

Attachment 9 – Response to Comments on the Salt and Nitrate Sources Pilot Implementation Study Draft Report

Comments received are list by the submitting entities. Responses to each comment are presented following the comment.

CENTRAL VALLEY SALINITY COALITION

General Comments and Recommendations

This first section provides general overarching comments on the draft report and includes most of our recommendations. The recommendations are provided in this section allow the team maximum flexibility to incorporate them. These comments either reflect CVSC technical review or may generalize or expand on comments provided in the Technical Committee Presentation Meeting.

1. **Comment:** A response summary should be an attachment to the report.

Response: Comments and associated responses will be included as an attachment to the final report.

2. **Comment:** The report would benefit from a conclusions section in Chapter 5 or elsewhere. It might identify:

- a. Goals from the workplan and the objectives of the study and how they were met
- b. Significance of the data and overall balance of the pilot areas
- c. Compare the pilot areas and their data and quality strengths and weaknesses
- d. Provide diagrams or graphics similar to Figure 2-2 that shows the values and overall balance of salts and nitrates for the three pilot areas.
- e. Consider using pie charts or other graphics to show the relative contributions of salt such as data provided in paragraph 1 on page 4-8 or Attachment Figure A2-14.
- f. Summarize the findings, conclusions and recommendations for the executive summary

Response: A Conclusions subsection will be added to Section 5 and to the Executive Summary sections of the final report. The subsections will address items a, b, and c above. Items d and e above (result graphics) will be added to the appropriate subsections of Section 4 and summary graphics will be added to the Executive Summary.

3. **Comment:** To the extent the team is capable, within the constraints provide an assessment of the level of “completeness” of the salt and nitrate characterization. Identify significant gaps if any for the recommendations.

Response: The level of completeness and significant data gaps will be addressed in the Executive Summary, Conclusions, and Recommendations subsections. Recommendations regarding filling of data gaps will be addressed in the Recommendation subsections. An

excerpt from text added to the ES on this point follows: “In summary, the goal of this work is to identify and assemble input data sets for available models, and then to use the models to quantitatively relate salt and nitrate sources and sinks within representative pilot study areas. Modeling of this kind is extremely sensitive to land cover (e.g., the distribution of impervious surfaces, irrigation and fertilization rates, salt loading, and plant community properties among analyzed catchments). Available data sources were combined to provide a level of land cover detail far in excess of any previously employed at this scale, at least with the widely used WARMF platform. The input data and modeling products therefore achieve the project goal and advance the work of CV-SALTS greatly. Recommendations for the most fruitful further refinements are based on results of the work.”

4. **Comment:** Reiterate the rationale for selection of the pilot areas from the workplan and then compare to what was accomplished.

***Response:** The introductory paragraphs for the subsection on Pilot Area Selection in Section 2 and for Attachment 3 on Pilot Area description will be expanded to include more discussion on the criteria used for pilot area selection and how the selections met the criteria.*

5. **Comment:** Expand the Executive Summary to include brief background on the study areas and perhaps a map of the Region with the areas indicated. Also expand the executive summary to include the important conclusions of the report. Move the (less than critical) recommendations to a conclusions and recommendations section.

***Response:** The Executive Summary will be expanded to include a brief background on the study areas and a regional map. The Executive Summary will be also be expanded to include a Conclusions subsection (see Comment No. 2)*

6. **Comment:** It may be beneficial for the Study team to make a presentation of the data from the full report in order to provide a complete comparison including the diagrams and graphics that may be added.

***Response:** The project team will present a summary of the report based the information in the Executive Summary at the March 11, 2009 TAC meeting.*

7. **Comment:** Recommend the final report include a section which identifies the following: (from a recommendation in the workplan review comments):
 - a. Data needed to characterize an area for salt and nitrate sources. As discussed in the meeting, the information needed to “fill the box” adequately to assure that any of the pilot area salt balance and sources are understood.
 - b. Generalized methodology should be presented between the objectives and the pilot study areas to help the reviewer understand why the various efforts are being undertaken in the pilot areas.
 - c. Once the generalized approach and data needs are stated, identify the sources of this data for the pilot areas and how the report fulfills the generalized approach.
 - d. Identify and outline the procedural steps used to ensure the data is appropriate for this study

- e. Identify how other data sources, especially those identified in the committee meeting on July 14 were included, used for corroboration, or not used in the study.

Response: *The generalized approach is spelled out in Section 2 and illustrated in Figure 2-1 of the report. The data needs are listed in Table 2-2 of the report and sources for these needs are listed in Table 2-3. Table 2-2 will be revised to indicate those data types that are essential and those data types that can be estimated to perform mass balances. A list of data sources with contact information and an indication of whether data were requested and received from the sources will be added as an attachment to the Report. A dot matrix table will be prepared that indicates data types need to characterize salt and nitrate sources and the relative availability of those data types for the three pilot areas.*

8. **Comment:** Comments in the Workplan also requested:

“Prepare an overview or non-technical executive summary for the report and include a similar preparation for the draft report. Something on the order of a press release for a lay audience to maximize the value to all stakeholders.”

Consider adding this document to the attachments or to accompany the final report.

Response: *The team will prepare a non-technical summary separate from the report document.*

9. **Comment:** For all pilot areas list data sources and list the agencies or groups from which data was requested. This could be added to the attachments.

Response: *A list of data sources with contact information and an indication of whether data were requested and received from the sources will be added as an attachment to the Report (see Comment No. 7 above).*

10. **Comment:** No data is presented that validates the amount of “atmospheric deposition” of TDS/EC, however in all three pilot it is a significant source and is not well explained. It there is uncertainty about this source is it testable by sensitivity or monitoring. What drives the variability of the values for the different pilot areas?

Response: *A new section for the report was added to discuss salinity. It describes how salinity is measured, how it is related to electrical conductivity, and what component ions make up salinity in the study areas. It also discusses the inorganic carbon component, its relationship to pH, and origin as carbon dioxide in the atmosphere.*

11. **Comment:** Please provide information on how the final report, tables, graphics, text, and WARMF model and supporting data will be provided to CVSC for future efforts. **(Joel - lead)**

Response: *A pdf version of the final report will be submitted to the CVSC Contract Executive Director with no restrictions on its distribution. An MS Word version of the final report will be submitted to the CVSC Contract Executive Director with the understanding that the MS Word version will not be posted for public access. The WARMF model for all three study areas, complete and fully functional with inputs, outputs, supporting data, graphical user interface, simulation engine, and documentation will be provided for download from an FTP site. There will be no restrictions on its distribution. Land cover input files will also be provided in an ARCGIS geodatabase.*

Specific Comments

1. **Comment:** Page ES-2: Significant Sources and Sinks verify they are generally in order of significance. Consider repeating this for the three pilot areas at the end of the ES with generalized significance.

Response: Table will be revised as appropriate to list in general order of significance. Results graphics will be added to ES to indicate order of significance in each pilot area (see General Comment No. 2)

2. **Comment:** Page ES-3: If possible bold or otherwise categorize those that were significant sources of data. Or address in the conclusions section. Consider a flow or input-output chart in section 1 or in the generalized methodology section.

Response: An input output diagram is provided in Figure 2-1. This figure will be corrected to show all text. Data needs priorities will be addressed as indicated under General Comment No. 7 above.

3. **Comment:** Page ES-5: Rows in Near Surface Groundwater section are missing. It might be useful to add the overall inputs and outputs and identify the net increase or decrease.

Response: The mass balance table for near-surface groundwater of the Yolo study area on page ES-5 includes rows for total input, total output, and change in storage. The specific input lines are atmospheric deposition, irrigation, fertilizer/land application, point sources, septic systems, and mineral weathering / reaction product. The specific output lines are net plant uptake / reaction decay, outflow to surface water, and recharge to deeper groundwater. These are consistent with the template shown in Table 3-19.

4. **Comment:** Page ES-6: Columns for % of input or output may be useful. Potentially a graph or chart showing their similarities and differences in the areas would assist understanding.

Response: Pie charts graphically illustrating the percentages of the various inputs and outputs will be added to supplement the tables for the each entire study area.

5. **Comment:** If added, in the Map showing the pilot areas show surface inputs and outputs if possible. The Maps shown in the attachments (Figure A3-3, 3-10-3-13) or A3-27 for example) would be useful in the ES. Summary statistics about the areas summarized vs the total CV region and the Population vs. the total CV region would add value and assist the committee with interpreting and estimating the cost for the rest of the CV.

Response: It would be difficult to add additional information to maps labeling the amount of each of the fluxes without making the map difficult to read. Pie charts will be provided to supplement the mass balance tables to give visual reference to the magnitude of each input and output.

Summary statistics on population and acreage will be added to the Executive Summary and appropriate Sections of the Report.

6. **Comment:** Page ES-7: Recommend conclusions and finding review before recommendations

Response: See response to General Comment No. 2 above

7. **Comment:** Page ES-7: Because of the number of recommendations, can they be further characterized
 - a. Importance needed for scientific rigor
 - b. Significance/likelihood to impact conclusions
 - c. Assumption/data gap
 - d. Useful for other areas to complete

Response: *The team will consider if this characterization improves clarity.*

8. **Comment:** Page 2-9: Chart labeling does not print accurately/distorted

Response: *This figure will be corrected to show all text.*

9. **Comment:** Page 2-10: Consider using this schematic chart with the data from the tables on ES-5-6 & 7 to explain the general situation of the pilot area.

Response: *It would be difficult to add additional information to the schematic chart labeling the amount of each of the fluxes without making the chart difficult to read. Pie charts will be provided to supplement the mass balance tables to give visual reference to the magnitude of each input and output.*

10. **Comment:** Page 3-1 etc: As provided in the workplan show the table of sources of data, land use and other information to be updated from report to reporting

Response: *In Section 3 we will reference the table of sources (Table 2-3) and dot matrix chart to be added in Section 2. A list of data sources with contact information and an indication of whether data were requested and received from the sources will be added as an attachment to the Report (see General Comment No. 7).*

11. **Comment:** Page 3-1: Provide a table for data gaps identified in Section 5 and add its reference here

Response: *If a data gap table is added to Section 5 will be referenced on Page 3-1*

12. **Comment:** Page 3-5: Consider adding the region map showing all three pilot areas in the Central Valley Region.

Response: *A regional map will be added to the ES and referenced here (see General Comment No. 5).*

13. **Comment:** Page 3-17: Move explanation for the charges on page 3-24 closer to that page for readability.

Response: *The figures will be moved closer to the explanatory text.*

14. **Comment:** Page 3-27: first bullet in last paragraph is colored blue

Response: *The bullet will be revised.*

15. **Comment:** Page 3-28: Table 3-7 is excellent for soil parameters for WARMF, are there similar tables for other WARMF parameters that can be included, even in an appendix?

Response: *Tables 3-4 through 3-6 list WARMF parameters, which vary by land use. Together with Table 3-7, these key WARMF parameters to which the model is sensitive.*

Additional parameters for land uses and catchments will be added to the appropriate tables or as new tables.

16. **Comment:** Page 4-1: Recommend and introduction to the pilot study results section as it differs from section 3 that was mostly ordered by media and data type, this section follows the pilot area organization.

Response: *An introductory statement will be added regarding organization of the Section.*

17. **Comment:** Page 4-1: The first paragraph describes the “Loading output and flux output” there is little in the body of the report that demonstrates these. An index of mass balances shown in the appendix may be very useful if one wants to review the information in the attachments. Like the old Thomas Guides had an index map to each catchment and page number.

Response: *Additional text will be added to section 4 to describe how the outputs shown in Figures 4-2 and 4-3 are generated. Maps identifying the catchment locations within each study area will be created for attachments 4-6.*

18. **Comment:** Page 4-5: Graph shows only a few observed data points for nitrate Cache Creek above Rumsey. Can some discussion be added about the adequacy and representativeness of this chart for other data?

Response: *Discussion will be added regarding the adequacy of available data for model calibration.*

19. **Comment:** Page 4-8: Consider showing the % of the total for each source and a diagram such as Attachment Figure A2-14 to assist understanding. Indication of the major sources and any validating data should accompany the descriptions on 4-10.

Response: *Pie charts will be added to supplement the mass balance tables for the entire study areas showing the percents for each source.*

20. **Comment:** Page 4-11: first paragraph: Could the salt also be stored in the soils? Last line in the last paragraph on chloride data. This should also be reflected in the recommendations.

Response: *The soils do store salt in pore water solution and adsorbed to soil particles. This is what is referred to in the discussion regarding the apparent accumulation reflected in Table 4-4. Additional text will be added to clarify the mechanism of storage.*

21. **Comment:** Table 4-5: Attempt to keep the tables on one page for readability. Provide additional detail on the connections between WARMF and other models including MODFLOW.

Response: *Tables will be kept to one page if possible. The connections between WARMF and the groundwater inputs are explained in Section 2. However, the connection can be repeated here.*

22. **Comment:** Page 4-14: It may be useful to add flow to table 4-8. It is unclear why imported water would increase by more than 3x in a wet year scenario?

Response: *The imported water in the Yolo study area is from the Fremont and Sacramento weirs, which divert flow from the Sacramento River to the Yolo Bypass, which is within the Yolo study area. Text clarifying this will be added to the report.*

23. **Comment:** Figure 4-12: Does this show that the TDS in the Groundwater increased 200 mg/l TDS in 10 years? If possible reorganize the figures to be closer to the text explaining them.

Response: *Figure 4-12 shows the simulated results for TDS. The section “Comparison of Simulated with Observed Values” discusses the results. As possible, figures will be placed near in the text to where they are referenced.*

24. **Comment:** Page 4-26: This is an excellent table; the use of color codes and notes makes it much more readable and understandable.

Response: *Comment noted*

25. **Comment:** Table 4-14: Again % of total load may be useful in comparison or bold significant contributors and discuss them with any validating data.

Response: *Pie charts will be added to graphically demonstrate the relative contributions of major categories of land uses.*

26. **Comment:** Table 4-16: Tule Atmospheric deposition is very low without explanation.

Response: *Additional text will be added to explain the cause.*

27. **Comment:** Table 4-18: uses pounds rather than KG. Consider using similar units.

Response: *The tables will be revised so that all use pounds.*

28. **Comment:** Table 4-20: Is diversion “out of the basin” or just out of surface water to irrigation?

Response: *Diversions from the San Joaquin River are all used for irrigation, but some of that irrigation is west of the river outside the study area.*

29. **Comment:** Page 4-39: paragraph 2, the Modesto areas is compared to the Tule, which has not yet been described. Reference the next section or other correction.

Response: *A reference will be added to the Tule River study area,*

30. **Comment:** Page 4-43: #3 the last sentence indicates a recommendation that should be repeated in the recommendations section.

Response: *A recommendation is regarding calibration using both head and groundwater age data is already included in the Recommendations section of the report.*

31. **Comment:** Page 4-52: table 4-23 indicates no nitrate contribution for septic tanks when there is a 10,000 pound per day contribution of TDS. Why is this?

Response: *Septic systems contribute ammonia to the near-surface groundwater. The nitrification of the ammonia originating from septic systems is included in the mineral weathering / reaction product line of the mass balance.*

32. **Comment:** Page 4-52: For total groundwater sections, please indicate the total groundwater volume of the area.

33. **Response:** “Total groundwater volumes” for each of the WARMF analysis areas have not been calculated. In any case, it is more important to understand the implications of salt and nitrate loads and their management on the beneficial use of groundwater. This means that the upper portion of the aquifer system may be most susceptible to impacts from loading. Thus, in coordination with evaluation of the salt and nitrate loads, it is important to develop a physical conceptualization of the aquifer system to better understand the potential impacts of the loads on the system.

REGIONAL WATER QUALITY CONTROL BOARD STAFF

General Comments

1. **Comment:** One of the tasks included in the RFP was to define the term “salt and nutrient sources of significance”. Although the authors identified what they considered the significant sources in the table on page ES-2, the criteria by which those sources were chosen is not discussed. What were the criteria used to select the identified “significant sources”? Also, some of the sources in the “Process” category of the mass balances, such as imported water, are very large sources of salt. But they were not included in the table on page ES-2. Should imported water be considered a significant source? If not, why not?

Response: Team will consider revision of the table on ES-2 and Table 2-1 to include surface water inflows and imported surface water.

2. **Comment:** Mass balances are conducted for surface water, near-surface groundwater, and deep groundwater in each study area. It would be helpful to also conduct mass balances for each study area in its entirety, comparing how much salt and nitrate enters the area with how much leaves the area.

Response: In the mass balance tables for near-surface groundwater and deeper groundwater, there are no line items for transport of mass into or out of the study area. The information on the mass balance for the study area in its entirety is in the mass balance table for surface water.

3. **Comment:** For the Mass Balance Accounting process, provide additional information regarding the percent of total inputs or outputs that each process represents for each constituent.

Response: Pie charts will be added to visually demonstrate the percentages of the various sources and sinks.

4. **Comment:** For the Mass Balance Accounting for Near-Surface Groundwater tables, break down the irrigation process into imported irrigation water and non-imported irrigation water.

Response: Imported water is used for irrigation in the Tule River study area. Text will be added describing how much of each constituent is from imported irrigation water.

5. **Comment:** The land use/source classification system used for this study should be carefully evaluated in terms of its usefulness for the purposes of CV-SALTS and revised accordingly. Some suggested improvements are:

- a. Include more information on each land use/source category (i.e.; what are the discharges or releases from each category that the data represents? For instance, does the “urban residential” data represent domestic wastewater only, and what does the “water” data represent?).

***Response:** A table providing commentary on each land use class has been added. The correspondence with source land cover classification systems (DWR and USGS) was available in the draft and will retained in the final report. The CV-SALTS classes were developed during work planning and reviewed by stakeholders. Additional changes were made during development of the report based on stakeholder input. The guiding principle for development of the classes was to segregate land covers with large differences in salinity or nitrate source properties, and to group covers having similar properties. This approach and the specific classes, having been reviewed by stakeholders and accordingly adapted, formed the basis of modeling analysis that commenced some months ago. Modification for the final report, therefore, would be contrary to input received, and impractical since modeling would need to be redone.*

- b. Evaluate if all categories listed are manageable sources. If some are not, identify them as unmanageable sources and separate them out from the manageable sources.

***Response:** Each source category would have manageable elements, some might be described as more manageable than others, however this was not part of the scope of the study and no methodology was developed for such analysis in the workplan. The development of such methodology should be an element of the Collaborative Surface and Groundwater Data Collection/Analysis Project, which is planned as a future CVSC study.*

- c. Organize as many of the listed categories as possible into larger categories that coincide with the Regional Board’s regulatory programs.

***Response:** Such reorganization was not scoped or budgeted in the Pilot Implementation Study. That task could be accomplished in future phases.*

- d. For the “Loading Sources of Inflows from Near-surface Groundwater” tables (e.g.; Table 4-2), re-organize the Land Use/Source categories and, where possible, place each into one of the significant sources categories listed in the table on page ES-2. Those Land Use/Source categories that do not fit into any of the significant sources categories could be placed into their own separate category or dropped from the table since, by definition, they are not significant.

***Response:** The purpose of the land cover mapping and associated parameters was to provide input to models, so that surface and subsurface hydrologic and chemical transport/transformation processes would be reasonably accurate. The reviewed and accepted methodology and land use classes were developed with stakeholders during work planning and later discussion for this purpose. The*

correspondence of land use classes with regulatory classifications varies, but in some cases is evident. For example, cropland is generally subject to the irrigated lands program, and various dairy classes to the Dairy General Waste Discharge Requirements. Not all regulatory permit footprints and permit information are readily available in usable GIS format for input into models, even if this were within the scope of the current work and requested by the stakeholder group during the course of the effort.

6. **Comment:** The “Loading Sources of Inflows from Near-surface Groundwater” tables (e.g.; Table 4-2) contain loading data for specific sources. Has this data been correlated in any way with the “Mass Balance Accounting for Near-surface Groundwater” tables? It does not appear that the load numbers in the tables do correlate. Can this be explained?

***Response:** The sum of the loads from individual land uses should be the same as the term for inflows from near-surface groundwater in the surface water mass balance. Imbalances are being corrected for the final report.*

7. **Comment:** In Section 4, there is a small “Trend Analysis” section for each study area that discusses the use of recharge volumes, and other inflow and outflows to the aquifer system to determine whether changes to the salt, nitrate and water balances stemming from changes in land use and practices will result in future groundwater quality changes. Was this exercise conducted? If so, please report the results.

***Response:** Trend analysis is a helpful tool for understanding the effects of salt and nitrate management, but it is not a deliverable for this project. If time and budget permitted, the analysis would actually have been performed. Trend analyses are mentioned in the report to indicate what could be learned from such an analysis.*

8. **Comment:** If a distinction is made between “shallow groundwater” and “deep groundwater, those terms should be clearly defined for each study area.

***Response:** Cross references will be added between the initial use of the terms “shallow”, “deep”, etc. to their definition for each study area.*

9. **Comment:** In some areas of the Central Valley, managed wetlands are a significant source of salt load. Would the methodology used for this study allow the loads from managed wetlands to be quantified?

***Response:** There are only limited managed wetlands within the current study areas, but the methodology could be used to quantify loads from wetlands. Wetlands would be classified as one or more land use types. The managed inflow would be irrigation, and animal waste would be considered land application. Other properties of the wetlands such as productivity would be entered just as they would for an agricultural land use.*

Specific Comments

1. **Comment: p. 3-47** – It is not indicated whether a request for groundwater data was sent to local agencies. Was this done?

***Response:** A list of data sources with contact information and an indication of whether data were requested and received from the sources will be added as an attachment to the Report (see Central Valley Salinity Coalition General Comment No. 7)*

2. **Comment: p. 3-48** – Out of 21 irrigation districts, for which electronic groundwater data was requested, only one provided data. This demonstrates the need for CV-SALTS to develop a strategy to engage local agencies in the effort.

Response: We agree. An Attachment will be added that lists the agencies and districts from which data were requested and which responded to the requests. It will need to be a CV-SALTS effort to develop a strategy to engage agencies and methods to work with the CVRWQCB and SWRCB to obtain the data where the agencies do not provide data that are available. We agree with the comment from CUWA that there should be better methods and processes for requesting, obtaining and managing water quality data.

3. **Comment: p. 3-51, 1st parag.** – The report indicates that the data from CDEC contained many errors. Where CDEC data was used, how were errors handled?

Response: Where there was overlap between CDEC and other data sources such as USGS, the other data source was used. When data unique to CDEC was used, it was examined graphically to identify errors. Common errors include unrealistic or negative values or constant values for extended periods. The suspect data was deleted.

4. **Comment: p. 3-51, Table 3-18** – Why are surface runoff and drainage discharge not included as inputs? Is percolation to shallow groundwater not considered a significant output?

Response: Surface runoff and drainage discharge are part of the output from near-surface groundwater to surface water. Percolation from the surface into the near-surface groundwater is not included in the mass balance tables because the surface water on land is combined with the near-surface groundwater in the mass balance tables.

5. **Comment: p. 4-8, Table 4-1** – The Yolo area has two sources of imported water. It would be helpful to quantify the load imported from each source.

Response: The imported water to the Yolo area is from the Fremont and Sacramento flood control weirs on the Sacramento River. Since the source water for both is similar, there is little benefit from disaggregating them.

6. **Comment: pp. 4-32 & 4-35, Tables 4-13 & 4-16** - In-flows to SW from near-surface GW (299,000 lb/dy TDS) and outflow to SW from near-surface GW (827,000 lb/dy TDS) are significantly different. Explain or correct.

Response: The imbalance will be corrected.

7. **Comment: p. 4-35, Table 4-16** – No data was given for septic systems. Please explain.

Response: Septic systems contributed much less than 1,000 lb/day of total dissolved solids so the source was not considered significant. Septic systems are considered to discharge nitrogen to the soil in the form of ammonia, so the septic contribution to nitrate is included within the mineral weathering / reaction product line item.

8. **Comment: p. 4-35, Table 4-17** – No data was given for pumping from municipal wells. Please explain.

Response: The pumping information available did not distinguish between sources, so it was listed under irrigation. Pumping for groundwater control is also used for irrigation.

9. **Comment: p. 4-39, Top of page – Item # 2** – The questions regarding the origin of groundwater were not answered.

Response: Additional explanation will be added to the report in Section 4.

10. **Comment: p. 4-52, Table 4-23** – The table shows zero nitrate loading from septic systems. Please explain.

Response: Septic systems are considered to load nitrogen to the soil in the form of ammonia. The conversion of ammonia to nitrate within the soil is included in the mineral weathering / reaction product line item of the mass balance.

CALIFORNIA URBAN WATER AGENICIES (CUWA)

General Comments

1. **Comment: Objective 5.** *Indicate how the methodology will account for total salt loading balance and accumulation and identify critical concentration discharges.* There is no discussion in the report about the critical concentration discharges. The discussion about the load of salt and nitrate coming from upstream sources does not contain any information about the concentrations in those upstream sources. In general, the upstream sources have low concentrations of salt and nitrate and the large loads are due to high quantities of water. These sources are not controllable sources. The report needs to provide more information on the concentrations of salt and nitrate in the various sources and more discussion about which of the sources are potentially controllable (Daniel).

Response: The goal of the project was to determine mass balances to identify sources and sinks of salt and nitrate for long term management. Concentration is highly variable and a function of flow. Although the WARMF model outputs time series of concentrations of total dissolved solids, nitrate, and other parameters, concentration analysis is not a goal of this project. Source Controllability was not within the scope of this study as scoped by the committee. For more discussion on controllability, see the discussion in response to RWQCB General Comment 5b.

2. **Comment: Objective 7.** *Identify how historic, current, and future source quantities will be determined or estimated to provide trend information.* There is limited discussion about the need to evaluate future source quantities in the report but there is no discussion of the methodology to be employed to estimate future source quantities.

Response: In the scoping process, the hope was that the pilot information would supply necessary data to determine a historical timeline, which would indicate a steady state or an increasing or decreasing trend. The workplan indicated data for just estimations could be insufficient to make estimations. Where the data was deemed sufficient, indication of trends is noted.

3. **Comment: Objective 8.** *Identify and quantify areas where nitrates are impacting beneficial uses of water.* There is no discussion in the report about the impacts of salt and nitrate on beneficial uses. The impacts of nitrate should be discussed from both the public health perspective (exceedences of the maximum contaminant level) and from the impact of nitrate in stimulating algal blooms that result in both drinking water and ecosystem impairment.

Response: Please see the response to Michael Johnson Specific Comment No. 2.

4. **Comment:** The report needs a Conclusions Section.

Response: A Conclusions subsection will be added to Section 5 and a Findings and Conclusions subsection will be added to the Executive Summary sections of the final report.

5. **Comment:** The Conclusions Section should contain a discussion about the controllable sources in the watershed and a discussion of beneficial use impairment.

Response: Source controllability was not within the scope of this study as scoped by the committee. For more discussion on controllability, see the discussion in response to RWQCB General Comment No. 5.b

6. **Comment:** CUWA strongly supports the recommendation that there be a single point of contact at the Regional Water Board for discharger data. It appears that the consultants were not able to access some data on point source discharges. CUWA recommends that the report contain a recommendation that the Regional Water Board require all dischargers to submit their data in electronic format to the Regional Water Board.

Response: This recommendation will be carried forward to the Executive Committee and Regional Water Quality Control Board for opportunities and implementation if possible.

7. **Comment:** The report does not describe how urban runoff discharges are treated in the model. Is urban runoff considered to be a point source discharge or a non-point source discharge?

Response: Urban runoff is treated as nonpoint source in the model. Each land use includes an impervious fraction. There is build-up of pollutants on the surface, which are washed off by precipitation on impervious surfaces or percolate into the ground on pervious surfaces. Water on impervious surfaces is routed directly to the local surface water. Subsurface water moves laterally following the slope of the land where it can exfiltrate with dissolved pollutants to surface water. The water table elevation is tracked at every time step. If the water table reaches the surface, overland flow is simulated on pervious surfaces, transporting sediment and adsorbed pollutants to surface waters as well

8. **Comment:** The graphics in the report are poor quality and difficult to read. CUWA recommends that they be improved for the final report.

Response: Graphics will be improved to the extent allowed by time and budget.

9. **Comment:** There is a mixture of units used in the report. The report authors should decide if they are going to use metric or English units and the units used in the tables of data and figures for the three study areas should be consistent so that study area loading rates can be compared. The units for nitrate should also be consistent throughout the report. In some cases nitrate is presented as N and in others it is presented as NO₃.

Response: Units will be converted to English where practical. In some cases, (e.g. WARMF output) conversion factors will be given if conversion is not practical.

Specific Comments

1. **Comment:** Page ES-4 – There is no reference to the Modesto and Tule study area results and there is no discussion of the results for any of the study areas.

Response: *Modesto and Tule River results are included in the Final Draft version of the report. A Conclusions subsection will be added to Section 5 and a Findings and Conclusions subsection will be added to the Executive Summary sections of the final report.*

2. **Comment:** Pages ES-6 and ES-7 – Why is chloride omitted from these two tables?

Response: *Mass balance for chloride was only performed for the Yolo study area as an example for specific ions.*

3. **Comment:** Page ES-8 – CUWA strongly supports the recommendation that there be a single point of contact at the Regional Water Board for discharger data.

Response: *Comment noted. See response to General Comment No. 6.*

4. **Comment:** Page 3-29 – The Regional Water Board should have the facility location, flow, effluent quality, and land discharge area for all dischargers in the Central Valley in their permit files. It is unclear why these data were not available to the report authors.

Response: *The project team requested these data from Regional Board staff, but due to insufficient resources not all requests were answered. There were insufficient time and budget to collect all these data from the Regional Board files in person.*

5. **Comment:** Page 3-29 – The report needs to contain a description of how dischargers were classified as major and minor. Is it based on discharge volume?

Response: *The US EPA defines a major discharger as one with a flow of at least 1 million gallons per day or industrial facilities with pretreatment programs.*

COMMUNITY WATER CENTER

General Comments

1. **Comment:** Thank you for the opportunity to submit comments on the Salt and Nitrate Source Pilot Implementation Study recently released by the Central Valley Salinity Coalition. We applaud your attempt to develop effective methodologies to quantify and track the significant salt and nitrate sources impacting the vulnerable water resources of the Central Valley, particularly given the limited amount of time available to complete this initial study. However, we would like to take this opportunity to raise several questions and concerns. In particular, we would like to have a better understanding of how these models will be able to improve over time and how the margin of error can accurately be ascertained given the significant data gaps that the report identifies. We would also like to have more clarity on the conclusions that can be drawn from this initial study and how environmental justice organizations like ours can most effectively engage with this important effort.

Response: *After the completion of the report, a presentation will be made on March 11th. The project team would be happy provide an opportunity for final questions and*

discussion after that presentation. If not we may be able to schedule other meetings depending on the Project Team and Community Water Center availability.

Specific Comments

Data Deficiencies

- 1. Comment:** We are particularly concerned with the significant data gaps identified in the initial report, as it appears that the models would be substantially more effective with more comprehensive data. Because of this concern, the credibility of the Modesto and Tule River area models is undercut somewhat by the severe data deficiencies identified in the study for those areas.

Response: *The data that were integrated into the Models were adequate to yield reasonable output needed for purposes of this study. It is not feasible in terms of time or budget to integrate any new data into the models at this time. More complete data would likely yield more certain output, but would not likely change the basic findings of the study.*

- 2. Comment:** We hope that the group will consider placing as much emphasis on maintaining and improving these models as the report currently places on the Yolo model.

Response: *The Technical Advisory Committee will soon be scoping the level of detail and data coverage needed for covering the entire Central Valley. Several of the pilot areas were chosen because they have more robust modeling and some were chosen because they have less data. In the pilot we wanted to see what data could be quickly made available and what data beyond that may be needed. We will be reviewing this with the results of the Phase 1 Beneficial Use and Objective Study to determine the level of data needed for each area.*

- 3. Comment:** In addition, it is unclear from the report whether the domestic well data gathered by the United States Geological Service (USGS) for the State Water Resources Control Board's Groundwater Ambient Monitoring and Assessment (GAMA) Program was or could be used in the Tule River model.

Response: *These data were requested from the SWRCB. Further explanation will be included in the report (Chapter 3, Groundwater Quality, Tule River Area).*

- 4.** If this data has not been integrated into that model, we suggest that it be integrated for the final draft of the report, in addition to other data available from GAMA and other state or county-maintained databases for the Tule River area.

Response: *See response to Comment No.1 above.*

- 5. Comment:** Given that the study is co-sponsored by a state agency that is involved in the collection and compiling of water quality data, we believe that the study could include considerably more data in the Modesto and Tule River area models without a significant delay. The report acknowledges that “[i]n the Modesto and Tule River areas, it is also likely that additional data may be available but were not publicly accessible from state or federal web sites.” 5-4. We recommend that the group prioritize gaining access to any applicable state and federal data and that the Regional Board assist in this effort.

Response: CV-SALTS agrees and will work to do so for future studies.

- 6. Comment:** Finally, it would be helpful to provide more clarification in the discussion of data averaging to assure readers that averaged data is not inappropriately being input into the model.

Response: In Chapter 3 (Groundwater Quality Analysis, Yolo Area), there is presently a discussion of the steps taken to develop groundwater quality conditions for purposes of source water quality input to WARMF. This discussion includes the use of mean values and also describes the treatment of data (weighting) where a well or wells exhibited higher or lower values than other wells in the same catchment. The discussion of averaging to estimate source water quality for the Modesto and Tule River will be clarified in the report.

Calibration

- 7. Comment:** The report mentions that there is a need to calibrate the Modesto model. We recommend that this take place before the report is finalized. Likewise, the report does not appear to address whether there is any plan to calibrate the Tule River model, which raises the question of whether it can be done with the data currently available in that model and if not, what is needed to complete this model. We recommend that the priorities reflect the necessary steps to complete both of these models.

Response: The Tule and Modesto models are calibrated. The report offers the recommendation (Groundwater Flow Modeling, Recommendations section) that future recalibration consider the use of both head and groundwater age data. The scope of the efforts in the Pilot was to use data and tools that were available in each region. At the pilot level we could not collect or fully validate models provided by others.

Municipal Wells

- 8. Comment:** We are troubled by the lack of discussion of municipal wells in the report, particularly given the significant impact of nitrate contamination on drinking water supplies in the Central Valley. We note that the report states that “[t]he split of agricultural and municipal use has not been determined, so for the mass balance all pumping was assumed to be agricultural.” 4-52. We recommend that the report consider in more detail the difference between agricultural and municipal wells and the impact of these differences on the models.

Response: Where possible from the data available as modeled, the team will identify separate Ag and Municipal/Industrial pumpage. Such as there has not been that differentiation for one or more of the study areas, additional explanation will be included in Chapter 3, Groundwater Pumpage.

- 9. Comment:** Where the report describes near surface groundwater as groundwater that interacts with surface water “well above the depths where pumping occurs,” we would appreciate some clarification of whether this statement applies to domestic wells in addition to agricultural wells.

Response: *The near-surface groundwater is only the first few meters of soil below the surface. Both municipal and agricultural wells draw water from the aquifer below this depth (i.e. deeper groundwater).*

Nitrate Sources (fertilizer, dairies, septic tanks, etc.)

10. **Comment:** We have several questions and concerns with respect to the various nitrate sources identified and discussed in the report. With respect to fertilizers, we are troubled by the fact that the fertilizer data used in the modeling was purely theoretical and based on the assumption that fertilizer application has been appropriate without reference to any application or sales data. See Attachment 8. Similarly, we are also concerned that the models also include the assumption that crops are taking up 100% of available nitrogen in the soil, including 100% of the nitrogen made available by fertilizer application. These assumptions may have significant impact on the results of the study, and we recommend that they be carefully examined and potentially modified, ideally by the addition of relevant data.

Response: *Actual fertilization rates are not reported (and therefore unavailable as a data input) unless a site is under permit (e.g., land application sites with applicable waste discharge requirements requiring such reporting). Permitted areas occupy a small fraction of the landscape, but the team reviewed and incorporated tabulated land application WDR and the General Dairy WDR data. The level of analysis and scope did not allow for a field-by-field analysis of other lands in the absence of such data, or the extraction of further data from narrative reports on permitted facilities. Fertilizer rates were therefore mostly based on recommendations for specific land cover classes, and checked against explicit uptake assumptions calculated from crop yields and nutrient content of harvested tissues. There was no assumption, explicit or implicit, that all nutrients are taken up. Rather, application and removal rates are tied to land cover, and soil processes (including hydrology, transformation, and transport) are modeled. Nitrogen and salinity leakage and losses are thus modeled results, not theoretical or a-priori assumptions. Authors agree that loading assumptions have significant impact on results and believe that the combination of land cover mapping and parameter (e.g., fertilization) estimates in this work product is a vast improvement on any comparable work in the Central Valley to date, is quite detailed given the scale of the analysis, and is fully adequate to satisfy project objectives.*

11. **Comment:** We are also concerned by the report's treatment of septic tanks and would appreciate some clarification of the role that septic tanks play as a source of salt and nitrate and how the models and analysis take this role into account. If this lack of clarity regarding septic tanks arises from a lack of data, we recommend that the group prioritize identifying and securing access to sources of this data. We would appreciate more clarity as to the conclusions regarding septic tanks that can be drawn from the initial study.

Response: *Septic system data is entered into WARMF based on the number of septic systems, an estimate of the number of people per septic system (2.5), and the discharge per person. Based on this, they have been found to be a very minor source of salt in each of the study areas. Their contribution of nitrate is presently assumed to be indirect, through loading of ammonia, which is then converted to nitrate in the soil. The contribution of nitrate then is included in the reaction product line item of the near-*

surface groundwater. The model does track the nitrate that originated as ammonia from septic systems, however, so an effort will be made to describe the septic contribution in the report.

12. **Comment:** Finally, we are concerned that the study does not appear to be considering point source discharges from Confined Animal Feeding Operations (CAFOs), including dairies, or that it is not clear how the study is taking these discharges into account. In particular, we would appreciate clarification of whether the models include point source discharges from CAFO waste lagoons and land application, as well as the anticipated strategy for acquiring this data from facilities that do not currently have NPDES or WDR permits. We recommend that the study include greater specificity and more data on these sources of salt and nitrate, and we are troubled by the report's statement that, "[d]ata for dairies were not collected because these discharges are simulated with land application rates in the WARMF model rather than input explicitly." 3-31. Where available, actual data for these facilities should be included in the study.

Response: Please see the response to comment 11. The extracted text is correct. Since dairy waste enters the environment mainly through soil and soil-plant systems, it was analyzed by routing it through the surface hydrology model processes in WARMF. Five land cover classes were developed in consultation with dairy specialists to accurately characterize dairy lagoons, production facilities, and land application areas. Data made available by the RWQCB, DWR, and USGS were employed to delineate areas to which these cover classes within the appropriate areas within WARMF catchments. This approach appropriately locates and quantifies loads discharged to and through land by these facilities, and utilizes the processes in WARMF to analyze the fate of pollutants. Other CAFO facility data were not so readily available and the team recommends that these data be collected and made available for future refinements, employing the methodology developed for dairy facilities in this work. This recommendation has been made more explicit in the final report.

Land Cover and Soils Recommendations

13. **Comment:** In the "land cover and soils" recommendations, we would urge that the recommendation to "[a]ssess regional variations in gaseous N losses (volatilization, denitrification) in soils and aquifers" be moved to the first priority in that category. We are aware of studies that indicate that this number could be significant, and we believe that integration of this data into the models is of high priority.

Response: The WARMF model does include ammonia volatilization (with rates depending on pH) and denitrification in the soil (with rates depending on levels of aeration). Denitrification is apparently a significant N loss process, at least in the Modesto study area / San Joaquin River watershed. The extracted text is intended to suggest that field characterization of loss rates would provide an additional model validation tool. Since these processes are already captured in the model, the authors judge that this validation activity is not a high priority.

Groundwater Quality

14. **Comment:** We strongly support the "groundwater quality" recommendations suggested by the report and hope that the group will work toward achieving these goals.

Response: Comment noted

Next Steps

15. **Comment:** The document states (Page 2-8) that “This investigation is limited to provide a generalized regional scale analysis of transport paths and is not designed to represent detailed salt and nitrate contamination patterns. A fully coupled groundwater flow and transport model would be a necessary tool for such purpose”. Unfortunately, that is exactly the type of model we think is needed to address the severe salinity and nitrate issues in the Central Valley. We are concerned that this very expensive and time-consuming effort is not providing the necessary tools to measure or address the growing problem of nitrates in Central Valley drinking water.

Response: The pilot studies are by their nature limited in time and funding. Significant to the Salinity/Nitrate Management is the development of methods to understand the impacts on surface and groundwater from all sources of salinity and nitrate. The final report will add information on how the models were integrated to perform the analyses to quantify sources. We would make use of a “fully coupled groundwater flow and transport model”, if available. However, a fully coupled model, while ideal, is not necessary to make reasonable and useful estimates of salt and nitrate sources as demonstrated by the results provided by this pilot study. Furthermore, some areas may not need this detailed level of analysis for purposes of preparing salt and nitrate management plans. If determined necessary to meet the objectives of an area-specific plan, that plan could then identify the need to develop such a fully coupled model. The need for comprehensive modeling will be consider in future CV-SALTS studies

MICHAEL JOHNSON – LLC

General Comments

1. **Comment:** Formatting in many of the tables is inconsistent and needs to be formalized.

Response: Table formatting consistency will be checked in the final report.

2. **Comment:** Significant detail is provided on the modeling in the report attachments, but the rationale for several key decisions is lacking. For example, the relevance of the age of the groundwater in the Tule basin is not well explained and consequently, the cost of the analysis could be questioned.

Response: The groundwater age computation was done for both the Modesto and the Tule River model. Groundwater age calculations are a tool to demonstrate the depth and extent to which nitrate loading from the land surface has impacted groundwater. Nitrogen use drastically increased in the 1950s and 1960s (from relatively low fertilization levels until the mid-20th century) and has remained elevated since then. A first approximation of the impact of that fertilizer can be obtained by delineating groundwater that is younger than 50 years of age. This explanation will be added to the report.

3. **Comment:** There are several tables with inconsistent references to methods used to develop the parameter values (i.e. superscripts at the bottom of the table but no

association within the data in the table or vice versa) and in many cases a general lack of description and/or reference to a method by which the data were obtained or estimated.

Response: *Tables will be checked for proper references.*

Specific issues are addressed below.

Specific Comments

1. **Comment:** The document could be improved with a list of acronyms as well as a consistent use of acronyms.

Response: *A list of acronyms will be added to the final report.*

2. **Comment:** The Executive Summary provides a list of 9 study objectives. Reading through the document, it is not clear that all 9 are addressed in the text. For example, objective #8 is to identify and quantify areas where nitrates are impacting beneficial uses of waters. Although it is possible to read through the text and apply some of the modeling results to think about beneficial uses, there is no explicit discussion of beneficial uses or impairments.

Response: *Objective 8 was reviewed in the early part of the contracting to limit the scope of the objective to the areas that are represented by the data collected. Originally, the CVSC Technical Committee expected objective data to be clearly available for both salinity and nitrate. Modeled values for nitrate and salinity can be inferred and the final report will provide additional insight, but pilot work will likely not yet provide all data needed to make determinations of impacts to beneficial uses. This will be an area of scope development in the Collaborative Surface and Groundwater Data Collection/Analysis Project that the CVSC plans to conduct in the near future.*

3. **Comment:** The report should contain an explanation of why some of the objectives were not possible to address as well as provide a description of how these objectives might be addressed in the future.

Response: *A Conclusions subsection will be added to Section 5 and a Findings and Conclusions subsection will be added to the Executive Summary sections of the final report that will address achievement of objectives*

4. **Comment:** In Table 3-3, there is a column for land application area (units of acres). There is no superscript on the column to indicate how the area was determined. The text on page 3-16 does not include a reference to how the land application area was developed. The information included in the report only references the source of the data stating that the data was obtained from the Regional Board for the latitude and longitude of the production areas along with associated acreages and herd sizes. More detail should be provided that explains how this data was used to develop the land application area.

It is unclear if the land application area data were directly from the Regional Board's dairy program or if they were estimated. If the values were estimated, the consultant should perform a "spot check" of the estimated values based on records of land designated by each dairy as application areas as well as sales records with location of purchase for dairy manure; these records should be maintained by the Regional Board's dairy program. A spot check is recommended since it is doubtful that the records are

electronic and therefore a full analysis of the data (if not already included) could prove too time consuming.

Response: *The text on page 3-16 included, “While RWQCB did not delineate lagoons, production areas, or land application areas, the latitude and longitude of the production areas were provided, along with associated acreages and herd sizes. ...These relationships are shown in Table 3-3.” The acreages in Table 3-3 are county averages calculated from reported land application areas and herd sizes for permitted facilities. Additional text has been added to the “Fertilization and Amendment Loading Rates” section, explaining how organic fertilizer and animal waste loads were handled. Dairy land application acreage is sized and located in catchments based on herd sizes, as described in the “Land Cover” section. Calculated dairy waste loads (per lactating animal) from six specific dairies for which detailed waste quantities were available were indeed checked. These agreed well with the loading rates (per acre) employed in the analysis and shown in Table 3-5. The herd-area relationships in Table 3-3 were used to relate waste loads per animal to per-acre loading rates.*

5. **Comment:** On page 3-17, there are three undefined terms “Resting dairy land”, “Unconstrained dairy land” and “Land constrained dairy land” which need to be defined. While their definitions may be common knowledge in the dairy industry, they are not well understood outside of the dairy industry.

Response: *The definitions are expanded in the Final Report.*

6. **Comment:** Tables 3-4, 3-5, and 3-6 contain incomplete superscripts in the heading or body of the table. References to the superscripts are provided below the table which means either the superscripts need to be inserted into the table or the reference should be removed from below the table.

Response: *The table footnotes have been corrected in the Final Report.*

7. **Comment:** It is not explained how the % NO₃ in Table 3-5 was obtained. There is no reference regarding where these data were obtained from or, if they were calculated in house by the consultants, what the method was for generating the %NO₃ numbers.

Response: *Fertilizer material usage data are not available in usable form. It should be noted that in most aerated soils (i.e., not rice), applied ammonium-N is rapidly transformed to nitrate-N. WARMF processes include this conversion. Therefore, model results are not particularly sensitive to this parameter. Thus, rather than mounting a costly effort to develop estimates based on available data, the estimated proportion of nitrate-N applied to land cover classes was based purely on professional experience with farming of these crops. Some of the factors considered included the preponderance of ammonium-N in dairy effluent, and the widespread use of relatively low-cost, ammonium-N sources. We recommend that fertilizer sales data be made available in a usable format. One of the possible uses for these data would be refinement of fertilizer loading quantity and quality parameters that were estimated for this analysis. As stated in the final report, the potential for these refinements did not prevent achievement of project objectives, nor does it compromise adequacy of the work as it stands.*

8. **Comment:** The URL should be provided for any online source of information within the text. For example, salt added as gypsum was extracted manually from CDFA reports but

there is no citation for these reports. Since there is no reference to the CDFR reports in the reference portion of the report it is unclear if the reports were available online or obtained directly from CDFR.

Response: *The reports were obtained directly from CDFR. The name and email address of our correspondent is listed in a new references table in the final report.*

9. **Comment:** The report clearly explains why the major and minor point source dischargers received little attention in the analysis (outside of budget constraints). In the Yolo County study area, it is unlikely that these discharges are going to contribute substantially to the salt or nitrate load. However, in the Modesto and Tule study areas, it is not clear that these dischargers are a minor component when developing the salt or nitrate load. This point is addressed in Section 5 with the first priority recommendation but could be addressed in more detail in the methodology and results section (Section 3 and 4).

Response: *We have added point source discharge data to the Tule River study area for several dischargers. We will evaluate and comment on the potential impact of minor non-dairy dischargers once the updated mass balances have been regenerated for the Tule River and Modesto study areas.*

10. **Comment:** There is a statement on page 3-49 that with “perfectly efficient irrigation”, all water would end up as evapotranspiration. While it may be conceptually correct within the confines of the model, it is technically incorrect as some water is going to end up in plant tissue. A substantial portion of this plant-water is removed from the land (harvested) and moved out of the basin to be processed. The same is true for the salt and nitrogen that is removed with the harvest. Plant uptake is listed as a sink in Table 2-1 but is not discussed in any detail later in the report. Estimates are provided in the attachments indicating that this component has been incorporated into the modeling. The statement should be modified.

Response: *The definition of irrigation efficiency is frequently defined as the depth of irrigation applied, divided by the following quantity: depth of evapotranspiration minus the depth of effective rainfall. According to this definition, the cited text is correct. The ultimate fate of water retained in plant tissues is either part of evapotranspiration when tissues desiccate, or part of the removed biomass. The commentor is correct that water removed in biomass, although taken up by the plant, is not included in water in evapotranspiration or calculated water losses from the system. When, for example, 18,000 lb/a of forage (dry matter) is removed at 80% moisture, the weight of removed water is 72,000 lb/a. If the same crop is irrigated with 3.5 feet of water, then the applied water weighs 9.3 million pounds, so that the water removed in the forage is less than 1% of applied water. While plant water is not accounted for in our analysis, it is quantitatively insignificant and introduces no significant error into the modeling effort.*

11. **Comment:** Much of the text starting on page 3-53 (section *Salts vs. Nitrates*) is written in the future tense as if the text had been copied and pasted from the proposal. The previous section (previous to page 3-53) is written in the past tense to reflect work performed. The sections written in future tense need to be revised to reflect their completion or revised to infer that they are future work to be done. Given the results, the work has been performed and the future tense is not appropriate.

Response: *Tense will be corrected*

12. **Comment:** I did not check all of the numbers in the text against the tabled values, but I did spot-check a couple of tables. The text at the bottom of page 4-10 and the top of page 4-11 refers to Table 4-4, the mass balance accounting for near-surface groundwater. My calculations based on the tabled values indicate that uptake by plants consumed 35 percent of the nitrate and 12 percent of the TDS as opposed to the 30 and 20 percent listed in the text. According to my calculations using numbers from the table, exfiltration to surface water is 27 percent for TDS, 35 percent for nitrate, and 21 percent for chloride. The chloride calculations agree but the other two calculations do not. It is possible that this discrepancy is a result of my misreading of the text but the tables and text should be compared for consistency.

Response: *The text and tables will be checked against each other once the tables have been updated.*

13. **Comment:** It is not clear from Section 5 if there are any real conclusions to be made. It is apparent that the authors believe that the model could be improved substantially if additional data were available. But, it is not clear whether or not the authors believe that the current estimates of loadings and the mass balance calculations are sufficient for regulatory action.

Response: *A conclusions section will be added to the report. The modeled results will be better described based on the data and assumptions in the final report. This pilot planning report is not intended to be directly used in a regulatory action or enforcement efforts.*

14. **Comment:** Also, it is not clear if the last objective of the study as identified in the Executive Summary, determine the applicability of the methodology to develop salt and nitrate load estimates for the entire Central Valley, has been met.

Response: *A conclusions section will be added to the report that addresses achievement of objectives.*

15. **Comment:** The current study areas were selected because of the significant amount of data already available for the analyses. Even with the amount of data already available, the models had difficulty with some areas of the analysis. Given the paucity of data available in other locations within the Valley, do the authors believe that these tools are sufficient to arrive at loadings and allow a mass balance to be performed for the entire Central Valley? Some statement addressing this point should be made, or at least the authors should indicate when such a conclusion could be made.

16. **Response:** *A conclusions section will be added to the report that addresses achievement of objectives.*

WILLIAM J. THOMAS

1. **Comment:** Considerable questions have arisen as to the next steps associated with these three area studies. Are they going to be sent out for peer review?

Response: *The committee did not scope this pilot implementation study for peer review, beyond that review provided by the participants and consultants comments that are provided here. If University of California peer review is needed it is critical that it be planned into any project at the initial point of development.*

2. **Comment:** Will the presentation of this study be subject to hearing or public response?

Response: *The Draft report is available for public comment and was the subject of the agenzized Technical Advisory Committee meeting on December 7, 16 and January 21st.*

3. **Comment:** Are the results of this study going to be used to engage similar evaluations to other areas of the valley?

Response: *The purpose of the pilot implementation study to develop methods and provide guidance that will be used to develop salt and nutrient management plans in the Central Valley. Results from this study will be combined with results from the future CVSC Beneficial Use and Objective Study to develop the requirements for future analyses for areas where salt and nitrate data are needed for development of the Basin Plan Amendments.*

4. **Comment:** Is this study going to be used to advance some particular regulatory program?

Response: *This pilot planning report is not intended to be directly used in a regulatory action or enforcement efforts.*

SOUTHERN SANJOAQUIN VALLEY WATER QUALITY COALITION

1. **Comment:** This letter is being transmitted on behalf of the Southern San Joaquin Valley Water Quality Coalition (Coalition). Coalition members have had a chance to quickly review the final draft report (Report) of the Salt and Nitrate Sources Pilot Implementation Study (Study). The review was conducted based on the stated goals of the Study being to develop and document procedures and methodologies to quantify, fairly and equitably, the significant salt and nitrate sources in the Central Valley. The brief review time which has been allowed to date has been utilized by Coalition members to determine if the stated goals of the Study were achieved.

This review has resulted in the tentative conclusion that there are a number of concerns with respect to the conduct and procedures related to the Report and the conclusions reached by same. The Coalition members intend on conducting a more thorough evaluation of the Report and generating specific comments.

At this time, however, our review to date puts us in a position where we strongly recommend to the Technical Advisory Committee that this consultant work product be subjected to a thorough peer review.

We feel that such a review will allow for many of the problems which we have discovered to date to be addressed and will likely result in the issuance of a revised Report. The Coalition strongly urges such a peer review in order to either verify the conclusions contained in the subject Report, or to recommended changes in same which will lead to a beneficial study.

Response: Many changes are being made to the draft report that may respond to your comments and the comments of other stakeholders. The CVSC Technical Committee did not scope this pilot implementation study for peer review, beyond review that is provided by the participants' and consultants' comments that are provided here. The Regional Board has not had peer review, other than from the participants of previous CV-SALTS studies. This purpose of this pilot implementation study is to develop methodology and provide guidance for future planning efforts and is not intended to provide regulatory or enforcement information.

If peer review is needed for a report that is part of CV-SALTS, it is critical that it be planned into any project at the initial point of development.