
***Lake Thunderbird TMDL Monitoring Plan Implementation:
Sample Year (SY) 2020- December Report***



SY2020 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

December 2020 Monitoring Report

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 December Water Quality Sampling 4
Results..... 4

LIST OF TABLES

TABLE 1 FIELD DATA FORM 5
TABLE 2 LABORATORY ANALYSIS SUMMARY 6
TABLE 3 QA/QC DATA 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 UDB-1..... 8
FIGURE 4 MONTHLY HYDROGRAPH TG-1 9
FIGURE 5 MONTHLY HYDROGRAPH TE-1 9
FIGURE 6 MONTHLY HYDROGRAPH WC-1..... 10
FIGURE 7 MONTHLY HYDROGRAPH URC-2..... 10
FIGURE 8 MONTHLY HYDROGRAPH LRC-1 11
FIGURE 9 MONTHLY HYDROGRAPH LDB-1 11
FIGURE 10 MONTHLY HYDROGRAPH JB-1 12
FIGURE 11 MONTHLY HYDROGRAPH CC-1 12
FIGURE 12 MONTHLY HYDROGRAPH UDB-1 13
FIGURE 13 DECEMBER MESONET DATA 14

SUMMARY OF DECEMBER WATER QUALITY SAMPLING

Sampling for December 2020 occurred on the seventh and was considered a base flow collection. Water samples were collected at all ten locations, and discharge measurements were collected at two locations. Mesonet data shows no precipitation on the seventh, 0.01 inches of precipitation in the 72 hours prior to sampling, and no precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of December was 3.25 inches. All water level gauges were operational for the month, except for LT-1 and UDB-1 due to equipment malfunction.

RESULTS

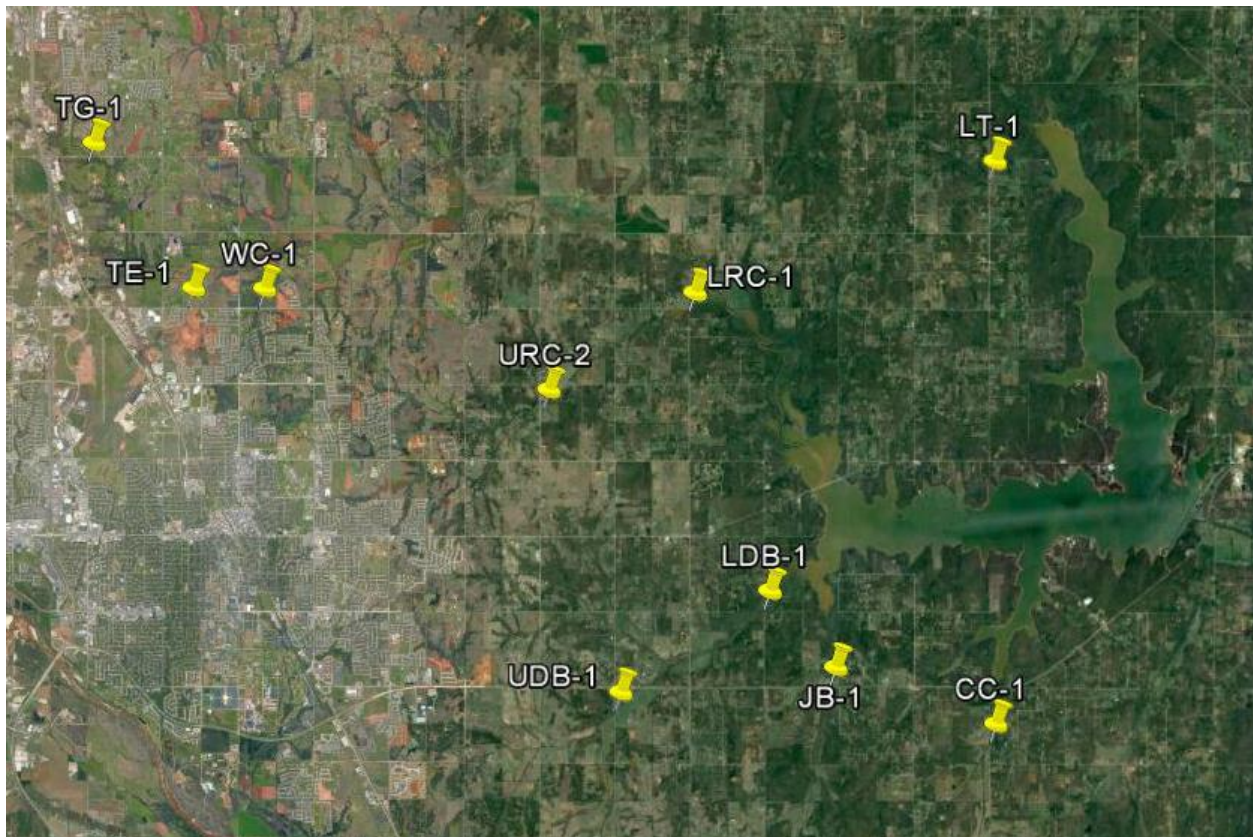


Figure 1 Monitoring Station Map

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	12/7/2020	10:55	SD	6.67	11.97	8.12	696	6	Used RP2, RP4 also over water, not sure RP1 over main channel
JB-1	Jim Blue Creek	12/7/2020	12:05	SD	7.02	9.71	7.87	956	8	Neither RP over water, orifice just under water, visible flow
LDB-1	Lower Dave Blue Creek	12/7/2020	12:35	SD	5.42	12.96	8.19	953	4	Low visual flow, sometimes flowing in reverse, low flow is normal, borderline moderate/abundant algae
LRC-1	Lower Rock Creek	12/7/2020	14:20	SD	6.15	12.26	8.07	715	5	Low/normal borderline visual flow
LT-1	Lake Laterals	12/7/2020	13:10	SD	6.66	7.37	7.71	640	5	No visible flow, latch on gauge box cut, solar panel gone
TE-1	Little River Tributary	12/7/2020	16:10	SD	10.26	13.45	7.92	603	23	Small beaver dam approx 20ft upstream of bridge, scum above dam, clear below, no visual flow
TG-1	Little River Tributary	12/7/2020	16:45	SD	7.40	12.17	7.97	946	5	Borderline low/normal flow conditions, dead animal trash gone
UDB-1	Upper Dave Blue Creek	12/7/2020	9:30	SD	4.15	10.14	7.92	960	4	Small tree debris still present in middle of channel from last visit, small amount of animal remains on REW
URC-2	Upper Rock Creek	12/7/2020	14:50	SD	9.30	6.15	7.52	679	18	Orifice just under water, used RP2, RP1 not over water, minimal visual flow
WC-1	Woodcrest Creek	12/7/2020	15:35	SD	10.11	8.01	7.61	900	7	Moderate/abundant amount of scum/small debris upstream of bridge, none downstream, minimal flow on downstream, solar panel broken

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	0.14	0.17	0.028	8.0
JB-1	Jim Blue Creek	<0.05	0.27	0.033	14.0
LDB-1	Lower Dave Blue Creek	0.13	0.20	0.025	6.0
LRC-1	Lower Rock Creek	<0.05	0.16	0.031	6.0
LT-1	Lake Laterals	<0.05	0.31	0.027	<5.0
TE-1	Little River Tributary	<0.05	0.59	0.116	8.0
TG-1	Little River Tributary	0.17	0.31	0.034	6.0
UDB-1	Upper Dave Blue Creek	0.07	0.13	0.028	6.0
URC-2	Upper Rock Creek	<0.05	0.52	0.079	8.0
WC-1	Woodcrest Creek	<0.05	0.25	0.055	12.0

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	0.14	0.17	0.027	8.0
Duplicate RPD	0%	0%	3.64%	0%

Table 3 QA/QC Data

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	0.59	20.84
JB-1	Jim Blue Creek	0.05	15.24
LDB-1	Lower Dave Blue Creek	1.78	16.13
LRC-1	Lower Rock Creek	0.10	17.77
LT-1	Lake Laterals	0.12	4.36
TE-1	Little River Tributary	0.12	11.07
TG-1	Little River Tributary	0.10	8.89
UDB-1	Upper Dave Blue Creek	0.53	17.34
URC-2	Upper Rock Creek	0.01	10.81
WC-1	Woodcrest Creek	0.01	7.46

Table 4 Station Discharge Summary

Discharge Measurement Summary

Date Generated: Fri Dec 11 2020

File Information				Site Details			
File Name	CC1207.WAD			Site Name	CC		
Start Date and Time	2020/12/07 12:10:31			Operator(s)	SCD		

System Information		Units (English Units)		Discharge Uncertainty		
Sensor Type	FlowTracker	Distance	ft	Category	ISO	Stats
Serial #	P4709	Velocity	ft/s	Accuracy	1.0%	1.0%
CPU Firmware Version	3.9	Area	ft ²	Depth	0.5%	3.8%
Software Ver	2.30	Discharge	cfs	Velocity	1.7%	8.1%
Mounting Correction	0.0%			Width	0.2%	0.2%
				Method	2.6%	-
				# Stations	2.5%	-
				Overall	4.1%	9.0%

Summary			
Averaging Int.	40	# Stations	20
Start Edge	LEW	Total Width	11.000
Mean SNR	27.0 dB	Total Area	5.463
Mean Temp	44.02 °F	Mean Depth	0.497
Disch. Equation	Mid-Section	Mean Velocity	0.1078
		Total Discharge	0.5889

Supplemental Data					
#	Time	Location	Gauge Height	Rated Flow	Comments
1	Mon Dec 7 12:30:24 CST 2020	11.000	20.840		

Measurement Results												
St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	12:10	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>12:11</i>	<i>1.00</i>	<i>0.6</i>	<i>0.350</i>	<i>0.6</i>	<i>0.140</i>	<i>0.0781</i>	<i>1.00</i>	<i>0.0781</i>	<i>0.263</i>	<i>0.0205</i>	<i>3.5</i>
2	12:12	1.50	0.6	0.400	0.6	0.160	0.1939	1.00	0.1939	0.200	0.0388	6.6
3	12:14	2.00	0.6	0.300	0.6	0.120	0.2500	1.00	0.2500	0.150	0.0375	6.4
4	12:15	2.50	0.6	0.350	0.6	0.140	0.3133	1.00	0.3133	0.175	0.0548	9.3
5	12:16	3.00	0.6	0.350	0.6	0.140	0.3448	1.00	0.3448	0.175	0.0604	10.2
<i>6</i>	<i>12:17</i>	<i>3.50</i>	<i>0.6</i>	<i>0.350</i>	<i>0.6</i>	<i>0.140</i>	<i>0.4012</i>	<i>1.00</i>	<i>0.4012</i>	<i>0.175</i>	<i>0.0702</i>	<i>11.9</i>
<i>7</i>	<i>12:18</i>	<i>4.00</i>	<i>0.6</i>	<i>0.350</i>	<i>0.6</i>	<i>0.140</i>	<i>0.3340</i>	<i>1.00</i>	<i>0.3340</i>	<i>0.175</i>	<i>0.0585</i>	<i>9.9</i>
8	12:19	4.50	0.6	0.500	0.6	0.200	0.2618	1.00	0.2618	0.250	0.0655	11.1
9	12:20	5.00	0.6	0.550	0.6	0.220	0.2490	1.00	0.2490	0.275	0.0685	11.6
10	12:21	5.50	0.6	0.600	0.6	0.240	0.1611	1.00	0.1611	0.300	0.0483	8.2
11	12:22	6.00	0.6	0.850	0.6	0.340	0.1152	1.00	0.1152	0.425	0.0489	8.3
<i>12</i>	<i>12:23</i>	<i>6.50</i>	<i>0.6</i>	<i>0.900</i>	<i>0.6</i>	<i>0.360</i>	<i>0.1837</i>	<i>1.00</i>	<i>0.1837</i>	<i>0.450</i>	<i>0.0827</i>	<i>14.0</i>
13	12:24	7.00	0.6	0.850	0.6	0.340	0.0495	1.00	0.0495	0.425	0.0211	3.6
<i>14</i>	<i>12:25</i>	<i>7.50</i>	<i>0.6</i>	<i>0.800</i>	<i>0.6</i>	<i>0.320</i>	<i>-0.0272</i>	<i>1.00</i>	<i>-0.0272</i>	<i>0.400</i>	<i>-0.0109</i>	<i>-1.8</i>
<i>15</i>	<i>12:26</i>	<i>8.00</i>	<i>0.6</i>	<i>0.700</i>	<i>0.6</i>	<i>0.280</i>	<i>-0.0174</i>	<i>1.00</i>	<i>-0.0174</i>	<i>0.350</i>	<i>-0.0061</i>	<i>-1.0</i>
<i>16</i>	<i>12:27</i>	<i>8.50</i>	<i>0.6</i>	<i>0.700</i>	<i>0.6</i>	<i>0.280</i>	<i>-0.0656</i>	<i>1.00</i>	<i>-0.0656</i>	<i>0.350</i>	<i>-0.0230</i>	<i>-3.9</i>
<i>17</i>	<i>12:28</i>	<i>9.00</i>	<i>0.6</i>	<i>0.700</i>	<i>0.6</i>	<i>0.280</i>	<i>-0.0269</i>	<i>1.00</i>	<i>-0.0269</i>	<i>0.525</i>	<i>-0.0141</i>	<i>-2.4</i>
<i>18</i>	<i>12:29</i>	<i>10.00</i>	<i>0.6</i>	<i>0.400</i>	<i>0.6</i>	<i>0.160</i>	<i>-0.0814</i>	<i>1.00</i>	<i>-0.0814</i>	<i>0.400</i>	<i>-0.0325</i>	<i>-5.5</i>
19	12:29	11.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

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

Discharge Measurement Summary

Date Generated: Fri Dec 11 2020

File Information		Site Details	
File Name	UDB1207.WAD	Site Name	UDB
Start Date and Time	2020/12/07 11:01:06	Operator(s)	SCD

System Information		Units (English Units)	Discharge Uncertainty	
Sensor Type	FlowTracker	Distance	ft	
Serial #	P4709	Velocity	ft/s	
CPU Firmware Version	3.9	Area	ft ²	
Software Ver	2.30	Discharge	cfs	
Mounting Correction	0.0%			

Summary			
Averaging Int.	40	# Stations	16
Start Edge	LEW	Total Width	16.000
Mean SNR	28.8 dB	Total Area	12.500
Mean Temp	38.94 °F	Mean Depth	0.781
Disch. Equation	Mid-Section	Mean Velocity	0.0427
		Total Discharge	0.5336

Supplemental Data					
#	Time	Location	Gauge Height	Rated Flow	Comments
1	Mon Dec 7 11:15:35 CST 2020	16.000	17.340		

Measurement Results												
St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	11:01	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	11:01	2.00	0.6	0.600	0.6	0.240	-0.0115	1.00	-0.0115	0.900	-0.0103	-1.9
2	11:02	3.00	0.6	0.950	0.6	0.380	0.0187	1.00	0.0187	0.950	0.0178	3.3
3	11:03	4.00	0.6	0.950	0.6	0.380	0.0354	1.00	0.0354	0.950	0.0337	6.3
4	11:04	5.00	0.6	1.100	0.6	0.440	0.0505	1.00	0.0505	1.100	0.0556	10.4
5	11:05	6.00	0.6	0.950	0.6	0.380	0.0899	1.00	0.0899	0.950	0.0854	16.0
6	11:06	7.00	0.6	1.300	0.6	0.520	0.0876	1.00	0.0876	1.300	0.1139	21.3
7	11:07	8.00	0.6	1.400	0.6	0.560	0.1138	1.00	0.1138	1.400	0.1594	29.9
8	11:08	9.00	0.6	1.050	0.6	0.420	0.0574	1.00	0.0574	1.050	0.0603	11.3
9	11:09	10.00	0.6	0.700	0.6	0.280	0.0344	1.00	0.0344	0.700	0.0241	4.5
10	11:10	11.00	0.6	0.900	0.6	0.360	0.0154	1.00	0.0154	0.900	0.0139	2.6
11	11:11	12.00	0.6	0.700	0.6	0.280	0.0112	1.00	0.0112	0.700	0.0078	1.5
12	11:12	13.00	0.6	0.500	0.6	0.200	-0.0187	1.00	-0.0187	0.500	-0.0094	-1.8
13	11:13	14.00	0.6	0.500	0.6	0.200	0.0052	1.00	0.0052	0.500	0.0026	0.5
14	11:14	15.00	0.6	0.600	0.6	0.240	-0.0351	1.00	-0.0351	0.600	-0.0211	-3.9
15	11:14	16.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Figure 3 Discharge Measurement Summary UDB-1

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offset: -06:00

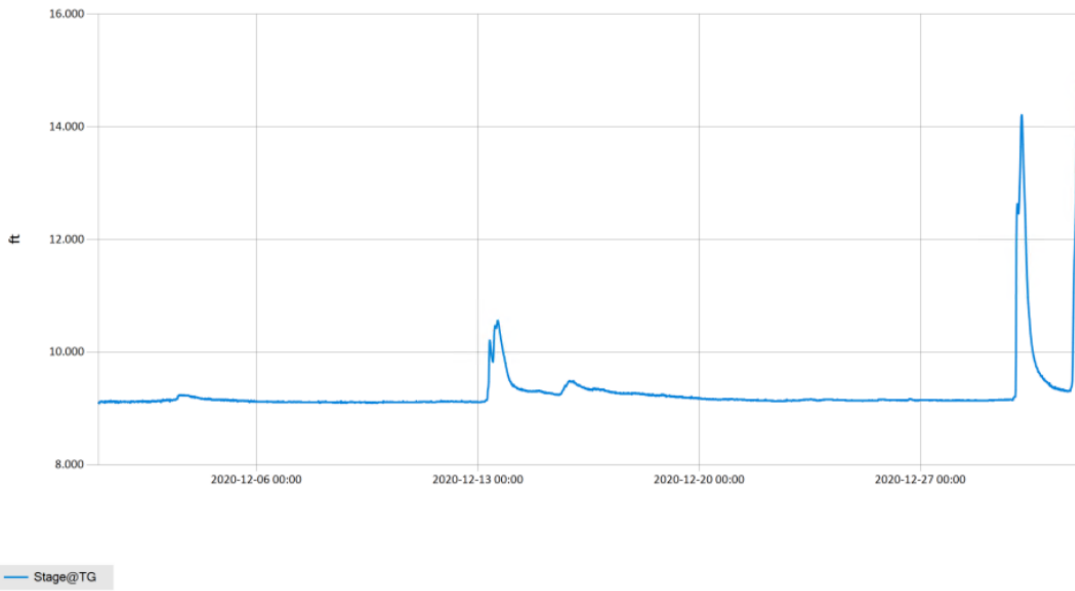


Figure 4 Monthly Hydrograph TG-1

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offset: -06:00

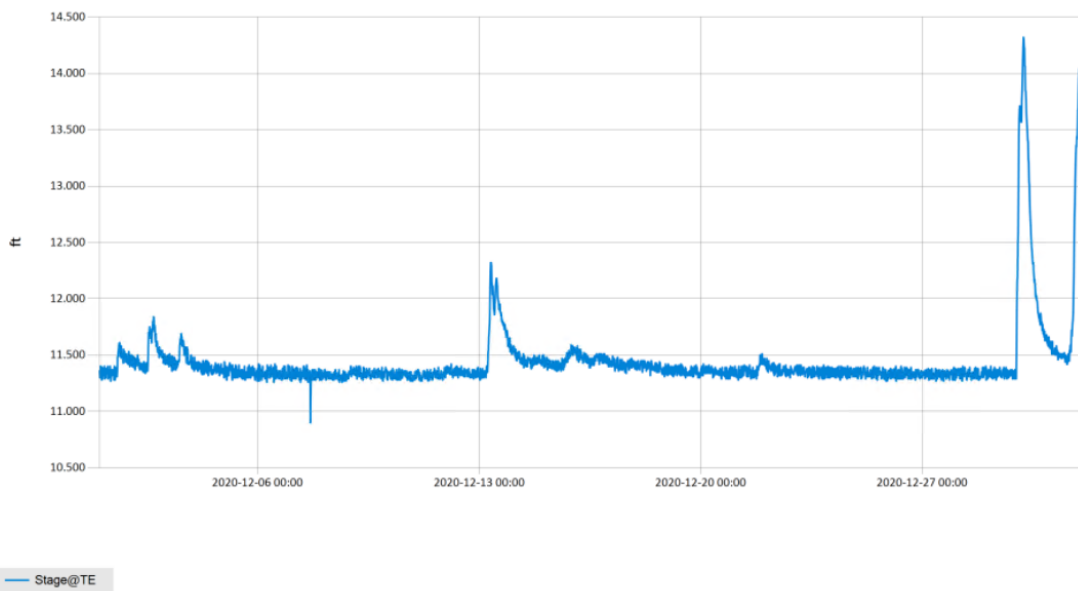


Figure 5 Monthly Hydrograph TE-1

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offs et: -06:00

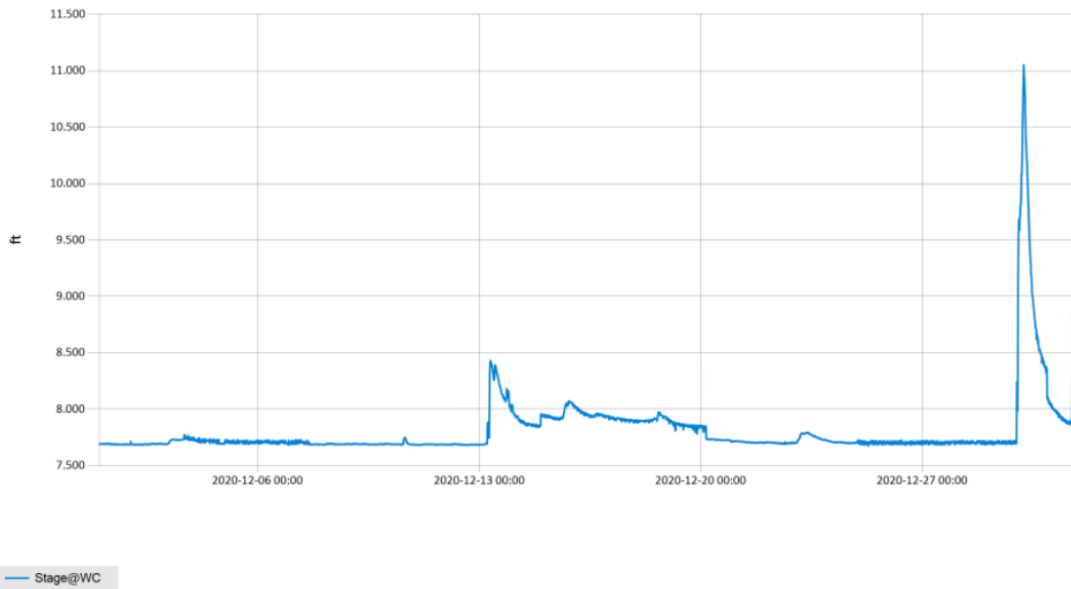


Figure 6 Monthly Hydrograph WC-1

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offs et: -06:00

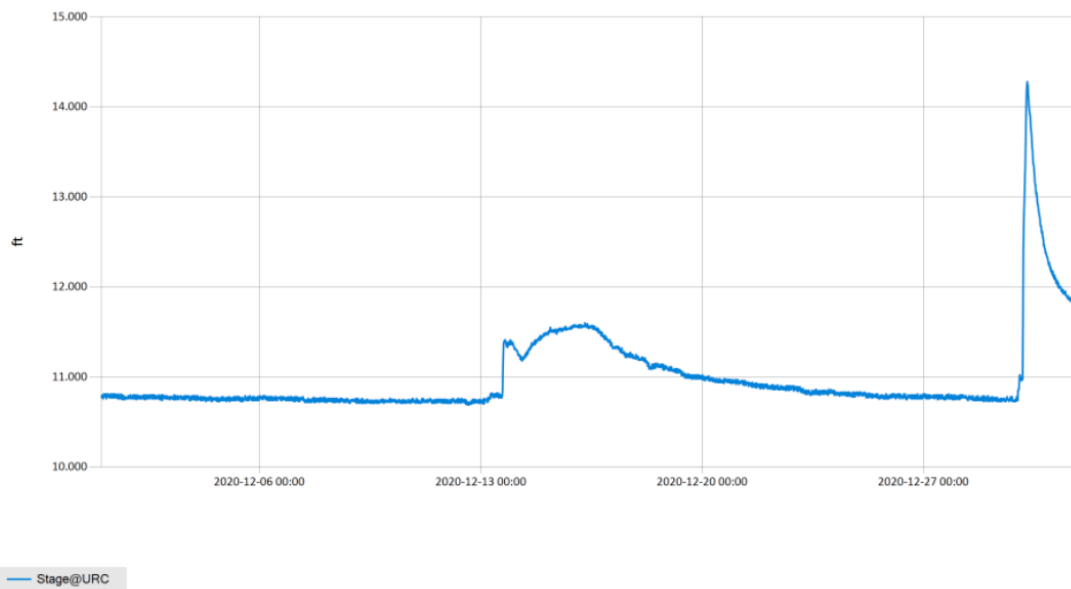


Figure 7 Monthly Hydrograph URC-2

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offs et: -06:00

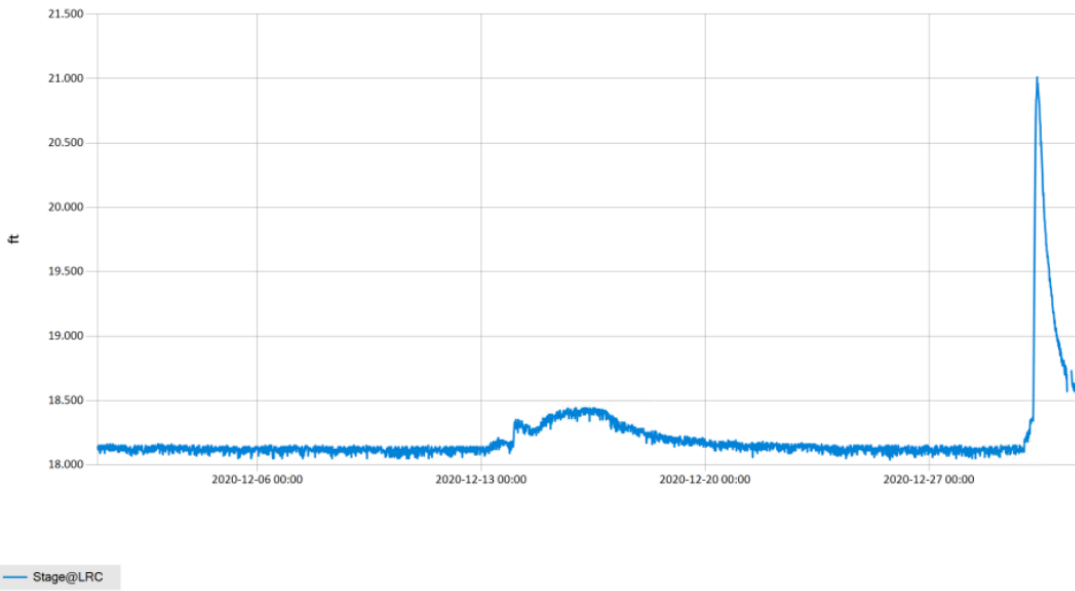


Figure 8 Monthly Hydrograph LRC-1

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offs et: -06:00

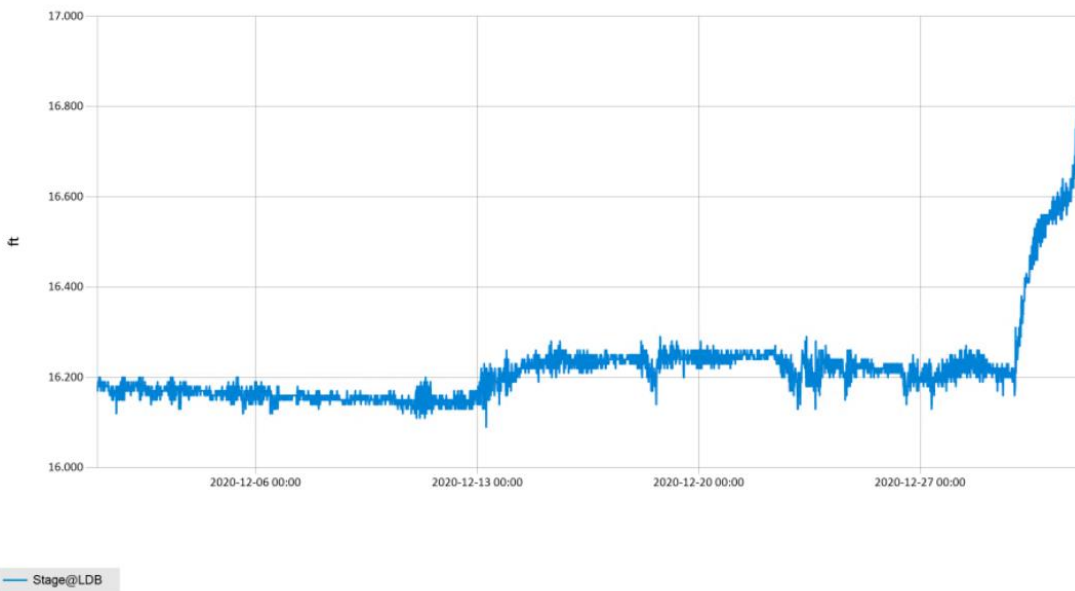
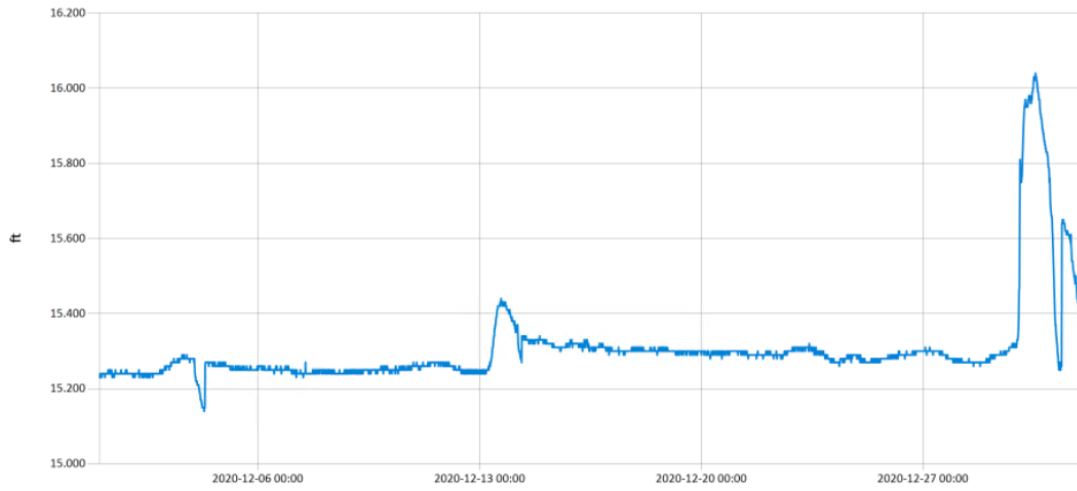


Figure 9 Monthly Hydrograph LDB-1

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offset: -06:00

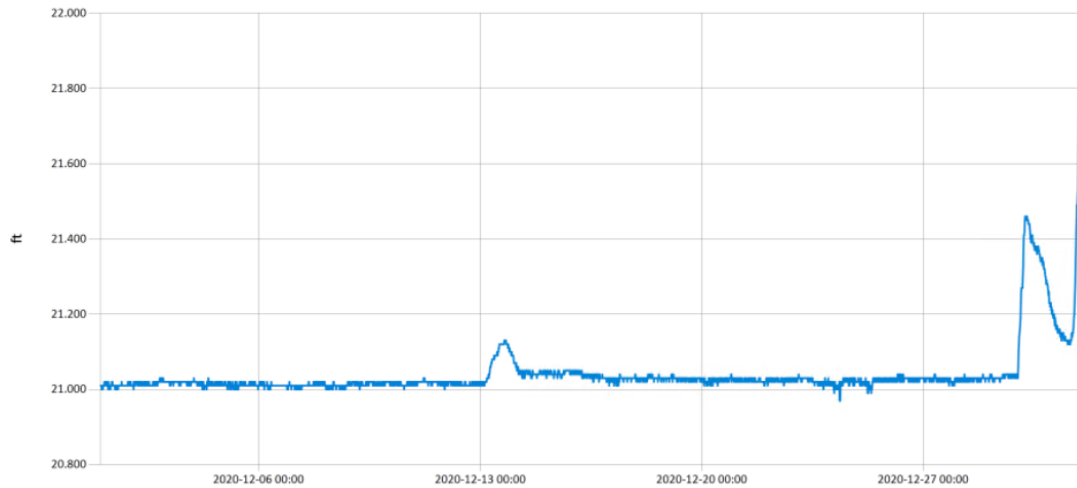


— Stage@JB

Figure 10 Monthly Hydrograph JB-1

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offset: -06:00

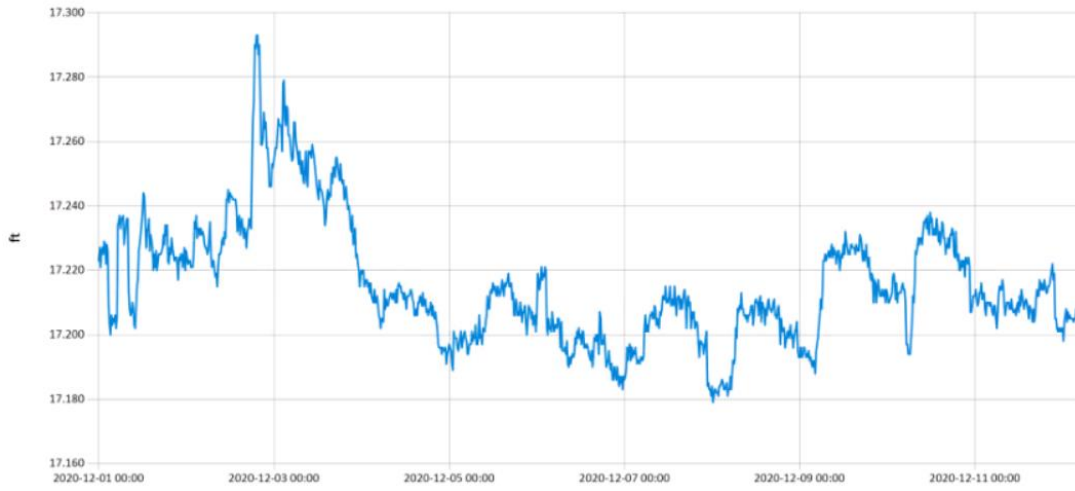


— Stage@CC

Figure 11 Monthly Hydrograph CC-1

Period Selected: 2020-12-01 00:00 - 2020-12-31 23:59

UTC Offset: -06:00



— Stage@UDB

Figure 12 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				December 2020				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		PRESSURE (in)		WIND SPEED (mph)		SOLAR (MJ/m ²)	4" SOIL TEMPERATURES			
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG	(in)	STN	MSL	DIR	AVG	MAX		SOD	BARE	MAX	MIN
1	56	30	42.2	20.6	22	0	64	27	44	0.00	28.76	30.00	SSE	10.2	24.8	12.54	47.3	41.0	45	38
2	46	37	40.2	34.5	24	0	98	41	82	0.10	28.83	30.08	ESE	7.3	16.5	1.39	47.8	41.9	44	40
3	40	28	35.4	33.8	31	0	99	86	94	0.04	28.95	30.20	NNW	8.8	23.9	1.97	47.7	42.2	43	40
4	55	25	37.6	27.5	25	0	94	36	70	0.00	28.94	30.19	WSW	4.7	14.6	12.42	45.9	41.0	46	37
5	57	28	41.6	31.0	22	0	92	40	68	0.00	28.94	30.19	NNW	5.7	18.9	11.59	45.7	42.1	48	38
6	58	31	42.8	31.2	21	0	92	36	67	0.01	28.87	30.12	NNW	7.3	19.4	12.00	46.2	42.9	48	39
7	64	30	44.6	31.2	18	0	94	27	64	0.00	28.93	30.19	WNW	4.2	13.5	12.16	46.2	43.5	50	39
8	66	32	47.4	27.5	16	0	78	19	50	0.00	28.92	30.18	NW	4.6	12.1	12.53	46.2	44.1	50	39
9	73	31	49.4	27.9	13	0	82	16	49	0.00	28.79	30.04	SSW	3.5	12.4	12.53	46.1	44.8	51	39
10	73	35	56.3	31.1	11	0	77	20	42	0.00	28.61	29.85	S	7.7	22.8	12.28	46.9	46.3	52	41
11	62	36	46.7	38.4	16	0	92	48	73	0.04	28.62	29.86	NW	9.2	19.4	7.89	49.1	49.1	51	45
12	45	29	37.1	29.5	28	0	92	55	75	0.00	28.79	30.04	WNW	8.0	21.9	10.03	47.1	44.1	48	41
13	37	26	32.8	30.4	34	0	99	76	91	0.53	28.91	30.16	N	11.6	26.2	1.93	45.4	40.3	44	38
14	44	20	30.0	25.6	33	0	98	54	84	0.16	28.98	30.24	E	5.8	15.4	11.71	43.2	39.0	44	36
15	32	28	30.7	29.1	35	0	98	84	94	0.00	28.78	30.02	ESE*	8.2*	22.7*	1.21	42.7	37.1	39	36
16	38	27	31.5	27.2	32	0	96	67	85	0.19	28.86	30.11	WNW	6.0	14.6	8.75	42.8	37.9	42	36
17	56	25	40.2	27.8	24	0	95	33	65	0.02	28.91	30.16	WSW	5.4	18.6	12.13	41.9	39.2	45	36
18	58	41	48.2	36.3	16	0	89	44	64	0.00	28.81	30.06	S	12.0	36.3	9.70	44.0	42.0	46	39
19	51	29	41.2	32.3	25	0	96	50	72	0.00	28.87	30.12	N	6.6	17.5	11.01	45.4	43.9	48	41
20	58	27	41.7	30.4	22	0	97	35	68	0.00	28.81	30.06	SSW	6.2	17.7	11.92	43.7	41.3	47	37
21	66	34	48.0	30.7	15	0	80	27	54	0.00	28.84	30.09	SSW	4.0	14.0	11.76	44.3	43.0	50	37
22	69	32	51.8	36.9	15	0	88	32	60	0.00	28.73	29.98	S	10.3	32.7	10.75	45.0	44.1	49	38
23	60	29	46.3	30.3	20	0	93	31	56	0.00	28.70	29.94	NNW	20.7	44.9	11.71	47.2	46.5	48	40
24	49	19	32.4	15.0	31	0	80	21	52	0.00	28.96	30.22	W	8.5	34.3	12.13	43.2	38.5	41	36
25	58	22	40.1	22.7	25	0	88	27	54	0.00	28.92	30.18	S	5.8	17.2	11.80	42.3	38.9	44	35
26	66	35	50.8	22.5	15	0	65	14	37	0.00	28.70	29.95	S	10.2	27.3	12.19	43.9	42.1	48	37
27	64	44	52.7	28.6	11	0	61	27	40	0.00	28.64	29.88	SSW	13.5	28.4	11.39	45.6	46.2	51	43
28	49	35	42.0	29.1	23	0	83	43	61	0.00	29.01	30.26	ENE	8.5	20.4	7.21	45.5	45.0	47	42
29	60	43	50.5	46.0	14	0	96	60	84	0.47	28.74	29.99	SSE	12.9	35.7	1.38	46.5	46.6	49	45
30	46	31	37.2	31.9	27	0	96	63	82	0.96	28.87	30.12	N	13.3	29.9	2.70	46.1	45.3	49	43
31	34	28	31.3	25.2	34	0	96	63	79	0.73	28.72	29.97	NNE*	NA	25.1*	2.80	42.8	40.8	43	39
	55	31	42.0	29.7	<- Monthly Averages ->				28.83	30.08	S *	8.3*	44.9*	9.15	45.3	42.6	47	39		
Temperature - Highest: 73					Degree Days - Total HDD: 697					Number of Days With:										
Lowest: 19					Total CDD: 0					Tmax ≥ 90: 0					Rainfall ≥ 0.01 inch: 11					
Rainfall: Monthly Total: 3.25 in.					Humidity - Highest: 99					Tmax ≤ 32: 1					Rainfall ≥ 0.10 inch: 7					
Greatest 24 Hr: 0.96 in.					Lowest: 14					Tmin ≤ 32: 22					Avg Wind Speed ≥ 10 mph: 9*					
										Tmin ≤ 0: 0					Max Wind Speed ≥ 30 mph: 5*					

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* Denotes incomplete record

Figure 13 December Mesonet Data