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

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

# **Lake Thunderbird TMDL Monitoring Plan Implementation:**

## **April 2023 Monitoring Report**

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Oklahoma Water Resources Board  
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## SUMMARY OF APRIL SAMPLING

Sampling for April 2023 occurred during base flow conditions on the eleventh. Water samples were collected at nine locations and discharge was measured at three locations. 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. Samples were not collected at LT-1, since this station will be relocated to a different location later this year. Mesonet shows no precipitation on the eleventh, in the 72 hours prior to sampling, or in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of April was 3.87 inches. All water level gauges were operational for the month, except for LRC-1 due to equipment malfunction, and the equipment at JB-1 will be reinstalled later this year.

## RESULTS

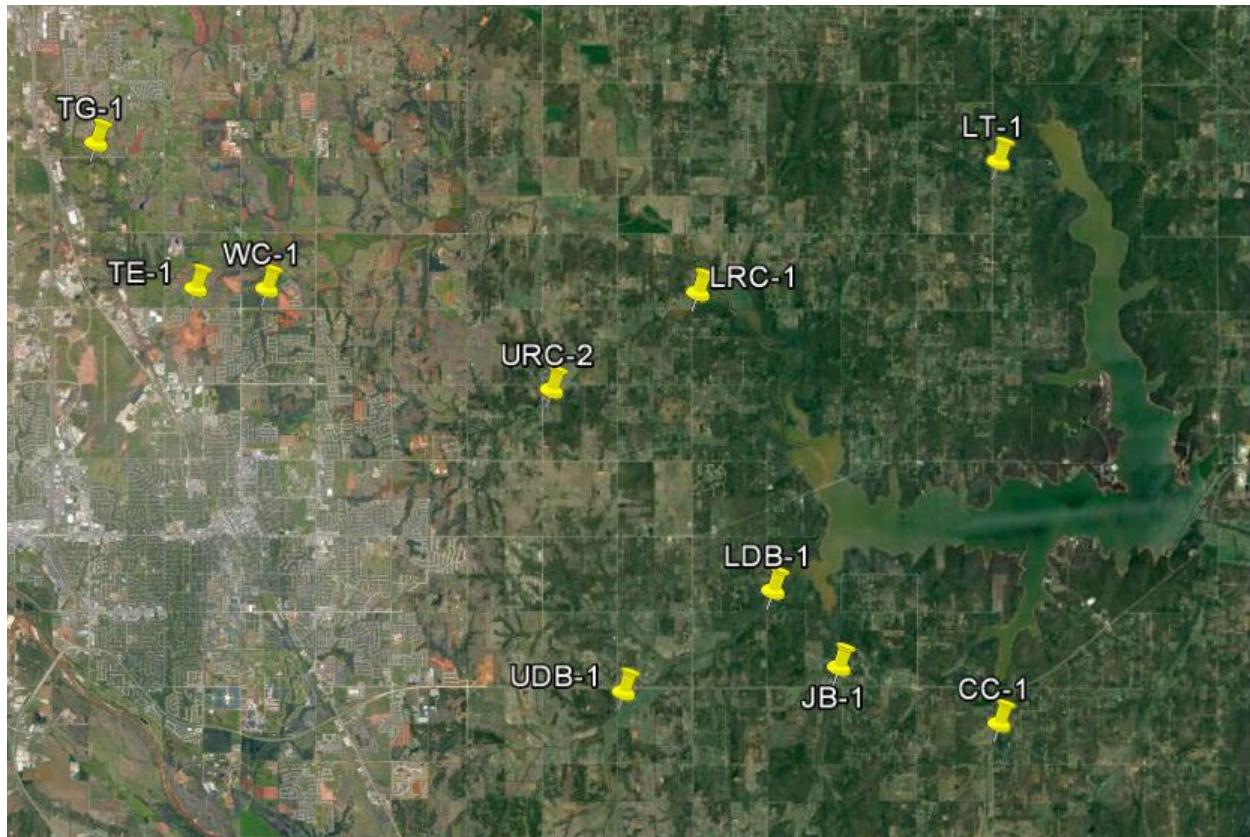


Figure 1 Monitoring Station Map

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	4/11/2023	9:13	SD	14.2	7.98	7.68	660	6	Used RP4; orifice may have been slightly clogged - purged and cleaned
JB-1	Jim Blue Creek	4/11/2023	9:30	SD	17.3	14.65	8.03	866	12	Barely connected on downstream side; flow taken on upstream side; no gauge; two samples collected - one downstream, one upstream
LDB-1	Lower Dave Blue Creek	4/11/2023	11:01	SD	16.5	8.09	7.98	901	39	Visually slightly higher than last month
LRC-1	Lower Rock Creek	4/11/2023	11:27	SD	16.5	9.39	7.92	707	10	Lots of algae growth along the banks
LT-1	Lake Laterals	4/11/2023	11:15	SD	N/A	N/A	N/A	N/A	N/A	Site not sampled; planning to relocate this location
TE-1	Little River Tributary	4/11/2023	14:02	SD	21.7	10.03	7.86	1058	23	Stage similar to last month so no flow taken; beaver dam still visible upstream of sampling location
TG-1	Little River	4/11/2023	14:23	SD	21.4	13.82	8.11	1185	2	Good amount of algae. Flow slowed upstream, constricted downstream of bridge
UDB-1	Upper Dave Blue Creek	4/11/2023	8:34	SD	14.9	7.79	7.82	908	8	Similar stage as last month
URC-2	Upper Rock Creek	4/11/2023	12:20	SD	17.9	9.06	7.61	698	15	Slightly lower than last month
WC-1	Woodcrest Creek	4/11/2023	13:45	SD	19.6	12.11	7.78	1032	3	Very similar stage to last month's collection; very low water level; algae more present 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	0.17	0.029	9.0
JB-1	Jim Blue Creek (ds)	<0.05	0.32	0.035	10.0
JB-1	Jim Blue Creek (us)	<0.05	0.28	0.032	7.0
LDB-1	Lower Dave Blue Creek	<0.05	0.42	0.058	54.0
LRC-1	Lower Rock Creek	<0.05	0.39	0.028	12.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	<0.05	0.52	0.036	10.0
TG-1	Little River	<0.05	0.40	0.021	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.39	0.018	<5.0
URC-2	Upper Rock Creek	<0.05	0.84	0.057	10.0
WC-1	Woodcrest Creek	<0.05	0.41	0.030	16.0

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	0.19	0.029	7.0
Duplicate RPD	0%	11.11%	0%	25%*

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.

<b>Monitoring Location ID</b>	<b>Monitoring Location Name</b>	<b>Discharge (cfs)</b>	<b>Stream Stage (ft)</b>
CC-1	Clear Creek	0.37	20.58
JB-1	Jim Blue Creek	0.12	N/A
LDB-1	Lower Dave Blue Creek	1.04	15.52
LRC-1	Lower Rock Creek	0.21	5.41
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.03	11.00
TG-1	Little River	0.71	9.05
UDB-1	Upper Dave Blue Creek	0.34	17.46
URC-2	Upper Rock Creek	0.20	11.13
WC-1	Woodcrest Creek	0.50	7.54

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

**File Information**

File name	Cc_20230411-090308.ft
Start date and time	4/11/2023 8:36 AM
Start location latitude	35.176
Start location longitude	-97.260
Calculations engine	FlowTracker2
Data collection mode	Discharge

**System Information**

**Discharge Summary**

Start time	4/11/2023 8:37 AM	End time	4/11/2023 8:57 AM
# Stations	15	Avg Interval	40
Mean depth	0.950 ft	Max depth	1.350 ft
Mean velocity	0.0557 ft/s	Max velocity	0.1822 ft/s
Mean SNR	43 dB	Total width	7.000 ft
Mean temp	58.136 °F	Total area	6.6500 ft <sup>2</sup>
Wetted Perimeter	7.840 ft	Total discharge	0.3704 ft <sup>3</sup> /s

**Discharge Uncertainty**

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	3.9%
Velocity	2.7%	14.5%
Width	0.2%	0.2%
Method	3.5%	
# Stations	3.3%	
Overall	5.7%	15.1%

**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
4/11/2023 8:37 AM	20.580				

**Measurement results**

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft <sup>2</sup> )	Flow (ft <sup>3</sup> /s)	%Q	
0	8:37 AM	0.000	None	0.000	0.0000	0.000	0	0.0000	0.0454	0.0000	0.0000	0.00	✓	
1	8:37 AM	0.500	0.6	0.800	0.6000	0.480	80	0.0454	1.0000	0.0454	0.4000	0.0182	4.90	✓
2	8:39 AM	1.000	0.6	1.000	0.6000	0.600	80	0.0807	1.0000	0.0807	0.5000	0.0403	10.89	✓
3	8:42 AM	1.500	0.6	1.100	0.6000	0.660	80	0.1693	1.0000	0.1693	0.5500	0.0931	25.13	✓
4	8:44 AM	2.000	0.6	1.300	0.6000	0.780	80	0.1822	1.0000	0.1822	0.6500	0.1184	31.97	✓
5	8:46 AM	2.500	0.6	1.350	0.6000	0.810	80	0.0924	1.0000	0.0924	0.6750	0.0624	16.83	✓
6	8:48 AM	3.000	0.6	1.350	0.6000	0.810	80	0.0515	1.0000	0.0515	0.6750	0.0348	9.39	✓
7	8:49 AM	3.500	0.6	1.300	0.6000	0.780	80	-0.0182	1.0000	-0.0182	0.6500	-0.0118	-3.19	✓
8	8:50 AM	4.000	0.6	1.300	0.6000	0.780	80	-0.0076	1.0000	-0.0076	0.6500	-0.0050	-1.34	✓
9	8:51 AM	4.500	0.6	1.100	0.6000	0.660	80	-0.0090	1.0000	-0.0090	0.5500	-0.0049	-1.33	✓
10	8:53 AM	5.000	0.6	0.900	0.6000	0.540	80	0.0098	1.0000	0.0098	0.4500	0.0044	1.19	✓
11	8:54 AM	5.500	0.6	0.800	0.6000	0.480	80	0.0557	1.0000	0.0557	0.4000	0.0223	6.02	✓
12	8:55 AM	6.000	0.6	0.600	0.6000	0.360	80	-0.0072	1.0000	-0.0072	0.3000	-0.0022	-0.59	✓
13	8:56 AM	6.500	0.6	0.400	0.6000	0.240	80	0.0022	1.0000	0.0022	0.2000	0.0004	0.12	✓
14	8:57 AM	7.000	None	0.000	0.0000	0.000	0	0.0000	0.0022	0.0000	0.0000	0.00	✓	

**Quality control warnings**

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	8:37 AM	0.500	0.6	0.800	0.6000	0.480	Large SNR Variation
2	8:39 AM	1.000	0.6	1.000	0.6000	0.600	SNR Threshold Variation,High Stn % Discharge
3	8:42 AM	1.500	0.6	1.100	0.6000	0.660	SNR Threshold Variation,High Stn % Discharge
4	8:44 AM	2.000	0.6	1.300	0.6000	0.780	SNR Threshold Variation,High Stn % Discharge
5	8:46 AM	2.500	0.6	1.350	0.6000	0.810	Large SNR Variation,High Stn % Discharge
7	8:49 AM	3.500	0.6	1.300	0.6000	0.780	Large SNR Variation
9	8:51 AM	4.500	0.6	1.100	0.6000	0.660	SNR Threshold Variation
13	8:56 AM	6.500	0.6	0.400	0.6000	0.240	Large SNR Variation

Figure 2 Discharge Measurement Summary CC-1

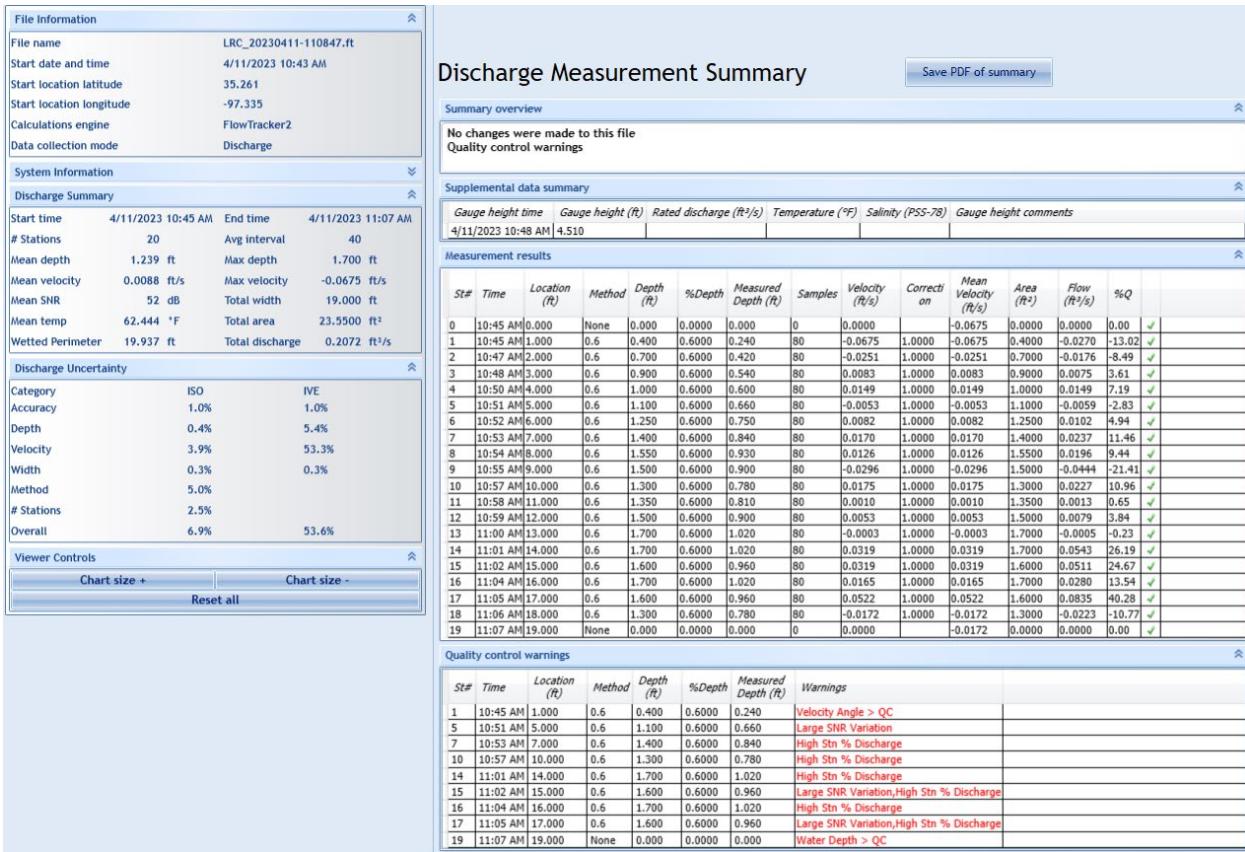


Figure 3 Discharge Measurement Summary LRC-1

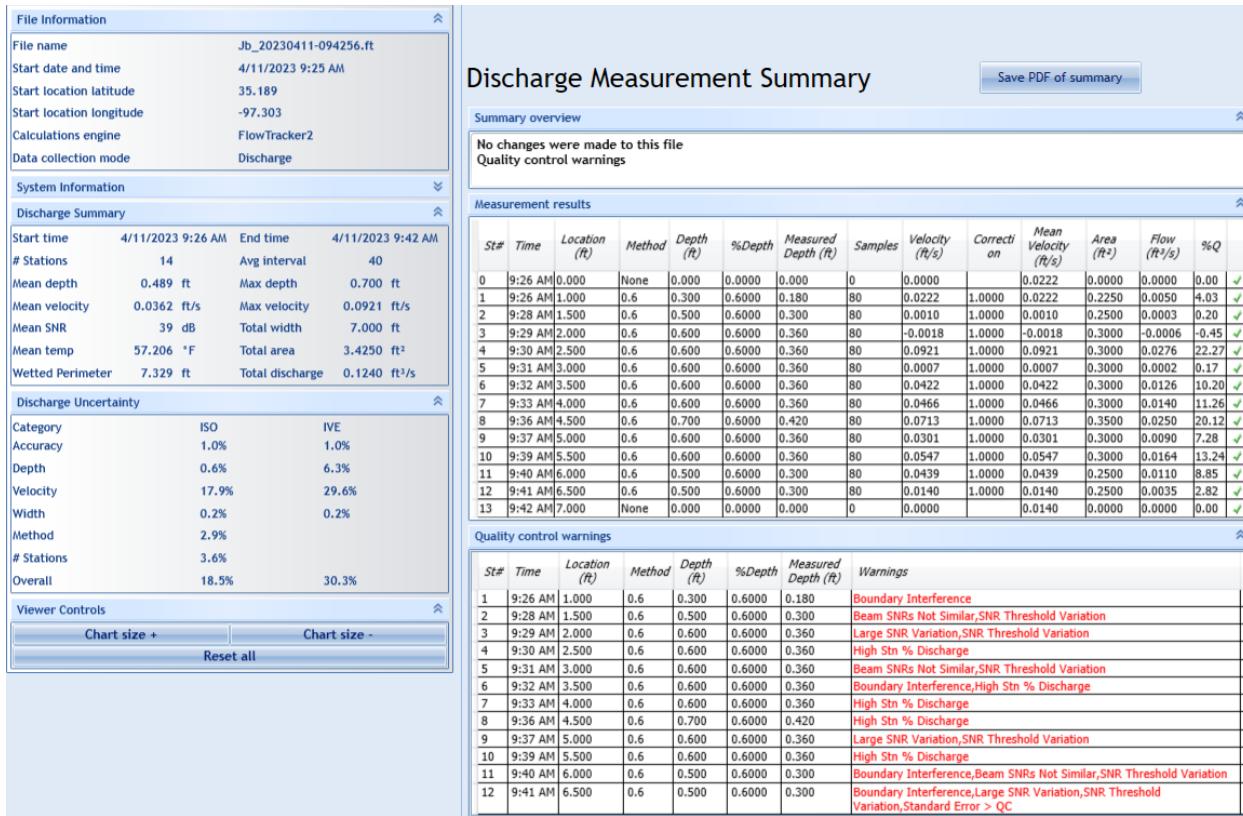


Figure 4 Discharge Measurement Summary JB-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

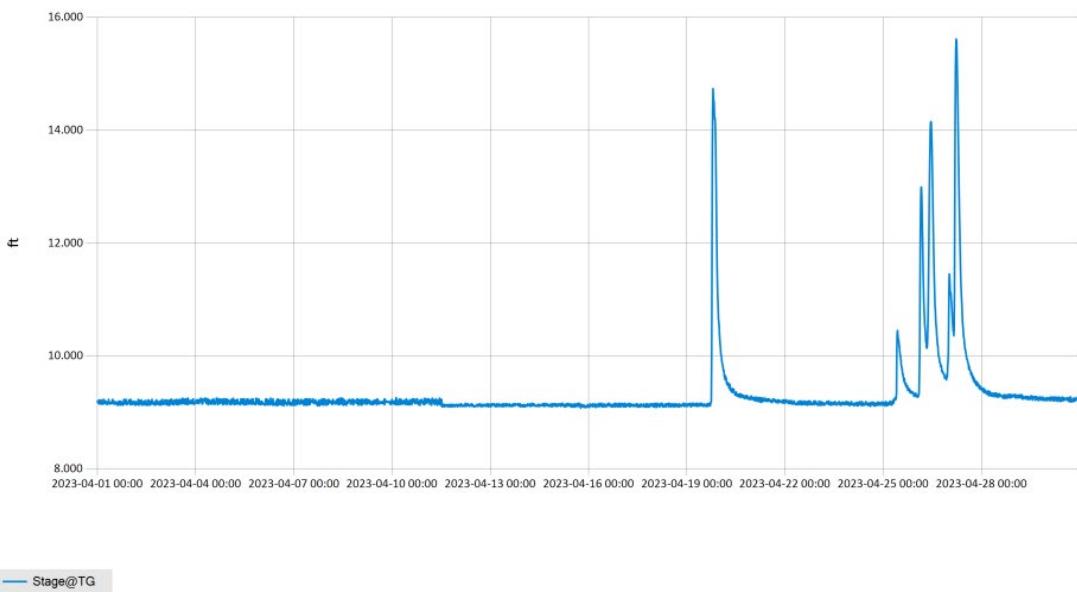


Figure 5 Monthly Hydrograph TG-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

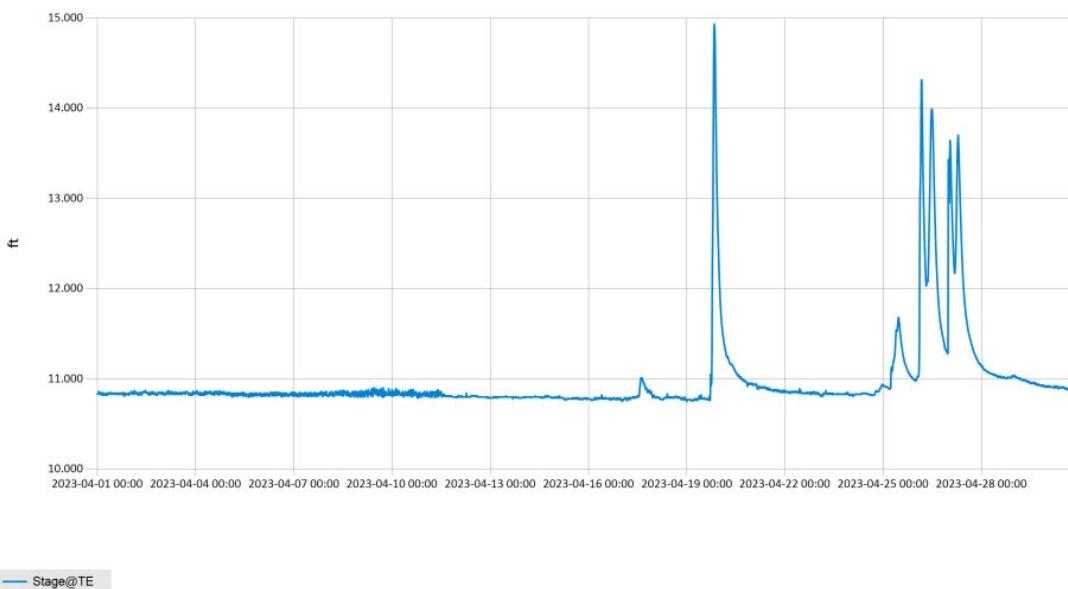


Figure 6 Monthly Hydrograph TE-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

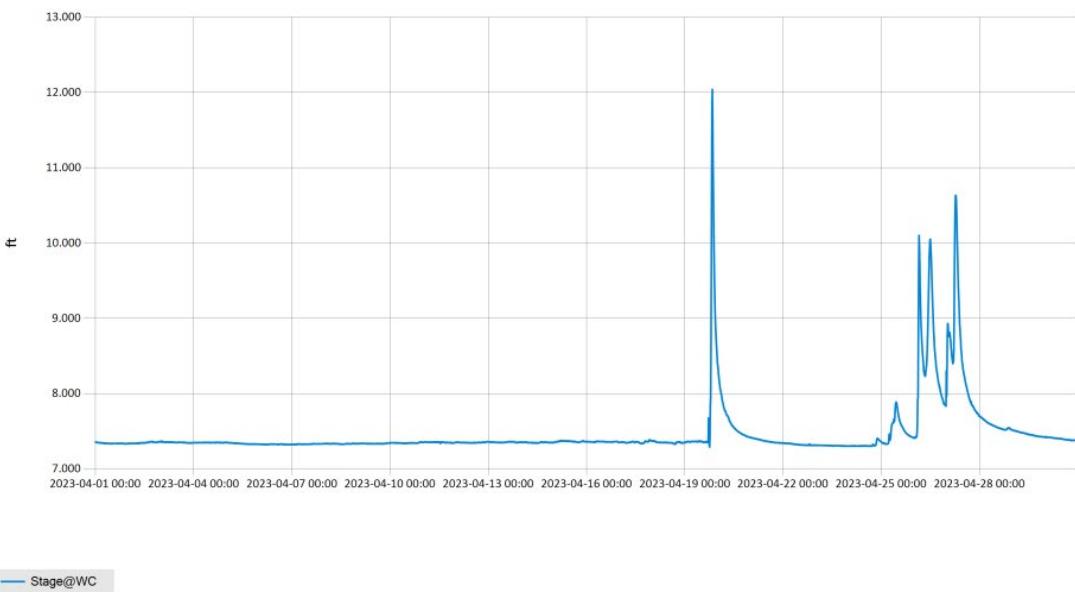


Figure 7 Monthly Hydrograph WC-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

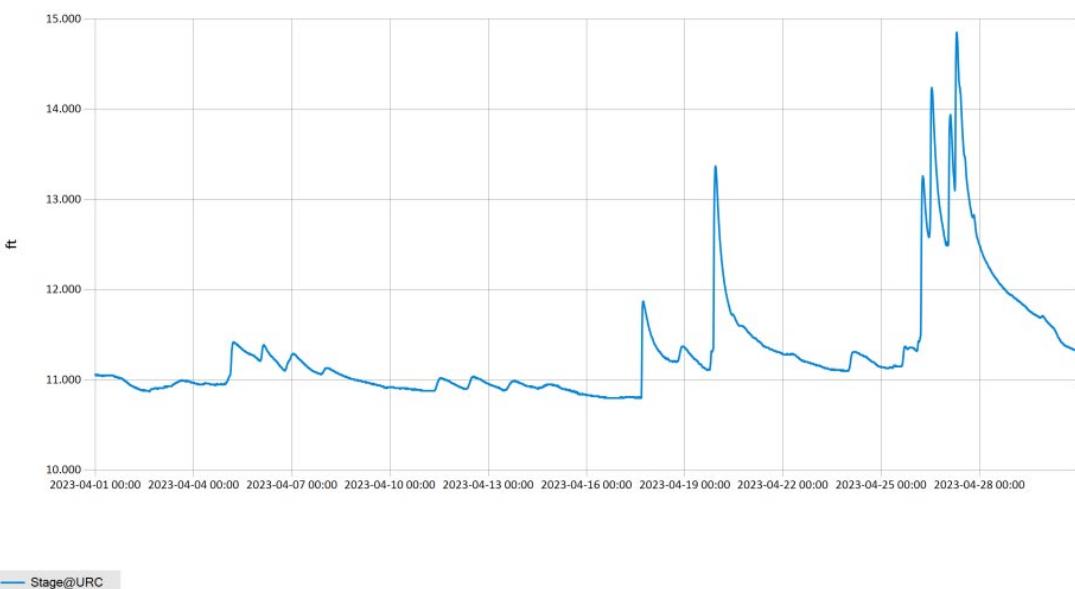


Figure 8 Monthly Hydrograph URC-2

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

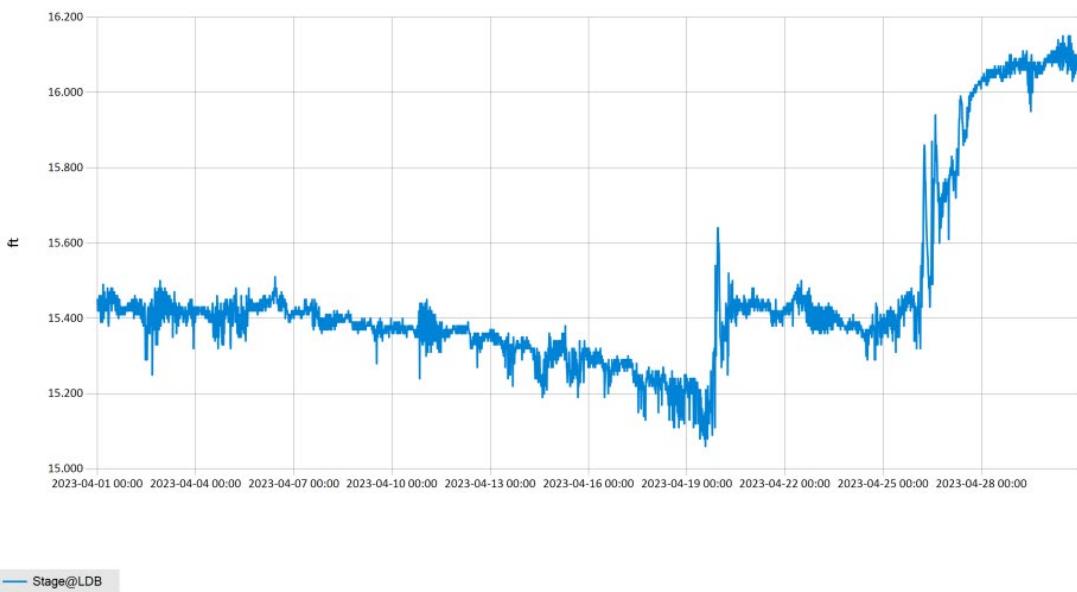


Figure 9 Monthly Hydrograph LDB-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

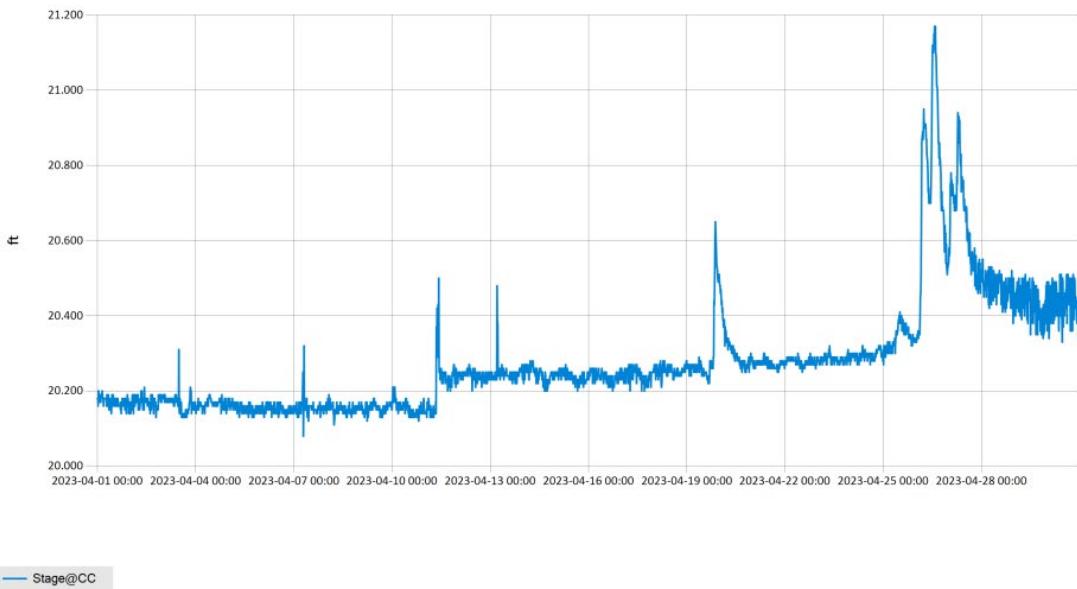


Figure 10 Monthly Hydrograph CC-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

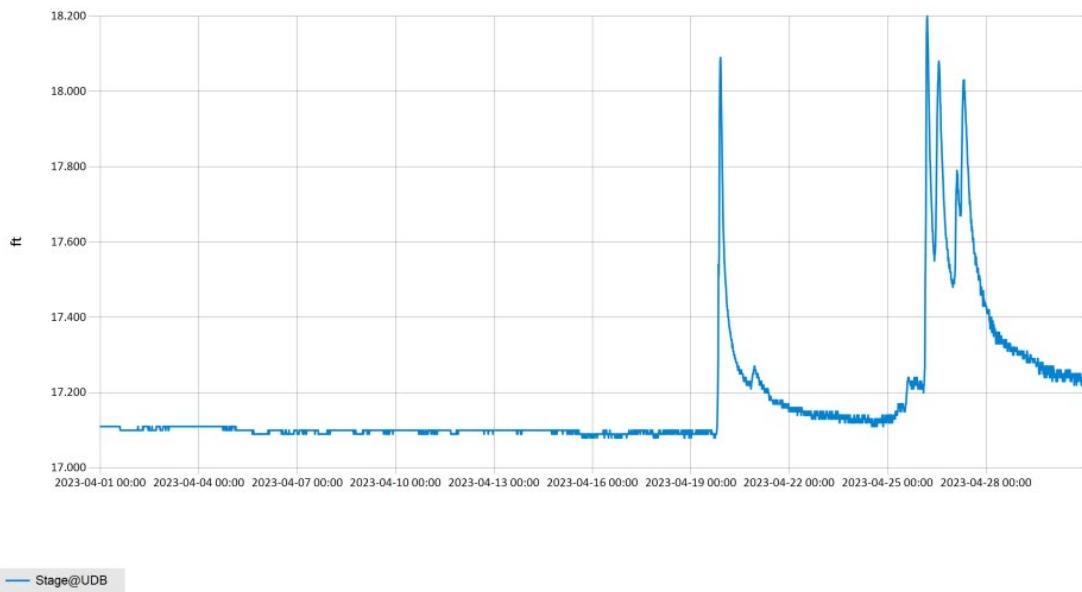


Figure 11 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY (NRMN) Norman Latitude: 35-14-09									April 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 SPEED (mph)	SOLAR (MJ/m²)	4" SOIL TEMPERATURES												
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG		STN	MSL			SOD	BARE	MAX	MIN									
1	66	44	55.7	28.1	10	0	48	25	35	0.00	28.88	30.13	NNW	9.1	31.2	23.95	54.3	53.7	61	47							
2	78	50	62.0	45.0	1	0	89	36	55	0.00	28.57	29.81	S	11.5	36.2	14.83	54.5	55.4	62	49							
3	85	58	71.5	49.7	0	6	94	19	55	0.00	28.34	29.58	S	11.7	26.8	24.17	57.7	63.2	72	56							
4	80	69	73.6	65.7	0	9	92	54	77	0.00	28.26	29.49	S	13.8	33.2	11.66	60.7	66.7	70	64							
5	72	38	48.7	27.6	10	0	84	28	45	0.00	28.78	30.03	NNW	13.3	33.8	24.34	58.1	61.5	66	55							
6	62	40	50.4	23.6	14	0	55	19	37	0.00	29.06	30.32	NE	8.9	24.2	19.87	54.8	56.7	64	50							
7	69	37	53.8	24.0	12	0	73	12	37	0.00	29.03	30.28	E	7.6	20.8	24.77	54.4	57.7	67	48							
8	73	42	58.5	30.3	8	0	66	16	37	0.00	28.92	30.17	ESE	4.8	14.6	24.66	55.6	61.3	72	52							
9	73	40	60.1	43.9	8	0	76	41	56	0.00	28.93	30.19	SSE	5.7	17.6	19.97	56.1	62.1	71	53							
10	76	53	64.3	51.1	0	0	94	37	65	0.00	28.98	30.24	SSE	6.9	26.6	20.79	58.9	66.0	75	59							
11	76	54	64.6	48.7	0	0	87	36	59	0.00	28.96	30.21	SSE	8.0	20.8	24.22	60.0	67.1	75	60							
12	77	51	64.4	45.8	1	0	79	32	53	0.00	28.78	30.03	S	8.8	26.1	25.14	60.3	67.0	75	59							
13	78	51	65.9	48.2	0	0	88	32	56	0.00	28.55	29.79	SSE	9.0	22.3	24.97	60.8	67.8	76	60							
14	81	59	69.2	56.3	0	5	85	48	64	0.00	28.42	29.65	S	13.6	33.5	21.14	61.9	69.0	76	63							
15	68	46	59.4	45.0	8	0	94	38	61	0.00	28.67	29.92	NNW	16.7	39.4	21.38	61.7	67.2	71	62							
16	69	37	53.1	29.9	12	0	81	19	46	0.00	28.95	30.21	NW	8.7	28.0	25.55	58.4	62.6	70	55							
17	79	38	62.1	37.6	7	0	86	24	45	0.00	28.73	29.98	S	9.3	30.5	24.82	58.0	63.9	73	54							
18	78	57	66.8	53.1	0	2	83	42	62	0.00	28.53	29.77	S	14.4	39.2	21.09	60.6	67.6	74	61							
19	84*	63*	72.0*	61.7*	0*	9*	92*	48*	71*	1.41*	28.46*	29.70*	S	* 15.7*	46.0*	NA	62.9*	69.7*	77*	65*							
20	74	55	65.5	43.1	1	0	78	22	47	0.03	28.66	29.91	NNW	13.2	34.7	24.17	63.0	67.2	72	60							
21	69*	47*	58.2*	33.8*	7*	0*	70*	20*	42*	0.00*	28.78*	30.03*	NNE*	5.8*	18.7*	NA	60.5*	60.5*	67*	55*							
22	53	45	48.7	32.0	16	0	79	37	54	0.01	28.86	30.11	NNE	11.1	30.0	12.22	57.8	54.8	59	52							
23	62	39	51.6	31.9	14	0	81	24	51	0.00	28.90	30.15	N	4.5	19.7	25.90	57.4	55.9	64	49							
24	63	39	51.7	39.6	14	0	90	32	67	0.09	28.83	30.08	SSE	6.1	21.5	13.80	56.8	54.7	59	50							
25	54	48	50.2	46.9	14	0	94	74	88	0.36	28.73	29.97	ESE	11.3	23.3	4.54	56.0	54.0	55	53							
26	57	50	52.6	50.7	11	0	97	83	93	1.55	28.69	29.93	E	8.9	41.7	5.14	55.4	54.5	57	53							
27	59	46	53.8	50.3	12	0	97	72	88	0.36	28.60	29.84	NW	6.8	18.6	7.25	56.0	56.6	59	55							
28	61	42	51.4	47.6	14	0	98	70	88	0.06	28.66	29.90	NNW	8.7	26.8	7.54	55.1	55.4	58	52							
29	68	47	57.4	41.8	7	0	85	37	58	0.00	28.70	29.95	NNW	11.5	27.1	26.76	55.3	57.9	65	51							
30	69	45	58.7	40.2	8	0	85	31	53	0.00	28.68	29.93	N	8.0	24.1	23.92	56.9	58.1	63	52							
	70* 48* 59.2* 42.4*				<- Monthly Averages ->				28.73*	29.98*	S	* 9.8*	46.0*	19.59*	58.0*	61.2*	68*	55*									
Temperature - Highest: 85* Lowest: 37*					Degree Days - Total HDD: 211* Total CDD: 32*					Number of Days With: Tmax ≥ 90: 0* Rainfall ≥ 0.01 inch: 8* Tmax ≤ 32: 0* Rainfall ≥ 0.10 inch: 4* Tmin ≤ 32: 0* Avg Wind Speed ≥ 10 mph: 12* Tmin ≤ 0: 0* Max Wind Speed ≥ 30 mph: 12*																	
Rainfall: Monthly Total: 3.87* in. Greatest 24 Hr: 1.55* in.					Humidity - Highest: 98* Lowest: 12*																						

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\* Denotes incomplete record

Figure 12 April Mesonet Data