

SJRRP Flow Bench Evaluation

November 3, 2011

Reclamation groundwater measurements on November 2 and Reclamation's calculations as shown herein indicate 80 cfs of flow from Sack Dam will not cause impacts. Flows below Sack Dam will increase to 80 cfs or the amount of Interim Flows entering Mendota Pool minus any normally calculated losses in the pool on Thursday, November 10.

Absent other influencing factors, hydraulic modeling shows no adverse seepage impacts up to a 140 cfs release from Sack Dam. Some current groundwater wells show higher levels than expected due to other influencing factors, so increases will take place gradually in steps of approximately 0.5 foot of water surface elevation increase. This document evaluates the second increase to 80 cfs.

As of November 3, 2011:

1. Flow rates from provisional real-time data are below known conveyance thresholds.
2. Daily operations coordination calls and the weekly planning call did not identify any concerns.
3. The seepage hotline received no calls to date in WY 2012.
4. Real-time groundwater monitoring did not identify groundwater levels above thresholds, Table 1. These wells do not restrict Friant Dam releases at this time.
5. Priority well weekly groundwater measurements, Table 2, identified groundwater tables above thresholds in two wells. These wells do not restrict releases at this time.
6. Stability in the lower reaches has been roughly achieved.
7. Projected groundwater levels from the proposed increase in flow (Table 4) calculated based on groundwater levels measured the week of October 23, show projected groundwater levels below thresholds except for two wells.
 - a. MW-10-94 – groundwater level predicted to rise 1.1 feet above threshold, assuming 80 cfs of flow into the Eastside Bypass and calculated from the most current groundwater level. This well is artificially high due to an adjacent unlined irrigation canal backing up water into a drainage ditch next to the well. This well does not restrict flows.
 - b. MW-10-95 - groundwater level predicted to rise 2.5 feet above threshold, assuming 80 cfs of flow into the Eastside Bypass and calculated from the most current groundwater level. Observed sand excavation lowers water surface elevations from those predicted. The local landowner has a working interceptor drain. This well does not restrict flows.
8. The LSJLD has not identified any operational concerns.

- 9. The CCID has not identified any operational concerns.
- 10. The SLCC has not identified any operational concerns.

Analysis

Priority well MW-10-95 (Reach 4B1 Eastside Bypass) measurements this week show depths to groundwater at 1.6 feet above the threshold. Reclamation conducted a site visit to MW-10-95 on Friday, October 7, 2011 and determined with the concurrence of the landowner that slow drainage nearby gravity irrigation is causing the shallow groundwater levels. The landowner did not identify concerns with flow up to 140 cfs in the river channel, and the landowner has harvested his corn crop. Hand augur boreholes dug on October 20 found groundwater levels at the other edge of the field at 5.2 feet below ground surface, below the threshold. Measurements the previous week were 4.75 feet below ground surface. Figure 1 below shows the groundwater trends over time in this and other nearby wells. Extensive sand excavation not captured by the rating curves has occurred at this cross-section. Reclamation predicts a water surface elevation in the San Joaquin River with 80 cfs of 94.9 feet. This does not take into account sand excavation, uses the conservative cross-sections in the existing hydraulic model and therefore overestimates the stage increase. Reclamation measured the elevation of the groundwater level in MW-10-95 at 95.6 feet. Thus, predictions show the water surface elevation 0.7 feet below the groundwater level in the field, allowing drainage. Reclamation will monitor groundwater levels at this location and shut off flows if necessary. This well does not restrict planned releases.

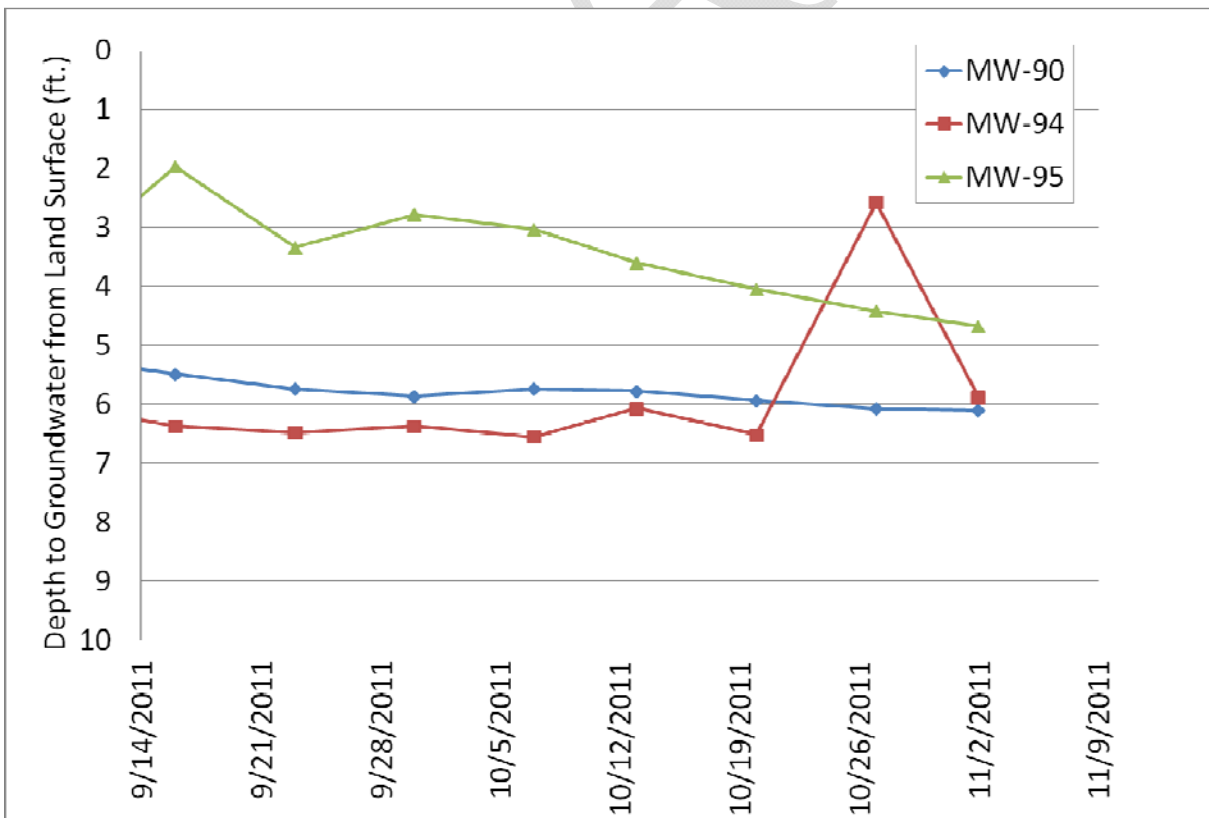


Figure 1: Groundwater depths over time

Priority well MW-10-94 (Reach 4B1 Eastside Bypass) measurements this week show depths to groundwater at 0.2 feet above the threshold. Reclamation conducted a site visit to MW-10-94 on Wednesday, November 2, 2011 and determined that this well is responding to a recent recharge event associated with flow in an unlined canal adjacent to the well. Predictions show the groundwater level with 80 cfs in the channel rising to 1.1 feet above the threshold. This does not take into account sand excavation, uses the conservative cross-sections in the existing hydraulic model and therefore overestimates the stage increase. The landowner has a working interceptor drain at this location to keep groundwater levels low and did not express concerns with up to 140 cfs of flow in the river. Also, the landowner has harvested the crop near this well. Reclamation will monitor groundwater levels at this location and shut off flows if necessary. This well does not restrict planned releases.

Data

Table 1 shows the groundwater depth in 7 realtime wells as of November 3, 2011. The data shows no groundwater depths in the realtime groundwater wells above thresholds. The property underlying one of these realtime wells, MW-10-92, contains an existing tile drain.

Table 1 – Realtime Well Data as of 11/3/2011

Well	Reach	Measured Groundwater Depth in Well (feet bgs)	Ground Surface Buffer (feet)	Lateral Gradient Buffer (feet)	Field Depth (feet bgs)	Field Threshold (feet bgs)	Comment
MW-09-54B	2B	14.7	-7.9	5.5	12.2	10.0	Acceptable
PZ-09-R3-7	3	8.5	-0.7	0.0	7.7	3.5	Acceptable
MW-10-75	3	8.7	-0.5	0.2	8.4	6.3	Acceptable
MW-11-130	4A	7.5	0.0	0.0	7.5	5.0	Acceptable
MW-10-89	4A	11.3	-3.4	0.0	7.8	7.6	Acceptable
MW-10-92	4A	9.0	-2.6	0.0	6.4	5.0	Acceptable
MW-11-142	4B1	6.0	0.0	0.0	6.0	4.0	Acceptable

bgs = below ground surface

Reclamation publishes the weekly groundwater report with manual measurements via electronic well sounder and recent flow data on the SJRRP website at:

<http://www.restoresjr.net/flows/Groundwater/Groundwater.html>.

Table 2 shows the manual measurements from field staff as reported in the weekly groundwater report. To calculate field depths, Reclamation adds ground surface buffers and lateral gradient buffers to measured groundwater depths in the well. A negative ground surface buffer indicates the well is above the field.

Table 2 – Priority Well Weekly Groundwater Measurements

Well	Reach	Measured Groundwater Depth in Well (feet bgs)	Ground Surface Buffer (feet)	Lateral Gradient Buffer (feet)	Field Depth (feet bgs)	Field Threshold (feet bgs)	Comment
FA-9	2A	7.5	-3.7	2.5	6.3	5.0	Acceptable
MW-09-47	2A	7.6	-3.5	3.3	7.4	7.0	Acceptable
MA-4	2A	10.8	-6.1	4.6	9.3	7.0	Acceptable
MW-09-49B	2A	4.8	-1.7	2.4	5.5	4.5	Acceptable
MW-09-55B	2B	8.0	-3.7	3.0	7.3	7.0	Acceptable
PZ-09-R2B-2	2B	10.4	-3.9	0.0	6.5	4.5	Acceptable
PZ-09-R3-5	3	10.9	-1.2	0.0	9.8	5.0	Acceptable
PZ-09-R3-6	3	9.8	-1.5	0.0	8.3	4.0	Acceptable
MW-09-87B	4A	10.9	-1.9	1.0	10.0	4.2	Acceptable
MW-10-90	4B1	6.1	0.8	0.0	6.9	6.0	Acceptable
MW-10-94	4B1	5.9	0.0	1.0	6.8	7.0	Above Threshold
MW-10-95	4B1	4.7	-2.2	1.0	3.4	5.0	Above Threshold

Note: bgs = below ground surface

Table 3 shows the anticipated flow rates used to evaluate future groundwater depths. Reclamation calculated losses from Friant Dam to the Mendota Pool based on the long-term pattern established by Exhibit B. Reach 3 includes an estimated 320 cfs delivery to Arroyo Canal in addition to the 80 cfs of Interim Flows.

Table 3 Anticipated Change in Flows

	Recent Flows (cfs)	Projected Flows (cfs)
Reach 1	350	350
Reach 2A	210	210
Reach 2B	120	120
Reach 3	320	400
Reach 4A	50	80
Reach 4B1 (ESB)	50	80

Table 4 shows the current and maximum rise in groundwater based on estimated changes in river stage and the conceptual model shown in Figure 2. Field depths are calculated by taking the most recent measurements from Table 2, adding the ground surface and the lateral gradient buffer, and subtracting the maximum predicted stage increase. Subsequent pages show the rating curves for each of the key wells from the Mussetter Engineering, Inc., 2008 San Joaquin HEC-RAS Model

Documentation Technical Memorandum prepared for California Dept. of Water Resources,
Fresno, California, June 2.

Table 4 Predicted Maximum Change in Groundwater Levels for Key Wells

Well	Reach	Measured Groundwater Depth in Well (feet bgs)	Maximum Predicted Stage Increase (feet)	Ground Surface Buffer (feet)	Lateral Gradient Buffer (feet)	Field Depth (feet bgs)	Field Threshold (feet bgs)	Comment
FA-9	2A	7.5	0.0	-3.7	2.5	6.3	5.0	Acceptable
MW-09-47	2A	7.6	0.0	-3.5	3.3	7.4	7.0	Acceptable
MA-4	2A	10.8	0.0	-6.1	4.6	9.3	7.0	Acceptable
MW-09-49B	2A	4.8	0.0	-1.7	2.4	5.5	4.5	Acceptable
MW-09-54B	2B	14.7	0.0	-7.9	5.5	12.2	10.0	Acceptable
MW-09-55B	2B	8.0	0.0	-3.7	3.0	7.3	7.0	Acceptable
PZ-09-R2B-2	2B	10.4	0.0	-3.9	0.0	6.5	4.5	Acceptable
PZ-09-R3-5	3	10.9	0.1	-1.2	0.0	9.6	5.0	Acceptable
PZ-09-R3-6	3	9.8	0.1	-1.5	0.0	8.2	4.0	Acceptable
PZ-09-R3-7	3	8.5	0.1	-0.7	0.0	7.6	3.5	Acceptable
MW-10-75	3	8.7	0.1	-0.5	0.2	8.3	6.3	Acceptable
MW-09-87B	4A	10.9	0.7	-1.9	1.0	9.3	4.2	Acceptable
MW-10-89	4A	11.3		-3.4	0.0	7.8	7.6	Acceptable
MW-10-92	4A	9.0	0.9	-2.6	0.0	5.6	5.0	Acceptable
MW-10-90	4B1	6.1	0.5	0.8	0.0	6.3	6.0	Acceptable
MW-10-94	4B1	5.9	0.9	0.0	1.0	5.9	7.0	Above Threshold
MW-10-95	4B1	4.7	0.9	-2.2	1.0	2.5	5.0	Above Threshold

Note: bgs = below ground surface

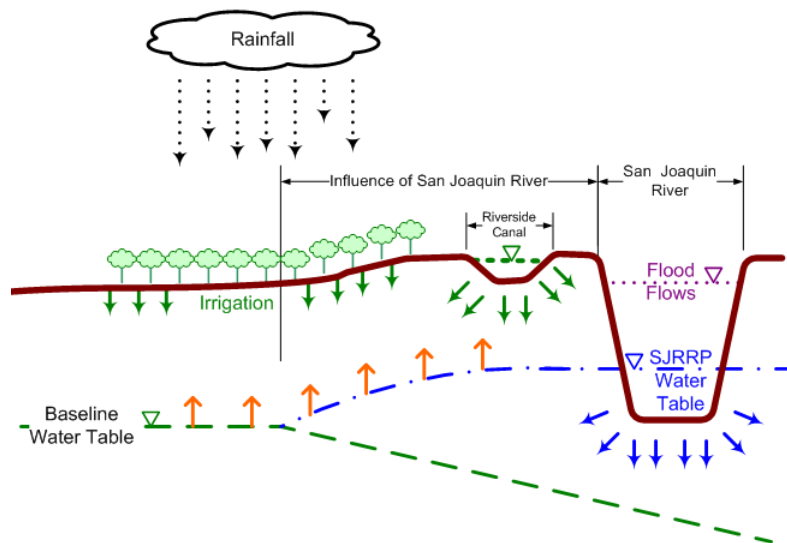
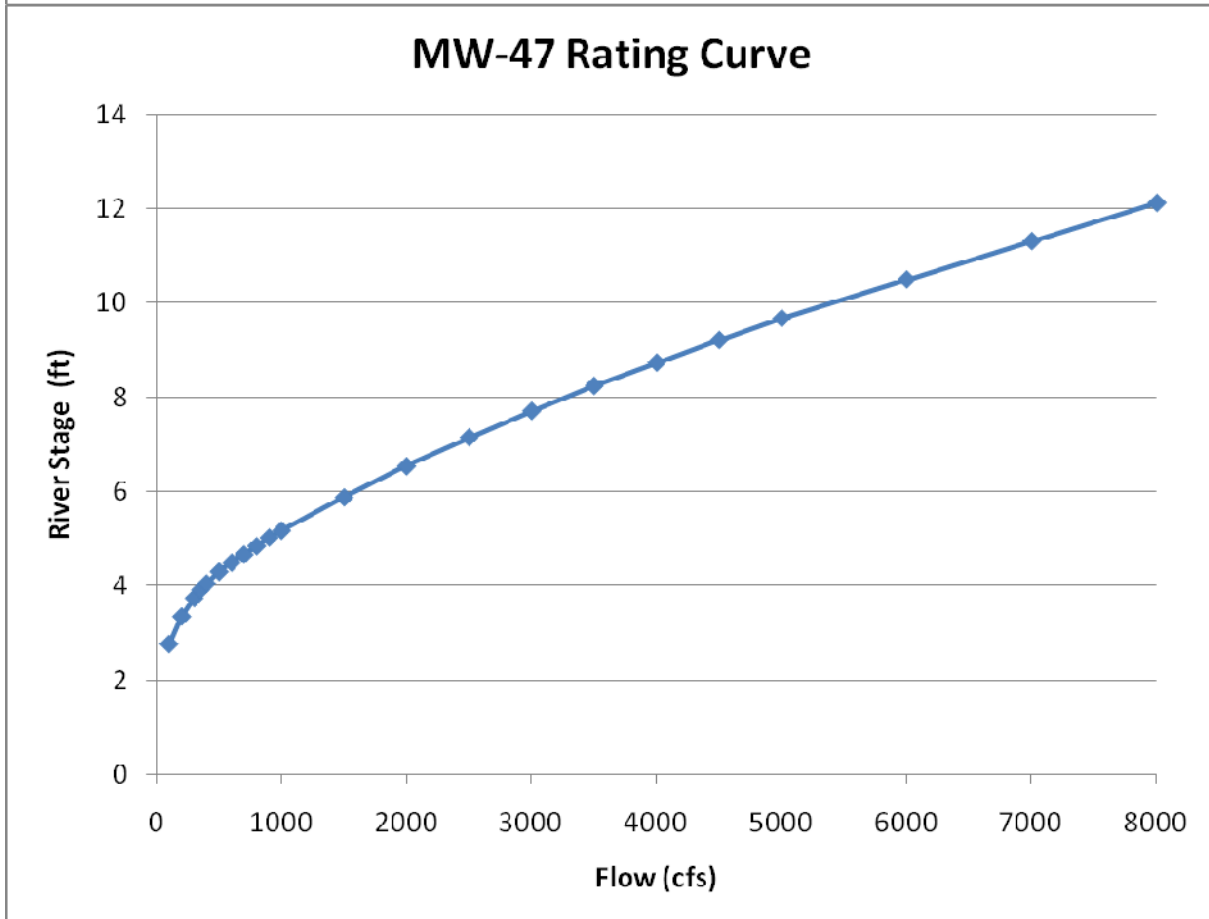
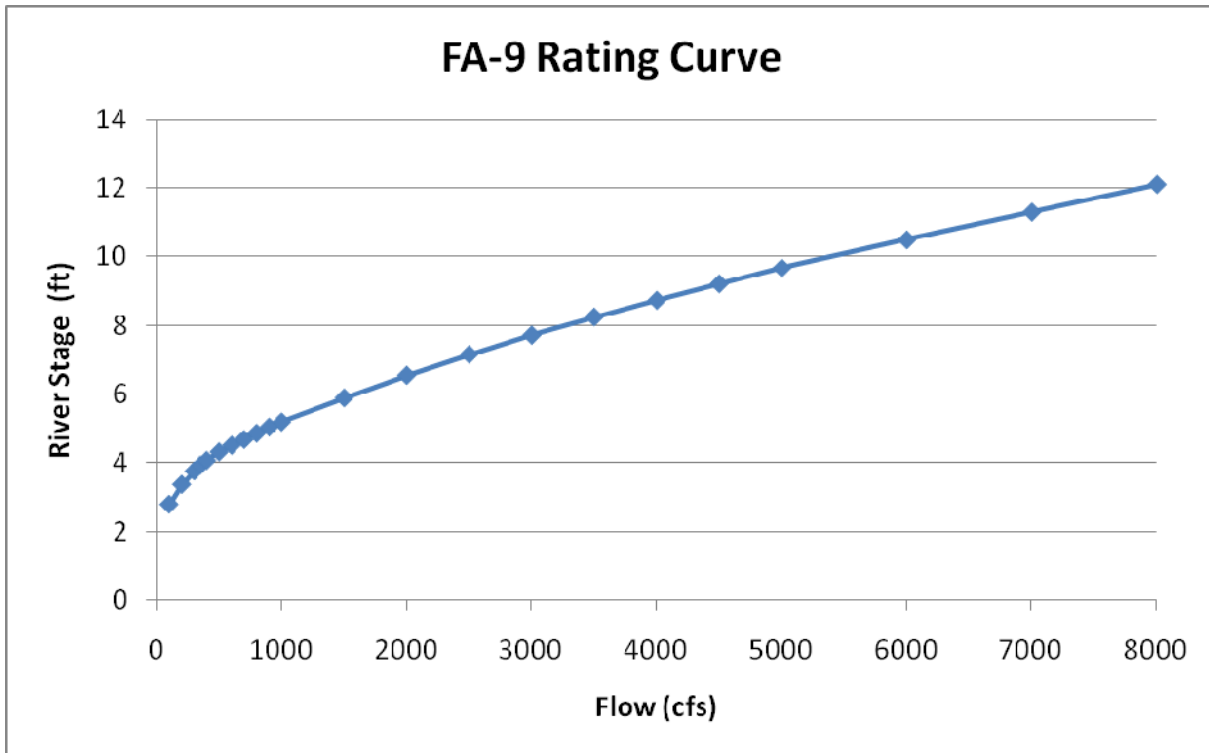
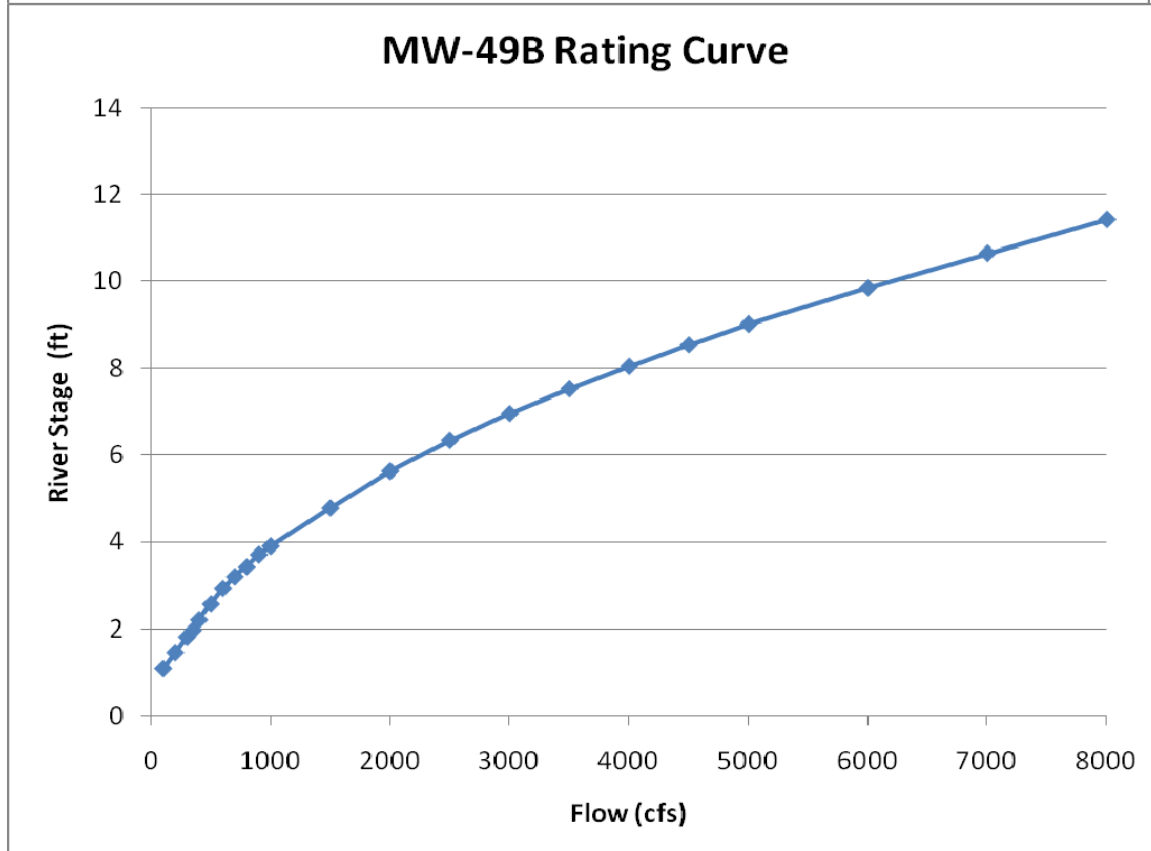
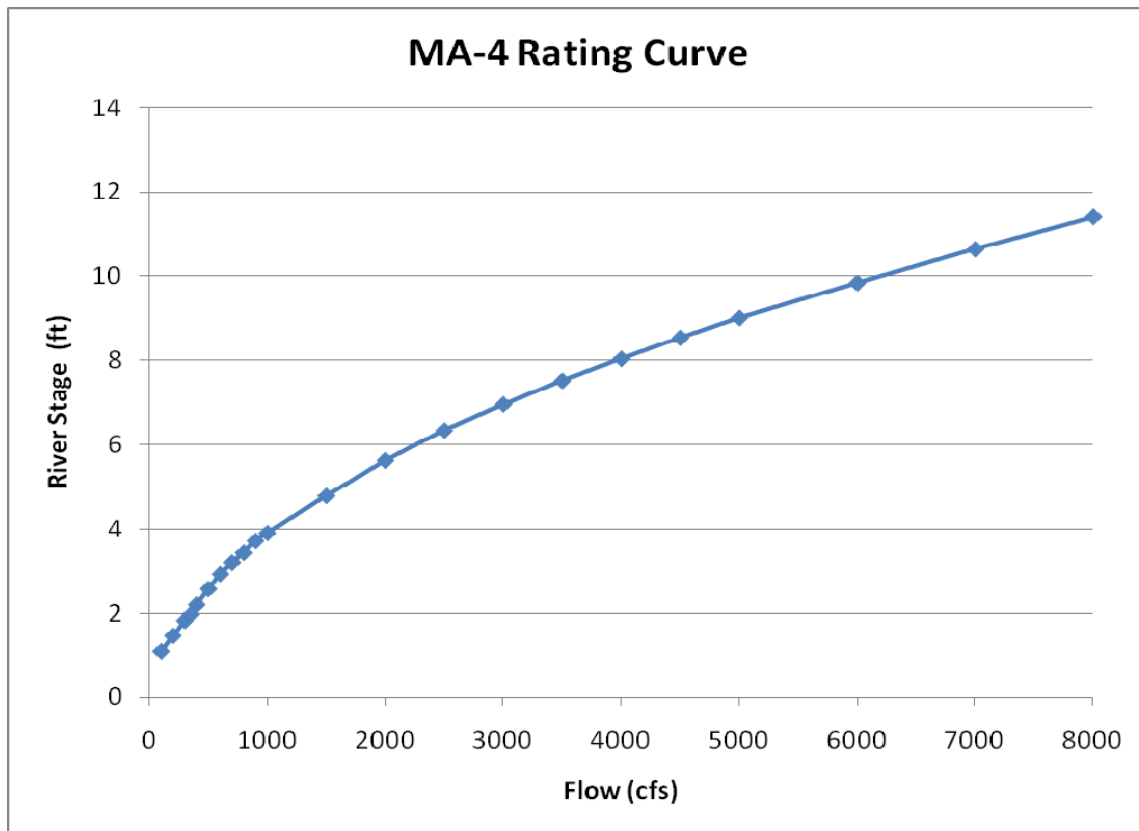
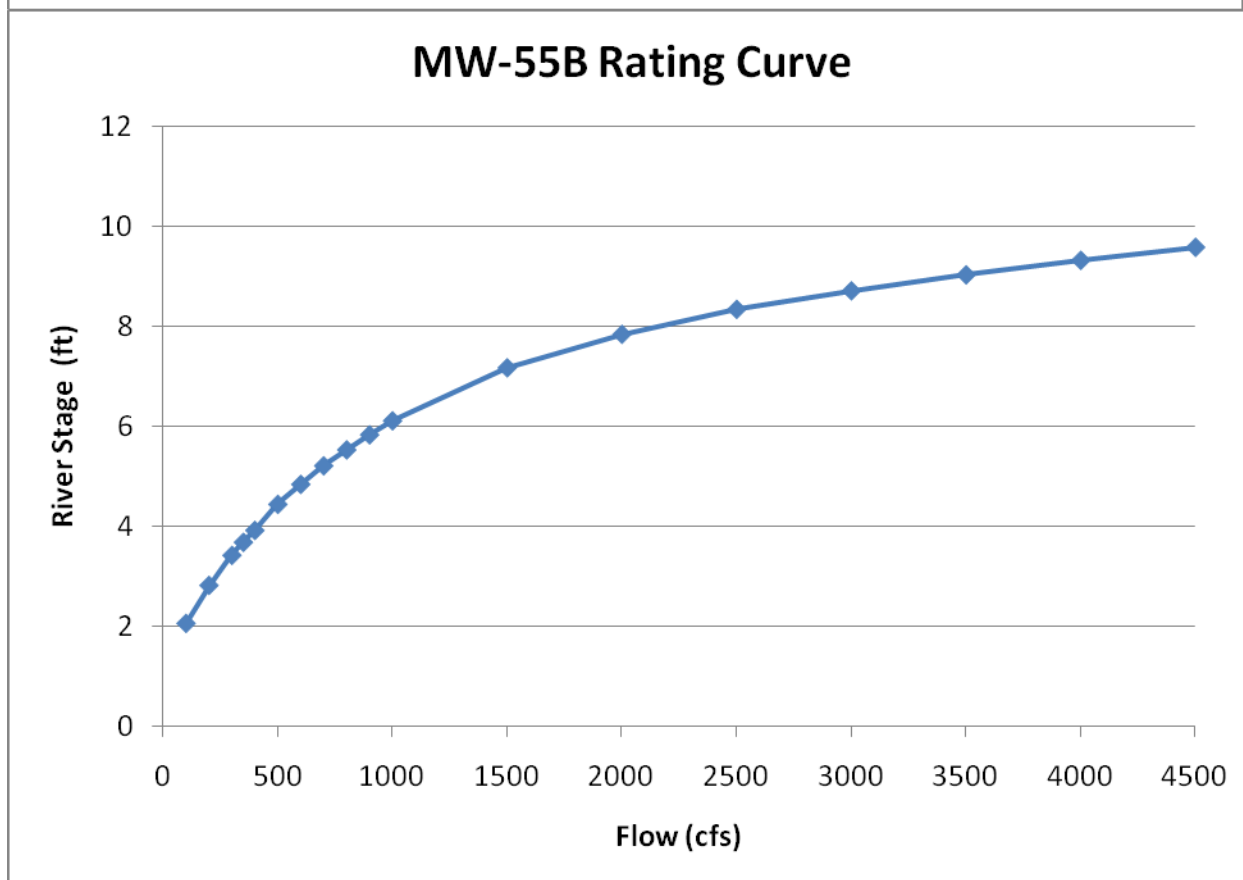
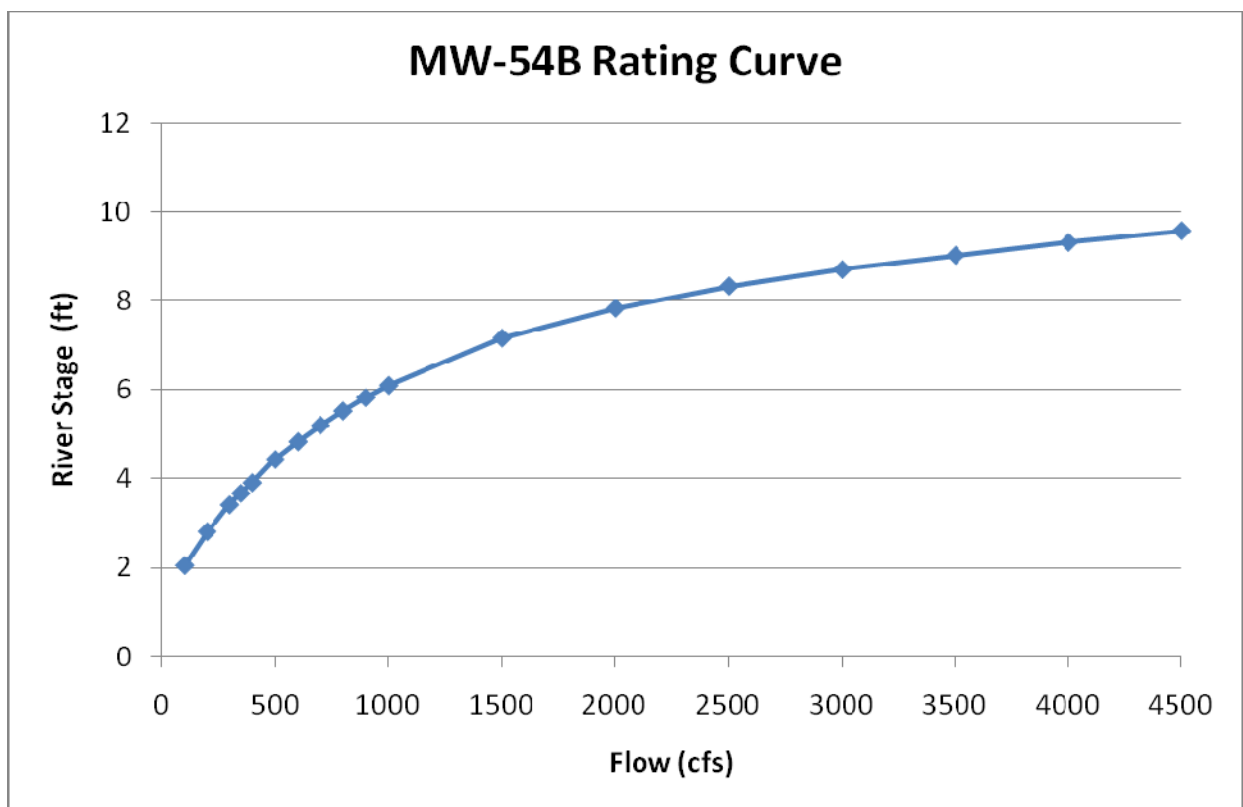


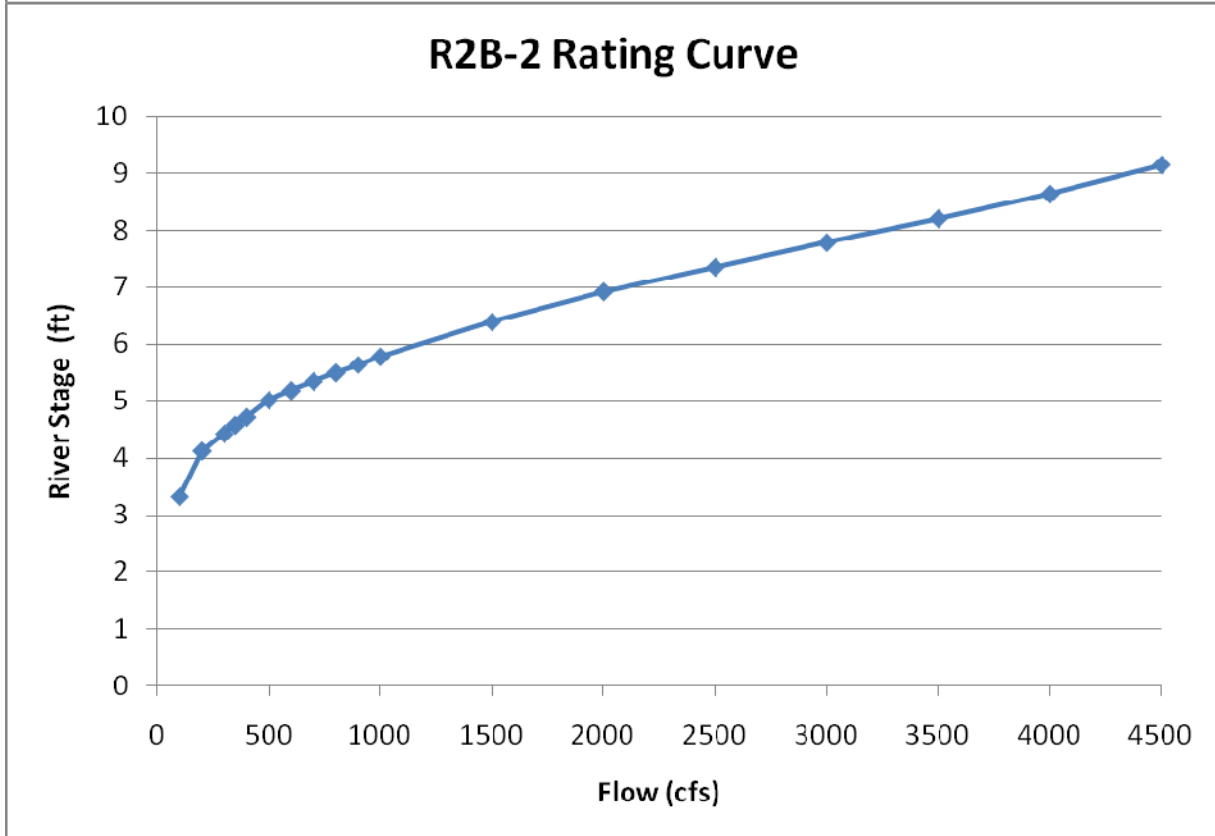
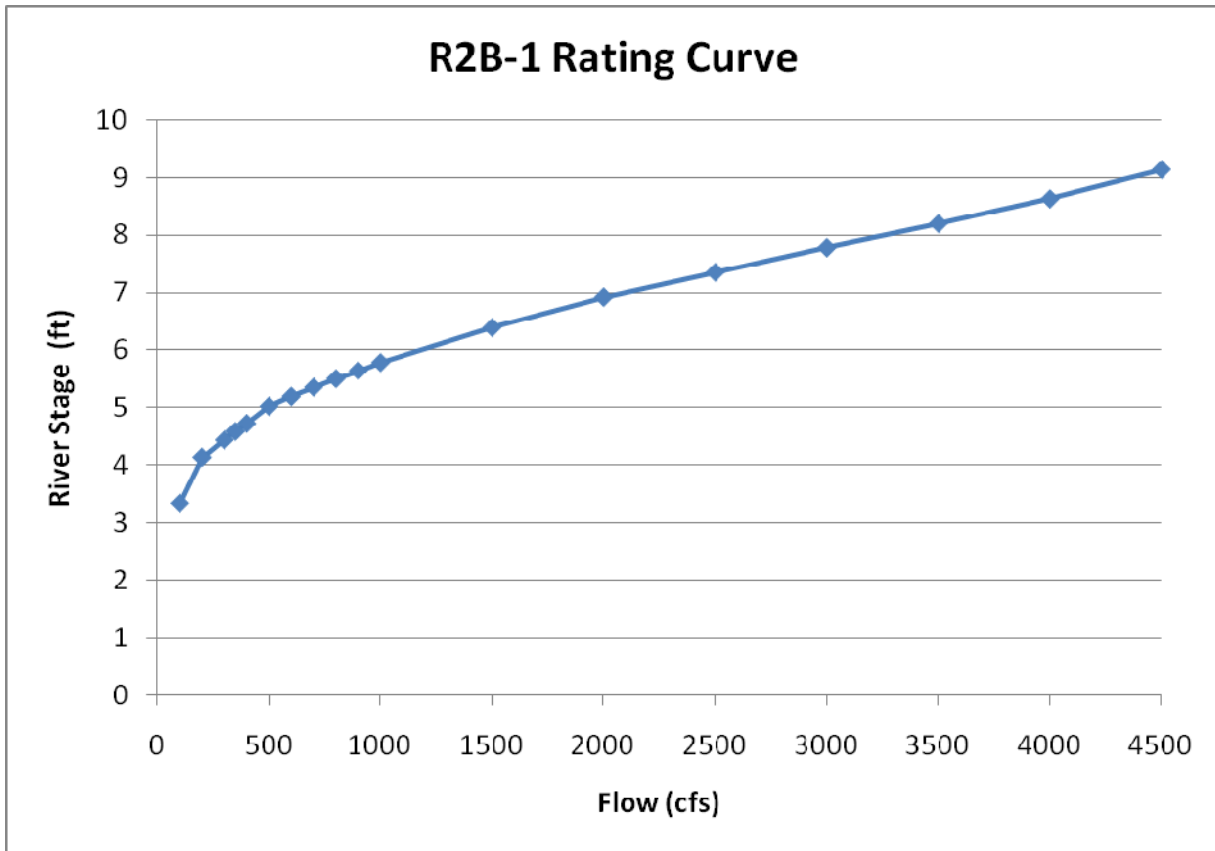
Figure 2 Conceptual Model for Flow Bench Evaluations Estimated Groundwater Depths

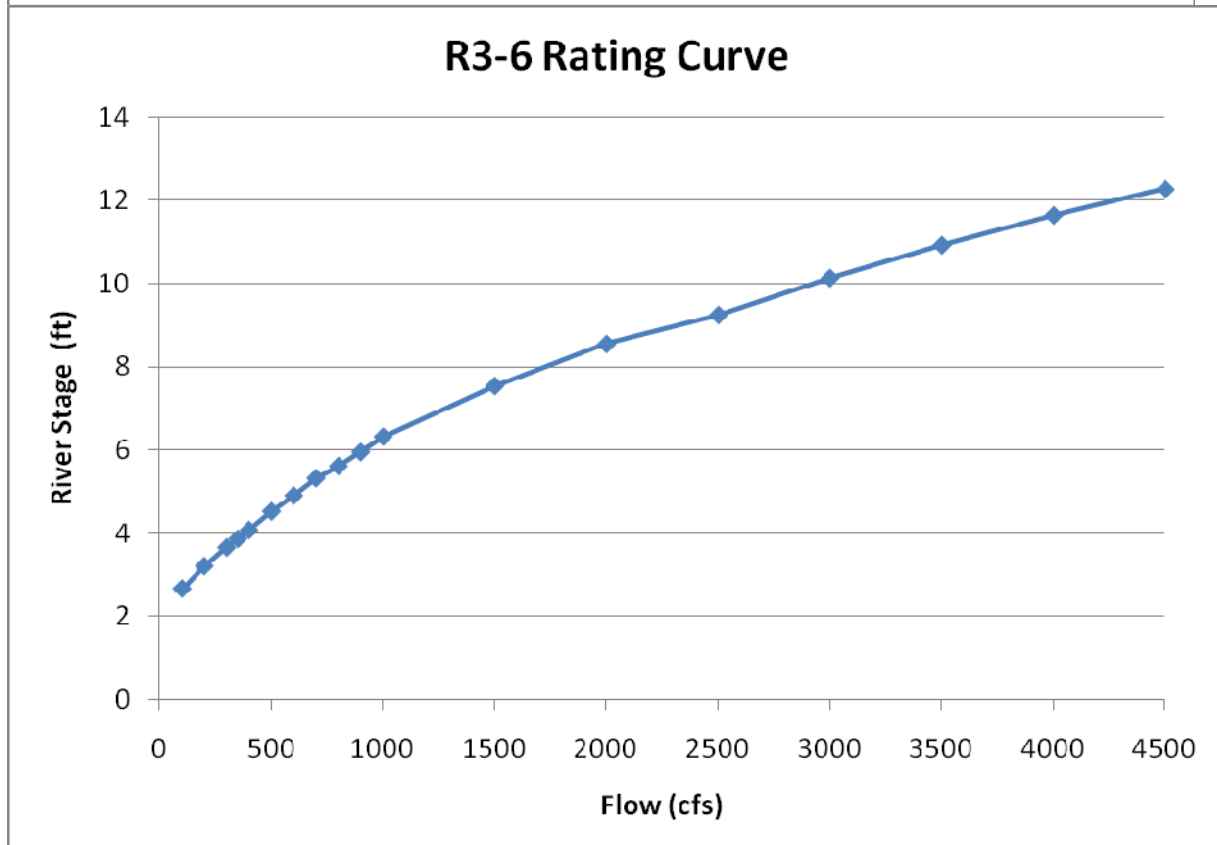
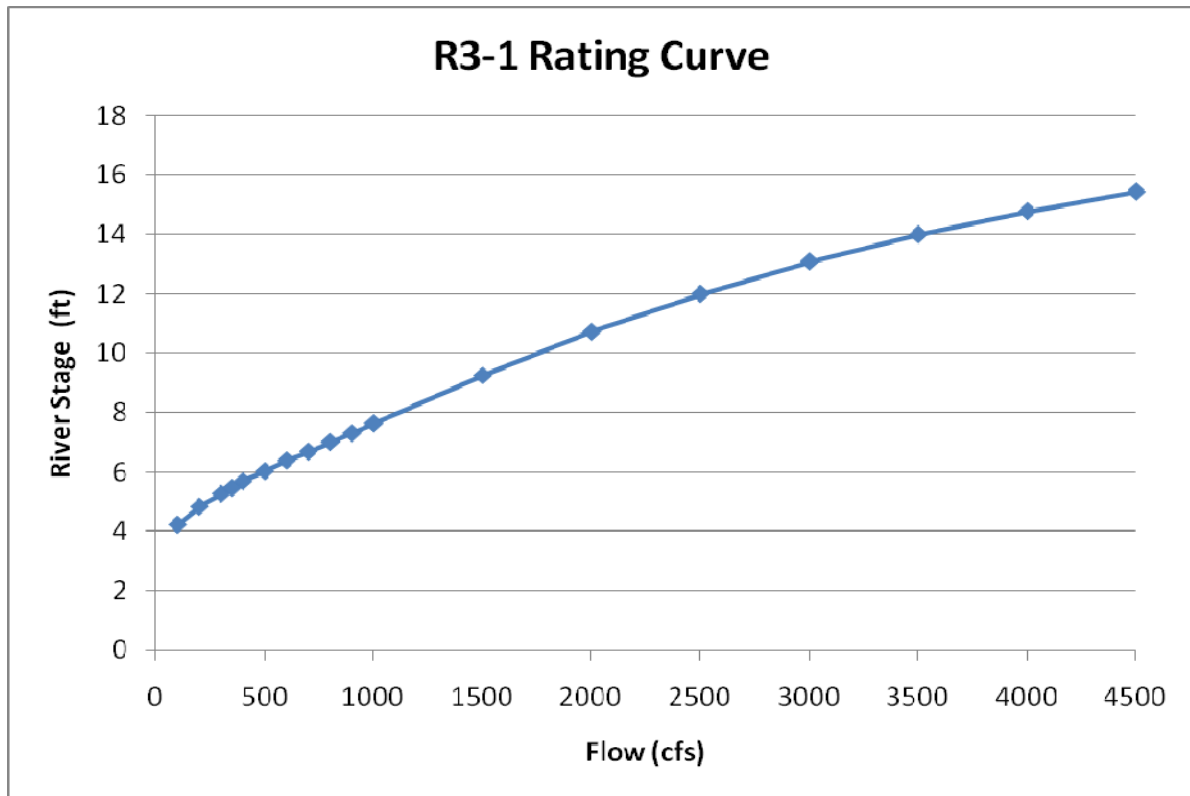
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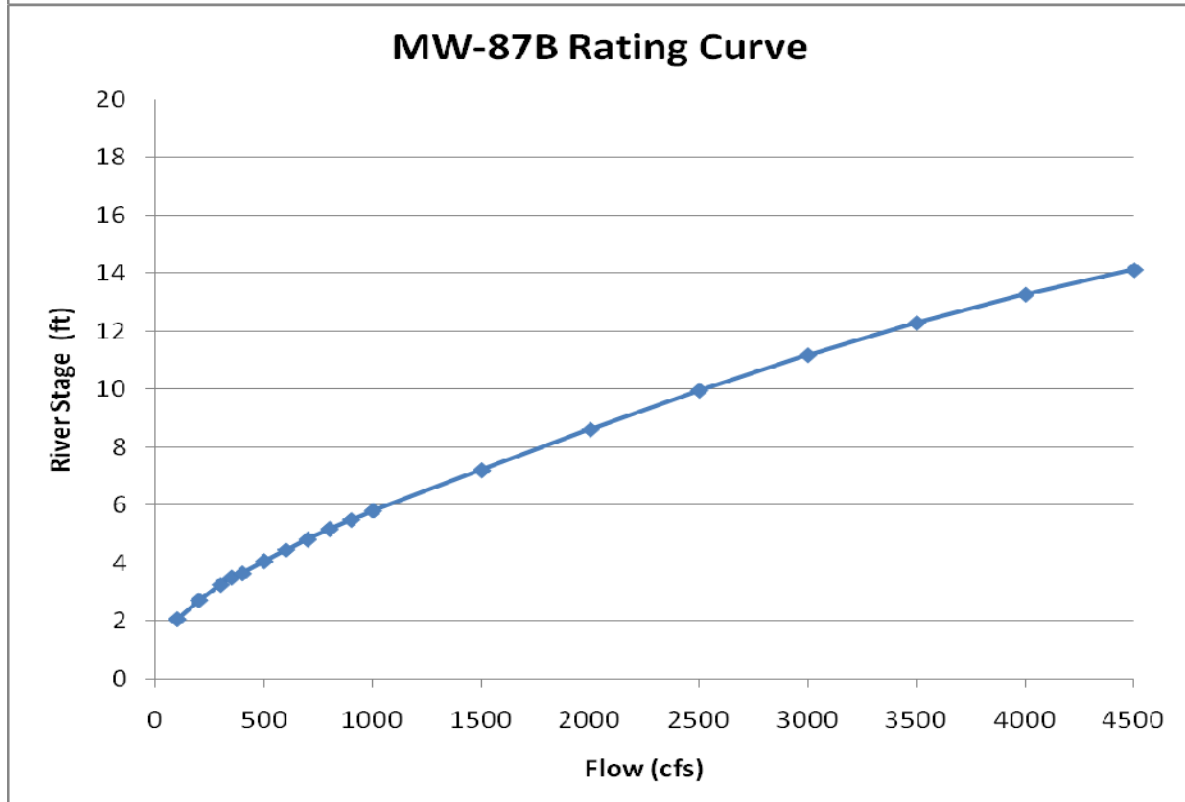
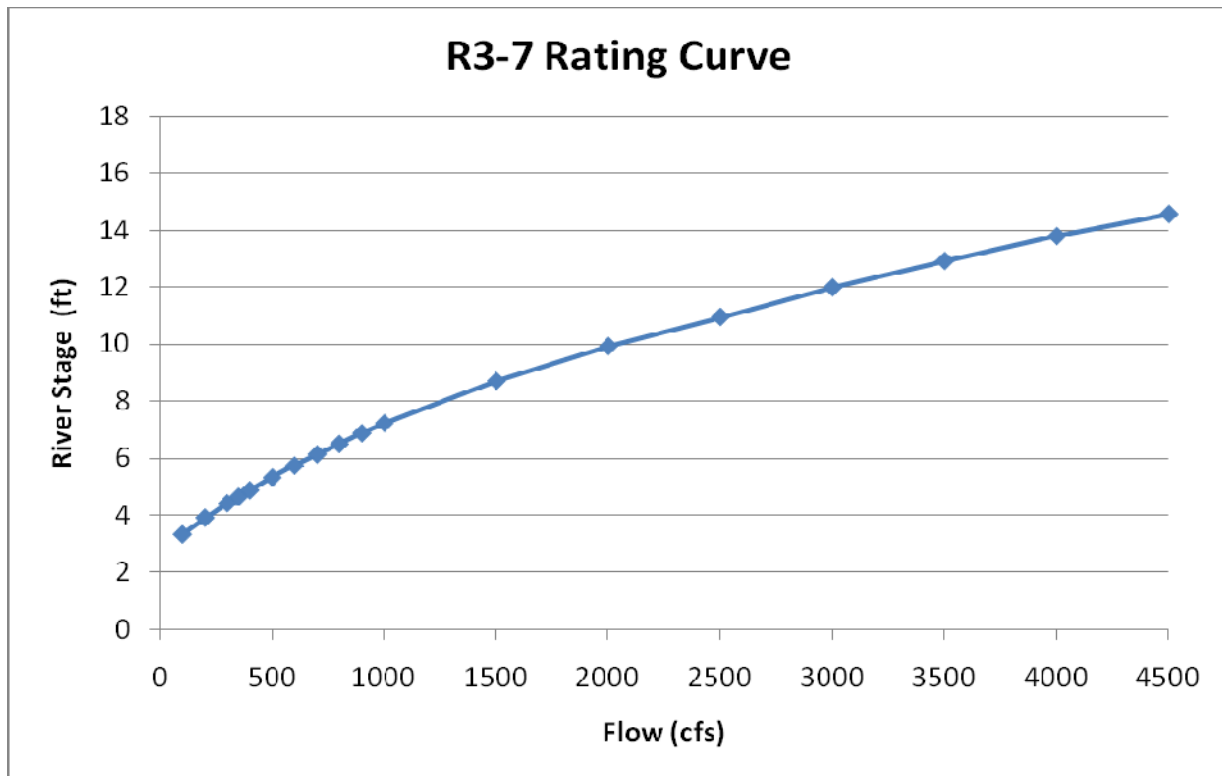


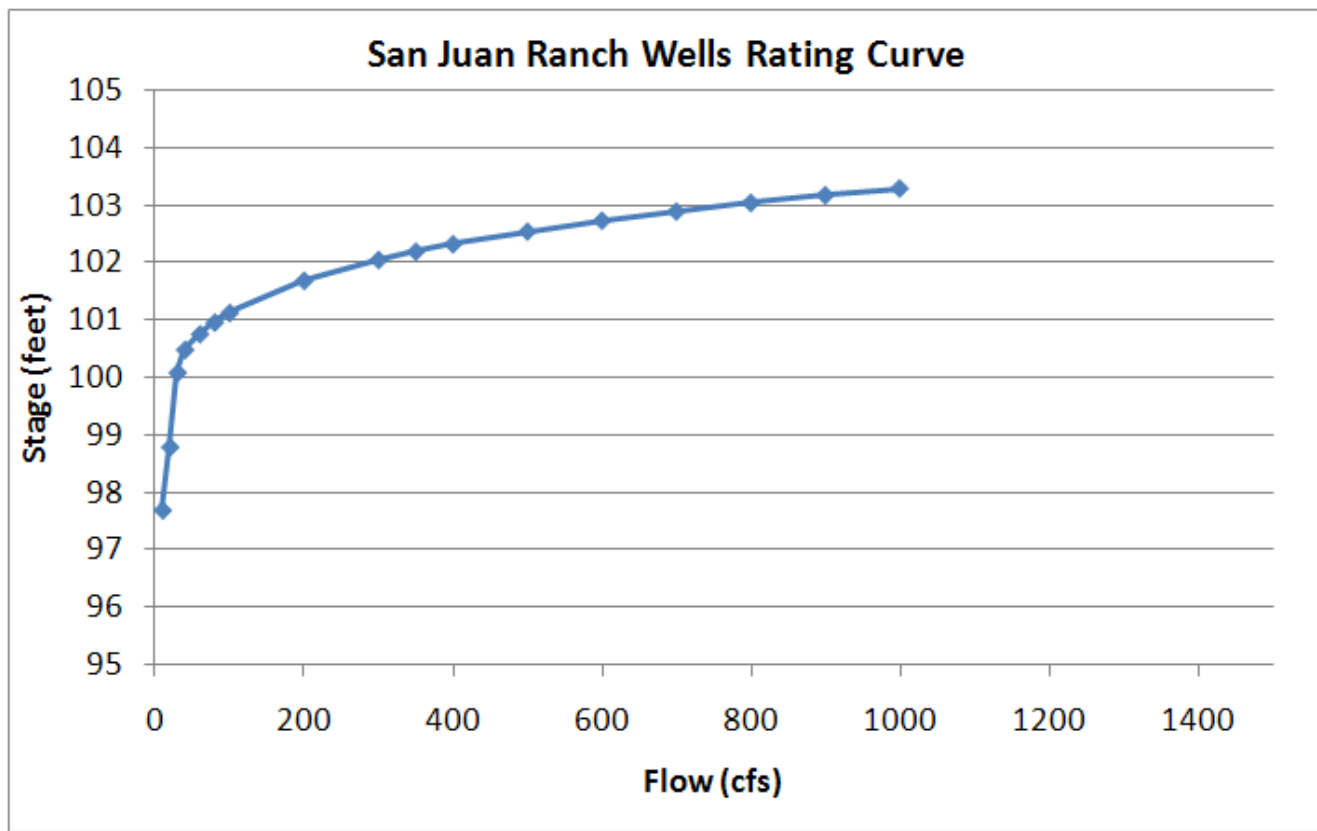












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