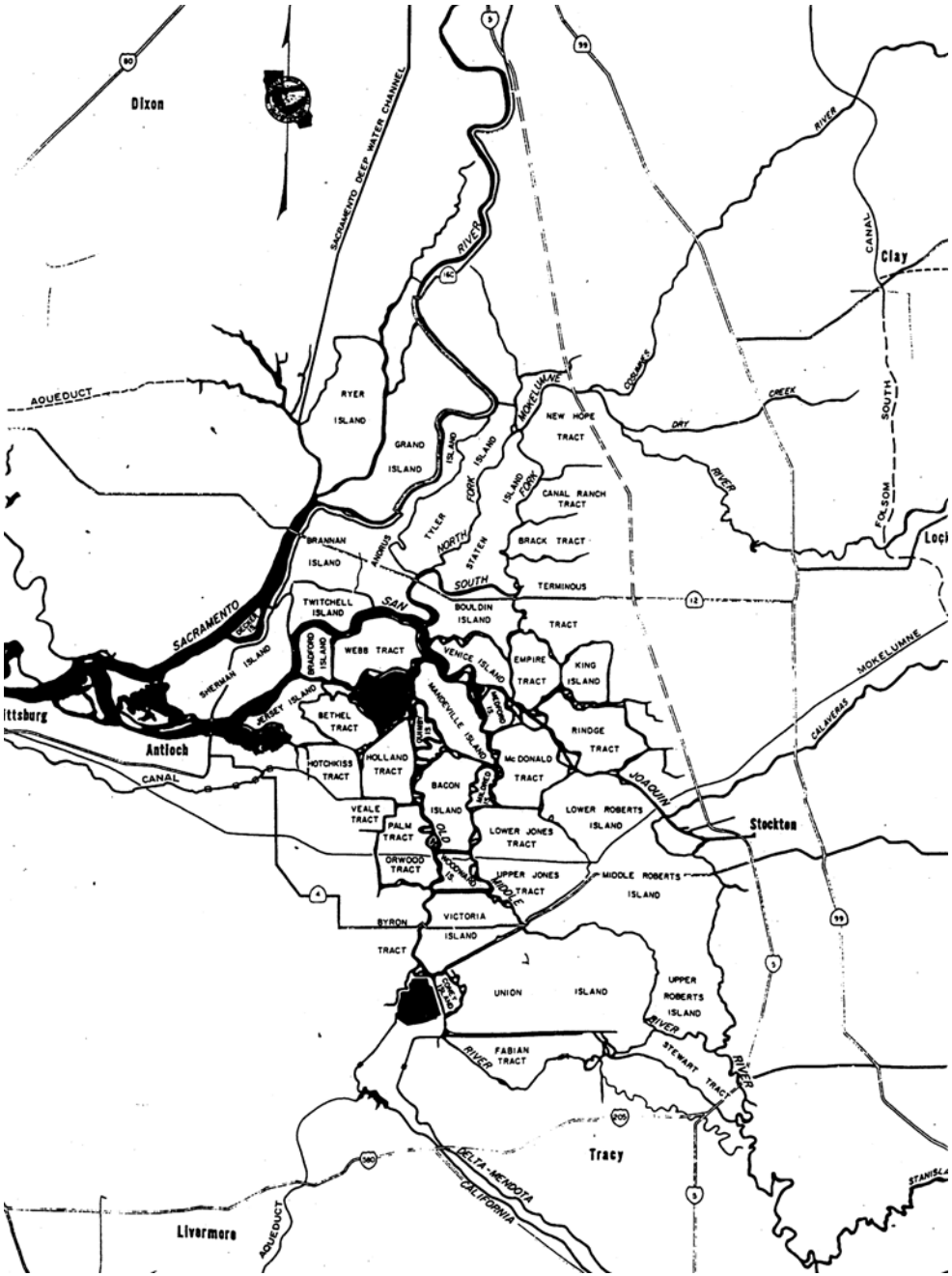
STATE WATER RESOURCES CONTROL BOARD PERIODIC REVIEW OF THE 1995 WATER QUALITY CONTROL PLAN

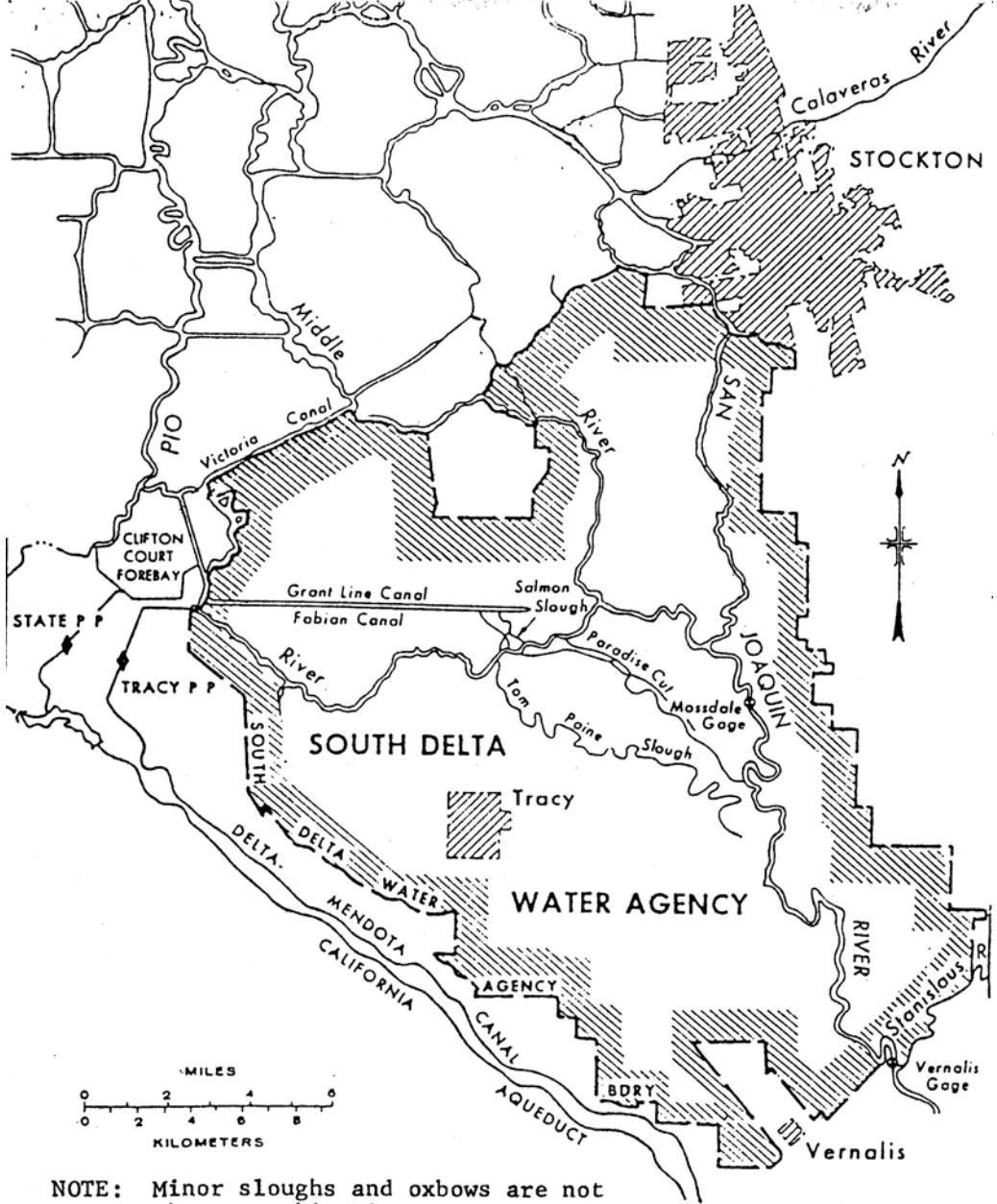
Issue 10: Southern Delta Electrical Conductivity

South Delta Water Agency

March 2005

Sacramento-San Joaquin Delta





NOTE: Minor sloughs and oxbows are not shown on this Figure.

SOUTH DELTA WATER AGENCY

FIGURE II.1

SOUTH DELTA WATER AGENCY is a political subdivision of the State of California, created and existing by virtue of Chapter 1089 of the statutes of 1973 of the State of California, as amended, known as the South Delta Water Agency Act. The entire area within the SDWA is located within the Sacramento-San Joaquin Delta as defined in California Water Code § 12220 and is generally referred to as the southern Delta. The boundaries of SDWA are described in section 9.1 of the Act, and includes approximately 148,000 acres.

The acreage is primarily devoted to agriculture and is dependent on the in-channel water supply in the southern Delta for irrigation water and other beneficial uses. The Stanislaus River forms a portion of the southern boundary of the SDWA to the point where that river flows into the San Joaquin River. The water rights pertaining to said lands are principally riparian in nature, and in some instances covered by pre-1914 appropriations or filings for appropriations pursuant to the Water Commission Act of 1913 (and permits and licensed issued pursuant thereto). The SDWA has as its general purpose to protect the water supply of the lands within the agency against intrusion of ocean salinity and to assure the lands a dependable supply of water of suitable quality sufficient to meet present and future needs.

Section

§ 116–4.1. General purposes of agency

Sec. 4.1. The general purposes of the agency shall be to negotiate, enter into, execute, amend, administer, perform, and enforce one or more agreements with the United States and with the State of California, or with either, which have for their general purposes the following:

(a) To protect the water supply of the lands within the agency against intrusion of ocean salinity; and

(b) To assure the lands within the agency a dependable supply of water of suitable quality sufficient to meet present and future needs.

The agency may also undertake activities to advise and assist landowners and local districts within the agency in reclamation and flood control matters. (Stats.1973, c. 1089, p. 2211, § 4.1. Amended by Stats.1987, c. 667, § 3.)

Historical and Statutory Notes

Derivation: Stats.1968, c. 419, p. 863, § 4.1.

§ 116–4.2. Powers of agency

Sec. 4.2. The agency shall also have the following powers:

(a) To have perpetual succession.

(b) To sue and be sued, except as otherwise provided herein or by law, in all actions and proceedings in all courts and tribunals of competent jurisdiction.

(h) To act jointly with or cooperate with the United States and with the State of California to the end that the purposes and activities of the agency may be fully and economically performed.

(i) To make and execute contracts and other instruments necessary or convenient to the exercise of its powers.

(j) To carry on technical and other investigations of all kinds necessary or convenient for the accomplishment of the purposes or powers of the agency.

(k) To do any and every lawful act necessary in order that a sufficient in-channel water supply may be available for any present or future beneficial use or uses of the lands within the agency.

(Stats.1973, c. 1089, p. 2211, § 4.2. Amended by Stats.1987, c. 667, § 4.)

§ 116–4.3. Incidental powers

Sec. 4.3. The agency shall have all powers necessary or convenient to carry out the purposes of this act, including powers granted by this act and any other provision of law.

(Stats.1973, c. 1089, p. 2212, § 4.3.)

Historical and Statutory Notes

Derivation: Stats.1968, c. 419, p. 864, § 4.3.

§ 116–4.5. Water rights

Sec. 4.5. The agency shall have no authority or power to affect, bind, prejudice, impair, restrict, or limit water rights within the agency.

(Added by Stats.1987, c. 667, § 5.)

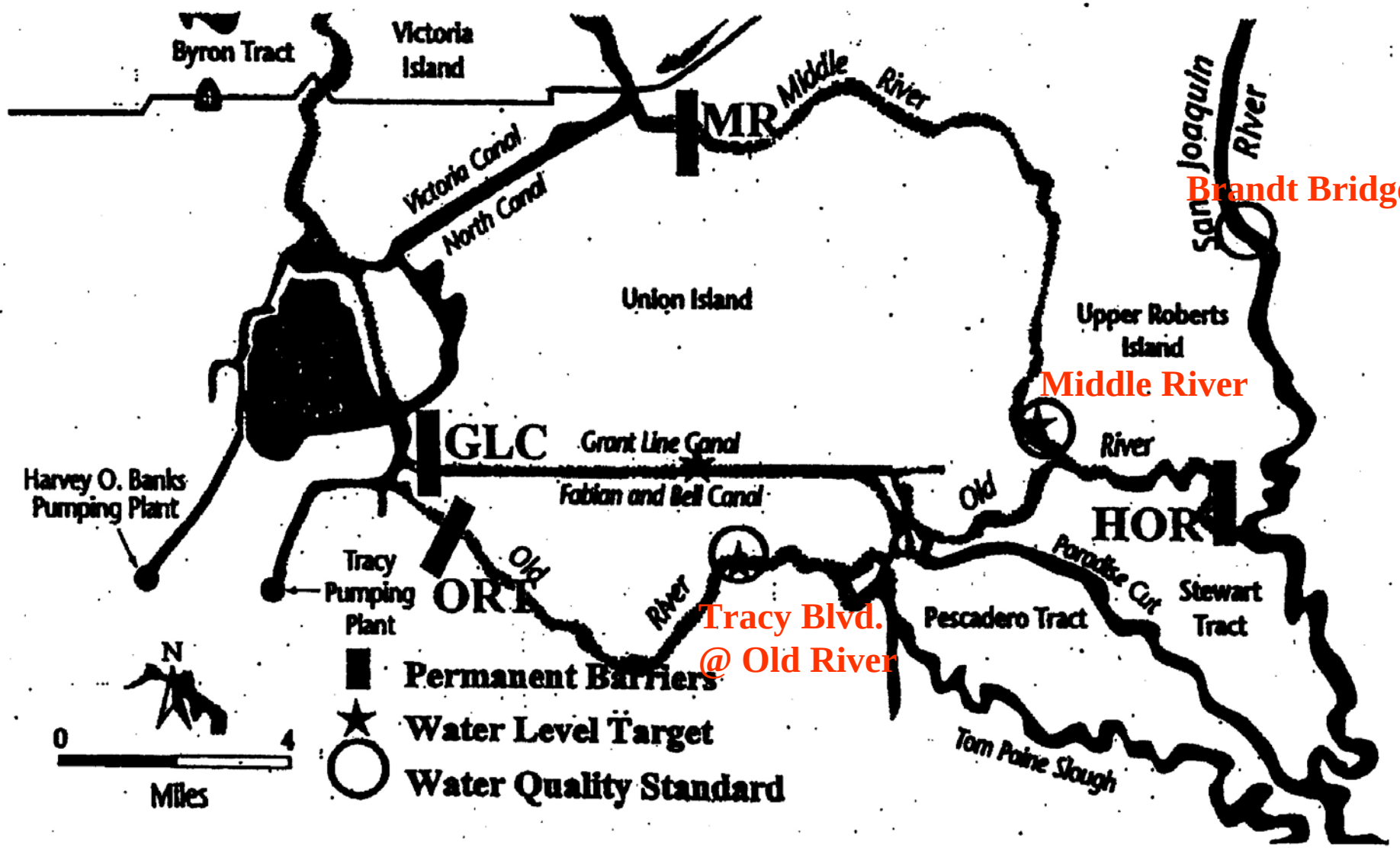
What are the Water Quality Objectives for Agricultural Beneficial Uses in the South Delta?

1995 Water Quality Control Plan
Water Quality Objectives for Agricultural Beneficial Uses
Excerpt From Table 2

SOUTHERN DELTA						
San Joaquin River at Airport Way Bridge, Vernalis	*C-10 (RSAN112)*	*Electrical Conductivity (EC)*	*Maximum 30-day running average of mean daily EC (mmhos/cm)*	*All*	*Apr-Aug*	*0.7*
-and-					*Sep-Mar*	*1.0*
San Joaquin River at Brandt Bridge site	*C-6 (RSAN073)*				*-or-*	
-and-						
Old River near Middle River [5]	*C-8 (ROLD69)*					
-and-						
Old River at Tracy Road Bridge [5]	*P-12 (ROLD59)*					
			If a three-party contract has been implemented among the DWR, USBR, and SDWA, that contract will be reviewed prior to implementation of the above and, after also considering the needs of other beneficial uses, revisions will be made to the objectives and compliance/monitoring locations noted, as appropriate.			
EXPORT AREA						
West Canal at mouth of Clifton Court Forebay	*C-9 (CHWST0)*	*Electrical Conductivity (EC)*	*Maximum monthly average of mean daily EC (mmhos/cm)*	*All*	*Oct-Sep*	*1.0*
-and-						
Delta-Mendota Canal at Tracy Pumping Plant	*DMC-1 (CHDMC004)*					

[1] River Kilometer Index station number.
[2] Determination of compliance with an objective expressed as a running average begins on the last day of the averaging period. If the objective is not met on the last day of the averaging period, all days in the averaging period are considered out of compliance.
[3] The Sacramento Valley 40-30-30 water year hydrologic classification index (see page 23) applies for determinations of water year type.
[4] When no date is shown, EC limit continues from April 1.
[5] The EC objectives shall be implemented at this location by December 31, 1997.

4. **Southern Delta agricultural salinity objectives.** Elevated salinity in the southern Delta is caused by low flows, salts imported in irrigation water by the State and federal water projects, and discharges of land-derived salts, primarily from agricultural drainage. Implementation of the objectives will be accomplished through the release of adequate flows to the San Joaquin River and control of saline agricultural drainage to the San Joaquin River and its tributaries. Implementation of the agricultural salinity objectives for the two Old River sites shall be phased in so that compliance with the objectives is achieved by December 31, 1997.


Byron Tract
Victoria Island
MR
Middle River
Victoria Canal
North Canal
San Joaquin River
Brandt Bridge
Union Island
Upper Roberts Island
Middle River
GLC
Grant Line Canal
Fabian and Bell Canal
Harvey O. Banks Pumping Plant
Old River
HOR
Tracy Pumping Plant
ORT
Tracy Blvd. @ Old River
Paradise Cut
Pescadero Tract
Stewart Tract
Tom Paine Slough
N
0
4
Miles
Permanent Barriers
Water Level Target
Water Quality Standard

Revised Water Right Decision 1641
Water Quality Objectives for Agricultural Beneficial Uses
Excerpt From Table 2

SOUTHERN DELTA						
San Joaquin River at Airport Way Bridge, Vernalis	*C-10 (RSAN112)*	*Electrical Conductivity (EC)*	*Maximum 30-day running average of mean daily EC (mmhos/cm)*	*All*	*Apr-Aug*	*0.7*
-and-					*Sep-Mar*	*1.0*
San Joaquin River at Brandt Bridge site[5]	*C-6 (RSAN073)*					
-and-						
Old River near Middle River [5]	*C-8 (ROLD69)*					
-and-						
Old River at Tracy Road Bridge [5]	*P-12 (ROLD59)*					
EXPORT AREA						
West Canal at mouth of Clifton CourtForebay	*C-9 (CHWST0)*	*Electrical Conductivity (EC)*	*Maximum monthly average of mean daily EC (mmhos/cm)*	*All*	*Oct-Sep*	*1.0*
-and-						
Delta-Mendota Canal at Tracy Pumping Plant	*DMC-1 (CHDMC004)*					

[1] River Kilometer Index station number.

[2] Determination of compliance with an objective expressed as a running average begins on the last day of the averaging period. The averaging period commences with the first day of the time period for the applicable objective. If the objective is not met on the last day of the averaging period, all days in the averaging period are considered out of compliance.

[3] The Sacramento Valley 40-30-30 water year hydrologic classification index (see Figure 1) applies for determinations of water year type.

[4] When no date is shown, EC limit continues from April 1.

[5] The 0.7 EC objective becomes effective on April 1, 2005. The DWR and the USBR shall meet 1.0 EC at these stations year round until April 1, 2005. The 0.7 EC objective is replaced by the 1.0 EC objective from April through August after April 1, 2005 if permanent barriers are constructed, or equivalent measures are implemented, in the southern Delta and an operations plan that reasonably protects southern Delta agriculture is prepared by the DWR and the USBR and approved by the Executive Director of the SWRCB. The SWRCB will review the salinity objectives for the southern Delta in the next review of the Bay-Delta objectives following construction of the barriers.

HOW WERE WATER QUALITY OBJECTIVES FOR BENEFICIAL USES DETERMINED

Crop tolerances

Different crops tolerate different soil concentrations in the water

Salinity accumulation in soil

Plants take up water, salt remains in soil

Soil permeabililty

At what rate will water move through a particular soil type

Leaching requirements

1989 - 1991

Southern Delta Agriculture Work Group

Western/Interior Delta Agriculture Work Group

Hydrodynamics and Salinity Work Group

Hearings, Testimony, Cross-Examination, etc.

Souther Delta Agriculture work roup
August 16, 1989

Name	Affiliation	Address	Telephone
Ed Winkler	DWR	3251 "S" Sacto.	323-8884
John Renning	USBR	2800 Cottage Way Sac	978-5128
Gordon Lyford	USBR	2800 Cottage Way Sac	978-5062
Buzz Link	CVPWA/RMI	1010 HORLEY WAY Ste 500 SAC	924-1534
LeRoy Kennedy	TID	P.O. Box 949, Turlock, 95381	(209) 883-8270
Wm R Johnston	Modesto ID	1342 W. San Jose Fresno, CA 93711	209 439 7277 209 526 7384
Alan M. Patesson	TID	1231 E. Whitmore Ave Hughson CA 95326	(209)-874-1718
Gordon Enas	DWR	1416 9th ST	916-323-8892
Terry Snyder	SWRCB	901 P ST. SACTO	324-5620
Fred Bachmann	DWR - Delta	1416 - 9th St.	324-4757
Bob Suits	DWR	1416 - 9th st.	322-7169
Jim Snow	DWR-O&M	"	324 6164
Miguel De Anda	DWR- PLANNING	"	445-4483
Phil Wendt	" "	"	323-8891
Elaine Merritt	DWR-O&M	"	322-0485
Craig Trombly	DWR- Delta	"	445-8867
DEREK HILTS	USBR	2800 COTTAGE WAY SAC	(916) 978-5124
Keith Bray	Kronick, Moskovitz, et al	770 L Street, Suite 1200	444-8920
Alex Hildebrand	SDWA	23443 S. Hays, Manteca 95336	209 823 4166
DAVE WHITRIDGE	SDWA	311 E MAIN #504	209 948-5551
G.T. ORLOB	SDWA	UCD, Civil Engrg	752-1424
Larry Dale	UCB/SWRCB	2030 Addison Berkeley CA	(415) 6449492
TED ROEFS	USBR	2800 Cottage Way Sac CA 95824	916-978-4923
Scott Humpert	SWRCB	901 P ST SACTO 95814	(916) 323-6144
Steve Nelson	ERM-West	1777 Botelho Dr., Suite 260, Walnut Creek 94596	(415) 9460455
RICH SATKOWSKI	SWRCB	901 P ST SAC	(916) 322-9871

Name	Affiliation	Address	Telephone
Harold Meyer	USBR	2800 Cottage Way	978-5139
Dick Clemmer	MWD	P.O. Box 54153 LA 90054	213-250-6666
DAVID LEIB	CCWD	PO Box H20 Concord 94524	415 674 8083
Francis Chung	DWR	1416 9th St,	916 445 9027
Charlie Kratzer	SWRCB	901 P St, Sacto	916 324-5752
Steve Arakawa	MWD	POBox 54153 LA 90054	(213) 250-6052

United States Department of Agriculture
Science and Education Administration
Agricultural Research Western Region
U.S. Salinity Laboratory
4500 Glenwood Drive
Riverside, CA 92501

Telephone: 714/683-0172

Jan. 4, 1982

TO: Parties Interested in the Irrigation Water Quality in the South Delta

Enclosed please find a copy of the final report of the committee formed to evaluate the irrigation water quality requirements for agriculture in the South Delta. Following the preliminary report sent to you on November 3, 1981, we received comments and desires for additional information from the South Delta Water Agency and the Bureau of Reclamation. The committee has attempted to take these comments and requests into consideration in preparing this final report.

The committee assumes that its task is now complete and stands adjourned.

Sincerely,

GLENN J. HOFFMAN
Committee Member

Enclosure

SDWA Exhibit No. 103

Jerry Johns
State Water Resources Control Board
Special Projects
P. O. Box 100
Sacramento, CA 95801

G. T. Orlob
424 Brentwood Dr.
Benicia, CA 94510

Jewell Meyer
Dept. of Soil & Environ. Sci.
University of California
Riverside, CA 92521

Alex Hildebrand
South Delta Water Agency
23443 S. Hays Road
Manteca, CA 95336

Terry Prichard
Univ. of Calif. Ext.
420 S. Wilson Way
Stockton, CA 95205

Gordon Lyford
Water & Power Resources Service
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825

Mr. Merv de Haas
U.S. Bureau of Reclamation
Mid-Pacific Region
2800 Cottage Way
Sacramento, CA 95825

John Payne
State Water Resources Control Board
P. O. Box 100
Sacramento, CA 95801

WATER QUALITY CONSIDERATIONS FOR THE SOUTH DELTA WATER AGENCY

G. J. Hoffman, T. Prichard, and J. Meyer

A mixture of soluble salts is present in all soils. If the concentration of these salts becomes excessive, crop yields will be reduced because of the decrease in osmotic potential of the soil water. To prevent harmful accumulation of salts, the soil profile must be leached periodically with an amount of water in excess of that used by evapotranspiration. Thus, where salinity is a hazard, the concept of efficient water use must be expanded to include an increment of water to meet the leaching requirement (L_r), defined as the minimum fraction of the total amount of applied water that must pass through the soil root zone to prevent a reduction in crop yield from an excess accumulation of salts. Leaching occurs whenever irrigation and rainfall exceed evapotranspiration.

Two quantities establish the leaching requirement: the salt concentration of the applied water and the salt tolerance of the crop. The average salt concentration of the applied water ($\bar{C}$) can be estimated from the mean salt concentration of the irrigation water (C_I) and the amount of rainfall (D_R) and irrigation (D_I) applied. Mathematically,

$$\bar{C} = \frac{C_I \, D_R}{D_I + D_R}$$

because rainfall has an insignificant salt concentration. The amount of water required by the major crops in South Delta, as estimated by both the Bureau of Reclamation and the Extension Service, is summarized in Table 1. Estimates of both evapotranspiration and the total amount of water that must be applied for

Map Symbol	Soil Series
Slow (40%) - less than 0.2 inches per hour	
AD	Finrod clay loam
AO	Archerdale very fine sandy loam, overwash
AR	Archerdale clay loam
CL	Stockton clay
CP	Capay clay, 0 to 2 percent slopes
CPB	Capay clay, 2 to 5 percent slopes
CS	Capay clay, saline alkali
CW	Capay clay, wet
EG	Peltier mucky clay loam, drained
ES	Peltier mucky clay loam, organic substratum
PD	Pescadero clay loam, drained
RM	Rincon clay loam
RW	Rincon clay loam, wet
TC	Colusa variant clay loam, drained
WA	Willows clay, drained
XD	Hollenbeck silty clay
Moderately slow (34%) - 0.2 to 0.6 inches per hour	
BC	Blancho clay loam, drained
BR	Brentwood clay loam
BZ	Bronzan sandy clay loam, drained
CD	Eightmile variant clay loam
CH	Bronzan clay loam, drained
CI	Bronzan clay loam
EA	Egbert mucky clay loam, partially drained
EB	Egbert silty clay loam, partially drained
EF	Egbert silty clay loam, sandy substratum
KI	Kingile muck, drained
KL	Kingile-Ryde complex
LR	Los Robles gravelly clay loam
LS	Los Robles clay loam
ME	Merritt silty clay loam, partially drained
MF	Merritt silty clay loam, flooded
OD	Chualar variant coarse sandy loam
RH	Ryde clay loam, drained
RS	Ryde clay loam, organic substratum
SI	Shinkee muck, drained
VJ	Veritas silty clay loam, overwash
VL	Veritas sandy loam, saline-alkali
VM	Veritas variant sandy loam
VR	Vernalis clay loam
VW	Vernalis clay loam, wet
VY	Vina loam
VZ	Valdes silt loam, drained
WB	Webile muck, drained

Map Symbol	Soil Series
Moderate (17%) - 0.6 to 2.0 inches per hour	
FC	Fluvaquents
GC	Grangeville clay loam, drained
MN	Manteca sandy loam
RF	Ryde clay loam, sandy substratum
RI	Ryde-Peltier complex
SC	Timor loamy sand
SH	Shima muck, drained
XV	Galt clay
Moderately rapid (6%) - 2.0 to 6.0 inches per hour	
CB	Columbia fine sandy loam
CC	Columbia fine sandy loam, clayey substratum
CE	Columbia fine sandy loam, channelled
CF	Columbia fine sandy loam, flooded
CJ	Eightmile loam
CO	Eightmile fine sandy loam, overwash
CT	Cortina gravelly loam
DN	Escalon sandy loam
DV	Devries sandy loam, drained
GV	Grangeville fine sandy loam, drained
GS	Grangeville fine sandy loam, flooded
HA	Honcut fine sandy loam
HG	Escalon sandy loma
HL	Honcut gravelly sandy loam
RK	Reiff loam
VF, VG	Veritas fine sandy loam, very deep
VH	Veritas sandy loam
VK	Devries variant sandy loam
Rapid (3%) - greater than 6.0 inches per hour	
DB	Dello sandy loam, clay substratum
DC	Dello loamy sand, drained
DD	Dello clay loam, overwash
DE	Dello loamy sand, moderately wet
DF	Dello sand, flooded
DH	Delhi loamy coarse sand
RC	Rindge mucky silt loam, overwash
RN	Rindge muck, drained
TG	Tujunga gravelly loamy coarse sand
TS	Tinnin loamy coarse sand, drained
TT	Tinnin loamy coarse sand, loamy substratum
TW	Bisgani loamy coarse sand, partially drained
VC	Venice mucky silt loam, overwash
VE	Venice muck, drained

Table 3. Leaching fractions achieved for various soil types in the South Delta (Meyer, unpublished report, 1976).

SCS Soil Permeability Class in/hr	Crop	No. of Sites Samples	Leaching Fraction Values	Leaching Fraction Mean
0 to 0.2	Alfalfa	2	0.03-0.05; <0.05	0.04
0.2 to 0.6	Alfalfa	2	0.15; 0.15	0.13
	Sugar Beet	1	0.10	
0.6 to 2.0	Walnut	1	0.15	
	Corn	1	0.15	0.18
	Alfalfa	1	0.25	
2.0 to 6.0	Tomato-Cabbage	1	0.25	0.25
	Tomato	1	0.25	
>6.0	-	0	-	-
			Overall Mean =	0.15
			Standard Deviation =	0.08

Table 5. Salt concentration of irrigation water, reported as mg/ℓ of total dissolved salts that results in various reductions in crop yield as a function of leaching fraction and rainfall.

Leaching Fraction	No Rainfall				Normal Effective Rainfall			
	Relative Crop Yield				Relative Crop Yield			
	100%	90%	80%	70%	100%	90%	80%	70%
				ALFALFA				
0.07	480	830	1170	1500	570	980	1380	1770
0.15	1060	1730	2430	3120	1250	2040	2870	3680
0.23	1880	3150			2220	3720		
				TOMATO				
0.07	590	860	1110	1360	650	950	1230	1510
0.15	1290	1800	2320	2840	1430	2000	2580	3150
0.23	2310	3280			2560	3640		
				WHEAT				
0.07	1430	1810			2800	3550		
0.15	3070	3790			6020	7430		
0.23								
				BEAN				
0.07	250	380	510	640	280	430	570	720
0.15	520	790	1060	1330	580	880	1190	1490
0.23	940	1430	1910	2410	1050	1600	2140	2700
				CORN				
0.07	420	630	830	1040	430	650	850	1070
0.15	880	1300	1730	2150	910	1340	1780	2210
0.23	1590	2360	3150		1640	2430	3240	
				SUGAR BEET				
0.07	1660	2120			1990	2540		
0.15	3580				4300			
0.23								
				FRUIT AND NUTS				
0.07	360	500	620	740	440	600	750	900
0.15	780	1040	1290	1550	940	1260	1560	1880
0.23	1400	1870	2340	2800	1690	2260	2830	3390
				GRAPE				
0.07	360	630	880	1140	420	740	1030	1330
0.15	780	1310	1840	2370	910	1530	2150	2770
0.23	1400	2370	3340		1640	2770	3910	

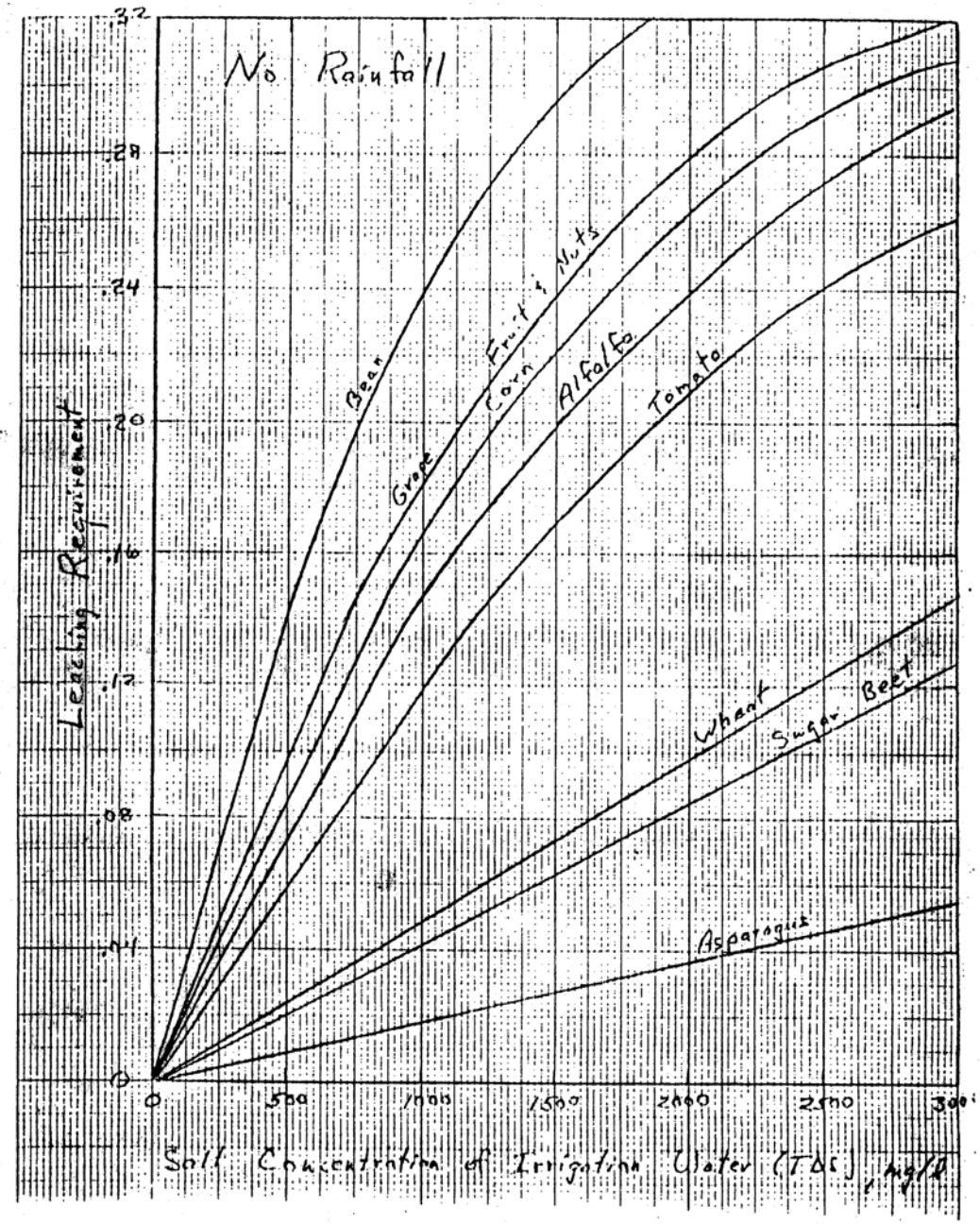


Fig. 1. Leaching requirement of the prominent crops in the South Delta as a function of the salinity of the irrigation water without rainfall.

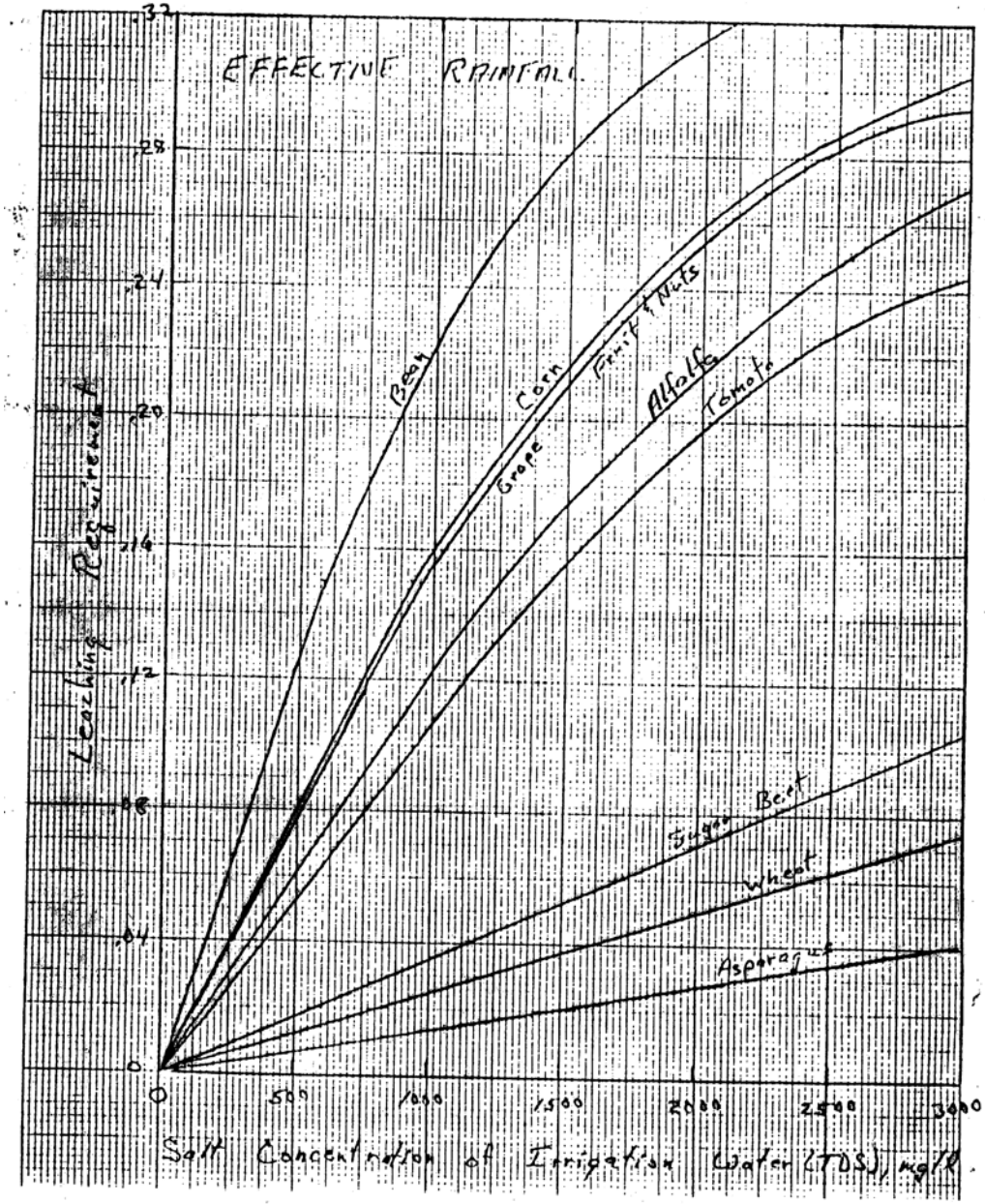


Fig. 2. Leaching requirement of the prominent crops in the South Delta as a function of the salinity of the irrigation water with effective normal rainfall.

OUTLINE OF TESTIMONY OF ALEXANDER HILDEBRAND
ON SOUTH DELTA AGRICULTURE

QUALIFICATIONS

My qualifications as an expert witness are set forth in SDWA Exhibit No. 1.

INTRODUCTION

Dr. Orlob has testified regarding the degradation of the South Delta's in-channel water supply that is caused by upstream development and by the operation of the export pumps.

My testimony will address the in-channel water supply needed for full crop yields, and the extent to which crop yields and crop versatility have been degraded by the degradation in the water supply which Dr. Orlob identified. I will then discuss proposals regarding water supply objectives for the South Delta.

You are already aware from evidence submitted of the effects of salts on plant performance by both osmotic and toxic ion effects, and also of the fact that there are threshold levels of soil-water salinity above which the growth of different varieties of established plants is reduced. You are also aware that the relationship between the soil-water salinity in the root zone of each plant and the salinity of irrigation water applied to that plant is a function of both the applied water salinity and the achieved leaching fraction.

There is little controversy over the maximum soil-water salinity which will permit a full yield of each variety of established crop plant, except that the figures should be

type. There were 51 measurement sites in ten fields. From SDWA Exhibit No. 104, a rough estimate of the variation in leach fraction over a typical field may be derived.

The San Joaquin County Agricultural Commissioner supplied crop acreages, crop yields, and on-farm unit crop values for each of the major crops grown in the South Delta in 1981. This material is submitted as SDWA Exhibit No. 108.

I will expand on the relevance of some of this data before we proceed to the use of this information to estimate crop yield losses versus South Delta in-channel water quality.

PERCOLATION TIME LIMITATIONS

The reason why soils with low permeability require better water for full crop yield can be illustrated by considering the crop alfalfa, which has been the crop with the largest acreage and the second largest value in the South Delta. It is grown largely in support of the County's large dairy industry.

Table 1 in the Consultants' Report, (SDWA Exhibit No. 103), shows that alfalfa consumptively uses about 41 inches of applied water depth per year. Page 8 of that Exhibit shows that 40% of the South Delta's soils have percolation rates of less than 0.2 inches of water per hour. Furthermore, the operations of mowing, baling, and bale hauling compact the near surface soil and further reduce percolation rates. With 0.15 inches per hour of water percolation, the time required to percolate 41 inches of water is 273 hours even with a uniform distribution of applied water (i.e. 41 inches ÷ .15 inches per hour = 273 hrs.).

No salt flushing can take place unless that time is exceeded.

With six hay harvests per year, the time required to mow, cure, and bale the hay makes it very difficult to get more than two irrigations per cutting, or twelve irrigations during the crop season. More than one extra irrigation in the fall is risky on tight soils because of the possibility of an early rain after a late fall irrigation which could drown or water damage the crop. On the other hand, if the winter turns out to be dry, most of the 41 inches has to be percolated by irrigation. This then requires about 21 hours of soaking time per irrigation in a dry year with no effective rainfall (273 hours ÷ 13 irrigations) or 17 hours in a normal year (with 8.4" effective rainfall- per SDWA Exhibit No. 103, Table 1) before any leaching takes place. This soaking time is long enough to cause serious water damage to the alfalfa plants on a tight soil. This is why the 0.04 leach fraction shown on Table 3 of the Report is a plausible leach fraction for alfalfa on the tight soils. Figures 1 and 2 of the Report show that alfalfa crop loss occurs in this case with water salinities over 275 or 325 mg/L TDS depending on rainfall. Table 5 shows a 480 ppm TDS requirement for full yield with a .07 leach fraction in a dry year.

My own measurements with tensiometers in one of my fields demonstrated that it was difficult to get any leach fraction in the low permeability areas when growing alfalfa.

It is somewhat more feasible to get a larger leach fraction with an annual crop having a shallower root system and

CROP	AVERAGE SDWA ACREAGE 1971-75	YIELD BASIS (% OF POTENTIAL)	IRRIGATION WATER QUALITY REQUIRED [1]					
			Requirement per U.C. Exhibit 2 (Uniform soil and "as needed" irrigation frequency)		Requirement with allowance for soil variability		Requirement with variable soil and with a 4 day delay in alternate irrigations from "as needed" schedule	
			Field-average Leach Ratio [2] (% of applied water)	Irrigation Water Quality Needed	Corresponding minimum LR for 90% of Typical Field [3]	Irrigation Water Quality Needed		
COLUMN A	B	C	D	E	F	G	H	REMARKS
		%	%	EC (TDS)	%	EC (TDS)	(TDS)	
Alfalfa	27,900	100	10	1.0 (640)	7.4	0.7 (450)	Better than 450	
		100	10 (annual average with zero June July, Aug. and 2 irrigations/mon.)	Better than 1.0 (640)	7.4	Better than 0.7 (450)	Better than 450	
		90	5	1.0 (640)	3.8	0.64 (410)	Better than 410	
		90	5 (see note above)	Better than 1.0 (640)	3.8	Better than 0.64 (410)	Better than 410	
Tomatoes	17,200	100	15	1.7 (1080)	11.	1.5 (960)	Better than 900	
		90	6	1.0 (640)	4.4	0.75 (480)	Better than 450	
Sugar Beets	12,800	100	15	4.7	11.			
Beans	9,400	100	16	0.7 (450)	12.	0.62 (400)	Better than 400	Similar for carrots and strawberries
		90	10	0.7 (450)	7.4	0.63 (400)		
Corn	7,700	100	15	1.1 (700)	11.	1.0 (640)	Better than 600	Similar for potatoes
		90	8	.85 (550)	6.	0.7 (450)	Better than 450	
Grapes		100	15	1.0 (640)	11.	0.75 (480)		
		90	6	0.7 (450)	4.4	0.55 (350)		
Inuts, peaches, apricots,	6,200	100	13	1.0 (640)	9.5	0.75 (480)		Similar for pears
		90	6.5	0.7 (450)	4.8	0.55 (350)		
Lettuce and onions		100	15	0.85 (540)	11.	0.75 (480)	Better than 480	
Seedlings Tomatoes Sugar Beets Onions Lettuce [4]	31,000	Good Survival and vigorous growth	The difficulty of achieving good survival increases as water qualities become poorer than 350 TDS and as necessary planting dates involve higher temperatures, winds, and low humidity. Depends also on facility with given soil of shaping and maintaining accurate seed bed shapes.					

1. All cases assume best common irrigation practices with flood and furrow irrigation, and reasonable provision of drain ditches and drainage pumps. All cases assume no long range salinity build up.
2. Average leach ratio, Col. D, determines input to groundwater. Removal of groundwater becomes more difficult when permissible groundwater levels must be below deep root zones and when elevations are near sea level.
3. U.C. Southern Delta Salinity Survey data*is assumed to be representative and is used to determine a leach ratio in Col. F which will be achieved or exceeded in 90% of a typical field which has the average leach ratio in Col. D. This Col. F leach ratio determines the crop yield for 90% of the field with full yield water quality.
4. Seedlings germinated with best established methods on raised row beds by furrow irrigation and planted at appropriate dates for crop.
5. Assumes adequate leach by irrigation, i.e., does not assume rain leach .

Abbreviations EC, TDS, LR are those used in U.C. Exhibit 2.
* See: Exhibit U.C. 7

IMPACT OF SAN JOAQUIN RIVER QUALITY ON CROP YIELDS IN THE SOUTH DELTA

G. T. Orlob

INTRODUCTION

The agricultural productivity of lands within the South Delta Water Agency is dependent upon both the quantity of water that enters the Delta at Vernalis and its quality. It is also determined in part by the nature of soils, i.e. their permeabilities and leaching requirements to avoid excessive accumulation of salinity during the growing season. In general, fine textured soils such as those that comprise the major part of South Delta lands have lower permeabilities, and thus require higher quality of applied water to assure optimal crop growth without loss of yield.

To demonstrate the nature and dependence of agricultural productivity in the South Delta on San Joaquin River quality, it is necessary to consider the following factors:

1. Soil characteristics, i.e. permeabilities and field leaching fractions, and variability of these over the lands of the South Delta,

2. Crop yields in relation to water quality, soil characteristics, and crop type,

3. Quality of water available in South Delta channels during the growing season, and

4. Cropping pattern and crop value for the South Delta.

SDWA EXHIBIT NO. 114

Table 5. Estimated Loss of Crop Revenue Due to Water Quality Degradation, Case Study: 1976 and 1976 With New Melones Operation

Crop	Area[1]	Unit Value[2]	Mkt.Value	Loss of Crop Revenue, 10^6 $			
				Actual 1976		1976 w/N.Melones	
				ΔY/100	ΔC	ΔY/100	ΔC
	acres	$/acre	10^6 $		$		$
Beans	9,840	656	6.46	0.406	2.62	0.331	2.14
Corn	11,070	563	6.23	0.201	1.25	0.105	0.65
Alfalfa	31,980	732	23.41	0.102	2.81	0.051	1.19
Tomatoes	17,220	2110	36.33	0.111	4.03	0.052	1.89
Fruit & Nuts	6,150	2154	13.25	0.359	4.76	0.199	2.64
Grapes	1,000	1358	1.36	0.169	0.23	0.093	0.13
TOTALS	72,260[3]		87.04		15.70		8.64

[1] 1971-75 average

[2] 1980 San Joaquin County Agriculture Department

[3] Does not include 50,740 acres of salt tolerant crops

What needs to be examined in order to change existing water quality objectives?

Statutes, regulations, and policies

What is necessary to protect agricultural beneficial uses?

South Delta crops

South Delta soils

Do current standards provide protection?

Reasonable use of water

Impacts resulting from any change

Statutes, regulations, and policies

FEDERAL ANTIDEGRADATION POLICY

(A) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

"(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."

. . .

"(3) Where high quality waters constitute an outstanding National resource, such as water of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected." (40, C.F.R. § 131.12.)

STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

. . .

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

. . .

Section 12232. Duty of state agencies not to cause degradation of quality of water

The State Water Resources Control Board, the State Department of Water Resources, the California Water Commission, and any other agency of the state having jurisdiction, shall do nothing, in connection with their responsibilities, to cause further significant degradation of the quality of water in that portion of the San Joaquin River between the point specified in Section 12230. *(Added by Stats.1961, c. 1454, p. 3300, § 1. Amended by Stats.1967, c. 284, p. 1448, § 136.5, operative Dec. 1, 1967.)*

California Water Code Section 13241

§ 13241. Water quality objectives; beneficial uses; prevention of nuisances

Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:

(a) Past, present, and probable future beneficial uses of water.

(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

(d) Economic considerations.

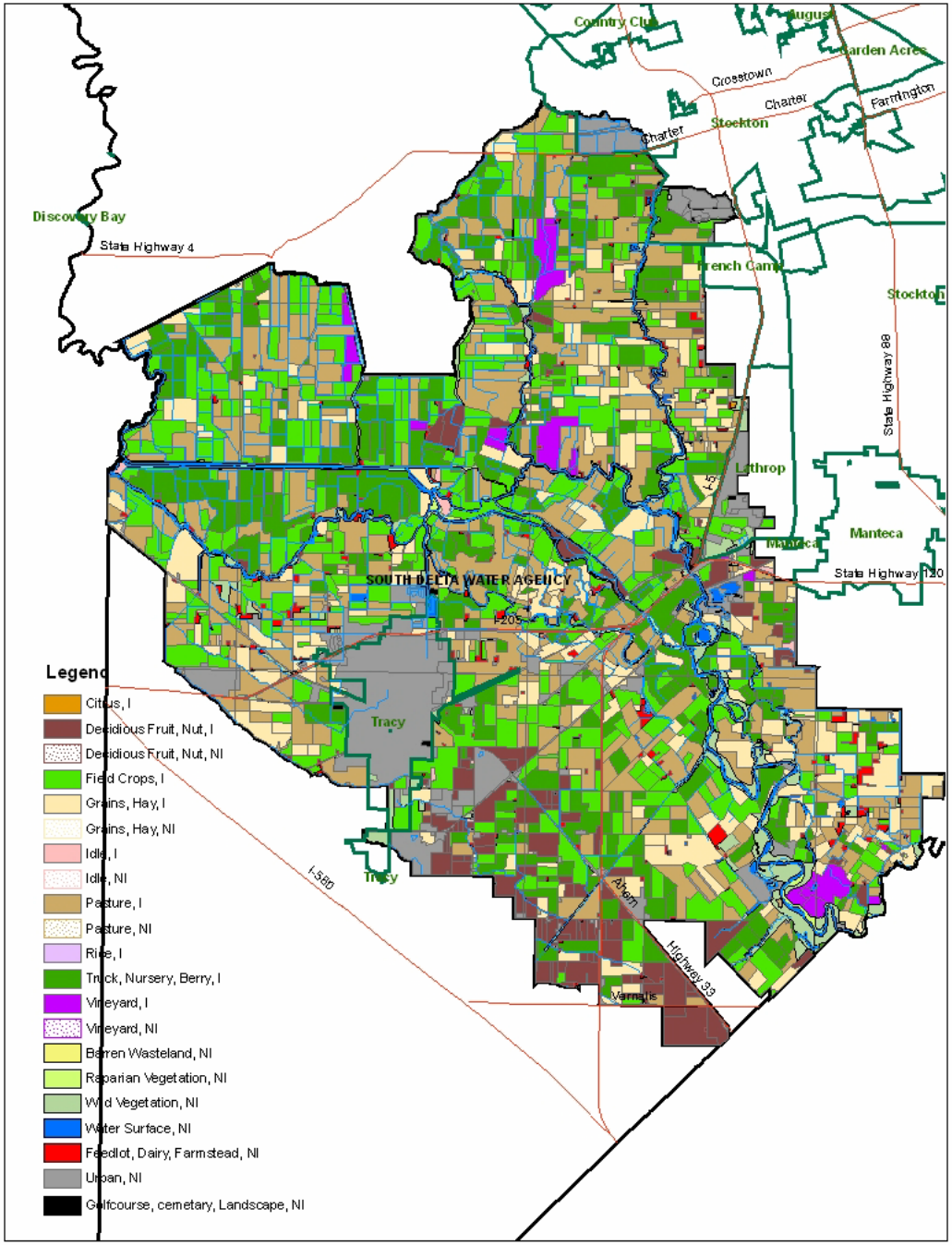
(e) The need for developing housing within the region.

(f) The need to develop and use recycled water.

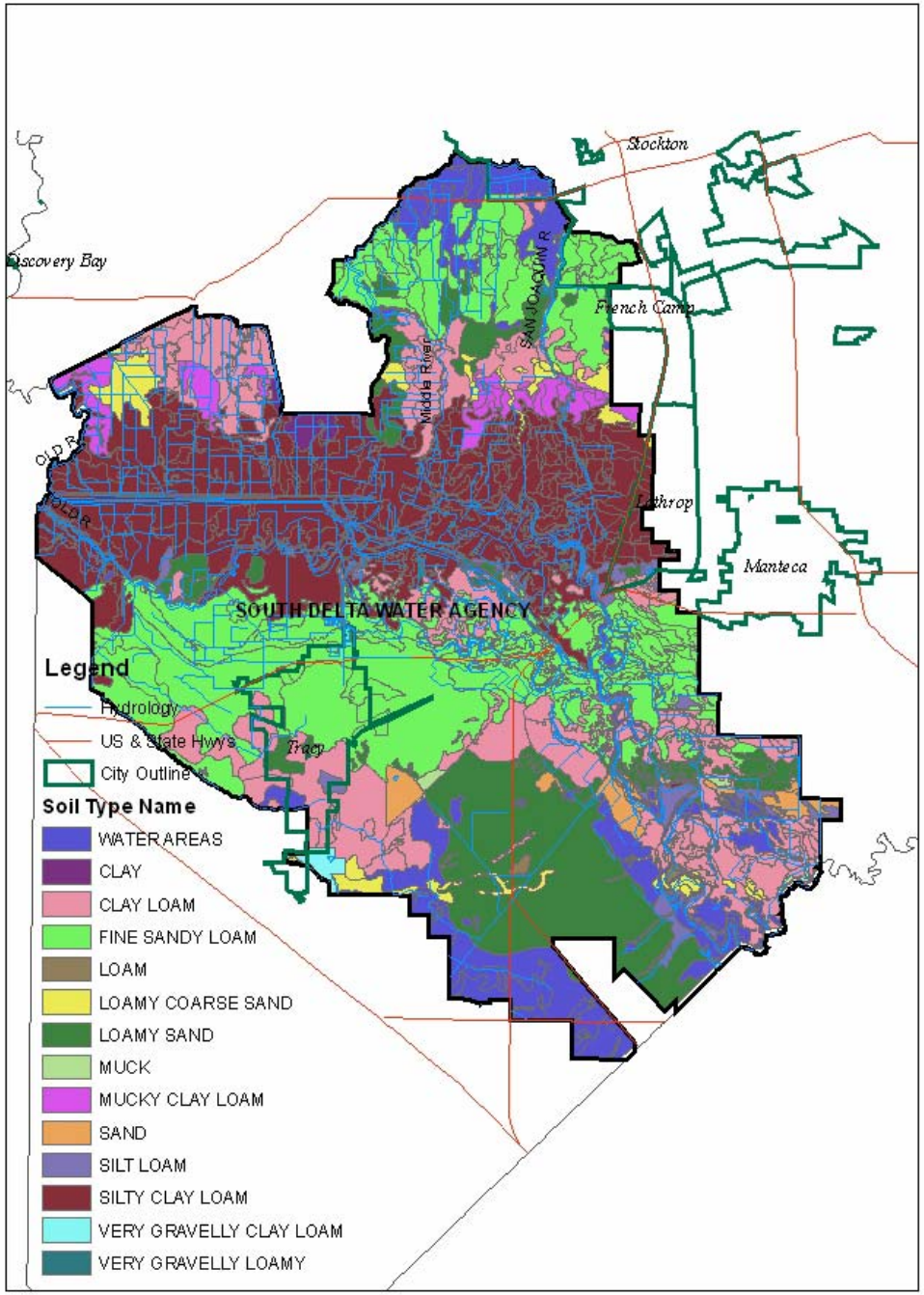
(Added by Stats.1969, c. 482, p. 1061, § 18, operative Jan. 1, 1970. Amended by Stats.1979, c. 947, p. 3272, § 8; Stats.1991, c. 187 (A.B.673), § 2.)

What is necessary to protect Agricultural beneficial uses?

South Delta crops


Country Club
Garden Acres
Crosstown
Charter
Farrington
Stockton
Discovery Bay
State Highway 4
French Camp
Stockton
State Highway 88
Lathrop
Manteca
State Highway 120
SOUTH DELTA WATER AGENCY
I-205
Tracy
I-580
Altamont
Highway 33
Vernalis
Legend
Citrus, I
Deciduous Fruit, Nut, I
Deciduous Fruit, Nut, NI
Field Crops, I
Grains, Hay, I
Grains, Hay, NI
Idle, I
Idle, NI
Pasture, I
Pasture, NI
Rice, I
Truck, Nursery, Berry, I
Vineyard, I
Vineyard, NI
Barren Wasteland, NI
Riparian Vegetation, NI
Wild Vegetation, NI
Water Surface, NI
Feedlot, Dairy, Farmstead, NI
Urban, NI
Golfcourse, cemetary, Landscape, NI

South Delta soils


Stockton
Discovery Bay
French Camp
Middle River
SAN JOAQUIN R
OLD R
TOLD R
Lathrop
Manteca
SOUTH DELTA WATER AGENCY
Tracy
Legend
Hydrology
US & State Hwy's
City Outline
Soil Type Name
WATER AREAS
CLAY
CLAY LOAM
FINE SANDY LOAM
LOAM
LOAMY COARSE SAND
LOAMY SAND
MUCK
MUCKY CLAY LOAM
SAND
SILT LOAM
SILTY CLAY LOAM
VERY GRAVELLY CLAY LOAM
VERY GRAVELLY LOAMY

SDWA SOIL TYPE SPREADSHEET

USDA SOIL CLASSIFICATION NO.	SOIL TYPE NAME	PERK RATE (in./hr)
118	Capay clay	0.1
119	Capay clay	0.1
120	Capay clay, saline-sodic	0.1
121	Capay clay, wet	0.1
122	Capay-Urban land complex	0.1
180	Jacktone clay	0.1
181	Jactone-Urban land complex	0.1
274	Willows clay, partially drained	0.1
153	Egbert silty clay loam, partially drained	0.3
154	Egbert silty clay loam, sandy substratum, partially drained	0.3
197	Merrit silty clay loam, partially drained	0.3
198	Merrit silty clay loam, partially drained	0.3
231	Ryde silty clay loam, organic substratum	0.3
267	Veritas silty clay loam	0.3
110	Boggiano clay loam	0.5
148	Dello clay loam, drained	0.5
152	Egbert mucky clay loam, partially drained	0.5
156	El Solyo clay loam	0.5
158	Finrod clay loam	0.5
167	Grangeville clay loam, partially drained	0.5
169	Guard clay loam, drained	0.5
211	Pescadero clay loam, partially drained	0.5
230	Ryde clay loam, partially drained	0.5
232	Ryde clay loam, sandy substratum, partially drained	0.5
243	Scribner clay loam, partially drained	0.5
244	Scribner clay loam, sandy substratum, partially drained	0.5
252	Stomar clay loam	0.5
253	Stomar clay loam	0.5
258	Trahern clay loam, partially drained	0.5
268	Vernalis clay loam	0.5
269	Vernalis clay loam, wet	0.5
281	Zacharias clay loam	0.5
282	Zacharias gravelly clay loam	0.5
261	Valdez silt loam, organic substratum, partially drained	0.7
204	Peltier mucky clay loam, partially drained	1
233	Ryde-Peltier complex, partially drained	1
108	Arents, saline-sodic	1.5
130	Columbia fine sandy loam, drained	1.5
131	Columbia fine sandy loam, partially drained	1.5
132	Columbia fine sandy loam, channeled, partially drained	1.5
133	Columbia fine sandy loam, clayey substratum, partially drained	1.5
134	Cometa sandy loam	1.5
137	Cortina gravelly sandy loam	1.5
147	Dello sandy loam, clayey substratum, drained	1.5
157	Exeter sandy loam	1.5
166	Grangeville fine sandy loam, partially drained	1.5
175	Honcut sandy loam	1.5
189	Kingdon fine sandy laom	1.5
193	Madera sandy loam	1.5
196	Manteca fine sandy loam	1.5
199	Montpellier sandy loam	1.5
201	Nord loam	1.5
223	Reiff loam	1.5
265	Veritas sandy loam, partially drained	1.5
266	Veritas fine sandy loam	1.5
109	Bisgani loamy coarse sand, partially drained	3
142	Delhi loamy sand	3
145	Dello loamy sand	3

146	Dello loamy sand, partially drained	3
254	Timor loamy sand	3
255	Tinnin loamy coarse sand	3
259	Tujunga loamy sand	3
144	Dello sand, partially drained	4
190	Kingile muck, partially drained	4
191	Kingile-Ryde complex, partially drained	4
224	Rindge mucky silt loam, partially drained	4
225	Rindge muck, partially drained	4
159	Fluvaquents	.5 (variable)
163	Gonzaga-Franciscan complex	.5 (variable)
214	Pits, gravel	>4
186	Kaseberg loam	1 to 3 (hardpan @ 10" typ.)
288		

Do current standards Provide protection?

Testimony presented in 2003 hearing Regarding Petition for Long-Term Permit Change by Merced Irrigation District, et al.

TESTIMONY OF WILLIAM SALMON

My name is William Salmon. I reside at 7615 West Undine Road, Stockton, California. Up through 2002 I was the manager of ABF Services, Inc ("ABF") and am now a consultant to that company. I also own and lease other property in the South Delta which I farm separately.

One of the parcels I farm separately is located on the west side of Union Island as specified on SDWA 2 attached hereto. It is approximately 457 acres and is owned by Mr. Robert E. Thorsen. This property is irrigated by diversions on Old River. As the land is below the water level, we have traditionally used syphons to divert the water. SDWA is separately providing title documents which I am informed indicated this property is riparian to Old River.

Since approximately 1999, the summer water levels along Old River adjacent to the Thorsen Ranch have been lower than they have been in the past. At low tide during these years, I have been unable to operate the syphons when needed which forced me to rely more heavily on the high tides. This in and of itself interferes with my need to irrigate the crops when necessary. My observations during these times confirm that the high tides were no longer sufficient for this purpose, and my farming operations were adversely affected. Although there is a certain amount of flexibility in irrigation, we were unable to divert sufficient water when needed, and crop yields were incrementally decreased.

In 2002, the problem again presented itself and appeared to be worse then before. With the help of the South Delta Water Agency, DWR and USBR were brought into the process. After various investigations and negotiations, DWR hired a contractor to install temporary pumps for me and my neighbor who is experiencing the same problem. The cost to DWR was/is tens of thousands of dollars. Although we had certain minor problems, the pumps were adequate to allow me to irrigate when needed. The pumps were removed this past year in October.

I am informed that DWR will again offer to install the temporary pumps this year. If not, I will be unable to irrigate the Thorsen Ranch when needed during peak summer months which will decrease crop yields. This conclusion is based upon the fact that the year appears to be another dry one and that the CVP and SWP will again seek to increase summer time pumping.

The Thorsen Ranch is downstream of the three tidal barriers and does not receive any benefit from their installation and operation. I am informed that those barriers actually result in an additional decrease in water levels in my area. In this area the low tide is lowered by the federal pumps which divert 24 hours per day. The state project takes water into Clifton Court Forebay at times other than the low tide. However, when Clifton Court Forebay is filled, the water levels around my diversions drop significantly.

Any further increase in export pumping by the state and federal projects would most likely further lower the water levels on Old River near the Thorsen Ranch. My protection from this is DWR's voluntary help in providing temporary pumps. There is no written or verbal agreement with DWR or any other agency to provide these temporary pumps to me.

As manager of ABF, I farmed a piece of property at the east end of Grant Line Canal as indicated on SDWA 3 attached here. SDWA is separately providing title documents which I am informed indicate this property is riparian to both Grant Line Canal and Middle River. The crops on this property have included walnuts, grapes, beans, alfalfa, tomatoes and other row crops.

In the last few years, I have noticed an increasing and substantial damage to the crops resulting from salinity. This problem has been verified by representatives of the Ag Extension Service and by a laboratory analysis done by my fertilizer representative at John Taylor Fertilizer. SDWA 17 is a copy of the tissue analysis of the walnuts. It indicates acute chloride toxicity.

SDWA 18 and SDWA 19 are certain water quality sampling data from DWR for Middle River and Grant Line Canal, the two places from which I diverted water for this property. The Middle River data for 2002 shows EC levels in the 700 and 800 range for most of the year, especially in summer. The Grant Line Canal data (measured at Doughty Cut) shows EC in August was generally above 800 and sometimes 900. For the summer months in general, the level was most always above 700, though of course there were fluctuations. The EC objective at Vernalis for agriculture during the summer months is 700.

I have also attached some pictures as SDWA 20 which show some of the salt damage to the crops. Copies are difficult to view, but they do show the burned margins of the leaves and arrested growth associated with the salt damage.

The data for the damages in 2002 are as follows. The 105 acres of walnuts had a decrease in yield form 254,580 tons in 1999 to 105,380 in 2002 for the Payne variety and 85,420 tons in 1999 to 33,440 tons for the Westside variety. There was obvious leaf burn and stunted growth on the walnuts for the salts. Although the orchard would have to have been removed eventually due to a virus, it still should have had many more years of production left. However, I had to remove the orchard in 2002 because of the decrease in yield at a cost of $450 - $550 per acre which included tree removal, root removal and associated labor.

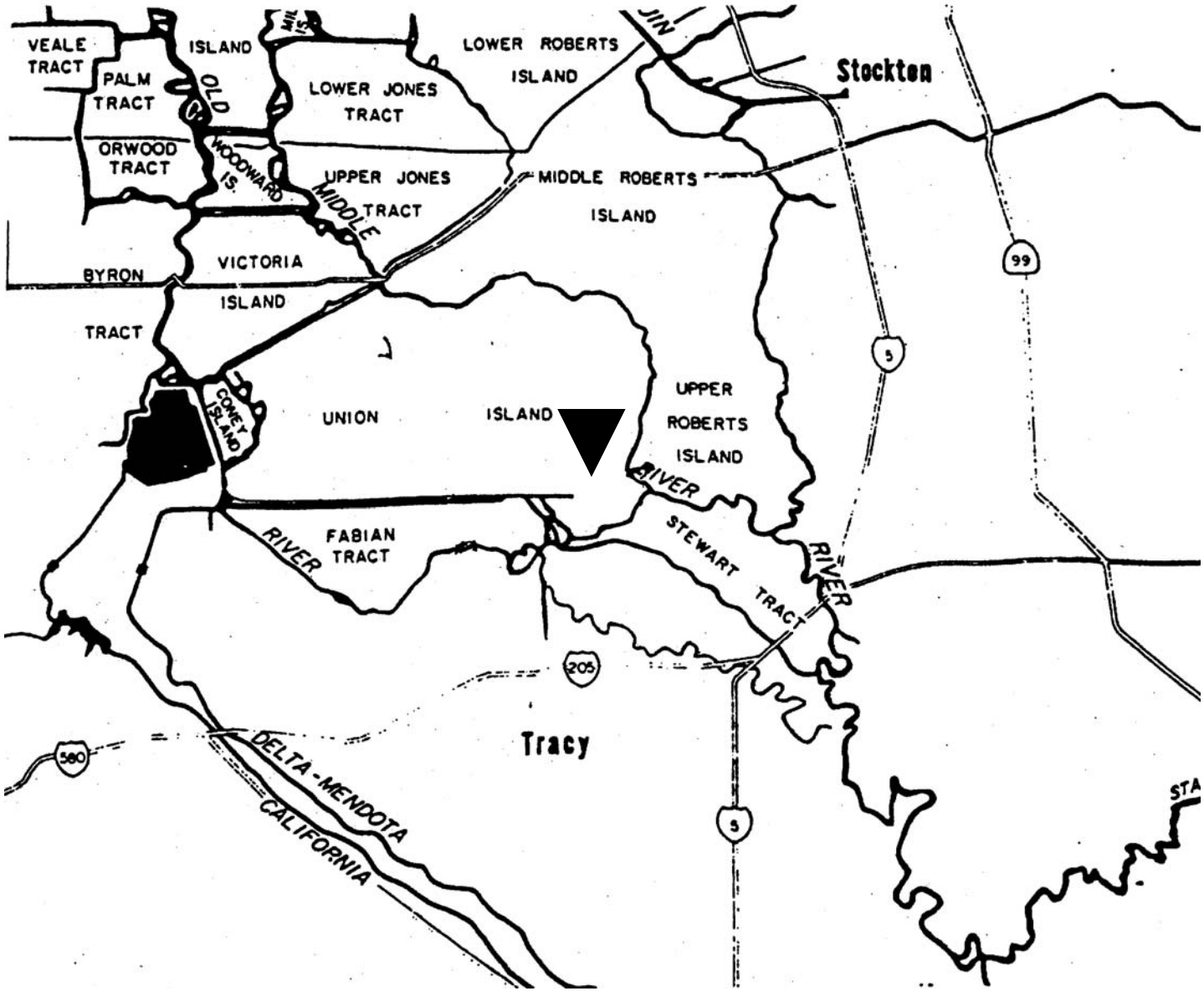
The grapes are 47 acres of the Chardonnay variety. The sugar levels necessary to allow harvest for the contract I have were never reached, the grapes actually began to turn into raisins and the vines to defoliate. Although I did harvest some of them for juice, basically the entire crop was lost.

Beans were planted on 68 acres. The stunted growth of the plants was very obvious and the crop yield was one-half of other fields using the same seed and cultural practices. This acreage yielded 10 sacks per acre while the others were 20.

To address this problem over the years I have applied soil amendments such as gypsum and have flooded the fields in winter to attempt to flush out the salts. However, the soil ph in combination with the salty water binds the chlorides and prevents leaching. The walnuts and grapes acreage are installed with tile drainage, but even that aid to drainage was inadequate.

Any actions which will increase salinity flowing into the South Delta will simply incrementally increase the harm which the ABF farming operation is subjected to each year.

Salmon Property Discussed in Testimony ▼



TESTIMONY OF KURT SHARP

STATE WATER RESOURCES CENTRAL BOARD

PETITION FOR LONG - TERM TRANSFER INVOLVING

CHANGE IN PLACE AND PURPOSE OF USE OF

MERCED IRRIGATION DISTRICT, MODESTO IRRIGATION DISTRICT

AND TURLOCK IRRIGATION DISTRICT

I am one of the managers of R.C. Farms, Inc.

R.C. Farms, Inc. is the owner of land riparian to the San Joaquin River on Lower Roberts Island downstream of the confluence with Old River and upstream from the confluence with Middle River. Said land is within the Central Delta Water Agency. Attached hereto as Exhibit A is a map showing the land. CDWA Exhibit 6 is a chain of title prepared for said land. The land currently abuts the San Joaquin River and it is my understanding of the documents in the chain of title that the land has never been separated from the San Joaquin River.

As an owner of said riparian lands, R.C. Farms, Inc. is entitled to divert waters from the San Joaquin River for reasonable beneficial uses upon those lands. R.C. Farms, Inc. and its predecessors in interest have so used said waters for irrigation at various times of the year and in various quantities for a period extending back to the late 1800's.

The months of special concern for R.C. Farms, Inc. on the San Joaquin River are April through August, the peak irrigation months, and water quality is of great concern to R.C. Farms, Inc. because it impacts the crops that R.C. Farms, Inc. grows.

Salt in the irrigation water adds to the salt in the soil and soil water. When the concentration of salts in the root zone of growing plants reaches a high enough level the plants

suffer and in some cases die. Because of different soil and drainage conditions in the fields the salt problem varies. Some of the fields have areas which are already high in salts. Adding additional salt will increase the salt accumulation in the soil and damage the crops. There is also a problem at the time of seed germination if there is too much salt. The adverse effects of the salt on the crops is visually apparent.

Attached hereto as Exhibit B are the results of a February 7, 2003 soil sampling on the subject R.C. Farms, Inc. land. Sample #3 which was taken from the field in the northwest portion of the land shows a high level of sodium.

Except for approximately 28 acres in the northwest corner of the property the fields are presently planted to asparagus which is about 8 years old and will be likely plowed out within three (3) years. Current plans are to plant the fields into field corn or wheat following the removal of the asparagus.

I have been involved in farming the subject lands for over ten (10) years and the salt damage areas are getting worse. Because the surface of the land is substantially below the water level in the San Joaquin River which abuts the property the fields are constantly receiving water which "seeps" from the river. We attempt to hold the water table below the ground surface by way of drainage ditches from which the excess water flows into the Reclamation District 684 canals and then is pumped back into the Delta.

With the asparagus we apply water from the San Joaquin River by annually flooding the fields in November and December. This is the customary practice which I believe is intended to facilitate the leaching or driving down of the salts. When the fields are planted to field corn water is applied to the portions of the fields farthest away from the river starting in June or July and continuing on about ten day intervals into late August or September and then the fields are

flooded in November and December. The portions of the fields near the river receive sufficient subirrigation from seepage. These portions of the fields are also flooded in November and December.

The customary practices are no longer sufficient to control the salt buildup in the problem areas of the fields. Artificial leaching such as is customary for potatoes is costly and economically infeasible for the crops which we grow.

R.C. Farms, Inc. has farmed said land for over twenty (20) years. The water quality at Vernalis affects the quality of the water in San Joaquin River abutting said lands. The water from the San Joaquin River seeps into and is also applied to the lands of R.C. Farms, Inc. Typically higher salinity in the San Joaquin River at Vernalis means higher salinity in the R.C. Farms, Inc. irrigation water.

As salinity in the seepage and applied irrigation water increases, the salinity in the soil water increases thereby adversely impacting the crop production.

RINDGE TRACT
ISLAND
Spud Island
SOUTH SPUD ISLAND RECREATION AREA
Hog Island
Acker Island
RINDGE TRACT
Fourteenmile Slough
Morrison Island
SAN JOAQUIN RIVER
Blackslough Landing
Windmill Cove
Vulcan Island
FIELD ISLAND
Pumping Sta
McDonald Island Fy
Black Slough
Tule Island
WRIG

Precision Agri Lab

24730 Avenue 13 Madera, CA 93637 Phone: 559-661-6386 FAX: 559-661-6135 email: pal@mail.agdecision.net

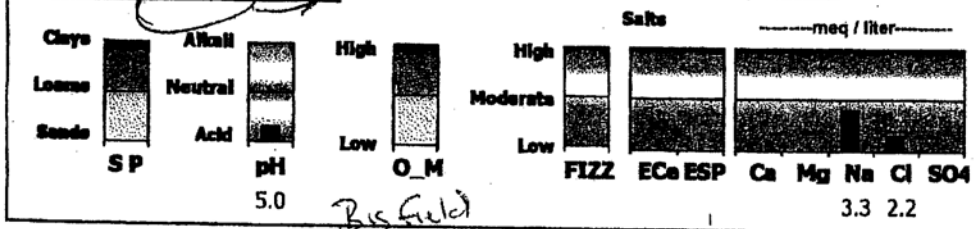
SOIL ANALYSIS REPORT

CONRAD SILVA

BRANCH NAME	WALNUT GROVE-W	**TEST ID #** 2456	**DATE SAMPLED:** 2/ 7/03
FIELDMAN	DON JOHNSON	**LOG IN #**	**DATE SUBMITTED:** 2/11/03
CROP	ASPARAGUS	**232078**	**DATE REPORTED:** 2 /17/03

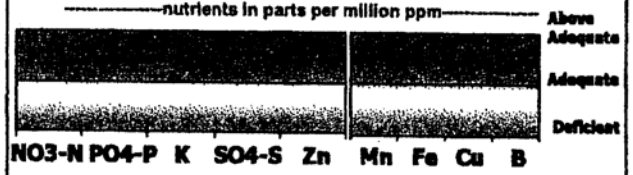
ID# 1 **DESCRIPTION** RC-1 — See MAP

Physical And Chemical Properties



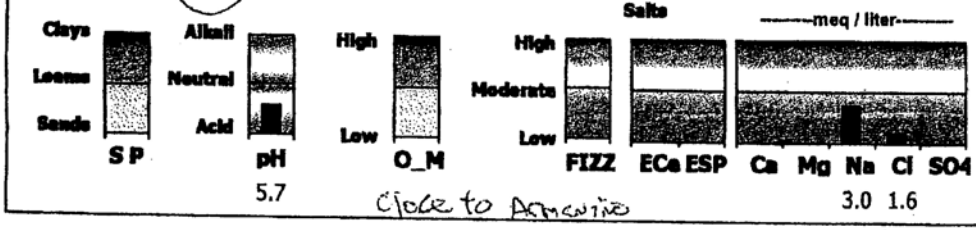
Big Field

Soil Nutrition



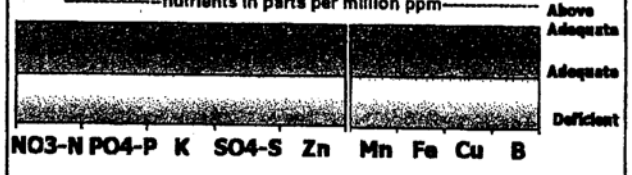
ID# 2 **DESCRIPTION** RC-2

Physical And Chemical Properties



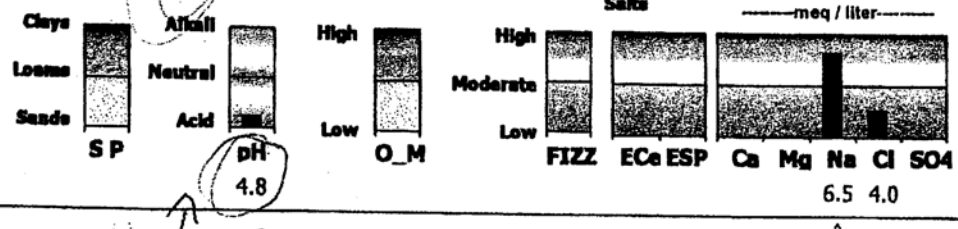
Close to Armona

Soil Nutrition



ID# 3 **DESCRIPTION** RC-3

Physical And Chemical Properties

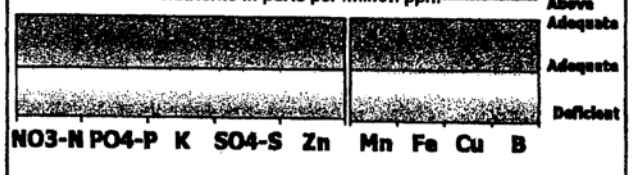


by Play sled

NA - S.HS

High

Soil Nutrition



APPROVED:_____

Precision Agri Lab

24730 Avenue 13 Madera, CA 93637 Phone: 559-661-6386 FAX: 559-661-6135 email: pal@mail.agdecision.net

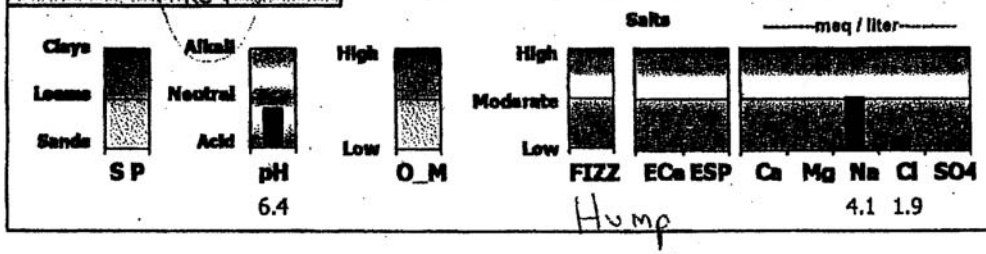
SOIL ANALYSIS REPORT

CONRAD SILVA

BRANCH NAME	WALNUT GROVE-W	**TEST ID #** 2456	**DATE SAMPLED:** 2/ 7/03
FIELDMAN	DON JOHNSON	**LOG IN #**	**DATE SUBMITTED:** 2/11/03
CROP	ASPARAGUS	**232078**	**DATE REPORTED:** 2 /17/03

ID#	DESCRIPTION
4	RC-4

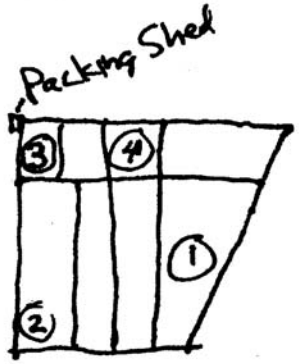
Physical And Chemical Properties



Soil Nutrition

ALL Ph Low

Salts are high in Asp next to Packing Shed



Reasonable use of water

Inv. Sec C

72

DESIGN MEMORANDUM NO. 5 JUNE 1965

NEW MELONES PROJECT

Stanislaus River, California

WATER QUALITY CONTROL

U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

9. Beneficiaries. - The Public Health Service report indicates the beneficiaries of water quality control operation would be widespread. The following is quoted from the report.

> Benefits resulting from providing water for water quality control in the New Melones Project will be widespread. They will accrue to hundreds of thousands of people utilizing, for a wide variety of purposes, the reach of the Stanislaus River from the proposed damsite to its mouth and the reach of the San Joaquin River from Vernalis to its mouth, a total stream distance of 148 miles. The estimated irrigation diversions from the San Joaquin River in the year 2025 of 1,000,000 acre-feet is equivalent to a full supply of irrigation water for about 330,000 acres. Recreational and sport fishery use of the Sacramento-San Joaquin Delta is currently estimated at 2,780,000 recreation days annually and is projected to reach 13,878,000 recreation days annually by the year 2020. Over half of this recreational use may be attributable to the San Joaquin River portion of the Delta. Although it is impossible to identify benefits accruing to any single individual, such benefits are likely to be very small. The reaches of the streams affected provide outdoor recreation for visitors residing in other areas of California and in other states of the Nation as well as local residents. Agricultural and industrial commodities produced in the area are distributed throughout the Nation.

California Water Code Section 12202

§ 12202. Salinity control and adequate water supply; substitute water supply; delivery

Among the functions to be provided by the State Water Resources Development System, in coordination with the activities of the United States in providing salinity control for the Delta through operation of the Federal Central Valley Project, shall be the provision of salinity control and an adequate water supply for the users of water in the Sacramento-San Joaquin Delta. If it is determined to be in the public interest to provide a substitute water supply to the users in said Delta in lieu of that which would be provided as a result of salinity control no added financial burden shall be placed upon said Delta water users solely by virtue of such substitution. Delivery of said substitute water supply shall be subject to the provisions of Section 10505 and Sections 11460 to 11463, inclusive, of this code. *(Added by Stats.1959, c. 1766, p. 4247, § 1.)*

California Water Code Sections 12204 & 12205

§ 12204. Exportation of water from delta

In determining the availability of water for export from the Sacramento-San Joaquin Delta no water shall be exported which is necessary to meet the requirements of Sections 12202 and 12203 of this chapter. *(Added by Stats.1959, c. 1766, p. 4249, § 1.)*

§ 12205. Storage of water; integration of operation and management of release of water

It is the policy of the State that the operation and management of releases from storage into the Sacramento-San Joaquin Delta of water for use outside the area in which such water originates shall be integrated to the maximum extent possible in order to permit the fulfillment of the objectives of this part. *(Added by Stats.1959, c. 1766, p. 4249, § 1.)*

California Water Code Section 11207

§ 11207. Primary purposes

Shasta Dam shall be constructed and used primarily for the following purposes:

(a) Improvement of navigation on the Sacramento River to Red Bluff.

(b) Increasing flood protection in the Sacramento Valley.

(c) Salinity control in the Sacramento-San Joaquin Delta.

(d) Storage and stabilization of the water supply of the Sacramento River for irrigation and domestic use. *(Added by Stats.1943, c. 370, p. 1896.)*

Is it reasonable to meet the 0.7 EC Objective in the South Delta?

SWRCB has already determined what is necessary to protect agricultural beneficial uses.

0.7 EC Objective developed 14 years ago

Implementation delayed repeatedly

Meeting salinity standards with the use of stored water required by statute

Methods to meet Southern Delta salinity objectives:

Control drainage, dilute upstream flows, use Friant, use San Luis Reservoir, recirculation, exchanges, purchases, barriers, New Melones releases or combinations of the above.

What have DWR and USBR done to help them meet the more restrictive three interior South Delta standards?

Control drainage?	NO.
Dilute upstream flows?	NO.
Use Friant?	NO.
Use San Luis?	NO.
Recirculation?	NO.
Exchanges?	NO.
Purchases?	NO.
Barriers?	KIND OF.
New Melones?	YES.

CAN IT BE AN UNREASONABLE USE OF WATER TO PROTECT SOUTHERN DELTA AGRICULTURAL BENEFICIAL USERS BEFORE WE KNOW HOW THE OBJECTIVES WILL BE MET OR HOW MUCH WATER WILL BE USED?

No, it cannot.

Impacts resulting from any change

Relaxation of Vernalis Standard would likely result in decreased releases from New Melones.

Decreased releases results in decreased Delta inflow.

Decrease Delta inflow transfers Delta outflow obligations to others.

Decreased San Joaquin River flow transfers water quality and consumptive use obligations to others.

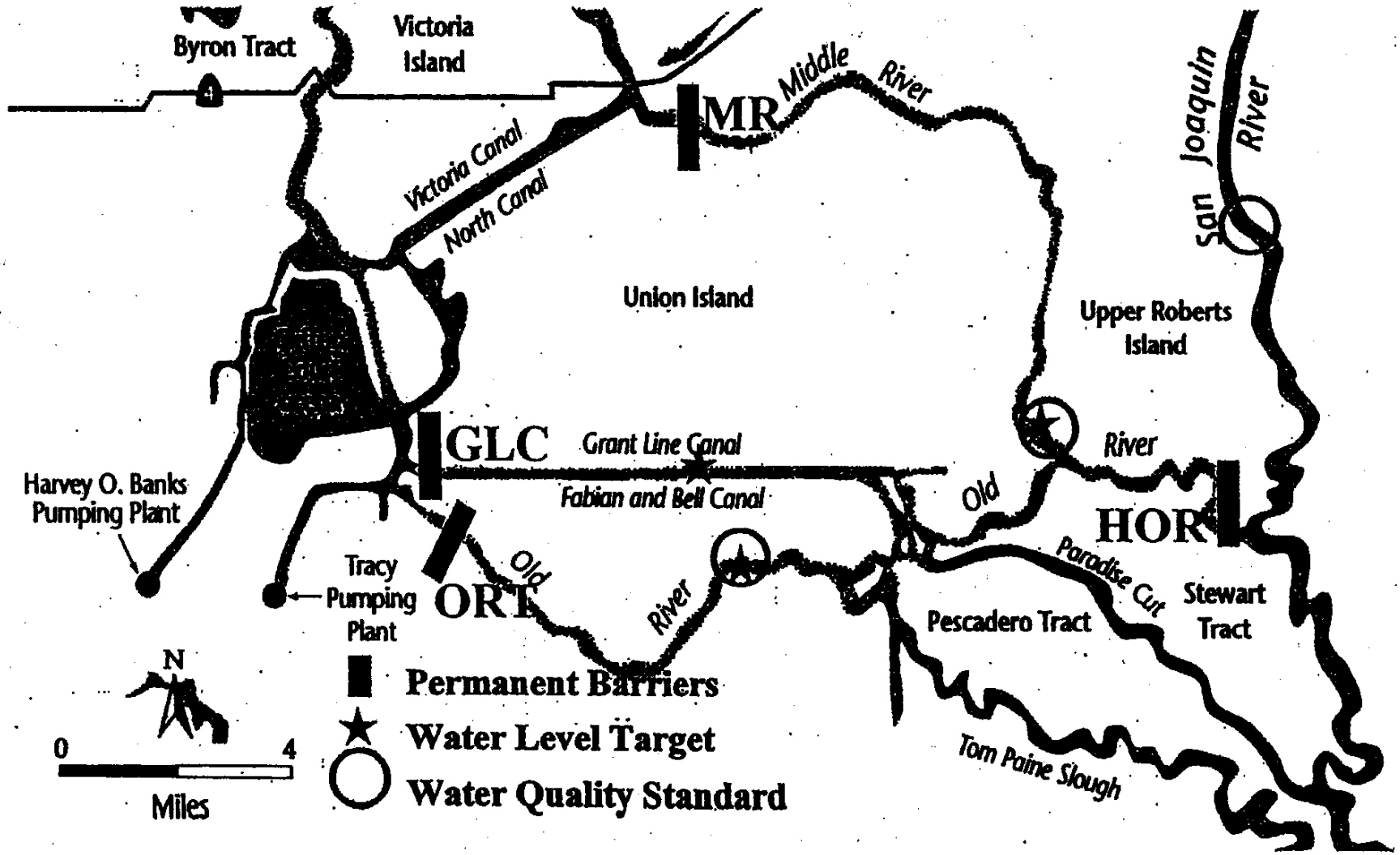
Delta is a tidal pool and therefore there is always water in the channel.

Obligation for salinity control set by statutes.

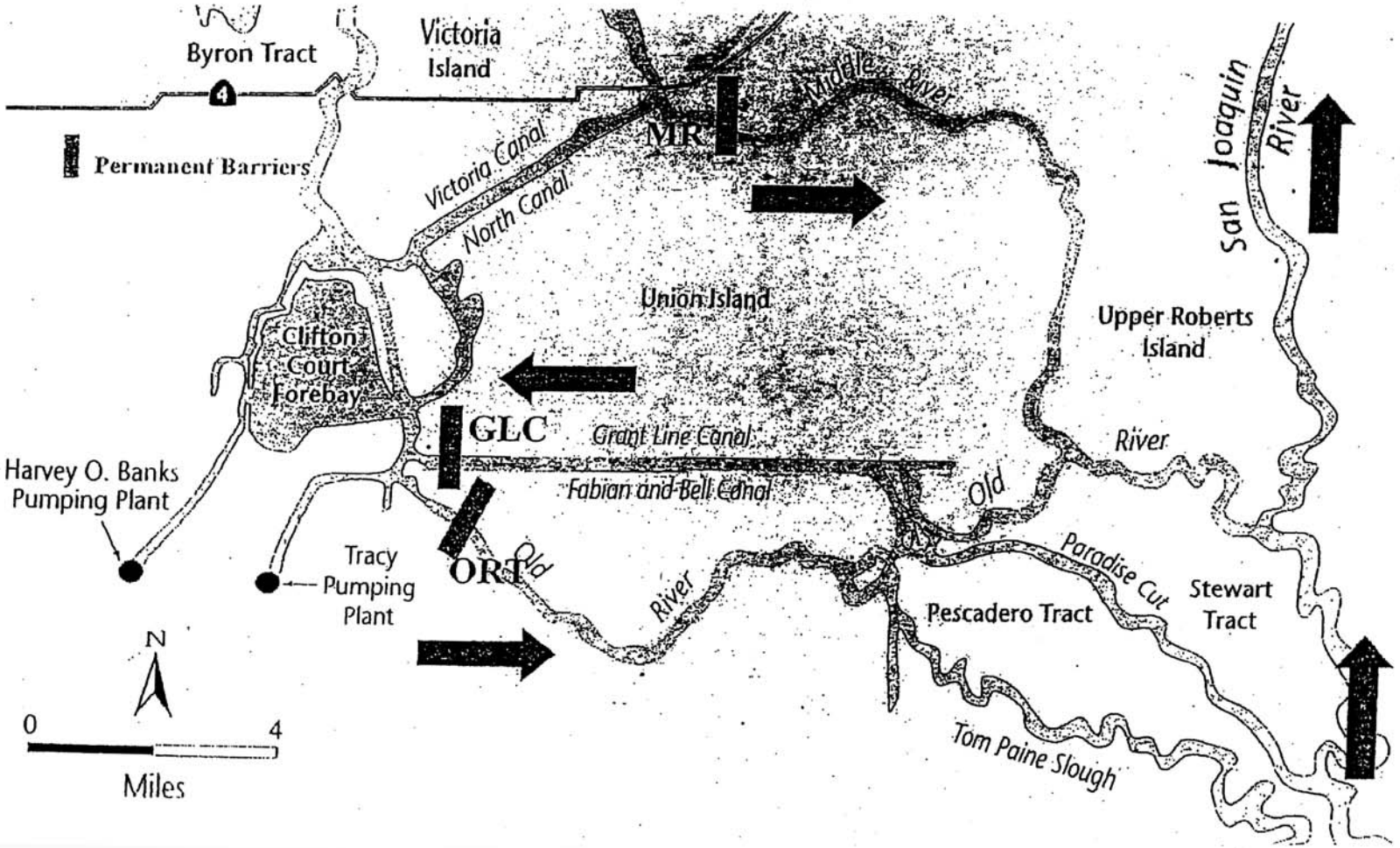
Decreased Vernalis quality worsens export quality, CCWD quality, etc.

Changing the three interior South Delta Objectives negates over 30 years of scientific investigation, critical thought, and consensus, rewards 30 years of inactivity by the USBR, and dooms South and Central Delta agricultural diverters to perpetually suffer the adverse impacts caused by upstream diversions and exports.

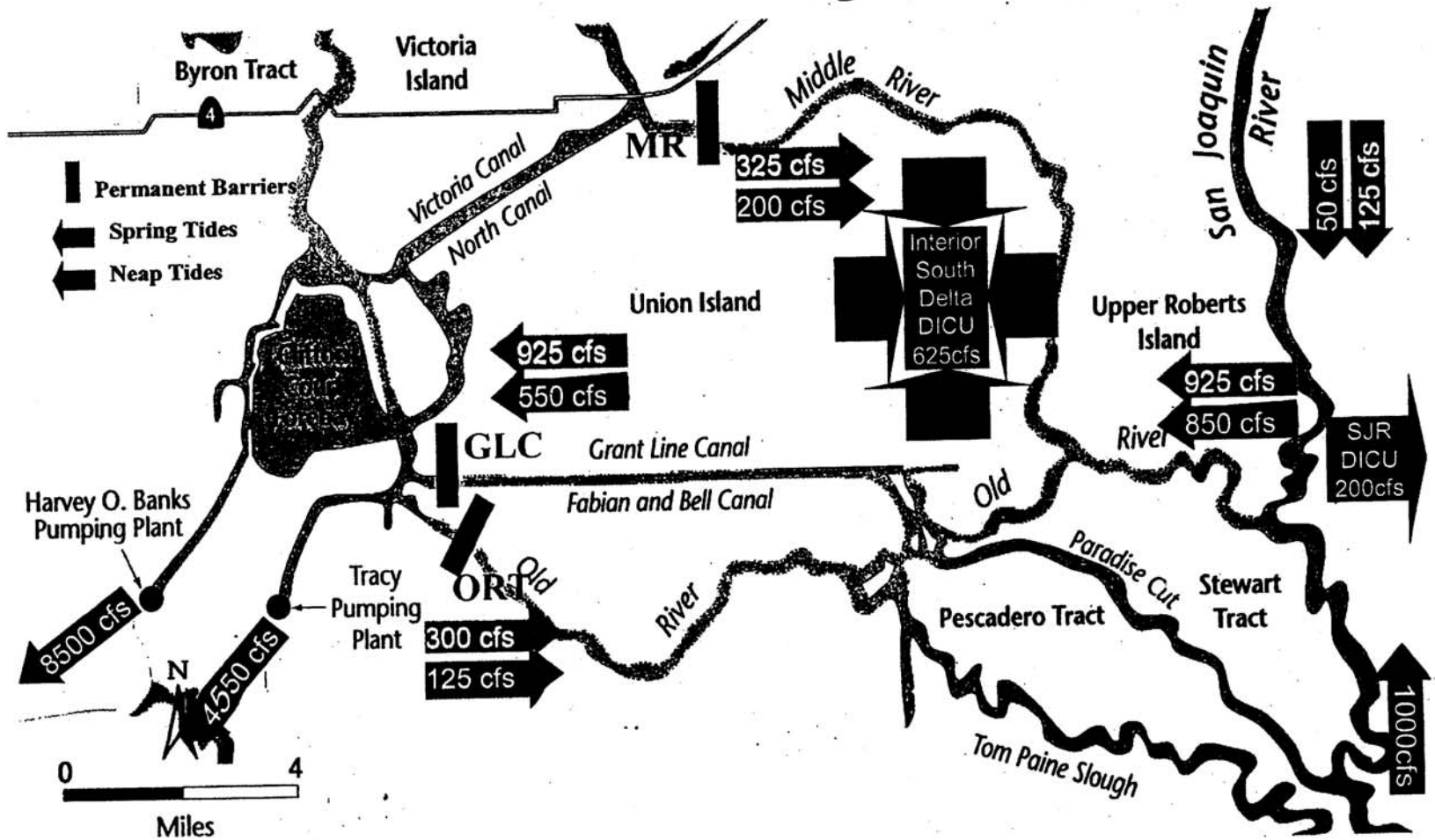
Update on South Delta Improvement Program ("SDIP")


Byron Tract
Victoria Island
MR
Middle River
Victoria Canal
North Canal
San Joaquin River
Union Island
Upper Roberts Island
GLC
Grant Line Canal
Fabian and Bell Canal
Harvey O. Banks Pumping Plant
Tracy Pumping Plant
ORT
Old River
HOR
Old River
Paradise Cut
Pescadero Tract
Stewart Tract
Tom Paine Slough
N
0
4
Miles
Permanent Barriers
Water Level Target
Water Quality Standard

DWR'S CURRENTLY PROPOSED SDIP

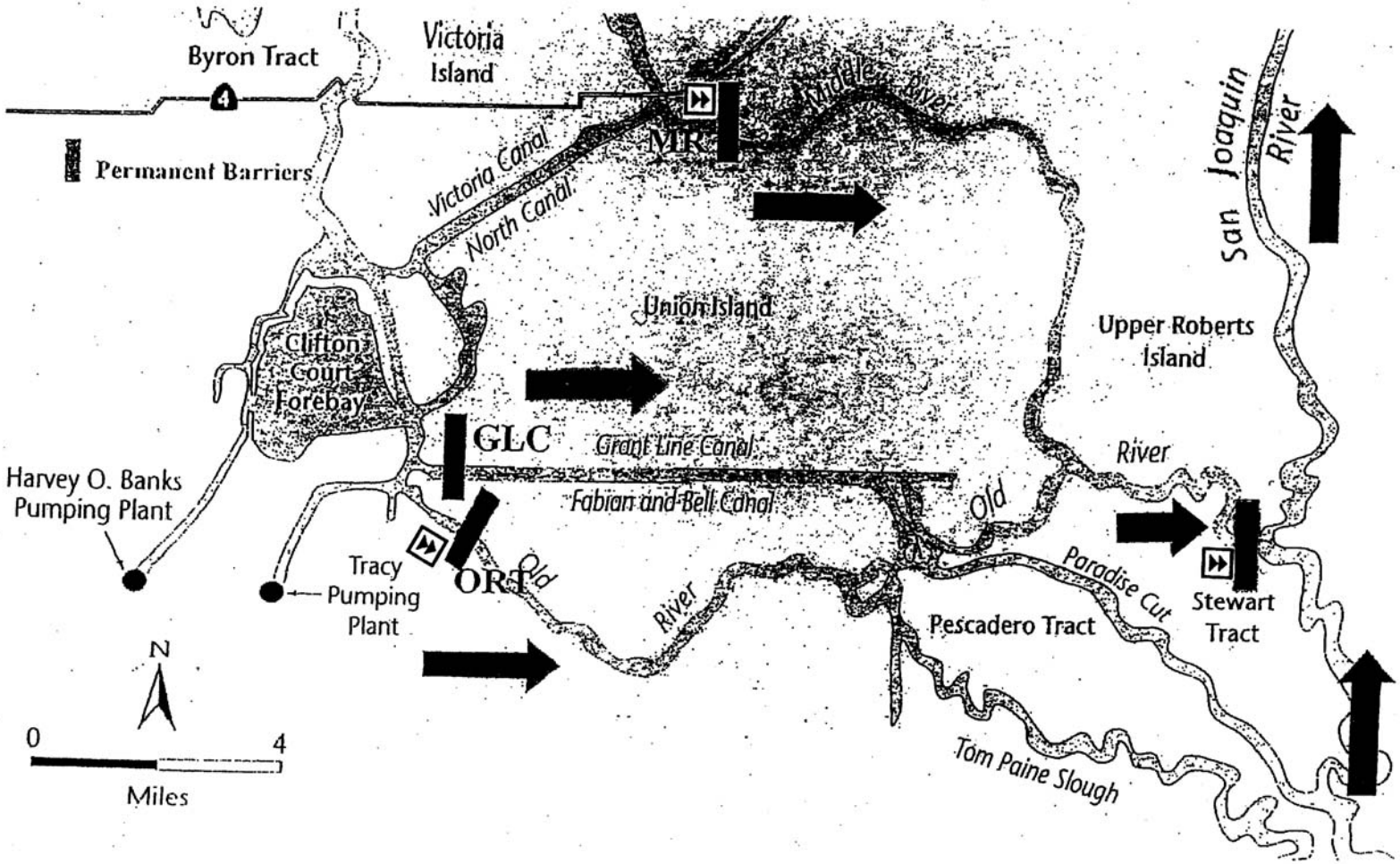


Net Flows – SJR 1000 cfs
SWP Priority 3 Ops



July 1985

Hildebrand Proposal for SDIP



⏭ --- Low-Lift Fish-Friendly Pumps

South Delta Water Agency recommends

Maintain 0.7/1.0 EC Objectives

Extend 0.7 EC standard to include March and September

Add additional compliance locations based upon flow patterns resulting from final SDIP

Accompanying this presentation is testimony of Alexander Hildebrand on behalf of the South Delta Water Agency. Mr. Hildebrand's testimony further explains the issues involved in determining the appropriate water quality standards necessary to protect agricultural beneficial uses.

Also accompanying this presentation is the March 10, 2005, letter from Mr. Terry L. Prichard, Certified Consulting Professional Agronomist and Soil Scientist regarding recent developments affecting the determination of water quality objectives .