State Water Resources Control Board
Order 5/19/2017

Term 11 –Water Use Efficiency and Supply Reliability Projects

April 2, 2018

Prepared by

Sonoma County Water Agency
404 Aviation Blvd
Santa Rosa, CA 95403

1 Introduction

This report has been prepared by the Sonoma County Water Agency (Water Agency) to fulfill the requirements of Term 11 of the State Water Resources Control Board (State Board) Order dated May 19, 2017 (Order).

Term 11 of the Order directs the Water Agency to take the following actions:

> By April 1, 2018, SCWA shall provide a written update to the Deputy Director for Water Rights regarding activities and programs being implemented by SCWA and its water contractors to assess and reduce water loss, promote increased water use efficiency and conservation, and improve regional water supply reliability.

2 Sonoma-Marin Saving Water Partnership

The Cities of Santa Rosa, Rohnert Park, Sonoma, Cotati, Petaluma, Town of Windsor and North Marin, Marin Municipal and Valley of the Moon Water Districts and the Water Agency formed the Sonoma-Marin Saving Water Partnership (Partnership) in 2010. The purpose of the Partnership is to establish the financial obligation for the nine local water retailers, Marin Municipal Water District and Sonoma County Water Agency, identify and recommend implementation of water conservation projects and to maximize implementation of cost-effective projects for the Partnership. The Partnership coordinates all water use efficiency focused media buys in the region and provides support to members that need additional assistance meeting conservation targets.

Since 2013, annual conservation campaigns focused on ongoing drought conditions were launched by the Partnership and the Water Agency. In 2014 “There’s a Drought On. Turn the Water Off.” was the regions first ever winter advertising reminding customers to conserve water. In 2015 the Partnership wanted to keep the similar, humorous, engaging campaign that resonated with the general public so we shifted into the “There’s Never Enough to Waste. Turn the Water Off.” campaign. The new campaign had the same look and feel as the prior year with a slight shift. Our focus became providing resources on how to make specific behavioral and hardware changes with the ads focusing on a call to action. As water supply conditions improved, the 2016 campaign focused on acknowledging the success achieved by the community. In 2017, the campaign focused on outdoor water use and increased water efficiency in order to keep the community engaged and to maintain the water use reductions gained during the drought. A few sample ads are below from the 2017 SMSWP outreach campaign.

2.1 Sonoma-Marin Saving Water Partnership Annual Report

The Partners committed to implement or use best efforts to secure the implementation of any water conservation requirements and will publish an Annual Report to track progress. The Annual Report tracks program implementation, highlight program milestones, and reinforce the importance of protecting and preserving water resources for future generations. The 2016/2017 Annual Report for the Partnership is attached in Appendix A.

3 Conservation Tracking

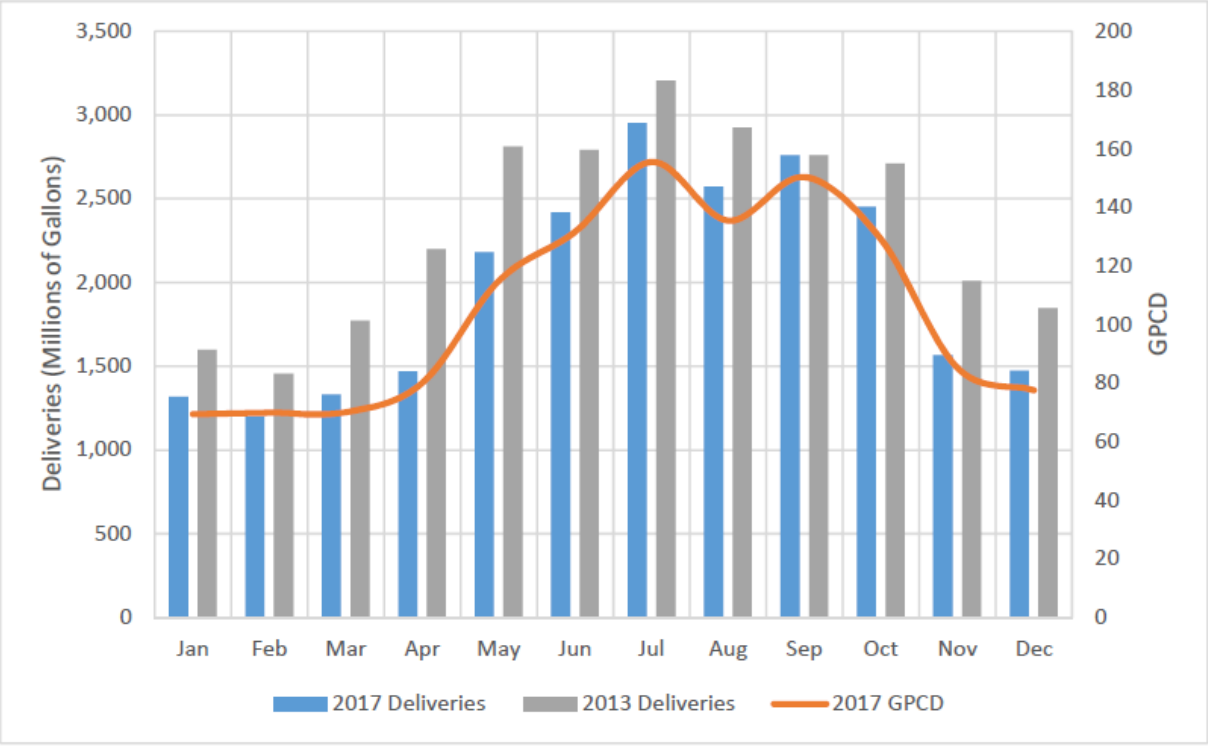
The Water Agency actively engaged all the Partners to track and report water use data in 2017 despite the region not having a mandated conservation goal. The Partners continue to see water demand reductions as compared to the 2013 Benchmark established by Executive Order B-40-17, which continues the reporting requirements established in Executive Order B-29-15. Table 1 below shows the

regions cumulative reduction in demand for 2017 exceeds 16% and each individual Partner served by the Agency. As displayed, the Partnership continued to experience significant demand reductions in the region. Chart 1 demonstrates a regional winter low of 69 gallons per capita per day (GPCD) and 155 GPCD in the summer, with fluctuations following local weather patterns.

Table 1: 2017 Total Deliveries Compared to 2013 Benchmark Water Use

Water Retailer	Total Deliveries (Gallons)	2013 Benchmark (Gallons)	Relative to 2013 Benchmark
Cal Am	284,932,699	309,018,000	-8%
Cotati	264,610,558	327,969,032	-19%
Marin Municipal	8,001,401,645	9,131,679,941	-12%
North Marin	2,507,719,800	3,254,000,000	-23%
Petaluma	2,679,831,209	3,191,983,293	-16%
Rohnert Park	1,486,190,118	1,668,000,000	-11%
Santa Rosa	5,830,924,012	7,111,187,431	-18%
Sonoma	650,452,296	747,787,642	-13%
Valley of the Moon	875,957,207	1,044,331,014	-16%
Windsor	1,108,813,603	1,273,975,459	-13%
SMSWP Total	**23,690,833,149**	**28,080,775,550**	**-16%**

Chart 1: SMSWP Monthly Deliveries and GPCD



4 Regional Water Supply Reliability Projects

The Water Agency currently has several long-term studies to investigate ways to improve the reliability of the Russian River watershed to supply water for human and environmental needs. At Lake Mendocino, the Water Agency has partnered on a project that has conducted a preliminary viability assessment for implementing Forecast Informed Reservoir Operations (FIRO). The Water Agency is also collaborating with NOAA and other partners to improve the regional monitoring and forecasting of precipitation on two projects: the Advanced Quantitative Precipitation Information System (AQPI) Project and the Hydrometeorological Testbed Project. These projects may provide ancillary support to the development of FIRO for Lake Mendocino. In Sonoma Valley, the Water Agency is evaluating the potential for groundwater banking with an aquifer storage and recovery pilot test program commencing in April 2018.

4.1 Forecast-Informed Reservoir Operations

Forecast-Informed Reservoir Operations (FIRO) is a reservoir management strategy that uses meteorological and hydrological forecasts to support more efficient operation of reservoirs and has been adopted at Lake Mendocino as a pilot study. Lake Mendocino with a total storage capacity of 116,500 acre-feet is operated jointly by the Water Agency, controlling releases when levels are in the water supply pool, and the U.S. Army Corps of Engineers (USACE), who owns the project and coordinates flood control releases. The Water Control Manual (issued 1959; revised August 1986) dictates release flows and contains a rule curve that specifies the top of the water conservation pool throughout the year. In general, the operation is designed to release stored water above the conservation pool as quickly as possible, retaining flood control space to capture future large inflow events. The rule curve is predicated on typical historical weather patterns– wet during the winter, dry otherwise. The rule curve does not account for variability in weather patterns and recent reductions to inflows into Lake Mendocino from Pacific Gas and Electric's (PG&E's) Potter Valley Project (which diverts water from the Eel River to the Russian River) that began in 2006.

The Water Control Manual lacks flexibility to adapt to the highly variable conditions of droughts and floods experienced in the Russian River watershed, as well the over 50% reduction of inflow into Lake Mendocino from the Potter Valley Project. As a result, the water supply reliability of Lake Mendocino is impaired with significant consequences to downstream water supply reliability and ecological resources. A Preliminary Viability Assessment (PVA) was completed in August 2017. The analytical results demonstrated that FIRO could improve reliability of meeting water management objectives without adversely affecting flood risk management. The Water Agency analysis with FIRO alternatives showed significant additional storage that resulted in improved reliability of meeting water management objectives. Compared with existing operation, additional water was stored and available for delivery for nearly all years simulated. Additionally, the analysis showed no significant loss of ability of the system

to manage flood risk for the Russian River basin. The report assessed risk in terms of average annual damage (AAD) based on data from 1951 to 2010.

Additional information on the project PVA is provided in 'Forecast-Informed Reservoir Operations: Preliminary Viability Assessment for Lake Mendocino' found in Appendix B.

4.2 Sonoma Valley Aquifer Storage and Recovery

The Water Agency has long considered groundwater banking of winter-time Russian River water into one of the regional groundwater basins as a potentially effective water supply reliability strategy. The Water Agency, City of Sonoma, and other local partners, including the cities of Rohnert Park and Cotati, Valley of the Moon Water District, and the Town of Windsor (study participants) have conducted a feasibility study for a regional groundwater banking program (Groundwater Banking Feasibility Study) to investigate the viability of enhancing the conjunctive management of surface water and groundwater resources (GEI, 2013). Conceptually, the groundwater banking program would involve the diversion and transmission of surplus Russian River water produced at existing drinking water production facilities during wet weather conditions (i.e., the winter and spring seasons) for storage in aquifers beneath the Santa Rosa Plain and/or Sonoma Valley. The stored water would then be available for subsequent recovery and use during dry weather conditions (i.e., the summer and fall seasons) or emergency situations. The Groundwater Banking Feasibility Study provided an evaluation of the regional needs and benefits, source water availability and quality, regional hydrogeologic conditions, and alternatives for groundwater banking. Based on the findings from the study, pilot studies to further assess the technical feasibility of Aquifer Storage and Recovery (ASR) as a method for groundwater banking were recommended and currently are being pursued in Sonoma Valley, as described below.

In December 2017, a technical report was prepared and submitted to the San Francisco Bay Regional Water Quality Control Board that documented the proposed design and approach to conduct an aquifer storage and recovery pilot test in Sonoma Valley. The overall objective of the pilot test is to verify and empirically determine specific hydrogeologic and water-quality factors to support a technical and economic viability assessment of ASR techniques in the region. The Regional Board issued a Notice of Applicability under State Water Resources Control Board's (Water Board's) Water Quality Order 2012-0010, General Waste Discharge Requirements for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater for the pilot study on March 1, 2018. The pilot study was initiated on March 19, 2018 and will consist of several cycles of recharge, storage, and recovery of approximately 11 acre-feet of drinking water through a confined aquifer system within the Sonoma Volcanics beneath the City of Sonoma over an approximate four month period. If ASR technology is deemed feasible, the pilot project results could be used to complete environmental documentation and design for a full scale or permanent ASR project in the region. Results from the pilot project will also provide information on the technical feasibility for ASR to other local agencies, including the Water Agency's other Water Contractors and the newly formed Groundwater Sustainability Agencies in Sonoma County.

Appendix A

2016/2017 Annual Report for the Sonoma-Marin Saving Water Partnership

ANNUAL REPORT 2016-2017

City of Santa Rosa

City of Rohnert Park

City of Petaluma

City of Sonoma

City of Cotati

North Marin Water District

Valley of the Moon Water District

Marin Municipal Water District

Town of Windsor

Sonoma County Water Agency

ABOUT THE PARTNERSHIP

The Sonoma-Marin Saving Water Partnership (Partnership) represents 10 water utilities in Sonoma and Marin counties that have joined together to provide regional solutions for water use efficiency.

The utilities include the Cities of Santa Rosa, Rohnert Park, Petaluma, Sonoma, Cotati; North Marin, Valley of the Moon and Marin Municipal Water Districts; Town of Windsor, and Sonoma County Water Agency (Partners). Each of the Partners have water conservation programs that can assist customers in reducing their water use.

The Partnership was formed to identify and recommend implementation of water use efficiency projects, and maximize the cost-effectiveness of water use efficiency programs in our region.

The Partners are committed to remain members in good standing of the California Urban Water Conservation Council and support its transition to the California Water Efficiency Partnership.

OUR SERVICE AREA

More than 600,000 residents in Sonoma and Marin counties rely on the water delivered from the Russian River by the Sonoma County Water Agency (Water Agency) to the nine cities and districts in the Partnership. Supplementing the water provided by the Water Agency are local supplies including recycled water, groundwater from underground aquifers and surface water reservoirs.

Recreation, agriculture and wildlife, including threatened and endangered steelhead, coho and Chinook salmon also rely on these same natural resources in order to thrive.

Realizing the importance of protecting and preserving water resources for future generations, the members of the Partnership have taken a proactive role in helping fund, maintain and implement an array of water supply, water use efficiency and fishery recovery programs.

THERE'S NEVER ENOUGH TO WASTE!

The 2016-2017 winter season resulted in above average rain and snowfall throughout most of the state ending California's five-year drought. Consequently, on April 7, 2017 Governor Jerry Brown ended the drought state of emergency and directed state agencies to implement a framework for long-term efficient water use. Even though our region experienced above average rainfall, the Sonoma Marin Water Saving Partnership cumulatively reduced water production by 21% compared to the State's 2013 benchmark year.

The Partnership's collaborative water conservation public outreach effort continued with a simple message: "There's Never Enough to Waste!" Radio, television, print and online media encouraged water users to remain diligent in using water efficiently. The area retail water providers continued their water conservation efforts as well as encouraged customers to make conservation a way of life.

For the fifth year in a row the Partnership received awards from the U.S. Environmental Protection Agency (EPA). In 2017 the EPA awarded the Partnership its first "Sustained Excellence Award" for its expanded irrigation-professional training opportunities to community college students and working with other partners on outdoor water efficiency education through the Qualified Water Efficient Landscaper (QWEL) program. The Partnership also received a 2017 "Excellence Award" for its education and outreach efforts. The Partnership was awarded two of 20 awards issued by the EPA nationally.

The Partnership was formed in late 2010 and recognizes that establishing common regional water conservation projects may cost effectively conserve more water than would otherwise be conserved by individual agencies. This regional approach is based on meeting water conservation regulatory requirements by offering financial incentives to conserve and by educating water users about where drinking water comes from and how to use it most efficiently. The Partnership, through its many water efficiency programs, educational seminars and outreach campaigns, is working every day of the year to educate our communities about the importance of conserving water resources and curbing water-wasting behaviors.

Regional water use during Fiscal Year 2016-2017 remains down significantly from prior years as a result of continued water conservation efforts by all Partnership agencies. The Partnership offers educational resources, programs and incentives to aid our communities in meeting water use efficiency requirements in the future as we work together in response to variable water year conditions and maintain supplies for beneficial use and instream needs.

Sincerely,

Michael Healy, Chair
Water Advisory Committee

Shirlee Zane, Chair
Sonoma County Water Agency

PARTNERSHIP ACHIEVEMENTS BY THE NUMBERS

RESIDENTIAL PROGRAMS

52 HOT WATER RECIRCULATION SYSTEM REBATES

11 LAUNDRY TO LANDSCAPE GRAYWATER SYSTEMS

4,301 RESIDENTIAL TOILET REPLACEMENTS

3,193 WATER SMART HOME EVALUATIONS

712 HIGH-EFFICIENCY CLOTHES WASHER REBATES

11,223 GALLONS OF RAINWATER HARVESTING CAPACITY ADDED

LANDSCAPE PROGRAMS

411,701 SQUARE FEET OF LAWN REMOVED VIA CASH FOR GRASS/ MULCH MADNESS

ECO FRIENDLY GARDEN TOUR

1,635 ATTENDEES

24 SITES

123 GARDEN SENSE CONSULTATIONS

38 POOL COVER REBATES

47 LANDSCAPE UPGRADE REBATES

87 IRRIGATION STATIONS RETROFITTED WITH SMART CONTROLLERS

48 QWEL & SQWEL GRADS

4 SHEET MULCHING CLASSES

6 RAINWATER HARVESTING WORKSHOPS

365 WATER WASTE ENFORCEMENTS

140 LANDSCAPE PLANS REVIEWED

10 BIOSWALES, DRIP IRRIGATION & LOW WATER USE GARDEN DESIGN CLASSES HELD

346 REBATES GIVEN FOR LAWN REMOVAL VIA CASH FOR GRASS/ MULCH MADNESS

FISCAL YEAR 2016-2017

COMMERCIAL PROGRAMS

115
INDOOR SURVEYS COMPLETED

45
COMMERCIAL HIGH EFFICIENCY TOILETS AND URINALS RETROFITTED

656,976 GALLONS SAVED THROUGH SUSTAINED REDUCTION

K-12 EDUCATION PROGRAMS

90
HIGH SCHOOL VIDEO CONTEST PARTICIPANTS

CURRICULUM MATERIALS DISTRIBUTED TO
27,370
STUDENTS

10,264
STUDENTS RECEIVED DIRECT INSTRUCTION

871
ENTRIES IN THE WATER AWARENESS POSTER CONTEST

17,084
ASSEMBLY PROGRAM ATTENDEES

9,041
STUDENTS REACHED AT COMMUNITY OUTREACH EVENTS

375
PARENT CHAPERONES ATTENDED FIELD TRIPS

58
TEACHERS ATTENDED WORKSHOPS

PARTNERSHIP HIGHLIGHTS

FISH LADDER VIEWING GALLERY OPENS

The Water Agency operates an inflatable dam located on the Russian River near Forestville to increases water production capacity during peak demand months. In September 2016, the construction of a new, modern fish ladder to bypass the dam was completed, allowing fish and other aquatic animals to safely swim past the inflatable dam. The new fish ladder also offered an opportunity to develop a viewing gallery. The viewing gallery serves as a window into the Russian River, allowing Water Agency fish biologists to count endangered salmon and creating a unique opportunity for the public on guided tours to catch a glimpse of aquatic wildlife. During the 2016-17 school year, 2,300 students visited the gallery as part of the Water Agency's award-winning water education program. During this field program, students learn about the Russian River and how it provides habitat for endangered salmon as well as drinking water for our community.

WATER SMART PLANT CARDS

The Partnership's popular plant cards were revised with new plants and the new "Water Smart Plant" labeling campaign for identifying climate appropriate plants at local nurseries. Each deck of cards feature 50 different low water use plants organized into six categories: trees, shrubs, perennials, grasses, groundcovers and vines. The cards are a component of the Partnerships outreach initiative to educate the public on outdoor water use and are available through the Partners and at outreach events.

PROGRAM EXPENDITURES

(In thousands of dollars)

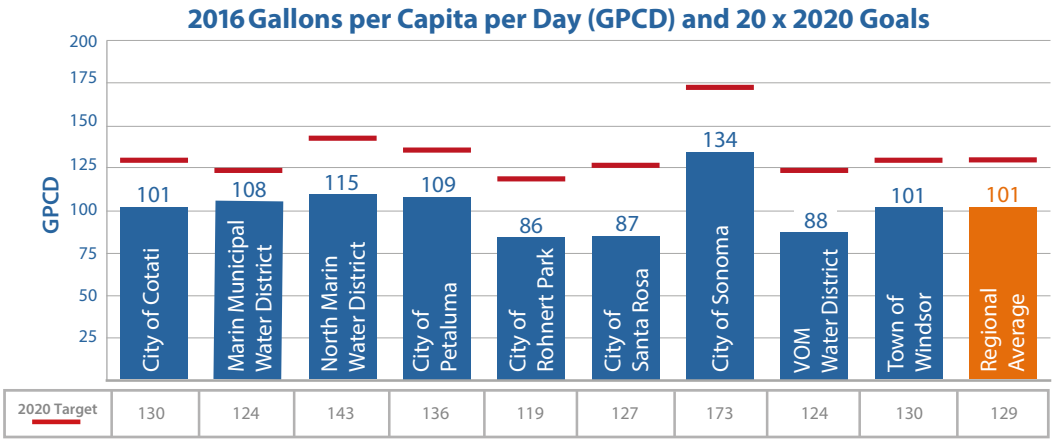
	FY 16-17	Minimum
City of Cotati	$55	$18
Marin Municipal Water District	$1858	$206
North Marin Water District	$540	$217
City of Petaluma	$657	$260
City of Rohnert Park	$16	$102
City of Santa Rosa	$3421	$555
City of Sonoma	$129	$59
Valley of the Moon Water District	$85	$70
Town of Windsor	$199	$13
Sonoma County Water Agency	$2085	NA
Regional Total	**$9045**	**$1500**

Minimum is established in the MOU regarding the Sonoma-Marin Saving Water Partnership.

20 X 2020 GOALS

In 2009, SBx7-7 established a statewide goal, known as 20 x 2020, to reduce per capita water use 20% by the year 2020. The chart below displays 2016 per capita water use in each Partner service area and the region as a whole. The 2020 goals are indicated by the red lines.

While the chart shows that all Partners are currently meeting the 2020 targets, we recognize that water use efficiency must continue. Many factors can affect water use patterns as has been seen in recent years. It is important to continue the work on water use efficiency to maintain the savings already achieved and make sure the region captures all the benefits of future water savings.



ANNUAL MULTI-MEDIA PUBLIC EDUCATION CAMPAIGN

Building on the success of past public outreach campaigns, the Partnership continued in 2018 with the message, "Water efficiency is…There's never enough to waste." The campaign was disseminated throughout the region via radio and print in English and Spanish.

Additionally, the Partnership had a large presence at the Sonoma County Fair, displaying its "Water Efficient House" in the Grace Pavilion. The interactive house provides tips for saving water inside and outside the home as well as rebate information for each of the Partners' service areas. About 223,000 people visited the County Fair this year.

EPA WaterSense 2017 SUSTAINED EXCELLENCE

AWARD STREAK CONTINUES

The Partnership was award two 2017 U.S. EPA WaterSense Awards continuing an award streak that began in 2013. Each year, 20 WaterSense Awards are given nationally to industry leaders who support WaterSense in its mission to promote water use efficiency. The Partnership received its first ever 2017 Sustained Excellence award for its Qualified Water Efficient Landscape Program and received the 2017 Excellence Award for Outreach and Education.

For more about WaterSense, visit www.epa.gov/watersense.

EPA WaterSense 2017 EXCELLENCE AWARD

SONOMA - MARIN SAVING WATER PARTNERSHIP

City of Cotati
(707) 665-3631
www.ci.cotati.ca.us

Marin Municipal Water District
(415) 945-1520
www.marinwater.org

City of Petaluma
(707) 778-4507
cityofpetaluma.net/wrcd

North Marin Water District
(415) 761-8933
www.nmwd.com

City of Rohnert Park
(707) 588-3300
www.rpcity.org

Sonoma County Water Agency
(707) 547-1933
sonomacountywater.org

City of Santa Rosa
(707) 543-3985
srcity.org/water

Town of Windsor
(707) 838-1004
townofwindsor.com

City of Sonoma
(707) 933-2237
www.sonomacity.org

Valley of the Moon
Water District
(707) 996-1037
www.vomwd.com

EPA WaterSense PARTNER

WWW.SAVINGWATERPARTNERSHIP.ORG

Appendix B

Forecast-Informed Reservoir Operations:

Preliminary Viability Assessment for Lake Mendocino (Summer 2017)

FORECAST INFORMED RESERVOIR OPERATIONS: PRELMINARY VIABILITY ASSESSMENT FOR LAKE MENDOCINO

PREPARED BY SONOMA COUNTY WATER AGENCY · SUMMER 2017

PROJECT PARTNERS

STEERING COMMITTEE MEMBERS

FIRO CO-CHAIRS

Jay Jasperse
Sonoma County Water Agency

F. Martin Ralph
Center for Western Weather and Water Extremes

Michael Anderson
California State Climate Office, Department of Water Resources

Levi Brekke
Bureau of Reclamation

Mike Dillabough
US Army Corps of Engineers

Michael Dettinger
United States Geological Survey

Joe Forbis
US Army Corps of Engineers

Alan Haynes
NOAA California-Nevada River Forecast Center

Patrick Rutten
NOAA Restoration Center

Cary Talbot
US Army Corps of Engineers

Robert Webb
NOAA's Earth System Research Laboratory

BACKGROUND

Lake Mendocino, located on the East Fork of the Russian River in California, has a total storage capacity of 122,500 acre-feet. Lake Mendocino is created by Coyote Valley Dam, which was constructed in 1958 for flood control, and provides water supply, recreation and stream flow.

The US Army Corps of Engineers (Corps) owns the project and makes flood control releases in accordance with the Water Control Manual (WCM). Sonoma County Water Agency (SCWA) is the local partner and controls releases when water levels are in the water supply pool.

The WCM, issued in 1959 and with minor revisions in 1986, was developed without the benefit of modern forecasting methods. The WCM specifies reservoir operation according to a rule curve, which dictates water storage during a flood event and water releases soon thereafter to create storage space for the next potential flood. The rule curve is predicated on historical weather patterns – wet during the winter, dry otherwise.

THE PROBLEM The rule curve does not account for increased variation in weather patterns and reductions to inflows into Lake Mendocino resulting from a 56% reduction of diversions from the Eel River due to changed hydroelectric facility operations. This region experiences some of the most variable weather in California, with frequent droughts and floods. As a result, the water supply reliability of Lake Mendocino is impaired with significant consequences to downstream municipal and agricultural water users as well as endangered coho salmon, threatened steelhead trout and Chinook salmon.

A VIABLE SOLUTION Applying scientific advances in weather and stream flow prediction can lessen the impacts of weather extremes without the need for expensive infrastructure expansion. This cost-effective approach, called Forecast

(over)

Informed Reservoir Operations (FIRO), is being assessed for its viability to optimize water management and improve resilience of Lake Mendocino.

A Steering Committee is working collaboratively on this project, which has transferability potential to other reservoirs. The preliminary viability assessment (PVA), which will be released in August 2017, finds that FIRO is a viable approach to improving management of Lake Mendocino in anticipation of upcoming conditions. Specifically, the PVA (available at link) finds that:

- Integrating forecasts of inflows into the reservoir and downstream flows into the river into decisions about reservoir releases would permit operators to more reliably meet water management objectives and environmental flows in the Russian River basin.
- Based on data from 1985-2010, median end of year reservoir storage attributable to FIRO was modeled and found to range from 8,633 AF to 27,780 AF, or up to a 49% increase.
- Making decisions about reservoir releases based on forecasts of reservoir inflows and local flows does not adversely affect flood risk management.
- Atmospheric River-type storms are the key drivers of both drought and flood risk in this region, as these events produce heavy and sometimes prolonged precipitation. The high-impact storms of 2017, following a years-long drought, illustrate the type of extremes that the watershed can experience in relatively short time periods.
- Current forecasting skill, especially during extended dry periods, provides an opportunity to implement some elements of FIRO. However, significant uncertainty remains in the strength, timing, duration, and orientation of land-falling Atmospheric Rivers.

PROJECT STATUS AND APPLICATION TO OTHER AREAS

Based on the results of the PVA, the Steering Committee is developing a FIRO Final Viability Assessment. The Final Viability Assessment will consider and recommend FIRO strategies that could be implemented in the near-term using current technology and scientific understanding, and identify and develop new science and technologies that can ensure FIRO implementation is safe and successful in the long term.

The Steering Committee is developing a plan for using FIRO to support requests to the Corps for deviations to the WCM over the next few years. Deviation requests will be designed to explore the viability of implementing FIRO strategies using current forecast skill and technology with the appropriate limitations that meet Corps conditions for deviations.

Finally, additional research will be conducted by the contributing agencies and centers, including CW3E, SCWA and Corps ERDC. The results of these studies will be included in the Final Viability Assessment to answer key questions identified in the PVA. Transferability of this project to other reservoirs and to flood reduction potential of FIRO will also be assessed.

CONTACTS/STEERING COMMITTEE CO-CHAIRS:

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