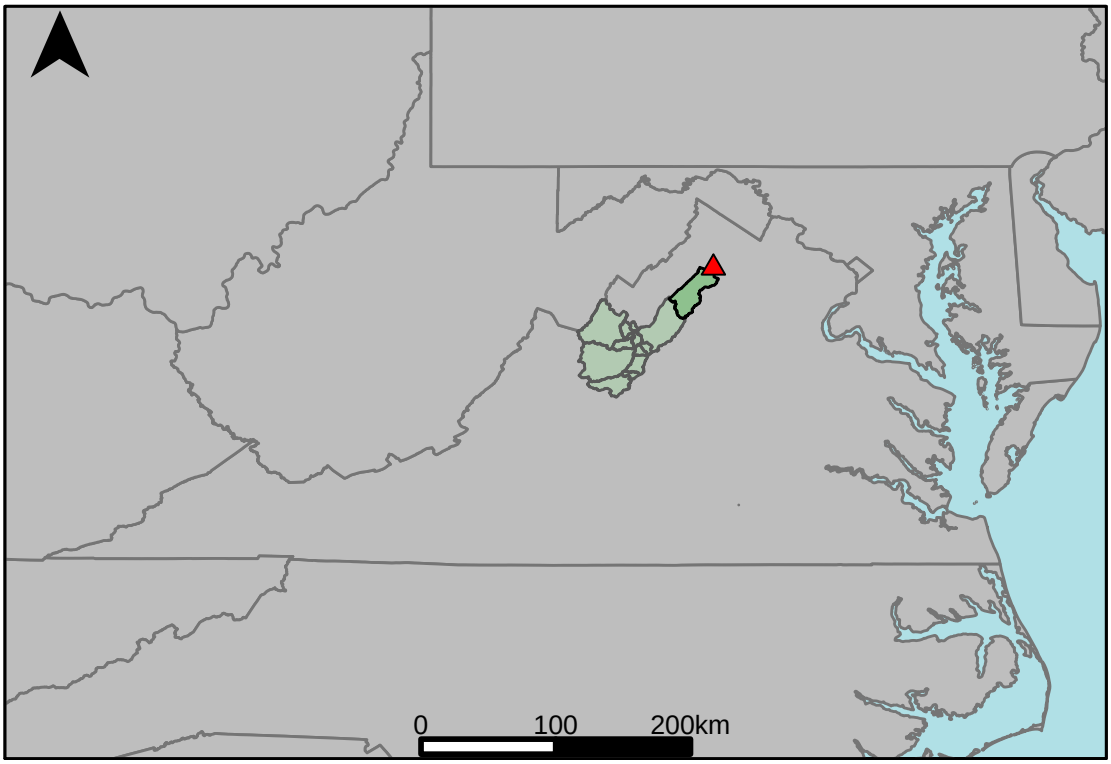
Appendix B.11: USGS Gage 01631000 vs. PS5_5240_5200 Shenandoah River



This river segment follows part of the flow of the South Fork of Shenandoah, a tributary of the Potomac. The gage is located in Warren County (Lat. 38°54'50.4", Long. -78°12'39.0"), approximately 1.6 miles southwest of Front Royal, VA. Drainage area is 1634 sq. miles. This gage started taking data in 1930 and is still taking data. Large diurnal fluctuations at low and medium flows are caused by powerplants upstream prior to 1954; occasional large diurnal fluctuation occurs thereafter. The average daily discharge error between the model and gage data for the 20 year timespan was -0.59%, with 30% of its rolling three month time spans above 20% error.

Table 1: Monthly Low Flows

	USGS Gage	Model	Pct. Error
Jan. Low Flow	440	331	-24.8
Feb. Low Flow	541	490	-9.43
Mar. Low Flow	750	761	1.47
Apr. Low Flow	831	898	8.06
May Low Flow	958	1180	23.2
Jun. Low Flow	1180	1230	4.24
Jul. Low Flow	1180	1140	-3.39
Aug. Low Flow	963	1060	10.1
Sep. Low Flow	658	749	13.8
Oct. Low Flow	483	493	2.07
Nov. Low Flow	450	419	-6.89
Dec. Low Flow	437	285	-34.8

Table 2: Monthly Average Flows

	USGS Gage	Model	Pct. Error
Overall Mean Flow	1700	1710	0.59
Jan. Mean Flow	2190	1910	-12.8
Feb. Mean Flow	2210	2430	9.95
Mar. Mean Flow	2810	2930	4.27
Apr. Mean Flow	2510	2420	-3.59
May Mean Flow	1890	1850	-2.12
Jun. Mean Flow	1350	1430	5.93
Jul. Mean Flow	856	1050	22.7
Aug. Mean Flow	807	877	8.67
Sep. Mean Flow	1650	1660	0.61
Oct. Mean Flow	1000	1060	6
Nov. Mean Flow	1610	1530	-4.97
Dec. Mean Flow	1580	1440	-8.86

Table 3: Monthly High Flows

	USGS Gage	Model	Pct. Error
Jan. High Flow	940	1170	24.5
Feb. High Flow	3730	2870	-23.1
Mar. High Flow	4360	2120	-51.4
Apr. High Flow	3670	4530	23.4
May High Flow	2820	2550	-9.57
Jun. High Flow	7050	6990	-0.85
Jul. High Flow	5170	4840	-6.38
Aug. High Flow	3090	2450	-20.7
Sep. High Flow	1760	2050	16.5
Oct. High Flow	1520	1680	10.5
Nov. High Flow	1040	1290	24
Dec. High Flow	856	890	3.97

Table 4: Period Low Flows

	USGS Gage	Model	Pct. Error
Min. 1 Day Min	196	97.5	-50.3
Med. 1 Day Min	330	229	-30.6
Min. 3 Day Min	201	98.4	-51
Med. 3 Day Min	356	233	-34.6
Min. 7 Day Min	208	99.1	-52.4
Med. 7 Day Min	366	245	-33.1
Min. 30 Day Min	237	120	-49.4
Med. 30 Day Min	444	333	-25
Min. 90 Day Min	273	208	-23.8
Med. 90 Day Min	623	595	-4.49
7Q10	257	128	-50.2
Year of 90-Day Min. Flow	2002	1999	100
Drought Year Mean	493	470	-4.67
Mean Baseflow	978	1050	7.36

Table 5: Period High Flows

	USGS Gage	Model	Pct. Error
Max. 1 Day Max	98200	72600	-26.1
Med. 1 Day Max	16500	15300	-7.27
Max. 3 Day Max	63300	57000	-9.95
Med. 3 Day Max	11400	11300	-0.88
Max. 7 Day Max	34100	29700	-12.9
Med. 7 Day Max	7710	7710	0
Max. 30 Day Max	10900	9230	-15.3
Med. 30 Day Max	4350	4120	-5.29
Max. 90 Day Max	7420	6740	-9.16
Med. 90 Day Max	2780	2710	-2.52

Table 6: Non-Exceedance Flows

	USGS Gage	Model	Pct. Error
1% Non-Exceedance	270	135	-50
5% Non-Exceedance	345	226	-34.5
50% Non-Exceedance	1020	1120	9.8
95% Non-Exceedance	4980	5030	1
99% Non-Exceedance	10900	10700	-1.83
Sept. 10% Non-Exceedance	362	224	-38.1

Fig. 1: Hydrograph

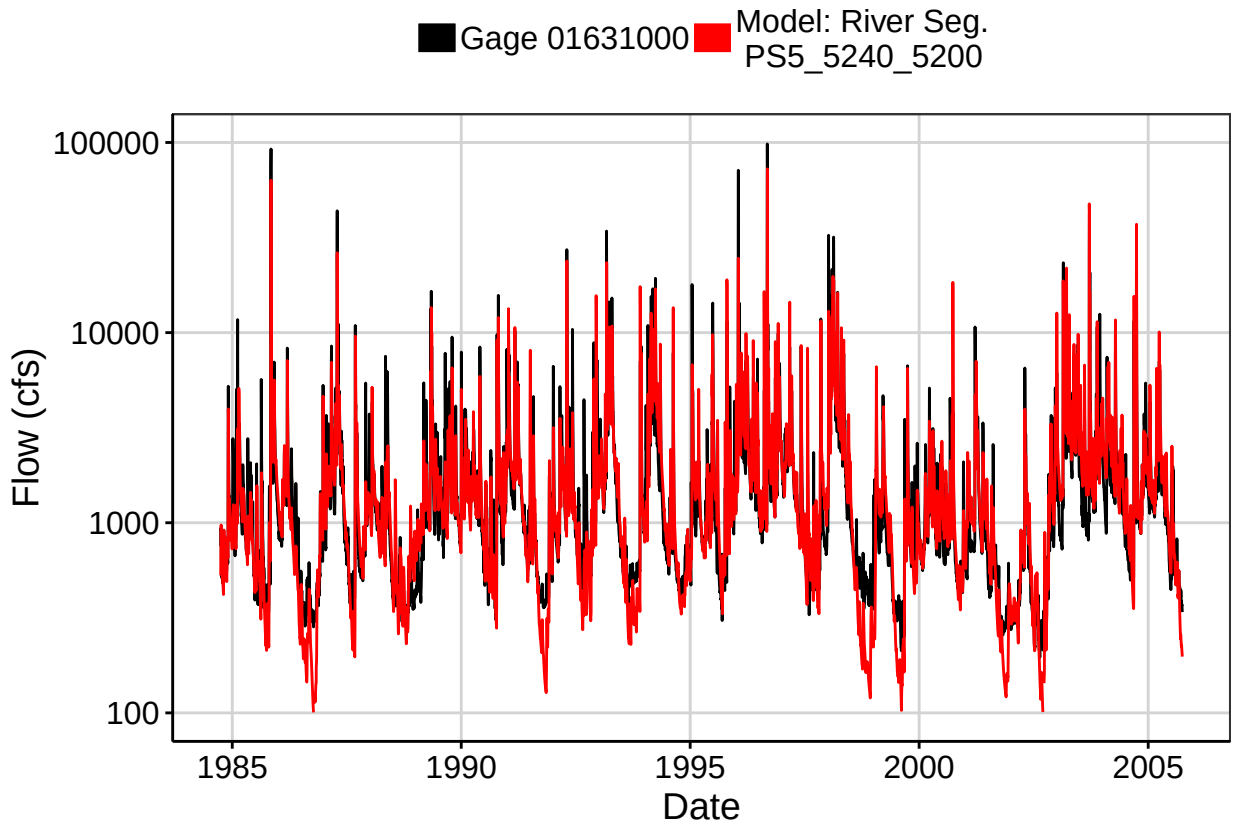


Fig. 2: Zoomed Hydrograph

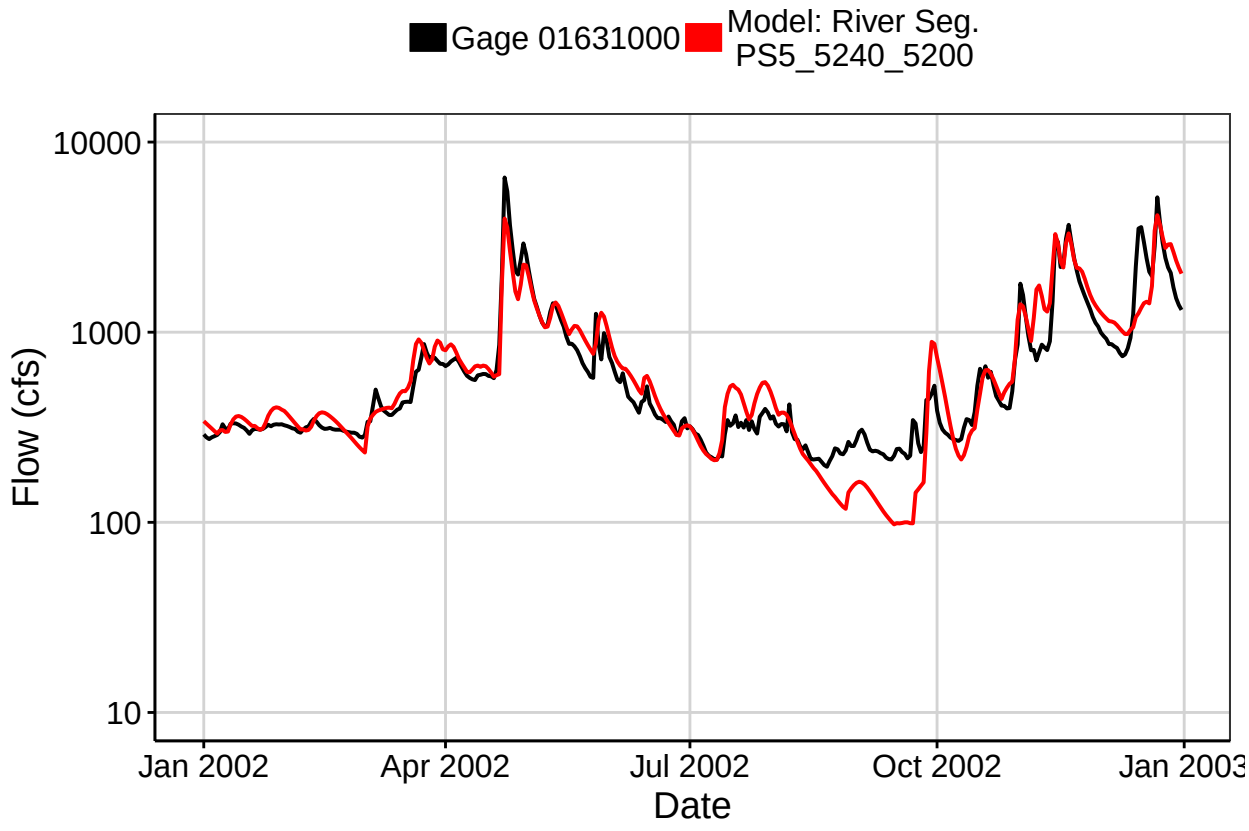


Fig. 3: Flow Exceedance

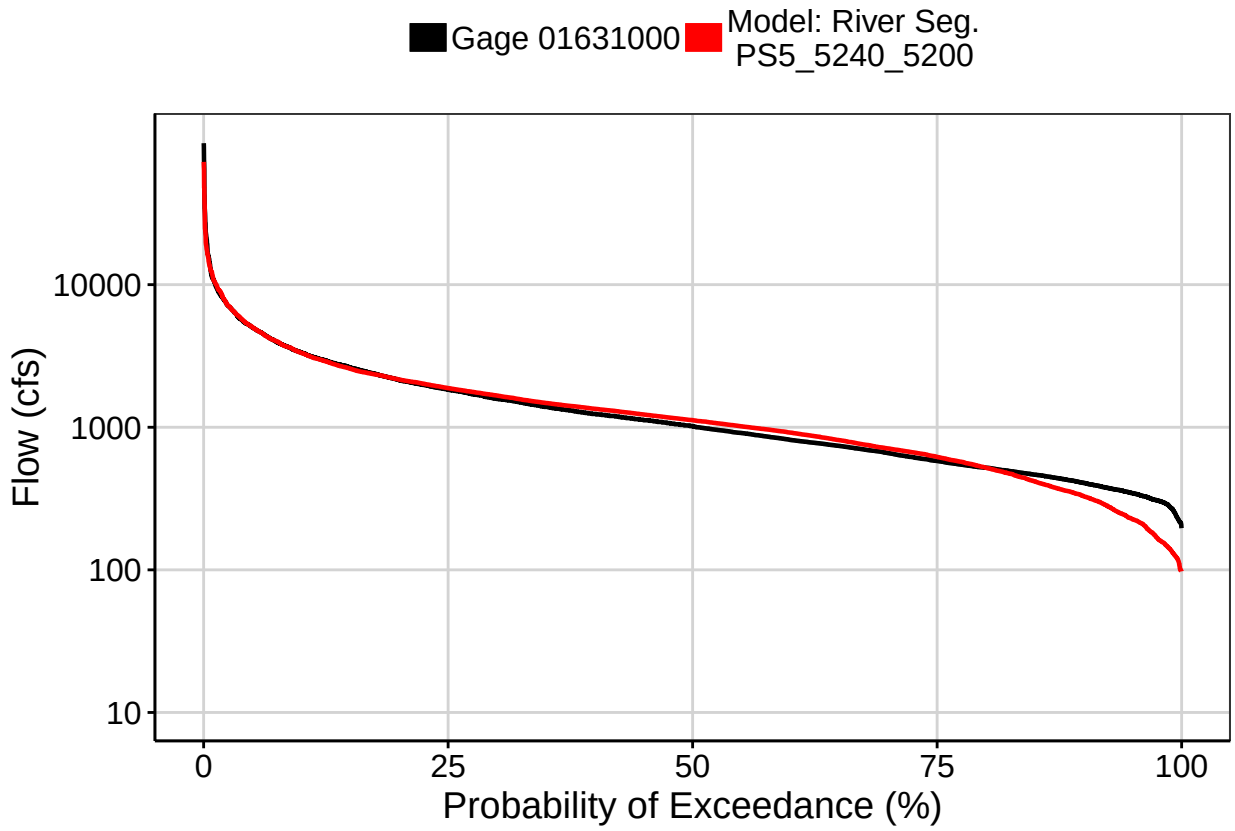


Fig. 4: Baseflow

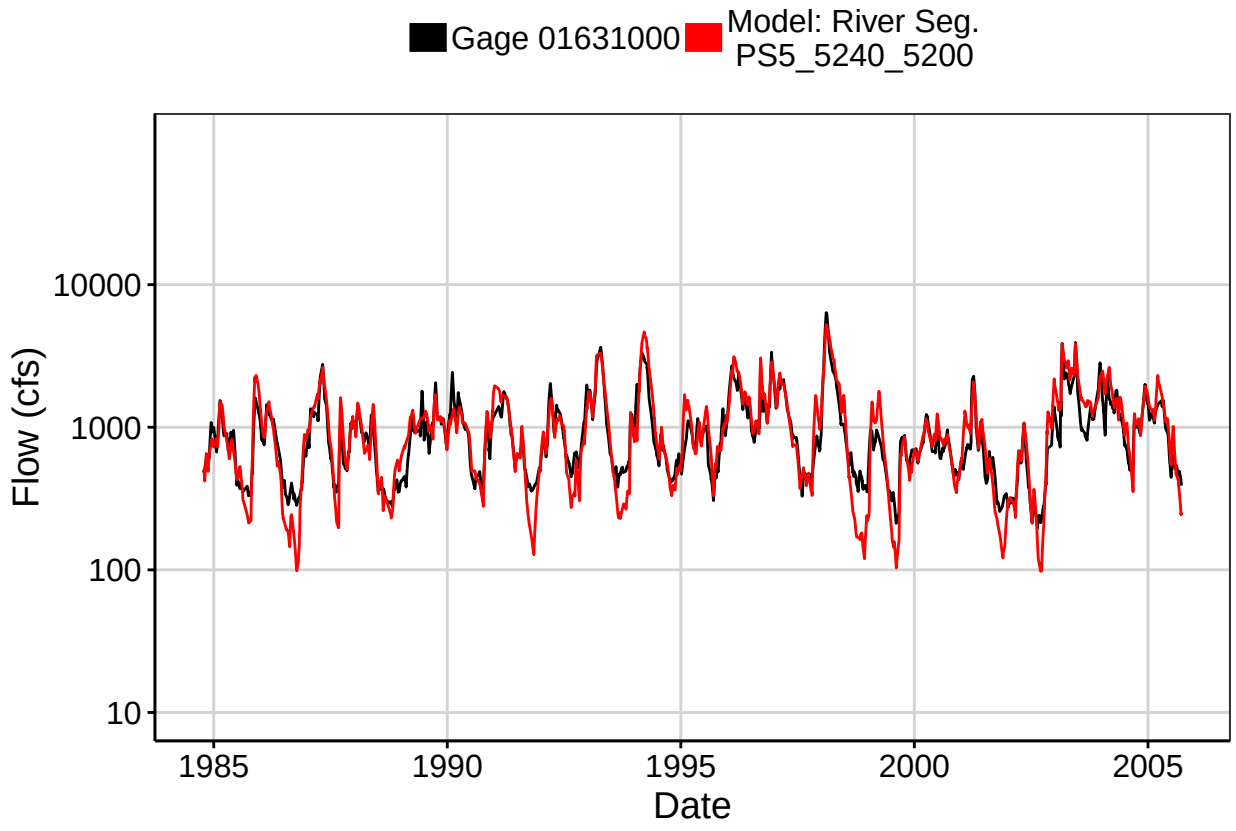


Fig. 5: Combined Baseflow

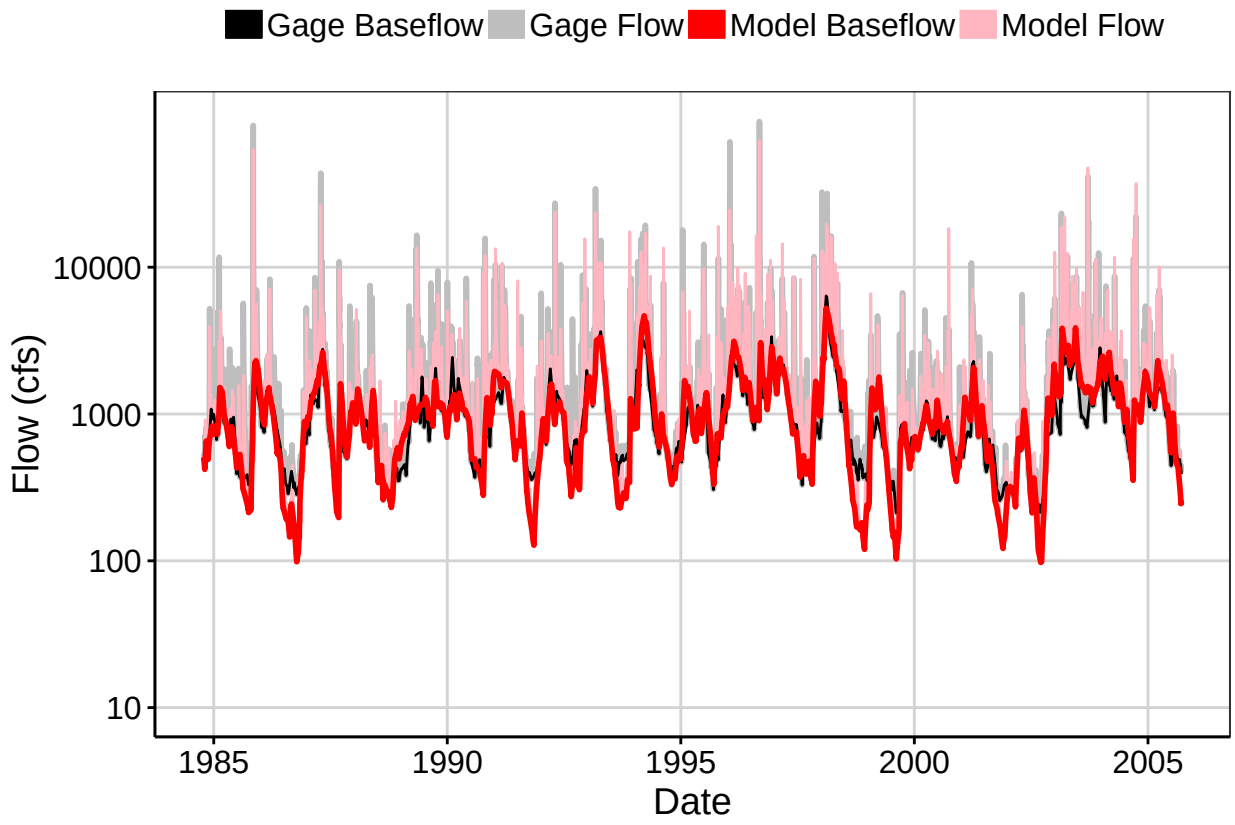


Fig. 6: Largest Error Segment

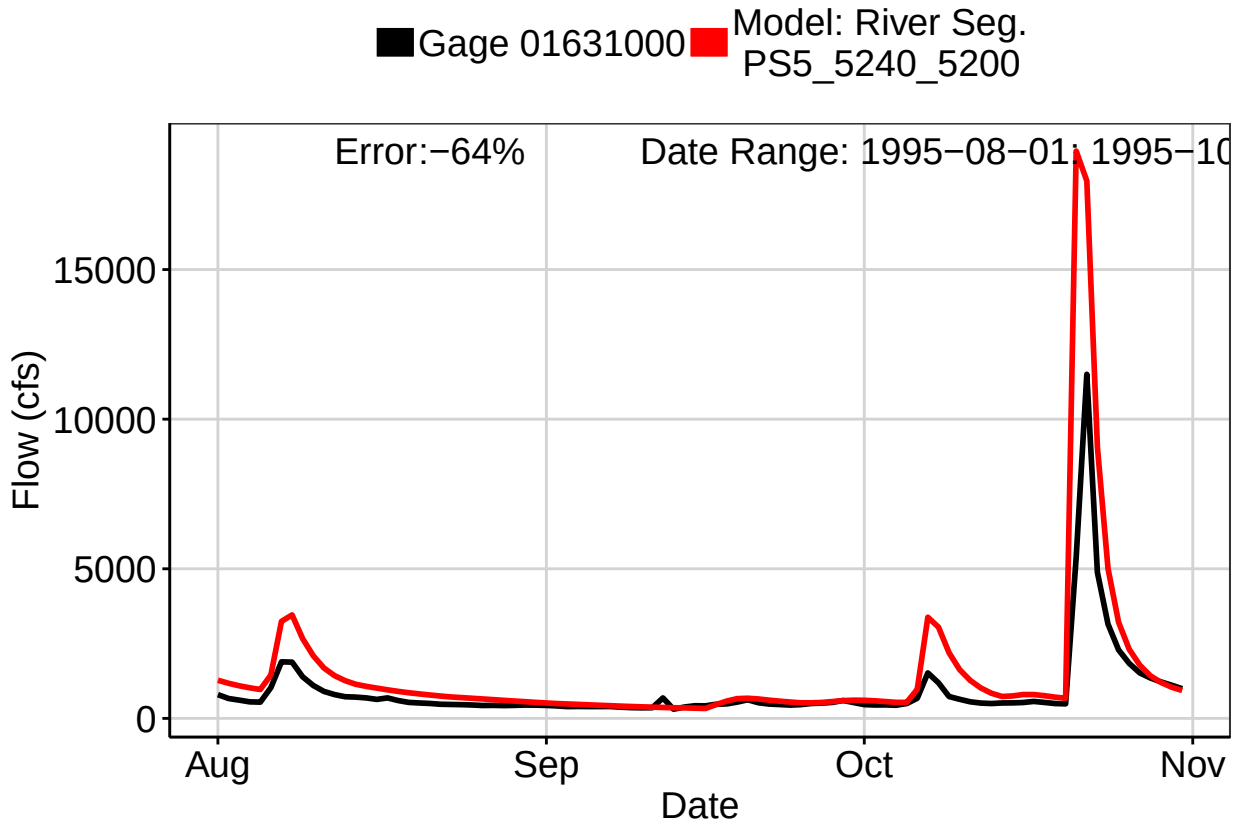


Fig. 7: Second Largest Error Segment

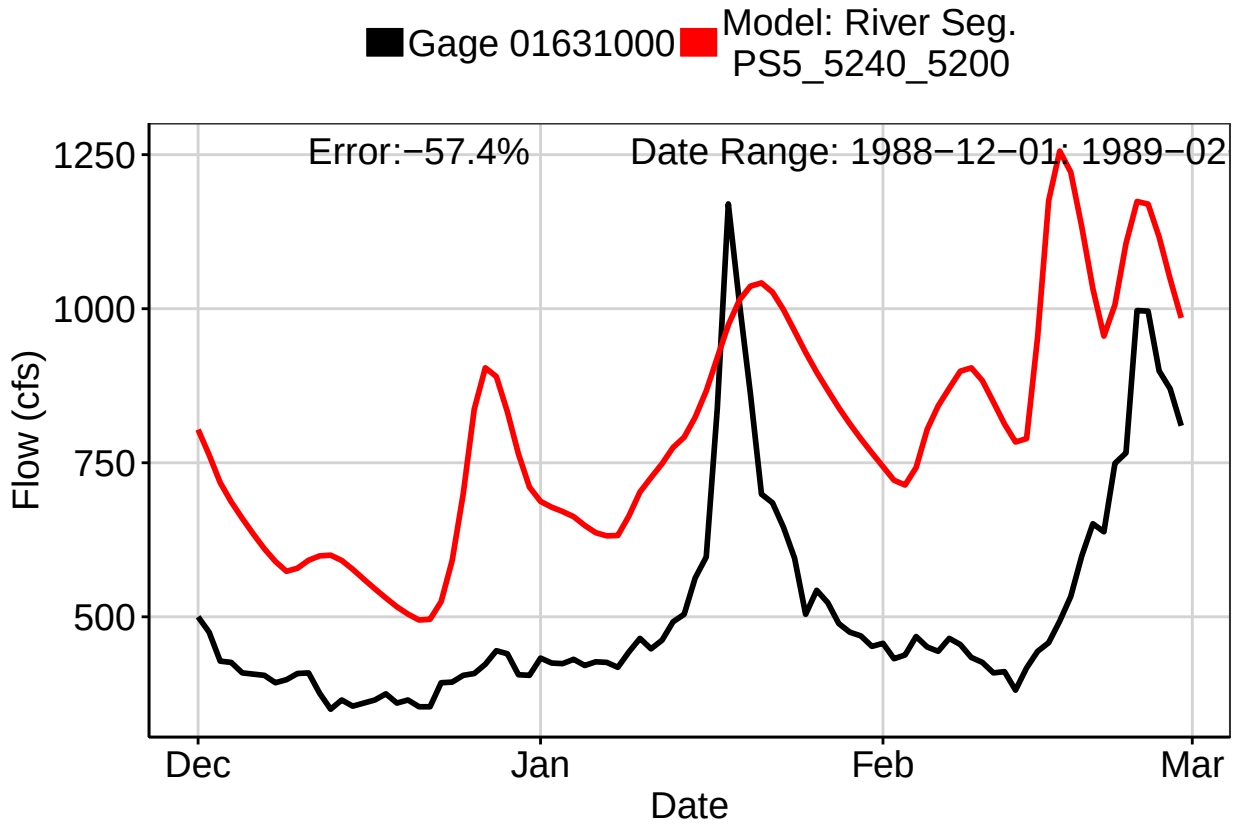


Fig. 8: Third Largest Error Segment

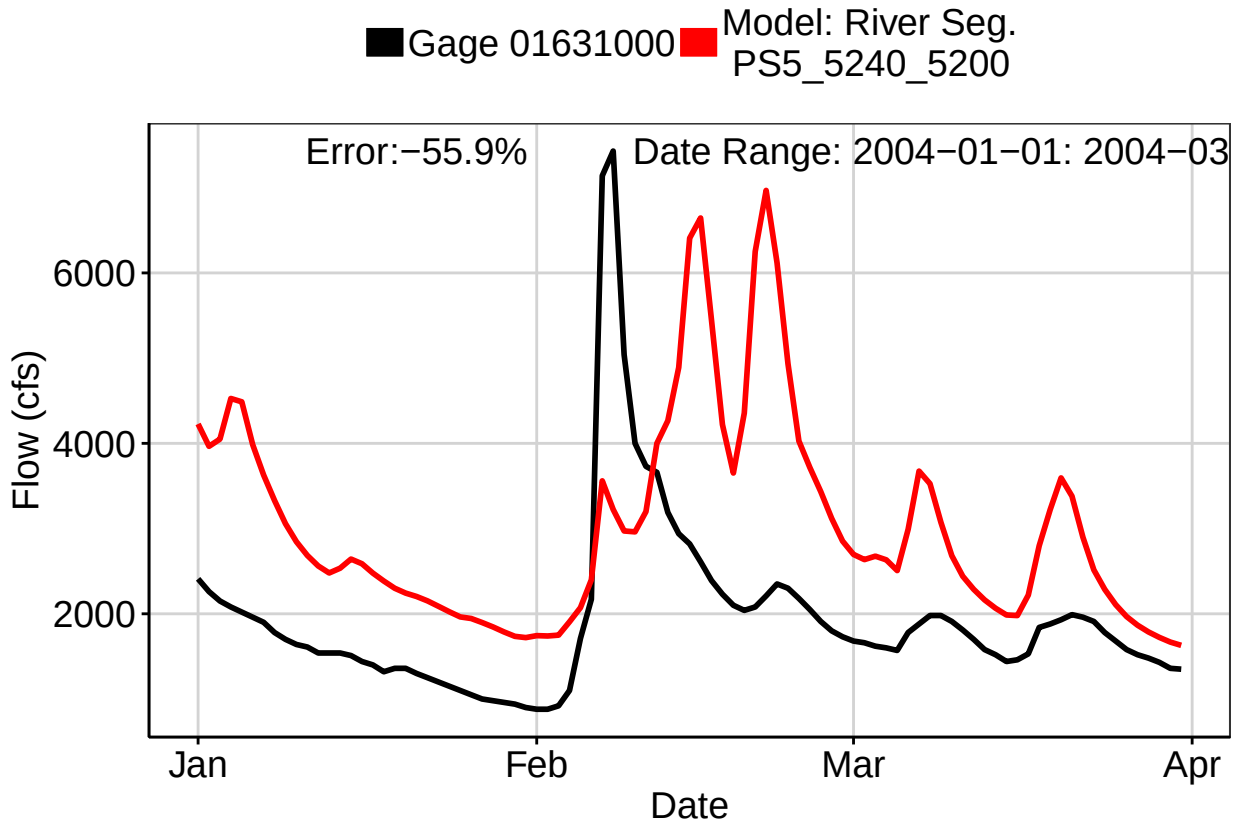


Fig. 9: Residuals Plot