

---

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

---



**OKLAHOMA**  
**Water Resources Board**

# Lake Thunderbird TMDL Monitoring Plan Implementation: August 2023 Monitoring Report

---

Oklahoma Water Resources Board  
Water Quality Programs Division  
Monitoring and Assessment Section  
3800 N. Classen, Oklahoma City, Oklahoma 73118  
405-530-8800

## Contact

Sarah Dexter, Project Leader, [sarah.dexter@owrb.ok.gov](mailto:sarah.dexter@owrb.ok.gov)  
Lance Phillips, Streams Program Manager, [lance.phillips@owrb.ok.gov](mailto:lance.phillips@owrb.ok.gov)  
Bill Cauthron, Monitoring Coordinator, [bill.cauthron@owrb.ok.gov](mailto:bill.cauthron@owrb.ok.gov)

---

---

## TABLE OF CONTENTS

TABLE OF CONTENTS .....	3
LIST OF TABLES.....	3
LIST OF FIGURES .....	3
SUMMARY OF AUGUST SAMPLING.....	4
RESULTS.....	4

## LIST OF TABLES

TABLE 1 FIELD DATA FORM .....	5
TABLE 2 LABORATORY ANALYSIS SUMMARY .....	6
TABLE 3 QA/QC DATA WHERE THE ASTERISK DENOTES RPD2.....	6
TABLE 4 STATION DISCHARGE SUMMARY .....	6

## LIST OF FIGURES

FIGURE 1 MONITORING STATION MAP .....	4
FIGURE 2 DISCHARGE MEASUREMENT SUMMARY CC-1.....	7
FIGURE 3 MONTHLY HYDROGRAPH TG-1 .....	8
FIGURE 4 MONTHLY HYDROGRAPH TE-1 .....	8
FIGURE 5 MONTHLY HYDROGRAPH WC-1.....	9
FIGURE 6 MONTHLY HYDROGRAPH URC-2.....	9
FIGURE 7 MONTHLY HYDROGRAPH LRC-1 .....	10
FIGURE 8 MONTHLY HYDROGRAPH LDB-1 .....	10
FIGURE 9 MONTHLY HYDROGRAPH CC-1 .....	11
FIGURE 10 MONTHLY HYDROGRAPH UDB-1 .....	11
FIGURE 11 AUGUST MESONET DATA .....	12

## SUMMARY OF AUGUST SAMPLING

Sampling for August 2023 occurred during base flow conditions on the fourteenth. Water samples were collected at nine locations and discharge was measured at one location. Two 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. Mesonet shows 0.04 inches of precipitation on the fourteenth, 0.17 inches of precipitation in the 72 hours prior to sampling, and no precipitation in the 72 hours after sampling occurred. The total rainfall amount in Norman for the month of August was 0.59 inches. Samples were not collected at LT-1 since this station will be relocated later this year. All water level gauges were operational for the month, except for JB-1, which is having communication issues.

## RESULTS

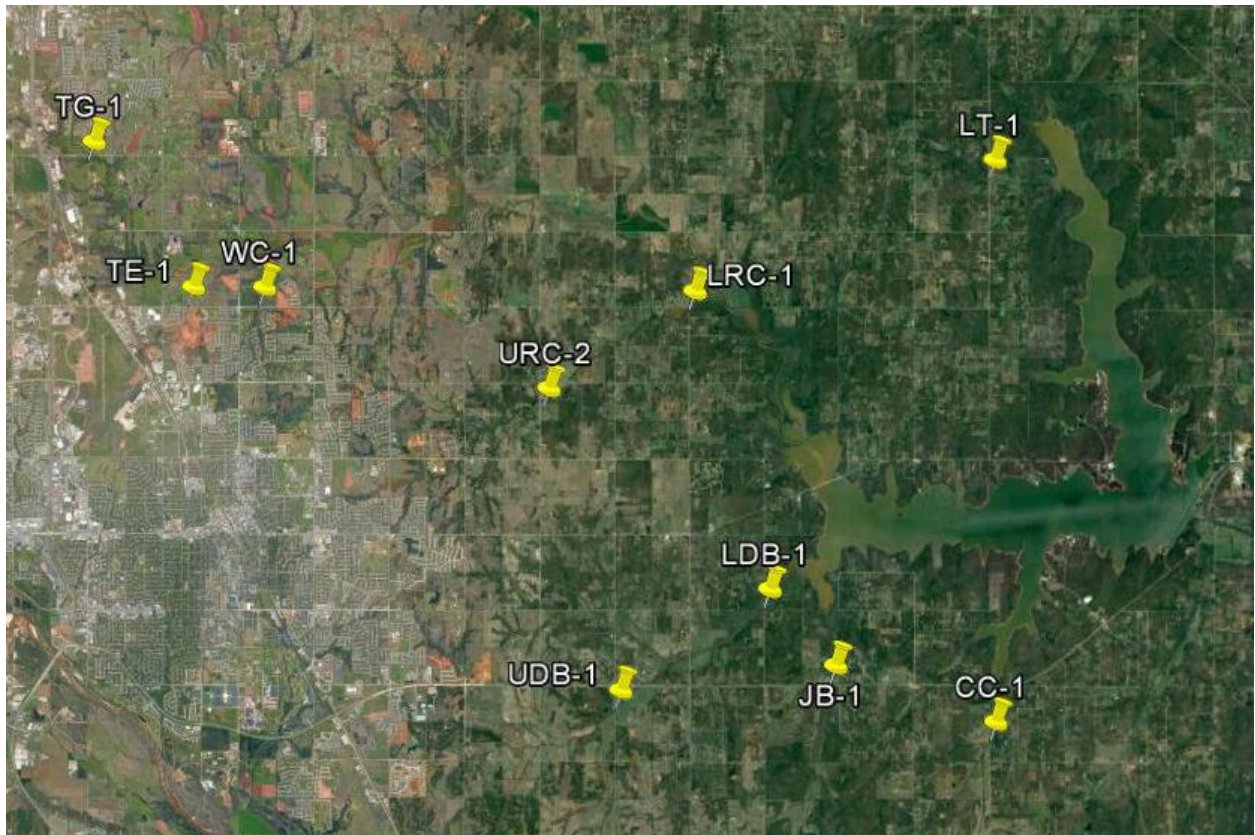


Figure 1 Monitoring Station Map

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	8/14/2023	9:16	AN	24.4	4.78	7.87	726	9	Very Low flow ; downstream of bridge channel forked into two distinct streams possibly due to beaver dam upstream
JB-1	Jim Blue Creek	8/14/2023	9:42	AN	23.1	4.61	7.78	914	27	No visual flow ; channel 2ft wide upstream and very shallow ; oil and grease heavily accumulated upstream; two samples collected
LDB-1	Lower Dave Blue Creek	8/14/2023	11:34	AN	25.9	5.09	7.88	1029	14	Normal looking conditions
LRC-1	Lower Rock Creek	8/14/2023	12:06	AN	25.3	5.19	7.88	716	13	Normal flow
TE-1	Little River Tributary	8/14/2023	14:41	AN	30.1	5.61	8.25	1181	673	Dry under bridge; sampled in pool upstream of bridge
TG-1	Little River	8/14/2023	15:09	AN	26.9	9.18	8.20	1143	6	Lots of algae, clear water; low water level; 2 channels downstream; RP1 barely over water
UDB-1	Upper Dave Blue Creek	8/14/2023	10:19	AN	24.1	4.72	7.99	1017	17	Low flow ; changed dcp
URC-2	Upper Rock Creek	8/14/2023	12:41	AN	30.8	8.83	8.23	3394	15	Low water level; no visual flow ; barely connected downstream
WC-1	Woodcrest Creek	8/14/2023	14:18	AN	23.2	6.11	7.73	672	13	Low water level; orifice out of water

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	0.19	0.78	0.050	6.0
JB-1	Jim Blue Creek (ds)	0.16	0.64	0.053	8.0
JB-1	Jim Blue Creek (us)	<0.05	0.40	0.040	10.0
LDB-1	Lower Dave Blue Creek	<0.05	0.80	0.055	6.0
LRC-1	Lower Rock Creek	<0.05	0.42	0.045	<5.0
TE-1	Little River Tributary	<0.05	2.15	0.415	390
TG-1	Little River	<0.05	0.63	0.052	16.0
UDB-1	Upper Dave Blue Creek	0.09	0.34	0.036	8.0
URC-2	Upper Rock Creek	<0.05	0.62	0.053	<5.0
WC-1	Woodcrest Creek	<0.05	0.32	0.057	<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	0.19	0.75	0.049	5.0
Duplicate RPD	0%	3.92%	2.02%	18.18%*

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	0.39	20.28
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	52.58	17.35
LRC-1	Lower Rock Creek	0.07	4.35
TE-1	Little River Tributary	N/A	N/A
TG-1	Little River	0.68	8.96
UDB-1	Upper Dave Blue Creek	0.08	17.20
URC-2	Upper Rock Creek	0.01	10.59
WC-1	Woodcrest Creek	0.01	6.56

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

**File Information**

File name: Clear Creek\_20230814.ft  
 Start date and time: 8/14/2023 8:54 AM  
 Start location latitude: 35.179  
 Start location longitude: -97.262  
 Calculations engine: FlowTracker2  
 Data collection mode: Discharge

**System Information**

**Discharge Summary**

Start time: 8/14/2023 9:00 AM    End time: 8/14/2023 9:12 AM  
 # Stations: 10    Avg interval: 40  
 Mean depth: 0.450 ft    Max depth: 0.600 ft  
 Mean velocity: 0.1930 ft/s    Max velocity: 0.3592 ft/s  
 Mean SNR: 43 dB    Total width: 4.500 ft  
 Mean temp: 76.358 °F    Total area: 2.0250 ft<sup>2</sup>  
 Wetted Perimeter: 4.901 ft    Total discharge: 0.3908 ft<sup>3</sup>/s

**Discharge Uncertainty**

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.7%	8.8%
Velocity	1.9%	19.2%
Width	0.2%	0.2%
Method	3.3%	
# Stations	5.1%	
Overall	6.5%	21.1%

**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**

Gauge height time	Gauge height (ft)	Rated discharge (ft <sup>3</sup> /s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
8/14/2023 9:00 AM	20.279				

**Measurement results**

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correcti on	Mean Velocity (ft/s)	Area (ft <sup>2</sup> )	Flow (ft <sup>3</sup> /s)	%Q	
0	9:00 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0003	0.0000	0.0000	0.00	✓
1	9:00 AM	0.500	0.6	0.550	0.6000	0.330	80	0.0003	1.0000	0.0003	0.2750	0.0001	0.02	✓
2	9:02 AM	1.000	0.6	0.600	0.6000	0.360	80	-0.0291	1.0000	-0.0291	0.3000	-0.0087	-2.23	✓
3	9:04 AM	1.500	0.6	0.600	0.6000	0.360	80	0.2839	1.0000	0.2839	0.3000	0.0852	21.79	✓
4	9:05 AM	2.000	0.6	0.500	0.6000	0.300	80	0.2843	1.0000	0.2843	0.2500	0.0711	18.19	✓
5	9:06 AM	2.500	0.6	0.500	0.6000	0.300	80	0.3433	1.0000	0.3433	0.2500	0.0858	21.96	✓
6	9:07 AM	3.000	0.6	0.450	0.6000	0.270	80	0.3592	1.0000	0.3592	0.2250	0.0808	20.68	✓
7	9:09 AM	3.500	0.6	0.450	0.6000	0.270	80	0.1615	1.0000	0.1615	0.2250	0.0363	9.30	✓
8	9:10 AM	4.000	0.6	0.400	0.6000	0.240	80	0.2012	1.0000	0.2012	0.2000	0.0402	10.30	✓
9	9:12 AM	4.500	None	0.000	0.0000	0.000	0	0.0000		0.2012	0.0000	0.0000	0.00	✓

**Quality control warnings**

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:00 AM	0.500	0.6	0.550	0.6000	0.330	Large SNR Variation, SNR Threshold Variation
3	9:04 AM	1.500	0.6	0.600	0.6000	0.360	High Stn % Discharge
4	9:05 AM	2.000	0.6	0.500	0.6000	0.300	High Stn % Discharge
5	9:06 AM	2.500	0.6	0.500	0.6000	0.300	High Stn % Discharge
6	9:07 AM	3.000	0.6	0.450	0.6000	0.270	High Stn % Discharge
8	9:10 AM	4.000	0.6	0.400	0.6000	0.240	High Stn % Discharge

Figure 2 Discharge Measurement Summary CC-1

Period Selected: 2023-08-01 00:00 - 2023-08-31 23:59

UTC Offset: -06:00

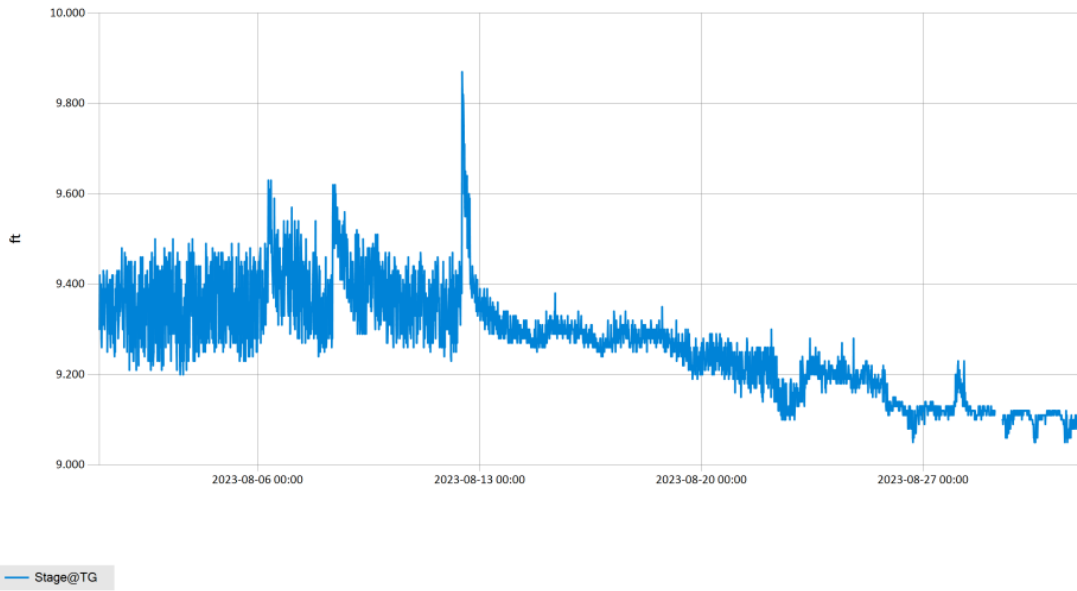


Figure 3 Monthly Hydrograph TG-1

Period Selected: 2023-08-01 00:00 - 2023-08-31 23:59

UTC Offset: -06:00

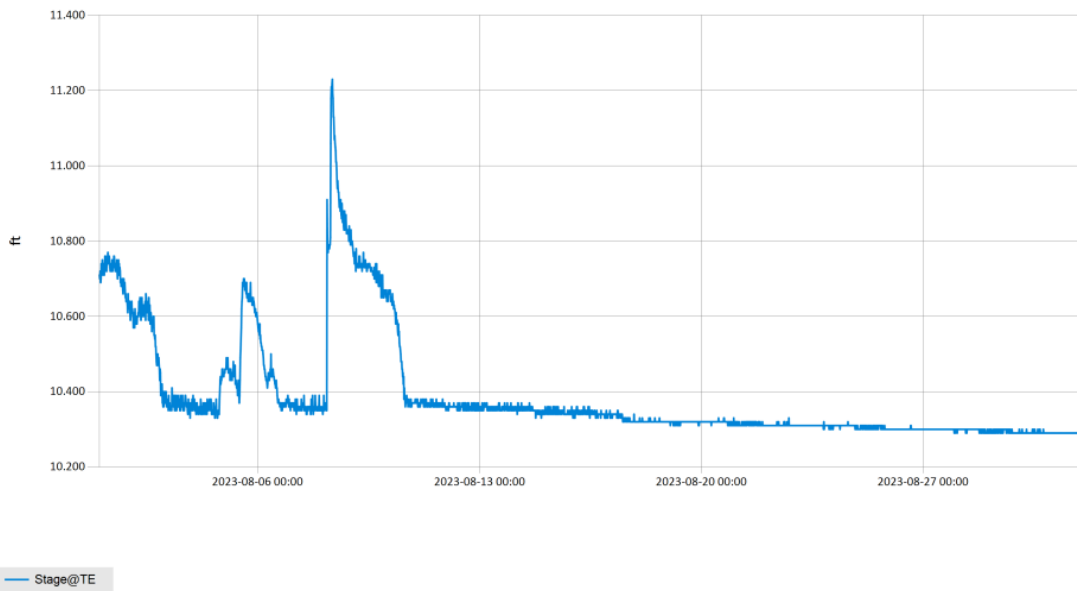
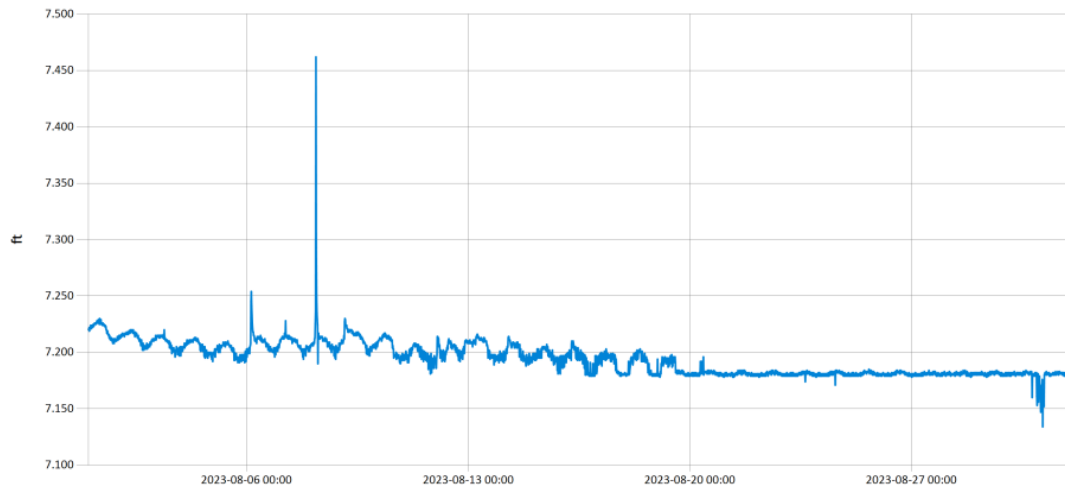


Figure 4 Monthly Hydrograph TE-1



Period Selected: 2023-08-01 00:00 - 2023-08-31 23:59

UTC Offset: -06:00

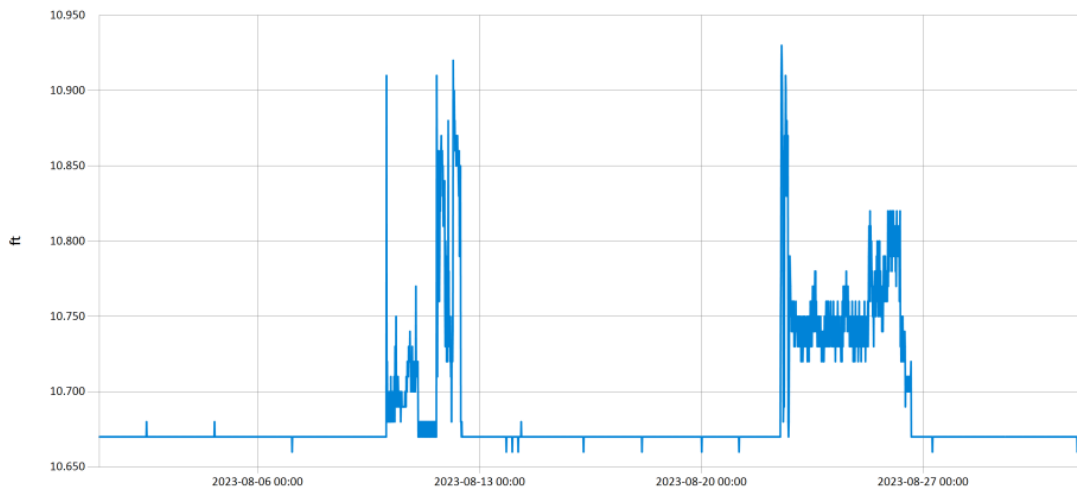


— Stage@WC

Figure 5 Monthly Hydrograph WC-1

Period Selected: 2023-08-01 00:00 - 2023-08-31 23:59

UTC Offset: -06:00

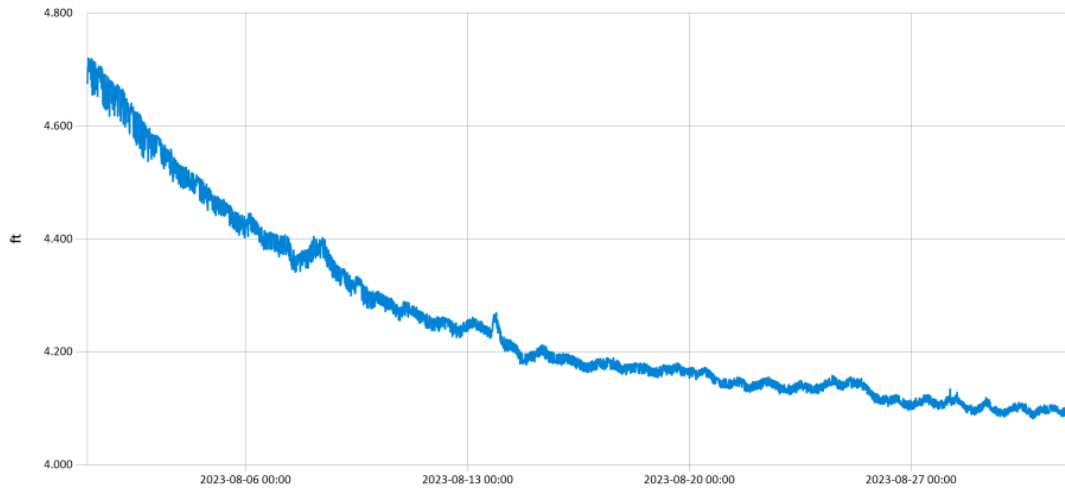


— Stage@URC

Figure 6 Monthly Hydrograph URC-2

Period Selected: 2023-08-01 00:00 - 2023-08-31 23:59

UTC Offset: -06:00

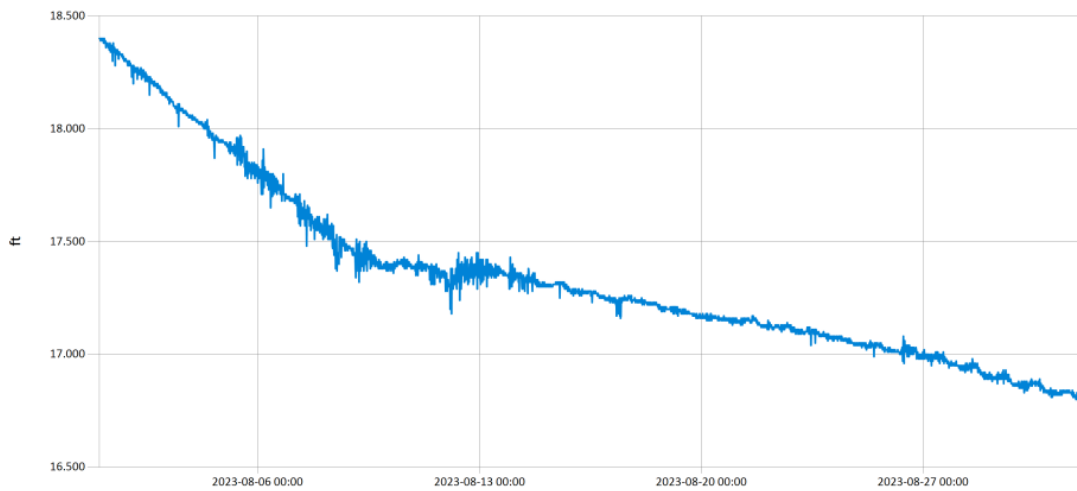


— Stage@LRC

Figure 7 Monthly Hydrograph LRC-1

Period Selected: 2023-08-01 00:00 - 2023-08-31 23:59

UTC Offset: -06:00

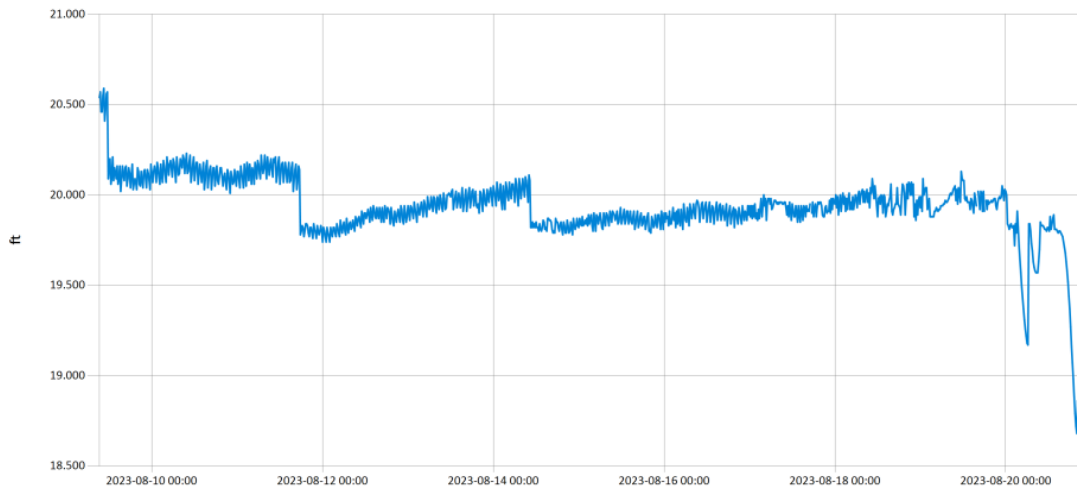


— Stage@LDB

Figure 8 Monthly Hydrograph LDB-1

Period Selected: 2023-08-01 00:00 - 2023-08-31 23:59

UTC Offs et: -06:00

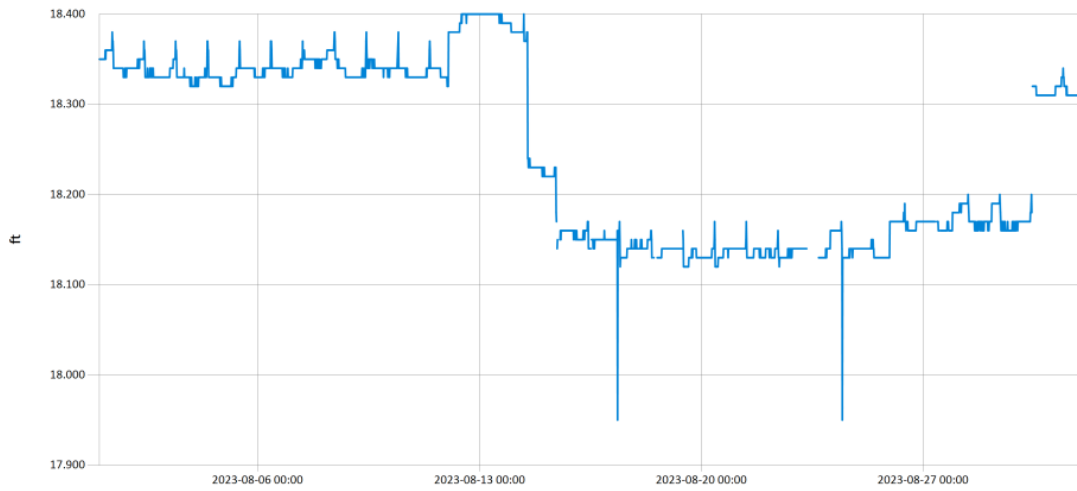


— Stage@CC

Figure 9 Monthly Hydrograph CC-1

Period Selected: 2023-08-01 00:00 - 2023-08-31 23:59

UTC Offs et: -06:00



— Stage@UDB

Figure 10 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				August 2023				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 )				DEG DAYS		HUMIDITY (%)			RAIN (in)		PRESSURE (in)		WIND SPEED (mph)		SOLAR (MJ/m <sup>2</sup> )	4" SOIL TEMPERATURES				
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG	(in)	STN	MSL	DIR	AVG	MAX		SOD	BARE	MAX	MIN	
1	102	78	89.7	69.6	0	25	85	29	55	0.00	28.78	30.03	S	8.9	20.7	26.23	83.4	91.8	98	86	
2	103	79	91.2	66.5	0	26	76	24	48	0.00	28.73	29.98	S	9.3	25.0	26.50	83.6	92.4	98	87	
3	103	77	90.5	62.2	0	25	56	24	40	0.00	28.68	29.93	S	8.6	24.6	25.94	83.3	92.2	98	86	
4	103	79	90.7	66.3	0	26	63	28	46	0.00	28.65	29.89	S	7.3	18.9	25.55	83.8	92.9	99	87	
5	94	75	85.6	66.2	0	20	83	34	54	0.00	28.70	29.94	S	9.8	34.3	21.97	83.8	91.5	95	88	
6	96	69	81.3	68.5	0	18	92	41	68	0.05	28.74	29.99	NE	8.5	30.6	24.06	83.4	89.5	96	83	
7	85	67	76.7	63.6	0	11	87	45	65	0.01	28.78	30.03	NE	8.2	28.7	18.14	82.2	88.1	92	84	
8	88	68	78.6	67.8	0	13	95	50	71	0.29	28.70	29.95	SE	11.5	41.2	24.19	81.5	84.6	88	80	
9	98	73	84.6	71.1	0	21	91	35	66	0.03	28.52	29.76	N	8.3	33.2	20.96	82.4	86.2	94	80	
10	94	71	83.1	68.3	0	17	93	34	64	0.00	28.59	29.84	ENE	5.7	18.3	25.48	82.9	88.8	96	81	
11	104	76	90.2	70.4	0	25	90	30	56	0.00	28.57	29.81	SSE	8.8	32.7	25.08	84.3	91.0	98	84	
12	91	76	82.5	68.1	0	19	85	37	63	0.17	28.64	29.89	SSE	9.3	27.8	6.22	82.6	85.8	92	81	
13	100	74	86.0	71.4	0	22	87	39	63	0.00	28.66	29.91	SSE	7.2	42.8	18.65	82.0	84.5	92	79	
14	86	65	74.9	61.4	0	10	89	35	66	0.04	28.87	30.13	N	9.8	27.9	17.54	81.0	84.0	88	80	
15	88	60	74.7	57.9	0	9	92	34	59	0.00	28.91	30.16	NNE	5.6	20.0	25.70	78.6	83.6	91	76	
16	92	60	77.7	59.3	0	11	94	34	57	0.00	28.77	30.02	SE	6.3	19.7	25.65	79.0	84.8	92	77	
17	100	71	83.7	62.0	0	21	74	28	50	0.00	28.66	29.90	S	7.8	21.0	25.41	80.7	87.2	95	80	
18	100	71	84.6	69.7	0	20	87	34	64	0.00	28.68	29.92	ENE	5.8	14.7	23.03	82.4	88.7	95	82	
19	106	75	91.4	61.0	0	26	67	19	40	0.00	28.70	29.95	S	6.2	21.3	24.70	83.0	90.2	97	83	
20	106	72	91.0	65.1	0	24	76	21	46	0.00	28.82	30.07	ESE	5.1	15.6	24.62	83.6	91.7	99	84	
21	103*	74*	90.4*	71.5*	0*	24*	91*	34*	57*	0.00*	28.85*	30.10*	ENE*	5.4*	19.2*	23.95*	85.1*	92.8*	99*	86*	
22	101	75	88.7	71.9	0	23	93	39	60	0.00	28.83	30.08	E	5.2	17.6	23.50	85.7	92.9	99	87	
23	101	77	89.6	69.6	0	24	76	32	54	0.00	28.80	30.05	SE	5.9	20.2	24.17	86.0	93.2	100	87	
24	102	78	90.3	66.7	0	25	80	25	50	0.00	28.76	30.01	ESE	5.7	20.4	23.85	85.9	93.4	99	87	
25	105	79	91.7	66.1	0	27	71	23	46	0.00	28.73	29.97	SE	6.3	16.7	23.08	86.2	93.7	100	88	
26	101	79	89.1	67.7	0	25	68	34	51	0.00	28.71	29.95	NNE	6.8	21.3	22.25	86.2	93.5	99	88	
27	91	74	81.7	67.5	0	17	84	44	63	0.00	28.73	29.97	NNE	8.8	19.7	17.38	85.1	91.3	95	88	
28	89	66	77.5	59.6	0	13	86	32	57	0.00	28.75	30.00	NE	7.0	24.8	24.41	83.2	88.7	94	83	
29	92*	65*	78.4*	59.9*	0*	13*	85*	31*	56*	0.00*	28.76*	30.01*	NNE*	5.0*	20.3*	NA	81.5*	87.8*	94*	82*	
30	92	67	79.4	59.8	0	14	82	29	54	0.00	28.72	29.97	NE	5.6	23.2	22.51	81.2	87.5	93	82	
31	93	63	79.1	60.2	0	13	86	29	56	0.00	28.70	29.95	E	5.5	17.7	23.78	81.1	87.0	94	80	
										97* 72* 84.7* 65.7*		<- Monthly Averages ->		28.73* 29.97*		S * 7.3* 42.8*		22.82*		83.1* 89.4* 96* 83*	
Temperature - Highest: 106*					Degree Days - Total HDD: 0*					Number of Days With:											
Lowest: 60*					Total CDD: 607*					Tmax ≥ 90: 26*					Rainfall ≥ 0.01 inch: 6*						
Rainfall: Monthly Total: 0.59* in.					Humidity - Highest: 95*					Tmax ≤ 32: 0*					Rainfall ≥ 0.10 inch: 2*						
Greatest 24 Hr: 0.29* in.					Lowest: 19*					Tmin ≤ 32: 0*					Avg Wind Speed ≥ 10 mph: 1*						
										Tmin ≤ 0: 0*					Max Wind Speed ≥ 30 mph: 6*						

© 1993-2023 Oklahoma Climatological Survey and the Oklahoma Mesonet

\* Denotes incomplete record

Figure 11 August Mesonet Data