# Appendix for Model 03120001

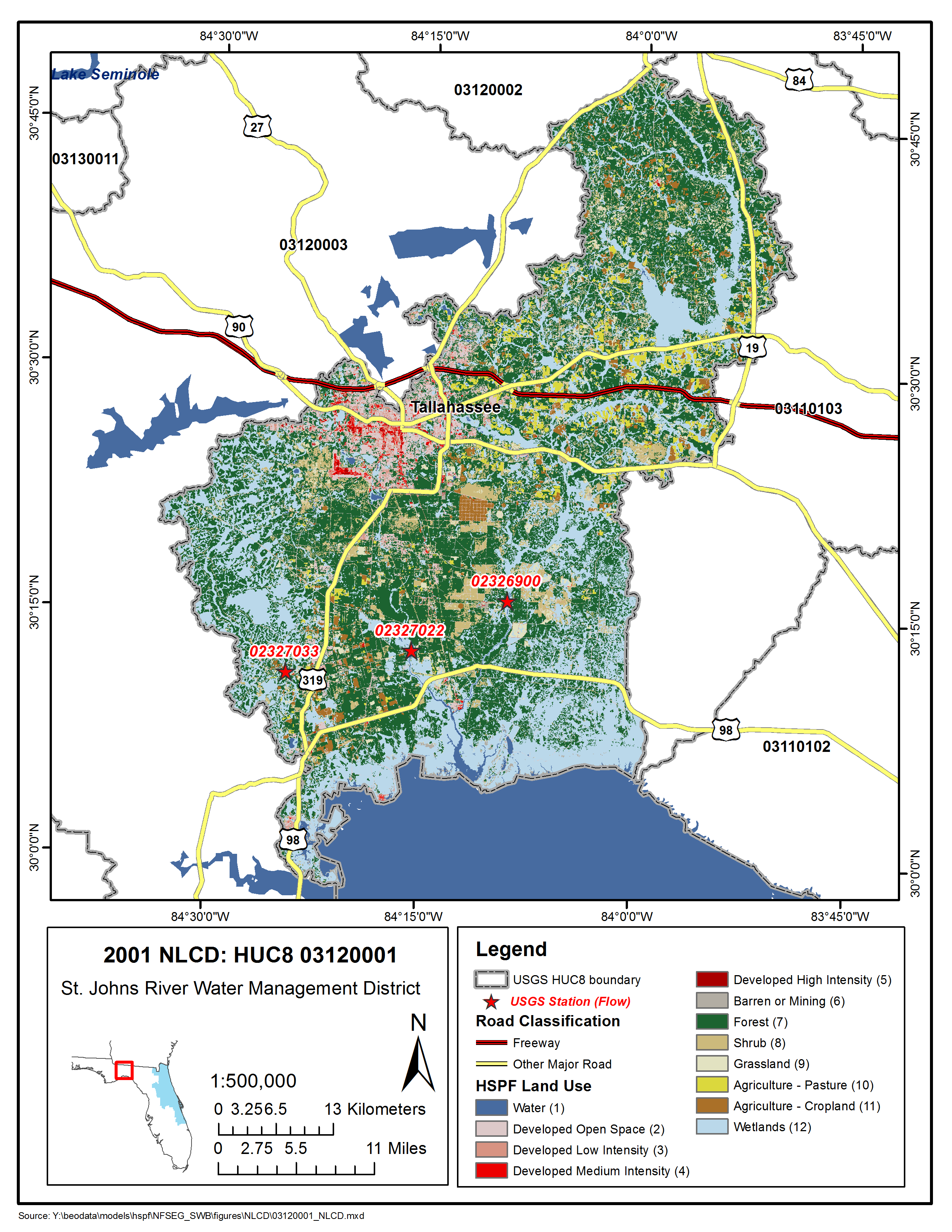


Figure 03120001-1: Land Cover from the National Land Cover Database.

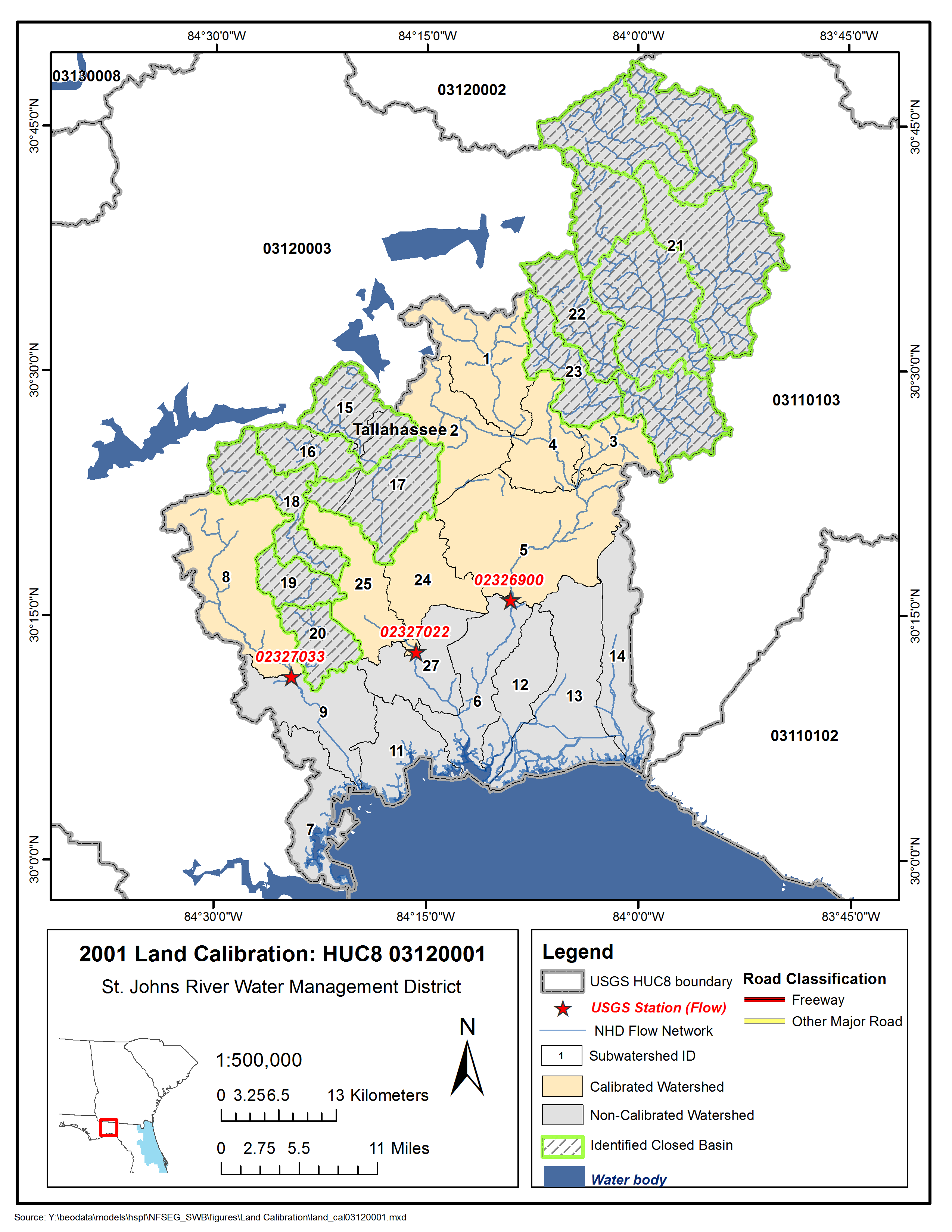


Figure 03120001-2: Calibrated sub-watersheds.

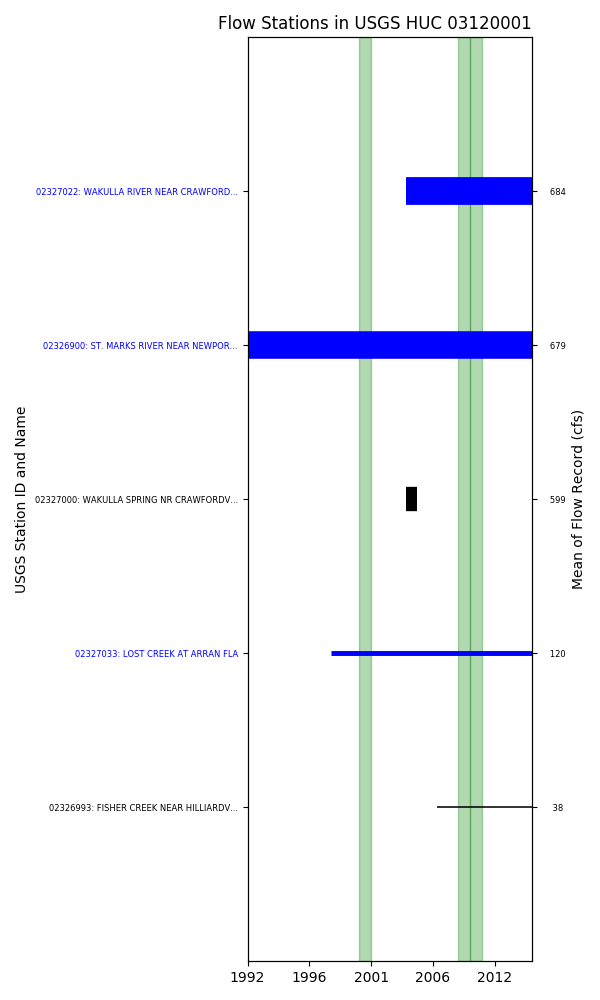


Figure 03120001-3: Station period of record. Blue color identifies gauges used for calibration.

## HSPF Reach 05, USGS Gauge 02326900

Table 03120001-1: Comparison Statistics Between HSPF Reach 05 and USGS Gauge 02326900.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -18.19 |
| Standard error | 183.50 |
| Relative bias | -0.03 |
| Relative standard error | 0.57 |
| Nash-Sutcliffe coefficient | 0.68 |
| Coefficient of efficiency | 0.41 |
| Index of agreement | 0.71 |

Table 03120001-2: Hydrologic Indices Between USGS Gauge 02326900 and HSPF Reach 05.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02326900 | Simulated Reach 05 | Percent Difference |
| MA1: Mean, all daily flows | 696.96 | 678.25 | -2.68 |
| MA2: Median, all daily flows | 612.00 | 570.37 | -6.80 |
| MA3: CV, all daily flows | 38.70 | 42.53 | 9.90 |
| MA4: CV, log of all daily flows | 35.81 | 39.59 | 10.57 |
| MA5: Mean daily flow / median daily flow | 1.14 | 1.19 | 4.42 |
| MA9: (Q10 - Q90) / median daily flow | 1.06 | 1.19 | 12.67 |
| MA10: (Q20 - Q80) / median daily flow | 0.63 | 0.72 | 15.31 |
| MA11: (Q25 - Q75) / median daily flow | 0.46 | 0.56 | 22.17 |
| MA12: Mean monthly flow, January | 492.18 | 587.23 | 19.31 |
| MA13: Mean monthly flow, February | 594.82 | 667.04 | 12.14 |
| MA14: Mean monthly flow, March | 747.29 | 700.56 | -6.25 |
| MA15: Mean monthly flow, April | 612.12 | 532.88 | -12.95 |
| MA16: Mean monthly flow, May | 566.41 | 504.14 | -10.99 |
| MA17: Mean monthly flow, June | 597.42 | 539.53 | -9.69 |
| MA18: Mean monthly flow, July | 666.46 | 630.42 | -5.41 |
| MA19: Mean monthly flow, August | 761.91 | 693.66 | -8.96 |
| MA20: Mean monthly flow, September | 651.09 | 594.52 | -8.69 |
| MA21: Mean monthly flow, October | 579.94 | 564.81 | -2.61 |
| MA22: Mean monthly flow, November | 421.40 | 455.69 | 8.14 |
| MA23: Mean monthly flow, December | 449.57 | 484.05 | 7.67 |
| ML1: Mean minimum monthly flow, January | 505.39 | 486.56 | -3.73 |
| ML2: Mean minimum monthly flow, February | 603.72 | 565.20 | -6.38 |
| ML3: Mean minimum monthly flow, March | 662.89 | 567.05 | -14.46 |
| ML4: Mean minimum monthly flow, April | 644.72 | 522.61 | -18.94 |
| ML5: Mean minimum monthly flow, May | 604.74 | 483.91 | -19.98 |
| ML6: Mean minimum monthly flow, June | 587.53 | 495.15 | -15.72 |
| ML7: Mean minimum monthly flow, July | 622.75 | 549.04 | -11.84 |
| ML8: Mean minimum monthly flow, August | 624.80 | 570.10 | -8.76 |
| ML9: Mean minimum monthly flow, September | 571.60 | 521.59 | -8.75 |
| ML10: Mean minimum monthly flow, October | 531.05 | 481.10 | -9.41 |
| ML11: Mean minimum monthly flow, November | 487.00 | 460.13 | -5.52 |
| ML12: Mean minimum monthly flow, December | 488.00 | 465.91 | -4.53 |
| ML13: CV of minimum monthly flows | 30.00 | 27.08 | -9.73 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.72 | 0.69 | -4.43 |
| ML15: Mean minimum annual flow / mean annual flow | 0.66 | 0.63 | -4.99 |
| ML16: Median minimum annual flow / median annual flow | 0.75 | 0.71 | -5.91 |
| ML20: Ratio of baseflow volume to total flow volume | 0.90 | 0.85 | -5.22 |
| ML22: Mean annual minimum flow divided by catchment area | 4.66 | 4.35 | -6.61 |
| RA1: Mean of positive changes from one day to next (rise rate) | 36.04 | 79.18 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 334.78 | 266.68 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 17.87 | 24.12 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 214.46 | 221.20 |  |
| RA5: Ratio of days that are higher than previous day | 0.31 | 0.23 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.01 | 0.03 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.01 | 0.02 |  |
| RA8: Number of flow reversals from one day to the next | 75.41 | 63.55 |  |
| RA9: CV, number of flow reversals from one day to the next | 39.57 | 36.85 |  |

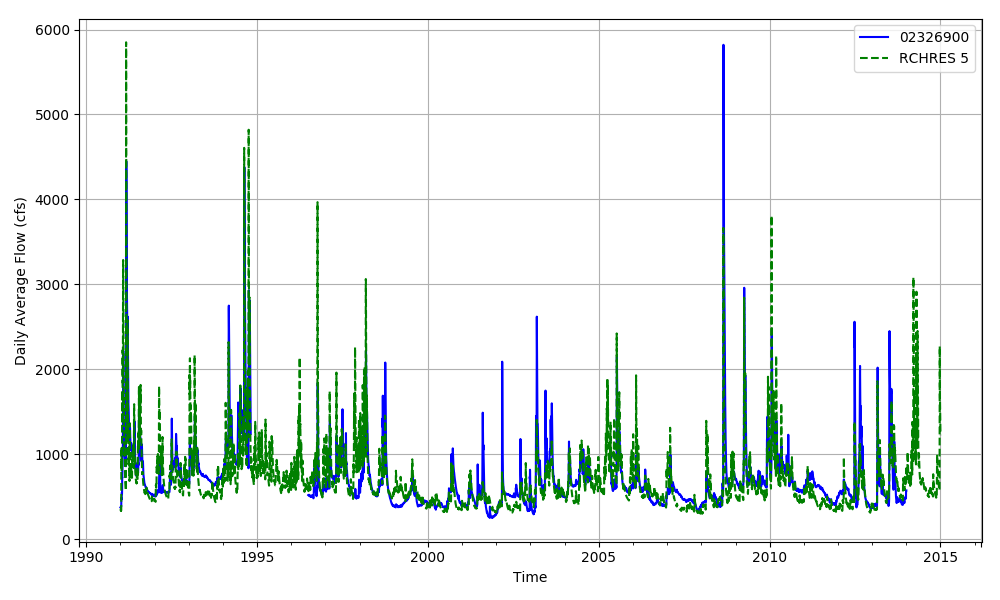


Figure 03120001-4: Daily flow for HSFP reach 05 and USGS station 02326900.

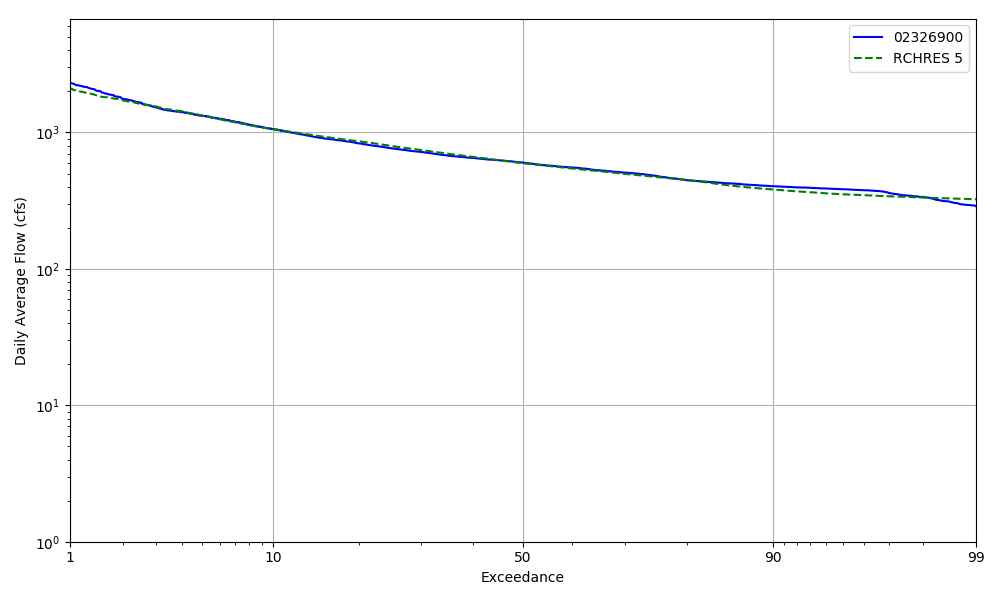


Figure 03120001-5: Daily exceedance for HSFP reach 05 and USGS station 02326900.

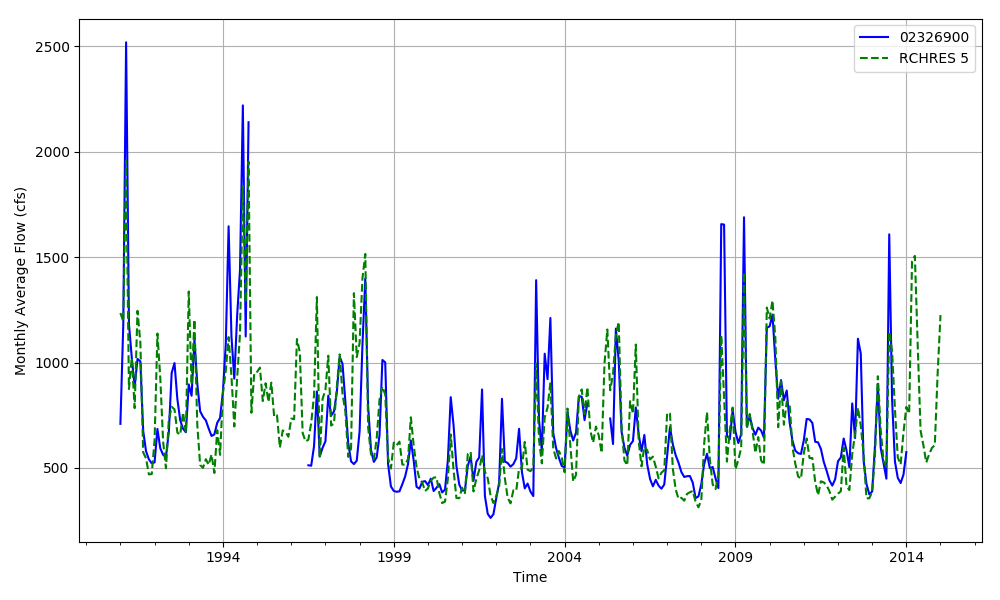


Figure 03120001-6: Monthly flow for HSFP reach 05 and USGS station 02326900.

## HSPF Reach 08, USGS Gauge 02327033

Table 03120001-3: Comparison Statistics Between HSPF Reach 08 and USGS Gauge 02327033.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -52.57 |
| Standard error | 135.74 |
| Relative bias | -0.45 |
| Relative standard error | 0.87 |
| Nash-Sutcliffe coefficient | 0.25 |
| Coefficient of efficiency | 0.38 |
| Index of agreement | 0.64 |

Table 03120001-4: Hydrologic Indices Between USGS Gauge 02327033 and HSPF Reach 08.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02327033 | Simulated Reach 08 | Percent Difference |
| MA1: Mean, all daily flows | 112.30 | 54.73 | -51.26 |
| MA2: Median, all daily flows | 32.00 | 34.67 | 8.33 |
| MA3: CV, all daily flows | 203.33 | 81.87 | -59.73 |
| MA4: CV, log of all daily flows | 150.90 | 75.40 | -50.03 |
| MA5: Mean daily flow / median daily flow | 3.51 | 1.58 | -55.01 |
| MA9: (Q10 - Q90) / median daily flow | 8.01 | 2.60 | -67.47 |
| MA10: (Q20 - Q80) / median daily flow | 3.94 | 1.35 | -65.74 |
| MA11: (Q25 - Q75) / median daily flow | 2.78 | 1.00 | -64.19 |
| MA12: Mean monthly flow, January | 57.80 | 30.48 | -47.26 |
| MA13: Mean monthly flow, February | 111.57 | 43.30 | -61.19 |
| MA14: Mean monthly flow, March | 201.16 | 57.58 | -71.38 |
| MA15: Mean monthly flow, April | 97.70 | 83.56 | -14.48 |
| MA16: Mean monthly flow, May | 22.54 | 35.59 | 57.93 |
| MA17: Mean monthly flow, June | 108.12 | 49.37 | -54.34 |
| MA18: Mean monthly flow, July | 111.69 | 61.10 | -45.30 |
| MA19: Mean monthly flow, August | 193.40 | 77.81 | -59.77 |
| MA20: Mean monthly flow, September | 139.13 | 48.29 | -65.29 |
| MA21: Mean monthly flow, October | 67.77 | 31.77 | -53.12 |
| MA22: Mean monthly flow, November | 37.67 | 32.70 | -13.19 |
| MA23: Mean monthly flow, December | 42.30 | 31.13 | -26.40 |
| ML1: Mean minimum monthly flow, January | 20.50 | 24.86 | 21.25 |
| ML2: Mean minimum monthly flow, February | 24.94 | 26.26 | 5.29 |
| ML3: Mean minimum monthly flow, March | 25.81 | 35.24 | 36.54 |
| ML4: Mean minimum monthly flow, April | 10.19 | 33.11 | 224.93 |
| ML5: Mean minimum monthly flow, May | 3.10 | 21.15 | 582.25 |
| ML6: Mean minimum monthly flow, June | 7.45 | 25.76 | 245.81 |
| ML7: Mean minimum monthly flow, July | 26.89 | 35.44 | 31.79 |
| ML8: Mean minimum monthly flow, August | 28.49 | 38.46 | 35.02 |
| ML9: Mean minimum monthly flow, September | 13.97 | 29.68 | 112.48 |
| ML10: Mean minimum monthly flow, October | 13.41 | 25.97 | 93.65 |
| ML11: Mean minimum monthly flow, November | 10.46 | 24.97 | 138.84 |
| ML12: Mean minimum monthly flow, December | 14.67 | 24.23 | 65.20 |
| ML13: CV of minimum monthly flows | 129.14 | 56.42 | -56.31 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.08 | 0.42 | 405.14 |
| ML15: Mean minimum annual flow / mean annual flow | 0.01 | 0.31 | 2099.60 |
| ML16: Median minimum annual flow / median annual flow | 0.05 | 0.45 | 863.68 |
| ML20: Ratio of baseflow volume to total flow volume | 0.27 | 0.67 | 148.89 |
| ML22: Mean annual minimum flow divided by catchment area | 9090.92 | 9091.06 | 0.00 |
| RA1: Mean of positive changes from one day to next (rise rate) | 59.83 | 12.21 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 320.34 | 320.65 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 25.67 | 3.41 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 298.78 | 311.45 |  |
| RA5: Ratio of days that are higher than previous day | 0.26 | 0.22 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.22 | 0.08 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.14 | 0.03 |  |
| RA8: Number of flow reversals from one day to the next | 65.91 | 64.64 |  |
| RA9: CV, number of flow reversals from one day to the next | 37.95 | 36.06 |  |

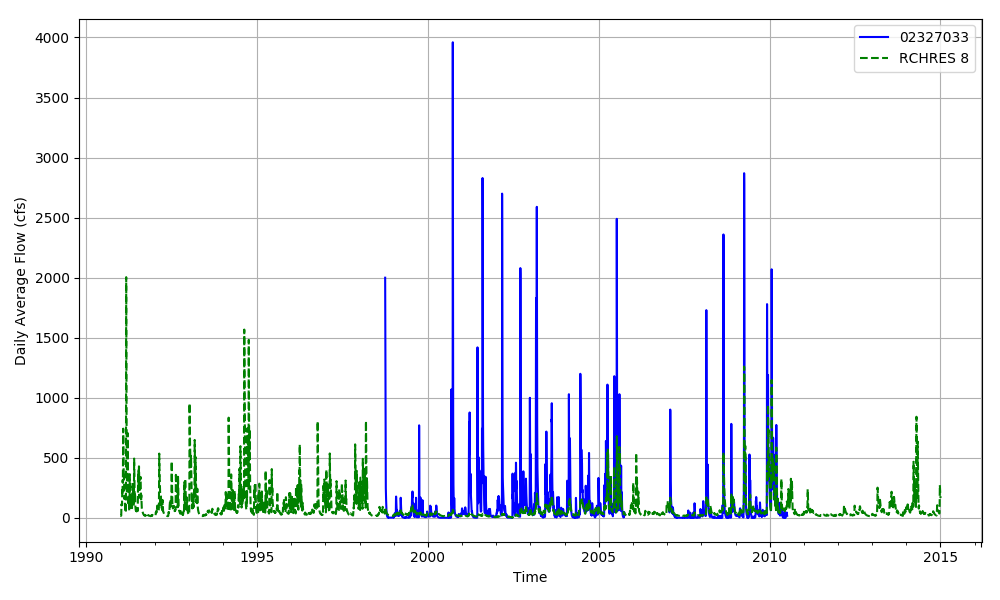


Figure 03120001-7: Daily flow for HSFP reach 08 and USGS station 02327033.

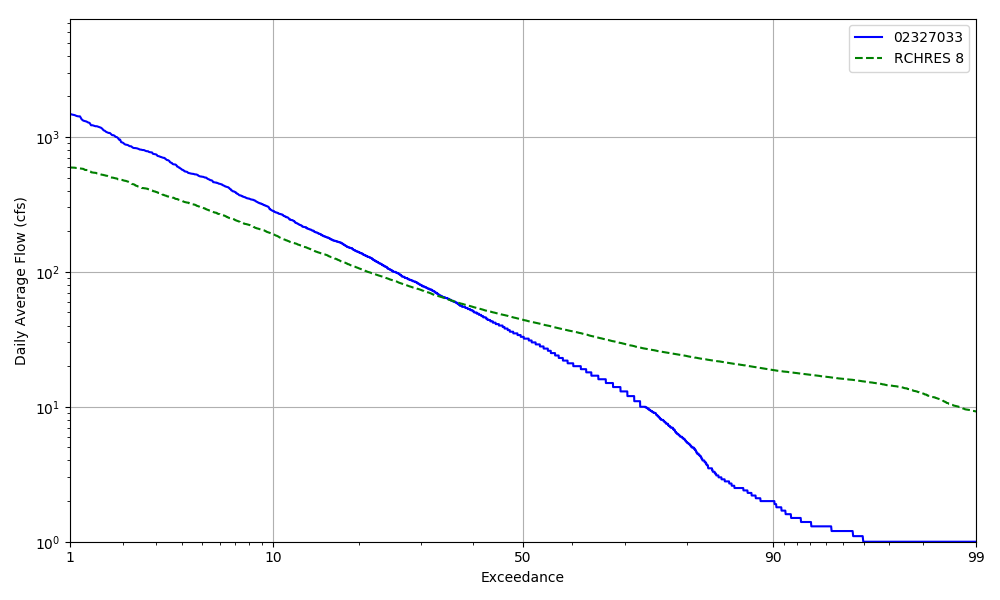


Figure 03120001-8: Daily exceedance for HSFP reach 08 and USGS station 02327033.

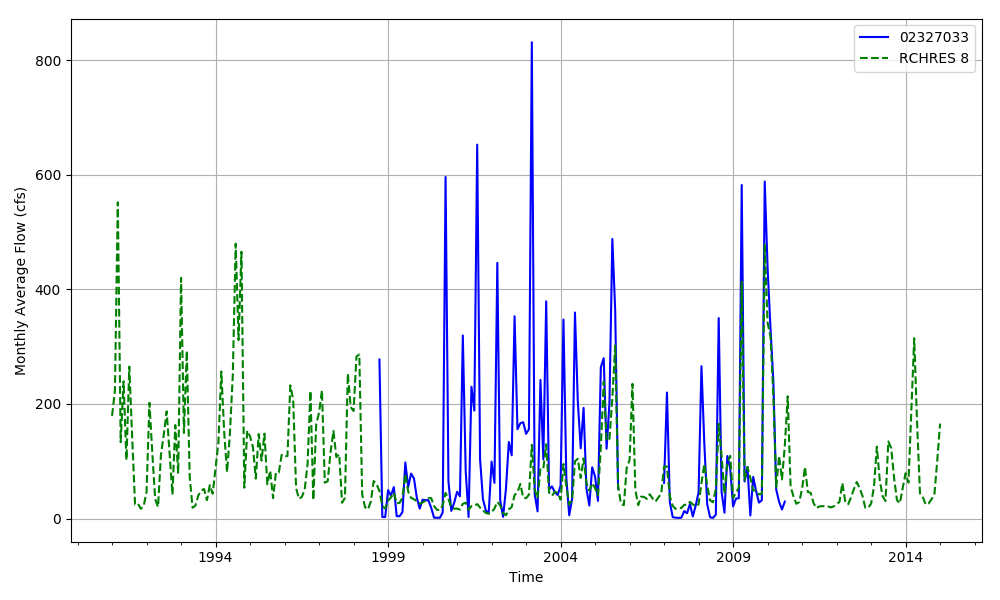


Figure 03120001-9: Monthly flow for HSFP reach 08 and USGS station 02327033.

## HSPF Reach 26, USGS Gauge 02327022

Table 03120001-5: Comparison Statistics Between HSPF Reach 26 and USGS Gauge 02327022.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -42.02 |
| Standard error | 169.30 |
| Relative bias | -0.07 |
| Relative standard error | 0.96 |
| Nash-Sutcliffe coefficient | 0.07 |
| Coefficient of efficiency | -0.08 |
| Index of agreement | 0.36 |

Table 03120001-6: Hydrologic Indices Between USGS Gauge 02327022 and HSPF Reach 26.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02327022 | Simulated Reach 26 | Percent Difference |
| MA1: Mean, all daily flows | 637.77 | 593.41 | -6.96 |
| MA2: Median, all daily flows | 636.00 | 553.67 | -12.94 |
| MA3: CV, all daily flows | 25.02 | 13.94 | -44.28 |
| MA4: CV, log of all daily flows | 25.79 | 16.10 | -37.57 |
| MA5: Mean daily flow / median daily flow | 1.00 | 1.07 | 6.88 |
| MA9: (Q10 - Q90) / median daily flow | 0.72 | 0.44 | -38.65 |
| MA10: (Q20 - Q80) / median daily flow | 0.49 | 0.29 | -40.74 |
| MA11: (Q25 - Q75) / median daily flow | 0.39 | 0.22 | -42.08 |
| MA12: Mean monthly flow, January | 432.02 | 447.24 | 3.52 |
| MA13: Mean monthly flow, February | 451.61 | 474.73 | 5.12 |
| MA14: Mean monthly flow, March | 378.88 | 462.76 | 22.14 |
| MA15: Mean monthly flow, April | 416.49 | 476.55 | 14.42 |
| MA16: Mean monthly flow, May | 435.75 | 432.49 | -0.75 |
| MA17: Mean monthly flow, June | 489.32 | 438.13 | -10.46 |
| MA18: Mean monthly flow, July | 566.44 | 449.95 | -20.57 |
| MA19: Mean monthly flow, August | 610.60 | 485.36 | -20.51 |
| MA20: Mean monthly flow, September | 506.68 | 435.80 | -13.99 |
| MA21: Mean monthly flow, October | 598.07 | 542.46 | -9.30 |
| MA22: Mean monthly flow, November | 571.39 | 464.05 | -18.79 |
| MA23: Mean monthly flow, December | 558.58 | 525.99 | -5.84 |
| ML1: Mean minimum monthly flow, January | 405.83 | 530.24 | 30.66 |
| ML2: Mean minimum monthly flow, February | 459.17 | 545.82 | 18.87 |
| ML3: Mean minimum monthly flow, March | 351.00 | 545.54 | 55.42 |
| ML4: Mean minimum monthly flow, April | 366.00 | 551.55 | 50.70 |
| ML5: Mean minimum monthly flow, May | 433.83 | 527.90 | 21.68 |
| ML6: Mean minimum monthly flow, June | 588.17 | 535.52 | -8.95 |
| ML7: Mean minimum monthly flow, July | 610.33 | 550.20 | -9.85 |
| ML8: Mean minimum monthly flow, August | 621.83 | 571.81 | -8.04 |
| ML9: Mean minimum monthly flow, September | 537.67 | 535.06 | -0.49 |
| ML10: Mean minimum monthly flow, October | 500.12 | 522.09 | 4.39 |
| ML11: Mean minimum monthly flow, November | 526.14 | 503.82 | -4.24 |
| ML12: Mean minimum monthly flow, December | 518.14 | 518.64 | 0.10 |
| ML13: CV of minimum monthly flows | 30.74 | 9.94 | -67.66 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.56 | 0.90 | 59.91 |
| ML15: Mean minimum annual flow / mean annual flow | 0.56 | 0.87 | 55.22 |
| ML16: Median minimum annual flow / median annual flow | 0.49 | 0.92 | 88.80 |
| ML20: Ratio of baseflow volume to total flow volume | 0.88 | 0.95 | 8.17 |
| ML22: Mean annual minimum flow divided by catchment area | 3.36 | 5.09 | 51.24 |
| RA1: Mean of positive changes from one day to next (rise rate) | 32.39 | 29.37 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 191.51 | 253.25 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 28.62 | 8.15 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 108.37 | 229.32 |  |
| RA5: Ratio of days that are higher than previous day | 0.46 | 0.22 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.03 | 0.02 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.03 | 0.01 |  |
| RA8: Number of flow reversals from one day to the next | 108.62 | 56.38 |  |
| RA9: CV, number of flow reversals from one day to the next | 53.75 | 56.90 |  |

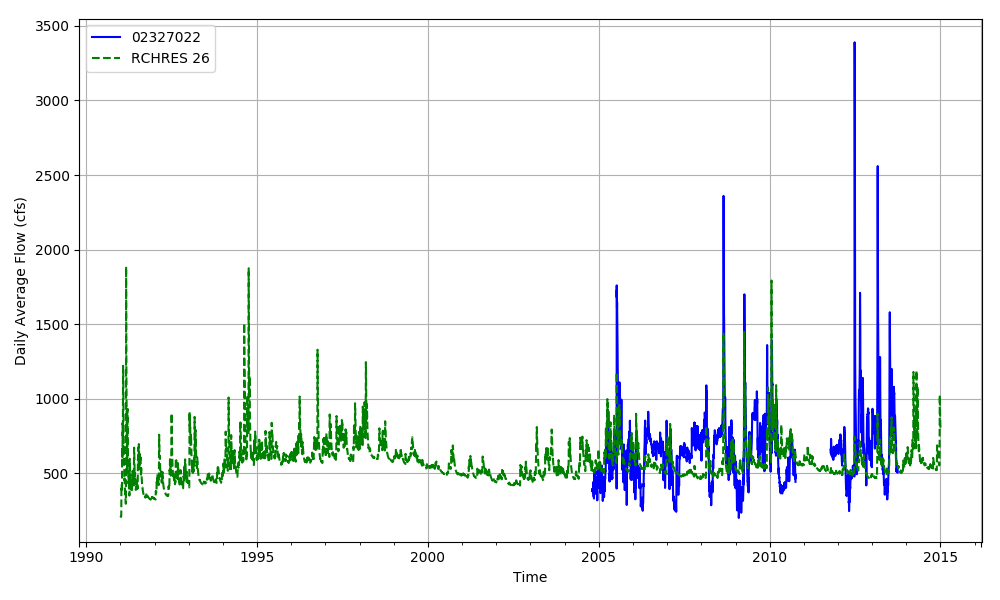


Figure 03120001-10: Daily flow for HSFP reach 26 and USGS station 02327022.

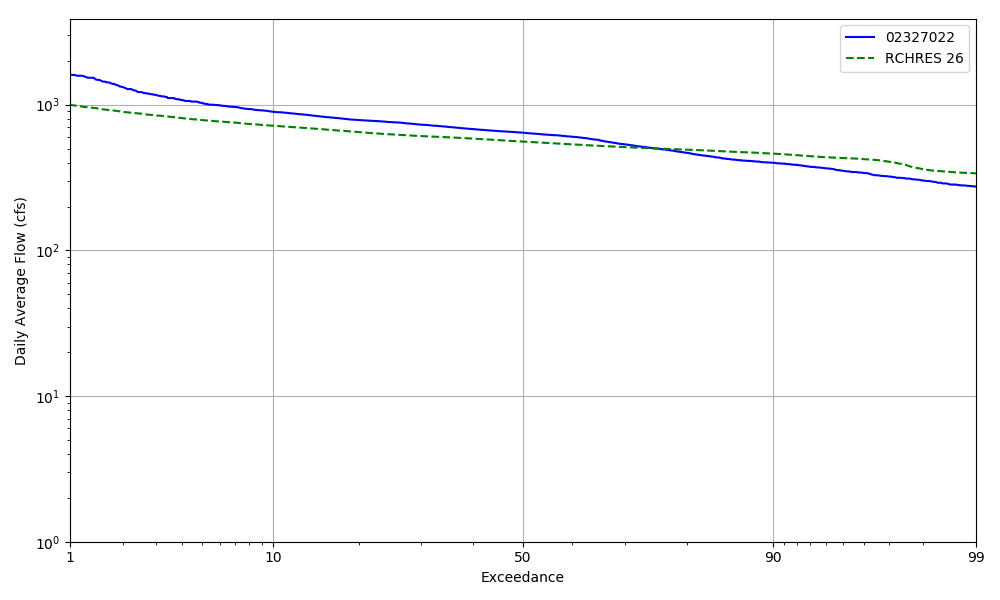


Figure 03120001-11: Daily exceedance for HSFP reach 26 and USGS station 02327022.

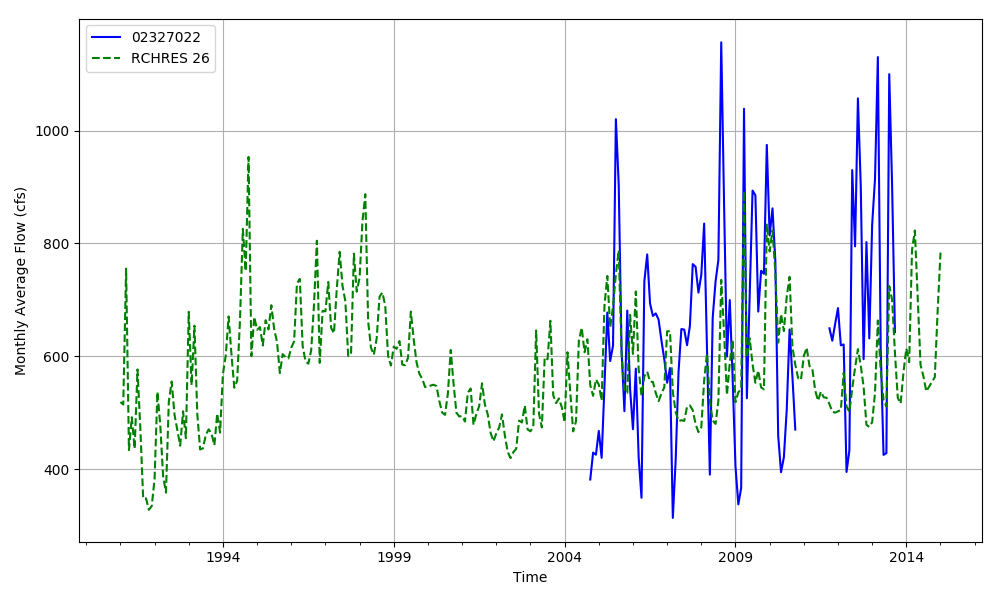


Figure 03120001-12: Monthly flow for HSFP reach 26 and USGS station 02327022.