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***Lake Thunderbird TMDL Monitoring Plan Implementation:  
Sample Year (SY) 2016- December Report***

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**SY2016 Monthly Report**

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*Lake Thunderbird TMDL Monitoring Plan Implementation:*

*December 2016 Monitoring Report*

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Water Quality Programs Division  
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## SUMMARY OF DECEMBER WATER QUALITY SAMPLING

Sampling for December 2016 occurred on the twenty-first and was considered a typical base flow collection. Although discharge measurements were attempted at every location, only two stations were collected, as frozen conditions hindered the ability to measure stream flow. All sites were at or near stage levels where greater than five discharge measurements have been collected this year. Water quality measurements were made at the ten designated monitoring stations with the exception of LT-1, which had a frozen isolated pool downstream of the station location, and JB-1 which was completely frozen up and downstream of the station. All water level gages were operational for the month with the exception of CC-1 and LRC-1. Both stations are recording data, but not transmitting, since the SIM cards have yet to be installed. These locations are expected to be fully operational by the second week of January. Mesonet data for Norman shows a total of 0.87 inches of rainfall for the month of December with no precipitation in the 72 hours preceding and 0.03 inches following the sampling event.

## RESULTS

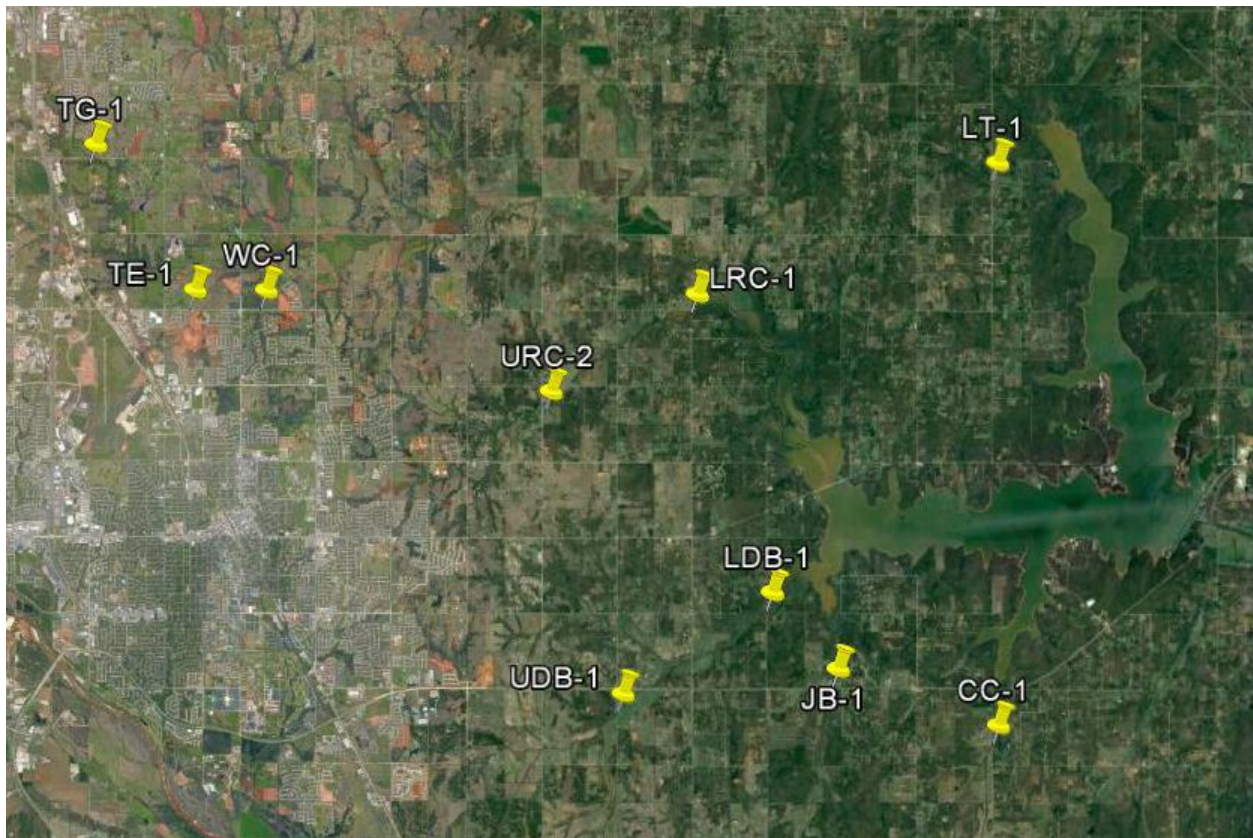


Figure 1 Monitoring Station Map

## Field Data Form

**Field Measurement Record**

**Reviewed By:**                     JM                    

Station	Date	Time	Field Crew	Temp C°	DO mg/L	SpC µS	pH	Turb (NTU)	Notes
cc-1	12/21/2016	9:40	sd	1.8	14.0	689.0	8.0	4.0	
tg-1	12/21/2016	14:10	sd	N/A	N/A	N/A	N/A	N/A	QA 33
udb-1	12/21/2016	8:50	sd	1.6	10.0	1111.0	7.6	4.0	frozen us and ds. Partly frozen under bridge. Riffle lightly flow ing. Sampled just above riffle.
jb-1	12/21/2016	10:20	sd	2.4	8.3	1034.0	7.3	5.0	completely frozen. Broke ice for turb/sonde reading, but unable to sample because of sediment clouds
ldb-1	12/21/2016	11:00	sd	2.9	14.4	1155.0	8.1	7.0	up and ds frozen. Partly frozen at bridge.
lt-1	12/21/2016	N/A	sd	N/A	N/A	N/A	N/A	N/A	upstream completely dry. Disconnected pool on ds, frozen.
lrc-1	12/21/2016	12:10	sd	3.5	10.5	884.0	7.8	10.0	frozen us, under bridge. Sampled ds. Ds of beaver dam no ice.
urc-2	12/21/2016	12:40	sd	4.5	8.4	891.0	7.4	9.0	small flow through vegetation. Frozen in us and ds pools.
wc-1	12/21/2016	13:05	sd	6.9	7.8	894.0	7.4	8.0	frozen up and dow n of bridge. Sampled in pool area under bridge
te-1	12/21/2016	13:20	sd	2.6	12.6	838.0	7.8	48.0	frozen up and ds. Broke ice to sample. Barely flow ing ds
tg-1	12/21/2016	14:00	sd	2.2	12.3	1382.0	7.8	3.0	partly frozen up and dow n. Sampled ds of beaver dam

Table 1 Field Data Form

<b>SITE NAME</b>	<b>QA CODE</b>	<b>TKN</b>	<b>NITRATE/NITRITE</b>	<b>TP</b>	<b>TSS</b>
TG-1	10	<0.050	0.054	0.033	<2.50
CC-1	12	<0.050	0.325	0.018	2.90
CC-1	22	<0.050	0.315	0.016	4.70
JB-1	10	N/A	N/A	N/A	N/A
UDB-1	10	<0.050	<0.050	0.022	<2.50
LDB-1	10	<0.050	<0.050	0.016	5.6
LRC-1	10	<0.050	<0.050	0.022	4.7
URC-2	10	0.425	<0.050	0.060	3.0
WC-1	10	<0.050	<0.050	0.058	2.90
TE-1	10	0.060	<0.050	0.063	20.00
TG-1	33	<0.050	<0.050	<0.015	<2.50
LT-1	10	N/A	N/A	N/A	N/A

Table 2 Laboratory Analysis Summary

<b>SITE</b>	<b>TG-1</b>	<b>CC-1</b>	<b>JB-1</b>	<b>UDB-1</b>	<b>LDB-1</b>	<b>LRC-1</b>	<b>URC-2</b>	<b>WC-1</b>	<b>TE-1</b>	<b>LT-1</b>
<b>STAGE</b>	8.99	0.40	15.71	17.39	14.7	8.93	12.61	8.67	11.62	N/A
<b>DISCHARGE</b>	N/A	0.713	N/A	0.114	N/A	N/A	N/A	N/A	N/A	N/A

Table 3 Measured Discharge Summary



# Discharge Measurement Summary

Date Generated: Wed Jan 4 2017

<b>File Information</b>		<b>Site Details</b>	
File Name	UDB.UDB.WAD	Site Name	UDB
Start Date and Time	2016/12/21 10:21:01	Operator(s)	LO

<b>System Information</b>		<b>Units (English Units)</b>		<b>Discharge Uncertainty</b>		
Sensor Type	FlowTracker	Distance	ft	<b>Category</b>	<b>ISO</b>	<b>Stats</b>
Serial #	P4710	Velocity	ft/s	Accuracy	1.0%	1.0%
CPU Firmware Version	3.9	Area	ft^2	Depth	0.7%	18.3%
Software Ver	2.30	Discharge	cfs	Velocity	2.3%	17.7%
Mounting Correction	0.0%			Width	0.2%	0.2%
				Method	3.5%	-
				# Stations	3.6%	-
				<b>Overall</b>	<b>5.6%</b>	<b>25.5%</b>

<b>Summary</b>			
Averaging Int.	40	# Stations	14
Start Edge	LEW	Total Width	6.000
Mean SNR	21.1 dB	Total Area	1.350
Mean Temp	35.67 °F	Mean Depth	0.225
Disch. Equation	Mid-Section	Mean Velocity	0.0845
		<b>Total Discharge</b>	<b>0.1141</b>

<b>Supplemental Data</b>					
#	Time	Location	Gauge Height	Rated Flow	Comments
1	Wed Dec 21 10:44:24 CST 2016	6.000	17.380		

<b>Measurement Results</b>												
St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	10:21	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>10:21</i>	<i>1.00</i>	<i>0.6</i>	<i>0.100</i>	<i>0.6</i>	<i>0.040</i>	<i>0.0043</i>	<i>1.00</i>	<i>0.0043</i>	<i>0.088</i>	<i>0.0004</i>	<i>0.3</i>
<i>2</i>	<i>10:22</i>	<i>1.75</i>	<i>0.6</i>	<i>0.200</i>	<i>0.6</i>	<i>0.080</i>	<i>0.0295</i>	<i>1.00</i>	<i>0.0295</i>	<i>0.100</i>	<i>0.0030</i>	<i>2.6</i>
<i>3</i>	<i>10:24</i>	<i>2.00</i>	<i>0.6</i>	<i>0.100</i>	<i>0.6</i>	<i>0.040</i>	<i>0.0072</i>	<i>1.00</i>	<i>0.0072</i>	<i>0.038</i>	<i>0.0003</i>	<i>0.2</i>
<i>4</i>	<i>10:26</i>	<i>2.50</i>	<i>0.6</i>	<i>0.300</i>	<i>0.6</i>	<i>0.120</i>	<i>0.0000</i>	<i>1.00</i>	<i>0.0000</i>	<i>0.150</i>	<i>0.0000</i>	<i>0.0</i>
<i>5</i>	<i>10:29</i>	<i>3.00</i>	<i>0.6</i>	<i>0.400</i>	<i>0.6</i>	<i>0.160</i>	<i>-0.0075</i>	<i>1.00</i>	<i>-0.0075</i>	<i>0.200</i>	<i>-0.0015</i>	<i>-1.3</i>
<i>6</i>	<i>10:30</i>	<i>3.50</i>	<i>0.6</i>	<i>0.400</i>	<i>0.6</i>	<i>0.160</i>	<i>0.0374</i>	<i>1.00</i>	<i>0.0374</i>	<i>0.200</i>	<i>0.0075</i>	<i>6.6</i>
<i>7</i>	<i>10:32</i>	<i>4.00</i>	<i>0.6</i>	<i>0.400</i>	<i>0.6</i>	<i>0.160</i>	<i>0.0751</i>	<i>1.00</i>	<i>0.0751</i>	<i>0.150</i>	<i>0.0113</i>	<i>9.9</i>
<i>8</i>	<i>10:38</i>	<i>4.25</i>	<i>0.6</i>	<i>0.400</i>	<i>0.6</i>	<i>0.160</i>	<i>0.1726</i>	<i>1.00</i>	<i>0.1726</i>	<i>0.100</i>	<i>0.0173</i>	<i>15.1</i>
<i>9</i>	<i>10:33</i>	<i>4.50</i>	<i>0.6</i>	<i>0.400</i>	<i>0.6</i>	<i>0.160</i>	<i>0.3540</i>	<i>1.00</i>	<i>0.3540</i>	<i>0.100</i>	<i>0.0354</i>	<i>31.0</i>
<i>10</i>	<i>10:39</i>	<i>4.75</i>	<i>0.6</i>	<i>0.100</i>	<i>0.6</i>	<i>0.040</i>	<i>0.4209</i>	<i>1.00</i>	<i>0.4209</i>	<i>0.025</i>	<i>0.0105</i>	<i>9.2</i>
<i>11</i>	<i>10:34</i>	<i>5.00</i>	<i>0.6</i>	<i>0.400</i>	<i>0.6</i>	<i>0.160</i>	<i>0.1998</i>	<i>1.00</i>	<i>0.1998</i>	<i>0.150</i>	<i>0.0300</i>	<i>26.3</i>
<i>12</i>	<i>10:35</i>	<i>5.50</i>	<i>0.6</i>	<i>0.100</i>	<i>0.6</i>	<i>0.040</i>	<i>0.0016</i>	<i>1.00</i>	<i>0.0016</i>	<i>0.050</i>	<i>0.0001</i>	<i>0.1</i>
13	10:35	6.00	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 Summary UDB-1

# Discharge Measurement Summary

Date Generated: Wed Jan 4 2017

## File Information

File Name CC.WAD  
Start Date and Time 2016/12/21 11:46:10

## Site Details

Site Name CC  
Operator(s) LO

## System Information

Sensor Type FlowTracker  
Serial # P4710  
CPU Firmware Version 3.9  
Software Ver 2.30  
Mounting Correction 0.0%

## Units (English Units)

Distance ft  
Velocity ft/s  
Area ft<sup>2</sup>  
Discharge cfs

## Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.6%	4.1%
Velocity	2.9%	30.7%
Width	0.2%	0.2%
Method	2.9%	-
# Stations	3.6%	-
<b>Overall</b>	<b>5.6%</b>	<b>31.0%</b>

## Summary

Averaging Int.	40	# Stations	14
Start Edge	LEW	Total Width	8.000
Mean SNR	40.2 dB	Total Area	2.274
Mean Temp	40.09 °F	Mean Depth	0.284
Disch. Equation	Mid-Section	Mean Velocity	0.3133
		<b>Total Discharge</b>	<b>0.7126</b>

## Supplemental Data

#	Time	Location	Gauge Height	Rated Flow	Comments
1	Wed Dec 21 12:04:10 CST 2016	8.000	0.400		

## Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	11:46	0.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	11:46	2.00	0.6	0.300	0.6	0.120	0.0249	1.00	0.0249	0.375	0.0093	1.3
2	11:47	2.50	0.6	0.300	0.6	0.120	0.0203	1.00	0.0203	0.150	0.0030	0.4
3	11:48	3.00	0.6	0.400	0.6	0.160	0.5535	1.00	0.5535	0.200	0.1107	15.5
4	11:51	3.50	0.6	0.300	0.6	0.120	0.5026	1.00	0.5026	0.150	0.0754	10.6
5	11:52	4.00	0.6	0.300	0.6	0.120	0.6667	1.00	0.6667	0.150	0.1000	14.0
6	11:53	4.50	0.6	0.300	0.6	0.120	0.3356	1.00	0.3356	0.150	0.0503	7.1
7	11:54	5.00	0.6	0.300	0.6	0.120	0.6106	1.00	0.6106	0.150	0.0915	12.8
8	11:57	5.50	0.6	0.300	0.6	0.120	0.4058	1.00	0.4058	0.150	0.0608	8.5
9	11:58	6.00	0.6	0.400	0.6	0.160	0.1785	1.00	0.1785	0.200	0.0357	5.0
10	11:59	6.50	0.6	0.400	0.6	0.160	0.9239	1.00	0.9239	0.200	0.1847	25.9
11	12:00	7.00	0.6	0.400	0.6	0.160	-0.0020	1.00	-0.0020	0.200	-0.0004	-0.1
12	12:02	7.50	0.6	0.400	0.6	0.160	-0.0430	1.00	-0.0430	0.200	-0.0086	-1.2
13	12:02	8.00	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 Summary CC-1





Figure 4 Monthly Hydrograph JB-1

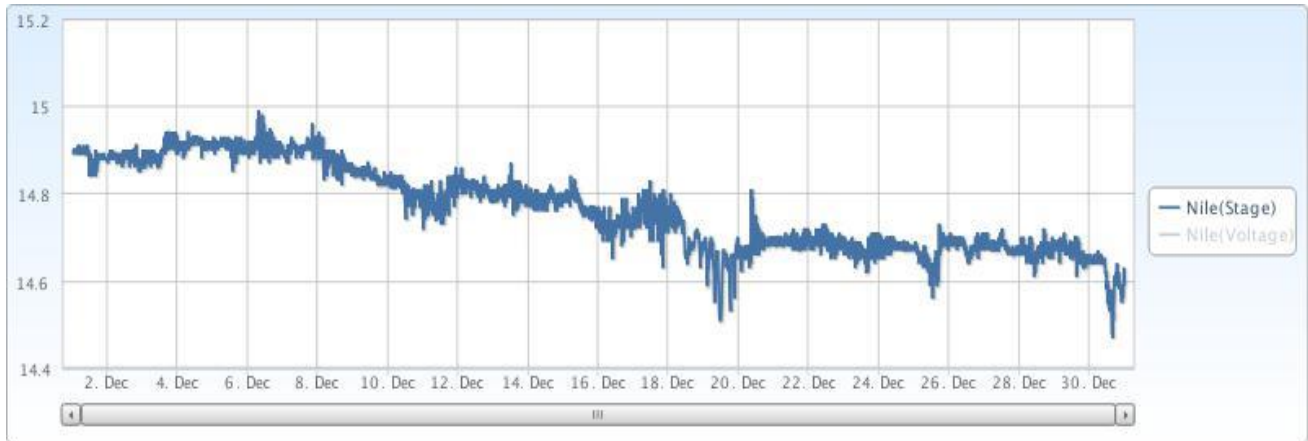


Figure 5 Monthly Hydrograph LDB-1

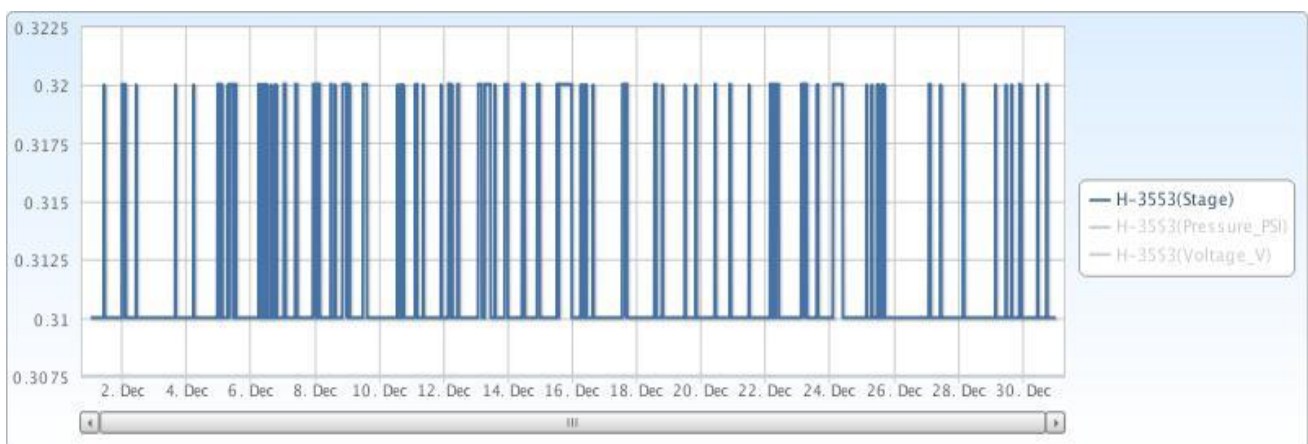


Figure 6 Monthly Hydrograph LT-1

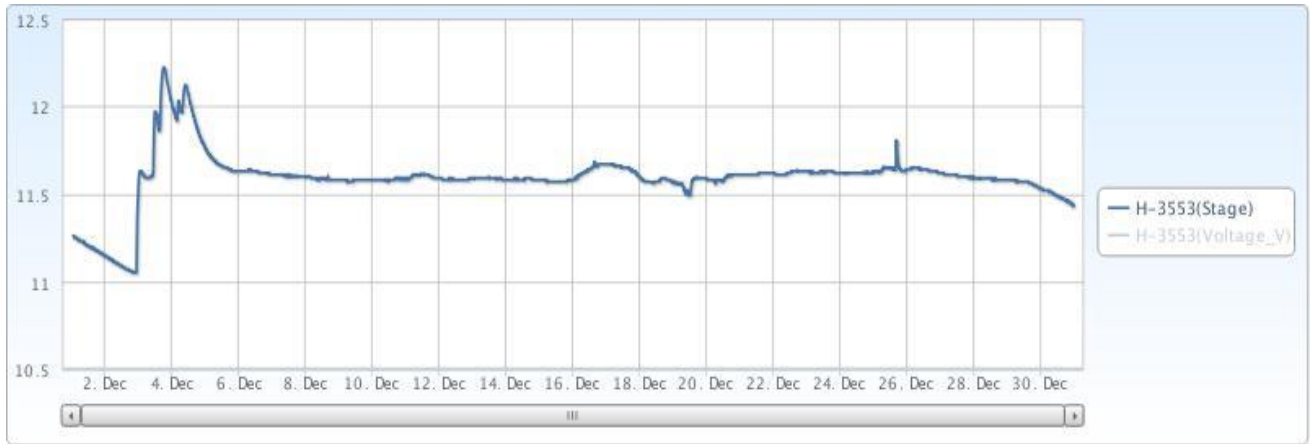


Figure 7 Monthly Hydrograph TE-1

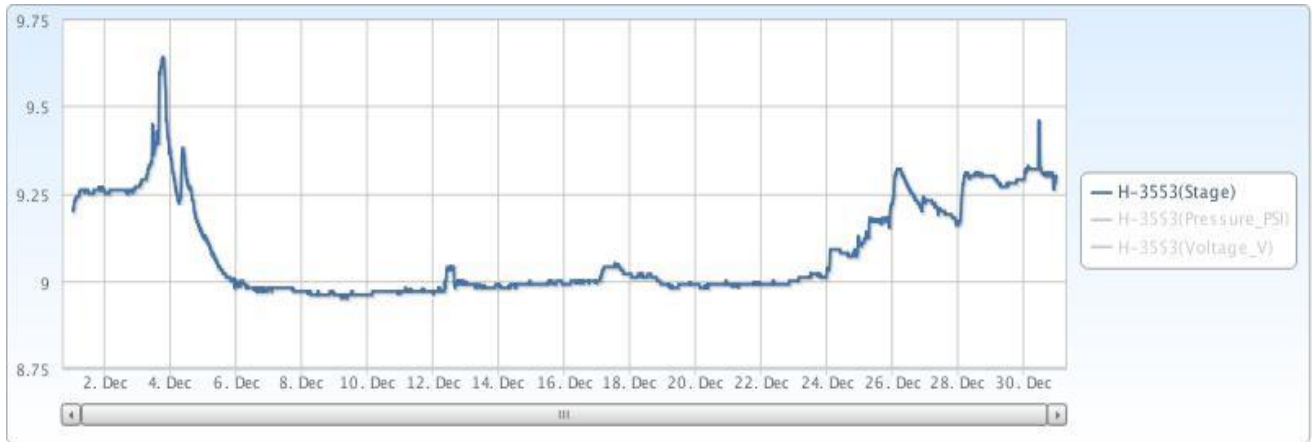


Figure 8 Monthly Hydrograph TG-1

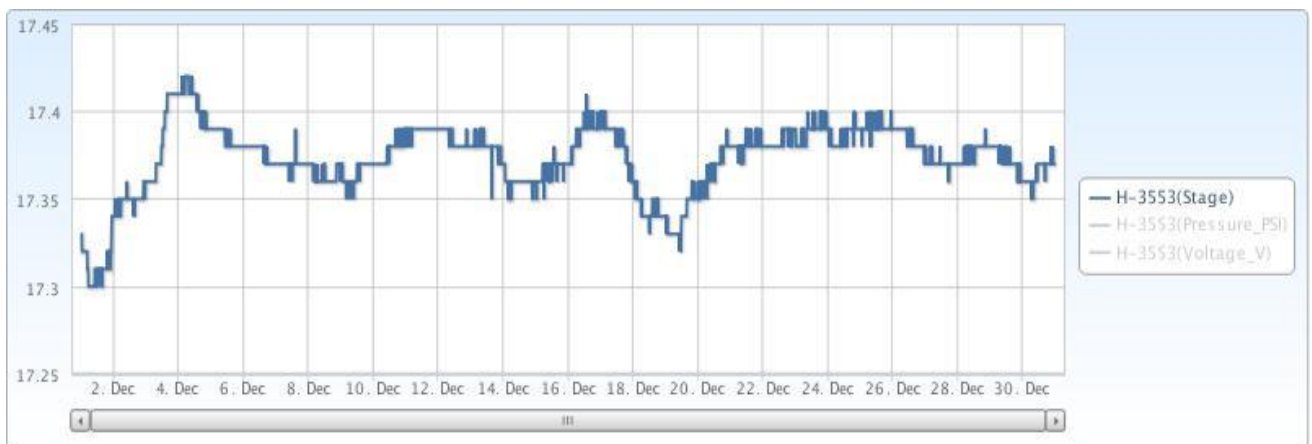


Figure 9 Monthly Hydrograph UDB-1

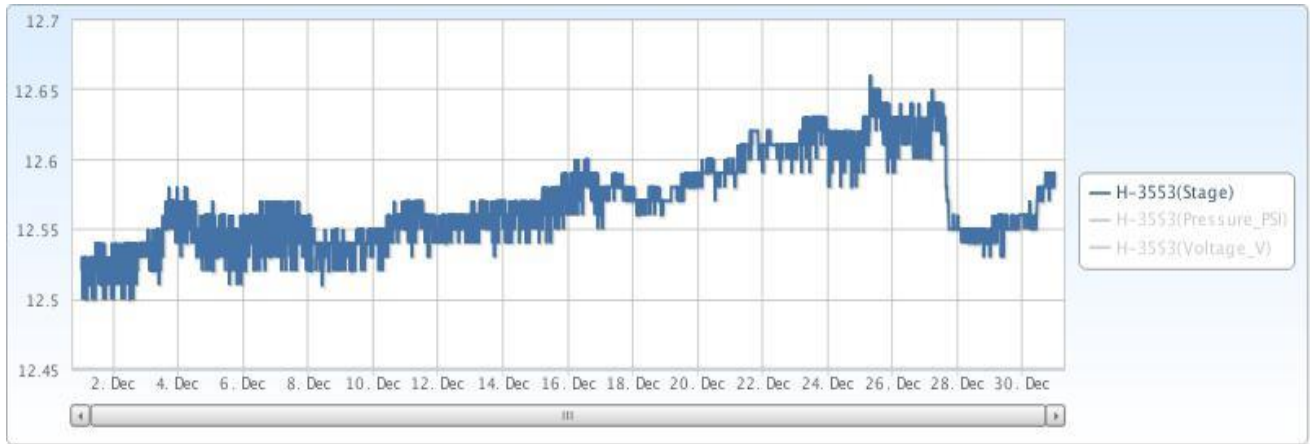


Figure 10 Monthly Hydrograph URC-2

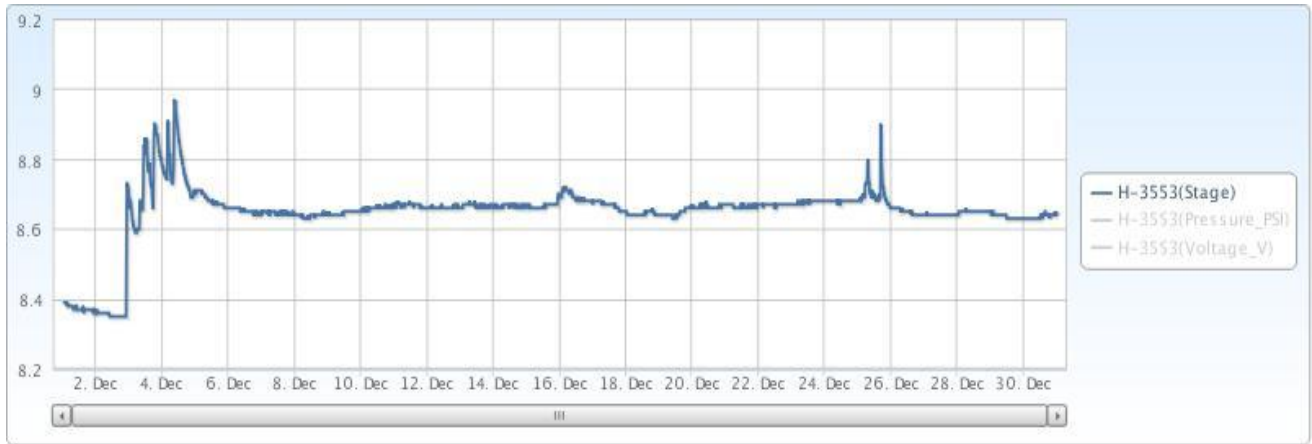


Figure 11 Monthly Hydrograph WC-1

MESONET CLIMATOLOGICAL DATA SUMMARY				December 2016				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 <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	62	26	45.0	25.4	21	0	86	25	51	0.00	28.77	30.02	S	6.2	22.7	11.78	50.2	48.8	55	43
2	60	31	46.5	35.2	20	0	97	43	67	0.10	28.88	30.14	E	4.1	15.5	8.41	51.6	50.5	55	46
3	47	44	44.9	44.1	20	0	100	94	97	0.44	28.87	30.12	ENE	5.5	17.8	1.87	52.7	50.6	52	49
4	54	35	44.3	40.6	21	0	100	53	88	0.16	28.79	30.04	NNW	5.1	16.5	7.69	52.3	49.5	53	46
5	51	31	40.5	38.5	24	0	100	71	93	0.01	28.58	29.82	SSE	5.5	19.7	7.33	49.9	45.7	49	42
6	46	30	40.9	28.7	27	0	99	36	65	0.00	28.75	30.00	N	11.0	35.4	9.89	50.3	46.0	48	43
7	40	26	33.4	25.3	32	0	89	62	72	0.00	28.94	30.20	NNE	8.8	26.5	3.29	47.7	41.5	43	40
8	34	22	27.6	12.2	37	0	88	31	55	0.00	29.37	30.64	N	12.0	24.9	9.90	45.4	38.8	41	37
9	35	18	28.2	12.7	39	0	79	38	53	0.00	29.28	30.55	SSE	6.3	17.0	4.79	43.4	37.5	39	36
10	48	34	39.7	26.3	24	0	81	43	59	0.00	28.96	30.22	SSE	12.6	35.6	5.31	44.5	41.0	44	39
11	65	34	49.4	42.7	16	0	98	51	79	0.00	28.62	29.86	S	16.4	35.7	5.76	48.1	47.3	52	43
12	47	25	36.2	25.4	29	0	89	38	67	0.00	28.80	30.05	N	5.7	16.7	8.56	47.3	44.5	48	41
13	40	26	33.2	23.7	32	0	89	47	69	0.00	28.88	30.13	N	10.5	27.5	10.02	46.3	43.0	46	41
14	38	22	30.7	21.6	35	0	88	46	70	0.00	29.01	30.27	NNE	8.3	24.3	6.94	44.5	40.5	43	39
15	36	22	28.4	20.8	36	0	100	49	75	0.04	29.04	30.29	SSE	8.2	19.9	2.25	42.7	37.8	39	37
16	67	36	49.8	46.3	14	0	100	44	90	0.04	28.42	29.66	S	13.9	34.3	3.01	45.2	43.3	48	39
17	63	9	27.6	23.5	29	0	99	50	85	0.00	28.66	29.91	N	18.4	39.9	1.44	45.7	42.3	48	36
18	21	4	12.1	0.3	52	0	80	36	61	0.00	29.31	30.58	N	9.2	28.6	12.19	38.9	33.3	36	32
19	36	8	21.8	0.0	43	0	78	15	44	0.00	29.36	30.63	S	4.9	16.2	12.28	37.3	31.7	33	31
20	55	25	37.6	13.4	25	0	57	23	38	0.00	29.05	30.31	S	7.2	20.0	11.89	39.1	33.1	35	32
21	65	24	42.8	24.9	21	0	82	24	52	0.00	28.86	30.11	N	7.1	21.5	10.52	41.3	38.0	44	34
22	43	30	37.5	26.9	28	0	82	49	66	0.00	29.11	30.37	N	6.9	17.9	2.60	42.5	39.8	41	38
23	51	31	42.4	36.2	24	0	100	61	79	0.01	28.80	30.05	S	7.4	22.4	3.84	43.4	41.6	44	39
24	61	31	44.3	44.3	19	0	100	97	100	0.02	28.78	30.03	SE	5.1	17.0	4.24	44.7	43.3	48	40
25	74	54	63.5	55.2	1	0	100	45	76	0.05	28.60	29.84	SSE	13.1	41.0	3.99	51.2	52.4	55	48
26	65	35	53.7	24.9	15	0	65	18	35	0.00	28.89	30.14	SW	8.8	22.7	10.62	51.0	51.6	56	49
27	60	26	43.4	24.7	22	0	88	22	53	0.00	28.98	30.24	SSE	4.4	13.2	11.85	47.7	47.1	52	42
28	64	47	53.8	34.1	9	0	84	29	49	0.00	28.77	30.02	N	10.1	21.6	11.10	48.5	49.2	54	46
29	53	31	42.7	13.9	23	0	50	14	32	0.00	29.20	30.46	N	11.1	26.7	11.24	47.5	47.6	51	44
30	59	25	42.6	17.3	23	0	68	15	39	0.00	28.92	30.17	SSW	12.1	34.7	11.50	44.5	44.1	48	40
31	57	33	46.3	26.9	20	0	77	34	48	0.00	28.56	29.81	NNE	9.3	32.6	11.59	46.2	47.0	51	44
	51	28	39.7	27.0	<- Monthly Averages ->					28.90	30.15	N	8.9	41.0	7.67	46.2	43.5	47	40	
Temperature - Highest: 74				Degree Days - Total HDD: 780				Number of Days With:												
Lowest: 4				Total CDD: 0				Tmax ≥ 90: 0				Rainfall ≥ 0.01 inch: 9								
								Tmax ≤ 32: 1				Rainfall ≥ 0.10 inch: 3								
Rainfall: Monthly Total: 0.87 in.				Humidity - Highest: 100				Tmin ≤ 32: 22				Avg Wind Speed ≥ 10 mph: 11								
Greatest 24 Hr: 0.44 in.				Lowest: 14				Tmin ≤ 0: 0				Max Wind Speed ≥ 30 mph: 8								

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\* Denotes incomplete record

Figure 12 Mesonet Data