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



SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

November 2021 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
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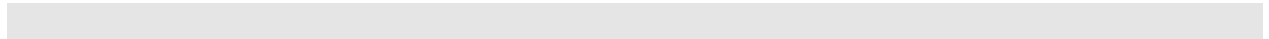


TABLE OF CONTENTS

| | |
|---|----------|
| Table of Contents | 3 |
| List of Tables | 3 |
| List of Figures | 3 |
| Summary of November 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 LRC-1 | 7 |
| FIGURE 3 DISCHARGE MEASUREMENT SUMMARY CC-1..... | 7 |
| FIGURE 4 DISCHARGE MEASUREMENT SUMMARY TE-1 | 8 |
| FIGURE 5 DISCHARGE MEASUREMENT SUMMARY TG-1 | 8 |
| FIGURE 6 DISCHARGE MEASUREMENT SUMMARY WC-1 | 9 |
| FIGURE 7 MONTHLY HYDROGRAPH TG-1 | 10 |
| FIGURE 8 MONTHLY HYDROGRAPH TE-1 | 10 |
| FIGURE 9 MONTHLY HYDROGRAPH WC-1..... | 11 |
| FIGURE 10 MONTHLY HYDROGRAPH URC-2 | 11 |
| FIGURE 11 MONTHLY HYDROGRAPH LRC-1 | 12 |
| FIGURE 12 MONTHLY HYDROGRAPH LDB-1 | 12 |
| FIGURE 13 MONTHLY HYDROGRAPH CC-1 | 13 |
| FIGURE 14 MONTHLY HYDROGRAPH UDB-1 | 13 |
| FIGURE 15 NOVEMBER MESONET DATA | 14 |

SUMMARY OF NOVEMBER WATER QUALITY SAMPLING

Sampling for November 2021 occurred on the eighth and was a base flow collection. Water samples were collected at eight locations and discharge measurements were collected at five locations. Samples were not collected at LT-1 because of dry conditions, or JB-1 due to construction activity. Mesonet data shows no precipitation on the eighth, 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 November was 0.41 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

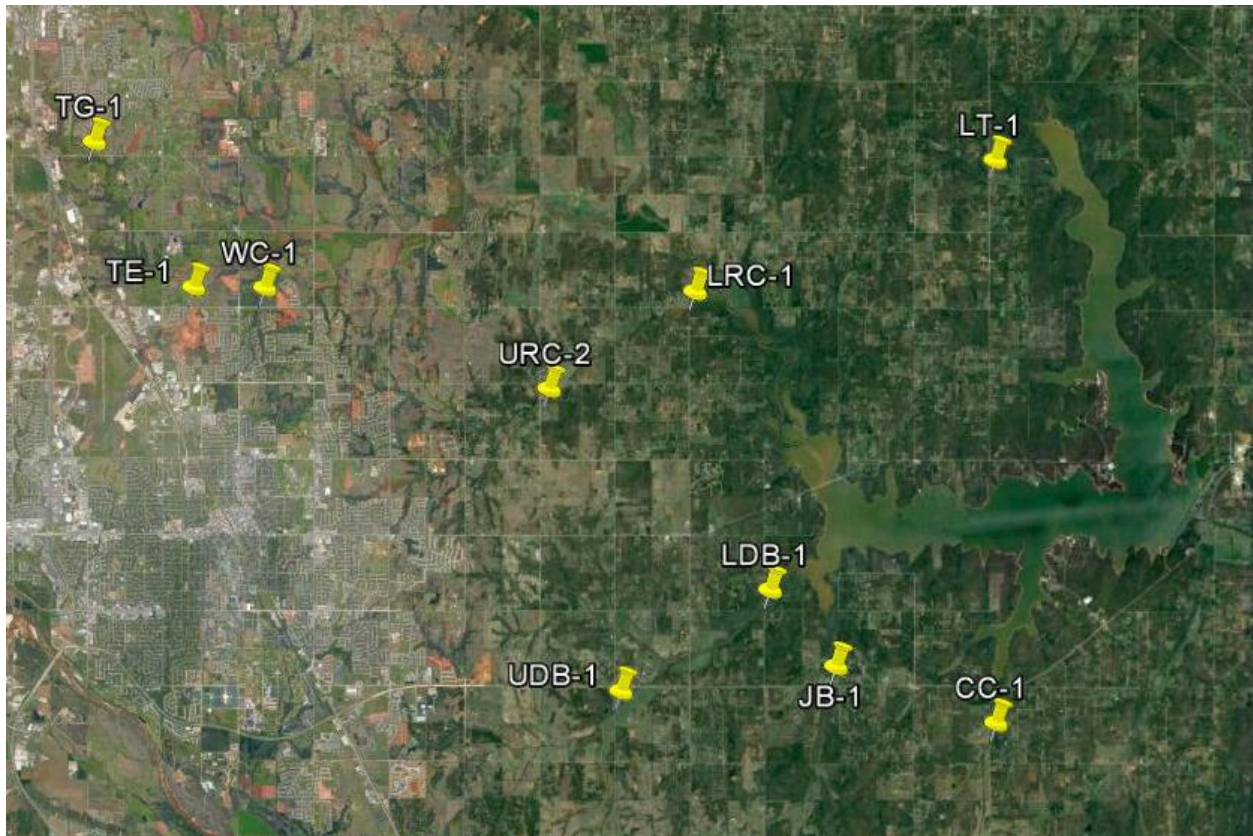


Figure 1 Monitoring Station Map

| 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 | 11/8/2021 | 9:15 | SD | 12.52 | 8.36 | 7.72 | 696 | 17 | Low/normal conditions |
| JB-1 | Jim Blue Creek | 11/8/2021 | 9:35 | SD | N/A | N/A | N/A | N/A | N/A | Active construction at site, did not sample. Looks as if channel has been disconnected where sampling usually occurred |
| LDB-1 | Lower Dave Blue Creek | 11/8/2021 | 9:45 | SD | 11.55 | 4.98 | 7.69 | 856 | 7 | Low water level, less turbid than usual, minimal visual flow |
| LRC-1 | Lower Rock Creek | 11/8/2021 | 10:55 | SD | 12.81 | 7.90 | 7.74 | 742 | 8 | Minimal visual flow, orifice clear |
| LT-1 | Lake Laterals | 11/8/2021 | 10:15 | SD | N/A | N/A | N/A | N/A | N/A | Upstream dry, downstream small shallow pool; did not sample |
| TE-1 | Little River Tributary | 11/8/2021 | 12:45 | SD | 15.45 | 9.52 | 7.50 | 724 | 11 | Very minimal flow, barely connected on downstream, scum visible on upstream; bubbler bouncing between ~11.23-10.75 |
| TG-1 | Little River Tributary | 11/8/2021 | 13:25 | SD | 14.11 | 9.02 | 7.62 | 768 | 5 | Low/normal flow, lots of floating leaf debris |
| UDB-1 | Upper Dave Blue Creek | 11/8/2021 | 8:25 | SD | 11.68 | 5.95 | 7.65 | 965 | 5 | Low water/flow level |
| URC-2 | Upper Rock Creek | 11/8/2021 | 11:35 | SD | 13.54 | 5.50 | 7.41 | 807 | 19 | Very minimal visual flow, orifice just barely under water |
| WC-1 | Woodcrest Creek | 11/8/2021 | 12:15 | SD | 14.10 | 4.68 | 7.19 | 645 | 31 | Very minimal visual flow, beaver activity under 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 | 0.06 | 0.22 | 0.039 | <5.0 |
| JB-1 | Jim Blue Creek | N/A | N/A | N/A | N/A |
| LDB-1 | Lower Dave Blue Creek | <0.05 | 0.32 | 0.076 | <5.0 |
| LRC-1 | Lower Rock Creek | <0.05 | 0.24 | 0.041 | 8.0 |
| LT-1 | Lake Laterals | N/A | N/A | N/A | N/A |
| TE-1 | Little River Tributary | <0.05 | 0.43 | 0.030 | <5.0 |
| TG-1 | Little River Tributary | 0.08 | 0.41 | 0.057 | <5.0 |
| UDB-1 | Upper Dave Blue Creek | <0.05 | 0.25 | 0.067 | <5.0 |
| URC-2 | Upper Rock Creek | <0.05 | 0.55 | 0.109 | 7.0 |
| WC-1 | Woodcrest Creek | <0.05 | 0.54 | 0.120 | 14.0 |

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 | 0.06 | 0.24 | 0.040 | <5.0 |
| Duplicate RPD | 0% | 8.70% | 2.53% | 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 | 0.67 | 20.46 |
| JB-1 | Jim Blue Creek | N/A | N/A |
| LDB-1 | Lower Dave Blue Creek | 1.63 | 16.01 |
| LRC-1 | Lower Rock Creek | 0.68 | 4.36 |
| LT-1 | Lake Laterals | N/A | N/A |
| TE-1 | Little River Tributary | 0.03 | 11.04 |
| TG-1 | Little River Tributary | 0.69 | 9.12 |
| UDB-1 | Upper Dave Blue Creek | 0.16 | 17.38 |
| URC-2 | Upper Rock Creek | 0.16 | 10.93 |
| WC-1 | Woodcrest Creek | 0.06 | 7.63 |

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

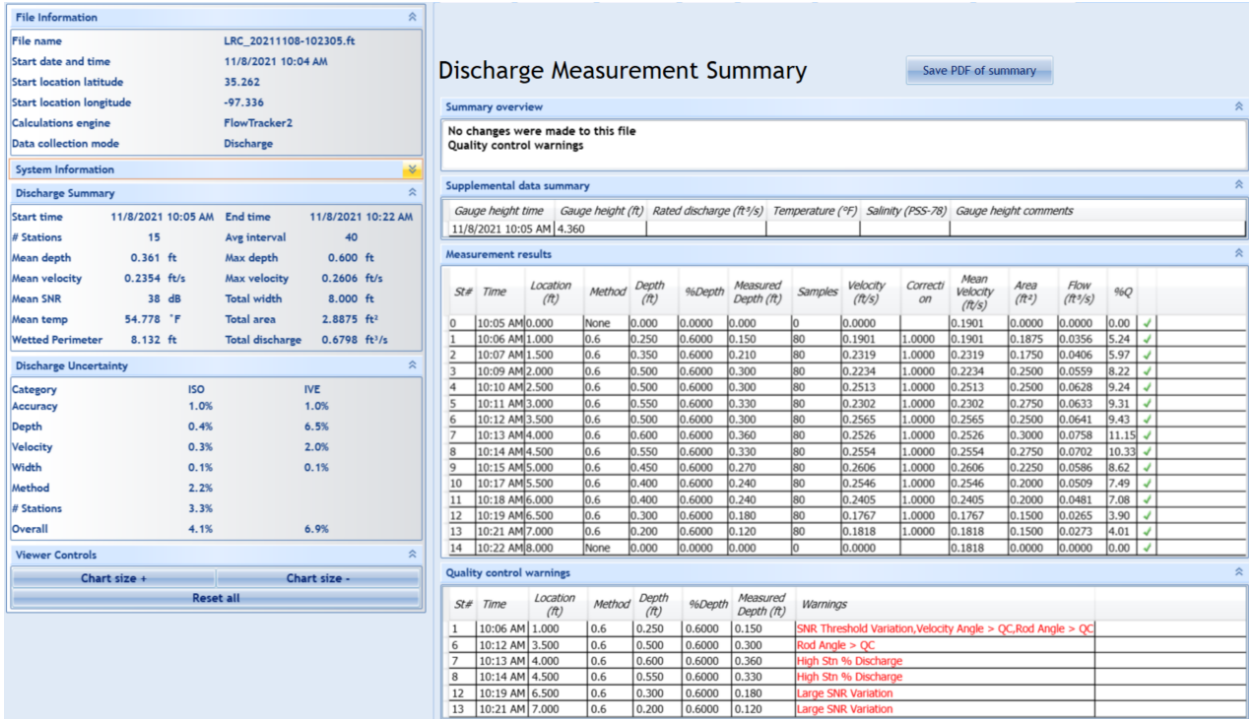


Figure 2 Discharge Measurement Summary LRC-1

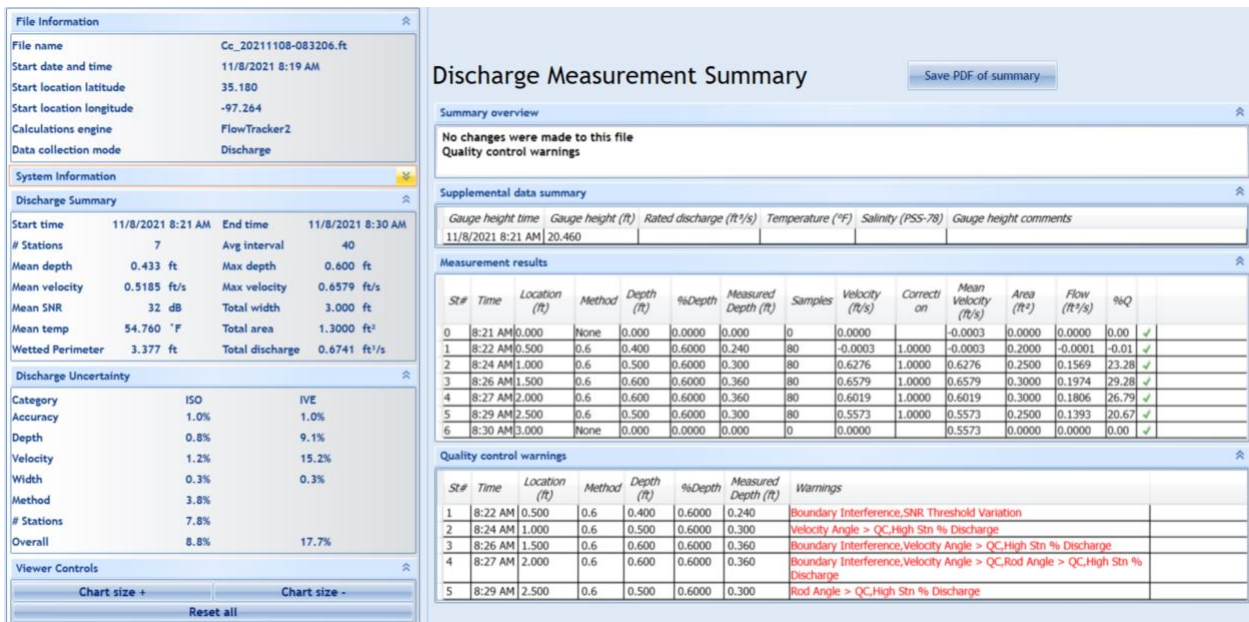


Figure 3 Discharge Measurement Summary CC-1

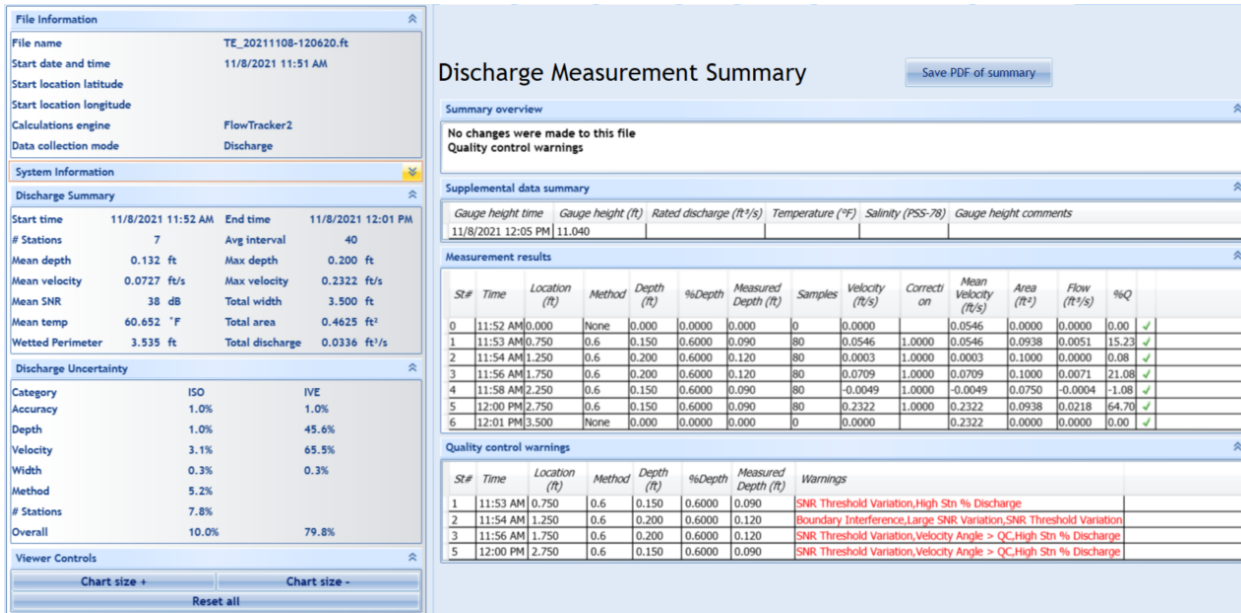


Figure 4 Discharge Measurement Summary TE-1

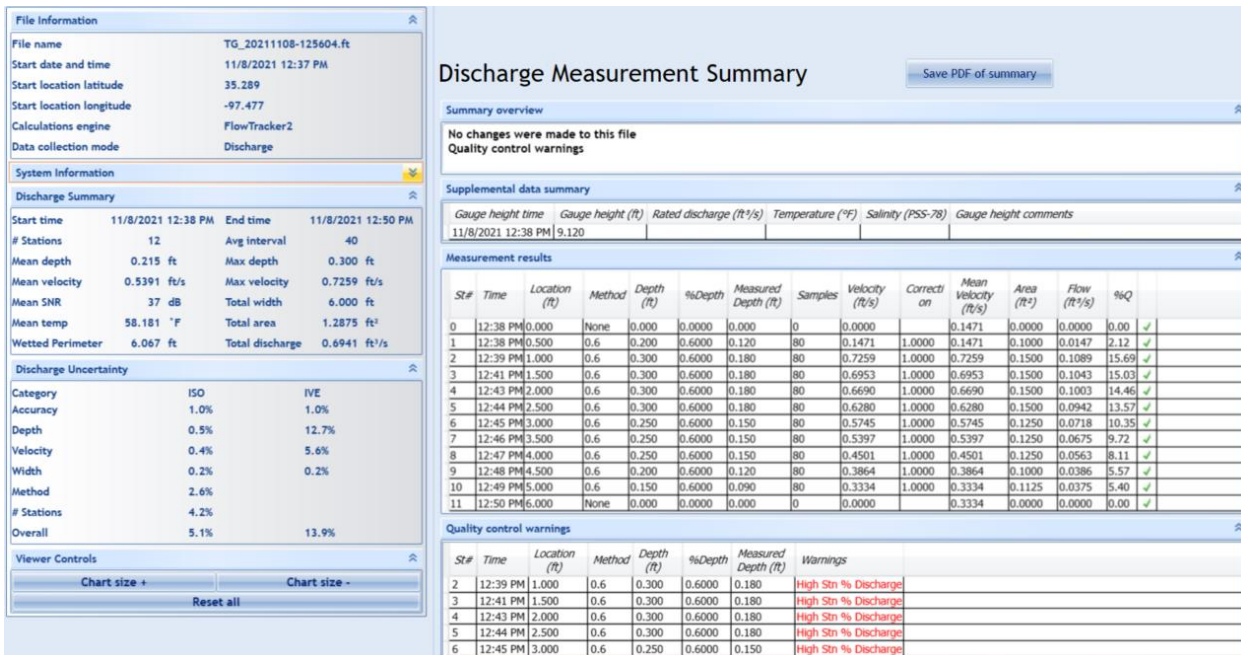


Figure 5 Discharge Measurement Summary TG-1

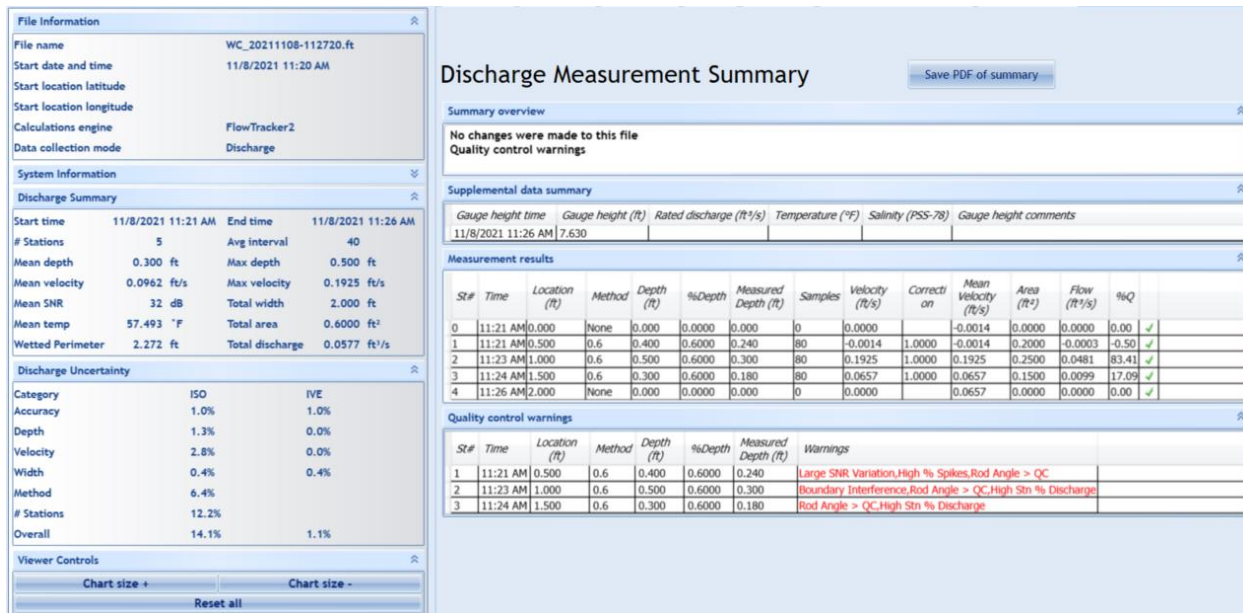
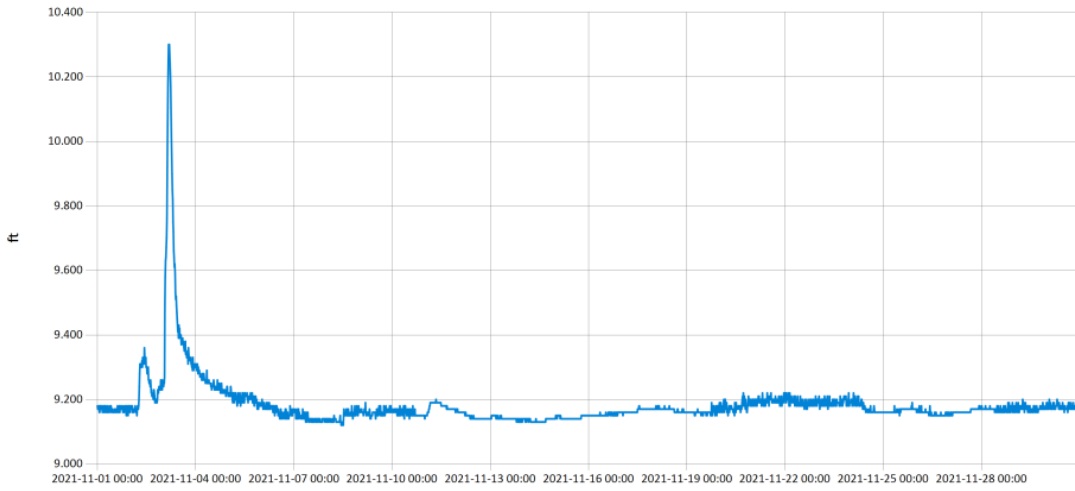


Figure 6 Discharge Measurement Summary WC-1

Period Selected: 2021-11-01 00:00 - 2021-11-30 23:59

UTC Offs et: -06:00



— Stage@TG

Figure 7 Monthly Hydrograph TG-1

Period Selected: 2021-11-01 00:00 - 2021-11-30 23:59

UTC Offs et: -06:00

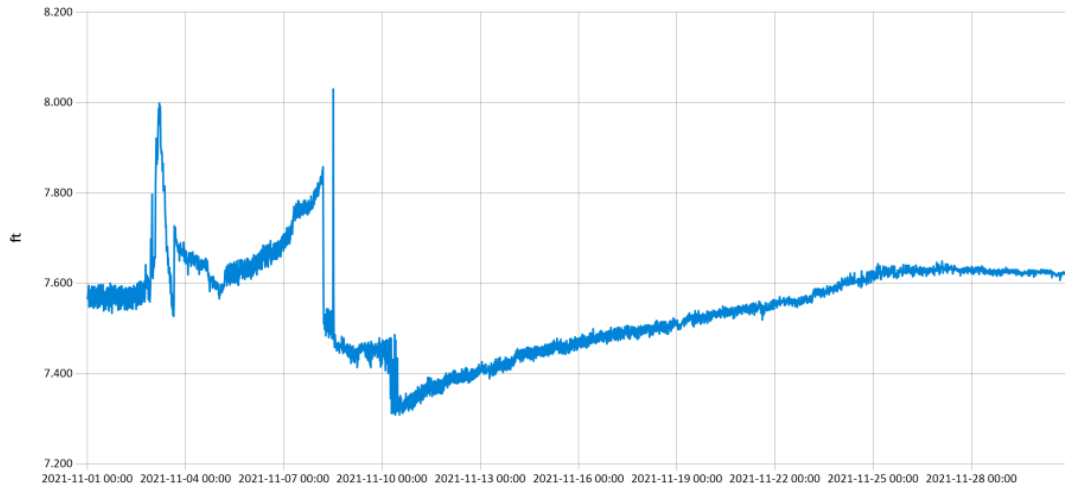


— Stage@TE

Figure 8 Monthly Hydrograph TE-1

Period Selected: 2021-11-01 00:00 - 2021-11-30 23:59

UTC Offs et: -06:00

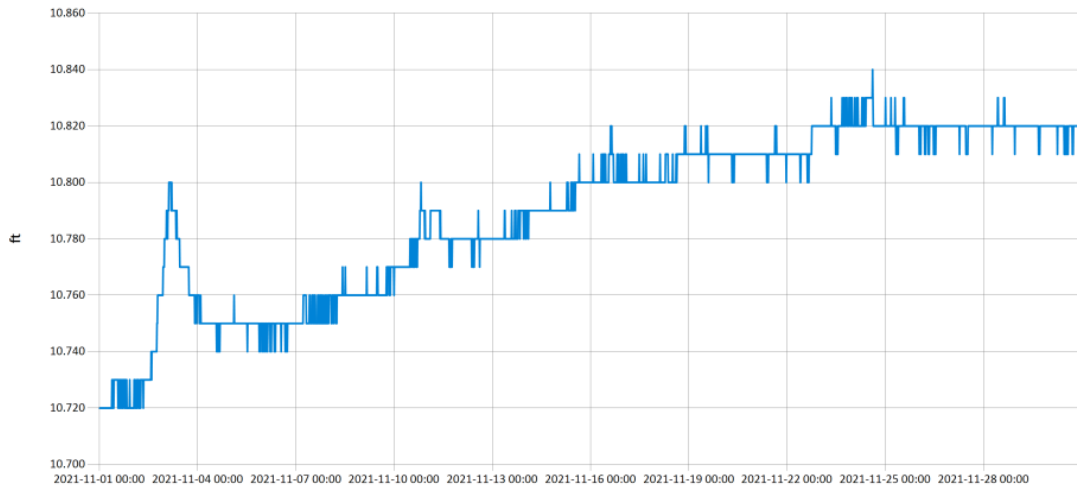


— Stage@WC

Figure 9 Monthly Hydrograph WC-1

Period Selected: 2021-11-01 00:00 - 2021-11-30 23:59

UTC Offs et: -06:00

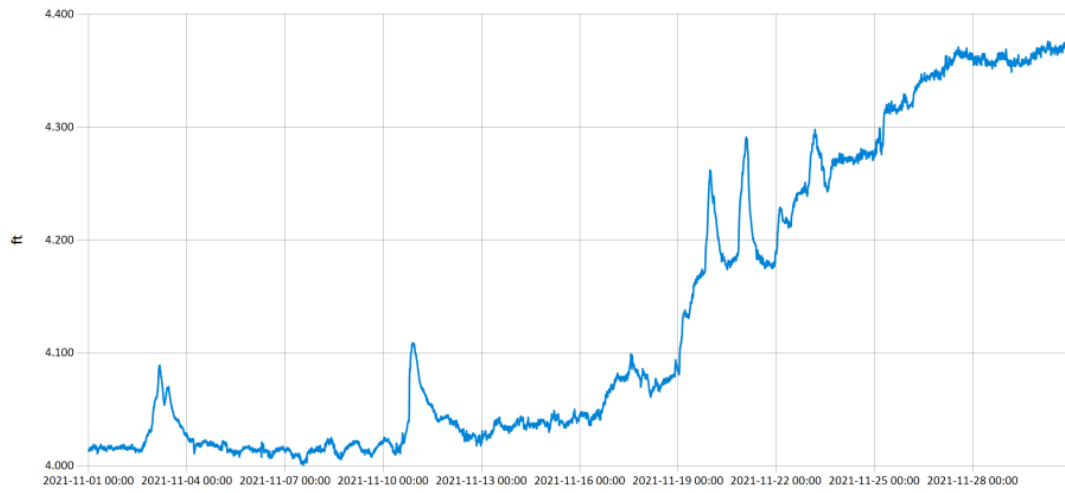


— Stage@URC

Figure 10 Monthly Hydrograph URC-2

Period Selected: 2021-11-01 00:00 - 2021-11-30 23:59

UTC Offs et: -06:00

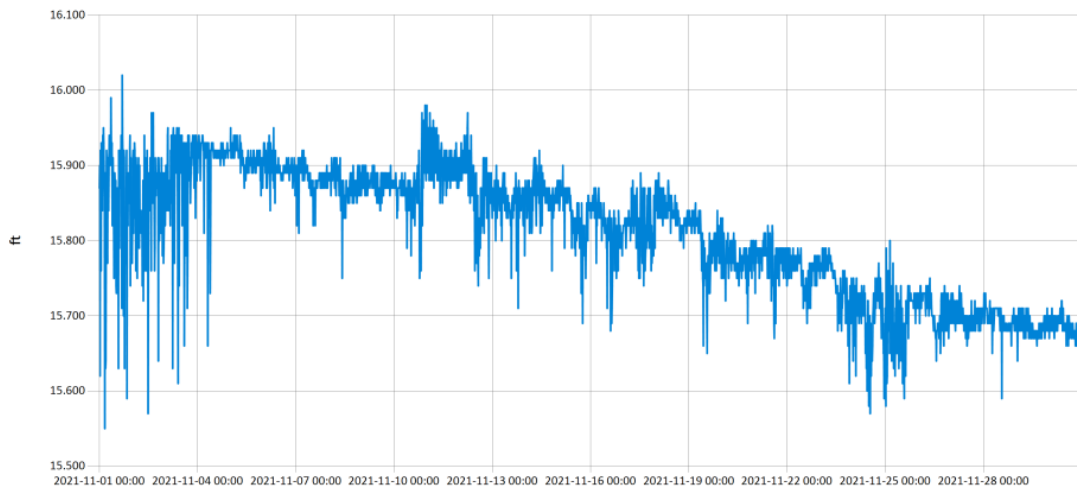


— Stage@LRC

Figure 11 Monthly Hydrograph LRC-1

Period Selected: 2021-11-01 00:00 - 2021-11-30 23:59

UTC Offs et: -06:00

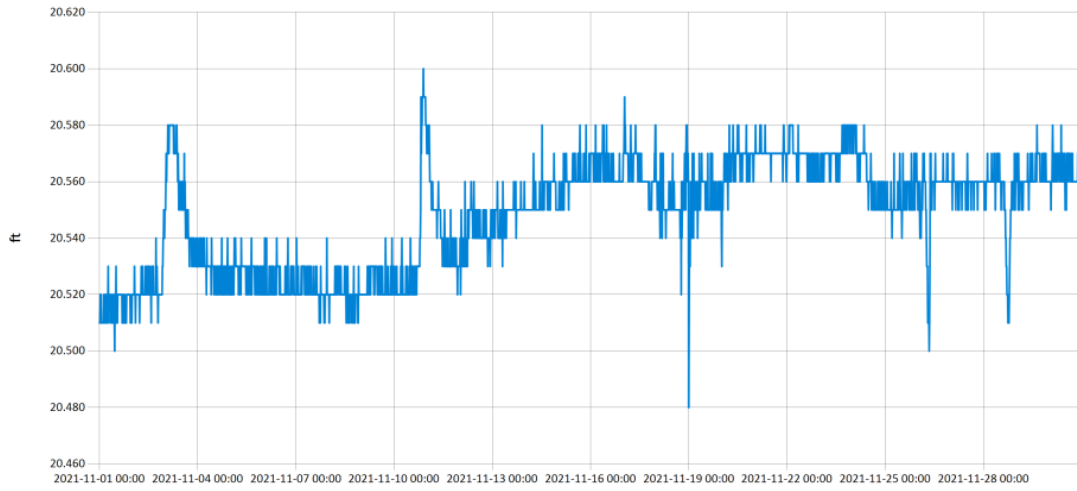


— Stage@LDB

Figure 12 Monthly Hydrograph LDB-1

Period Selected: 2021-11-01 00:00 - 2021-11-30 23:59

UTC Offs et: -06:00

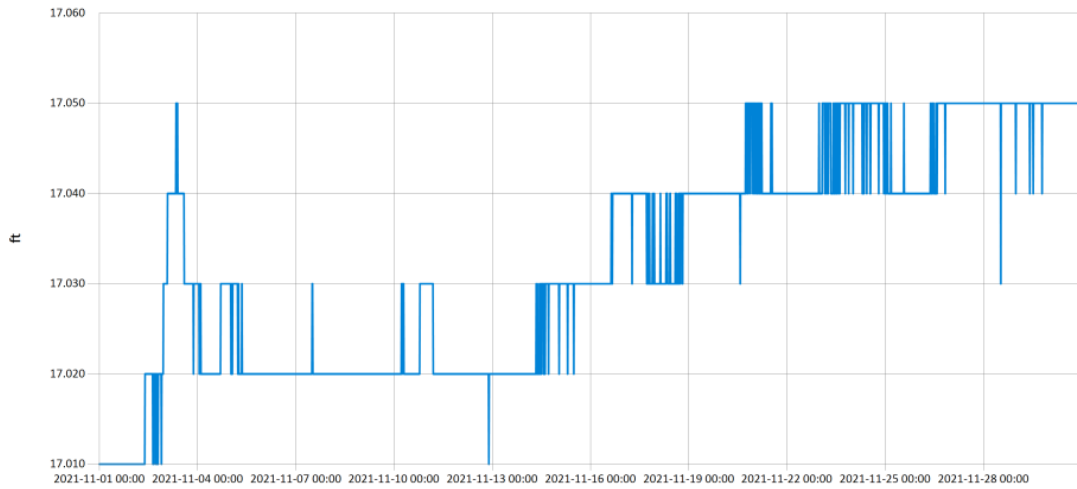


— Stage@CC

Figure 13 Monthly Hydrograph CC-1

Period Selected: 2021-11-01 00:00 - 2021-11-30 23:59

UTC Offs et: -06:00



— Stage@UDB

Figure 14 Monthly Hydrograph UDB-1

| MESONET CLIMATOLOGICAL DATA SUMMARY | | | | | November 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 ²) | 4" SOIL TEMPERATURES | | | |
| | MAX | MIN | AVG | DEWPT | HDD | CDD | MAX | MIN | AVG | (in) | STN | MSL | DIR | AVG | MAX | SOD | | BARE | MAX | MIN | |
| 1 | 54 | 45 | 48.9 | 40.7 | 16 | 0 | 84 | 63 | 73 | 0.00 | 28.99 | 30.25 | NE | 9.2 | 20.7 | 4.23 | 57.2 | 56.1 | 58 | 55 | |
| 2 | 47 | 42 | 44.2 | 40.7 | 21 | 0 | 96 | 79 | 88 | 0.21 | 29.08 | 30.34 | NE | 10.1 | 21.0 | 2.72 | 55.9 | 53.5 | 55 | 52 | |
| 3 | 47 | 43 | 44.7 | 42.6 | 20 | 0 | 97 | 87 | 92 | 0.20 | 29.06 | 30.32 | NE | 6.3 | 15.9 | 2.69 | 55.0 | 51.4 | 52 | 50 | |
| 4 | 54 | 42 | 47.5 | 42.5 | 17 | 0 | 94 | 64 | 83 | 0.00 | 29.02 | 30.28 | S | 3.4 | 12.1 | 7.81 | 55.5 | 52.8 | 57 | 50 | |
| 5 | 60 | 40 | 49.0 | 40.4 | 15 | 0 | 96 | 49 | 74 | 0.00 | 28.95 | 30.21 | SSE | 6.5 | 18.9 | 14.62 | 55.1 | 52.2 | 58 | 48 | |
| 6 | 66 | 38 | 52.0 | 41.7 | 13 | 0 | 94 | 48 | 70 | 0.00 | 28.95 | 30.20 | S | 6.3 | 18.1 | 14.95 | 55.2 | 52.5 | 59 | 47 | |
| 7 | 75 | 45 | 58.4 | 45.0 | 5 | 0 | 85 | 33 | 64 | 0.00 | 28.86 | 30.11 | S | 9.6 | 25.3 | 15.06 | 56.3 | 55.1 | 62 | 49 | |
| 8 | 75 | 52 | 62.5 | 50.5 | 2 | 0 | 86 | 42 | 67 | 0.00 | 28.85 | 30.10 | S | 11.0 | 25.8 | 13.73 | 57.8 | 58.5 | 65 | 53 | |
| 9 | 71 | 57 | 61.9 | 55.7 | 1 | 0 | 91 | 59 | 81 | 0.00 | 28.84 | 30.09 | S | 5.9 | 16.7 | 9.56 | 59.4 | 60.8 | 66 | 58 | |
| 10 | 69 | 53 | 62.2 | 56.8 | 4 | 0 | 94 | 66 | 83 | 0.00 | 28.61 | 29.86 | S | 11.2 | 26.8 | 3.77 | 60.1 | 60.8 | 63 | 59 | |
| 11 | 63 | 43 | 52.3 | 35.6 | 12 | 0 | 82 | 29 | 56 | 0.00 | 28.82 | 30.07 | NNW | 7.9 | 24.9 | 13.28 | 58.1 | 57.2 | 63 | 53 | |
| 12 | 57 | 33 | 48.5 | 26.7 | 20 | 0 | 83 | 18 | 47 | 0.00 | 28.94 | 30.19 | NNW | 10.8 | 34.6 | 13.48 | 55.4 | 54.5 | 59 | 51 | |
| 13 | 62 | 30 | 46.4 | 27.1 | 19 | 0 | 81 | 25 | 51 | 0.00 | 28.91 | 30.17 | S | 6.0 | 20.2 | 12.68 | 52.8 | 51.5 | 58 | 46 | |
| 14 | 62 | 39 | 50.5 | 34.2 | 14 | 0 | 87 | 32 | 56 | 0.00 | 28.88 | 30.13 | NNE | 5.8 | 24.1 | 13.39 | 53.6 | 53.7 | 60 | 49 | |
| 15 | 74 | 37 | 56.8 | 40.4 | 9 | 0 | 90 | 33 | 57 | 0.00 | 28.80 | 30.05 | S | 5.9 | 17.5 | 13.68 | 53.7 | 54.5 | 62 | 48 | |
| 16 | 79 | 54 | 66.4 | 55.3 | 0 | 2 | 95 | 42 | 70 | 0.00 | 28.57 | 29.81 | S | 12.4 | 32.8 | 13.19 | 56.5 | 59.0 | 65 | 54 | |
| 17 | 68 | 44 | 57.2 | 38.2 | 9 | 0 | 83 | 25 | 52 | 0.00 | 28.74 | 29.98 | N | 15.9 | 32.9 | 11.81 | 57.8 | 60.2 | 63 | 56 | |
| 18 | 55 | 30 | 42.6 | 18.2 | 22 | 0 | 81 | 16 | 41 | 0.00 | 29.21 | 30.48 | NNE | 6.4 | 19.3 | 13.99 | 53.5 | 53.4 | 59 | 49 | |
| 19 | 58 | 27 | 45.8 | 21.2 | 23 | 0 | 82 | 25 | 40 | 0.00 | 29.03 | 30.29 | S | 9.7 | 28.7 | 11.35 | 50.9 | 50.0 | 55 | 45 | |
| 20 | 70 | 46 | 55.9 | 37.1 | 7 | 0 | 90 | 35 | 51 | 0.00 | 28.76 | 30.01 | S | 9.3 | 23.1 | 10.96 | 52.6 | 53.5 | 59 | 49 | |
| 21 | 60 | 41 | 51.0 | 37.3 | 14 | 0 | 92 | 36 | 62 | 0.00 | 28.93 | 30.19 | N | 10.4 | 27.9 | 7.02 | 53.4 | 54.1 | 57 | 51 | |
| 22 | 64 | 29 | 47.3 | 30.4 | 18 | 0 | 92 | 29 | 56 | 0.00 | 29.02 | 30.27 | SSW | 5.2 | 20.9 | 13.07 | 51.2 | 50.8 | 57 | 45 | |
| 23 | 70 | 37 | 54.6 | 30.9 | 11 | 0 | 82 | 19 | 45 | 0.00 | 28.78 | 30.02 | S | 10.5 | 31.9 | 13.02 | 51.5 | 52.3 | 58 | 47 | |
| 24 | 68 | 50 | 59.4 | 44.8 | 6 | 0 | 79 | 40 | 59 | 0.00 | 28.67 | 29.91 | S | 15.0 | 34.0 | 7.19 | 54.0 | 56.4 | 60 | 54 | |
| 25 | 50 | 29 | 40.7 | 25.1 | 26 | 0 | 78 | 36 | 55 | 0.00 | 29.13 | 30.39 | N | 13.5 | 36.5 | 13.02 | 51.7 | 52.6 | 57 | 48 | |
| 26 | 62 | 25 | 43.8 | 23.1 | 22 | 0 | 88 | 20 | 50 | 0.00 | 28.97 | 30.22 | SSW | 7.9 | 23.8 | 12.80 | 48.7 | 48.2 | 54 | 42 | |
| 27 | 66 | 40 | 50.9 | 27.2 | 12 | 0 | 63 | 22 | 42 | 0.00 | 28.77 | 30.02 | S | 6.5 | 19.1 | 10.98 | 50.1 | 50.8 | 57 | 46 | |
| 28 | 59 | 37 | 47.3 | 30.7 | 17 | 0 | 77 | 34 | 54 | 0.00 | 28.97 | 30.23 | N | 5.8 | 18.0 | 12.47 | 50.2 | 51.0 | 57 | 46 | |
| 29 | 73 | 40 | 55.5 | 33.0 | 8 | 0 | 67 | 23 | 45 | 0.00 | 28.82 | 30.07 | S | 6.6 | 14.7 | 12.38 | 50.3 | 51.6 | 58 | 46 | |
| 30 | 76 | 43 | 58.4 | 40.8 | 6 | 0 | 75 | 29 | 55 | 0.00 | 28.76 | 30.00 | S | 4.9 | 17.8 | 12.22 | 51.7 | 54.1 | 60 | 48 | |
| | 64 | 40 | 52.1 | 37.1 | <- Monthly Averages -> | | | | | 28.89 | 30.14 | S | 8.5 | 36.5 | 11.04 | 54.2 | 54.1 | 59 | 50 | | |
| Temperature - Highest: 79 | | | | | Degree Days - Total HDD: 389 | | | | | Number of Days With: | | | | | | | | | | | |
| Lowest: 25 | | | | | Total CDD: 2 | | | | | Tmax ≥ 90: 0 | | | | | Rainfall ≥ 0.01 inch: 2 | | | | | | |
| Rainfall: Monthly Total: 0.41 in. | | | | | Humidity - Highest: 97 | | | | | Tmax ≤ 32: 0 | | | | | Rainfall ≥ 0.10 inch: 2 | | | | | | |
| Greatest 24 Hr: 0.21 in. | | | | | Lowest: 16 | | | | | Tmin ≤ 32: 6 | | | | | Avg Wind Speed ≥ 10 mph: 10 | | | | | | |
| | | | | | | | | | | Tmin ≤ 0: 0 | | | | | Max Wind Speed ≥ 30 mph: 6 | | | | | | |

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* Denotes incomplete record

Figure 15 November Mesonet Data