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Central Valley Regional Water Quality Control Board

TO: Gerald Bowes, Ph.D.
Manager, Cal/EPA Scientific Peer Review Program
Office of Research, Planning and Performance
State Water Resources Control Board

FROM: Adam Laputz
Assistant Executive Officer
CENTRAL VALLEY WATER BOARD

DATE: 22 November 2016
Revised 2 December 2016 (Revisions indicated in red type)

SUBJECT: REQUEST FOR EXTERNAL PEER REVIEW OF PROPOSED BASIN PLAN AMENDMENTS TO ESTABLISH SALINITY WATER QUALITY OBJECTIVES IN REACH 83 OF THE SAN JOAQUIN RIVER.

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) requests that you initiate the process to identify reviewers to provide external peer review for the proposed amendments per the requirements of Health and Safety Code section 57004. The proposed Basin Plan Amendments are tentatively scheduled to be considered by the Central Valley Water Board in April 2017. The applicable portions of the draft staff report and supporting technical documents are currently ready for review.

The proposed amendments will affect salinity water quality objectives in Reach 83 of the San Joaquin River, from the mouth of the Merced River to Vernalis. The amendments consist of the following elements:

- Salinity water quality objectives for Reach 83 of the San Joaquin River that are protective of existing and potential beneficial uses.
- An implementation program to achieve proposed salinity water quality objectives.
- A salinity performance goal during certain months and water year types to promote achievement of the best possible water quality.
- A monitoring and surveillance program to evaluate compliance with water quality objectives and the effectiveness of the implementation program.

<u>Expected Date of Central Valley Water Board Hearing</u>
Staff is expected to present to the Central Valley Water Board the Draft Staff Report and proposed Basin Plan Amendment in April 2017, with a proposed adoption by the Central Valley Water Board in June 2017. In order to meet this schedule, we request receipt of the scientific peer reviewer's comments no later than 31 January 2017.

Requested Review Period
We request that scientific peer review be accomplished within the normal review period of thirty (30) days.

Length of Documents and References
The primary document (Draft Staff Report) is approximately 275 pages, including appendices. There are 6 secondary documents to be reviewed and these are as follows:

- Central Valley Water Board. (2016b). *Revisions to the 2010 Salt Tolerance of Crops in the Lower San Joaquin River (Merced to Stanislaus River Reaches) and 2016 Addendum* (306 pages)

- Hoffman, Glenn J. (2010). *Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta* (137 pages)

- Larry Walker Associates (LWA). (2014a). *Development of a Basin Plan Amendment for Salt and Boron in the LSJR, Task 2a: Compile and Update Water Quality and Salt Loading Data* (27 pages)

- Larry Walker Associates (LWA). (2014c*). Development of a Basin Plan Amendment for Salt and Boron in the LSJR, LWA Task 2a Addendum* (4 pages)

- Larry Walker Associates (LWA). (2014d*). Development of a Basin Plan Amendment for Salt and Boron in the Lower San Joaquin River, Summary of Work Completed: Tasks 2, 3, and 8b*(73 pages)

- Larry Walker Associates (LWA). (2015). *Development of a Basin Plan Amendment for Salt and Boron in the Lower San Joaquin River, Task #4 – Implementation Planning for Proposed Salinity Objectives* (73 pages)

Suggested Areas of Expertise for Reviewers
It would be useful for the external peer reviewers to have knowledge about:

- Agriculture, including knowledge of crop yields, leaching fractions, and agricultural impacts to water quality (for Conclusions 1 and 2 in Attachment 2)

- Surface water/watershed modeling and/or crop salinity tolerance modeling (for Conclusions 1 and 2 in Attachment 2)

- Environmental interaction of salinity and boron (for Conclusions 3 in Attachment 2)

Attachment 1 provides a summary of the proposed basin planning action. Attachment 2 contains scientific and policy elements that will be part of the Board's consideration. We would like a peer review of the specific scientific findings and conclusions listed in Attachment 2.

Attachment 3 contains a list of the persons who have participated in the development of this proposal. Attachment 4 contains the list of references used in the development of the staff report. Peer reviewers are not expected to review these documents but all the references will be available to the peer reviewers.

If you have any questions, please contact James Brownell at either (916) 464-4675 or james.brownell@waterboards.ca.gov.

Attachments

cc: Mr. Rik Rasmussen, Division of Water Quality, State Water Resources Control Board, Sacramento

Attachment 1 -Revised

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS TO ESTABLISH SALINITY WATER QUALITY OBJECTIVES IN REACH 83 OF THE SAN JOAQUIN RIVER.

Plain English Summary of Proposed Action

I. Summary

Central Valley Water Board staff is proposing amendments to the Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and San Joaquin River Basin 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 Vernalis. The San Joaquin River at Vernalis is the southern boundary of the Sacramento-San Joaquin Delta (Figure 1). The proposed amendments would:

- Define salinity WQOs that are protective of beneficial uses in the Lower San Joaquin River (LSJR). The proposed Basin Plan amendments would establish a water quality objective 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 (as defined in Attachment 2), when the water quality objective would require that EC not exceed 2,470 µS/cm as a 30-day running average and 2,200 µS/cm as the average of the previous four consecutive quarterly samples at a minimum.
- Incorporate an implementation program into the Basin Plan to achieve proposed salinity WQOs.
- 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.
- Require the implementation of a monitoring and surveillance program to evaluate the effectiveness of the implementation program.

These proposed amendments would set objectives that would be protective of the two existing or potential beneficial uses in the LSJR that are most sensitive to salinity impacts: Agricultural Supply (AGR) and Municipal and Domestic Supply (MUN). In addition, setting an EC performance goal will promote achievement of the best 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 established in 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 Board, 2006).

II. Background

[1]An EC measurement made or corrected to 25 °C is equivalent to specific conductance. Subsequent references to EC in this document shall be assumed to be equivalent to specific conductance.

Salinity has long been a recognized problem in the LSJR (downstream of Mendota Pool to Vernalis), but there are no established salinity WQOs in this stretch of the river. The Bay-Delta Plan establishes salinity WQOs for the portion of the San Joaquin River in the south Delta. 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 WQOs and a program of implementation for the main stem of the San Joaquin River upstream of Vernalis (State Water 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 TMDL to address electrical conductivity and boron in the LSJR and to meet the WQOs in the Bay-Delta Plan for Airport Way Bridge near Vernalis. The Control Program also required the establishment of salinity WQOs upstream of Vernalis. The development of the proposed salinity WQOs was a stakeholder-driven effort coordinated by the Lower San Joaquin River (LSJR) Committee, which is a subcommittee of the Central Valley Salinity Alternatives for Long-term Sustainability (CV-SALTS).

We are requesting peer reviewers to evaluate whether the basis for several specific components of the proposed Basin Plan Amendment are supported with sound scientific observations and principles.

III. Rationale

The LSJR Committee, which is comprised of State, Federal and Local agency representatives, as well as representatives of agricultural, environmental, municipal and wetland operations, conducted a review of beneficial uses, water quality, and current practices in the LSJR to recommend changes to the Basin Plan that will enable the Central Valley Water Board to maximize beneficial use protection and salt management in the basin. As a result of this review, the LSJR Committee developed recommendations to amend the Basin Plan to add salinity WQOs in LSJR from the confluence of the Merced River to Vernalis (Reach 83), as detailed in attached documents. No changes are proposed to the Basin Plan's existing boron WQOs for this stretch of the river. In accordance with the Water Code, the Basin Plan Amendment will include an implementation program to achieve compliance with the salinity WQOs and a surveillance and monitoring program to assess compliance.

IV. Methodology

The salinity WQOs in the proposed Basin Plan Amendment are the result of both technical work and policy recommendations by LSJR Committee.

A review of salinity parameters for the protection of applicable beneficial uses in Reach 83 identified the AGR and MUN beneficial uses to be the existing and potential uses most sensitive to elevated salinity. (Draft Staff Report, Chapter 4).

Based on technical work pertaining to crop salt-sensitivity, land uses in the area, and a policy decision on the reasonable level of crop protection, almonds were selected as the most salt-sensitive agricultural crop in need of AGR protection in the LSJR irrigation use area. A steady-state soil salinity model (Hoffman model) was used to evaluate salt tolerance of almonds in the LSJR irrigation use area and served as the foundation for determining the appropriate EC values to protect the AGR beneficial use in Reach 83.

An EC WQO of 1,550 µS/cm as a 30-day running average is proposed, except during Extended Dry Periods (as defined in Attachment 2, Section B.4) when the WQO will be increased to 2,470 µS/cm as a 30-day running average and 2,200 µS/cm as the average of the previous four consecutive quarterly samples (Draft Staff Report, Chapter 5). The proposed WQOs fall within the specified range provided in Title 22 of the California Code of Regulation's Secondary Maximum Contaminant Level (MCL) for specific conductance (recommended value =900 µS/cm, upper value =1,600 µS/cm, short term value = 2,200 µS/cm), which are the WQOs identified in the Basin Plan to protect MUN.

A watershed modeling tool called WARMF, which stands for Watershed Analysis Risk Framework, was used to simulate salt loading in Reach 83 based on historic conditions (Draft Staff Report, Chapter 5). The model was further used to evaluate the ability of different implementation management strategies to meet the proposed salinity WQOs. Results from the watershed modeling analyses indicated that salinity concentrations would be lower than the proposed objectives in some situations, which led the LSJR Committee to recommend including an EC implementation performance goal (Performance Goal) of 1,350 µS/cm as a 30-day running average, relative to certain seasonal and water year considerations (Draft Staff Report, Chapter 6). The Performance Goal would also be dependent on the completion of currently proposed management actions.

Water quality model and trend data indicate that proposed salinity and existing boron WQOs can be met with the implementation of planned activities in the watershed, primarily the completion of the Grasslands Bypass Project (GBP) in 2019 (Draft Staff Report, Chapters 5-7). However, changing conditions in the watershed increase the uncertainty of model and trend projections. In particular, boron concentrations have historically tracked EC concentrations based on established ratios. Ratios may change as planned conservation practices are implemented in the basin, therefore a monitoring and surveillance program is proposed to assess water quality conditions and evaluate the effectiveness of the implementation program (Draft Staff Report, Chapter 7). In addition, a re-opener to the Basin Plan Amendment is proposed, no later than ten years following adoption of salinity WQOs, to reassess the EC WQOs, Performance Goal, and boron concentrations to ensure the appropriate level of protection of beneficial uses in the LSJR (Draft Staff Report, Chapter 6).

V. Documents for Peer Review

The following documents will be provided to peer reviewers for their assessment of the scientific peer review topics presented in Attachment 2:

- Central Valley Water Board. (2016 *DRAFT*). *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.*(275 pages)

- Central Valley Water Board. (2016b). *Revisions to the 2010 Salt Tolerance of Crops in the Lower San Joaquin River (Merced to Stanislaus River Reaches) and 2016 Addendum* (306 pages)

- Hoffman, Glenn J. (2010). *Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta* (137 pages)

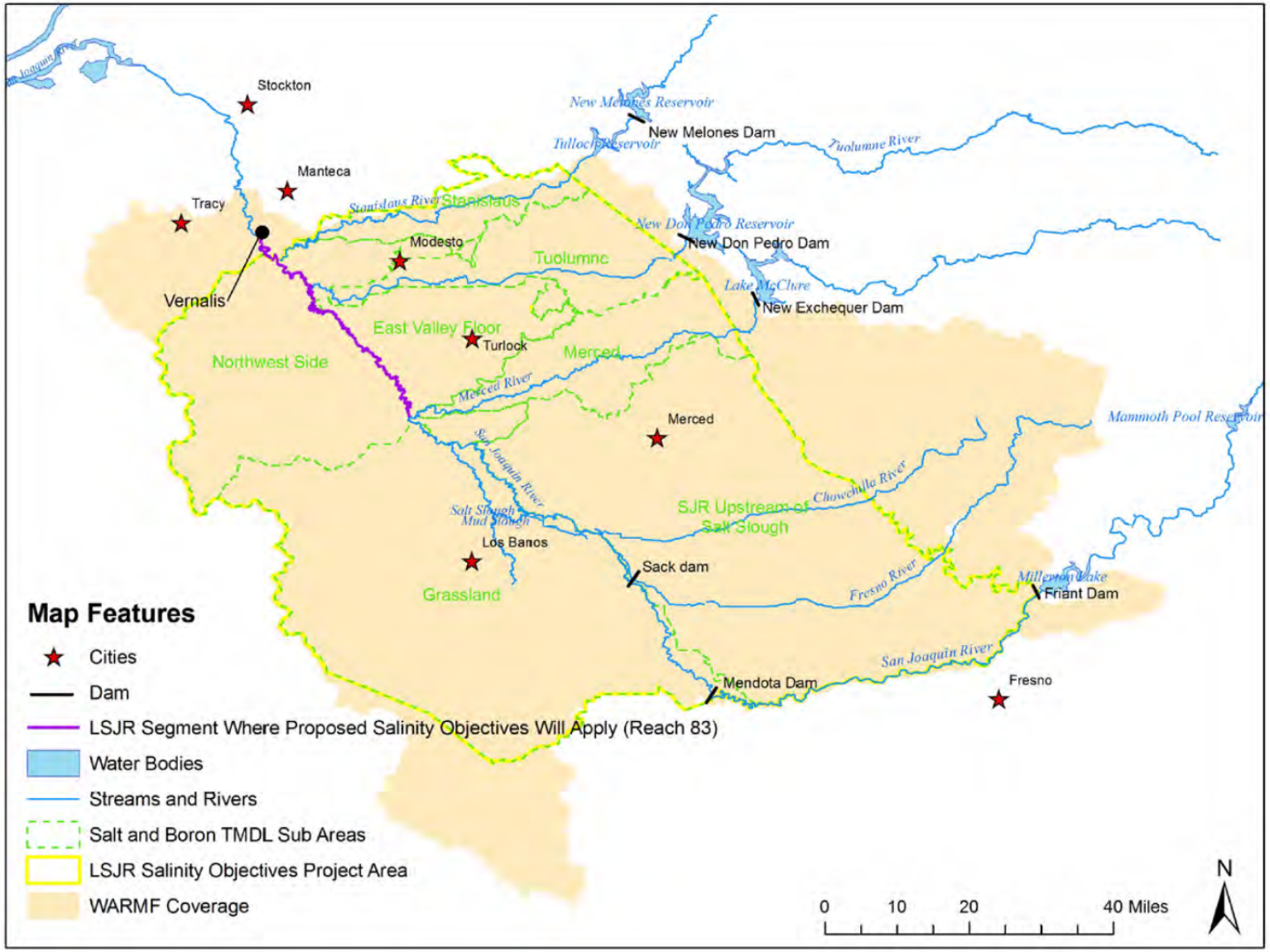
- Larry Walker Associates (LWA). (2014a). *Development of a Basin Plan Amendment for Salt and Boron in the LSJR, Task 2a: Compile and Update Water Quality and Salt Loading Data* (27 pages)

- Larry Walker Associates (LWA). (2014c*). Development of a Basin Plan Amendment for Salt and Boron in the LSJR, LWA Task 2a Addendum* (4 pages)

- Larry Walker Associates (LWA). (2014d*). Development of a Basin Plan Amendment for Salt and Boron in the Lower San Joaquin River, Summary of Work Completed: Tasks 2, 3, and 8b*(73 pages)

- Larry Walker Associates (LWA). (2015). *Development of a Basin Plan Amendment for Salt and Boron in the Lower San Joaquin River, Task #4 – Implementation Planning for Proposed Salinity Objectives* (73 pages)

Figure 1: Overview map of Lower San Joaquin River Project Area



Attachment 2 - Revised

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS TO ESTABLISH SALINITY WATER QUALITY OBJECTIVES IN REACH 83 OF THE SAN JOAQUIN RIVER.

Description of Scientific Basis for the Proposed Amendments to be addressed by Peer Reviewers

The statutory mandate for external peer review (Health and Safety Code section 57004) states that the reviewer's responsibility is to determine whether the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices.

We request that you make this determination for each of the following findings and conclusions that constitute the scientific portion of the proposed regulatory action. An explanatory statement is provided for each finding or conclusion to focus the review.

Peer review is required for elements that are not based on previously peer-reviewed science. Policy decisions by the Central Valley Water Board are not elements that require peer review. Central Valley Water Board staff has identified in Section A below three specific conclusions for scientific peer review comment on the proposed Basin Plan amendments. Full context will be obtained by the reviewer by reading relevant sections of the Staff Report and its supporting documentation. Selected references that support the conclusions are provided for this review.

The discussion following each conclusion references the most relevant section of the Staff Report for the discussion. Findings and conclusions in the Staff Report include the citation to the reference source.

A. Scientific peer review conclusions:

1. **Data generated by the WARMF watershed modeling tool was appropriate to:**

   - **Evaluate water quality changes in the LSJR under different implementation management actions.**
   - **Predict the attainment of the proposed WQOs with the implementation of the planned management actions**
   - **Identify the potential for lower salinity concentrations (the proposed Performance Goal) with the implementation of the planned management actions for certain seasonal and water year types**

   LSJR Committee concluded that the WARMF tool is adequate to model changes in EC water quality in the Lower San Joaquin River under different implementation management strategies. The committee also concluded that the WARMF simulation of EC water quality at Crow Landing and Maze Road under the preferred implementation option ("Planned Bundle") supports attainment of the proposed EC WQO of 1,550 µS/cm as a maximum 30-day running average. However, the significant level of WARMF model uncertainty provides less confidence that a level of 1,350 µS/cm is attainable. The LSJR Committee concluded that the model results of the "Planned Bundle" support the potential attainment of this value during certain seasonal and water year types,

therefore, promoting a 1,350 µS/cm EC Performance Goal during these time periods promotes achievement of the best possible water quality under variable conditions.

A watershed modeling tool called WARMF, which stands for Watershed Analysis Risk Framework, was used to simulate salt loading in Reach 83 based on historic conditions (Draft Staff Report, Chapter 5). The model was further used to evaluate the ability of different implementation management strategies to meet the proposed salinity WQOs. Results from the watershed modeling analyses indicated that salinity concentrations would be lower than the proposed objectives in some situations, which led the LSJR Committee to recommend including an EC implementation performance goal (Performance Goal) of 1,350 µS/cm as a 30-day running average, relative to certain seasonal and water year considerations (Draft Staff Report, Chapter 6). The Performance Goal would also be dependent on the completion of currently proposed management actions.

The WARMF model is a tool that supports the watershed approach for the development and evaluation of water quality management alternatives. The WARMF model was identified by the LSJR Committee as the best readily available tool for generating the baseline salt loading analysis for the LSJR. The model was run using historical conditions to establish a “Baseline” model simulation, upon which later implementation model simulations could be screened and compared.

Historical ambient water quality data at key locations within Reach 83 of the LSJR were evaluated using WARMF to characterize water quality on the basis of month, season, and water year type for the water years 1977 through 2013. Historic 30-day running average EC levels measured at the Maze Road and Crows Landing-Patterson locations showed improved water quality starting in 1995 with the implementation of the Grassland Bypass Project (GBP). The GBP systematically reduces salt loading from 90,000-acres of commercial farmland to the LSJR with zero discharge scheduled by 2019. With consideration that the operational conditions and water quality of the LSJR differ from pre-GBP and post-GBP, subsequent WARMF model simulations focused on the 1995-2013 time period.

A “Baseline” WARMF model simulation was run using the 1995-2013 historic conditions, followed by model simulations to predict the impact of different management or implementation actions on salinity concentration in the river. Rates of compliance with a range of EC salinity criteria in Reach 83 were evaluated, including the preferred alternative of 1,550 µS/cm as a maximum 30-day running average. WARMF model results of the preferred implementation option (“Planned Bundle”) indicate that key planned actions, most notably the discontinuation of agricultural drainage from the GBP in 2019, will result in ambient EC water quality within Reach 83 that does not exceed the proposed EC WQO of 1,550 µS/cm. In fact, the WARMF model showed EC levels remaining at or below 1,350 µS/cm in Reach 83, particularly in water year types with more rainfall. While these results suggest that the river may achieve an EC level in the future that is lower than the proposed EC WQO of 1,550 µS/cm, the LSJR Committee concluded that the level of uncertainty inherent in the WARMF model at Crows Landing is too large to support pursuing an EC WQO that is lower than the 1,550 µS/cm maximum 30-day running average value derived by the Hoffman model for the protection of irrigated agriculture. (Draft Staff Report, Chapter 5).

The WARMF model results for the preferred "Planned Bundle" implementation option guided the LSJR Committee's recommendation to use the 1,350 µS/cm maximum 30-day running average value as a Performance Goal during certain months and water year types, which would promote a higher level of water quality, when possible, for agricultural crops during the irrigation season. Table 1 below summarizes when the Performance Goal would apply (in concurrence with the proposed EC WQO of 1,550 µS/cm) for different seasonal and Water Year types (excluding years that are part of an Extended Dry Period).

Table 1: LSJR Reach 83 Performance Goal (PG) for Seasonal and Water Year Considerations (µS/cm) during Non-Extended Dry Periods.

Water Year Type	Irrigation Season		Non-irrigation Season
	March – June	July - September	October - February
Wet	**1,350 (PG)** & 1,550 (WQO)		1,550 (WQO)
Above Normal	**1,350 (PG)** & 1,550 (WQO)		1,550 (WQO)
Below Normal	**1,350 (PG)** & 1,550 (WQO)	1,550 (WQO)	
Dry	**1,350 (PG)** & 1,550 (WQO)	1,550 (WQO)	
Critical	1,550 (WQO)		

Although an exceedance of the Performance Goal could trigger additional management actions, the Performance Goal differs from a WQO because an exceedance of the Performance Goal would not imply that beneficial uses were being impaired. The LSJR Committee recommended a monitoring and surveillance program, using key monitoring sites in Reach 83 of the LSJR, to evaluate the attainment of the EC Performance Goal and WQOs. If monitoring results indicate that the water quality in the LSJR is elevated above the Performance Goal during the periods specified on Table 1, the committee recommended that the Central Valley Water Board staff evaluate reasons why the Performance Goal was not being met. Such action may include staff requesting reports from dischargers and other stakeholders regarding their salinity management actions and related activities. In addition, the LSJR Committee recommended a re-opener to the Basin Plan Amendment in ten years to determine if the planned implementation actions have resulted in ambient river EC water quality less than 1,550 µS/cm as modeled. As such, the EC WQOs and Performance Goal can be re-evaluated at that time.

We are requesting scientific peer review of the use of the WARMF model to support staff conclusions.

In addition to the Draft Staff Report's Chapters 4-7, the following documents, included in this package, support staff Conclusion 1:

- Larry Walker Associates (LWA). (2014a). *Development of a Basin Plan Amendment for Salt and Boron in the LSJR, Task 2a: Compile and Update Water Quality and Salt Loading Data* (27 pages)

- Larry Walker Associates (LWA). (2014c*). Development of a Basin Plan Amendment for Salt and Boron in the LSJR, LWA Task 2a Addendum* (4 pages)

- Larry Walker Associates (LWA). (2014d*). Development of a Basin Plan Amendment for Salt and Boron in the Lower San Joaquin River, Summary of Work Completed: Tasks 2, 3, and 8b*(73 pages)

- Larry Walker Associates (LWA). (2015). *Development of a Basin Plan Amendment for Salt and Boron in the Lower San Joaquin River, Task #4 – Implementation Planning for Proposed Salinity Objectives* (73 pages) Appendix B includes information on Model Uncertainty.

2. **It was appropriate to utilize the conservative, steady-state soil salinity Hoffman Model to calculate ranges of protective salinity criteria for irrigated agriculture in the Lower San Joaquin River Basin and work with local irrigators to determine appropriate parameter inputs to the model.**

   The Hoffman Model is based on a conservative steady-state soil salinity analysis and comparison to published crop salt tolerance data, with the use of parameters for crop yield, precipitation, irrigation water salinity and leaching fraction. Hoffman's methodology and model underwent scientific peer review in 2011 through the State Water Resources Control Board as part of a technical report for the Delta (Hoffman, 2010). Hoffman received overall support for his approach and conclusion of an irrigation water salinity range that would be reasonably protective of agricultural beneficial uses in the southern Delta. Hoffman's steady-state soil salinity model was similarly applied in this effort using information specific to the LSJR irrigation use area. To support the reasonable protection of irrigation supply water, parameter inputs to the model (including crop yield, crop type, leaching fraction, precipitation amount) were derived from policy decisions made by CV-SALTS and the LSJR Committee after vetting with local irrigators.

   The Central Valley Water Board's report on the salt tolerance of crops in the Lower San Joaquin River (Central Valley Water Board, 2016b) applied the same approach as Hoffman's work in the Delta, and looked at existing data and information (including soil data, salinity and drainage impairment, crop types and acreages, crop salt-sensitivity data, and evapotranspiration values) to evaluate the salinity status of the LSJR irrigation use area. As part of a CV-SALTS and LSJR Committee policy decision, it was decided that sensitive crops that are relatively rare should not drive analyses that will inform AGR thresholds. Instead, consideration should be given to crops that make up greater than 5 percent of the acreage in an irrigation use study area. This value was deemed appropriate to encompass "common crops" that are sufficiently widespread in a study area (Draft Staff Report, Chapter 5). Land use data in the LSJR Irrigation Area was evaluated again in 2014 and, based on these results, almonds were selected as the most salt sensitive crop requiring protection in Reach 83 of the LSJR (Draft Staff Report, Chapter 5).

   The specific parameter values established to provide reasonable protection of agricultural beneficial uses were derived from the following CV-SALTS and LSJR Committee policy decisions (Draft Staff Report, Chapter 5):

Crop yield of 95 percent during a 5th percentile precipitation year (a 1 in 20 dry year) using 15 percent leaching fraction.

An EC value of 1,550 µS/cm was derived as reasonably protective of almond crops in the Lower San Joaquin River study area using the Hoffman Model. To remain consistent with the WQOs and sampling regimes established in the San Joaquin River at Vernalis for the protection of agricultural beneficial uses of water entering the Delta, the LSJR Committee recommended using the same water quality compliance period of a maximum 30-day running average of mean daily electrical conductivity for Reach 83 of the LSJR (State Water Board, 2000).

After working with local irrigators, the LSJR Committee recommended alternative salinity WQOs for the protection of AGR during Extended Dry Periods (definition provided in Draft Staff Report, Chapter 6) with the use of the following parameter values in the Hoffman steady-state soil salinity model:

Crop yield of 75 percent during a 5th percentile precipitation year using 15 percent leaching fraction.

The reduction of crop yield from 95 to 75 percent was considered by local irrigators and the LSJR Committee as reasonable protection of agricultural beneficial uses under the environmental conditions of an Extended Dry Period when agricultural producers value water quantity over water quality to maintain a viable operation (i.e. keep tree crops alive).

Using these parameters in the Hoffman Model, the reduction in crop yield percentage to 75% results in an EC value of 2,470 µS/cm. The LSJR Committee did not recommend any change during an Extended Dry Period to the compliance period of a maximum 30-day running average for the protection of AGR.

In addition to the Draft Staff Report's Chapters 5-6, the following documents, included in this package, support staff Conclusion 2:

- Central Valley Water Board. (2016b). *Revisions to the 2010 Salt Tolerance of Crops in the Lower San Joaquin River (Merced to Stanislaus River Reaches) and 2016 Addendum* (306 pages)

- Hoffman, Glenn J. (2010). *Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta* (137 pages)

3. Based on recent trend data, it is reasonable to expect that the proposed EC WQOs will be protective of the boron WQOs in the Lower San Joaquin River and that proposed implementation provisions will ensure long-term attainment of the boron WQOs.

Based on recent water quality trend data, including data collected during the 2015 and 2016 drought and when the GBP was not discharging, Central Valley Water Board staff conclude that the establishment of an EC WQO of 1,550 µS/cm as a maximum 30-day running average, with adjustments for Extended Dry Periods, should not cause the

boron WQOs to be exceeded in the LSJR when the GBP is completed. Staff also concludes that implementation of a monitoring and surveillance program to track boron concentrations in the LSJR and a re-opener of the Basin Plan Amendment ten years after adoption to assess water quality conditions will ensure long-term attainment of the Boron WQOs.

During the development of the salt and boron TMDL in 2004, a positive correlation ratio between the EC values and boron concentrations in the LSJR showed that the boron concentrations in the river would not impair the AGR beneficial use as long the Vernalis EC WQOs were not exceeded (Central Valley Water Board TMDL Staff Report Section 4.4.1, 2004). Boron inputs to the river have since been shown to be largely influenced by discharge from the Grasslands Bypass, which is dominated by ground water. As discharges from the Grasslands Bypass Project into the LSJR via Mud Slough have decreased, so too have overall boron concentrations in the LSJR at Crows Landing, even during periods when EC measurements remained above 1,000 µS/cm. Data collected in more recent years indicate that the implementation of the 1,550 µS/cm EC WQO will not negatively impact the attainment of the boron WQOs that are currently listed in the Basin Plan. There is less data available for boron concentrations during Extended Dry Periods, however some recent information collected during the 2015 and 2016 drought and during periods when the GBP was not discharging, continue to show boron objectives being met (Draft Staff Report, Appendix C)

The monitoring and surveillance program for this Basin Plan Amendment requires an evaluation of boron concentrations in addition to EC measurements (Draft Staff Report, Chapter 7). The re-opener to the Basin Plan Amendment in ten years following adoption will be an opportunity to evaluate the long-term attainment of the boron WQOs in the LSJR and adjust implementation activities as warranted (Draft Staff Report, Chapter 6). We are asking for scientific peer review of the boron water quality analysis presented to support this strategy.

The Draft Staff Report's Chapters 6-7 and Appendix C are the primary supporting documents for this item.

B. <u>The Big Picture</u>

Reviewers are not limited to addressing only the scientific issues presented above, and are asked to contemplate the broader perspective.

(a) In reading the staff technical reports and proposed implementation language, are there any additional scientific issues that are part of the scientific basis of the proposed rules not described above? If so, please comment with respect to the statute language given above.

(b) Taken as a whole, is the scientific portion of the proposed rule based upon sound scientific knowledge, methods, and practices?

Reviewers should also note that some proposed actions may rely significantly on professional judgment where available scientific data are not as extensive as desired to

support the statute requirement for absolute scientific rigor. In these situations, the proposed course of action is favored over no action.

The preceding guidance will ensure that reviewers have an opportunity to comment on all aspects of the scientific basis of the proposed Board action. At the same time, reviewers also should recognize that the Board has a legal obligation to consider and respond to all feedback on the scientific portions of the proposed rule. Because of this obligation, reviewers are encouraged to focus feedback on the scientific issues that are relevant to the central regulatory elements being proposed.

Attachment 3

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS TO ESTABLISH SALINITY WATER QUALITY OBJECTIVES IN REACH 83 OF THE SAN JOAQUIN RIVER.

Individuals Involved in Development of this Basin Plan Amendment

Adam Laputz, Central Valley Water Board
Amanda Carvajal, Merced County Farm Bureau
Andy Safford, EKI
Anne Littlejohn, Central Valley Water Board
Bobby Pierce, West Stanislaus Irrigation District
Brandon Nakagawa, San Joaquin County
Brooke Bradshaw, US Rep. Jeff Denham
Chester Anderson, East and West Stanislaus Resource Conservation Districts
Craig Moyle, MWH Americas, Inc.
Dan Roberts, Twin Oaks Irrigation District
Dan Steiner
Daniel Cozad, CV-SALTS
Danielle Moss, Larry Walker and Associates
Daron McDaniel, US Rep. Jeff Denham
David Cory, San Joaquin Valley Drainage Authority
Debbie Webster, Central Valley Clean Water Association
Debra Liebersbach, Turlock Irrigation District
Dennis Westcot, San Joaquin Tributary Authority
Diana Waller, USDA - NRCS
Diane Madsen, San Joaquin Valley Drainage Authority
Erich Delmas, City of Tracy
Ernest Taylor, California Department of Water Resources
Gabriel Delgado
Gail Cismowski
Jamie Meek, East Stanislaus Resource Conservation District
Jamil Ibrahim, MWH Americas, Inc.
Jeanne Chilcott, Central Valley Water Board
Jennifer Watts State Water Resources Control Board
Jim Brownell, Central Valley Water Board
Jobaid Kabir, US Bureau of Reclamation
Joe McGahan, San Joaquin Valley Drainage Authority
Joe Tapia, California Department of Water Resources
Joel Herr, Systech Water Resources
John Beam, Grassland WD/RCD
John Clancy, San Joaquin Tributary Association
John Dickey, Plantierra
John Herrick, South Delta Water Agency
Jose Faria, California Department of Water Resources
Karen Ashby, Larry Walker and Associates
Karna Harrigfeld, Stockton East Water District
Kevin Padway, US Rep. Jeff Denham
Larry Lindsey, State Water Resources Control Board
Lisa Beutler, MWH Americas, Inc

Mark Gowdy, State Water Resources Control Board
Michael Mosley, US Bureau of Reclamation
Mike Johnson, LSJR Committee Manager
Mike Trouchon, Larry Walker and Associates
Mona Shulman, Pacific Coast Producers
Nigel Quinn, Lawrence Berkeley National Laboratory - US Bureau of Reclamation
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Roberta Howe, California Department of Water Resources
Roberta Larson, Wastewater Association
Roberta Tassey, US Bureau of Reclamation
Shawn Carmo, Grassland Water District
Sherman Boone, East Stanislaus RCD
Tess Dunham Wastewater Association/Ag industry
Thaddeus Hunt, State Water Resources Control Board
Tom Grovhoug, Larry Walker and Associates

Attachment 4

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS TO ESTABLISH SALINITY WATER QUALITY OBJECTIVES IN REACH 83 OF THE SAN JOAQUIN RIVER.

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