
Lake Thunderbird TMDL Monitoring Plan Implementation: Sample Year (SY) 2023- June Report



OKLAHOMA
Water Resources Board

Lake Thunderbird TMDL Monitoring Plan Implementation:

June 2023 Monitoring Report

Oklahoma Water Resources Board
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SUMMARY OF JUNE SAMPLING

Sampling for June 2023 occurred above base flow conditions on the thirteenth. Water samples were collected at nine locations and discharge was measured at four locations. Two water samples were collected at JB-1; one on the upstream side of the road, and one on the downstream side of the road where the channel constricts. Samples were not collected at LT-1 since this station will be relocated later this year. Mesonet shows 0.15 inches of precipitation on the thirteenth, 1.28 inches of precipitation in the 72 hours prior to sampling, and 0.77 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of June was 5.13 inches. All water level gauges were operational for the month, except for JB-1, which will be reinstalled later this year.

RESULTS

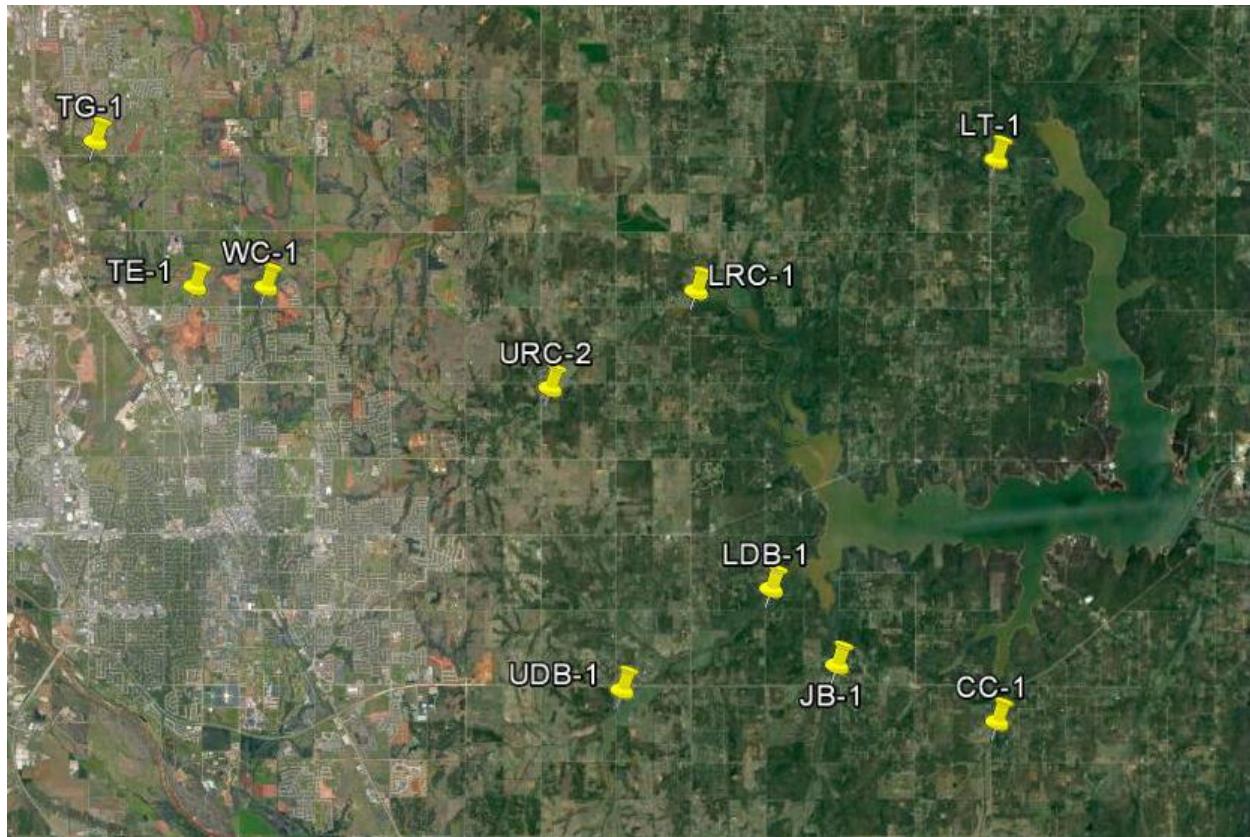


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	6/12/2023	9:59	AN	19.6	6.11	7.79	524	152	Bank full, used RP4
JB-1	Jim Blue Creek	6/13/2023	8:15	AN	18.0	6.85	7.97	884	24	Water level has come up, flow stronger; some trash on downstream, took flow on upstream
LDB-1	Lower Dave Blue Creek	6/13/2023	9:08	AN	20.5	5.35	7.96	661	120	Large amount of floating debris; bank full
LRC-1	Lower Rock Creek	6/13/2023	10:54	AN	20.4	7.73	8.11	629	35	Looks lower than usual, but appears to be flowing more
TE-1	Little River Tributary	6/13/2023	15:30	AN	25.1	7.87	8.02	365	52	Smelled like human feces under bridge; have flow measurements at this stage
TG-1	Little River	6/13/2023	16:25	AN	23.4	8.58	8.14	405	10	Appears lower than usual; debris cleared out of midstream
UDB-1	Upper Dave Blue Creek	6/13/2023	9:43	AN	19.3	7.69	8.02	456	109	Higher water level than usual; changed dcp from 21.20 to 17.52
URC-2	Upper Rock Creek	6/13/2023	11:50	AN	19.6	7.45	8.04	382	175	Used RP2, good flow
WC-1	Woodcrest Creek	6/13/2023	14:59	AN	21.7	8.14	7.97	393	30	Looks normal

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	0.25	1.14	0.201	82.0
JB-1	Jim Blue Creek (ds)	0.08	0.56	0.072	30.0
JB-1	Jim Blue Creek (us)	0.07	0.54	0.066	28.0
LDB-1	Lower Dave Blue Creek	0.24	0.72	0.117	104
LRC-1	Lower Rock Creek	0.17	0.65	0.063	38.0
TE-1	Little River Tributary	0.32	0.90	0.109	34.0
TG-1	Little River	0.43	0.65	0.096	20.0
UDB-1	Upper Dave Blue Creek	0.28	0.61	0.106	68.0
URC-2	Upper Rock Creek	0.18	1.09	0.140	132
WC-1	Woodcrest Creek	0.30	1.05	0.200	50.0

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	0.25	1.28	0.230	104
Duplicate RPD	0%	11.57%	13.46%*	23.66%*

Table 3 QA/QC Data Where the Asterisk Denotes RPD2

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	0.94	20.36
JB-1	Jim Blue Creek	0.40	N/A
LDB-1	Lower Dave Blue Creek	53.88	17.38
LRC-1	Lower Rock Creek	3.63	3.69
TE-1	Little River Tributary	0.04	11.19
TG-1	Little River	0.67	8.93
UDB-1	Upper Dave Blue Creek	2.21	17.52
URC-2	Upper Rock Creek	0.04	11.74
WC-1	Woodcrest Creek	0.04	7.48

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

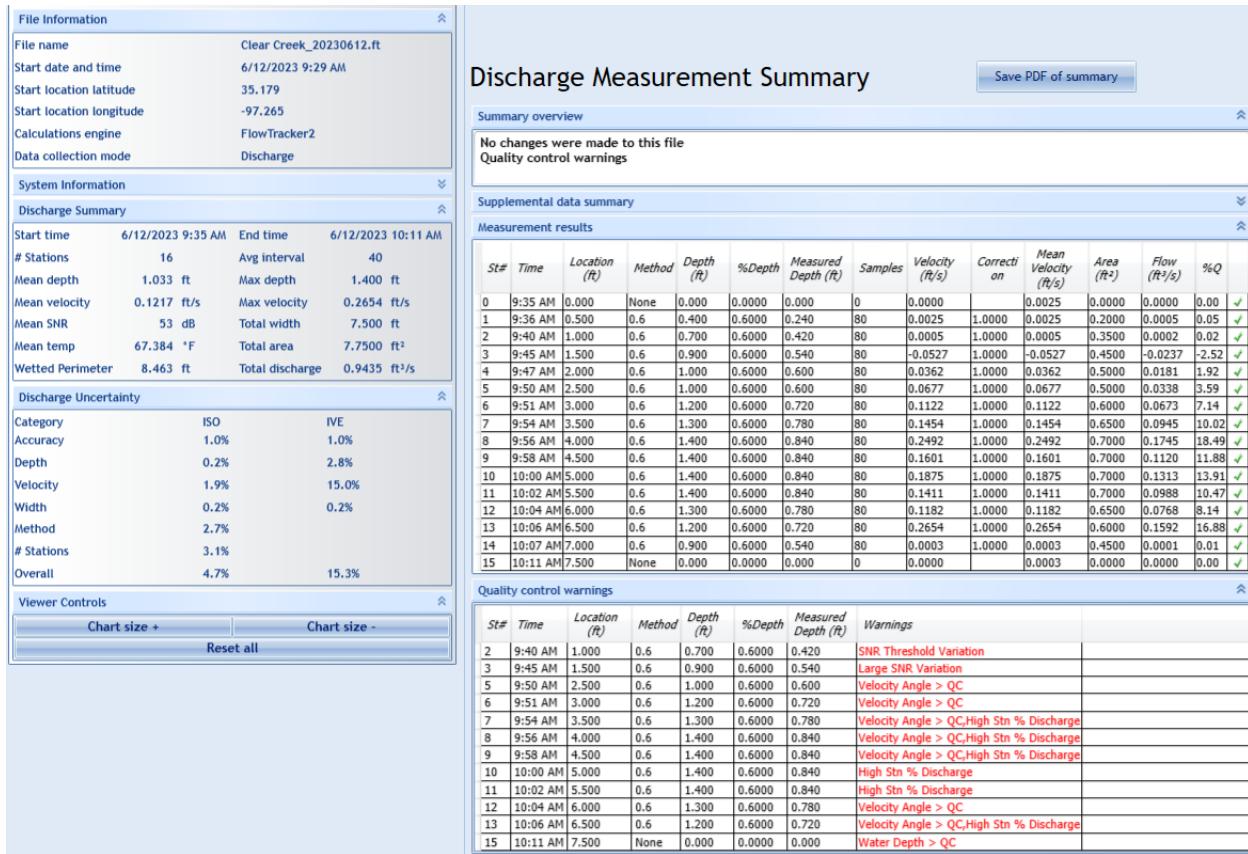


Figure 2 Discharge Measurement Summary CC-1

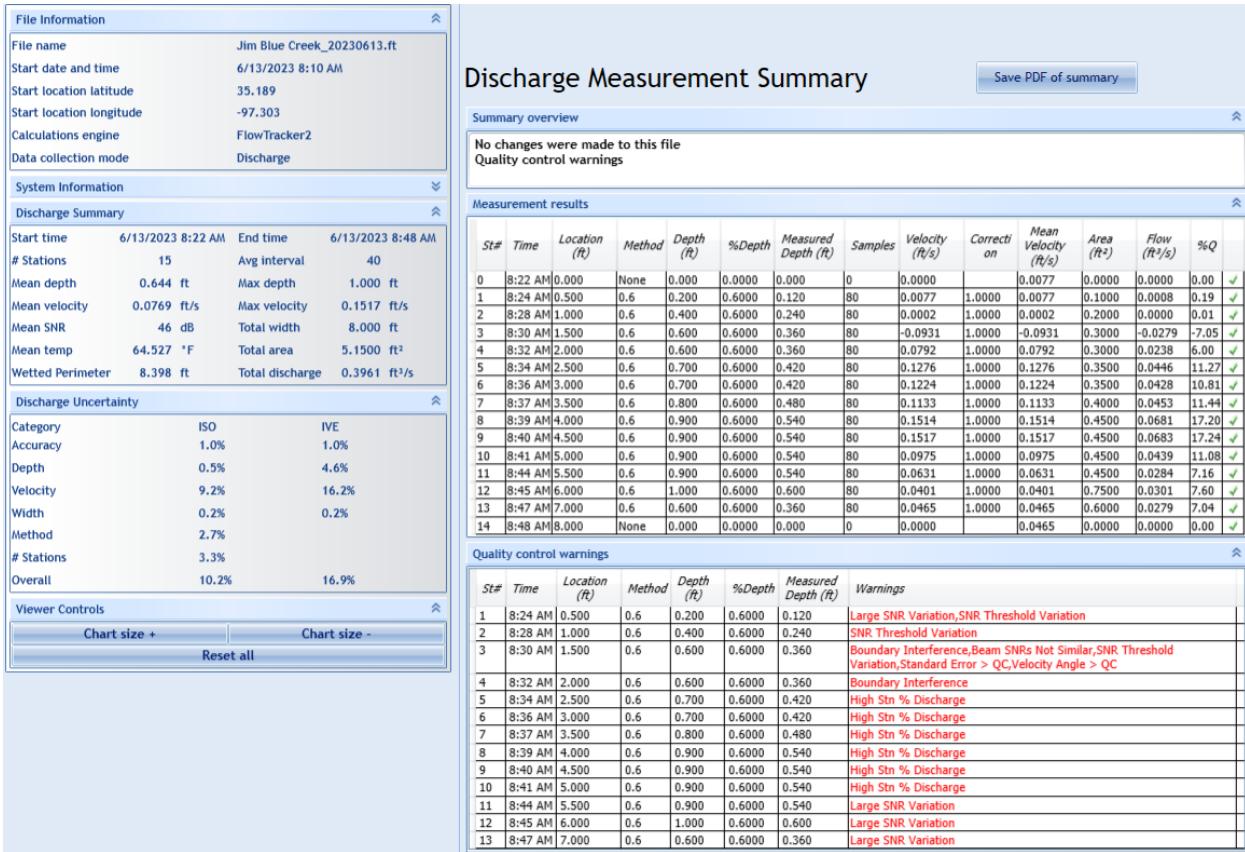


Figure 3 Discharge Measurement Summary JB-1

File Information

File name	Lower Rock Creek_20230613.ft	
Start date and time	6/13/2023 10:33 AM	
Start location latitude	35.261	
Start location longitude	-97.335	
Calculations engine	FlowTracker2	
Data collection mode	Discharge	

System Information

Discharge Summary			
Start time	6/13/2023 10:42 AM	End time	6/13/2023 11:21 AM
# Stations	25	Avg interval	40
Mean depth	1.023 ft	Max depth	1.750 ft
Mean velocity	0.2366 ft/s	Max velocity	0.5975 ft/s
Mean SNR	47 dB	Total width	15.000 ft
Mean temp	68.787 °F	Total area	15.3500 ft ²
Wetted Perimeter	16.105 ft	Total discharge	3.6319 ft ³ /s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	2.9%
Velocity	1.1%	2.4%
Width	0.2%	0.2%
Method	3.4%	
# Stations	2.0%	
Overall	4.2%	3.9%

Viewer Controls

Chart size +	Chart size -
Reset all	

Discharge Measurement Summary

[Save PDF of summary](#)

Summary overview

No changes were made to this file

Quality control warnings

Supplemental data summary

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q
0	10:42 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0040	0.0000	0.0000	0.00 ✓
1	10:43 AM	0.500	0.6	0.100	0.6000	0.060	80	0.0040	1.0000	0.0040	0.0500	0.0002	0.01 ✓
2	10:45 AM	1.000	0.6	0.100	0.6000	0.060	80	0.0355	1.0000	0.0355	0.0500	0.0018	0.05 ✓
3	10:46 AM	1.500	0.6	0.200	0.6000	0.120	80	0.0154	1.0000	0.0154	0.1000	0.0015	0.04 ✓
4	10:47 AM	2.000	0.6	0.300	0.6000	0.180	80	-0.0474	1.0000	-0.0474	0.1500	-0.0071	-0.20 ✓
5	10:49 AM	2.500	0.6	0.300	0.6000	0.180	80	-0.1091	1.0000	-0.1091	0.1500	-0.0164	-0.45 ✓
6	10:50 AM	3.000	0.6	0.600	0.6000	0.360	80	-0.1917	1.0000	-0.1917	0.3000	-0.0575	-1.58 ✓
7	10:52 AM	3.500	0.6	0.600	0.6000	0.360	80	-0.1418	1.0000	-0.1418	0.3000	-0.0425	-1.17 ✓
8	10:53 AM	4.000	0.6	0.700	0.6000	0.420	80	-0.1984	1.0000	-0.1984	0.3500	-0.0694	-1.91 ✓
9	10:55 AM	4.500	0.6	0.800	0.6000	0.480	80	-0.2229	1.0000	-0.2229	0.4000	-0.0892	-2.46 ✓
10	10:56 AM	5.000	0.6	0.800	0.6000	0.480	80	-0.1768	1.0000	-0.1768	0.4000	-0.0707	-1.95 ✓
11	10:58 AM	5.500	0.6	0.700	0.6000	0.420	80	-0.1360	1.0000	-0.1360	0.3500	-0.0476	-1.31 ✓
12	11:00 AM	6.000	0.6	0.900	0.6000	0.540	80	-0.0904	1.0000	-0.0904	0.4500	-0.0407	-1.12 ✓
13	11:01 AM	6.500	0.6	1.000	0.6000	0.600	80	-0.0620	1.0000	-0.0620	0.5000	-0.0310	-0.85 ✓
14	11:02 AM	7.000	0.6	1.200	0.6000	0.720	80	0.0024	1.0000	0.0024	0.9000	0.0022	0.06 ✓
15	11:04 AM	8.000	0.6	1.400	0.6000	0.840	80	0.0837	1.0000	0.0837	1.4000	0.1172	3.23 ✓
16	11:06 AM	9.000	0.6	1.600	0.6000	0.960	80	0.1472	1.0000	0.1472	1.2000	0.1766	4.86 ✓
17	11:08 AM	9.500	0.6	1.700	0.6000	1.020	80	0.2119	1.0000	0.2119	0.8500	0.1801	4.96 ✓
18	11:12 AM	10.000	0.6	1.600	0.6000	0.960	80	0.3218	1.0000	0.3218	0.8000	0.2574	7.09 ✓
19	11:14 AM	10.500	0.6	1.600	0.6000	0.960	80	0.4127	1.0000	0.4127	0.8000	0.3302	9.09 ✓
20	11:15 AM	11.000	0.6	1.600	0.6000	0.960	80	0.4694	1.0000	0.4694	1.2000	0.5633	15.51 ✓
21	11:16 AM	12.000	0.6	1.500	0.6000	0.900	80	0.4954	1.0000	0.4954	1.5000	0.7431	20.46 ✓
22	11:18 AM	13.000	0.6	1.750	0.6000	1.050	80	0.5109	1.0000	0.5109	1.7500	0.8941	24.62 ✓
23	11:20 AM	14.000	0.6	1.400	0.6000	0.840	80	0.5975	1.0000	0.5975	1.4000	0.8365	23.03 ✓
24	11:21 AM	15.000	None	0.000	0.0000	0.000	0	0.0000		0.5975	0.0000	0.0000	0.00 ✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
3	10:46 AM	1.500	0.6	0.200	0.6000	0.120	Boundary Interference
4	10:47 AM	2.000	0.6	0.300	0.6000	0.180	Large SNR Variation
5	10:49 AM	2.500	0.6	0.300	0.6000	0.180	Boundary Interference,Large SNR Variation,Velocity Angle > QC
6	10:50 AM	3.000	0.6	0.600	0.6000	0.360	Velocity Angle > QC
7	10:52 AM	3.500	0.6	0.600	0.6000	0.360	Velocity Angle > QC
8	10:53 AM	4.000	0.6	0.700	0.6000	0.420	Large SNR Variation,Velocity Angle > QC
9	10:55 AM	4.500	0.6	0.800	0.6000	0.480	Velocity Angle > QC
10	10:56 AM	5.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
11	10:58 AM	5.500	0.6	0.700	0.6000	0.420	Velocity Angle > QC
12	11:00 AM	6.000	0.6	0.900	0.6000	0.540	Velocity Angle > QC
15	11:04 AM	8.000	0.6	1.400	0.6000	0.840	Velocity Angle > QC
16	11:06 AM	9.000	0.6	1.600	0.6000	0.960	Velocity Angle > QC
17	11:08 AM	9.500	0.6	1.700	0.6000	1.020	Velocity Angle > QC
20	11:15 AM	11.000	0.6	1.600	0.6000	0.960	High Stn % Discharge
21	11:16 AM	12.000	0.6	1.500	0.6000	0.900	High Stn % Discharge
22	11:18 AM	13.000	0.6	1.750	0.6000	1.050	High Stn % Discharge
23	11:20 AM	14.000	0.6	1.400	0.6000	0.840	High Stn % Discharge
24	11:21 AM	15.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 4 Discharge Measurement Summary LRC-1

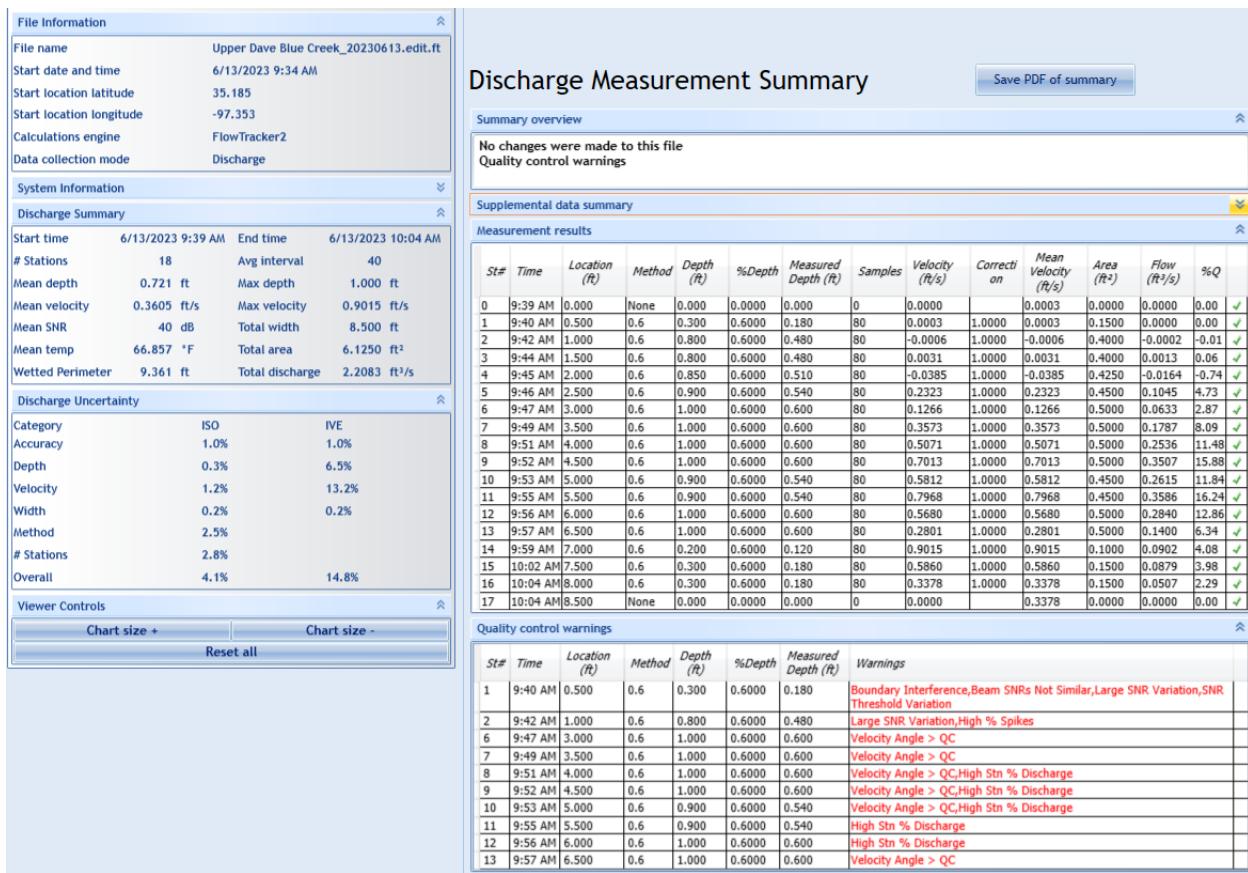
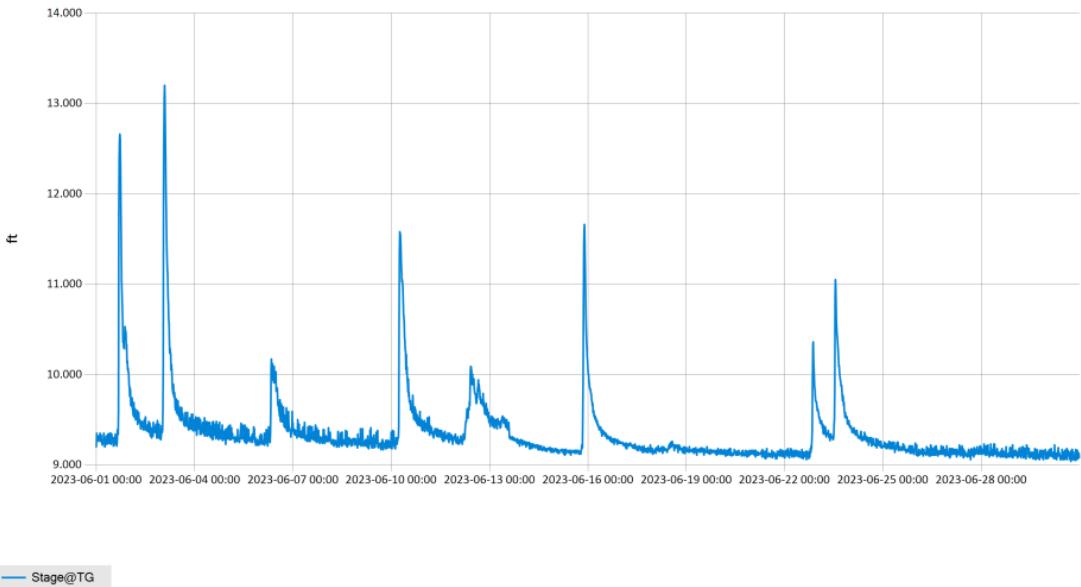


Figure 5 Discharge Measurement Summary UDB-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

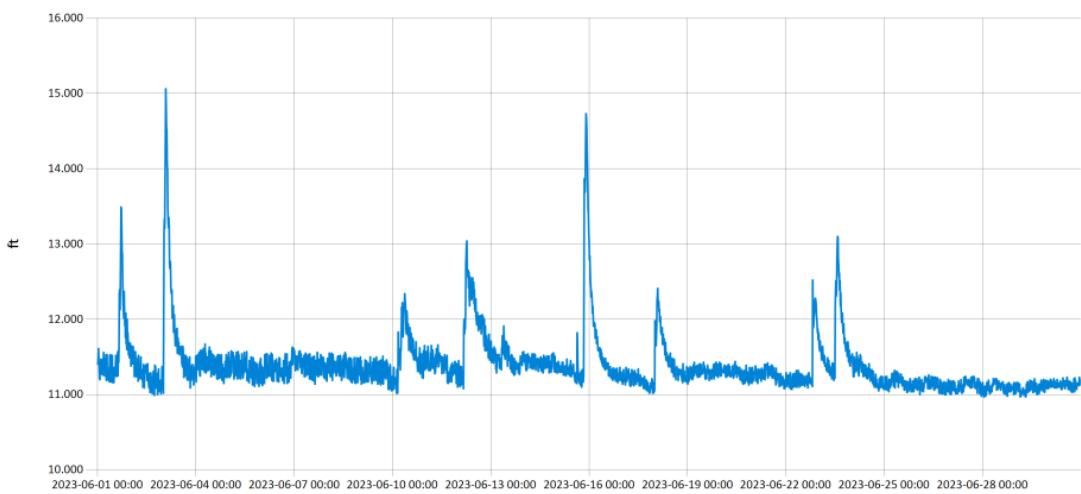


Stage@TG

Figure 6 Monthly Hydrograph TG-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

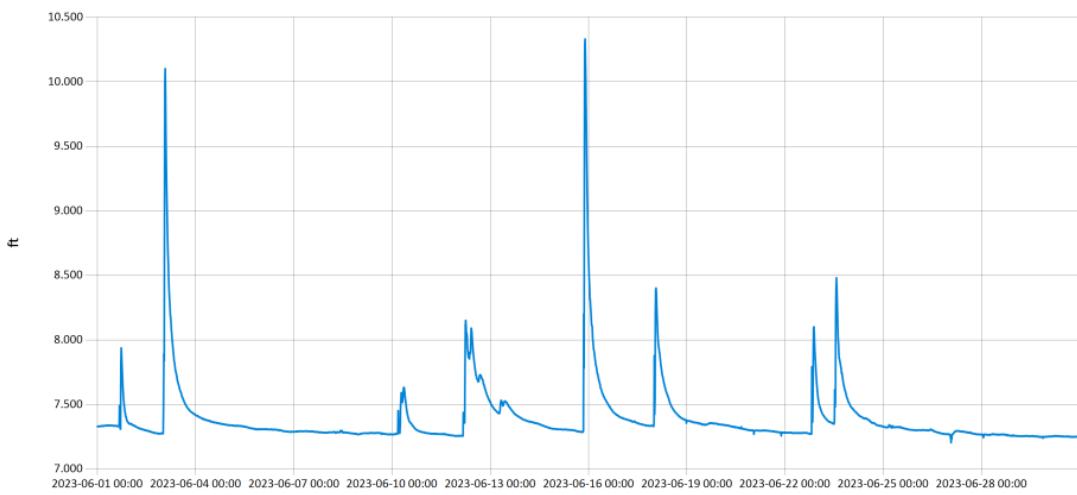


Stage@TE

Figure 7 Monthly Hydrograph TE-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

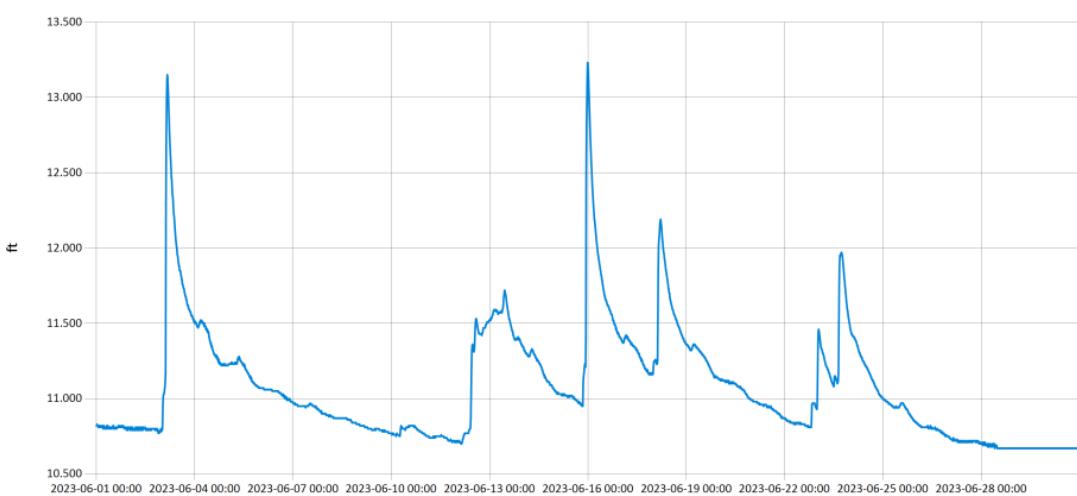


Stage@WC

Figure 8 Monthly Hydrograph WC-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

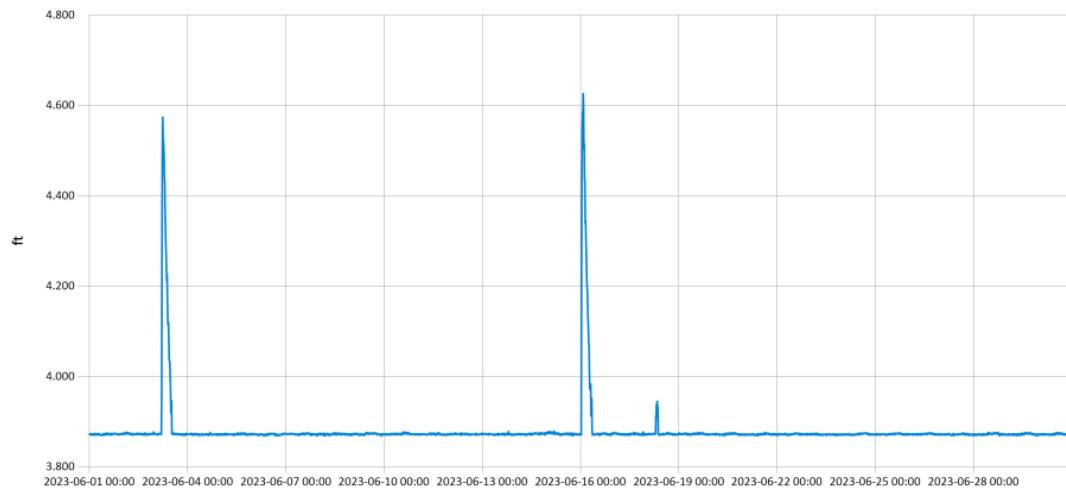


Stage@URC

Figure 9 Monthly Hydrograph URC-2

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

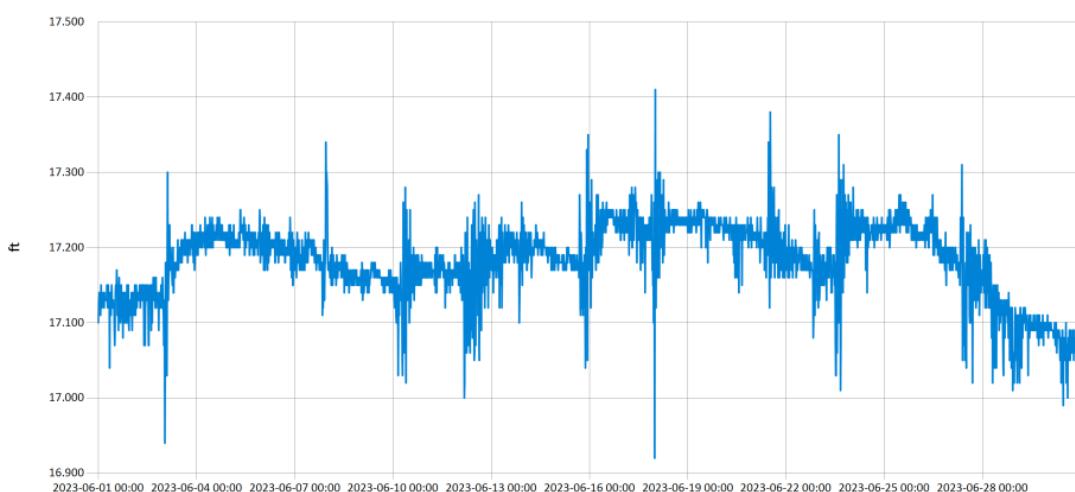


Stage@LRC

Figure 10 Monthly Hydrograph LRC-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

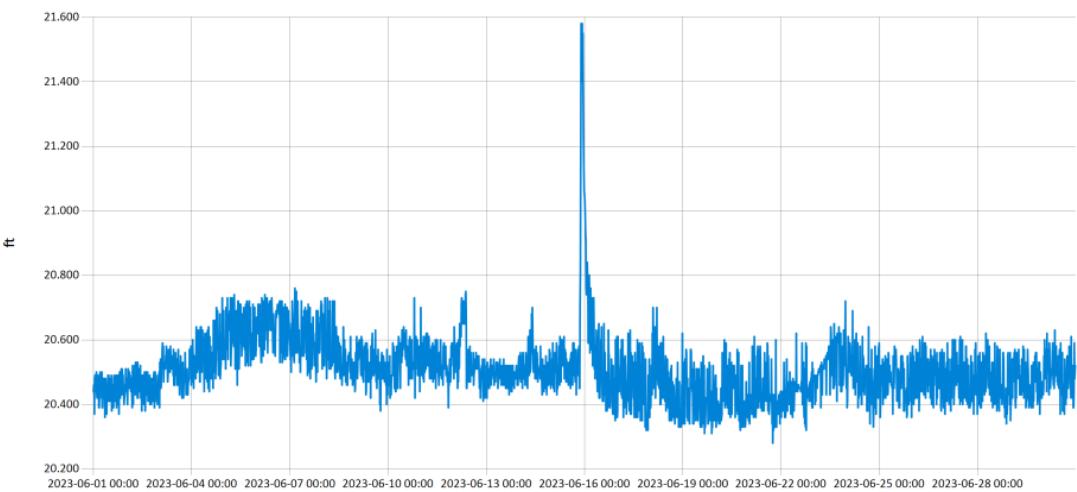


Stage@LDB

Figure 11 Monthly Hydrograph LDB-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

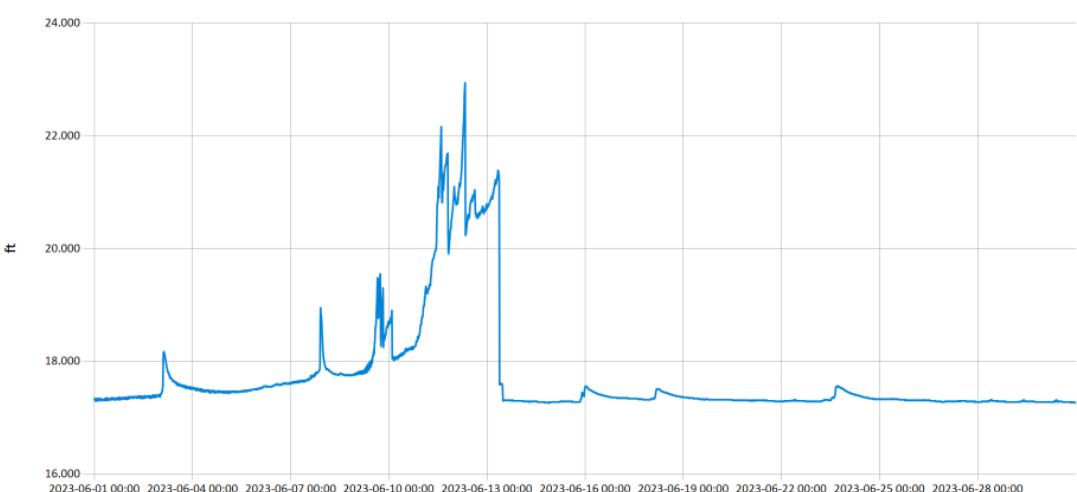


Stage@CC

Figure 12 Monthly Hydrograph CC-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00



Stage@UDB

Figure 13 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY (NRMN) Norman Latitude: 35-14-09									June 2023 Nearest City: 2.1 NW Norman Longitude: 97-27-53						Time Zone: Midnight-Midnight CST County: Cleveland Elevation: 1171 feet					
DAY	TEMPERATURE (°F)				DEG DAYS		HUMIDITY (%)			RAIN (in)	PRESSURE (in)		WIND DIR	SPEED (mph)	SOLAR (MJ/m²)	4" SOIL TEMPERATURES				
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG		STN	MSL				SOD	BARE	MAX	MIN	
1	86	68	75.5	65.8	0	12	91	52	72	0.63	28.68	29.93	SSE	7.1	34.8	18.53	73.5	78.0	85	74
2	86	67	76.4	64.2	0	11	88	50	67	0.00	28.67	29.91	SE	8.2	26.8	22.16	73.7	75.4	80	71
3	79	63	70.6	64.3	0	6	97	58	82	1.10	28.65	29.90	WSW	5.0	30.0	20.94	73.4	75.0	81	70
4	79	64	70.2	64.8	0	6	96	68	84	0.00	28.70	29.94	NE	4.3	12.1	10.51	72.9	73.4	76	71
5	86	64	74.7	62.6	0	10	95	42	69	0.00	28.74	29.98	NW	3.7	17.4	23.47	73.1	74.2	81	68
6	86	64	74.0	62.3	0	10	91	44	69	0.00	28.72	29.97	ENE	4.1	14.8	20.01	74.1	74.4	82	69
7	87	62	75.0	62.4	0	10	93	39	67	0.00	28.65	29.89	ESE	3.6	19.8	23.07	74.8	75.1	82	69
8	88	64	76.4	63.2	0	11	94	40	66	0.00	28.60	29.84	SW	4.5	20.4	25.74	75.2	76.6	84	70
9	91	65	80.0	65.6	0	13	95	40	64	0.00	28.59	29.83	SSE	4.1	15.3	24.59	75.8	79.2	87	71
10	86	64	75.8	65.4	0	10	94	47	72	0.29	28.54	29.78	SSE	6.4	36.6	23.62	76.4	78.8	84	73
11	88	67	77.2	65.0	0	12	96	42	68	0.00	28.60	29.85	NNW	8.1	24.7	28.22	76.8	79.5	87	73
12	67	61	63.4	60.4	1	0	95	81	90	0.99	28.72	29.96	NE	6.8	28.4	5.29	73.1	72.3	78	70
13	80	61	70.6	64.2	0	5	94	62	81	0.15	28.62	29.87	SE	4.7	15.3	17.71	72.6	73.3	79	68
14	86	66	76.0	63.7	0	11	98	40	69	0.00	28.52	29.76	NW	4.4	17.6	27.68	75.0	77.1	83	72
15	88	64	75.2	64.8	0	11	98	44	73	0.77	28.53	29.77	ESE	7.6	84.0	21.70	75.1	75.8	83	70
16	86	65	74.7	63.6	0	10	91	46	71	0.00	28.62	29.87	NNE	5.6	19.4	25.91	74.9	76.3	84	70
17	86	64	77.2	67.1	0	10	97	53	72	0.13	28.63	29.87	SSE	8.7	62.1	25.51	76.0	77.6	82	72
18	85	62	72.7	61.9	0	8	97	45	71	0.28	28.55	29.79	NW	6.0	37.0	29.06	75.6	77.2	84	70
19	90	63	79.2	66.6	0	11	97	44	68	0.00	28.58	29.82	ESE	8.2	20.5	28.27	76.2	77.5	83	71
20	94	74	83.6	74.1	0	19	85	58	74	0.00	28.57	29.82	ESE	10.1	20.8	26.55	78.5	79.9	86	74
21	85	75	80.1	70.3	0	15	84	57	73	0.00	28.64	29.88	SE	9.9	46.1	23.81	79.4	80.0	84	77
22	88	68	78.1	67.8	0	13	90	51	72	0.29	28.68	29.93	E	6.4	32.9	23.07	79.0	80.5	88	75
23	84	67	74.8	68.3	0	10	97	61	81	0.50	28.70	29.95	SE	6.6	52.6	14.51	76.9	77.2	80	74
24	93	70	82.1	72.2	0	16	95	53	74	0.00	28.62	29.86	SSE	7.3	18.6	26.75	77.8	78.9	85	73
25	91	73	83.3	73.1	0	17	94	61	72	0.00	28.64	29.89	NE	7.0	20.0	23.24	79.6	80.9	85	76
26	88	76	81.3	61.6	0	17	64	38	52	0.00	28.69	29.93	ENE	8.0	20.8	25.77	79.4	79.0	84	75
27	90	74	81.9	70.4	0	17	87	56	69	0.00	28.62	29.86	SE	10.6	31.5	17.79	78.8	79.1	85	75
28	97*	76*	86.6*	73.1*	0*	22*	96*	45*	67*	0.00*	28.60*	29.84*	SSE*	10.3*	23.9*	NA	79.8*	85.0*	93*	77*
29	98	76	87.2	69.7	0	22	73	41	57	0.00	28.65	29.90	S	9.0	20.4	27.72	79.9	87.6	96	80
30	94	77	85.2	67.8	0	20	80	37	58	0.00	28.69	29.94	SSE	7.8	20.2	25.72	79.7	88.2	95	82
	87*	67*	77.3*	66.2*	<- Monthly Averages ->				28.63*	29.88*	SSE*	6.8*	84.0*	22.65*	76.2*	78.1*	84*	73*		
Temperature - Highest: 98* Lowest: 61*					Degree Days - Total HDD: 1* Total CDD: 370*					Number of Days With: Tmax ≥ 90: 9* Rainfall ≥ 0.01 inch: 10* Tmax ≤ 32: 0* Rainfall ≥ 0.10 inch: 10* Tmin ≤ 32: 0* Avg Wind Speed ≥ 10 mph: 3* Tmin ≤ 0: 0* Max Wind Speed ≥ 30 mph: 10*										
Rainfall: Monthly Total: 5.13* in. Greatest 24 Hr: 1.10* in.					Humidity - Highest: 98* Lowest: 37*															

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* Denotes incomplete record

Figure 14 June Mesonet Data