



# United States Department of the Interior

BUREAU OF RECLAMATION  
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IN REPLY REFER TO:

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ENV-8.00

NOV 16 2012

Mr. Jim Martin  
Engineering Geologist  
Regional Water Quality Control Board  
Central Valley Region  
11020 Sun Center Drive, #200  
Rancho Cordova, CA 95670

Subject: Bureau of Reclamation Quarterly Activity and Monitoring Report  
7/1/12 to 9/30/12

Dear Mr. Martin:

Please find enclosed the *Quarterly Activity and Monitoring Report* for the third quarter of 2012. The report summarizes Reclamation's activities relative to its salinity control plan and fulfills the quarterly reporting requirement in the Management Agency Agreement.

We value the contribution and continued collaboration from your agency as we strive to address the salinity issues in the San Joaquin River. If you have any questions, please contact Mr. Michael Mosley at 916-978-5119 or [mmosley@usbr.gov](mailto:mmosley@usbr.gov).

Sincerely,

 for Jobaid Kabir  
Jobaid Kabir  
Decision Analysis Branch Chief

Enclosure

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# **Quarterly Activity and Monitoring Report**

**July 1 – September 30, 2012**

*In compliance with the “Management Agency Agreement between the  
Central Valley Regional Water Quality Control Board and the United States  
Bureau of Reclamation” executed on December 22, 2008*

November 14, 2012

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## Abbreviations and Acronyms

Action Plan	Actions to Address the Salinity and Boron TMDL Issues for the Lower San Joaquin River November 2010
Authority	San Luis & Delta-Mendota Water Authority
Basin Plan	Water Quality Control Plan for the Sacramento and San Joaquin River Basins, 4 <sup>th</sup> Edition
BMP	Best Management Practices
BO	Biological Opinion
CALFED	California Bay-Delta Authority
CCID	Central California Irrigation District
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
Corps	U.S. Army Corps of Engineers
CVO	Central Valley Operations
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CV Water Board	Central Valley Regional Water Quality Control Board
CV-SALTS	Central Valley Salinity Alternatives for Long Term Sustainability
DCRT	Data Collection and Review Team
DMC	Delta-Mendota Canal
DWR	California Department of Water Resources
EC	electrical conductivity
GBP	Grassland Bypass Project
GDA	Grassland Drainage Area
GRCD	Grassland Resource Conservation District
GWD	Grassland Water District
LSJR	Lower San Joaquin River
MAA	Management Agency Agreement
µS/cm	micro Siemens per centimeter
mg/L	milligram(s) per liter (parts per million)
Reclamation	United States Bureau of Reclamation
RTMP	Real Time Management Program
Service	U.S. Fish and Wildlife Service
SJR	San Joaquin River

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TAF	thousand acre-feet
TDS	total dissolved solids
TMDL	total maximum daily load
VAMP	Vernalis Adaptive Management Plan
WARMF	Watershed Analysis Risk Management Framework
WDR	Waste Discharge Requirement
WQO	water quality objective
WEAP	Water Evaluation and Planning System
WRDP	Westside Regional Drainage Plan
WSI	Water Supply Index
WWQM	Wetland Water Quality Model
YSI	Yellow Springs Instrument Company

## Purpose

The Central Valley Regional Water Quality Control Board's (CV Water Board) Salt and Boron Total Maximum Daily Load (TMDL) was approved and placed into effect on July 28, 2006. In response to the Salt and Boron TMDL, the United States Bureau of Reclamation (Reclamation) developed the salinity management plan, *Actions to Address the Salinity and Boron TMDL Issues for the Lower San Joaquin River* (Action Plan) and entered into a Management Agency Agreement (MAA) with the CV Water Board on December 22, 2008. The MAA describes the actions Reclamation will take to meet the obligations allocated to it by the Salt and Boron TMDL for the Lower San Joaquin River. The MAA states:

Reclamation will submit quarterly reports to the Regional Water Board by 45 days after the end of the calendar quarter. The quarterly reports will include a summary of activities conducted by Reclamation during the quarter in conjunction with each element included in their Action Plan, including activities related to developing a Real Time Management Program. In addition Reclamation will include data collected relevant to DMC load evaluation.

The "Quarterly Activity and Monitoring Report" summarizes the activities conducted by Reclamation in conjunction with each element outlined in its Action Plan. The Action Plan describes Reclamation's past, current and planned practices and procedures to mitigate and manage adverse impacts of salt and boron imported into the San Joaquin Basin via the Delta Mendota Canal (DMC) in order to help achieve compliance with the objectives contained in the CV Water Board's *Water Quality Control Plan for the Sacramento River and the San Joaquin River Basins – 4<sup>th</sup> Edition* (Basin Plan).

### Organization of Quarterly Report

The quarterly report provides a synopsis of the various activities associated with each element identified in the Action Plan. Action categories include Flow, Salt Load Reduction, and Mitigation. For each action a brief description and list of activities are identified. The quarterly report includes calculations of salt loads based on DMC deliveries and calculations of assimilative capacity provided through dilution flows. The calculation methods used in this report are provisional and some elements in this report do not include estimations of benefits at this time. Reclamation submitted the *Compliance Monitoring and Evaluation Plan* to the CV Water Board (Reclamation 2010) which outlines the criteria and methodology for determining DMC loads and credits.

## A. Flow Actions

Reclamation has agreed to provide mitigation and dilution flows to meet the Vernalis salinity and boron objectives. Historically, Reclamation has provided dilution flows from the New Melones Project and through purchases for the Vernalis Adaptive Management Plan (VAMP). The dilution flow provision in the VAMP has expired; stakeholders are currently creating a new document that will replace the VAMP. Flow actions include but are not limited to: dilution flows from New Melones Reservoir, water acquisitions, and recirculation.

## **1. New Melones Reservoir Operations – Provision of Dilution Flow**

**Brief Description:** In the Flood Control Act of October, 1962, Congress reauthorized and expanded the New Melones unit (P.L. 87-874) to a multipurpose unit to be built by the U.S. Army Corps of Engineers (Corps) and operated by the Secretary of the Interior as part of the Central Valley Project (CVP), thus creating the New Melones Unit. The multipurpose objectives of the unit include flood control, irrigation, municipal and industrial water supply, power generation, fishery enhancement, water quality improvement, and recreation. Since June of 2009, New Melones has been operated to meet the National Marine Fisheries Service Biological Opinion (BO) to Reclamation on the effects of the continued operation of the CVP and the California State Water Project on the various runs of Chinook salmon, Central Valley steelhead, and green sturgeon, and their designated critical habitat.

The Sacramento and San Joaquin River Basin Plan was amended in 2004 to include a Control Program for Salt and Boron Discharges into the Lower San Joaquin River. Items 12 and 13 of the Salt and Boron Control Program state:

Item 12. Salt loads in water discharged into the Lower San Joaquin River (LSJR) or its tributaries for the express purpose of providing dilution flow are not subject to load limits described in this control program if the discharge:

- a. complies with salinity water quality objectives for the LSJR at the Airport Way Bridge near Vernalis;
- b. is not a discharge from irrigated lands; and
- c. is not provided as a water supply to be consumptively used upstream of the San Joaquin River at the Airport Way Bridge near Vernalis.

Item 13. Entities providing dilution flows, as described in item 12, will obtain an allocation equal to the salt load assimilative capacity provided by this flow. This dilution flow allocation can be used to:

- 1) Offset salt loads discharged by this entity in excess of any allocation or; 2) trade, as described in item 10. The additional dilution flow allocation provided by dilution flows will be calculated as described in Table IV-8 (CV Water Board 2004c).

### **Activities**

- Reclamation continues to operate its facilities to comply with State Water Board D-1641, the applicable Biological Opinions and the Stanislaus River at Ripon monitoring station dissolved oxygen criteria.

**Quantification Methodology:** Table IV-8 (CV Water Board 2004c) states that dilution flow allocations are calculated as follows:

$$A_{dil} = Q_{dil} * (C_{dil} - WQO) * 0.8293$$

Where:

- $A_{dil}$  = dilution flow allocation in thousand tons<sup>1</sup> of salt per month  
 $Q_{dil}$  = dilution flow volume in thousand acre-feet per month (TAF) – above base flows  
 $C_{dil}$  = dilution flow electrical conductivity (EC) in micro-Siemens per centimeter (μS/cm)  
WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in μS/cm

Table 1 lists data and monthly calculations for the past quarter. Data for flow releases from Goodwin Dam, the Stanislaus River “design flows,” and salinity at Orange Blossom Bridge are used to calculate the monthly dilution flow allocations. The water-year type is estimated based on the 75% probability of exceedance found in California Department of Water Resources (DWR) Water Supply Index Forecasts (<http://cdec.water.ca.gov/cgi-progs/iodir/WSI>) for the San Joaquin Valley. The 75% exceedance forecast for May 1, 2012 is 2.2, which classifies 2012 as a dry year.

**Dilution Flow Allocation:** WY2012 classified as a dry year.

**Table 1: Goodwin Dam Monthly Dilution Flow Allocation**

	Goodwin Dam Flow (GDF) <sup>a</sup> TAF	Base Design Flow (DF) <sup>b</sup> TAF	$Q_{dil}$ , TAF GDF-DF= $Q_{dil}$	WQO <sup>c</sup> , μS/cm	$C_{dil}$ (monthly average EC at Orange Blossom Bridge) <sup>d</sup> , μS/cm	Dilution Flow Allocation, $A_{dil}$ , tons
July-12	27	3	24	700	57	-12,798
Aug-12	17	12	5	700	61	-2,650
Sep-12	15	15	0	1000	69	0

Source: Reclamation 2012a

<sup>a</sup> <http://www.usbr.gov/mp/cvo/reports.html>

<sup>b</sup> Reclamation 2010 Compliance Monitoring and Evaluation Plan

<sup>c</sup> CV Water Board 2004a and 2004b Appendix 1: Technical TMDL Report

<sup>d</sup> <http://cdec.water.ca.gov/cgi-progs/staSearch>

## 2. Water Acquisitions

**Brief Description:** The Central Valley Project Improvement Act (CVPIA) signed into law on October 30, 1992, modified priorities for managing water resources of the CVP. CVPIA altered the management of the CVP to make fish and wildlife protection, restoration, and enhancement

<sup>1</sup> This is a typographical error in the Basin Plan Amendment. The units are actually tons.

have equal priority with agriculture, municipal and industrial, and power uses. To meet water acquisition needs under CVPIA, the U.S. Department of the Interior developed a Water Acquisition Program, a joint effort by Reclamation and the U.S. Fish and Wildlife Service (Service). The program's purpose is to acquire water supplies to meet the habitat restoration and enhancement goals of the CVPIA and to improve Interior's ability to meet regulatory water quality requirements.

### ***Activities***

- Reclamation did not acquire any additional water this quarter.

Quantification Methodology: The discussion on dilution flow allocation presented under New Melones Reservoir Operations is pertinent here as well. Please refer to the Table IV-8 (CV Water Board 2004c) dilution allocation formula stated for the Table 1 calculation above.

### ***3. DMC Recirculation Pilot Studies – Provision of Dilution Water***

Brief Description: The DMC Recirculation Project studied the feasibility of using CVP flows to provide dilution water for salinity management. As part of the project studies, Reclamation conducted three pilot recirculation studies in 2004, 2007, and 2008. The pilot studies pumped water from the Delta at Tracy and conveyed it through the DMC to the Newman Wasteway, where it is then conveyed to the Lower San Joaquin River. The “Delta-Mendota Canal Recirculation Feasibility Study, Plan Formulation Report” is complete and available at <http://www.usbr.gov/mp/dmcrecirc/docs/final/index.html>.

### ***Activities***

- No new activities related to this project have occurred in 2012.

## **B. Salt Load Reduction Actions**

Reclamation is under a court order to provide drainage to its San Luis Unit, on the Westside of the Lower San Joaquin Valley. As part of this effort, Reclamation has historically supported the Westside Regional Drainage Plan (WRDP) through grants and in-kind services. Salt Load Reduction Actions include the Grassland Bypass Project (GBP), implementation of the WRDP, and the following conservation programs: Water Conservation Field Services Program, WaterSMART Program (formerly Water 2025 Grants Program), and the California Bay Delta Authority (CALFED) Bay-Delta Water Use Efficiency Program.

## **1. Grassland Bypass Project**

**Brief Description:** The GBP is a multi-agency stakeholder project based upon the 2009 Use Agreement<sup>2</sup> between the Reclamation and the San Luis and Delta-Mendota Water Authority (Authority) to manage and reduce the volume of agricultural drainage water produced within the 97,000 acre Grassland Drainage Area (GDA), and to use a 28-mile segment of the San Luis Drain to convey it to Mud Slough, a tributary of the San Joaquin River. The GBP has removed agricultural drainage water from wetland water supply conveyance channels, facilitated drainage management that maintains the viability of agriculture in the GDA, and promoted continuous improvement in water quality in the San Joaquin River.

### **Activities**

- The Grassland Area Farmers continue to meet the 2012 annual load limits for salts specified in the 2009 Use Agreement and have met the monthly limits for April through September 2012.
- The volume of agricultural drainage water discharged from the GDA into the San Luis Drain has been reduced by 18,500 acre-feet in 2012 through displacement across the San Joaquin River Water Quality Improvement Project (SJRIP) re-use area.
- The load of salts discharged from the GDA has been reduced by more than 98,000 tons in 2012 through displacement across the SJRIP.
- Reclamation and the Grassland Area Farmers continue to assist CV Water Board staff with the development of a revised Waste Discharge Requirement (WDR) for the discharge of agricultural subsurface drainage water into Mud Slough (north), a tributary of the San Joaquin River.
- Reclamation continues to implement the monitoring requirements for the 2001 WDR. Reclamation staff continues to collect and analyze water samples from nine sites for selenium, boron, salts, nutrients, and molybdenum; continue to operate auto-samplers in the San Luis Drain and in the river at Crows Landing.
- The Interagency Data Collection and Review Team (DCRT) continues to implement the GBP monitoring program that includes quarterly biota sampling at seven locations, acute and chronic toxicity analyses, flow and water quality monitoring, and sediment monitoring for accumulation and selenium contamination. The DCRT will revise the GBP monitoring program to be consistent with the revised WDR.
- The DCRT completed nine of eleven chapters of the 2010-2011 report, which have been posted on the GBP website that is maintained by the San Francisco Estuary Institute: <http://www.sfei.org/gbp>.
- There has been no resolution of the November 9, 2011, complaint filed by six environmental groups, led by the Pacific Coast Federation of Fishermen's Associations. The complaint is against Reclamation and the Authority for alleged failure to comply with the Clean Water Act permit system and failure to halt operation of the GBP. On August 31, 2012, the District Court denied the motion to dismiss filed by the Authority

<sup>2</sup> U.S. Bureau of Reclamation and the San Luis and Delta-Mendota Water Authority, December 22, 2009. Agreement for Continued Use of the San Luis Drain for the Period January 1, 2010 through December 31, 2019. Agreement No. 10-WC-20-3975

on April 27, 2012. The federal defendants issued a motion for judgment and a court date is scheduled for November 30, 2012

## **2. Westside Regional Drainage Plan**

**Brief Description:** The Westside Regional Drainage Plan (WRDP) is a local stakeholder program developed by integrating all consistent elements of drainage management developed by government and local agencies and private partnerships. The original efforts of the WRDP focused on reducing selenium discharges to the San Joaquin River. Success of the original effort prompted a proposal to expand the WRDP to go beyond regulatory requirements and eliminate selenium, boron, and salt discharges to the San Joaquin River, while maintaining productivity of agriculture lands in the San Joaquin valley and enhancing water supplies for the region.

While Reclamation lacks control of many of the resources needed to be an active participant in the WRDP, Reclamation provides annual grant funding to develop the WRDP.

### **Activities**

- Reclamation continues to negotiate a long-term agreement with Panoche Drainage District to treat and dispose of high saline groundwater in six sumps that currently discharge into the DMC. This will reduce the load of salts delivered to the Mendota Pool, Grassland wetlands, irrigated lands, and LSJR. The draft WDR for the GBP included directions to terminate the flows from the sumps into the DMC by 2015.
- Reclamation continues to administer two grants with Panoche Drainage District to implement the WRDP for construction of infrastructure, source control activities, and environmental mitigation. A new grant for \$4.2 million was issued in mid September 2012. Negotiations have begun for a fourth \$4 million grant.
- The grants have assisted Panoche Drainage District to develop the SJRIP which has displaced 18,500 acre-feet of agricultural drainage water, 98,000 tons of salts and 450,300 tons of boron from the river during 2012.

## **3. Conservation Efforts**

**Brief Description:** The water use efficiency program includes several grant programs which fund actions to assure efficient use of existing and any new water supplies. Efficiency actions can alter the pattern of water diversions and reduce the magnitude of diversions, providing additional benefits. Efficiency actions can also result in reduced discharge of effluent or drainage and improve water quality. Although Reclamation is unable to quantify the benefits of the various funded projects as related to salinity reduction, the following information is provided to depict the agency's water conservation efforts in the basin. Through WaterSMART and the CALFED Bay-Delta Restoration program Reclamation has awarded 82 projects in the San Joaquin Valley that required performance measures since 2006. As information is collected from these projects, quantifiable benefits may be determined in the future.

### **Activities**

Under the 2012 Bay-Delta Restoration Program: Agriculture Water Conservation and Efficiency Grants, Reclamation awarded four projects within the San Joaquin Basin:

- Tulare Irrigation District, Canal Modernization Project, Phase II, Reclamation Funding: \$467,200, Total Project Cost: \$934,400. The district will install flow measurement and automated delivery devices at the headworks of Packwood Creek, Evans Canal and regulating basins within the district. The project will improve water management capabilities within the district's canal system and facilitate flexibility to meet grower irrigation demands. The project will reduce system spills and is expected to save 1,355 acre-feet of water annually.
- Firebaugh Canal Water District, Second Lift Canal Lining Project, Phase III, Reclamation Funding: \$500,000, Total Project Cost: \$2,150,000. The project will allow concrete lining of 2.2 miles of earthen canal to prevent seepage, as well as eliminate high sediment loads in delivered water. By decreasing suspended silts, growers can reduce the back flushing and filtering needed for efficient farm irrigation systems such as drip, or sub-surface, drip irrigation. Through reductions in seepage, the project is expected to conserve 485 acre-feet of water annually.
- Central California Irrigation District, East Ditch Reservoir and Santa Rita Canal Reservoir Project, Reclamation Funding: \$1,000,000, Total Project Cost: \$3,700,000. The proposed project will construct two regulating reservoirs to capture operational spills and drain water from canals. The reservoirs will provide mid-stream storage to hold the captured water and release it back into the irrigation system as needed, improving delivery flexibility and providing more precise control of irrigation flows. The project is expected to conserve 12,000 acre-feet of water annually.
- Henry Miller Reclamation District, Lower Arroyo Canal Modernization Project, Reclamation Funding: \$117,532, Total Project Cost: \$239,350. The project will install five long crested weirs on the Lower Arroyo Canal. The weirs precisely control canal water levels and help prevent system spills. Installing the weirs will reduce water level fluctuations, providing more constant deliveries to improve reliability and flexibility of deliveries to growers. It will also promote accurate measuring and water accounting. The project is expected to conserve 4,750 acre-feet of water annually.

Under the 2012 WaterSMART Water and Energy Efficiency Program, Reclamation awarded three projects within the San Joaquin basin:

- Delhi County Water District, received \$500,000 (\$1,485,000 over 3 years) for their Water Conservation, Energy Efficiency & BioGas Production Project. The Delhi County Water District, near Turlock, California, will install a biogas collection system at its existing wastewater treatment facility. The improvements will allow the recovery of between 20,000 and 40,000 cubic feet of methane-rich biogas each day, or roughly 300 gasoline equivalent gallons of biogas per day for use as a compressed natural gas transportation fuel or for use in power generation. In addition, the project includes construction of a pipeline and pumping system to deliver treated water for use at a nearby sod farm. The

project is expected to result in water savings of 701 acre-feet annually by replacing water currently supplied through other sources. Total Project Cost: \$3,332,693

- Kaweah Delta Water Conservation District, received \$400,000 (\$800,000 over 2 years) for their Packwood Creek Water Conservation Project. The Kaweah Delta Water Conservation District, in Tulare County, California, will install four new automated check structures and will automate an existing check structure at Packwood Creek. The project will allow for increased quantities of otherwise unstorable storm and flood waters to be delivered to existing basins for ground water recharge. The project is expected to result in the better management of approximately 29,360 acre-feet of water annually. The project also includes restoration of Valley Oak riparian forest habitat near the site, which is expected to benefit a number of endangered species. Total Project Cost: \$1,610,866.
- Pixley Irrigation District received \$750,000 (\$1,500,000 over 3 years) for their Gravity Conveyance and Conservation Project. The Pixley Irrigation District in Tulare County, California, will work with the Lower Tule Irrigation District to increase the capacity of the existing Casa Blanca Canal and also construct a new 7.5-mile canal. Together, those improvements will facilitate the increased delivery of surplus water and flood flows and will also address current seepage losses. Once completed, the project is expected to result in water savings of approximately 9,850 acre-feet annually, and avoid the need to use groundwater in most cases. Total Project Cost: \$4,362,375.

Under the 2012 CALFED Water Use Efficiency Program, Reclamation awarded two projects within the San Joaquin Basin:

- The Cawelo Water District received \$1,000,000 to line approximately 3,523 linear feet of existing earthen canal from Coffee Road to Rosedale Highway. The project will conserve 2,910 acre-feet annually.
- The McCoy Lateral Rehabilitation and Atwater Drain Bypass Project, Merced County, received \$1,000,000 to help reduce spilling of operational discharges of irrigation water generated by the 1900 and Tin Flume Laterals into the Atwater Drain by creating a bypass system. The project will also reline and enlarge a portion of the McCoy Lateral. The project will conserve 2,561 acre-feet annually.

## C. Mitigation Actions

Reclamation's Action Plan identifies two mitigation actions to reduce salinity loads: (1) a Real Time Management Program (RTMP) to improve the timing of west-side discharge of saline drainage to the LSJR so as to occur during times of sufficient river assimilative capacity, and (2) Implementation of innovative wetland best management practices (BMP) for salinity. These could include early drawdown and re-flooding during years of water surplus; delayed wetland drawdown (cannot be practiced on the same land two years in a row without damaging wetland habitat) and recirculation of wetland drainage. Reclamation actively supports the development of a real time water management program combined with the river assimilative capacity forecast as a best management practice for discharging salt loads to the LSJR and in managed seasonal wetlands.

## **1. RTMP – Development of Stakeholder-Driven Program**

**Brief Description:** The RTMP is described in the TMDL as a stakeholder driven effort to use “real-time” water quality and flow monitoring data to support water management operations in order to maximize the use of assimilative capacity in the San Joaquin River. The CV Water Board describes this assimilative capacity as up to 85% of the load determined by Vernalis salinity objective. Reclamation is working with its consultant and Berkeley National Laboratory to support the development of a stakeholder-driven program.

### **Activities**

- Reclamation continues working to facilitate stakeholder involvement in developing a RTMP. The RTMP team is evaluating options and opportunities for engaging stakeholders through participation in CV-SALTS and the Lower San Joaquin River Committee within the larger CV-SALTS effort.
- During the third quarter of FY 2012, Reclamation continued progress on the proposed process and milestones for meeting the 2014 salt and boron TMDL compliance date. Reclamation and the CV Water Board have a monthly meeting to discuss their combined efforts. Reclamation is negotiating the requirements for an approved RTMP with the CV Water Board.
- To fully manage salt loading, a full-scale, stakeholder-driven RTMP must be implemented. Reclamation and Grassland Water District (GWD) continue to work together on the operation and maintenance of existing monitoring stations within the Grassland Resource Conservation District (GRCD). The ability to utilize real-time data to inform decision making and the sharing of real-time actions and information on salt load export from west-side water districts and wetlands is key to implementation of RTMP. Reclamation provided funding to GWD to complete a RTMP pilot project.
- The RTMP pilot project is a proposed two-year study which will monitor and report the volume of water, as well as salt load, of all major water sources entering the wetlands of the GRCD, key inter-conveyance points of mixing, deliveries to state federal and private wetlands, and all major outflows draining from the region to the LSJR. Real-time data that is publically available and web enabled will be used to provide decision support to wetland and water managers to maximize water conservation and water quality delivered within the GRCD.
- The RTMP pilot study includes the development of a visualization tool that will aid water managers in system projections. The visualization tool will be associated with the WARMF River Forecast model. GWD will work closely with Reclamation’s model developers to ensure assumptions, data input, and proof of concept are meaningful. Reclamation intends to develop the following in collaboration with GWD:
  - Forecast model-for San Joaquin River salt assimilative capacity
  - Improved GUI Interface and visual support for the forecast model to make it easier to use the model and interpret model output.

- A visualization tool that works with output from the existing YSI – EcoNET web server to enhance District understanding of salt export on a watershed scale.
- The sensor network system and visualization tool under development for the GWD and the State and Federal refuges can serve as a prototype for the basin-wide system. Many of the same issues of data sharing and coordination are also relevant to the agricultural watersheds and between water districts.
- The initial approach that was taken to develop a wetland salinity management tool to aid decision making involving the modeling of salt loading into and out of wetland management subareas was discouraged by GWD over a concern over the adequacy of supporting data. The GWD were concerned about public access to model simulated wetland salinity levels which could deviate from actual values without easy means of making the correction – especially in areas not well served by monitoring. It is impossible to install monitoring at each of the hundreds of wetland impoundments in the GRCD. The visualization tool encouraged by the GWD is less risky and provides updates as color rendered channel segments where the color corresponds to the current EC in a color ramp – where blue is water of high quality (low salinity below 500  $\mu\text{S}/\text{cm}$ ) and red is degraded water (EC is typically higher than 5,000  $\mu\text{S}/\text{cm}$ ). The WISKI hydrological data management system was reconfigured to export hourly data for all sites for a period of 1 month – these data are posted every hour to a Reclamation ftp site from which they can be downloaded and uploaded into the visualization tool. The visualization tool prototype is currently in the initial development phase.

## **2. RTMP – Technical Support**

**Brief Description:** A successful RTMP will require a real time monitoring network and a model capable of forecasting San Joaquin River assimilative capacity. The concept behind the RTMP is to enable the use of available assimilative capacity to export salt loads from the basin and to improve the scheduling of salinity loading to the river at times when there is significant dilution capacity. Matching salt load export with river assimilative capacity will reduce the frequency with which the river's capacity for salinity is exceeded (to the extent that exceedances are caused by discharges and not by background or allowed loads). Development of an accurate forecast model will serve as a decision making tool to help manage salinity loads in the river without violating water quality standards. Reclamation is committed to participate in the development and support of these tools. Reclamation staff has valuable experience in both of these areas. The technical support of this program will follow the stakeholder process.

### **Activities**

- Reclamation is working to gather the necessary information to identify general needs to engage real time management stakeholders. This study is scheduled to be completed later this year.
- Berkeley National Laboratory and Reclamation continues to work closely with Systech Water Resources and the US Geological Survey to improve the resolution of the current surface and groundwater simulation models by redefining watersheds to match water

districts on the west-side of the San Joaquin Basin and improving automation of data assimilation for real-time forecasting.

- Reclamation has begun conference calls with Irrigation Districts and Farmers to start planning a strategy and develop support resources to initiate a real-time salinity management strategy. This will start by identifying existing activities that with additional investment might become part of the real-time salinity management menu of options. An example is Patterson Irrigation District; one of the most technologically advanced irrigation districts in the San Joaquin Basin. Their current system is geared to water delivery optimization and power minimization (they pump a portion of their supply directly from the San Joaquin River). With additional investment in water quality instrumentation the District would have the capability of making return flow storage and reuse decisions including salt management as an additional management objective. A SCADA control system allows decisions to be made from a console in the District office.

### **3. Wetland BMP Plan**

The California Department of Fish and Game (CDFG) and the GRCD in coordination with Reclamation are developing BMP plans to reduce the impact of discharges from managed wetlands into the San Joaquin River. Reclamation also provides resources to support the development of a real-time monitoring network and other potential BMP analysis tools within Federal, State, and private managed wetlands. At present, the BMP plan has not been completed and released to the public.

### **Activities**

- Reclamation is developing a plan to continue support of a network of real-time flow and water quality monitoring stations at both wetland pond sites and major inflow and outflow conveyances within the GRCD. Reclamation (Resources Management Division) has supported this work for the past 3 ½ years; budget cuts and a realignment of programs has forced a transition to funding out of the water acquisitions program. Reclamation continues to sponsor research to reduce the unit cost of telemetered monitoring and web-access of real-time data. Reclamation has installed two MACE Agriflow data collection platforms adjacent to the monitoring wells at the Volta pump well sites. Reclamation will be working with MACE Inc. to test a new low-cost telemetry system during the next quarter.
- Reclamation is working with the Service, CDFG, and local wetland managers to update and finalize the BMP Plan. During 2009 and 2010 new flow and water quality monitors came on-line which are quantifying the volume and quality of return flows into the District from Central California Irrigation District (CCID) and the San Luis Canal Water District. This quantification will improve water management in the South GWD and improve water use efficiency.

### **4. Participation in CV-SALTS Program**

Brief Description: The CV Water Board and State Water Resources Control Board initiated a comprehensive effort to address salinity problems in California's Central Valley and adopt long-

term solutions that will lead to enhanced water quality and economic sustainability. The CV-SALTS is a collaborative basin planning effort aimed at developing and implementing a comprehensive salinity management program. The goal of CV-SALTS is to maintain a healthy environment and a good quality of life for all Californians by protecting the state's most essential and vulnerable resource - water.

## **Activities**

Reclamation continues to participate in the following sub-committees of the program: Executive, Technical Advisory and Economic, Education and Outreach, and Lower San Joaquin. In addition:

- Reclamation continues to lead the Technical Subcommittee and regularly attends the Executive Committee Policy meetings. Reclamation is participating with the CV Water Board in the analysis of the basin plan; potential changes may be pursued as projects.
- Reclamation continues to make progress on the Westside Salt Sources Assessment, which complements the CV-SALTS Pilot Salt Sources Study. This effort includes assistance in updating the WARMF-SJR models.
- Reclamation participates in CV-SALTS and the Lower San Joaquin River Committee as they evaluate beneficial use designations and a potential amendment of the Basin Plan. Reclamation will assist in the development of quality plans, a Stakeholder Participation Plan, and a proposed process for Real-time Management.

## **D. Central Valley Project Deliveries Load Calculation**

**Brief Description:** The CVP delivers water to both the Grassland and Northwest subareas (as described in the Basin Plan) through the DMC, the San Luis Canal, and the San Joaquin River/Mendota Pool. Most CVP water is pumped from the Delta into the DMC through the C.W. "Bill" Jones Pumping Plant located near Tracy, California. CVP water is conveyed south to DMC Check 13 near Santa Nella, California, where water is either mixed with the State Water Project in O'Neill Forebay and then either pumped into San Luis Reservoir for later delivery through the DMC or San Luis Canal, or conveyed further south to the DMC terminus at the Mendota Pool. During periods of drought, groundwater and river water are pumped into the DMC at several locations. The calculation methods used in this report are provisional and some elements in this report do not include estimations of benefits at this time. Reclamation submitted the *Compliance Monitoring and Evaluation Plan* to the CV Water Board (Reclamation 2010) which outlines the criteria and methodology for determining DMC loads and credits.

**Quantification Methodology:** The monthly amount of CVP water supply delivered to each district is pro-rated according to the area of each district within either the Grassland subarea, Northwest subarea, or outside of these subareas. The monthly mean salinity of CVP water is calculated from average daily measurements taken at three locations along the DMC. The salinity of CVP water delivered to each district is associated with the salinity monitoring site closest to the District's turnout along the DMC.

The Basin Plan allocates a salt load to Reclamation for water delivered to the Grassland and Northwest side Subareas. This background load allocation is calculated according to Table IV-8 Summary of Allocations and Credits (CV Water Board 2004c):

$$LA_{DMC} = Q_{DMC} * 52 \text{ mg/L} * 0.00136$$

Where:

- $LA_{DMC}$  = Load Allocation of salts, in tons
- $Q_{DMC}$  = monthly amount of CVP water delivered to Grassland and Northwest Subareas, in acre - feet
- 52 mg/L = “background” salinity of water in the San Joaquin River released at Friant Dam (per the Basin Plan) measured as total dissolved solids (TDS)
- 0.00136 = factor for converting units into tons

Actual DMC salt loads are calculated by the following equation:

$$L_{DMC} = Q_{DMC} * C_{DMC} * 0.00136$$

Where:

- $L_{DMC}$  = Actual DMC Load, in tons
- $Q_{DMC}$  = monthly amount of water delivered to Grassland and Northwest Subareas, in acre - feet
- $C_{DMC}$  = monthly average of salinity of the water delivered to Grassland and Northwest Subareas, in mg/L TDS
- 0.00136 = factor for converting units into tons

Each Subarea’s  $Q_{DMC}$  is calculated and then paired with the associated monthly average TDS for that reach, so the equation essentially becomes:

$$L_{DMC} = 0.00136 * \Sigma(Q_{DMC} * C_{DMC})_{\text{Subareas}}$$

This equation is then broken into calculations for each subarea based on the source of CVP water. Table 2 lists the monthly volumes of CVP water and salts delivered to the Grassland and Northwest subareas and an estimate of the salts delivered in excess of the Monthly Load Allocation.

**Table 2. Calculation of DMC Allocations and Loads**

	Grassland Subarea						Northwest Subarea						Total
	San Joaquin River and Mendota Pool Deliveries from CVP, load in thousand tons	Delta- Mendota Canal Deliveries from CVP, load in thousand tons	San Luis and Cross Valley Canal Deliveries from CVP, load in thousand tons	Total Flow, thousand acre-feet	Load Allocation, thousand tons	Actual Load - Load Allocation, thousand tons	San Joaquin River and Mendota Pool Deliveries from CVP, load in thousand tons	Delta- Mendota Canal Deliveries from CVP, load in thousand tons	Total Flow, thousand acre-feet	Load Allocation, thousand tons	Actual Load - Load Allocation, thousand tons	Total Excess Load from CVP Deliveries, thousand tons	

Jan-11	8.7	0.2	0.6	5.6	0.4	9.2	0.03	0.01	0.08	0.01	0.03	9.2
Feb-11	17.4	1.9	2.3	22.9	1.6	20.0	0.8	0.5	4.1	0.3	1.1	21.1
Mar-11	13.5	3.5	2.5	23.1	1.6	17.9	1.1	0.4	4.7	0.3	1.1	19.0
Apr-11	17.6	2.2	2.2	22.6	1.6	20.5	1.6	1.1	9.7	0.7	2.0	22.5
May-11	29.7	7.0	3.1	49.8	3.5	36.3	2.7	2.3	18.3	1.3	3.7	40.0
Jun-11	31.4	5.4	4.4	49.0	3.5	37.8	2.6	1.9	18.7	1.3	3.3	41.0
Jul-11	34.8	7.6	5.1	86.9	6.1	41.3	3.2	3.8	31.9	2.3	4.8	46.1
Aug-11	36.3	10.5	4.3	80.0	5.6	45.4	3.4	3.5	28.1	2.0	5.0	50.4
Sep-11	23.8	10.2	1.7	66.9	4.7	30.9	1.7	1.8	13.7	1.0	2.5	33.4
Oct-11	18.4	3.7	1.2	33.3	2.4	21.1	1.0	0.6	5.9	0.4	1.2	22.3
Nov-11	8.6	4.9	1.5	28.2	2.0	13.1	0.6	0.4	3.5	0.2	0.8	13.9
Dec-11	0.9	9.0	1.1	26.5	1.9	9.1	0.02	1.1	2.9	0.2	0.9	9.9
Jan-12	6.9	9.1	4.1	37.4	2.6	17.5	0.1	1.6	2.9	0.2	1.5	18.9
Feb-12	43.1	12.0	8.1	105.7	7.5	55.8	3.8	2.9	11.1	0.8	5.9	61.6
Mar-12	24.0	5.1	6.0	49.1	3.5	31.6	2.1	1.9	6.0	0.4	3.7	35.3
Apr-12	21.6	4.5	5.5	50.0	3.5	28.1	1.6	2.8	8.0	0.6	3.8	31.9
May-12	40.4	14.3	7.9	138.3	9.8	52.8	3.8	4.1	19.0	1.3	6.6	59.4
Jun 12	39.2	11.1	7.9	158.0	11.1	47.1	3.6	4.2	22.7	1.6	6.2	53.3
Jul 12	35.4	11.5	5.6	174.5	12.3	40.1	3.3	5.0	29.6	2.1	6.2	46.4
Aug 12	37.7	11.9	4.6	160.2	11.3	42.9	3.8	5.2	27.7	2.0	7.0	49.9
Sep 12	29.2	16.3	3.1	116.9	8.3	40.3	0.3	2.2	8.1	0.6	1.9	42.2

Source: Reclamation 2012b

### E. Reporting Requirements

In the MAA, Reclamation agreed to provide quarterly reports to the CV Water Board. Reclamation will consult with the CV Water Board before proposing any changes to the sample report format. Quarterly reports are due 45 days after the end of the calendar quarter:

**Table 3. Quarterly Report Submission Schedule**

End of Calendar Quarter	Due Date of Quarterly Report
September 30, 2012	November 14, 2012
December 31, 2012	February 14, 2013
March 31, 2013	May 15, 2013
June 30, 2013	August 14, 2012

### F. Funding Reporting

Reclamation agreed in the MAA to seek additional funding, including grant funding, to support salinity control efforts. Table 4 summarizes Reclamation’s funding initiatives.

#### Activities

**Table 4. Program Funding Initiatives**

Program	Description	Status	Period of Performance
Program to Meet Standards	Technical Support to Meet Salinity Objectives for	Execution 2013 Modification	FY2012 - FY2014

<b>Program</b>	<b>Description</b>	<b>Status</b>	<b>Period of Performance</b>
	Vernalis		
Salt and Boron TMDL	Coordinator/Facilitator Technical Support for RTMP	Execution	FY2012 - FY2013
Salt and Boron TMDL	Continued Technical Support for SJR RTMP	Execution	FY2012 - FY2013
Westside Salt Assessment	Fate and Transport Study	Execution	FY2012 - FY2013
Salinity Control	Westside Regional Drainage Plan	Negotiate New Grant Funding	FY2013 – 2016
Salinity Control	Grassland Bypass Project	Requested 2013 Funding	FY2013
Cooperative Agreement for a Pilot Study	Grassland Resource Conservation District Real Time Management Program Pilot Study	Negotiated New Grant Funding	September 1, 2012 - September 30, 2014

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## G. References

- CV Water Board  
2004a      Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges Into the Lower San Joaquin River Draft Final Staff Report Appendix 1: Technical TMDL Report, Regional Water Quality Control Board Central Valley Region, July 4, 2004.
- CV Water Board  
2004b      Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the Lower San Joaquin River Final Draft Staff Report. Appendix D: Background Salt and Boron Loading, Appendix E: Alternate Methods For Calculating Salt Loading from the Northwest Side of the Lower San Joaquin River. Regional Water Quality Control Board Central Valley Region, July 4, 2004.
- CV Water Board  
2004c      Amendments to The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for The Control of Salt and Boron Discharges into the Lower San Joaquin River Final Staff Report. Table IV-8 Summary of Allocations and Credits, Dilution Flow Allocations, Regional Water Quality Control Board Central Valley Region, September 10, 2004
- Reclamation 2010      Compliance Monitoring and Evaluation Plan, In Compliance with the “Management Agency Agreement between the Central Valley Regional Water Quality Control Board and the Bureau of Reclamation” executed on December 22, 2008. US Bureau of Reclamation, November 2010.
- Reclamation 2012a      Calculations for Quarterly Report, Q3-2012, Table 1: Goodwin Dam Monthly Dilution Flow Allocations, US Bureau of Reclamation, November 14, 2012
- Reclamation 2012b      Delta-Mendota Canal Water Quality Monitoring Program Report for July – September 2012. US Bureau of Reclamation, Draft, October 26, 2012. Revised 26 Oct. 2012 SCC-107