Comments and Recommendations Regarding

California's 2006 Clean Water Act § 303(d) List of Water Quality

Limited Segments

Submitted By:

SAN JOAQUIN RIVER GROUP AUTHORITY

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FACT SHEET

1. SUMMARY

1.1. Region: Central Valley (Region 5)

1.2. Type of water body: River.

1.3. Name of water body segment: Lower San Joaquin River ("LSJR").

1.4. Pollutants.

The LSJR is listed as a water body impaired by Electrical conductivity ("EC") and Boron.[1] EC is classified as an "other" pollutant. Boron is classified as a toxic pollutant. The CVRWQCB's linkage analysis demonstrates that boron concentrations are strongly linked to EC. (Amendments to the Water Quality Control Plan For the Sacramento River and San Joaquin River Basins for the Control Of Salt And Boron Discharges Into the Lower San Joaquin River, Final Staff Report of the Regional Water Quality Control Board, Central Valley Region, Appendix 1: Technical Report, September 10, 2004 ("Salt & Boron TMDL: Appendix 1"), p87.) Consequently, failure to meet the South Delta EC Objectives would also result in failure to meet boron objectives. Conversely, compliance with the South Delta EC Objective would also result in compliance with boron objectives. The extent of the impairment is 130 river miles and 2.9 million acres.

1.5. Medium: Water.

1.6. Total Mass Daily Load schedule.

Development of a Total Mass Daily Load ("TMDL") for salt and boron started in 1998. (SWRCB Resolution 98-055, Attachment 1.) On September 10, 2004, the

[1] The LSJR was listed for impairment by salt and boron in 1996. In 1998, the listing for salinity was changed to EC.

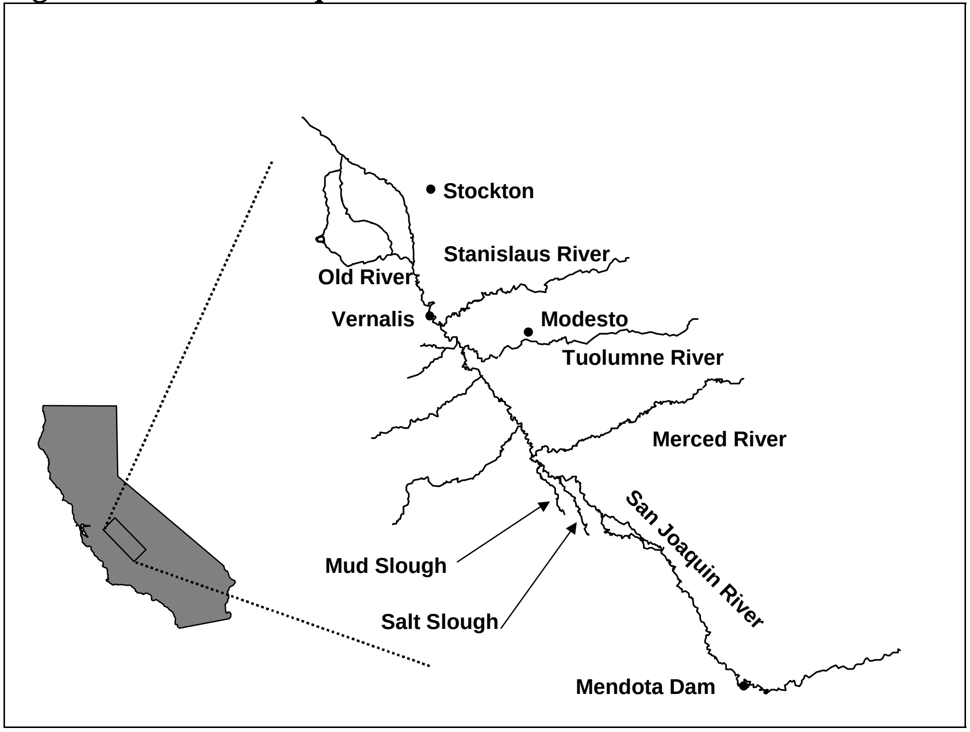
CVRWQCB adopted resolution R5-2004-0005 to amend the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins to Control Salt and Boron Discharges into the San Joaquin River. (CVRWQCB Resolution R5-2004-0005.) Final action by the SWRCB on the TMDL occurred on November 16, 2005, with the adoption of Resolution 2005-0087. (SWRCB Resolution 2005-0087, Adopting Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the San Joaquin River, Final Staff Report (November 16, 2004) ("Salt & Boron TMDL").)

1.7. Recommendation: De-list.

2. Watershed Description.

The southern part of the Central Valley of California is comprised of two hydrologic basins: the San Joaquin River ("SJR") and the Tulare Lake Basins. (Salt & Boron TMDL: Appendix 1, p87.) The SJR Basin is drained by the SJR, which discharges to the Sacramento-San Joaquin Delta ("Delta"). (Id., p6.)

Figure 1: The San Joaquin River Basin in California.



The SJR is a major tributary of the Sacramento-San Joaquin Delta ("Delta") that drains approximately 8.7-million acres in California's Central Valley. (Id., p1.) The Lower SJR ("LSJR") is the region draining the 130 miles of the San Joaquin River downstream of Mendota Dam and upstream of Vernalis. (Id., p5.)

The SJR watershed is bounded by the Sierra Nevada Mountains on the east, the Coast Ranges on the west, the Delta to the north, and the Tulare Lake Basin to the south. (Id.) The SJR flows southwest form its source in the Sierra Nevada Mountains until it reaches Friant Dam. (Id.) Below Friant Dam, the SJR flows westerly to the center of the San Joaquin Valley near Mendota, where it turns northwesterly and eventually joins the Sacramento River in the Delta. (Id.) The main stem of the entire SJR is about 300 miles long and drains approximately 13,500 square miles. (Id.)

The major tributaries to the SJR upstream of the Airport Way Bridge near Vernalis (the southern boundary of the Delta) are on the east side of the San Joaquin

Valley, with drainage basins in the Sierra Nevada Mountains. (Id.) These major east side tributaries are the Stanislaus, Tuolumne, and Merced Rivers. (Id.) The Cosumnes, Mokelumne, and Calaveras Rivers flow into the SJR downstream of the Airport Way Bridge near Vernalis. (Id.) Several smaller, ephemeral streams, including Hospital, Ingram, Del Puerto, Orestimba, Panoche, and Los Banos Creeks, flow into the SJR from the west side of the valley. (Id.) All have drainage basins in the Coast Range, flow intermittently, and contribute sparsely to water supplies. (Id.) Mud Slough (north) and Salt Slough also drain the Grassland Watershed on the west side of San Joaquin Valley. (Id.) During the irrigation season, surface and subsurface agricultural return flows contribute greatly to these creeks and sloughs. (Id.)

The San Joaquin Valley occupies approximately 18 million acres in the southern portion of California's Central Valley, accounting for almost 18% of the total land area of the state. (Id., p9.) The San Joaquin Valley has historically been recognized as a leading region for agricultural production in the State of California as well as the nation. (Id., p10.) The valley is home to five of the top ten agricultural producing counties in the U.S., with approximately 5 million acres of land devoted to irrigated agriculture. (Id.) Consequently, the region's economy and historical urban development heavily depends on agricultural activities. (Id.)

The LSJR is listed in accordance with Section §303(d) of the Federal Clean Water Act for exceeding salinity and boron water quality objectives. (Id.; see also 33 USCA §1313(d).) The 130-mile reach of the LSJR from Mendota Pool to Vernalis has been listed as impaired. (Id.) This reach drains an area of approximately 2.9-million acres. (Id.) Water quality data collected by Central Valley Regional Water Quality Control Board

("CVRWQCB") staff from 1986 through 1998 indicated that water quality objectives were routinely exceeded throughout the lower river. (Id., p11.) The non-irrigation season salinity objective was exceeded 11% of the time and the irrigation season salinity objective was exceeded 49% of the time. (Id.)

The entire reach was listed as a water quality limited segment in 1996, but in 2002, it was divided into four segments. The first segment is the 67 miles from Mendota Pool to Bear Creek, the second is the 14 miles from Bear Creek to Mud Slough, the third is 3-miles from Mud Slough to the Merced River, and the fourth was a 43-mile segment from the Merced River to the South Delta boundary at Vernalis. No explanation was given for the change was provided. For basin planning purposes, the 130-mile has been treated as a single segment. Even the Salt & Boron TMDL described the impaired areas as a single, 130-mile segment.

3. Beneficial Use Affected and Numeric Water Quality Objectives.

3.1. Beneficial use affected.

The beneficial use of water for agriculture supply includes farming, horticulture, and ranching, which includes, but is not limited to, irrigation, stock watering, and support of vegetation for ranch grazing. (1995 Water Quality Control Plan for the San Francisco Bar/Sacramento-San Joaquin Delta Estuary ("1995 WQCP"), p12.) The South Delta EC Objectives were specifically designed to protect South Delta Agriculture and is the only beneficial use they support. (1995 WQCP, p17.)

The first South Delta salinity standards for agriculture were adopted in 1967 in D-1275, which approved the water rights for the State Water Project ("SWP"). (Id.) In response to growing concerns for Delta water quality however, the SWRCB subsequently adopted Resolution 68-17 in 1968 and D-1379 in 1971. (Id., p5.) D-1379 required the Central Valley Project ("CVP") and SWP to meet water quality standards, although it was later stayed as a result of litigation. (Id.) The SWRCB eventually required the United States Bureau of Reclamation ("USBR") to meet a salinity standard at Vernalis when it adopted D-1422 and D-1616, the decisions issuing permits for New Melones. (SWRCB Water Right Decision 1485 (August 1978) ("D-1485"), p79.)

In developing the South Delta EC Objectives in 1978, the SWRCB focused on two salt-sensitive crops grown in the south Delta – beans and alfalfa. (Jim Brownell Presentation, p1) It was thought that if the salinity of the irrigation water was sufficient to protect these crops, then the salinity of the applied water would not be a limiting factor for other, less salt-sensitive crops grown in the south Delta. (Id.) As such, the Vernalis EC Objectives were based on the perceived maximum threshold salinity of irrigation water able to maintain 100% yield potential for beans, corn, and alfalfa. (Id.) It should be noted, however, that crop yields can vary by 10% due solely to variations in weather, seeds, field conditions, farming practices, and countless other variables. (SWRCB Periodic Review of the 1995 WQCP ("Periodic Review"), SJRG-06: Article, The Economic Impacts of Reducing Corn and Dry Bean Yields in a Portion of San Joaquin County, California ("Periodic Review SJRG Exh-6"), p2.)

> "The SWRCB based southern Delta EC objectives on the calculated maximum salinity of applied water which sustains 100% yields of two important salt sensitive crops grown in the southern Delta (beans and alfalfa.)."

(Periodic Review, SJRG Exh-08: Statement, Presentation of William R. Johnston, P. E. Concerning Southern Delta Electrical

Conductivity Water Quality Objectives (March 2005) ("Periodic Review SJRG-08"), p1.)

In the D-1485 hearings, the SWRCB focused on the principal salt-sensitive crops grown at the time, corn, beans, and alfalfa, the types of soils, organic and mineral, and types of irrigation methods, sub-surface and surface.[2] (Id., p2.) Experts from the University of California testified that good leaching and low salt accumulations were found in all locations where the irrigation water supply averaged 1.1 dS/m, and the wide variability of Delta soils contributed more to the variability in the salt accumulation than did San Joaquin River salinity. (Periodic Review, SJRG Exh-08, p3; South Delta Salinity Study, Meyer, et al. (1976) (D-1485 Exhibit UC-7).) Despite these findings, the experts from the University of California concluded that “salinity is a problem now in the South Delta. Given the wide variety of soils in the South Delta, good yields and diversity of crops appear to be related to water quality and levels of farm management.” (Id.)

After testimony ended, the SWRCB inquired about crops, particularly corn, grown on organic soils. (Id., p4.) The SWRCB heard substantial testimony from experts at the University of California Agricultural Extension Service concerning the ability to leach salt from the soil to avoid salt accumulation in the crop root zone. (Periodic Review SJRG-08, p2; Meyer, et al (1973, 1974 1975, and 1976) (D-1485 UC Exhibits, 1976).) Two witnesses, Mr. Carlton and Mr. Kegal, testified at length regarding the difficulty in leaching peat soils, due primarily to the fact that these soils were often on islands located

[2] Sub-irrigation is an irrigation technique in which water is applied in open ditches or tile lines that are blocked, which raises the existing water table until it is high enough to wet the soil to the surface. (San Joaquin County Soil Survey, p260.) The upward movement of the water tends to concentrate salts at or near the surface regardless of whether salinity originates from the soil or the water. (Ayers, R. S. and D. W. Westcot, "Water Quality for Agriculture". FAO Irrigation and Drainage Paper No. 29 (Rev. 1), Food and Agriculture organization of the United Nations, Rome, Italy (1985), §2.4.5..)

below sea level. (Id.) As a result, the water surrounding the islands was higher than the surface of the soil, and thus the surrounding water table was generally too high to permit adequate leaching. (Id., p2.) Mr. Meyer added that such peat soils were sub-irrigated and could only be leached in the non-irrigation season. (Id., p3.) In response, Mr. Ayers calculated that to achieve a 100% yield with surface irrigation of corn on mineral soils with a 16% leaching fraction, water with a salinity of 1.13 dS/m would be required.[3] (Periodic Review SJRG-08, p3; Ayers (1976) (D-1485 UC Exhibit 8).)

Mr. Ayers concluded that the range of water quality needed for 100% yield of beans with subsurface irrigation, and with the leaching and water management found at the study site, which consisted of organic soils, ranged from 0.34 to 0.68 dS/m. (Id.) The SWRCB, after public review, testimony, workshops, and negotiation, finally established the Vernalis EC Objectives as shown in Table 1. (Id.)

D-1485 revised the existing standards for flow and salinity and ordered the USBR and Department of Water Resources ("DWR") to meet these standards by either reducing pumping, releasing water stored in upstream reservoirs, or doing both. (1995 WQCP, p5.)

In the 1995 WQCP, the SWRCB revisited the Vernalis EC Objectives and made minor modifications. D-1641 implemented the 1995 WQCP, and found that the USBR was the sole cause of the salinity problem in the lower San Joaquin River. (SWRCB Revised Decision 1641, In re: Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A Petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project

[3] The salt tolerance tables developed by Ayers and Westcot apply when leaching fractions range from 15-16%. (Periodic Review SJRG Exh-08, p3)

(December 29, 1999, revised in accordance with Order WR 2000-02, March 15, 2000) ("D-1641"), p95.) Based on the evidence presented at the hearing, the SWRCB found the salinity objective could not be met with releases solely from New Melones. (D-1641, p80.) The SWRCB gave the USBR substantial latitude in choosing how it would meet the South Delta EC Objectives, but nevertheless impose the obligation for meeting them on the USBR. (D-1641, p159-160, 162.)

3.2. Water Quality Objectives.

Salinity objectives for the Lower San Joaquin River ("LSJR"), measured as EC, contained in the current Southern Delta EC Objectives in the Water Quality Objectives for Agricultural Beneficial Uses ("South Delta EC Objectives"), were adopted in the 1995 WQCP and subsequently implemented in State Water Resources Control Board ("SWRCB") Decision 1641. (1995 WQCP, p 17, Table 2; D-1641, p182.) The South Delta EC Objective is measured at Airport Way Bridge, near the town of Vernalis, in San Joaquin County, and requires a 30-day running average EC of 0.7 decisiemens per meter ("dS/m") from April 1 through August 31 ("Vernalis Irrigation Season EC Objective") and 1.0 dS/m at all other times ("Vernalis Non-Irrigation Season EC Objective"). (see Table 1, *infra.*) In addition, the CVRWQCB has adopted boron water quality objectives for the LSJR, but these objectives were never approved by the United States Environmental Protection Agency.

Table 1: Water Quality Objective for the Southern Delta for Electrical Conductivity. (Fourth Edition of the Water Quality Control Plan fro the Sacramento River and San Joaquin River Basins (1998) ("Basin Plan"), Table III-5; 1995 WQCP, p17 (Table 2).)

SALINITY Reach	Irrigation Season (April 1 – August 31)	Non-Irrigation Season (September 1 – March 1)
Vernalis only	0.7 dS/m (30-day running average)	1.0 dS/m (30-day running average)
BORON Reach	Irrigation Season (March 15 – September 15)	Non-Irrigation Season (September 16 – March 14)
Merced River to Vernalis	2.0 mg/L (maximum) 0.8 mg/L (monthly mean)	2.6 mg/L (maximum) 1.0 mg/L (monthly mean)[4]

The South Delta EC Objectives were the numeric targets for the Salt & Boron TMDL. (Salt & Boron TMDL: Appendix 1, p1.) After the SWRCB adopted the 1995 WQCP, it directed the CVRQWCB to establish EC objectives for the LSJR upstream of Vernalis. (Id.) No upstream objectives have been established.

4. Summary of data and/or information.

4.1. Numeric Data

4.1.1. Water Quality Data.

"Vernalis", the compliance point for the South Delta EC Objectives, is located on the Airport Way Bridge, near the town of Vernalis in San Joaquin County, and upstream from the confluence of the Stanislaus River with the San Joaquin River. (Periodic Review, SJRG Exh-07: Statement, Presentation of Daniel B. Steiner Concerning San Joaquin River Hydrology and Alternative Flow and Quality Objectives at Vernalis (March 2005) ("Periodic Review SJRG-07"), p1.) It serves as the downstream boundary for the salt and boron §303(d) impairment. (Salt & Boron TMDL: Appendix 1, p26.) The Vernalis gauging station, which is operated by the United State Geographic Survey ("USGS") and DWR, was established in 1922 and "provides a good long-term daily flow

[4] In Critical years, the required monthly mean Non-Irrigation Season Merced River-Vernalis Boron Objective is 1.3 mg/L.

record."[5] (Id., p26.) The station also collects EC data. (Id.) The CVRWQCB used USGS data obtained at the Vernalis station to develop the TMDL and calculate the monthly and annual mass salt loading for the SJR at Airport Way Bridge near Vernalis. (Id.)

Table 2: Flow and water quality monitoring stations at Vernalis. (California Data Exchange Center)

USGS/DWR Monitoring Station at Airport Way Bridge Near Vernalis

Station ID	VNS	**Elevation**	35' ft
River Basin	SJR	**County**	San Joaquin
Hydrologic Area	SJR	**Nearby City**	Modesto
Latitude	37.6670°N	**Longitude**	121.2670°W
Operator	USGS and DWR	**Data Collection**	Dual Path
River Stage Definitions			
Datum 0	0.00' NGVD	Peak of Record	01/05/1997 00:00 34.88'
Monitor Stage	24.5'	Flood Stage	29.0'
Danger Stage	29.5'	Top of Levee	37.3'

The following data types are available from the VNS Station at CDEC:

Mean daily flow (cfs)	(daily)	Computed	01/01/1993 to present.
Battery voltage (volts)	(event)	Satellite	02/24/1995 to present.
Flow, river discharge (cfs)	(event)	Computed	02/24/1995 to present.
River Stage, feet	(event)	Satellite	02/24/1995 to present.
Battery voltage, volts	(hourly)	Microwave	From 01/01/1995 to present.
Flow, river discharge, cfs	(hourly)	Computed	From 01/01/1984 to present.

[5] Water quality data and analysis were provided by Mr. Daniel B. Steiner. (Periodic Review SJRG-07.) The USGS/DWR station is designated the VER station on the California Data Exchange Center.

Figure 2: Combined Tracy and Vernalis quadrangles, with Delta irrigation, water, and reclamation districts, surface water Use, and Bean cultivation.

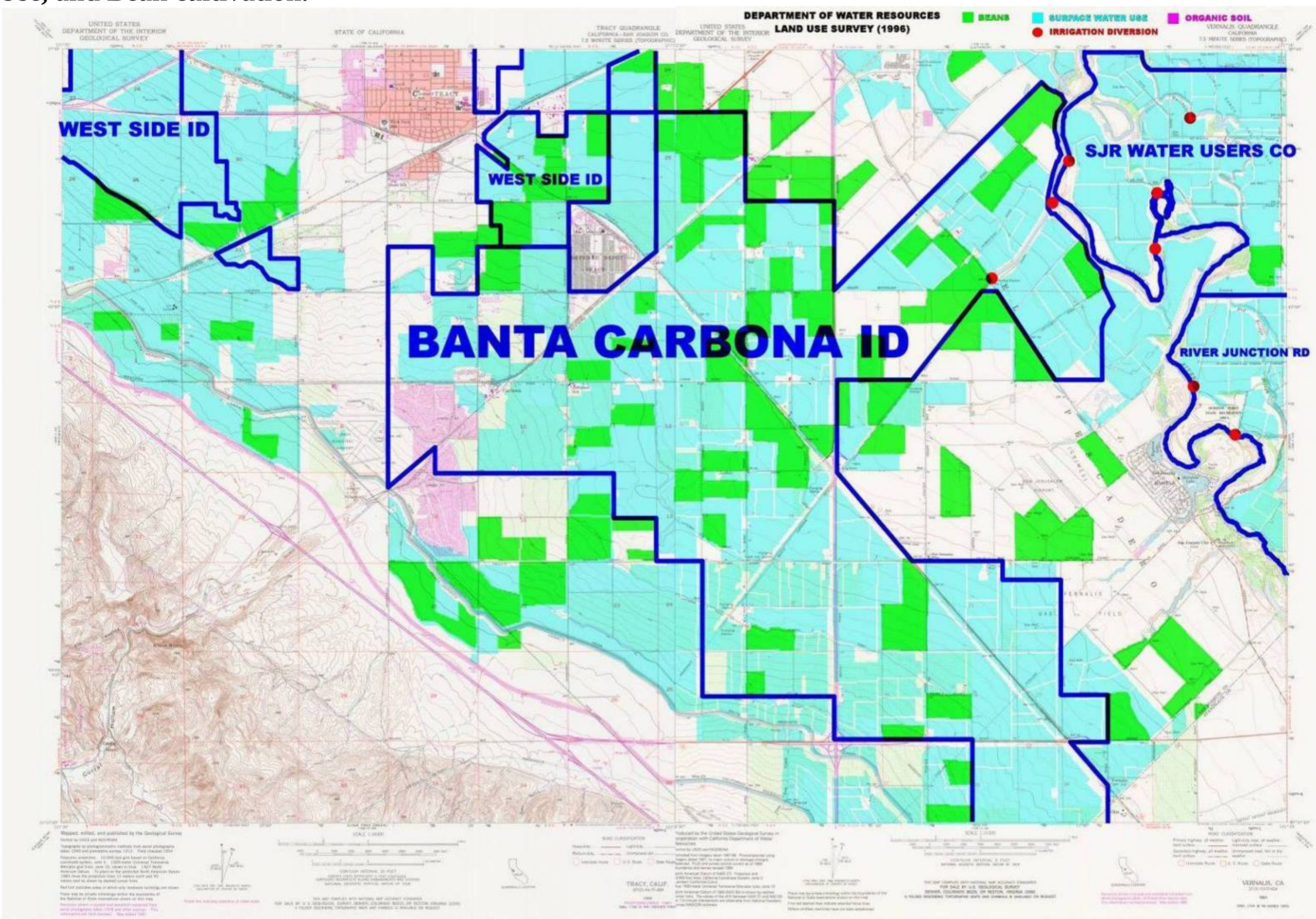


Figure 3: Combined Tracy and Vernalis quadrangles, with Legal Delta boundary, surface water Use, and Bean cultivation.

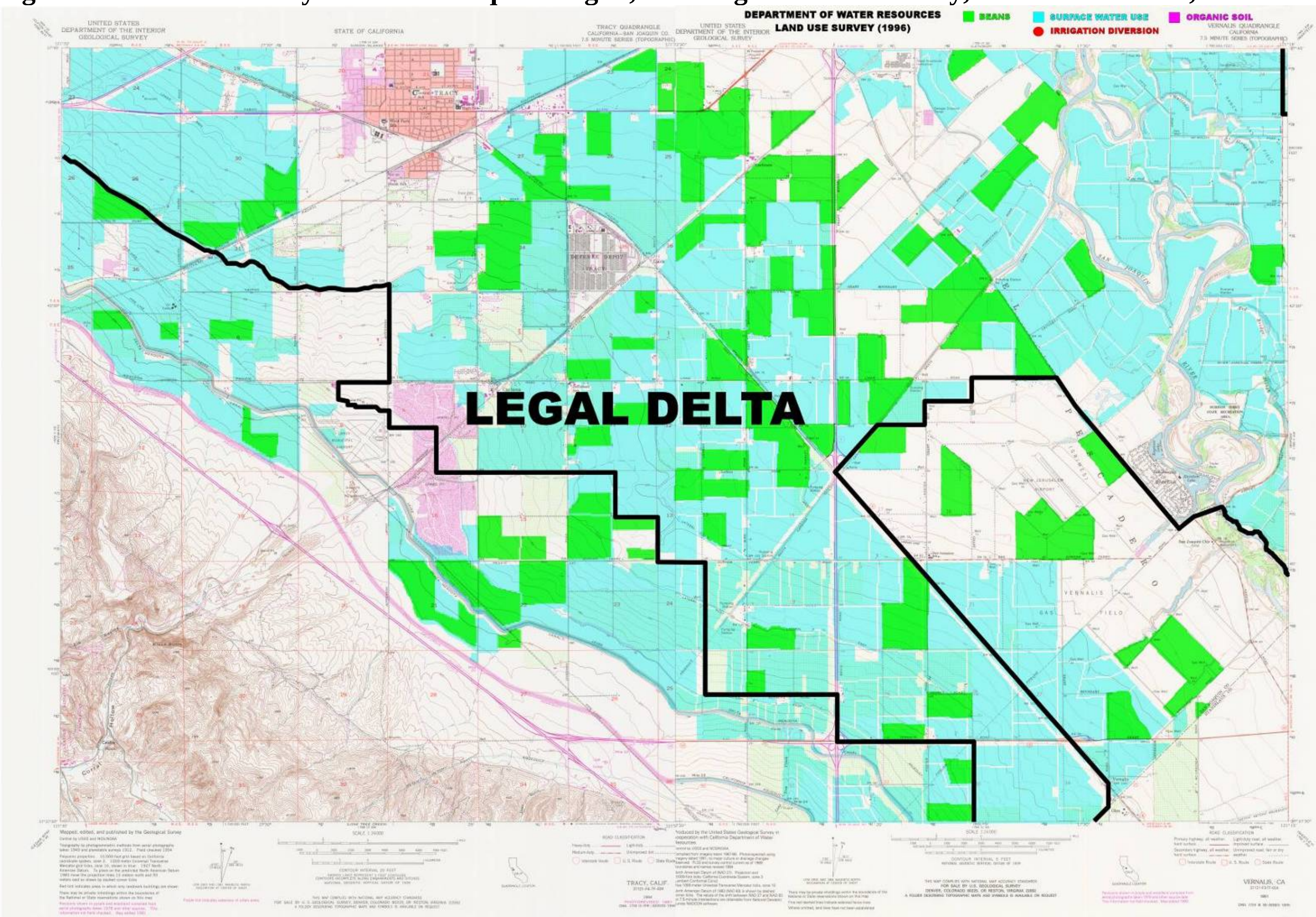
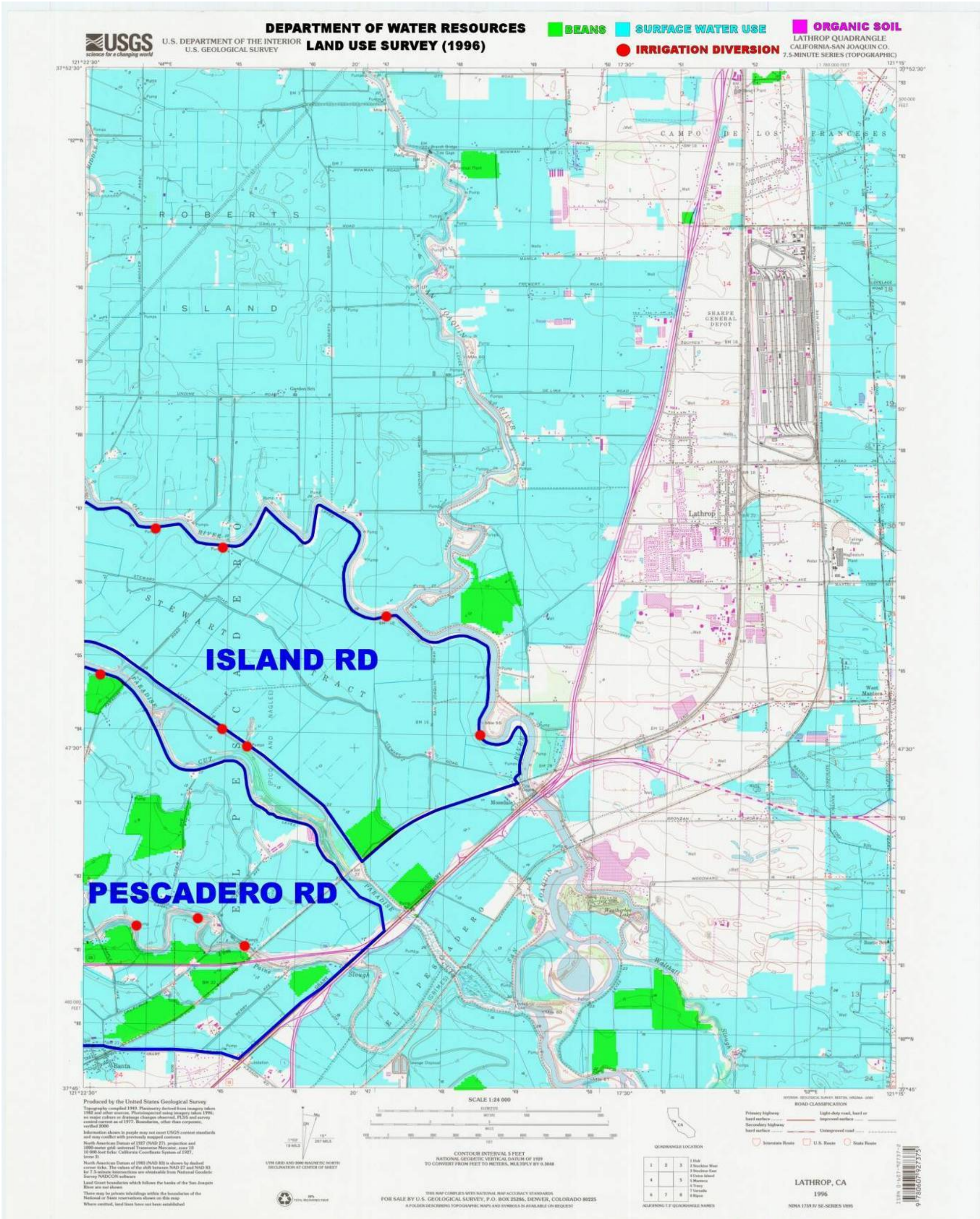


Figure 4: Lathrop quadrangle, with the Delta irrigation, water, and reclamation districts, surface water use, and Bean cultivation.



4.1.2. Crop Data.

Crop data was compiled from the Agriculture Commission reports for the counties of Stanislaus, Fresno, Merced, Madera, and San Joaquin.

Crop data and water use specific to the Banta Carbona Irrigation District was obtained from crop production and water use reports filed by Banta Carbona Irrigation District with the USBR.

Crop statistics specific to each USGS topographic map were obtained from the 1988 and 1996 DWR Land Use Surveys for San Joaquin County. The most recent DWR land use survey for San Joaquin County was performed in 1996. Data, available in GIS shape file format, was imported to Microsoft Excel, where it was sorted and filtered.

4.2. Non-numeric data:

4.2.1. Geographic data.

Geographic data consisted of the boundaries and delineations of the Legal Delta, irrigation, water, and reclamation districts, cropping patterns, surface water use, and diversion locations.

The quadrangle maps used were USGS 7.5 minute topographic maps with a scale of 1:24,000. The maps were scanned, stored in tiff files formant, and then converted to jpeg files for use as raster layers in Corel Paint Shop Pro 9. The “TracyVernalis” (see Figure 1 and Figure 2, *supra*) map was created by combining copying and pasting the individual tiff files using Adobe Photoshop to create a single combined map.

Cropping patterns, crop acreage, and surface water use data were obtained from the DWR land use surveys for 1988 and 1996, which consisted of numerical and non-numerical data in a GIS shape file format. Non-numerical data was evaluated using ESRI

ArcExplorer, converted to a jpeg format, and added as a raster layer to a Corel Paint Shop Pro 9 file.

Legal Delta boundaries were obtained based on the San Joaquin County Land Use Survey conducted by the DWR and published on the Internet in pdf format. The Legal Delta Boundary was then drawn as a vector layer in a Corel Paint Shop Pro 9 file.

Irrigation, water, and reclamation district boundaries were obtained from either the place of use maps on file with the Division of Water Rights or directly from the irrigation, water, or reclamation district. The boundaries were then drawn as a vector layer in a Corel Paint Shop Pro 9 file.

Soil data was obtained from the San Joaquin County Soil Survey, which was compiled by the National Resource Conservation Service under the United States Department of Agriculture. The survey consists of a series of 7.5 minute topographic quadrangle maps with a scale of 1:24,000. Maps used in the process were scanned, saved as tiff files, converted to jpeg formats, and then added as a raster layer using Corel Paint Shop Pro 9. All organic soil types were shaded orange. All raster and vector layers were combined into a single file with Corel Pain Shop Pro 9. Each quadrangle, such as those shown in Figure 2, Figure 3, and Figure 4, is a different representation of the same Paint Shop Pro file displayed with different layers shown in different combinations. Layers include the "base" topographic map, the Legal Delta boundary, irrigation, reclamation, and water district boundaries, diversions locations of irrigation, reclamation, and water districts, land irrigated with surface water, land used for cultivating beans, corn, and alfalfa, and organic soils. Each crop type and each irrigation, water, and reclamation district exists as a separate raster or vector layer. Different combinations of graphic layers are depicted in Figure 2, Figure 3, and Figure 4. (see also Periodic Review SJRG Exh-21: Statement, Appendix A, Terminology ("Periodic Review SJRG-21").)

4.2.2. Testimonial evidence.

Testimonial evidence was obtained from witnesses who were under oath and subject to cross examination in the following legal proceedings:

1. In the Matter of: Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A Petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project (December 29, 1999), revised in accordance with WR 2000-02 (March 15, 2000). (D-1641)

2. SWRCB, <u>In re Long-Term Petition Change of: Modesto Irrigation District, et al.</u>

3. Central Delta Water Agency et al. v. United States et al., case number CV-F-99-5650.

4. 1998 Bay-Delta Hearings for D-1641.

4.2.3. Public Records.

Memorandums, documents, staff reports, and other documents were obtained from the CVRWQCB and SWRCB by means of five Public Records Act Requests made pursuant to Government Code §6250 et seq.

4.2.4. Technical Analysis.

The SJRGA developed its technical analysis with assistance from several technical consultants, including Mr. Daniel B. Steiner, Ms. Susan Paulsen and the staff at FlowScience, and Drs. Bert Hagen and John Mason at California State University Fresno. All of the technical consultants have provided citations to, and descriptions of, their methodologies and data sources in their technical documents.

5. Potential Sources of the Pollutant.

Delta salinity was a concern even before the Central Valley Project ("CVP") was built in 1944 and the State Water Project ("SWP") was built in 1968. The primary concern was salt intrusion from the San Francisco Bay and Pacific Ocean. (Water Code Appendix §§116-4.1(a)(1), 117-4(a)(1); SWRCB Water Rights Decision 990 (February 9, 1961) ("D-990"), p45.) In dry years such as 1924, 1931, and 1934, water with an EC above 1.56 dS/m infiltrated nearly every Delta channel, including the Grant Line Canal and Upper Roberts Island. (D-990, p45; Periodic Review SJRG-08, p1.) Water with an EC in excess of 1.56 dS/m only stayed below Antioch in 1938, a very wet year. (D-990, p43.)

In 1920, the State Water Commission advocated storing water for later release as a method of controlling salt intrusion from the Pacific Ocean. (D-990, p46.) Then, in response to a 1925 request for a plan for water resource development from the Legislature, the State Engineer concluded that a salt water barrier would be required to prevent salt intrusion. (Id.) When the State Legislature authorized the CVP in 1931, it acknowledged that salinity control was one the primary purposes of Shasta Dam, because flow at Antioch would prevent the need to construct a physical barrier at the mouth of the river. (Id., p48.)

In 1961, the State Water Rights Board, the predecessor to the SWRCB, adopted D-990, which approved water rights for the CVP. (1995 WQCP, p4.) D-990 addressed the salinity problem solely as an issue of seawater intrusion, because in Dry and Critical years, Delta salinity problems were due to seawater intrusion from the San Francisco Bay. (Id.)

Another significant source of salt and boron loading is surface and subsurface agricultural drainage. (Salt & Boron TMDL: Appendix 1, p 11.) The vast majority of agriculturally derived salt and boron loading to the LSJR originates from lands on the west side of the LSJR watershed. (Id.) Soils on the west side of the San Joaquin Valley are derived from rocks of marine origin in the Coast Range that are high in salt and boron. (Id.) Dry conditions make irrigation necessary for nearly all crops grown commercially in the watershed, but when irrigation water is applied, salt and boron leach from the west side soils, mobilize, and move into the shallow groundwater and subsurface drainage produced when farmers drain the shallow groundwater from the root zone to protect their crops. (Id.) The discharge of subsurface drainage has resulted in elevated salt and boron concentrations in the LSJR and certain tributaries. (Id.)

Large quantities of water are imported from the Delta to irrigate much of the west side of the basin. (Id.) The imported water supplies are relatively high in salts and the water imported to the basin represents a significant portion of the SJR's total salt load. (Id.)

Groundwater accretions to the river are another significant source of salt and boron loading to the LSJR, as ongoing irrigation practices have led to accumulation of salts in the unconfined and semi-confined aquifer that underlies most of the west side of the San Joaquin Valley and lands on the east side of the San Joaquin Valley directly adjacent to the river. (Id.)

Discharges from managed wetlands also contribute to the LSJR's salt and boron load. (Id.) The LSJR watershed contains over 130 thousand acres of wetland habitat, most of which are located in the Grassland Watershed. (Id.) These wetlands are either managed by the California Department of Fish and Game ("DFG"), United States Fish and Wildlife Service ("FWS") or by water districts on behalf of privately owned duck and gun clubs. (Id.) Water is applied to maintain the wetlands, and saline discharges occur when flooded wetlands are drained. (Id.)

Other less significant sources of salt and boron loading include municipal and industrial discharges as well as loading from the higher quality east side tributaries. (Id.)

6. Data evaluation.

The framework for developing the § 303(d) List is contained in the Water Quality Control Policy for Developing California's Clean Water Act §303(d) List ("Listing Policy"), adopted pursuant to SWRCB Resolution 2004-0063. (SWRCB Resolution 2004-0063: Adoption of Water Quality Control Policy for Developing California's Clean Water Act §303(d) List (September 30, 2004.).)

Under the Porter-Cologne Act, the SWRCB alone is responsible for setting statewide policy concerning water quality control. (Water Code §§13140-13147.) The SWRCB has dual responsibilities in fulfilling its obligations to protect water quality: first, a quasi-legislative "regulatory function of ensuring water quality", and second, a quasi-judicial adjudicatory function. (United States v. State Water Resources Control Board (1986) 182 Cal.App.3d 82, 112 ("Racanelli").) "Generally speaking, a legislative action is the formulation of a rule to be applied to all future cases, while an adjudicatory act involves the actual application of such a rule to a specific set of existing facts." (Strumsky v. San Diego Employees Retirement Assc. (1974) 11 Cal.3d 28, 34 fn2.)

Quasi-legislative functions include the adoption of laws, policies, and regulations, including water quality objectives, intended to create new rules for future application.

(20th Century Insurance Co. v. Garemendi (1994) 8 Cal.4th 216, 275.) In fulfilling its quasi-legislative function, an agency must adequately consider all relevant factors and demonstrate a rational connection between those factors, the choice made, and the purposes of the enabling statute (Racanelli (1986) 182 Cal.App.3d, *supra* at 113.) As a policy intended to create "rules" for developing the state's § 303(d) List, the Listing Policy is the result of a quasi-legislative process.

An agency cannot ignore or violate regulations properly enacted through quasi-legislative processes. (United States v. Nixon (1974) 418 U.S. 683, 695; Bonn v. California State University (1979) 88 Cal.App.3d 985, 990; Frates v. Burnett (1970) 9 Cal.App.3d 63, 71.) Quasi-legislative regulations "represent [] an authentic form of substantive lawmaking: Within its jurisdiction, the agency has been delegated the Legislature's lawmaking power. Because agencies granted such substantive rulemaking power are truly 'making law', their quasi-legislative rules have the dignity of statutes." (Yamaha Corp. v. State Bd. of Equalization (1988) 19 Cal.4th 1, 10.)

The scope of the SWRCB's quasi-legislative authority, and hence, the Listing Policy adopted pursuant to that authority, is limited by the rulemaking powers granted by state and federal law. California Water Code §13191.3(a) required that the SWRCB develop guidelines for developing the § 303(d) List. Additionally, the Budget At for Fiscal Year 2001-2002 required development of a policy establishing criteria for developing the § 303(d) List that included a "weight of the evidence approach" and criteria to ensure that the data and information used to identify and list water bodies is accurate and verifiable. (Supplemental Report of the 2001 Budget Act, Legislative Analyst's Office (July 30, 2001), p23-24.) As a resolution adopted pursuant to the

SWRCB's quasi-legislative authority, the § 303(d) List must be developed consistent with the Listing Policy. In order to deviate from the Listing Policy, the SWRCB would have to first amend the Listing Policy.

In contrast to quasi-legislative functions, quasi-adjudicatory functions result in decisions where an agency applies existing laws, policies, or regulations to determine specific rights of specific parties based on existing facts. (20th Century Insurance Co. (1994) 8 Cal.4th *supra*, at 275.) Although the Water Code only required adoption of "guidelines", the Listing Policy uses compulsory language in numerous sections, particularly §3, the section establishing listing criteria, §4, the section establishing de-listing criteria, and §6.1.4, the section establishing data quality assessment processes. In adopting compulsory language, the SWRCB went beyond the minimum requirements of Water Code §13191.3(a) and limited its discretion and that of RWQCBs. Consequently, the SWRCB has discretion where provided by the Listing Policy, but must treat as mandatory sections that use compulsory language, such as §§3, 4, and 6.1.4. In developing the § 303(d) List, the RWQCBs and SWRCB apply the Listing Policy to determine the status of specific water bodies and pollutants based on existing water quality and water body data, facts, and information.

6.1. The LSJR Must Be De-Listed Due to Faulty Data and Analysis.

A water body "shall" be de-listed, regardless of the source of §303(d) impairment, if the listing was based on faulty data, and the listing would not have occurred in the absence of such faulty data. (Listing Policy, §4.) "Faulty data" includes, but is not limited to, typographical errors, improper quality assurance or quality control procedures, and limitations regarding the analytical methods that led to improper conclusions regarding the water quality status of the segment. (Id.)

The California § 303(d) List was first developed in 1996, before the Listing Policy was adopted in September 2004. The Listing Policy established very specific procedures and requirements for developing the § 303(d) List. (Id., §6.1.) Fact sheets had to describe, with particularity, the data used, the quality and quantity of the data, the procedures used to assure sufficient data quality, and the methods used to collect and analyze the data. (Id.) The CVRWQCB retained significant discretion to determine how data and information would be evaluated. (Id., §6.1.5.) Nevertheless, the Listing Policy dictated certain minimum standards for the quantity and quality of data, spatial and temporal representation of the water body, and methods used to collect and analyze data. (Id., §§6.1.4-6.1.5.)

Consistent with the Listing Policy, the SWRCB TMDL Unit, in developing the 2006 § 303(d) List, reevaluated several listings when it became clear the original data supporting the listing was "faulty" or non-existent. (Draft Staff Report Supporting the Recommended Revisions to the Clean Water Act §303(d) List; Volume 1 (September 2005); p11.) Based on its review, the Unit and has recommended removing water bodies and pollutants from the § 303(d) List if the analysis used to originally list the water body or pollutant would fail meet the guidelines contained in §6.1.3 of the Listing Policy. (Id., p11.) If a listing is re-analyzed, the water body-pollutant combination is re-considered for listing as if it had never been listed before, using the guidelines contained in §3 of the Listing Policy. (Id.) Consequently, the burden is on keeping the water body-pollutant combination on the § 303(d) List.

The LSJR was listed for §303(d) impairment due to salinity in 1996. In 1998 its listing for salinity was changed to EC. None of the procedures, protocols, or data quality, data quantity, or evaluation requirements established in the Listing Policy existed. Consequently, data used to develop the § 303(d) Listings may not have met the stringent standards subsequently adopted in the Listing Policy and led to improper conclusions regarding the water segment's status. A water body listed on the basis of such data must be removed from the § 303(d) List. (Listing Policy, §4.) Since §4 uses compulsory language, removal from the § 303(d) List is not discretionary, but mandatory.

6.1.1. No data was used to list the LSJR for salt and boron in 1996, a failure never cured in subsequent listing cycles.

In addition to the factors specifically described in the Listing Policy as those leading to a "faulty analysis", the SWRCB TMDL unit has recommended removal of a water body and pollutant if data or information used to support the original listing does not exist. (Draft Staff Report Supporting the Recommended Revisions to the Clean Water Act §303(d) List; Volume 1 (September 2005), p11.)

The SJRGA made five requests for public records pursuant to Government Code §6250 et seq. Two requests were made to the SWRCB and three were made to the CVRWQCB. In its requests to the SWRCB, the SJRGA obtained all documents, approximately 1,500 pages, related to the 1996 § 303(d) List for California. In its second PRA request to the SWRCB, the SJRGA obtained the portion of the administrative record applicable to the Central Valley Region for the development of the 2002 California §303(d) List. In its first request to the CVRWQCB, the SJGRA obtained approximately 80 pages. In its second request to the CVRWQCB, the SJRGA obtained all of the data, memorandums, and other documents relied on by CVRWQCB Staff in developing the

§303(d) List in 1996. In its second PRA request to the CVRWQCB, the SJRGA obtained other supporting documents related to the development of the §303(d) List for 1996, in addition to the entire administrative record of the CVRWQCB for the 1998 §303(d) List. Finally, in its third PRA request to the CVRWQCB, the SJRGA obtained a copy of the administrative record supporting the development of recommendations by the CVRWQCB for the 2002 §303(d) listing cycle.

6.1.1.1. No data was used to add the LSJR to the §303(d) List in 1996 for the pollutants salt and boron.

During the §303(d) listing process in 1996, CVRWQCB staff did not recommend addition of the LSJR to the §303(d) List for salt and boron. (CVRWQCB 1996 Clean Water Act §303(d) List Administrative Record, p23-36.) Written comments were submitted by the public, but none related to salt or boron impairment of the LSJR. (CVRWQCB 1996 Clean Water Act §303(d) List Administrative Record, p56-57.) There was, however, criticism that the listings were based on old data, data not based on rigorous quality assurance or quality controls, or data that may have been outdated. (Id., AR57.) The CVRWQCB agreed that "some of the data on which listing decisions were based are somewhat dated, but sometimes it is the only data available for certain pollutants." (Id.)

When the CVRWQCB circulated its agenda for its January 26, 1996 meeting, salt and boron were not among the pollutants proposed for addition to the SJR in the draft §303(d) list. (CVRWQCB 1996 Clean Water Act §303(d) List, AR1-5.) At the CVRWQCB meeting, the list was adopted unanimously and without public comment. (CVRWQCB 1996 Clean Water Act §303(d) List, AR40-48.) The § 303(d) List attached to the meeting minutes did not include salt or boron among the pollutants on the LSJR. (Id.)

Salt and boron did not appear as pollutants anywhere in CVRWQCB documents until three days later, when a memorandum from Jerry Bruns to file included the §303(d) list adopted by the CVRWQCB and included salt and boron as pollutants impairing the LSJR.[6] (CVRWQCB 1996 Clean Water Act §303(d) List Administrative Record, p37.) There is no correspondence, memoranda, data, or other material in the record indicating how or why salt and boron were added to the list of pollutants on the LSJR. (Id.)

The record also lacks any statement mentioning, referencing, or supporting the addition of salt or boron pollutants on the LSJR until an April memorandum from Sue Yee of the CVRWQCB Planning Unit to Nancy Richard of the CVRWQCB Division of Water Quality. (CVRWQCB 1996 Clean Water Act §303(d) List Administrative Record, p39.) The "newly revised § 303(d) List", which included salt and boron as pollutants impairing the SJR, was attached. (Id.) According to the memorandum:

> "Salt has been added to the LSJR and the Delta, and boron has been added to the LSJR. These pollutants are well documented to be impairing the respective water bodies and should have been included on the earlier list. The water body data used for making these changes as well as that used for making the list is on file at our office."

(Id.) The data Sue Yee referred to consisted of Water Code §§12230-12233, the 1995 WQCP, and the Technical Report prepared pursuant to SWRCB Water Quality Order 85-1.[7] (CVRWQCB response to 10.30.05 PRA request 11.21.05.) The record contains no data and no analysis, and Water Code §12230, the 1995 WQCP, and SWRCB Water

[6] Despite its addition to the §303(d) list in 1996, there was no recommendation for a TMDL for the control of salt and boron discharges to the LSJR. (CVRWQCB 1996 Clean Water Act §303(d) List Administrative Record, p37.)

[7] None of these items are specifically referenced in the administrative record for the 1996 §303(d) List.

Quality Order ("WQO") 85-1, each discussed in detail below, conducted no analysis and made no factual findings of impairment of the LSJR due to salt and boron.

6.1.1.1.1. Water Code §12230.

According to Water Code §12230, "Legislative Findings and Declarations" for the SJR:

> The Legislature hereby finds and declares that a serious problem of water quality exists in the San Joaquin River between the junction of the San Joaquin River and the Merced River and the junction of the San Joaquin River with Middle River; that by virtue of the nature and causes of the problem and its effect upon water supplies in the Sacramento-San Joaquin Delta, it is a matter of statewide interest and is the responsibility of the State to determine an equitable and feasible solution to this problem.

Water Code §12230, adopted in 1961 only says the SJR has "a serious water quality" problems the State should fix. It does not describe the type of water quality problem or the severity and says nothing about salt or boron. It makes no factual finding that, within the meaning of §303(d) of the Clean Water Act, the LSJR is a water body impaired by salt and boron. Neither does anything in Water Code §12230 direct or otherwise require anyone in the State to develop discharge or drainage controls. No compulsory language is used. Nothing in Water Code §12230 requires, supports, or otherwise suggests the LSJR should have been listed for salt and boron.

6.1.1.1.2. 1995 Water Quality Control Plan.

The 1995 WQCP is a quasi-legislative document. (Racanelli, *supra*, 182 Cal.App.3d at 112.) As a quasi-legislative document, the WQCP establishes general policies and regulations, but cannot apply specific rules to specific facts to make specific findings, such as finding the existence of a §303(d) impairment. (Id.) A factual finding of impairment could only occur through a quasi-legislative process such as that contemplated by the Listing Policy, where evidence is taken, a hearing is held, and specific rules are applied to specific facts. (Id.)

Neither does the 1995 WQCP direct the CVRWQCB to adopt drainage controls or implement load reduction programs. The program of implementation merely says the CVRWQCB "should" continue its salt load reduction program and that controlled and limited discharges "may" be accomplished by coordinating the release of drain water with high flows. (1995 WQCP, p29-30.) The language used is discretionary, not compulsory.

D-1641 directed the CVRWQCB to adopt a basin plan amendment to regulate the timing of agriculture drainage discharges into the SJR, but only after the adoption of EC objective upstream from Vernalis. (D-1641, p85.) No upstream objectives have been established.

6.1.1.1.3. Water Quality Order 85-1.

WQO 85-1 was adopted in 1985 in response to a complaint that wastewater discharged from Kesterson Reservoir that caused, or threatened to cause, pollution and nuisance, especially due to high selenium concentrations in the discharged water. (SWRCB WQO 85-1, p3-6.) The discharged wastewater was particularly high in selenium, mercury, and nickel. (Id., p32.) In response, the SWRCB ordered the CVRWQCB to develop a monitoring program and collect data adequately characterizing the quantity, quality, and destination of agricultural drainage flows across the boundaries of irrigation districts and other appropriate entities. (Id., p64.) Additionally, the SWRCB would form a technical committee that would draft a report that would serve as a basis for "appropriate" basin plan amendments and a program the CVRWQCB would undertake to regulate agriculture drainage into the SJR Basin. (Id., p64-65.)

WQO 85-1 directed the CVRWQCB to develop appropriate basin plan amendments and impose drainage controls and used compulsory language, but the direction was for the control of agriculture drainage generally and not salt and boron in particular. (Id.) At the time, it was acknowledged that most of the return flows consisted of agriculture return flows, but little data existed regarding the "quantity and quality" of the return flows, which dictated the need for monitoring and data collection. (Id., p58.)

The SWRCB acknowledged ongoing monitoring efforts to collect data that would eventually be used to develop basin plan amendments and regulate discharges under waste discharge requirements. (Id., p8.) It also noted that since 1981, flows in the San Luis Drain principally consisted of saline subsurface agriculture drainage flows from Westlands Water District. (Id., p5.) However, the only pollutant the SWRCB specifically instructed the CVRWQCB to control was selenium. (Id., p64.) There is no direction or requirement for the CVRWQCB to develop basin plan amendments, waste discharge requirements, or TMDLs for the control of salt and boron.

6.1.1.1.4. Regulation of Agricultural Drainage to the San Joaquin River: Final Report, Prepared Pursuant to Water Quality Order 85-1.

Pursuant to WQO 85-1, a technical committee prepared a report in 1987 on Delta water quality and recommendations for the control of agricultural discharges. (Technical Report for WQO 85-1.) Increasing salinity caused by subsurface agriculture drainage had long been a major concern in the LSJR Basin. (Technical Report for WQO 85-1, pIV-3.) Furthermore, the 1975 Basin Plan had acknowledged water quality concerns caused by

EC and classified the LSJR from Lander Avenue to below Vernalis a "water quality limited segment" due to excessive salinity. (Id., pVIII-15.) Therefore, the technical committee included salt among the "constituents of concern" in the LSJR Basin. (Id., pIV-3.)

The Technical Report for WQO 85-1 contains no other analysis. There is no discussion of water quality data showing increasing salinity in the Delta and no discussion of actual impacts to agriculture. The description of the LSJR as a "water quality limited" in the 1975 Delta Plan fails to support any determination of §303(d) impairment. Furthermore, the supporting facts are 30 years old, predate the implementation of the Vernalis EC objectives by D-1485 and many other operational changes (see §6.1.4 *infra*), and do not represent current conditions in the LSJR. Even the Technical Report for WQO 85-1, now nearly 20 years old, predates D-1641, the IOP, and many other regulatory and operational changes in the LSJR. The relevance of the analysis and conclusions contained therein are dubious at best and would not be considered reliable analysis for listing a water body under pursuant to the Listing Policy. (see 6.1.4 *infra,* discussion of the Listing Policy's requirements for temporal relevance of data in §6.1.4.)

Technical Report for WQO 85-1 presented a stronger argument against listing the LSJR than it did in favor of listing the LSJR. At the time, the salinity objective for the South Delta was 500 Total Dissolved Solids ("TDS"). (WQO 85-1, Attachment 10.) Analysis of Normal, Dry, and Critical years at Vernalis in shows that TDS never exceeded 500 Total Dissolved Solids ("TDS"), which was the water quality objective at that time.[8] (Technical Report for WQO 85-1, pVIII-30-VIII-33.) The technical committee recommended an EC objective of 0.7 dS/m in order to protect agricultural beneficial uses in the San Joaquin Valley, although it failed to provide any supporting citations, discussion, or analysis. (Id., pIV-9.) While some locations in the Delta regularly exceeded 0.7 dS/m, the EC at Vernalis was "usually at or below 0.7 [dS/m]."[9] (Id., VIII-14.) The WQCP for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, adopted in May of 1991 pursuant to SWRCB Resolution No. 91-34, subsequently adopted the technical committee's recommended EC objective of 0.7 dS/m. (1995 WQCP, p5, 8.) Therefore, when the Technical Report for WQO 85-1 was adopted, there was compliance with both the TDS objective that existed at the time and the EC objective subsequently adopted.

6.1.1.2. Subsequent Listing Cycles Have Not Cured the Failure to Use Any Data in 1996.

The §303(d) List has been revised twice since 1996, once in 1998 and again in 2002.[10] No analysis in either year however, was sufficient to list the LSJR for EC and boron.

6.1.1.2.1. Evaluation of Lower San Joaquin River §303(d) Listing for Electrical Conductivity and Boron in 1998.

Two changes occurred to the §303(d) listing for salt and boron in 1998. First, the pollutant designation for "Salinity" was changed to "EC." (CVRWQCB 10.31.05 PRA

[8] Since the figures depict salinity in increments of 500 ppm, a more accurate reading is not possible. Water Years 1979 and1984 served at Normal year types, 1981 and 1985 served as Critical year types, and 1985 served as the Dry year type. 500 TDS is approximately 0.8 dS/m.
[9] 0.7 dS/m is approximately 450 TDS.
[10] As of this writing, no "do-not de-list" recommendations have been made for the 2006 listing cycle. The SJRGA has been informed however, that CVRWQCB Staff intends to submit a "do not de-list" fact sheet. If such fact sheet is submitted, the SJRGA will submit a supplemental analysis of the CVRWQCB Staff recommendation.

response 11.21.05; CVRWQCB 1998 Clean Water Act §303(d) Administrative Record, p37, 237, 251.) No data was evaluated in association with the change from "salinity" to "EC." (Id.) Rather, the change was ministerial and reflected change from a year-round objective of 500 TDS to the current Vernalis EC Objectives adopted by the WQCP for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary in May of 1991, pursuant to SWRCB Resolution No. 91-34, subsequently adopted the technical committee's recommended EC objective of 0.7 dS/m. (1995 WQCP, p5, 8.)

The other change designated the LSJR for a TMDL for the control of discharges of salt and boron. (SWRCB Resolution 98-055, Attachment 1.) According to responses to public comments on the draft §303(d) List for the Central Valley region for 1998:

> The priority for developing an EC TMDL for the [SJR] has been elevated to high because of its significance to water quality impacts, staff and Board commitment to comply with the Bay/Delta Water Quality Control Plan, and increased stakeholder interest in salinity control on the River due to the serious water quality impacts experienced during the last drought.

(CVRWQCB 1998 Clean Water Act §303(d) Administrative Record, p236.)

Irrespective of the CVRWQCB's response to comments, there are no public comments or anything else indicating "increased stakeholder interest". Furthermore, no data or evidence documents "the serious water quality impacts experienced during the last drought." Even if there were discussions of water quality impacts experienced during the 1987-1992 drought, nothing in the administrative record indicates that EC measurements obtained during the 1987-1992 draught are sufficiently represent the LSJR Basin to support a §303(d) listing for EC. None of the references cited for revision of the 1998 §303(d) List even apply to, or specifically address, EC in the LSJR. (CVRWQCB 1998 Clean Water Act §303(d) Administrative Record, p1263-1267.) Nothing in the administrative record for the 1998 §303(d) listing cycle supported continued listing or cured the deficiencies in the 1996 listing of the LSJR for EC.

6.1.1.2.2. Evaluation of Lower San Joaquin River §303(d) Listing for Electrical Conductivity and Boron in 2002.

After 1998, the next revision of the §303(d) List occurred in 2003 when the SWRCB adopted the 2002 §303(d) List pursuant to Resolution 2003-0009. There have been no other revisions since then, and the 2002 §303(d) List has provided the basis for the draft §303(d) for 2006. (SWRCB, Revision of the Clean Water Act §303(d) List of Water Quality Limited Segments: Volume 1, Revision of the Clean Water Act Section 303(d) List of Water Quality Limited Segments (September 2005).)

The most significant change that occurred in the 2002 listing cycle divided the formerly 130-mile stretch from Mendota Pool to Vernalis into four segments. (Id.) The first was a 67-mile segment from Mendota Pool to Bear Creek, the second was a 14-mile segment from Bear Creek to Mud Slough, the third was a 3-mile segment from Mud Slough to the Merced River, and the fourth was a 43-mile segment from the Merced River to the South Delta boundary at Vernalis. (Id.) No explanation was given for this change. The majority of §303(d) documents for the 2002 listing cycle list the water quality limited segment as the 130-miles from Mendota Pool to Vernalis. Even the Salt & Boron TMDL described the water quality limited segment as 130 miles from Mendota Pool to Vernalis. (Salt & Boron TMDL, p1.)

The other change to the LSJR listing was rescheduling the TMDL end date from December 1999 to 2002. (CVRWQCB Final Staff Report on Recommended Changes to California's Clean Water Act §303(d) List (December 14, 2001) ("CVRQCB §303(d) Recommendations for 2002"), p11.) No other changes were made. (Id.) Since the Listing

Policy was not yet adopted, there were no “Do Not De-List” recommendations in 2002. However, analysis of water body-pollutant combinations for which no recommendations for any changes were made, were included by implication in the list of references for “Documents and References Reviewed that Did Not Provide Information to Support Changes to the 303(d) List” (CVRWQCB §303(d) Recommendations for 2002, p41.)

The two references relevant to EC at Vernalis, or the LSJR, are the “Water Quality of the Lower San Joaquin Rivers: Lander Avenue to Vernalis October 1995 - September 1997”, drafted by Chilcott and Grober in December, 1998, and “Water Quality of the Lower San Joaquin Rivers: Lander Avenue to Vernalis October 1997 - September 1998”, drafted by Chilcott, Grober, and Eppinger in May of 2000. Both limit their study area to the 60 miles from Lander Avenue, downstream to Vernalis. (Chilcott J.E., L.F. Grober, J.L. Eppinger, and A. Ramirez. 1998. Water Quality of the Lower San Joaquin River: Lander Avenue to Vernalis October 1995 - September 1997 (Water Years 1996-1997), CRWQCB-CVR (December 1998) (“Agricultural Drainage Contribution to Water Quality 1996-1997”), p1; Chilcott, J.E., L.F. Grober, A. Vargas, and J.L. Eppinger, Agricultural Drainage Contribution to Water Quality in the Grassland Watershed of Western Merced County, California: October 1997 - September 1999, CRWQCB-CVR (May 2000) (“Agricultural Drainage Contribution to Water Quality 1997-1998”) p1.) The water quality limited segment however, starts miles farther upstream at Mendota Pool.

Furthermore, both reports together only study Water Years 1996-1998, or October 1, 1995 through September 30, 1998. (Water Quality of the Lower San Joaquin River: Lander Avenue to Vernalis 1996 – 1997, p1; Water Quality of the Lower San Joaquin River: Lander Avenue to Vernalis October 1997 - September 1998, p1.) Water Years

1996-1998 were all Wet year types and are not representative of the historical range of climactic conditions experienced in the LSJR Basin. (see Appendix 1: Vernalis Flow and Water Quality Data.)

Since the reports do not evaluate the entire segment and the study period or historical range of climactic conditions experience in the LSJR Basin, neither alone, or even together, can cure the deficiencies in the 1996 §303(d) analysis listing the LSJR for EC, irrespective of their data, analyses, or conclusions. Other aspects of each report are discussed below.

6.1.1.2.2.1. Water Quality of the Lower San Joaquin Rivers: Lander Avenue to Vernalis October 1995 - September 1997.

"Water Quality of the Lower San Joaquin River: Lander Avenue to Vernalis 1996 - 1997" reported on the water quality monitoring program conducted by the CVRWQCB from October 1, 1995 through September 30, 1997. (Agricultural Drainage Contribution to Water Quality 1996-1997, p1.) The primary constituents evaluated included electrical conductivity, boron and selenium, with more limited analyses of molybdenum, copper, chromium, lead, nickel, zinc, chloride and sulfate. (Id.) According to the analysis of salt load and flow-weighted concentrations for each month of Water Year 1998, there were no exceedances of either the Vernalis Irrigation Season EC Objective or the Vernalis Non-Irrigation Season EC Objective. (Id., p29; see Table 4, *infra*.) Hence, water quality data would not have supported listing the LSJR. Water Quality of the Lower San Joaquin River: Lander Avenue to Vernalis 1996 – 1997 contains no other analysis or data applicable to listing the LSJR for EC on the basis of water quality objective exceedances.

Table 3: Monthly and Annual Discharge and EC for SJR near Vernalis for Water Years 1996 and 1997.[11] (Agricultural Drainage Contribution to Water Quality 1996-1997, p31 Table 12.)

Water Year 1996

Month	Flow (AF)	TDS	EC (dS/m)	Objective (dS/m)	Exceedance
Oct-95	351,608	156	0.24	1.0	No
Nov-95	158,354	386	0.60	1.0	No
Dec-95	155,033	450	0.70	1.0	No
Jan-96	165,085	454	0.71	1.0	No
Feb-96	6,169,320	166	0.26	1.0	No
Mar-96	889,332	136	0.21	1.0	No
Apr-96	429,270	209	0.33	0.7	No
May-96	512,661	129	0.20	0.7	No
Jun-96	236,197	322	0.50	0.7	No
Jul-96	152,134	403	0.63	0.7	No
Aug-96	143,371	369	0.58	0.7	No
Sep-96	143,756	329	0.51	1.0	No

Water Year 1997

Month	Flow (TAF)	TDS	EC (dS/m)	Objective (dS/m)	Exceedance
Oct-96	165,402	266	0.42	1.0	No
Nov-96	161,515	337	0.53	1.0	No
Dec-96	749,455	121	0.19	1.0	No
Jan-97	2,740,109	91	0.14	1.0	No
Feb-97	2,185,068	97	0.15	1.0	No
Mar-97	801,271	176	0.28	1.0	No
Apr-97	281,289	303	0.47	0.7	No
May-97	294,138	244	0.38	0.7	No
Jun-97	157,470	361	0.56	0.7	No
Jul-97	107,935	394	0.62	0.7	No
Aug-97	115,232	366	0.57	0.7	No
Sep-97	123,105	362	0.57	1.0	No

6.1.1.2.2.2. Water Quality of the Lower San Joaquin Rivers: Lander Avenue to Vernalis October 1997 - September 1998.

"Water Quality of the Lower San Joaquin River: Lander Avenue to Vernalis October 1997 - September 1998" reported on the water quality monitoring program conducted by the CVRWQCB from October 1, 1997 to September 30, 1998. (Agricultural Drainage Contribution to Water Quality 1997-1998, p1.) The report

[11] Table 11, from Agricultural Drainage Contribution to Water Quality 1997-1998 reported salinity as TDS. For Table 4, *supra,* EC values are shown in addition to TDS.

analyzed flows, discharges, and loading at different points along the LSJR. (Id.) As in the report detailing Water Years 1996 and 1997, the primary constituents evaluated included electrical conductivity, boron and selenium, with more limited analyses of molybdenum, copper, chromium, lead, nickel, zinc, chloride and sulfate. (Id.) According to the analysis of salt load and flow-weighted concentrations for each month of Water Year 1998, there were no exceedances of either the Vernalis Irrigation Season EC Objective or the Vernalis Non-Irrigation Season EC Objective. (Id., p29; see Table 4, *infra*.) Hence, water quality data would not have supported listing the LSJR. Water Quality of the Lower San Joaquin River: Lander Avenue to Vernalis October 1997 - September 1998 contains no other analysis or data applicable to listing the LSJR for EC on the basis of water quality objective exceedances.

Table 4: Monthly and Annual Discharge and EC for SJR near Vernalis for Water Year 1998.[12] (Agricultural Drainage Contribution to Water Quality 1997-1998, p29 Table 11.)

Month	Flow (TAF)	TDS	EC (dS/m)	Objective (dS/m)	Exceedance
Oct-97	166	282	0.44	1.0	No
Nov-97	118	386	0.60	1.0	No
Dec-97	130	538	0.84	1.0	No
Jan-98	370	232	0.36	1.0	No
Feb-98	1,561	164	0.26	1.0	No
Mar-98	1,190	207	0.32	1.0	No
Apr-98	1,305	155	0.24	0.7	No
May-98	1,103	114	0.18	0.7	No
Jun-98	1,057	90	0.14	0.7	No
Jul-98	811	102	0.16	0.7	No
Aug-98	335	210	0.33	0.7	No
Sep-98	343	156	0.24	1.0	No

[12] Table 11, from Agricultural Drainage Contribution to Water Quality 1997-1998 reported salinity as TDS. For Table 4, *supra,* EC values are shown in addition to TDS.

6.1.1.3. Evaluation of Lower San Joaquin River §303(d) Listing for Electrical Conductivity and Boron for the Draft Staff Report for the Revision of the Clean Water Act §303(d) List for 2006.

The Draft Staff Report for the Revision of the Clean Water Act §303(d) List for 2006 was released in September, 2005. The LSJR-EC and LSJR-Boron water body-pollutant combinations were not mentioned in the de-list recommendations or do not de-list recommendations. (SWRCB, Revision of the Clean Water Act §303(d) List of Water Quality Limited Segments: Volume 3, Revision of the Clean Water Act Section 303(d) List of Water Quality Limited Segments (September 2005); SWRCB, Revision of the Clean Water Act §303(d) List of Water Quality Limited Segments: Evaluation of Data and Information Related to the Clean Water Act Section 303(d) List of Water Quality Limited Segments: Water Body Fact Sheets Supporting "Do Not De-List" Recommendations (September 2005).)

6.1.2. The water quality sampling used to support the existence of LSJR impairment by salt and boron is biased.

In its TMDL documents describing the §303(d) impairment in the LSJR, the CVRWQCB repeatedly cites to frequent exceedances of the South Delta EC Objectives recorded from 1986 to 1998. (Salt & Boron TMDL: Appendix 1, p11.) During this period, the Vernalis Irrigation Season EC Objective was exceeded 49% of the time and the Vernalis Non-Irrigation Season EC Objective was exceeded 11% of the time. (Id.) No other sampling or other water quality data is ever referenced.

To list a water body for §303(d) impairment for "conventional" or "other" pollutants, the numerical water quality objective for EC must have been exceeded using the binomial distribution to reject the null hypothesis presented in Table 3.2 of the Listing Policy. (Listing Policy, §3.2; see Table 5, *infra*.) EC is classified as an "other" type of pollutant and therefore listed pursuant to §3.2 of the Listing Policy. (Listing Policy, §3.2.) Boron is classified as a toxic pollutant and listed pursuant to §3.1 of the Listing Policy. (Id., §3.2.)

> According to §4.2 of the Listing Policy:
>
> Numeric water quality objectives for conventional pollutants are exceeded as follows:
>
> - Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.2.

(Listing Policy, §3.2, see Table 5 *infra.*) The null hypothesis is defined as an exceedance frequency of no more than 10%. (Listing Policy, p10.) Hence, a water body can only be listed if the exceedance frequency of the applicable water quality objective is more than 10%. (Id.) If the exceedance frequency is more than 10%, then the water body "shall" be listed if the number of exceedances is equal to, or greater than, a value determined by the binomial distribution test. (Id.) §3.2 and Table 3.2 use compulsory language. Their application is mandatory, not discretionary.

Table 5: Minimum number of measured exceedances needed to place a water segment from the section § 303(d) List for conventional or other pollutants. (Listing Policy, §3 Table 3.2.)

Sample Size	List if Number of Exceedances Equal or Less Than
5 – 30	5*
31 – 36	6
37 – 42	7
43 – 48	8
49 – 54	9
55 – 60	10
61 – 66	11
67 – 72	12
73 – 78	13
79 – 84	14
85 – 91	15
92 – 97	16
98 – 103	17
104 – 109	18
110 – 115	19
116 – 121	20

Null Hypothesis: Actual exceedance proportion ≤ 10 percent.
Alternate Hypothesis: Actual exceedance proportion >25 percent.
The minimum effect size is 15 percent.

Application of the binomial test requires a minimum sample size of 26. The number of exceedances required using the binomial test at a sample size of 26 is extended to smaller sample sizes.

For sample sizes greater than 121, the maximum number of exceedances allowed is established at α and $\beta < 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(n-k, n, 1 – 0.10, TRUE)
β = Excel® Function BINOMDIST(k-1, n, 0.25, TRUE)
where n = the number of samples,
k = maximum number of measured exceedances allowed,
0.10 = acceptable exceedance proportion, and
0.25 = unacceptable exceedance proportion.

The period from 1987 to 1992, half of the years referenced, was one of the longest, most severe droughts on record in California. From 1986 to 1998, there were six Wet years and seven Critical years. (Periodic Review SJRG-07, p32.) Six of the Critical years were consecutive. (Id.) Critical years occurred in almost 54% of the years from 1987 to 1998. (Id.)

A survey of the historical period from 1922 to 1994, the period used by CALSIM II and other planning models, paints a completely different picture. Over the 73 years period, there were twenty Wet years, fourteen Above-Normal years, twelve Below Normal Years, eleven Dry years, and sixteen Critical years. (Id., p24.) This would translate to a frequency of approximately 27% for Wet years, 19% for Above-Normal years, 16% for Below-Normal years, 15% for Dry years, and 22% for Critical years. The historical record is completely different from the time period used to support existing impairment in the SLJR Basin.

Furthermore, exceedances did not occur at the same rate throughout the year. The exceedance frequency during the non-irrigation season was only 11%, which would be insufficient to list the LSJR for EC. Even assuming the period from 1987 from 1998 accurately represents the historical LSJR Basin, under Table 3.2 of the Listing Policy, the exceedance frequencies would be insufficient to list the LSJR during the non-irrigation season.

The historical record also shows that consecutive Critical years have occurred only four times in California - from 1929-1931, 1960-1961, 1976-1977, and 1987-1992. From 1929 to 1931 there were three consecutive Critical years, from 1960 to1961 there were two consecutive Critical years, from 1976 to 1977 there were two consecutive Critical years, and from 1987 to 1992 there were six consecutive Critical year sequences. (Id., p32.) The 1987 to 1992 period is twice as long as any other consecutive period of Critical years on record. It is not only unique among all years on record, but unique among Critical years. The period from 1986 to 1998 only represents the worst case scenario for the LSJR Basin, but not the historic Basin. Under §6 of the Listing Policy, the period from 1986 to 1998 cannot be used to list the LSJR for impairment.

6.1.3. The Vernalis Electrical Conductivity Objectives at Vernalis do not spatially represent the impaired water body.

According to §6.1.5.3 of the Listing Policy, data used to list a water-body pollutant combination must geographically represent the water body. If the data set originally used to list the water body does not geographically represent the water body, the data set and resulting analysis falls short of the data quality assurance and data quality control guidelines contained in §6 of the Listing Policy and results in a "faulty analysis." Under §4 of the Listing Policy, a water body listed due to a unrepresentative geographic data has been listed due to a "faulty analysis" and therefore must be de-listed.

The Vernalis EC Objectives were specifically designed to protect agricultural beneficial uses in the South Delta, based on the crops, soils, and conditions prevalent in the South Delta. (D-1641, p79.) Since Vernalis is the southern boundary of the legal Delta, the Vernalis EC Objectives do not apply to the 130-mile segment of the LSJR from Mendota Pool to downstream to Vernalis. Water quality data from Vernalis therefore could not be used to determine whether the LSJR from Mendota Pool to Vernalis.

The LSJR Basin includes portions of the counties of Fresno, Madera, Merced, San Joaquin, and Stanislaus. (Salt & Boron TMDL, p11.) Soil types, weather patterns, and other conditions along this segment may vary significantly from the South Delta. Consequently, the maintenance or exceedance of EC objectives developed based on South Delta soils, South Delta weather, and South Delta crops would not indicate whether agricultural beneficial uses in the LSJR Basin are protected or impacted.

Furthermore, flows from the Tuolumne, Merced, and Stanislaus River, in addition to Mud Slough and Salt Slough could contribute to significantly different conditions within the segment itself.

Agricultural practices, and as a result, the water quality necessary to protect agricultural beneficial uses may also change significantly along the segment from Mendota Pool to Vernalis. The Technical Report for WQO 85-1 for example, recommended an EC objective of 3.0 dS/m from Salt Slough to Hills Ferry based on the historic water quality and agriculture practices of that region, but recommended an EC objective of 0.7 dS/m in the South Delta. (Regulation of Agricultural Drainage to the San Joaquin River: Final Report, SWRCB Order No. WQ 85-1. August 1987 ("Technical Report for WQO 85-1"), pVIII-16.)

Currently, there are no EC objectives for the segment of the LSJR upstream from Vernalis. (Salt & Boron TMDL, p3.) Nevertheless, the Vernalis EC Objectives have been used for basin planning and in development of TMDLs for the LSJR from Mendota Pool downstream to Vernalis. (Salt & Boron TMDL, p2.)

6.1.4. The water quality sample used to justify impairment of the LSJR by salt and boron does not represent the current Basin.

The Listing Policy requires that data used to list a water body-pollutant combination temporally represent the water body. (Listing Policy, §6.1.5.3.) If the data set originally used to list the water body does not represent current conditions in the water body, it no longer temporally represents the water body. The data set and resulting analysis would fall short of the data quality assurance and quality control guidelines contained in §6 of the Listing Policy and now result in a "faulty analysis."[13] Under §4 of the Listing Policy, if a water body was listed due to a "faulty analysis" shall be de-listed. Since the language used is mandatory, the SWRCB has no discretion to keep such a water body on the §303(d) List.

As the CVRWQCB has acknowledged, historical flow and water quality data is not indicative of future trends due to substantial operations and regulatory changes in the LSJR Basin.

> Though extensive historical flow data is available for the LSJR, use of the historical flow data is inherently flawed because numerous structural and operational changes have affected LSJR hydrology over time, therefore past hydrologic conditions are not necessarily a good indicator of future conditions.[14]

(CVRWQCB, Amendments to the Water Quality Control Plan For the Sacramento River and San Joaquin River Basins for the Control Of Salt And Boron Discharges Into the Lower San Joaquin River, Final Staff Report of the Regional Water Quality Control Board, Central Valley Region, Appendix 5: Technical Evaluation of Alternatives, September 10, 2004 ("Salt & Boron TMDL: Appendix 5"), p3; see Vernalis Flow and Water Quality Data.)

Many new programs were implemented after adoption of the 1995 WQCP and D-1641. Some were specifically intended to solve, or at least diminish, the EC problem. At a minimum, these radical changes demand a reevaluation of the LSJR's §303(d) status for EC. Some of the most significant programs and regulatory changes are discussed below.

[13] In order to keep the water body- pollutant combination on the § 303(d) List it must be proved that current conditions in the water body still require listing. (Draft Staff Report Supporting the Recommended Revisions to the Clean Water Act §303(d) List; Volume 1 (September 2005); p11.)

[14] The Listing Policy requires evaluation of all readily available data. (Listing Policy, §6.1.) Data demonstrating the lack of impairment, as defined by §4.2 of the Listing Policy, was not only "readily available", but known. Under §6.1 of the Listing Policy, reconsideration of the LSJR's status was required. (Id.)

6.1.4.1. D-1641.

D-1641 implemented the South Delta EC Objectives for the first time. Prior to the adoption of D-1641, specific water right permit terms or conditions required salinity control.

D-1641 implemented the South Delta EC Objectives for the first time and allocated responsibility for their implementation. The SWRCB determined that the Central Valley Project ("CVP") was the primary cause of exceedances of the Vernalis EC Objectives. (D-1641, p83.) Consequently, the SWRCB amended the CVP permits to require that the USBR meet the Vernalis EC Objectives using "any means available to it." (Id., p89.) The USBR was given wide latitude in choosing how to achieve the Objectives, (Id.) D-1641 also required the DWR and USBR meet the EC objectives at Brandt Bridge, Old River near Middle River, and Old River at Tracy Road Bridge. (Id.)

If the DWR and USBR violate, or threaten to violate, the terms and conditions of their permits, the SWRCB may order them to cease and desist from their violations. (Water Code §1831.) Then, if the DWR and USBR fail to comply with an order to cease and desist from violating their permit terms and conditions, they may liable for up to $1,000 per day that the violation occurs. (Water Code §1845(b)(1).) The SWRCB may also seek civil liability or request further action by the Attorney General, who "shall" petition for prohibitory of mandatory injunctive relief, which may include temporary restraining orders, preliminary injunctions, or permanent injunctions. (Water Code §1845.) Having allocated responsibility through D-1641, the SWRCB now has a power enforcement tool at its disposal to help ensure water quality objectives are achieved and beneficial uses protected.

6.1.4.2. New Melones Interim Plan of Operations.

Although the USBR may use sources of dilution flows other the New Melones to reduce EC in the Delta, it has historically met its responsibility for salinity control in the Delta by releasing water from New Melones. (D-1641, p79, 83.) Since 1997, the USBR has operated New Melones Reservoir pursuant to the Interim Plan of Operations ("IPO"). (Long Term Central Valley Project Operations Criteria and Plan Biological Assessment ("CVP-OCAP-BA") (June 30, 2004), p2-49.) The IPO defines categories of water supply and based on storage and projected inflow then allocates annual water releases for CVP contracts and in-stream fishery enhancement, water quality, and Vernalis flow requirements required in D-1641. (Id.) The IPO supports meeting the Vernalis flows from the Stanislaus required in D-1641 when water conditions are determined to be in a "high" or "medium-high" IPO designation with up to 75 TAF of water. (Id., p2-50; see Table 6 and Table 7, *infra.*) If the Vernalis EC Objectives cannot be met using the IPO, then additional water is used to achieve compliance. (Id.)

Table 6: Inflow characterization for the New Melones Interim Plan of Operations. (Id.)

Annual Water Supply Category	March-September Forecasted Inflow Plus End of February Storage (TAF)
Low	0-1400
Medium-Low	1400-2000
Medium	2000-2500
Medium-High	2500-3000
High	3000-6000

Table 7: New Melones Interim Plan of Operations Flow Objectives (TAF). (Id.)

Storage Plus Inflow		Fishery		South Delta EC Objectives		Bay-Delta		CVP Contractors	
From	**To**	**From**	**To**	**From**	**To**	**From**	**To**	**From**	**To**
1400	2000	98	125	70	80	0	0	0	0
2000	2500	125	345	80	175	0	0	0	59
2500	3000	345	467	175	250	75	75	90	90
3000	6000	467	467	250	250	75	75	90	90

The IPO is a standard operating procedure, but not a legal obligation. New Melones must comply with its permit obligations before allocations can be made to Central Valley Project Improvement Act ("CVPIA") §3406(b)(2)[15] uses or CVP contracts. (Id.; see also CVPIA, Publ. Law No. 102-575 §3406(b) 106 Stat 4600, 4604 (October 30, 1992).) In water years 2002, 2003, and 2004, the USBR deviated from the IPO to provide additional releases for Vernalis EC Objectives and Vernalis flow standards. (Id.)

6.1.4.3. Grasslands Bypass Project.

The purpose of the Grasslands Bypass Project is to reduce selenium discharges, but there was a decrease of salt discharges between 1995 and 1997 of almost 100,000 tons per year. (D-1641, p84.) The Grasslands Bypass Project transports selenium-laden agricultural subsurface drainage and tail water, as well as storm water, from 97,000 acres in the Grassland Watershed. (Id., fn51.) The project conveys drainage water to the SJR via the southern 28 miles of the San Luis Drain. (Id., fn51.)

As part of the project, Grasslands area farmers manage discharges of subsurface drainage water through sump management - the regulation of water levels in sumps by shutting sumps off at times. (Id., p84.) The farmers also recycle their subsurface drainage

[15] CVPIA §3406(b)(2) releases from New Melones consist of the portion of the fishery flow management volume utilized beyond agreements with the Department of Fish and Game and the volume used for base flows at Vernalis (Id.)

water onto their fields, although this requires careful management to avoid crop damage. (Id.)

Since the implementation of the Grasslands Bypass Project, flows have decreased from 58 TAF to 30 TAF and salt loads have been reduced from 210,000 tons to 117,000 tons. (USBR-DWR SWRCB CDO Proceeding; DWR-18, p7.)

6.1.4.4. Westlands Water District Source Controls.

Westlands Water District has implemented similar source-control measures similar to those implemented for the Grasslands Bypass Project.

6.1.4.5. Vernalis Adaptive Management Program ("VAMP") and SJR Agreement ("SJRA").

The VAMP experiment is designed to assess the effect of export pumping at various specific river flows, which range from 3,200 cfs to 7,000 cfs. (D-1641, p19.) Under the VAMP experiment, the flows at Vernalis during the April-May pulse flow period could be lower than is required by the objectives in the 1995 WQCP, and the export pumping rates would be lower than the pumping rates allowed in the 1995 WQCP. (Id.)

The SJRA allocates responsibility for meeting the April-May pulse flow objectives in the 1995 WQCP for twelve years to certain water right holders in the watershed of the SJR. (Id., p17.) It also provides for supplemental flows at other times of the year. (Id.) The SJRA provides a mechanism for conducting the VAMP, an experiment to determine the relative impact of flow in the SJR and exports in the Delta on Chinook salmon in the LSJR. (Id.)

6.1.4.6. Temporary Barrier Project.

The South Delta Temporary Barriers Project ("TBP") was initiated as a test project in 1991. (DWR, South Delta Improvements Package, Temporary Barrier Project Information.) The TBP consists of four rock barriers across four South Delta channels – the Head of Old River Barrier ("HORB"), the Old River near Tracy barrier ("ORTB"), the Middle River Barrier ("MRB"), and the Grant Line Canal Barrier ("GLCB"). (Id.)

The HORB serves as a fish barrier and has operated in most years between September 15 and November 30 and April 15 and May 30. (Id.) The other three barriers serve as agricultural barriers and are installed April 15 and September 30 each year. (Id.) The MRB has operated since 1987, the ORTB since 1991, and the GLCB since 1996, when all four barriers were operated for the first time. (Id.) The barriers are not installed in high-flow years such as 1998.

The TBP has substantially impacted the LSJR Basin. The three agriculture barriers have improved water levels and water circulation in the South Delta channels and consequently, water quality. (Id.) The HORB has improved migration conditions for SJR salmon, as will as EC and flows at Vernalis and dissolved oxygen in the Stockton Deep Water Ship Channel. (Id.; Periodic Review SJRG Exh-04: Evaluation of Revised Salinity Standards at Vernalis ("Periodic Review SJRG-04").)

The TBP was extended for five years in 1996 and again for seven years in 2001. (Id.) Continued installation of the barriers will allow DWR to perform further monitoring, as required, to determine potential hydraulic effects on South Delta channels and biological effects on vegetation and fisheries within the south Delta. (Id.) Information gathered will be used to aid development of long-term solutions to agricultural water supply problems and improvements to salmon migration. (Id.) The TBP will also allow DWR to improve permanent barrier designs and review alternative timing operations for permanent barriers, which are a major component of the South Delta Improvements Program ("SDIP").

The permanent barriers will offer operational flexibility that the TBP does not. The permanent barriers will include radial gates that can be easily opened on the flood portion of the tide and closed on the ebb tide. (D-1641, p9.) Operators will be able to respond quickly to real-time monitoring results regarding fish, water levels, and water quality. (Id.) Additionally, the permanent barriers will not require annual installation and will be able to withstand higher flows than the temporary barriers. (Id.)

A site-specific Draft Environmental Impact Report /Environmental Impact Statement was issued in November, 2005. (DWR, South Delta Improvements Package, Long-Term Solutions.) The USBR and DWR plan to complete the public review of the Draft EIS/EIR in January 2006 and approve a final version by summer 2006. (Department of Water Rights SWRCB Cease and Desist Order Exhibit 23, p4.) Construction of the gates would be completed by 2009. (Id.)

6.1.4.7. Central Valley Improvement Act §3406(b)(2) Releases

CVPIA §3406(b)(2) authorized and directed the Secretary of the Interior to dedicate and manage annually 800 TAF of CVP yield for the primary purpose of implementing the fish, wildlife, and habitat restoration purposes and measures authorized by CVPIA, to assist the State of California in its efforts to protect the waters of the San Francisco Bay/Sacramento San Joaquin Delta Estuary, and to help to meet such obligations as may be legally imposed upon the CVP under State or Federal law following the date of enactment of CVPIA, including but not limited to additional obligations under the Federal Endangered Species Act. (Federal Register: January 2, 2003 (Volume 68, Number 1), p128.) §3406(b)(2) effectively requires the USBR to commit at least 800 TAF to the LSJR for wildlife habitat. However, since the §3406(b)(2) releases increase flows in the LSJR, they increase assimilative capacity and have the collateral benefit of improving water quality.

6.1.4.8. FERC Flows.

Under the §10(j) of the Federal Power Act ("FPA"), in deciding whether to issue a license, the Federal Energy Regulatory Commission ("FERC") must give equal consideration to developmental and environmental values. (18 Code of Federal Regulations ("CFR") 4.34(e)(1); 18 CFR 5.26(a).) Environmental values include fish and wildlife resources and their spawning grounds and habitat. (Id.) Consequently, FERC must include conditions to adequately and equitably protect, mitigate damage to, and enhance fish and wildlife, based on recommendations of state fish and wildlife agencies. (Id.)

As a term of its FERC license and requirement of its 1995 FERC Settlement Agreement, the New Don Pedro Project must maintain minimum instream flows on the Tuolumne River below La Grange Dam, an expanded fish monitoring program, a salmon and riparian habitat restoration program coordinated and administered through the Tuolumne River Technical Advisory Committee. The FERC Settlement Agreement identified new minimum flow standards for different water-year types and a general framework for evaluating the efficacy of these flows. (see Table 8, *infra.*) All participants to the settlement would also work collectively to obtain additional flows on the Tuolumne River.

The FERC flows increase flows on the Tuolumne River. Since the Tuolumne is a tributary to the SJR, the FERC flows contribute to increased flow on the SJR and at Vernalis. Although the flows are released to improve fish habitat, the increased flow increased assimilative capacity and, consequently, water quality.

Table 8: 1995 FERC Settlement Agreement Flow Schedule for Tuolumne River(cfs)

Schedule	October 1-October 15	Attraction Pulse Flow	October 16 – May 31	Out-migration Pulse Flow	June 1 – Sept. 30	Volume (AF)
Days	15		228		122	365
Critical & BN	100	None	150 cfs	11,091 AF	50 cfs	94,000
Median Critical	100	None	150 cfs	20,091 AF	50 cfs	103,000
Intermediate C-D	150	None	150 cfs	32,619 AF	50 cfs	117,016
Median D	150	None	150 cfs	37,060 AF	75 cfs	127,507
Intermediate D-BN	180	1,675 AF	180 cfs	35,920 AF	75 cfs	142,502
Median BN	200	1,736 AF	175 cfs	60,027 AF	75 cfs	165,002
Intermediate BN-AN	300	5.950 AF	300 cfs	89,882 AF	250 cfs	300,923
Median AN	300	5.950 AF	300 cfs	89,882 AF	250 cfs	300,923
Intermediate AN-W	300	5.950 AF	300 cfs	89,882 AF	250 cfs	300,923
Median W/Maximum	300	5.950 AF	300 cfs	89,882 AF	250 cfs	300,923

6.2. New modeling with current LSJR conditions shows the water quality objectives always could have been met.

As presented by Dan Steiner, the latest modeling of the San Joaquin River Basin represented in CALSIM II ("CALSIM II-Revised") is the product of over three years of refinement and enhancement of prior models used to simulate the hydrology and water resource operations of the LSJR Basin. (Periodic Review SJRG-07, p17.)

CALSIM II-Revised first analyzes "Maze", which is upstream from the confluence of the SJR and Stanislaus River and drives conditions at Vernalis. (Id., p14; see Figure 5, *infra*.) At Maze, CALSIM II-Revised captures the effects of upstream operations of the Merced River and Tuolumne River in addition to occasional flow from the upper SJR and Kings River. Then, it analyzes water quality using a new mass balance approach. (Id.) Finally, it presents results for Vernalis. (Id.; see Figure 6, *infra*.)

Figure 5: Electrical Conductivity at Maze simulated by CALSIM II-Revised.[16] (Periodic Review SJRG Exh-13: Power Point presentation, CALSIM II - San Joaquin River Basin Refinements and Results, p15.)

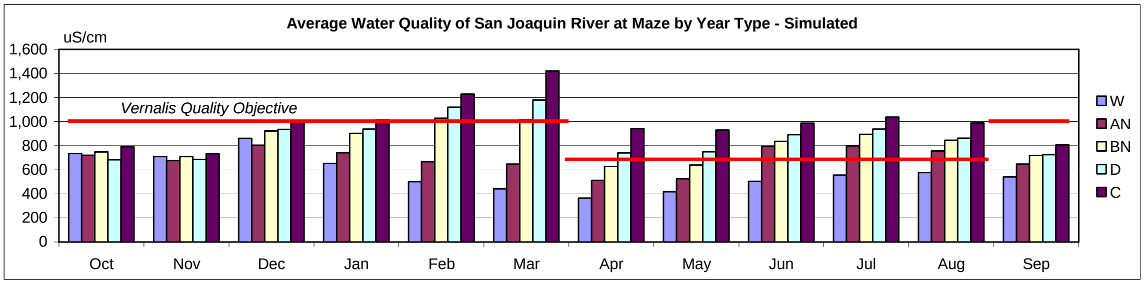
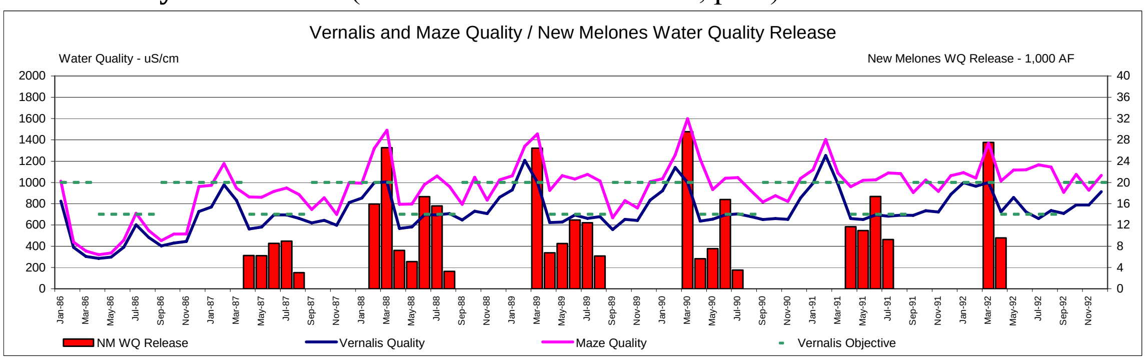


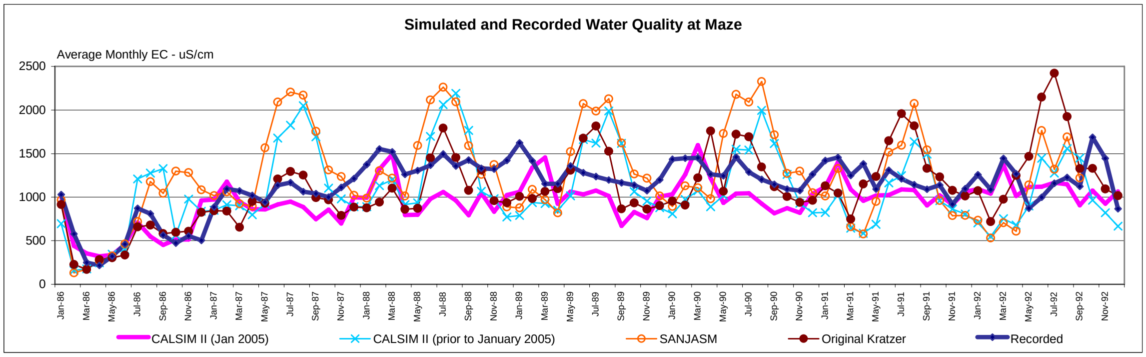
Figure 6: CALSIM II-Revised simulation of San Joaquin River Electrical Conductivity at Vernalis. (Periodic Review SJRG-13, p20.)

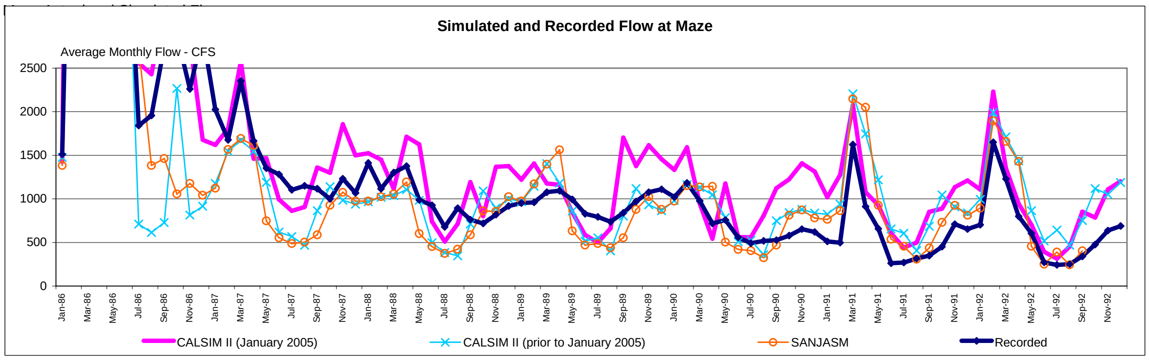


CALSIM II-Revised significantly improves on prior modeling efforts. SANJASM, the original Kratzer equation, and prior versions of CALSIM II all overestimated salinity at Maze, and in turn overestimated releases from New Melones for water quality. (Id., p19.) These prior models overstated salt loading in the LSJR occurring in the summer months, exaggerated the LSJR salinity problem, and led the SWRCB to believe a serious problem existed. (Id., p19-20; see Figure 7, *infra*.)

[16] Note that EC is depicted in “uS/cm.” For purposes of conversion, 1000 uS/cm = 1 dS/m.

Figure 7: Comparison of CALSIM II-Revised to Electrical Conductivity and flow at Maze simulated by previous models and to historical water quality and flow.[17] (Periodic Review SJRG-13, p17.)





CALSIM II-Revised incorporates current river and water resource management methods, and, as a result, simulates different conditions. (Id., p20.) CALSIM II-Revised also incorporates the effects of new projects, such as the VAMP, the Grasslands Bypass Project, and the IPO, which have changed the river's hydrology from conditions existing in the past. It has been refined and calibrated against recent recorded data, and more accurately models current river hydrology and actual salinity conditions. (Id.) These changes are captured by CALSIM II-Revised and demonstrate the extent that new programs and regulatory changes implemented since 1995 have radically changed the hydrology of the LSJR. As a result, water sampling data for the LSJR prior to 1995 do not represent current conditions.

[17] Note that EC is depicted in "uS/cm." For purposes of conversion, 1000 uS/cm = 1 dS/m.

Under the Listing Policy, such data is now considered "faulty" and leads to improper conclusions regarding the status of the LSJR. The LSJR must be removed from the § 303(d) List for EC and boron.

6.3. There Has Been One-Hundred Percent Compliance With the Vernalis Electrical Conductivity Objectives for Ten Years.

According to §4.2 of the Listing Policy:

> Numeric water quality objectives for conventional pollutants are not exceeded as follows:
> - Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 4.2.
> - The binomial distribution cannot be used to support a delisting with sample sizes less than 26

(Listing Policy, §4.2, see Table 9 *infra.*) Hence, if the number of exceedances is no more than the value determined by the binomial distribution test, the water body "shall" be de-listed. (Id.) §4.2 and Table 4.2 use compulsory language. Their application is mandatory, not discretionary.

Table 9: Maximum number of measured exceedances allowed to remove a water segment from the section § 303(d) List for conventional or other pollutants. (Listing Policy, p15.)

Sample Size	De-List if Number of Exceedances Equal or Less Than
26 – 30	4
31 – 36	5
37 – 42	6
43 – 48	7
49 – 54	8
55 – 60	9
61 – 66	10
67 – 72	11
73 – 78	12
79 – 84	13
85 – 91	14
92 – 97	15
98 – 103	16
104 – 109	17
110 – 115	18
116 – 121	19

The binomial distribution cannot be used to support a delisting with sample sizes less than 26.

Null Hypothesis: Actual exceedance proportion ≥ 25 percent.
Alternate Hypothesis: Actual exceedance proportion < 10 percent.
The minimum effect size is 15 percent.

For sample sizes greater than 121, the maximum number of exceedances allowed is established at α and $\beta < 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(k, n, 0.25, TRUE)
β = Excel® Function BINOMDIST(n-k-1, n, 1 – 0.1, TRUE) where n = the number of samples,
k = maximum number of measured exceedances allowed,
0.10 = acceptable exceedance proportion, and
0.25 = unacceptable exceedance proportion.

There have been no exceedances of the Vernalis EC Objectives since 1995. [18] (Vernalis Flow & Water Quality Data.) The South Delta EC Objectives are based on a 30-day running average, which over nearly ten years, constitutes over 3,500 samples.

[18] CVRWQCB Staff has acknowledged consistent, unflagging compliance with the South Delta Objectives. (CVRWQCB Responses to Comments for Amendments to the Basin Plan for the Control of Salt and Boron (July 2004), p12.)

(Listing Policy, §4.2.) Since there has been perfect compliance for ten years, the LSJR must be removed from the § 303(d) List.

CVRWQCB has acknowledged that the Vernalis EC Objectives have been met, without fail, since 1995, but dispute whether the period accurately represents the full range of climatic and hydrologic conditions that may occur in the LSJR. (CVRWQCB Responses to Written Public Comments on the November 2003 Draft Staff Report for Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the LSJR (July 2004), p12.) However, using CALSIM II-Revised to simulate historic conditions with current river and water resource management practices shows that in the 73-year period from 1922 to 1994, 15 exceedances of the Vernalis Irrigation Season EC Objective would have occurred if New Melones were operated with strict adherence to the IPO. (Id., p12-13; see Table 10, *infra*.) Of the 15 months with exceedances, 10 would have occurred in the irrigation season. (Id.)

There are a total of 876 months over the period from 1922 to 1994. This equates to 876 "samples." Hence, application of the binomial distribution test pursuant to §4.2 would require de-listing if no more than 145 exceedances occurred during this period. (see Appendix 3: §303(d) Exceedance Tables.) Since under current conditions and current operations, there would have been only 15 exceedances, the LSJR must be de-listed for EC. (Id., p12-13.)

Table 10: Exceedances of the objective at Vernalis simulated by CALSIM II-Revised with current LSJR hydrology.[19] (Periodic Review SJRG-13, p21.)

Average Monthly Water Quality at Vernalis - Simulated (uS/cm)

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1935	C	C	C	C	1080	C	C	C	C	C	C	C
1961	C	C	C	C	1058	C	C	C	C	C	717	C
1977	C	C	C	C	C	C	C	C	C	C	710	C
1988	C	C	C	C	C	C	C	C	C	C	708	C
1989	C	C	C	C	1207	C	C	C	C	C	C	C
1990	C	C	C	C	1139	C	C	C	C	C	C	C
1991	C	C	C	C	1253	C	C	C	C	C	C	C
1992	C	C	C	C	C	C	749	1011	723	C	737	C
1994	C	C	C	C	C	C	C	C	735	718	725	C

Notes: "C" means water quality was within compliance for month. Exceedence during April or May is during non-pulse flow period.

Water Quality Objective - uS/cm

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1000	1000	1000	1000	1000	1000	700	700	700	700	700	1000

Estimated Additional New Melones Release Needed to Provided Water Quality Compliance - 1,000 acre-feet

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1935					10							
1961					7						2	
1977											1	
1988											1	
1989					20							
1990					15							
1991					22							
1992							6	21	1		3	
1994									4	1	2	

End of Month New Melones Storage - 1,000 acre-feet

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1935	584	580	583	616	640	690	820	1012	1127	1074	1001	958
1961	1201	1216	1231	1239	1243	1224	1186	1132	1079	1023	966	934
1977	1448	1444	1436	1428	1400	1339	1273	1209	1181	1124	1069	1047
1988	1443	1424	1410	1414	1404	1361	1298	1222	1182	1145	1109	1081
1989	1045	1029	1022	1020	1029	1079	1047	1002	984	932	882	886
1990	906	908	923	936	952	920	856	786	733	676	633	609
1991	598	580	589	587	584	626	594	558	521	461	404	385
1992	382	371	386	400	450	467	441	361	308	252	194	166
1994	716	738	772	802	825	775	723	675	619	552	490	455

The largest exceedance of the Vernalis Irrigation Season EC Objective, and the largest exceedance of either of the Vernalis EC Objectives in the entire 73-year period, would have occurred in May, 1992, when the Vernalis Irrigation Season EC Objective was exceeded by 0.311 dS/m.[20] (Id.) All other exceedances of the Vernalis Irrigation Season EC Objective would have exceeded the objective by less than 0.05 dS/m. (Id.) Meeting the Vernalis Irrigation Season Salinity Objective in May, 1992, would have

[19] Only violations of the Objective are shown. Violations are shaded pink. For purposes of conversion, 1000 uS/cm = 1 dS/m.

[20] Despite the exceedance in May, 1992, yields for dry beans, the most salt-sensitive crop grown in the south Delta, were far above the mean yield for San Joaquin County. (Periodic Review SJRG Exh-05: Article, The Economic Impacts of Reducing Corn and Dry Bean Yields in a Portion of San Joaquin County, California (Periodic Review SJRG-05, p56.) 1992 was also a Critical year type following five consecutive Critical years. (Periodic Review SJRG-07, p32.)

required 21,000 AF of water, but all other violations would have required 1,000 AF to 6,000 AF of additional water.[21] (Id.)

For every exceedance, New Melones had more than sufficient water available in storage to achieve the Vernalis EC Objectives. The USBR uses the IPO to determine when to release water from New Melones and how much water to release when a release is made. (Bay-Delta Hrg. Tr. Lowell Ploss, p195-196 (April 21-22, 1998).) Additionally, the IPO projects how much water New Melones will retain in storage for the remainder of each year. (Id.) By managing releases and storage, the IPO can insure an adequate supply of water in the event of a prolonged drought. (Id.) As Mr. Lowell Ploss, then the head of CVP operations for the United States Bureau of Reclamation ("USBR"), stated in D-1641, the USBR would do everything possible to meet salinity objectives. (D-1641; Bay-Delta Hrg. Tr. Lowell Ploss, p6553-6554 (November 10, 1998).) Since 1995, the USBR has met, or exceeded, the Vernalis EC Objectives. (Declaration of Daniel B. Steiner, CVRWQCB Responses to Comments for Amendments to the Basin Plan for the Control of Salt and Boron, p12.)

The Salt & Boron TMDL does not completely analyze EC over the 73-period. The Problem Statement in the TMDL documents is limited to the period from 1986 to 1998. (Salt & Boron TMDL: Appendix 1, p11.) Furthermore, the CVRWQCB analysis only cites exceedance frequency as exceedances of the Vernalis Irrigation Season and Non-Irrigation Season EC Objectives, but not an overall frequency of exceedance. (Id.) Even the CVRWQCB evaluation of alternatives limits the projected exceedance rate to

[21] The average amount of water required to meet the Summer Vernalis for all 10 of the irrigation season violations would have been 8,400 AF. If the violation in May, 1992, is excluded, the average amount of water required would have been 2,333 AF.

year types by irrigation season and non-irrigation season. (Salt & Boron TMDL: Appendix 5, p21; see also Appendix 1: Vernalis Flow and Water Quality Data.)

The CVRWQCB used a combination of two models, the Department of Water Resources Simulation ("DWRSIM") and San Joaquin River Input-Output ("SJRIO") model, to develop the Salt & Boron TMDL and simulate the proposed alternative programs of implementation, including the "no project" alternative, which represented current conditions. (Salt & Boron TMDL: Appendix 5, p1.) DWRSIM is a generalized planning model that is designed to simulate the river and reservoir systems upstream of the Sacramento and San Joaquin River Delta, Delta export operations, and the SWP and the CVP conveyance systems in the export areas. (Id., p2.) When the CVRWQCB Staff conducted its analysis, DWRSIM had just been replaced by CALSIM. (Id.) Since then, CALSIM II has replaced CALSIM and now, CALSIM II-Revised is slated to replace CALSIM II. (Periodic Review SJRG Exh-07, p17.) SJRIO was originally developed for the Technical Report for WQO 85-1, and subsequently calibrated and tested with equations developed by Kratzer et al. (Salt & Boron TMDL: Appendix 5, p4.)

In its modeling, the CVRWQCB simulated water quality and projected exceedances in monthly time steps. (Salt & Boron TMDL: Appendix 5, p2.) If the projected frequency of exceedances projected by the CVRWQCB for each year type and season are multiplied by the number of months of each type of season in each year type, a more complete picture emerges (see Table 11, *infra.*) Under modeling conducted by the CVRWQCB, exceedances would have occurred in approximately 70 months during the irrigations seasons from 1922 to 1994. (Id., p16.) Approximately 60 exceedances would have occurred in the non-irrigation seasons. (Id.) Hence, exceedances would have occurred in a total of approximately 129 months from 1922 to 1994. (Id.) Since the 129 projected exceedances is less than the threshold value of 145 calculated by the binomial distribution test pursuant to Table 4.2 of the Listing Policy, even analysis by the CVRWQCB shows that the LSJR must be de-listed for EC. (see Appendix 3: §303(d) Exceedance Tables.)

If the sampling period is extended to 2004, the number of samples increases to 996. For sample sizes of 996, the binomial distribution test requires de-listing if the exceedance frequency is 165 or less. (see Appendix 3: §303(d) Exceedance Tables.) The CVRWQCB modeling for the Salt & Boron TMDL, predicts that if the sample period is increased by ten years to 2004, 10 additional exceedances would have occurred, even though, under actual conditions, no additional exceedance occurred. (Salt & Boron TMDL: Appendix 5, p21; Table 11, *infra*.) Hence, the total number of exceedances from 1922 to 2004 would have been 139. (Id.) Since the 139 projected exceedances is less than the threshold value of 165 calculated by the binomial distribution test pursuant to Table 4.2 of the Listing Policy, analysis by the CVRWQCB shows, once again, that the LSJR must be de-listed for EC.[22] (see Appendix 3: §303(d) Exceedance Tables.)

[22] DWRSIM, like all of CALSIM II-Revised predecessor's, overestimates EC at Vernalis. (Periodic Review SJRG Exh-07, p17-20.) As a result, the number of exceedances that would have occurred under actual conditions from 1922 to 1994 and from 1922 to 2004 is even lower.

Table 11: Central Valley Regional Water Quality Control Board Comparison of Modeled Salinity Exceedance Rates. (Salt & Boron TMDL: Appendix 5, p21; see also Appendix 1: Vernalis Flow and Water Quality Data; see also Listing Policy, Tables 3.2 and 4.2.)[23]

1922-1994 Period			Irrigation Season		Non-Irrigation Season	
Year Type	Years	Months	% Exceedances	# Exceedances	% Exceedances	# Exceedances
C	16	192	40	38	34	33
D	11	132	18	12	14	9
BN	12	144	13	9	15	11
AN	14	168	9	8	7	6
W	20	240	2	2	1	1
Total	73	876	16	70	14	60
			Total %	15	Total #	129

1922-2004 Period			Irrigation Season		Non-Irrigation Season	
Year Type	Years	Months	% Exceedances	# Exceedances	% Exceedances	# Exceedances
C	16	192	40	38	34	33
D	14	168	18	15	14	12
BN	13	156	13	10	15	12
AN	16	192	9	9	7	7
W	24	288	2	3	1	1
Total	83	996	15	75	13	64
			Total %	14	Total #	139

The §6.1 of the Listing Policy requires that "All readily available data and information shall be evaluated." Data demonstrating that the LSJR must be de-listed, pursuant to §3.2 of the Listing Policy was not only "readily available", but known to the CVRWQCB. The CVRWQCB was required to re-evaluate the §303(d) status of the LSJR for EC and boron and either recommend that the LSJR be de-listed or not de-listed. (Listing Policy, §6.1.2.2.) Neither has occurred. (SWRCB, Revision of the Clean Water Act §303(d) List of Water Quality Limited Segments: Volume 3, Water Body Fact Sheets Supporting the Listing and De-Listing Recommendations (September 2005); SWRCB, Revision of the Clean Water Act §303(d) List of Water Quality Limited Segments: Evaluation of Data and Information Related to the Clean Water Act Section 303(d) List

[23] All of the numbers shown in Table 11 were rounded to the nearest whole number. (see Appendix 1: Vernalis Water Quality and Flow Data.)

of Water Quality Limited Segments: Water Body Fact Sheets Supporting "Do Not De-List" Recommendations (September 2005).)

In D-1641, the SWRCB required that the USBR meet the Vernalis EC Objectives and use "any measures available" to do so. (D-1641, p79, 89.) CALSIM II-Revised shows salinity objectives can be met.[24] The permit terms adopted in D-1641 are legal obligations with which the USBR must comply. The IPO is a management protocol, but is not a legal obligation. (Salt & Boron TMDL, p71.) Since the USBR can achieve the Vernalis EC Objectives, is legally required to do so, and has stated it will meet the Vernalis EC Objectives, the Vernalis EC Objectives will always be achieved. Even if the USBR violates their permit terms and conditions and strictly follows the IPO, the Vernalis EC Objectives will still be met over 98% of the time, which is still sufficient to require de-listing of the LSJR.

6.4. Trends in Compliance with Vernalis Electrical Conductivity Objectives Require De-Listing.

Under §4.10 of the Listing Policy, a water body shall be removed from the § 303(d) List if the factors for assessing trends in water quality contained in §3.10 are either unsubstantiated or not observed. (Listing Policy, §4.10.) §3.10 requires listing if declining trends in water quality are substantiated and impacts to the beneficial use protected by the water quality objective are observed. (Id., §3.10.)

6.4.1. Changes in Electrical Conductivity Below the Vernalis Electrical Conductivity Objective Do Not Affect Crop Yield.

§3.10 is intended to address the anti-degradation component of water quality standards. (Id.) Under the state anti-degradation policy,

[24] CALSIM II-Revised also shows flow objectives can be met, even without USBR releases of §3406(b)(2) 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 §12230.

(Water Code §12232.) State anti-degradation policy is implemented in lieu of, and consistent with, the federal anti-degradation policy where federal anti-degradation policy applies. (see 40 C.F.R. § 131.12 and Statement of Policy with Respect to Maintaining High Quality Waters in California, SWRCB Resolution 68-16 (October 28, 1968).) The state anti-degradation policy incorporates the required portions of the federal policy, and is more stringent and comprehensive than the federal policy. (SWRCB Order WQ 86-17 1986 WL 25526, p10.)

The state anti-degradation policy also provides, in part:

> "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."

(SWRCB Resolution 68-16.) (emphasis added) As applied in concert with the federal policy, the state policy applies to three categories of water. The first category consists of waters where water quality objectives are being met. For these waters, the anti-degradation policy applies to maintain the water quality necessary to support existing uses. The second category of water consists of waters where water quality is better than required to support existing uses. For these waters, the anti-degradation policy provides that water quality can be lowered to allow important economic or social development, provided is only lowered to the point where existing uses remain fully protected. The third category consists of waters that are outstanding national resources. For these waters, the anti-degradation policy prevents any lowering of water quality.[25] (40 CFR Section 131.12(a)(1)-(3).)

Regardless of which category encompasses these waterways, Resolution 68-16 clearly provides that changes in water quality will be permitted, if the quality remains capable of supporting existing beneficial uses. Further, the SWRCB has no legal "obligation to set water quality standards so as to provide salinity control to southern Delta riparians." (Racanelli, *supra* 182 Cal.App.3d at 122.) Rather, the SWRCB's "paramount duty [is] to provide 'reasonable protection' to beneficial uses, considering all the demands made upon the water." (Id.)

South Delta agriculture is the only beneficial use supported by the Vernalis EC Objectives, which were established based on the EC thresholds of the most salt sensitive crops grown in the South Delta, accounting for factors such as the soils and weather prevalent in the South Delta. (D-1641, p79.) Below the EC threshold, crop growth is constant and unaffected by EC. Lower EC will not improve crop growth and higher EC, so long as it remains below the crop's EC threshold, will not restrict crop growth. (USBR-DWR SWRCB CDO Proceeding, DWR-22, p2.) Consequently, agricultural beneficial uses remain unaffected when EC is less than the Vernalis EC Objectives.

[25] There are only two such waters in this third category located in California – Lake Tahoe and Mono Lake.

6.4.2. Evidence Supporting LSJR Impairment of Agricultural Beneficial Uses is Non-Existent and Anecdotal.

Consistent with the Listing Policy, the SWRCB, in developing the 2006 § 303(d) List, reevaluated several listings when it became clear the original data supporting the listing was "faulty" and has recommended removal of waters and pollutants from the § 303(d) List for water bodies and pollutants if data used to support the original listing did not exist or was anecdotal. (Draft Staff Report Supporting the Recommended Revisions to the Clean Water Act §303(d) List; Volume 1 (September 2005); p11.) Cross examination of South Delta farmers refutes any claims of actual harm to agricultural beneficial uses and a comparison of historical crop data with EC shows any claims of impairment have been anecdotal. Thus, no evidence justifies any claim that LSJR agricultural beneficial uses are impaired by EC in the LSJR.

6.4.2.1. South Delta Farmers Have Never Demonstrated Any Evidence that Agricultural Beneficial Uses Are Impaired.

The Vernalis EC Objectives were specifically intended to establish a maximum concentration of salinity in the water at Vernalis sufficient to support a 100% crop yield. (D-1641, p79.) Since then, it became conventional wisdom that any time the Vernalis EC Objectives were exceeded, especially the when the Vernalis Irrigation Season Salinity Objective applied, crop yields were affected. A farmer in the south Delta, William Salmon, testified that "**Any** actions which will increase salinity flowing into the South Delta will simply incrementally increase the harm which [my] farming operation is subjected to each year." (Periodic Review SDWA Exh-09A: Written presentation, Issue 10: Southern Delta Electrical Conductivity South Delta Water Agency (March 2005), p47-48.) (emphasis added.)

While the foregoing statement by Mr. Salmon attempts to link the quality of water at Vernalis with the quality and yield of crops that he grows, the allegedly supporting information he submitted shows no correlation between his crops and water quality at Vernalis. In another declaration, Mr. Salmon stated that the salinity problem has been getting worse since 1999. (Bay-Delta, Depo. Tr. William Salmon, p13 (May 25, 1999).) If true, this is certainly odd, as there have been no exceedances of the Vernalis standard since at least 1995. (Decl. of Dan Steiner; see also Appendix 1: Vernalis Flow and Water Quality Data.) Indeed, Mr. Salmon testified in his deposition that he did not know if the Vernalis water quality standard had been violated since 2000. (Id., p15.) Thus, regardless of the veracity of Mr. Salmon's claims of salinity damage to his crops, he provided no data supporting a direct relationship between damage to his crops caused by salinity of the San Joaquin River water and exceedances of the Vernalis EC Objectives.[26]

Another farmer, Kurt Sharp, testified similarly, stating that "As salinity at Vernalis rises, particularly above the Vernalis standard, there is a corresponding negative effect on the irrigated crops grown by [me]." (Central Delta Water Agency ("CDWA") v. USA, declaration of Kurt Sharp in Support of Motion for Summary Judgment, p3 (June 14, 1999).) (emphasis added.)[27] Mr. Sharp's statement has even less evidentiary support.

[26] Mr. Salmon's claim that salinity is the cause of the yield loss of his crops is dubious at best. In a 1999 deposition, Mr. Salmon admitted that he was unable to correlate damage to his walnuts to salinity of the irrigation water he used. He stated "Now, that is not totally. it is not totally. I can't totally say that it is the salt. I also have a virus, what they call black line disease which walnuts get." (Bay-Delta, Depo. Tr. William Salmon, p78 (May 25, 1999).) Mr. Salmon made a similar admission regarding tomatoes, for which he stated "And in 1990 I finally gave up growing tomatoes because I was no longer – it was no longer economically feasible for me to grow with my yields. My yields kept coming down. Now, I can't sit here and tell you that it was directly related to the salt in the water…" (Id., p81.) Perhaps most telling, despite this dramatic statement about quitting tomatoes due to declining yields, in 1999 Mr. Salmon planted 357.5 acres of tomatoes. (Id., Ex. 5.)

[27] The property Mr. Sharp farms is not located within the south Delta, but in the Central Delta Water Agency ("CDWA"), far to the north of the area to be protected by the Southern Delta water quality objectives. However, his testimony underscores the fact that many Delta farmers, even those who are not in the south Delta, believe south Delta salinity has adversely affected their crop yields.

Despite alleging a direct connection between water quality at Vernalis and adverse impacts to crops grown by R.C. Farms, Mr. Sharp admitted he has absolutely no basis for attempting to make such a connection. In a 2003 deposition, Mr. Sharp acknowledged that knowing the salt content of the irrigation water he was applying would be a key piece of information regarding his claim of connection between water quality at Vernalis and adverse impacts to crops he grows. (CDWA v. USA Depo. Tr. Kurt Sharp, June 24, 2003, p10-11.) Despite this, Mr. Sharp admitted that he did not know or check the salt content of the water he was applying, and acknowledged that water quality could be getting better and he would not even know it. (Id., p11, 21-22.)

Mr. Sharp was even more open and honest about lacking any information correlating water quality at Vernalis and impacts to the crops grown at R.C. Farms in his deposition taken June 24, 2003, as the following exchange illustrates:

> "Q. Have you done any analysis to understand the correlation between EC at Vernalis and EC at R.C. Farms?"
>
> "A. Have I done any what?"
>
> "Q. Analysis."
>
> "A. No."
>
> "Q. Are you aware of any reports or studies that you have read or reviewed that has a correlation between EC's at Vernalis and EC's at where you divert from the San Joaquin River?"
>
> "A. Say that question again."
>
> "Q. Yeah. Have you read any books, analysis, reports that shows a correlation between EC's at Vernalis and EC's at R.C. Farms?"
>
> "A. No, I have not."

(CDWA v. USA, Depo. Tr., Kurt Sharp, p25 (June 24, 2003).)

When asked to give specific details about crop yield declines due to salt, Mr. Sharp testified that certain parts of R.C. farms' fields have been experiencing declines from 1997 up and through 2003 which he attributed to salt build-up (In re Long-Term Petition Change of: Modesto Irrigation District, et al., Depo. Tr. Kurt Sharp, p15-17 (March 27, 2003).)

A third farmer, Alex Hildebrand has testified that "Any time the Vernalis standard is exceeded, there is a corresponding negative effect on the irrigated crops grown in the South Delta. I have personally experienced such harm on my crops." (CDWA v. USA, Decl. of Hildebrand, p12-13 (May 7, 1999).) He too failed to provide any quantitative data supporting a link between violations of the Vernalis EC Objectives and his crop yields. Additionally, his statement conflicted with another statement made when cross-examined under oath:

> I don't think we have a continuing buildup of salt load within the South Delta as they have down in the CVP service area, because in the wet years we get it leached out. So it accumulates during seasons when the salinity is high and flows are very low, but we're able to purge it again. The salt load that I had three years ago are well leached out now.

(1998 Bay-Delta Hrg., p88 (January 19, 1998).)

The CVRWQCB, in listing the LSJR as impaired due to EC, also concluded that agricultural beneficial uses were impaired, but like the South Delta farmers, did so without any analysis, quantitative data, or citations to any supporting evidence. (Salt & Boron TMDL: Appendix 1, p10.) The CVRWQCB, Messrs. Salmon, Sharp, and Hildebrand, and many others have consistently claimed that exceedances of the Vernalis

EC Objectives have harmed their crop yields, but neither they, nor anyone else, have ever provided any quantitative evidence supporting a correlative or causal relationship between EC of the LSJR water at Vernalis and declining crop yields in the South Delta. Neither have they ever demonstrated that their conditions are representative of the South Delta. In fact, they have argued that soil conditions are so variable in the South Delta that no farmer would be representative of the South Delta. (Periodic Review SDWA-12, p5-10.) Their evidence is non-existent, anecdotal at best, and insufficient to support a § 303(d) Listing of the LSJR for EC.

6.4.2.2. Historical Data Shows Electrical Conductivity at Vernalis Has Not Impaired Beneficial Uses in the Lower San Joaquin River Basin.

No EC objectives for the segment of the LSJR from Mendota Pool to Vernalis have been developed or adopted. The Vernalis EC Objectives were established to protect agricultural beneficial uses in the South Delta, based on South Delta soils, South Delta weather conditions, South Delta crops, and South Delta agricultural practices. (1995 WQCP, p17.) The Vernalis EC Objectives were established to protect agriculture, the most sensitive beneficial use affected by EC. (2002 TMDL Report, p24.) In D-1485, the SWRCB adopted a Vernalis Irrigation Season EC Objective of 0.7 dS/m, the maximum average EC beans can tolerate in their root zone before declining in yield. (1995 WQCP, p5; see Periodic Review SJRG-08, p4.) No such analysis has been performed for the LSJR Basin and there has been no determination of the minimum EC necessary to protect agricultural beneficial uses based on conditions, agriculture practices, and prevalent crop types. Consequently, no objective determination of whether beneficial uses are impaired is possible in the SJR from Mendota Pool to Vernalis.

Due to the lack of upstream objectives, the Vernalis EC Objectives have been used as a surrogate for LSJR Basin planning. Even the Salt & Boron TMDL, designed to protect beneficial uses in the LSJR Basin from Mendota Pool to Vernalis, was designed to achieve the Vernalis EC Objectives. (Salt & Boron TMDL, p1.)

Since the Vernalis Irrigation Season EC Objectives were established presumably for the salt tolerance of beans, exceedances of the Vernalis Irrigation Season EC Objectives should have correlated strongly with declines in bean yields. (1995 WQCP, p5; see Periodic Review SJRG-08, p4.) If the §303(d) listing for the LSJR were correct, then agricultural beneficial uses should be impaired and the yields of salt-sensitive crops, particularly beans, should have correlated with exceedances of the Vernalis Irrigation Season EC Objectives.

In order to determine whether exceedances of the Vernalis EC Objectives have had any had relationship with crop yields in the LSJR, bean yields reported by the agriculture commissions from 1970 to 2003 were compared to the corresponding average EC for each irrigation season, i.e., from April 1 through August 31 of each year. [28] (see Table 12, *infra*; see also Appendix 1: Vernalis Flow and Water Quality Data and Appendix 2: LSJR Crop Data.) Since the LSJR Basin consists of portions of the counties of Fresno, Madera, Merced, San Joaquin, and Stanislaus, the total acreage and production was weighted by the percentage of its agriculture land occupying the LSJR Basin. (see Table 13, *infra*.)

[28] Data for historical flow and electrical conductivity was obtained from Mr. Daniel Steiner. (see Appendix 1: Vernalis Flow and Water Quality Data; see also Periodic Review SJRG-07.)

Table 12: LSJR bean harvest, 1970-2003.[29] (see Appendix 2: LSJR Crop Data.)

Year	Acres Harvested						EC	Year
	Fresno	Madera	Merced	San Joaquin	Stanislaus	LSJR[31]	(dS/m)	Type[30]
1970	11,858	3,900	2,950	16,120	32,420	38,891	0.68	AN
1971	6,497	1,400	1,835	17,834	25,200	28,069	0.72	BN
1972	9,130	3,000	1,878	18,530	27,500	32,092	1.01	D
1973	9,490	2,400	5,477	17,275	28,560	36,138	0.68	AN
1974	11,794	4,400	9,201	17,875	29,000	42,424	0.53	W
1975	8,060	1,100	3,177	23,504	18,800	23,422	0.57	W
1976	6,620	3,000	5,445	21,751	20,000	28,388	0.99	C
1977	5,460	3,800	6,255	22,200	24,550	34,112	1.49	C
1978	8,360	4,700	7,589	29,200	36,920	48,445	0.41	W
1979	10,100	6,700	10,284	27,600	30,900	47,498	0.68	AN
1980	10,200	4,500	7,210	27,803	33,200	44,550	0.71	W
1981	11,300	6,600	9,250	28,239	35,500	50,856	0.73	D
1982	13,500	8,000	8,780	36,105	36,600	53,179	0.28	W
1983	11,100	1,500	8,540	23,000	30,698	40,700	0.19	W
1984	13,000	4,600	10,250	23,700	35,500	50,067	0.63	AN
1985	12,800	3,600	9,800	28,900	33,715	47,107	0.62	D
1986	11,300	4,000	5,070	19,200	32,780	41,457	0.38	W
1987	18,000	4,700	5,230	20,600	32,382	42,695	0.72	C
1988	17,000	4,900	5,640	24,300	33,105	43,952	0.74	C
1989	12,000	3,700	5,540	26,600	31,210	40,432	0.75	C
1990	13,000	3,800	4,560	25,900	33,530	41,828	0.75	C
1991	12,000	2,000	7,480	20,600	39,600	48,536	0.86	C
1992	14,700	1,050	7,580	20,900	36,700	45,331	0.78	C
1993	17,900	1,550	5,750	24,500	22,900	31,424	0.64	W
1994	22,000	3,100	7,140	16,200	27,800	39,139	0.74	C
1995	25,500	3,720	7,244	24,100	26,100	38,818	0.26	W
1996	24,000	4,342	3,828	22,800	28,720	38,248	0.49	W
1997	22,900	2,259	8,009	24,200	26,300	38,111	0.56	W
1998	15,300	2,100	6,102	22,300	18,900	28,171	0.19	W
1999	17,700	2,600	5,773	19,600	17,310	27,018	0.45	AN
2000	13,400	200	5,147	21,700	18,390	24,727	0.46	AN
2001	11,500	220	3,816	15,200	17,200	21,915	0.58	D
2002	12,500	460	4,218	10,600	18,450	23,718	0.56	D
2003	6,880	980	3,921	9,400	14,280	19,308	0.55	BN
Max	25,500	8,000	10,284	36,105	39,600	53,179		
Min	5,460	200	1,835	9,400	14,280	19,308		

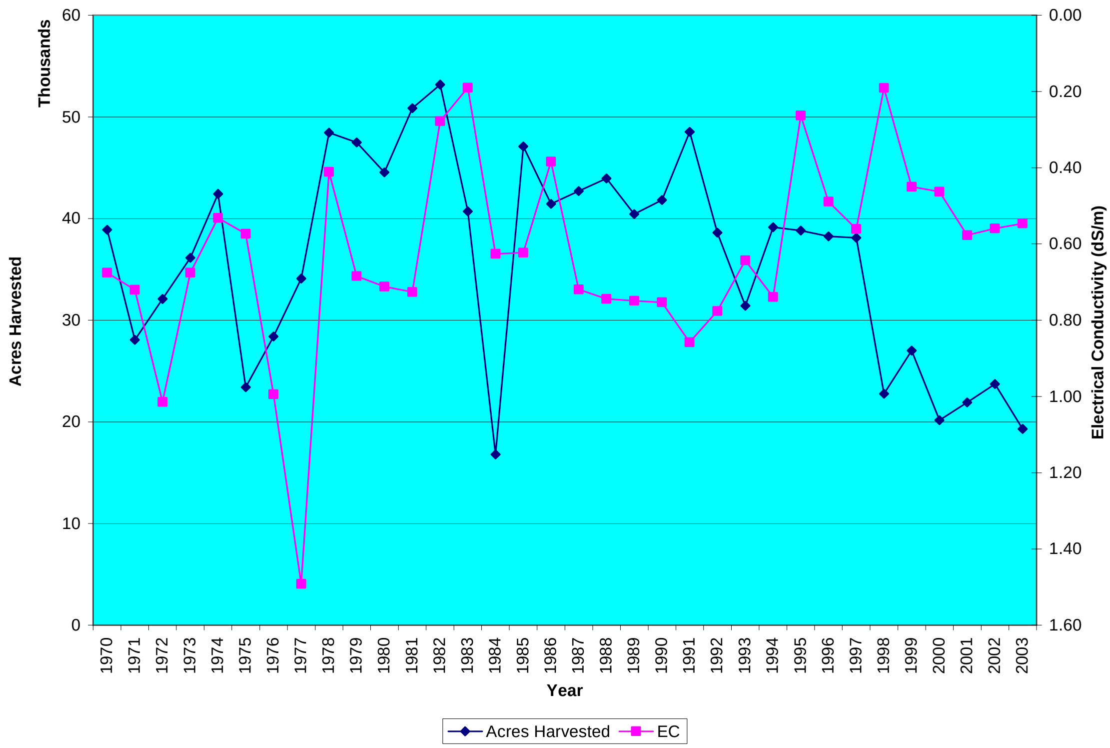
[29] Years in which the seasonal average exceeded the Objective are shaded pink. For the purposes of this analysis the yields of all reported varieties of dry beans have been averaged.
[30] San Joaquin River Basin Index Year Types. W= Wet, AN = Above Normal, BN = Below Normal, D = Dry, C = Critical. (Periodic Review SJRG-07, p32.)
[31] Acres of beans harvested in the LSJR were calculated by summing the acres of beans harvested in each county by the percentage of each county's agriculture acreage that occupies the LSJR in Table 13.

Table 13: Acres of Agriculture in the Lower San Joaquin Basin (Salt & Boron TMDL, p37.)

County	Ag Acres in County	Ag Acres in Project Area	Percent of Ag in Project Area
Fresno	1,343,255	153,537	11.4
Madera	366, 144	342,454	93.5
Merced	541,741	541,741	100
San Joaquin	578,310	14,486	2.5
Stanislaus	404, 250	380,666	94.2

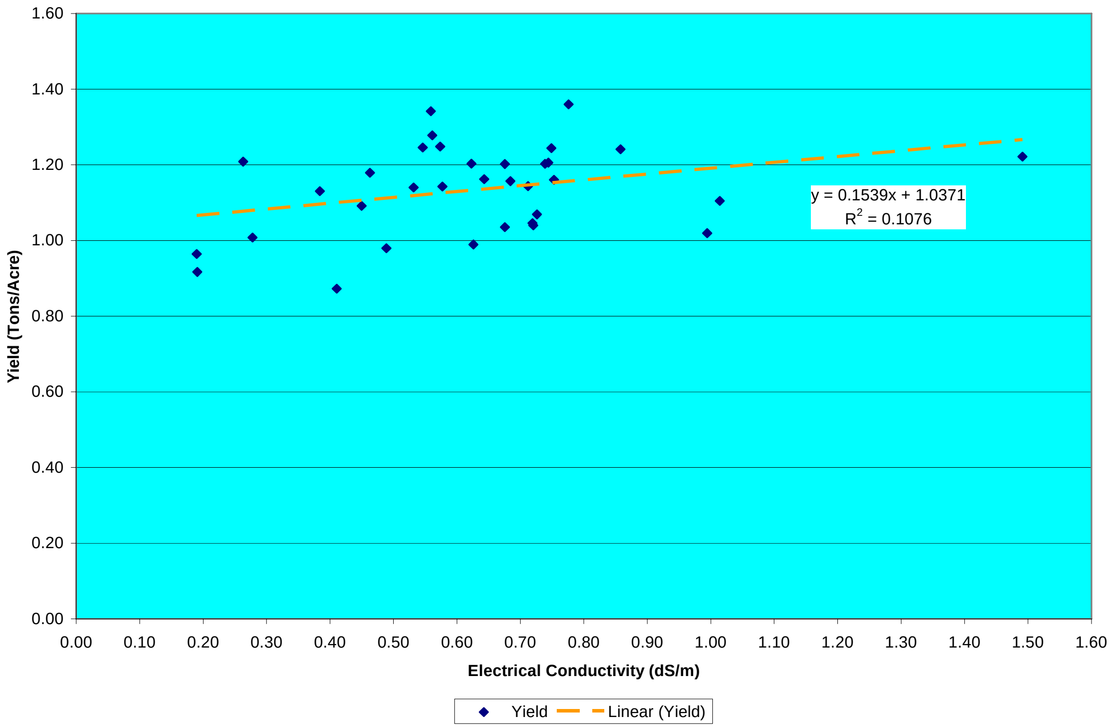
From 1970 to 2003, the total acres of beans harvested in the LSJR Basin decreased from 38,891 acres to 19,308 acres. (see Table 12, *supra*; see also Figure 8 *infra.*) The acreages devoted to bean cultivation peaked in 1982, when 53,179 acres of beans were harvested and reached its minimum in 2003, when 19,308 acres were harvested.

Figure 8: Lower San Joaquin River Basin Bean Acres Harvested (1970-2003). (see Appendix 2: LSJR Basin Crop Data.)



In the thirty-three years observed, the seasonal average EC exceeded the Vernalis Irrigation Season EC Objective thirteen times. (see Table 12, *supra.*) Overall, seasonal average EC at Vernalis ranged from a low of 0.19 dS/m to a high of 1.49 dS/m. The mean EC for the period was 0.63 dS/m. Overall however, bean yields displayed an upward trend compared of EC. (see Figure 9, *infra.*)

Figure 9: Lower San Joaquin Basin dry bean yields and electrical conductivity (1970-2003). (see Appendix 2: LSJR Crop Data.)



Since the salinity threshold of beans is 0.7 dS/m, bean yields should have been lower in years when the seasonal average EC at Vernalis exceeded 0.7 dS/m than in years when it did not. While there were some years when the average EC at Vernalis exceeded 0.7 dS/m and bean yields were significantly below the mean, there were many other years when bean yields were not significantly below the mean. There were even some years when the average EC at Vernalis exceeded 0.7 dS/m and bean yields were significantly above the mean!

Table 14: Average Lower San Joaquin River Basin dry bean yield and seasonal average electrical conductivity at Vernalis, 1970-2003.[32] (see Appendix 2: LSJR Crop Data.)

Year	Yield (Tons/Acre)						EC	Year
	Fresno	Madera	Merced	San Joaquin	Stanislaus	LSJR[34]	(dS/m)	Type[33]
1970	0.75	1.00	0.90	0.88	0.79	1.04	0.68	AN
1971	0.70	0.75	0.75	0.88	1.11	1.04	0.72	BN
1972	0.76	1.00	1.00	1.05	1.14	1.10	1.01	D
1973	0.70	1.20	1.10	1.16	1.25	1.20	0.68	AN
1974	0.71	0.90	1.13	1.18	1.20	1.14	0.53	W
1975	0.88	1.10	1.25	1.18	1.28	1.25	0.57	W
1976	0.84	1.25	1.15	0.91	0.96	1.02	0.99	C
1977	0.71	1.00	1.06	0.89	1.30	1.22	1.49	C
1978	0.71	1.00	0.78	0.85	0.97	0.87	0.41	W
1979	0.87	0.85	1.19	0.97	1.18	1.16	0.68	AN
1980	0.77	0.70	1.08	1.07	1.21	1.14	0.71	W
1981	0.92	1.00	1.02	1.04	1.19	1.07	0.73	D
1982	0.77	1.40	0.99	0.80	1.15	1.01	0.28	W
1983	0.94	0.85	0.92	0.85	1.01	0.96	0.19	W
1984	0.90	0.94	0.91	0.91	1.07	0.99	0.63	AN
1985	1.07	1.06	0.95	1.15	1.25	1.20	0.62	D
1986	0.80	1.30	1.02	1.05	1.19	1.13	0.38	W
1987	0.97	1.15	1.06	1.06	1.09	1.05	0.72	C
1988	0.94	1.00	1.19	1.07	1.33	1.21	0.74	C
1989	0.99	0.91	0.99	1.04	1.29	1.24	0.75	C
1990	1.07	1.10	1.13	1.50	1.17	1.16	0.75	C
1991	1.07	0.95	1.26	1.15	1.25	1.24	0.86	C
1992	0.93	1.04	1.20	1.09	1.40	1.36	0.78	C
1993	0.98	1.05	1.11	1.13	1.23	1.16	0.64	W
1994	1.04	1.09	1.12	1.20	1.23	1.20	0.74	C
1995	0.96	1.15	1.10	1.15	1.30	1.21	0.26	W
1996	0.84	1.00	0.70	1.08	1.03	0.98	0.49	W
1997	1.14	1.03	0.90	1.14	1.45	1.28	0.56	W
1998	1.14	1.33	0.79	0.8	0.88	0.92	0.19	W
1999	1.38	1.26	0.98	1.15	1.06	1.09	0.45	AN
2000	1.20	1.45	0.76	1.09	1.26	1.18	0.46	AN
2001	0.88	1.35	0.86	1.05	1.20	1.14	0.58	D
2002	1.20	1.35	1.08	1.08	1.34	1.34	0.56	D
2003	1.54	1.42	0.99	1.09	1.29	1.25	0.55	BN
Mean	0.94	1.09	1.01	1.05	1.18	1.13	0.63	
SD	0.20	0.19	0.15	0.14	0.15	0.12	0.25	
Max	1.54	1.45	1.26	1.50	1.46	1.36	1.49	
Min	0.70	0.70	0.70	0.80	0.88	0.87	0.19	

[32] Years in which the seasonal average exceeded the Objective are shaded pink. Years in which the yield was less than 10% below the mean are shaded green. For the purposes of this analysis the yields of all reported varieties of dry beans have been averaged. Further, the yield was calculated by dividing the total dry bean production of each county, which was weighted by the percentage of that county's agriculture land occupying the LSJR Basin, by the acres of beans harvested in the LSJR in Table 12.

[33] San Joaquin River Basin Index Year Types. W= Wet, AN = Above Normal, BN = Below Normal, D = Dry, C = Critical. (Periodic Review SJRG-07, p32.)

[34] Average overall yield for the LSJR was calculated by dividing the total tons of beans produced in all three counties by the total acres of beans harvested in all three counties. (see Appendix 2: LSJR Crop Data.)

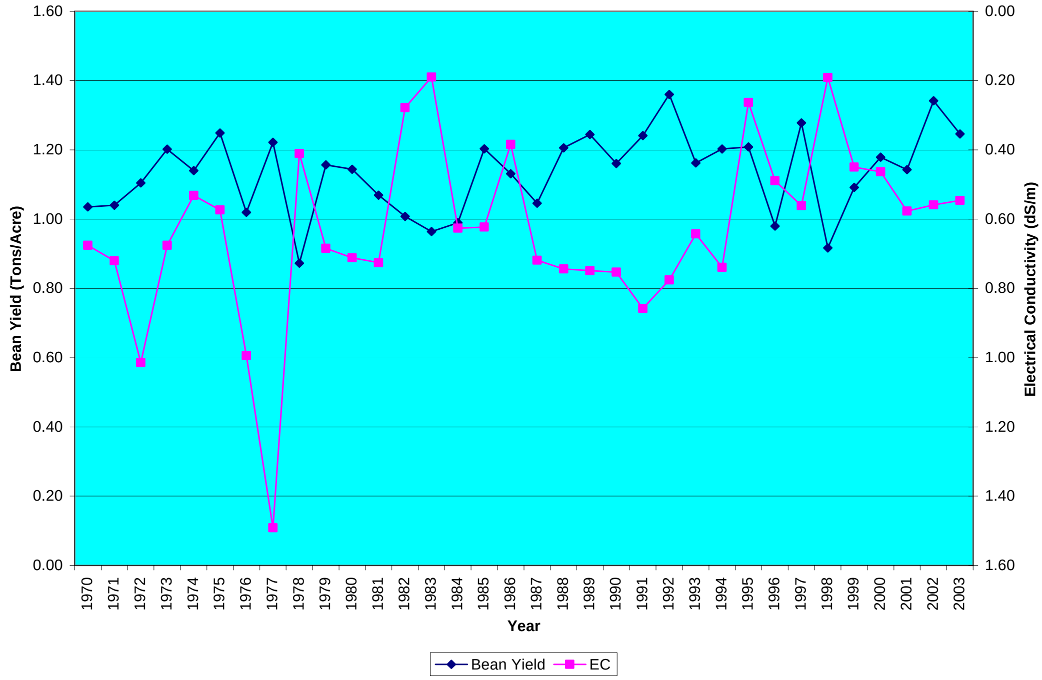
For all of the counties combined, yields ranged from 0.87 tons/acre to 1.36 tons/acre. The mean yield was 1.13 tons/acre. (see Appendix 2: LSJR Basin Crop Data.) However, since yields vary by about 10%, solely due to variations in weather, seed quality, insect infestations, fertilization, and other factors and farming practices, yields could have been as low as 1.02 tons/acre for reasons unrelated to water quality. (Periodic Review SJRG-06, p2.)

From 1970 to 2003, bean yields for the LSJR Basin, which consisted of all four counties combined, fell significantly below the mean seven times. (see Table 14, *supra.*) None of the years when the when yields were less than 10% below the mean occurred when the average irrigation season EC at Vernalis exceeded 0.7 dS/m.[35]

If the §303(d) listing were correct, then EC at Vernalis should have had a significant effect on bean yields in the LSJR Basin, but it did not. The yields in Figure 10 should have mirrored the EC at Vernalis, but they did not. **No instances of elevated EC at Vernalis corresponded to significantly low bean yields.**

[35] Similarly, there were no years in when yields were more than a standard deviation below the mean in when the average EC at Vernalis exceeded 0.7 dS/m.

Figure 10: Lower San Joaquin Basin dry bean yield and seasonal average electrical conductivity from 1970 to 2003. (see Appendix 2:LSJR Basin Crop Data.)



According to the work of Ayers and Westcot however, it takes time for salt to accumulate in the root zone to a concentration sufficient to reduce yield. (R. S. Ayers and D. W. Westcot, Water Quality for Agriculture §2.4.2 (FAO Irrigation and Drainage Paper, 29 Rev. 1, 1985).) Even without leaching, two or more years of irrigation are generally required before salt concentrations climb high enough to impact crop yields. (Id.) To determine whether any patterns or trends emerged, bean yields and water quality over the period from 1970 to 2003 to were examined. Based on the Ayers and Westcot work, one or more consecutive years in which the seasonal average salinity exceeded 0.7 dS/m should have eventually led to declines in yields.[36] Following the two Critical years in 1976 and 1977, when the EC's were 0.99 dS/m and 1.49 dS/m respectively, the yields

[36] Based on the testimony of Dr. John Letey in the USBR-DWR Cease and Desist Order hearing, enough leaching may occur that, over time, salts never buildup. (USBR-DWR SWRCB CDO Proceeding, DWR-22, p4.)

in 1978 fell to 0.87 tons/acre, the lowest in the entire thirty-three year period. Then, after 1980 and 1981, when the EC's were 0.71 dS/m and 0.73 dS/m, the yields subsequently declined for three straight years from 1982 to 1984.

There was also however, a prolonged period from 1987 to 1992, when the average EC was consistently above 0.7 dS/m and yields were not only above the mean, but among the highest for the entire period observed. In fact, the best yield of the entire period occurred in 1992, the sixth consecutive year when the average EC for the irrigation season at Vernalis was more than 0.7 dS/m. The entire thirty-three year period, and the six-year period in particular, even shows an overall trend of increasing yields which indicating that, if anything, beneficial uses are more protected now than they were thirty years ago. Even a cursory review of the crop data shows no impairment of agricultural beneficial uses in the LSJR Basin.

A similar analysis of corn grain (see Figure 11, *infra*) and corn silage (see Figure 12, *infra*) shows that, much like beans, EC at Vernalis has had little effect on yields of either crop. Over the thirty-three year period from 1970 to 2003, yields of both crops steadily increased, irrespective of EC. 1977 had the highest average irrigation season EC at Vernalis for the entire thirty-three year period and was the only year when the average EC exceeded corn's EC threshold of 1.1 dS/m. Nevertheless, EC still increased from the year before.

Figure 11: Lower San Joaquin Basin corn grain yield and seasonal average electrical conductivity from 1970 to 2003. (see Appendix 2:LSJR Basin Crop Data.)

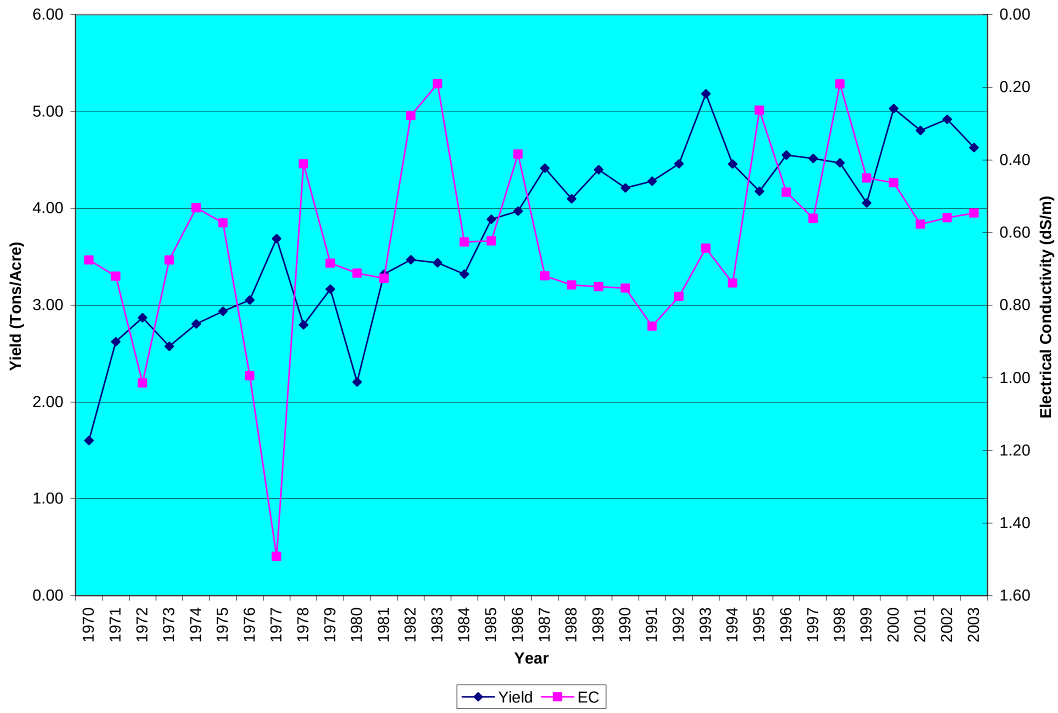
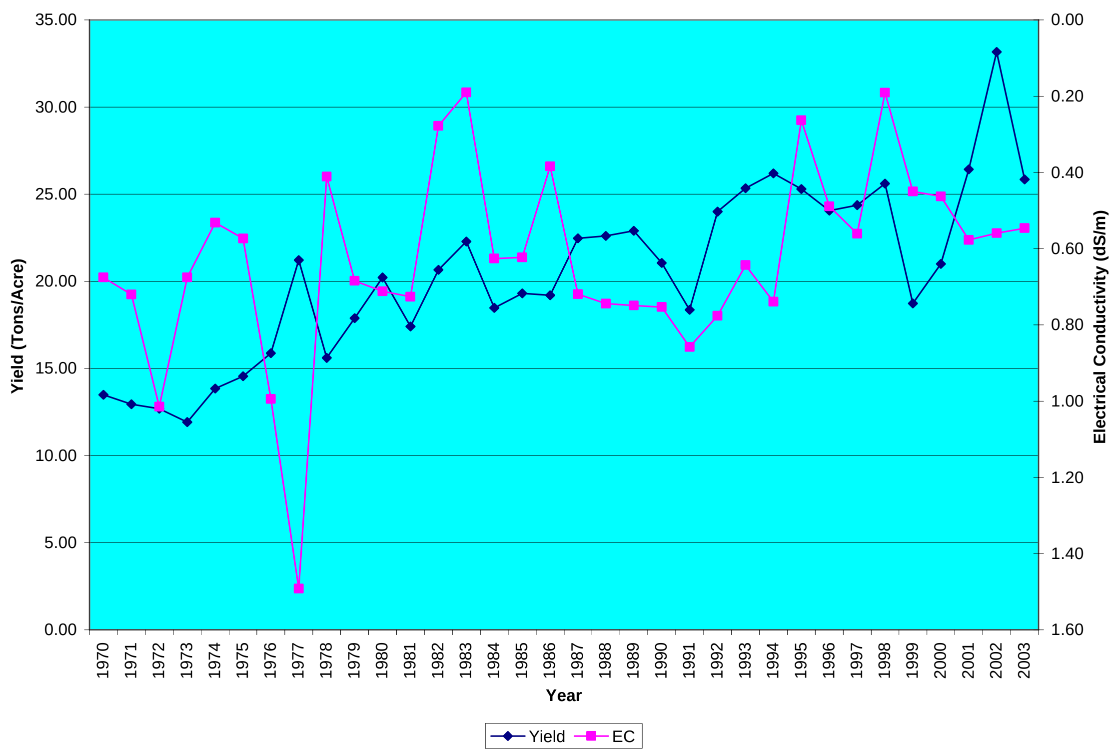


Figure 12: San Joaquin Basin corn grain yield and seasonal average electrical conductivity from 1970 to 2003. (see Appendix 2:LSJR Basin Crop Data.)



If South Delta farmers were correct in their beliefs the §303(d) listing for the LSJR correct, then bean and corn yields should have declined in relation to exceedances of the Vernalis EC Objectives. Contrary to conventional wisdom and the deeply-held beliefs of many, historical data disproves the existence of any correlation or causal relationship between EC at Vernalis and impacts to south Delta agriculture.

The foregoing analysis assumes bean production is evenly distributed throughout each county. It also assumes that the Vernalis EC Objectives apply to the LSJR Basin, but since the Vernalis EC Objectives were developed specifically for conditions and crops in the South Delta, they do not apply to the LSJR Basin. Finally, the foregoing analysis is "preliminary", because it assumes all agriculture in the LSJR uses water from the LSJR, even though many water users use water from the areas such as the Delta-Mendota Canal. A more detailed analysis would have to consider the acreage in the LSJR Basin irrigated with water from the LSJR and what crops are actually grown on that acreage. Given that the segment of the LSJR from Mendota Pool to Vernalis is 130 miles long and that there are numerous tributaries along the way, no single objective can adequately represent the entire basin. If the South Delta farmers were correct in their beliefs, then bean yields should have declined in relation to exceedances of the Vernalis EC Objectives, but the foregoing analysis demonstrates that EC at Vernalis has had no affect on LSJR bean yields and, consequently, LSJR agricultural beneficial uses.

6.4.3. Assumptions Underlying the Development of the South Delta Electrical Conductivity Objectives in D-1485 Were Incorrect.

Since the historical data showed no impact on crop yields due to exceedances of the Vernalis EC Objectives, the SJRGA re-examined the information used to establish Vernalis EC Objectives in D-1485, and found that some of the fundamental assumptions forming the foundation of D-1485 were either incorrect or outdated. As a result, the Vernalis EC Objectives are virtually irrelevant to south Delta agriculture and exceedances, if they did occur, would not substantially affect beneficial uses.

6.4.3.1. Data Used to Establish the South Delta Electrical Conductivity Objectives Did Not Account for Rainfall.

As discussed in the testimony of Dr. James Brownell, the initial work on establishing crop salinity relationships, which was later used by the SWRCB in D-1485, was done in large pots, under controlled conditions and did not consider leaching due to natural rainfall. (Periodic Review SJRG-06, p1.)

For example, the SWRCB considered the 1974 UC-Committee of Consultants developed "Guidelines for Interpretation of Water Quality for Agriculture" (1976 UC Exhibit 1), which evaluated the interrelationship between the salinity of the irrigation water, the soil salinity, and the leaching fraction to determine the impact on crop yields. Another exhibit submitted by the University of California Agricultural Extension (1976 UC Exhibit 7), similarly evaluated only the impacts of the salinity of the irrigation water actually applied. UC Exhibit 3 predicted yield declines based upon crops grown under controlled circumstances, with salinity of the irrigation water applied at one of two fixed amounts, 1.35 dS/m and 2.0 dS/m. (1976 UC Exhibit 3.)

Agronomy research continued after D-1485 and began incorporating the effects of rainfall. The SWRCB considered much of this material when it re-examined the Vernalis EC Objectives in the late 1980's. In 1983, Prichard, Hoffman, and Meyer determined that the winter rainfall observed in their study generally leached surface soils free of salts and allow good seed germination. (Ayers and Westcot, Water Quality for Agriculture §8.2.)

With such conditions, corn could be irrigated with an EC_w as high as 2.2 with no loss in yield.[37] (Periodic Review SJRG-06, p5.)

In 1986, Hoffman et al. obtained similar result when they reported that 100% yields of corn could be achieved using irrigation water with an EC_w as high at 2.0 dS/m if leaching were adequate from either winter rain or irrigation to reduce the average soil water EC_e below the tolerance threshold. (Periodic Review SJRG-08, p5.) Even sub-irrigation with irrigation water with an EC_w as high as 1.5 dS/m failed to reduce corn yields. (Id., p5.) If leaching was inadequate, maximum yield was impossible even with non-saline water.[38] (Id.)

Ayers and Westcot compiled additional information in 1985, including a model derived from previous work performed at the United States Department of Agriculture Salinity Laboratory in 1977 by Maas and Hoffman. (Periodic Review SJRG-06, p1.) Ayers and Westcot assumed the plant root zone was divided into four equal quarters where the plant extracted forty percent of its water from the top quarter, thirty percent from the second quarter, twenty percent from the third quarter, and ten percent from the bottom quarter. (Id.) It also assumed a 15% leaching fraction and the occurrence of no rainfall. (Periodic Review SJRG Exh-03: Article, An Approach to Develop Site-Specific Criteria for Electrical Conductivity to Protect Agricultural Beneficial Uses that Accounts for Rainfall (July 2004) ("Periodic Review SJRG-03"), p11.) Based on these assumptions Ayers and Westcot concluded irrigation water with an average root zone salinity of 1.0

[37] EC_e is the EC of the saturated soil extract. (Periodic Review SJRG Exh-02: Article, Irrigation Water Salinity and Salt Production (2002) ("Periodic Review SJRG-02"), p2.) EC_e is sampled from soil after the soil has been saturated with water. (Id.)
[38] EC_w is the EC of the irrigation water. (Periodic Review SJRG-02, p2.) Since salts accumulate in the root zone, plants are indirectly affected by the EC of irrigation water, but directly affected by the EC of the soil extract. (Id., p3.)

dS/m, the salinity threshold for beans, would require irrigation water with an EC_w of 0.7 dS/m. (Id.) Even though their work excluded rainfall, they recognized rainfall could provide additional leaching benefits beyond that provided by irrigation water alone by stating

> "Rainfall **must** be considered in estimating the leaching requirement..[rainfall] in excess of ET... will satisfy all or part of the leaching needed to control salts. The advantage of rainfall in accomplishing all or part of the leaching is that it uniformly applies an almost salt-free water (EC_w<0.05 dS/m.)"

(Ayers and Westcot, Water Quality For Agriculture §2.4.2.) (emphasis added)

Hoffman, Prichard and Meyer later developed a mathematic equation to quantifying the impact of rainfall. (Periodic Review SDWA-12, p1.) Using this equation, they predicted relative crop yield using the same assumptions used by Ayers and Westcot, except one scenario lacked rainfall and the other include "normal effective rainfall." (Periodic Review SDWA Exh-12: Hoffman, Prichard, and Meyer, "Water Quality Considerations for the South Delta Water Agency," (Jan. 4, 1982) ("Periodic Review SDWA-12"), Table 5.) In the scenario without rainfall, the maximum irrigation water EC_w able to maintain 100% yield of beans was 0.8125 dS/m. With "normal effective rainfall" however, 100% yields were attainable with irrigation water EC_w's as high as 0.906 dS/m. (Id.,Table 5.)

Despite recognition that natural rainfall was a factor in predicting the maximum salinity in irrigation water protective of 100% crop yield, research excluding rainfall essentially supported the existing 0.7 dS/m water quality objective. (Hoffman, Table 5; (Ayers and Westcot, Water Quality for Agriculture §2.4.2.) Apparently giving more credence to the predictions that did not include rainfall, the SWRCB left the Vernalis Summer Objective unchanged. In doing so, the SWRCB has maintained a standard which is objectively over-protective of the south Delta agricultural beneficial uses. (see Periodic Review SJRG-06, p9.) As a result, even when exceedances have occurred, agriculture has not been affected.

6.4.3.2. The SWRCB Developed a Policy Protecting Sub-Irrigation on Organic Soils, Which are Rare in the South Delta.

In the D-1485 proceedings, the SWRCB was concerned about the large amount of corn grown on organic (peat) soils using sub-irrigation. (Periodic Review SJRG-08, p2.) Their concern was misplaced however, because almost all of the soil in the south Delta is mineral soil. A review of the San Joaquin County soil survey shows there are no organic soils south of the Grant Line Canal. (see San Joaquin County Soil Survey; see Periodic Review SJRGA-35, Figures 12 through 17.) The only organic soils in the south Delta are within the boundaries of the CDWA. (Id.)

Mr. Hildebrand corroborated the absence of organic soils in the south Delta in testimony before the SWRCB in 1987, which stated

> "let us examine the source and nature of the technical information which is needed in order to make a valid application in the South Delta of generalized data on applied water quality versus crop yield. You heard a lot about peat soils, but **ours are mineral soils**. **Some are below sea level, but most are above summer mean levels**."

(Periodic Review SDWA Exh-07: Statement, Outline of Testimony by Mr. Alex Hildebrand, p2-3 (includes Bay-Delta testimony from Mr. Hildebrand from the 1980's).) Mr. Hildebrand further testified that

> "The "Report on the Salt Tolerance of Corn in the Delta" by the U.S. Salinity Laboratory, et al. was based on peat lands. **It, therefore, has limited applicability in the South Delta**."

(Id., p12.) (emphasis added.)

The SWRCB improperly designed the Vernalis EC Objectives to protect crops grown on organic soils, because it improperly assumed there were organic soils in the south Delta. (Periodic Review SJRG-35, p15-19, Figures 12 to 17.) Then, as now, the SWRCB should have focused on the data and testimony concerning the affects of salinity on salt sensitive crops such as beans which are grown in mineral soils with surface irrigation. (Id., p15-19, Figures 12 to 17.)

6.4.3.3. Fish and Agriculture Barriers Limit the Reach and Influence of San Joaquin River Water.

The development of the Vernalis EC Objectives in D-1485 also relied on a critical, fundamental assumption – that south Delta agriculture uses San Joaquin River water for irrigation and therefore EC at Vernalis influences EC elsewhere in the south Delta. Under an agreement between fishery agencies and the projects, a temporary barrier is installed at the HORB in the fall in order to increase flow in the San Joaquin River past Stockton. (D-1641, p73-74.) When D-1641 was adopted, it was known that when the HORB is installed, most of the water flowing downstream in the main stem of the SJR remained there, rather than flowing into Old River. (Id.) When the HORB is not installed, over half of the water flowing in the main stem of the SJR flows into Old River. (Id.)

To determine the hydrologic relationship between Vernalis and other parts of the Delta with greater specificity, Ms. Susan Paulsen used the Fischer Delta Model ("FDM") to simulate hydrodynamics and salinity within the Delta. (Periodic Review SJRGA-04, p1.) As explained in her presentation, once operations of the HORB, Grant Line Canal Barrier ("GLCB"), Middle River Barrier ("MRB"), Old River Barrier at Tracy ("ORB"), and Delta Cross Channel Barrier ("DXC") begin in April, and until they end in

December, almost 100% of the water from the San Joaquin River remains in the San Joaquin River. (see Flow Science Executive Summary, p12; see Figures 6 and 7.)

Figure 13: Flow split at confluence of Old and San Joaquin Rivers with standard HORB schedule. (Periodic Review SJRG-04, p12.)

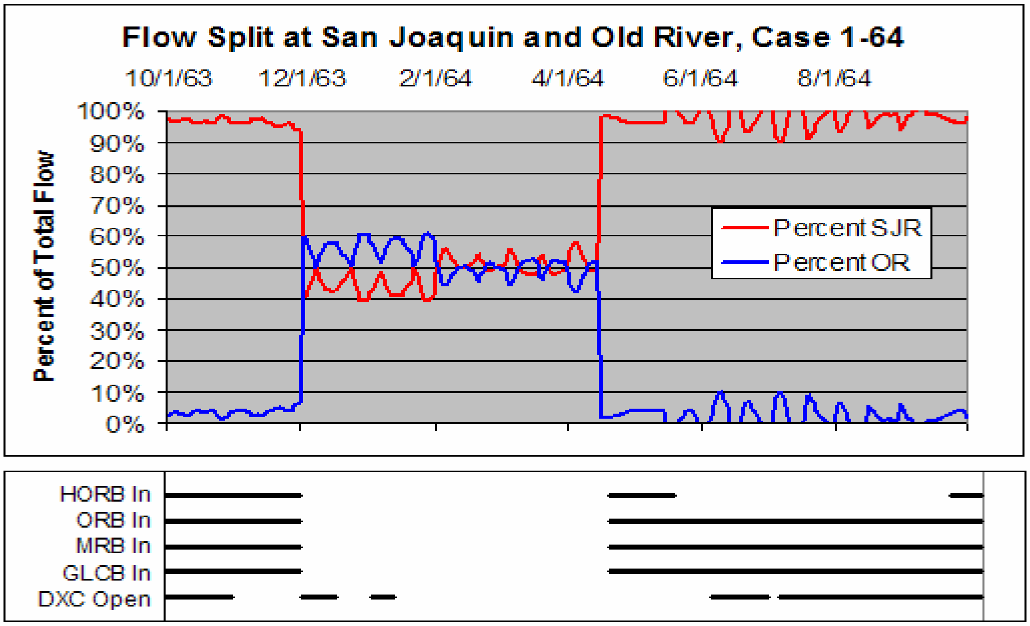
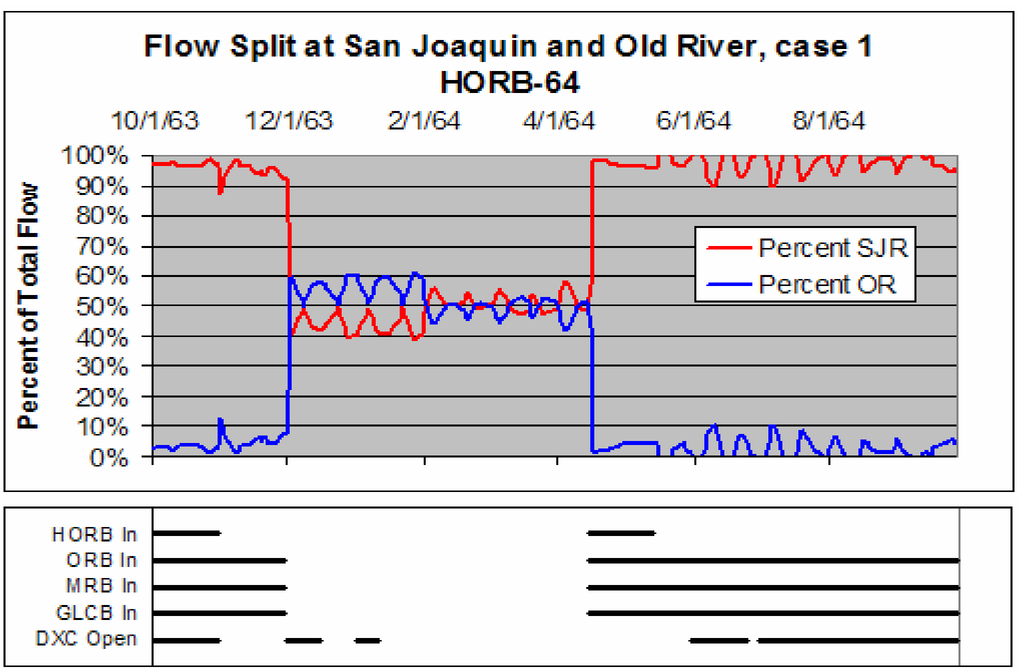
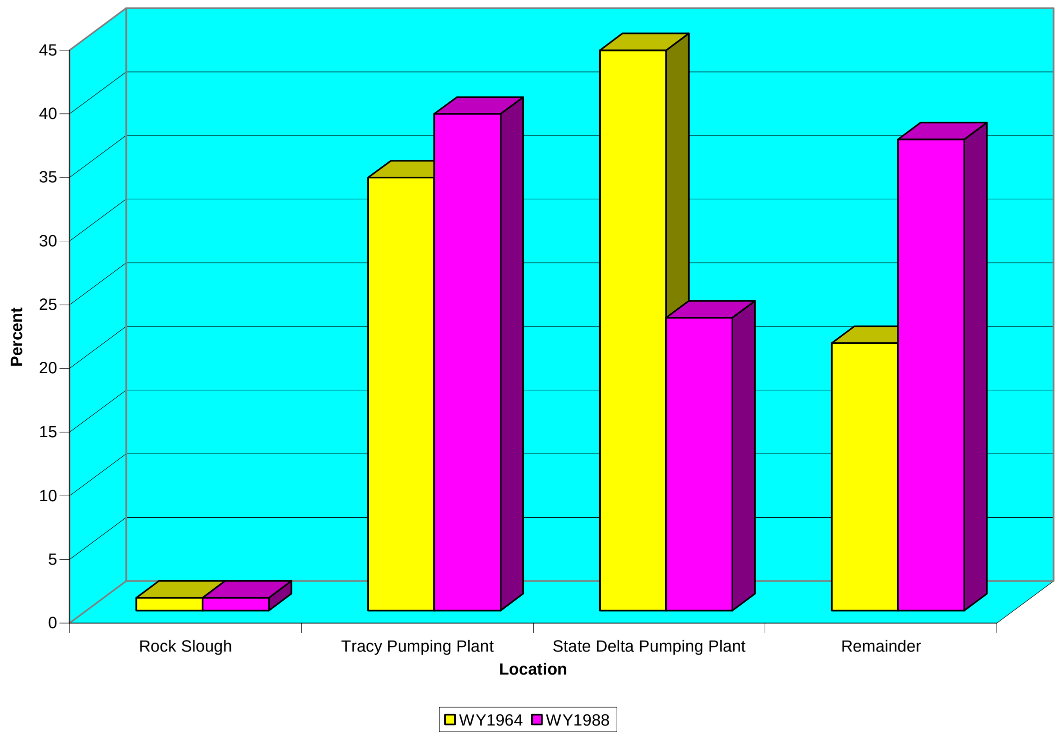


Figure 14: **Flow split at confluence of Old and San Joaquin Rivers with modified HORB schedule.** (Periodic Review SJRG-04, p12.)



Ms. Paulsen also analyzed the effects of exports. In a Dry year, only 21% of San Joaquin River water remains in the Delta.[39] (Id., p4, 11; see Figure 15, *infra*.) The rest of the water is exported. (Id.) In a Critical year, only 37% of San Joaquin River water remains in the Delta.[40] (Id.) As in Dry years, the remaining water is exported. (Id.)

Figure 15: Fate of San Joaquin River Water in Water Years 1964 and 1988. (Periodic Review SJRGA Exh-39: Figures, Appendix G, Fischer Delta Model Simulated Flow Split Percentages ("Periodic Review SJRGA-39"), p4.)



Finally, Ms. Paulsen added a tracer to further isolate the fate of San Joaquin River water. She determined that in an Above Normal year, no more than 18.5% of San Joaquin River water flowed into Turner Cut.[41] (Periodic Review SJRG-39, p13-14.) Even in a Dry year, when a greater proportion of water remains in the Delta, no more than 23% of

[39] Ms. Paulsen modeled water year 1964 as the Dry year. (Periodic Review SJRG-04; Periodic Review SJRG-39.)
[40] Ms. Paulsen modeled water year 1988 as the Critical year. (Periodic Review SJRG-04; Periodic Review SJRG-39.)
[41] Water year 2000 was used to simulate the Above Normal year. (Periodic Review SJRG-39.)

San Joaquin River water enters Turner Cut.[42] (Id.) These simulated percentages, as low as they may appear, actually overestimate the amount of San Joaquin River water flowing into Turner Cut, because the FDM sometimes counts tracers multiple times.[43] Therefore, the amount of San Joaquin River water entering Turner Cut is less than that predicted by the simulation. (Id.)

Together, the three agricultural barriers prevent almost all of the San Joaquin River's water from entering Old River and effectively eliminate any significant hydrologic relationship between Vernalis and the interior south Delta during the summer irrigation season and thwart any significant influence EC at Vernalis can have on EC on Old River at Middle River, Old River at Tracy Road Bridge, or other locations in the interior south Delta. (Periodic Review SJRG-04, p12.) Once the SJR water reaches the Stockton Deep Water Ship Channel, water from SJR joins the Sacramento River. (Environmental Impact Report ("EIR") for the 1995 WQCP, pIII-104, III-106; Periodic Review SJRG-05, p5-6.) Very little of the water in Turner Cut, Paine Slough, the Grant Line Canal, and other areas in the interior southern Delta comes from the San Joaquin River. (Id.) Instead, most water comes from the Sacramento River. (Id.) As a result, the interior south Delta is irrigated primarily with Sacramento River water, and the most fundamental assumption underlying the South Delta EC Objectives, that SJR water irrigates crops in the south Delta, is wrong.

[42] Water Year 2001 was used to simulate the Above Normal year. (Periodic Review SJRG-39, p3.)

[43] On Tables 2 and 3, the CVP, SWP, Los Vaqueros, and Contra Costa export columns, plus the Martinez column should total approximately 100%. (Periodic Review SJRG-39, p13-14.) If they total less than 100%, the remaining percentage represents water remaining in the Delta. The sum of the Old River, Stockton Ship Channel, Turner Cut, Columbia Cut, Little Connection Slough, and Middle River columns will exceed 100%, because the tracers are counted multiple times.

Thomas M. Zuckerman, a farmer on the Rindge Tract, corroborated Ms. Paulsen's analysis. He testified that, due to the "myriad of channels and connections to the Sacramento River, both natural and constructed as part of the Central Valley Project", the water he pumps comes from either the Sacramento or Mokelumne River, not the San Joaquin. (Bay-Delta, Depo. Tr. Thomas A. Zuckerman, p33-34 (May 25, 1999).)

Ms. Paulsen's analysis further refutes the testimony of Mr. Salmon. (Periodic Review SDWA-09A, p47.) Mr. Salmon describes declines in the yields of walnuts and grapes grown at his farm at the east end of the Grant Line Canal. (Id.) No correlation existed between his crop yields and EC at Vernalis however, because in the irrigation season there is no significant hydrologic relationship between the water he diverts and the water at Vernalis. (Periodic Review SJRG-04, p12; see §III(A), *supra*.) Even if Mr. Salmon, the SDWA, or others had evidence demonstrating a correlation between the EC of the water Mr. Salmon diverts and EC at Vernalis, they lack of any significant hydrologic relationship forecloses the existence of any causal relationship.

The Vernalis Irrigation Season Objective was set at a level of salinity sufficient to protect the yields of beans, the most salt-sensitive crop grown in the south Delta[44], but due to the combined effects of exports and barriers, the Vernalis Irrigation Season Objective only provides substantial protection to crops irrigated with San Joaquin River water upstream from the Stockton Deep Water Ship Channel and east of the HORB. (Periodic Review SJRG-04, p20-21, Figures 18 and 19.) About 3,000 acres of beans are

[44] Mr. Hildebrand testified that beans are so salt sensitive that as the irrigation water became saltier, beans in the south Delta were replaced with corn. (Periodic Review SDWA-09A, p10.) In fact, Mr. Hildebrand testified that so much corn was grown that there a surplus. (Id.)

grown in this area[45], and almost all of them are located in the Banta-Carbona Irrigation District ("BCID").[46] Consequently, the Vernalis Summer Objective only protects 3,000 acres of beans.

6.4.3.4. Current Research.

In the recent USBR-DWR Cease and Desist Order Hearing, Dr. John Letey described how Ayers and Westcot, D-1485, and the 1995 WQCP, conservatively assumed steady-state conditions, i.e., water is assumed to flow continuously through the soil and the soil solution concentration is assumed to be constant at all times, although neither condition exists in the field. (USBR-DWR SWRCB CDO Proceeding, DWR-22, p4.)

The steady-state model used by Ayers and Westcot did not address transient conditions that occur in the field.[47] (San Joaquin Valley Drainage Implementation Program and University of California Salinity/Drainage Program, Drainage Reuse Technical Committee (February 1999), §IV(A).) If a non-saline soil profile is irrigated with saline water, one or more years of irrigation may be required to build the soil salinity to a steady level consistent with the salinity of the irrigation water and crop-water uptake. (Id.) In the field, crops, rainfall and the amount of irrigation water applied, vary and steady-state conditions, such as those assumed by Ayers and Westcot, do not exist.

[45] Drs. Hagen and Mason estimated that, based on the rate of decline in bean production in San Joaquin County, 4,346 acres of beans would be grown in the south Delta in 2003. (Periodic Review SJRG-05, p2.) In 1996, about 75% of the beans were irrigated with surface water. (Id.) Assuming the proportion of beans irrigated with surface water remained constant, about 3,259 acres of beans would have been irrigated with surface water in 2003.

[46] In 2003, about 2,300 acres of beans were grown in the BCID. (Periodic Review SJRG-05, p2.)

[47] The San Joaquin Valley Drainage Implementation Program was established in 1991 as a cooperative effort of the USBR, United States Fish and Wildlife Service, USGS, United States Department of Agriculture-Natural Resources, Conservation Service, SWRCB, California Department of Fish and Game, California Department of Food and Agriculture, and the DWR to develop and implement recommendations for the San Joaquin Valley Drainage Implementation Program. (http://www.owue.water.ca.gov/statedrain/index.cfm)

(Id.) Another limitation is that the model does not allow for upward water movement in the soil profile. (Id.) The transient model described by Dr. Letey has the advantage of including the effects of temporal variation in potential transpiration, allowing any irrigation schedule, switching irrigation water qualities, allowing upward or downward soil water movement in the profile, and allowing differences in crop rotation. (Id.)

In 1982, Hoffman, Prichard, and Meyer concluded that the "biggest uncertainty in this information is the leaching fractions which can reasonably be achieved for the various combinations of soils, crops, and management options suitable for the South Delta" (Periodic Review SDWA-12, p10.) The importance of leaching fraction is based on steady-state conditions, but since steady state-conditions do not account for the initial salinity status in the soil profile, it becomes less important in the transient model. (Id.)

Ayers and Westcot also assumed that 40% of the root water uptake was distributed to the first quarter of the root section, 30% to the second quarter, 20% to the third quarter, and 10% to the fourth, and final, quarter. (Id., p8.) However, Ayers and Westcot weighed each quarter of the root zone's contribution equally, when the EC contribution of each quarter according to the portions of water taken up more accurately represents impacts on crops. (Id.) Weighing each quarter of the root zone equally significantly overestimates soil EC. (Id.)

Finally, Ayers and Westcot assumed that the EC of the soil water was half the EC of the saturated soil extract, but this assumption fails under quantitative analysis, because it assumes that at water contents that soils are commonly collected in the field, an equal amount of distilled water must be applied to saturate the soil. (Id.) In a true quantitative analysis however, the average root zone EC_e equals EC_i. (Id., p9.) A calculation more accurately reflecting true quantitative analysis would conclude that an EC of 1.0 dS/m would be sufficient to protect bean yields and, by extension, all other crops grown in the South Delta. (Id., p11.) When the effects of rainwater are considered, South Delta crops could tolerate irrigation water EC even higher than 1.0 dS/m. (Id., p14.)

6.5. The SWRCB is Reviewing the Vernalis Irrigation Season Electrical Conductivity Objective and May Change It From 0.7 dS/m to 1.0 dS/m.

The water body shall also be de-listed if objectives or standards have been revised and the water body meets the revised water quality standards. (Listing Policy, §4.) At a minimum, a change in water quality objectives require reevaluation of the water body's § 303(d) Listing. (Id.)

The SWRCB is currently conducting its Periodic Review of the Bay-Delta Water Quality Control Plan and has decided to review the Vernalis EC Objectives. As part of the Periodic Review, the SJRGA has recommended changing the Vernalis EC Objectives from an objective of 0.7 dS/m from April through August and 1.0 dS/m the rest of the year, to an objective of 1.0 dS/m for the entire year ("Alternative Objective"). In the subsequent USBR-DWR Cease and Desist Order hearings and Salt and Boron TMDL hearings, numerous other parties have submitted separate and independent analyses suggesting that a year-round South Delta EC Objective of 1.0 dS/m would be sufficient to protect agricultural beneficial uses.

Mr. Steiner used CALSIM II-Revised to model the effect of the Alternative Objective on flows and water quality. (Periodic Review SJRG-07, p21.) Currently, the Vernalis Irrigation Season Salinity Objective and the dissolved oxygen objective at Ripon require similar levels of release from New Melones. (Id.) As a result, the dissolved oxygen objective at Ripon drives Vernalis EC, and changing the Vernalis Irrigation

Season Salinity Objective does not significantly change releases from New Melones for EC at Vernalis.[48] (Id., p27; see Figure 16 and Figure 17, *infra*.)

Water quality on average would be about the same, although in Critical year types EC at Vernalis would increase by about 0.1 dS/m. (Id.) In Dry year types, the most marked change would occur in July, but even this change would only be about 0.05 dS/m. (Periodic Review SJRG-07, p26.) It should be emphasized, that such changes only occur when a 100 cfs flow surrogate is used. **If the current dissolved oxygen objectives at Ripon remain, EC at Vernalis does not change.** (Id.)

If the SWRCB adopts and implements the Alternative Objective, the new salinity objective will be 1.0 dS/m for the entire year. EC at Vernalis will never exceed 1.0 dS/m, even with the current IPO, exceedances will never occur, and as now, beneficial uses will not be impaired.

[48] In CALSIM II-Revised, assumed operation of the IPO at New Melones "layers" one component of flow upon another, i.e., the fishery release is assumed to provide the "first" water in the river. (Periodic Review SJRG-07, p21.) Then, if required to meet the Objective, supplemental releases are made. (Id.)

Figure 16: Simulated Electrical Conductivity with current Vernalis Electrical Conductivity Objectives. (Periodic Review SJRG-07, p26.)

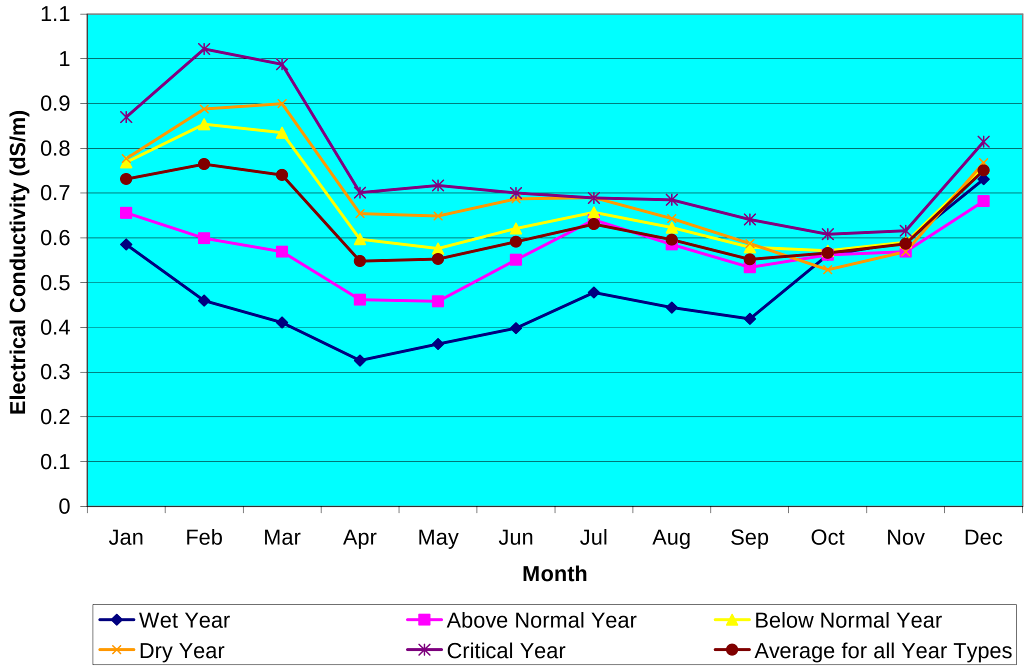
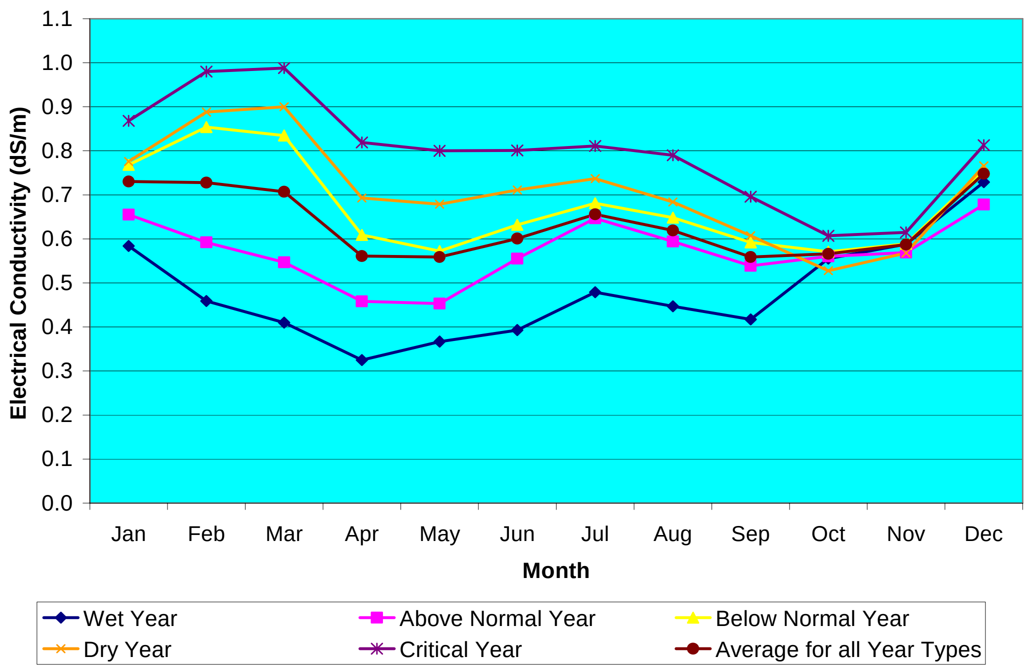


Figure 17: Simulated Electrical Conductivity with Alternative Objective.[49] (Id.)



[49] In Figure 16 and Figure 17, the dissolved oxygen objective at Ripon is been replaced with a 100 cfs surrogate.

6.6. Situation-Specific Weight of the Evidence Factors.

Under §4.11 of the Listing Policy

> When all other Delisting Factors do not result in the delisting of a water segment but information indicates attainment of standards, a water segment shall be evaluated to determine whether the weight of the evidence demonstrates that a water segment shall be removed from the § 303(d) List. If warranted, a listing may be maintained if the weight of the evidence indicates a water quality standard is not attained.

A thorough review of the 1996 §303(d) administrative record shows that the LSJR was listed for salt and boron without the use of any data. Nothing but a "belief" that the salt and boron are problems supports the LSJR §303(d) listing, but under the Listing Policy however, a "belief" is insufficient. Credible evidence and reliable, quantitative data is required.

In January, 2004, the San Joaquin Tributaries Association, now the SJRGA, commented in response to the TMDL that the historical record did not reflect current conditions of the LSJR. (Comments of the San Joaquin Tributaries Association on the Proposed Amendments to the Water Quality Control Plan for the Control of Salt and Boron Discharges into the San Joaquin River (January 16, 2004).) The CVRWQCB did not respond. (CVRWQCB Responses to Written Public Comments on the November 2003 Draft Staff Report for Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the LSJR, p11-12.)

There is no evidence that the Vernalis EC Objectives are not being attained. No party has submitted any evidence that under current conditions the Vernalis EC Objectives will not be attained in the future with sufficient frequency to require § 303(d)

Listing. Neither has anyone demonstrated actual, real-world impacts on agricultural beneficial uses in the LSJR Basin with information or data that withstands cross-examination or meets the requirements of §6 of the Listing Policy.

There is no evidence with any weight favoring continued listing of the LSJR for EC and boron. Under the §4 of the Listing Policy, the LSJR must be de-listed for EC and boron. The requirement to remove the LSJR from the § 303(d) List for EC and boron is compulsory. The SWRCB and RWQCB have no discretion to do otherwise. If they, or any other party, wish to keep the LSJR on the § 303(d) List for EC and boron they must prove the Vernalis EC Objectives are not being met, they must prove actual, not just theoretical, harm is occurring to SLJR agricultural beneficial uses, and they must prove the harm suffered is caused by EC exceedances. Any assertion they make must be supported by facts, quantitative data, and information that meets the quality assurance and quality control standards established in §6 of the Listing Policy and required by the 2001 Budget Act Supplementary Report.

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