# Appendix for Model 03080101

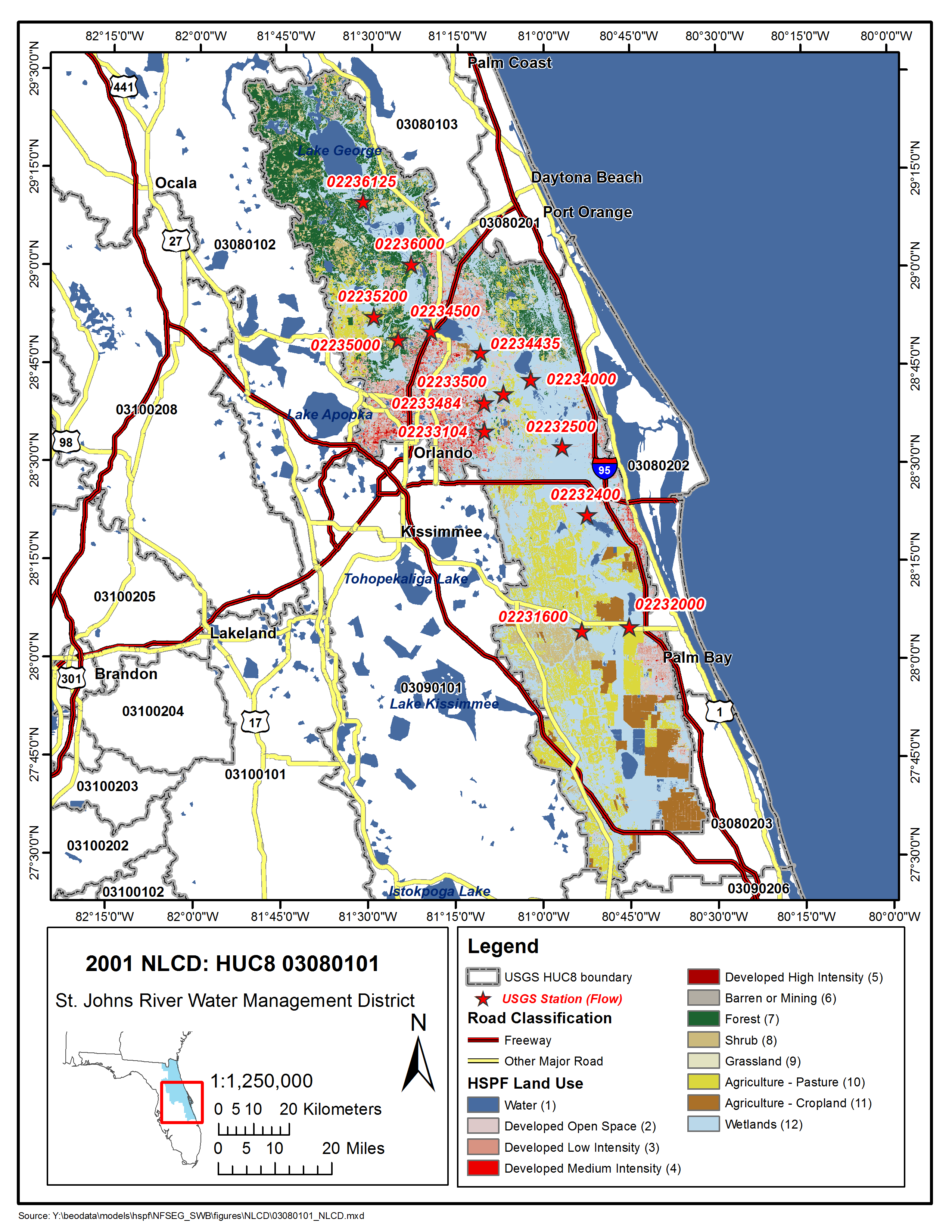


Figure 03080101-1: Land Cover from the National Land Cover Database.

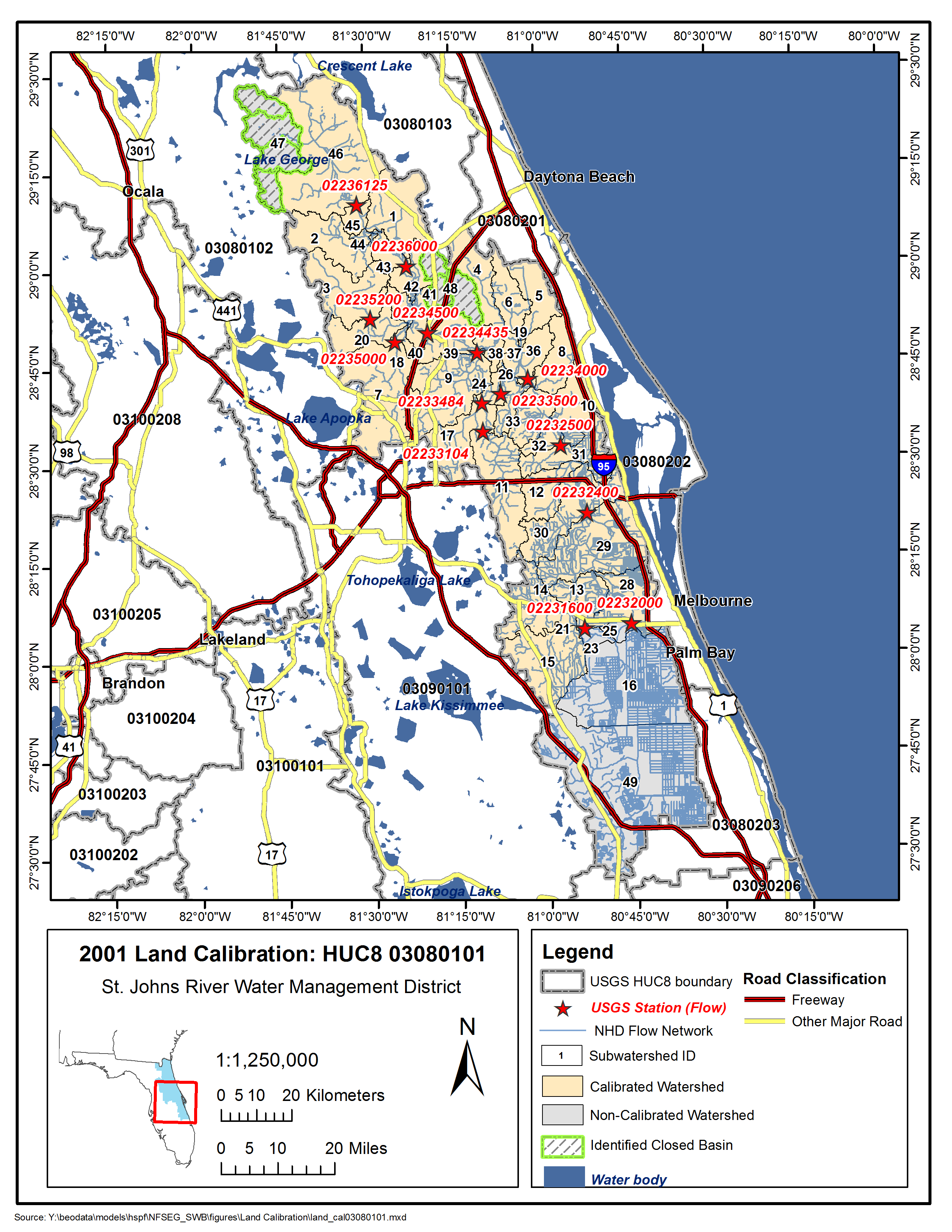


Figure 03080101-2: Calibrated sub-watersheds.

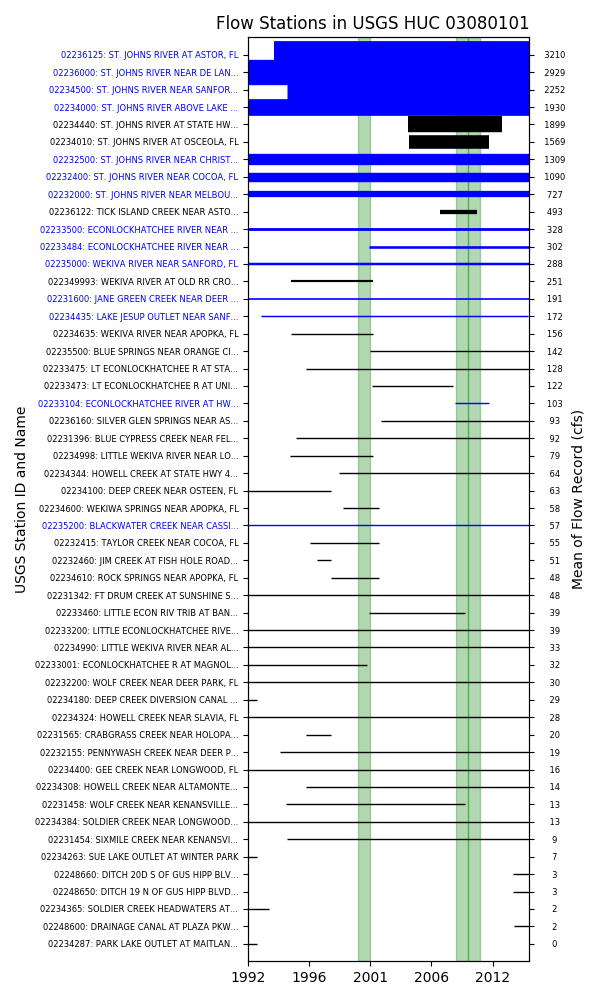


Figure 03080101-3: Station period of record. Blue color identifies gauges used for calibration.

## HSPF Reach 03, USGS Gauge 02235200

Table 03080101-1: Comparison Statistics Between HSPF Reach 03 and USGS Gauge 02235200.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 22.79 |
| Standard error | 56.52 |
| Relative bias | 0.40 |
| Relative standard error | 0.80 |
| Nash-Sutcliffe coefficient | 0.36 |
| Coefficient of efficiency | 0.32 |
| Index of agreement | 0.70 |

Table 03080101-2: Hydrologic Indices Between USGS Gauge 02235200 and HSPF Reach 03.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02235200 | Simulated Reach 03 | Percent Difference |
| MA1: Mean, all daily flows | 57.06 | 80.10 | 40.36 |
| MA2: Median, all daily flows | 26.00 | 40.62 | 56.23 |
| MA3: CV, all daily flows | 108.78 | 99.90 | -8.16 |
| MA4: CV, log of all daily flows | 111.63 | 112.33 | 0.63 |
| MA5: Mean daily flow / median daily flow | 2.19 | 1.97 | -10.16 |
| MA9: (Q10 - Q90) / median daily flow | 5.18 | 5.07 | -2.18 |
| MA10: (Q20 - Q80) / median daily flow | 2.96 | 2.90 | -1.99 |
| MA11: (Q25 - Q75) / median daily flow | 2.31 | 2.20 | -4.48 |
| MA12: Mean monthly flow, January | 55.85 | 66.69 | 19.41 |
| MA13: Mean monthly flow, February | 51.63 | 59.50 | 15.24 |
| MA14: Mean monthly flow, March | 56.24 | 70.59 | 25.52 |
| MA15: Mean monthly flow, April | 40.10 | 49.03 | 22.26 |
| MA16: Mean monthly flow, May | 27.91 | 26.72 | -4.28 |
| MA17: Mean monthly flow, June | 39.47 | 52.38 | 32.72 |
| MA18: Mean monthly flow, July | 45.97 | 84.30 | 83.38 |
| MA19: Mean monthly flow, August | 60.63 | 109.12 | 79.96 |
| MA20: Mean monthly flow, September | 97.94 | 130.89 | 33.64 |
| MA21: Mean monthly flow, October | 86.77 | 130.10 | 49.93 |
| MA22: Mean monthly flow, November | 49.32 | 77.35 | 56.85 |
| MA23: Mean monthly flow, December | 45.22 | 63.46 | 40.33 |
| ML1: Mean minimum monthly flow, January | 38.83 | 38.41 | -1.10 |
| ML2: Mean minimum monthly flow, February | 37.30 | 37.02 | -0.75 |
| ML3: Mean minimum monthly flow, March | 38.68 | 42.22 | 9.14 |
| ML4: Mean minimum monthly flow, April | 21.75 | 26.45 | 21.61 |
| ML5: Mean minimum monthly flow, May | 12.17 | 13.20 | 8.39 |
| ML6: Mean minimum monthly flow, June | 20.50 | 24.02 | 17.14 |
| ML7: Mean minimum monthly flow, July | 29.92 | 56.66 | 89.36 |
| ML8: Mean minimum monthly flow, August | 32.30 | 68.17 | 111.05 |
| ML9: Mean minimum monthly flow, September | 46.18 | 73.74 | 59.67 |
| ML10: Mean minimum monthly flow, October | 47.77 | 71.76 | 50.20 |
| ML11: Mean minimum monthly flow, November | 32.72 | 50.03 | 52.91 |
| ML12: Mean minimum monthly flow, December | 30.79 | 35.80 | 16.27 |
| ML13: CV of minimum monthly flows | 112.25 | 127.44 | 13.53 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.28 | 0.17 | -41.40 |
| ML15: Mean minimum annual flow / mean annual flow | 0.17 | 0.09 | -47.23 |
| ML16: Median minimum annual flow / median annual flow | 0.23 | 0.16 | -32.39 |
| ML20: Ratio of baseflow volume to total flow volume | 0.73 | 0.78 | 6.20 |
| ML22: Mean annual minimum flow divided by catchment area | 0.08 | 0.07 | -12.24 |
| RA1: Mean of positive changes from one day to next (rise rate) | 8.66 | 9.18 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 251.85 | 247.71 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 3.18 | 3.53 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 176.31 | 148.40 |  |
| RA5: Ratio of days that are higher than previous day | 0.21 | 0.28 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.08 | 0.06 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.04 | 0.04 |  |
| RA8: Number of flow reversals from one day to the next | 56.46 | 63.21 |  |
| RA9: CV, number of flow reversals from one day to the next | 21.56 | 23.01 |  |

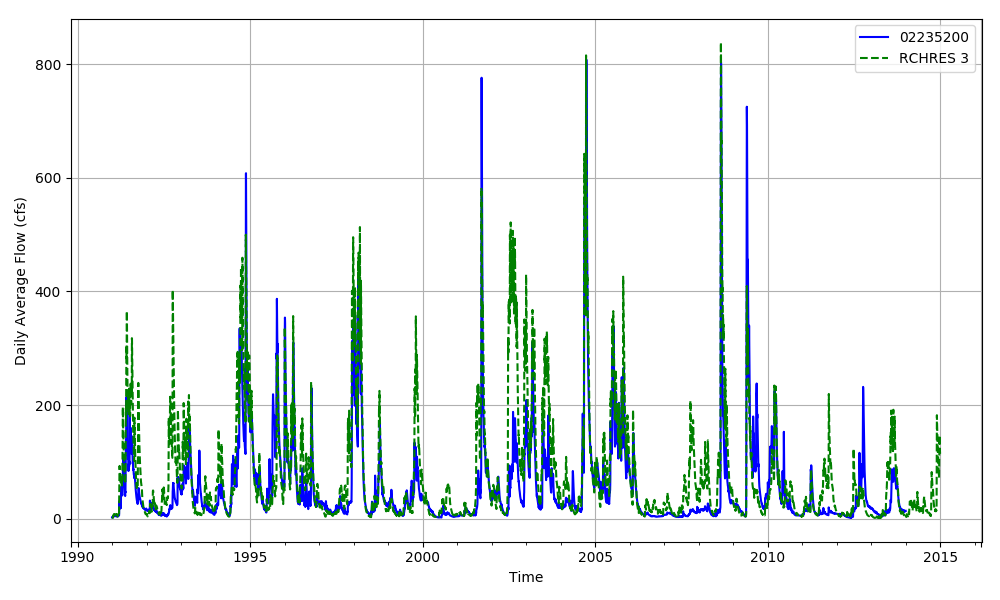


Figure 03080101-4: Daily flow for HSFP reach 03 and USGS station 02235200.

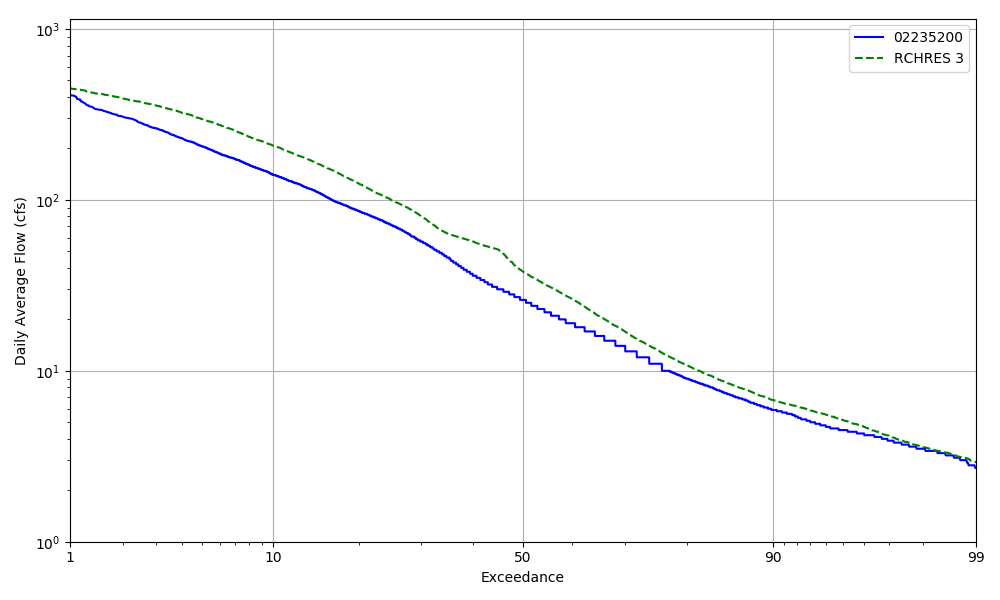


Figure 03080101-5: Daily exceedance for HSFP reach 03 and USGS station 02235200.

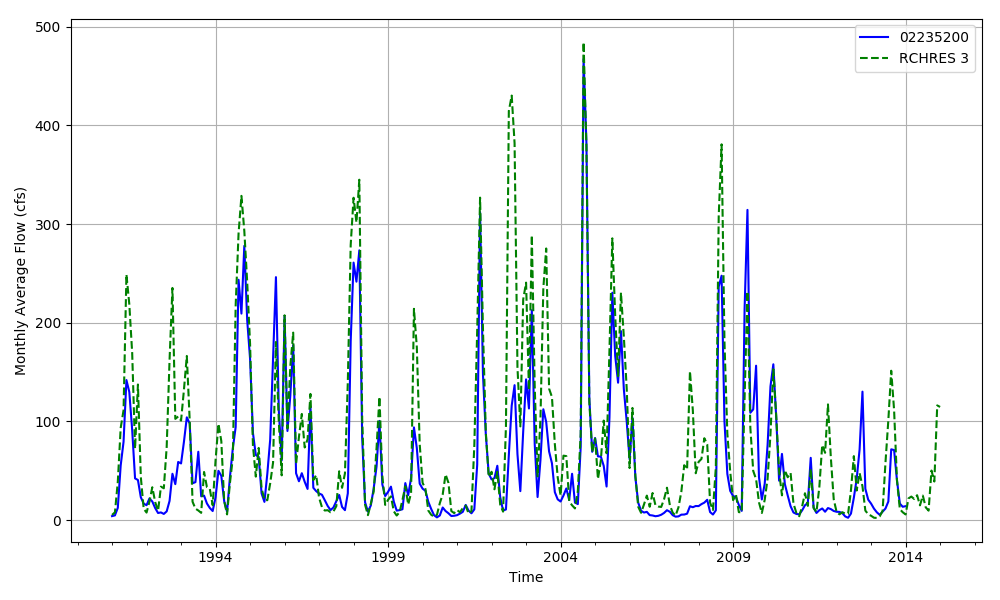


Figure 03080101-6: Monthly flow for HSFP reach 03 and USGS station 02235200.

## HSPF Reach 07, USGS Gauge 02235000

Table 03080101-3: Comparison Statistics Between HSPF Reach 07 and USGS Gauge 02235000.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 1.41 |
| Standard error | 62.69 |
| Relative bias | 0.00 |
| Relative standard error | 0.58 |
| Nash-Sutcliffe coefficient | 0.66 |
| Coefficient of efficiency | 0.46 |
| Index of agreement | 0.73 |

Table 03080101-4: Hydrologic Indices Between USGS Gauge 02235000 and HSPF Reach 07.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02235000 | Simulated Reach 07 | Percent Difference |
| MA1: Mean, all daily flows | 289.61 | 291.21 | 0.55 |
| MA2: Median, all daily flows | 253.00 | 250.42 | -1.02 |
| MA3: CV, all daily flows | 39.87 | 47.15 | 18.24 |
| MA4: CV, log of all daily flows | 34.60 | 34.33 | -0.80 |
| MA5: Mean daily flow / median daily flow | 1.14 | 1.16 | 1.59 |
| MA9: (Q10 - Q90) / median daily flow | 1.02 | 1.02 | 0.26 |
| MA10: (Q20 - Q80) / median daily flow | 0.58 | 0.63 | 8.37 |
| MA11: (Q25 - Q75) / median daily flow | 0.44 | 0.48 | 10.45 |
| MA12: Mean monthly flow, January | 275.66 | 256.37 | -7.00 |
| MA13: Mean monthly flow, February | 258.50 | 239.18 | -7.47 |
| MA14: Mean monthly flow, March | 265.67 | 259.32 | -2.39 |
| MA15: Mean monthly flow, April | 231.14 | 233.28 | 0.93 |
| MA16: Mean monthly flow, May | 214.25 | 213.00 | -0.59 |
| MA17: Mean monthly flow, June | 262.18 | 277.31 | 5.77 |
| MA18: Mean monthly flow, July | 302.12 | 315.28 | 4.36 |
| MA19: Mean monthly flow, August | 338.23 | 345.58 | 2.17 |
| MA20: Mean monthly flow, September | 342.98 | 361.09 | 5.28 |
| MA21: Mean monthly flow, October | 316.25 | 338.24 | 6.96 |
| MA22: Mean monthly flow, November | 264.04 | 263.12 | -0.35 |
| MA23: Mean monthly flow, December | 265.78 | 251.26 | -5.46 |
| ML1: Mean minimum monthly flow, January | 233.92 | 212.21 | -9.28 |
| ML2: Mean minimum monthly flow, February | 230.83 | 211.77 | -8.26 |
| ML3: Mean minimum monthly flow, March | 223.74 | 214.23 | -4.25 |
| ML4: Mean minimum monthly flow, April | 202.70 | 200.61 | -1.03 |
| ML5: Mean minimum monthly flow, May | 192.30 | 188.27 | -2.10 |
| ML6: Mean minimum monthly flow, June | 206.09 | 207.26 | 0.57 |
| ML7: Mean minimum monthly flow, July | 244.00 | 256.90 | 5.29 |
| ML8: Mean minimum monthly flow, August | 255.17 | 269.71 | 5.70 |
| ML9: Mean minimum monthly flow, September | 257.57 | 272.19 | 5.68 |
| ML10: Mean minimum monthly flow, October | 247.26 | 261.81 | 5.88 |
| ML11: Mean minimum monthly flow, November | 234.52 | 230.41 | -1.75 |
| ML12: Mean minimum monthly flow, December | 235.35 | 214.52 | -8.85 |
| ML13: CV of minimum monthly flows | 24.26 | 27.08 | 11.64 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.73 | 0.71 | -1.81 |
| ML15: Mean minimum annual flow / mean annual flow | 0.64 | 0.62 | -2.42 |
| ML16: Median minimum annual flow / median annual flow | 0.73 | 0.72 | -1.97 |
| ML20: Ratio of baseflow volume to total flow volume | 0.87 | 0.87 | 0.85 |
| ML22: Mean annual minimum flow divided by catchment area | 1.80 | 1.76 | -2.29 |
| RA1: Mean of positive changes from one day to next (rise rate) | 20.81 | 60.86 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 224.28 | 321.34 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 10.01 | 21.66 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 153.61 | 442.56 |  |
| RA5: Ratio of days that are higher than previous day | 0.29 | 0.26 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.03 | 0.07 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.02 | 0.02 |  |
| RA8: Number of flow reversals from one day to the next | 79.08 | 122.54 |  |
| RA9: CV, number of flow reversals from one day to the next | 21.75 | 19.61 |  |

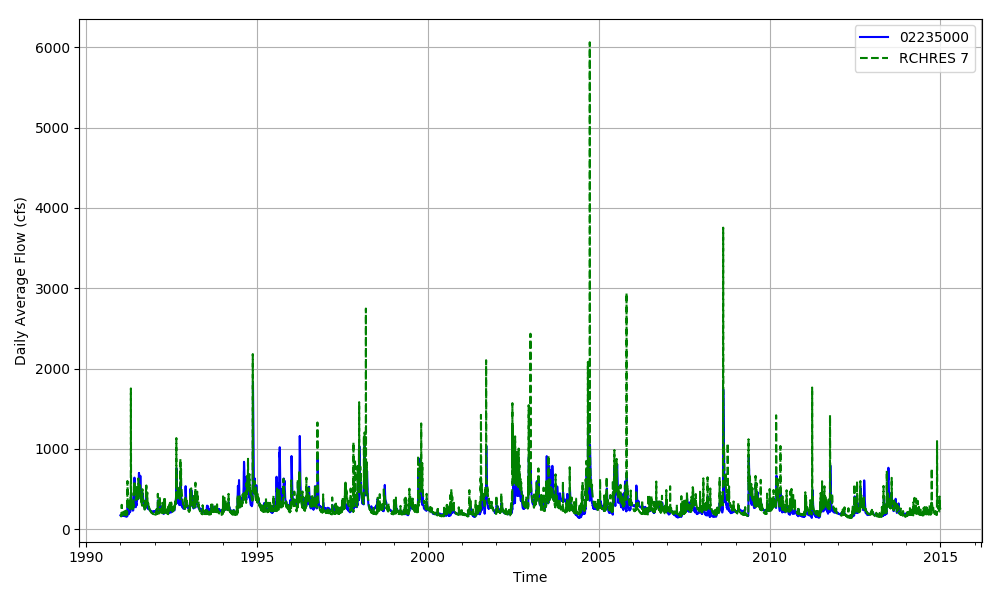


Figure 03080101-7: Daily flow for HSFP reach 07 and USGS station 02235000.

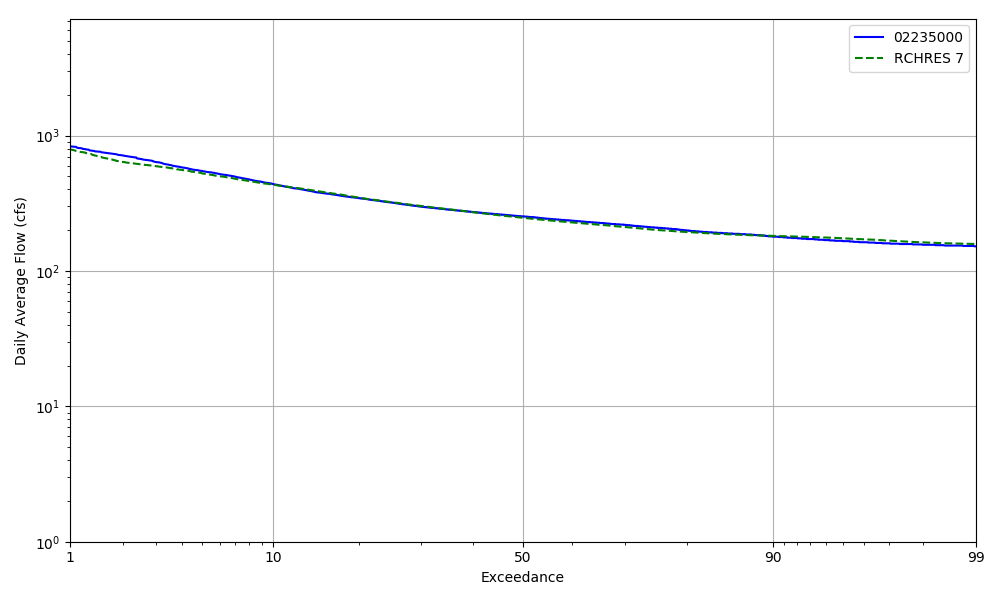


Figure 03080101-8: Daily exceedance for HSFP reach 07 and USGS station 02235000.

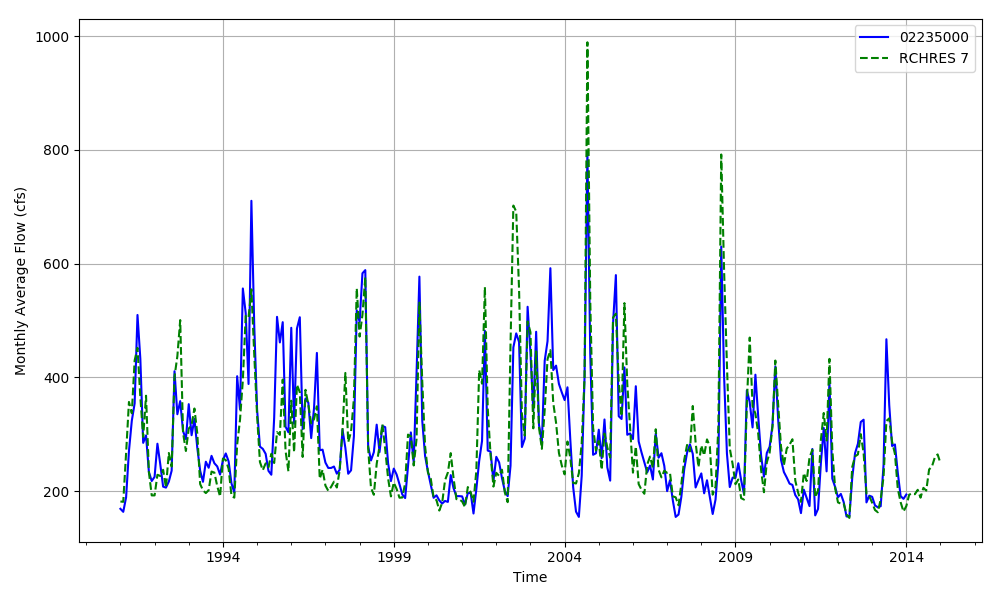


Figure 03080101-9: Monthly flow for HSFP reach 07 and USGS station 02235000.

## HSPF Reach 09, USGS Gauge 02234435

Table 03080101-5: Comparison Statistics Between HSPF Reach 09 and USGS Gauge 02234435.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 14.47 |
| Standard error | 227.58 |
| Relative bias | 0.09 |
| Relative standard error | 1.13 |
| Nash-Sutcliffe coefficient | -0.28 |
| Coefficient of efficiency | 0.01 |
| Index of agreement | 0.43 |

Table 03080101-6: Hydrologic Indices Between USGS Gauge 02234435 and HSPF Reach 09.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02234435 | Simulated Reach 09 | Percent Difference |
| MA1: Mean, all daily flows | 292.09 | 180.86 | -38.08 |
| MA2: Median, all daily flows | 261.00 | 121.04 | -53.63 |
| MA3: CV, all daily flows | 60.20 | 91.17 | 51.45 |
| MA4: CV, log of all daily flows | 59.52 | 83.08 | 39.59 |
| MA5: Mean daily flow / median daily flow | 1.12 | 1.49 | 33.53 |
| MA9: (Q10 - Q90) / median daily flow | 1.85 | 2.97 | 60.83 |
| MA10: (Q20 - Q80) / median daily flow | 1.20 | 1.78 | 47.99 |
| MA11: (Q25 - Q75) / median daily flow | 0.96 | 1.41 | 46.54 |
| MA12: Mean monthly flow, January | 284.68 | 146.68 | -48.48 |
| MA13: Mean monthly flow, February | 246.82 | 124.39 | -49.60 |
| MA14: Mean monthly flow, March | 233.44 | 143.46 | -38.55 |
| MA15: Mean monthly flow, April | 226.22 | 99.44 | -56.04 |
| MA16: Mean monthly flow, May | 186.80 | 72.77 | -61.04 |
| MA17: Mean monthly flow, June | 254.90 | 167.24 | -34.39 |
| MA18: Mean monthly flow, July | 263.22 | 225.06 | -14.50 |
| MA19: Mean monthly flow, August | 186.34 | 255.67 | 37.21 |
| MA20: Mean monthly flow, September | 251.10 | 247.00 | -1.63 |
| MA21: Mean monthly flow, October | 245.78 | 218.21 | -11.22 |
| MA22: Mean monthly flow, November | 271.51 | 145.95 | -46.25 |
| MA23: Mean monthly flow, December | 288.44 | 135.10 | -53.16 |
| ML1: Mean minimum monthly flow, January | 52.32 | 90.50 | 72.96 |
| ML2: Mean minimum monthly flow, February | 51.12 | 81.21 | 58.88 |
| ML3: Mean minimum monthly flow, March | 31.49 | 80.53 | 155.75 |
| ML4: Mean minimum monthly flow, April | 57.92 | 51.26 | -11.51 |
| ML5: Mean minimum monthly flow, May | 30.50 | 35.17 | 15.32 |
| ML6: Mean minimum monthly flow, June | 54.07 | 59.41 | 9.87 |
| ML7: Mean minimum monthly flow, July | 74.16 | 131.77 | 77.68 |
| ML8: Mean minimum monthly flow, August | 40.56 | 167.73 | 313.54 |
| ML9: Mean minimum monthly flow, September | 81.68 | 164.21 | 101.04 |
| ML10: Mean minimum monthly flow, October | 80.20 | 133.40 | 66.34 |
| ML11: Mean minimum monthly flow, November | 78.08 | 101.20 | 29.62 |
| ML12: Mean minimum monthly flow, December | 90.09 | 79.52 | -11.73 |
| ML13: CV of minimum monthly flows | 149.57 | 99.63 | -33.39 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.01 | 0.18 | 1901.98 |
| ML15: Mean minimum annual flow / mean annual flow | 0.01 | 0.13 | 1493.34 |
| ML16: Median minimum annual flow / median annual flow | 0.00 | 0.17 | 3593.69 |
| ML20: Ratio of baseflow volume to total flow volume | 0.34 | 0.69 | 101.20 |
| ML22: Mean annual minimum flow divided by catchment area | 0.03 | 0.24 | 807.18 |
| RA1: Mean of positive changes from one day to next (rise rate) | 102.37 | 64.94 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 102.64 | 284.63 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 102.86 | 21.43 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 103.57 | 376.21 |  |
| RA5: Ratio of days that are higher than previous day | 0.50 | 0.25 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.30 | 0.16 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.29 | 0.06 |  |
| RA8: Number of flow reversals from one day to the next | 142.23 | 86.55 |  |
| RA9: CV, number of flow reversals from one day to the next | 28.65 | 25.83 |  |

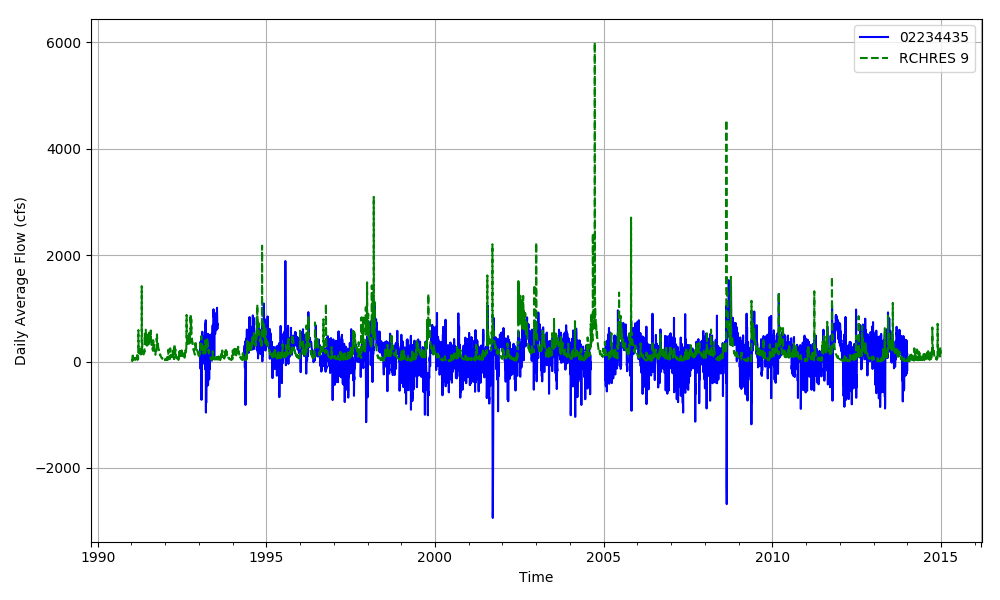


Figure 03080101-10: Daily flow for HSFP reach 09 and USGS station 02234435.

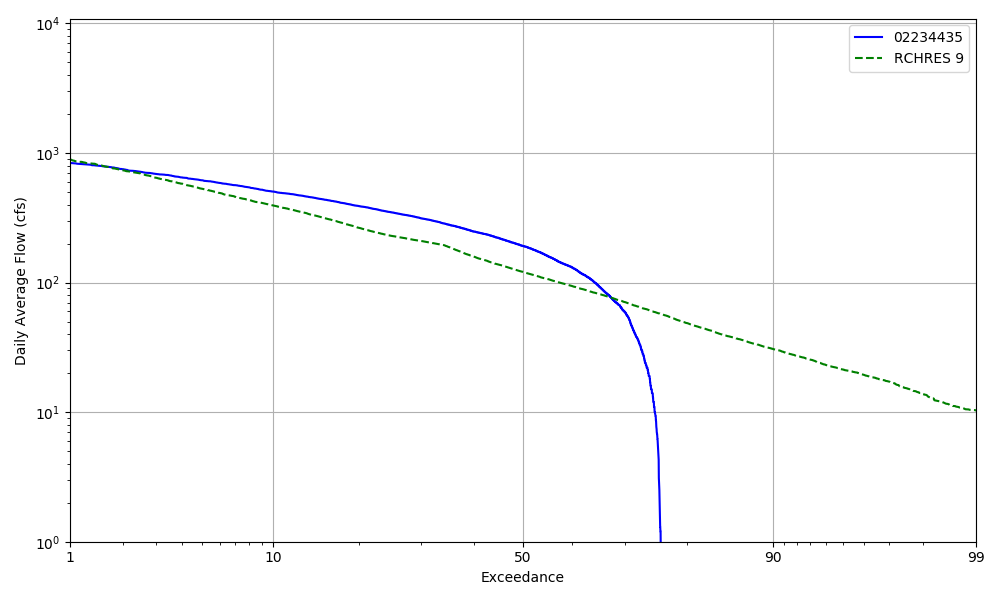


Figure 03080101-11: Daily exceedance for HSFP reach 09 and USGS station 02234435.

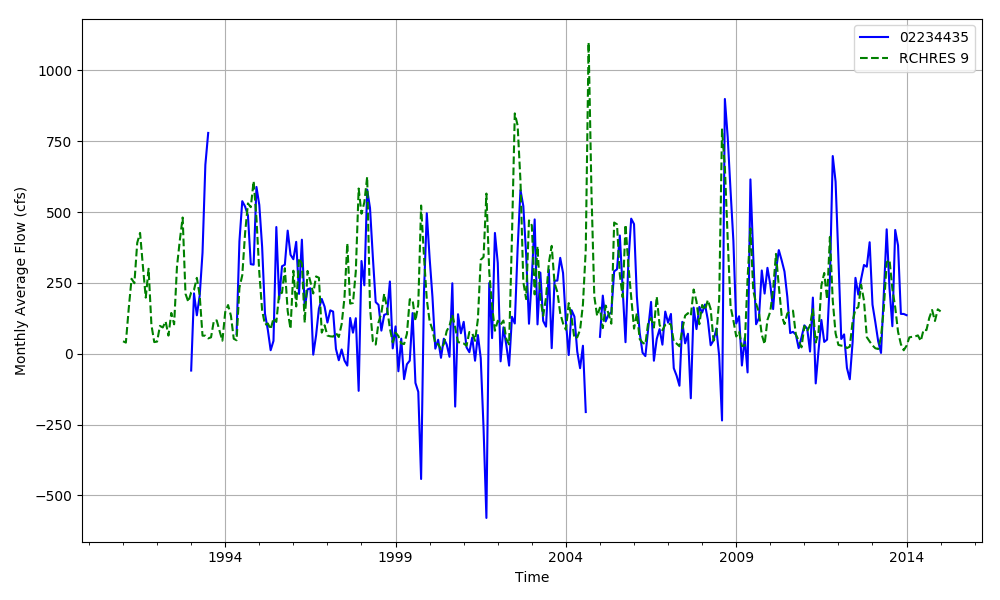


Figure 03080101-12: Monthly flow for HSFP reach 09 and USGS station 02234435.

## HSPF Reach 11, USGS Gauge 02233104

Table 03080101-7: Comparison Statistics Between HSPF Reach 11 and USGS Gauge 02233104.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -13.10 |
| Standard error | 66.68 |
| Relative bias | -0.13 |
| Relative standard error | 0.65 |
| Nash-Sutcliffe coefficient | 0.58 |
| Coefficient of efficiency | 0.48 |
| Index of agreement | 0.71 |

Table 03080101-8: Hydrologic Indices Between USGS Gauge 02233104 and HSPF Reach 11.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02233104 | Simulated Reach 11 | Percent Difference |
| MA1: Mean, all daily flows | 103.56 | 89.65 | -13.43 |
| MA2: Median, all daily flows | 39.00 | 58.38 | 49.69 |
| MA3: CV, all daily flows | 145.41 | 98.45 | -32.29 |
| MA4: CV, log of all daily flows | 118.88 | 92.02 | -22.59 |
| MA5: Mean daily flow / median daily flow | 2.66 | 1.54 | -42.17 |
| MA9: (Q10 - Q90) / median daily flow | 6.70 | 3.34 | -50.17 |
| MA10: (Q20 - Q80) / median daily flow | 3.56 | 2.35 | -34.14 |
| MA11: (Q25 - Q75) / median daily flow | 2.78 | 2.01 | -27.62 |
| MA12: Mean monthly flow, January | 52.59 | 55.30 | 5.14 |
| MA13: Mean monthly flow, February | 92.81 | 86.95 | -6.32 |
| MA14: Mean monthly flow, March | 146.01 | 96.57 | -33.86 |
| MA15: Mean monthly flow, April | 110.40 | 99.58 | -9.80 |
| MA16: Mean monthly flow, May | 93.95 | 82.72 | -11.96 |
| MA17: Mean monthly flow, June | 97.90 | 126.48 | 29.20 |
| MA18: Mean monthly flow, July | 167.36 | 121.42 | -27.45 |
| MA19: Mean monthly flow, August | 188.47 | 135.42 | -28.15 |
| MA20: Mean monthly flow, September | 140.24 | 112.22 | -19.98 |
| MA21: Mean monthly flow, October | 26.68 | 29.70 | 11.32 |
| MA22: Mean monthly flow, November | 11.67 | 11.48 | -1.66 |
| MA23: Mean monthly flow, December | 37.05 | 58.85 | 58.86 |
| ML1: Mean minimum monthly flow, January | 18.00 | 30.75 | 70.85 |
| ML2: Mean minimum monthly flow, February | 37.67 | 52.56 | 39.53 |
| ML3: Mean minimum monthly flow, March | 30.33 | 41.61 | 37.19 |
| ML4: Mean minimum monthly flow, April | 31.63 | 58.11 | 83.71 |
| ML5: Mean minimum monthly flow, May | 7.27 | 26.90 | 270.25 |
| ML6: Mean minimum monthly flow, June | 19.61 | 71.67 | 265.50 |
| ML7: Mean minimum monthly flow, July | 45.07 | 85.83 | 90.44 |
| ML8: Mean minimum monthly flow, August | 63.67 | 83.99 | 31.93 |
| ML9: Mean minimum monthly flow, September | 37.33 | 77.98 | 108.87 |
| ML10: Mean minimum monthly flow, October | 20.00 | 22.72 | 13.59 |
| ML11: Mean minimum monthly flow, November | 12.70 | 12.27 | -3.37 |
| ML12: Mean minimum monthly flow, December | 21.33 | 32.41 | 51.93 |
| ML13: CV of minimum monthly flows | 95.11 | 97.23 | 2.23 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.09 | 0.20 | 130.40 |
| ML15: Mean minimum annual flow / mean annual flow | 0.03 | 0.11 | 212.93 |
| ML16: Median minimum annual flow / median annual flow | 0.11 | 0.19 | 72.02 |
| ML20: Ratio of baseflow volume to total flow volume | 0.44 | 0.76 | 71.61 |
| ML22: Mean annual minimum flow divided by catchment area | 0.04 | 0.10 | 137.50 |
| RA1: Mean of positive changes from one day to next (rise rate) | 49.41 | 15.73 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 237.00 | 168.43 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 20.62 | 5.03 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 227.96 | 162.17 |  |
| RA5: Ratio of days that are higher than previous day | 0.26 | 0.24 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.20 | 0.09 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.11 | 0.05 |  |
| RA8: Number of flow reversals from one day to the next | 69.33 | 71.33 |  |
| RA9: CV, number of flow reversals from one day to the next | 5.46 | 18.08 |  |

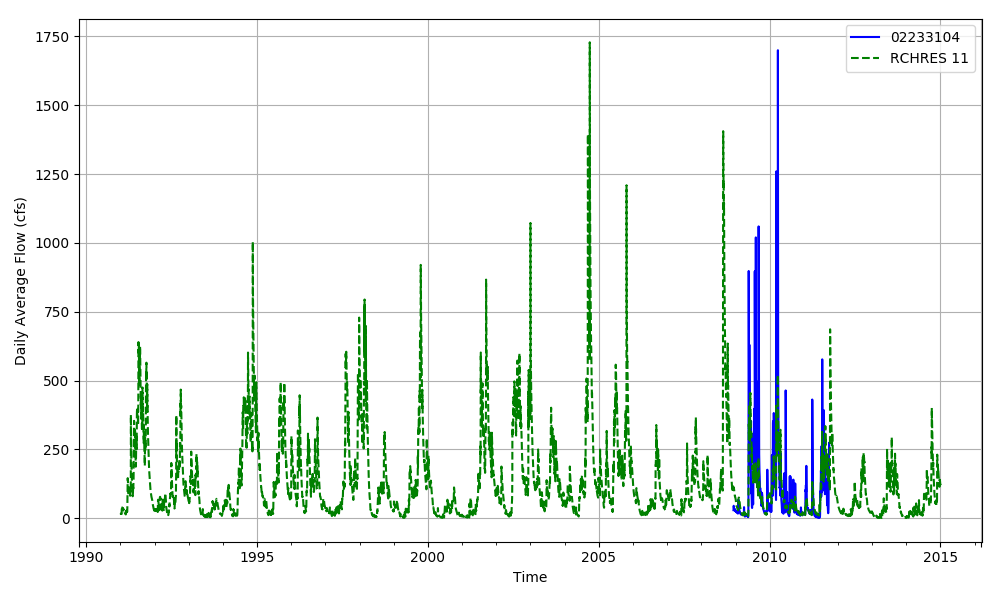


Figure 03080101-13: Daily flow for HSFP reach 11 and USGS station 02233104.

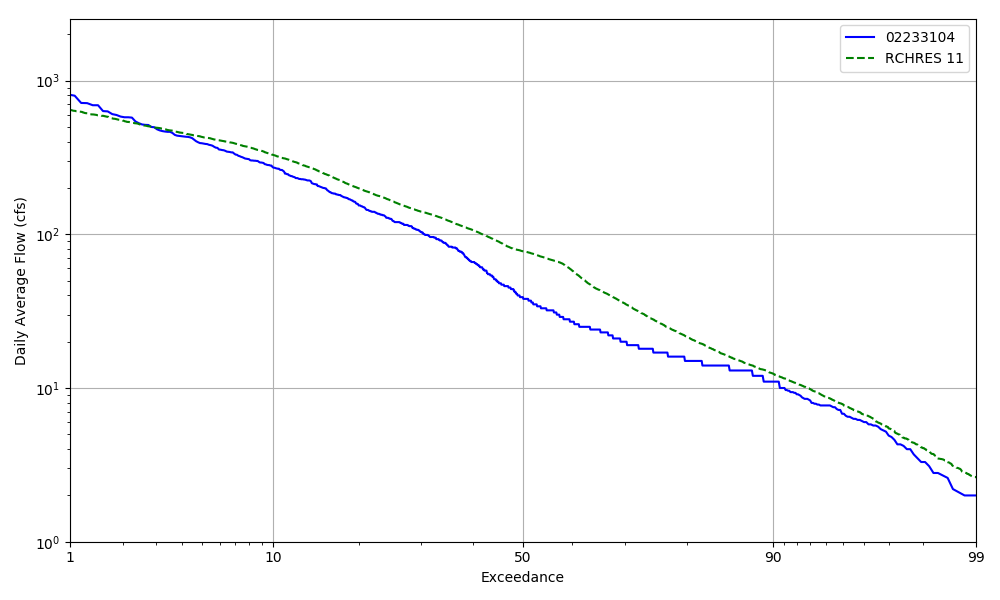


Figure 03080101-14: Daily exceedance for HSFP reach 11 and USGS station 02233104.

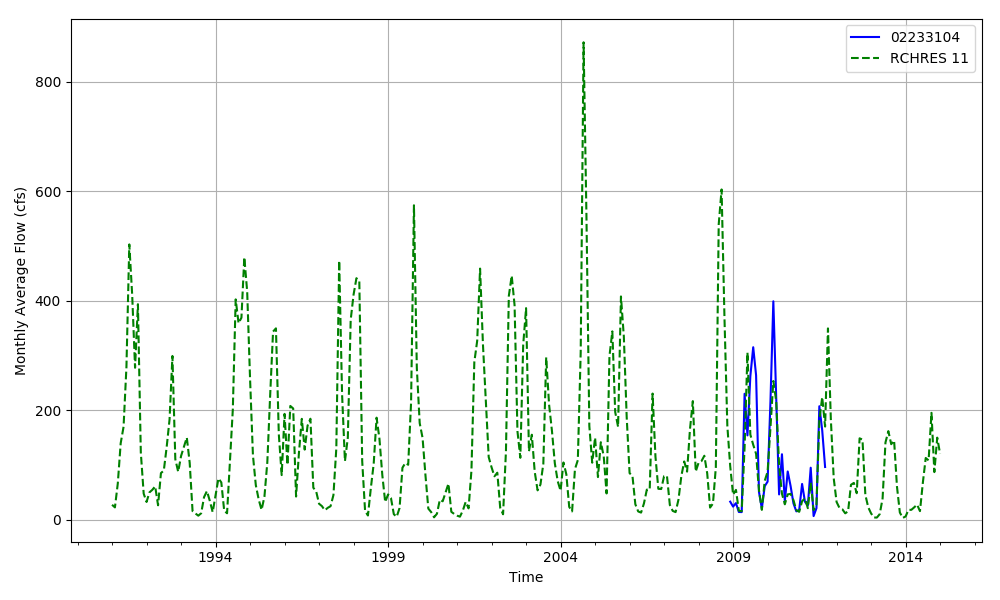


Figure 03080101-15: Monthly flow for HSFP reach 11 and USGS station 02233104.

## HSPF Reach 17, USGS Gauge 02233484

Table 03080101-9: Comparison Statistics Between HSPF Reach 17 and USGS Gauge 02233484.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -62.85 |
| Standard error | 166.57 |
| Relative bias | -0.21 |
| Relative standard error | 0.51 |
| Nash-Sutcliffe coefficient | 0.74 |
| Coefficient of efficiency | 0.57 |
| Index of agreement | 0.77 |

Table 03080101-10: Hydrologic Indices Between USGS Gauge 02233484 and HSPF Reach 17.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02233484 | Simulated Reach 17 | Percent Difference |
| MA1: Mean, all daily flows | 301.05 | 237.48 | -21.12 |
| MA2: Median, all daily flows | 152.00 | 153.08 | 0.71 |
| MA3: CV, all daily flows | 128.94 | 102.65 | -20.39 |
| MA4: CV, log of all daily flows | 105.48 | 92.02 | -12.76 |
| MA5: Mean daily flow / median daily flow | 1.98 | 1.55 | -21.67 |
| MA9: (Q10 - Q90) / median daily flow | 4.22 | 3.36 | -20.19 |
| MA10: (Q20 - Q80) / median daily flow | 2.29 | 1.88 | -18.01 |
| MA11: (Q25 - Q75) / median daily flow | 1.66 | 1.47 | -11.91 |
| MA12: Mean monthly flow, January | 177.59 | 156.62 | -11.81 |
| MA13: Mean monthly flow, February | 145.22 | 130.54 | -10.11 |
| MA14: Mean monthly flow, March | 188.13 | 137.76 | -26.78 |
| MA15: Mean monthly flow, April | 126.08 | 98.13 | -22.17 |
| MA16: Mean monthly flow, May | 108.37 | 78.55 | -27.52 |
| MA17: Mean monthly flow, June | 273.30 | 211.72 | -22.53 |
| MA18: Mean monthly flow, July | 421.87 | 290.81 | -31.07 |
| MA19: Mean monthly flow, August | 654.63 | 382.28 | -41.60 |
| MA20: Mean monthly flow, September | 537.40 | 453.07 | -15.69 |
| MA21: Mean monthly flow, October | 399.34 | 352.34 | -11.77 |
| MA22: Mean monthly flow, November | 158.30 | 187.67 | 18.55 |
| MA23: Mean monthly flow, December | 159.46 | 164.33 | 3.05 |
| ML1: Mean minimum monthly flow, January | 79.92 | 83.38 | 4.33 |
| ML2: Mean minimum monthly flow, February | 88.08 | 85.61 | -2.81 |
| ML3: Mean minimum monthly flow, March | 81.58 | 73.07 | -10.44 |
| ML4: Mean minimum monthly flow, April | 58.25 | 52.26 | -10.29 |
| ML5: Mean minimum monthly flow, May | 37.92 | 33.04 | -12.87 |
| ML6: Mean minimum monthly flow, June | 72.67 | 73.46 | 1.09 |
| ML7: Mean minimum monthly flow, July | 174.83 | 186.80 | 6.84 |
| ML8: Mean minimum monthly flow, August | 238.08 | 215.77 | -9.37 |
| ML9: Mean minimum monthly flow, September | 242.58 | 276.15 | 13.84 |
| ML10: Mean minimum monthly flow, October | 155.25 | 190.74 | 22.86 |
| ML11: Mean minimum monthly flow, November | 93.58 | 120.52 | 28.79 |
| ML12: Mean minimum monthly flow, December | 76.54 | 84.67 | 10.62 |
| ML13: CV of minimum monthly flows | 97.64 | 104.13 | 6.66 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.25 | 0.12 | -50.38 |
| ML15: Mean minimum annual flow / mean annual flow | 0.14 | 0.08 | -41.07 |
| ML16: Median minimum annual flow / median annual flow | 0.23 | 0.12 | -49.56 |
| ML20: Ratio of baseflow volume to total flow volume | 0.53 | 0.69 | 31.85 |
| ML22: Mean annual minimum flow divided by catchment area | 0.33 | 0.19 | -43.13 |
| RA1: Mean of positive changes from one day to next (rise rate) | 86.48 | 77.77 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 277.51 | 336.47 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 37.83 | 22.96 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 262.91 | 426.08 |  |
| RA5: Ratio of days that are higher than previous day | 0.29 | 0.23 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.13 | 0.15 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.07 | 0.06 |  |
| RA8: Number of flow reversals from one day to the next | 73.46 | 89.08 |  |
| RA9: CV, number of flow reversals from one day to the next | 22.14 | 24.59 |  |

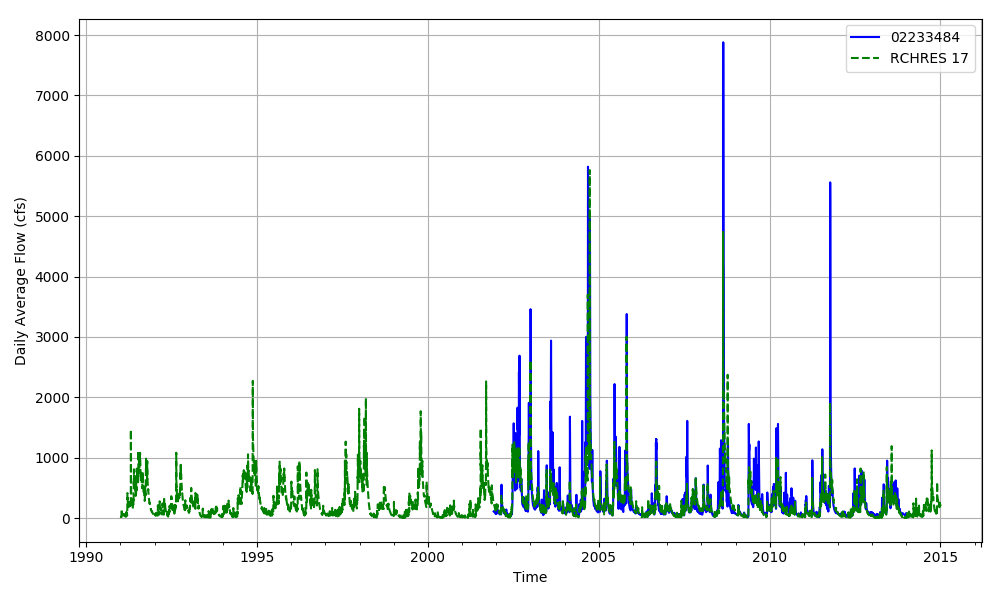


Figure 03080101-16: Daily flow for HSFP reach 17 and USGS station 02233484.

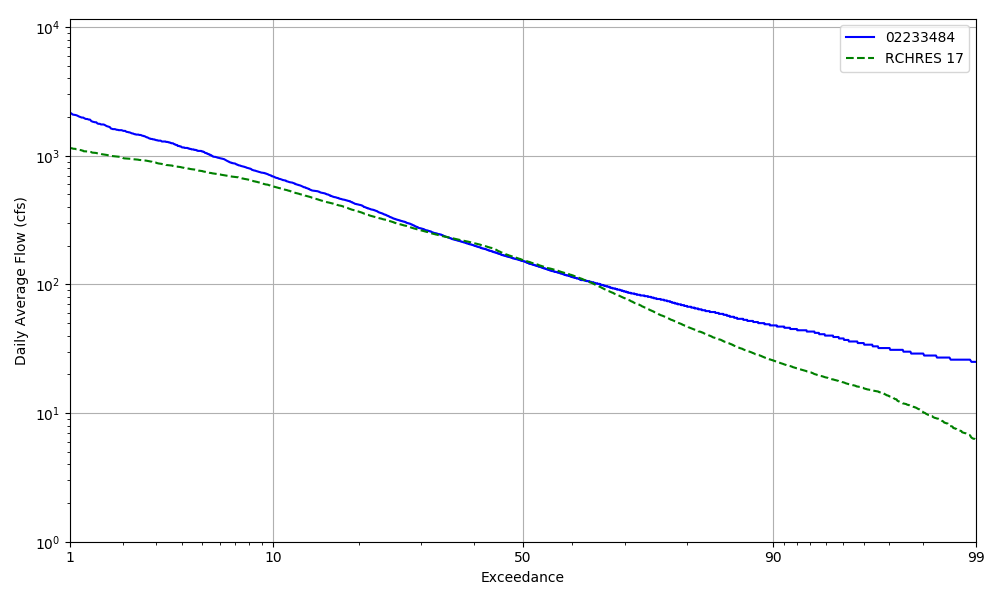


Figure 03080101-17: Daily exceedance for HSFP reach 17 and USGS station 02233484.

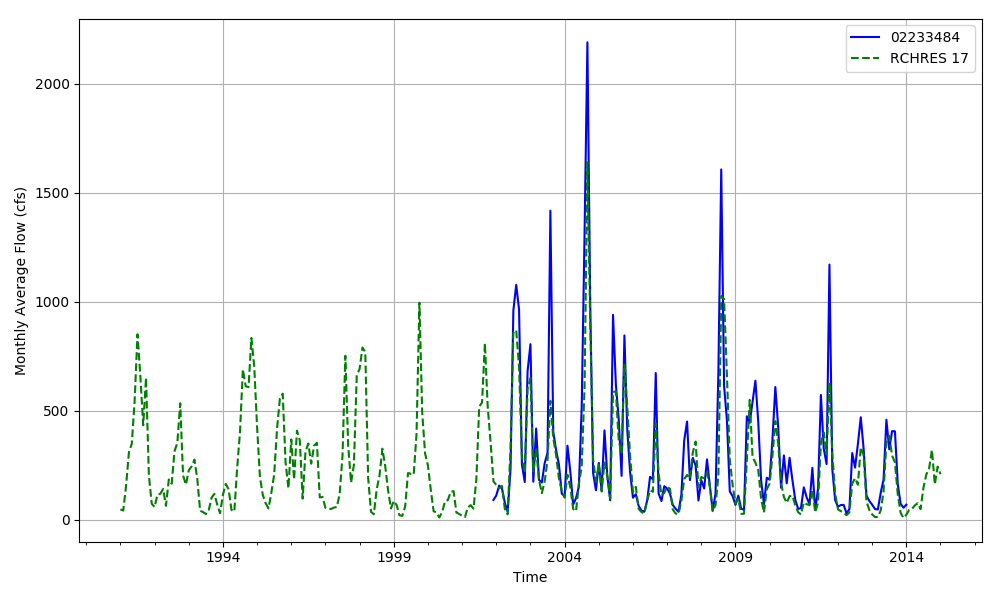


Figure 03080101-18: Monthly flow for HSFP reach 17 and USGS station 02233484.

## HSPF Reach 21, USGS Gauge 02231600

Table 03080101-11: Comparison Statistics Between HSPF Reach 21 and USGS Gauge 02231600.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 58.62 |
| Standard error | 193.79 |
| Relative bias | 0.31 |
| Relative standard error | 0.61 |
| Nash-Sutcliffe coefficient | 0.63 |
| Coefficient of efficiency | 0.39 |
| Index of agreement | 0.65 |

Table 03080101-12: Hydrologic Indices Between USGS Gauge 02231600 and HSPF Reach 21.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02231600 | Simulated Reach 21 | Percent Difference |
| MA1: Mean, all daily flows | 191.01 | 249.62 | 30.68 |
| MA2: Median, all daily flows | 35.00 | 156.08 | 345.94 |
| MA3: CV, all daily flows | 189.16 | 94.55 | -50.02 |
| MA4: CV, log of all daily flows | 171.59 | 93.32 | -45.62 |
| MA5: Mean daily flow / median daily flow | 5.46 | 1.60 | -70.70 |
| MA9: (Q10 - Q90) / median daily flow | 16.46 | 3.68 | -77.62 |
| MA10: (Q20 - Q80) / median daily flow | 6.58 | 2.27 | -65.56 |
| MA11: (Q25 - Q75) / median daily flow | 4.51 | 1.78 | -60.52 |
| MA12: Mean monthly flow, January | 74.04 | 168.17 | 127.12 |
| MA13: Mean monthly flow, February | 68.38 | 133.71 | 95.56 |
| MA14: Mean monthly flow, March | 119.35 | 146.53 | 22.78 |
| MA15: Mean monthly flow, April | 65.58 | 127.13 | 93.87 |
| MA16: Mean monthly flow, May | 18.20 | 99.60 | 447.25 |
| MA17: Mean monthly flow, June | 79.83 | 152.10 | 90.52 |
| MA18: Mean monthly flow, July | 278.65 | 285.50 | 2.46 |
| MA19: Mean monthly flow, August | 408.40 | 360.50 | -11.73 |
| MA20: Mean monthly flow, September | 367.37 | 419.27 | 14.13 |
| MA21: Mean monthly flow, October | 426.61 | 495.43 | 16.13 |
| MA22: Mean monthly flow, November | 178.28 | 293.74 | 64.76 |
| MA23: Mean monthly flow, December | 101.79 | 181.41 | 78.22 |
| ML1: Mean minimum monthly flow, January | 37.12 | 96.48 | 159.91 |
| ML2: Mean minimum monthly flow, February | 28.64 | 80.29 | 180.34 |
| ML3: Mean minimum monthly flow, March | 32.45 | 77.76 | 139.59 |
| ML4: Mean minimum monthly flow, April | 15.74 | 66.13 | 320.07 |
| ML5: Mean minimum monthly flow, May | 3.81 | 44.38 | 1063.48 |
| ML6: Mean minimum monthly flow, June | 12.78 | 69.53 | 443.92 |
| ML7: Mean minimum monthly flow, July | 84.03 | 158.64 | 88.80 |
| ML8: Mean minimum monthly flow, August | 150.90 | 227.29 | 50.62 |
| ML9: Mean minimum monthly flow, September | 88.86 | 256.45 | 188.60 |
| ML10: Mean minimum monthly flow, October | 91.61 | 276.87 | 202.24 |
| ML11: Mean minimum monthly flow, November | 31.72 | 180.12 | 467.83 |
| ML12: Mean minimum monthly flow, December | 29.22 | 107.82 | 269.00 |
| ML13: CV of minimum monthly flows | 206.63 | 104.46 | -49.45 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.02 | 0.17 | 637.58 |
| ML15: Mean minimum annual flow / mean annual flow | 0.01 | 0.10 | 1419.04 |
| ML16: Median minimum annual flow / median annual flow | 0.00 | 0.17 |  |
| ML20: Ratio of baseflow volume to total flow volume | 0.41 | 0.73 | 78.72 |
| ML22: Mean annual minimum flow divided by catchment area | 0.01 | 0.25 | 2317.98 |
| RA1: Mean of positive changes from one day to next (rise rate) | 45.84 | 43.89 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 354.11 | 282.33 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 21.08 | 17.83 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 355.36 | 351.28 |  |
| RA5: Ratio of days that are higher than previous day | 0.28 | 0.29 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.12 | 0.07 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.09 | 0.05 |  |
| RA8: Number of flow reversals from one day to the next | 46.83 | 70.33 |  |
| RA9: CV, number of flow reversals from one day to the next | 24.87 | 19.22 |  |

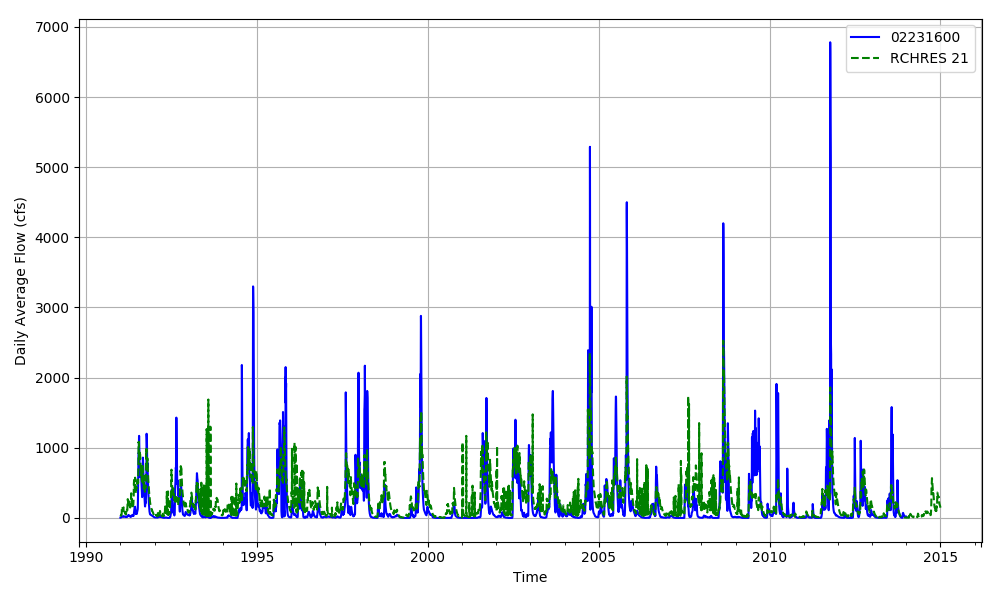


Figure 03080101-19: Daily flow for HSFP reach 21 and USGS station 02231600.

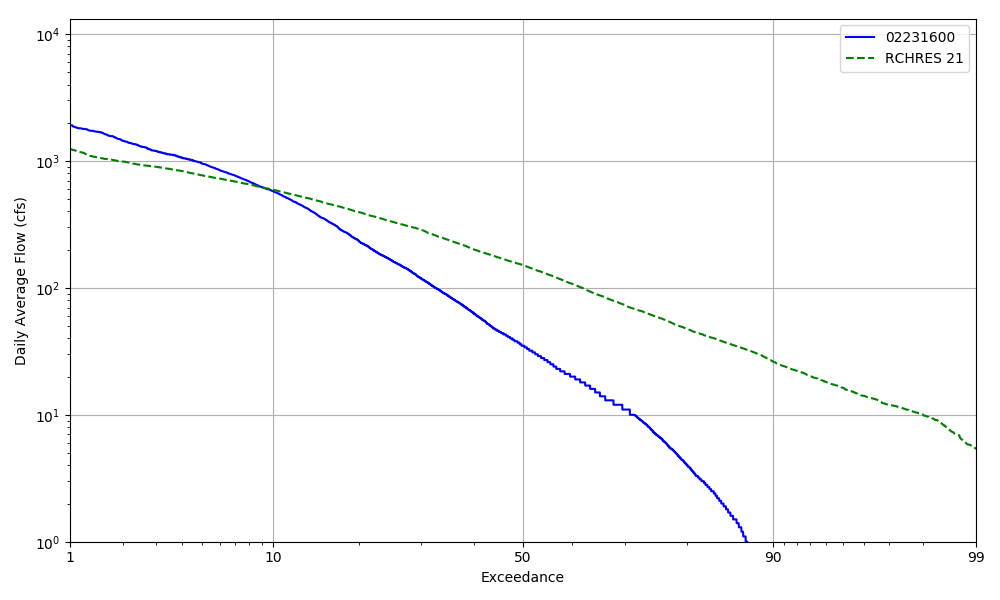


Figure 03080101-20: Daily exceedance for HSFP reach 21 and USGS station 02231600.

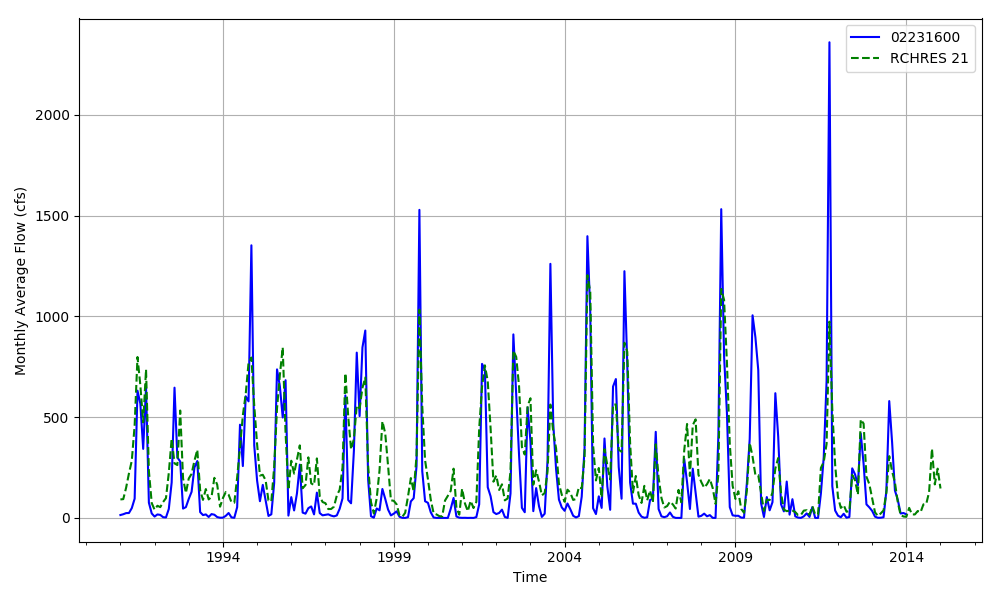


Figure 03080101-21: Monthly flow for HSFP reach 21 and USGS station 02231600.

## HSPF Reach 24, USGS Gauge 02233500

Table 03080101-13: Comparison Statistics Between HSPF Reach 24 and USGS Gauge 02233500.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -72.91 |
| Standard error | 192.39 |
| Relative bias | -0.22 |
| Relative standard error | 0.56 |
| Nash-Sutcliffe coefficient | 0.69 |
| Coefficient of efficiency | 0.56 |
| Index of agreement | 0.76 |

Table 03080101-14: Hydrologic Indices Between USGS Gauge 02233500 and HSPF Reach 24.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02233500 | Simulated Reach 24 | Percent Difference |
| MA1: Mean, all daily flows | 331.06 | 257.71 | -22.15 |
| MA2: Median, all daily flows | 156.00 | 165.80 | 6.28 |
| MA3: CV, all daily flows | 127.83 | 97.96 | -23.37 |
| MA4: CV, log of all daily flows | 107.51 | 92.56 | -13.91 |
| MA5: Mean daily flow / median daily flow | 2.12 | 1.55 | -26.76 |
| MA9: (Q10 - Q90) / median daily flow | 4.93 | 3.59 | -27.20 |
| MA10: (Q20 - Q80) / median daily flow | 2.61 | 2.10 | -19.48 |
| MA11: (Q25 - Q75) / median daily flow | 1.92 | 1.60 | -16.42 |
| MA12: Mean monthly flow, January | 209.55 | 194.98 | -6.95 |
| MA13: Mean monthly flow, February | 191.11 | 165.11 | -13.60 |
| MA14: Mean monthly flow, March | 231.18 | 175.06 | -24.28 |
| MA15: Mean monthly flow, April | 168.70 | 123.96 | -26.52 |
| MA16: Mean monthly flow, May | 109.02 | 82.70 | -24.14 |
| MA17: Mean monthly flow, June | 271.04 | 207.40 | -23.48 |
| MA18: Mean monthly flow, July | 451.87 | 308.16 | -31.80 |
| MA19: Mean monthly flow, August | 666.92 | 399.82 | -40.05 |
| MA20: Mean monthly flow, September | 607.44 | 449.90 | -25.94 |
| MA21: Mean monthly flow, October | 469.22 | 417.59 | -11.00 |
| MA22: Mean monthly flow, November | 219.18 | 238.88 | 8.99 |
| MA23: Mean monthly flow, December | 204.54 | 194.74 | -4.79 |
| ML1: Mean minimum monthly flow, January | 99.54 | 113.08 | 13.60 |
| ML2: Mean minimum monthly flow, February | 98.96 | 98.91 | -0.05 |
| ML3: Mean minimum monthly flow, March | 96.91 | 87.50 | -9.72 |
| ML4: Mean minimum monthly flow, April | 66.30 | 57.67 | -13.02 |
| ML5: Mean minimum monthly flow, May | 47.17 | 35.65 | -24.42 |
| ML6: Mean minimum monthly flow, June | 77.43 | 75.67 | -2.28 |
| ML7: Mean minimum monthly flow, July | 196.65 | 184.30 | -6.28 |
| ML8: Mean minimum monthly flow, August | 224.17 | 237.12 | 5.77 |
| ML9: Mean minimum monthly flow, September | 233.96 | 265.82 | 13.62 |
| ML10: Mean minimum monthly flow, October | 179.52 | 240.60 | 34.02 |
| ML11: Mean minimum monthly flow, November | 111.70 | 146.99 | 31.60 |
| ML12: Mean minimum monthly flow, December | 89.87 | 109.51 | 21.86 |
| ML13: CV of minimum monthly flows | 98.25 | 105.50 | 7.38 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.29 | 0.11 | -60.36 |
| ML15: Mean minimum annual flow / mean annual flow | 0.14 | 0.07 | -48.36 |
| ML16: Median minimum annual flow / median annual flow | 0.24 | 0.10 | -58.73 |
| ML20: Ratio of baseflow volume to total flow volume | 0.54 | 0.72 | 33.33 |
| ML22: Mean annual minimum flow divided by catchment area | 0.41 | 0.19 | -53.51 |
| RA1: Mean of positive changes from one day to next (rise rate) | 83.03 | 66.57 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 245.82 | 306.00 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 39.26 | 21.12 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 231.15 | 368.90 |  |
| RA5: Ratio of days that are higher than previous day | 0.30 | 0.24 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.11 | 0.15 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.07 | 0.06 |  |
| RA8: Number of flow reversals from one day to the next | 69.17 | 90.12 |  |
| RA9: CV, number of flow reversals from one day to the next | 19.82 | 18.91 |  |

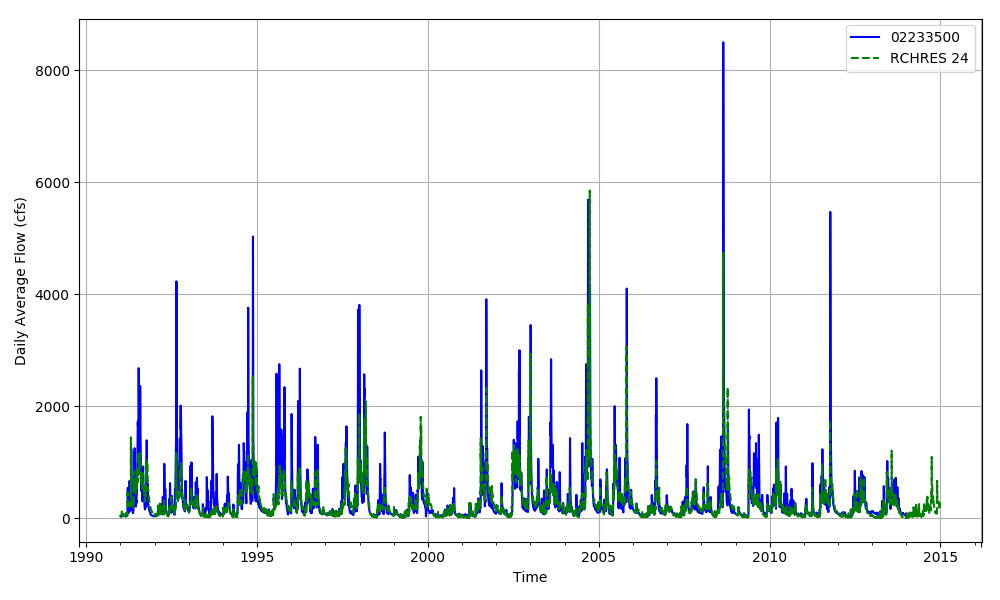


Figure 03080101-22: Daily flow for HSFP reach 24 and USGS station 02233500.

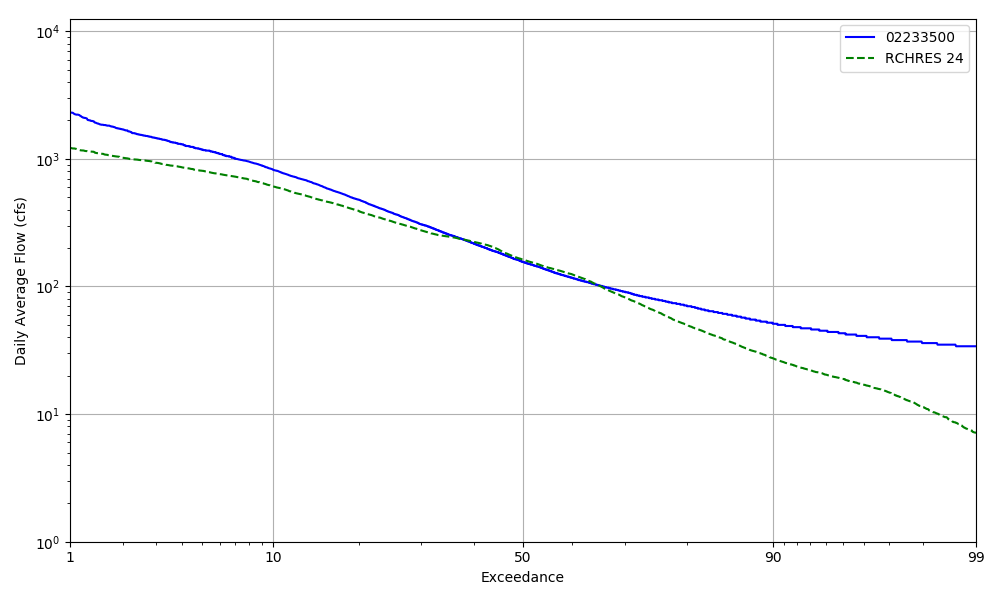


Figure 03080101-23: Daily exceedance for HSFP reach 24 and USGS station 02233500.

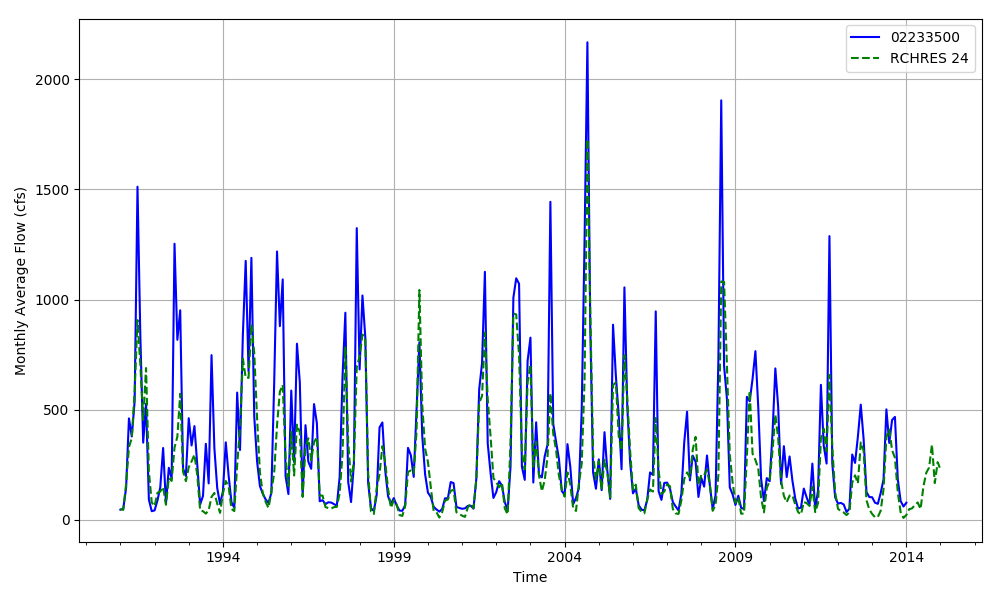


Figure 03080101-24: Monthly flow for HSFP reach 24 and USGS station 02233500.

## HSPF Reach 25, USGS Gauge 02232000

Table 03080101-15: Comparison Statistics Between HSPF Reach 25 and USGS Gauge 02232000.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -95.07 |
| Standard error | 515.25 |
| Relative bias | -0.13 |
| Relative standard error | 0.55 |
| Nash-Sutcliffe coefficient | 0.70 |
| Coefficient of efficiency | 0.54 |
| Index of agreement | 0.73 |

Table 03080101-16: Hydrologic Indices Between USGS Gauge 02232000 and HSPF Reach 25.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02232000 | Simulated Reach 25 | Percent Difference |
| MA1: Mean, all daily flows | 755.07 | 634.43 | -15.98 |
| MA2: Median, all daily flows | 317.00 | 396.09 | 24.95 |
| MA3: CV, all daily flows | 114.74 | 93.06 | -18.89 |
| MA4: CV, log of all daily flows | 120.57 | 91.55 | -24.07 |
| MA5: Mean daily flow / median daily flow | 2.38 | 1.60 | -32.75 |
| MA9: (Q10 - Q90) / median daily flow | 6.51 | 3.64 | -44.20 |
| MA10: (Q20 - Q80) / median daily flow | 3.51 | 2.32 | -33.98 |
| MA11: (Q25 - Q75) / median daily flow | 2.70 | 1.81 | -32.86 |
| MA12: Mean monthly flow, January | 370.00 | 379.23 | 2.50 |
| MA13: Mean monthly flow, February | 331.24 | 304.97 | -7.93 |
| MA14: Mean monthly flow, March | 355.95 | 334.36 | -6.07 |
| MA15: Mean monthly flow, April | 392.20 | 302.59 | -22.85 |
| MA16: Mean monthly flow, May | 226.72 | 213.97 | -5.63 |
| MA17: Mean monthly flow, June | 325.14 | 413.87 | 27.29 |
| MA18: Mean monthly flow, July | 786.31 | 767.17 | -2.43 |
| MA19: Mean monthly flow, August | 1182.75 | 957.29 | -19.06 |
| MA20: Mean monthly flow, September | 1472.09 | 1103.50 | -25.04 |
| MA21: Mean monthly flow, October | 1541.07 | 1294.97 | -15.97 |
| MA22: Mean monthly flow, November | 925.43 | 759.70 | -17.91 |
| MA23: Mean monthly flow, December | 490.37 | 444.96 | -9.26 |
| ML1: Mean minimum monthly flow, January | 261.16 | 230.60 | -11.70 |
| ML2: Mean minimum monthly flow, February | 254.80 | 192.06 | -24.62 |
| ML3: Mean minimum monthly flow, March | 230.47 | 186.78 | -18.96 |
| ML4: Mean minimum monthly flow, April | 265.47 | 169.92 | -35.99 |
| ML5: Mean minimum monthly flow, May | 121.37 | 112.23 | -7.53 |
| ML6: Mean minimum monthly flow, June | 127.21 | 187.94 | 47.74 |
| ML7: Mean minimum monthly flow, July | 466.24 | 436.08 | -6.47 |
| ML8: Mean minimum monthly flow, August | 659.43 | 605.61 | -8.16 |
| ML9: Mean minimum monthly flow, September | 885.13 | 697.18 | -21.23 |
| ML10: Mean minimum monthly flow, October | 792.09 | 725.56 | -8.40 |
| ML11: Mean minimum monthly flow, November | 447.93 | 466.48 | 4.14 |
| ML12: Mean minimum monthly flow, December | 308.45 | 272.74 | -11.58 |
| ML13: CV of minimum monthly flows | 140.04 | 102.52 | -26.79 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.11 | 0.15 | 34.67 |
| ML15: Mean minimum annual flow / mean annual flow | 0.06 | 0.10 | 58.78 |
| ML16: Median minimum annual flow / median annual flow | 0.06 | 0.15 | 128.80 |
| ML20: Ratio of baseflow volume to total flow volume | 0.77 | 0.75 | -2.73 |
| ML22: Mean annual minimum flow divided by catchment area | 0.39 | 0.58 | 50.77 |
| RA1: Mean of positive changes from one day to next (rise rate) | 50.46 | 73.94 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 241.64 | 273.56 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 39.42 | 31.13 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 145.07 | 184.09 |  |
| RA5: Ratio of days that are higher than previous day | 0.42 | 0.30 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.07 | 0.07 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.06 | 0.05 |  |
| RA8: Number of flow reversals from one day to the next | 123.83 | 71.38 |  |
| RA9: CV, number of flow reversals from one day to the next | 32.63 | 20.32 |  |

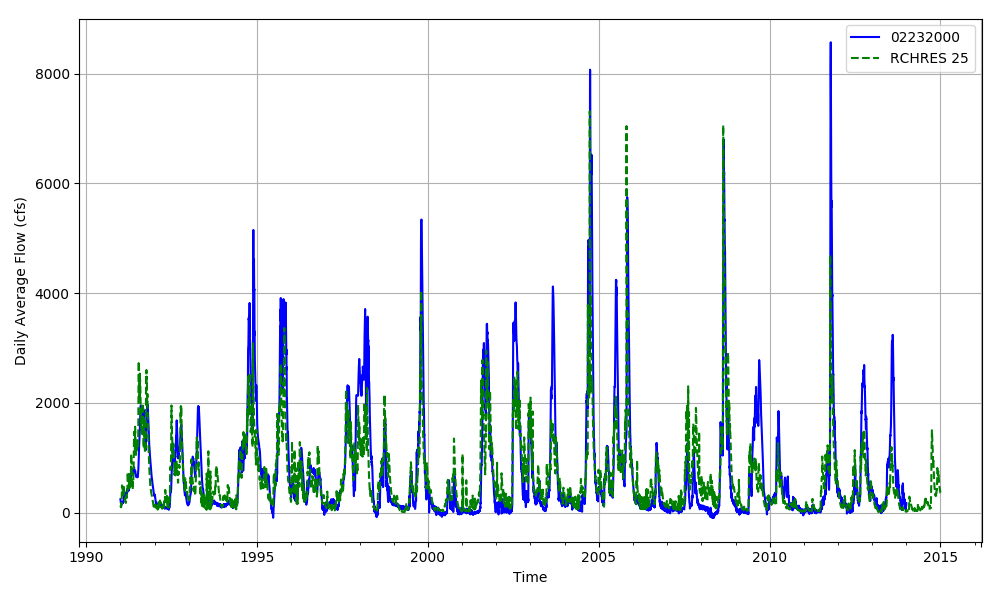


Figure 03080101-25: Daily flow for HSFP reach 25 and USGS station 02232000.

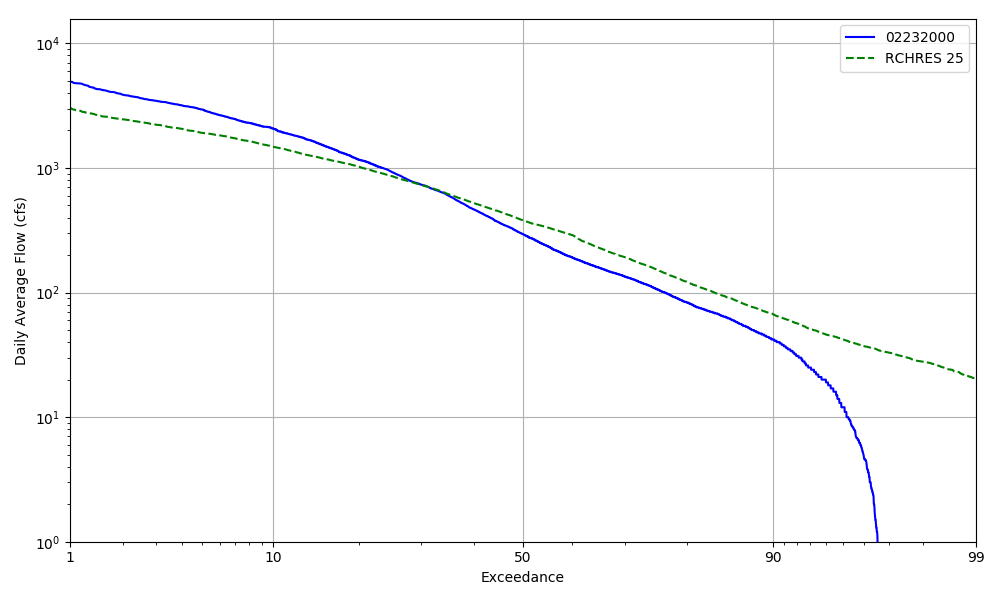


Figure 03080101-26: Daily exceedance for HSFP reach 25 and USGS station 02232000.

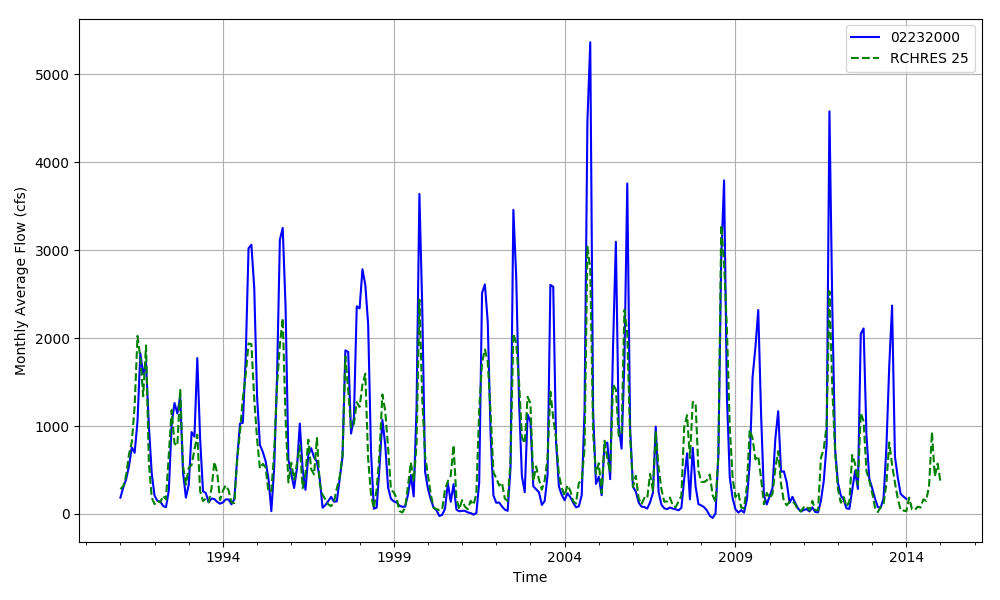


Figure 03080101-27: Monthly flow for HSFP reach 25 and USGS station 02232000.

## HSPF Reach 29, USGS Gauge 02232400

Table 03080101-17: Comparison Statistics Between HSPF Reach 29 and USGS Gauge 02232400.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -129.88 |
| Standard error | 669.72 |
| Relative bias | -0.12 |
| Relative standard error | 0.54 |
| Nash-Sutcliffe coefficient | 0.71 |
| Coefficient of efficiency | 0.53 |
| Index of agreement | 0.74 |

Table 03080101-18: Hydrologic Indices Between USGS Gauge 02232400 and HSPF Reach 29.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02232400 | Simulated Reach 29 | Percent Difference |
| MA1: Mean, all daily flows | 1111.12 | 962.52 | -13.37 |
| MA2: Median, all daily flows | 602.00 | 613.54 | 1.92 |
| MA3: CV, all daily flows | 97.75 | 93.28 | -4.57 |
| MA4: CV, log of all daily flows | 107.11 | 92.26 | -13.86 |
| MA5: Mean daily flow / median daily flow | 1.85 | 1.57 | -15.00 |
| MA9: (Q10 - Q90) / median daily flow | 4.63 | 3.58 | -22.61 |
| MA10: (Q20 - Q80) / median daily flow | 2.77 | 2.15 | -22.36 |
| MA11: (Q25 - Q75) / median daily flow | 2.05 | 1.66 | -19.14 |
| MA12: Mean monthly flow, January | 729.56 | 628.56 | -13.84 |
| MA13: Mean monthly flow, February | 530.10 | 507.33 | -4.29 |
| MA14: Mean monthly flow, March | 540.94 | 531.41 | -1.76 |
| MA15: Mean monthly flow, April | 551.77 | 463.43 | -16.01 |
| MA16: Mean monthly flow, May | 365.34 | 301.42 | -17.50 |
| MA17: Mean monthly flow, June | 402.00 | 592.98 | 47.51 |
| MA18: Mean monthly flow, July | 900.32 | 1090.39 | 21.11 |
| MA19: Mean monthly flow, August | 1440.28 | 1429.93 | -0.72 |
| MA20: Mean monthly flow, September | 1984.82 | 1671.66 | -15.78 |
| MA21: Mean monthly flow, October | 2417.70 | 1924.74 | -20.39 |
| MA22: Mean monthly flow, November | 1704.28 | 1176.39 | -30.97 |
| MA23: Mean monthly flow, December | 999.89 | 726.06 | -27.39 |
| ML1: Mean minimum monthly flow, January | 528.34 | 402.44 | -23.83 |
| ML2: Mean minimum monthly flow, February | 390.78 | 333.35 | -14.70 |
| ML3: Mean minimum monthly flow, March | 364.47 | 305.32 | -16.23 |
| ML4: Mean minimum monthly flow, April | 423.74 | 265.33 | -37.38 |
| ML5: Mean minimum monthly flow, May | 258.95 | 164.93 | -36.31 |
| ML6: Mean minimum monthly flow, June | 224.90 | 277.67 | 23.46 |
| ML7: Mean minimum monthly flow, July | 590.16 | 650.77 | 10.27 |
| ML8: Mean minimum monthly flow, August | 991.12 | 911.48 | -8.04 |
| ML9: Mean minimum monthly flow, September | 1401.39 | 1079.81 | -22.95 |
| ML10: Mean minimum monthly flow, October | 1776.91 | 1117.24 | -37.12 |
| ML11: Mean minimum monthly flow, November | 1126.22 | 742.48 | -34.07 |
| ML12: Mean minimum monthly flow, December | 676.35 | 451.19 | -33.29 |
| ML13: CV of minimum monthly flows | 123.60 | 102.68 | -16.93 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.12 | 0.15 | 26.35 |
| ML15: Mean minimum annual flow / mean annual flow | 0.08 | 0.10 | 28.03 |
| ML16: Median minimum annual flow / median annual flow | 0.04 | 0.14 | 229.74 |
| ML20: Ratio of baseflow volume to total flow volume | 0.91 | 0.78 | -14.14 |
| ML22: Mean annual minimum flow divided by catchment area | 0.88 | 0.90 | 2.04 |
| RA1: Mean of positive changes from one day to next (rise rate) | 57.63 | 91.38 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 205.06 | 326.91 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 44.41 | 42.13 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 141.19 | 177.90 |  |
| RA5: Ratio of days that are higher than previous day | 0.42 | 0.32 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.05 | 0.06 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.04 | 0.04 |  |
| RA8: Number of flow reversals from one day to the next | 132.21 | 60.25 |  |
| RA9: CV, number of flow reversals from one day to the next | 38.60 | 20.66 |  |

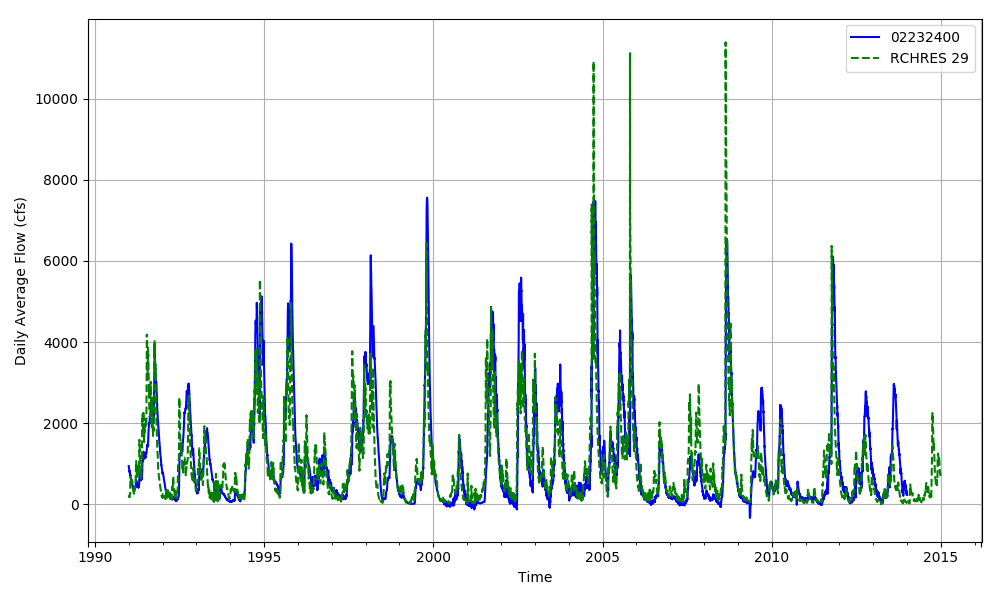


Figure 03080101-28: Daily flow for HSFP reach 29 and USGS station 02232400.

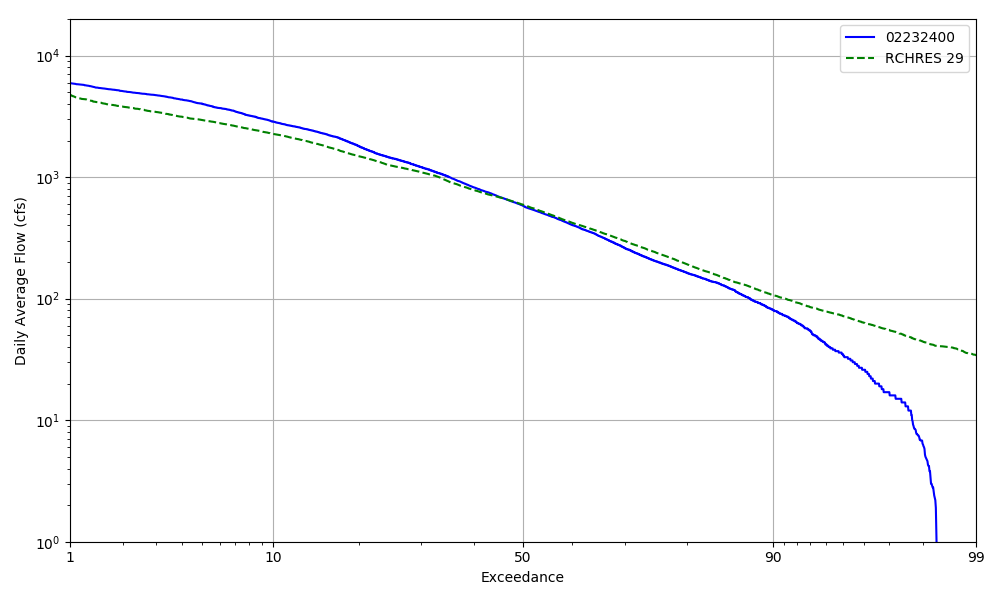


Figure 03080101-29: Daily exceedance for HSFP reach 29 and USGS station 02232400.

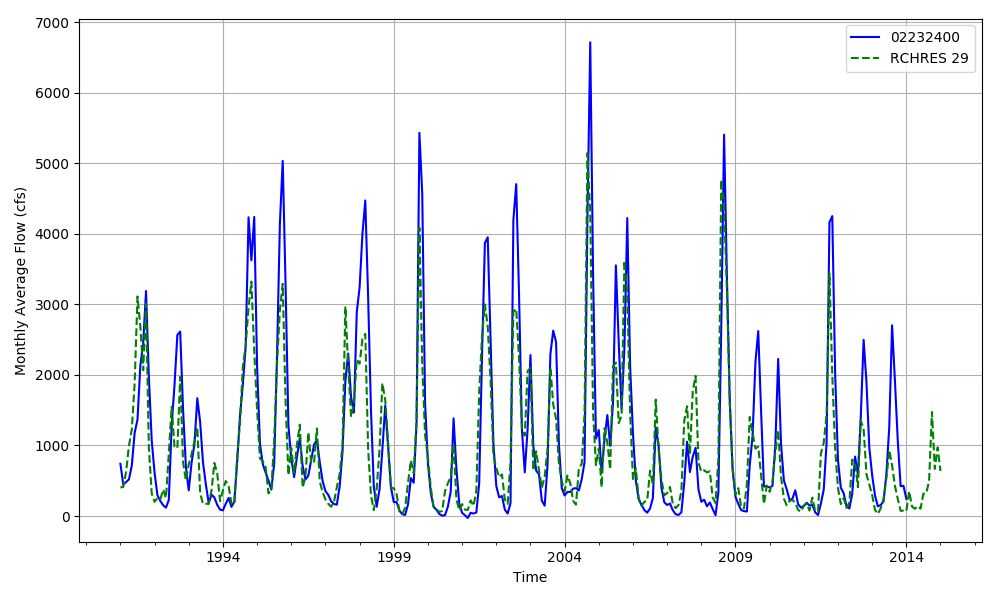


Figure 03080101-30: Monthly flow for HSFP reach 29 and USGS station 02232400.

## HSPF Reach 31, USGS Gauge 02232500

Table 03080101-19: Comparison Statistics Between HSPF Reach 31 and USGS Gauge 02232500.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -96.44 |
| Standard error | 730.59 |
| Relative bias | -0.07 |
| Relative standard error | 0.53 |
| Nash-Sutcliffe coefficient | 0.72 |
| Coefficient of efficiency | 0.54 |
| Index of agreement | 0.76 |

Table 03080101-20: Hydrologic Indices Between USGS Gauge 02232500 and HSPF Reach 31.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02232500 | Simulated Reach 31 | Percent Difference |
| MA1: Mean, all daily flows | 1335.29 | 1224.87 | -8.27 |
| MA2: Median, all daily flows | 803.00 | 772.42 | -3.81 |
| MA3: CV, all daily flows | 91.07 | 93.81 | 3.01 |
| MA4: CV, log of all daily flows | 100.68 | 93.21 | -7.42 |
| MA5: Mean daily flow / median daily flow | 1.66 | 1.59 | -4.64 |
| MA9: (Q10 - Q90) / median daily flow | 4.31 | 3.68 | -14.58 |
| MA10: (Q20 - Q80) / median daily flow | 2.47 | 2.15 | -12.95 |
| MA11: (Q25 - Q75) / median daily flow | 1.90 | 1.65 | -13.08 |
| MA12: Mean monthly flow, January | 969.71 | 864.29 | -10.87 |
| MA13: Mean monthly flow, February | 725.34 | 697.20 | -3.88 |
| MA14: Mean monthly flow, March | 680.27 | 702.71 | 3.30 |
| MA15: Mean monthly flow, April | 655.01 | 582.59 | -11.06 |
| MA16: Mean monthly flow, May | 423.91 | 371.79 | -12.29 |
| MA17: Mean monthly flow, June | 540.15 | 714.07 | 32.20 |
| MA18: Mean monthly flow, July | 1073.67 | 1319.08 | 22.86 |
| MA19: Mean monthly flow, August | 1716.24 | 1781.63 | 3.81 |
| MA20: Mean monthly flow, September | 2336.29 | 2109.45 | -9.71 |
| MA21: Mean monthly flow, October | 2778.09 | 2418.69 | -12.94 |
| MA22: Mean monthly flow, November | 2023.48 | 1518.66 | -24.95 |
| MA23: Mean monthly flow, December | 1259.05 | 977.00 | -22.40 |
| ML1: Mean minimum monthly flow, January | 699.92 | 560.04 | -19.99 |
| ML2: Mean minimum monthly flow, February | 560.74 | 469.82 | -16.21 |
| ML3: Mean minimum monthly flow, March | 488.57 | 402.46 | -17.62 |
| ML4: Mean minimum monthly flow, April | 506.13 | 341.92 | -32.44 |
| ML5: Mean minimum monthly flow, May | 297.08 | 206.45 | -30.51 |
| ML6: Mean minimum monthly flow, June | 288.82 | 337.88 | 16.99 |
| ML7: Mean minimum monthly flow, July | 761.48 | 806.18 | 5.87 |
| ML8: Mean minimum monthly flow, August | 1189.39 | 1127.90 | -5.17 |
| ML9: Mean minimum monthly flow, September | 1819.57 | 1348.70 | -25.88 |
| ML10: Mean minimum monthly flow, October | 2069.83 | 1422.43 | -31.28 |
| ML11: Mean minimum monthly flow, November | 1502.87 | 971.33 | -35.37 |
| ML12: Mean minimum monthly flow, December | 843.00 | 622.43 | -26.16 |
| ML13: CV of minimum monthly flows | 117.67 | 102.68 | -12.74 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.15 | 0.16 | 2.15 |
| ML15: Mean minimum annual flow / mean annual flow | 0.10 | 0.10 | -0.62 |
| ML16: Median minimum annual flow / median annual flow | 0.10 | 0.14 | 43.37 |
| ML20: Ratio of baseflow volume to total flow volume | 0.93 | 0.78 | -16.41 |
| ML22: Mean annual minimum flow divided by catchment area | 1.47 | 1.16 | -20.79 |
| RA1: Mean of positive changes from one day to next (rise rate) | 63.90 | 104.88 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 234.90 | 336.15 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 37.47 | 50.86 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 123.26 | 152.54 |  |
| RA5: Ratio of days that are higher than previous day | 0.36 | 0.33 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.04 | 0.06 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.03 | 0.04 |  |
| RA8: Number of flow reversals from one day to the next | 100.58 | 54.50 |  |
| RA9: CV, number of flow reversals from one day to the next | 39.73 | 20.46 |  |

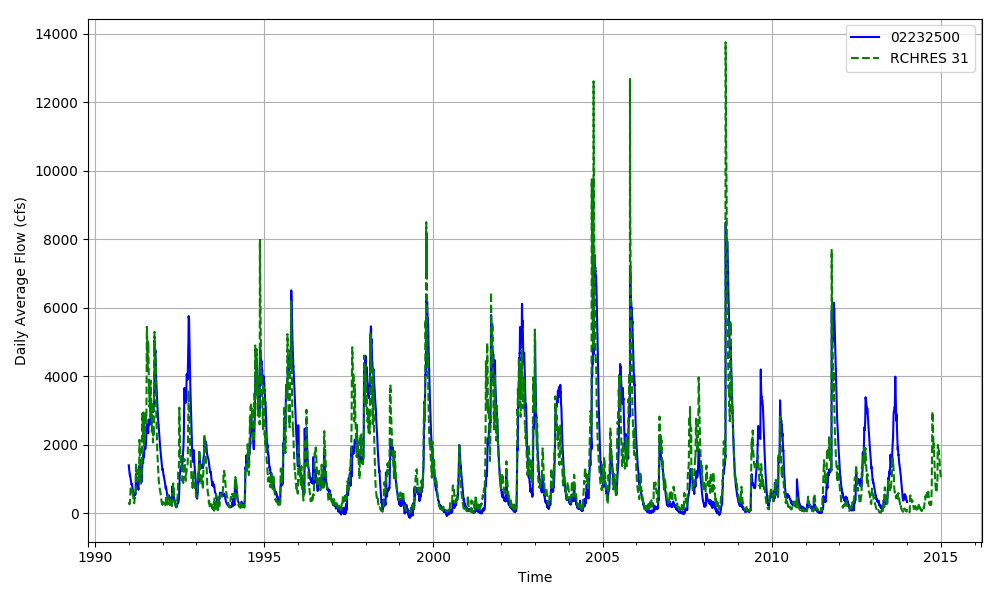


Figure 03080101-31: Daily flow for HSFP reach 31 and USGS station 02232500.

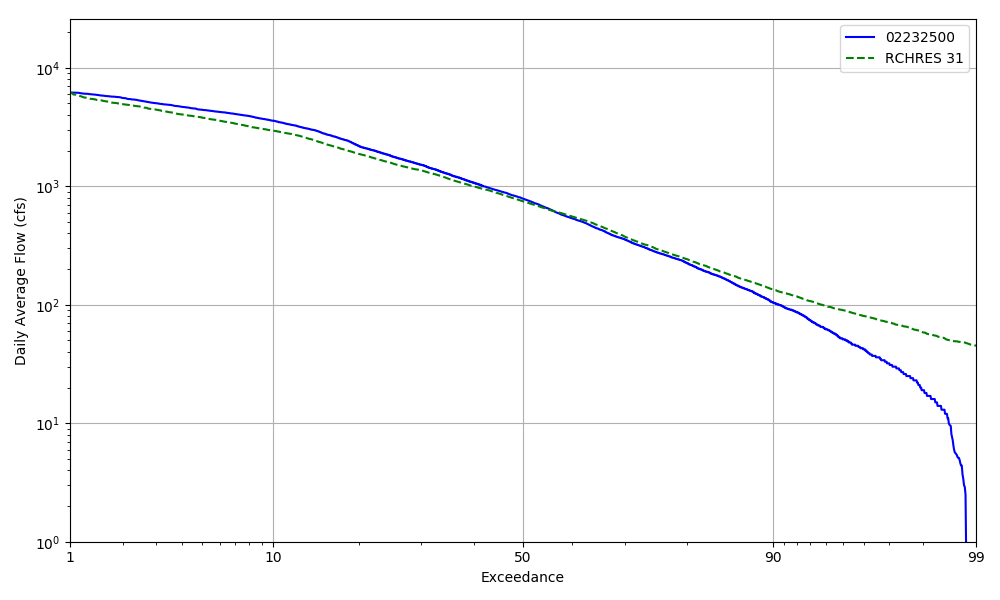


Figure 03080101-32: Daily exceedance for HSFP reach 31 and USGS station 02232500.

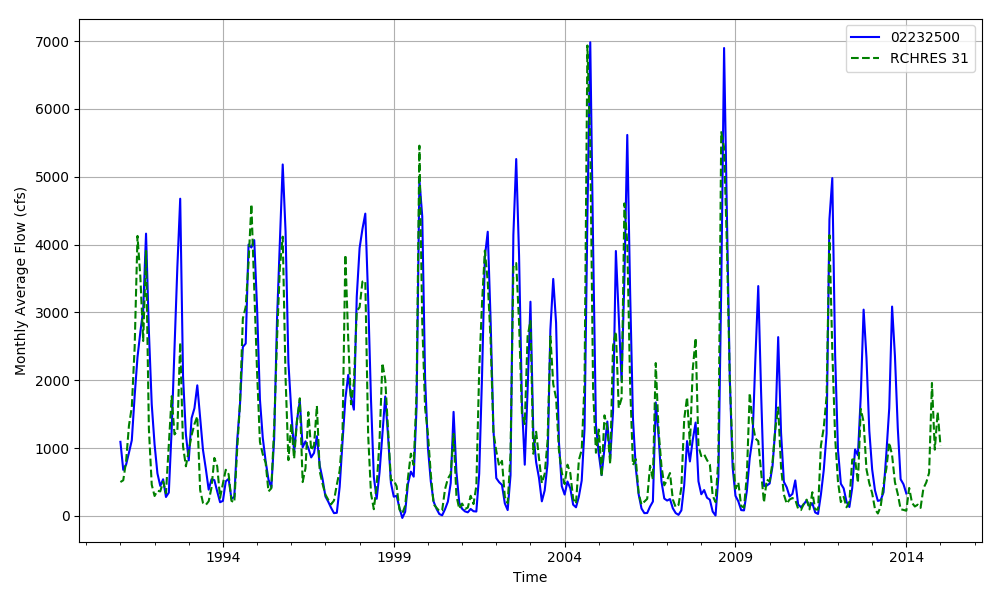


Figure 03080101-33: Monthly flow for HSFP reach 31 and USGS station 02232500.

## HSPF Reach 35, USGS Gauge 02234000

Table 03080101-21: Comparison Statistics Between HSPF Reach 35 and USGS Gauge 02234000.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -236.91 |
| Standard error | 901.79 |
| Relative bias | -0.12 |
| Relative standard error | 0.48 |
| Nash-Sutcliffe coefficient | 0.77 |
| Coefficient of efficiency | 0.60 |
| Index of agreement | 0.79 |

Table 03080101-22: Hydrologic Indices Between USGS Gauge 02234000 and HSPF Reach 35.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02234000 | Simulated Reach 35 | Percent Difference |
| MA1: Mean, all daily flows | 1958.19 | 1712.51 | -12.55 |
| MA2: Median, all daily flows | 1200.00 | 1101.56 | -8.20 |
| MA3: CV, all daily flows | 85.98 | 93.64 | 8.91 |
| MA4: CV, log of all daily flows | 93.76 | 93.18 | -0.61 |
| MA5: Mean daily flow / median daily flow | 1.63 | 1.55 | -4.73 |
| MA9: (Q10 - Q90) / median daily flow | 3.91 | 3.66 | -6.39 |
| MA10: (Q20 - Q80) / median daily flow | 2.39 | 2.08 | -12.89 |
| MA11: (Q25 - Q75) / median daily flow | 1.88 | 1.60 | -15.21 |
| MA12: Mean monthly flow, January | 1505.08 | 1270.44 | -15.59 |
| MA13: Mean monthly flow, February | 1111.43 | 1035.63 | -6.82 |
| MA14: Mean monthly flow, March | 1032.98 | 1040.04 | 0.68 |
| MA15: Mean monthly flow, April | 972.25 | 819.17 | -15.74 |
| MA16: Mean monthly flow, May | 626.77 | 518.23 | -17.32 |
| MA17: Mean monthly flow, June | 967.23 | 1047.58 | 8.31 |
| MA18: Mean monthly flow, July | 1735.07 | 1857.39 | 7.05 |
| MA19: Mean monthly flow, August | 2680.93 | 2489.97 | -7.12 |
| MA20: Mean monthly flow, September | 3315.38 | 2922.69 | -11.84 |
| MA21: Mean monthly flow, October | 3729.66 | 3239.68 | -13.14 |
| MA22: Mean monthly flow, November | 2827.81 | 2031.96 | -28.14 |
| MA23: Mean monthly flow, December | 1893.53 | 1383.20 | -26.95 |
| ML1: Mean minimum monthly flow, January | 979.04 | 818.84 | -16.36 |
| ML2: Mean minimum monthly flow, February | 737.78 | 699.89 | -5.14 |
| ML3: Mean minimum monthly flow, March | 633.34 | 591.38 | -6.63 |
| ML4: Mean minimum monthly flow, April | 612.65 | 464.93 | -24.11 |
| ML5: Mean minimum monthly flow, May | 377.16 | 289.56 | -23.23 |
| ML6: Mean minimum monthly flow, June | 475.21 | 477.64 | 0.51 |
| ML7: Mean minimum monthly flow, July | 1183.83 | 1172.32 | -0.97 |
| ML8: Mean minimum monthly flow, August | 1751.91 | 1585.09 | -9.52 |
| ML9: Mean minimum monthly flow, September | 2529.61 | 1850.37 | -26.85 |
| ML10: Mean minimum monthly flow, October | 2802.96 | 1925.34 | -31.31 |
| ML11: Mean minimum monthly flow, November | 2088.70 | 1311.71 | -37.20 |
| ML12: Mean minimum monthly flow, December | 1295.78 | 878.04 | -32.24 |
| ML13: CV of minimum monthly flows | 113.80 | 102.35 | -10.06 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.15 | 0.15 | 1.25 |
| ML15: Mean minimum annual flow / mean annual flow | 0.11 | 0.10 | -6.00 |
| ML16: Median minimum annual flow / median annual flow | 0.11 | 0.13 | 14.00 |
| ML20: Ratio of baseflow volume to total flow volume | 0.86 | 0.77 | -10.33 |
| ML22: Mean annual minimum flow divided by catchment area | 2.15 | 1.63 | -23.90 |
| RA1: Mean of positive changes from one day to next (rise rate) | 132.22 | 157.67 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 201.27 | 334.63 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 88.71 | 73.12 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 162.47 | 170.94 |  |
| RA5: Ratio of days that are higher than previous day | 0.39 | 0.32 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.06 | 0.06 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.04 | 0.04 |  |
| RA8: Number of flow reversals from one day to the next | 114.92 | 64.21 |  |
| RA9: CV, number of flow reversals from one day to the next | 33.85 | 18.66 |  |

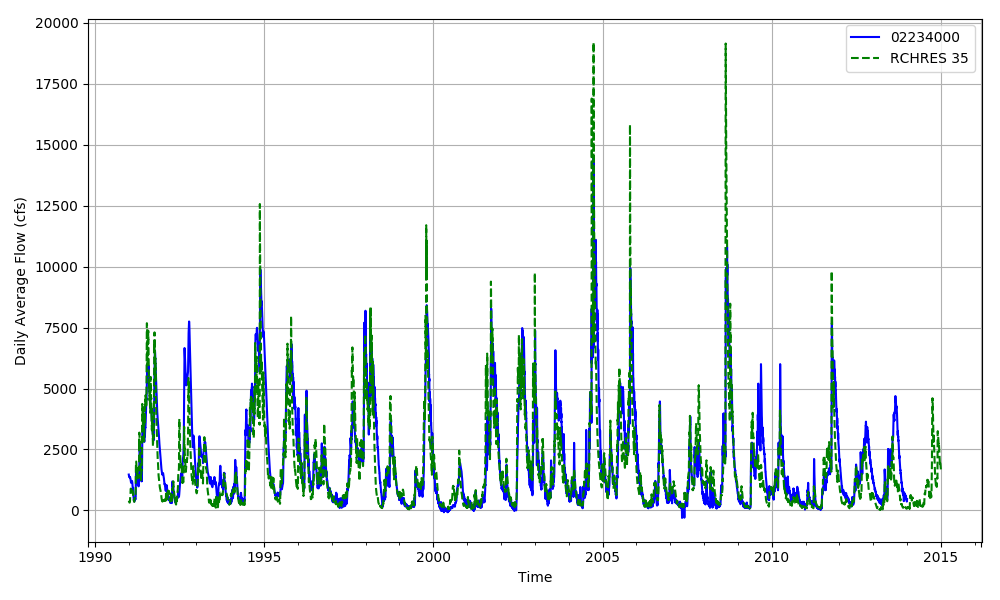


Figure 03080101-34: Daily flow for HSFP reach 35 and USGS station 02234000.

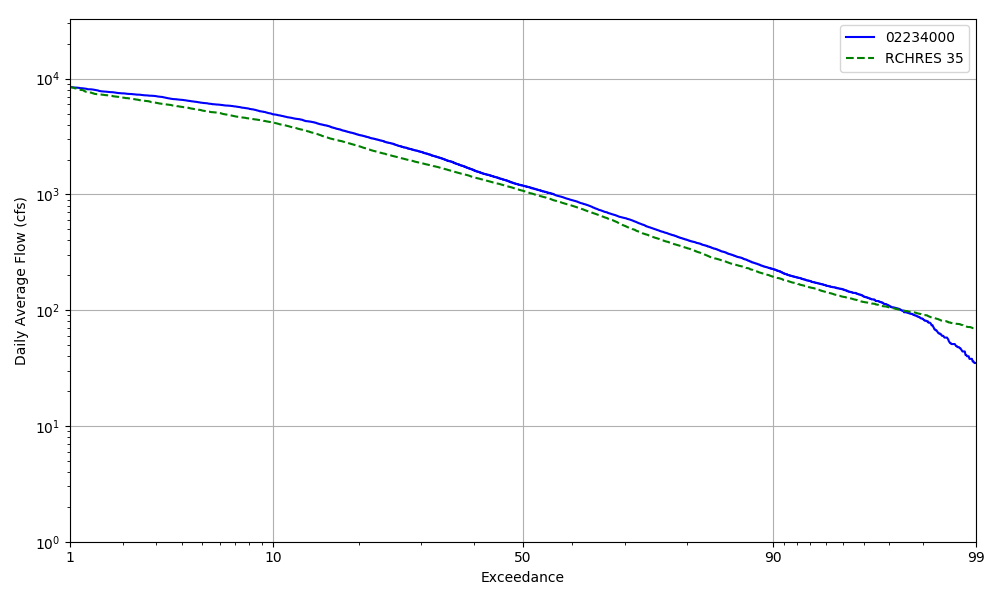


Figure 03080101-35: Daily exceedance for HSFP reach 35 and USGS station 02234000.

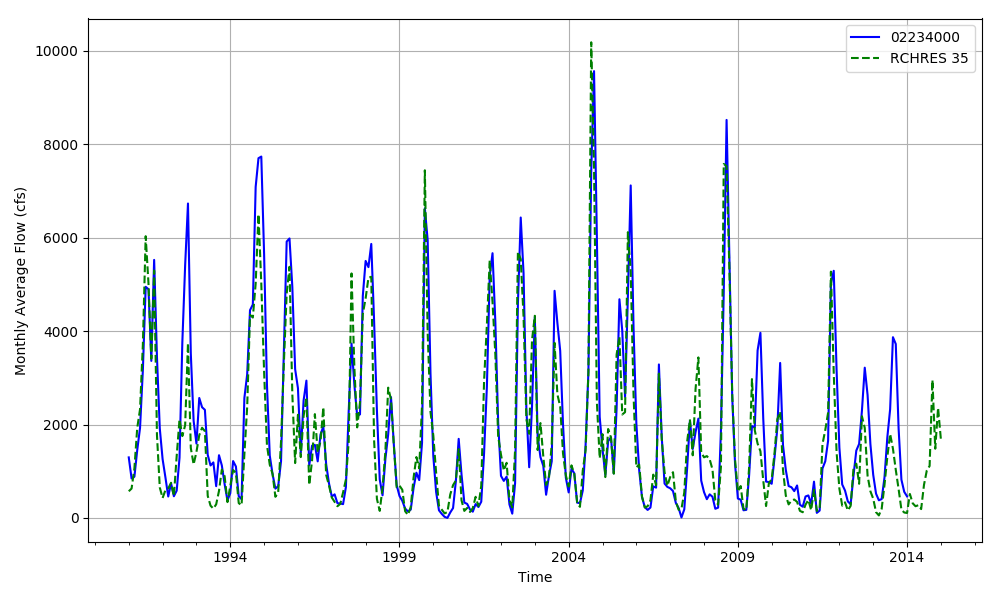


Figure 03080101-36: Monthly flow for HSFP reach 35 and USGS station 02234000.

## HSPF Reach 39, USGS Gauge 02234500

Table 03080101-23: Comparison Statistics Between HSPF Reach 39 and USGS Gauge 02234500.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -79.80 |
| Standard error | 1222.34 |
| Relative bias | -0.04 |
| Relative standard error | 0.55 |
| Nash-Sutcliffe coefficient | 0.70 |
| Coefficient of efficiency | 0.51 |
| Index of agreement | 0.75 |

Table 03080101-24: Hydrologic Indices Between USGS Gauge 02234500 and HSPF Reach 39.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02234500 | Simulated Reach 39 | Percent Difference |
| MA1: Mean, all daily flows | 2534.46 | 2150.40 | -15.15 |
| MA2: Median, all daily flows | 1790.00 | 1387.35 | -22.49 |
| MA3: CV, all daily flows | 73.15 | 93.53 | 27.86 |
| MA4: CV, log of all daily flows | 81.84 | 92.65 | 13.21 |
| MA5: Mean daily flow / median daily flow | 1.42 | 1.55 | 9.47 |
| MA9: (Q10 - Q90) / median daily flow | 2.99 | 3.52 | 17.87 |
| MA10: (Q20 - Q80) / median daily flow | 1.76 | 1.97 | 12.28 |
| MA11: (Q25 - Q75) / median daily flow | 1.38 | 1.49 | 8.03 |
| MA12: Mean monthly flow, January | 1978.97 | 1614.01 | -18.44 |
| MA13: Mean monthly flow, February | 1353.90 | 1316.55 | -2.76 |
| MA14: Mean monthly flow, March | 1494.30 | 1420.80 | -4.92 |
| MA15: Mean monthly flow, April | 1425.70 | 1017.72 | -28.62 |
| MA16: Mean monthly flow, May | 965.77 | 618.79 | -35.93 |
| MA17: Mean monthly flow, June | 1152.23 | 1253.51 | 8.79 |
| MA18: Mean monthly flow, July | 1845.39 | 2232.39 | 20.97 |
| MA19: Mean monthly flow, August | 2627.41 | 3082.76 | 17.33 |
| MA20: Mean monthly flow, September | 3754.32 | 3755.62 | 0.03 |
| MA21: Mean monthly flow, October | 4108.63 | 3872.86 | -5.74 |
| MA22: Mean monthly flow, November | 3451.77 | 2368.45 | -31.38 |
| MA23: Mean monthly flow, December | 2394.62 | 1672.87 | -30.14 |
| ML1: Mean minimum monthly flow, January | 1111.32 | 1125.20 | 1.25 |
| ML2: Mean minimum monthly flow, February | 590.28 | 964.23 | 63.35 |
| ML3: Mean minimum monthly flow, March | 714.05 | 850.78 | 19.15 |
| ML4: Mean minimum monthly flow, April | 790.94 | 580.27 | -26.64 |
| ML5: Mean minimum monthly flow, May | 275.38 | 367.22 | 33.35 |
| ML6: Mean minimum monthly flow, June | 407.99 | 552.17 | 35.34 |
| ML7: Mean minimum monthly flow, July | 1012.21 | 1427.37 | 41.02 |
| ML8: Mean minimum monthly flow, August | 1618.66 | 1925.17 | 18.94 |
| ML9: Mean minimum monthly flow, September | 2725.16 | 2309.22 | -15.26 |
| ML10: Mean minimum monthly flow, October | 3056.22 | 2293.79 | -24.95 |
| ML11: Mean minimum monthly flow, November | 2575.79 | 1613.13 | -37.37 |
| ML12: Mean minimum monthly flow, December | 1393.37 | 1036.98 | -25.58 |
| ML13: CV of minimum monthly flows | 139.69 | 98.49 | -29.49 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.04 | 0.18 | 388.12 |
| ML15: Mean minimum annual flow / mean annual flow | 0.03 | 0.11 | 292.57 |
| ML16: Median minimum annual flow / median annual flow | 0.01 | 0.16 | 1710.50 |
| ML20: Ratio of baseflow volume to total flow volume | 0.78 | 0.78 | -0.13 |
| ML22: Mean annual minimum flow divided by catchment area | 0.76 | 2.35 | 211.11 |
| RA1: Mean of positive changes from one day to next (rise rate) | 198.84 | 197.21 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 95.18 | 357.53 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 196.64 | 94.32 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 96.11 | 219.24 |  |
| RA5: Ratio of days that are higher than previous day | 0.49 | 0.32 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.08 | 0.05 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.07 | 0.04 |  |
| RA8: Number of flow reversals from one day to the next | 129.65 | 58.95 |  |
| RA9: CV, number of flow reversals from one day to the next | 20.47 | 22.50 |  |

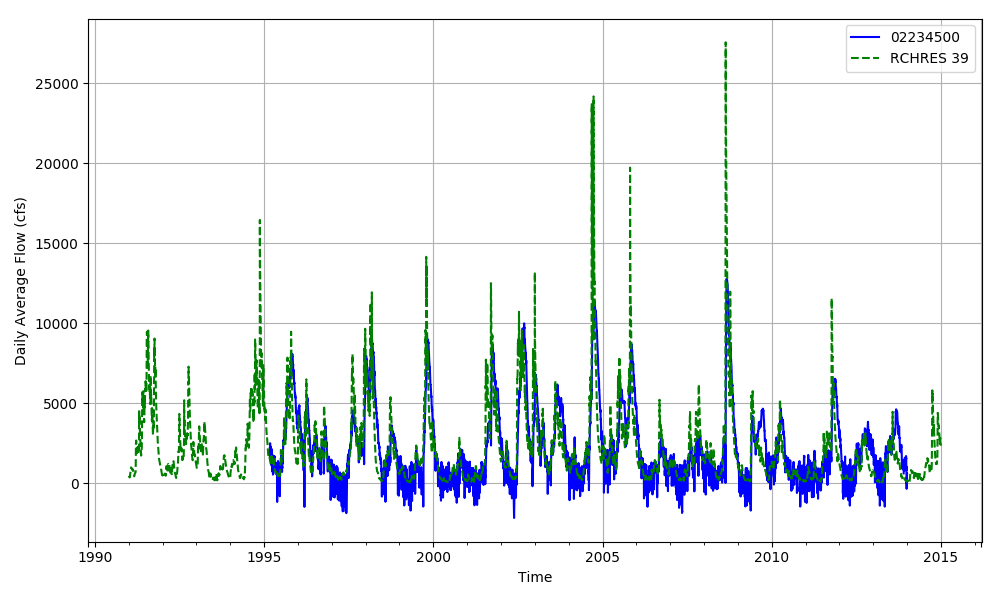


Figure 03080101-37: Daily flow for HSFP reach 39 and USGS station 02234500.

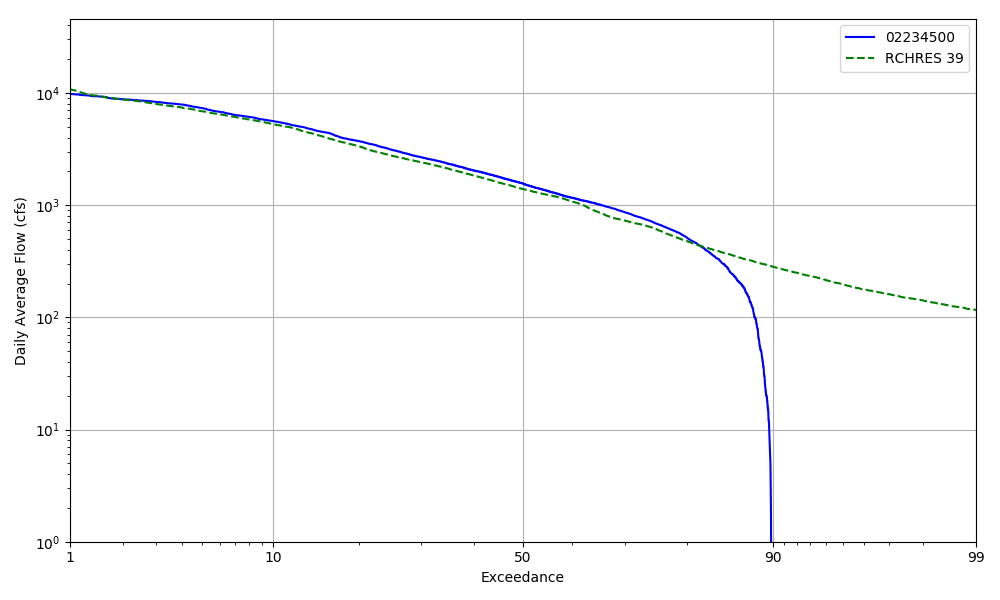


Figure 03080101-38: Daily exceedance for HSFP reach 39 and USGS station 02234500.

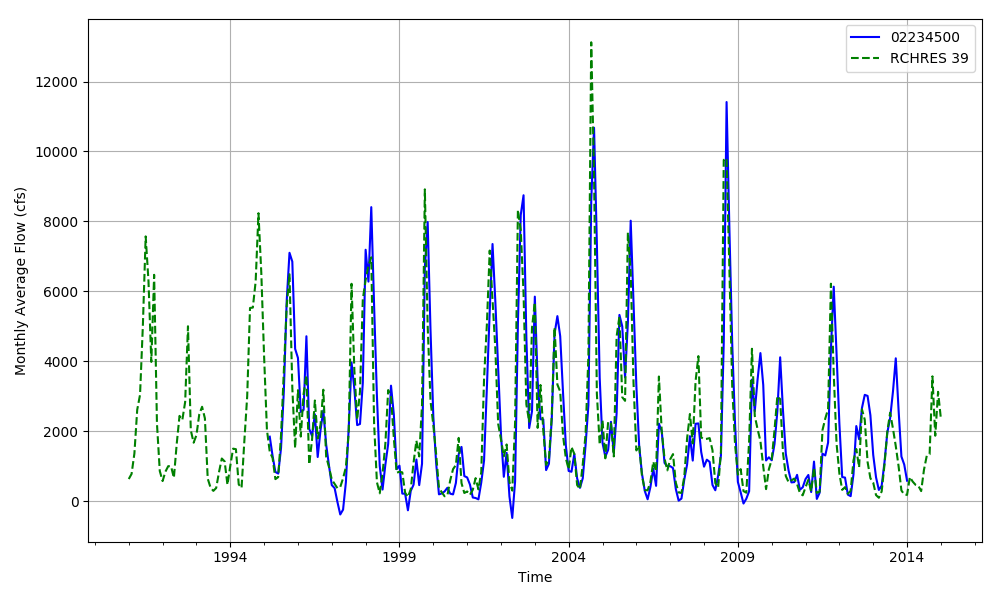


Figure 03080101-39: Monthly flow for HSFP reach 39 and USGS station 02234500.

## HSPF Reach 42, USGS Gauge 02236000

Table 03080101-25: Comparison Statistics Between HSPF Reach 42 and USGS Gauge 02236000.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -9.30 |
| Standard error | 1341.24 |
| Relative bias | -0.00 |
| Relative standard error | 0.57 |
| Nash-Sutcliffe coefficient | 0.67 |
| Coefficient of efficiency | 0.49 |
| Index of agreement | 0.75 |

Table 03080101-26: Hydrologic Indices Between USGS Gauge 02236000 and HSPF Reach 42.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02236000 | Simulated Reach 42 | Percent Difference |
| MA1: Mean, all daily flows | 3125.54 | 2935.33 | -6.09 |
| MA2: Median, all daily flows | 2400.00 | 2044.08 | -14.83 |
| MA3: CV, all daily flows | 64.21 | 79.47 | 23.76 |
| MA4: CV, log of all daily flows | 69.66 | 78.70 | 12.99 |
| MA5: Mean daily flow / median daily flow | 1.30 | 1.44 | 10.27 |
| MA9: (Q10 - Q90) / median daily flow | 2.44 | 2.86 | 17.51 |
| MA10: (Q20 - Q80) / median daily flow | 1.48 | 1.65 | 11.27 |
| MA11: (Q25 - Q75) / median daily flow | 1.18 | 1.24 | 5.07 |
| MA12: Mean monthly flow, January | 2743.58 | 2332.45 | -14.99 |
| MA13: Mean monthly flow, February | 2091.24 | 2019.94 | -3.41 |
| MA14: Mean monthly flow, March | 2074.32 | 2099.61 | 1.22 |
| MA15: Mean monthly flow, April | 1995.58 | 1692.34 | -15.20 |
| MA16: Mean monthly flow, May | 1431.50 | 1199.56 | -16.20 |
| MA17: Mean monthly flow, June | 1822.60 | 2002.17 | 9.85 |
| MA18: Mean monthly flow, July | 2704.05 | 3160.70 | 16.89 |
| MA19: Mean monthly flow, August | 3292.34 | 4026.32 | 22.29 |
| MA20: Mean monthly flow, September | 4360.47 | 4598.98 | 5.47 |
| MA21: Mean monthly flow, October | 4836.31 | 4929.72 | 1.93 |
| MA22: Mean monthly flow, November | 4228.45 | 3239.26 | -23.39 |
| MA23: Mean monthly flow, December | 3258.13 | 2420.94 | -25.70 |
| ML1: Mean minimum monthly flow, January | 1540.54 | 1653.03 | 7.30 |
| ML2: Mean minimum monthly flow, February | 1014.20 | 1558.55 | 53.67 |
| ML3: Mean minimum monthly flow, March | 957.48 | 1412.86 | 47.56 |
| ML4: Mean minimum monthly flow, April | 1042.57 | 1157.95 | 11.07 |
| ML5: Mean minimum monthly flow, May | 487.81 | 865.21 | 77.37 |
| ML6: Mean minimum monthly flow, June | 734.30 | 1173.15 | 59.76 |
| ML7: Mean minimum monthly flow, July | 1773.48 | 2246.53 | 26.67 |
| ML8: Mean minimum monthly flow, August | 2221.04 | 2794.90 | 25.84 |
| ML9: Mean minimum monthly flow, September | 3051.57 | 3048.42 | -0.10 |
| ML10: Mean minimum monthly flow, October | 3394.96 | 3142.62 | -7.43 |
| ML11: Mean minimum monthly flow, November | 3080.75 | 2286.99 | -25.77 |
| ML12: Mean minimum monthly flow, December | 1993.70 | 1698.89 | -14.79 |
| ML13: CV of minimum monthly flows | 120.28 | 78.84 | -34.45 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.04 | 0.34 | 798.06 |
| ML15: Mean minimum annual flow / mean annual flow | 0.03 | 0.25 | 666.34 |
| ML16: Median minimum annual flow / median annual flow | 0.02 | 0.32 | 1724.09 |
| ML20: Ratio of baseflow volume to total flow volume | 0.77 | 0.81 | 5.23 |
| ML22: Mean annual minimum flow divided by catchment area | 1.21 | 6.57 | 444.95 |
| RA1: Mean of positive changes from one day to next (rise rate) | 239.72 | 246.70 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 104.72 | 346.89 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 234.10 | 112.92 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 106.33 | 237.32 |  |
| RA5: Ratio of days that are higher than previous day | 0.48 | 0.31 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.07 | 0.03 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.06 | 0.03 |  |
| RA8: Number of flow reversals from one day to the next | 122.12 | 67.46 |  |
| RA9: CV, number of flow reversals from one day to the next | 18.73 | 21.13 |  |

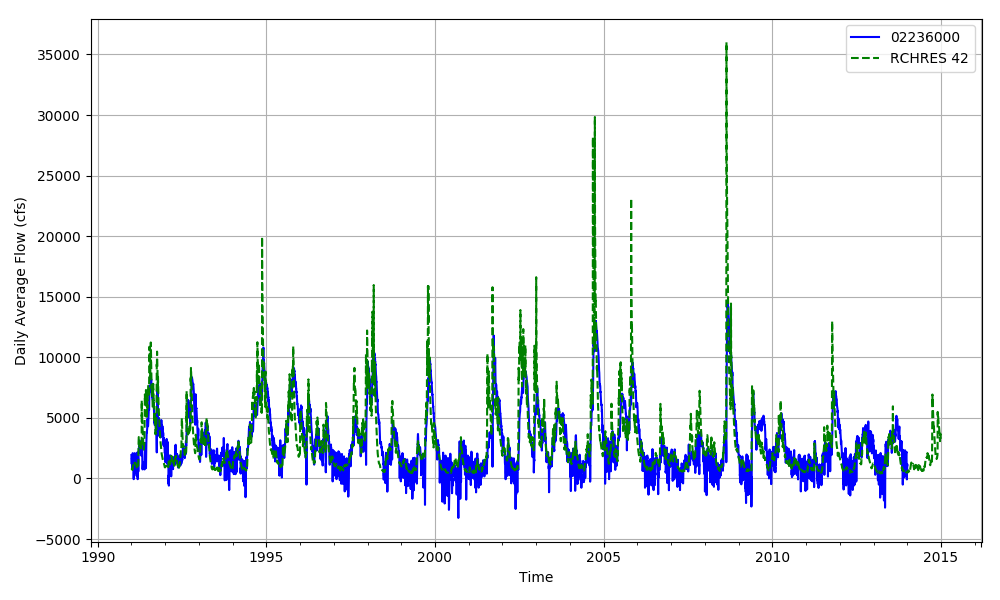


Figure 03080101-40: Daily flow for HSFP reach 42 and USGS station 02236000.

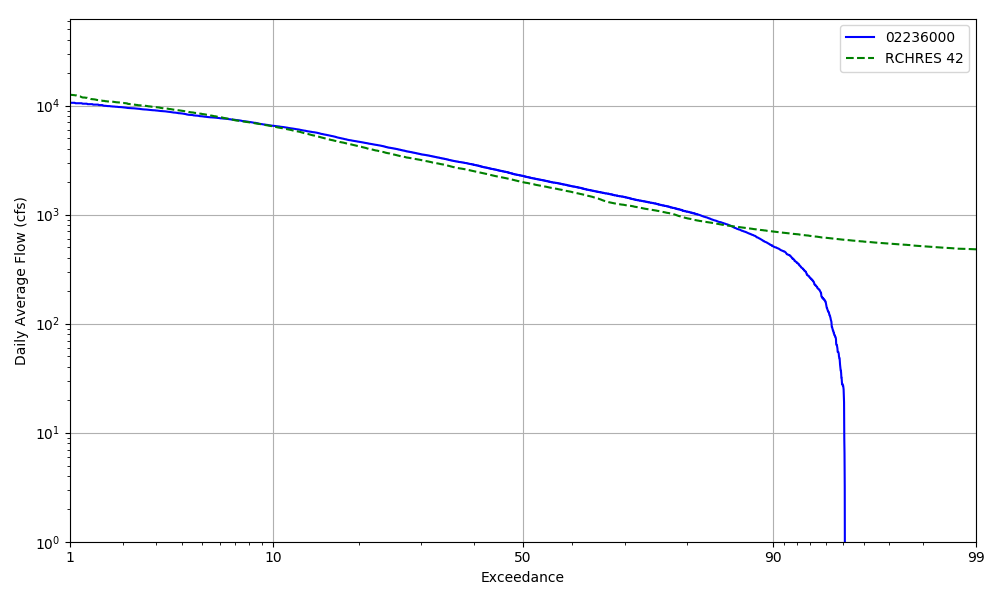


Figure 03080101-41: Daily exceedance for HSFP reach 42 and USGS station 02236000.

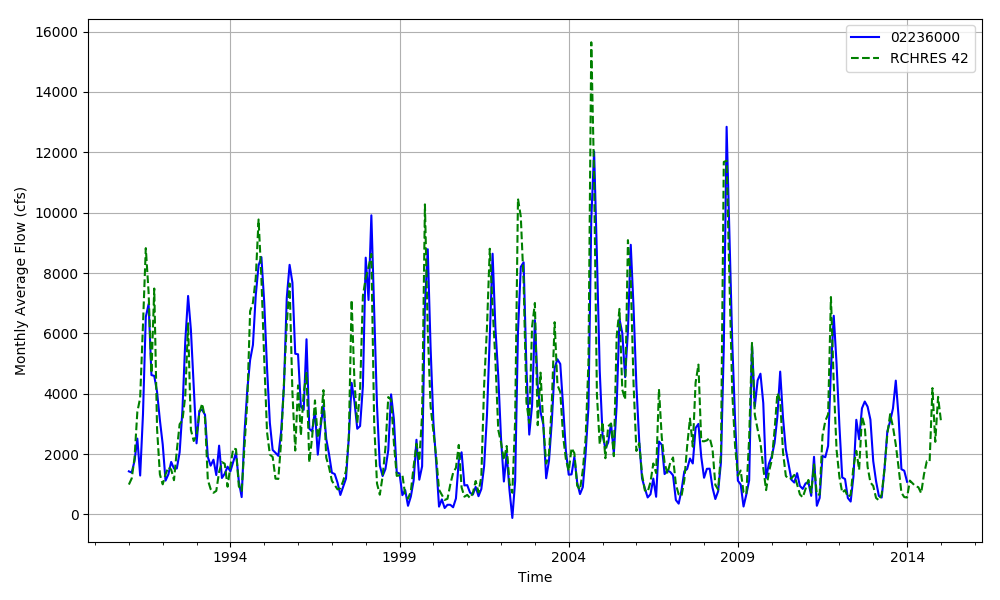


Figure 03080101-42: Monthly flow for HSFP reach 42 and USGS station 02236000.

## HSPF Reach 45, USGS Gauge 02236125

Table 03080101-27: Comparison Statistics Between HSPF Reach 45 and USGS Gauge 02236125.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 150.98 |
| Standard error | 1538.23 |
| Relative bias | 0.05 |
| Relative standard error | 0.61 |
| Nash-Sutcliffe coefficient | 0.63 |
| Coefficient of efficiency | 0.47 |
| Index of agreement | 0.74 |

Table 03080101-28: Hydrologic Indices Between USGS Gauge 02236125 and HSPF Reach 45.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02236125 | Simulated Reach 45 | Percent Difference |
| MA1: Mean, all daily flows | 3547.81 | 3327.56 | -6.21 |
| MA2: Median, all daily flows | 2810.00 | 2365.05 | -15.83 |
| MA3: CV, all daily flows | 63.01 | 77.45 | 22.92 |
| MA4: CV, log of all daily flows | 68.52 | 76.95 | 12.31 |
| MA5: Mean daily flow / median daily flow | 1.26 | 1.41 | 11.44 |
| MA9: (Q10 - Q90) / median daily flow | 2.36 | 2.72 | 15.48 |
| MA10: (Q20 - Q80) / median daily flow | 1.44 | 1.59 | 10.65 |
| MA11: (Q25 - Q75) / median daily flow | 1.11 | 1.18 | 6.73 |
| MA12: Mean monthly flow, January | 3116.75 | 2672.47 | -14.25 |
| MA13: Mean monthly flow, February | 2293.32 | 2289.69 | -0.16 |
| MA14: Mean monthly flow, March | 2299.43 | 2328.12 | 1.25 |
| MA15: Mean monthly flow, April | 2195.40 | 1724.31 | -21.46 |
| MA16: Mean monthly flow, May | 1642.02 | 1214.58 | -26.03 |
| MA17: Mean monthly flow, June | 2043.69 | 1976.91 | -3.27 |
| MA18: Mean monthly flow, July | 2875.52 | 3464.68 | 20.49 |
| MA19: Mean monthly flow, August | 3385.92 | 4432.05 | 30.90 |
| MA20: Mean monthly flow, September | 4587.52 | 5217.07 | 13.72 |
| MA21: Mean monthly flow, October | 5193.73 | 5319.44 | 2.42 |
| MA22: Mean monthly flow, November | 4615.38 | 3680.67 | -20.25 |
| MA23: Mean monthly flow, December | 3593.07 | 2829.08 | -21.26 |
| ML1: Mean minimum monthly flow, January | 1641.80 | 2023.53 | 23.25 |
| ML2: Mean minimum monthly flow, February | 824.21 | 1883.54 | 128.53 |
| ML3: Mean minimum monthly flow, March | 999.37 | 1698.85 | 69.99 |
| ML4: Mean minimum monthly flow, April | 894.11 | 1287.05 | 43.95 |
| ML5: Mean minimum monthly flow, May | 378.95 | 971.53 | 156.38 |
| ML6: Mean minimum monthly flow, June | 694.00 | 1208.00 | 74.06 |
| ML7: Mean minimum monthly flow, July | 1629.75 | 2576.57 | 58.10 |
| ML8: Mean minimum monthly flow, August | 1627.95 | 3107.73 | 90.90 |
| ML9: Mean minimum monthly flow, September | 2133.30 | 3406.48 | 59.68 |
| ML10: Mean minimum monthly flow, October | 2557.90 | 3476.45 | 35.91 |
| ML11: Mean minimum monthly flow, November | 2442.90 | 2645.20 | 8.28 |
| ML12: Mean minimum monthly flow, December | 1522.70 | 2025.94 | 33.05 |
| ML13: CV of minimum monthly flows | 133.23 | 75.20 | -43.56 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.02 | 0.37 | 1875.54 |
| ML15: Mean minimum annual flow / mean annual flow | 0.02 | 0.27 | 1561.37 |
| ML16: Median minimum annual flow / median annual flow | 0.01 | 0.34 | 2224.82 |
| ML20: Ratio of baseflow volume to total flow volume | 0.61 | 0.83 | 34.80 |
| ML22: Mean annual minimum flow divided by catchment area | 0.52 | 8.08 | 1443.35 |
| RA1: Mean of positive changes from one day to next (rise rate) | 494.68 | 273.37 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 99.00 | 352.18 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 488.02 | 125.73 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 98.26 | 240.01 |  |
| RA5: Ratio of days that are higher than previous day | 0.49 | 0.31 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.12 | 0.03 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.12 | 0.03 |  |
| RA8: Number of flow reversals from one day to the next | 135.24 | 57.71 |  |
| RA9: CV, number of flow reversals from one day to the next | 22.96 | 24.89 |  |

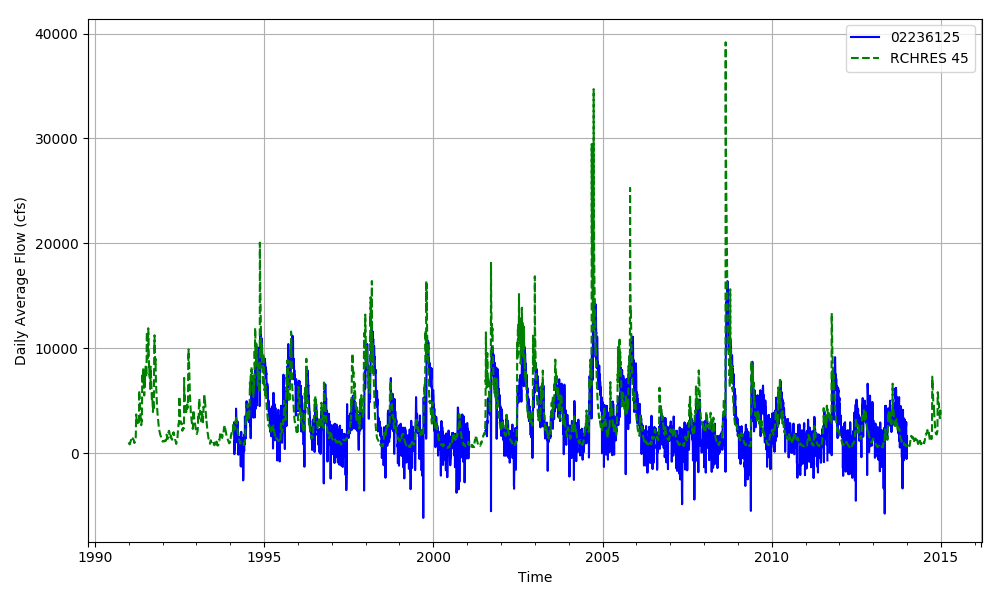


Figure 03080101-43: Daily flow for HSFP reach 45 and USGS station 02236125.

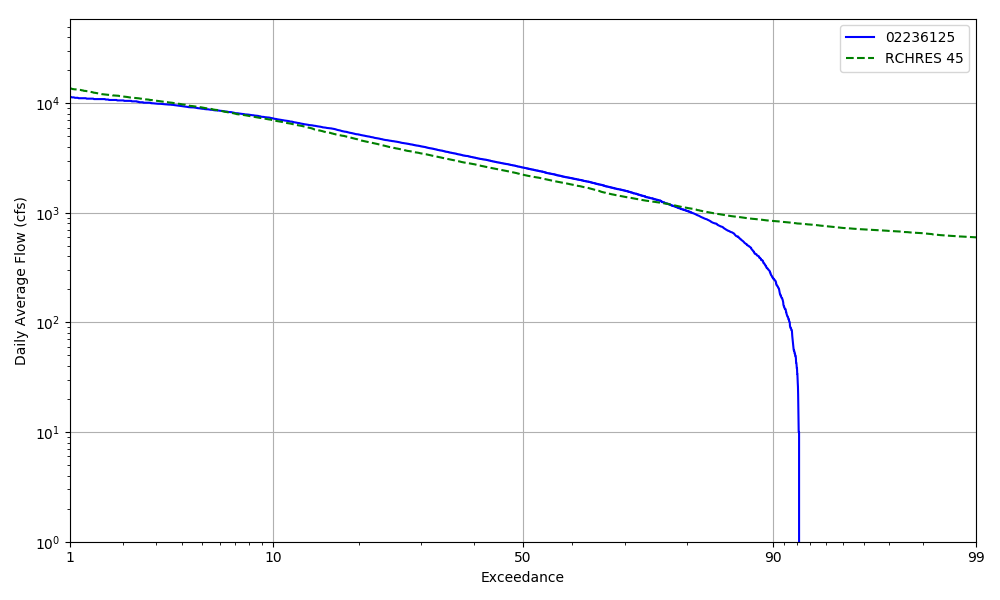


Figure 03080101-44: Daily exceedance for HSFP reach 45 and USGS station 02236125.

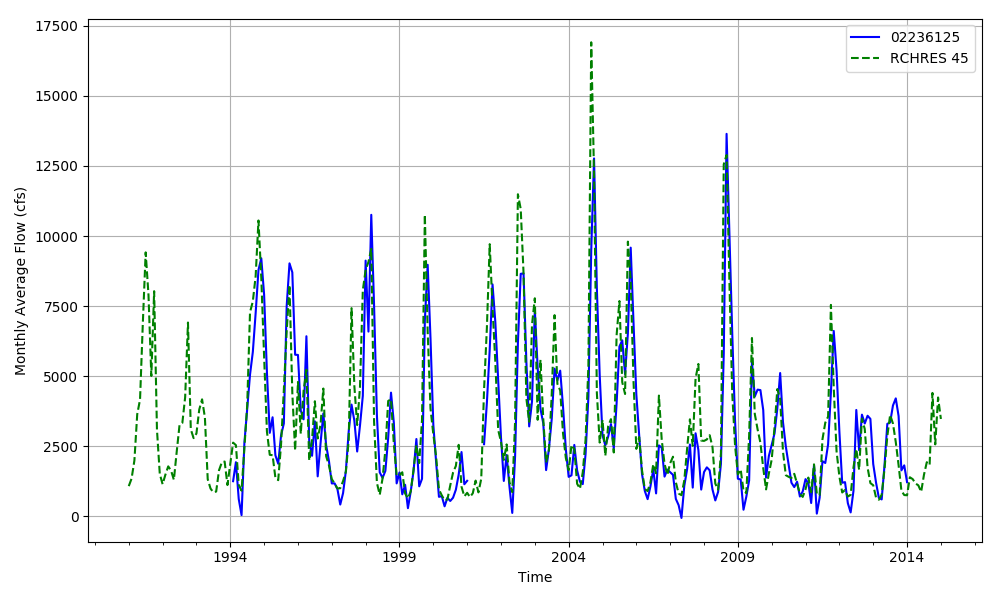


Figure 03080101-45: Monthly flow for HSFP reach 45 and USGS station 02236125.