

CENTRAL VALLEY PROJECT

C A L I F O R N I A

Delta Lowlands Service Area Investigations

Report Area DL-9

Stockton to Middle River and Vicinity

JANUARY 1964

WATER RIGHTS ENGINEERING BRANCH
DIVISION OF PROJECT DEVELOPMENT
BUREAU OF RECLAMATION
REGION 2, SACRAMENTO, CALIFORNIA

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CALIFORNIA

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Region 2, Sacramento, California

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DELTA LOWLANDS SERVICE AREA INVESTIGATIONS
REPORT AREA DL- 9

INTRODUCTION

Purpose and scope. - The purpose of this report is to assemble and summarize factual data on the historic use of water for irrigation within a place of use designated "DL-9, Delta Lowlands." This information, in conjunction with similar data covering the Sacramento River, Delta Uplands and other Delta Lowlands water users, will provide an inventory of factual data for use in determining the quantity of water individuals or organizations will require for the irrigation of their lands, and the benefits that accrue due to operation of the Central Valley Project.

The Delta Lowlands are depicted in the "Report on 1956 Cooperative Study Program," Volume I, Plate 3. As in previous investigations conducted jointly by the Bureau and the State, the Lowlands consist generally of land lying below an elevation of five feet above mean sea level and for the most part have been historically served by unmeasured diversions of water from Delta channels. Some of the unmeasured diversions from points on or in the vicinity of the main channels of the Sacramento and San Joaquin Rivers are made by low-lift pumping plants. Some pumping diversions are also made in peripheral areas of the Lowlands. However, no feasible method has been developed for accurately measuring net flows in tidal channels, and the combination of hydraulic and economic problems involved in determining the quantities of water

diverted through the very large number of tide gates and siphons precluded measurements of the bulk of the water used in the irrigation of the Delta Lowlands. Therefore, water used within the area has historically been estimated by the consumptive-use method utilizing available crop data and results of special studies in selected areas. In the consumptive-use method, it is assumed that all cropped lands lying below an elevation of five feet were deriving some irrigation supply from subsurface water.

For report purposes, the Delta Lowlands has been divided into ten component parts. The location of area "DL-9" with respect to the other nine parts is shown on Plate 1, entitled "Report Areas," and the detailed boundary for the area is shown on Plate 3, entitled "Application, Permit, and License Data and Land Ownership."

The Delta Lowlands in the 1956 Cooperative Study Program were assumed to have riparian status. Subsequently, in contract negotiations with Sacramento River and Delta Uplands water users, the validity of this assumption has been questioned. Although various types of field data are available from scattered sources, some of it has never been published in a form convenient for ready reference. This material, supplemented by data collected in 1963, is covered here under land ownership, water rights, water supply for irrigation, irrigation and drainage facilities, and land use and water requirements. It is not the purpose of this report to substantiate or repudiate the

riparian assumption, but rather to present information that will aid in analyzing the various problems and help in understanding the physical characteristics involved.

Description of the report area. - The report area is a part of the southeastern Delta. Except for a relatively small portion located adjacent to Stockton, the area lies west of the San Joaquin River; part of the river is also a reach of the Stockton Deep Water Channel. In addition to the San Joaquin River and Ship Channel, the major portion of the report area is also bounded by Middle River, Old River, Turner Cut and Whisky Slough. A levee forms the boundary for the northwest portion of Middle Division Roberts Island. The geographical entities covered in the report area are:

Reclamation District 403, inactive (Rough and Ready Island)

Reclamation District 404 (Boggs Tract)

Reclamation District 524 (Middle Division Roberts Island and The Pocket)

Reclamation District 544 (Upper Division Roberts Island)

Reclamation District 684 (Lower Division Roberts Island)

Honker Lake Tract

The entire report area lies within San Joaquin County, and is located within projected Townships 1 South, 1 and 2 North, Range 5 East and Townships 1 South and 1 North, Range 6 East, Mount Diablo Base and Meridian.

The report area is entirely overlapped by the Sacramento and San Joaquin Drainage District which was organized in 1911 for the purpose of reclamation and drainage of primarily swamp and overflow lands along the Sacramento and San Joaquin River systems from Chico Creek on the north to Fresno Slough on the south.

Development of the report area. - The lands in the report area, with the exception of a strip located in the southern part adjacent to Old River, became privately owned primarily through the purchase of swamp and overflowed lands from the State during the period 1855-1872; a strip of land bordered by Old River on the south and San Joaquin River on the east was acquired prior to 1850 as a part of the Mexican Land Grant, El Pescadero. The lands in the report area have all been reclaimed and holdings range in size from small farms of a few acres to large holdings of several hundred acres.

Description and development of Reclamation District 403, inactive (Rough and Ready Island). - Rough and Ready Island is surrounded by the Stockton Deep Water Channel and Burns Cutoff, and is located opposite of the western boundary of the city of Stockton. Elevations within Rough and Ready Island range from ten feet above mean sea level near the ship channel to about sea level near the central and remaining western portion of the island. A portion of Rough and Ready Island was first cultivated in 1850. In 1853,

reclamation of this area was begun by raising the elevation by borrow and fill methods. By 1872, about 23 acres had been reclaimed and the island had also been enclosed by a levee. A year later, the area was organized into Reclamation District 163. The district's levees were topped by flood water in 1875. Three years later the reclamation of the island was improved when drainage ditches were dug and a steam-operated pump was installed to remove excess water. In 1881, the area was reorganized into Reclamation District 403. After being flooded in 1892, levee repairs were made and the island was farmed until 1942, when it was acquired by the U. S. Navy. The area has subsequently been used as a naval installation.

Description and development of Reclamation District 404

(Boggs Tract). - Boggs Tract lies adjacent to the southern part of the city of Stockton and is located on the east side of San Joaquin River and north of French Camp Slough. Elevations within Boggs Tract are generally about five feet above mean sea level. The northern part of the tract has been subdivided. Early reclamation efforts consisted of low-levee construction along the San Joaquin River. The levees extended easterly to higher lands. The area was organized into Reclamation District 404 on August 9, 1881.

Description and development of Reclamation District 524

(Middle Division Roberts Island, and The Pocket); Reclamation

District 544 (Upper Division Roberts Island); Reclamation District 684 (Lower Division Roberts Island); and Honker Lake Tract. -

Reclamation Districts 524, 544, and 684, and Honker Lake Tract are component parts of Roberts Island. This island lies near the city of Stockton and is surrounded almost entirely by a waterway consisting of Turner Cut, San Joaquin, Middle and Old Rivers, and Whisky Slough. Reclamation of Roberts Island was begun by individual settlers in 1856. In 1870 Reclamation District 109 and 110 were formed and the Tule Land Reclamation Company began extensive work in the area. In 1871, action of the San Joaquin County Supervisors provided for the division of the island into smaller reclamation districts and reclaiming activities were delayed. Between 1874 and 1876, Reclamation Districts 209 and 223 were formed and the area was enclosed by levees; cross levees were also constructed

On October 30, 1889, Middle Division Roberts Island was formed into Reclamation District 524 through consolidation of Districts 110, 209 and 302; parts of Reclamation District 109 and 223 were also included. The Pocket area is included in Reclamation District 524. Middle Division was flooded in 1886. Within this portion of Roberts Island, elevations range from five feet above mean sea level near the eastern levee to mean sea level in the remaining three-fourths of the area which includes The Pocket. Middle Division Roberts Island is separated from Lower and Upper Divisions by levees.

Reclamation of Upper Division Roberts Island was completed

in 1876, and the area was reorganized into Reclamation District 544 on August 4, 1892. Elevations within the Upper Division range from ten feet above mean sea level near the east levee and near Old River on the south to five feet in the central and remaining western portion. Upper Division is separated from Middle Division Roberts Island by a levee. Flooding occurred in the Upper Division in 1879.

In 1877 and 1878 a large portion of Roberts Island was acquired by the Glasgow-California Land Company. This company dammed off ten sloughs from the surrounding channels, constructed about 32 miles of new levee, and increased the height of existing levees. Most of these works were constructed in the section now identified as Lower Division Roberts Island. Lower Division Roberts Island was reorganized into Reclamation District 684 on October 4, 1877, and included the predecessor Reclamation District 659 and parts of inactive Reclamation Districts 109 and 223. Lower Division was flooded in 1886, 1906 and 1907. Elevations within the northwest part of Lower Division Roberts Island are about ten feet below mean sea level and the remainder of the area lies about five feet below sea level.

Honker Lake Tract, a part of Roberts Island, was reclaimed after 1875. Definite dates of reclamation and levee enlargement are not available but State Bulletin 27 indicates that Honker Lake

Tract was reclaimed at the same time as Middle Division Roberts Island. Elevations within Honker Lake Tract are at about mean sea level.

WATER RIGHTS AND LAND OWNERSHIP

General. - Information pertaining to water rights within the report area was collected and developed primarily in connection with riparian and appropriative rights.

Assumed riparian rights. - The Delta Lowlands in the 1956 Cooperative Study Program were assumed to be riparian to channels of the Delta. The cooperating groups felt that such an assumption, from an engineering standpoint, was desirable as well as reasonable and that differences arising from such an assumption could very possibly be resolved by negotiation or compromise.

Appropriative rights. - Data pertaining to applications, permits, and licenses obtained in conformance with the California Water Code for lands within the report area were obtained from the files of the California State Water Rights Board. This information is presented in tabular form on Plate 3, entitled "Application, Permit, and License Data and Land Ownership." Plate 3 also shows the areas covered by each appropriative right.

Land ownership. - The land ownerships shown on Plate 3 were taken from the 1963 assessor's plats of San Joaquin County. The assessor's records were utilized to obtain names of owners, acreages of holdings, and plats showing boundaries of the holdings. Boundaries for Reclamation Districts were determined from State, county, and district maps. Tabulated names and acreages for the ownerships within the report area are included in supporting data for this report.

Salinity control. - In addition to irrigation diversions from the Delta channels, another recognized demand includes substantial requirements of outflow from the Delta as a whole in order to provide quality control necessary to prevent degradation of Delta supplies due to sea water incursion. The flushing action of an artificially maintained Delta outflow also prevents excessive concentrations of dissolved solids arising from surface evapotranspiration, drainage flows and high midsummer evaporation from the many thousands of acres of water surface in the Delta channels.

Prior to the initiation of controlled summer flows through the Delta by the Central Valley Project in 1944, intrusions of sea water into the Delta channels were a constant threat. Damaging intrusions occurred to varying degrees in many years of below normal streamflow, with the intrusions of 1924 and 1931 assuming dramatic proportions. A chloride concentration of 1,000 parts per million of water is commonly used as a criterion beyond which usefulness for irrigation is limited. Since Shasta Dam began operating in 1944, the maximum annual salinity encroachment into the Delta area has reached no further upstream than a point near the eastern tip of Sherman Island. The extent of intrusion prior to and after Shasta operation is represented by curved lines on Plate 2, entitled "Maximum Annual Salinity Encroachment." The extent of maximum intrusion varies from year to year, but most of the post Shasta encroachment lines pass through the vicinity of the central portion of Sherman Island.

WATER SUPPLY FOR IRRIGATION

Sources of irrigation supply. - The irrigation water supply for the report area is diverted from various channels of the Delta, including the San Joaquin River, and drains. The exterior or main Delta channels are subject to tidal action and fluctuations. Flow of the drains is sustained by percolation from Delta channels and by surface and subsurface drainage of immediately adjacent irrigated lands.

Areas susceptible of irrigation. - Except for levees, berm, water courses and associated aquatic and phreatophytic growth, the lands in most of the reclamation districts and tracts comprising the report area are all susceptible of irrigation. Reclamation District 403, Rough and Ready Island, however, is considered only partially susceptible of irrigation because it is a Naval Reservation. Acreages devoted to various crops and the non-agricultural areas are discussed in the chapter covering land use and water requirements.

IRRIGATION AND DRAINAGE FACILITIES

General. - During 1952, a field survey was conducted throughout the Delta to provide information on existing irrigation and drainage facilities. The locations of the main canals, gravity diversions, irrigation pumping plants, irrigation wells, and drainage systems were delineated in the field on aerial photographs. In 1963, this information was spotchecked and supplemented where major changes were found to have occurred. The field information thus collected is depicted on Plate 4, entitled "Irrigation and Drainage Facilities."

In general, the irrigation of the lower-positioned lands in the Delta was not successful until drainage systems were developed with the capability of controlling water levels at elevations desirable for plant growth. In the report area, drainage facilities are usually provided by the reclamation districts. In unorganized areas, the drainage facilities are individually-owned and operated. Within each district or tract, each system of collection drains terminates at a pumping plant which discharges into an adjacent channel.

Irrigation and drainage facilities. - Lands within Reclamation District 403 (Rough and Ready Island) have not been used extensively for agricultural purposes since 1942 when the area was acquired by the U. S. Navy and utilized for a naval supply annex. Prior to 1942, irrigation diversions were made by siphoning from the San Joaquin River and Burns Cutoff. Since 1942, diversions have been made mainly for fire control.

The northern part of Reclamation District 404 (Boggs Tract) has been subdivided and industrialized. Municipal and industrial water for this part of Boggs Tract is supplied by wells. The remainder of the area is devoted to agriculture and is irrigated by pumping from the San Joaquin River and French Camp Slough. Drainage is provided by facilities of individual water users since Reclamation District 404 acts only in the capacity of providing levee protection.

Sources of irrigation water for lands within Reclamation District 524 (Middle Division Roberts Island) are Middle and San Joaquin Rivers and Burns Cutoff. Low-lift pumps are used to divert water since most of the area is above mean sea level. Diversions are made by individuals and one incorporated mutual water company. Woods Irrigation Company, Incorporated, has since 1909 served the central part of Middle Division from three pumping plants on Middle River. In 1962, according to State Bulletin 114, entitled "Directory of Water Service Agencies in California," Woods Irrigation Company served 7,892 acres. In the area it irrigates, the company also operates and maintains the drainage facilities, consisting of ditches and pumping plants. In the remainder of the area, since the district provides only levee protection, drainage is provided by individually-owned facilities. The Pocket area, a part of Reclamation District 524, is irrigated

by pumping from Middle River, and the collected drainage water is discharged into Middle River by three pumping plants.

Lands within Reclamation District 544 (Upper Division Roberts Island) are supplied irrigation water from the San Joaquin, Old, and Middle Rivers. Since the elevation of most of the land in this district lies at about five feet above mean sea level, diversions are made by low-lift pumping plants. Many of the systems include underground pipelines to convey the water to the fields. Several systems utilize pumps to lift water to higher-positioned lands in the central part of the district. The irrigation systems in the area are privately owned and operated. Since the district provides only levee protection, drainage is usually provided by individually-owned and operated facilities.

The area within Reclamation District 684 (Lower Division Roberts Island) receives irrigation water from Whisky Slough, Turner Cut, Burns Cutoff, and the San Joaquin River. Most diversions are made through individually-owned and operated gravity diversion facilities. Drainage water is discharged into Whisky Slough and the San Joaquin River from district-operated facilities.

On Honker Lake Tract, water is diverted by gravity from Trapper Slough and by pumping from Middle River. The southern portion of the tract is served by a system connected to a pumping plant on Middle River. This system skirts the levee around the Pocket area and extends through the Honker Lake Tract levee to serve that

area. Relift pumps are part of both the gravity and pumping irrigation systems. All facilities including drainage facilities are privately owned. Drainage water is discharged into Trapper Slough by two pumping plants.

Operational practices. - Water for irrigation is usually pumped from adjacent channels into a network of supply ditches or is pumped or siphoned directly onto the separate fields. For higher positioned lands, relift pumps are utilized. In some areas, underground concrete pipe systems are used for water distribution.

Alfalfa and pasture crops are usually irrigated by flooding. The water is applied to the head end of bordered checks by siphon tubes from ditches or from the outlets of underground pipes. Row crops are usually irrigated by flooding the furrows from ditches. Water applied in excess to that needed for crop requirements and water which seeps into the area from upward percolation from adjacent channels is collected in drain ditches and returned to the surrounding channels by drainage pumping plants.

Operation of the irrigation facilities usually begins during April, or occasionally during March, and terminates about the end of September or early in October.

LAND USE AND WATER REQUIREMENTS

General. - In the Delta Lowlands, historical records of irrigation development are limited to crop and land-use information for entities such as islands, tracts or districts obtained from field surveys conducted during certain years. Tables 1 through 7 list the crops raised for the years 1924 through 1932, 1938, 1948, 1950, 1952, and 1955. Except for the year 1952 when the Bureau of Reclamation compiled crop data on the Lowlands, the crop records are those presented in Bulletin 23, State Water Supervision Reports (after 1955, Bulletin 23, Surface Water Flow Reports). The most recent crop survey for the report area available from the State was made in 1958. Crop information from that survey, converted to the Bureau of Reclamation system of notation, is presented on Plate 5 entitled "Crops Survey - 1958."

Land use. - In connection with the 1952 crop survey, the Bureau compiled acreage totals for all agricultural areas planted to irrigated or non-irrigated crops, and non-agricultural areas within the Delta, including water-surface areas. The water-surface areas considered include those located within the various districts and those affected by tidal action; those affected by tidal action extend from the Delta Lowlands into the Uplands. Information from the 1952 Survey, modified by the State for changing conditions, is given in the 1955 Water Supervision Report. As tabulated in the report, the Delta Lowlands comprised 425,427 acres divided as to use as follows: agricultural 385,743; urban 6,914; tule and swamp 4,239; levee and berm 16,889; and interior water surface 11,642.

In addition to the 425,427 acres, there are 35,663 acres of exterior water surface of which 34,306 acres are in the Lowlands and 1,357 in the Upland area. The agricultural land of the Lowlands varies in composition from peat soils in the central part to mineral soils in the peripheral areas. The extent of peat soils is delineated on Plate 6.

Water requirements. - The land use data, with revisions for changing conditions, have been used subsequently by the State Department of Water Resources in making estimates of the consumptive use in the Delta Lowlands. These estimates are made by applying an appropriate consumptive-use factor to the acreage determined to be utilized by each crop or other water-consuming area with modification made to the values obtained to reflect the effect of utilizable rainfall. Unit consumptive-use factors for pasture, various crops, native vegetation and other classifications are given in Table 8. These values were determined by special studies and experimentation by the State supplemented by data furnished by the Bureau of Reclamation. In this connection, the contributions of the various agencies and individuals are discussed in detail in State Bulletin 23 for the year 1955. Much of the data was used in the determination of the estimated modified monthly consumptive-use requirements in acre-feet during the irrigation season in the Delta Lowlands as given in the "Assumptions as to Water Rights" volume of the 1956 Cooperative Study Program. The total of the modified monthly consumptive-use values is 1,059,600

acre-feet distributed as follows: April 55,200, May 111,200,
June 145,200, July 225,300, August 240,800, September 178,900,
and October 103,000.

TABLE 1. - Historical crop and land use record, Reclamation District 403 (Rough and Ready Island)

Item	Y E A R											
	1924	1925	1926	1927	1928	1929	1930	1931	1932	1938	1948(f)	1952(f)
<u>Irrigated crop</u>												
Alfalfa	200	250	140	250	300	160	110	125	135	362		
Asparagus			160	100	70	140	10					
Beans												
Beets (Sugar)					25							
Celery	300											
Corn and milo	300			250	250	20	310	210	700	225		
Fruit and nuts	200	30					75	75	75			
Grain and hay	500	500			92	270	300	402	250	545		
Onions												
Pasture					40	60		25				
Peas												
Potatoes	100				70	90		175				
Rice												
Safflower												
Seed												
Tomatoes		10		60	135	175	10			85		
Truck crops, misc.		1090	300	660	982	915	815	1012(c)	1160(e)	1217		
Total irrigated	1300						292	314	121			
<u>Other water use area</u>							20		45	9		
Idle (in weeds, vegetation)												
Fallow and bare												
Aquatic growth and interior water surface							26	24	24	24		
Total (water consuming)							1153	1350(c)	1350(e)	1250		
<u>Non-irrigated area</u>												
Grain and hay (b)						210	500			55		
Pasture, bare or idle (b)								315	315	260		
Industrial and urban												
Levee							49	82	82	82		1388
Total acreage	1560	1560	1700	1700	1700	1700	1702	1647(d)	1647	1647		1467

(a) Records are from State Bulletin 23 except for U.S.B.R. data in 1952.

From 1931-1950 of the levee acreage for the entire lowlands, 440 acres of willows and 4600 acres of weeds were estimated to be water consuming. No breakdown by entity is available.

(b) Lands lying above elevation 5 feet (U.S.G.S.) datum.

(c) Includes 100 acres corn double cropped after grain.

(d) Area revised.

(e) Includes 100 acres corn as second crop after grain.

(f) U. S. Navy annex.

TABLE 2. - Historical crop and land use record, Reclamation District 404 (Boggs Tract)

Item	Y E A R													
	1924	1925	1926	1927	1928	1929	1930	1931	1932	1938	1948	1950	1952 (a)	1955
<u>Irrigated crop</u>							<u>Acres</u>							
Alfalfa	560	1200	375	370	400	1000	1000	925	825	580	323	295	95	105
Asparagus									60				290	
Beans	20	50			15			80	10	20				83
Beets (Sugar)														
Celery														
Corn and milo	250	50			20	100		100	150			128		79
Fruit and nuts	65	100	70	35							5			
Grain and hay		100	100				470	420	580	685	520	499	386	290
Onions		10												
Pasture		400			15			200		55		267	153	221
Peas														
Potatoes		50												
Rice	50													
Safflower														
W Seed														
Tomatoes								80	10	30	131			163
Truck crops, misc.											50			
Total irrigated	945	1960	545	405	450	1100	1470	1805	1635	1370 (d)	1029	1189	924	941
<u>Other water use area</u>														
Idle (in weeds, vegetation)							473	68	190	315	437	258		
Fallow and bare							46	520	520	120	299	318		
Aquatic growth and interior water surface							68	68	68	348 (e)	368	368	17	
Total (water consuming)							2057	2461	2413	2153	2133	2133	941	941
<u>Non-irrigated area</u>														
Grain and hay (b)			726			1050	550		50	150	150	150		
Pasture, bare or idle (b)								122	120	300	300	300		
Industrial and urban														
Levee							71	71	71	71	71	71	107	81
Total acreage	2650	2650	2680	2680	2680	2680	2678	2654 (c)	2654	2654	2654	2654	2717	1343

(a) Records are from State Bulletin 23 except for U.S.B.R. data in 1952.

(b) From 1931-1950 of the levee acreage for the entire lowlands, 440 acres of willows and 4600 acres of weeds were estimated to be water consuming. No breakdown by entity is available.

(c) Total acreage revised to conform with area changes.

(d) Includes 20 acres beans, second crop to grain.

(e) Includes 280 acres rice.

TABLE 3. - Historical crop and land use record, Reclamation District 524 (Middle Division Roberts Island)

Item	Y E A R														
	1924	1925	1926	1927	1928	1929	1930	1931	1932	1938	1948	1950	1952 (a)	1952 (c)	1952
Irrigated area															
Alfalfa	8600	3500	3090	3895	2497	2565	2602	2995	2553	3600	643	2133	2425	2744	
Asparagus							138	45		1590	4471	3765	5076	4596	
Beans	500	900	3515	1980	1640	1070	684	1493	240	80	100		9		
Beets (Sugar)								3	120		315	235	42	129	
Celery															
Corn and milo	300		197	1365	1570	589	1650	1436	714	600	345	160	297	631	
Fruit and nuts		250	30	50	30	30	30	8	8	10			26	25	
Grain and hay			950	3235	800	1100	2149	4080	5092	3000	2942	2986	2226	1887	
Onions															
Pasture		1000					629	315	845	300	921	334	390	275	
Peas															
Potatoes	200	200			72			225	30	230					
Rice															
Safflower														30	
Seed															
Tomatoes						125		7			60				
Truck crops, misc.											828	542	796	1173	
Total irrigated	9600	5850	7782	10525	6609	5479	7882	10619 (c)	9637	10224 (d)	10690	10155	11320	11490	
Other water use area															
Idle (in weeds, vegetation)															
Fallow and bare															
Aquatic growth and interior water surface															
Total (water consuming)															
Non-irrigated area															
Grain and hay (b)					3300	4064	1917		200	550					
Pasture, bare or idle (b)									90	136					
Industrial and urban															
Levee															
Total acreage	12000	12000	11000	11000	11000	11000	11000	11000	11000	11000	11000	11000	11900	11950	

(a) Records are from State Bulletin 23 except for U.S.B.R. data in 1952.
 From 1931-1950 of the levee acreage for the entire lowlands, 440 acres of willows and 4600 acres of weeds were estimated to be water consuming. No breakdown by entity is available.

(c) Includes 157 acres beans double-cropped after grain.
 (d) Includes 80 acres beans, 264 acres tomatoes, and 30 acres corn as second crop after grain.

TABLE 4. - Historical crop and land use record, Reclamation District 524 (The Pocket)

Item	Y E A R													
	1924	1925	1926	1927	1928	1929	1930	1931	1932	1938	1948	1950	1952 (a)	1952
Irrigated crop														
Alfalfa			10		30	30	30	25	40	175	50	193	71	
Asparagus			30								100		42	56
Beans				150		130						152	25	
Beets (Sugar)											100			
Celery														
Corn and milo			118	105	200	40	140	75	175	70	15			
Fruit and nuts														
Grain and hay				250	290			339	220	135	160	118	148	286
Onions														
Pasture								40	100			47	64	58
Peas														
Potatoes														
Rice														
Safflower														
Seed														
Tomatoes											85		112	63
Truck crops, misc.														
Total irrigated			158	505	520	200	170	479	435	480	510	510	462	463
Other water use area														
Idle (in weeds, vegetation)							150		60	15				
Fallow and bare							6	27	11	11			20	19
Aquatic growth and interior water surface							14	14	14	14	10	10		
Total (water consuming)							340	520	520	520	520	520	482	482
Non-irrigated area														
Grain and hay (b)						300	180							
Pasture, bare or idle (b)														
Industrial and urban														
Levee							33	33	33	33	33	33	57	57
Total acreage			520	520	520	520	553	553	553	553	553	553	539	539

(a) Records are from State Bulletin 23 except for U.S.B.R. data in 1952.

From 1931-1950 of the levee acreage for the entire lowlands, 440 acres of willows and 4600 acres of weeds were estimated to be water consuming. No breakdown by entity is available.

(b) Lands lying above elevation 5 feet (U.S.G.S.) datum.

TABLE 5. - Historical crop and land use record, Reclamation District 544 (Upper Division Roberts Island)

Item	Y E A R													
	1924	1925	1926	1927	1928	1929	1930	1931	1932	1938	1950	1952 (a)	1952 (c)	1952
<u>Irrigated area</u>	2600	800	1010	805	1201	550	1143	527	595	1554	4289	3080	1925	
Alfalfa										80	260	567	848	
Asparagus		400	585	845	696	702	1025	1083	727	533				
Beans											469			10
Beets (Sugar)									10					
Celery														
Corn and milo		125	80		240		42	325	449	288	367	113	771	
Fruit and nuts		90	25	50	50	60	20	21	21	39	35	25	45	
Grain and hay				405	1500	2148	2935	473	981	360	3376	2140	2408	
Onions								12	10					
Pasture		200		100	124		10	166	150	40	162	63	65	
Peas														
Potatoes	700					48		23						
Rice														
Safflower												235		
Seed						213								
Peanut											220	864	1242	
Truck crops, misc.														
Total irrigated	3300	1615	1710	2205	3811	3721	5175	2630	2958	2939(c)	7183	7087	7314	
<u>Other water use area</u>			10						15	45				
Idle (in weeds, vegetation)														
Fallow and bare														
Aquatic growth and interior water surface							90		60	60	169			
Total (water consuming)														
<u>Non-irrigated area</u>														
Grain and hay (b)					3500	3514	2000	4385	4120	3490				
Pasture, bare or idle (b)														
Industrial and urban														
Levee														
Total acreage	8900	8900	7480	7480	7480	7480	7475	7475	7475	7475	7475	7646	7616	

(a) Records are from State Bulletin 23 except for U.S.B.R. data in 1952. (c) Includes 141 acres beans as second crop after grain.

From 1931-1950 of the levee acreage for the entire lowlands, 440 acres of willows and 4600 acres of weeds were estimated to be water consuming. No breakdown by entity is available.

(b) Lands lying above elevation 5 feet (U.S.G.S.) datum.

TABLE 6. - Historical crop and land use record, Reclamation District 684 (Lower Division Roberts Island)

Item	Y E A R												
	1924	1925	1926	1927	1928	1929	1930	1931	1932	1938	1950	1952 (a)	1952
Irrigated area							A	E	O				
Alfalfa	1500	840	2255	2470	1478	1200	1259	1115	1148	560	216	172	198
Asparagus	500	550	346	460	606	691	466	520	456	2515	5275	5315	4242
Beans	100	700	764	620	650	30	71	192		245			
Beets (Sugar)						22		407	175	440			44
Celery	50		35	30						90			
Corn and milo	3400	950	758	1755	2736	2389	3010	3176	2990	1350	1160	888	2302
Fruit and nuts	50	100	10					2	2	174	35	12	
Grain and hay	4500	60	2366	845	1630	1536	1836	2106	2435	2240	2653	1947	2111
Onions													
Pasture		300	1371		877	172	800	1001	520	145	474	229	288
Peas													
Potatoes	200	850	2226	1170	1369	818	460	748	606	1790		339	278
Rice													
Safflower													
Seed						100			176		65		280
Wheatens											110	402	312
Truck crops, misc.											25	237 (f)	
Total irrigated	10300	4350	10307	7350	9346	6958	7902	9267 (c)	8508	9385 (e)	9951	9541	10055
Other water use area													
Idle (in weeds, vegetation)										10			
Fallow and bare							464	345	139		51	373	172
Aquatic growth and interior water surface							160	348	840	350	34	20	
Total (water consuming)							160	160	160	158	17	403	65
Non-irrigated area													
Grain and hay (b)					1270	3637	1831			300			
Pasture, bare or idle (b)								138	406	75			
Industrial and urban													
Levee							142	142	142	142	142	4	19
Total acreage	10500	10500	10660	10660	10660	10660	10659	10195 (d)	10195	10195	10195	10601	10571

(a) Records are from State Bulletin 23 except for U.S.B.R. data in 1952.

(b) From 1931-1950 of the levee acreage for the entire lowlands, 440 acres of willows and 4600 acres of weeds were estimated to be water consuming. No breakdown by entity is available.

(c) Includes 205 acres sudan grass double-cropped after grain.

(d) Area revised.

(e) Includes 150 acres corn and 65 acres beans as second crop after grain

TABLE 7. - Historical crop and land use record, Honker Lake Tract.

Item	Y E A R													
	1924	1925	1926	1927	1928	1929	1930	1931	1932	1938	1950	1952 (a)	1952	
<u>Irrigated crop</u>														
Alfalfa			540			120	120			340				200
Asparagus										85			1019	1223
Beans			440	870	250		105	120						
Beets (Sugar)										140				
Celery			195											
Corn and milo				340	1072	885	440	180	290	85			42	103
Fruit and nuts														
Grain and hay			220	400	363		70	1075	740	640	844	216		498
Onions														
Pasture							310	300	560	550	60			
Peas														
Potatoes														
Rice														
Safflower														
Seed								60						
Tomatoes										145				
Truck crops, misc.										40	30	450		
Total irrigated			1395	1610	1685	1005	1055	1735	1590	1700	1661	1727		2024
<u>Other water use area</u>							10							
Idle (in weeds, vegetation)														
Fallow and bare														
Aquatic growth and interior water surface														
Total (water consuming)							22	22	22	22	18	34		34
<u>Non-irrigated area</u>														
Grain and hay (b)						718	621							
Pasture, bare or idle (b)														
Industrial and urban														
Levee							72	72	72	72	72	72	111	111
Total acreage			1890	1890	1890	1890	1890	1890	1890	1890	1890	2193	2193	2193

(a) Records are from State Bulletin 23 except for U.S.B.R. data in 1952.

From 1931-1950 of the levee acreage for the entire lowlands, 440 acres of willows and 4600 acres of weeds were estimated to be water consuming. No breakdown by entity is available.

(b) Lands lying above elevation 5 feet (U.S.G.S.) datum.

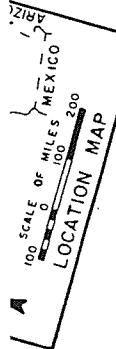
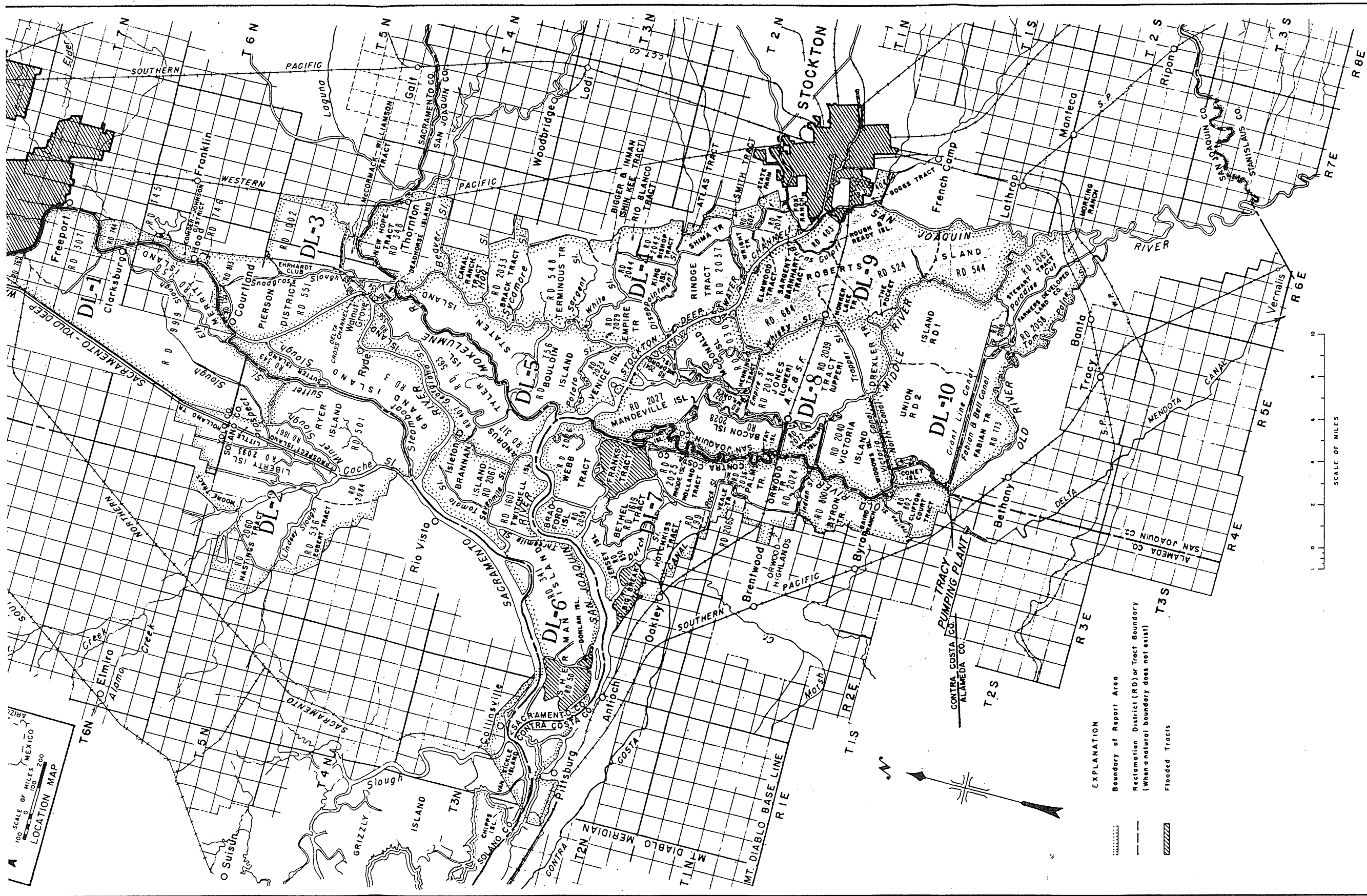
TABLE 8. - UNIT CONSUMPTIVE USE OF WATER IN SACRAMENTO-SAN JOAQUIN DELTA

In acre-feet per acre

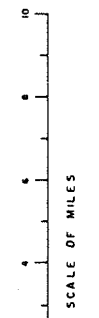
Classification:	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.:	Total
<u>Pasture</u>													
Sudan	<u>.05</u>	<u>.05</u>	<u>.10</u>	<u>.10</u>	.15	.30	.30	.25	.20	<u>.10</u>	<u>.10</u>	<u>.10</u>	1.8
Miscellaneous	<u>.05</u>	<u>.10</u>	<u>.15</u>	<u>.40</u>	.50	.65	.70	.70	.50	<u>.20</u>	<u>.10</u>	<u>.10</u>	4.15
<u>Alfalfa</u>	<u>.06</u>	<u>.08</u>	<u>.10</u>	.30	.40	.50	.65	.55	.50	<u>.20</u>	<u>.10</u>	<u>.07</u>	3.51
<u>Rice</u>	<u>.05</u>	<u>.05</u>	<u>.10</u>	.15	.90	1.15	1.25	1.20	.35	<u>.09</u>	<u>.10</u>	<u>.10</u>	5.49
<u>Field Crops</u>													
Beans	<u>.06</u>	<u>.08</u>	<u>.08</u>	<u>.16</u>	.20	.14	.24	.58	.37	<u>.09</u>	<u>.07</u>	<u>.05</u>	2.12
Corn and Milo	<u>.04</u>	<u>.04</u>	<u>.04</u>	<u>.08</u>	.10	.24	.70	.60	.40	<u>.10</u>	<u>.10</u>	<u>.07</u>	2.51
Grain and Hay	.04	.04	.07	.40	.60	.30	.14	.23	.21	.14	<u>.07</u>	<u>.05</u>	2.29
Peas	<u>.10</u>	<u>.10</u>	.20	.30	.10	.05	.14	.13	.11	<u>.09</u>	<u>.10</u>	<u>.10</u>	1.52
Safflower and Sunflower	<u>.05</u>	<u>.05</u>	<u>.10</u>	.30	.40	.50	.20	.13	.11	<u>.09</u>	<u>.10</u>	<u>.10</u>	2.13
Sugar Beets	.06	.08	.08	.13	.32	.51	.61	.53	.20	.13	<u>.10</u>	<u>.07</u>	2.82
<u>Truck Crops</u>													
Asparagus	<u>.05</u>	<u>.05</u>	<u>.05</u>	<u>.05</u>	.08	.14	.40	.68	.55	.42	.12	<u>.10</u>	2.69
Celery	<u>.04</u>	<u>.04</u>	<u>.04</u>	<u>.08</u>	.10	.10	.10	.20	.25	.30	.20	<u>.05</u>	1.50
Onions	<u>.04</u>	<u>.04</u>	<u>.08</u>	.13	.27	.49	.43	.20	.16	.13	<u>.10</u>	<u>.07</u>	2.14
Potatoes	<u>.06</u>	<u>.08</u>	<u>.08</u>	<u>.16</u>	.15	.38	.52	.30	.15	<u>.09</u>	<u>.07</u>	<u>.05</u>	2.09
Tomatoes	<u>.05</u>	<u>.05</u>	<u>.10</u>	<u>.10</u>	<u>.10</u>	.25	.35	.60	.45	.35	<u>.10</u>	<u>.10</u>	2.60
Seed and Misc.	<u>.06</u>	<u>.08</u>	<u>.08</u>	<u>.10</u>	.25	.50	.50	.50	.35	.10	<u>.10</u>	<u>.07</u>	2.69
<u>Fruit and Nuts</u>													
Assorted	<u>.04</u>	<u>.04</u>	<u>.04</u>	.18	.32	.50	.57	.40	.23	<u>.07</u>	<u>.07</u>	<u>.05</u>	2.51
Grapes	<u>.04</u>	<u>.09</u>	<u>.04</u>	<u>.09</u>	.20	.35	.50	.35	.22	<u>.05</u>	<u>.07</u>	<u>.05</u>	2.05
<u>Native Vegetation</u>													
Lush	.12	.14	.21	.31	.40	.59	.68	.57	.39	.29	.20	.12	4.02
Medium	.12	.16	.22	.28	.31	.40	.45	.38	.28	.24	.19	.13	3.16
Dry	.13	.17	.23	.24	.22	.21	.22	.20	.17	.18	.18	.14	2.29
<u>Other</u>													
Fallow and Bare	<u>.04</u>	<u>.04</u>	<u>.04</u>	<u>.08</u>	.10	.13	.14	.13	.11	<u>.09</u>	<u>.07</u>	<u>.05</u>	1.02
Idle Crop Land	<u>.06</u>	<u>.08</u>	<u>.08</u>	.16	.20	.26	.28	.24	.16	.13	<u>.10</u>	<u>.07</u>	1.82
Duck Ponds	<u>.05</u>	<u>.05</u>	<u>.10</u>	<u>.10</u>	<u>.10</u>	<u>.05</u>	.14	.13	.60	.60	.30	<u>.10</u>	2.32
Urban	<u>.06</u>	<u>.08</u>	<u>.08</u>	.16	.20	.20	.21	.20	.16	.13	<u>.07</u>	<u>.05</u>	1.60
Tule and Swamp	.13	.18	.34	.51	.70	.79	.87	.77	.64	.49	.27	.13	5.82
Levee and Berm	<u>.10</u>	<u>.10</u>	.15	.20	.25	.30	.35	.35	.30	.20	<u>.10</u>	<u>.10</u>	2.50
Water Surface	<u>.06</u>	<u>.10</u>	.20	.33	.50	.58	.65	.57	.44	.27	<u>.12</u>	<u>.06</u>	3.88

NOTE: Figures underlined (.05) represent estimated consumptive use by weeds and soil evaporation before planting or after harvesting.





- EXPLANATION**
- Boundary of Report Area
 - Reclamation District (RD) or Tract Boundary
(When natural boundary does not exist)
 - Flooded Tracts

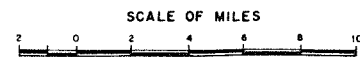


UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT
DELTA - DIVISION - CALIF.

REPORT AREAS

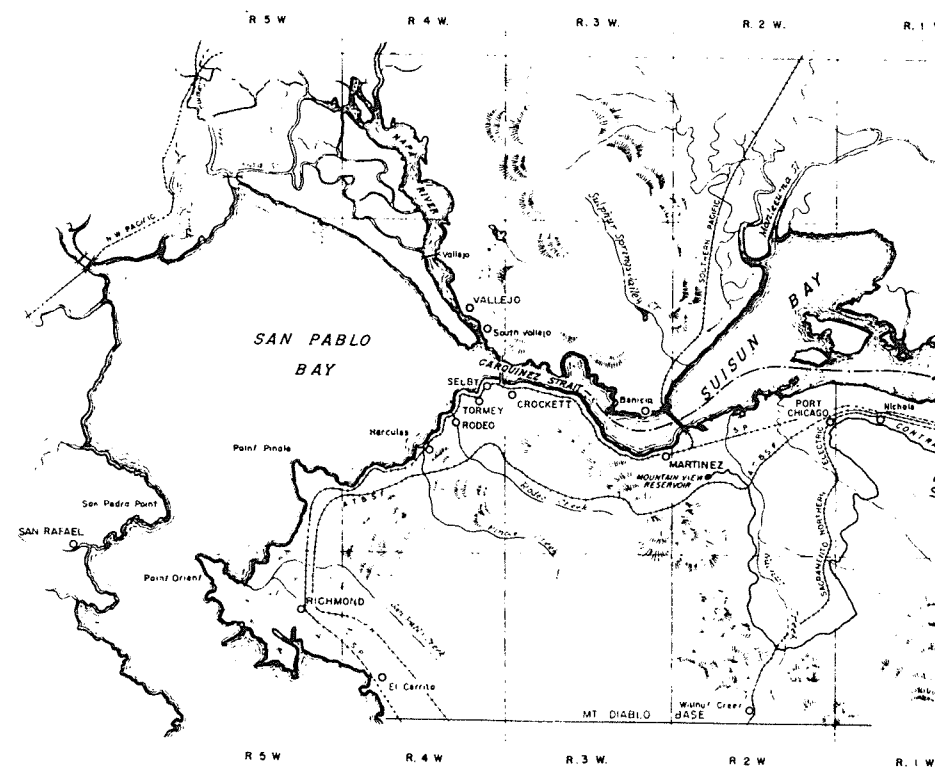
DELTA LOWLANDS SERVICE AREA INVESTIGATIONS

MAXIMUM ANNUAL SALINITY ENCROACHMENT SACRAMENTO - SAN JOAQUIN DELTA AND UPPER BAYS



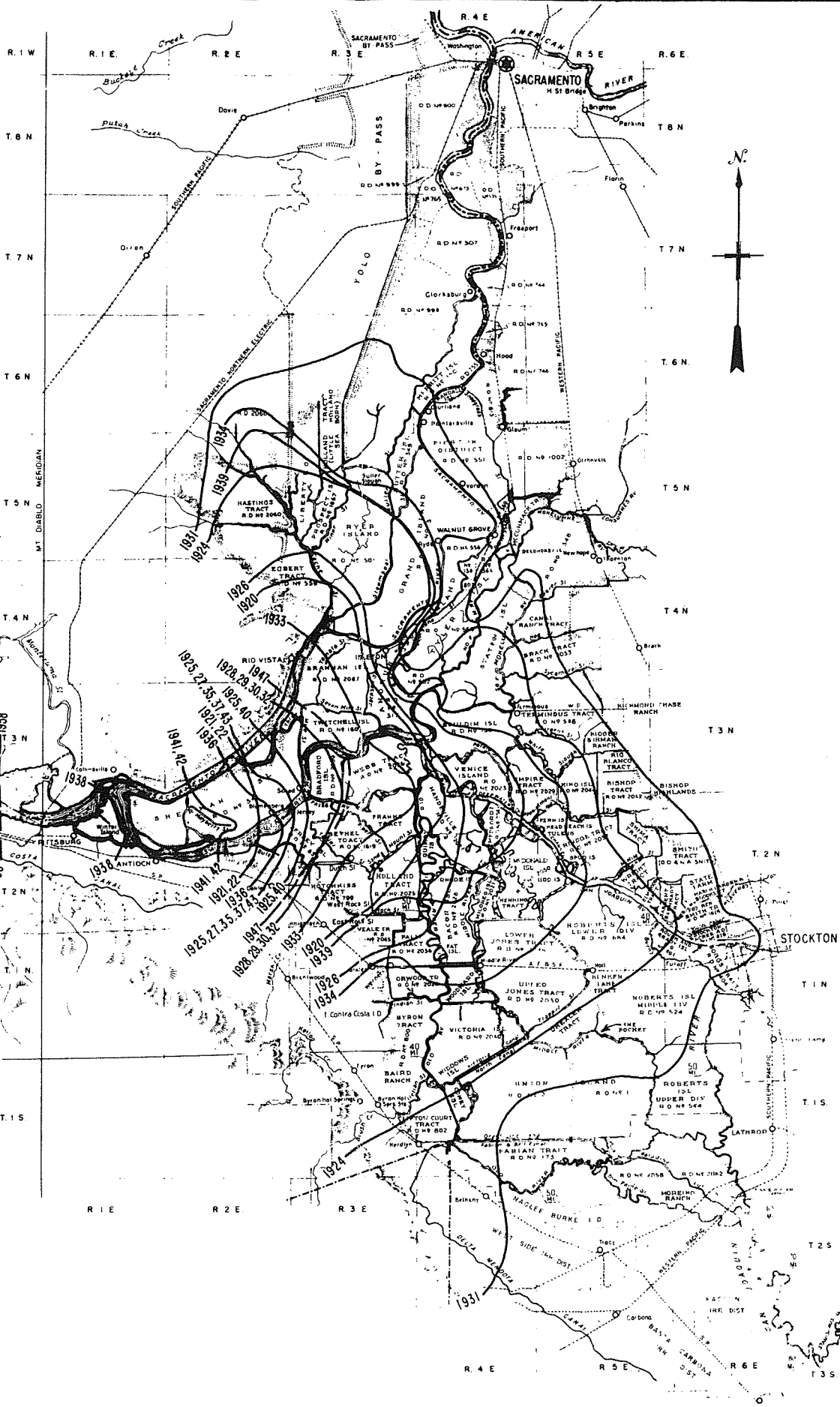
EXPLANATION

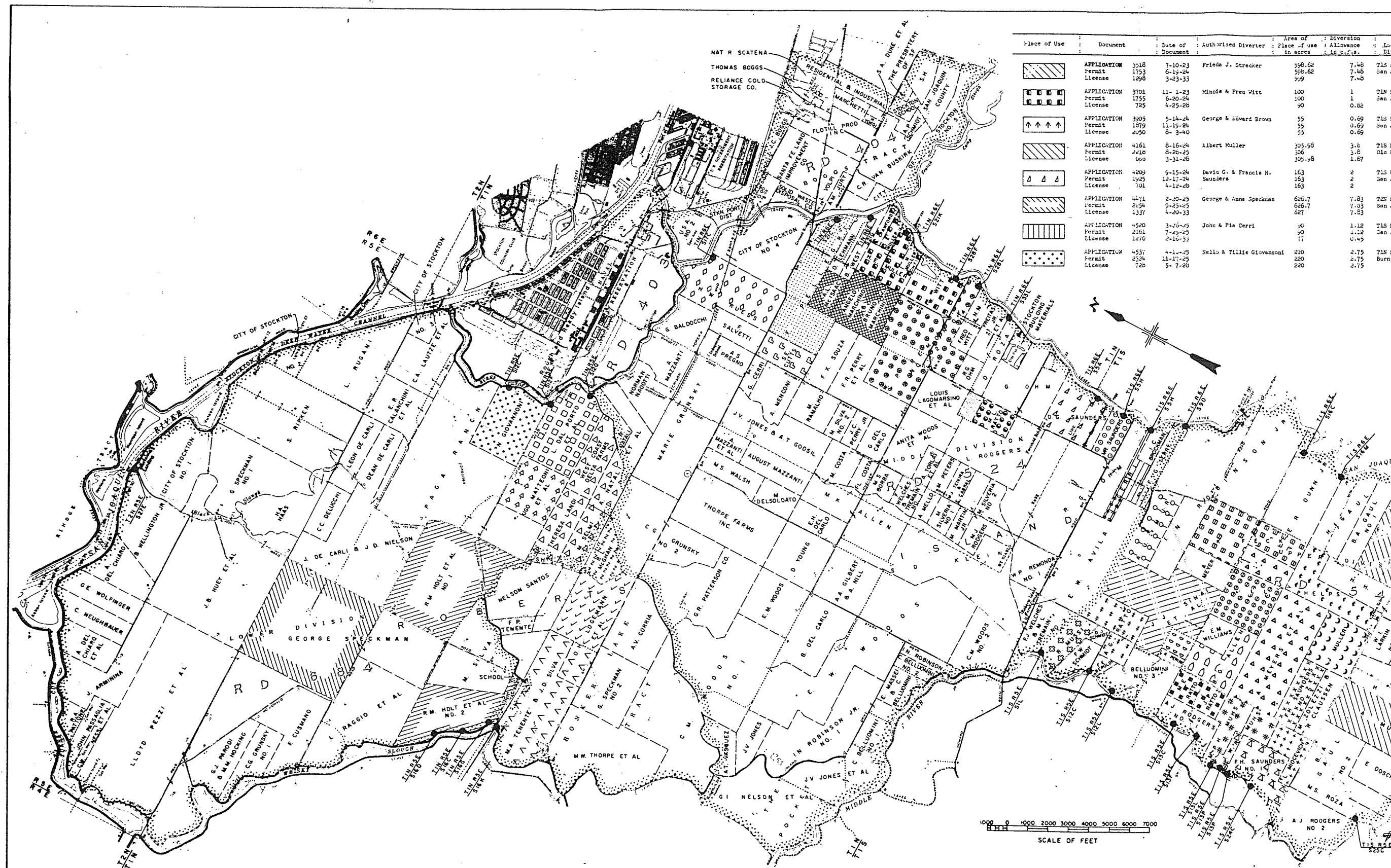
- Salinity encroachment prior to Shasta Dam operation
(Represents chlorides of 1,000 parts per million parts of water)
- - - Salinity encroachment after Shasta Dam operation
for 1947 and 1958 (See note)



NOTE

Maximum annual encroachment (after Shasta Dam) occurred in 1947, and the least of the maximum annual encroachments occurred in 1958 for the period ending in 1962. For the other years after Shasta Dam operation, the hydraulic barrier for prevention of salinity has been maintained in the vicinity of the central portion of Sherman Island. The western one-third of Sherman Island has been inundated since 1925.



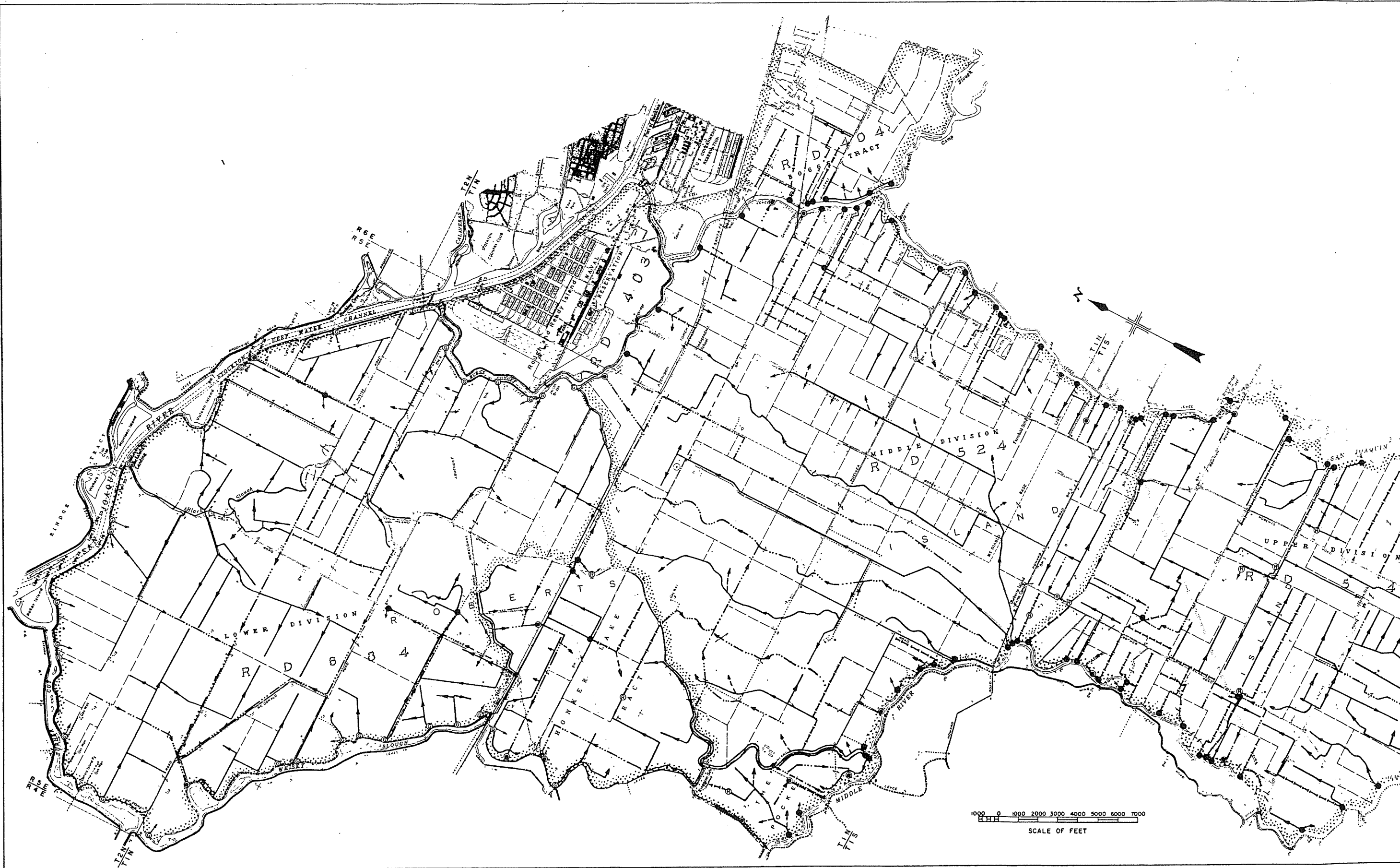


Place of Use	Document	Date of Document	Authorized Diverter	Area of Place of Use in acres	Diversion Allowance in c.f.s.	Loc. Div.
[Diagonal lines]	APPLICATION 3518 Permit 1753 License 1298	7-10-23 6-15-24 3-23-33	Frieda J. Strecker	598.62 598.62 59	7.48 7.46 7.48	TIS R San J
[Grid pattern]	APPLICATION 3701 Permit 1755 License 725	11-1-23 6-20-24 4-25-26	Mingo & Free Witt	100 100 90	1 1 0.82	TIN R San J
[Upward arrows]	APPLICATION 3905 Permit 1279 License 4050	5-14-24 11-15-24 8-3-40	George & Edward Brown	55 55 55	0.69 0.69 0.69	TIS R San J
[Diagonal lines]	APPLICATION 4161 Permit 2418 License 460	8-16-24 8-28-25 3-31-26	Albert Muller	305.98 306 305.98	3.6 3.6 1.67	TIS R Ola H
[Small squares]	APPLICATION 4209 Permit 1925 License 701	9-15-24 12-17-24 4-12-25	David G. & Francis H. Saunders	163 163 163	2 2 2	TIS R San J
[Diagonal lines]	APPLICATION 4471 Permit 2254 License 1337	2-20-25 9-25-25 4-20-33	George & Anna Speckman	626.7 626.7 627	7.83 7.83 7.83	TIN R San J
[Vertical lines]	APPLICATION 4520 Permit 2161 License 1470	3-20-25 7-29-25 2-16-33	John & Pia Cerri	90 90 77	1.12 1.12 0.45	TIS R San J
[Dotted pattern]	APPLICATION 4537 Permit 2534 License 728	4-1-25 11-17-25 5-7-26	Nello & Tillie Giovannoli	220 220 220	2.75 2.75 2.75	TIN R Burns

0 1000 2000 3000 4000 5000 6000 7000
SCALE OF FEET

APPLICATION, PERMIT, AND LICENSE DATA, 1963

Place of Use	Document	Date of Document	Authorized Diverter	Area of Place of Use in acres	Diversion Allowance in c.f.s.	Location of Diversion Point	Place of Use	Document	Date of Document	Authorized Diverter	Area of Place of Use in acres	Diversion Allowance in c.f.s.	Location of Diversion Point	Place of Use	Document	Date of Document	Authorized Diverter	Area of Place of Use in acres	Diversion Allowance in c.f.s.	Location of Diversion Point
	APPLICATION 3518 Permit 1753 License 1896	7-10-23 6-19-24 3-23-33	Frieda J. Strezker	556.62 556.62 559	7.48 7.46 7.46	TIS R5E S20A San Joaquin River		APPLICATION 4562 Permit 2342 License 3271	4-29-25 12-9-25 11-2-51	W. P. Remonda	203.7 203.7 203.7	2.55 2.55 2.55	TIS R5E S28L San Joaquin River		APPLICATION 5659 Permit 5600 License 2791	5-7-40 7-21-40 5-11-45	Airco S. Roney	334.78 334.78 334.78	4.18 4.18 4.18	TIS R5E S12L Middle River
	APPLICATION 3701 Permit 1755 License 1725	11-1-23 6-20-24 4-25-28	Minnie & Frea Witt	100 100 90	1 0.82 0.82	TIS R5E S28F San Joaquin River		APPLICATION 4636 Permit 2401 License 1246	6-15-25 1-25-26 12-20-32	Martin P. H. & Julie W. R. Mahs	160 154.6 153	2 1.93 1.93	TIS R5E S13L, S13P Middle River		APPLICATION 10067 Permit 5695 License 2934	1-20-40 1-23-41 3-16-48	Mary Ratto (Administratrix)	84.8 84.8 84.8	1.7 1.7 1.13	TIS R5E S13P Middle River
	APPLICATION 3905 Permit 1879 License 4050	9-14-24 11-19-24 8-3-40	George & Edvert Brown	55 55 55	0.69 0.69 0.69	TIS R5E S28G San Joaquin River		APPLICATION 4620 Permit 2424 License 1240	10-31-25 2-27-26 4-22-29	Gwendolyn E. Steindorf	203 203 203	2.53 2.53 2.53	TIS R5E S29G Old River		APPLICATION 10233 Permit 5661 License 2700	4-26-41 5-20-41 3-1-45	Francis H. & Eva Lewis Saunders	136 136 136	1.72 1.72 1.72	TIS R5E S13P, S24C Middle River
	APPLICATION 4161 Permit 2210 License 600	8-16-24 8-26-25 3-31-28	Albert Muller	305.98 305.98 305.98	3.6 3.8 1.67	TIS R5E S30L Old River		APPLICATION 4922 Permit 2405 License 1233	2-13-26 5-12-26 4-4-27	D. Muller	172.1 172.1 172.1	2.15 2.15 1.81	TIS R5E S21K San Joaquin River		APPLICATION 10314 Permit 5738 License 2792	1-22-42 3-23-42 3-22-45	Alfred E. Roney	31.6 31.6 31.6	0.39 0.39 0.39	TIS R5E S12L Middle River
	APPLICATION 4209 Permit 1925 License 101	9-15-24 12-17-24 4-12-28	David G. & Francis H. Saunders	163 163 163	2 2 2	TIS R5E S2A San Joaquin River		APPLICATION 4979 Permit 2549 License 059	4-30-26 6-23-26 5-14-29	I. E. Saunders	77 77 75	0.96 0.96 0.94	TIS R5E S11 Middle River		APPLICATION 10611 Permit 5738 License 2792	3-21-42 3-23-42 3-22-45	George & Anna Speckman	626.7 626.7 626.7	7.83 7.83 7.4	TIS R5E S27E San Joaquin River
	APPLICATION 4271 Permit 2254 License 1337	2-20-25 9-23-25 4-20-33	George & Anna Speckman	626.7 626.7 627	7.83 7.83 7.53	TIS R5E S27E San Joaquin River		APPLICATION 5054 Permit 2803 License 1245	8-29-26 6-23-26 12-16-32	Hotel Masters & Bessie McQueen	72.4 72.4 72	0.9 0.9 0.9	TIS R5E S12K Burns Cutoff		APPLICATION 11412 Permit 6990 License 3300	5-1-46 3-1-46 1-21-51	Albert Muller	281 281 281	1.33 1.33 1.33	TIS R5E S30L Old River
	APPLICATION 4320 Permit 2261 License 1470	3-20-25 7-29-25 4-16-33	John & Pio Cerri	90 90 77	1.12 1.12 0.45	TIS R5E S2J San Joaquin River		APPLICATION 5102 Permit 2616 License 064	7-15-26 9-14-26 8-14-29	Frank Pellegrini	270 270 270	3 3 3	TIS R5E S12C San Joaquin River		APPLICATION 11602 Permit 6700 License 3433	1-27-46 1-25-47 7-21-52	John & Pio Cerri	13.32 13.3 13.32	0.45 0.2 0.2	TIS R5E S2J San Joaquin River
	APPLICATION 4537 Permit 2324 License 720	4-1-25 11-17-25 5-7-28	Nello & Tillie Giovannoni	220 220 220	2.75 2.75 2.75	TIS R5E S12C, S12F Burns Cutoff		APPLICATION 5121 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11694 Permit 6790 License 3677	1-13-47 1-21-47 2-24-51	Leland & Abigail Meyer	507 507 427.6	4.5 6.53 4.5	TIS R5E S13P Middle River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
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	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
	APPLICATION 4936 Permit 2507 License 1600	4-13-31 10-09-31 6-20-36	Estel Cutts	79 79 79	1 1 1	TIS R5E S12C San Joaquin River		APPLICATION 5211 Permit 2626 License 1345	7-22-26 10-15-26 5-6-33	San Giovannoni & Louis Delpurto	377.6 377.6 376	4.7 4.7 4.7	TIS R5E S12K Burns Cutoff		APPLICATION 11739 Permit 6831 License 3673	4-20-47 6-19-47 4-9-53	Jedie V. Muri	130 130 130	1.6 1.6 1.6	TIS R5E S2D San Joaquin River
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1000 0 1000 2000 3000 4000 5000 6000 7000
SCALE OF FEET



- EXPLANATION**
- Report area boundary and Reclamation District or tract boundary when no natural boundary exists
 - Generally boundary
 - Irrigation pumping plant
 - Drainage pumping plant
 - Gravity diversion facility
 - Relief-pumping plant
 - Irrigation canal
 - Combination irrigation-drainage canal
 - Drain
 - Pipeline
 - Source of water (schematic)

NOTE
 Irrigation and drainage facilities, 1963, were taken from a 1952 U.S.B.R. field survey and spot-checked in 1963 for major changes.

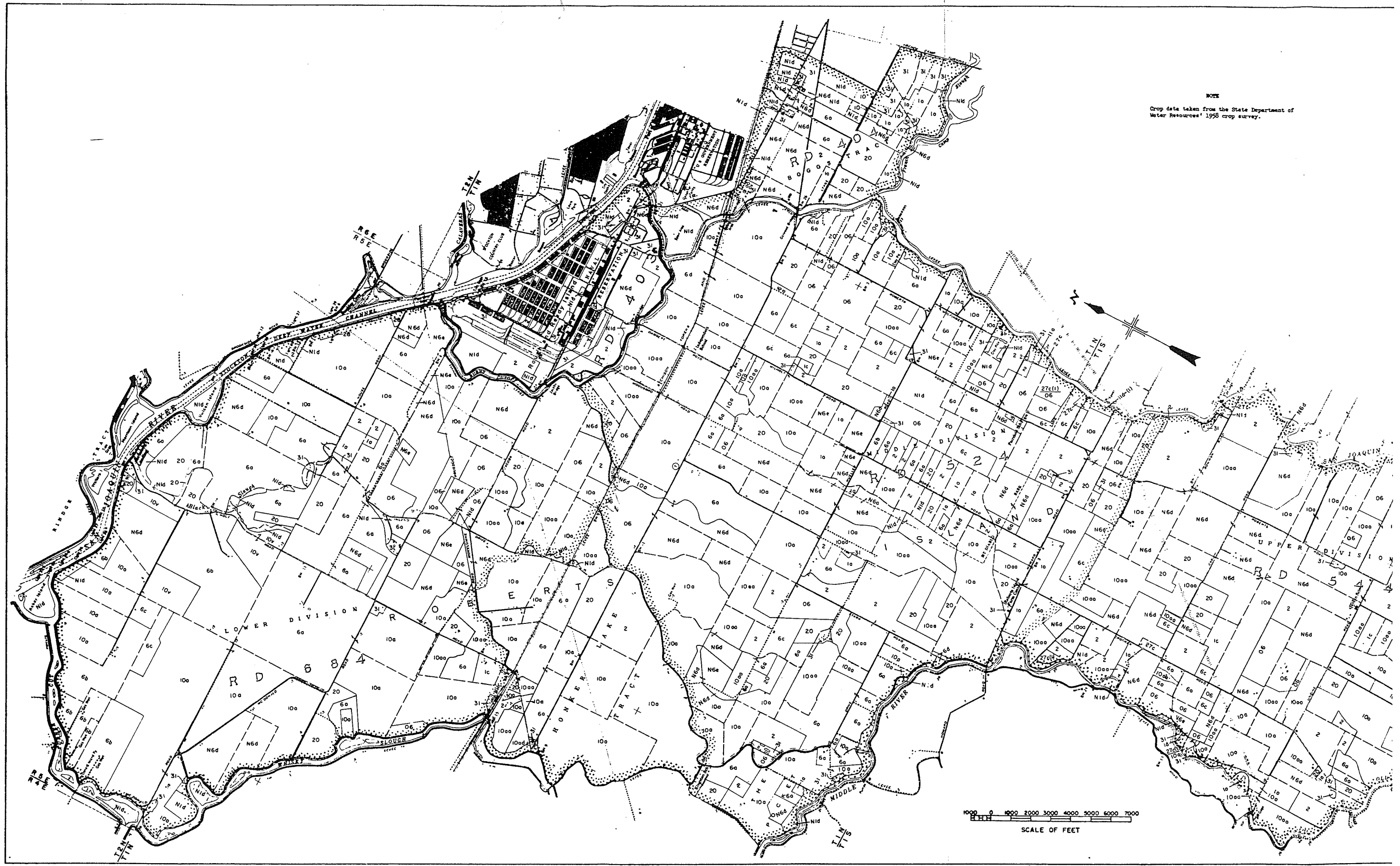
UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION - REGION 2
 DELTA LOWLANDS SERVICE AREA INVESTIGATIONS

IRRIGATION AND DRAINAGE FACILITIES

REPORT AREA DL-9
 STOCKTON TO MIDDLE RIVER AND VICINITY

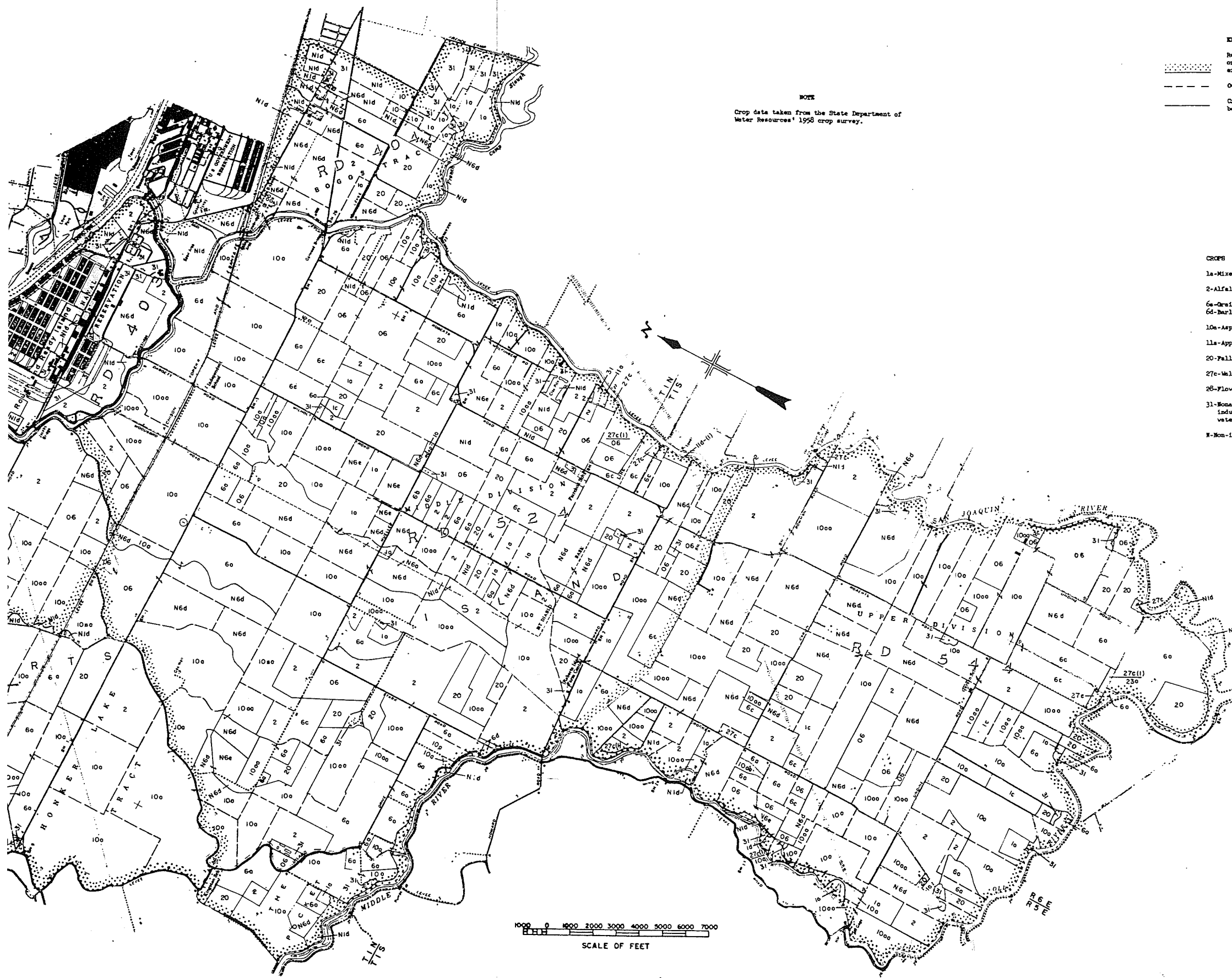
DRAWN... G.G.W.	SUBMITTED... <i>Robert L. Nixon</i>
TRACED... T.D. H.J.M.	RECOMMENDED... <i>Robert L. Nixon</i>
CHECKED... M.W.	APPROVED... <i>Edward J. Leonard</i>

SACRAMENTO, CALIF. DEC 30, 1963 863-208-185



NOTE
 Crop data taken from the State Department of
 Water Resources' 1958 crop survey.

1000 0 1000 2000 3000 4000 5000 6000 7000
 SCALE OF FEET



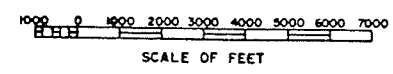
NOTE
 Crop data taken from the State Department of
 Water Resources' 1958 crop survey.

EXPLANATION

- Report area boundary and Reclamation District or tract boundary when no natural boundary exists.
- Ownership and crop boundary.
- Crop boundary when not identical with ownership boundary.

CROPS

- 1a-Mixed pasture, 1c-Sodas, 1d-Native pasture
- 2-Alfalfa
- 6a-Grain sorghums, 6b-Field corn, 6c-Sugar beets, 6d-Barley, 6e-Wheat, 6f-Miscellaneous seed crops
- 10a-Asparagus, 10b-Tomatoes, 10c-Potatoes
- 11a-Apples
- 20-Fallow
- 27c-Walnuts
- 28-Flowers and nursery
- 31-Agricultural land such as municipal and industrial areas, farmsteads, schools, and water surface
- N-Non-irrigated

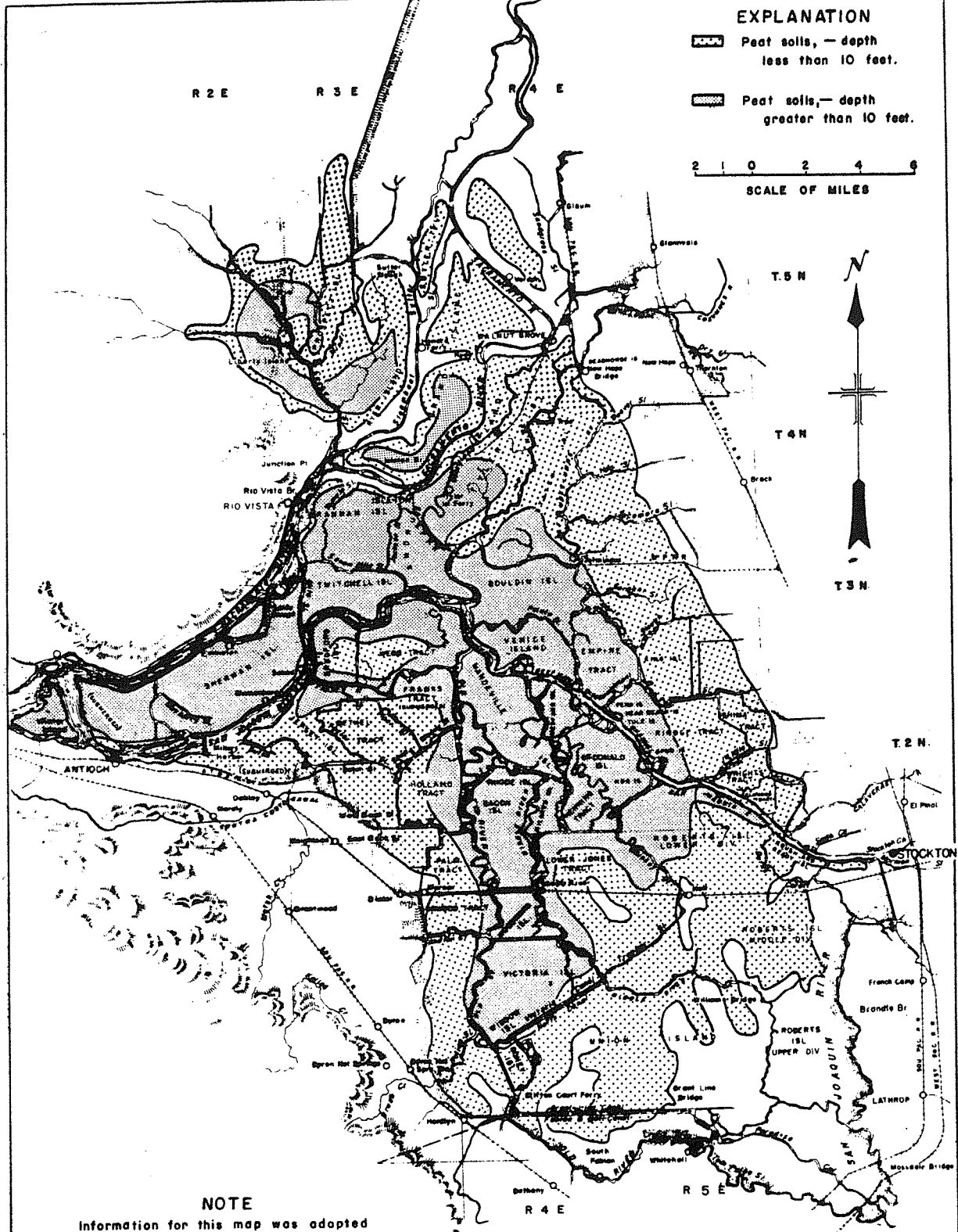


UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION - REGION 2
 DELTA LOWLANDS SERVICE AREA INVESTIGATIONS



CROP SURVEY 1958
 REPORT AREA DL-9
 STOCKTON TO MIDDLE RIVER AND VICINITY

DRAWN *K.S.M.* SUBMITTED *Alfred J. ...*
 TRACED *A.A.S.* RECOMMENDED *Alfred J. ...*
 CHECKED *S.E.M.* APPROVED *Alfred J. ...*

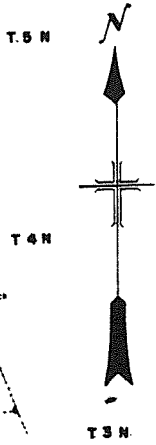
SACRAMENTO, CALIF. DEC. 30, 1964 863-208-195



EXPLANATION

-  Peat soils, - depth less than 10 feet.
-  Peat soils, - depth greater than 10 feet.

2 1 0 2 4 6
SCALE OF MILES



NOTE

Information for this map was adopted from Plate 4, "Isopachs of Peat and Related Organic Sediments, 1956" in State publication "Investigation of the Sacramento-San Joaquin Delta, Report No. 1, Ground Water Geology."

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT
EXTENT OF PEAT SOILS
IN THE DELTA AREA

863-208-198