# Appendix for Model 03060109

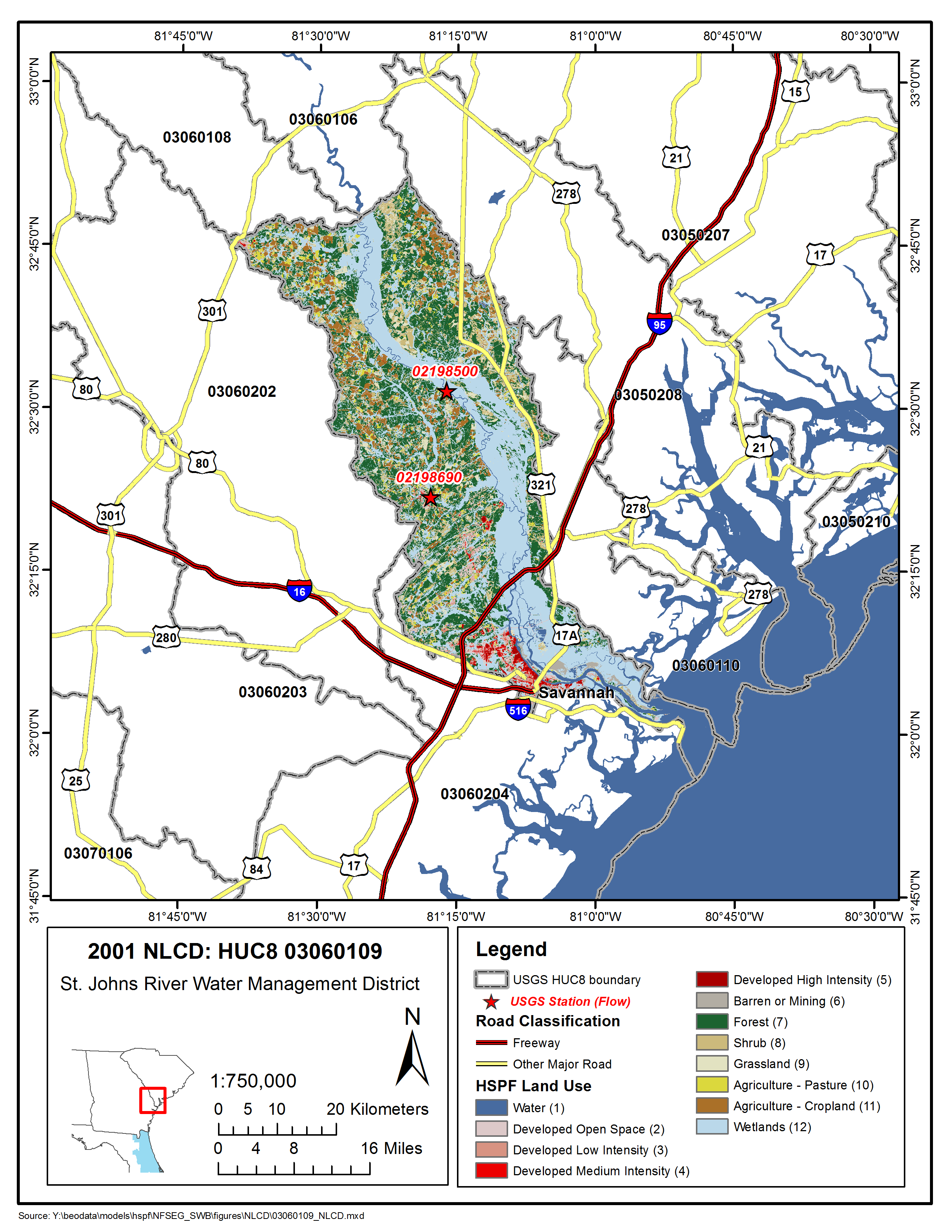


Figure 03060109-1: Land Cover from the National Land Cover Database.

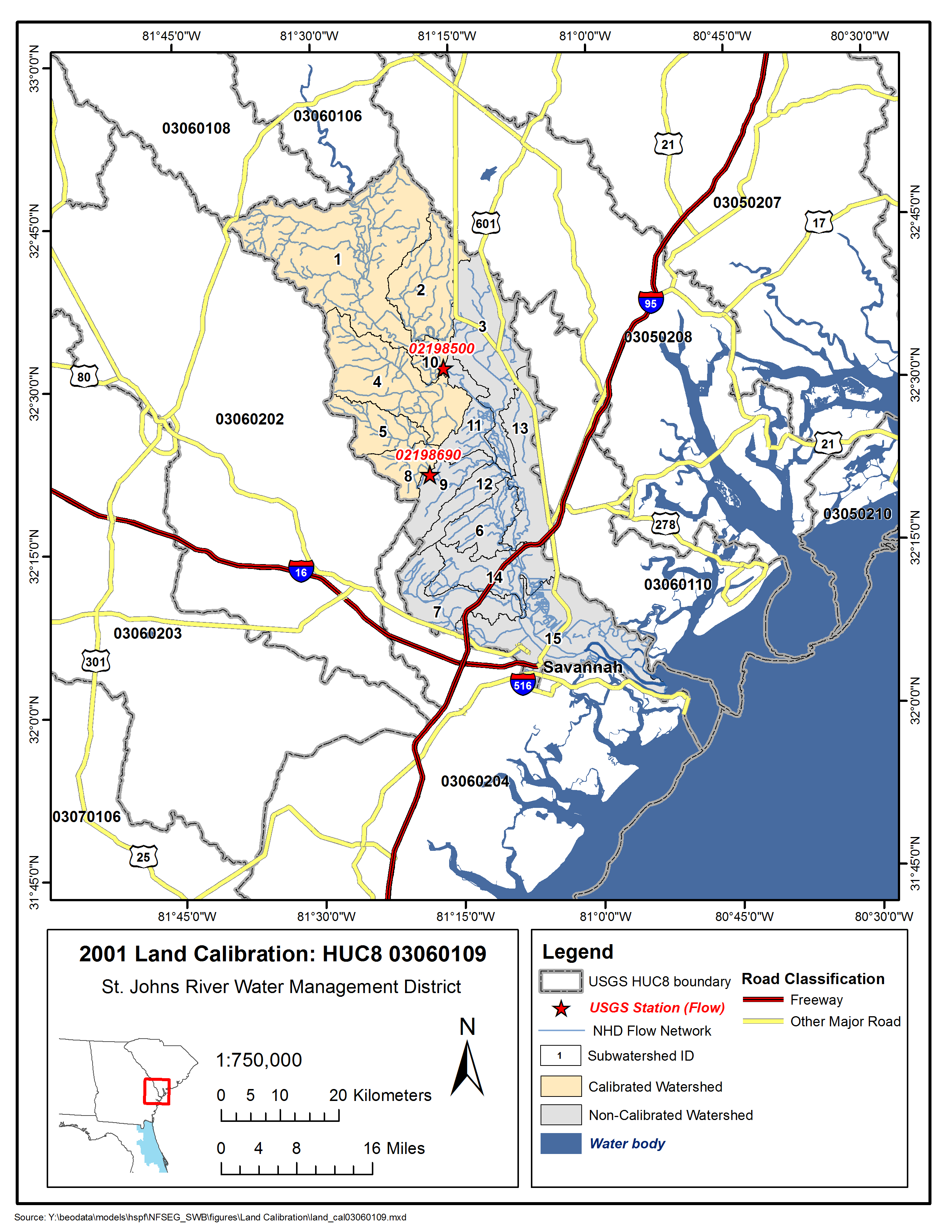


Figure 03060109-2: Calibrated sub-watersheds.

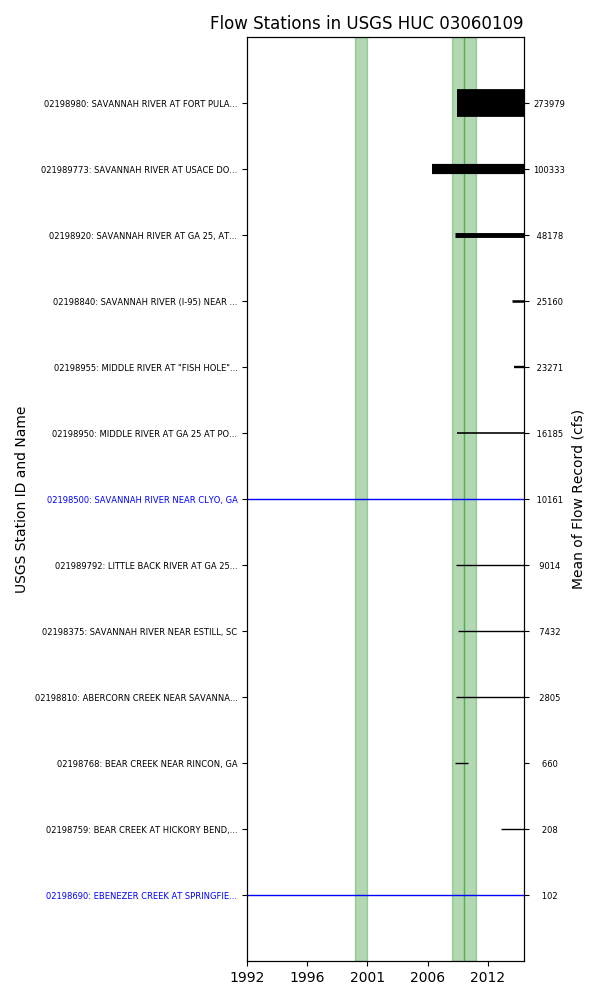


Figure 03060109-3: Station period of record. Blue color identifies gauges used for calibration.

## HSPF Reach 08, USGS Gauge 02198690

Table 03060109-1: Comparison Statistics Between HSPF Reach 08 and USGS Gauge 02198690.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -4.71 |
| Standard error | 80.72 |
| Relative bias | -0.04 |
| Relative standard error | 0.46 |
| Nash-Sutcliffe coefficient | 0.79 |
| Kling-Gupta coefficient | 0.84 |
| Coefficient of efficiency | 0.65 |
| Index of agreement | 0.82 |

Table 03060109-2: Hydrologic Indices Between USGS Gauge 02198690 and HSPF Reach 08.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02198690 | Simulated Reach 08 | Percent Difference |
| MA1: Mean, all daily flows | 112.02 | 107.22 | -4.29 |
| MA2: Median, all daily flows | 19.00 | 23.64 | 24.41 |
| MA3: CV, all daily flows | 176.67 | 169.31 | -4.16 |
| MA4: CV, log of all daily flows | 172.56 | 160.17 | -7.18 |
| MA5: Mean daily flow / median daily flow | 5.90 | 4.54 | -23.07 |
| MA9: (Q10 - Q90) / median daily flow | 16.23 | 12.14 | -25.18 |
| MA10: (Q20 - Q80) / median daily flow | 6.87 | 6.09 | -11.37 |
| MA11: (Q25 - Q75) / median daily flow | 4.74 | 3.99 | -15.82 |
| MA12: Mean monthly flow, January | 168.24 | 181.49 | 7.87 |
| MA13: Mean monthly flow, February | 213.06 | 223.87 | 5.07 |
| MA14: Mean monthly flow, March | 189.60 | 181.07 | -4.50 |
| MA15: Mean monthly flow, April | 128.70 | 94.31 | -26.72 |
| MA16: Mean monthly flow, May | 39.79 | 40.20 | 1.04 |
| MA17: Mean monthly flow, June | 86.56 | 64.46 | -25.52 |
| MA18: Mean monthly flow, July | 84.67 | 71.97 | -15.00 |
| MA19: Mean monthly flow, August | 146.54 | 105.28 | -28.15 |
| MA20: Mean monthly flow, September | 43.35 | 41.76 | -3.67 |
| MA21: Mean monthly flow, October | 54.07 | 53.14 | -1.72 |
| MA22: Mean monthly flow, November | 43.27 | 67.03 | 54.92 |
| MA23: Mean monthly flow, December | 99.74 | 118.66 | 18.97 |
| ML1: Mean minimum monthly flow, January | 44.94 | 43.70 | -2.77 |
| ML2: Mean minimum monthly flow, February | 58.71 | 49.95 | -14.91 |
| ML3: Mean minimum monthly flow, March | 42.11 | 30.79 | -26.90 |
| ML4: Mean minimum monthly flow, April | 21.76 | 13.28 | -38.95 |
| ML5: Mean minimum monthly flow, May | 4.56 | 5.36 | 17.43 |
| ML6: Mean minimum monthly flow, June | 3.95 | 3.98 | 0.70 |
| ML7: Mean minimum monthly flow, July | 8.97 | 9.96 | 11.11 |
| ML8: Mean minimum monthly flow, August | 15.81 | 11.04 | -30.20 |
| ML9: Mean minimum monthly flow, September | 5.02 | 4.69 | -6.55 |
| ML10: Mean minimum monthly flow, October | 3.71 | 3.11 | -16.09 |
| ML11: Mean minimum monthly flow, November | 9.05 | 12.29 | 35.91 |
| ML12: Mean minimum monthly flow, December | 29.89 | 30.31 | 1.41 |
| ML13: CV of minimum monthly flows | 188.06 | 177.25 | -5.75 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.01 | 0.01 | -36.08 |
| ML15: Mean minimum annual flow / mean annual flow | 0.00 | 0.00 | -9.79 |
| ML16: Median minimum annual flow / median annual flow | 0.00 | 0.00 | -100.00 |
| ML20: Ratio of baseflow volume to total flow volume | 0.29 | 0.30 | 4.65 |
| ML22: Mean annual minimum flow divided by catchment area | 0.01 | 0.01 | 58.85 |
| RA1: Mean of positive changes from one day to next (rise rate) | 54.45 | 64.95 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 395.18 | 352.24 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 27.78 | 25.61 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 383.08 | 381.92 |  |
| RA5: Ratio of days that are higher than previous day | 0.32 | 0.28 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.27 | 0.36 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.21 | 0.19 |  |
| RA8: Number of flow reversals from one day to the next | 83.92 | 83.83 |  |
| RA9: CV, number of flow reversals from one day to the next | 19.23 | 20.62 |  |

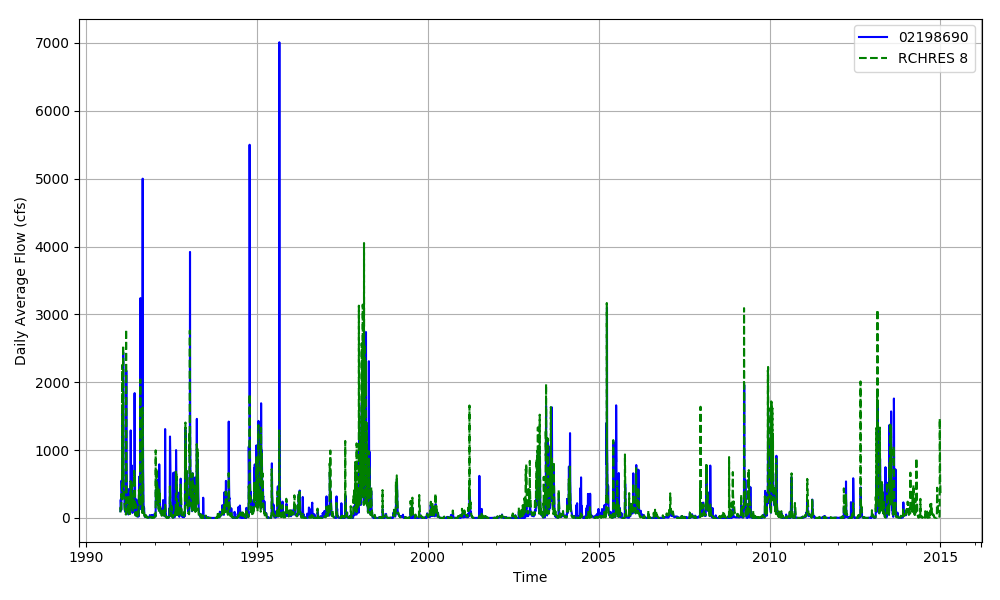


Figure 03060109-4: Daily flow for HSFP reach 08 and USGS station 02198690.

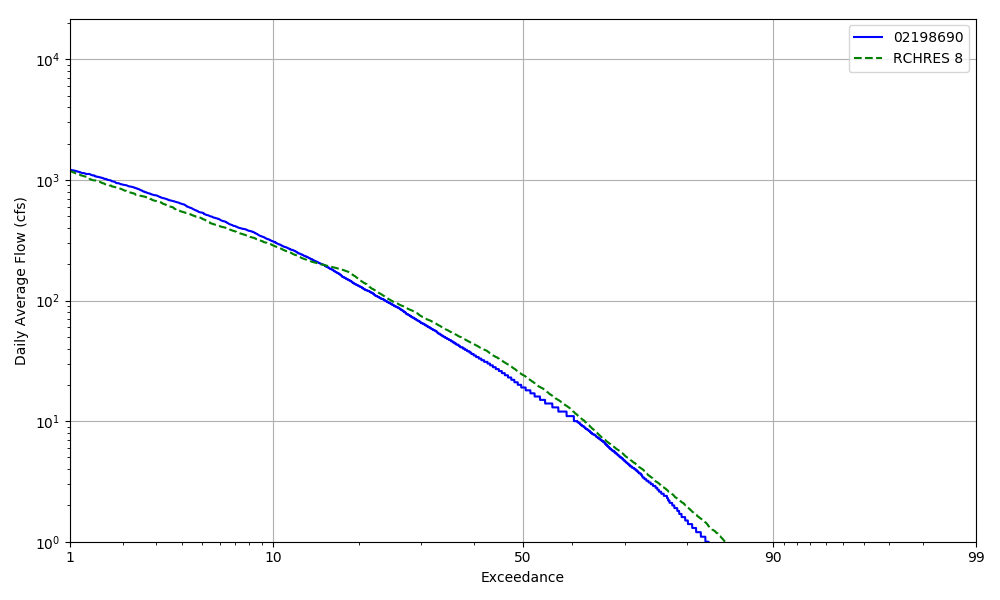


Figure 03060109-5: Daily exceedance for HSFP reach 08 and USGS station 02198690.

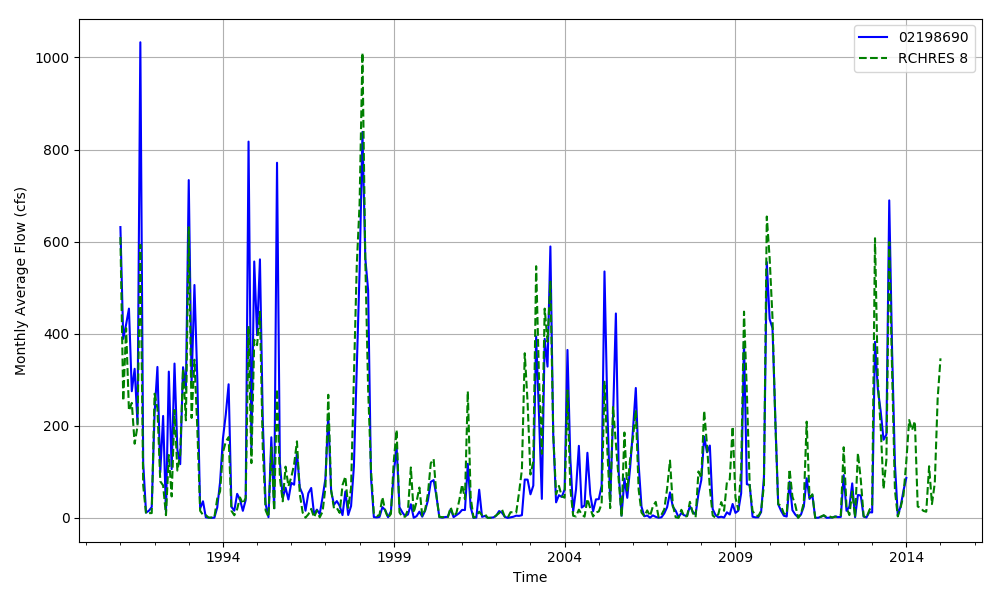


Figure 03060109-6: Monthly flow for HSFP reach 08 and USGS station 02198690.

## HSPF Reach 10, USGS Gauge 02198500

Table 03060109-3: Comparison Statistics Between HSPF Reach 10 and USGS Gauge 02198500.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | -6152.59 |
| Standard error | 7615.23 |
| Relative bias | -0.60 |
| Relative standard error | 1.08 |
| Nash-Sutcliffe coefficient | -0.16 |
| Kling-Gupta coefficient | 0.18 |
| Coefficient of efficiency | -0.25 |
| Index of agreement | 0.46 |

Table 03060109-4: Hydrologic Indices Between USGS Gauge 02198500 and HSPF Reach 10.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02198500 | Simulated Reach 10 | Percent Difference |
| MA1: Mean, all daily flows | 10293.50 | 4131.48 | -59.86 |
| MA2: Median, all daily flows | 7500.00 | 2839.92 | -62.13 |
| MA3: CV, all daily flows | 46.62 | 63.15 | 35.47 |
| MA4: CV, log of all daily flows | 62.65 | 69.93 | 11.62 |
| MA5: Mean daily flow / median daily flow | 1.37 | 1.45 | 6.00 |
| MA9: (Q10 - Q90) / median daily flow | 2.01 | 2.84 | 41.36 |
| MA10: (Q20 - Q80) / median daily flow | 1.03 | 1.52 | 48.24 |
| MA11: (Q25 - Q75) / median daily flow | 0.75 | 1.15 | 52.21 |
| MA12: Mean monthly flow, January | 11811.88 | 5498.51 | -53.45 |
| MA13: Mean monthly flow, February | 13245.51 | 6180.65 | -53.34 |
| MA14: Mean monthly flow, March | 14516.51 | 6980.03 | -51.92 |
| MA15: Mean monthly flow, April | 11866.18 | 5159.21 | -56.52 |
| MA16: Mean monthly flow, May | 8858.50 | 3544.03 | -59.99 |
| MA17: Mean monthly flow, June | 8453.83 | 3207.93 | -62.05 |
| MA18: Mean monthly flow, July | 9058.04 | 2817.48 | -68.90 |
| MA19: Mean monthly flow, August | 8905.97 | 2783.93 | -68.74 |
| MA20: Mean monthly flow, September | 7579.32 | 2560.50 | -66.22 |
| MA21: Mean monthly flow, October | 7251.94 | 2727.90 | -62.38 |
| MA22: Mean monthly flow, November | 7510.71 | 2849.35 | -62.06 |
| MA23: Mean monthly flow, December | 10127.65 | 3865.43 | -61.83 |
| ML1: Mean minimum monthly flow, January | 9265.00 | 3965.97 | -57.19 |
| ML2: Mean minimum monthly flow, February | 10293.48 | 4262.51 | -58.59 |
| ML3: Mean minimum monthly flow, March | 10045.22 | 4747.39 | -52.74 |
| ML4: Mean minimum monthly flow, April | 8049.56 | 3753.65 | -53.37 |
| ML5: Mean minimum monthly flow, May | 6967.83 | 2691.77 | -61.37 |
| ML6: Mean minimum monthly flow, June | 6772.17 | 2291.11 | -66.17 |
| ML7: Mean minimum monthly flow, July | 6735.65 | 2044.39 | -69.65 |
| ML8: Mean minimum monthly flow, August | 7156.96 | 2000.98 | -72.04 |
| ML9: Mean minimum monthly flow, September | 6197.39 | 1772.97 | -71.39 |
| ML10: Mean minimum monthly flow, October | 5749.56 | 1849.47 | -67.83 |
| ML11: Mean minimum monthly flow, November | 6114.78 | 2117.01 | -65.38 |
| ML12: Mean minimum monthly flow, December | 8078.70 | 2769.36 | -65.72 |
| ML13: CV of minimum monthly flows | 62.25 | 77.06 | 23.79 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.66 | 0.49 | -25.87 |
| ML15: Mean minimum annual flow / mean annual flow | 0.57 | 0.39 | -32.56 |
| ML16: Median minimum annual flow / median annual flow | 0.64 | 0.50 | -22.40 |
| ML20: Ratio of baseflow volume to total flow volume | 0.84 | 0.79 | -5.03 |
| ML22: Mean annual minimum flow divided by catchment area | 51.79 | 14.48 | -72.04 |
| RA1: Mean of positive changes from one day to next (rise rate) | 494.84 | 418.54 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 137.94 | 407.28 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 458.83 | 212.42 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 132.15 | 457.07 |  |
| RA5: Ratio of days that are higher than previous day | 0.47 | 0.34 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.03 | 0.03 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.03 | 0.02 |  |
| RA8: Number of flow reversals from one day to the next | 90.88 | 51.04 |  |
| RA9: CV, number of flow reversals from one day to the next | 27.75 | 26.10 |  |

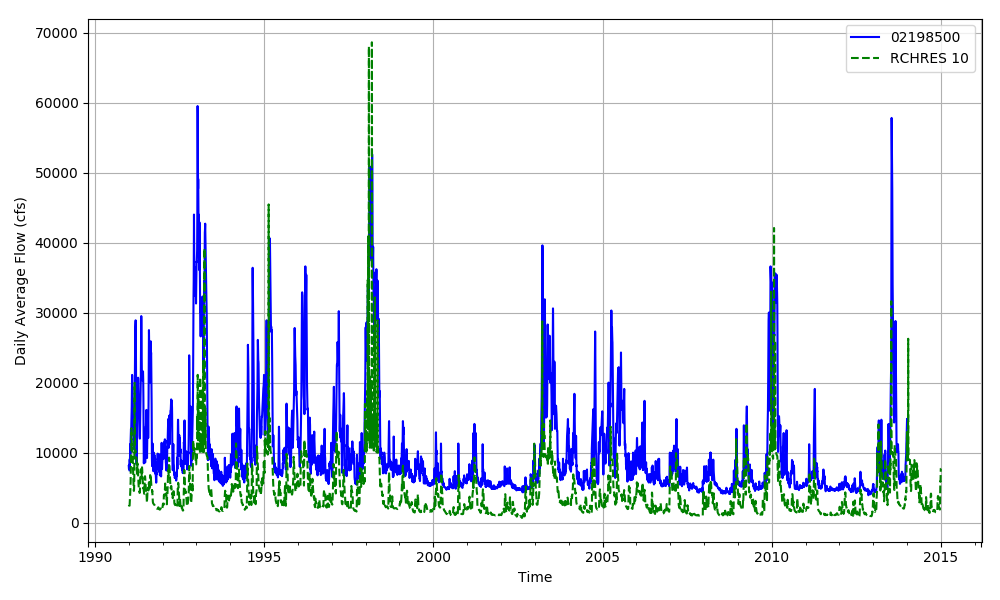


Figure 03060109-7: Daily flow for HSFP reach 10 and USGS station 02198500.

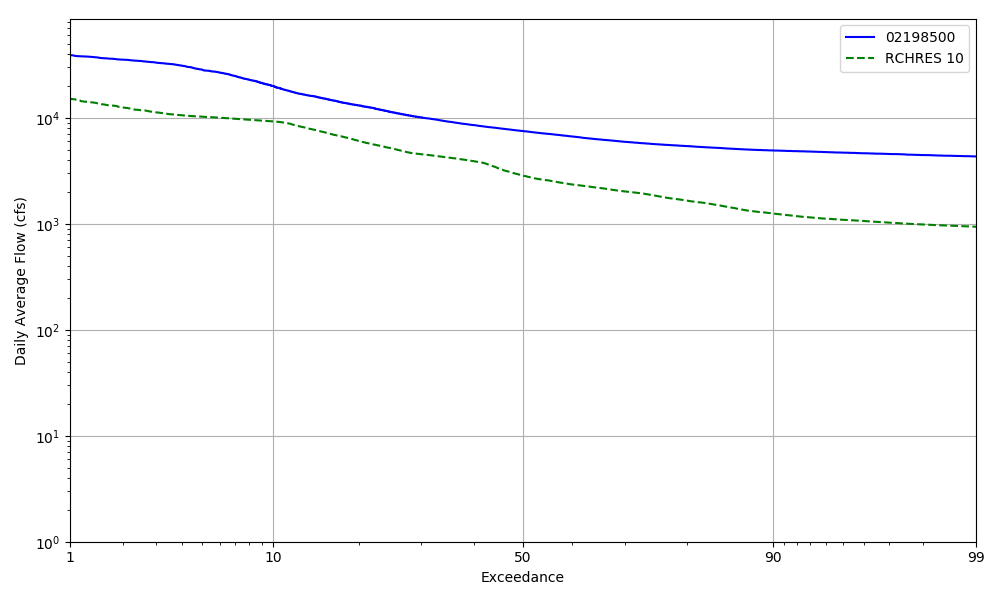


Figure 03060109-8: Daily exceedance for HSFP reach 10 and USGS station 02198500.

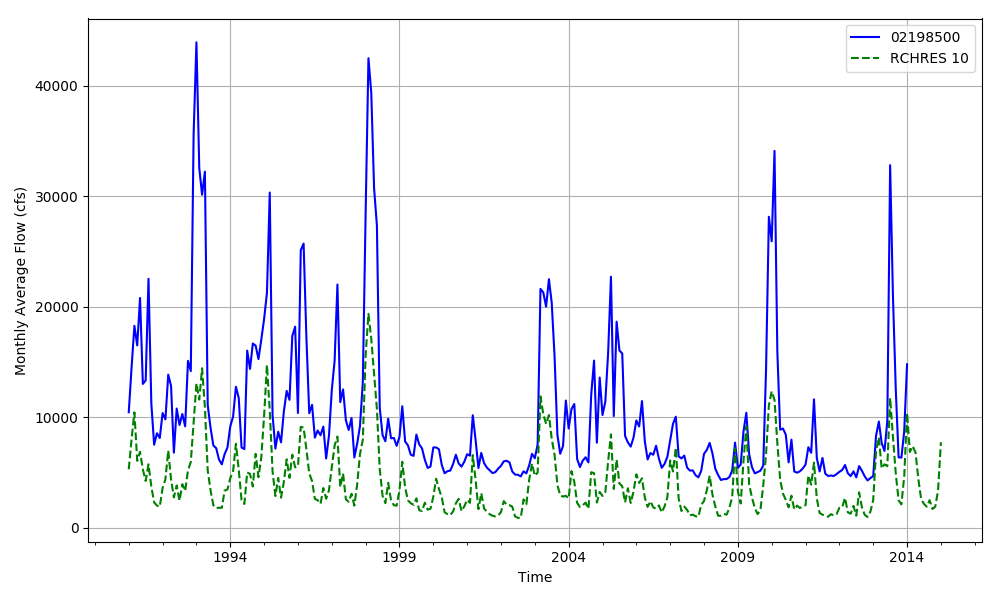


Figure 03060109-9: Monthly flow for HSFP reach 10 and USGS station 02198500.