CV-SALTS Technical Advisory Committee Meeting

When: Thursday, September 29th, 2011 from 9:00 AM to 12:00 PM

Location: SacRegional, 10060 Goethe Road, Sacramento

Conference #: (218) 339-4600 Participant Code: 927571#

Agenda

1. Welcome and Introductions

2. Interface between Technical Project Manager and Technical Advisory Committee
    a. Discuss and clarify functional and advisory roles
    b. Review project items in development

3. Possible Approach to developing a Central Valley Salt and Nutrient Management Plan
    a. Presentation by Technical Project Manager
    b. Discuss & comment

4. City of Davis Salinity Study Draft Workplan –Recommendation Letter
    a. Review & Approve Recommendation Letter to be forwarded to Executive Committee by October 10th, for inclusion in October 20th Meeting Agenda

5. South Delta Water Agency Letter
    a. Update on Study Development Status

6. Knowledge Gained Subcommittee
    a. Subcommittee chair
    b. Discuss time frame for revising Framework document

7. CDFA FREP Annual Conference, November 16-17, in Tulare
    a. CV-SALTS Participation

8. Next Meeting/Call October _____ at ________

Date

Diana Messina
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Central Valley Regional Water Quality Control Board
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CENTRAL VALLEY SALINITY ALTERNATIVES FOR LONG-TERM SUSTAINABILITY (CV-SALTS) TECHNICAL ADVISORY COMMITTEE RECOMMENDATIONS REGARDING CITY OF DAVIS SALINITY STUDY DRAFT WORKPLAN

On 26 August 2011, the CV-SALTS Technical Advisory Committee reviewed and discussed the City of Davis draft workplan to conduct a salinity study in order to determine appropriate salinity water quality objectives to protect agricultural supply water. Committee focused on the applicability of data collected as part of an earlier Woodland study to the current effort; use of the Hoffman model (a steady-state vadose zone salinity leaching model) as a check on the Grattan model (a transient vadose zone salinity leaching model); appropriateness of using either model to evaluate boron, chloride or sodium; means of determining leaching fraction; and other issues raised by committee members. Discussion points, findings and recommendations for the above issues have been documented in Attachment 1 (CV-SALTS Technical Advisory Committee City of Davis Salinity Study Draft Workplan Recommendations, September 2011).

In addition to discussing the technical issues related to the Salinity Study Workplan, the Technical Advisory Committee also briefly discussed some over-arching policy issues such as the determination of the most sensitive crop to be protected in a given sub-area, the concept of a "reasonable level of protection" (i.e., acceptable range of relative crop yield), and determining appropriate adjustments for drought years. While the Committee recognizes that the policy discussions will continue at the Executive Committee, some factors they agree need to be considered include:

- Evaluating seasonality of cropping and irrigation when reviewing water quality objectives to protect agricultural supply. Literature numbers developed typically provide a margin of safety for stress during different seasonal conditions (e.g., although winter grown crops may be more salt sensitive, they are also being grown in less stressful environment).
- Identifying whether economic viability, as opposed to the presence of a crop in the area, is a better consideration to determine the crops to be protected. Both the percentage of acreage devoted to a particular crop in a region and the economic return of those crops should be considered in establishing the crops that must be protected from salinity impacts.
- Providing adjustments to account for drought situations (e.g., most growers prefer, and can manage, sufficient quantities of poorer quality water as opposed to restrictions on the quantities of water provided to them.)

We appreciate the opportunity to comment on the City of Davis draft salinity workplan and anticipate that our recommendations will be incorporated into the final study.

Nigel Quinn
Chair, CV-SALTS Technical Advisory cCommittee

Parry Klassen
Chair, CV-SALTS Executive Committee

Cc: Stan Grczko City of Davis

Pamela Creedon, Executive Officer, Central Valley Regional Water Quality Control Board

Attachment 1. CV-SALTS Technical Advisory Committee
City of Davis Salinity Study Draft Workplan Recommendations
September 2011

1) Applicability of Woodland data to the City of Davis study.

The cropping pattern identified in the City of Woodland study is likely similar to the City of Davis case since the majority of agricultural use will occur within the Yolo Bypass. The Committee concurred with initial Central Valley Water Board staff comments that the City of Davis must clearly delineate the areas that utilize the downstream receiving waters as agricultural supply, confirm the types of crops grown in these areas, investigate cropping patterns and growth cycles of crops, and identify the most salt sensitive crop(s) to be protected.

Finding: The draft workplan appears to adequately address the above needs.

2) Use of the Hoffman model to evaluate the results from the Grattan model.

The Committee expressed concern with using a steady state model (Hoffman) to evaluate a transient state model (Grattan) and noted that the steady state model is very conservative.

The finding that a steady state model provides more conservative results than a transient model appears to be based upon the results obtained with the steady state model developed by Ayers and Westcot.[1] The Central Valley Regional Water Quality Control Board (CVRWQCB) has traditionally used the Ayers and Westcot model to assist staff in establishing NPDES permit effluent limits.

The Ayers and Westcot model assumes a plant water use pattern of 40-30-20-10, which means the plant gets 40 percent of its evapotranspiration demand from the upper quarter of the root zone, 30 percent from the next quarter, 20 percent from the next, and 10 percent from the lowest quarter. The soil-water salinity is calculated as the linear average of these four zones. This is a primary criticism of the model. According to Letey et al. (2011), the assumption that plants respond to a linear average soil-water salinity is not supported by experimental evidence.[2] Rather, most water is extracted from the upper parts of the root zone where the salt concentration is not very sensitive to the leaching fraction.

The Ayers and Westcot model also does not consider the dilution effects of rainfall. This omission is cited as another reason why the model provides conservative results. The transient model for the City of Woodland study was specifically developed by Grattan to address the fact that rainfall is not taken into account in the Ayers and Westcot model.[3] Grattan (2006) states on page 12: "The main goal of our model is to determine the extent by which rainfall will reduce the seasonal average root zone salinity, allowing the use of higher salinity water."

The Hoffman steady state model recognizes water uptake by plants does not necessarily correspond to a linear average of soil-water salinity within the root zone.[4] Consequently, the Hoffman model incorporates an exponential soil-water uptake factor. The Hoffman model also accounts for rainfall. Therefore, as noted on page 122 of Hoffman (2010), results obtained by the Hoffman model may not differ appreciably from a transient model, such as the one developed by Grattan, particularly if the leaching fraction is greater than 15 percent, and cropping patterns and irrigation water quality are relatively stable.

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[1] Ayers, R.S. and D.M. Westcot. 1985. *Water Quality for Agriculture*. FAO Irrigation and Drainage Paper 29.

[2] Letey, J. et al. 2011. *Evaluation of Soil Salinity Leaching Requirement Guidelines*. Agricultural Water Management.

[3] Grattan, S.R. and D. Isidoro-Ramirez. 2006. *An Approach to Develop Site-Specific Criteria for Electrical Conductivity, Boron and Fluoride to Protect Agricultural Beneficial Uses*.

[4] Hoffman, G.J. 5 January 2010. *Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta*. Final Report.

Transient models have shortcomings as well. On page 122, Hoffman (2010) states:

> The steady state model appears to be very reasonable at leaching fractions above 0.15. At least two groups of scientists and engineers are currently working on comparing the transient models described here and several others and attempting to resolve which model(s) should be used. One must keep in mind that transient models require a large amount of input data which are not always available. It is hoped that within a few years transient models will have been developed and field tested so that they may be used with confidence.

The workplan for the City of Davis study indicates the crop tolerance model for electrical conductivity (EC) will be determined in consultation with the CVRWQCB.[5]

The preference from the subcommittee is to shift to the use of a transient model, but group did not recommend defaulting to the Grattan model until peer review was completed through field testing. The group also noted that building in water management (e.g. method of application and seasonality of use) may alleviate some salinity concerns.

Recommendation: Use of the Hoffman model as an initial check on Gratten model results can be tried as long as some of the basic differences between the models are understood. If the two model results are "considerably" different (e.g., greater than 100 mg/L TDS difference), conduct further review to determine why.

The Hoffman and Grattan models will provide estimates of soil salinity that will result from the conditions simulated by the models. The modeled soil salinity will be compared to a response curve that relates the relative yield of a particular crop to soil salinity.[6] If this comparison indicates the modeled soil salinity will not result in an unacceptable crop yield then the agricultural (AGR) beneficial use of waters from the Willow Slough Bypass, Conaway Ranch Toe Drain, and/or Yolo Bypass, which receive treated effluent from the City of Davis, has been protected.

The available response curves for many crops are based on data obtained from experiments that were conducted 20 to 30 years ago. The salt tolerances of these crops may be higher today than when the experiments were performed because new and improved varieties are now probably being grown. For this reason, Hoffman (2010) on page 102, recommended that a field experiment be conducted to ensure the salt tolerance of beans is established for local conditions before setting the salinity water quality standard for the South Delta. Consideration should be given to performing similar field experiments if available response curves do not pertain to the crop varieties being grown in the City of Davis study area.

3) Is it appropriate to run the Grattan or other model to evaluate boron, chloride and/or sodium water quality objectives?

No known models were identified for sodium or chloride. Grattan tried to adapt his model to account for the behavior of boron in soil. However, after consulting with soil chemists at the U.S. Salinity Laboratory, Grattan (2006) states on page iv that boron "adsorption/desorption processes are highly dependent upon soil mineralogy, clay content, surface area, organic matter content and pH." On page 31, Grattan (2006) concluded that his model is "not appropriate to predict soil boron behavior nor could it be readily adapted to account for complex soil boron chemistry." There was some speculation that the UC Salinity Laboratory may have a boron model, but that the model would be calibrated for boron concentrations at a much higher level than those seen in the City of Davis treated effluent.

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[5] Larry Walker Associates. February 2011. *EC, Boron, Sodium and Chloride Study Workplan*. p. 4.

[6] According to University of California, Davis, University of California Irrigation Program publication titled *Agricultural Salinity and Drainage*, revised 2006, the most common method of experimentally determining soil salinity is to measure the EC of the solution extracted from a saturated soil paste sample. This measurement is frequently called the salinity of the saturation extract (EC_e).

Recommendations: Rather than attempting to model boron, chloride, or sodium, the Committee recommends reviewing literature values to identify any potential concerns and to follow up on those concerns by reviewing current management practices. In particular, chloride impairment can be related to how the water is applied (sprinkler vs. furrow) and infiltration issues associated with sodium (binding of surface soils) may be offset by higher overall salinity concentrations. The Committee also recommended evaluating current sodium concentrations in groundwater and current management practices utilized by growers irrigating with groundwater to determine whether current practices already account for and mitigate elevated sodium concentrations.

4) Leaching fractions

Both steady state and transient models rely upon water and salt mass balances. According to Letey and Feng, steady state models require the constant flow of water.[7] Under these conditions, the mass balance dictates the salinity of the drainage water leaving the root zone (EC_{dw}) is equal to the irrigation water salinity (EC_w) divided by the leaching fraction (LF). The salinity of the drainage water is given by the following equation under steady state conditions:

$$EC_{dw} = \frac{EC_w}{LF}$$

In contrast, transient models use the Darcy-Richards equation to estimate water flow and the advection-dispersion equation for a non-reactive, non-interacting solute to estimate salt transport. Information on soil properties is needed for a transient model. Besides soil properties, transient models are required to account for all of the time dependent variables encountered in the field. Letey and Feng (2007) indicate these variables include "switching crops with different salinity tolerance, variable irrigation water salinity including rainfall that is pure, timing and amount of irrigation, initial soil salinity conditions, etc."

The Hoffman model (steady state) has typically utilized 15 to 20percent as the leaching fraction. This fraction has been calculated in the San Joaquin Valley through a mass balance approach using tile drainage and applied water data. While the methodology is adequate, the same data set is not currently available for the Yolo Bypass. The Grattan model utilizes the Darcy-Richards and advection-dispersion equations rather than the assumption of a specific leaching fraction input. In other words, the Grattan model simulates leaching rather than assuming a fixed leaching fraction value.

Recommendation: For the Hoffman model, utilize a range of 15 to 20 percent for the leaching fraction input to represent conditions in the Bypass. If utilizing rice as the most limiting crop, recognize that the current management practice of ponding irrigation water alleviates some salt impact since salt does not accumulate in the soil profile during the growing season.

5) Other technical considerations

The Committee discussed in detail the importance of irrigation water management in mitigating anticipated impacts from suboptimal water quality and provided two additional recommendations.

Recommendation: Initial study results should be discussed with the local agricultural commissioner, UC Cooperative Extension, and local growers to determine if the actual users of the water have any specific concerns with the study assumptions, findings, or the numbers being developed.

Recommendation: Should consider the potential to have different objectives during different growing seasons (e.g. winter cropping).

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[7] Letey, J. and G.L. Feng. 2007. *Dynamic Versus Steady-State Approaches to Evaluate Irrigation Management of Saline Waters*. Agricultural Water Management.

A Framework for Salt/Nitrate Source Identification Studies

1. Introduction

At the April 22, 2011 Executive Committee Meeting, the Knowledge Gained Subcommittee presented a technical memorandum, dated April 15, 2011, to the Executive Committee outlining the framework for preparing salt/nitrate source identification studies. The Executive Committee approved the basic elements provided in the memorandum and directed the Knowledge Gained Subcommittee to complete a more detailed framework document. This document provides the more detailed framework for preparing regional-scale salt/nitrate source identification studies in the Central Valley, as requested by the Executive Committee.

Our recommendation is that salt/nitrate source identification studies be conducted in a phased manner to promote cost-effective and timely evaluations, and to provide an opportunity for on-going stakeholder input to data evaluations. We have developed a detailed approach for preparing "Initial Studies" consisting primarily of initial data gathering and simplified modeling to establish water budgets and salt/nitrate balances for each identified Study Area.[1] The Knowledge Gained Subcommittee also recommends that the Initial Studies include basic summary information about known contamination and impairment, recycled water and groundwater recharge projects, regulatory parameters, and local planning programs and monitoring pertaining to salt and nitrate within the Study Area.[2] Such basic information will be useful to Stakeholders for prioritizing Study Areas and evaluating the need and scope for subsequent "Follow-up Studies" needed to complete a comprehensive Salt and Nitrate Management Plan for the entire Central Valley.

[1] We use the term "Study Area" throughout the document to define planning areas within the Central Valley. At this point we have not attempted to define Study Areas beyond thinking of them as small enough to be effectively managed and modeled. The framework described herein is intended to guide regional-scale salt/nitrate source identification studies and is not necessarily applicable to source identification studies that would be accomplished on a facility- or municipal-scale basis, although much of this framework is scalable for those applications.

[2] Such information does not include detailed evaluations of the current management and policy issues in Study Areas. However, we recognize the value and need for such evaluations and recommend that they be completed simultaneously with, but separate from, the Initial Studies.

At this point, we have not developed a detailed approach for preparing subsequent "Follow-up Studies" because the specific scopes of such additional studies will depend on the Initial Study results and region-specific management and policy issues for the Study Area.

2. Technical Study Goals

The goals, or general statements of intent, of the salt/nitrate source identification studies are to provide data and information that can be used to:

- Prioritize Study Areas throughout the Central Valley;
- Understand the linkages between Study Areas;
- Prioritize potential salt/nitrate management practices;
- Develop Salt and Nutrient Management Plans required by the Recycled Water Policy;
- Identify and support appropriate beneficial use and water quality objective changes, and
- Support proposed Basin Plan amendments.

3. Technical Study Objectives

Technical objectives define the strategies or steps to attain the identified goals. To provide flexibility to the parties performing the studies, these objectives are general in nature. Steps for performing studies that comply with these objectives are described in later sections of this document.

The key technical objectives for an Initial Study are:

1. Develop a conceptual model for the Study Area including water budgets and salt/nitrate mass balances;
2. Characterize the movement of water and salt/nitrate into and out of neighboring Study Areas;
3. Develop water budgets and salt/nitrate mass balances that are complete and include an accounting of all components in sufficient detail to identify potential management strategies.
4. Quantify the rate of salt/nitrate accumulation or reduction in surface water and groundwater within a Study Area;
5. Analyze historical and projected salt /nitrate loading rates and concentrations for surface water and groundwater within the Study Area in cases where these loads can be quantified;
6. Provide the information needed to prioritize Study Areas; and
7. Identify and evaluate data gaps, data sensitivity, default assumptions, and data limitations for the Study Area.

Follow-up Studies may be needed for a Study Area based upon stakeholder review of Initial Study results and the region-specific management and policy issues for the Study Area. Technical objectives for a Follow-up Studies may include:

1. Delineate the lateral and vertical extents of regions within a Study Area where beneficial uses are being or have been impaired by salt/nitrate accumulation, or are vulnerable to such impairment;
2. Determine current and legacy salt/nitrate sources that are causing or have caused beneficial use impairment and establish the salt/nitrate load contribution of each source;
3. Assess the fate and transport of salt and nitrate, including surface water mixing and preferential migration pathways (e.g., presence or absence of low permeability strata, proximity of irrigation or potable supply wells),
4. Ensure compliance with the salt and nutrient management plan requirements of the Recycled Water Policy, and
5. Characterize temporal variations in salt/nitrate loads that may influence implementation of management practices, such as the Real Time Management Program of discharges to the San Joaquin River.

4. Technical Study Approach

Studies should be conducted in a phased approach to promote cost-effective evaluations and provide an opportunity for stakeholder input at intermediate points in the technical study process.

Initial Studies should be completed for all Study Areas. They should consist of the initial data gathering and simplified modeling to establish water budgets and salt/nitrate balances and the collection of additional basic summary information about known contamination and impairment, recycled water and groundwater recharge projects, regulatory parameters, and local planning programs and monitoring pertaining to salt and nitrate within the Study Area.

INITIAL STUDIES

Step 1: The first step in an Initial Study is a clear delineation of the Study Area and a description of Study Area characteristics. All studies should employ a clearly defined Study Area, with horizontal and vertical boundaries that are consistently used as the frame of reference for all subsequent evaluations. Boundaries may include a combination of natural hydrological boundaries (watersheds and groundwater basins), water supply and wastewater infrastructure, locations of existing salty/nitrate regulatory endpoints, land use, data availability, coverage and format, and political boundaries such as water districts, agricultural coalitions, and Integrated Regional Water Management (IRMW) planning areas. Wherever possible, Study Areas should be defined by natural boundaries because use of political boundaries will complicate and increase the cost and amount of time it takes to develop water budgets and salt/nitrate mass balances. Study area characteristics should include climate, physiography, geology, hydrology, and hydrogeology. We recommend using GIS to delineate Study Areas and Study Area features to promote consistency between Study Areas, but equivalent geo-referenced data are acceptable.

Step 2: The second step in an Initial Study is the development of water budgets.[3] A water budget is the characterization and accounting of inputs (water sources), outputs (water sinks), and changes in water volume (e.g., groundwater elevation changes) for a defined Study Area. Examples of water sources and sinks are provided in the attached Salt/Nitrate Balance Study Evaluation Checklist (Table 1). The study also may need to identify constraints to the water budget as applicable[4] (e.g. permit terms, environmental regulations, risk management). *The development of accurate water budgets is the foundation of the salt/nitrate mass balances.*

Step 3: The third step in an Initial Study is the development of salt/nitrate loads and mass balances. All salt/nitrate sources, sinks, and concentrators are identified with appropriate quantitative, location, and associated land use data. Examples of salt/nitrate sources, sinks, and concentrators are provided in the attached Salt/Nitrate Balance Study Evaluation Checklist (Table 1). This information is used in conjunction with the water budgets to estimate salt/nitrate loads and to complete accompanying mass balances. Salt/nitrate loads being discharged to a particular water body are estimated by multiplying the flow volume of each discharge by its total dissolved solids (TDS) (or other measurement of salt concentration) and nitrate concentrations. As with the water budgets, the data and assumptions relied upon to conduct the salt/nitrate mass balances must be clearly identified.

Step 4: The fourth step in an Initial Study is to synthesize and create visualizations of water budget and salt/nitrate mass balance information. Data visualization should be done in consideration of salt/nitrate issues and regulatory endpoints so that stakeholders can determine if the studies are sufficient to accomplish the goals of the study (i.e., the goals established in Section 2 of this document such as establish surface water and groundwater beneficial uses, prioritize Study Areas, understand the linkages between Study Areas, prioritize potential salt/nitrate management practices, identify and support appropriate beneficial use and water quality objective changes, and develop regional Salt and Nutrient Management Plans that act together to protect or restore surface water and groundwater beneficial uses ultimately adopted in the Basin Plan).

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[3] More than one water budget may need to be developed to capture variability in water volumes and management strategies attributable to different hydrologic conditions (e.g., wet, above normal, below normal, dry, and critical water year classifications, dry vs. rainy seasons). For surface water evaluations, we recommend a minimum of a monthly temporal scale for water budgets and salt/nitrate mass balances. For groundwater evaluations, we recommend an annual, or if justified, a longer temporal scale for water budgets and salt/nitrate balances.

[4] It is critical to identify the water that may be consumed in the Study Area and that which must be allowed to pass through or remain in place.

The Knowledge Gained Subcommittee recommends that data be presented in a consistent manner and that minimum data visualization requirements be developed by CV SALTS such that results of studies from different Study Areas can be compared and integrated into a valley-wide conceptual model. Examples of recommended data visualization are water budget diagrams, mass balance diagrams, bar charts, pie charts, histograms and time series graphs. For consistency, we recommend that such data visualizations use the following units:

- Loading rates: tons/day, tons/month, or tons/yr (depending on temporal scale of interest)
- Concentrations: mg/L
- Flowrates: acre-ft/day, acre-ft/month, or acre-ft/yr (depending on temporal scale of interest)

The salt/nitrate source identification studies should be essentially the "common language" between regional Salt and Nitrate Management Plans, so as to allow for some surety that regional management practices will be coordinated and not acting at cross-purposes to one another.

Step 5: The fifth step in an Initial Study is the collection of the additional basic information needed to prioritize Study Areas, identify Study Areas that will require Follow-up Studies, and feed into the comprehensive salt and nitrate management plan for the entire Central Valley. This additional information should include identification and descriptions of known contamination/impairment in the Study Area , recycled water and groundwater recharge projects in the Study Area, regulatory parameters, and local planning programs and monitoring pertaining to salt and nitrate within the Study Area.

FOLLOW-UP STUDIES

The nature and complexity of Follow-up Studies will vary depending on the situation. Additional investigations or computer modeling may be needed to refine water budgets, more accurately characterize temporal salt/nitrate concentration trends, evaluate salt/nitrate fate and transport, or help prioritize management practices needed to meet regulatory endpoints (e.g., attainment of water quality objectives in local and downstream water bodies).

Follow-up Studies may include the following:

- Modeling to develop more refined water budgets, salt/nitrate mass balances, and for other complex analytical needs;
- Evaluation of surface water bodies carrying the largest loads and regions within groundwater basins with the highest salt/nitrate concentrations;
- Evaluation of drivers of surface water and groundwater supply management and of land cover decisions in the Study Area;
- Evaluation of land cover at current development level and at estimated build out (or through end of existing general plan coverage);
- Evaluation of current best management practices in the region; and

- Evaluation of current monitoring gaps and funding/schedule to fill.

DATA COMPLETENESS AND ACCURACY

All data relied upon to conduct the studies should be clearly documented.

The reliability of the water budgets and salt/nitrate mass balances largely depends upon data completeness and accuracy. Data completeness and accuracy varies broadly throughout the Central Valley. Incomplete or conflicting data should be described, and actions taken to address such problems (e.g., using other assumptions supported by references needed to develop salt/nitrate loads and mass balances) should be documented.

Data that has undergone quality assurance/quality control review should be used preferentially to conduct salt/nitrate source identification studies. Other data should be used only after they are reviewed for obvious quality issues, and such data should be clearly documented as being of lower quality. Sensitivity analyses should be conducted to determine whether data variability affects water budgets and salt/nitrate mass balances.

Assumptions will need to be made in cases where no data exist. All assumptions should be clearly identified and, whenever, possible, supported by references. **The Knowledge Gained Subcommittee recommends that CV SALTS develop a set of approved default assumptions for use when data are not available. Sensitivity analyses can be used to determine whether default assumptions are appropriate, or whether additional data collection or studies are needed.**

5. Suggested Initial Study Outline

A suggested general outline for Initial Study report, along with a brief description of each report section, is provided below. In addition, the attached Salt/Nitrate Balance Study Evaluation Checklist (Table 1) provides much more detail and should be reviewed and used in conjunction with the outline below. Recommended outline for Initial Study reports:

- Description of the Study and Physical Description of Regions: This section should include an overview of the study goals and objectives, the constituents addressed in the study, and any stakeholders participating in study. In addition, both written and graphical descriptions should be provided of regional, watershed, and groundwater basin boundaries; areal extent of the region; climate, water sources, hydrology, geology, hydrogeology, and land use of the region.

- Data: This section should identify data sources, discuss data quality, limitations and sensitivity, and describe any assumptions used and the basis for those assumptions..

- Water Budgets: Regions should develop one or more water budgets that characterize the water dynamics and use of the region, at spatial and temporal scales that are appropriate for salt/nitrate management. This section should include a conceptual model of the budgets; discuss factors influencing the budgets; identify and quantify the significant surface and groundwater sources entering and pathways leaving the region; and should develop and discuss the water balances. All assumptions upon which the water budgets were based should be clearly identified, and the bases for the assumptions should be explained and, where possible, supported by references.

- Salt/Nitrate Loads and Mass Balances: Regions should develop salt/nitrate loads and mass balances that correspond to each water budget developed. This section should identify all significant salt/nitrate sources and sinks; quantify salt/nitrate loads associated with each source and sink; prioritize sources to surface water and groundwater, and estimate the rate of salt/nitrate accumulation or loss and project groundwater TDS/nitrate concentrations into the future. Representative TDS/nitrate concentrations used to calculate salt/nitrate loads should be identified. All assumptions upon which the mass balances were based should be clearly identified, and the bases for the assumptions should be explained and, where possible, supported by references. Data gaps and recommended areas of further study, if needed, should be discussed.

- Additional Basic information: For each Study Area, additional basic information should be collected that will be needed for the overall CV-SALTS effort. This additional information should include a summary of:

  - Known contamination/impairment in the Study Area – this information could be obtained from individuals, organizations, or agencies familiar with water quality issues in the Study Area (e.g. County Environmental Health Departments, Integrated Regional Water Management Groups, water purveyors. water users)
  - Recycled water and groundwater recharge projects in effect or planned in the Study Area
  - Regulatory requirements, beneficial uses, local planning objectives, and existing management programs and strategies pertaining to salt and nitrate loads and concentrations within the Study Area, and
  - Surface water and groundwater monitoring programs collecting flow, groundwater level, and salt and nitrate-related water quality data.

Version 8

CV-SALTS Annual Meeting Calendar 2011

JANUARY

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Sac Regional

FEBRUARY

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Sac Regional

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Sac Regional

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Sac Regional

MAY

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Sac Regional

JUNE

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Sac Regional

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Sac Regional

AUGUST

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Sac Regional

SEPTEMBER

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ACWA Downtown

OCTOBER

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Sac Regional

NOVEMBER

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ACWA Downtown

DECEMBER

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12	13	14	15	16	17	18
19	20	21	22	23	**24**	**25**
26	27	28	29	30	31	

Cal EPA?

SALTY 5 Coordination Meetings

1/3/2011	Salty 5 January
2/7/2011	Salty 5 February
3/7/2011	Salty 5
4/4/2011	Salty 5
5/2/2011	Salty 5
6/6/2011	Salty 5
7/11/2011	Salty 5
8/1/2011	Salty 5
9/12/2011	Salty 5
10/3/2011	Salty 5
11/7/2011	Salty 5
12/5/2011	Salty 5

CV-SALTS Committee Meetings

2/24/2011	Salinity Leadership Group
1/20/2011	Committees Meetings
2/10/2011	Committees Meetings
3/17/2011	Committees Meetings
4/12/2011	Committees Meetings
4/22/2011	Committees Meetings
5/12/2011	Committees Meetings
5/24/2011	Committees Meetings
6/16/2011	Committees Meetings
6/23/2011	Committees Meetings
7/21/2011	Committees Meetings
8/9/2011	Committees Meetings
8/18/2011	Committees Meetings
9/13/2011	Committees Meetings
9/15/2011	Committees Meetings
10/19/2011	Committees Meetings
10/20/2011	Committees Meetings
11/17/2011	Committees Meetings
12/15/2011	Committees Meetings
1/11/2011	LSJR Committee
2/17/2011	LSJR Committee
3/24/2011	LSJR Committee

Potential Conflicting Meetings

6/7/2011	State Board Meeting
6/8/2011	Regional Board Meeting
6/8/2011	State Board Meeting
6/9/2011	Regional Board Meeting
6/10/2011	Regional Board Meeting
6/21/2011	State Board Meeting
6/22/2011	State Board Meeting
7/5/2011	State Board Meeting
7/6/2011	State Board Meeting
7/19/2011	State Board Meeting
7/20/2011	State Board Meeting
8/2/2011	State Board Meeting
8/3/2011	Regional Board Meeting
8/3/2011	State Board Meeting
8/4/2011	Regional Board Meeting
8/5/2011	Regional Board Meeting
8/16/2011	State Board Meeting
8/17/2011	State Board Meeting
9/6/2011	State Board Meeting
9/7/2011	State Board Meeting
9/20/2011	State Board Meeting
9/21/2011	State Board Meeting