Technically-related Comments

Comments received from United States Bureau of Reclamation, City of Tracy, Central Valley Clean Water Association, Ecologic Engineering, San Joaquin River Group Authority

Comment Category	Matrix #	Author	Comment	Comment Responses
Models	18	Central Valley Clean Water Association	"Therefore, the final report should clearly separate the two major recommendations: the first being the recommended model for use in the State Water Board's current revaluation of salinity objectives, and the second being the additional study and investigation required to address uncertainty of model inputs and the validity of alternate models to determine the most appropriate models for evaluating salinity objectives."	Refer to CV-SALTS
	20	Central Valley Clean Water Association	"CVCWA is concerned with the levels of conservatism that may be embodied in the final model. It is entirely appropriate to review the available information to develop the model inputs and select appropriately conservative values."	Refer to CV-SALTS
	21	Central Valley Clean Water Association	"Finally, the use of a steady state model over a transient model will result in a conservative salinity objective for equivalent inputs. CVCWA recommends adding a list of the conservative assumptions made in selecting model parameters, so there will be confidence that the modeled result will be protective of the irrigation use with out being needlessly stringent."	Ultimate model selection to develop WQO is outside the scope of this Report but it's an issue that the CV-SALTS committee can evaluate further
	24	Central Valley Clean Water Association	"The transient modeling approach should be utilized in the evaluation of the salinity objective. Information listed in the Hoffman Report and presented at the August 13, 2009 workshop point toward the ability of transient models to accurately replicate irrigation practices and crop responses to more robustly calculate the proper salinity objective. The steady state models calculate more conservative salinity requirements due to the fact that they cannot account for the natural variations that occur in the growing cycle. In the event the State Water Board determines the use of a steady state model is appropriate for the current salinity objective evaluation, the specific model should be carefully selected."	The Draft Report was only intended to present modeling results from a steady-state model. This is an issue that CV-SALTS can pursue further.
	26	Central Valley Clean Water Association	"...it seems appropriate to clearly define why the recommended model is selected and why other models were not selected."	This report was only intended to present results from a steady state model, not to make a final decision about what model should be used to develop a new WQO
Leaching Fractions	9	United States Bureau of Reclamation	"Using [the data in Section 3.13.2] to calculate leaching fraction and to draw conclusions about irrigation management is a premature. Given the uncertainty in the leaching factor assumption, and the significance of this assumption in determining water quality objectives, CVSC should consider funding studies to reduce this uncertainty."	The additional studies suggested here would have to approved/coordinated with CV-SALTS

Leaching Fractions (cont.)	59	San Joaquin River Group Authority	A portion of the modeling is done with unrealistic assumptions regarding leaching. The study uses leaching fractions of 0.10 or less for modeling production of almonds and alfalfa. A leaching fraction of 0.10 or less is impossible to achieve without very sophisticated irrigation technology that is presently not available in the study area.	Comment Noted. A given party could use leaching fractions that are applicable for their site specific conditions using the current model framework. However, choice of leaching fractions is a policy call that needs to be decided within the CV-SALTS initiative for further Regional Board consideration (See Section 6.2.1)
	63	San Joaquin River Group Authority	**Actual leaching fractions may be higher than assumed:** The Study Report needs to take a closer look at actual leaching fractions (LF) in Western Stanislaus County. The tile drainage data presented in the Study Report shows that it may be 25% or higher and this is consistent with findings in the South Delta. Unfortunately the data upon which this conclusion is based is not a valid data set and the SJRGA is recommending the use of additional data that is in the Regional Board files. This new data will likely show that these high leaching fractions do exist as a result of present irrigation practices.	Comment noted. Staff appreciates efforts taken by SJRGA to share additional data sources for the tile drainage analysis. Additional data provided by the SJRGA was analyzed independently and compared to data from the Chilcott et al 1988 study. It should also be noted that not all data provided by the SJRGA was used, only drains within the LSJR Use Area were considered. Considering irrigation water salinity of 0.59 ds/m, average leaching fractions from the SJRGA data set was 0.22, the Chilcott study was 0.29 and when both data sets were pooled together the leaching fraction was 0.24. This additional analysis is attached as Attachment 1 to the Draft Report.(Could be pursued further by CV-SALTS)

Leaching Fractions (cont.)	66	San Joaquin River Group Authority	Water management practices for dry bean production will not change as water conservation measures are introduced: One of the factors of that will need to consider in reviewing the water quality objectives for Lower San Joaquin River is the State mandate for increased water conservation by both urban and agricultural users. Mandated water conservation needs will not likely change the water management practices for dry bean production. The present production returns on dry beans will not allow the level of investment needed for improved irrigation practices. As dry beans are planted for various reasons, including soil fertility improvement, it is unlikely that farmers will switch to a higher income cropping pattern. It is unlikely that water conservation will significantly change the leaching fraction. The primary reason is the continued need to pre-irrigate and the continued use of furrow irrigation. In water conservation efforts, the first and easiest water losses to control are those of surface water runoff. As these are a big component of the irrigation practices in Western Stanislaus County, they are likely to be the first to be controlled. This will leave deep percolation in the same range as it is now, in the range of 20-25%. This is the leaching fraction that should be assumed in future modeling when water conservation is assumed to occur.	Refer to CV-SALTS
	92	San Joaquin River Group Authority	Page 96, Alfalfa Write-up. The analysis shows that at no time would a yield loss occur at .15 LF even under the most extreme conditions and EC levels near 2.0 dS/m. This is consistent with the production practices in the Imperial Valley of California where similar conditions exist and no yield losses occur. There is extensive discussion however about high evaporative demand and not being able to get enough water into the soil to meet both ET and LF. This does occur during short periods in the hottest summer periods but stored soil water normally meets all crop demands during this period. The impact of salinity is not short-term; it is a buildup of salts over a season or several seasons. This does not occur in the San Joaquin Valley due to soil conditions and irrigation practices. The alternative LFs of .07 and.10 are unreasonable and unachievable with present technology and irrigation practices in the San Joaquin Valley. LF is likely to be closer to 0.20 and should have been included in the modeling effort results presented in Table 6.1.	The current model framework allows for choice of different leaching fractions based on site specific conditions.
	92	San Joaquin River Group Authority	We recommend that the .20 LF model results be presented in Chapter 6 as a large portion of the alfalfa is grown on or near the high water table lands in the LSJR area. Table 3.10 shows that these lands are well drained and likely to have LF closer to .20 than to .07.	The current model framework allows for choice of different leaching fractions based on site-specific conditions

Planting and Harvesting Dates	57	San Joaquin River Group Authority	Dry beans are not planted before the first weeks of May yet they are assumedto be planted as early as April 1st.	Page 86, Table 5.3: The Report acknowledges that there are three possible planting dates with corresponding crop coefficients for the San Joaquin Valley. One of the example planting dates is May 1st as shown in Table 5.2. In addition, model output scenarios (exponential distribution) associated with each of the three planting dates at three varying leaching fractions are given in Table 5.3. Moving forward, CV-SALTS could choose any of the suggested dates as they see fit.
	89	San Joaquin River Group Authority	Page 74, Third Paragraph. This assumes that the first cutting of alfalfa occurs by March 13th. This needs to be confirmed with the growers in the area as this seems very early for this growing area. An early date like this may be applicable to the Southern San Joaquin Valley, but not here. It is unlikely also that any irrigations would take place prior to the middle of March as the ground is still wet from the winter and putting on additional irrigation water at this time would delay the soil warming up from the winter period and this is most important to an alfalfa grower.	Comment Noted. Staff endeavored to follow a similar approach to Dr. Hoffman based on dates given by Goldhammer and Snyder, 1989. As noted by the commenter, additional information from alfalfa growers could be helpful and can be pursued should CV-SALTS consider it necessary.
	90	San Joaquin River Group Authority	Page 74, Fourth Paragraph. The dates for almond production need to be confirmed with growers on the Westside of the San Joaquin River. An almond tree begins to shut down with the onset of short days and colder night time temperatures. The largest change in night time lows occurs in October and it could be assumed that little crop growth or water use would occur after October 15th. It is also unlikely that an almond grower would irrigate his trees prior to the first two weeks of April. Because of winter rains and cold soil temperatures, irrigating prior to this time may cause root oxygen stress that could cause fruit drop or fruit delay due to the cold soil temperatures. It takes a wet soil much longer to warm up than one that is dryer. While you can define the growing season (and it does vary from year-to-year), you need to focus the steady-state modeling on the irrigation season which will normally not start until April 1st and will likely end by October 15th even though growth will be occurring outside that period. The irrigation period is when San Joaquin River water may be used.	Comment Noted. Staff endeavored to follow a similar approach to Dr. Hoffman based on dates given by Goldhammer and Snyder, 1989. As noted by the commenter, additional information from almond growers could be helpful and can be pursued should CV-SALTS consider it necessary. Staff notes that modeling of alfalfa presents a bigger challenge than bean or almond due to the numerous harvest cycles. Consultant with Dr. Hoffman may be necessary should CV-SALTS want to pursue this further.

Soil Water Uptake Patternw	25	Central Valley Clean Water Association	"Because of the demonstrated large variability in ability to replicate validation tests (depending on conditions, either greatly overestimating or greatly underestimating salinity requirements), the 40-30-20-10 model used in the Ayres and Westcott United Nations work does not appear as well suited to determine the salinity objectives in the southern Delta as the exponential model developed by Hoffman and van Genuchten, which replicated the validation data reasonably well. All parameters for the recommended model should be tabularized in the report, including the recommended values for the parameters specific for the critical crops in the southern Delta."	In Section 5.2, the results from both uptake models are presented in the Report. An additional tabular presentartion of results from the exponential model is presented in Table 6.1 (Pg. 122)
	65	San Joaquin River Group Authority	The SJRGA supports the development of a transient model for evaluating the crop tolerance of crops in Western Stanislaus County but in the absence of a valid transient model, the Study Report should recommend the use of the exponential steady state model over the 40-30-20-10 steady-state model. The 40-30-20-10 model does not represent the present state of knowledge regarding crop water uptake and would only compound the Study Report shortcomings since present crop tolerance data used in the model is over 50 years old.	The study Report recommends use of the exponential model (See Section 6.2.1)
Temporal Scale	74	San Joaquin River Group Authority	Page 5, Final Paragraph describes a figure on water quality for a series of years. It would be more helpful if this analysis was conducted by water year types to see whether the water quality differences shown are related to the water year type. This would require a larger data set than used here.	Page 5, Final Paragraph: Comment Noted. Staff endeavored to follow a similar approach to Dr. Hoffman which was by calendar year. As noted by the commenter, consideration of water year could be helpful and can be pursued should CV-SALTS consider it necessary.
	76	San Joaquin River Group Authority (cont.)	Page 8. It would be helpful if a similar presentation could be done based on water year types as the cropping pattern likely also varies by water year type.	Comment Noted. Staff endeavored to follow a similar approach to Dr. Hoffman which was by calendar year. As noted by the commenter, consideration of water year could be helpful and can be pursued should CV-SALTS consider it necessary.

Spatial Scale	78	San Joaquin River Group Authority	Page 17, Third Paragraph. There is no reason to spend additional time on developing the information for San Joaquin County as it makes up less than 2% of the total area.	Page 17, Third Paragraph: This Report addresses only the protection of one beneficial use agriculture (irrigation) of the many listed in the Basin Plan for the LSJR. Protection of each of the beneficial uses must be evaluated as part of the development of site specific water quality objectives. Thus irrespective of it's small size, adequate information needs to be developed for San Joaquin County not to inadvertently overlook any vital issue.
Cropping Patterns	79	San Joaquin River Group Authority	Page 18, Final Paragraph. The discussion shows an 8% decline in moderately sensitive crops and an 8% increase in moderately tolerant crops in 2000. In looking at the data in the table, you need to be careful in making too many interpretations from only two surveys. In 2000, the tomato processing plants were shifting to overseas and there was a serious reduction in tomato production. This may account for the changes in cropping patterns when only looking at two distinct years. The tomato production has since recovered in California. It may have been more helpful to look at the crop production figures complied by the individual water districts as these are done annually. To keep the amount of effort in perspective, the SJRGA recommends this be done for the three crops analyzed in this report.	Page 18, Final Paragraph: Comment Noted. Staff endeavored to follow a similar approach to Dr. Hoffman. However, as noted by the commenter, should CV-SALTS consider it necessary, further data could be solicited from individual water districts.
	80	San Joaquin River Group Authority	Page 26, First Full Paragraph. This same comment applies here. This decision may be based on economics, water supply availability and a variety of other factors none of which may be related to water quality. This is the short comings of using a survey that was only conducted once every ten years.	Comment Noted. Staff endeavored to follow a similar approach to Dr. Hoffman. However, as noted by the commenter, should CV-SALTS consider it necessary, further data could be solicited from individual water districts.
	81	San Joaquin River Group Authority	Page 28, First Full Paragraph and Figure 3.5b on page 31. The reduction in dry beans could be related to tomato prices, water availability or a number of factors. It is doubtful that it was related to water quality as bean production like many field crops in the Westside is cyclic and primarily based on economics, not water quality. Again this is the difficulty of using two surveys which were often conducted ten years apart.	Refer to CV-SALTS

Effective Rainfall	61	San Joaquin River Group Authority	Winter Rainfall assumptions used in crop models are extremely conservative: Effective rainfall is assumed to be part of crop ET while in reality it also plays a major role in salinity control in any Mediterranean climate. This role of effective rainfall during the winter irrigation season has been left out of the report. This analysis needs to be conducted and the impact of winter rains on leaching and salt control needs to be fully evaluated. The lack of this analysis further validates the need for development of a transient model	In the model, effective rainfall is not assumed to be part of crop ET. Effective rainfall is a function of growing season precipitation, non-growing season precipitation less the bare soil evaporation. Crop ET is a product of the crop coefficient and reference evaporation. As illustrated in Table 5.1, the model computes (for both exponential and 40-30-20-10) "I2" which is the amount of irrigation required to maitain a given leaching fraction, considered in this computation is the crop ET and effective precipitation. Hence, the role of effective rainfall during the winter irrigation season was not left out of this Report. (can be pursued further by CV-SALTS)
Factors Influencing Effective Rainfall	55	Ecologic Engineering	"Page 79 Section 5.1.4 -- Surface evaporation would be reduced when soil surface is dry and there is no precipitation (i.e. August, September, and potentially October), which would increase Peff and decrease the resultant soil salinity. Bypass flow and surface (or sub surface) run off would reduce Peff and increase soil salinity."	Comment Noted. The scenarios mentioned by the commenter are feasible but may require doing some modifications to the steady state model to investigate their occurrence. Should CV-SALTS want to investigate this further, it's advisable to contact Dr. Glenn Hoffman before any Steady State Model modifications are performed.
Factors Influencing Effective Rainfall	60	San Joaquin River Group Authority	Estimate of effective rainfall using soil evaporation rates that do not reflect reality during the winter period.	Page 48, Figure 3.11: Comment Noted: Soil evaportation is function of the crop coefficient and estimated bare soil evaporation and is a component of effective precipitation. CV-SALTS may modify soil evaporation rates to reflect reality during the winter period. However this would need modifications to the current model settings. Staff advises to contact Dr. Hoffman.

Pre-irrigation	58	San Joaquin River Group Authority	Need to verify and consider that present-day cultural practices include pre-irrigations, which minimize or eliminate any potential salinity impacts during germination and seedling emergence as well as greatly reduce salinity control throughout the growing season.	Comment Noted: This would need potential adjustments to current model settings. E.g. for the "I2" term: amount of irrigation required to maintain the leaching fraction (also accounts for precipitation:See Table 5.2), consideration has to be made to exisitng soil mositure conditions resulting from pre-irrigation. Staff advises further discussion with Dr. Hoffman before making model modifications.
Groundwater	50	Ecologic Engineering	"Page 59 Section 3.12.2 -- Well level data from the DWR is collected from wells with several purposes, and generally the wells are used for production. A production well will likely be screened at deeper interval than that associated with shallow groundwater. Therefore, data from these wells may not reflect the depth to shallow groundwater."	Page 59 Section 3.12.2: Groundwater basins throughout Northern California are monitored to determine water quality and related factors affecting beneficial uses. The DWR wells referenced in this study are not production wells. The DWR data source clearly states that the wells are for monitoring shallow groundwater. DWR conducts comprehensive assessments on a 3 to 4 year rotation to determine general chemical characteristics, including mineral, nutrient, heavy metal concentrations, organic and bacterial concentrations. Most of the sampled wells are either irrigation, stock, or domestic wells.

Groundwater (cont)	51	Ecologic Engineering (cont.)	"Page 64 Section 3.13.2 -- There is no discussion with respect to depth of groundwater (Figure 3-17) nor the design or depth of the drains."	Page 64 Section 3.13.2: There is no discussion with respect to depth of groundwater because the study that this Report relied upon (Chilcott et al, 1988) specifically noted that data on shallow groundwater was not reported since the focus of the study was to monitor only actively discharging subsurface tile drainage systems. The Chilcott study further notes that previous studies (Deverel et al., 1984) have shown that shallow groundwater quality is closely associated with the differing soils and topographic position in the basin, however, the data collected in their study was not analyzed for this association. Staff's review of the Chilcott study did not reveal details on drain designs or depth.
Soils	34	Ecologic Engineering	"Pages 13 - 16 Table 2.1. -- Moreover, for purposes relevant to soil salinity, limiting layer (slowest) saturated hydraulic conductivity should be reported."	Pages 13 - 16 Table 2.1: Comment Noted. However due to limited data range, SSURGO data base dos not provide data on limiting layer. There may be additional sources of data, but they may be difficult to integrate with the SSURGO data unless they are geo-referenced.

Soils (cont.)	36	Ecologic Engineering	"Page 34 Section 3.3.2 -- The depiction of saline and/or sodic soils appears to be a relic of the Soil Survey's used. Saline and sodic soils all occur in the Eastern Stanislaus Area Soil Survey, which was mapped prior to being published in 1964, and incorporated salinity classes into map units. The 1992 San Joaquin Soil Survey and 2002 Stanislaus County, Western Part Soil Survey did not incorporate salinity classes into the map units. The lack of salinity classes in the later survey's is largely attributable to high variability in the salinity of a soil series associated with irrigation water source and management (e.g. Fresno slightly saline vs. Fresno strongly saline, same soil different salinity) and to advances in surface water supply and engineered drainage in the area since the 1960's. Soil chemical data collected and provided with the later soil surveys should be reviewed to determine if there are potentially saline and/or sodic soils in this greater portion of the irrigation use area."	Page 34 Section 3.3.2: Soil chemical data collected and provided with the later soil surveys wasreviewed to determine if there are potentially saline and/or sodic soils in the greater portion of the irrigation use area as suggested by the commenter. However, since the information provided by NRCS is not geo-referenced, it's challenging to translate any specific information to the LSJR Irrigation Use Area.
	41	Ecologic Engineering	"Page 40 Section 3.4.2 -- Review of the coefficient of linear extensibility (COLE) for soils mapped in 1964 would allow for evaluation of shrink-swell potential."	Page 40 Section 3.4.2: Staff's initial assessment found that it was more appropriate to use the shrink-swell rationale provided by NRCS for Merced (1990), San Joaquin (1992) and Stanislaus (1992 and 2002). Staff found the Eastern Stanislaus Soil Survey for 1964 and review of this survey did not yield any information related to the COLE index. In addition, Staff's ability to relate any information to the LSJR Irrigation Use Area would be limited since this data is not geo-referenced. However, this is an issue that CV-SALTS can take for further investigation to verify shrink-swell soils in the Irrigation Use Area.

Soils (cont.)	43	Ecologic Engineering (cont.)	"Page 40 Section 3.4.2 -- Shrink-swell and bypass flow are a major process affecting water movement in the use area and needs to be addressed with respect to irrigation and soil salinity management. There is potential that high shrink-swell potential soils may require increased leaching fractions when compared to low shrink-swell soils to allow for leaching salts from the entire root zone. However, bypass flow in soil cracks may actually be beneficial to controlling soil salinity (see Crescimanno and Garofalo, 2006. Soil Science Society of America Journal 70: 1774-1787)."	Page 40 Section 3.4.2: Comment Noted. Addressing high shrink-swell soils through increasing leaching fractions for the LSJR Irrigation Use Area when compared to low shrink-swell soils to allow for leaching of salts from the entire root zone is a major decision that CV-SALTS could address as is necessary.
	45		"Page 46 Section 3.5.2 -- Based on widespread shrink swell potential in the use area, there is great potential that initial rainy season storms will be largely ineffective in providing moisture to the root zone. Additionally, high clay content and low hydraulic conductivities of the soils may increase surface runoff and reduce effective precipitation. Further, subsurface drains may remove precipitation that would otherwise be stored in the root zone. Figure 3.11 shows at least five years where Png is below the Es, and several years have Png below 10 inches, the level necessary to reduce irrigation requirement by 4 inches."	Page 46 Section 3.5.2: We don't have actual field soil moisture data available. Such data would be helpful in confirming the scenarios noted by the commenter. The scenarios given by the commenter are potentially feasible but site specific data would have to be collected to confirm them. CV-SALTS could follow up on these issues in case field studies are conducted in the LSJR Irrigation Use Area.
Follow-up Studies	18	Central Valley Clean Water Association	"Therefore, the final report should clearly separate the two major recommendations: the first being the recommended model for use in the State Water Board's current revaluation of salinity objectives, and the second being the additional study and investigation required to address uncertainty of model inputs and the validity of alternate models to determine the most appropriate models for evaluating salinity objectives."	Refer to CV-SALTS
Follow-up Studies	27	Central Valley Clean Water Association	"Additionally, the recommendation should clearly include: (1) additional studies necessary to provide confidence in other models or approaches, and (2) provisions for the objectives to be reconsidered when new information becomes available from the recommended studies and transient models or CV-SALTS, possibly through the triennial review process."	Refer to CV-SALTS

Follow-up Studies	56	Ecologic Engineering	"Page 123 Section 7 -- Additional future evaluations should include the following: 1. Field studies of bean should be accompanied by comparison of uptake models to determine if one more closely predicts bean water uptake. 2. Potential leaching fractions should be evaluated as well as actual leaching fractions in the LSJR area to determine possible potential salinity control measures. 3. The extent of subsurface drains in the LSJR area should be evaluated, since several soils could not be properly managed for salinity if artificial drainage was not provided. 4. Further, the effects of soil salinity management on LSJR salinity should be evaluated."	Page 123 Section 7: Section 6.2.1 of the Report notes that actual selection of a salinity threshold(s) protective of the agriculture (irrigation) beneficial use will involve a number of policy considerations some of which are mentioned by the commenter such as leaching fractions. In addition, to the degree that the requested studies go beyond date what is stated in the draft report, CV-SALTS and Regional Board staff may evaluate appropriateness of inclusion
Follow-up Study - Crop Tolerance Curves	64	San Joaquin River Group Authority	The study report is based on the 100%-yield potential defined by the 1977 Mass and Hoffman analysis that established crop tolerance curves for major crops. Unfortunately, the dry bean data used for this analysis is now over 50 years old and does not represent more salt tolerant varieties used today and is likely over conservative. It is recommended that the Study Report strongly advise against the continued use of these data and it recommend that a new curve be established for dry beans.	Comment Noted. In Section 7. "Next Steps", the Study Report recommends updated field studies for relevant cultivars of dry beans that span the entire bean growth cycle. The study Report can not recommend against the continued use of the 1977 Mass and Hoffman analysis with no current peer reveiwed study in place (with updated curves) that suggests otherwise.