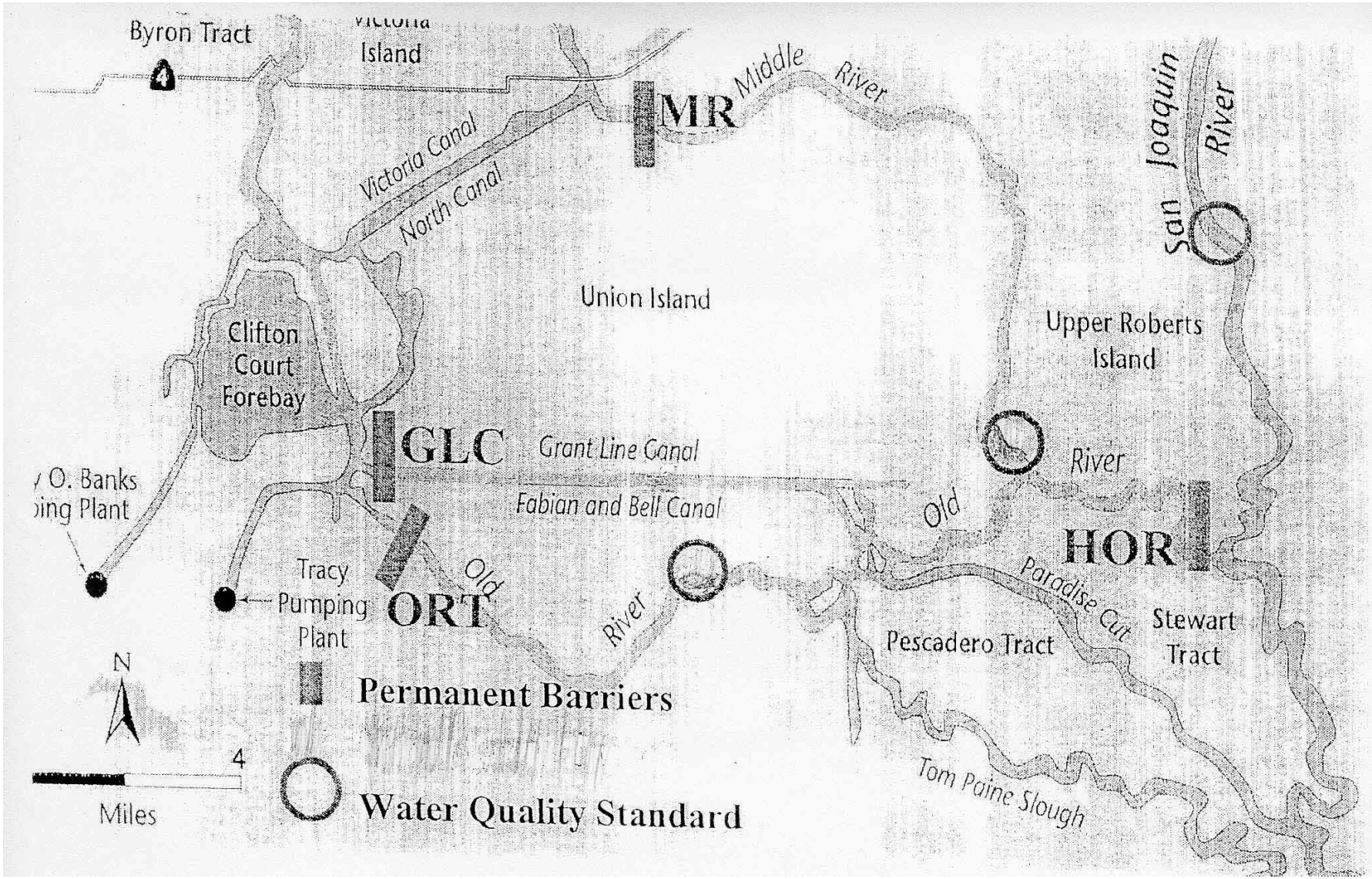
SWRCB Workshop

Considering the Southern Delta Water Quality Objectives for Salinity in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary

January 16, 2007

Presentation by South Delta Water Agency

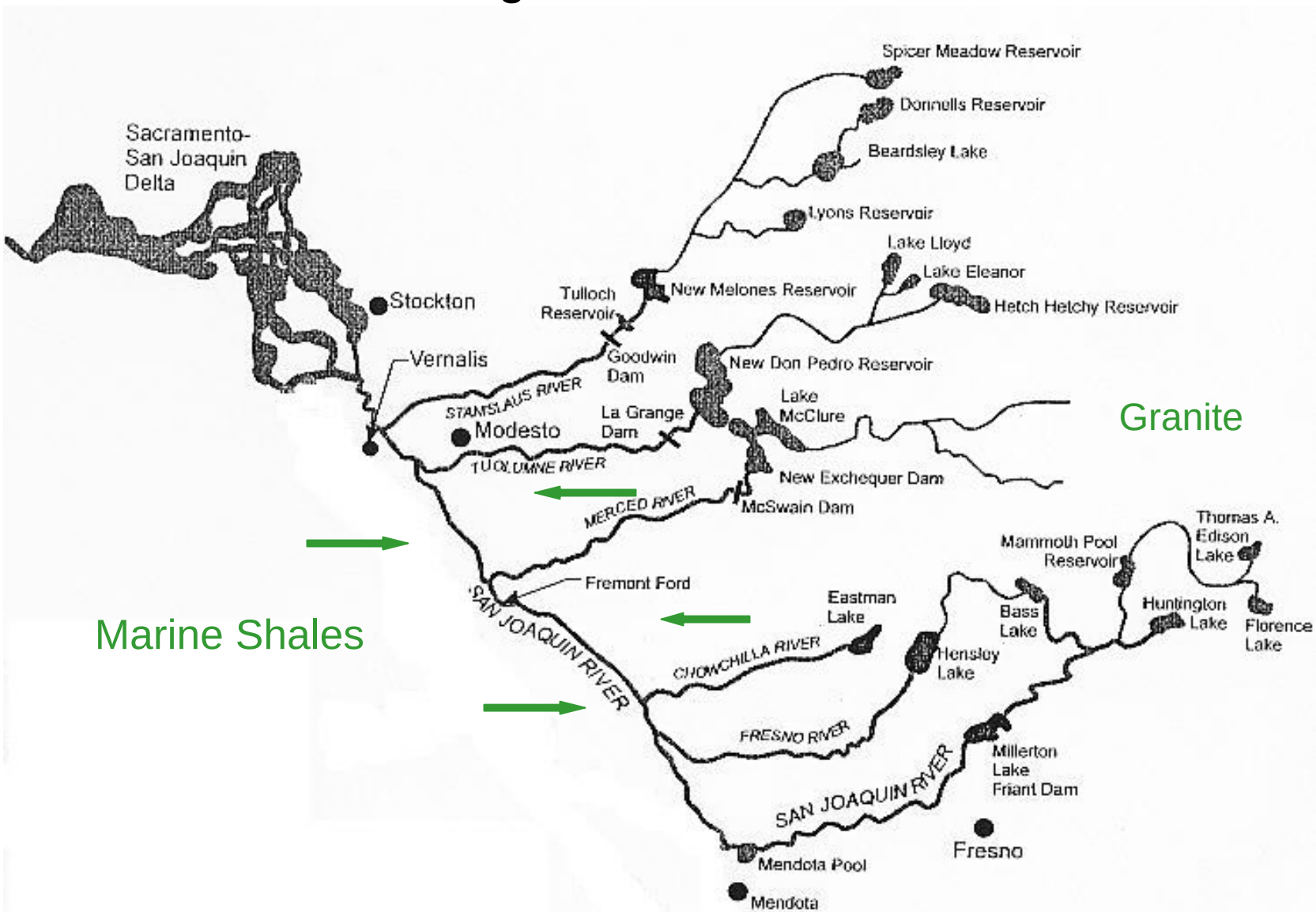
Current Southern Delta Water Quality Objectives



0.7 mmhos/cm EC April – August

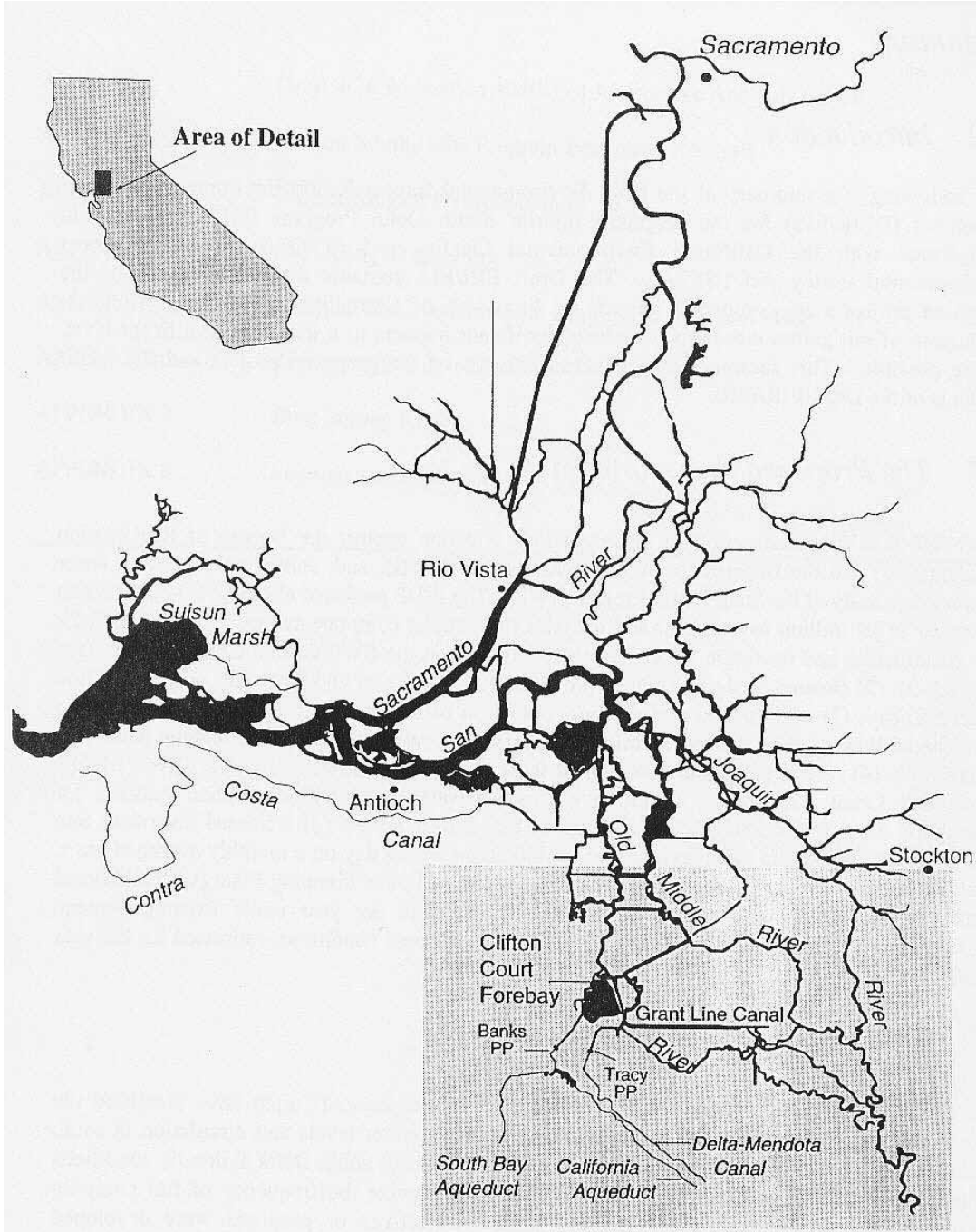
1.0 mmhos/cm EC September - March

“Indigenous” Salts

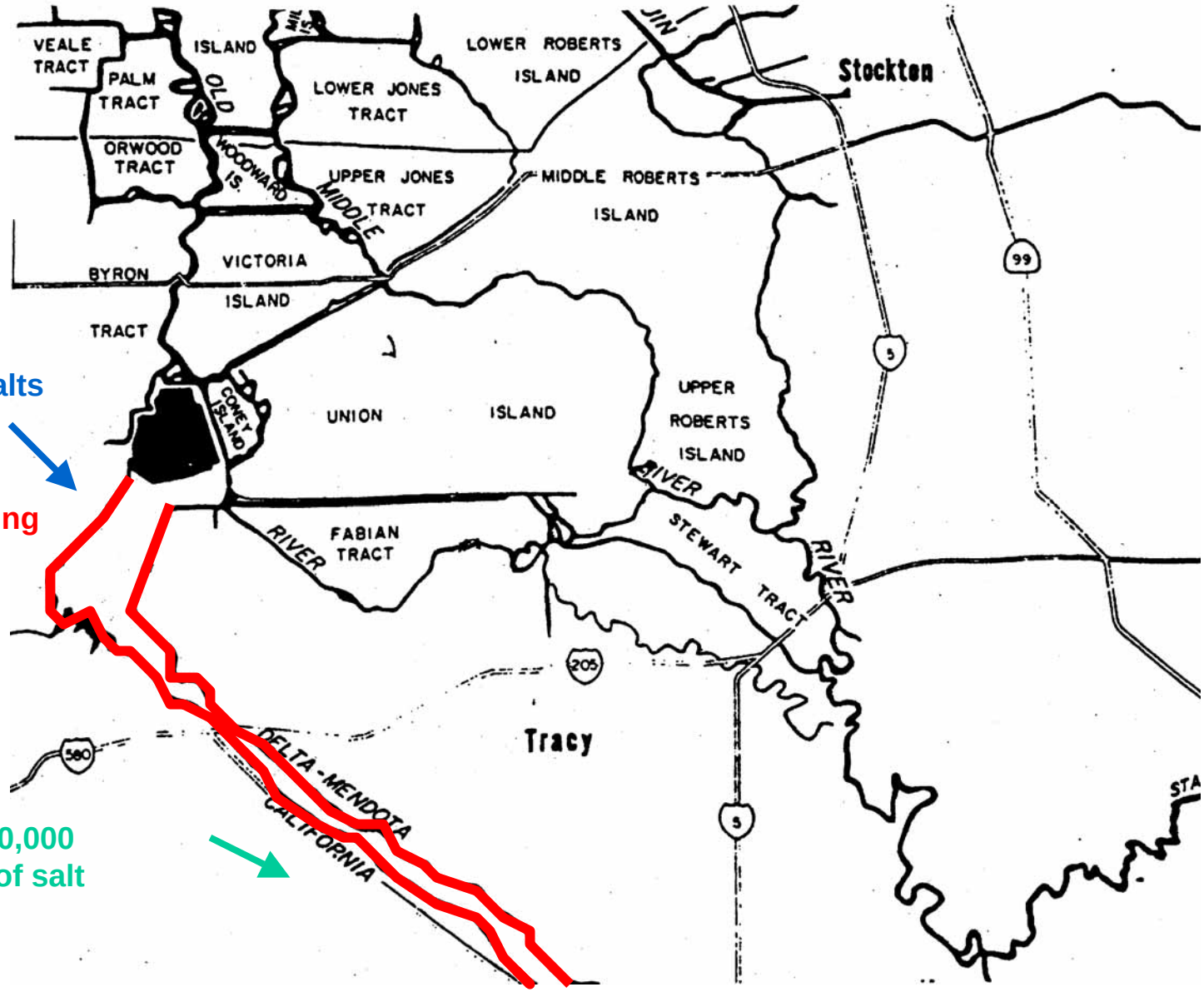


Indigenous salts derive primarily from the weathering of rocks and soils.

Sacramento-San Joaquin Delta



Imported Salts

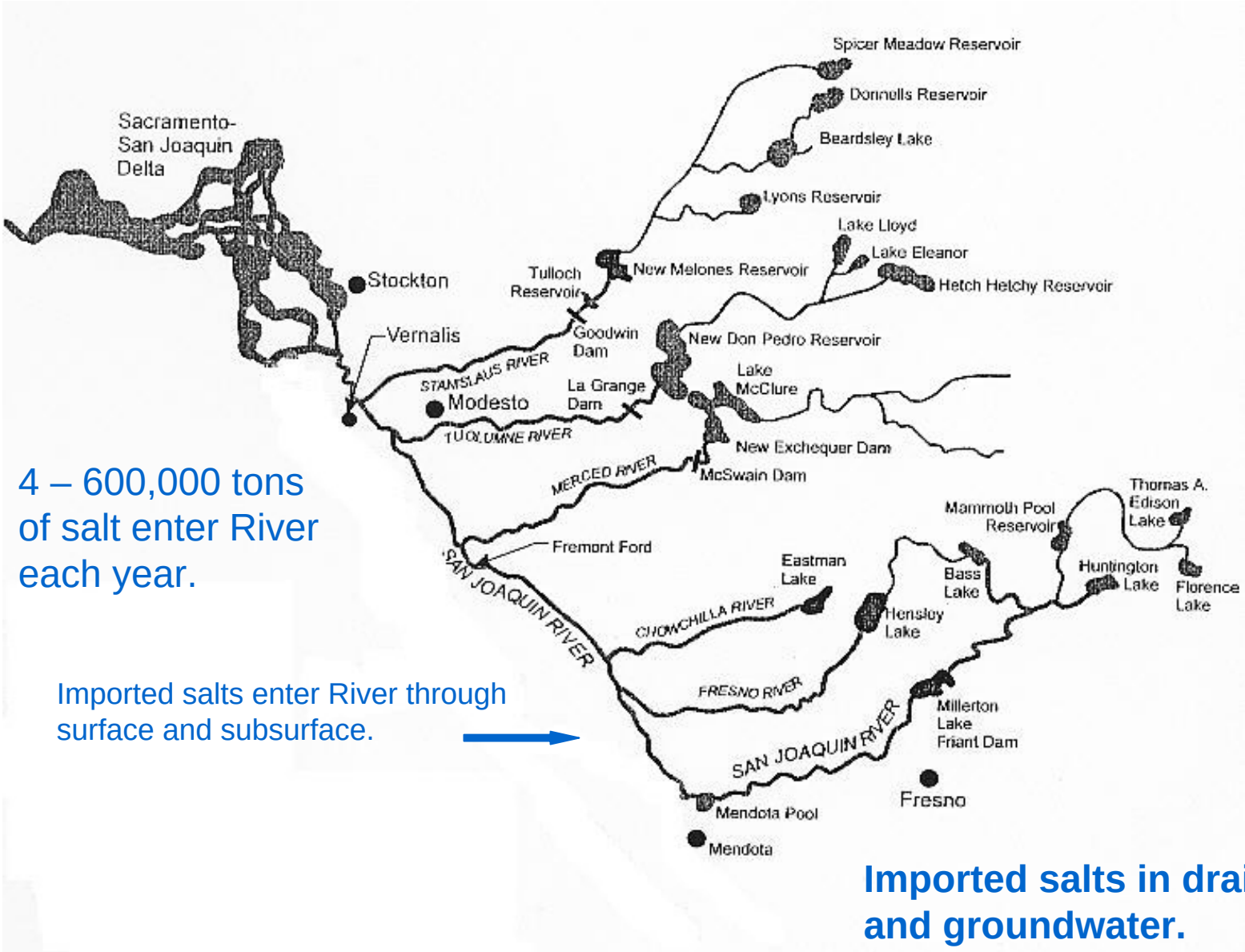


Ocean Salts

Export Pumping

≤1,000,000 tons of salt

Imported Salts



4 – 600,000 tons of salt enter River each year.

Imported salts enter River through surface and subsurface.

Imported salts in drains and groundwater.

Pre-Project Conditions

TABLE VI-27. EXTREME VALUES OF HIGH TDS AND LOW FLOW AT VERNALIS BY YEAR CLASSIFICATION

Year Class	Maximum monthly mean TDS mg/L		Minimum monthly mean flow AF x 1000	
	Pre*	Post**	Pre	Post
Dry	490	765	35.8	17.3
Below normal	407	530	67.1	44.0
Above normal	398	521	77.5	55.0
Combined above & below normal	399	528	76.2	46.8
Wet	358	364	116.4	96.6
All years	424	561	68.1	48.9

* 1930-1944, data from table VI-19, based on load-flow regression data.

** 1952-1966, data from table VI-15.

Effects of the CVP Upon the Southern Delta Water Supply
Sacramento-San Joaquin River Delta June 1980

Pre-Project Conditions

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

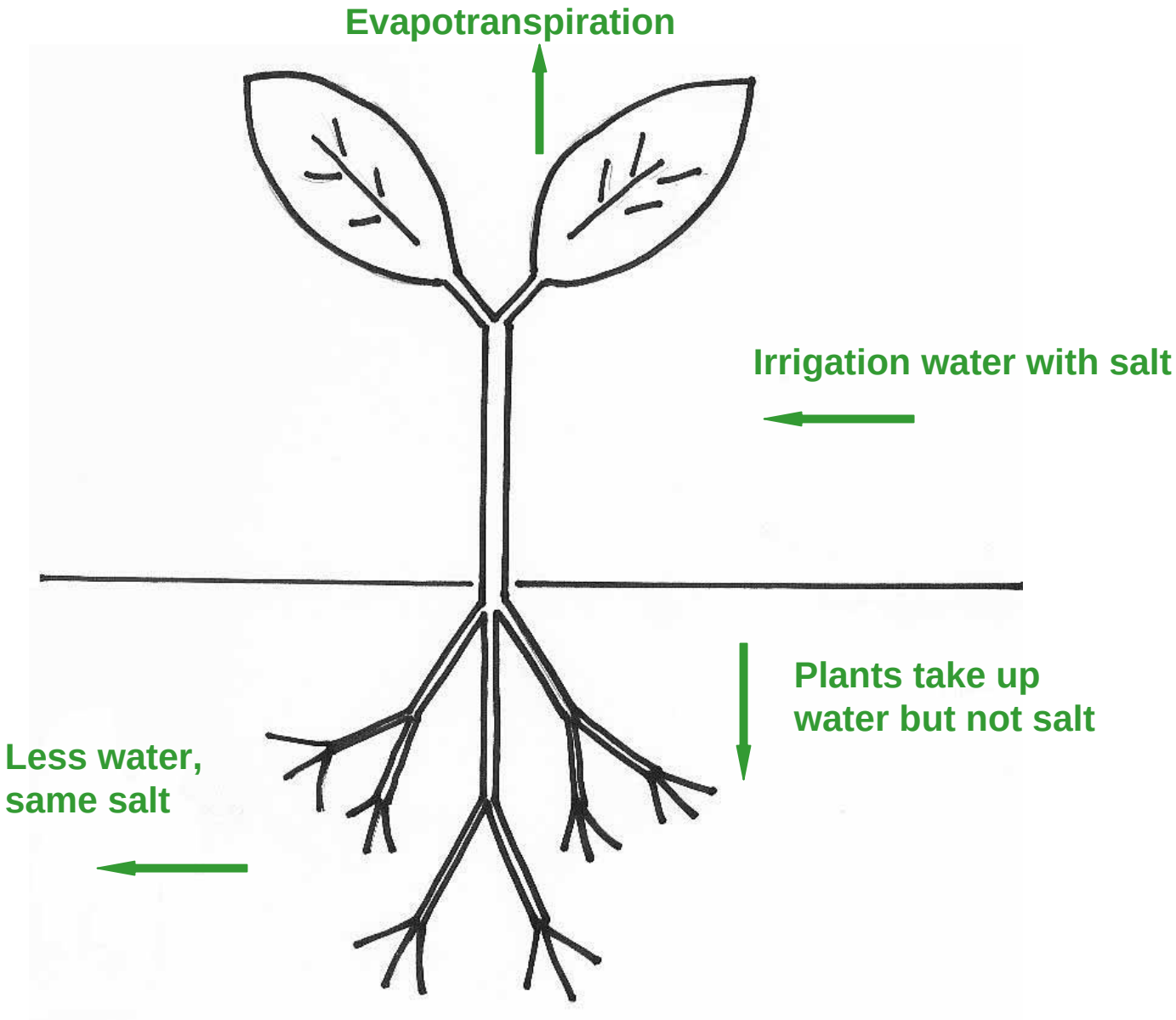

Evapotranspiration
Irrigation water with salt
Plants take up
water but not salt
Less water,
same salt

Table V-21

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		EFFECT OF CVP ON RUNOFF AT VERNALIS		
	Reduction in Runoff KAF[1]	Post 1947 Reduction as Percent of Pre-1944 Actual Runoff	Reduction in Runoff KAF[1]	Reduction at Vernalis as Percent of Pre-1944 Flow	Reduction at Vernalis as Percent of Post-1947 Flow
DRY					
April-Sept	206- 417	49-67[2]	6- 7	1.4- 1.6	3.0- 3.6
Full Year	294- 519	25-44	93- 138	8 - 12	10 - 14
BELOW NORMAL					
April-Sept	1064-1177	60-68[2]	386- 428	22 - 24[2]	55 - 61
Full Year	1219	44[2]	543	- 20[2]	35
ABOVE NORMAL					
April-Sept	1406-1732	47-57	440- 704	14 - 23	40 - 64
Full Year	1400-1721	28-34	768-1076	15 - 21	25 - 36
WET					
April-Sept	1002-1760	19-32	554- 965	10 - 18	15 - 26
Full Year	1168-2916	13-32	771-2014	9 - 22	12 - 31
AVERAGE OF ALL YEARS[3]					
April-Sept	920-1272	44-56	347- 526	12 - 17	28 - 39
Full Year	1020-1594	28-39	544- 943	13 - 19	21 - 29

[1] Range of estimates by all methods of analysis. See Tables V-2 through V-17

[2] Pre-CVP "actual" is assumed to be post-1947 actual plus pre-1944 to post-1947 loss

[3] Assumes that each year class occupies one-quarter of period

Agricultural Code Section 411

(a) The Department of Food and Agriculture shall supply the Department of Water Resources with a forecast that estimates the amount of production of food, fiber, livestock, and other farm products.

. . .

(c) The department shall include an additional table in the forecast that estimates the agricultural water needs based upon food security considerations that include, at a minimum, the following:

. . .

(2) Production of farm products sufficient to feed the state's population, as well as continue to provide at least 25 percent of the nation's table food.

(3) Production necessary to meet the growth in export markets.

Effects on Crop Yields

- Decreased crop yields

- Necessary Monitoring

- *Unless otherwise indicated, water quality objectives cited for a general area, such as for the southern Delta, are applicable for all locations in that general area and compliance locations will be used to determine compliance with the cited objectives.* (2006 Water Quality Control Plan.)

Salinities Above the Standards Adversely Affect Crop Yield

- Prior studies
- Prior evidence of crop damage on Salmon Farm
- Prior evidence of calculated economic impacts to San Joaquin County

[Most recently submitted in 2006 CDO Hearing]

Challenges to Existing Standards

- Ignore variations to plant sensitivity during different growth stages

- *In addition to the generalized salt tolerance of crops . . . some crops may be more sensitive during emergence than during later stages of growth. . . . Some crops are salt sensitive at the early seedling stage. Data from literature indicate that barley, corn, rice, and wheat are most sensitive during emergence and the four leaf stage.* (Hoffman, et al., Water Quality Considerations for the South Delta Water Agency)

Challenges to Existing Standards

- Incorrectly assume all rainfall provides leaching benefits

Challenges to Existing Standards

- Ignore limited soil permeabilities in the South Delta

- Ignore leaching waters' different rates of flow through the soil profile

Inadequacies of South Delta Improvement Program (SDIP)

- Periodic lack of control of salinity and DO
- Changes/additions to enable SDIP to meet the standards

The South Delta Improvement Program (SDIP)

- Proposed SDIP improvements and operations do not always provide sufficient flows to maintain water quality at the current standards.

Nearly Dry Channel December 4, 2006

Middle River at Undine Bridge

Asparagus farmers unable to divert

Export Pumping Effects on South Delta Water Levels

With the same CVP export rate and the same riverflow rate at Vernalis, but with a 4,800 ft^3/s average daily SWP export rate (drawn off the high tide at about 12,000 ft^3/s), the drawdown at the CVP intake channel is increased to 1.83 feet at HHW and 0.32 foot at LLW; at Old River and Tom Paine Slough it is 1.78 feet at HHW and 0.34 foot at LLW; and at Mossdale it is 1.33 feet at HHW and 0.37 foot at LLW. The intermittent pumping impact at Clifton Court was calculated at 0.127 foot per 1,000 ft^3/s at HHW, which compares favorably with the rate calculated using the June 21-22, 1972 data (0.122 $ft/1,000\ ft^3/s$).

Effects of the CVP Upon the Southern Delta Water Supply
Sacramento-San Joaquin River Delta June 1980, page 170-171.

Export Pumping Effects on South Delta Water Levels

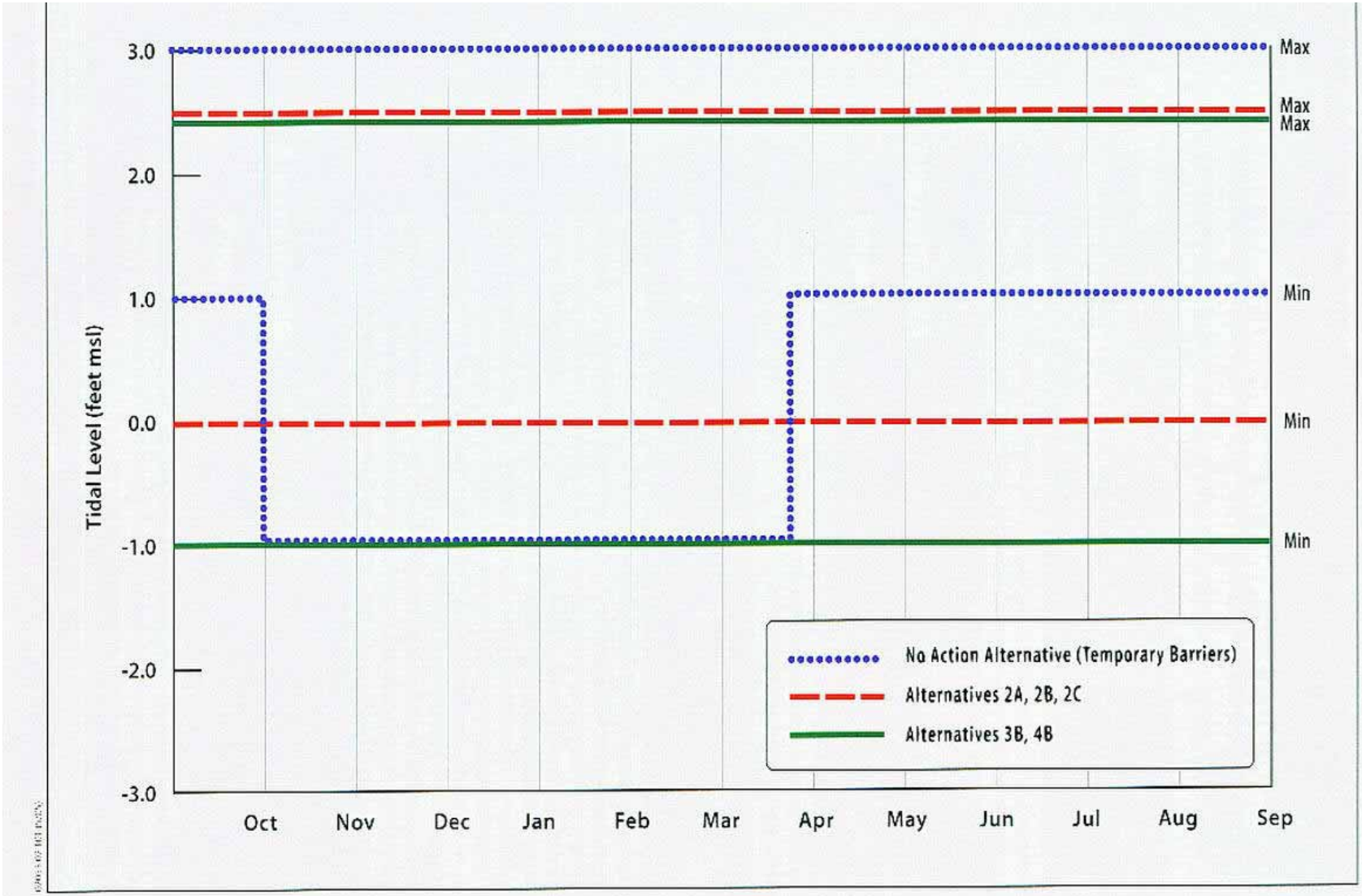
TABLE VII-6

SUMMARY OF WATER LEVEL CHANGES IN THE SOUTHERN DELTA
DUE TO EXPORT PUMPING BY THE CVP AND SWP[1/]

Node	Location	RUN SD-29A Q_e[2/](DMC) = 4323, Q_e(SWP) = 0			RUN SD-29B Q_e(DMC) = 4323, Q_e(SWP) = 1600, Q_{ep}[3/](SWP) = 2000			RUN SD-30 Q_e(DMC) = 4323, Q_e(SWP) = 2800, Q_{ep}(SWP) = 7000			RUN SD-32 Q_e(DMC) = 4323, Q_e(SWP) = 4800, Q_{ep}(SWP) = 12,000		
		HHW	MTL	LLW	HHW	MTL	LLW	HHW	MTL	LLW	HHW	MTL	LLW
1	Bacon Isl. (Input)	0	0	0	0	0	0	0	0	0	0	0	0
20	Clifton Ct.	-0.36	-0.35	-0.34	-0.89	-0.47	-0.36	-1.08	-0.58	-0.34	-1.74	-0.77	-0.26
22	Old R. @ DMC	-0.52	-0.49	-0.40	-1.01	-0.59	-0.40	-1.17	-0.70	-0.39	-1.83	-0.89	-0.32
26	WSID	-0.51	-0.47	-0.47	-1.01	-0.58	-0.49	-1.17	-0.68	-0.46	-1.84	-0.87	-0.38
32	Old R. @ Tracy Rd.	-0.43	-0.41	-0.39	-0.97	-0.54	-0.40	-1.12	-0.64	-0.37	-1.81	-0.83	-0.29
115	Grantline @ Tracy Rd.	-0.44	-0.40	-0.44	-0.93	-0.60	-0.46	-1.09	-0.61	-0.43	-1.76	-0.80	-0.36
34	Tom Paine Sl.	-0.41	-0.42	-0.37	-0.92	-0.53	-0.40	-1.11	-0.62	-0.39	-1.78	-0.81	-0.34
35	Salmon Sl.	-0.40	-0.39	-0.33	-0.90	-0.50	-0.37	-1.06	-0.59	-0.36	-1.73	-0.79	-0.31
39	Old R. @ Middle R.	-0.35	-0.33	-0.31	-0.81	-0.46	-0.35	-1.00	-0.56	-0.34	-1.63	-0.74	-0.31
44	Old R. @ San Joaquin	-0.31	-0.27	-0.18	-0.65	-0.38	-0.24	-0.89	-0.46	-0.26	-1.32	-0.61	-0.29
139	San Joaquin @ Mossdale	-0.34	-0.26	-0.13	-0.66	-0.38	-0.22	-0.87	-0.46	-0.27	-1.33	-0.65	-0.37

1/ Based on mathematical model analysis using a version of the WRE Model
2/ Q_e is the average daily diversion
3/ Q_{ep} is the actual diversion during HHW
Note: Vernalis flow rate 550 cfs.

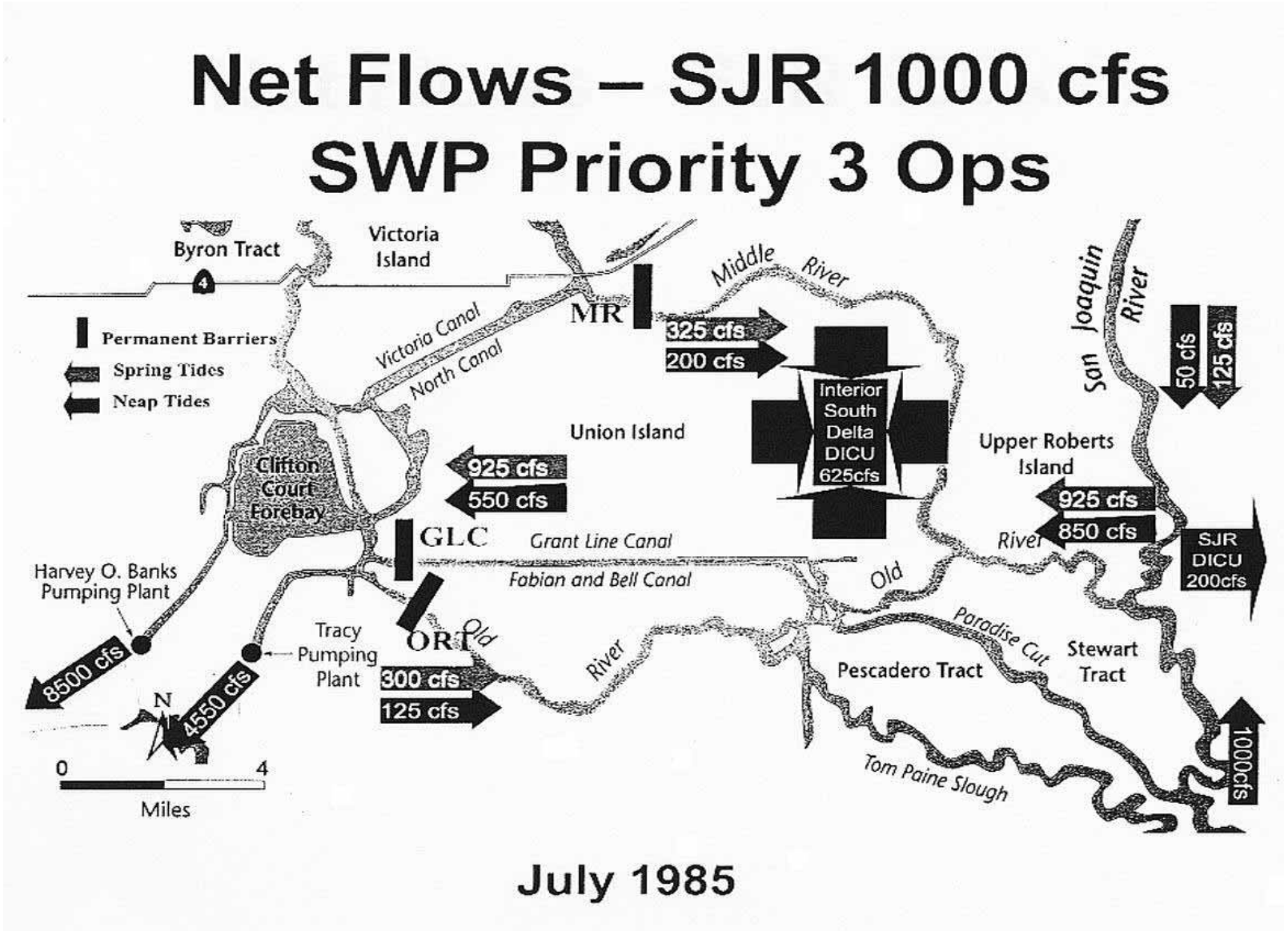
Effects of the CVP Upon the Southern Delta Water Supply Sacramento-San Joaquin River Delta June 1980.



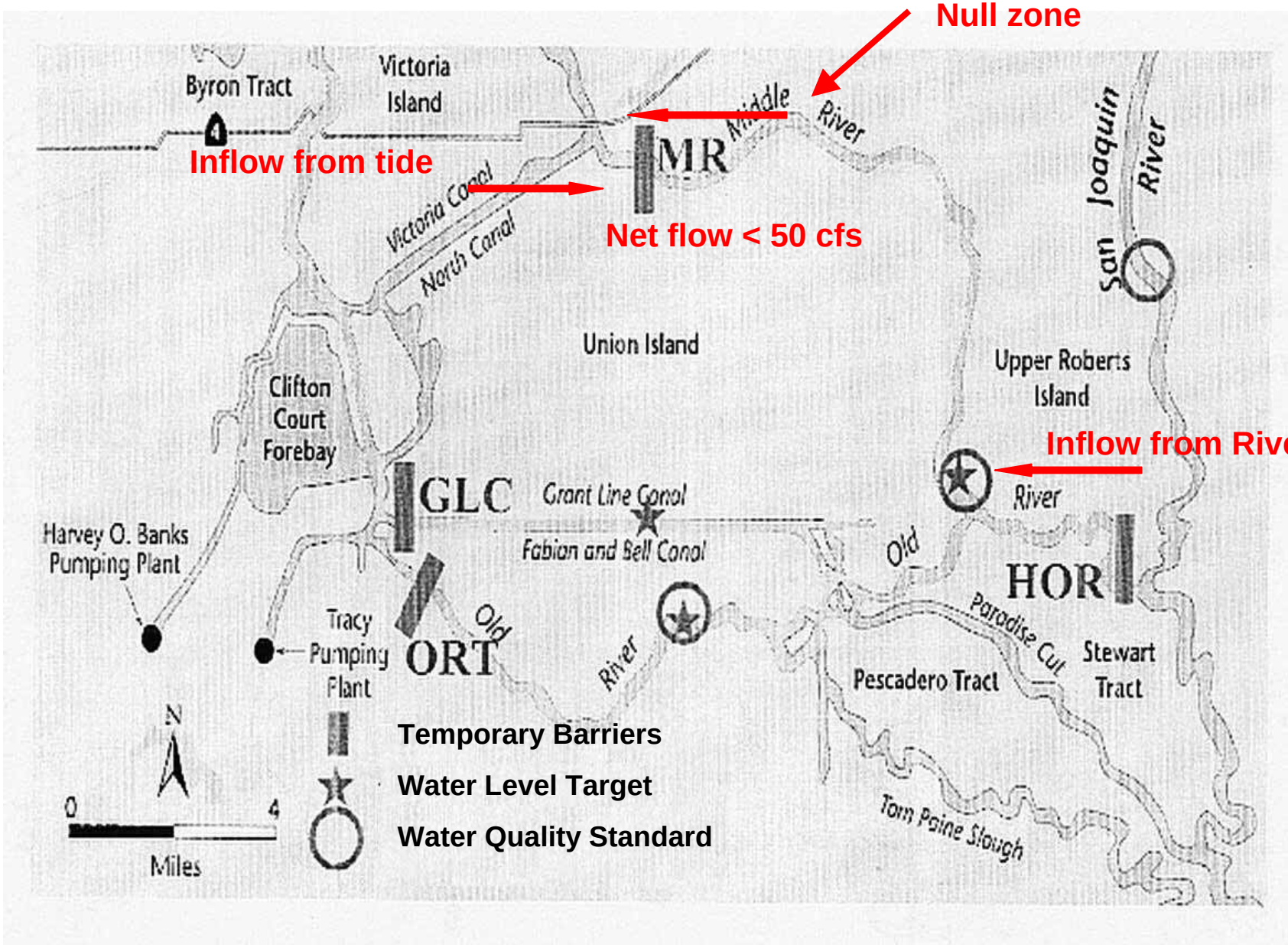
Jones & Stokes

Figure 4-1
Minimum and Maximum Tidal Level for Grant Line Canal at Tracy Boulevard Bridge for each Alternative

Possible SDIP Scenario



Null Zones With Temporary Barriers



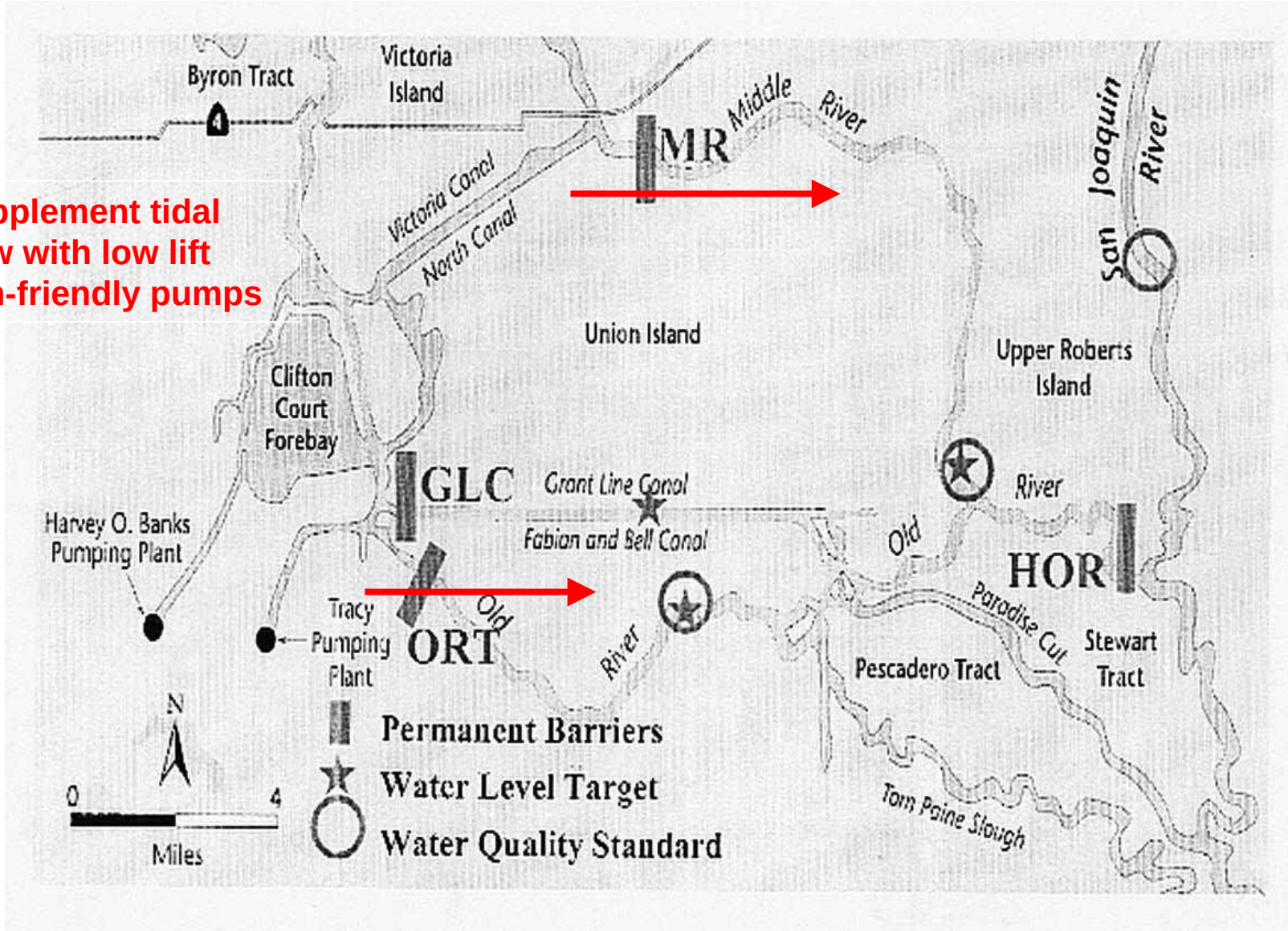
How to Meet the Standards

- Supplement tidal flows with low lift fish friendly pumps

- Supplement San Joaquin River flows with (better quality) recirculation water

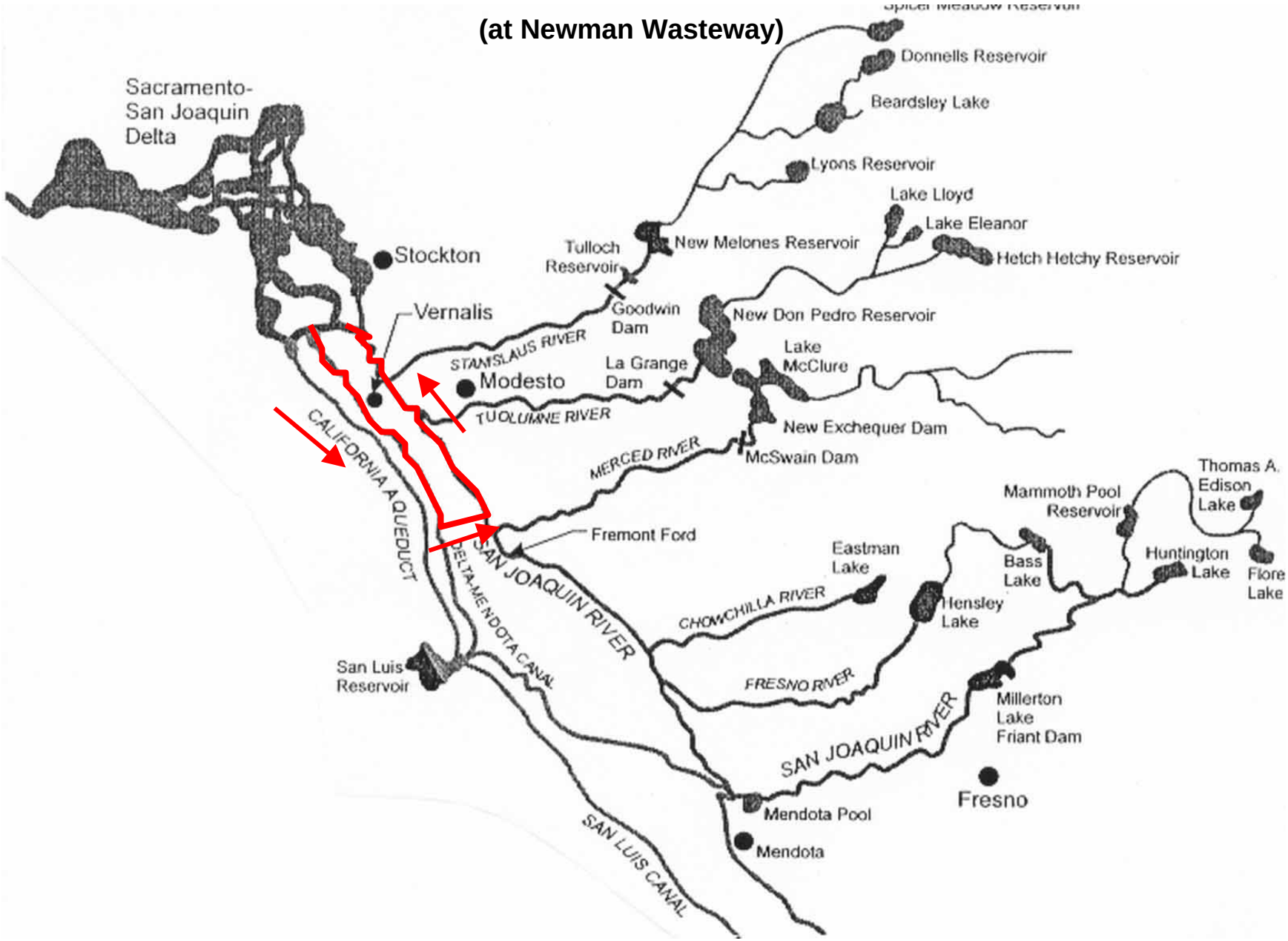
Supplement Tidal Flows

Supplement tidal flow with low lift fish-friendly pumps



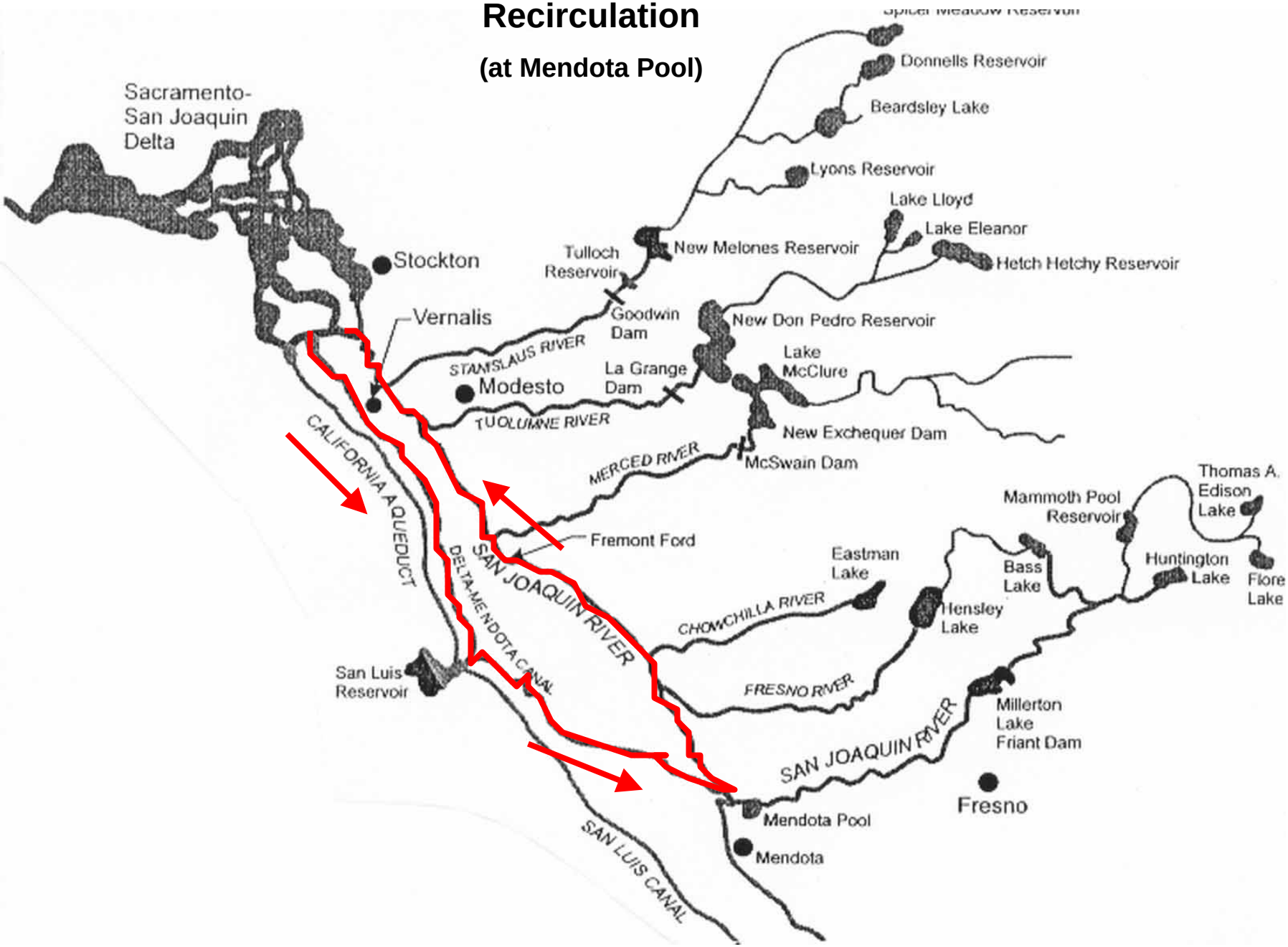
Recirculation

(at Newman Wasteway)



Recirculation

(at Mendota Pool)



Recirculation

(at Westley Wasteway)