

Quarterly Activity and Monitoring Report

October 1 – December 31, 2010

*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*

February 15, 2011

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Abbreviations and Acronyms

Action Plan	Actions to Address the Salinity and Boron TMDL Issues for the LSJR
AF	acre-foot or acre-feet
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
CALFED	CALFED Bay-Delta Program
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CVO	Central Valley Operations
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	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
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
Exchange Contractors	San Joaquin River Exchange Contractors Water Authority
GBP	Grassland Bypass Project
GDA	Grassland Drainage Area
GRCD	Grassland Resource Conservation District
GUI	graphical user interface
ID	irrigation district
Interior	U.S. Department of the Interior
IPO	Interim Plan of Operations
LSJR	Lower San Joaquin River
MAA	Management Agency Agreement
μS/cm	micro Siemens per centimeter
μg/L	microgram(s) per liter (parts per billion)
mg/L	milligram(s) per liter (parts per million)
NPDES	National Pollutant Discharge Elimination System
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control

Reclamation RTMP	Bureau of Reclamation Real Time Management Program
Secretary Service SJR SJRIP SJRWQMG SLDMWA SWP SWRCB	Secretary of the Interior U.S. Fish and Wildlife Service San Joaquin River San Joaquin River Improvement Project San Joaquin River Water Quality Management Group San Luis and Delta Mendota Water Authority State Water Project State Water Resources Control Board
TAF TDS TMDL TPRT	thousand acre-feet total dissolved solids total maximum daily load Technical Policy and Review Team
VAMP	Vernalis Adaptive Management Plan
WAP WCFSP WDR WQO WRDP	Water Acquisition Program Water Conservation Field Service Program Waste Discharge Requirement water quality objective Westside Regional Drainage Plan
YSI	Yellow Spring Instrument

Purpose

The Central Valley Regional Water Quality Control Board's Salt and Boron Total Maximum Daily Load (TMDL) was approved and placed into effect on July 28, 2006. In response to the Salinity and Boron TMDL, the United States Bureau of Reclamation (Reclamation) developed a salinity control 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 Central Valley Regional Water Quality Control Board (CVWQCB) on December 22, 2008. The MAA describe the actions Reclamation will take to meet the obligations allocated to it by the Salinity 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 salinity control plan for the Lower San Joaquin River. 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 Regional 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 will provide a synopsis of the various activities associated with each element identified in the Action Plan. The Action Plan describes all of the actions contemplated by the MAA. Within the Action Plan, actions are divided into three major categories: Flow, Salt Load Reduction, and Mitigation. For each action a brief description and list of activities are identified. The quarterly report will include 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 *Draft Compliance Monitoring and Evaluation Plan* to the CVRWQCB (October 2009) 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. Flow actions include: dilution flows from New Melones, water acquisitions, and Recirculation.

1. New Melones Reservoir Operations – Provision of Dilution Flow

Brief Description: In the Flood Control Act of October, 1962, the Congress reauthorized and expanded the New Melones project (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 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 the Bureau of Reclamation on the effects of the continued operation of the Federal Central Valley Project (CVP) and the California State Water Project (SWP) on the various runs of Chinook salmon, Central Valley steelhead, and green sturgeon, and their designated critical habitat.

Items 12 and 13 of the Control Program for Salt and Boron Discharges into the Lower San Joaquin River of the Basin Plan Amendment states:

12. Salt loads in water discharged into the 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.

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.

Activity:

- *Operated system to comply with Biological Opinions and Ripon dissolved oxygen criteria.*

Quantification Methodology: Table IV-8 in the Basin Plan Amendment 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 tons¹ of salt per month

Q_{dil} = dilution flow volume in thousand acre-feet per month – above base flows

C_{dil} = dilution flow electrical conductivity in $\mu\text{S}/\text{cm}$

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 DWR’s Water Supply Index Forecasts (<http://cdec.water.ca.gov/cgi-progs/iodir/WSI>) for the San Joaquin Valley. The 75% exceedance forecast for December 1, 2010 is 2.9, which would make 2010 a below normal year.

Dilution Flow Allocation: WY2010 as a below normal year.

Table 1: Goodwin Dam Monthly Dilution Flow Allocation, tons

	Goodwin Dam Flow, TAF	Base Flow, TAF	Q_{dil} , TAF	WQO, $\mu\text{S}/\text{cm}$	C_{dil} (monthly average EC at Orange Blossom Bridge), $\mu\text{S}/\text{cm}$	Dilution Flow Allocation, A_{dil} , tons
Oct-10	39	9	30	1000	69	23,162
Nov-10	12	12	0	1000	71	0
Dec-10	28	13	15	1000	84	11,394

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 Central Valley Project. CVPIA altered the management of the Central Valley Project to make fish and wildlife protection, restoration, and enhancement as project purposes having equal priority with agriculture, municipal and industrial, and power uses. To meet water acquisition needs under CVPIA, the U.S. Department of the Interior (Interior) developed a Water Acquisition Program (WAP), a joint effort by the 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 the Interior’s ability to meet regulatory water quality requirements. Under the Basin Plan Amendment, performance of the Vernalis Adaptive Management Program’s spring pulse flow does not provide dilution flows, so it is not reported here.

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

Activity:

- *Reclamation acquired 12,500 acre-feet of water in October 2010 from Merced Irrigation District that was released to the San Joaquin River that provided assimilative capacity to the river.*
- *Reclamation executed a one year extension of the San Joaquin River Agreement which will provide fall flows for 2011.*

Quantification Methodology: The discussion on dilution flow allocation presented under New Melones Reservoir Operations is pertinent here as well. Table IV-8 of the Basin Plan Amendment 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 tons² of salt per month
- Q_{dil} = dilution flow volume in thousand acre-feet per month
- C_{dil} = dilution flow electrical conductivity in $\mu\text{S/cm}$
- WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in $\mu\text{S/cm}$

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 convey 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>

Activity:

- *Submitted the “Delta-Mendota Canal Recirculation Feasibility Study, Plan Formulation Report” to the State Water Resources Control Board*

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 River. As part of its efforts to provide drainage, Reclamation has historically supported the Westside Regional Drainage Plan (WRDP) through monetary grants and in-kind services. Reclamation recognizes there is still much to be done to implement the Westside Regional Drainage Plan. Salt Load Reduction Actions include the Grassland Bypass Project, the Westside Regional Drainage Plan, and conservation programs (Water Conservation

² *ibid*

Field Services Program, Water 2025 Grants Program, and the CALFED Water Use Efficiency Program).

1. Grassland Bypass Project

Brief Description: The Grassland Bypass Project (GBP) is a multi-agency stakeholder project based upon an agreement³ between the Reclamation and the Authority to use a 28-mile segment of the San Luis Drain to convey agricultural subsurface drainage water from the 97,000 acre Grassland Drainage Area (GDA) to Mud Slough, a tributary of the San Joaquin River. The purpose of the project is to separate unusable agricultural drainage water discharged from the GDA from wetland water supply conveyance channels, facilitate drainage management that maintains the viability of agriculture in the GDA, and promote continuous improvement in water quality in the San Joaquin River.

Activity:

- *The new Agreement for Use of the San Luis Drain has strict limits on the loads of salts and selenium that can be discharged by the GBP. These limits are based on the assimilative capacity of the San Joaquin River and diminish over time to meet objectives specified in the Basin Plan. The Use Agreement includes significant fines for exceeding the monthly and annual limits.*
- *To date, the Grassland Area Farmers have met monthly and annual load limits for salts and selenium specified in the Use Agreement. The discharge of salts from the GDA in 2010 is estimated to be about 63,400 tons, which is a 64 percent reduction from the average load of salts discharged between 1985 – 1996, prior to the GBP.*
- *In FY 2011, Reclamation has obligated more than \$800,000 to fund the GBP Compliance Monitoring Program, including flow and water quality monitoring at seven sites, peer review of data, and publication of data synthesis reports.*
- *The Regional Water Quality Control Board amended the Basin Plan for the Sacramento and San Joaquin Rivers to allow the project to continue through 2019⁴. The State Water Resources Control Board approved the Basin Plan Amendment⁵, and the resolution is awaiting California Office of Administrative Law and the US Environmental Protection Agency approval. A revised Waste Discharge Requirement is being prepared by the Regional Board.*
- *The Interagency Data Collection and Review Team (DCRT) continues to implement the monitoring program that includes quarterly biota sampling at seven locations, acute and chronic toxicity analyses, flow and water quality monitoring, and sediment monitoring for the accumulation of selenium. The DCRT will revise the GBP monitoring program to make it consistent with the revised Waste Discharge Requirement.*

³ 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

⁴ Central Valley Regional Water Quality Control Board, May 27, 2010. Resolution R5-2010-0046. Amending the Water Quality Control Plan for the Sacramento River and San Joaquin River Basin for the Control of Selenium in the Lower San Joaquin River Basin.

⁵ State Water Resources Control Board, October 5, 2010. Resolution No. 2010-0046. Approving Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) to Address Selenium Control in the San Joaquin River Basin.

- *The DCRT has completed most of the chapters for the 2008-2009 report. Currently the DCRT is completing its review of the draft chapters on biological effects and toxicity.*

2. Westside Regional Drainage Plan (WRDP)

Brief Description: The Westside Regional Drainage Plan 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 solution area 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 funding to support and sustain the WRDP.

Activity:

- *2009 San Joaquin River Salinity Management Grant: Reclamation awarded \$10.3 million to Panoche Drainage District to construct source control projects and to construct and operate infrastructure for the re-use of subsurface drainage water specified in the WRDP. The District used federal grant funds for lining two miles of canal with concrete, construction of two pumping stations, land development, installation of irrigation systems, and environmental mitigation. In 2010, the District displaced almost 72,000 tons of salts that would otherwise have been discharged to the San Joaquin River.*
- *Reclamation continues negotiations with Panoche Drainage District on a long-term agreement to fund the treatment and disposal of high saline groundwater in six sumps that currently discharge into the DMC. The sumps are a source of contamination of CVP water delivered to local wildlife refuges. Under the 2009 Grant, Reclamation awarded \$500,000 for the design and construction of plumbing to collect the sump water. To date, this construction has not occurred.*
- *Heavy rains fell on the GDA during October – December 2010 causing minor local flooding from Panoche Creek to the Mendota Pool. No floodwater was discharged from the GDA into adjacent wetlands water supply channels.*

3. Conservation Efforts

Brief Description: The water use efficiency program element 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 improved 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 the WaterSMART, CALFED, and the WCFSP, Reclamation has awarded 68 projects in the San Joaquin Valley that require performance measures since 2006. Through the American Recovery and Reinvestment Act (ARRA), Reclamation awarded 3 grant projects and 1 contract that require

performance measures. As information is collected from these projects, quantifiable benefits may be determined in the future.

Activity:

- *No new projects occurred within the San Joaquin basin.*
- *Reclamation recently advertised the FY2011 Field Services Program, WaterSMART Bay-Delta Agriculture Efficiency, and WaterSMART Water and Energy Efficiency Financial Assistance Opportunities on www.grants.gov. The Field Services Program is estimated to award \$1,000,000 in water conservation projects to benefit the Mid Pacific Region of California and Nevada, and is anticipated to be awarded by June 2011. The WaterSMART Bay-Delta Ag Efficiency program is estimated to award \$5,000,000 in water conservation projects throughout the California Bay-Delta region and is anticipated to be announced in June 2011. The WaterSMART Water and Energy Efficiency program is estimated to award \$27,000,000 in water conservation projects throughout the western United States and is anticipated to be announced in August 2011.*

C. Mitigation Actions

Reclamation's Action Plan identifies two mitigation actions to reduce salinity loads: a Real Time Management Program (RTMP) to maximize the removal of salt using assimilative capacity in the San Joaquin River, and a wetlands BMP plan to research and potentially develop practices to reduce salinity loading from managed wetlands. Reclamation has actively supported the development of a real time monitoring and forecasting program in the River and in managed wetlands.

1. RTMP – Development of Stakeholder-Driven Program

Brief Description: The Real Time Management Program 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 Regional 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.

Activity:

- *Reclamation continues working with its consultants to facilitate stakeholder involvement in developing a Real Time Management Program (RTMP). With the Upstream Salinity Studies transferring to CV-SALTS, the RTMP team is evaluating options and opportunities for engaging stakeholders.*
- *Reclamation is working with Berkeley National Laboratory to develop a hydrological data management system for continuous assessment of real-time water quality data and enhancement of data sharing between stakeholders.*
 - *This hydrological management system is being beta-tested in the Grassland Water District with sensor data supplied from more than fifty real-time flow and water quality monitoring stations.*

- *During 2011, Button Willow Lake, which serves as a wetland drainage collection facility located within the Los Banos Wildlife Management Area (LBWMA), will have its outlet structure instrumented and reconfigured to enable real-time drainage control. This feature will allow water managers in the LBWMA to schedule discharge of salt load from the refuge in response to dynamic salt load allocations determined by future forecasts of San Joaquin River assimilative capacity. In this manner the real-time water quality management system under development for the Grassland Water District and the State and Federal refuges can serve as a prototype for the Basin-wide system envisioned by the Central Valley Regional Water Quality Control Board in the Salt and Boron TMDL.*

2. RTMP – Technical Support

Brief Description: A successful RTMP will require a real time monitoring network and a model capable of producing a reasonably accurate forecasting of 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 river's capacity for salinity are 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.

Activity:

- *Reclamation is working with its contractor to gather the necessary information to identify general infrastructure needs to engage real time management stakeholders.*
- *Reclamation is working with its contractor to provide technical support for the upstream salinity studies as they relate to RTMP.*
- *Reclamation is working with Berkeley National Laboratory to provide technical support for the upstream salinity studies as they relate to RTMP. Through the Program to Meet Standards (PTMS) Reclamation is investing in technical analysis and enhancement of both the WESTSIM and WARMF-SJR models to reconcile the hydrologic water budgets which will result in improved understanding of Westside hydrology and will ultimately result in a more accurate and robust forecasting tool.*
- *Reclamation is providing personnel support to the Lower San Joaquin River Subcommittee to CV-SALTS. This subcommittee is committed to implementing policies and proposals that will enhance compliance with Regional Board water quality objectives; making improvements to the current Basin Plan for the San Joaquin Basin to promote cost-effective solutions to current salinity challenges; and enhancing stakeholder involvement in real-time salinity management.*

3. Wetlands BMP Plan

Brief Description: The Service, CDFG, and the Grassland Resource Conservation District (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 (over 45 stations) and other potential BMP analysis tools within federal, state, and private managed wetlands. At present, the Plan has not been completed and released to the public.

Activity:

- *Reclamation is continuing to finance and provide technical support for a network of real-time flow and water quality monitoring stations at both wetland pond sites and major inflow and outflow conveyances within the Grasslands Ecological Area. Understanding the fate of salt under different wetland habitat management objectives is a necessary first step to evaluate the potential for wetland real-time water quality management. Data from the stations is being used to help characterize salt loading from key drainage subareas within the watershed and to provide key control points for real-time salt load forecasting and eventual management of salt loading to the San Joaquin River.*
- *Reclamation is working with the Service, CDFG, and local wetlands 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 CCID and the San Luis Canal Water District. This quantification will improve water management in the South Grassland Water District and improve water use efficiency.*
- *Reclamation's contractors completed drilling and well development for the two production wells located in the Volta Wildlife Management Area with the wells scheduled to begin production in early spring 2011. Well discharge will be continuously monitored to assess long term impacts on refuge water quality and local groundwater resources. Berkeley National Laboratory is assisting Reclamation with a hydrologic data management system to tie this well monitoring program into the larger real-time water quality monitoring program for the Grasslands Ecological Area.*

4. Participation in CV-SALTS program

Brief Description: The Central Valley Water Board and State Water 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 Central Valley Salinity Alternatives for Long-Term Sustainability (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.

Activity:

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

- *Reclamation remains active in the “Lesson Learned” Subcommittee which is completing a technical white paper on the study and how the principles can be extended to similar studies of other watersheds in the Central Valley. This effort will result in a framework for regional salt and nitrate information collection that can be applied Basin-wide.*
- *Reclamation’s consultants continue 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 WESTSIM and WARMF-SJR models, improving model calibration and development of a spreadsheet-based model, summary water and salinity budgets for agricultural and wetland land uses on the west-side. A draft report has been completed and is under internal review within Reclamation.*
- *The US Geological Survey has been working closely with Reclamation and Berkeley National Laboratory on the enhancement of their Central Valley Hydrologic Model (CVHM). The model has relied heavily on updated data records from WESTSIM and new data being made available through Reclamation-sponsored monitoring activities. The model will ultimately address land subsidence impacts due to increased deep aquifer pumping on the west-side of the Valley. Reclamation is researching the integration of surface and groundwater monitoring and lower cost data management and web-posting using the WISKI Hydrologic Data Management System.*

D. Central Valley Project Deliveries Load Calculation

Brief Description: The Central Valley Project (CVP) delivers water to both the Grassland and Northwest subareas (as described in the Basin Plan) through the Delta-Mendota Canal (DMC). The DMC starts at the pumping headworks in the Delta, the C.W. Jones (Jones) Pumping Plant at Tracy, California. Water is conveyed south to the San Luis Reservoir, where water is mixed with the State Water Project in O’Neill Forebay and then either pumped into San Luis Reservoir for later delivery, or conveyed further south through the DMC to the Mendota Pool. Turnouts and groundwater pump-ins occur at several locations along the DMC. “Reach 1” of the DMC includes turnouts between the Jones Pumping Plant and the San Luis Reservoir. Deliveries for Reach 1 are made through the San Luis Canal and the Cross Valley Canal, as well as directly out of the DMC. “Reach 2” of the DMC includes turnouts between the O’Neill Forebay and the Mendota Pool. “Reach 3” covers deliveries made out of the Mendota Pool. Some simplification of this system has been made for accounting purposes, as some districts take portions of their deliveries through several turnouts.

Quantification Methodology: The Basin Plan allocates a load to Reclamation for water delivered to the Grassland and Northwest side Subareas. This load allocation is calculated according to Table IV-8 Summary of Allocations and Credits:

$$LA_{DMC} = Q_{DMC} * 52 \text{ mg/L} * 0.0013599$$

Where:

- LA_{DMC} = Load Allocation of salts, in tons
- Q_{DMC} = monthly amount of water delivered to Grassland and Northwest side subareas, in acre feet
- 52 = “background” TDS of water in the San Joaquin River at Friant per the Basin Plan

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0.0013599 = factor for converting units into tons

Actual DMC salt loads are calculated by the following equation:

$$L_{DMC} = Q_{DMC} * (C_{DMC}) * 0.0013599$$

Where:

L_{DMC} = Actual DMC Load, in tons

Q_{DMC} = monthly amount of water delivered to Grassland and Northwest side subareas, in acre feet

C_{DMC} = monthly average (arithmetic mean) of salinity of the water delivered to Grassland and Northwest Subareas, in mg/L TDS

0.0013599 = factor for converting units into tons

Each delivery reach's Q_{DMC} is calculated and then paired with the associated monthly average EC for that reach, so the equation essentially becomes:

$$L_{DMC} = 0.0013599 * \Sigma(Q_{DMC} * C_{DMC})_{Reach\ 1-3}$$

This equation is then broken into two calculations, one for each subarea. Table 2 summarizes data taken from the monthly report titled *Delta-Mendota Canal Water Quality Monitoring Program* and illustrates the excess loads from the subareas and the total excess loads from CVP deliveries.

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Table 2. Calculation of WY 2010 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	
September to March Standard, 1000 uS/cm												
Oct-09	31.3	6.0	2.3	85.5	6.0	33.7	0.6	0.4	2.2	0.2	0.9	34.5
Nov-09	11.0	5.4	1.6	39.1	2.8	15.2	0.4	0.6	2.0	0.1	0.8	16.0
Dec-09	0	3.3	0.4	6.9	0.5	3.2	0	0.3	0.5	0	0.3	3.4
Jan-10	1.3	3.1	0.5	7.6	0.5	4.5	0	0.1	0.2	0	0.1	4.6
Feb-10	20.2	1.5	1.4	38.0	2.7	20.4	0.5	0.3	1.4	0.1	0.7	21.1
Mar-10	19.6	6.2	3.4	54.2	3.8	25.3	1.7	1.2	5.3	0.4	2.5	27.8
April to September Standard, 700 uS/cm												
Apr-10	16.0	2.2	3.9	37.1	2.6	19.5	0.9	0.8	3.2	0.2	1.5	21.0
May-10	35.6	10.2	5.3	123.9	8.8	42.4	3.3	2.5	16.3	1.1	4.6	47.0
Jun-10	33.5	9.2	6.1	165.0	11.7	37.1	3.0	3.1	21.6	1.5	4.6	41.7
Jul-10	32.9	10.2	5.8	191.8	13.5	35.4	3.0	4.7	32.4	2.3	5.4	40.8
Aug-10	37.2	12.0	4.2	171.5	12.1	41.3	3.4	4.5	24.4	1.7	6.2	47.4
September to March Standard, 1000 uS/cm												
Sep-10	35.8	17.6	2.2	133.7	9.4	46.2	2.5	1.9	11.3	0.8	3.7	49.9
Oct-10	26.9	8.4	2.8	87.3	6.2	31.8	0.2	1.2	3.9	0.3	1.2	33.0
Nov-10	13.7	3.8	2.1	42.3	3.0	16.6	0.5	0.3	2.0	0.1	0.7	17.3
Dec-10	10.3	0.5	0.4	23.8	1.7	9.4	0.5	0.0	1.2	0.1	0.5	9.9

E. Reporting Requirements

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

End of calendar quarter	Due date of Quarterly report
Dec 31, 2008	February 15, 2009
March 31, 2009	May 15, 2009
June 30, 2009	August 15, 2009
September 30, 2009	November 15, 2009
December 31, 2009	February 15, 2010
March 31, 2010	May 15, 2010
June 30, 2010	August 15, 2010
September 30, 2010	November 15, 2010
December 31, 2010	February 15, 2011

F. Funding Reporting

Reclamation agreed in the MAA to seek additional funding, including grant funding, to support salinity control efforts. In its quarterly reports, Reclamation will report on its efforts to support the securing of additional funding.

Activity:

- *A funding request was submitted for the 2011 and 2012 budgets for:*
 - *WRDP*
 - *administrative coordination and activities related to the RTMP*
 - *administration of the Grassland Bypass Project*
- *The federal government is operating under a continuing resolution which limits funding to 2010 activities. Funding to for Salinity and Boron TMDL activities are under 2011 activities.*