LSPC Model Development and Hydrology Calibration for the Green/Duwamish River Pollutant Load Assessment

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PREPARED FOR

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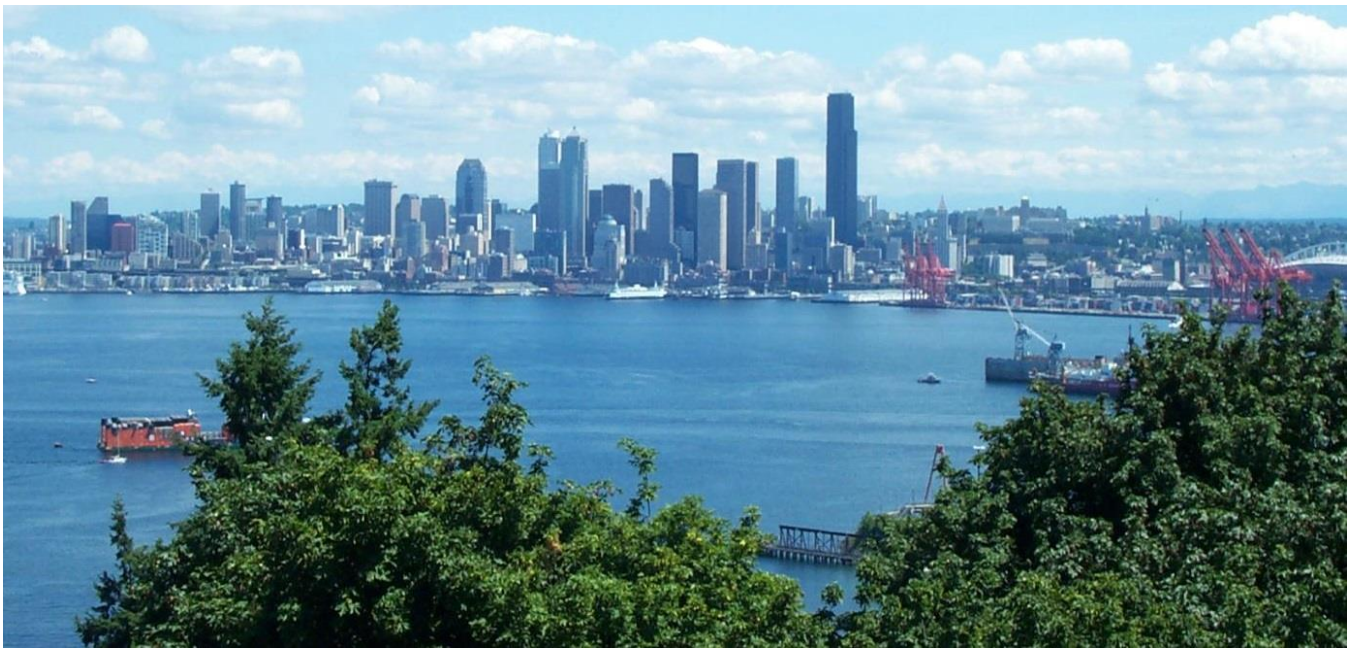
Appendices



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Appendix A. Green River LSPC Model Hydrology Calibration Results

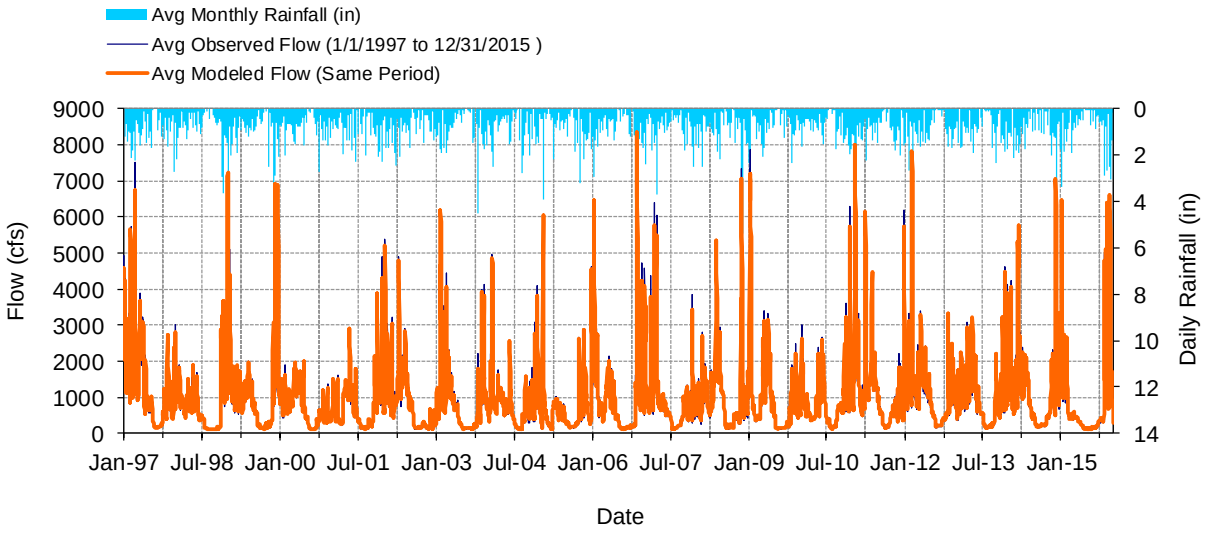

Figure A-1. Mean daily flow at Green River near Purification Plant near Palmer (USGS 12106700)

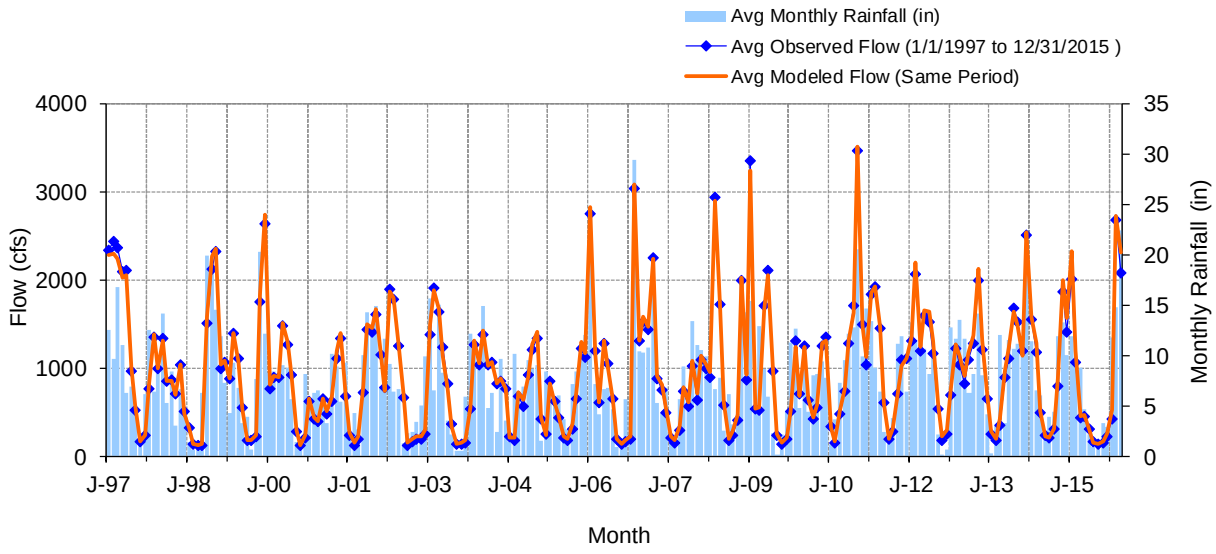

Figure A-2. Mean monthly flow at Green River near Purification Plant near Palmer (USGS 12106700)

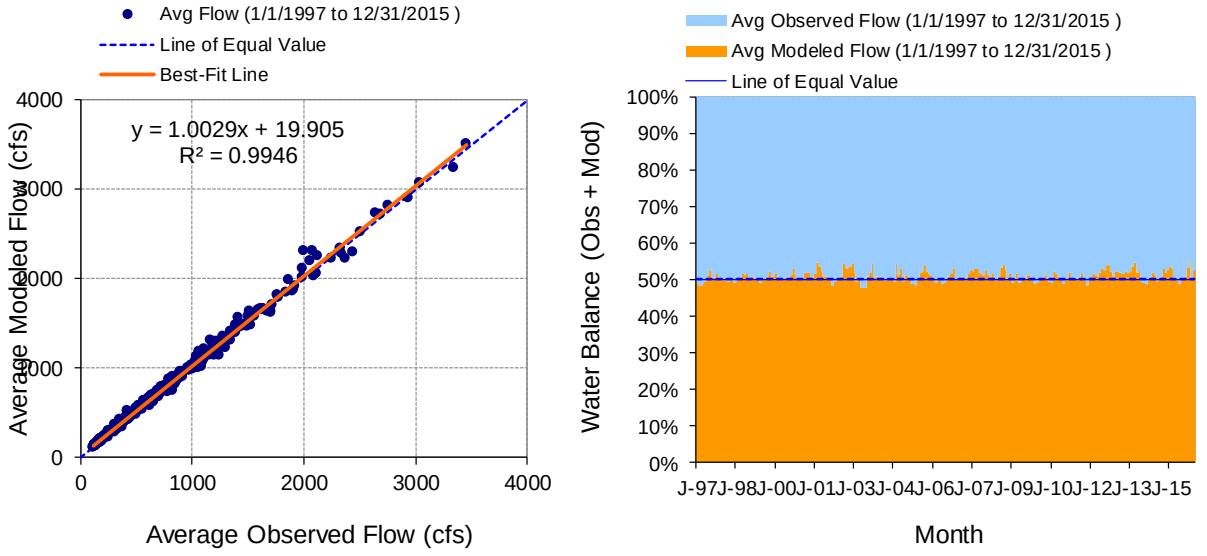

Figure A-3. Monthly flow regression and temporal variation at Green River near Purification Plant near Palmer (USGS 12106700)

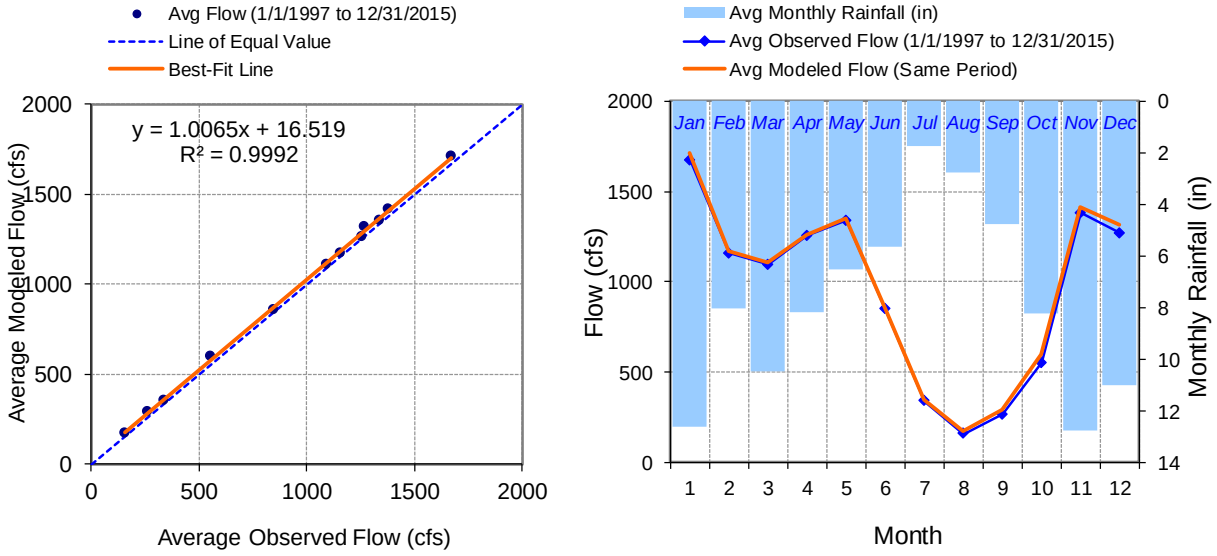

Figure A-4. Seasonal regression and temporal aggregate at Green River near Purification Plant near Palmer (USGS 12106700)

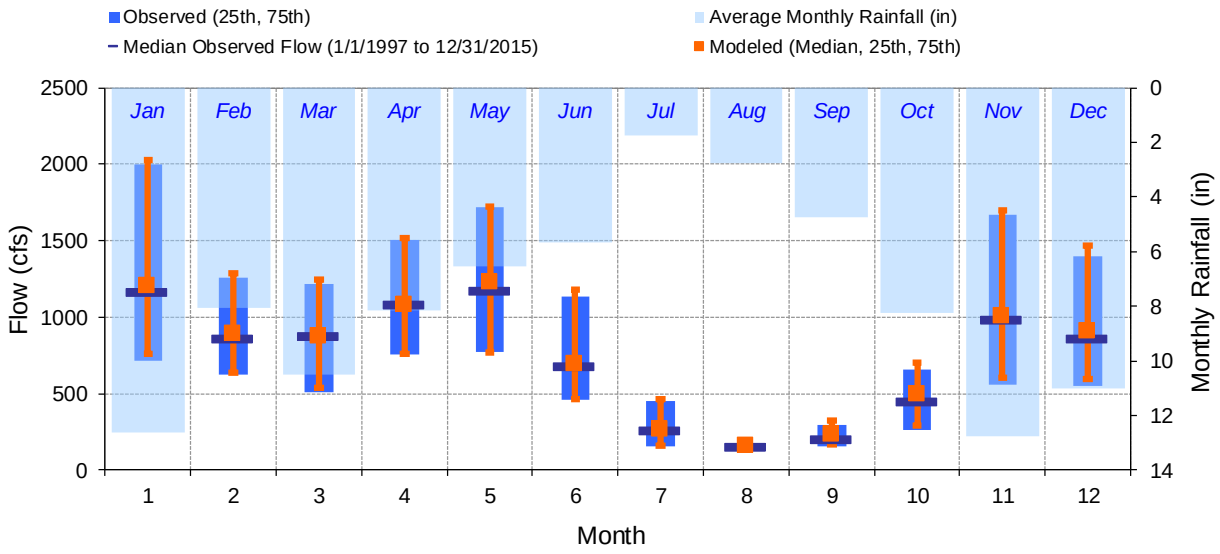

Figure A-5. Seasonal medians and ranges at Green River near Purification Plant near Palmer (USGS 12106700)

Table A-1. Seasonal summary at Green River near Purification Plant near Palmer (USGS 12106700)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	1671.89	1160.00	712.00	2000.00	1711.81	1204.93	758.74	2031.23
Feb	1156.59	860.50	626.50	1260.00	1169.01	893.40	637.75	1289.07
Mar	1093.42	874.00	511.00	1220.00	1103.89	875.05	535.46	1249.68
Apr	1253.43	1080.00	757.75	1507.50	1263.14	1084.94	763.52	1520.75
May	1338.68	1170.00	770.00	1720.00	1349.45	1226.87	765.57	1721.59
Jun	846.33	679.00	458.50	1137.50	858.23	692.15	464.30	1181.56
Jul	339.25	260.00	152.00	453.00	350.03	264.55	158.92	464.97
Aug	157.86	149.00	131.00	175.00	171.22	160.30	142.44	188.38
Sep	263.91	202.50	154.25	295.00	290.80	231.00	171.63	327.05
Oct	551.80	452.00	265.00	658.00	595.20	497.64	295.15	699.54
Nov	1379.53	985.00	561.50	1670.00	1415.59	1010.46	603.60	1699.57
Dec	1268.98	861.00	550.00	1400.00	1315.47	909.92	595.85	1465.51

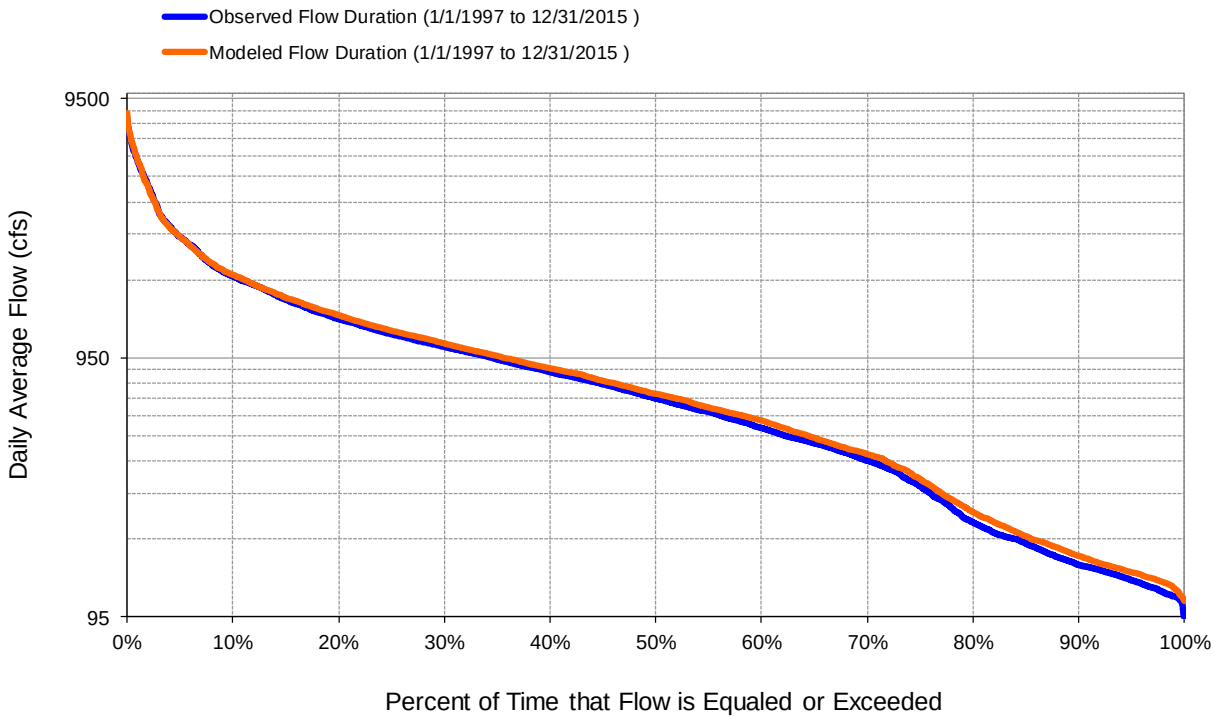

Figure A-6. Flow exceedance at Green River near Purification Plant near Palmer (USGS 12106700)

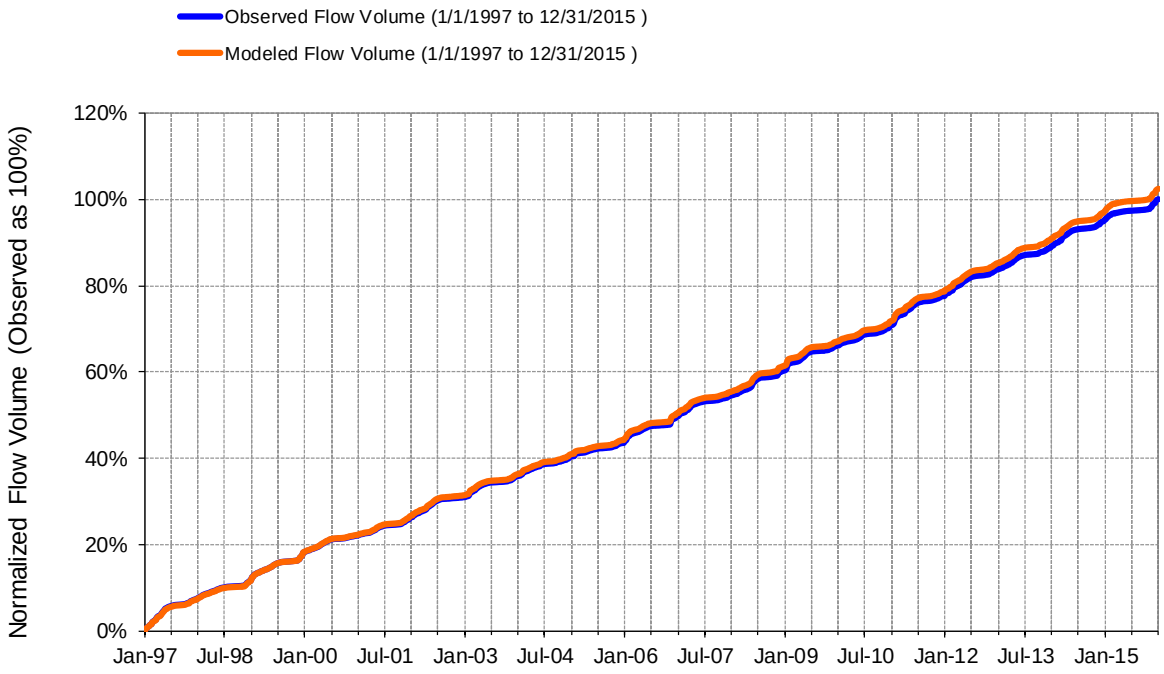

Figure A-7. Flow accumulation at Green River near Purification Plant near Palmer (USGS 12106700)

Table A-2. Summary statistics at Green River near Purification Plant near Palmer (USGS 12106700)

LSPC Simulated Flow		**Observed Flow Gage**	
REACH OUTFLOW FROM SWS 10023 19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Green River near Purification Plant (USGS 12106700) Manually Entered Data Drainage Area (sq-mi): 231	
Total Simulated In-stream Flow:	**56.73**	Total Observed In-stream Flow:	**55.39**
Total of simulated highest 10% flows:	**19.38**	Total of Observed highest 10% flows:	**19.34**
Total of Simulated lowest 50% flows:	**10.27**	Total of Observed Lowest 50% flows:	**9.68**
Simulated Summer Flow Volume (months 7-9):	**4.01**	Observed Summer Flow Volume (7-9):	**3.76**
Simulated Fall Flow Volume (months 10-12):	**16.37**	Observed Fall Flow Volume (10-12):	**15.75**
Simulated Winter Flow Volume (months 1-3):	**19.36**	Observed Winter Flow Volume (1-3):	**19.06**
Simulated Spring Flow Volume (months 4-6):	**16.98**	Observed Spring Flow Volume (4-6):	**16.82**
Total Simulated Storm Volume:	**12.74**	Total Observed Storm Volume:	**13.30**
Simulated Summer Storm Volume (7-9):	**0.38**	Observed Summer Storm Volume (7-9):	**0.38**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	2.42%		
Error in 50% lowest flows:	6.07%		
Error in 10% highest flows:	0.22%		
Seasonal volume error - Summer:	6.67%		
Seasonal volume error - Fall:	3.95%	>>	Clear
Seasonal volume error - Winter:	1.62%		
Seasonal volume error - Spring:	0.94%		
Error in storm volumes:	-4.17%		
Error in summer storm volumes:	0.39%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.983	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.899	as E or E' approaches 1.0	
Monthly NSE	0.993		
Obs Baseflow	76.0%		
Sim Baseflow	77.5%		
Baseflow fraction error	1.5%		
Coefficient of determination, r^2	0.98		
Weighted r^2	0.97		

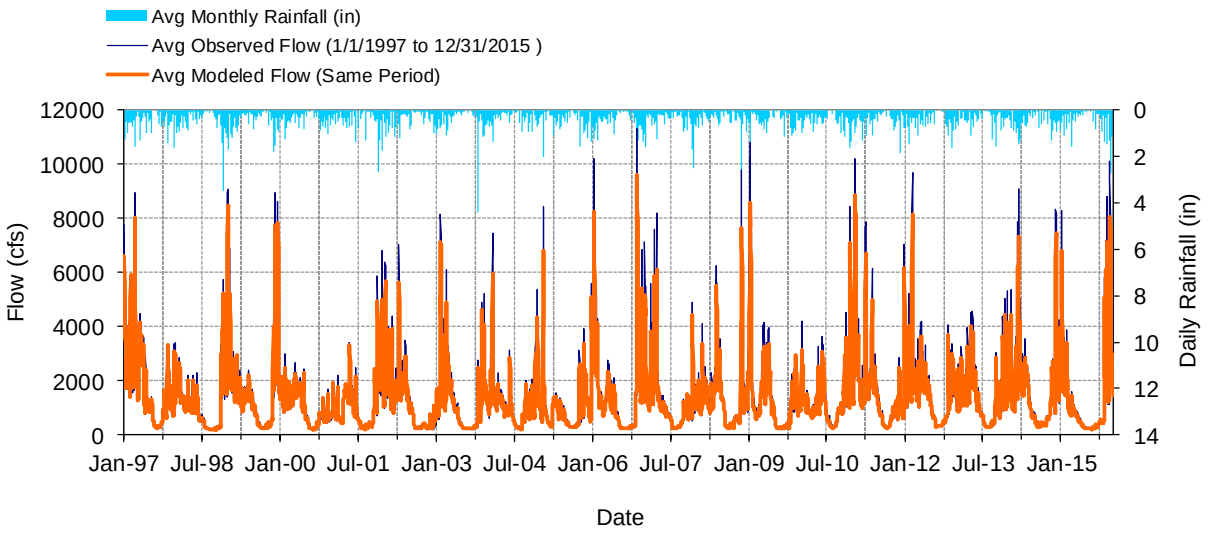

Figure A-8. Mean daily flow at Green River near Auburn (USGS 12113000)

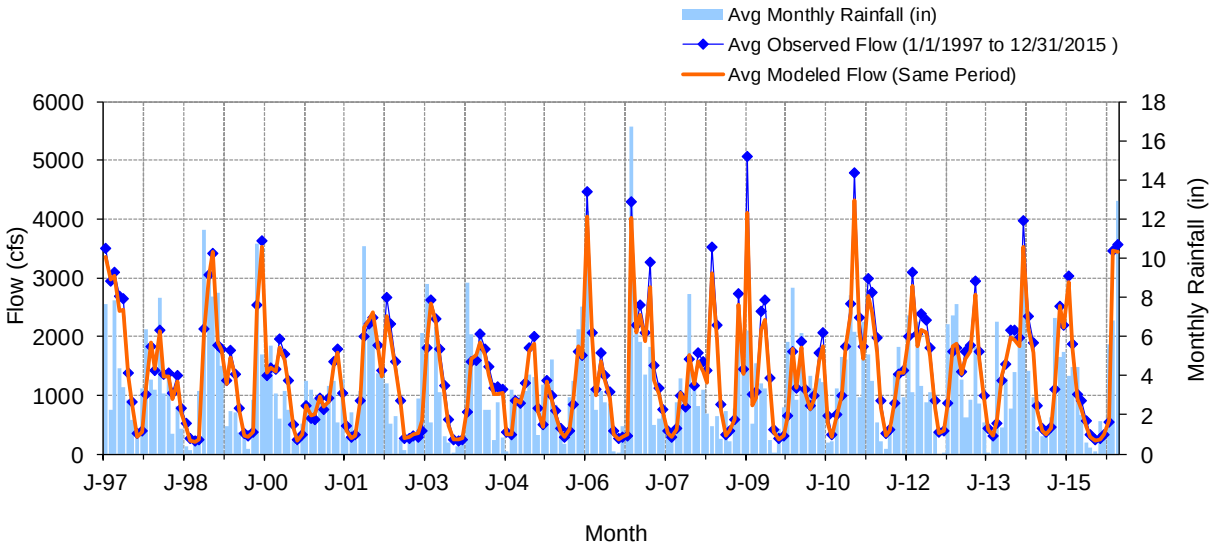

Figure A-9. Mean monthly flow at Green River near Auburn (USGS 12113000)

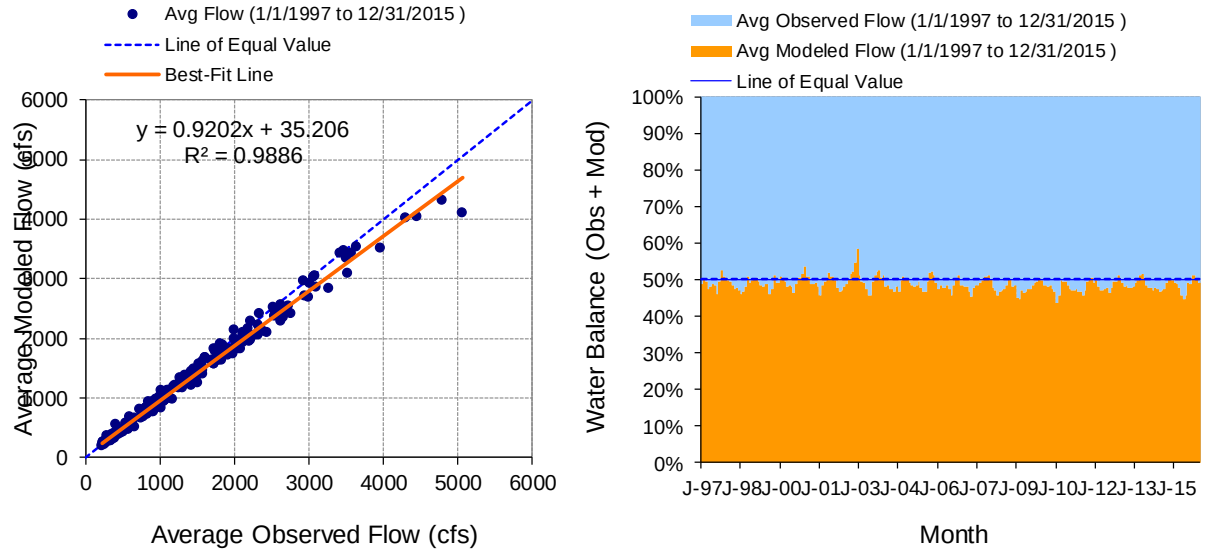

Figure A-10. Monthly flow regression and temporal variation at Green River near Auburn (USGS 12113000)

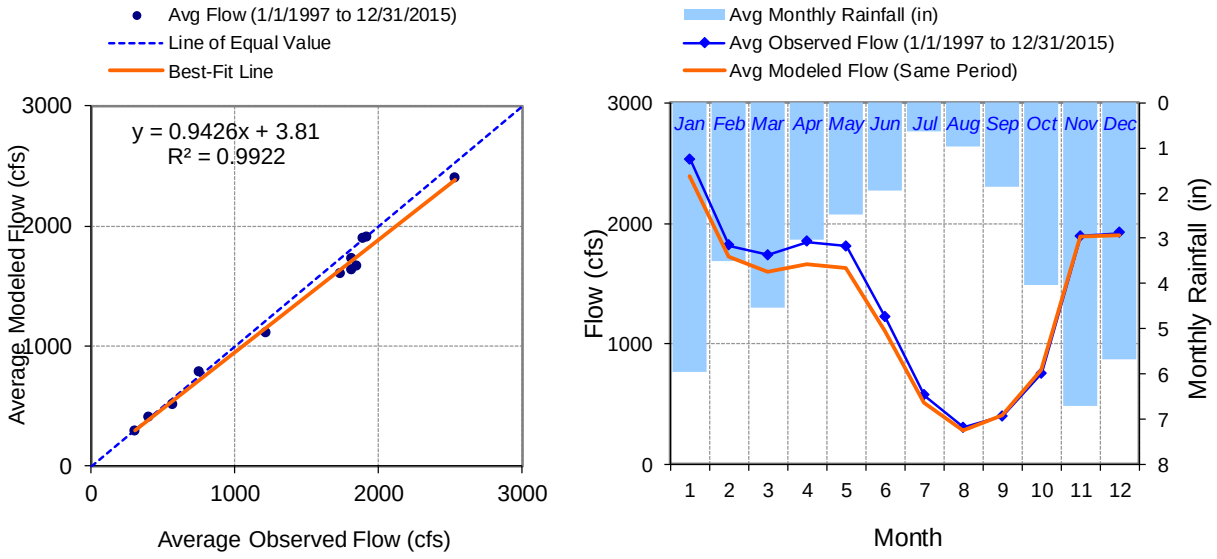

Figure A-11. Seasonal regression and temporal aggregate at Green River near Auburn (USGS 12113000)

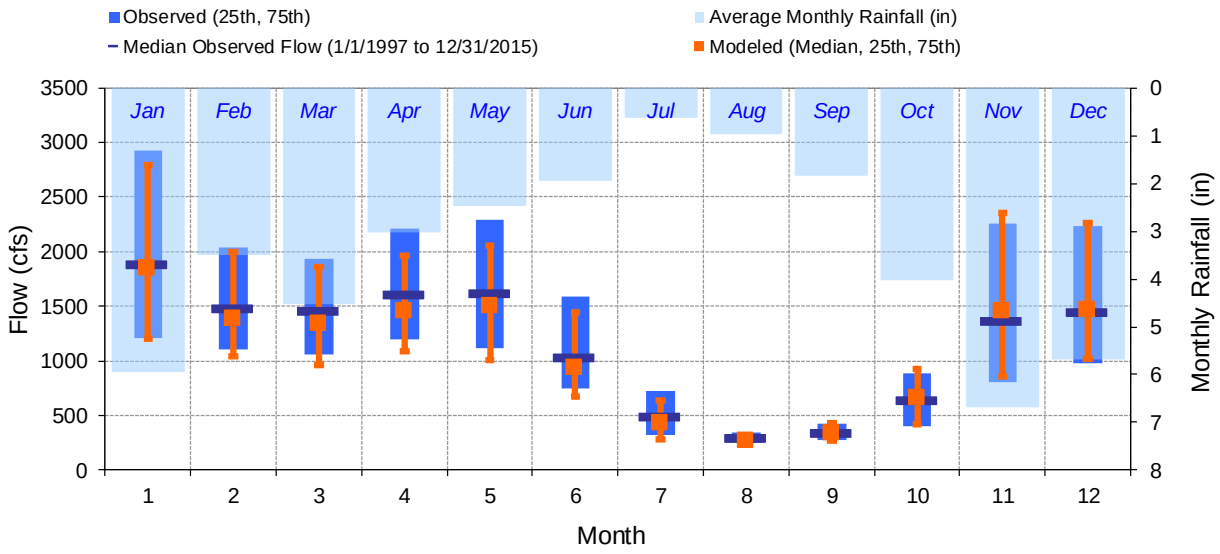

Figure A-12. Seasonal medians and ranges at Green River near Auburn (USGS 12113000)

Table A-3. Seasonal summary at Green River near Auburn (USGS 12113000)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	2530.53	1880.00	1210.00	2930.00	2390.61	1853.93	1206.33	2798.10
Feb	1813.90	1480.00	1110.00	2042.50	1722.91	1390.14	1043.64	1999.10
Mar	1736.11	1460.00	1060.00	1940.00	1600.64	1338.62	960.14	1861.74
Apr	1846.15	1610.00	1200.00	2210.00	1664.59	1460.60	1088.87	1965.97
May	1810.21	1620.00	1120.00	2290.00	1631.00	1502.99	1008.28	2059.67
Jun	1220.81	1035.00	753.25	1587.50	1106.97	940.50	676.88	1447.18
Jul	569.11	494.00	322.00	721.00	508.08	433.20	284.51	637.45
Aug	305.28	292.00	257.00	345.00	284.36	269.47	245.35	309.57
Sep	400.49	338.00	276.00	430.75	401.93	335.28	272.42	435.42
Oct	754.08	636.00	399.00	887.00	780.02	667.37	422.44	932.41
Nov	1895.37	1370.00	803.00	2255.00	1895.46	1459.06	860.52	2360.43
Dec	1921.24	1440.00	984.00	2240.00	1897.48	1468.07	1022.88	2264.36

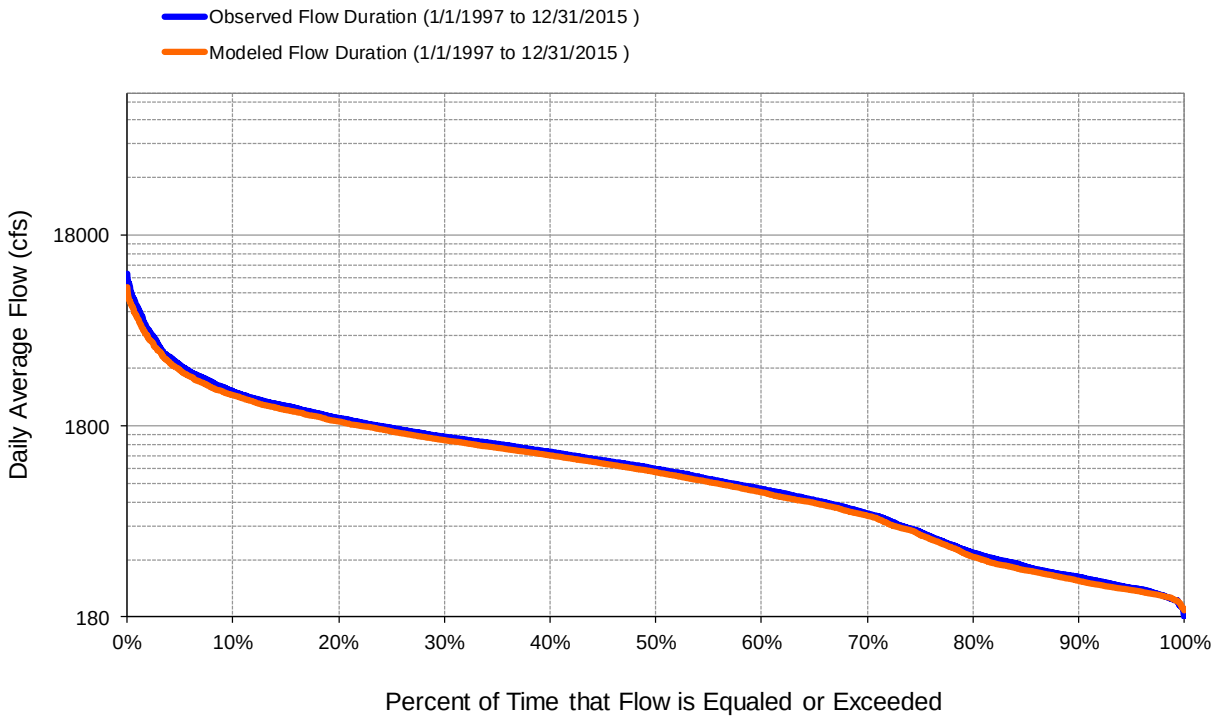

Figure A-13. Flow exceedance at Green River near Auburn (USGS 12113000)

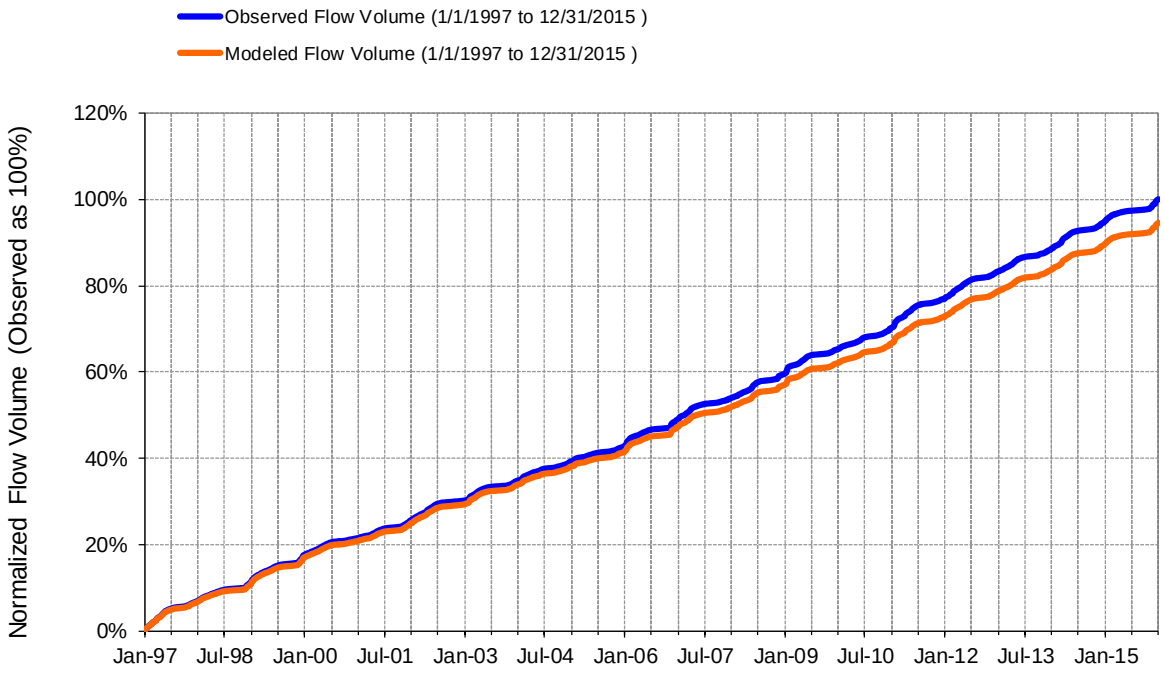

Figure A-14. Flow accumulation at Green River near Auburn (USGS 12113000)

Table A-4. Summary statistics at Green River near Auburn (USGS 12113000)

LSPC Simulated Flow		**Observed Flow Gage**	
REACH OUTFLOW FROM SWS 20314		Green River near Auburn (USGS 12113000)	
19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Drainage Area (sq-mi): 399	
Total Simulated In-stream Flow:	**44.98**	Total Observed In-stream Flow:	**47.59**
Total of simulated highest 10% flows:	**13.97**	Total of Observed highest 10% flows:	**15.28**
Total of Simulated lowest 50% flows:	**9.13**	Total of Observed Lowest 50% flows:	**9.48**
Simulated Summer Flow Volume (months 7-9):	**3.41**	Observed Summer Flow Volume (7-9):	**3.65**
Simulated Fall Flow Volume (months 10-12):	**13.04**	Observed Fall Flow Volume (10-12):	**13.03**
Simulated Winter Flow Volume (months 1-3):	**16.06**	Observed Winter Flow Volume (1-3):	**17.10**
Simulated Spring Flow Volume (months 4-6):	**12.46**	Observed Spring Flow Volume (4-6):	**13.81**
Total Simulated Storm Volume:	**10.77**	Total Observed Storm Volume:	**12.30**
Simulated Summer Storm Volume (7-9):	**0.33**	Observed Summer Storm Volume (7-9):	**0.37**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-5.47%		
Error in 50% lowest flows:	-3.74%		
Error in 10% highest flows:	-8.53%		
Seasonal volume error - Summer:	-6.38%		
Seasonal volume error - Fall:	0.05%		
Seasonal volume error - Winter:	-6.05%		
Seasonal volume error - Spring:	-9.73%		
Error in storm volumes:	-12.49%		
Error in summer storm volumes:	-9.30%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.964	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.853	as E or E' approaches 1.0	
Monthly NSE	0.978		
Obs Baseflow	74.1%		
Sim Baseflow	76.1%		
Baseflow fraction error	1.9%		
Coefficient of determination, r^2	0.98		
Weighted r^2	0.87		

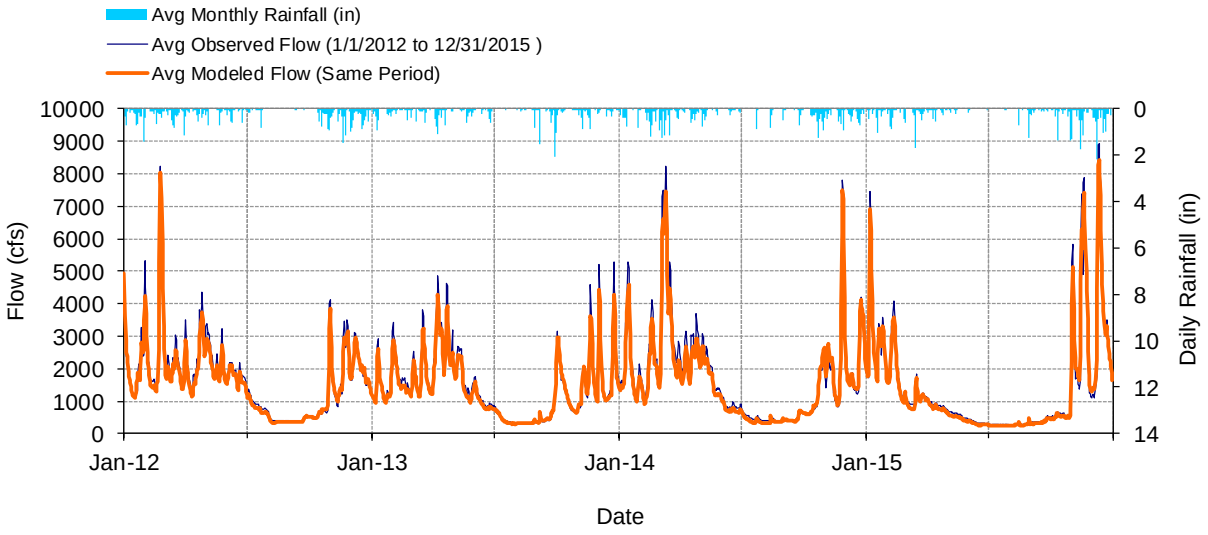

Figure A-15. Mean daily flow at Green River at 200th St at Kent (USGS 12113344)

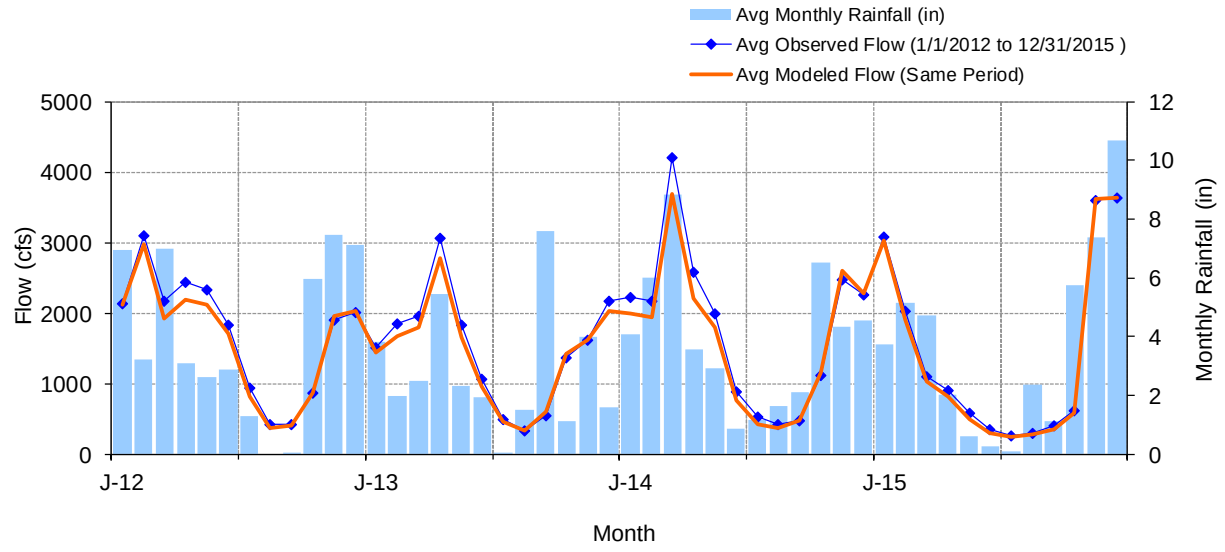

Figure A-16. Mean monthly flow at Green River at 200th St at Kent (USGS 12113344)

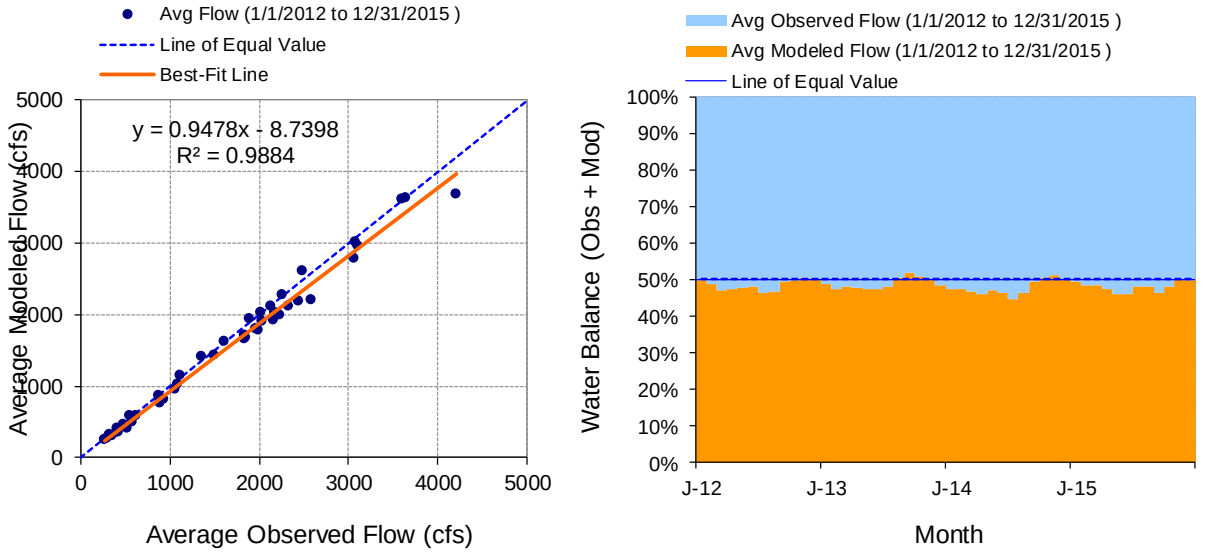

Figure A-17. Monthly flow regression and temporal variation at Green River at 200th St at Kent (USGS 12113344)

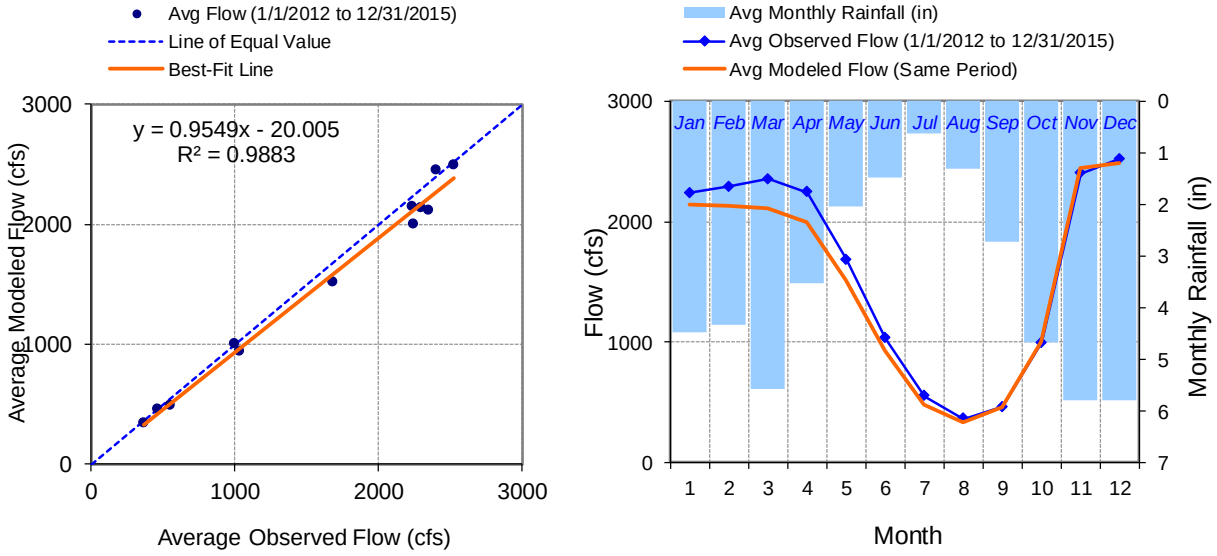

Figure A-18. Seasonal regression and temporal aggregate at Green River at 200th St at Kent (USGS 12113344)

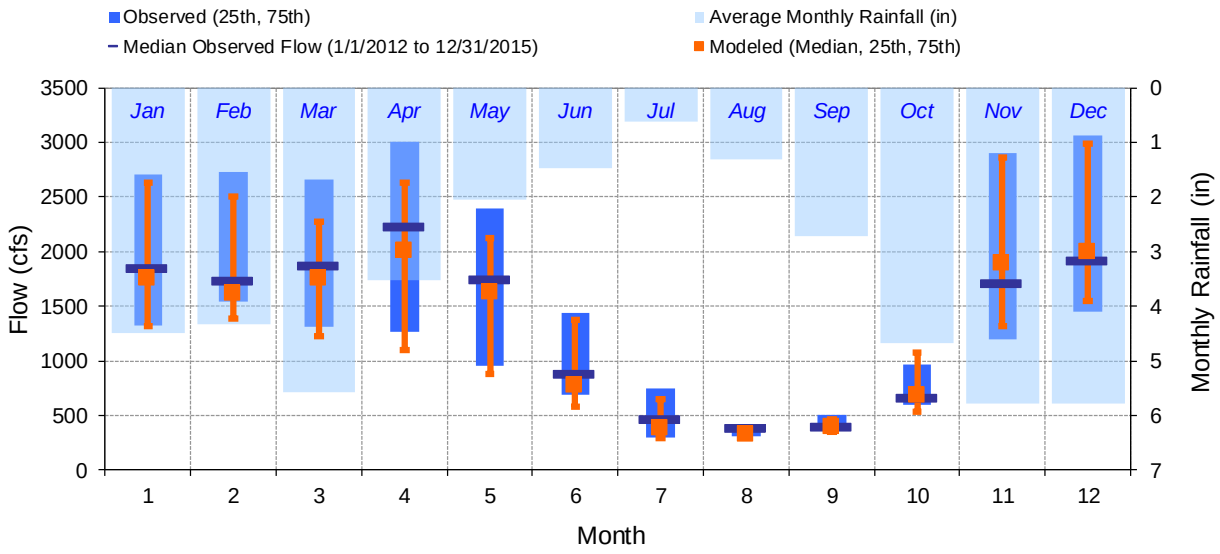

Figure A-19. Seasonal medians and ranges at Green River at 200th St at Kent (USGS 12113344)

Table A-5. Seasonal summary at Green River at 200th St at Kent (USGS 12113344)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	2236.05	1850.00	1320.00	2702.50	2141.17	1760.08	1318.14	2637.68
Feb	2292.74	1730.00	1540.00	2730.00	2129.63	1622.17	1391.14	2503.98
Mar	2353.15	1870.00	1317.50	2660.00	2108.59	1761.80	1223.09	2274.33
Apr	2244.32	2230.00	1265.00	3012.50	1997.59	2013.73	1103.11	2633.88
May	1684.70	1745.00	956.25	2392.50	1515.73	1634.71	881.83	2126.12
Jun	1032.39	884.50	692.00	1440.00	931.24	771.96	584.57	1372.12
Jul	551.53	464.00	298.75	753.50	483.71	381.34	291.77	654.79
Aug	364.05	382.00	312.50	403.00	332.51	329.50	307.42	353.56
Sep	460.71	402.00	368.00	502.00	454.20	391.26	351.79	462.65
Oct	994.19	657.00	593.00	968.00	1002.70	682.42	537.54	1073.74
Nov	2398.91	1705.00	1200.00	2902.50	2444.48	1898.46	1319.70	2867.84
Dec	2521.37	1920.00	1447.50	3070.00	2490.28	2002.69	1554.23	2984.76

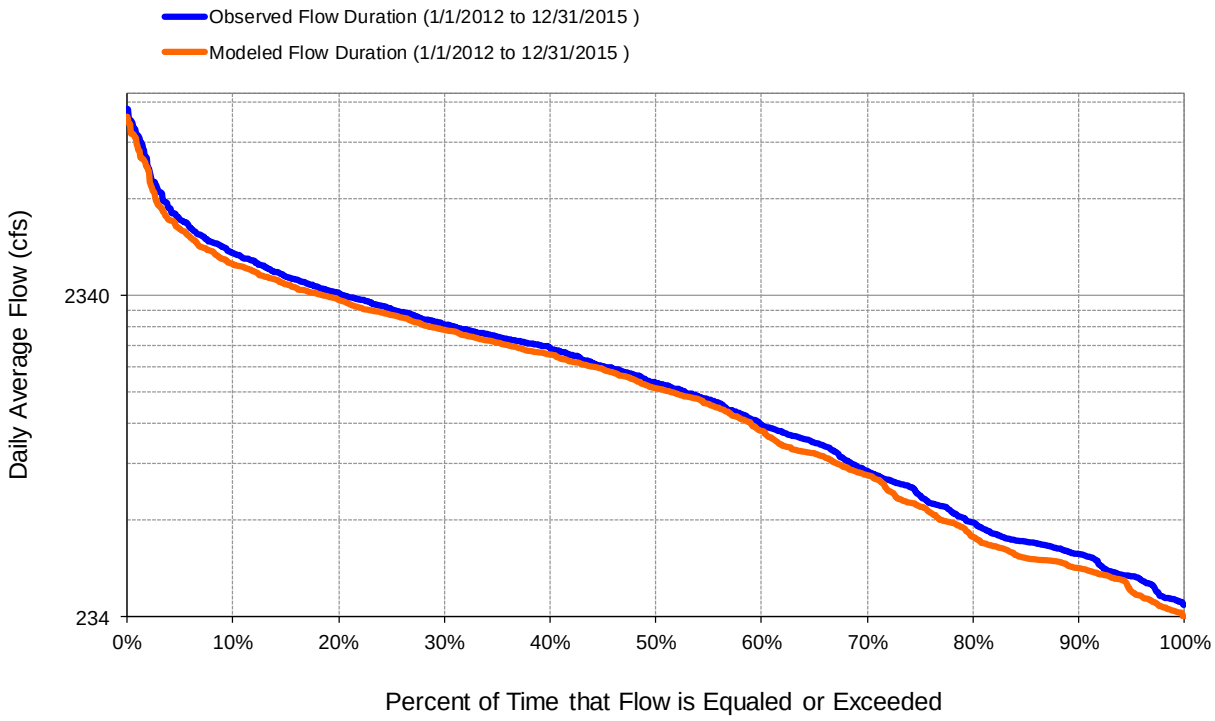

Figure A-20. Flow exceedance at Green River at 200th St at Kent (USGS 12113344)

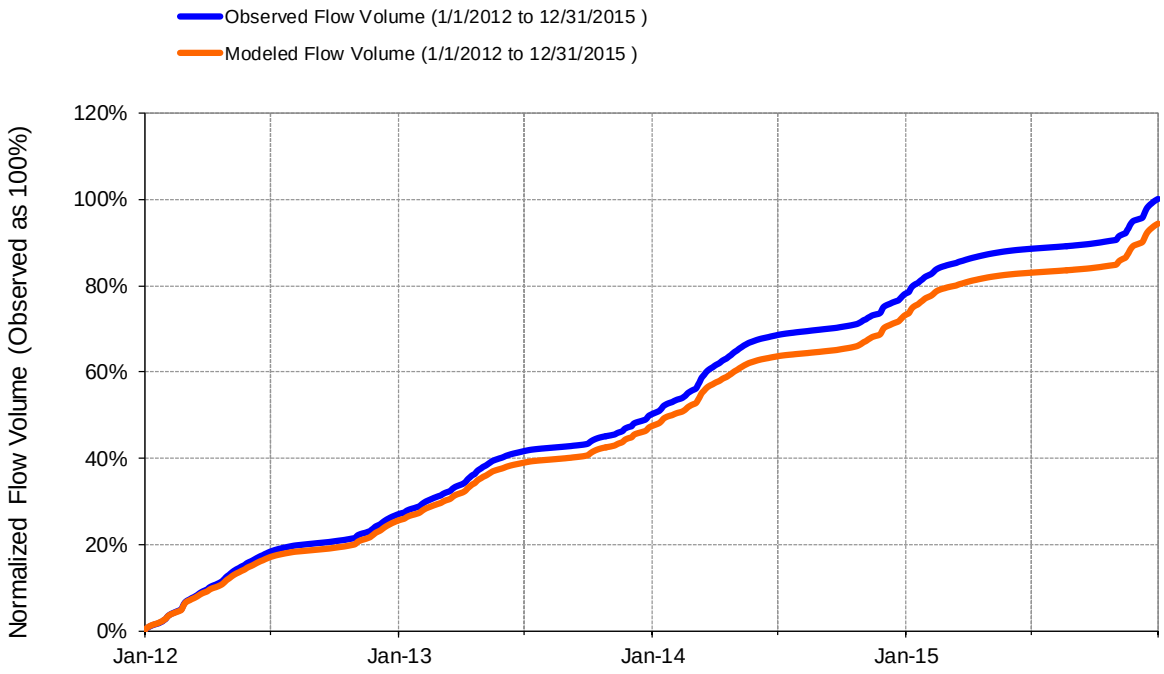

Figure A-21. Flow accumulation at Green River at 200th St at Kent (USGS 12113344)

Table A-6. Summary statistics at Green River at 200th St at Kent (USGS 12113344)

LSPC Simulated Flow		**Observed Flow Gage**	
REACH OUTFLOW FROM SWS 22566 4-Year Analysis Period: 1/1/2012 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Green River at 200th St at Kent, WA (USGS 12113344) Manually Entered Data Drainage Area (sq-mi): 451	
Total Simulated In-stream Flow:	**45.13**	Total Observed In-stream Flow:	**47.89**
Total of simulated highest 10% flows:	**13.14**	Total of Observed highest 10% flows:	**14.16**
Total of Simulated lowest 50% flows:	**9.01**	Total of Observed Lowest 50% flows:	**9.60**
Simulated Summer Flow Volume (months 7-9):	**3.21**	Observed Summer Flow Volume (7-9):	**3.48**
Simulated Fall Flow Volume (months 10-12):	**14.98**	Observed Fall Flow Volume (10-12):	**14.92**
Simulated Winter Flow Volume (months 1-3):	**15.82**	Observed Winter Flow Volume (1-3):	**17.07**
Simulated Spring Flow Volume (months 4-6):	**11.12**	Observed Spring Flow Volume (4-6):	**12.41**
Total Simulated Storm Volume:	**11.10**	Total Observed Storm Volume:	**12.33**
Simulated Summer Storm Volume (7-9):	**0.30**	Observed Summer Storm Volume (7-9):	**0.30**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-5.75%		
Error in 50% lowest flows:	-6.16%		
Error in 10% highest flows:	-7.15%		
Seasonal volume error - Summer:	-7.76%		
Seasonal volume error - Fall:	0.37%	>> Clear	
Seasonal volume error - Winter:	-7.31%		
Seasonal volume error - Spring:	-10.41%		
Error in storm volumes:	-9.90%		
Error in summer storm volumes:	-1.78%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.973	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.854	as E or E' approaches 1.0	
Monthly NSE	0.979		
Obs Baseflow	74.3%		
Sim Baseflow	75.4%		
Baseflow fraction error	1.1%		
Coefficient of determination, r^2	0.98		
Weighted r^2	0.92		

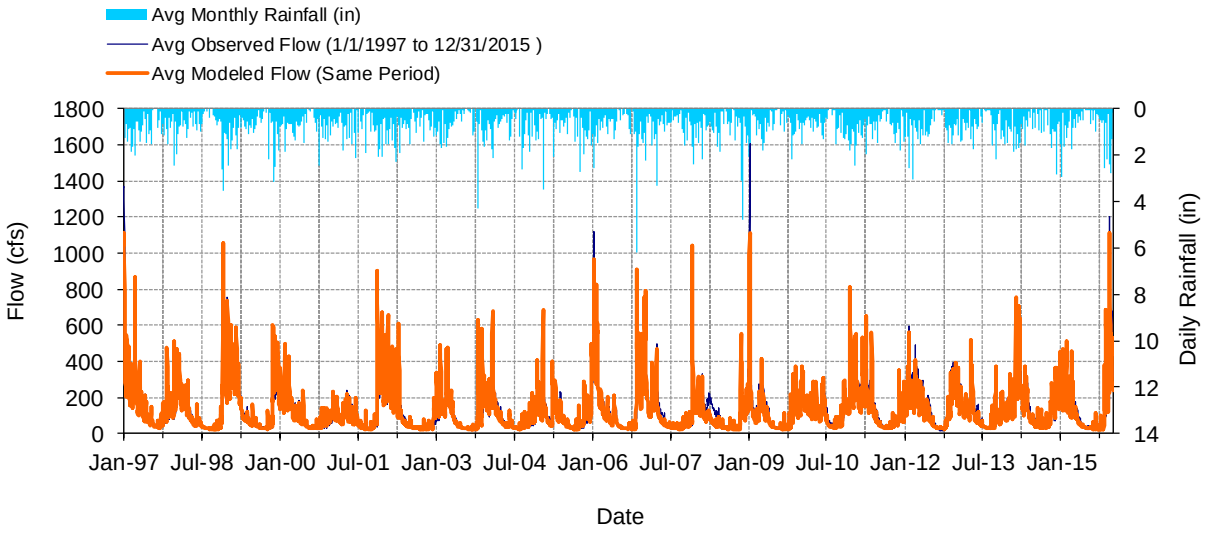

Figure A-22. Mean daily flow at Big Soos Creek near Auburn (USGS 12112600)

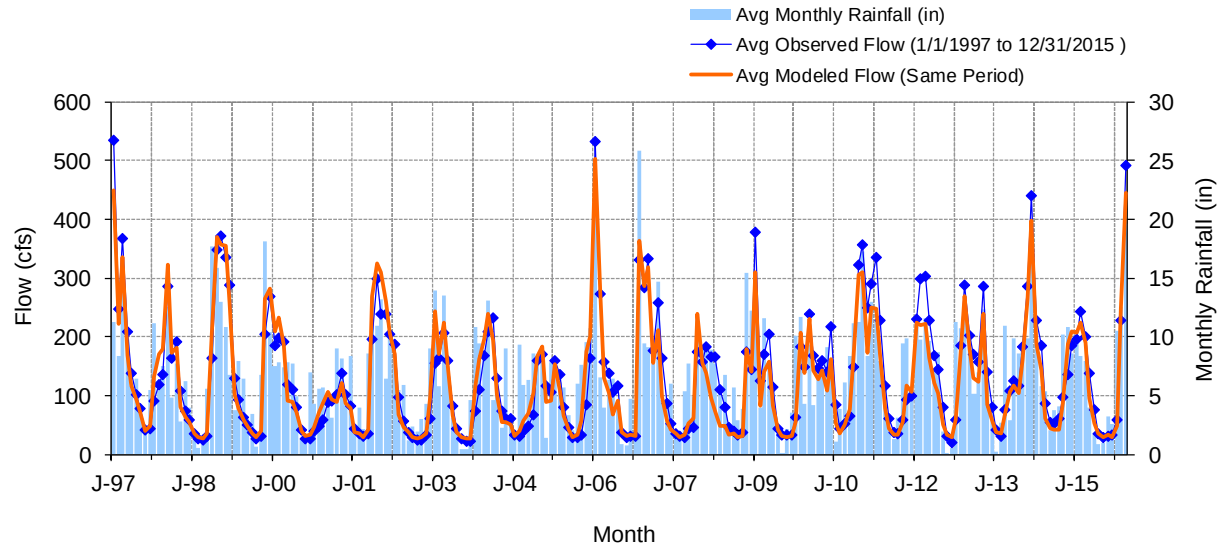

Figure A-23. Mean monthly flow at Big Soos Creek near Auburn (USGS 12112600)

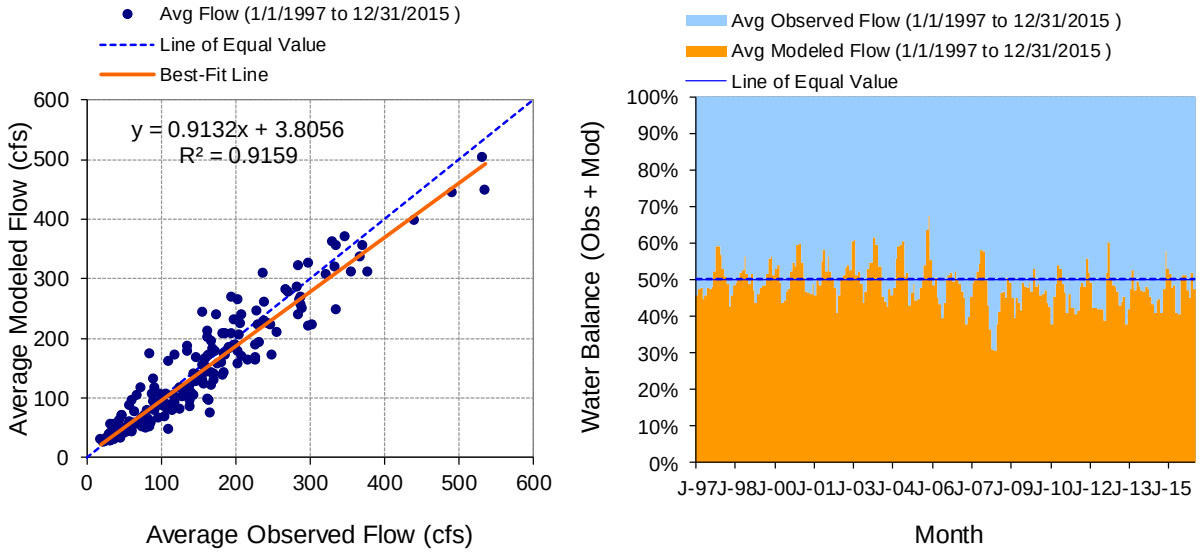

Figure A-24. Monthly flow regression and temporal variation at Big Soos Creek near Auburn (USGS 12112600)

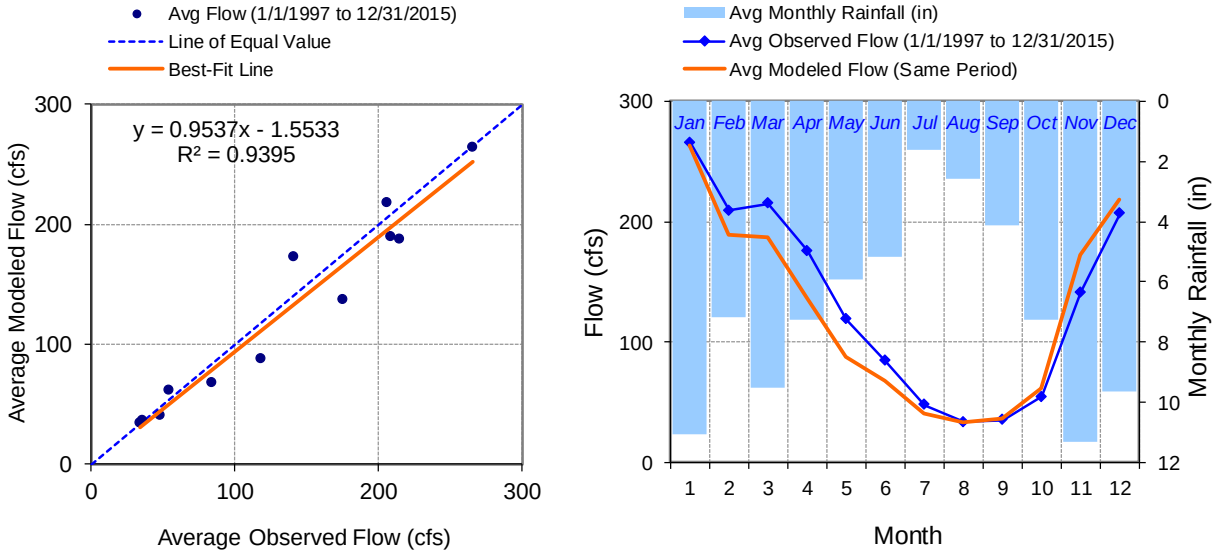

Figure A-25. Seasonal regression and temporal aggregate at Big Soos Creek near Auburn (USGS 12112600)

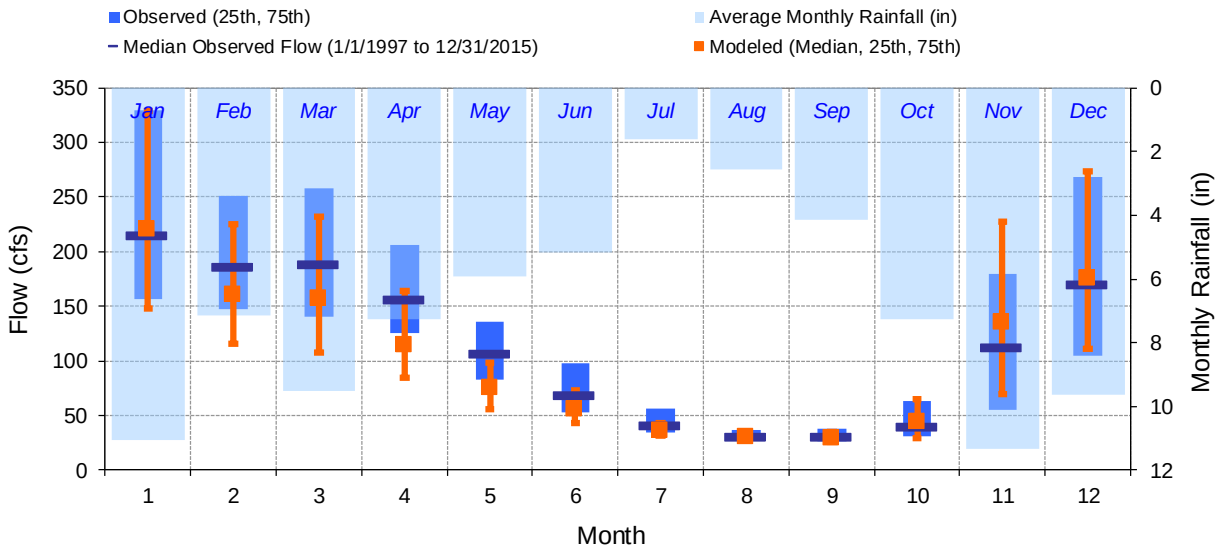

Figure A-26. Seasonal medians and ranges at Big Soos Creek near Auburn (USGS 12112600)

Table A-7. Seasonal summary at Big Soos Creek near Auburn (USGS 12112600)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	265.77	215.00	157.00	329.00	263.76	220.53	147.48	329.37
Feb	208.98	185.50	147.75	251.25	189.13	160.90	116.02	225.31
Mar	214.80	188.00	141.00	258.00	187.18	157.55	107.56	231.66
Apr	175.56	156.00	125.00	205.75	137.15	114.05	84.98	164.12
May	118.49	107.00	83.00	136.00	87.38	75.21	56.28	98.97
Jun	84.25	69.00	53.00	98.00	67.45	56.05	43.05	73.33
Jul	47.52	41.00	34.00	56.00	40.22	36.32	31.90	42.94
Aug	33.77	31.00	28.00	37.00	33.34	30.31	27.71	34.26
Sep	35.34	30.00	26.00	38.00	36.25	28.87	26.11	35.41
Oct	54.21	40.00	31.00	63.00	61.51	44.19	29.02	65.30
Nov	141.05	112.50	55.00	179.75	172.76	134.80	69.13	227.73
Dec	206.43	170.00	105.00	268.00	217.91	176.01	111.63	273.34

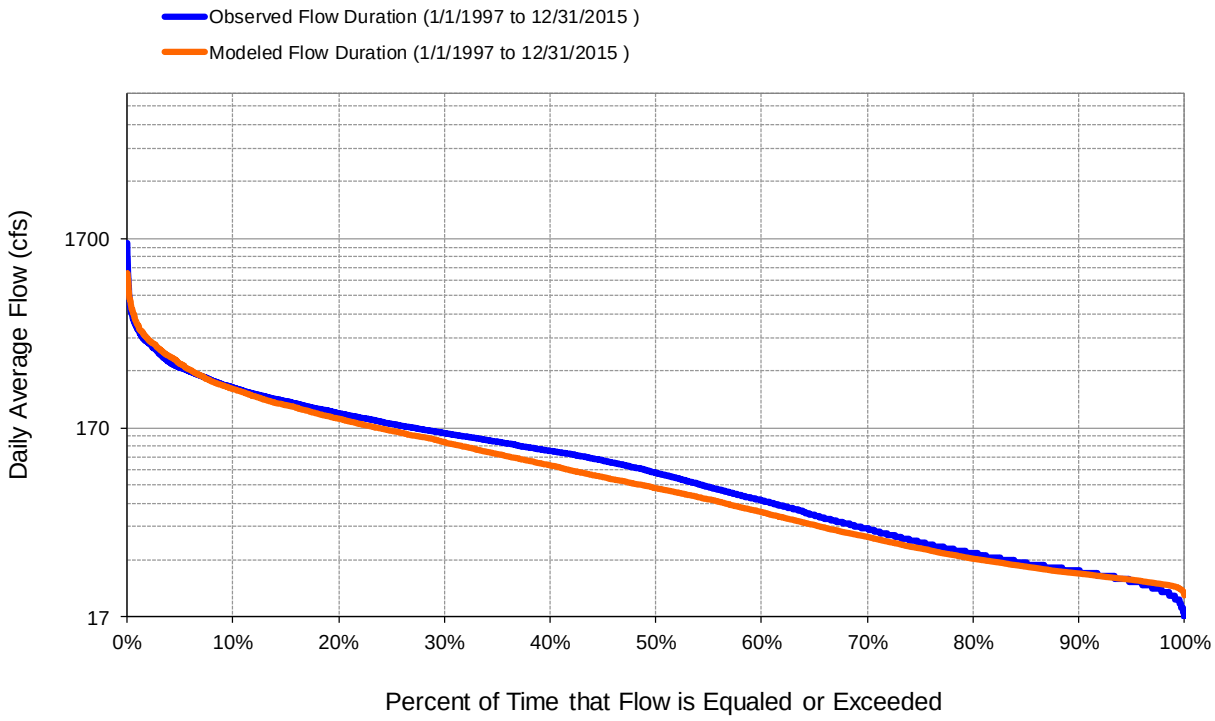

Figure A-27. Flow exceedance at Big Soos Creek near Auburn (USGS 12112600)

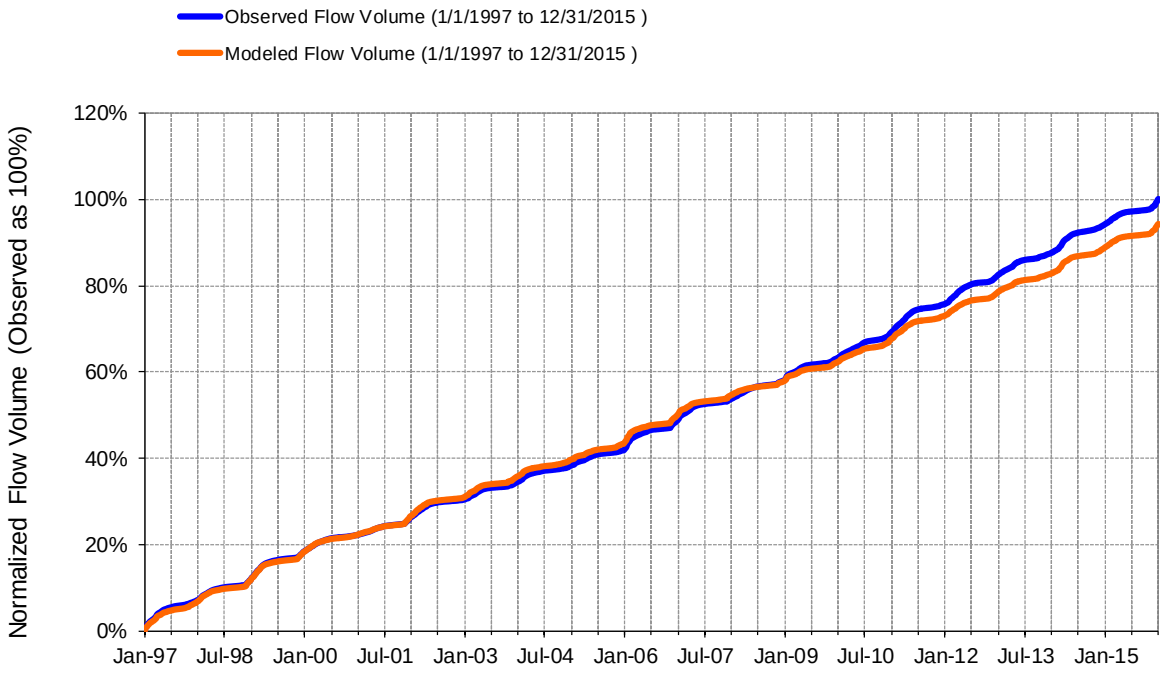

Figure A-28. Flow accumulation at Big Soos Creek near Auburn (USGS 12112600)

Table A-8. Summary statistics at Big Soos Creek near Auburn (USGS 12112600)

LSPC Simulated Flow		**Observed Flow Gage**	
REACH OUTFLOW FROM SWS 180592 19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Big Soos Creek near Auburn (USGS 12112600) Manually Entered Data Drainage Area (sq-mi): 66.70	
Total Simulated In-stream Flow:	**25.30**	Total Observed In-stream Flow:	**26.85**
Total of simulated highest 10% flows:	**8.43**	Total of Observed highest 10% flows:	**8.20**
Total of Simulated lowest 50% flows:	**4.50**	Total of Observed Lowest 50% flows:	**4.96**
Simulated Summer Flow Volume (months 7-9):	**1.88**	Observed Summer Flow Volume (7-9):	**2.00**
Simulated Fall Flow Volume (months 10-12):	**7.72**	Observed Fall Flow Volume (10-12):	**6.87**
Simulated Winter Flow Volume (months 1-3):	**10.77**	Observed Winter Flow Volume (1-3):	**11.60**
Simulated Spring Flow Volume (months 4-6):	**4.93**	Observed Spring Flow Volume (4-6):	**6.39**
Total Simulated Storm Volume:	**5.36**	Total Observed Storm Volume:	**4.08**
Simulated Summer Storm Volume (7-9):	**0.21**	Observed Summer Storm Volume (7-9):	**0.18**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-5.77%		
Error in 50% lowest flows:	-9.40%		
Error in 10% highest flows:	2.79%		
Seasonal volume error - Summer:	-5.92%		
Seasonal volume error - Fall:	12.46%	>> Clear	
Seasonal volume error - Winter:	-7.11%		
Seasonal volume error - Spring:	-22.86%		
Error in storm volumes:	31.46%		
Error in summer storm volumes:	20.44%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.870	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.680	as E or E' approaches 1.0	
Monthly NSE	0.910		
Obs Baseflow	84.8%		
Sim Baseflow	78.8%		
Baseflow fraction error	-6.0%		
Coefficient of determination, r^2	0.88		
Weighted r^2	0.84		

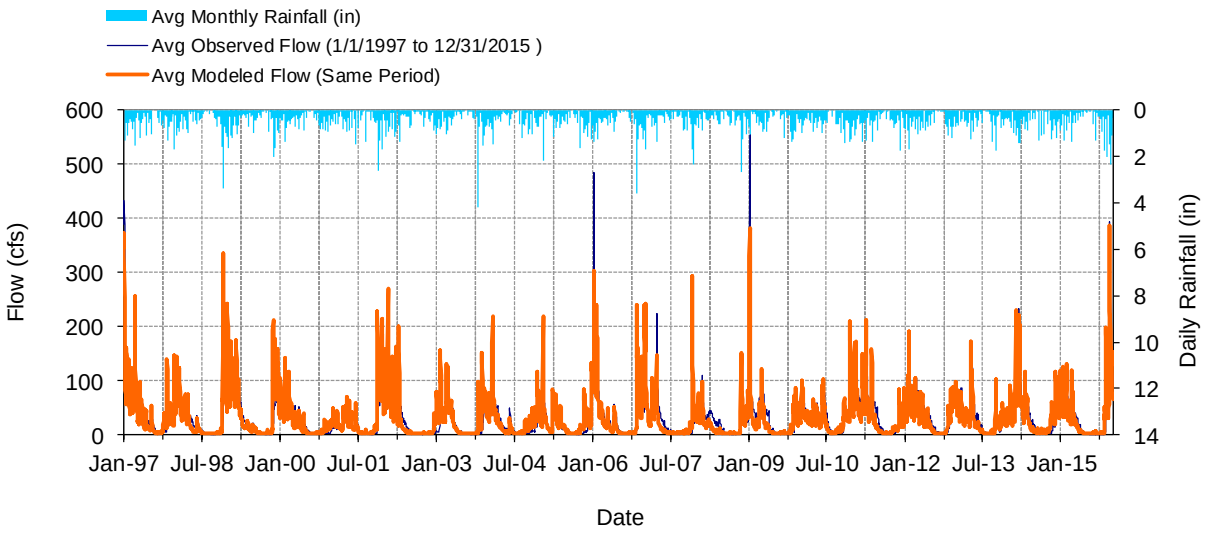

Figure A-29. Mean daily flow at Covington Creek near mouth (King County 09a)

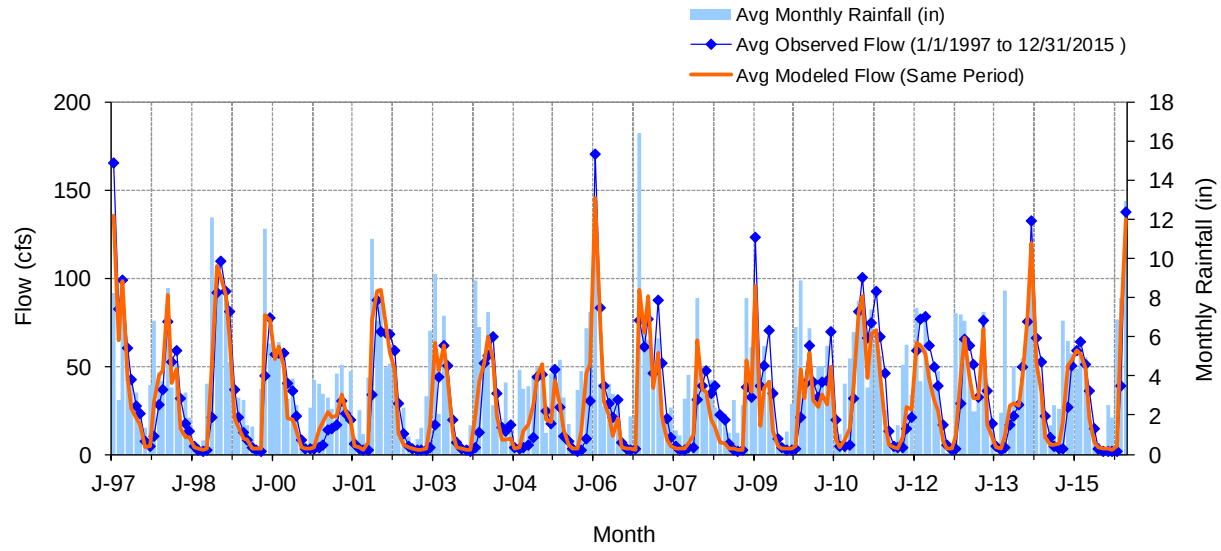

Figure A-30. Mean monthly flow at Covington Creek near mouth (King County 09a)

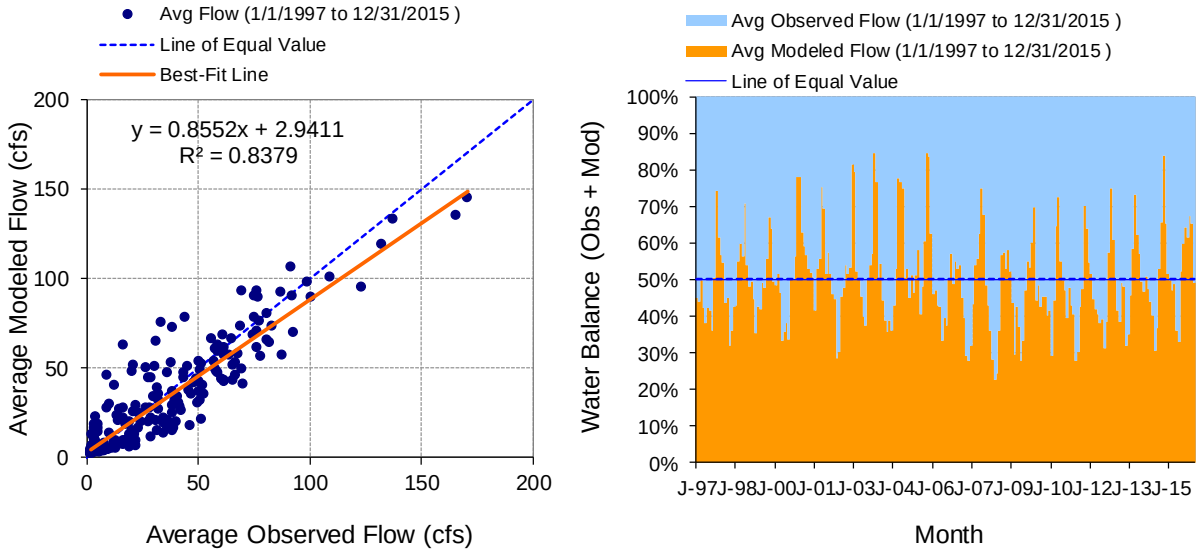

Figure A-31. Monthly flow regression and temporal variation at Covington Creek near mouth (King County 09a)

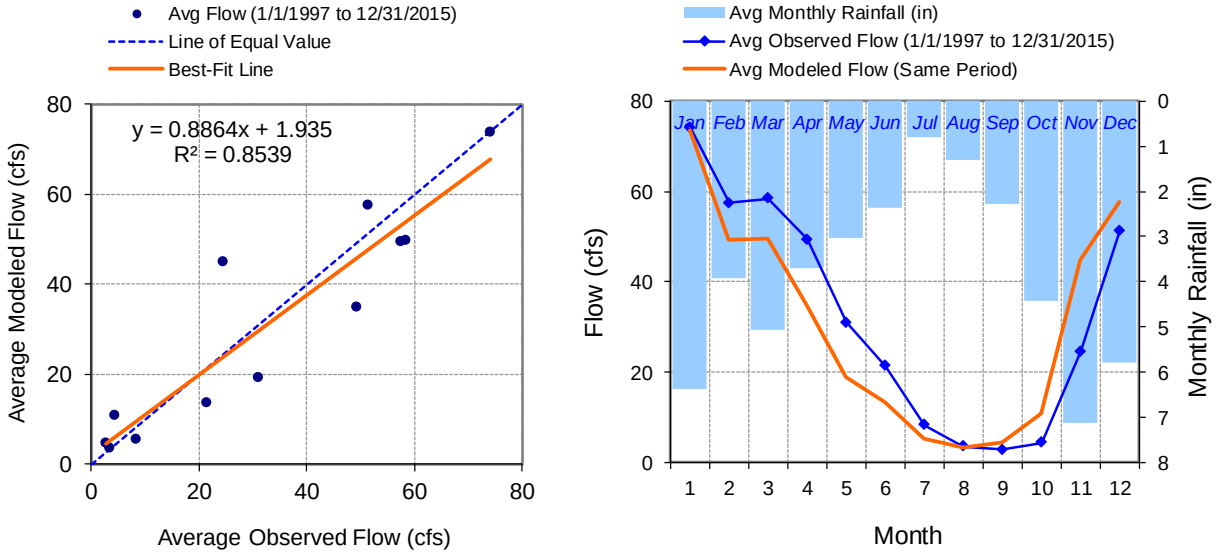

Figure A-32. Seasonal regression and temporal aggregate at Covington Creek near mouth (King County 09a)

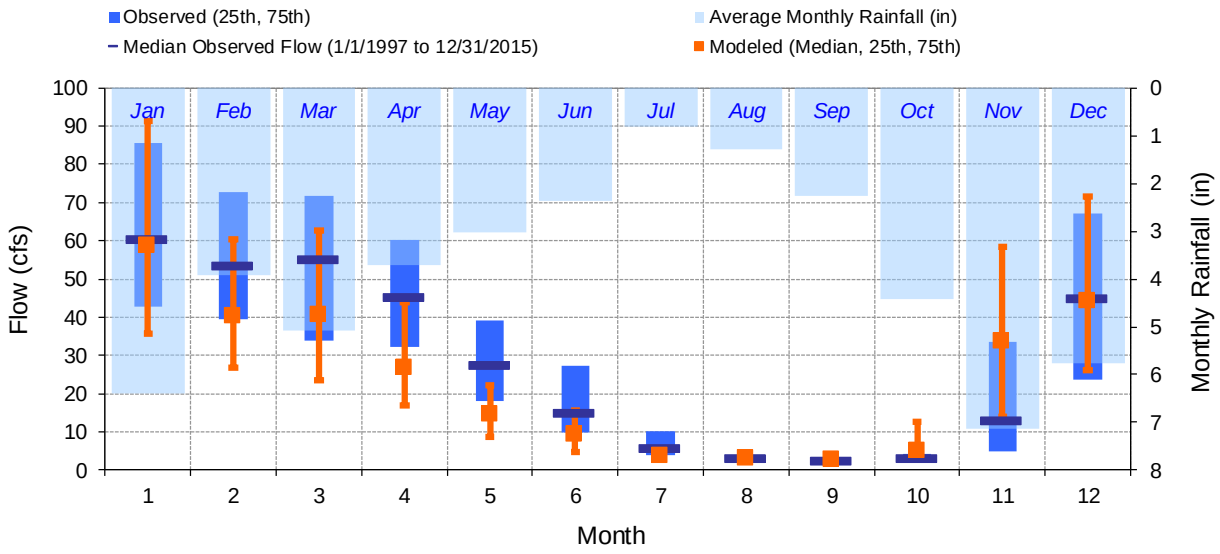

Figure A-33. Seasonal medians and ranges at Covington Creek near mouth (King County 09a)

Table A-9. Seasonal summary at Covington Creek near mouth (King County 09a)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	74.24	60.47	42.93	85.63	73.81	58.60	35.79	91.43
Feb	57.51	53.36	39.50	72.59	49.31	40.27	26.72	60.45
Mar	58.38	55.19	33.94	71.70	49.47	40.76	23.60	62.62
Apr	49.31	45.29	32.29	60.08	34.87	26.93	16.85	44.09
May	31.00	27.35	18.20	39.06	18.96	14.53	8.63	22.06
Jun	21.41	14.95	9.85	27.45	13.44	9.43	4.69	15.51
Jul	8.27	5.67	3.87	10.25	5.27	3.80	3.33	5.25
Aug	3.52	3.05	2.48	3.92	3.41	3.14	2.82	3.61
Sep	2.76	2.41	1.97	3.32	4.38	2.88	2.58	3.62
Oct	4.30	2.94	2.11	4.36	10.71	4.95	2.73	12.69
Nov	24.57	13.11	4.89	33.62	44.76	33.59	14.09	58.30
Dec	51.37	44.91	23.63	67.22	57.56	44.33	26.21	71.63

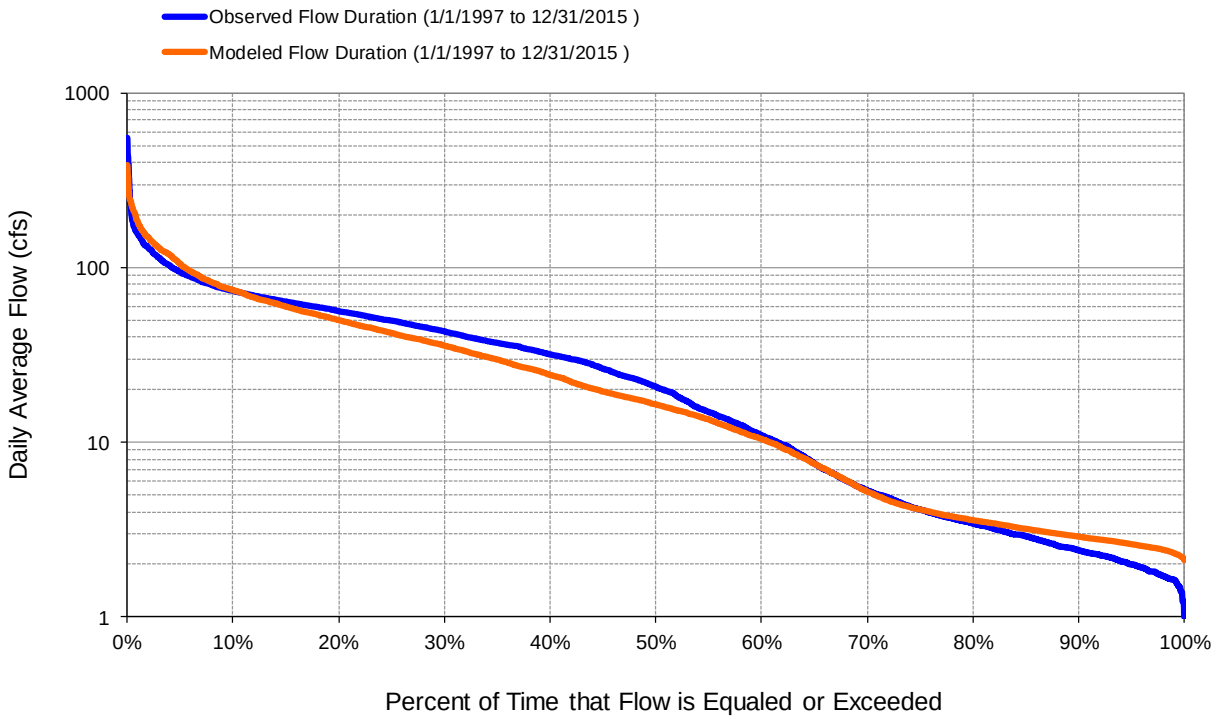

Figure A-34. Flow exceedance at Covington Creek near mouth (King County 09a)

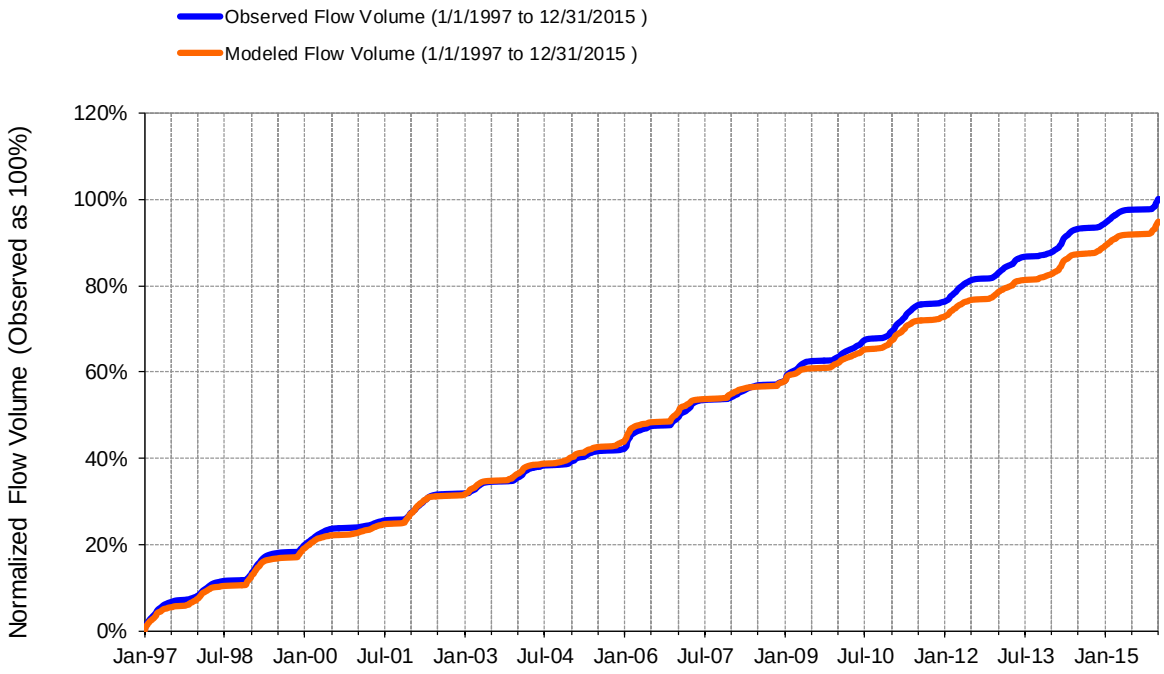

Figure A-35. Flow accumulation at Covington Creek near mouth (King County 09a)

Table A-10. Summary statistics at Covington Creek near mouth (King County 09a)

LSPC Simulated Flow		**Observed Flow Gage**	
REACH OUTFLOW FROM SWS 180512 19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Covington Creek near mouth (King County 09a) Manually Entered Data Drainage Area (sq-mi): 21.7	
Total Simulated In-stream Flow:	**19.04**	Total Observed In-stream Flow:	**20.10**
Total of simulated highest 10% flows:	**7.54**	Total of Observed highest 10% flows:	**6.97**
Total of Simulated lowest 50% flows:	**1.95**	Total of Observed Lowest 50% flows:	**2.02**
Simulated Summer Flow Volume (months 7-9):	**0.69**	Observed Summer Flow Volume (7-9):	**0.77**
Simulated Fall Flow Volume (months 10-12):	**5.93**	Observed Fall Flow Volume (10-12):	**4.22**
Simulated Winter Flow Volume (months 1-3):	**8.94**	Observed Winter Flow Volume (1-3):	**9.83**
Simulated Spring Flow Volume (months 4-6):	**3.49**	Observed Spring Flow Volume (4-6):	**5.28**
Total Simulated Storm Volume:	**2.88**	Total Observed Storm Volume:	**1.59**
Simulated Summer Storm Volume (7-9):	**0.06**	Observed Summer Storm Volume (7-9):	**0.04**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-5.27%		
Error in 50% lowest flows:	-3.62%		
Error in 10% highest flows:	8.19%		
Seasonal volume error - Summer:	-10.70%		
Seasonal volume error - Fall:	40.45%	>> Clear	
Seasonal volume error - Winter:	-9.08%		
Seasonal volume error - Spring:	-33.92%		
Error in storm volumes:	81.13%		
Error in summer storm volumes:	36.59%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.683	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.552	as E or E' approaches 1.0	
Monthly NSE	0.835		
Obs Baseflow	92.1%		
Sim Baseflow	84.9%		
Baseflow fraction error	-7.2%		
Coefficient of determination, r^2	0.72		
Weighted r^2	0.62		

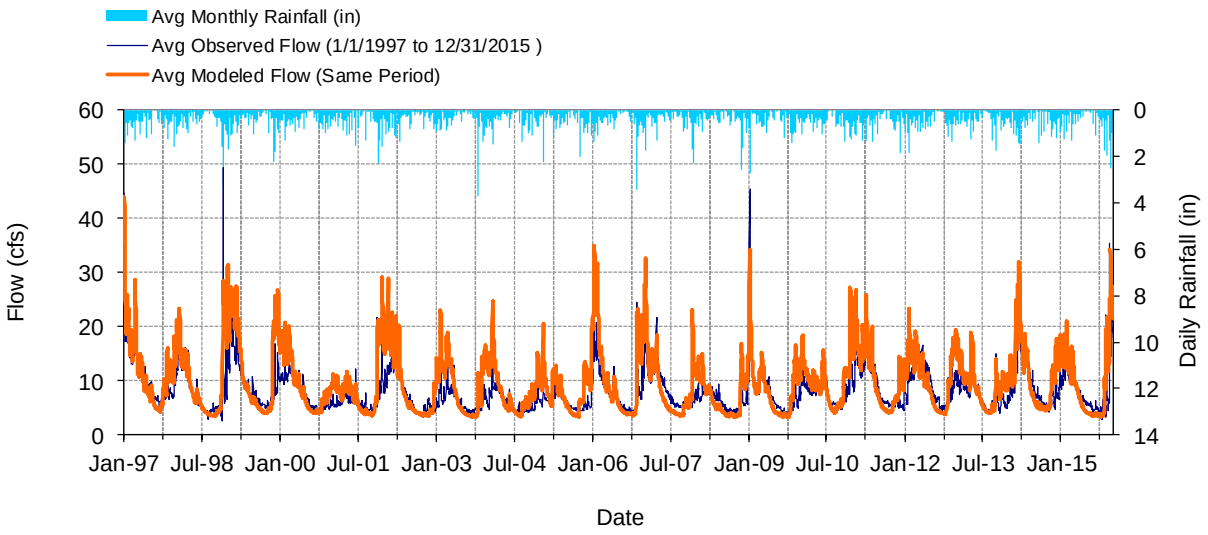

Figure A-36. Mean daily flow at Crisp Creek near Green River Rd (King County 40d)

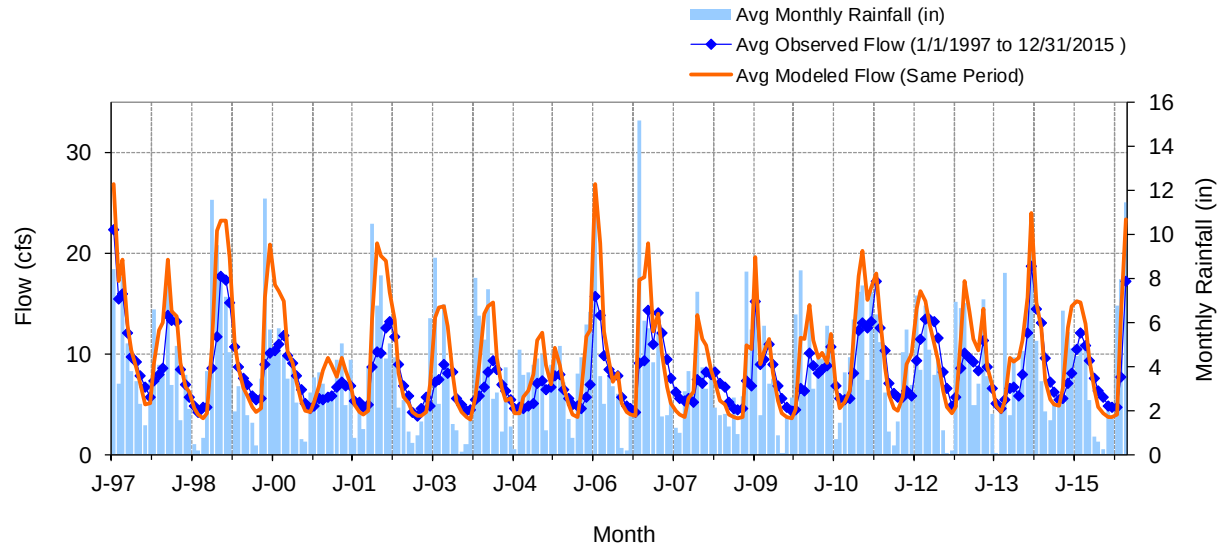

Figure A-37. Mean monthly flow at Crisp Creek near Green River Rd (King County 40d)

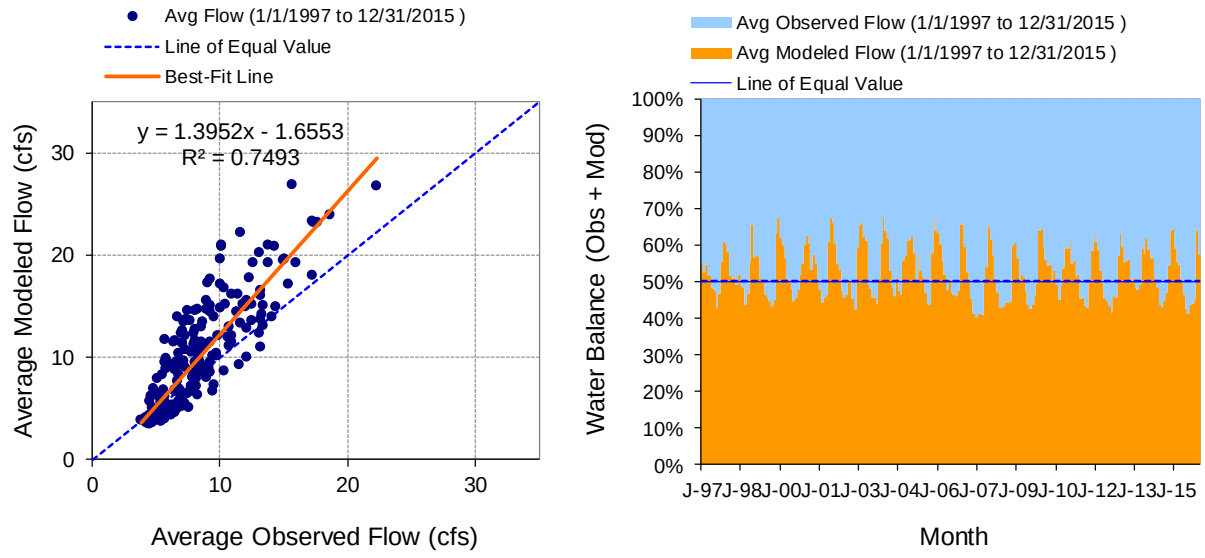

Figure A-38. Monthly flow regression and temporal variation at Crisp Creek near Green River Rd (King County 40d)

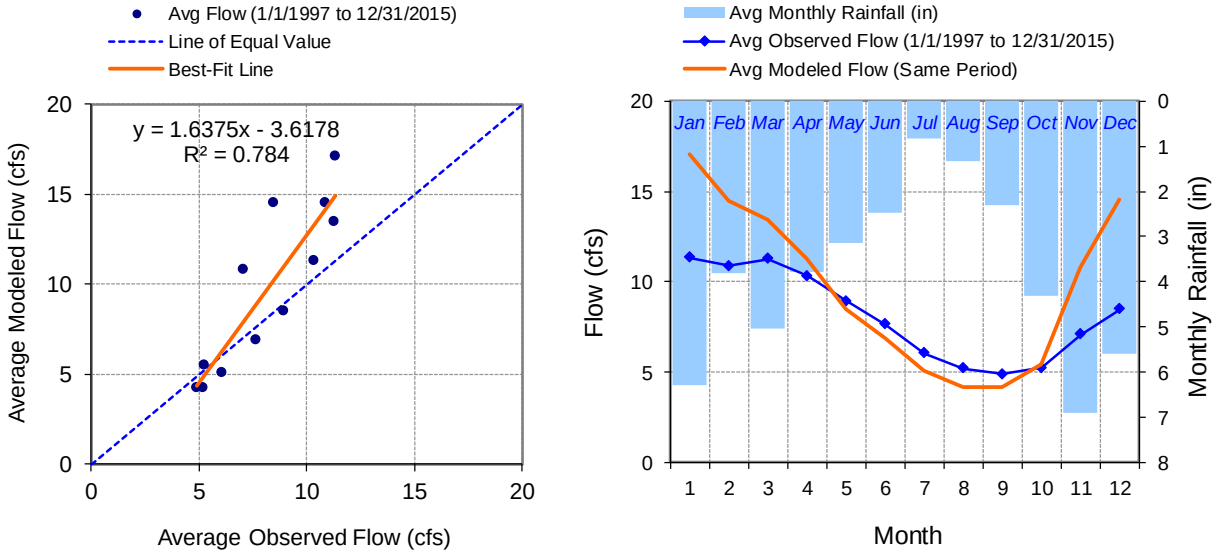

Figure A-39. Seasonal regression and temporal aggregate at Crisp Creek near Green River Rd (King County 40d)

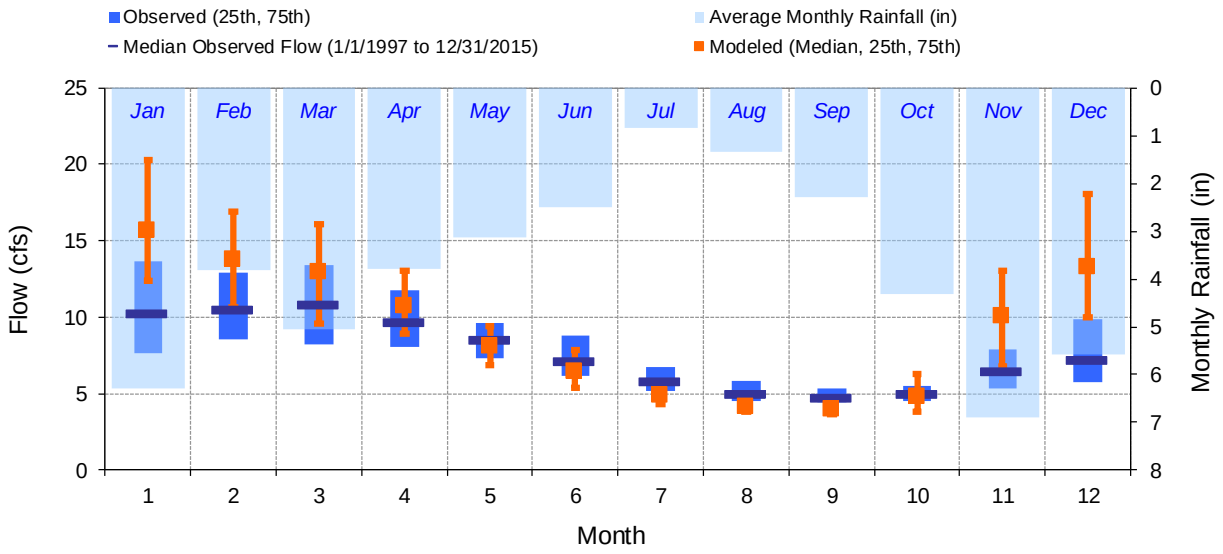

Figure A-40. Seasonal medians and ranges at Crisp Creek near Green River Rd (King County 40d)

Table A-11. Seasonal summary at Crisp Creek near Green River Rd (King County 40d)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	11.33	10.24	7.66	13.67	17.07	15.70	12.42	20.32
Feb	10.88	10.45	8.52	12.94	14.47	13.76	10.66	16.93
Mar	11.26	10.81	8.24	13.37	13.46	12.98	9.62	16.07
Apr	10.34	9.64	8.09	11.79	11.26	10.75	8.91	13.01
May	8.93	8.50	7.35	9.65	8.49	8.10	6.90	9.41
Jun	7.65	7.12	6.17	8.83	6.90	6.48	5.40	7.84
Jul	6.04	5.79	5.14	6.75	5.07	4.87	4.28	5.60
Aug	5.18	4.99	4.50	5.82	4.20	4.11	3.82	4.54
Sep	4.88	4.75	4.43	5.33	4.20	4.00	3.65	4.39
Oct	5.23	4.94	4.50	5.52	5.45	4.80	3.85	6.28
Nov	7.09	6.43	5.34	7.93	10.79	10.09	6.81	13.05
Dec	8.48	7.19	5.79	9.89	14.53	13.25	10.01	18.07

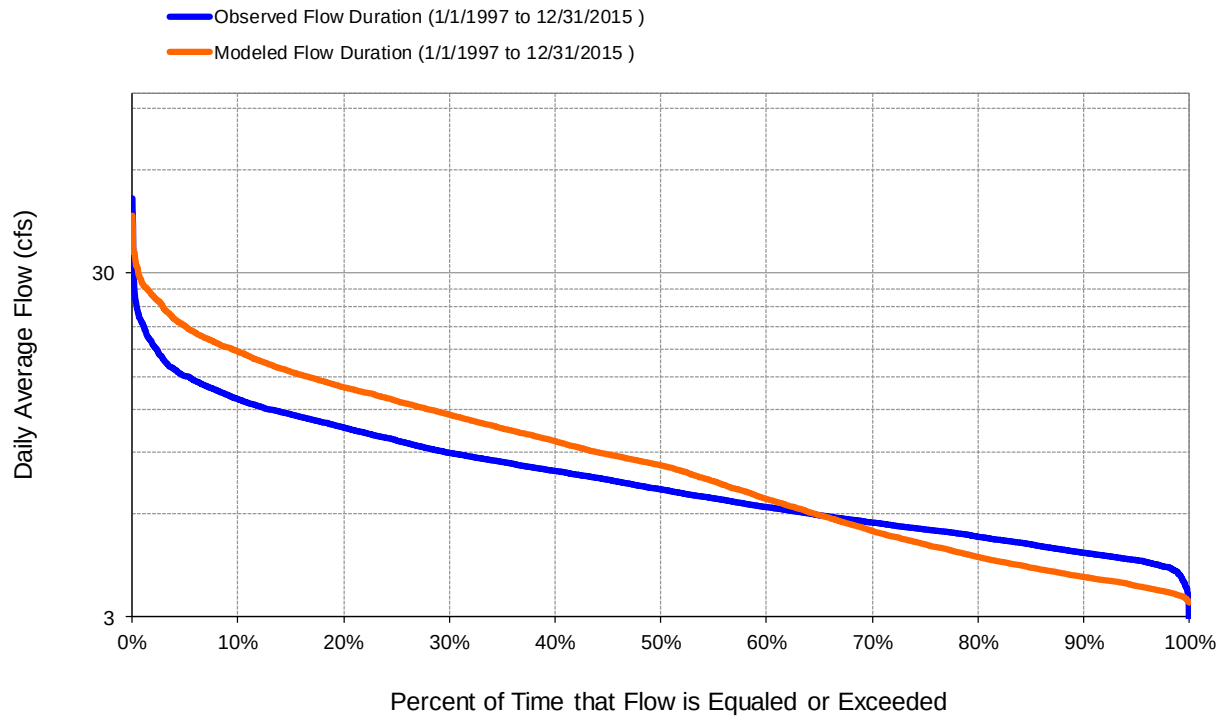

Figure A-41. Flow exceedance at Crisp Creek near Green River Rd (King County 40d)

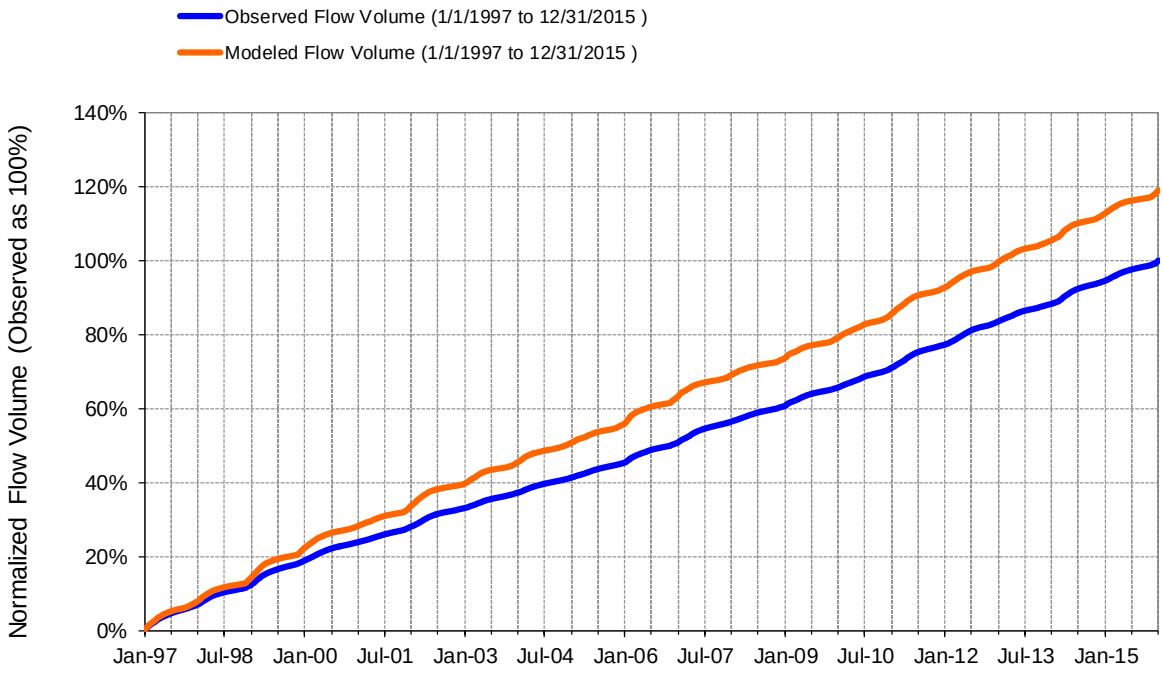

Figure A-42. Flow accumulation at Crisp Creek near Green River Rd (King County 40d)

Table A-12. Summary statistics at Crisp Creek near Green River Rd (King County 40d)

LSPC Simulated Flow		**Observed Flow Gage**	
REACH OUTFLOW FROM SWS 15002 19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Crisp Creek at Green River RD (King County 40d) Manually Entered Data Drainage Area (sq-mi): 3.59	
Total Simulated In-stream Flow:	**36.45**	Total Observed In-stream Flow:	**30.62**
Total of simulated highest 10% flows:	**8.44**	Total of Observed highest 10% flows:	**6.20**
Total of Simulated lowest 50% flows:	**9.89**	Total of Observed Lowest 50% flows:	**10.27**
Simulated Summer Flow Volume (months 7-9):	**4.28**	Observed Summer Flow Volume (7-9):	**5.12**
Simulated Fall Flow Volume (months 10-12):	**9.76**	Observed Fall Flow Volume (10-12):	**6.60**
Simulated Winter Flow Volume (months 1-3):	**14.03**	Observed Winter Flow Volume (1-3):	**10.43**
Simulated Spring Flow Volume (months 4-6):	**8.37**	Observed Spring Flow Volume (4-6):	**8.46**
Total Simulated Storm Volume:	**1.32**	Total Observed Storm Volume:	**1.46**
Simulated Summer Storm Volume (7-9):	**0.06**	Observed Summer Storm Volume (7-9):	**0.13**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	19.05%		
Error in 50% lowest flows:	-3.71%		
Error in 10% highest flows:	36.14%		
Seasonal volume error - Summer:	-16.41%		
Seasonal volume error - Fall:	47.86%	>>	Clear
Seasonal volume error - Winter:	34.52%		
Seasonal volume error - Spring:	-1.02%		
Error in storm volumes:	-9.58%		
Error in summer storm volumes:	-53.42%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.060	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.115	as E or E' approaches 1.0	
Monthly NSE	-0.029		
Obs Baseflow	95.2%		
Sim Baseflow	96.4%		
Baseflow fraction error	1.1%		
Coefficient of determination, r^2	0.71		
Weighted r^2	0.55		

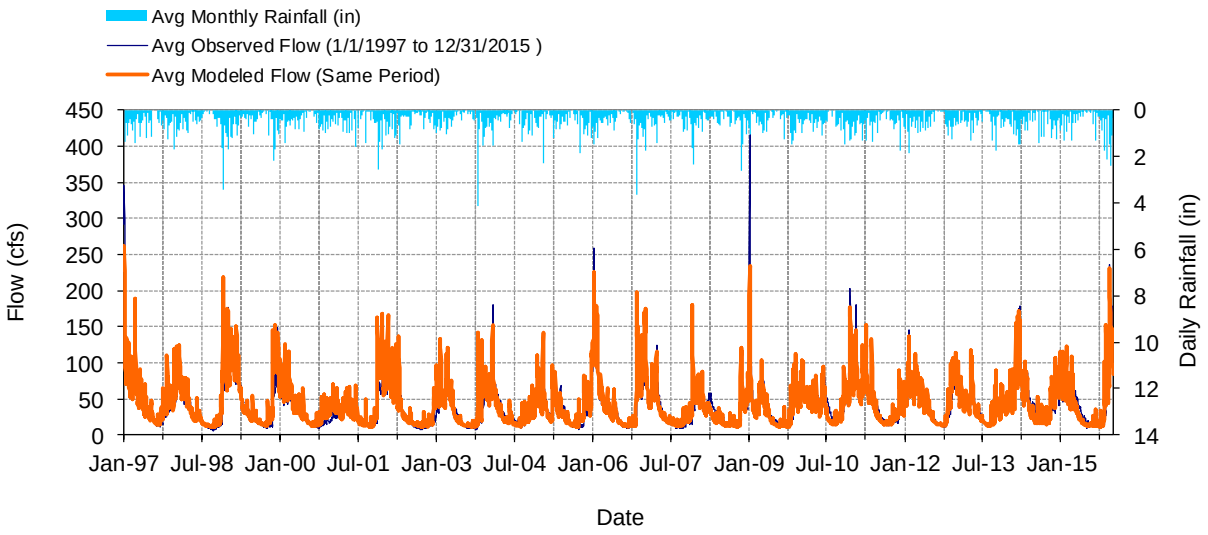

Figure A-43. Mean daily flow at Jenkins Creek near mouth (King County 26a)

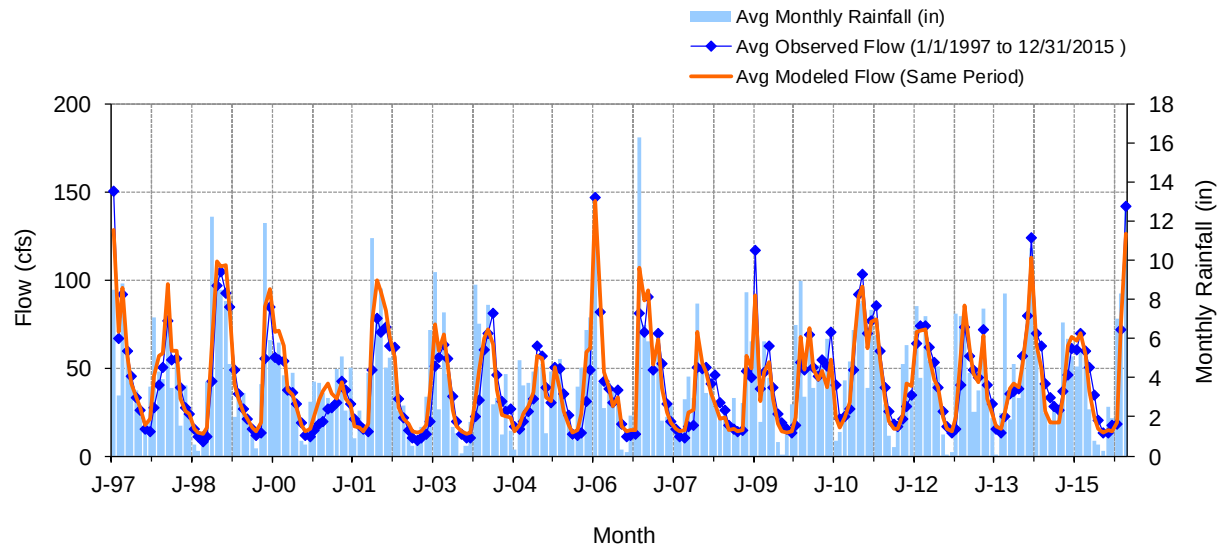

Figure A-44. Mean monthly flow at Jenkins Creek near mouth (King County 26a)

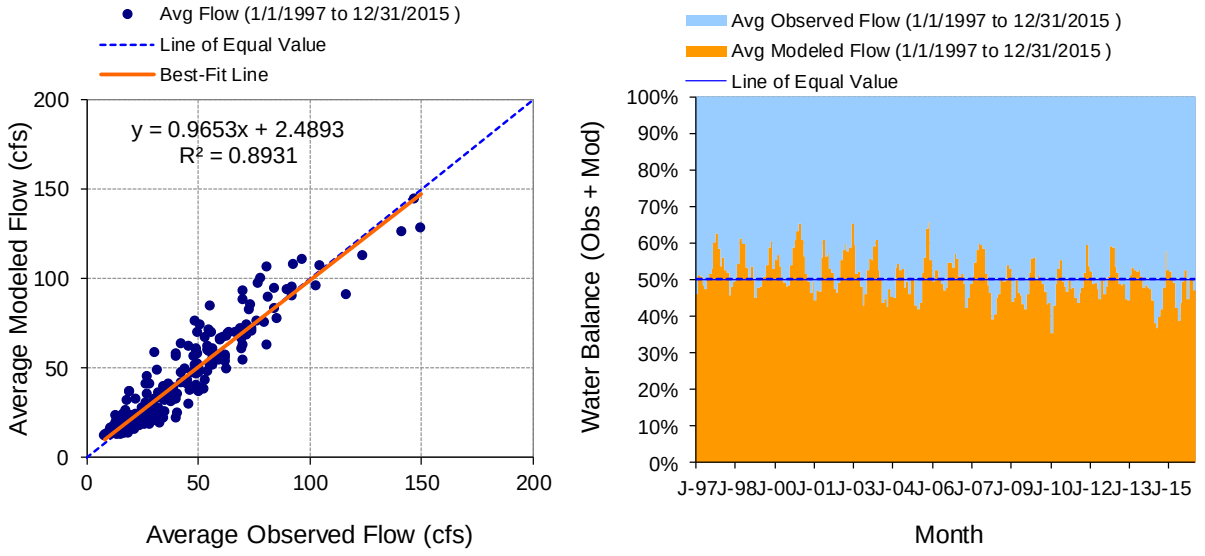

Figure A-45. Monthly flow regression and temporal variation at Jenkins Creek near mouth (King County 26a)

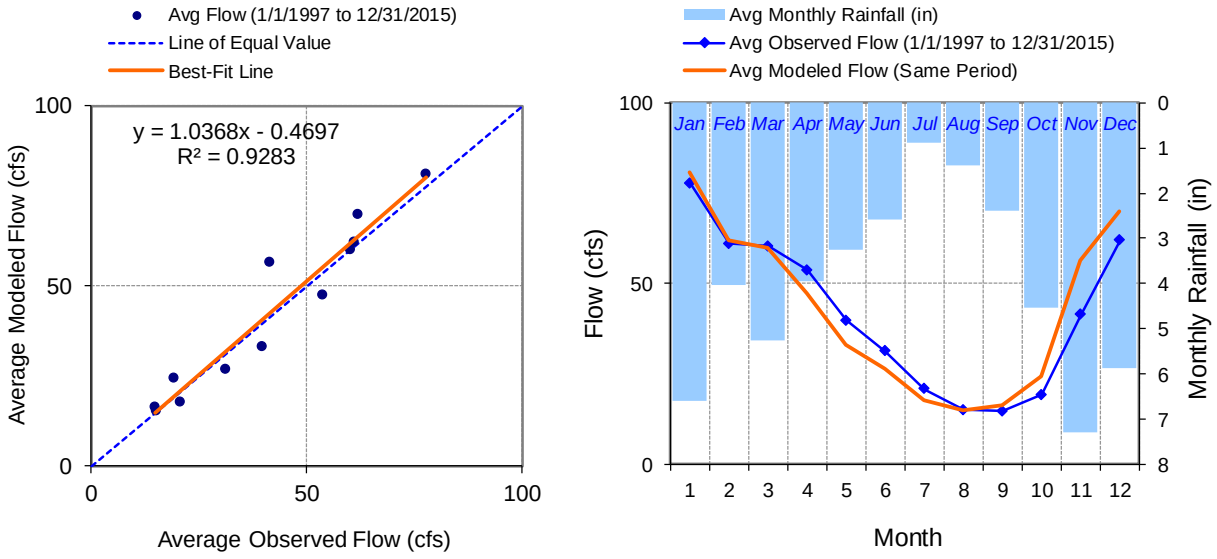

Figure A-46. Seasonal regression and temporal aggregate at Jenkins Creek near mouth (King County 26a)

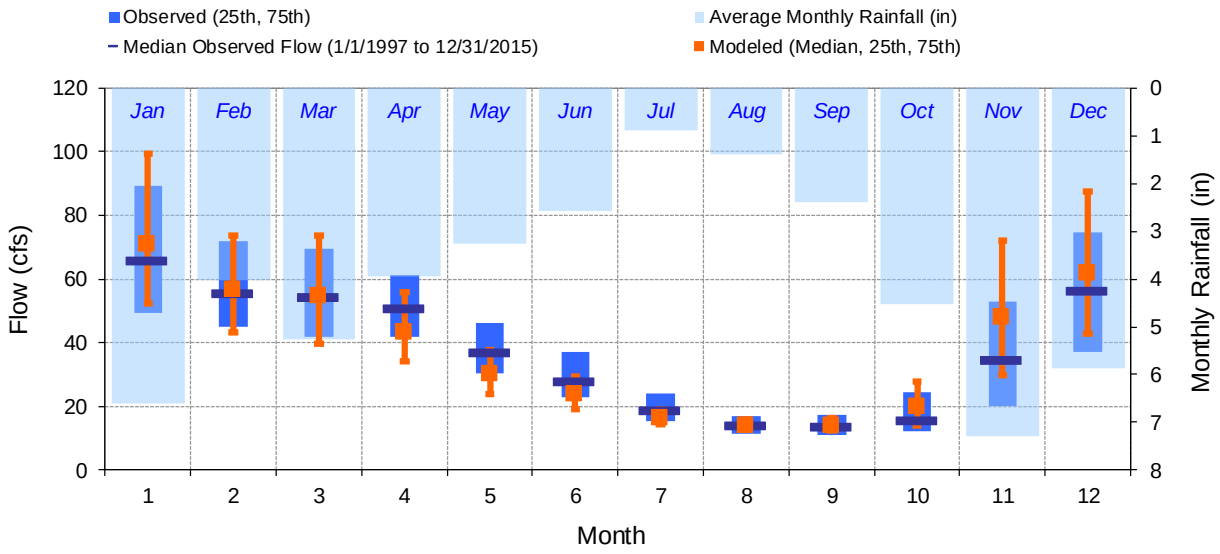

Figure A-47. Seasonal medians and ranges at Jenkins Creek near mouth (King County 26a)

Table A-13. Seasonal summary at Jenkins Creek near mouth (King County 26a)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	77.68	65.94	49.45	89.37	80.89	71.05	52.37	99.52
Feb	60.93	55.65	45.09	71.88	61.98	56.70	43.28	73.64
Mar	60.27	54.31	42.01	69.40	59.90	54.65	39.50	73.68
Apr	53.73	50.83	41.87	61.35	47.34	43.29	34.27	56.01
May	39.68	37.09	30.27	46.32	33.03	30.25	24.02	37.79
Jun	31.23	27.90	22.98	37.28	26.59	23.80	19.29	29.41
Jul	20.71	18.89	15.19	24.12	17.72	16.52	14.51	19.29
Aug	14.99	14.07	11.51	16.93	15.06	13.97	12.92	15.78
Sep	14.74	13.57	10.86	17.22	16.15	13.86	12.59	16.54
Oct	19.28	15.57	12.35	24.62	24.29	20.07	14.10	27.65
Nov	41.40	34.50	20.16	52.75	56.27	48.00	29.69	72.14
Dec	61.83	56.45	36.94	74.66	69.86	61.64	42.74	87.36

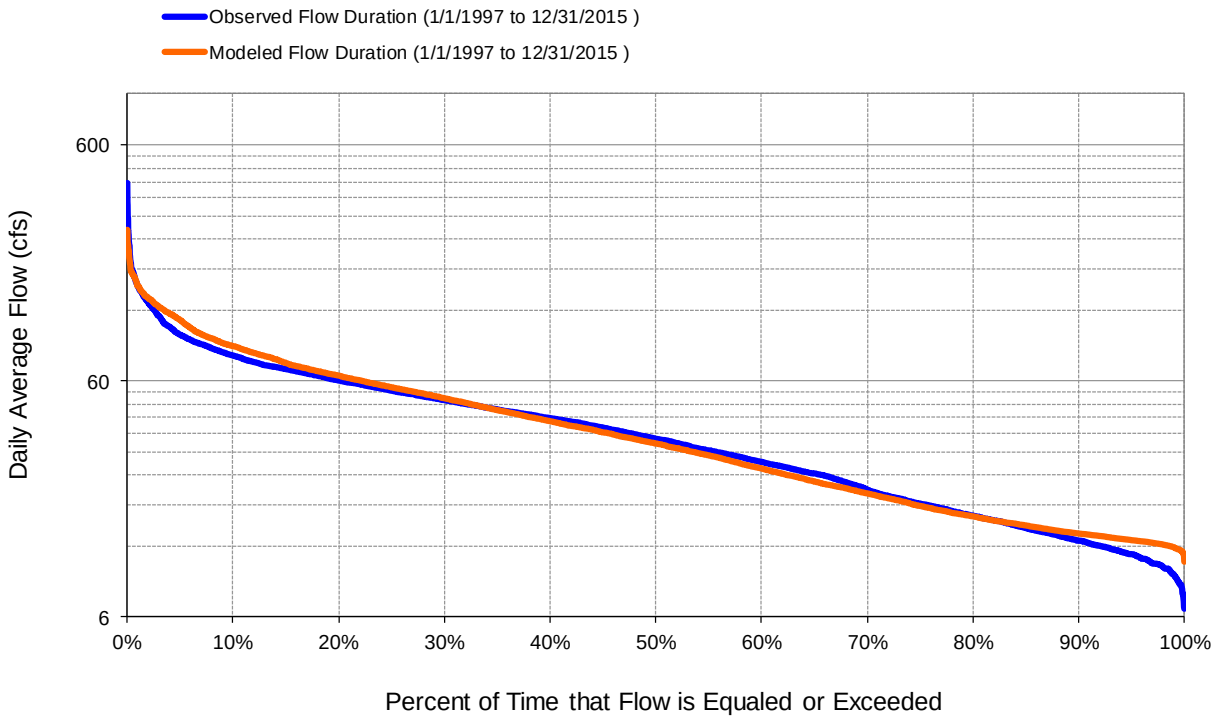

Figure A-48. Flow exceedance at Jenkins Creek near mouth (King County 26a)

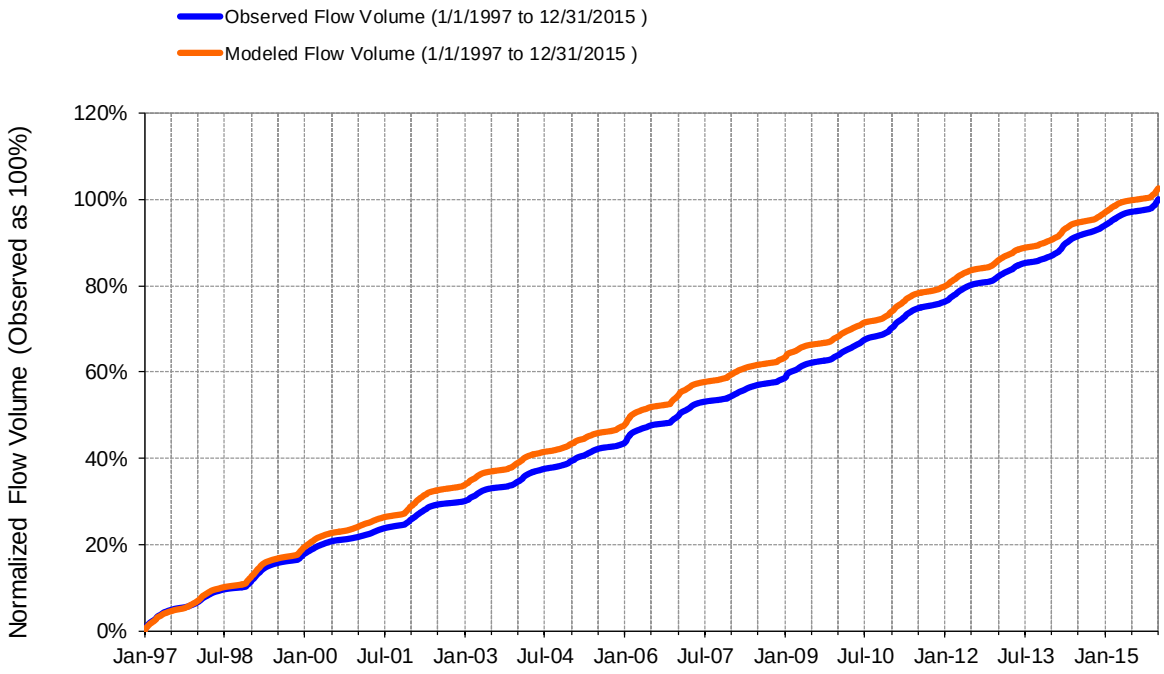

Figure A-49. Flow accumulation at Jenkins Creek near mouth (King County 26a)

Table A-14. Summary statistics at Jenkins Creek near mouth (King County 26a)

LSPC Simulated Flow		**Observed Flow Gage**	
REACH OUTFLOW FROM SWS 180332 19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Jenkins Creek near mouth (King County 26a) Manually Entered Data Drainage Area (sq-mi): 16.8	
Total Simulated In-stream Flow:	**34.23**	Total Observed In-stream Flow:	**33.38**
Total of simulated highest 10% flows:	**9.35**	Total of Observed highest 10% flows:	**8.77**
Total of Simulated lowest 50% flows:	**7.83**	Total of Observed Lowest 50% flows:	**7.95**
Simulated Summer Flow Volume (months 7-9):	**3.32**	Observed Summer Flow Volume (7-9):	**3.43**
Simulated Fall Flow Volume (months 10-12):	**10.20**	Observed Fall Flow Volume (10-12):	**8.32**
Simulated Winter Flow Volume (months 1-3):	**13.53**	Observed Winter Flow Volume (1-3):	**13.27**
Simulated Spring Flow Volume (months 4-6):	**7.18**	Observed Spring Flow Volume (4-6):	**8.37**
Total Simulated Storm Volume:	**3.29**	Total Observed Storm Volume:	**2.17**
Simulated Summer Storm Volume (7-9):	**0.22**	Observed Summer Storm Volume (7-9):	**0.15**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	2.54%		
Error in 50% lowest flows:	-1.42%		
Error in 10% highest flows:	6.55%		
Seasonal volume error - Summer:	-3.12%		
Seasonal volume error - Fall:	22.64%	>>	Clear
Seasonal volume error - Winter:	1.96%		
Seasonal volume error - Spring:	-14.21%		
Error in storm volumes:	51.46%		
Error in summer storm volumes:	47.61%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.829	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.626	as E or E' approaches 1.0	
Monthly NSE	0.886		
Obs Baseflow	93.5%		
Sim Baseflow	90.4%		
Baseflow fraction error	-3.1%		
Coefficient of determination, r^2	0.84		
Weighted r^2	0.81		

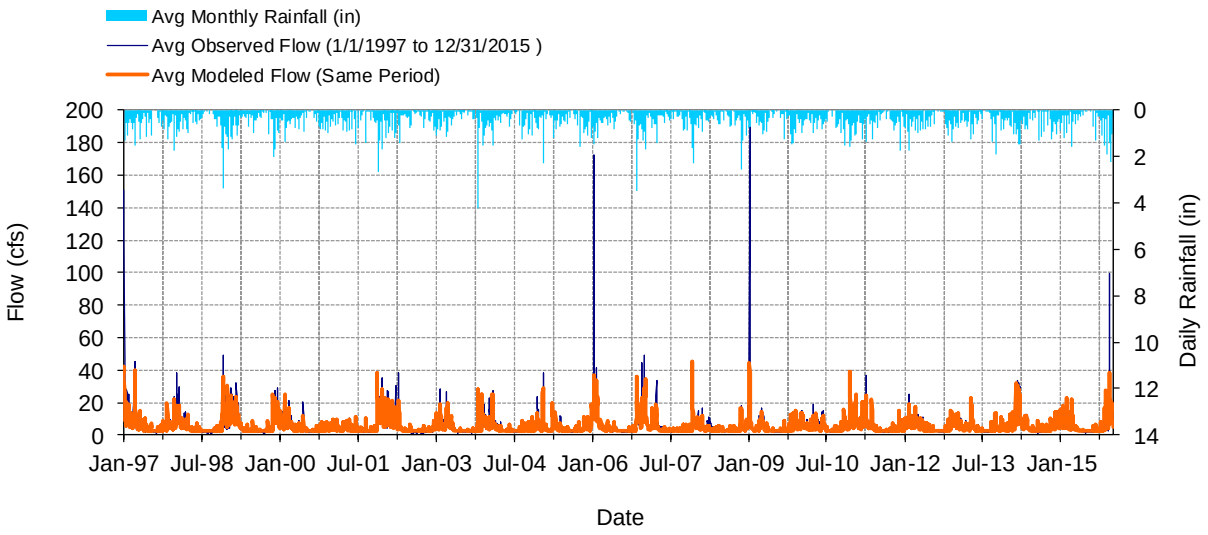

Figure A-50. Mean daily flow at Little Soos Creek at SE 272 (King County 54i)

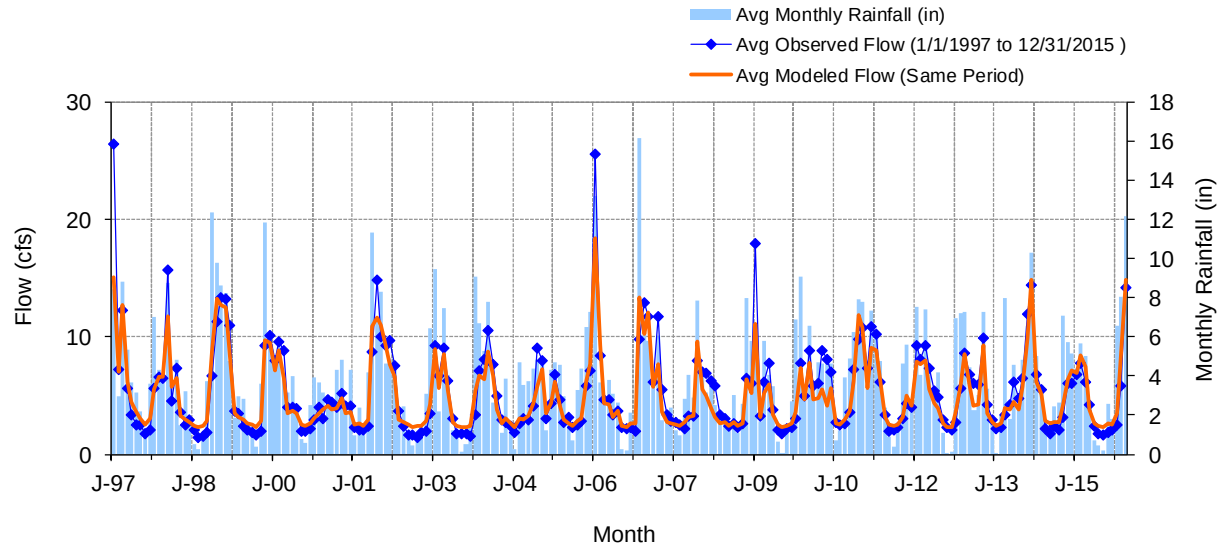

Figure A-51. Mean monthly flow at Little Soos Creek at SE 272 (King County 54i)

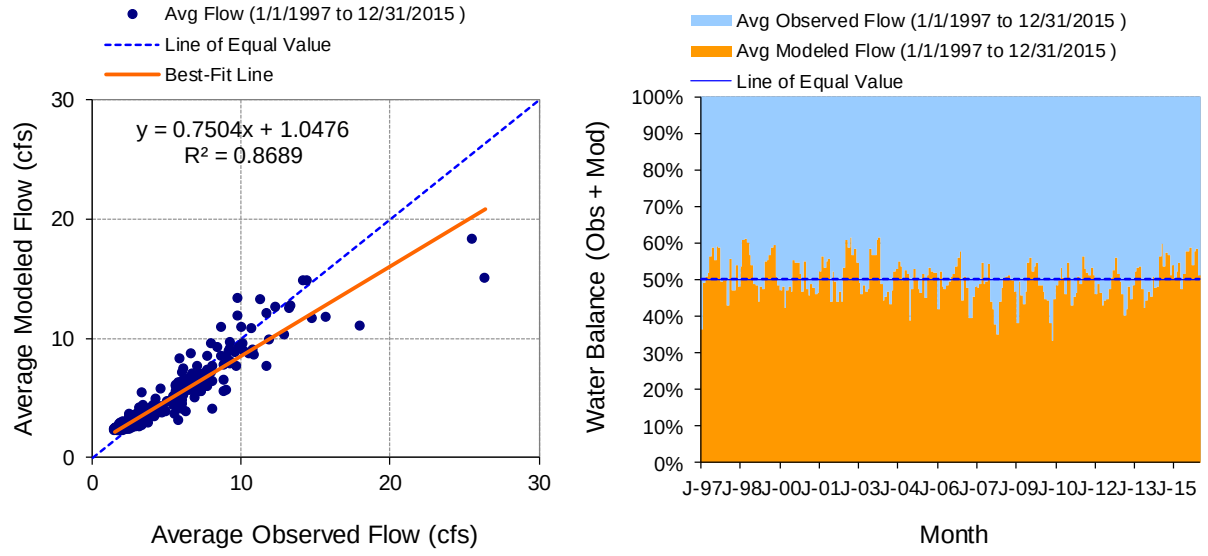

Figure A-52. Monthly flow regression and temporal variation at Little Soos Creek at SE 272 (King County 54i)

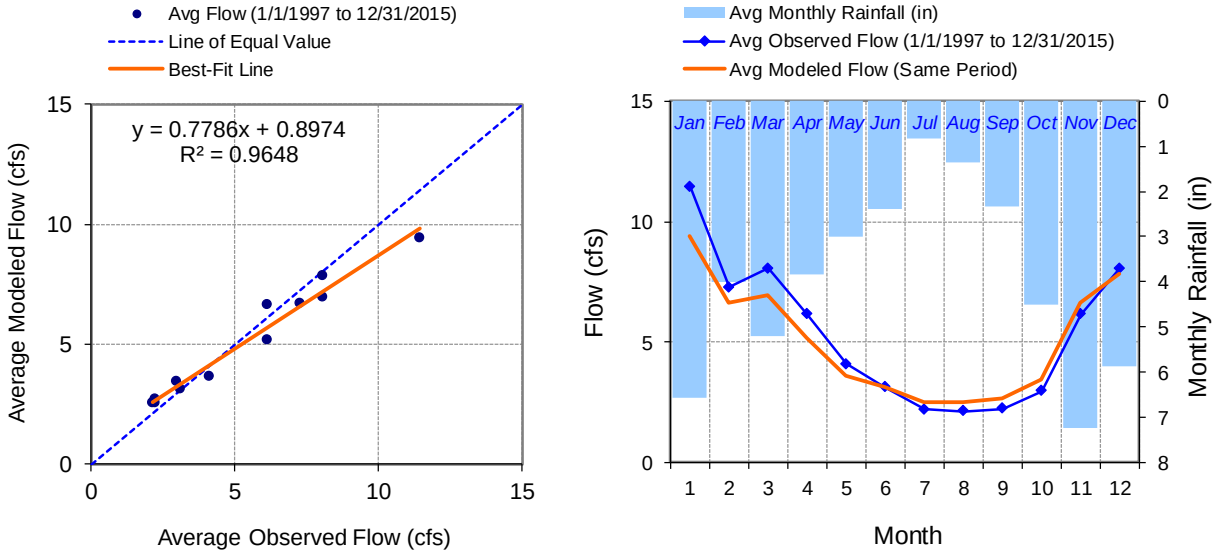

Figure A-53. Seasonal regression and temporal aggregate at Little Soos Creek at SE 272 (King County 54i)

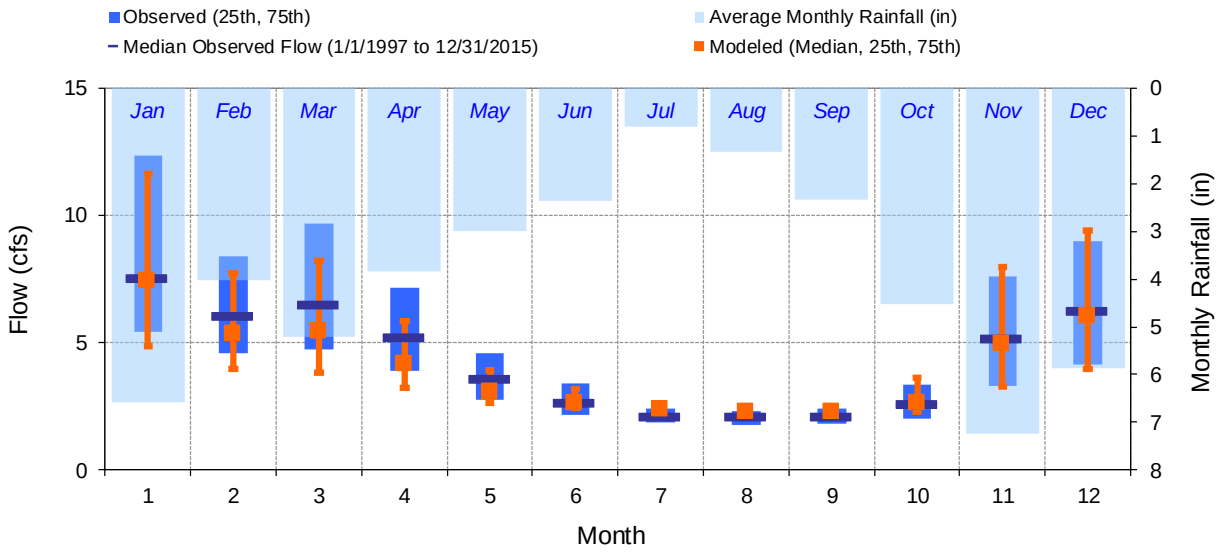

Figure A-54. Seasonal medians and ranges at Little Soos Creek at SE 272 (King County 54i)

Table A-15. Seasonal summary at Little Soos Creek at SE 272 (King County 54i)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	11.45	7.51	5.41	12.33	9.40	7.45	4.89	11.62
Feb	7.26	6.05	4.58	8.41	6.65	5.38	3.97	7.71
Mar	8.06	6.49	4.75	9.68	6.93	5.45	3.85	8.24
Apr	6.15	5.23	3.88	7.15	5.16	4.16	3.23	5.84
May	4.09	3.57	2.78	4.61	3.61	3.06	2.63	3.90
Jun	3.11	2.65	2.18	3.40	3.12	2.64	2.44	3.20
Jul	2.21	2.09	1.85	2.44	2.50	2.38	2.32	2.45
Aug	2.13	2.09	1.79	2.32	2.50	2.32	2.28	2.37
Sep	2.21	2.11	1.84	2.44	2.68	2.30	2.27	2.49
Oct	2.96	2.57	2.00	3.33	3.44	2.66	2.31	3.62
Nov	6.15	5.17	3.30	7.62	6.63	4.98	3.28	7.99
Dec	8.06	6.23	4.14	9.00	7.83	6.05	3.99	9.43

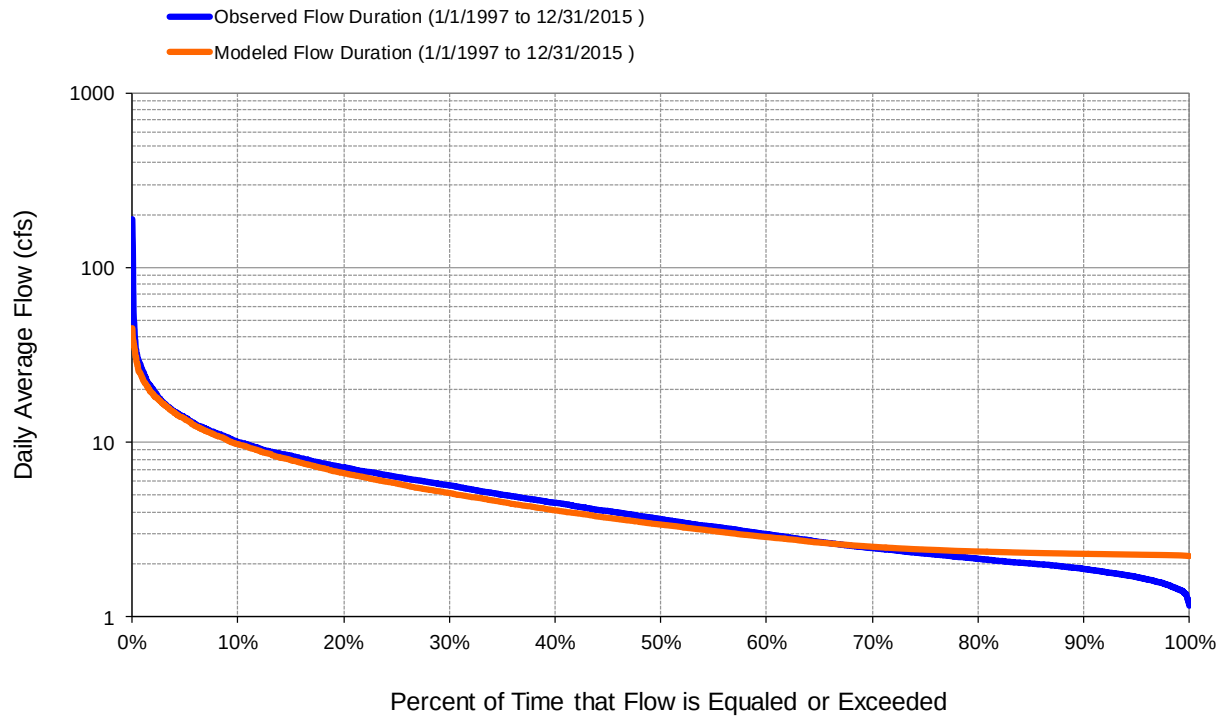

Figure A-55. Flow exceedance at Little Soos Creek at SE 272 (King County 54i)

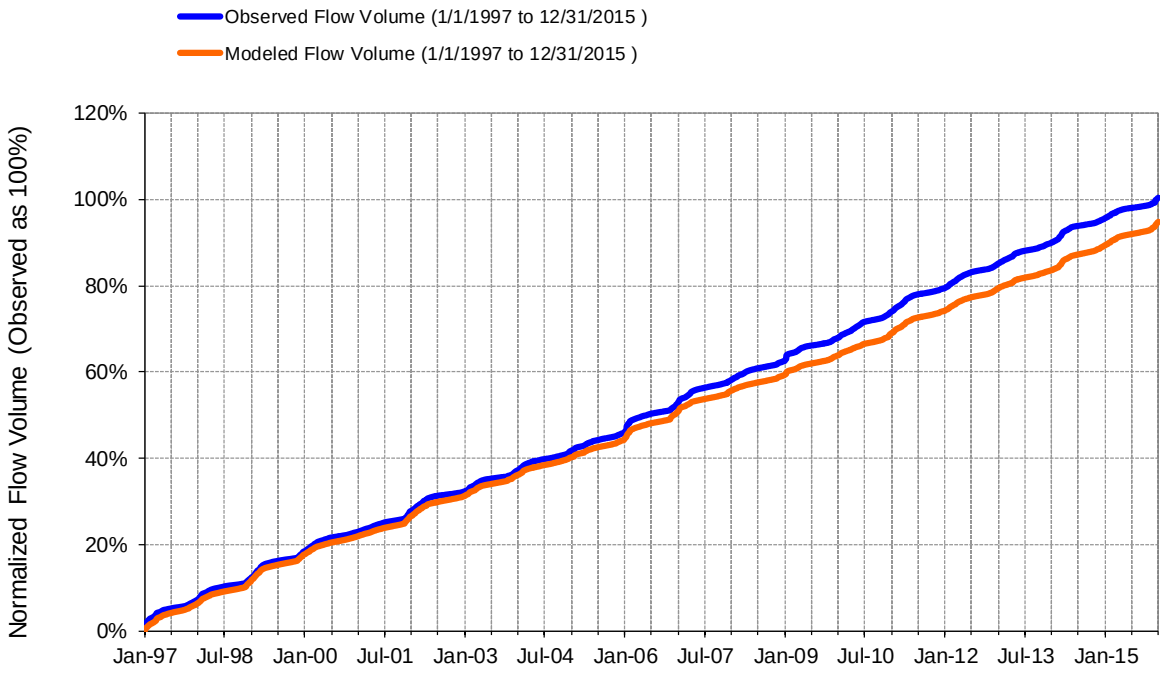

Figure A-56. Flow accumulation at Little Soos Creek at SE 272 (King County 54i)

Table A-16. Summary statistics at Little Soos Creek at SE 272 (King County 54i)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 180142		Little Soos Creek at SE272 (King County 54i)	
19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 3.69	
Total Simulated In-stream Flow:	**18.53**	Total Observed In-stream Flow:	**19.56**
Total of simulated highest 10% flows:	**5.68**	Total of Observed highest 10% flows:	**6.37**
Total of Simulated lowest 50% flows:	**4.72**	Total of Observed Lowest 50% flows:	**4.42**
Simulated Summer Flow Volume (months 7-9):	**2.37**	Observed Summer Flow Volume (7-9):	**2.03**
Simulated Fall Flow Volume (months 10-12):	**5.53**	Observed Fall Flow Volume (10-12):	**5.30**
Simulated Winter Flow Volume (months 1-3):	**7.00**	Observed Winter Flow Volume (1-3):	**8.16**
Simulated Spring Flow Volume (months 4-6):	**3.63**	Observed Spring Flow Volume (4-6):	**4.08**
Total Simulated Storm Volume:	**2.83**	Total Observed Storm Volume:	**2.97**
Simulated Summer Storm Volume (7-9):	**0.17**	Observed Summer Storm Volume (7-9):	**0.12**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-5.29%		
Error in 50% lowest flows:	6.97%		
Error in 10% highest flows:	-10.87%		
Seasonal volume error - Summer:	17.20%		
Seasonal volume error - Fall:	4.29%	>>	Clear
Seasonal volume error - Winter:	-14.26%		
Seasonal volume error - Spring:	-10.96%		
Error in storm volumes:	-4.54%		
Error in summer storm volumes:	47.76%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.601	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.587	as E or E' approaches 1.0	
Monthly NSE	0.847		
Obs Baseflow	84.8%		
Sim Baseflow	84.7%		
Baseflow fraction error	-0.1%		
Coefficient of determination, r^2	0.61		
Weighted r^2	0.33		

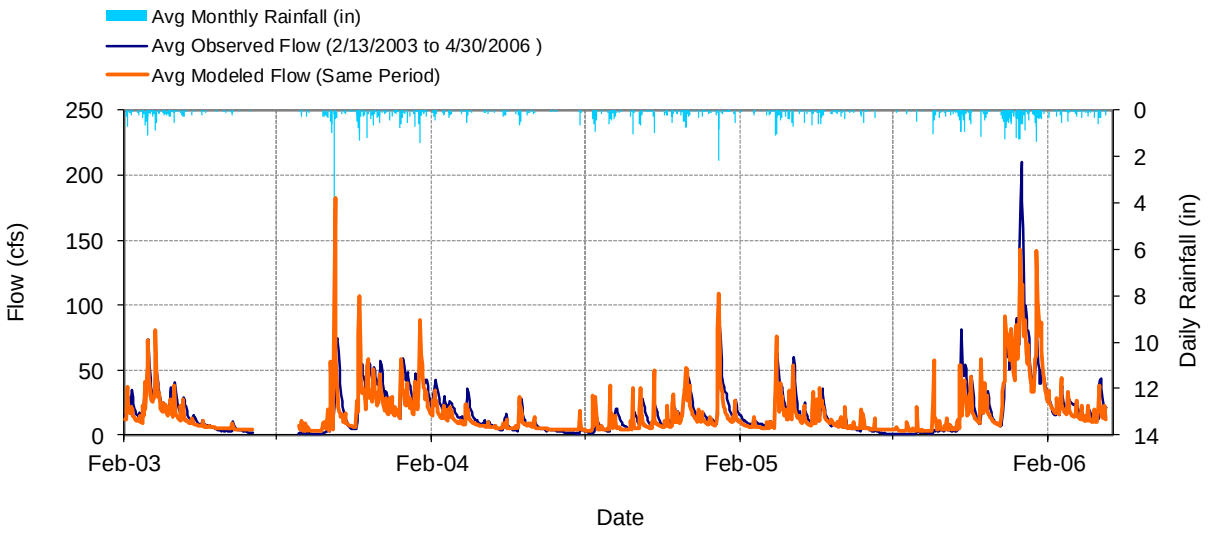

Figure A-57. Mean daily flow at Mill Creek at SR181 (King County 41a)

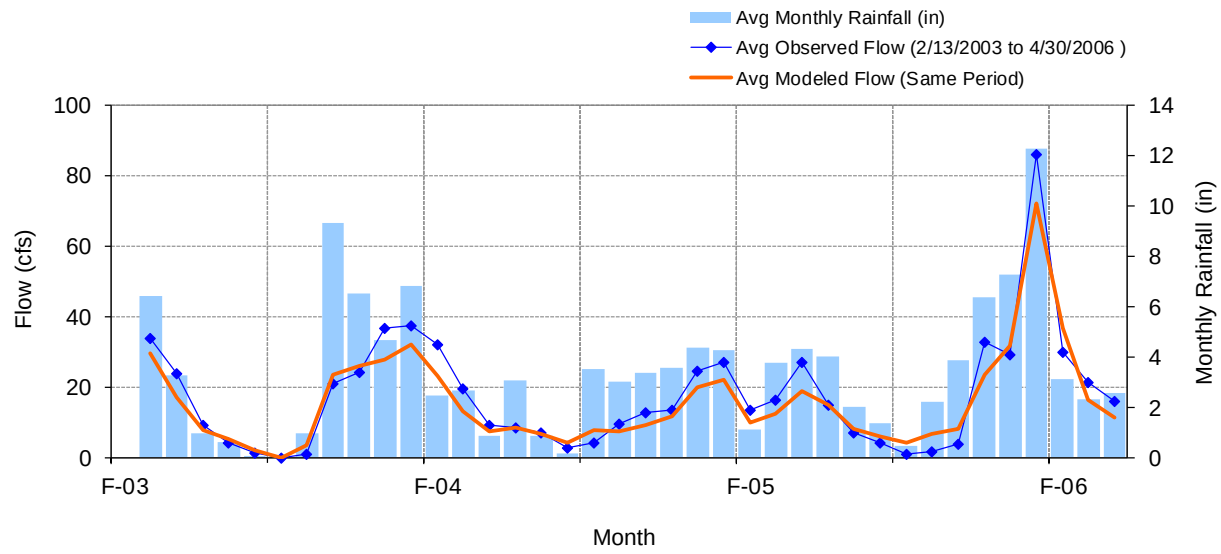

Figure A-58. Mean monthly flow at Mill Creek at SR181 (King County 41a)

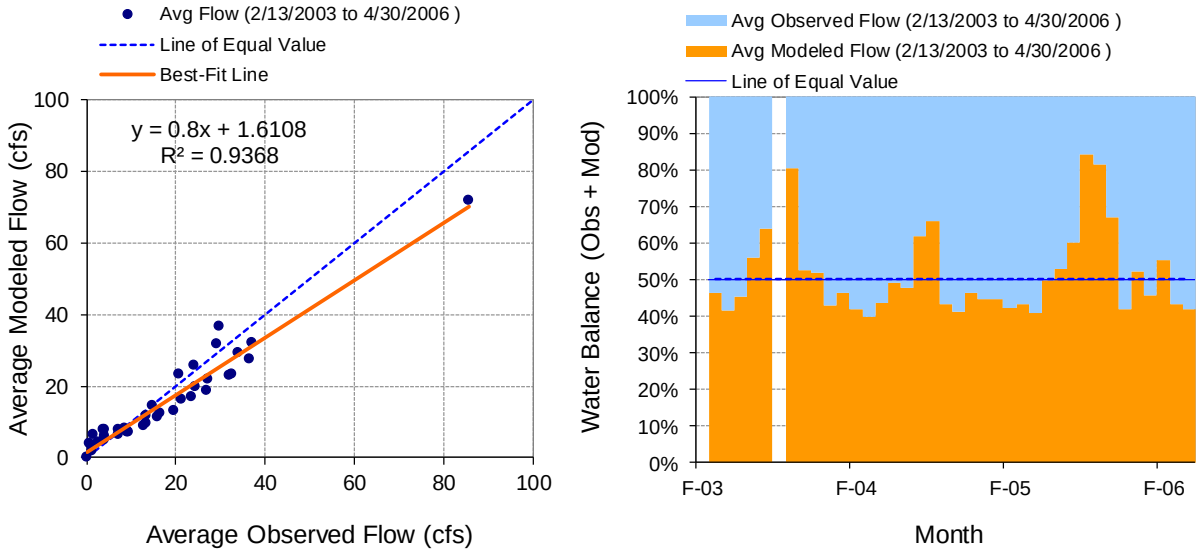

Figure A-59. Monthly flow regression and temporal variation at Mill Creek at SR181 (King County 41a)

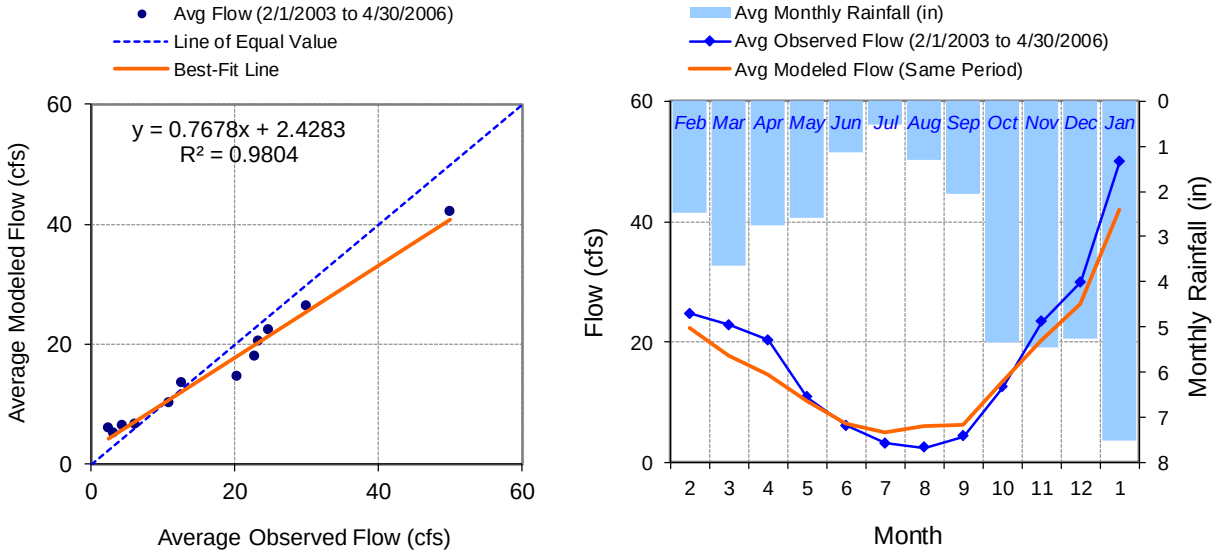

Figure A-60. Seasonal regression and temporal aggregate at Mill Creek at SR181 (King County 41a)

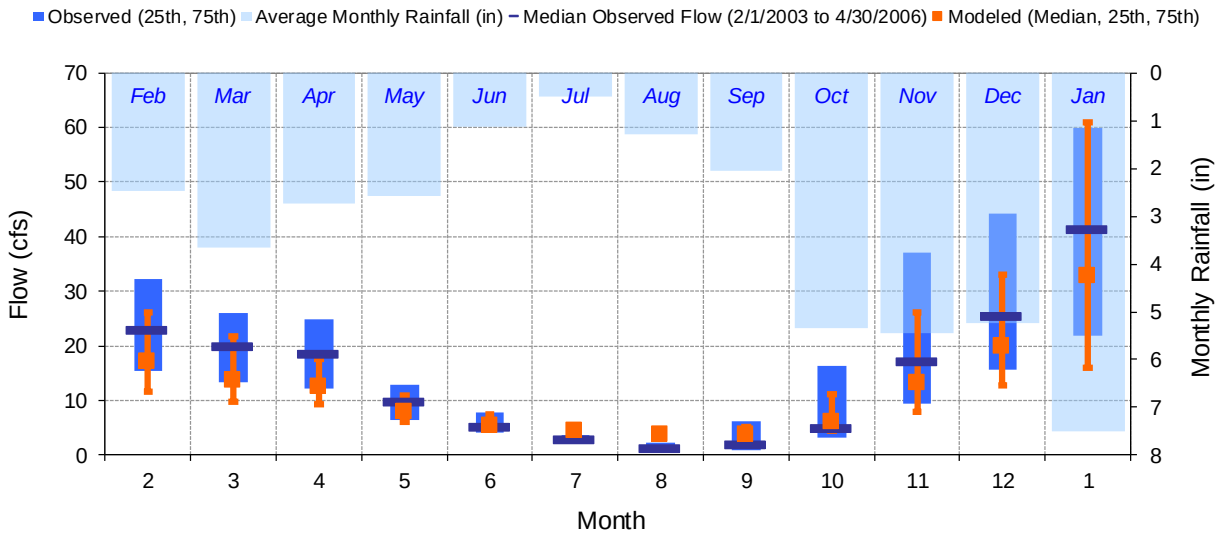

Figure A-61. Seasonal medians and ranges at Mill Creek at SR181 (King County 41a)

Table A-17. Seasonal summary at Mill Creek at SR181 (King County 41a)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Feb	24.68	22.80	15.47	32.34	22.27	17.08	11.70	26.03
Mar	22.82	19.88	13.34	26.12	17.84	13.71	9.84	21.65
Apr	20.29	18.52	12.10	24.76	14.52	12.43	9.25	17.59
May	10.78	9.89	6.37	12.84	10.16	7.85	5.99	10.82
Jun	6.07	5.26	4.14	7.76	6.52	5.39	4.99	7.55
Jul	3.13	2.88	2.00	3.74	4.97	4.39	4.17	4.61
Aug	2.37	1.28	0.76	2.39	5.97	3.85	3.71	4.01
Sep	4.30	1.87	0.89	6.17	6.33	3.82	3.49	5.12
Oct	12.50	4.99	3.22	16.43	13.39	6.15	4.52	11.13
Nov	23.37	17.07	9.52	37.06	20.33	13.17	7.96	26.04
Dec	29.96	25.42	15.76	44.13	26.34	19.89	12.81	32.95
Jan	50.02	41.36	21.90	60.00	41.95	32.90	16.03	61.06

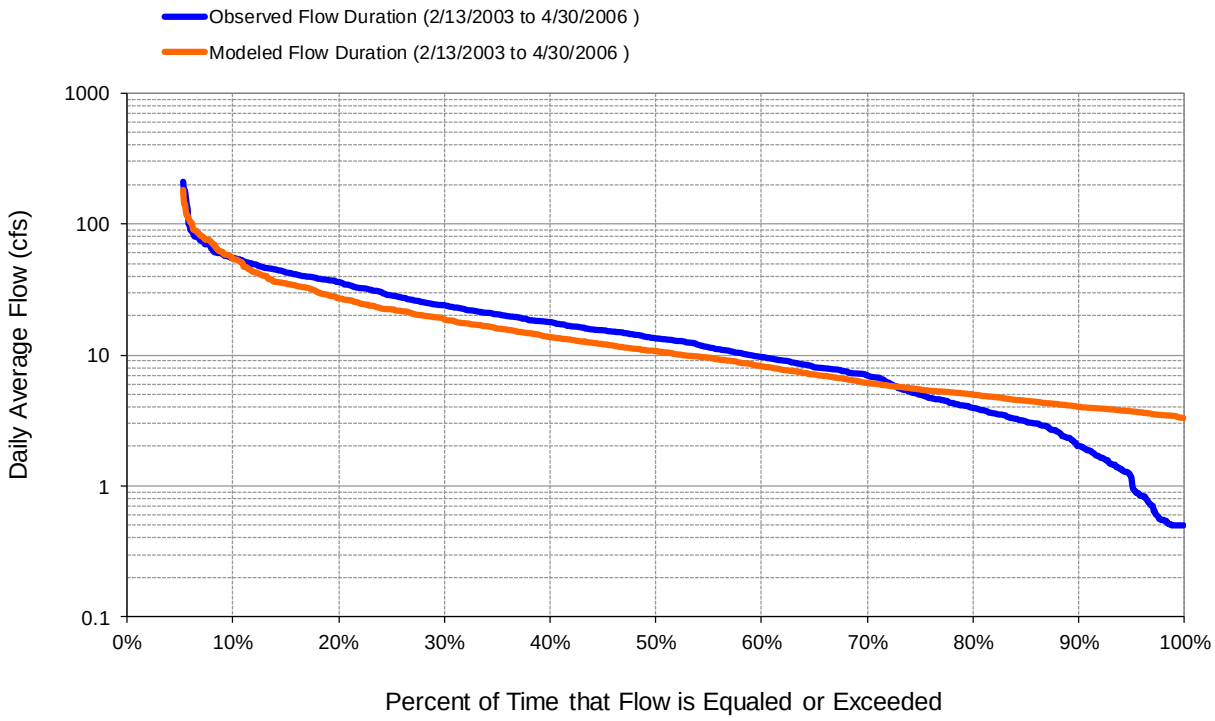

Figure A-62. Flow exceedance at Mill Creek at SR181 (King County 41a)

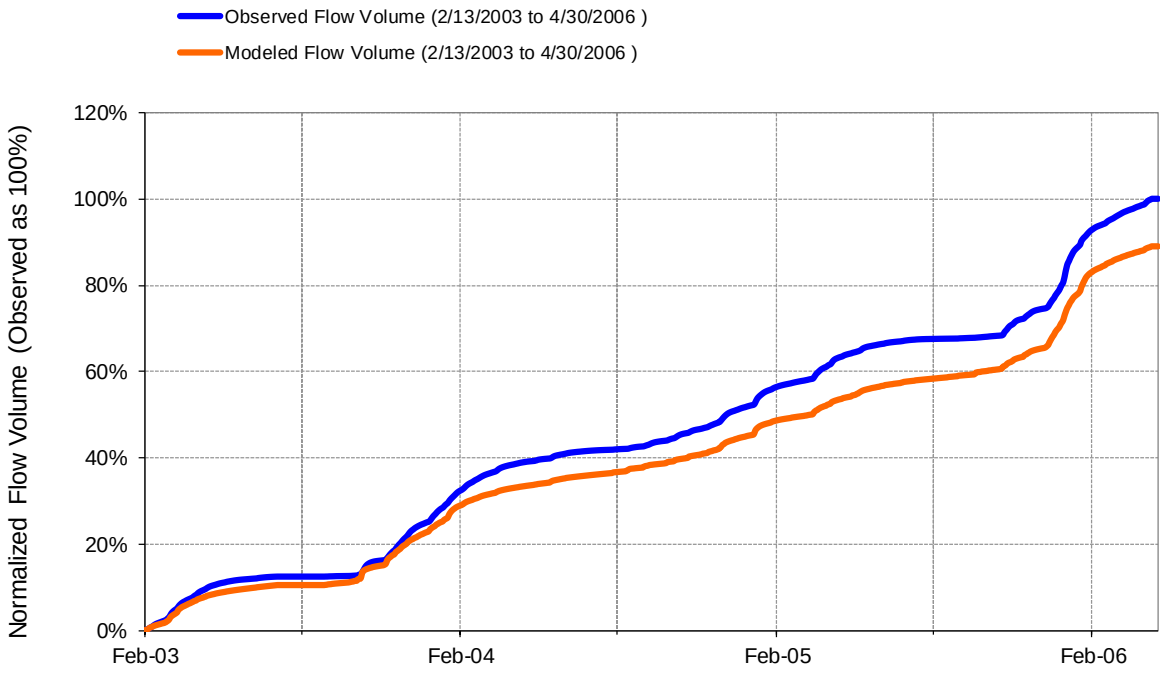

Figure A-63. Flow accumulation at Mill Creek at SR181 (King County 41a)

Table A-18. Summary statistics at Mill Creek at SR181 (King County 41a)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 21475		Mill Creek at SR 181 (King County 41a)	
3.21-Year Analysis Period: 2/1/2003 - 4/30/2006 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi):	
Total Simulated In-stream Flow:	**15.84**	Total Observed In-stream Flow:	**17.80**
Total of simulated highest 10% flows:	**5.98**	Total of Observed highest 10% flows:	**6.19**
Total of Simulated lowest 50% flows:	**2.81**	Total of Observed Lowest 50% flows:	**2.63**
Simulated Summer Flow Volume (months 7-9):	**1.10**	Observed Summer Flow Volume (7-9):	**0.64**
Simulated Fall Flow Volume (months 10-12):	**4.77**	Observed Fall Flow Volume (10-12):	**5.23**
Simulated Winter Flow Volume (months 1-3):	**7.23**	Observed Winter Flow Volume (1-3):	**8.62**
Simulated Spring Flow Volume (months 4-6):	**2.73**	Observed Spring Flow Volume (4-6):	**3.30**
Total Simulated Storm Volume:	**3.65**	Total Observed Storm Volume:	**2.64**
Simulated Summer Storm Volume (7-9):	**0.29**	Observed Summer Storm Volume (7-9):	**0.10**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-11.02%		
Error in 50% lowest flows:	6.75%		
Error in 10% highest flows:	-3.29%		
Seasonal volume error - Summer:	71.65%		
Seasonal volume error - Fall:	-8.72%	>>	Clear
Seasonal volume error - Winter:	-16.16%		
Seasonal volume error - Spring:	-17.33%		
Error in storm volumes:	38.37%		
Error in summer storm volumes:	203.13%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.676	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.517	as E or E' approaches 1.0	
Monthly NSE	0.899		
Obs Baseflow	85.2%		
Sim Baseflow	77.0%		
Baseflow fraction error	-8.2%		
Coefficient of determination, r^2	0.69		
Weighted r^2	0.53		

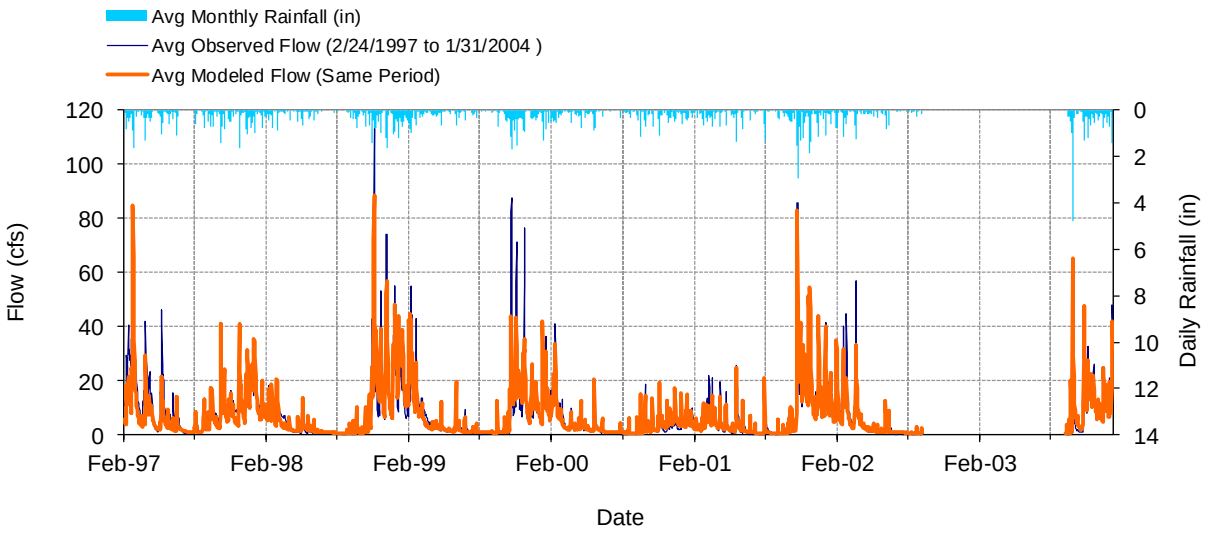

Figure A-64. Mean daily flow at Mill Creek near Peasley Canyon (King County mf1)

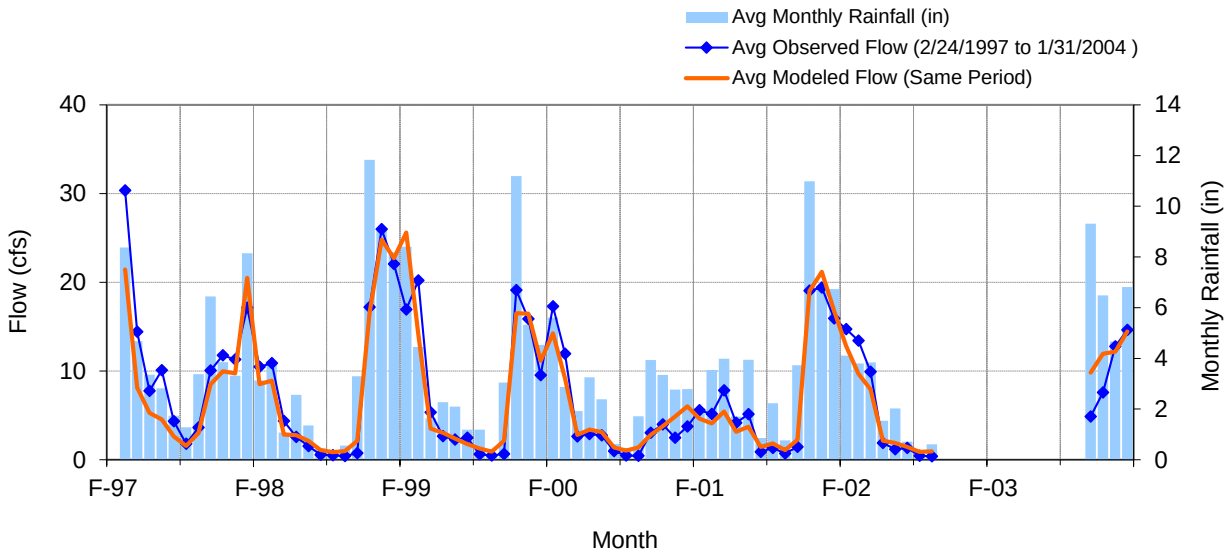

Figure A-65. Mean monthly flow at Mill Creek near Peasley Canyon (King County mf1)

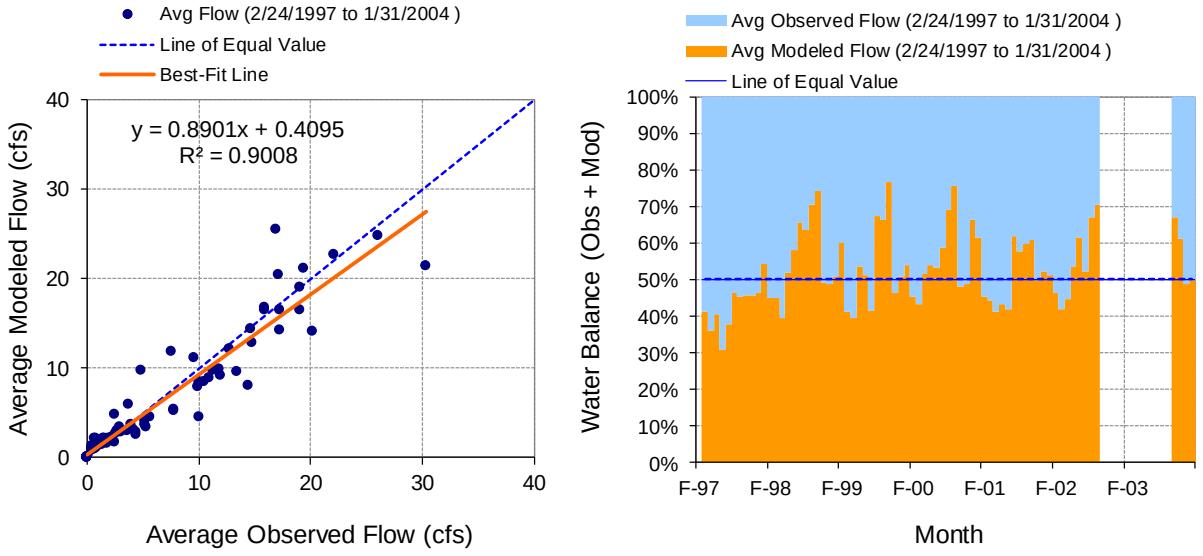

Figure A-66. Monthly flow regression and temporal variation at Mill Creek near Peasley Canyon (King County mf1)

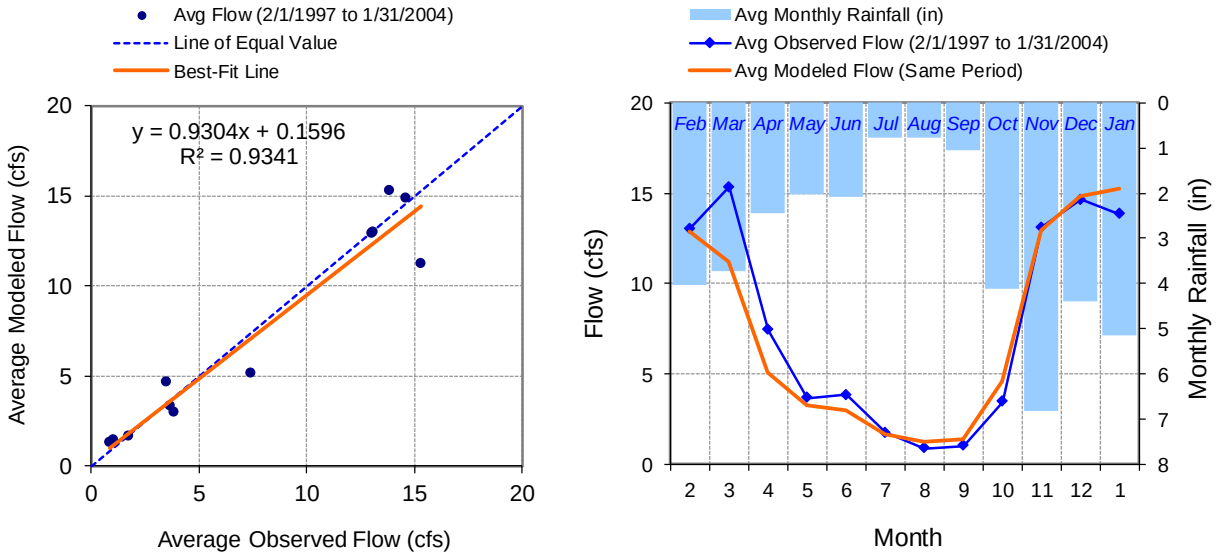

Figure A-67. Seasonal regression and temporal aggregate at Mill Creek near Peasley Canyon (King County mf1)

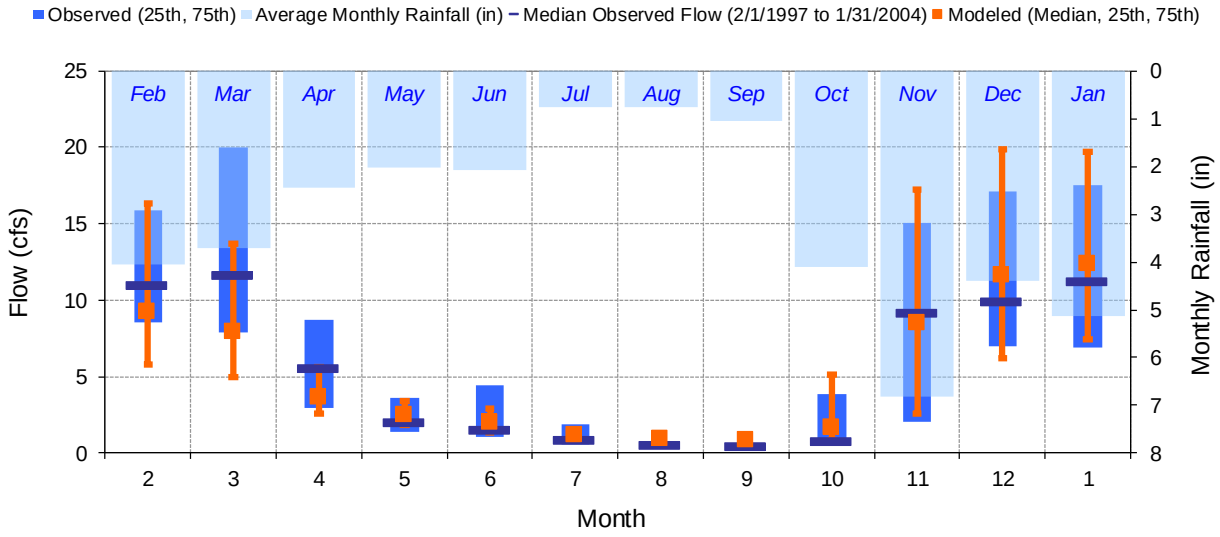

Figure A-68. Seasonal medians and ranges at Mill Creek near Peasley Canyon (King County mf1)

Table A-19. Seasonal summary at Mill Creek near Peasley Canyon (King County mf1)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Feb	13.03	11.00	8.52	15.88	12.89	9.27	5.81	16.34
Mar	15.33	11.66	7.90	20.02	11.24	7.91	5.01	13.69
Apr	7.41	5.59	2.99	8.70	5.11	3.63	2.56	5.66
May	3.65	2.00	1.38	3.62	3.30	2.47	1.86	3.41
Jun	3.82	1.51	1.08	4.43	2.97	1.99	1.39	2.88
Jul	1.76	0.85	0.55	1.91	1.63	1.23	1.04	1.50
Aug	0.86	0.50	0.41	0.71	1.24	0.91	0.86	1.04
Sep	1.01	0.46	0.40	0.57	1.38	0.83	0.79	1.02
Oct	3.47	0.82	0.55	3.88	4.61	1.64	0.85	5.17
Nov	13.11	9.21	2.03	15.05	12.96	8.51	2.59	17.26
Dec	14.64	9.88	7.03	17.11	14.87	11.62	6.19	19.87
Jan	13.84	11.23	6.92	17.55	15.26	12.39	7.46	19.74

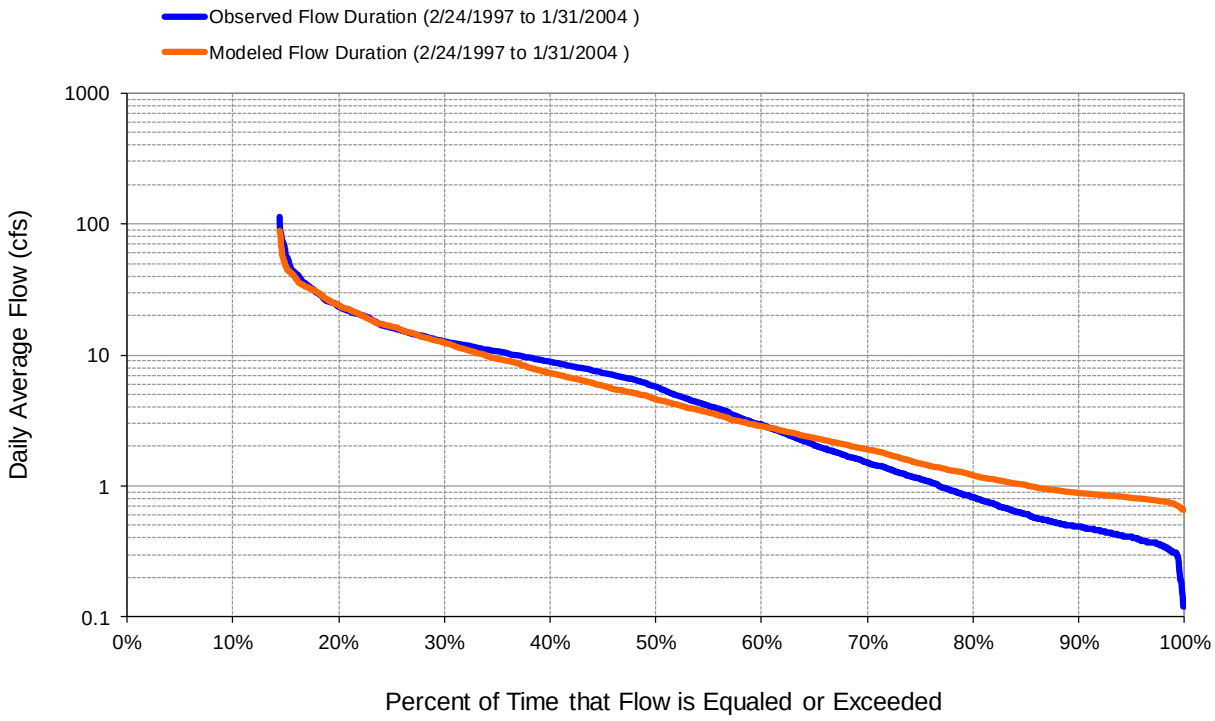

Figure A-69. Flow exceedance at Mill Creek near Peasley Canyon (King County mf1)

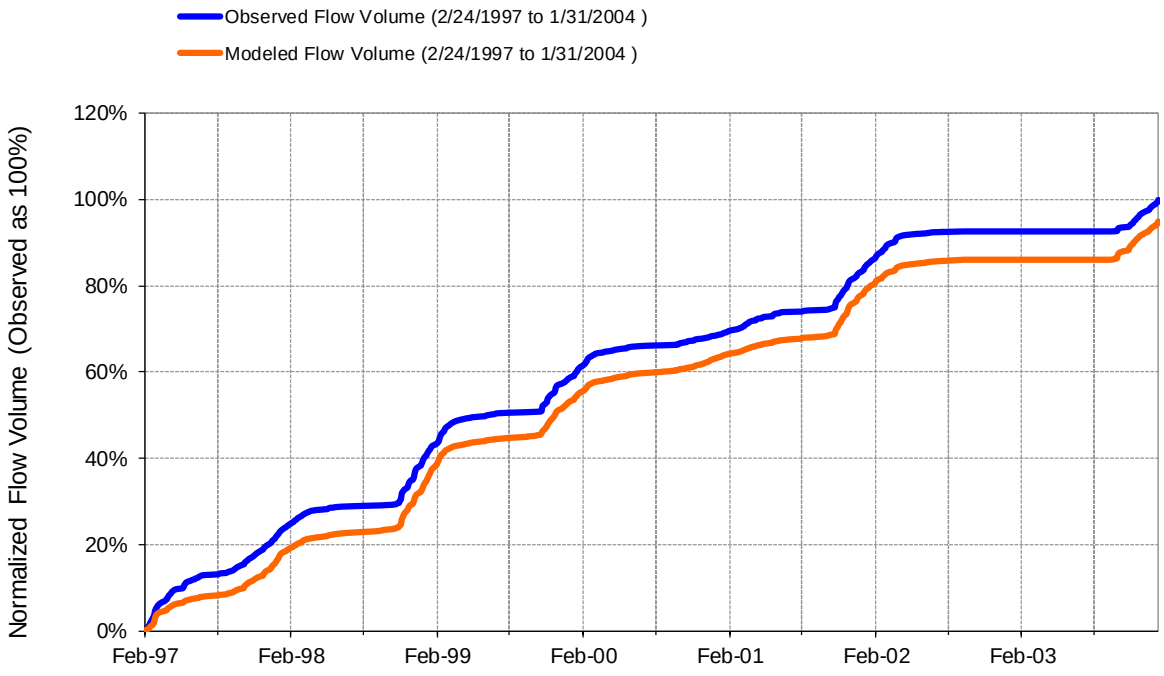

Figure A-70. Flow accumulation at Mill Creek near Peasley Canyon (King County mf1)

Table A-20. Summary statistics at Mill Creek near Peasley Canyon (King County mf1)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 21635		Mill Creek nr Peasley Canyon (King County mf1)	
6.93-Year Analysis Period: 2/1/1997 - 1/31/2004 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 5.93	
Total Simulated In-stream Flow:	**14.12**	Total Observed In-stream Flow:	**14.85**
Total of simulated highest 10% flows:	**6.03**	Total of Observed highest 10% flows:	**6.38**
Total of Simulated lowest 50% flows:	**1.50**	Total of Observed Lowest 50% flows:	**1.19**
Simulated Summer Flow Volume (months 7-9):	**0.71**	Observed Summer Flow Volume (7-9):	**0.60**
Simulated Fall Flow Volume (months 10-12):	**5.39**	Observed Fall Flow Volume (10-12):	**5.18**
Simulated Winter Flow Volume (months 1-3):	**6.16**	Observed Winter Flow Volume (1-3):	**6.63**
Simulated Spring Flow Volume (months 4-6):	**1.87**	Observed Spring Flow Volume (4-6):	**2.44**
Total Simulated Storm Volume:	**3.62**	Total Observed Storm Volume:	**3.58**
Simulated Summer Storm Volume (7-9):	**0.16**	Observed Summer Storm Volume (7-9):	**0.10**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-4.94%		
Error in 50% lowest flows:	26.51%		
Error in 10% highest flows:	-5.58%		
Seasonal volume error - Summer:	16.94%		
Seasonal volume error - Fall:	3.97%	>>	Clear
Seasonal volume error - Winter:	-7.06%		
Seasonal volume error - Spring:	-23.48%		
Error in storm volumes:	1.15%		
Error in summer storm volumes:	57.23%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.763	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.602	as E or E' approaches 1.0	
Monthly NSE	0.883		
Obs Baseflow	75.9%		
Sim Baseflow	74.4%		
Baseflow fraction error	-1.5%		
Coefficient of determination, r^2	0.77		
Weighted r^2	0.61		

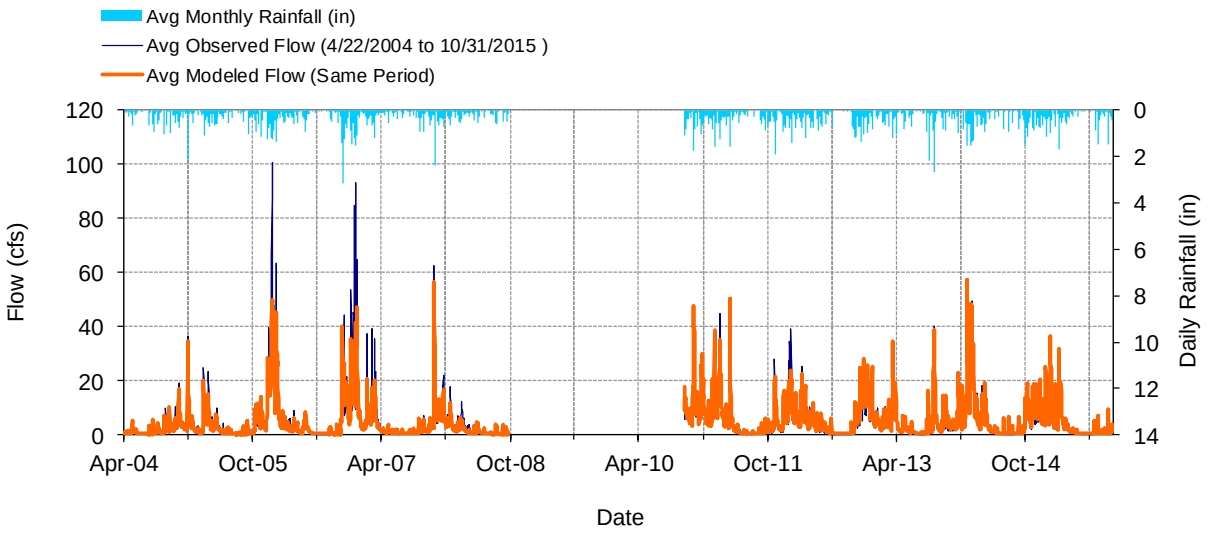

Figure A-71. Mean daily flow at Mill Creek near Peasley Canyon Rd (King County 41c)

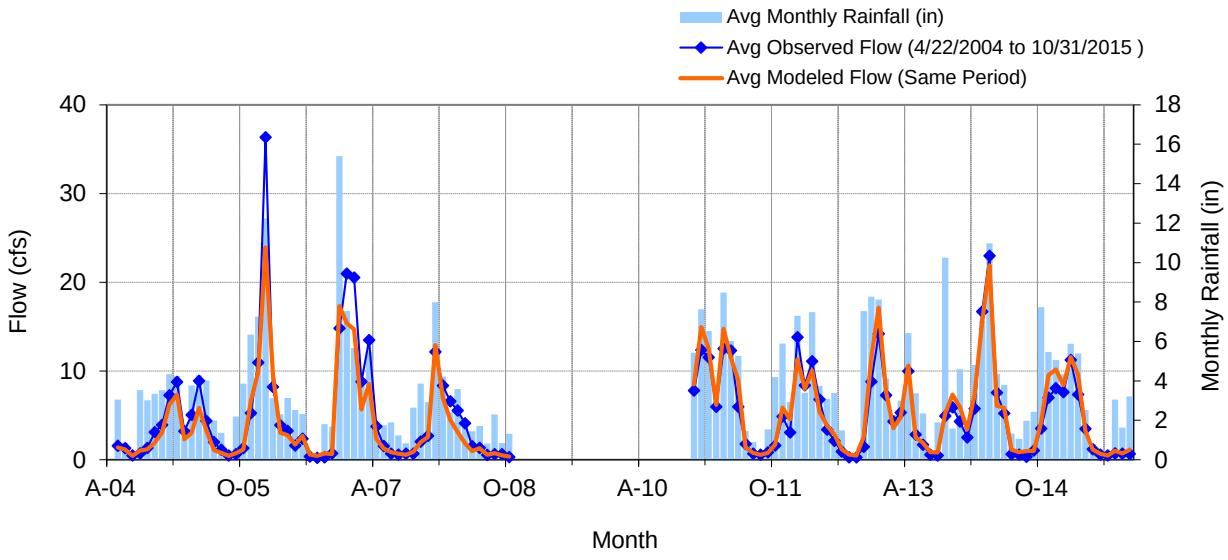

Figure A-72. Mean monthly flow at Mill Creek near Peasley Canyon Rd (King County 41c)

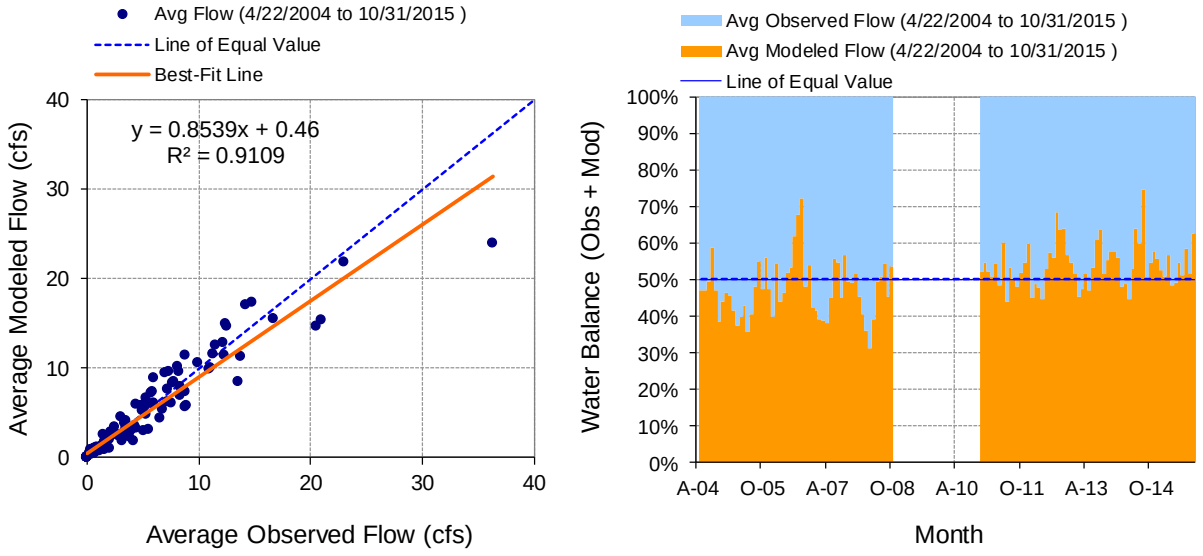

Figure A-73. Monthly flow regression and temporal variation at Mill Creek near Peasley Canyon Rd (King County 41c)

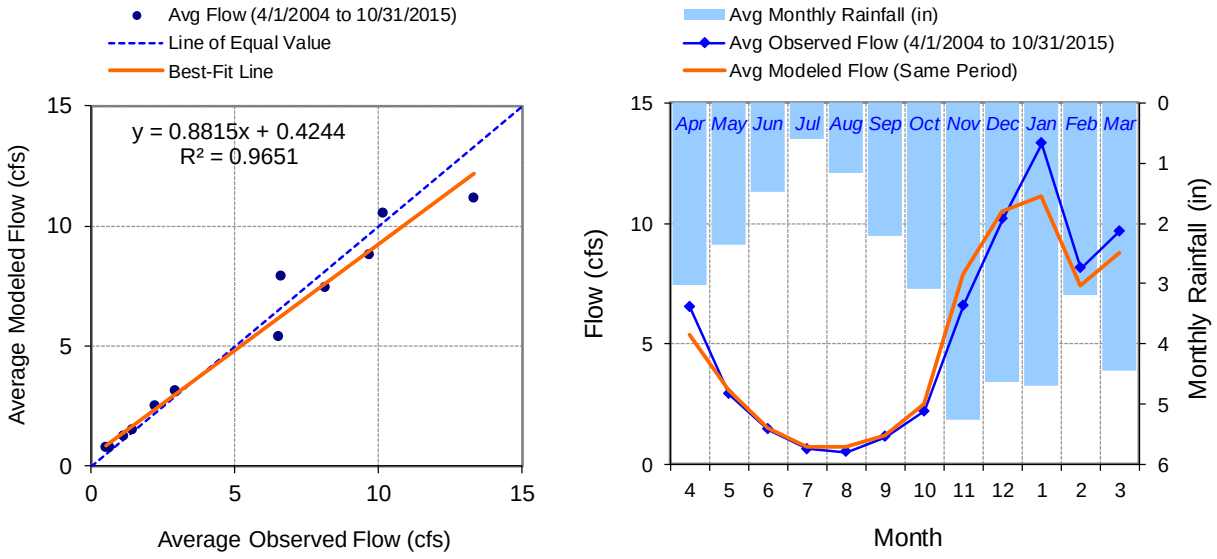

Figure A-74. Seasonal regression and temporal aggregate at Mill Creek near Peasley Canyon Rd (King County 41c)

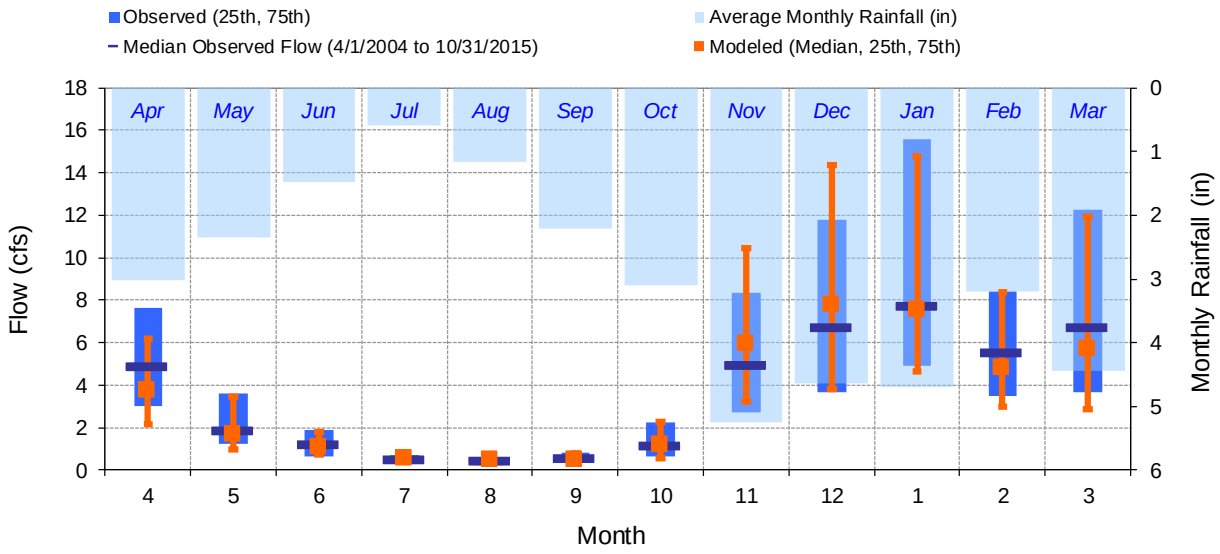

Figure A-75. Seasonal medians and ranges at Mill Creek near Peasley Canyon Rd (King County 41c)

Table A-21. Seasonal summary at Mill Creek near Peasley Canyon Rd (King County 41c)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Apr	6.50	4.91	2.99	7.62	5.37	3.73	2.13	6.22
May	2.92	1.88	1.21	3.60	3.09	1.71	0.98	3.45
Jun	1.44	1.21	0.65	1.91	1.50	1.08	0.73	1.83
Jul	0.62	0.51	0.40	0.68	0.72	0.58	0.49	0.72
Aug	0.51	0.41	0.26	0.53	0.72	0.49	0.42	0.57
Sep	1.12	0.58	0.45	0.85	1.22	0.48	0.40	0.78
Oct	2.21	1.18	0.63	2.24	2.48	1.20	0.58	2.26
Nov	6.60	4.96	2.72	8.33	7.88	5.98	3.20	10.43
Dec	10.16	6.73	3.68	11.78	10.51	7.81	3.83	14.34
Jan	13.32	7.71	4.91	15.58	11.13	7.57	4.62	14.77
Feb	8.15	5.52	3.51	8.43	7.43	4.85	2.96	8.37
Mar	9.68	6.73	3.66	12.27	8.76	5.71	2.87	11.95

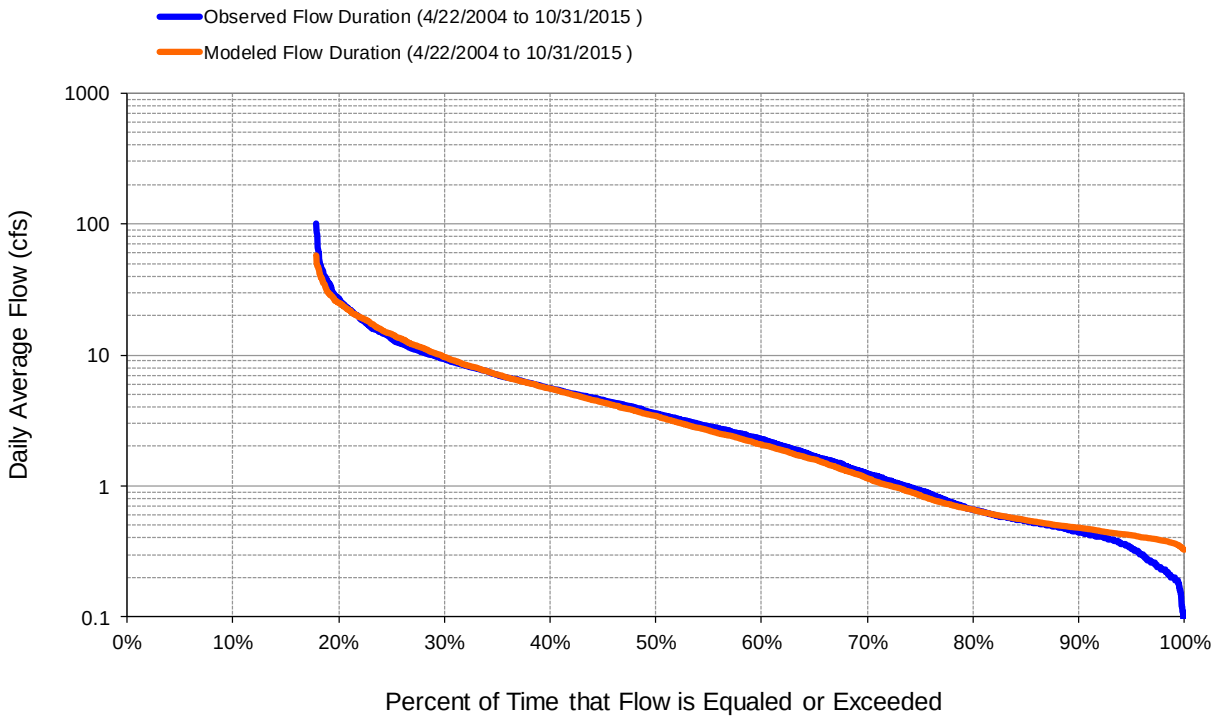

Figure A-76. Flow exceedance at Mill Creek near Peasley Canyon Rd (King County 41c)

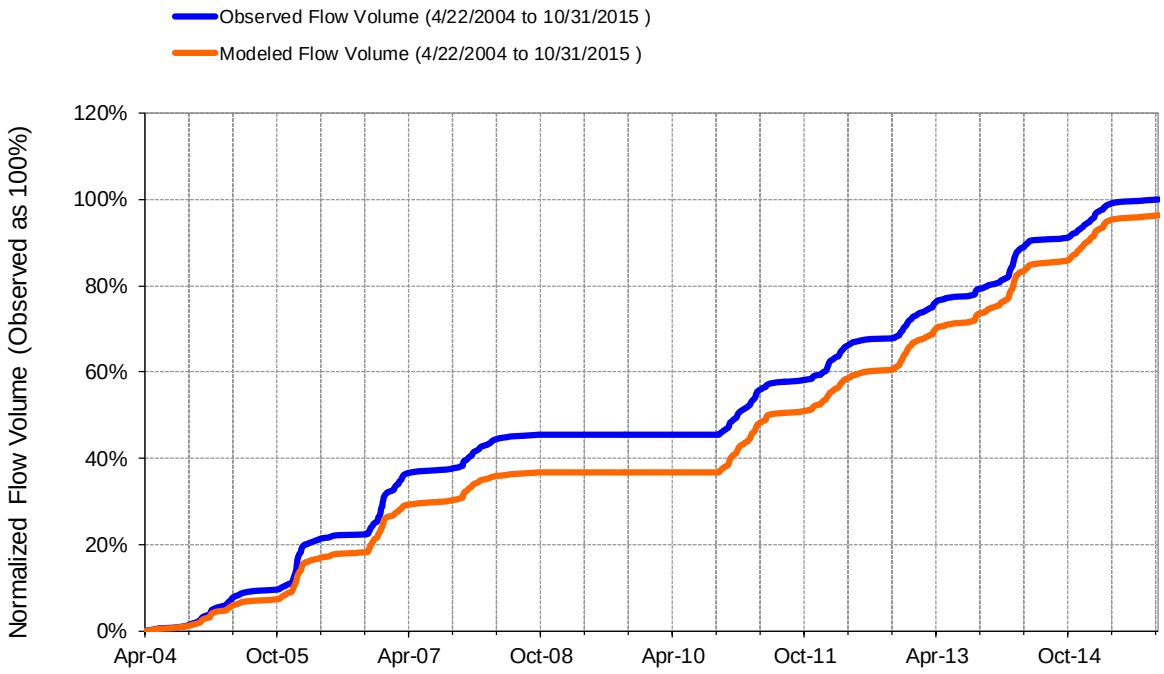

Figure A-77. Flow accumulation at Mill Creek near Peasley Canyon Rd (King County 41c)

Table A-22. Summary statistics at Mill Creek near Peasley Canyon Rd (King County 41c)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 21615		Mill Creek near Peasley Canyon RD (King County 41c)	
11.53-Year Analysis Period: 4/1/2004 - 10/31/2015 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 4.19	
Total Simulated In-stream Flow:	**13.04**	Total Observed In-stream Flow:	**13.53**
Total of simulated highest 10% flows:	**5.87**	Total of Observed highest 10% flows:	**6.33**
Total of Simulated lowest 50% flows:	**1.18**	Total of Observed Lowest 50% flows:	**1.22**
Simulated Summer Flow Volume (months 7-9):	**0.62**	Observed Summer Flow Volume (7-9):	**0.53**
Simulated Fall Flow Volume (months 10-12):	**4.45**	Observed Fall Flow Volume (10-12):	**4.04**
Simulated Winter Flow Volume (months 1-3):	**5.73**	Observed Winter Flow Volume (1-3):	**6.53**
Simulated Spring Flow Volume (months 4-6):	**2.24**	Observed Spring Flow Volume (4-6):	**2.43**
Total Simulated Storm Volume:	**2.80**	Total Observed Storm Volume:	**2.90**
Simulated Summer Storm Volume (7-9):	**0.19**	Observed Summer Storm Volume (7-9):	**0.13**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-3.66%		
Error in 50% lowest flows:	-3.12%		
Error in 10% highest flows:	-7.20%		
Seasonal volume error - Summer:	18.05%		
Seasonal volume error - Fall:	9.97%	>>	Clear
Seasonal volume error - Winter:	-12.33%		
Seasonal volume error - Spring:	-7.75%		
Error in storm volumes:	-3.24%		
Error in summer storm volumes:	45.97%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.836	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garrick), E':	0.712		
Monthly NSE	0.894		
Obs Baseflow	78.6%		
Sim Baseflow	78.5%		
Baseflow fraction error	-0.1%		
Coefficient of determination, r^2	0.84		
Weighted r^2	0.66		

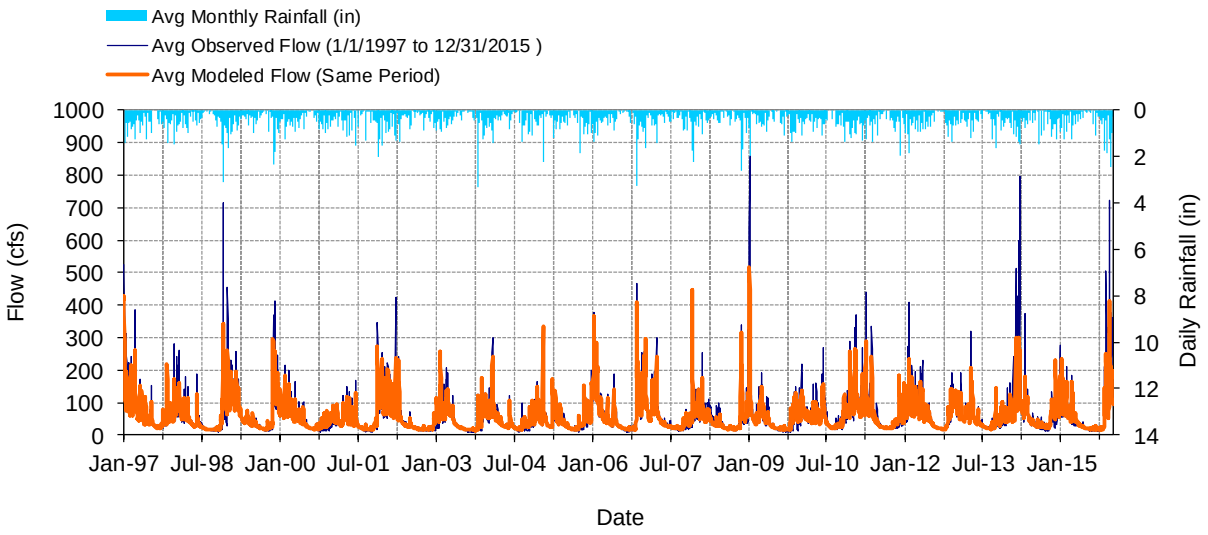

Figure A-78. Mean daily flow at Newaukum Creek near Black Diamond (USGS 12108500)

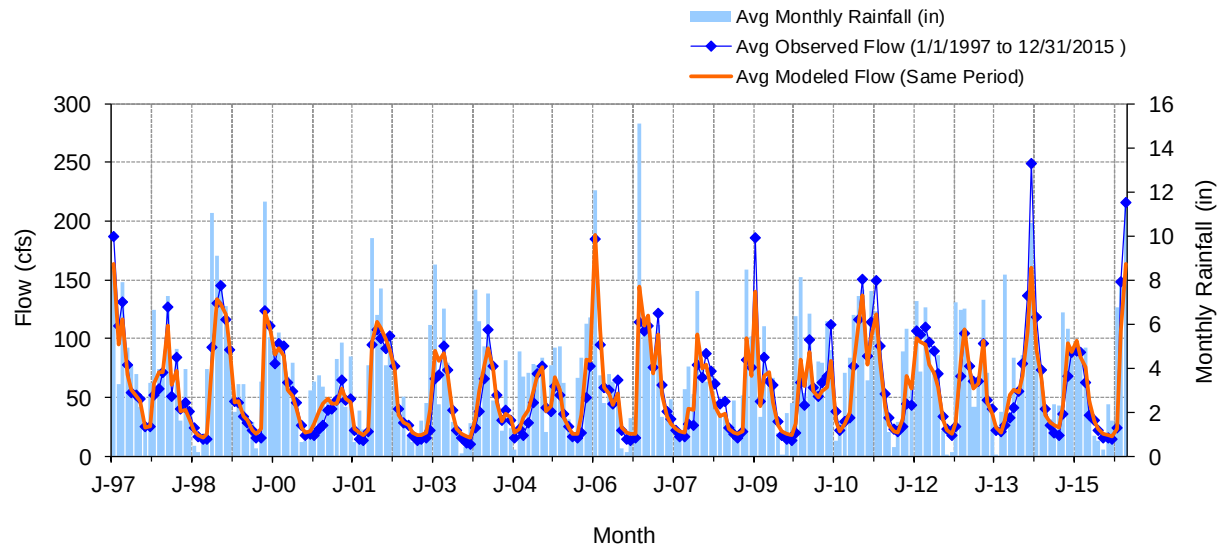

Figure A-79. Mean monthly flow at Newaukum Creek near Black Diamond (USGS 12108500)

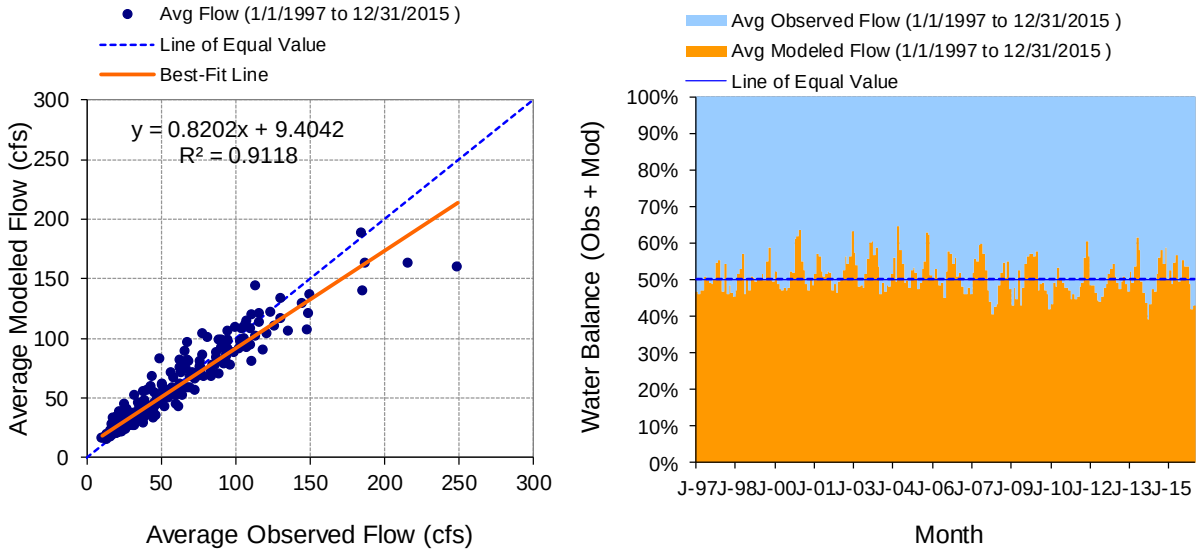

Figure A-80. Monthly flow regression and temporal variation at Newaukum Creek near Black Diamond (USGS 12108500)

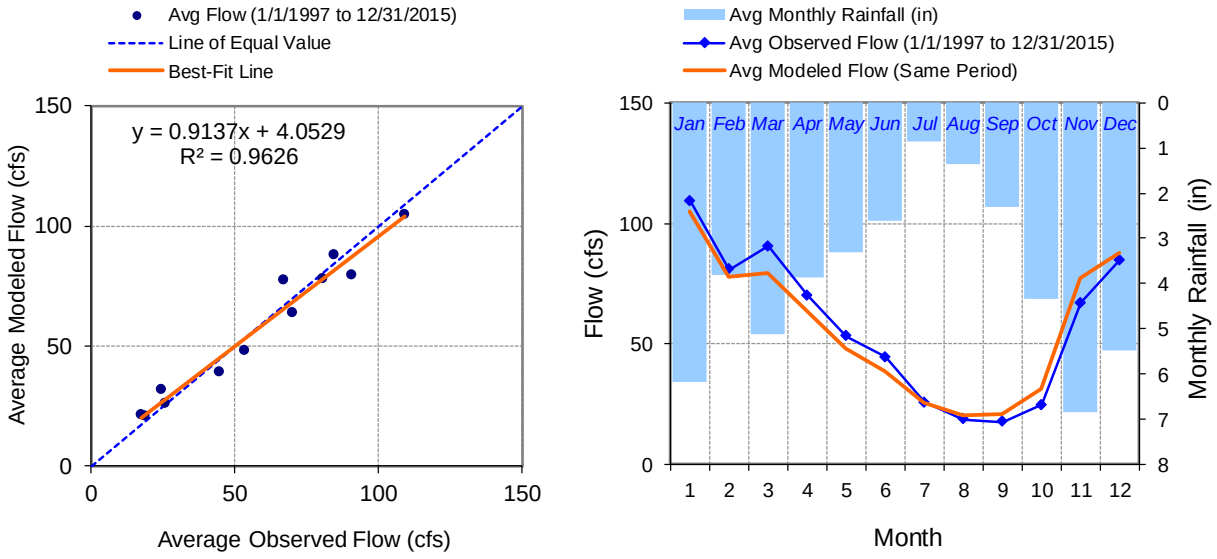

Figure A-81. Seasonal regression and temporal aggregate at Newaukum Creek near Black Diamond (USGS 12108500)

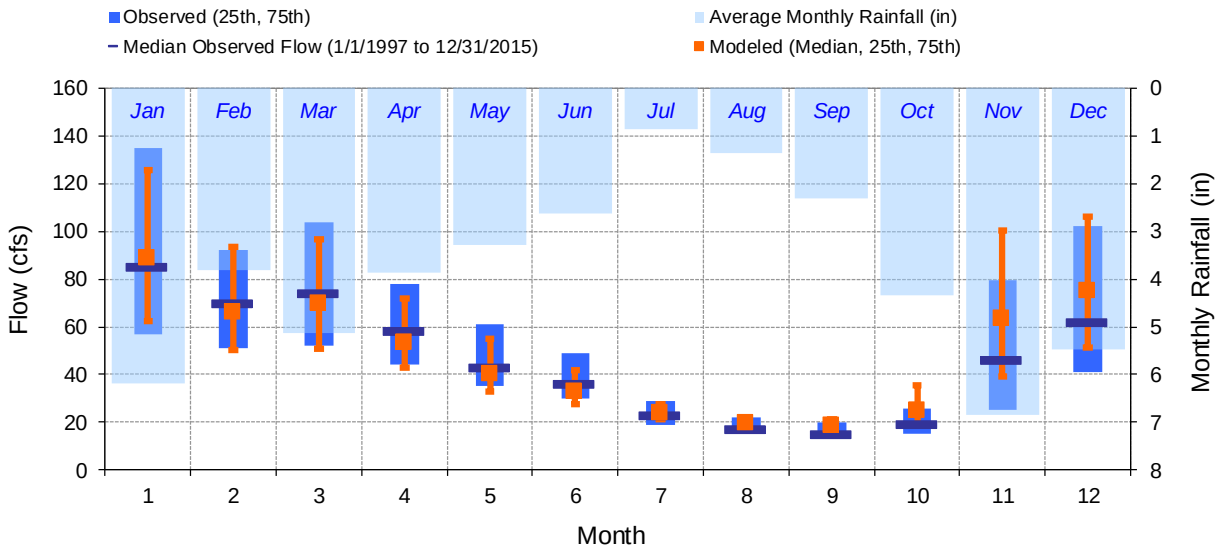

Figure A-82. Seasonal medians and ranges at Newaukum Creek near Black Diamond (USGS 12108500)

Table A-23. Seasonal summary at Newaukum Creek near Black Diamond (USGS 12108500)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	109.33	85.00	57.00	135.00	104.78	88.53	62.51	125.54
Feb	80.68	69.50	51.00	92.00	77.87	65.97	50.46	93.35
Mar	90.59	74.00	52.00	104.00	79.34	69.87	50.86	96.38
Apr	70.16	58.00	44.00	77.75	63.73	53.46	42.67	72.05
May	53.17	43.00	35.00	61.00	47.90	40.36	32.80	55.01
Jun	44.48	36.00	30.00	49.00	38.80	32.81	27.54	41.86
Jul	25.52	23.00	19.00	29.00	25.53	23.86	21.08	27.58
Aug	18.73	17.00	15.00	22.00	20.51	19.91	18.19	21.89
Sep	17.44	15.00	13.00	20.00	20.93	18.76	17.28	21.51
Oct	24.51	19.00	15.00	26.00	31.45	25.23	18.72	35.41
Nov	66.98	46.00	25.00	79.75	77.41	63.42	39.11	100.19
Dec	84.72	62.00	41.00	102.00	87.51	74.95	51.36	106.37

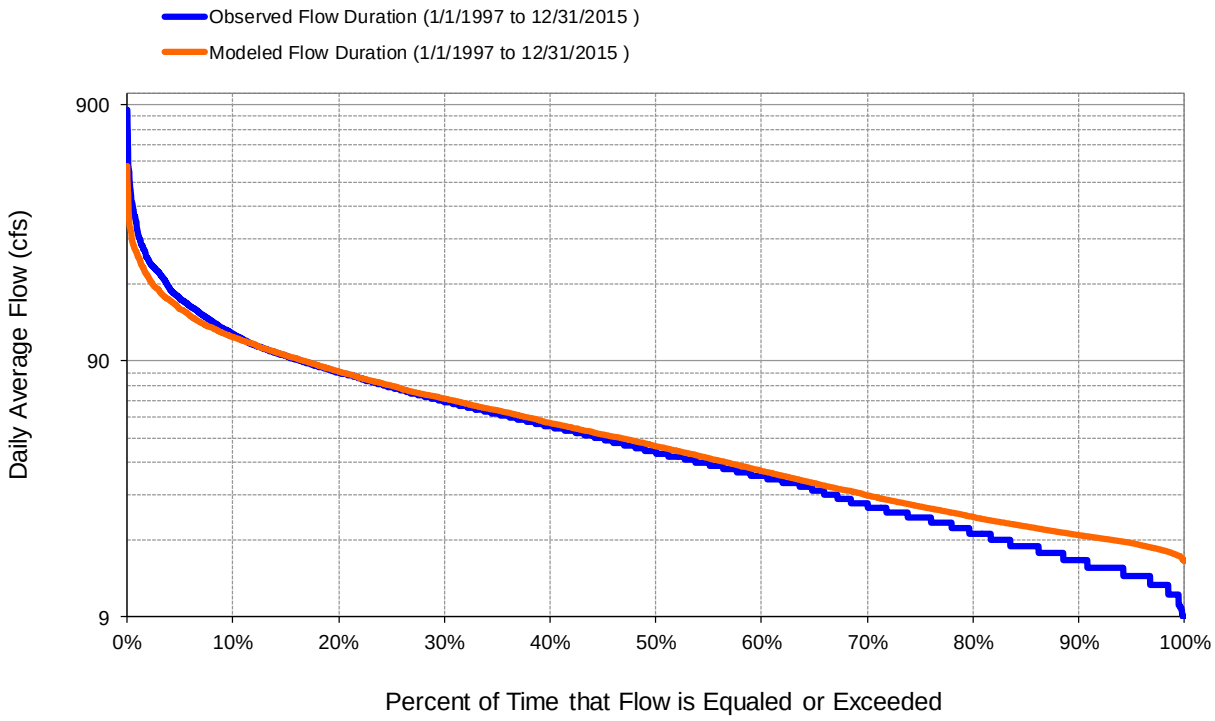

Figure A-83. Flow exceedance at Newaukum Creek near Black Diamond (USGS 12108500)

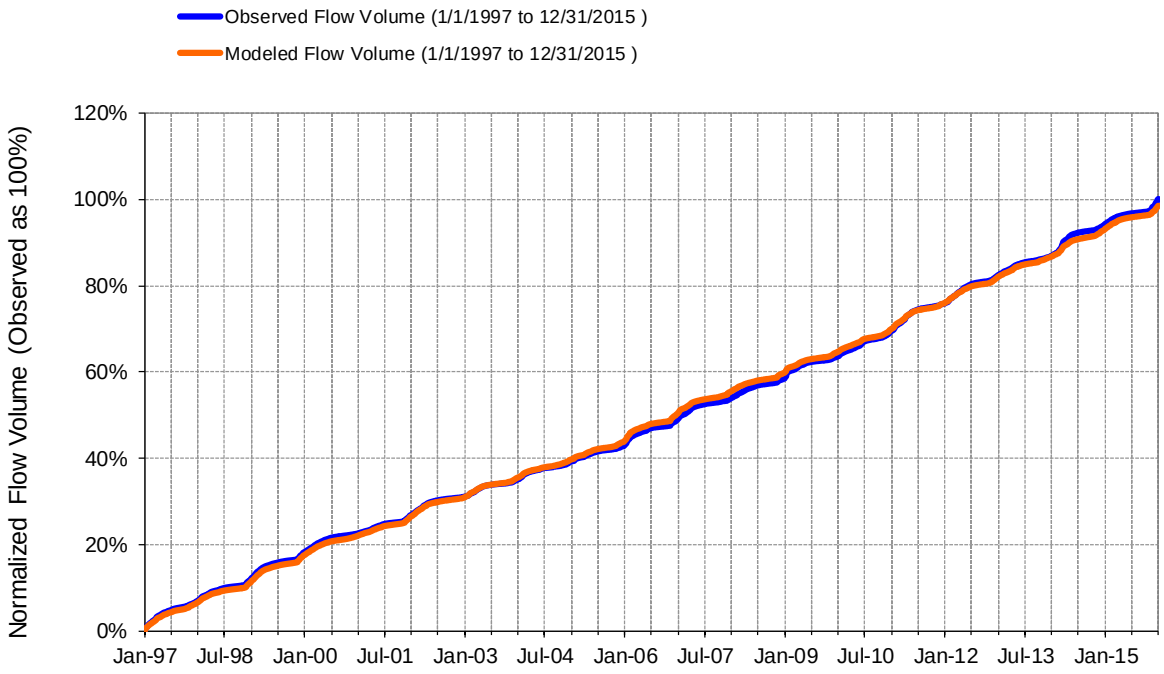

Figure A-84. Flow accumulation at Newaukum Creek near Black Diamond (USGS 12108500)

Table A-24. Summary statistics at Newaukum Creek near Black Diamond (USGS 12108500)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SUBBASIN 14281		Newaukum Creek near Black Diamond (USGS 12108500)	
19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 27.4	
Total Simulated In-stream Flow:	**27.87**	Total Observed In-stream Flow:	**28.30**
Total of simulated highest 10% flows:	**7.99**	Total of Observed highest 10% flows:	**9.34**
Total of Simulated lowest 50% flows:	**6.43**	Total of Observed Lowest 50% flows:	**5.74**
Simulated Summer Flow Volume (months 7-9):	**2.79**	Observed Summer Flow Volume (7-9):	**2.57**
Simulated Fall Flow Volume (months 10-12):	**8.16**	Observed Fall Flow Volume (10-12):	**7.32**
Simulated Winter Flow Volume (months 1-3):	**10.73**	Observed Winter Flow Volume (1-3):	**11.50**
Simulated Spring Flow Volume (months 4-6):	**6.19**	Observed Spring Flow Volume (4-6):	**6.91**
Total Simulated Storm Volume:	**3.17**	Total Observed Storm Volume:	**4.76**
Simulated Summer Storm Volume (7-9):	**0.10**	Observed Summer Storm Volume (7-9):	**0.17**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-1.54%		
Error in 50% lowest flows:	11.99%		
Error in 10% highest flows:	-14.48%		
Seasonal volume error - Summer:	8.45%		
Seasonal volume error - Fall:	11.39%	>>	Clear
Seasonal volume error - Winter:	-6.72%		
Seasonal volume error - Spring:	-10.35%		
Error in storm volumes:	-33.35%		
Error in summer storm volumes:	-37.73%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.833	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.692	as E or E' approaches 1.0	
Monthly NSE	0.902		
Obs Baseflow	83.2%		
Sim Baseflow	88.6%		
Baseflow fraction error	5.4%		
Coefficient of determination, r^2	0.83		
Weighted r^2	0.65		

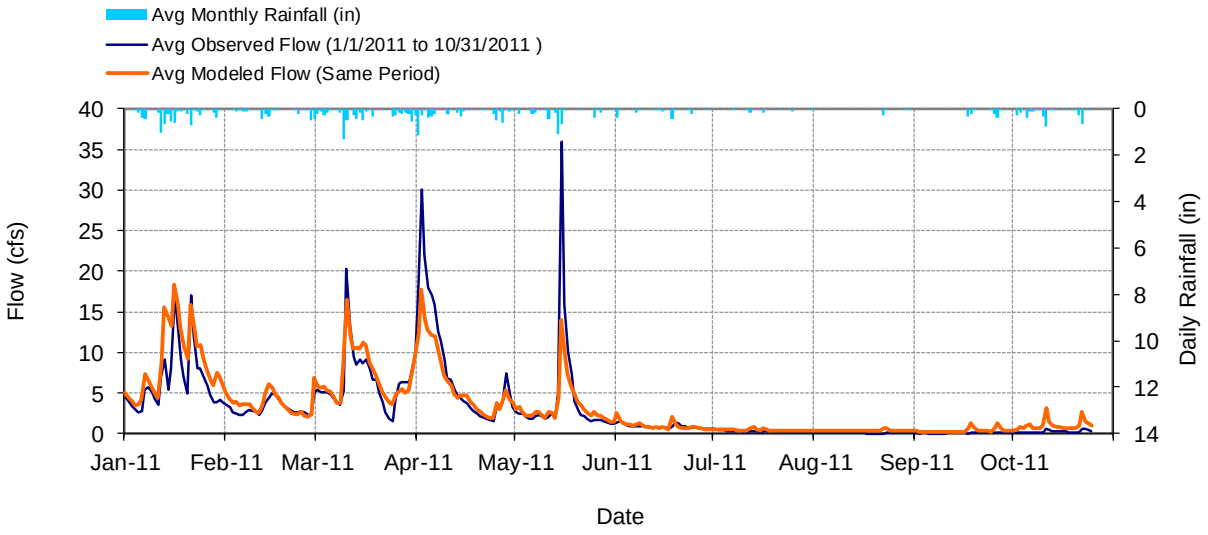

Figure A-85. Mean daily flow at Olson Creek at Green River Rd (King County 32c)

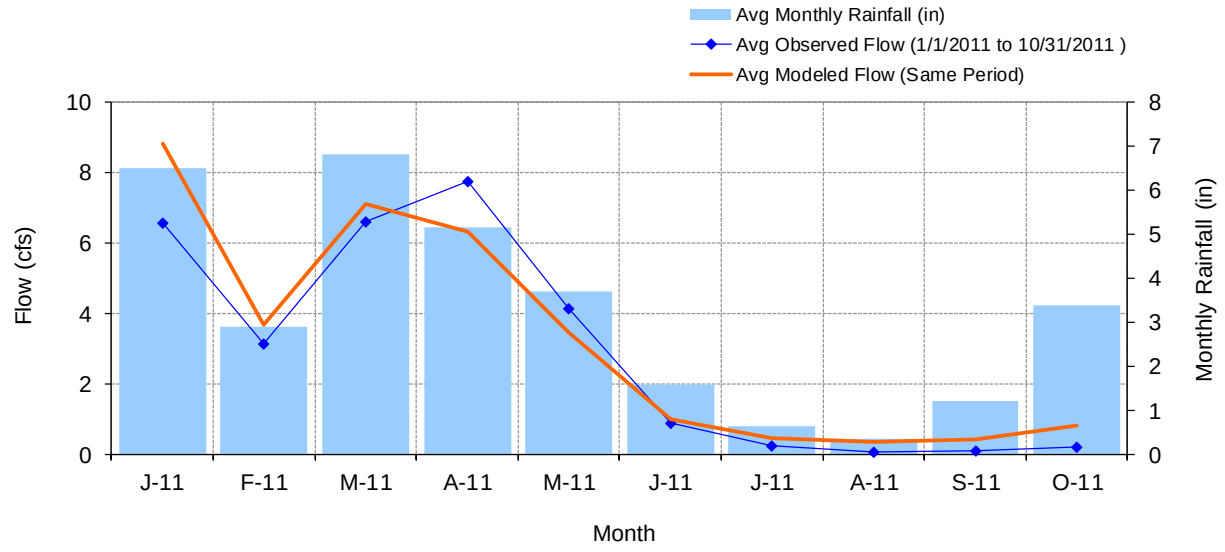

Figure A-86. Mean monthly flow at Olson Creek at Green River Rd (King County 32c)

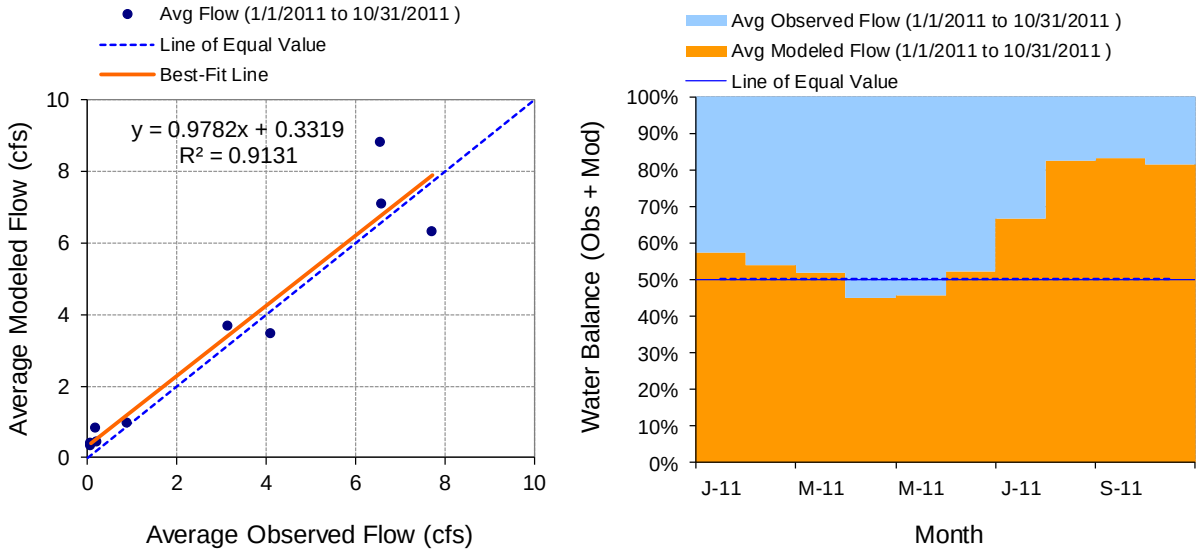

Figure A-87. Monthly flow regression and temporal variation at Olson Creek at Green River Rd (King County 32c)

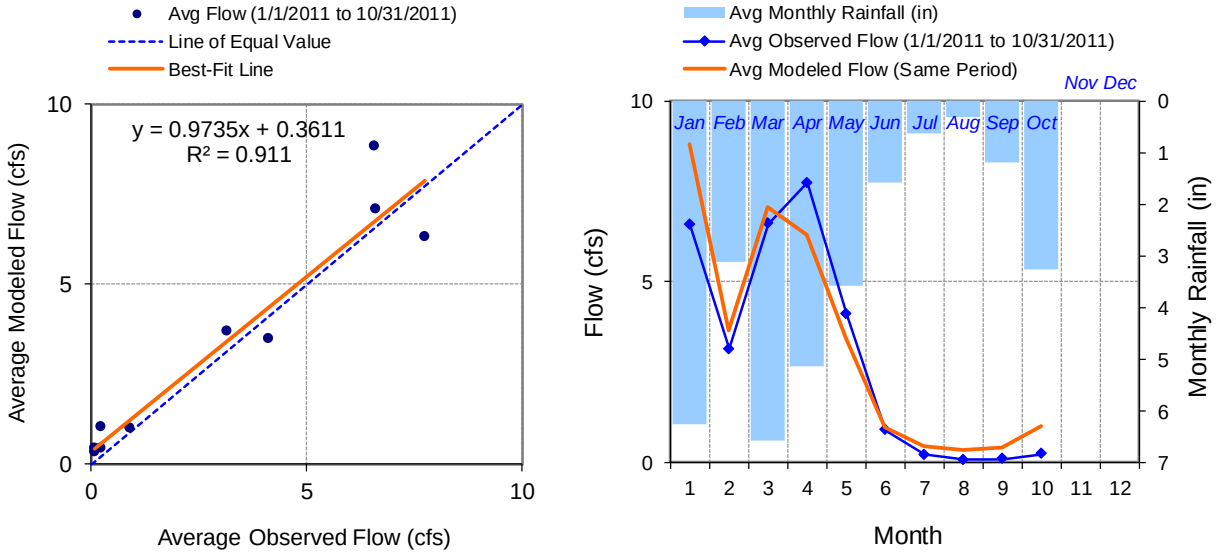

Figure A-88. Seasonal regression and temporal aggregate at Olson Creek at Green River Rd (King County 32c)

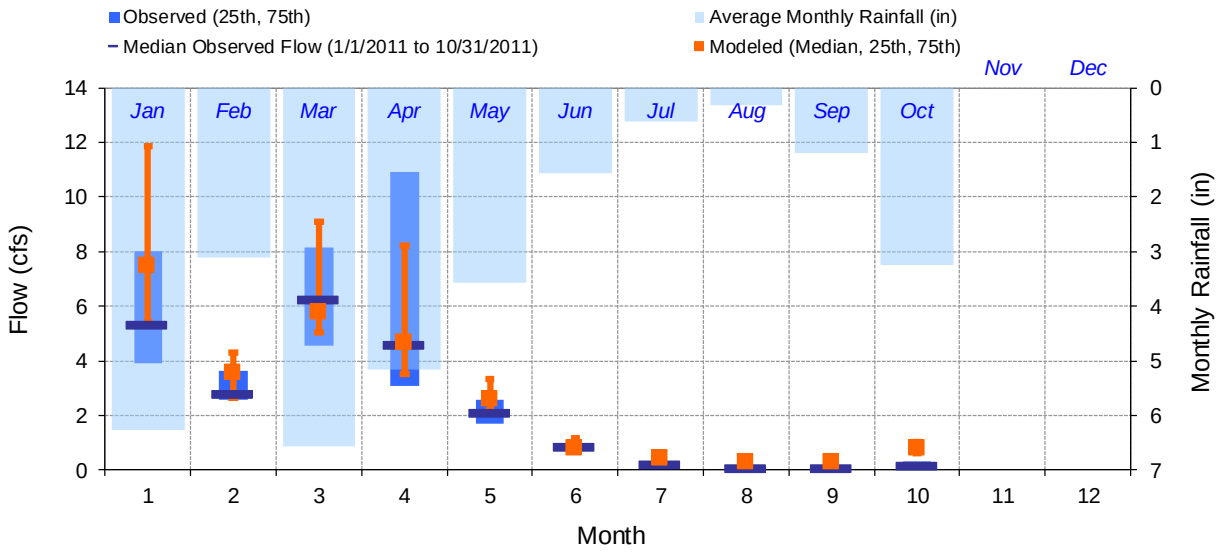

Figure A-89. Seasonal medians and ranges at Olson Creek at Green River Rd (King County 32c)

Table A-25. Seasonal summary at Olson Creek at Green River Rd (King County 32c)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	6.57	5.33	3.90	8.00	8.81	7.47	5.41	11.87
Feb	3.14	2.78	2.57	3.65	3.67	3.56	2.67	4.33
Mar	6.60	6.23	4.57	8.14	7.08	5.78	5.04	9.11
Apr	7.73	4.57	3.06	10.93	6.30	4.66	3.53	8.21
May	4.11	2.10	1.72	2.59	3.46	2.62	2.19	3.33
Jun	0.89	0.84	0.73	0.96	0.97	0.80	0.70	1.16
Jul	0.22	0.20	0.13	0.25	0.44	0.42	0.37	0.46
Aug	0.07	0.07	0.06	0.09	0.33	0.31	0.30	0.32
Sep	0.08	0.07	0.05	0.11	0.41	0.28	0.28	0.32
Oct	0.23	0.17	0.12	0.30	1.02	0.82	0.64	1.05
Nov	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

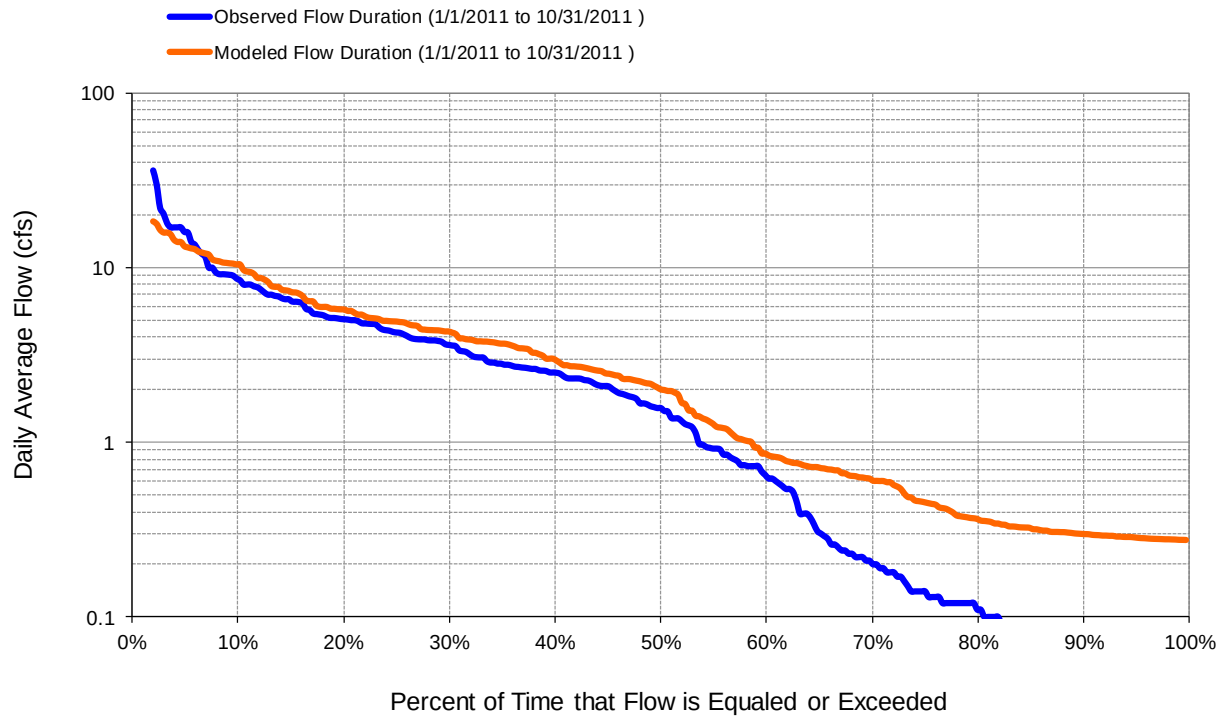

Figure A-90. Flow exceedance at Olson Creek at Green River Rd (King County 32c)

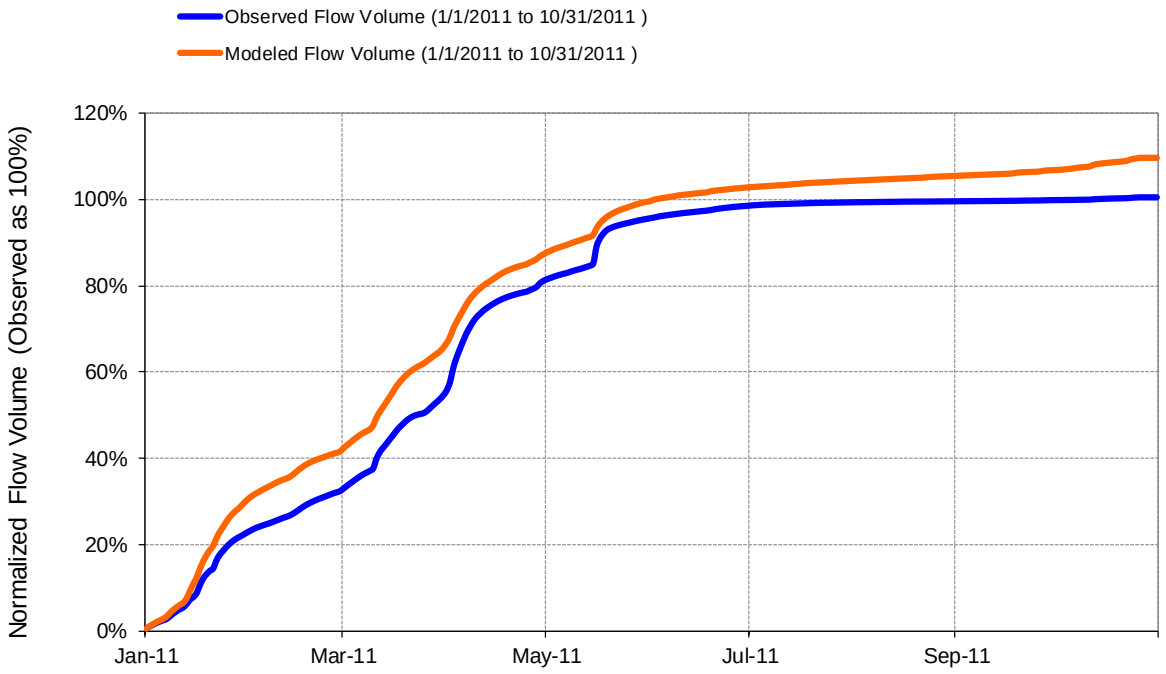

Figure A-91. Flow accumulation at Olson Creek at Green River Rd (King County 32c)

Table A-26. Summary statistics at Olson Creek at Green River Rd (King County 32c)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 19425		Olson Creek at Green River RD (King County 32c)	
0.83-Year Analysis Period: 1/1/2011 - 10/31/2011 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 1.84	
Total Simulated In-stream Flow:	**23.85**	Total Observed In-stream Flow:	**21.85**
Total of simulated highest 10% flows:	**9.37**	Total of Observed highest 10% flows:	**10.24**
Total of Simulated lowest 50% flows:	**2.24**	Total of Observed Lowest 50% flows:	**1.16**
Simulated Summer Flow Volume (months 7-9):	**0.88**	Observed Summer Flow Volume (7-9):	**0.28**
Simulated Fall Flow Volume (months 10-12):	**0.62**	Observed Fall Flow Volume (10-12):	**0.14**
Simulated Winter Flow Volume (months 1-3):	**14.46**	Observed Winter Flow Volume (1-3):	**12.05**
Simulated Spring Flow Volume (months 4-6):	**7.90**	Observed Spring Flow Volume (4-6):	**9.38**
Total Simulated Storm Volume:	**4.00**	Total Observed Storm Volume:	**5.14**
Simulated Summer Storm Volume (7-9):	**0.12**	Observed Summer Storm Volume (7-9):	**0.04**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	9.15%		
Error in 50% lowest flows:	93.93%		
Error in 10% highest flows:	-8.49%		
Seasonal volume error - Summer:	216.18%		
Seasonal volume error - Fall:	339.15%	>>	Clear
Seasonal volume error - Winter:	19.94%		
Seasonal volume error - Spring:	-15.76%		
Error in storm volumes:	-22.14%		
Error in summer storm volumes:	212.43%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.797	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.686	as E or E' approaches 1.0	
Monthly NSE	0.900		
Obs Baseflow	76.5%		
Sim Baseflow	83.2%		
Baseflow fraction error	6.7%		
Coefficient of determination, r^2	0.81		
Weighted r^2	0.75		

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Appendix B. Duwamish River LSPC Model Hydrology Calibration Results

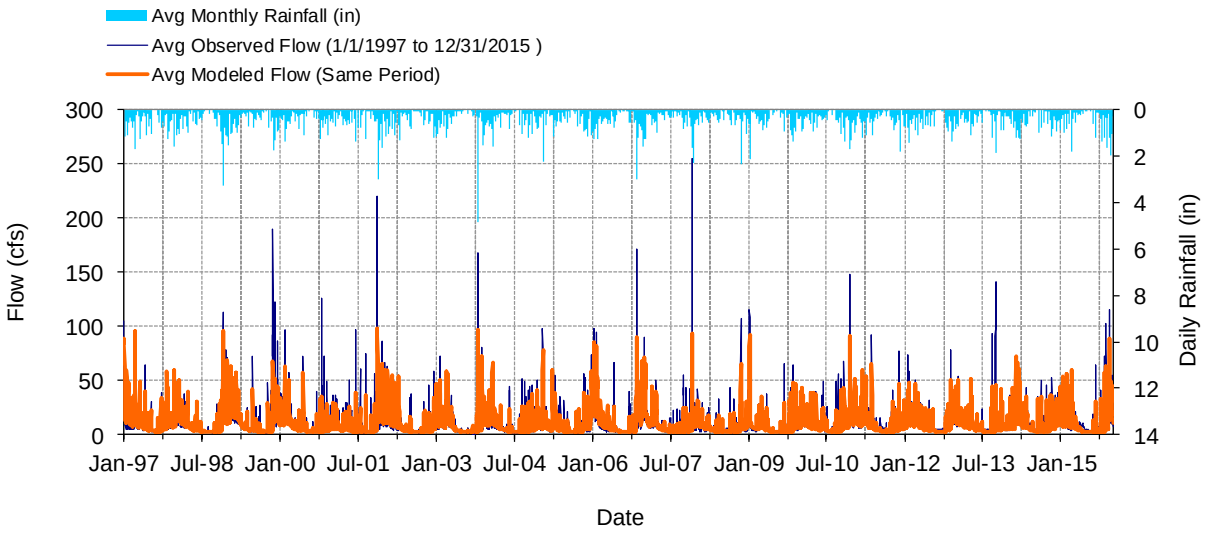

Figure B-1. Mean daily flow at Springbrook Creek at Orillia (USGS 12113346)

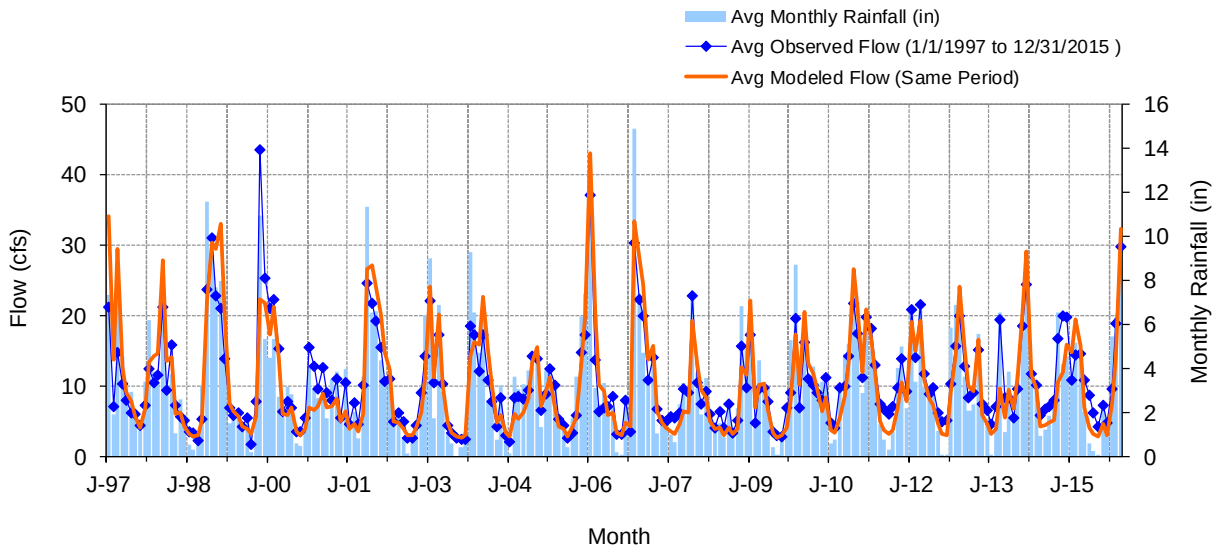

Figure B-2. Mean monthly flow at Springbrook Creek at Orillia (USGS 12113346)

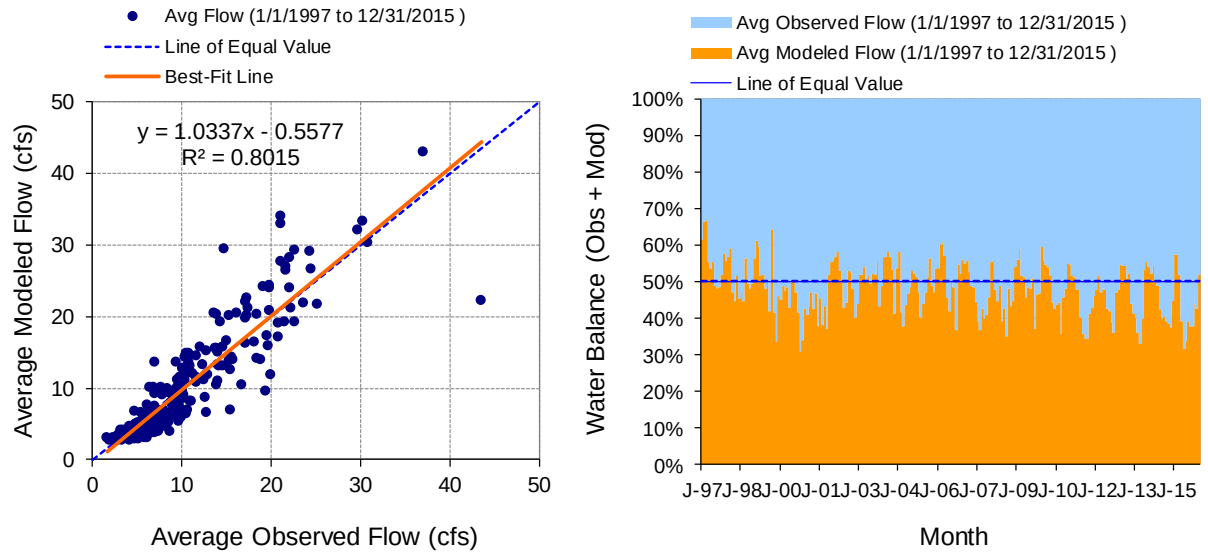

Figure B-3. Monthly flow regression and temporal variation at Springbrook Creek at Orillia (USGS 12113346)

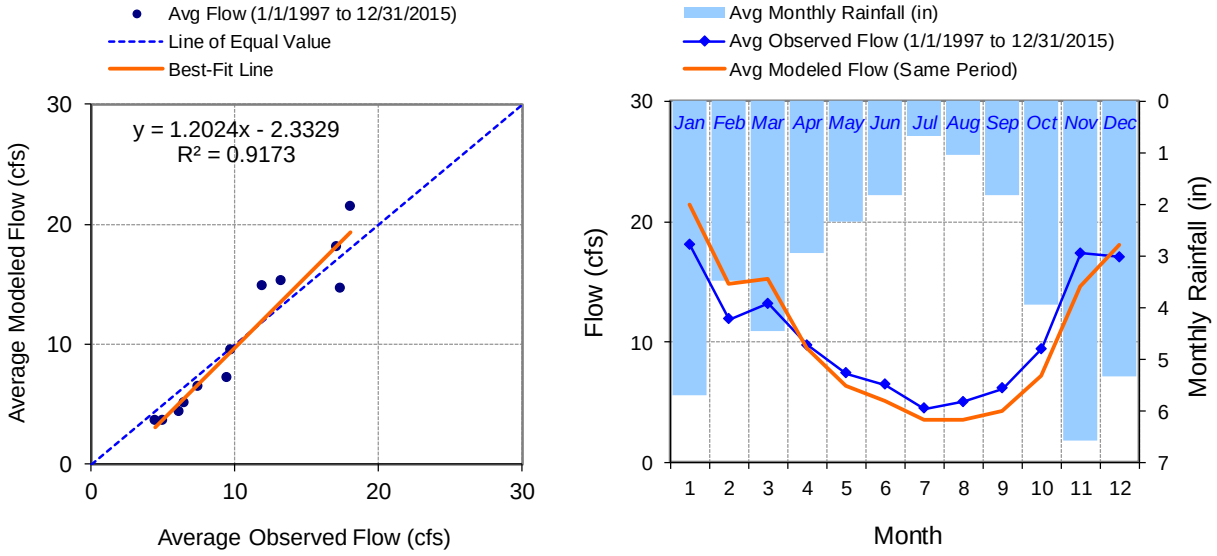

Figure B-4. Seasonal regression and temporal aggregate at Springbrook Creek at Orillia (USGS 12113346)

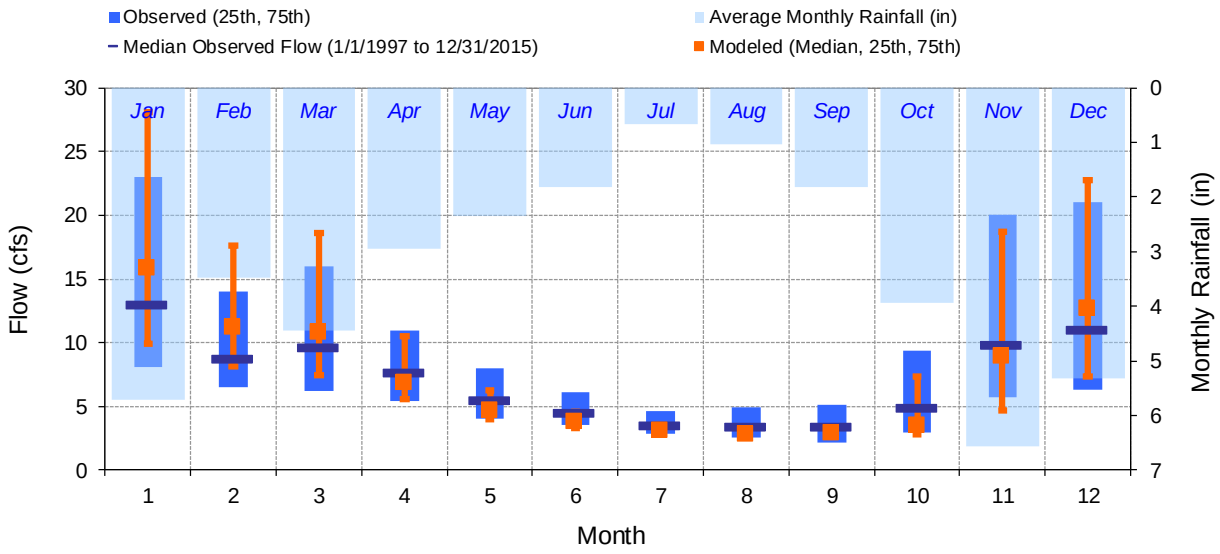

Figure B-5. Seasonal medians and ranges at Springbrook Creek at Orillia (USGS 12113346)

Table B-1. Seasonal summary at Springbrook Creek at Orillia (USGS 12113346)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	18.06	13.00	8.10	23.00	21.43	15.82	9.93	28.05
Feb	11.90	8.70	6.50	14.00	14.83	11.20	8.10	17.62
Mar	13.18	9.60	6.20	16.00	15.20	10.85	7.42	18.63
Apr	9.75	7.60	5.40	11.00	9.52	6.90	5.55	10.54
May	7.39	5.50	4.00	8.00	6.38	4.68	4.03	6.25
Jun	6.46	4.50	3.50	6.10	5.07	3.77	3.33	4.57
Jul	4.44	3.50	2.90	4.60	3.59	3.11	2.83	3.40
Aug	5.00	3.40	2.60	4.90	3.58	2.85	2.65	3.10
Sep	6.12	3.40	2.20	5.18	4.28	2.88	2.65	3.10
Oct	9.42	4.90	3.00	9.40	7.18	3.51	2.82	7.35
Nov	17.39	9.80	5.70	20.00	14.62	8.97	4.71	18.74
Dec	17.05	11.00	6.30	21.00	18.03	12.69	7.37	22.74

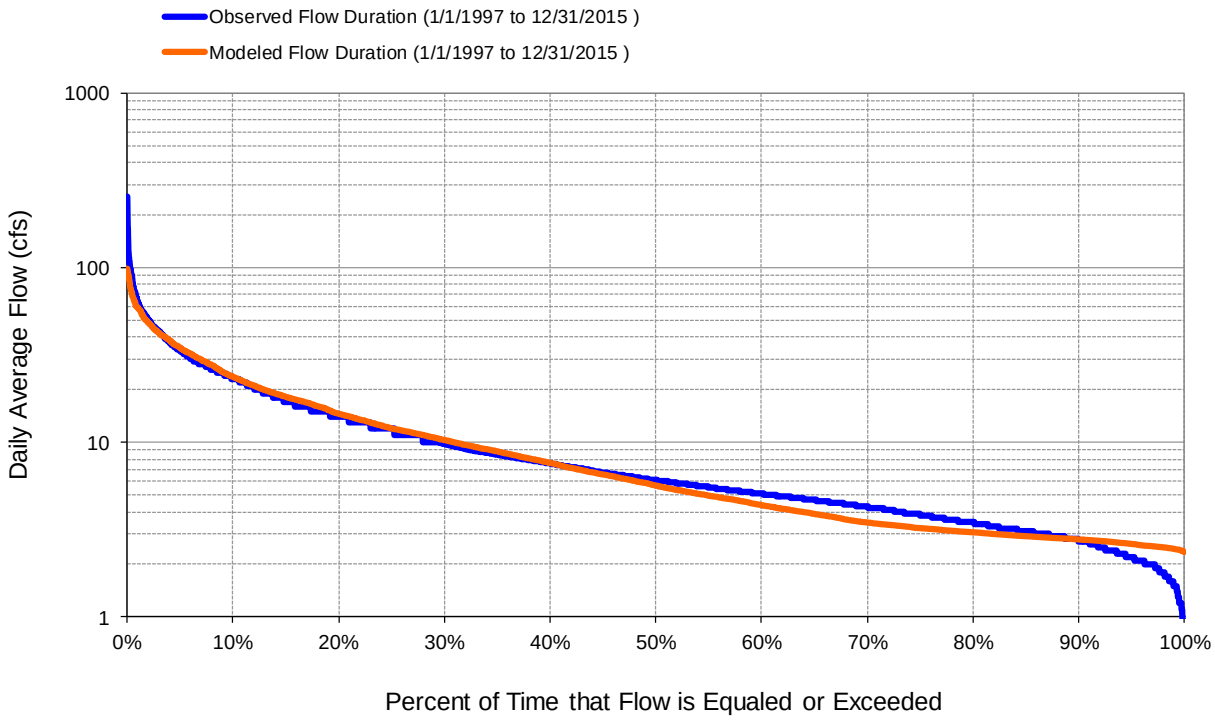

Figure B-6. Flow exceedance at Springbrook Creek at Orillia (USGS 12113346)

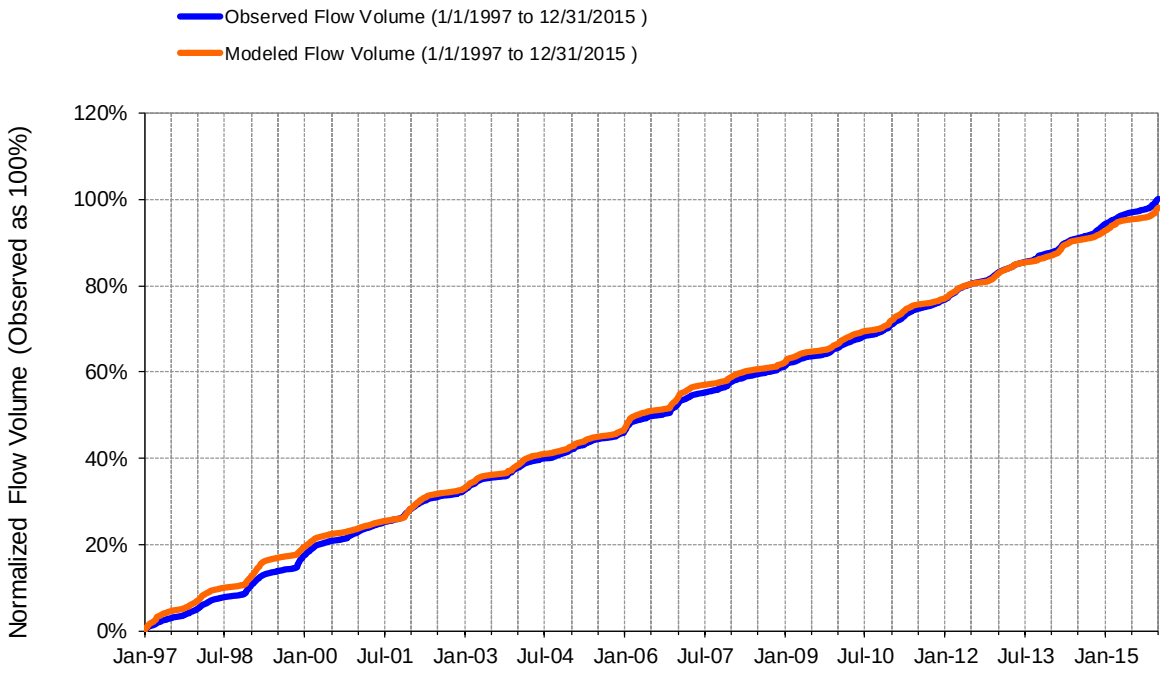

Figure B-7. Flow accumulation at Springbrook Creek at Orillia (USGS 12113346)

Table B-2. Summary statistics at Springbrook Creek at Orillia (USGS 12113346)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 23260		Springbrook Creek at Orillia (USGS 12113346)	
19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 8.44	
Total Simulated In-stream Flow:	**16.57**	Total Observed In-stream Flow:	**16.91**
Total of simulated highest 10% flows:	**6.30**	Total of Observed highest 10% flows:	**6.61**
Total of Simulated lowest 50% flows:	**2.84**	Total of Observed Lowest 50% flows:	**3.11**
Simulated Summer Flow Volume (months 7-9):	**1.55**	Observed Summer Flow Volume (7-9):	**2.10**
Simulated Fall Flow Volume (months 10-12):	**5.38**	Observed Fall Flow Volume (10-12):	**5.92**
Simulated Winter Flow Volume (months 1-3):	**6.85**	Observed Winter Flow Volume (1-3):	**5.75**
Simulated Spring Flow Volume (months 4-6):	**2.80**	Observed Spring Flow Volume (4-6):	**3.15**
Total Simulated Storm Volume:	**4.33**	Total Observed Storm Volume:	**5.54**
Simulated Summer Storm Volume (7-9):	**0.32**	Observed Summer Storm Volume (7-9):	**0.62**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-2.03%		
Error in 50% lowest flows:	-8.62%		
Error in 10% highest flows:	-4.59%		
Seasonal volume error - Summer:	-26.37%		
Seasonal volume error - Fall:	-9.11%	>>	Clear
Seasonal volume error - Winter:	19.14%		
Seasonal volume error - Spring:	-11.17%		
Error in storm volumes:	-21.89%		
Error in summer storm volumes:	-48.56%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.722	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.582	as E or E' approaches 1.0	
Monthly NSE	0.733		
Obs Baseflow	67.2%		
Sim Baseflow	73.9%		
Baseflow fraction error	6.6%		
Coefficient of determination, r^2	0.72		
Weighted r^2	0.54		

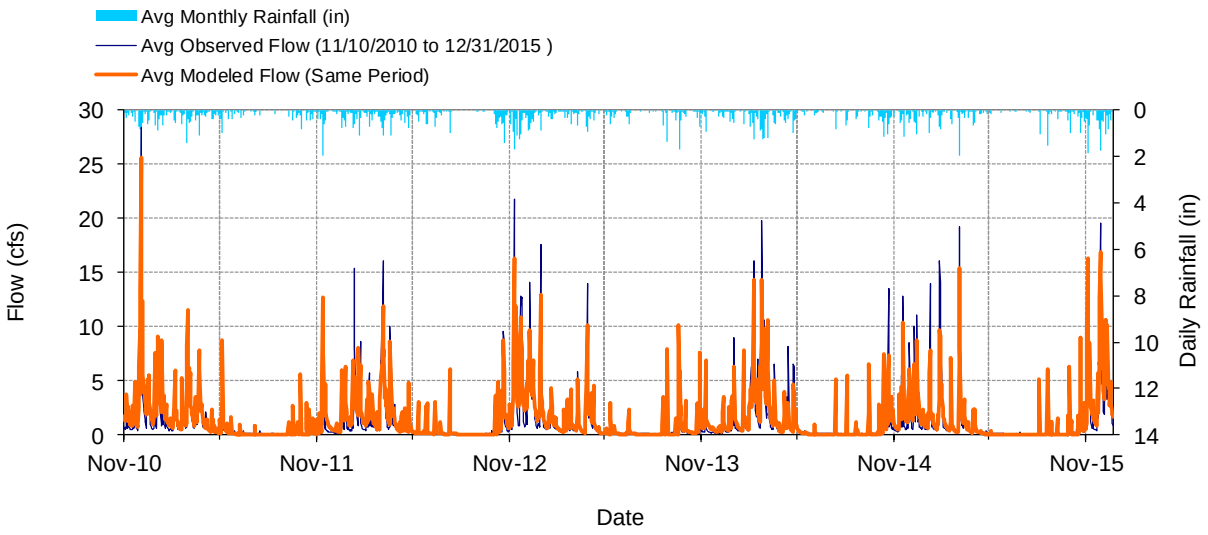

Figure B-8. Mean daily flow at Duwamish River Trib 0003 (King County 13a)

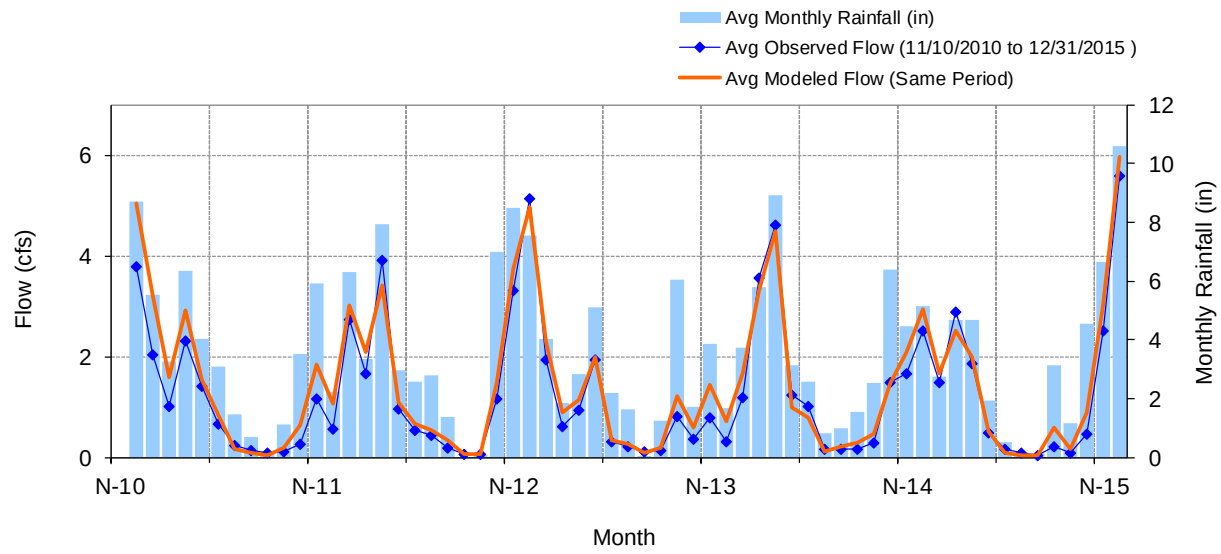

Figure B-9. Mean monthly flow at Duwamish River Trib 0003 (King County 13a)

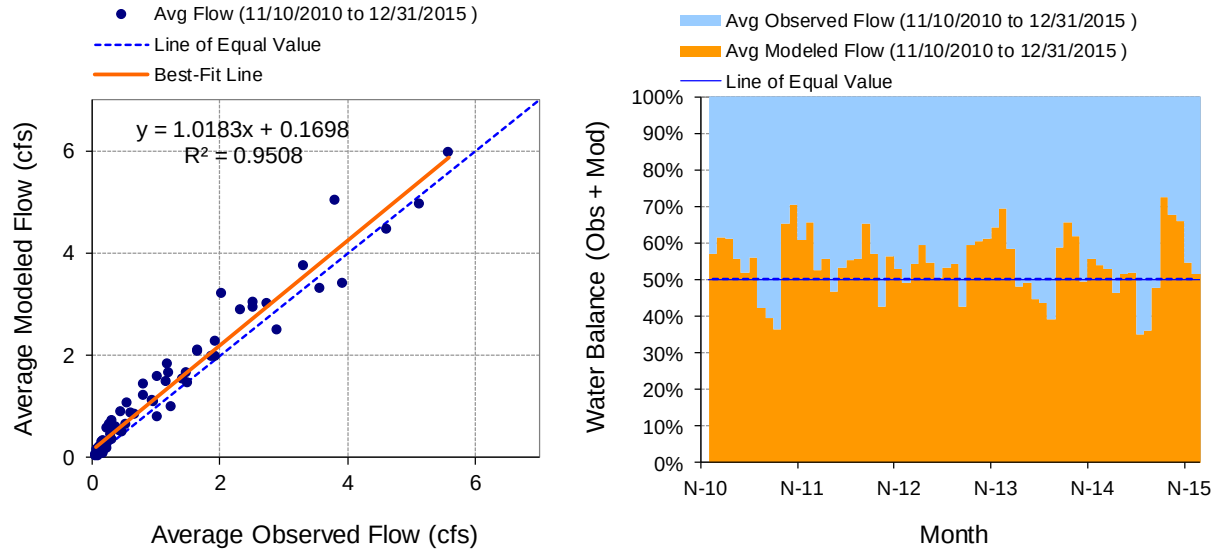

Figure B-10. Monthly flow regression and temporal variation at Duwamish River Trib 0003 (King County 13a)

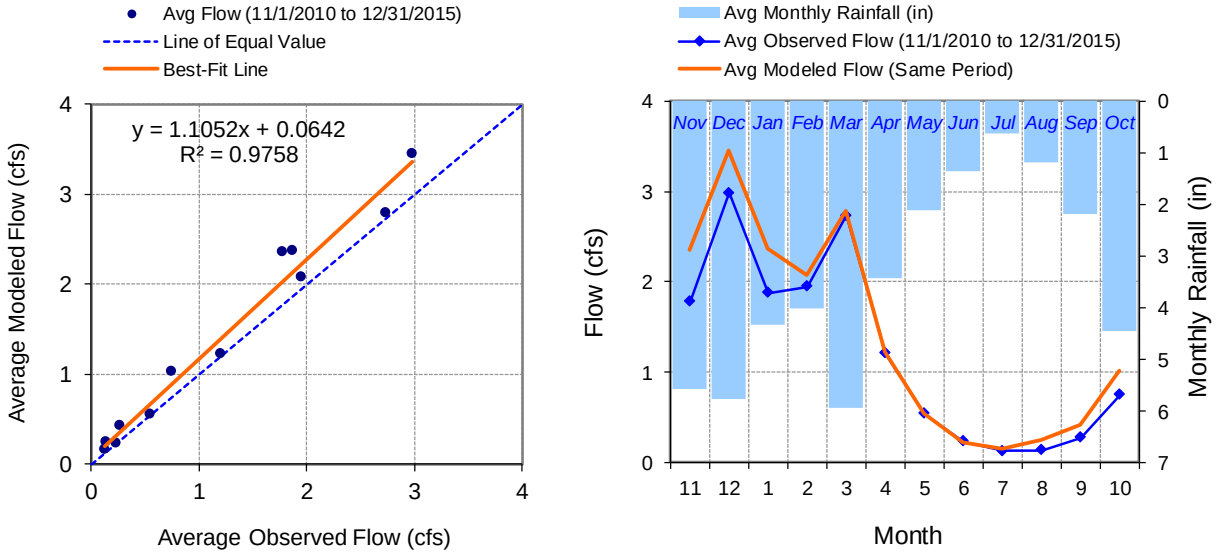

Figure B-11. Seasonal regression and temporal aggregate at Duwamish River Trib 0003 (King County 13a)

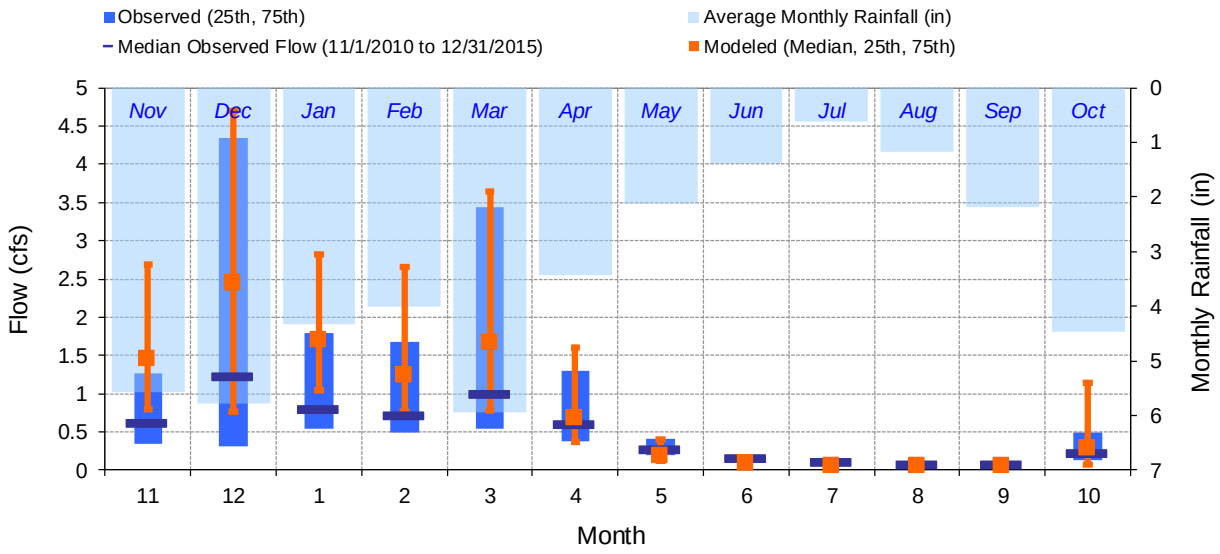

Figure B-12. Seasonal medians and ranges at Duwamish River Trib 0003 (King County 13a)

Table B-3. Seasonal summary at Duwamish River Trib 0003 (King County 13a)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Nov	1.78	0.61	0.35	1.27	2.35	1.46	0.79	2.69
Dec	2.98	1.23	0.31	4.35	3.45	2.45	0.77	4.70
Jan	1.87	0.80	0.54	1.80	2.37	1.70	1.04	2.83
Feb	1.95	0.71	0.50	1.68	2.08	1.24	0.76	2.65
Mar	2.73	1.00	0.54	3.45	2.78	1.67	0.79	3.65
Apr	1.21	0.61	0.38	1.31	1.22	0.69	0.37	1.60
May	0.54	0.27	0.20	0.41	0.55	0.19	0.13	0.40
Jun	0.23	0.15	0.12	0.19	0.23	0.09	0.07	0.13
Jul	0.12	0.10	0.08	0.11	0.15	0.06	0.05	0.09
Aug	0.13	0.08	0.06	0.09	0.24	0.05	0.05	0.06
Sep	0.27	0.08	0.06	0.12	0.42	0.05	0.05	0.07
Oct	0.75	0.22	0.13	0.49	1.02	0.29	0.07	1.14

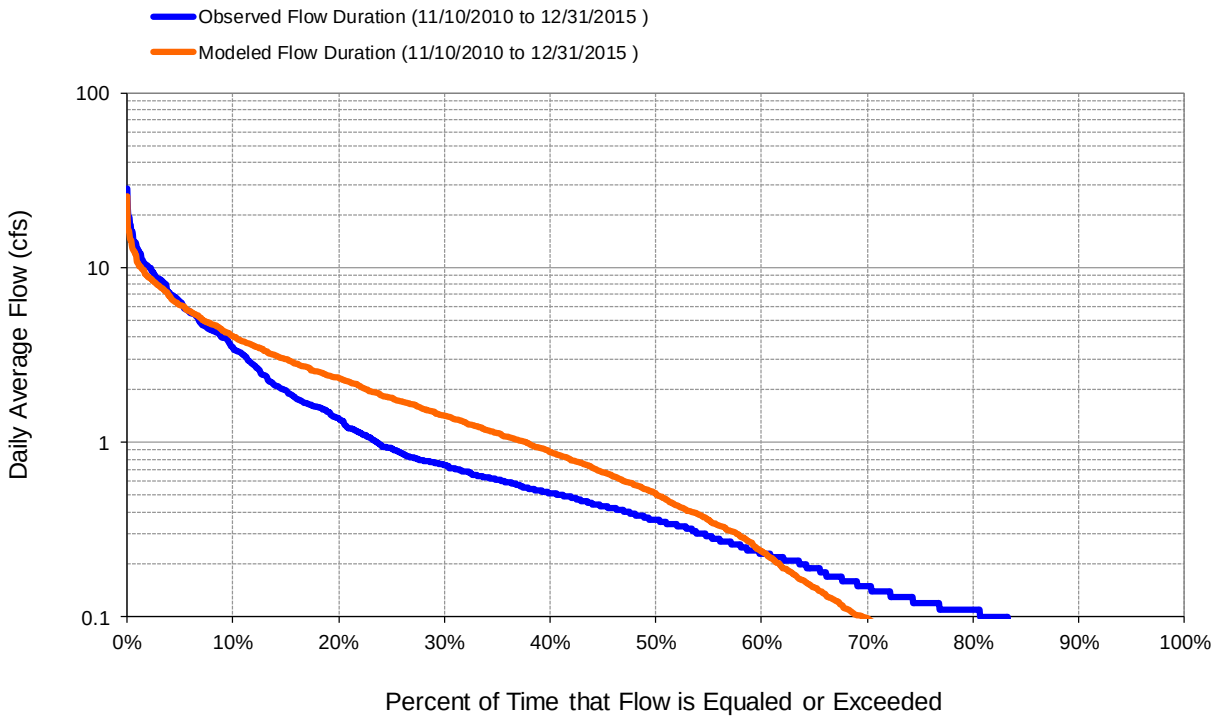

Figure B-13. Flow exceedance at Duwamish River Trib 0003 (King County 13a)

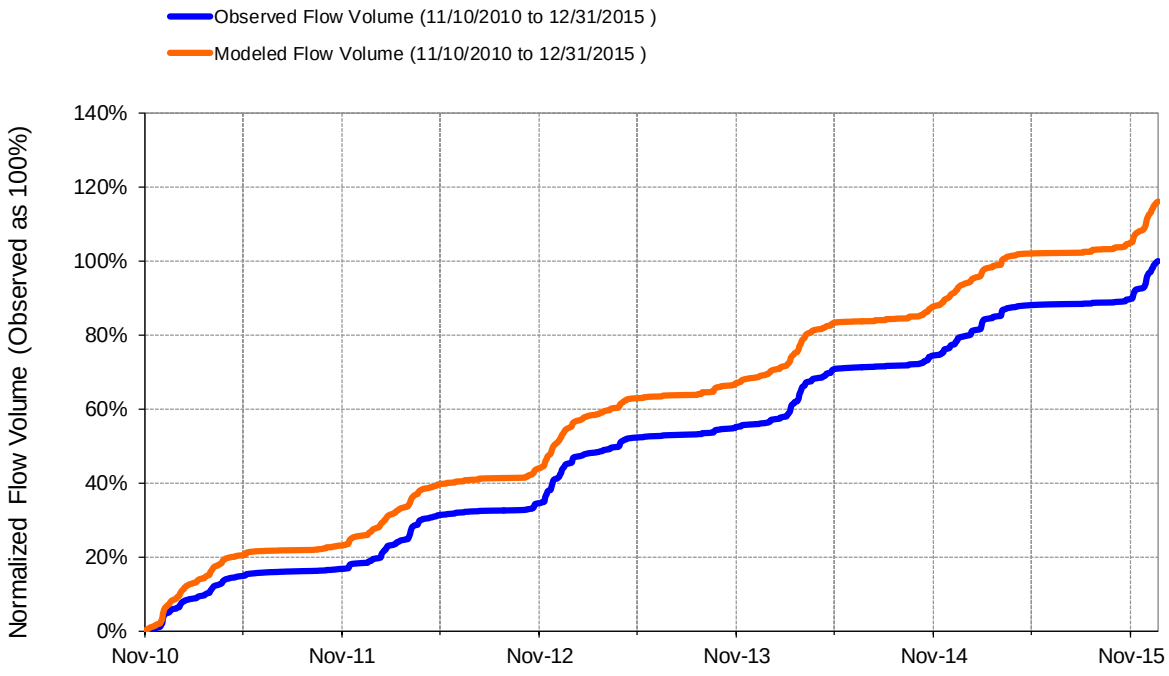

Figure B-14. Flow accumulation at Duwamish River Trib 0003 (King County 13a)

Table B-4. Summary statistics at Duwamish River Trib 0003 (King County 13a)

LSPC Simulated Flow		**Observed Flow Gage**	
REACH OUTFLOW FROM SWS 25626		Duwamish River Trib 0003 (King County 13a)	
5.14-Year Analysis Period: 11/1/2010 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 0.56	
Total Simulated In-stream Flow:	**35.13**	Total Observed In-stream Flow:	**30.25**
Total of simulated highest 10% flows:	**17.29**	Total of Observed highest 10% flows:	**18.45**
Total of Simulated lowest 50% flows:	**1.69**	Total of Observed Lowest 50% flows:	**1.82**
Simulated Summer Flow Volume (months 7-9):	**1.61**	Observed Summer Flow Volume (7-9):	**1.03**
Simulated Fall Flow Volume (months 10-12):	**15.52**	Observed Fall Flow Volume (10-12):	**12.59**
Simulated Winter Flow Volume (months 1-3):	**14.10**	Observed Winter Flow Volume (1-3):	**12.76**
Simulated Spring Flow Volume (months 4-6):	**3.91**	Observed Spring Flow Volume (4-6):	**3.86**
Total Simulated Storm Volume:	**13.91**	Total Observed Storm Volume:	**13.84**
Simulated Summer Storm Volume (7-9):	**1.13**	Observed Summer Storm Volume (7-9):	**0.52**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	16.13%		
Error in 50% lowest flows:	-7.08%		
Error in 10% highest flows:	-6.30%		
Seasonal volume error - Summer:	55.59%		
Seasonal volume error - Fall:	23.23%	>>	Clear
Seasonal volume error - Winter:	10.43%		
Seasonal volume error - Spring:	1.23%		
Error in storm volumes:	0.54%		
Error in summer storm volumes:	117.56%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.841	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.644	as E or E' approaches 1.0	
Monthly NSE	0.923		
Obs Baseflow	54.3%		
Sim Baseflow	60.4%		
Baseflow fraction error	6.1%		
Coefficient of determination, r^2	0.85		
Weighted r^2	0.71		

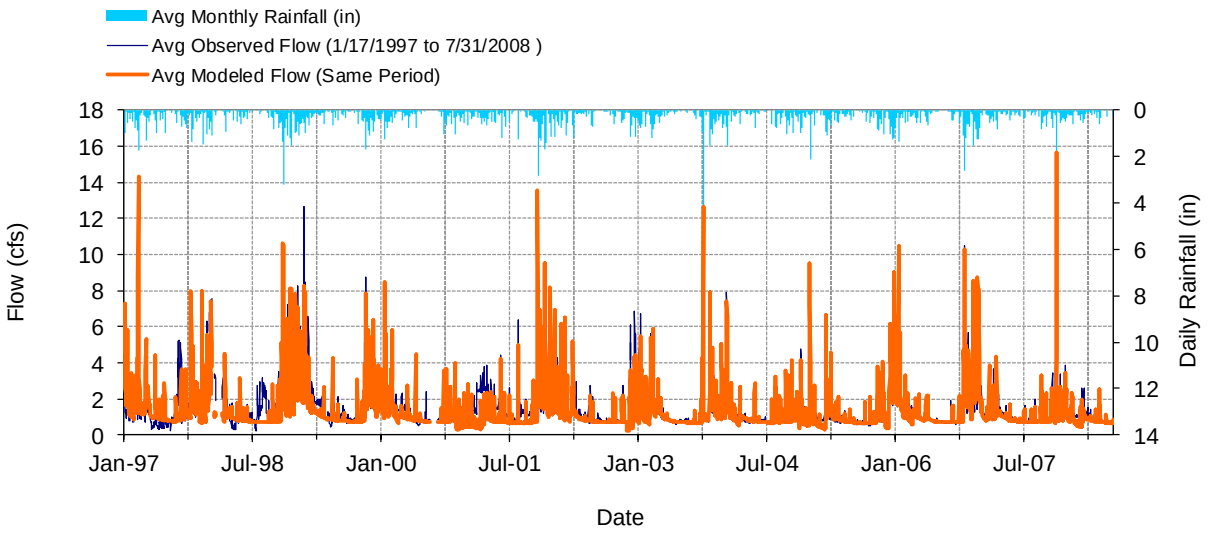

Figure B-15. Mean daily flow at Hamm Creek South Fork (King County ha5)

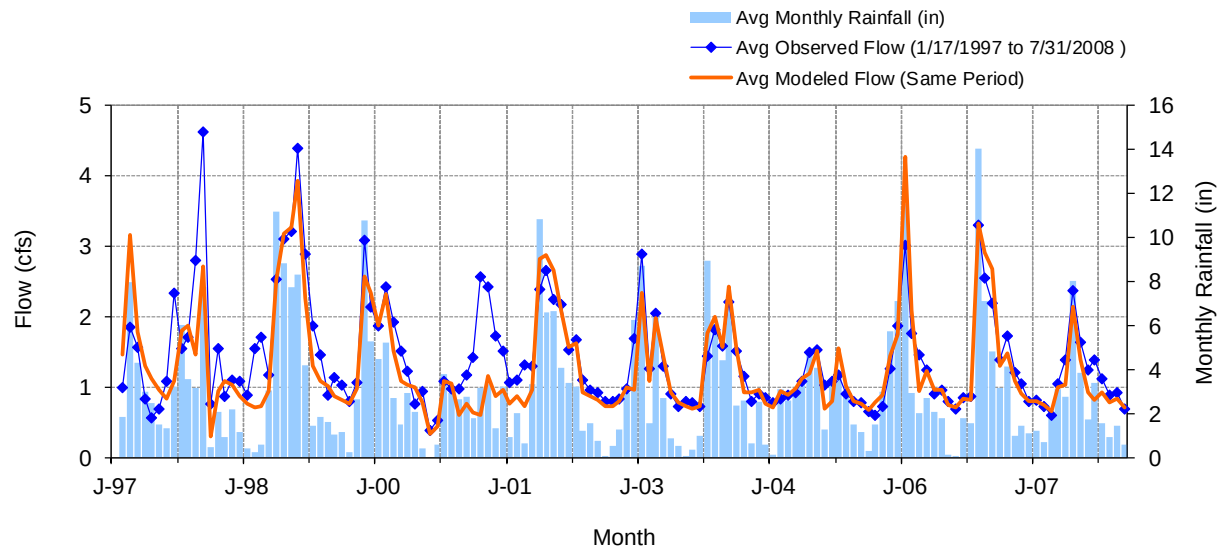

Figure B-16. Mean monthly flow at Hamm Creek South Fork (King County ha5)

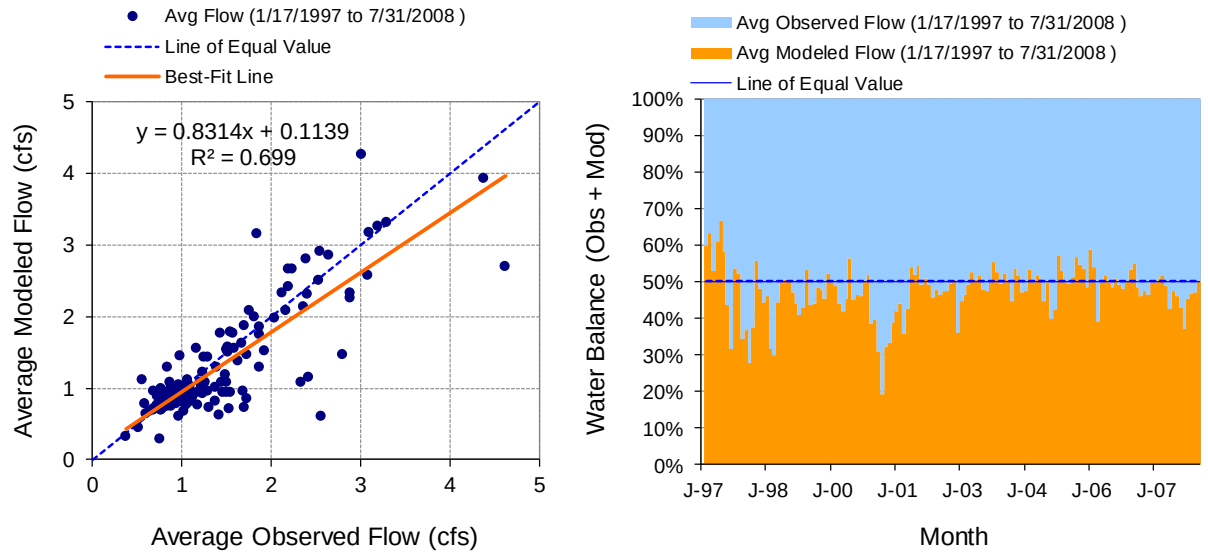

Figure B-17. Monthly flow regression and temporal variation at Hamm Creek South Fork (King County ha5)

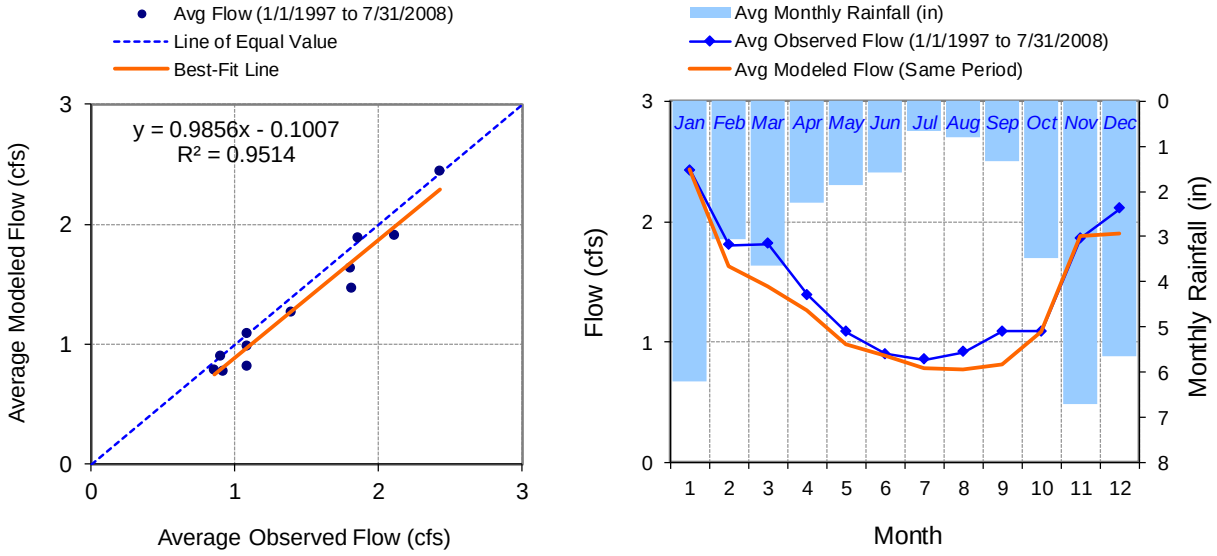

Figure B-18. Seasonal regression and temporal aggregate at Hamm Creek South Fork (King County ha5)

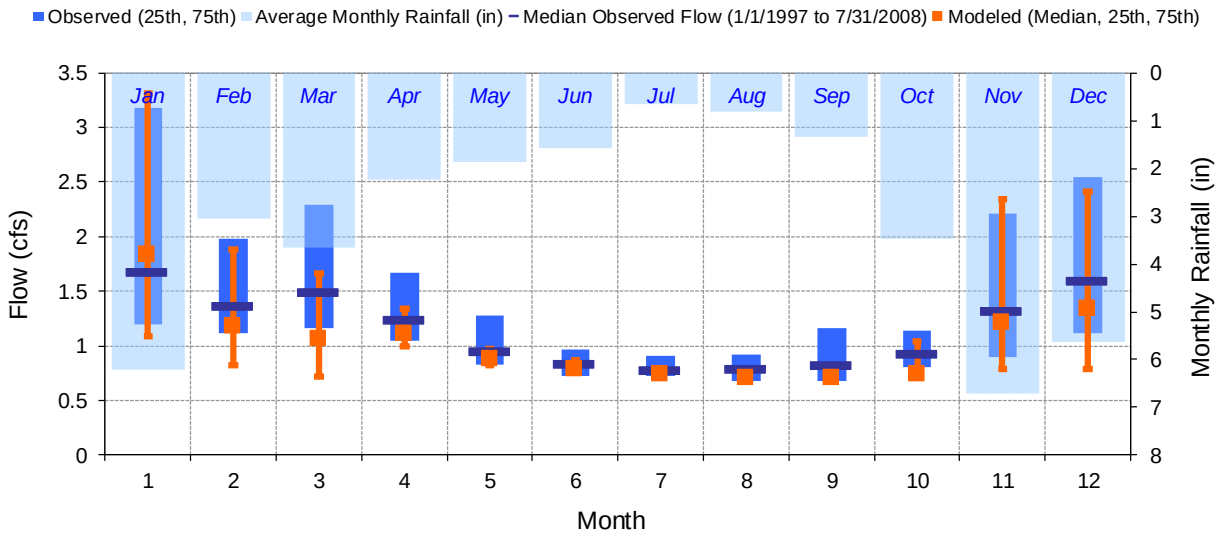

Figure B-19. Seasonal medians and ranges at Hamm Creek South Fork (King County ha5)

Table B-5. Seasonal summary at Hamm Creek South Fork (King County ha5)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	2.43	1.68	1.20	3.18	2.44	1.84	1.09	3.31
Feb	1.80	1.37	1.12	1.98	1.63	1.18	0.83	1.88
Mar	1.82	1.49	1.16	2.29	1.46	1.06	0.72	1.67
Apr	1.39	1.24	1.05	1.67	1.26	1.11	0.99	1.34
May	1.08	0.96	0.83	1.28	0.98	0.88	0.82	0.97
Jun	0.90	0.83	0.73	0.97	0.89	0.79	0.76	0.87
Jul	0.86	0.78	0.72	0.91	0.78	0.74	0.71	0.78
Aug	0.92	0.79	0.68	0.92	0.77	0.71	0.69	0.74
Sep	1.09	0.83	0.68	1.16	0.81	0.71	0.69	0.75
Oct	1.09	0.93	0.81	1.14	1.09	0.75	0.70	1.04
Nov	1.86	1.32	0.90	2.21	1.88	1.22	0.79	2.34
Dec	2.11	1.59	1.12	2.55	1.90	1.35	0.79	2.42

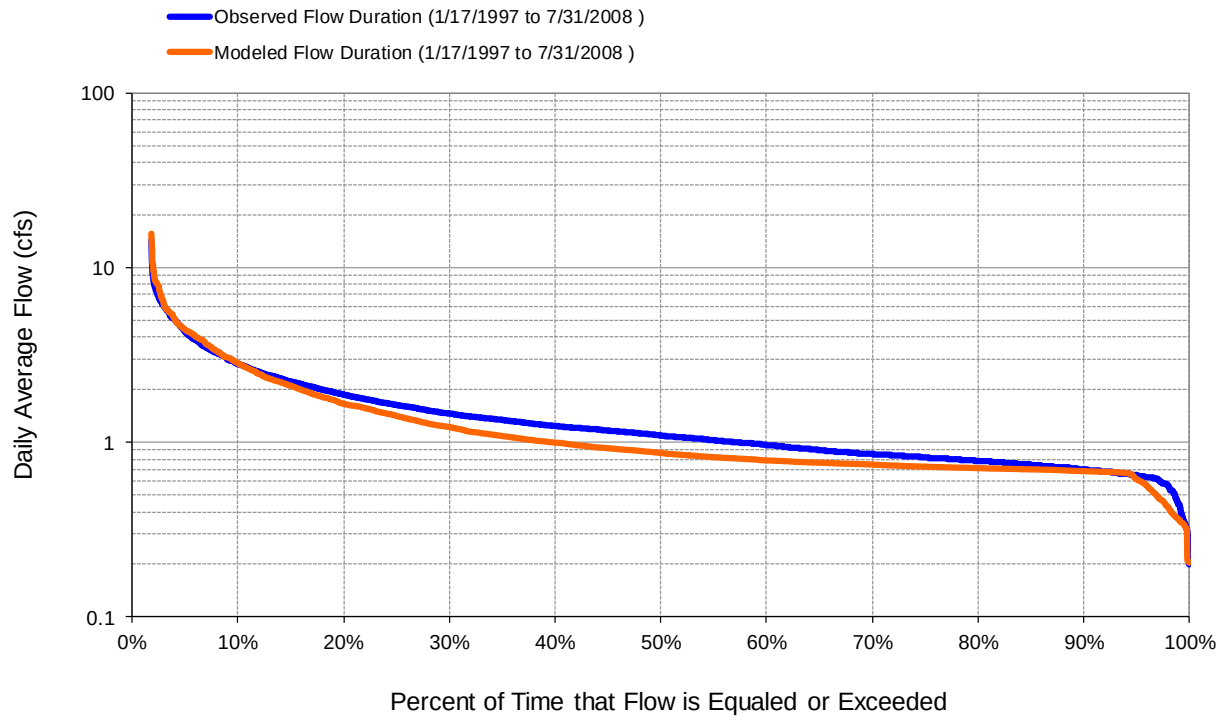

Figure B-20. Flow exceedance at Hamm Creek South Fork (King County ha5)

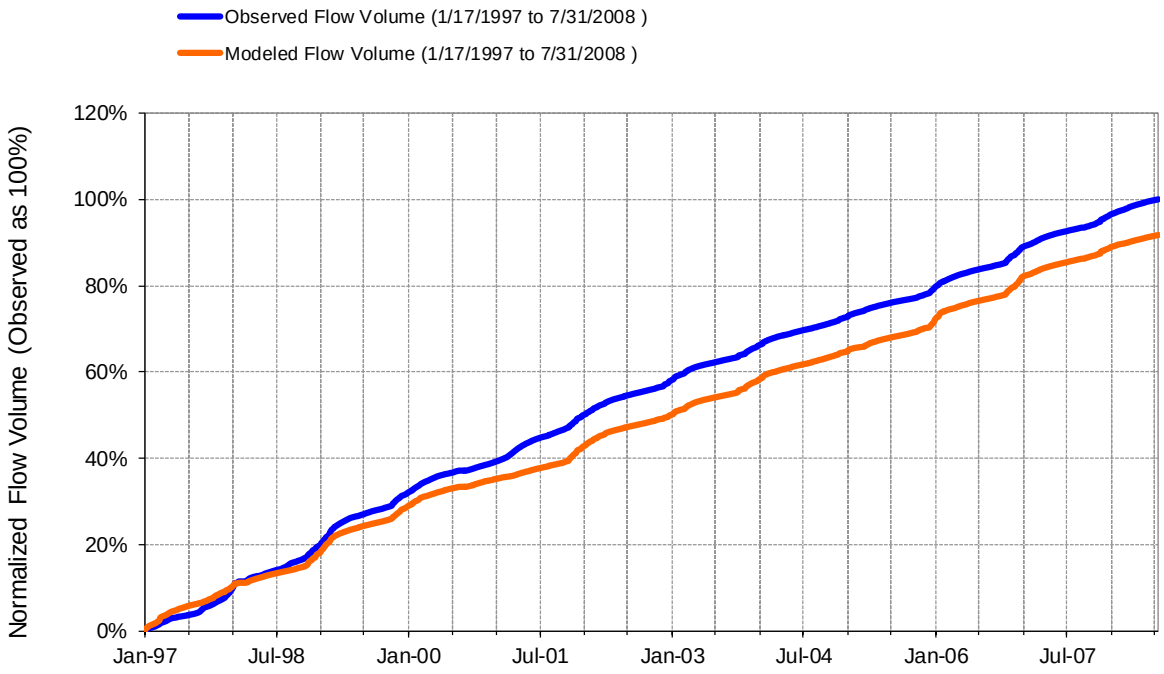

Figure B-21. Flow accumulation at Hamm Creek South Fork (King County ha5)

Table B-6. Summary statistics at Hamm Creek South Fork (King County ha5)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 24010		Hamm Creek South Fork (King County ha5)	
11.54-Year Analysis Period: 1/1/1997 - 7/31/2008 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 0.74	
Total Simulated In-stream Flow:	**23.81**	Total Observed In-stream Flow:	**25.98**
Total of simulated highest 10% flows:	**7.80**	Total of Observed highest 10% flows:	**7.47**
Total of Simulated lowest 50% flows:	**6.43**	Total of Observed Lowest 50% flows:	**7.36**
Simulated Summer Flow Volume (months 7-9):	**3.44**	Observed Summer Flow Volume (7-9):	**4.14**
Simulated Fall Flow Volume (months 10-12):	**7.14**	Observed Fall Flow Volume (10-12):	**7.42**
Simulated Winter Flow Volume (months 1-3):	**8.27**	Observed Winter Flow Volume (1-3):	**9.07**
Simulated Spring Flow Volume (months 4-6):	**4.96**	Observed Spring Flow Volume (4-6):	**5.35**
Total Simulated Storm Volume:	**4.94**	Total Observed Storm Volume:	**4.47**
Simulated Summer Storm Volume (7-9):	**0.25**	Observed Summer Storm Volume (7-9):	**0.47**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-8.33%		
Error in 50% lowest flows:	-12.69%		
Error in 10% highest flows:	4.50%		
Seasonal volume error - Summer:	-16.94%		
Seasonal volume error - Fall:	-3.78%	>>	Clear
Seasonal volume error - Winter:	-8.78%		
Seasonal volume error - Spring:	-7.21%		
Error in storm volumes:	10.50%		
Error in summer storm volumes:	-45.56%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.627	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garrick), E':	0.433		
Monthly NSE	0.639		
Obs Baseflow	82.8%		
Sim Baseflow	79.3%		
Baseflow fraction error	-3.5%		
Coefficient of determination, r^2	0.71		
Weighted r^2	0.65		

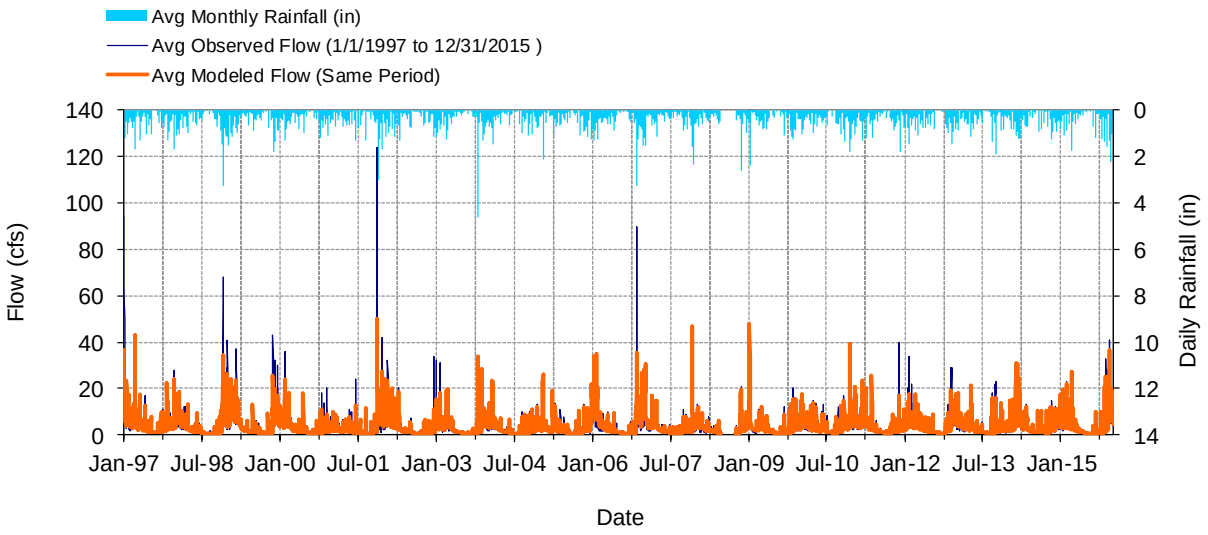

Figure B-22. Mean daily flow at Mill Creek at Earthworks Park (USGS 12113347)

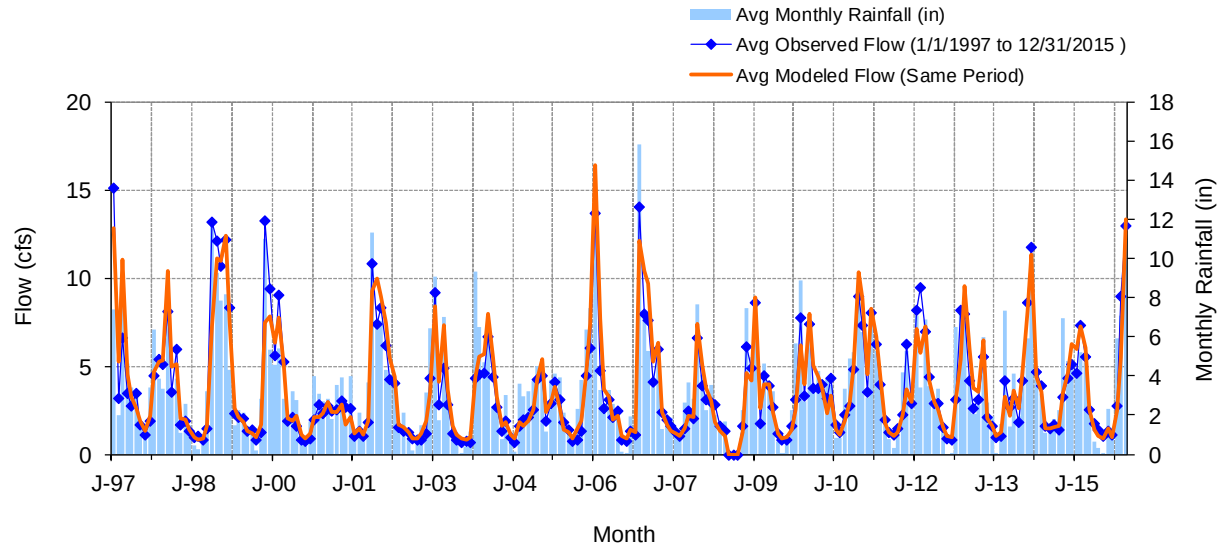

Figure B-23. Mean monthly flow at Mill Creek at Earthworks Park (USGS 12113347)

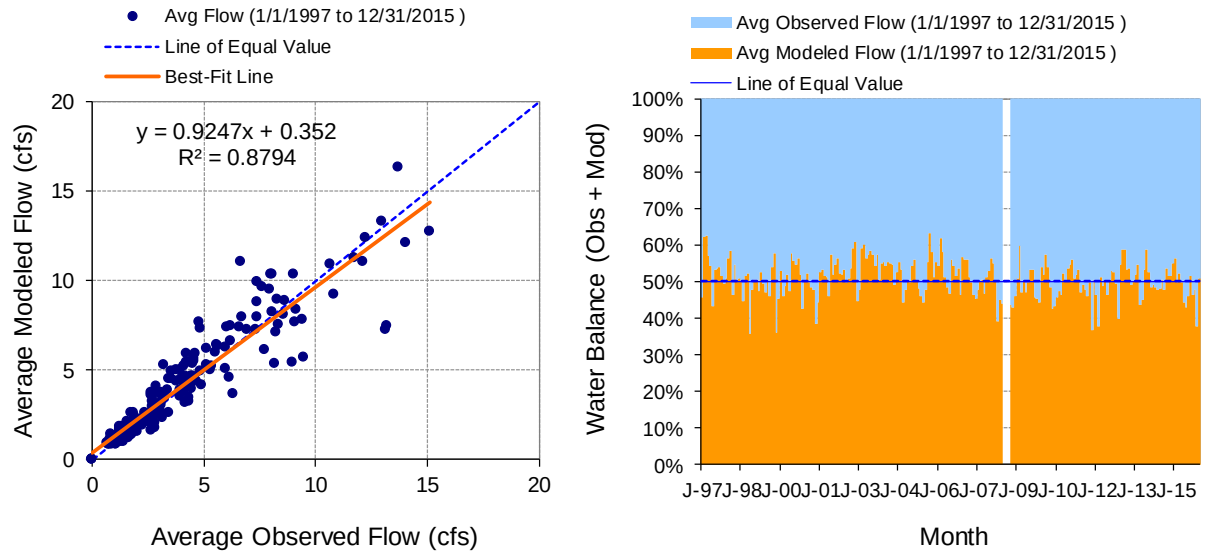

Figure B-24. Monthly flow regression and temporal variation at Mill Creek at Earthworks Park (USGS 12113347)

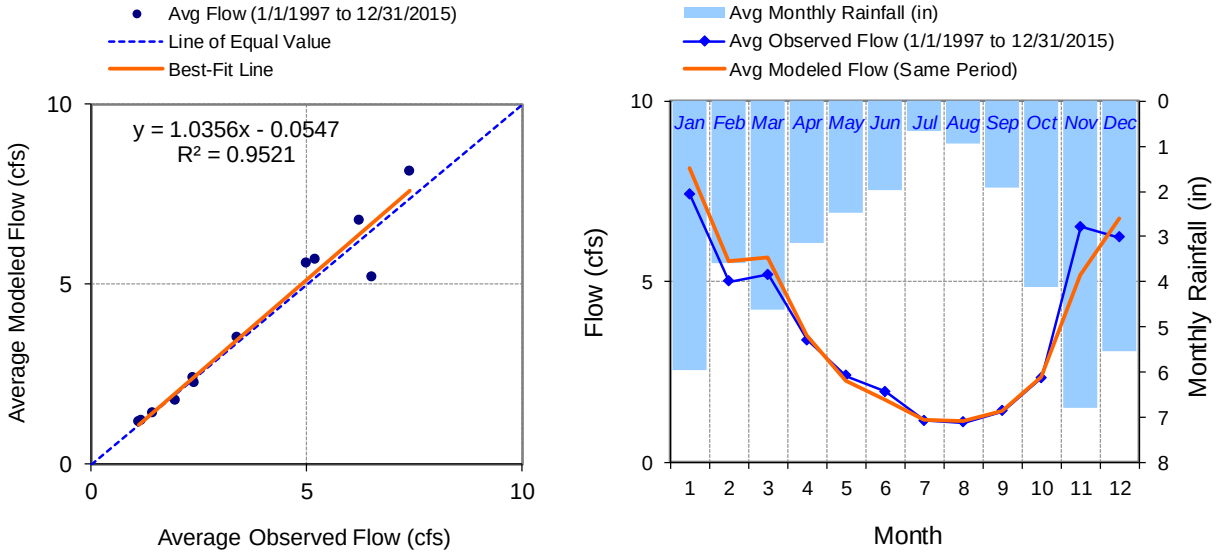

Figure B-25. Seasonal regression and temporal aggregate at Mill Creek at Earthworks Park (USGS 12113347)

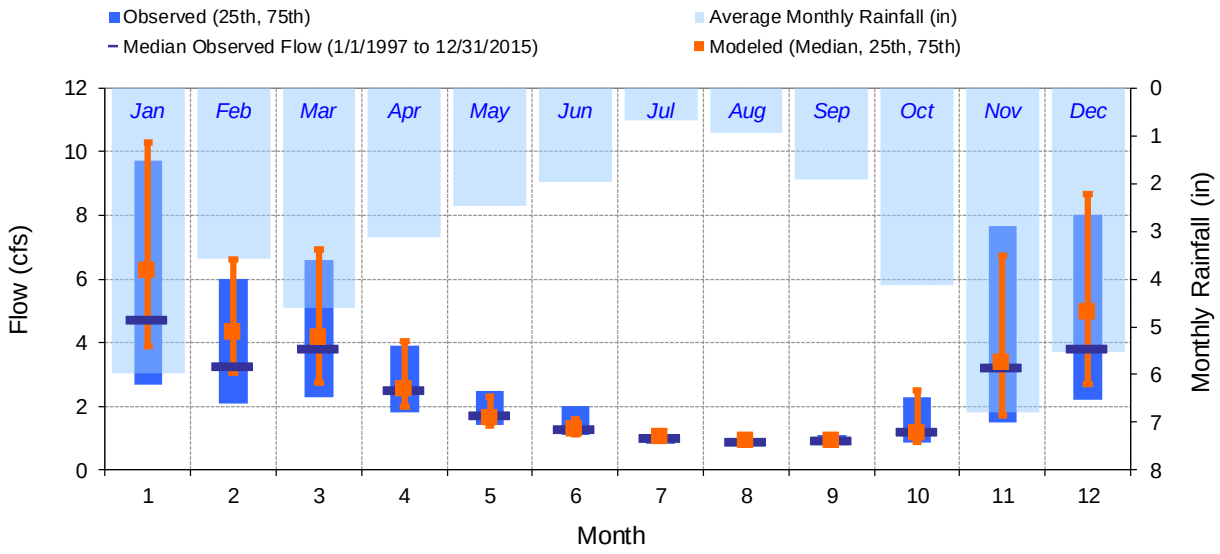

Figure B-26. Seasonal medians and ranges at Mill Creek at Earthworks Park (USGS 12113347)

Table B-7. Seasonal summary at Mill Creek at Earthworks Park (USGS 12113347)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	7.41	4.70	2.70	9.70	8.14	6.26	3.89	10.30
Feb	5.00	3.25	2.10	6.00	5.58	4.33	3.05	6.61
Mar	5.19	3.80	2.30	6.60	5.68	4.15	2.75	6.91
Apr	3.39	2.50	1.80	3.90	3.52	2.54	1.99	4.04
May	2.39	1.70	1.40	2.50	2.25	1.63	1.38	2.32
Jun	1.95	1.30	1.10	2.00	1.75	1.27	1.11	1.59
Jul	1.15	0.99	0.82	1.10	1.19	1.03	0.94	1.14
Aug	1.09	0.89	0.77	1.00	1.15	0.92	0.86	1.02
Sep	1.42	0.91	0.78	1.10	1.41	0.92	0.85	1.02
Oct	2.35	1.20	0.86	2.30	2.37	1.18	0.89	2.52
Nov	6.52	3.20	1.50	7.68	5.19	3.38	1.73	6.74
Dec	6.22	3.80	2.20	8.00	6.75	4.94	2.71	8.68

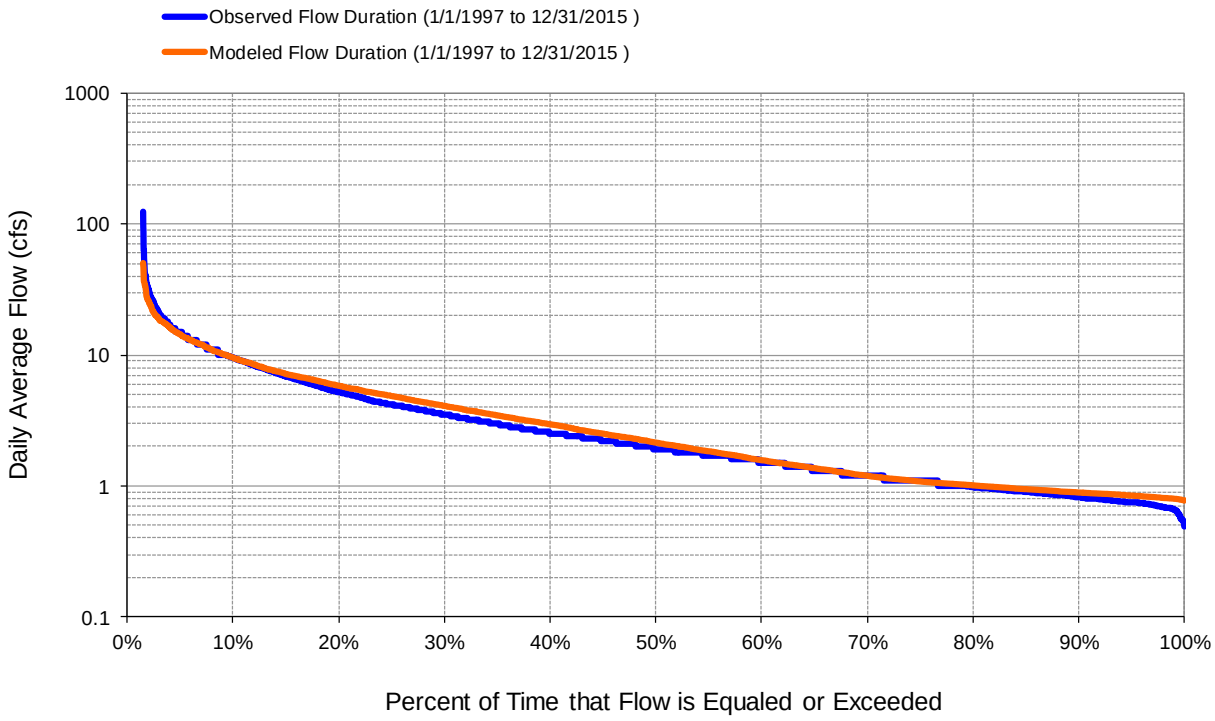

Figure B-27. Flow exceedance at Mill Creek at Earthworks Park (USGS 12113347)

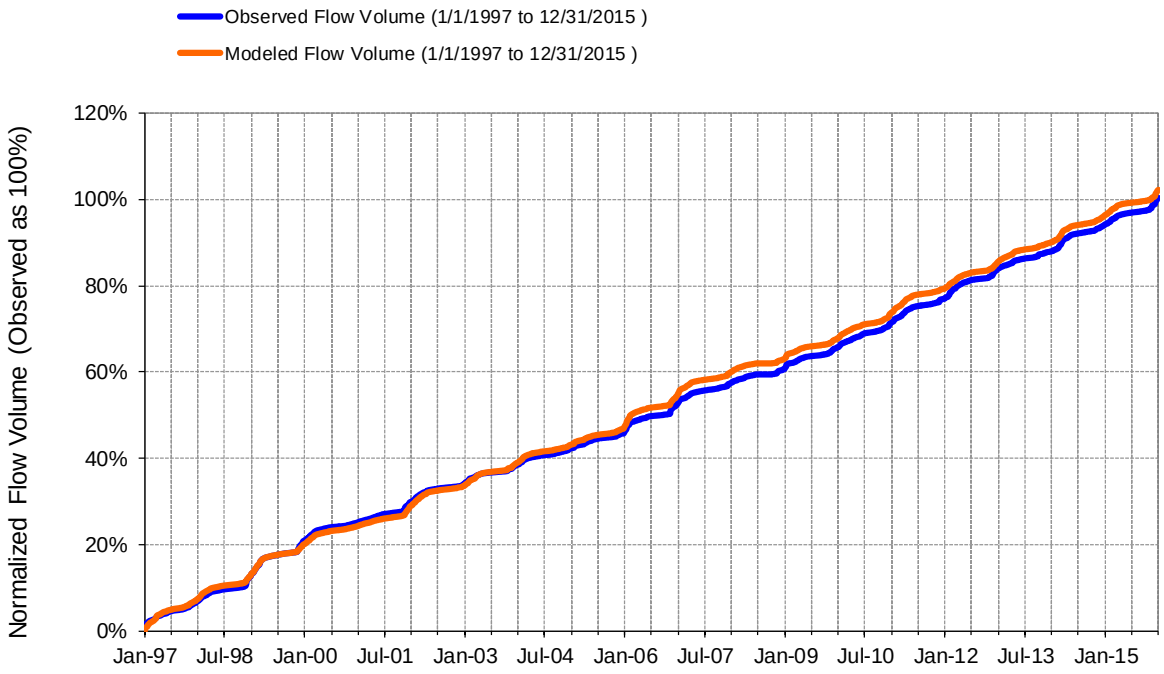

Figure B-28. Flow accumulation at Mill Creek at Earthworks Park (USGS 12113347)

Table B-8. Summary statistics at Mill Creek at Earthworks Park (USGS 12113347)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 23060		Mill Creek at Earthworks Park (USGS 12113347)	
19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 2.49	
Total Simulated In-stream Flow:	**20.31**	Total Observed In-stream Flow:	**19.89**
Total of simulated highest 10% flows:	**7.72**	Total of Observed highest 10% flows:	**8.40**
Total of Simulated lowest 50% flows:	**3.24**	Total of Observed Lowest 50% flows:	**3.09**
Simulated Summer Flow Volume (months 7-9):	**1.63**	Observed Summer Flow Volume (7-9):	**1.58**
Simulated Fall Flow Volume (months 10-12):	**6.55**	Observed Fall Flow Volume (10-12):	**6.89**
Simulated Winter Flow Volume (months 1-3):	**8.75**	Observed Winter Flow Volume (1-3):	**7.94**
Simulated Spring Flow Volume (months 4-6):	**3.39**	Observed Spring Flow Volume (4-6):	**3.48**
Total Simulated Storm Volume:	**5.01**	Total Observed Storm Volume:	**5.68**
Simulated Summer Storm Volume (7-9):	**0.33**	Observed Summer Storm Volume (7-9):	**0.33**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	2.10%		
Error in 50% lowest flows:	5.06%		
Error in 10% highest flows:	-8.11%		
Seasonal volume error - Summer:	2.62%		
Seasonal volume error - Fall:	-4.87%	>>	Clear
Seasonal volume error - Winter:	10.18%		
Seasonal volume error - Spring:	-2.75%		
Error in storm volumes:	-11.91%		
Error in summer storm volumes:	0.49%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.766	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.672	as E or E' approaches 1.0	
Monthly NSE	0.874		
Obs Baseflow	71.4%		
Sim Baseflow	75.4%		
Baseflow fraction error	3.9%		
Coefficient of determination, r^2	0.77		
Weighted r^2	0.56		

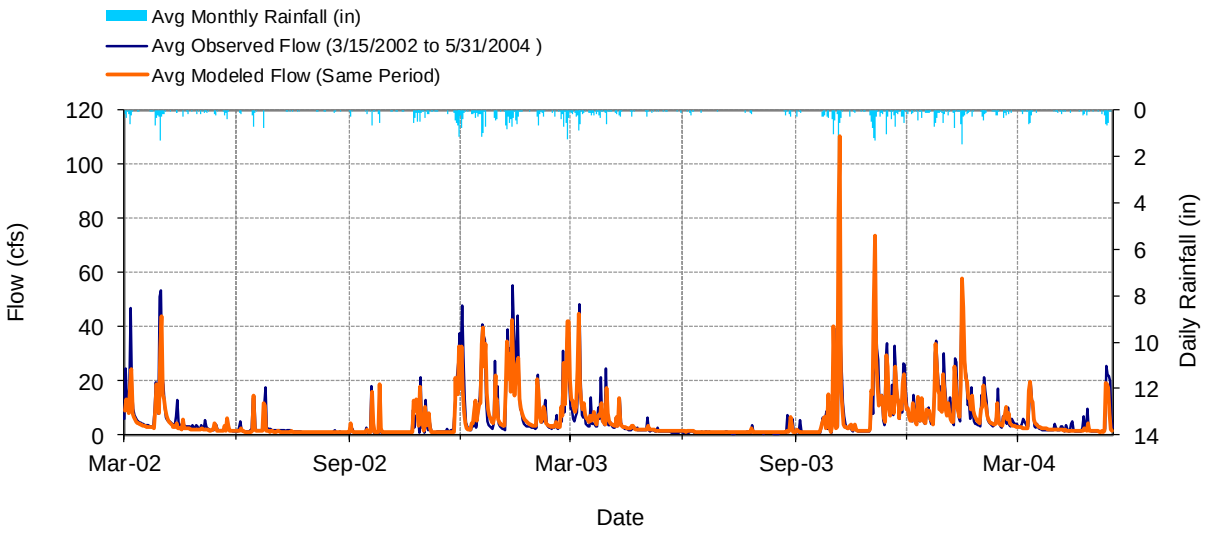

Figure B-29. Mean daily flow at Mill Creek (Kent) above Diversion (King County 03F)

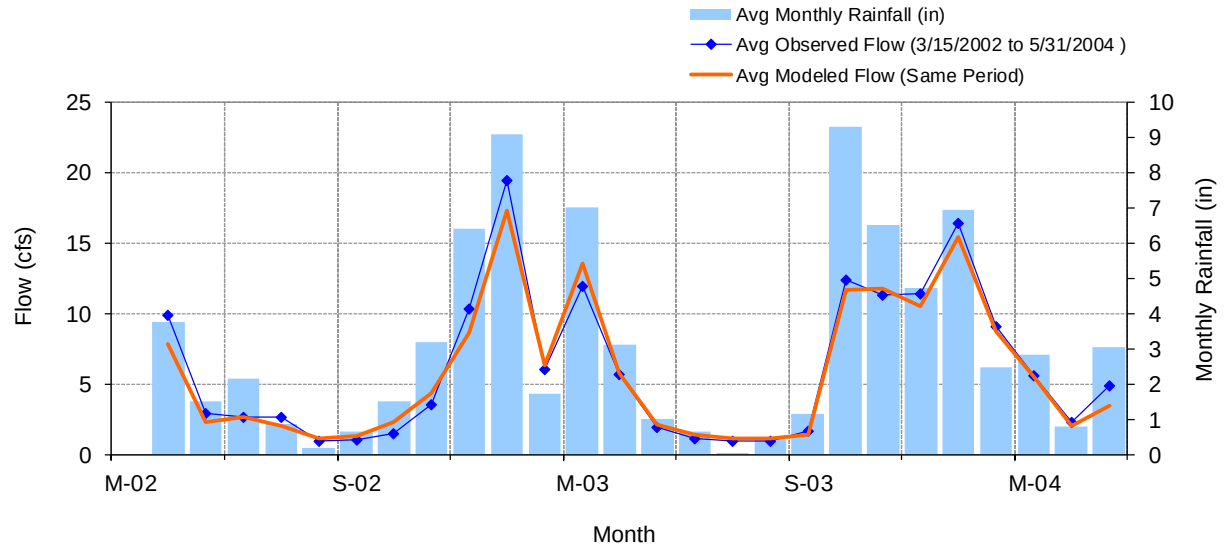

Figure B-30. Mean monthly flow at Mill Creek (Kent) above Diversion (King County 03F)

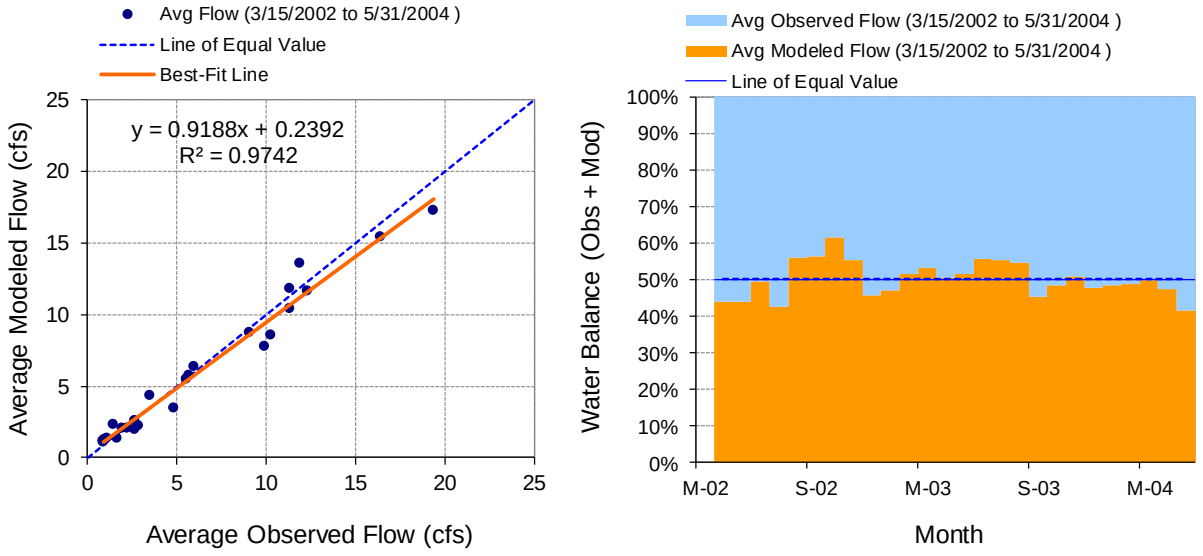

Figure B-31. Monthly flow regression and temporal variation at Mill Creek (Kent) above Diversion (King County 03F)

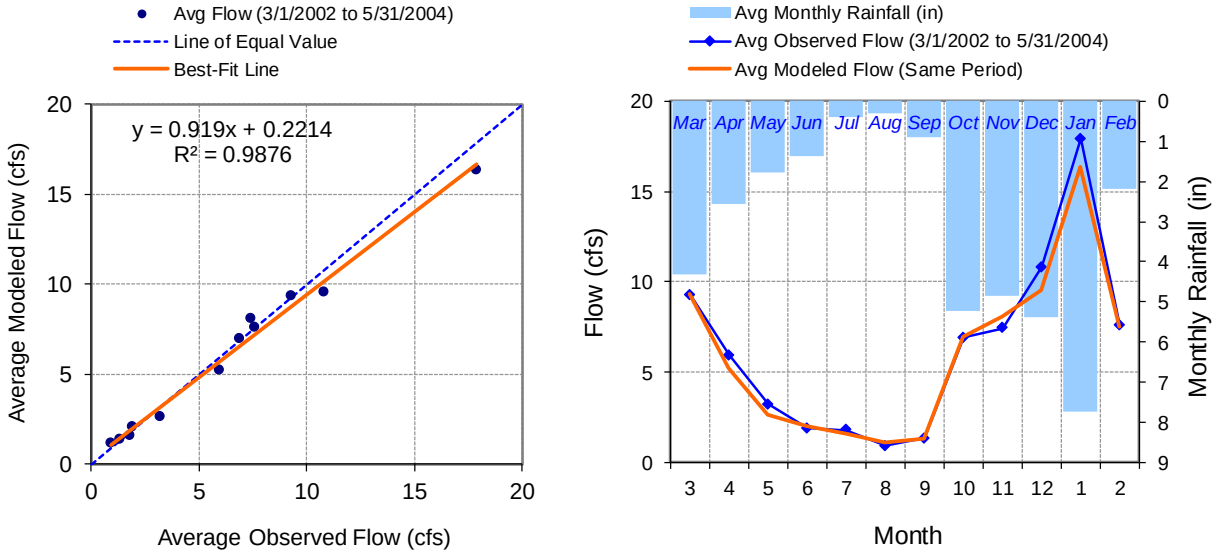

Figure B-32. Seasonal regression and temporal aggregate at Mill Creek (Kent) above Diversion (King County 03F)

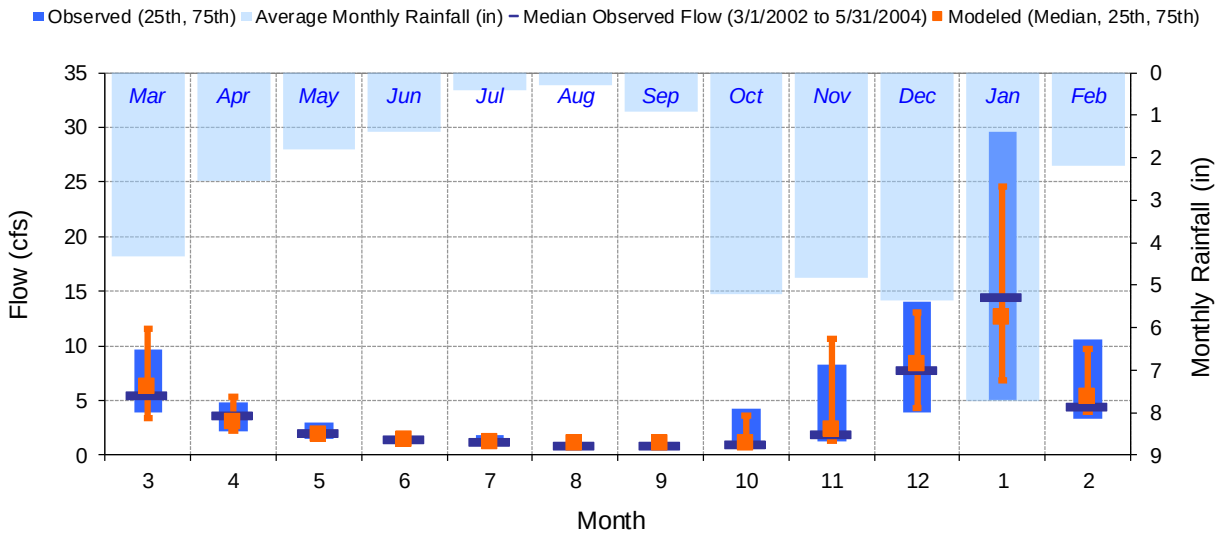

Figure B-33. Seasonal medians and ranges at Mill Creek (Kent) above Diversion (King County 03F)

Table B-9. Seasonal summary at Mill Creek (Kent) above Diversion (King County 03F)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Mar	9.29	5.51	3.88	9.71	9.31	6.24	3.44	11.55
Apr	5.95	3.61	2.22	4.88	5.20	3.09	2.22	5.40
May	3.22	1.99	1.52	2.95	2.60	1.90	1.63	2.23
Jun	1.89	1.49	1.05	1.64	2.01	1.42	1.33	1.54
Jul	1.79	1.17	0.97	1.88	1.57	1.24	1.14	1.32
Aug	0.91	0.83	0.73	0.92	1.13	1.12	1.04	1.15
Sep	1.34	0.85	0.77	1.14	1.34	1.10	1.03	1.15
Oct	6.89	0.94	0.78	4.22	6.96	1.12	1.08	3.68
Nov	7.43	1.88	1.30	8.24	8.07	2.39	1.35	10.65
Dec	10.82	7.74	3.92	14.02	9.52	8.36	4.28	13.12
Jan	17.91	14.50	5.11	29.58	16.34	12.61	6.84	24.54
Feb	7.57	4.41	3.38	10.54	7.55	5.31	3.97	9.72

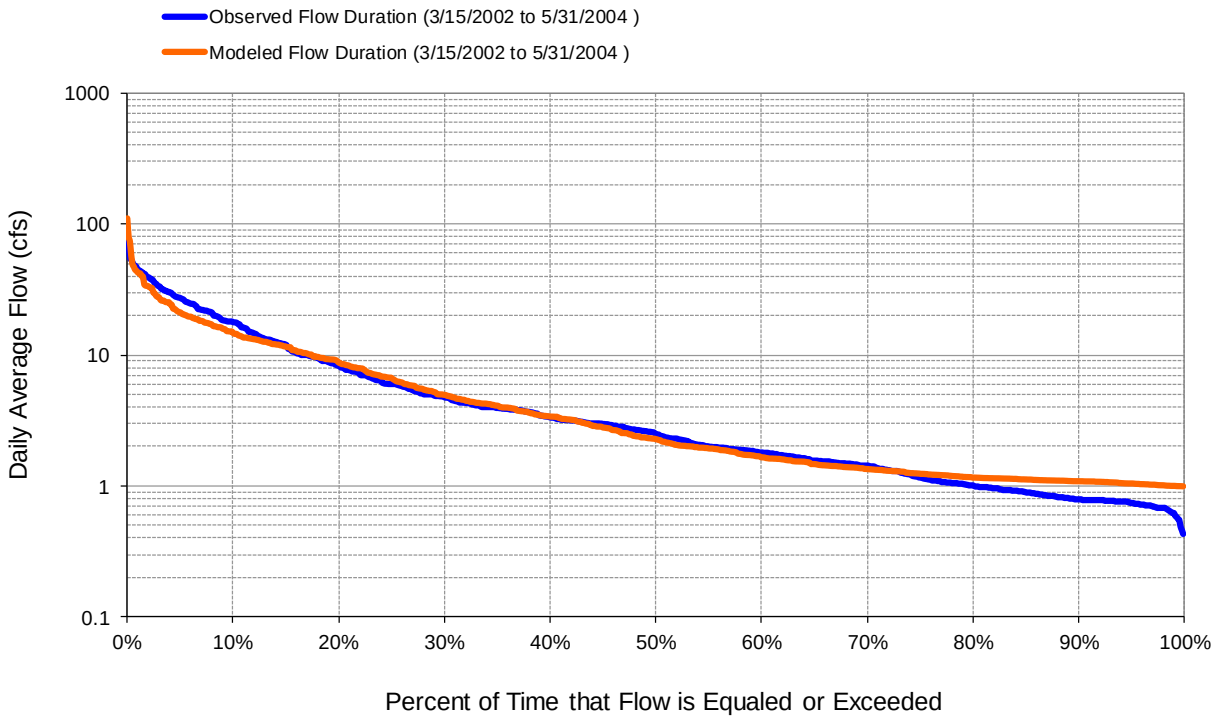

Figure B-34. Flow exceedance at Mill Creek (Kent) above Diversion (King County 03F)

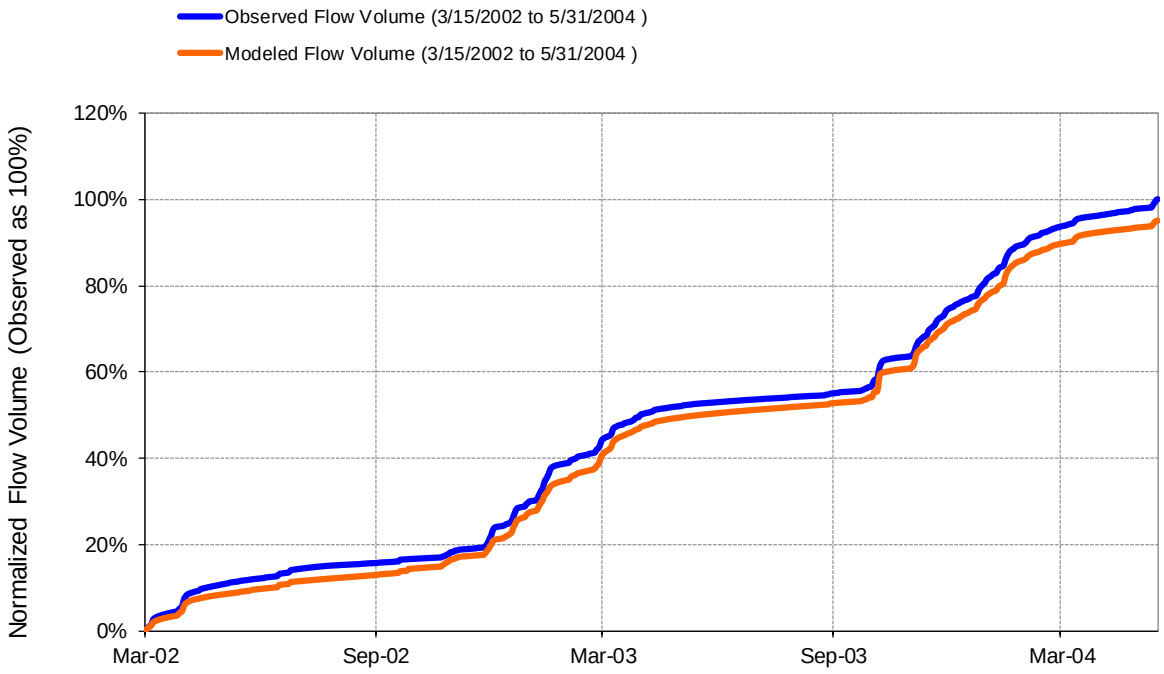

Figure B-35. Flow accumulation at Mill Creek (Kent) above Diversion (King County 03F)

Table B-10. Summary statistics at Mill Creek (Kent) above Diversion (King County 03F)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 23080		Mill Creek (Kent) above Diversion (King County 03F)	
2.21-Year Analysis Period: 3/1/2002 - 5/31/2004 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi):	
Total Simulated In-stream Flow:	**16.63**	Total Observed In-stream Flow:	**17.51**
Total of simulated highest 10% flows:	**7.67**	Total of Observed highest 10% flows:	**8.65**
Total of Simulated lowest 50% flows:	**1.93**	Total of Observed Lowest 50% flows:	**1.83**
Simulated Summer Flow Volume (months 7-9):	**0.86**	Observed Summer Flow Volume (7-9):	**0.87**
Simulated Fall Flow Volume (months 10-12):	**5.26**	Observed Fall Flow Volume (10-12):	**5.39**
Simulated Winter Flow Volume (months 1-3):	**7.61**	Observed Winter Flow Volume (1-3):	**7.94**
Simulated Spring Flow Volume (months 4-6):	**2.90**	Observed Spring Flow Volume (4-6):	**3.31**
Total Simulated Storm Volume:	**6.11**	Total Observed Storm Volume:	**6.90**
Simulated Summer Storm Volume (7-9):	**0.14**	Observed Summer Storm Volume (7-9):	**0.23**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-5.05%		
Error in 50% lowest flows:	5.75%		
Error in 10% highest flows:	-11.33%		
Seasonal volume error - Summer:	-0.29%		
Seasonal volume error - Fall:	-2.44%	>>	Clear
Seasonal volume error - Winter:	-4.25%		
Seasonal volume error - Spring:	-12.46%		
Error in storm volumes:	-11.49%		
Error in summer storm volumes:	-41.04%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.860	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garrick), E':	0.728		
Monthly NSE	0.965		
Obs Baseflow	60.6%		
Sim Baseflow	63.3%		
Baseflow fraction error	2.7%		
Coefficient of determination, r^2	0.86		
Weighted r^2	0.77		

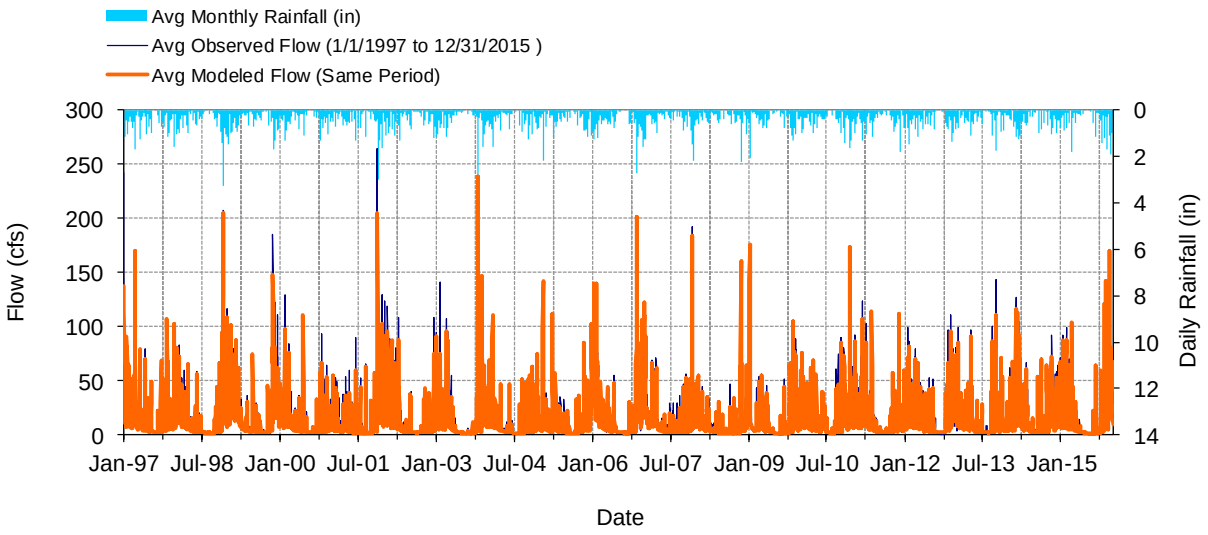

Figure B-36. Mean daily flow at Mill Creek near Orillia (USGS 12113349)

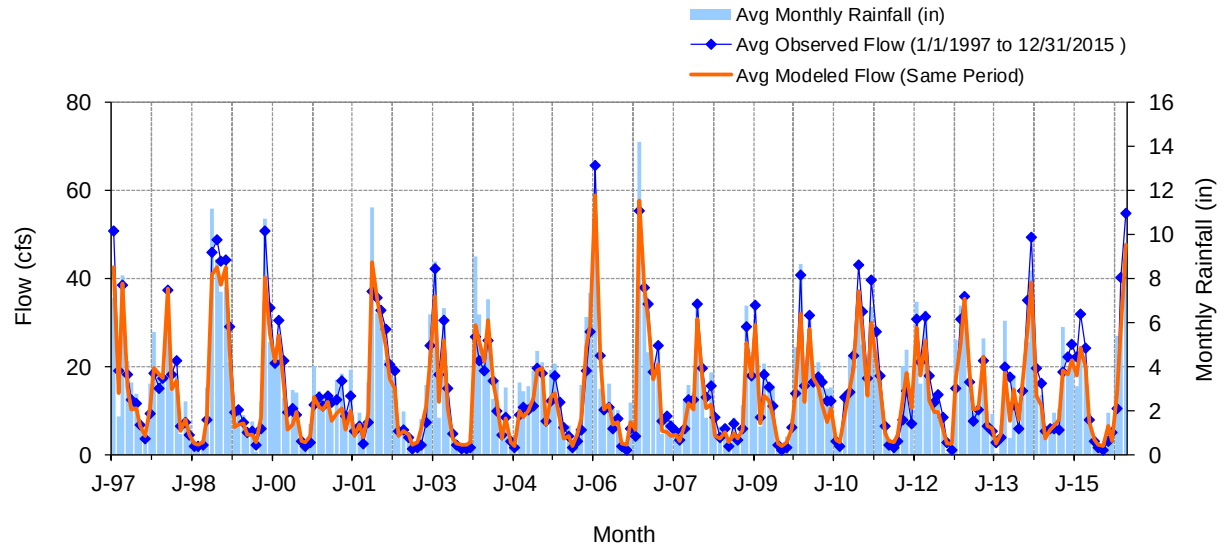

Figure B-37. Mean monthly flow at Mill Creek near Orillia (USGS 12113349)

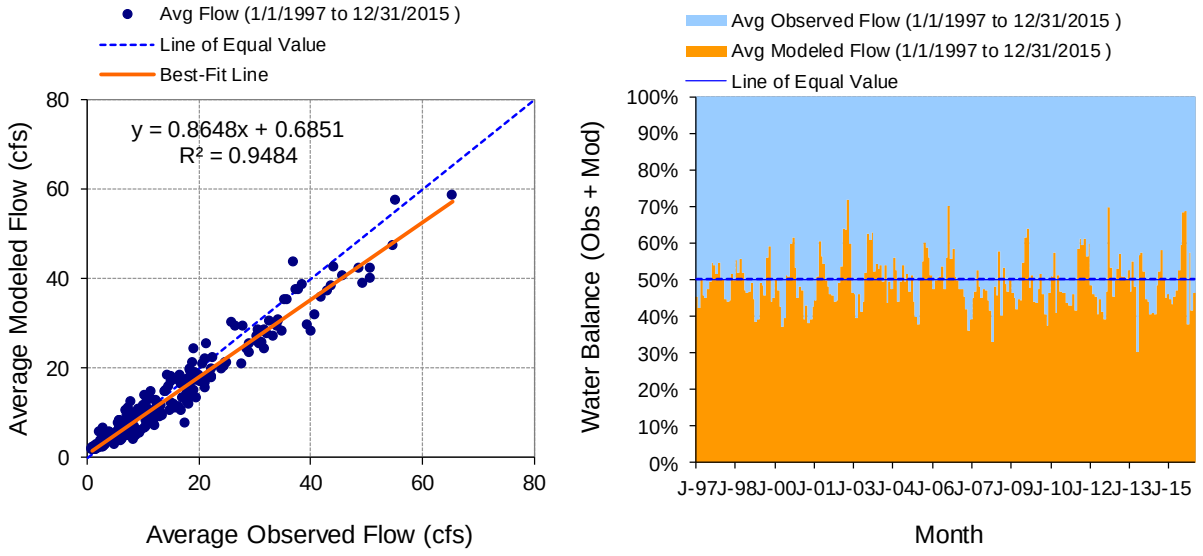

Figure B-38. Monthly flow regression and temporal variation at Mill Creek near Orillia (USGS 12113349)

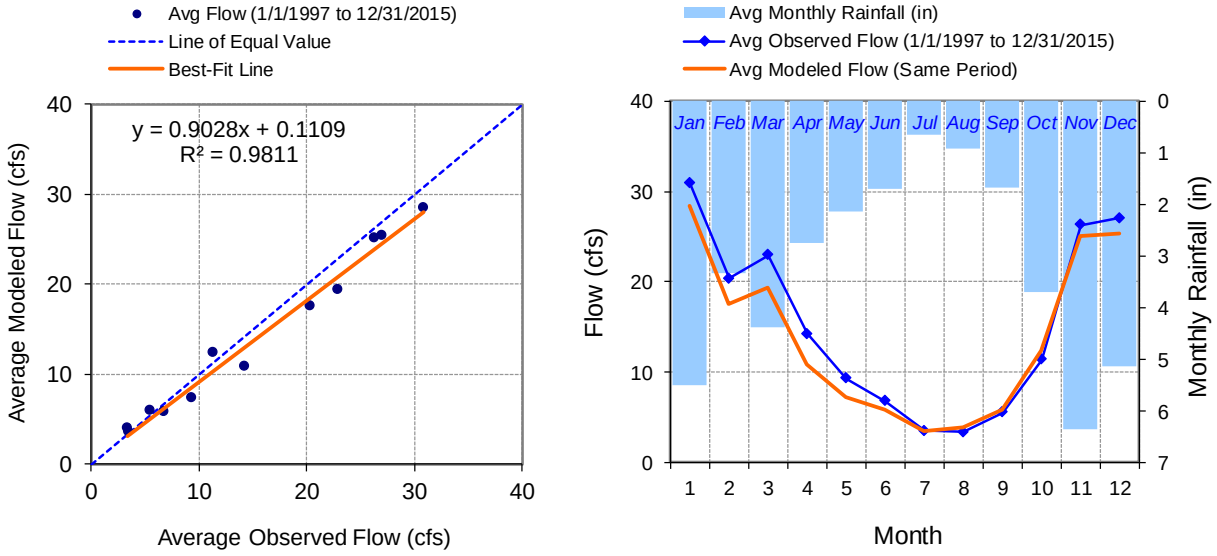

Figure B-39. Seasonal regression and temporal aggregate at Mill Creek near Orillia (USGS 12113349)

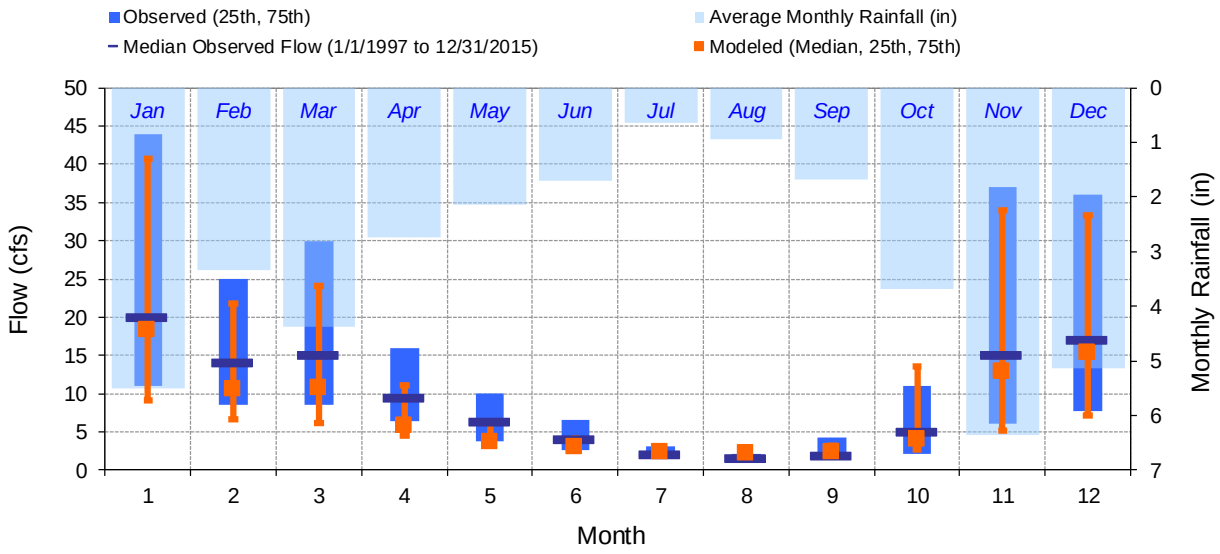

Figure B-40. Seasonal medians and ranges at Mill Creek near Orillia (USGS 12113349)

Table B-11. Seasonal summary at Mill Creek near Orillia (USGS 12113349)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Jan	30.86	20.00	11.00	44.00	28.46	18.34	9.09	40.67
Feb	20.35	14.00	8.50	25.00	17.53	10.59	6.62	21.79
Mar	22.95	15.00	8.60	30.00	19.29	10.75	6.21	24.07
Apr	14.21	9.45	6.43	16.00	10.82	5.78	4.43	11.12
May	9.27	6.30	3.80	10.00	7.25	3.77	3.13	6.31
Jun	6.79	4.10	2.70	6.60	5.82	3.08	2.54	4.21
Jul	3.48	2.10	1.50	3.10	3.49	2.40	2.06	2.81
Aug	3.38	1.50	1.20	2.20	3.90	2.26	2.02	2.49
Sep	5.50	1.90	1.40	4.25	5.86	2.45	2.14	3.19
Oct	11.35	5.00	2.20	11.00	12.34	4.07	2.70	13.64
Nov	26.28	15.00	6.10	37.00	25.09	12.91	5.09	33.91
Dec	27.04	17.00	7.80	36.00	25.30	15.36	7.10	33.40

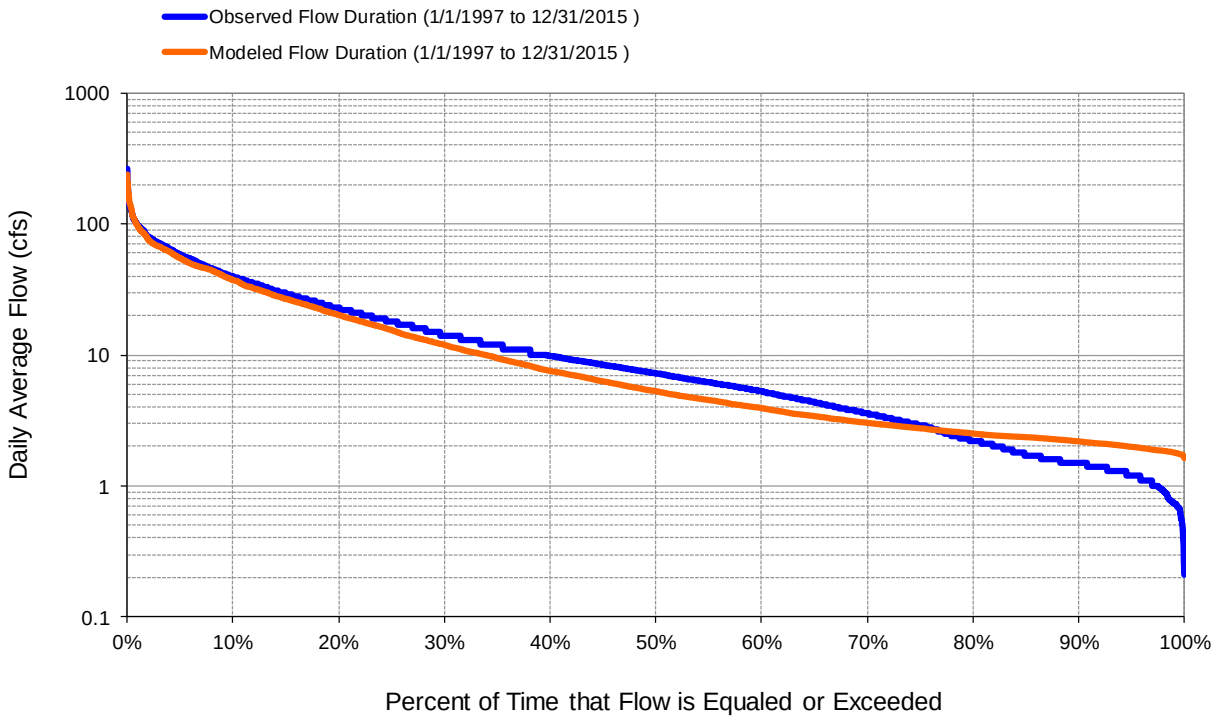

Figure B-41. Flow exceedance at Mill Creek near Orillia (USGS 12113349)

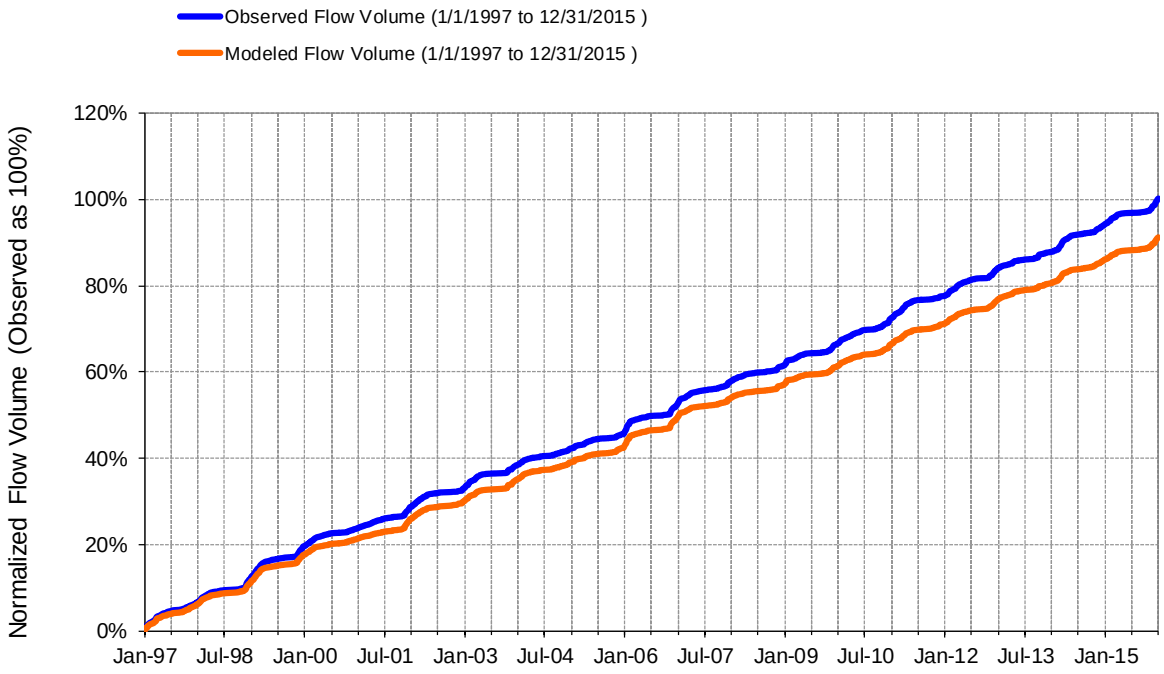

Figure B-42. Flow accumulation at Mill Creek near Orillia (USGS 12113349)

Table B-12. Summary statistics at Mill Creek near Orillia (USGS 12113349)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 23160		Mill Creek near mouth at Orillia (USGS 12113349)	
19-Year Analysis Period: 1/1/1997 - 12/31/2015 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 5.63	
Total Simulated In-stream Flow:	**33.18**	Total Observed In-stream Flow:	**36.44**
Total of simulated highest 10% flows:	**15.34**	Total of Observed highest 10% flows:	**15.97**
Total of Simulated lowest 50% flows:	**3.64**	Total of Observed Lowest 50% flows:	**3.96**
Simulated Summer Flow Volume (months 7-9):	**2.68**	Observed Summer Flow Volume (7-9):	**2.49**
Simulated Fall Flow Volume (months 10-12):	**12.68**	Observed Fall Flow Volume (10-12):	**13.07**
Simulated Winter Flow Volume (months 1-3):	**13.05**	Observed Winter Flow Volume (1-3):	**14.81**
Simulated Spring Flow Volume (months 4-6):	**4.78**	Observed Spring Flow Volume (4-6):	**6.06**
Total Simulated Storm Volume:	**12.44**	Total Observed Storm Volume:	**11.95**
Simulated Summer Storm Volume (7-9):	**0.97**	Observed Summer Storm Volume (7-9):	**1.00**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-8.93%		
Error in 50% lowest flows:	-8.23%		
Error in 10% highest flows:	-3.93%		
Seasonal volume error - Summer:	7.24%		
Seasonal volume error - Fall:	-2.98%	>>	Clear
Seasonal volume error - Winter:	-11.94%		
Seasonal volume error - Spring:	-21.08%		
Error in storm volumes:	4.03%		
Error in summer storm volumes:	-2.72%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.881	Model accuracy increases	
Baseline adjusted coefficient (Garrick), E':	0.717	as E or E' approaches 1.0	
Monthly NSE	0.930		
Obs Baseflow	67.2%		
Sim Baseflow	62.5%		
Baseflow fraction error	-4.7%		
Coefficient of determination, r^2	0.89		
Weighted r^2	0.81		

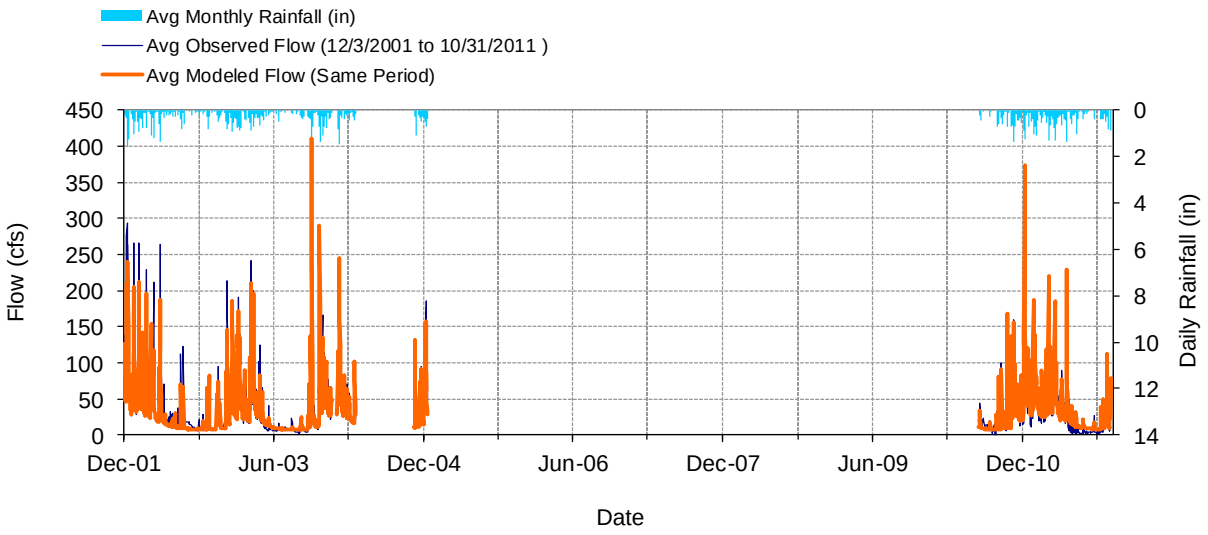

Figure B-43. Mean daily flow at Springbrook Creek at O'Grady Way (King County 03G)

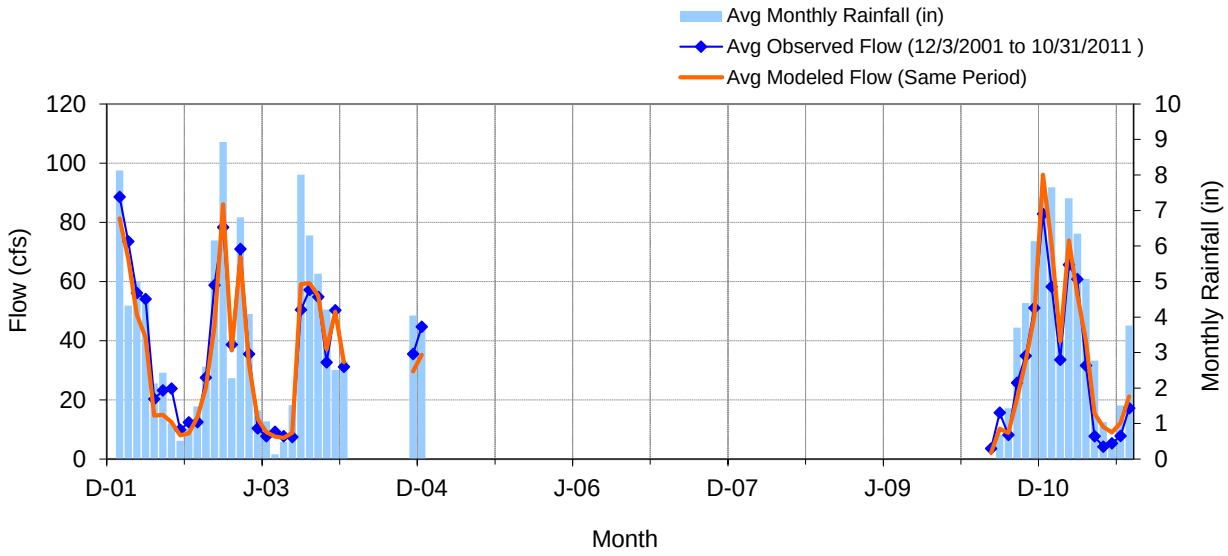

Figure B-44. Mean monthly flow at Springbrook Creek at O'Grady Way (King County 03G)

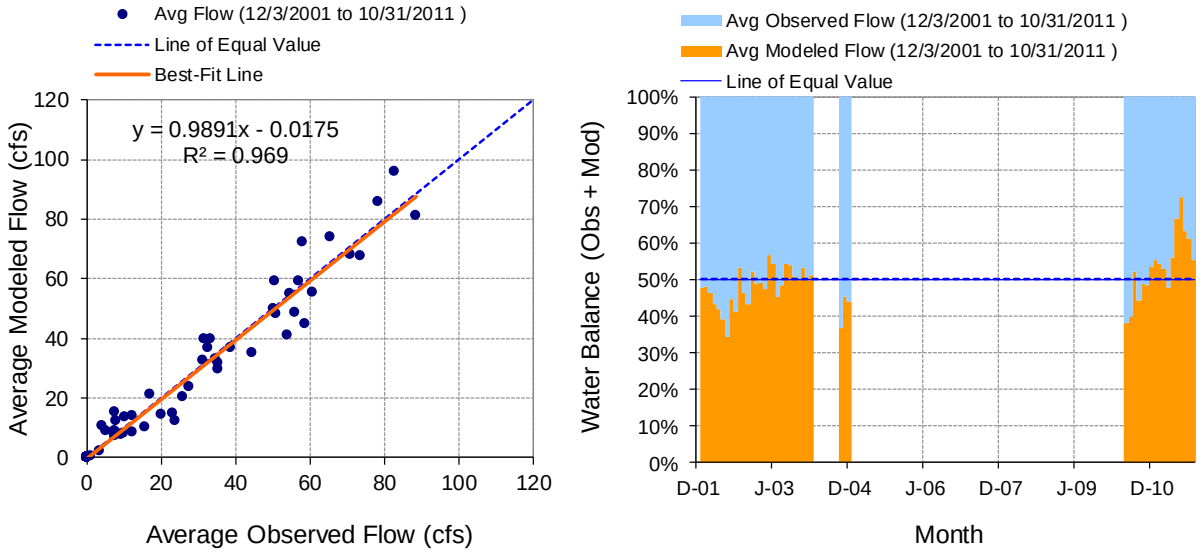

Figure B-45. Monthly flow regression and temporal variation at Springbrook Creek at O'Grady Way (King County 03G)

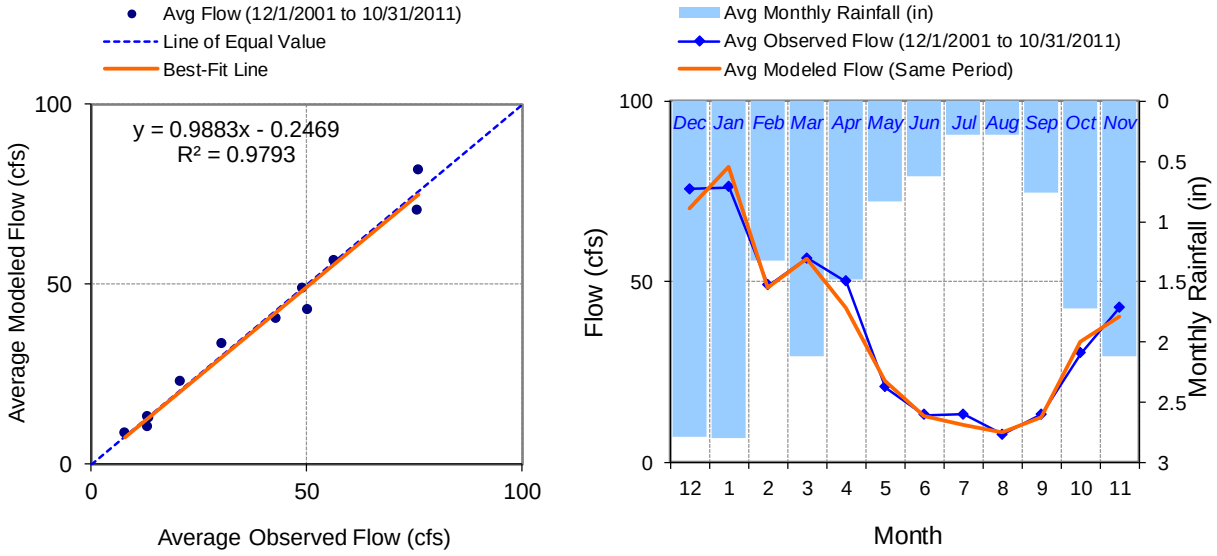

Figure B-46. Seasonal regression and temporal aggregate at Springbrook Creek at O'Grady Way (King County 03G)

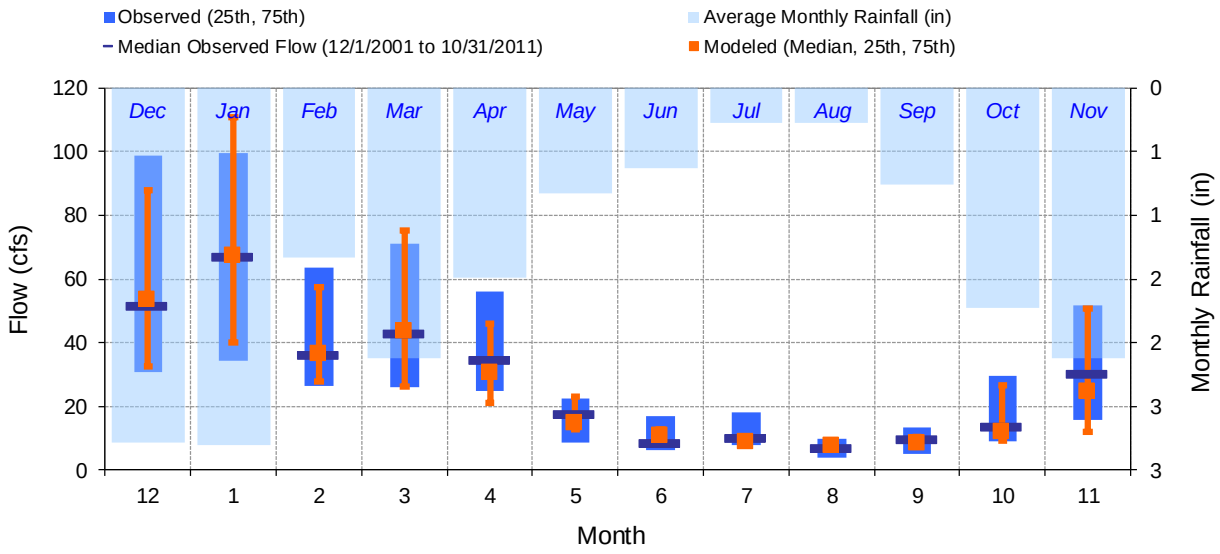

Figure B-47. Seasonal medians and ranges at Springbrook Creek at O'Grady Way (King County 03G)

Table B-13. Seasonal summary at Springbrook Creek at O'Grady Way (King County 03G)

MONTH	OBSERVED FLOW (CFS)				MODELED FLOW (CFS)			
	MEAN	MEDIAN	25TH	75TH	MEAN	MEDIAN	25TH	75TH
Dec	75.65	51.48	30.94	98.73	70.27	53.31	32.60	87.85
Jan	76.09	67.12	34.30	99.39	81.75	67.29	40.02	110.83
Feb	49.00	36.05	26.29	63.42	48.55	36.68	27.84	57.29
Mar	56.42	42.98	26.03	71.29	56.37	43.57	26.17	75.40
Apr	50.10	34.65	24.92	56.13	42.85	30.61	21.05	45.80
May	20.74	17.44	8.59	22.35	22.72	14.84	12.75	22.97
Jun	13.17	8.65	6.10	16.95	13.00	10.78	9.23	12.85
Jul	13.20	9.86	7.72	17.96	10.32	9.01	8.07	10.17
Aug	7.74	6.91	3.90	10.01	8.27	7.84	7.33	8.43
Sep	13.34	9.48	5.07	13.55	12.53	8.38	7.88	10.25
Oct	30.26	13.51	9.23	29.55	33.37	12.19	9.07	26.45
Nov	42.83	30.16	15.65	51.57	40.33	24.48	11.93	50.92

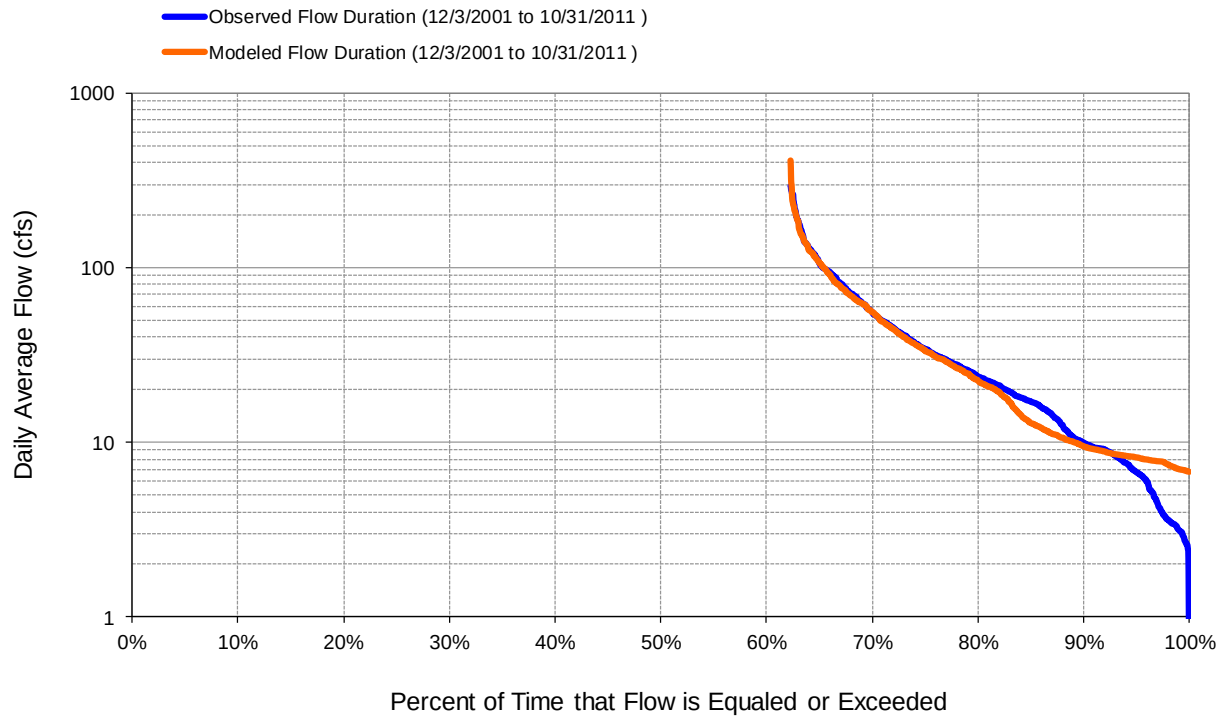

Figure B-48. Flow exceedance at Springbrook Creek at O'Grady Way (King County 03G)

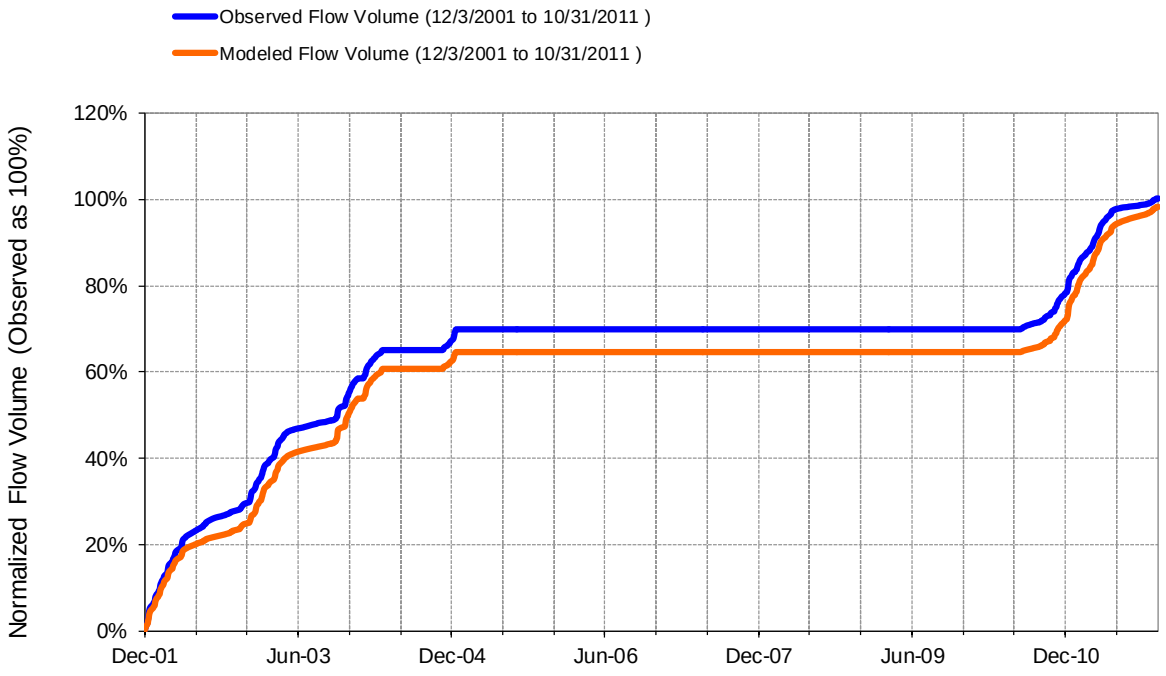

Figure B-49. Flow accumulation at Springbrook Creek at O'Grady Way (King County 03G)

Table B-14. Summary statistics at Springbrook Creek at O'Grady Way (King County 03G)

LSPC Simulated Flow		Observed Flow Gage	
REACH OUTFLOW FROM SWS 23470		Springbrook Creek at O'Grady Way (King County 03G)	
9.91-Year Analysis Period: 12/1/2001 - 10/31/2011 Flow volumes are (inches/year) for upstream drainage area		Manually Entered Data Drainage Area (sq-mi): 25.6	
Total Simulated In-stream Flow:	**7.42**	Total Observed In-stream Flow:	**7.57**
Total of simulated highest 10% flows:	**2.89**	Total of Observed highest 10% flows:	**2.91**
Total of Simulated lowest 50% flows:	**1.07**	Total of Observed Lowest 50% flows:	**1.10**
Simulated Summer Flow Volume (months 7-9):	**0.56**	Observed Summer Flow Volume (7-9):	**0.62**
Simulated Fall Flow Volume (months 10-12):	**2.72**	Observed Fall Flow Volume (10-12):	**2.82**
Simulated Winter Flow Volume (months 1-3):	**3.08**	Observed Winter Flow Volume (1-3):	**3.00**
Simulated Spring Flow Volume (months 4-6):	**1.06**	Observed Spring Flow Volume (4-6):	**1.13**
Total Simulated Storm Volume:	**2.08**	Total Observed Storm Volume:	**2.21**
Simulated Summer Storm Volume (7-9):	**0.10**	Observed Summer Storm Volume (7-9):	**0.15**
Errors (Simulated-Observed)	*Error Statistics*		
Error in total volume:	-1.97%		
Error in 50% lowest flows:	-2.61%		
Error in 10% highest flows:	-0.79%		
Seasonal volume error - Summer:	-9.22%		
Seasonal volume error - Fall:	-3.53%	>>	Clear
Seasonal volume error - Winter:	2.62%		
Seasonal volume error - Spring:	-6.29%		
Error in storm volumes:	-5.64%		
Error in summer storm volumes:	-34.41%		
Nash-Sutcliffe Coefficient of Efficiency, E:	0.863	Model accuracy increases as E or E' approaches 1.0	
Baseline adjusted coefficient (Garrick), E':	0.698		
Monthly NSE	0.931		
Obs Baseflow	70.8%		
Sim Baseflow	71.9%		
Baseflow fraction error	1.1%		
Coefficient of determination, r^2	0.87		
Weighted r^2	0.81		