

**DEPARTMENT OF WATER RESOURCES**

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~~DWR~~

Date: February 28, 2017

To: Thomas Howard, Executive Director  
State Water Resources Control Board  
1001 I Street  
Sacramento, California 95814

Francis Chung, Chief  
Bay-Delta Office

From: **Department of Water Resources**

Subject: Quarterly Status Report, February 2017, State Water Resources Control Board  
Order WR 2010-0002

MAR 2 2017

Pursuant to Condition 11 of State Water Resources Control Board (Board) Order WR 2010-0002 (Order), the Department of Water Resources (DWR), in coordination with the U.S. Bureau of Reclamation (Reclamation), is submitting this report to apprise the Board of the activities undertaken to comply with the conditions listed in paragraphs 2, 3, 4, 5, 6, 7, and 8 of the Order's Part A.

Condition A.2 – DWR and Reclamation took receipt of the Board Notice for Submission of Interior Southern Delta Salinity Objectives Compliance Plan and Schedule letter, dated December 20, 2016. DWR has begun plans for an updated plan and schedule as called for in the Notice.

Condition A.3 – DWR has no new information to report this quarter regarding the June 25, 2010 work plan to improve the accuracy of the delta models in the south Delta. We are awaiting direction from the Board on whether or not to proceed with the work plan as proposed.

DWR has continued consideration of Delta Stewardship Council Peer Review comments and is developing response to comments on the report *On Estimating Net Delta Outflow (NDO), Approaches to Estimating NDO in the Sacramento-San Joaquin Delta*. DWR is developing explanations, clarifications, and acknowledgements on areas of agreement and disagreement.

DWR has posted a report to its webpage entitled *Evaluation of Salinity Patterns and Effect of Tidal Flows and Temporary Barriers in the South Delta Channels*, a report written by ICF and funded by DWR. The report presents an analysis of water flows and salinity in the south Delta using measured data. The analysis provides an improved understanding of sources and transport of salinity in the south Delta area and the data analysis methodologies will support predictive model improvement (see Condition A.7).

Condition A.4 – DWR and Reclamation continue to implement activities described in the Compliance Plan for Station C-6 (Plan). These activities include monitoring within the south Delta, reviewing prior data and analyses, modeling and developing salt balances, working with wetland managers to improve wetland discharges, and continuing to support and facilitate real-time water quality monitoring programs. In addition, the Plan includes a section entitled *San Joaquin Salinity Management Plan*, describing programs and activities to control the volume and concentrations of saline discharges to the San Joaquin River upstream of Vernalis.

The second annual Management Agency Agreement (MAA) report between the Central Valley Regional Water Quality Control Board and Reclamation was submitted in January 2017 and is enclosed with this report. The report provides a synopsis of various activities performed by Reclamation, including providing flows to the system, salt load reductions, and mitigation. The next annual MAA report is planned for submittal in January 2018. Fiscal Year 2017 conservation funding will be awarded in May or June 2017.

Condition A.5 – In compliance with the Temporary Barriers Project (TBP) permit conditions, DWR prepared and submitted the *2016 Annual Summary Report on Environmental Permit Compliance for the Temporary Barriers Project* on February 3, 2017. The report submittal fulfilled the California Department of Fish and Wildlife Streambed Alteration Agreement, National Marine Fisheries Service Biological Opinion 2012/9347, and U.S. Fish and Wildlife Service (USFWS) Biological Opinion 81420-2008-F-0522 annual reporting requirements.

DWR worked on planning the 2017 South Delta TBP. DWR prepared and submitted the *2017 Plan for Construction and Operation of the South Delta Temporary Barriers* to the Board for review and approval on January 31, 2017. The plan was based on the most updated hydrological conditions at that time. With the continuation of above average rainfall and high San Joaquin River flows, it is likely that the Head of Old River rock barrier will not be needed and the agricultural barriers installation will be delayed to the first week of May. The full operation of the agricultural barriers, provided the flow and fisheries conditions allow, will be on June 1, 2017. DWR also submitted a letter to the US Army Corps of Engineers (Corps) requesting that it initiates consultation with the USFWS to append its Programmatic Biological Opinions for 2017. No in-water work will begin until Corps approval is received. Construction schedule details will be available as soon as DWR receives the final regulatory agency approvals.

Condition A.6 – Reclamation has no new information to report this quarter regarding the *Delta-Mendota Canal Recirculation Plan Formulation Report*, which remains available for download and review at <http://www.usbr.gov/mp/dmcrecirc/docs/final/index.html>. The related *Delta-Mendota Canal Recirculation Project Feasibility Study* also remains available for download.

Condition A.7 – DWR continues to work closely with the Delta Watermaster and the South Delta Water Agency (SDWA) in formulating and evaluating options to reduce local sources of water quality degradation.

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As reported in the November 2016 Quarterly Status Report, a south Delta salinity study draft report entitled *Evaluation of Salinity Patterns and Effect of Tidal Flows and Temporary Barriers in the South Delta Channels* was submitted to the Delta Watermaster and SDWA in January 2016 for review and comment. The report presents an analysis of field data that clearly identifies the presence of high saline water originating in and along specific south Delta reaches, which migrates into Old River and increases salinity at Station C-6. The report explores engineering options that could benefit water quality at Station C-6 as well as administrative options, including changing the station to a reporting rather than a compliance station. The report has been finalized and is available for download at the following link:

[http://baydeltaoffice.water.ca.gov/sdb/tbp/web\\_pg/pub\\_doc/salinity\\_report/South%20Delta%20Salinity%20Final%20Sept%202016%20kc%2012.21.16.pdf](http://baydeltaoffice.water.ca.gov/sdb/tbp/web_pg/pub_doc/salinity_report/South%20Delta%20Salinity%20Final%20Sept%202016%20kc%2012.21.16.pdf). A hard copy will be transmitted to the Board in early March 2017.

As first reported in the November 2015 Quarterly Status Report, a 2015 emergency drought barrier effects analysis report was planned for completion in January 2017. The report is currently being finalized and is now expected to be provided to the Board in March 2017. Further, in accordance with the emergency drought barrier 401 permit water quality monitoring plan, DWR submitted the *2015 Emergency Drought Barrier Water Quality Monitoring Report* to the Board on February 1, 2017. Planning for a 2018 West False River drought salinity barrier has been cancelled as a result of significantly improved hydrologic conditions. Planning for potential future drought actions is expected to resume later this year.

Reclamation continues to await comments from the Board regarding the report entitled *Special Study: Evaluation of Dilution Flow to Meet Interior South Delta Water Quality Objectives*, submitted April 11, 2011.

Condition A.8 – No additional salinity control measures have been required by the Executive Director. DWR and Reclamation continue to take action based on the approval of the Compliance Plan for Station C-6 as described under Condition A.4 and have begun preparation of an updated compliance as described under Condition A.2. Additionally, DWR completed 2016 TBP compliance actions and worked on 2017 TBP planning as described above under Condition A.5.

If you or your staff wishes to discuss this report further, please contact Mark Holderman, Chief of the South Delta Branch, at 916-653-7247 or [Mark.Holderman@water.ca.gov](mailto:Mark.Holderman@water.ca.gov).

Sincerely,

  
Francis Chung, Acting Chief  
Bay-Delta Office

Enclosure

# RECLAMATION

*Managing Water in the West*

**2016 Annual Report**

**January 1, 2016 – December 31, 2016**

**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**

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MOU	Memorandum of Understanding
μS/cm	micro Siemens per centimeter
mg/L	milligram(s) per liter (parts per million)
PTMS	Program to Meet Standards
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
SJTSP	San Joaquin Tributary Settlement Process
State Water Board	State Water Resources Control Board
TAF	thousand acre-feet
TDS	total dissolved solids
TMDL	total maximum daily load
VAMP	Vernalis Adaptive Management Plan
WARMF	Watershed Analysis Risk Management Framework
WARMF – SJR	Watershed Analysis Risk Management Framework San Joaquin River
WDR	Waste Discharge Requirement
WQO	water quality objective
WRDP	Westside Regional Drainage Plan
WSI	Water Supply Index
YSI	Yellow Springs Instrument Company

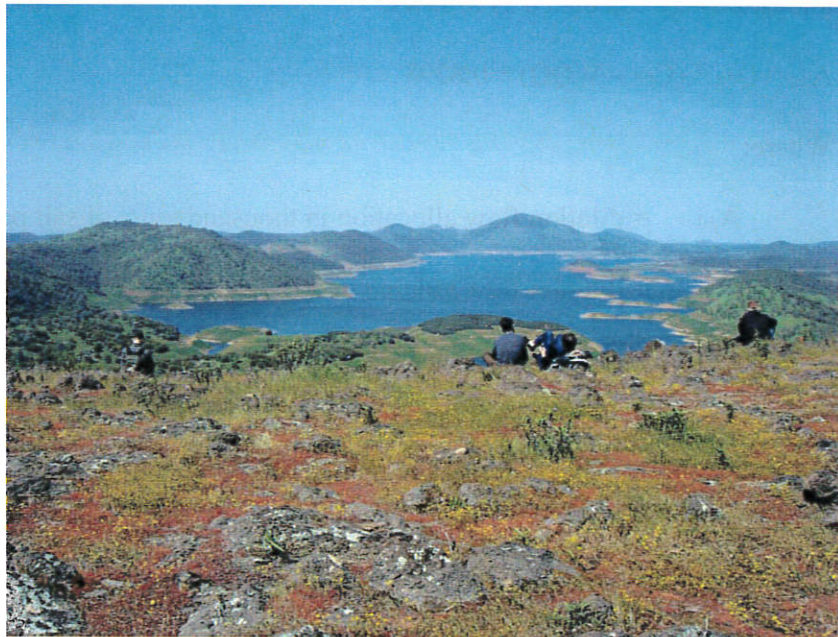
dilution flows to the San Joaquin River from the New Melones reservoir and through purchases for the Vernalis Adaptive Management Plan (VAMP) or the Central Valley Project Improvement Act (CVPIA). The San Joaquin River Agreement, which included provisions to acquire spring and fall pulse flows for the VAMP, expired on December 31, 2011. Reclamation continued to provide interim spring pulse flows for the San Joaquin River through a two-year agreement with Merced Irrigation District, which expired on December 31, 2013. During this timeframe, stakeholders within the watershed, including Reclamation, initiated the San Joaquin Tributary Settlement Process to formulate a collaborative solution to present to the State Water Board as an alternative to the State Water Board's new proposed San Joaquin River flow standard.

### ***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 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 Basin Plan was amended in 2004 to include a Control Program for Salt and Boron Discharges into the LSJR.

Items 12 and 13 of the Salt and Boron Control Program state as follows:



**Figure 1. New Melones Reservoir**

Item 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:



Dilution Flow Allocation: WY2016 classified as a dry year.

**Table 1: Goodwin Dam Monthly Dilution Flow Allocation, 2016**

	Goodwin Dam Flow (GDF) TAF <sup>a</sup>	Base Design Flow (DF) TAF <sup>b</sup>	Q <sub>dil</sub> , TAF GDF-DF=Q <sub>dil</sub>	WQO <sup>c</sup> , μS/cm	C <sub>dil</sub> (monthly average EC at Orange Blossom Bridge) <sup>d</sup> , μS/cm	Dilution Flow Allocation, A <sub>dil</sub> , tons
January	13	12	1	1,000	112	-888
February	12	19	0	1,000	126	0
March	13	17	0	1,000	144	0
April	72	28	44	700	119	-25,564
May	88	61	27	700	72	-16,956
June	26	2	24	700	68	-15,168
July	18	3	15	700	68	-9,480
August	14	12	2	700	73	-1,254
September	9	15	0	1,000	69	0
October	46	10	36	1,000	101	-32,364
November	18	14	4	1,000	71	-3,716
December	16	13	3	1,000	86	-2,742
Total						-108,132

Source: Reclamation 2016a

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

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

<sup>c</sup> State Water Board Decision 1641

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

<sup>e</sup> In months where Goodwin Dam flow is less than Base Design flow, the Base Design flow has been adjusted to match the Goodwin Dam flow. This action eliminates the dilution credit for that month.

## ***WATER ACQUISITIONS***

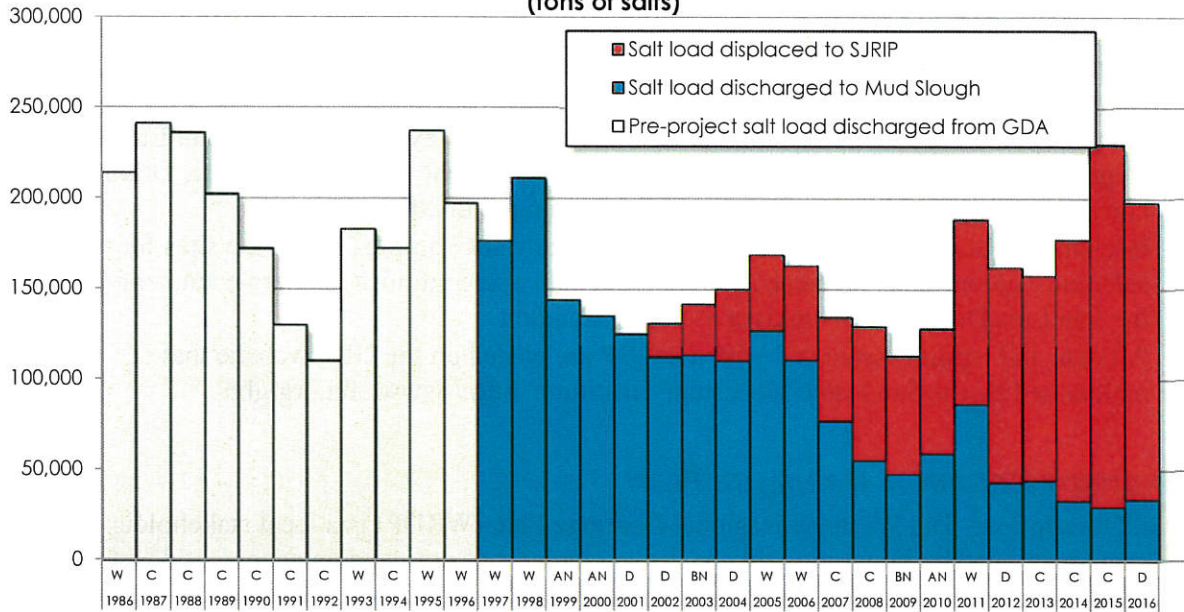
Brief Description: The CVPIA signed into law on October 30, 1992, modified priorities for managing water resources of the CVP. CVPIA altered the management of the CVP to elevate fish and wildlife protection, restoration, and enhancement as a co-equal priority with water supply for agriculture and municipal and industrial purposes while recognizing other associated benefits such as power generation. To meet water acquisition needs under CVPIA, the U.S. Department of the Interior developed a Water Acquisition Program, a joint effort by Reclamation and the U.S. Fish and Wildlife Service. 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 for water quality purposes this year.

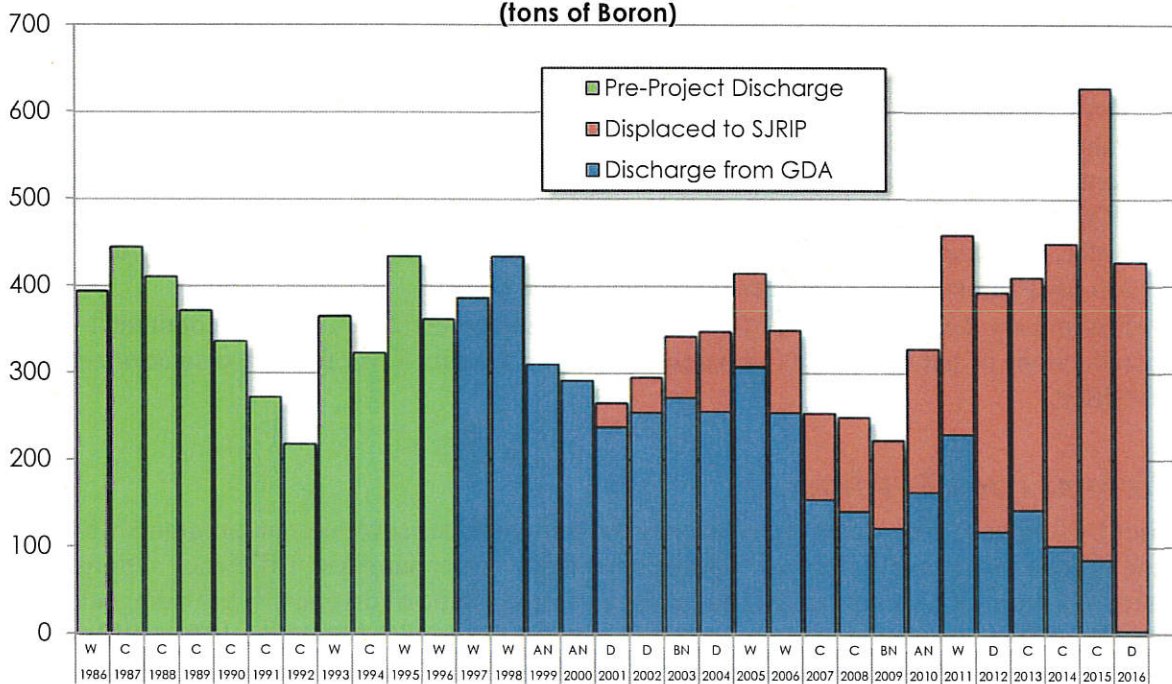


**Figure 2. Salt Control under the Grassland Bypass Project  
(tons of salts)**



- Figure 3 shows the progressive reduction of boron discharged from the GDA. For Water Year 2016, only 4 tons of boron were discharged to the LSJR and more than 424 tons were displaced to the SJRIP.

**Figure 3. Boron Control under the Grassland Bypass Project  
(tons of Boron)**



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, the Reclamation/Natural Resources Conservation Service partnership, and the CALFED Bay-Delta Restoration program, Reclamation awarded over 90 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

The 2016 WaterSMART Water and Energy Efficiency Program grants have been announced; Reclamation was awarded two projects within the San Joaquin basin in 2016.

### **Madera Irrigation District, Irrigation Water Conservation, and Canal Automation Improvement Project (Madera County)**

**Reclamation Funding: \$292,261; Total Project Cost: \$591,721**

The Madera Irrigation District near Fresno, California, will replace existing manual control gates with 13 automated, solar-powered metered control gates and will install a new automated flume gate in the Dry Creek weir. The new equipment will be connected to a new Supervisory Control and Data Acquisition system to provide remote sensing and control of all gate/channel operations within the canal system. The project will allow the District to maintain constant water levels, eliminating losses from spills and over-deliveries, which is expected to result in annual water savings of 3,610 acre-feet. Depending on existing conditions and needs, conserved water will be made available to meet demands within the District, channeled to the Madera Ranch Water Bank, or stored in the Hidden or Friant reservoirs.

### **Madera Irrigation District, Lateral 24.2-17.0 Pipeline Improvement Project (Madera County)**

**Reclamation Funding: \$580,900; Total Project Cost: \$1,184,500**

The Madera Irrigation District will also convert approximately 6,500 linear feet of existing sandy, open canal to 36-inch double-gasketed polypropylene pipe. As part of the project, the District will also install a solar-powered automated meter on the new pipeline, install new Supervisory Control and Data Acquisition equipment to enable remote monitoring and control of pipeline operations, and construct a small recharge pond at the end of the new pipeline to capture excess water and provide groundwater recharge. The project is expected to result in annual water savings of 1,759 acre-feet by reducing water currently lost to evaporation, spills, and over-deliveries. Depending on existing conditions and needs, conserved water will be made available to meet demands within the District, channeled to the Madera Ranch Water Bank, or stored in the Hidden or Friant reservoirs.

## **Salt Load Management**

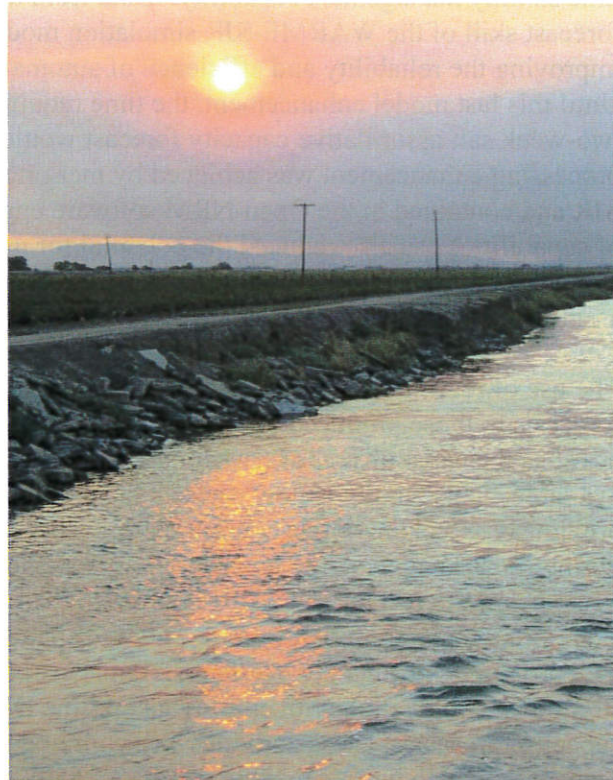
The MAA lists several actions that are intended to manage salt and boron loads in the San Joaquin River. Reclamation has actively supported the development of the San Joaquin River Salinity Forecasting Model which utilizes the WARMF (Watershed Analysis Risk Management



### ***RTMP – TECHNICAL SUPPORT***

Brief Description: A successful RTMP will require networks of sensors owned and operated by stakeholder groups within the Basin that allow easy access to data. Real-time quality assurance of this data is essential to encourage data sharing so that an entity avoids liability-related issues if erroneous data is posted to the Internet. Towards this end, Reclamation and technical consultant Lawrence Berkeley National Laboratory have been working with KISTERS International Inc. to develop an easy-to-use, semiautomated data QA solution. The RTMP pilot study in Grassland Water District developed an application of the WISKI software, which allows data from the 50 stations in the district to be quality checked before being archived in their database. A server crash in early 2015 was remedied in mid-2016 and the system is now operational again.

Meetings were conducted with senior YSI (XYLEM) personnel during 2016 to sustain the ECONet web reporting system after the parent company XYLEM announced that was mothballing the YSI-ECONET owing to a lack of customer base. The company agreed to continue operating the server through 2016 to allow GWD to investigate alternative systems and acquire resources to make the transition. GWD and the District's Technical Consultant, Lawrence Berkeley National Laboratory, will meet with the company InSITU Inc. in December 2016 to explore a potential long-term hardware, telemetry, and web hosting solution.



**Figure 4. Newman Wasteway**

Previously reported work by Reclamation staff to develop a data visualization tool for flow, EC, and salt load within Grassland Water District conveyance channels has now been emulated within the WARMF-Online web-based data and salinity forecast visualization tool. WARMF-Online is a web-based application developed by 34-North Inc. using their Open-NRM software platform that provides real-time access to continuous and discrete flow and EC data throughout the Basin as well as the means of visualizing flow, EC, and salt load assimilative capacity forecasts. The current WARMF-Online application complements an EPA-sponsored, web-based information system focused on environmental data generated on the east side of the San Joaquin Basin. By building upon existing capability, we have sought to provide a “one-stop shop” for pertinent data essential for salt management decision-making in the San Joaquin Basin. Significant improvements to the WARMF-Online website were made in 2016 – developing dashboards for individual stakeholders and stakeholder entities such as Karna Harrigfeld, representing South San Joaquin Water District, and another for modelers interested in assessing the performance of the WARMF-SJR forecasting model. Additional dashboards are being



two-month period in the fall. The previous algorithm had simulated wetlands using an analog of a slow-moving river across the wetland landscape. Despite the improvement in drainage flow simulation, simulation of wetland EC and wetland salt loading is still poor and will be investigated further.

- The visualization tool developed for Grassland Water District (GWD) in 2014, which obtained the last 31 days of hourly mean data after being processed by WISKI, was used to guide the development of the same capability in WARMF-Online. Flow and EC data as well as salt loads will be made available for the five current outlet sites in GWD and allow data downloads. The data can then be compared with WARMF model output which lumps the flow and salt loads from the Northern and Southern divisions of Grassland Water District. We will work closely with GWD staff to develop appropriate data and model visualization graphics.
- The WARMF Technical Review Team held bimonthly meetings at the Regional Water Quality Control Board office during FY 2016. The objective of these meetings has been to involve and receive feedback from interested parties regarding the current planned improvements to the WARMF-SJR forecast model and model interface, and to guide the development of WARMF-Online. The improved WARMF-SJR Forecast Model interface and linkage to WARMF-Online has made it easier to assemble the data sets and model inputs to make forecasts of SJR salt assimilative capacity. Activities during FY2016 were directed at making WARMF-Online more intuitive, which will be partly accomplished by continued development and refinement of user dashboards. This process of development and user feedback will continue into 2017 when additional dashboards will be completed for new users such as Grassland Water District and the State and Federal refuges.
- LBNL and Reclamation continue to work closely with Systech Water Resources, Inc. to improve and update map resolution and watershed boundaries within the WARMF-SJR model. Systech Water Resources has begun the migration of the current map interface to an ARC-GIS compliant interface, although completion of this task will require dedicated funding. LBNL will investigate the use of MapWindows as an alternative to ArcGIS to add this functionality. MapInfo is shareware whose development is overseen by Dr. Dan Ames and Brigham Young University. We will look into potential BYU student involvement in making further progress on this initiative.
- The United States Geological Survey plans to release the WESTSIM-HM model to Reclamation at the end of 2016 and will release the model to the public around mid-2017. This model serves as a resource for enhancing the groundwater simulation capability within the WARMF-SJR model. Only the west side of the San Joaquin River explicitly recognizes the groundwater system, and the portion of recharge that migrates laterally to the San Joaquin River is a calibration parameter within the WARMF model. WESTSIM-HM can be used to provide realistic parameter values that improve the accuracy of River flow simulation and volume of groundwater accretions. We will strive to have San Joaquin River diversions provided digitally by the end of FY 2017 to further improve flow and water quality simulations and the realism of salt assimilative capacity forecasts. Obtaining these data from Patterson, West Stanislaus, and El Solyo Irrigation Districts is a program goal for FY 2017.
- West-side tributary return flow data from eight real-time flow and salinity monitoring stations were manually uploaded, QA-checked, compiled in SHEF format, and forwarded



## ***PARTICIPATION IN CV-SALTS PROGRAM***

**Brief Description:** The CV 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 CV-SALTS stakeholder group 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 participates in the following subcommittees of the CVSALTS program, including executive, technical advisory, and LSJR committees. Reclamation continues to co-chair the CVSALTS Technical Committee (through a contract with Berkeley National Laboratory). Reclamation's participation in the LSJR Committee has been essential as the subcommittee evaluates beneficial use designations and a potential amendment of the Basin Plan to establish water quality objectives upstream of Vernalis. The committee has also involved local stakeholders in discussing options for a salinity management implementation program to meet the objectives. Presentations on the progress of the San Joaquin River real-time management program are routinely made during this meeting.

### **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 prorated 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 Subareas. This background load allocation is calculated according to Table IV-4.4

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

Water Year	Water Year Type	Grassland Subarea						Northwest Subarea					Total Excess Load from CVP Deliveries, 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	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	
2012	Dry	305.4	113.6	56.6	1153.4	81.5	394.1	24.1	31.9	147.4	10.4	45.6	439.7
2013	Critical	355.1	97.2	51.3	1060.1	74.9	428.6	27.1	25.6	121.4	8.6	44.1	472.7
2014	Critical	302.1	55.3	49.1	674.8	47.7	358.9	22.5	23.5	80.8	5.7	40.3	399.2
2015	Critical	285.7	56.9	46.7	611.8	43.2	346.2	22.0	32.5	84.0	5.9	48.5	394.7
2016	Dry	275.4	89.9	36.2	873.4	61.7	339.8	50.5	15.5	92.8	6.6	29.5	369.2

Source: Reclamation 2016

## Report of Annual Work Plan Activity Performance

Reclamation has met schedule milestones for the MAA and performance of actions that assist San Joaquin River Stakeholders in managing salt loads and offsetting the DMC salt load into the San Joaquin River. New Melones Reservoir has been operating in accordance with D-1641 water quality requirements.

The San Joaquin River salt assimilative capacity forecasting tool and decision support systems is based on the WARMF-SJR model. The WARMF-SJR model has been used for studies worth several million dollars since it was first developed for the San Joaquin River dissolved oxygen TMDL in 2005. This work continues in FY2017 as Reclamation and its contractors Systech Water Resources Inc. and Berkeley National Laboratory improve the performance of the model and the datasets available for model calibration and validation.

Reclamation has also provided funding and a contractor, 34 North, to create and maintain a website for San Joaquin River real time management activities that include having access to timely flow and EC data, and the ability to estimate salt loading and salt loading assimilative capacity from these monitoring station data sources. The website WARMF-Online is unique in its ability to combine access to real-time environmental data and model-based simulation and forecasting projections of future conditions. Stakeholder involvement is critical to the success of the real-time water quality management program — not only to improve the collective understanding of the River itself but also to improve stakeholder projections of their own operations over the two-week forecast period. Data uploading automation is important to bring the simulation model up-to-date. However, stakeholder estimates of salt loading to the River and their ability to manage these return flows will be important for forecast accuracy and reliability.



## References

- State Water Board D-1641 Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project. State Water Resources Control Board, March 15, 2000.
- 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-4.4 Summary of Allocations and Credits, Dilution Flow Allocations, Regional Water Quality Control Board Central Valley Region, September 10, 2004.
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PROOF OF SERVICE

I, the undersigned, hereby certify that I am over eighteen (18) years of age and an employee of the State of California Department of Water Resources, 1416 Ninth Street, Sacramento, California 95814.

On February 28, 2017, I served true and correct copies of the attached Department of Water Resources "Quarterly Status Report" electronically to the office of Division of Water Rights of the State Water Resources Control Board on the 14<sup>th</sup> floor of the California Environmental Protection Agency Building at 1001 I Street in Sacramento. I also served true and correct copies of this document by electronically transmitting the report to the parties listed on the attached Mailing List.

Date: February 28, 2017

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