# Appendix for Model 03060105

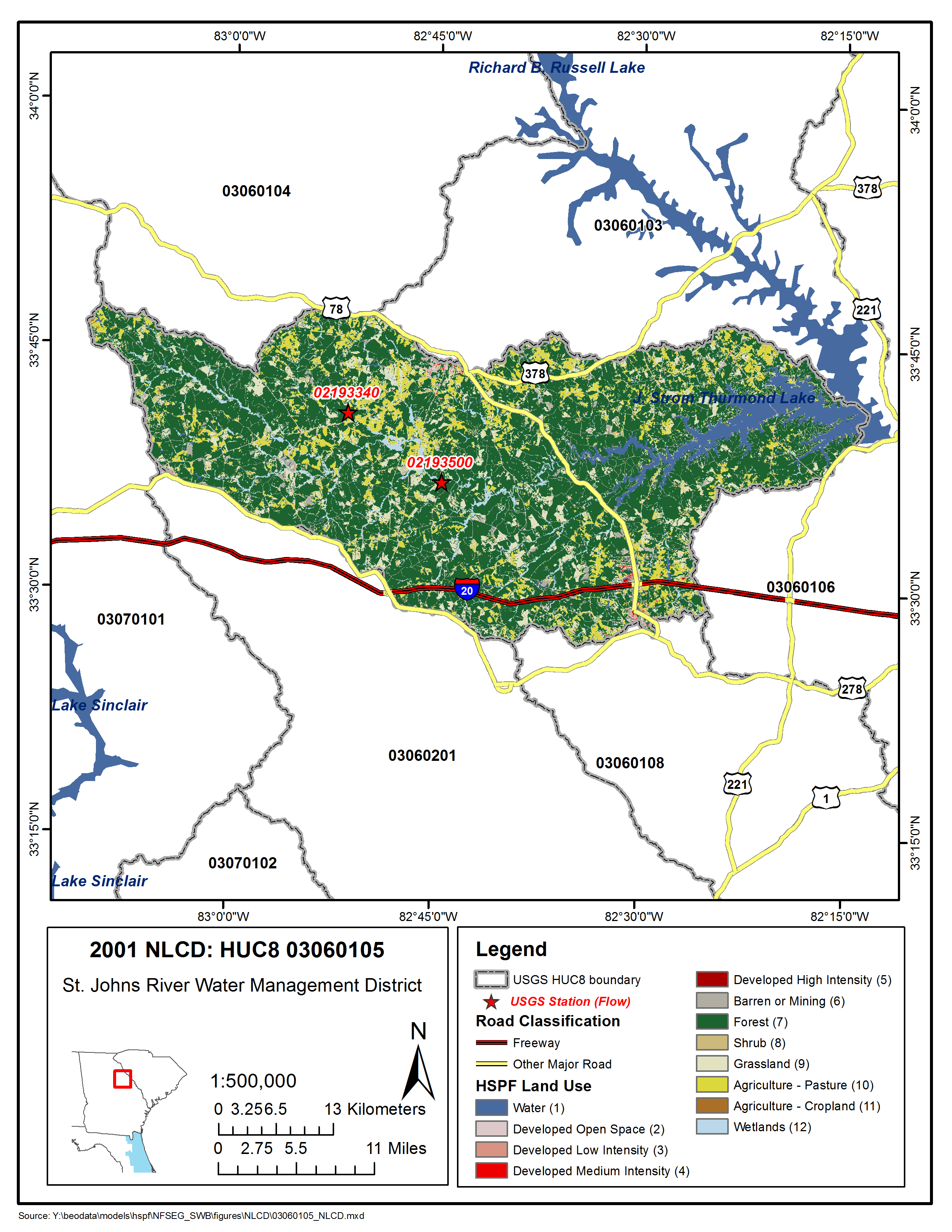


Figure 03060105-1: Land Cover from the National Land Cover Database.

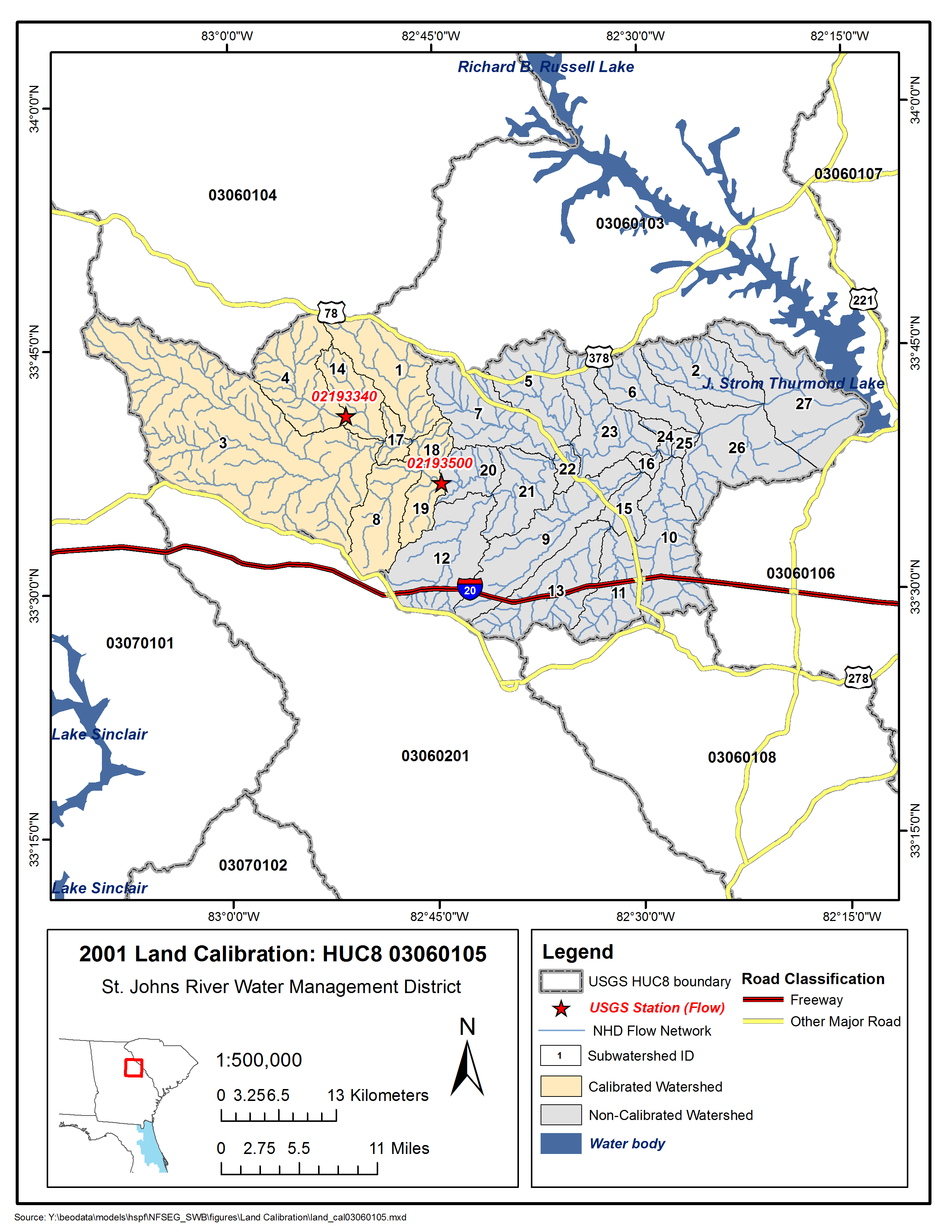


Figure 03060105-2: Calibrated sub-watersheds.

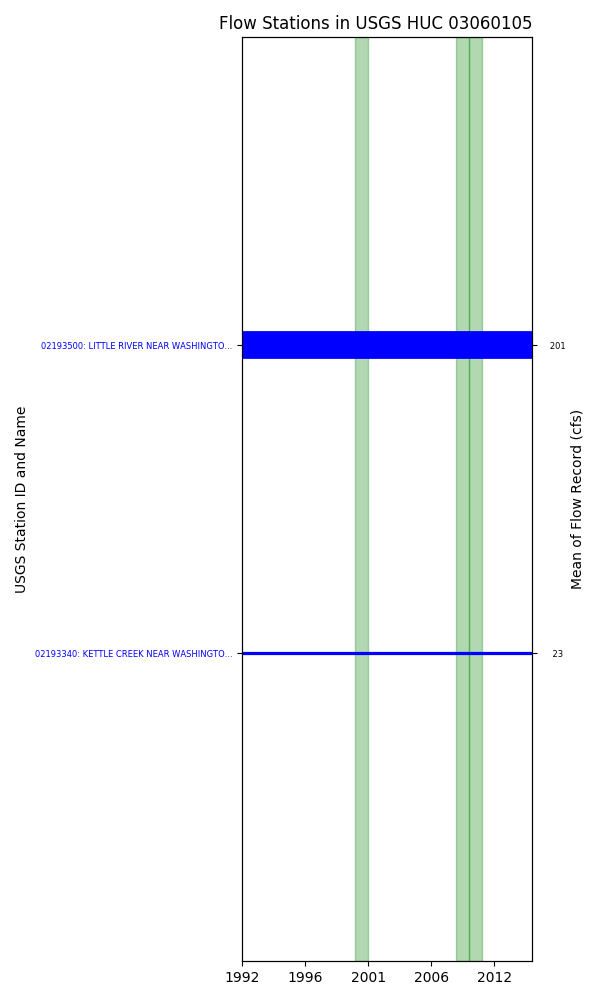


Figure 03060105-3: Station period of record. Blue color identifies gauges used for calibration.

## HSPF Reach 04, USGS Gauge 02193340

Table 03060105-1: Comparison Statistics Between HSPF Reach 04 and USGS Gauge 02193340.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 0.35 |
| Standard error | 11.86 |
| Relative bias | 0.01 |
| Relative standard error | 0.43 |
| Nash-Sutcliffe coefficient | 0.82 |
| Kling-Gupta coefficient | 0.91 |
| Coefficient of efficiency | 0.65 |
| Index of agreement | 0.83 |

Table 03060105-2: Hydrologic Indices Between USGS Gauge 02193340 and HSPF Reach 04.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02193340 | Simulated Reach 04 | Percent Difference |
| MA1: Mean, all daily flows | 24.14 | 24.36 | 0.90 |
| MA2: Median, all daily flows | 8.70 | 6.75 | -22.40 |
| MA3: CV, all daily flows | 295.09 | 274.75 | -6.89 |
| MA4: CV, log of all daily flows | 119.12 | 139.81 | 17.36 |
| MA5: Mean daily flow / median daily flow | 2.77 | 3.61 | 30.03 |
| MA9: (Q10 - Q90) / median daily flow | 4.61 | 7.52 | 63.11 |
| MA10: (Q20 - Q80) / median daily flow | 2.49 | 3.17 | 27.13 |
| MA11: (Q25 - Q75) / median daily flow | 1.83 | 2.32 | 27.14 |
| MA12: Mean monthly flow, January | 29.82 | 33.62 | 12.74 |
| MA13: Mean monthly flow, February | 50.63 | 48.52 | -4.16 |
| MA14: Mean monthly flow, March | 53.03 | 51.36 | -3.14 |
| MA15: Mean monthly flow, April | 25.44 | 24.65 | -3.09 |
| MA16: Mean monthly flow, May | 17.69 | 18.06 | 2.06 |
| MA17: Mean monthly flow, June | 13.84 | 13.33 | -3.70 |
| MA18: Mean monthly flow, July | 12.17 | 12.19 | 0.15 |
| MA19: Mean monthly flow, August | 12.59 | 11.42 | -9.30 |
| MA20: Mean monthly flow, September | 12.81 | 13.72 | 7.07 |
| MA21: Mean monthly flow, October | 10.64 | 11.72 | 10.18 |
| MA22: Mean monthly flow, November | 16.55 | 15.64 | -5.50 |
| MA23: Mean monthly flow, December | 25.02 | 30.05 | 20.11 |
| ML1: Mean minimum monthly flow, January | 10.03 | 11.08 | 10.45 |
| ML2: Mean minimum monthly flow, February | 12.89 | 11.82 | -8.24 |
| ML3: Mean minimum monthly flow, March | 14.13 | 11.78 | -16.64 |
| ML4: Mean minimum monthly flow, April | 10.90 | 8.43 | -22.65 |
| ML5: Mean minimum monthly flow, May | 6.12 | 5.59 | -8.68 |
| ML6: Mean minimum monthly flow, June | 4.33 | 3.80 | -12.12 |
| ML7: Mean minimum monthly flow, July | 3.39 | 3.19 | -5.86 |
| ML8: Mean minimum monthly flow, August | 2.61 | 2.91 | 11.31 |
| ML9: Mean minimum monthly flow, September | 2.39 | 2.43 | 1.89 |
| ML10: Mean minimum monthly flow, October | 3.26 | 2.78 | -14.75 |
| ML11: Mean minimum monthly flow, November | 5.08 | 4.05 | -20.20 |
| ML12: Mean minimum monthly flow, December | 7.10 | 6.67 | -6.12 |
| ML13: CV of minimum monthly flows | 97.12 | 117.71 | 21.20 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.12 | 0.18 | 42.70 |
| ML15: Mean minimum annual flow / mean annual flow | 0.05 | 0.06 | 19.49 |
| ML16: Median minimum annual flow / median annual flow | 0.08 | 0.16 | 109.35 |
| ML20: Ratio of baseflow volume to total flow volume | 0.34 | 0.30 | -11.58 |
| ML22: Mean annual minimum flow divided by catchment area | 0.01 | 0.02 | 16.18 |
| RA1: Mean of positive changes from one day to next (rise rate) | 35.66 | 34.51 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 350.81 | 348.81 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 15.11 | 12.76 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 500.52 | 505.74 |  |
| RA5: Ratio of days that are higher than previous day | 0.26 | 0.27 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.25 | 0.09 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.13 | 0.10 |  |
| RA8: Number of flow reversals from one day to the next | 102.46 | 108.50 |  |
| RA9: CV, number of flow reversals from one day to the next | 18.38 | 19.25 |  |

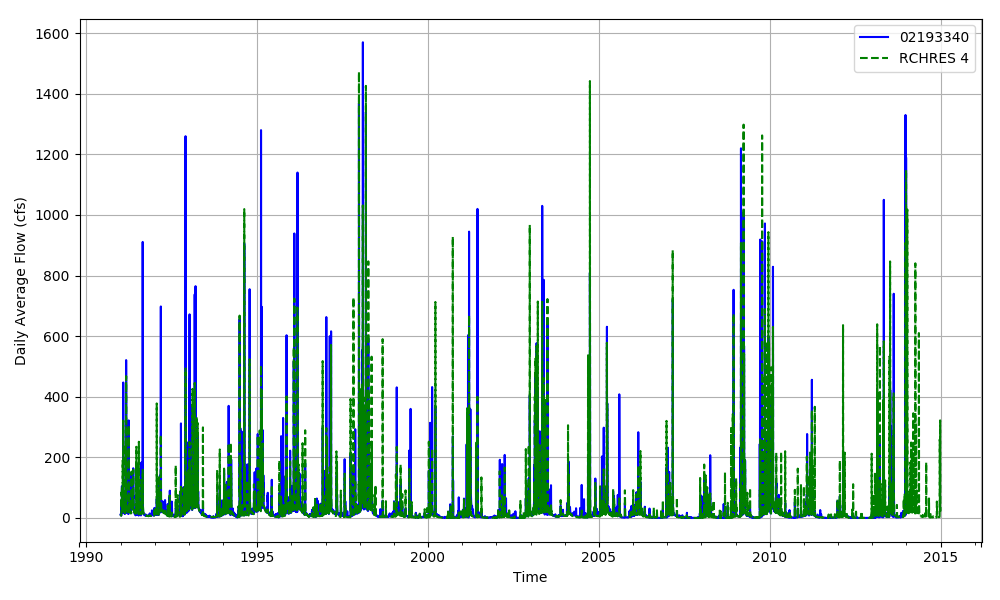


Figure 03060105-4: Daily flow for HSFP reach 04 and USGS station 02193340.

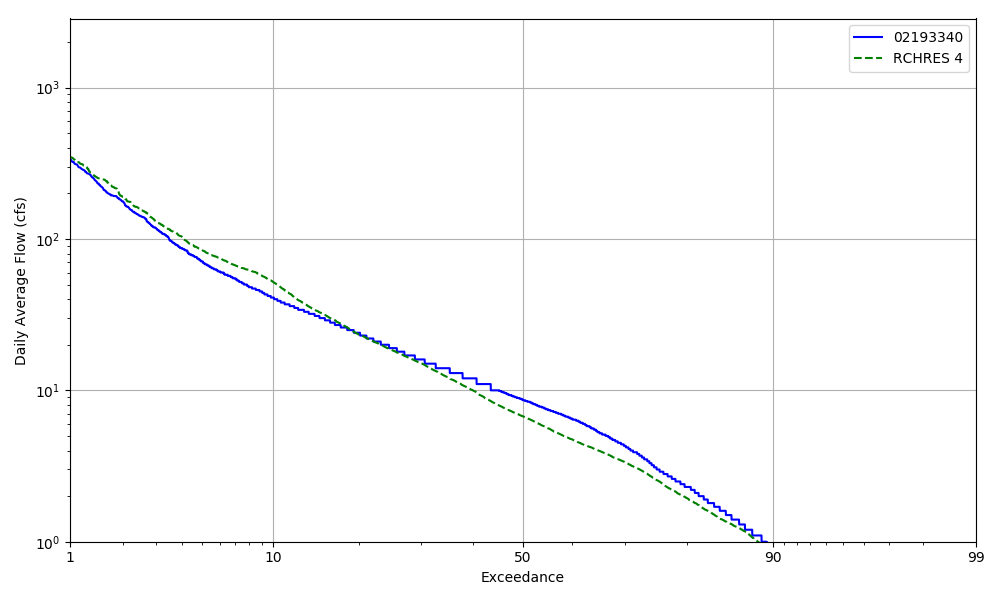


Figure 03060105-5: Daily exceedance for HSFP reach 04 and USGS station 02193340.

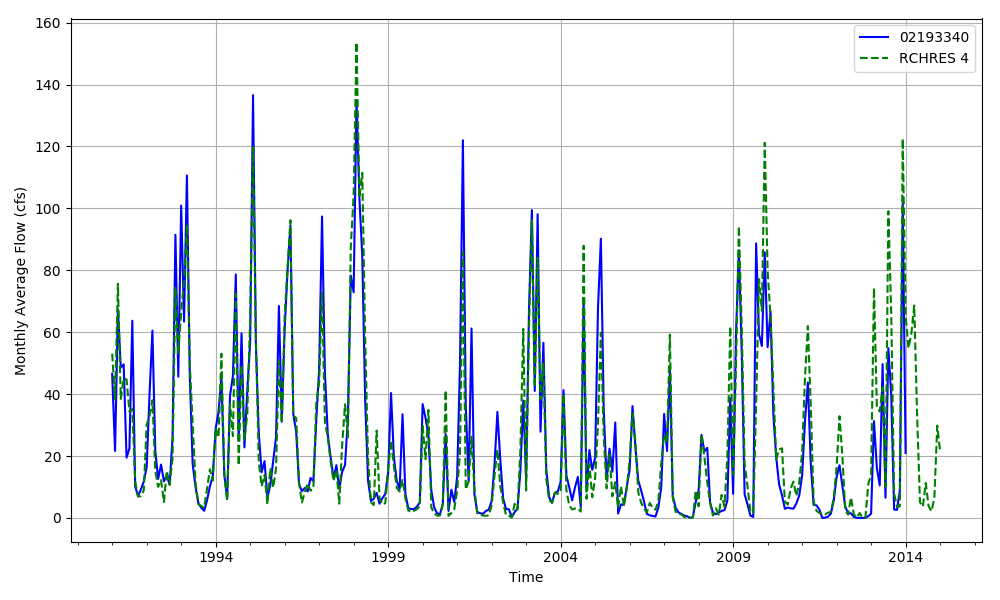


Figure 03060105-6: Monthly flow for HSFP reach 04 and USGS station 02193340.

## HSPF Reach 20, USGS Gauge 02193500

Table 03060105-3: Comparison Statistics Between HSPF Reach 20 and USGS Gauge 02193500.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 8.65 |
| Standard error | 98.61 |
| Relative bias | 0.04 |
| Relative standard error | 0.38 |
| Nash-Sutcliffe coefficient | 0.85 |
| Kling-Gupta coefficient | 0.91 |
| Coefficient of efficiency | 0.70 |
| Index of agreement | 0.85 |

Table 03060105-4: Hydrologic Indices Between USGS Gauge 02193500 and HSPF Reach 20.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02193500 | Simulated Reach 20 | Percent Difference |
| MA1: Mean, all daily flows | 206.61 | 215.46 | 4.28 |
| MA2: Median, all daily flows | 68.00 | 63.08 | -7.24 |
| MA3: CV, all daily flows | 239.03 | 257.91 | 7.90 |
| MA4: CV, log of all daily flows | 143.41 | 137.48 | -4.14 |
| MA5: Mean daily flow / median daily flow | 3.04 | 3.42 | 12.42 |
| MA9: (Q10 - Q90) / median daily flow | 5.85 | 7.60 | 29.98 |
| MA10: (Q20 - Q80) / median daily flow | 2.81 | 3.35 | 19.11 |
| MA11: (Q25 - Q75) / median daily flow | 2.09 | 2.39 | 14.40 |
| MA12: Mean monthly flow, January | 286.82 | 294.54 | 2.69 |
| MA13: Mean monthly flow, February | 434.75 | 429.35 | -1.24 |
| MA14: Mean monthly flow, March | 473.71 | 457.65 | -3.39 |
| MA15: Mean monthly flow, April | 218.15 | 223.68 | 2.53 |
| MA16: Mean monthly flow, May | 151.45 | 164.11 | 8.36 |
| MA17: Mean monthly flow, June | 113.08 | 114.84 | 1.55 |
| MA18: Mean monthly flow, July | 95.27 | 103.88 | 9.04 |
| MA19: Mean monthly flow, August | 92.35 | 95.04 | 2.91 |
| MA20: Mean monthly flow, September | 104.20 | 130.69 | 25.43 |
| MA21: Mean monthly flow, October | 85.01 | 105.18 | 23.72 |
| MA22: Mean monthly flow, November | 143.99 | 133.86 | -7.03 |
| MA23: Mean monthly flow, December | 218.19 | 263.97 | 20.98 |
| ML1: Mean minimum monthly flow, January | 106.17 | 103.18 | -2.81 |
| ML2: Mean minimum monthly flow, February | 110.74 | 108.65 | -1.88 |
| ML3: Mean minimum monthly flow, March | 118.09 | 109.75 | -7.06 |
| ML4: Mean minimum monthly flow, April | 78.87 | 77.58 | -1.64 |
| ML5: Mean minimum monthly flow, May | 44.80 | 51.87 | 15.77 |
| ML6: Mean minimum monthly flow, June | 28.90 | 34.94 | 20.91 |
| ML7: Mean minimum monthly flow, July | 22.29 | 29.04 | 30.30 |
| ML8: Mean minimum monthly flow, August | 18.06 | 25.49 | 41.13 |
| ML9: Mean minimum monthly flow, September | 14.36 | 21.64 | 50.72 |
| ML10: Mean minimum monthly flow, October | 22.16 | 25.47 | 14.94 |
| ML11: Mean minimum monthly flow, November | 39.06 | 37.35 | -4.37 |
| ML12: Mean minimum monthly flow, December | 61.58 | 60.74 | -1.37 |
| ML13: CV of minimum monthly flows | 116.30 | 119.48 | 2.74 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.10 | 0.18 | 85.32 |
| ML15: Mean minimum annual flow / mean annual flow | 0.04 | 0.06 | 83.71 |
| ML16: Median minimum annual flow / median annual flow | 0.04 | 0.14 | 252.14 |
| ML20: Ratio of baseflow volume to total flow volume | 0.32 | 0.31 | -2.96 |
| ML22: Mean annual minimum flow divided by catchment area | 0.09 | 0.15 | 79.88 |
| RA1: Mean of positive changes from one day to next (rise rate) | 192.44 | 281.66 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 308.82 | 355.87 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 78.14 | 98.73 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 393.22 | 528.57 |  |
| RA5: Ratio of days that are higher than previous day | 0.27 | 0.26 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.24 | 0.11 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.12 | 0.09 |  |
| RA8: Number of flow reversals from one day to the next | 89.54 | 94.75 |  |
| RA9: CV, number of flow reversals from one day to the next | 18.10 | 18.54 |  |

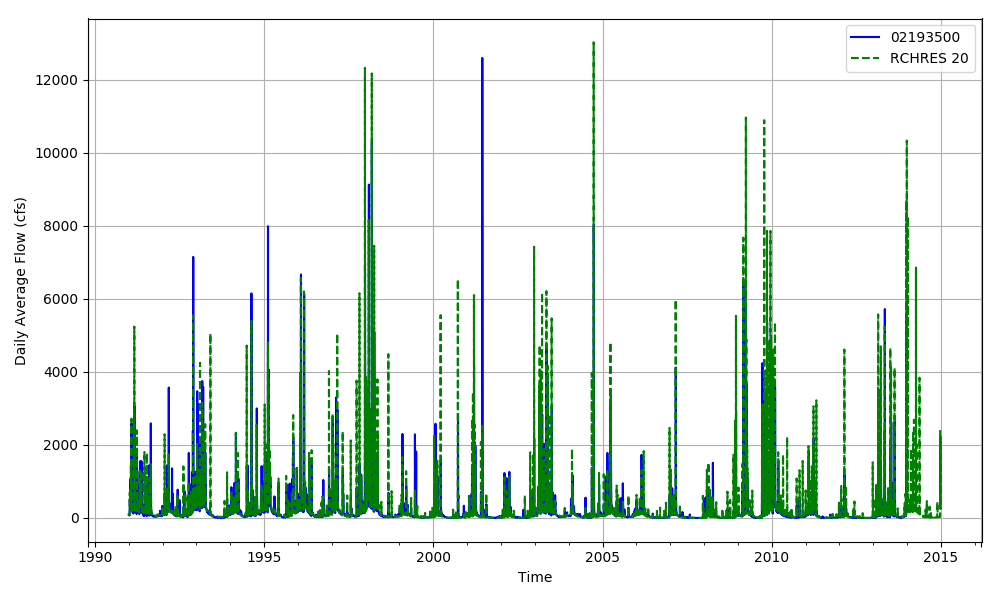


Figure 03060105-7: Daily flow for HSFP reach 20 and USGS station 02193500.

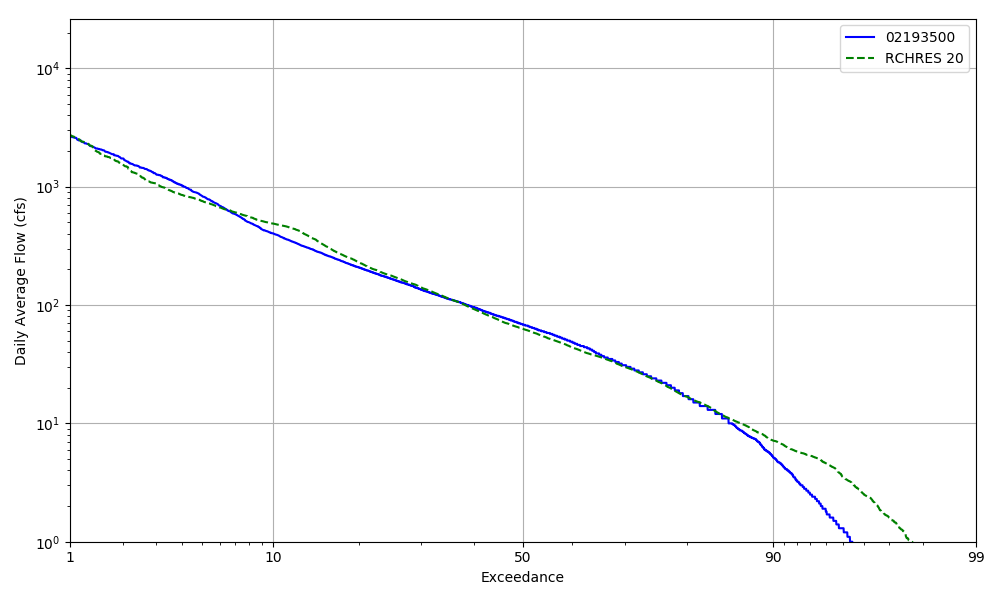


Figure 03060105-8: Daily exceedance for HSFP reach 20 and USGS station 02193500.

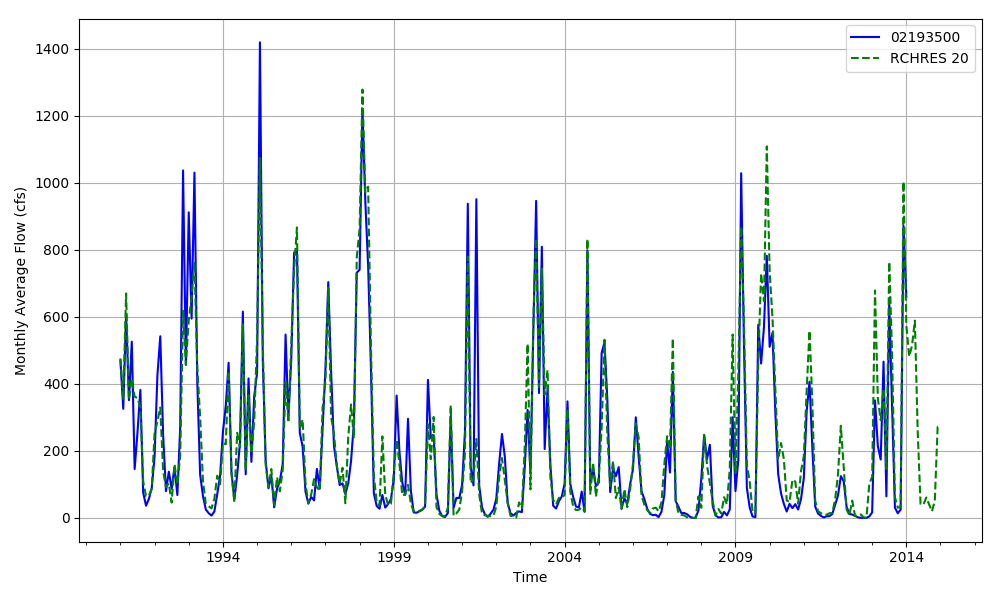


Figure 03060105-9: Monthly flow for HSFP reach 20 and USGS station 02193500.