Lake Thunderbird TMDL Monitoring Plan Implementation: Sample Year (SY) 2021- April Report

SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

April 2021 Monitoring Report

Oklahoma Water Resources Board
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SUMMARY OF APRIL WATER QUALITY SAMPLING

Sampling for April 2021 consisted of two sampling events. The first collection occurred during base flow conditions on the twelfth. Water samples were collected at all ten locations and discharge measurements were collected at five locations. Mesonet data shows no precipitation on the twelfth, no precipitation in the 72 hours prior to sampling, and 1.24 inches of precipitation in the 72 hours after the sampling event. The second collection occurred on the twenty-eighth during a stormwater event. Water samples were collected at eight locations, five of which were via autosampler, as well as all seven stormwater outfalls. A discharge measurement was also collected at one location. Mesonet data shows 2.09 inches of precipitation on the twenty-eighth, 0.45 inches of precipitation in the 72 hours prior to sampling, and 0.01 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of April was 5.19 inches. All water level gauges were operational for the month, except for LT-1 and TE-1 due to equipment malfunction.

RESULTS

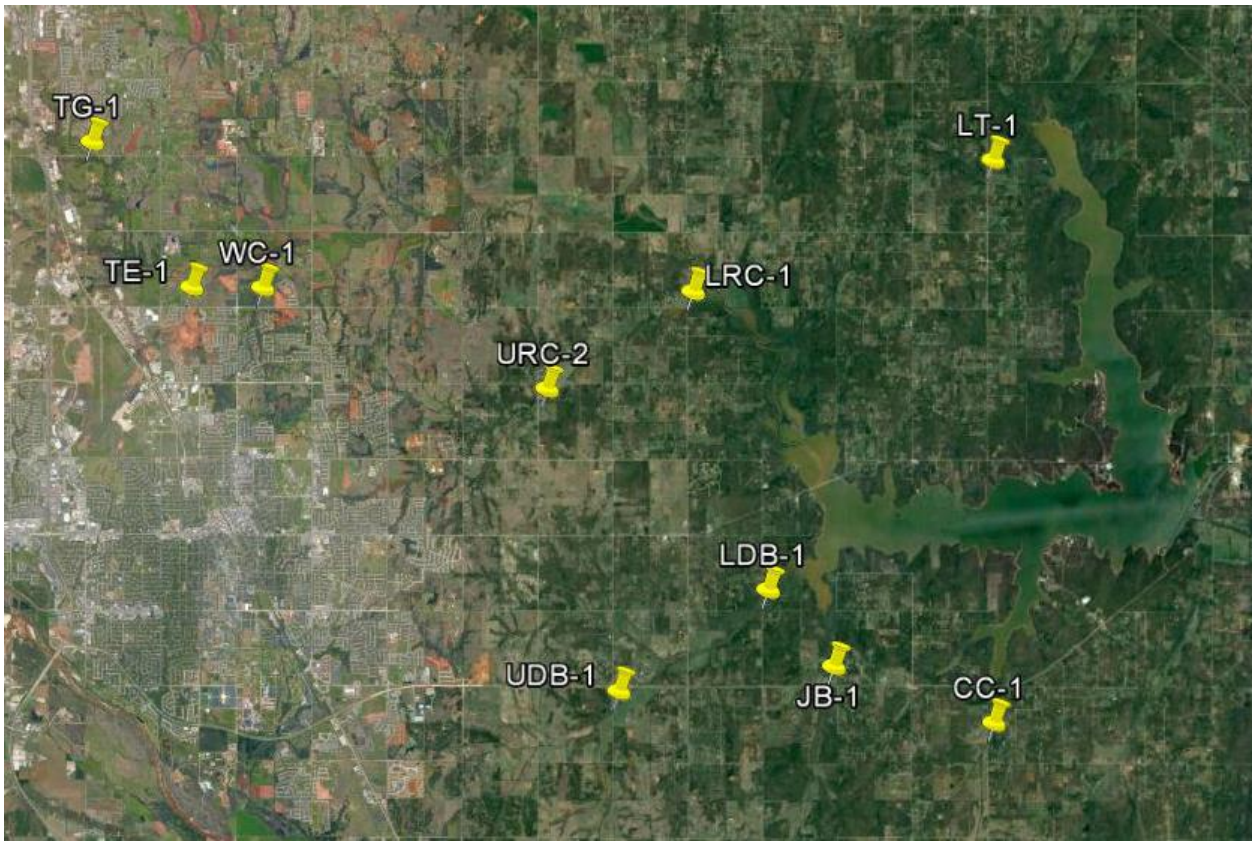

Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/l)	pH	Specific Conductance (mS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	4/12/2021	9:25	SD	13.42	9.01	7.81	689	5	Similar stage to last month
JB-1	Jim Blue Creek	4/12/2021	10:35	SD	13.55	8.84	7.76	814	6	Neither RP over water, orifice clear
LDB-1	Lower Dave Blue Creek	4/12/2021	11:45	SD	15.63	7.84	7.87	982	25	Negative visual flow
LRC-1	Lower Rock Creek	4/12/2021	13:05	SD	15.65	9.18	7.97	810	5	Same tapedown as Feb, low/normal flow conditions
LT-1	Lake Laterals	4/12/2021	12:20	SD	15.88	5.52	7.63	588	16	Very low visual flow on upstream, borderline low/normal conditions
TE-1	Little River Tributary	4/12/2021	16:15	SD	17.98	13.60	8.07	1254	7	Low/normal conditions, very low visual flow, scum above small beaver dam approx 30ft upstream
TG-1	Little River Tributary	4/12/2021	17:15	SD	17.11	14.26	8.18	1363	2	Low/normal flow conditions
UDB-1	Upper Dave Blue Creek	4/12/2021	8:35	SD	13.93	8.10	7.86	974	4	Similar stage to last month
URC-2	Upper Rock Creek	4/12/2021	13:55	SD	15.67	8.20	7.86	920	14	Low/normal flow conditions, lots of cow tracks under bridge/water's edge
WC-1	Woodcrest Creek	4/12/2021	15:00	SD	16.58	11.45	7.89	1199	3	Low/normal flow conditions, orifice buried, algae abundant upstream of bridge

Table 1 Field Data Form

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
CC-1	Clear Creek	<0.05	0.18	0.023	<5.0
JB-1	Jim Blue Creek	<0.05	0.25	0.027	7.0
LDB-1	Lower Dave Blue Creek	0.07	0.35	0.044	22.0
LRC-1	Lower Rock Creek	<0.05	0.19	0.023	6.0
LT-1	Lake Laterals	<0.05	0.55	0.045	11.0
TE-1	Little River Tributary	<0.05	0.39	0.025	7.0
TG-1	Little River Tributary	<0.05	0.33	0.024	6.0
UDB-1	Upper Dave Blue Creek	<0.05	0.20	0.015	<5.0
URC-2	Upper Rock Creek	<0.05	0.34	0.038	12.0
WC-1	Woodcrest Creek	<0.05	0.20	0.028	<5.0

Table 2 Laboratory Analysis Summary

Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
Field Blank	<0.05	<0.10	<0.010	<5.0
Duplicate	<0.05	0.18	0.024	<5.0
Duplicate RPD	0%	0%	4.26%	0%

Table 3 QA/QC Data

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues, and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.85	20.99
JB-1	Jim Blue Creek	0.68	15.36
LDB-1	Lower Dave Blue Creek	7.76	16.83
LRC-1	Lower Rock Creek	0.50	17.98
LT-1	Lake Laterals	0.64	4.58
TE-1	Little River Tributary	0.01	11.19
TG-1	Little River Tributary	0.74	9.14
UDB-1	Upper Dave Blue Creek	1.40	17.62
URC-2	Upper Rock Creek	0.35	11.16
WC-1	Woodcrest Creek	0.12	7.61

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

Discharge Measurement Summary

Date Generated: Thu Apr 15 2021

File Information	
File Name	CC0412.WAD
Start Date and Time	2021/04/12 08:28:59

Site Details	
Site Name	CC
Operator(s)	SCD

System Information	
Sensor Type	FlowTracker
Serial #	P4713
CPU Firmware Version	3.9
Software Ver	2.30
Mounting Correction	0.0%

Units	(English Units)
Distance	ft
Velocity	ft/s
Area	ft^2
Discharge	cfs

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.4%	1.4%
Velocity	2.1%	15.9%
Width	0.1%	0.1%
Method	2.0%	-
# Stations	2.5%	-
Overall	**4.0%**	**16.0%**

Summary

Averaging Int.	40	# Stations	20
Start Edge	LEW	Total Width	10.000
Mean SNR	27.4 dB	Total Area	5.600
Mean Temp	55.83 °F	Mean Depth	0.560
Disch. Equation	Mid-Section	Mean Velocity	0.1523
		Total Discharge	**0.8531**

Supplemental Data

#	Time	Location	Gauge Height	Rated Flow	Comments
1	Mon Apr 12 08:48:34 CDT 2021	10.000	20.990		

Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	08:28	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	*08:29*	*1.00*	*0.6*	*0.400*	*0.6*	*0.160*	*0.1309*	*1.00*	*0.1309*	*0.300*	*0.0393*	*4.6*
2	*08:31*	*1.50*	*0.6*	*0.350*	*0.6*	*0.140*	*0.0341*	*1.00*	*0.0341*	*0.175*	*0.0060*	*0.7*
3	08:32	2.00	0.6	0.350	0.6	0.140	0.3812	1.00	0.3812	0.175	0.0667	7.8
4	*08:33*	*2.50*	*0.6*	*0.350*	*0.6*	*0.140*	*0.3110*	*1.00*	*0.3110*	*0.175*	*0.0544*	*6.4*
5	*08:34*	*3.00*	*0.6*	*0.400*	*0.6*	*0.160*	*0.1335*	*1.00*	*0.1335*	*0.200*	*0.0267*	*3.1*
6	*08:35*	*3.50*	*0.6*	*0.400*	*0.6*	*0.160*	*0.4016*	*1.00*	*0.4016*	*0.200*	*0.0803*	*9.4*
7	*08:36*	*4.00*	*0.6*	*0.500*	*0.6*	*0.200*	*0.3343*	*1.00*	*0.3343*	*0.250*	*0.0836*	*9.8*
8	*08:37*	*4.50*	*0.6*	*0.550*	*0.6*	*0.220*	*0.2444*	*1.00*	*0.2444*	*0.275*	*0.0672*	*7.9*
9	*08:38*	*5.00*	*0.6*	*0.700*	*0.6*	*0.280*	*0.0594*	*1.00*	*0.0594*	*0.350*	*0.0208*	*2.4*
10	08:39	5.50	0.6	0.800	0.6	0.320	0.1795	1.00	0.1795	0.400	0.0718	8.4
11	*08:40*	*6.00*	*0.6*	*0.800*	*0.6*	*0.320*	*0.1588*	*1.00*	*0.1588*	*0.400*	*0.0635*	*7.4*
12	*08:41*	*6.50*	*0.6*	*0.800*	*0.6*	*0.320*	*0.1486*	*1.00*	*0.1486*	*0.400*	*0.0594*	*7.0*
13	*08:42*	*7.00*	*0.6*	*0.850*	*0.6*	*0.340*	*0.1401*	*1.00*	*0.1401*	*0.425*	*0.0595*	*7.0*
14	*08:43*	*7.50*	*0.6*	*0.850*	*0.6*	*0.340*	*0.1572*	*1.00*	*0.1572*	*0.425*	*0.0668*	*7.8*
15	*08:44*	*8.00*	*0.6*	*0.850*	*0.6*	*0.340*	*0.0896*	*1.00*	*0.0896*	*0.425*	*0.0381*	*4.5*
16	*08:45*	*8.50*	*0.6*	*0.800*	*0.6*	*0.320*	*0.1388*	*1.00*	*0.1388*	*0.400*	*0.0555*	*6.5*
17	*08:46*	*9.00*	*0.6*	*0.650*	*0.6*	*0.260*	*-0.0289*	*1.00*	*-0.0289*	*0.325*	*-0.0094*	*-1.1*
18	*08:47*	*9.50*	*0.6*	*0.600*	*0.6*	*0.240*	*0.0095*	*1.00*	*0.0095*	*0.300*	*0.0029*	*0.3*
19	08:47	10.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Figure 2 Discharge Measurement Summary CC-1

Discharge Measurement Summary

Date Generated: Thu Apr 15 2021

File Information	
File Name	JB0412.WAD
Start Date and Time	2021/04/12 09:40:57

Site Details	
Site Name	JB
Operator(s)	SCD

System Information	
Sensor Type	FlowTracker
Serial #	P4713
CPU Firmware Version	3.9
Software Ver	2.30
Mounting Correction	0.0%

Units	(English Units)
Distance	ft
Velocity	ft/s
Area	ft^2
Discharge	cfs

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.7%	2.5%
Velocity	1.2%	9.9%
Width	0.2%	0.2%
Method	3.3%	-
# Stations	5.8%	-
Overall	**6.9%**	**10.3%**

Summary

Averaging Int.	40	# Stations	9
Start Edge	LEW	Total Width	4.000
Mean SNR	35.9 dB	Total Area	1.050
Mean Temp	56.30 °F	Mean Depth	0.262
Disch. Equation	Mid-Section	Mean Velocity	0.6472
		Total Discharge	**0.6795**

Supplemental Data

#	Time	Location	Gauge Height	Rated Flow	Comments
1	Mon Apr 12 09:48:32 CDT 2021	4.000	15.360		

Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	09:40	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	*09:40*	*0.50*	*0.6*	*0.300*	*0.6*	*0.120*	*0.0023*	*1.00*	*0.0023*	*0.150*	*0.0003*	*0.1*
2	09:41	1.00	0.6	0.300	0.6	0.120	0.8068	1.00	0.8068	0.150	0.1210	17.8
3	09:42	1.50	0.6	0.300	0.6	0.120	0.7930	1.00	0.7930	0.150	0.1189	17.5
4	09:43	2.00	0.6	0.350	0.6	0.140	0.8743	1.00	0.8743	0.175	0.1530	22.5
5	09:44	2.50	0.6	0.350	0.6	0.140	0.9206	1.00	0.9206	0.175	0.1611	23.7
6	09:46	3.00	0.6	0.300	0.6	0.120	0.7129	1.00	0.7129	0.150	0.1069	15.7
7	*09:47*	*3.50*	*0.6*	*0.200*	*0.6*	*0.080*	*0.1818*	*1.00*	*0.1818*	*0.100*	*0.0182*	*2.7*
8	09:47	4.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Figure 3 Discharge Measurement Summary JB-1

Discharge Measurement Summary

Date Generated: Thu Apr 15 2021

File Information	
File Name	TE0412.WAD
Start Date and Time	2021/04/12 15:06:32

Site Details	
Site Name	TE
Operator(s)	SCD

System Information	
Sensor Type	FlowTracker
Serial #	P4713
CPU Firmware Version	3.9
Software Ver	2.30
Mounting Correction	0.0%

Units	(English Units)
Distance	ft
Velocity	ft/s
Area	ft^2
Discharge	cfs

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	4.4%	21.0%
Velocity	49.3%	363.5%
Width	1.6%	1.6%
Method	24.0%	-
# Stations	2.6%	-
Overall	**55.1%**	**364.2%**

Summary

Averaging Int.	40	# Stations	19
Start Edge	LEW	Total Width	9.000
Mean SNR	51.1 dB	Total Area	6.775
Mean Temp	64.28 °F	Mean Depth	0.753
Disch. Equation	Mid-Section	Mean Velocity	0.0008
		Total Discharge	**0.0051**

Supplemental Data

#	Time	Location	Gauge Height	Rated Flow	Comments
1	Mon Apr 12 15:24:09 CDT 2021	9.000	11.190		

Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	15:06	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	*15:06*	*0.50*	*0.6*	*0.300*	*0.6*	*0.120*	*-0.0043*	*1.00*	*-0.0043*	*0.150*	*-0.0006*	*-12.6*
2	*15:07*	*1.00*	*0.6*	*0.800*	*0.6*	*0.320*	*-0.0066*	*1.00*	*-0.0066*	*0.400*	*-0.0026*	*-51.5*
3	15:08	1.50	0.6	0.900	0.6	0.360	0.0033	1.00	0.0033	0.450	0.0015	29.0
4	15:09	2.00	0.6	1.000	0.6	0.400	-0.0056	1.00	-0.0056	0.500	-0.0028	-54.8
5	*15:10*	*2.50*	*0.6*	*0.950*	*0.6*	*0.380*	*-0.0049*	*1.00*	*-0.0049*	*0.475*	*-0.0023*	*-45.9*
6	15:11	3.00	0.6	0.900	0.6	0.360	0.0030	1.00	0.0030	0.450	0.0013	26.1
7	15:12	3.50	0.6	0.900	0.6	0.360	0.0016	1.00	0.0016	0.450	0.0007	14.5
8	15:13	4.00	0.6	0.950	0.6	0.380	-0.0180	1.00	-0.0180	0.475	-0.0086	-168.3
9	15:14	4.50	0.6	1.000	0.6	0.400	0.0121	1.00	0.0121	0.500	0.0061	119.2
10	15:14	5.00	0.6	0.950	0.6	0.380	0.0075	1.00	0.0075	0.475	0.0036	70.4
11	*15:15*	*5.50*	*0.6*	*0.900*	*0.6*	*0.360*	*0.0056*	*1.00*	*0.0056*	*0.450*	*0.0025*	*49.3*
12	15:16	6.00	0.6	0.900	0.6	0.360	0.0135	1.00	0.0135	0.450	0.0061	118.9
13	15:17	6.50	0.6	0.850	0.6	0.340	0.0125	1.00	0.0125	0.425	0.0053	104.1
14	15:18	7.00	0.6	0.700	0.6	0.280	-0.0026	1.00	-0.0026	0.350	-0.0009	-18.0
15	15:19	7.50	0.6	0.650	0.6	0.260	0.0039	1.00	0.0039	0.325	0.0013	25.1
16	*15:20*	*8.00*	*0.6*	*0.500*	*0.6*	*0.200*	*-0.0259*	*1.00*	*-0.0259*	*0.250*	*-0.0065*	*-127.2*
17	*15:23*	*8.50*	*0.6*	*0.400*	*0.6*	*0.160*	*0.0056*	*1.00*	*0.0056*	*0.200*	*0.0011*	*21.9*
18	15:23	9.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Figure 4 Discharge Measurement Summary TE-1

Discharge Measurement Summary

Date Generated: Thu Apr 15 2021

File Information	
File Name	URC0412.WAD
Start Date and Time	2021/04/12 12:51:01

Site Details	
Site Name	URC
Operator(s)	SCD

System Information	
Sensor Type	FlowTracker
Serial #	P4713
CPU Firmware Version	3.9
Software Ver	2.30
Mounting Correction	0.0%

Units	(English Units)
Distance	ft
Velocity	ft/s
Area	ft^2
Discharge	cfs

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.5%	2.4%
Velocity	1.0%	4.1%
Width	0.2%	0.2%
Method	2.3%	-
# Stations	2.6%	-
Overall	**3.8%**	**4.8%**

Summary

Averaging Int.	40	# Stations	19
Start Edge	LEW	Total Width	9.000
Mean SNR	33.1 dB	Total Area	4.450
Mean Temp	59.78 °F	Mean Depth	0.494
Disch. Equation	Mid-Section	Mean Velocity	0.0794
		Total Discharge	**0.3531**

Supplemental Data

#	Time	Location	Gauge Height	Rated Flow	Comments
1	Mon Apr 12 13:07:50 CDT 2021	9.000	11.160		

Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	12:51	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	*12:51*	*0.50*	*0.6*	*0.400*	*0.6*	*0.160*	*-0.0823*	*1.00*	*-0.0823*	*0.200*	*-0.0165*	*-4.7*
2	*12:52*	*1.00*	*0.6*	*0.600*	*0.6*	*0.240*	*0.0121*	*1.00*	*0.0121*	*0.300*	*0.0036*	*1.0*
3	*12:53*	*1.50*	*0.6*	*0.650*	*0.6*	*0.260*	*0.0276*	*1.00*	*0.0276*	*0.325*	*0.0090*	*2.5*
4	12:53	2.00	0.6	0.650	0.6	0.260	0.0453	1.00	0.0453	0.325	0.0147	4.2
5	12:54	2.50	0.6	0.600	0.6	0.240	0.0840	1.00	0.0840	0.300	0.0252	7.1
6	12:55	3.00	0.6	0.600	0.6	0.240	0.1165	1.00	0.1165	0.300	0.0349	9.9
7	12:56	3.50	0.6	0.600	0.6	0.240	0.1385	1.00	0.1385	0.300	0.0415	11.8
8	12:57	4.00	0.6	0.600	0.6	0.240	0.1217	1.00	0.1217	0.300	0.0365	10.3
9	12:58	4.50	0.6	0.600	0.6	0.240	0.1342	1.00	0.1342	0.300	0.0403	11.4
10	12:59	5.00	0.6	0.600	0.6	0.240	0.1375	1.00	0.1375	0.300	0.0412	11.7
11	13:00	5.50	0.6	0.550	0.6	0.220	0.1385	1.00	0.1385	0.275	0.0381	10.8
12	13:01	6.00	0.6	0.550	0.6	0.220	0.0942	1.00	0.0942	0.275	0.0259	7.3
13	13:02	6.50	0.6	0.650	0.6	0.260	0.0827	1.00	0.0827	0.325	0.0269	7.6
14	*13:03*	*7.00*	*0.6*	*0.450*	*0.6*	*0.180*	*0.0587*	*1.00*	*0.0587*	*0.225*	*0.0132*	*3.7*
15	13:04	7.50	0.6	0.300	0.6	0.120	0.0633	1.00	0.0633	0.150	0.0095	2.7
16	*13:05*	*8.00*	*0.6*	*0.300*	*0.6*	*0.120*	*0.0364*	*1.00*	*0.0364*	*0.150*	*0.0055*	*1.5*
17	*13:06*	*8.50*	*0.6*	*0.200*	*0.6*	*0.080*	*0.0358*	*1.00*	*0.0358*	*0.100*	*0.0036*	*1.0*
18	13:06	9.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Figure 5 Discharge Measurement Summary URC-2

Discharge Measurement Summary

Date Generated: Thu Apr 15 2021

File Information	
File Name	WC0412.WAD
Start Date and Time	2021/04/12 14:06:05

Site Details	
Site Name	WC
Operator(s)	SCD

System Information	
Sensor Type	FlowTracker
Serial #	P4713
CPU Firmware Version	3.9
Software Ver	2.30
Mounting Correction	0.0%

Units	(English Units)
Distance	ft
Velocity	ft/s
Area	ft^2
Discharge	cfs

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.5%	2.2%
Velocity	1.6%	12.0%
Width	0.2%	0.2%
Method	2.5%	-
# Stations	2.5%	-
Overall	**4.0%**	**12.2%**

Summary

Averaging Int.	40	# Stations	20
Start Edge	LEW	Total Width	11.000
Mean SNR	27.4 dB	Total Area	4.512
Mean Temp	61.84 °F	Mean Depth	0.410
Disch. Equation	Mid-Section	Mean Velocity	0.0259
		Total Discharge	**0.1168**

Supplemental Data

#	Time	Location	Gauge Height	Rated Flow	Comments
1	Mon Apr 12 14:25:55 CDT 2021	11.000	7.610		

Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	14:06	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	*14:06*	*0.50*	*0.6*	*0.300*	*0.6*	*0.120*	*-0.0052*	*1.00*	*-0.0052*	*0.150*	*-0.0008*	*-0.7*
2	14:07	1.00	0.6	0.300	0.6	0.120	0.0194	1.00	0.0194	0.150	0.0029	2.5
3	*14:07*	*1.50*	*0.6*	*0.300*	*0.6*	*0.120*	*0.0026*	*1.00*	*0.0026*	*0.150*	*0.0004*	*0.3*
4	*14:09*	*2.00*	*0.6*	*0.350*	*0.6*	*0.140*	*0.0171*	*1.00*	*0.0171*	*0.175*	*0.0030*	*2.6*
5	14:10	2.50	0.6	0.400	0.6	0.160	0.0367	1.00	0.0367	0.200	0.0073	6.3
6	14:11	3.00	0.6	0.400	0.6	0.160	0.0423	1.00	0.0423	0.200	0.0085	7.2
7	*14:12*	*3.50*	*0.6*	*0.400*	*0.6*	*0.160*	*0.0259*	*1.00*	*0.0259*	*0.200*	*0.0052*	*4.4*
8	*14:14*	*4.00*	*0.6*	*0.400*	*0.6*	*0.160*	*0.0020*	*1.00*	*0.0020*	*0.200*	*0.0004*	*0.3*
9	*14:14*	*4.50*	*0.6*	*0.400*	*0.6*	*0.160*	*0.0259*	*1.00*	*0.0259*	*0.200*	*0.0052*	*4.4*
10	*14:16*	*5.00*	*0.6*	*0.300*	*0.6*	*0.120*	*0.0200*	*1.00*	*0.0200*	*0.150*	*0.0030*	*2.6*
11	*14:16*	*5.50*	*0.6*	*0.300*	*0.6*	*0.120*	*0.0003*	*1.00*	*0.0003*	*0.150*	*0.0000*	*0.0*
12	*14:19*	*6.00*	*0.6*	*0.350*	*0.6*	*0.140*	*-0.0059*	*1.00*	*-0.0059*	*0.263*	*-0.0016*	*-1.3*
13	14:20	7.00	0.6	0.450	0.6	0.180	0.0256	1.00	0.0256	0.450	0.0115	9.9
14	*14:22*	*8.00*	*0.6*	*0.500*	*0.6*	*0.200*	*0.0479*	*1.00*	*0.0479*	*0.375*	*0.0180*	*15.4*
15	14:27	8.50	0.6	0.600	0.6	0.240	0.0279	1.00	0.0279	0.300	0.0084	7.2
16	14:23	9.00	0.6	0.700	0.6	0.280	0.0571	1.00	0.0571	0.350	0.0200	17.1
17	*14:26*	*9.50*	*0.6*	*0.800*	*0.6*	*0.320*	*0.0449*	*1.00*	*0.0449*	*0.400*	*0.0180*	*15.4*
18	*14:24*	*10.00*	*0.6*	*0.600*	*0.6*	*0.240*	*0.0164*	*1.00*	*0.0164*	*0.450*	*0.0074*	*6.3*
19	14:24	11.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Figure 6 Discharge Measurement Summary WC-1

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/l)	pH	Specific Conductance (mS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	4/28/2021	13:00	SD	18.44	7.72	7.57	258	159	Peak @ 23:15 on 4/27 at 25.09, second smaller peak @ 21:45 on 4/28 at 21.9
JB-1	Jim Blue Creek	4/28/2021	13:50	SD	18.60	7.11	7.56	285	102	Peak @ 03:15 at 18.87, second peak @ 02:00 on 4/29 at 17.58
LDB-1	Lower Dave Blue Creek	4/29/2021	14:00	SD	17.41	7.99	7.80	425	68	Peak @ 07:15 on 4/30 at 19.04, flow taken shortly before arrival
LRC-1	Lower Rock Creek	4/28/2021	23:00	SD	*	*	7.73	224	1000	T4 collected @ 23:00 at 26.5, peak @ 23:45 at 26.79
TE-1	Little River Tributary	4/28/2021	15:45	SD	20.55	7.41	7.69	151	923	Bottle 3 was T2 collected @ 15:45 at 15.64, peak @ 15:15 at 16.03, sonde from current conditions (15.52), channel out of banks
TG-1	Little River Tributary	4/28/2021	14:30	SD	*	*	7.81	177	1000	T4 collected @ 14:30 at 23.84, peak @15:15 at 24.27, very out of banks; water over road at intersection, in field on upstream
URC-2	Upper Rock Creek	4/28/2021	22:15	SD	*	*	7.59	200	1000	T2 collected @ 22:15 at 17.72, collected at peak
WC-1	Woodcrest Creek	4/28/2021	13:30	SD	19.31	7.91	7.78	190	767	T1 collected @ 13:30 at 11.59, peak @ 15:30 at 12.58, second peak @ 21:15 at 17.06, bankfull channel
SW-08	Stormwater Outfall 08	4/28/2021	17:45	SD	20.17	8.30	7.59	261	40	Water was at top of samplers, so collected from current conditions, more floating debris in bottles than observed in channel
SW-09	Stormwater Outfall 09	4/28/2021	15:40	SD	19.90	6.68	7.41	427	13	
SW-10	Stormwater Outfall 10	4/28/2021	15:05	SD	19.52	8.09	7.86	412	10	Sonde from current conditions, not much lower than when bottles collected
SW-11	Stormwater Outfall 11	4/28/2021	15:15	SD	20.68	8.31	7.62	229	58	One sampler only filled halfway, so used some current water conditions to fill bottles; sonde from current conditions
SW-12	Stormwater Outfall 12	4/28/2021	18:05	SD	19.49	7.34	7.79	445	23	
SW-13	Stormwater Outfall 13	4/28/2021	14:45	SD	18.93	7.28	7.57	387	73	
SW-14	Stormwater Outfall 14	4/28/2021	18:25	SD	19.34	7.97	7.61	253	793	

Table 5 Stormwater Field Data Form Where an Asterisk Denotes a Sample from an Autosampler

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
CC-1	Clear Creek	0.07	1.51	0.220	84.0
JB-1	Jim Blue Creek	<0.05	1.14	0.146	44.0
LDB-1	Lower Dave Blue Creek	0.08	1.03	0.113	40.0
LRC-1	Lower Rock Creek	0.16	3.99	1.02	1390
TE-1	Little River Tributary	0.32	1.58	0.447	510
TG-1	Little River Tributary	0.29	3.41	1.17	1810
URC-2	Upper Rock Creek	0.11	5.96	1.68	3330
WC-1	Woodcrest Creek	0.37	2.77	0.745	760
SW-08	Stormwater Outfall 08	1.38	1.89	0.391	28.0
SW-09	Stormwater Outfall 09	0.11	0.78	0.192	12.0
SW-10	Stormwater Outfall 10	0.13	1.12	0.214	30.0
SW-11	Stormwater Outfall 11	0.53	1.82	0.312	60.0
SW-12	Stormwater Outfall 12	0.80	1.25	0.130	24.0
SW-13	Stormwater Outfall 13	0.29	1.09	0.143	52.0
SW-14	Stormwater Outfall 14	0.12	2.61	0.665	950

Table 6 Stormwater Laboratory Analysis Summary

Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
Field Blank	<0.05	<0.10	<0.010	<5.0
Duplicate	0.08	1.46	0.211	96.0
Duplicate RPD	13.33%*	3.37%	4.18%	13.33%*

Table 7 Stormwater QA/QC Data Where an Asterisk Denotes RPD2

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	18.85	21.77
JB-1	Jim Blue Creek	30.00	17.34
LDB-1	Lower Dave Blue Creek	179.6	19.00
LRC-1	Lower Rock Creek	207.9	26.50
TE-1	Little River Tributary	283.1	15.64
TG-1	Little River Tributary	1630	23.84
URC-2	Upper Rock Creek	222.2	17.72
WC-1	Woodcrest Creek	101.7	11.59

Table 8 Stormwater Discharge Summary

Discharge Measurement Summary

Date Generated: Mon May 3 2021

File Information	
File Name	CC0428.WAD
Start Date and Time	2021/04/28 11:32:36

Site Details	
Site Name	CC
Operator(s)	SCD

System Information	
Sensor Type	FlowTracker
Serial #	P4713
CPU Firmware Version	3.9
Software Ver	2.30
Mounting Correction	0.0%

Units	(English Units)
Distance	ft
Velocity	ft/s
Area	ft^2
Discharge	cfs

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.1%	1.0%
Velocity	0.5%	1.8%
Width	0.1%	0.1%
Method	1.7%	-
# Stations	2.0%	-
Overall	**2.9%**	**2.3%**

Summary

Averaging Int.	40	# Stations	25
Start Edge	LEW	Total Width	12.500
Mean SNR	61.3 dB	Total Area	12.600
Mean Temp	64.63 °F	Mean Depth	1.008
Disch. Equation	Mid-Section	Mean Velocity	1.4960
		Total Discharge	**18.8505**

Supplemental Data

#	Time	Location	Gauge Height	Rated Flow	Comments
1	Wed Apr 28 12:00:54 CDT 2021	12.500	21.770		

Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	11:32	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	*11:32*	*1.00*	*0.6*	*0.800*	*0.6*	*0.320*	*0.0043*	*1.00*	*0.0043*	*0.600*	*0.0026*	*0.0*
2	11:33	1.50	0.6	1.000	0.6	0.400	0.8130	1.00	0.8130	0.500	0.4065	2.2
3	*11:35*	*2.00*	*0.6*	*1.150*	*0.6*	*0.460*	*1.0636*	*1.00*	*1.0636*	*0.575*	*0.6116*	*3.2*
4	*11:36*	*2.50*	*0.6*	*1.100*	*0.6*	*0.440*	*1.2297*	*1.00*	*1.2297*	*0.550*	*0.6764*	*3.6*
5	*11:37*	*3.00*	*0.6*	*1.100*	*0.6*	*0.440*	*1.4898*	*1.00*	*1.4898*	*0.550*	*0.8195*	*4.3*
6	11:38	3.50	0.6	1.100	0.6	0.440	1.7661	1.00	1.7661	0.550	0.9714	5.2
7	*11:39*	*4.00*	*0.6*	*1.000*	*0.6*	*0.400*	*1.6404*	*1.00*	*1.6404*	*0.500*	*0.8202*	*4.4*
8	*11:40*	*4.50*	*0.6*	*1.000*	*0.6*	*0.400*	*1.6955*	*1.00*	*1.6955*	*0.500*	*0.8478*	*4.5*
9	*11:41*	*5.00*	*0.6*	*0.950*	*0.6*	*0.380*	*1.8123*	*1.00*	*1.8123*	*0.475*	*0.8610*	*4.6*
10	*11:42*	*5.50*	*0.6*	*1.000*	*0.6*	*0.400*	*1.9734*	*1.00*	*1.9734*	*0.500*	*0.9867*	*5.2*
11	*11:43*	*6.00*	*0.6*	*0.950*	*0.6*	*0.380*	*1.8645*	*1.00*	*1.8645*	*0.475*	*0.8858*	*4.7*
12	*11:44*	*6.50*	*0.6*	*1.000*	*0.6*	*0.400*	*1.9390*	*1.00*	*1.9390*	*0.500*	*0.9695*	*5.1*
13	11:45	7.00	0.6	1.050	0.6	0.420	1.9813	1.00	1.9813	0.525	1.0401	5.5
14	11:46	7.50	0.6	1.200	0.6	0.480	2.0049	1.00	2.0049	0.600	1.2031	6.4
15	11:47	8.00	0.6	1.200	0.6	0.480	1.9659	1.00	1.9659	0.600	1.1797	6.3
16	11:48	8.50	0.6	1.300	0.6	0.520	1.8930	1.00	1.8930	0.650	1.2304	6.5
17	11:49	9.00	0.6	1.200	0.6	0.480	1.7657	1.00	1.7657	0.600	1.0596	5.6
18	11:50	9.50	0.6	1.300	0.6	0.520	1.7411	1.00	1.7411	0.650	1.1316	6.0
19	11:51	10.00	0.6	1.200	0.6	0.480	1.8540	1.00	1.8540	0.600	1.1125	5.9
20	11:52	10.50	0.6	1.200	0.6	0.480	1.8714	1.00	1.8714	0.600	1.1230	6.0
21	*11:54*	*11.00*	*0.6*	*1.100*	*0.6*	*0.440*	*0.8635*	*1.00*	*0.8635*	*0.550*	*0.4750*	*2.5*
22	11:55	11.50	0.6	0.900	0.6	0.360	0.5433	1.00	0.5433	0.450	0.2445	1.3
23	11:56	12.00	0.6	0.700	0.6	0.280	0.3848	1.00	0.3848	0.350	0.1347	0.7
24	11:56	12.50	None	0.600	0.0	0.0	0.0000	1.00	0.3848	0.150	0.0577	0.3

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Figure 7 Stormwater Discharge Measurement Summary CC-1

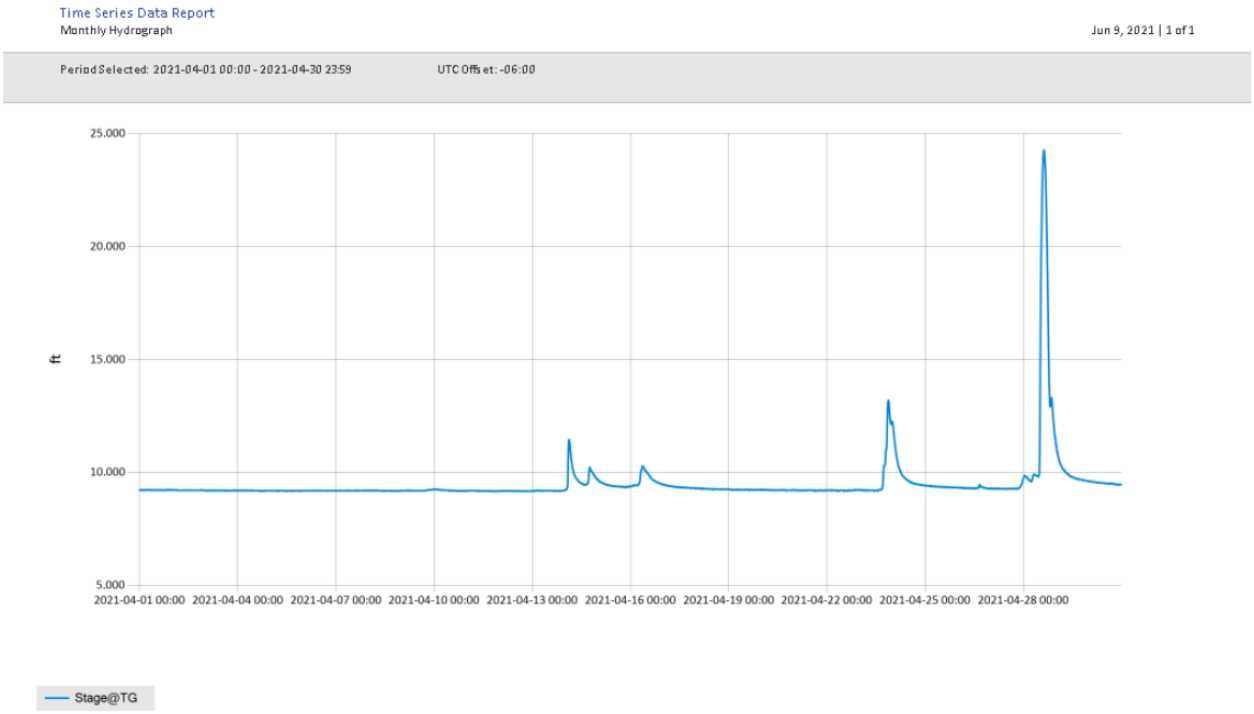

Figure 8 Monthly Hydrograph TG-1

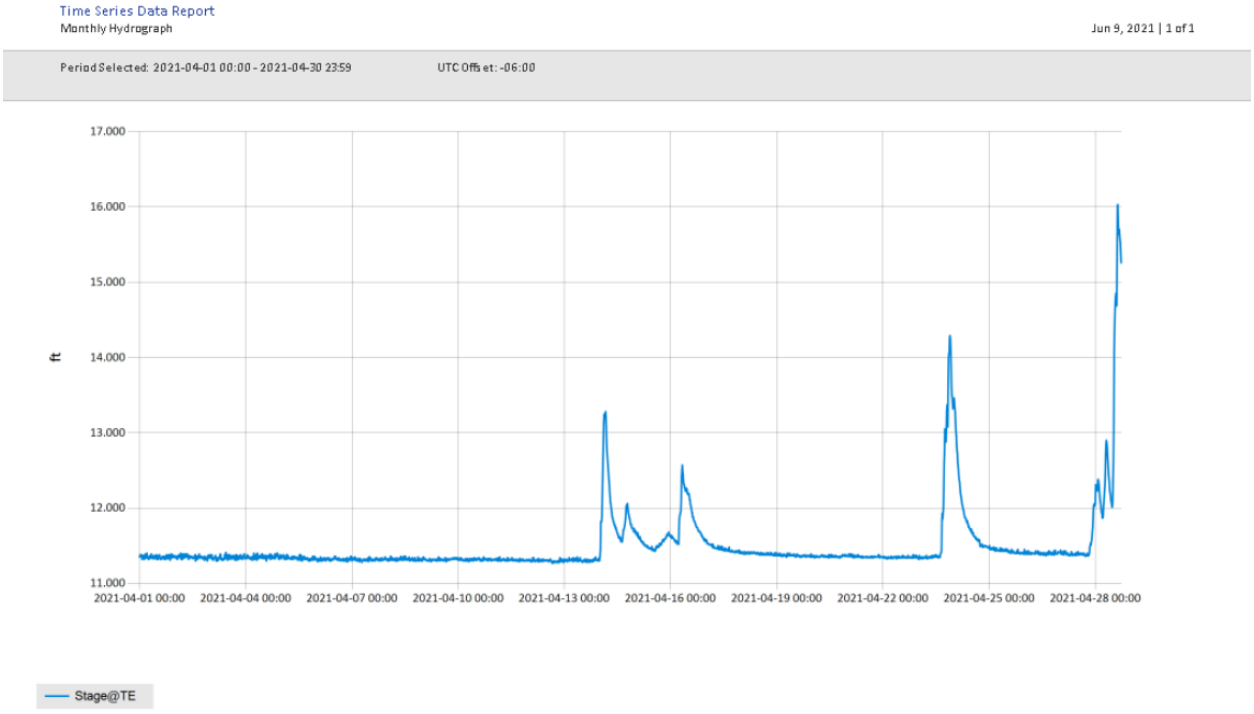

Figure 9 Monthly Hydrograph TE-1

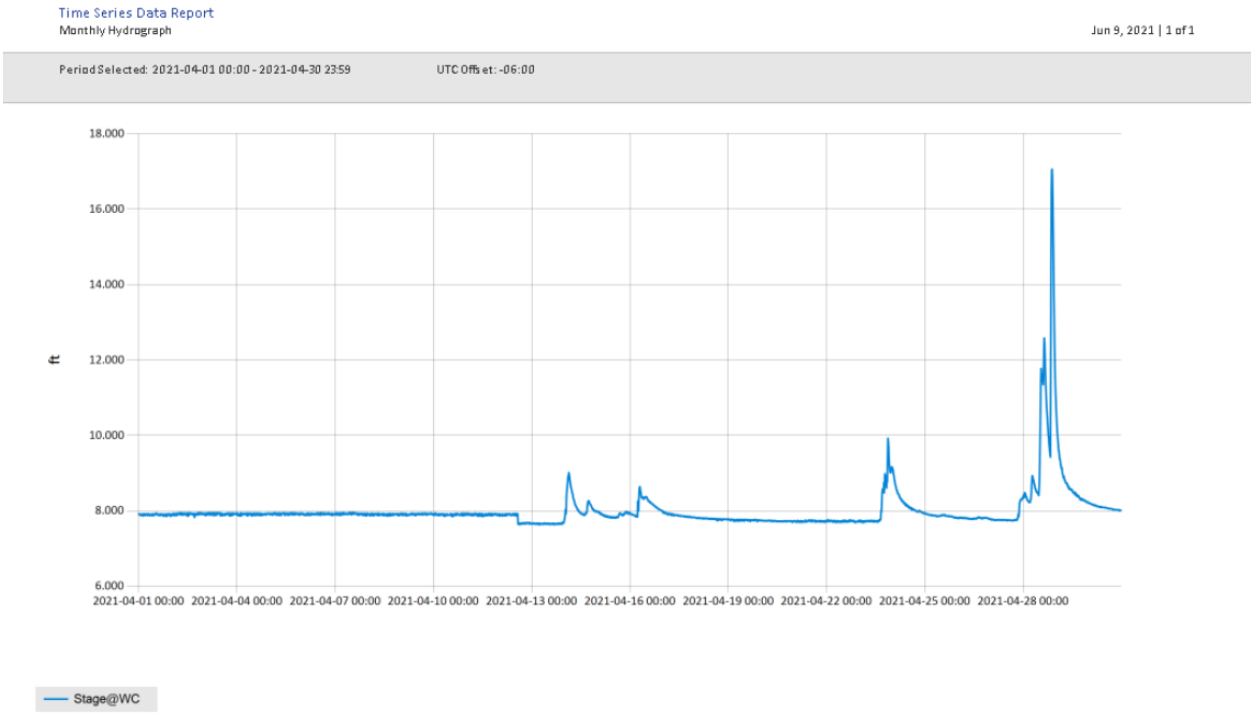

Figure 10 Monthly Hydrograph WC-1

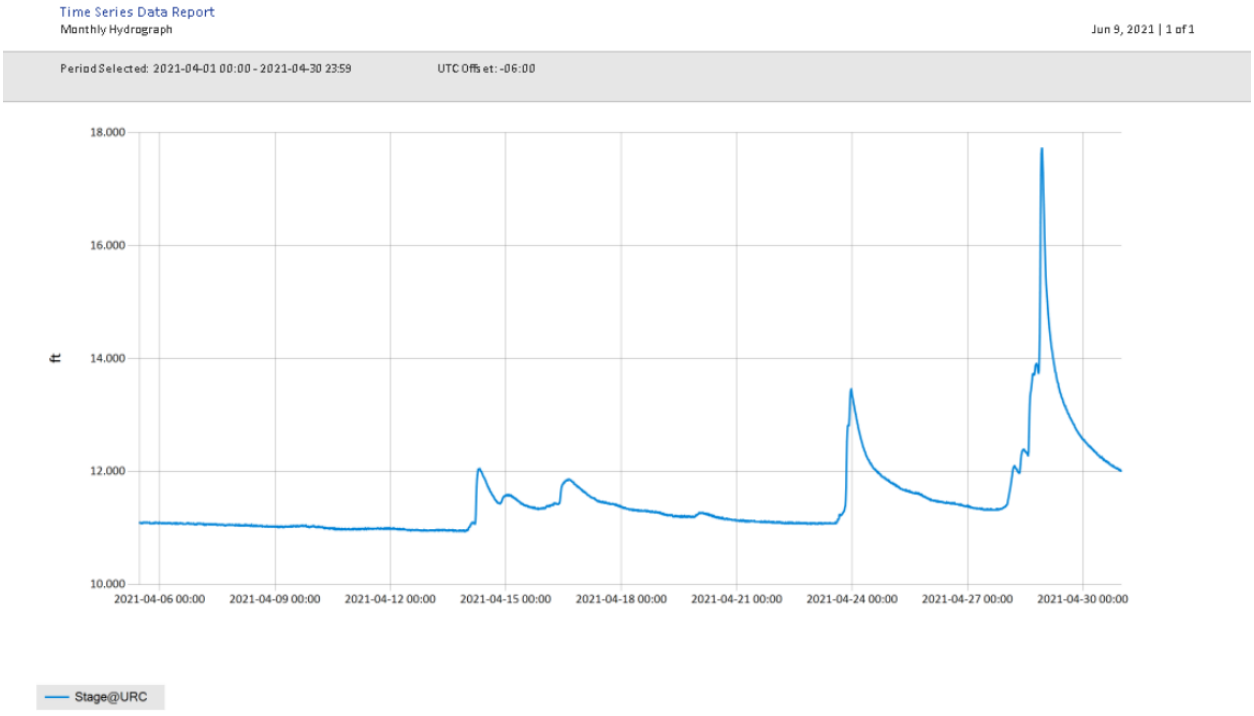

Figure 11 Monthly Hydrograph URC-2

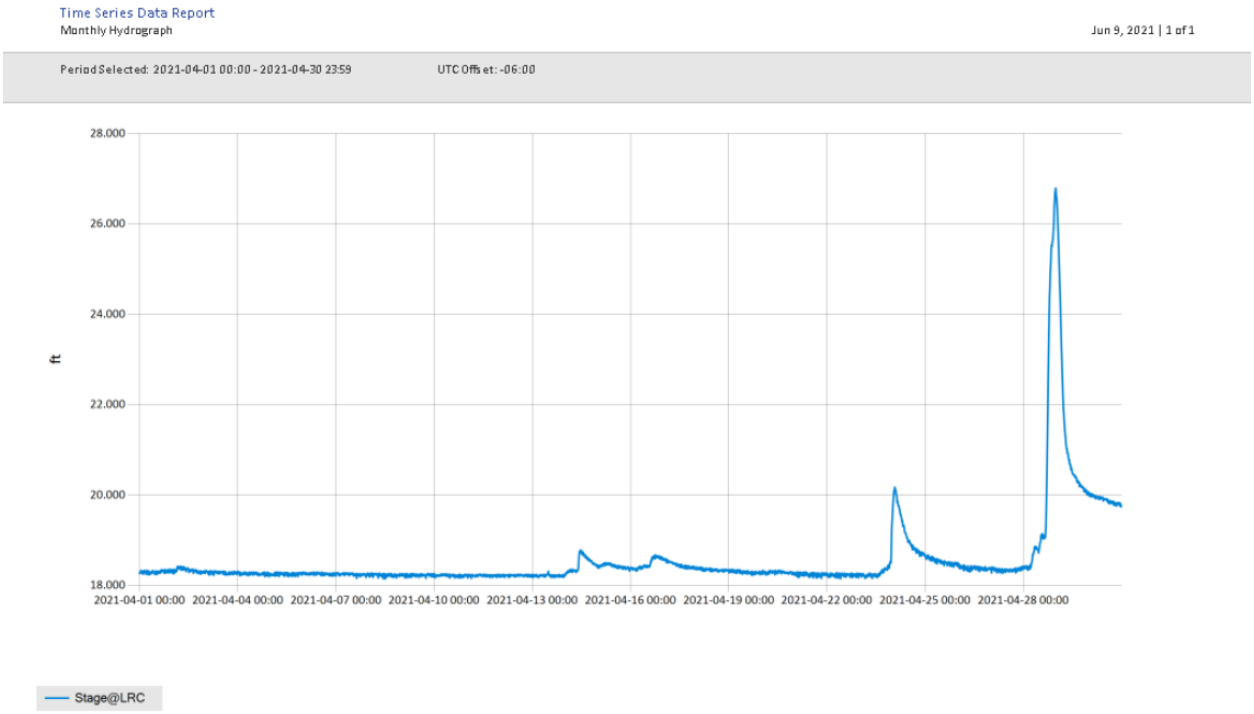

Figure 12 Monthly Hydrograph LRC-1

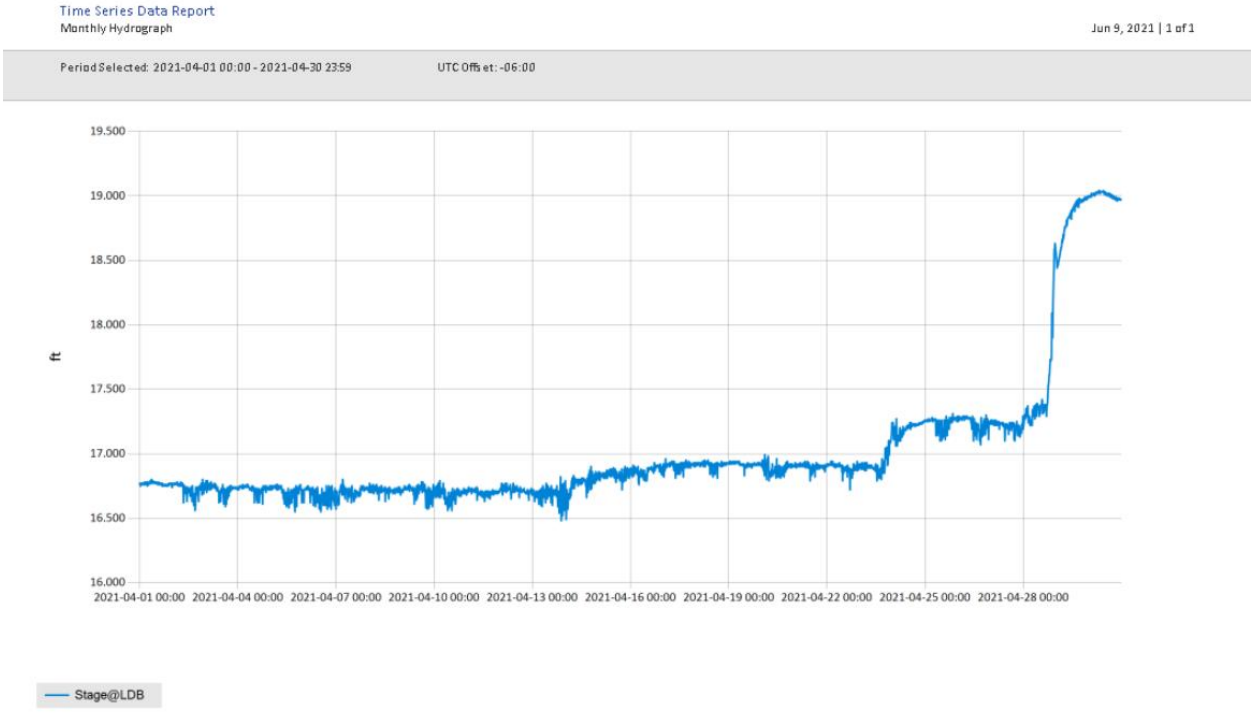

Figure 13 Monthly Hydrograph LDB-1

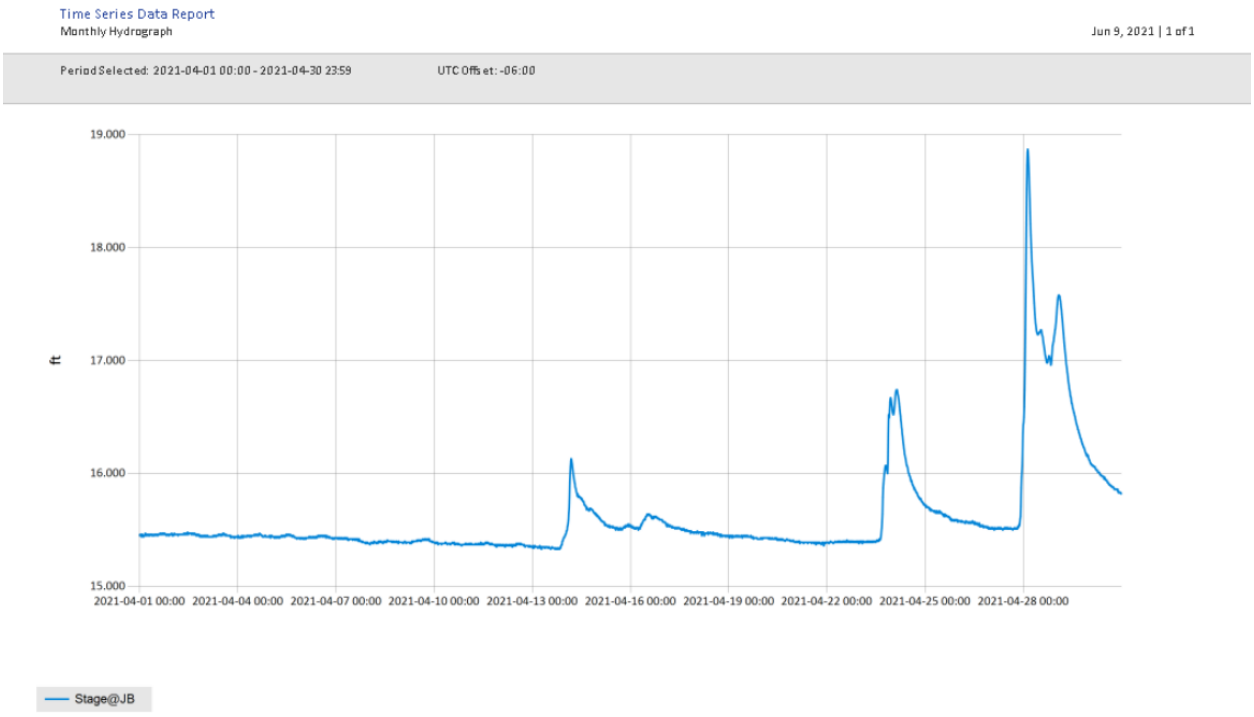

Figure 14 Monthly Hydrograph JB-1

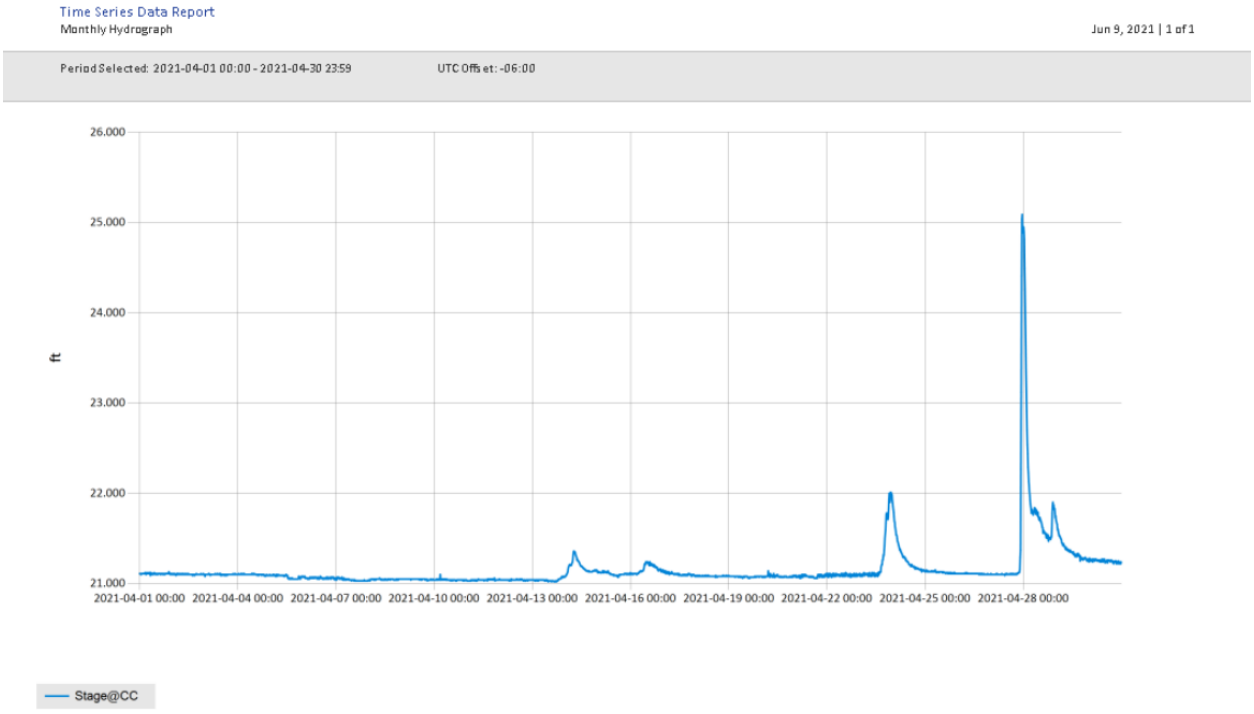

Figure 15 Monthly Hydrograph CC-1

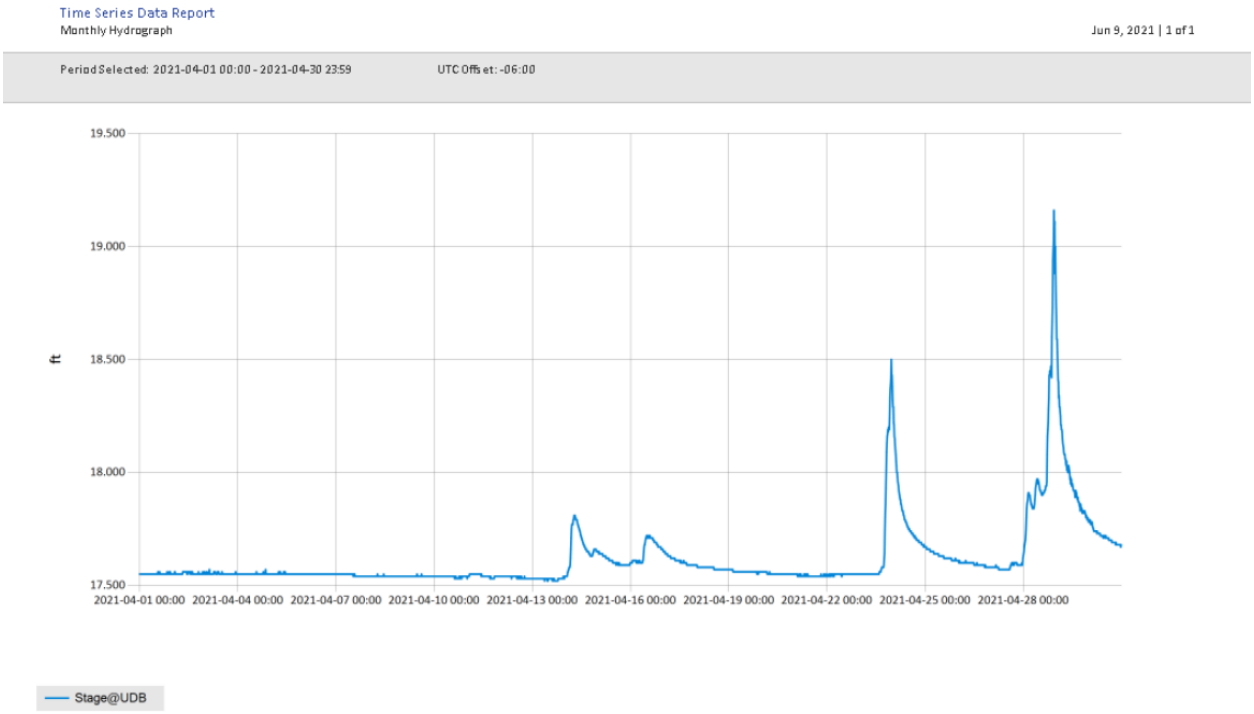

Figure 16 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — April 2021 — Time Zone: Midnight-Midnight CST

(NRMN) Norman — Nearest City: 2.1 NW Norman — County: Cleveland

Latitude: 35-14-09 — Longitude: 97-27-53 — Elevation: 1171 feet

DAY	TEMPERATURE (°F) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	65	34	51.5	25.2	16	0	71	21	39	0.00	29.20	30.47	SE	5.3	14.5	24.60	52.8	56.7	66	48
2	68	44	56.3	27.8	9	0	42	25	34	0.00	29.04	30.29	SSE	12.1	31.3	24.44	53.3	58.1	66	51
3	73	49	61.3	40.8	4	0	75	37	48	0.00	28.96	30.22	SSE	10.3	25.7	24.30	55.0	61.2	69	54
4	73	50	62.0	52.6	3	0	93	53	72	0.00	28.90	30.15	S	9.0	22.7	20.74	57.0	63.1	70	57
5	78	57	66.7	53.3	0	2	89	42	64	0.00	28.68	29.93	S	13.0	32.2	21.55	58.7	65.1	71	59
6	79	61	69.2	58.7	0	5	88	54	70	0.00	28.47	29.70	S	16.6	36.0	13.46	59.8	65.4	70	62
7	70	47	57.7	42.2	6	0	79	39	58	0.00	28.54	29.78	NW	15.8	38.7	24.32	59.3	65.3	70	61
8	78	45	62.5	37.7	3	0	73	23	43	0.00	28.52	29.75	WSW	10.9	23.9	25.76	57.6	63.4	72	55
9	76	49	64.5	51.5	2	0	80	43	64	0.00	28.42	29.65	SSE	12.5	47.3	11.46	59.1	65.0	71	61
10	67	41	53.7	35.5	11	0	78	27	53	0.00	28.62	29.86	NW	11.1	29.5	26.06	57.2	62.2	69	56
11	82	46	65.1	37.8	1	0	60	20	39	0.00	28.45	29.69	SSW	9.5	29.4	26.10	57.0	63.2	72	55
12	68	52	59.5	35.8	5	0	55	34	41	0.00	28.66	29.91	NNE	14.2	30.0	17.15	57.3	63.4	67	59
13	70	48	58.1	33.7	6	0	91	24	43	0.17	28.84	30.09	NE	13.4	31.3	21.76	56.8	63.2	70	58
14	56	47	50.1	45.6	13	0	96	56	85	0.90	28.88	30.13	NE	10.2	22.7	4.94	55.1	56.6	61	55
15	57	49	50.8	43.0	12	0	91	48	76	0.17	28.81	30.06	NE	7.1	20.2	7.43	54.3	54.6	56	53
16	53	44	48.8	46.1	17	0	98	76	90	0.39	28.69	29.94	NNW	9.9	28.6	3.53	53.8	53.7	56	52
17	54	39	46.8	37.3	19	0	90	52	71	0.00	28.88	30.13	NNW	10.9	27.0	14.38	52.5	52.4	56	48
18	64	39	51.7	36.4	13	0	92	29	61	0.00	28.85	30.11	NW	6.8	22.7	26.01	53.5	53.8	61	47
19	74	39	59.1	35.9	8	0	89	22	47	0.00	28.72	29.97	S	6.7	20.2	27.59	54.0	55.1	63	47
20	54	32	41.3	28.6	22	0	87	36	62	0.00	28.93	30.19	N	14.7	33.0	12.53	52.5	50.3	56	46
21	59	29	45.8	26.6	21	0	90	24	52	0.00	29.01	30.27	NW	5.1	20.2	25.97	50.7	49.8	58	42
22	59	45	49.9	34.1	13	0	84	39	55	0.00	28.84	30.09	SSE	8.8	26.1	7.07	51.4	50.8	54	48
23	66	50	57.8	52.5	7	0	97	67	83	1.00	28.54	29.78	SE	8.0	28.3	4.35	53.0	54.0	57	51
24	67	52	58.0	50.4	5	0	95	45	78	0.01	28.68	29.93	NNW	8.0	26.7	15.78	55.4	58.3	64	55
25	77	50	64.2	52.5	1	0	89	46	67	0.00	28.66	29.90	SSE	12.5	31.7	27.43	56.4	60.0	66	53
26	79	63	70.6	57.6	0	6	84	48	64	0.00	28.52	29.76	S	14.2	34.7	20.05	59.7	62.5	67	59
27	76	65	68.8	63.7	0	5	96	71	84	0.45	28.53	29.77	S	10.8	26.5	7.55	61.0	63.4	66	61
28	70	60	67.0	65.5	0	0	100	87	95	2.09	28.54	29.78	SSE	7.4	69.0	3.86	62.0	64.4	66	63
29	75*	54*	63.9*	53.1*	1*	0*	89*	38*	70*	0.01*	28.80*	30.05*	NNE*	11.4*	25.7*	16.26*	60.8*	63.3*	67*	61*
30	79	51	66.5	46.9	0	0	89	24	55	0.00	28.93	30.18	E	5.4	17.8	27.98	60.6	64.6	72	57
	69*	48*	58.3*	43.6*	<- Monthly Averages ->						28.74*	29.98*	S *	10.4*	69.0*	17.81*	56.3*	59.4*	65*	54*

Temperature - Highest: 82*
Lowest: 29*

Degree Days - Total HDD: 219*
Total CDD: 19*

Rainfall: Monthly Total: 5.19* in.
Greatest 24 Hr: 2.09* in.

Humidity - Highest: 100*
Lowest: 20*

Number of Days With:

Tmax ≥ 90:	0*	Rainfall ≥ 0.01 inch:	9*
Tmax ≤ 32:	0*	Rainfall ≥ 0.10 inch:	7*
Tmin ≤ 32:	2*	Avg Wind Speed ≥ 10 mph:	17*
Tmin ≤ 0:	0*	Max Wind Speed ≥ 30 mph:	11*

* Denotes incomplete record

Figure 17 April Mesonet Data