

RECLAMATION

Managing Water in the West

Annual Work Plan, FY2017
October 1, 2016 – September 30, 2017

**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 4, 2014**



U.S. Department of the Interior
Bureau of Reclamation

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Table of Contents

Purpose.....	4
Reclamation Staff Resources	5
Goals and Objectives for FY 2017.....	6
Status of the Program.....	11
Publications Update	15
References.....	16

Tables:

- Table 1. List of Reclamation Staff
- Table 2. Reclamation Goals and Real Time Management Program Phase 3 Elements
- Table 3. FY2017 Proposed Funding
- Table 4. Planned Reclamation Activities to meet San Joaquin River salinity regulations for 2017
Fiscal Year

Abbreviations and Acronyms

Action Plan	Actions to Address the Salinity and Boron TMDL Issues for the Lower San Joaquin River November 2008
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
CESU	Cooperative of Ecosystem Studies Unit
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 Stakeholder Group
D-1641	State Water Resources Control Board Decision 1641
DMC	Delta-Mendota Canal
DWR	California Department of Water Resources
EC	electrical conductivity
GBP	Grassland Bypass Project
GOES	Geostationary Operational Environmental Satellites
GWD	Grassland Water District
LSJR	Lower San Joaquin River
MAA	Management Agency Agreement
MOU	Memorandum of Understanding
PTMS	Program to Meet Standards
Reclamation	United States Bureau of Reclamation
RTMP	Real Time Management Program
SJR	San Joaquin River
State Water Board	State Water Resources Control Board
TMDL	total maximum daily load
TRT	Technical Research Team
USGS	United States Geological Survey
VAMP	Vernalis Adaptive Management Plan

WARMF

Watershed Analysis Risk Management Framework

Purpose

The Central Valley Regional Water Quality Control Board's (CV Water Board) Salt and Boron Total Maximum Daily Load (TMDL) for the San Joaquin River 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) drafted an Action Plan (dated July 9, 2008) and entered into a Management Agency Agreement (MAA) with the CV Water Board on December 22, 2008. The Action Plan was created to accompany the MAA and provide details about Reclamation's planned activities to comply with the TMDL. Many of the activities were scientific in nature and intended to characterize the basin and identify future projects to meet the needs of the TMDL. A good example study that has been completed is the Delta Mendota Canal (DMC) Recirculation Project. This project evaluated the feasibility of recirculating water from the DMC to the San Joaquin River and back into the DMC when necessary to reduce the salinity concentration in the river. The project was not deemed feasible but serves as an example of the scientific study and discovery that was accomplished to find effective salinity management practices for the San Joaquin River.

The initial requirements for creating a real-time management program for the San Joaquin River were also explored and a real-time pilot has been implemented in the San Joaquin watershed to be used as an example for stakeholders within the watershed. Reclamation has partnered with Grassland Water District (GWD) over the last 10 years to develop real time management stations, quality control, a reporting system and an ArcGIS based visualization tool. This activity has benefitted GWD by improving operations and water accounting in addition to salt management benefits. GWD is now a member of the San Joaquin River real time management Memorandum of Understanding (MOU) group.

A Reclamation Compliance Plan (dated May 2010) and Compliance Report (dated May 2010) were also written to provide the methodology used for the activities described in the Reclamation Action Plan. These documents contain information regarding the technical analysis, computation, and methodology utilized in each Reclamation activity. The 2008 MAA was updated in December 2014 (here after called the updated MAA) with a new focus on developing the real time management program in the San Joaquin River. The updated MAA states that Reclamation actions will be described in an Annual Work Plan. The Annual Work Plan serves as a continuation of the work that was initiated in the Reclamation Action Plan.

The Annual Work Plan summarizes annual planned activities to be conducted by Reclamation in conjunction with each element outlined in the MAA.¹ This includes support of Phase 3 activities listed in the Real Time Management Program (RTMP) Framework Document, approved by the CV Water Board in December 2014. The original Action Plan described Reclamation's past practices and procedures to mitigate and manage adverse impacts of salt and boron imported into the San Joaquin Basin via the 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). Those actions have now been updated, added to the MAA and are reported in the Annual Work Plan and Annual Report.

¹ The activities in the Work Plan are subject to the availability of a financial allocation.

Reclamation performs a variety of salinity management activities within the San Joaquin watershed. Examples of these activities include the Grassland Bypass Project, WaterSMART Grant Program, New Melones Plan of Operations, real time salinity management program development, support to the Westside Regional Drainage Plan and salinity management support to GWD. Reclamation has committed significant resources to the development of a real time management pilot project in GWD to initiate the real-time water quality management program. Reclamation is committed to continuing the development of real time salinity management within the San Joaquin River watershed to reduce reliance on New Melones dilution flows. Reclamation’s planned activities for FY2017 regarding the real time salinity management program are described in this work plan.

The purpose of the Water Board approved RTMP is to provide a roadmap for implementing management activities. The document outlines a suite of actions for salinity management as part of the RTMP that when implemented will meet salinity water quality objectives at Vernalis, allow export of salt loads in accordance with the provisions in the Basin Plan from surface waters during times of river assimilative capacity, reduce the reliance on New Melones Reservoir for meeting water quality objectives for salinity at Vernalis and establish an organizational approach for the continuing development, implementation and coordination of RTMP activities. Reclamation, through the MAA, has committed to provide technical support in order to develop the components of a fully functioning RTMP that would be able to meet the desired objectives.

Reclamation Staff Resources

Table 1 lists Reclamation staff resources that are utilized at least in part for activities relating to salt and boron in the San Joaquin River.

Table 1: List of Reclamation Staff

Agency	Staff Resource Name	Role
Reclamation	To Be Filled	Program to Meet Standards project manager
Reclamation	Nigel Quinn	Technical Expert contracted from Lawrence Berkeley Lab to Reclamation
Reclamation	To Be Filled	Regional Water Quality Coordinator
Reclamation	Michael Eacock	Natural Resource Specialist
Reclamation	Jun Wang	Watershed Analysis Risk Management Framework (WARMF) modeler
Reclamation	Kirk Nelson	Contract manager; modeler

Reclamation	Junaid As-Salek	Contract manager; modeler
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Goals and Objectives for FY 2017

All the activities and technical support planned for the 2017 fiscal year are intended to provide resources, information and support to San Joaquin stakeholders that wish to participate in the real-time management program. Reclamation intends to spend substantial time conducting outreach activities and providing technical support to those who wish to gather knowledge and/or participate in real-time management. Reclamation will continue to support the real-time management program through the real time management stakeholder group. Experience gained from the GWD pilot study will also be utilized to guide expansion of the program into other water districts, refuges and entities in the San Joaquin River watershed.

Goals for the 2017 fiscal year:

Table 2: Reclamation Goals and Real Time Management Program Phase 3 Elements

FY 2017 Goals	Associated RTMP Phase 3 Element
1. Continue funding and managing a contract to support and develop the WARMF Online website for stakeholder use.	One or more cooperating agencies or other entities will conduct programmatic weekly forecasting of assimilative capacity in the San Joaquin River (SJR). Data sharing is of utmost importance to the successful implementation of the RTMP; key stakeholders will be asked to share flow and water quality information throughout the basin.
2. Begin posting stakeholder drainage discharges into the San Joaquin River on WARMF Online – beginning with data from GWD. Work with stakeholders to develop real-time drainage data QA – using WISKI or similar software tools.	One or more cooperating agencies or other entities will conduct programmatic weekly forecasting of assimilative capacity in the SJR. Data sharing is of utmost importance to the successful implementation of the RTMP; key stakeholders will be asked to share flow and water quality information throughout the basin.
3. Hold two Technical Research Team (TRT) meetings in Los Banos and/or Modesto to facilitate stakeholder participation. Tentative dates are September 2016 and March 2017.	Develop and recommend specific additional management practices needed to better coordinate the real time operation of discharges to the San Joaquin River.
4. Assess model accuracy at predicting flow and electrical conductivity (EC) at Vernalis; analyze data requirements that will be required to incorporate upstream San Joaquin River EC standard into the model	One or more cooperating agencies or other entities will conduct programmatic weekly forecasting of assimilative capacity in the SJR. Data sharing is of utmost importance to the successful implementation of the RTMP;

<p>forecast. Present the assessment in the next Annual Report.</p>	<p>key stakeholders will be asked to share flow and water quality information throughout the basin.</p>
<p>5. Continue to provide technical support as needed. Examples of technical support include: assistance with operating monitoring stations, telemetry, data collection protocols, data management, visualization of data, planning and station layout, project management, etc.</p>	<p>Develop and recommend specific additional management practices needed to better coordinate the real time operation of discharges to the San Joaquin River.</p>
<p>6. Continue the effort to incorporate real-time east side SJR data into the WARMF forecast model.</p>	<p>Continue outreach for additional stakeholders.</p>
<p>7. If approved, utilize grant funds awarded to install and/or improve monitoring stations on the Merced and/or Tuolumne Rivers (GWD and San Joaquin Valley Drainage Authority have submitted grant applications to the California Department of Water Resources (DWR) to upgrade existing and new real time management monitoring sites.)</p>	<p>The RTMP participants will analyze the need for additional infrastructure and identify necessary funding requirements through the MOU.</p>

The Bureau of Reclamation, in response to the passage of the Water Supply, Reliability, and Environmental Improvement Act ([Public Law 108-361](#)), which includes the California Bay-Delta Authority (CALFED), has initiated implementation of the Program to Meet Standards. This program intends to provide greater flexibility in meeting existing water quality standards for the Central Valley Project (CVP); a major objective of the program is to reduce reliance on releases from New Melones Reservoir for water quality purposes. Reclamation currently utilizes the CALFED funding authorization for the Program to Meet Standards.

The goals for the 2017 fiscal year, listed above, include improvements and refinements to the existing WARMF San Joaquin River forecast model with emphasis on ease of use, automation of data inputs (which can take up to 3 hours to complete) and visualization of both data input and WARMF model output. Reclamation has entered into a contract with Systec Water Resources, Inc. to improve the model interface and automate data gathering. This work should help reduce model forecast time requirements (data gathering, data organization and actual time to run the model with all necessary inputs) to less than 1 day. Time associated with gathering data inputs from separate websites and data organization will be reduced significantly with a goal of less than 1 hour to complete the task. A significant initiative in FY-2017 will be continuing the development of online tools. These tools will allow users to access flow, water quality and meteorology data that is used directly in the model. This work incorporates and builds on the

SJR water quality information website commissioned by the Eastside Drainage Coalition under grant funding from the Environmental Protection Agency. Merging the efforts has prevented duplication of work and will provide cooperation and support to the earlier effort.

Reclamation will continue to provide technical support for the current real-time monitoring network and for those entities which desire to participate in real time management. Each water district will pose a different challenge given the different levels of monitoring, reporting and automated control capabilities. Real-time drainage data quality assurance (QA) is known to be a potential impediment to sharing real-time data. The Reclamation technical expert has knowledge of tools and applications that will aid in creating a viable real time data reporting system. Concerns from each district will be addressed in a case specific manner and incorporated into the forecast model and sensor network if funds are available and the concerns are appropriate. The Basin Plan includes a tiered implementation schedule; some stakeholders have chosen to participate ahead of schedule and are not required by the Basin Plan to participate for several more years.

Another goal associated with technical support is improved communication to solicit information on flows, EC and salt loads discharged or diverted from the river that can be utilized to improve the quality of the forecast model. The Los Banos and/or Modesto stakeholder meetings will improve Reclamation's ability to deliver this technical support where needed during the fiscal year.

Other planned activities include incorporating real-time data from Turlock Irrigation District into the WARMF forecast model. Turlock Irrigation District has been supportive of the real time salinity management group ahead of regulatory requirements. Reclamation will continue to hold periodic informational meetings with willing stakeholders on the real-time salinity management program and provide technical support for those wishing to create their own systems.

By providing funding to the Lawrence Berkeley Lab, Reclamation will continue activities to improve the accuracy of the model at simulating flows and salt loads generated at the sub-watershed level. The work will focus on the eight west-side drainage stations and the managed wetland entities; improved model accuracy should facilitate stakeholder acceptance of the WARMF forecast model predictions. Although Reclamation is working to create a schedule for Modesto Irrigation District, in fiscal year 2017 the focus will be to continue work with Turlock Irrigation District.

The following are specific FY17 program goals and objectives:

A. Manage contracts.

1. Systec Water Resources Inc.
2. Cooperative Ecosystem Studies Unit (CESU) agreement with University of California at Merced for expert services from Dr. Nigel Quinn of the Lawrence Berkeley Lab
3. Pending contract to be established for RTMP website maintenance.

B. Provide technical support to the RTMP network. At the quarterly meetings of the CV Water Board-approved RTMP steering committee, update the list of vital monitoring stations, required actions and the schedule for completion.²

1. Vital stations along the River and on the west side of the San Joaquin basin:³ The status information was reported by Dr. Nigel Quinn, Berkeley National Laboratory, on June 29, 2016.

Station Description	Status
i. Salt Slough at Hwy 165 (near Stevenson) ^a	Active
ii. Mud Slough near Gustine (Grassland Bypass Project (GBP) Site D) ^a	Active
iii. Mud Slough above San Luis Drain Confluence (GBP Site C) ^b	Sampling location; not a monitoring site
iv. San Luis Drain at Outlet (GBP Site B) ^b	Active
v. Los Banos Creek at Highway 140 ^c	Active
vi. Newman Wasteway ^a	Not currently monitored and reported to California Data Exchange Center
vii. Marshall-Spanish-Moran Drains ^c	Active
viii. Ramona Lake ^c	Active
ix. Orestimba Creek near Crows Landing ^a	Active
x. Westley Wasteway ^c	Active
xi. Del Puerto Creek ^c	No battery
xii. Hospital Creek ^c	Active
xiii. Ingram Creek ^c	Active
xiv. San Joaquin River near Patterson ^d	Active
xv. San Joaquin River at Maze Road bridge ^d	Active
xvi. San Joaquin River near Crows Landing ^a	Active

² Reclamation is not currently allocating funds for additional monitoring sites.

³ Stations are referenced from the 2014 San Joaquin River RTMP Framework Document

- (a) Stations maintained by the USGS under contract with Reclamation
- (b) Stations monitored for the Grassland Bypass project by the San Luis and Delta Mendota Water Authority with funding from Reclamation
- (c) Station monitoring supported by the Westside Drainage Authority (maintenance) and Reclamation (upgrades and troubleshooting)
- (d) Stations maintained by DWR

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2. Reclamation is providing troubleshooting assistance and overseeing maintenance of the west side stations in cooperation with the Westside Drainage Authority. Reclamation has contracted with the United States Geological Survey (USGS) for routine maintenance of many of the San Joaquin River stations as well as the important west-side tributary stations at Mud and Salt Slough. Reclamation currently cooperates with the USGS to provide timely technical support to minimize station down time.
- C. Provide funding and technical support to the GWD.
1. To support the district's real-time salinity management staff, equipment, etc. During FY 2017 solutions will need to be found to replace the current YSI-ECONet system. Several grant applications have been submitted to funding agencies to share some of the cost of the system refurbishment.
- D. Provide technical support for RTMP in the San Joaquin watershed; data acquisition from Irrigation Districts on the east and west sides of the San Joaquin Basin. Perform outreach regarding salinity management and RTMP.
1. Real-time management technical support throughout the basin.
 2. Provide funding for a technical expert in real-time management. The technical expert is Dr. Nigel Quinn, through a CESU agreement with the University of California at Merced.
 3. Considerable field level experience has been gained over the past 15 years with respect to monitoring station design, monitoring equipment integration and data telemetry options. The goal has always been to increase and improve data access while causing minimum disruption or security threat to potential data providers. Reclamation continues to be involved in researching new sensors and monitoring technologies and improving monitoring integration. Reclamation has experience with solutions for real-time data quality assurance using the hydrological data management software WISKI. This software is presently being used by Merced, Turlock and Modesto Irrigation Districts and was recently installed in GWD.
 4. Schedule an outreach meeting with a San Luis Wildlife Refuge contact to discuss RTMP and salinity management Best Management Practices
- E. Work directly with Turlock Irrigation District to develop a cost-effective and secure real-time data access solution.
1. During FY2017 continue the series of meetings with TID staff to explain the goals and principles of real-time salinity management and explain model data needs and technical requirements for access. The most recent meeting concluded with a commitment from TID engineers and IT personnel to develop a prototype solution for testing. Data management and telemetry solutions have been developed in the past year. Reclamation is continuing to collaborate with the District to further develop and refine the data transmission until it is available for use in the forecast model. Although the east side of the SJR are not scheduled for

compliance with the salinity TMDL or required to fully implement real-time management until after 2016, early participation by TID and other stakeholders is appreciated and important to the success of real-time salinity management in the Lower San Joaquin River (LSJR) Basin. Reclamation supports this collaboration without hard deadlines; soft schedule milestones are used to focus the efforts of each organization. The ultimate goal is to receive data that can be incorporated into the forecast model.

- F. Hold TRT meetings in Los Banos and/or Modesto with Stakeholders
 - 1. Stakeholders have requested that Reclamation change the TRT meeting so that the information discussed can be incorporated into another venue. Reclamation will therefore incorporate the TRT meeting into the RTMP and LSJR Committee meetings on a quarterly schedule. Reclamation will continue to run the forecast model weekly and provide the information through the website.

- G. Run the San Joaquin River salinity forecast model weekly and make the information available to San Joaquin River Stakeholders
 - 1. Although Reclamation currently funds both development and use of the WARMF forecasting model – the long term goal is to share this activity among primary stakeholders. These include the DWR, the Westside Drainage Coalition, the Eastside Drainage Coalition and Reclamation. Responsibility for developing weekly forecasts has been successfully shared between small numbers of entities in past regulatory programs.

- H. Participate in Central Valley Salinity Alternatives for Long Term Sustainability (CV-SALTS).
 - 1. Reclamation attends CV-SALTS Executive Administrative and Policy sessions and Lower San Joaquin River Committee meetings. Reclamation provides support to the CV-SALTS Technical Advisory Committee.

Status of the Program

Table 3: FY 2017 Proposed Funding

No.	Funding Program	Year	Allocation	In Kind
I.	PTMS -Technical Support to RTM Model data automation -Visualization tool WARMF-Online -Forecasting model development/improvements - Water district/agency outreach activities -Water District technical support	2017	\$700K estimated	

No.	Funding Program	Year	Allocation	In Kind
II.	Staff resources	2017		\$200K estimated
III.	Grassland Bypass Project ¹	2017-2019	\$860K annual	
IV.	WaterSMART Program ¹	2017	TBD	
V.	Westside Regional Drainage Plan ¹	2016-2019	\$3.8M estimated	
¹ The funding allocation is not specifically a PTMS allocation but yields salinity benefits in the San Joaquin River.				

Funding amounts listed in Table 2 are subject to allocation and are to be considered estimates until allocations have been completed. **The PTMS allocation is utilized to fund Reclamation activities directly related to salinity in the San Joaquin River.** The Grassland Bypass Project and WaterSMART Program also provide salinity management benefits to the San Joaquin River, and are listed accordingly in Table 2. Table 3 lists major activities planned in accordance with the funding allocation listed in Table 2. The activities list is not all-inclusive or binding; Reclamation may choose to perform other tasks as necessary or required.

Table 4: Planned Reclamation Activities to meet San Joaquin River salinity regulations for 2017 Fiscal Year

Activity Number	Table 2 Funding Authority	Activity Name	Activity Description	Estimated Completion Date
1	I	WARMF model forecasting capability	Improvements to algorithms to add groundwater flow capability to west-side watersheds to improve small watershed simulation. Model currently assumes no groundwater pumping on west-side of Valley. Work on wetland simulation to improve realism of wetland simulations.	projected completion in late FY2017
2	I and II	WARMF-Online data and output visualization	Improve relevance of model output visualization through use of customized stakeholder dashboards. Increase use of WARMF-Online.	Ongoing

Activity Number	Table 2 Funding Authority	Activity Name	Activity Description	Estimated Completion Date
3	I and II	TRT meetings and participation in RTMP MOU Group meetings	Participate in meetings, activities and forecasting discussions related to implementation of RTMP. Participate in the RTMP MOU Group as a Cooperating Agency. Incorporate TRT meetings into RTMP MOU Group meetings and/or LSJR Committee meetings on a quarterly schedule.	Ongoing
4	I and II	CV-SALTS Participation	Participate in the CV-SALTS Executive Committee, Technical Committee and Lower San Joaquin River Committee.	Ongoing
5	I and II	Contract/Project Management	New project contracting and renewal of existing contracts and cooperative agreements	Ongoing
6	I	Technical support to Grassland Water District	Ongoing technical support. New initiative (starting in FY 2016) to develop a cost-effective, long-term alternative to YSI-ECONet which is no longer being supported. Grant funding being applied for to offset costs.	Ongoing into FY 2017
7	I	Technical support to other east and west-side water districts/agencies	Primary effort on data integration and development of common data quality assurance protocols. This will be accomplished using a combination of tools to be added to current WARMF Online capabilities and for individual water districts use of commercial real-time hydrological data management and QA tools such as WISKI.	Ongoing
8	I	Outreach to east and west-side water districts and Wildlife Refuges	Ongoing outreach on design of monitoring stations, selection of sensors, choice of telemetry (CDMA, Geostationary Operational Environmental Satellites (GOES),	Ongoing

Activity Number	Table 2 Funding Authority	Activity Name	Activity Description	Estimated Completion Date
			SCADA, LAN). Outreach to develop collaborative data acquisition and sharing. Schedule outreach meeting with San Luis Wildlife Refuges to present and discuss real time management. Attend other stakeholder meetings for the purpose of outreach.	
9	CVP Operations	New Melones Operations Plan	Reclamation will continue to operate New Melones reservoir according to State Water Board Water Rights stipulations to ensure that the D-1641 salinity standard at Vernalis is not exceeded.	Ongoing

Publications Update

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- Reclamation Action Plan 2008 Reclamation’s Salinity Management Plan, Actions to Address the Salinity and Boron Total Maximum Daily Load Issues For the Lower San Joaquin River, July 2008.
- Compliance Plan 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, May 2010.
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- Management Agency Agreement, 2008 and 2014 Management Agency Agreement Between the Central Valley Regional Water Quality Control Board and the United States Bureau of Reclamation, Mid-Pacific Region. A Cooperative Means of Implementing Relevant Provisions of the Regional Water Board’s Water Quality Control Plan for the Sacramento River and the San Joaquin River Basins – 4th Edition, executed in December 2008 and updated in December 2014.