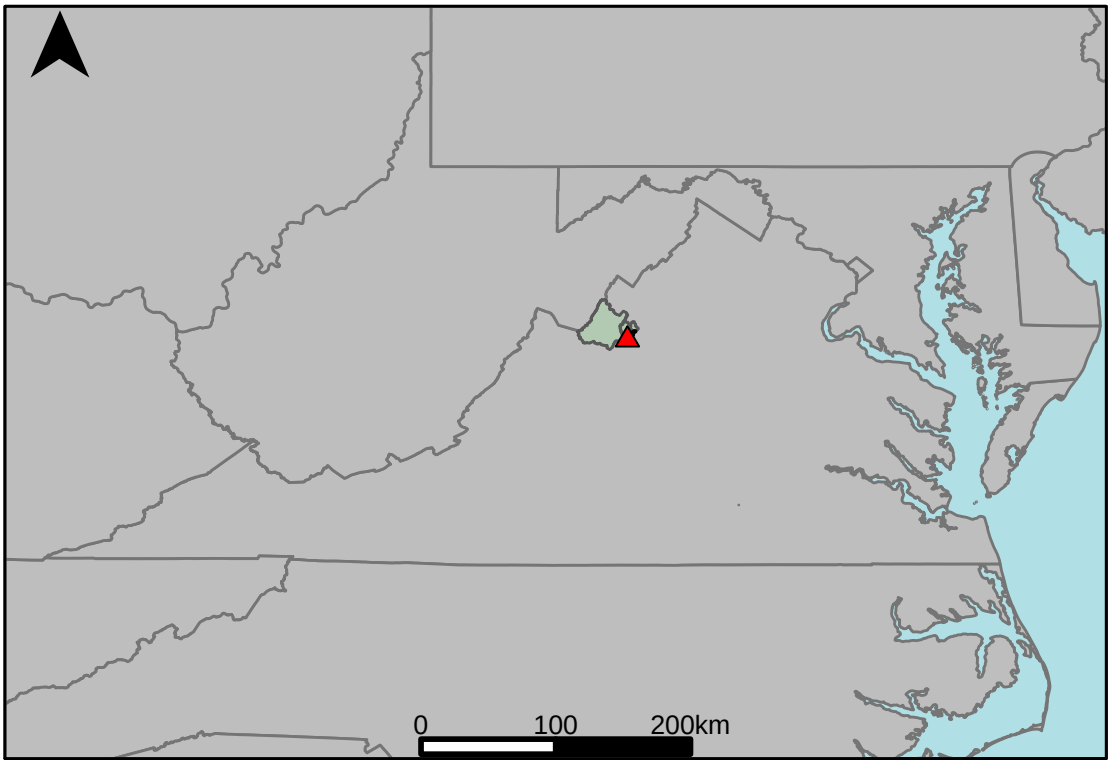
# Appendix B.4: USGS Gage 01622000 vs. PS3_6161_6280 Shenandoah River




This river segment follows part of the flow of the North River, a tributary of the Potomac. The gage is located in Rockingham County (Lat. 38°20'25.5", Long. -78°54'49.1"), approximately 2 miles southeast of Mount Crawford, VA. Drainage area is 376 sq. miles. This gage started taking data in 1926 and is still taking data. At a point 26.8 mi upstream, there is a diversion from the Staunton Dam Reservoir. Diurnal fluctuation at low and medium flow is caused by a wastewater treatment plant discharge and irrigation at points upstream. The average daily discharge error between the model and gage data for the 20 year timespan was 4.09%, with 46.7% of its rolling three month time spans above 20% error.

**Table 1: Monthly Low Flows**

| | USGS Gage | Model | Pct. Error |
|---|---|---|---|
| Jan. Low Flow | 74 | 48.6 | -34.3 |
| Feb. Low Flow | 101 | 84.2 | -16.6 |
| Mar. Low Flow | 148 | 161 | 8.78 |
| Apr. Low Flow | 169 | 191 | 13 |
| May Low Flow | 183 | 245 | 33.9 |
| Jun. Low Flow | 252 | 250 | -0.79 |
| Jul. Low Flow | 230 | 201 | -12.6 |
| Aug. Low Flow | 180 | 164 | -8.89 |
| Sep. Low Flow | 122 | 96.1 | -21.2 |
| Oct. Low Flow | 87 | 61.9 | -28.9 |
| Nov. Low Flow | 84 | 54.9 | -34.6 |
| Dec. Low Flow | 75 | 38.3 | -48.9 |

**Table 2: Monthly Average Flows**

| | USGS Gage | Model | Pct. Error |
|---|---|---|---|
| Overall Mean Flow | 416 | 399 | -4.09 |
| Jan. Mean Flow | 519 | 468 | -9.83 |
| Feb. Mean Flow | 486 | 591 | 21.6 |
| Mar. Mean Flow | 720 | 722 | 0.28 |
| Apr. Mean Flow | 601 | 528 | -12.1 |
| May Mean Flow | 526 | 401 | -23.8 |
| Jun. Mean Flow | 371 | 296 | -20.2 |
| Jul. Mean Flow | 190 | 211 | 11.1 |
| Aug. Mean Flow | 214 | 188 | -12.1 |
| Sep. Mean Flow | 393 | 405 | 3.05 |
| Oct. Mean Flow | 212 | 239 | 12.7 |
| Nov. Mean Flow | 380 | 407 | 7.11 |
| Dec. Mean Flow | 393 | 352 | -10.4 |

**Table 3: Monthly High Flows**

| | USGS Gage | Model | Pct. Error |
|---|---|---|---|
| Jan. High Flow | 206 | 401 | 94.7 |
| Feb. High Flow | 1240 | 946 | -23.7 |
| Mar. High Flow | 1050 | 495 | -52.9 |
| Apr. High Flow | 1040 | 1360 | 30.8 |
| May High Flow | 737 | 624 | -15.3 |
| Jun. High Flow | 2060 | 2050 | -0.48 |
| Jul. High Flow | 1440 | 1440 | 0 |
| Aug. High Flow | 1400 | 778 | -44.4 |
| Sep. High Flow | 462 | 630 | 36.4 |
| Oct. High Flow | 366 | 583 | 59.3 |
| Nov. High Flow | 280 | 343 | 22.5 |
| Dec. High Flow | 202 | 305 | 51 |

**Table 4: Period Low Flows**

| | USGS Gage | Model | Pct. Error |
|---|---|---|---|
| Min. 1 Day Min | 30 | 13.1 | -56.3 |
| Med. 1 Day Min | 63 | 27 | -57.1 |
| Min. 3 Day Min | 30.7 | 13.2 | -57 |
| Med. 3 Day Min | 64.3 | 28.3 | -56 |
| Min. 7 Day Min | 32.3 | 13.5 | -58.2 |
| Med. 7 Day Min | 66.9 | 30.6 | -54.3 |
| Min. 30 Day Min | 37.7 | 17.1 | -54.6 |
| Med. 30 Day Min | 78.8 | 52.5 | -33.4 |
| Min. 90 Day Min | 50.2 | 32.1 | -36.1 |
| Med. 90 Day Min | 110 | 120 | 9.09 |
| 7Q10 | 39.9 | 16.6 | -58.4 |
| Year of 90-Day Min. Flow | 1999 | 1999 | 0 |
| Drought Year Mean | 145 | 184 | 26.9 |
| Mean Baseflow | 206 | 206 | 0 |

**Table 5: Period High Flows**

| | USGS Gage | Model | Pct. Error |
|---|---|---|---|
| Max. 1 Day Max | 32000 | 31700 | -0.94 |
| Med. 1 Day Max | 4070 | 5650 | 38.8 |
| Max. 3 Day Max | 21500 | 15700 | -27 |
| Med. 3 Day Max | 3310 | 2910 | -12.1 |
| Max. 7 Day Max | 11100 | 8260 | -25.6 |
| Med. 7 Day Max | 2190 | 2180 | -0.46 |
| Max. 30 Day Max | 3230 | 2560 | -20.7 |
| Med. 30 Day Max | 1110 | 1100 | -0.9 |
| Max. 90 Day Max | 1670 | 1690 | 1.2 |
| Med. 90 Day Max | 652 | 661 | 1.38 |

**Table 6: Non-Exceedance Flows**

| | USGS Gage | Model | Pct. Error |
|---|---|---|---|
| 1% Non-Exceedance | 41 | 16.4 | -60 |
| 5% Non-Exceedance | 54 | 30.8 | -43 |
| 50% Non-Exceedance | 224 | 234 | 4.46 |
| 95% Non-Exceedance | 1350 | 1190 | -11.9 |
| 99% Non-Exceedance | 2920 | 2960 | 1.37 |
| Sept. 10% Non-Exceedance | 54 | 26.8 | -50.4 |

**Fig. 1: Hydrograph**

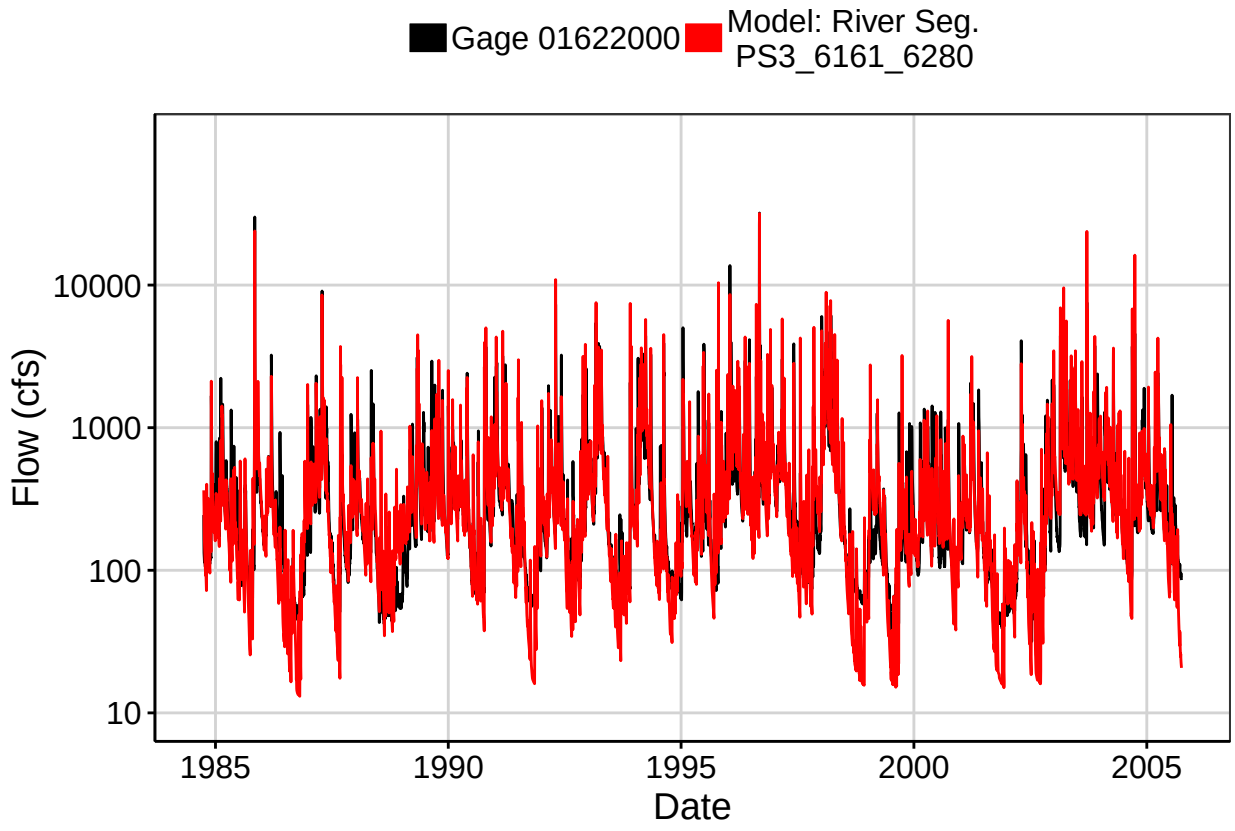


**Fig. 2: Zoomed Hydrograph**

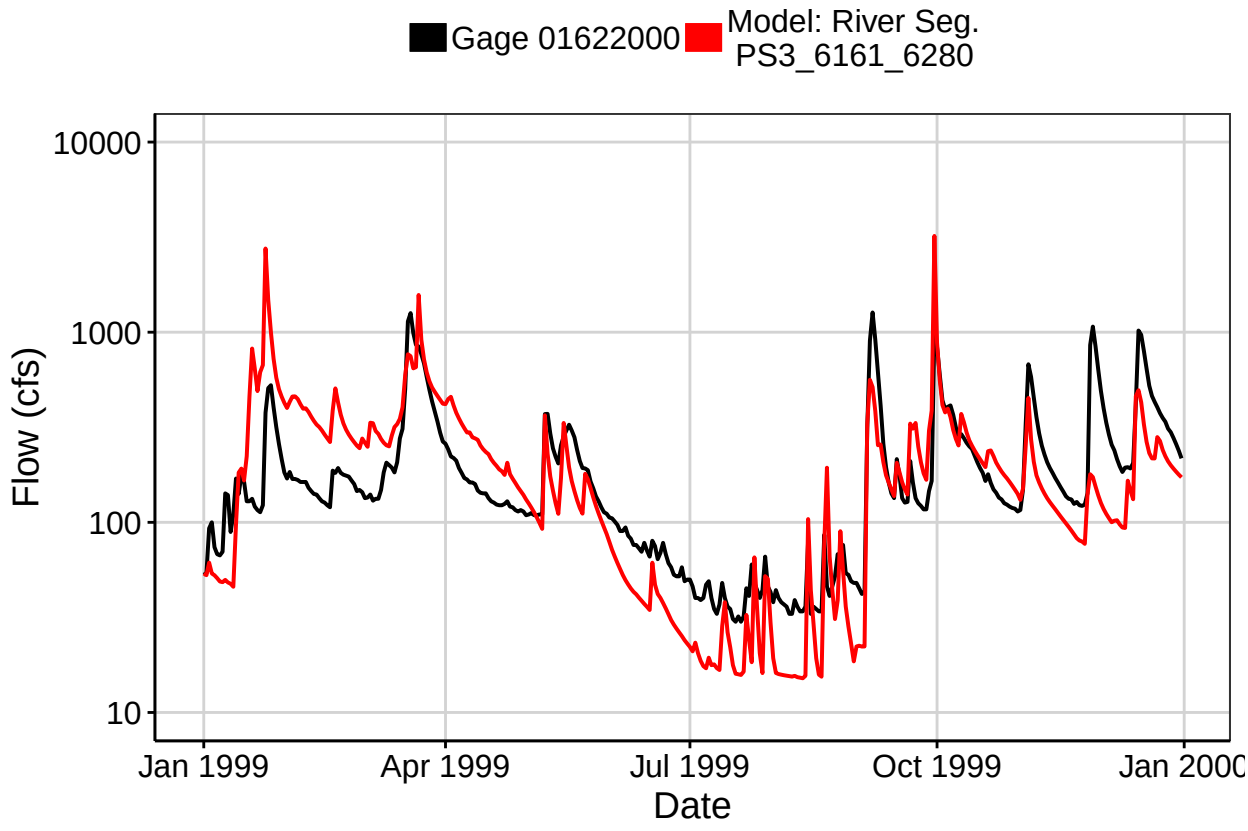


**Fig. 3: Flow Exceedance**

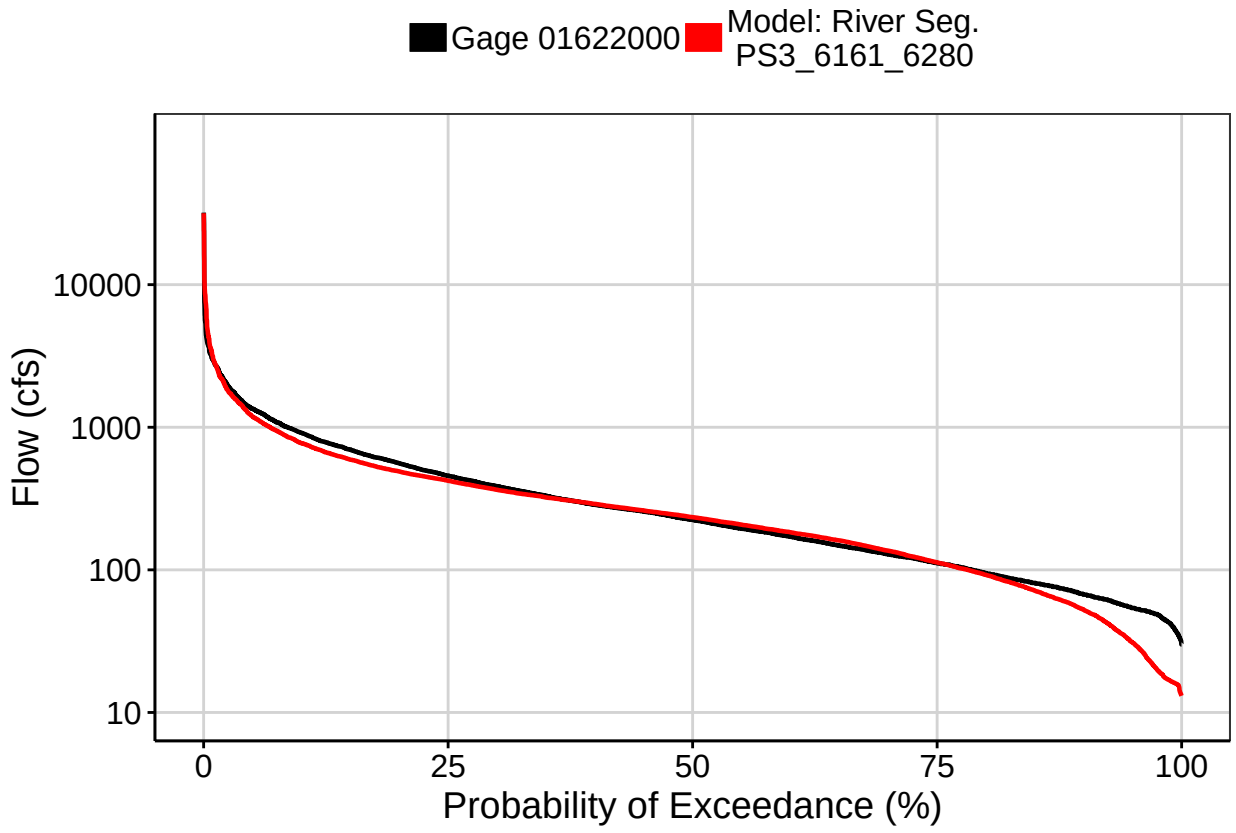


**Fig. 4: Baseflow**

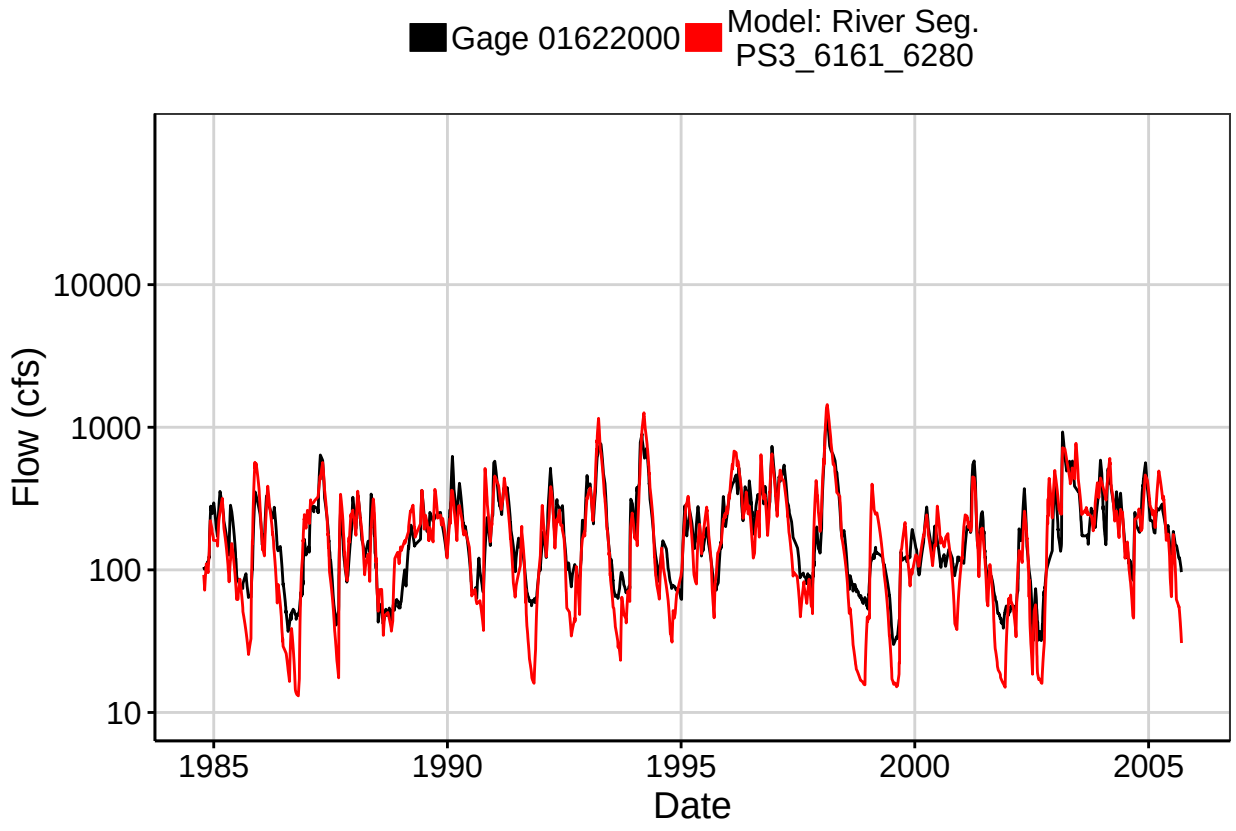


**Fig. 5: Combined Baseflow**

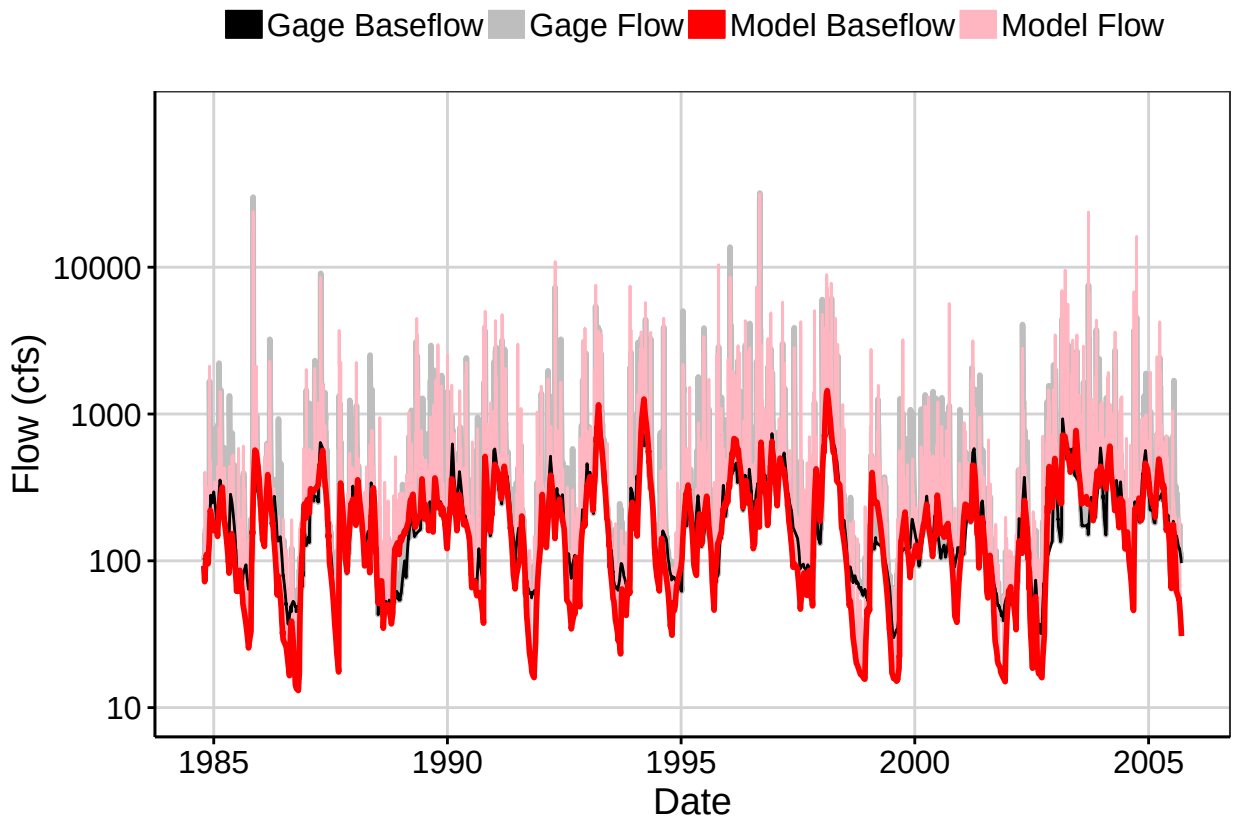


**Fig. 6: Largest Error Segment**

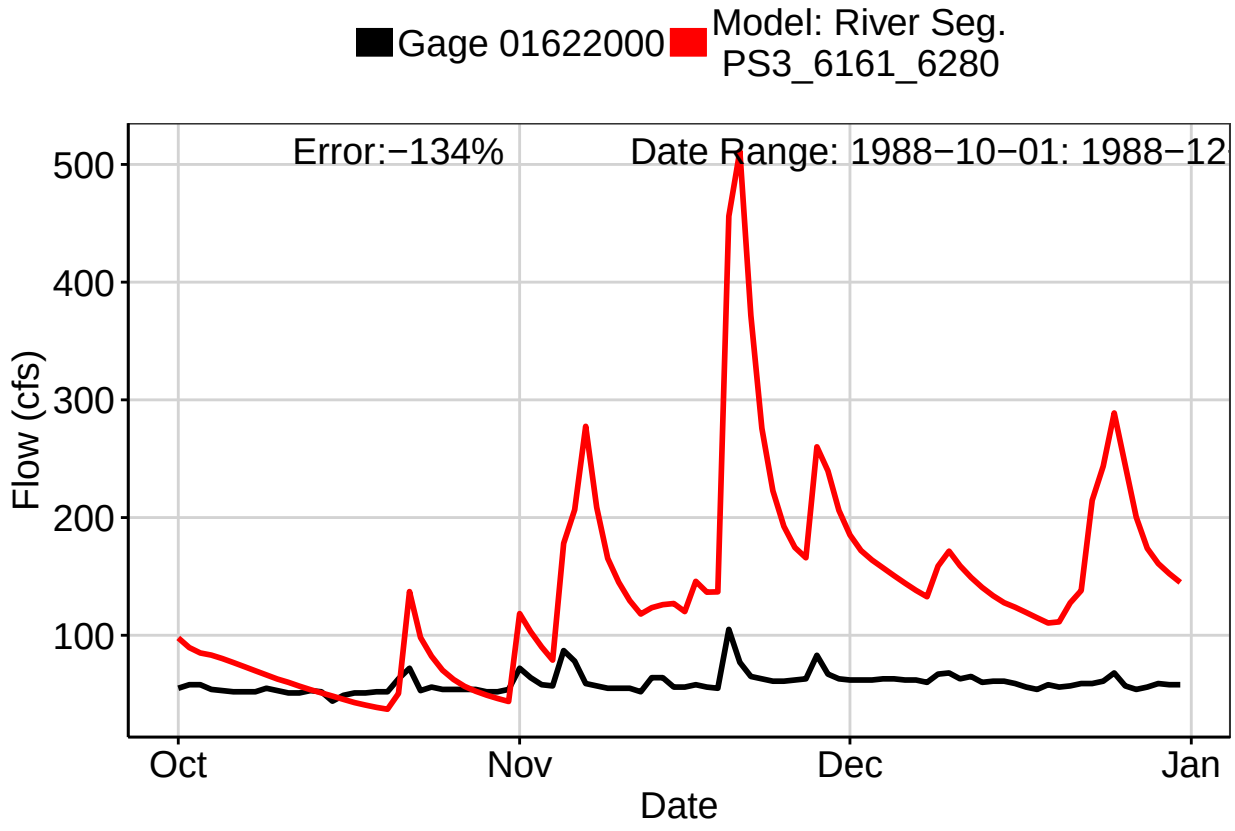


**Fig. 7: Second Largest Error Segment**

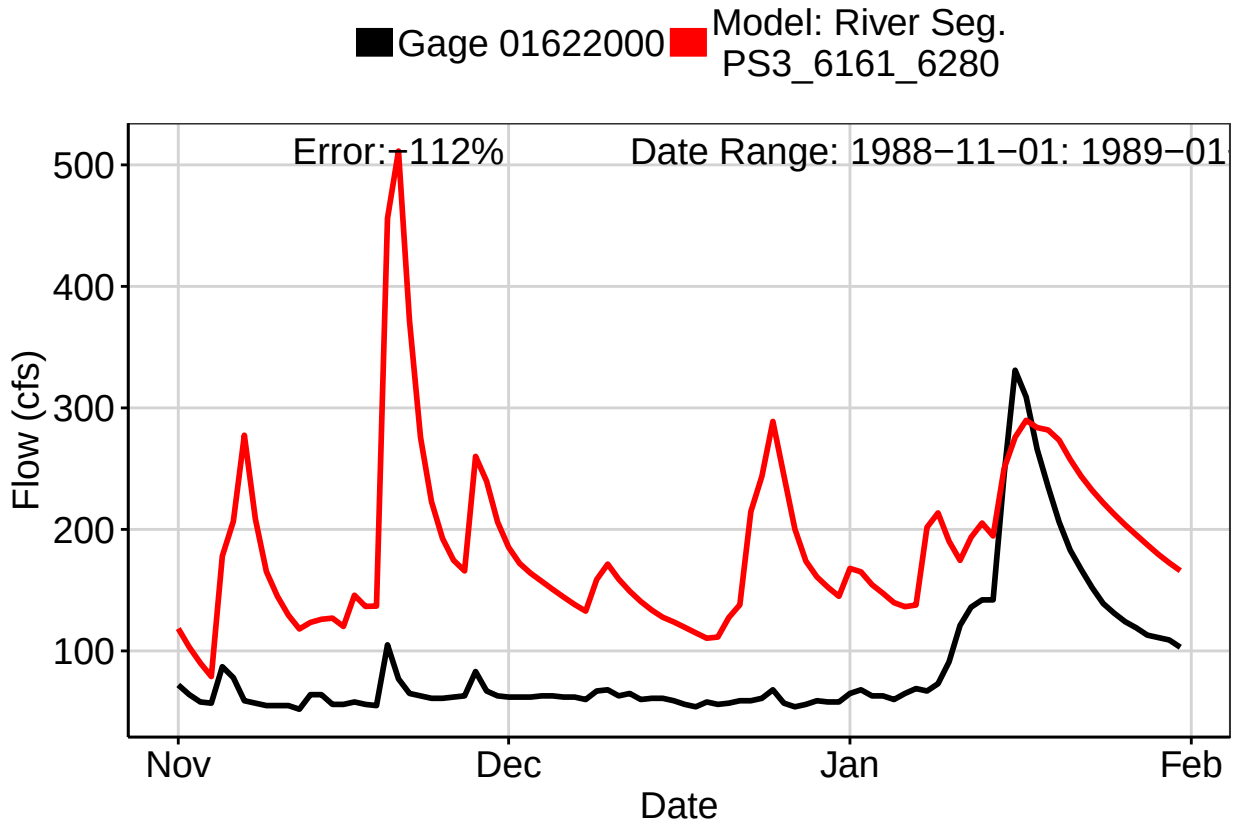


**Fig. 8: Third Largest Error Segment**

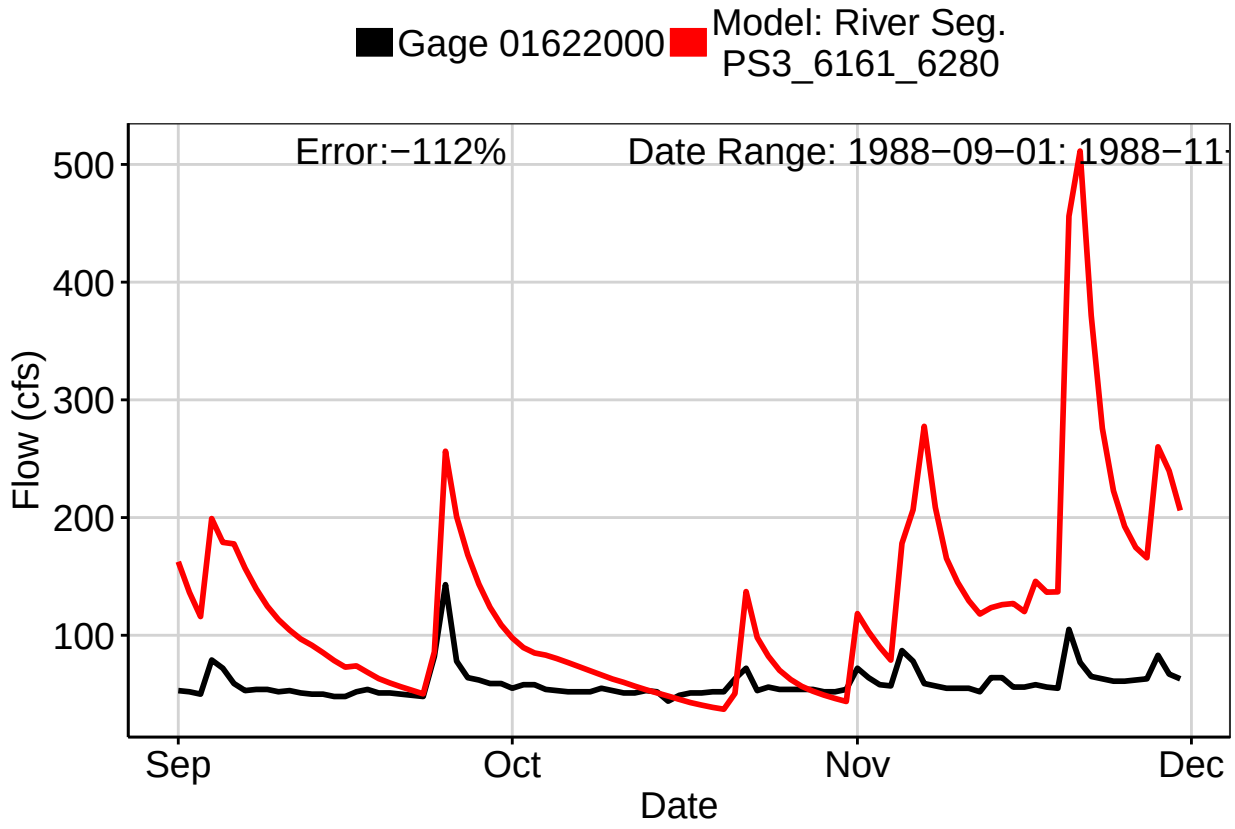


**Fig. 9: Residuals Plot**