

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

# Rainfall Monitoring in the Big Barren Creek Watershed, Mark Twain National Forest, Southeast Missouri

## Water Years 2018-2021

### FINAL SUMMARY REPORT

**Prepared by:**

Marc R. Owen, M.S., Assistant Director, OEWRI  
Shoukat Ahmed, Graduate Assistant, OEWRI  
Elande' Engelbrecht, Graduate Assistant, OEWRI  
Robert T. Pavlowsky, Ph.D., Director, OEWRI

**Assisted in the field by:**

Joe Nash, Katy Reminga, Triston Rice, and Josh Hess

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

**November 12, 2021**



**OEWRi EDR-21-004.1**

## TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
LIST OF TABLES.....	2
LIST OF FIGURES.....	2
LIST OF PHOTOS.....	2
SUMMARY.....	3
References.....	4
TABLES.....	5
FIGURES.....	7
RAINFALL MONITORING STATION INFORMATION.....	10
Upper Rain Gage.....	10
Middle Rain Gage.....	11
Lower Rain Gage.....	12
DAILY RAINFALL TOTALS FOR WATER YEARS 2018, 2019, 2020, AND 2021.....	13

### LIST OF TABLES

Table 1. Rainfall monitoring station locations in the Big Barren Creek watershed.....	5
Table 2. Comparison of rainfall totals between gages.....	5
Table 3. Daily precipitation total comparison for water year 2018 (206 days count).....	5
Table 4. Annual precipitation totals comparison water years 2019 and 2020.....	6
Table 5. Frequency analysis for daily rainfall total WY 2018-2021.....	6
Table 6. Daily rainfall totals for WY2018.....	13
Table 7. Daily rainfall totals for WY2019.....	14
Table 8. Daily rainfall totals for WY2020.....	15
Table 8. Daily rainfall totals for WY2021.....	16

### LIST OF FIGURES

Figure 1. Location and land use of the Big Barren Creek watershed.....	7
Figure 2. Rainfall monitoring stations with hydrological gaging stations and burn history.....	8
Figure 3. Rainfall summary for 1,302 days of monitoring with A) percent wet and dry days by month, B) days with >2.5 cm of rainfall, and C) days with >5.0 cm of rainfall.....	9

### LIST OF PHOTOS

Photo 1. Rainfall monitoring site URG (March 8, 2018).....	10
Photo 2. Rainfall monitoring site MRG (March 8, 2018).....	11
Photo 3. Rainfall monitoring site LRG (March 8, 2018).....	12

## SUMMARY

This report summarizes the 2018-2021 Water Year (WY) rainfall results for the three stations that were installed to monitor the Big Barren Creek watershed in 2018. The “Water Year” runs each year from October 1st to September 30th. 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). There were three rainfall gages installed in the upper, middle, and lower watershed on March 8, 2018 (Table 1, Figure 2). Rainfall data was recorded using Onset Hobo RG3-M Rain Gauge Data Loggers mounted on fence posts at three locations throughout the watershed (Photos 1-3). These gages are tipping bucket style instruments and can measure rainfall in 0.2 mm increments. Raw data was downloaded approximately every 10 weeks using the Hobo Waterproof Shuttle. Daily rainfall totals collected for this project will be presented in annual water year (WY) tables in the back of this report.

Rainfall variability in the watershed was assessed three different ways. First, variability was assessed between the three gages located within the watershed by comparing monthly totals in April and May 2018. Due to problems with the gage instruments, all three gages were not always in operation. Second, daily totals from an average of the three gages was compared to two alternative data sources for Water Year 2018. One alternative source was to use six nearby gages to calculate the inverse distance weighted (IDW) average for the watershed (Pavlovsky et al, 2016). The other method was to use data gathered by Parameter-elevation Regressions on Independent Slopes Model (PRISM) data from Oregon State University (Daly et al., 2008). The latitude and longitude of the geographic center of the Big Barren Creek watershed was used to retrieve daily rainfall totals for water years 2018-2021 (PRISM, 2021). Finally, annual totals were compared to the two alternative sources for Water Years 2019 and 2020.

Rainfall variability for sites within the watershed varied less than 10% among sites suggesting relatively low rainfall variability across the watershed. Between April 1, 2018 and May 31, 2018 total rainfall ranged from 26.0 cm at the MRG and 30.4 cm at the URG with an average of 28.2 for all three sites (Table 2). Rainfall variability across the watershed was assessed using coefficient of variation percentage (cv%). The cv% for the rainfall totals over April and May 2018 among sites was 7.8%. This relatively low variability associated with rainfall across the watershed is therefore unlikely to overly influence measured runoff characteristics among sub-watersheds. Furthermore, when there are malfunctions with the instrumentation this analysis also suggests rainfall totals generated by the remaining working gages are suitable for analysis.

Average daily rainfall total and annual rainfall total variability among available sources also varied less than 10%, but there can be high variability in individual daily rainfall totals. To evaluate these different sources, percent exceedance was calculated from daily rainfall totals available for WY2018 (206 days). From all sources there were no daily rainfall totals for 50% of the period (daily totals = 0.00 cm) (Table 3). For exceedance values of 30%-50%, cv% ranged from 50% to nearly 200%, but this is expected with very low values (<0.2 cm). For the 10-20% exceedances, variability was much lower with cv% ranging from 11.2%-20.5%. Maximum daily rainfall totals from each source ranged from 3.81-6.02 cm with a cv% of 23.1%. These data show there is relatively high daily rainfall total variability among the three data sources for small events <1 cm. Conversely, variability is much lower for rainfall totals >1 cm. Further, average daily rainfall totals for the evaluation period from the three sources had a cv% of 7.8%. Finally, total annual rainfall from the tree sources had cv% values of 7%-8% for WY2019 and WY2020 (Table 4). These results suggest local variability during isolated storms, but overall these different sources compare well to each other over time.

For the entire 1,302 days of rainfall monitoring in the watershed, the wettest months were in the spring both by the number of rainfall days and the number of higher intensity rainfall events. Generally, the highest percentage of rainfall days occurred during the late winter-spring with the wettest month being May (65.6%). The lowest percentage of rainfall days occurred during late summer in September (22.2%) (Figure 3A). Days of rainfall >2.5 cm occurred 8 times in both April and May, 9 times in March, 10 times in October, and 11 times in August (Figure 3B). Also, days of rainfall >5.0 cm occurred two times in October, January, March, and May (Figure 3C). These data are somewhat skewed because an entire 365 days was not monitored in WY2018, but the trends still show the spring as the wettest months with the highest rainfall intensities throughout the year.

## References

Daly, C., M. Halbleib, J.I. Smith, W.P. Gibson, M.K. Doggett, G.H. Taylor, J. Cutis, and P.P. Pasteris (2008) Physiographically sensitive mapping of climatological temperature and precipitation across the conterminous United States. *International Journal of Climatology*, Published online in Wiley InterScience DOI: 1.1002/joc.1688. Royal Meteorological Society.

Pavlovsky, 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.

PRISM (2021) Rainfall Totals Extracted via Data Explorer. PRISM Climate Group, Oregon State University, <http://prism.oregonstate.edu>, created 4/22/2021.

## TABLES

Table 1. Rainfall monitoring station locations in the Big Barren Creek watershed.

Site Name	ID	Northing (m) NAD83,UTM15N	Easting (m) NAD83,UTM15N	Elevation (m)	Start Record	End Record
Upper Rain Gage	URG	4,078,409.778	660,543.946	308.96	3/8/2018	9/30/2021
Middle Rain Gage	MRG	4,078,952.150	668,718.378	192.69	3/8/2018	9/30/2021
Lower Rain Gage	LRG	4,074,255.916	681,056.034	127.44	3/8/2018	9/30/2020

Table 2. Comparison of rainfall totals between gages.

Gage	Start	End	Total (cm)
Upper	4/1/2018	5/31/2018	30.4
Middle	4/1/2018	5/31/2018	26.0
Lower	4/1/2018	5/31/2018	28.1
		Mean	28.2
		Stdev	2.2
		cv%	7.8

Table 3. Daily precipitation total comparison for water year 2018 (206 days count)

Percent Exceedance	Rainfall (cm)					
	Gages	PRISM	IDW	Mean	Stdev	CV%
100%	0.00	0.00	0.00	0.00	0.00	NA
90%	0.00	0.00	0.00	0.00	0.00	NA
80%	0.00	0.00	0.00	0.00	0.00	NA
70%	0.00	0.00	0.00	0.00	0.00	NA
60%	0.00	0.00	0.00	0.00	0.00	NA
50%	0.00	0.00	0.01	0.00	0.00	173.2
40%	0.00	0.03	0.06	0.03	0.03	104.5
30%	0.07	0.11	0.20	0.13	0.07	51.3
20%	0.36	0.55	0.51	0.47	0.10	20.5
10%	1.18	1.43	1.19	1.27	0.14	11.2
Max	6.02	3.81	4.64	4.82	1.12	23.1
Average	0.39	0.33	0.35	0.36	0.03	7.8

Table 4. Annual precipitation totals comparison water years 2019 and 2020.

Water Year	Rainfall (cm)					
	Gages	PRISM	IDW	Mean	Stdev	CV%
2019	133.1	141.3	155.3	143.2	11.2	7.8
2020	186.3	162.1	163.5	170.6	13.6	8.0
Average	159.7	151.7	159.4	156.9	12.4	7.9

Table 5. Frequency analysis for daily rainfall total WY 2018-2021.

Rainfall Range (cm)	WY				Total
	2018	2019	2020	2021	
0.00	125	205	227	242	799
0.01-0.049	14	39	21	19	93
0.05-0.49	34	60	33	45	172
0.5-1.29	15	27	31	27	100
1.3-2.49	6	14	24	17	61
2.5-4.99	9	19	25	11	63
5.0-7.49	3	1	5	4	13
>7.5	0	0	0	0	0
Total Days	206	365	366	365	1,302

## FIGURES

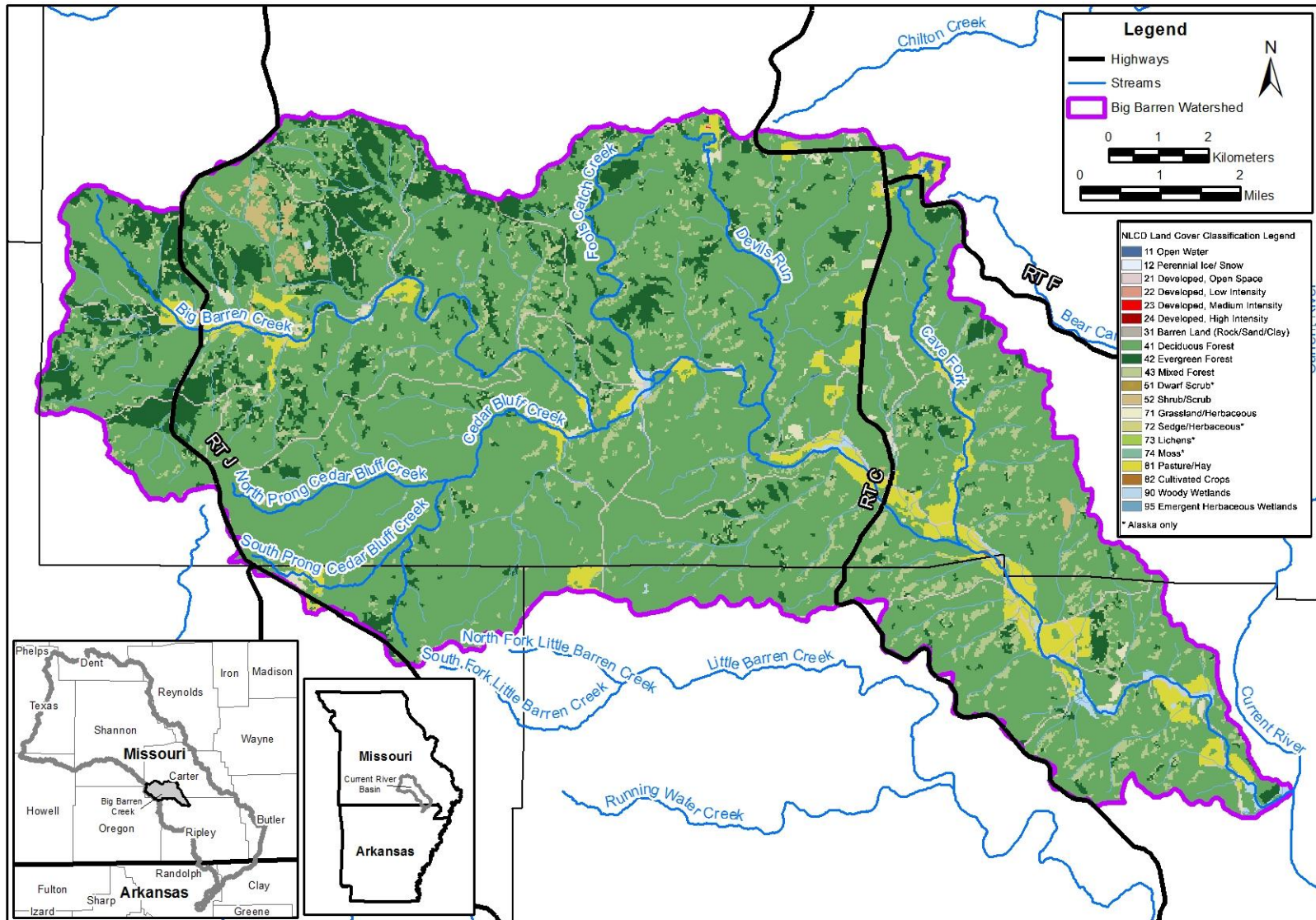


Figure 1. Location and land use of the Big Barren Creek watershed.

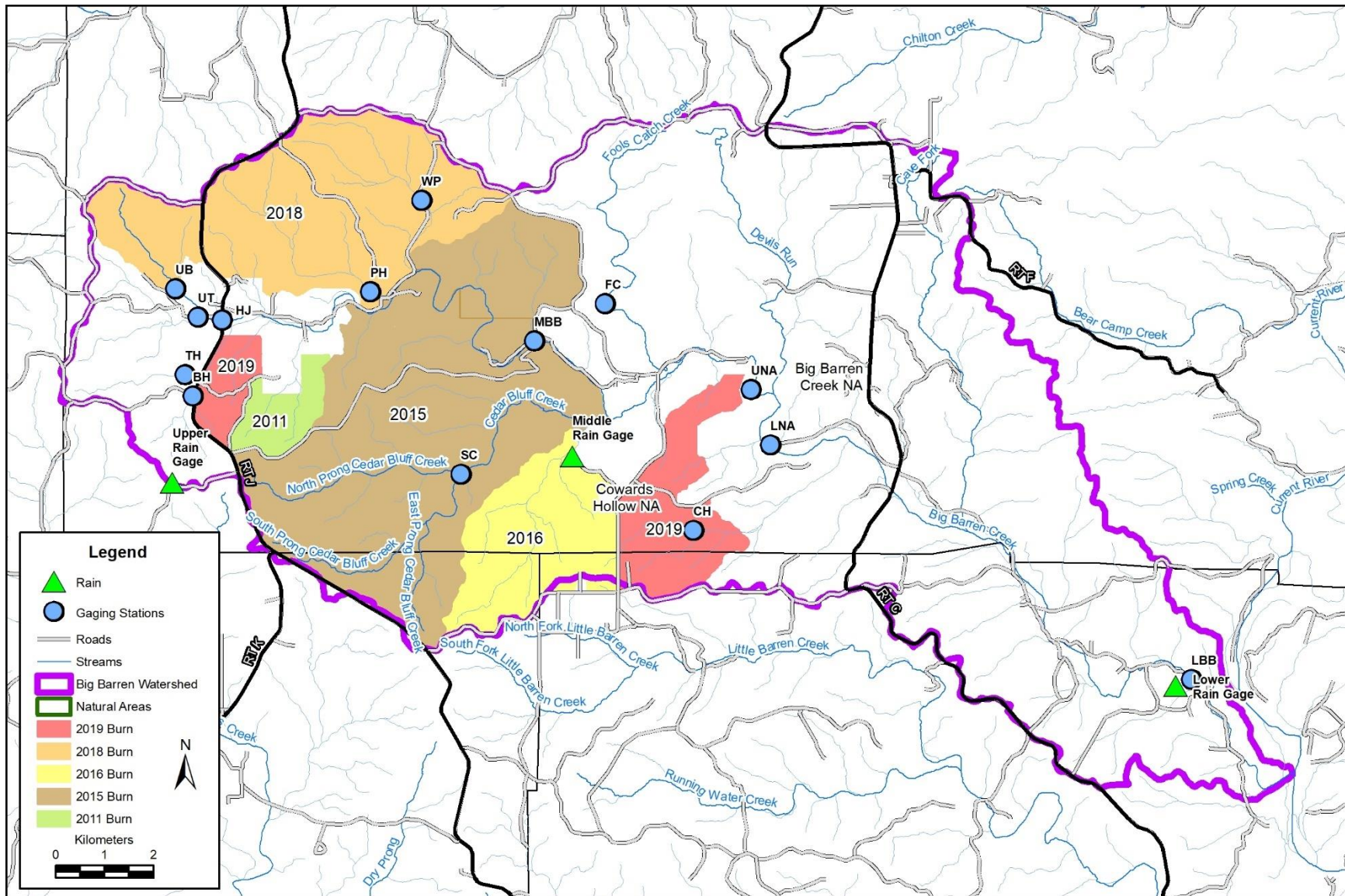


Figure 2. Rainfall monitoring stations with hydrological gaging stations and burn history.



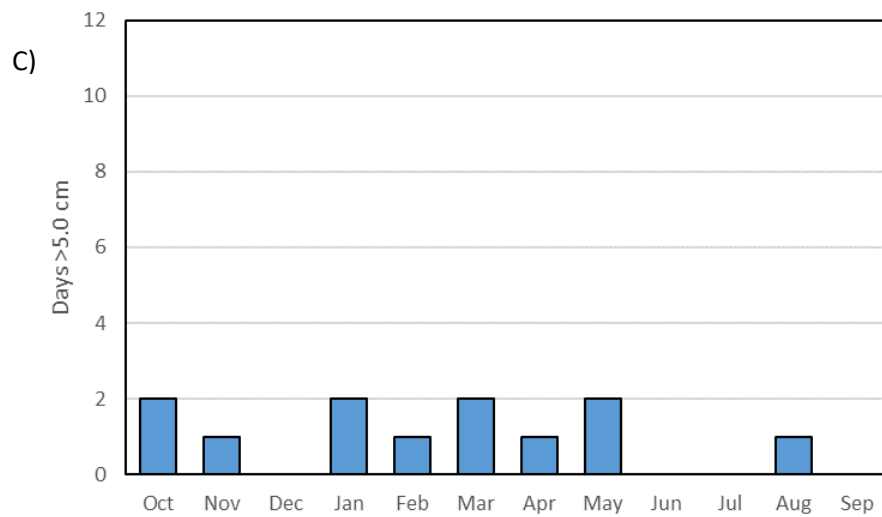
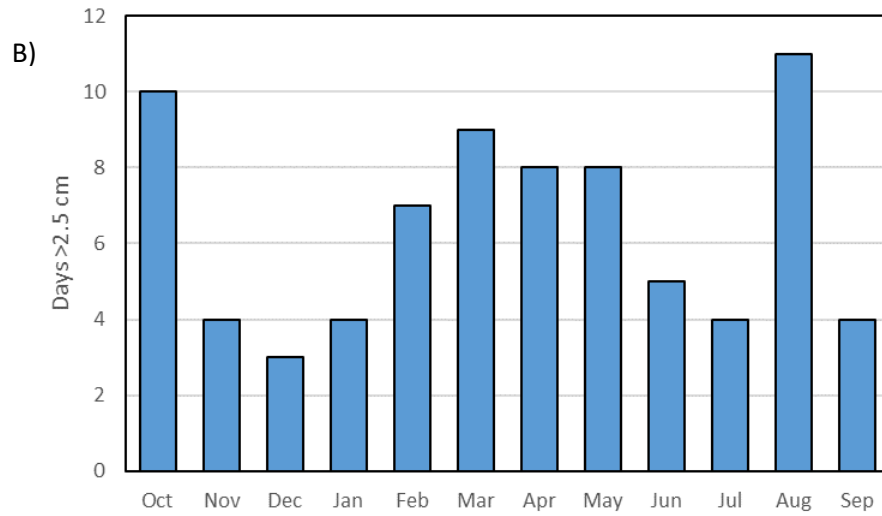
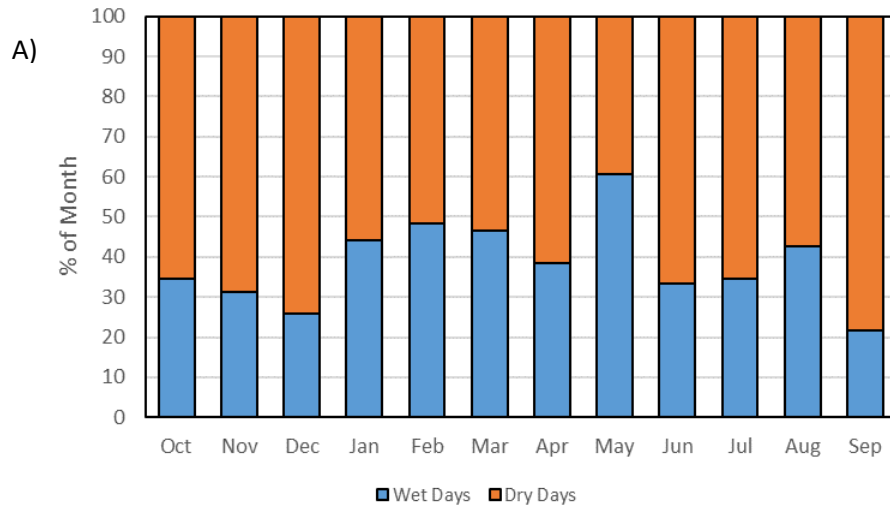


Figure 3. Rainfall summary for 1,302 days of monitoring with A) percent wet and dry days by month, B) days with >2.5 cm of rainfall, and C) days with >5.0 cm of rainfall.

## RAINFALL MONITORING STATION INFORMATION

### Upper Rain Gage

Site Name:	Upper Rain Gage
Site ID:	URG
Date Installed:	3/8/2018
Location Description:	The Upper Rain Gage is located on Forest Service property near the Sinking Creek Trailhead along Forest Service Road 3152. There is a cabin and maintained yard on the north side of the road across from a fire tower. The rain gage is attached to the top of a fence post in the northeast corner of the property approximately 40 m from the cabin.



Photo 1. Rainfall monitoring site URG (March 8, 2018).

## Middle Rain Gage

Site Name:	Middle Rain gage
Site ID:	MRG
Date Installed:	3/8/2018
Location Description:	The Middle Rain Gage is located on Nature Conservancy property off of Carter County Road 170. The road dead ends into the entrance gate. The rain gage is attached to the top of a fence post 25 m to the west of the driveway about 200 m from the gate.



Photo 2. Rainfall monitoring site MRG (March 8, 2018).

## Lower Rain Gage

Site Name:	Lower Rain Gage
Site ID:	LRG
Location Description:	The Lower Rain Gage is located on private property off of Ripley County Road C-10. The rain gage is attached to the top of a fence post 12 m to the east of the driveway about 300 m south of the north gate.



Photo 3. Rainfall monitoring site LRG (March 8, 2018).

## DAILY RAINFALL TOTALS FOR WATER YEARS 2018, 2019, 2020, AND 2021

Table 6. Daily rainfall totals for WY2018.

Day	Daily Rainfall (cm)											
	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							1.5	0.0	0.0	2.2	0.0	0.0
2							0.0	0.0	0.6	0.0	0.0	0.0
3							0.2	5.6	0.0	0.0	0.1	0.0
4							0.0	0.0	0.0	0.0	0.0	0.0
5							0.0	0.0	0.0	0.0	0.0	0.0
6							0.0	0.0	0.0	0.0	0.3	0.3
7							0.0	0.0	0.0	0.0	1.2	2.9
8							0.0	0.0	0.0	0.0	0.5	0.3
9						0.4	0.0	0.0	0.1	0.0	0.0	0.0
10						0.4	0.0	0.3	0.0	0.0	0.5	0.0
11						0.0	0.0	0.0	0.0	0.0	0.0	0.0
12						0.0	0.0	0.0	0.0	0.0	0.0	0.0
13						0.0	3.2	0.0	0.0	0.5	0.0	0.0
14						0.0	1.7	1.1	0.0	1.7	0.0	0.0
15						0.0	0.0	0.7	0.0	0.6	2.6	0.0
16						0.2	0.0	0.0	0.0	0.0	1.5	0.0
17						0.0	0.0	0.8	0.0	0.0	0.2	0.0
18						0.7	0.0	0.0	0.0	0.0	0.0	0.0
19						0.4	0.0	4.5	0.0	0.0	1.4	0.0
20						0.1	0.0	0.5	0.0	0.0	2.8	0.0
21						0.0	0.0	0.0	0.0	0.0	0.0	0.1
22						0.0	4.9	0.0	0.0	0.0	0.0	4.4
23						0.0	1.2	0.0	0.0	0.0	0.1	0.8
24						0.0	0.0	0.0	0.3	0.0	0.1	0.1
25						0.0	0.2	0.6	0.2	0.0	0.0	0.6
26						0.1	0.0	0.0	4.0	0.1	0.0	0.4
27						6.0	0.0	0.0	0.1	0.0	0.0	0.2
28						0.4	0.0	0.0	0.9	0.0	0.0	0.1
29						5.6	0.0	0.0	0.0	0.1	0.0	0.0
30						0.0	0.0	0.0	0.0	0.0	3.4	0.0
31						1.3		1.1		0.0	0.0	
Total						15.6	12.9	15.3	6.2	5.3	14.5	10.3
Mean						0.7	0.4	0.5	0.2	0.2	0.5	0.3
Max						6.0	4.9	4.5	4.0	1.7	3.4	4.4

Table 7. Daily rainfall totals for WY2019.

Day	Daily Average Rainfall (cm)											
	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	0.0	1.5	2.6	0.0	0.1	0.0	0.0	1.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
4	0.0	1.6	0.0	4.7	0.0	0.0	0.9	0.1	0.0	0.4	0.0	0.0
5	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0
6	0.0	0.0	0.1	0.0	2.1	0.0	0.1	0.1	0.2	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	3.5	0.1	0.0	0.1	2.5	0.0	1.0	0.0
8	0.0	0.1	0.0	0.0	0.0	0.6	0.5	0.1	0.0	0.0	0.0	0.0
9	0.5	0.0	0.0	0.0	0.0	1.6	0.0	0.1	0.0	0.0	3.2	0.0
10	3.7	0.0	0.0	0.0	2.5	0.0	0.0	0.1	0.0	1.4	0.0	0.0
11	0.0	0.0	0.0	0.3	4.3	0.0	0.1	0.1	0.0	0.0	0.2	0.0
12	0.3	0.1	0.0	1.1	0.4	0.2	0.0	0.0	0.2	0.0	0.0	0.0
13	1.6	0.0	4.2	0.0	0.0	3.8	3.6	0.1	0.0	0.0	0.0	0.0
14	1.2	0.0	1.1	0.0	0.0	1.0	0.5	0.0	0.0	0.4	0.0	0.0
15	0.4	0.6	0.8	0.0	0.2	0.0	0.0	0.1	0.0	3.4	0.0	0.0
16	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	2.2	0.3	0.6	0.0
17	0.0	0.0	0.0	0.4	0.9	0.0	0.0	0.0	0.2	0.2	0.0	0.0
18	0.0	0.0	0.0	0.3	0.0	0.0	3.7	0.0	0.0	0.0	0.1	0.0
19	2.9	0.0	0.0	1.2	3.3	0.0	0.0	0.0	0.1	0.0	0.1	0.0
20	0.0	0.0	0.0	0.0	1.0	0.1	0.0	0.0	0.0	0.0	0.0	1.1
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	2.5	0.0
22	0.0	0.0	0.0	2.4	0.2	0.0	0.0	0.1	0.0	0.3	3.0	0.1
23	0.0	1.5	0.0	1.7	0.3	0.5	0.0	0.0	5.0	0.0	2.5	0.1
24	0.0	0.0	0.0	0.0	0.0	1.1	0.8	0.1	0.0	0.0	0.1	0.0
25	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	3.2	0.0
26	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.2	0.0	0.1	1.2
27	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0
28	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0		1.2	0.0	0.0	0.0	0.9	0.0	0.0
30	0.0	0.4	0.2	0.0		1.1	0.4	0.0	0.0	0.0	0.0	0.0
31	4.7		1.9	0.0		0.0		0.0		0.0	0.0	
Total	16.3	7.5	11.2	12.2	19.0	11.7	11.7	2.6	12.7	7.5	18.3	2.4
Mean	0.5	0.2	0.4	0.4	0.7	0.4	0.4	0.1	0.4	0.2	0.6	0.1
Max	4.7	1.6	4.2	4.7	4.3	3.8	3.7	1.0	5.0	3.4	3.2	1.2

Table 8. Daily rainfall totals for WY2020.

Day	Daily Average Rainfall (cm)											
	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	4.6
2	0.0	0.0	0.0	0.2	0.0	1.0	0.0	0.0	0.0	0.0	2.3	0.8
3	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.6	3.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	5.4	0.0	0.0	5.4	2.4	0.0	0.0	0.0
5	0.0	0.0	0.4	0.0	1.8	0.0	0.0	0.0	0.2	0.0	0.0	0.0
6	4.7	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
7	0.4	2.5	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	3.5	0.0	0.0	0.0
9	0.0	0.0	0.0	2.4	1.9	1.1	0.0	0.0	1.9	0.0	0.0	0.0
10	1.1	0.0	0.0	6.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.6	0.8	0.0	3.7	0.0	2.9	0.1	0.2	0.0	0.0	0.6	0.0
12	0.0	0.0	0.0	0.0	3.2	0.0	1.6	1.6	0.0	0.0	2.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.4	0.0
14	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
15	4.0	0.0	0.1	0.0	0.0	0.0	0.0	2.7	0.0	0.1	0.0	0.0
16	0.0	0.0	0.8	0.0	0.0	2.5	0.0	3.7	0.0	0.0	0.0	0.0
17	0.0	0.0	0.3	1.3	0.6	0.4	0.0	0.8	0.0	4.5	0.0	0.0
18	0.0	0.0	0.0	1.0	0.1	1.6	0.0	0.1	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	2.7	0.4	0.1	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	1.4	0.0	0.0	0.0
21	0.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	0.0	0.0
22	0.0	2.6	0.0	0.0	0.0	0.8	1.7	1.0	0.0	0.2	0.0	0.0
23	0.0	0.0	0.0	1.4	0.9	0.0	0.8	0.0	0.0	0.8	0.0	0.0
24	0.0	0.0	0.0	0.3	2.5	3.2	0.0	0.0	0.0	0.0	0.0	0.0
25	0.2	0.0	0.0	0.0	0.0	0.0	1.6	0.1	0.0	0.0	0.0	0.0
26	3.9	0.8	0.0	0.1	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	3.4	1.2
28	0.0	1.4	2.9	0.4	0.1	0.6	2.6	0.6	0.0	0.3	5.3	1.8
29	0.2	0.7	0.9	0.8	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
30	1.6	0.7	0.0	0.0		0.9	0.0	0.0	0.0	4.5	2.2	0.0
31	0.0		0.0	0.0		2.0		0.0			0.2	
Total	17.3	18.9	5.5	17.9	17.7	23.1	10.0	24.9	12.7	13.2	16.7	8.4
Mean	0.6	0.6	0.2	0.6	0.6	0.7	0.3	0.8	0.4	0.4	0.5	0.3
Max	4.7	5.3	2.9	6.2	5.4	3.4	2.6	5.4	3.5	4.5	5.3	4.6

Table 9. Daily rainfall totals for WY2021.

Day	Daily Average Rainfall (cm)											
	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021
1	0.0	0.0	0.0	1.3	0.0	1.2	0.0	0.0	2.7	2.4	0.0	0.0
2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.2	1.7	0.0	0.0	0.0
3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.3	0.0	0.0	3.9	0.0	0.0	0.0	2.5
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
6	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.7	0.0	0.8	0.0
7	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0
8	0.0	0.0	0.0	0.1	0.0	0.0	2.4	0.7	0.0	0.8	0.7	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.8	0.0	0.0
11	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
12	0.0	0.0	0.2	0.4	0.0	0.6	0.0	0.0	0.0	0.0	1.3	0.0
13	0.0	0.0	0.2	0.0	0.0	3.7	0.1	0.0	0.0	0.0	0.0	0.0
14	0.0	0.4	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0
15	0.3	1.1	0.0	0.0	0.0	1.4	0.0	0.3	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.4	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	0.1	0.0	2.0	0.0	0.0	0.0	0.0
18	0.2	0.0	0.0	0.0	0.2	2.6	0.1	2.3	0.0	0.9	0.5	0.0
19	6.9	0.0	0.0	0.0	0.3	0.3	0.0	0.1	0.0	0.0	0.2	0.0
20	0.1	0.0	0.0	0.0	1.1	0.0	0.3	0.0	0.0	0.0	2.9	0.0
21	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.4
22	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.4	0.0	0.0	1.5	0.2	0.0	0.0	0.0	1.4	0.0
24	0.0	2.1	0.0	0.4	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0
25	0.0	1.3	0.0	7.2	0.0	0.7	0.0	0.2	0.0	0.0	0.0	0.0
26	2.7	0.0	0.0	0.0	0.0	1.0	0.0	0.6	0.1	0.0	0.0	0.0
27	3.1	0.0	0.0	0.1	0.4	0.0	0.0	3.0	0.0	0.0	0.0	0.0
28	6.2	0.0	0.0	0.4	2.4	0.3	2.7	0.1	0.0	0.0	0.0	0.0
29	2.3	0.0	0.0	0.2		0.0	5.1	0.0	0.0	0.0	0.1	0.0
30	0.0	0.0	1.9	2.2		0.0	0.0	0.0	0.8	0.0	0.0	1.0
31	0.0		0.1	0.0		0.2		0.0		0.5	0.0	
Total	21.7	6.7	4.8	13.5	5.2	14.1	16.2	15.4	7.5	6.6	7.8	4.4
Mean	0.7	0.2	0.2	0.4	0.2	0.5	0.5	0.5	0.2	0.2	0.3	0.1
Max	6.9	2.1	1.9	7.2	2.4	3.7	5.1	3.9	2.7	2.4	2.9	2.5