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2015 Restoration Allocation and Default Flow Schedule

January 20, 2015

Introduction

The following transmits the 2015 Restoration Allocation and Default Flow Schedule to the Restoration Administrator for the San Joaquin River Restoration Program (SJRRP), consistent with the Restoration Flow Guidelines (RFG, December 2013). This Restoration Allocation and Default Flow Schedule provides the following:

- Forecasted Water Year Unimpaired Runoff: estimated flows that would occur absent regulation on the river. This runoff is utilized to identify the Restoration Year Type.
- Hydrograph Volumes: annual allocation hydrograph based on water year unimpaired inflow, utilizing the Method 3.1 with the Gamma pathway (RFG-Appendix C) agreed to by the Parties in December 2008.
- Flow targets at Gravelly Ford: flows at the head of Reach 2 based on scheduled releases from Friant Dam less the assumed Holding Contract demands and losses in Exhibit B.
- Restoration Budget: volumes for the annual allocation, spring flexible flow, base flow, riparian recruitment, and fall flexible flow.
- Remaining Flexible Flow Volume: the amount of water released for the SJRRP and the remaining volume of water available for scheduling.
- Operational Constraints: flow release limitations based on downstream channel capacity, regulatory, or legal constraints.
- Default Flow Schedule: the restoration schedule in the absence of a recommendation from the Restoration Administrator.
- Additional Flow Schedules: this section provides Restoration release allocations that would result from 10^{th} and 50^{th} percentiles unimpaired runoff.

Consistent with Paragraph 18 of the Settlement, the Restoration Administrator shall make recommendations to the Secretary of the Interior concerning the manner in which the hydrographs shall be implemented. The Restoration Administrator is requested to recommend a flow schedule showing the use of the entire Annual Allocation during the upcoming Restoration Year, and categorize all recommended flows by account (e.g., shifts in the Default Flow Schedule, Buffer Flow releases) consistent with the Restoration Flow Guidelines.

Forecast Unimpaired Runoff

Unimpaired runoff represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds. The forecast of the unimpaired runoff determines the potential river release requirements for the SJRRP. Information for forecasting the unimpaired runoff includes:

- The Bureau of Reclamation (Reclamation), Friant Division estimate of unimpaired flow to support the water supply allocation;
- The Department of Water Resources (DWR) Water Supply Index forecast latest update on January 1, 2015 (published on January 9, 2015) for Water Year 2015 San Joaquin River inflow to Millerton Lake Unimpaired Flow[1];
- The National Weather Service (NWS) Raw Ensemble Streamflow Prediction (ESP) Water Supply Forecast (Water Year 2015) for the San Joaquin River at Millerton Lake[2].

Table 1 shows the 2015 San Joaquin River Water Year forecast breakdown at Millerton Lake. The latest DWR forecast is based on January 1, 2015 information while the NWS forecast was updated on January 20, 2015. The DWR 50% exceedence forecast was 1,095 TAF, while the 50% NWS exceedence forecast was 781 TAF (Table 1 and Figure 1). The South Central California Area Office (SCCAO) used the average of the NWS and DWR forecasts to determine their current water supply outlook. The average of the DWR and NWS 50% exceedence forecast was 938 TAF. Since the 50% exceedance forecast is less than 1,831 TAF, the 90% exceedance forecast is used to determine the pattern year type. The pattern year type is critical high. Based on Forecast Use Option 1D (RFG, December 2013) for a critical high pattern year type, the average of the DWR 90% forecast and NWS 90% forecast of unimpaired runoff, 445.5 TAF, is used to estimate the Restoration Allocation, resulting in a **Critical High Year** hydrograph for the SJRRP.

[1] http:// http://cdec.water.ca.gov/cgi-progs/iodir?s=b120

[2] http://www.cnrfc.noaa.gov/awipsProducts/RNOHFSWYV.php

Table 1-San Joaquin River Water Year Forecast at Millerton Lake

Forecast Source	90%	50%	10%
DWR, January 1, 2015	490 TAF	1,095 TAF	2,225 TAF
NWS, January 2, 2015	400 TAF	949 TAF	2,277 TAF
NWS, January 6, 2015	466 TAF	952 TAF	2,180 TAF
NWS, January 8, 2015	473 TAF	961 TAF	2,147 TAF
NWS, January 12, 2015	446 TAF	857 TAF	2,057 TAF
NWS, January 13, 2015	389 TAF	783 TAF	1,939 TAF
NWS, January 14, 2015	373 TAF	763 TAF	2,004 TAF
NWS, January 15, 2015	357 TAF	742 TAF	1,910 TAF
NWS, January 16, 2015	352 TAF	766 TAF	1,957 TAF
NWS, January 17, 2015	367 TAF	764 TAF	1,969 TAF
NWS, January 19, 2015	396 TAF	781 TAF	2,034 TAF
NWS, January 20, 2015	401 TAF	781 TAF	1,984 TAF

Based on the information and analysis described above, the SJRRP is currently in a Critical High Restoration Year type. The January forecasts from the NWS show a flat trend, with the 90% exceedance hovering around 400 TAF, the Critical Low Restoration Year type threshold (Figure 1). DWR provides weekly forecasts beginning in February, and thus a similar trends analysis is not yet possible for the DWR forecasts. However DWR's February 1 forecast could put the 90% exceedence Restoration Year type near Critical Low considering the recent dry conditions. The range of uncertainty for the 90% exceedence forecast includes a possibility of a Critical Low Restoration Year type.

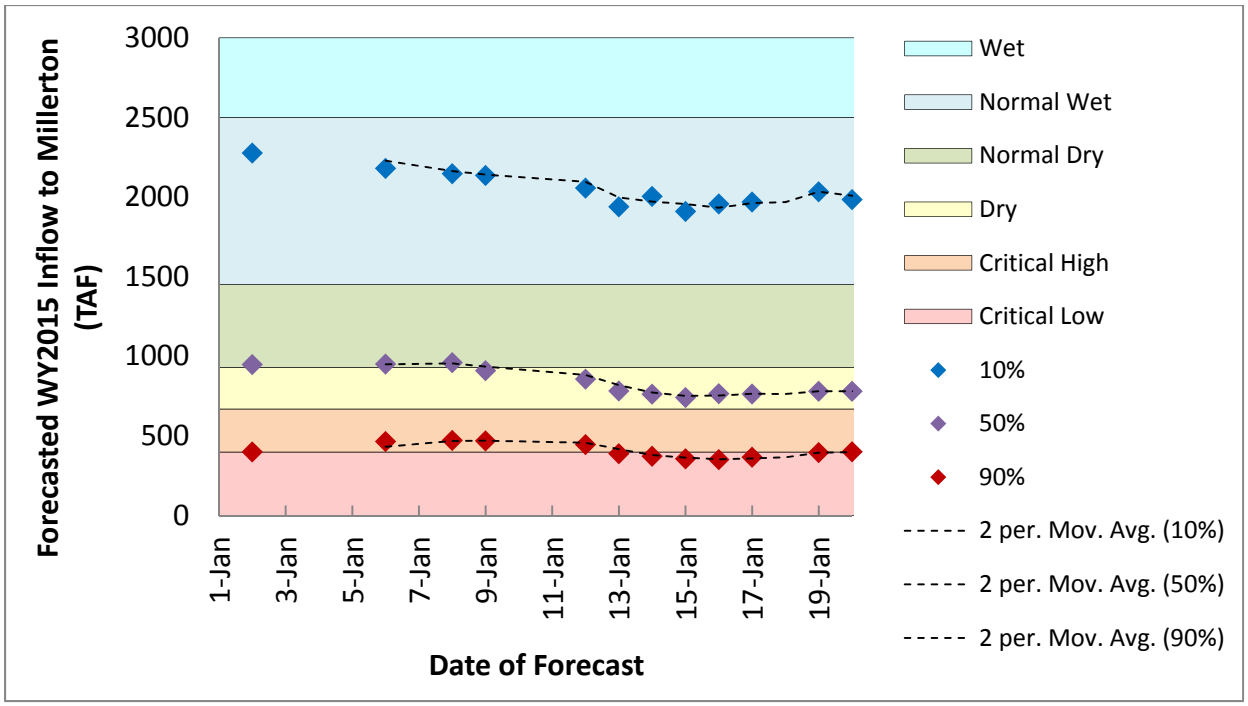

Figure 1 - Water Year 2015 NOAA National Weather Service Ensemble Streamflow Prediction Forecasts

Contractual Obligation Considerations

Consistent with Section 10004(j) of the San Joaquin River Restoration Settlement Act, the Settlement and the Settlement Act do not modify the rights and obligations of the United States under the Purchase Contract between Miller and Lux and the United States (Purchase Contract) and the Second Amended Exchange Contact between the United States, Department of the Interior, Bureau of Reclamation and Central California Irrigation District, San Luis Canal Company, Firebaugh Canal Water District, and Columbia Canal Company (Exchange Contract). The Bureau of Reclamation's (Reclamation's) obligations in the Purchase Contract and Exchange Contract remain unchanged. As a result, if a situation were to occur where the SJRRP flows conflicted with Reclamation making necessary deliveries under the Purchase Contract and Exchange Contract, Reclamation would make water available to meet the contractual requirements and/or refrain from making releases under the Settlement.

In determining whether to release flows for the SJRRP, Reclamation considers its ability to meet the prior and more senior obligations in the Purchase Contract and Exchange Contract. Reclamation has completed an extensive analysis of water supplies available to the Central Valley Project (CVP) utilizing the DWR and NWS runoff projections. Reclamation considered a series of operational parameters for the CVP, such as human health and safety needs, economic impacts, fishery and wildlife protection needs, refuge water supplies, and operational flexibility. These efforts are described in detail in the Central Valley Project and State Water Project

Drought Contingency Plan, January 15, 2015 to September 30, 2015 (2015 DCP[3]), submitted on January 15, 2015, to the State Water Resources Control Board. As described in the 2015 DCP, there are a series of hydrologic and operational factors in play that Reclamation does not yet know the outcomes of. These factors include the possibility that, based on the initial inflow projections to Shasta Reservoir, the Exchange Contract would provide for 840,000 acre feet to be made available to the Exchange Contractors. Because the natural inflow to Shasta was less than 3.2 million acre-feet for the 2014 water year, if these inflow projections fall below 4.0 million acre-feet in the 2015 February 1 forecast, the Exchange Contract would provide for 650,000 acre-feet to be made available under the Exchange Contract. These factors described in the 2015 DCP could result in substantial differences in the CVP water supply available south of the Delta, and therefore, substantially affect Reclamation's ability to provide the water to be made available under the Exchange Contract. Considering all of the information available and the high level of uncertainty in some key factors, at this time, Reclamation is uncertain if it can provide the water to be made available under the Exchange Contract. Considering the downward trends in the NWS forecast, the recently dry conditions and expected dry conditions through the end of the month, and the low reservoir storage amounts as compared to previous years[4], Reclamation feels it is prudent to exercise an abundance of caution and not allocate water to the SJRRP at this time.

DWR is expected to complete another snow survey and release its February 1 updated flow forecast around February 9, 2015. Reclamation will analyze this data, other forecast information, and CVP hydrologic and operational factors. Reclamation anticipates completing this analysis on February 17 and will prepare and send a revised Restoration allocation and default flow schedule following the analysis. Water may be allocated to the SJRRP at that time. In the event that the Restoration Administrator would like to exercise the flexible flow provisions of the Settlement, Reclamation requests that the Restoration Administrator provide a flow recommendation, assuming a Critical High Restoration Year type and the allocation volumes described herein, by January 31. Reclamation will follow the process in the RFGs and review the recommendation in anticipation of beginning flows as soon as possible on or after February 17.

Exhibit B Method 3.1 Hydrograph Volumes

Table 2 shows the Exhibit B Method 3.1 hydrograph volumes and corresponding allocation volumes for the entire year, including total releases from Friant Dam and releases for the SJRRP in excess of Holding Contracts.

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[3] Available here: http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/2015_drought_contingency_plan.pdf

[4] Current reservoir information is available here: http://www.usbr.gov/mp/cvo/

Table 2—Exhibit B Method 3.1 Hydrograph Volumes

Flow Period	Releases from Friant Dam (cfs)	Flows Targets at Gravelly Ford (cfs)	SJRRP Flows at Gravelly Ford (cfs)	Friant Release Volume (TAF)	SJRRP Flow Volume at Gravelly Ford (TAF)
Mar 1 - Mar 15	500	375	370	14.9	11.0
Mar 16 - Mar 31	1390	1265	1260	44.1	40.0
Apr 1 - Apr 15	200	55	50	5.9	1.5
Apr 16 - Apr 30	200	55	50	5.9	1.5
May 1 - Jun 30	215	30	25	26.0	3.0
Jul 1 - Aug 31	255	30	25	31.4	3.1
Sept 1 - Sept 30	260	55	50	15.5	3.0
Oct 1 - Oct 31	160	5	0	9.8	0.0
Nov 1 - Nov 6	400	275	270	4.7	3.2
Nov 7 - Nov 10	120	5	0	0.9	0.0
Nov 11 - Dec 31	120	5	0	12.1	0.0
Jan 1 - Feb 28	110	15	10	12.9	1.2
		Unreleased Restoration Flows		**3.5**	**3.5**
				Total = 187.8	**Total = 70.9**

cfs=cubic feet per second
af = acre-feet

Due to levee stability related channel capacity constraints in Reach 2B that constrain Friant Dam releases, Restoration Flows of 3,491 acre-feet are generated that are not scheduled in the above default flow schedule.

Restoration Budget

Table 3 shows the components of the restoration budget for March 1, 2015, through February 28, 2016. The base flow allocation, spring flexible flow, and fall flexible flow reflect the Exhibit B hydrograph for a critical high year. The riparian recruitment component is without any balance because the Restoration Year Type is Critical High. The estimated total allocation consists of 116,866 acre-feet riparian release and 70,919 acre-feet Restoration Flow release. The total flow volume for Restoration Flows as well as various accounting flow components may change as current unimpaired flow forecasts are updated.

Table 3 – Restoration Budget with Flow Accounts

Schedule Start Date	Friant Restoration Flow (cfs)	Gravelly Ford Flow Targets (cfs)	Riparian Demand (cfs)	Riparian Demand (af)	Base Flow (af)	Spring Flexible Flow (af)	Fall Flexible Flow (af)	Buffer Flow (af)	Riparian Recruitment Flow (af)
Mar. 1	500	375	130	3,868	0	11,008	-	1,488	-
Mar. 16	1390	1265	130	4,126	0	39,987	-	4,760*	-
Apr. 1	200	55	150	4,463	0	1,488	-	595	-
Apr. 16	200	55	150	4,463	0	1,488	-	595	-
May. 1	215	30	190	22,988	3,025	-	-	2,601	0
Jul. 1	255	30	230	28,284	3,074	-	-	3,136	-
Sep. 1	260	55	210	12,496	2,975	-	-	1,547	-
Oct. 1	160	5	160	9,838	0	-	-	984	-
Nov. 1	400	275	130	1,547	0	-	3,213	476	-
Nov. 7	120	5	120	952	0	-	0	95	-
Nov. 11	120	5	120	12,139	0	-	-	1,214	-
Jan. 1	110	15	100	6,149	615	-	-	676	-
Feb. 1	110	15	100	5,554	555	-	-	611	-
URF						3,491			
			Total=	**116,866**	**10,244**	**57,462***	**3,213**	**18,779**	**0**

cfs=cubic feet per second * = includes buffer flows on unreleased volume due to channel capacity constraint
af = acre-feet
URF = Unrealeased Restoration Flows

Remaining Flexible Flow Volume

The Friant release for accounting uses the most recent flow schedule. The amount of water remaining for flexible flow scheduling is the volume of flexible flow water in excess of releases required to meet riparian demands, less past releases. Table 4 shows the estimated remaining volume.

Table 4 – Estimated Flexible Flow Volume Remaining

Flow Account	Yearly Allocation (af)	Release up to Date (af)	Remaining Flow Volume (af)
Spring Flexible Flow+ Base Flow (March 1-May 28, 2015)	58,851	0	58,998
Riparian Recruitment	0	0	0
Fall Flexible Flow	3,213	0	3,213
Buffer Flow	18,779	0	0
Purchased Water	0	0	0

af= acre-feet

Operational Constraints

Operating criteria, such as channel conveyance capacity, ramping rate constraints, scheduled maintenance, and downstream seepage concerns, may restrict the release of Restoration Flows. At this time, channel capacity and seepage constraints prevent flows below Sack Dam.

Upon completion of the last flowage easement, approximately 70 cfs will be allowable past Sack Dam, which is anticipated to be obtained this spring. Reclamation will complete a Flow Bench Evaluation prior to any increases below Sack Dam to verify the allowed flow increase. Once flows are allowed, Reclamation believes it is prudent to start flows at 50 cfs below Sack Dam. Reclamation will monitor groundwater levels for two weeks and only after groundwater levels have stabilized below thresholds will Reclamation perform another Flow Bench Evaluation to evaluate an increase to 70 cfs.

In addition, the 2015 Restoration Year Channel Capacity Report identifies a maximum flow in Reach 2B of 1,120 cfs. This results in a maximum release from Friant Dam between 1,360 cfs and 1,490 cfs depending on the time of year. Reclamation will coordinate with the Restoration Administrator through the biweekly Flow Scheduling Subgroup conference calls and on an as-needed basis to update these constraints.

Default Flow Schedule

The Default Flow Schedule identifies how Reclamation will schedule the restoration allocation during the non-critical low years in the absence of a recommendation from the Restoration Administrator, consistent with the Settlement. Since the Restoration Year Type is Critical High, the default flow schedule follows Exhibit B in the Settlement, modified to reflect the operational constraints outlined in the previous section (Table 5). Subsequent default schedules will be derived from new flow forecasts and will be modified based on the restoration flow volume

remaining for the year. The current default flow schedule may be modified based on the February 1 updated flow forecast to be published on February 9, 2015.

Table 5 – Restoration Default Flow Schedule

Date	Flow
Feb 1 – Mar 1	0 cfs
Mar 1 - Mar 15	500 cfs
Mar 16 - Mar 31	1390 cfs
Apr 1 - Apr 15	200 cfs
Apr 16 - Apr 30	200 cfs

cfs=cubic feet per second

Additional Flow Schedules

As per the Restoration Flow Guidelines, additional Restoration allocations that will result from the 10^{th} and 50^{th} percentile unimpaired runoff are presented in Table 6. Although these flow schedules are not utilized for restoration purposes, these flow ranges provide insight into the uncertainty of flow forecasting as well as what may happen once updated forecasts are available.

Table 6 – Additional Flow Schedules, 10^{th} and 50^{th} Percentile

Flow Period	Flow Schedule, (10th percentile, 2,104.5 TAF Unimpaired Inflow, Normal-Wet year), cfs	Flow Schedule, (50th percentile, 938 TAF Unimpaired Inflow, Normal--Dry year), cfs
Mar 1 - Mar 15	500	500
Mar 16 - Mar 31	1,390	1,390
Apr 1 - Apr 15	1,390	1,361
Apr 16 - Apr 30	1,390	350
May 1 - Jun 30	500	350
Jul 1 - Aug 31	350	350
Sept 1 - Sept 30	350	350
Oct 1 - Oct 31	350	350
Nov 1 - Nov 6	700	700
Nov 7 - Nov 10	700	700
Nov 11 - Dec 31	350	350
Jan 1 - Feb 28	350	350
Unreleased Restoration Flows	**114,169 acre-feet**	**3,491 acre-feet**
Volume Released at Friant	**491,992 acre-feet**	**331,377 acre-feet**
Restoration Allocation at Gravelly Ford	**371,506 acre-feet**	**210,891 acre-feet**

cfs = cubic feet per second