CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

PROPOSED AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS

TO ESTABLISH SALINITY WATER QUALITY OBJECTIVES IN THE LOWER SAN JOAQUIN RIVER (MOUTH OF MERCED TO VERNALIS)

DRAFT STAFF REPORT

FEBRUARY 2017, AMENDED MAY 2017

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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11020 Sun Center Drive #200
Rancho Cordova, CA95670

Phone: (916) 464-3291
email: info5@waterboards.ca.gov
Web site: http://www.waterboards.ca.gov/centralvalley/

DISCLAIMER

This publication is a report by staff of the California Regional Water Quality Control Board, Central Valley Region. This report contains the evaluation of alternatives and technical support for the adoption of a Basin Plan Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins. Mention of specific products does not represent endorsement of those products by the Central Valley Water Board.

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Acknowledgments

Thank you to the participants of the Lower San Joaquin River Committee and the Central Valley Salinity Alternatives for Long Term Sustainability (CV-SALTS) initiative for their commitment and work on this project.

EXECUTIVE SUMMARY

The purpose of this Staff Report is to provide the rationale and supporting documentation for proposed amendments to the Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and San Joaquin River Basin (Central Valley Water Board, 2016a) that would establish salinity water quality objectives (WQOs) in Reach 83 of the Lower San Joaquin River (LSJR), which is defined as the LSJR from the mouth of the Merced River to the Airport Way Bridge near Vernalis. This report proposes amendments to the Basin Plan that would:

1 Define salinity WQOs that are protective of beneficial uses in the LSJR. The proposed Basin Plan amendments would establish a WQO that would require that electrical conductivity (EC) at 25 degrees Celsius[1] not exceed 1,550 micro Siemens per centimeter (µS/cm) as a 30-day running average, except during Extended Dry Periods,[2] when the WQO would require that EC not exceed 2,470 µS/cm as a 30-day running average and 2,200 µS/cm as an annual average using at a minimum the previous four consecutive quarterly samples.

2 Incorporate an implementation program into the Basin Plan to achieve proposed salinity WQOs.

3 Set an EC performance goal of 1,350 µS/cm during certain months and water-year types, based on modeling results of expected water quality.

4 Require the implementation of a monitoring and surveillance program to evaluate the effectiveness of the implementation program.

These proposed amendments would set water quality objectives for EC that would be protective of the ~~two~~ beneficial uses in the LSJR ~~that are most sensitive to salinity impacts:~~ including Agricultural Supply (AGR) and Municipal and Domestic Supply (MUN). In addition, setting an EC performance goal will promote achievement of the best

[1] An EC measurement made or corrected to 25 °C is equivalent to specific conductance

[2] An Extended Dry Period is defined using the State Water Board's San Joaquin Valley "60-20-20" Water Year Hydrologic Classification to assign a numeric indicator to a water year type as follows:

- Wet – 5
- Above Normal – 4
- Below Normal – 3
- Dry – 2
- Critically Dry – 1

The indicator values will be used as follows to determine when an Extended Dry Period is in effect:

- An Extended Dry Period shall begin when the sum of the current year's 60-20-20 indicator value and the previous two year's 60-20-20 indicator values total six (6) or less.
- An Extended Dry Period shall be deemed to exist for one water year (12 months) following a period with an indicator value total of six (6) or less.

The method for determining the San Joaquin Valley Water Year Hydrologic Classifications is defined in the State Water Board Revised Water Right Decision 1641, March 2000, Figure 2, page 189. This method uses the best available estimate of the 60-20-20 San Joaquin Valley water year hydrologic classification at the 75% exceedance level using the best available data published in the California Department of Water Resources' ongoing Bulletin 120 series.

possible water quality under variable conditions. The proposed amendments do not change or replace the EC WQOs for the San Joaquin River at the Airport Way Bridge near Vernalis which was set by the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan) for water entering the southern Delta (State Water Resources Control Board, 2006).

In Revised *Water Right Decision 1641*, the California State Water Resources Control Board (State Water Board) directed the Central Valley Regional Water Quality Control Board (Central Valley Water Board) to develop and adopt salinity objectives and a program of implementation for the main stem of the San Joaquin River upstream of Vernalis (State Water Resources Control Board, 2000). In 2004, the Central Valley Water Board adopted the Control Program for Salt and Boron Discharges into the Lower San Joaquin River (Control Program) that included a Total Maximum Daily Load (TMDL) to address EC in the LSJR and meet the WQOs in the Bay-Delta Plan at the Airport Way Bridge near Vernalis. The Control Program and TMDL were subsequently approved by the United States Environmental Protection Agency (US EPA) in 2006. The TMDL is implemented through waivers of waste discharge requirements (WDRs) or WDRs that apportion load allocations to different geographic subareas in the valley. As an alternative to the load allocations, the TMDL allows discharger participation in a Central Valley Water Board approved real-time management program as a means to attain salinity WQOs, while maximizing the export of salts out the watershed to help protect the region's agricultural production and long term sustainability. The Control Program also required a second phase to establish and implement new salinity and boron objectives for the San Joaquin River upstream of Vernalis.

The Central Valley Water Board held an initial California Environmental Quality Act (CEQA) scoping meeting for a basin planning effort to develop the upstream WQOs on 11 May 2005. After preliminary studies, the Central Valley Water Board held a second CEQA scoping meeting on 30 March 2009, to limit the geographic scope of the project to the section of the river upstream of the Airport Way Bridge near Vernalis to the Merced River. Central Valley Water Board staff subsequently released a draft report, *Salt Tolerance of Crops in the Lower San Joaquin River (Merced to Stanislaus River Reaches)* (LSJR Salt Tolerance Report) in March 2010 that presented the application of crop salt sensitivity parameters needed to establish EC water quality criteria in the LSJR (Central Valley Water Board, 2010a). At that same time, the Central Valley Water Board requested that the Central Valley Salinity Alternatives for Long-term Sustainability (CV-SALTS) initiative continue the effort on the upstream San Joaquin River beneficial use and salt and boron objectives evaluation and to continue to work on the policy and science to develop a basin plan amendment that would address those issues. CV-SALTS is a collaborative stakeholder driven and managed program to develop sustainable salinity and nitrate management planning for the Central Valley.

The proposed WQOs herein are the result of a stakeholder-driven effort led by the LSJR Committee, which is a subcommittee of the CV-SALTS. It includes members of irrigation, water, and resource conservation districts, city, county, state and federal agencies, producers, growers, irrigators, water quality and watershed coalitions, managed wetlands, drainage authorities, clean water and wastewater associations, consultants of various organizations and other interested parties.

Between May 2010 and the end of 2015, the LSJR Committee developed recommendations for EC WQOs that are protective of beneficial uses in the LSJR, EC Performance Goals that may be achievable, and recommendations for a program to implement the WQOs and Performance Goals for consideration by the Central Valley Water Board. The Committee began by conducting reviews of beneficial uses and water quality data for the LSJR, including white papers on Aquatic Life (Buchwalter, David, Ph.D., North Carolina State University, 2014) and Stock Watering sensitivity to salinity (Kennedy/Jenks Consultants, 2013), and concluded that ~~the~~additional work was needed to determine reasonable protection of Agricultural Supply (AGR) ~~beneficial use is the most sensitive to salinity, followed by the~~and potential Municipal and Domestic Supply (MUN) beneficial use~~s~~. The Committee also decided there was not enough information available to support a change from the current boron WQOs for the LSJR, and instead focused their efforts on the EC WQOs and EC Performance Goals. Next, the Committee developed guidelines for determining reasonable protection of AGR to assist with development of EC WQOs and vetted them with the CV-SALTS Executive Committee. The guidelines recommend key components to consider when determining reasonable protection of AGR and include a leaching fraction to represent irrigation practices when site-specific data are not available, crop yield values acceptable to stakeholders under certain conditions, and metrics for identifying the most salt sensitive commercial crop that requires protection. In addition, an Extended Dry Period definition was developed to assist with establishing reasonable salinity objectives in the LSJR during time periods when water supplies are constrained.

The LSJR Committee then developed EC water quality criteria for consideration as WQOs protective of AGR for this Basin Plan Amendment by entering existing and recently acquired scientific data, and applying the recommended guidelines into the Hoffman Model, a steady-state soil-water salinity model. This model had been peer reviewed during the State Water Board's salinity review of the Bay-Delta (State Water Resources Control Board, 2012) and used in the 2010 draft and the finalized LSJR Salt Tolerance Report (Central Valley Water Board, 2016b). The proposed EC WQO of 1,550 µS/cm is derived from the Hoffman model for the LSJR by utilizing a leaching fraction of 15 percent and protecting for a 95 percent almond crop yield, during a 5th percentile annual rainfall year (all but 5% of the driest years from 1951-2013) In conformance with the WQOs and sampling regimes established in the San Joaquin

River at Vernalis for the protection of agricultural uses of water entering the Bay-Delta, the LSJR Committee recommended maintaining the same water quality compliance period of a 30-day running average of mean daily EC (State Water Resources Control Board, 2000). The proposed WQO likewise falls within the recommended range (900 to 1600 µS/cm) of Title 22 of the California Code of Regulation's Secondary Maximum Contaminant Level (SMCL) for specific conductance, which is considered reasonably protective of the MUN use in the Basin Plan.

The preferred project alternative also incorporates separate EC WQOs for Extended Dry Periods. These Extended Dry Period EC WQOs were developed using the Hoffman model to protect a lower almond crop yield expectation of at least 75 percent. During these periods, an EC WQO of 2,470 µS/cm as a maximum 30-day running average is proposed as reasonably protective of irrigation supply water. A concurrent EC WQO of 2,200 µS/cm as an annual average (using at a minimum the previous four consecutive quarterly samples) is also proposed for an Extended Dry Period to reasonably protect the potential MUN beneficial use because such a value is equivalent to the short term Title 22 SMCL for specific conductance.

The Watershed Analysis Risk Management Framework (WARMF) watershed modeling tool, using historical conditions to simulate salt loading in the LSJR, was applied to evaluate the ability of different implementation strategies to meet the proposed salinity WQOs. The compliance point for the evaluation was the LSJR at Crows Landing, a point upstream of freshwater dilution flows from the Tuolumne and Stanislaus Rivers. The preferred implementation plan selected by the LSJR Committee includes the execution of current and currently planned activities to manage irrigation return flows to the LSJR. Modeling of this implementation strategy indicated that the proposed salinity objectives would be met at Crows Landing.

The LSJR Watershed drains approximately 2.9 million acres, which includes approximately 1.4 million acres of acricultural land use. A key activity within the selected implementation plan is the ~~the~~ Grassland Bypass Project~~'s, plan to achieve~~ achieving zero discharge of subsurface agricultural return flows by the end of 2019. The discharge is from 97,000-acre~~'~~s of the Grassland Bypass Project area to tributaries of the LSJR. The planned activities in the watershed are predicted to result in the LSJR reaching compliance with the proposed EC and existing boron WQOs for this stretch of the river by the end of 2019. The proposed objectives and implementation program are also predicted to improve (decrease) salinity levels over historic conditions and reduce the reliance on New Melones fresh water releases while continuing to meet the salt objectives downstream at the Airport Way Bridge near Vernalis.

The WARMF watershed modeling analyses also suggested that the selected implementation program will result in the attainment of an EC value of 1,350 µS/cm in the LSJR during certain seasons or water-year types. These findings were not conclusive and, as a result, the LSJR Committee stakeholders recommended that an EC value of 1,350 µS/cm be established as an implementation performance goal during specific months of the irrigation season of certain water-year types to promote the best possible water quality. The Staff Report includes a proposed monitoring plan to verify compliance with the LSJR EC and boron WQOs and attainment of the EC performance goal. The LSJR Committee proposed that the Central Valley Water Board use future monitoring data to reevaluate the EC WQOs ten years after adoption of the Basin Plan Amendment and determine whether or not an adjustment to lower the WQOs is appropriate.

This Staff Report also evaluates the proposed Basin Plan Amendment's consistency with existing federal and state laws, regulations and policies, contains an environmental analysis that complies with the applicable requirements of the California Environmental Quality Act (CEQA), and includes antidegradation and economic analyses that evaluate potential impacts of this project. The Board's Basin Planning Program is considered a certified regulatory program, which means that the Board is exempt from the requirement to prepare an environmental impact report for basin planning activities under the California Environmental Quality Act. (Pub. Res. Code, § 21080.5; Cal. Code Regs., tit. 14, § 15251(g).) The Board's environmental review of the proposed Basin Plan Amendments is instead contained in this Staff Report, which is considered to be part of the "substitute environmental documentation" or "SED".

PROPOSED BASIN PLAN AMENDMENT LANGUAGE

The proposed changes to the Basin Plan are as follows. Text additions to the existing Basin Plan language are underlined. Text deletions to the existing Basin Plan are in ~~strikethrough~~.

CHAPTER 1 INTRODUCTION

Modify the Basin Plan under the heading, "3. East Valley Floor" (page I-3.00), as follows:

3. East Valley Floor

This subarea includes approximately 413 square miles of land on the east side of the LSJR that drains directly to the LSJR between the Airport Way Bridge near Vernalis and the Salt Slough confluence. The subarea is largely comprised of the land between the major east-side drainages of the Tuolumne, Stanislaus, and Merced Rivers. This subarea lies within central Stanislaus County and north-central Merced County. Numerous drainage canals~~, including the Harding Drain~~ and natural drainages~~, drain~~ occur in this this subarea. The subarea is comprised of the following minor subareas:

CHAPTER III WATER QUALITY OBJECTIVES

Modify the Basin Plan under the heading, "Salinity" (page III-6.02), as follows:

Electrical Conductivity and Total Dissolved Solids-- Special Cases in the Sacramento and San Joaquin River Basins Other Than the Delta

The objectives for electrical conductivity and total dissolved solids in Table III-3 apply to the water bodies specified. To the extent of any conflict with the general Chemical Constituents water quality objectives, the more stringent shall apply, with the exception of the electrical conductivity water quality objectives for Reach 83 of the San Joaquin River, which the Board has determined to be protective of all beneficial uses within Reach 83.~~.~~

~~Electrical conductivity water quality objectives for Reach 83 of the San Joaquin River are set to protect the Agricultural Supply (AGR) and the potential Municipal and Domestic Supply (MUN) beneficial uses.~~

Modify the Basin Plan under the heading, "Salinity" (Table III-3 on page III-7.00), as follows:

Table III-3

ELECTRICAL CONDUCTIVITY AND TOTAL DISSOLVED SOLIDS

PARAMETER	WATER QUALITY OBJECTIVES	APPLICABLE WATER BODIES
Electrical Conductivity (at 25°C)	Shall not exceed 230 micromhos/cm (50 percentile) or 235 micromhos/cm (90 percentile) at Knights Landing above Colusa Basin Drain; or 240 micromhos/cm (50 percentile) or 340 micromhos/cm (90 percentile) at I Street Bridge, based upon previous 10 years of record.	Sacramento River (13, 30)
	Shall not exceed 150 micromhos/cm (90 percentile) in well-mixed waters of the Feather River.	North Fork of the Feather River (33); Middle Fork of the Feather River from Little Last Chance Creek to Lake Oroville (36); Feather River from the Fish Barrier Dam at Oroville to Sacramento River (40)
	Shall not exceed 150 micromhos/cm from Friant Dam to Gravelly Ford (90 percentile).	San Joaquin River, Friant Dam to Mendota Pool (69)
	Shall not exceed 1550 micromhos/cm (as a 30-day running average), except during Extended Dry Periods[3], when concentrations shall not exceed 2470 micromhos/cm (as a 30-day running average) and 2200 micromhos/cm (as an annual average using at a minimum the previous four quarterly samples)	San Joaquin River between the Mouth of Merced River and the Airport Way Bridge near Vernalis (83)
Total Dissolved Solids	Shall not exceed 125 mg/l (90 percentile)	North Fork of the American River from the source to Folsom Lake (44); Middle Fork of the American River from the source to Folsom Lake (45); South Fork of the American River from the source to Folsom Lake (48, 49); American River from Folsom Dam to Sacramento River (51)
	Shall not exceed 100 mg/l (90 percentile)	Folsom Lake (50)
	Shall not exceed 1,300,000 tons	Goose Lake (2)

3 See Chapter IV-32.00 for definition of an Extended Dry Period

Modify the Basin Plan under the heading, "Control Program for Salt and Boron Discharges into the Lower San Joaquin River (LSJR)" (pages IV-32.00 through IV-32.07), as follows:

Control ~~p~~Program for Salt and Boron Discharges into the Lower San Joaquin River (LSJR)

The goal of the salt and boron control program is to achieve compliance with salt and boron water quality objectives without restricting the ability of dischargers to export salt out of the San Joaquin River basin.

For the purpose of this control program, nonpoint source land uses include all irrigated lands and nonpoint source discharges are discharges from irrigated lands.

Irrigated lands are lands where water is applied for producing crops and, for the purpose of this control program, includes, but is not limited to, land planted to row, field and tree crops as well as commercial nurseries, nursery stock production, managed wetlands, and rice production.

This control program is phased to allow for implementation of existing water quality objectives, while providing the framework and timeline for implementing future water quality objectives.

The salt and boron control program establishes ~~salt load limits~~ 1) a method for determining the maximum allowable salt loading to the LSJR from discharges to achieve compliance with salinity water quality objectives (WQOs) at the Airport Way Bridge near Vernalis ~~with salt and boron water quality objectives for the LSJR~~ and 2) WQOs and an implementation program for salinity between the mouth of the Merced River and the Airport Way Bridge. ~~The Regional Water Board establishes a method for determining the maximum allowable salt loading to the LSJR. Load allocations are established for nonpoint sources and waste load allocations are established for point sources.~~

Salt Loading and the Vernalis Salinity Control Program

Load allocations to specific dischargers or groups of dischargers are proportionate to the area of nonpoint source land use contributing to the discharge. Control actions that result in salt load reductions will be effective in the control of boron.

Load allocations are established for nonpoint sources and waste load allocations are established for point sources.

~~The salt and boron control program establishes timelines for: 1) developing and adopting salt and boron water quality objectives for the San Joaquin River upstream of the Airport Way Bridges near Vernalis; 2) a control program to achieve these objectives; and 3) developing and adopting a groundwater control program.~~

Per the amendments to the Basin Plan for control of salt and boron discharges into the ~~lower San Joaquin River (~~LSJR~~)~~ basin, approved by the Regional Water Board in Resolution No. 88-195, Resolution No. 2004-0108, and Resolution No.

R5-2017-XXX and incorporated herein, the Regional Water Board will take the following actions, as necessary and appropriate, to implement this control program:

1. The Regional Water Board shall use waivers of waste discharge requirements or waste discharge requirements to apportion load allocations to each of the following seven geographic subareas that comprise the LSJR:

    a. San Joaquin River Upstream of Salt Slough
    b. Grassland
    c. Northwest Side
    d. East Valley Floor
    e. Merced River
    f. Tuolumne River
    g. Stanislaus River

    These subareas are described in Chapter 1 and in more detail in Appendix 41.

2. Dischargers of irrigation return flows from irrigated lands are in compliance with this control program if they meet any of the following conditions:

    a. Cease discharge to surface water
    b. Discharge does not exceed 315µS/cm electrical conductivity (based on a 30-day running average)
    c. Operate under waste discharge requirements that include effluent limits for salt
    d. Operate under a waiver of waste discharge requirements for salt and boron discharges to the LSJR

3. The Regional Water Board will adopt ~~a~~ waivers of waste discharge requirements or waste discharge requirements for salinity management, or incorporate into ~~an~~ existing agricultural waivers or waste discharge requirements, the conditions required to participate in a Regional Water Board approved real-time management program. Load allocations for nonpoint source dischargers participating in a Regional Water Board approved real-time management program are described in Table IV-4.4. Additional waiver conditions or waste discharge requirements will include use of Regional Water Board approved methods to measure and report flow and electrical conductivity. Participation in a Regional Water Board approved real-time management program and attainment of salinity water quality objectives at the Airport Way Bridge near Vernalis will constitute compliance with this control program.

4. The Regional Water Board will adopt waste discharge requirements with fixed monthly base load allocations specified as effluent limits for nonpoint source discharges that do not meet conditions specified in ~~a~~ waivers of waste discharge requirements or waste discharge requirements for salinity management. Entities operating under ~~WDRs~~ waste discharge requirements, or that will be required to operate under ~~WDRs~~ waste discharge requirements in order to comply with other programs, may participate in a Regional Water Board approved real-time management program in lieu of additional ~~WDRs~~ waste discharge requirements for salinity if they meet the conditions specified in the waiver of ~~WDRs~~ waste discharge requirements for salinity management, as described in item 3.

5. Fixed monthly base load allocations and the method used to calculate real-time load allocations are specified in Table IV-4.4.

6. Waste Load Allocations are established for point sources of salt in the basin. NPDES permitted discharges shall not exceed the salinity water quality objectives established for the LSJR at the Airport Way Bridge near Vernalis unless the discharger is a member of a Regional Water Board-approved real time management program or a pollutant trading program consistent with the Control Program for Salt and Boron Discharges into the LSJR The Regional Water Board will revise NPDES permits to incorporate ~~TMDL allocations~~ the requirements of the Control Program when the permits are renewed or reopened at the discretion of the Regional Water Board.

7. Supply water credits are established for irrigators that receive supply water from the Delta Mendota Canal (DMC) or the LSJR between the confluence of the Merced River and the Airport Way Bridge near Vernalis as described in Table IV-4.4.

8. Supply water Load Allocations are established for salts in irrigation water imported to the LSJR Watershed from the Sacramento/San Joaquin River Delta as described in Table IV-4.4.

   Per Resolution No. R5-2014-0150, ~~T~~the Regional Water Board ~~will attempt to enter into~~ adopted a revised Management Agency Agreement (MAA) with the U.S. Bureau of Reclamation, replacing a 2008 MAA to address salt imports from the DMC to the LSJR watershed. The MAA ~~shall~~ includes provisions requiring the U.S. Bureau of Reclamation to:

   a. Meet DMC load allocations; or
   b. Provide mitigation and/or dilution flows to create additional assimilative capacity for salt in the LSJR equivalent to DMC salt loads in excess of their allocation.

   The Regional Water Board shall request a report of waste discharge from the U.S. Bureau of Reclamation to ~~address~~ meet DMC ~~discharges~~ load allocations if a MAA ~~is not established by 28 July 2008~~ meeting the provisions identified above does not remain in place.

9. The Regional Water Board will review and, if necessary, update the load allocations and/or waste load allocations by 28 July 2012 and every 6 years thereafter. Any changes to waste load allocations and/or load allocations can be made through subsequent amendment to this control program. Changes to load allocations will be implemented through revisions of the applicable waste discharge requirements or waivers of waste discharge requirements. Changes to waste load allocations will be implemented through revisions of the applicable NPDES permits.

10. The Regional Water Board encourages real-time water quality management and pollutant trading of waste load allocations, load allocations, and supply water allocations as a means for attaining salt and boron water quality objectives while maximizing the export of salts out of the LSJR watershed. This control program shall in no way preclude basin-

wide stakeholder efforts to attain salinity water quality objectives in the LSJR so long as such efforts are consistent with the control program.

11. The established waste load allocations, load allocations, and supply water allocations represent a maximum allowable level. The Regional Water Board may take other actions or require additional reductions in salt and boron loading to protect beneficial uses.

12. Salt loads in water discharged into the LSJR or its tributaries for the express purpose of providing dilution flow are not subject to load limits described in this control program if the discharge:

    a. complies with salinity water quality objectives for the LSJR at the Airport Way Bridge near Vernalis;
    b. is not a discharge from irrigated lands; and
    c. is not provided as a water supply to be consumptively used upstream of the San Joaquin River at the Airport Way Bridge near Vernalis.

13. Entities providing dilution flows, as described in item 12, will obtain an allocation equal to the salt load assimilative capacity provided by this flow. This dilution flow allocation can be used to: 1) offset salt loads discharged by this entity in excess of any allocation or; 2) trade, as described in item 10. The additional dilution flow allocation provided by dilution flows will be calculated as described in Table IV-4.4.

~~14. It is anticipated that salinity and boron water quality objectives for the San Joaquin River from Mendota Dam to the Airport Way Bridge near Vernalis will be developed and considered for adoption in the second phase of this TMDL, according to time schedule in Table IV-4.1.~~

~~Table IV-4.1: Schedule for developing water quality objectives for salt and boron in the LSJR from Mendota Dam to the Airport Way Bridge near Vernalis~~

~~Milestone~~	~~Date~~
~~Staff report on criteria needed to protect beneficial uses~~	~~October 2004~~
~~Staff report and Regional Water Board workshop on water quality objectives that can reasonably be achieved~~	~~June 2005~~
~~Draft second phase TMDL with water quality objectives and program of implementation for LSJR from Mendota Dam to Airport Way Bridge near Vernalis~~	~~September 2005~~
~~Board Hearing for consideration of adoption~~	~~June 2006~~

Compliance with Water Quality Objectives Upstream of the Airport Way Bridge near Vernalis

~~15. Salinity and boron water quality objectives for the San Joaquin River from Mendota Dam to the Airport Way Bridge near Vernalis will be implemented using the implementation framework described in this 'Control Program for Salt and Boron Discharges into the Lower San Joaquin River' or other implementation mechanisms, as appropriate.~~

1. Per the amendments to the Basin Plan for control of salt and boron discharges into the LSJR basin between the Airport Way Bridge near Vernalis and the mouth of the Merced River, approved by the Regional Water Board in Resolution No. 88-195 and Resolution No. R5-2017-XXXX, and incorporated herein, the following actions will be implemented:

   a. The Regional Water Board will determine nonpoint source discharge compliance with electrical conductivity and boron WQOs using data collected at Crows Landing and Maze Road. Daily average electrical conductivity data will be utilized to calculate the 30-day running averages for electrical conductivitycompliance; weekly boron concentration data will be utilized to calculate the monthly average and maximum boron concentrations for compliance.
   b. The Regional Water Board has established a non-regulatory performance goal for the LSJR that represents a potentially-achievable 30-day running average that is lower than the WQO. As the Salt and Boron Control Program is implemented, the Regional Water Board will continue to evaluate whether this performance goal is achievable during the irrigation seasons of Wet, Above Normal, Below Normal, and Dry Water Years, as specified in Table IV-4.1.

Table IV-4.1: Electrical Conductivity Performance Goal Periods (except during Extended Dry Periods)

WY Type	Irrigation Season		Non-irrigation Season
	Mar-Jun	Jul-Sept	Oct-Feb
Wet	1350 µS/cm		
Above Normal	1350 µS/cm		
Below Normal	1350 µS/cm		
Dry	1350 µS/cm		
Critical			

   c. Attainment of the electrical conductivityPerformance Goal will be evaluated using data collected at Crows Landing and Maze Road.
   d. Ten years after Regional Water Board's adoption of the Basin Plan Amendment, and based on the evaluations described in the subparagraphs above, the Regional Water Board will consider reopening the Basin Plan to potentially revise the LSJR electrical conductivityWQOs.
   e. During an Extended Dry Period, the electrical conductivity WQO will be 2470 µS/cm (30-day running average) to protect the AGR beneficial use. In addition, during an Extended Dry Period, the electrical conductivity WQO for protection of the potential MUN beneficial use shall be 2200 µS/cm as the average of the previous four (4) consecutive quarterly samples at a minimum.

An Extended Dry Period is based in part on the water year type numeric indicator identified in the State Water Board's San Joaquin Valley "60-20-20" Water Year Hydrologic Classification[4] as follows:

- Wet – 5
- Above Normal – 4
- Below Normal – 3
- Dry – 2
- Critically Dry – 1

The indicator values will be used as follows to determine when an Extended Dry Period is in effect:

- An Extended Dry Period shall begin when the sum of the current year's 60-20-20 indicator value and the previous two year's 60-20-20 indicator values total six (6) or less.
- An Extended Dry Period shall be deemed to exist for one water year (12 months) following a period with an indicator value total of six (6) or less.

2. ~~Considerations~~ In addition to meeting the requirements of the Vernalis Salinity Control Program, considerations for NPDES permitted discharges to the LSJR are as follows: ~~hat meet the Vernalis Salinity Control Program requirements are as follows:~~

   a. When evaluating whether an NPDES point source discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion of the EC WQOs for the Lower San Joaquin River, the Regional Water Board should consider available dilution of the effluent in the receiving water, and may consider dilution as determined down to the first downstream diversion that provides AGR irrigation supply or MUN beneficial use.

   b. If an NPDES point source discharge is deemed to have reasonable potential to cause or contribute to an instream excursion above the EC WQOs, water quality-based effluent limits shall be required. For publicly-owned treatment works (POTWs), the water quality-based effluent limitations may be established in terms of EC concentration or total dissolved solids (TDS) loading to account for site-specific consideration of dry weather versus wet weather conditions. However, concentration and loading limits shall not be applied at the same time. When establishing water quality-based effluent limitations for POTWs in terms of TDS loading, an EC to TDS ratio of 0.64 shall be used to convert EC concentrations to TDS concentrations, unless a discharger-specific ratio can be demonstrated. The design average dry weather flow of the POTW shall be used to calculate the TDS loading limits.

   c. For NPDES point source discharges, if water quality-based effluent limits are required:

      i. effluent limitations for protection of AGR beneficial uses shall be expressed as monthly averages instead of thirty-day running averages;

      ii. effluent limitations for protection of MUN beneficial uses should be expressed as an annual average.

[4] The method for determining the San Joaquin Valley Water Year Hydrologic Classifications is defined in the State Water Board Revised Water Right Decision 1641, March 2000, Figure 2, page 189. This method uses the best available estimate of the 60-20-20 San Joaquin Valley water year hydrologic classification at the 75% exceedance level using the best available data published in the California Department of Water Resources' ongoing Bulletin 120 series.

~~a. When evaluating whether an NPDES point source discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion of the EC WQOs for the Lower San Joaquin River, the Regional Water Board shall consider available dilution of the effluent in the receiving water, as determined at the first downstream diversion that provides AGR irrigation supply or MUN beneficial use.~~

~~b. If an NPDES point source discharge is deemed to have reasonable potential to cause or contribute to an instream excursion above the EC WQOs at the first diversion that occurs downstream that provides AGR irrigation supply or MUN beneficial use, water quality-based effluent limits shall be required. For publicly-owned treatment works (POTWs) the water quality-based effluent limitations may be established in terms of EC concentration or total dissolved solids (TDS) loading to account for site-specific consideration of dry weather versus wet weather conditions. However, concentration and loading limits shall not be applied at the same time. When establishing water quality-based effluent limitations for POTWs in terms of TDS loading, an EC to TDS ratio of 0.64 shall be used to convert EC concentrations to TDS concentrations, unless a discharger-specific ratio can be demonstrated. The design average dry weather flow of the POTW shall be used to calculate the TDS loading limits.~~

~~c. For NPDES point source discharges, a receiving water limitation shall be required stating that the discharge shall not cause an exceedance of the EC WQOs in the receiving water, with compliance to be determined based on monthly average concentrations at the first downstream diversion that provides AGR irrigation supply or MUN beneficial use.~~

d. The Regional Water Board will incorporate the requirements of the EC water quality objectives for the Lower San Joaquin River when the NPDES permits are renewed or reopened at the discretion of the Regional Water Board.

~~16. A groundwater control program for sources of salt discharges into the LSJR will be developed by June 2020 if water quality objectives in the LSJR are not being attained.~~

Implementation Priority and Schedules

Salt Loading and the Vernalis Water Quality Objectives

~~17.~~The Regional Water Board will focus control actions on the most significant sources of salt and boron discharges to the LSJR. Priority for implementation of load allocations to control salt and boron discharges will be given to subareas with the greatest unit area salt loading (tons per acre per year) to the LSJR (Table IV-4.2). The priorities established in Table IV-4.2 will be reviewed by 28 July 2012 and every 6 years thereafter.

Table IV-4.2: Priorities for implementing load allocations[1]

Subarea	Priority
San Joaquin River Upstream of Salt Slough	Low
Grassland	High
Northwest Side	High
East Valley Floor	Low
Merced River	Low
Tuolumne River	Medium
Stanislaus River	Low
Delta Mendota Canal[2]	High

[1] Priorities based on the unit area salt load from each subarea and mass loading from the DMC

[2] Delta Mendota Canal is not a subarea

~~*Time Schedules for Implementation*~~

~~18~~1. The Regional Water Board will incorporate base load allocations into waste discharge requirements and real-time load allocations into conditions of waiver of waste discharge requirements by 28 July 2008. Dischargers regulated under a waiver of waste discharge requirements for dischargers participating in a real-time management program for the control of salt and boron in the LSJR shall comply with the waiver conditions within 1 year of the date of adoption of the waiver.

~~19~~2. Existing NPDES point source dischargers are low priority and subject to the compliance schedules for low priority discharges in Table IV-4.3. New point source discharges that begin discharging after the date of the adoption of this control program must meet the requirements of the Control Program for Salt and Boron Discharges into the ~~Lower San Joaquin River~~ LSJR upon the commencement of the discharge.

Table IV-4.3: Schedule for Compliance with the load allocations for salt and boron discharges into the LSJR

Priority	Year to implement[1]	
	Wet through Dry Year Types	Critical Year Types
High	8	12
Medium	12	16
Low	16	20

[1]number of years from the effective date [28 July 2006] of this control program

~~16~~3. A groundwater control program for sources of salt discharges into the LSJR will be developed by June 2020 if water quality objectives in the LSJR are not being attained.

Water Quality Objectives Upstream of the Airport Way Bridge near Vernalis

1. The electrical conductivity water quality objectives for the San Joaquin River between its confluence with the Merced River and the Airport Way Bridge near Vernalis will be implemented by 1 January 2020.

Table IV-4.4 Summary of Allocations and Credits

BASE SALT LOAD ALLOCATIONS

Base Load Allocations (thousand tons of salt)

Year-type[1]	Month / Period												
	Jan	Feb	Mar	Apr 1 to Apr. 14	Pulse Period [2]	May 16 to May 31	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	41	84	116	23	72	31	0	0	5	45	98	44	36
Abv. Norm	44	84	64	26	71	14	0	0	0	44	58	35	32
Blw. Norm	22	23	31	11	45	8	0	0	0	38	41	34	30
Dry	28	39	25	5	25	1	0	0	0	25	31	27	28
Critical	18	15	11	0	0	0	0	0	0	19	30	26	23

REAL-TIME SALT LOAD ALLOCATIONS

Nonpoint source dischargers operating under waiver of waste discharge requirements or waste discharge requirements must participate in a Regional Water Board approved real-time management program and meet real-time load allocations. Loading capacity and real-time load allocations are calculated for a monthly time step. The following method is used to calculate real-time load allocations. Flows are expressed in thousand acre-feet per month and loads are expressed in ~~thousand~~ tons per month.

Loading Capacity (LC) in ~~thousand~~ tons per month is calculated by multiplying flow in thousand acre-ft per month by the salinity water quality objective in µS/cm, a unit conversion factor of 0. 8293, and a coefficient of 0.85 to provide a 15 percent margin of safety to account for any uncertainty.

LC = Q * WQO * 0.8293 * 0.85 where:
LC = total loading capacity in ~~thousand~~ tons per month
Q = flow in the San Joaquin River at the Airport way Bridge near Vernalis in thousand acre-feet per month
WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in µS/cm

The sum of the real-time Load Allocations (LA) for nonpoint source dischargers are equal to a portion of the LSJR's total Loading Capacity (LC) as described by the following equation:

$LA = LC - L_{BG} - L_{CUA} - L_{GW} - \Sigma WLA$ Where:
LA = sum of the real-time Load Allocations for nonpoint source dischargers
L_{BG} = loading from background sources
L_{CUA} = consumptive use allowance
L_{GW} = loading from groundwater
ΣWLA = sum of the waste load allocations for all point sources

Background loading in ~~thousand~~ tons is calculated using the following equation: $L_{BG} = Q *$

85 µS/cm * 0.8293

Table IV-4.4 Summary of Allocations and Credits (continued)

Consumptive use allowance loading is calculated with the following equation:

$L_{CUA} = Q * 230\ \mu S/cm * 0.8293$

Monthly groundwater Loading (L_{GW}) (in thousand tons)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
15	15	30	32	36	53	46	27	16	13	14	15

Waste load allocations for individual point sources are calculated using the following equation:

$WLA=Q_{PS}*WQO*0.8293$

where:
WLA = waste load allocation in ~~thousand~~ tons per month
Q_{PS} = effluent flow to surface waters from the NPDES permitted point source discharger (in thousand acre-feet per month)
WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in µS/cm

APPORTIONING OF SALT LOAD ALLOCATION

An individual discharger or group of dischargers can calculate their load allocation by multiplying the nonpoint source acreage drained by the load allocation per acre.

$$\text{LA per acre} = \frac{\text{LA}}{\text{nonpoint source acreage}} \text{ Total}$$

As of 1 August 2003, the total nonpoint source acreage of the LSJR Basin is 1.21-million acres. Nonpoint source land uses include all irrigated agricultural lands (including managed wetlands). Agricultural land includes all areas designated as agricultural or semi-agricultural land uses in the most recent land use surveys published by the California Department of Water Resources. California Department of Water Resources land use surveys are prepared and published on a county-by-county basis. Multiple counties or portions of counties may overlay a given subarea. The land use surveys must be used in combination with a Geographic Information System to quantify the agricultural land use in each subarea. Nonpoint source land areas will be updated every 6 years though an amendment to the Basin Plan if
updated California Department of Water Resources land use surveys have been published. The following land use surveys (or portions thereof) are used to quantify agricultural land use in the LSJR watershed.

County	Year of most recent land use survey[1]
Merced	1995
Madera	1995
San Joaquin	1996
Fresno	1994
Stanislaus	1996

[1]-as of 1 August 2003

Acreage of managed wetlands is based on the boundaries of the federal, private and state owned wetlands that comprise the Grassland Ecological Area in Merced County. Agricultural lands (as designated in DWR land uses surveys) within the Grassland Ecological Area are counted as an agricultural land use and not as managed wetlands. All other lands within the Grassland Ecological Area are considered to be managed wetlands.

CONSUMPTIVE USE ALLOWANCE

In addition to the base load allocations or real-time load allocations shown above, a consumptive use allowance (L_{CUA}) is provided to each discharger:

L_{CUA} in tons per month = discharge volume in thousand acre-feet per month * 230 µS/cm * 0.8293

Table IV-4.4 Summary of Allocations and Credits (continued)

SUPPLY WATER CREDITS

A supply water credit is provided to irrigators in the Grassland and Northwest Side Subareas that receive water from the DMC. This DMC supply water credit is equal to 50 percent of the added salt load, in excess of background, delivered to Grassland and Northwest Side subareas. The following fixed DMC supply water credits apply to dischargers operating under base load allocations:

DMC supply water credits (thousand tons)

Year-type[1]	Month / Period												
	Jan	Feb	Mar	Apr 1 to Apr. 14	Pulse Period [2]	May 16 to May 31	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NORTHWEST SIDE SUBAREA													
Wet	0.0	0.2	0.0	0.7	1.4	0.7	2.0	2.6	2.6	1.0	0.9	0.6	0.0
Abv. Norm	0.0	0.0	0.0	0.8	1.9	1.0	2.3	2.3	2.6	1.2	0.8	0.3	0.0
Blw. Norm	0.0	0.0	0.0	1.0	2.6	1.5	3.4	4.2	3.3	2.5	1.9	0.8	0.0
Dry	0.0	0.0	0.0	0.1	0.3	0.2	0.3	0.5	0.5	0.2	0.2	0.0	0.0
Critical	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRASSLAND SUBAREA													
Wet	2.1	5.9	13.9	7.8	17.3	8.8	22.6	20.8	23.2	17.2	16.0	10.4	3.7
Abv. Norm	1.2	4.8	9.4	10.4	24.7	13.6	27.6	20.3	24.5	23.9	16.6	7.5	2.6
Blw. Norm	1.4	5.7	13.8	12.5	29.5	15.9	32.6	29.2	29.8	32.9	25.3	12.8	4.5
Dry	2.2	6.7	15.9	11.1	23.4	11.2	22.9	23.1	24.0	28.0	23.7	13.0	5.3
Critical	3.3	8.9	17.2	10.2	24.1	13.3	33.3	32.5	31.8	27.5	28.7	13.6	5.9

The following method is used to calculate real-time DMC supply water credits in ~~thousand~~ tons per month and applies to dischargers operating under real-time load allocations.

Real-time CVP Supply Water Credit = Q_{CVP}* (C_{CVP} - C_{BG}) * 0.8293*0.5

Where:
Q_{CVP} = volume of water delivered from CVP in thousand acre-feet per month[3]
C_{CVP} = electrical conductivity of water delivered from CVP in µS/cm[3]
C_{BG} = background electrical conductivity of 85 µS/cm

For irrigators in the Northwest Side Subarea an additional supply water credit is provided to account for salts contained in supply water diverted directly from the LSJR (LSJR diversion water credit). The LSJR diversion credit is equal to 50 percent of the added salt load (in excess of background) in supply water diverted from the San Joaquin River between the confluence of the Merced River and the Airport Way Bridge near Vernalis. The following fixed LSJR supply water credits apply to dischargers operating under base load allocations:

LSJR supply water credits (thousand tons)

Year-type[1]	Month / Period												
	Jan	Feb	Mar	Apr 1 to Apr. 14	Pulse Period [2]	May 16 to May 31	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	0.0	0.6	9.2	6.2	9.4	11.0	17.2	23.5	20.5	9.5	1.3	0	0
Abv. Norm	0.0	0.8	5.0	7.4	12.3	11.2	21.8	24.9	20.3	10.7	1.5	0	0
Blw. Norm	0.0	0.6	5.5	7.0	14.4	13.4	27.3	33.1	24.9	13.9	2.4	0	0
Dry	0.0	0.7	5.3	6.4	11.1	10.7	27.5	34.0	20.3	11.4	2.4	0	0
Critical	0.0	0.8	4.5	5.1	14.8	10.6	25.2	28.5	22.3	8.7	2.5	0	0

Table IV-4.4 Summary of Allocations and Credits (continued)

The following method is used to calculate Real-time LSJR supply water credits in ~~thousand~~ tons per month and applies to dischargers operating under real-time load allocations.

Real-time LSJR Supply Water Credit = $Q_{LSJR\ DIV}$* ($C_{LSJR\ DIV}$ -C_{BG}) * 0.8293 * 0.5

Where:
$Q_{LSJR\ DIV}$ = volume of water diverted from LSJR between the Merced River Confluence and the Airport Way Bridge near Vernalis in thousand acre-feet per month[4]
$C_{LSJR\ DIV}$ = electrical conductivity of water diverted from the LSJR in µS/cm[4]
C_{BG} = background electrical conductivity of 85 µS/cm

SUPPLY WATER ALLOCATIONS

The U.S. Bureau of Reclamation DMC load allocation (LA_{DMC}) is equal to the volume of water delivered from the DMC (Q_{DMC}) to the Grassland and Northwest side Subareas at a background Sierra Nevada quality of 85 µS/cm.

$LA_{DMC} = Q_{DMC}$ * 85 µS/cm * 0.8293

DILUTION FLOW ALLOCATIONS

Entities providing dilution flows obtain an allocation equal to the salt load assimilative capacity provided by this flow, calculated as follows:

$A_{dil} = Q_{dil}$*(C_{dil}-WQO)*0.8293

Where:
A_{dil} = dilution flow allocation in ~~thousand~~ tons of salt per month
Q_{dil} = dilution flow volume in thousand acre-feet per month
C_{dil} = dilution flow electrical conductivity in µS/cm
WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in µS/cm

[1] The water year classification will be established using the best available estimate of the 60-20-20 San Joaquin Valley water year hydrologic classification (as defined in Footnote 17 for Table 3 in the State Water ~~Resources Control~~ Board's *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary*, ~~May 1995~~December 2006) at the 75% exceedance level using data from the Department of Water Resources Bulletin 120 series. The previous water year's classification will apply until an estimate is made of the current water year.

[2] Pulse period runs from 4/15-5/15. Period and distribution of base load allocation and supply water credits between April 1 and May 31 may change based on scheduling of pulse flow as specified in State Water Board Revised Water Rights Decision 1641. Total base load allocation for April 1 through May 31 does not change but will be redistributed based on any changes in the timing of the pulse period

[3]Methods used to measure and report the volume and electrical conductivity of water delivered from the CVP to irrigated lands must be approved by the Regional Water Board as part of ~~the~~ waste discharge requirements or waivers of waste discharge requirements conditions required to participate in a Regional Water Board approved real-time management program

[4] Methods used to measure and report the volume and electrical conductivity of water diverted from the SJR between the confluence of the Merced and the Airport Way Bridge near Vernalis must be approved by the Regional Water Board as part of the waiver conditions required to participate in a Regional Water

CHAPTER V SURVEILLANCE AND MONITORING

Modify the Basin Plan by adding a new heading and text to the bottom of page V-5.00, as follows:

Salt and Boron Discharges into the Lower San Joaquin River

The amendments to the Basin Plan that established boron and electrical conductivity WQOs for discharges into the lower San Joaquin River (LSJR) between the mouth of the Merced River and the Airport Way Bridge near Vernalis were approved by the Regional Water Board in Resolution No. 88-195 and Resolution No. 2017-XXXX, incorporated herein. The Regional Water Board will review data collected at Crows Landing and Maze Road to determine compliance with the LSJR electrical conductivity WQOs and attainment of the Performance Goal. Daily average electrical conductivity measurement calculations will be utilized to calculate the 30-day running average for WQO compliance and Performance Goal attainment. The Regional Water Board will review boron concentration data collected weekly at Crows Landing to determine if the monthly average or maximum boron WQOs are being exceeded. Should the boron objectives be exceeded at Crows Landing, boron analyses should be expanded to weekly sampling at Maze Road and the Airport Way Bridge near Vernalis. To evaluate changing loads into the system that may result from changing management activities and/or changes in hydrology, continuous flow monitoring is recommended in the river at Crows Landing, Maze Road and the Airport Way Bridge near Vernalis.