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Initial 2018 Restoration Allocation & Default Flow Schedule

January 23, 2018

Introduction

The following transmits the initial 2018 Restoration Allocation and Default Flow Schedule to the Restoration Administrator for the San Joaquin River Restoration Program (SJRRP), consistent with the Restoration Flows Guidelines (version 2.0, February 2017). This Restoration Allocation and Default Flow Schedule provides the following:

- Forecasted water year Unimpaired Inflow: the estimated flows that would occur absent regulation on the river. This value is also known as the "Natural River" or "Unimpaired Runoff" or "Full Natural," and is utilized to identify the Water Year Type.
- Hydrograph Volumes: the annual allocation hydrograph based on water year unimpaired inflow, utilizing the Method 3.1 with the Gamma Pathway (RFG-Appendix C, Figure C-3) agreed to by the Parties in December 2008.
- Default Flow Schedule: the schedule of Restoration Flows in the absence of a recommendation from the Restoration Administrator.
- Additional Allocations: the hypothetical Restoration Allocations that would result from 10%, 50%, 75%, and 90% probability of exceedance Unimpaired Inflow forecast.
- Unreleased Restoration Flows: the amount of Restoration Flows not released due to channel capacity constraints and without delaying completion of Phase 1 improvements.
- Flow targets at Gravelly Ford: the flows at the head of Reach 2, and estimated scheduled releases from Friant Dam adjusted for the assumed Holding Contract demands and losses in Exhibit B.
- Restoration Budget: the volumes for the annual allocation, spring flexible flow, base flow, riparian recruitment, and fall flexible flow.
- Remaining Flexible Flow Volume: the volume of Restoration Flows released and the remaining volume available for flexible scheduling.
- Operational Constraints: the flow release limitations based on downstream channel capacity, regulatory, or legal constraints.

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. As described in the Restoration Flow Guidelines (Guidelines), the Restoration Administrator is requested to recommend a flow schedule showing

the use of the entire annual allocation during the upcoming Restoration Year, categorize all recommended flows by account, and recommend both an unconstrained and a capacity limited recommendation. If an unconstrained recommendation and a capacity limited recommendation are not provided by the Restoration Administrator, the Default Flow Schedule without constraints (Table 5a) and the Default Flow Schedule with constraints (Table 5b) will be used respectively.

Forecasted Unimpaired Inflow

Unimpaired Inflow 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. It is calculated for the period of a Water Year. The forecast of the Unimpaired Inflow determines the volume of Restoration Flows available for the Restoration Year (i.e. the Restoration Allocation). Information for forecasting the Unimpaired Inflow primarily includes:

- Reclamation estimate of Unimpaired Inflow (i.e. Natural River) into Millerton Lake to support the water supply allocation[1];
- The Department of Water Resources (DWR) Bulletin 120 latest update for San Joaquin River inflow to Millerton Lake Unimpaired Flow, and/or the most current DWR Bulletin Water Supply Index (WSI)[3];
- The National Weather Service (NWS) Ensemble Streamflow Prediction (ESP) Water Supply Forecast for the San Joaquin River at Millerton Lake[5].

Table 1 shows the water year 2018 (October 1, 2017 to September 30, 2018) observed accumulated and forecasted water year Unimpaired Inflows at Millerton Lake. This includes the published DWR forecast, the DWR forecast adjusted for expected runoff for the current month, and the NWS forecast with and without a 7-day smoothing function applied to remove the day-to-day variance. Figure 1a plots these values over the entire water year, while Figure 1b shows the most recent period in detail.

Table 1 — San Joaquin River Water Year Actuals and Forecasts at Millerton Lake

	Forecast Exceedance Percentile				
	90%	**75%**	**50%**	**25%**	**10%**
Accumulated "Full Natural" Unimpaired Inflow, January 15, 2018 [1]	120.5 TAF				
Accumulated Unimpaired Inflow as percent of normal	63%				
Total Unimpaired Inflow projected to end of water year [2]	N/A				
DWR, January 1, 2018 [3] (Published Value)	649 TAF	900 TAF	1,149 TAF	1,714 TAF	2,280 TAF
DWR, January 23, 2018 [4] (Runoff Adjusted)	670 TAF	906 TAF	1,138 TAF	1,657 TAF	2,177 TAF
NWS, January 18, 2018 (Published Daily Value [5])	558 TAF	689 TAF	1,020 TAF	1,540 TAF	2,120 TAF
Smoothed NWS, January 18, 2018 (7-day Smoothing [6])	561 TAF	698 TAF	1,036 TAF	1,595 TAF	2,170 TAF
Smoothed NWS, January 10, 2018 (Runoff Adjusted [4])	561 TAF	698 TAF	1,035 TAF	1,593 TAF	2,166 TAF

[1] http://www.usbr.gov/mp/cvo/vungvari/milfln.pdf

[2] Projected value only presented from May through September; based on USBR-SCCAO runoff regression method

[3] B120: http://cdec.water.ca.gov/cgi-progs/iodir?s=b120, or B120 Update: http://cdec.water.ca.gov/cgi-progs/iodir_ss/b120up, or WSI: http://cdec.water.ca.gov/cgi-progs/iodir/WSI.2017

[4] The adjusted data has been updated with the actual unimpaired inflow through the current date and projected out for the remainder of the month.

[5] http://www.cnrfc.noaa.gov/water_resources_update.php?stn_id=FRAC1&stn_id2=FRAC1&product=WaterYear

[6] The NWS smoothed data uses a 7-day triangular weighted moving average, where the most recent day (n) is given greater weight than each previous forecast day (n-1, 2, 3, etc.); this reduces noise stemming from ESP model input. The following formula us used: $((Forecast_n * 1) + (Forecast_{n-1} * 0.857) + (Forecast_{n-2} * 0.714) + (Forecast_{n-3} * 0.571) + (Forecast_{n-4} * 0.429) + (Forecast_{n-5} * 0.286) + (Forecast_{n-6} * 0.143)) / 4$

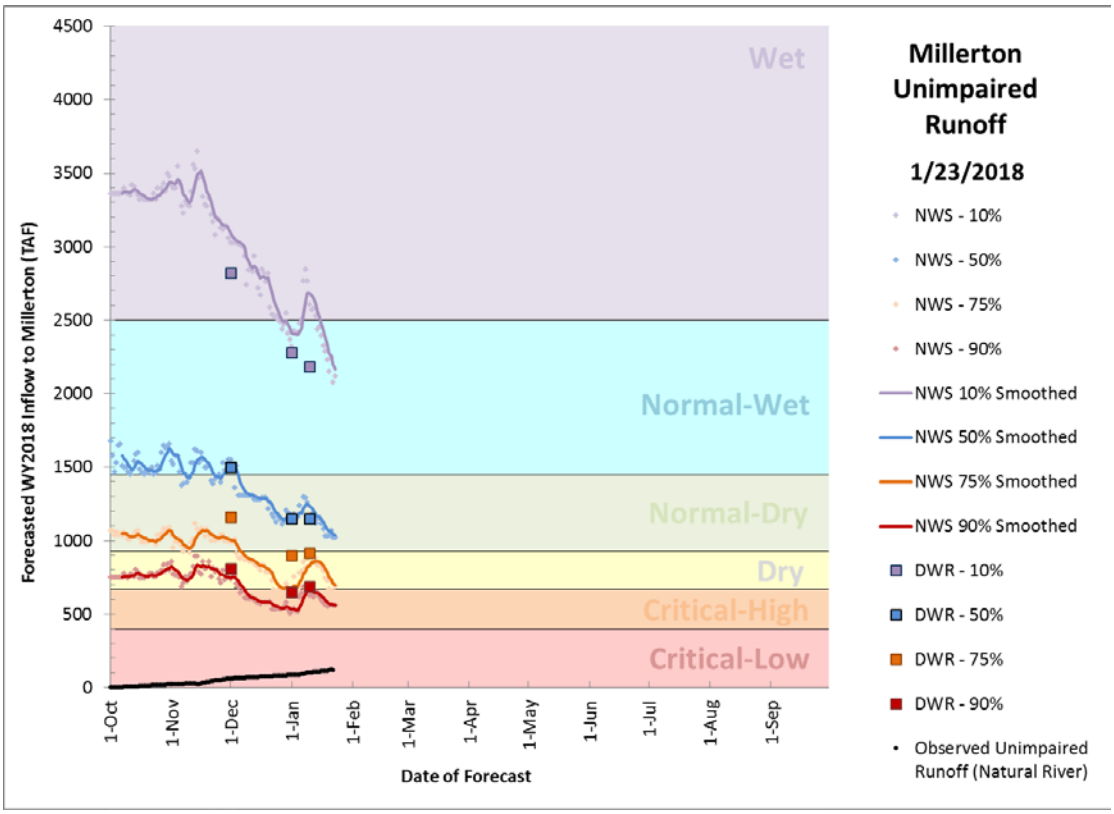

Figure 1a — Plot of 2018 Water Year forecasts, including both NWS Ensemble Streamflow Prediction Forecast and DWR Forecast

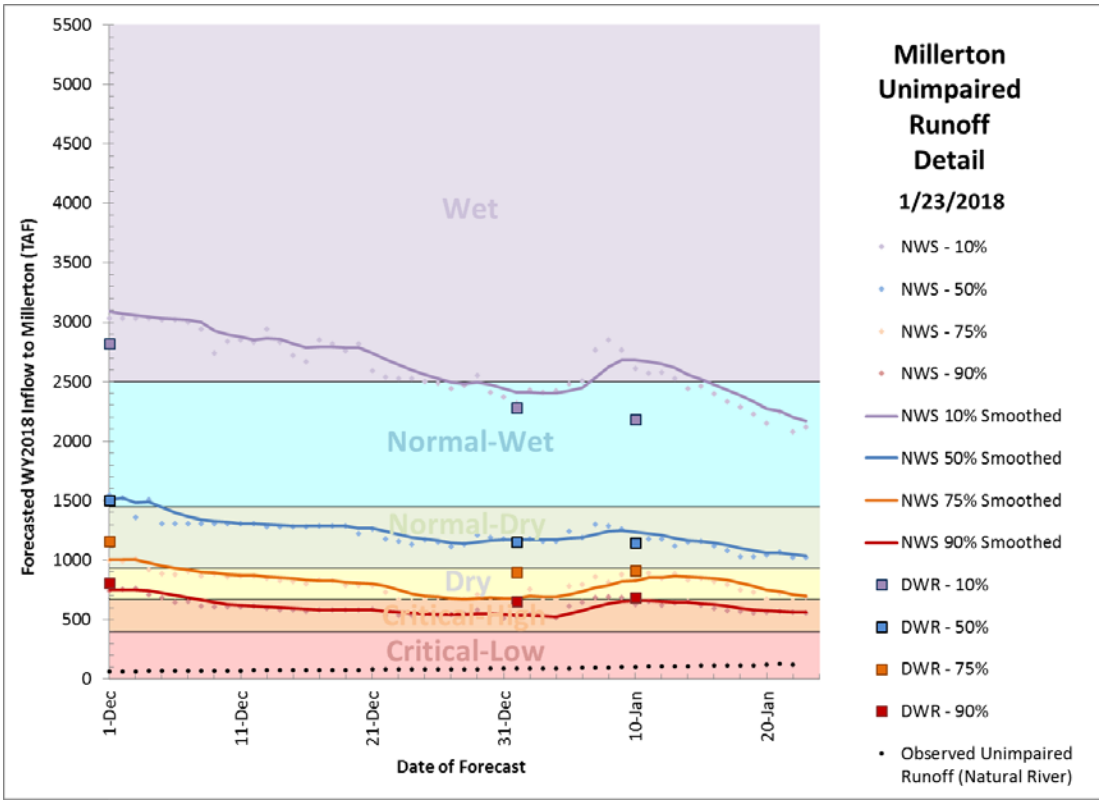

Figure 1b — Detail plot of most recent forecasts

Combining Forecasts

Staff from the South-Central California Area Office of Reclamation and SJRRP jointly track and evaluate the accuracy of runoff forecasts. Based on the age of these forecasts, the short-term and long-term weather forecasts, the climatological outlook, observed Unimpaired Inflow, and other available information, a hybrid forecast is generated. The weighting of the different components is regularly evaluated and selected using professional judgment and the best available information. For the current allocation, the DWR "runoff adjusted" and NWS "smoothed runoff adjusted" forecasts are combined with a 20/80 blending respectively. This results in the Hybrid Unimpaired Inflow Forecasts shown in Table 2.

Table 2 — Current Blending and Hybrid Unimpaired Inflow Forecast

	Forecast Probability of Exceedance using blending				
	90%	**75**%	**50**%	**25**%	**10**%
Blending Ratio	20/80				
Hybrid Unimpaired Inflow Forecast (TAF)	584	741	1,057	1,607	2,169

This 20/80 blending is chosen based on the historic performance of the DWR and NWS forecasts at this time of the year, the accuracy of these forecasts in predicting monthly runoff over the recent months, the overall climate outlook for the remaining wet season, and other forecast

performance factors. NASA Airborne Snow Observatory (ASO) data was not yet available at the time of this allocation. At this early stage in the evolution of 2018 runoff, there is a substantial amount of uncertainty in the precipitation that may fall in the remaining winter and spring. There is additional uncertainty in the volume of the existing snowpack, and what fraction of that volume may result in runoff. Actual rainfall and snowfall over the remaining month of January through mid-February is likely to substantially affect the DWR and NWS forecasts before the next Restoration Allocation, and the pending availability of NASA ASO data will have a strong bearing on future blending of these forecasts.

Rainfall and snowfall accumulation so far this season have been well below normal. However, due to the residual moisture and runoff associated with the very wet 2017 water year, observed runoff was tracking near normal earlier in the autumn and has been gradually declining since. One method for tracking the performance of the hybrid forecast is to plot observed Unimpaired Inflow against a 30-year average Unimpaired Inflow curve scaled to the 2018 water year hybrid forecast. Such a plot is presented in Figure 2, and shows the trace of the observed runoff tracking slightly above the scaled 75% exceedance hybrid forecast (the same forecast exceedance used for the Restoration Allocation — see next section). As one can see from the plot, observed runoff is tracking above the expected runoff for a 75% exceedance forecasting. This provides some degree of confidence in the current Restoration Allocation, although given how early it is in the water year, there are substantial unknown factors in the coming months that will affect the final water year outcome.

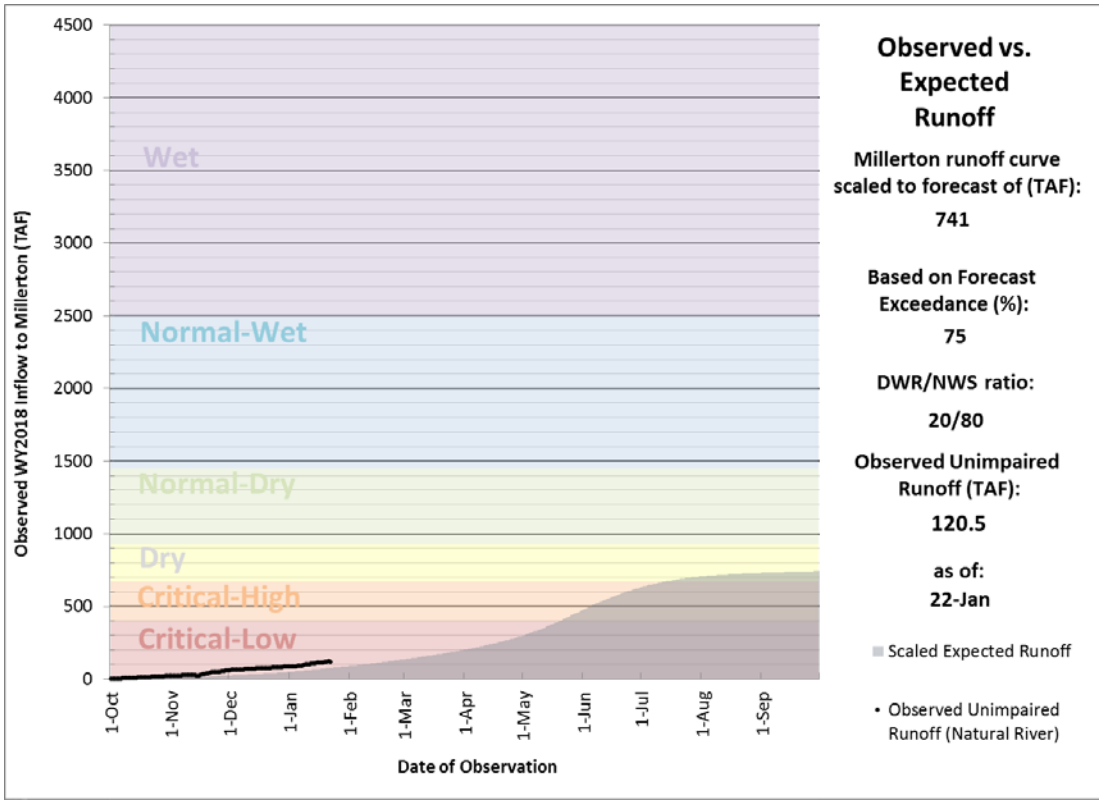

Figure 2 — Observed Unimpaired Inflow trace shown with average Unimpaired Inflow curve scaled to the hybrid forecast value

Restoration Allocation

As per the current Guidelines, the 75% exceedance forecast is used for the allocation under current hydrologic conditions to set the Restoration Flow Allocation. Table 3 below, from the Guidelines version 2.0, depicts the progression of forecast exceedance used to set the Restoration Allocation.

Table 3 — Guidance on Percent Exceedance Forecast to Use for Allocation

		Date of Allocation Issuance					
	Value (TAF)	**January**	**February**	**March**	**April**	**May**	**June**
If the 50% forecast is:	Above 2200	50	50	50	50	50	50
	1100 to 2200	75	75	50	50	50	50
	900 to 1099	75	75	75	50	50	50
	700 to 899	90	90	75	50	50	50
	500 to 699	90	90	75	50	50	50
	Below 500	90	90	90	90	75	50

Applying the 20/80 forecast blending determined by Reclamation, and using the 75% exceedance forecast dictated by the Guidelines, Reclamation calculates an **Unimpaired Inflow hybrid forecast of 741 TAF** and a **Dry Water Year Type**. This provides a **Restoration Allocation of 171.178 Thousand Acre-Feet (TAF)** as measured at Gravelly Ford (GRF). Combined with Holding Contracts on the San Joaquin River, this equates to a **Friant Dam Release of 288.124 TAF**. Future updates to these forecasts and their blending will alter the Restoration Allocation multiple times before it is finalized at the end of June. Other hypothetical allocations are presented in Table 4 as grayed values, and indicate the range of probable forecasts and the resultant Restoration Allocation.

Table 4 — SJRRP Water Year Type and Allocation for 2018 Restoration Year Shown with Other Hypothetical Values in Gray

	Forecast Probability of Exceedance using proposed blending				
	90%	**75%**	50%	25%	10%
Hybrid Unimpaired Inflow Forecast (TAF)	584	**741**	1,057	1,607	2,169
Water Year Type	Critical-High	**Dry**	Normal-Dry	Normal-Wet	Normal-Wet
Restoration Allocation at GRF (TAF)	70.919	**171.178**	230.481	305.349	384.083
Friant Dam Flow Releases (TAF)	187.785	**288.124**	347.396	422.295	501.028

Reclamation will issue updates to the Restoration Allocation based on changing hydrology as needed through the coming months and will finalize the allocation based on the hydrologic conditions present on June 30th. Thus the Restoration Allocation may increase or decrease, potentially substantially, over this period of time.

Default Flow Schedule

The Default Flow Schedule, known as Exhibit B in the Settlement, identifies how Reclamation will schedule the Restoration Allocation for the current Water Year Type and Unimpaired Inflow volume absent a recommendation from the Restoration Administrator. The Guidelines provide detail on how a Default Flow Schedule is derived from the allocation volume. This approved method of distributing water throughout the year is referred to as "Method 3.1 with the gamma pathway."

Exhibit B Method 3.1 Default Hydrograph

Table 5a shows the Exhibit B Method 3.1 default hydrograph flows and corresponding Restoration Allocation volumes for the entire year absent channel capacity constraints, including total releases from Friant Dam and Restoration Flows releases in excess of Holding Contracts.

Table 5b shows the Exhibit B Method 3.1 default hydrograph volumes with operational constraints, primarily controlled by a 1,210 cfs channel constraint in Reach 2B. This default hydrograph depicted in Table 5b will be implemented in the absence of a specific recommendation by the Restoration Administrator. Due to levee stability related channel capacity constraints in Reach 2B that constrain Friant Dam releases, a Restoration Flow volume of **0 TAF** is generated that is not scheduled in the constrained Default Flow Schedule and would become Unreleased Restoration Flows (URFs) under the default hydrograph. This is an estimated volume of water, actual URF volumes will depend on the Restoration Administrator Recommendation and real-time assessment of groundwater seepage channel constraints.

Table 5a — Default Hydrograph

Flow Period	Flow (cfs)				Volume (TAF)	
	Friant Dam Release	Holding Contracts[8]	Flow Target at GRF	Restoration Flow at GRF	Friant Dam Release	Restoration Flow at GRF
Mar 1 – Mar 15	500	130	375	370	14.876	11.008
Mar 16 – Mar 31	1500	130	1375	1370	47.603	43.478
Apr 1 – Apr 15	350	150	205	200	10.413	5.950
Apr 16 – Apr 30	350	150	205	200	10.413	5.950
May 1 – Jun 30 [9]	333	190	148	143	40.250	17.261
Jul 1 – Aug 31	260	230	35	30	31.974	3.689
Sep 1 – Sep 30	350	210	145	140	20.826	8.331
Oct 1 – Oct 31	350	160	195	190	21.521	11.683
Nov 1 – Nov 6	700	130	575	570	8.331	6.783
Nov 7 – Nov 10	700	130	575	570	5.554	4.522
Nov 11 – Dec 31	350	120	235	230	35.405	23.266
Jan 1 – Feb 28	350	100	255	250	40.959	29.256
				Totals	**288.124**	**171.178**

Table 5b — Default Hydrograph with Channel Constraints

Flow Period	Flow (cfs)				Volume (TAF)		
	Friant Dam Release	Holding Contracts [7]	Flow Target at GRF	Restoration Flow at GRF	Friant Dam Release	Restoration Flow at GRF	URF [8]
Mar 1 – Mar 15	500	130	375	370	14.876	11.008	0
Mar 16 – Mar 31	1500	130	1375	1370	47.603	43.478	0
Apr 1 – Apr 15	350	150	205	200	10.413	5.950	0
Apr 16 – Apr 30	350	150	205	200	10.413	5.950	0
May 1 – Jun 30 [9]	333	190	148	143	40.250	17.261	0
Jul 1 – Aug 31	260	230	35	30	31.974	3.689	0
Sep 1 – Sep 30	350	210	145	140	20.826	8.331	0
Oct 1 – Oct 31	350	160	195	190	21.521	11.683	0
Nov 1 – Nov 6	700	130	575	570	8.331	6.783	0
Nov 7 – Nov 10	700	130	575	570	5.554	4.522	0
Nov 11 – Dec 31	350	120	235	230	35.405	23.266	0
Jan 1 – Feb 28	350	100	255	250	40.959	29.256	0
				Totals	**288.124**	**171.178**	**0** [8]

[7] In recent years, Holding Contract demands have been higher than assumed under Exhibit B of the Settlement, in which case, flows at Friant are increased to achieve the Gravelly Ford Flow Target.

[8] This estimate of URF volume is based solely on Reach 2B channel capacity. Other flow and seepage constraints throughout the restoration area may result in higher actual URFs and is dependent on the Restoration Administrator's recommendation.

[9] Riparian Recruitment releases in Wet Water Year Types are included in the May 1 – June 30 flow period

Exhibit B Restoration Flow Budget

Table 6 shows the components of the restoration budget for March 1, 2018, through February 28, 2019 (i.e. the Restoration Year). The base flow allocation, spring flexible flow, fall flexible flow, and riparian recruitment flow reflect the Exhibit B hydrograph for the Restoration Allocation. The estimated total release at Friant Dam consists of 116,945 acre-feet release for Holding Contracts in addition to the Restoration Flows as measured at Gravelly Ford (GRF). The volume for Restoration Flows as well as various accounting flow components may change with any subsequent Restoration Allocation.

Table 6 — Restoration Budget with Flow Accounts

Flow Period	Holding Contract Demand [10] (TAF)	Restoration Flow Accounting Volumes (TAF)						
		Spring Flexible Flow	Summer Base Flow	Fall Flexible Flow	Winter Base Flow	Riparian Recruit-ment Flow	Buffer Flow	Flexible Buffer Flow
Mar 1 – Mar 15	3.868	11.008	–	–	–	-–	1.488	–
Mar 16 – Mar 31	4.126	43.478	–	–	–	–	4.760	–
Apr 1 – Apr 15	4.463	5.950	–	–	–	–	1.041	–
Apr 16 – Apr 30	4.463	5.950	–	–	–	–	1.041	–
May 1 – May 28	10.552	0	7.942	–	–	0 within 60-90 days of flushing flow	4.025	Of which 5.000 may be applied Mar 1–May 1, or Oct 1–Nov 30
May 29 – Jun 30	12.436	–	9.319	–	–			
Jul 1 – Aug 31	28.284	–	3.689	–	–		3.197	
Sep 1 – Sep 30	12.496	–	8.331	0	–	–	2.083	
Oct 1 – Oct 31	9.838	–	–	11.683	–	–	2.152	Of which 7.081 may be applied Sep 3–Dec 28
Nov 1 – Nov 6	1.547	–	–	6.783	–	–	0.833	
Nov 7 – Nov 10	1.031	–	–	4.522	–	–	0.555	
Nov 11 – Nov 30	4.760	–	–	9.124	–	–	1.388	
Dec 1 – Dec 31	7.379	–	–	0	14.142	–	2.152	
Jan 1 – Jan 31	6.149	–	–	–	15.372	–	2.152	–
Feb 1 – Feb 28	5.554	0	–	–	13.884	–	1.944	–
	116.946 [10]	**66.387**	**29.281**	**32.112**	**43.398**	**0**	**28.811**	
		171.178 (Restoration Flow Volume)						
		288.124 [10] (Friant Dam Release Volume)						

[10] In recent years, Holding Contract demands have been higher than assumed under Exhibit B of the Settlement, in which case, flows at Friant Dam are increased to achieve the Gravelly Ford Flow Target, and associated Friant Dam Release Volume is greater.

Remaining Flexible Flow Volume

The amount of water remaining for flexible flow scheduling is the volume of flexible flow water released from Friant Dam in excess of releases required to meet Holding Contract demands, less past releases. Table 7 tracks these balances. The released to date volumes are derived from QA/QC daily average data when available, and partly from provisional data posted to CDEC, and thus may have future adjustments. This may affect the remaining flow volume as well.

Table 7 — Estimated Flexible Flow Volume Remaining and Released to Date

Flow Account	Yearly Allocation [11] (TAF)	Released to Date [12] (TAF)	Remaining Flow Volume [12,13] (TAF)
Spring Period (Mar 1 – Apr 30)	66.387	0	66.387
Riparian Recruitment	0	0	0
Summer Base Flows (May 1 – Sep 30)	29.281	0	29.281
Fall Period (Oct 1 – Nov 30)	32.112	0	32.112
Winter Base Flows (Dec 1 – Feb 28)	43.398	0	43.398
Buffer Flows	28.811	0	28.811
Unreleased Restoration Flows	—	0	0
Purchased Water	—	0	0
	Total:	**0**	

[11] These Flow Volumes assume no channel constraints, as measured at Gravelly Ford

[12] As of 1/23/2018.

[13] Restoration Flow Guidelines limit the application of the calculated Remaining Flow Volume to certain times, and thus all of this volume may not be available for use.

[14] This volume of Restoration Flows was met by flood flows

Operational Constraints

Operating criteria, such as channel conveyance capacity, ramping rate constraints, scheduled maintenance, reservoir storage, contractual obligations, and downstream seepage concerns, may restrict the release of Restoration Flows. Table 8 summarizes known 2018 operational constraints.

Table 8 — Summary of Operational Constraints

Constraint	Period	Flow Limitation
Levee Stability	Currently in effect	1,210 cfs in Reach 2B
	Currently in effect	580 – 1,070 cfs in Eastside Bypass
Channel Conveyance / Seepage Limitation	Currently in effect	Approximately 300 cfs below Sack Dam / Reach 4A

The 2018 Restoration Year Channel Capacity Report identifies a maximum flow in Reach 2B of 1,210 cfs. This results in a maximum release from Friant Dam between 1,390 cfs and 1,550 cfs depending on the time of year. The 2018 Restoration Year Channel Capacity Report also identifies a maximum flow in the Middle Eastside Bypass of 580 to 1,070 cfs, depending on the configuration of the weirs at the Merced National Wildlife Refuge. Reclamation will coordinate with the Restoration Administrator through the biweekly Flow Scheduling conference calls and on an as-needed basis to update these constraints.

In addition, flows are limited to approximately 300 cfs below Sack Dam into Reach 4A due to groundwater seepage constraints as per the current Seepage Management Plan. The exact flow rate which can be accommodated through Reach 4A is dependent on groundwater levels and will be determined through Flow Bench Evaluations. Flows are expected to be constrained to approximately 300 cfs through the spring period below Sack Dam, with the possibility of approximately 500 cfs below Sack Dam in Spring 2018 if additional seepage easements are obtained. If flows must be reduced at Sack Dam as compared to upstream flow rates, Reclamation will make arrangements to capture excess Restoration Flows at approved points of rediversion such as Mendota Pool, upstream of Sack Dam.

Reclamation will complete a Flow Bench Evaluation prior to any scheduled flow increases at or below Gravelly Ford to verify the scheduled increase is not anticipated to cause groundwater levels to rise above thresholds. Should the requested flow increase trigger projected groundwater level rises above seepage thresholds, Reclamation will inform the Restoration Administrator of the current constraint, and adjust releases accordingly.

Appendix A: Abbreviations, Acronyms, and Glossary

af	acre–feet
CALSIM	California Statewide Integrated Model
CCID	Central California Irrigation District
CDEC	California Data Exchange Center
cfs	cubic feet per second
CVP	Central Valley Project
Delta	Sacramento–San Joaquin Delta
DWR	California Department of Water Resources
ESP	Ensemble Streamflow Prediction
Exhibit B	Exhibit B of the Settlement depicting Default Flow Schedules
GRF	Gravelly Ford Flow Gauge
Guidelines	Restoration Flow Guidelines
LSJLD	Lower San Joaquin Levee District
NWS	National Weather Service
QA/QC	Quality Assurance/Quality Control (i.e. finalized)
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Restoration Year	the cycle of Restoration Flows, March 1 through February 28/29
RWA	SJRRP Reclaimed Water Account
Secretary	U.S. Secretary of the Interior
Settlement	Stipulation of Settlement in *NRDC, et al., v. Kirk Rodgers, et al.*
SJREC	San Joaquin River Exchange Contractors
SJRRP	San Joaquin River Restoration Program
SLCC	San Luis Canal Company
TAF	thousand acre–feet
URF	Unreleased Restoration Flows
WSI	DWR Water Supply Index
WY	water year, October 1 through September 30

Appendix B: History of Millerton Unimpaired Inflow

Table B — Water Year Totals in Thousand Acre-Feet

Water Year [1]	Unimpaired Inflow [2] (Natural River)	SJRRP Water Year Type [3]
1931	480.2	Critical-High
1932	2,047.4	Normal-Wet
1933	1,111.4	Normal-Dry
1934	691.5	Dry
1935	1,923.2	Normal-Wet
1936	1,853.3	Normal-Wet
1937	2,208.0	Normal-Wet
1938	3,688.4	Wet
1939	920.8	Dry
1940	1,880.6	Normal-Wet
1941	2,652.5	Wet
1942	2,254.0	Normal-Wet
1943	2,053.7	Normal-Wet
1944	1,265.4	Normal-Dry
1945	2,134.633	Normal-Wet
1946	1,727.115	Normal-Wet
1947	1,121.564	Normal-Dry
1948	1,201.390	Normal-Dry
1949	1,167.008	Normal-Dry
1950	1,317.457	Normal-Dry
1951	1,827.254	Normal-Wet
1952	2,840.854	Wet
1953	1,226.830	Normal-Dry
1954	1,313.993	Normal-Dry
1955	1,161.161	Normal-Dry
1956	2,959.812	Wet
1957	1,326.573	Normal-Dry
1958	2,631.392	Wet
1959	949.456	Normal-Dry
1960	826.021	Dry
1961	647.428	Critical-High
1962	1,924.066	Normal-Wet
1963	1,945.266	Normal-Wet
1964	922.351	Dry
1965	2,271.191	Normal-Wet
1966	1,298.792	Normal-Dry
1967	3,233.097	Wet
1968	861.894	Dry
1969	4,040.864	Wet
1970	1,445.837	Normal-Dry
1971	1,416.812	Normal-Dry
1972	1,039.249	Normal-Dry
1973	2,047.585	Normal-Wet
1974	2,190.308	Normal-Wet
1975	1,795.922	Normal-Wet
1976	629.234	Critical-High
1977	361.253	Critical-Low
1978	3,402.805	Wet
1979	1,829.988	Normal-Wet
1980	2,973.169	Wet
1981	1,067.757	Normal-Dry
1982	3,317.171	Wet
1983	4,643.090	Wet
1984	2,042.750	Normal-Wet
1985	1,135.975	Normal-Dry
1986	3,031.600	Wet
1987	756.853	Dry
1988	862.124	Dry
1989	939.168	Normal-Dry
1990	742.824	Dry
1991	1,027.209	Normal-Dry
1992	807.759	Dry
1993	2,672.322	Wet
1994	824.097	Dry
1995	3,876.370	Wet
1996	2,200.707	Normal-Wet
1997	2,817.670	Wet
1998	3,160.759	Wet
1999	1,527.040	Normal-Wet
2000	1,735.653	Normal-Wet
2001	1,065.318	Normal-Dry
2002	1,171.457	Normal-Dry
2003	1,449.954	Normal-Dry
2004	1,130.823	Normal-Dry
2005	2,826.872	Wet
2006	3,180.816	Wet
2007	684.333	Dry
2008	1,116.790	Normal-Dry
2009	1,455.379	Normal-Wet
2010	2,028.706	Normal-Wet
2011	3,304.824	Wet
2012	831.582	Dry
2013	856.626	Dry
2014	509.579	Critical-High
2015	327.410	Critical-Low
2016	1,300.986	Normal-Dry
2017	4,395.400	Wet

[1] Water year is from Oct 1 through Sept 30, for example the 2010 water year began Oct 1, 2009.

[2] Also known as “Natural River” or “Unimpaired Inflow into Millerton” – This is the total runoff that would flow into Millerton Lake if there were no dams or diversions upstream. There was a lower level of precision prior to 1945.

[3] The six SJRRP Water Year Types are based on unimpaired inflow. Critical-Low= <400 TAF, Critical-High=400-669.999 TAF, Dry= 670-929.999 TAF, Normal-Dry 930-1449.999, Normal-Wet 1450-2500, Wet>2500

Appendix C: Previous Year (2016) Flow Accounting

Table C-1 — Restoration Flow Accounting and Unreleased Restoration Flows excluding Restoration Flows met by flood flows, Unreleased Restoration Flows lost to flood spill, and Holding Contracts during flood flows. For the period February, 2016 through February, 2017.

Flow Period	Holding Contract Demand (TAF)	Released Restoration Flow Volumes (TAF)							URFs (TAF)
		Spring Flexible Flow	Summer Base Flow	Fall Flexible Flow	Winter Base Flow	Riparian Recruit-ment Flow	Buffer Flow	Flexible Buffer Flow	
Feb 1 – Feb 15	–	0	–	–	–	–	–	–	–
Feb16 – Feb 29	5.939	1.835	–	–	–	–	–	–	–
Mar 1 – Mar 15	1.607	2.521	–	–	–	–	0	–	–
Mar 16 – Mar 31	3.735	2.541	–	–	–	–	0	–	–
Apr 1 – Apr 15	4.852	3.834	–	–	–	–	0	–	–
Apr 16 – Apr 30	6.488	2.555	–	–	–	–	0	–	–
May 1 – May 28	12.891	0	5.080	–	–	0	0	0	89.473
May 29 – Jun 30	15.087	–	5.413	–	–				4.696
Jul 1 – Aug 31	32.658	–	18.260	–	–		0		19.999
Sep 1 – Sep 30	13.140	–	11.925	0	–	–	0		24.421
Oct 1 – Oct 31	13.314	–	–	11.044	–	–	0	0	6.546
Nov 1 – Nov 6	2.017	–	–	3.037	–	–	0		–
Nov 7 – Nov 10	1.805	–	–	1.484	–	–	0		–
Nov 11 – Nov 30	5.988	–	–	5.915	–	–	0		–
Dec 1 – Dec 31	9.854	–	–	0	3.435	–	0		7.105
Jan 1 – Jan 31	1.922	–	–	–	0.438	–	0	–	–
Feb 1 – Feb 28	0	0	–	–	0	–	0	–	–
	131.297	**13.285**	**40.677**	**21.479**	**3.873**	**0**	**0.000**		**152.240**
		79.315							
		79.315							
		231.555							
	362.852								

Table C-2 — Restoration Flow Accounting and Unreleased Restoration Flows including Restoration Flows met by flood flows, Unreleased Restoration Flows lost to flood spill, and Holding Contracts during flood flows. For the period February, 2016 through February, 2017.

Flow Period	Holding Contract Demand (TAF)	Released Restoration Flow Volumes (TAF)							URFs (TAF)
		Spring Flexible Flow	Summer Base Flow	Fall Flexible Flow	Winter Base Flow	Riparian Recruit-ment Flow	Buffer Flow	Flexible Buffer Flow	
Feb 1 – Feb 15	–	0	–	–	–	–	–	–	–
Feb16 – Feb 29	5.939	1.835	–	–	–	–	–	–	–
Mar 1 – Mar 15	1.607	2.521	–	–	–	–	0	–	–
Mar 16 – Mar 31	3.735	2.541	–	–	–	–	0	–	–
Apr 1 – Apr 15	4.852	3.834	–	–	–	–	0	–	–
Apr 16 – Apr 30	6.488	2.555	–	–	–	–	0	–	–
May 1 – May 28	12.891	0	5.080	–	–	0	0	0	89.473
May 29 – Jun 30	15.087	–	5.413	–	–				4.696
Jul 1 – Aug 31	32.658	–	18.260	–	–		0		19.999
Sep 1 – Sep 30	13.140	–	11.925	0	–	–	0		24.421
Oct 1 – Oct 31	13.314	–	–	11.044	–	–	0	0	6.546
Nov 1 – Nov 6	2.017	–	–	3.037	–	–	0		–
Nov 7 – Nov 10	1.805	–	–	1.484	–	–	0		–
Nov 11 – Nov 30	5.988	–	–	5.915	–	–	0		–
Dec 1 – Dec 31	9.854	–	–	0	3.435	–	0		7.105
Jan 1 – Jan 31	24.466	–	–	–	9.866	–	0	–	–
Feb 1 – Feb 28	9.634	–	–	–	13.885	–	0	–	8.428
	162.475	**13.285**	**40.677**	**21.479**	**27.186**	**0**	**0.000**		**160.668**
		102.627							
		102.627							
		263.295							
	426.770								