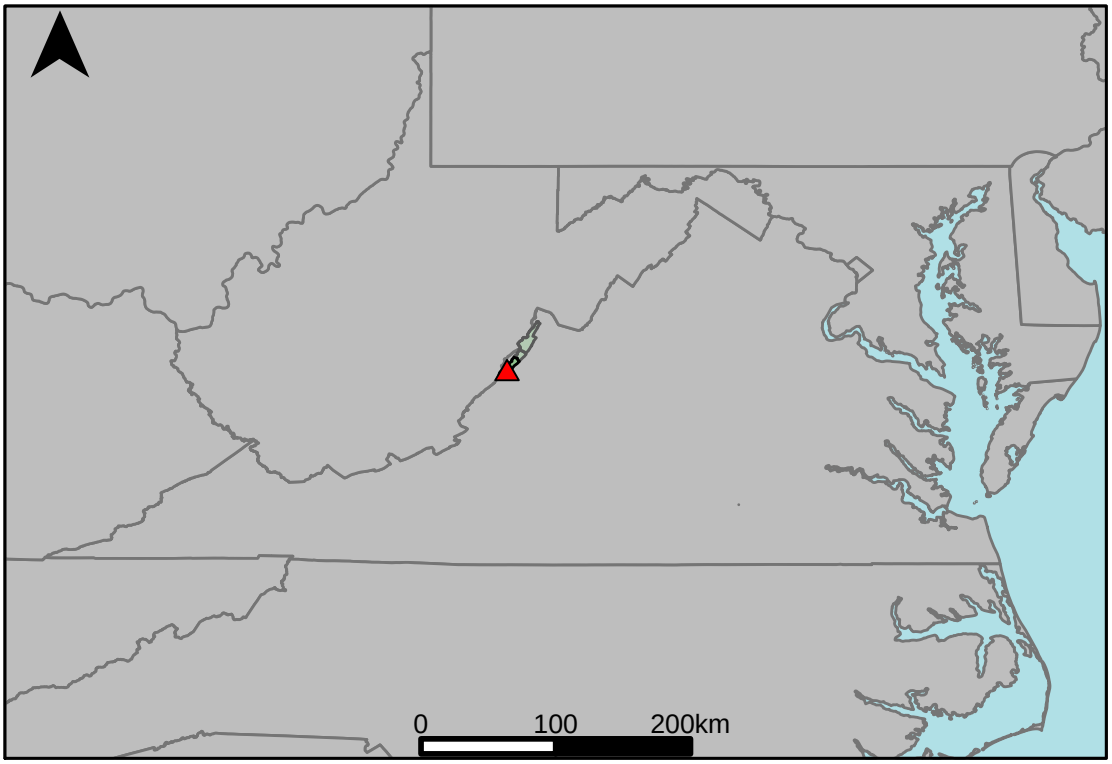
Appendix A.4: USGS Gage 02011500 vs. JU2_6600_6810 Upper James River



This river segment follows part of the flow of the Back Creek, a tributary of the James. The gage is located in Bath County (Lat. 38°04'10.4", Long. -79°53'49.2"), approximately 18 miles north of Clifton Forge, VA. Drainage area is 134 sq. miles. This gage started taking data in 1951 and is still taking data. Flow has been regulated since October 1984 by Back Creek Lake 11.3 mi upstream and since January 1985 by Little Back Creek Lake 14.4 mi upstream, amounts unknown. There is also a diversion 10.5 mi upstream by Virginia Power for recreation lakes, net averages 0.5 cfs. The average daily discharge error between the model and gage data for the 20 year timespan was -4.4%, with 56.2% of its rolling three month time spans above 20% error.

Table 1: Monthly Low Flows

	USGS Gage	Model	Pct. Error
Jan. Low Flow	20.6	28.2	36.9
Feb. Low Flow	25	39.8	59.2
Mar. Low Flow	48	77.7	61.9
Apr. Low Flow	47	79	68.1
May Low Flow	60.8	86.3	41.9
Jun. Low Flow	106	140	32.1
Jul. Low Flow	76	93.3	22.8
Aug. Low Flow	52	54.7	5.19
Sep. Low Flow	29	24.9	-14.1
Oct. Low Flow	22	21.9	-0.46
Nov. Low Flow	20.6	20	-2.91
Dec. Low Flow	18	16.8	-6.67

Table 2: Monthly Average Flows

	USGS Gage	Model	Pct. Error
Overall Mean Flow	182	190	4.4
Jan. Mean Flow	262	245	-6.49
Feb. Mean Flow	271	312	15.1
Mar. Mean Flow	382	392	2.62
Apr. Mean Flow	288	269	-6.6
May Mean Flow	261	208	-20.3
Jun. Mean Flow	130	126	-3.08
Jul. Mean Flow	59.9	71.8	19.9
Aug. Mean Flow	49	75.6	54.3
Sep. Mean Flow	66.2	119	79.8
Oct. Mean Flow	56.4	89	57.8
Nov. Mean Flow	162	194	19.8
Dec. Mean Flow	201	185	-7.96

Table 3: Monthly High Flows

	USGS Gage	Model	Pct. Error
Jan. High Flow	37	168	354
Feb. High Flow	448	362	-19.2
Mar. High Flow	960	465	-51.6
Apr. High Flow	959	599	-37.5
May High Flow	700	711	1.57
Jun. High Flow	1240	957	-22.8
Jul. High Flow	770	714	-7.27
Aug. High Flow	1050	574	-45.3
Sep. High Flow	264	283	7.2
Oct. High Flow	216	227	5.09
Nov. High Flow	60	113	88.3
Dec. High Flow	48	195	306

Table 4: Period Low Flows

	USGS Gage	Model	Pct. Error
Min. 1 Day Min	8.4	14.6	73.8
Med. 1 Day Min	17	16.2	-4.71
Min. 3 Day Min	9	14.6	62.2
Med. 3 Day Min	17.3	16.3	-5.78
Min. 7 Day Min	9.07	14.7	62.1
Med. 7 Day Min	18.1	16.7	-7.73
Min. 30 Day Min	9.73	15.3	57.2
Med. 30 Day Min	19.5	25.3	29.7
Min. 90 Day Min	14.1	22	56
Med. 90 Day Min	33.4	52	55.7
7Q10	13.4	14.9	11.2
Year of 90-Day Min. Flow	1999	1999	0
Drought Year Mean	81.3	129	58.7
Mean Baseflow	68.3	91.2	33.5

Table 5: Period High Flows

	USGS Gage	Model	Pct. Error
Max. 1 Day Max	9940	13500	35.8
Med. 1 Day Max	3270	1890	-42.2
Max. 3 Day Max	4600	6300	37
Med. 3 Day Max	2000	1200	-40
Max. 7 Day Max	2270	3330	46.7
Med. 7 Day Max	1150	971	-15.6
Max. 30 Day Max	908	1070	17.8
Med. 30 Day Max	643	531	-17.4
Max. 90 Day Max	582	701	20.4
Med. 90 Day Max	351	369	5.13

Table 6: Non-Exceedance Flows

	USGS Gage	Model	Pct. Error
1% Non-Exceedance	14	15.2	8.57
5% Non-Exceedance	18	17.6	-2.22
50% Non-Exceedance	79	106	34.2
95% Non-Exceedance	652	639	-1.99
99% Non-Exceedance	1470	1090	-25.9
Sept. 10% Non-Exceedance	17	16.5	-2.94

Fig. 1: Hydrograph

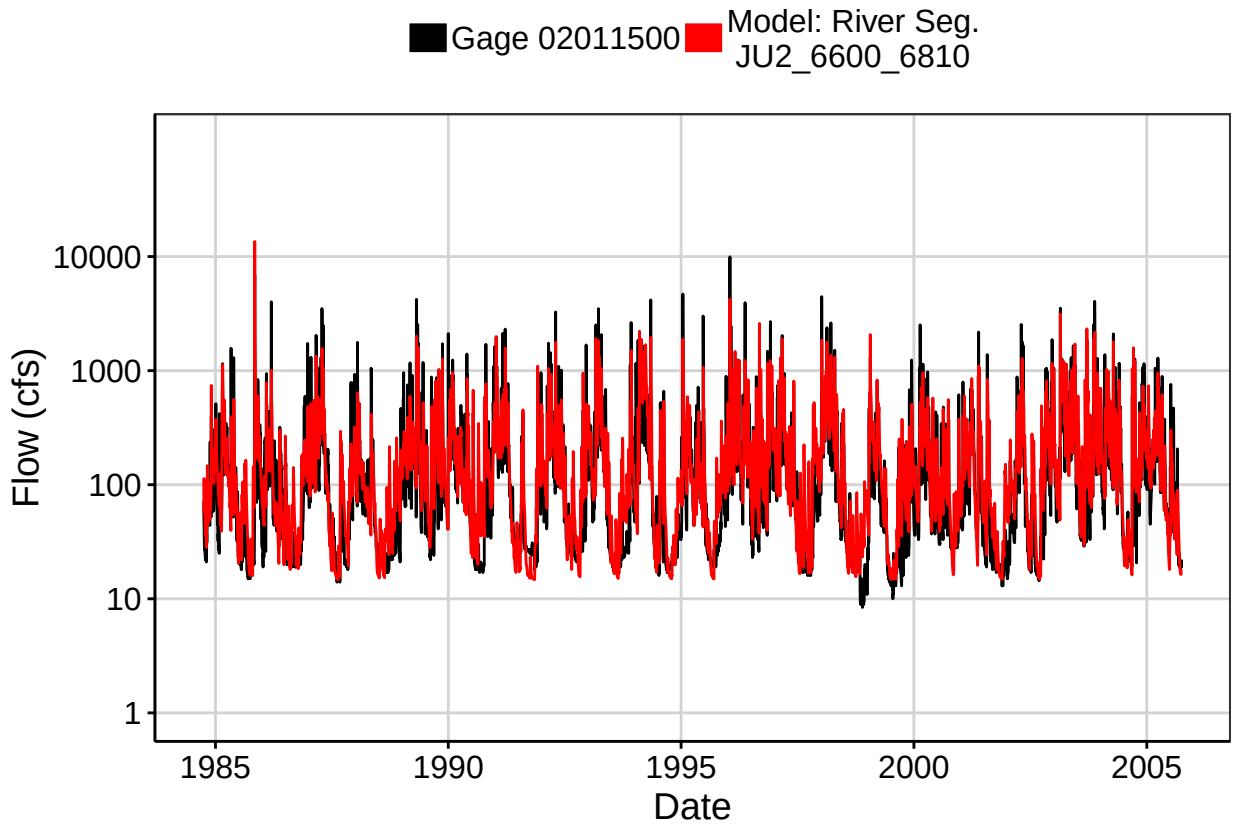


Fig. 2: Zoomed Hydrograph

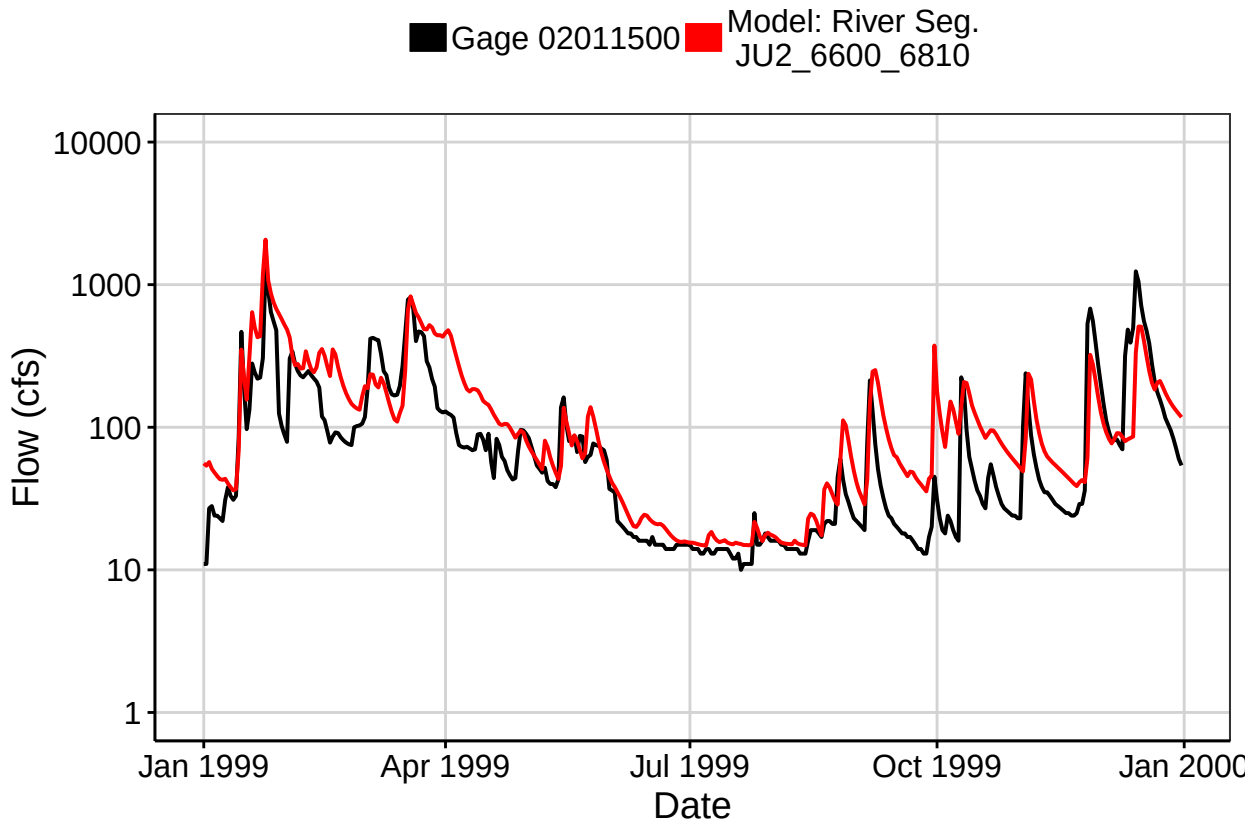


Fig. 3: Flow Exceedance

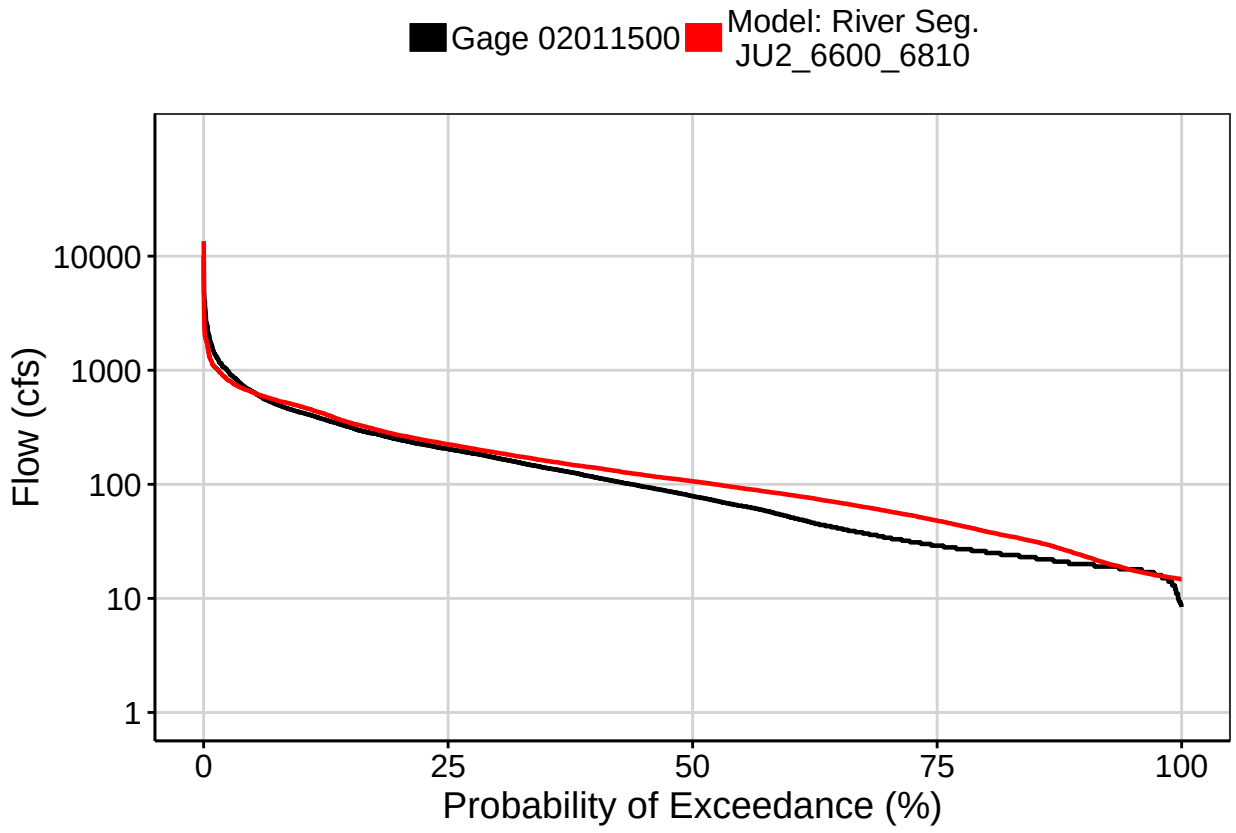


Fig. 4: Baseflow

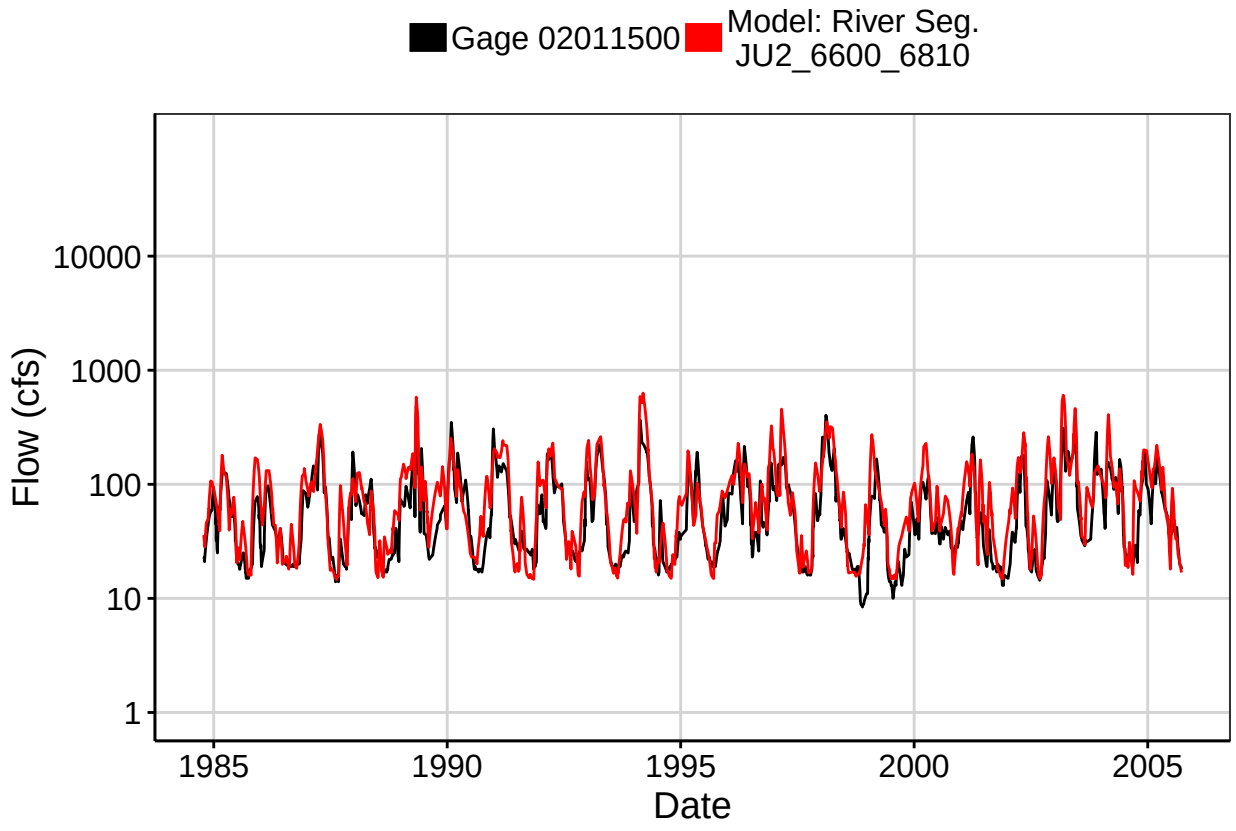


Fig. 5: Combined Baseflow

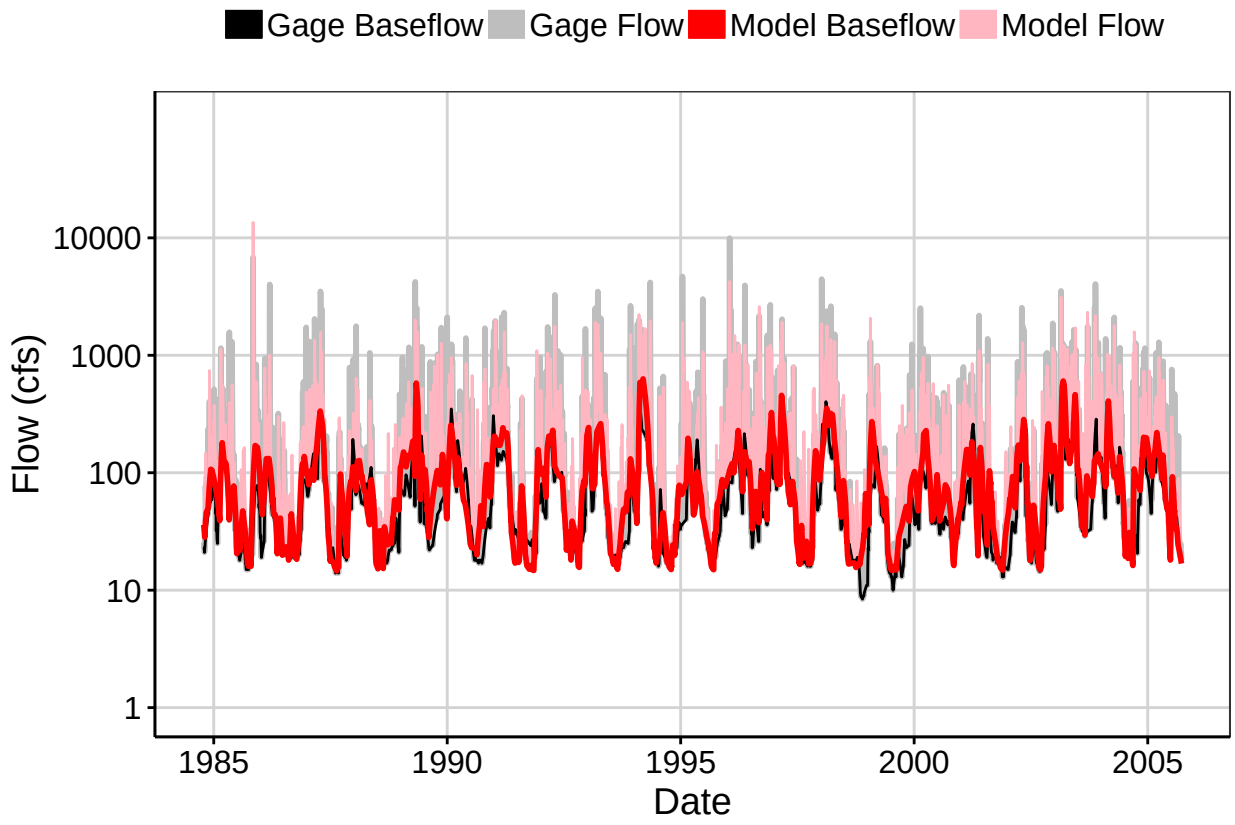


Fig. 6: Largest Error Segment

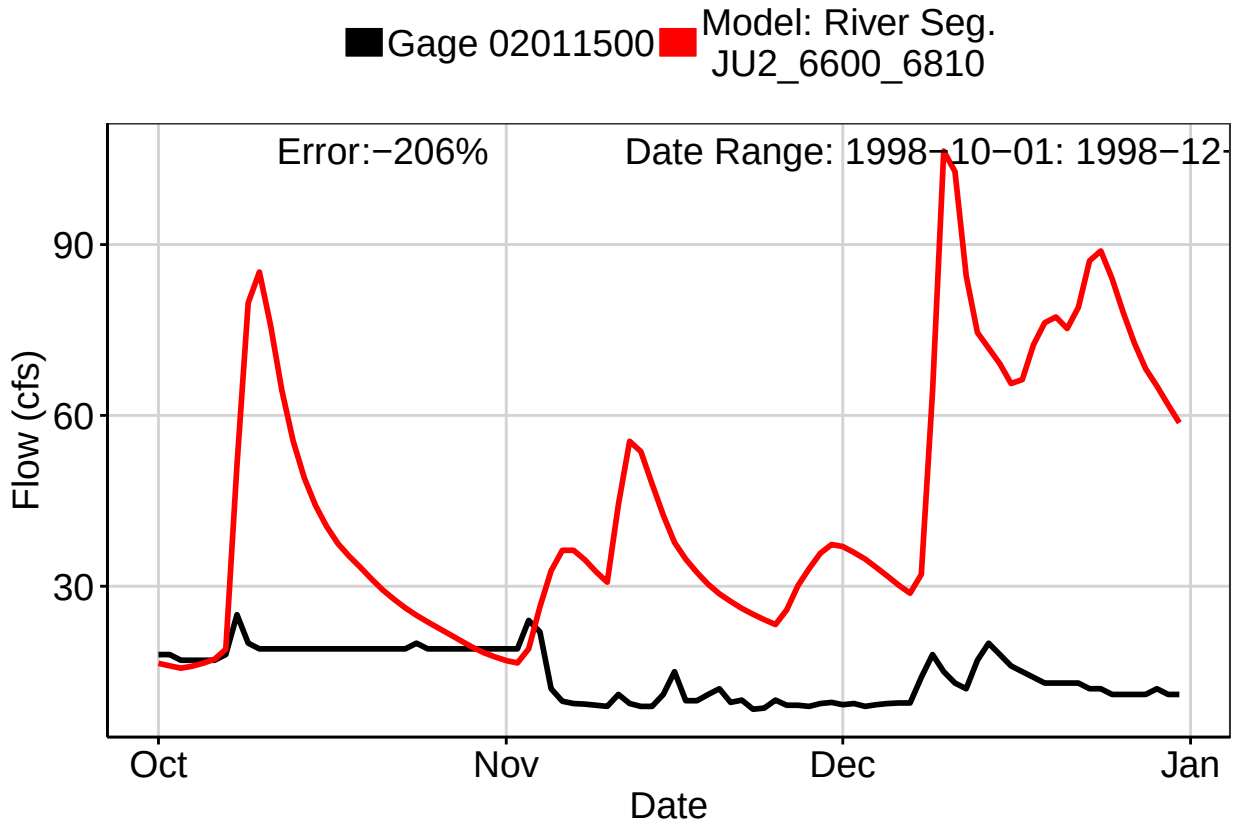


Fig. 7: Second Largest Error Segment

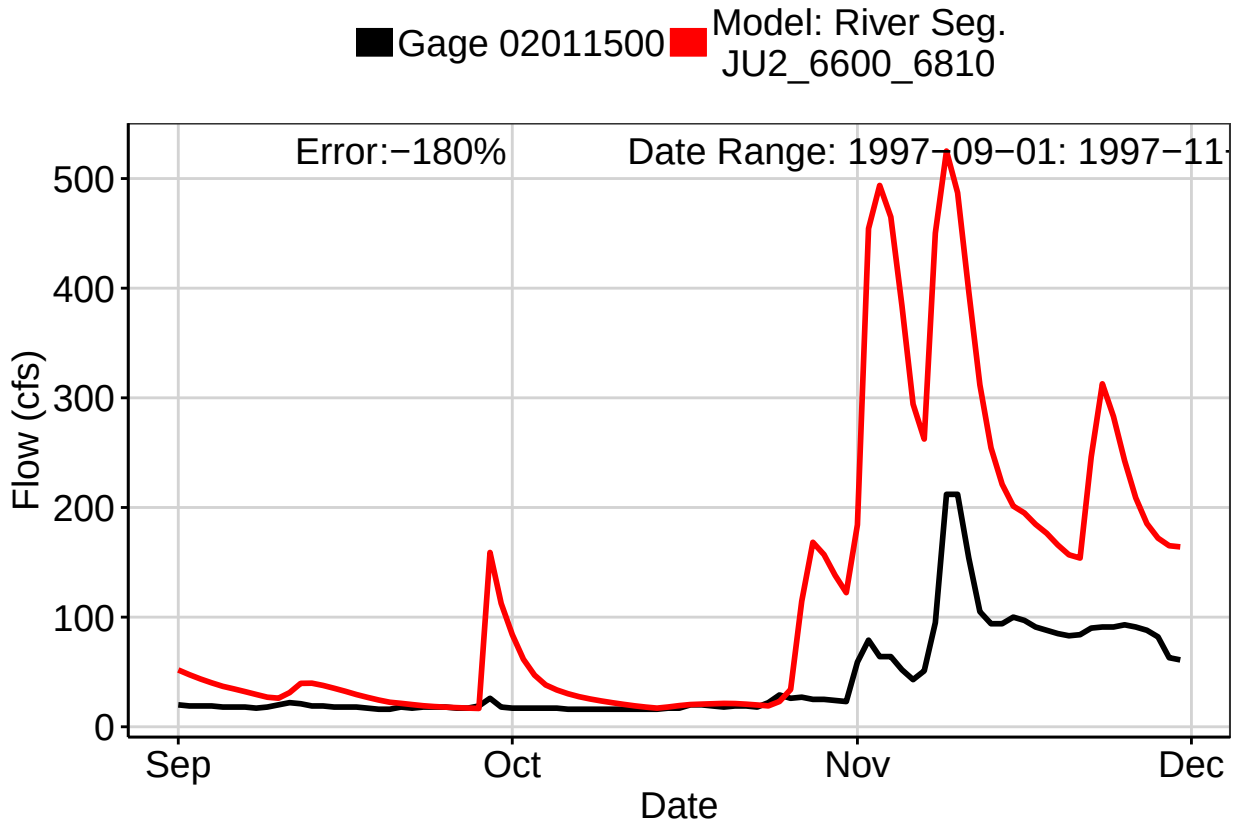


Fig. 8: Third Largest Error Segment

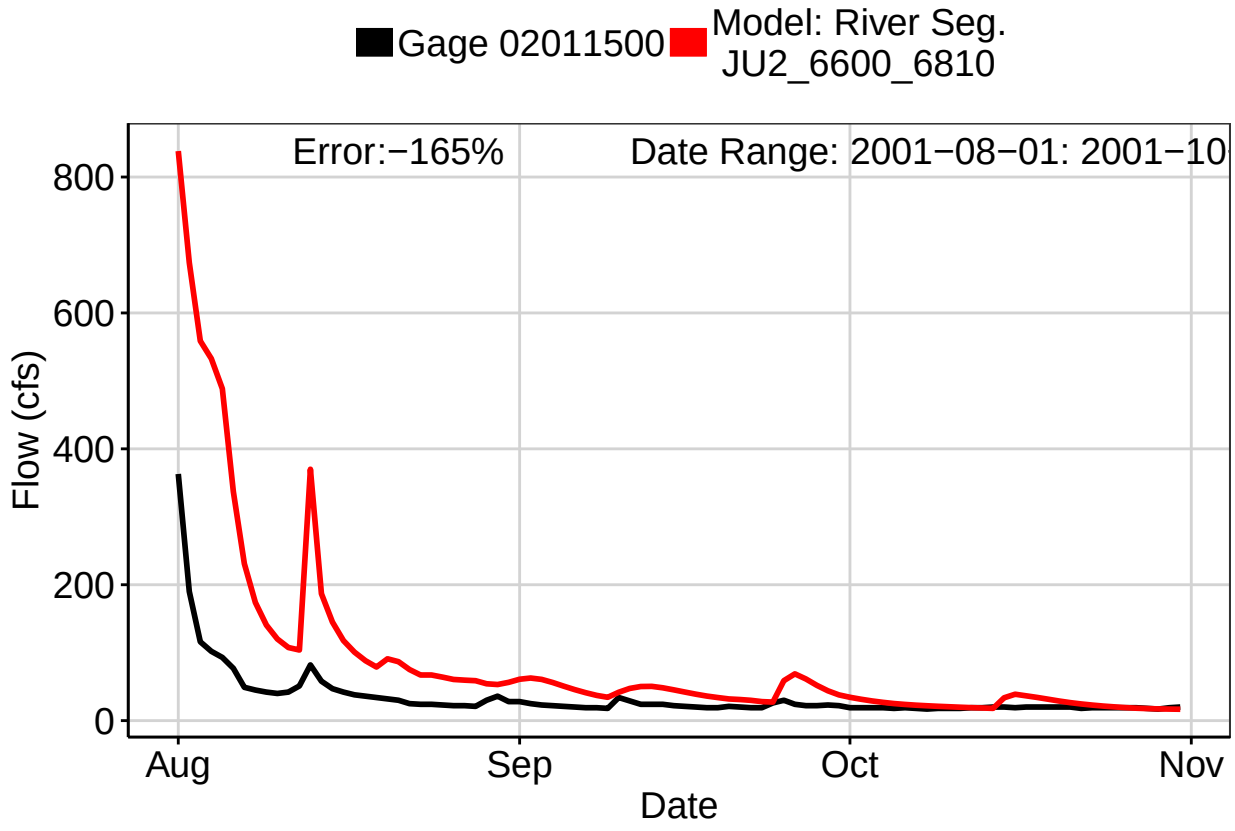


Fig. 9: Residuals Plot