O'Laughlin & Paris LLP

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1/6-7/11 Bd. Wrkshop
SJR Technical Report
Deadline: 12/6/10 by 12 noon

VIA US Mail (Bay-Delta@waterboards.ca.gov)

December 6, 2010

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-2000

RECEIVED
DEC - 6 2010
SWRCB EXECUTIVE

Re: SJR Technical Report Workshop

Dear Members of the Board:

The San Joaquin River Group Authority ("SJRGA") and its member agencies submit the attached comments on the Southern Delta Salinity portion of the *Draft Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives* ("Draft Report").[1] Pursuant to the public notice, five copies will follow by US mail. Detailed comments are attached. Some of them major issues identified are –

- Based on available information, South Delta irrigated agriculture is a beneficial use sensitive to saline irrigation water from April through October. From April through August the most sensitive crop commonly grown is beans. In September and October the most sensitive crop commonly irrigated is alfalfa. Given leaching fractions generally observed in the Southern Delta, an objective of 1.1 dS/m from April through August and of 1.7 dS/m in September and October would adequately protect South Delta irrigated agriculture even in years with minimal precipitation.

- The regression analysis is overly simplistic in the extreme and ignores other recognized factors affecting South Delta salinity. Old River at Tracy Road Blvd. is likely affected by local sources and the variability (R^2) explained by the regression equation for Old River at Tracy Road Blvd. is marginal for developing a relationship between the variables.

- The Water Supply Analysis fails to consider all sources of flow and the degree to which the sources of flow considered are subject to SWRCB orders requiring diversion reductions. In calculating necessary additional flows for objectives at

[1] Modesto Irrigation District, Turlock Irrigation District, Merced Irrigation District, South San Joaquin Irrigation District, and Oakdale Irrigation District, San Joaquin River Exchange Contractors Water Authority, Friant Water Users Authority, and the City and County of San Francisco.

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Vernalis, the analysis needs to include sources of all flow, not just "low salinity flow." Furthermore, even though the salinity objectives being implemented are in the Delta and intended to protect in-Delta beneficial uses, in-Delta diversions are not included in the analysis. Water right priorities must be followed and many in-Delta diverters my hold water rights junior to those upstream.

- The Water Supply Analysis, by considering flow as a method of implementing Interior South Delta salinity objectives, fails to distinguish between the objectives and implementing the objectives. SJR flow is but one possible method of implementing the objectives.

- Depending on the percentage of unimpaired flow, more than a 100 percent reduction in diversions would be required in at least 21 percent of years. Up to a 166 percent reduction in diversions would be required, appropriating the entire SJR Basin and requiring the release of stored water.

- Although the Draft Report considers a range of proposed objectives for San Joaquin River flow as "bookends," there is no set of alternatives for South Delta salinity objectives that could serve a similar purpose. Considering a set of alternatives in combination with the proposed range of alternatives for San Joaquin River flow objectives would provide extremely useful information.

The Draft Report is intended to "provide the Board with the scientific information and tools needed to establish SJR flow and southern Delta salinity objectives, and a program of implementation to achieve these objectives," but its analysis is insufficiently detailed and far too simplistic. The SWRCB must implement whatever objective it eventually adopts, even if it later discovers the impacts, costs, and/or practical realities of implementing the objective are undesirable or unattainable. (St. Water Resources Control Bd. Cases (2006) 136 Cal.App.4th 674, 733.) If the SWRCB wishes to avoid such a situation, it needs to more carefully evaluate its hypothetical objectives and program of implementation before proceeding.

Very truly yours,
O'LAUGHLIN & PARIS LLP

By:

TIM O'LAUGHLIN

Attachments

Draft Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives
Comments of the San Joaquin River Group Authority

The following comments, submitted on behalf of the San Joaquin River Group Authority ("SJRGA") and its member agencies focus on the portion of the *Draft Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives* ("Draft Report") addressing Southern Delta salinity and the water supply analysis as it relates to salinity.[1] The SJRGA will be submitting additional comments on fish and wildlife flows, hydrology, and other issues discussed in the Draft Report. The SJRGA will first provide general comments and then more specific comments on portions of the Draft Report.

General Comments.

1. References do not cite page numbers.

The Draft Report cites references, but excludes page numbers. Some references are lengthy. Unless a citation is citing a reference generally, page numbers, especially for lengthy references, should be included.

2. Reliance on drafts, overruled orders, and unpublished, non-peer reviewed papers.

The Draft Report too often relies on drafts that were never finalized, orders that have been overruled, unpublished, non-peer reviewed papers. The draft papers cited have not been finalized in response to public comment and have not been peer reviewed. Such work is incomplete and has not been vetted for any sort of adequacy in its data, analysis, or methodology. Finally, unpublished and non-peer reviewed work relied upon has generally been prepared for specific proceedings by stakeholder groups and government agencies who are either advocating for the interest of the stakeholder group they represent or for their agency's purpose. These papers should be viewed as advocacy, as opposed to a paper published in an academic peer-reviewed journal.

This does not mean such references should be disregarded, but how the reference was ultimately treated must be submitted. If the reference was submitted in a court proceeding, was the referenced factual conclusion adopted by the court? If the reference was submitted in a SWRCB proceeding, was the referenced factual conclusion adopted by the SWRCB? For example, the Draft Report cites the City of Tracy Wastewater Treatment Plant NPDES Permit (CVRWQCB Order No. R5-2007-0036) to support the proposition that the proposition that NPDES discharges do not significantly impact Interior South Delta salinity. (Draft Report, p. 73-74.) On review, the SWRCB disagreed and concluded that discharge from the City of Tracy Wastewater Treatment Plant, to the contrary, had a reasonable potential to cause or contribute to an excursion above water quality standards. (SWRCB Water Quality Order 2009-0003, p. 5.)

[1] Modesto Irrigation District, Turlock Irrigation District, Merced Irrigation District, South San Joaquin Irrigation District, and Oakdale Irrigation District, San Joaquin River Exchange Contractors Water Authority, Friant Water Users Authority, and the City and County of San Francisco.

Other references, although not specifically submitted for any particular proceeding, rely on references that were submitted for a proceeding and were overturned or overruled. If something was deemed arbitrary and capricious by a court, then it should similarly be deemed arbitrary and capricious by the SWRCB.[2]

3. The Delta's areas are not defined.

The current *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (Bay-Delta Plan) contains objectives for the "Central Delta" and "Southern Delta." These areas are not defined. The "Delta" is defined in Water Code section 12220, and although the "Southern Delta" is likely the southern portion thereof, greater precision is necessary to determine which objectives apply where.

4. Define "Variability."

How much variability the SWRCB seeks to achieve, or exactly what it means, is unclear. "Variability" can occur by the hour, day, week, month, or year. It should also be understood that a "variable" and more "natural" system would not only have big, high flow years, but also very dry, low-flow years.

5. Scientific Criteria not fully defined.

The entire basis for the scientific criteria to be used for setting objectives is not fully defined. It completely omits the need to ensure that salt is removed from the San Joaquin River ("SJR") Basin. Without such recognition, the basin will suffer long-term salinity degradation and such an action will violate existing Regional Board policy and efforts to develop salinity management plans for the Basin as required under SWRCB Recycled Water Policy. The Regional Board Basin Plan Policy says that the SJR can be used to remove salts from the basin provided that water quality objectives are being met. This policy was recognition that a drain to remove salt from the basin will not likely be built in the near future and salts removal is critical to the basin's long-term survival. The CV-SALTS program has already begun an effort to develop a long-term strategy for salt control and management and this must be recognized in developing the objectives at Vernalis. There is no mention or analysis in the SWRCB staff report of the need to remove salt from the basin for long-term salinity control. This must be considered in setting any water quality objectives for salinity at Vernalis.

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[2] For example, with respect to Delta fishery flows a body of work exists that has been tested more rigorously then 90 percent or more of all peer reviewed papers. That information is contained in declarations presented in the federal court OCAP litigation, where countervailing declarations were produced, cross examination of the declarants took place, and a judge issued rulings with respect to the adequacy of the scientific data for regulatory purposes. This type of data should be included in the data set and considered by the State Board. It clearly meets the test for being the type of information on which responsible persons are accustomed to rely in the conduct of serious affairs.

Specific Comments.

6. Page 69: Under Section 4.2 it is stated "Additionally, point sources of salt in the southern Delta can have a minimal overall salinity effect."

NPDES point source discharges likely have a small overall salinity effect when taken in the context of other sources, but their localized impact can be quite large unless there is sufficient flow in the area to move them out. Tidal effects (tidal "sloshing") can cause this salt load to remain in the area for extended periods of time. These salts then become intermixed with other salts in water that is diverted to agricultural land; thus, these salts become more concentrated prior to discharge as agricultural return water back to the interior Delta channels. Most of the NPDES discharges are located in the Old River area and thus compound the problem.

7. Pages 69-73. R^2 value does not support the conclusion of the analysis conducted in Section 4.2.1 entitled "Estimating Southern Delta Salinity Degradation."

There is a fundamental problem with the analysis conducted in Section 4.2.1 entitled "Estimating Southern Delta Salinity Degradation" and the use of the results. The basis of the analysis is that EC at Vernalis can be used to estimate salinity at three points within the "Interior South Delta". Those points are 1) SJR at Brandt Bridge (BDT), 2) Old River at Middle River/Union Island (UNI), and 3) Old River at Tracy (OLD).

The regression analysis shown in figures 4-2, 4-3 and 4-4 shows that there is a relationship for two of the sites (BDT and UNI) as shown by the very high R^2 value. When comparing these two figures it shows that there is a 3-5% increase in salinity between Vernalis and these two points (approximately 12 river miles). The lower salinity degradation rate is on the main stem SJR (BDT) and this rate of degradation is not uncommon among western rivers. The more interior site (UNI) has a slightly higher rate of degradation that is not related to Vernalis and is likely due to the lower overall flow rate and greater rate of extraction, discharge and recirculation that likely occur in this interior reach.

The third site (OLD) however shows no such relationship. The R^2 value is only 0.75 which is marginal for establishing a relationship between the two variables. It shows a degradation rate 2-3 times that of the other two sites. This should immediately raise an alarm that some other source or sources are contributing significantly to the rise in salinity in this reach. In looking at Figure 4-1 several issues immediately arise, each of which may be contributing to the salinity increase at site OLD.

- The measuring point is in the immediate vicinity of the outflow of Tom Payne Slough and Paradise Cut, which are known to carry elevated levels of salinity due to restricted flows, recirculation by diversions and discharge of return flows, recirculation by agricultural diversions and discharge of return flows, and continuous surface and subsurface agricultural drainage water discharges. The area of Tom Payne Slough is known to have soils and groundwater with elevated salinity and most likely these salts originated prior to the development of agriculture.

- The measuring point is in an area of known high salinity soils and groundwater northeast of the City of Tracy. This is demonstrated by the high salinity values found in the subsurface drainage upslope of Tom Payne Slough and by the high saline groundwater underlying the area adjacent to the former Tracy Sugar facility.

- The measuring point is on the eastern boundary of what is known as an area of high salinity caused by the alluvial formation of marine origin in contrast to the areas slightly east that are of an alluvial origin from the Sierra Nevada. The presence of these saline soils was strongly noted in the Hoffman Report. (Hoffman Report, p.7 and p. 23-26.) These marine soils continue from approximately Tracy along the entire western side of the Delta in a fashion similar to that found in the Panoche Fan area of Fresno and Merced Counties. (Montoya, 2007)

- The measuring point is in the immediate vicinity of the City of Tracy WWTP discharge and close to the Mountain House Community Services District WWTP discharge. SWRCB Water Quality Order 2009-0003 notes that these discharges are known to cause very serious localized salinity problems. (SWRCB Water Quality Order 2009-0003, p. 6.) Adding additional flow at Vernalis to mitigate this impact would be inconsistent with state and federal policy that does not allow dilution to be used to mitigate for a point source impact. In addition, policy already outlined in the Regional Board's Basin Plan and approved by the SWRCB focuses on not allowing localized hot spots to develop while the Board continues to develop policies for controlling salinity long term (Sacramento/San Joaquin River and Tulare Lake Basin Plans).

Flow Science replicated the SWRCB Staff analysis for the SJRGA with results very close to those computed by the SWRCB Staff.[3] However, in the Vernalis OLD plot, EC data points for 10/2008-12/2009 are generally located along the upper bound of all data points, indicating the relationship between Vernalis CDEC EC and OLD EC has changed somewhat for the recent period.[4] (*see* Figure 1, below.) Since October 2008, OLD EC has been higher for any given EC at Vernalis. Why EC has changed and whether the causes of such changes will continue has not been considered.

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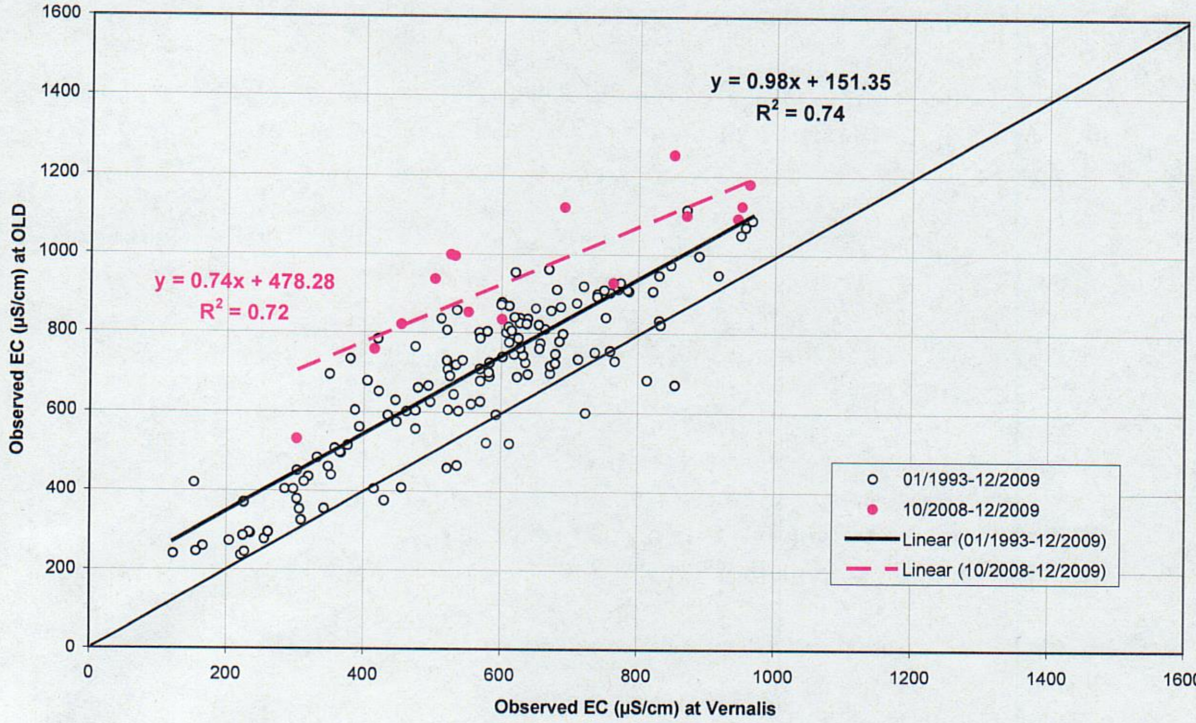
[3] The SWRCB Staff method of analysis is described at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/water_quality_control_planning/salinity.shtml.

[4] For the two periods, April-August and September-March, the regression relationships between Vernalis EC and OLD EC showed some difference from SWRCB's results, but not by much. This could be a result of less data points.

Figure 1. Comparison of Vernalis EC and OLD EC for 1993-2009 and 10/2008-12/2009.



The Old River area overlies naturally saline soils that existed prior to land development in the area. In addition, the entire area is underlain by a high salinity water table that makes salinity control in this area difficult. Placing the burden of maintaining salinity levels in Old River that results from this saline area on Vernalis flows places an undue burden on upstream water users for maintaining farming in what is a naturally saline area of California.

The poor fit of the regression equation at OLD is further illustrated in Figures 4-5 and 4-6, where staff attempt to place confidence or prediction limits on something that was only marginally accurate in the first place. The result is shown in Figure 4-7, which should raise a red flag, as the salinity predicted by the regression relationship compares poorly to the actual measured salinity for the 1993-2009 time period. Based on the regression equation, the SWRCB's prediction of salinity at OLD should be reasonably accurate in high flow years (i.e. 2006) and very poor in lower flow years (i.e. 2007-2009) but neither is true. The latter may be the result of there being no Head of Old River Barrier ("HORB") during the 2008-2009 period, and thus more flow entering Old River. Another factor may be related to changing flow in the recent (2008-2009) time period, as compared to the prior period. Since the regression relationship was developed for one particular set of conditions, changes in flow conditions (e.g., due to the recent Biological Opinions, changes in Delta diversions or operations) will invalidate the regression relationship, as discussed in greater detail below.

If the SWRCB retains OLD in its analysis, it should include actions for controlling salinity sources at this location, such as modifying farming practices or point source controls, as local salinity sources produce large increases in salinity. Otherwise, the SWRCB should use another site such as UNI or BDT, that has a less marginal relationship to Vernalis EC.

8. Page 70-72. Interior South Delta Salinity Objectives[5]

Southern Delta Salinity objectives for Old River at Middle River, Old River at Tracy Road Bridge, and San Joaquin River at Brandt Bridge will be referred to generally as the "Interior South Delta Objectives."

According to State Water Resources Control Board ("SWRCB") Water Right Decision 1641 ("D-1641")

> Water quality in the southern Delta downstream of Vernalis is influenced by San Joaquin River inflow; tidal action; diversions of water by the [State Water Project ("SWP")], [Central Valley Project ("CVP")], and local water users; agricultural return flows; and channel capacity. The salinity objectives for the interior southern Delta can be implemented by providing dilution flows, controlling in-Delta discharges of salts, or by using measures that affect circulation in the Delta.

(D-1641, p.86-87 (*citations omitted*).)

Consistent with D-1641, the 2006 Bay-Delta Plan stated:

> Elevated salinity in the southern Delta is caused by various factors, including low flows; salts imported to the San Joaquin Basin in irrigation water; municipal discharges; subsurface accretions from groundwater; tidal actions; diversions of water by the SWP, CVP, and local water users; channel capacity; and discharges from land-derived salts, primarily from agricultural drainage.

(2006 Bay-Delta Plan, p. 27.)

The regression analysis is abhorrently inadequate. It addresses only correlations between San Joaquin River inflow and salinity at the Interior South Delta locations and ignores all other factors. It draws a correlation with San Joaquin River ("SJR") inflow, but, since it addresses none of the other factors affecting Interior South Delta Salinity, it ignores causes. This is a classic example of the difference between a correlative analysis and a causal analysis.

In the past, flow barriers have been installed to enhance water levels, improve circulation, and lower surface water salinity concentrations. (D-1641, p. 87; *see also* Dept. of Water Resources ("DWR") Temporary Barriers Operating Schedule (http://baydeltaoffice.water.ca.gov/sdb/tbp/web_pg/tempbsch.cfm).) he barriers generally have improved water quality in the southern Delta, because salts otherwise trapped in the channels are transported out of the area due to the enhanced circulation. D-1641, p. 88.) The barriers also

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[5] Southern Delta Salinity objectives with compliance locations at Old River at Middle River, Old River at Tracy Road Bridge, and San Joaquin River at Brandt Bridge will be referred to generally as the "Interior South Delta Objectives."

reduce the amount of salt imported by way of the Delta-Mendota Canal, which should result in some long-term improvement in the quality of the SJR. (Id.)

CVP/SWP export pumping also has significant effects on Interior South Delta salinity, sometimes even improving it, but the regression analysis similarly ignores the influence of CVP/SWP export pumping. (Draft Report, p. 51) Changes in CVP/SWP export pumping rates (e.g., BDCP north Delta diversion) will change the salinity regime in south Delta and undermine the validity of the regression equations. If it is true that CVP/SWP export pumping improves Interior South Delta salinity, then the regression equations cannot be correct.

The SWRCB regression equations were derived using observed data between 1993 and 2009. To use these equations in planning studies for the future, it has to be assumed that future changes in south Delta flow and salinity regime are negligible. This assumption is not valid because factors such as Bay Delta Conservation Plan measures, south Delta barrier operations, climate change and sea level rise will induce significant changes of flow and salinity regime in the Southern Delta. In addition, the change proposed in the very same report (Draft Report, p. 65), a higher and more naturally variable inflow from Vernalis, will change south Delta hydrodynamics and salinity. Therefore, the validity of using these regression equations in setting future SJR salinity objectives is questionable. In fact, as pointed out in the prior comment, the regression result for 2009 shown in Figure 4-7 is the worst, which is likely caused by the absence of the HORB and changes in CVP/SWP exporting schedule due to the NMFS Biological Opinion on the CVP/SWP OCAP.

9. Page 73-74. Salt loads from NPDEPS permits, dischargers, runoff from irrigated lands, tail water return flows, and subsurface drainage discharges within the Delta.

D-1641 noted that salinity concentrations exceeding the Interior South Delta salinity objective are caused in part by in-Delta irrigation activities and therefore recommended that irrigators within the Delta implement water management measures as a means of controlling salt impacts within the Delta channels. (D-1641, p. 87.) The Draft Report, to the contrary, concludes that discharges of salts insignificantly affect Interior South Delta salinity based on three NPDES permits. It ignores other NPDEPS permits, discharges, as well as non-NPDES discharges, sich as runoff from irrigated lands, tailwater return flows, and subsurface drainage discharges within the Southern Delta. The Hoffman Report and Montoya (2007[6]) describe many sources of salinity within the Delta.

The Executive Summary for the 2007 Review of Monitoring Data Irrigated Lands Conditional Waiver Program, which is the most recent report available, notes that "Salinity, as measured by electrical conductivity, is a concern in all Zones of the Central Valley although most notably in Zones 2, 3, and the northwest portions of Zone 4." (CVRWQCB, 2007 Review of Monitoring Data Irrigated Lands Conditional Waiver Program[7], p. ES-3 (July 13, 2007).) The

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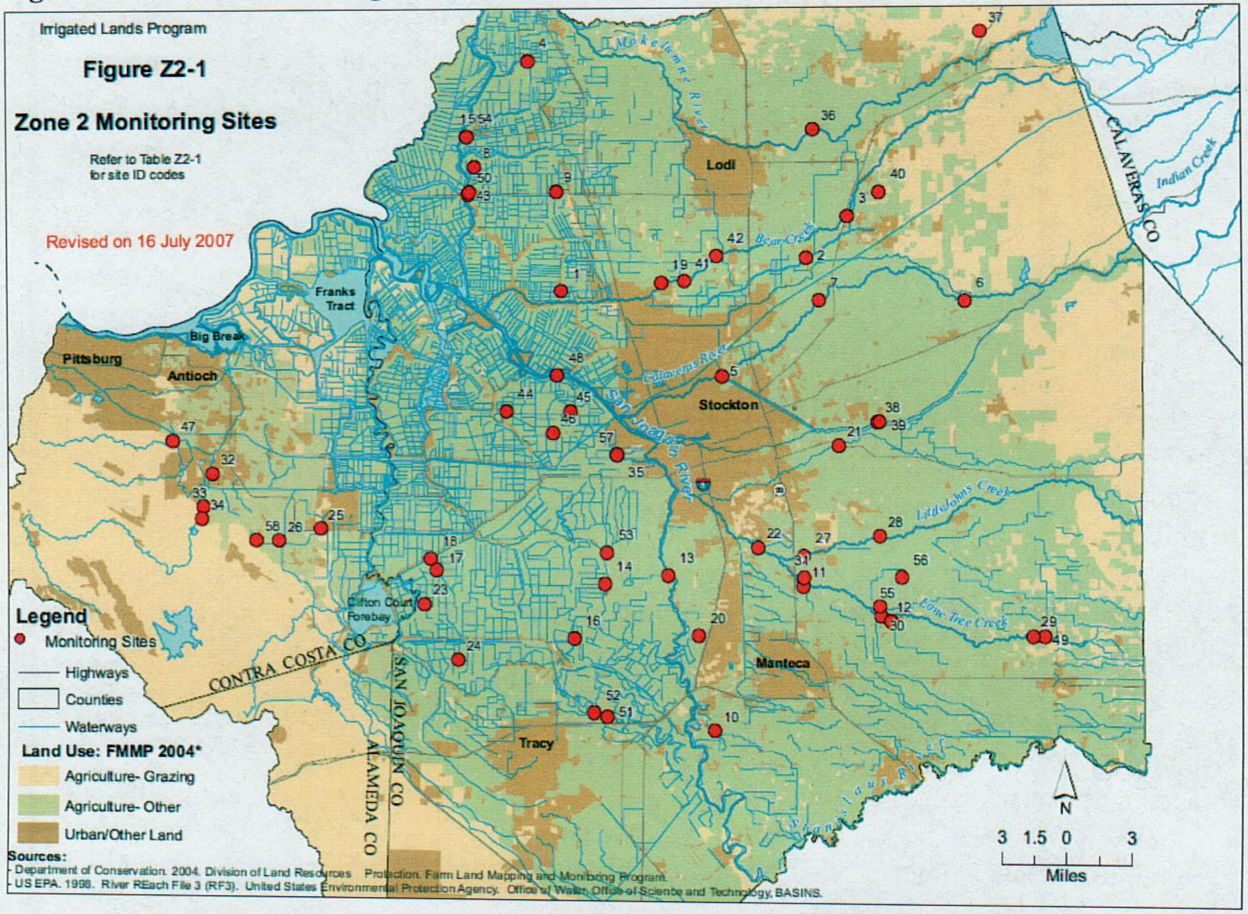
[6] Montoya, B. 2007. Memorandum Report "*Sources of Salinity in the South Sacramento-San Joaquin Delta.*" California Dept. of Water Resources, Environmental Assessment Branch, Sacramento, CA.
[7] Available at
http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/monitoring_data/staff_monitoring_data_analysis/2007_monitoring_data_report/2007_data_review/exec_summ.pdf

narrative for Zone 2, which includes the Delta, notes several sites in the Southern Delta, primarily in the Grant Line Canal area, where specific conductivity and total dissolved solids have returned monitoring results above trigger levels.[8] (*see* Figure 1 and Table 1.)

The narrative for the Zone 2 report notes that "The frequency of salinity, in excess of water quality triggers measured as electrical conductivity, predominates in the Delta drain areas and in areas where receiving waters receive Delta water. Four of the 54 monitoring sites where specific conductance was tested exhibited 36% of all the occurrences above the trigger level. These monitoring points: Terminous Tract off Guard Road, Grant Line Canal near Calpack Road, Drain to Grant Line Canal off Wing Levee Road, and Drain to North Canal at South Bonetti Road occupy Delta drain areas." The Grant Line monitoring points are both located in the South Delta. Grant Line Canal near Calpack Road measured 41occurences of total dissolved solids ("TDS") and specific conductivity above trigger points and Grant Line Canal off Wing Levee Road measured 37. However, the Drain to North Canal at South Bonetti Rd. measured 36, nearly as many.

Figure 2. Zone 2 monitoring sites.



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[8] Available at http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/monitoring_data/staff_monitoring_data_analysis/2007_monitoring_data_report/2007_data_review/zone2_narrative.pdf

Table 1. Monitoring results from Irrigated Lands Conditional Waiver reports for total dissolved solids and specific conductivity for South Delta area drains above trigger levels.

Site Number	Monitoring Site	Total Dissolved Solids	Specific Conductivity	Total
10	Drain 11 @ Walsal Slough (Top of Bank)			0
13	Drain at Bowman Rd.		4	4
14	Drain at Wing Levee Road		6	6
16	Drain to Grant Line Canal off Wing Levee Rd.	12	14	26
17	Drain to North Canal along Bonetti Drive			0
18	Drain to North Canal at South Bonetti Rd.	12	13	25
20	Drain to San Joaquin River off South Manthey Rd.	6	8	14
23	Grant Line Canal @ Clifton Court Rd	5	5	10
24	Grant Line Canal near Calpack Rd	10	16	26
51	Tom Paine Slough at El Rancho Rd.		4	4
52	Tom Paine Slough at Paradise Rd.			0
53	Unnamed Canal at Howard Road			0
Total		45	70	115

Consistent with the foregoing interpretation, the SWRCB overruled the cited CVRWQCB Order No. R5-2007-0036 and determined that the approach described in the Draft Report is inconsistent with federal requirements in establishing final effluent limitations when the discharge has a reasonable potential to cause or contribute to an excursion above water quality standards. (SWRCB Water Quality Order 2009-0003, p. 5.) In considering the City of Tracy's wastewater discharge permit, the SWRCB concluded that treatment plant's discharge, which could exceed the Interior South Delta salinity objective by more than 100 percent, did have such potential. (Id. at 6.) The final effluent limitation had to be the objective. This same limitation should apply to all other discharges.

Many other high salinity discharges occur in the Southern Delta. Of 74 discharge sites identified by the DWR, the majority discharge agricultural drainage. (Hoffman, G. J., Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta, (January 2010) ("Hoffman Report"), p. 51.) The New Jerusalem Drainage District, for example, has for at least 30 years discharged agricultural drainage at an electrical conductivity ("EC") averaging 2.6 dS/m, nearly double that discharged by the City of Tracy. (Id. at 53.) Another drainage system, the Tracy Road Drainage Sump, averaged 3.4 dS/m. (Id. at 54.) Of 24 other drains sampled, the average EC was 3.0 dS/m. (Id. at 52.) The drains noted in the Hoffman Report all carry subsurface drainage that results from controlling the water table in the upland areas of the Southern Delta. These subsurface drains in the upland areas represent only a small portion of the drains in the South Delta. The lower portion of the upland area (vicinity of Deuel Vocational Facility) and many of the South Delta Islands all have large open drains to lower the water table. The water table underlying the Delta is known to be very high in salt (brackish) from previous seawater intrusions that occurred through time.

The simple statistical approach used in the Draft Report is anything but adequate, addressing but one of the many factors cited by the SWRCB as influencing Southern Delta salinity. The more sophisticated models capable of simulating Delta barrier operations and SWP/CVP operating conditions are both required and necessary to adequately inform the SWRCB of the manner in which the various factors described in D-1641 interact and influence salinity in the Interior South Delta. The simple mass-balance analysis conducted in Section 4.2.2 is also skewed. It assumes that all the salt load that enters the Head of Old River moves into and through Old River. This is not true, however, because a large fraction of flow entering the Head of Old River moves down through Grant Line Canal, and furthermore, Grant Line Canal flow is often higher than flow passing down Old River through OLD.

10. Page 75-76. Hoffman Report.

The Draft Report summarizes the Hoffman Report's conclusions. However, how the most critical factors in the Southern Delta interact to dictate leaching fraction is important in determining what would constitute "reasonable" protection of Southern Delta Agricultural beneficial uses. The Draft Report's summary is too brief to adequately communicate such an understanding. Much like a brief sound bite, such brief summaries, although facially correct, can still communicate a false, misleading, or incorrect message.

a. The Hoffman Report relies on limited assumptions and outdated information regarding the salt tolerance of beans.

The Hoffman Report assumes that salinity is the only factor limiting bean production. Under field conditions soil boron levels, irrigation management, drainage and weather conditions also influence yields. The Hoffman Report also uses bean tolerance data from the 1950s which is known to be outdated and overly conservative. Cultural practices, including pre-irrigations, developed over decades of bean production on the Western side of the SJR Basin also limit salinity damage under field conditions. The Hoffman Report also does not consider the role of winter time effective rainfall in salt leaching which, in many instances, mitigate much of the salinity damage concerns. Each of these factors needs to be considered in developing any recommendations for water quality objectives based on the results described in the Hoffman Report.

b. Almonds, apricots, beans, and walnuts are salt-sensitive crops of significance in the Southern Delta, with beans being the more salt-sensitive.

Of these crops, the Hoffman Report notes that beans have a salt tolerance threshold 1.0 dS/m, depending on conditions. The Hoffman Report therefore concludes that protecting bean yields against loss from excess salinity will also protect all other crops. Priority given apricots is odd, as they represent only 0.12 percent of the irrigated acreage in the Southern Delta, whereas other noted salt-sensitive crops represent at least 1 percent of the irrigated acreage in the Southern Delta.

Although the Hoffman Report states that almonds, apricots, beans, and walnuts are the salt-sensitive crops of significance in the Southern Delta, it focuses on beans, alfalfa, and almonds: bean because it is the most salt sensitive crop in the South Delta with any significant acreage; alfalfa, a perennial crop, was used to set the current salinity objective for the time of the year not governed by bean; and almond because it is a salt sensitive, perennial tree crop. (Hoffman Report, p. 68.)

Some crops are perennial but are not necessarily irrigated every month. This distinction is important as water quality only needs to be protected when water is diverted and applied for irrigation. An example is alfalfa that grows year-round but is not irrigated year-round. The first irrigation depends on spring rains and, as a result, only occurs as early as March 15. (Electronic Mail from John Herrick to Marc Gowdy, re: Follow-up on SDWA Comments on Hoffman Report (Oct. 21, 2009); Hoffman Report, p. 73.) (Id.) The last irrigation usually occurs 15 days after the last cutting, usually in the first week of October. (Id.) Beans are planted as early as April 1 and as late as mid-June. (Id. at 68.) Beans planted April 1 are harvested by the end of July and beans planted in mid-June are harvested by the end of September. (Id. at 80.) Although the irrigation season objective currently runs until only August 31, beans, in addition to other summer crops, are less salt-sensitive in September and October due to the cooler weather and shorter days than they are earlier in the summer. (SWRCB Water Right Order No. 95-06, p. 29.) Finally, tree and vine crops such as almonds, apricots, and walnuts, although perennial, are not irrigated in the winter. (Hoffman Report, p. 38.)

Setting a water quality objective should be based on protection of a beneficial use. As there is no irrigation beneficial use in the winter, there is no need for a winter-time or non-irrigation season objective. All of the salinity criteria described in the Hoffman Report is based on a certain rate of evapotranspiration during the summer or irrigation period which could result in salt buildup in the soil if the water salinity is too high or leaching is too low. The evapotranspiration rate in the non-irrigation season is minimal or near nil. Even if a grower irrigated during the winter months, the winter rainfall would take care of any salt load that had been applied. The key step in using saline water is to go into the growing season with a low salinity seedbed and to be sure that early growth is not impacted by salinity. For beans and alfalfa, any seeding is done after a pre-irrigation is applied to ensure that the seedbed is low salinity. This is a universal practice in the South Delta and on the Western side of the San Joaquin River. Beans are pre-irrigated from 1 April to end of May and this is the important time for the salinity of the diverted river water. Setting a water quality objective during this time is important for bean germination and early irrigations on other crops. For alfalfa, pre-irrigations and seeding are mostly done in the late fall and often with ground water as surface waters supplies are not often available during that period. The higher salinity groundwater is not a major concern because it is a cooler period and evapotranspiration is low. Winter rainfall leaches any salt out and by next spring, the alfalfa new alfalfa is growing in a low salinity environment.

Based on available information, irrigated agriculture is a beneficial use sensitive to saline irrigation water from April through October. From April through August the most sensitive crop commonly grown is beans, a shallow rooted crop. In September and October the most sensitive crop commonly irrigated is the deeper rooted alfalfa. This is consistent with the vast majority of post-1914 appropriations on file with the Division of Water Rights, which appropriate water for irrigation from April through August, and with the generally defined "irrigation season," which spans the same period. If April through August is the "irrigation season," then, by definition, no irrigation would occur in the non-irrigation season. As a result, outside the irrigation season, irrigated agriculture is not a beneficial use. The beneficial use needs to be better defined prior to setting a water quality objective.

c. Based on the last nine years of data, the current level of salinity in the surface waters of the Southern Delta appears suitable for all agricultural crops.

If true, then the current salinity objectives are more restrictive than necessary to protect South Delta agriculture. A higher (less restrictive) salinity objective would sufficiently protect South Delta agriculture.

d. Based on limited data and known crop tolerances, boron may be a concern.

Reiterating the need to address in-Delta discharges of salts, the boron concentration of effluent from subsurface drains in the New Jerusalem Drainage District over the past three decades averaged 2.6 mg/l and ranged from 0.8 to 4.2 mg/l. (Hoffman Report, p. 76.) By comparison, the boron tolerance of bean is a threshold value of 0.75 to 1.0 mg/l in the soil water within the crop root zone. (Id.) In addition, the soils of the upland areas of the South Delta are known to be high in natural boron. Bean crops have nonetheless been grown on these soils for several decades without any reported toxicity or yield losses.

Orchard crops, especially apricots and other stone fruits are some of the most sensitive crops to boron. These are grown extensively along the San Joaquin River from the Merced confluence to Vernalis. None of these crops show any boron toxicity even though San Joaquin River water with much higher boron levels than seen at Vernalis is often the primary irrigation water source.

Boron toxicity develops with time as the crop accumulates boron in the leaves. Thus boron concentration should be looked at as a long-term average over the irrigation season not an instantaneous value. An example is walnuts and apricots grown throughout the western side of the San Joaquin River Basin even though this area is a boron enriched area. Damage and yield losses are not seen, even when irrigated with San Joaquin River water as these trees are deciduous and the boron that has accumulated in the leaves throughout the growing season is lost with leaf drop. This minimizes the toxic accumulation of boron in these sensitive crops and reduces the overall toxicity impact on the crops. However, as there is no reported boron toxicity on the west side of the San Joaquin River Basin or in the Delta, additional work to study the boron impacts would be academic and of little benefit. The SJRGA recommends against conducting such a study.

e. Depth to the water table in much of the southern Delta is at an acceptable depth for crop production.

It must be recognized that almost all the Southern Delta is underlain by a brackish water table that needs to be controlled in order to have continuous crop production. As such, salts generated by evapo-conconcentration and from the brackish native groundwater must be discharged to the Delta channels. Responsibility for managing this discharge must fall on the Delta agricultural interests similar to the direction the Regional and State Boards have given to other dischargers upstream on the San Joaquin River and elsewhere in the San Joaquin and Sacramento Valleys.

f. Relatively high leaching fractions are associated with an overall irrigation efficiency of 75 percent for furrow and border irrigation methods predominant in the southern Delta.

The SJRGA agrees with this statement and also points out that for certain crops, especially beans, the efficiencies may be even lower than 75 percent. It is also unlikely that this efficiency or the overall efficiency can be increased in the Delta as the present irrigation practices cannot be practically or economically changed. In addition, the fluctuating saline water table would necessitate increased leaching which leads to lower efficiencies. The consequence of this lower efficiency is two-fold. First, the lower efficiency provides a lower salinity root zone and as shown by Hoffman the higher leaching fractions allow the use of higher salinity water for irrigation. Second, the lower efficiencies increase drainage flows discharged to the southern Delta channels and this must remain the responsibility of the dischargers, not upstream water right holders.

g. Data from drains in the western part of the southern Delta suggest leaching fractions are between 0.21 and 0.27, with minimums ranging from 0.11 to 0.22.

The SJRGA agrees with this conclusion. The information presented in the Hoffman Report on the New Jerusalem Drainage District is typical of the areas in the Southern Delta. Based on the data from this extensive drainage system the average leaching fractions ranged from 0.21 to 0.27 which leads to the conclusion that actual leaching fractions generally observed in the Southern Delta, with few exceptions, are 0.20 or higher.

The average leaching fractions observed, which ranged from 0.21 to 0.27, is with few exceptions. Actual leaching fractions generally observed in the Southern Delta, with few exceptions, are 0.20 or better.

h. The field study data supporting the salt tolerance of beans is sparse and over 30 years old. There is also no information on the salt sensitivity of bean and many other crops in early growth stages.

The SJRGA agrees with the conclusion and supports the development of salt tolerance data for beans crops presently grown in the south western portion of the southern Delta. Application of this factor should be withheld until field testing can be conducted to determine whether this factor is important in the Southern Delta.

i. Salt dissolution from the soil profile may cause the actual salinity in the root zone to be about 5 percent higher than estimated by the steady-state model.

The steady-state model does not address salt dissolution from the soil profile. (Hoffman Report, p. 68.) Transient models do address this issue, but transient models are not near sufficiently developed to support water quality control planning efforts. (Id.).

j. Steady-state modeling presented in the report, and the results from other transient model studies suggest the water quality standard could be increased up to 0.9 to 1.1 dS/m and be protective of all crops normally grown in the southern Delta under current irrigation practices. During low rainfall years, however, this might lead to yield loss of about 5 percent under certain conditions.

The potential loss of 5 percent yield in low rainfall years would only occur with a leaching fraction of 0.15 or less, which is uncharacteristically poor in the Southern Delta. (Hoffman Report, p. 82 Figure 5.8b.), and almost impractical for a bean crop. Based on prevalent leaching fractions, which exceed 0.20, the water quality standard could be higher without loss of crop yield, even in a year with minimum precipitation.

For beans, the exponential model would predict no yield loss for leaching fractions above 0.20. (Hoffman Report, p. 79.) For a leaching fraction of 0.15 and at the five percentile for rainfall, yield loss would be 5% using the exponential model. (Id. at 82 Figure 5.8b.) With leaching fractions prevalent in the Southern Delta, which exceed 0.20, the salinity objective could be 1.1 dS/m and no yield losses would occur regardless of precipitation. (Id. at 84 Figure 5.9b.) With median precipitation, the objective could be 1.4 dS/m and no bean yield losses would occur. An additional consideration is that during a year with low rainfall (5^{th} percentile) it is unlikely that sufficient water would be available to support bean cropping as most of the available water (due to cutback in diversions) would likely go to permanent crops such as orchards or be supplemented by groundwater which is at a higher salinity level than the surface water supply.

Although, according to the Hoffman Report, alfalfa is generally grown on clay soils with low infiltration rates, farmers in the Southern Delta, with few exceptions, achieve high leaching fractions of 0.20, 0.25, and above. (Hoffman Report, p. 86.) Even with a leaching fraction of 0.15, higher than all but the worst locations in the Southern Delta, the exponential model shows that no yield losses would occur with a salinity objective of 1.7 dS/m, even with "minimum precipitation." (Id. at 90 Figure 5.13b.) (Id. at 89 Figure 5.12b.) With median precipitation, yield losses appear to begin at 1.9 dS/m. (Id.)

For almonds, using the exponential model, a leaching fraction of 0.15 would prevent yield loss, regardless of precipitation, with a salinity objective of 1.0 dS/m. (Hoffman Report, p. 92.) More precisely, the salinity objective could be 1.3 dS/m and yield losses would be prevented, even with "minimum precipitation." (Id. at 96 Figure 5.17b.) With median precipitation, yield losses would be prevented with a salinity objective of 1.4 dS/m. Prevalent South Delta leaching fractions, although much higher, were not modeled. However, salinity objectives protective with a leaching fraction of 0.15 would also be protective with a leaching fraction of 0.20 or 0.25.

In the model developed in the Hoffman Report, leaching fraction and precipitation are the most significant variables affecting crop yield or production in the Southern Delta. With leaching fractions prevalent in the Southern Delta, the salinity objective could be 1.1 dS/m during the irrigation season for beans, even with minimum precipitation. However, the highest leaching fraction the Hoffman Report modeled was 0.20 and even higher leaching fractions are common.

Since none of the crops modeled are irrigated outside the growing (irrigation) season, the Hoffman Report does not indicate what the salinity of surface water could be at such times of the year when crops are not irrigated. If alfalfa remains the basis for a salinity objective in the non-irrigation season, the objective could be 1.7 dS/m and no yield losses would occur.

There is, however, no need for a winter-time or non-irrigation season objective. All of the salinity criteria are based on a certain rate of precipitation and evapotranspiration and thus salt buildup in the soil. The evapotranspiration rate in the non-irrigation season is near nil. Even if a grower irrigated during the winter months, winter rainfall would leach any salt load.

Much of the foregoing analysis considers conditions with minimum precipitation. In such years, however, less irrigation occurs, because less water is available for diversion. Junior appropriators, especially those with Term 91 permit conditions, must cease diverting and riparian water users have no natural or abandoned flows to divert. In Below Normal, Dry, and Critical years there is no natural flow available for diversion by riparian water users. (D-1641, p. 32.) Since riparian water users have priority to appropriators, there would also be no water available for appropriators. Finally, as the CVP/SWP must diminish in-Delta diversions and deliver less water to contractors, less irrigation occurs on the west side of the SJR Basin and less salt is discharged back to the SJR and Delta. If nobody is allowed to irrigate during specific times, there would be no irrigated agriculture beneficial use to protect.

k. Effective rainfall should be included in any modeling of soil water salinity in the southern Delta. Also, the exponential crop water uptake model is recommended as it better matches laboratory data. The 40-30-20-10 model used previously is more conservative, which leads to higher estimates of soil water salinity.

The SJRGA concurs with this recommendation.

l. In addition to the conclusions above, a number of recommendations were made for further studies in the Southern Delta regarding.

While the Hoffman Report recommended further study, it nonetheless states that sufficient information exists to support changing the objective. (Hoffman Report, p. 113.)

11. Page 77. Secondary MCLs.

Under the Chemical Constituent Objective contained in the Central Valley Regional Water Quality Control Board ("CVRWQCB") *Water Quality Control Plan for the Sacramento River and San Joaquin River Basin* ("Basin Plan"), "Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses." (Basin Plan, p. III-3.00.) At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels ("MCLs") specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into the Basin Plan. (Id.) However, waters of the Delta are not automatically designated MUN. Rather, "Beneficial uses of the Delta vary and will be evaluated on a case by case basis." (Id. at II-6.00.) Consequently, before considering whether the Specific

Conductivity Secondary MCL, or secondary MCL, is an applicable objective in the Delta, the SWRCB must first determine, on a case by case basis, whether MUN uses are existing uses in specific areas of the Delta and, on that basis, whether the Specific Conductivity Secondary MCL should apply.

MCLs are established by the Department of Public Health ("DPH") and apply to drinking water provided to the public by community water systems. [9] (Cal. Code Regs., tit. 22, §64449(a).) Secondary MCLs apply to water "supplied to the public" that comes out of a tap. (Cal. Code Regs., tit. 22, §§64402.10, 64449(a).) It does not apply to water sources such as individual surface water intakes or to surface water generally. (Id.) This is consistent with the federal definition, pursuant to which an MCL is the maximum permissible level of a contaminant in water which is delivered to the free flowing *outlet* of the ultimate user of public water system. (22 C.F.R. §143.2(f); *see also* 44 Fed. Reg. 42197 (Jul. 19, 1979).)

The DPH establishes MCLs based on consumer acceptance levels of aesthetic qualities such as taste and smell, but without fixed consumer acceptance contaminant levels for specific conductivity. [10] (Cal. Code Regs., tit. 22, §64449(d).) The regulations recommend a concentration equivalent to an EC of 0.9 dS/m, an upper level of 1.6 dS/m, and a short-term level of 2.2 dS/m. (Cal. Code Regs., tit. 22, §64449(a) Table 64449-B.) Constituent concentrations ranging to the upper contaminant level are acceptable if it is neither reasonable nor feasible for community water systems to provide more suitable waters. Constituent concentrations ranging to the short-term contaminant level are acceptable for existing community water systems on a temporary basis pending construction of treatment facilities or development of acceptable new water sources. [11] (Cal. Code Regs., tit. 22, §64449(d)(3).) Since all MCLs are incorporated by reference into the Basin Plan, which must be compatible with the Sources of Drinking Water Policy, all three levels are considered acceptable for "potential" municipal or domestic use, even though the definition of MCL excludes it from surface water application.

Previously, MCLs, although a consideration in determining what a water quality objective should be, have not directly applied as water quality objectives for the Delta. When adopting objectives for trihalomethanes ("THMs") for the Delta in the *1991 Water Quality Control Plan for Salinity for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary* ("1991 Salinity Plan"), the SWRCB stated that the primary MCL for THMs applied to treated drinking water, not to surface waters such as the Delta. (SWRCB, *1991 Water Quality Control Plan for Salinity for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary* (May 1991), p. 5-5 – 5-6.)

When the Southern Delta salinity objectives were originally adopted in the SWRCB's 1978 *Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh*

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[9] A "community water system" is defined as a public water system serving at least 15 service connections or regularly serving an average of at least 25 individuals daily at least 60 days out of the year. (Cal. Code Regs., tit. 22, §64410.10.)

[10] Secondary MCLs were initially adopted by the USEPA as guidelines to provide states a realistic frame of reference for the aesthetic water quality goal they should be trying to achieve for consumer acceptance and confidence in public water systems. (40 C.F.R. §143.1; *see also* 44 Fed. Reg. 42195 (Jul. 19, 1979).

[11] A "water source" is an individual water source or individual surface water intake. (Cal. Code Regs., tit. 22, §64402.10.)

("1978 Delta Plan"), MCLs were not addressed in the considerations. (1978 Delta Plan, p. VI-21 – VI-22.) MUN uses were also not addressed when the SWRCB considered salinity objectives for the Sothern Delta in the 1991 Salinity Plan. (1991 Salinity Plan, p. 5-11 – 5-13.) In adopting the Southern Delta salinity objectives, the SWRCB adopted an objective of 1.0 dS/m for the non-irrigation season, an objective slightly higher than the "recommended" 0.9 dS/m secondary MCL and that objective has remained. (SWRCB, *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (2006), p. 13.) The only area in the Southern Delta with a salinity objective that currently supports MUN uses is the Export Area, which also has an objective of 1.0 dS/m. (2006 Bay-Delta Plan, p. 13.) The 0.9 dS/m "recommended" level is therefore not considered necessary for reasonable protection of MUN uses.

Currently, MUN beneficial uses in Delta are protected by chloride objectives. In the Southern Delta there are objectives at Clifton Court Forebay, the Delta Mendota Canal, and the Contra Costa Pumping Plant. (2006 Bay-Delta Plan, p. 12.) If the constituent of concern for MUN beneficial uses is specifically chloride, then a chloride objective should continue acting as the parameter for protecting in-Delta MUN beneficial uses.

12. Policy for Application of Water Quality Objectives

The Draft Report does not address the Basin Plan's *Policy for Application of Water Quality Objectives*, which states that water quality objectives will define the least stringent limits which will be imposed on ambient water quality and that "background" defines the most stringent limits. (Basin Plan, p. IV-17.00.) Numeric and narrative water quality objectives define the least stringent standards that the CVRWQCB applies in order to protect beneficial uses. (Id.) However, water quality objectives do not require improvement over naturally occurring background concentrations. (Id.) If the natural background concentration of a particular constituent, such as salinity, exceeds an applicable water quality objective, the natural background concentration is considered to comply with the objective. (Id.)

The Delta was historically a tidal marsh, subject at times to significant seawater intrusion. Natural background salinity concentrations therefore were likely very high. (SWRCB Water Right Order No. 2004-0004, *In the Matter of Administrative Civil Liability Complaints for Violations of Licenses 13444 and 13274 of Lloyd L. Phelps, Jr.; License 13194 of Joey P. Ratto, Jr.; License 13315 of Ronald D. Conn and Ron Silva, et al.* (Feb. 19, 2004), p. 15 fn. 7.) There is, however, no discussion of historical or "background" salinity conditions for the South Delta. Rather, the Draft Report focuses on the areas of the San Joaquin River *upstream* of the Delta. If the Report is going to address salinity within the Delta then it needs to address historical hydrology in the Delta.

DWR has previously obtained historical chloride data from Sacramento-San Joaquin Water Supervisor Reports, 1924-1943. (DWR, *Department of Water Resources Comments to January 16-19, 2007 SWRCB South Delta Salinity Workshop* (Jan. 5, 2007) (http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/sds_srjf/sds/docs/dwr010807.pdf), p. 33.) The reports expressed chloride concentrations as chloride per 100,000 part of water. (Id.) The data was converted to ppm (mg/l).[12] (Id.) (*see* Table 2 and Table 3, below.)

[12] Conversion to EC is inexact and depends on the composition of salts in the water source at a particular location, but based on analysis of chlorides compared to EC at a location on Old River at Bacon Island (using water quality data from December 1998 through July 2003), DWR estimated for previous hearings before the SWRCB that 150 mg/l chloride is approximately 0.7 dS/m EC, and 250 mg/l approximately 1.0 dS/m EC.

Table 2. Historical chloride concentrations, in mg/l, measured in the Delta from 1924-1940

	Year																
Station	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Middle River	1860	130	690		210	170	130	270	120	180	1080	110	120	160	130	600	550
Mansion House	1480	110	690		160	160	110	240			900						
Victoria Island																350	
Stockton Country Club	1080		480			360	180	1220			440						
Clifton Court Ferry	800		240			230		130			400					190	
Stockton Country Club						2000	1200	1320	720	660	760					320	
Garwood Bridge								920			380						
Brandt Bridge								430			210						
Williams Bridge	420		180			120		1180			430						
Naglee Burke Pump																140	
Whitehall						150		310			120						
Mossdale Bridge	140					160	100	120	140	130	250	120	140	120	120	160	140
Durham Ferry Bridge								100									

Table 3. Sacramento-San Joaquin Water Supervisor Report Chloride Monitoring Locations

Station	Monitoring Location
Middle River	Middle River, east bank, at Santa Fe RR crossing
Mansion House	Victoria Island, Old River, east bank, at junction with North Victoria Canal
Victoria Island	Old River at Borden Hwy crossing
Stockton	On Lindley Cut-off (San Joaquin R.), north bank, aobut 3/4 mi above Burns cut-off junction
Clifton Court Ferry	Old River just below junction with Grant Line Canal
Stockton	Near head of Stockton Channel at wharf of California Trans Co. (1931)
Garwood Bridge	San Joaquin River at drawbridge 1 mi above Santa Fe RR crossing
Brandt Bridge	San Joaquin River at drawbridge 6 mi above Santa Fe RR crossing
Williams Bridge	Middle River about 4 mi below Salmon Slough junction
Naglee Burke Pump	Old River at Naglee Burke pump (102.5 mi from GGB)
Whitehall	Old River west of junction of Salmon Slough & Paradise cut due north of Tracy (104.8 mi from GGB)
Mossdale Bridge	San Joaquin River at Lincoln Hwy crossing about 3 mi SW of Lathrop
Durham Ferry Bridge	San Joaquin River 1/2 mi below San Joaquin City

13. Page 80. Use of monthly model

A monthly model does not mimic natural flow, if variability within a month is desired. The modeling evaluates 20% unimpaired flow on a monthly basis, but cannot simulate the effect of daily, three-day, and weekly averages. CALSIM II is the planning model for the CVP and SWP, but since it is monthly time step model, the ability to plan for variability within a month may not be possible. Although this looks ahead to implementation, the SJRGA reminds the SWRCB that it must look ahead to determine whether a potential objective is even feasible.

14. Page 81. SJR flow objective alternatives

a. The analysis needs to consider all flows.

As the SJRGA stated in its analysis regarding the process, policy, and law, the SWRCB needs to consider all water rights in the SJR Basin and South Delta. The SWRCB does not comply with its obligation to implement a water quality control plan if its objectives cannot be implemented. (St. Water Resources Control Bd. Cases (2006) 136 Cal.App.4th 674, 736.) However, once the SWRCB establishes a water quality objective, including a flow water quality objective, it must implement that objective and it cannot implement an alternative objective. (Id. at 733.) Rather, it must revisit and amend the objective. (Id.) If the SWRCB wants to avoid establishing an objective, only to discover that the impacts, costs, and/or practical realities of implementing the objective are undesirable or unattainable, then it needs to look ahead and not just consider how much water is "physically available," but also where water would come from and who would be supplying water.

b. The analysis lacks a comparison to current regulatory conditions.

The Draft Report is intended to serve as an SEP for purposes of compliance with the California Environmental Quality Act ("CEQA") for an eventual amendment to the SJR flow objectives in the Bay-Delta Plan.

If a proposed project revises a current plan or regulation, then the project baseline used to determine whether impacts to the environment are significant is the continuation of the current policy, plan, or regulation in the foreseeable future. (Cal. Code Regs., tit. 14, §15125(e); Envtl. Plan. & Infor. Ctr. v. County of El Dorado (1982) 131 Cal.App.3d. 350, 357-358.) In comparing project alternatives, the continuation of current policies and regulations therefore acts as the no project alternative. (Cal. Code Regs., tit. 14, §15126.6(e)(3)(A), (C).) The Bay-Delta Plan and the flow objectives therein are regulations. (Cal. Code Regs., tit. 23. § 3002.) The current Bay-Delta Plan SJR flow objectives therefore operate as the current conditions for assessing reasonably foreseeable environmental impacts of the hypothetical proposed flow objectives.

The Water Supply Analysis excludes the current Bay-Delta Plan SJR flow objectives. It compares the hypothetical proposed flow objectives to one another, but not to current regulatory conditions. The Draft Report therefore cannot begin to serve as an adequate basis for a SEP.

15. Page 82. Calculation of EC_{Trib} Eqn. 5.1.

EC_{Trib}, average EC of the three eastside tributaries of SJR, was used in Eqn. 5.1. In the spreadsheet demonstrating water supply impact analysis methodology provided by SWRCB.[13] EC_{Trib} was calculated as a simple average of EC of Stanislaus, Tuolumne and Merced Rivers. However, flow rates of the three tributaries are not the same, and it is not unusual for one tributary to have five times more flow than another tributary. Thus, tributary EC should be calculated as flow-weighted average EC.

When average tributary EC is not flow-weighted, a tributary with a small flow but high EC will erroneously result in higher average tributary EC, which, in turn, will lead to a higher tributary flow needed to meet the EC target at Vernalis.

16. Page 83-86. Combined SJRG Flow and Southern Delta Salinity Objective Alternatives.

a. The analysis needs to consider all flows

In calculating necessary additional flows for objectives at Vernalis, the analysis needs to include sources of all flow, not just "low salinity flow." (Draft Report, p. 89 fn. 5.) The SJRGA has set forth in its policy, process, and legal response to the Draft Report the analysis the SWRCB will be required to perform to establish flow and salinity objectives and a program of implementation and then to allocate responsibility for implementing the objectives in subsequent water right proceeding. The SJRGA asserts that the water right priorities must be followed. Thus, junior appropriators would be required to curtail their diversions first unless substantial justification dictates otherwise, even if the source is not low salinity flow. (El Dorado Irr. Dist. v. St. Water Resources Control Bd. (2006) 142Cal.App.4th 937, 963.) Unless curtailing such diversions constitutes a waste and unreasonable use of water or violates the public trust, the rule of priority must be followed under *El Dorado Irrigation District v. State Water Resources*

[13] Available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/water_quality_control_planning/docs/sjrf_spprtinfo/Water%20Supply%20Impact%20Analysis.xls

Control Board, *City of Barstow v. Mojave Water Agency*[14], and *National Audubon Society v. Superior Court*[15].

Similarly, in calculating necessary additional flows for the Interior South Delta, the SWRCB must also include Interior South Delta diversions, because many may have water rights junior to those upstream. Since curtailing Interior South Delta diversions would only contribute to meeting Interior South Delta salinity objectives, the Draft Report needs to separate the flow impact analysis salinity between flows at Vernalis and flows for the Interior South Delta, to the degree flow is evaluated as an implementation action for Interior South Delta salinity objective.

b. The analysis ignores non-flow implementation actions.

The Water Supply Analysis focuses implementing the SJR flow and South Delta Salinity objectives solely through upstream flows. Although the Vernalis Salinity Objective is currently implemented through a combination of water right conditions on the USBR and a total maximum daily load ("TMDL") upstream. Further actions are anticipated, such as the eventual elimination of discharges by the Grasslands Bypass. One action the SWRCB has ordered, but never pursued is the USBR's duty, under Public Law 86-498, to provide drainage.

As the SWRCB stated in Decision 1641, Public Law 86-498 required assurance that the San Luis Drain would be constructed. (D-1641, p. 86-87.) In litigation in 1963 and 1967, the USBR assured the federal courts that a drain would be constructed. (Id.) The USBR nonetheless continues to delay making progress on an out-of-valley drain. (Id.) The USBR has been ordered by the courts to initiate activities to resolve the drainage problems in the San Joaquin Valley. (Id.) It should proceed promptly to initiate such activities and file any necessary applications. (Id.) In 2000, the 9th Circuit Court of Appeal affirmed that the USBR must provide drainage to the San Luis Unit lands and remedy a substantial portion of the salinity discharges. (Firebaugh Canal Co., et al. v. United States of America, et al., 203 F.3d 568, 578 (9th Cir., 2000).) Nevertheless, the SWRCB has not demanded that the USBR provide its report to the SWRCB in regard to compliance with its duty to provide for removal of salinity through the provision of

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[14] In response to an argument that Article X, Section 2 of the California Constitution authorized an equitable apportionment of all water rights "regardless of preexisting priorities," the Court disagreed and held that the water right priority system "has long been the central principle in California water law" (City of Barstow v. Mojave Water Agency, (2000) 23 Cal.4th 1224, 1243) It further found no

> "precedent for wholly disregarding the priorities of existing water rights in favor of equitable apportionment in this state, where water allocation has been based on an initial consideration of owners' legal water rights. **Case law simply does not support applying an equitable apportionment to water use claims** unless all claimants have correlative rights; for example, when parties establish mutual prescription." (Id. at. 2148-1249)(emphasis added).

Even under the physical solution doctrine, water rights could not be allocated equitably as it would impermissibly ignore the priorities of the various water right holders. (Id. at 1250). After an exhaustive review of case, theories and doctrines, the Court ultimately concluded that there is no "compelling authority for th[e] argument that courts can avoid prioritizing water rights and instead allocate water based entirely on equitable principles." (Id. at 1251).

[15] "All users of water, including public trust uses, must now conform to the standard of reasonable use." (emphasis added). Thus, even the scientifically unassailable needs of a particular beneficial use are not dispositive of whether a water quality objective should be adopted in the first instance, and/or the nature, extent and scope of any objective should the Board decide to adopt one. (National Audubon Society v. Superior Court (1983) 33 Cal. 419, 443)

drainage, nor does the Technical Report address at all the alternatives of reduction of salinity in the SJR by the provision of drainage which has actually occurred since 1995, or the further reductions that can be achieved without greater flows.

c. Analysis, at this stage, should be limited to SJR Flow Objectives and the resulting EC at Vernalis, with flows for the Interior South Delta, if evaluated, limited to consideration as but one possible method of implementation.

Consistent with D-1641, the 2006 Bay-Delta Plan stated that elevated salinity in the Southern Delta is caused by various factors, including low flows; salts imported to the San Joaquin Basin in irrigation water; municipal discharges; subsurface accretions from groundwater; tidal actions; diversions of water by the SWP, CVP, and local water users; channel capacity; and discharges from land-derived salts, primarily from agricultural drainage. (2006 Bay-Delta Plan, p. 27.) Consequently, D-1641 found that salinity objectives for the Interior South Delta could be implemented by providing dilution flows, controlling in-Delta discharges of salts, or by using measures that affect circulation in the Delta. (D-1641, p.86-87 (*citations omitted*).) Flow is therefore merely one of multiple potential methods for implementing Interior South Delta Salinity Objectives. It is not an objective itself.

The analysis, at this stage, should determine the amount of flow needed to meet objectives for fish and wildlife, the resulting EC conditions for Vernalis and the Interior South Delta, and then, based on those resulting EC conditions discuss the various possible implementation actions already addressed in D-1641 and the 2006 Bay-Delta Plan. Other measures, such as controlling in-Delta discharges of salts may be more appropriate, especially when the Old River station appears to be influenced by saline outflows from Tom Payne Slough and possibly Paradise Cut, as well as saline groundwater effluence to several urban/agricultural drainage channels. (DWR, *Department of Water Resources Comments to January 16-19, 2007 SWRCB South Delta Salinity Workshop* (Jan. 5, 2007), p. 33.) To the degree flow is discussed as a method of implementing salinity objectives, it should be discussed separately as an implementation action.

d. If flows required for salinity at Old River at Tracy Road Blvd. are considered, current conditions must be confirmed.

The Water Supply Impact analysis uses the regression equation for OLD, but for predicting EC in the future, the regression equation for OLD relies on an assumption that conditions for the period from 1993 through 2009 will remain the same. Conditions changed starting in October 2008. If post-2008 conditions remain then the correct regression equation would be based on EC observed since October 2008, *not* on EC observed since 1993. For the substitute environmental document to adequately address reasonably foreseeable environmental impacts, current must first be determined. The regression equation used for OLD does not represent current environmental conditions.

e. The Water Supply Analysis only considers the impacts of the present salinity objectives.

In order to adequately inform the SWRCB of the impacts of implementing various alternative South Delta salinity objectives, the Draft Report must present a reasonable range of alternatives. For SJR flow objectives, a range of proposed unimpaired flows serve as "bookends." There is nothing of the sort for South Delta salinity, even though a range of proposed alternatives, similarly serving as "bookends," would be extremely useful for informing the SWRCB and the public as to the impacts of implementing proposed South Delta salinity objectives in combination with proposed SJR flow objectives.

17. Page 84. Assumed improvements in water use efficiency.

In calculating return flows, the analysis assumes improvements in water use efficiency will reduce return flows by fifty percent. (Draft Report, p. 84.) The analysis does not state how much conservation would be required to reduce return flows by fifty percent. An appendix to the CVRWQCB staff report on the total maximum daily load for salt and boron for the Lower San Joaquin River Basin stated that, in the Lower SJR Basin "many areas have already reached high levels of conservation, applying water sufficient only to provide minimum leaching requirements." (CVRWQCB, *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basin for the Control of Salt and Boron Discharges into the Lower San Joaquin River-Final Staff Report* (September 10, 2004), App. 2 p. 2-2[16].) Consequently, many areas in the Lower SJR are already highly efficient and significant additional gains in efficiency, especially those sufficient to reduce return flows by fifty percent are not realistic.

18. Page 83-84. Methodology for estimating water supply impact

"This methodology for estimating water supply impact assumes the additional flow needed to satisfy the objective alternatives in a particular water year will be provided entirely by diversion reductions during the months of February through September in the same water year"

[16] Available at
http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/vernalis_salt_boron/appendix234.pdf

(Draft Report, p.83-84). The Draft Report stated that this is a conservative assumption in that reservoirs were not re-operated in CALSIM to spread diversion reductions over more than the year the additional flow is needed. This may be a conservative assumption, but it is not a reasonable assumption. One of the major functions of the reservoirs is to mitigate the gap between water supply and demand. It does not make sense to cut beneficial water uses to provide addition flow while the additional flow can be provided more efficiently and economically by re-operating the reservoirs. This assumption for estimating water supply impact is fundamentally flawed. CALSIM modeling needs to be conducted to better estimate water supply impact.

19. Page 84-85. Equations for water supply impact.

The water supply impact equation listed in the Draft Report does not agree with an equation derived from balance of mass. Water supply impact was calculated from Equations 5.4 and 5.5 in the Draft Report.

$$RF_{\mathrm{Re}d} = \left(\frac{F_{Tot}}{D_{ws}} * RF_{ws} \right) * (1 + 0.5)$$

(Eqn. 5.4 of SWRCB)

WSI = FTot + RFRed (Eqn. 5.5 of SWRCB)

Defining $r = RF_{ws} / D_{ws}$, and using Eqn. 5.4, Eqn. 5.5 can be simplified to:

$WSI = (1 + 1.5r) * F_{Tot}$ (Eqn. 1)

The water supply impact equation based on balance of mass is:

$$WSI = \frac{0.5RF_{ws} + F_{Tot}}{1 - 0.5r}$$

(Eqn. 2)

where the return flow was assumed to be reduced by an additional 50%, as assumed in the Draft Report. Derivation of Eqn. 2 is provided in the Appendix.

The water supply impact equation in the Draft Report (essentially Eqn. 1) is clearly different from the equation derived from balance of mass (Eqn. 2). The water supply impact calculated in the Draft Report should be checked for mass balance, particularly to check that SJR flow at Vernalis will meet the additional flow requirement with the calculated return flow reduction.

20. Page 85. The Draft Report states that, in some cases, the Water Supply Impact is greater than all diversions in a particular month.

The Draft Report does not state when this would occur or under what conditions. If it does occur, then additional flow would not be obtained through diversion curtailment, but through required releases of previously stored water. It would also mean that the entire Lower

SJR Basin is being appropriated for fish and wildlife and in-Delta appropriators. Such a scenario is unacceptable.

21. Page 89. Table 5-4 needs additional detail.

Although average Water Supply Impacts may appear simple compared to more variable monthly Water Supply Impacts, they can mask significant impacts. Water users generally divert consistent amounts of water over time, and the calculated unimpaired flow percentage is also fairly consistent for each water year type, but the required flow would vary depending on total unimpaired flow. As a result, the impact will be greater in some months and in some years than in others, but Table 5-4 has insufficient detail to disclose when storage impacts occur because it would depend on the sequence of water year types. Furthermore, the Water Supply Impact at times is greater than all diversions. Meeting the flow requirement would, at such times require the release of stored water. Required storage releases, plus curtailed diversions into storage could impact carryover and long-term storage, leading to significant impacts in some months and in some years. Municipalities could see water supplies cut off and stored water could be unavailable for subsequent uses, including uses important to water quality and fish and wildlife protection.

An examination of the Excel spreadsheet used to develop the Water Supply Impact shows that in 17 of 82 years (21 percent of years), the required diversion reduction for both SJR Flow and South Delta Salinity would be more than all of the diversions upstream. (*see* Table 3, below.) In other words, maintaining salinity in the Interior South Delta would appropriate the entire SJR Basin *and* require the release of stored water in at least 21 percent of years. Stored water releases would also be made for the benefit of in-Delta appropriators and riparian water users, neither of whom have the right to divert previously stored water.

Table 4. Required diversion reductions for SJR flow and South Delta salinity objectives for years when diversion reductions exceed upstream

WY	WY Type	TAF Diversion	TAF Flow for Flow Objective	TAF Flow for Salinity Objective	TAF Flow + Salinity	% Flow	% Salinity	% Flow + Salinity Objective
1922	W	1985	2258	129	2388	114	7	120
1925	BN	1966	2034	181	2214	103	9	113
1927	AN	2090	2539	185	2724	121	9	130
1932	AN	2130	2532	199	2731	119	9	128
1935	AN	1881	2627	184	2811	140	10	149
1936	AN	2000	1959	166	2125	98	8	106
1940	AN	2125	2005	162	2167	94	8	102
1950	BN	2006	1839	162	2001	92	8	100
1962	BN	2006	2191	176	2367	109	9	118
1963	AN	1982	2200	180	2379	111	9	120
1973	AN	2071	2326	144	2470	112	7	119
1978	W	1816	2395	149	2544	132	8	140
1991	C	1514	1510	179	1689	100	12	112
1993	W	1934	3038	177	3215	157	9	166

Although the spreadsheet includes the amount of additional flow required, it does not address whether sufficient upstream storage would be available and whether such releases would be available. The spreadsheet also details only one Water Supply Impact analysis and it does not specify which unimpaired flow proportion the analysis is for, although it appears, from reviewing the spreadsheet, to be for 60 percent unimpaired flow. Since some of the Water Supply Impact unimpaired flow proportions were calculated in another model run not provided in the spreadsheet, evaluating impacts at other unimpaired flow proportion in any detail is impossible.

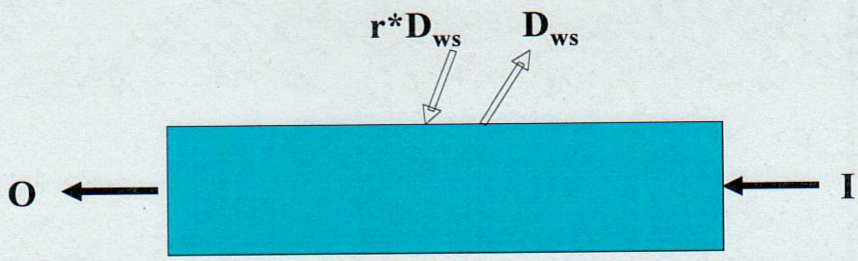
Although the Water Supply Impact analysis is not intended to evaluate specific impacts yet, appropriating the entire SJR Basin and an additional 66 percent from storage in one year would have severe impacts.

Appendix. Water supply impact equation based on balance of mass.

The mass balance equation for a watershed with diversion and return flow is:

$$I - D_{ws} + r * D_{ws} = O \qquad \text{(Eqn. 1)}$$

where
I = total inflow to the watershed;
D_{ws} = total diversion in the watershed;
$r = RF_{ws} / D_{ws}$, fraction of D_{ws} retruned to the watershed;
O = outflow of the watershed.



When the outflow needs to be increased by F_{Tot}, the total diversion changes to D'_{ws} and the return fraction changes to r'. Assuming inflow remains the same, the mass balance equation for this new scenario is:

$$I - D'_{ws} + r'* D'_{ws} = O + F_{Tot} \qquad \text{(Eqn. 2)}$$

Substituting Eqn. 1 into Eqn. 2, the new diversion can be expressed as:

$$D'_{ws} = \frac{(1-r) * D_{ws} - F_{Tot}}{1-r'} \qquad \text{(Eqn. 3)}$$

The reduction in diversion (i.e., the water supply impact) is:

$$WSI = D_{ws} - D'_{ws} = \frac{(r-r') * D_{ws} + F_{Tot}}{1-r'} \qquad \text{(Eqn. 4)}$$

A 50% reduction in return flow means $r' = 0.5r$, which, when substituted into Eqn. 4 gives:

$$WSI = \frac{(r-0.5r) * D_{ws} + F_{Tot}}{1-0.5r} = \frac{0.5r * D_{ws} + F_{Tot}}{1-0.5r} = \frac{0.5RF_{ws} + F_{Tot}}{1-0.5r} \qquad \text{(Eqn. 5)}$$