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

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**SY2021 Monthly Report**

*Lake Thunderbird TMDL Monitoring Plan Implementation:*

*August 2021 Monitoring Report*

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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](mailto:sarah.dexter@owrb.ok.gov)

Jason Murphy, Project Supervisor, [jason.murphy@owrb.ok.gov](mailto:jason.murphy@owrb.ok.gov)

Lance Phillips, Streams Program Manager, [lance.phillips@owrb.ok.gov](mailto:lance.phillips@owrb.ok.gov)

Bill Cauthron, Monitoring Coordinator, [bill.cauthron@owrb.ok.gov](mailto:bill.cauthron@owrb.ok.gov)

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## SUMMARY OF AUGUST WATER QUALITY SAMPLING

Sampling for August 2021 occurred on the sixteenth and was considered a base flow collection. Water samples were collected at nine locations and discharge measurements were collected at two locations. Samples were not collected at LT-1 because of pool conditions. Mesonet data shows 0.01 inches of precipitation on the sixteenth, 0.18 inches of precipitation in the 72 hours prior to sampling, and 0.85 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of August was 1.46 inches. All water level gauges were operational for the month, except for JB-1 due to road construction. The gauge at LT-1 was removed in 2018 as a result of equipment malfunction. The equipment has not been replaced due to intermittent streamflow and dry conditions. Furthermore, this station is being reviewed for a possible location change.

## RESULTS

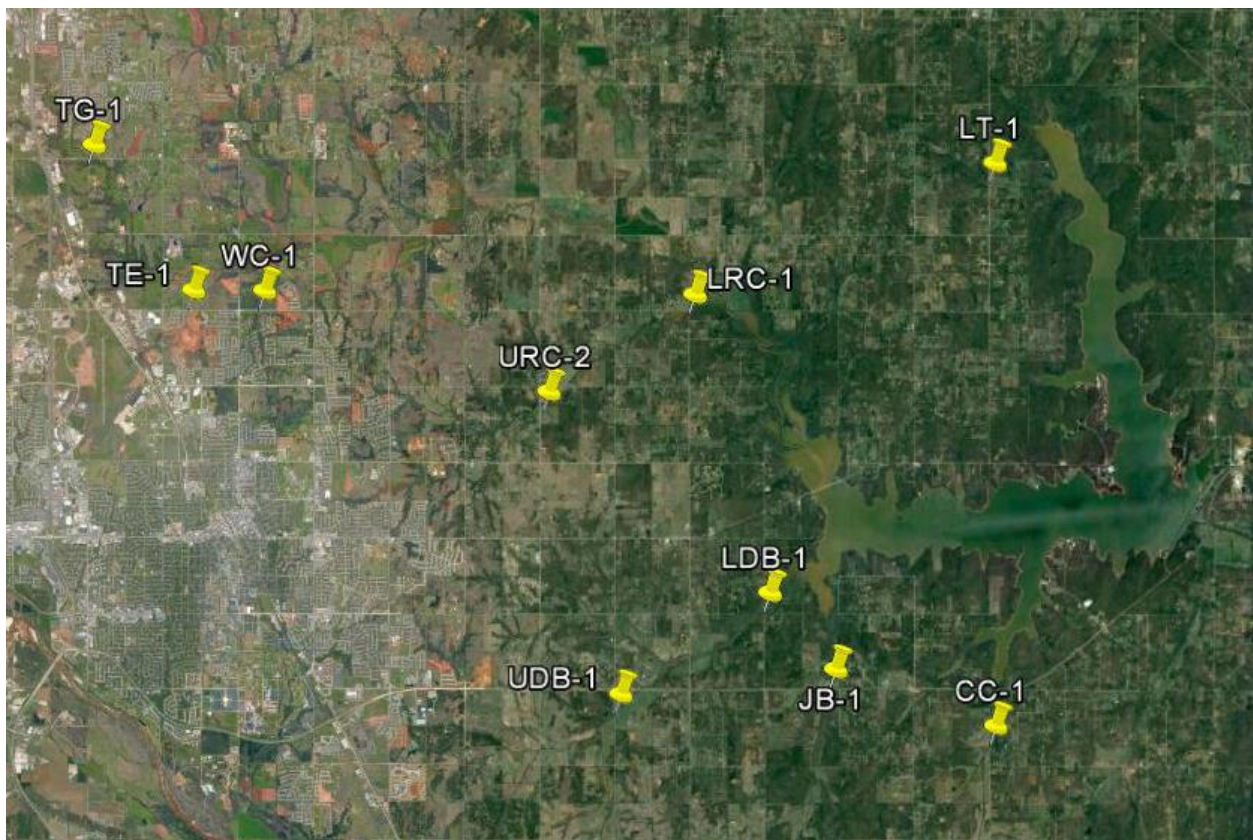


Figure 1 Monitoring Station Map

| 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              | 8/16/2021 | 9:50  | SD         | 22.12                  | 7.28                         | 7.98 | 689                          | 10              | Used rp3, narrow channel   |
| JB-1                   | Jim Blue Creek           | 8/16/2021 | 10:50 | SD         | 23.90                  | 6.40                         | 7.82 | 1010                         | 9               | Construction started on Hwy 9; large amount of tree/brush cut down; channel very low, not much visible flow, barely connected on ds, very scummy |
| LDB-1                  | Lower Dave Blue Creek    | 8/16/2021 | 11:45 | SD         | 27.52                  | 6.24                         | 8.10 | 963                          | 18              | Minimal flow, lots of scum and small debris  |
| LRC-1                  | Lower Rock Creek         | 8/16/2021 | 12:40 | SD         | 24.82                  | 8.41                         | 8.00 | 790                          | 9               | DCP was reading old stage, changed offset to read new stage  |
| LT-1                   | Lake Laterals            | 8/16/2021 | 12:10 | SD         | N/A                    | N/A                          | N/A  | N/A                          | N/A             | Did not sample; upstream completely dry, downstream had a small pool, very scummy/green  |
| TE-1                   | Little River Tributary   | 8/16/2021 | 16:10 | SD         | 25.29                  | 4.76                         | 7.84 | 1281                         | 5               | Similar stage to last month, very low water level/flow; small beaver dam still upstream  |
| TG-1                   | Little River Tributary   | 8/16/2021 | 16:40 | SD         | 27.03                  | 8.11                         | 7.90 | 918                          | 7               | Low water level  |
| UDB-1                  | Upper Dave Blue Creek    | 8/16/2021 | 8:55  | SD         | 22.32                  | 5.62                         | 7.85 | 998                          | 7               | Low flow   |
| URC-2                  | Upper Rock Creek         | 8/16/2021 | 14:45 | SD         | 25.61                  | 12.70                        | 7.77 | 942                          | 10              | Very low water level/flow  |
| WC-1                   | Woodcrest Creek          | 8/16/2021 | 15:35 | SD         | 24.13                  | 5.26                         | 7.38 | 1067                         | 4               | Low water level, similar stage to last month, filamentous common on us, non filamentous common on ds   |

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              | 0.23                       | 0.31                     | 0.061             | 11.0                          |
| JB-1                   | Jim Blue Creek           | 0.05                       | 0.34                     | 0.055             | <5.0                          |
| LDB-1                  | Lower Dave Blue Creek    | <0.05                      | 0.52                     | 0.057             | 16.0                          |
| LRC-1                  | Lower Rock Creek         | <0.05                      | 0.28                     | 0.041             | <5.0                          |
| LT-1                   | Lake Laterals            | N/A                        | N/A                      | N/A               | N/A                           |
| TE-1                   | Little River Tributary   | <0.05                      | 0.60                     | 0.053             | <5.0                          |
| TG-1                   | Little River Tributary   | 0.08                       | 0.40                     | 0.045             | 6.0                           |
| UDB-1                  | Upper Dave Blue Creek    | 0.10                       | 0.41                     | 0.035             | <5.0                          |
| URC-2                  | Upper Rock Creek         | <0.05                      | 0.39                     | 0.048             | 6.0                           |
| WC-1                   | Woodcrest Creek          | <0.05                      | 0.28                     | 0.050             | <5.0                          |

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                | 0.25                       | 0.25                     | 0.059             | 11.0                          |
| Duplicate RPD            | 8.33%                      | 21.43%*                  | 3.33%             | 0%                            |

Table 3 QA/QC Data Where the Asterisk Denotes RPD 2

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              | 0.37            | 20.68             |
| JB-1                   | Jim Blue Creek           | N/A             | N/A               |
| LDB-1                  | Lower Dave Blue Creek    | 8.87            | 16.86             |
| LRC-1                  | Lower Rock Creek         | 1.00            | 4.40              |
| LT-1                   | Lake Laterals            | N/A             | N/A               |
| TE-1                   | Little River Tributary   | 0.12            | 11.07             |
| TG-1                   | Little River Tributary   | 0.96            | 9.17              |
| UDB-1                  | Upper Dave Blue Creek    | 0.28            | 17.44             |
| URC-2                  | Upper Rock Creek         | 0.20            | 10.96             |
| WC-1                   | Woodcrest Creek          | 0.91            | 7.61              |

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

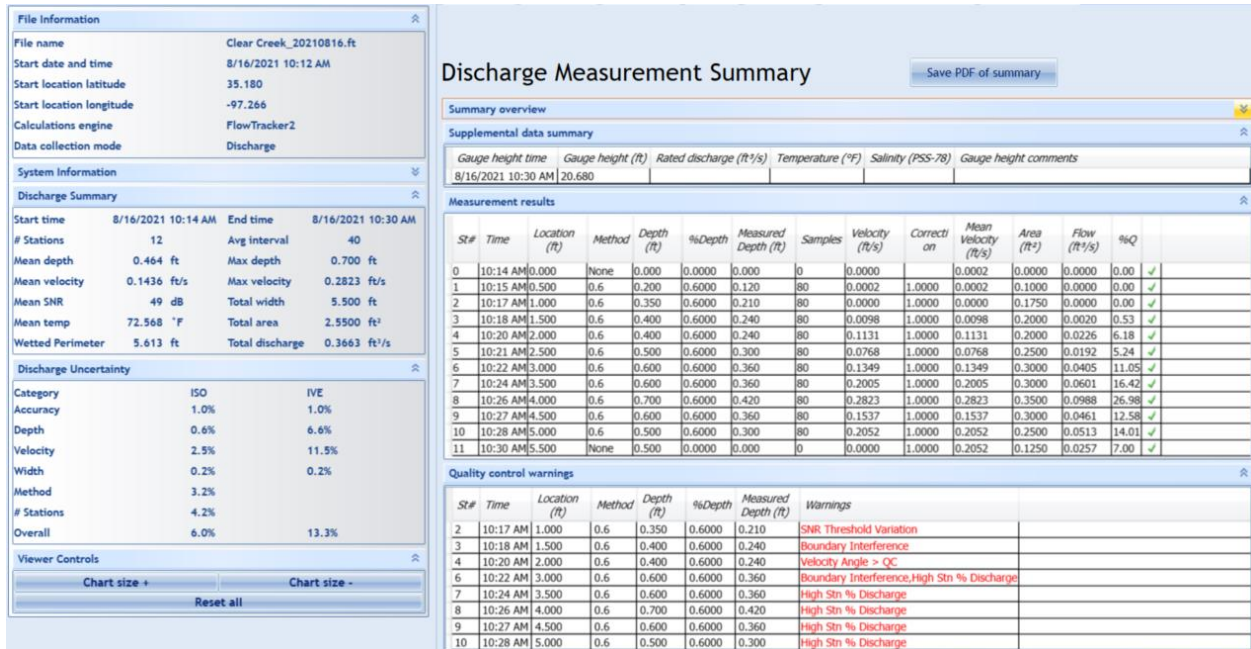


Figure 2 Discharge Measurement Summary CC-1

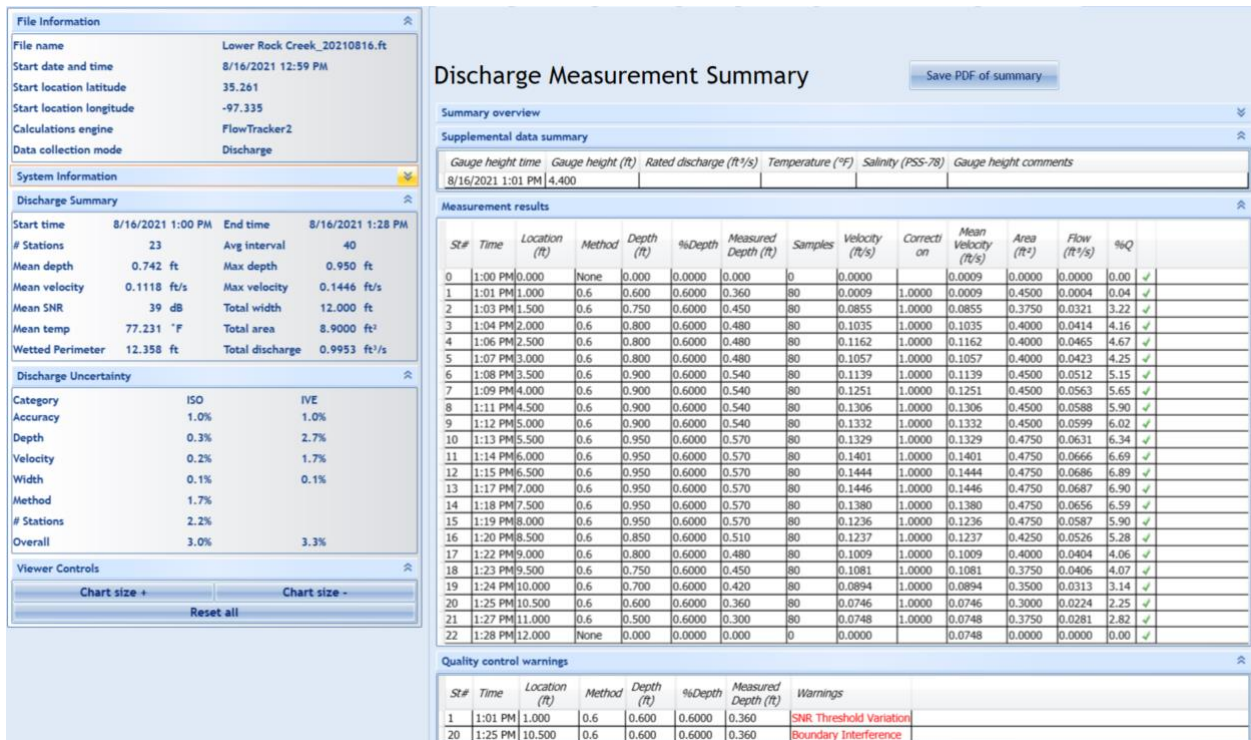
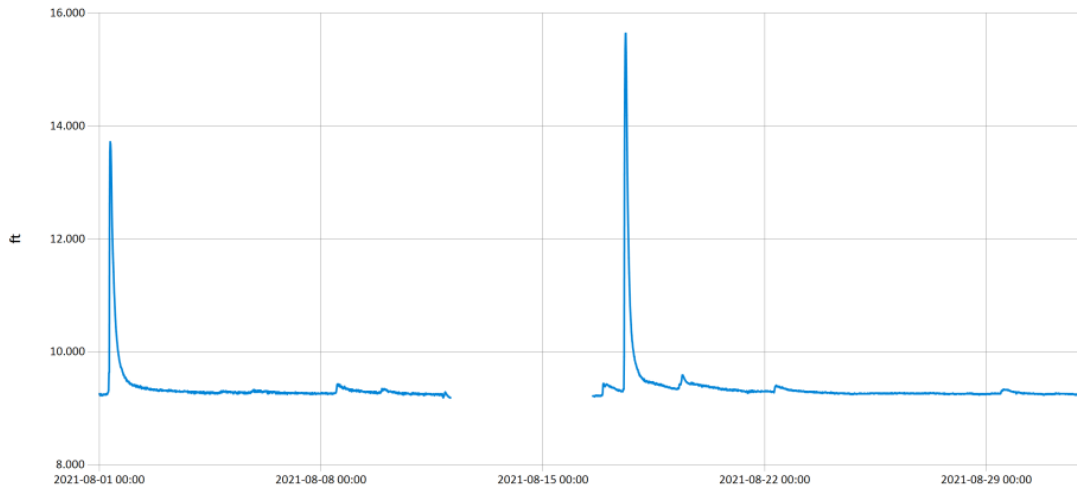


Figure 3 Discharge Measurement Summary LRC-1



Period Selected: 2021-08-01 00:00 - 2021-08-31 23:59

UTC Offs et: -06:00

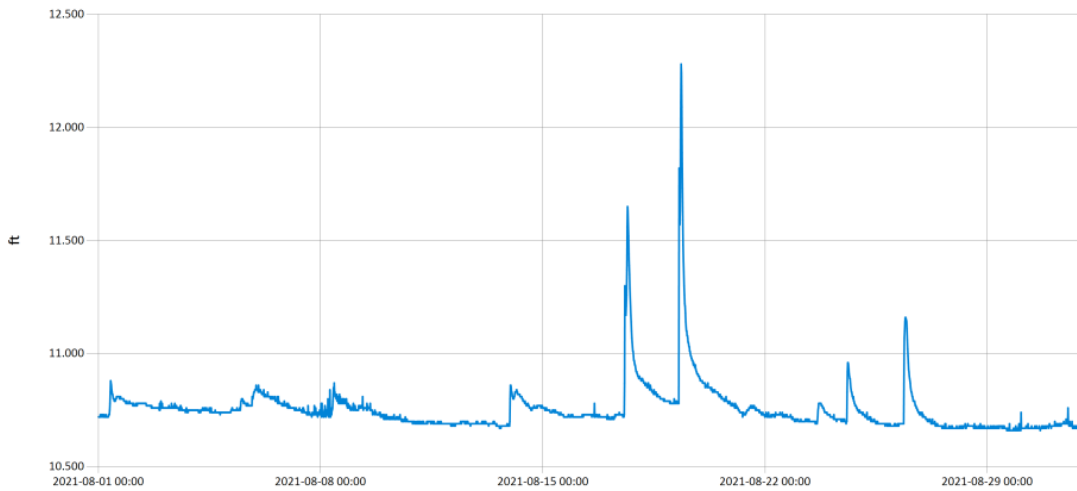


— Stage@TG

Figure 4 Monthly Hydrograph TG-1

Period Selected: 2021-08-01 00:00 - 2021-08-31 23:59

UTC Offs et: -06:00



— Stage@TE

Figure 5 Monthly Hydrograph TE-1



Period Selected: 2021-08-01 00:00 - 2021-08-31 23:59

UTC Offs et: -06:00

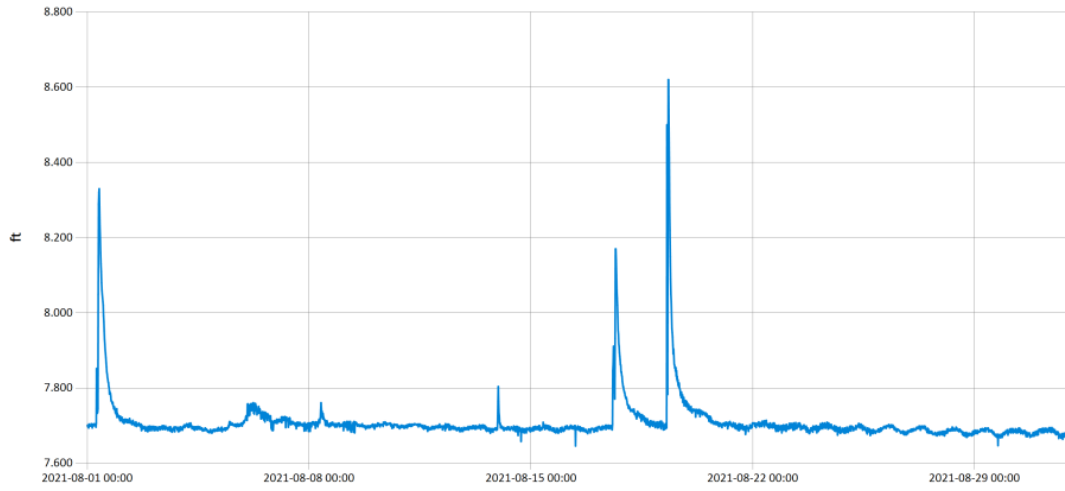


Figure 6 Monthly Hydrograph WC-1

Period Selected: 2021-08-01 00:00 - 2021-08-31 23:59

UTC Offs et: -06:00

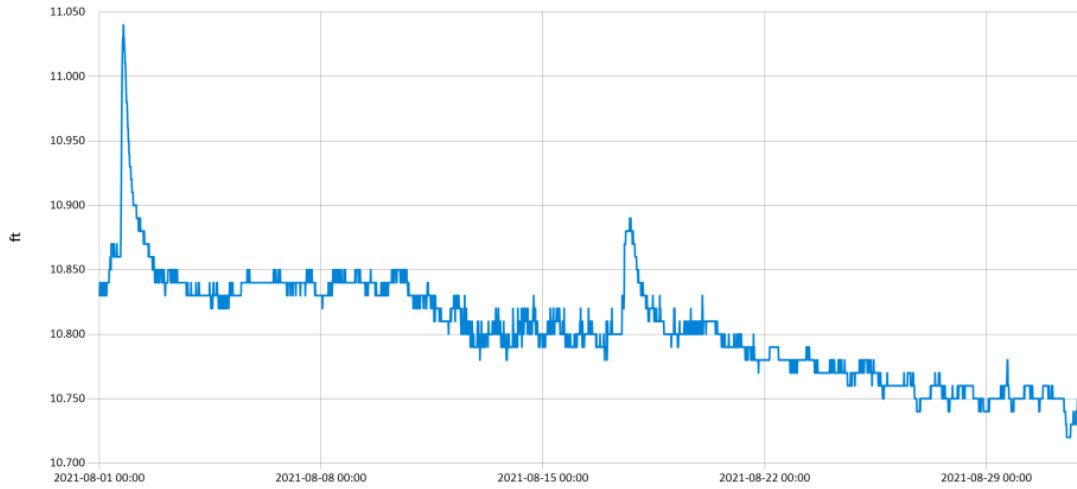
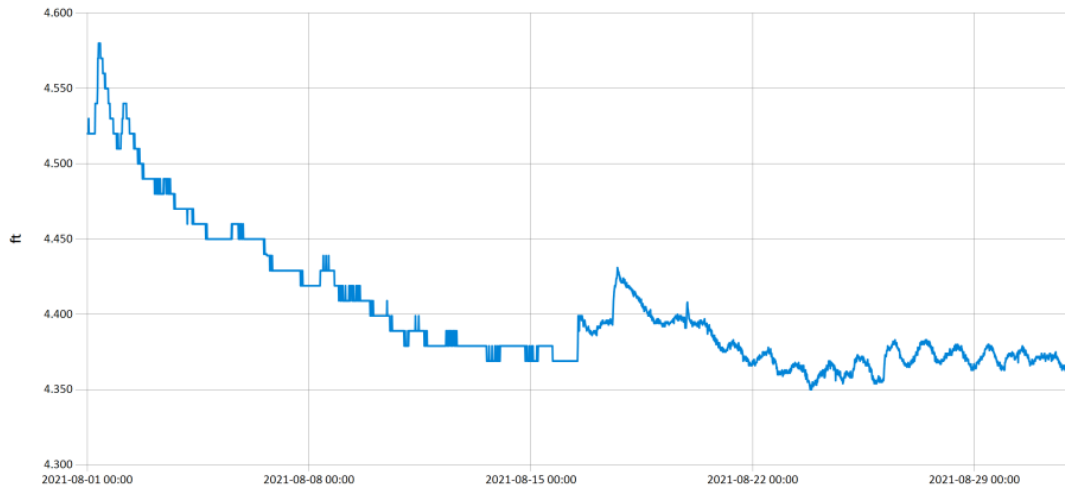


Figure 7 Monthly Hydrograph URC-2

Period Selected: 2021-08-01 00:00 - 2021-08-31 23:59

UTC Offs et: -06:00

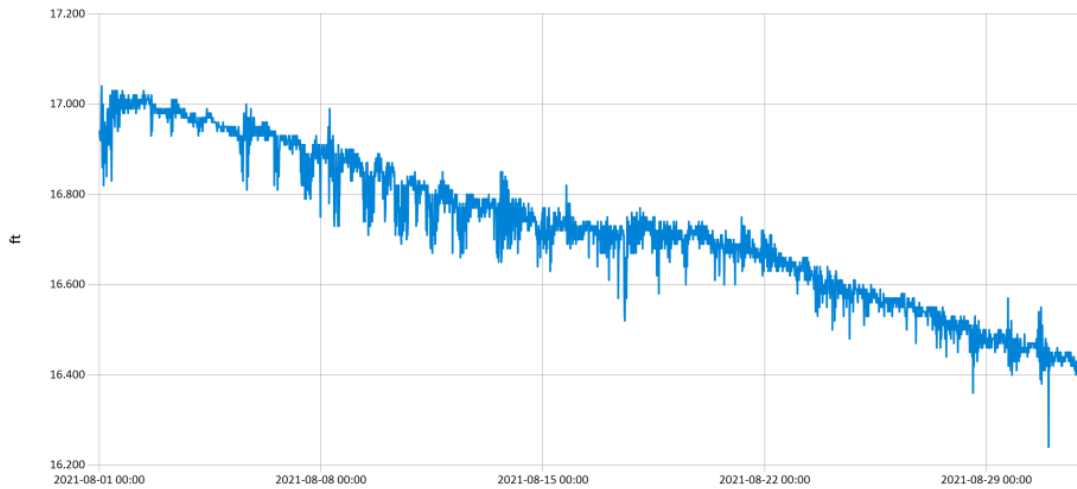


— Stage@LRC

Figure 8 Monthly Hydrograph LRC-1

Period Selected: 2021-08-01 00:00 - 2021-08-31 23:59

UTC Offs et: -06:00

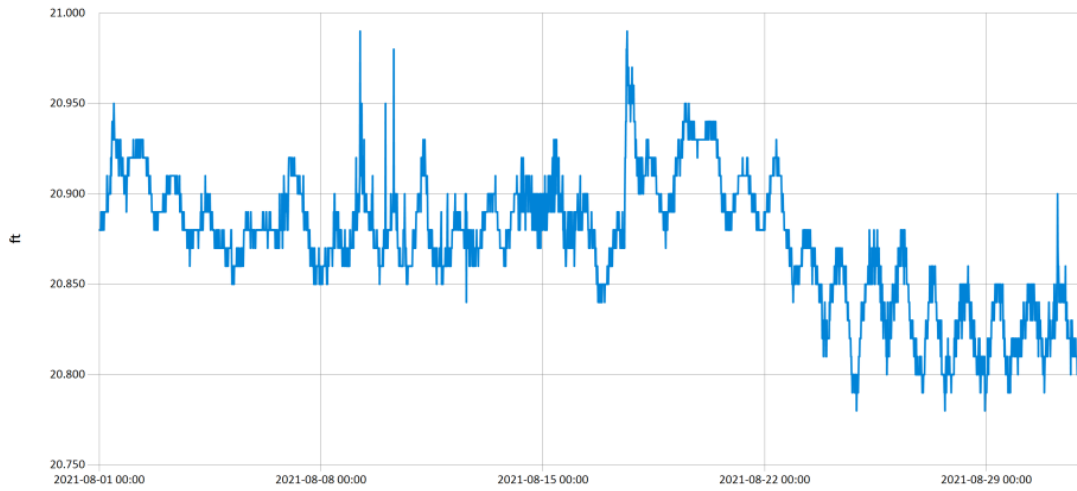


— Stage@LDB

Figure 9 Monthly Hydrograph LDB-1

Period Selected: 2021-08-01 00:00 - 2021-08-31 23:59

UTC Offs et: -06:00

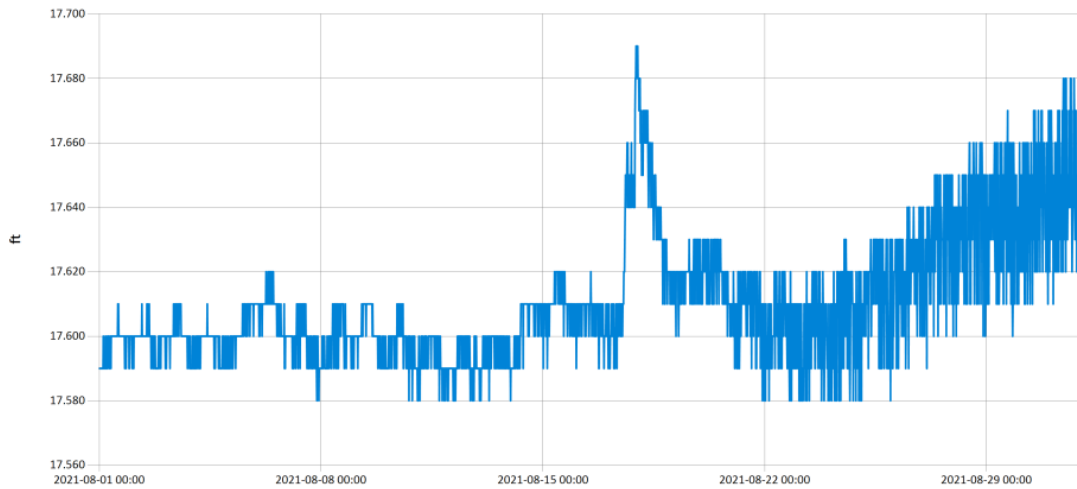


— Stage@CC

Figure 10 Monthly Hydrograph CC-1

Period Selected: 2021-08-01 00:00 - 2021-08-31 23:59

UTC Offs et: -06:00



— Stage@UDB

Figure 11 Monthly Hydrograph UDB-1

| MESONET CLIMATOLOGICAL DATA SUMMARY |                    |     |      | August 2021                 |                        |     |                            | 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                                   | 86                 | 70  | 76.6 | 68.2                        | 0                      | 13  | 96                         | 59                               | 76  | 0.11 | 28.84 | 30.09                                   | NNE | 8.7  | 27.7             | 13.64 | 79.7                       | 85.9                 | 91  | 82  |  |
| 2                                   | 84                 | 66  | 75.2 | 61.5                        | 0                      | 10  | 89                         | 42                               | 65  | 0.00 | 28.85 | 30.10                                   | NNE | 7.9  | 21.2             | 25.20 | 77.7                       | 83.4                 | 91  | 77  |  |
| 3                                   | 86                 | 63  | 75.2 | 61.9                        | 0                      | 9   | 95                         | 42                               | 66  | 0.00 | 28.81 | 30.06                                   | NE  | 5.4  | 16.5             | 24.64 | 76.6                       | 83.7                 | 91  | 77  |  |
| 4                                   | 87                 | 64  | 76.4 | 62.2                        | 0                      | 10  | 87                         | 40                               | 64  | 0.00 | 28.82 | 30.07                                   | E   | 3.4  | 13.8             | 20.91 | 76.6                       | 84.0                 | 91  | 77  |  |
| 5                                   | 78                 | 68  | 72.2 | 67.1                        | 0                      | 8   | 94                         | 72                               | 84  | 0.23 | 28.82 | 30.07                                   | SE  | 6.0  | 17.5             | 9.80  | 75.4                       | 79.5                 | 83  | 76  |  |
| 6                                   | 92                 | 67  | 79.3 | 68.8                        | 0                      | 15  | 96                         | 46                               | 73  | 0.00 | 28.75 | 30.00                                   | S   | 8.4  | 21.1             | 24.90 | 76.8                       | 80.7                 | 90  | 73  |  |
| 7                                   | 93                 | 73  | 82.8 | 70.6                        | 0                      | 18  | 86                         | 50                               | 68  | 0.00 | 28.67 | 29.91                                   | S   | 10.0 | 24.9             | 24.53 | 78.8                       | 85.0                 | 93  | 78  |  |
| 8                                   | 92                 | 74  | 82.6 | 71.7                        | 0                      | 18  | 95                         | 49                               | 71  | 0.08 | 28.63 | 29.88                                   | SSE | 9.7  | 34.6             | 19.22 | 79.2                       | 84.5                 | 90  | 80  |  |
| 9                                   | 95                 | 78  | 85.8 | 72.4                        | 0                      | 21  | 80                         | 50                               | 65  | 0.00 | 28.64 | 29.89                                   | S   | 12.3 | 26.4             | 24.34 | 80.1                       | 86.6                 | 94  | 80  |  |
| 10                                  | 94                 | 78  | 85.6 | 70.6                        | 0                      | 21  | 76                         | 47                               | 62  | 0.00 | 28.72 | 29.97                                   | S   | 11.8 | 26.5             | 25.97 | 80.8                       | 88.1                 | 95  | 82  |  |
| 11                                  | 95                 | 77  | 85.0 | 67.7                        | 0                      | 21  | 74                         | 40                               | 58  | 0.00 | 28.72 | 29.97                                   | S   | 10.7 | 28.1             | 25.05 | 80.8                       | 88.1                 | 95  | 82  |  |
| 12                                  | 94                 | 77  | 85.1 | 70.2                        | 0                      | 21  | 78                         | 47                               | 62  | 0.00 | 28.76 | 30.00                                   | S   | 9.5  | 22.6             | 19.61 | 80.7                       | 87.5                 | 92  | 82  |  |
| 13                                  | 95                 | 71  | 81.5 | 68.6                        | 0                      | 18  | 95                         | 41                               | 67  | 0.17 | 28.85 | 30.10                                   | S   | 6.9  | 33.4             | 21.04 | 81.1                       | 87.7                 | 96  | 82  |  |
| 14                                  | 87                 | 70  | 76.5 | 69.2                        | 0                      | 14  | 95                         | 52                               | 79  | 0.01 | 28.92 | 30.17                                   | SE  | 3.6  | 12.6             | 16.09 | 79.7                       | 83.9                 | 90  | 80  |  |
| 15                                  | 90                 | 68  | 77.5 | 67.7                        | 0                      | 14  | 98                         | 43                               | 74  | 0.00 | 28.81 | 30.06                                   | ESE | 3.6  | 22.2             | 20.13 | 78.8                       | 84.3                 | 93  | 77  |  |
| 16                                  | 91                 | 69  | 78.6 | 68.9                        | 0                      | 15  | 95                         | 48                               | 74  | 0.01 | 28.71 | 29.95                                   | SSE | 5.9  | 21.3             | 19.86 | 79.1                       | 85.0                 | 92  | 79  |  |
| 17                                  | 85                 | 70  | 73.9 | 69.9                        | 0                      | 13  | 97                         | 66                               | 88  | 0.43 | 28.69 | 29.94                                   | SE  | 6.6  | 22.9             | 8.27  | 78.0                       | 80.8                 | 85  | 77  |  |
| 18                                  | 85                 | 69  | 76.1 | 70.5                        | 0                      | 12  | 97                         | 64                               | 84  | 0.00 | 28.74 | 29.98                                   | SSE | 7.9  | 21.8             | 14.88 | 77.4                       | 77.8                 | 82  | 75  |  |
| 19                                  | 84                 | 73  | 76.8 | 73.8                        | 0                      | 13  | 98                         | 78                               | 91  | 0.42 | 28.71 | 29.96                                   | SSE | 7.9  | 17.2             | 9.34  | 77.9                       | 78.1                 | 81  | 76  |  |
| 20                                  | 94                 | 76  | 84.1 | 73.1                        | 0                      | 20  | 91                         | 50                               | 71  | 0.00 | 28.60 | 29.84                                   | S   | 10.3 | 22.7             | 22.66 | 79.7                       | 80.5                 | 86  | 76  |  |
| 21                                  | 95                 | 74  | 84.2 | 70.8                        | 0                      | 19  | 89                         | 47                               | 65  | 0.00 | 28.66 | 29.91                                   | S   | 7.5  | 21.7             | 24.21 | 81.0                       | 84.7                 | 94  | 77  |  |
| 22                                  | 95                 | 73  | 84.3 | 71.6                        | 0                      | 19  | 92                         | 45                               | 68  | 0.00 | 28.72 | 29.97                                   | S   | 7.8  | 20.5             | 23.28 | 81.2                       | 86.9                 | 95  | 79  |  |
| 23                                  | 95                 | 73  | 84.6 | 67.5                        | 0                      | 19  | 85                         | 35                               | 59  | 0.00 | 28.71 | 29.96                                   | S   | 9.6  | 26.0             | 25.33 | 81.1                       | 87.4                 | 95  | 80  |  |
| 24                                  | 96                 | 73  | 84.5 | 68.3                        | 0                      | 20  | 78                         | 41                               | 60  | 0.00 | 28.70 | 29.95                                   | S   | 9.7  | 24.6             | 24.84 | 80.9                       | 87.4                 | 95  | 80  |  |
| 25                                  | 98                 | 74  | 85.7 | 69.4                        | 0                      | 21  | 84                         | 38                               | 61  | 0.00 | 28.77 | 30.02                                   | S   | 7.5  | 18.6             | 24.58 | 81.6                       | 88.6                 | 97  | 81  |  |
| 26                                  | 96                 | 74  | 85.4 | 69.3                        | 0                      | 20  | 85                         | 38                               | 60  | 0.00 | 28.80 | 30.05                                   | SSE | 6.7  | 16.1             | 24.38 | 82.0                       | 89.4                 | 97  | 82  |  |
| 27                                  | 94                 | 74  | 83.3 | 69.5                        | 0                      | 19  | 87                         | 41                               | 65  | 0.00 | 28.74 | 29.99                                   | SSE | 7.9  | 20.1             | 23.25 | 82.1                       | 89.2                 | 96  | 83  |  |
| 28                                  | 93                 | 73  | 81.8 | 68.5                        | 0                      | 18  | 85                         | 38                               | 66  | 0.00 | 28.76 | 30.00                                   | SSE | 7.8  | 22.2             | 23.46 | 81.9                       | 88.5                 | 96  | 82  |  |
| 29                                  | 92                 | 72  | 80.4 | 69.0                        | 0                      | 17  | 92                         | 41                               | 71  | 0.00 | 28.75 | 30.00                                   | SSE | 6.6  | 26.0             | 20.74 | 81.3                       | 87.7                 | 94  | 82  |  |
| 30                                  | 94                 | 69  | 79.9 | 69.6                        | 0                      | 17  | 96                         | 41                               | 74  | 0.00 | 28.65 | 29.90                                   | E   | 3.3  | 23.2             | 19.80 | 80.5                       | 87.3                 | 95  | 81  |  |
| 31                                  | 97                 | 71  | 83.6 | 68.8                        | 0                      | 19  | 95                         | 33                               | 65  | 0.00 | 28.54 | 29.78                                   | S   | 4.7  | 16.2             | 22.53 | 80.8                       | 87.9                 | 96  | 81  |  |
|                                     | 91                 | 72  | 80.8 | 68.9                        | <- Monthly Averages -> |     |                            |                                  |     |      | 28.74 | 29.99                                   | S   | 7.6  | 34.6             | 20.85 | 79.6                       | 85.2                 | 92  | 79  |  |
| Temperature - Highest: 98           |                    |     |      |                             |                        |     | Degree Days - Total HDD: 0 |                                  |     |      |       | Number of Days With:                    |     |      |                  |       |                            |                      |     |     |  |
| Lowest: 63                          |                    |     |      |                             |                        |     | Total CDD: 512             |                                  |     |      |       | Tmax ≥ 90: 22 Rainfall ≥ 0.01 inch: 8   |     |      |                  |       |                            |                      |     |     |  |
| Rainfall: Monthly Total: 1.46 in.   |                    |     |      |                             |                        |     | Humidity - Highest: 98     |                                  |     |      |       | Tmax ≤ 32: 0 Rainfall ≥ 0.10 inch: 5    |     |      |                  |       |                            |                      |     |     |  |
| Greatest 24 Hr: 0.43 in.            |                    |     |      |                             |                        |     | Lowest: 33                 |                                  |     |      |       | Tmin ≤ 32: 0 Avg Wind Speed ≥ 10 mph: 5 |     |      |                  |       |                            |                      |     |     |  |
|                                     |                    |     |      |                             |                        |     |                            |                                  |     |      |       | Tmin ≤ 0: 0 Max Wind Speed ≥ 30 mph: 2  |     |      |                  |       |                            |                      |     |     |  |

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\* Denotes incomplete record

Figure 12 August Mesonet Data