SAN JOAQUIN RIVER RESTORATION PROGRAM

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Allocation and Default Flow Schedule

Effective May 17, 2013

1.0 Introduction

The following text transmits the allocation and default flow schedule to the Restoration Administrator for the San Joaquin River Restoration Program (SJRRP), effective May 17, 2013 and consistent with the Restoration Flow Guidelines Paragraph 13(j)(i). This allocation and default flow schedule provides the following information:

- Forecasted Unimpaired Runoff: estimated flows that would occur absent regulation on the river.
- Hydrograph Volumes: annual allocation hydrograph based on water year unimpaired inflow, utilizing the Method 3.1 with the Gamma pathway agreed to by the Parties in December 2008 and included in the draft Restoration Flow Guidelines.
- Flow targets at Gravelly Ford: flows at the head of Reach 2 based on scheduled releases from Friant Dam less the assumed riparian demand and losses in Exhibit B.
- Restoration budget: volumes for the annual allocation, Spring flexible flow, base flow, riparian recruitment, and Fall flexible flow periods after channel capacity constraints.
- 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.

2.0 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 USBR, Friant Division estimate of unimpaired flow to support water supply allocation;
- The Department of Water Resources (DWR) Water Supply Index forecast latest update on May 14, 2013 for Water Year 2013 San Joaquin River inflow to Millerton Lake Unimpaired Flow[1];
- The National Weather Service (NWS) Raw ESP Water Supply Forecast (Water Year 2013) for the San Joaquin River at Millerton Lake[2];

Table 1 shows the 2013 San Joaquin River water year forecast breakdown at Millerton Lake. The latest DWR forecast was based on May 14, 2013 information while the NWS forecast was updated on May 16, 2013. Both of these forecasts included about 630 TAF of observed inflow to Millerton Lake.

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

Forecast Source	90%	50%	10%
DWR, January 1, 2013	1,020 TAF	1,690 TAF	2,820 TAF
NWS, January 14, 2013	1,017 TAF	1,540 TAF	2,908 TAF
DWR, February 1, 2013	1,060 TAF	1,580 TAF	2,600 TAF
DWR, March 1, 2013	850 TAF	1,190 TAF	1,890 TAF
NWS, March 8, 2013	911 TAF	1,119 TAF	1,871 TAF
DWR, April 1, 2013	750 TAF	955 TAF	1,330 TAF
NWS, April 8, 2013	867 TAF	964 TAF	1,187 TAF
DWR, April 23, 2013	710 TAF	885 TAF	1,140 TAF
NWS, April 26, 2013	861 TAF	902 TAF	1,060 TAF
DWR, May 1, 2013	665 TAF	825 TAF	1010 TAF
NWS, May 8, 2013	876 TAF	914 TAF	1006 TAF

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

[2] http://www.cnrfc.noaa.gov/rawESP_WY.php?id=FRAC1

Forecast Source	90%	50%	10%
DWR, May 14, 2013	**755 TAF**	835 TAF	970 TAF
NWS, May 16, 2013	857 TAF	884 TAF	939 TAF

TAF= Thousand acre-feet

A forecast of Critical-High or wetter provides for full exercise of flow flexibility by the Restoration Administrator. The May 14, 2013 Forecast of Unimpaired Runoff for Water Year 2013 (DWR) shows a 90% probability of at least **755 thousand acre-feet (TAF)**, resulting in a **Dry Year** hydrograph for the SJRRP.

3.0 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 Riparian Holding Contracts.

Table 2—Exhibit B Method 3.1 Hydrograph Volumes

Flow Period	Default Releases from Friant Dam (cfs)	Flows Targets at Gravelly Ford (cfs)	SJRRP Flows at Gravelly Ford (cfs)	Release Volume from Friant Dam for the SJRRP at Gravelly Ford (af)
Mar 1 - Mar 15	500	375	370	11,008
Mar 16 - Mar 31	1,500	1,375	1,370	43,478
Apr 1 - Apr 15	350	205	200	5,950
Apr 16 - Apr 30	350	205	200	5,950
May 1 - Jun 30	350	165	160	19,359
Jul 1 - Aug 31	268	43	38	4,716
Sept 1 - Sept 30	350	145	140	8,331
Oct 1 - Oct 31	350	195	190	11,683
Nov 1 - Nov 6	700	575	570	6,783
Nov 7 - Nov 10	700	575	570	4,522
Nov 11 - Dec 31	350	235	230	23,266
Jan 1 - Feb 28	350	255	250	29,256
				Total=174,303

cfs = cubic feet per second, af = acre-feet

4.0 Restoration Budget

Table 3 shows the components of the restoration budget for March 1, 2013 through February 28, 2014. There are no riparian recruitment flows as the restoration year type is Dry. The estimated total flow volume for restoration is 174,303 acre-feet. Because a continuous allocation method is used, the total flow volume for restoration as well as various accounting components for the same restoration non-critical year type will change with an updated unimpaired flow forecast.

Table 3 – Restoration Budget with Flow Accounts

Schedule Start	Friant Default Flow (cfs)	Friant Capacity Constraint (cfs)	Friant Interim Flow (cfs)	Gravelly Ford Flow Targets (cfs)	Assumed Riparian Demand (cfs)	Base Flow (af)	Spring Flexible Flow (af)	Fall Flexible Flow (af)	Riparian Recruitment Flow (af)
Mar. 1	500	1,500	500	375	130		11,008		
Mar. 16	1,500	1,500	1,500	1,375	130		43,479		
Apr. 1	350	1,500	350	205	150		5,950		
Apr. 16	350	1,500	350	205	150		5,950		
May. 1	350	1,500	350	165	190	10,790	8,569		0
Jul. 1	268	1,500	268	43	230	4,716			
Sep. 1	350	1,500	350	145	210	8,331			
Oct. 1	350	1,500	350	195	160	11,683			
Nov. 1	700	1,500	700	575	130			6,783	
Nov. 7	700	1,500	700	575	130			4,523	
Nov. 11	350	1,500	350	235	120	23,266			
Jan. 1	350	1,500	350	255	100	15,372			
Feb. 1	350	1,500	350	255	100	13,884			
					Total=	88,042	74,956	11,306	0

cfs = cubic feet per second af = acre-feet

Levee stability constraints at Reach 2B restrict local flows to 810 cfs, corresponding to an estimated release from Friant Dam of about 1,040 cfs for March, 1,060 cfs for April, 1,100 cfs for May-June, and 1,140 cfs in July, based on the Exhibit B riparian demand and MEI flow loss curves. Consistent with the March 25, 2010 memo on the exercise of flexibility during Interim Flows, the Friant capacity is set to 1,500 cfs for computing volumes. Field conditions may limit the physical release from Friant Dam to rates less than the monthly rates mentioned above, based on real-time data collection and flow bench evaluations.

5.0 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. About 65,056 acre-feet of Interim Flow has been released up to May 16, 2013. Approximately 9,900 acre-feet of flow needs to be released during May 17 through May 28 from the budgeted Spring Pulse volume including base flows from May 1 – May 28 (74,956 acre-feet).

Table 4 – Estimated Flexible Flow Volume Remaining

Flow Account	Yearly Allocation (af)	Release up to May 16, 2013 (af)	Remaining Flow Volume (af)
Spring Flexible Flow+ Base Flow (March 1-May 28, 2013)	74,956	65,056	9,900
Riparian Recruitment	0	0	0
Fall Flexible Flow	11,306	0	11,306
Total Restoration Flow Volume	174,303	65,056	109,247

af = acre-feet

6.0 Operational Constraints

Operating criteria such as channel conveyance capacity, ramping rate constraints, scheduled maintenance, and downstream seepage concerns, may restrict the release of Interim Flows. Seepage management constraints may limit the release of Interim Flows at Friant Dam and below Mendota Dam. Reclamation will re-regulate flows at Mendota Dam to the extent that real-time water supply demands provide the ability to divert Interim Flows. The best available information on constraints at the time of this allocation include:

- Reach 2A: 1,060 cfs based on Levee Stability
- Reach 2B: 810 cfs local flow based Levee Stability
- Mendota Pool Demand: 940-1209 cfs for the month of May to date
- Reaches 4-5: 0.0 cfs based on existing groundwater levels above thresholds

At this time, channel capacity constraints releases from Friant Dam to less than 1,040 cfs for March, and 1,060 cfs for April. Reclamation will coordinate with the Restoration Administrator through the weekly Flow Scheduling Subgroup conference calls and on an as-needed basis to facilitate Interim Flow release from Friant Dam.

7.0 Default Flow Schedule

The Default Flow Schedule identifies how Reclamation will schedule the restoration allocation in the absence of a recommendation from the Restoration Administrator, consistent with the Settlement. Although the Interim Flow schedule provides for up to 1,500 cfs release for determining volumes, the Friant Dam release will be restricted to 1,040 cfs to 1,100 cfs to provide levee stability for Reach 2A and Reach 2B and seepage protection in downstream reaches. Reclamation developed a default schedule (March 1- May 16, 2013) based on the previous RA recommended schedule; available restoration allocation was distributed in such a way to accommodate various studies to collect relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture and reuse (Table 5). The default schedule from May 17 onwards is based on the Exhibit B hydrograph for the Dry Year Type using the latest DWR's Bulletin 120 Water Supply update (May 14, 2013). Subsequent default schedules will be derived from new flow forecasts and will be modified based on the Interim Flow released up to that time.

Table 5 – Default Flow Schedule

Date	Flow
Mar 1 – Mar 21	350 cfs
Mar 22 –Mar 27	650 cfs
Mar 28 – Apr 3	600 cfs
Apr 4 – Apr 11	700 cfs
Apr 12 – Apr 30	1,060 cfs
May 1 – May 1	900 cfs
May 2 – May 2	700 cfs
May 3 – May 3	500 cfs
May 4 – May 4	350 cfs
May 5 –May 14	275 cfs
May 15 - May 16	295 cfs
May 17 – May 28	450 cfs
May 29 – Jun 30	350 cfs
Jul 1 – Aug 31	268 cfs
Sep 1 –Sep 30	350 cfs
Oct 1 – Oct 31	350 cfs
Nov 1 – Nov 10	700 cfs
Nov 11 – Dec 31	350 cfs
Jan 1 – Feb 28	350 cfs
cfs = cubic feet per second	

8.0 Additional Flow Schedules

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

Table 6 – Additional Flow Schedule, 10th and 50th Percentile

Flow Period	Flow Schedule, (10th percentile, 970 TAF Unimpaired Inflow, Normal-Dry year), cfs	Flow Schedule, (50th percentile, 835 TAF Unimpaired Inflow, Dry year), cfs
Mar 1 - Mar 15	500	500
Mar 16 - Mar 31	1,500	1,500
Apr 1 - Apr 15	1,500	613
Apr 16 - Apr 30	350	350
May 1 - Jun 30	350	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

cfs = cubic feet per second