# SJRRP Flow Bench Evaluation

January 13, 2012

In the September 14, 2011 recommendation, the Restoration Administrator scheduled a combined Interim Flow and riparian release from Friant Dam of 350 cfs starting January 16, 2012. Groundwater measurements indicate these releases will not exceed groundwater thresholds. Operation and maintenance considerations at Friant Dam require delaying the increase until January 17, 2012. Combined Interim Flow and riparian releases from Friant Dam will increase to 350 cfs on January 17, 2012. Flows below Sack Dam will remain at 0 cfs. Reclamation will conduct a flow bench evaluation when Interim Flows reach Mendota Pool to evaluate the groundwater conditions and determine the flow release below Sack Dam that will not exceed groundwater thresholds.

As of January 12, 2012:

1. Flow rates are below known conveyance thresholds.

2. Coordination calls did not identify any concerns.

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

4. Real-time groundwater monitoring identified groundwater levels below thresholds, see Table 1.

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 as described below.

6. Flows are currently zero so stability criteria does not apply.

7. Projected groundwater levels from the proposed increase in flow (Table 4) calculated based on groundwater levels measured the week of January 7, show projected groundwater levels below thresholds.

8. The LSJLD noted erosion control work occurring on levees, but had no concerns as equipment would be driven on top of levees and flows would not impact maintenance.

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. No water from the San Joaquin River currently reaches the Eastside Bypass. CCID's general manager noted water in the Eastside Bypass and through Sand Slough Control Structure. This well does not restrict planned releases from Friant Dam. Once Interim Flows reach Mendota Pool, Reclamation will conduct another flow bench evaluation of groundwater levels to evaluate the amount of flow that can pass below Sack Dam.

Priority well MW-10-90 (Reach 4B1 Eastside Bypass) measurements this week show depths to groundwater at 0.5 feet above the threshold. No water from the San Joaquin River currently reaches the Eastside Bypass. CCID's general manager noted water in the Eastside Bypass and through Sand Slough Control Structure. This well does not restrict planned releases from Friant Dam. Once Interim Flows reach Mendota Pool, Reclamation will conduct another flow bench evaluation of groundwater levels to evaluate the amount of flow that can pass below Sack Dam.

# Data

Table 1 shows the groundwater depth in 7 realtime wells as of January 12, 2012.

**Table 1 – Realtime Well Data as of 1/12/2012**

| 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 | 19.0 | -7.9 | 5.5 | 16.6 | 10.0 | Acceptable |
| PZ-09-R3-7 | 3 | 10.5 | -0.7 | 0.0 | 9.8 | 3.5 | Acceptable |
| MW-10-75 | 3 | 10.2 | -0.5 | 0.2 | 9.9 | 6.3 | Acceptable |
| MW-11-130 | 4A | 7.0 | 0.0 | 0.0 | 7.0 | 5.0 | Acceptable |
| MW-10-89 | 4A | 11.5 | -3.4 | 0.0 | 8.1 | 7.6 | Acceptable |
| MW-10-92 | 4A | 9.0 | -2.6 | 0.0 | 6.4 | 5.0 | Acceptable |
| MW-11-142 | 4B1 | 6.4 | 0.0 | 0.0 | 6.4 | 4.0 | Acceptable |

bgs = below ground surface

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.

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 with a publish date of January 7, 2012. 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 | 11.3 | -3.7 | 2.5 | 10.1 | 5.0 | Acceptable |
| MW-09-47 | 2A | 11.7 | -3.5 | 3.3 | 11.6 | 7.0 | Acceptable |
| MA-4 | 2A | 14.1 | -6.1 | 4.6 | 12.6 | 7.0 | Acceptable |
| MW-09-49B | 2A | 9.9 | -1.7 | 2.4 | 10.7 | 4.5 | Acceptable |
| MW-09-55B | 2B | 14.1 | -3.7 | 3.0 | 13.4 | 7.0 | Acceptable |
| PZ-09-R2B-1 | 2B | - | -1.3 | 0.0 | - | 5.0 | Acceptable |
| PZ-09-R2B-2 | 2B | 12.8 | -3.9 | 0.0 | 8.9 | 4.5 | Acceptable |
| PZ-09-R3-5 | 3 | 12.8 | -1.2 | 0.0 | 11.7 | 5.0 | Acceptable |
| PZ-09-R3-6 | 3 | 11.8 | -1.5 | 0.0 | 10.3 | 4.0 | Acceptable |
| MW-09-87B | 4A | 12.0 | -1.9 | 1.0 | 11.2 | 4.2 | Acceptable |
| MW-10-90 | 4B1 | 4.8 | 0.8 | 0.0 | 5.5 | 6.0 | Above Threshold |
| MW-10-94 | 4B1 | 6.5 | 0.0 | 1.0 | 7.4 | 7.0 | Acceptable |
| MW-10-95 | 4B1 | 4.6 | -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.

**Table 3 Anticipated Change in Flows**

| | Recent Flows (cfs) | Projected Flows (cfs) |
|---|---|---|
| Reach 1 | 100 | 255 |
| Reach 2A | 0 | 255 |
| Reach 2B | 0 | 175 |
| Reach 3 | 0 | 0[1] |
| Reach 4A | 0 | 0 |
| Reach 4B1 (ESB) | 0 | 0 |

[1] Does not include Arroyo Canal water supply deliveries

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) | Predicted Shallowest Depth (feet bgs) | Field Threshold (feet bgs) | Comment |
|---|---|---|---|---|---|---|---|---|
| FA-9 | 2A | 11.3 | 3.1 | -3.7 | 2.5 | 7.0 | 5.0 | Acceptable |
| MW-09-47 | 2A | 11.7 | 3.1 | -3.5 | 3.3 | 8.5 | 7.0 | Acceptable |
| MA-4 | 2A | 14.1 | 4.1 | -6.1 | 4.6 | 8.5 | 7.0 | Acceptable |
| MW-09-49B | 2A | 9.9 | 1.7 | -1.7 | 2.4 | 9.0 | 4.5 | Acceptable |
| MW-09-54B | 2B | 19.0 | 1.5 | -7.9 | 5.5 | 15.1 | 10.0 | Acceptable |
| MW-09-55B | 2B | 14.1 | 1.5 | -3.7 | 3.0 | 11.9 | 7.0 | Acceptable |
| PZ-09-R2B-1 | 2B | - | 0.1 | -1.3 | 0.0 | - | 5.0 | Acceptable |
| PZ-09-R2B-2 | 2B | 12.8 | 0.1 | -3.9 | 0.0 | 8.9 | 4.5 | Acceptable |

Note: bgs = below ground surface

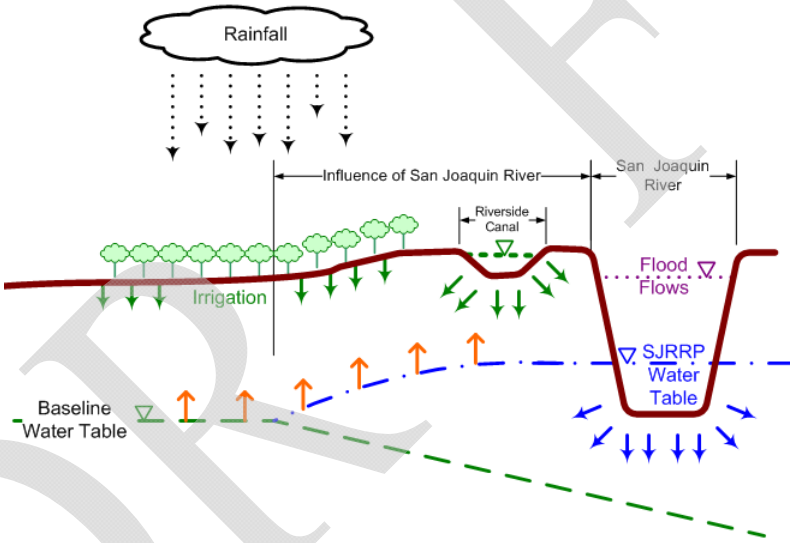
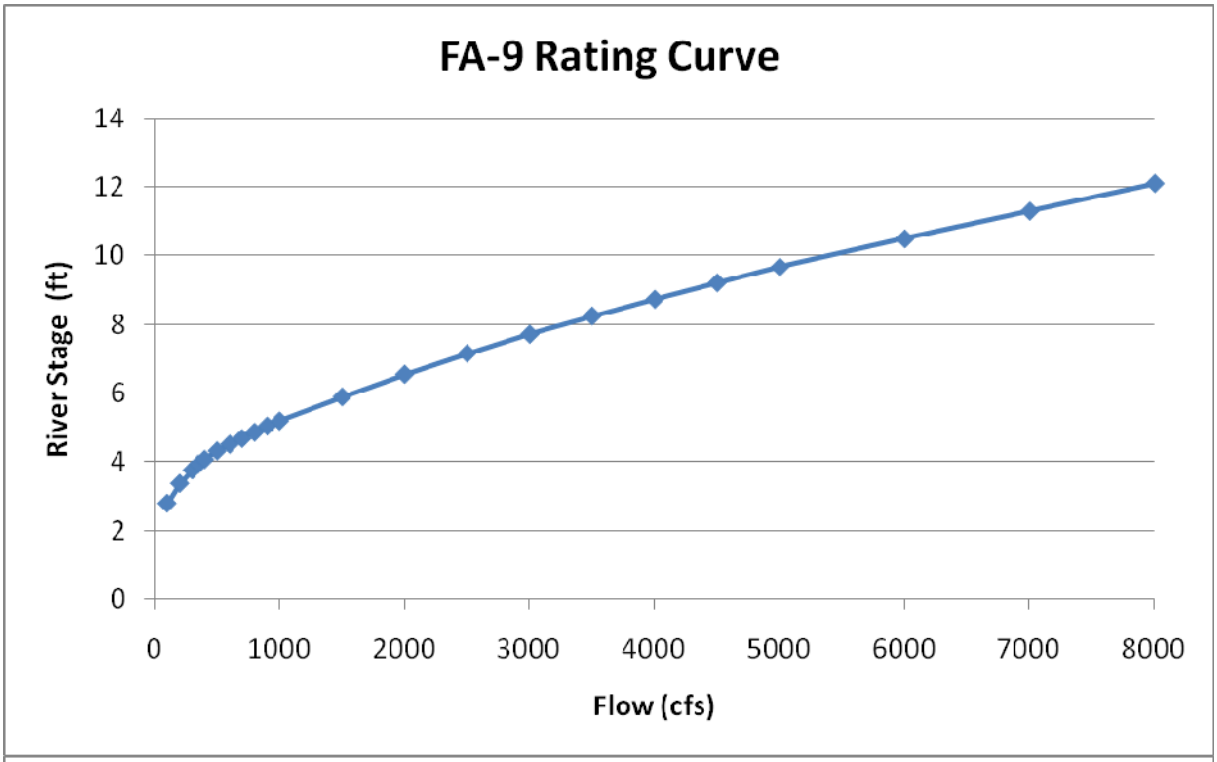
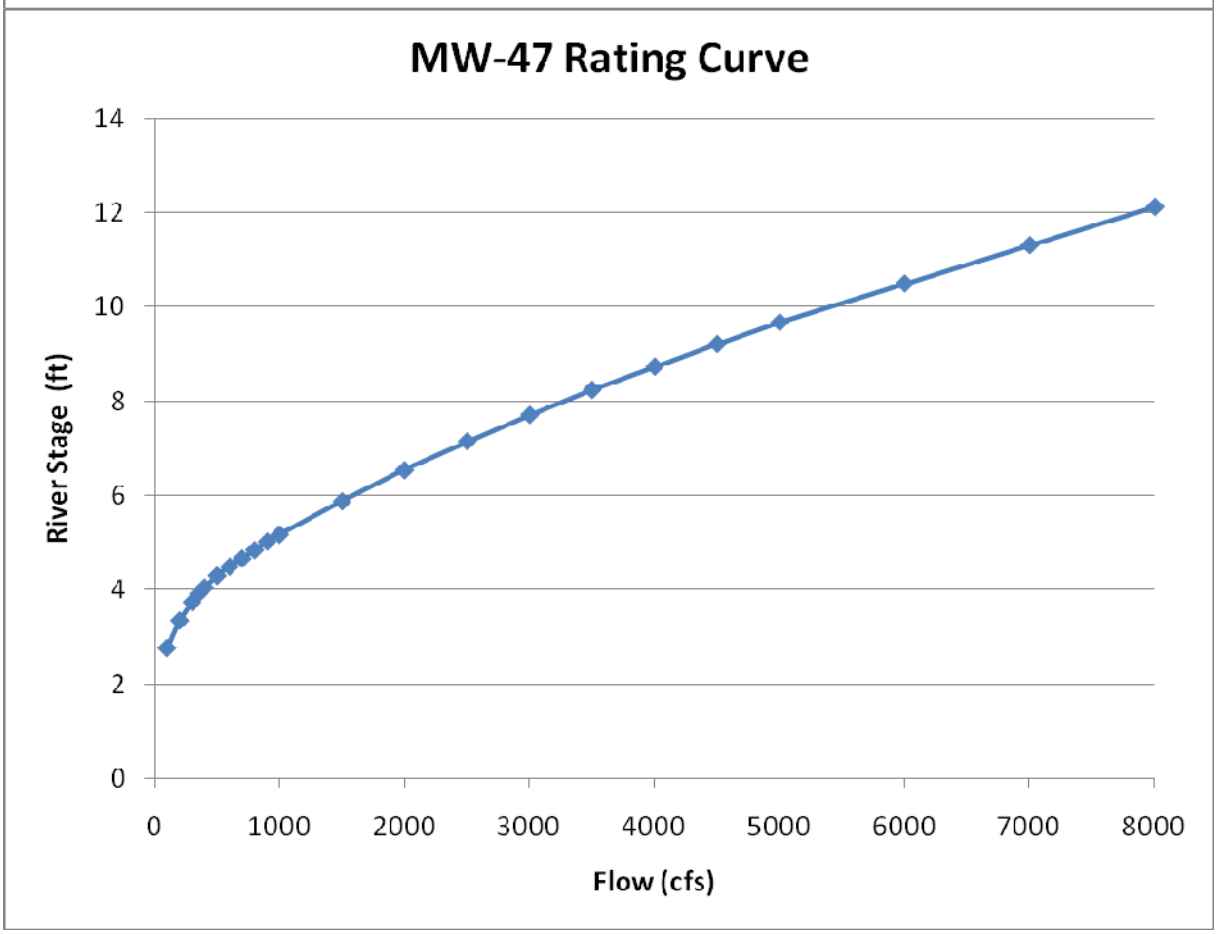
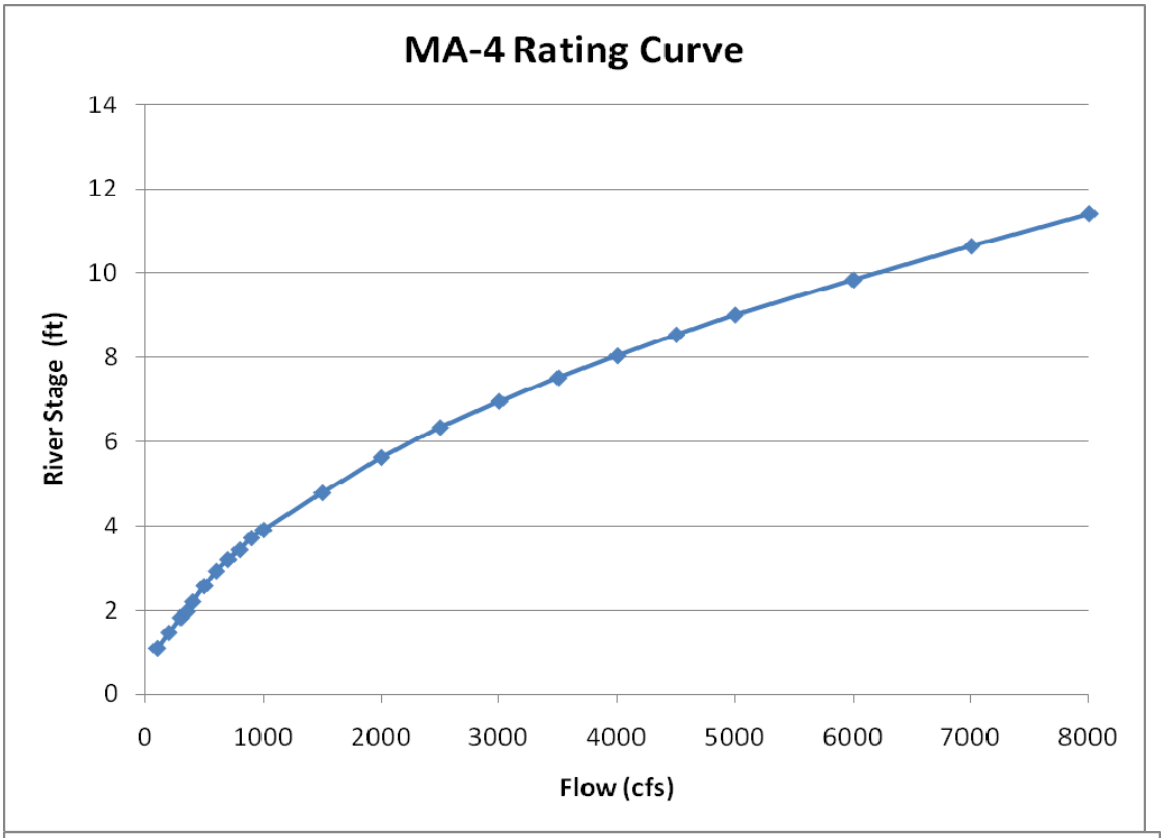
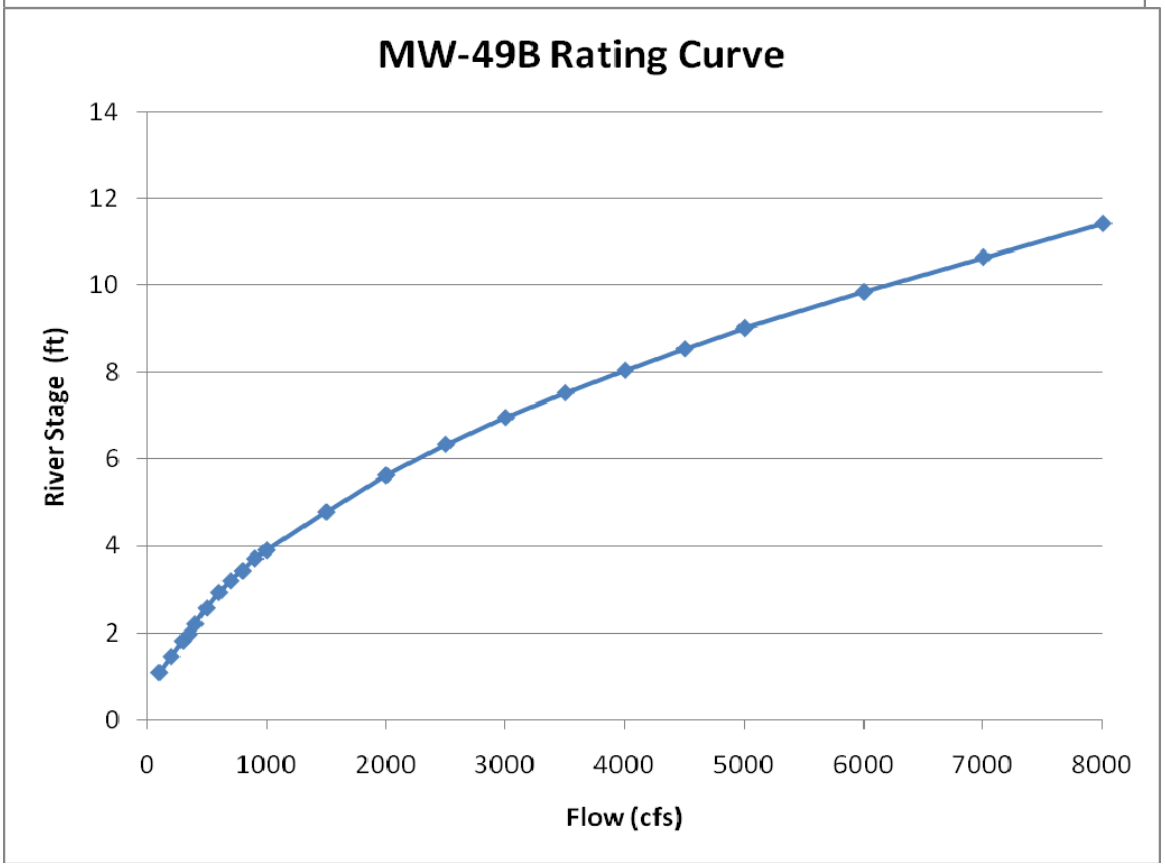


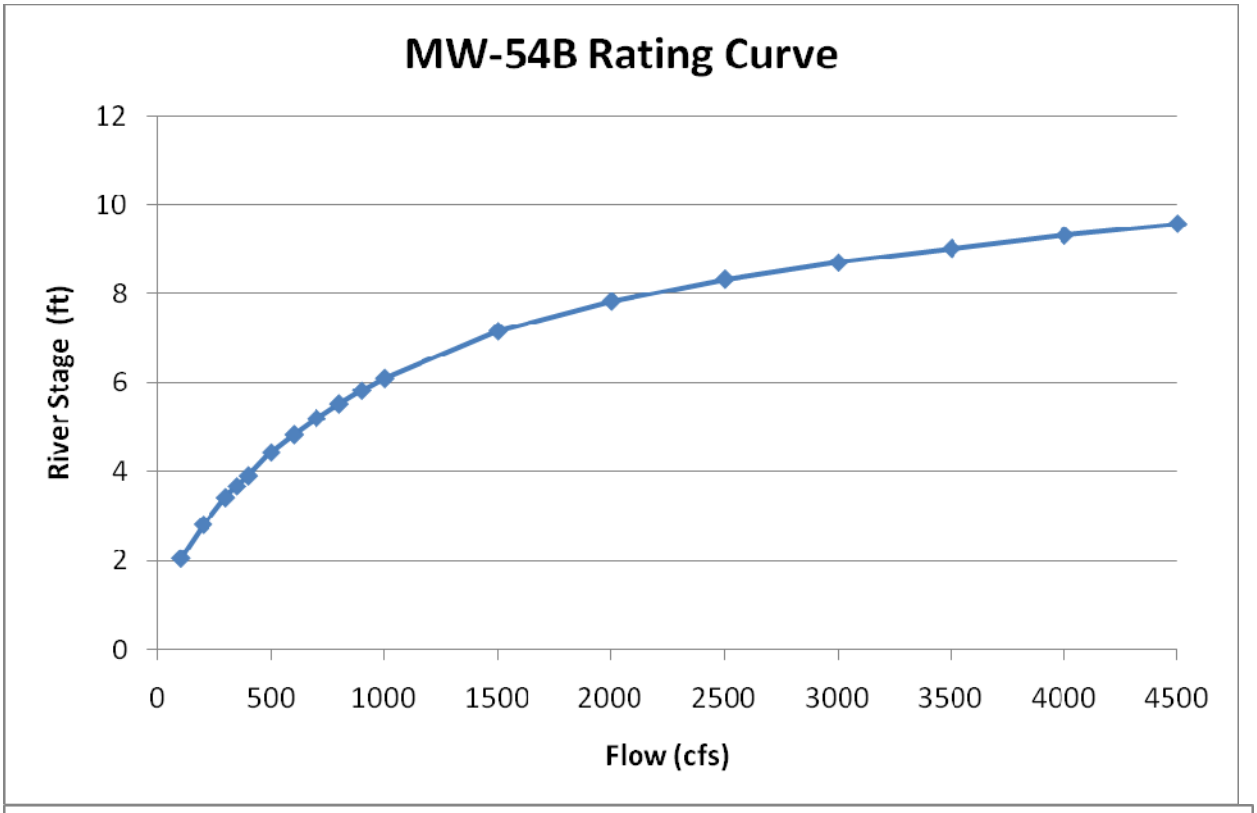

**Figure 1 Conceptual Model for Flow Bench Evaluations Estimated Groundwater Depths**

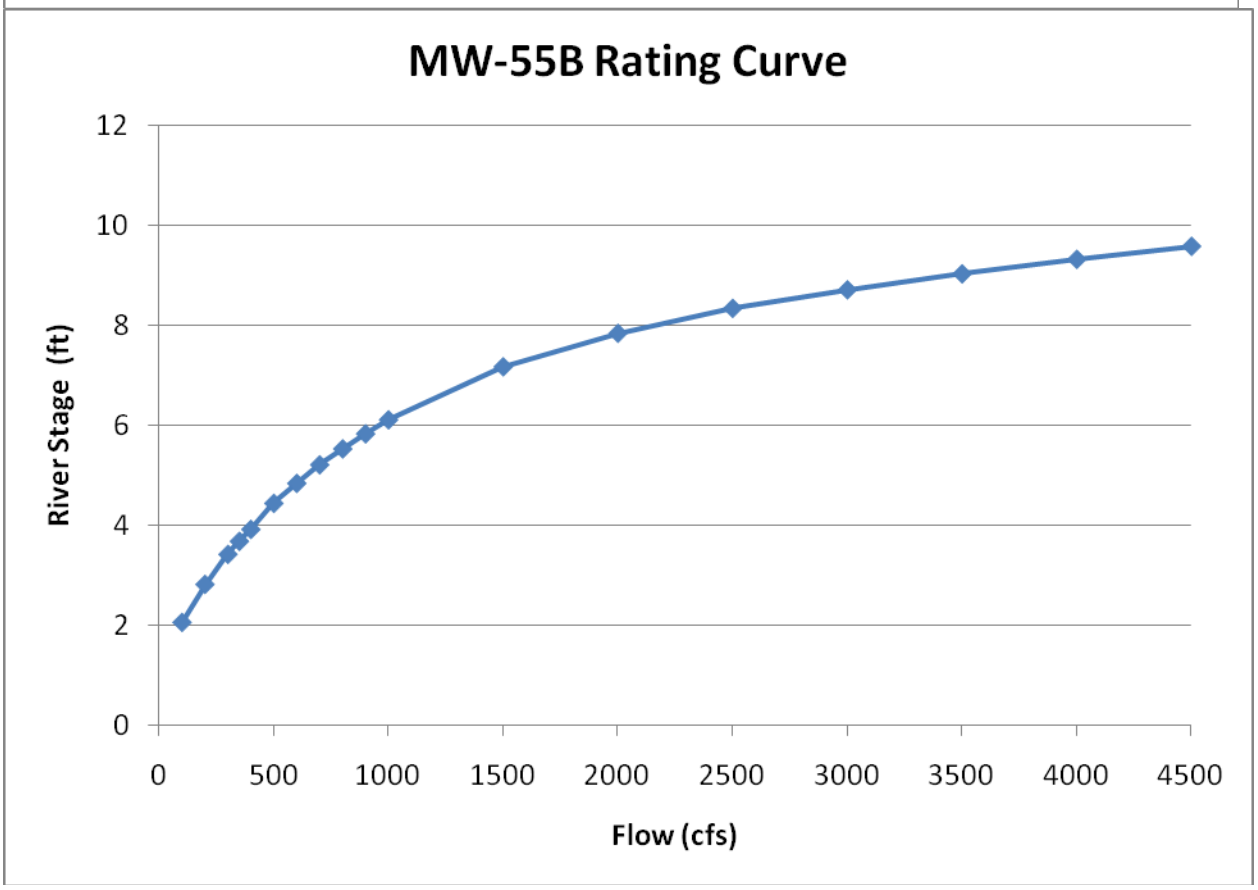

FA-9 Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
14
0
1000
2000
3000
4000
5000
6000
7000
8000
Flow (cfs)

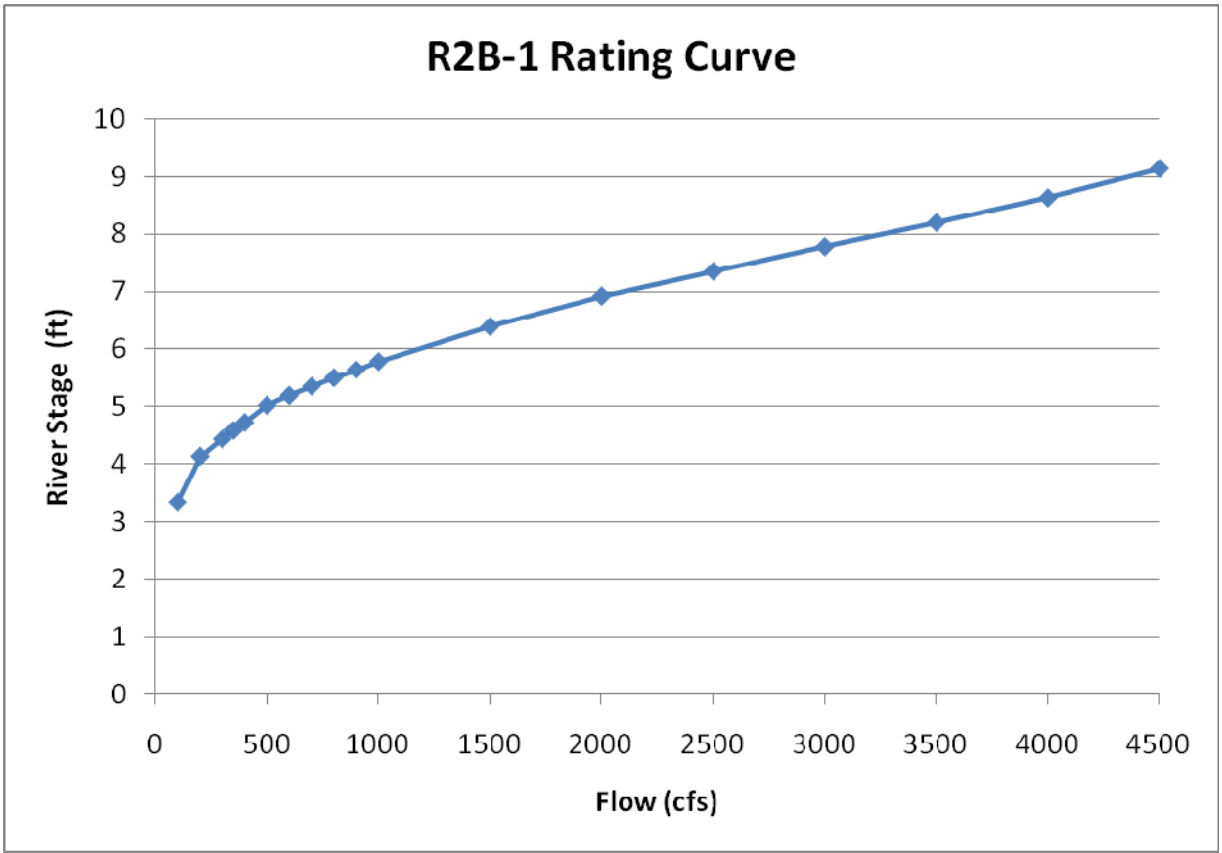

MW-47 Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
14
0
1000
2000
3000
4000
5000
6000
7000
8000
Flow (cfs)

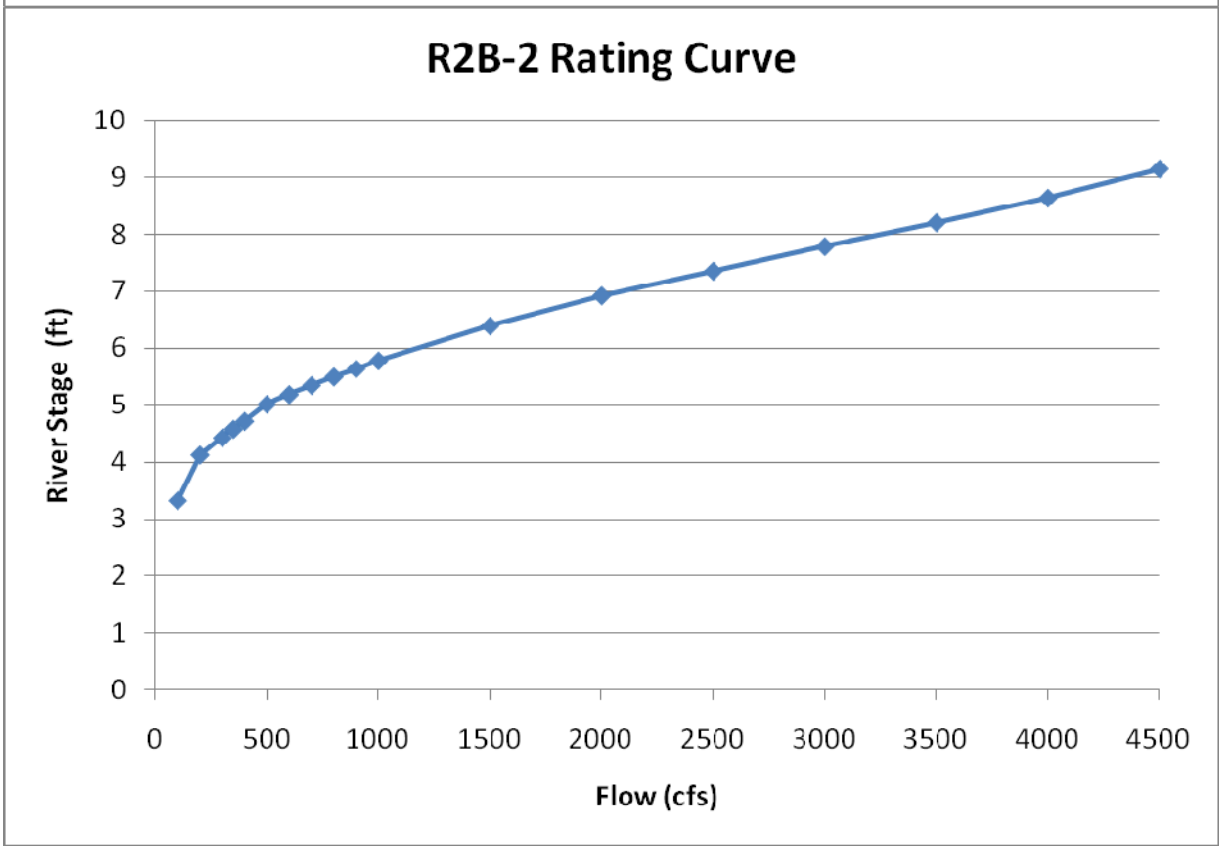

MA-4 Rating Curve
River Stage (ft)
Flow (cfs)
0
2
4
6
8
10
12
14
0
1000
2000
3000
4000
5000
6000
7000
8000

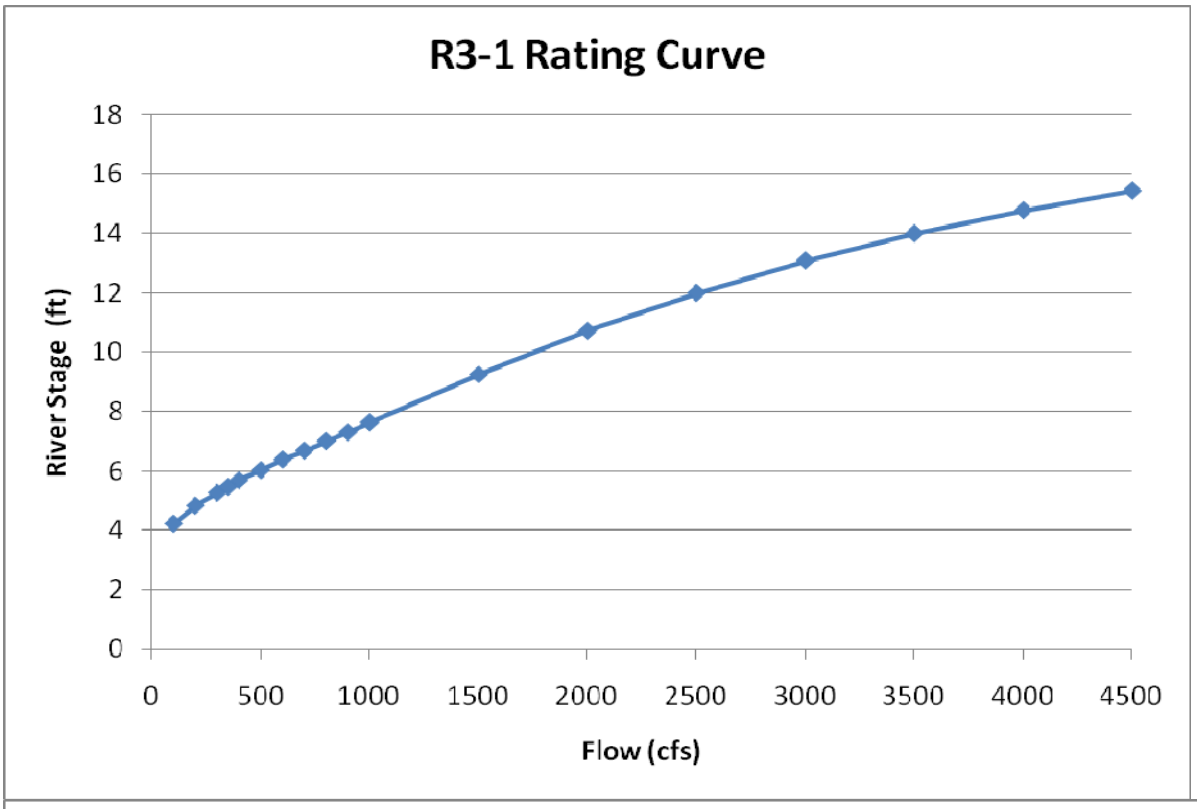

MW-49B Rating Curve
River Stage (ft)
Flow (cfs)
0
2
4
6
8
10
12
14
0
1000
2000
3000
4000
5000
6000
7000
8000

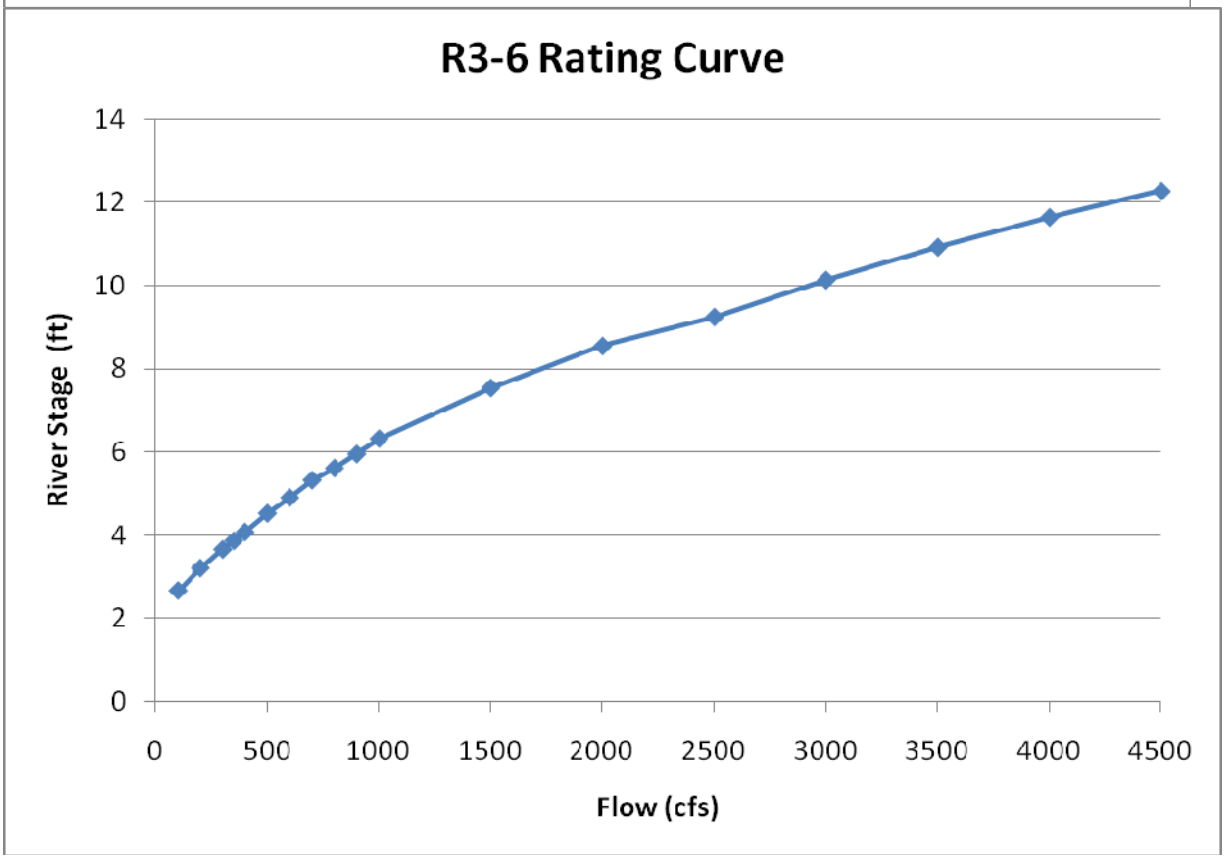

MW-54B Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)

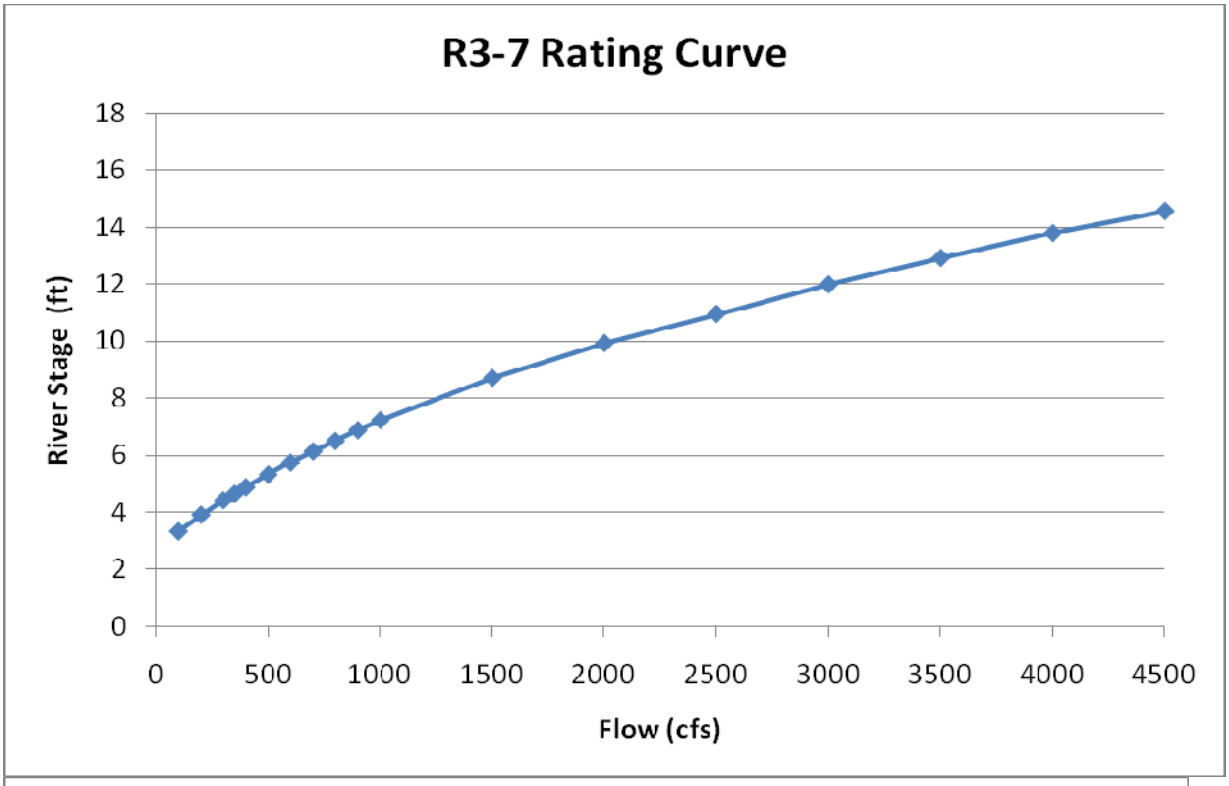

MW-55B Rating Curve
River Stage (ft)
0
2
4
6
8
10
12
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)

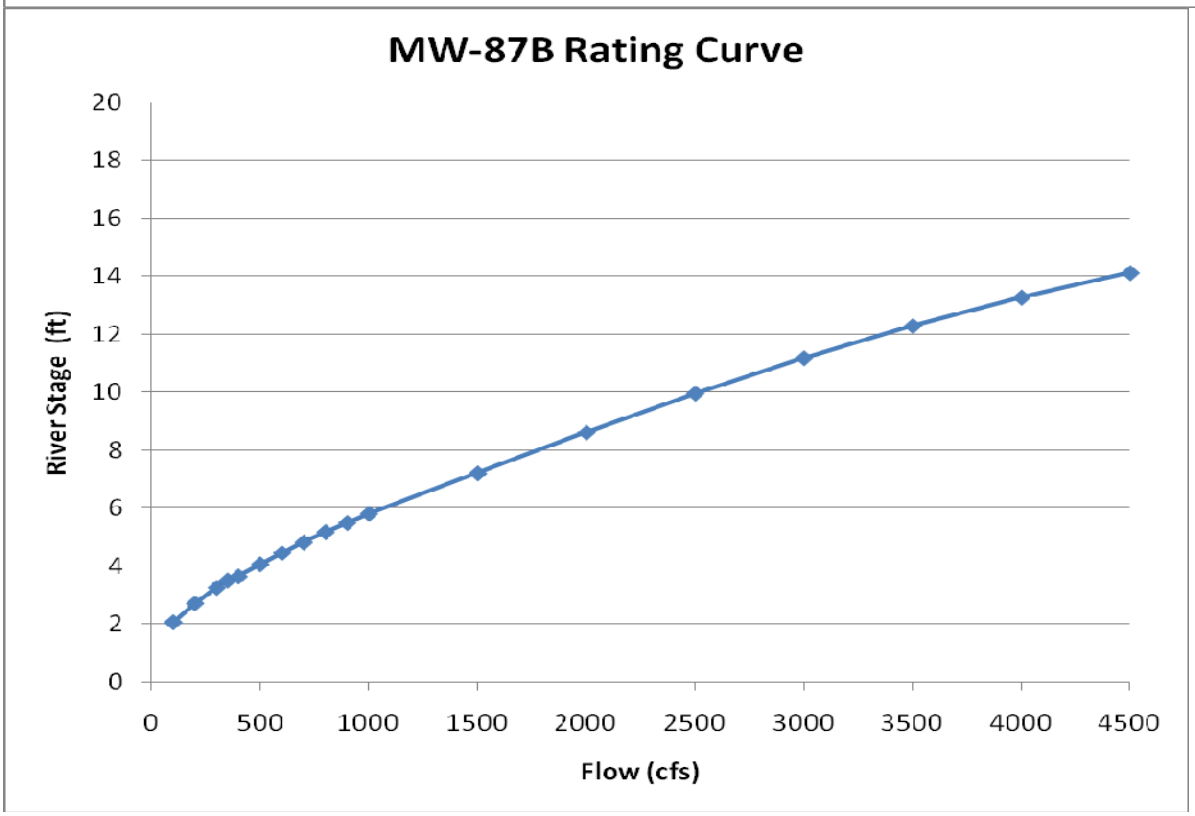

R2B-1 Rating Curve
River Stage (ft)
0
1
2
3
4
5
6
7
8
9
10
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)

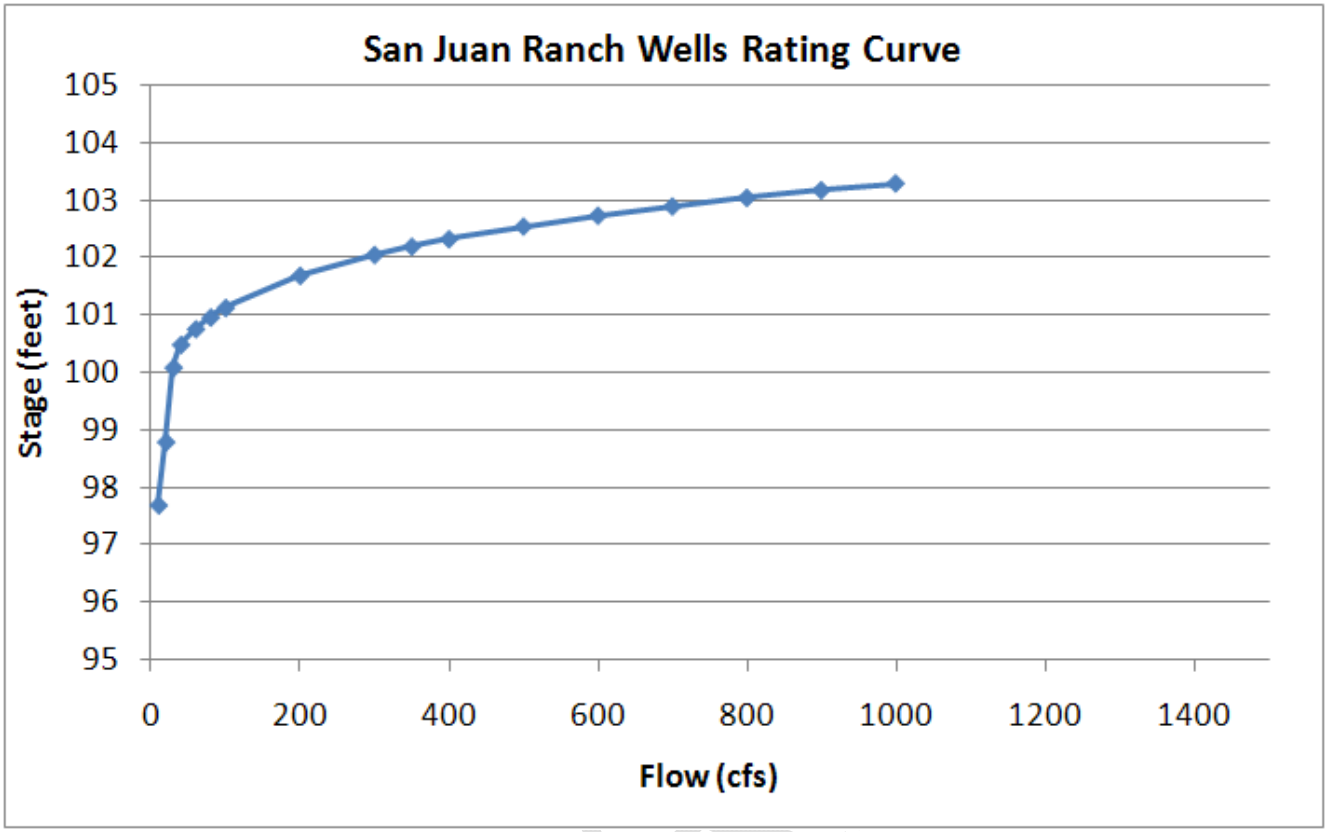

R2B-2 Rating Curve
River Stage (ft)
0
1
2
3
4
5
6
7
8
9
10
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)


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)
0
2
4
6
8
10
12
14
16
18
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Flow (cfs)


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


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)