

Ozarks Environmental and Water Resources Institute (OEWRI)  
Missouri State University (MSU)

# Hydrological Monitoring of the Big Barren Creek Watershed, Mark Twain National Forest, Southeast Missouri Water Year 2019

## SUMMARY REPORT

**Prepared by:**

Marc R. Owen, M.S., Assistant Director, OEWRI  
Shoukat Ahmed, Graduate Assistant, OEWRI  
Robert T. Pavlowsky, Ph.D., Director, OEWRI

**Assisted in the field by:**

Matt Thies, Nick Bradley, Joe Nash, Hannah Adams, Grace Roman, Katy Reminga,  
Kayla Coonen, Triston Rice, Max Hillermann, and Tyler Pursley

Ozark Environmental and Water Resources Institute  
Missouri State University  
Temple Hall 343  
901 South National Avenue  
Springfield, MO 65897

**Completed for:**

Kelly Whitsett, Forest Hydrologist and Cave and Karst Program Manager  
U.S. Forest Service  
Mark Twain National Forest  
401 Fairgrounds Road  
Rolla, MO 65401

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## WATER YEAR 2019 SUMMARY

This report summarizes the 2019 Water Year (WY2019) discharge results for the 14 stations that were installed in the Big Barren Creek watershed in 2015 and 2016. The 2019 Water Year runs from October 1, 2018 to September 30, 2019. Big Barren Creek is a tributary of the Current River Basin (8-digit Hydrological Unit Code (HUC) #11010008) located in portions of Ripley, Oregon and Carter Counties in southeast Missouri (Figure 1). Gaging station locations were selected along both the main stem of Big Barren Creek and distributed along smaller tributaries throughout the watershed (Figure 2). Drainage areas for the tributary sites ranged from 1.59-7.82 km<sup>2</sup> and gage locations within the smaller tributary watersheds drain forest service lands that have either been entirely burned or unburned (Table 1). The drainage areas of the main stem sites have a mix of land uses from private lands to burned and unburned public forest, ranging in drainage area from 8.82-183.1 km<sup>2</sup>. The majority of the streams within the Big Barren Creek watershed are ephemeral due to the underlying karst landscape where sinkholes, losing streams, and caves are common (Weary et al., 2014). Perennial sections of these streams are located within, or just downstream, of the Big Barren Creek Natural Area and the Cowards Hollow Natural Area which appear to be associated with a series of northeast trending faults (Weary et al., 2014; Figure 2).

Stage data was recorded every 5-minutes using Hobo U20L-04 Water Level Loggers. The level loggers were installed inside a PVC pipe assembly and secured to 1-2 m staff gages that were installed at each site. An additional level logger was installed to measure barometric pressure used to compensate for barometric pressure changes. Raw data is downloaded periodically ( $\approx$  every 10 weeks) from the level loggers using the Hobo Waterproof Shuttle. Discharge rating curves were created at each site to estimate flows for each 5-minute stage reading over the monitoring period. Specific methods used to develop these rating curves can be seen in a separate report (Owen et al., 2020). For 12 of the 14 sites there were 0 days of missing data over the year. However, at HYJ there was nearly 300 days of missing data due to vandalism and about 9 days missing at LBB due to equipment problems.

### **Rainfall**

There was a total of 133.0 cm of rainfall in WY2019, which is 13.2 cm higher than the average annual rainfall for the area between 1956-2014 (Pavlowsky et al., 2016). Of that total, 43.0 cm (32.3%) fell in the winter from January to March (Figure 3). The highest period of rainfall during the winter occurred between February 6-11 (12.4 cm). The second highest seasonal rainfall total occurred in the fall from October-December with 34.9 cm (26.2%) of the total annual rainfall. The lowest seasonal rainfall occurred in the summer from July-September with 22.4 cm (16.9%) with over half of that total occurring between August 21-27 (13.0 cm). While the total

annual rainfall was relatively high compared to the long-term average, no daily rainfall total exceeded 7.5 cm during WY2019 (Pavlowsky et al., 2016).

For WY2019, rainfall totals were recorded at three Onset HOBO rain gage data loggers (part# RG3-M) installed in the upper, middle, and lower portions of the watershed (Figure 2). Due to inconsistent records at the lower and middle stations, the upper station is reported here. The total rainfall collected at the gages located within the watershed recorded 22.3 cm ( $\approx 16\%$  RPD) less rainfall than using the inverse distance weighted method from nearby gages (Pavlowsky et al., 2016).

### **Discharge and Runoff**

The range in discharge values for WY2019 were calculated for both perennial and ephemeral gaging stations in the Big Barren Creek watershed and annual average discharges are comparable to nearby USGS gaging stations. Average discharge for the perennial sites ranged from 0.043 m<sup>3</sup>/s at CH to 2.26 m<sup>3</sup>/s at LNA (Table 2). For ephemeral sites, average annual discharge ranged from 0.001 m<sup>3</sup>/s at PH to 1.81 m<sup>3</sup>/s at LBB. Station BH only recorded partial flows as it was recently discovered a portion of the flow in the channel jumps to the road ditch upstream of the gaging station. Therefore, runoff measured at this site is far lower than the other gaging stations. At TH and UNA downstream obstructions (beaver dam and log jam) created a backwater effect during runoff events that was manually corrected by subtracting the estimated height of the obstruction. Therefore, the uncertainty of the discharge estimates at these stations is higher than the others.

Annual peak discharge ranged from 1.2 m<sup>3</sup>/s at CH to 69.8 m<sup>3</sup>/s at LBB. Minimum discharge at the perennial sites ranged from 0.01 m<sup>3</sup>/s at CH to 0.147 m<sup>3</sup>/s at UNA. Average annual discharge for the sites from this study were plotted by drainage area and compared to nearby USGS gaging stations. Ephemeral sites plot below the best-fit line of perennial USGS stations and perennial sites plot on or just below the USGS stations (Figure 4). Furthermore, the USGS station along a losing section of Logan Creek near Ellington plots along the best-fit line of the ephemeral sites in this study.

## REFERENCES

Owen, M.R., S. Ahmed, and R.T. Pavlowsky (2020). Gaging Station Report for: Hydrological Monitoring of the Big Barren Creek Watershed, Mark Twain National Forest, Southeast Missouri, DRAFT REPORT. OEWR I EDR-20-00X. Completed for the U.S. Forest Service, November 24, 2020.

Pavlowsky, R.T., M.R. Owen, and R. A. Bradley (2016) *Historical Rainfall Analysis for the Big Barren Creek Watershed, Southeast Missouri (1955-2015)*. OEWR I EDR-16-001. Completed for the U.S. Forest Service, March 23, 2016.

Weary, D.J., R.W. Harrison, R.C. Orndorff, R.E. Weems, J.S. Schindler, J.E. Repetski, and H.A. Pierce (2014) Bedrock Geologic Map of the Spring Valley, West Plains, and Parts of the Piedmont and Poplar Bluff 30'x60' Quadrangles, Missouri, Including the Upper Current River and Eleven Point River Drainage Basins. U.S. Geological Survey Scientific Investigations Map 3280.

## TABLES

Table 1. WY2019 gaging station locations in the Big Barren Creek watershed.

Site Name	Site ID	Northing (m) NAD83, UTM15N	Easting (m) NAD83, UTM15N	Elevation (m)	Drainage Area (km <sup>2</sup> )	Stream Type	Burn History	Missing Days
Tram Hollow	TH	4,080,612.536	660,800.255	257.10	1.59	Ephemeral	Unburned	0.0
Cowards Hollow	CH	4,077,436.497	671,184.193	201.49	2.19	Perennial	Burned	0.0
Upper Big Barren	UBB	4,082,297.631	660,727.701	253.46	2.51	Ephemeral	Burned	0.0
Barnes Hollow	BH	4,080,152.539	660,963.250	258.76	2.67	Ephemeral	Unburned	0.0
Upper Tributary	UT	4,081,698.540	660,910.259	247.92	4.19	Ephemeral	Burned	0.0
Wolf Pond	WP	4,084,372.539	665,468.255	232.65	5.13	Ephemeral	Burned	0.0
Polecat Hollow	PH	4,082,395.533	664,472.252	224.51	6.19	Ephemeral	Burned	0.0
South Prong Cedar	SPC	4,078,550.511	666,420.219	209.96	7.28	Ephemeral	Burned	0.0
Fools Catch	FC	4,081,865.521	669,811.222	196.79	7.82	Ephemeral	Unburned	0.0
Highway J	HYJ	4,081,730.799	661,557.484	245.46	8.82	Ephemeral	Mixed	298*
Middle Big Barren	MBB	4,081,306.806	667,938.252	191.57	47.8	Ephemeral	Mixed	0.0
Upper Natural Area	UNA	4,080,307.787	672,375.327	163.74	103.6	Perennial	Mixed	0.0
Lower Natural Area	LNA	4,079,188.630	672,767.129	158.50	124.2	Perennial	Mixed	0.0
Lower Big Barren	LBB	4,074,388.720	681,374.962	121.83	186.1	Ephemeral	Mixed	8.9

\* Gage was vandalized and removed from the bridge.

Table 2. WY2019 Big Barren Creek watershed gaging station data summary.

Site Name	Drainage Area (km <sup>2</sup> )	Rainfall* Vol. (m <sup>3</sup> )	Runoff Vol. (m <sup>3</sup> )	Rainfall As Runoff (%)	Runoff Depth (cm)	Avg. Q (m <sup>3</sup> /s)	Max Q (m <sup>3</sup> /s)	10% Q** (m <sup>3</sup> /s)	50% Q** (m <sup>3</sup> /s)	90% Q** (m <sup>3</sup> /s)	Min Q (m <sup>3</sup> /s)
Tram Hollow***	1.59	2,114,700	85,320	4.0	5.4	0.003	1.26	0.000	0.000	0.000	0.000
Cowards Hollow	2.19	2,912,700	1,347,649	46.3	61.5	0.043	1.20	0.075	0.028	0.016	0.010
Upper Big Barren	2.51	3,338,300	229,690	6.9	9.2	0.007	2.67	0.011	0.000	0.000	0.000
Barnes Hollow****	2.67	3,551,100	11,916	0.3	0.5	0.0004	0.96	0.000	0.000	0.000	0.000
Upper Tributary	4.19	5,572,700	131,598	2.4	3.2	0.004	4.83	0.000	0.000	0.000	0.000
Wolf Pond	5.13	6,822,900	52,145	0.8	1.0	0.002	7.33	0.000	0.000	0.000	0.000
Polecat Hollow	6.19	8,232,700	36,805	0.4	0.6	0.001	2.87	0.000	0.000	0.000	0.000
South Prong Cedar	7.28	9,682,400	1,261,475	13.0	17.3	0.040	2.34	0.064	0.007	0.000	0.000
Fools Catch	7.82	10,400,600	312,808	3.0	4.0	0.010	4.57	0.000	0.000	0.000	0.000
Middle Big Barren	47.8	63,520,800	772,146	1.2	1.6	0.025	5.96	0.042	0.002	0.000	0.000
Upper Natural Area***	103.6	137,788,000	35,163,216	25.5	33.9	1.12	23.4	1.82	0.666	0.213	0.147
Lower Natural Area	124.2	165,186,000	71,351,163	43.2	57.5	2.26	23.7	5.73	0.875	0.021	0.010
Lower Big Barren	186.1	243,523,000	57,130,494.6	23.5	31.2	1.81	69.8	4.91	0.044	0.000	0.000

\*Total rainfall for WY2019 = 133.0 cm

\*\* Exceedance value

\*\*\* Estimated due to downstream obstruction.

\*\*\*\* Poor site conditions, channel only receives a portion of the total watershed runoff at the gage location.



Table 3. Water Year 2019 Records for Nearby USGS Gaging Stations.

Station Name	Start Year	Years of Record	Drainage Area km <sup>2</sup>	WY 2019 Avg. Annual Q (m <sup>3</sup> /s)	Flow Exceedance (%)			
					90% (m <sup>3</sup> /s)	50% (m <sup>3</sup> /s)	10% (m <sup>3</sup> /s)	0% (Max) (m <sup>3</sup> /s)
EAST FORK BLACK RIVER NEAR LESTERVILLE, MO	2003	17	135.2	2.56	0.16	1.10	5.09	119.8
CURRENT RIVER AT MONTAUK STATE PARK, MO	2007	13	152.3	4.60	3.06	4.22	6.55	133.4
E. FORK BLACK R. BELOW LOWER TAUM SAUK RESERVOIR	2008	12	226.1	4.27	0.40	1.70	9.49	133.4
LOGAN CREEK AT ELLINGTON, MO*	1994	26	360.0	1.14	0.14	0.60	2.22	69.1
JACKS FORK NEAR MOUNTAIN VIEW, MO	2001	19	479.2	8.42	1.12	4.05	19.2	555.1
BIG CREEK AT SAM A. BAKER STATE PARK	2005	15	489.5	10.6	1.29	5.52	22.9	311.5
LITTLE BLACK RIVER BELOW FAIRDEALING, MO	2007	13	502.5	9.70	1.57	5.01	20.9	124.3
SOUTH FORK SPRING RIVER AT SADDLE, AR	2010	10	686.4	12.9	1.90	8.58	27.1	265.4
CURRENT RIVER ABOVE AKERS, MO	2001	19	764.1	17.4	7.27	13.5	33.4	166.0
JACKS FORK AT ALLEY SPRING, MO	1993	27	771.8	12.0	2.18	6.71	26.2	617.4
JACKS FORK AT EMINENCE, MO	1921	99	1,030.8	23.2	5.92	14.8	51.9	628.7
BLACK RIVER NEAR ANNAPOLIS, MO	1939	81	1,253.6	21.6	5.61	13.1	44.1	320.0
BLACK RIVER BELOW ANNAPOLIS, MO	2006	14	1,276.9	27.0	6.33	15.5	56.9	368.2
ST. FRANCIS RIVER NEAR SACO, MO	2005	15	1,719.8	38.7	1.85	15.6	98.0	617.4
ELEVEN POINT RIVER NEAR BARDLEY, MO	1921	99	2,053.9	34.5	10.4	31.2	60.4	237.6
SPRING RIVER AT TOWN BRANCH BRIDGE AT HARDY, AR	2001	19	2,188.6	41.7	12.0	31.7	82.4	487.1
ST. FRANCIS RIVER NEAR PATTERSON, MO	1921	99	2,476.0	51.7	4.19	28.0	120.4	654.2
BLACK RIVER AT LEEPER, MO	2008	12	2,556.3	44.3	12.7	29.7	103.1	164.3
BLACK RIVER ABOVE WILLIAMSVILLE, MO	2008	12	2,608.1	50.9	15.2	38.8	105.4	NA
ELEVEN POINT RIVER NEAR RAVENDEN SPRINGS, AR	2000	20	2,926.7	52.5	15.3	46.2	96.9	331.3
SPRING RIVER AT IMBODEN, AR	2005	15	3,056.2	60.9	15.6	45.0	121.6	761.8
BLACK RIVER AT POPLAR BLUFF, MO	1939	81	3,224.6	58.4	18.4	45.6	113.1	198.2
ST. FRANCIS RIVER AT WAPPAPELLO, MO	1940	80	3,395.5	69.8	8.31	69.4	126.0	194.8
CURRENT RIVER AT VAN BUREN, MO	1912	108	4,317.5	86.5	31.2	61.5	173.1	795.8
BLACK RIVER NEAR CORNING, AR	1938	81	4,532.5	82.4	18.0	67.4	160.7	368.2
CURRENT RIVER AT DONIPHAN, MO	1918	102	5,278.4	117.5	45.3	90.1	213.4	1,124

\* Losing section of Logan Creek, ephemeral

## FIGURES

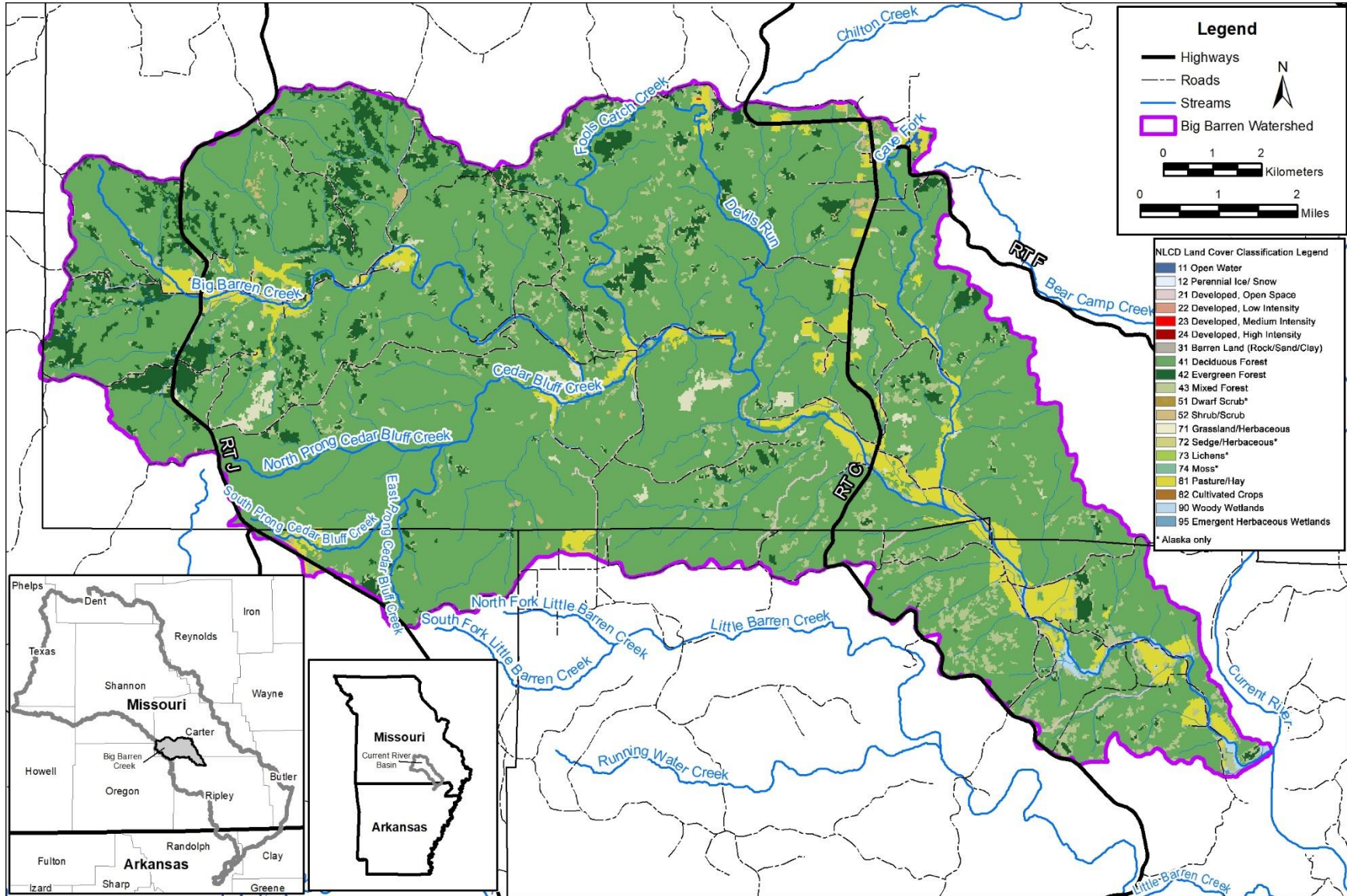


Figure 1. Location and land use of the Big Barren Creek watershed.



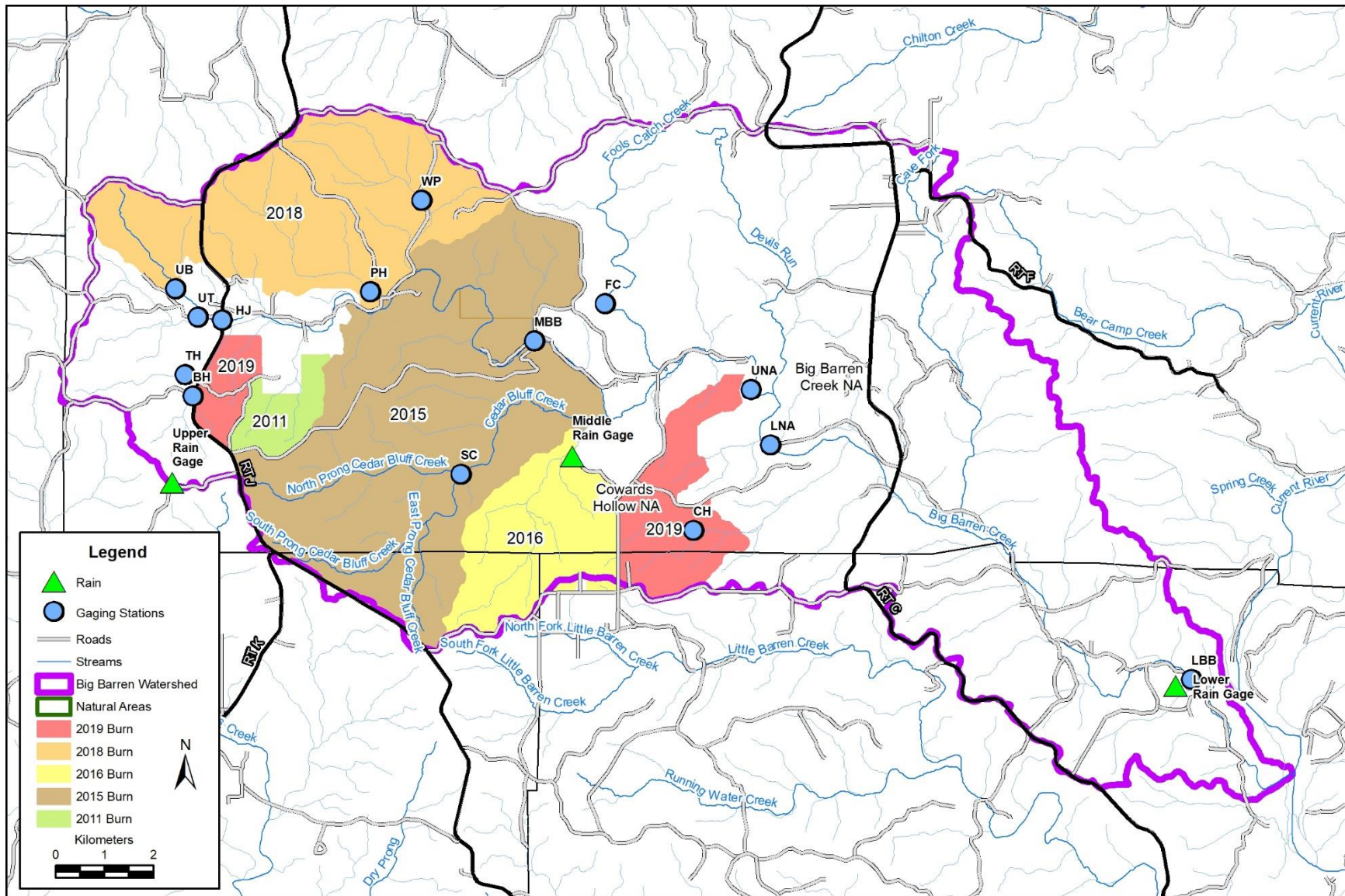


Figure 2. Hydrologic monitoring stations (WY2019) with burn history.

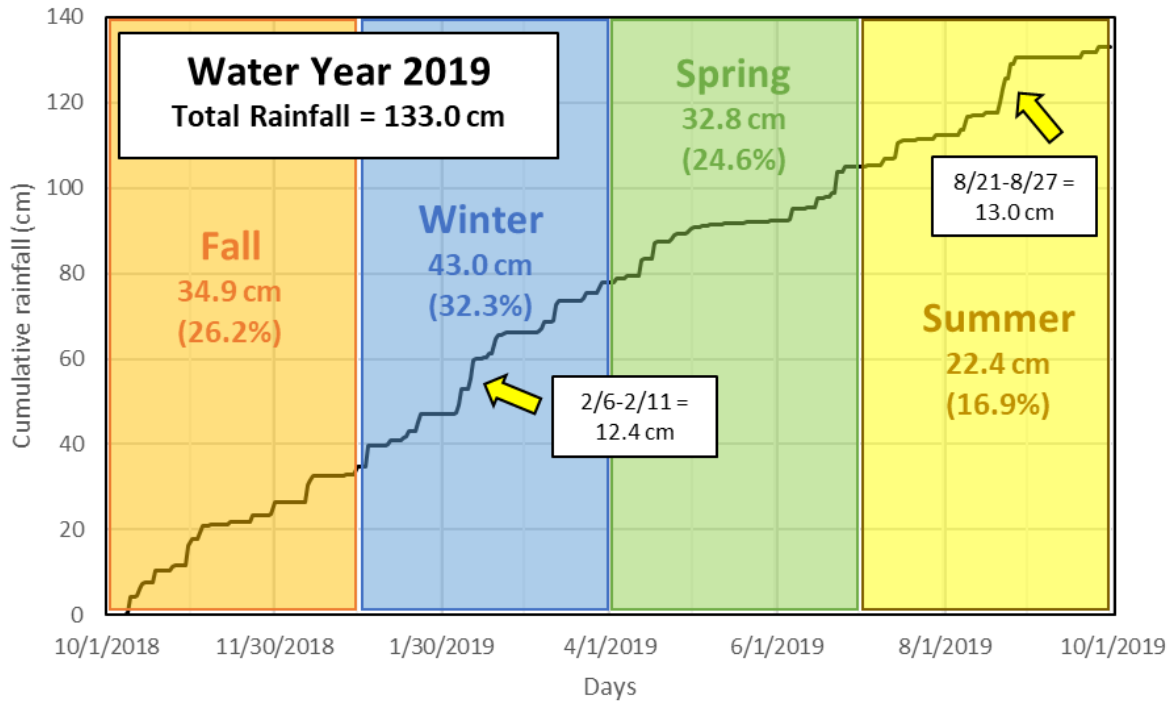


Figure 3. WY2019 cumulative rainfall by season.

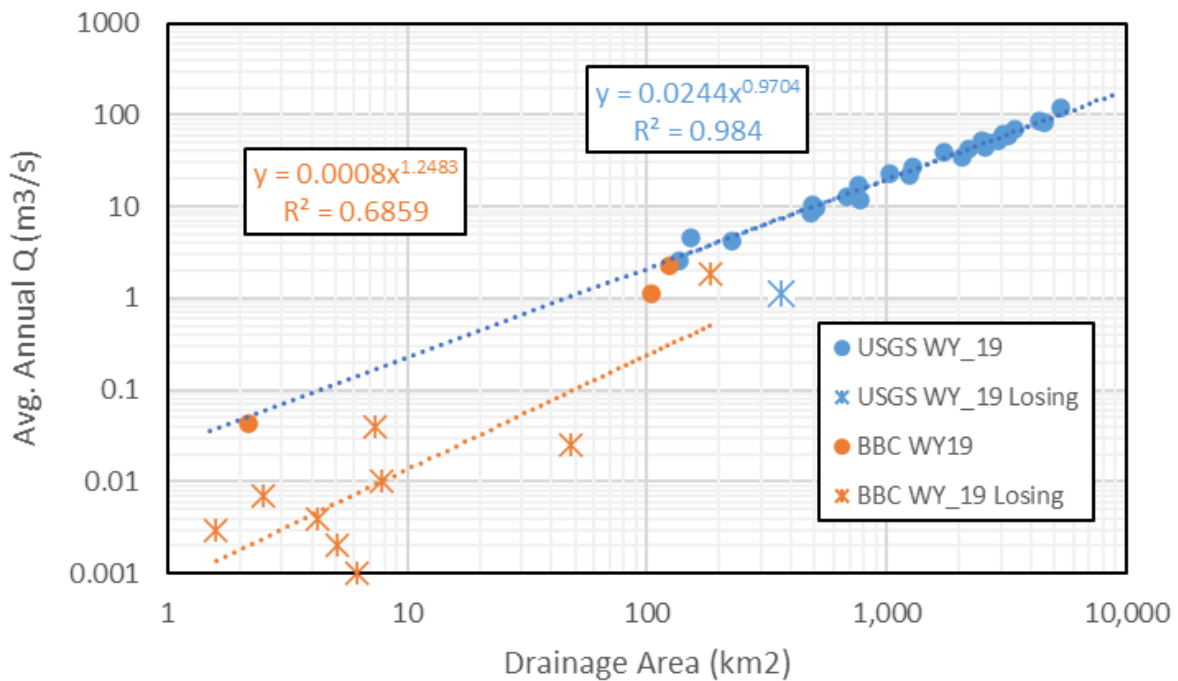


Figure 4. Average annual discharge for Big Barren Creek gages compared to nearby USGS gages (WY2019).

## WY2019 GAGING STATION RESULTS

### Tram Hollow (1.59 km<sup>2</sup>)

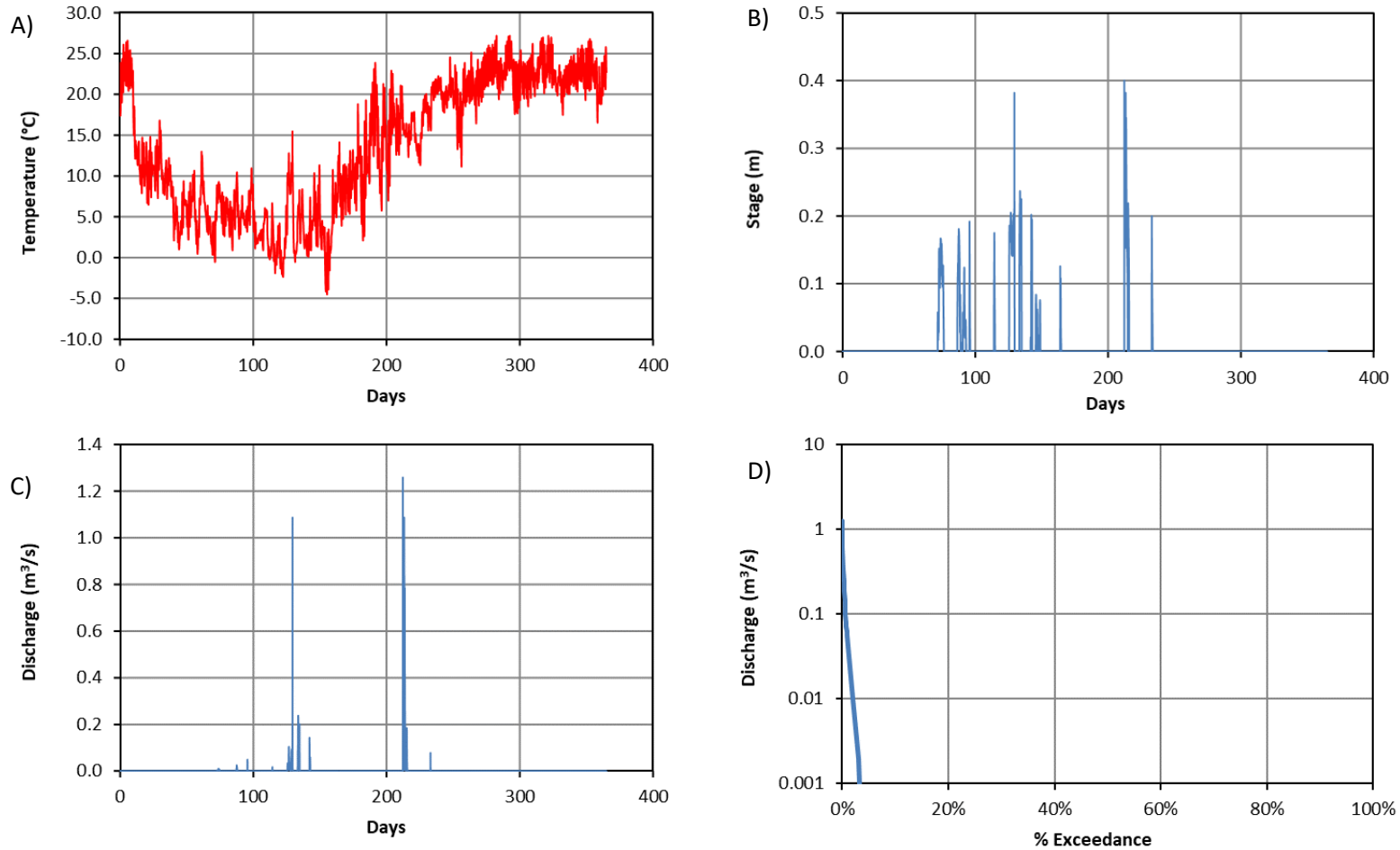


Figure 5. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Tram Hollow.

Table 4. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Tram Hollow.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.03	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.00		0.00		0.00	0.00	
<b>Total</b>	0.00	0.00	0.01	0.00	0.32	0.00	0.00	0.65	0.00	0.00	0.00	0.00
<b>Mean</b>	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00
<b>Max</b>	0.00	0.00	0.01	0.00	0.08	0.00	0.00	0.37	0.00	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

### Cowards Hollow (2.19 km<sup>2</sup>)

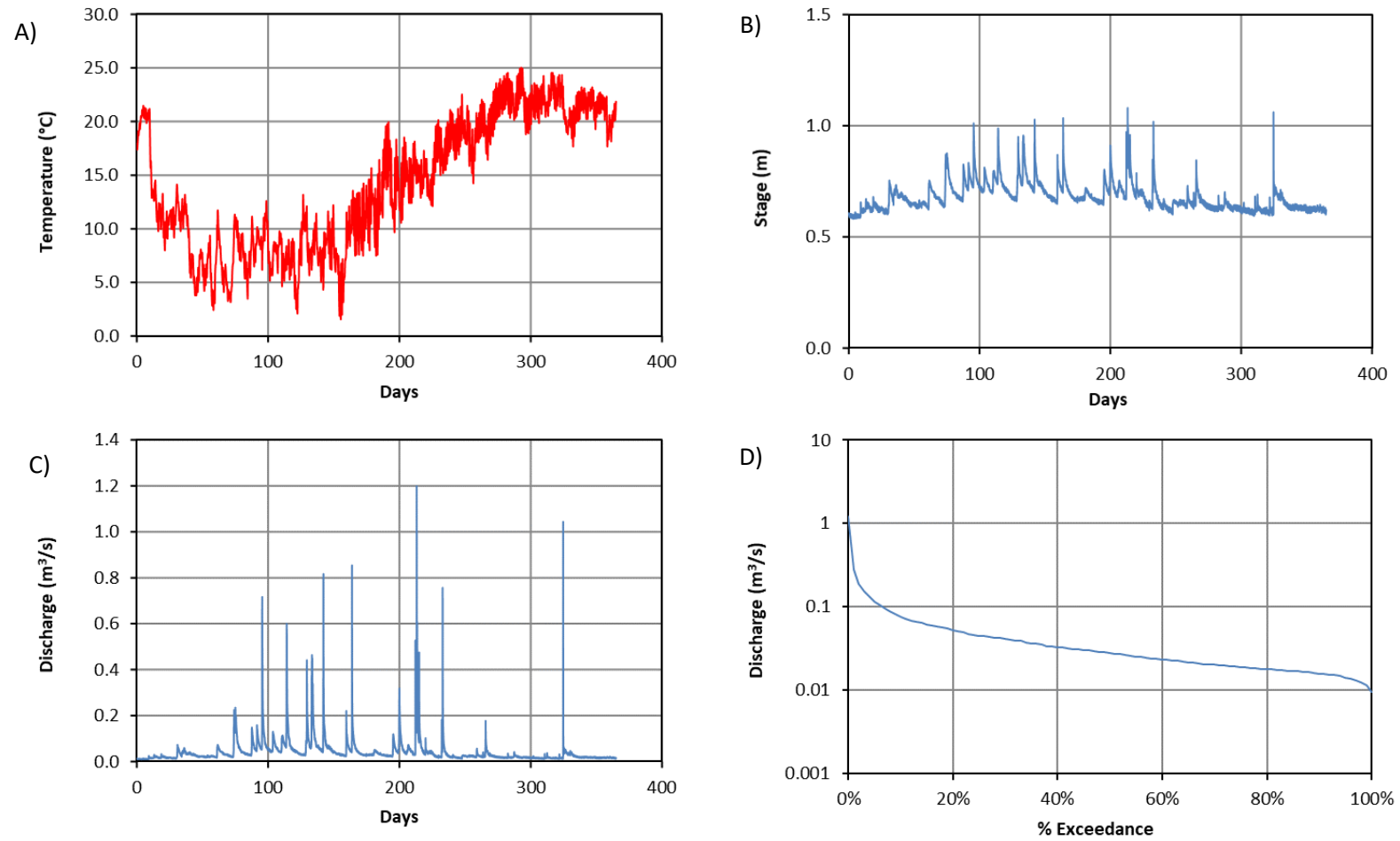


Figure 6. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Cowards Hollow.

Table 5. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Cowards Hollow (CH)

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.02	0.08	0.08	0.14	0.05	0.05	0.06	0.24	0.02	0.03	0.02	0.03
2	0.01	0.06	0.08	0.10	0.04	0.04	0.05	0.59	0.02	0.03	0.02	0.03
3	0.01	0.04	0.06	0.08	0.04	0.04	0.04	0.17	0.02	0.02	0.02	0.02
4	0.01	0.05	0.06	0.44	0.04	0.04	0.04	0.23	0.02	0.02	0.02	0.02
5	0.01	0.06	0.05	0.23	0.04	0.04	0.04	0.10	0.02	0.02	0.02	0.02
6	0.01	0.07	0.04	0.13	0.06	0.04	0.04	0.07	0.03	0.02	0.02	0.02
7	0.01	0.05	0.04	0.09	0.28	0.04	0.04	0.05	0.03	0.02	0.02	0.03
8	0.01	0.05	0.04	0.08	0.18	0.03	0.04	0.05	0.03	0.02	0.02	0.02
9	0.01	0.05	0.04	0.07	0.10	0.12	0.03	0.07	0.03	0.02	0.03	0.02
10	0.02	0.05	0.03	0.07	0.09	0.12	0.03	0.05	0.03	0.03	0.02	0.02
11	0.02	0.04	0.03	0.06	0.50	0.08	0.03	0.05	0.03	0.02	0.02	0.02
12	0.02	0.04	0.03	0.11	0.29	0.07	0.03	0.06	0.03	0.02	0.02	0.02
13	0.02	0.04	0.06	0.14	0.16	0.18	0.03	0.06	0.03	0.02	0.02	0.02
14	0.03	0.04	0.24	0.10	0.11	0.25	0.13	0.05	0.03	0.02	0.02	0.02
15	0.03	0.03	0.26	0.08	0.09	0.12	0.09	0.04	0.03	0.04	0.02	0.02
16	0.03	0.03	0.14	0.07	0.09	0.09	0.07	0.03	0.03	0.03	0.02	0.02
17	0.02	0.03	0.09	0.06	0.07	0.07	0.06	0.03	0.05	0.03	0.02	0.02
18	0.02	0.03	0.08	0.06	0.07	0.06	0.12	0.03	0.03	0.03	0.02	0.02
19	0.03	0.03	0.06	0.12	0.09	0.05	0.26	0.03	0.03	0.02	0.02	0.02
20	0.03	0.03	0.05	0.14	0.42	0.04	0.12	0.03	0.03	0.02	0.02	0.02
21	0.03	0.03	0.05	0.11	0.15	0.04	0.08	0.20	0.03	0.02	0.11	0.02
22	0.02	0.03	0.05	0.10	0.10	0.04	0.06	0.20	0.03	0.02	0.06	0.02
23	0.02	0.03	0.04	0.48	0.09	0.04	0.05	0.07	0.09	0.02	0.06	0.02
24	0.02	0.03	0.04	0.19	0.09	0.04	0.05	0.05	0.08	0.02	0.05	0.02
25	0.02	0.03	0.04	0.12	0.08	0.04	0.08	0.04	0.05	0.02	0.04	0.02
26	0.02	0.03	0.04	0.09	0.07	0.04	0.08	0.03	0.04	0.02	0.04	0.02
27	0.02	0.03	0.11	0.08	0.06	0.04	0.07	0.03	0.04	0.02	0.05	0.02
28	0.02	0.03	0.13	0.07	0.06	0.04	0.06	0.02	0.03	0.02	0.04	0.02
29	0.02	0.03	0.09	0.06		0.04	0.05	0.03	0.03	0.02	0.04	0.02
30	0.02	0.02	0.07	0.06		0.05	0.04	0.03	0.03	0.02	0.03	0.02
31	0.03		0.13	0.05		0.07		0.02		0.02	0.03	
<b>Total</b>	0.64	1.17	2.37	3.76	3.48	2.03	1.98	2.72	1.03	0.75	0.96	0.68
<b>Mean</b>	0.02	0.04	0.08	0.12	0.12	0.07	0.07	0.09	0.03	0.02	0.03	0.02
<b>Max</b>	0.03	0.08	0.26	0.48	0.50	0.25	0.26	0.59	0.09	0.04	0.11	0.03
<b>Min</b>	0.01	0.02	0.03	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02



### Upper Big Barren (2.51 km<sup>2</sup>)

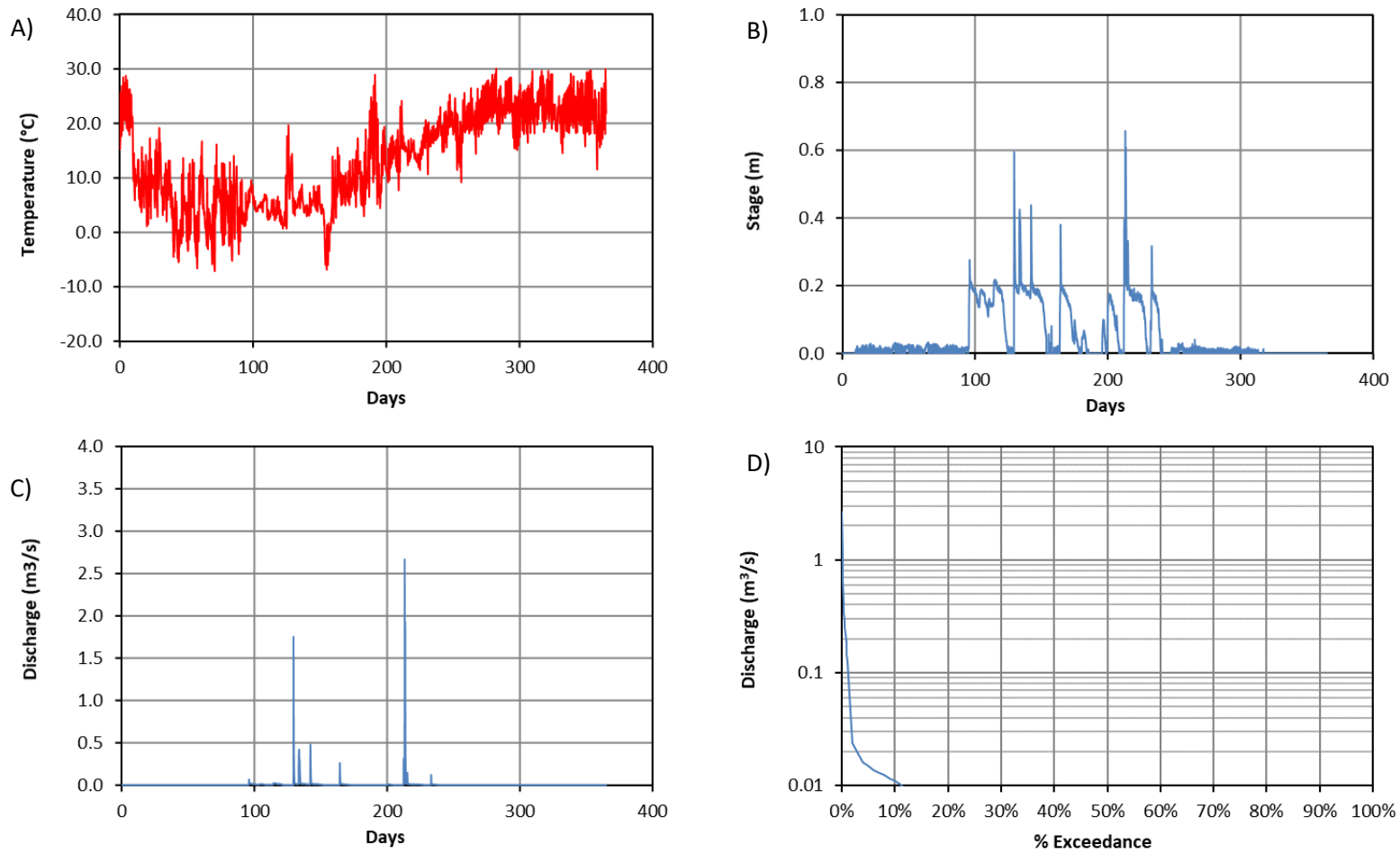


Figure 7. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Upper Big Barren.

Table 6. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Upper Big Barren.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.01	0.36	0.00	0.00	0.01	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.01	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.01	0.10	0.00	0.00	0.01	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.01	0.01	0.07	0.00	0.01	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.14	0.00	0.01	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.01		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.00		0.00		0.00	0.00	
<b>Total</b>	0.00	0.00	0.00	0.28	1.04	0.14	0.03	1.17	0.00	0.00	0.00	0.00
<b>Mean</b>	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.04	0.00	0.00	0.00	0.00
<b>Max</b>	0.00	0.00	0.00	0.02	0.36	0.07	0.01	0.81	0.00	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Barnes Hollow (2.67 km<sup>2</sup>)**

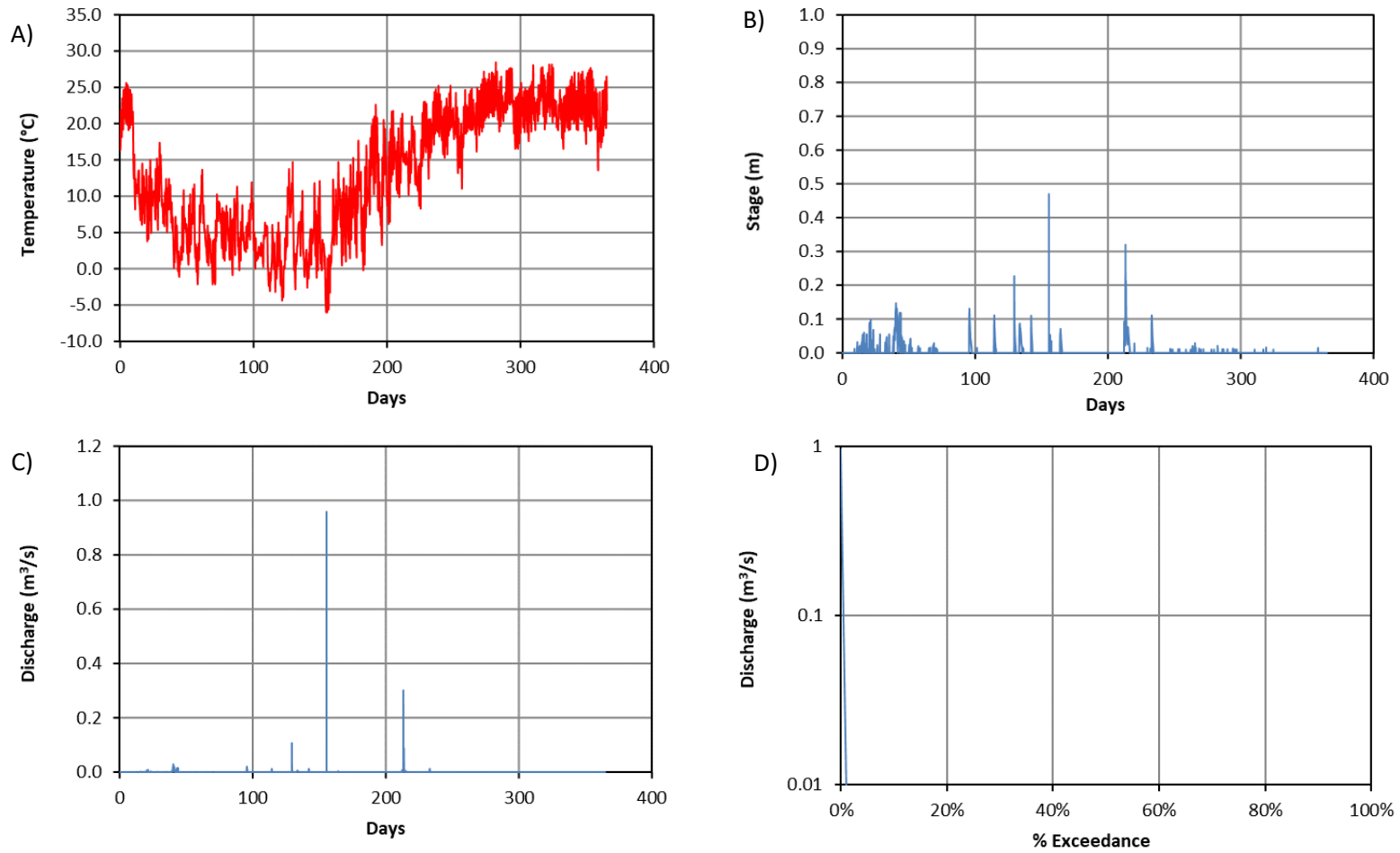


Figure 8. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Barnes Hollow.

Table 7. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Barnes Hollow (BH)

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.00		0.00		0.00	0.00	
<b>Total</b>	0.01	0.03	0.00	0.01	0.02	0.01	0.00	0.06	0.00	0.00	0.00	0.00
<b>Mean</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Max</b>	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.05	0.00	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

### Upper Tributary (4.19 km<sup>2</sup>)

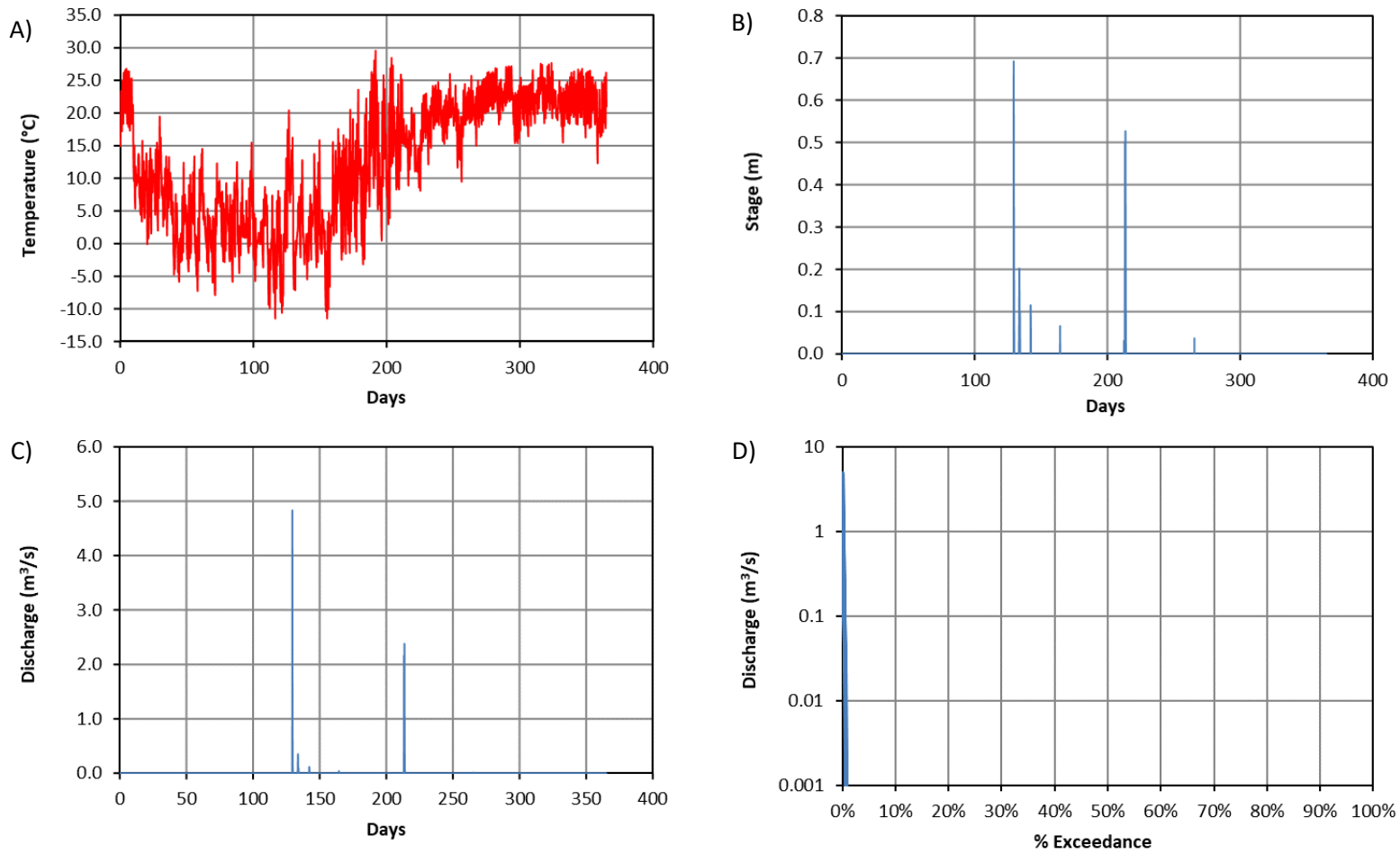


Figure 9. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at the Upper Tributary.

Table 8. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Upper Tributary.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.00		0.00		0.00	0.00	
<b>Total</b>	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.74	0.00	0.00	0.00	0.00
<b>Mean</b>	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.00	0.00
<b>Max</b>	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.74	0.00	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Wolf Pond (5.13 km<sup>2</sup>)**

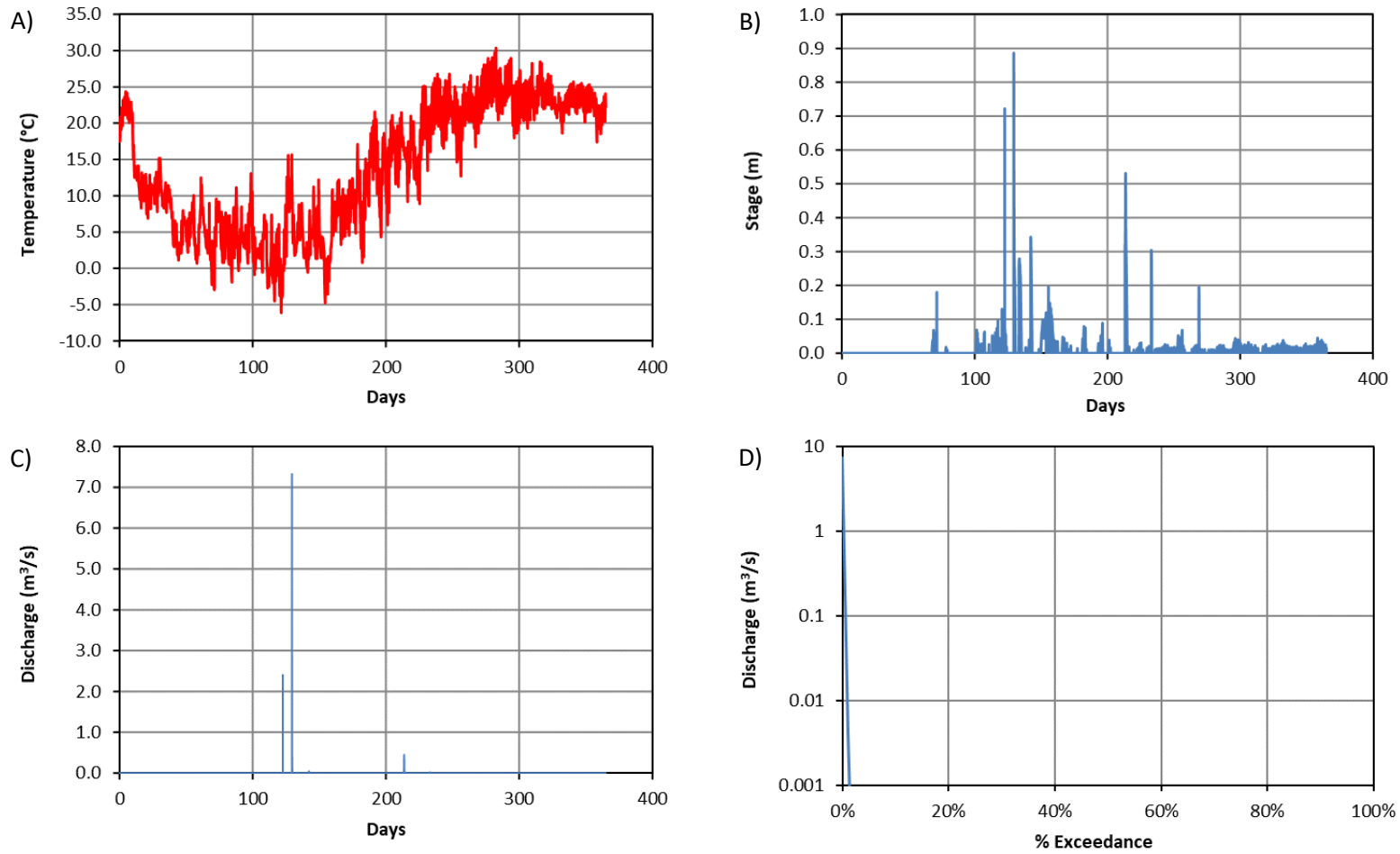


Figure 10. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at the Wolf Pond Tributary.

Table 9. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Wolf Pond Tributary.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.01		0.00		0.00		0.00	0.00	
<b>Total</b>	0.00	0.00	0.00	0.01	0.49	0.00	0.00	0.10	0.00	0.00	0.00	0.00
<b>Mean</b>	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Max</b>	0.00	0.00	0.00	0.01	0.47	0.00	0.00	0.09	0.00	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



### Polecat Hollow (6.19 km<sup>2</sup>)

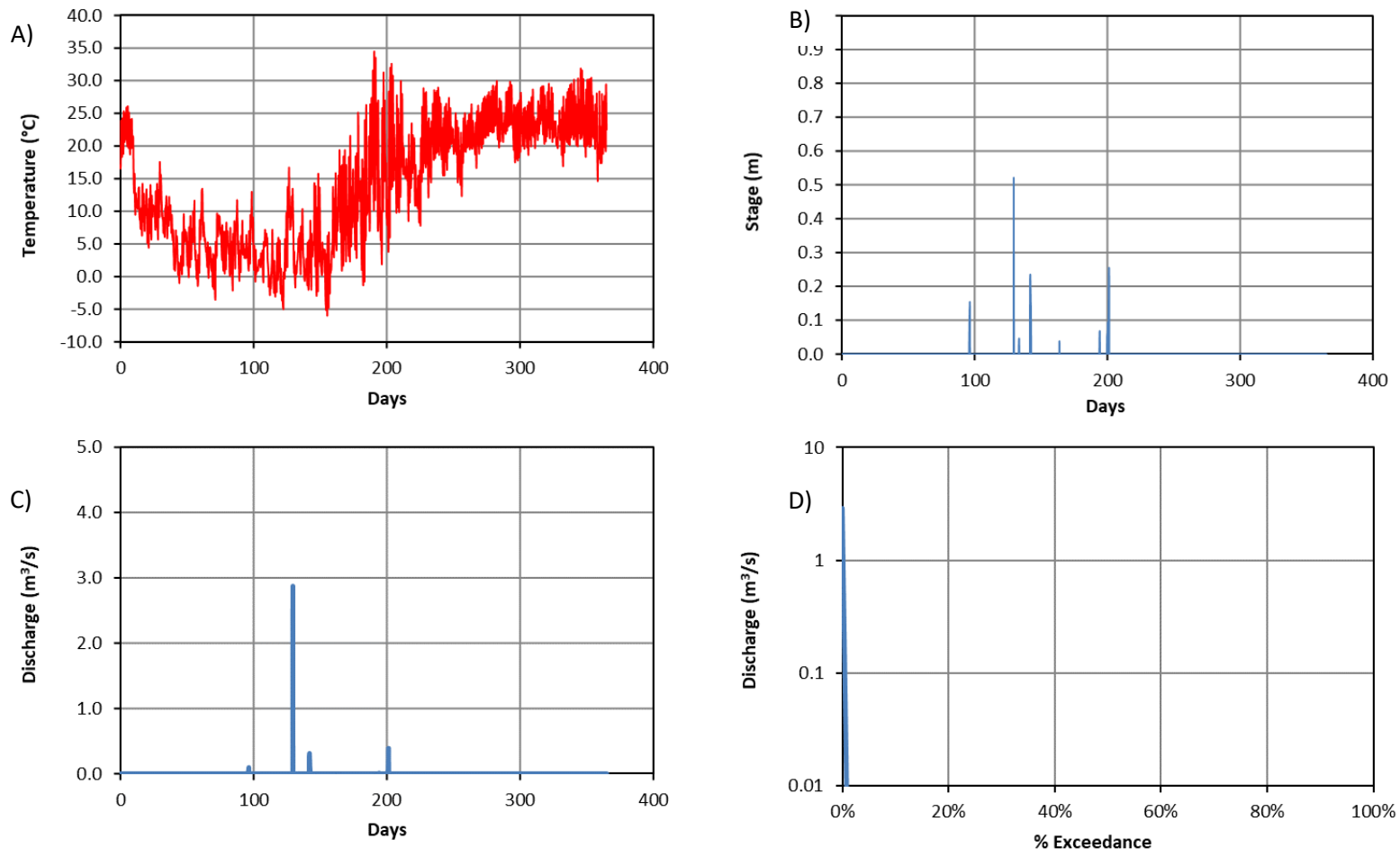


Figure 11. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Polecat Hollow.

Table 10. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Polecat Hollow

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.05	0.00	0.08	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.00		0.00		0.00	0.00	
<b>Total</b>	0.00	0.00	0.00	0.03	0.31	0.00	0.09	0.00	0.00	0.00	0.00	0.00
<b>Mean</b>	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Max</b>	0.00	0.00	0.00	0.02	0.18	0.00	0.08	0.00	0.00	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

### South Prong Cedar Bluff Creek (7.28 km<sup>2</sup>)

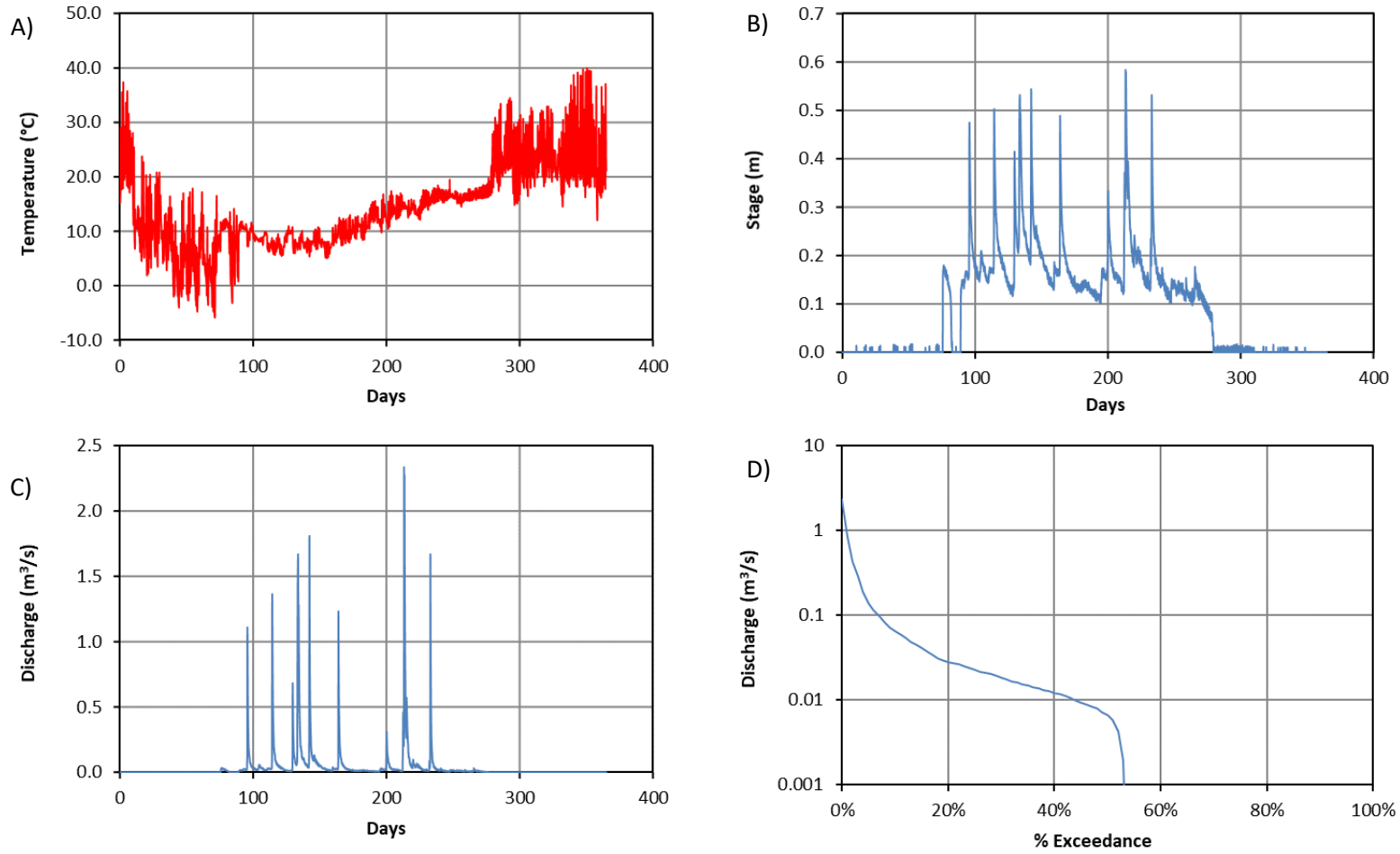


Figure 12. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at South Prong Cedar Bluff Creek.

Table 11. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at South Prong Cedar Bluff Creek.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.02	0.02	0.04	0.01	0.23	0.01	0.00	0.00	0.00
2	0.00	0.00	0.00	0.02	0.02	0.03	0.01	1.41	0.01	0.00	0.00	0.00
3	0.00	0.00	0.00	0.02	0.01	0.03	0.01	0.49	0.01	0.00	0.00	0.00
4	0.00	0.00	0.00	0.44	0.01	0.02	0.01	0.40	0.01	0.00	0.00	0.00
5	0.00	0.00	0.00	0.26	0.01	0.02	0.01	0.16	0.01	0.00	0.00	0.00
6	0.00	0.00	0.00	0.09	0.01	0.02	0.01	0.08	0.02	0.00	0.00	0.00
7	0.00	0.00	0.00	0.05	0.27	0.02	0.01	0.05	0.01	0.00	0.00	0.00
8	0.00	0.00	0.00	0.04	0.18	0.01	0.01	0.04	0.01	0.00	0.00	0.00
9	0.00	0.00	0.00	0.03	0.08	0.02	0.01	0.07	0.01	0.00	0.00	0.00
10	0.00	0.00	0.00	0.03	0.06	0.03	0.01	0.05	0.01	0.00	0.00	0.00
11	0.00	0.00	0.00	0.02	1.11	0.03	0.01	0.05	0.01	0.00	0.00	0.00
12	0.00	0.00	0.00	0.02	0.76	0.02	0.01	0.05	0.01	0.00	0.00	0.00
13	0.00	0.00	0.00	0.05	0.24	0.16	0.01	0.05	0.01	0.00	0.00	0.00
14	0.00	0.00	0.00	0.04	0.13	0.51	0.02	0.03	0.01	0.00	0.00	0.00
15	0.00	0.00	0.01	0.03	0.10	0.14	0.03	0.02	0.01	0.00	0.00	0.00
16	0.00	0.00	0.03	0.03	0.08	0.08	0.02	0.02	0.01	0.00	0.00	0.00
17	0.00	0.00	0.03	0.02	0.06	0.05	0.02	0.02	0.01	0.00	0.00	0.00
18	0.00	0.00	0.02	0.02	0.05	0.04	0.03	0.02	0.01	0.00	0.00	0.00
19	0.00	0.00	0.02	0.02	0.05	0.03	0.20	0.02	0.01	0.00	0.00	0.00
20	0.00	0.00	0.01	0.03	0.86	0.03	0.08	0.01	0.01	0.00	0.00	0.00
21	0.00	0.00	0.01	0.03	0.22	0.02	0.05	0.12	0.01	0.00	0.00	0.00
22	0.00	0.00	0.00	0.03	0.11	0.02	0.03	0.65	0.01	0.00	0.00	0.00
23	0.00	0.00	0.00	0.72	0.11	0.02	0.02	0.12	0.02	0.00	0.00	0.00
24	0.00	0.00	0.00	0.23	0.10	0.02	0.02	0.05	0.02	0.00	0.00	0.00
25	0.00	0.00	0.00	0.11	0.08	0.01	0.02	0.03	0.01	0.00	0.00	0.00
26	0.00	0.00	0.00	0.07	0.06	0.01	0.02	0.02	0.01	0.00	0.00	0.00
27	0.00	0.00	0.00	0.06	0.05	0.01	0.02	0.02	0.01	0.00	0.00	0.00
28	0.00	0.00	0.00	0.04	0.05	0.01	0.02	0.02	0.01	0.00	0.00	0.00
29	0.00	0.00	0.01	0.04		0.01	0.01	0.02	0.01	0.00	0.00	0.00
30	0.00	0.00	0.02	0.03		0.01	0.01	0.02	0.00	0.00	0.00	0.00
31	0.00		0.01	0.02		0.01		0.01		0.00	0.00	
<b>Total</b>	0.00	0.00	0.16	2.64	4.90	1.48	0.75	4.37	0.30	0.01	0.00	0.00
<b>Mean</b>	0.00	0.00	0.01	0.09	0.17	0.05	0.03	0.14	0.01	0.00	0.00	0.00
<b>Max</b>	0.00	0.00	0.03	0.72	1.11	0.51	0.20	1.41	0.02	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00

**Fools Catch (7.82 km<sup>2</sup>)**

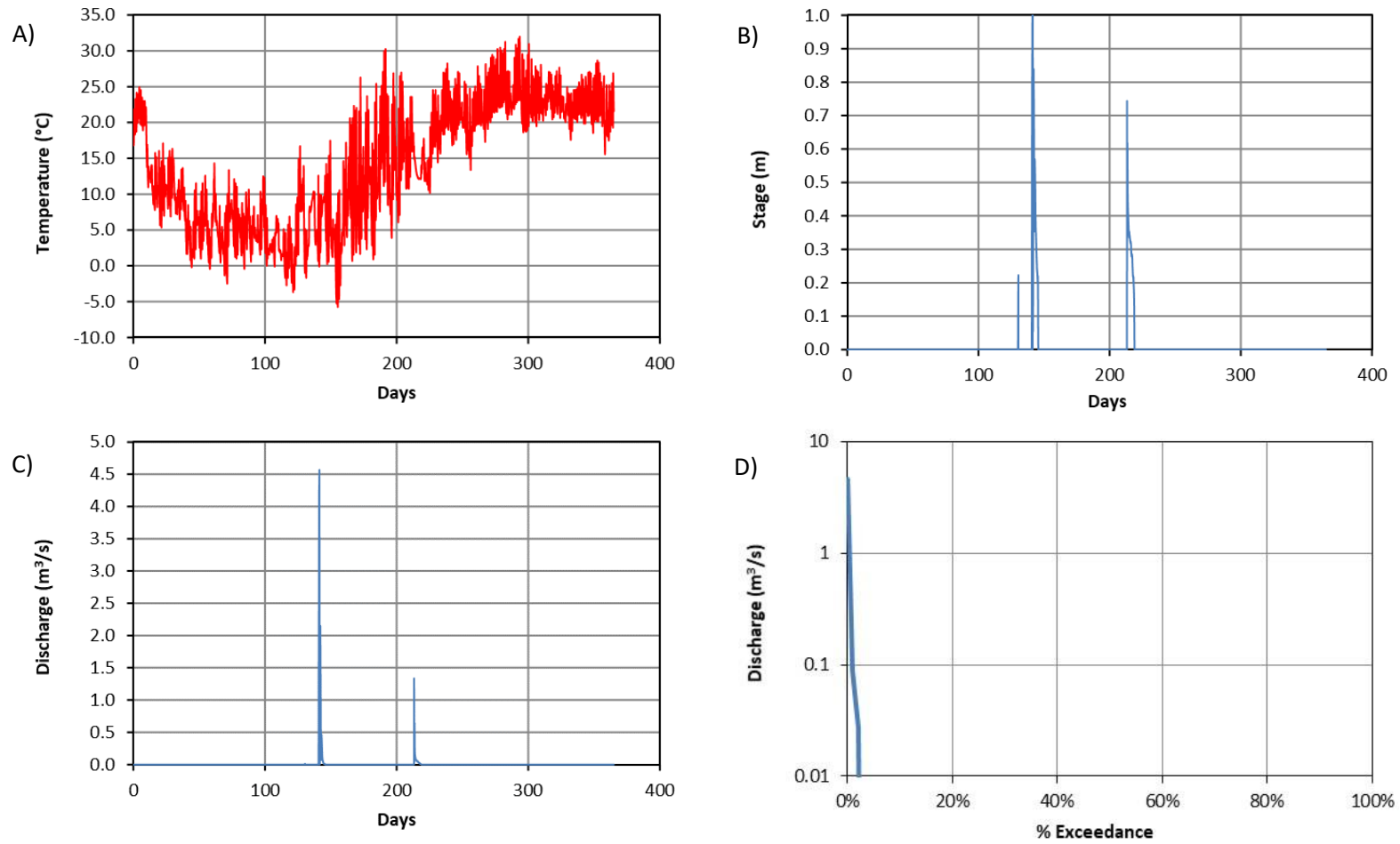


Figure 13. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Fools Catch.

Table 12. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Fools Catch

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	1.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.00		0.00		0.00	0.00	
<b>Total</b>	0.00	0.00	0.00	0.00	3.14	0.00	0.00	0.48	0.00	0.00	0.00	0.00
<b>Mean</b>	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.02	0.00	0.00	0.00	0.00
<b>Max</b>	0.00	0.00	0.00	0.00	1.76	0.00	0.00	0.28	0.00	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Middle Big Barren Creek (47.76 km<sup>2</sup>)

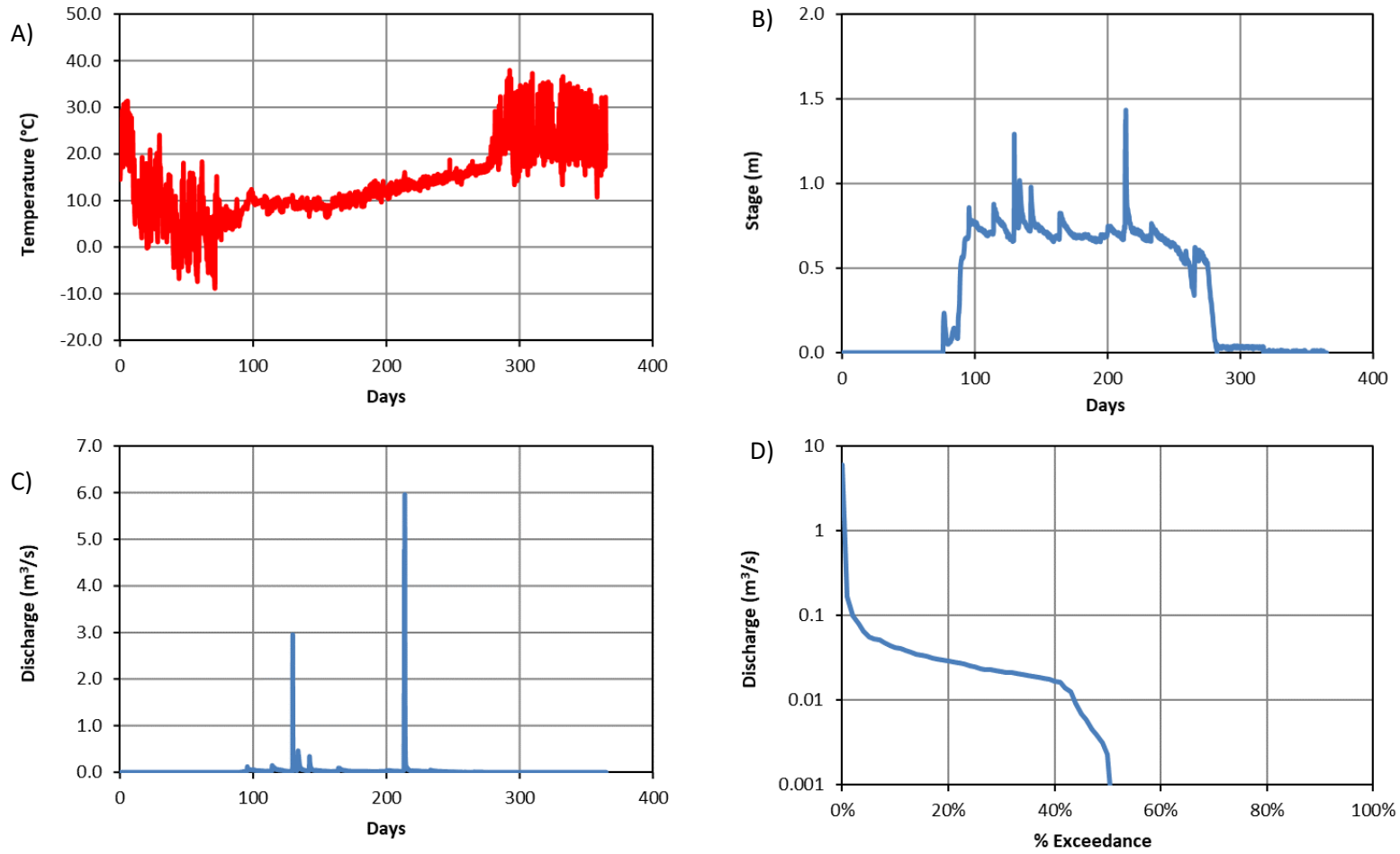


Figure 14. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Middle Big Barren.

Table 13. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Middle Big Barren.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.02	0.03	0.03	0.02	0.03	0.02	0.00	0.00	0.00
2	0.00	0.00	0.00	0.02	0.03	0.03	0.02	2.35	0.01	0.00	0.00	0.00
3	0.00	0.00	0.00	0.02	0.02	0.03	0.02	0.32	0.01	0.00	0.00	0.00
4	0.00	0.00	0.00	0.06	0.02	0.03	0.02	0.09	0.01	0.00	0.00	0.00
5	0.00	0.00	0.00	0.05	0.02	0.02	0.02	0.06	0.01	0.00	0.00	0.00
6	0.00	0.00	0.00	0.05	0.02	0.02	0.02	0.04	0.01	0.00	0.00	0.00
7	0.00	0.00	0.00	0.05	0.46	0.02	0.02	0.03	0.01	0.00	0.00	0.00
8	0.00	0.00	0.00	0.05	0.09	0.02	0.02	0.03	0.01	0.00	0.00	0.00
9	0.00	0.00	0.00	0.05	0.05	0.02	0.02	0.03	0.01	0.00	0.00	0.00
10	0.00	0.00	0.00	0.04	0.04	0.02	0.02	0.03	0.01	0.00	0.00	0.00
11	0.00	0.00	0.00	0.04	0.26	0.02	0.02	0.03	0.01	0.00	0.00	0.00
12	0.00	0.00	0.00	0.03	0.24	0.02	0.02	0.03	0.01	0.00	0.00	0.00
13	0.00	0.00	0.00	0.03	0.10	0.03	0.02	0.03	0.01	0.00	0.00	0.00
14	0.00	0.00	0.00	0.03	0.06	0.07	0.02	0.03	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.03	0.05	0.07	0.02	0.02	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.03	0.04	0.05	0.02	0.02	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.02	0.04	0.05	0.02	0.02	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.02	0.04	0.04	0.02	0.02	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.03	0.03	0.04	0.04	0.02	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.03	0.19	0.03	0.04	0.02	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.03	0.09	0.03	0.04	0.02	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.03	0.05	0.03	0.03	0.04	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.09	0.04	0.02	0.03	0.04	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.10	0.04	0.02	0.03	0.03	0.01	0.00	0.00	0.00
25	0.00	0.00	0.00	0.08	0.04	0.02	0.03	0.03	0.01	0.00	0.00	0.00
26	0.00	0.00	0.00	0.06	0.04	0.02	0.03	0.03	0.01	0.00	0.00	0.00
27	0.00	0.00	0.00	0.06	0.03	0.02	0.02	0.02	0.01	0.00	0.00	0.00
28	0.00	0.00	0.00	0.05	0.04	0.02	0.02	0.02	0.01	0.00	0.00	0.00
29	0.00	0.00	0.00	0.05		0.02	0.02	0.02	0.01	0.00	0.00	0.00
30	0.00	0.00	0.00	0.04		0.02	0.02	0.02	0.00	0.00	0.00	0.00
31	0.00		0.01	0.04		0.02		0.02		0.00	0.00	
<b>Total</b>	0.00	0.00	0.01	1.35	2.21	0.90	0.71	3.54	0.22	0.01	0.00	0.00
<b>Mean</b>	0.00	0.00	0.00	0.04	0.08	0.03	0.02	0.11	0.01	0.00	0.00	0.00
<b>Max</b>	0.00	0.00	0.01	0.10	0.46	0.07	0.04	2.35	0.02	0.00	0.00	0.00
<b>Min</b>	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00



Upper Natural Area (103.6 km<sup>2</sup>)

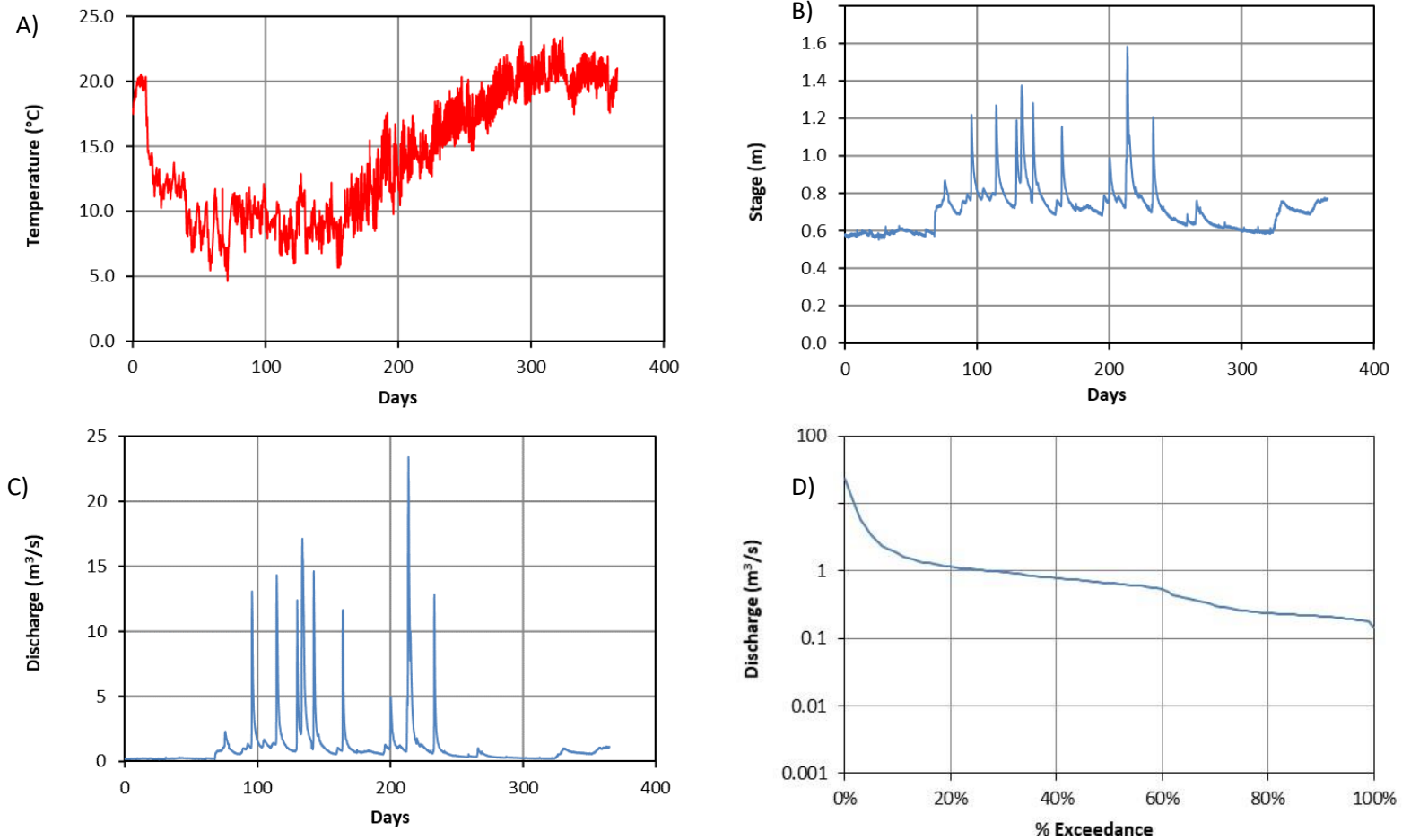


Figure 15. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Upper Natural Area.

Table 14. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Upper Natural Area.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.19	0.22	0.24	1.26	0.96	0.91	0.78	2.60	0.57	0.43	0.24	0.76
2	0.18	0.22	0.25	1.20	0.91	0.84	0.81	16.35	0.53	0.40	0.24	0.73
3	0.18	0.20	0.24	1.09	0.87	0.78	0.78	11.97	0.50	0.38	0.24	0.72
4	0.19	0.22	0.23	6.20	0.81	0.70	0.77	8.20	0.47	0.36	0.24	0.71
5	0.20	0.23	0.22	7.29	0.79	0.65	0.73	4.43	0.44	0.35	0.23	0.69
6	0.20	0.22	0.21	3.29	0.81	0.62	0.70	2.59	0.44	0.33	0.23	0.67
7	0.20	0.22	0.21	2.24	4.89	0.59	0.67	1.83	0.44	0.33	0.24	0.66
8	0.20	0.23	0.62	1.73	5.82	0.57	0.66	1.51	0.43	0.32	0.23	0.67
9	0.19	0.24	0.76	1.43	2.72	0.66	0.64	1.58	0.40	0.31	0.25	0.65
10	0.21	0.25	0.80	1.25	2.18	1.01	0.61	1.29	0.39	0.31	0.23	0.64
11	0.20	0.27	0.82	1.14	12.27	0.95	0.59	1.23	0.38	0.30	0.23	0.63
12	0.21	0.27	0.83	1.13	13.00	0.87	0.57	1.24	0.38	0.30	0.22	0.62
13	0.21	0.27	0.94	1.54	6.28	1.46	0.57	1.18	0.36	0.29	0.22	0.61
14	0.23	0.25	1.09	1.56	3.67	7.97	0.90	1.07	0.35	0.29	0.22	0.60
15	0.22	0.25	1.95	1.40	2.59	2.96	1.21	0.98	0.34	0.33	0.22	0.60
16	0.23	0.25	1.80	1.25	2.07	1.82	1.08	0.88	0.37	0.30	0.23	0.59
17	0.21	0.25	1.43	1.16	1.76	1.41	0.98	0.81	0.43	0.30	0.22	0.58
18	0.20	0.25	1.10	1.08	1.35	1.17	1.12	0.75	0.40	0.30	0.23	0.62
19	0.22	0.24	0.92	1.18	1.03	1.01	4.05	0.70	0.38	0.30	0.23	0.67
20	0.23	0.22	0.84	1.35	10.45	0.93	2.53	0.64	0.36	0.29	0.23	0.74
21	0.21	0.22	0.75	1.36	4.51	0.85	1.70	1.14	0.36	0.28	0.29	0.86
22	0.19	0.21	0.68	1.34	2.42	0.78	1.34	8.54	0.36	0.28	0.39	0.95
23	0.18	0.22	0.63	10.40	2.04	0.73	1.13	2.80	0.56	0.28	0.51	1.02
24	0.18	0.21	0.58	6.03	1.74	0.72	1.06	1.62	0.90	0.27	0.56	1.00
25	0.19	0.21	0.58	3.01	1.41	0.75	1.14	1.19	0.70	0.26	0.63	0.98
26	0.19	0.21	0.57	2.18	1.25	0.74	1.16	0.96	0.64	0.26	0.82	1.04
27	0.18	0.20	0.64	1.76	1.13	0.71	1.06	0.84	0.61	0.25	0.96	1.05
28	0.18	0.20	0.83	1.52	1.02	0.70	0.96	0.75	0.56	0.25	0.96	1.09
29	0.18	0.19	0.99	1.32		0.72	0.85	0.71	0.51	0.25	0.92	1.09
30	0.18	0.19	0.94	1.16		0.74	0.79	0.68	0.46	0.25	0.85	1.09
31	0.22		0.98	1.04		0.75		0.63		0.25	0.79	
<b>Total</b>	6.14	6.84	23.67	70.90	90.76	36.08	31.92	81.66	14.01	9.39	12.30	23.33
<b>Mean</b>	0.20	0.23	0.76	2.29	3.24	1.16	1.06	2.63	0.47	0.30	0.40	0.78
<b>Max</b>	0.23	0.27	1.95	10.40	13.00	7.97	4.05	16.35	0.90	0.43	0.96	1.09
<b>Min</b>	0.18	0.19	0.21	1.04	0.79	0.57	0.57	0.63	0.34	0.25	0.22	0.58

**Lower Natural Area (124.2 km<sup>2</sup>)**

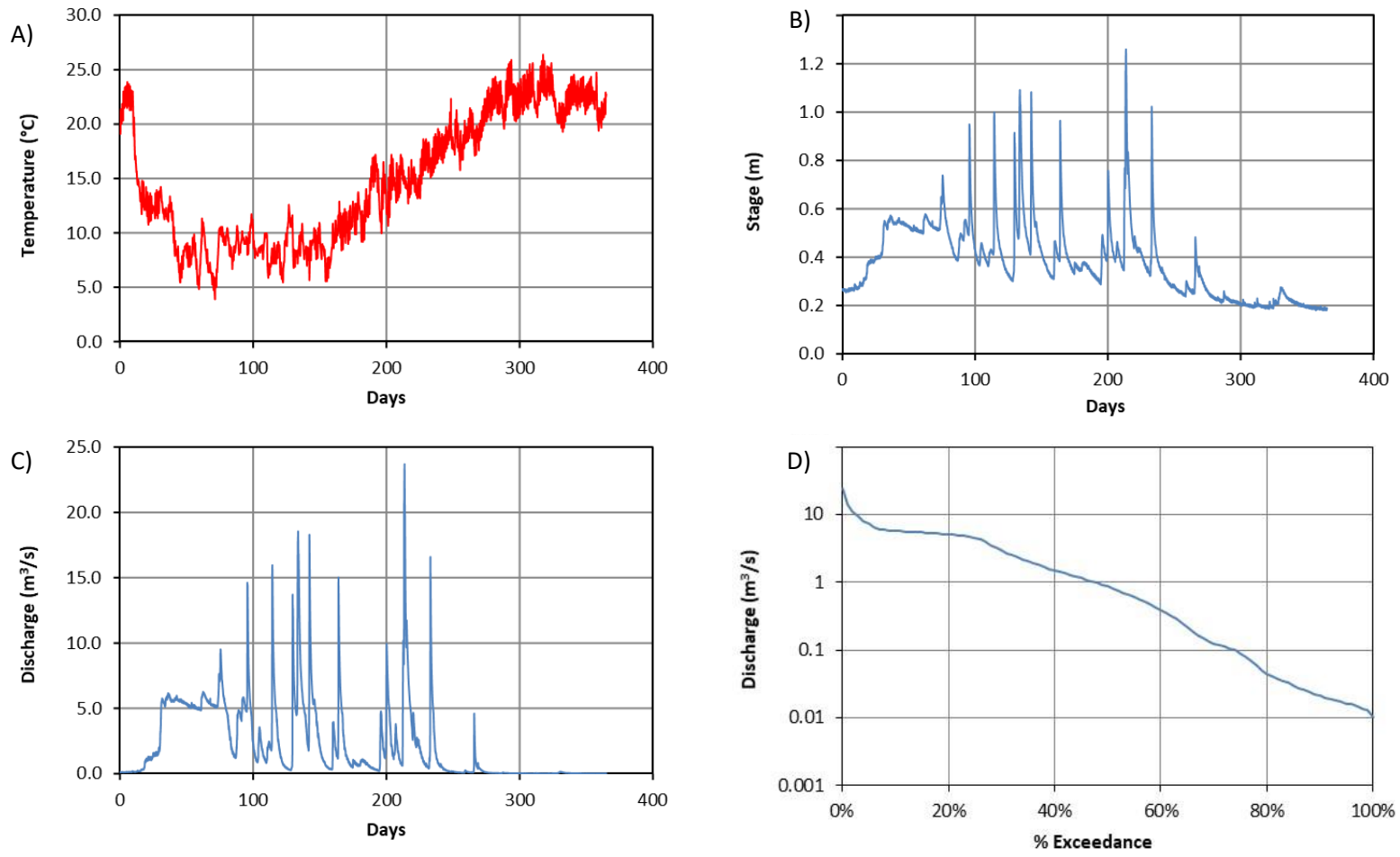


Figure 16. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Lower Natural Area.

Table 15. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Lower Natural Area.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.11	5.56	5.81	5.77	0.58	1.32	0.99	6.51	0.33	0.14	0.02	0.05
2	0.11	5.53	6.14	5.41	0.47	1.04	0.94	18.49	0.27	0.11	0.02	0.04
3	0.10	5.29	6.03	4.90	0.41	0.87	0.80	12.68	0.22	0.09	0.02	0.04
4	0.11	5.63	5.80	9.32	0.33	0.63	0.75	10.33	0.19	0.07	0.02	0.04
5	0.11	5.86	5.60	8.80	0.29	0.52	0.62	7.47	0.17	0.07	0.02	0.03
6	0.12	6.03	5.46	5.83	0.34	0.42	0.54	5.65	0.16	0.06	0.02	0.03
7	0.12	5.85	5.43	4.60	7.15	0.37	0.46	4.51	0.16	0.05	0.02	0.03
8	0.12	5.58	5.27	2.92	7.95	0.34	0.42	3.35	0.15	0.05	0.02	0.03
9	0.12	5.60	5.25	1.87	5.31	1.52	0.37	4.11	0.12	0.04	0.03	0.02
10	0.17	5.57	5.21	1.34	4.62	3.41	0.33	2.70	0.11	0.04	0.02	0.02
11	0.14	5.68	5.16	1.00	14.28	2.21	0.29	2.35	0.10	0.04	0.02	0.02
12	0.14	5.82	5.15	1.18	13.65	1.52	0.26	2.44	0.09	0.04	0.02	0.02
13	0.15	5.66	5.50	3.08	8.64	2.67	0.25	2.22	0.09	0.03	0.02	0.02
14	0.20	5.58	7.17	2.77	6.61	11.03	2.96	1.74	0.08	0.04	0.02	0.02
15	0.19	5.60	8.65	1.97	5.44	6.55	3.69	1.35	0.07	0.07	0.02	0.02
16	0.21	5.55	7.43	1.45	4.77	4.92	2.18	1.03	0.09	0.05	0.02	0.02
17	0.30	5.49	6.17	1.15	3.97	3.44	1.43	0.81	0.21	0.05	0.02	0.02
18	0.32	5.43	5.51	0.91	2.65	2.13	2.03	0.67	0.15	0.04	0.02	0.02
19	0.62	5.37	4.99	1.44	2.33	1.52	8.57	0.58	0.12	0.04	0.02	0.01
20	1.01	5.30	4.59	2.20	13.84	1.20	5.93	0.46	0.10	0.03	0.02	0.01
21	1.07	5.19	3.75	2.18	8.29	0.94	4.35	2.21	0.10	0.03	0.02	0.01
22	1.16	5.13	2.86	1.95	6.04	0.74	2.55	11.51	0.09	0.03	0.03	0.01
23	1.16	5.17	2.14	11.96	5.55	0.60	1.64	6.09	1.02	0.03	0.03	0.01
24	1.16	5.20	1.65	7.92	5.12	0.58	1.36	4.04	2.15	0.03	0.03	0.01
25	1.28	5.13	1.42	5.52	4.18	0.87	2.29	2.13	0.71	0.03	0.04	0.01
26	1.46	5.09	1.30	4.36	3.15	0.84	2.95	1.30	0.52	0.03	0.07	0.01
27	1.48	5.01	2.02	2.84	2.40	0.73	1.91	0.91	0.45	0.02	0.13	0.01
28	1.50	4.95	4.54	2.00	1.77	0.64	1.29	0.69	0.34	0.02	0.12	0.01
29	1.53	4.97	4.75	1.38		0.64	0.89	0.61	0.25	0.03	0.09	0.01
30	1.84	4.92	4.45	0.99		0.79	0.71	0.53	0.18	0.03	0.07	0.01
31	3.40		4.81	0.72		0.97		0.41		0.02	0.06	
<b>Total</b>	21.49	162.73	150.03	109.71	140.13	55.96	53.74	119.88	8.80	1.46	1.06	0.63
<b>Mean</b>	0.69	5.42	4.84	3.54	5.00	1.81	1.79	3.87	0.29	0.05	0.03	0.02
<b>Max</b>	3.40	6.03	8.65	11.96	14.28	11.03	8.57	18.49	2.15	0.14	0.13	0.05
<b>Min</b>	0.10	4.92	1.30	0.72	0.29	0.34	0.25	0.41	0.07	0.02	0.02	0.01

Lower Big Barren Creek (183.1 km<sup>2</sup>)

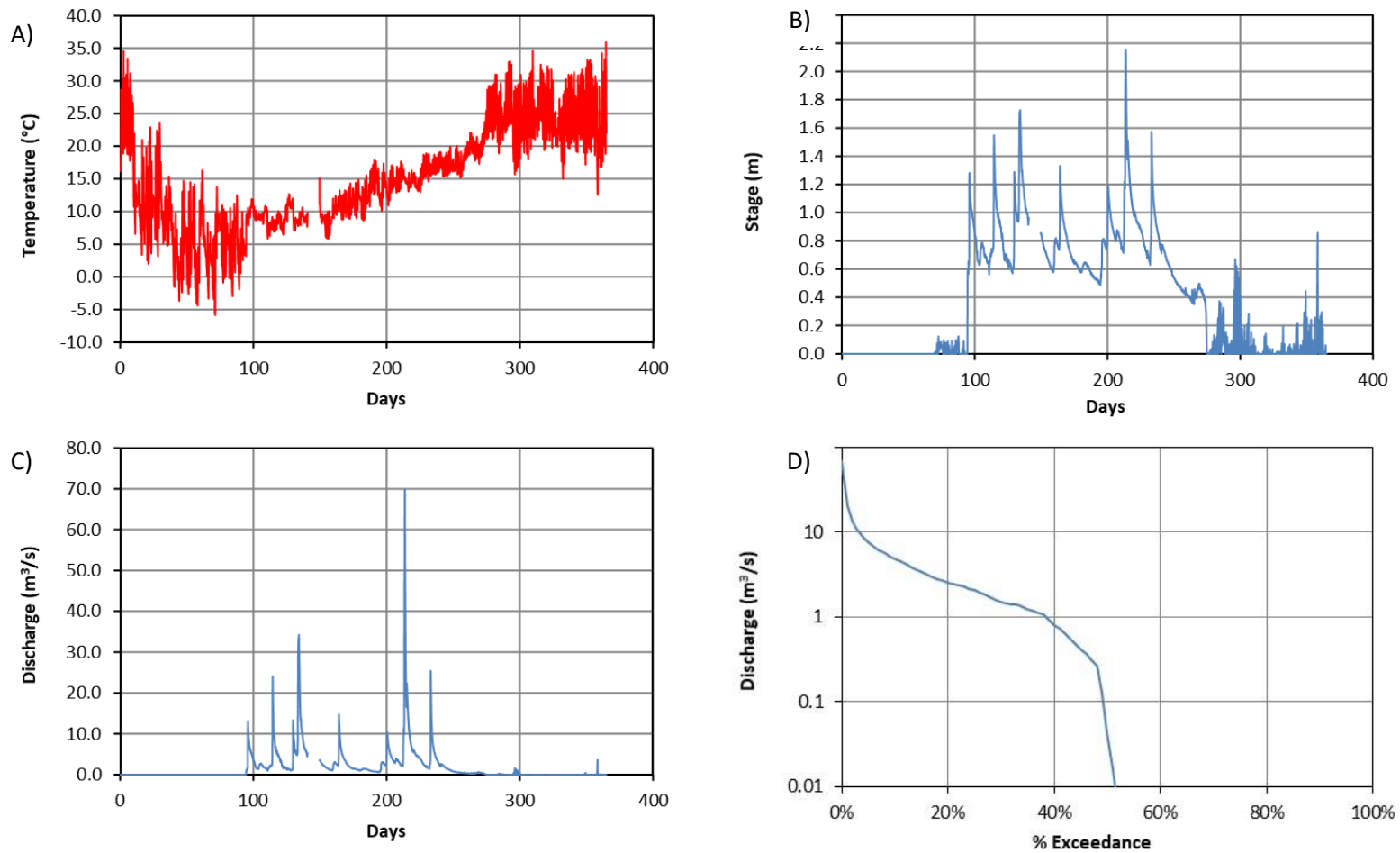


Figure 17. WY2019 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Lower Big Barren.

Table 16. Daily Mean Discharge (m<sup>3</sup>/s) for WY 2019 at Lower Big Barren Creek.

Day	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1	0.00	0.00	0.00	0.00	1.73	2.64	1.41	6.11	1.91	0.23	0.00	0.00
2	0.00	0.00	0.00	0.00	1.55	2.28	1.44	41.69	1.63	0.05	0.00	0.00
3	0.00	0.00	0.00	0.49	1.40	2.04	1.34	27.14	1.45	0.00	0.02	0.00
4	0.00	0.00	0.00	3.97	1.39	1.77	1.26	18.72	1.31	0.00	0.00	0.00
5	0.00	0.00	0.00	9.10	1.15	1.57	1.13	12.61	1.16	0.00	0.00	0.00
6	0.00	0.00	0.00	6.30	1.12	1.36	0.99	9.08	1.01	0.00	0.00	0.00
7	0.00	0.00	0.00	5.23	5.36	1.21	0.91	7.14	0.86	0.00	0.00	0.00
8	0.00	0.00	0.00	4.17	8.55	1.10	0.84	6.00	0.77	0.00	0.00	0.01
9	0.00	0.00	0.00	3.17	5.67	1.27	0.80	5.88	0.69	0.00	0.00	0.01
10	0.00	0.00	0.00	2.20	4.92	2.81	0.77	5.16	0.63	0.00	0.00	0.00
11	0.00	0.00	0.00	1.53	20.61	2.88	0.74	4.70	0.58	0.02	0.00	0.00
12	0.00	0.00	0.00	1.40	26.72	2.53	0.67	4.43	0.55	0.06	0.00	0.00
13	0.00	0.00	0.00	2.21	13.83	2.48	0.65	4.14	0.49	0.06	0.00	0.00
14	0.00	0.00	0.00	2.67	10.41	11.44	1.30	3.73	0.45	0.04	0.00	0.03
15	0.00	0.00	0.00	2.37	7.92	7.10	2.94	3.27	0.42	0.07	0.00	0.08
16	0.00	0.00	0.00	1.87	6.44	5.23	2.86	2.66	0.42	0.00	0.00	0.01
17	0.00	0.00	0.00	1.73	5.73	4.27	2.48	2.28	0.38	0.00	0.00	0.00
18	0.00	0.00	0.00	1.49	M	3.62	2.63	2.01	0.34	0.00	0.00	0.00
19	0.00	0.00	0.00	1.28	M	3.00	8.52	1.88	0.32	0.00	0.00	0.01
20	0.00	0.00	0.00	1.67	M	2.47	7.00	1.56	0.29	0.00	0.00	0.00
21	0.00	0.00	0.00	2.02	M	2.13	5.36	2.50	0.30	0.00	0.00	0.00
22	0.00	0.00	0.00	2.20	M	1.87	4.36	16.69	0.26	0.01	0.00	0.01
23	0.00	0.00	0.00	14.68	M	1.65	3.72	8.51	0.36	0.12	0.00	0.03
24	0.00	0.00	0.00	10.39	M	1.50	3.25	6.02	0.34	0.42	0.00	0.81
25	0.00	0.00	0.00	6.81	M	1.43	3.13	4.71	0.40	0.27	0.00	0.02
26	0.00	0.00	0.00	5.57	M	1.40	3.74	3.86	0.55	0.21	0.00	0.01
27	0.00	0.00	0.00	4.84	M	1.28	3.44	3.26	0.55	0.16	0.00	0.03
28	0.00	0.00	0.00	4.15	3.15	1.15	2.95	2.49	0.46	0.06	0.00	0.00
29	0.00	0.00	0.00	3.27		1.09	2.51	2.28	0.40	0.00	0.00	0.00
30	0.00	0.00	0.00	2.31		1.09	2.19	2.47	0.32	0.00	0.00	0.00
31	0.00		0.00	1.73		1.29		2.23			0.00	
<b>Total</b>	0.00	0.00	0.01	110.82	127.67	78.96	75.30	225.20	19.63	1.80	0.03	1.07
<b>Mean</b>	0.00	0.00	0.00	3.57	7.09	2.55	2.51	7.26	0.65	0.06	0.00	0.04
<b>Max</b>	0.00	0.00	0.00	14.68	26.72	11.44	8.52	41.69	1.91	0.42	0.02	0.81
<b>Min</b>	0.00	0.00	0.00	0.00	1.12	1.09	0.65	1.56	0.26	0.00	0.00	0.00