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



SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

June 2021 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
Jason Murphy, Project Supervisor, jason.murphy@owrb.ok.gov
Lance Phillips, Streams Program Manager, lance.phillips@owrb.ok.gov
Bill Cauthron, Monitoring Coordinator, bill.cauthron@owrb.ok.gov

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SUMMARY OF JUNE WATER QUALITY SAMPLING

Sampling for June 2021 consisted of two sampling events. The first collection occurred during base flow conditions on the seventh. Water samples were collected at nine locations and a discharge measurement was collected at one location. LRC-1 was not collected because of active construction on the bridge and streambank. Mesonet data shows no precipitation on the seventh, 0.41 inches of precipitation in the 72 hours prior to sampling, and no precipitation in the 72 hours after the sampling event. The second collection occurred during stormwater conditions on the twenty-sixth and twenty-seventh. URC-2 was collected via autosampler on the twenty-sixth, and all seven stormwater outfalls were collected on the twenty-seventh. Mesonet data shows 3.06 inches of precipitation on the twenty-sixth, no precipitation in the 72 hours prior to sampling, and 2.78 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of June was 6.54 inches. All water level gauges were operational for the month, except for LT-1 and LRC-1 due to equipment malfunction.

RESULTS

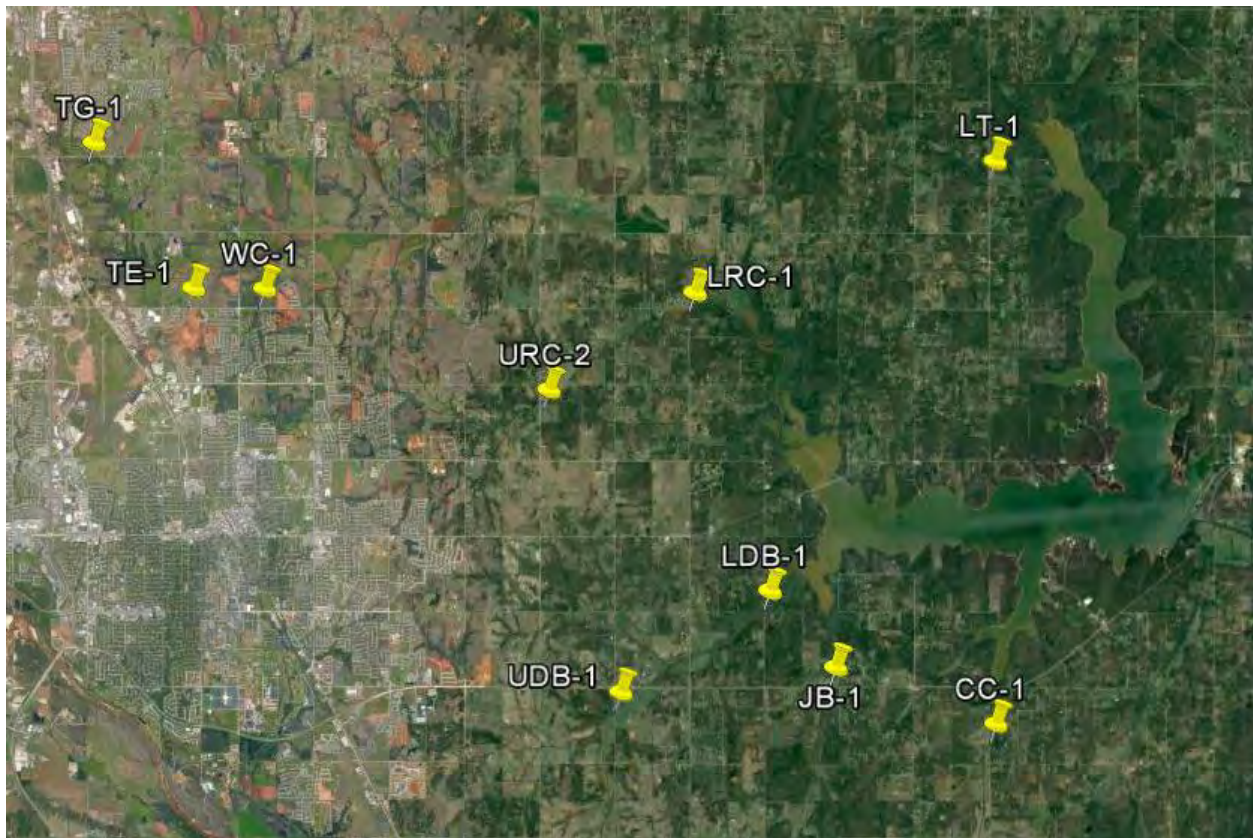


Figure 1 Monitoring Station Map

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	6/7/2021	9:35	SD	19.37	7.99	7.83	679	21	RP3 only one over water, similar stage to last month, used DCP for flow
JB-1	Jim Blue Creek	6/7/2021	10:30	SD	19.69	7.47	7.76	738	20	Higher stage than usual, but still base flow conditions, positive visual flow
LDB-1	Lower Dave Blue Creek	6/7/2021	11:20	SD	21.11	8.82	7.90	835	17	Higher stage than usual, but still base conditions, negative visual flow when collecting
LRC-1	Lower Rock Creek	6/7/2021	12:30	SD	N/A	N/A	N/A	N/A	N/A	Not able to sample; construction stabilizing downstream bank, bridge walls have been redone (RPs gone)
LT-1	Lake Laterals	6/7/2021	11:55	SD	21.05	3.43	7.41	403	9	No DCP; aquatic vegetation on upstream, filamentous on downstream, positive visual flow on upstream
TE-1	Little River Tributary	6/7/2021	14:55	SD	27.27	12.29	8.15	718	18	Similar stage to last month, low water conditions, water flowing through small section of beaver dam on upstream
TG-1	Little River Tributary	6/7/2021	15:50	SD	24.20	9.58	7.89	798	9	Orifice partially buried in small gravel, noticeably less algae than normal
UDB-1	Upper Dave Blue Creek	6/7/2021	8:45	SD	19.03	8.05	7.90	958	11	Borderline normal/above normal flow conditions, hay on edges of bridge and channel banks
URC-2	Upper Rock Creek	6/7/2021	13:10	SD	20.77	7.49	7.82	772	37	Rain gauge clogged, higher stage than usual, but base flow conditions
WC-1	Woodcrest Creek	6/7/2021	14:00	SD	21.62	8.46	7.67	929	8	Some small gravel covering orifice

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	0.36	0.43	0.054	20.0
JB-1	Jim Blue Creek	0.09	0.45	0.054	8.0
LDB-1	Lower Dave Blue Creek	0.07	1.04	0.097	6.0
LRC-1	Lower Rock Creek	N/A	N/A	N/A	N/A
LT-1	Lake Laterals	<0.05	0.83	0.067	<5.0
TE-1	Little River Tributary	0.14	0.68	0.093	8.0
TG-1	Little River Tributary	0.23	0.65	0.096	8.0
UDB-1	Upper Dave Blue Creek	0.20	0.34	0.041	6.0
URC-2	Upper Rock Creek	0.16	0.78	0.085	46.0
WC-1	Woodcrest Creek	0.43	0.57	0.091	6.0

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	0.36	0.45	0.051	24.0
Duplicate RPD	0%	4.55%	5.71%	18.18%*

Table 3 QA/QC Data Where an 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	2.20	21.14
JB-1	Jim Blue Creek	0.60	16.32
LDB-1	Lower Dave Blue Creek	91.82	18.06
LRC-1	Lower Rock Creek	N/A	N/A
LT-1	Lake Laterals	0.10	4.39
TE-1	Little River Tributary	0.10	11.07
TG-1	Little River Tributary	3.82	9.29
UDB-1	Upper Dave Blue Creek	1.01	17.58
URC-2	Upper Rock Creek	0.43	11.49
WC-1	Woodcrest Creek	0.11	7.58

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

Discharge Measurement Summary

Date Generated: Tue Jun 22 2021

File Information				Site Details			
File Name	CC0607.WAD			Site Name	CC		
Start Date and Time	2021/06/07 08:27:07			Operator(s)	SCD		

System Information		Units (English Units)		Discharge Uncertainty		
Sensor Type	FlowTracker	Distance	ft	Category	ISO	Stats
Serial #	P4713	Velocity	ft/s	Accuracy	1.0%	1.0%
CPU Firmware Version	3.9	Area	ft^2	Depth	0.4%	3.4%
Software Ver	2.30	Discharge	cfs	Velocity	0.9%	3.1%
Mounting Correction	0.0%			Width	0.1%	0.1%
				Method	1.9%	-
				# Stations	3.0%	-
				Overall	3.8%	4.7%

Summary			
Averaging Int.	40	# Stations	17
Start Edge	LEW	Total Width	8.000
Mean SNR	52.3 dB	Total Area	3.549
Mean Temp	66.37 °F	Mean Depth	0.444
Disch. Equation	Mid-Section	Mean Velocity	0.6193
		Total Discharge	2.1981

Supplemental Data					
#	Time	Location	Gauge Height	Rated Flow	Comments
1	Mon Jun 7 08:43:26 CDT 2021	8.000	21.140		

Measurement Results												
St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	08:27	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
<i>1</i>	<i>08:27</i>	<i>0.50</i>	<i>0.6</i>	<i>0.550</i>	<i>0.6</i>	<i>0.220</i>	<i>0.3888</i>	<i>1.00</i>	<i>0.3888</i>	<i>0.275</i>	<i>0.1069</i>	<i>4.9</i>
2	08:28	1.00	0.6	0.600	0.6	0.240	0.6453	1.00	0.6453	0.300	0.1936	8.8
3	08:29	1.50	0.6	0.400	0.6	0.160	0.5636	1.00	0.5636	0.200	0.1127	5.1
4	08:30	2.00	0.6	0.300	0.6	0.120	0.7474	1.00	0.7474	0.150	0.1121	5.1
5	08:31	2.50	0.6	0.300	0.6	0.120	0.8212	1.00	0.8212	0.150	0.1231	5.6
6	08:31	3.00	0.6	0.300	0.6	0.120	0.8701	1.00	0.8701	0.150	0.1305	5.9
7	08:32	3.50	0.6	0.300	0.6	0.120	0.9803	1.00	0.9803	0.150	0.1470	6.7
8	08:33	4.00	0.6	0.300	0.6	0.120	0.9738	1.00	0.9738	0.150	0.1460	6.6
9	08:34	4.50	0.6	0.300	0.6	0.120	1.1434	1.00	1.1434	0.150	0.1714	7.8
10	08:36	5.00	0.6	0.300	0.6	0.120	1.0157	1.00	1.0157	0.150	0.1523	6.9
11	08:37	5.50	0.6	0.400	0.6	0.160	0.8406	1.00	0.8406	0.200	0.1681	7.6
12	08:38	6.00	0.6	0.400	0.6	0.160	0.8064	1.00	0.8064	0.200	0.1613	7.3
13	08:39	6.50	0.6	0.500	0.6	0.200	0.6486	1.00	0.6486	0.250	0.1622	7.4
<i>14</i>	<i>08:40</i>	<i>7.00</i>	<i>0.6</i>	<i>0.800</i>	<i>0.6</i>	<i>0.320</i>	<i>0.3530</i>	<i>1.00</i>	<i>0.3530</i>	<i>0.400</i>	<i>0.1412</i>	<i>6.4</i>
15	08:41	7.50	0.6	0.900	0.6	0.360	0.2516	1.00	0.2516	0.450	0.1132	5.2
16	08:41	8.00	None	0.900	0.0	0.0	0.0000	1.00	0.2516	0.225	0.0566	2.6

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

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
URC-2	Upper Rock Creek	6/26/2021	7:30	SD	*	*	7.30	193	1000	T1 collected at 07:30 (6/26) @ 15.55, peak at 08:30 (6/26) @ 15.94
SW-08	Stormwater Outfall 08	6/27/2021	10:30	SD	22.39	6.83	7.48	830	124	Samplers probably filled 6/26, water 1 in. over samplers, sonde from current conditions, more small floating debris in bottles than current conditions, visible debris line on bank, water had been up a few feet higher
SW-09	Stormwater Outfall 09	6/27/2021	9:40	SD	23.01	7.01	7.47	365	21	Samplers probably filled 6/26, more floating debris in bottles than current conditions
SW-10	Stormwater Outfall 10	6/27/2021	8:40	SD	24.39	6.37	7.42	278	9	Samplers gone, collected from current conditions
SW-11	Stormwater Outfall 11	6/27/2021	9:10	SD	22.64	7.08	7.46	126	152	More floating debris in bottles than channel, samplers probably filled 6/26
SW-12	Stormwater Outfall 12	6/27/2021	10:55	SD	24.43	6.25	7.68	195	429	Samplers probably filled 6/26, water in bottles much more turbid than current conditions
SW-13	Stormwater Outfall 13	6/27/2021	10:00	SD	22.40	6.80	7.44	224	129	Samplers probably filled 6/26, water up at least 1 ft higher than current conditions, very turbid water flowing down center of channel
SW-14	Stormwater Outfall 14	6/27/2021	11:20	SD	23.59	7.06	7.32	269	120	Sampled from current conditions

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)
URC-2	Upper Rock Creek	0.51	4.57	1.06	2230
SW-08	Stormwater Outfall 08	0.66	8.16	0.949	452
SW-09	Stormwater Outfall 09	0.15	0.91	0.234	32.0
SW-10	Stormwater Outfall 10	0.13	0.74	0.154	<5.0
SW-11	Stormwater Outfall 11	0.45	2.56	0.594	386
SW-12	Stormwater Outfall 12	0.25	2.00	0.383	568
SW-13	Stormwater Outfall 13	0.40	1.09	0.258	76.0
SW-14	Stormwater Outfall 14	0.12	1.56	0.199	144

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

Table 7 Stormwater QA/QC Data

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
URC-2	Upper Rock Creek	87.93	15.55

Table 8 Stormwater Station Discharge Summary

Period Selected: 2021-06-01 00:00 - 2021-06-30 23:59

UTC Offset: -06:00

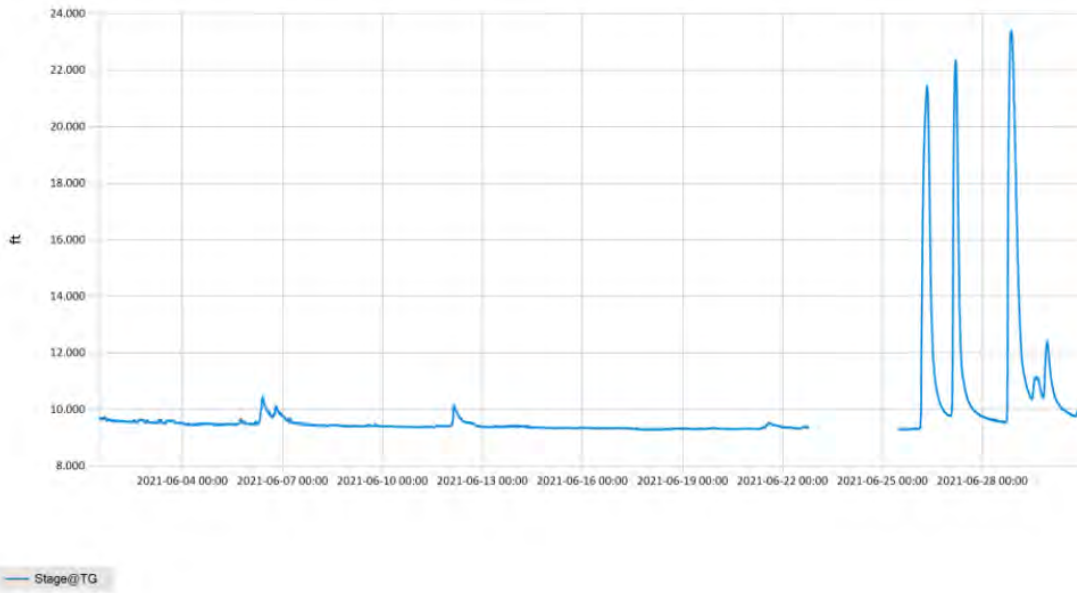


Figure 3 Monthly Hydrograph TG-1

Period Selected: 2021-06-01 00:00 - 2021-06-30 23:59

UTC Offset: -06:00

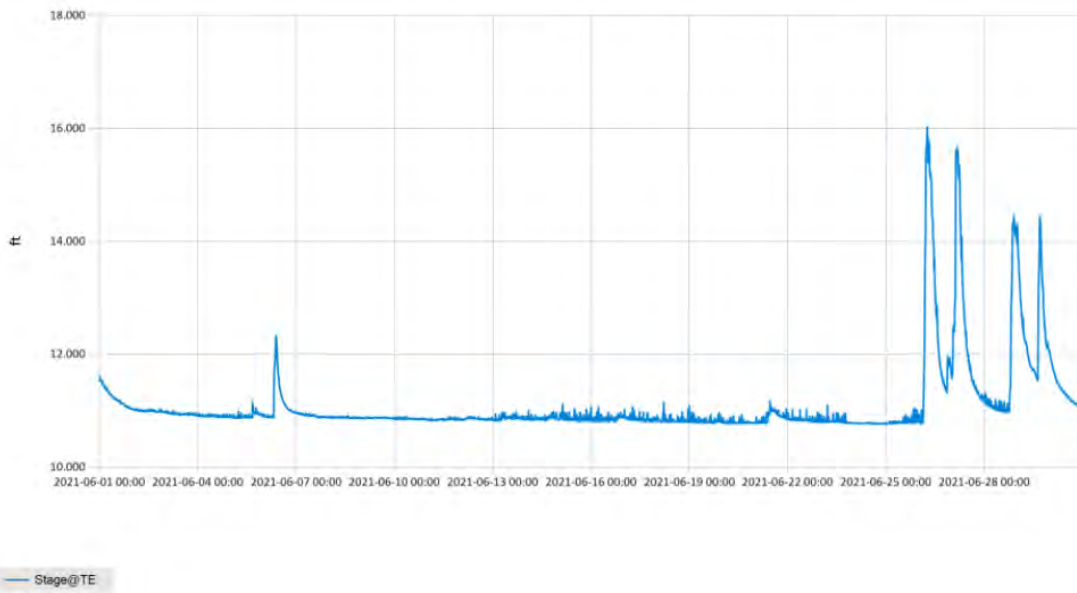


Figure 4 Monthly Hydrograph TE-1

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UTC Offset: -06:00

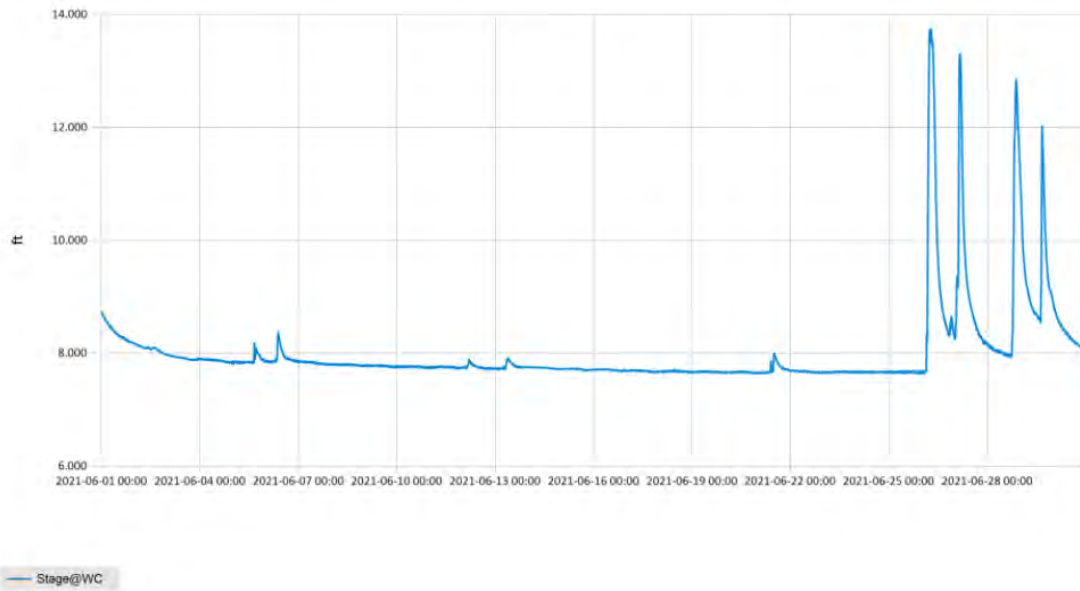


Figure 5 Monthly Hydrograph WC-1

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UTC Offset: -06:00

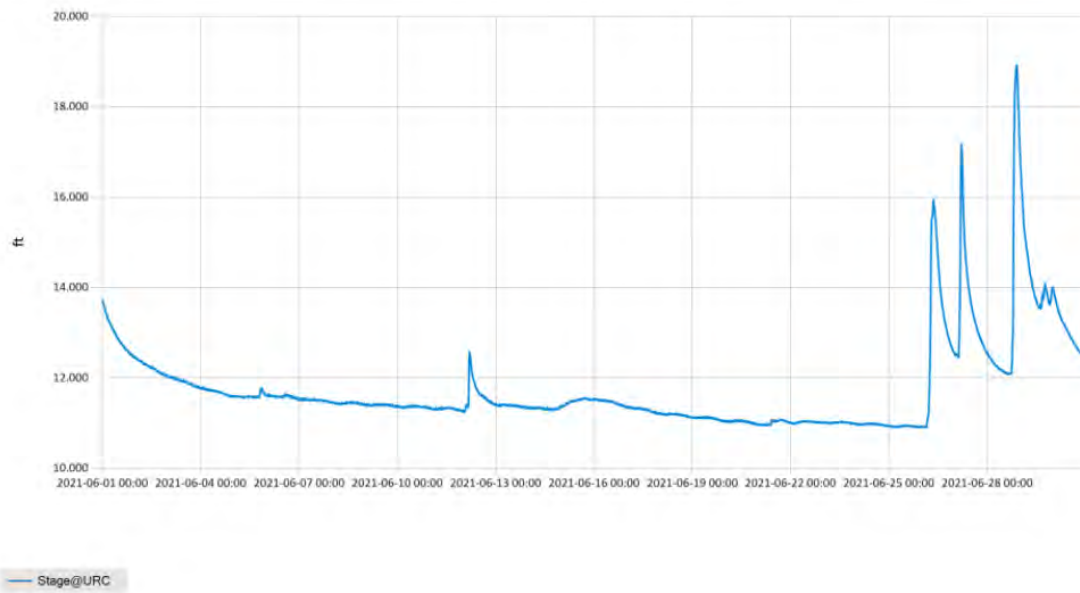


Figure 6 Monthly Hydrograph URC-2

Period Selected: 2021-06-01 00:00 - 2021-06-30 23:59

UTC Offs et: -06:00

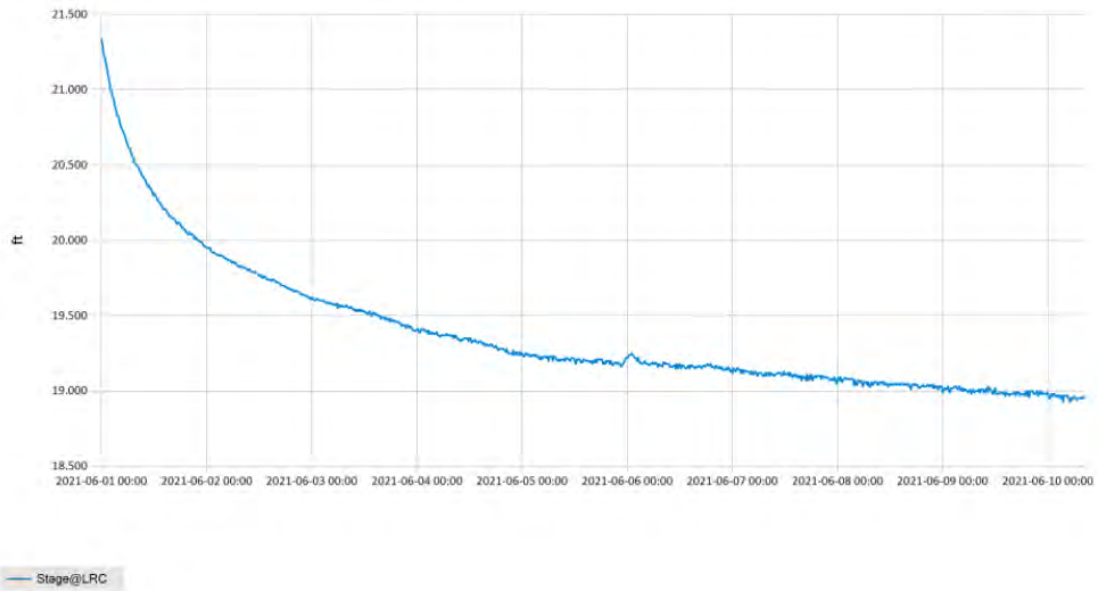


Figure 7 Monthly Hydrograph LRC-1

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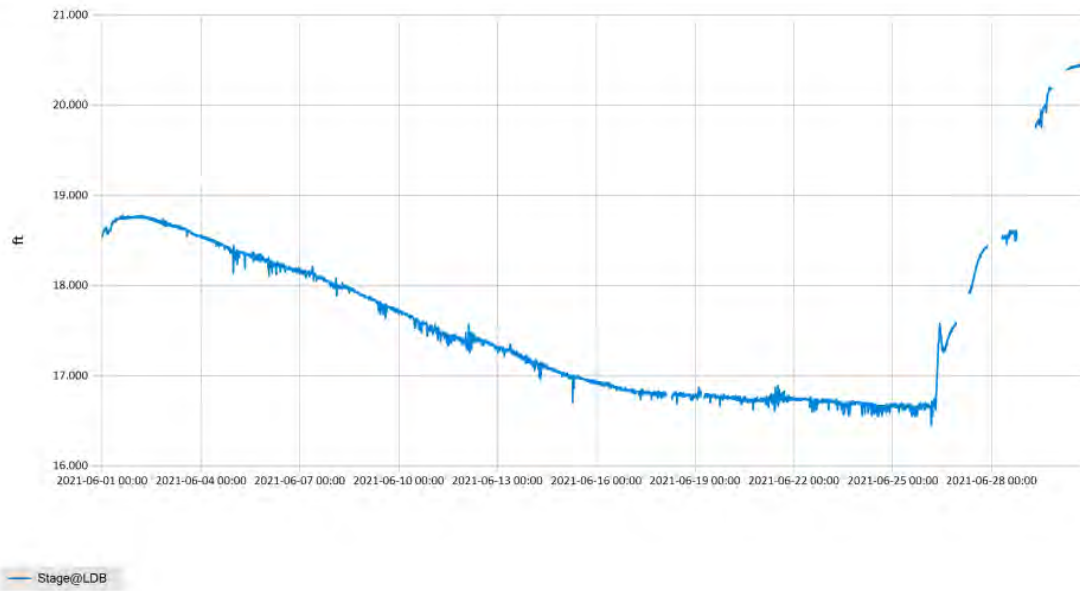


Figure 8 Monthly Hydrograph LDB-1

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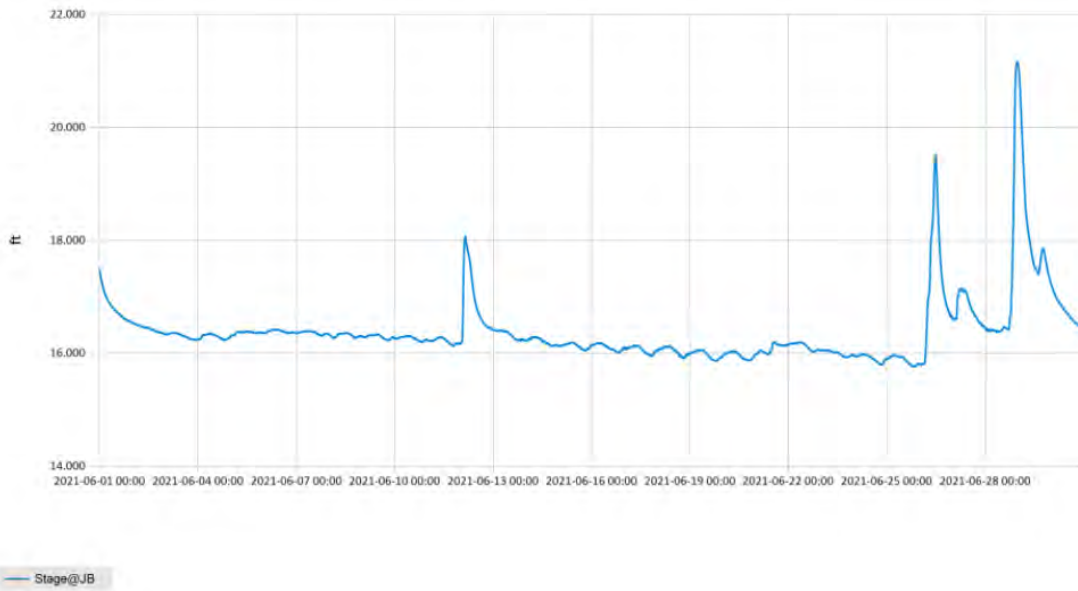


Figure 9 Monthly Hydrograph JB-1

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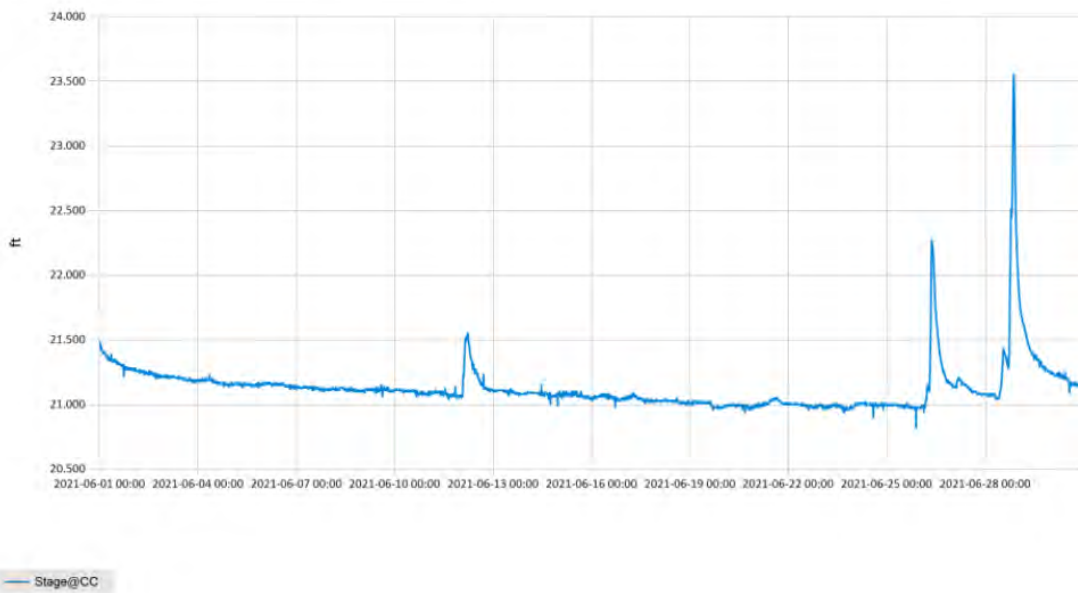


Figure 10 Monthly Hydrograph CC-1

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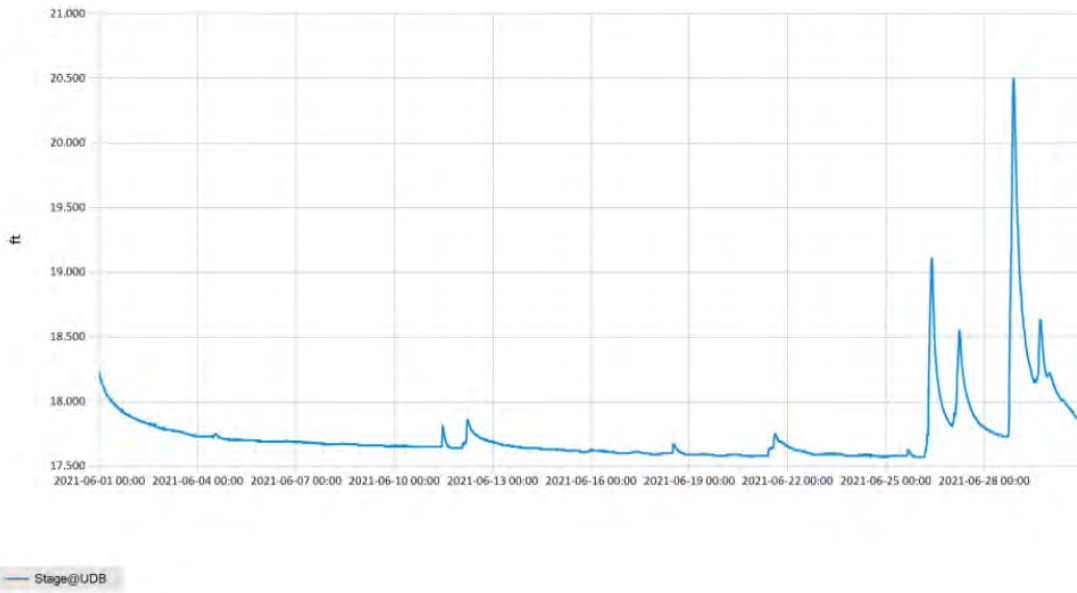


Figure 11 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY		June 2021		Time Zone: Midnight-Midnight CST																		
(NR/MN) 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	4" SOIL TEMPERATURES			
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG		STN	MSL	DIR	AVG	MAX	(MJ/m ²)	SOD	BARE	MAX	MIN		
1	67	58	61.4	58.7	2	0	98	76	91	0.02	28.83	30.08	N	7.5	16.7	8.63	65.8	65.3	68	63		
2	76	54	64.9	57.6	0	0	100	51	79	0.00	28.76	30.01	SE	3.0	13.5	19.35	66.3	67.6	75	62		
3	83	55	70.9	59.0	0	4	98	43	69	0.00	28.75	30.00	S	4.3	13.8	27.96	68.4	71.7	80	63		
4	84	61	74.0	60.4	0	8	95	38	65	0.00	28.76	30.01	SSE	5.9	17.7	29.21	71.2	73.1	79	67		
5	79	64	70.4	64.3	0	7	96	65	82	0.00	28.67	29.91	SSE	5.5	19.2	14.71	71.3	71.3	75	67		
6	81	64	71.6	66.3	0	8	96	65	84	0.41	28.58	29.82	SSE	8.2	23.2	17.72	71.5	72.0	78	67		
7	83	66	73.9	67.4	0	9	98	59	81	0.00	28.58	29.82	SSE	6.9	27.2	20.05	72.7	73.9	79	70		
8	87	69	76.4	70.2	0	13	97	58	82	0.00	28.65	29.89	ESE	6.3	16.3	17.39	73.8	74.7	80	71		
9	90	74	81.1	74.3	0	17	97	63	81	0.00	28.70	29.94	SSE	7.6	20.0	22.23	75.9	77.4	83	73		
10	90	74	82.0	74.5	0	17	93	60	79	0.00	28.65	29.89	SSE	7.8	21.1	25.11	77.8	79.2	85	74		
11	90	73	82.0	74.3	0	17	93	64	78	0.00	28.57	29.81	S	9.4	24.8	24.64	78.6	80.5	87	75		
12	93	67	81.1	70.1	0	15	93	45	71	0.05	28.70	29.95	ENE	7.6	43.0	27.87	79.0	82.2	90	74		
13	92	74	80.9	73.7	0	18	98	58	80	0.04	28.75	30.00	ENE	4.9	24.6	16.62	79.4	82.7	89	79		
14	91	69	81.3	66.7	0	15	94	40	64	0.00	28.79	30.04	E	4.3	12.9	29.87	79.2	84.1	93	76		
15	93	65	80.5	64.8	0	14	97	33	63	0.00	28.81	30.06	ESE	3.2	13.5	29.70	78.5	85.6	95	77		
16	93	67	82.2	67.8	0	15	95	42	64	0.00	28.79	30.04	S	4.7	16.9	29.56	78.7	86.7	95	78		
17	93	71	83.1	67.8	0	17	84	42	62	0.00	28.75	29.99	S	6.6	18.6	26.62	79.4	86.8	94	80		
18	92	71	83.0	69.0	0	17	89	43	65	0.00	28.68	29.93	S	8.4	21.3	27.84	79.7	86.8	93	80		
19	91	70	81.4	66.7	0	16	91	42	63	0.00	28.60	29.85	S	8.1	21.1	29.04	79.8	86.9	94	80		
20	93	71	82.4	66.4	0	17	76	41	60	0.00	28.50	29.74	S	10.3	26.2	28.27	79.4	86.3	93	80		
21	79	59	69.6	61.1	0	4	98	56	75	0.18	28.71	29.95	NNE	9.1	34.3	13.56	76.8	80.1	86	75		
22	84	56	71.5	54.5	0	5	99	30	60	0.00	28.77	30.02	SSE	7.2	23.2	29.77	73.7	77.4	86	69		
23	91	68	79.7	68.3	0	15	82	55	69	0.00	28.67	29.92	SSE	11.5	26.4	23.52	75.6	80.8	88	75		
24	95	77	85.1	71.9	0	21	88	46	66	0.00	28.64	29.88	S	12.7	28.3	27.38	78.6	84.7	91	79		
25	94	78	84.8	72.0	0	21	87	47	67	0.00	28.60	29.84	S	10.8	24.9	23.94	79.3	86.0	92	81		
26	81	67	75.3	70.8	0	9	98	70	87	3.06	28.63	29.88	SSE	7.3	33.1	12.99	76.4	80.9	86	77		
27	80	68	73.5	69.0	0	9	97	72	86	1.03	28.70	29.95	NE	7.3	26.8	13.83	75.8	78.7	82	76		
28	83	70	73.9	70.5	0	12	97	66	90	1.04	28.78	30.03	ENE	5.6	20.6	12.59	75.7	78.0	82	75		
29	81	71	74.7	71.5	0	11	97	75	90	0.71	28.84	30.09	SE	6.0	21.9	13.03	75.6	77.9	81	75		
30	87	71	78.5	72.0	0	14	98	61	81	0.00	28.83	30.08	S	5.9	21.1	24.92	77.1	80.5	86	75		
	87	67	77.0	67.4	<- Monthly Averages ->						28.70	29.95	S	7.1	43.0	22.26	75.7	79.3	86	74		
Temperature - Highest: 95					Degree Days - Total HDD: 3					Number of Days With:												
Lowest: 54					Total CDD: 363					Tmax ≥ 90: 15					Rainfall ≥ 0.01 inch: 9							
Rainfall: Monthly Total: 6.54 in.					Humidity - Highest: 100					Tmax ≤ 32: 0					Rainfall ≥ 0.10 inch: 6							
Greatest 24 Hr: 3.06 in.					Lowest: 30					Tmin ≤ 32: 0					Avg Wind Speed ≥ 10 mph: 4							
										Tmin ≤ 0: 0					Max Wind Speed ≥ 30 mph: 3							

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* Denotes incomplete record

Figure 12 June Mesonet Data