SOUTH DELTA WATER AGENCY OPPOSITION TO SED PROPOSED CHANGES TO SALINITY STANDARDS

State Water Resources Control Board Hearings on SED

Stockton, California

December 16, 2016

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South Delta Water Agency

The SED concludes that the current water quality objectives for the protection of agricultural beneficial uses (standards) are overly protective and proposes to change the 0.7/1.0 EC standards to a year round 1.0 EC standard.

The SED however proposes to implement this new standard by requiring 0.7 EC be maintained at Vernalis in order that water quality in the southern Delta does not get worse.

The SED also proposes to no longer measure compliance at three locations, but proposes to measure compliance by averaging unspecified measurements in long stretches of channels.

THE PROPOSED CHANGES TO THE SOUTHERN DELTA SALINITY STANDARDS HAVE NO FACTUAL BACKGROUND AND ARE NOT SUPPORTED BY THE SCIENCE CITED IN THE SED.

THE PROPOSAL TO MEASURE AVERAGE EC's IN CHANNELS AND NOT AT DISCRETE LOCATIONS WILL NECESSARILY INSURE NO VIOLATIONS WILL OCCUR.

BACKGROUND/HISTORY OF SALT PROBLEM

BACKGROUND/HISTORY OF REGULATORY EFFORTS

LOCAL FARMERS' TESTIMONY OF CURRENT ADVERSE IMPACTS

ERRORS COMMITTED IN HOFFMAN REPORT

LEACHING STUDY RESULTS BY MICHELLE LEINFELDER-MILES

EFFECTS OF AVERAGING EC's IN CHANNELS

SOLUTIONS

BACKGROUND/HISTORY OF SALT PROBLEM

In the late 1940’s through the1950’s the United States Bureau of Reclamation built and began operating the Central Valley Project.

The CVP included Friant Dam on the upper San Joaquin River, and later Shasta Dam on the Sacramento River and export pumps from the southern Delta.

The San Joaquin River water was sent via canals to Kern County and other places. Some of those previously dependent on the San Joaquin were given a substitute supply via the Delta pumps.

Eventually other southern San Joaquin valley interests also received water pumped from the Delta.

The CVP had a number of effects on the San Joaquin River and Southern Delta.

It significantly decreased flows due to Friant Dam;

It added large amounts of salt to the River via drainage from lands irrigated with CVP water; and

It altered flows in the southern Delta and lowered water levels due to the massive export pumps.

EFFECTS OF THE CVP
UPON THE SOUTHERN DELTA WATER SUPPLY
SACRAMENTO-SAN JOAQUIN RIVER DELTA, CALIFORNIA

JUNE 1980

Prepared jointly by the
Water and Power Resources Service
and the South Delta Water Agency

SDWA 14

TABLE V-18 (1980)

SUMMARY OF REDUCTIONS IN RUNOFF OF SAN JOAQUIN RIVER AT VERNALIS FROM PRE-CVP TO POST-CVP

YEAR TYPE & PERIOD	EFFECT OF ALL POST-CVP UPSTREAM DEVELOPMENT ON RUNOFF AT VERNALIS: Reduction in Runoff acre-feet[1]	EFFECT OF ALL POST-CVP UPSTREAM DEVELOPMENT ON RUNOFF AT VERNALIS: Post CVP Reduction as Percent of Pre-CVP Actual Runoff	EFFECT OF CVP ON RUNOFF AT VERNALIS: Reduction in Runoff acre-feet[1]	EFFECT OF CVP ON RUNOFF AT VERNALIS: Reduction at Vernalis as Percent of Pre-CVP Flow	EFFECT OF CVP ON RUNOFF AT VERNALIS: Reduction at Vernalis as Percent of Post CVP Flow
DRY					
April-Sept	417,000	68[2]	6,000[3]	1.4	3.0
Full Year	519,000	45	128,000[3]	11	13
BELOW NORMAL					
April-Sept	1,064,000	60[2]	386,000	22[2]	55
Full Year	1,219,000	44[2]	543,000	20[2]	35
ABOVE NORMAL					
April-Sept	1,732,000	57	440,000	15	40
Full Year	1,400,000	28	768,000	15	25
WET					
April-Sept	1,000,000	19	554,000	15	10
Full Year	1,168,000	13	771,000	9	12
AVERAGE OF ALL YEARS					
April-Sept	1,053,000	40	345,000	13	24
Full Year	1,076,000	24	553,000	12	19

1. From Tables 2, 4, 6, 8, 10, 12, 14, 16
2. Pre-CVP "actual" is assumed to be post-CVP actual plus pre-CVP to post-CVP loss per Tables 4, 6, and 10
3. (...)rected for difference in pre-CVP and po(...) CVP unimpaired flow

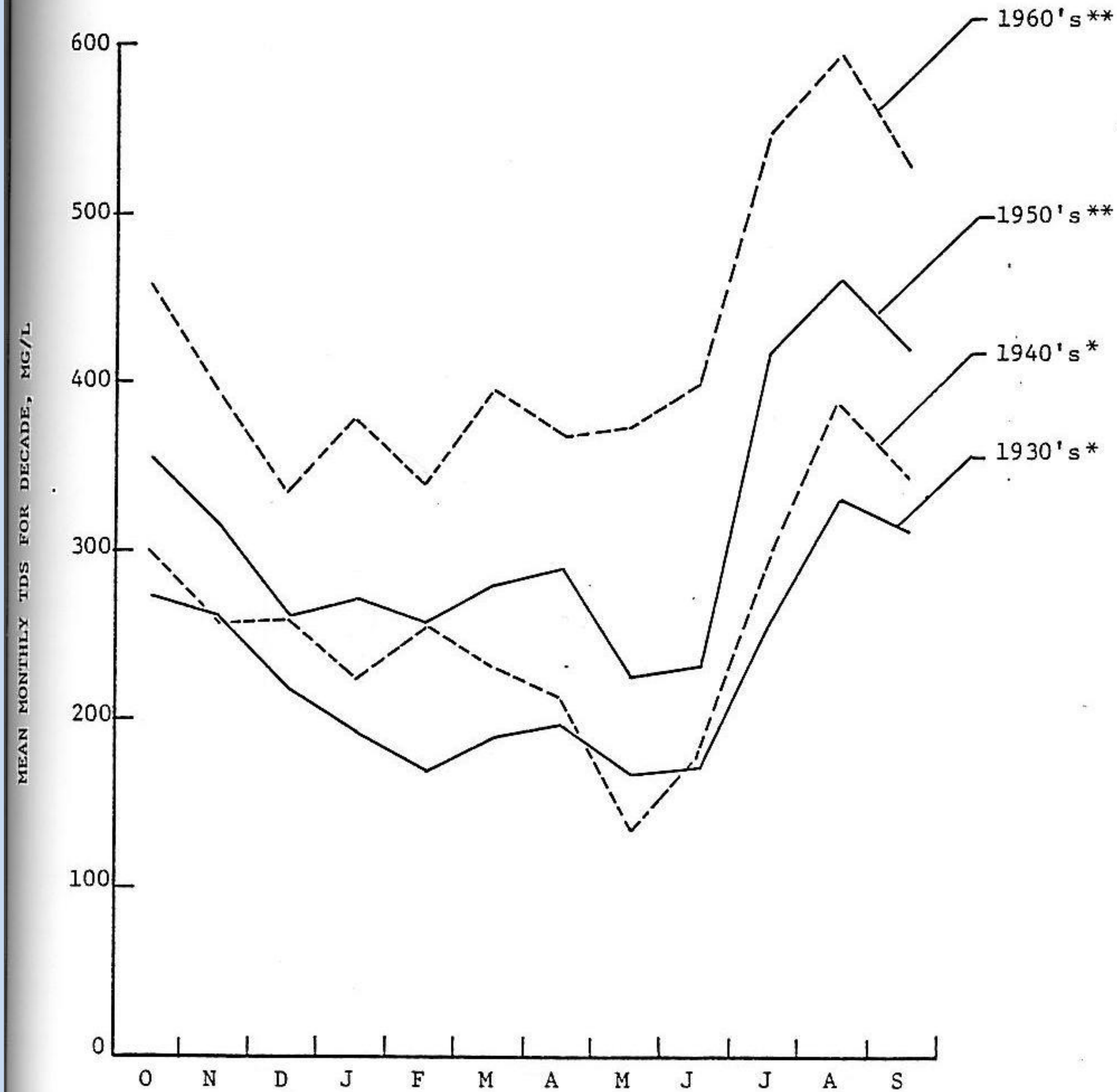


Figure VI-25 MEAN MONTHLY TDS AT VERNALIS BY DECADES
1930-1969
*Based on Mossdale chloride data
**Based on actual observations

Table 3. Annual salt load from mass emissions and Delta exports through the Sacramento-San Joaquin Delta system

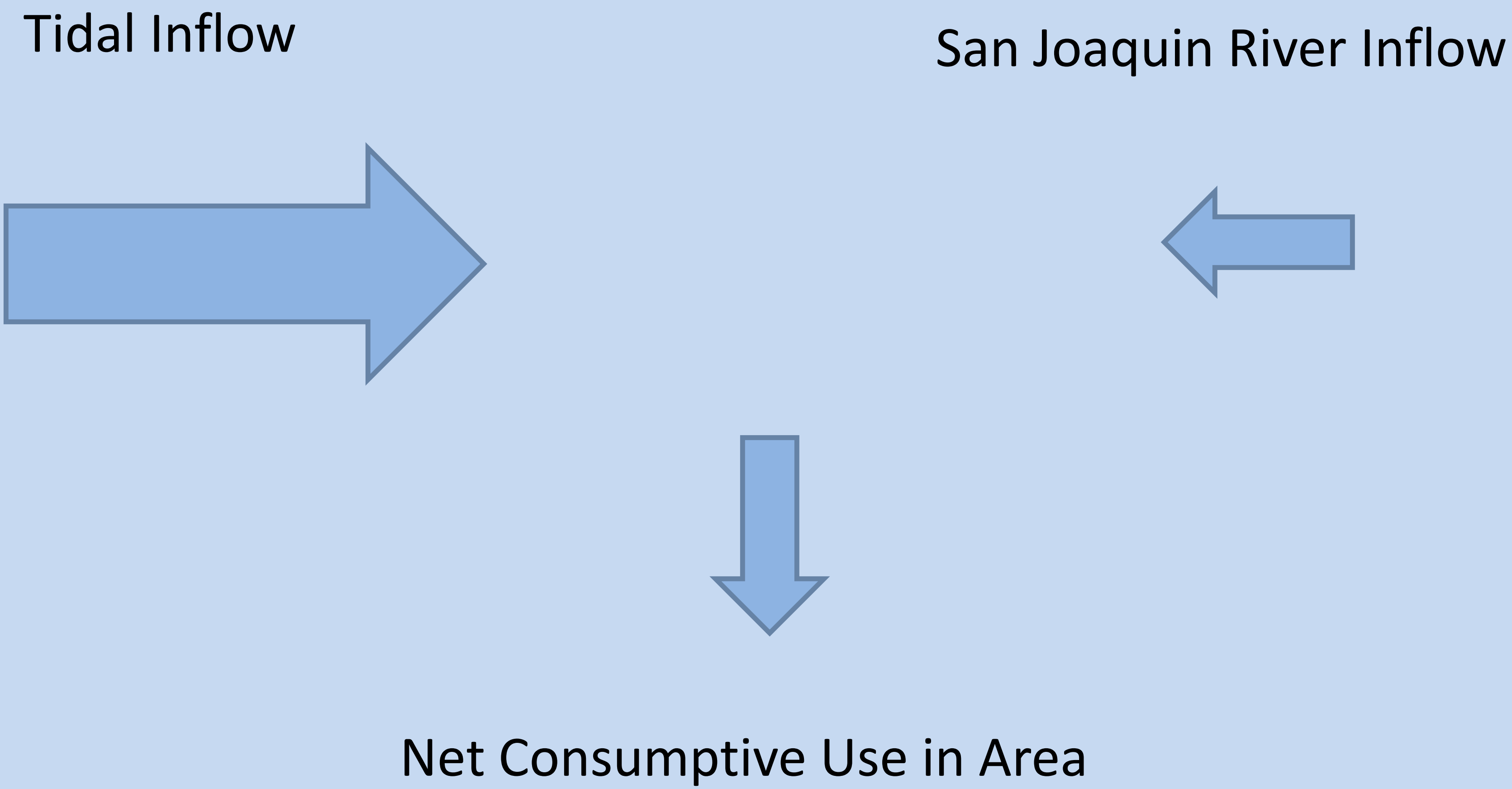
	Min	Max	Mean	1985 to 1994 Mean	2001 to 2004 Mean	Period of Record / Notes
Mass Emissions	Annual Salt Load (thousand tons/year)					
Sacramento River	730	3,049	1,945	1,521	1,748	1959 to 2004[1]
Yolo Bypass	0	2,392	405	169	179	1959 to 2004[1], assume EC=100
San Joaquin River	263	2,557	922	749	742	1959 to 2004[2]
Delta Outflow						
Delta Exports	Annual Salt Load (thousand tons/year)					
California Aqueduct (SWP)	983	1,022	1,004		1,004	2001 to 2004[3]
Delta Mendota Canal (CVP)	631	1,003	900		884	2001 to 2004[3]
North Bay Aqueduct	2	6	4	3	6	1959 to 2004[1], assume EC=Sac River
Contra Costa Canal	37	46	41		41	1959 to 2004[1], assume EC=SWP

[1]Source: DayFlow; [2]Source: USGS, 2006; [3]Source: DWR, 2006c

Note: Blanks in the above table represent data that must be compiled by future efforts, if possible

Central Valley Regional Water Quality Control Board: ***Salinity in the Central Valle***y, May 2006

WHY DO SALTS COLLECT IN SOUTH DELTA CHANNELS?



BACKGROUND/HISTORY OF REGULATORY EFFORTS

In the 1970’s and 1980’s the SWRCB in conjunction with stakeholders developed water quality objectives (or standards) for the protection of agricultural beneficial uses in the southern Delta and other areas.

The end result was the 1995 Water Quality Control Plan for the Sacramento-San Joaquin Bay-Delta.

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
					Sep-Mar	1.0
-and-						
San Joaquin River at Brandt Bridge site	C-6 (RSAN073)				-or-	
-and-						
Old River near Middle River [5]	C-8 (ROLD69)			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.		
-and-						
Old River at Tracy Road Bridge [5]	P-12 (ROLD59)					

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)					

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[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.

1995 Bay-Delta WQCP; page 29

The 1995 Water Quality Control Plan was a quasi-legislative process by the SWRCB. The Plan was implemented via a water rights hearing and eventual water rights decision which was a quasi-judicial process.

The decision implementing the 1995 Plan was D-1641.

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

[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.

D-1641 was challenged in numerous lawsuits.

The eventual ruling was that water quality objectives (southern Delta salinity standards) cannot be changed in a water right order implementing those objectives.

Court eventually ordered SWRCB to either assign responsibility for meeting the standards or amend the Water Quality Control Plan itself.

The 1995 Water Quality Control Plan contained no references or statements that the salinity standards in the southern Delta were somehow in question or overly protective.

Over the next few years other interests began asserting that the 0.7 EC standard was unnecessary as it was to protect beans, and fewer beans were now grown in the area.

Still other interests provided new models which purportedly showed adequate leaching occurred with 1.0 EC or worse water.

No party presented any evidence that salt was NOT affecting southern Delta agriculture; i.e. things were fine.

Cease and Desist hearing held by SWRCB against DWR and USBR 2006

DWR and USBR “shall implement measures to obviate the threat of non-compliance … by July 1, 2009

Cease and Desist hearing held by SWRCB against DWR and USBR 2010

DWR and USBR “shall implement measures to obviate threat of non-compliance … (no later than) January 1, 2013 …”

LOCAL FARMERS’ TESTIMONY OF CURRENT ADVERSE IMPACTS

Chip Salmon: Salt damage to grapes, beans and walnuts; decreased production;

Rudy Mussi: Salt problems require additional expenditures to partially mitigate;

Richard Marchini: Salt damages to walnuts causing decreased crop yields;

Jack Alvarez: Salt in applied water causes decreased crop yields in cannery tomatoes and lima beans;

Mark Bacchetti: Salt damages to plants/crops and increased soil salinity;

Neither SED nor HOFFMAN REPORT include any investigation or data on additional management practices needed, crop damages or decreased yields.

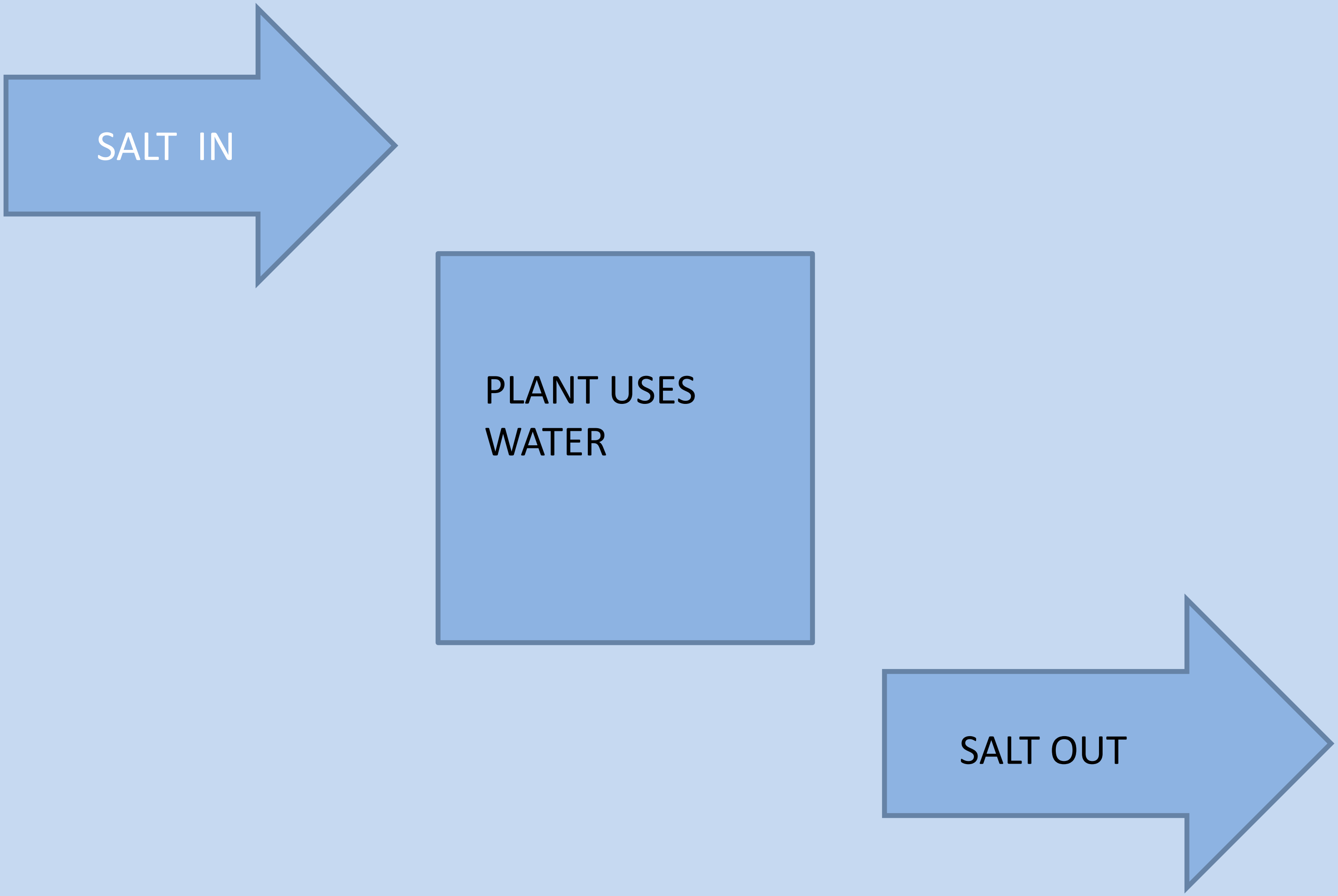
ERRORS COMMITTED IN HOFFMAN REPORT

SWRCB hires Dr. Glenn Hoffman to review crop salt tolerances in the southern Delta.

Hoffman's draft Report
dated July 14, 2009

Final Report
dated January 5, 2010

Hoffman approach: Measure salt in and salt out to determine leaching fraction.



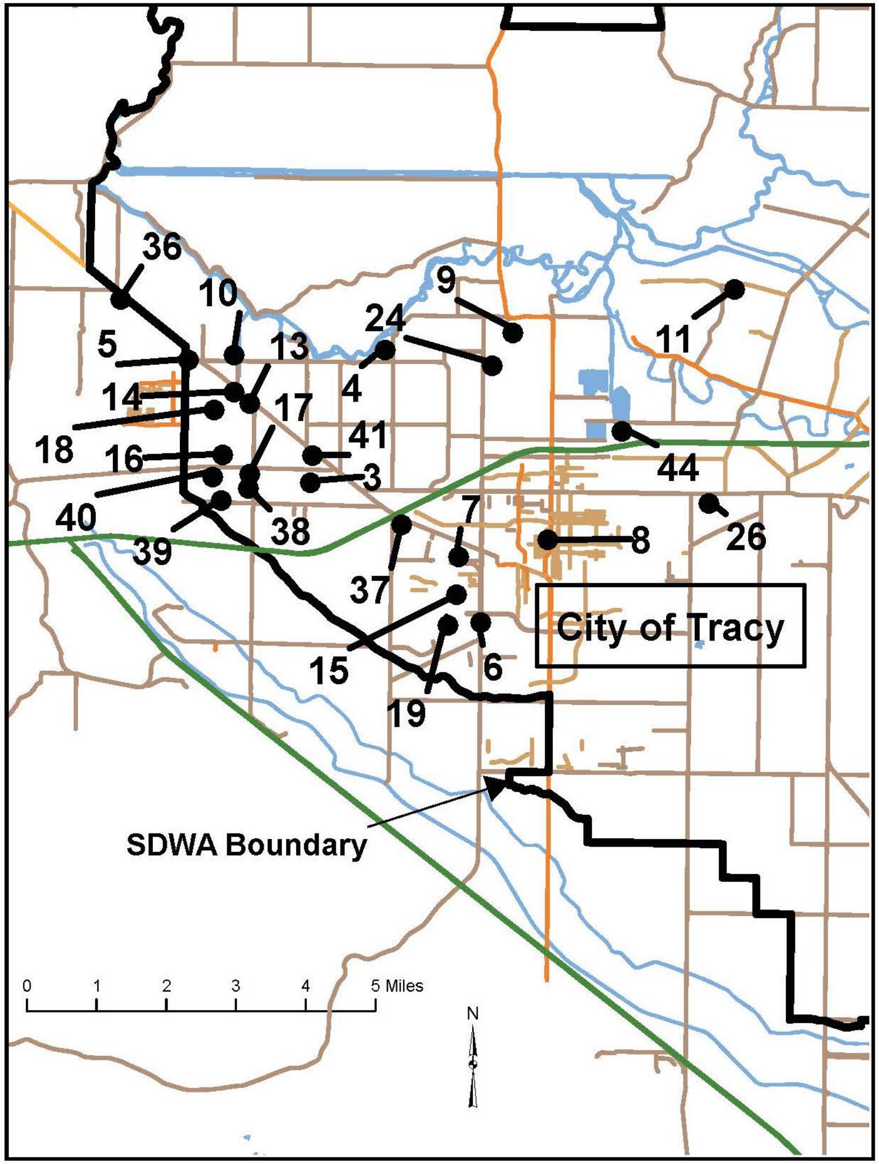
PROBLEM:

Hoffman used assumed applied water salinity for “salt in” and tile drain data for “salt out.”

Table 3.10. Electrical conductivity (EC) and calculated leaching fraction (L), assuming EC of applied water is 0.7 dS/m for subsurface tile drains during 1986 and 1987. (Chilcott et al., 1988.).

Drain Location	No. of Samples	EC (dS/m)	L assuming EC_i=0.5 dS/m	L assuming EC_i=0.7 dS/m
3, Grant Line Rd. Sump	3	2.7	0.19	.26
4, Bethany / Lammers	3	2.1	0.24	.33
5, Patterson Pass Rd.	6	2.5	0.20	.28
6, Moitose	3	1.6	0.31	.44
7, Krohn Rd.	4	2.1	0.24	.33
8, Pimentel	2	2.2	0.23	.32
9, Lammers / Corral Hollow	4	4.4	0.11	.16
11, Delta Ave.	6	2.4	0.21	.29
13, Costa Brothers East	2	4.1	0.12	.17
14, Costa Brothers West	4	3.6	0.14	.19
15, Castro	3	2.4	0.21	.29
16, Earp	4	2.8	0.18	.25
17, Freeman	4	3.9	0.13	.18
18, Costa	5	3.4	0.15	.21
19, Moitoso and Castro	4	2.0	0.25	.35
24, Corral Hollow / Bethany	5	6.2	0.08	.11
26, Chrisman Rd.	3	2.0	0.25	.35
36, Kelso Rd. / Byron Hwy.	6	2.4	0.21	.29
37, Spirow Nicholaw	4	3.1	0.16	.23
38, JM Laurence Jr. East	4	3.5	0.14	.20
39, JM Laurence Jr. West	4	2.4	0.21	.29
40, Sequeira	3	3.6	0.14	.19
41, Reeve Rd.	3	3.8	0.13	.18
44, Larch Rd.	4	2.8	0.18	.25
Number of Drains Sampled: 24				
	Average:	3.0	0.18	0.23
	Median:	2.8	0.18	0.25
	Minimum:	1.6	0.08	0.11
	Maximum:	6.2	0.31	0.44

Figure 3.18. Location of subsurface tile drains sampled on the west side of the SDWA (Chilcott, et al., 1988).



PROBLEM continued:

The tile drain data is a measurement of the poor quality ground water; it is NOT a measurement of the salts that have leached through the soil profile.

THUS BY OBERVING LOTS OF “SALT OUT” HOFFMAN CONCLUDED ADEQUATE LEACHING WAS OCCURRING.

IN REALITY HOW MUCH SALT WAS BEING LEACHED COULD NOT BE CALCULATED BY HOFFMAN.

First Substitute Environmental Document released by SWRCB late 2012.

Recommends relaxation of southern Delta Water Quality Objectives (salinity standards) from 0.7/1.0 EC to 1.0 EC all year.

LEACHING STUDY RESULTS BY MICHELLE LEINFELDER-MILES

SDWA commissioned a study (done by Michelle Leinfelder-Miles to actually test the “salt in” and “salt out” on numerous alfalfa fields in the southern Delta.

The study found that in most fields, salt was accumulating in the root zone and not leaching out.

EFFECTS OF AVERAGING EC's IN CHANNELS

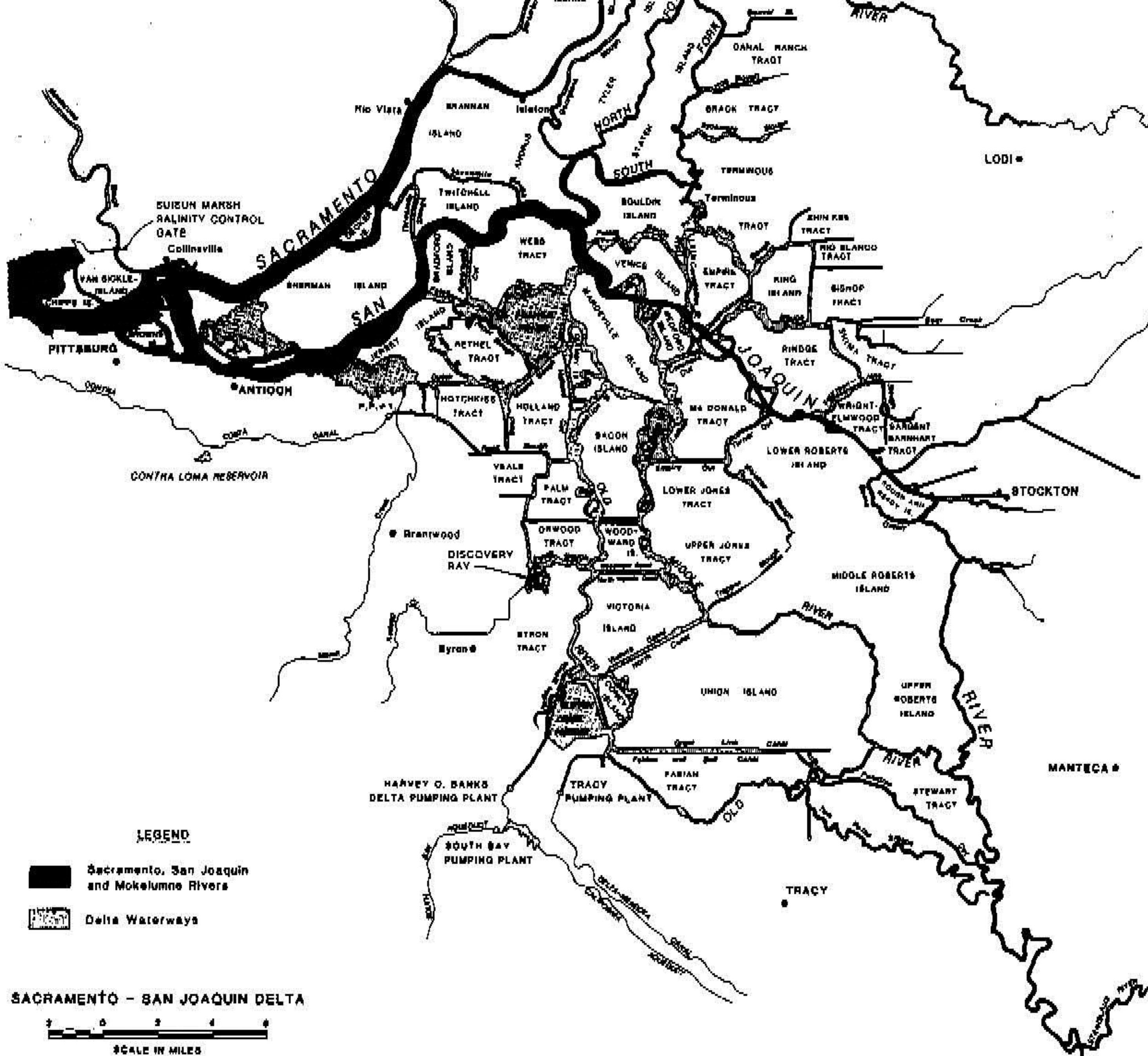
Proposed three channel reaches for measuring compliance of 1.0 EC standard:

1. Vernalis to Brandt Bridge
2. Middle River from Old River to Victoria Canal
3. Old River/Grant Line Canal from Head of Old River to West Canal.

PROBLEM:

Each of the reaches contains areas of good water quality which means that the average will hide the areas (and instances) of bad water quality.

HOW CAN AN AVERAGE CHANNEL SALINITY INFORM THE BOARD OF A PROBGLEM AREA WHERE WATER QUALITY IS WORSE THAN THE STANDARD?



SACRAMENTO
SAN
JOAQUIN
RIVER
NORTH
SOUTH
FORK
Rio Vista
BRANNAN
ISLAND
Isleton
TYLER
STATEN
SUISUN MARSH
SALINITY CONTROL
GATE
Collinsville
VAN SICKLE ISLAND
Chipps Is.
TWITCHELL
ISLAND
WEBB
TRACT
SHERMAN ISLAND
PITTSBURG
ANTIOCH
CANAL RANCH
TRACT
BRACK TRACT
TERMINOUS
Terminous
BOULDIN
ISLAND
VENICE ISLAND
EMPIRE
TRACT
KING
ISLAND
BISHOP
TRACT
RIO BLANCO
TRACT
SHIMA TRACT
LODI
BETHEL
TRACT
JERSEY
MANDEVILLE
ISLAND
RINDGE
TRACT
WRIGHT-
ELMWOOD
TRACT
SARGENT
BARNHART
TRACT
HOTCHKISS
TRACT
HOLLAND
TRACT
BACON
ISLAND
MC DONALD
TRACT
LOWER ROBERTS
ISLAND
STOCKTON
CONTRA LOMA RESERVOIR
VEALE
TRACT
PALM
TRACT
LOWER JONES
TRACT
ORWOOD
TRACT
UPPER JONES
TRACT
Brentwood
DISCOVERY
BAY
VICTORIA
ISLAND
MIDDLE ROBERTS
ISLAND
Byron
BYRON
TRACT
UNION ISLAND
UPPER
ROBERTS
ISLAND
MANTECA
HARVEY O. BANKS
DELTA PUMPING PLANT
TRACY
PUMPING PLANT
FABIAN
TRACT
STEWART
TRACT
SOUTH BAY
PUMPING PLANT
TRACY
OLD
LEGEND
Sacramento, San Joaquin
and Mokelumne Rivers
Delta Waterways
SACRAMENTO – SAN JOAQUIN DELTA
SCALE IN MILES

SOLUTIONS

1. Permanent Barriers;
2. Timed inflows;
3. Coordinated barrier operations (culvert changes);
4. Augment flows with pumps:
5. Test project with operable barrier, and;
6. Combinations of above.