Restoration Administrator Flow Recommendation

To: Don Portz, Chad Moore, Emily Thomas, Don Portz
CC: Michael Jackson, Rufino Gonzalez, Doug Obegi, Steve Ottemoeller, Ian Buck-Macleod, TAC
Date: November 15, 2021
From: Tom Johnson, Restoration Administrator
Subject: Revised Recommendation for 2021 Restoration Flows

The following is a Restoration Flow Recommendation by the Restoration Administrator (RA) for the remainder of the 2021 Restoration Year Flows pursuant to the Restoration Flow Guidelines (RFG) Ver. 2.1, as amended, and Exhibit B of the Settlement.

Background

The SJRRP has issued a Final 2021 Restoration Allocation (Allocation) dated June 25, 2021, which designates 2021 as a **Critical-High** Water Year Type with an Unimpaired Inflow hybrid forecast of 529 TAF and provides an allocation of Restoration Flows of 70.919 thousand acre-feet (TAF) as measured at Gravelly Ford (GRF). The Allocation also specified certain contractual and operational constraints on Restoration Flow releases for 2021.

The current approved Restoration Flow Recommendation is dated June 1, 2021, and included several key elements:

1. There have been no Restoration Flows released since June 4, 2021, in order to conserve water and the Millerton Reservoir cold water pool. This has resulted in a disconnection of the San Joaquin River, with Reach 2A, Reach 4A, and middle Eastside Bypass having no Restoration Flows since June.
2. Restoration Flows were scheduled to resume on September 10, 2021, with flow magnitude and volumes sufficient to reconnect the river quickly. However, Restoration Flows have been postponed to a later date to preserve cold water pool and protect spawning/incubating spring-run Chinook salmon.

As of November 1, 23,639 AF of Restoration Flows have been released. As of November 1, the remaining Restoration Flow and URF Exchange water for 2021 totals approximately 57,878 AF. Since early October, an Ad Hoc Flow Recommendation placed a minimum release "floor" of 230 cfs for Friant Dam in the event that riparian holding contract demand dropped below 230 cfs (needed to keep at least 5 cfs at GRF). On October 8, holding contract demand dropped below 230 cfs, and small amounts of Restoration Flows exceeding 5 cfs at GRF began to occur.

Key drivers for Restoration Flow Recommendations are keeping the San Joaquin River connected and flowing throughout the Restoration Area and ensuring appropriate flow and water temperature for key spring-run Chinook Salmon life stages in the Restoration Area. Because 2021 was a Critical-High water year type, there was insufficient water to meet both objectives, thus the recommended cessation of Restoration Flows on June 1. Going forward, objectives will be to continue to manage flows and water

temperatures for key spring-run Chinook Salmon life stages (spawning and egg incubation) and reconnect the river as swiftly as possible once those life stage needs are met.

As was done prior to the June 1 Recommendation, several different Restoration Flow release scenarios have been evaluated to develop a revised Recommendation based on the most recent reservoir and river conditions. Recent Millerton Reservoir water temperature measurements and cold-water pool prediction spreadsheets have been utilized to predict reservoir releases, and HEC-5Q water temperature model output have been utilized to predict instream flow temperatures downstream of Millerton Reservoir under different Restoration Flow release scenarios.

Recent water temperature profiles in Millerton Reservoir have been on a cooling trend, and it is anticipated that sufficient cold water to maintain acceptable river temperatures will be present in the reservoir within a couple of weeks. The next temperature measurement at Millerton Reservoir will be around November 20.

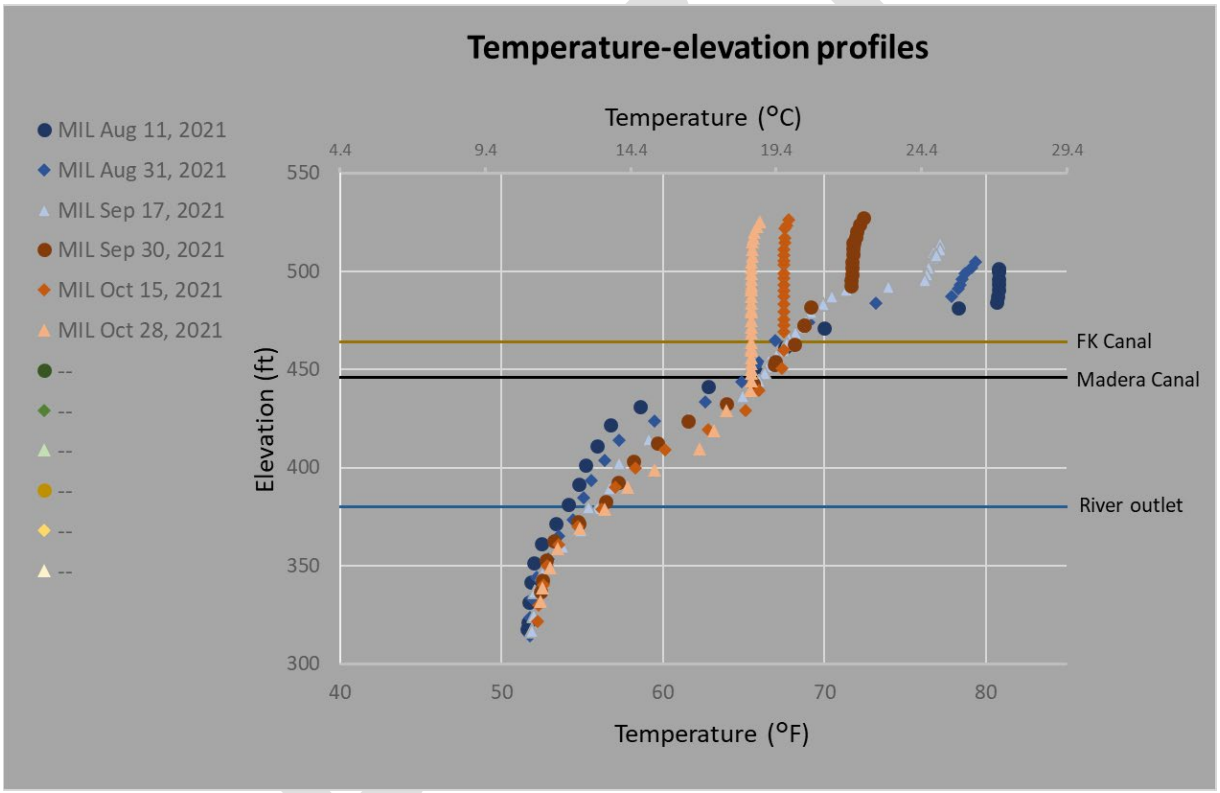
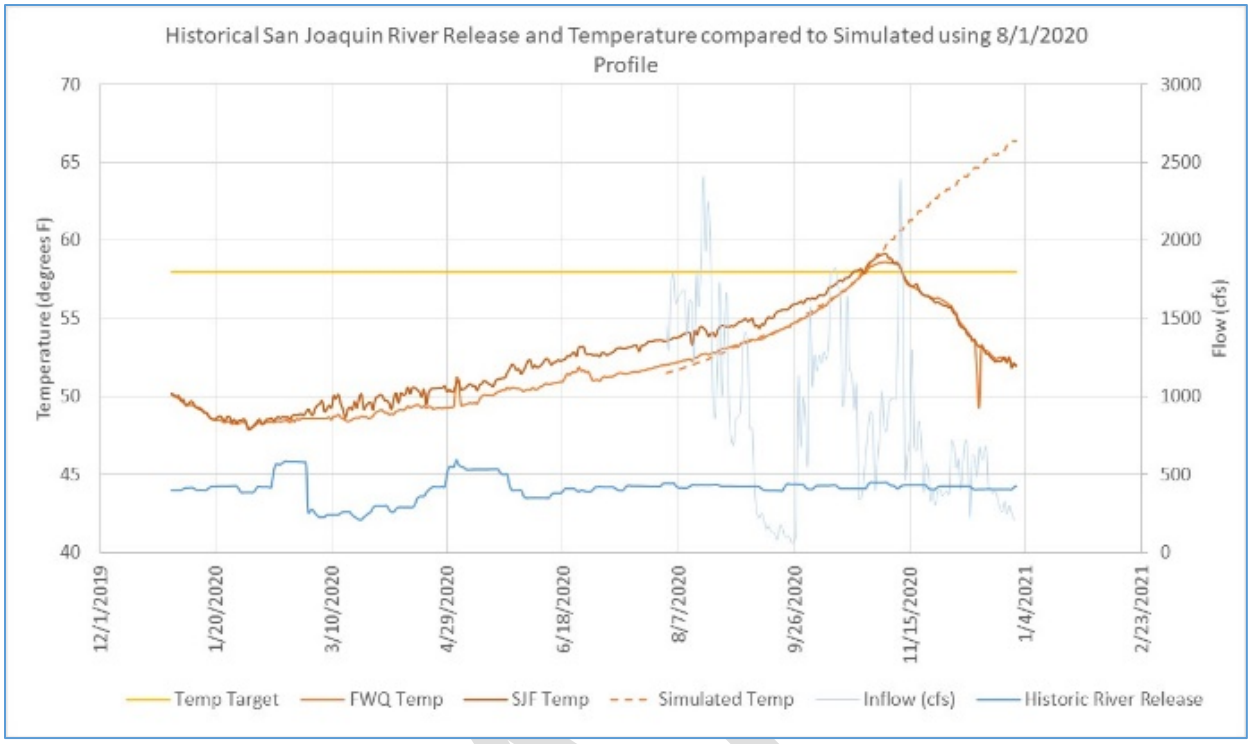
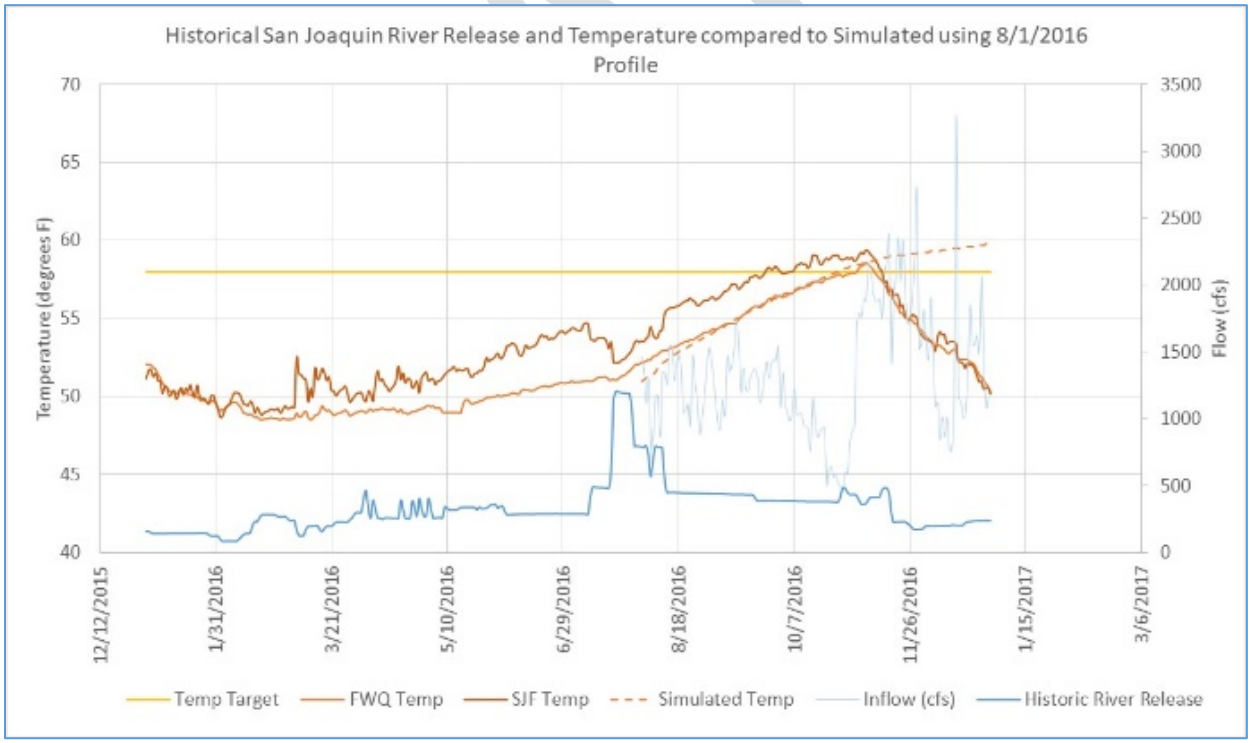


Figure 1- Millerton Reservoir Temperature Traces

Historic Millerton Reservoir release temperature patterns illustrate the timing for when the reservoir tends to transition from warmer releases to cooler releases. In past years, releases from Millerton Reservoir become much cooler sometime in mid-November due to a combination of colder water inflows (September – November releases from SCE and PG&E reservoirs upstream), and the reservoir "turning over" (de-stratifying in response to ambient meteorological conditions). Charts of reservoir release temperatures from 2020 and 2016 showing this process are provided below:





Given the apparent benefits of a continued low flow release (Holding Contracts only), cold water pool has been preserved to date to support spring-run Chinook spawning and egg incubation. With the anticipated

reservoir turnover and cooling of reservoir releases, higher Restoration Flow releases can soon be conducted to reconnect the river while still maintaining adequate water temperatures to support egg incubation. Accordingly, the following specifies an updated Recommendation.

Updated Recommendation for Restoration Year 2021

The following is an updated Restoration Flow Recommendation:

1. Continue to release 230 cfs from *Friant Dam* until November 24. This will allow time to evaluate the next set of water temperature measurements from Millerton Reservoir.
2. As of November 24, maintain a flow of 100 cfs of Restoration Flows (105 total flow) at *Gravelly Ford* (GRF)
3. As of December 1, maintain a flow of 200 cfs of Restoration Flows (205 total flow) at *Gravelly Ford* (GRF)
4. As of December 10, maintain a flow of 300 cfs of Restoration Flows (305 total flow) at *Gravelly Ford* (GRF)
5. As of December 20, increase and maintain a release of 550 cfs at *Friant Dam*
6. As of January 20, 2022, adjust to and maintain a flow of 250 cfs of Restoration Flows (355 total flow) at *Gravelly Ford* (GRF)
7. On February 14 – 16, initiate the flow pulse sequence specified in Table 1. All flows are measured at *Friant Dam*
8. On February 17, 2022, set and maintain a release of 490 cfs at *Friant Dam*
9. On February 21 – 23, initiate the flow pulse sequence specified in Table 2. All flows are measured at *Friant Dam*
10. On February 24, 2022, set and maintain a release of 460 cfs at *Friant Dam*
11. On February 25, 2022, set and maintain a release of 350 cfs at *Friant Dam*

Notes and Comments:

- The change in release target location between Friant Dam and Gravelly Ford is intentional, depending on controlling river condition and/or flow objective. For example, a flow of 550 cfs from *Friant Dam* in December and January provides the maximum flow to achieve river reconnection, while maintaining a safe stage level for scientific work occurring in Reach 1 during that time.
- The precise volume of Restoration Flows released under this schedule is unknown, due to the variable nature of Reach 1 demands and specifying flow releases at Friant Dam. The accompanying flow table (Table 4) provides a reasonable estimate of total Restoration Flow utilization for all dates covered in this updated Recommendation. As necessary, updates to this Recommendation will be made in late January or early February to synchronize remaining Restoration Flow volumes with releases. It is the intent of this and future Recommendations to release all remaining Restoration Year 2021 Restoration volumes to the river prior to February 28, 2022.

Table 1: February 2022 Pulse 1			
Date	Time of Day	Friant Release (cfs)	Avg CFS for day
2/14/2022	7:00:00 AM	525	838.3333
2/14/2022	8:00:00 AM	725	
2/14/2022	9:00:00 AM	925	
2/14/2022	10:00:00 AM	1425	
2/14/2022	11:00:00 AM	1425	
2/14/2022	12:00:00 PM	1425	
2/14/2022	1:00:00 PM	1225	
2/14/2022	2:00:00 PM	1225	
2/14/2022	3:00:00 PM	1225	
2/14/2022	4:00:00 PM	1225	
2/14/2022	5:00:00 PM	725	
2/14/2022	6:00:00 PM	725	
2/14/2022	7:00:00 PM	725	
2/14/2022	8:00:00 PM	725	
2/14/2022	9:00:00 PM	725	
2/14/2022	10:00:00 PM	725	
2/14/2022	11:00:00 PM	725	
2/14/2022	12:00:00 AM	725	
2/15/2022	1:00:00 AM	725	640.625
2/15/2022	2:00:00 AM	725	
2/15/2022	3:00:00 AM	725	
2/15/2022	4:00:00 AM	725	
2/15/2022	5:00:00 AM	725	
2/15/2022	6:00:00 AM	725	
2/15/2022	7:00:00 AM	725	
2/15/2022	8:00:00 AM	650	
2/15/2022	9:00:00 AM	650	
2/15/2022	10:00:00 AM	650	
2/15/2022	11:00:00 AM	650	
2/15/2022	12:00:00 PM	650	
2/15/2022	1:00:00 PM	650	
2/15/2022	2:00:00 PM	650	
2/15/2022	3:00:00 PM	575	
2/15/2022	4:00:00 PM	575	
2/15/2022	5:00:00 PM	575	
2/15/2022	6:00:00 PM	575	
2/15/2022	7:00:00 PM	575	
2/15/2022	8:00:00 PM	575	
2/15/2022	9:00:00 PM	575	
2/15/2022	10:00:00 PM	575	
2/15/2022	11:00:00 PM	575	
2/15/2022	12:00:00 AM	575	
2/16/2022	1:00:00 AM	575	539.5833
2/16/2022	2:00:00 AM	575	
2/16/2022	3:00:00 AM	575	
2/16/2022	4:00:00 AM	575	
2/16/2022	5:00:00 AM	575	
2/16/2022	6:00:00 AM	575	
2/16/2022	7:00:00 AM	575	
2/16/2022	8:00:00 AM	525	
2/16/2022	9:00:00 AM	525	
2/16/2022	10:00:00 AM	525	
2/16/2022	11:00:00 AM	525	
2/16/2022	12:00:00 PM	525	
2/16/2022	1:00:00 PM	525	
2/16/2022	2:00:00 PM	525	
2/16/2022	3:00:00 PM	525	
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2/16/2022	7:00:00 PM	525	
2/16/2022	8:00:00 PM	525	
2/16/2022	9:00:00 PM	525	
2/16/2022	10:00:00 PM	525	
2/16/2022	11:00:00 PM	525	
2/16/2022	12:00:00 AM	525	

Table 2: February 2022 Pulse 2			
Date	Time of Day	Friant Release (cfs)	Avg CFS for day
2/14/2022	7:00:00 AM	525	1150.833
2/14/2022	8:00:00 AM	1025	
2/14/2022	9:00:00 AM	1525	
2/14/2022	10:00:00 AM	2025	
2/14/2022	11:00:00 AM	2025	
2/14/2022	12:00:00 PM	2025	
2/14/2022	1:00:00 PM	1625	
2/14/2022	2:00:00 PM	1625	
2/14/2022	3:00:00 PM	1625	
2/14/2022	4:00:00 PM	1625	
2/14/2022	5:00:00 PM	1125	
2/14/2022	6:00:00 PM	1125	
2/14/2022	7:00:00 PM	1125	
2/14/2022	8:00:00 PM	1125	
2/14/2022	9:00:00 PM	1125	
2/14/2022	10:00:00 PM	1125	
2/14/2022	11:00:00 PM	1125	
2/14/2022	12:00:00 AM	1125	
2/15/2022	1:00:00 AM	1125	870.8333
2/15/2022	2:00:00 AM	1125	
2/15/2022	3:00:00 AM	1125	
2/15/2022	4:00:00 AM	1125	
2/15/2022	5:00:00 AM	1125	
2/15/2022	6:00:00 AM	1125	
2/15/2022	7:00:00 AM	825	
2/15/2022	8:00:00 AM	825	
2/15/2022	9:00:00 AM	825	
2/15/2022	10:00:00 AM	825	
2/15/2022	11:00:00 AM	825	
2/15/2022	12:00:00 PM	825	
2/15/2022	1:00:00 PM	825	
2/15/2022	2:00:00 PM	825	
2/15/2022	3:00:00 PM	825	
2/15/2022	4:00:00 PM	825	
2/15/2022	5:00:00 PM	825	
2/15/2022	6:00:00 PM	725	
2/15/2022	7:00:00 PM	725	
2/15/2022	8:00:00 PM	725	
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2/15/2022	10:00:00 PM	725	
2/15/2022	11:00:00 PM	725	
2/15/2022	12:00:00 AM	725	
2/16/2022	1:00:00 AM	725	616.6667
2/16/2022	2:00:00 AM	725	
2/16/2022	3:00:00 AM	725	
2/16/2022	4:00:00 AM	725	
2/16/2022	5:00:00 AM	725	
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2/16/2022	8:00:00 PM	525	
2/16/2022	9:00:00 PM	525	
2/16/2022	10:00:00 PM	525	
2/16/2022	11:00:00 PM	525	
2/16/2022	12:00:00 AM	525	

Table 3. Summary of Restoration Flow Recommendations for November 1,2021 through February 28, 2022.

Date Range	*Friant Release**	*Restoration Flows at Gravelly Ford*	*Total Flow at Gravelly Ford***	*Target Flow at Sack Dam****
November 1 – November 23, 2021	230 cfs	As occurs	As occurs	0 cfs
From November 24, 2021	As necessary	100 cfs	105 cfs	0 cfs
From December 1, 2021	As necessary	200 cfs	205 cfs	0 cfs
From December 11, 2021	As necessary	300 cfs	305 cfs	0 cfs
From December 20, 2021	550 cfs	As occurs	As occurs	0 cfs
From January 20, 2022	As necessary	250 cfs	355 cfs	285 cfs or less
February 14 – February 16	Pulse 1, releases per Table 1	As occurs	As occurs	285 cfs or less
From February 17, 2022	490 cfs	As occurs	As occurs	285 cfs or less
February 21 – February 23	Pulse 2, releases per Table 2	As occurs	As occurs	285 cfs or less
February 24, 2022	460 cfs	As occurs	As occurs	285 cfs or less
February 25 – Feb 28	350 cfs	As occurs	As occurs	285 cfs or less

**** Estimated releases at Friant Dam are based upon Exhibit B estimates of Riparian/Holding Contract releases and Reach 1 losses. In recent years those required releases have generally been running higher than Exhibit B estimates by 20 to 70+ cfs.***

*****Total Flow includes the minimum Holding Contract flows of 5 cfs required at Gravelly Ford***

******Modest recapture may be necessary at Mendota Pool during the Pulse events***

Additional Consultation

I will continue to coordinate with the TAC, Program Office, and Implementing Agencies to monitor hydrologic conditions, fish population conditions, uncontrolled season releases, operational conditions, and other factors, and will update the Restoration Flow Recommendation as conditions change.

Table 4 – Summary Volumes

GRAVELLY FORD FLOWS AVAILABLE VERSUS RA RECOMMENDATION			
	Available	**Used**	**Balance**
Total GRF River Flow Target without 5 cfs (March 1, 2021 - Feb 28, 2022):	**91.417 TAF**	**81.550 TAF**	**9.867 TAF**
Allocation Flow	70.919 TAF	70.225 TAF	**0.694 TAF**
Exchange Flow	10.425 TAF	10.423 TAF	**0.002 TAF**
Buffer Flows	10.073 TAF	0.902 TAF	**9.171 TAF**

ACCOUNTS SUMMARY at Gravelly Ford, this Restoration Year			
	Available	**Used**	**Balance**
Continuity (Baseflows):	29.365 TAF	54.228 TAF	-24.863 TAF
Spring Flexible Flows:	40.959 TAF	0.000 TAF	40.959 TAF
Fall Flexible Flows:	0.595 TAF	0.000 TAF	0.595 TAF
Riparian Recruitment Flows:	0.000 TAF	0.000 TAF	0.000 TAF
Extra Summer Flow (Water Supply	0.000 TAF	15.997 TAF	-15.997 TAF
Total:	**70.919 TAF**	**70.225 TAF**	**0.694 TAF**
URF Exchanges Scheduled:	10.425 TAF	10.423 TAF	0.002 TAF
Buffer Flows:	10.073 TAF	0.902 TAF	9.171 TAF
Last Year Feb Flows:	0.000 TAF	0.000 TAF	0.000 TAF