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

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

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

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Oklahoma Water Resources Board  
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## TABLE OF CONTENTS

TABLE OF CONTENTS .....	3
LIST OF TABLES.....	3
LIST OF FIGURES .....	3
SUMMARY OF SEPTEMBER 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 RPD4.....	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 DISCHARGE MEASUREMENT SUMMARY LRC-1.....	8
FIGURE 4 DISCHARGE MEASUREMENT SUMMARY TG-1 .....	9
FIGURE 5 MONTHLY HYDROGRAPH TG-1.....	10
FIGURE 6 MONTHLY HYDROGRAPH TE-1 .....	10
FIGURE 7 MONTHLY HYDROGRAPH WC-1.....	11
FIGURE 8 MONTHLY HYDROGRAPH URC-2.....	11
FIGURE 9 MONTHLY HYDROGRAPH LRC-1 .....	12
FIGURE 10 MONTHLY HYDROGRAPH LDB-1 .....	12
FIGURE 11 MONTHLY HYDROGRAPH CC-1 .....	13
FIGURE 12 MONTHLY HYDROGRAPH UDB-1 .....	13
FIGURE 13 SEPTEMBER MESONET DATA .....	14

## SUMMARY OF SEPTEMBER SAMPLING

Sampling for September 2023 occurred during base flow conditions on the twelfth. Water samples were collected at nine locations and discharge was measured at three locations. Mesonet shows 0.16 inches of precipitation on the twelfth, 0.31 inches of precipitation in the 72 hours prior to sampling, and 0.30 inches of precipitation in the 72 hours after sampling occurred. The total rainfall amount in Norman for the month of September was 2.57 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

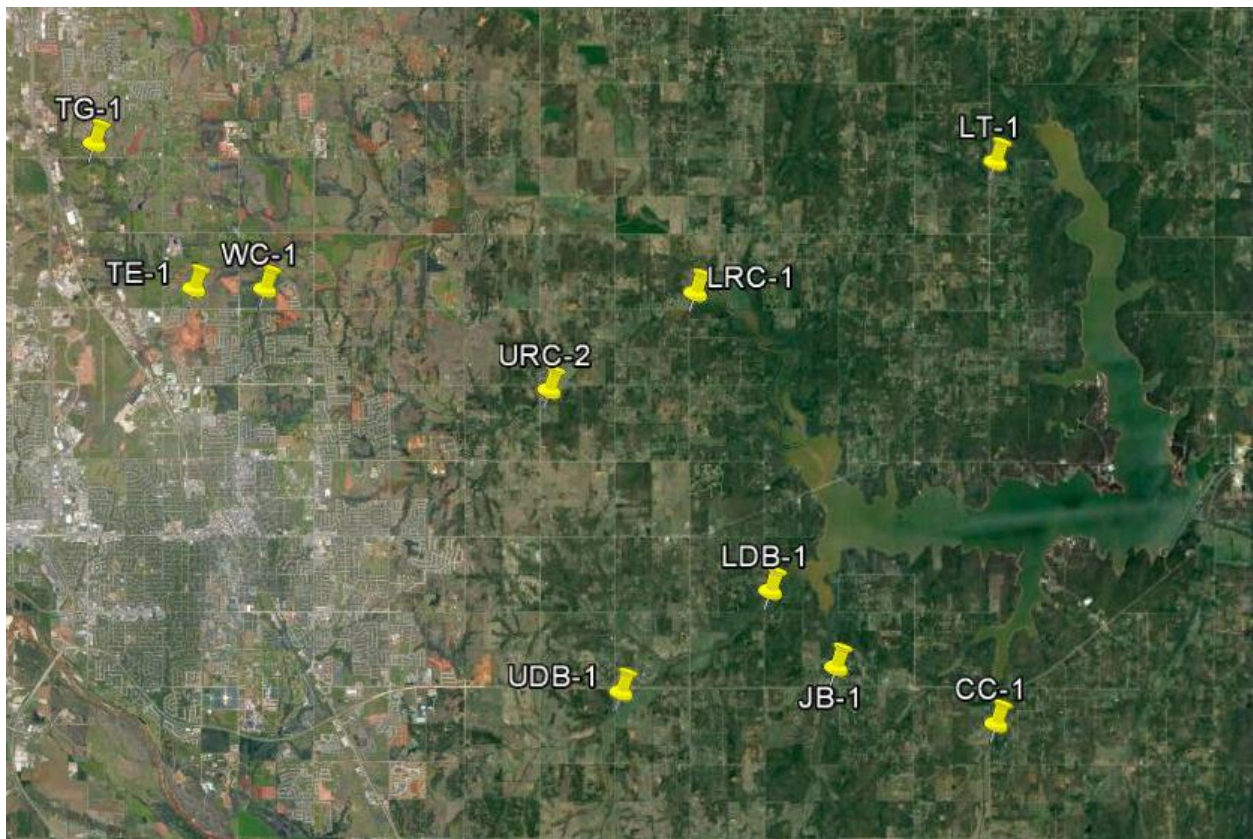


Figure 1 Monitoring Station Map

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	9/12/2023	9:55	SD	20.9	5.50	7.97	682	10	Used RP4; DCP not working; bank vegetation very overgrown
JB-1	Jim Blue Creek	9/12/2023	10:20	SD	21.3	5.46	8.16	328	65	Disconnected on downstream side of bridge; sampled on upstream; did not look connected at the rocks on upstream side
LDB-1	Lower Dave Blue Creek	9/12/2023	10:40	SD	24.3	3.48	8.22	488	28	Low water level; no visible surface flow
LRC-1	Lower Rock Creek	9/12/2023	11:25	SD	22.0	4.44	7.92	648	18	Normal stage but channel was more full than usual; large tree fallen across channel downstream
TE-1	Little River Tributary	9/12/2023	13:04	SD	23.1	5.64	7.74	1286	20	Beaver dam approx 25ft upstream and a second one further upstream of that; had water and some visual flow
TG-1	Little River	9/12/2023	13:45	SD	22.4	7.20	8.16	334	30	Orifice may have been clogged; flowing more than usual- could be considered borderline normal/above normal flow
UDB-1	Upper Dave Blue Creek	9/12/2023	8:35	SD	20.7	3.39	8.01	924	13	Lower than normal; Orifice not held firmly in place- may explain why stage is very different; changed DCP
URC-2	Upper Rock Creek	9/12/2023	12:13	SD	21.3	4.79	7.91	729	27	Orifice out of water
WC-1	Woodcrest Creek	9/12/2023	12:43	SD	21.2	5.01	7.95	385	25	Just barely disconnected under the bridge; very low water conditions; 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	<0.05	0.33	0.059	<5.0
JB-1	Jim Blue Creek	0.12	2.23	0.320	84.0
LDB-1	Lower Dave Blue Creek	<0.05	0.81	0.061	18.0
LRC-1	Lower Rock Creek	<0.05	0.38	0.048	<5.0
TE-1	Little River Tributary	0.07	0.83	0.080	10.0
TG-1	Little River	0.28	0.56	0.077	20.0
UDB-1	Upper Dave Blue Creek	<0.05	0.39	0.038	12.0
URC-2	Upper Rock Creek	0.10	0.52	0.050	18.0
WC-1	Woodcrest Creek	0.52	1.29	0.102	10.0

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	0.29	0.060	5.0
Duplicate RPD	0%	12.90%	1.68%	66.67%*

Table 3 QA/QC Data Where the Asterisk Denotes RPD4

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	0.24	20.18
JB-1	Jim Blue Creek	0.00	7.08
LDB-1	Lower Dave Blue Creek	2.32	16.54
LRC-1	Lower Rock Creek	-0.48	4.33
TE-1	Little River Tributary	0.03	10.99
TG-1	Little River	5.09	9.14
UDB-1	Upper Dave Blue Creek	0.01	16.99
URC-2	Upper Rock Creek	0.01	10.65
WC-1	Woodcrest Creek	0.00	7.24

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

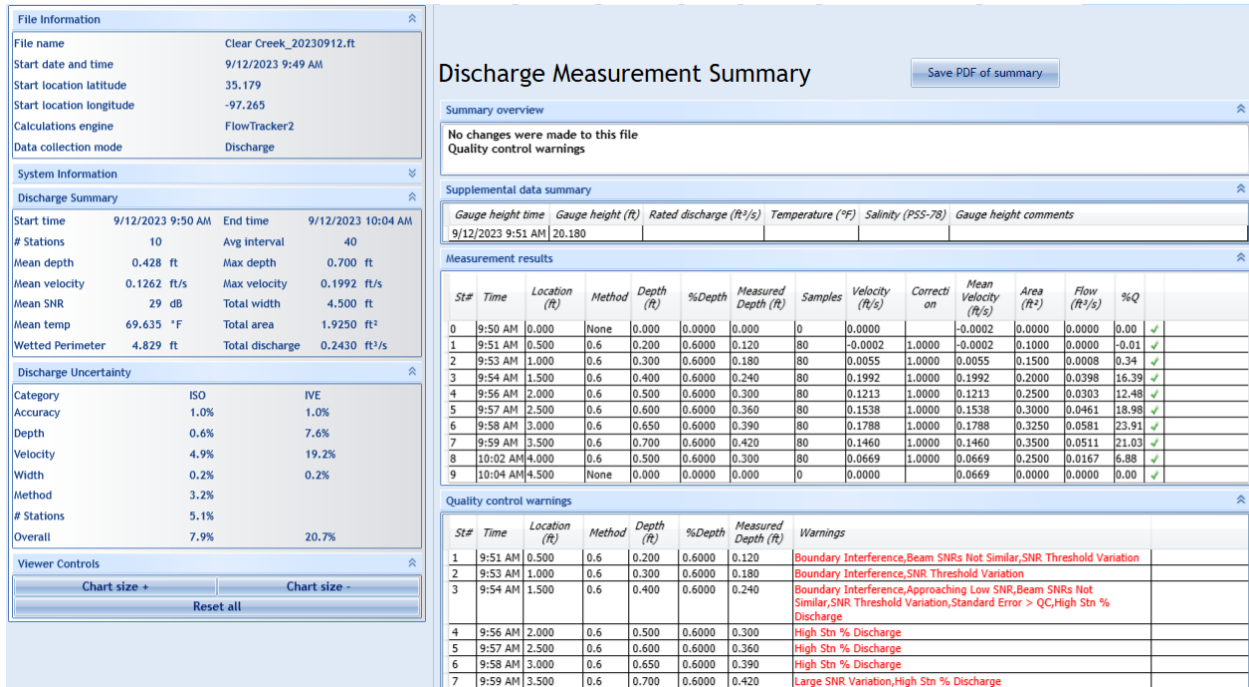


Figure 2 Discharge Measurement Summary CC-1

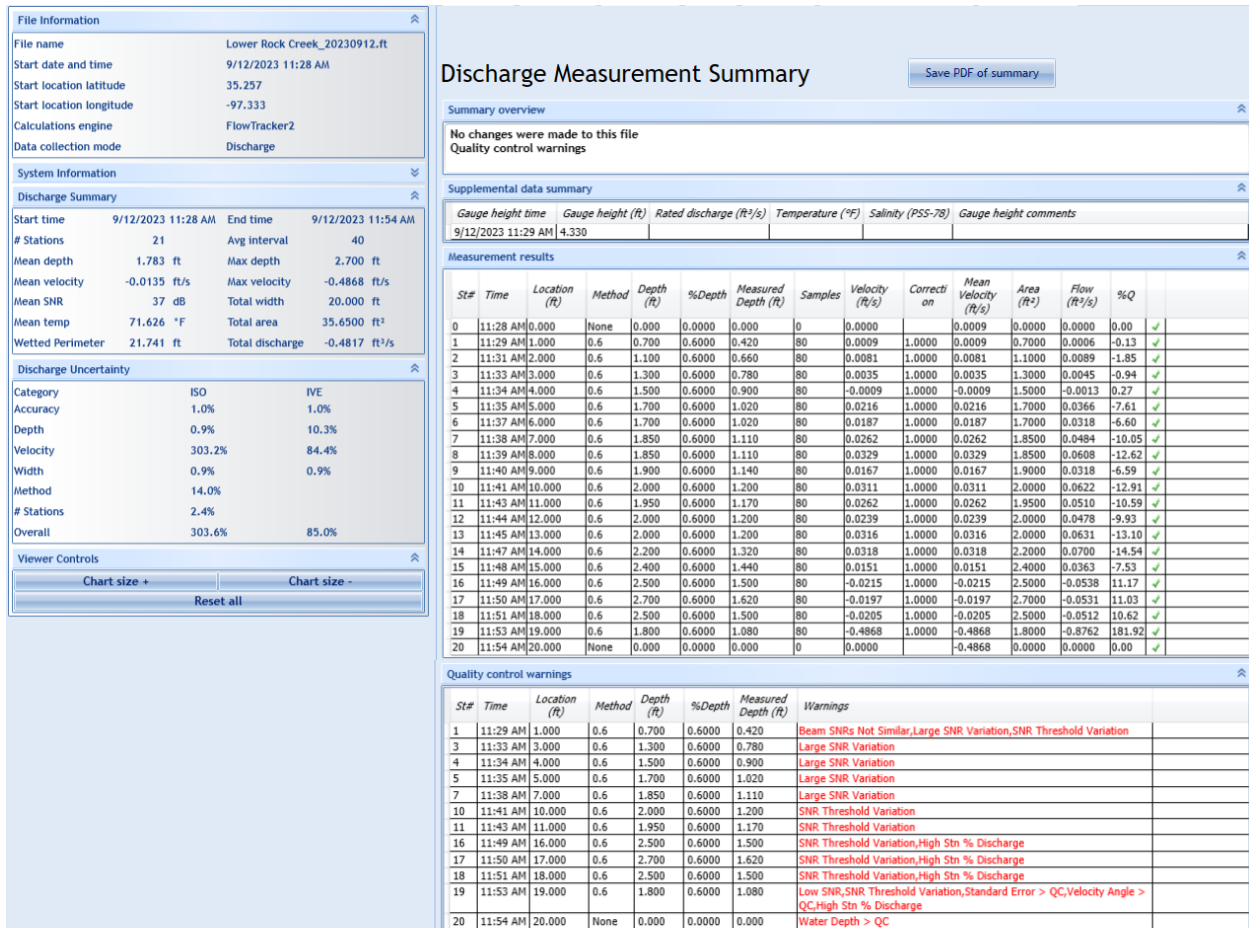


Figure 3 Discharge Measurement Summary LRC-1



**File Information**

File name: Little River\_20230912.ft  
 Start date and time: 9/12/2023 1:37 PM  
 Start location latitude: 35.286  
 Start location longitude: -97.471  
 Calculations engine: FlowTracker2  
 Data collection mode: Discharge

**System Information**

**Discharge Summary**

Start time: 9/12/2023 1:37 PM    End time: 9/12/2023 2:15 PM  
 # Stations: 26    Avg interval: 40  
 Mean depth: 0.660 ft    Max depth: 1.000 ft  
 Mean velocity: 0.3087 ft/s    Max velocity: 0.4307 ft/s  
 Mean SNR: 32 dB    Total width: 25.000 ft  
 Mean temp: 72.345 °F    Total area: 16.5000 ft²  
 Wetted Perimeter: 25.382 ft    Total discharge: 5.0939 ft³/s

**Discharge Uncertainty**

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	3.1%
Velocity	0.4%	4.1%
Width	0.1%	0.1%
Method	1.7%	
# Stations	2.0%	
Overall	2.8%	5.2%

**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 (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
9/12/2023 1:41 PM	9.140				

**Measurement results**

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	1:37 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0912	0.0000	0.0000	0.00	✓
1	1:38 PM	1.000	0.6	0.700	0.6000	0.420	80	0.0912	1.0000	0.0912	0.7000	0.0639	1.25	✓
2	1:39 PM	2.000	0.6	1.000	0.6000	0.600	80	0.2355	1.0000	0.2355	1.0000	0.2355	4.62	✓
3	1:41 PM	3.000	0.6	1.000	0.6000	0.600	80	0.2431	1.0000	0.2431	1.0000	0.2431	4.77	✓
4	1:42 PM	4.000	0.6	1.000	0.6000	0.600	80	0.3137	1.0000	0.3137	1.0000	0.3137	6.16	✓
5	1:43 PM	5.000	0.6	1.000	0.6000	0.600	80	0.3767	1.0000	0.3767	1.0000	0.3767	7.40	✓
6	1:44 PM	6.000	0.6	1.000	0.6000	0.600	80	0.3713	1.0000	0.3713	1.0000	0.3713	7.29	✓
7	1:45 PM	7.000	0.6	1.000	0.6000	0.600	80	0.4016	1.0000	0.4016	1.0000	0.4016	7.88	✓
8	1:47 PM	8.000	0.6	0.900	0.6000	0.540	80	0.2771	1.0000	0.2771	0.9000	0.2494	4.90	✓
9	1:48 PM	9.000	0.6	0.800	0.6000	0.480	80	0.2372	1.0000	0.2372	0.8000	0.1897	3.72	✓
10	1:49 PM	10.000	0.6	0.900	0.6000	0.540	80	0.4307	1.0000	0.4307	0.9000	0.3877	7.61	✓
11	1:50 PM	11.000	0.6	0.800	0.6000	0.480	80	0.3772	1.0000	0.3772	0.8000	0.3018	5.92	✓
12	1:51 PM	12.000	0.6	0.700	0.6000	0.420	80	0.1990	1.0000	0.1990	0.7000	0.1393	2.74	✓
13	1:53 PM	13.000	0.6	0.600	0.6000	0.360	80	0.4217	1.0000	0.4217	0.6000	0.2530	4.97	✓
14	2:02 PM	14.000	0.6	0.500	0.6000	0.300	80	0.4289	1.0000	0.4289	0.5000	0.2145	4.21	✓
15	2:03 PM	15.000	0.6	0.500	0.6000	0.300	80	0.3975	1.0000	0.3975	0.5000	0.1987	3.90	✓
16	2:04 PM	16.000	0.6	0.500	0.6000	0.300	80	0.3602	1.0000	0.3602	0.5000	0.1801	3.54	✓
17	2:05 PM	17.000	0.6	0.500	0.6000	0.300	80	0.3387	1.0000	0.3387	0.5000	0.1693	3.32	✓
18	2:06 PM	18.000	0.6	0.500	0.6000	0.300	80	0.3432	1.0000	0.3432	0.5000	0.1716	3.37	✓
19	2:07 PM	19.000	0.6	0.500	0.6000	0.300	80	0.3296	1.0000	0.3296	0.5000	0.1648	3.24	✓
20	2:08 PM	20.000	0.6	0.500	0.6000	0.300	80	0.2896	1.0000	0.2896	0.5000	0.1448	2.84	✓
21	2:09 PM	21.000	0.6	0.400	0.6000	0.240	80	0.2967	1.0000	0.2967	0.4000	0.1187	2.33	✓
22	2:10 PM	22.000	0.6	0.400	0.6000	0.240	80	0.2718	1.0000	0.2718	0.4000	0.1087	2.13	✓
23	2:12 PM	23.000	0.6	0.400	0.6000	0.240	80	0.2311	1.0000	0.2311	0.4000	0.0925	1.81	✓
24	2:13 PM	24.000	0.6	0.400	0.6000	0.240	80	0.0087	1.0000	0.0087	0.4000	0.0035	0.07	✓
25	2:15 PM	25.000	None	0.000	0.0000	0.000	0	0.0000		0.0087	0.0000	0.0000	0.00	✓

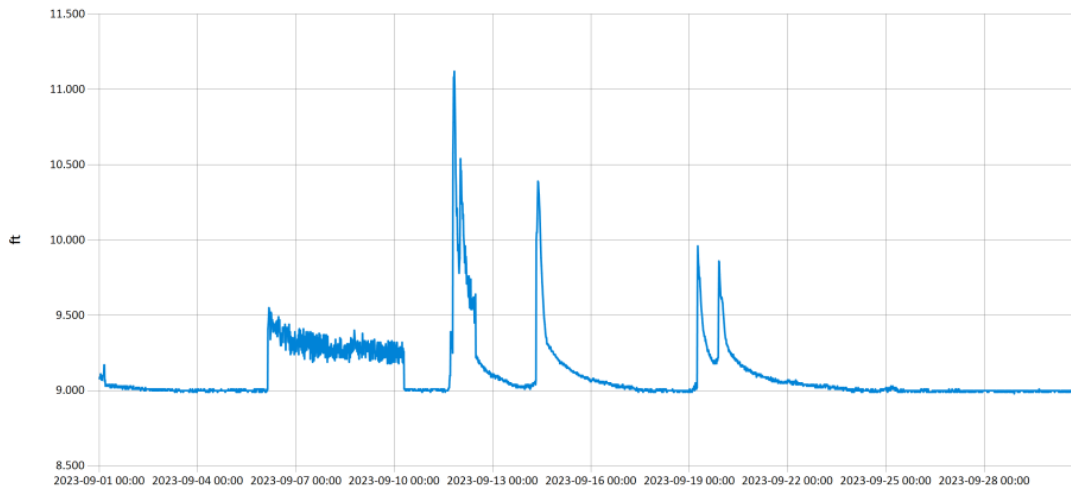
**Quality control warnings**

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	1:38 PM	1.000	0.6	0.700	0.6000	0.420	Velocity Angle > QC
9	1:48 PM	9.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
24	2:13 PM	24.000	0.6	0.400	0.6000	0.240	Large SNR Variation, SNR Threshold Variation

Figure 4 Discharge Measurement Summary TG-1

Period Selected: 2023-09-01 00:00 - 2023-09-30 23:59

UTC Offs et: -06:00

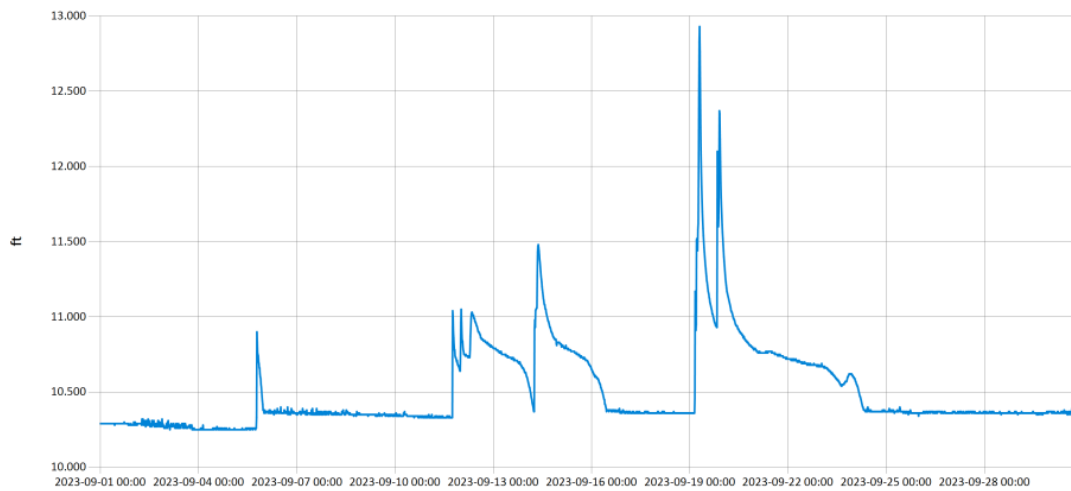


— Stage@TG

Figure 5 Monthly Hydrograph TG-1

Period Selected: 2023-09-01 00:00 - 2023-09-30 23:59

UTC Offset: -06:00

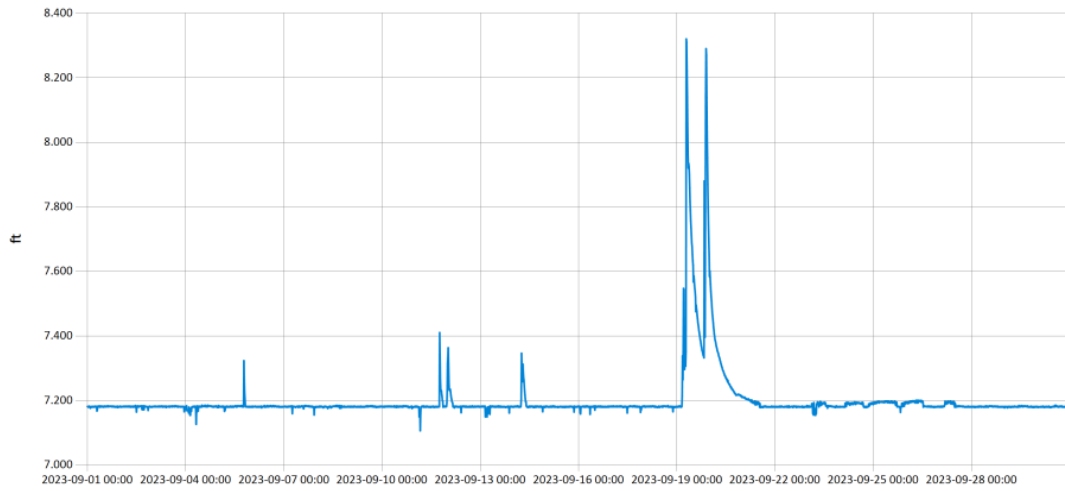


— Stage@TE

Figure 6 Monthly Hydrograph TE-1

Period Selected: 2023-09-01 00:00 - 2023-09-30 23:59

UTC Offs et: -06:00

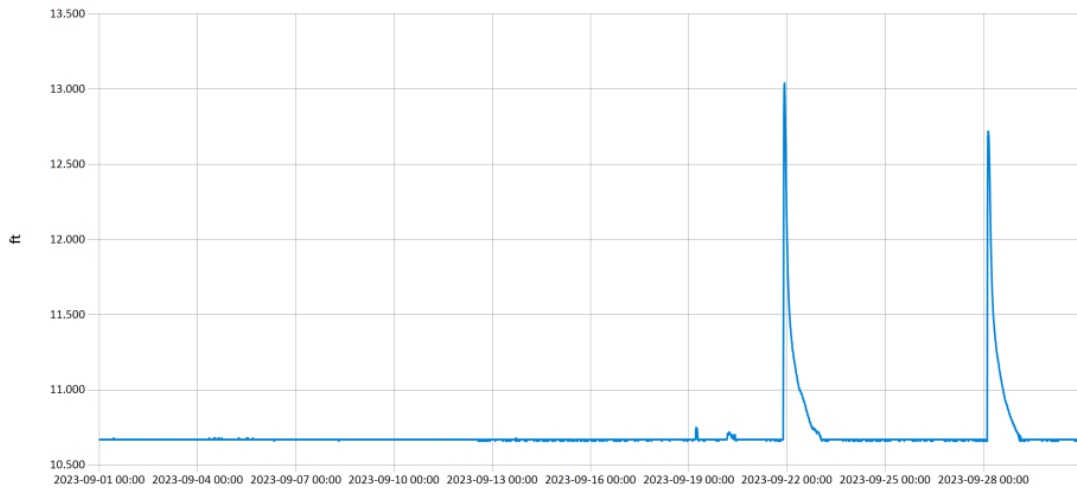


— Stage@WC

Figure 7 Monthly Hydrograph WC-1

Period Selected: 2023-09-01 00:00 - 2023-09-30 23:59

UTC Offs et: -06:00

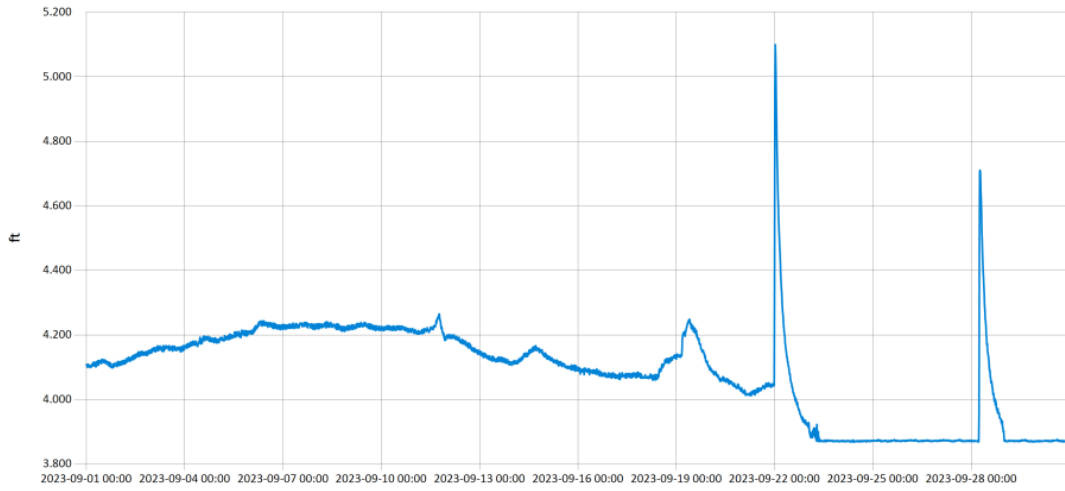


— Stage@URC

Figure 8 Monthly Hydrograph URC-2

Period Selected: 2023-09-01 00:00 - 2023-09-30 23:59

UTC Offset: -06:00

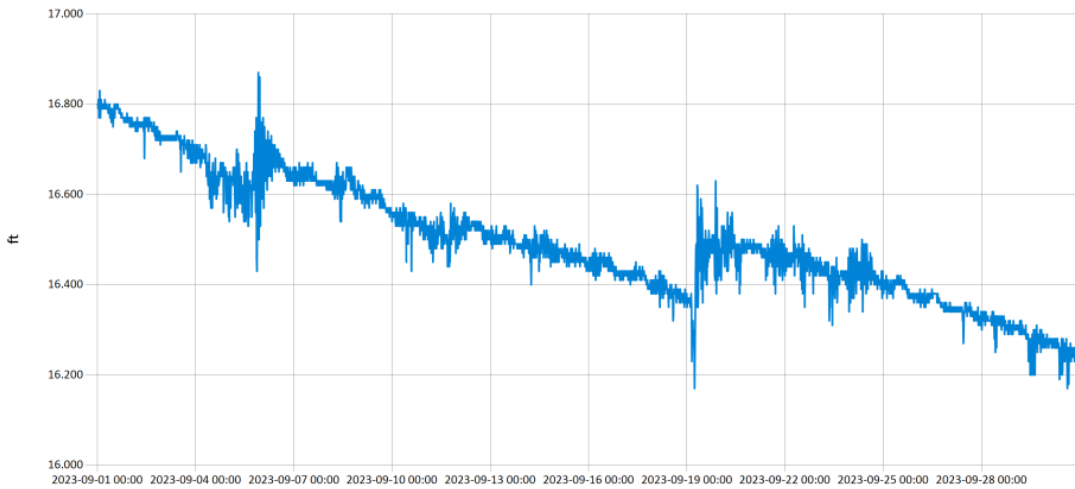


— Stage@LRC

Figure 9 Monthly Hydrograph LRC-1

Period Selected: 2023-09-01 00:00 - 2023-09-30 23:59

UTC Offset: -06:00



— Stage@LDB

Figure 10 Monthly Hydrograph LDB-1

Period Selected: 2023-09-01 00:00 - 2023-09-30 23:59

UTC Offset: -06:00

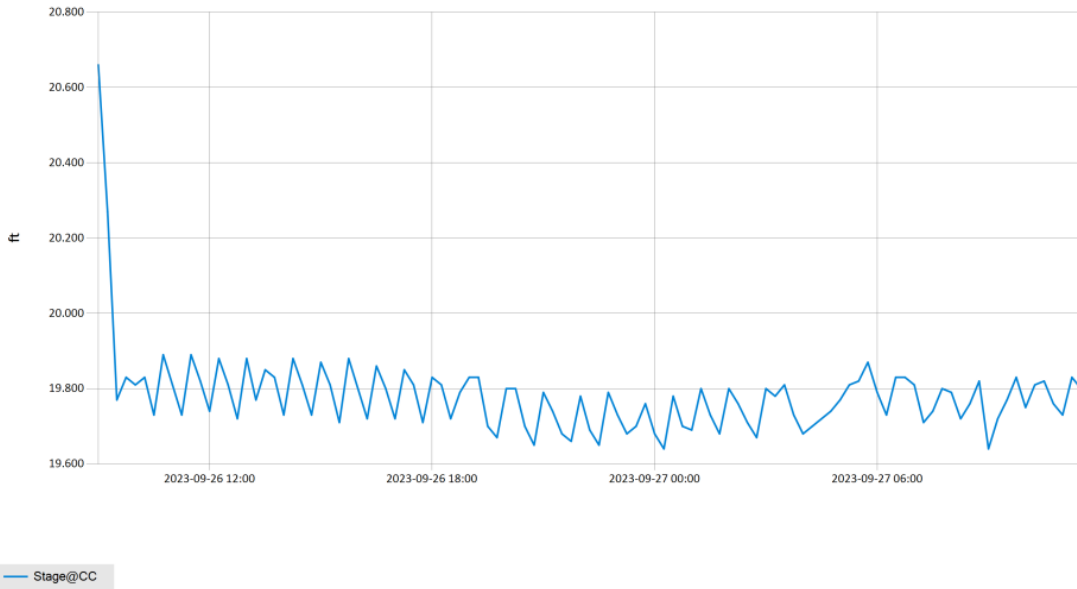


Figure 11 Monthly Hydrograph CC-1

Period Selected: 2023-09-01 00:00 - 2023-09-30 23:59

UTC Offset: -06:00

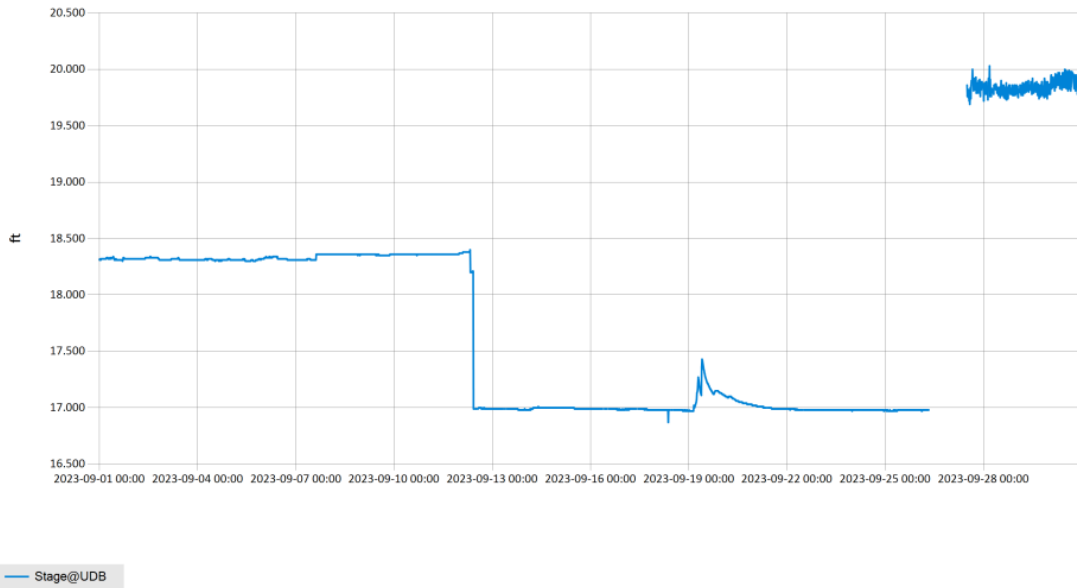


Figure 12 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY					September 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 HDD	DAYS CDD	HUMIDITY (%)			RAIN (in)	PRESSURE (in)		WIND SPEED (mph)			SOLAR (MJ/m <sup>2</sup> )	4" SOIL TEMPERATURES					
	MAX	MIN	AVG	DEWPT			MAX	MIN	AVG		STN	MSL	DIR	AVG	MAX		SOD	BARE	MAX	MIN		
1	96	71	82.0	59.6	0	18	73	27	49	0.00	28.78	30.03	SE	8.3	18.5	23.53	82.1	87.5	94	82		
2	95	67	81.5	54.7	0	16	71	22	43	0.00	28.80	30.05	SSE	6.4	19.7	23.80	81.9	87.2	94	81		
3	99	72	85.0	60.1	0	20	75	26	46	0.00	28.68	29.92	SE	8.2	21.6	22.21	82.4	87.4	94	81		
4	100	73	86.4	61.5	0	22	70	26	46	0.00	28.54	29.78	SSE	11.7	29.6	22.04	82.7	87.7	93	82		
5	104	74	86.1	67.1	0	24	85	24	58	0.12	28.59	29.84	S	10.6	40.4	18.26	83.6	88.1	94	84		
6	92	69	79.4	57.3	0	16	84	29	49	0.00	28.77	30.02	NNE	7.9	23.9	22.69	81.0	84.9	91	79		
7	102	67	85.0	61.8	0	20	71	27	48	0.00	28.68	29.92	SE	6.0	16.8	22.18	81.1	86.1	93	79		
8	99	74	84.5	67.5	0	21	77	35	58	0.00	28.68	29.92	ENE	8.4	23.9	21.52	82.8	88.0	94	83		
9	92	69	79.5	61.6	0	15	87	32	57	0.00	28.84	30.09	E	7.0	16.9	21.79	82.3	86.9	92	82		
10	91	60	76.6	55.4	0	10	84	28	50	0.00	28.85	30.10	ESE	6.6	18.4	18.10	80.4	84.0	89	79		
11	79	64	69.9	61.6	0	6	95	50	77	0.31	28.82	30.07	SE	6.6	18.1	7.92	78.6	80.5	83	77		
12	76	63	67.6	61.7	0	4	97	60	83	0.16	28.86	30.11	NNE	7.8	18.3	10.08	75.3	74.5	77	73		
13	80	63	71.3	62.0	0	7	95	54	74	0.00	28.80	30.05	ESE	6.2	16.2	14.92	75.4	75.2	81	71		
14	73	66	69.0	63.1	0	5	97	67	82	0.30	28.79	30.04	ESE	7.5	17.4	6.55	74.9	73.7	76	71		
15	77	65	70.8	59.4	0	6	84	57	68	0.00	28.82	30.07	SE	4.8	15.0	8.98	74.3	72.0	75	69		
16	83	63	71.5	59.6	0	8	91	45	68	0.00	28.84	30.09	NNE	5.0	15.2	18.97	74.8	75.0	83	69		
17	88	58	72.3	56.7	0	8	98	27	63	0.00	28.84	30.09	WNW	3.6	13.7	21.92	74.3	76.7	85	69		
18	91	58	76.8	51.7	0	10	80	25	45	0.00	28.74	29.99	S	6.5	24.8	21.57	73.9	77.8	86	70		
19	85	64	73.9	61.6	0	9	91	44	67	1.67	28.61	29.86	SSE	10.4	30.4	16.09	72.9	75.2	78	72		
20	85	65	75.9	64.8	0	10	86	54	69	0.01	28.62	29.86	ESE	8.9	23.5	17.48	74.1	73.9	78	70		
21	83	67	74.5	65.9	0	10	91	57	75	0.00	28.72	29.96	SSE	8.4	22.6	11.44	74.7	73.5	77	70		
22	86	70	77.0	67.9	0	13	87	61	74	0.00	28.67	29.91	SE	11.0	30.9	19.79	75.4	75.1	81	70		
23	96	70	82.2	69.3	0	18	93	43	68	0.00	28.56	29.80	SSE	9.4	24.9	19.63	76.6	79.0	87	73		
24	82	70	75.9	69.4	0	11	94	69	81	0.00	28.65	29.89	NE	7.9	20.4	14.00	77.1	79.9	84	76		
25	88	62	75.8	61.6	0	10	98	32	66	0.00	28.83	30.08	NE	5.3	18.3	20.61	76.3	79.2	86	72		
26	91*	59*	76.8*	55.4*	0*	10*	94*	22*	53*	0.00*	28.82*	30.07*	SSE*	4.8*	17.5*	20.47*	75.0*	79.0*	87*	71*		
27	92	65	78.7	58.1	0	13	74	30	51	0.00	28.74	29.99	SSE	5.4	19.2	19.45	75.0	79.9	88	73		
28	93	65	80.0	59.6	0	14	82	29	53	0.00	28.71	29.95	SSE	6.5	18.4	19.64	75.4	80.8	88	74		
29	93	71	81.7	62.2	0	17	79	34	54	0.00	28.71	29.96	SSE	9.5	27.3	18.77	75.8	81.5	88	76		
30	92	70	80.5	61.8	0	16	79	34	55	0.00	28.80	30.05	SSE	9.0	24.3	19.13	76.1	81.7	88	76		
89* 66* 77.6* 61.3*					<- Monthly Averages ->					28.74* 29.99*		SSE* 7.5* 40.4*			18.12*		77.5* 80.4* 86* 75*					
Temperature - Highest: 104*					Degree Days - Total HDD: 0*					Number of Days With:												
Lowest: 58*					Total CDD: 388*					Tmax ≥ 90: 17*			Rainfall ≥ 0.01 inch: 6*									
Rainfall: Monthly Total: 2.57* in.					Humidity - Highest: 98*					Tmax ≤ 32: 0*			Rainfall ≥ 0.10 inch: 5*									
Greatest 24 Hr: 1.67* in.					Lowest: 22*					Tmin ≤ 32: 0*			Avg Wind Speed ≥ 10 mph: 4*									
										Tmin ≤ 0: 0*			Max Wind Speed ≥ 30 mph: 3*									

© 1993-2023 Oklahoma Climatological Survey and the Oklahoma Mesonet

\* Denotes incomplete record

Figure 13 September Mesonet Data