

RECLAMATION

Managing Water in the West

Quarterly Activity and Monitoring Report

October 1 – December 31, 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



Delta-Mendota Canal near Tracy, California

February 14, 2013

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Table of Contents

Purpose.....	1
A. Flow Actions	1
1. New Melones Reservoir Operations – Provision of Dilution Flow	2
2. Water Acquisitions.....	3
3. DMC Recirculation Pilot Studies – Provision of Dilution Water.....	4
B. Salt Load Reduction Actions.....	4
1. Grassland Bypass Project.....	4
2. Westside Regional Drainage Plan.....	6
3. Conservation Efforts	6
C. Mitigation Actions.....	8
1. RTMP – Development of Stakeholder-Driven Program	9
2. RTMP – Technical Support	9
3. Wetland BMP Plan	10
4. Participation in CV-SALTS Program	11
D. Central Valley Project Deliveries Load Calculation.....	12
E. Reporting Requirements.....	13
F. Funding Reporting.....	14
G. References	15

Tables

Table 1. Goodwin Dam Monthly Dilution Flow Allocation

Table 2. Calculation of DMC Allocations and Loads

Table 3. Quarterly Report Submission Schedule

Table 4. Program Funding Initiatives

Figures

Figure 1. Salts Discharged from the Grassland Drainage Area (tons)

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 th 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
DSS	Decision Support System
DWR	California Department of Water Resources
EC	electrical conductivity
GBP	Grassland Bypass Project
GDA	Grassland Drainage Area
GOES	Geostationary Operational Environmental Satellites
GRCD	Grassland Resource Conservation District
GWD	Grassland Water District
LBNL	Lawrence Berkeley National Laboratory
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
SJRIP	San Juan Recovery Implementation Program
TAF	thousand acre-feet
TDS	total dissolved solids
TMDL	total maximum daily load
VAMP	Vernalis Adaptive Management Plan
UOP	University of Pacific
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 – 4th 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 negotiating 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:

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

Where:

- A_{dil} = dilution flow allocation in thousand tons¹ 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 ($\mu\text{S}/\text{cm}$)
- WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in $\mu\text{S}/\text{cm}$

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) TAF ^a	Base Design Flow (DF) TAF ^b	Q_{dil} , TAF GDF-DF= Q_{dil}	WQO ^c , $\mu\text{S}/\text{cm}$	C_{dil} (monthly average EC at Orange Blossom Bridge) ^d , $\mu\text{S}/\text{cm}$	Dilution Flow Allocation, A_{dil} , tons
Oct-12	46	10	36	1000	90	-27,168
Nov-12	17	14	3	1000	99	-2,242
Dec-12	18	13	5	1000	104	-3,715

Source: Reclamation 2012a

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

^b Reclamation 2010 Compliance Monitoring and Evaluation Plan

^c CV Water Board 2004a and 2004b Appendix 1: Technical TMDL Report

^d <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 have equal priority with agriculture, municipal and industrial, and power uses. To meet water

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

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 Agreement² 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

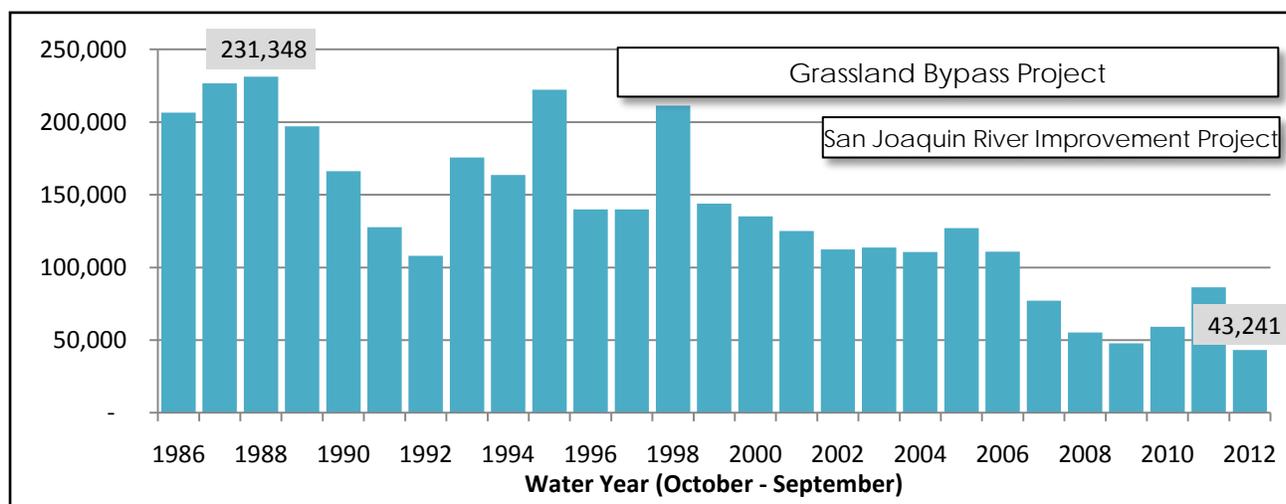
² U.S. Bureau of Reclamation and the San Luis and Delta-Mendota Water Authority, December 22, 2009. Agreement for Continued Use of the San Luis Drain for the Period January 1, 2010 through December 31, 2019. Agreement No. 10-WC-20-3975

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 load of salts discharged from the GDA has been significantly reduced through the implementation of the Grassland Bypass Project in 1996 and the development of the San Joaquin River Improvement Project (SJRIP) in 2002. Figure 1 shows the progressive reduction of salts from the GDA.³ The annual load of salts discharged in Water Year 2012 was 43,000 tons, much less than discharged prior to 1996.

Figure 1. Salts Discharged from the Grassland Drainage Area (tons)



- The reduction is through source control in the GDA and displacements of agricultural drainage water across the SJRIP re-use area.
- 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 and continues 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, acute and chronic toxicity analyses, flow and water quality monitoring, and sediment monitoring for

³ Source: Reclamation 2012b

accumulation and selenium contamination. The DCRT will revise the GBP monitoring program to be consistent with the revised WDR which is expected in late 2013.

- The DCRT completed the 2010-2011 report, which will be 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 on April 27, 2012. The court heard the federal defendant's motion for judgment on January 22, 2013, and a decision is expected in spring 2013.

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 (see above) included directions to terminate the flows from the sumps into the DMC by 2015.
- Reclamation continues to administer three grants with Panoche Drainage District worth \$14.8 million to implement the WRDP for source control activities, groundwater management, reuse of drain water and salt treatment/disposal. Negotiations have also begun for a fourth grant worth \$4 million.
- Panoche Drainage District has used most of this money to develop the SJRIP through construction of infrastructure and environmental mitigation. In 2012, the District has displaced 23,735 acre-feet of agricultural drainage water, 118,450 tons of salts and 273 tons of boron from the river. Absent the SJRIP, this water would have been discharged to the LSJR.

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 RTMP combined with the River Forecast Model for assimilative capacity.

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 Stakeholders and CV-SALTS to support the development of a stakeholder-driven program.

Activities

- Reclamation continues working to initiate stakeholder involvement opportunities 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 (LSJR Committee). Although the LSJR Committee lost some of its momentum in the final quarter of 2012 – future meetings will include a standing agenda item on RTMP. Reclamation initiated monthly teleconferences with Joe McGahan, Dave Cory, and Ric Ortega to discuss the direction and support for the RTMP.
- During the fourth quarter of FY 2012, Reclamation continued progress on the proposed process and milestones to identify program needs. Reclamation and the CV Water Board have maintained a monthly meeting to coordinate their efforts. Together they are identifying the necessary requirements to establish a “Board Approved” RTMP, reviewing the potential load requirements under the 2008 Salt and Boron TMDL, and discussing the upper San Joaquin River water quality objectives.

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. The River Forecast model, under development, is one component of the RTMP decision support system (DSS). Reclamation is committed to participate in the development of DSS tools. Reclamation’s experienced staff will continue to support the development of the RTMP and some of their activities are described below.

Activities

- Reclamation and Grassland Water District (GWD) continue to work together on the development of a visual simulation tool. The tool presents real-time data on water flows and volume and salt loads for waters entering, within and leaving the Grasslands Resource Conservation District (GRCD). The tool provides real-time data for key

conveyance mixing points, operational spill and drainage flows from CCID and San Luis Canal Company discharge to the southern portion of GWD. The RTMP pilot study includes the development of a visualization tool that will help wetland water managers estimate salt loads leaving the District and allow a comparison to be made between actual loads and target salt loads (which have yet to be established). The visualization tool obtains the last 30 days of hourly mean data after it has been processed by the WISKI software program at Lawrence Berkeley National Lab (LBNL) and uploaded to a Reclamation ftp site in Denver. The tool is mostly complete – remaining problems relate to the operation and reliability of Reclamation’s ftp server.

- A parallel project will soon be underway to improve the current WARMF model interface for river assimilative capacity forecasting. This WARMF model upgrade will also bring back on line the west-side tributaries after repair of some of the GOES transmitters that are no longer synching the GPS time. The new WARMF River Forecast Model interface will enhance the following tasks
 - Forecasts of San Joaquin River salt assimilative capacity
 - Visualization support of each forecast to make it easier to interpret model output. In particular each river reach will be color coded according to current EC and salt load.
 - The visualization tool will display data from the YSI – EcoNET web server (via the LBNL server and Reclamation ftp site) to enhance District understanding of salt export on a watershed scale.
 - Reclamation is evaluating ftp site enhancements to improve reliability and ease of use of real-time data.
- The sensor network system and visualization tool under development for the GWD and the State and Federal refuges demonstrates RTMP and how it may be used for a basin-wide system. Many of the same issues of data sharing and coordination are also relevant to the agricultural watersheds and between water districts.
- LBNL 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.
- LBNL and Reclamation are working with the Westside Drainage Authority and UOP to rehabilitate the west-side tributary stations and restore GOES telemetry to each station. This may require repair or replacement of the GOES radios at each site – since none of the sites allows the transmitter clock to synch with Greenwich Mean time – causing potential problems with transmission scheduling. GOES radios are being sent in to Design Analysis Inc. for evaluation and potential repair.

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 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 Lower San Joaquin River. In addition:

- Reclamation continues to provide funding for the chair of the Technical Subcommittee and regularly attends the Executive Committee Policy meetings.
- Reclamation has completed technical review of the Westside Salt Sources Assessment technical memoranda, which complements the CV-SALTS Pilot Salt Sources Study. These reports were released to the public February 2013.
- 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 has offered to assist the LSJR Committee in the development of quality plans, a Stakeholder Participation Plan, and a proposed process for Real Time Management Program implementation.

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):

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

Where:

- L_{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:

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

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:

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

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	
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
Oct 12	28.6	8.9	3.2	84.8	6.0	34.8	0.4	0.9	2.8	0.2	1.1	35.8
Nov 12	14.0	2.8	2.1	37.0	2.6	16.2	0.3	0.4	1.6	0.1	0.6	16.8
Dec 12	6.2	0.4	0.4	12.5	0.9	6.2	0.2	0.1	0.4	0.03	0.2	6.3

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
December 31, 2012	February 14, 2013
March 31, 2013	May 15, 2013
June 30, 2013	August 14, 2013
September 30, 2013	November 14, 2013

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 Vernalis	Execution 2013 Modification	FY2012 - FY2014
Salt and Boron TMDL	Coordinator/Facilitator Technical Support for RTMP	Execution Closed	FY2009 - FY2012
Salt and Boron TMDL	Continued Technical Support for SJR RTMP	Execution Closed	FY2009 - FY2012
Salt and Boron TMDL	Technical Support for LSJR Meeting Water Quality Objectives	In Negotiation	Expected July 2013
Program to Meet Standards	Technical Support Program to Meet Standards	In Negotiation	Expected July 2013
Westside Salt Assessment	Fate and Transport Study	Closed	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 RTMP Pilot Study	Grassland Resource Conservation District Real Time Management Program Pilot Study	Negotiated New Grant Funding	September 1, 2012 - September 30, 2014

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, Q4-2012, Table 1: Goodwin Dam Monthly Dilution Flow Allocations, US Bureau of Reclamation, February 8, 2013
- Reclamation 2012b Delta-Mendota Canal Water Quality Monitoring Program Report for October – December 2012. US Bureau of Reclamation, Draft, February 08, 2013.