

Section 1

Project Overview

1.1 Background

Central Valley Salinity Alternatives for Long Term Sustainability (CV-SALTS) is developing a comprehensive regulatory and programmatic approach to the management of salt and nitrate in the Central Valley that is consistent with the State Recycled Water Policy (SRWP). This work is being done with the Central Valley Regional Water Quality Control Board (Regional Board), the State Water Resources Control Board (State Board), the Central Valley Salinity Coalition and Stakeholders. As stated in the CV-SALTS Strategy and Framework document, the strategy to fulfill the requirements of the SRWP is to adopt a Central Valley Salt and Nutrient Management Plan (SNMP) and revise the Basin Plans applicable to the Central Valley to facilitate implementation of the SNMP. Fulfillment of this strategy will establish the basis for short and long-term management of salt and nitrate across the Central Valley.

The SWRP states the following:

“It is the intent of this Policy that salts and nutrients from all sources be managed on a basin-wide or watershed-wide basis in a manner that ensures attainment of water quality objectives and protection of beneficial uses....the appropriate way to address salt and nutrient issues is through the development of regional or subregional salt and nutrient management plans rather than through imposing requirements solely on individual recycled water projects.”

Among other things, the SRWP requires that development of the SNMP include the following element (SRWP Section 6.b.3 (e)): “Implementation measures to manage salt and nutrient loading in the basin on a sustainable basis”. Inherent to the development of implementation measures for the management of salt in the Central Valley is making an *a priori* determination regarding where policymakers want the salt to go, or be disposed of, in the region over the long-term. Alternatives for salt disposal range from keeping the salt on site to transporting it elsewhere within the Central Valley (“in-valley”) or exporting it out of the Central Valley (“out-of-valley”), e.g., through ocean disposal.

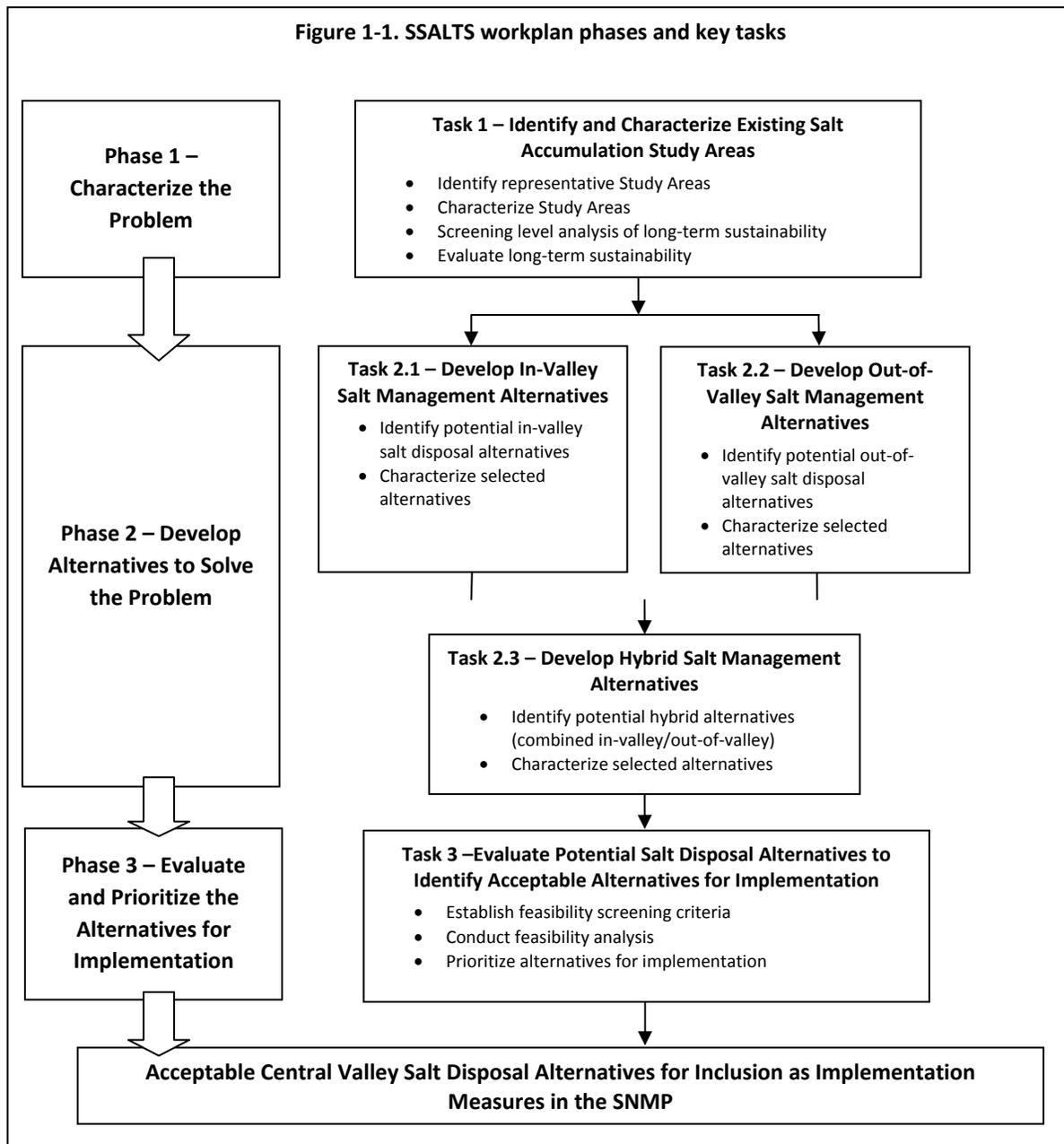
To identify the best alternatives for long-term salt management, CV-SALTS has identified the need to implement work in the area of implementation planning through initiation of the Strategic Salt Accumulation Land and Transportation Study (SSALTS). The purpose of this study is to identify the range of viable Central Valley alternatives for salt disposal (taking into account regulatory, institutional, economic, and technological issues) to provide input for consideration during development of the SNMP for the Central Valley. The findings will also be used to guide discussions regarding the need for changes to the existing Basin Plan to facilitate salt disposal in a manner that is most beneficial to the region covered by the SNMP.

1.2 Workplan Purpose

The findings from completion of SSALTS will provide input to policymakers regarding where opportunities exist to dispose of salt over the long term. The deliverables from this study will provide CV-SALTS with timely, strategic identification of potential viable alternatives for salt disposal in a manner that is sustainable over the long term. Potential alternatives for salt disposal range from expanded use of existing salt disposal areas, establishment of new salt disposal areas within the Central Valley, export or transport of salt out of the Central Valley, or some combination of the above. The findings will provide important input to the development of the SNMP under Phases 2 and 3 of Conceptual Model development and provide information to support development of the Basin Plan Amendment to adopt the SNMP for the Central Valley.

SSALTS will be conducted in three phases that (1) characterize the problem; (2) develop alternatives to solve the problem; and (3) evaluate and prioritize the alternatives. These phases are further described below and in **Figure 1-1**.

- *Phase 1, Identify and Characterize Existing Salt Accumulation Study Areas* - SSALTS will identify representative Study Areas that serve as prototype examples of existing salt accumulation areas in the Central Valley. Phase 1 is not an attempt to identify all potential locations; instead, the selected Study Areas will provide (a) a representative cross-section of situational examples or settings where salts accumulate, and (b) provide information regarding why salts accumulate in these areas. Characterization of the representative Study Areas will include an analysis of the capacity, longevity, and costs associated with continued salt accumulation in these areas and provide a forecast regarding the likelihood that these areas will remain viable for continued salt accumulation at a minimum of a 50-year planning period. This 50-year planning horizon will be extended where practicable to provide a general assessment of sustainability at 50-year increments beyond the initial 50-year period. Phase 1 will utilize existing studies and data and will be coordinated closely with other CV-SALTS activities.
- *Phase 2, Develop Potential Salt Management Strategies* - SSALTS will develop potential long-term salt disposal alternatives in three parts:
 - *Develop In-Valley Salt Management Alternatives* - SSALTS will analyze the Phase 1 Study Areas to determine if these areas can be expanded to increase the opportunity for their continued use for salt disposal, and also identify potential new areas that can serve as additional, intentional salt disposal areas in the Central Valley. The outcome of this effort will be the identification of in-valley salt disposal alternatives for further evaluation under Phase 3.
 - *Develop Out of Valley Salt Management Alternatives* - SSALTS will develop alternatives to export or transport salt out of the Central Valley. The viability of the identified alternatives will be evaluated under Phase 3.
 - *Develop Hybrid Salt Management Alternatives* – SSALTS will evaluate the in-valley and out-of-valley alternatives to identify potential alternatives that utilize a combined or hybrid approach for managing salt. The viability of any identified alternatives will be evaluated under Phase 3.



- *Phase 3, Evaluate Potential Salt Disposal Alternatives to Identify Acceptable Alternatives for Implementation* – The viability of various alternatives developed under Phase 2 will be fully evaluated using selected feasibility criteria (e.g., regulatory, institutional, economic, technological, etc.). The outcome of this evaluation will be the identification and prioritization of acceptable salt disposal alternatives for incorporation into the developing Central Valley SNMP as salt management implementation measures.

To meet the goals of the SSALTS, this Workplan will focus on fulfilling the following seven objectives:

1. Complete the technical tasks associated with each of the three SSALTS project phases, as described above and illustrated in Figure 1-1.

2. Work cooperatively and synergistically with other CV-SALTS technical activities, in particular the development of the Initial Conceptual Model (ICM) and preparation of study deliverables consistent with the CV-SALTS Geographic Information System (GIS) framework.
3. Identify representative Study Areas where salt accumulation is occurring and use these areas as “strawmen” for additional analyses, including (a) the viability of the continued use of these areas for salt disposal (Phase 1), (b) developing salt disposal alternatives given the situations illustrated by the Study Areas (Phase 2), and (c) evaluating the feasibility of identified alternatives (Phase 3).
4. Develop list of potential “in-valley”, “out-of-valley”, or combinations thereof (“hybrid”), salt disposal alternatives as example management practices that have the potential to serve as long-term sustainable salt disposal alternatives. In this regard, “sustainable” means implementation of solutions over a 50-year period or longer, and may include (a) implementing alternatives that result in no net gain or reduction in salt within a given area; (b) allowing for acceptable salt accumulation within a given area using approved management practices; or (c) some combination of both. Some options such as real-time salinity management can be viewed as both “in valley” (since they require local actions to implement) and “out-of-valley” (since they ultimately provide a disposal option that reduces the salt load retained in the Central Valley). This could also be considered a hybrid approach.
5. Using feasibility criteria to evaluate potential alternatives for long-term salt disposal, create a prioritized list of alternatives for the Central Valley and inclusion in the SNMP as acceptable implementation measures. While “in-valley” and “out-of-valley” alternatives are shown as being evaluated at the same time in Figure 1-1 and 2-1, in practice, out-of-valley solutions would most likely be considered first in a stepwise analysis since the remaining salt load, after accounting for that mass that could safely be exported from the Central Valley, would be that requiring long-term disposal for each given area.
6. Provide support for the development of the SNMP by providing information on acceptable salt management alternatives that can be used as a menu for salt disposal, which can help guide the development of specific alternatives within management zones.
7. Provide input to Executive Committee policy discussions regarding acceptable salt disposal alternatives.

1.3 Linkage to Other CV-SALTS Technical Studies

Consistent with the CV-SALTS Workplan, SSALTS is one of several technical studies being implemented to support development of the Central Valley SNMP. While each study fulfills a particular data or information need, all are linked in some manner to fulfill the larger purpose of establishing a SNMP for the Central Valley (e.g., as shown in **Figure 1-2**). Accordingly, implementation of the SSALTS Workplan will be coordinated closely with other ongoing technical studies and projects. In particular, SSALTS will coordinate closely with the following technical activities:

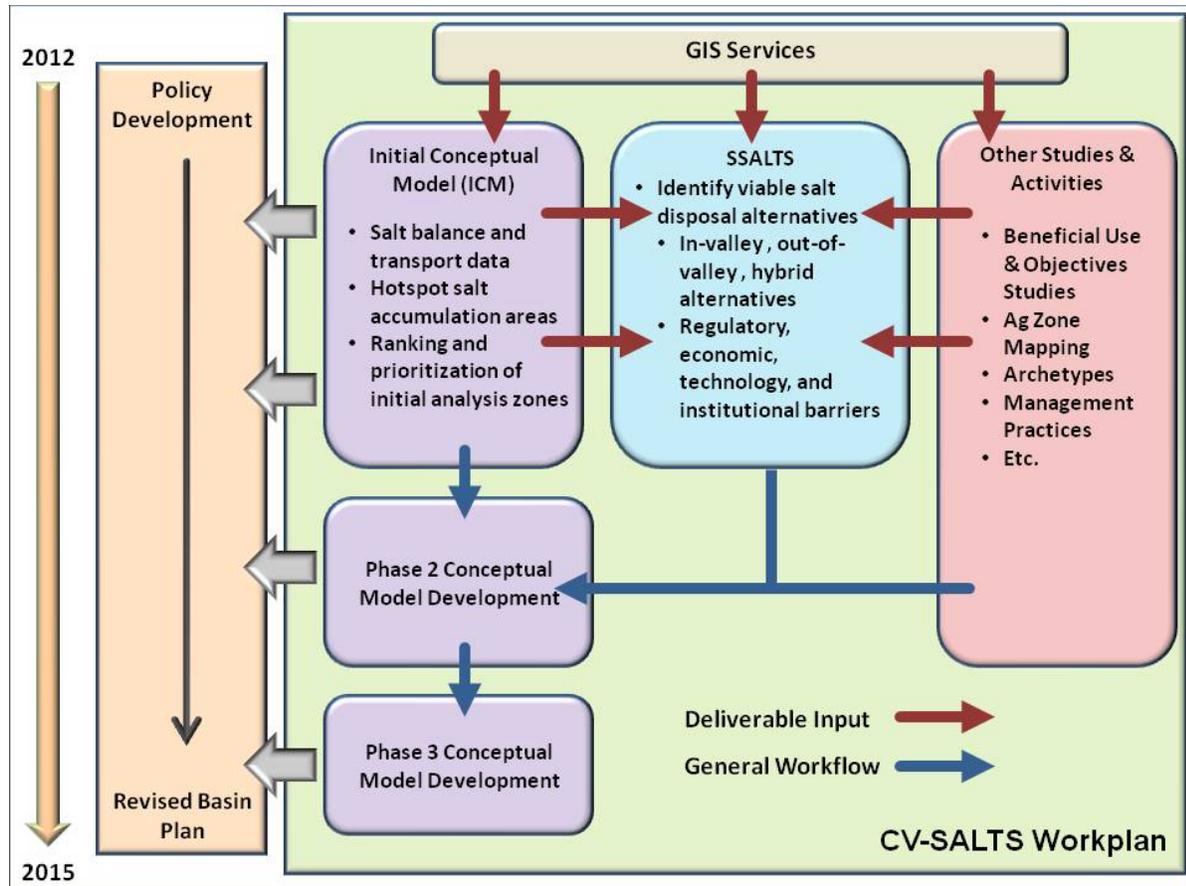


Figure 1-2. Relationship between SSALTS and other CV-SALTS studies or activities occurring under the CV-SALTS Workplan

- GIS Services** – CV-SALTS is continuing to develop a comprehensive GIS framework upon which the SNMP will be based. This effort includes the development of additional map layers and associated attribute data to support CV-SALTS technical studies and policy discussions. SSALTS will utilize the deliverables from this effort wherever appropriate. Conversely, all SSALTS GIS-related deliverables will be consistent and compatible with the developing CV-SALTS GIS framework.
- Conceptual Model Development** – CV-SALTS is developing a Conceptual Model in three phases. Development of this model provides the technical basis to unify data and modeled information from across the Central Valley to understand salt and nitrate characteristics at various geographic scales and support salt and nutrient management planning activities, including preparation of the SNMP. The first phase or ICM will identify initial analysis zones (IAZ) for salt and nitrate, develop methods for analyzing salt and nitrate characteristics within IAZs, describe existing salt transport and balance in the Central Valley, and identify hot spots and priorities for salt management. The ICM will also include analysis of salt and nitrate balances in two selected Central Valley subareas. Completion of this analysis provides the opportunity to develop a template for salt/nitrate analyses envisioned under subsequent Conceptual Model development phases, e.g., at a management zone level.

Phase 2 of Conceptual Model Development will initiate efforts to develop an SNMP for the Central Valley. This phase will utilize the data, methodologies and results developed as part of the ICM to

refine the conceptual model and establish an understanding of the interconnectedness of water balance, salt, and nutrient modeling for the Central Valley. The findings from the ICM and refinements in Phase 2 will provide the basis for the delineation of management zones for incorporation into the SNMP. During Phase 3, a draft Central Valley SNMP will be prepared that includes an implementation program and proofs of concept. This effort will include other analyses critical to adoption of the SNMP as a Basin Plan Amendment, e.g., economic analysis of proposed implementation alternatives and antidegradation analysis.

SSALTS will use the IAZ-specific data generated by the ICM project effort where appropriate to support preparation of SSALTS deliverables, e.g., the viability of implementing potential salt disposal alternatives for selected Study Areas. Just as the ICM project deliverables will inform the SSALTS analysis, the findings from SSALTS will inform subsequent phases of the development and application of the Conceptual Model to evaluate implementation alternatives. **Figure 1-3** summarizes the proposed SSALTS deliverable schedule in the context of the ICM Workplan deliverable schedule and expected schedules for Phases 2 and 3 leading to the development of a draft SNMP. Of critical importance is that the key findings from SSALTS be completed in sufficient time to inform Phase 2 and 3 of SNMP development. That is, the identification of acceptable salt disposal alternatives under SSALTS provides the basis for the development of the implementation elements of the draft SNMP.

- *Other Studies and Activities* - CV-SALTS has completed or has ongoing other technical activities that can inform the SSALTS project. Deliverables from these efforts will be used as needed to support execution of SSALTS tasks.

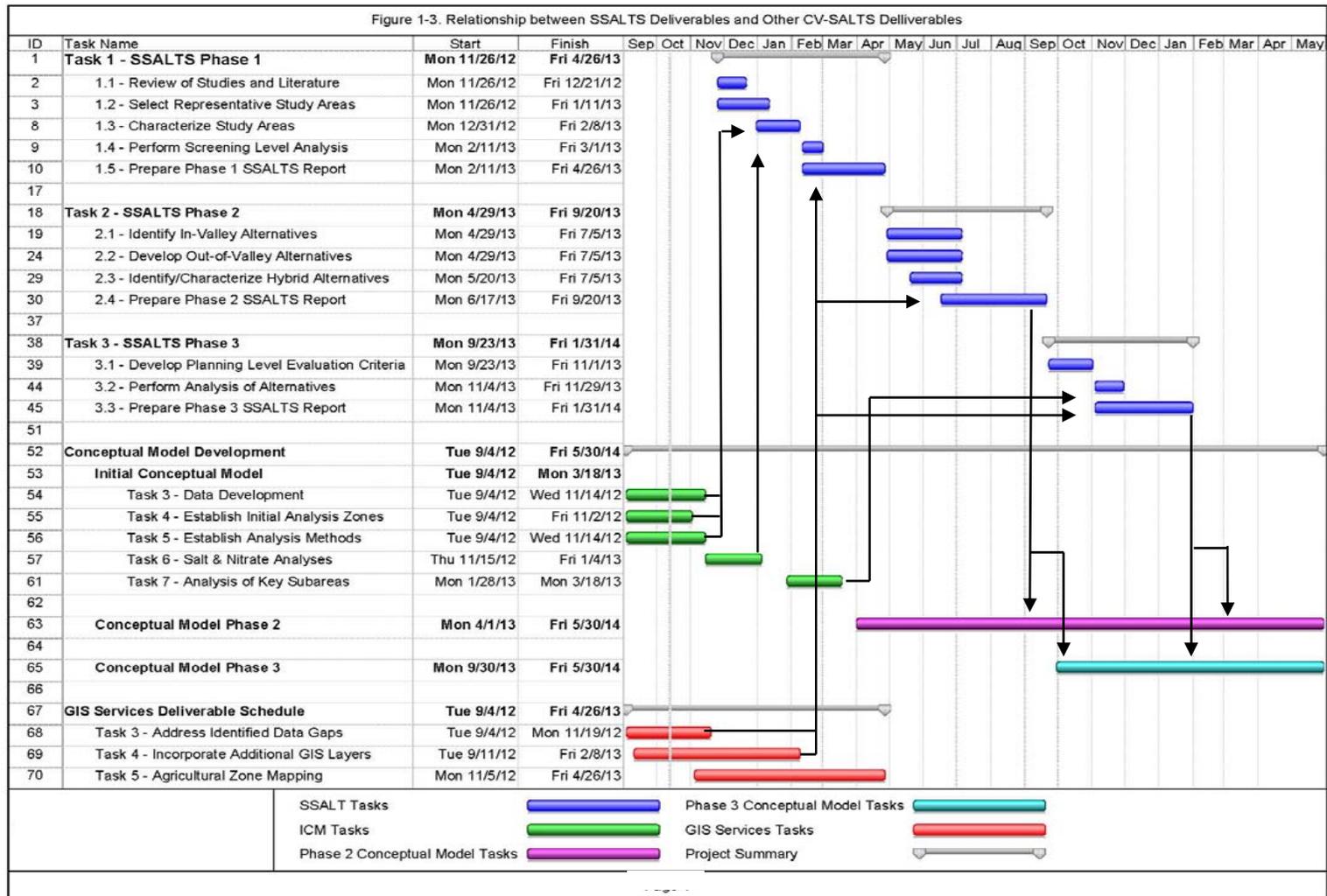


Figure 1-3. Primary linkages between SSALTS deliverables and other CV-SALTS project deliverables.

Section 2

Workplan Tasks and Schedule

2.1 Workplan Tasks

SSALTS will be conducted in three phases and will build on ongoing CV-SALTS technical studies or projects. In addition, it will guide upcoming CV-SALTS projects that focus on the development of implementation measures for inclusion in the SNMP. This Workplan addresses the objectives described in Section 1.2 through the completion of four primary tasks:

- Task 1 – Phase 1, Identify and Characterize Existing Salt Accumulation Study Areas
- Task 2 – Phase 2, Develop Potential Salt Management Strategies
- Task 3 – Phase 3, Evaluate Potential Salt Disposal Alternatives to Identify Acceptable Alternatives for Implementation
- Task 4 – CV-SALTS Coordination Activities

An additional Task 5 is included as a placeholder for follow-up studies or analyses, if deemed necessary during the execution of this Workplan.

Phase 1 (Task 1) activities are described in detail below. Work to be conducted under Phases 2 and 3 is also described, but with the proviso that the Workplan for these tasks may be modified where appropriate to take into account Phase 1 findings or findings made as part of other CV-SALTS projects. The need to revisit the scope of work contained in Phases 2 and 3 will be evaluated as part of the review of the reports completed under each phase.

The following text describes the work to be completed under each of the SSALTS primary tasks. Section 2.2 describes the deliverables for each task, and Section 2.3 provides a general schedule for completion of the SSALTS project.

Task 1 - Phase 1, Identify and Characterize Existing Salt Accumulation Areas

Under Phase 1, SSALTS will identify representative Study Areas where salt is accumulating either intentionally (e.g., industrial or municipal activities) or unintentionally (e.g. natural occurrences or non-point sources). The representative Study Areas will serve as prototypes for the development and characterization of salt management strategies in Phase 2 under various situations or scenarios. The prototype areas will be of sufficient size to adequately identify the salt accumulation problem and serve as a prototype to assist with identifying solutions under subsequent phases.

Phase 1 will start with a review of previous CV-SALTS studies and recent literature. The review will focus on identifying areas where available data and mass balance estimates indicate that salt is accumulating within the Central Valley. Following completion of this review, prototype areas will be selected for characterization in sufficient detail to allow a high level screening analysis of the potential for these areas to continue to accumulate salt over the long-term. To complete this effort, the following tasks will be executed:

- *Task 1.1, Review of Studies or Literature Regarding Salt Accumulation in the Central Valley – Available CV-SALTS studies and historic, but relevant, literature (including salinity-related research conducted during the 1980s and 1990s) will be reviewed to document baseline salt accumulation information or data applicable to the Central Valley. Preparation of this Workplan included an initial review of the following documents (in order of publication date):*
 - *CV-SALTS Management Practice Screening Tool Outline: Preliminary Draft*, prepared by the BMP Subcommittee, December 2011
 - *CV-SALTS Salt and Nitrate Sources Pilot Implementation Study Report (“Pilot Study”)*, prepared by Larry Walker Associates (LWA), February, 2010
 - *The Economic Impacts of Central Valley Salinity*, University of California Davis Final Report to the State Water Resources Control Board, Contract 05-417-150-0, March, 2009
 - *California Water Plan Update 2009, Volume 2. Resource Management Strategies, Chapter 18, Salt and Salinity Management*, California Department of Water Resources, 2009
 - *Salinity in the Central Valley: An Overview*, Central Valley Regional Water Quality Control Board, May, 2006
 - *San Luis Drainage Feature Re-evaluation Final Environmental Impact Statement*, U.S. Bureau of Reclamation, May 2006
 - *A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley*, San Joaquin Valley Drainage Program, September, 1990
 - *Water Quality for Agriculture. Food and Agriculture Organization (FAO) of the United Nations Irrigation and Drainage Paper 29 Rev. 1*, Ayers, R. S. and D. W. Westcot, 1985

Identification of additional relevant studies or literature for review under this task will include a query to CV-SALTS participants (e.g., Executive Committee, Technical Advisory Committee [TAC], Regional Board Staff, CV-SALTS contractors [e.g., ICM project participants], and other stakeholders). Based on the study/literature review, the deliverable for this task will be a tabular summary of documents reviewed and their relevance to SSALTS (if any) and, if relevant, brief summary of key findings. This summary will be submitted to the TAC for review and comment.

- *Task 1.2, Select Representative Salt Accumulation Study Areas – The outcome from this task will be a list of up to ten (10) representative salt accumulation Study Areas for further analysis under subsequent tasks and project phases. For the purposes of this task, salt accumulation areas are defined as areas where the total input of salt exceeds the total output. Study Areas will be selected based on consideration of five general criteria. Specifically, Study Areas should:*

- Include representative areas with existing salinity concerns that can be used as prototypes for strategically developing salt disposal alternatives under the SNMP.
- Represent a range of conditions (e.g., areal extent, sources of salt, disposal constraints, surface water vs. groundwater, etc.) in order to be useful for implementation planning in SSALTS.
- Support evaluation of alternatives to strategically identify the best available or acceptable options to address salt disposal given the set of facts associated with a given Study Area.
- Provide opportunities to evaluate a variety of disposal alternatives and allow the results to be scalable or extrapolated to other Central Valley areas with similar disposal issues.
- Consider, but not necessarily be constrained by, regulatory barriers to implementation. In this regard, SSALTS can be used to help inform policy decisions necessary during development of the SNMP and Basin Plan Amendment.

Initially, a preliminary list of potential Study Areas will be developed for consideration. This list will be generated from the findings of Task 1.1 and input that will be requested from the Executive Committee, TAC, Regional Board staff, and other stakeholders, as deemed necessary. To the extent practicable, development of this preliminary list of Study Areas will consider available reports, data and modeling analyses, previous or ongoing studies (e.g., ICM Task 7 Subarea Analysis), and geographic coverage of the major Central Valley hydrologic basins (Sacramento River, San Joaquin River, and Tulare Lake).

The preliminary list will be submitted to the TAC in a summary tabular format for review and comment. Following revision, as needed, the recommendations will be submitted to the Executive Committee for review, revision (if needed), and approval.

The list of preliminary Study Areas will be fully evaluated to develop a final list of recommended Study Areas for inclusion in subsequent SSALTS analyses. The intent is to develop a final list that includes Study Areas consistent with the concepts described above and representative of a range of sizes (e.g., Tulare Lake Basin or San Joaquin River Basin) and types of land cover and activities (e.g. municipal, industrial, natural, non-point source) that affect salt accumulation. Accordingly, the preliminary list of Study Areas will be chosen to include a range of major land cover or water use sectors such as:

- Agriculture (e.g., irrigated crops, orchard, and dairies);
- Industrial (e.g., food processors, oil and gas extraction);
- Municipal (e.g., POTWs, septic systems); and
- Non-urban (e.g., grasslands, rangeland).

Table 2-1 presents a summary of important ongoing salt management efforts, for the most part compiled by CV-SALTS and summarized on the Regional Board’s website¹. These salt management efforts represent a cross section of land cover or water use sectors and will be used as a starting point for identifying representative salt accumulation areas for this phase and the development and evaluation of salt disposal alternatives in subsequent project phases. Many of the projects and programs listed in Table 2-1 incorporate combined management approaches, including both in-valley salt disposal and out-of-valley export/transport of salt. Much of this list represents relatively small or local areas. As such, this list will be supplemented as needed to achieve the goal of having a range of Study Areas consistent with the concepts described above, including incorporation of one or more large Study Areas that are well known, e.g., the Tulare Lake Basin.

Table 2-1. Ongoing salt management efforts in the Central Valley

Central Valley Basin Planning Area	Project/Program	Description
Tulare Lake Basin	City of Fresno Outreach Program	Implementation of a source control education program to reduce the cost of treatment to remove salts
	Red Rock Ranch Farm Drainage Management System	Implementation of salt management strategies that include relocation and storage; planning for implementation of treatment strategy
San Joaquin River Basin	Westside Drainage Plan	Combination of salt management strategies in use that include land retirement, groundwater management, source control and regional reuse; planning for use of drainage treatment or salt disposal management practices
	Grassland Bypass Project	Combination of salt management strategies in use that include movement of salt out-of-valley and in-valley displacement and storage; planning for implementation of treatment, collection and in-basin salt storage
	Hilmar Cheese Waste Management Project	Implementation of salt management strategy to treat and dispose of saline wastewater
	Stevinson Water District Wetland Project	Combination of salt management strategies in use that include salt displacement, source control and out-of-valley disposal; planning for implementation of real-time management strategy
	Grassland Water District Real-Time Salinity Management Program	Development of real-time management actions such as a web-based, publicly accessible flow and water quality monitoring network and experimentation with drainage salt load scheduling to demonstrate improved capability to manage of salt load export to the San Joaquin River
Sacramento River Basin	City of Dixon Salt and Sodium Reduction Program	Implementation of a source control education program to reduce the cost of treatment to remove salts
	City of Woodland Salt Minimization Project	Implementation of source control salt management; developing an alternate water supply that is a secure and reliable source of lower salinity water
Industry-Specific	Almond Board’s Outreach for Orchard Management	Implementation of education of and outreach salt management strategy
	Wine Industry Recommended Practices	Development and implementation of management practices for managing salt in discharges

¹ http://www.swrcb.ca.gov/rwqcb5/water_issues/salinity/salt_management_efforts/index.shtml. Website provides a list projects and programs previously identified by Regional Board staff in the Central Valley and Delta regions with salt (including nitrate) management as either a primary goal or as a beneficial side effect of actions taken for some other reason (e.g. selenium management). These locations can provide insight into and lessons learned about salt management/disposal management practices being implemented in the region.

Each of the salt accumulation Study Areas will be characterized to identify the primary “sinks” for salt in the selected areas. To be consistent with the CV-SALTS Pilot Study, (LWA, February 2010), this characterization will be based on the following categories where salt accumulates:

- *Surface Waters and Land Surfaces* - Land application areas, evaporation ponds, other standing surface waters.
- *Near Surface Groundwater* – Subsurface water down to the depth where it can potentially interact with surface water via lateral flow and seepage.
- *Deep Groundwater* - The portion of the aquifer system underlying the “near-surface groundwater.”

Use of these categories is consistent with the approach used by the Pilot Study to develop mass balance estimates and will provide a basis for discussion and understanding of potential salt accumulation strategies.

Finally, the evaluation of the preliminary list of Study Areas will document any relevant technical, regulatory or institutional factors that may have bearing on subsequent salt management analyses. Based on the completed evaluation, a final list of up to 10 recommended Study Areas, along with the basis for the recommendations, will be submitted to the TAC for review and comment. Following revision, as needed, the recommendations will be submitted to the Executive Committee for review and approval. Subsequent Phase 1 tasks will begin after approval of this site list.

- *Task 1.3, Characterize Salt Accumulation Study Areas* - Task 1.3 will characterize the Study Areas identified under Task 1.2, based on available data/reports, discussions with affected stakeholders and reasonable extrapolations. No new data collection will be performed. However, as needed, Task 1.3 will be closely coordinated with other CV-SALTS technical studies so that where there are opportunities to obtain data or analysis results through those efforts within the time frame of this task, the data is provided, reviewed and incorporated into this task effort. Task 1.3 will characterize each selected location by completing the following steps:

- Step 1: Characterize the Attributes of Each Study Area:
 - *Physical Attributes:* Water balance (e.g., surface and groundwater hydrology), land cover, soils, topography, and other relevant physical features. Surface water/groundwater model outputs (e.g., WARMF, MODFLO, IGSM, and CVHM) developed under the Pilot Study and new data being developed as part of the ICM will be mined to provide additional information to characterize each location. The developing GIS framework will also be used as appropriate to support this step.
 - *Land Cover Attributes:* Cropping and irrigation practices, industrial processes or dairy operations, urban uses that affect salt accumulation, e.g., use of water softeners.
 - *Institutional, Economic and Regulatory Attributes:* The overlying institutional, economic and regulatory attributes of each study location will be evaluated. Understanding these attributes will be important for evaluating whether existing salt accumulation areas have potential for long-term sustainable operations. Relevant information associated with each type of attribute includes:

- *Institutional* – Municipal wastewater collection systems, water management districts, agricultural irrigation districts, flood control districts, city/county planning and zoning agencies.
 - *Economic* – Economic impacts of changes in water quality, water supply, production of goods and services, income, and employment due to salinity in various economic sectors including municipal and industrial water treatment, food processing, confined animal feeding operations, and agriculture.
 - *Regulatory* - Discharge permit requirements, compliance with beneficial uses, water quality objectives, water rights, or other regulatory factors that potentially impact a specific location.
- Step 2 - Characterize Sources of Salt to Each Study Area: As noted in *Salinity in the Central Valley* (Central Valley Regional Board 2006), sources can be categorized according to their origin using the following four general groupings:
- Evapo-concentrated from directly applied supply water;
 - Added through the dissolution of naturally occurring salts;
 - Through the direct addition of salts, e.g., fertilizers or in food processing; or water softeners; addition of salt in municipal wastewater; and
 - Through the importation of salts via water supply deliveries.

The origin of salt sources to the selected salt accumulation Study Areas will be derived from a review of previous CV-SALTS studies, including the Pilot Study, input from stakeholders and TAC, and information developed during execution of the ICM.

- Step 3 – Characterize the Capacity of Each Study Area: The limiting capacity of each salt accumulation area will be estimated in order to forecast the likelihood of achieving long-term sustainable conditions or not. This information will be of particular value during subsequent project phases. Capacity may be measured directly or indirectly using indicator parameters. Under this task, only the capacity of each Study Area for salt accumulation will be evaluated; under subsequent tasks in Phases 2 and 3, SSALTS will develop and examine possible alternatives for long-term, expanded salt disposal in or near each Study Area, such as increased use of evaporation ponds, or possibly allowing localized subsurface areas or sub-basins to increase in salinity; or implementing additional opportunities for export or transport of salt out of the area.

The approach used to characterize the capacity of a Study Area for additional salt accumulation will likely be site specific, dependent on the nature of the salt accumulation concern associated with the area. Information developed as part of the ICM project will be of particular value for completion of this Step. Specifically, ICM Task 5 will develop a methodology for estimating ambient groundwater quality for salt and nitrate and calculating water, salt and nitrate balance. Task 6 will provide information on salt/nitrate balance and transport in IAZs across the Central Valley. The outcomes from these tasks will be used in this Step to support characterization of the capacity of each salt accumulation area, especially with regards to the groundwater aquifers associated with each Study Area.

In addition this Step could also include an evaluation of the capacity of irrigated agriculture to accumulate salts, if that is a particular concern in a Study Area. In this scenario, capacity may be assessed by the impact of salt accumulation on crop yield. If salt accumulations become excessive, losses in yield will result. To prevent yield loss, salts in the soil must be controlled at a concentration below that which might affect yield. In this type of example, unless directed otherwise because of findings from other CV-SALTS studies (e.g., the Agricultural Zone Mapping) or ongoing policy development by the Executive Committee, SSALTS will utilize the steady-state modeling results of crop salt tolerance developed by Hoffman, 2010 (Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta, January 5, 2010)². Hoffman’s approach can be used to estimate increases in salt loads that would still be protective of all of the crops normally grown in each area. These increased salt loads would provide additional capacity for salt accumulations. Ultimately, potentially available capacity and the ability to use that capacity may require implementation of specific salt management practices, including, e.g., switching to more salt tolerant crops, implementation of Integrated On-Farm Drainage Management (IDFM) practices, or fallowing.

Other salt capacity approaches may be developed based on the nature of or characterization of a given Study Area. Prior to characterizing the salt accumulation capacity of each Study Area, the project team will develop a tabular summary outlining the recommended approach to be applied to each Study Area, and conduct a review meeting to present the recommended analysis methods with the TAC in order to obtain their technical input and approval.

- Step 4 – Characterize the Cost/Benefits of Continued Salt Accumulation for Each Study Area: The analysis will include a relative assessment of the cost and benefits of continued salt accumulation in each Study Area. Since actual data describing costs and benefits is expected to be limited and not site-specific, it is expected that, for the most part, this analysis will necessarily be qualitative (e.g., providing a relative assessment using terms such as low, medium, or high).
- Step 5 – Characterize Institutional/Regulatory Barriers for Each Study Area: Given the site attributes identified under Step 1 above, this step will summarize likely or potential institutional/regulatory barriers for implementation of a strategy that allows long-term accumulation of salt at a Study Area. Identification of these barriers will be developed based on feedback from the TAC and other stakeholders.

The deliverable for this task will be a Technical Memorandum(TM) that provides a completed characterization for each of the up to 10 salt accumulation Study Areas. Each site characterization will be supported by GIS-based maps (using the GIS framework, as appropriate), with data tables and figures, where needed, to fully describe the area’s attributes, salinity characteristics, existing salt sources, and long-term capacity for salt accumulation, including results of cost/benefit assessment and institutional/regulatory barriers. If appropriate, information for each Study Area may be prepared in a “fact sheet” type format. A draft TM will be provided to the TAC for review and comment. TAC comments will be addressed when the information from this draft TM is incorporated into a Phase 1 Report.

² This report includes salt tolerance thresholds for a range of crops (e.g., alfalfa, bean, and almonds), various irrigation methods (e.g., furrow, flood, sprinkler, drip), leaching fractions, and irrigation water salinities.

- *Task 1.4, Perform Screening-Level Analysis of Long-Term Sustainability of Representative Study Areas* - Each of the salt accumulation Study Areas characterized in Task 1.3 will be analyzed to assess their longevity and sustainability over an initial 50-year planning horizon. To the extent practicable, this analysis will also evaluate long-term sustainability beyond this period at 50-year increments, but no more than a total of 200 years. This assessment beyond 50 years will be accompanied by caveats and assumptions regarding the uncertainty associated with extrapolations beyond the initial 50-year planning period.

The analysis under this task will rely on initial mass balance estimates and expected loadings given what is known regarding existing and potential future salt loadings. This analysis will rely on information developed by ICM Tasks 5 and 6.

The intent of the Task 1.4 analysis is to provide high-level planning information that can be used to support SSALTS Phase 2 and 3 analyses and CV-SALTS discussions regarding likely alternatives for salt disposal to be considered for incorporation into the SNMP. As such, the Task 1.4 results will be useful for making relative comparisons among alternatives (e.g., the disposal method at one Study Area is generally more cost-effective than at another) as opposed to making absolute projections based on capacity or cost. In some cases, long-term sustainability may be based simply on the relative increase or decrease of estimates in salt loads.

In order to prepare screening level forecasts, known trends relative to historic, current, and future conditions at each Study Area will be linearly extrapolated, at a minimum, over a 50-year planning horizon (e.g., population growth, potential land cover changes, crop/irrigation practices, water demands, etc.). Where feasible, the screening analysis results will be normalized (e.g., per acre or per capita) in order to facilitate comparisons among areas. Similarly, planning level costs, operating and capital, will be estimated. Average annual unit costs will be derived (e.g., \$/million gallons of water treated or \$/lb of salt removed) based on available data.

The screening analysis of long-term sustainability will be summarized in graphical and tabular formats with all underlying assumptions and data sources clearly identified. The analysis will be implemented within a spreadsheet format so that “what if” questions can be addressed. The Task 1.4 analysis is not expected to provide definitive answers to these types of questions; however, the results can be used to guide CV-SALTS to strategically identify cases where a more detailed and refined modeling analysis is warranted or where important data gaps exist that should be addressed prior to development of the SNMP.

The deliverable for this task will be a TM that provides the results of the analysis of the long-term sustainability of salt accumulation at each of the up to 10 salt accumulation Study Areas. The TM will be supported by GIS-based maps, figures or tabular summaries, where needed. A draft TM will be provided to the TAC for review and comment. TAC comments will be addressed when the information from this draft TM is incorporated into a Phase 1 Report.

- *Task 1.5, Prepare Phase 1 SSALTS Report* - A Phase 1 Report will be prepared that includes the following: (a) description of the process performed to identify and characterize salt accumulation Study Areas; (b) summary of the background studies and literature reviewed; (c) final versions of the TM's prepared under Tasks 1.3 and 1.4 (either as is or edited as needed to conform to a report style format); (d) conclusions and recommendations based on the work completed under Phase 1; and (e) if necessary, recommendations for modifications to this Workplan for Task 2 (Phase 2) and/or Task 3 (Phase 3) based on the findings from this phase. A Draft Phase 1 Report will be

prepared and reviewed by the TAC. Once revised, a Final Draft Phase 1 Report will be submitted to the Executive Committee for review and comment. A Final Phase 1 Report will be prepared based on Executive Committee comments.

Task 2 - Phase 2, Develop Potential Salt Management Strategies

Phase 2 will not be initiated without Executive Committee approval. In this phase, we will focus on the development of potential salt management strategies for each Study Area that may include salt disposal within the Central Valley (“in-valley”), transporting or exporting salt to areas outside of the Central Valley (“out-of-valley”), or some combination of both. Under Phase 2, alternatives that support these potential strategies for salt disposal will be identified (through review of literature and reports and information obtained from regional experts) and characterized. Analysis of the alternatives to determine the best implementation options will occur under Phase 3.

The Phase 1 information developed for the representative Study Areas provides a foundation for Phase 2 analyses. For example, if the capacity for continued salt disposal within a particular Study Area is limited, then under Phase 2 alternatives for addressing that limitation through in-valley or out-of-valley disposal strategies (or some combination of both) will be identified and characterized. This effort includes the following Phase 2 tasks:

- *Task 2.1, Develop In-Valley Salt Management Alternatives* - The objective of this task is to develop and describe in-valley salt disposal strategies that may be implemented in the Central Valley, ranging from continuing to accumulate salts at or near Phase 1 Study Areas or purposefully disposing of salt at potential new areas to be identified. Two subtasks will be completed.
 - *Task 2.1.1, Identify In-Valley Salt Management Alternatives* – This task focuses on identifying in-valley salt management alternatives for future consideration in subsequent tasks. The steps for identifying these alternatives include:
 - Develop in-valley salt disposal alternatives (expansion of existing locations or identification of new locations) by reviewing relevant reports and the published literature and conducting interviews with selected stakeholders (e.g., managers or operators of study locations) and regional technical experts regarding accepted practices to manage salt.
 - Eliminate any potential alternatives to expand existing salt storage areas or establish new areas that are not deemed feasible. Document the basis for elimination.
 - Develop a preliminary list of salt management alternatives for the Central Valley. Development of the list will include a detailed description of the alternative and a description of any institutional, economic or regulatory considerations or barriers that may affect implementation.
 - Solicit TAC and stakeholder comment on the preliminary list of location-specific salt management alternatives. As needed, revise the preliminary list to create a final list to be considered further under subsequent Phase 2 tasks.

The deliverable for Task 2.1.1 will be a final list of potentially feasible in-valley salt management alternatives.

- *Task 2.1.2, Characterize In-Valley Salt Management Alternatives* – Based on the outcome of Task 2.1.1, this task will focus on characterizing the various in-valley salt management alternatives that may be deployed in the Central Valley. The analysis will evaluate potential management practices (MPs), e.g., combinations of various source and treatment controls, as well as disposal/storage practices and technologies relevant to agricultural, municipal, and industrial salt sources, including:
 - Agricultural, including irrigation BMPs, fertilizer use BMPs, evaporation ponds, IFDM practices, land retirement, or others as needed.
 - Municipal, including water-softener control (e.g., ordinances and/or rebates), industrial discharge controls (e.g., local pretreatment limits), recycled water demineralization treatment, household salinity source reduction BMPs, landscape irrigation BMPs, landscape fertilizer use BMPs, or others as needed.
 - Industrial, including mechanical evaporation, desalters using reverse osmosis and ultra-filtration technologies, deep well injection, or others as needed.
 - Applied/imported water, including source load diversion (e.g., Grasslands Bypass Project), source water salinity controls (e.g., City of Fresno Public Education Program), source water demineralization (e.g., brackish groundwater desalination), modified ratios of local or imported water sources (e.g., blending), or others as needed.

Under this task, regional collaborative projects within the Central Valley will also be considered. Examples of regional collaborative projects might include:

- Regional reuse
- Regional groundwater management
- Regional evaporation/treatment facilities

Certain types of regional approaches for managing salt may also include combinations of interim in-valley salt accumulation combined with export or transport out of Central Valley, e.g., real-time management, regional salt storage or conveyance systems, and water or salt trading. Opportunities for combined (in and out-of-valley strategies) or hybrid strategies to manage salt will be developed under Task 2.3.

The deliverable for Task 2.1.2 will be fact sheet summaries prepared for each of the in-valley MPs evaluated for feasibility under this task. To the extent that information is available, the format of each fact sheet will be based on the Management Practice Screening Tool Checklist developed by the CV-SALTS Management Practices Subcommittee (**Table 2-2**). These fact sheets will be submitted to the TAC for review and comment. Revised fact sheets based on TAC comments will be incorporated into the Phase 2 Report prepared below under Task 2.4.

- *Task 2.2 – Develop Out-of-Valley Salt Management Alternatives* - The objective of this task is to develop and characterize salt disposal alternatives that may be applicable to a given Study Area and that may be used to export or transport salt out of the Central Valley. Two subtasks will be completed:
 - *Task 2.2.1, Identify Out-of-Valley Salt Management Alternatives* - The objective of this task is to develop a list of salt export/transport alternatives that result in the disposal of salt outside of the Central Valley. Similar to Task 2.1.1, the steps for identifying these alternatives include:

Table 2-2. Planned in-valley salt disposal Management Practices Fact Sheets

Section	Planned Content
Description	Brief description of the MP to summarize the practice, applicable industries, and other important relevant information.
Constituent Salts or Nutrients Managed	Identification of the primary and secondary salinity constituents treated, reduced or managed by this practice and how they are reduced or managed.
Applicability	Description of (a) documented application of this practice; (b) where, how, and how extensively the practice has been implemented; and (c) the conditions or circumstances that limit the application of this practice.
Practice Benefits and Impacts	Description of the documented benefits and impacts of implementing the practice, e.g., air quality, energy use, water supply, etc.
Effectiveness Documentation	Description of the documented effectiveness of implementing the practice and summary of critical factors or limitations to effectiveness.
Supporting Documentation	Summary of relevant source material that provides information regarding the MP.
Implementation: Planning Level Costs	Summary of planning level costs (in units that may be used for comparison with other MPs) for implementation, including capital and annual operation & maintenance costs.
Implementation: Status and Potential	Description of historic and current level of implementation; describe potential for full implementation of this practice. This would include the extent that the practice may be applicable across the entire valley (e.g., widespread vs. highly location-specific)
Implementation: Monitoring Documentation	Description of the level of monitoring and documentation available to support the practice. Describe additional monitoring needs, if known.
Implementation: Other Regulatory Approvals or Requirements	Summarize what is known regarding regulatory or government agency approval of the MP or certification of the MP by industry or other standard-setting entity.

- Develop salt disposal alternatives that involve the export or transport of salt out of the Central Valley by reviewing relevant reports and the published literature and conducting interviews with selected stakeholders (e.g., managers or operators of study locations) and regional technical experts regarding accepted practices for collecting and moving salt among basins or to the ocean.
- Eliminate any potential salt export/transport management alternatives that are not deemed feasible at any Study Area. Document the basis for elimination.
- Develop a preliminary list of alternative salt export/transport management alternatives that may be feasible. Development of the list will include a detailed description of the salt management alternative and a description of any institutional, economic or regulatory considerations that may affect implementation.
- Solicit TAC and stakeholder comment on the preliminary list of salt export/transport management alternatives; as needed, revise the list to be considered further under subsequent tasks.

The deliverable for this task will be a final list of export/transport potentially feasible salt management strategies. These strategies will be further developed as salt management alternatives and analyzed in subsequent Phase 3 tasks.

- *Task 2.2.2 – Characterize Out-of-Valley Salt Management Alternatives* – Based on the outcome of Task 2.2.1, this task will focus on characterizing the export/transport salt management alternatives for analysis under Phase 3. At a minimum, the types of export/transport management alternatives expected to be developed under this task include:

- *Real-Time Management*- A real-time management program would utilize the available assimilative capacity in the San Joaquin River to dispose of salt loads into surface waters. Under a real time management program, discharges from wetland and agricultural drainage areas would be controlled and timed to coincide with periods when in river dilution flows are sufficient to meet Vernalis salinity objectives. By increasing the frequency of meeting Vernalis electrical conductivity (EC) objectives, a real time management program could reduce the number and/or magnitude of high quality releases of low total dissolved solids water (e.g., releases of Stanislaus River flows from New Melones Reservoir) to meet Vernalis EC objectives.

SSALTS will evaluate the potential for a real-time management program to remove salts from the basin. Requisite elements of a real-time management program include:

- Flow and water quality control infrastructure;
- Development and maintenance of a real-time drainage discharge and water quality monitoring system; and
- Establishment of institutions responsible for long-term stakeholder cooperation and coordination to continuously match real-time contaminant loads with assimilative capacity.
- *Out-of Valley Salt Disposal* - The San Luis Drainage Feature Re-evaluation (SLDFR) Final EIS analyzed three “out-of-valley” alternatives for salt disposal:
 - Ocean Disposal;
 - Delta-Chipps Island Disposal; and
 - Delta-Carquinez Strait Disposal.

The alternatives analysis presented in the SLDFR EIS, related to the ocean and delta disposal alternatives, also included “in-valley” (e.g., as will be developed under Task 2.1) salt disposal elements: on-farm and in-district actions, drain water collection systems, Delta-Mendota Canal Drain, regional reuse facilities, and land retirement. Reused drain water would be collected from reuse facilities and transported by pipelines and tunnels to the Pacific Ocean or Delta for disposal. Each alternative analyzed included conveyance pipelines/canals and outfall/diffusers. Major areas of concern identified for the ocean disposal alternative were:

- Impacts to ecology and tourism from drainage discharge to the Pacific Ocean;
- Impacts to sensitive habitats from pipeline construction; and
- Impacts from pipeline failure.

The primary areas of concern for the “out-of-valley” Delta disposal alternatives were:

- Impacts to drinking water supplies from salt discharge;
- Impacts to birds and fish in the Delta from selenium bioaccumulation; and
- Technical and economic feasibility of selenium treatment.

The deliverable for this task will be fact sheet summaries of each alternative developed under this task. For the examples provided above, the project team will summarize work already completed or performed to date. To the extent appropriate, the fact sheets will be similar in format to those prepared under Task 2.1.2, and in particular include information regarding the cost and benefits of the alternative, estimates of the salt load removal capacity, and institutional and regulatory barriers to implementation. These fact sheets will be submitted to the TAC for review and comment. Revised fact sheets based on TAC comments will be incorporated into the Phase 2 Report prepared below under Task 2.4.

- *Task 2.3 – Identify and Describe Potential Hybrid Salt Management Alternatives* - The objective of this task is to develop and describe salt disposal alternatives that may incorporate a combination of in-valley and out-of-valley alternatives. Information from deliverables developed for Tasks 2.1 and 2.2 will be used to identify and characterize the hybrid alternative. This information will be supplemented as needed to fully characterize the alternative. If any hybrid alternatives are identified, fact sheets will be developed (similar to those developed under Tasks 2.1.2 and 2.2.2) to describe each alternative.

The deliverable for Task 2.3 will be a TM that describes the hybrid alternatives and their potential application to manage salt disposal in the Central Valley. The TM will be supported by GIS-based maps, figures or tabular summaries, where needed. A draft TM will be provided to the TAC for review and comment. TAC comments will be addressed when the information from this draft TM is incorporated into a Phase 2 Report.

- *Task 2.4, Prepare Phase 2 SSALTS Report* - The Phase 2 Report will be a cumulative extension of the Phase 1 Report. The Report will (a) summarize work completed to date under Phase 1, (b) describe the various salt management alternatives developed and characterized for each of the three strategies (in-valley, out-of-valley, and hybrid); (c) incorporate the fact sheets developed under Tasks 2.1.2, 2.2.2 and 2.3; (d) provide conclusions and recommendations based on the work completed in this task; and (e) if necessary, provide recommendations for modifications to this Workplan for Task 3 (Phase 3) based on the findings from this task. A Draft Phase 2 Report will be prepared and reviewed by the TAC. Once revised, a Final Draft Phase 2 Report will be submitted to the Executive Committee for review and comment. A Final Phase 2 Report will be prepared based on Executive Committee comments.

Task 3 - Phase 3, Evaluate Potential Salt Disposal Alternatives to Identify Acceptable Alternatives for Implementation

Phase 3 builds upon the work completed under previous phases by evaluating the range of in-valley, out-of-valley and hybrid salt management alternatives developed under Phase 2. Under this phase, SSALTS will develop feasibility criteria (e.g., regulatory, institutional, economic, technological, etc.) to provide a basis for evaluating each alternative and complete the feasibility analysis. The outcome of this evaluation will be the identification and prioritization of acceptable salt disposal alternatives (i.e.,

implementation measures) for incorporation into the developing SNMP for the Central Valley. Phase 3 includes the following tasks:

- *Task 3.1, Develop Planning Level Feasibility Criteria to Evaluate Alternatives* - Potential feasibility screening criteria for evaluation of salt management alternatives will be developed. Examples of screening criteria for consideration include the following categories or types: engineering, technology, economic, environmental, regulatory, and institutional. Consideration will also be given to the potential for an identified salt management practice to have wide applicability in the Central Valley or only be useful within a narrow range of circumstances.

The project team will prepare a TM that identifies potential feasibility criteria, the method by which each proposed criterion will be used as a screening tool, and the approach that will be used to apply the final selected criteria to the various alternatives to be evaluated. A draft TM will be submitted to the TAC for review and comment. Following revision, as needed, the TM will be submitted to the Executive Committee for review, revision (if needed), and approval.

- *Task 3.2, Perform Screening-Level Feasibility Analysis of Salt Management Alternatives* – Under this task, the project team will evaluate individual and/or combinations of in-valley and out-of-valley salt management alternatives using the feasibility criteria developed under Task 3.1.

The deliverable for Task 3.2 will be a TM that describes (a) the results of the analysis after application of the feasibility criteria; and (b) a prioritized list of salt management alternatives. The TM will be supported by GIS-based maps, figures or tabular summaries, where needed. A draft TM will be provided to the TAC for review and comment. TAC comments will be addressed when the information from this draft TM is incorporated into a Phase 3 Report.

- *Task 3.3, Prepare Phase 3 SSALTS Report* - The Phase 3 Report will be a cumulative extension of the Phase 1 and 2 Reports. The Report will (a) summarize work completed to date under Phases 1 and 2; (b) incorporate the results of the feasibility analysis completed under this Phase; (c) conclusions and recommendations based on the work completed in Phase 3; and (d) recommendations for salt management alternatives for inclusion in the SNMP as acceptable implementation measures. A Draft Phase 3 Report will be prepared and reviewed by the TAC. Once revised, a Final Draft Phase 3 Report will be submitted to the Executive Committee for review and comment. A Final Phase 3 Report will be prepared based on Executive Committee comments.

Task 4 – CV-SALTS Coordination Activities

Task 4 activities will occur throughout all phases of the project. Throughout execution, this project will need to coordinate with ongoing Executive Committee policy discussions and authorized CV-SALTS technical studies and projects. Accordingly, this project will implement the following coordination activities:

- *Task 4.1, CV-SALTS Executive Committee Coordination* –The project manager will provide periodic updates on SSALTS project progress to the CV-SALTS Executive Committee to ensure consistency of project deliverables with CV-SALTS policies and discussion needs. Presentations or handouts will be prepared as needed to support meeting discussions.
- *Task 4.2, CV-SALTS TAC Coordination* - Coordinate with the TAC to (a) identify the appropriate format and repository for data gathered or developed by this project; and (b) provide opportunity

for the CV-SALTS TAC to review SSALTS project deliverables to ensure that appropriate technical input and review occurs during project execution and that project activities are technically consistent with other CV-SALTS technical studies and projects.

- *Task 4.3, CV-SALTS SNMP Support* – Based on approved project deliverables, prepare appropriate documentation, where needed, to support development of the Central Valley SNMP.
- *Task 4.4, Technical/Regulatory Project Coordination* – Participate in coordination activities with other CV-SALTS projects or personnel to ensure collaborative development of project deliverables.

Task 5 – Optional Additional Services (Post-Phase 3)

If directed by CV-SALTS, ongoing support can be provided to the development of the SNMP. Support could include further development of alternatives for inclusion in the SNMP and development of information for inclusion in the Basin Plan Amendment and supporting documentation. The recommendations prepared under Task 3.3 would be used as the primary basis for defining the level of support and areas of focus.

2.3 Workplan Deliverables and Schedule

Table 2-3 summarizes the primary task deliverables and review requirements associated with the implementation of the tasks in this Workplan. **Figure 2-1** provides the schedule for completion of Workplan tasks. The relationship between this schedule and the schedule for inter-related projects, such as development of the Conceptual Model, was provided in Figure 1-3. The SSALTS project schedule assumes the following:

- The existing schedule for execution of the GIS Services and ICM projects is maintained. As planned now, inputs from these projects will occur in a timely manner to be incorporated into this project's deliverables.
- The project is implemented by December 1, 2012. Phase 1 is to be completed by late April 2013; Phase 2 will be completed by end of September 2013; and Phase 3 will be completed in January 2014. Frequent review steps are included in this schedule to incorporate TAC and Executive Committee review of work products. The project schedule could be shortened if these reviews are expedited; in contrast, this schedule could be extended if reviews do not occur in a timely manner.
- Because development of the final report for each phase includes recommendations for any modifications to the scope of work for subsequent phases, it has been assumed that with completion of the final report, no gap will occur between project phases.

Table 2-3. Workplan tasks and deliverables

Tasks	Subtasks	Primary Deliverables	Primary Review Requirements
Task 1 – Phase 1, Identify and Characterize Existing Salt Accumulation Areas	1.1 – Review of Studies or Literature	Tabular summary of documents reviewed and relevance to SSALTS (if any)	TAC review and comment
	1.2 – Select Representative Salt Accumulation Study Areas	<ul style="list-style-type: none"> Preliminary list of representative Study Areas for additional evaluation Final list of up to 10 recommended Study Areas, along with the basis for the recommendations, for inclusion in the Phase 1 analysis 	TAC and Executive Committee review and approval
	1.3 – Characterize Salt Accumulation Study Areas	Draft TM that provides a completed characterization for each of the up to 10 salt accumulation Study Areas (comments to be addressed as part of Task 1.5)	TAC review and comment
	1.4 - Perform Screening-Level Analysis of Long-Term Sustainability of Representative Study Areas	Draft TM that provides the results of the analysis of the long-term sustainability of salt accumulation at each of up to 10 salt accumulation Study Areas (comments to be addressed as part of Task 1.5)	TAC review and comment
	1.5 - Prepare Phase 1 SSALTS Report	<ul style="list-style-type: none"> Draft Phase 1 SSALTS Report Final Draft Phase 1 SSALTS Report Final Phase 1 SSALTS Report 	TAC review of Draft Report; Executive Committee review of Final Draft Report
Task 2 – Phase 2, Develop Potential Salt Management Strategies	2.1 - Develop In-Valley Salt Management Alternatives		
	2.1.1 - Identify In-Valley Salt Management Alternatives	<ul style="list-style-type: none"> Preliminary list of in-valley salt management alternatives Final list of in-valley salt management alternatives 	TAC review and comment
	2.1.2 - Characterize In-Valley Salt Management Alternatives	Draft fact sheet summaries for each of the in-valley MPs identified under Task 2.1.1 (comments on drafts to be addressed as part of Task 2.4)	TAC review and comment
	2.2 – Develop Out-of-Valley Salt Management Alternatives	TAC review and comment	
	2.2.1 - Identify Out-of-Valley Salt Management Alternatives	<ul style="list-style-type: none"> Preliminary list of out-of-valley salt management alternatives Final list of out-of-valley salt management alternatives 	TAC review and comment
	2.2.2 - Characterize Out-of-Valley Salt Management Alternatives	Draft fact sheet summaries for each of the out-of-valley MPs identified under Task 2.2.1 (comments on drafts to be addressed as part of Task 2.4)	TAC review and comment
	2.3 – Identify and Describe Potential Hybrid Salt Management Alternatives	Draft TM that describes potential hybrid salt management alternatives (comments on drafts to be addressed as part of Task 2.4)	TAC review and comment
	2.4 - Prepare Phase 2 SSALTS Report	<ul style="list-style-type: none"> Draft Phase 2 SSALTS Report Final Draft Phase 2 SSALTS Report Final Phase 2 SSALTS Report 	TAC review of Draft Report; Executive Committee review of Final Draft Report

Table 2-3. Workplan tasks and deliverables

Tasks	Subtasks	Primary Deliverables	Primary Review Requirements
Task 3 – Phase 3, Evaluate Potential Salt Disposal Alternatives to Identify Acceptable Alternatives for Implementation	3.1 – Develop Planning Level Feasibility Criteria to Evaluate Alternatives	<ul style="list-style-type: none"> • Draft TM that describes recommended feasibility criteria and their use • Final Draft TM • Final TM 	TAC review of Draft TM; Executive Committee review of Final Draft TM
	3.2 - Perform Screening-Level Analysis of Salt Management Alternatives	Draft TM that describes (a) results of the application of feasibility criteria to alternatives, and (b) provides a prioritized list of salt management alternatives (comments on draft to be addressed as part of Task 3.3)	TAC review and comment
	3.3 - Prepare Phase 3 SSALTS Report	<ul style="list-style-type: none"> • Draft Phase 3 SSALTS Report • Final Draft Phase 3 SSALTS Report • Final Phase 3 SSALTS Report 	TAC review of Draft TM; Executive Committee review of Final Draft TM
Task 4 – Coordination Activities	4.1 – CV-SALTS Executive Committee Coordination	Briefings, handouts, as requested	Not Applicable
	4.2 – CV-SALTS TAC Coordination	<ul style="list-style-type: none"> • Establish data compilation format and repository • Briefings, handouts, as requested 	
	4.3 – CV-SALTS SNMP Support	Templates, procedures for comparable studies for inclusion in the SNMP	
	4.4 – Technical/Regulatory Coordination	Coordination meetings and teleconferences, as needed, to coordinate technical and regulatory project elements of this Workplan	
Task 5 – Optional Additional Services	Additional Services, if requested	To be determined	To be determined

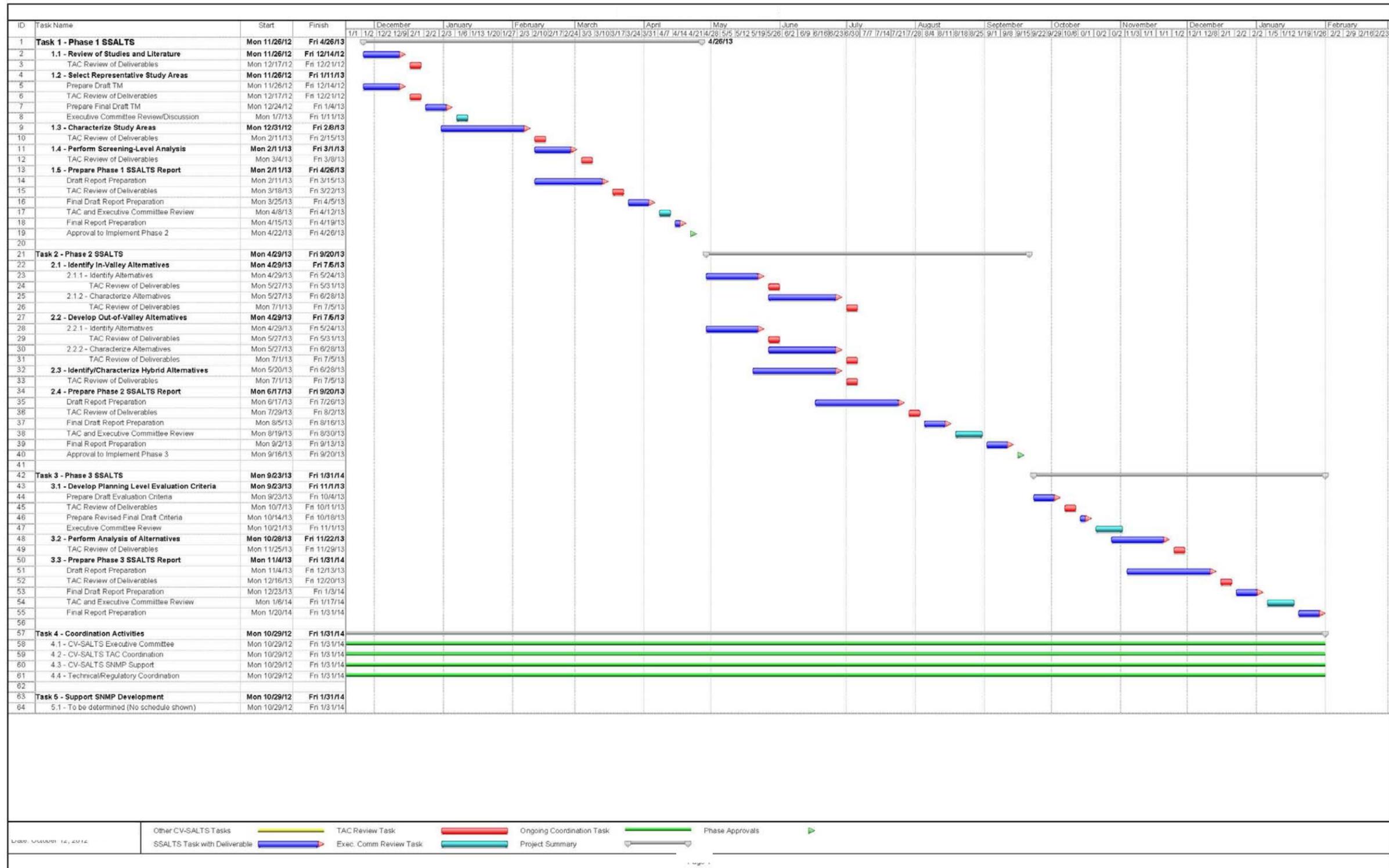


Figure 2-1. Project schedule

Section 3

Workplan Execution & Budget

This Workplan will address the objectives described above through the completion of four key tasks. As shown in **Table 3-1**, it has been assumed that a contractor will be responsible for the execution of all tasks.

Table 3-1 provides an estimated level of effort (LOE) (hours) and cost for completion of each task or subtask. These estimates are based on an analysis of the LOE expected to complete each task or subtask and using a typical technical staff mix made up of a various levels of expertise. The total estimate for completion of all three phases is \$320,000. Total for each of the primary tasks (Tasks 1-4) is as follows:

- Phase 1 (Task 1) – 620 hours, \$100,000
- Phase 2 (Task 2) – 850 hours, \$138,000
- Phase 3 (Task 3) – 350 hours, \$57,000
- Task 4 – 120 hours, \$25,000

Table 3-1. Task execution responsibilities and anticipated budget needs

Tasks	Subtasks	Primary Deliverables	Primary Responsibility for Execution	Anticipated LOE (hrs) and Budget Needs
Task 1 – Phase 1, Identify and Characterize Existing Salt Accumulation Areas	1.1 – Review of Studies or Literature	Tabular summary of documents reviewed and relevance to SSALTS (if any)	Contractor	100 hrs, \$16,000
	1.2 – Select Representative Salt Accumulation Study Areas	<ul style="list-style-type: none"> • Preliminary list of representative Study Areas for additional evaluation • Final list of up to 10 recommended Study Areas, along with the basis for the recommendations, for inclusion in the Phase 1 analysis 	Contractor	80 hrs, \$13,000
	1.3 – Characterize Salt Accumulation Study Areas	Draft TM that provides a completed characterization for each of the up to 10 salt accumulation Study Areas (comments to be addressed as part of Task 1.5)	Contractor	180 hrs, \$29,000
	1.4 - Perform Screening-Level Analysis of Long-Term Sustainability of Representative Study Areas	Draft TM that provides the results of the analysis of the long-term sustainability of salt accumulation at each of up to 10 salt accumulation Study Areas (comments to be addressed as part of Task 1.5)	Contractor	160 hrs, \$26,000
	1.5 - Prepare Phase 1 SSALTS Report	<ul style="list-style-type: none"> • Draft Phase 1 SSALTS Report • Final Draft Phase 1 SSALTS Report • Final Phase 1 SSALTS Report 	Contractor	100 hrs, \$16,000
Task 2 – Phase 2, Develop Potential Salt Management Strategies	2.1 - Develop In-Valley Salt Management Alternatives			
	2.1.1 - Identify In-Valley Salt Management Alternatives	<ul style="list-style-type: none"> • Preliminary list of in-valley salt management alternatives • Final list of in-valley salt management alternatives 	Contractor	160 hrs, \$26,000
	2.1.2 - Characterize In-Valley Salt Management Alternatives	Draft fact sheet summaries for each of the in-valley MPs identified under Task 2.1.1 (comments on drafts to be addressed as part of Task 2.4)	Contractor	200 hrs, \$32,500
	2.2 – Develop Out-of-Valley Salt Management Alternatives			
	2.2.1 - Identify Out-of-Valley Salt Management Alternatives	<ul style="list-style-type: none"> • Preliminary list of out-of-valley salt management alternatives • Final list of in-valley salt management alternatives 	Contractor	120 hrs, \$19,500
	2.2.2 - Characterize Out-of-Valley Salt Management Alternatives	Draft fact sheet summaries for each of the out-of-valley MPs identified under Task 2.2.1 (comments on drafts to be addressed as part of Task 2.4)	Contractor	160 hrs, \$26,000
	2.3 – Identify and Describe Potential Hybrid Salt Management Alternatives	Draft TM that describes potential hybrid salt management strategies (comments on drafts to be addressed as part of Task 2.4)	Contractor	100 hrs, \$16,500
	2.4 - Prepare Phase 2 SSALTS Report	<ul style="list-style-type: none"> • Draft Phase 2 SSALTS Report • Final Draft Phase 2 SSALTS Report • Final Phase 2 SSALTS Report 	Contractor	110 hrs, \$17,500

Table 3-1. Task execution responsibilities and anticipated budget needs

Tasks	Subtasks	Primary Deliverables	Primary Responsibility for Execution	Anticipated LOE (hrs) and Budget Needs
Task 3 – Phase 3, Evaluate Potential Salt Disposal Alternatives to Identify Acceptable Alternatives for Implementation	3.1 – Develop Planning Level Feasibility Criteria to Evaluate Alternatives	<ul style="list-style-type: none"> • Draft TM that describes recommended feasibility criteria and their use • Final Draft TM • Final TM 	Contractor	80 hrs, \$13,250
	3.2 - Perform Screening-Level Analysis of Salt Management Alternatives	Draft TM that describes (a) results of the application of feasibility criteria to alternatives, and (b) provides a prioritized list of salt management alternatives (comments on draft to be addressed as part of Task 3.3)	Contractor	160 hrs, \$26,000
	3.3 - Prepare Phase 3 SSALTS Report	<ul style="list-style-type: none"> • Draft Phase 3 SSALTS Report • Final Draft Phase 3 SSALTS Report • Final Phase 3 SSALTS Report 	Contractor	110 hrs, \$17,750
Task 4 – Coordination Activities	4.1 – CV-SALTS Executive Committee Coordination	Briefings, handouts, as requested	Contractor	120 hrs, \$25,000
	4.2 – CV-SALTS TAC Coordination	<ul style="list-style-type: none"> • Establish data compilation format and repository • Briefings, handouts, as requested 	Contractor	
	4.3 – CV-SALTS SNMP Support	Templates, procedures for comparable studies for inclusion in the SNMP	Contractor	
	4.4 – Technical/Regulatory Coordination	Coordination meetings and teleconferences, as needed, to coordinate technical and regulatory project elements of this Workplan	Contractor	
Task 5 – Optional Additional Services	Additional Services, if requested	To be determined	Contractor	No budget developed