

SJRRP Flow Bench Evaluation

January 7, 2022

Introduction

The following Flow Bench Evaluation (FBE) documents current releases and groundwater conditions following the FBE report completed December 23, 2021 and evaluates potential Restoration Flow changes based on the December 29 Restoration Administrator (RA) Recommendation approved on January 7, 2022. Note that use of “FBE” throughout the report refers specifically to the FBE model-based analysis described in Appendix J of the Seepage Management Plan (SMP).

With recent storms, capacity in Millerton Lake is diminishing and the likelihood for flood control releases is increasing. Based on this data, the RA Recommendation aims to accelerate the evacuation of remaining 2021 Restoration Flows. This FBE evaluates the current releases and groundwater conditions monitored as of January 7, 2022 and conservatively evaluates up to 300 cfs below Sack Dam (15 cfs above the newest RA Recommendation). The new RA Recommendation calls for 285 cfs below Sack Dam, which may vary above and below this amount. This target Sack Dam flow is based on a Gravelly Ford target of 430 cfs.

As of January 7, 2022:

1. Channel conveyance: Flow rates are below known conveyance thresholds.
2. Operations Conference Call: An operations call was held on January 5, 2022. No known operational constraints were identified on the call.
3. Seepage Hotline Calls: The seepage hotline has received no calls regarding Restoration Flows in Water Year 2022.
4. Real-time wells: A number of real-time equipment locations are currently going through equipment upgrades. All functioning telemetered groundwater monitoring well levels are below Seepage Management Plan (SMP) thresholds.
5. Priority wells: Weekly groundwater measurements in priority wells, both real-time and manually measured, indicate that all wells are below well thresholds. Note that manual monitoring efforts have been impacted by storm conditions, but data is collected using dataloggers at most locations and will be downloaded at the next opportunity.
6. Flow Stabilization: Releases at Sack Dam have been relatively stable (ranging approximately +/- 20 cfs) since December 30, 2021 per SJRRP Flow Coordinator reports from the Mendota Pool Watermaster. Measurements by DWR taken on January 7, 2022 indicate flows in Sack Dam have been approximately 270 cfs. The rating curve for the SDP gage was updated on CDEC as of 12:45pm on January 7, 2022. Friant Dam releases have also been relatively stable during the same period (ranging from 630 cfs - 650 cfs).
7. Projected Groundwater Level Changes: With the flow scenarios evaluated in this FBE, groundwater levels are projected to increase between 0.0 ft and 0.1 ft depending on reach (see Summary).

8. Levees: LSJLD has not expressed concerns about current flows.
9. Water Districts: The SJRECWA has not identified any operational concerns.

Data

The following Data section considers monitoring measurements collected during the stable flow period below Sack Dam beginning approximately December 30, 2021. These values are referred to as “pre-condition” to inform current groundwater levels before any changes to Restoration Flows. The “projected” values indicate the results from this FBE model-based analysis with the proposed flow changes.

Table 1 shows groundwater depths in two real-time wells and three manual measurements from field staff. Measurements were reported from the field on January 5 and January 6 and will be reported in the Weekly Groundwater Report with a publish date for the week ending January 8, 2022. Reclamation publishes the Weekly Groundwater Report with manual measurements via electronic well sounder on the SJRRP website [HERE](#). To calculate field depths, Reclamation adds ground surface buffers and lateral gradient buffers to measured groundwater depths in the well (Equation 1, Figure 1).

$$Field\ Depth_{Current} = D_{well} - GS_{Buffer} + LG_{Buffer} \tag{1}$$

Where:

- $Field\ Depth_{Current}$ Current groundwater level depth in the field
- D_{well} Current groundwater level depth as measured in the monitoring well
- GS_{Buffer} Ground surface buffer, or the difference in elevation between the well and the field
- LG_{Buffer} Lateral gradient buffer, to account for losing reaches where the groundwater table slopes away from the river (if any)

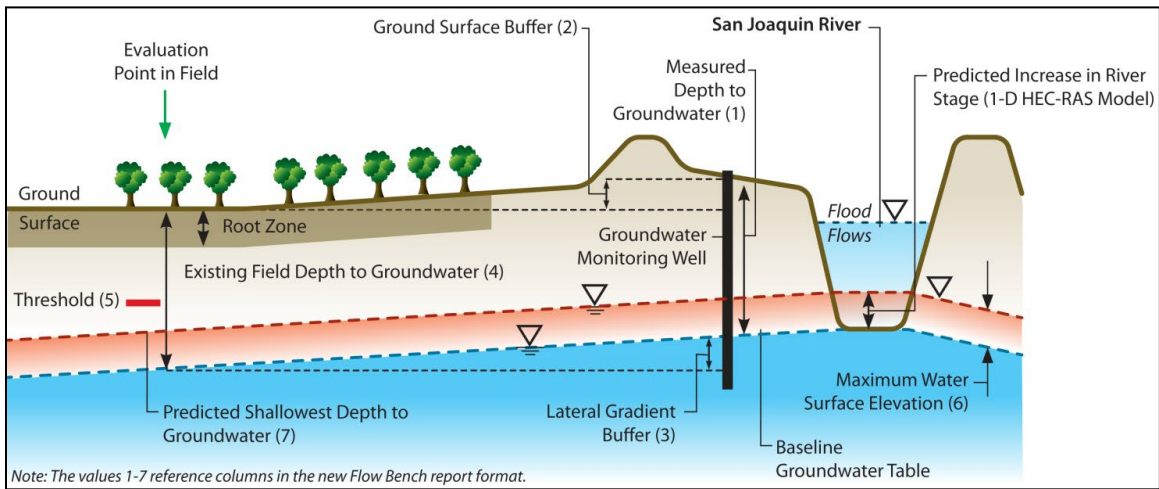


Figure 1. Conceptual Model for Observed Groundwater Level Method

The pre-condition well data in Table 1 show acceptable conditions throughout the critical monitoring locations. Again, the pre-condition data represents the levels observed during the period of stabilizing flows below Sack Dam. Groundwater depths in all wells indicate conditions below thresholds. Groundwater levels are continuing to rise from previously dry conditions and will continue to be monitored. Measurements at other monitoring locations are not available at this time, but additional monitoring locations will be included in subsequent FBEs.

Table 1. Pre-Condition Well Data

Well	Reach	1 - Measured Groundwater Depth in Well (feet bgs)	Date Measured	2 - Ground Surface Buffer (feet)	3 - Lateral Gradient Buffer (feet)	4 - Field GW Depth (feet bgs)	5 - Field Threshold (feet bgs)	Comment
MW-09-49B	2A	6.2	1/5/2022	1.7	2.4	6.9	6.0	Acceptable
PZ-09-R3-7	3	8.4	1/5/2022	0.7	1.1	8.7	6.5	Acceptable
MW-18-80B	4A	10.2	1/6/2022	4.2	1.2	7.2	6.7	Acceptable
MW-17-225	4A	11.3	1/6/2022	2.9	1.1	9.5	6.5	Acceptable
MW-10-89	4A	13.1	1/6/2022	1.0	-	12.1	6.5	Acceptable

bgs = below ground surface; GW = groundwater

Analysis

With many well locations starting from dry conditions due to lack of Restoration Flows since June (documented in Weekly Groundwater Monitoring Reports located [HERE](#)), groundwater levels are still well below threshold throughout the Restoration Area; however, the dynamic groundwater conditions will be closely monitored. Although groundwater levels are continuing to rise from previously dry conditions, no well thresholds are projected to be exceeded. After consideration of 300 cfs at Sack Dam by conservatively applying an additional 15 cfs to the newest RA Recommendation throughout the Restoration Area, the largest anticipated water level increase was estimated based on the concept illustrated in Figure 2. This is expected to be 0.1 ft with a buffer of at least 0.3 ft from the nearest field threshold. After any changes to Restoration Flows, subsequent FBEs may be completed to assess stabilizing conditions.

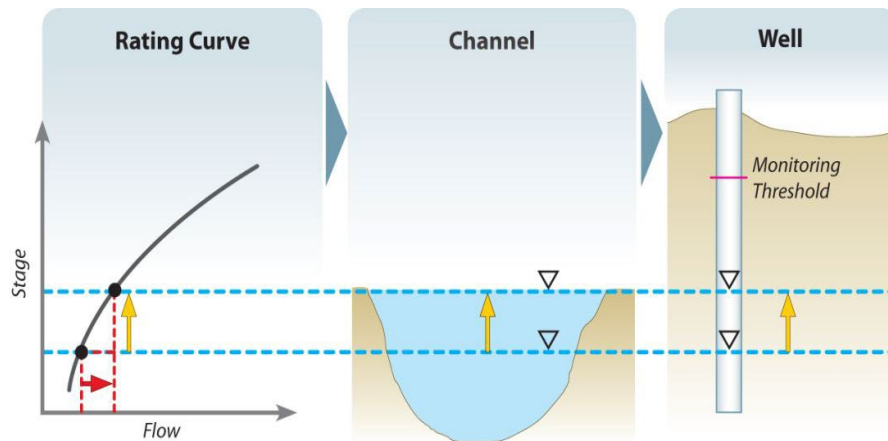


Figure 2. Conceptual Relationship between River Stage and Groundwater Levels

Table 2 shows the flow rates used to evaluate projected groundwater depths. Pre-condition flows are based on the Sack Dam measurement of 270 cfs by DWR. San Luis Canal Company (SLCC) demands were also accounted for in Reach 3 based on the Mendota Pool Watermaster’s reports of 80 cfs demands. SLCC demands were assumed to not change from 80 cfs between the pre-condition and projected flow scenarios. The comparison of pre-condition and projected flows informs the estimated result of changing flows to be consistent with the newest RA Recommendation and conservatively evaluating an additional 15 cfs above those targets.

Table 2. Anticipated Change in Flows with Addition of 15 cfs to RA Recommendation

	Pre-condition Flows (cfs)	Projected Flows from Evaluation (cfs)
Friant Dam	648 ¹	670
Reach 2A	434 ²	445
Reach 3	393 ²	405 ³
Reach 4A	270 ⁴	300

¹ Source: CDEC, 1/5/2022 daily discharge

² Source: CDEC, 1/5/2022 mean daily flow

³ Assumes 80 cfs SLCC demand (reported by Mendota Pool Watermaster) and 25 cfs losses

⁴ Source: DWR manual measurement, approximately 1/8 mi downstream of SDP gage

Table 3 shows the change in groundwater based on estimated changes in river stage and the conceptual models shown in Figures 1 and Figure 2. Field depths are calculated by taking the most recent measurements from Table 1, adding the ground surface and the lateral gradient buffers, and subtracting the maximum predicted stage increase (Equation 2).

$$Field\ Depth_{Predicted} = Field\ Depth_{Current} - WSEL_{Max\ Increase} \quad (2)$$

Summary

This analysis, in combination with recent field measurements, indicates acceptable conditions for at least 300 cfs past Sack Dam, including the current 285 cfs RA Recommendation at Sack Dam. Groundwater levels will continue to be monitored so as not to surpass thresholds. SLCC demands will also be monitored to assess the capacity for Restoration Flows in Reach 3. Reclamation retains the right to recapture Restoration Flows in Mendota Pool to adjust for any Restoration Flow constraints. Subsequent FBEs will be performed to evaluate stabilizing conditions and to inform any other potential flow changes.

Table 3. Predicted Groundwater Levels for Priority Wells with Projected Flows

Well	Reach	1 - Measured Groundwater Depth in Well (feet bgs)	Date Measured	2-Ground Surface Buffer (feet)	3 - Lateral Gradient Buffer (feet)	4 - Field GW Depth (feet bgs)	6 - Predicted WSEL Change (feet)	7 - Predicted Shallowest GW Depth (ft bgs_field)	5 - Field Threshold (feet bgs)	Comment
MW-09-49B	2A	6.2	1/5/2022	1.7	2.4	6.9	0.0	6.9	6.0	Acceptable
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bgs = below ground surface; GW = groundwater; WSEL = water surface elevation