Central Valley Project and
State Water Project
Fall 2016 Drought Preparedness Plan

November 2016 – January 2017

Final Working Draft 10/28/16

Contents

Introduction

California has just ended its fifth consecutive year of below-average rainfall and snowpack, and Water Year (WY) 2016 was the ninth of ten years with below-average runoff. This extended drought has produced chronic and significant shortages to municipal and industrial, environmental, agricultural, and wildlife refuge water supplies, and led to historically low groundwater levels. The current dry hydrology has set many new statewide records, including the driest four-year period of statewide precipitation (2012-2015). In calendar year 2013, many communities recorded their lowest-ever levels of annual precipitation; calendar year 2014 saw record-low water allocations for the Central Valley Project (CVP) and State Water Project (SWP) contractors; and 2015 recorded the driest January on record and the lowest Sierra snowpack on record at 5 percent of historical April 1 average.

Since December 2013, State and Federal agencies that supply water, regulate water quality, and protect fish and wildlife have worked closely together to cope with persistent drought. The U.S. Bureau of Reclamation (Reclamation), California Department of Water Resources (DWR), California Department of Fish and Wildlife (CDFW), State Water Resource Control Board (SWRCB), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS), (collectively, the State and Federal Agencies) have closely coordinated to manage water resources through both forward-thinking and real-time efforts, including work on drought operations planning and active participation in Real-time Drought Operations Management Team (RTDOMT) meetings.

Water Year 2016 was classified as below normal in the Sacramento Basin and precipitation events occurred that replenished storage levels higher than the previous two years of exceptionally dry conditions. The precipitation pattern in 2016 resulted in a snowpack that was 85 percent of average; however, the increased reservoir storage was primarily the result of increased rainfall runoff. The 2016 precipitation pattern created the opportunity to manage the Sacramento River Basin's reservoir releases to meet requirements of the Biological Opinions, the Shasta Temperature Management Plan, and Water Rights Decision 1641 (D-1641).

Unfortunately, in WY 2016 the San Joaquin River system was classified as dry with significantly less precipitation than the northern Sierra this year and cumulatively over the past four years. As a result, reservoir storages in the San Joaquin basin have remained at critically low levels. As a result, Reclamation filed a Temporary Urgency Change Petition with the State Water Resource Control Board (SWRCB) to seek modification of D-1641 criteria for San Joaquin River flows at Vernalis.

This Drought Preparedness Plan provides an overview of current conditions as they relate to projected flow and storage conditions using the 50 percent, 90 percent, and 99 percent exceedance probabilities for assumed hydrology and assesses projected water operations based on these various hydrologic scenarios through January 31, 2017. Although WY 2016 is classified as below normal in the Sacramento Valley and dry in the San Joaquin Valley, it is important to note that Reclamation and DWR managed water operations in the Sacramento River Basin reservoirs to achieve compliance with the Biological Opinions and D-1641. Additionally,

the CVP and SWP also achieved the highest End-of-September (EOS) storages within the past five years: Oroville experienced the highest 2016 EOS in the last 3 years; Folsom experienced the highest 2016 EOS in the last 2 years; Shasta experienced the highest 2016 EOS in the last 5 years.

Purpose

In consideration of hydrologic uncertainty and EOS storage in Shasta, Oroville, and Folsom reservoirs, this document provides a framework for CVP and SWP water operations this fall and early next year. DWR and Reclamation are preparing this Drought Preparedness Plan to describe current reservoir storage and forecasted hydrology, and review historic actions taken in 2014 and 2015 that requested modifications to D-1641 and adjustments to the Biological Opinions. There is always a potential that dry conditions may persist into WY 2017, however, based on current upstream reservoir storage in the Sacramento River and the San Joaquin River Basins, the CVP and SWP do not foresee the need to seek D-1641 modifications or Biological Opinion adjustments through January 31, 2017.

It is difficult to balance multiple critical uses of available water supplies under dry conditions and low reservoir storages. While this DPP is not a detailed operational plan, it serves to identify current conditions and outline the CVP's and SWP's ability to meet D-1641 objectives and Biological Opinion criteria. As Reclamation and DWR plan and respond to several consecutive dry years, they recognize the need for documentation of up-to-date hydrology to inform water operations during future drought response efforts.

Goals

Water supply and environmental challenges for our State continue as California approaches winter after a fifth consecutive drought year. Although the precipitation that has occurred to date is well above average, if 2017 precipitation results in yet another dry winter, the State and Federal Agencies may again need to make difficult decisions to balance water supply objectives, cold water pool management, flows for fish, and maintenance of water quality in the Delta. The following preliminary goals for water year 2017 and are intended to identify potential balancing of water supply and biological resources:

- Ensure the CVP and SWP meet essential human health and safety needs.
- Manage Sacramento-San Joaquin Delta (Delta) water quality and outflow consistent with D-1641 and the Biological Opinions.
- Provide and maintain adequate protections for State and Federal endangered and threatened species and other fish and wildlife resources.
- Seek and consider water management flexibilities to improve water supply and biological resource benefits.

Current Conditions

Water Quality

The Delta has been in balanced conditions since May 5, 2016. Salinity management has been mainly controlling operations. When the CVP and SWP are operating for salinity management, they typically minimize exports and operate to a higher Net Delta Outflow Index (NDOI) than the D-1641 requirements as a first step in moderating salinity degradation. This course of action is usually adequate until the first significant runoff events of the water year provide sufficient flow to improve Delta salinity conditions. Considering the above average rainfall to date, the CVP and DWR do not anticipate exceeding D-1641 standards this fall.

Hydrology

Precipitation to Date

Precipitation to date is above average for the Sacramento River and San Joaquin River watersheds. The Sacramento and San Joaquin Valley water year totals to date are above the cumulative precipitation from last year at this time. As of October 24, 2016, the Sacramento Valley 8-station index was 7.3 inches or 302 percent of average for that date. The San Joaquin Valley 5-station index was 3.3 inches or 206 percent of average for that date.

Runoff

The snow lines (freezing lines) associated with the storms this year are relatively high. These October storms have saturated the soil and future storms should result in increased runoff into the reservoirs and downstream into the Delta.

SWP and CVP Upstream Storage

On September 30, 2016 Shasta Reservoir on the Sacramento River, Oroville Reservoir on the Feather River, and Folsom Reservoir on the American River were at 62, 46, and 31 percent of capacity. Trinity Reservoir on the Trinity River was at 40 percent of capacity while New Melones on the Stanislaus River was at 22 percent of capacity. The San Joaquin River watershed has experienced severely dry conditions for the past several years which is reflected in the low storage levels.

Reservoir	**End of September Storage**
Lake Oroville	1.62 MAF
Lake Shasta	2.81 MAF
Lake Folsom	306 TAF
New Melones	528 TAF
Trinity Lake	969 TAF

Reservoir	October 24, 2016 Storage)
Lake Oroville	1.55 MAF
Lake Shasta	2.67 MAF
Lake Folsom	319 TAF
New Melones	516 TAF
Trinity Lake	966 TAF

Snow Pack

The temperatures during these precipitation events to date have been near normal so there has not been any accumulation of snow. The winter snow surveys begin in December and January at limited stations. Snow surveys for all the stations begin in February and will be performed on or about the first of each month thereafter until the final snow survey in May.

Projected Hydrology and Runoff

The DWR's Hydrology and Flood Operations Office within the Division of Flood Management produces estimates of water year runoff for the major watersheds of the Sacramento and San Joaquin River basins beginning in December and provides monthly updates through May of each year. The forecasts utilized for this DPP consider anticipated runoff resulting from precipitation predicted to occur for the remainder of the year under the 50 percent, 90 percent, and 99 percent hydrologic exceedence scenarios.

Operations Forecast 50, 90, 99 Percent Hydrologies

The operational forecasts included in this DPP are based on a model using 50 percent, 90 percent, and 99 percent historical hydrologies as of October 1, 2016 adjusted for current month through the end of the year. These operational scenarios show the likely ranges of storages and flows associated with each scenario (Attachment 1). The base assumptions for the current month utilize existing storage conditions, actual precipitation and runoff that have occurred to date, and then uses the future runoff based on historical statistics, projected water supply deliveries, and meeting existing D-1641 standards and current Biological Opinion Reasonable and Prudent Alternatives (RPAs). The 50 percent, 90 percent, and 99 percent hydrologic studies suggest that the CVP and SWP would be able to meet requirements of D-1641 and the Biological Opinions through January 31, 2017.

Under all the hydrologic scenarios, the model assumes that DWR would fulfill all of its contractual obligations. For the Feather River Settlement contractors, no shortage provision is assumed under the 50 percent, 90 percent and 99 percent hydrologic scenarios through January, 2017. A final determination of the delivery to the Feather River Settlement contractors will be made based on the April forecasts. Deliveries to the Sacramento River Settlement contractors and San Joaquin River Exchange contractors are not explicitly identified in these forecasts. Reclamation will be evaluating available supplies to these contractors based on February forecast projections.

Summary of Requests in 2014 and 2015

For a summary of Temporary Urgency Change Petition requests during 2014 and 2015, please refer to the Central Valley Project and State Water Project 2016 Drought Contingency Plan for Water Project Operations February - November 2016 (Pages 18 and 19).

ATTACHMENT 1

MODELED FORECAST RESULTS

For the 2016 Fall Drought Preparedness Plan

(Updated using Historical Hydrology)

October 1 - 50% HYDROLOGY

END OF MONTH STORAGES (TAF)

RESERVOIRS	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Trinity	891	929	994
Shasta	2667	2764	3014
Folsom	335	373	416
Oroville	1375	1389	1562
New Melones	498	525	562

MONTHLY AVERAGE RELEASES (CFS)

RESERVOIRS	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Trinity	300	300	300
Sacramento	5500	5500	5500
American	1250	1250	1750
Feather	2450	1750	1750
Stanislaus	200	200	200

DELTA SUMMARY (CFS)

	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Rio Vista Flows	7300	12950	14050
Sac River at Freeport	12600	15700	18850
SJ River at Vernalis	1900	2050	2100
Computed Outflow	5050	9650	20000
Combined Project Pumping	10150	9650	4700

October 1 - 90% HYDROLOGY

END OF MONTH STORAGES (TAF)

RESERVOIRS	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Trinity	912	896	903
Shasta	2475	2439	2558
Folsom	266	259	258
Oroville	1248	994	1021
New Melones	473	480	486

MONTHLY AVERAGE RELEASES (CFS)

RESERVOIRS	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Trinity	300	300	300
Sacramento	5500	5000	3250
American	1000	1000	1000
Feather	2450	1350	1750
Stanislaus	200	200	210

DELTA SUMMARY (CFS)

	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Rio Vista Flows	5700	10250	10600
Sac River at Freeport	10450	12550	12600
SJ River at Vernalis	1350	1450	1800
Computed Outflow	5000	5000	9200
Combined Project Pumping	6350	8750	4550

October 1 - 99% HYDROLOGY

END OF MONTH STORAGES (TAF)

RESERVOIRS	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Trinity	*	*	*
Shasta	2425	2319	2338
Folsom	236	199	186
Oroville	1226	959	900
New Melones	*	*	*

MONTHLY AVERAGE RELEASES (CFS)

RESERVOIRS	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Trinity	*	*	*
Sacramento	5500	5000	3250
American	1000	1000	700
Feather	2450	3750	1250
Stanislaus	*	*	*

DELTA SUMMARY (CFS)

	2016		2017
	NOVEMBER	DECEMBER	JANUARY
Rio Vista Flows	4700	8850	5900
Sac River at Freeport	9100	10950	7150
SJ River at Vernalis	850	750	1000
Computed Outflow	5000	6000	6000
Combined Project Pumping	3900	4700	2300

* 99% forecasts were not performed for Trinity and New Melones operations.