CHAPTER 3: WATERSHED HYDROLOGY
APPENDIX 3.K: 05-LAKE GEORGE BASIN CALIBRATION

5B ALEXANDER CREEK WATERSHED

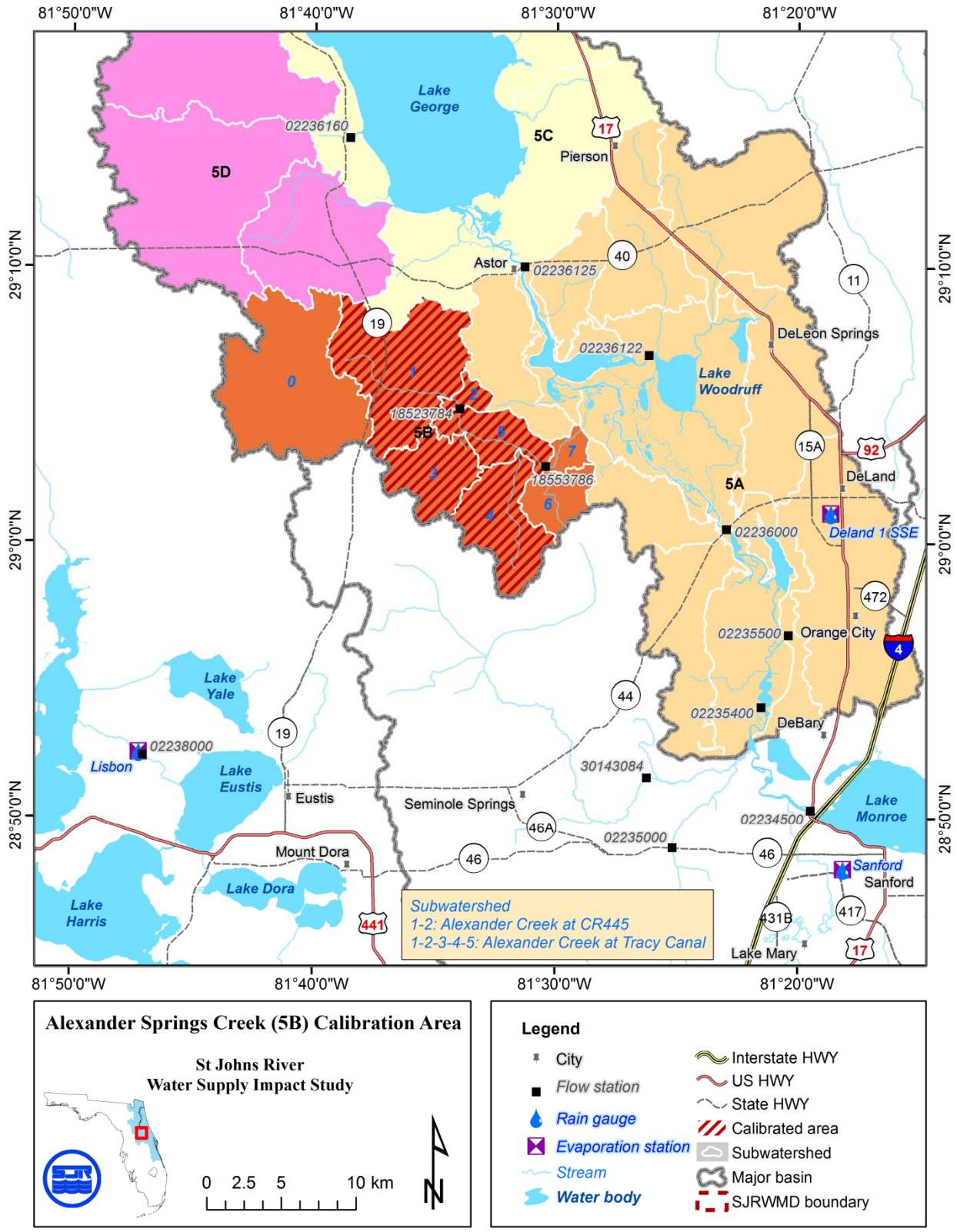

Figure 3.K.1: 5B Alexander Creek Watershed calibration areas

5B ALEXANDER CREEK WATERSHED. ALEXANDER CREEK AT CR445 SUBWATERSHEDS

Alexander Creek is a spring-fed tributary of the St. Johns River. The Upper Alexander Creek Basin is at the western portion of Alexander Creek with a total area of 125.0 square miles. The SJRWMD Upper Alexander Creek Gage Station (18523784) is located on the creek, 1.4 miles downstream of Alexander Springs at the bridge for County Road 445. The 26.8 square miles contributing storm water are Nine Mile Creek, a large tributary system, and Upper Alexander Creek (subwatersheds 1 and 2) were measured at the gage station on Alexander Creek. The parameters calibrated using this gage were also applied to an Unnamed Drainage Basin (subwatershed 3). This subwatershed shares similar hydrologic characteristics with subwatershed 1 as well as the same Lisbon rainfall and evaporation station.

Lisbon rainfall and evaporation stations were used for Nine Mie Creek (subwatershed 1) while Deland rainfall and evaporation stations were used were Upper Alexander Creek (subwatershed 2). There were an average of 14.1 inches/year rainfall difference between the two stations. The actual rainfall for the basin is likely between these gages. The calibration period for the HSPF Mode was October 2003 to December 2008. The Upper Alexander Creek Gage Station did not exist until October 2003. Alexander Springs flow was added to the calibration model with observed monthly data. The data was extrapolated for each day of the month and input into the model as a daily time-series.

Parameter Estimation Program (PEST) was applied for HSPF model parameters calibration of the 10 parameters according to the WSI project general model parameters guideline and ranges. As the results of the model performance shows , the observed annual mean discharge for 2004 to 2008 was 82.0 cfs. The simulated discharge over the calibration was 82.4 cfs. The model goodness-of-fit statistics resulted in a Nash-Sutcliffe coefficient of 0.79. During the process of hydrologic calibration, the daily flow-frequency duration curves and the correlation of simulated and observed daily flows are evaluated. In addition, simulated and observed stages are compared at the calibration sites. Furthermore, the comparison of simulated and observed flows is performed for monthly values. The plots for these comparisons are provided in the following subsection. Based on the results of hydrologic calibration, it is concluded that the HSPF model reasonably represents the hydrologic processes of the watershed.

Table 3.K.1: Calibration Model Performance

Nash-Sutcliffe (Monthly Mean Flow)	Percent Error of the Mean
0.79	1.02

Table 3.K.2: Descriptive Calibration Statistics

Statistic (Daily Flow (mgd))	Observed (SJRWMD:18523784)	Simulated
Average	82.00	82.84
Median	76.89	78.76
Variance	448.80	612.33
Standard Deviation	21.18	24.75
Skew	3.53	6.46
Kurtosis	19.44	54.79
Minimum	60.75	65.19
Maximum	258.53	367.63
Range	197.77	302.44

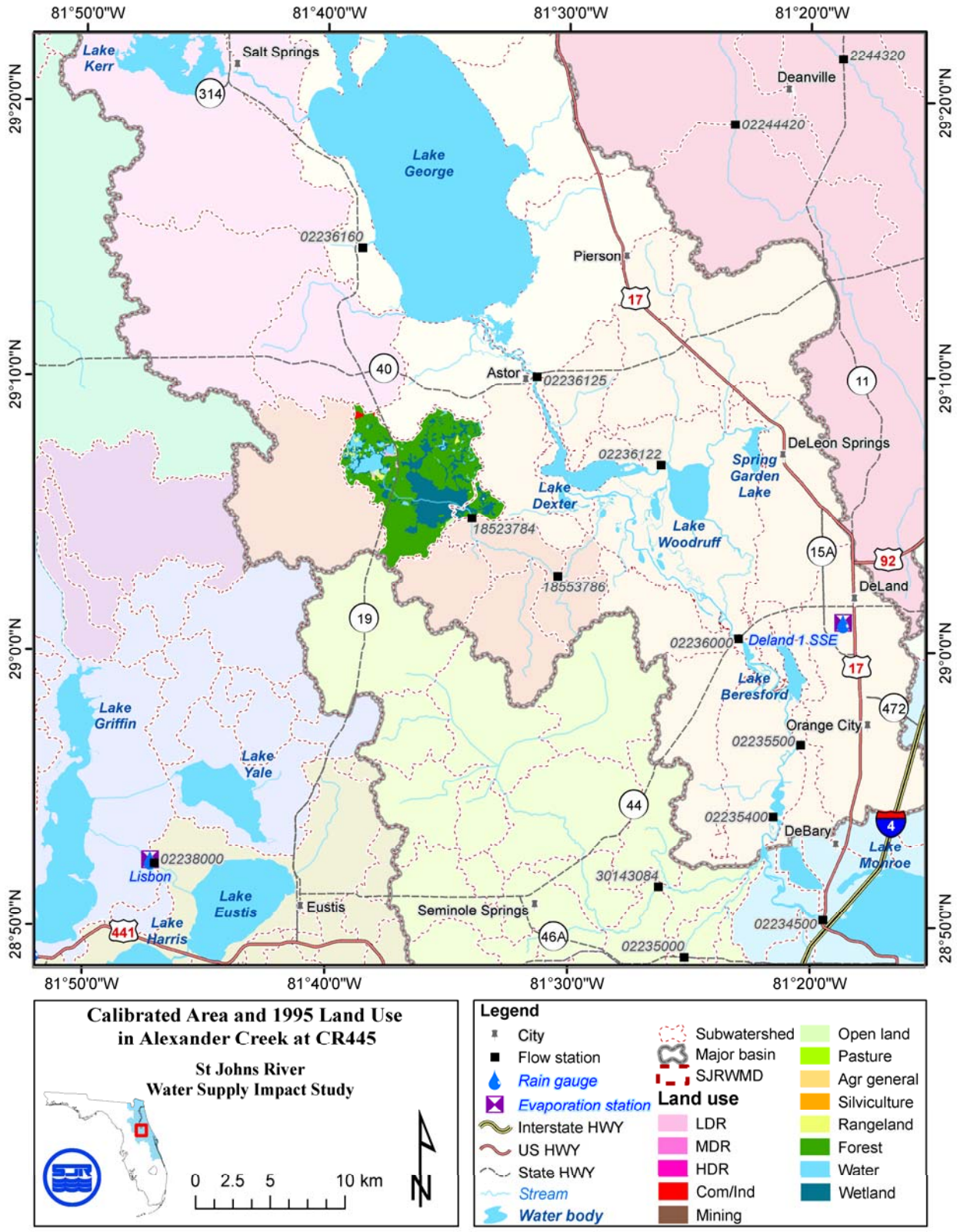

Figure 3.K.2: Alexander Creek at CR445 land use map

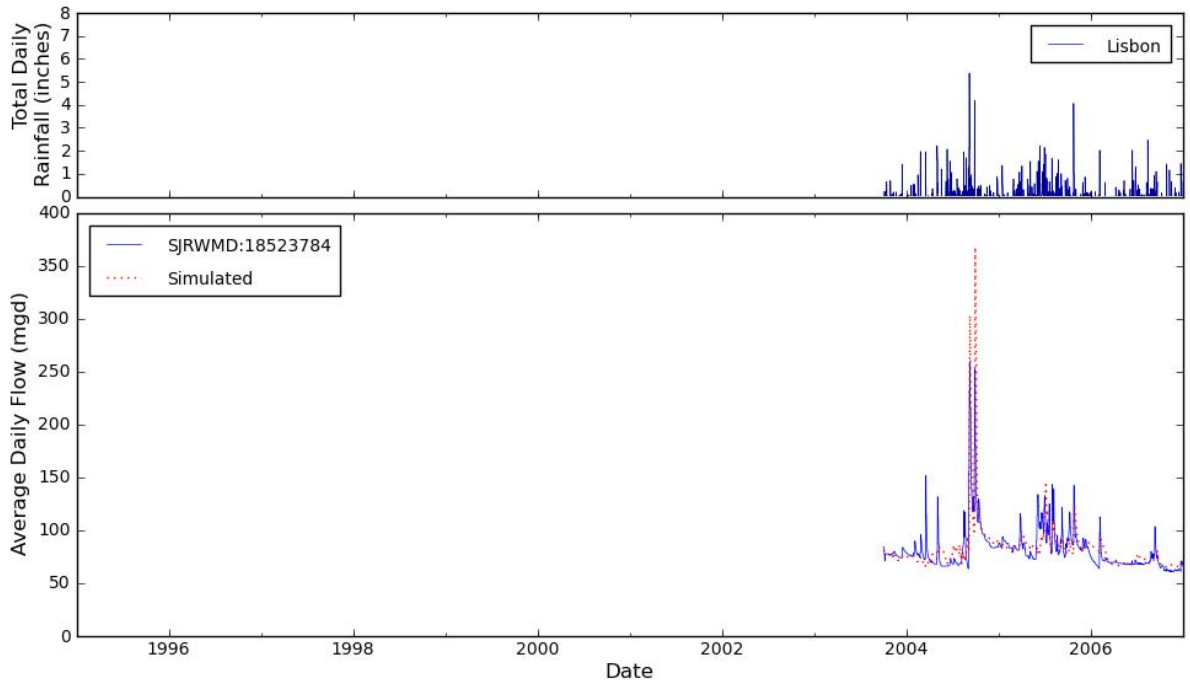

Figure 3.K.3: Alexander Creek at CR445 daily hydrograph

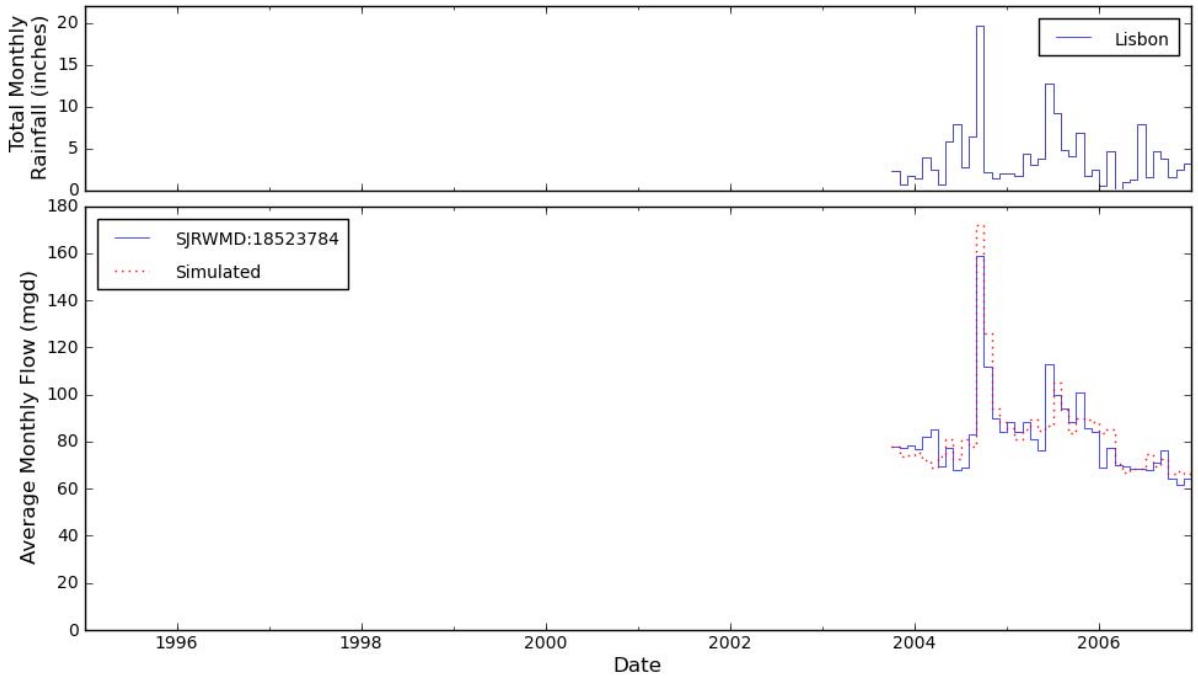

Figure 3.K.4: Alexander Creek at CR445 monthly hydrograph

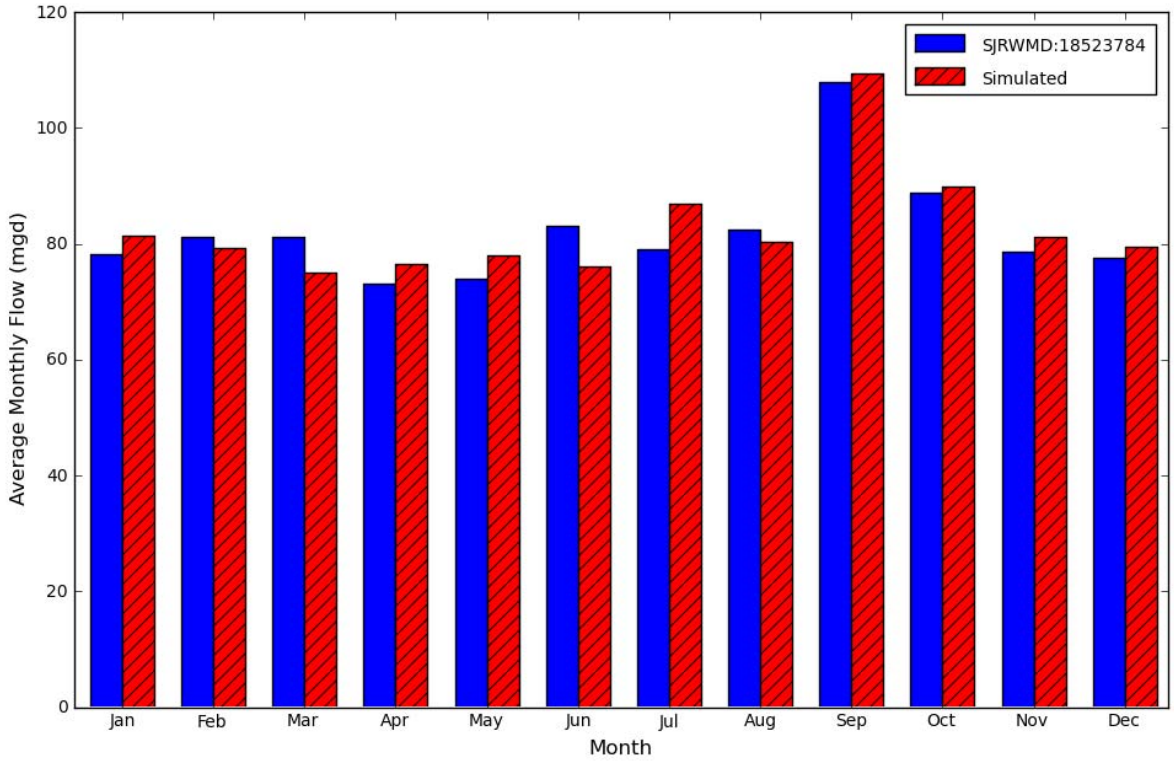

Figure 3.K.5: Alexander Creek at CR445 average monthly flow

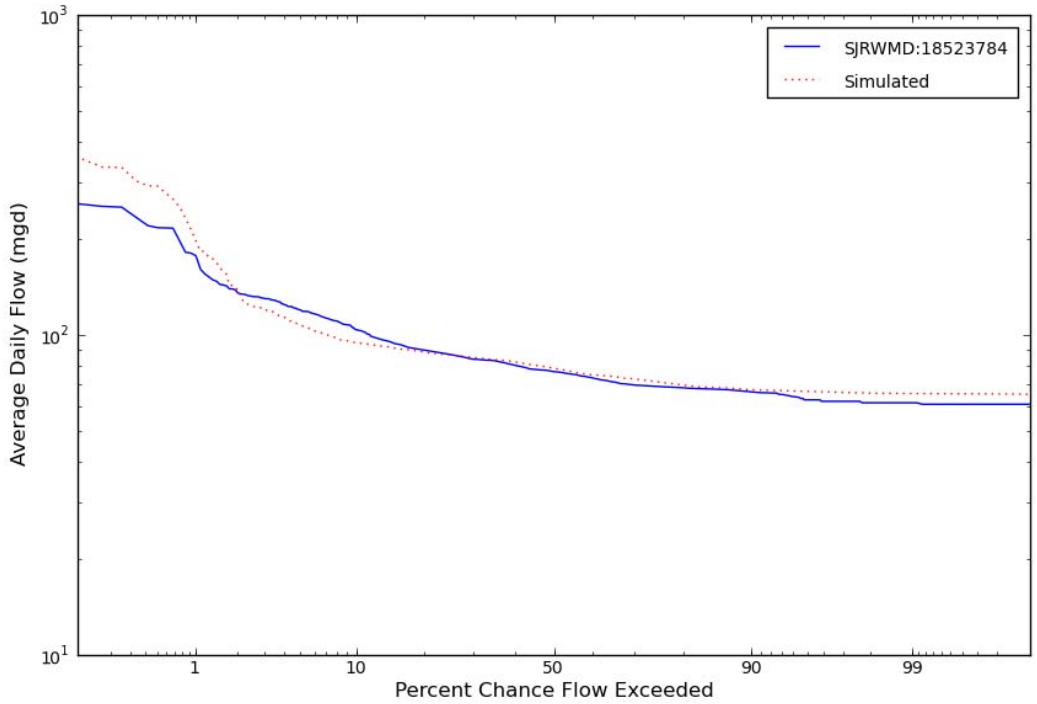

Figure 3.K.6: Alexander Creek at CR445 exceedance probability curve

5B ALEXANDER CREEK WATERSHED. ALEXANDER CREEK AT TRACY CANAL SUBWATERSHEDS

Alexander Creek is a spring-fed tributary of the St. Johns River. The Middle Alexander Creek Basin is in the central portion of Alexander Creek with a total area of 125.0 square miles. The SJRWMD Middle Alexander Creek Gage Station (18553786) is located on the creek, 7.5 miles downstream of Alexander Springs and XX miles upstream from the St. Johns River. The gage is located on Alexander Creek just prior to the junction with Tracy Canal. The 31.5 square miles contributing storm water are an Unnamed Drainage basin, Glenn Branch, and Middle Alexander Creek (subwatersheds 3,4, and 5) were measured at the gage station on Alexander Creek. The parameters calibrated using this gage were also applied to Tracy Canal and Lower Alexander Creek (subwatersheds 6 and 7), both downstream of the gage. Subwatershed 3 had parameters calibrated with the Upper Alexander Creek gage applied to the basin. This subwatershed shares similar hydrologic characteristics with subwatershed 1 as well as the same Lisbon rainfall and evaporation station.

Lisbon rainfall and evaporation stations were used for the Unnamed Drainage Basin (subwatershed 3) while Deland rainfall and evaporation stations were used were Glenn Branch and Middle Alexander Creek (subwatersheds 4 and 5). There were an average of 14.1 inches/year rainfall difference between the two stations. The actual rainfall for the basin is likely between these gages. The calibration period for the HSPF Mode was October 2003 to December 2008. The Middle Alexander Creek Gage Station did not exist until October 2003. Alexander Springs flow was added to the calibration model with observed monthly data. The data was extrapolated for each day of the month and input into the model as a daily time-series.

Parameter Estimation Program (PEST) was applied for HSPF model parameters calibration of the 10 parameters according to the WSI project general model parameters guideline and ranges. As the results of the model performance shows , the observed annual mean discharge for 2004 to 2008 was 92.0 cfs. The simulated discharge over the calibration was 94.4 cfs. The model goodness-of-fit statistics resulted in a Nash-Sutcliffe coefficient of 0.80. During the process of hydrologic calibration, the daily flow-frequency duration curves and the correlation of simulated and observed daily flows are evaluated. In addition, simulated and observed stages are compared at the calibration sites. Furthermore, the comparison of simulated and observed flows is performed for monthly values. The plots for these comparisons are provided in the following subsection. Based on the results of hydrologic calibration, it is concluded that the HSPF model reasonably represents the hydrologic processes of the watershed.

Table 3.K.3: Calibration Model Performance

Nash-Sutcliffe (Monthly Mean Flow)	Percent Error of the Mean
0.80	2.57

Table 3.K.4: Descriptive Calibration Statistics

Statistic (Daily Flow (mgd))	Observed (SJRWMD:18553786)	Simulated
Average	92.03	94.39
Median	82.73	86.82
Variance	1006.37	1395.46
Standard Deviation	31.72	37.36
Skew	3.06	5.26
Kurtosis	14.16	35.61
Minimum	63.99	66.40
Maximum	355.47	424.02
Range	291.49	357.62

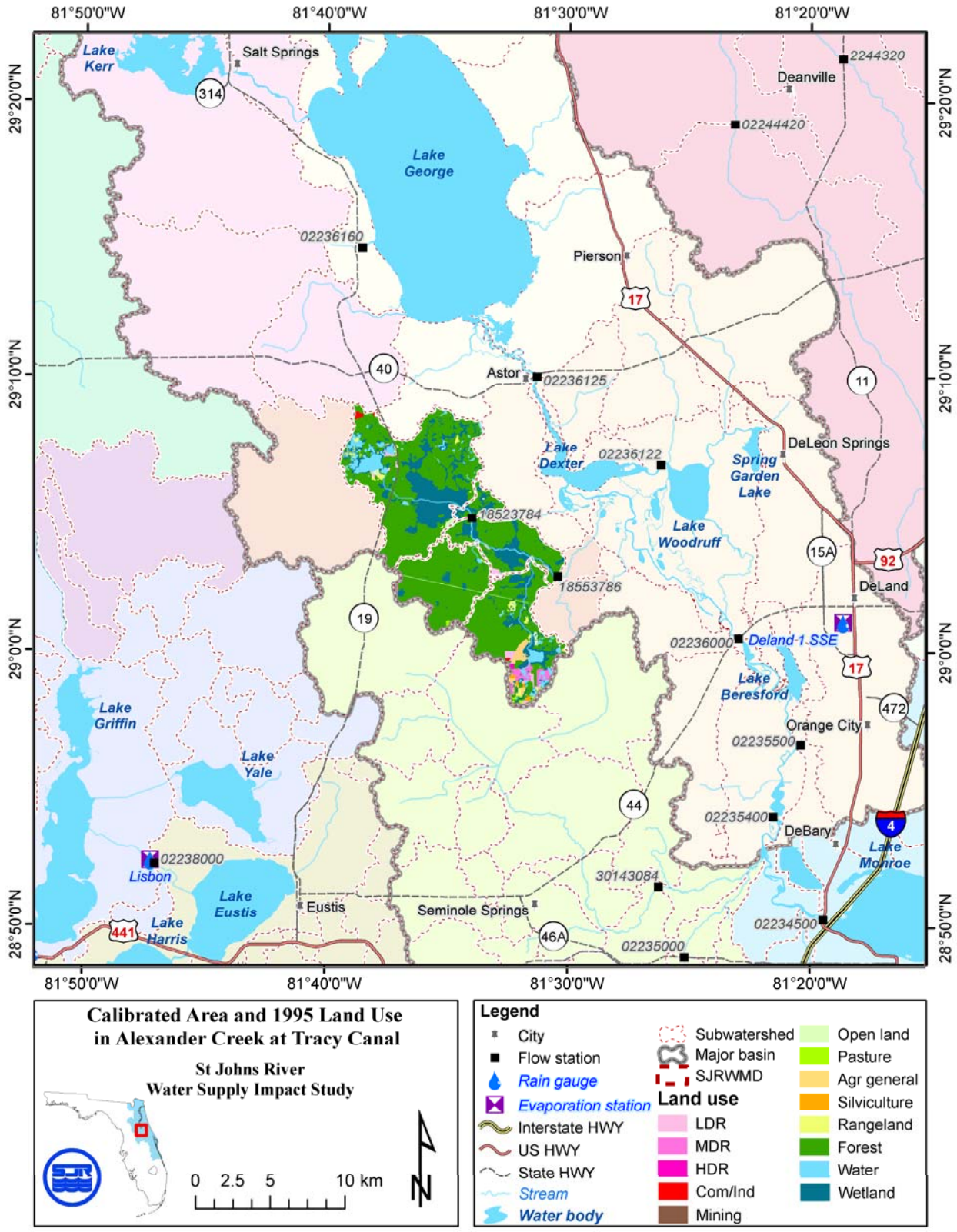

Figure 3.K.7: Alexander Creek at Tracy Canal land use map

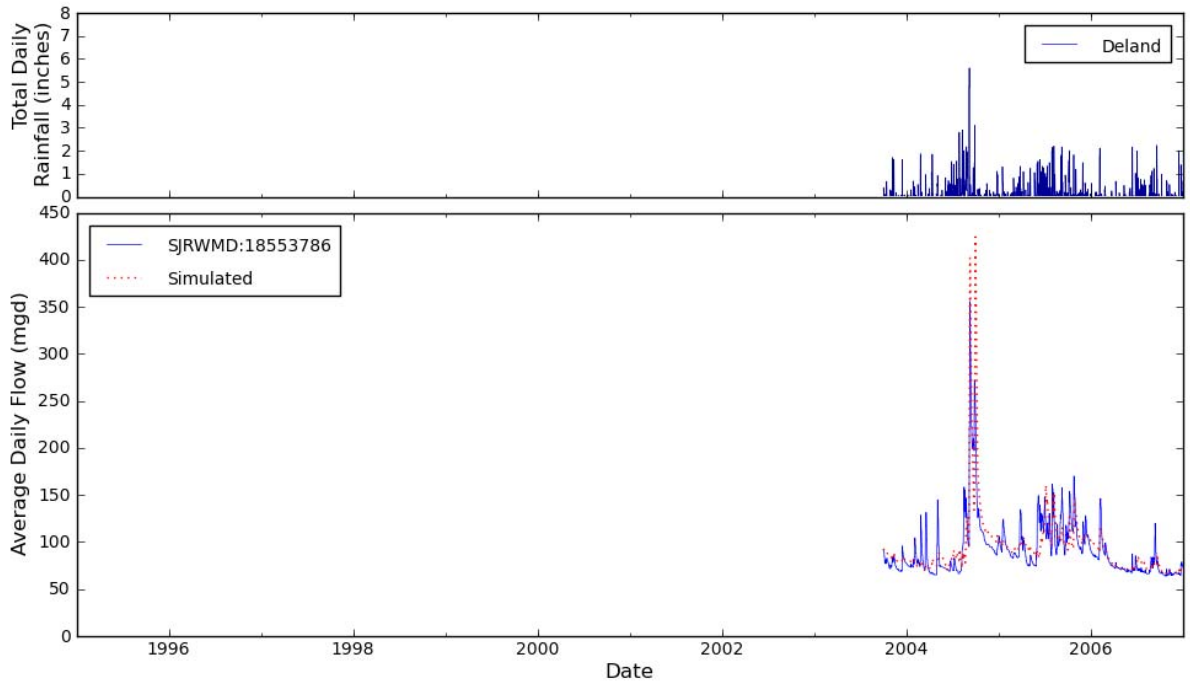

Figure 3.K.8: Alexander Creek at Tracy Canal daily hydrograph

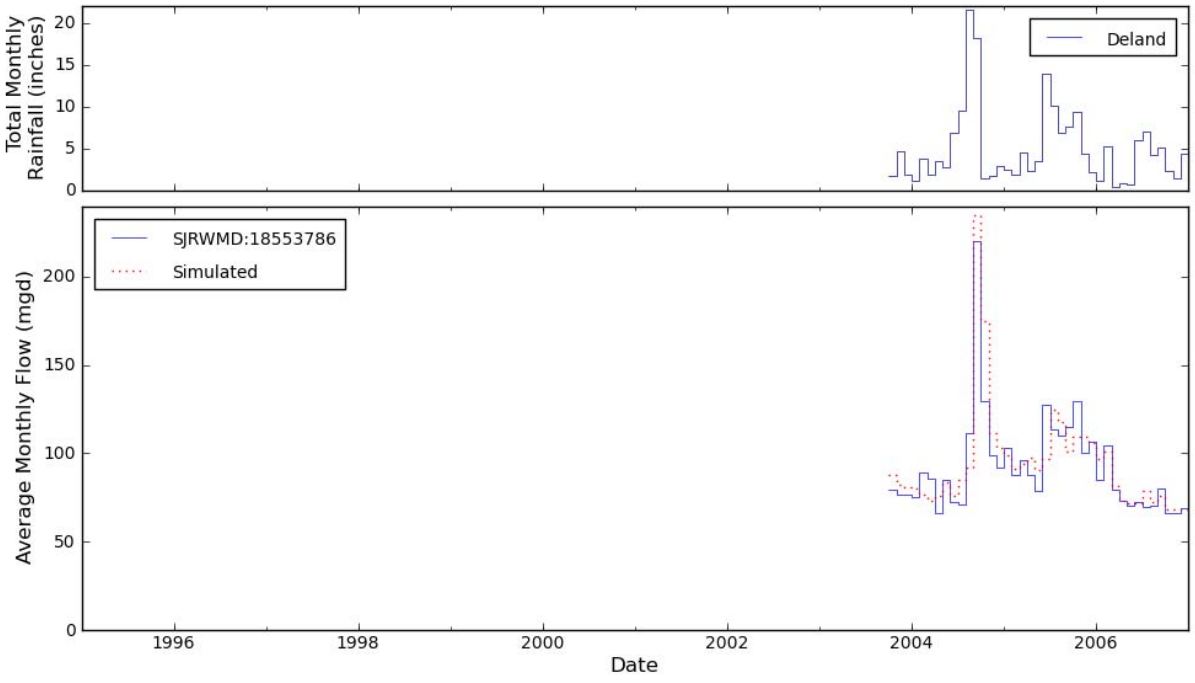

Figure 3.K.9: Alexander Creek at Tracy Canal monthly hydrograph

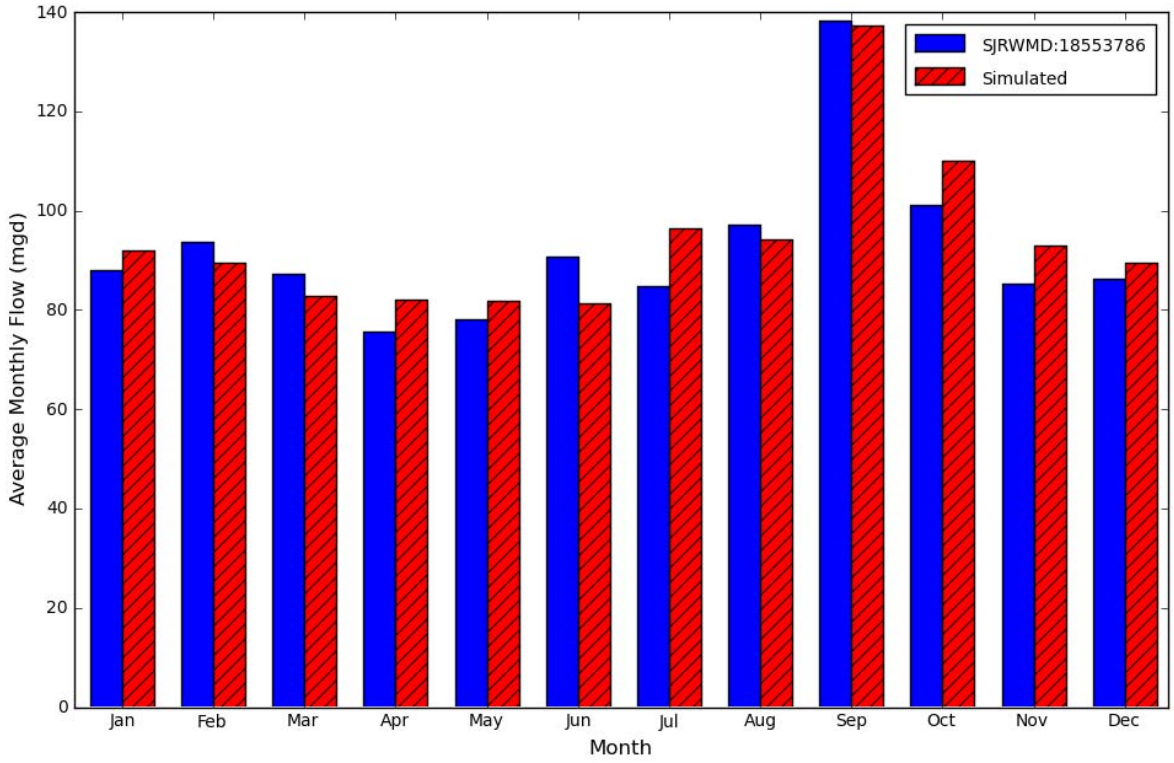

Figure 3.K.10: Alexander Creek at Tracy Canal average monthly flow

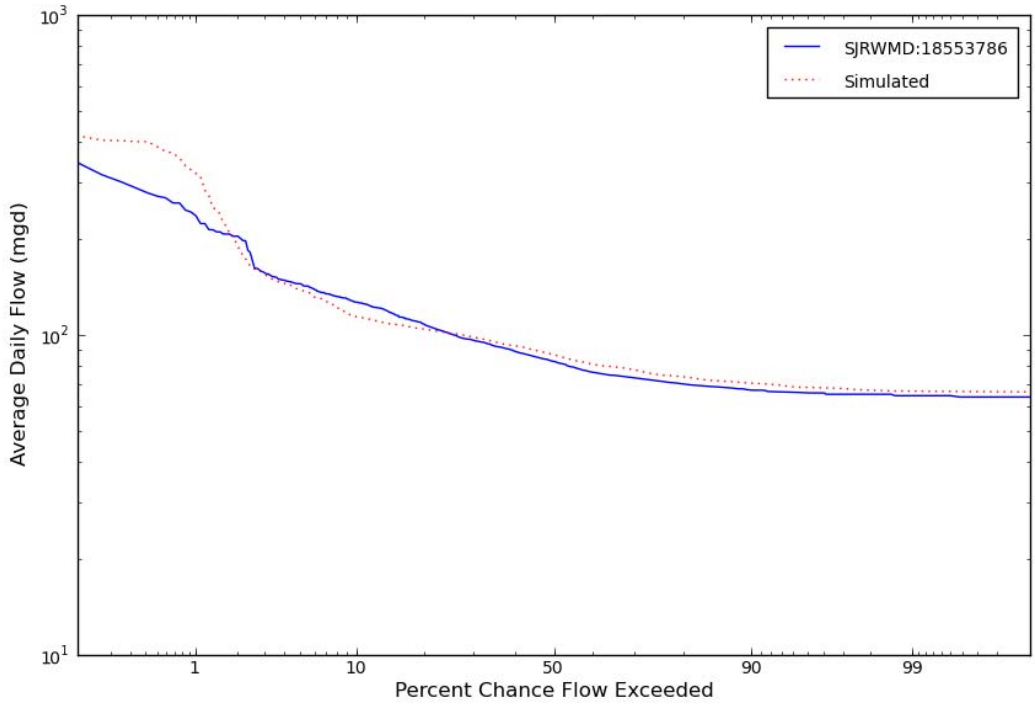

Figure 3.K.11: Alexander Creek at Tracy Canal exceedance probability curve