

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 2018

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

April 15, 2021



OEWR I EDR-21-002.3

TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
LIST OF TABLES.....	3
LIST OF FIGURES.....	4
WATER YEAR 2018 SUMMARY.....	5
Rainfall.....	5
Discharge and Runoff	6
References.....	7
TABLES.....	8
FIGURES.....	11
Tram Hollow (1.59 km ²)	14
Cowards Hollow (2.19 km ²).....	16
Upper Big Barren (2.51 km ²)	18
Barnes Hollow (2.67 km ²).....	20
Upper Tributary (4.19 km ²)	22
Wolf Pond (5.13 km ²)	24
Polecat Hollow (6.19 km ²).....	26
South Prong Cedar Bluff Creek (7.28 km ²)	28
Fools Catch (7.82 km ²).....	30
Highway J (8.82 km ²)	32
Middle Big Barren Creek (47.76 km ²).....	34
Upper Natural Area (103.6 km ²)	36
Lower Natural Area (124.2 km ²)	38
Lower Big Barren Creek (183.1 km ²)	40

LIST OF TABLES

Table 1. WY2018 gaging station locations in the Big Barren Creek watershed.....	8
Table 2. WY2018 Big Barren Creek watershed gaging station data summary.	9
Table 3. Water Year 2018 Records for Nearby USGS Gaging Stations.	10
Table 3. Daily Mean Discharge (m ³ /s) for WY 2018 at Tram Hollow.....	15
Table 4. Daily Mean Discharge (m ³ /s) for WY 2018 at Cowards Hollow (CH)	17
Table 5. Daily Mean Discharge (m ³ /s) for WY 2018 at Upper Big Barren.....	19
Table 6. Daily Mean Discharge (m ³ /s) for WY 2018 at Barnes Hollow (BH)	21
Table 7. Daily Mean Discharge (m ³ /s) for WY 2018 at Upper Tributary.....	23
Table 8. Daily Mean Discharge (m ³ /s) for WY 2018 at Wolf Pond Tributary.....	25
Table 9. Daily Mean Discharge (m ³ /s) for WY 2018 at Polecat Hollow	27
Table 10. Daily Mean Discharge (m ³ /s) for WY 2018 at South Prong Cedar Bluff Creek.	29
Table 11. Daily Mean Discharge (m ³ /s) for WY 2018 at Fools Catch.....	31
Table 13. Daily Mean Discharge (m ³ /s) for WY 2018 at Highway J	33
Table 14. Daily Mean Discharge (m ³ /s) for WY 2018 at Middle Big Barren.	35
Table 15. Daily Mean Discharge (m ³ /s) for WY 2018 at Upper Natural Area.....	37
Table 16. Daily Mean Discharge (m ³ /s) for WY 2018 at Lower Natural Area.....	39
Table 17. Daily Mean Discharge (m ³ /s) for WY 2018 at Lower Big Barren Creek.....	41

LIST OF FIGURES

Figure 1. Location and land use of the Big Barren Creek watershed.	11
Figure 2. Hydrologic monitoring stations (WY2018) with burn history.....	12
Figure 3. WY2018 cumulative rainfall by season.	13
Figure 4. Average annual discharge for Big Barren Creek gages compared to nearby USGS gages (WY2018).	13
Figure 5. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Tram Hollow.	14
Figure 6. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Cowards Hollow.	16
Figure 7. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Upper Big Barren.	18
Figure 8. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Barnes Hollow.	20
Figure 9. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at the Upper Tributary.....	22
Figure 10. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at the Wolf Pond Tributary.....	24
Figure 11. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Polecat Hollow.....	26
Figure 12. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at South Prong Cedar Bluff Creek.....	28
Figure 13. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Fools Catch.	30
Figure 14. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Highway J.....	32
Figure 15. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Middle Big Barren.....	34
Figure 16. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Upper Natural Area.	36
Figure 17. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Lower Natural Area.	38
Figure 18. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Lower Big Barren.	40

WATER YEAR 2018 SUMMARY

This report summarizes the 2018 Water Year (WY2018) discharge results for the 14 stations that were installed in the Big Barren Creek watershed in 2015 and 2016. The 2018 Water Year runs from October 1, 2017 to September 30, 2018. 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 km² 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 km². 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 13 of the 14 sites there were less than 2 days of missing data over the year. However, at Cowards Hollow there was over 36 days of missing data due to equipment problems.

Rainfall

There was a total of 130.9 cm of rainfall in WY2018, which is 11.1 cm higher than the average annual rainfall for the area between 1956-2014 (Pavlowisky et al., 2016). Of that total, 46.0 cm (35.1%) of the total annual rainfall came in the winter from January through March (Figure 3). High rainfall amounts occurred between February 21-26 (15.5 cm) and March 27-29 (13.9 cm). The second highest seasonal rainfall total occurred in the winter from January-March with 26.6 cm (20.9%) of the total annual rainfall. The spring and the summer had similar rainfall totals with 36.9 cm (28.2%) and 34.4 cm (26.3%). The lowest seasonal rainfall occurred in the fall

from October-December with only 13.6 cm (10.4%). While the total annual rainfall was relatively high compared to the long-term average, no daily rainfall total exceeded 7.5 cm during WY2018 (Pavlovsky et al., 2016).

For WY2018, rainfall totals were collected from two different sources. Between October 1, 2017 to March 8, 2018, rainfall totals were collected from nearby stations (Pavlovsky et al., 2016). From March 9, 2018 to September 30, 2018, rainfall was recorded at three Onset HOB0 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 station, an average of the upper and middle stations is reported here. Comparing the totals from both sources shows that the stations located in the watershed recorded 16.2 cm ($\approx 13\%$ RPD) more rainfall than using the inverse distance weighted method from nearby gages.

Discharge and Runoff

The range in discharge values for WY2018 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 0.053 m³/s at CH to 1.10 m³/s at LNA (Table 2). For ephemeral sites, average annual discharge ranged from 0.001 m³/s at WP and PH to 1.15 m³/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, data produced at this site is far lower than the other gaging stations. Annual peak discharge ranged from 1.44 m³/s at WP to 61.6 m³/s at LBB. Minimum discharge at the perennial sites ranged from 0.002 m³/s at LNA to 0.052 m³/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. OEWRI 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)*. OEWRI 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. WY2018 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 ²)	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	5.9
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	5.8
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	0.0
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	5.8

Table 2. WY2018 Big Barren Creek watershed gaging station data summary.

Site Name	Drainage Area (km ²)	Rainfall* Vol. (m ³)	Runoff Vol. (m ³)	Rainfall As Runoff (%)	Runoff Depth (cm)	Avg. Q (m ³ /s)	Max Q (m ³ /s)	10% Q** (m ³ /s)	50% Q** (m ³ /s)	90% Q** (m ³ /s)	Min Q (m ³ /s)
Tram Hollow	1.59	2,055,130	91,889	4.5	5.9	0.003	2.40	0.000	0.000	0.000	0.000
Cowards Hollow	2.19	2,879,800	1,661,981	57.7	75.5	0.053	6.06	0.107	0.032	0.010	0.006
Upper Big Barren	2.51	3,285,590	162,392	4.9	6.5	0.005	3.62	0.005	0.000	0.000	0.000
Barnes Hollow***	2.67	3,495,030	12,905	0.4	0.5	<0.001	0.34	0.000	0.000	0.000	0.000
Upper Tributary	4.19	5,484,710	124,321	2.3	3.0	0.004	5.94	0.000	0.000	0.000	0.000
Wolf Pond	5.13	6,715,170	22,440	0.3	0.4	0.001	1.44	0.000	0.000	0.000	0.000
Polecat Hollow	6.19	8,102,710	28,989	0.4	0.5	0.001	1.81	0.000	0.000	0.000	0.000
South Prong Cedar	7.28	9,529,520	821,611	8.6	11.3	0.026	3.71	0.049	0.000	0.000	0.000
Fools Catch	7.82	10,236,380	60,236	0.6	0.8	0.002	2.34	0.000	0.000	0.000	0.000
Highway J	8.82	11,545,380	308,977	2.7	3.5	0.010	3.32	0.000	0.000	0.000	0.000
Middle Big Barren	47.8	62,517,840	496,792	0.8	1.04	0.016	9.55	0.033	0.000	0.000	0.000
Upper Natural Area	103.6	135,612,400	20,260,308	14.9	19.6	0.643	28.25	0.829	0.421	0.140	0.052
Lower Natural Area	124.2	162,577,800	34,575,148	21.3	27.8	1.10	28.38	3.41	0.218	0.012	0.002
Lower Big Barren	186.1	239,677,900	36,142,335	15.1	19.7	1.15	61.62	3.29	0.000	0.000	0.000

*Total rainfall for WY2018 = 130.9 cm

** Exceedance value

*** Poor site conditions, only receives a portion of the total watershed runoff.

Table 3. Water Year 2018 Records for Nearby USGS Gaging Stations.

Station Name	Start Year	Years of Record	Drainage Area (km ²)	WY 2018 Avg. Annual Q (m ³ /s)	Flow Exceedance (%)			
					90% (m ³ /s)	50% (m ³ /s)	10% (m ³ /s)	0% (Max) (m ³ /s)
EAST FORK BLACK RIVER NEAR LESTERVILLE, MO	2003	16	135.2	1.82	0.09	0.27	2.74	212.4
E. FORK BLACK R. BELOW LOWER TAUM SAUK RESERVOIR	2008	11	226.1	2.94	0.21	0.52	4.89	100.3
LOGAN CREEK AT ELLINGTON, MO	1994	25	360.0	0.63	0.08	0.13	0.97	89.5
JACKS FORK NEAR MOUNTAIN VIEW, MO	2001	18	479.2	4.46	0.67	1.12	7.43	124.0
BIG CREEK AT SAM A. BAKER STATE PARK	2005	14	489.5	6.74	0.94	1.82	12.0	314.4
LITTLE BLACK RIVER BELOW FAIRDEALING, MO	2007	12	502.5	5.36	1.11	1.91	11.2	256.0
SOUTH FORK SPRING RIVER AT SADDLE, AR	2010	9	686.4	4.83	0.97	1.48	10.7	174.2
CURRENT RIVER ABOVE AKERS, MO	2001	18	764.1	12.6	5.44	6.94	24.5	317.2
JACKS FORK AT ALLEY SPRING, MO	1993	26	771.8	6.66	1.39	1.80	11.8	348.3
JACKS FORK AT EMINENCE, MO	1921	98	1,030.8	13.3	4.53	5.83	24.0	376.7
BLACK RIVER NEAR ANNAPOLIS, MO	1939	80	1,253.6	15.2	3.85	5.64	27.9	495.6
BLACK RIVER BELOW ANNAPOLIS, MO	2006	13	1,276.9	18.7	4.64	6.63	36.5	563.6
ST. FRANCIS RIVER NEAR SACO, MO	2005	14	1,719.8	21.8	1.07	3.62	41.4	917.6
ELEVEN POINT RIVER NEAR BARDLEY, MO	1921	98	2,053.9	19.4	9.87	13.7	35.6	193.6
SPRING RIVER AT TOWN BRANCH BRIDGE AT HARDY, AR	2001	18	2,188.6	20.6	9.79	11.4	41.0	277.3
ST. FRANCIS RIVER NEAR PATTERSON, MO	1921	98	2,476.0	30.7	2.49	6.80	60.4	900.6
BLACK RIVER AT LEEPER, MO	2008	11	2,556.3	27.9	10.0	12.8	93.7	198.2
BLACK RIVER ABOVE WILLIAMSVILLE, MO	2008	11	2,608.1	31.8	10.8	14.2	101.8	NA
ELEVEN POINT RIVER NEAR RAVENDEN SPRINGS, AR	2000	19	2,926.7	28.1	13.7	18.1	54.9	424.8
SPRING RIVER AT IMBODEN, AR	2005	14	3,056.2	28.3	11.3	13.5	58.1	676.8
BLACK RIVER AT POPLAR BLUFF, MO	1939	80	3,224.6	36.9	14.2	18.0	107.4	213.0
ST. FRANCIS RIVER AT WAPPAPELLO, MO	1940	79	3,395.5	40.6	3.7	13.6	129.7	234.8
CURRENT RIVER AT VAN BUREN, MO	1912	107	4,317.5	54.3	24.7	28.6	106.9	736.3
BLACK RIVER NEAR CORNING, AR	1938	80	4,532.5	46.4	13.5	19.3	113.5	396.5
CURRENT RIVER AT DONIPHAN, MO	1918	101	5,278.4	75.0	39.4	43.9	138.7	889.2

* Losing section of Logan Creek, ephemeral

FIGURES

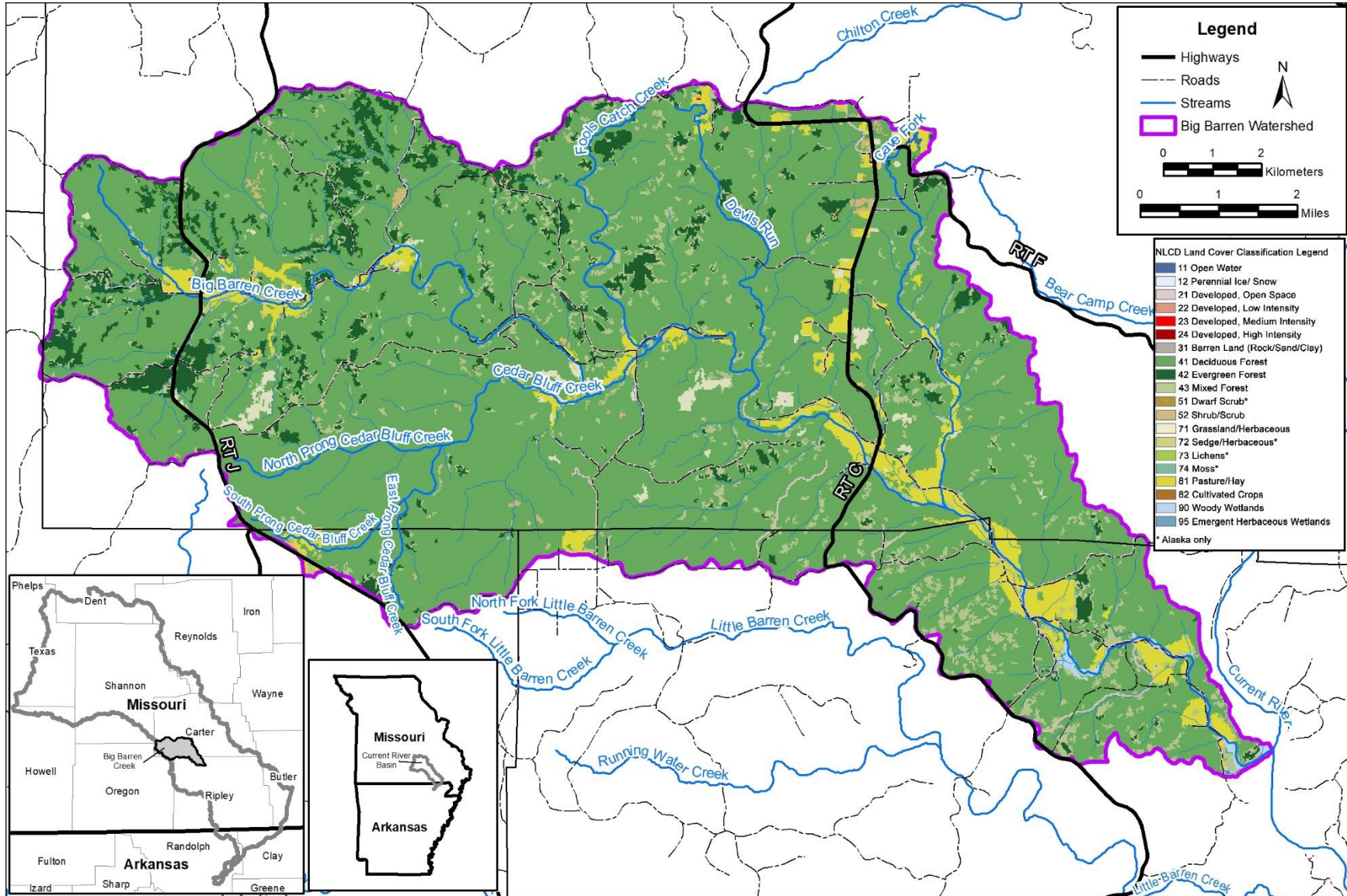


Figure 1. Location and land use of the Big Barren Creek watershed.

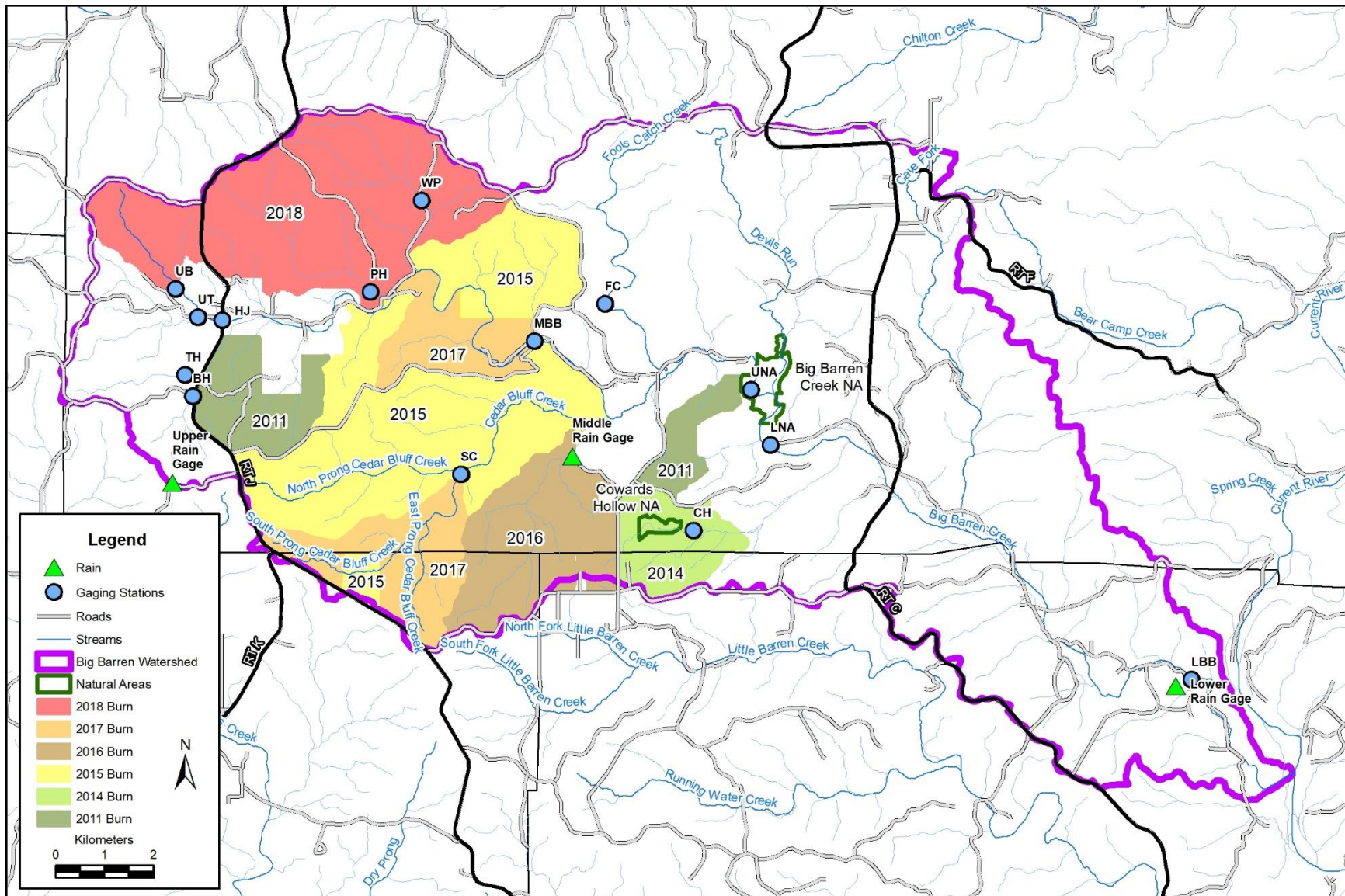


Figure 2. Hydrologic monitoring stations (WY2018) with burn history.

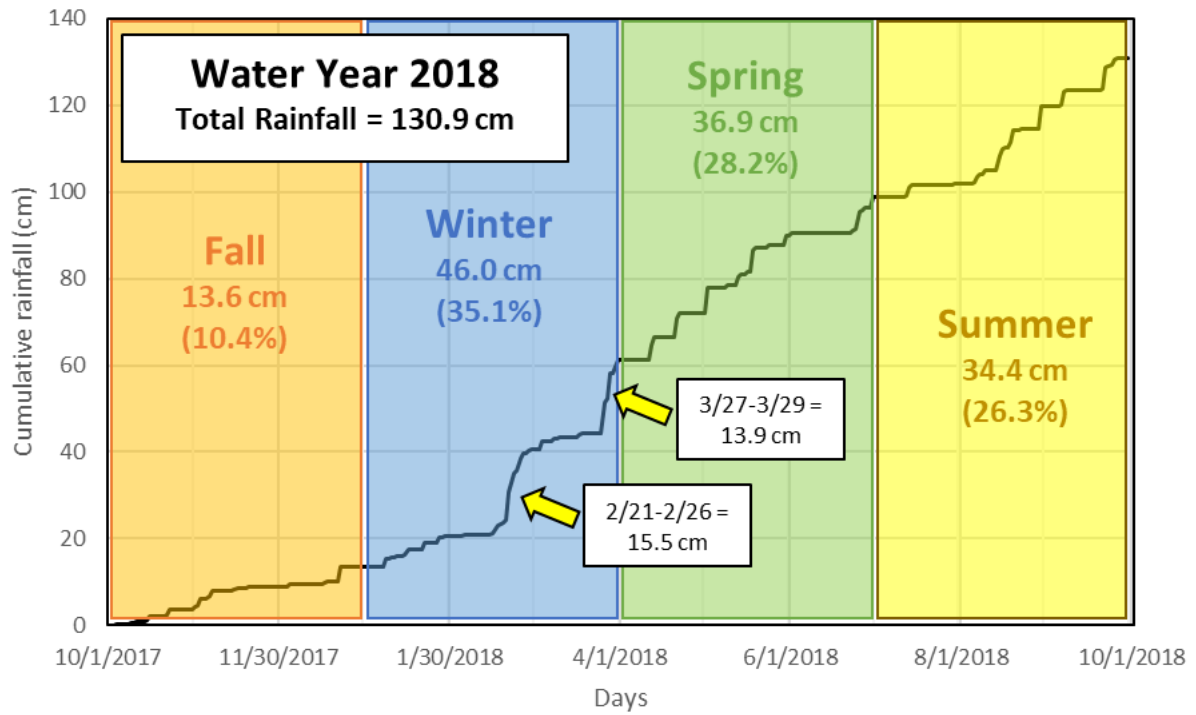


Figure 3. WY2018 cumulative rainfall by season.

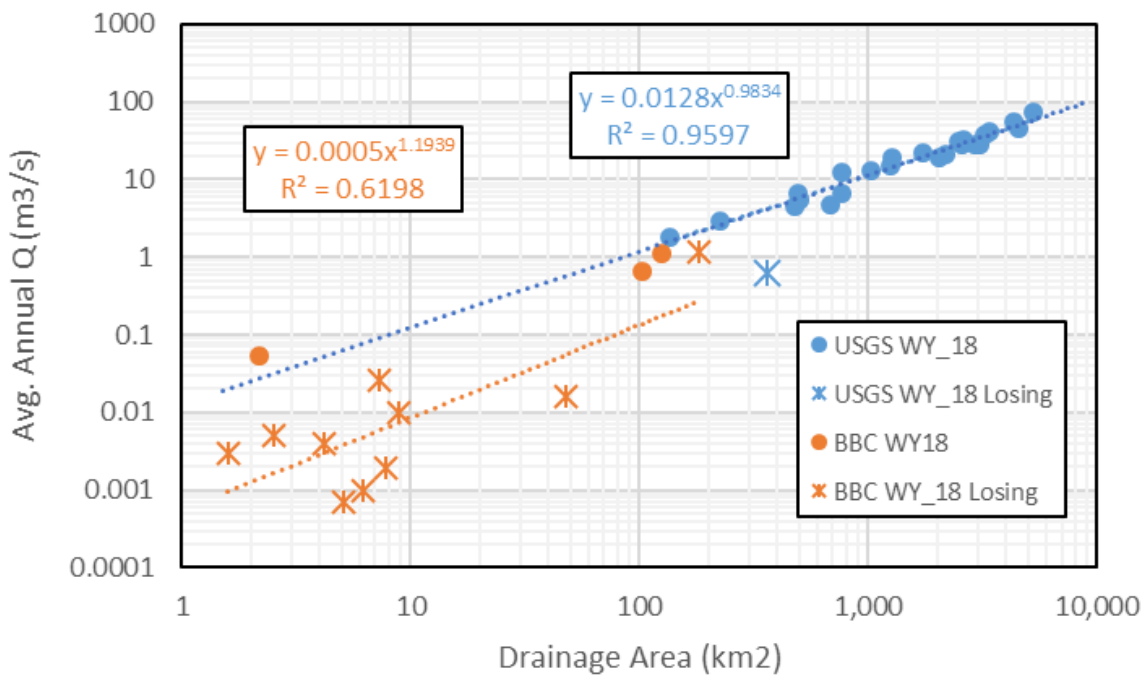


Figure 4. Average annual discharge for Big Barren Creek gages compared to nearby USGS gages (WY2018).

WY2018 GAGING STATION RESULTS

Tram Hollow (1.59 km²)

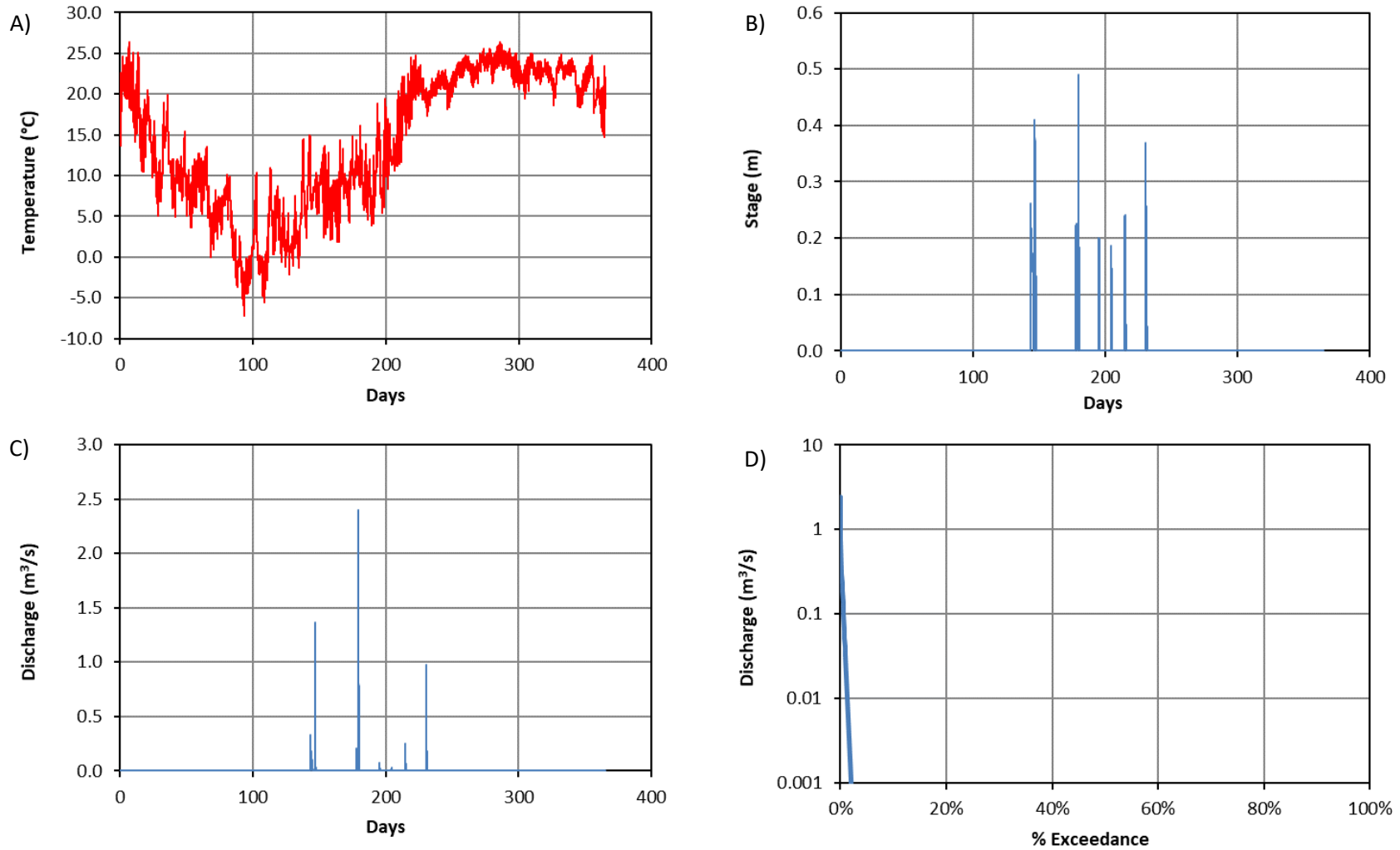


Figure 5. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Tram Hollow.

Table 4. Daily Mean Discharge (m³/s) for WY 2018 at Tram Hollow.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
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	0.03	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	0.00	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	0.01	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	0.11	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.05	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	0.01	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.02	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	0.03	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.46	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.01	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	
Total	0.00	0.00	0.00	0.00	0.39	0.51	0.02	0.15	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.21	0.46	0.01	0.11	0.00	0.00	0.00	0.00
Min	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 km²)

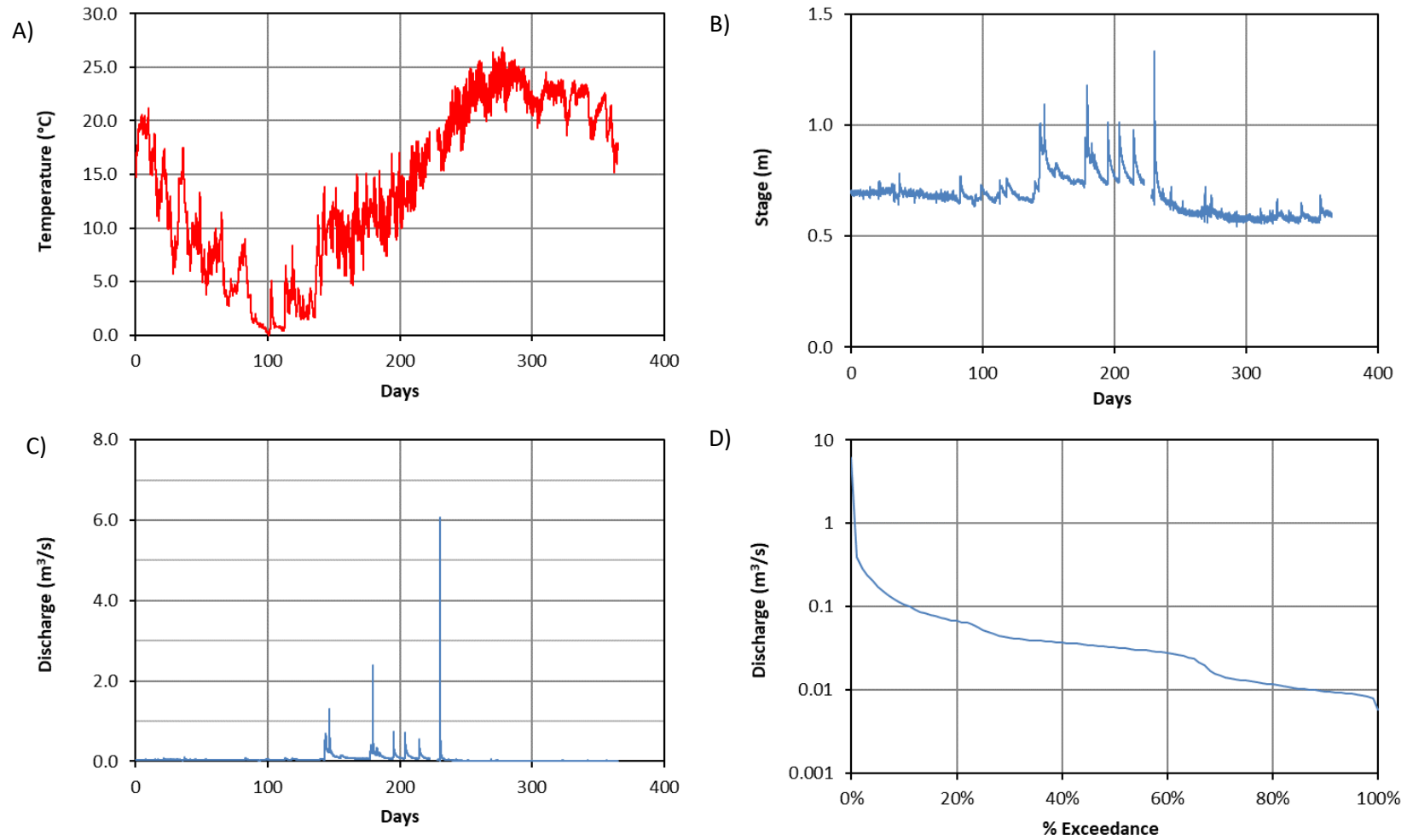


Figure 6. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Cowards Hollow.

Table 5. Daily Mean Discharge (m³/s) for WY 2018 at Cowards Hollow (CH)

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
1	0.04	0.05	0.03	0.02	0.04	0.11	0.21	0.07	0.02	0.02	0.01	0.01
2	0.04	0.03	0.03	0.02	0.04	0.11	0.21	0.07	0.02	0.02	0.01	0.01
3	0.04	0.04	0.03	0.03	0.03	0.10	0.16	0.17	0.02	0.01	0.01	0.01
4	0.04	0.03	0.03	0.03	0.03	0.09	0.16	0.22	0.02	0.01	0.01	0.01
5	0.04	0.03	0.03	0.03	0.03	0.13	0.13	0.15	0.02	0.01	0.01	0.01
6	0.04	0.05	0.03	0.03	0.03	0.13	0.11	0.11	0.02	0.01	0.01	0.01
7	0.04	0.05	0.03	0.03	0.03	0.12	0.10	0.09	0.02	0.01	0.01	0.01
8	0.04	0.04	0.03	0.05	0.03	0.10	0.08	0.08	0.01	0.01	0.01	0.01
9	0.04	0.04	0.03	0.04	0.03	0.09	0.08	0.07	0.02	0.01	0.01	0.01
10	0.04	0.04	0.03	0.04	0.03	0.09	0.07	0.07	0.01	0.01	0.01	0.01
11	0.04	0.04	0.03	0.04	0.03	0.08	0.07	M	0.01	0.01	0.01	0.01
12	0.04	0.03	0.03	0.03	0.03	0.08	0.06	M	0.01	0.01	0.01	0.01
13	0.04	0.04	0.03	0.03	0.03	0.08	0.07	M	0.01	0.01	0.01	0.01
14	0.04	0.04	0.03	0.03	0.03	0.08	0.35	M	0.01	0.01	0.01	0.01
15	0.04	0.04	0.03	0.03	0.02	0.08	0.19	M	0.01	0.01	0.01	0.01
16	0.04	0.04	0.03	0.03	0.03	0.07	0.14	M	0.01	0.01	0.01	0.01
17	0.04	0.04	0.03	0.03	0.05	0.07	0.11	M	0.01	0.01	0.01	0.01
18	0.04	0.03	0.03	0.03	0.06	0.06	0.10	0.03	0.01	0.01	0.01	0.01
19	0.04	0.04	0.03	0.03	0.05	0.07	0.08	0.37	0.01	0.01	0.01	0.01
20	0.04	0.04	0.03	0.03	0.06	0.07	0.07	0.15	0.01	0.01	0.02	0.01
21	0.04	0.04	0.03	0.03	0.47	0.07	0.07	0.08	0.01	0.01	0.01	0.01
22	0.05	0.04	0.03	0.05	0.38	0.07	0.23	0.05	0.01	0.01	0.01	0.02
23	0.05	0.04	0.03	0.05	0.26	0.07	0.33	0.04	0.01	0.01	0.01	0.02
24	0.04	0.04	0.03	0.04	0.48	0.07	0.21	0.03	0.01	0.01	0.01	0.01
25	0.04	0.03	0.03	0.04	0.31	0.07	0.15	0.03	0.01	0.01	0.01	0.01
26	0.04	0.03	0.03	0.04	0.20	0.06	0.13	0.03	0.02	0.01	0.01	0.01
27	0.04	0.03	0.03	0.06	0.15	0.16	0.11	0.03	0.01	0.01	0.01	0.01
28	0.04	0.03	0.03	0.06	0.12	0.29	0.09	0.02	0.01	0.01	0.01	0.01
29	0.04	0.03	0.03	0.05		0.68	0.08	0.02	0.01	0.01	0.01	0.01
30	0.04	0.03	0.03	0.05		0.26	0.08	0.02	0.01	0.01	0.01	0.01
31	0.04		0.03	0.04		0.17		0.02		0.01	0.01	
Total	1.23	1.13	0.03	1.13	3.07	3.77	4.03	2.05	0.44	0.34	0.32	0.33
Mean	0.04	0.04	0.03	0.04	0.11	0.12	0.13	0.09	0.01	0.01	0.01	0.01
Max	0.05	0.05	0.03	0.06	0.48	0.68	0.35	0.37	0.02	0.02	0.02	0.02
Min	0.04	0.03	0.03	0.02	0.02	0.06	0.06	0.02	0.01	0.01	0.01	0.01

Upper Big Barren (2.51 km²)

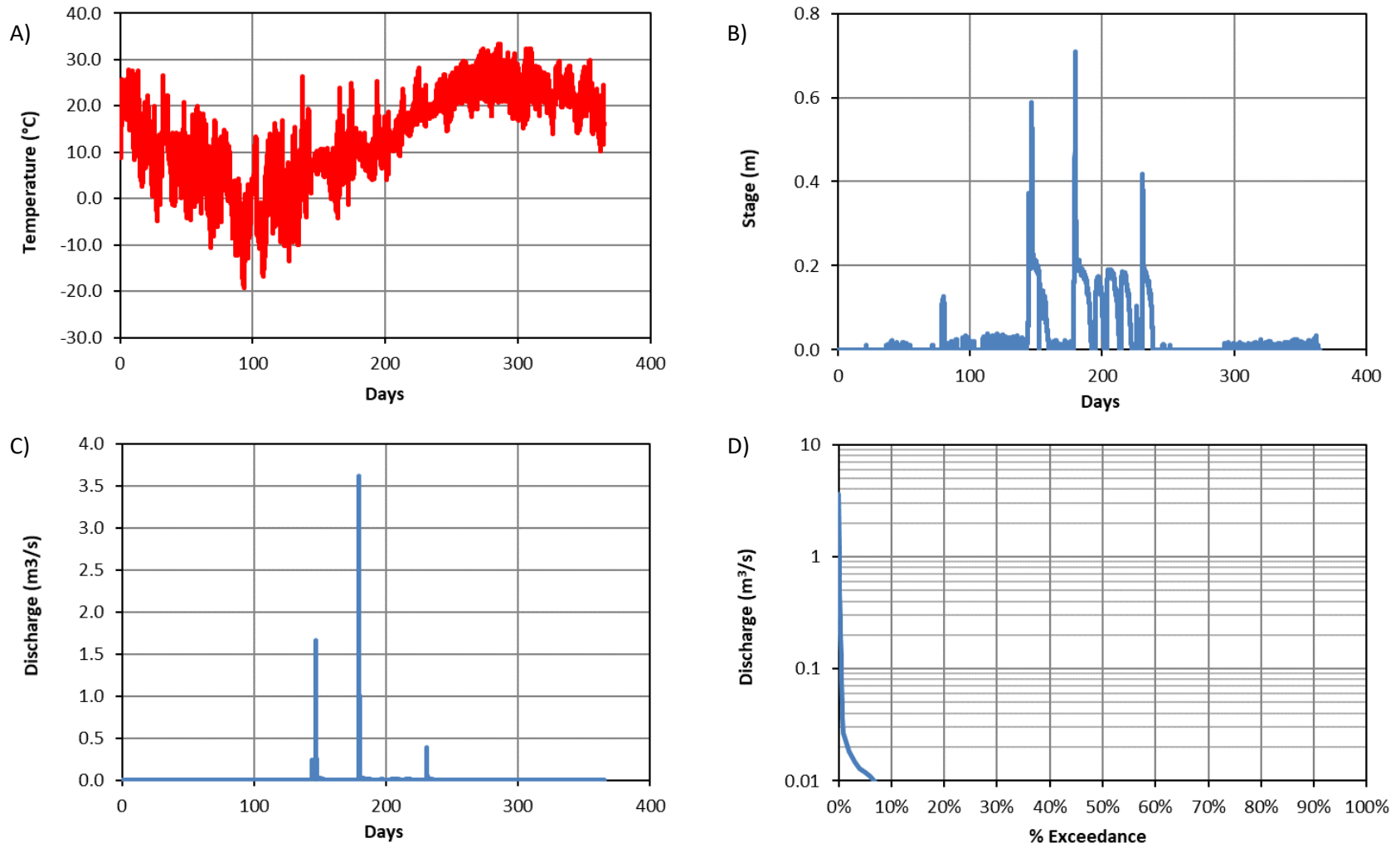


Figure 7. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Upper Big Barren.

Table 6. Daily Mean Discharge (m³/s) for WY 2018 at Upper Big Barren.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
1	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	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	0.01	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.01	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	0.08	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.01	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.31	0.00	0.01	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.11	0.00	0.01	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		0.83	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.05	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.01		0.00		0.00	0.00	
Total	0.00	0.00	0.00	0.00	0.58	0.93	0.18	0.19	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.31	0.83	0.02	0.08	0.00	0.00	0.00	0.00
Min	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 km²)

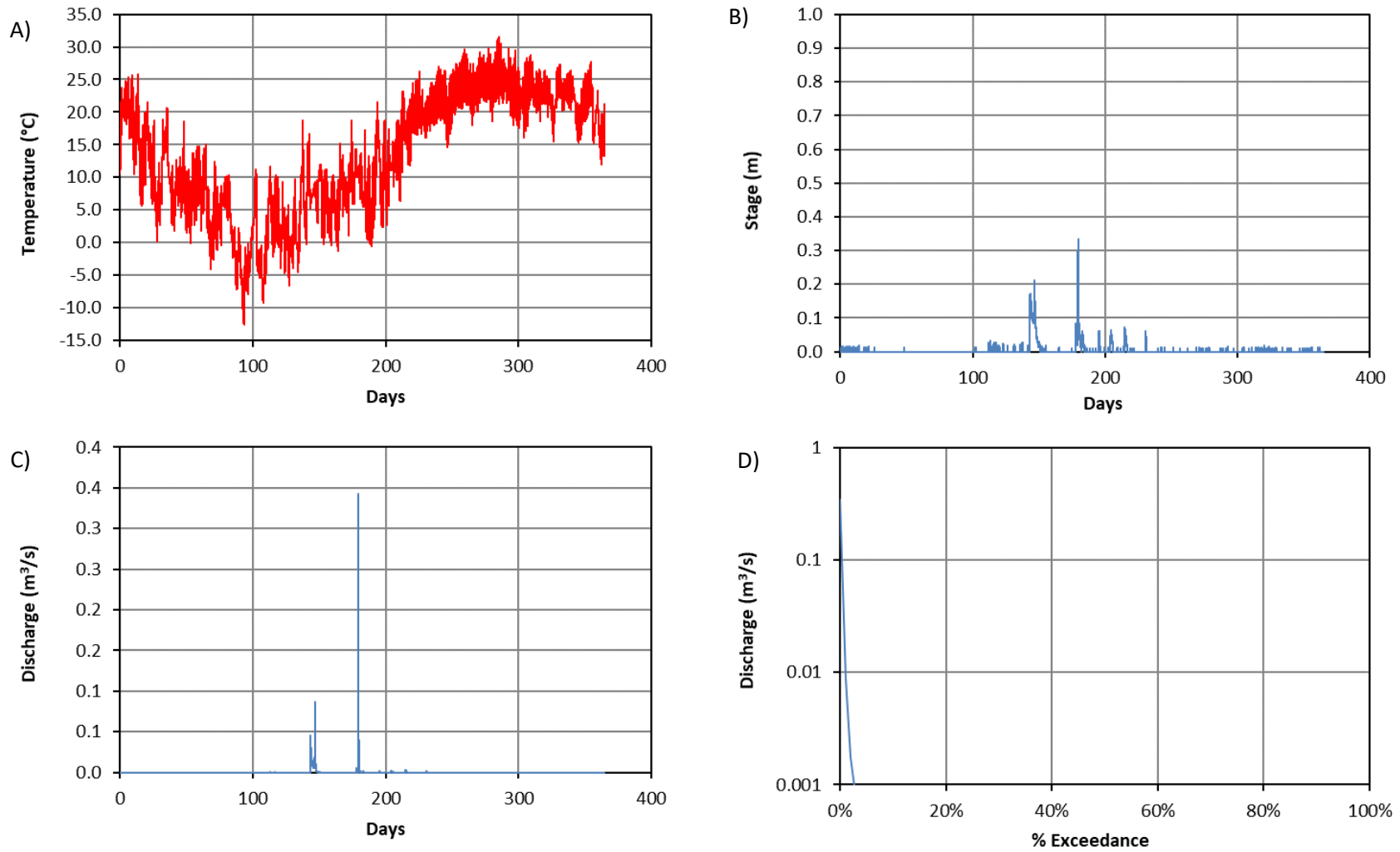


Figure 8. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Barnes Hollow.

Table 7. Daily Mean Discharge (m³/s) for WY 2018 at Barnes Hollow (BH)

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
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	0.00	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	0.00	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	0.00	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	0.02	0.00	0.00	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	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.01	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		0.07	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	
Total	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.02	0.07	0.00	0.00	0.00	0.00	0.00	0.00
Min	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 km²)

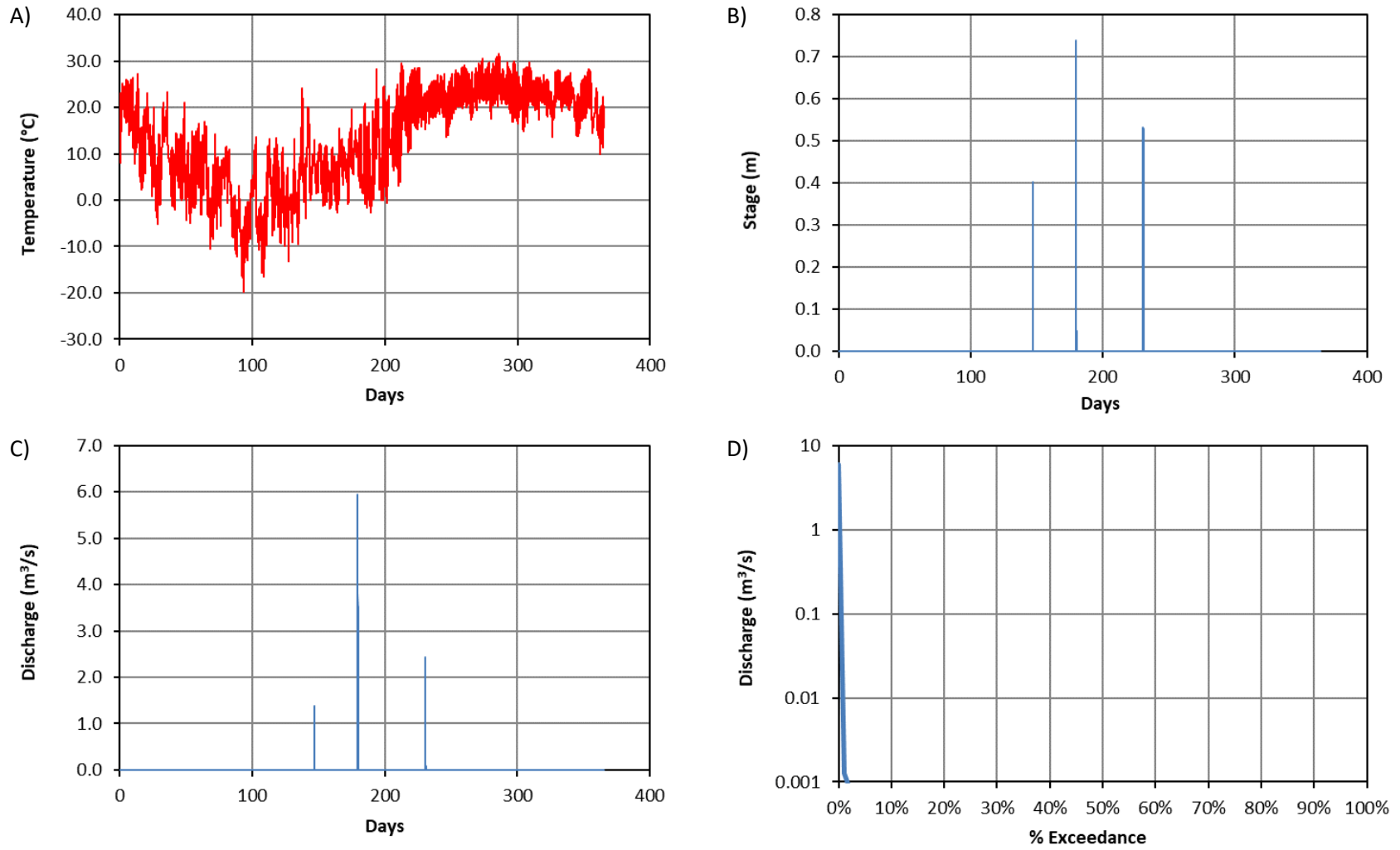


Figure 9. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at the Upper Tributary.

Table 8. Daily Mean Discharge (m³/s) for WY 2018 at Upper Tributary.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
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	0.00	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	0.00	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	0.00	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	0.21	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	0.17	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		1.05	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	
Total	0.00	0.00	0.00	0.00	0.17	1.05	0.00	0.21	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.17	1.05	0.00	0.21	0.00	0.00	0.00	0.00
Min	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 km²)

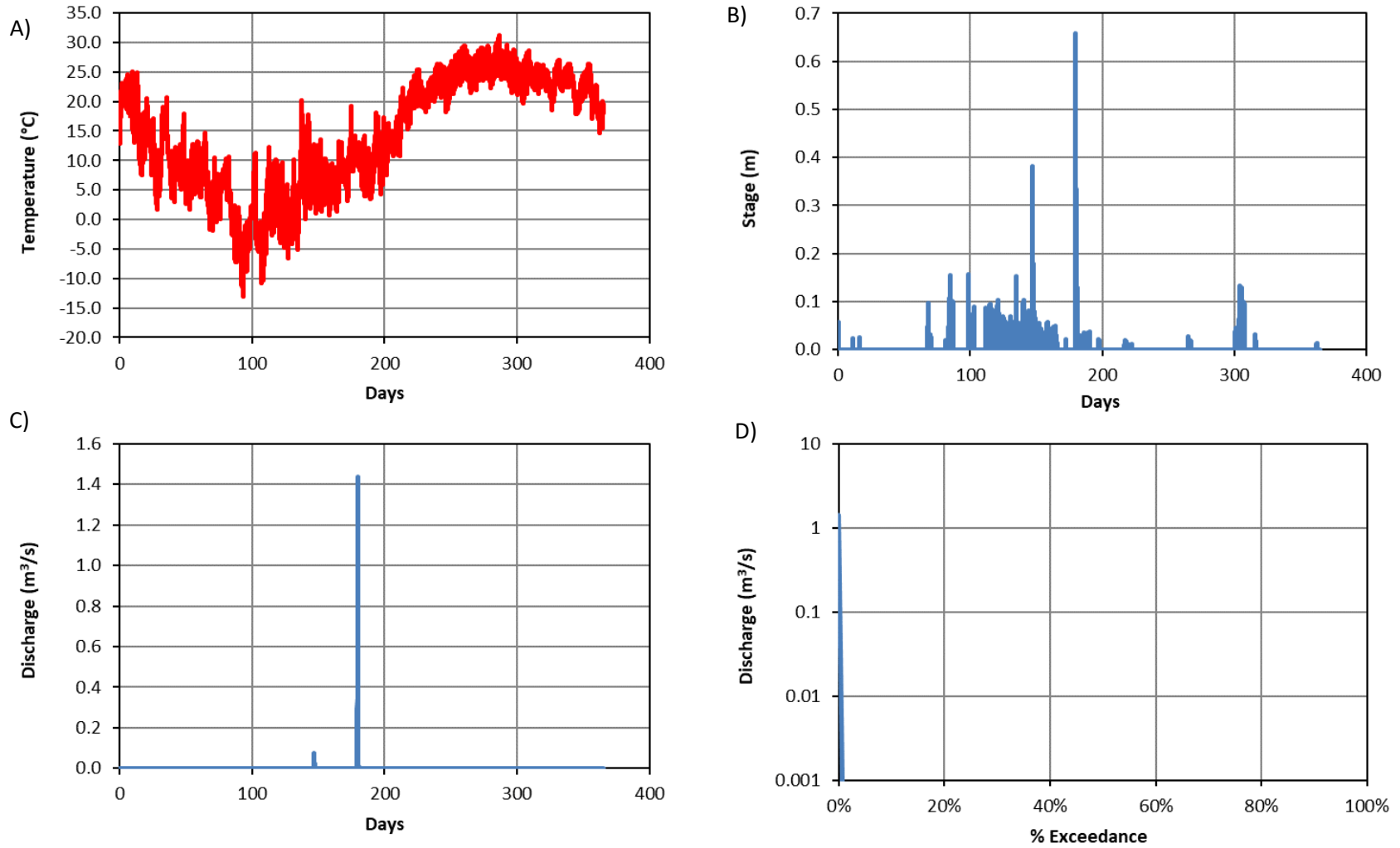


Figure 10. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at the Wolf Pond Tributary.

Table 9. Daily Mean Discharge (m³/s) for WY 2018 at Wolf Pond Tributary.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
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	0.00	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	0.00	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	0.00	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	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.01	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		0.24	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.01	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	
Total	0.00	0.00	0.00	0.00	0.02	0.24	0.00	0.00	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.01	0.24	0.00	0.00	0.00	0.00	0.00	0.00
Min	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 km²)

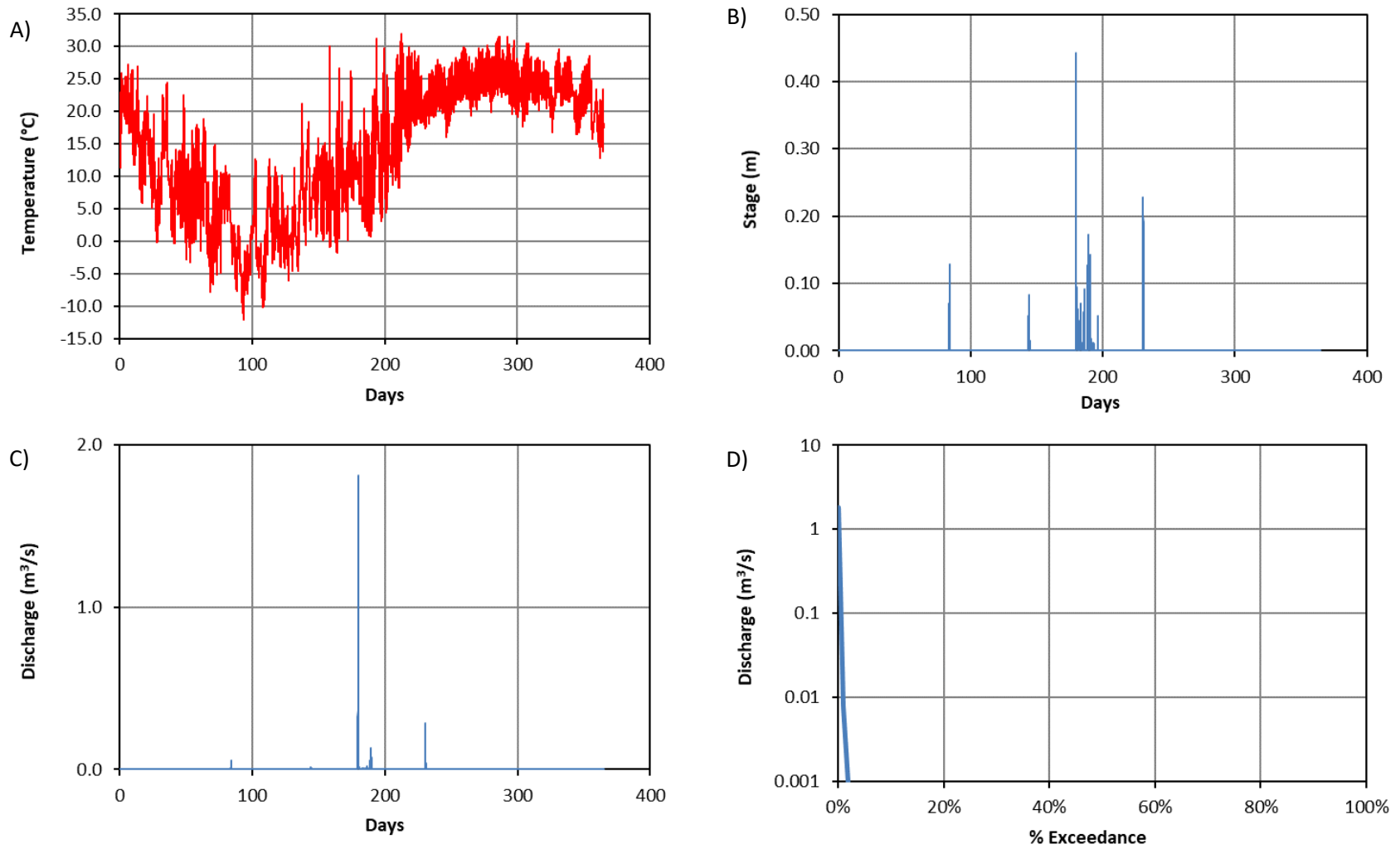


Figure 11. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Polecat Hollow.

Table 10. Daily Mean Discharge (m³/s) for WY 2018 at Polecat Hollow

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
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	0.00	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	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.01	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	0.00	0.00	0.00	0.02	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	0.01	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		0.23	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.01	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	
Total	0.00	0.00	0.01	0.00	0.01	0.24	0.05	0.02	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.01	0.00	0.00	0.23	0.03	0.02	0.00	0.00	0.00	0.00
Min	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 km²)

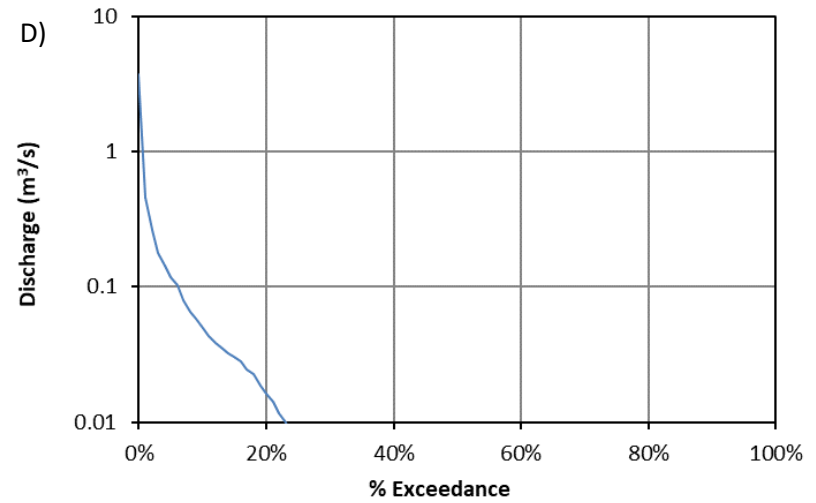
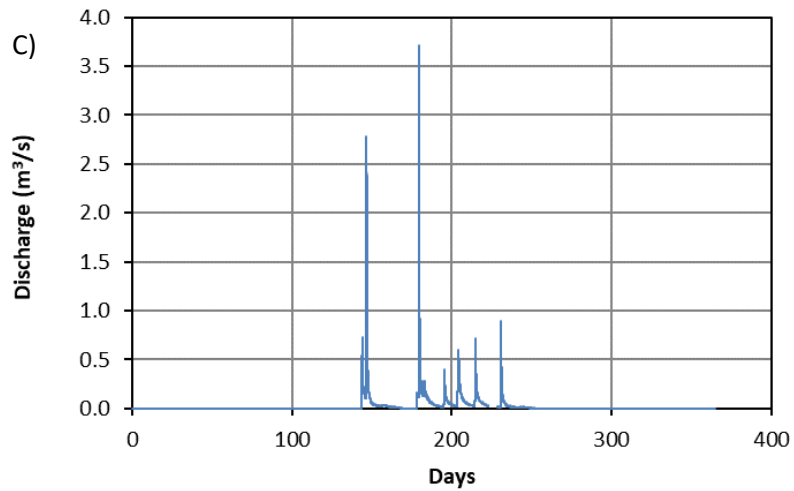
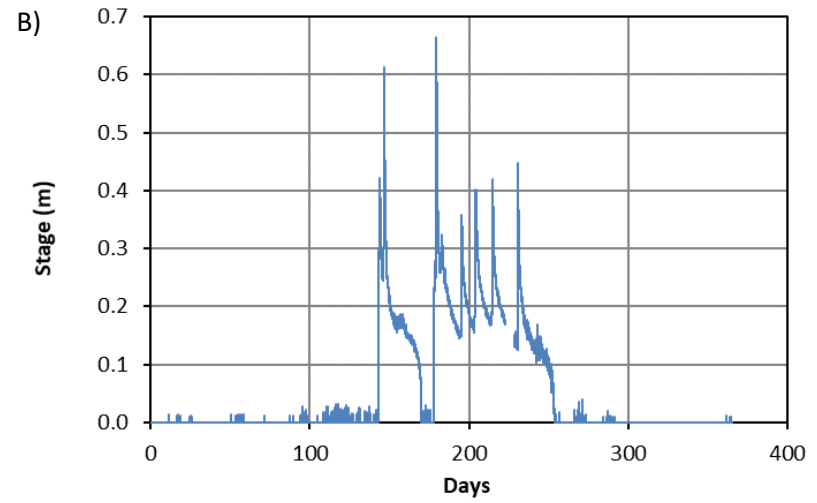
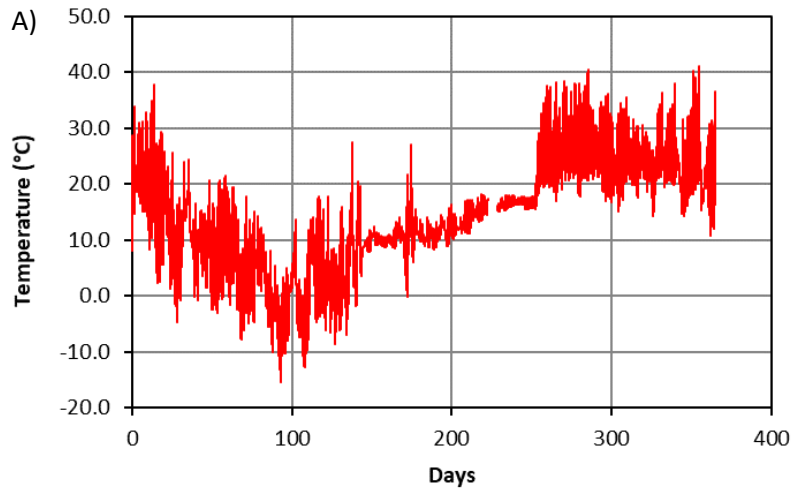


Figure 12. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at South Prong Cedar Bluff Creek.

Table 11. Daily Mean Discharge (m³/s) for WY 2018 at South Prong Cedar Bluff Creek.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
1	0.00	0.00	0.00	0.00	0.00	0.04	0.18	0.03	0.01	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.03	0.20	0.03	0.01	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.03	0.12	0.18	0.01	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.02	0.09	0.31	0.01	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.03	0.07	0.13	0.01	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.08	0.01	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.06	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.05	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.04	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.04	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.02	0.02	M	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.02	0.02	M	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.01	0.02	M	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.01	0.23	M	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.01	0.13	M	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.01	0.08	M	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.01	0.06	M	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.25	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.25	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.25	0.00	0.03	0.09	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.37	0.00	0.10	0.05	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.14	0.00	0.46	0.04	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.80	0.00	0.21	0.03	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.52	0.00	0.12	0.02	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.14	0.00	0.08	0.02	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.07	0.01	0.06	0.02	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.05	0.12	0.05	0.01	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		1.31	0.04	0.01	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.43	0.04	0.01	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.15		0.01		0.00	0.00	
Total	0.00	0.00	0.00	0.00	2.35	2.41	2.72	1.79	0.06	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.08	0.08	0.09	0.07	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.80	1.31	0.46	0.31	0.01	0.00	0.00	0.00
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00

Fools Catch (7.82 km²)

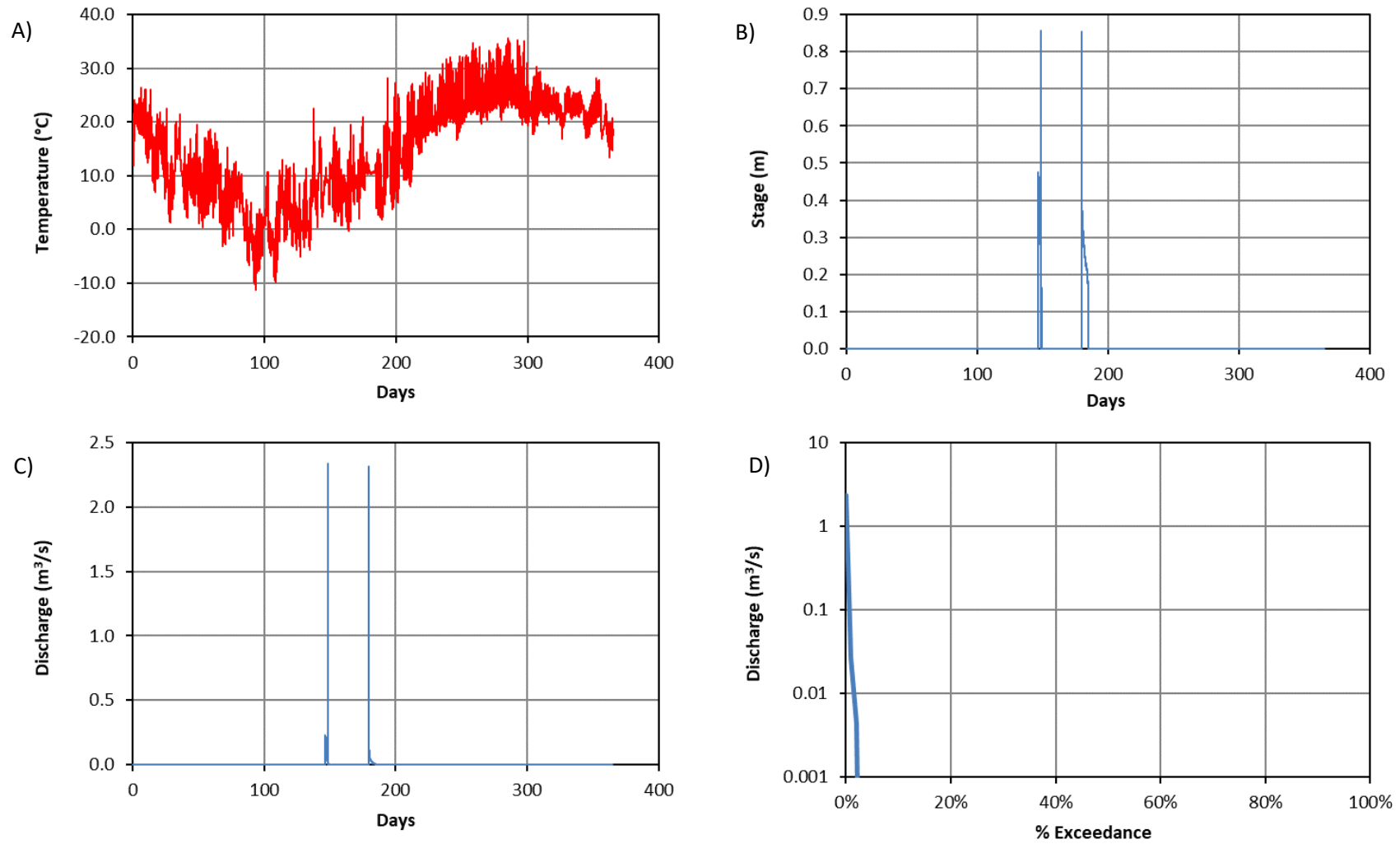


Figure 13. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Fools Catch.

Table 12. Daily Mean Discharge (m³/s) for WY 2018 at Fools Catch

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
1	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	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	0.00	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	0.00	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	0.00	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	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.03	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		0.43	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.06	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.03		0.00		0.00	0.00	
Total	0.00	0.00	0.00	0.00	0.15	0.52	0.03	0.00	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.07	0.43	0.02	0.00	0.00	0.00	0.00	0.00
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Highway J (8.82 km²)

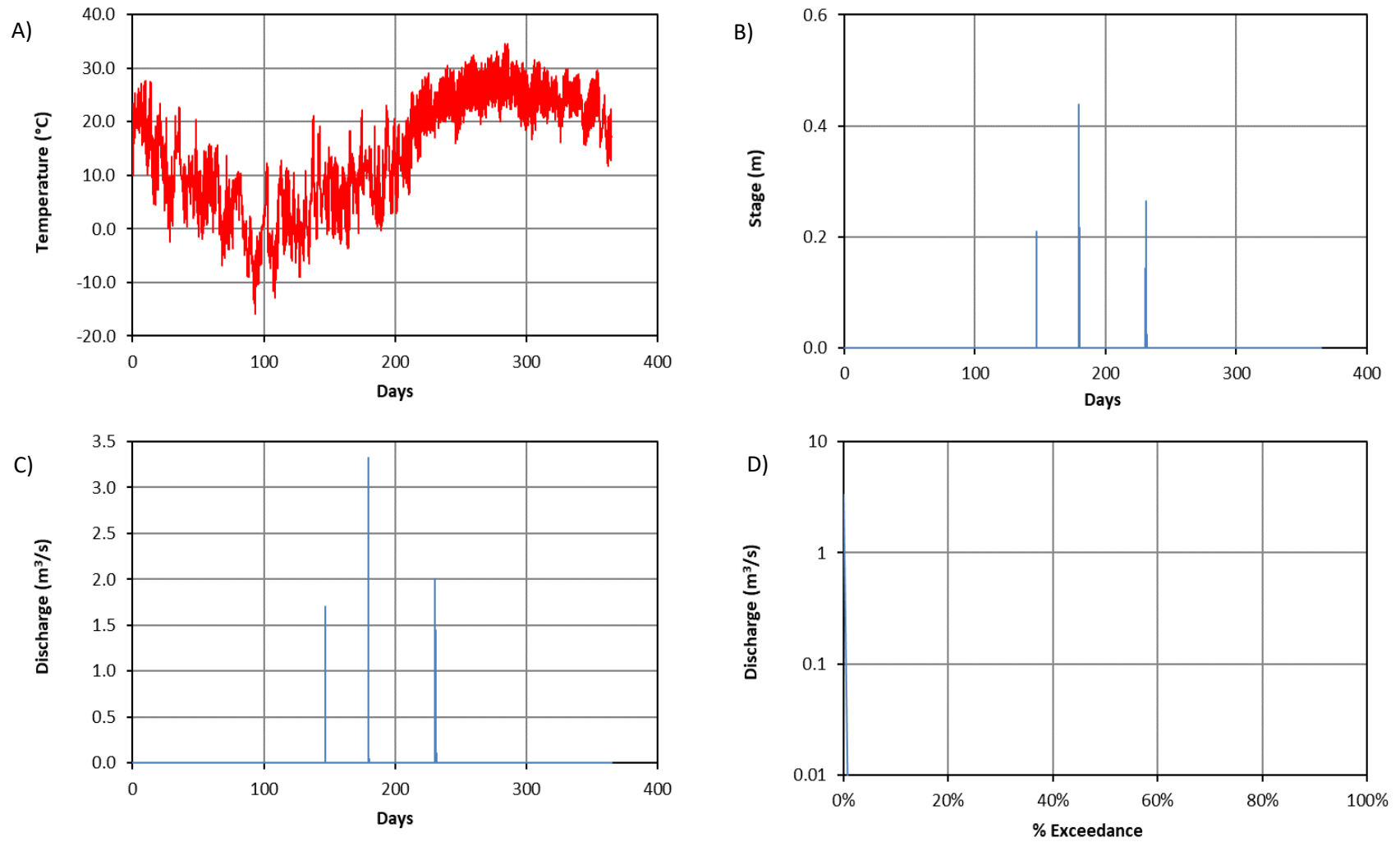


Figure 14. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Highway J.

Table 13. Daily Mean Discharge (m³/s) for WY 2018 at Highway J

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
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	0.00	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	0.00	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	0.00	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	0.37	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	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	0.24	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		0.83	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.01	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	
Total	0.00	0.00	0.00	0.00	0.25	0.83	0.00	0.44	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.24	0.83	0.00	0.37	0.00	0.00	0.00	0.00
Min	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 km²)

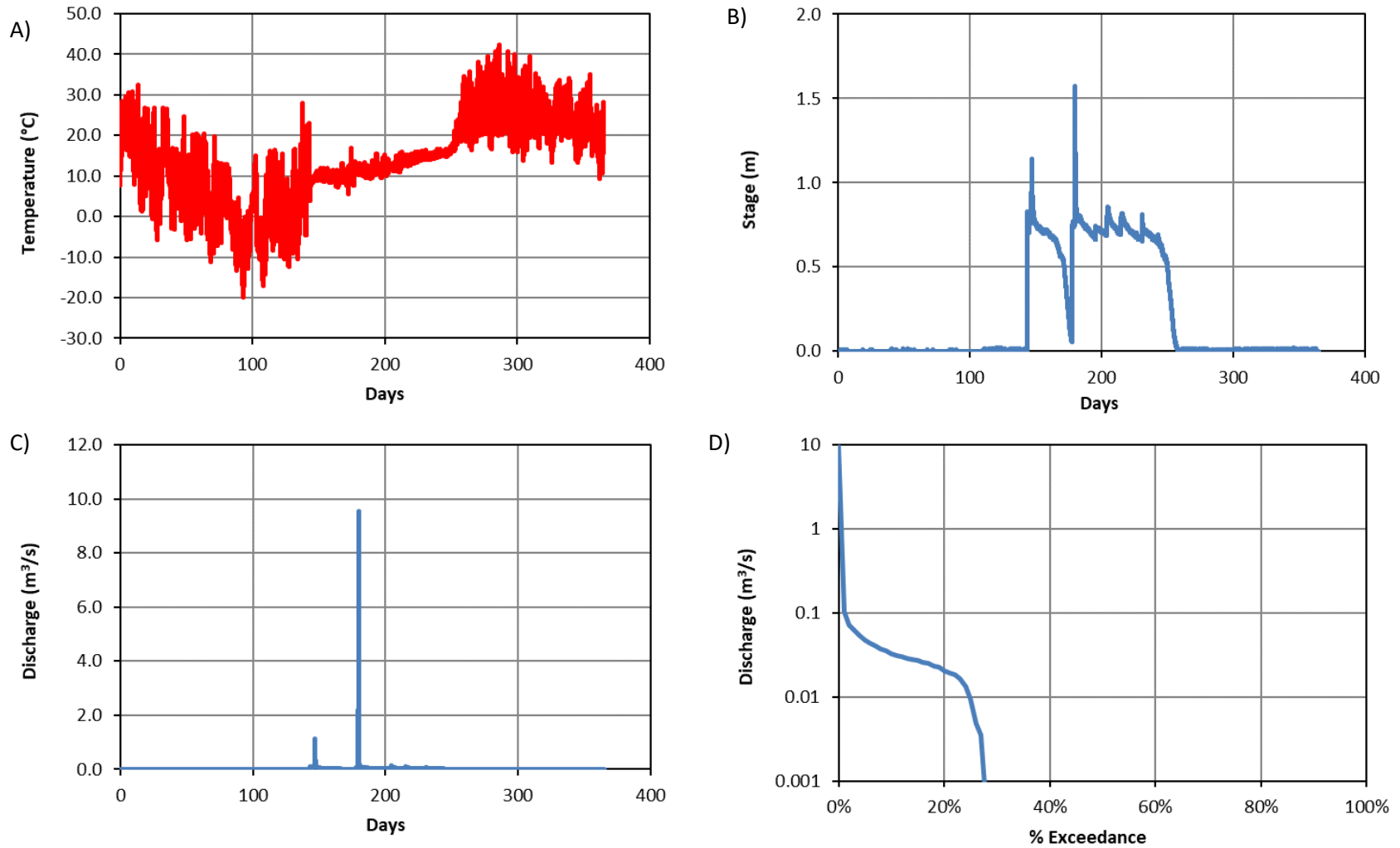


Figure 15. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Middle Big Barren.

Table 14. Daily Mean Discharge (m³/s) for WY 2018 at Middle Big Barren.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
1	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.03	0.01	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.02	0.01	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.04	0.01	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.07	0.01	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.06	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.05	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.04	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.03	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.03	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.02	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.02	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.02	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.04	0.00	0.02	0.03	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.05	0.00	0.03	0.03	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.06	0.00	0.09	0.03	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.34	0.00	0.08	0.03	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.20	0.00	0.06	0.02	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.07	0.00	0.05	0.02	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.05	0.01	0.04	0.02	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.02	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		1.98	0.04	0.02	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		0.23	0.03	0.02	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		0.07		0.01		0.00	0.00	
Total	0.00	0.00	0.00	0.00	0.85	2.76	1.19	0.90	0.05	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.03	0.09	0.04	0.03	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00	0.34	1.98	0.09	0.07	0.01	0.00	0.00	0.00
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00

Upper Natural Area (103.6 km²)

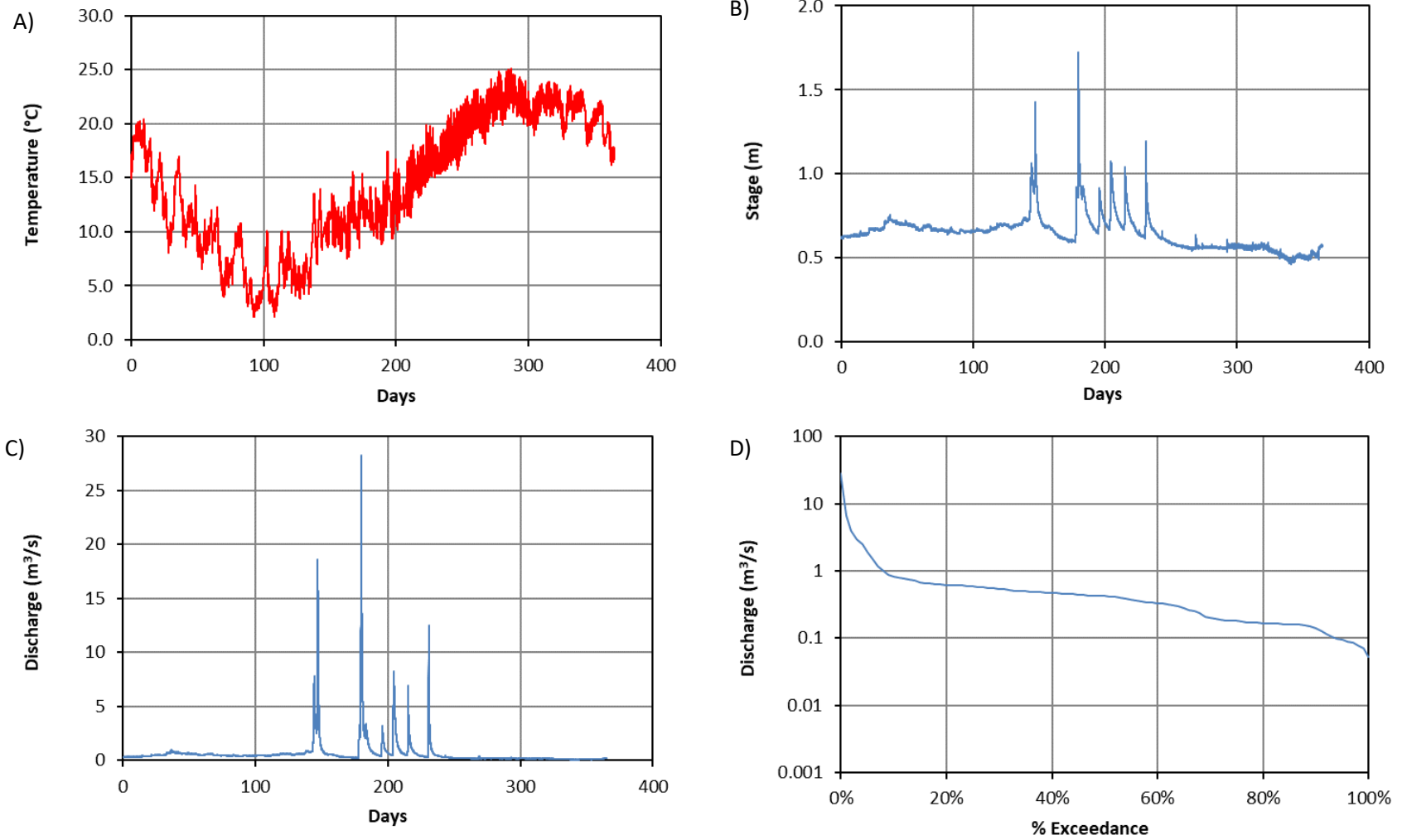


Figure 16. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Upper Natural Area.

Table 15. Daily Mean Discharge (m³/s) for WY 2018 at Upper Natural Area.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
1	0.31	0.51	0.47	0.44	0.63	0.76	2.46	0.56	0.31	0.17	0.17	0.09
2	0.31	0.57	0.56	0.42	0.62	0.65	3.03	0.51	0.28	0.17	0.17	0.09
3	0.32	0.68	0.56	0.42	0.60	0.60	2.08	1.16	0.27	0.17	0.17	0.08
4	0.33	0.70	0.57	0.42	0.59	0.53	1.38	4.56	0.26	0.17	0.17	0.07
5	0.33	0.73	0.60	0.42	0.54	0.55	1.03	2.02	0.24	0.16	0.16	0.07
6	0.33	0.85	0.58	0.42	0.51	0.56	0.87	1.27	0.23	0.17	0.16	0.07
7	0.33	0.79	0.55	0.43	0.55	0.57	0.73	0.96	0.22	0.17	0.17	0.07
8	0.34	0.75	0.47	0.44	0.56	0.53	0.64	0.79	0.21	0.17	0.18	0.07
9	0.34	0.72	0.48	0.43	0.59	0.49	0.57	0.68	0.21	0.17	0.18	0.07
10	0.34	0.72	0.48	0.44	0.61	0.46	0.51	0.62	0.20	0.17	0.17	0.08
11	0.35	0.68	0.48	0.46	0.60	0.42	0.47	0.53	0.20	0.17	0.17	0.09
12	0.34	0.65	0.46	0.47	0.62	0.38	0.44	0.44	0.19	0.16	0.17	0.10
13	0.34	0.66	0.45	0.45	0.62	0.35	0.42	0.40	0.19	0.16	0.18	0.10
14	0.34	0.62	0.46	0.44	0.63	0.33	2.08	0.37	0.19	0.16	0.18	0.09
15	0.39	0.65	0.47	0.44	0.71	0.32	1.93	0.37	0.18	0.17	0.19	0.09
16	0.36	0.64	0.47	0.43	0.81	0.31	1.14	0.34	0.18	0.16	0.18	0.09
17	0.37	0.62	0.46	0.42	0.83	0.30	0.88	0.33	0.17	0.16	0.18	0.09
18	0.37	0.66	0.44	0.43	0.78	0.28	0.75	0.31	0.17	0.16	0.16	0.08
19	0.37	0.65	0.44	0.44	0.78	0.28	0.63	3.67	0.17	0.16	0.16	0.08
20	0.38	0.62	0.41	0.45	0.84	0.27	0.56	3.15	0.17	0.17	0.17	0.09
21	0.39	0.62	0.42	0.44	3.04	0.26	0.51	1.26	0.16	0.18	0.15	0.09
22	0.47	0.60	0.44	0.50	5.95	0.25	1.05	0.81	0.16	0.18	0.14	0.11
23	0.48	0.57	0.49	0.50	3.21	0.25	6.97	0.61	0.16	0.18	0.13	0.12
24	0.48	0.59	0.43	0.51	6.64	0.25	3.79	0.52	0.16	0.18	0.14	0.11
25	0.48	0.58	0.41	0.52	8.83	0.26	2.01	0.47	0.16	0.18	0.12	0.10
26	0.48	0.52	0.41	0.51	2.32	0.25	1.38	0.43	0.18	0.18	0.12	0.11
27	0.50	0.51	0.39	0.59	1.22	0.33	1.03	0.39	0.17	0.18	0.12	0.11
28	0.48	0.48	0.38	0.60	0.93	2.76	0.84	0.35	0.16	0.18	0.11	0.16
29	0.47	0.47	0.39	0.63		13.02	0.70	0.33	0.17	0.18	0.10	0.18
30	0.47	0.48	0.46	0.61		10.10	0.62	0.30	0.16	0.18	0.10	0.19
31	0.48		0.46	0.60		3.32		0.30		0.18	0.10	
Total	12.05	18.90	14.52	14.71	45.18	39.99	41.48	28.80	5.89	5.29	4.78	2.92
Mean	0.39	0.63	0.47	0.47	1.61	1.29	1.38	0.93	0.20	0.17	0.15	0.10
Max	0.50	0.85	0.60	0.63	8.83	13.02	6.97	4.56	0.31	0.18	0.19	0.19
Min	0.31	0.47	0.38	0.42	0.51	0.25	0.42	0.30	0.16	0.16	0.10	0.07

Lower Natural Area (124.2 km²)

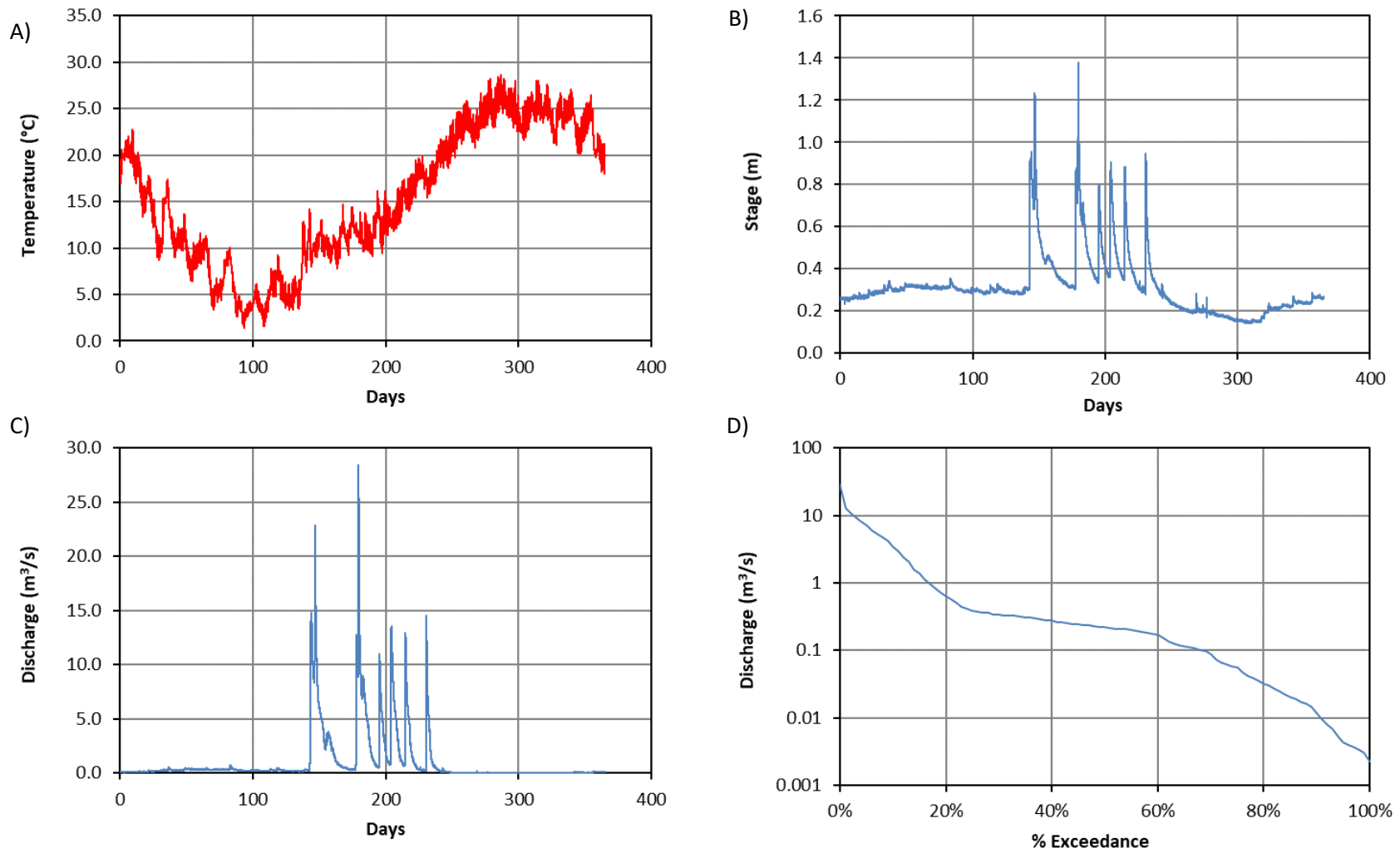


Figure 17. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Lower Natural Area.

Table 16. Daily Mean Discharge (m³/s) for WY 2018 at Lower Natural Area.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
1	0.10	0.22	0.33	0.22	0.24	5.15	7.53	0.96	0.25	0.022	0.003	0.04
2	0.10	0.21	0.33	0.21	0.21	4.56	8.33	0.72	0.16	0.027	0.003	0.04
3	0.10	0.30	0.32	0.21	0.20	3.26	6.78	3.67	0.13	0.021	0.003	0.04
4	0.10	0.24	0.32	0.22	0.21	2.49	5.47	9.88	0.10	0.020	0.003	0.04
5	0.09	0.26	0.38	0.22	0.20	2.96	4.62	6.38	0.09	0.016	0.003	0.04
6	0.09	0.40	0.31	0.21	0.19	3.46	3.48	4.90	0.08	0.015	0.003	0.04
7	0.09	0.40	0.31	0.22	0.19	3.49	2.37	3.17	0.06	0.015	0.003	0.05
8	0.10	0.30	0.29	0.26	0.18	2.86	1.65	1.92	0.06	0.016	0.004	0.10
9	0.11	0.26	0.30	0.24	0.19	2.31	1.27	1.30	0.06	0.015	0.004	0.07
10	0.11	0.25	0.32	0.23	0.20	1.98	0.99	0.98	0.05	0.013	0.003	0.06
11	0.12	0.24	0.32	0.26	0.21	1.56	0.77	0.69	0.04	0.012	0.003	0.07
12	0.12	0.25	0.35	0.25	0.18	1.17	0.64	0.49	0.04	0.011	0.003	0.06
13	0.12	0.24	0.31	0.23	0.17	0.94	0.58	0.36	0.04	0.010	0.003	0.07
14	0.11	0.24	0.30	0.22	0.17	0.78	7.70	0.29	0.03	0.009	0.004	0.06
15	0.15	0.28	0.30	0.21	0.18	0.71	6.97	0.32	0.03	0.010	0.007	0.06
16	0.12	0.27	0.30	0.19	0.24	0.65	5.10	0.23	0.03	0.009	0.007	0.06
17	0.12	0.26	0.33	0.18	0.28	0.58	3.75	0.24	0.03	0.008	0.014	0.06
18	0.12	0.34	0.31	0.19	0.29	0.48	2.52	0.23	0.02	0.008	0.016	0.06
19	0.13	0.41	0.30	0.20	0.26	0.51	1.60	5.21	0.02	0.007	0.017	0.06
20	0.12	0.37	0.32	0.20	0.34	0.46	1.17	7.99	0.02	0.007	0.038	0.06
21	0.13	0.38	0.32	0.20	12.00	0.39	0.89	5.12	0.02	0.007	0.034	0.06
22	0.20	0.38	0.37	0.31	12.75	0.35	3.12	2.83	0.02	0.006	0.027	0.12
23	0.18	0.38	0.58	0.29	9.38	0.33	12.28	1.35	0.02	0.006	0.026	0.12
24	0.17	0.38	0.43	0.26	13.04	0.35	9.09	0.83	0.02	0.005	0.030	0.12
25	0.17	0.38	0.34	0.24	13.86	0.34	6.61	0.65	0.02	0.004	0.030	0.11
26	0.17	0.37	0.32	0.22	8.75	0.31	5.33	0.50	0.04	0.004	0.028	0.12
27	0.21	0.35	0.27	0.36	6.61	3.46	4.19	0.39	0.04	0.004	0.027	0.12
28	0.19	0.36	0.25	0.36	5.73	10.98	2.68	0.29	0.02	0.004	0.029	0.12
29	0.21	0.34	0.25	0.31		17.62	1.73	0.23	0.02	0.004	0.032	0.11
30	0.20	0.35	0.26	0.27		12.70	1.25	0.18	0.02	0.004	0.037	0.11
31	0.20		0.25	0.25		7.84		0.17		0.004	0.043	
Total	4.24	9.41	10.03	7.44	86.46	95.04	120.48	62.47	1.57	0.325	0.491	2.23
Mean	0.14	0.31	0.32	0.24	3.09	3.07	4.02	2.02	0.05	0.010	0.016	0.07
Max	0.21	0.41	0.58	0.36	13.86	17.62	12.28	9.88	0.25	0.027	0.043	0.12
Min	0.09	0.21	0.25	0.18	0.17	0.31	0.58	0.17	0.02	0.004	0.003	0.04

Lower Big Barren Creek (183.1 km²)

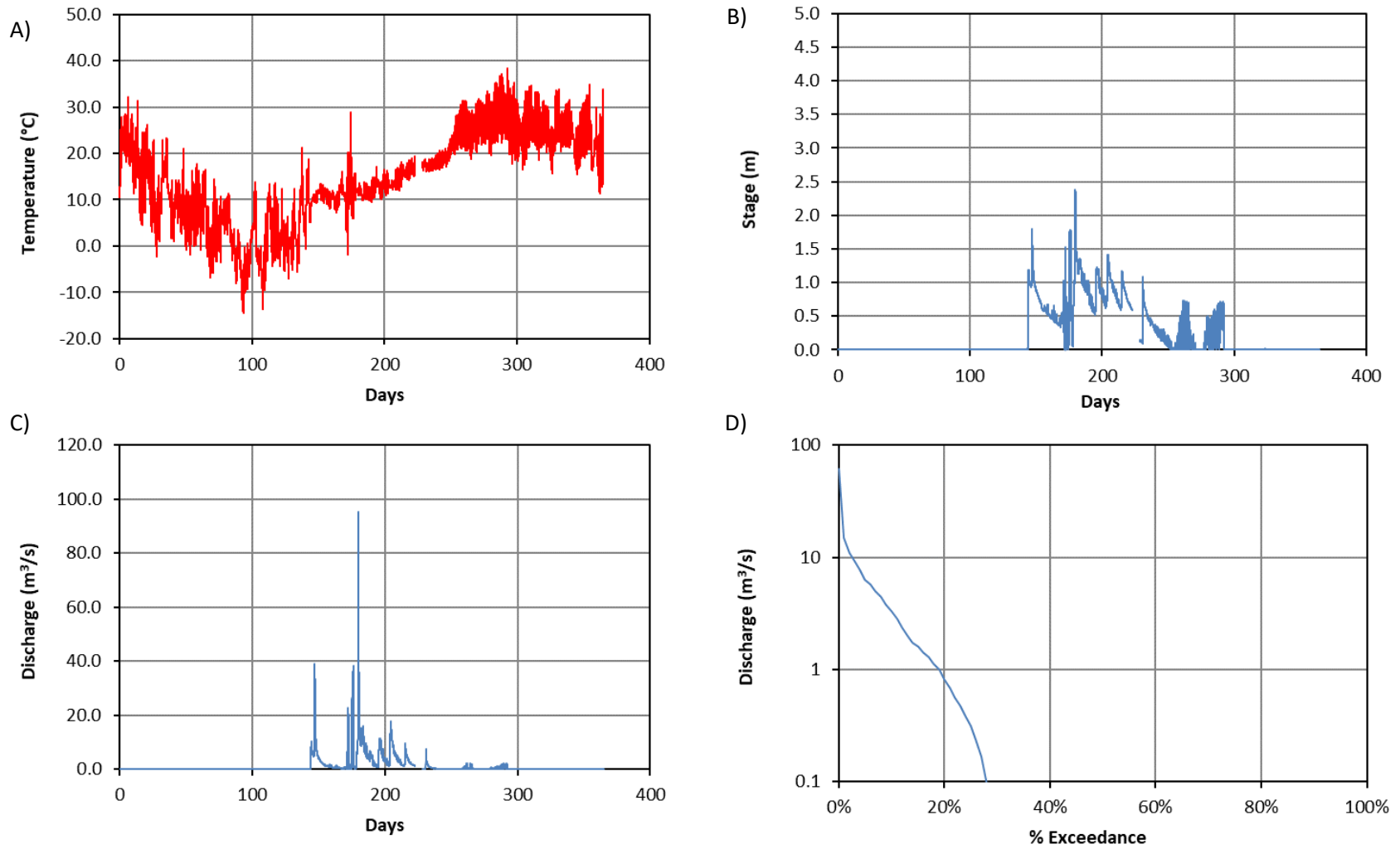


Figure 18. WY2018 A) temperature, B) stage, C) discharge, and D) flow duration curve collected from gaging station at Lower Big Barren.

Table 17. Daily Mean Discharge (m³/s) for WY 2018 at Lower Big Barren Creek.

Day	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
1	0.00	0.00	0.00	0.00	0.00	2.96	10.13	1.82	0.06	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	2.33	13.81	1.39	0.04	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	1.93	8.58	1.82	0.02	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	1.35	7.19	7.92	0.04	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	1.08	6.16	5.05	0.02	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	1.16	4.62	3.75	0.01	0.02	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	1.07	4.86	2.83	0.01	0.24	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	1.05	5.08	2.21	0.01	0.29	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.96	3.21	1.77	0.00	0.16	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.63	2.27	1.47	0.00	0.17	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.54	1.74	M	0.00	0.25	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.65	1.21	M	0.00	0.41	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.71	1.03	M	0.00	0.50	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.50	6.66	M	0.00	0.45	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.42	10.01	M	0.01	0.88	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.29	7.54	M	0.04	0.89	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.24	5.09	M	0.10	1.01	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.37	3.47	0.01	0.14	1.24	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.63	3.19	1.83	0.32	1.05	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.59	2.52	3.07	0.43	0.72	0.00	0.00
21	0.00	0.00	0.00	0.00	0.82	4.04	1.93	1.48	0.17	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	7.90	0.84	2.61	0.96	0.53	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	5.72	0.65	15.02	0.64	0.57	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	10.75	1.44	10.54	0.46	0.14	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	17.73	18.04	7.50	0.40	0.03	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	7.02	13.14	5.65	0.38	0.01	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	4.72	0.02	4.55	0.26	0.02	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	3.71	4.18	3.71	0.16	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00		38.11	3.11	0.14	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00		24.91	2.47	0.10	0.00	0.00	0.00	0.00
31	0.00		0.00	0.00		11.20		0.08			0.00	
Total	0.00	0.00	0.00	0.00	58.39	136.02	165.46	39.99	2.72	8.27	0.00	0.00
Mean	0.00	0.00	0.00	0.00	2.09	4.39	5.52	1.67	0.09	0.28	0.00	0.00
Max	0.00	0.00	0.00	0.00	17.73	38.11	15.02	7.92	0.57	1.24	0.00	0.00
Min	0.00	0.00	0.00	0.00	0.00	0.02	1.03	0.01	0.00	0.00	0.00	0.00