SJRRP Flow Bench Evaluation

May 7, 2012

In the May 2, 2012 recommendation, the Restoration Administrator recommends increasing the combined Interim Flow and riparian release from Friant Dam to 1100 cubic feet per second (cfs) starting May 1, 2012. Friant Dam San Joaquin River release increased to 1000 cfs on May 2, 2012 (see May 2, 2012 flow bench evaluation). To date, groundwater levels in monitoring wells adjacent to the Eastside Bypass continue to restrict flows below Sack Dam to 0 cfs. The release from Friant Dam will increase to 1100 cfs on May 7, 2012 at noon.

As of May 7, 2012:

1. Flow rates are below known conveyance thresholds.

2. Operations calls did not identify any concerns.

3. The seepage hotline received no calls to date in WY 2012.

4. Real-time groundwater monitoring identified two groundwater monitoring wells, MW-10-92 and MW-10-90, with levels above thresholds, Table 1. These wells do not restrict releases.

5. Priority well weekly groundwater measurements, Table 2, identified groundwater tables above thresholds in two additional wells, MW-10-94 and MW-10-95. While MW-10-94 does not restrict releases as groundwater levels there can drain, MW-10-95 restricts releases at this time.

6. Flows have reached steady levels.

7. Projected groundwater levels from the proposed increase in flow (Table 4) calculated based on groundwater levels measured the week ending May 5, show projected groundwater levels above thresholds in four wells.

8. The LSJLD has not identified any concerns.

9. The SJRECWA has not identified any concerns.

Analysis

Priority well MW-10-95 (Reach 4B1 Eastside Bypass) measurements show depths to groundwater at 1.2 feet above the threshold. No water from the San Joaquin River currently reaches the Eastside Bypass. The projected water surface elevation in the Eastside Bypass adjacent to this well with 10 cfs in the channel is 92.7 feet above sea level. The threshold elevation in MW-10-95 is 92.8 feet above sea level. This does not provide enough of a gradient (0.1 feet) to allow groundwater levels to drain below the threshold. This well restricts releases past Sack Dam to 0 cfs at this time.

Priority well MW-10-90 (Reach 4B1 Eastside Bypass) measurements show depths to groundwater at 1.1 feet above the threshold. No water from the San Joaquin River currently

reaches the Eastside Bypass. The projected water surface elevation in the Eastside Bypass adjacent to this well with 10 cfs in the channel is 94.2 feet above sea level. The threshold elevation in MW-10-90 is 95.1 feet above sea level. This provides a gradient to allow groundwater levels to drain to below the threshold. This location does not provide a gradient to allow for drainage at flows of 50 cfs or above, and thus restricts flows below Sack Dam to less than 50 cfs at this time.

Priority well MW-10-94 (Reach 4B1 Eastside Bypass) measurements show depths to groundwater at 0.9 feet above the threshold. No water from the San Joaquin River currently reaches the Eastside Bypass. The projected water surface elevation in the Eastside Bypass adjacent to this well with 10 cfs in the channel is 92.7 feet above sea level. The threshold elevation in MW-10-94 is 95.6 feet above sea level. This provides a gradient to allow groundwater levels to drain to below the threshold. This location does not provide a gradient to allow for drainage at flows of 100 cfs or above, and thus restricts flows below Sack Dam to less than 100 cfs at this time.

Data

Table 1 shows the groundwater depth in 7 realtime wells as of May 7, 2012 and manual measurements from field staff as reported in the weekly groundwater report with a publish date of May 5, 2012. The property underlying one of these realtime wells, MW-10-92, contains an existing tile drain. 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. 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 1 –Well Data

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	7.6	-3.7	2.5	6.3	5.0	Acceptable
MW-09-47	2A	7.9	-3.5	3.3	7.7	7.0	Acceptable
MA-4	2A	11.4	-6.1	4.6	9.9	7.0	Acceptable
MW-09-49B	2A	5.1	-1.7	2.4	5.9	4.5	Acceptable
MW-09-54B	2B	14.5	-7.9	5.5	12.1	10.0	Acceptable
MW-09-55B	2B	8.1	-3.7	3.0	7.5	7.0	Acceptable
PZ-09-R2B-1	2B	-	-1.3	0.0	-	5.0	Acceptable
PZ-09-R2B-2	2B	10.8	-3.9	0.0	-	4.5	Acceptable
PZ-09-R3-5	3	11.5	-1.2	0.0	10.3	5.0	Acceptable
PZ-09-R3-6	3	10.2	-1.5	0.0	8.8	4.0	Acceptable
PZ-09-R3-7	3	9.0	-0.7	0.0	8.3	3.5	Acceptable
MW-10-75	3	9.8	-0.5	0.2	9.5	6.3	Acceptable
MW-11-130	4A	6.6	0.0	0.0	6.6	5.0	Acceptable
MW-09-87B	4A	13.2	-1.9	1.0	12.3	4.2	Acceptable
MW-10-89	4A	12.7	-3.4	0.0	9.2	7.6	Acceptable
MW-10-92	4A	6.4	-2.6	0.0	3.8	5.0	Above

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
							Threshold
MW-10-90	4B1	5.2	0.8	0.0	5.9	7.0	Above Threshold
MW-10-94	4B1	5.2	0.0	1.0	6.1	7.0	Above Threshold
MW-10-95	4B1	5.1	-2.2	1.0	3.8	5.0	Above Threshold
MW-11-142	4B1	5.4	0.0	0.0	5.4	4.0	Acceptable

bgs = below ground surface

Table 2 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.

Table 2 Anticipated Change in Flows

	Recent Flows (cfs)	Projected Flows for Evaluation (cfs)
Reach 1	1000	1100
Reach 2A	815	915
Reach 2B	690	784
Reach 3	170	170
Reach 4A	0	0
Reach 4B1 (ESB)	0	0

Table 3 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 1, 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 3 Predicted 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)	Predicted Shallowest Depth (feet bgs)	Field Threshold (feet bgs)	Comment
FA-9	2A	7.6	0.2	-3.7	2.5	6.2	5.0	Acceptable
MW-09-47	2A	7.9	0.2	-3.5	3.3	7.6	7.0	Acceptable
MA-4	2A	11.4	0.3	-6.1	4.6	9.6	7.0	Acceptable
MW-09-49B	2A	5.1	0.3	-1.7	2.4	5.6	4.5	Acceptable
MW-09-54B	2B	14.5	0.3	-7.9	5.5	11.8	10.0	Acceptable

MW-09-55B	2B	8.1	0.3	-3.7	3.0	7.1	7.0	Acceptable
PZ-09-R2B-1	2B	-	0.1	-1.3	0.0	-	5.0	Acceptable
PZ-09-R2B-2	2B	10.8	0.0	-3.9	0.0	-	4.5	Acceptable
PZ-09-R3-5	3	11.5	0.0	-1.2	0.0	10.3	5.0	Acceptable
PZ-09-R3-6	3	10.2	0.0	-1.5	0.0	8.8	4.0	Acceptable
PZ-09-R3-7	3	9.0	0.0	-0.7	0.0	8.3	3.5	Acceptable
MW-10-75	3	9.8	0.0	-0.5	0.2	9.5	6.3	Acceptable
MW-11-130	4A	6.6	0.0	0.0	0.0	6.6	5.0	Acceptable
MW-09-87B	4A	13.2	0.0	-1.9	1.0	12.3	4.2	Acceptable
MW-10-89	4A	12.7	0.0	-3.4	0.0	9.2	7.6	Acceptable
MW-10-92	4A	6.4	0.0	-2.6	0.0	3.8	5.0	Interceptor Line

Table 4 shows the predicted maximum rise in groundwater based the elevation of the water surface in the river and the conceptual model shown in Figure 2. Reclamation uses this drainage method where current groundwater levels are higher than thresholds without flows in the San Joaquin River.

Table 4: Predicted Groundwater Elevation for Key Wells

Well	Reach	Predicted Elevation in Model (feet)	Threshold Elevation (feet)	Drainage Method Comment
MW-10-90	4B1	94.0	95.1	Acceptable
MW-10-94	4B1	92.4	95.6	Acceptable
MW-10-95	4B1	92.4	92.8	Approximately at Threshold

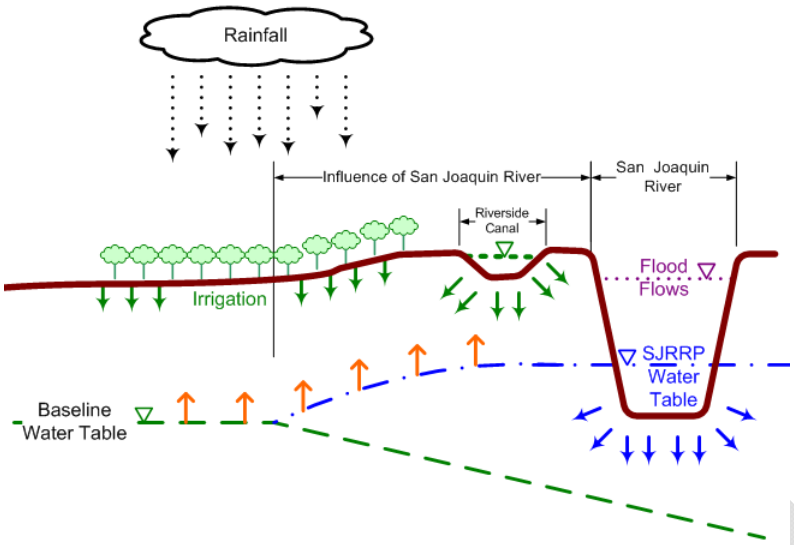
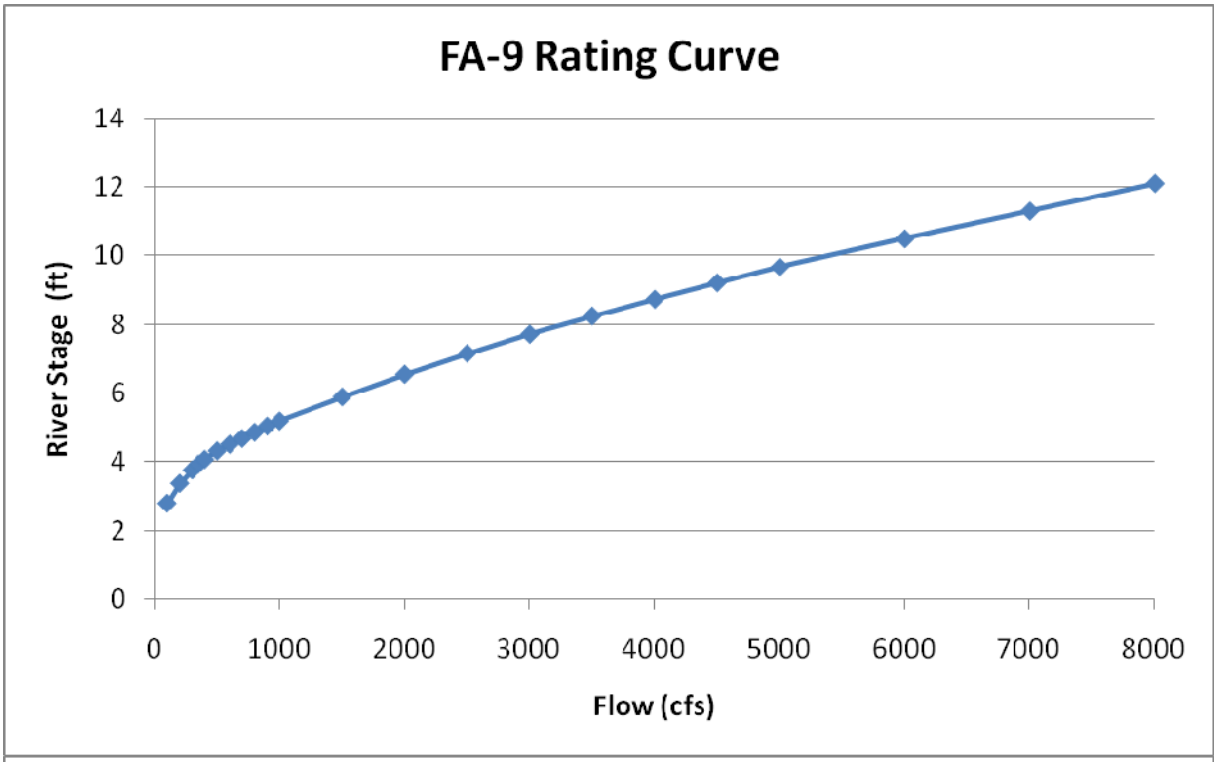
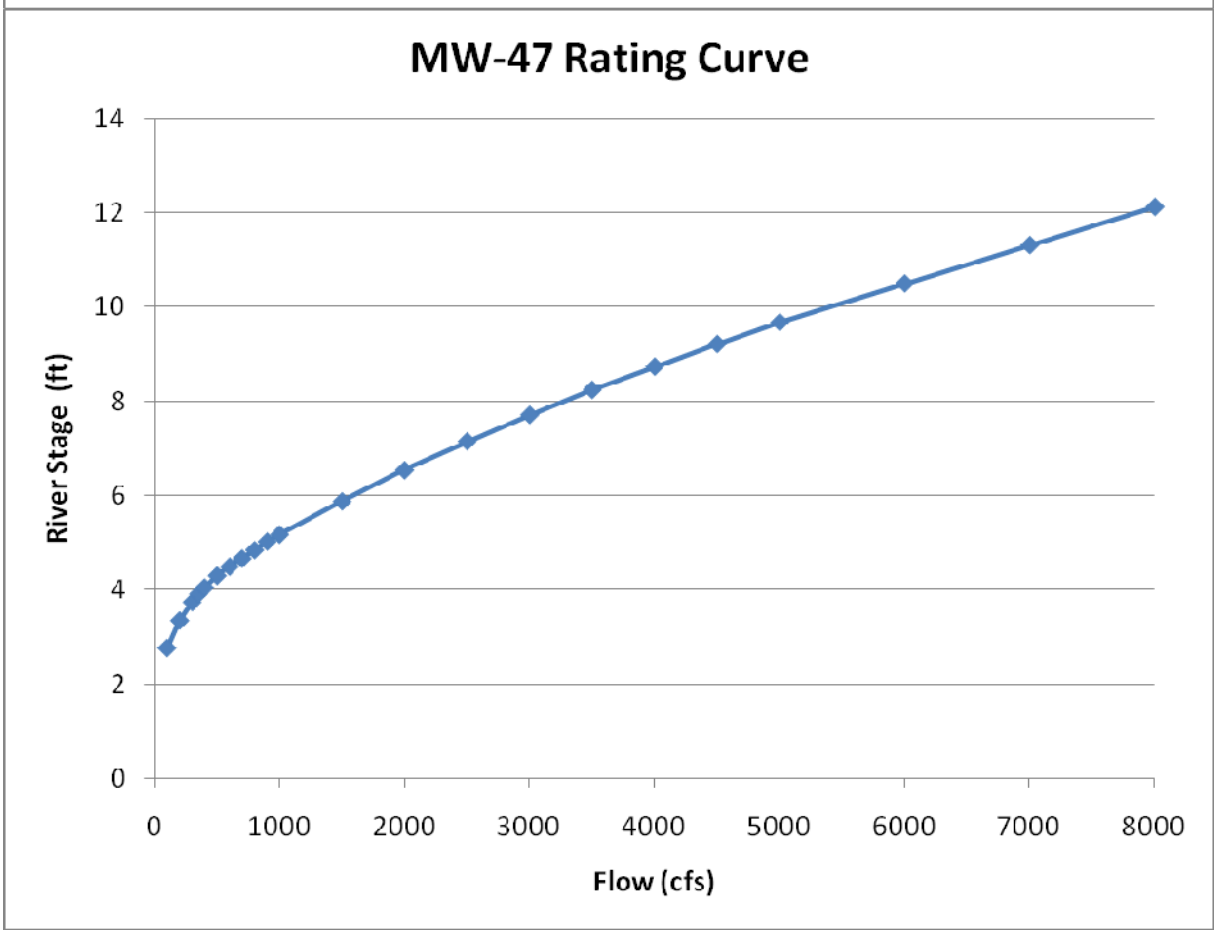
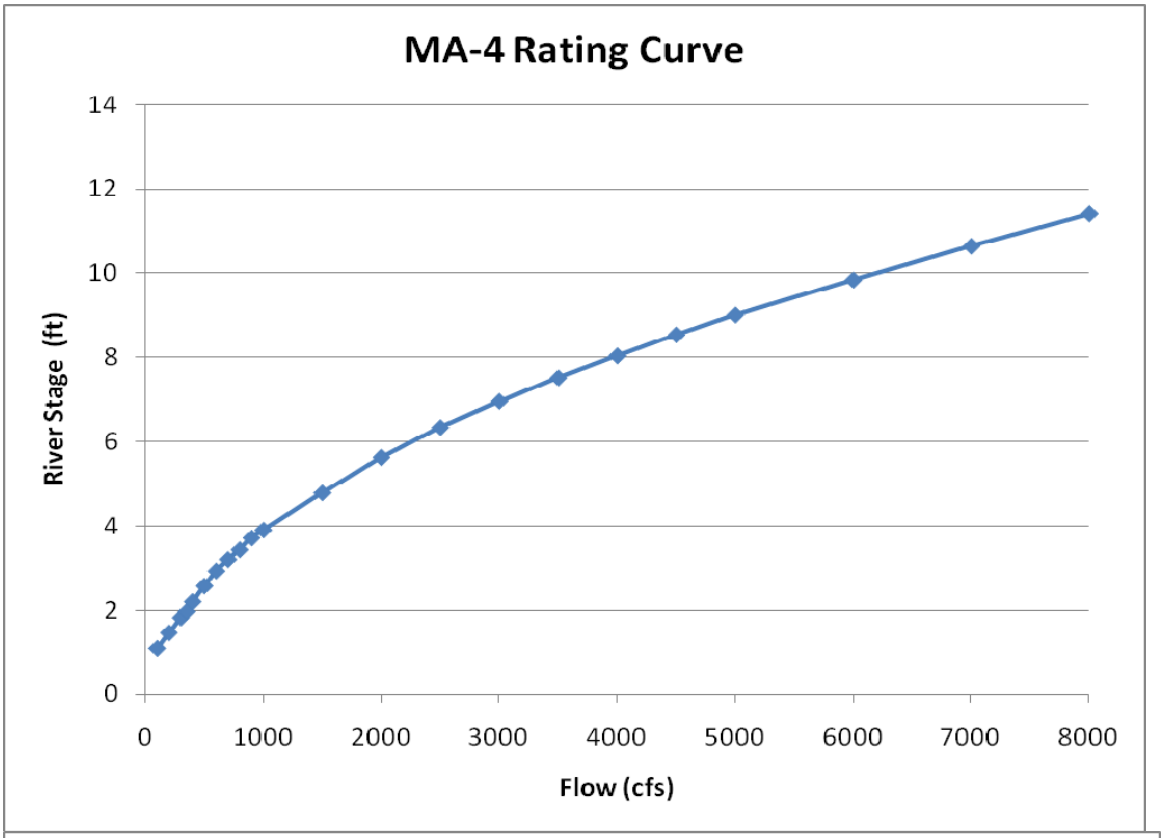
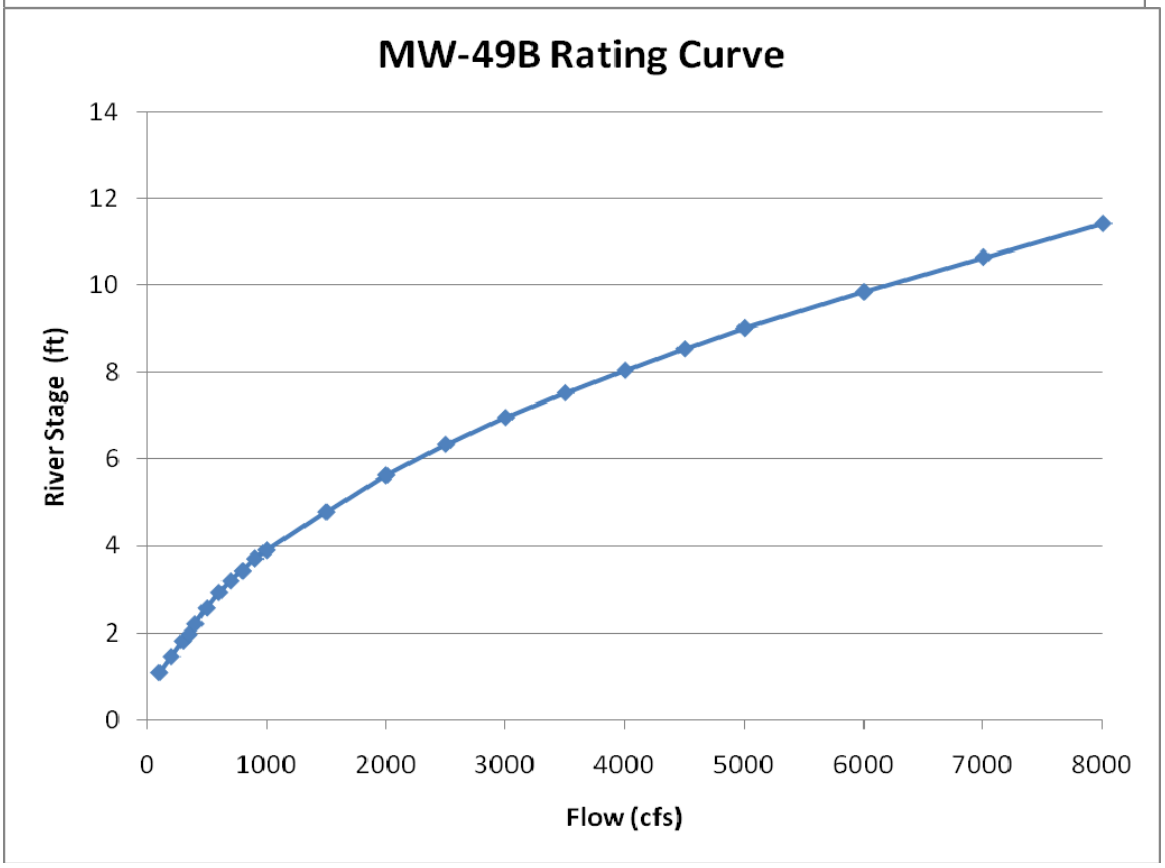


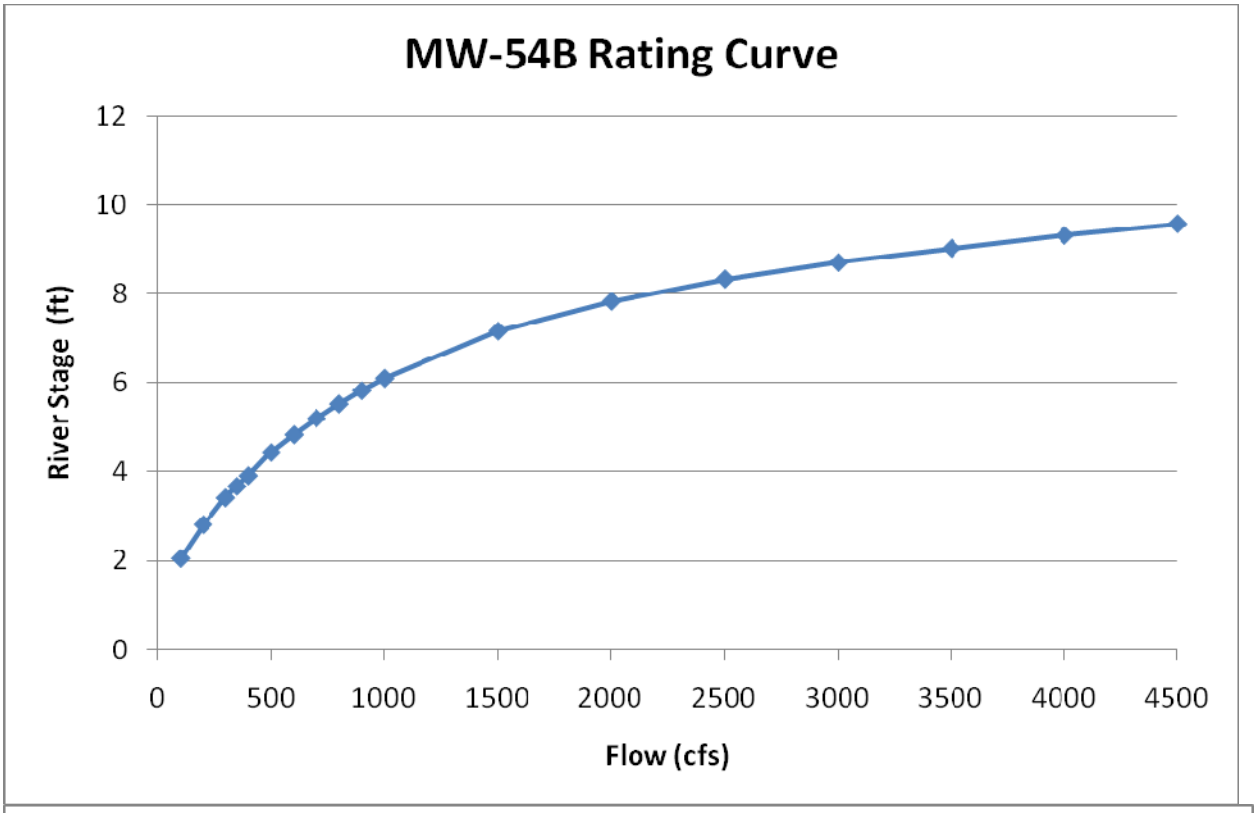
Figure 1 Conceptual Model for Flow Bench Evaluations Estimated Groundwater Depths

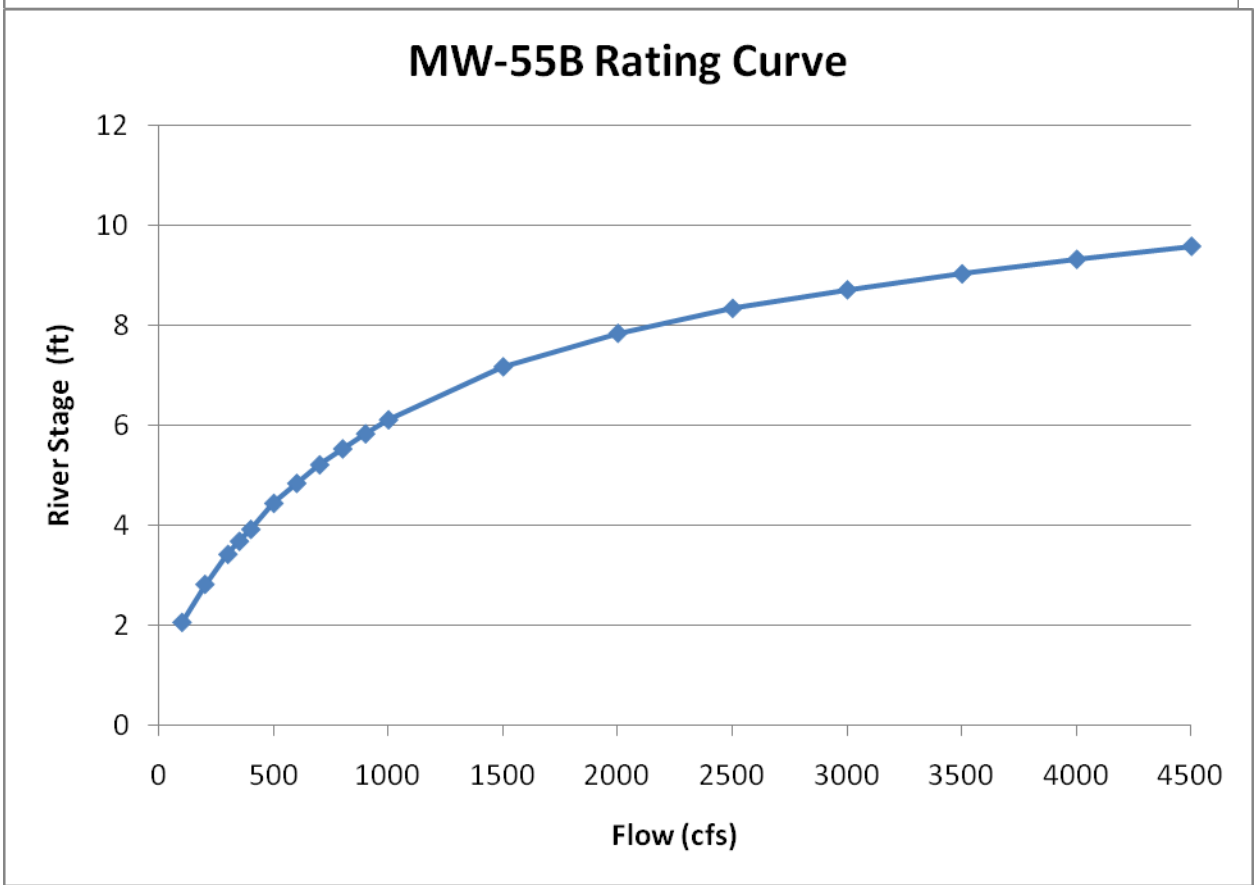

FA-9 Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
14
0
1000
2000
3000
4000
5000
6000
7000
8000
Flow (cfs)

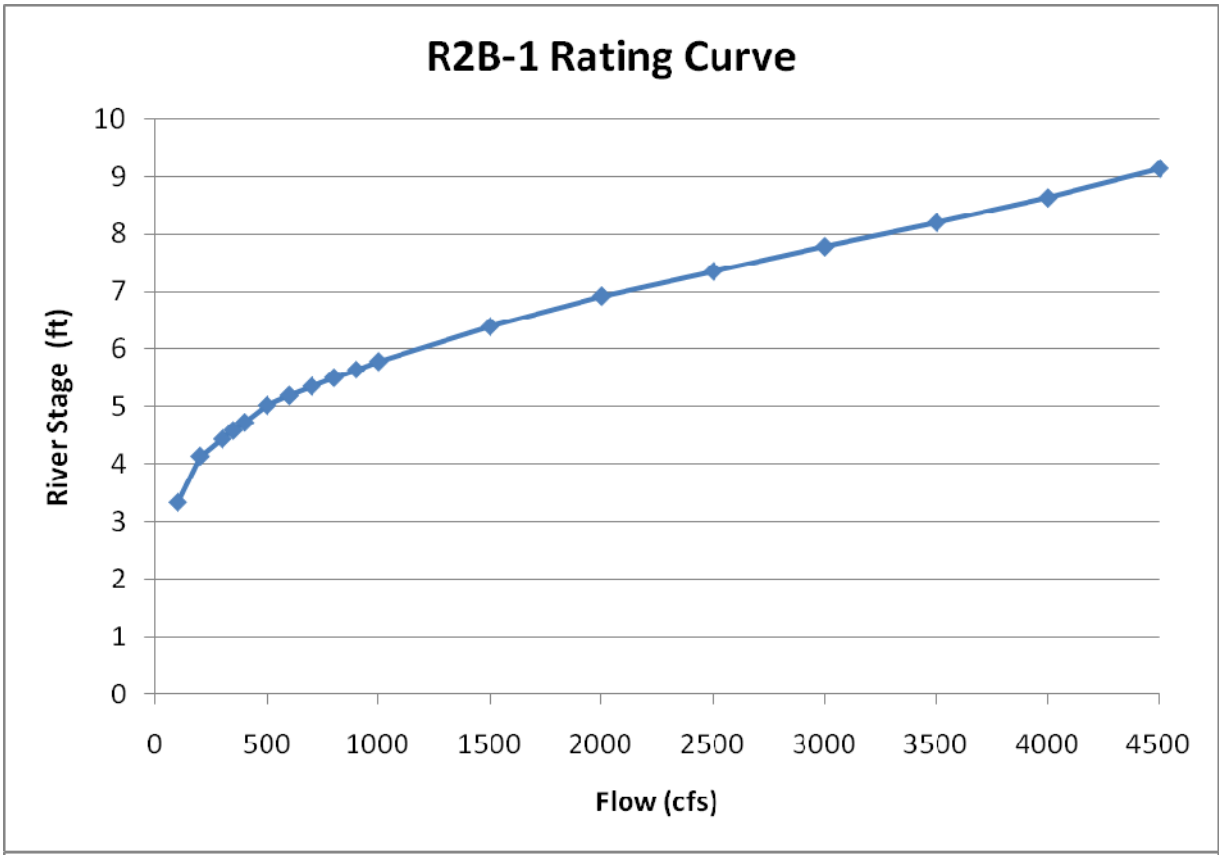

MW-47 Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
14
0
1000
2000
3000
4000
5000
6000
7000
8000
Flow (cfs)

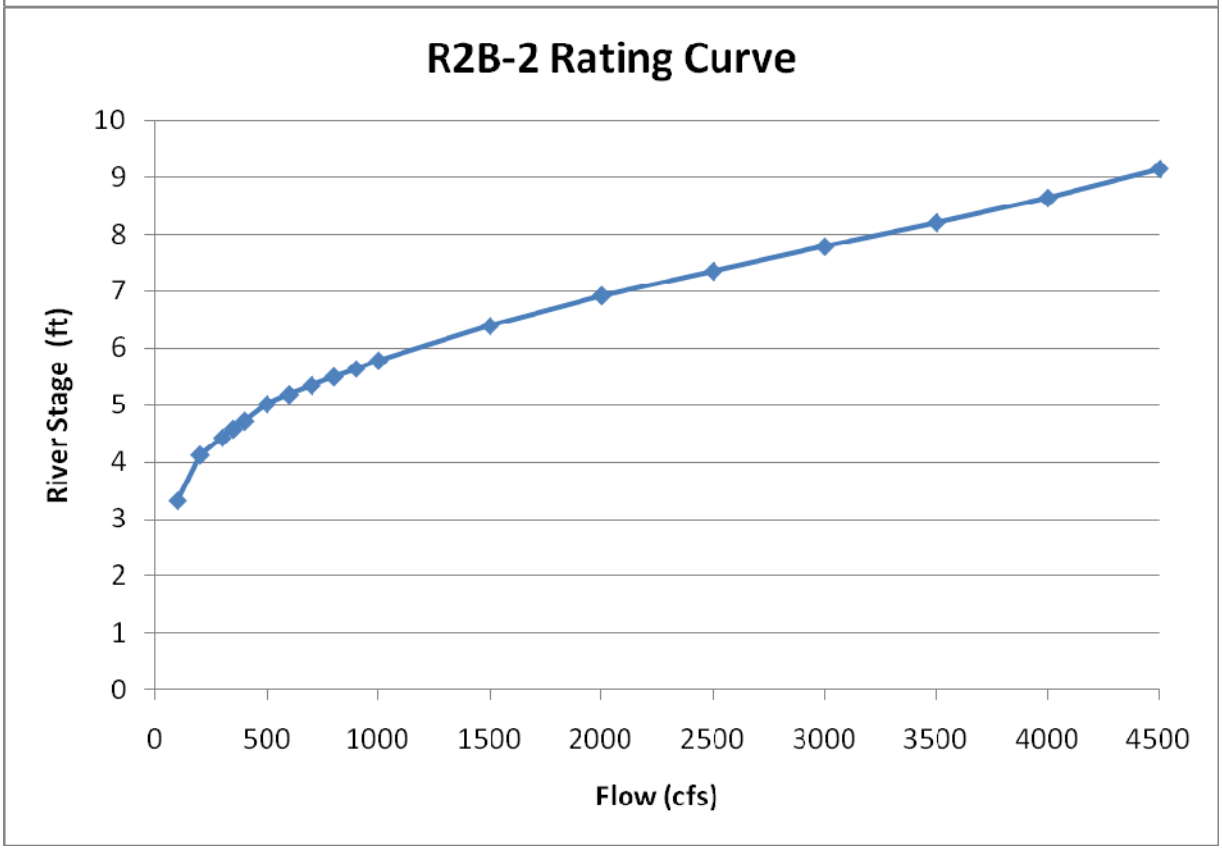

MA-4 Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
14
0
1000
2000
3000
4000
5000
6000
7000
8000
Flow (cfs)

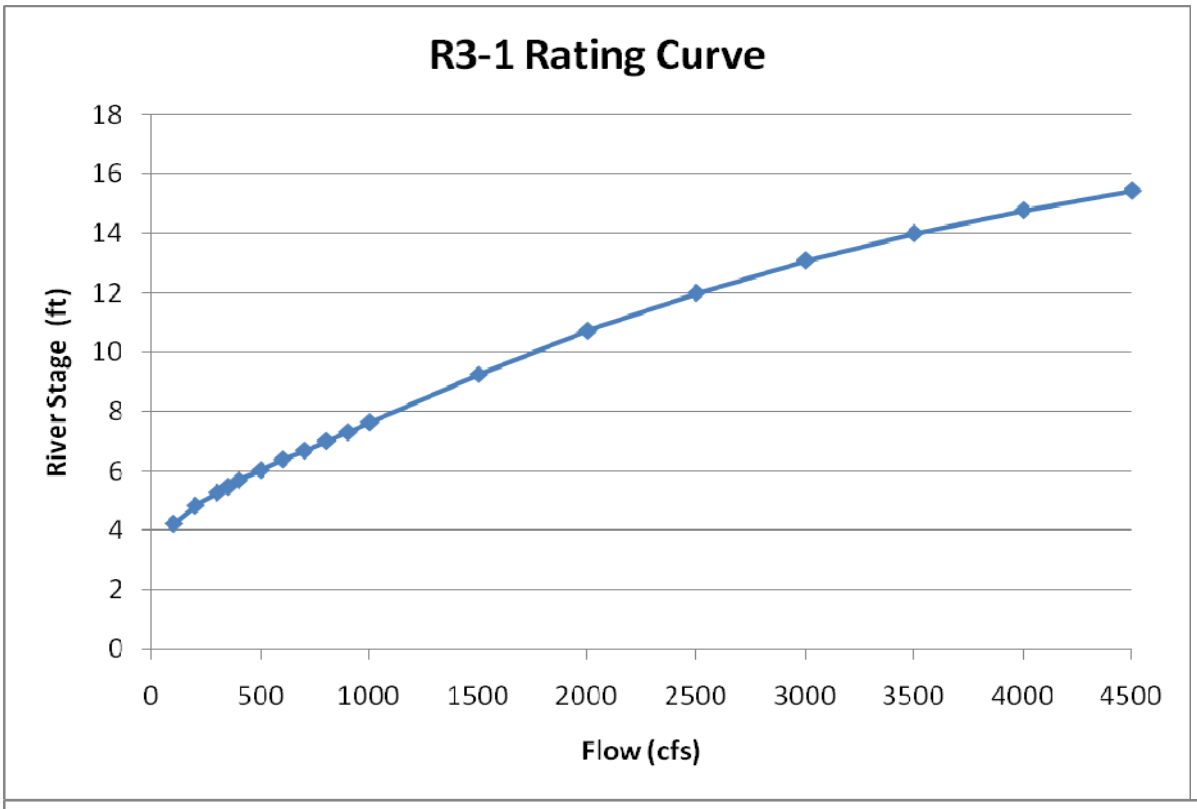

MW-49B Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
14
0
1000
2000
3000
4000
5000
6000
7000
8000
Flow (cfs)

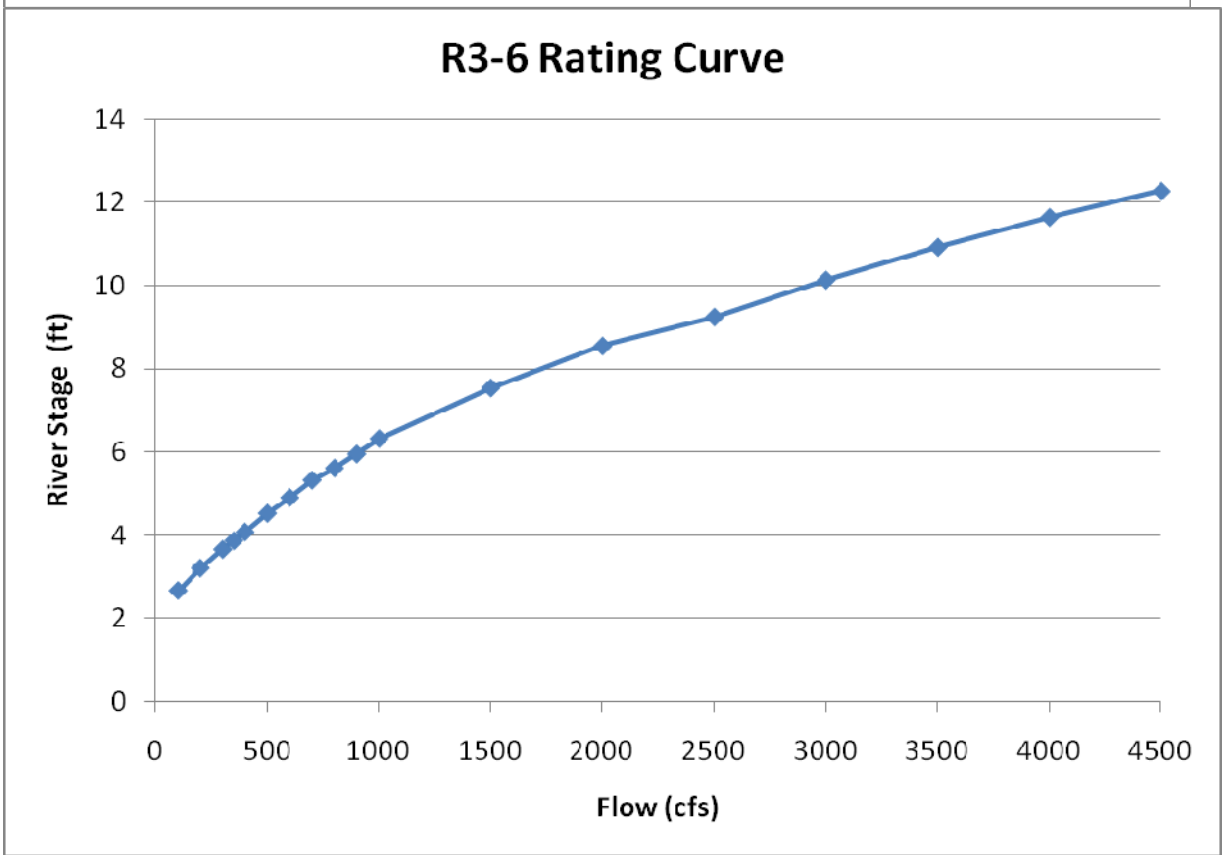

MW-54B Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)

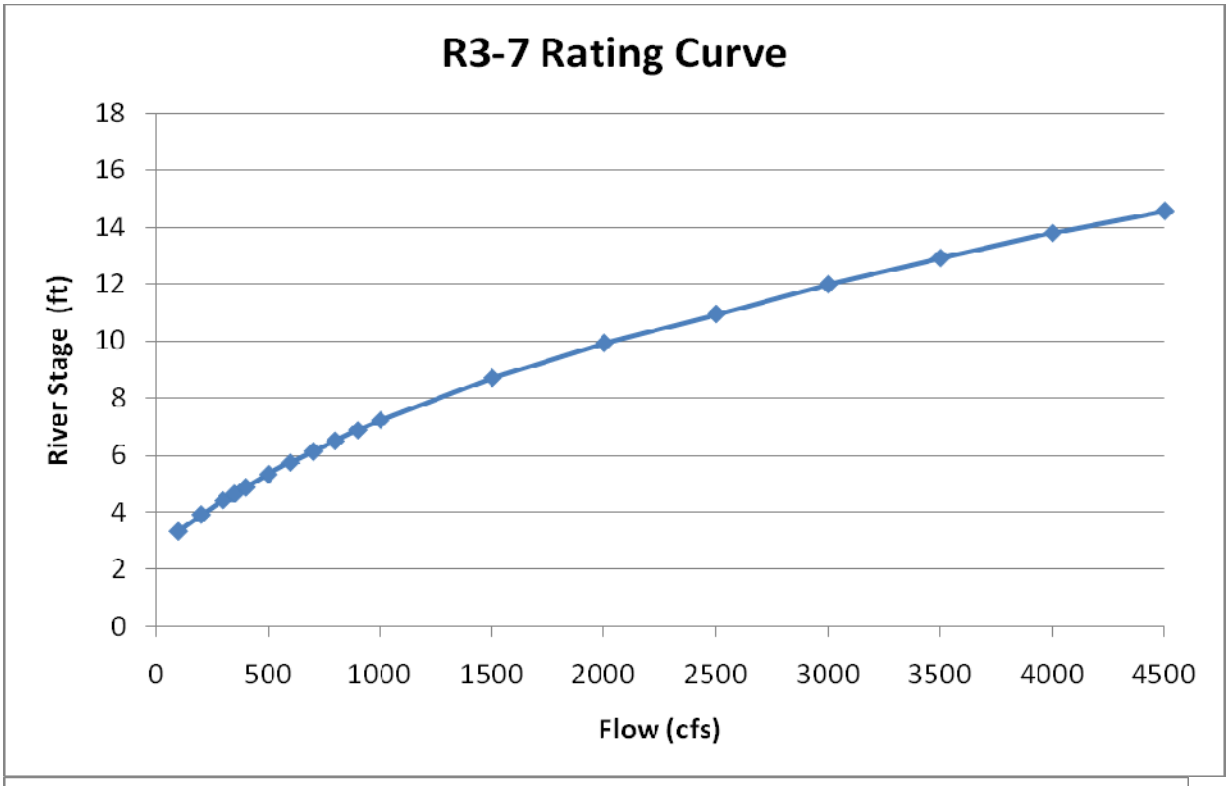

MW-55B Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)

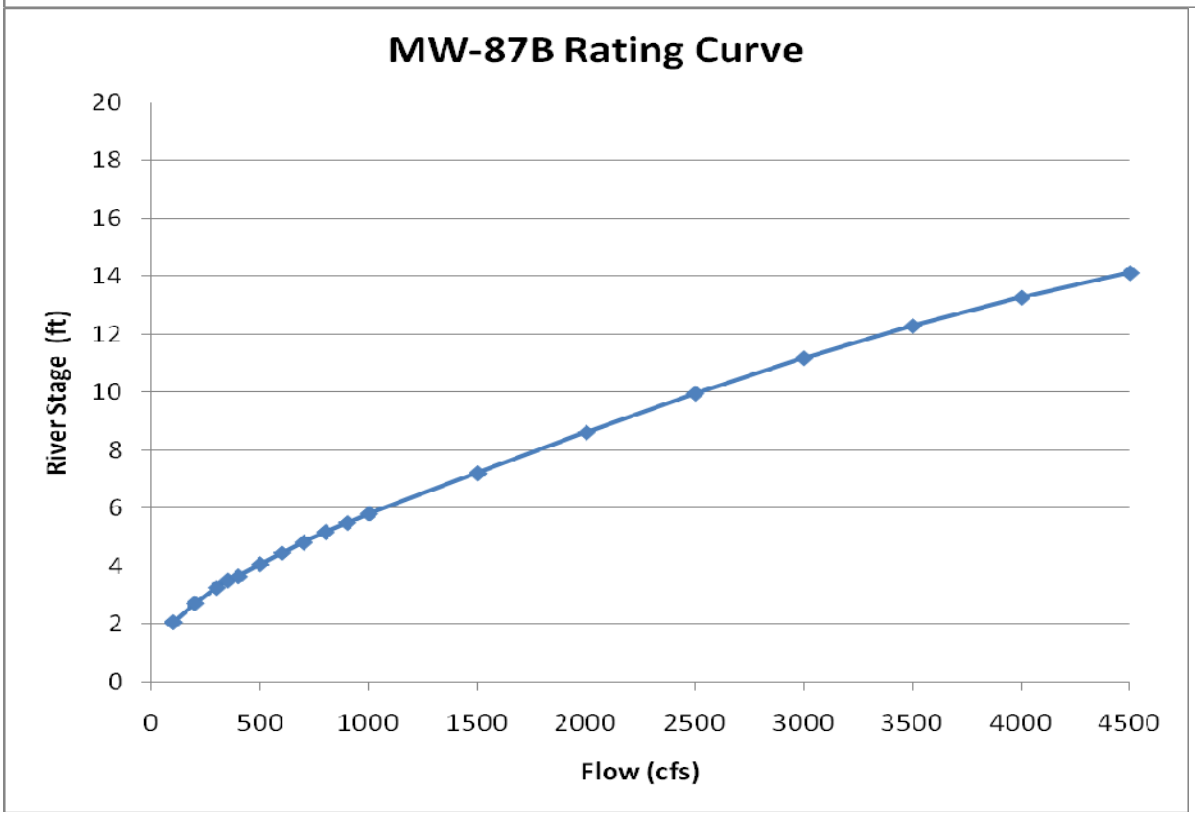

R2B-1 Rating Curve
River Stage (ft)
0
1
2
3
4
5
6
7
8
9
10
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)

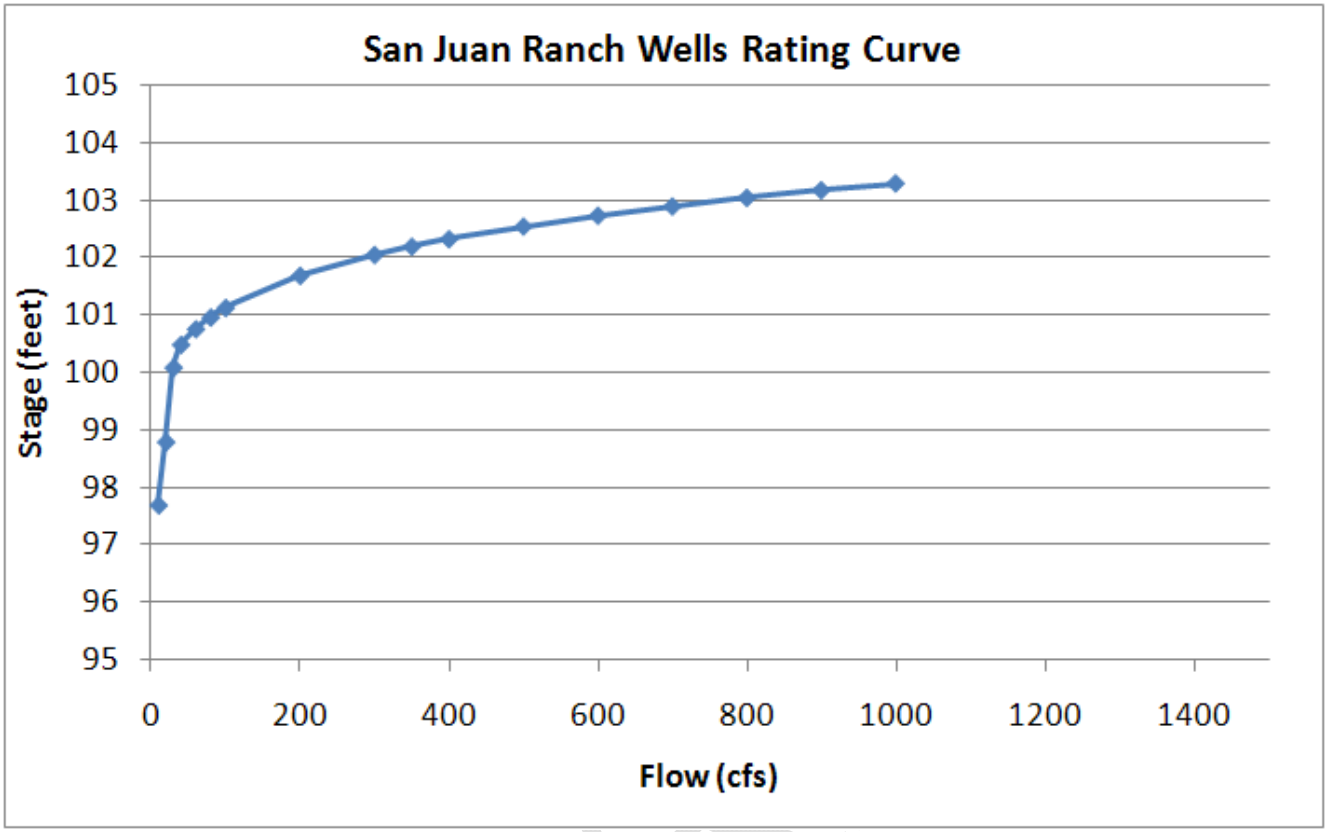

R2B-2 Rating Curve
River Stage (ft)
0
1
2
3
4
5
6
7
8
9
10
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)


R3-1 Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
14
16
18
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)


R3-6 Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
14
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)


R3-7 Rating Curve
River Stage (ft)
Flow (cfs)
0
2
4
6
8
10
12
14
16
18
0
500
1000
1500
2000
2500
3000
3500
4000
4500


MW-87B Rating Curve
River Stage (ft)
Flow (cfs)
0
2
4
6
8
10
12
14
16
18
20
0
500
1000
1500
2000
2500
3000
3500
4000
4500


San Juan Ranch Wells Rating Curve
Stage (feet)
105
104
103
102
101
100
99
98
97
96
95
0
200
400
600
800
1000
1200
1400
Flow (cfs)