# Appendix for Model 03110103

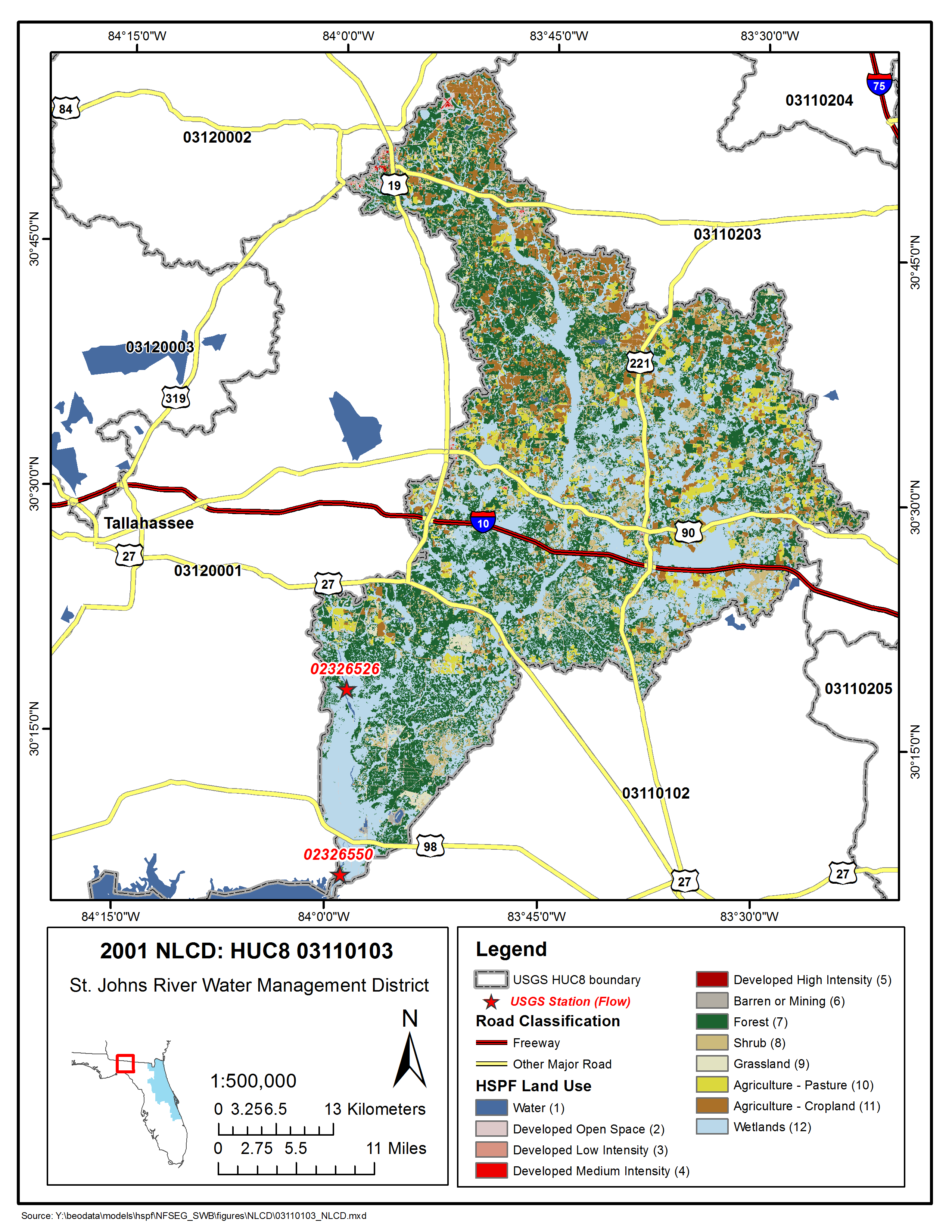


Figure 03110103-1: Land Cover from the National Land Cover Database.

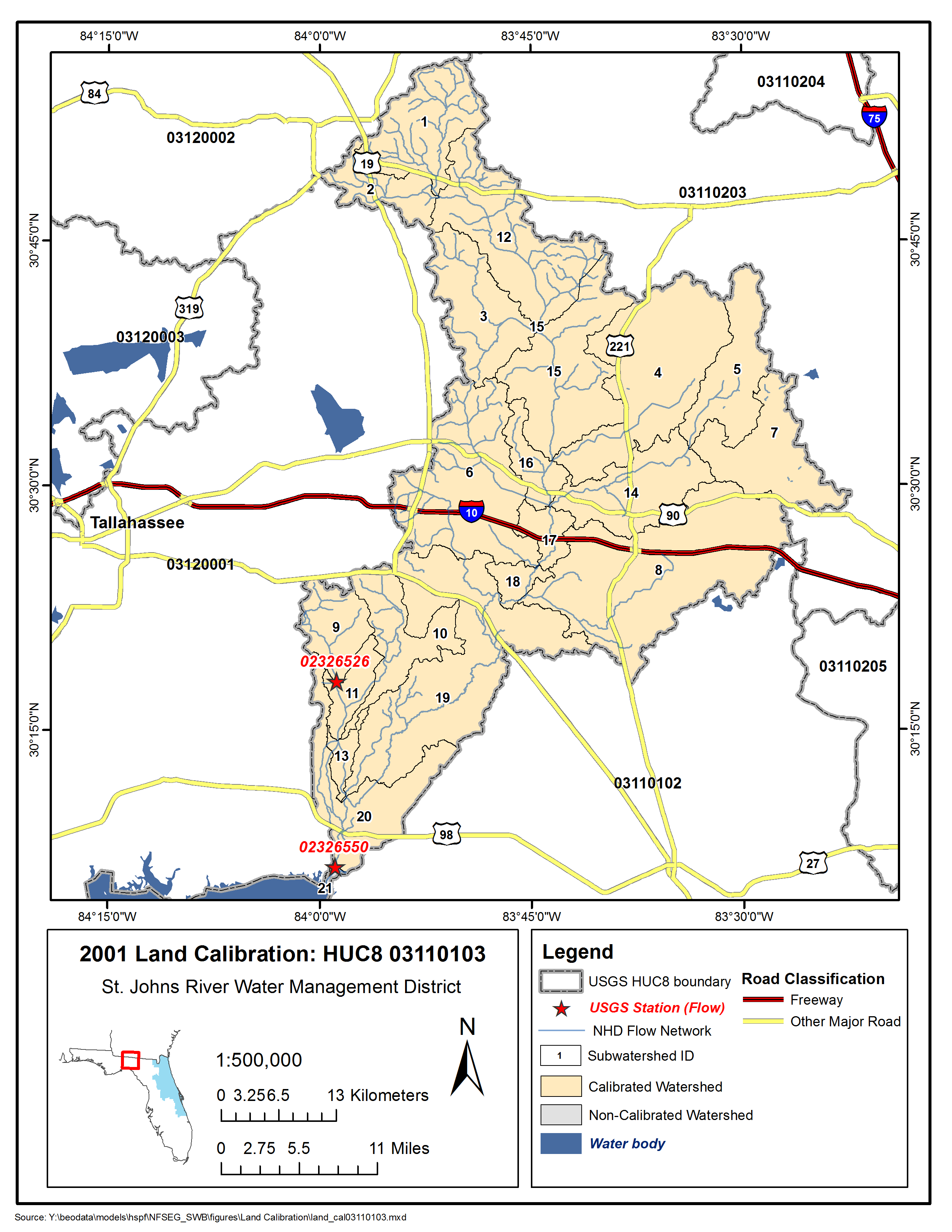


Figure 03110103-2: Calibrated sub-watersheds.

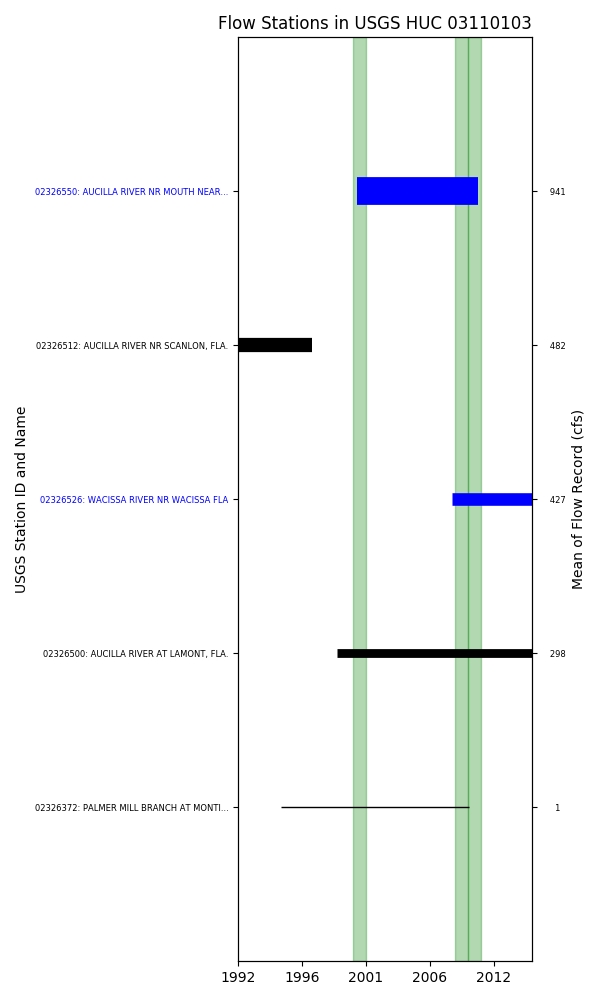


Figure 03110103-3: Station period of record. Blue color identifies gauges used for calibration.

## HSPF Reach 09, USGS Gauge 02326526

Table 03110103-1: Comparison Statistics Between HSPF Reach 09 and USGS Gauge 02326526.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 31.37 |
| Standard error | 153.08 |
| Relative bias | 0.07 |
| Relative standard error | 1.37 |
| Nash-Sutcliffe coefficient | -0.87 |
| Coefficient of efficiency | -0.32 |
| Index of agreement | 0.36 |

Table 03110103-2: Hydrologic Indices Between USGS Gauge 02326526 and HSPF Reach 09.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02326526 | Simulated Reach 09 | Percent Difference |
| MA1: Mean, all daily flows | 438.35 | 465.72 | 6.24 |
| MA2: Median, all daily flows | 432.00 | 442.94 | 2.53 |
| MA3: CV, all daily flows | 15.44 | 13.19 | -14.61 |
| MA4: CV, log of all daily flows | 22.53 | 22.51 | -0.12 |
| MA5: Mean daily flow / median daily flow | 1.01 | 1.05 | 3.62 |
| MA9: (Q10 - Q90) / median daily flow | 0.66 | 0.68 | 3.63 |
| MA10: (Q20 - Q80) / median daily flow | 0.45 | 0.46 | 2.79 |
| MA11: (Q25 - Q75) / median daily flow | 0.35 | 0.38 | 8.95 |
| MA12: Mean monthly flow, January | 418.51 | 453.48 | 8.36 |
| MA13: Mean monthly flow, February | 377.29 | 366.87 | -2.76 |
| MA14: Mean monthly flow, March | 403.32 | 395.35 | -1.97 |
| MA15: Mean monthly flow, April | 438.91 | 411.88 | -6.16 |
| MA16: Mean monthly flow, May | 406.26 | 395.09 | -2.75 |
| MA17: Mean monthly flow, June | 358.99 | 390.72 | 8.84 |
| MA18: Mean monthly flow, July | 323.86 | 406.93 | 25.65 |
| MA19: Mean monthly flow, August | 345.35 | 416.01 | 20.46 |
| MA20: Mean monthly flow, September | 354.07 | 411.72 | 16.28 |
| MA21: Mean monthly flow, October | 412.98 | 460.92 | 11.61 |
| MA22: Mean monthly flow, November | 397.05 | 437.24 | 10.12 |
| MA23: Mean monthly flow, December | 422.96 | 447.95 | 5.91 |
| ML1: Mean minimum monthly flow, January | 397.67 | 428.27 | 7.70 |
| ML2: Mean minimum monthly flow, February | 423.80 | 411.01 | -3.02 |
| ML3: Mean minimum monthly flow, March | 446.60 | 438.84 | -1.74 |
| ML4: Mean minimum monthly flow, April | 477.00 | 468.52 | -1.78 |
| ML5: Mean minimum monthly flow, May | 447.80 | 456.30 | 1.90 |
| ML6: Mean minimum monthly flow, June | 388.80 | 445.89 | 14.68 |
| ML7: Mean minimum monthly flow, July | 347.80 | 453.29 | 30.33 |
| ML8: Mean minimum monthly flow, August | 359.60 | 467.62 | 30.04 |
| ML9: Mean minimum monthly flow, September | 394.60 | 472.21 | 19.67 |
| ML10: Mean minimum monthly flow, October | 388.50 | 444.00 | 14.29 |
| ML11: Mean minimum monthly flow, November | 377.83 | 422.60 | 11.85 |
| ML12: Mean minimum monthly flow, December | 400.00 | 421.09 | 5.27 |
| ML13: CV of minimum monthly flows | 25.67 | 23.30 | -9.22 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.77 | 0.82 | 5.81 |
| ML15: Mean minimum annual flow / mean annual flow | 0.76 | 0.82 | 7.95 |
| ML16: Median minimum annual flow / median annual flow | 0.75 | 0.83 | 9.76 |
| ML20: Ratio of baseflow volume to total flow volume | 0.97 | 0.98 | 0.82 |
| ML22: Mean annual minimum flow divided by catchment area | 3.14 | 3.99 | 27.06 |
| RA1: Mean of positive changes from one day to next (rise rate) | 13.11 | 13.61 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 199.55 | 197.28 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 6.55 | 3.71 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 154.57 | 157.38 |  |
| RA5: Ratio of days that are higher than previous day | 0.30 | 0.22 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.01 | 0.01 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.01 | 0.00 |  |
| RA8: Number of flow reversals from one day to the next | 90.00 | 70.33 |  |
| RA9: CV, number of flow reversals from one day to the next | 39.15 | 39.59 |  |

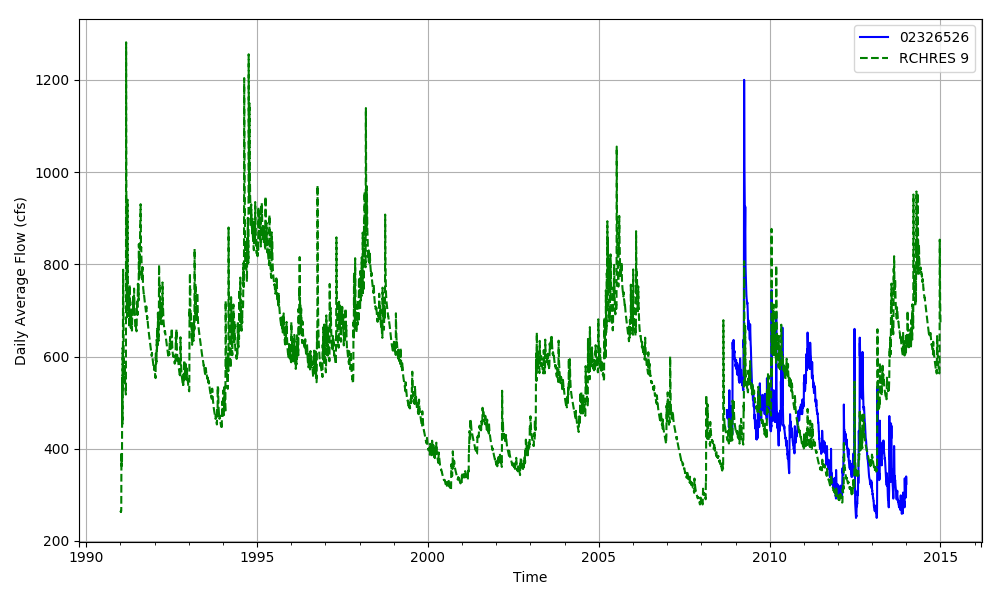


Figure 03110103-4: Daily flow for HSFP reach 09 and USGS station 02326526.

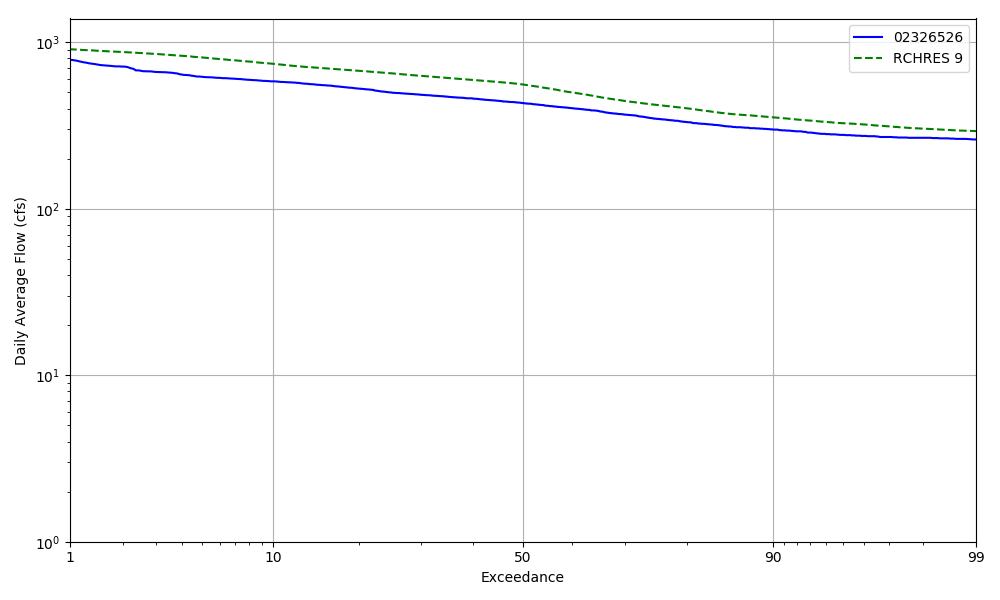


Figure 03110103-5: Daily exceedance for HSFP reach 09 and USGS station 02326526.

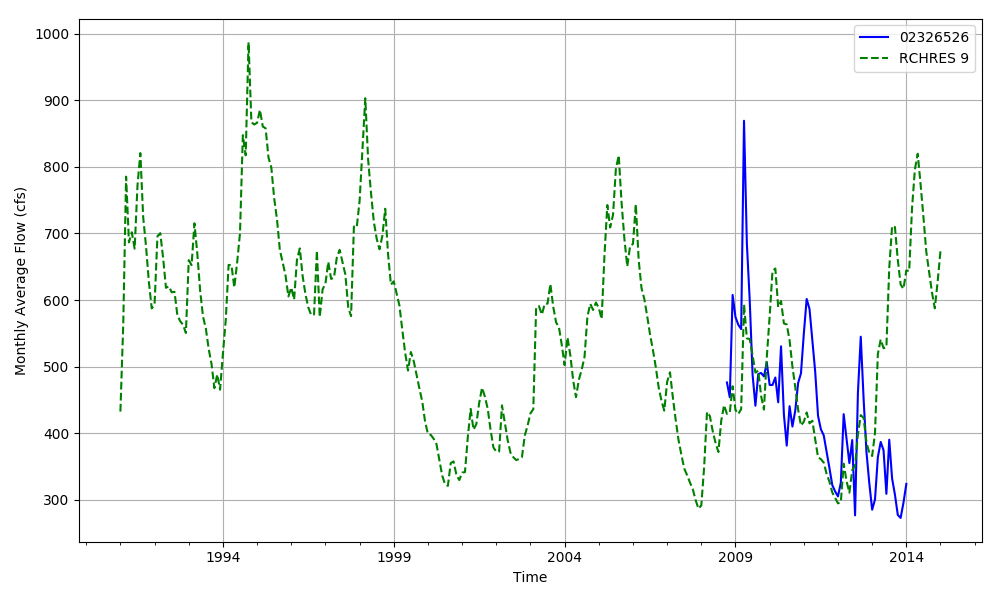


Figure 03110103-6: Monthly flow for HSFP reach 09 and USGS station 02326526.

## HSPF Reach 20, USGS Gauge 02326550

Table 03110103-3: Comparison Statistics Between HSPF Reach 20 and USGS Gauge 02326550.

|  |  |
| --- | --- |
| Statistic | Value |
| Bias | 106.70 |
| Standard error | 621.19 |
| Relative bias | 0.11 |
| Relative standard error | 0.90 |
| Nash-Sutcliffe coefficient | 0.20 |
| Coefficient of efficiency | 0.02 |
| Index of agreement | 0.49 |

Table 03110103-4: Hydrologic Indices Between USGS Gauge 02326550 and HSPF Reach 20.

|  |  |  |  |
| --- | --- | --- | --- |
| Hydrologic Index and description (Olden and Poff, 2003) | Observed 02326550 | Simulated Reach 20 | Percent Difference |
| MA1: Mean, all daily flows | 996.62 | 1050.50 | 5.41 |
| MA2: Median, all daily flows | 878.00 | 766.70 | -12.68 |
| MA3: CV, all daily flows | 53.43 | 62.42 | 16.83 |
| MA4: CV, log of all daily flows | 62.96 | 60.92 | -3.24 |
| MA5: Mean daily flow / median daily flow | 1.14 | 1.37 | 20.71 |
| MA9: (Q10 - Q90) / median daily flow | 1.84 | 1.88 | 1.89 |
| MA10: (Q20 - Q80) / median daily flow | 1.05 | 1.04 | -1.22 |
| MA11: (Q25 - Q75) / median daily flow | 0.75 | 0.79 | 5.48 |
| MA12: Mean monthly flow, January | 955.62 | 922.53 | -3.46 |
| MA13: Mean monthly flow, February | 1005.62 | 1174.64 | 16.81 |
| MA14: Mean monthly flow, March | 1083.91 | 1315.00 | 21.32 |
| MA15: Mean monthly flow, April | 911.37 | 1013.38 | 11.19 |
| MA16: Mean monthly flow, May | 666.92 | 699.16 | 4.83 |
| MA17: Mean monthly flow, June | 683.88 | 833.18 | 21.83 |
| MA18: Mean monthly flow, July | 690.78 | 914.17 | 32.34 |
| MA19: Mean monthly flow, August | 761.11 | 973.48 | 27.90 |
| MA20: Mean monthly flow, September | 871.03 | 817.37 | -6.16 |
| MA21: Mean monthly flow, October | 732.62 | 681.53 | -6.97 |
| MA22: Mean monthly flow, November | 665.91 | 612.93 | -7.96 |
| MA23: Mean monthly flow, December | 892.54 | 869.69 | -2.56 |
| ML1: Mean minimum monthly flow, January | 531.67 | 645.69 | 21.45 |
| ML2: Mean minimum monthly flow, February | 691.67 | 768.85 | 11.16 |
| ML3: Mean minimum monthly flow, March | 757.67 | 849.99 | 12.19 |
| ML4: Mean minimum monthly flow, April | 597.59 | 694.54 | 16.22 |
| ML5: Mean minimum monthly flow, May | 374.17 | 533.54 | 42.59 |
| ML6: Mean minimum monthly flow, June | 397.69 | 536.61 | 34.93 |
| ML7: Mean minimum monthly flow, July | 424.58 | 659.32 | 55.29 |
| ML8: Mean minimum monthly flow, August | 416.01 | 639.69 | 53.77 |
| ML9: Mean minimum monthly flow, September | 555.19 | 581.61 | 4.76 |
| ML10: Mean minimum monthly flow, October | 446.04 | 607.46 | 36.19 |
| ML11: Mean minimum monthly flow, November | 509.44 | 573.99 | 12.67 |
| ML12: Mean minimum monthly flow, December | 528.38 | 632.46 | 19.70 |
| ML13: CV of minimum monthly flows | 87.81 | 43.32 | -50.67 |
| ML14: Mean minimum daily flow / mean median annual flow | 0.19 | 0.63 | 228.19 |
| ML15: Mean minimum annual flow / mean annual flow | 0.18 | 0.51 | 184.89 |
| ML16: Median minimum annual flow / median annual flow | 0.07 | 0.59 | 688.83 |
| ML20: Ratio of baseflow volume to total flow volume | 0.66 | 0.72 | 9.63 |
| ML22: Mean annual minimum flow divided by catchment area | 1.75 | 4.89 | 179.03 |
| RA1: Mean of positive changes from one day to next (rise rate) | 162.38 | 131.62 |  |
| RA2: CV, mean of positive changes from one day to next (rise rate) | 149.45 | 330.53 |  |
| RA3: Mean of negative changes from one day to next (fall rate) | 143.43 | 67.38 |  |
| RA4: CV, mean of negative changes from one day to next (fall rate) | 129.54 | 213.95 |  |
| RA5: Ratio of days that are higher than previous day | 0.46 | 0.34 |  |
| RA6: Median of difference in log of flows over two consecutive days of rising | 0.12 | 0.04 |  |
| RA7: Median of difference in log of flows over two consecutive days of falling | 0.11 | 0.03 |  |
| RA8: Number of flow reversals from one day to the next | 149.64 | 38.36 |  |
| RA9: CV, number of flow reversals from one day to the next | 40.80 | 44.61 |  |

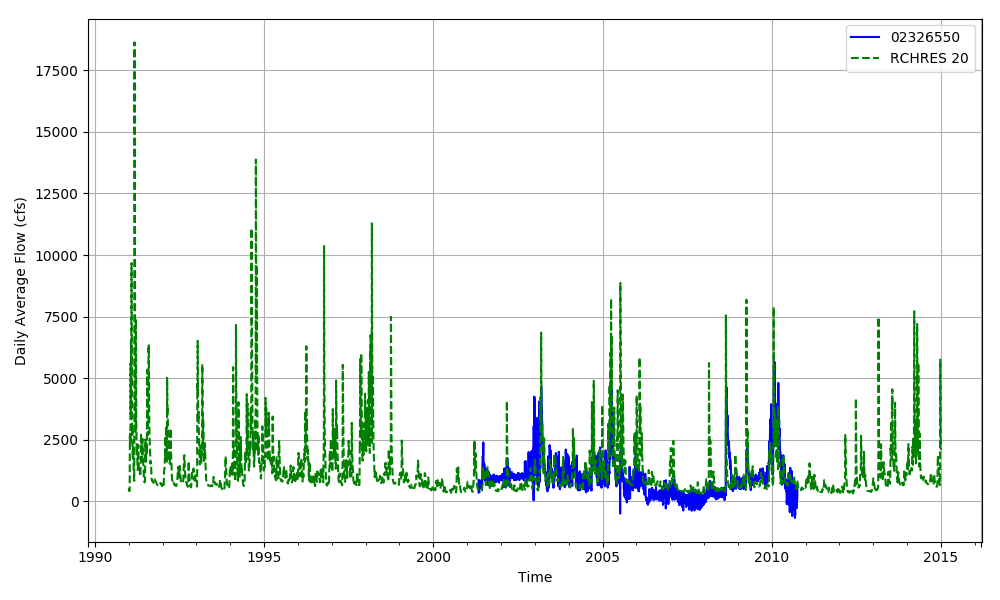


Figure 03110103-7: Daily flow for HSFP reach 20 and USGS station 02326550.

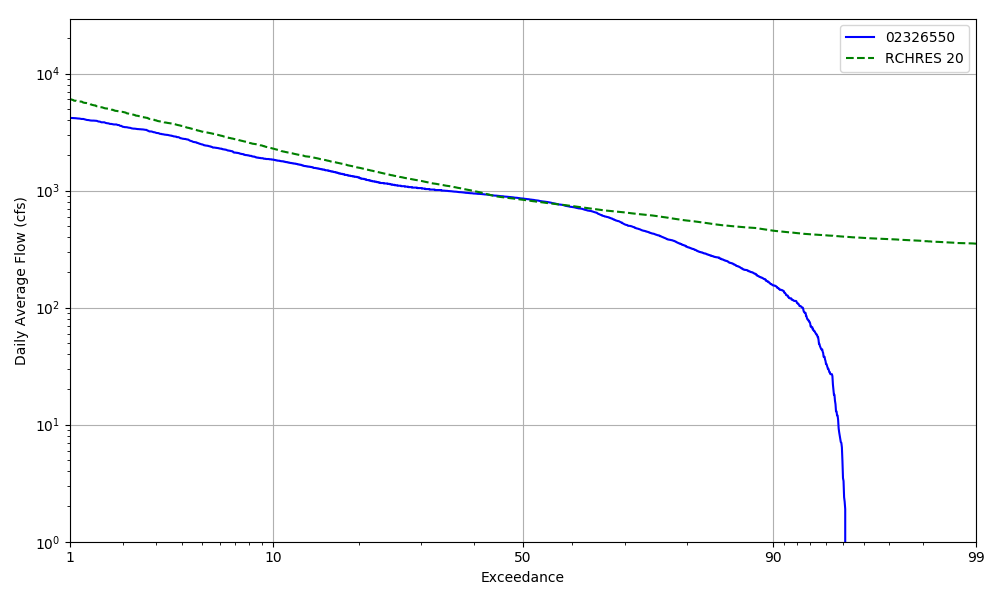


Figure 03110103-8: Daily exceedance for HSFP reach 20 and USGS station 02326550.

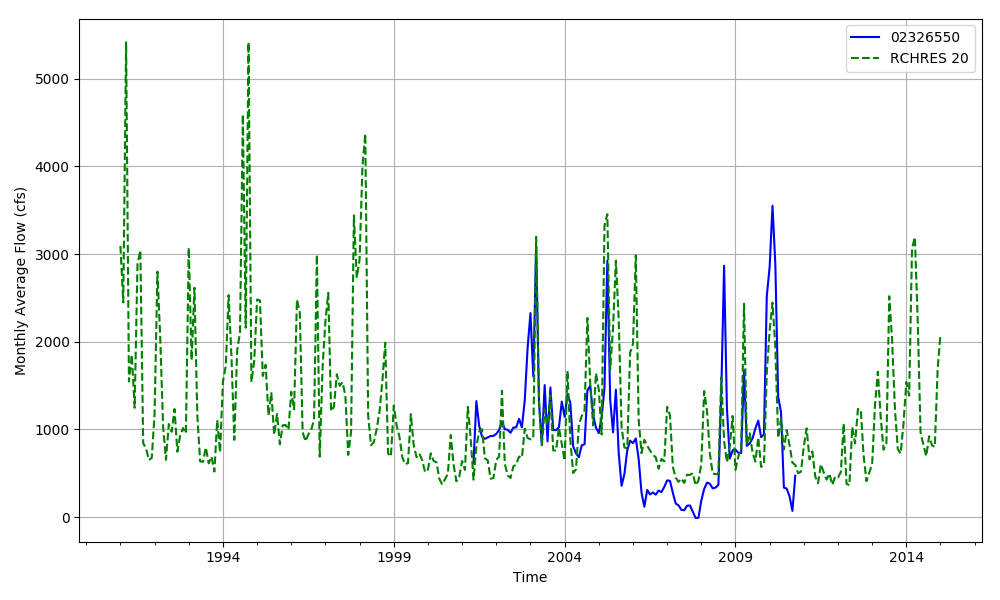


Figure 03110103-9: Monthly flow for HSFP reach 20 and USGS station 02326550.