STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

FRANK F. MERRIAM, Governor
EARL LEE KELLY, Director of Public Works

DIVISION OF WATER RESOURCES

REPORT OF

SACRAMENTO-SAN JOAQUIN

WATER SUPERVISION

FOR YEAR

1936

MAY, 1937

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STATE PRINTING OFFICE

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Sacramento, 1937

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ACKNOWLEDGMENT

In the conduct of the activities and investigations under the heading of "Sacramento-San Joaquin Water Supervision", valuable assistance has been rendered by many individuals and public and private agencies.

Land owners and water users and the executives, engineers, managers, and water superintendents of the various water organizations throughout the territory covered by this work have cooperated fully in furnishing the many and varied data requested.

For the compilation of pumped diversions the Pacific Gas and Electric Company, San Joaquin Light and Power Corporation and Modesto and Turlock Irrigation Districts have furnished a large number of power consumption records.

Valuable cooperation has been extended by the Water Resources Branch of the United States Geological Survey, Department of the Interior.

The State Division of Highways has cooperated in the expeditious and efficient testing of salinity samples in its testing laboratory.

In the San Joaquin Valley the City of San Francisco Public Utilities Commission, Hetch Hetchy Water Supply, has made available a large amount of stream flow data.

The Modesto, Turlock and Oakdale Irrigation Districts and Miller and Lux, Incorporated, have assisted in observing and maintaining recording and staff gages in the San Joaquin Valley.

ORGANIZATION

Frank F. Merriam - Governor
Earl Lee Kelly - Director of Public Works
Edward Hyatt - State Engineer

- - 0 - -

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ADVISORY COMMITTEE

PERMANENT COMMITTEE OF THE SACRAMENTO-SAN JOAQUIN RIVER PROBLEMS CONFERENCE

This Committee, representing the water users and other interests involved, was appointed by the First Sacramento-San Joaquin River Problems Conference in January 1924. Its continued interest and cooperation and particular activity in the promulgation of effective conservation measures in the seasons of critical water supply have contributed in large measure to the successful prosecution of the Water Supervision work.

Herbert E. White, Chairman, Sacramento

E. L. Adams, Chico
A. E. Anderson, San Francisco
Alden Anderson, Sacramento
G. A. Atherton, Stockton
P. M. Downing, San Francisco
William Durbrow, Grass Valley
Manly S. Harris, San Francisco
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R. V. Meikle, Turlock
Jesse Poundstone, Grimes
F. T. Robson, Vina

CHAPTER I

INTRODUCTION

The purpose of this report is to make of record the measurements made and data collected in connection with the Water Supervision work in the Sacramento-San Joaquin area during 1936.

Origin and History of Work

The work was inaugurated in 1924 through the efforts of the first Sacramento-San Joaquin River Problems Conference and its Permanent Committee working with the former Division of Water Rights. A complete description of the origin, history and conduct of this work will be found in the 1924 and 1926 Biennial Reports of the former Division of Water Rights, in Bulletin Number 4 of the same Division, and in Bulletin Number 23 of the Division of Water Resources. The latter Bulletin brings together all data and measurements obtained in the five year period, 1924 to 1928, inclusive. The Water Supervision reports for subsequent years are mimeographed as is the present report.

Objectives and Scope

The work of supervision is a measure of relief in the difficulties attendant upon water supply conditions and the use of water throughout the Sacramento-San Joaquin territory, particularly on the Sacramento River and in the Delta Region. The situation involves the major problem of satisfying the water requirements for irrigation in both the Up-River areas and the Delta, for the control of salinity in the Delta and Upper Bay areas, and for navigation above Sacramento as demanded by the U. S. War Department, when, in nearly every season of the last thirteen years, each one of these requirements has exceeded the available Summer flow in the rivers. Pending ulti-

mate relief through the development of reservoir storage this situation has been met through a provisional administration of stream flow and diversions. There has been no agreement under which a water master might definitely and equitably distribute the existing water supply to those entitled to receive it but it seems inevitable that such an agreement or a definite schedule of water priorities must be developed, Its realization will require however, that there shall be available reliable and accurate data over a long period of years covering all of the actual diversions and uses of water, the stream flow, return flow, salinity, and all pertinent hydrographic data. Looking to this requirement, then, the Division of Water Resources is, concurrently with the provisional stream administration, continuing the investigations and all measurements necessary to complete the record of basic data,

In the seasons of severe or extreme water shortage such as 1924, 1926, 1931, and 1934 the Division of Water Resources working in cooperation with the Permanent Committee of the Sacramento-San Joaquin River Problems Conference, was able to effect conservation measures and regulation which were highly successful in tiding over the critical situations of these seasons. Up-River areas were patrolled and waste eliminated, close check kept of river flow, diversions and the advance of salinity into the Delta, and when salinity of dangerous degree threatened, bulletins giving the results of all tests throughout the Delta were given to the water users at weekly or shorter intervals. With deficient stream flow there has been always imminent the threat of conflict between "Up-River" and Delta interests and of drastic action by the War Department to enjoin irrigation diversions in the maintenance of navigation with which it is charged. But in the evidence by the water users of their desire to cooperate and to work with the Division of Water Resources for utmost conservation, the War De-

partment has been constrained to waive severe action and to assume a course taking cognizance of the needs of irrigation; and the fact that actual conflict and disastrous litigation between Up-River and Delta interests have not developed may, in a large measure, be attributed to the part which the State is taking through the Division of Water Resources in bringing the water users together, in making such adjustments and effecting such measures as the situation will permit and in pursuing the investigation of the facts necessary to a permanent solution of the difficulties.

Investigational Work

During the past year the investigational work has, due to financial limitations, continued under a considerably reduced program but along lines similar to those of previous years, and has comprised: measurements and records of the diversions of water from the Sacramento, Feather, Yuba, American, Merced, Tuolumne, Stanislaus, and San Joaquin rivers on the valley floor and above the Delta; stream flow measurements throughout the territory, largely in cooperation with the Water Resources Branch of the U. S. Geological Survey; measurements and records of waters returned to the Sacramento and San Joaquin rivers; an annual census of irrigated acreages and crops under all diversions recorded; and observations and investigation of the advance and retreat of salinity in the Delta channels and Upper Bays. Lack of finance has, since 1932, made it necessary to omit the annual census of irrigated crops and water consuming areas in the Delta, as conducted in previous years.

History of State and Water Users' Cooperative Financing

When this work was initiated in 1924, the water users and other interests concerned raised the money for the first year by subscription

to the extent of about $17,000. However, at the 1925 legislative session, the Permanent Committee of the Sacramento-San Joaquin River Problems Conference made the plea that due to the widespread character of the work and importance to the public generally, it should, properly, be carried by the State. As a result, provision for continuing this work was made in the budget of what was then the Division of Water Rights and subsequently the Division of Water Resources. This held until June 30, 1933, with an annual expenditure for the work amounting to about $23,000.

With the drastic reduction in budgets at the 1933 legislative session, provision for the work was entirely eliminated from the Division of Water Resources' budget. On June 30, 1933, therefore, this work was entirely suspended. Because a complete cessation of the work meant an irreparable loss in the records as well as probable reversion to the former conditions of litigation and conflict in the utilization of Sacramento River waters, the Permanent Committee of the Sacramento-San Joaquin River Problems Conference appeared before the Governor and Director of Finance on August 10, 1933, to urge an appropriation from the State Emergency Fund to be matched by moneys to be raised by the water users; the total amount not to exceed that necessary to carry on the bare essentials only of the work. It was estimated that $12,500 annually would accomplish this and thereby prevent the greatly disproportionate loss which would be sustained with the work completely abandoned. The Emergency Fund allotment was granted on the condition that the water users would raise their proportionate share, and the work for the 1933 irrigation season was resumed. The Emergency Fund allotment was held up by reference to the Supreme Court and the decision of the latter which approved the allotment was not handed down until early March 1934. Pend-

ing this decision, the work had again been entirely suspended on November 1, 1933, at the close of the irrigation season, and the compilation of the 1933 report which would ordinarily have occurred during the Winter months was not made. With the Emergency Fund allotment assured, the Permanent Committee immediately began a campaign to secure the necessary subscriptions from the water users, and by the beginning of the 1934 irrigation season it appeared that a substantial amount of money would be raised from this source. Essential items of the work were, therefore, again resumed in April 1934, and continued throughout the irrigation season. By the first of July 1934 the total subscriptions from the water users amounted to $5500. This was insufficient to match the Emergency Fund allotment but on account of the critical 1934 water supply and the resultant extreme importance of carrying on the water supervision, the Permanent Committee urged that the State should meet the emergency by making available the entire allotment from the Emergency Fund. This was done and there were provided therefore, sufficient funds to complete the 1934 field work and the compilation and publication of the 1933 and 1934 reports.

Provision was made in the budget of the Department of Public Works submitted to the 1935 Legislature for the carrying on of the supervision work and an allotment of $15,000 for the biennium was approved. This money did not become available until July 1, 1935, and the work was not actively resumed until that time. The limited funds available allow the carrying on of only the most essential items of the work. During 1935 it was possible however to tabulate records that would ordinarily be filed pending availability of funds because of assistance given by Works Progress Administration workers under Project Number 2666.

Conservation Features

A comparison of the run-off and water supply conditions of the 1936 season with those of previous seasons is indicated in Table 1.

TABLE 1

COMPARATIVE SACRAMENTO-SAN JOAQUIN WATER SUPPLY, 1924 TO 1936

Year	Sacramento San Joaquin Run-off in per cent of Normal *	Minimum Flow in Second-feet				Rice Acreage Served by Sacramento River and Tributaries
		Sacramento River at			San Joaquin River near Vernalis	
		Red Bluff	Colusa	Sacramento		
1924	28	2810	1470	705	391	88500
1925	83	3240	1870	2760	660	94700
1926	57	2980	1030	1330	565	128600
1927	114	3580	1960	3420	1290	123300
1928	80	3400	1960	2510	840	101100
1929	42	3060	1550	2300	565	73700
1930	63	2980	1680	2350	645	88000
1931	29	2480	820	Zero	200	126500
1932	78	2620	1530	1900	965	90700
1933	46	2620	1350	1340	569	87400
1934	40	2400	1320	1050	315	91800
1935	86	2860	1780	2700	850	78100
1936	91	2700	1540	2150	980	104400

*Normal taken as 40-year mean (1889-1929) of natural run-off at foothill stations of major tributaries.

CHAPTER II

MEASUREMENTS OF STREAM FLOW

During the irrigation season of 1936, stream flow measurements and records were obtained through cooperation with the Water Resources Branch of the U. S. Geological Survey, for stations on the Sacramento River at Kennett, Red Bluff, Butte City, Colusa, Wilkins Slough, Knights Landing, and Verona; on the Feather River at Oroville and Nicolaus; on the American River at Fairoaks and H Street Bridge, Sacramento; on the Mokelumne River at Woodbridge; Merced River near Livingston, and on the San Joaquin River near Newman and Vernalis.

The above cooperative stations were supplemented by stations maintained by the Division of Water Resources in connection with the San Joaquin return water measurements (See Chapter IV), by stations as follows: Stanislaus River at Orange Blossom Bridge, Tuolumne River at Roberts Ferry Bridge and Hickman Bridge, Merced River at Yosemite Valley Railroad Crossing and Hills Ferry Road Bridge (near mouth), Dry Creek at Basso Ranch (near Modesto), and San Joaquin River at Delta Bridge and Fremont Bridge. The San Joaquin return water measurement stations were further supplemented by those maintained in cooperation with the Modesto and Turlock Irrigation Districts and the City of San Francisco, Hetch Hetchy Water Supply, as follows: Stanislaus River at Hatmark Ranch, Tuolumne River at Tuolumne City Bridge and San Joaquin River at Grayson (Laird Slough). The station on the San Joaquin River at Hetch Hetchy Crossing was maintained and records were furnished by the City of San Francisco Hetch Hetchy Water Supply. In addition, many stations maintained on by-pass and drainage channels for the measurement of return water are listed in Chapter IV.

The U. S. Geological Survey stations at Kennett, Red Bluff, Verona, Oroville, Fairoaks, Woodbridge, Livingston, Vernalis and Newman are maintained throughout the year but the records are given in this report for the irrigation season only.

Sacramento River at Sacramento

The record of the flow of the Sacramento River at Sacramento for the periods of low flow as given in this and previous reports, does not represent actual measurements at a station below the City of Sacramento intake. Because of tidal action during periods of low flow, a gaging station at this point is not maintained. The daily discharge record as given has been computed for the periods of low flow by using the Verona record and making due allowance for the measured inflow and draft between that station and Sacramento.* In this computation it is not practicable and no attempt has been made to allow for the time required for the flow to travel from Verona to Sacramento and to make the various deductions and additions enroute at the exact time that the given Verona flow would have passed the respective points of inflow or draft. During the Summer period the velocities between Verona and Sacramento are low and a given flow may require a day's time or more to travel this distance. Under these conditions, the computed flow at Sacramento may differ somewhat from what would have been found if the actual flow could have been measured. Contributing to this difference also there are the accretions or losses which cannot be measured. In the upper sections of the river the invisible accretions or losses between two points are susceptible of computation as the remaining quantity required to satisfy the equation when the flow at the upper and lower points and all definite intermediate inflows and drafts are known. With no actual measure-

* When the flow is above 25,000 cubic feet per second at a gage height of 10.0, the effect of the tidal influence is lost and a direct ratio between gage height and discharge is used to determine the daily flow.

ment of the flow at Sacramento, the invisible accretions or losses between Verona and Sacramento cannot be thus defined and hence they are unaccounted for in the computed flow at Sacramento. From the data presented subsequently in Chapter IV, it would appear that some return flow might be expected in the Verona-Sacramento section but, as indicated in the tabulation of return water (Table 51) no figure for it has been given (except for the measured drains - Table 49) because it could not be derived without a record of the actual flow at Sacramento.

TABLE 2

DISCHARGE OF SACRAMENTO RIVER AT KENNETT

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	14700	6280	7250	4260	3740	2800	2700	2700
2	14500	6100	6850	4130	3740	2910	2650	2650
3	13700	9030	7050	4130	3740	2860	2750	2650
4	12900	14200	7250	4130	3610	2750	2750	2650
5	12600	10900	7050	4000	3370	2800	2800	2700
6	11800	8990	6280	4260	3370	2800	2860	2650
7	11400	8330	6100	5920	3370	2800	2800	2650
8	10600	8110	5920	9210	3370	2750	2800	2700
9	10400	8110	5920	7250	3610	2800	2700	2700
10	9920	7890	5920	6100	3610	2860	2750	2650
11	9440	7890	5750	5590	3490	2800	2700	2600
12	8990	8330	5750	5270	3490	2800	2600	2650
13	8770	8110	5750	4970	3370	2860	2550	2650
14	8550	7890	6100	4820	3370	2860	2650	2650
15	8330	8110	6100	7840	3370	2750	2650	2650
16	8110	8330	5920	5920	3370	2750	2750	2650
17	8110	8330	5590	5270	3250	2700	2800	2600
18	7670	8770	5430	4970	3250	2650	2750	2650
19	7460	8770	5270	4680	3130	2700	2650	2700
20	7460	8110	4970	4680	3130	2700	2700	2800
21	7250	7890	4820	4540	3020	2700	2700	2700
22	7050	8110	4680	4400	3020	2700	2700	2600
23	7050	8550	4260	4260	3130	2750	2750	2650
24	7460	8770	4260	4130	3130	2800	2750	2650
25	7460	8330	4130	4130	3130	2800	2750	2650
26	7050	7890	4400	4000	3020	2750	2400	2650
27	6100	7460	4400	3870	2910	2700	2550	2700
28	6650	7460	4820	3740	2910	2700	2600	2650
29	6650	8330	4680	3610	2860	2650	2400	2700
30	6460	8110	4540	3610	2860	2650	2450	2750
31	6460		4400		2800	2700		2750
Mean	9066	8383	5536	4923	3275	2761	2680	2669
Ac.Ft. for Month	557500	498800	340400	292900	201400	169800	159500	164100

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. The record is given here for the period of the irrigation season only.

TABLE 3

DISCHARGE OF SACRAMENTO RIVER NEAR RED BLUFF

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	20900	9150	9000	5520	4260	3100	2940	2860
2	19800	8590	8600	5300	4260	3100	2940	3020
3	19100	11300	8800	5300	4260	3180	2940	3020
4	18000	28300	9000	5300	4160	3100	3020	3020
5	17000	18400	8800	5190	4070	3020	3100	3020
6	16000	14000	8200	5300	3880	3020	3100	3020
7	15300	12100	8000	7240	3880	3020	3100	2940
8	14300	11200	7800	11800	3880	3020	3100	2940
9	13700	10900	7800	10300	4160	3020	3020	3020
10	13400	10600	7800	8320	4360	3100	2940	3020
11	12700	10300	7600	7510	4260	3020	3020	3020
12	12100	10600	7600	6720	4070	3020	2940	2940
13	11800	10600	7800	6340	3980	3020	2860	2940
14	11500	10300	8000	6100	3790	3100	2860	3020
15	11200	10300	8000	7510	3790	3020	2940	3020
16	10600	10600	7800	8590	3700	2940	2940	3020
17	10600	10900	7500	6980	3700	2940	3020	3020
18	10300	10900	7300	6340	3610	2940	3020	2940
19	10300	10900	7100	5860	3520	2860	3020	3020
20	10000	10300	6800	5640	3520	2940	2940	3180
21	10000	10300	6500	5520	3440	2940	2940	3180
22	9720	10300	6200	5410	3440	3020	2940	3020
23	9430	10600	5500	5190	3440	3020	2940	3020
24	9430	10900	5500	5080	3440	3020	3020	3020
25	9720	10300	5300	4870	3520	3020	3020	3020
26	9430	9720	5300	4760	3520	3020	2860	3020
27	8590	9400	5300	4660	3350	3020	2780	3020
28	8590	9400	5860	4460	3180	2940	2860	3020
29	8870	10300	6340	4360	3180	2940	2860	3020
30	8870	10000	5980	4160	3100	2940	2700	3180
31	10600		5640		3100	2940		3260
Mean	12320	11380	7185	6188	3736	3010	2956	3025
Ac.Ft. for Month	757400	677300	441800	368200	229700	185000	175900	186000

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located near the Iron Canyon damsite, Mile 198.6 above Sacramento. The record is given here for the period of the irrigation season only.

TABLE 4

DISCHARGE OF SACRAMENTO RIVER AT BUTTE CITY

Day	Daily Discharge in Second-feet				
	May.	Jun.	Jul.	Aug.	Sep.	Oct.
1		*4950	3150	1780	1690	2470
2		4750	3070	1720	1710	2470
3		4600	3070	1780	1720	2690
4		4750	3070	1780	1720	2690
5		4750	2990	1720	1980	2690
6		4750	2840	1710	1980	2690
7		6000	2690	1690	2120	2690
8		7800	2690	1670	2190	2690
9		10700	2620	1670	2120	2690
10		9600	2760	1670	2050	2690
11		8400	2920	1720	1980	2690
12		7400	2840	1720	2050	2690
13		6650	2760	1690	2120	2690
14		6200	2690	1670	2190	2690
15		5750	2540	1680	2190	2690
16		6900	2470	1680	2260	2760
17		7650	2400	1630	2260	2760
18		6450	2400	1600	2400	2840
19		5750	2330	1600	2470	2840
20		5150	2260	1580	2470	2920
21		4950	2190	1590	2400	2990
22		4660	2120	1600	2400	3070
23		4570	2050	1630	2400	2990
24		4280	1980	1690	2470	2920
25		4190	1980	1710	2540	2920
26		3920	1980	1720	2540	2920
27		3740	2050	1720	2540	2920
28		3650	1980	1710	2400	2920
29		3480	1850	1670	2470	2920
30		3310	1850	1670	2540	2920
31			1780	1680		2920
Mean		5657	2464	1682	2210	2788
Ac.Ft. for Month		336600	151500	103400	131500	171500

NOTE: This station is maintained seasonally under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located near Butte City Bridge, Mile 115.8 above Sacramento.

* Beginning of discharge record for season.

TABLE 5

DISCHARGE OF SACRAMENTO RIVER AT COLUSA

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*5100	3180	1780	1720	2590
2		4900	3100	1750	1720	2520
3		4800	3100	1720	1750	2660
4		4700	3100	1750	1780	2740
5		4700	3020	1690	1840	2740
6		4700	2860	1660	1940	2740
7		4900	2700	1660	2040	2740
8		6180	2620	1630	2180	2740
9		8930	2540	1630	2180	2740
10		10300	2620	1630	2080	2740
11		9260	2780	1660	2020	2740
12		8050	2860	1690	2020	2740
13		7170	2780	1660	2080	2740
14		6510	2700	1630	2160	2740
15		6070	2540	1600	2220	2740
16		6070	2460	1630	2220	2820
17		7610	2420	1600	2300	2820
18		6840	2380	1570	2300	2900
19		6070	2380	1570	2440	2900
20		5410	2300	1540	2520	2900
21		5100	2220	1540	2440	2980
22		4800	2120	1570	2440	3060
23		4600	2080	1600	2440	3060
24		4400	2010	1630	2520	2980
25		4300	1980	1660	2520	2980
26		4100	1980	1690	2590	2980
27		3900	2010	1690	2590	2980
28		3720	1980	1690	2440	2980
29		3540	1870	1660	2440	2980
30		3360	1840	1660	2520	2980
31			1810	1660		2980
Mean		5670	2463	1648	2215	2836
Ac.Ft. for Month		337400	151400	101400	131800	174400

NOTE: This station is maintained seasonally under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located at Colusa Bridge, Mile 89.4 above Sacramento.

* Beginning of discharge record for season.

TABLE 6

DISCHARGE OF SACRAMENTO RIVER BELOW WILKINS SLOUGH

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*4940	2760	1310	1430	2820
2		4740	2600	1270	1390	2880
3		4740	2550	1270	1470	2880
4		4620	2550	1230	1510	2980
5		4550	2600	1230	1600	2980
6		4550	2550	1190	1740	2980
7		4680	2350	1150	1820	2980
8		5140	2200	1150	1960	2980
9		7300	2150	1110	2050	2930
10		9500	2150	1070	2050	2880
11		9280	2300	1110	2050	2880
12		8380	2450	1190	2000	2880
13		7440	2400	1150	2100	2880
14		6810	2300	1150	2200	2820
15		6320	2200	1110	2300	2880
16		5970	2050	1110	2350	2930
17		6740	1960	1110	2450	2980
18		7020	1960	1070	2450	2980
19		6180	1960	1070	2500	2980
20		5620	1920	1070	2600	3040
21		5140	1820	1070	2660	3040
22		4740	1740	1110	2660	3100
23		4420	1640	1150	2710	3100
24		4160	1560	1190	2710	3040
25		3960	1510	1230	2710	2980
26		3770	1510	1270	2820	2930
27		3520	1510	1310	2880	2930
28		3300	1510	1310	2880	2980
29		3100	1430	1310	2710	2980
30		2930	1390	1350	2760	3040
31			1350	1390		2980
Mean		5452	2030	1187	2251	2956
Ac.Ft. for Month		324400	124800	73010	133900	181800

NOTE: This station is maintained seasonally under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located at Mile 62.9 above Sacramento, a short distance below Wilkins Slough pumping plant of Reclamation District 108.

* Beginning of discharge record for season.

TABLE 7

DISCHARGE OF SACRAMENTO RIVER AT KNIGHTS LANDING

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*5490	2980	1640	1860	3120
2		5280	2790	1580	1980	3180
3		5420	2720	1470	2100	3180
4		5140	2790	1330	2220	3240
5		5210	2860	1390	2220	3180
6		5070	2790	1470	2400	3180
7		4870	2600	1470	2460	3240
8		5560	2400	1390	2460	3310
9		7520	2340	1390	2530	3310
10		9260	2280	1360	2590	3180
11		9340	2280	1220	2660	3180
12		8740	2400	1280	2720	3180
13		7940	2460	1420	2790	3120
14		7450	2400	1470	2920	3180
15		6890	2400	1470	2860	3240
16		6400	2280	1390	3050	3240
17		6610	2100	1220	3120	3240
18		7240	2040	1150	3120	3310
19		6470	1980	1220	3180	3310
20		5910	1980	1360	3180	3240
21		5560	1920	1470	3180	3240
22		5070	1920	1470	3180	3310
23		4680	1860	1520	3120	3310
24		4420	1800	1420	3120	3310
25		4160	1690	1420	3120	3240
26		4020	1640	1640	3120	3180
27		3830	1580	1800	3120	3120
28		3700	1520	1860	3180	3120
29		3640	1580	1860	2920	3180
30		3180	1580	1920	2980	3180
31			1640	1920		3180
Mean		5802	2181	1484	2782	3217
Ac.Ft. for Month		345300	134100	91220	165500	197800

NOTE: This station is maintained seasonally under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located at the Knights Landing R.R. Bridge, Mile 34.0 above Sacramento, below the point of discharge to the river of Colusa Basin drainage via the Back Borrow Pit of Reclamation Districts 108 and 787.

* Beginning of discharge record for season.

TABLE 8

DISCHARGE OF SACRAMENTO RIVER AT VERONA

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	54300	28800	26700	13800	5460	3120	2900	5180
2	53000	29500	25700	12600	5180	3120	3120	5320
3	52200	27400	24700	11600	4900	2800	3340	5320
4	51400	27600	25200	10700	4760	2600	3450	5320
5	50900	35300	26400	11000	4760	2700	3450	5040
6	50100	40600	26900	11000	4620	2900	3450	4900
7	49100	42300	25700	13000	4260	2800	3560	5180
8	47500	41100	23600	21400	4020	2700	3450	5180
9	45700	38700	21600	23600	3900	2700	3450	5040
10	43600	36000	20500	22500	3780	2700	3560	4900
11	41600	34100	20500	20800	3780	2350	3780	4760
12	39400	32900	21000	19200	3780	2450	4140	4620
13	37200	32700	21200	17700	3900	2600	4260	4500
14	35300	32400	21600	15900	3780	2700	4260	4500
15	33900	32700	23000	14400	3780	2700	4020	4620
16	32400	33400	24100	13200	3780	2600	4380	4620
17	31200	34300	23400	12600	3560	2260	4760	4620
18	30300	35300	22300	13200	3450	2080	4760	4760
19	29500	35800	21400	12600	3450	2300	4900	4760
20	28600	35500	19700	11600	3450	2500	4900	4620
21	27900	34800	17500	10700	3450	2600	4760	4760
22	27100	34600	15500	10100	3560	2600	4620	4760
23	26700	34600	14600	9220	3450	2600	5040	4900
24	26200	34800	14400	8680	3340	2400	5320	4900
25	25200	34800	14600	8140	3230	2300	5320	4760
26	24100	33400	14800	7600	3120	2600	5320	4760
27	23000	31700	14800	7120	2900	2900	5320	4500
28	21900	30000	14400	6640	2800	3120	5180	4500
29	21400	28300	14600	6480	3010	3010	4760	4620
30	23800	27400	14400	5740	3120	3120	4900	4760
31	25700		14200		3120	3120		4900
Mean	35810	33690	20290	12760	3789	2679	4281	4835
Ac.Ft. for Month	2202000	2005000	1248000	759300	233000	164700	254700	297300

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located at Mile 19.6 above Sacramento at the mouth of "Cross Canal" main drain of Reclamation District 1001, and below the mouth of the Feather River. The record is given here for the period of the irrigation season only.

TABLE 9

DISCHARGE OF SACRAMENTO RIVER AT SACRAMENTO

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	61500	35900	34200	18300	7570	3380	3090	5610
2	60600	35400	32700	16900	7100	3390	3410	5180
3	60000	33600	33000	15900	6850	2990	3690	5750
4	59200	33900	35600	15900	6580	2810	3730	5740
5	58200	43800	38300	15600	6360	2870	3960	5450
6	57200	46200	38900	15800	6190	3080	3860	5360
7	55700	48000	35900	28300	5780	2970	3970	5670
8	54200	48000	32500	33000	5510	2860	3790	5660
9	52500	46800	30300	32100	5280	2870	3830	5510
10	51000	44800	29300	29900	4970	2830	4020	5420
11	49000	43000	30300	28000	4840	2540	4190	5240
12	46200	43000	31400	26800	4810	2590	4530	5040
13	44800	43300	31100	24700	4880	2670	4620	4910
14	42700	43600	32000	22200	4760	2730	4650	4920
15	40600	43900	33900	20000	4650	2800	4400	5070
16	38600	45100	34200	18600	4600	2670	4730	5070
17	37700	47100	33200	17800	4360	2340	5180	5110
18	36800	48000	33000	18700	4310	2170	5130	5220
19	35400	49200	31400	18300	4180	2420	5310	5230
20	34800	48200	30000	16700	4080	2610	5310	5100
21	34200	47700	26300	15500	4070	2680	5150	5260
22	33900	48000	23200	14600	4120	2870	5000	5270
23	33600	47700	21700	13500	4010	2740	5430	5410
24	32200	47700	21700	13300	3920	2510	5720	5410
25	31100	47100	22300	12500	3790	2400	5720	5260
26	29300	45400	23200	11500	3600	2700	5710	5370
27	27800	43600	22900	10500	3300	3000	5740	5020
28	26900	41200	22000	9800	3160	3250	5570	5050
29	25700	38600	21700	9400	3330	3130	5170	5200
30	29600	36500	20000	8200	3420	3250	5310	5320
31	33300		18500		3310	3240		5480
Mean	42400	43800	30200	18400	4760	2820	4660	5320
Ac.Ft. for Month	2607000	2607000	1794000	1095000	292900	173300	277500	327100

NOTE: This represents the flow past Sacramento (below the City of Sacramento intake) to the Delta. The discharges of this table have been computed as follows: March to May, inclusive, gage heights and rating curve at Sacramento; June to October, inclusive, by adding to the measured Verona discharges the measured inflow of return water and American River and subtracting therefrom the measured diversions between Verona and Sacramento. A gaging station is not maintained at Sacramento during periods of low flow because of tidal action.

TABLE 10

DISCHARGE OF FEATHER RIVER NEAR OROVILLE

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	12300	7520	8480	4460	2390	2040	2440	2340
2	12300	6800	8320	4220	2340	1840	2590	2290
3	12500	7680	9340	4220	2240	2090	2340	1790
4	12500	12900	9700	4280	2240	2490	2040	1560
5	12400	9250	9340	4280	2140	2540	1840	1740
6	11700	7680	8480	4720	2040	2390	1600	1990
7	11300	7280	7680	10800	2090	2490	1560	1840
8	11000	7680	7120	8320	2240	2390	1790	1790
9	11000	8000	7040	6400	2040	1740	1840	1640
10	10200	8240	7600	5570	2040	2190	2290	1640
11	9700	8800	7680	5120	1940	2340	2390	1510
12	9250	9700	7680	4790	1940	2440	1940	1560
13	9340	10200	7840	4460	2040	2390	1560	1790
14	9340	11000	9700	4280	2040	2340	2090	1740
15	9070	11400	9340	4100	2040	1740	2340	1790
16	8980	12300	8320	3920	2040	1690	2290	1790
17	9070	12900	7680	3800	2140	2190	2240	1690
18	9160	12500	7360	3680	2140	2440	2190	1460
19	8980	11900	7040	3560	2240	2440	1890	1600
20	8800	11900	6190	3380	2540	2440	1560	1690
21	9160	11900	5840	3200	2760	2140	2090	1840
22	9160	13300	5770	3080	2590	1640	2390	1640
23	8480	13100	5700	2980	2540	1600	2440	1640
24	7840	12000	5570	2920	2440	2090	2440	1690
25	7200	10800	5840	2810	2040	2240	2440	1510
26	6640	9970	5570	2700	1940	2140	2390	1560
27	6120	9430	5380	2640	2290	2240	1640	1790
28	6400	9520	5700	2540	2340	2240	1940	1840
29	8720	9880	5380	2540	2540	2140	2340	1790
30	8240	9340	4920	2540	2590	1560	2390	1790
31	9430		4600		2540	2190		1510
Mean	9557	10160	7168	4210	2242	2157	2111	1737
Ac.Ft. for Month	587700	604700	440700	250500	137900	132600	125600	106800

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. The record is given here for the period of the irrigation season only.

TABLE 11

DISCHARGE OF FEATHER RIVER AT NICOLAUS

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*7440	2150	1460	680	2300
2		6740	2000	1320	1140	2300
3		5950	1820	1060	1320	2250
4		5820	1730	929	1240	2050
5		5950	1730	1190	1030	1780
6		6210	1500	1320	1000	1730
7		10400	1280	1240	840	2000
8		17800	1240	1280	645	1960
9		15000	1280	1240	617	1820
10		11000	1190	1100	768	1680
11		9120	1140	840	983	1640
12		8640	1100	1100	1370	1600
13		8020	1060	1100	1240	1500
14		7160	1040	1190	1020	1680
15		6600	1060	1140	974	1730
16		6080	1050	956	1460	1680
17		5690	1040	666	1600	1780
18		5690	1030	666	1550	1780
19		5560	1070	1030	1550	1730
20		5060	1090	1090	1550	1640
21		4580	1240	1140	1320	1680
22		4580	1600	1050	1370	1780
23		3990	1460	824	1860	1780
24		3770	1420	610	2050	1780
25		3550	1420	603	2150	1730
26		3330	1240	888	2150	1730
27		3000	1060	929	2150	1500
28		2800	1080	947	1860	1640
29		2500	1320	983	1730	1680
30		2200	1370	1010	2150	1730
31			1420	872		1780
Mean		6474	1330	1025	1379	1788
Ac.Ft.for Month		385200	81780	63020	82050	110000
Diversios below Nicolaus Acre-feet		122	1129	2605	76	0
Discharge to Sacramento River Acre-feet		385100	80650	60420	81970	110000

NOTE: This station is maintained seasonally under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located at Mile 9.3 above the mouth of the river and 0.1 mile below Nicolaus Bridge.
* Beginning of discharge record for season.

TABLE 12

DISCHARGE OF AMERICAN RIVER AT FAIR OAKS

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	8220	7080	7080	4790	2460	602	412	445
2	8220	6110	7740	4640	2420	580	427	430
3	8220	6110	11000	4640	2280	544	405	461
4	7980	12800	13100	5420	2150	571	453	457
5	7740	9800	13400	4940	1990	522	530	449
6	7300	7080	10100	5100	1910	518	510	453
7	7080	6470	7980	15500	1910	492	416	468
8	6870	6870	7740	11900	1830	505	356	453
9	7080	7300	8720	7740	1760	467	461	445
10	7300	7980	10400	7080	1580	471	464	461
11	6870	8980	11300	7080	1450	471	427	464
12	6870	10700	11300	7520	1450	467	409	332
13	7300	11300	11900	6670	1360	467	405	377
14	7080	11900	13400	6290	1390	450	398	398
15	6870	12800	12800	5590	1300	442	410	480
16	6670	14000	10700	5420	1270	434	427	487
17	7080	14400	10400	5260	1240	399	427	487
18	6870	14400	10100	5760	1240	426	420	453
19	6670	13400	10100	5760	1140	426	416	518
20	6870	12800	7740	5260	1080	438	412	502
21	7080	13100	7080	5100	1040	446	377	562
22	7300	13400	7080	4790	985	467	374	558
23	6470	13400	7740	4790	960	479	412	562
24	6110	13100	8220	4790	935	363	412	542
25	5760	11300	8720	4490	910	398	394	558
26	5100	11000	8980	4200	835	398	420	554
27	4940	10400	7980	3650	785	416	420	510
28	4640	9520	8220	3410	715	430	402	538
29	6470	9240	6870	3070	670	434	391	550
30	7080	7980	5760	2750	648	427	405	542
31	9800		5100		602	416		603
Mean	6965	10490	9315	5780	1364	463	420	487
Ac.Ft. for Month	428300	624200	572700	343900	83890	28490	24980	29950

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. The record is given here for the period of the irrigation season only.

TABLE 13

DISCHARGE OF AMERICAN RIVER AT SACRAMENTO

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*4800	2460	640	447	486
2		4700	2340	640	468	470
3		4700	2340	565	468	492
4		5000	2160	595	461	476
5		5000	1980	565	573	459
6		5200	1980	545	580	492
7		14000	1930	531	552	525
8		13000	1880	531	415	520
9		8720	1780	517	508	503
10		7640	1600	482	498	508
11		7440	1420	517	486	514
12		7840	1420	489	464	464
13		7240	1370	468	481	448
14		6660	1370	434	442	464
15		5910	1260	434	454	498
16		5730	1220	440	470	492
17		5550	1200	454	481	531
18		5910	1200	447	476	508
19		6090	1100	468	470	508
20		5370	1020	468	492	514
21		5190	1000	447	442	537
22		4850	960	461	448	549
23		4680	936	482	459	549
24		5020	912	434	470	543
25		4680	835	420	470	531
26		4260	798	427	464	585
27		3700	752	427	492	555
28		3540	715	440	470	585
29		3240	700	440	481	611
30		2740	662	461	476	598
31			640	420		618
Mean		5947	1353	487	479	520
Ac.Ft. for Month		353800	83190	29930	28480	32000
Diversions Below Gaging Station-Ac.Ft.		41	41	36	24	3
Discharge to Sacto. River Acre-feet		353800	83150	29890	28460	32000

NOTE: This station is maintained seasonally under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located at H Street Bridge, Sacramento, 6.0 miles above the mouth of the river.

* Beginning of discharge record for season. Period June 1st to 8th, inclusive, by comparison with Fairoaks record.

TABLE 14

DISCHARGE OF MOKELUMNE RIVER AT WOODBRIDGE

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	2420	1410	1950	464	556	204	222	367
2	2240	1500	903	417	570	175	321	402
3	2180	1340	1190	309	554	170	403	402
4	2140	1410	1520	410	511	232	422	329
5	2120	1560	1870	390	325	247	411	299
6	2110	1380	2560	406	220	291	321	341
7	2070	1200	3110	336	212	248	283	437
8	1830	1130	2350	2080	218	234	248	424
9	1690	1120	1940	2780	280	267	321	416
10	1640	1170	1900	2500	274	194	335	434
11	1610	1350	1860	2390	500	219	356	358
12	1580	1620	2010	2930	621	234	341	322
13	1370	1860	2170	3390	65	242	299	471
14	1200	2000	2310	2840	141	231	253	418
15	864	2240	2660	2510	210	239	315	418
16	745	2460	3110	2510	164	305	325	430
17	727	2580	3220	2290	195	210	358	416
18	1070	2740	3370	2070	192	232	371	338
19	1160	2970	3220	2020	158	236	419	344
20	1200	3410	2770	2190	143	224	415	414
21	1220	3630	1810	2020	179	258	282	422
22	892	3680	673	1830	175	288	333	402
23	1000	3780	523	1810	185	299	373	448
24	1140	3760	494	1610	191	219	381	432
25	1160	3720	875	1510	192	264	394	355
26	1120	3680	1120	1390	245	279	386	350
27	1120	3180	1450	1170	154	279	243	398
28	1130	3050	1790	924	224	272	335	387
29	1130	2970	1830	771	234	291	390	393
30	1170	2910	1400	437	195	228	415	422
31	1310		652		200	206		562
Mean	1431	2360	1891	1623	267	242	342	398
Ac.Ft. for Month	87980	140400	116300	96600	16430	14910	20370	24500

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located just below dam of Woodbridge Irrigation District. The record is given here for the period of the irrigation season only.

TABLE 15

DISCHARGE OF SAN JOAQUIN RIVER AT DELTA BRIDGE

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	1020	80	525	525	146			
2	870	90	525	450	133			
3	650	175	425	287	110			
4	500	175	327	146	100			
5	327	190	306	133	30			
6	327	235	327	160	22			
7	306	268	425	190	22			
8	287	287	500	160	15			
9	268	268	555	121	15			
10	251	220	585	146	15			
11	251	205	585	175	15	-	-	-
12	235	251	500	175	5			
13	220	287	475	175	5	FLOW	FLOW	FLOW
14	235	350	475	190	0			
15	235	375	525	268				
16	235	375	555	375				
17	220	400	585	375	-	NO	NO	NO
18	190	425	615	375				
19	146	475	685	235	FLOW	-	-	-
20	146	500	720	205				
21	175	500	720	205				
22	190	525	720	220				
23	175	500	720	251	NO			
24	175	500	720	251	-			
25	160	500	650	220				
26	133	500	585	220				
27	100	525	525	220				
28	100	555	555	235				
29	80	525	585	160				
30	80	525	585	160				
31	80		585					
Mean	270	360	554	234	21.2	0	0	0
Ac.Ft. for Month	16600	21400	34100	13900	1260	0	0	0

NOTE: This is a staff gage station at the county road bridge East of Los Banos, Mile 158.7 above mouth of San Joaquin R. Daily gage readings. Prior to the time all river flow is diverted above this station, ordinarily in early July, there may be considerable river flow which by-passes the station via Pick Anderson and Salt Sloughs.

TABLE 16

DISCHARGE OF SAN JOAQUIN RIVER AT FREMONT BRIDGE

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1			2200	212	181	200
2			2160	200	178	225
3			2120	200	175	225
4			1790	200	179	225
5			1460	192	182	222
6			1260	183	185	218
7			1070	175	186	220
8			1020	175	187	222
9			970	175	191	225
10			930	168	195	218
11			920	162	200	212
12			910	162	196	206
13			833	162	193	200
14			756	162	196	200
15			643	162	200	200
16			530	162	200	200
17			416	162	200	193
18		*2640	370	162	200	187
19		2610	323	162	198	200
20		2510	306	162	197	212
21		2420	289	162	189	210
22		2380	289	159	181	208
23		2340	289	156	175	206
24		2340	289	165	168	203
25		2350	270	175	162	200
26		2360	250	170	158	188
27		2350	243	165	154	175
28		2340	237	160	150	178
29		2290	233	161	161	178
30		2240	229	162	172	181
31			225	172		180
Mean		**2400	769	171	183	204
Ac.Ft. for Month		**61800	47300	10500	10900	12500

NOTE: This is a staff gage station at the county bridge on the road between Gustine and Stevinson, Mile 129.5 above mouth of San Joaquin River and 5.7 miles above the mouth of the Merced River.

* Beginning of record for season.

** 13 days.

TABLE 17

DISCHARGE OF SAN JOAQUIN RIVER NEAR NEWMAN

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	12800	3300	7580	5910	3090	500	434	450
2	12300	3440	7440	5670	2810	500	402	500
3	11600	3600	7300	5340	2690	500	390	500
4	10700	3840	6780	4930	2510	466	405	534
5	9710	4270	6650	4180	2160	450	421	570
6	8450	5450	6780	3520	1830	434	450	552
7	7440	5560	7040	3230	1670	450	483	552
8	6390	5230	7170	3090	1570	408	466	534
9	5670	5230	6910	2950	1520	387	431	534
10	5230	5230	6910	2810	1470	393	431	517
11	5030	5130	7040	2750	1470	381	421	500
12	4930	5130	7300	2750	1470	369	466	500
13	4830	5230	7580	2690	1370	369	483	500
14	4630	5560	7720	3000	1270	360	534	500
15	4630	5790	7860	3300	1160	360	517	500
16	4630	6270	8000	3760	1090	405	517	466
17	4630	6910	8300	3840	960	434	500	424
18	4540	7300	8450	3840	860	424	483	450
19	4450	7440	8450	3920	800	415	483	450
20	4270	7720	8600	3920	780	418	450	450
21	4090	7720	8600	3840	720	450	434	434
22	3920	7720	8450	3760	663	450	424	431
23	4000	7720	7440	3680	625	500	405	450
24	4000	7860	6910	3600	606	552	412	434
25	3840	8000	6910	3680	588	517	396	405
26	3680	8000	6910	3840	552	466	387	375
27	3440	7860	6780	3840	552	450	396	360
28	3230	7860	6650	3760	570	431	402	354
29	3020	7860	6520	3600	552	412	408	357
30	3020	7720	6390	3370	534	434	431	366
31	3090		6150		517	466		372
Mean	5684	6198	7341	3746	1259	437	442	462
Ac.Ft. for Month	349500	368800	451400	222900	77410	26880	26300	28410

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located at Hills Ferry Bridge, Mile 123.7 above mouth of San Joaquin R. and just below the mouth of the Merced River. The record is given here for the period of the irrigation season only.

TABLE 18
DISCHARGE OF SAN JOAQUIN RIVER AT GRAYSON

Day	Daily Discharge in Second-feet											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	1240	1260	15300	3800	8100	6950	3780	675	630	560	560	1160
2	1200	1190	14500	3950	8050	6700	3450	675	630	585	555	1180
3	1220	1140	13100	4300	7850	6400	3300	675	620	615	560	1180
4	1260	1560	12000	4400	7550	5900	3120	700	620	655	550	1180
5	1230	1810	11200	4600	7300	5400	2970	660	620	725	550	1180
6	1230	1940	9900	5100	7200	4900	2540	615	640	790	540	1180
7	1260	2070	9650	5800	7200	4200	2210	585	665	780	550	1190
8	1200	2260	9000	6100	7350	3500	1960	585	665	775	550	1240
9	1230	2330	8600	6100	7450	3150	1850	555	640	780	555	1280
10	1320	2290	6700	6100	7450	3100	1820	575	610	710	580	1300
11	1350	2120	5750	6100	7400	2850	1740	560	610	725	620	1290
12	1280	2030	5400	6050	7400	2650	1650	555	600	710	655	1280
13	1480	2240	5100	6100	7500	2700	1550	545	635	705	710	1270
14	1510	2690	5000	6200	7750	2700	1500	540	675	685	770	1270
15	1580	4350	5200	6400	8000	3100	1330	540	700	710	830	1290
16	1650	4750	5500	6600	8200	3650	1230	560	685	860	875	1310
17	1700	5650	5450	6950	8300	3750	1180	590	690	725	900	1310
18	1660	6450	5400	7300	8450	3700	1100	570	685	650	900	1300
19	1670	7650	5300	7650	8500	3900	1040	560	685	640	875	1290
20	1650	9250	5300	7900	8500	4000	1010	560	685	630	865	1300
21	1620	11000	4900	8100	8500	4000	980	550	660	625	860	1410
22	1580	12200	4850	8100	8500	4000	895	550	600	615	850	1620
23	1530	12250	4600	8100	8400	4000	840	560	550	610	865	1780
24	1480	12000	4550	8100	8150	3850	825	620	525	620	900	1740
25	1400	13300	4600	8100	7900	4000	795	610	525	615	975	1630
26	1400	16500	4450	8150	7650	4000	795	590	510	595	1000	1480
27	1340	16800	4200	8200	7600	4150	845	560	510	570	1060	1420
28	1260	17700	3950	8200	7600	4250	855	550	540	555	1060	1460
29	1300	18500	3800	8200	7600	4000	825	565	560	550	1080	1550
30	1320		3700	8150	7500	4100	820	620	570	555	1120	1660
31	1300		3850		7250		820	620		570		1810
Mean	1400	6730	6800	6630	7810	4120	1600	590	618	661	777	1370
Ac.Ft. for Month	86210	387300	418100	394500	480300	245000	98690	36280	36770	40640	47780	84360

NOTE: Recording gage station maintained jointly by Division of Water Resources, City of San Francisco, Modesto Irrigation District and Turlock Irrigation District. Station is at Laird Slough Bridge, Mile 96.95 above mouth of San Joaquin River.

TABLE 19

DISCHARGE OF SAN JOAQUIN RIVER AT HETCH HETCHY ACQUEDUCT CROSSING

Day	Daily Discharge in Second-feet											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	2470	2380	21500	5900	11700	11600	5750	945	980	1440	1550	2060
2	2440	2180	20000	5800	11000	11000	5100	965	945	1400	1480	2090
3	2330	2410	18900	6000	10100	10100	5050	970	890	1600	1440	2100
4	2300	2850	17700	6200	9600	9200	4820	935	895	1660	1470	2120
5	2290	2960	16400	6500	9400	8400	4600	920	900	1740	1480	2090
6	2310	2970	16000	7000	9700	7700	4120	880	980	1740	1490	2090
7	2270	3020	14700	7400	10000	7000	3550	860	1030	1800	1500	2120
8	2270	3150	13800	7900	10200	7200	3120	845	1030	1800	1510	2290
9	2340	3250	12800	8200	10300	8500	2850	845	980	1810	1520	2740
10	2470	3150	10500	8500	10200	9000	3300	860	900	1810	1540	2780
11	2530	2910	9400	8600	10100	8600	3400	845	870	1810	1600	2780
12	2880	2770	8300	8700	10100	8100	2850	830	860	1780	1640	2780
13	3460	3610	7900	9100	10200	8300	2600	815	930	1760	1720	2770
14	3120	4600	9200	9400	10900	8900	2500	830	1000	1650	2000	2770
15	3030	6300	9800	9600	12100	9500	2320	815	1020	1640	2150	2780
16	3530	7100	10000	10000	14200	9900	2150	835	1030	1780	2180	2780
17	3270	8100	10000	10500	16400	9500	2000	875	1040	1800	2000	2730
18	3070	10000	10000	11000	17600	8500	1620	865	1040	1720	1990	2660
19	2960	11200	10000	11600	17600	7900	1410	830	1040	1730	1940	2650
20	2910	12100	9800	12000	17500	7900	1350	830	1030	1700	1910	2620
21	2780	14000	9100	12300	17200	9300	1270	830	1020	1690	1890	2670
22	2680	16100	8800	12200	16100	8700	1180	865	940	1700	1860	2810
23	2640	17900	8500	12100	14500	8900	1080	950	1140	1640	1870	3000
24	2550	21200	8400	12000	13300	8400	1030	1030	1320	1620	1920	3020
25	2510	23900	8100	11900	12300	6800	980	1020	1380	1640	1960	2950
26	2450	24600	7700	11900	12100	6400	980	1010	1370	1620	2020	2800
27	2390	24300	7200	11900	12400	7000	1020	980	1380	1540	2040	2690
28	2310	22900	5900	11900	12800	7100	1030	920	1430	1530	2020	2730
29	2400	22600	5400	11900	12900	7400	980	890	1460	1510	2020	2750
30	2420		5400	11700	12400	7200	955	915	1490	1480	2040	2900
31	2400		5700		12100		955	990		1560		3050
Mean	2638	9811	10870	9657	12480	8467	2449	897	1077	1668	1792	2618
Ac.Ft. for Month	162200	564300	668200	574600	767600	503800	150600	55130	64100	102500	106600	161000

NOTE: Recording gage station maintained by City of San Francisco Public Utilities Commission; Hetch Hetchy Water Supply. Mile 82.65 above mouth of San Joaquin River.

TABLE 20

DISCHARGE OF SAN JOAQUIN RIVER NEAR VERNALIS

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	26500	7860	16100	15300	7260	1250	1160	1720
2	25300	7860	15300	14500	6080	1280	1130	1650
3	24300	7860	14100	13500	5990	1310	1100	1820
4	23400	8060	13400	12100	5720	1250	1130	1900
5	22400	8560	13200	11000	5450	1190	1130	1960
6	21300	9000	13600	10000	4910	1130	1220	1960
7	20200	9330	14400	9220	4300	1100	1250	2000
8	18900	9660	14700	9330	3740	1040	1220	2000
9	17700	9880	14700	11300	3660	1040	1190	2000
10	16000	10200	14400	12400	4140	1100	1100	2000
11	13800	10600	14100	12200	4140	1070	1100	2000
12	12000	10800	14100	11300	3420	1040	1070	2000
13	11200	11300	14200	11400	3180	980	1100	1960
14	11600	11800	14800	12100	3020	1010	1190	1930
15	12200	12400	16100	12800	2860	1010	1250	1900
16	12500	12900	18100	13200	2630	1040	1250	1960
17	12700	13800	20100	13200	2420	1130	1250	2000
18	12800	14700	21100	12100	2070	1100	1250	1960
19	12700	15600	21300	10400	1900	1040	1250	1930
20	12500	16500	21100	9770	1860	1040	1250	1960
21	11800	17400	20900	10200	1760	1040	1250	1930
22	11600	17400	20500	10800	1650	1070	1190	1930
23	11200	17400	19100	11300	1490	1190	1280	1900
24	10700	17200	17700	10800	1430	1310	1490	1860
25	10200	17000	16800	9220	1370	1280	1550	1820
26	9660	17200	16300	8560	1370	1190	1550	1860
27	9000	17000	16700	8780	1370	1130	1580	1790
28	7660	17000	16800	8890	1400	1070	1620	1720
29	6960	16800	17000	9110	1340	1070	1650	1720
30	6760	16700	17000	8780	1280	1100	1680	1680
31	7160		16300		1280	1160		1760
Mean	14280	12990	16580	11120	3048	1121	1281	1890
Ac.Ft. for Month	878100	773100	1020000	661600	187400	68950	76220	116200

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. It is located at Durham Ferry Bridge below the mouth of the Stanislaus River and is at Mile 76.7 above mouth of the San Joaquin River. The record is given here for the period of irrigation season only.

TABLE 21

DISCHARGE OF MERCED RIVER AT YOSEMITE VALLEY
RAILROAD CROSSING

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*1060	260	62	40	45
2		570	130	62	40	45
3		530	130	50	37	45
4		500	160	35	40	45
5		500	160	45	45	50
6		500	160	35	45	50
7		500	160	35	45	50
8		500	130	35	45	51
9		500	130	25	45	50
10		500	130	40	45	50
11		230	130	35	45	50
12		180	110	40	45	45
13		460	110	43	45	37
14		1440	72	46	45	25
15		1440	68	49	45	20
16		1160	65	52	45	15
17		1110	62	55	45	15
18		1260	50	58	45	15
19		1290	62	61	45	15
20		1290	50	63	45	10
21		1290	50	65	45	10
22		1220	50	67	45	5
23		1190	50	69	45	5
24		1280	50	72	45	5
25		1450	50	75	37	5
26		1400	50	75	37	5
27		1200	50	45	37	5
28		1000	62	45	37	5
29		700	62	45	37	5
30		590	62	45	45	5
31			62	45		5
Mean		895	94.4	50.8	42.9	25.4
Ac.Ft. for Month		53200	5810	3120	2550	1560

NOTE: This is a staff gage station. Daily readings.

* Beginning of discharge record for season.

TABLE 22

DISCHARGE OF MERCED RIVER NEAR LIVINGSTON

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	2420	1820	3050	1300	538	218	175	239
2	2280	1740	3000	985	405	218	186	246
3	2240	1740	2510	860	334	218	180	262
4	1900	1780	2510	770	324	204	198	270
5	1820	3130	3160	672	314	186	204	254
6	1620	3060	3940	616	305	180	204	246
7	1480	2020	4180	630	287	175	211	254
8	1510	1700	3760	616	287	170	211	254
9	1510	1740	3340	563	278	175	211	246
10	1540	1700	3160	550	278	186	204	246
11	1680	2020	3280	474	270	175	198	239
12	1660	2380	3580	391	287	175	225	232
13	1700	2750	3700	380	262	175	239	232
14	1780	2900	3940	1100	239	186	246	225
15	1900	3160	4180	1660	225	192	246	218
16	1860	3940	4560	1440	225	198	246	218
17	1820	4300	4880	1160	232	211	232	218
18	1820	4360	4360	1230	246	211	232	225
19	1780	4500	4300	1340	232	211	218	204
20	1820	4240	4430	1370	254	225	218	186
21	1820	3940	3940	1440	198	254	239	175
22	1740	3820	3030	1400	186	246	218	170
23	1860	3880	1510	1300	186	270	211	170
24	1700	3940	2060	1260	192	270	204	165
25	1440	3940	2020	1510	180	246	204	165
26	1400	3820	1980	1620	192	254	198	160
27	1260	3700	1980	1510	218	239	211	160
28	1160	3760	2020	1200	198	204	218	156
29	1340	3640	2060	920	204	198	211	156
30	1440	3340	2020	714	204	211	218	156
31	1700		1580		204	211		160
Mean	1706	3092	3162	1033	258	209	214	210
Ac.Ft. for Month	104900	184000	194400	61450	15840	12880	12730	12910

NOTE: This is a permanent station maintained throughout the year under Federal-State cooperation by the Water Resources Branch of the U. S. Geological Survey. The station is at Mile 17.1 above mouth.

TABLE 23

DISCHARGE OF MERCED RIVER NEAR MOUTH

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*1780	825	252	200	230
2		1680	707	267	190	237
3		1540	617	260	190	237
4		1410	457	245	207	245
5		1140	510	245	218	245
6		975	475	230	230	230
7		900	440	245	245	222
8		875	410	230	222	222
9		800	410	230	215	230
10		775	410	230	207	230
11		752	380	237	207	230
12		685	395	230	230	230
13		685	360	222	230	222
14		875	355	230	260	222
15		1290	335	222	252	230
16		1320	315	252	252	230
17		1260	305	252	237	230
18		1230	315	252	230	230
19		1320	325	237	230	207
20		1320	315	252	215	207
21		1320	285	245	222	195
22		1290	267	260	222	190
23		1230	267	285	215	195
24		1200	267	295	215	190
25		1260	260	275	207	190
26		1350	252	252	207	190
27		1350	252	252	222	185
28		1230	237	237	222	185
29		1110	237	230	215	185
30		975	252	237	222	185
31			252	245		185
Mean		1160	371	246	221	214
Ac.Ft. for Month		69300	22800	15100	13100	13200

NOTE: This is a staff gage station at bridge 1.1 miles above the mouth. Daily readings.

* Beginning of record for season.

TABLE 24

DISCHARGE OF DRY CREEK NEAR MODESTO

Day	Daily Discharge in Second-feet					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		150	63	62	65	62
2		135	63	65	65	59
3		106	61	66	71	59
4		98	62	65	70	60
5		101	64	63	70	60
6		108	65	62	68	65
7		121	67	56	68	66
8		121	67	57	65	76
9		116	69	56	68	59
10		96	70	56	68	59
11		96	70	60	66	62
12		96	70	66	68	62
13		92	80	66	68	64
14		86	71	65	66	59
15	*91	86	72	65	62	62
16	116	86	72	65	62	70
17	96	87	70	66	64	82
18	70	76	71	65	64	82
19	64	77	70	65	65	82
20	88	75	71	62	65	82
21	83	74	70	62	62	82
22	82	70	69	62	64	82
23	74	70	65	62	64	82
24	67	63	65	59	62	82
25	74	63	65	60	64	82
26	92	63	65	65	64	79
27	93	63	65	64	64	76
28	100	66	71	64	64	72
29	122	75	67	62	64	79
30	130	74	67	65	62	65
31	140		63	64		65
Mean	**93.1	89.7	67.7	130	65.4	70.3
Ac.Feet for Month	**3140	5340	4170	8020	3890	4320
M.I.D.Spill below Station-Ac.Ft.	900	1760	930	470	230	1190
***Discharge to Tuolumne R. Acre-feet	4040	7100	5100	8490	4120	5510
***Discharge to Tuolumne R. Mean c.f.s.	120	119	82.9	138	69.2	89.6

NOTE: This is a staff gage station about two miles above mouth.
Daily readings.
* Beginning of record for season.
** 17 days.
*** Neglecting seepage return below station.

TABLE 25

DISCHARGE OF TUOLUMNE RIVER AT ROBERTS FERRY BRIDGE

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	*5800	820	1580	3540	715	43	33	568
2	5830	848	840	2460	1240	45	34	683
3	5830	903	848	1800	1090	42	52	670
4	5830	960	1060	1620	1020	42	52	698
5	5830	960	1940	1520	720	42	52	625
6	5800	1020	1940	1450	715	42	45	670
7	5760	1240	2040	1920	540	40	45	693
8	5680	1540	2220	5230	520	38	45	679
9	1890	1940	2100	5160	1580	38	45	693
10	848	1620	2100	4330	1360	38	52	647
11	903	1750	2100	4100	620	38	52	620
12	1060	2580	2220	4630	560	38	52	602
13	3740	2640	3310	6360	520	38	48	589
14	4220	2960	6750	5900	540	38	45	598
15	4200	3340	8420	3750	528	38	45	584
16	4210	4410	8580	3540	500	36	45	560
17	4260	4340	7700	2580	169	36	52	580
18	4040	4830	6900	3150	98	34	55	616
19	4030	5530	6980	3680	84	34	52	602
20	2050	5310	6830	4030	73	36	48	629
21	3080	3880	5830	4630	69	34	48	634
22	2800	3810	4480	5160	66	38	560	634
23	2760	3540	3880	4630	66	38	625	607
24	2280	3540	4000	990	63	38	625	616
25	2340	3480	4700	1240	59	34	625	589
26	1990	3480	5910	2900	55	36	634	580
27	460	3480	6530	2450	52	36	625	602
28	765	3480	5980	3540	48	36	625	602
29	820	3200	5530	3410	48	38	625	598
30	793	3110	4780	3020	48	36	602	598
31	875		4030		45	34		612
Mean	3250	2820	4260	3420	446	37.9	218	622
Ac.Ft. for Month	200000	168000	262000	204000	27400	2330	13000	38200

NOTE: This is a recording gage station.

* Beginning of record for season.

TABLE 26

DISCHARGE OF TUOLUMNE RIVER AT HICKMAN BRIDGE

Day	Daily Discharge in Second-feet					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1				131	125	565
2				129	125	731
3				129	125	748
4				127	125	748
5				127	123	671
6				124	125	731
7				124	125	764
8				124	125	736
9				122	125	748
10				124	125	736
11				125	125	660
12				122	125	620
13				122	123	650
14			*381	122	123	630
15			360	122	123	625
16			340	122	123	615
17			300	122	123	640
18			175	122	123	640
19			165	124	123	615
20			160	124	125	650
21			155	125	145	655
22			150	127	580	650
23			145	131	635	620
24			141	131	645	620
25			141	129	650	600
26			141	129	655	590
27			141	129	655	615
28			141	129	660	610
29			141	127	660	605
30			135	127	620	600
31			133	127		655
Mean			**191	126	280	656
Ac.Ft. for Month			**6830	7730	16600	40300

NOTE: This is a recording gage station.

* Beginning of record for season.

** 18 days.

TABLE 27

DISCHARGE OF TUOLUMNE RIVER AT TUOLUMNE CITY

DAY	DAILY DISCHARGE IN SECOND-FEET											
	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
1	1180	1060	6550	1670	3780	4970	1720	415	395	830	910	910
2	1150	930	6450	1650	4390	4290	1665	415	405	860	820	920
3	995	1510	6500	1680	3530	3340	1885	430	410	970	790	940
4	940	1420	6450	1740	3260	3050	1780	430	425	980	865	920
5	980	1190	6400	1720	3530	2750	1600	415	420	965	905	900
6	1020	1060	6350	1660	4000	2440	1380	410	415	925	940	900
7	1060	1000	6200	1620	3960	2510	1240	410	405	980	905	890
8	1020	970	6050	1820	4010	4770	1060	405	400	985	865	1500
9	1060	910	5350	2010	4150	6400	1160	405	385	970	825	1610
10	1060	790	2250	2500	4110	5750	1890	420	376	985	825	1610
11	1330	720	1950	2370	4130	5200	1490	425	378	975	825	1615
12	1780	660	1800	2980	4040	5300	1050	425	380	940	835	1630
13	1970	2670	2110	3270	4320	6250	975	425	382	915	925	1640
14	1370	2250	4020	3460	5250	6950	910	420	385	910	1210	1580
15	1510	4350	4720	3740	7200	7400	885	425	388	910	1285	1700
16	1820	3300	4750	4300	8150	6650	855	425	391	910	1095	1530
17	1350	4710	4770	4950	8500	3740	760	425	394	910	915	1340
18	1280	6750	4730	4750	7600	3460	550	415	394	910	930	1310
19	1170	6190	4600	5430	7050	3790	500	410	394	910	905	1300
20	1180	5850	4250	5870	7100	4630	480	410	385	910	895	1275
21	1060	6300	3110	5100	6800	4910	450	410	390	910	900	1230
22	1060	6350	3590	4510	5800	5450	450	415	380	910	875	1240
23	1040	7100	3480	4230	4770	5650	450	435	765	910	915	1295
24	1020	8100	3440	4120	4610	2740	445	460	825	910	930	1275
25	1000	9750	3340	4160	4860	1720	445	430	890	910	940	1295
26	960	9400	3270	4140	6000	2320	445	400	880	910	935	1215
27	940	7980	2340	4110	6750	3940	445	390	890	910	920	1260
28	1070	6750	1200	4120	6800	3150	445	385	915	915	900	1215
29	1160	6510	1500	4040	6500	4390	445	375	890	900	900	1260
30	1130		1580	3820	5450	3130	440	380	910	900	900	1320
31	1110		1850		5500		335	380		915		1330
MEAN	1186	4018	4031	3388	5352	4368	924	413	521	924	920	1289
AC.FT. FOR MONTH	72930	231100	247900	201600	329100	259900	56820	25400	31000	56820	54740	79260
DIVERSIONS BELOW STATION-AC.FT.	0	0	0	5	2	7	99	100	74	7	0	0
M.I.D.SPILL BELOW STATION-AC.FT.	0	0	257	2361	1042	1286	455	325	328	936	0	0
*DISCHARGE TO SAN JOAQUIN RIVER ACRE-FEET	72930	231100	247600	199200	328100	258600	56270	24980	30600	55880	54740	79260

* NEGLECTING SEEPAGE RETURN BELOW STATION.

NOTE: RECORDING GAGE STATION MAINTAINED JOINTLY BY DIVISION OF WATER RESOURCES, CITY OF SAN FRANCISCO, MODESTO IRRIGATION DISTRICT AND TURLOCK IRRIGATION DISTRICT. STATION IS 3.35 MILES ABOVE THE MOUTH.

TABLE 28

DISCHARGE OF STANISLAUS RIVER AT ORANGE BLOSSOM BRIDGE

Day	Daily Discharge in Second-feet					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1			405	28	28	28
2			405	28	28	40
3			538	28	28	40
4			94	28	28	35
5			94	28	28	32
6			54	28	28	29
7			604	28	28	26
8			869	28	28	23
9			134	28	28	20
10			54	28	28	20
11			40	28	28	20
12			28	28	28	20
13			28	28	28	20
14			40	28	28	20
15			32	28	28	20
16			40	28	28	20
17			40	28	28	20
18			28	28	28	26
19			28	28	28	26
20			28	28	28	26
21			28	28	28	26
22			28	28	28	26
23			28	28	28	26
24			28	28	28	26
25			28	28	28	26
26			28	28	28	26
27			28	28	28	20
28			28	28	28	20
29		*471	28	28	28	20
30		177	28	28	28	20
31			28	28		28
Mean			126	28.0	28.0	25.0
Ac.Ft. for Month			7720	1720	1590	1540

NOTE: This station is located 5.7 miles above Oakdale. The record is from daily staff gage readings.

* Beginning of record for season.

TABLE 29

DISCHARGE OF STANISLAUS RIVER AT HATMARK RANCH

Day	Daily Discharge in Second-feet						
	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	*3420	1110	300	270	239	303	285
2	3400	950	300	270	241	305	250
3	3000	928	315	260	245	302	284
4	2400	880	310	265	254	297	333
5	2330	877	280	270	280	291	352
6	1980	823	280	270	295	254	360
7	1800	642	280	270	291	212	356
8	2540	542	280	245	282	203	333
9	3800	828	280	225	273	199	294
10	4200	718	300	220	241	196	308
11	3650	547	290	225	235	194	325
12	3350	496	290	230	239	195	335
13	3600	462	280	235	241	209	335
14	4080	410	260	240	245	216	341
15	4100	371	245	245	254	235	327
16	3800	342	280	250	264	243	295
17	4110	356	290	255	279	260	323
18	3200	354	290	250	288	242	345
19	1980	348	260	235	291	286	347
20	2300	353	260	235	300	318	347
21	2530	344	270	235	300	335	353
22	2600	342	280	230	294	336	348
23	2700	334	290	225	286	346	323
24	2500	341	300	225	273	335	337
25	2300	344	310	225	275	297	340
26	2300	341	300	230	280	311	345
27	1910	337	295	230	282	341	363
28	2100	332	260	235	282	313	370
29	1850	329	255	235	284	282	363
30	1530	324	260	235	285	277	332
31		319	275		291		373
Mean	2845	517	283	242	271	271	333
Ac.Ft. for Month	169300	31790	17400	14400	16660	16130	20480
Diversions below Station-Ac.Ft.	127	157	291	166	110	0	0
**Discharge to San Joaquin River-Ac.Ft.	169200	31630	17110	14230	16550	16130	20480

NOTE: Recording gage station maintained jointly by Division of Water Resources, City of San Francisco, Modesto I.D. and Turlock I.D. Station is 5.3 miles above mouth of river.

* Beginning of discharge record for season.
** Neglecting seepage return below station.

CHAPTER III

MEASUREMENTS OF DIVERSIONS

Measurements and records of diversions in 1936 have included those from the Sacramento River and its tributaries on the valley floor, those to the Delta Uplands from Cache Slough, Old San Joaquin River, Tom Paine Slough, and San Joaquin River, and those on the Stanislaus, Tuolumne, Merced, and San Joaquin (above Durham Ferry Bridge) rivers as obtained in connection with the return water measurements (See Chapter IV). For 1936 this report records a total of 601 points of diversion, (31 of which were newly reported this year), segregated to the various sources as follows: Sacramento River 265, Colusa Trough 9, Back Borrow Pit (carrying drainage water from Colusa Basin along the back levees of Reclamation Districts 108 and 787) 11, Lower Butte Creek and Butte Slough 20, By-Pass and Drainage Channels 37, Feather River 42, Yuba River 15, American River 32, diversions to Delta Uplands from Cache Slough 1, from Old San Joaquin River 13, from Tom Paine Slough 8, and from San Joaquin River (below Vernalis gaging station) 46, San Joaquin River (above Vernalis gaging station) 21, Stanislaus River 16, Tuolumne River 11, and Merced River 53. In addition, there were ten plants removed or dismantled during 1936.

All of these diversions except five are accomplished by pumping. The five exceptions are gravity diversions, two on the Yuba River, two on the Feather River and one on the Sacramento River, and the records for these are obtained by means of canal ratings. In the case of the pumping diversions there are a few instances where the records are obtained by means of canal ratings but in the main the records are obtained from the relation established between electric power consumption and pump discharge. This is possible due to the fact that nearly all of the pumping plants are electrically operated.

Prior to 1933 all pump operators kept daily operation records on blanks furnished by the Division of Water Resources. These records were collected monthly by the field engineers and at the same time the readings of the electric meters were recorded. Under the reduced program necessitated by the curtailment of funds during the years 1933, 1934 and 1935, only the larger plants kept the daily operation records and the monthly power consumption data was secured from the power distributing agency at the end of the irrigation season in lieu of monthly meter readings by the field engineers. However, in 1936 the water users again began keeping daily operation records from which it would be possible to compute the daily pumping diversions if desired. The monthly power consumption data however, is still secured from the power distributing agencies at the end of the irrigation season as it is not possible to visit all plants monthly. The relation between power input and water pumped is determined from current meter measurements of the discharge and measured kilowatt input. At the larger pumping plants several measurements are made during each season. At the smaller plants a sufficient number of measurements are made initially to determine the rating and thereafter at intervals sufficient to show any changes which may occur in the rating. With the daily operation records available prior to 1933 it was possible to compile from the monthly diversions as computed from the power record, a daily diversion record for each plant, and this was done. However, during the years 1933, 1934 and 1935, except for the larger diversions, the monthly records only are available.

For 1936 the amount of water diverted by the larger plants was computed, as above, and several discharge measurements were made at each plant during the season. Due to the intermittent operation of the smaller plants and the large area to be covered by the field engineer, it is not possible to

make many discharge measurements at any one of these plants. However it is felt that the rating as initially determined, remains more or less constant and that over a period of time, enough measurements will be secured to determine any change in the rating. The diversions for 1936 have been computed on a monthly basis only and the breakdown into daily records was not made, although it is possible to do so if desired.

Summaries of the 1936 diversions throughout the Sacramento-San Joaquin territory are shown in Table 30. A segregation is made to show the relative diversions from the various river sources. For each segregation the table shows also the acreage irrigated and the computed seasonal gross duty of water. Table 31 summarizes the diversions between different points on the Sacramento River.

TABLE 30

DIVERSIONS, ACREAGE IRRIGATED, AND GROSS SEASONAL DUTY OF WATER IN THE SACRAMENTO-SAN JOAQUIN AREA

Source	Seasonal Diversions Acre-feet	Acreage Irrigated			Gross Seasonal Duty of Water Ac.Ft. per Acre
		General	Rice	Total	
Sacramento River-Redding to Sacramento	1054970	93093	62662	155755	6.8
Feather River below Oroville	479090	23990	26546	50536	9.5
Yuba River on Valley floor	64060	5202	2665	7867	8.1
American River below Fairoaks	4730	2492	0	2492	1.9
By-Pass and Drainage Channels	45420	6106	4221	10327	4.4
Lower Butte Creek and Slough	(1) 20880	1755	1628	(1)3383	6.2
Colusa Trough and Back Borrow Pit	52440	0	6700	6700	7.8
Total above Sacramento	1721590	132638	104422	237060	7.3
Delta Uplands from -					
Cache Slough	9520	2450	0	2450	3.9
Old San Joaquin River	63270	30232	0	30232	2.1
Tom Paine Slough	12240	4450	0	4450	2.7
San Joaquin River	45670	18993	0	18993	2.3
San Joaquin River from Fremont Bridge to Durham Ferry Bridge	108530	41862	160	42022	2.6
Merced River below Snelling	12020	3662	0	3662	3.3
Tuolumne River below Roberts Ferry Br.	2180	736	0	736	3.0
Stanislaus River below Orange Blossom Bridge	7550	2313	0	2313	3.3
Total delta uplands and pumping diversions of San Joaquin River and tributaries*	260980	104698	160	104858	2.5
Sacramento-San Joaquin Delta**					

(1) All gun club diversions and acreages have been excluded where possible. The diversions to Sutter By-Pass have also been excluded. (See Table 35).

* Note that major gravity diversions by canals of Oakdale, South San Joaquin, Modesto, Turlock, Waterford, and Merced Irrigation Districts and Miller and Lux are not included within the scope of those measurements.

** Delta crop census for compilation of Delta consumptive use of water was not taken in 1936. See 1932 and prior reports for acreage irrigated and consumptive use of water in the Delta which vary but little from year to year.

TABLE 31

SUMMARY OF SACRAMENTO RIVER DIVERSIONS
(Acre-feet)

River Section	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Totals
Redding to Red Bluff	2728	20188	21192	21103	21684	21457	21393	19568	149313
Red Bluff to Butte City	1506	19393	95433	80062	96988	94532	48839	19228	455981
Butte City to Colusa	0	807	6339	8394	8704	6588	5133	406	36371
Colusa to Wilkins Slough	823	17931	45462	44123	44753	43939	15243	3039	215313
Wilkins Slough to Knights Landing	84	9778	15770	17324	16673	14785	5385	1102	80901
Knights Landing to Verona	0	1317	3265	3753	3720	3786	1192	39	17072
Verona to Sacramento	2179	7120	16341	19351	23695	21771	7018	2543	100018
Totals	7320	76534	203802	194110	216217	206858	104203	45925	1054969

TABLE 32

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet: Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Total Diversion March to October Acre-feet	Acreage Irrigated: General	Rice
City of Sacramento	0.8 L	3-20" 1-18"	1599	1717	2312	2599	3260	3121	2619	2112	19339	Municipal	
-- AMERICAN RIVER - MILE 1.1 LEFT --													
-- BACK BORROW PIT RECLAMATION DISTRICT 1000 - MILE 1.3 LEFT --													
E. Fourness	1.45 R	1-8"				69	62	10		22	163	145	
Suburban Holdings Co.(Jones Ranch)	2.05 L	1-8"		7	17	34	48	90	48	23	267	120	
-- RECLAMATION DISTRICT 1000 DRAIN - MILE 2.1 LEFT --													
Frank Christophel	2.4 L	1-5"			12	14	20	13	8	11	78	40	
H. M. Swalley	2.45 L	1-5"		3	19	14	24	15	16	3	94	40	
Hayward Reed	2.9 L	1-5"						1			(1) 1	(1) 3	
Earl Fruit Company	3.55 R	1-16"	129		17	345	65	134			690	135	
W. E. M. Beardslee	3.75 R	1-5"			4	16	7				27	27	
J. De Rosa	4.0 R	1-10"				81	50	19			150	105	
Reese and Greer	4.65 R	1-7"					57	1			58	170	
Harbinson Brothers	5.05 R	1-14"			19	80	94		69	2	264	96	
R. S. Seydel	5.25 R	1-8"			5	76	95	27	6		209	(2) 160	
C. H. Merkeley Estate	5.3 R	1-8"				4	24				28	40	
A. Casselman	5.5 R	1-6"			4	4	13				21	25	
A. A. Casselman	5.55 R	1-6"			30	39	37	1			107	60	
K. L. Lovdal	5.7 R	1-10"			NO	DIVERSION							
J. E. Bandy	6.0 R	1-6"	7	13	21	16	37	25	28	22	169	59	
Riverside Mutual Water Company	6.10 L	2-18"	14	525	362	1847	2003	1841	687		7279	(3) 1492	174
O. A. and F. L. White	6.6 R	1-6"						13	12	1	26	34	
E. S. Fisk	7.0 R	1-4"			NO	DIVERSION							
California Bank and Trust Company	7.5 L	1-8"			16	41	40	22	64		183	100	
F. L. Martin & A. B. Carter (Stahl)	7.8 L	1-10"				76	25	42	44		187	55	
A. Marty	7.9 R	1-8"		9	34	52	48	31	21	8	203	(4)	
M. E. and R. F. Bennett	7.9 L	1-10"			29	48		67	19		163	91	
M. Marty	8.3 R	2-10"	9	20	131	63	106	113	104	59	605	(5) 263	
Blauth Estate	8.5 R	1-7"			50	43	15				108	80	
H. Waldeck	8.7 R	1-6"	6	8	21	19	24	25	21	14	138	43	
Hazel Goethe	8.95 R	1-6"	7	11	18	17	24	36	36	21	170	40	
California Lands, Inc.	9.35 R	1-14"			123	333	363	146			965	(6) 439	
R. G. Pearson and P. S. Driver	9.8 L	1-14"			36	275	231	191	109	30	872	(7) 371	

* Mileage along river above Sacramento.

(1) Additional water was received through Riverside Mutual Water Company plant at Mile 6.10 L. This portion of the property reported to have been irrigated from river prior to plant failure. A total of 23 acres were irrigated.

(2) Includes 42 acres on adjoining Schmidt property.

(3) Includes 20 acres on Hayward Reed property - See plant at Mile 2.9 Left.

(4) See plant at Mile 8.3 Right.

(5) This is the total acreage served by this plant and the one at Mile 7.9 Right.

(6) Includes 180 acres on adjoining Merkeley property.

(7) Pearson 136 acres, Driver 235 acres.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet							Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
Karl Casselman	9.9 R	1-12"				40	18	8	15		81	90	
E. C. Boom - Trustee for F.W.Kiesel	10.25 L	1-14"			49	79	161	98	22		409	292	
Reese Estate	10.75 R	1-12"				188	106				294	185	
R. F. Fiddyment & Natomas Company	10.75 L	1-12"			2	65	68	38	27		200	(1) 90	
McKeehan and Harris (2)	11.1 R	1-12"			51	97	159	145	111	17	580	240	
A. L. White	11.6 L	1-10"				26	36	28			90	(3) 51	
-- ELKHORN FERRY - MILE 11.9 --													
Conaway Ranch	12.0 R	4-36"		224	7112	4731	6685	7277	871		26900	905	4300
Thomas O'Connor	12.5 R	1-12"			24	99	123	16			262	140	
Gertrude Brown	12.7 R	1-6"			20	18	28	21	24	9	120	75	
Julius Hauser	13.1 R	1-12"				16	139	57			212	110	
J. Corey (4)	13.2 R	1-8"				54	67	8			129	80	
Henry Schaefer	13.25 R	1-10"				20	134	59			213	60	
Elkhorn Mutual Water Company	14.1 L	1-24"											
		1-20"			964	2256	1817	1745	830		7612	2070	146
Joseph Veress	14.25 R	1-10"			NO	DIVERSION							
M. E. Dole	14.4 R	1-6"			NO	DIVERSION							
California Lands, Inc.	15.15 R	1-10"				53	73	84			210	55	
Harry Hall (Gerkin)	15.7 L	1-6"				7	3	16			26	54	
Central Mutual Water Company	16.0 L	2-38"	254	3265	2969	2666	3053	3035	880	143	(5)16265	796	2253
Frank Fisher and Henry Rich (Hershey Plant)	16.27 R	1-20"				127	298	86			511	490	
H. T. Silvius	16.4 R	1-6"			NO	DIVERSION							
W. B. Beach	16.62 R	1-6"				11	11	3			25	38	
Thomas J. Cox Estate	16.7 R	1-14"			48						48	80	
Frank Fisher and Henry Rich	17.4 R	1-18"				108	177	60			345	(6) 310	
California Western States Life Insurance Company	17.75 R	1-20"				118	458	44			620	170	
M. and J. Scheiber (L. Ashwandan)	18.45 L	1-12"				36	122	143	23	44	368	155	
G. H. Lyall (F. S. Machado)	18.7 L	1-8"					54	28	10	2	94	50	
Natomas Company - Reclamation District 1001 (7)	19.6 L	2-20"			140	369	859	665	47		2080	760	640
	(7)											(8)	(8)

* Mileage along river above Sacramento.

(1) Divided between tenants as follows: Ross 60 acres, Lauppe 30 acres.

(2) Formerly American Trust Company.

(3) Includes 21 acres on adjoining C. A. White property.

(4) Spelled Colli in 1935 report.

(5) This plant pumps to the irrigation canal both from a drain canal of R.D. 1000 and from the Sacramento River. The diversions listed are those from the river only. The water obtained from the drain canal was as follows (Acre-feet) April 360, May 620, June 720, July 744, August 568, September 300, Total 3312.

(6) Includes 80 acres on adjoining Beach property.

(7) Cross Canal, the main drain between Recl.Dist. 1000 and 1001, joins the Sacramento R. at Mile 19.6 L. Plant is on North bank and 0.75 mile from junction.

(8) Acreages in district as follows: Rice, Cerrati 640; general crops, Goethe 290, Leady 280, Scheiber 30, Natomas Company 160.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion: March to: October : Acre-feet:	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
Northern Mutual Water Co. (1)	19.6 L	1-24"	154	919	977	1014	1150	1033	7		5254		600
Natomas Ben May (2)	19.6L(2)	1-24"		399	705	948	1124	1090	240		4506		583
-- VERONA GAGING STATION - MILE 19.6 - -													
-- FEATHER RIVER - MILE 20.9 L --													
-- SACRAMENTO SLOUGH - MILE 21.2 L --													
West Coast Life Insurance Co.	21.7 R	1-15"	PLANT DISMANTLED										
Frank Fisher and Henry Rich (Keller Plant)	22.5 R	1-22"		530	792	748	832	896	292		4090	630	400
Hershey Estate (3)	26.95 R	1-18"	NO DIVERSION (3)									(3)	
Morse Inglin	28.2 R	1-6"			40	28	22	20	18	5	133	25	
Russell Brothers	29.2 R	1-12"				57	68	45	31	13	214	100	
M. R. Richardson (4)	29.7 R	1-8"			NO	DIVERSION							
P. L. Traganza and K. Russell	29.75 R	1-8"			23	30					53	37	
Laura Freitas	29.9 L	1-12"			28	50	22	11			111	92	
Leo Giovanetti	30.2 L	1-3"				1	1	1	1		4	3	
M. R. Richardson (4)	30.6 R	1-12"			NO	DIVERSION							
Floyd Anderson	30.7 R	1-6"				1	3	1	1	1	7	6	
George Senf	30.9 L	1-8"			NO	DIVERSION							
A. C. Huston	31.5 R	1-12"			158	67	55				280	165	
M. Alonso	31.8 L	1-6"					1	6			7	(5)32	
M. R. Richardson	32.0 R	1-10"(6)							22	15	37	31	
Sutter Mutual Water Co. (Portuguese Bend)	32.0 L	2-24"		787	2083	2587	2674	2775	805		11711	(7)	(7)
Collier Brothers	32.5 R	1-10"			54	65	26	30	21	5	201	135	
R. B. Coulter	33.2 L	1-20"			NO	DIVERSION							
J. G. Knox	33.35 L	1-8"			12	8	9				29	35	
Snowball Estate	33.5 R	1-12"			NO	DIVERSION							
Fred Leiser	33.75 L	1-12"			33	34	4				71	50	
Snowball Estate	33.8 R	1-3"			2	1	3	1	1		8	1	
J. W. Snowball (8)	33.85 R	1-6"			40	76					116	200	
-- KNIGHTS LANDING GAGING STATION - MILE 34.0 --													
-- COLUSA BASIN DRAINAGE - MILE 34.15 R --													

* Mileage along river above Sacramento.

(1) Cross Canal- South Bank - 1.0 mile from junction with Sacramento River.

(2) New installation 1936 - Cross Canal - North Bank - 3.35 miles from junction with Sacramento River.

(3) This plant diverts water to Grays Bend (Old River channel) to supplement seepage therein. Hershey Estate maintains a booster plant on this channel. In 1936 there was sufficient seepage to supply water for 290 acres of beets. Ac.Ft. as follows: May 146, Jun.113, Jul.101.

(4) Formerly Kendall Estate.

(5) Includes 8 acres on adjoining Richardson property.

(6) Replaces former 4" unit.

(7) See plant at Mile 63.75 Left.

(8) New installation 1936.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
Meek Estate	34.2 R	2-16"										355	
		1-10"			19	380	872	325	37	194	1827	(1)	
River Farms Company (Townsite Plant)	34.25 R	1-24"											
		1-26"	84	28	364	339	1129	466	383		2793	1051	
		1-20"											
Commercial Investment Company (R. B. Bailey)	34.85 L	1-12"				49	50	36			135	113	
Walter Raymond	35.2 L	1-12"			NO	DIVERSION							
J. H. Scott	35.6 L	1-7"			NO	DIVERSION							
J. H. Donnelly (J. G. Knox)	35.8 L	1-10"			13	19	1	12	15		60	15	
F. L. Burrell (J. L. Sills)	36.2 L	1-16"			467	494	502	547	517	46	2573	40 (2)	312
Amedeo Moroni	36.7 L	1-5"			NO	DIVERSION							
W. W. Bottimore	37.2 L	1-12" (3)			19	38	26				83	45	
L. W. Bundock	37.75 L	1-8"				8	17	5			30	50	
Addie Reel (A. R. Kramer)	38.4 L	1-10"				19	26	48			93	90	
California Lands Inc. (H. A. Kramer)	38.8 L	1-10"			33	27	11				71	90	
F. O. Eastman	39.4 L	1-12"			26		17				43	80	
Commercial Investment Company	39.8 L	1-10"			NO	DIVERSION							
William Duffy, Jr.	39.9 L	1-6"			NO	DIVERSION							
Sutter Mutual Water Company (State Ranch Bend)	40.6 L	1-24"		1695	2753	2943	2728	2827	1007		13953	(4)	(4)
Buell Ranch (John Goulart)	42.2 L	1-6"			NO	DIVERSION (5)						(5)	
Matteoli and Fratchia	42.3 L	1-8"				60	23	27			110	(6) 85	
A. Kramer	43.1 L	1-12"					103	64	11		178	96	
El Dorado Ranch	43.1 R	1-18"			64	226	254	95	260	150	1049	442	
River Farms Company (Recl. Dist. 2047 Plant)	43.1 R	2-50"		3506	2402	2749	3728	2900	1307	640	17232	473	2550 (7)
-- RECLAMATION DISTRICT 108 DRAIN - MILE 44.0 R --													
John Clauss (G. Guisti)	47.3 L	1-14"				8	6				14	3	
P. J. Hiatt	48.7 L	1-20"		65	1584	568					(8) 2217	300	(8)
P. J. Hiatt	49.7 L	1-14"			122	51					173	50	
Reclamation District 108 (Tyndall Mound Plant)	51.1 R	2-24"											
		1-36"		3620	4614	4375	4648	4244	310	59	21870	138	3500
California National Bank (P.J.Hiatt)	51.2 L	2-16"		439	1092	1514	968	1104	211		5328	600	380

* Mileage along river above Sacramento.

(1) Includes 20 acres on adjoining Burtchardt property.

(2) Includes 36 acres on adjoining Sutter Basin Company lands.

(3) Replaces former 14" unit.

(4) See plant at Mile 63.75 Left.

(5) See acreage note for plant at Mile 42.3 Left.

(6) Includes 35 acres on adjoining Buell Ranch, Mile 42.2 Left.

(7) River Farms Company 1200 acres, 1350 acres for Reclamation District 108.

(8) Irrigating program included 185 acres of rice which were abandoned after start of irrigation operations.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
J. F. White	51.5 L	1-8"					18	11	3		32	14	
T. J. Cummings Ranch Company	52.0 L	1-16"			181	256	80	13			530	170	
Geo. Van Ruitan	52.9 L	1-10"			NO	DIVERSION							
Geo. Van Ruiten	53.9 L	1-12"			NO	DIVERSION							
G. W. Stretter (A. R. Waybur)	55.1 L	1-20"			155	432	124	380			1091	230	
Reclamation District 108 (Boyer Bend Plant)	56.4 R	1-18"										409	
		1-30"		62	965	413	312	380			2132	(1)	
J. M. Miller	56.65 R	1-12"				39	124	51	143		357	127	
G. W. Stretter (A. R. Waybur)	56.95 L	1-20"			176	499	54	142	16		887	264	
J. M. Kirkup	57.5 L	1-16"				105		40			145	80	
H. S. Fasig	58.2 L	1-15"				840	255	8	712	11	1826	90	
Alex Grant	58.9 L	1-16"			NO	DIVERSION							
Lamb Brothers	59.8 L	1-14"										240	300
		1-8"		363	669	743	513	1046	446	2	3782	(2)	(2)
Reclamation District 108 (Steiner Bend Plant)	59.85 R	1-16"			NO	DIVERSION							
F. L. Burrell	60.4 L	1-10"			NO	DIVERSION							
Blanche Coulter Brown	60.5 L	1-12"			NO	DIVERSION							
Sutter Basin Corporation (Coles Landing)	61.3 L	1-12"			NO	DIVERSION							
Hines Ranch	62.3 R	1-10"			18	8		6			32	12	
Rowena B. Coulter (E. Seaman) (3)	62.3 L	1-10"(4)			34	74	42				150	90	
William Baker	62.6 R	1-8"				5	16	5			26	26	
R. L. Young	62.8 L	1-8"				43	26	3	7		79	16	
-- WILKINS SLOUGH GAGING STATION	MILE 62.9	--											
Reclamation District 108 (Wilkins Slough Plant)	63.2 R	5-42"		5702	9558	6849	8830	7064	1118		39121	333	4206 (5)
Sutter Mutual Water Company (Tisdale) and Improvement Mutual Water Company	63.75 L	6-42"	625	10455	26479	25441	24816	29155	12385	2417	131773 (6)	14810 (7)	8566 (7)
La Roca Monte Rancho Company	64.3 R	1-12"			42	78	9		13	4	146	106	
Tisdale Irrigation & Drainage Co.	64.4 L	1-12"			327	497	248	193	166	13	1444	(8)	
Colusa Development Co. (Lohman)	64.9 R	1-12"					115				115	200	

* Mileage along river above Sacramento.

(1) Includes 12 acres on adjoining Carl Miller property.

(2) All on adjoining Spencer Ranch.

(3) Formerly listed as J. B. Smith.

(4) 5" unit has been removed.

(5) An additional 1350 acres of rice in Reclamation District 108 served by plant at Mile 43.1 Right.

(6) Includes 10211 acre-feet delivered to Improvement Mutual Water Company (In Reclamation District 1600). Acre-feet by months - April 390, May 1999, June 2446, July 1792, August 2488, September 1096.

(7) These figures give the total acreage irrigated from the Portuguese Bend, State Ranch Bend, and Tisdale Plants, Miles 32.0 L, 40.6 L, and 63.75 L respectively. Include Improvement Mutual Water Company as follows: Rice 258 acres and general crops 1605 acres.

(8) See acreage note for plant at Mile 67.1 Left.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
M. Bettencourt	65.1 R	1-10"					9	9	7	12	37	20	
California Lands, Inc. (Arnold Christenson)	65.7 L	1-10" (1)			148	275	277	36			736	450	
J. L. Browning	66.4 R	1-18"			251	185	98	52	80	31	697	460	
Tisdale Irrigation & Drainage Co. (Winship Plant)	67.1 L	1-20"			606	568	478	384	100	30	2166	1167 (2)	
		1-12"										(3)	
Desmond A. Winship, et al.	67.2 L	1-10"			NO DIVERSION (3)								
Meridian Farms Water Company #6	67.4 L	1-12"			49	84	47	33	27	4	244	(4) 137	
Scott F. Ennis and E. S. Brown	67.5 L	2-24"			1939	2220	1533	977			6669	(5) 1885	
-- RECLAMATION DISTRICT #70 DRAIN - MILE 68.8 LEFT --													
Meridian Farms Water Company #5	68.81 L	1-12"	198	131	224	142	70	102	6		873	258	
J. L. Browning	69.0 R	1-24"		130	325	383	268	278	67	93	1544	(6) 500	
Faxon Ranch	69.2 R	1-18"			291	132	93	70	7	146	739	(7) 353	
-- EDDYS FERRY (GRIMES) - MILE 69.45 --													
Wilbur Jensen and Mary Cecil, et al.	70.35 R	1-24"			NO DIVERSION								
Houchins, Hoffman, Beckley and Ritchie (J. M. Ritchie)	70.4 R	1-20"			217	177	111	5		23	533	277	
		1-6"										(8)	
Meridian Farms Water Company #4 (Grimes)	71.1 L	1-24"			662	1249	727	846	121		3605	927	203
J. L. Browning	71.9 R	1-12"			140	236	208	15	1		600	220	
Antone Steidlmayer	73.9 R	1-12"				165	55	42	32		294	100	
E. E. Vann (L. B. Westfall)	73.6 R	1-12"			NO DIVERSION (9)							(9)	
Meridian Farms Water Company #3 (Headquarters)	74.8 L	1-18"			23	314	358	338	88		1121	344	
L. B. Westfall	75.3 R	1-10"				50	350	13	41		454	(10) 239	
J. H. Yates	76.1 L	1-12"			14	6	12	1			33	50	
Ella Blackmer	76.2 L	1-8"					21	6			27	16	
Steidlmayer Brothers	76.5 R	1-16"			12	453		123	33		621	225	
E. V. Jacobs	77.9 L	1-12"				134	165				299	190	
Sebia Davis Estate (11)	78.2 R	1-12"				67	6				73	150	
Sebia Davis Estate	78.8 R	1-36"		870	1688	1483	1402	1344	11	22	6820	400	1200

* Mileage along river above Sacramento.

(1) Replaces former 12" unit.
(2) Includes 112 acres on adjoining Smith lands (Mile 67.2 Left).
(3) See acreage note for plant at Mile 67.1 Left.
(4) An additional 183 acres served by plant at Mile 67.5 Left.
(5) Includes 183 acres on adjoining lands for Meridian Farms Mutual Water Company.
(6) An additional 16 acres served through plant at Mile 69.2 Right.
(7) Includes 16 acres on adjoining Browning lands (Mile 69.0 Right).
(8) Divided as follows: Houchins 39, Hoffman 47, Beckley 156, Ritchie 35 acres.
(9) See acreage note for plant at Mile 75.3 Right.
(10) Includes acreages as follows: Tuttle and Napier Ranch 140, and 39 for E. E. Vann (Mile 73.6 Right).
(11) New installation 1936.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
C. E. Reische	79.0 L	1-10"		8	42	104	74	47	9	8	292	(1) 163	
Henry Schmidt (R. M. Peart) (2)	79.3 R	1-10"			60	55	6	26			147	72	
E. V. Jacobs	79.5 L	1-8"				32	16				48	38	
G. W. Wood	79.7 L	1-10"			11	13	26	16	13		79	(3) 57	
-- MERIDIAN BRIDGE - MILE 79.85 --													
Meridian Farms Water Company #1 and #2 (Meridian)	80.0 L	1-24"	635	1697	1799	2625	2214	607	31		9608	1442	234
		1-18"										(4)	(4)
George P. Ahlf	80.3 R	1-8"			NO DIVERSION								
Wonderly and Lilienthal	81.5 L	1-16"			10	13	131	94	52	29	329	(5) 143	
Steidlmayer Brothers	81.9 R	1-20"			429	17	376	118	3	3	946	(6) 566	
F. T. Reische and L. J. Wood	82.5 L	1-12"				1	15	32	19		67	(7) 59	
George W. Kirkpatrick	83.3 L	1-14"			NO DIVERSION								
-- BUTTE SLOUGH - MILE 84.0 LEFT --													
Oakland Prune Company	86.1 R	1-12"			68	70	39	43	76		296	(8) 100	
J. F. Peck	86.6 L	1-18"				208	145	16			369	(9) 120	
Lloyd Scoggins	86.8 L	1-8"				42	34				76	45	
W. P. Dwyer (Lower)	86.9 R	1-16"			97	24	121				242	100	
W. P. Dwyer (Upper)	87.4 R	1-15"				49	42			104	195	60	
Jacobsen and O'Rourke	87.6 L	1-10"			NO DIVERSION								
Swinford Tract Irrigation Co.	87.7 R	1-12"			53	77	136			69	335	132	
Edward K. Lange	88.0 R	1-6"				1	5				6	21	
W. D. DeJarnett (Nagle & Locovitch)	88.2 L	1-10"				18	47	7			72	(10) 110	
W. D. DeJarnett	88.7 L	1-14"					20				20	25	
Colusa Irrigation Company	89.2 R	1-20"				412	428	240	161		1241	597	
Phil B. Arnold	89.25 L	1-8"					71				71	85	
G. A. Berkey	89.26 L	1-12"					90				90	80	
-- COLUSA GAGING STATION (BRIDGE) - MILE 89.4 --													
T. H. Boggs and Sisters	89.7 L	1-6"		2	2	2	2	2			10	7	
T. H. Boggs and Sisters	89.8 L	1-12"			NO DIVERSION								
Roberts Ditch Company	90.7 R	2-20"		34	327	693	840	783	437	114	3228	1215	

* Mileage along river above Sacramento.

(1) Includes acreages as follows: Staas 25, Lemos 30, Rockholtz 20, Kilgore 28.

(2) New installation 1936.

(3) Includes 30 acres on adjoining Burtis property.

(4) An additional 34 acres of rice and 134 acres of general crops were irrigated from Plant #7 pumping from an interior lake supplied both by drainage and surplus water from Plants Nos. 1 and 2.

(5) Wonderly 15 acres; Lilienthal 110 acres and 18 acres on adjoining Thrash property.

(6) Includes 66 acres on Tubbs Ranch.

(7) Reische 8, Wood 35 and 8 acres each on adjoining Hall and Staas property.

(8) Includes 30 acres on adjoining Peart property.

(9) Includes 30 acres on adjoining Reichel property.

(10) DeJarnett 30, Nagle 40, Locovitch 40.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	* Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion: March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
George P. Ahlf	92.5 L	1-8"				45	58	27		31	161	(1)85	
U. W. Brown	93.0 R	1-12"				74	34				108	(2)90	
George P. Ahlf	93.0 L	1-6"					24	1			25	35	
I. G. Zumwalt	93.2 R	1-36"											
		1-18"			N O	D I V	E R S	I O N					
Tuttle Land Company	94.3 R	1-15"											
		1-20"		59	168	56	641	100	71		1095	310	
W. D. DeJarnett (3)	94.4 R	1-8"			20	9	12	20			61	30	
California Lands, Inc. (4)	94.8 R	1-12"			N O	D I V	E R S	I O N					
J. W. Browning	95.2 L	1-14"											
		1-20"			N O	D I V	E R S	I O N					
A. N. Lewis (Colusa Development Co.)	95.6 L	1-16"										220	
		1-20"				48	458				506	(5)	
I. G. Zumwalt	95.7 R	1-12"					168		173	65	406	200	
Bridget Graham Estate	95.8 L	1-16"											
		1-20"			N O	D I V	E R S	I O N	(6)			(6)	
H. Heitman	97.7 R	1-12"			10	12	34	11		7	74	59	
Frank Beckley	98.0 L	1-10"				39	49	8			96	61	
J. L. Erisey	98.3 R	1-10"			N O	D I V	E R S	I O N					
R. A. Sperry and Colusa Development Company	98.6 L	1-15"			N O	D I V	E R S	I O N					
D. Boggs	98.8 L	1-18"					56	20	20		96	60	
Cheney Slough Irrigation Company	99.0 R	1-36"			16	517	110	167	32		842	279	
		2-26"					55	26	7	1	89	(7)	
J. P. Boggs (8)	99.1 L	1-10"										120	
Terrill and Sartain	99.2 L	1-20"			1074	1039	1201	1114	680		5108	165	600
Dave George	99.8 L	1-16"			135	47	41	14	65	13	315	140	
J. W. Browning	100.8 L	1-20"			N O	D I V	E R S	I O N					
R. C. Wohlfrom	101.1 R	1-20"				205					205	133	
Clara C. Packer	102.8 R	1-36"											
		2-30"			312	535	626	690	127		2290	600	200
		2-18"											
Glenn-Colusa Corporation	103.3 L	1-14"			N O	D I V	E R S	I O N					
American Company	103.7 R	1-16"				54	77	66			197	145	

* Mileage along river above Sacramento.

(1) Includes 45 acres on Colusa Development Company property.

(2) Includes 40 acres on Ella Arnold property.

(3) Installed in 1933. Not previously reported.

(4) Formerly W. E. Pinney.

(5) Colusa Development Company 65 and 155 on adjoining lands of Bridget Graham Estate (Mile 95.8 Left).

(6) See acreage note for plant at Mile 95.6 Left.

(7) Acreage divided as follows: Mitchell 75, Seaver 180, Middlecamp 24.

(8) New installation 1936.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
Compton-Delevan Irrigation Dist.	103.8 R	2-24"			NO DIVERSION (1)						(1)	(1)	(1)
		1-36"											
E. M. Gordon	103.9 R	1-16"			NO DIVERSION								
		1-20"											
B. F. Gould Estate	104.8 L	1-26"			227	392	384		136	9	1148	(2)380	
Thousand Acre Ranch (H.W.Keller)	106.0 R	1-14"				107	77	42			226	185	
California Lands, Incorporated	110.0 R	1-12"				135	120	7		105	367	185	
California Lands, Incorporated	111.2 R	1-6"				8		9		7	24	27	
-- PRINCETON FERRY - MILE 112 --													
Reclamation District 1004	112.1 L	1-30"										521	1228
		1-50"		712	3986	4289	3591	3481	3364	54	19477	(3)	(3)
Princeton-Codora-Glenn Irr. Dist.	112.4 R	3-24"			NO DIVERSION (1)						(1)	(1)	(1)
I. G. Zumwalt (4)	112.6 L	1-10"				45					45	55	
Edward L. Steele	115.5 L	1-12"			62	43	46		21		172	116	
-- BUTTE CITY GAGING STATION - MILE 115.8 --													
-- BUTTE CITY BRIDGE - MILE 115.9 --													
California Lands, Incorporated	117.8 R	1-10"				61	54	31	24	26	196	147	
C. T. White	123.7 R	1-6"			NO DIVERSION								
Princeton-Codora-Glenn Irrigation District (1)	123.9 R	3-24"			NO DIVERSION (1)						(1)	(1)	(1)
Provident Irrigation District (1)	124.2 R	4-42"											
		1-36"			NO DIVERSION (1)						(1)	(1)	(1)
California Lands, Incorporated (1)	124.4 R	1-16"			NO DIVERSION (1)						(1)	(1)	(1)
F. S. Reager	130.75R	1-6"				4	5	6	4		19	7	
-- ORD FERRY - MILE 130.8 --													
Parrott-Phelan Estate	141.5 L	5-24"		561	817	1370	1937	1957	1140	112	7894	(5)300	(5)625
-- OLD CHICO LANDING RAILROAD BRIDGE SITE - MILE 142.1 --													
Chico Hop Company	146.9 L	1-5"			NO DIVERSION								
M. F. Rose	148.7 R	1-6"						3			3	5	
M. F. Rose	148.9 R	1-6"			NO DIVERSION								
-- GIANELLA BRIDGE - MILE 149.5 --													
California Lands, Incorporated	150.0 L	1-10"			NO DIVERSION								
Joseph Gianella	150.0 L	1-10"			NO DIVERSION								
	(6)												

* Mileage along river above Sacramento.

(1) See plant at Mile 154.8 Right.

(2) Includes 140 acres for Colusa Development Company.

(3) 854 acres of the rice served wholly from Sacramento River plant, balance of acreage, both rice and general, served jointly from Sacramento River and Butte Creek gravity. (See lower Butte Creek diversions, Mile 9.3 Right).

(4) Formerly A. J. Stone.

(5) All on Phelan Ranch; Parrett Ranch obtained water from Butte Creek.

(6) Pump on Nord Slough or Pine Creek Lagoon which joins Sacramento River at Mile 147.0 Left. Plant is located three miles up slough on right bank or opposite Mile 150.0 left, Sacramento River.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
Holly Sugar Corporation (1)	151.0 R	1-12"			602	796	819	852	441	221	3731	1290	
		1-16"											
A. Holecek	152.2 R	1-5"			3	5	17	10	8	2	45	28	
Maas Brothers	154.6 R	1-5"				5	5	1			11	12	
Glenn-Colusa Irrigation District (2)	154.8 R	1-100"											
		4-72"											
		2-66"											
		2-50"	1491	9185	64603	55426	67678	68248	35756	15362	317749	17691	20424
		1-42"									(3)	(4)	(5)
		2-30"											
Jacinto Irrigation District	154.8 R	(6)	15	553	2033	2029	3039	2727	1882	1422	13700	4530	
Compton-Delevan Irrigation Dist.	154.8 R	(6)		298	2360	1244	1230	1202	436	145	6915	30	850
Provident Irrigation District	154.8 R	(6)		4451	12601	3378	9925	9078	3537	234	43204	119	4811
Princeton-Codora-Glenn Irr. Dist.	154.8 R	(6)		4175	10544	14019	10352	8699	4649	1232	53670	2303	1977
Maxwell Irrigation District	154.8 R	(6)		159	1359	1448	1537	1537	853	446	7339		1400
California Lands, Incorporated	154.8 R	(6)		4	381	179	89				653	374	
-- CORNING-VINA BRIDGE - MILE 166.5 --													
A. F. Landis	166.7 R	1-3"			3	4	3	6	7		23	5	
Laura B. Caro	166.8 R	1-2"			2	1		5	1	2	11	4	
R. A. Foster	169.1 R	1-8"			NO DIVERSION								
-- TEHAMA BRIDGE - MILE 177.5 --													
E. B. Noble	184.5 R	1-14"			118	81	134	110	70	22	535	160	
Coneland Water Company	187.6 L	1-12"					108	20	18		146	525	
E. Sluiters	188.6 L	1-8"			1	2	28	21	11		63	21	
-- RED BLUFF BRIDGE - MILE 193.45 --													
G. E. Sutton	196.2 R	1-6"			NO DIVERSION								
J. A. Edwards	196.2 L	1-6"			NO DIVERSION								
Bank of America (Peterson)	196.5 L	1-4"			NO DIVERSION								
J. Erickson	196.6 L	1-5"		7	6	10	27	19	2	2	73	27	
C. Droz	197.0 L	1-8"			NO DIVERSION								
W. H. Freemeyers	197.65L	1-3"			NO DIVERSION								

* Mileage along river above Sacramento.

(1) Formerly Sacramento River Farms, Ltd.

(2) This is a common point of diversion for the Glenn-Colusa, Jacinto, Compton-Delevan, Provident, Princeton-Codora-Glenn, and Maxwell Irrigation Districts and California Lands Incorporated (Mile 124.4 R).

(3) Additional by gravity from Stony Creek (acre-feet) March 795, April 5820, May 1958, Total 8573. The diversion shown includes water for users outside district as follows (Acre-feet) C. L. Leonard May 91, June 135, July 115. Golden State Orchards May 111, June 210, July 343, August 125, September 4; I. G. Zumwalt May 1200, July 1230, August 1230, September 222. Total 5016.

(4) Includes 198 acres of duck lakes, also 78 acres for C. L. Leonard outside district.

(5) Includes 295 acres for I. G. Zumwalt outside of district.

(6) Same plant as that of Glenn-Colusa Irrigation District.

TABLE 32 (CONTINUED)

SACRAMENTO RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
C. Droz (Billings)	197.73L	1-5"											
		1-4"(1)					1				1	1	
-- RED BLUFF GAGING STATION (IRON CANYON) - MILE 198.6 --													
C. W. Griffin	206.75L	1-10"			NO	DIVERSION (2)							
-- BEND FERRY BRIDGE - MILE 207 --													
Cunningham Ranch (3)	209.0 L	1-2½"			NO	DIVERSION (2)							
J. F. Nunes	215.5 R	1-7"			NO	DIVERSION							
-- JELLEYS FERRY - MILE 215.6 --													
J. F. Nunes	216.0 R	1-3"			1	1	19				21	10	
W. A. Hunaeus	216.4 L	1-3"					3	6			9	6	
T. A. Haakonson	217.5 L	1-5"					22	23	7	1	53	(4)59	
J. L. Haskins	218.0 L	1-5"					3	13			16	22	
Rio Alto Rancho	221.0 R	1-10"			NO	DIVERSION							
-- BALLS FERRY BRIDGE - MILE 224.5 --													
-- ANDERSON BRIDGE - MILE 232.9 --													
L. C. Smith and G. W. George	233.0 L	1-6"			NO	DIVERSION							
		1-4"											
Wm. Menzel Meat Company	240.2 L	1-12"			21	117	170	244	217		769	(5)92	
Graf and Graf	241.5 L	1-8"			5	8	60	30	50	3	156	40	
Adams Brothers	242.0 R	1-6"			NO	DIVERSION							
--REDDING- ALTURAS BRIDGE - MILE 242.0 --													
--NEW REDDING-YREKA BRIDGE - MILE 245.9 --													
Anderson-Cottonwood Irrigation District	246.0 R	Gravity	2728	20143	21142	20936	21326	21050	21045	19534	147904 (6)	13000 (7)	
John Diestelhorst	246.3 R	1-10"		45	23	41	81	91	74	30	(8) 385	25	
-- OLD REDDING-YREKA BRIDGE - MILE 246.4 --													
Totals			7320	76534	203802	194110	216217	206858	104203	45925	1054969	93093	62662

* Mileage along river above Sacramento.

(1) Replace 6" and 2" pumps respectively.

(2) Paynes Creek water used.

(3) Formerly W. E. Bonnett.

(4) Includes 5 acres on adjoining Lundblad property.

(5) Includes 25 acres on adjoining Henderson land.

(6) Considerable return water from this diversion reaches the Sacramento River as seepage or direct spill in the drains and creek channels between Redding and South of Cottonwood.

(7) Estimated. District has no data.

(8) It is estimated that at least one-half of this diversion is returned directly to the river.

TABLE 33

*COLUSA TROUGH DIVERSIONS

Water User	**Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	*** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
Hattie O'Hair	(1)1.1 L	1-32" Box			NO DIVERSION							
-- COLUSA TROUGH GAGING STATION - MILE 0 --												
I. G. Zumwalt	2.2 R	1-15" (2)										
		1-20" (2)		2460	1920	1860	1920	640			8800	1200
		1-36" (2)										
A. D. J. Land Company	3.0 L	2-28" Box (3)				164	156	250	202		772	105
Louis Byington	4.3 L	1-8"			PLANT REMOVED							
Maxwell Irrigation District Plant #2A	7.0 R	1-15"										
		1-26"			NO DIVERSION							
		1-36"										
Maxwell Irrigation District Plant #3A (4)	7.0 R	1-20"			NO DIVERSION							
M. E. Rourke (5)	(4)											
	11.5 L	2-20"										
		1-14"			3970	3840	3970	3970	2560		18310	2300
-- LATERAL HIGHWAY - BUTTE CITY TO WEST SIDE - MILE 20.5 --												
Razor Ranch	20.7 R	1-6"			NO DIVERSION							
Razor Ranch	21.1 R	1-15"			NO DIVERSION							
Stevens Brothers	22.0 R	1-18" Box		71	741	838	697	696	440		3483	300
Totals			0	2531	6631	6702	6743	5556	3202	0	31365	3905

* Main Drain of Reclamation District 2047.
** Mileage along Trough above Colusa-Williams Highway.
*** All rice. No general crops.
(1) Below Colusa-Williams Highway.
(2) 14" box pump removed, 15" dug out of mud, new 20" unit installed 1936.
(3) Additional unit installed in 1936.
(4) Plant is on Lateral E (Stone Corral Creek) and is 3/4 mile west of Plant #2A (Mile 7.0 R).
(5) New installation at an old point of diversion.

TABLE 34

* BACK BORROW PIT DIVERSIONS

Water User	**Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion: March to: October :Acre-feet:	*** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
-- KNIGHTS LANDING RIDGE CUT JUNCTION - MILE 0.4 R --												
Fairchild Ranch	1.3 R	1-12"			PLANT DISMANTLED							
River Farms Company	1.45R	1-20"			NO DIVERSION							
W. P. Dwyer	4.35R	1-20"			NO DIVERSION							
Reclamation District #108 (Geo. Youngmark)	8.8 R	1-14"			1213	948	1037	910			4108	560
Hershey Estate (Peterson and Johnson)	11.15R	1-12" 1-14"		929	1245	1186	1226	1159	157		5902	675
Hershey Estate	13.75R	1-16"			NO DIVERSION							
B. F. Mumma	14.75R	1-10"		31	148	127	129	128	13		576	110
-- COUNTY LINE BRIDGE - MILE 15.25 --												
M. T. Emmert	15.75R	1-15"			NO DIVERSION							
Katherine West	18.1 R	2-15"		212	1643	1430	1377	1346	225		6233	700
C. R. Sugget and Gregory Estate	20.0 R	1-15"			NO DIVERSION							
Gregory Estate (Knox) (1)	21.35R	1-16"			533	462	468	457			1920	400
Bean and Brindenburg (E. A. Johnson)	22.15R	1-16"			665	590	547	470	68		2340	350
-- HANNUM BRIDGE - MILE 22.8 --												
Totals			0	1172	5447	4743	4784	4470	463	0	21079	2795

* Carries return water from Colusa Basin along West Border of Reclamation Districts 108 and 787 and thence to discharge to Sacramento River at Knights Landing or partial diversion via Knights Landing Ridge Cut.

** Mileage along Borrow Pit from outfall gate just above junction of Borrow Pit with Sacramento River at Knights Landing.

*** All rice - no general crops.

(1) New installation 1936.

TABLE 35

LOWER BUTTE CREEK AND BUTTE SLOUGH DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated		
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice	(1) Gun Club
Lower Butte Creek														
Reclamation District #833 (R. C. Ingram)	2.9 L	36"Box					912	925	406		2243	675		
West Butte Country Club	3.85L	1-6"					30				30	30		
Reclamation District #1004	3.9 R	1-15"										125	1628	
		1-24"			1608	2420	2517	2500	531		9576	(2)	(2)	
Butte Lodge Gun Club	4.0 R	1-22"			NO	DIVERSION (3)								(3) 900
Reclamation District #1004	9.3 R	Gravity		246	1530	1500	1550	1550	1500	1240	(4) 9116	(5)	(5)	
Butte Basin Gun Clubs (6)	10	Gravity									(6) & (7)			5000 (6) & (7)
--BIGGS-AFTON ROAD - MILE 19.4 --														
Glenn Rice Farms	19.8R(8)	1-24"	16							168	184			200
John Hannah	20.2 R	1-20"			NO	DIVERSION								
John Hannah	21.2 R	1-36"			NO	DIVERSION								

* Approximate mileage from junction with Sacramento River.

(1) Only diversions which occurred prior to November 1st are given for gun club acreage. In most instances the diversions for this purpose extended into November and December.

(2) This is the total acreage served by this plant and a portion of the gravity diversion at Mile 9.3 Right.

(3) Served by gravity diversions at Mile 9.3 Right.

(4) Includes 438 acre-feet in September and 1240 acre-feet in October furnished to Butte Lodge Gun Club, Mile 4.0 Right.

(5) See notes for plants at Miles 3.9 R, 4.0 R, and "Sacramento River Diversions", Mile 112.1 Left.

(6) In addition to gun clubs under other diversions listed, this comprises the group of clubs diverting Butte Creek water by gravity from the main or interconnecting channels (Sanborn Slough, etc.) in the vicinity of Mile 10. Through Reclamation District 833 canals, most of the clubs in this group receive also, drainage and Feather River water diverted for the clubs by Western Canal. These diversions are principally in the fall months and those from Butte Creek have not been measured. For diversions via Western Canal see table of Feather River Diversions, Mile 59.7 R. The area flooded by this group is estimated to be approximately 5000 acres. The clubs included are White Mallard, Wild Goose, Last Chance, Berry and Keller, Tule Goose, Bettens, Greenhead, Field and Tule, North Butte, Henshaw, Sacramento Outing, Anderson, West Butte, and Colusa Shooting.

(7) See Feather River Diversions, Mile 59.7 Right.

(8) Plant is on Howard Slough but opposite this mileage on Butte Creek.

TABLE 35 (CONTINUED)

LOWER BUTTE CREEK AND BUTTE SLOUGH DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion: March to October Acre-feet	Acreage Irrigated		
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice	(1) Gun Club
Butte Slough														
Butte Slough Irrigation Co. Ltd. (Diversion to Sutter By-Pass)(2)	0.3 West	Gravity		649	4808	3045	4961	6990	5195	143	(3)25791	(4)		
M. Marty	0.3 West	1-12"				32	62	4			98	60		
G. S. and D. C. Smith	1.4 East	1-8"					24	196	45		265	200		
J. E. Smith (5)	3.0 West	1-10"							6		6	18		
I. E. Nall	3.5 West	1-10"			19	48	53	42	16		178	110		
W. H. Ross (D. S. Miller)	3.7 West	1-10"			3	10	5	18		3	39	45		
P. A. Reische	4.1 West	1-12"				119	114	86			319	(6) 197		
E. V. Jacobs (G. M. Gomes)	4.8 West	1-10"			47	86	101	64	87		385	110		
Armstrong, Hensen & Locovitch (7)	5.1 West	1-10"				29	187	66	3	13	298	(8)185		
W. Nall	6.3 West	1-7"			NO	DIVERSION								
T. J. Hageman	6.8 West	3-8"			NO	DIVERSION								
LONG BRIDGE - MILE 7.5														
TOTALS (Lower Butte Creek and Butte Slough)			16	895	8015	7289	10516	12441	7789	1567	48528	1755 (9)	1628	6100 (10)

* Approximate mileage from junction with Sacramento River.

(1) Only diversions which occurred prior to November 1st are given for gun club acreage. In most instances the diversions for this purpose extended into November and December.

(2) Butte Slough Irrigation Company maintains a dam on Butte Slough just above its junction with Sacramento River and thereby diverts water via Butte Slough to East and West Borrow Pits of Sutter By-Pass near "Long Bridge". The total water so diverted is here shown. Rediversions from West Borrow Pit of Sutter By-Pass were made at Miles 28.4, 28.6 and 29.0 R. (See Sutter By-Pass Diversions, Table 36.).

(3) Prior to April 28, water was available for rediversion due to spring run-off.

(4) See acreages under rediversions at Miles 28.4 R, 28.6 R, and 29.0 R., - West Borrow Pit Sutter By-Pass. A considerable additional but indef inite acreage was served by sub-irrigation and direct diversions from flow diverted to East Borrow Pit of Sutter By-Pass which is joined by Feather River return flow entering via Wadsworth Canal. See East Borrow Pit Sutter By-Pass Diversions, Table 36, and footnote Table 64.

(5) New installation 1936.

(6) Includes acreages as follows; S. E. Reische 55, C. P. Reische 80, M. T. Heaton 20, J. E. Messick 15.

(7) Formerly A. Armstrong and Colusa County Bank.

(8) Armstrong 135 acres, Hensen 50 acres.

(9) Does not include acreage under diversion to Sutter By-Pass. See footnotes (2) and (4).

(10) Note that this includes an estimate of 5000 acres for which the diversions are not reported.

TABLE 36

BY-PASS AND DRAINAGE CHANNEL DIVERSIONS

Water User	Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
West Borrow Pit of Sutter By-Pass													
	(1)												
-- WEST BORROW PIT GAGING STATION - MILE 1.4 --													
-- SOUTHERN PACIFIC RAILROAD CROSSING - MILE 2.5 --													
-- KNIGHTS LANDING-MARYSVILLE CAUSEWAY - MILE 12.7 --													
State Reclamation Board (Christensen)	16.1L(2)	1-16"				237					237		(3)
Middleton & Dessez (J.L.Sills)(4)	17.5 L	1-15"			360	485	513	517	584	68	2527		291
-- SOUTH LEVEE TISDALE BY-PASS - MILE 18.9 --													
-- RECLAMATION DISTRICT 1660 GRAVITY RETURN - MILE 19.3 --													
D. C. Smith and E. I. McGrath and S. A. McKeehan	27.1 R	1-16"			NO	DIVERSION							
Butte Slough Irrigation Co.Ltd.(5)	28.4 R	Gravity		322	1746	1578	1808	1748	972		8174	3450	
S. F. Robertson (5)	28.6 R	1-10"			NO	DIVERSION							
Frye Brothers (5)	29.0 R	1-7"			NO	DIVERSION							
-- NORTHERN ELECTRIC RAILROAD CROSSING - MILE 29.15 --													
East Borrow Pit of Sutter By-Pass													
	(6)												
C. F. Holmes and R. E. Hughes	0.4 S*	1-14"			18	197			263		478	275	
C. F. Holmes and R. E. Hughes	0.1 S*	1-16"			NO	DIVERSION							
-- GAGING STATION-WILLOW SLOUGH AT CHANDLER - MILE 0 --													
C. F. Holmes and R. E. Hughes	0.5 N*	1-14"				258	157	712	297		1424	380	
E. H. Christensen	(7)1.4 N	1-12"			NO	DIVERSION							
A. W. Kimerer	(7)1.4 N	1-14"			286	732	901	820	638		3377		380
E. H. Christensen	(7)1.4 N	1-12"			NO	DIVERSION							
C. F. Holmes and R. E. Hughes	1.5 N*	(8)1-14"			124	121	353	283			881		260
		1-4"											
State Reclamation Brd.(C.H.Baird)(9)	2.19N*	1-10"				29					29	(10)125	
Arnold Christensen	2.2 N	1-16"			NO	DIVERSION							
State Reclamation Brd.(C.H.Baird)(9)	2.65N*	1-3"				2					2	(11)	
C. F. Holmes and R. E. Hughes (9)	2.9 N*	1-14"			368	617	570	460	116		2131		(12)750
C. F. Holmes and R. E. Hughes (9)	4.0 N*	1-14"			456	742	765	795	418		3176		(13)
		1-10"											

(1) Mileage is given northerly from drainage plant of Reclamation District 1500. Mile 9.15 West Borrow Pit is opposite Chandler.
(2) Serves By-Pass area.
(3) See acreage note, East Borrow Pit Diversions, Mile 6.95 N*.
(4) New installation 1936 at an old point of diversion.
(5) Diversions at Mile 28.4 R, 28.6 R, and 29.0 R are from water diverted to the West Borrow Pit from Butte Slough. They are included in the total diversion to Sutter By-Pass as listed under Butte Slough Diversions - (See Table 35).
(6) Mileage is given northerly or southerly from Chandler. Chandler is opposite Mile 9.15 West Borrow Pit. Plants are on left bank unless marked with asterisk denoting right bank.
(7) Plant is on drain canal which enters By-Pass at this point.
(8) 14" unit replaces 8" unit.
(9) New installation 1936.
(10) This is the total acreage served by this plant and the one at Mile 2.65 N*.
(11) See acreage note for plant at Mile 2.19 N*.
(12) This is the total acreage served by this plant and the one at Mile 4.0 N*.
(13) See acreage note for plant at Mile 2.9 N*.

TABLE 36 (CONTINUED)

BY-PASS AND DRAINAGE CHANNEL DIVERSIONS

Water User	Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
East Borrow Pit of Sutter By-Pass (Continued)													
	(1)												
-- KNIGHTS LANDING - MARYSVILLE CAUSEWAY - MILE 4.4 N --													
C. F. Holmes and R. E. Hughes	4.5 N*	1-14"			106	84	18	161	88	45	502	235	
State Reclamation Board (E. H. Christensen and Son)	5.8 N*	1-16"			392	682	790	795	64		2723		(2)
State Reclamation Board (E. H. Christensen and Son) (3)	6.6 N*	1-12"			462	416	646	428	94		2046		(2)
State Reclamation Board (E. H. Christensen and Son)	6.95 N*	1-12"			537	803	890	927	162		3319		850 (4)
-- EAST LEVEE OF WADSWORTH CANAL - MILE 16.0 N --													
R. L. Morehead	18.75N.	1-10"			NO PLANT	DIVERSION DISMANTLED							
F. W. DeWitt and George Smith	18.8 N*												
Meyer, Platter, Morehead, DeWitt Bros., Epperson & Middleton	19.1 N	1-14"				155	452	369			976	652 (5)	
-- NORTHERN-ELECTRIC RAILROAD CROSSING - MILE 20.0 N --													
Sacramento Slough													
	(6)												
C. F. Holmes and R. E. Hughes	1.4 R	1-24"						376			376	360	
Knights Landing Ridge Cut (7)													
	(8)												
-- RECLAMATION DISTRICT 730 DRAINAGE PLANT #2 - MILE 3.8 --													
California National Bank	4.55 L	1-12"		64	142	120	82				408	250	
Hershey Estate (A.J.Darneille)	4.7 L	1-15"			196	432	481	442	31		1582		(9)
Sieber Brothers	4.7 R	1-6"				8	12	10		5	35	19	
-- WEST LEVEE OF YOLO BY-PASS - MILE 6.3 --													
Frank Fisher and Henry Rich	6.3 (10)	Gravity			503	450	2505	2568	1309		(11)7335		(12)1350
E. L. Wallace	6.3 (10)	Gravity									(13)	200	

(1) Mileage is given northerly or southerly from Chandler. Chandler is opposite Mile 9.15 West Borrow Pit. Plants are on left bank unless marked with asterisk denoting right bank.
(2) See acreage note for plant at Mile 6.95 N*.
(3) Plant reinstalled 1936 at an old point of diversion.
(4) This is the total acreage served by this plant and the ones at Miles 5.8 N*, 6.6 N* and West Borrow Pit 16.1 L.
(5) Meyer 90, Platter 25, Morehead 100, Meyer (DeWitt) 146, Epperson (DeWitt) 174, Middleton (DeWitt) 117.
(6) Mileage is given easterly from drainage plant of Reclamation District 1500 which is at head of slough.
(7) Flow is principally Colusa Basin drainage diverted to the Ridge Cut by checking at the Knights Landing outfall gates on the Back Borrow Pit of Reclamation District 787. See Table 66.
(8) Mileage is given southerly from head in Back Borrow Pit near Knights Landing.
(9) See acreage note for Fisher and Rich diversion at Mile 6.3.
(10) Diversions at this point are for irrigating land in Yolo By-Pass (See Yolo By-Pass diversions).
(11) This is the total controlled diversion to both irrigated areas listed under this mileage. Prior to June 20, ample additional water was available due to heavy run-off.
(12) Includes 140 acres served through plant at Mile 4.7 Left.
(13) See Fisher and Rich diversion at this same mileage.

TABLE 36 (CONTINUED)

BY-PASS AND DRAINAGE CHANNEL DIVERSIONS

Water User	Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
Yolo By-Pass (East Borrow Pit or Tule Canal)													
	(1)												
J. S. Bell	0.8 S	1-10"			NO DIVERSION								
Joe Valine	0.7 S	1-10"			NO DIVERSION								
George Swanston	0.3 S	1-12"			NO DIVERSION								
George Swanston	0.1 N*	1-18"			PLANT REMOVED								
George Swanston	1.8 N*	1-15"											
(Wallace and Crawford)		(2) 1-20"				1006	914	1061	477		3458		340
C. S. Luce	2.4 N	1-10"			13	77	59				149	(3) 160	
C. S. Luce	3.4 N	1-8"				40	38				78	(4)	
-- SACRAMENTO-WOODLAND RAILROAD CROSSING - MILE 6.2 --													
-- RECLAMATION DISTRICT 1600 DRAINAGE PLANT - MILE 10.0 --													
Frank Fisher and Henry Rich	10.1 R*										(5)		(5)
-- FREMONT WEIR (EAST EXT) - MILE 12.3 --													
Back Borrow Pit Reclamation District 1000													
	(6)												
-- GAGING STATION - MILE 2.1 --													
Totals - By-Pass and Drainage Channel Diversions													
West Borrow Pit of Sutter By-Pass		0	322	2106	2300	2321	2265	1556	68		10938	3450	291
East Borrow Pit of Sutter By-Pass		0	0	2749	4838	5542	5750	2140	45		21064	1667	2240
Sacramento Slough		0	0	0	0	0	376	0	0		376	360	0
Knights Landing Ridge Cut		0	64	841	1010	3080	3020	1340	5		9360	469	1350
Yolo By-Pass (East Borrow Pit or Tule Canal)		0	0	13	1123	1011	1061	477	0		3685	160	340
Back Borrow Pit Reclamation District 1000		0	0	0	0	0	0	0	0		0	0	0
TOTALS		0	386	5709	9271	11954	12472	5513	118		(7) 45423	6106	4221

(1) Mileage is given northerly or southerly from North levee of Sacramento By-Pass. Asterisk indicates land irrigated is in By-Pass area.
(2) 20" unit installed in 1936.
(3) This is the total acreage served by this plant and the one at Mile 3.4 N.
(4) See acreage note for plant at Mile 2.4 N.
(5) See Knights Landing Ridge Cut diversions, Mile 6.3
(6) Mileage is given easterly from Sacramento River.
(7) Includes 8174 acre-feet included also in diversions listed under Butte Slough. See footnote (5) West Borrow Pit of Sutter By-Pass diversions, this table, and footnote (2) Butte Slough Diversions, Table 35.

TABLE 37

FEATHER RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet							Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
Sutter Basin Corporation	0.6 R	1-16"			NO DIVERSION								
Sutter Basin Corporation	2.6 R	1-20"					1020	2514			3534	1698	
		1-26"											
California Lands Incorporated	6.44 L	1-8"			NO DIVERSION								
M. Scheiber	7.7 L	1-8"				122	109	91	76		398	175	
-- NICOLAUS GAGING STATION - MILE 9.3 --													
-- NICOLAUS BRIDGE - MILE 9.4 --													
George Pollock Company	9.75 R	1-20"			62	147	406	119	33		767	605	
Garden Highway Mutual Water Co.	13.1 R	1-20"											
		1-24"	216	832	1206	1461	1508	1313	394	156	7086	(1) 1182	440
Feather River Water Company	16.35 R	1-14"	113			244	337	80	208		982	236	
Plumas Mutual Water Company	17.5 L	1-22"			487	1842	2080	1408	1263	976	8056	1482	
G. C. Shannon	18.25 R				PLANT REMOVED								
G. C. Shannon	18.75 R	1-6"				60	66	19	27		172	67	
Oswald Water District	21.4 R	1-16"	273	208	481	1267	1176	1045	562	20	5032	686	
Alicia Mutual Water Company	24.0 L	1-26"											
		1-30"		67	1718	2546	2098	1467	1520	558	9974	771	187
Cunningham Brothers	25.2 R	1-10"			NO DIVERSION								
R. Saturi (2)	27.0 L	1-10"			NO DIVERSION								
-- MOUTH OF YUBA RIVER - MILE 27.3 --													
-- YUBA CITY-MARYSVILLE BRIDGE - MILE 28.0 --													
Levee District No. 1 (3)	28	Gravity		NO	SUMMER DIVERSION								
J. L. Sullivan	33.9 R	1-10"	166	54	72	107	140	34	47		620	150	
Sutter Butte Canal Company	38.1 R	2-42"											
(Sunset Plant) (4)		1-26"			NO DIVERSION(4)							(4)	(4)
Pacific Highway Orchards Tract (Charles Cottrell)	43.7L (5) H.S1.0.4L	1-18"			NO DIVERSION								
Ogden Estate	43.7L (5) H.S1.0.7L	1-4"				5	5	5	2		17	13	
Moznett-Wetmore Subdivision No. 1 (Charles St. Claire)	43.7L (5) H.S1.1.2L	1-10"		6	15	79	67	32	25		224	126	
Manuel Barba	43.7L (5) H.S1.1.25L	1-8"		5	30	25	56	35	49	3	203	65	

* Mileage along river above mouth.

(1) Includes 250 acres on adjoining lands of Brown and Purington.

(2) Installed in 1934. Not previously reported.

(3) New point of diversion. First used Winter of 1935-36.

(4) See Sutter Butte Canal Company's diversion. at Mile 58.1 Right.

(5) Plant diverts Feather River water backed into Honcut Slough. Slough is tributary to Feather River at Mile 43.7 Left. Mileage of plant above mouth of Honcut Slough is indicated.

TABLE 37 (CONTINUED)

FEATHER RIVER DIVERSIONS

Water User	* Mile and Bank	Number and Size of Pump	Monthly Diversions in acre-feet								Total Diversion: March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
A. P. Barba (John Bettencourt)	47.9 L	1-12"				283	236	173	145		837	128	
E. F. Biggs	48.3 L	1-10"					156	151			307	290	
Clyne Ranch (Penecaldo) (1)	51.0 R	1-6"				19	39	19			77	(2) 46	
C. E. Porter	51.1 L	1-7"					116	9	3		128	(3) 75	
Edward Steadman	51.4 R	1-10"				9	237	139			385	105	
California Lands Incorporated	51.6 R	1-5"			NO	DIVERSION							
W. E. Blower	52.1 L	1-9"				41	32	31	21	3	128	90	
California Lands Incorporated	52.5 L	1-6"					13	5			18	40	
F. L. Morris	52.7 L	1-8"			31	28	19	7	6	5	96	83	
Frank Dutra	52.9 R	1-6"				4	14	16			34	30	
G. H. Bogue	53.1 R	1-6"			17	15	22	26	7	2	89	40	
Budh Singh	54.7 R	1-8"					70	20			90	57	
Hearst Estate (Sunical Packing Co.)	55.1 L	1-14"			3	351	394	256	132	61	1197	358	
L. A. Kister Estate	55.5 L	1-8"				15	239	102			356	122	
Rio Bonita Ranch	56.6 R	1-14"			NO	DIVERSION							
J. H. Abbey	56.8 R	1-8"			NO	DIVERSION							
Alvin Kister	57.0 L	1-8"				49	115	67	10	11	252	51	
J. E. Carrico	57.0 R	1-8"			NO	DIVERSION							
Henry Haselbush	57.9 R	1-10"			25	11	37	30		36	139	48	
Sutter Butte Canal Company	(4) 58.1 R	Gravity	10025	58403	57161	57907	52651	36134	17814		290095	13969	9369
Richvale Irrigation District	(4) 58.1 R	Gravity	2005	11683	11435	11584	10533	7229	3564		58033	384	6962
Western Canal Company	59.7 R	Gravity	934	18442	14676	18849	18178	8481	10207		(5) 89767	818	9588
-- U.S.G.S. OROVILLE GAGING STATION --MILE 65 --													
TOTALS			768	14136	92675	92002	99147	90575	56374	33416	479093	23990	26546

*Mileage along river above mouth.

(1) Formerly Paul Wagner (Clyne Ranch).

(2) Includes 15 acres on adjoining Steadman property.

(3) Includes 65 acres on adjoining Robinson property.

(4) This is a common point of diversion for Sutter Butte Canal Company and Richvale Irrigation District. Ownership in the water is divided five-sixths to Sutter Butte Canal Company and one-sixth to Richvale Irrigation District and the total measured diversion has been arbitrarily divided in this ratio to give the diversion for each as here given.

(5) The Oct. figure includes 9788 ac.ft. There was an additional diversion of 10818 acre-feet in November. These diversions were for flooding gun clubs in Butte Basin. (See Lower Butte Creek diversions).

TABLE 38

YUBA RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
-- SEVENTH STREET BRIDGE - MILE 0.9 --													
California Lands Incorporated	0.9 L	1-5"						2	1	1	4	5	
Davis Brothers	1.6 L	1-12"				41	120	145	55		361	(1)123	
Charles Shingle (2)	1.8 R	1-5"				13	15	13	8	3	52	15	
G. E. Edwards (3)	1.9 L	1-6"					8	14	9	2	33	15	
Virge Cox (2)	3.0 L	1-10"					9	10	4		23	12	
Ward Hughins (2)	3.0 R	1-6"				9		17	18		44	30	
E. O. Rubke	4.1 L	1-8"			9	49	116	106	28		308	125	
S. J. Monaco	4.3 R	1-4"			1	1	18				20	8	
Earl Fruit Company & Dinsmore	4.75L	1-10"					16	32	5		53	(4) 55	
Wm. M. Dinsmore	4.9 L					PLANT		REMOVED					
Dantoni Orchards (Earl Fruit Co.)	5.3 L	1-8"			40	20	39				(5) 99	70	
Marysville River Farms Co. (L. A. Plantz)	5.9 L	1-10"					59	50	55		164	60	
Marysville River Farms Co. (J.V.Pearson & J.Nagler)	6.35L	1-10"				70	138	78	25		(6) 311	75	
Marysville River Farms Co. (L. A. Plantz) (2)	6.35L	1-5"						10			(7) 10	15	
Hallwood Irrigation Company and Cordua Irrigation District (8)	11.0 R	Gravity		9435	11246	10036	9509	9249	7426	3721	60622	4498 (8)	2665 (8)
Yuba Consolidated Gold Field Co. (9)	14.5 L	Gravity		274	283	274	283	283	274	283	(10)1954	96	
TOTALS			0	9709	11579	10513	10330	10009	7908	4010	64058	5202	2665

* Approximate mileage along river above highway crossing at Marysville.

(1) Includes 20 acres on adjoining Newberry lands.

(2) New installation 1936.

(3) Plant installed in 1935 but not previously reported.

(4) Includes 20 acres on adjoining Pearson and Nagler property which was also irrigated from plant at Mile 5.3 Left.

(5) A portion of this diversion was used on the adjoining Pearson and Nagler property. See note for plant at Mile 4.75 Left.

(6) A portion of this diversion was used for the acreage reported under the Plantz unit at this same mileage.

(7) See note for 10" unit at this same mileage.

(8) Hallwood Irrigation Company and Cordua Irrigation District have a common point of diversion and common canal for about one-half mile; Diversion and acreage figures are for combined projects. Irrigated acreage is segregated as follows: Hallwood - Rice 535, General 4053; Cordua - Rice 2130 (includes 480 outside of district), General 445.

(9) Formerly W. P. Hammon.

(10) Continuous gravity diversion. Water is used on Orange Grove and surplus returns to river via dredger ponds and rock piles.

TABLE 39

AMERICAN RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
-- GARDEN HIGHWAY BRIDGE - MILE 0.2 --												
-- AUBURN BOULEVARD BRIDGE - MILE 1.9 --												
-- SACRAMENTO NORTHERN RAILROAD BRIDGE - MILE 2.0 --												
-- WESTERN PACIFIC RAILROAD BRIDGE - MILE 2.1 --												
North Sacramento Land Company	2.4 R	1-6"					12	12			24	(1) 35
North Sacramento Land Company	2.55 R	1-3"			NO	DIVERSION						
North Sacramento Land Company	2.8 R	1-5"					4	5			9	(2) 35
G. A. Meister (Azeveda)	3.1 L	1-10"				1					1	5
-- SOUTHERN PACIFIC RAILROAD BRIDGE - MILE 3.5 --												
G. A. Meister (Azeveda)	3.7 L	1-4"										
		1-6"				30	10		10		50	16
G. A. Meister (Azeveda)	4.1 L	1-10"		6	20	26	15	19	14	3	103	61
-- GAGING STATION - AMERICAN RIVER AT SACRAMENTO - MILE 6.1 --												
R. and E. G. Cutter	6.7 L	1-7"			PLANT	REMOVED						
C. M. Cutter	6.8 L	1-5"			PLANT	REMOVED						
S. H. Cowell	7.1 L	1-7"				1	8		5	6	20	20
E. Clemens Horst	7.5 R	1-8"					85				85	104
Haggin Bottom Land Company	7.7 R	1-4"			NO	DIVERSION						
Haggin Bottom Land Company	7.8 R	1-4"				23	23	9	6	1	62	55
J. H. Kerby	9.0 L	1-6"			22	10	22	15	1		70	45
Azeveda Dairy (3)	9.2 R	(4)1-12"					86	74	30		190	55
M. Oji	9.2 L	1-8"		18	7	9	17	13	9		73	50

* Mileage along river above mouth.
** All general crops. No rice.
(1) See plant at Mile 2.8 Right.
(2) Total acreage served by this plant and one at Mile 2.4 Right.
(3) Formerly Sierra Oaks Dairy.
(4) Replaces former 10" unit.

TABLE 39 (CONTINUED)

AMERICAN RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
C. E. Wells	9.35 L	1-8"				1	16				17	(1)
C. E. Wells	9.5 L	1-5"				5	11				16	(2) 50
C. E. Wells	9.55 L	1-5"			NO	DIVERSION						
Henry Cowell	9.6 L	1-6"			NO	DIVERSION						
Haggin Bottom Land Company	10.2 R	1-8"				7	59	33	6		105	115
Guy H. Roddan	10.3 L	1-10"		18	20	20	33	23	10	3	127	27
Gold Nugget Orchard Co.(E.A.Boyle)	10.4 R	1-5"				17	15		28		60	17
Haggin Bottom Land Company	10.5 R	1-6"			NO	DIVERSION						
Mucke Sand and Gravel Company	11.2 L	1-6"		3	6	7	5	4	5	4	34	20
J. T. Gore Estate	11.5 L	1-6"			NO	DIVERSION						
Wm. A. Meyer	11.7 L	1-4"				10	14	8		7	39	27
Harry Nakatomi	11.7 L	1-5"					17	21			38	35
H. T. Danielson	13.1 R	1-5"					4	8			12	10
P. Osterli	13.2 R	1-6"			10	26	37	5			78	55
Mary Deterding	13.9 R	1-6"			2	36	45	26	13	2	124	77
Mary Deterding	14.7 R	1-4"					11				11	(3)
Mary Deterding	15.1 R	1-6"					31				31	(4) 45
Carmichael Irrigation District	16.0 R	1-12"										
		1-8"	44	267	268	557	624	728	529	324	3341	1523
		1-6"										
William H. Devlin	17.1 R	1-6"					4	2	1		7	10
-- GAGING STATION - AMERICAN RIVER AT FAIROAKS - MILE 19.2 --												
Totals			44	312	355	786	1208	1005	667	350	4727	2492

* Mileage along river above mouth.
** All general crops. No rice.
(1) See acreage note for plant at Mile 9.5 Left.
(2) This is the total acreage served by this plant and the one at Mile 9.35 Left.
(3) See plant at Mile 15.1 Right.
(4) This is the total acreage served by this plant and the one at Mile 14.7 Right.

TABLE 40

DELTA UPLANDS DIVERSIONS FROM CACHE SLOUGH

Water User	Location	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	* Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
Reclamation District No. 2058	SW¼ NE¼ Sec.34 T6N, R1E.	1-36" 1-30"			2264	1426	2088	1847	1153	745	9523	2450

* All general crops. No rice.

TABLE 41

DELTA UPLANDS DIVERSIONS FROM OLD SAN JOAQUIN RIVER

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
East Contra Costa Irrigation District	36.5 L (1)	2-30" 1-24" 1-18"	177	1528	6459	3785	6553	4241	3141	1397	27281	13058
Byron-Bethany Irrigation District	40.9 L (2)	1-30" 1-26"	47	571	1870	1820	2437	2635	1343	1406	12129	6949
Joe Santos	44.6L(3)	1-7"			5	29	41	7	17		99	50
E. H. Stevenson Estate	45.3 L	1-12"			NO	D I V E R S I O N						
H. Lindeman	47.2 L	1-12"								104	104	100
A. F. Nunes (4)	47.2 L	1-10"			83						83	100
West Side Irrigation District	47.65L(5)	7-15"	165	2446	2735	1663	3985	1845	1433	1904	16176	7354
Langeman and Froese	48.7 L	1-8"		18	28		41	40	13		140	75
Naglee Burke Irrigation District	50.4 L	1-16" 1-18"		635	770	974	977	808	735	367	5266	1838
Freemont Irrigation Association	50.9 L	1-14"	9	99	227	219	343	343	201	33	1474	513
Joe Freitas	51.0 L	1-8"			8	9	8	5	3	1	34	30
Attilio Casserini	51.2 L	1-8"			4	2	3	8	3		20	40
Excelsior Ranch	52.4 L	1-10"	22	13	46	120	104	62	69	27	463	(6) 125
-- TOM PAINE SLOUGH - MILE 54.3 --												
Totals			420	5310	12235	8621	14492	9994	6958	5239	63269	30232

* Distance along river from its mouth 4½ miles below Antioch. Mileage as established by War Department Survey of 1913-15.

** All general crops. No rice.

(1) To junction of Old River and Indian Slough. Pumping plant is located two and one-half miles west along Indian Slough.

(2) To junction of Old River and Italian Slough. Pumping plant is located two and three-fourths miles southwest along Italian Slough and extension cut.

(3) Plant is on cut which joins river at Mile 44.6 Left.

(4) Formerly listed as A. F. Noonis.

(5) To junction of Old River with Intake Cut. Pumping plant is located one mile south along Intake Cut.

(6) Includes 50 acres on Stevinson Estate (See Tom Paine Slough Mile 0.7 S).

TABLE 42

DELTA UPLANDS DIVERSIONS FROM TOM PAINE SLOUGH

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion: March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
Stinson Estate Company	0.7 S	2-18"		86	150	190	274	211	107	157	1175	(1)933
Stinson Estate Company	1.2 S	1-18"		71	41	61	61	30			264	(2)
Holly Western Sugar Co.	(3)2.1 S	1-12"					47	160	156	160	(4) 523	360
Tracy Clover Irrigation District	(3)2.1 S	1-16"		140	177	168	184	194	153	140	1156	451
Pescadero Reclamation Dist. #2058	(5)											
Plant Number 1	2.9 S	1-12"		38	71	40	103	68	73	39	432	(6)2706
Plant Number 3	6.3 S	1-24"		442	1020	980	1351	1332	1061	730	6916	(7)
Plant Number 5	8.3 S	1-12"	38	145	151	123	309	227	83	55	1131	(7)
Plant Number 5A	9.0 S	1-12"		68	70	108	140	151	76	27	640	(7)
Totals			38	990	1680	1670	2469	2373	1709	1308	12237	4450

* Distance along Tom Paine Slough from its mouth which is at Mile 54.3 on Old San Joaquin River (War Department Survey of 1913-15.)

** All general crops. No rice.

(1) This is the total acreage served by this plant and the one at Mile 1.2 S. Figure includes 407 acres on adjoining lands. An additional 50 acres served from Excelsior Ranch (Old San Joaquin River, Mile 52.4 Left).

(2) See acreage note for plant at Mile 0.7 S.

(3) To junction of Tom Paine Slough and dredger cut. Pumping plant is located 1½ miles south along dredger cut.

(4) This diversion used in sugar factory for washing and cooling purposes before putting onto the land.

(5) Formerly Farmers Developed Lands Company.

(6) This is the total uplands area (South of Tom Paine Slough) irrigated from all Pescadero Reclamation District plants on Tom Paine Slough.

(7) See plant at Mile 2.9 S.

TABLE 43

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER

Water User	*Mile and Bank	Number and Size of pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
-- GARWOOD BRIDGE - MILE 45.3 --												
Annie Jury (1)	45.55 R	1-6"			2	5	24	6			37	20
Paul Weston	46.3 R	1-12"				31	21	16	13		81	61
		1-6"(2)				12	13	10	6		51	13
R. C. Rose (3)	46.65 R	1-8"			10	45	58	54			157	155
Wilhoit and Hammell (3)	46.85 R	1-10"					2				2	2
T. J. Wolfe (4)	47.2 R	1-5"						1			1	1
Wolfinger Brothers	47.3 R	1-10"			29	54	39	126	137	10	395	225
John Haack	48.0 R	1-12"	1	1	6	6	8	11	5	4	42	9
H. G. Learned	48.3 R	1-4"		2	4	6	3	5	5	3	28	18
H. G. Learned (Yoshido)	48.5 R	1-3½"	3	3	47	8	44	46	16	5	172	(5) 80
Joe Calcagno	48.5 R	1-6"	1	6	9	10	15	21	12	5	79	(6) 80
F. Piccardo, J. Vigliani and A. Calcagno	48.6 R	1-6"										
G. B. Figari (J. Calcagno)	48.7 R	1-5"				9	15	16	2		42	60
M. O. Couper (7)	49.0 R	1-10"				4	7	3			14	45
Mettler, Cross and Drury (S. B. Chapman)	49.5 R	1-14"			33	32	29	8	36	20	158	100
A. A. Rodgers	50.1 R	1-10"			40	10	32	9	27		118	40
-- BRANDT BRIDGE - MILE 50.2 --												
Brandt Brothers	50.4 R	1-6"	2	4	6	3	7	8	4	2	36	(8) 67
Frank Reichmuth	50.4 R	1-8"		9	18	31	38	31	34	5	166	80
Brandt Brothers	50.8 R	1-6"										
		1-7"	10	17	28	21	34	29	16	11	166	(9)
		1-10"										
California Lands Incorporated (3)	52.4 R	1-6"				9	9	5	1		24	30
Joe Margre (3)	52.9 R	1-5"		5	11	15	15	14	5		65	20
California Lands Incorporated	53.2 R	1-12"			67	2	66	51	14		200	120
E. DeLima	53.4 R	1-8"	4		15	7	17	14	10	2	69	30
M. DosReis	53.7 R	1-12"	30	70	109	135	257	145	94	64	904	396
R. E. Albertson (7)	54.9 R	1-10"				33	39	48	32	26	178	66

* Distance along San Joaquin River from its mouth four and one-half miles below Antioch. (Mileage as established by War Department Survey of 1913-15).

** All general crops. No rice.

(1) Old installation. Not previously reported.
(2) 6" unit added in 1936.
(3) New installation 1936.
(4) Formerly August Eisele.
(5) Includes 20 acres on adjoining property.
(6) Piccardo 40, Bigliani 40, Calcagno 0.
(7) New installation 1936 at an old point of diversion.
(8) This is the total acreage served by this plant and the one at Mile 50.8 Right.
(9) See Brandt Brothers at Mile 50.4 Right.

TABLE 43 (CONTINUED

DELTA UPLANDS DIVERSIONS FROM SAN JOAQUIN RIVER

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
-- JUNCTION WITH MIDDLE RIVER - MILE 56.2 LEFT --												
Oakwood Stock Farm	57.0 R	1-14"			114	159	104	85	47		509	(1) 170
James Tobin	57.15R	1-7"			NO	DIVERSION						
T. J. Dutmall	57.3 R	1-3"			NO	DIVERSION						
A. J. Thomson	57.3 R	1-5"			NO	DIVERSION						
G. Gardella Company	57.5 R	1-4"		8	10	12	10	6	4	1	51	10
V. Sanguenetti	58.4 R	1-2½"		1	1	1	2	2	1		8	4
G. B. Figari (G. Alfieri)	58.6 R	1-3"		1	1		2				4	1
R. Mauro	58.7 R	1-4"				1	1				2	3
-- MOSSDALE BRIDGE - MILE 58.9 - RECORDING GAGE --												
C. C. Abersold	59.25R	1-6"	4	6	33	6	22	41	29	12	153	33
H. A. Niestrath (Madruga)	59.3 R	1-14"			22	36	13	62		37	170	150
H. A. Niestrath (Madruga)	60.1R(2)	1-6"			6	17	17	20	7	13	80	50
-- JUNCTION WITH PARADISE CUT - PARADISE DAM - MILE 62.2 LEFT --												
Banta Carbona Irrigation District	67.5 L	1-36"										
		3-24"	1428	7298	5959	3287	10184	7307	2780	1573	39806	15243
		2-20"									(3)	(4)
McMullin Reclamation Dist. #2075	71.0 R	1-16"		46	258	140	415	312	107	11	1289	1200
Mortensen, Anderson & Whitman	73.2 R	1-12"				19	87	102	116	51	375	(5) 360
J. Lawrence	75.0 R	1-4"			NO	DIVERSION						
Henry Gard (6)	75.1 R	1-6"						3	4	2	9	10
J. W. Cannon	75.2 R	1-4"			NO	DIVERSION						
S. G. Paxton (7)	75.25R	1-5"					2	7	7		16	17
R. R. Swank	75.35R	1-4"						1	2	6	9	9
R. N. Jansen	75.45R	1-6"			NO	DIVERSION						
Ralph Martin (Simpson)	75.7 R	1-7"			NO	DIVERSION						
Ralph Martin (Loe Wan)	76.2 R	1-6"						4	2	2	8	15
--- U.S.G.S. GAGING STATION - SAN JOAQUIN RIVER NEAR VERNALIS - MILE 76.7 --												
Totals			1483	7467	6838	4166	11651	8629	3575	1865	45674	18993

* Distance along San Joaquin River from its mouth four and one-half miles below Antioch. (Mileage as established by War Department survey of 1913-15).

** All general crops. No rice.

(1) Oliveria 100, Solveiria 70.

(2) Up Walthall Slough .2 mile and opposite this mileage on river.

(3) Additional diversions (acre-feet) November 827, December 229.

(4) Includes 2000 acres outside of district.

(5) Mortensen 232, Anderson 65, Whitman 63.

(6) New installation 1936.

(7) Formerly A. A. H. Beck.

TABLE 44
SAN JOAQUIN RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	Acreage Irrigated	
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		General	Rice
-- U.S.G.S. GAGING STATION - SAN JOAQUIN RIVER NEAR VERNALIS - MILE 76.7 --													
River Junction Farms Company #2	79.1 R	1-14"			NO	DIVERSION							
-- STANISLAUS RIVER - MILE 79.7 RIGHT --													
-- MAZE ROAD BRIDGE (NEWLY COMPLETED) - MILE 81.85 --													
W. C. Blewett	81.95L	3-12"		63	315	234	288	258	197	207	1562	1390	
El Solyo Ranch	82.05L	3-18"	239	860	1801	1207	2480	2378	1745	1560	12270	3363	
		1-12"											
-- GAGING STATION - SAN JOAQUIN RIVER AT HETCH HETCHY WATER SUPPLY CROSSING - MILE 82.65 --													
-- TUOLUMNE RIVER - MILE 91.0 RIGHT --													
West Stanislaus Irrigation Dist.	91.8 L	3-26"	4018	6791	5402	13003	11214	4785	1820	783	47816	20606	
White Lake Ranch #1	91.8L(1)	1-6"			NO	DIVERSION							
White Lake Ranch #2	91.8L(1)	1-8"			NO	DIVERSION							
White Lake Ranch #3	91.8L(1)	1-8"			NO	DIVERSION							
-- LAIRD SLOUGH BRIDGE - GAGING STATION - SAN JOAQUIN RIVER NEAR GRAYSON - MILE 96.05--													
Rancho El Pescadero (C.L.Jones)	98.9 L	1-16"			510	20	333	130	31		1024	550	
Patterson Water Company	104.4 L	4-26"											
		1-18"		4143	6463	6046	7602	6471	5647	617	36989	13507	
		1-14"											
Wisnom and Ross (C.C.Jones)	104.5 R	1-10"			50	9	22	41	33		155	170	
Mortgage Guarantee Company	106.5 R	1-10"			15	1	1				17	70	
Patterson Ranch Company	109.8 L	2-16"	254	823	831	1050	1302	1410	874	413	6957	1537	160
		1-8"											
E. Ustick	112.55R	1-12"			110	106	148	167	113	110	754	200	
-- CROWS LANDING BRIDGE - MILE 113.4 --													
James J. Johnson	113.5 R	1-10"			NO	DIVERSION							
A. J. Silviera	113.85R	1-6"			1	11	26	25	8	4	(2) 75	(2)39	
A. J. Silviera	114.35R	1-7"									(2)	(2)	
King Ranch	114.95R	1-10"			NO	DIVERSION							
L. B. Crow (Catrina & Machado)(3)	116.05L	1-12"		64	110	106	76	112	74	28	570	(4)290	
Oscar Hogan	116.45R	1-12"				61	75	75	61		(5) 272	90	
C. F. Olinger (6)	116.95R	1-12"					27	27	11	7	72	50	
-- U.S.G.S. GAGING STATION - SAN JOAQUIN RIVER NEAR NEWMAN - MILE 123.7 --													
-- MERCED RIVER - MILE 123.75 R --													
J. J. Stevinson Corporation	129.4 R	1-10"			NO	DIVERSION							
-- FREMONT FORD BRIDGE GAGING STATION - MILE 129.5 --													
-- DELTA BRIDGE (TURNER ISLAND) GAGING STATION - MILE 158.7 --													
Totals			4511	12744	15608	21854	23594	15879	10614	3729	108533	41862	160

* Mileage along San Joaquin River from its mouth four and one-half miles below Antioch. Mileage was formerly given above Durham Ferry Bridge Mile 76.7.

(1) Pump is on out leading to West Stanislaus Irrigation District.
(2) These are the combined diversion and acreage figures for the plants at Miles 113.85 Right and 114.35 Right.
(3) Formerly L. B. and E. M. Crow.
(4) Catrina 90, Machado 200.
(5) Record of operation refused. Estimated diversion based on past operations and acreage irrigated.
(6) Plant installed in 1920 but not previously reported.

TABLE 45

MERCED RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in acre-feet								Total Diversion March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
-- GAGING STATION - MERCED RIVER NEAR MOUTH - MILE 1.1 --												
Stevinson Water District	3.8 R	1-15"			180	193	237	330	295	120	1355	600
Floyd Stevinson	4.0 L	1-8"		22	45	32	23	9	2	1	134	51
J. Grey and W. E. Mitchell (1)	4.2 L	1-4"			NO	DIVERSION						
H. DeAngeles	5.8 L	1-10"		9	34	43	63	61	49	6	265	80
J. F. Peck	6.1 L	1-18"		23	68	71	198	82	74	3	519	90
Stevinson Water District	6.25 L	1-6"			20	3	15	22	1		61	55
Stevinson Water District	6.55 L	1-15"			NO	DIVERSION						
Francis Hartman	8.5 L	1-12"			135	3	4	40			182	100
Mary Collier	8.85 L	1-8"(2)		6	32	10		31	79	8	166	75
Grace McCullagh	9.4 L	1-10"			304	317	160	243	127	108	1259	180
R. W. Adams and J. B. Silva	10.35 L	1-10"										
		1-8"		161	307	253	240	225	165	7	1358	412
W. D. Adams	10.85 L	1-5"(3) 1-12"	19	154	100	272	238	206	104	67	1160	408
C. G. McLaughlin	11.4 L				PLANT:	DISMANTLED						
C. G. McLaughlin	11.55 L	1-4"			1	1	3	3	2		10	7
H. F. Milliken Estate	11.6 L	1-10"			139	184	70	7			400	80
J. Regello	11.6 L	1-12"					19	2			21	10
-- NEW MILLIKEN BRIDGE - MILE 11.65 --												
M. Azevedo (1)	12.35 L	1-10"					46	196	177	17	436	(4)103
Pacific Coast Joint Land Bank (5)	12.85 L	1-10"										
		1-6" (6)			222	203	187	261	95		968	(7)273
California Lands Incorporated	16.5 L	1-12"		38	43	76	96	70	30	2	355	95
Merced River Farms Company	17.05 L	1-6"			1		8	2			11	11
-- U.S.G.S. GAGING STATION - MERCED RIVER NEAR LIVINGSTON - MILE 17.1 --												
R. G. and G. L. Woodward	17.3 L	1-6"							2		2	3
		1-4"(8)									(9) 5	4
R. G. and G. L. Woodward	17.65 L	1-3"					1	1	3			
O. B. Daniels (Jordan) (10)	17.7 L	1-5"					2	2	2	1	7	(11) 5
C. P. Hockett and F. Simpkins	18.7 L	1-6"					14	14	9	2	39	(12)32
J. A. McDonough	19.3 L	1-6"			NO	DIVERSION						

* Mileage along river above mouth.

** All general crops. No rice.

(1) New installation 1936.

(2) Replaces 15" unit.

(3) 5" unit added in 1936.

(4) See acreage note for plant at Mile 12.85 Left.

(5) Formerly Bettencourt, Neves and Azevedo.

(6) 6" unit added in 1936.

(7) Of this acreage 73 acres were partially irrigated from plant at 12.35 Left.

(8) 4" unit added in 1936.

(9) A portion of this diversion used on acreage reported at Mile 17.7 Left.

(10) Formerly Fred Griffith.

(11) See acreage note for plant at Mile 17.65 Left.

(12) Hockett 8, Simpkins and Shields 24.

TABLE 45 (CONTINUED)

MERCED RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
Geo. Bloss (G. T. White) (1)	20.3 R	1-3½"					1	1			2	4
John Reininghaus	20.4 L	1-6"	4	16	24	23	29	12	8		116	140
W. J. Hoskins (H. A. Carter) (2)	20.65R	1-3½"		1	1	5	2	2	5	1	17	12
-- SOUTHERN PACIFIC RAILROAD (MAIN LINE) - MILE 21.05 --												
Sunbeam Farm Company	21.1 R	1-6"			14	1	8	7	29	6	65	23
Wm. Collier (Cabrall and Co.)(3)	21.15R	1-6"				5	3	4			12	14
Wm. Collier (O.W.Harrison)	22.2 R	1-6"	1	5	101	89	97	78	67	8	446	170
		1-12"										
Wm. Collier	23.3 R	1-6"			113	78	112	112	54	9	478	52
M. McConnell	23.4 L	1-5"			NO	DIVERSION						
C. J. McConnell (Veiera & Santos)	24.2 L	1-5"				3	3	3	2		11	10
California Lands Incorporated	24.3 R	1-4"			NO	DIVERSION						
C. J. McConnell (Veiera & Santos)	24.5 L	1-6"				4	4		4		12	10
California Lands Incorporated	24.6 R	1-6"			NO	DIVERSION						
River Farms Association	26.3 R	1-8"			77	68	90	72	26		333	60
C. A. Laughlin	26.55R	1-4"			NO	DIVERSION						
-- SANTA FE RAILROAD CROSSING - MILE 27.05 --												
W. C. Magneson	27.6 R	1-10"		29	18		59	40	50	29	225	30
M. Nishihara (4)	27.8 R	1-4"		3	6	2		8	15	4	38	33
Y. Tanabe (Kube)	28.1 R	1-6"			NO	DIVERSION						
G. H. Lovely (Pierce)	28.4 R	1-4"						6	11	1	18	10
J. Campadoncia	28.6 R	1-6"			NO	DIVERSION						
D. J. Enright (5)	28.6 R	1-8"			16		43	33	11		103	80
C. L. Mehrton (Alves)	29.1 R	1-7"					16	23	8		47	52
Tony Demchilli (Bettencourt)	29.75R	1-6"				26	32	14	15		87	30
American National Trust Company (Firpo and Caraglio)	29.9 R	1-6"					41	29	25		95	50
California Lands Inc. (Maitoza)	30.2 L	1-6"			15	8		23			46	25
American National Trust Company (Firpo and Caraglio)	30.95R	1-12"			6	27	29	41	30		133	50
California Lands Inc. (Maitoza)	31.1 L	1-8"						26	19		45	25
-- SOUTHERN PACIFIC RAILROAD - OAKDALE BRANCH - MILE 32.52 --												
Pacific Coast Joint Land Bank (6)	32.9 R	1-6"						104			104	15
Pacific Coast Joint Land Bank (6)	33.55R	1-7"	2	1	147	91	288	128			577	43
C. P. Stout (W. Westfall)	39.2 L	1-24"		18	23	58	25	132	28	11	295	50
-- GAGING STATION (MERCED RIVER AT YOSEMITE VALLEY RAILROAD CROSSING) - MILE 42.1 --												
Totals			26	486	2192	2149	2426	2705	1623	411	12018	3662

* Mileage along river above mouth.
** All general crops. No rice.
(1) Installed 1934 but not previously reported.
(2) Installed 1933 but not previously reported.
(3) New installation 1936.
(4) Formerly California Lands Incorporated (Nishihara).
(5) Formerly R. K. Kynaston.
(6) Formerly L. Rusconi.

TABLE 46

TUOLUMNE RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet							Total Diversion: March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
John Caldwell	1.8 R	1-10"			NO	DIVERSION						
J. M. DeSousa	2.2 R	1-6"		5	2	7	19	20	16	7	76	20
E. B. Henry	3.1 R	1-16"(1)					80	80	58		218	50
-- GAGING STATION - TUOLUMNE RIVER AT TUOLUMNE CITY - MILE 3.35 --												
Bancroft Fruit Farm	4.1 R	1-10"	41	32	76	80	25	35	40	17	346	(2)260
Bancroft Fruit Farm	5.0 R	1-10"		12	43	58	76	78	9	73	349	(3)
Randolph Marketing Company	7.1 R	1-10"		30	116	81	112	70	127		536	200
R. S. Brown	7.8 L	1-10"			NO	DIVERSION						
W. F. Duffy	7.9 R	1-8"		11	11	1					23	15
		1-4"										
W. F. Duffy	8.4 R	1-10"			109	71	55	91	29		355	80
A. Holmes (Kissamos & Pavlakias)	10.2 R	1-11"		35	21	33	40	50		20	199	37
-- SOUTHERN PACIFIC RAILROAD (MAIN LINE) - MILE 15.8 --												
-- DRY CREEK INFLOW - MILE 16.5 RIGHT --												
-- SANTA FE RAILROAD - MILE 21.6 --												
-- SOUTHERN PACIFIC RAILROAD (OAKDALE BRANCH) - MILE 31.5 --												
-- GAGING STATION - TUOLUMNE RIVER AT HICKMAN BRIDGE - MILE 31.7 --												
Geo. H. Sawyer	39.8 L	1-6"			9	14	15	18	16	4	76	74
-- GAGING STATION - TUOLUMNE RIVER AT ROBERTS FERRY BRIDGE - MILE 39.9 --												
Totals			41	125	387	345	422	442	295	121	2178	736

* Mileage along river above mouth.
** All general crops. No rice.
(1) Replaces 12" unit.
(2) This is the total acreage served by this plant and the one at Mile 5.0 Right.
(3) See plant at Mile 4.1 Right.

TABLE 47

STANISLAUS RIVER DIVERSIONS

Water User	*Mile and Bank	Number and Size of Pump	Monthly Diversions in Acre-feet								Total Diversion March to October Acre-feet	** Acreage Irrigated
			Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.		
Frank Coker	1.1 R	1-6"			NO DIVERSION							
H. Sayler	1.6 R	1-7"			2		5	3			10	30
A. B. Kennedy	2.9 R	1-8"			NO DIVERSION							
Hatmark Ranch	5.25L	2-14"		108	135	127	152	288	166	110	1086	105
-- GAGING STATION - STANISLAUS RIVER AT HATMARK RANCH - MILE 5.3 --												
Bret Harte Water Users Association	5.9 R	1-20"		435	391	496	586	453	295	110	2766	1019
McMullin Reclamation Dist. #2075	5.95R	2-16"		14	94	219	624	116	95	28	1190	340
Henry Pelucca	6.7 L	1-15"		20	41	39	31	36	16	17	200	70
J. W. Updike	7.4 L	1-8"					15	5			20	45
S. M. Updike	8.2 L	1-12"					71	61	1		133	48
D. F. Koetitz	10.1 L	1-10"		150	145	210	162	151	139	89	1046	210
D. F. Koetitz	10.4 L	1-18"			NO DIVERSION							
-- SOUTHERN PACIFIC RAILROAD BRIDGE (MAIN LINE) - MILE 15.9 --												
American Trust Company	18.5 R	1-12"				31	44	92	25	25	217	125
G. R. Stoddard	19.9 L	1-7"					2	28	10		40	25
Palo Alto Company	20.75R	1-14"				96	200	132	166	27	621	190
Heath Ranch	20.9 L	1-4"					29	36	30		95	18
Earl Fruit Company	21.75R	1-8"			30	38	31	6		23	128	88
-- MODESTO ESCALON BRIDGE - MILE 28.15 --												
-- SANTA FE RAILROAD CROSSING - MILE 31.85 --												
-- SOUTHERN PACIFIC RAILROAD (OAKDALE BRANCH) - MILE 39.0 --												
-- GAGING STATION - STANISLAUS RIVER AT ORANGE BLOSSOM BRIDGE - MILE 44.7 --												
Totals			0	727	838	1256	1952	1407	943	429	7552	2313

* Mileage along river above mouth.
** All general crops. No rice.

CHAPTER IV

MEASUREMENTS OF RETURN WATER

Sacramento Return Waters

In the Sacramento Valley the flow of all well defined channels carrying irrigation waters returned to the Sacramento River is measured and recorded. Table 49 lists these channels in downstream order and gives the total flow as computed from the measurements.

Between Colusa and Red Bluff there are no large well defined return channels. Records or estimates of all natural inflow from streams in this stretch of the river were, however, obtained. Above Red Bluff, from a point below Cottonwood to Redding, there is some return from the irrigation of the Anderson-Cottonwood Irrigation District but it is not recorded.

Return Flow from other than Sacramento River Sources

In the water returned to the Sacramento River as included in Table 49, it should be noted that practically all of that entering the river through Butte Slough is derived from Feather River diversions through the Western and Sutter Butte canals. Of the discharge entering through Sacramento Slough, that portion flowing down the East Borrow Pit of Sutter By-pass, is, also, practically all of Feather River origin.

Relation of Sacramento Return Water to Irrigation Draft

Tables 50 and 51 record the Sacramento River return water, July to September, inclusive, 1936, and indicate the relation between the return and the diversions from which it was derived. Since, in Tables 50 and 51, it is the purpose to show the return water from Sacramento River diversions only, the inflow from Butte Slough, East Borrow Pit of Sutter By-Pass, Back

Borrow Pit of Reclamation District 1000 and from the Feather and American Rivers has been excluded. In Table 50 is shown the relation to the diversions of that return water only which was measured at the well defined channels. With the records available for the discharge of the Sacramento River at Red Bluff, Butte City, Colusa, Wilkins Slough, Knights Landing, and Verona and all diversions between these points recorded, as well as the Feather River and other well defined inflows, it is possible to compute what should represent the total water returned to the river between each of these points, including not only the flow in the definite channels which were measured, but all seepage, groundwater return, etc., which could not be directly measured. The figures for the return water computed in this manner and the relation of this return to the draft is shown in Table 51. It should be noted, however, that the return shown for the Verona-Sacramento section is only that contributed by the measured drains since, as explained in Chapter II, the total return in this section including all accretions, is not susceptible of computation in the manner outlined because of the fact that no record of low water flow actually measured at Sacramento is available.

The data in Tables 50 and 51 show that seepage, groundwater return, etc., (for the period July-September, Inclusive) which could not be directly measured, amounted to 15 per cent of the irrigation draft, the direct return in definite channels 32 per cent, and the total return 47 per cent.

A comparison of the accumulated return water and the accumulated irrigation draft, in downstream order, Red Bluff to Sacramento, for the period July to September, inclusive, 1936, is shown on Plate 1. This shows also for the same period, the average discharge, inflow and draft at all

points in this stretch of the river. The return water line is plotted from the data of Table 51.

Draft-Return Water Relation for Particular Sacramento Valley Areas

In the Sacramento Valley there are certain units or districts which are set apart physically by levees or otherwise, so that the direct return water in each district may be readily segregated when the records of all diversions to and discharges from the unit are available. Included in such units are, the area above the Colusa-Williams Highway Crossing of Colusa Trough, Reclamation District 108, and Reclamation District 1500. The relation between draft and return water for the Colusa Trough area is shown in Table 52 and for Reclamation Districts 108 and 1500, in Tables 53 and 54.

Tables 57 to 68, inclusive, present in detail the discharge records for the Sacramento Valley return water channels.

San Joaquin Return Waters

In the 1936 San Joaquin Valley return water measurements, the gaging stations were located at the same points as in previous years beginning with 1928, and the same methods were followed. A continuous record of the discharge during the season was obtained at an upper and lower station on each stream: San Joaquin, Merced, Tuolumne and Stanislaus Rivers. On all but the Stanislaus, continuous records of discharge were also obtained at intermediate stations - four on the San Joaquin River, (1) at Fremont Ford Bridge, (2) just below the junction with the Merced River (maintained by the U. S. Geological Survey and referred to as "San Joaquin River near Newman"), (3) near Grayson (Laird Slough), and (4) at the Hetch Hetchy Water Supply Crossing below the Tuolumne River inflow; one on the Merced

River near Livingston; and one on the Tuolumne River at Hickman Bridge. In June of 1936 high water from natural flow had the effect of vitiating return water determinations from the measurements for that month so that the 1936 figures are only given beginning with July. Measurements and records of all pumping diversions between stations on each stream were obtained, thereby completing the necessary data for the computations of the return water. The records for the gaging stations are given in Chapter II, Tables 15 to 29, inclusive, and the diversion records for the San Joaquin streams above Durham Ferry Bridge, are given in Chapter III, Tables 44 to 47, inclusive.

Table 55 gives the results of the San Joaquin return water measurements and Table 56 shows a comparison of the return water with the irrigation draft in the San Joaquin Valley. Plate 2 depicts the accumulated return water on the San Joaquin River in downstream order, Delta Bridge to Vernalis gaging station, for the period August to October, inclusive, 1936, and shows also for this period, the average discharge, inflow and draft at all points in this stretch of the river.

Comparative Sacramento and San Joaquin Return Water, 1924 to 1936

Comparative figures, 1924 to 1936, for the Sacramento and San Joaquin seasonal return water in per cent of the irrigation draft are shown in Table 48. Figures for the seasonal stream flow in per cent of the 40-year mean 1889-1929, of the Sacramento River at Red Bluff and the San Joaquin River and its three main tributaries above the Vernalis gaging station are given also in order to show what relation, if any, there may have been between the variation from year to year in the run-off and the variation in the return water percentages. With respect to the Sacramento River data, there appears to be a fairly close relationship between the seasonal run-

off at Red Bluff and the return flow percentages. The higher return flow percentages occurred in the years of good run-off and the decrease in percentage in the years when the run-off was greatly below normal is quite marked. This is undoubtedly a reflection of the conservation and waste prevention measures effected in the seasons of low water supply. In these seasons, the spill from the rice fields and all controllable wastes were practically eliminated in order that the river diversions might be reduced accordingly. The latter, then, approached more nearly the actual consumptive requirements of the crops so that the return flow percentage was considerably smaller. In the seasons of less critical water supply and correspondingly less urgent demand for conservation, the greater facility in irrigation operations obtained by larger diversions and correspondingly greater wastes and spill, may offer an explanation of the larger return water percentages in these seasons. In the years of more normal stream flow there probably occurs also, a greater accretion from groundwater storage, etc., and in this event the additional return from this source should not, strictly speaking, be included in the percentage figures since this would not be a return derived from the irrigation draft.

In the case of the San Joaquin return water data there appears to be no such definite relation between the seasonal flow of the San Joaquin River and its tributaries in per cent of normal and the return water percentages. This may be due to the regulation which occurs in Lake Mc Clure on the Merced River, Don Pedro Reservoir on the Tuolumne River and Melones Reservoir on the Stanislaus River. It is to be noted that in some years the period used in the comparison of return flow and diversions makes considerable difference in the percentage figures, and further, that for the period August-September only, the percentage is nearly always greater

than when the July-September period is used. Under the suspicion that there may be a considerable lag between the diversions and corresponding return flow, the figures in the last column of Table 48 were compiled to show the August-September return flow in per cent of the July-August diversions. These percentages still seem to bear no definite relation to the seasonal run-off percentages but their variation from year to year is somewhat reduced and a more or less constant percentage of return flow is indicated.

The average percentage of diversions occurring as return water in the San Joaquin River is shown to be considerably smaller than that for the Sacramento River. This difference may probably be attributed to the fact that, whereas, due to basin topography, practically all drainage from Sacramento River diversions is quickly returned to the river; in the San Joaquin Valley, much of the drainage from the major foothill diversions may pass to the underground water and from there, in the lower areas of many of the irrigation districts, be recovered by drainage pumps for reuse in the irrigation canals. Considerable of the San Joaquin return, therefore, may never reach the river to be accounted for in the return water measurements.

TABLE 48

SACRAMENTO AND SAN JOAQUIN RETURN WATER PERCENTAGES, 1924-1936

Year	Sacramento			San Joaquin River						
	Seasonal Run-off at Red Bluff in Per Cent of Normal *	Return Water in per cent of Diversions		Seasonal Run-off in per cent of Normal S.J. River and Tributaries**	Return Water in per cent of Diversions					Aug.-Sep. Return in Per Cent of Jul.-Aug. Diversions
		Jun.-Sep. Inc.	Jul.-Sep. Inc.		Jun. Sep. Inc.	Jul. Sep. Inc.	Aug. Sep. Inc.	Jul. Oct. Inc.	Aug. Oct. Inc.	
1924	36	33	33	24		35	41			29
1925	86		(1)55	86			38			23
1926	61	49	45	55		28	32			22
1927	117	66	59	100			32			23
1928	82	49	46	67		28	28			23
1929	47	42	39	44		19	21			16
1930	65	55	47	50	20	21	22			17
1931	36	(2)33	32	26	(3)23	27	40			18
1932	54	56	47	101			26		29	21
1933	49	56	48	52		22	20	25	25	17
1934	48	45	41	35	(4)20	21	28	(5)25	33	16
1935	80		62	98		30	24	34	31	19
1936	76	56	47	100		31	25	35	32	20

* 40-year mean (1889-1929) of natural run-off.

** 40-year mean (1889-1929) of natural run-off at foothill stations of San Joaquin, Merced, Tuolumne and Stanislaus Rivers.

(1) July-October, inclusive, 59.
(2) May-September, inclusive, 34.
(3) May-September, inclusive, 19.
(4) May-September, inclusive, 20.
(5) June-October, inclusive, 23; May-October, inclusive, 21.

TABLE 49

WATER DISCHARGED TO SACRAMENTO RIVER ABOVE SACRAMENTO AS MEASURED AT DEFINITE RETURN CHANNELS

RETURN	Table Number	July		August		September		October		Jul.-Oct. Inclusive	
		Acre-feet	cfs.	Acre-feet	cfs.	Acre-feet	cfs.	Acre-feet	cfs.	Acre-feet	cfs.
Butte Slough (1)	58	7650	124	5160	84	14900	250	6330	103	34040	140
Reclamation District 70 Drain	59	1560	25	2230	36	589	10	246	4	4625	19
Reclamation District 108 Drain	60	4990	81	6030	98	5070	85	383	6	16473	68
Colusa Basin Drainage (2)	61	11600	189	18600	302	28100	473	10600	172	68900	282
Sacramento Slough (3)	62	19500	317	25000	407	26400	444	13800	224	84700	347
Reclamation District 1000 Drain	68	442	7	401	6	1380	23	313	5	2536	10
Back Borrow Pit Reclamation District 1000	None	0		0		0		0		0	
Totals		45740	744	57420	934	76440	1285	31670	515	211270	866

(1) This flow is practically all from lands irrigated by Feather River diversions.
(2) A portion of the water which would ordinarily be returned to the Sacramento River at this point is diverted to the Knights Landing Ridge Cut. See Table 66.
(3) This is the combined daily flow as given in Tables 63 and 65 and includes some return water from Feather River diversions. See Table 64.

TABLE 50

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JULY TO SEPTEMBER
(USING ONLY RETURN WATER WHICH ENTERED THROUGH DEFINITE RETURN CHANNELS*)

	July		August		September		July to September Inclusive	
	Acre-feet	Aver. c.f.s.	Acre-feet	Aver. c.f.s.	Acre-feet	Aver. c.f.s.	Acre-feet	Aver. c.f.s.
RETURN								
Reclamation District 70 Drain	1560	25	2230	36	589	10	4379	24
Reclamation District 108 Drain	4990	81	6030	98	5070	85	16090	88
Colusa Basin Drainage at Knights Landing**	14680	239	21620	352	29440	494	65740	360
Sacramento Slough (less flow from East Borrow Pit Sutter By-Pass)	18450	300	21640	352	18710	315	58800	322
Reclamation District 1000 Drain (2d Bannon Slough)	442	7	401	6	1380	23	2223	12
Total Return	40120	652	51920	844	55190	927	147230	807
Total Diversions-Red Bluff to Sacramento	194530	3164	185400	3015	82810	1391	462740	2536
Return in per cent of Diversions	21		28		67		32	

NOTE: In order to show return water from Sacramento River irrigation only, the discharge to the river of Butte Slough is excluded, as is also a portion of the return through Sacramento Slough derived from Feather River diversions and the return through the Back Borrow Pit of Reclamation District 1000.

* As distinguished from use of all accretions as indicated in Table 51.

** Includes flow diverted to Knights Landing Ridge Cut.

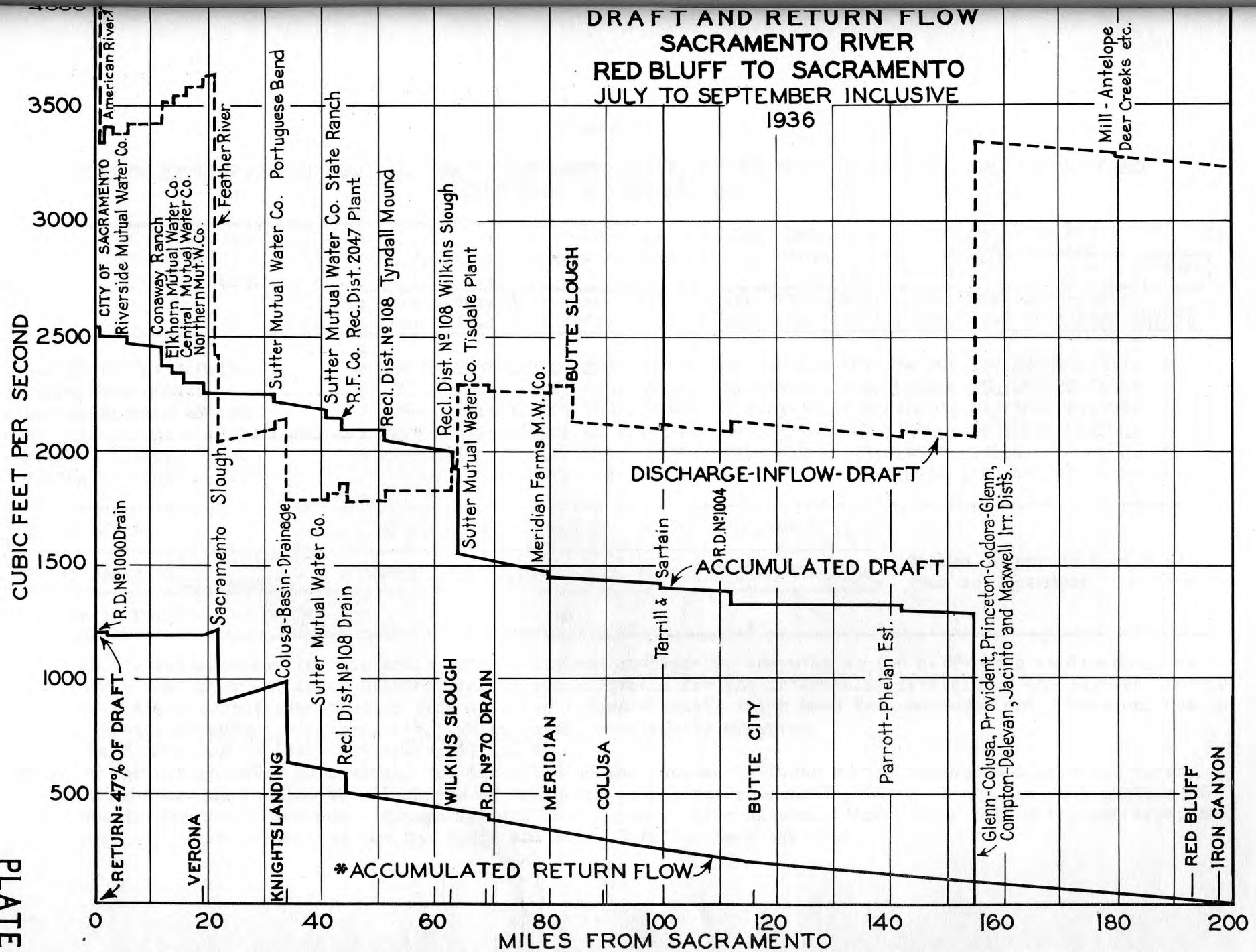


PLATE 1.

* In order to show return water from Sacramento River Irrigation only, the discharge to the Sacramento River of the Feather and American Rivers has been excluded as well as that from Butte Slough, the Feather River portion of Sacramento Slough and the inflow of Mill, Antelope, Deer and other creeks between Red Bluff and Butte City.

TABLE 51

RELATION BETWEEN RETURN WATER AND DRAFT, SACRAMENTO RIVER, RED BLUFF TO SACRAMENTO, JULY TO SEPTEMBER
(INCLUDING ALL ACCRETIONS*)

River Section	July		August		September		Total Return Jul-Sep. Inc.		Red Bluff to Lower end of Section				
									Return		Draft		Return in per cent of Draft
	Acre-feet	Aver. cfs.	Acre-feet	Aver. cfs.	Acre-feet	Aver. cfs.	Acre-feet	Aver. cfs.	Acre-feet	Aver. cfs.	Acre-feet	Aver. cfs.	
Red Bluff-Butte City	16810	273	12810	208	4440	75	34060	187	34060	187	240360	1317	14
Butte City-Colusa	8600	140	4590	75	5430	91	18620	102	52680	289	260780	1429	20
Colusa-Wilkins Slough	10500	171	10390	169	2440	41	23330	128	76010	417	364720	1999	21
Wilkins Slough-Knights Landing	29050	472	36020	586	38320	644	103390	567	179400	983	401560	2200	45
Knights Landing-Verona	20920	340	13490	219	730	12	35140	193	214540	1176	410260	2248	52
Verona to Sacramento **	440	7	480	8	1360	23	2280	12	216820	1188	462740	2536	47
Total Return	86320	1403	77780	1265	52720	886	216820	1188					
Total Draft (Red Bluff to Sacramento	194530	3164	185400	1389	82810	1392	462740	2536					
Return in Per Cent of Draft	44		42		64		47						

Return in per cent of draft June to September -- 56%

* As the return water in this table between any two stations is computed as the difference in discharge between the upper and lower station, making due allowance for the intervening diversions, the results include both those accretions entering from definite return channels which have been measured and accretions due to seepage, groundwater return, etc., which cannot be directly measured.

** See discussion in text of Chapters II and IV.

NOTE: In the return water here shown, the discharge to the Sacramento River of the Feather and American rivers is excluded as is also the discharge of following return water channels, Butte Slough and that portion of the discharge of Sacramento Slough derived from Feather River waters. Also inflow from Mill, Antelope, and Deer and other creeks between Red Bluff and Butte City has been excluded.

TABLE 52

RELATION BETWEEN THE RETURN WATER IN COLUSA TROUGH AT COLUSA-WILLIAMS HIGHWAY AND THE DIVERSIONS FROM WHICH THE RETURN WATER WAS DERIVED

	Mile and Bank	Jul.	Aug.	Sep.	July to Sept. Inclusive		Acreage Irrigated	
		Acre-feet			Ac.Ft.	c.f.s.	General	Rice
DIVERSIONS								
- Sacramento River -								
Glenn-Colusa Irrigation District	154.8 R	67678	68248	35756	171682	941	17691	20424
Jacinto Irrigation District	154.8 R	3039	2727	1882	7648	42	4530	0
Compton-Delevan Irrigation District	154.8 R	1230	1202	436	2868	16	30	850
Provident Irrigation District	154.8 R	9925	9078	3537	22540	124	119	4811
Princeton-Codora-Glenn Irrigation District	154.8 R	10352	8699	4649	23700	130	2303	1977
Maxwell Irrigation District	154.8 R	1537	1537	853	3927	22	0	1400
California Lands, Incorporated	154.8 R	89	0	0	89		37[4]	0
California Lands, Incorporated	117.8 R	54	31	24	109	1	147	0
American Company	103.7 R	77	66	0	143	1	145	0
Clara C. Packer	102.8 R	626	690	127	1443	8	600	200
Cheney Slough Irrigation Company	99.0 R	110	167	32	309	2	279	0
Tuttle Land Company	94.3 R	641	100	71	812	4	310	0
- Colusa Trough -	*							
Stevens Brothers	22.0 R	697	696	440	1833	10	0	30
M. E. Rourke	11.5 L	3970	3970	2560	10500	58	0	2300
A. D. J. Land Company	3.0 L	156	250	202	608	3	0	105
I. G. Zumwalt	2.2 R	1920	640	0	2560	14	0	1200
(Acre-feet		102100	98100	50570	250770		26528	33297
(c. f. s.		1660	1595	822		1375		
RETURN								
Colusa Trough at Colusa-Williams Highway		17800	23100	25100	66000	362		
Colusa Trough Diversions		6740	5560	3200	15500	85		
(Acre-feet		24540	28660	28300	81500			
(c. f. s.		399	466	475		447		
Return in per cent of diversions		24	29	56	32			

* Mileage above Colusa-Williams Highway.

TABLE 53

RELATION BETWEEN RETURN WATER AND DIVERSIONS
RECLAMATION DISTRICT 108

	Jul.	Aug.	Sep.	Jul. to Sep. Inclusive		Acreage Irrigated	
	Acre-feet			Acre-feet	Aver. c.f.s.	Genl.	Rice
Diversions (1)	15900	13285	2263	31448	172	1045	9056
Return Water (2)	4990	6030	5070	16090	88		
Return in per cent of Diversions	31	45	224	51			

(1) The diversions comprise those from Sacramento River, right bank, from Mile 43.1 to 63.2

(2) The return water is the discharge to Sacramento River of Reclamation District 108 drain at Rough and Ready Bend (Table 60).

TABLE 54

RELATION BETWEEN RETURN WATER AND DIVERSIONS
RECLAMATION DISTRICT 1500

	Jul.	Aug.	Sep.	Jul. to Sep. Inclusive		Acreage Irrigated	
	Acre-feet			Acre-feet	Aver. c.f.s.	Genl.	Rice
Diversions (1)	31325	35773	15040	82138	450	15918	9300
Return Water (2)	15300	16500	14200	46000	252		
Return in per cent of Diversions	49	46	94	56			

(1) The diversions comprise those from Sacramento River, left bank, from Mile 29.9 to Mile 63.75. The principal ones are the Sutter Mutual Water Company's plants at Tisdale, State Ranch and Portuguese Bend.

(2) The return water is the discharge through the drainage plant of Reclamation District 1500 on the West Borrow Pit of the Sutter By_Pass. This water reaches Sacramento River via Sacramento Slough. See Table 63.

TABLE 55
RETURN FLOW IN SAN JOAQUIN VALLEY STREAMS
(Acre-feet except as noted)

		July	August	Sept.	October	Jul.-Aug. Incl.	Aug-Sep. Incl.	Jul-Oct. Incl.	Aug-Oct. Incl.
SAN JOAQUIN RIVER									
DELTA BRIDGE TO FREMONT FORD BRIDGE									
Discharge at Delta Bridge	Table 15	1260	0	0	0	1260	0	1260	0
Discharge at Fremont Ford Bridge	Table 16	47300	10500	10900	12500	57800	21400	81200	33900
Diversions	Table 44	0	0	0	0	0	0	0	0
Net return flow		46040	10500	10900	12500	56540	21400	79940	33900
Net return flow - Cubic feet per Second		749	171	183	203	460	177	328	186
FREMONT FORD BRIDGE TO NEWMAN									
Discharge at Fremont Ford Bridge	Table 16	47300	10500	10900	12500	57800	21400	81200	33900
Discharge near Newman	Table 17	77410	26880	26300	28410	104290	53180	159000	81590
Inflow of Merced River	Table 23	22800	15100	13100	13200	37900	28200	64200	41400
Diversions	Table 44	0	0	0	0	0	0	0	0
Net return flow		7310	1280	2300	2710	8590	3580	13600	6290
Net return flow - Cubic feet per Second		119	20.8	38.7	44.1	69.9	29.6	55.7	34.5
NEWMAN TO GRAYSON (LAIRD SLOUGH)									
Discharge near Newman	Table 17	77410	26880	26300	28410	104290	53180	159000	81590
Discharge near Grayson (Laird Slough)	Table 18	98690	36280	36770	40640	134970	73050	212380	113690
Diversions	Table 44	9612	8458	6852	1179	18070	15310	26100	16490
Net return flow (1)		30890	17860	17320	13410	48750	35180	79480	48590
Net return flow - Cubic feet per Second (1)		502	290	291	218	396	291	326	266
GRAYSON TO HETCH HETCHY CROSSING									
Discharge near Grayson (Laird Slough)	Table 18	98690	36280	36770	40640	134970	73050	212380	113690
Discharge at Hetch Hetchy Crossing	Table 19	150600	55130	64100	102500	205730	119230	372330	221730
Inflow of Tuolumne River	Table 27	56270	24980	30600	55880	81250	55580	167730	111460
Diversions	Table 44	11214	4785	1820	783	16000	6610	18600	7390
Net return flow		6850	-1340	-1450	6760	5510	-2790	10820	3970
Net return flow - Cubic feet per Second		111	-21.8	-24.4	110	44.8	-23.1	44.3	21.8
HETCH HETCHY CROSSING TO VERNALIS									
Discharge at Hetch Hetchy Crossing	Table 19	150600	55130	64100	102500	205730	119230	372330	221730
Discharge at Vernalis	Table 20	187400	68950	76220	116200	256350	145170	448770	261370
Inflow of Stanislaus River	Table 29	31630	17110	14230	16550	48740	31340	79520	47890
Diversions	Table 44	2770	2640	1940	1767	5410	4580	9120	6350
Net return flow		7940	-650	-170	-1080	7290	-820	6040	-1900
Net return flow - Cubic feet per Second		129	-10.6	-2.9	-17.6	59.3	-6.8	24.8	-10.4
SUMMARY - DELTA BRIDGE TO VERNALIS									
Discharge at Delta Bridge	Table 15	1260	0	0	0	1260	0	1260	0
Discharge at Vernalis	Table 20	187400	68950	76220	116200	256350	145170	448770	261370
Diversions	Table 44	23600	15880	10610	3730	39480	26490	53820	30220
Inflow of tributaries		110700	57190	57930	85630	167890	115120	311450	200750
Total net return flow (1)		99040	27640	28900	34300	126680	56540	189880	90840
Total net return flow - Cubic feet per Second (1)		1611	450	486	558	1030	467	778	498

(1) It is possible that this accretion or return flow is not all from the San Joaquin River itself.

TABLE 55 (CONTINUED)
RETURN FLOW IN SAN JOAQUIN VALLEY STREAMS
(Acre-feet except as noted)

		July	August	Sep.	October	Jul-Aug. Incl.	Aug-Sep. Incl.	Jul-Oct. Incl.	Aug-Oct. Incl.
STANISLAUS RIVER									
ORANGE BLOSSOM BRIDGE TO HATMARK RANCH									
Discharge at Orange Blossom Bridge	Table 28	7720	1720	1590	1540	9440	3130	12570	4850
Discharge at Hatmark Ranch	Table 29	31630	17110	14230	16550	48740	30780	79520	47890
Diversions	Table 47	1950	1410	940	430	3360	1370	4730	2780
Net return flow		25860	16800	13580	15440	42660	29020	71680	45820
Net return flow - Cubic feet per Second		421	273	228	251	347	240	294	251
TUOLUMNE RIVER									
ROBERTS FERRY BRIDGE TO HICKMAN BRIDGE									
Discharge at Roberts Ferry Bridge	Table 25	27400	2330	13000	38200	29730	15330	80930	53530
Discharge at Hickman Bridge	Table 26	No record	7730	16600	40300	---	24330	---	64630
Diversions	Table 46	15	20	20	0	35	40	55	40
Net return flow		---	5420	3620	2100	---	9040	---	11140
Net return flow - Cubic feet per Second		---	88.1	60.8	34.1	---	74.7	---	61.0
HICKMAN BRIDGE TO TUOLUMNE CITY									
Discharge at Hickman Bridge	Table 26	No record	7730	16600	40300	---	24330	---	64660
Discharge at Tuolumne City	Table 27	56270	24980	30600	55880	81250	55580	167730	111460
Inflow of Dry Creek	Table 24	5100	8490	4120	5510	181320	12610	190950	18120
Diversions	Table 46	310	320	210	110	630	530	950	640
Net return flow (1)		---	9080	10090	10180	---	19170	---	29350
Net return flow - Cubic feet per Second (1)		---	148	170	166	---	158	---	161
SUMMARY - ROBERTS FERRY TO TUOLUMNE CITY									
Discharge at Roberts Ferry Bridge	Table 25	27400	2330	13000	38200	29730	15330	80930	53530
Discharge at Tuolumne City	Table 27	56270	24980	30600	55880	81250	55580	167730	111460
Inflow of tributaries		5100	8490	4120	5510	13590	12610	23220	18120
Diversions	Table 46	320	340	230	110	660	570	1000	680
Net return flow (1)		24090	14500	13710	12280	38590	28210	64580	40490
Net return flow - Cubic feet per Second (1)		391	236	230	200	314	233	265	222
MERCED RIVER									
YOSEMITE VALLEY RAILROAD TO LIVINGSTON									
Discharge at Yosemite Valley Railroad Crossing	Table 21	5810	3120	2550	1560	8930	5670	13040	7230
Discharge at Livingston	Table 22	15840	12880	12730	12910	28720	25610	54360	38520
Diversions	Table 45	820	910	420	70	1730	1330	2220	1400
Net return flow		10850	10670	10600	11420	21520	21270	43540	32690
Net return flow - Cubic feet per Second		176	174	178	186	175	176	178	179
LIVINGSTON TO MOUTH									
Discharge at Livingston	Table 22	15840	12880	12730	12910	28720	25610	54360	38520
Discharge near Mouth	Table 23	22800	15100	13100	13200	37900	28200	64200	41400
Diversions	Table 45	1610	1790	1200	340	3400	2990	4940	3330
Net return flow		8570	4010	1570	630	12580	5580	14780	6210
Net return flow - Cubic feet per Second		139	65.2	26.4	10.2	102	46.1	60.6	34.0
SUMMARY - YOSEMITE VALLEY RAILROAD TO MOUTH									
Discharge at Yosemite Valley Railroad Crossing	Table 21	5810	3120	2550	1560	8930	5670	13040	7230
Discharge near Mouth	Table 23	22800	15100	13100	13200	37900	28200	64200	41400
Diversions	Table 45	2430	2700	1620	410	5130	4320	7160	4730
Net return flow		19420	14680	12170	12050	34100	26850	58320	38900
Net return flow - Cubic feet per Second		316	239	205	196	277	222	239	213

(1) The inflow of Dry Creek has been deducted to obtain these figures.

TABLE 56

COMPARISON OF DIVERSIONS AND RETURN WATER - SAN JOAQUIN VALLEY
(Quantities in Acre-feet except as noted)

	Jul.	Aug.	Sep.	Oct.	Jul. to Oct. Inc.
- DIVERSIONS -					
San Joaquin River near Friant (1) (2) (Miller and Lux Canals, etc.)	157900	95780	78290	58210	390180
Merced River at Exchequer (1) (2) (Merced Irrigation District Canal, etc.)	103600	91890	62630	25270	283390
Turlock Irrigation District Canal (1)	72520	65960	60910	690	200080
Modesto Irrigation District Canal (1)	41130	44930	28500	28520	143080
South San Joaquin and Oakdale Irrigation District Canals (1)	48470	47630	30370	10100	136570
Oakdale Irrigation District Canal (1)	20840	20050	14820	7160	62870
Pumping Diversions - San Joaquin, Merced, Tuolumne and Stanislaus Rivers (3)	28300	20330	13400	4680	66710
Total Diversions	472760	386570	288920	134630	1282880
Total Diversions (Average Second-feet)	7690	6290	4860	2190	5270
- RETURN -					
San Joaquin River near Vernalis (1)	187400	68950	76220	116200	448770
Pumping diversions - San Joaquin, Merced, Tuolumne and Stanislaus Rivers (3)	28300	20330	13400	4680	66710
Total Return	215700	89280	89620	120880	515480
Undiverted power releases and spill (Tuolumne and Stanislaus Rivers)	23020	0	10040	32810	65870
Net Return	192680	89280	79580	88070	449610
Net Return (Average Second-feet)	3134	1452	1337	1432	1843
Return in per cent of Diversions	41	23	27	65	35

NOTE: Prior to July, return water measurements were vitiated by high river stages.
(1) U. S. G. S. station.
(2) This flow all diverted below gaging stations after July 1st.
(3) See Tables 44, 45, 46 and 47.

PLATE 2

Average discharge in cubic feet per second
0
200
400
600
800
1000
1200
1400
1600
Miles from mouth of San Joaquin River
75
80
90
100
110
120
130
140
150
160
U.S.G.S. GAGE NEAR VERNALIS
STANISLAUS RIVER
HETCH HETCHY CROSSING
TUOLUMNE RIVER
West Stanislaus Irrig. Dist.
GAGE- LAIRD SLOUGH NEAR GRAYSON
Patterson Water Co.
Patterson Ranch
CROWS LANDING BRIDGE
NEWMAN- U.S.G.S. GAGE MERCED RIVER
DELTA BRIDGE
DISCHARGE-INFLOW-DRAFT
ACCUMULATED RETURN FLOW
SAN JOAQUIN RIVER RETURN FLOW
AUGUST TO OCTOBER INCLUSIVE
1936

TABLE 57

DISCHARGE OF COLUSA TROUGH AT COLUSA WILLIAMS HIGHWAY

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		565	228	330	448	180
2		499	234	335	463	145
3		490	241	345	480	125
4		504	248	353	480	125
5		545	257	350	482	110
6		620	260	345	519	100
7		720	271	337	506	100
8		810	270	348	482	100
9		750	265	358	469	100
10		665	281	358	456	100
11		567	300	359	460	100
12		477	316	364	461	100
13		407	330	367	477	110
14		367	356	370	507	110
15		358	360	372	512	90
16		340	344	366	465	90
17		322	313	364	453	90
18		290	268	363	436	90
19		264	270	362	443	88
20		257	268	364	433	78
21		252	271	377	421	80
22		255	270	387	424	78
23		249	281	388	417	77
24		244	287	400	410	75
25		237	281	417	300	71
26		233	305	422	300	65
27		226	308	426	280	65
28	*455	222	313	422	250	65
29	495	223	329	422	220	65
30	550	225	338	429	200	65
31	580		332	436		65
Mean		406	290	375	422	93.6
Ac.Ft. for Month		24200	17800	23100	25100	5760

NOTE: This is return water flowing in the main drain of Reclamation District 2047; it is drainage chiefly from lands irrigated by Glenn-Colusa, Provident, Princeton-Codora-Glenn, Compton-Delevan, and Maxwell Irrigation Districts.

* Beginning of record for season.

TABLE 58

DISCHARGE OF BUTTE SLOUGH

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		* 40	140	93	99	339
2		100	139	109	118	315
3		40	0	0	182	413
4		100	0	108	190	385
5		80	186	98	182	256
6		260	147	98	173	242
7		260	147	90	183	200
8		568	170	78	199	96
9		350	170	71	214	96
10		506	167	71	214	100
11		506	143	90	223	100
12		0	180	79	284	0
13		161	147	79	274	100
14		260	122	79	270	100
15		586	84	79	260	150
16		454	85	55	260	96
17		100	147	47	260	0
18		300	147	72	260	0
19		291	145	72	273	0
20		432	145	63	281	96
21		480	62	72	281	0
22		336	102	72	320	0
23		390	110	72	320	0
24		390	69	79	320	0
25		288	78	90	314	0
26		240	78	98	327	0
27		150	102	108	312	0
28		150	78	108	307	0
29		150	126	128	302	0
30		150	126	128	302	0
31			316	117		105
Mean		271	124	84.0	250	103
Ac.Ft. for Month		16100	7650	5160	14900	6330

NOTE: This is the discharge to the Sacramento River at Mile 84 left and is measured at and regulated by the gravity culverts at the mouth of the Slough. This flow and Butte Slough and Butte Creek diversions (See Table 35) are made up almost entirely of return water from lands irrigated by Feather River diversions.

* Beginning of discharge record for season.

TABLE 59

DISCHARGE OF RECLAMATION DISTRICT 70 DRAIN

Day	Daily Discharge in Second-feet						
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*0	34	27	44	23	4
2		0	31	28	44	22	4
3		0	35	28	44	20	4
4		0	32	0	45	18	4
5		3	30	0	45	16	4
6		3	29	0	45	13	4
7		4	29	0	45	12	4
8		5	28	0	45	10	4
9		6	26	0	45	10	4
10		7	0	43	46	10	4
11		7	0	40	46	10	4
12		7	0	37	46	10	4
13		0	27	36	44	10	4
14		0	27	34	43	10	4
15		0	27	32	40	10	4
16		0	27	30	39	7	4
17		0	17	28	36	7	4
18		0	12	26	35	7	4
19		0	26	14	33	6	4
20		0	19	14	30	6	4
21		0	17	15	31	6	4
22		0	25	16	28	6	4
23		0	19	16	27	6	4
24		0	18	16	26	6	4
25		0	21	44	26	6	4
26		0	25	44	25	6	4
27		0	29	43	25	6	4
28		38	32	43	25	6	4
29		39	24	43	24	6	4
30		38	26	44	23	6	4
31		34		44	23		4
Mean	0	6.2	23.1	25.3	36.2	9.9	4.0
Ac.Ft. for Month	0	379	1370	1560	2230	589	246

NO FLOW

NOTE: This is the drainage from Reclamation District 70 returned to Sacramento River at Mile 68.8 Left. For this period of record it was all controlled gravity flow.

* Beginning of record for season.

TABLE 60

DISCHARGE OF RECLAMATION DISTRICT 108 DRAIN
AT ROUGH AND READY BEND

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		75	177		0	91	113	18
2	73			272	78	91	112	12
3			205		30	90	109	12
4	75		149	260	90	89	109	6
5		94			88	91	159	6
6	75		198		86	89	245	12
7				440	87	89	214	6
8	71		212		88	90	55	0
9				247	89	90	71	6
10	67		218		89	90	73	12
11				247	89	90	76	6
12	63	157			85	90	80	6
13			232		90	90	79	6
14				425	84	89	79	6
15	90		226		83	90	79	0
16		131			85	93	79	0
17			225	259	87	94	79	0
18					87	100	76	0
19		121	219	233	86	102	75	0
20	120				86	101	75	0
21			229	307	87	102	70	3
22					33	105	68	12
23		139			46	105	61	4
24			283		98	107	57	0
25	126				97	110	54	0
26		167			97	111	44	0
27			241		96	112	44	22
28				455	94	112	42	18
29	117	186			94	112	42	18
30			182		93	113	37	2
31			270		93	113		0
Mean	28.3	35.7	105	105	81.1	98.1	85.2	6.2
Ac.Ft. for Month	1740	2120	6480	6240	4990	6030	5070	383

NOTE: This is the drainage from Reclamation District 108 returned to the Sacramento River at Mile 44.0 Right. Discharge prior to July 1st by pumping, balance of season through siphon and by intermittent pumping . No direct drainage to Back Borrow Pit from Reclamation District 108 this season.

TABLE 61

DISCHARGE OF COLUSA BASIN DRAINAGE AT KNIGHTS LANDING

Day	Daily Discharge in Second-feet				
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		*564	134	233	495	289
2		519	140	239	521	261
3		461	120	251	532	222
4		481	126	247	540	207
5		471	136	243	575	208
6		437	159	239	578	211
7		485	163	247	610	229
8		605	173	231	603	222
9		0	173	211	540	197
10		0	126	219	443	177
11		400	146	233	407	151
12		863	150	240	424	133
13		627	173	250	443	130
14		479	194	255	481	143
15		435	178	257	495	161
16		425	201	258	470	133
17		395	296	258	457	113
18		341	259	266	462	112
19		15	230	258	485	139
20		76	221	255	472	148
21		139	221	266	470	163
22		153	227	276	370	169
23		163	233	289	625	178
24		167	205	304	460	197
25		163	200	311	408	200
26		153	191	342	418	178
27		81	199	781	383	166
28		85	205	527	383	169
29		104	217	474	315	155
30		128	238	458	315	84
31			238	458		93
Mean		314	189	302	473	172
Ac.Ft. for Month		18700	11600	18600	28100	10600

NOTE: This is the drainage from Colusa Basin passing down the Back Borrow Pit of Reclamation Districts 108 and 787 and entering the Sacramento River at Mile 34.15 Right, just above the Knights Landing gaging station. It includes the drainage from Reclamation District 787 entering the Back Borrow Pit via Sycamore Slough outlet. Irregularities in the flow are due to checking operations at the Knights Landing outfall gates whereby a portion of the flow of the Back Borrow Pit is diverted to the Knights Landing Ridge Cut. This diversion is shown in Table 66.

* Beginning of record for season.

TABLE 62

DISCHARGE OF SACRAMENTO SLOUGH

Day	Daily Discharge in Second-feet					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1			*322	393	453	139
2			354	399	421	95
3			352	405	405	146
4			293	411	360	140
5			293	377	399	241
6			300	385	399	226
7			296	371	395	243
8			288	382	391	279
9			335	389	447	231
10			297	371	499	209
11			262	358	574	184
12			271	347	574	193
13			276	345	661	199
14			278	345	742	212
15			330	340	665	230
16			327	340	529	252
17			279	351	622	265
18			280	345	532	265
19			288	351	560	265
20			288	354	365	265
21			283	370	340	265
22			341	420	261	257
23			314	472	441	247
24			293	490	471	247
25			302	492	405	237
26			332	486	341	237
27			311	488	307	242
28			349	470	247	242
29			427	541	305	223
30			432	523	215	237
31			427	481		237
Mean			317	406	444	224
Ac.Ft. for Month			19500	25000	26400	13800

NOTE: This is return water discharged to Sacramento River via Sacramento Slough at Mile 21.2 Left. This is the sum of the flow measured at two points: Outlet of Reclamation District 1500 Drain (Table 63) and West Borrow Pit of Sutter By-Pass 1.4 miles above Reclamation District 1500 Drain (Table 65). The flow in Table 65 includes the flow in Table 64.

* Beginning of discharge record for season.

TABLE 63

DISCHARGE OF RECLAMATION DISTRICT 1500 DRAIN

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	*156	72	191	340	242	240	300	44
2	210	66	192	348	290	246	291	0
3	133	63	193	272	288	252	297	51
4	160	70	194	347	229	274	252	56
5	163	73	198	357	229	240	291	88
6	150	82	172	357	236	248	291	56
7	150	70	313	258	236	249	273	56
8	121	82	191	282	232	260	269	56
9	156	82	329	270	289	267	294	61
10	128	82	106	288	262	263	294	56
11	130	81	94	312	227	263	294	47
12	141	81	174	324	236	263	294	56
13	144	83	174	330	238	267	297	47
14	140	84	172	336	236	267	282	42
15	132	85	168	333	288	267	279	42
16	118	88	170	339	285	267	209	46
17	118	92	267	234	230	267	342	42
18	66	94	249	232	231	267	252	42
19	82	99	199	236	236	267	280	42
20	91	100	186	240	236	267	228	42
21	92	104	204	240	227	262	232	42
22	83	107	218	240	285	267	177	42
23	112	110	224	240	250	267	200	37
24	74	120	224	351	229	267	191	42
25	76	189	222	342	229	269	145	37
26	79	110	220	240	248	272	154	37
27	73	190	222	135	227	274	137	42
28	73	189	226	200	227	265	77	42
29	65	189	282	200	274	336	152	23
30	73	189	336	220	279	318	62	37
31	73		328		274	303		37
Mean	115	104	214	281	249	268	238	44.8
Ac.Ft. for Month	7060	6200	13200	16700	15300	16500	14200	2760

NOTE: This is the drainage from Reclamation District 1500 discharged to West Borrow Pit of Sutter By-Pass and thence via Sacramento Slough (in the By-Pass) to Sacramento River. This is one of the sources measured to obtain the total flow in Sacramento Slough. See Table 62.

* Beginning of record for season.

TABLE 64

DISCHARGE OF SUTTER BY-PASS - EAST BORROW PIT
(WILLOW SLOUGH AT CHANDLER)

Day	Daily Discharge in Second-feet					
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		161	125	7	55	31	95
2		150	95	7	59	32	95
3		145	63	8	59	32	95
4		140	63	8	59	33	95
5		135	63	9	45	33	95
6		110	63	11	44	34	255
7		108	63	4	44	34	240
8		98	63	4	44	52	221
9		8	63	4	44	102	203
10		8	63	4	30	179	185
11		8	90	4	4	195	150
12		9	190	4	4	228	100
13		9	240	4	4	280	50
14		9	235	4	4	270	50
15		111	110	4	4	244	60
16		210	9	4	4	250	60
17		200	9	4	13	245	70
18		166	9	11	22	240	60
19		0	9	33	22	137	60
20		3	9	25	22	0	50
21		17	9	4	38	11	50
22		9	9	4	83	146	50
23		9	9	4	118	250	50
24		9	9	4	116	204	50
25		9	9	21	116	119	50
26		9	9	34	114	99	50
27		9	19	49	114	106	50
28	*165	9	17	70	112	99	50
29	162	9	25	70	110	95	50
30	160	9	7	57	108	95	50
31		132		47	78		50
Mean		65.1	58.6	17.0	54.6	129	91.6
Ac.Ft. for Month		4000	3480	1050	3360	7690	5630

NOTE: This is return water originating from Feather River and Butte Slough Diversions. It is discharged to Willow Slough through a controlled culvert at Chandler, thence across Sutter By-Pass to the West Borrow Pit and thence via the latter and Sacramento Slough (in the By-Pass) to Sacramento River.

* Beginning of record for season.

TABLE 65

DISCHARGE OF SUTTER BY-PASS - WEST BORROW PIT
1.4 MILES ABOVE R. D. 1500 DRAINAGE PLANT

Day	Daily Discharge in Second-feet					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1			80	153	153	95
2			64	153	130	95
3			64	153	108	95
4			64	137	108	84
5			64	137	108	153
6			64	137	108	170
7			60	122	122	187
8			56	122	122	223
9			46	122	153	170
10			35	108	205	153
11			35	95	280	137
12			35	84	280	137
13			38	78	364	152
14			42	78	460	170
15			42	73	386	188
16			42	73	320	206
17			49	84	280	223
18			49	78	280	223
19			52	84	280	223
20			52	87	137	223
21			56	108	108	223
22			56	153	84	215
23			64	205	241	210
24			64	223	280	205
25		*137	73	223	260	200
26		137	84	214	187	200
27		122	84	214	170	200
28		108	122	205	170	200
29		102	153	205	153	200
30		95	153	205	153	200
31			153	178		200
Mean			67.6	138	206	179
Ac.Ft. for Month			4160	8510	12300	11000

NOTE: This is the flow in the West Borrow Pit below the confluence of East Borrow Pit flow entering via Willow Slough. 1.4 miles downstream this flow is joined by the discharge through R.D. 1500 Drainage Plant and the combined flow is thence discharged via Sacramento Slough (in the By-Pass) to Sacramento River. This is one of the sources measured to obtain the total flow in Sacramento Slough. See Table 62.

* Beginning of discharge record for season.

TABLE 66

DISCHARGE OF KNIGHTS LANDING RIDGE CUT AT WEST LINE OF YOLO BY-PASS

Day	Daily Discharge in Second-feet					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		15	41	48	26	
2		15	41	48	30	
3		15	41	53	30	
4		15	41	53	30	
5		15	48	48	37	
6		15	48	53	37	
7		15	53	53	41	
8		15	53	48	41	
9		15	60	41	30	
10		15	60	48	30	
11		15	60	48	26	
12		15	48	48	26	NO FLOW
13		15	53	53	30	
14		10	53	53	37	
15		4	60	53	37	
16		4	66	53	30	
17		4	60	53	30	
18		0	66	53	30	
19		0	60	53	37	
20	*0	12	53	53	30	
21	10	21	48	53	30	
22	21	21	48	53	0	
23	24	26	48	60	0	
24	27	26	48	60	0	
25	30	26	41	60	0	
26	33	21	41	66	0	
27	37	30	41	60	0	
28	41	30	41	30	0	
29	54	37	41	26	0	
30	67	41	41	21	0	
31	80		48	21		
Mean	**35.3	16.9	50.0	49.1	22.5	0
Ac.Ft. for Month	**841	1010	3080	3020	1340	0

NOTE: This is Colusa Basin drainage diverted to Knights Landing Ridge Cut by checking at the Knights Landing outfall gates on the Back Borrow Pit of Reclamation District 787.

* Beginning of record and controlled flow for season.

** 12 days.

TABLE 67

DISCHARGE OF YOLO BY-PASS-EAST BORROW PIT (TULE CANAL)

Day	Daily Discharge in Second-feet					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
1		50	40	42	47	41
2		60	41	42	47	41
3		65	41	42	49	40
4		80	41	43	49	40
5		90	42	43	49	40
6		80	42	44	50	39
7		80	42	44	50	38
8		80	42	44	50	36
9		80	43	45	51	34
10		65	44	45	52	32
11		58	44	45	51	30
12		55	45	45	50	26
13		50	46	46	50	24
14		40	46	46	50	22
15		45	46	46	49	18
16		40	47	46	48	18
17		38	47	47	47	18
18		35	48	47	49	18
19		35	48	47	48	16
20		35	48	47	47	16
21		35	46	49	46	16
22	*38	35	44	48	45	16
23	36	35	44	48	44	16
24	34	40	43	47	43	16
25	33	40	43	47	42	15
26	32	40	42	47	41	14
27	31	40	42	47	41	13
28	30	40	41	47	41	12
29	35	40	41	47	41	11
30	40	40	41	47	41	10
31	45		42	47		9
Mean	**35.4	52.5	43.6	45.7	46.9	23.7
Ac.Ft. for Month	**702	3130	2680	2810	2790	1460

NOTE: This station is located on the East Borrow Pit of Yolo By-Pass three miles south of the Woodland-Elkhorn Highway and just below the south levee of Reclamation District 827. It records any undiverted drainage from Reclamation District 1600 and the return or waste from Colusa Basin Drainage diverted to Yolo By-Pass via Knights Landing Ridge Cut.

* Beginning of record for season.
** 10 days.

TABLE 68

DISCHARGE OF RECLAMATION DISTRICT 1000 DRAIN
(2nd BANNON SLOUGH)

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	*215	0	43	53	51			
2	156	83	86					41
3	178	47					101	
4	179	67		67	32			
5	178	74	36				84	
6	90	67	56					
7	134	87	107	40				
8	104	67					62	
9	142	60		66				
10	97	60					101	55
11	97	53			38		67	
12	104	53		53			56	
13	75	53						
14	104	53					78	
15	104	53				54	39	
16	67	0		53				
17	67	80					45	
18	67	80			45			
19	67	0	107	20			33	
20	75	87	71	59				
21	0	74					28	
22	89	0				148		
23	0	87						
24	52	0						
25	75	127			57			
26	0	0						62
27	75	87	43	60				
28	59	0						
29	0	0						
30	89	0	43					
31	59							
Mean	90.2	50.0	19.1	15.7	7.2	6.5	23.1	5.1
Ac.Ft. for Month	5550	2970	1170	934	442	401	1380	313

NOTE: This is drainage from Reclamation District 1000 returned to the Sacramento River by pumping at Mile 2.1 Left.

* Beginning of record for season.

CHAPTER V

USE OF WATER IN THE SACRAMENTO-SAN JOAQUIN DELTA

As outlined in preceding reports, this investigation having as its objective, a complete annual determination of the consumptive use of water in the entire Sacramento-San Joaquin Delta, has comprised the experimental work to determine the unit consumptive use of water by the various irrigated crops and vegetation in the Delta and the general field work to obtain annually a complete census of the irrigated crops and water consuming areas. With the unit consumptive use of water determined by the experimental work and the complete census available, the former is applied to the data of the latter to derive the consumptive use of water in the Delta as a whole or on individual tracts or islands.

Due to financial limitations, the census of the irrigated crops and water consuming areas in the Delta has not been made since 1932. There is, therefore, no record of the Delta consumptive use of water since that time.

Table 69 summarizes the crop and water consuming areas and figures for the consumptive use of water as previously reported for the years 1924 to 1932 inclusive. It will be noted that in the nine year period shown, there has been no very great change in the irrigated crop area and that for the years 1930, 1931 and 1932 the crop areas and total water consuming areas, and consequently the estimates for the total consumptive use of water, are practically constant. From this consideration it appears reasonable to assume that there probably occurred little departure from these figures during 1936 and that probably the use of water in this year may be closely approximated by the consumptive use shown for the years 1930, 1931 and 1932.

TABLE 69

CONSUMPTIVE USE OF WATER IN THE SACRAMENTO-SAN JOAQUIN DELTA 1924-1932

	Water Consuming Area in Acres		Seasonal (2) Use of Water in Acre-feet		Seasonal Unit Consumption in Ac.-feet per Ac.		Annual (3) Use of Water in Acre-feet		Annual Unit Consumption in Acre-feet per Ac.	
	Total (1)	Irr. Crops	Total	Irr. Crops	Total	Irr. Crops	Total	Irr. Crops	Total	Irr. Crops
1924		319800		674840		2.11				
1925		315600		660900		2.10				
1926		316200		649560		2.06				
1927		315600		649090		2.06				
1928		321500		674920		2.10				
1929	420900	321800	1100140	689550	2.62	2.14	1250180	839590	2.97	2.61
1930	446800	338000	1161000	744000	2.60	2.20	1322000	895000	2.96	2.65
1931	446310	339300	1167390	756010	2.61	2.23	1319250	907870	2.96	2.68
1932	447430	336440	1181030	746800	2.64	2.22	1334060	899830	2.98	2.67

(1) Total includes interior and exterior water surface, bare and weed lands which consume seepage water, willow and tule areas, etc.

(2) Includes water used by crops and vegetation during the composite growing season and by evaporation for the entire year.

(3) Includes in addition to seasonal use, the use of water on the cropped area during the non-growing or dormant season.

NOTE: Prior to 1929 the annual census was not complete with respect to water consuming areas other than irrigated crop lands.

CHAPTER VI

SALINITY INVESTIGATION

Purpose

The purpose of the salinity investigation, as outlined in previous reports, has been to record the occurrence and extent of the encroachment into upper bay and delta channels of salinity from San Francisco Bay, and to establish the relation between movement of salinity, stream flow to the Delta, and tidal action. As reported in Bulletin 27 of the Division of Water Resources, this relation was established for the conditions which obtained during the period of the special investigation for that Bulletin and upon the basis of all data available to that time. Subsequent investigations, therefore, have been directed to the maintenance of an unbroken record of the salinity, tidal and stream flow variations, essential not only in corroboration of the relation as at present established but as the basis for a check of possible modifications in the relation due to changes in channel and tidal conditions which may have taken place or will occur in the future. Also, during periods of low stream flow, the continuation of salinity sampling has been essential in keeping Delta irrigators advised of conditions so that damage from the use of water of too high salt content might be averted.

Scope

The scope of this investigation each season has been such as to insure that samples of water to be tested for salinity would be taken at regular intervals at a sufficient number of stations throughout the Delta and upper bay region that the advance and retreat of the salinity from early Summer to late Fall would be completely recorded. Plate 3 shows

the limit of encroachment into the Delta of 100 part salinity in the years 1920 to 1936, inclusive. Nineteen bay and delta sampling stations are maintained permanently throughout the year, and three additional stations in 1936 were established and maintained for the duration of the season in order to completely record the encroachment and recession of salinity.

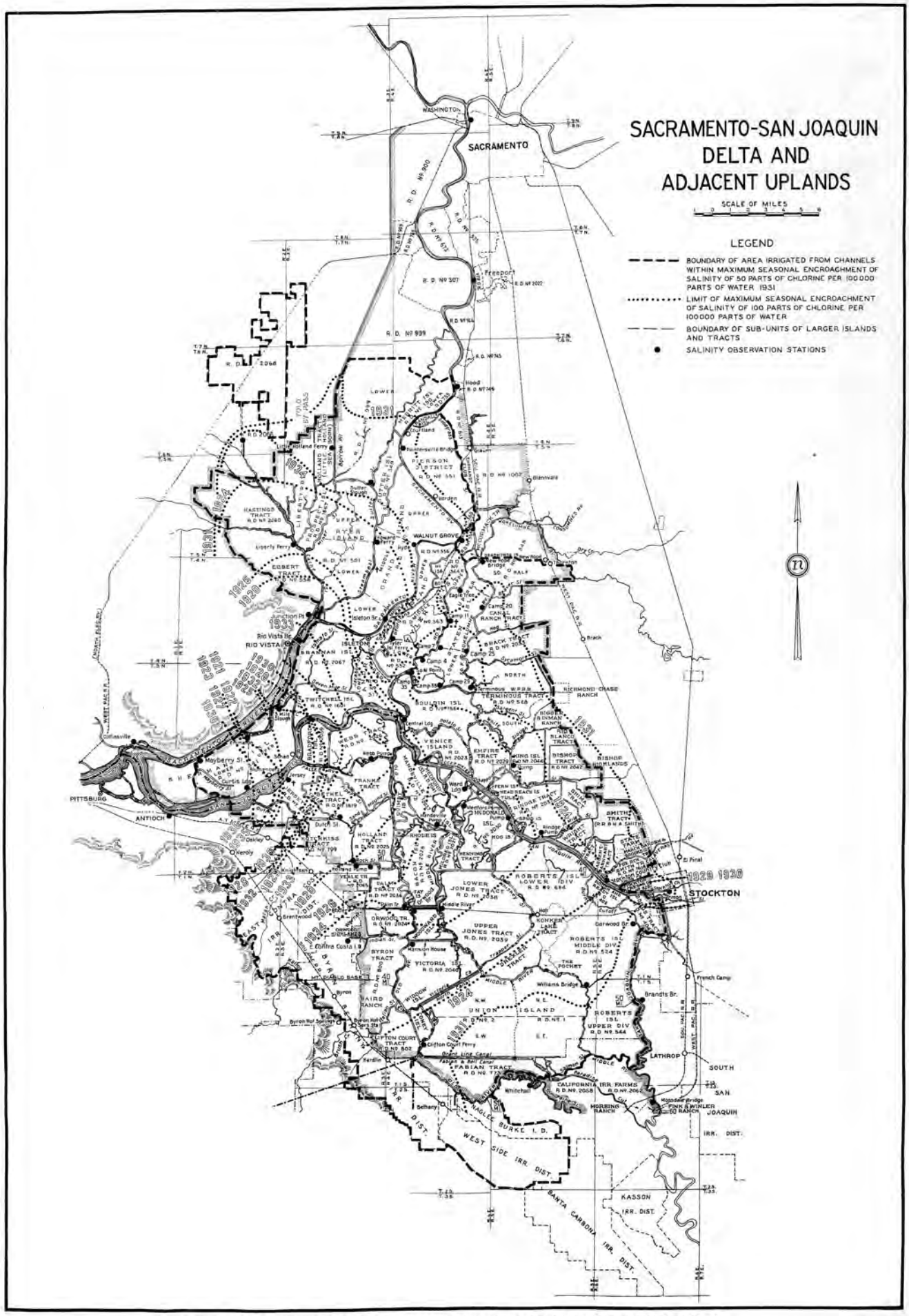
Station Maintenance and Records

As in the past, the salinity sampling at all stations was done by local observers. Each observer was provided with a schedule showing the exact time for taking the samples so that, throughout the Delta at four-day intervals, all samples would be taken at approximately one and one-half hours after the same high tide. The observers were furnished with stamped containers for the sample bottles so that the latter could be mailed as filled to the laboratory at Sacramento. All testing was done at the chemical laboratory of the Division of Highways. The records of the tests of all samples taken in 1936 are given in Table 72 and Table 71 gives the location and description of each station.

The maximum salinity as recorded at the stations operated in 1936 is shown in Table 70. For comparative purposes, this table shows also the maximum salinity recorded at those stations in previous years beginning with 1924. A comparison of the Summer stream flow to the delta in 1936 and the corresponding salinity at certain of the lower delta stations is shown on Plate 4.

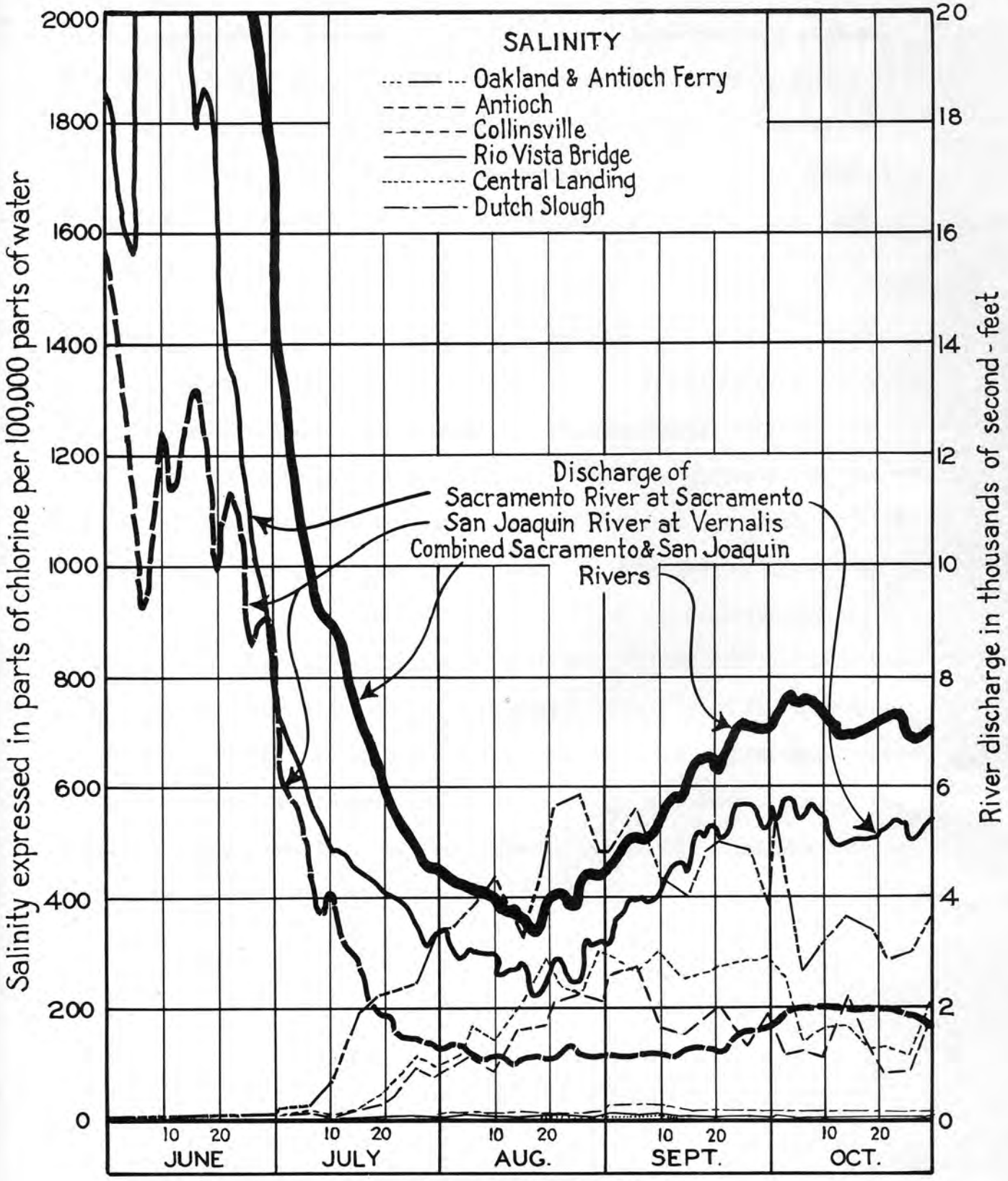
Salinity Bulletins

In preceding years during periods of low river flow and consequent rapid encroachment of salinity, water users throughout the delta were anxious to obtain the results of the tests in order that their irrigation operations



MAXIMUM SEASONAL SALINITY ENCROACHMENT OF 100 PARTS OF CHLORINE PER 100,000 PARTS OF WATER, SACRAMENTO-SAN JOAQUIN DELTA 1920-1936

PLATE 3.



COMPARISON OF
RIVER DISCHARGE AND SALINITY
AT BAY AND DELTA STATIONS
1936

PLATE 4

might be governed to prevent the use of water of injurious salt content. Therefore bulletins were mailed at weekly or ten-day intervals to the water users throughout the delta, reporting the salinity at the various stations. During 1936 however, the encroachment of salinity as shown on Plate 3 was not of sufficient magnitude to justify the issuing of these bulletins.

Tide Gages

In the analysis of the relation between salinity, stream flow and tidal action as presented in Bulletin 27, the comprehensive information covering the tidal variations throughout the delta as obtained from the records of the tide gages was indispensable. Of the stations which supplied data used in the investigation for Bulletin 27, four were maintained by the U. S. Army Engineers, one each by U. S. Coast and Geodetic Survey, U. S. Navy; East Contra Costa Irrigation District and Staten Island Land Company. The remaining stations, nine in number, are being maintained by the Division of Water Resources and are located at Sacramento, Walnut Grove, New Hope Landing, San Joaquin end of Georgiana Slough, Sacramento and San Joaquin ends of Three Mile Slough, Antioch, Collinsville, and Mossdale Bridge (San Joaquin River).

TABLE 70

MAXIMUM RECORDED SALINITY AT BAY AND DELTA STATIONS
1924 TO 1936, INCLUSIVE

Year	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
Sacramento-San Joaquin Runoff in per cent of Normal*	28	83	57	114	80	42	63	29	78	46	40	86	91
Station (1)	Maximum Recorded Salinity in parts of chlorine per 100,000												
San Francisco, San Pablo and Suisun Bays													
Point Orient			2020	1880	1870	1830	1780	1870	1720	1800	1840	1720	1740
Point Davis			1850	1510	1610	1660	1620	1810	1520	1680	1800	1500	1440
Bulls Head Point			1690	1330	1410	1370	1380	1690	1320	1380	1640	1260	1340
Bay Point			1400	950	1170	1050	1060	1540	1010	1160	1460	720	960
O and A Ferry	1345	762	1100	510	750	830	800	1390	620	900	1200	540	580
Innisfail Ferry						870	810	1400	680	900	1260	720	580
North San Pablo Bay													
Sonoma Creek Bridge						1600	1670	1660	1420	1620			
Grandview							1610	1870	1460	1660			
Vallejo							1340	1700	1300	1420			
Cuttings Wharf							1320	1800	1200	1320			
Sacramento River Delta													
Collinsville	1150	448	1020	370	590	680	570	1260	500	620	1080	390	300
Emmaton	802	136	540	65	156	310	250	1000	166	380	760	88	54
Three Mile Slough Bridge	692	81	430	25	109	205	150	860	90	320	660	77	57
Rio Vista Bridge	608	21	256	12	44	67	52	740	28	130	520	12	8
Junction Point						17	26	620	(2) 7	74	410		
Liberty Ferry	192	11	32		7	14	6	560			230		
Grand Island (Steamboat Sl.)						5					350		
Isleton Bridge	310	12	68		13	6	10	635	(2) 6	46	310		
Howard Ferry	157		27			7		500			232		
Sutter Slough	46					11		320			50		
Little Holland Ferry	48					11		300			14		
Ryde						9		280			11		
Reclamation District 2068								280			176		
Walnut Grove	42		15			8		220			10		
Paintersville Bridge	47		17			9		144			8		
Sacramento						8	5	10	6	7	7	4	4

* Normal taken as 40-year mean (1889-1929) of natural runoff at foothill stations of major tributaries.
(1) For location and description see Table 71.
(2) Maximum salinity obtained from first sample taken in season.

TABLE 70 (CONTINUED)

MAXIMUM RECORDED SALINITY AT BAY AND DELTA STATIONS
1924 TO 1936, INCLUSIVE

Year	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
Sacramento-San Joaquin Runoff in per cent of Normal*	28	83	57	114	80	42	63	29	78	46	40	86	91
Station (1)	Maximum Recorded Salinity in parts of chlorine per 100,000												
Mokelumne River Delta													
Southwest Point			65		23	9	9	390		17	107		
Camp 33, Staten Island	113		32		25	8	7	245		13			
Tyler Island Ferry	44		19			9	9	200			10		
Camp 11, Staten Island	96		23			7		134		5	25		
Camp 29, Staten Island			25		16	11		182			52		
Camp 25, Staten Island	110		24			7		164		7			
Camp 20, Staten Island			22			8		124			18		
San Joaquin River Delta													
Antioch	1080	356	920	179	450	600	470	1240	400	580	960	290	270
Curtis Landing						450		1060	280	470	810	180	
Jersey	708	81	470	53	192	365	220	910	150	280	(2) 620	86	78
Webb Pump	414	24	147	16	46	80	61	680	35	122	(3) 340	16	16
Central Landing	288	10	98		19	20	15	425	8	25	(4) 90	8	7
Dutch Slough								510	37	80	280	21	21
Rock Slough West of Dam												8	11
Ward Landing						23	16	350			190		
Holland Pump	308	18	148		334	42	23	325	11				
Bacon Pump										25	160	11	
Mandeville Pump			84		25	25	17	350	18	29	166		
King Island Pump	164		48		19	16		261			104		
Rock Slough East of Dam												8	11
Rindge Pump	126	35	50		28	28	16	198	16	22	94	18	20
Orwood Bridge			86		21	18	12	277			107		
East Contra Costa Irr. Dist.						16	17	200			73		
Middle River	186	13	69		21	17	13	270	12	18	108	11	12
Mansion House	148	11	69		16	16	11	240			90		
Stockton Country Club	108		48			36	18	122			44		
Clifton Court Ferry	80		24			23		130			40		
Stockton						200	120	132	72	66	76		
Garwood Bridge								92			38		
Brandts Bridge								43			21		
Williams Bridge	42		18			12		118			43		
Whitehall						15		31			12		
Mossdale Bridge	14					16	10	12	14	13	25	12	14

* Normal taken as 40 year mean (1889-1929) of natural runoff at foothill stations of major tributaries.
(1) For location and description, see Table 71.
(2) Estimated maximum of 670 in period not covered by sampling.
(3) Estimated maximum of 350 in period not covered by sampling.
(4) Estimated maximum of 125 in period not covered by sampling.

TABLE 71

SALINITY STATIONS AT WHICH OBSERVATIONS WERE TAKEN

STATION	Miles from Golden Gate	Time Interval between High Tide at Golden Gate and Time for taking Samples at Station		LOCATION
		Hours	Mins.	
				SAN FRANCISCO, SAN PABLO AND SUISUN BAYS
Point Orient*	12.3	2	20	North End San Francisco Bay, East Shore, one-half mile south of Pt. San Pablo. Wharf of Standard Oil Company.
Point Davis*	25.2	3	15	East End San Pablo Bay, South Shore. Oleum Wharf of Union Oil Company.
Bulls Head Point*	34.0	3	50	West End Suisun Bay, South Shore. Wharf of Mountain Copper Company.
Bay Point*	39.9	4	15	Suisun Bay, South Shore. Bay Point Wharf of Coos Bay Lumber Company.
O and A Ferry*	46.5	4	40	Upper End Suisun Bay between Mallard Station and Chipps Island at Sacramento Northern Railroad Ferry Crossing.
Innisfail Ferry*	47.3	4	50	Montezuma Slough, about 1 mile east of Junction with Cutoff Slough, near North End of Grizzly Island.
				NORTH SAN PABLO BAY
Sonoma Creek Bridge	26.4	3	10	Sonoma Creek Entrance at Drawbridge.
Grand View	27.0	3	10	Petaluma Creek, State Highway Drawbridge near town of Grand View.
Vallejo	29.1	3	35	Napa River at Sears Point Toll Road Bridge, about one mile from Mare Island Navy Yard Causeway.
Cuttings Wharf	36.7	4	00	Napa River, Right Bank, opposite North End of Bull Island, near Carneros Station on Southern Pacific Railroad.
				SACRAMENTO RIVER DELTA
Collinsville*	50.8	5	25	Sacramento River, North Bank, at Junction with San Joaquin River.
Emmaton*	57.7	5	45	Sacramento River, South Bank, Lower end of Horseshoe Bend.
Three Mile Slough Bridge	60.0	5	55	At Junction of Slough and Sacramento River.
Rio Vista Bridge	63.5	6	05	At Highway Bridge near Northerly limits of Rio Vista.
Junction Point	65.2	6	10	Sacramento River, Right Bank, just below the Junction with Steamboat Slough.
Liberty Ferry	67.6	6	25	Cache Slough at Junction with Prospect Slough.
Grand Island (Steamboat Slough)	68.2	6	30	Steamboat Slough at Grand Island Drainage Pumping Plant, three miles from Junction Junction Point.
Isleton Bridge	68.7	6	30	Sacramento River, one mile upstream from Isleton.
Howard Ferry	71.4	6	55	Steamboat Slough, 1½ miles below junction with Sutter Slough.
Sutter Slough	72.8	7	00	At Junction with Miner Slough.
Little Holland Ferry	73.2	7	05	Back Borrow Pit of Reclamation District 999, two miles above junction with Miner Sl.
Ryde	74.4	7	15	Sacramento River, Right Bank, at town of Ryde.
Reclamation District 2068	74.6	7	15	Haas Slough, at Reclamation District 2068 pumping plant.
Walnut Grove	77.4	7	25	Sacramento River, Highway Bridge, at Walnut Grove.
Paintersville Bridge	77.6	7	25	Sacramento River one mile below Courtland.
Sacramento*	103.5	9	30	Sacramento River at Southern Pacific Railroad Bridge.

* Permanent station maintained throughout the year.

TABLE 71 (CONTINUED)

SALINITY STATIONS AT WHICH OBSERVATIONS WERE TAKEN

STATION	Miles from Golden Gate	Time Interval between High Tide at Golden Gate and time for taking Samples at Station — Hours	Mins.	LOCATION
				MOKELUMNE RIVER DELTA
Southwest Point	78.8	7	25	Staten Island, North Fork Mokelumne River, South Bank, Just above Junction with South Fork.
Camp 33, Staten Island	80.2	7	30	South Fork, Mokelumne River, North Bank, Two miles above North Fork Junction.
Tyler Island Ferry	81.9	7	40	On Georgiana Slough, about due east of Isleton.
Camp 11, Staten Island	83.1	7	45	North Fork, Mokelumne River, East Bank, Four miles above South Fork Junction.
Camp 29, Staten Island	83.4	7	50	South Fork, Mokelumne River, North Bank, opposite Terminous.
Camp 25, Staten Island	86.4	8	05	South Fork, Mokelumne River, West Bank, one mile above Syoamore Slough Junction.
Camp 20, Staten Island	88.9	8	30	South Fork, Mokelumne River, West Bank, one-half mile below Beaver Slough Junction.
				SAN JOAQUIN RIVER DELTA
Antioch*	54.9	5	55	San Joaquin River, at City Water Works pumping plant.
Curtis Landing	58.9	6	10	San Joaquin River, Right Bank, about three-fourths mile above Antioch Toll Bridge.
Jersey*	61.4	6	20	San Joaquin River, Left Bank, one mile below Mouth of False River.
Webb Pump*	72.0	7	00	False River, two miles below Old River Junction.
Central Landing*	72.0	7	00	Mokelumne River at Central Landing, Bouldin Island.
Dutch Slough*	73.0	7	05	At Bethel Island Bridge.
Rock Slough West of Dam*	77.0	7	20	In Rock Slough, West of Dam at Junction of Sand Mound Slough and Rock Slough.
Ward Landing	79.6	7	35	San Joaquin River near Junction with Little Connection Slough on the Southwest Side of Empire Tract.
Holland Pump	80.6	7	40	Rock Slough, North Bank, 1½ miles west of Old River Junction.
Bacon Pump	82.9	7	50	Old River at Bacon Island Drainage Pumping Plant, near Junction with Rock Slough.
Mandeville Pump	83.0	7	50	Connection Slough, North Bank, one mile west of Middle River, on South end of Mandeville Island.
King Island Pump	84.2	8	00	Honker Cut at Empire Tract - King Island Ferry.
Rock Slough East of Dam*	85.4	8	05	In Rock Slough, three-fourths of a mile East of Junction with Sand Mound Slough.
Rindge Pump*	86.1	8	10	San Joaquin River, North Bank, one mile below Fourteen Mile Slough Junction.
Orwood Bridge	86.3	8	10	Old River, at Santa Fe Railroad Crossing, Orwood.
East Contra Costa I. D.	86.7	8	20	Indian Slough, at East Contra Costa Irrigation District Pumping Plant.
Middle River P.O.*	87.7	8	20	Middle River, East Bank, at Santa Fe Railroad Crossing.
Mansion House	88.4	8	30	Victoria Island, Old River, East Bank, at Junction with North Victoria Canal.
Stockton Country Club	90.8	8	45	On Lindley Cutoff (San Joaquin River), North Bank, about three-fourths of a mile above Burns Cutoff Junction.
Clifton Court Ferry	94.2	9	10	Old River just below Junction with Grant Line Canal.
Stockton	94.8	9	15	Near Head of Stockton Channel at Wharf of California Transportation Company.
Garwood Bridge	95.3	9	15	San Joaquin River. At Drawbridge one mile above Santa Fe Railroad Crossing.
Brandt Bridge	100.6	9	50	San Joaquin River. At Drawbridge six miles above Santa Fe Railroad Crossing.
Williams Bridge	101.6	9	55	Middle River, about four miles below Salmon Slough Junction.
Whitehall	104.8	10	20	Old River, West of Junction of Salmon Slough and Paradise Cut. Due north of Tracy.
Mossdale Bridge*	108.5	10	50	San Joaquin River at Lincoln Highway Crossing, about three miles southwest of Lathrop.

* Permanent station maintained throughout the year.

TABLE 72

SALINITY OBSERVATIONS, SACRAMENTO-SAN JOAQUIN DELTA AND UPPER BAYS
Samples taken by local observers approximately one and one-half hours after high high tide
Salinity expressed in parts of chlorine per 100,000 parts of water

Station	JANUARY							
	2	6	10	14	18	22	26	30
San Francisco, San Pablo and Suisun Bays								
Point Orient	1480	1520	1440	1000	960		1020	1080
Point Davis			940	700	127	340	480	580
Bulls Head Point		840		270		9	80	88
Bay Point		250			12	6	11	
O and A Ferry	120	50	3	3	1	4	4	5
Innisfail Ferry	b	160	120	154	64	57	41	33
Sacramento River Delta								
Collinsville	26	12	4	6	1	3	1	3
Emmaton		2	2	1	1	1a	1	
Sacramento		1a	1	1	1ab	1	1	1
San Joaquin River Delta								
Antioch	ad 17	10	9	6	4	3	4	4
Jersey		5				a	3	3
Dutch Slough	7	7	8	8	4ab	9	8	8
Rindge Pump	9	7a	5		3	5a	7	7
Rock Slough West of Dam	b 5	7	6	8	7	9	11	8
Rock Slough East of Dam	b 6	6	6	7	8	7	7	7
Middle River P.O.	4ab	6a	5	8	8ab	7a	7	
Mossdale Bridge		4	3	3	13	5	5	

Station	FEBRUARY						
	2	6	10	14	18	22	26
San Francisco, San Pablo and Suisun Bays							
Point Orient	1040e	1160	1040	840	640	580	500
Point Davis				390	320		
Bulls Head Point	b 140	380		37	7		4
Bay Point	24					a	8
O and A Ferry	3	4a	4a	2	2	2	
Innisfail Ferry	25	30	40	50	27		15
Sacramento River Delta							
Collinsville	2	2	1	1	2	2	1
Emmaton	1b	2	1	1		1a	1
Sacramento	ab 1	1a	1	1	1ab	1	1
San Joaquin River Delta							
Antioch	4		3	5	8	2	3
Jersey	3			4			
Dutch Slough	8a	7a	6	8ab	6	9	3
Rindge Pump	7						
Rock Slough West of Dam	7	7a	9	10	9a	7a	6
Rock Slough East of Dam	7	12a	6	8	8a	8	13
Middle River P.O.	ab	7	7	5	6ab	4a	2
Mossdale Bridge		3a	2	4	1	2	2

a, b, c, d, e, f, See footnotes last page of this table.

TABLE 72 (CONTINUED)

SALINITY OBSERVATIONS, SACRAMENTO-SAN JOAQUIN DELTA AND UPPER BAYS

Samples taken by local observers approximately one and one-half hours after high high tide.

Salinity expressed in parts of chlorine per 100,000 parts of water

Station	MARCH							
	2	6	10	14	18	22	26	30
	San Francisco, San Pablo and Suisun Bays							
Point Orient	640:	820:	680:	720:	1140:b	960:	1080:	1140:
Point Davis	:	160:	240:	270:	600:b	460:	:	490:
Bulls Head Point	:ab 4:ab	3:	5:	32:	:a	26:	138:a	160:
Bay Point	3:	2:a	4:	4:	:a	3:	:	9:
O and A Ferry	:	:	:	1:d	11:	1:a	1:	1:
Innisfail Ferry	23:	25:a	32:	:	36:a	33:a	31:	33:
	Sacramento River Delta							
Collinsville	2:	1:	1:	4:	4:a	1:	1:	2:
Emmaton	1:ab	1:a	1:	:	1:a	1:	1:	1:
Sacramento	1:b	1:	1:	1:	1:b	1:	1:	1:
	San Joaquin River Delta							
Antioch	2:	1:	2:	2:	5:a	1:	:a	2:
Dutch Slough	2:	3:	3:	4:	5:b	2:	2:	1:
Rock Slough West of Dam	6:	5:	4:b	5:	3:b	3:	3:	2:
Rock Slough East of Dam	3:	3:	2:b	3:	4:b	2:	3:d	2:
Middle River P.O.	3:	2:	2:	2:	:b	3:	5:	2:
Mossdale Bridge	1:	1:	1:	2:	2:b	1:	1:	2:

Station	APRIL							
	2	6	10	14	18	22	26	30
	San Francisco, San Pablo and Suisun Bays							
Point Orient	1120:b	800:	1000:	1160:	1120:b	1000:	940:	960:
Point Davis	:b	560:	420:	440:b	520:b	340:	194:	:
Bulls Head Point	:b 286:b	230:	:	110:b	178:b	198:	25:	:
Bay Point	:a 5:	:a	3:	2:a	3:	:	1:a	1:
O and A Ferry	:b 2:	2:a	2:a	2:b	1:a	2:	1:a	1:
Innisfail Ferry	:a 40:a	39:a	39:	38:a	33:a	29:a	24:a	22:
	Sacramento River Delta							
Collinsville	:a 1:a	1:a	1:	1:a	1:a	1:a	1:a	1:
Emmaton	:a 1:a	1:	1:	2:a	1:b	2:a	1:	1:
Sacramento	:b 1:b	3:	1:	1:b	1:b	3:	1:a	1:
	San Joaquin River Delta							
Antioch	:a 2:a	1:a	2:	2:a	3:a	3:	1:a	2:
Jersey	: :	:	:	:	:a	2:	:	:
Dutch Slough	:b 6:b	3:	4:	2:b	4:b	2:	1:a	1:
Rock Slough West of Dam	:b 2:b	3:	4:	4:b	3:b	2:a	7:a	1:
Rock Slough East of Dam	:b 1:b	4:	5:	2:b	2:b	2:a	1:a	1:
Middle River P.O.	:b 5:b	5:	:	4:	:b	3:b	2:	:
Mossdale Bridge	:b 4:b	1:ab	3:	4:b	1:b	1:	1:a	1:

a, b, c, d, e, f, See footnotes last page of this table.

TABLE 72 (CONTINUED)

SALINITY OBSERVATIONS, SACRAMENTO-SAN JOAQUIN DELTA AND UPPER BAYS
Samples taken by local observers approximately one and one-half hours after high high tide
Salinity expressed in parts of chlorine per 100,000 parts of water

Station	MAY							
	2	6	10	14	18	22	26	30
San Francisco, San Pablo and Suisun Bays								
Point Orient	980	1000	980	900	1060		1180:a	860
Point Davis	560:b						680	460
Bulls Head Point	450:b	110	108:a	66:b	164:b	400	50	
Bay Point	2:a	:a	2				2:a	6
O and A Ferry	5:a	1	1	1:b	2:b	1	1:b	2
Innisfail Ferry	21:a	20:a	21:a	26:a	22:a	19:a	13:a	19
Sacramento River Delta								
Collinsville	3:a	1:a	2:a	1:a	4:a	1:a	1	1
Emmaton	:a	1	1:a	3:a	3:b	1	:a	1
Sacramento	1:b	1	1:a	1:b	1:b	1:a	1:a	1
San Joaquin River Delta								
Antioch	2:bd	1	1:a	3:a	1:a	1:a	3:a	3
Dutch Slough	1:b	1	1	:a	1:b	3:b	1:b	2
Rock Slough West of Dam	1:b	1	2:a	1:b	1:b	1:a	2:a	3
Rock Slough East of Dam	1:b	2	2:a	2:b	1:b	1:a	1:a	2
Middle River P.O.	:b	1:b	2:a	1:b	1	:a	2	
Mossdale Bridge	1:b	1	1:a	1:b	1:b	2:b	1:b	2

Station	JUNE							
	2	6	10	14	18	22	26	30
San Francisco, San Pablo and Suisun Bays								
Point Orient	1160:b	1180		1380:b	1260	1000	1100	1240
Point Davis	620:b		580	680		620		940
Bulls Head Point	390:b	560	220	390:b	340	100	380	
Bay Point	3:a	5	3	4:a	5:a	7	:a	70
O and A Ferry	2:b	1	1	3:b	2:a	3	3:a	4
Innisfail Ferry	19:a	15:a	16:a	22		8	:a	16
Sacramento River Delta								
Collinsville	2:a	1:a	1:a	1		2	1:bd	3
Emmaton	1:b	1:a	2:a	2:a	1	1	3:a	1
Sacramento	1:b	1:a	1:a	1:b	1	1:a	1:a	1
San Joaquin River Delta								
Antioch	1:a	2	1:a	1:a	1:a	2:a	1:a	1
Jersey				:a	1	1:a	2:a	3
Dutch Slough	1:b	2	1	:b	4	2		
Rock Slough West of Dam	1:b	1:a	1:a	1:b	1	2:a	1:a	2
Rock Slough East of Dam	1:b	2:a	1:a	2:b	1	3:a	2:a	2
Middle River P.O.	1:b	1:a	2:a	1:ab	1	1:a	2	
Mossdale Bridge	1:b	1:b	5:b	1:b	1	1:b	1:a	1

a, b, c, d, e, f, See footnotes last page of this table.

TABLE 72 (CONTINUED)

SALINITY OBSERVATIONS, SACRAMENTO-SAN JOAQUIN DELTA AND UPPER BAYS

Samples taken by local observers approximately one and one-half hours after high high tide

Salinity expressed in parts of chlorine per 100,000 parts of water

Station	JULY							
	2	6	10	14	18	22	26	30
San Francisco, San Pablo and Suisun Bays								
Point Orient	1380:b	1360:	1360:	1440:b	1460:	1440:	1540:	1600:
Point Davis	:	:	940:	1040:b	1160:	1080:	1260:	1360:
Bulls Head Point	660:b	660:	660:	660:b	840:	740:	940:b	980
Bay Point	:a	98:	220:a	200:a	380:	400:	420:a	540:
O and A Ferry	9:b	11:	65:b	190:ab	220:	220:	240:b	340:
Innisfail Ferry	:a	22:	35:a	52:a	95:a	162:a	132:	:
Sacramento River Delta								
Collinsville	3:b	9:a	3:a	8:a	47:a	70:a	108:a	94:
Emmaton	2:b	8:	:a	1:b	3:	:a	3:a	5:
Three Mile Slough Bridge	:a	1:	:a	4:b	1:	2:a	4:b	5:
Rio Vista Bridge	:a	2:	1:a	2:b	1:	2:	2:b	2:
Sacramento	1:b	1:a	1:b	3:b	2:a	2:a	1:a	2:
San Joaquin River Delta								
Antioch	2:a	5:a	2:a	9:a	23:	36:	91:	69:
Jersey	:	:	:a	2:	:a	5:a	7:a	7:
Central Landing	:	:	:	:	:	:	:	3:
Dutch Slough	1:b	7:	4:b	2:b	4:	4:b	1:	:
Rock Slough West of Dam	2:b	1:a	2:a	2:b	3:a	3:a	4:a	6:
Rock Slough East of Dam	1:b	1:a	4:a	3:b	4:a	4:a	6:a	5:
Middle River P.O.	2:a	2:a	2:	:b	4:a	2:	:	7:
Mossdale Bridge	3:b	3:b	4:b	6:b	7:b	9:b	14:b	13:

Station	AUGUST							
	2	6	10	14	18	22	26	30
San Francisco, San Pablo and Suisun Bays								
Point Orient	1620:b	1580:	1600:	1640:b	1640:	1580:	1640:	1680:
Bulls Head Point	860:b	1040:	1100:b	1060:b	1000:	1080:	1220:b	1080:
Bay Point	520:ad	640:	740:	:	:	640:a	740:	:
O and A Ferry	340:b	380:	440:b	320:a	440:	560:a	580:a	480:
Innisfail Ferry	232:a	284:a	330:	:	:a	430:a	490:a	510:
Sacramento River Delta								
Collinsville	110:cd	168:a	144:bd	210:ab	290:	240:a	220:a	300:
Emmaton	9:b	:a	16:a	23:b	54:	:	44:	:
Three Mile Slough Bridge	7:b	9:a	21:b	32:b	30:	37:	56:b	48:
Rio Vista Bridge	2:b	8:	4:b	2:b	4:	4:b	2:b	4:
Sacramento	2:b	2:a	1:b	2:b	2:a	2:a	2:b	3:
San Joaquin River Delta								
Antioch	88:a	120:a	82:a	160:a	170:	210:a	220:ab	210:
Curtis Landing	:	:	:	:a	108:a	76:	:	:
Jersey	:a	16:a	11:a	24:	:a	27:	:a	66:
Webb Pump	:	:	:	:	:	:a	9:a	12:
Central Landing	:	:	:a	7:a	4:	:a	4:	:
Dutch Slough	7:b	7:b	11:b	11:b	9:	9:b	10:b	14:
Rindge Pump	:	:	:	:b	13:a	16:a	15:a	16:
Rock Slough West of Dam	4:a	5:a	4:a	4:b	5:a	5:a	6:b	7:
Rock Slough East of Dam	4:a	4:a	4:a	4:b	5:a	6:a	6:b	5:
Middle River P.O.	5:bd	5:	:ad	5:ab	6:	:a	6:	:
Mossdale Bridge P	11:b	11:b	11:b	10:b	11:b	11:b	10:b	9:

a, b, c, d, e, f, See footnotes last page of this table.

TABLE 72 (CONTINUED)

SALINITY OBSERVATIONS, SACRAMENTO-SAN JOAQUIN DELTA AND UPPER BAYS

Samples taken by local observers approximately one and one-half hours after high high tide

Salinity expressed in parts of chlorine per 100,000 parts of water

Station	SEPTEMBER							
	2	6	10	14	18	22	26	30
	San Francisco, San Pablo and Suisun Bays							
Point Orient	1660:	1660:	1620:	1660:	1680:	1640:	1640:	1740:
Point Davis	:	:	:	:	1320:	:	1420:	1420:
Bulls Head Point	1200:	1060:	1160:ab	960:	:	:	:	:
Bay Point	:	820:a	800:	:	:	720:	:	680:
O and A Ferry	480:	560:a	440:ab	400:a	470:	500:b	480:	380:
Innisfail Ferry	560:ab	520:	:	540:	580:	:b	560:a	560:
	Sacramento River Delta							
Collinsville	290:a	260:a	300:	250:	260:a	270:a	280:bd	280:
Emmaton	:ab 47:a	44:a	48:	:	38:	:a	20:	:
Three Mile Slough Bridge	50:	48:b	57:	29:	40:	32:b	17:	17:
Rio Vista Bridge	6:	3:	8:	5:	3:	4:abd	5:	3:
Sacramento	:ab 3:a	1:a	2:ab	2:a	1:a	4:a	2:	1:
	San Joaquin River Delta							
Antioch	260:	270:a	160:	150:ad	190:a	200:a	130:	190:
Jersey	:ab 78:	:a	36:	40:a	37:	:	:	29:
Webb Pump	16:	11:a	14:	13:	11:a	14:d	13:	11:
Central Landing	:	:a	5:a	3:	:	:	:	:
Dutch Slough	15:	21:b	19:	16:	17:	:	:	:
Rindge Pump	14:a	17:a	15:	15:a	16:a	18:a	20:	18:
Rock Slough West of Dam	8:a	7:a	9:	8:a	10:a	11:a	10:	11:
Rock Slough East of Dam	7:a	8:a	9:	8:a	11:a	10:a	10:	11:
Middle River P.O.	:	:a	10:ab	9;	:a	11:abd	12:	10:
Mossdale Bridge	:ab 10:ab	9:b	8:	:a	6:a	9:a	8:a	7:

Station	OCTOBER							
	2	6	10	14	18	22	26	30
	San Francisco, San Pablo and Suisun Bays							
Point Orient	1680:	1560:	1640:a	1580:	1640:	1600:	1560:	1700:
Point Davis	1440:	1280:	1320:	:	:	1300:	:	:
Bulls Head Point	1340:	1060:ab	1000:ab	880:	1060:	880:ab	800:ab	940:
Bay Point	960:	:	:	:	:	:	:	:
O and A Ferry	540:	260:ab	330:	360:	340:	280:	300:	360:
Innisfail Ferry	540:	500:	500:	500:	540:	:	480:	460:
	Sacramento River Delta							
Collinsville	:b 250:a	140:	162:	166:a	128:a	134:	110:	204:
Emmaton	26:a	11:a	18:	:a	8:	:	6:ab	10:
Three Mile Slough Bridge	21:	12:	12:	7:	13:	8:	6:	7:
Rio Vista Bridge	4:	1:	1:	1:	1:	1:	1:	2:
Sacramento	:a 2:a	1:	1:ab	1:a	1:ab	1:	1:ab	2:
	San Joaquin River Delta							
Antioch	:a 116:a	120:	112:	224:	130:	94:	94:	170:
Jersey	:a	13:	:	14:	:a	13:	:	32:
Webb Pump	:a	10:	10:	8:a	8:e	9:	8:	7:
Dutch Slough	:	:	10:	9:	10:	9:	:	:
Rindge Pump	:a 15:a	14:	11:	12:a	10:a	10:	9:	8:
Rock Slough West of Dam	:a	10:	9:	10:a	10:a	9:	9:	8:
Rock Slough East of Dam	:a	10:	10:	9:a	7:a	7:	6:	7:
Middle River P.O.	:	10:	:	10:	:a	7:d	10:	7:
Mossdale Bridge	6:b	4:a	5:	6:	5:b	7:	6:	8:

a, b, c, d, e, f, See footnotes last page of this table.

TABLE 72 (CONTINUED)

SALINITY OBSERVATIONS, SACRAMENTO-SAN JOAQUIN DELTA AND UPPER BAYS

Samples taken by local observers approximately one and one-half hours after high high tide

Salinity expressed in parts of chlorine per 100,000 parts of water

Station	NOVEMBER								
	2	6	10	14	18	22	26	30	
San Francisco, San Pablo and Suisun Bays									
Point Orient	1640	1500	1620	1580	1600	1480	1620	1590	
Point Davis	1300		1260	1220	1120 b	1260			
Bulls Head Point	a	820 ab	900 a	940	1020	1000	1100	900	
Bay Point			600						
O and A Ferry	300	300 ab	260	340	260 a	278 ab	216	480	
Innisfail Ferry	460	420	420	440	460	460	460		
Sacramento River Delta									
Collinsville	a 128	108	140	156 a	94 b	134	100	262	
Emmaton	a 6	8	1	4	a	6			
Three Mile Slough Bridge	b 7	4	3		4	4	4	4	
Rio Vista Bridge	2	1	1	1	1	1	1	1	
Sacramento	a 1	1 ab	1 a	1 a	1	2 ab	1 a	1	
San Joaquin River Delta									
Antioch	168	74	94	112 a	60	72	112	88	
Jersey			13						
Webb Pump	ab	7 a	6				d	7	
Dutch Slough	9	7	8	9	10	7	8	8	
Rindge Pump	a 9	10	10 a	11 a	13	8	8 a	9	
Rock Slough West of Dam	a 7	6	7	7	8	9	8	8	
Rock Slough East of Dam	a 7	6	7	6	8	8	7	6	
Middle River P.O.		7	a	7 a	10		8		
Mossdale Bridge	7	7		5	4	5	6	7	

Station	DECEMBER								
	2	6	10	14	18	22	26	30	
San Francisco, San Pablo and Suisun Bays									
Point Orient	1640	1560	1560	1560	1480	1520	1600		
Point Davis	d 1200	1200	1240		1120	1140		1200	
Bulls Head Point	1040	920 ab	780 a	780	880 a	760 ab	860	1020	
Bay Point		380		500	380	380			
O and A Ferry	a 200	525	220	300	200	260	250		
Innisfail Ferry	400	460		420		400	380	360	
Sacramento River Delta									
Collinsville	a 122	94	116	146 a	56	68	a	38	
Emmaton		6	a	5 a	4	3	3 a	4	
Sacramento	a 1	1 ab	1 a	1 a	1	1 ab	1 a	1	
San Joaquin River Delta									
Antioch	a 98	58	74		48	44	131	65	
Jersey			10				a	5	
Webb Pump	d 7		a	1			ab	4	
Dutch Slough	7	6	8	8	9	9	7	8	
Rindge Pump	7	9	7 a	9 a	6	12	7 a	8	
Rock Slough West of Dam	a 8	7	7 a	7 a	7	7	6	5	
Rock Slough East of Dam	a 5	7	7 a	6 a	6	4	5	5	
Middle River P.O.	7	ab	6		4				
Mossdale Bridge	b 4	4	2	2		3	4	4	

a Low high tide.
b Taken on following day.
c Taken two days later.
d. Over 1 hour off scheduled time.
e Taken on preceding day.
f Taken two days earlier.

CHAPTER VII

SURFACE WATER ANALYSES

Purpose

The purpose of these analyses is to make of record the quality of water in the stream and return flow channels in the Sacramento-San Joaquin Valley area.

Scope

The scope of this work is such as to secure enough samples at intervals during the season to insure that any change in the quality or chlorine content will be noted.

Station Maintenance and Record

In the past, no continuous sampling program has been followed except for the stations maintained in the Sacramento-San Joaquin Delta as reported in Chapter VI. Samples of return water were taken in 1924 at a few places and the results are tabulated in Tables 28 and 29 of Bulletin 4 of the Division of Water Rights, published in 1924. Bulletin 23 of the Division of Water Resources gives the results for a few samples taken in 1928. In Bulletin 27 of the Division of Water Resources will be found the tabulated results of many miscellaneous samples taken in the period from 1906 to 1924, the complete records of sampling at the Sacramento-San Joaquin Delta and San Francisco Bay stations for the period 1920-1931, inclusive, and the results of the complete chemical analyses of samples taken in 1929. Appendix E of Bulletin 29 of the Division of Water Resources tabulates the results of a few samples taken in 1906-1908 and compares the results with samples taken in 1930 at the same or nearly

identical points. Table E-2 of that Bulletin gives the results of a very comprehensive sampling program in 1930 in conjunction with the Water Resources Branch of the U. S. Geological Survey, covering most of the rivers in California and Table E-3 gives the results of the sampling of the Sacramento River at Sacramento at about weekly intervals from July 1931 to July 1932.

During the irrigation season of 1936 the samples were taken by the field engineers of this office incident to their other duties as sufficient funds were not available to engage observers to take the samples at regular intervals and mail them to the Highway Laboratory for analyses, as is done in the case of the samples taken in the Delta. Table 73 gives the results of the samples analyzed for chlorine only, and in Table 74 are shown the results of the complete chemical analyses of some Sacramento and San Joaquin river waters.

TABLE 73

MISCELLANEOUS SALINITY OBSERVATIONS
Sacramento-San Joaquin Area

Salinity expressed in parts of chlorine per 100,000 parts of water

Location	June			July			August			September			October			November			December		
	Day	Cl	cfs.	Day	Cl	cfs.	Day	Cl	cfs.	Day	Cl	cfs.	Day	Cl	cfs.	Day	Cl	cfs.	Day	Cl	cfs.
SACRAMENTO VALLEY																					
Stream Channels																					
Sacramento River at Kennett				28	.4	2910															
at Meridian							12	1	1500												
at Verona				28	2.6	2800															
at Sacramento				26	2	3600	6	2	3080	6	2	3860	6	2	5360						
Feather River at Nicolaus							3	2	1060												
Return Flow Channels																					
Colusa Trough at Colusa-Williams Hy.							12	3	364	22	5	424	19	8	88						
Butte Slough at Mouth							4	1	108	22	2	320	20	2	96						
Reclamation District 70 Drain at plant							12	4	46	2	6	22									
Reclamation District 108 Drain at plant							12	9	90												
Colusa Basin Drain at Knights Landing							22	5	276	11	4	407	18	3	112						
Sacramento Slough at Sacramento River							21	22	370												
Reclamation Dist. 1500 Drain at plant				24	25	229	18	21	267	18	22	252	8	37	56						
Sutter By-Pass																					
East Borrow Pit at Chandler													22	3	50						
West Borrow Pit above 1500 Drain				24	21	64	21	16	108	18	4	280	8	3	223						
Yolo By-Pass																					
East Borrow Pit at Elkhorn							11	11													
at S.P.R.R.							11	15	45												
Reclamation Dist. 1000 Drain at plant				25	8	57															
SAN JOAQUIN VALLEY																					
San Joaquin River																					
At Friant				29	.2	1860				30	1	1140									
At Mendota				29	.2								2	1		10	1		6	1	
At Delta Bridge	18	1	375																		
At Fremont Bridge	18	1	2640	13	5	833	4	20	200	4	13	179	9	6	225	6	14	173			
Near Newman	18	1	3840	13	5	1370	4	18	466	4	10	405	9	1	534	6	15				
At Crows Landing Bridge	18	1		13	4		4	15		4	13		9	7		6	13				
Near Grayson (Laird Slough)	20	1	4000	15	9	1330	4	15	700	4	16	620	9	7	780	6	16	540			
At Durham Ferry Bridge	20	1	9770	13	6	3180	4	9	1250	5	8	1130	9	3	2000	4	7	1650			
Near Lathrop (Mossdale Bridge)	22	1		14	6		6	11		6	9		10	5		6	7		6	4	
Merced River																					
At Yosemite Valley Railroad							5	1	45												
Near mouth	18	1	1230	13	1	360	4	2	245	4	2	207	9	2	230	6	2	185			
Dry Creek																					
Near Modesto	17	3	87	14	1	71	5	1	63	3	1	71	9	1	59	5	1	50			
Tuolumne River																					
At Roberts Ferry Bridge							5	7	42												
At Hickman Bridge							5	7	127												
At Tuolumne City	20	1	4630	15	3	885	5	8	415	4	9	425	6	3	925	6	3	940			
Stanislaus River																					
At Orange Blossom Bridge	17	1	1770				6	1	28												
At Hatmark Ranch	17	2	4110	15	2	371	6	1	280	4	1	265	9	1	273	4	1	297			

TABLE 74

PARTIAL ANALYSIS OF SOME SURFACE WATERS
Sacramento-San Joaquin Area

Expressed in parts per 100,000 parts of water

Location	Date 1936	Discharge c.f.s.	Total Dissolved Solids (Calc.)	Carbonate CO_3	Bi-Carbonates HCO_3	Total Hardness $CaCO_3$	Alkalinity $CaCO_3$	Sulphates SO_4	Chlorides Cl	Alkalis (Calc.) Na	Silica SiO_2	Iron and Aluminia Oxide	Lime Ca	Magnesia Mg	Nitrate NO_3	Borate BO_3	Boiler Rating: Scale	Boiler Rating: Foaming	Boiler Rating: Corroding	Alkali Rating
SACRAMENTO RIVER																		Very		
at Kennett	7/28	2910	11	1.4	8.1	7.1		.1	.4	1.2			1.6	.7	.075	.007	Good	Good	Good	Good
at Verona	7/28	2800	18.5	1.4	10.2	10.8		.8	2.6	2.2			2.1	1.3	.030	.01-	Fair	Very Good	Good	Good
at Courtland	7/29	3300	12.5	2.4	4.1	7.5		.5	2.2	1.7			1.3	1.0	.088	.01-	Good	Very Good	Good	Good
SAN JOAQUIN DELTA		Low																Very		
at Central Landing	7/29	Tide High	14.0	0.7	8.3	8.9		.8	2.6	1.8			1.9	1.0	.163	.01-	Good	Good	Good	Good
at Central Landing	7/29	Tide High						.8	2.6											
at end of Rock Sl.	4/25	Tide High	22.0	Nil	9.3	4.9	7.6	2.5	3.6	5.0	2.5	.5	.7	.8			Good	Good	Good	Good
at end of Rock Sl.	11/26	Tide	30.5	Nil	12.7	10.7		3.5	7.6	7.1			2.8	.9	.11	.01-	Fair	Fair	Fair	Good
SAN JOAQUIN RIVER																				
at Vernalis	7/29	1340	32.5	2.2	4.4	10.5		5.4	10.6	8.7			1.6	1.5	.013	.02	Fair	Fair	Fair	Fair
near Newman	7/29	552	50.0	1.7	4.1	13.6		9.9	16.8	13.4			2.4	1.9	.044	.022	Fair	Bad	Fair	Fair
at Mendota	7/29		2.5	.5	1.5	1.8		.1	.2	.3			.4	.2	.092	.01-	Good	Very Good	Good	Good
at Friant	7/29	1860	3.5	.5	1.7	1.4		.2	.2	.7			.4	.1	Trace	.01-	Good	Good	Good	Good