

## APPENDIX H:

### LSPC Hydrology Calibration

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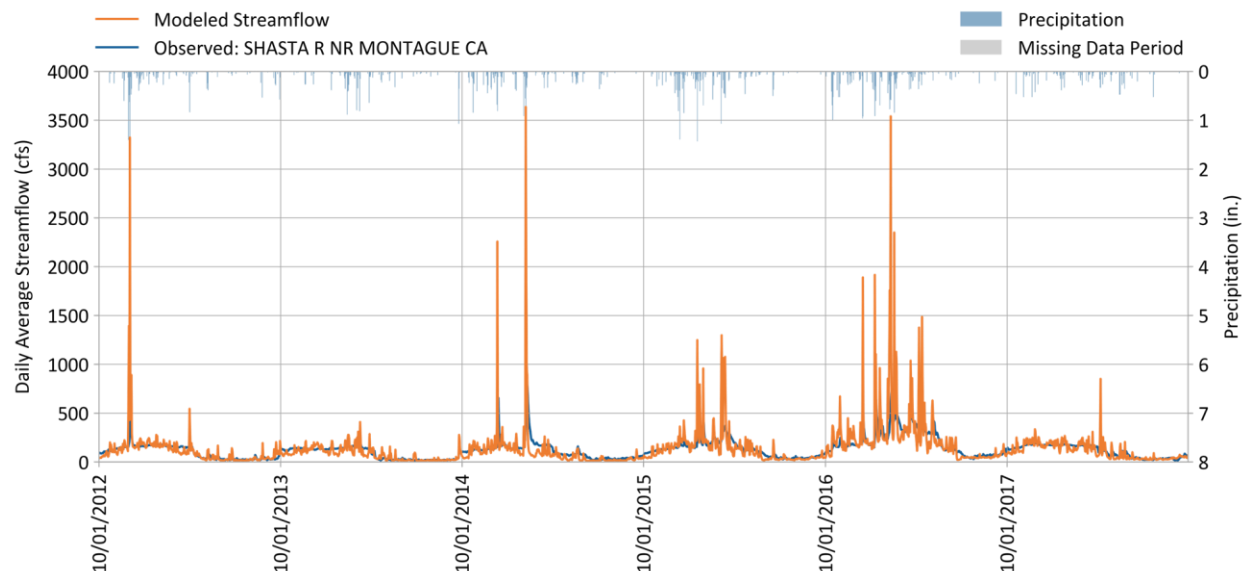
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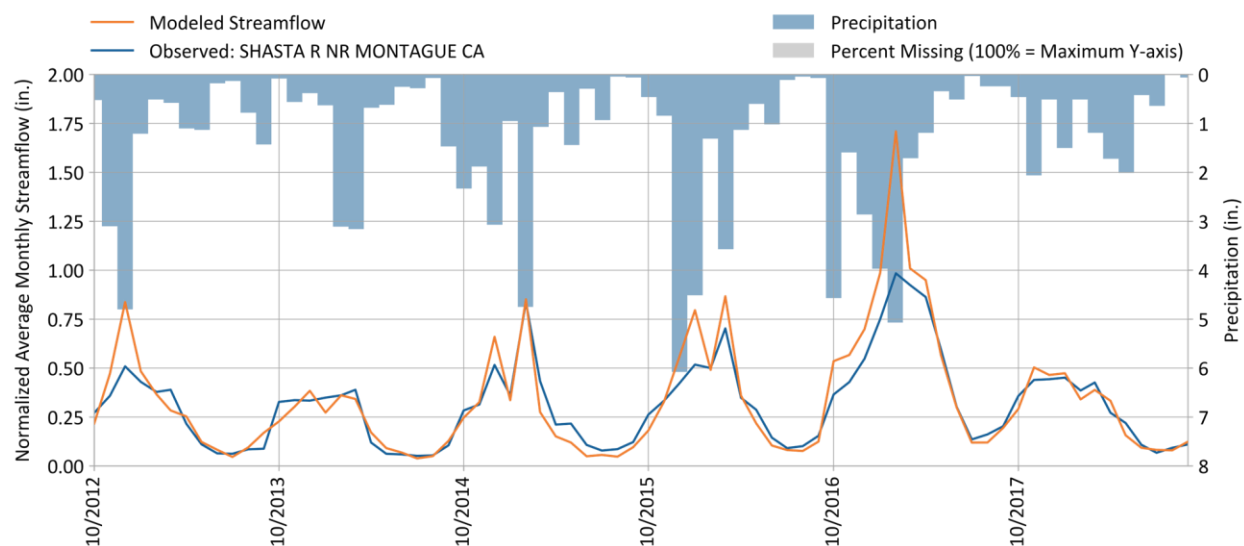
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SHASTA R NR MONTAGUE CA  
Station ID: 11517000  
10/01/2012 - 09/30/2018

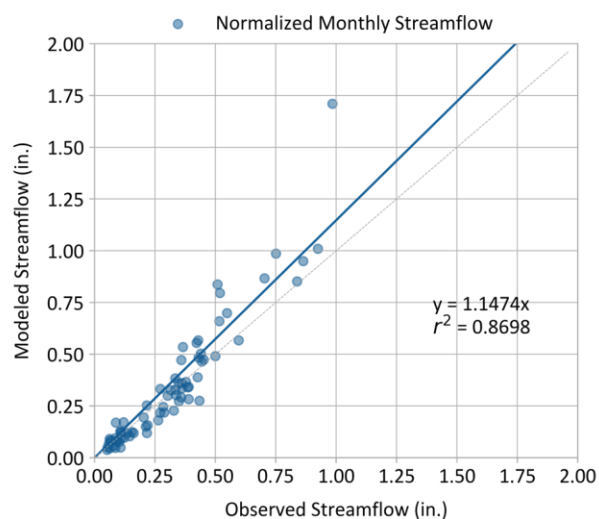
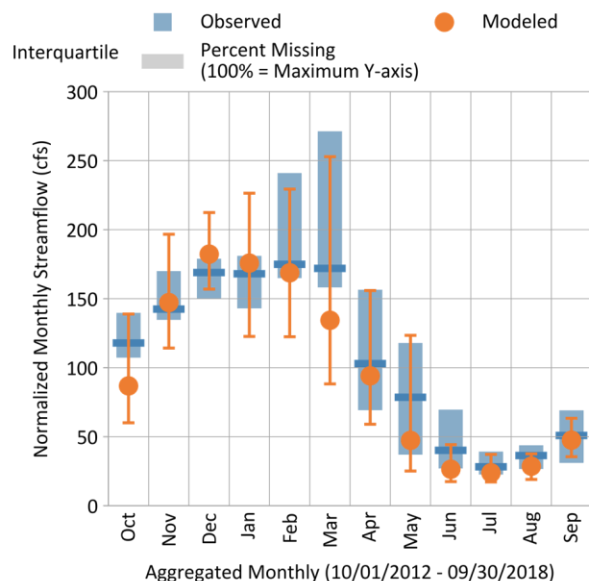
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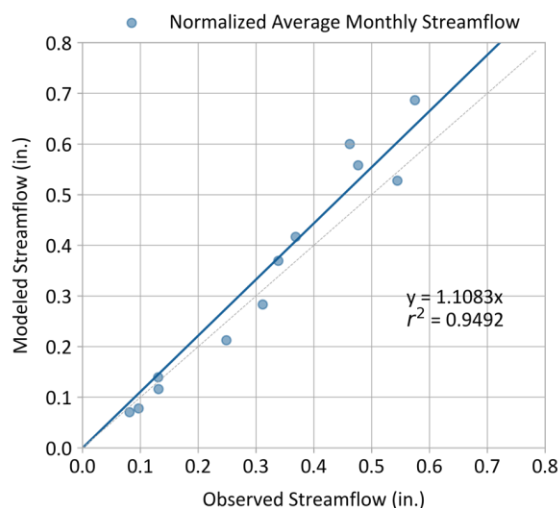
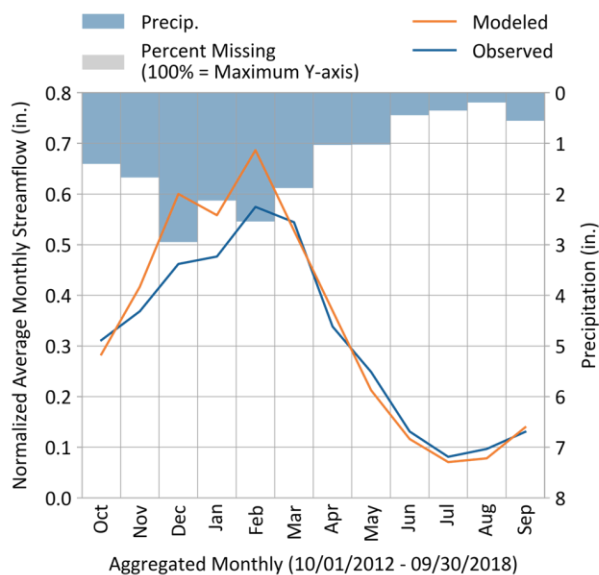
**Figure H-1. SHASTA R NR MONTAGUE CA (11517000) - Hydrology calibration: Simulated vs. daily observed streamflow.**



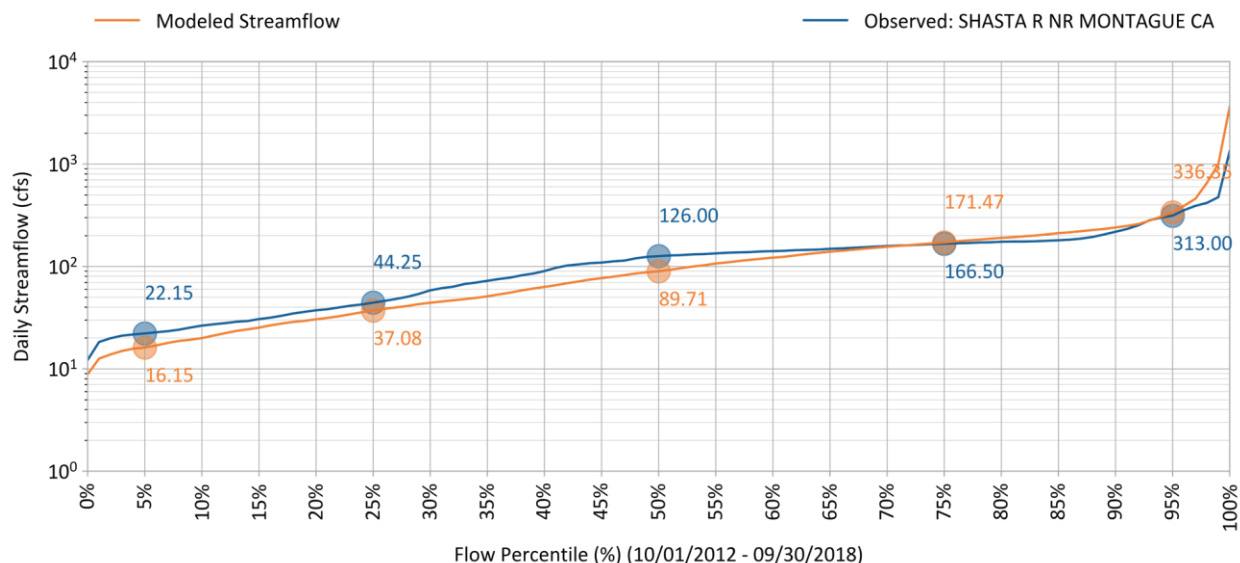
**Figure H-2. SHASTA R NR MONTAGUE CA (11517000) - Hydrology calibration: Simulated vs. observed normalized monthly streamflow.**



**Figure H-3. SHASTA R NR MONTAGUE CA (11517000) - Hydrology calibration: Simulated vs. observed normalized monthly streamflow.**



**Figure H-4. SHASTA R NR MONTAGUE CA (11517000) - Hydrology calibration: Average normalized monthly streamflow.**



**Figure H-5. SHASTA R NR MONTAGUE CA (11517000) - Hydrology calibration: Simulated vs. observed streamflow duration curves.**

**Table H-1. SHASTA R NR MONTAGUE CA (11517000) - Hydrology calibration: Percent bias statistical metric for predicted vs observed volumes**

Calibration Metrics for Daily Flow (10/01/2012 - 09/30/2018)	Percent Bias (PBIAS)		
	All Seasons	Wet Season	Dry Season
All Conditions	-7.9%	-11.9%	10.3%
Highest 10% of Daily Flow Rates	-35.3%	-38.6%	9.3%
Lowest 50% of Daily Flow Rates	11.8%	10.9%	12.2%
Days Categorized as Storm Flow	-17.9%	-23.1%	4.4%
Days Categorized as Baseflow	9.6%	7.2%	21.3%
Baseflow Recession Rate <sup>1</sup>	6.3%	N/A	N/A

Calibration Metrics (10/01/2012 - 09/30/2018)	Recommended Error Criteria				Reference
	Very Good	Good	Fair	Poor	
All Conditions	<5%	5% - 10%	10% - 15%	>15%	Based on HSPF experience by A.A. Donigian Jr.,prepared for USEPA (2000)
Seasonal Flows	<10%	10% - 15%	15% - 25%	>25%	
Highest 10% of Daily Flow Rates					
Lowest 50% of Daily Flow Rates					
Days Categorized as Storm Flow					
Days Categorized as Baseflow					
Baseflow Recession Rate					

1: Sorted percentile values of recession rates were used.

**Table H-2. SHASTA R NR MONTAGUE CA (11517000) - Hydrology calibration: R<sup>2</sup> statistical metric for predicted vs observed volumes**

Calibration Metrics for Daily Flow (10/01/2012 - 09/30/2018)	R-Squared (R <sup>2</sup> )		
	All Seasons	Wet Season	Dry Season
All Conditions	0.4	0.32	0.57
Highest 10% of Daily Flow Rates	0.11	0.1	0.04
Lowest 50% of Daily Flow Rates	0.38	0.2	0.29
Days Categorized as Storm Flow	0.41	0.35	0.59
Days Categorized as Baseflow	0.5	0.34	0.61
Baseflow Recession Rate <sup>1</sup>	0.99	N/A	N/A

Calibration Metrics (10/01/2012 - 09/30/2018)	Recommended Error Criteria				Reference
	Very Good	Good	Fair	Poor	
All Conditions	>0.85	0.75 - 0.85	0.60 - 0.75	≤0.60	Moriassi et al. (2015)
Seasonal Flows	>0.75	0.60 - 0.75	0.50 - 0.60	≤0.50	
Highest 10% of Daily Flow Rates					
Lowest 50% of Daily Flow Rates					
Days Categorized as Storm Flow					
Days Categorized as Baseflow					
Baseflow Recession Rate					

1: Sorted percentile values of recession rates were used.



**Table H-3. SHASTA R NR MONTAGUE CA (11517000) - Hydrology calibration: Nash-Sutcliffe efficiency statistical metric for predicted vs observed flow rates**

Calibration Metrics for Daily Flow (10/01/2012 - 09/30/2018)	Nash-Sutcliffe Efficiency (NSE)		
	All Seasons	Wet Season	Dry Season
All Conditions	-1.85	-4.03	0.4
Highest 10% of Daily Flow Rates	-14.35	-14.65	-6.64
Lowest 50% of Daily Flow Rates	-0.09	-1.51	-0.36
Days Categorized as Storm Flow	-2.77	-5.52	0.3
Days Categorized as Baseflow	0.15	-0.5	0.53
Baseflow Recession Rate <sup>1</sup>	-0.37	N/A	N/A

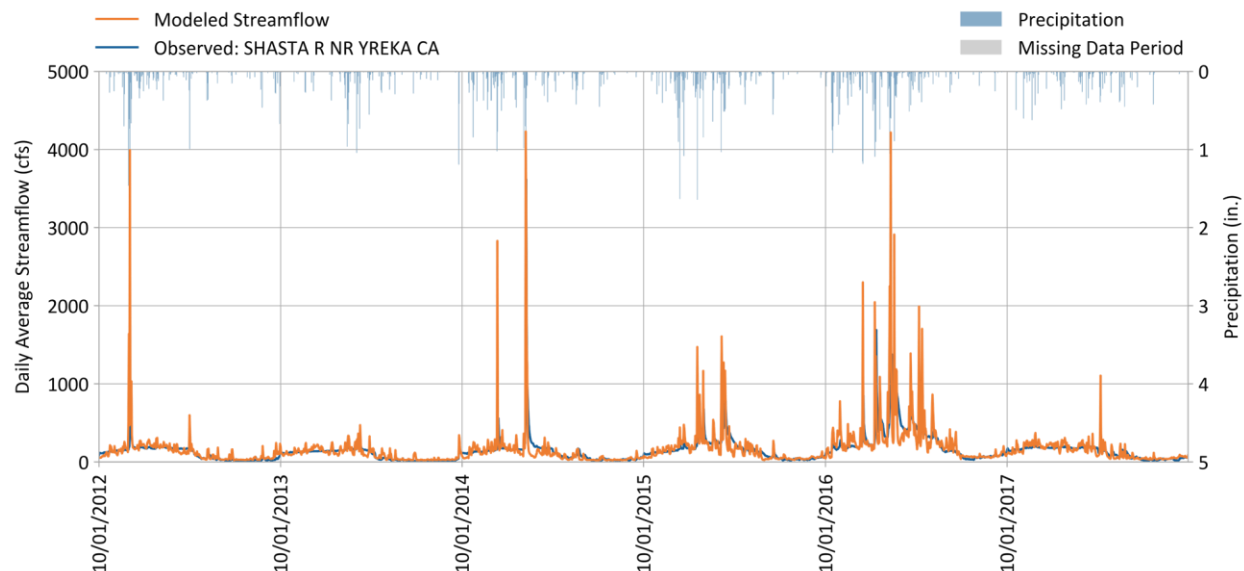
Calibration Metrics (10/01/2012 - 09/30/2018)	Recommended Error Criteria				Reference
	Very Good	Good	Fair	Poor	
All Conditions	>0.80	0.70 - 0.80	0.50 - 0.70	≤0.50	Moriassi et al. (2015)
Seasonal Flows	>0.70	0.50 - 0.70	0.40 - 0.50	≤0.40	
Highest 10% of Daily Flow Rates					
Lowest 50% of Daily Flow Rates					
Days Categorized as Storm Flow					
Days Categorized as Baseflow					
Baseflow Recession Rate					

1: Sorted percentile values of recession rates were used

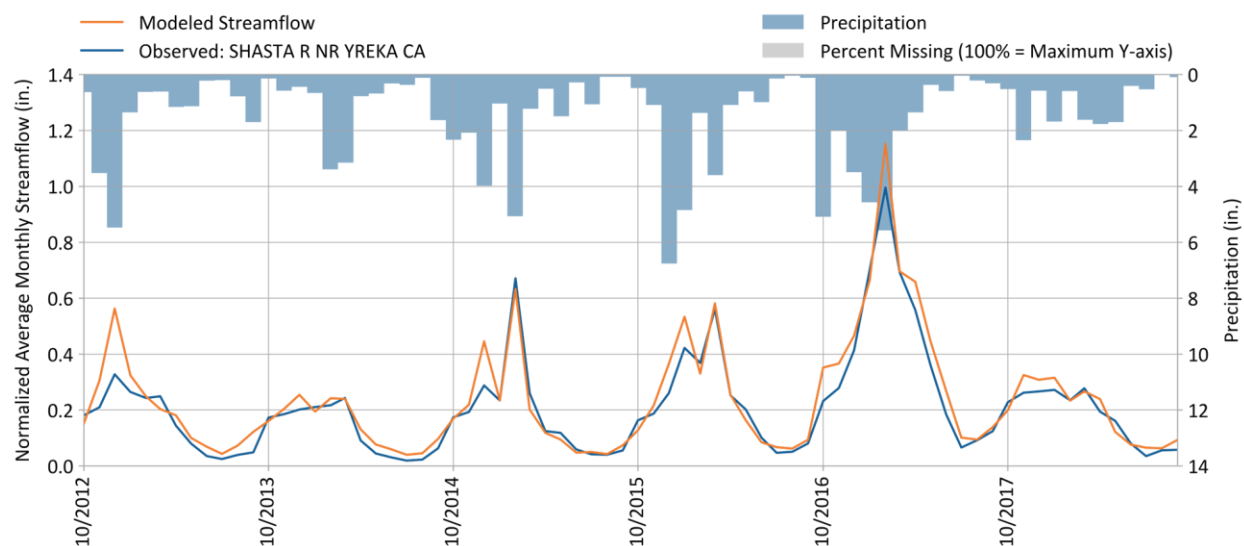
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SHASTA R NR YREKA CA  
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10/01/2012 - 09/30/2018

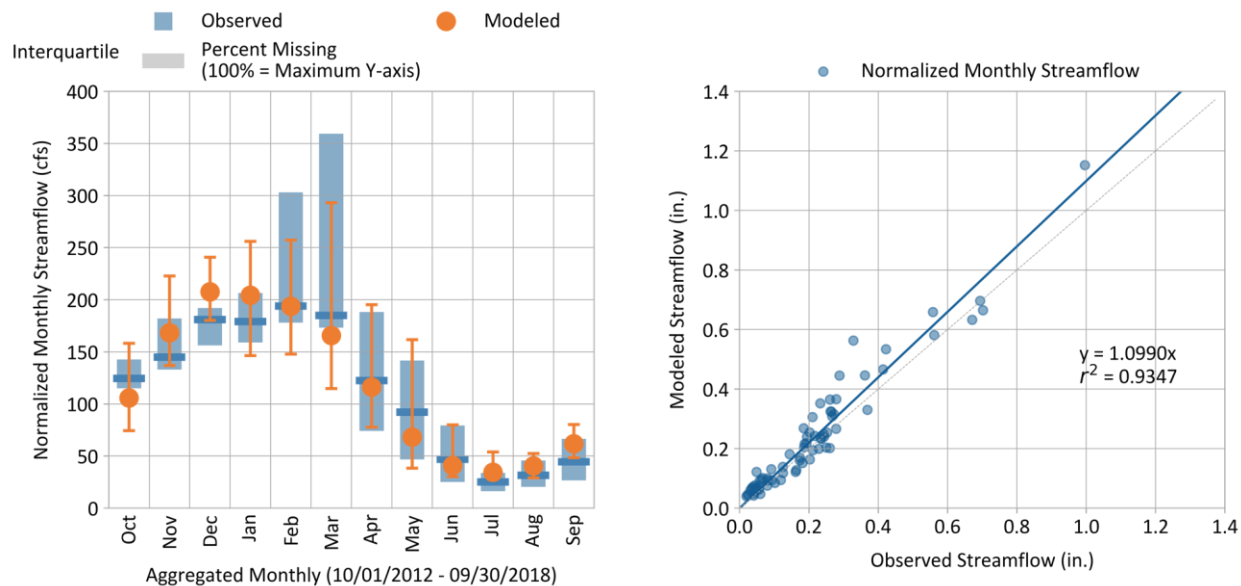
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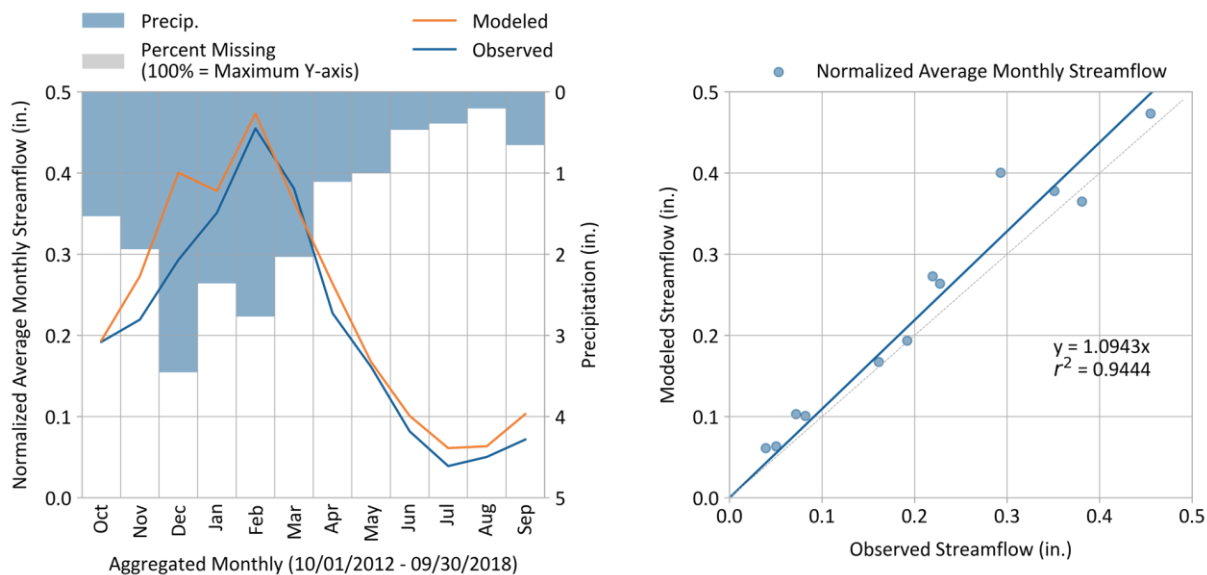
**Figure H-6. SHASTA R NR YREKA CA (11517500) - Hydrology calibration: Simulated vs. daily observed streamflow.**



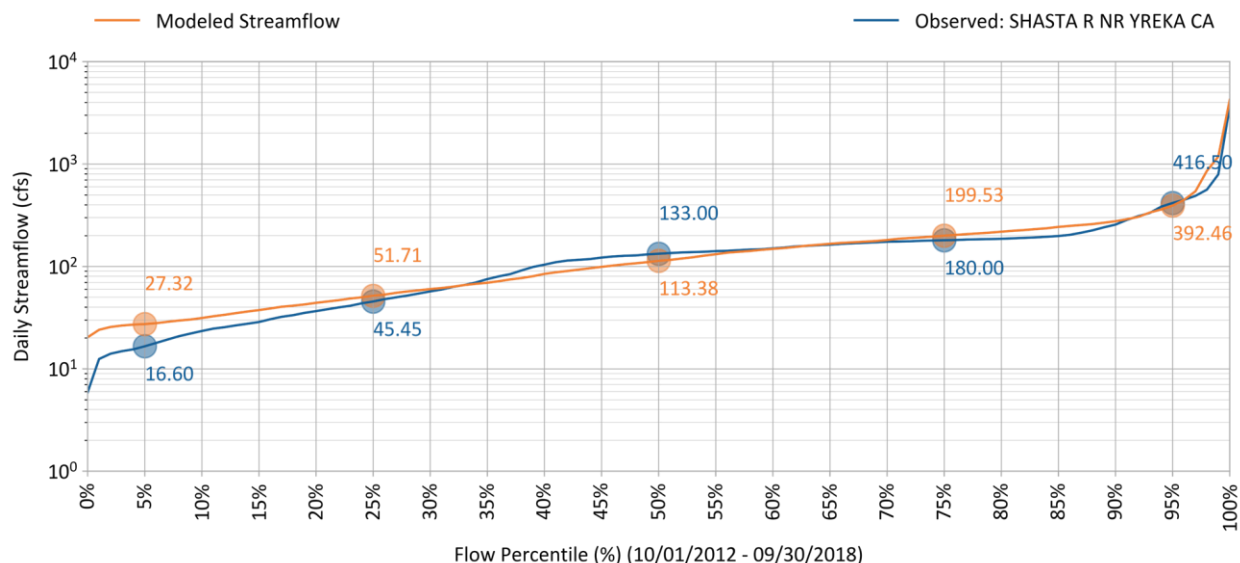
**Figure H-7. SHASTA R NR YREKA CA (11517500) - Hydrology calibration: Simulated vs. observed normalized monthly streamflow.**



**Figure H-8. SHASTA R NR YREKA CA (11517500) - Hydrology calibration: Simulated vs. observed normalized monthly streamflow.**



**Figure H-9. SHASTA R NR YREKA CA (11517500) - Hydrology calibration: Average normalized monthly streamflow.**



**Figure H-10. SHASTA R NR YREKA CA (11517500) - Hydrology calibration: Simulated vs. observed streamflow duration curves.**

**Table H-4. SHASTA R NR YREKA CA (11517500) - Hydrology calibration: Percent bias statistical metric for predicted vs observed volumes**

Calibration Metrics for Daily Flow (10/01/2012 - 09/30/2018)	Percent Bias (PBIAS)		
	All Seasons	Wet Season	Dry Season
All Conditions	-12.7%	-10.8%	-22.7%
Highest 10% of Daily Flow Rates	-14.1%	-13.4%	-26.9%
Lowest 50% of Daily Flow Rates	-12.8%	4.3%	-26.0%
Days Categorized as Storm Flow	-26.2%	-25.1%	-31.5%
Days Categorized as Baseflow	9.7%	12.3%	-5.8%
Baseflow Recession Rate <sup>1</sup>	3.5%	N/A	N/A

Calibration Metrics (10/01/2012 - 09/30/2018)	Recommended Error Criteria				Reference
	Very Good	Good	Fair	Poor	
All Conditions	<5%	5% - 10%	10% - 15%	>15%	Based on HSPF experience by A.A. Donigian, Jr.,prepared for USEPA (2000)
Seasonal Flows	<10%	10% - 15%	15% - 25%	>25%	
Highest 10% of Daily Flow Rates					
Lowest 50% of Daily Flow Rates					
Days Categorized as Storm Flow					
Days Categorized as Baseflow					
Baseflow Recession Rate					

1: Sorted percentile values of recession rates were used

**Table H-5. SHASTA R NR YREKA CA (11517500) - Hydrology calibration: R<sup>2</sup> statistical metric for predicted vs observed volumes**

Calibration Metrics for Daily Flow (10/01/2012 - 09/30/2018)	R-Squared (R <sup>2</sup> )		
	All Seasons	Wet Season	Dry Season
All Conditions	0.46	0.39	0.62
Highest 10% of Daily Flow Rates	0.25	0.25	0.01
Lowest 50% of Daily Flow Rates	0.42	0.21	0.32
Days Categorized as Storm Flow	0.49	0.43	0.65
Days Categorized as Baseflow	0.56	0.43	0.63
Baseflow Recession Rate <sup>1</sup>	0.96	N/A	N/A

Calibration Metrics (10/01/2012 - 09/30/2018)	Recommended Error Criteria				Reference
	Very Good	Good	Fair	Poor	
All Conditions	>0.85	0.75 - 0.85	0.60 - 0.75	≤0.60	Moriassi et al. (2015)
Seasonal Flows	>0.75	0.60 - 0.75	0.50 - 0.60	≤0.50	
Highest 10% of Daily Flow Rates					
Lowest 50% of Daily Flow Rates					
Days Categorized as Storm Flow					
Days Categorized as Baseflow					
Baseflow Recession Rate					

1: Sorted percentile values of recession rates were used

**Table H-6. SHASTA R NR YREKA CA (11517500) - Hydrology calibration: Nash-Sutcliffe efficiency statistical metric for predicted vs observed flow rates**

Calibration Metrics for Daily Flow (10/01/2012 - 09/30/2018)	Nash-Sutcliffe Efficiency (NSE)		
	All Seasons	Wet Season	Dry Season
All Conditions	-0.38	-0.82	0.23
Highest 10% of Daily Flow Rates	-2.01	-2.05	-24.35
Lowest 50% of Daily Flow Rates	0.13	-1.12	-0.51
Days Categorized as Storm Flow	-0.71	-1.18	0.0
Days Categorized as Baseflow	0.53	0.33	0.56
Baseflow Recession Rate <sup>1</sup>	0.73	N/A	N/A

Calibration Metrics (10/01/2012 - 09/30/2018)	Recommended Error Criteria				Reference
	Very Good	Good	Fair	Poor	
All Conditions	>0.80	0.70 - 0.80	0.50 - 0.70	≤0.50	Moriassi et al. (2015)
Seasonal Flows	>0.70	0.50 - 0.70	0.40 - 0.50	≤0.40	
Highest 10% of Daily Flow Rates					
Lowest 50% of Daily Flow Rates					
Days Categorized as Storm Flow					
Days Categorized as Baseflow					
Baseflow Recession Rate					

1: Sorted percentile values of recession rates were used