

CITY OF NORMAN

FY 2023

ANNUAL REPORT

REPORTING PERIOD 07/01/2022 TO 06/30/2023

**Phase II Small Municipal Separate Storm
Sewer System (MS4) General Permit (OKR04)**

Authorization No. OKR040015



**City of Norman Phase II MS4 Annual Report
Reporting Period 7/1/2022 to 6/30/2023**

**Phase II Small Municipal Separate Storm Sewer System (MS4)
General Permit (OKR04)
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Section 1: Compliance Status

1.1. Executive Summary

The Phase II MS4 Annual Report (AR) for the City of Norman (City) is submitted as required by Part VI.C. of the Oklahoma Department of Environmental Quality (DEQ) Phase II Municipal Separate Storm Sewer System (MS4) General Permit, OKR04, Authorization No. OKR040015, and covers the reporting period of July 1, 2022, through June 30, 2023. As part of these requirements, the City conducted an assessment of permit compliance, including an assessment of the appropriateness of Best Management Practices (BMPs), progress toward the goal of reducing the discharge of pollutants, and achieving measurable goals for each Minimum Control Measure (MCM). The City's assessment indicates that it is in compliance with permit requirements.

On November 29, 2005, the City received Authorization No. OKR040015. General Permit OKR04 expired on February 9, 2010, but was administratively continued until its reauthorization, which became effective on November 1, 2015. A Notice of Intent (NOI) and other permit application material were submitted as part of the OKR04 application on January 29, 2016. On March 17, 2017, the City received Authorization No. OKR040015. On September 24, 2021, the City received a renewed Authorization No. OKR040015.

Some of the major accomplishments during the reporting period include removing pollutants from the MS4 through street sweeping, spill response, dry weather field screening, and infrastructure maintenance; educating the public on the importance of stormwater pollution prevention through public clean-up events, meetings, discussions, and the Artful Inlets program; and enhanced inspections of construction sites. The City's two stormwater inspectors conducted 1,628 inspections of 102 sites during the reporting period, and issued twenty-four Notices of Violation (NOVs), fourteen Cease and Desist Orders (CDOs) and six Stop Work Orders (SWO) for noncompliance.

A continuing requirement for this reporting period involves implementation of the Lake Thunderbird Watershed Total Maximum Daily Load (TMDL) Compliance and Monitoring Plans. On November 10, 2013, ODEQ issued a TMDL for the Lake Thunderbird watershed, which established a waste load allocation for the Cities of Norman, Oklahoma City, and Moore, and required that each city submit Compliance and Monitoring Plans. The City's Compliance and Monitoring Plans were approved by ODEQ on September 21, 2016, and subsequently adopted by the City Council on October 25, 2016. Currently, accumulated monitoring data is being evaluated in order to develop the next 5-Year Monitoring and Compliance Plan, as well as to report the term's findings. On October 13, 2020, City Council approved a contract with Freese and Nichols, Inc., to review the first five years of data and update the City's Compliance and Monitoring Plan. Work on this is on-going with a projected completion date of spring 2023.

As an example of an annually implemented non-structural BMP, on October 30, 2022, the Stormwater Division hosted the Seventh Annual Lake Thunderbird Watershed Workshop and Clean-up Event at Lake Thunderbird State Park. The goal is to educate Norman citizens on the impact stormwater has on Lake Thunderbird's water quality and to engage the public to participate in the protection of the watershed. In addition, everyone who came took an active role in removing pollution, in the form of trash, from the watershed. Approximately 51 people attended and collected over 1,200 lb. of trash and recyclables that may otherwise have ended up in Lake Thunderbird.

An additional non-structural BMP that has been implemented is the City's participation in the Lake Thunderbird Watershed Alliance (LTWA), a collaborative effort to work with stakeholders within the watershed to protect the lake's water quality and quantity and to serve as a clearinghouse for Lake

Thunderbird watershed-related implementation projects, research and outreach. The LTWA hopes to become a pass-through funding source for individuals and groups to utilize grant monies to install BMPs throughout the watershed.

This reporting period also saw the installation of 2023 Artful Inlets pieces. Five (5) new educational artworks were installed in April 2023. The quality and quantity of applicants for the program has increased dramatically, and this program has wonderful momentum to keep alive for years to come. The City has created an ArcGIS Story Map which includes all of the pieces installed thus far, information on the pieces and the artists, and video animations of the flow paths from each of the inlets (<https://bit.ly/3xr5EPi>).

1.2. BMP Implementation and Evaluation

The City considers the current BMPs to be appropriate and effective during this reporting period. Evaluation of the BMPs is on-going, and if any are found to be no longer effective or appropriate, the BMP will be amended, deleted and/or replaced.

An assessment of the BMPs currently being implemented by the City is presented in the tables in Section 1.3.

1.3. MCM Measurable Goals

Progress in achieving the measurable goals for each BMP of the six MCMs is presented in the following tables. Supporting documentation for each MCM is attached in the Appendices.

Table 1. MCM 1: Public Education and Involvement						
NO.	DESCRIPTION OF ACTIVITY	MEASURABLE GOAL	FREQUENCY	COMMENTS	EVALUATION	STATUS
1.1	Distribute pamphlets in City utility bills about: 1. stormwater pollution prevention, 2. fertilizer use, and 3. hazards associated with illegal discharges and improper disposal of waste.	Reach <u>75%</u> of all utility customers.	Annual	Distributed three (3) utility bill inserts to <u>34,300</u> out of 34,300, or <u>100%</u> of utility accounts receiving paper bills (as of May 2023): 1. Green Your Lawn 2. Don't Blow It 3. When the Rain Doesn't Drain	This continues to be an excellent method of distributing stormwater information to Norman residents.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.2	Maintain a stormwater website (https://bit.ly/CoNSWQ) with education materials and facilitate the reporting of stormwater quality concerns and illicit discharges. Additional information promoting the City's environmental programs and environmental awareness will be available at GreenNorman.org.	1. Review and update the content of these websites <u>annually</u> . 2. Post copies of the <u>NOI and SWMP</u> for public review.	Annual	1. Information on pollution prevention tips, rain barrels, fertilizer applicator registration, and public events were posted and updated <u>annually</u> . 2. Copies of the <u>NOI and SWMP</u> are posted on the stormwater website (https://bit.ly/CoAnnualreport).	The website remains a useful reference tool where residents can find information about Norman's program and upcoming events.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.3	Continue operating the Action Center Hotline (operated by the City Clerk's office) to allow citizens to easily report pollution concerns to personnel in the city who can take appropriate action to address stormwater pollution issues. The action center can be contacted by phone at (405) 366-5396 and email at Action.Center@NormanOK.gov .	1. Maintain a log of <u>all stormwater pollution complaints</u> in the Stormwater Division. 2. Respond to citizen complaints within <u>72 hours</u> of receipt.	Annual	1. <u>All stormwater complaints</u> are tracked using the CBI MS4Web database. 2. All citizen complaints are responded to within <u>72 hours</u> of receipt. Response times are typically less than 24 hours.	The Action Center is a valuable resource to citizens with a variety of concerns.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.4	Participate in a public education event to encourage public participation in learning about environmental and natural resource issues and to raise environmental awareness in the public.	Participate in <u>one (1)</u> public education event <u>annually</u> .	Annual	In partnership with City of Norman's Environmental Services Division, stormwater information was distributed during Norman's Earth Day Festival on April 23, 2023. Approximately 3,600 citizens were in attendance.	Norman Earth Day Festival is a fun and interactive way to share information with Norman residents.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.5	Work with local schools to provide promotional items and educational materials about the impacts of stormwater pollution.	1. Provide educational material to <u>two (2)</u> schools <u>annually</u> , or as requested. 2. Present stormwater information <u>annually</u> at selected schools as part of National Public Works Week.	Annual	1. Two activities involving elementary students were completed: a. Eisenhower 5 th Grade, September 1, 2022, demonstrated the EnviroScape model. b. Stormwater educational materials were distributed to local elementary schools through the City's Environmental Control	The EnviroScape is a fun and interactive way to help students learn about stormwater and water quality. Students find the model entertaining and memorable.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No

				<p>Advisory Board’s (ECAB) “Water’s Worth It” annual poster contest in 2022. Poster contest packets were distributed to teachers at approximately 22 public and private elementary schools within Norman city limits. Posters are displayed at City Hall.</p> <p>2. The EnviroScape model and OFMA floodplain model were demonstrated to Eisenhower Elementary as part of Public Works Week, May 21-27, 2023:</p>	
1.6	<p>Publish newspaper advertisements to inform the public about:</p> <ol style="list-style-type: none"> 1. stormwater pollution prevention, 2. fertilizer use, and 3. hazards associated with illegal discharges and improper disposal of waste. 	<p>Publish <u>four (4) advertisements annually.</u></p>	Annual	<p>The following topics were placed as ads in the Norman Transcript, Norman Transcript special editions, and/or the Norman Magazine in FYE 2023:</p> <ol style="list-style-type: none"> 1. Only Rain Down the Drain, July 2022, Norman Magazine 2. Artful Inlets Walking Tour, July 2022, Discover Norman 3. Litter Campaign, July 2022, OU Game Day Inserts 4. We Drink Our Stormwater, September 2022, Norman Magazine 5. Household Hazardous Waste, September-November 2022, Norman Magazine, Home Improvement Insert, and Women in Business Edition 6. Stormwater “Did You Know?”, November 2022, Thanksgiving Edition 7. Year End Review, December 2022, Norman Magazine 8. Only Rain Down the Drain, December 2022, Coloring Book Edition 9. Artful Inlets Walking Tour, January 2023, Norman Magazine and Tank on a Trip 	<p>Publishing ads in the Norman Transcript and its associated products (Norman Magazine and other special editions), is an effective method of reaching citizens throughout the city.</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No</p>

				10. Recycle the Rain, January 20223, Norman Ballots 11. Recycle the Rain, March 2023, Norman Magazine 12. Fertilizer Dos and Don'ts, May 2023, Norman Magazine		
1.7	Increase the effectiveness of public education by developing educational material for citizens whose primary language is not English.	Evaluate educational materials <u>once per permit cycle</u> for translation.	Once per permit cycle	Educational brochure for fertilizer applicators was reviewed and updated in 2022.	Providing multi-lingual material is critical to ensuring information is available to all Norman residents.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.8	Develop educational materials regarding the Lake Thunderbird TMDL and watershed protection; incorporate with other public education materials where possible.	Distribute the <u>TMDL materials</u> through existing Public Education BMPs (BMPs 1.4, 1.6, and 1.12).	Annual	Information was distributed during the Norman Earth Day Festival on April 23, 2023 (BMP 1.4), published in the Norman Magazine ad "Fertilizers Do's and Don't's" during May-June 2023 (BMP 1.6), and discussed at the Love Your Lakes Workshop on July 30, 2022 (BMP 1.12).	This is an effective and multi-faceted approach to distributing TMDL information which provides multiple points of contact with citizens.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.9	Provide an email link (posted on the Engineering Division and Stormwater Division webpages) which allows the public to directly contact staff regarding the SWMP and stormwater issues in general.	Respond to inquiries <u>within 72 hours of receipt</u> .	Annual	pwstormwater@normanok.gov has been established, including a link from the Stormwater Division webpage, for receipt of email regarding stormwater issues. In FYE 2023, the Stormwater Division received 15 emails. Response rate was 100%. Based on recent feedback from DEQ, additional tracking to verify the 72-hour response time will be implemented and included in the FYE 2024 AR.	While this method is not as frequently used as the Action Center, it is still an effective tool for citizens with general stormwater questions.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.10	Attend City of Norman's Environmental Control Advisory Board (ECAB) meetings to provide information on stormwater pollution issues.	Attend City of Norman's ECAB meetings <u>quarterly</u> .	Quarterly	Stormwater Division representatives have attended ECAB meetings on a monthly basis (excluding December 2022) and have worked with the group on several stormwater-related issues and events.	ECAB remains an excellent way for citizens to meet and communicate concerns to city staff and coordinate on various projects.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.11	Coordinate public meetings as needed to discuss Lake Thunderbird TMDL and the City of Norman TMDL Compliance and Monitoring Plans.	Hold <u>one (1) meeting annually</u> .	Annual	On October 30, 2022, the Lake Thunderbird Workshop and Cleanup Event was held, the City's program and the Thunderbird TMDL were discussed,	This meeting is an excellent way to engage the community while removing	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial

				and participants were encouraged to provide comments, ask questions and participate.	waste/trash from the TMDL watershed. It is the most well attended clean-up event.	<input type="checkbox"/> No
1.12	Maintain working partnership between the Oklahoma Conservation Commission's Blue Thumb organization.	Coordinate <u>one (1)</u> stormwater event <u>annually</u> (public meeting, clean-up event, etc.).	Annual	On July 24-30, 2022, in celebration of Love Your Lakes week, a clean-up event and workshop was held at Central Oklahoma Master Conservancy District offices. Speakers included representatives from Blue Thumb, OSU Extension, and Lake Thunderbird Watershed Alliance. A DIY Rain Chain Workshop was also held where 10 residents were provided free materials to build their own rain chain.	Clean-up events continue to be a popular way to engage with the community. The interactive DIY workshop was well received and will be incorporated in future reporting years where possible.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.13	Provide training to appropriate city staff on: 1. illicit discharges, 2. construction site stormwater runoff, and 3. Lake Thunderbird TMDL requirements.	Provide staff training <u>annually</u> .	Annual	City construction inspectors and stormwater staff attended the Oklahoma Certified Inspector of Sediment and Erosion Control course on February 2, 2023. City staff also attended the Builder's Workshop on September 7, 2022 where illicit discharges, construction stormwater runoff, and Lake Thunderbird TMDL requirements were discussed.	Continuing education and training is critical to ensuring city staff is knowledgeable and can respond effectively to citizen concerns.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.14	Provide training to appropriate city staff on industrial stormwater runoff.	Provide training <u>every two years</u> .	Once every two years	This BMP is scheduled for implementation starting in Permit Year 3 (2023-24).		
1.15	Provide training to appropriate city staff on pollution prevention at MS4 operations.	Provide staff training <u>annually</u> .	Annual	This BMP is scheduled for implementation starting in Permit Year 5 (2025-26).		
1.16	Provide training to local developers, contractors, and home builders about construction site stormwater runoff, post-construction runoff, and illicit discharges.	Provide training <u>annually</u> .	Annual	The Builder's Workshop was held on: 1. September 7, 2022 2. February 6, 2023	There has been a general decrease in interest and attendance in the current traditional workshop format; city staff are evaluating alternative methods of distributing information to the responsible parties.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
1.17	Provide training to local industrial facilities about industrial site stormwater runoff.	Provide training <u>every two years</u> .	Once every two years	This BMP is scheduled for implementation starting in Permit Year 4 (2024-45).		

1.18	Distribute information the public about stormwater pollution prevention, illicit discharges, fertilizer use, and/or the hazards associated with illegal dumping.	Distribute information <u>quarterly</u> .	Quarterly	The Runoff Roundup, a quarterly newsletter with stormwater topics, volunteering opportunities, and other information, was distributed on: 1. September 2022 2. December 2022 3. March 2023 4. June 2023	This is an effective tool for distributing information about stormwater and upcoming events to citizens. There are currently 431 citizens on the mailing list.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
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Table 2. MCM 2: Industrial Stormwater Runoff Control

NO.	DESCRIPTION OF ACTIVITY	MEASURABLE GOAL	FREQUENCY	COMMENTS	EVALUATION	STATUS
2.1	Develop and maintain a list of OKR05 permitted facilities within the City of Norman.	Develop the list using DEQ data. Update the list <u>annually</u> .	Annual	This BMP is scheduled for implementation starting in Permit Year 3 (June 2023-24).		
2.2	Implement an ordinance to require BMPs that will minimize exposure, provide good housekeeping preventative maintenance, spill prevention and response, and erosion and sediment controls.	Review and update ordinances <u>within two (2) years</u> of OKR04 and OKR05 renewal.	Once per permit cycle	A review of the City of Norman's Engineering Design Criteria (EDC) was completed in 2022. The revised EDC was adopted by council and went into effect on March 28, 2023.	Ensuring the EDC and ordinances reflect the current requirements is a critical aspect to the regulatory component of the program.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
2.3	Develop internal procedures to inspect industrial sites. Inspect industrial facilities for compliance.	Develop internal procedures to inspect industrial sites. Inspect <u>up to 10 (or 20% of total industrial facilities if less than 50) per year</u> .	Once per permit cycle	This BMP is scheduled for implementation starting in Permit Year 4 (June 2024-25).		

Table 3. MCM 3: Illicit Discharge Detection and Elimination

NO.	DESCRIPTION OF ACTIVITY	MEASURABLE GOAL	FREQUENCY	COMMENTS	EVALUATION	STATUS
3.1	Provide a facility for the public to drop off unwanted household hazardous waste (HHW).	<u>Report total amount of waste collected.</u>	Annual	The City built a standalone HHW Collection Facility which opened to the public in February 2022. During the reporting period, the facility collected 95,093 pounds of household hazardous waste and serviced 1,274 vehicles.	The community has responded positively to the new facility; it is an effective way to address household hazardous waste.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
3.2	Provide opportunities for the public to drop off unwanted electronic waste (e-waste).	Hold one (1) event <u>annually</u> . <u>Report total amount of waste collected.</u>	Annual	The City hosted e-waste collection events on September 17, 2022 and May 6, 2023. A total of 31,211 lbs. were collected and 557 cars were serviced.	This is an effective method for collecting e-waste and preventing it from polluting the stormwater system.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
3.3	Develop and maintain a list of high priority areas within the MS4.	Update the list <u>annually</u> .	Annual	This BMP is scheduled for implementation starting in Permit Year 4 (June 2024-25).		

3.4	Implement a Dry Weather Field Screening (DWFS) program to assess condition of outfalls and detect illicit discharges, including illegal dumping and connections to the MS4. Illicit discharge investigations should include City inspections of the MS4 to detect illicit discharges. The inspections will be done visually by inspecting creeks, channels, manholes, and other accessible parts of the MS4.	Screen <u>40% of identified outfalls annually</u> and <u>each high priority area outfall annually</u> . Trace, investigate, and remove <u>all</u> identified illicit discharges <u>within 72 hours</u> of identification. <u>Collect samples</u> where appropriate to characterize the pollutant.	Annual	During the reporting period: <ul style="list-style-type: none"> all 63 monitoring points, visual screen points, and outfalls were inspected (<u>100% of identified outfalls</u>), and Seven (7) illicit discharges were found and eliminated within 72 hours of identification. Stormwater compliance inspectors are equipped with test strips (pH, ammonia, chlorine, and salt) and additional samples are collected as needed.	DWFS is an effective tool for identifying illicit discharges. Test strips are critical to timely response and investigations.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
3.5	City of Norman Ordinance O-0506-76, adopting the Engineering Design Criteria (EDC) was adopted. Enforcement Actions including referrals, spill reports, inspections, and sampling may be used to identify violations of City stormwater regulations.	Review and revise ordinance <u>one per permit cycle</u> .	Once per permit cycle	A review of the City of Norman's Engineering Design Criteria (EDC) was completed in 2022. The revised EDC was adopted by council and went into effect on March 28, 2023.	Ensuring the EDC and ordinances reflect the current requirements is a critical aspect to the regulatory component of the program.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
3.6	The GIS MS4 map is maintained by the City of Norman's Engineering Division.	Update GIS map of the MS4 system <u>annually</u> .	Annual	The GIS map is updated as needed when new infrastructure is installed and/or mapped.	The GIS map is a valuable tool for investigating illicit discharges.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
3.7	Maintain a list of occasional, incidental non-stormwater discharges that are allowable under OKR04 (Part II(B)(2)) that will not require additional investigation under MCM3.	Update the list <u>annually</u> .	Annual	The list of non-stormwater discharges included in the SWMP were reviewed and no changes are needed at this time.	A current list of allowable non-stormwater discharges is necessary to properly identify illicit discharges.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
3.8	The City of Norman Manufactured Fertilizer Ordinance is a proactive effort to preserve and protect water bodies within the City's limits. The ordinance limits the use of phosphorus-based fertilizer and established rules of the application of all fertilizers. Commercial applicators of fertilizers must register with the city. Registered fertilizer applicators must provide their customers with information about proper fertilizer usage.	Review and update code of ordinances and EDC requirements for compliance with OKR04 <u>once per permit cycle</u> . Develop list of fertilizer applicators and update <u>annually</u> . Send out registration and fertilizer usage information <u>annually</u> .	Annual/once per permit cycle	A review of the City of Norman's Engineering Design Criteria (EDC) was completed in 2022. The revised EDC was adopted by council and went into effect on March 28, 2023. Registration and fertilizer usage information was mailed to applicators on April 14, 2023. The list of fertilizer applicators was compared to the Department of Agriculture's fertilizer licenses based in Norman, OK on June 26, 2023; subsequently, 2 new companies were identified.	Ensuring the EDC and ordinances reflect the current requirements is a critical aspect to the regulatory component of the program. Updating the applicator list and contacting them annually ensures that new companies are added and licensed as needed.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No

Table 4. MCM 4: Construction Site Stormwater Runoff Control						
NO.	DESCRIPTION OF ACTIVITY	MEASURABLE GOAL	FREQUENCY	COMMENTS	EVALUATION	STATUS
4.1	Section 5000 of the Engineering Design Criteria (EDC) contains requirements for erosion and sediment control from construction activities, permitting requirement, and enforcement options.	Review and update code of ordinances and EDC requirements for compliance with OKR04 and OKR10 <u>once per permit cycle.</u>	Once per permit cycle	A review of the City of Norman's Engineering Design Criteria (EDC) was completed in 2022. The revised EDC was adopted by council and went into effect on March 28, 2023.	Ensuring the EDC and ordinances reflect the current requirements is a critical aspect to the regulatory component of the program.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
4.2	A Water Quality Protection Zone Ordinance was adopted in 2011. Natural vegetative buffers or a combination of buffers and other BMPs must be maintained to protect water quality during and after construction.	Review and update ordinance requirements for compliance with OKR04 <u>once per permit cycle.</u>	Once per permit cycle	WQPZ ordinance has been established, and zones are identified as property is platted on an ongoing basis. Two Certificates of Survey and three final plats were filed with WQPZ during the reporting period. A review of the City of Norman's Engineering Design Criteria (EDC) was completed in 2022. . The revised EDC was adopted by council and went into effect on March 28, 2023.	The WQPZ is an important tool to ensuring water quality is taken into consideration when plats are proposed. Ensuring the EDC and ordinances reflect the current requirements is a critical aspect to the regulatory component of the program.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
4.3	All construction sites with an earth disturbance of one acre or larger are required to obtain a City of Norman Earth Change Permit. Earth Change Permit must be obtained prior to commencing earth disturbing activities.	Review <u>all</u> submitted earth change permit applications, stormwater pollution prevention plans, and sediment and erosion control plans.	Annual	During the reporting period, 35 earth change permit applications were submitted and reviewed for compliance with OKR10.	The permitting process is an effective and consistent way to ensure that plans have been developed in accordance with city and DEQ's OKR10 requirements.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
4.4	City of Norman Construction Stormwater Control Requirements are found in section 5000 of the EDC contains requirements for BMP to reduce or eliminate pollutants in stormwater runoff from construction sites. Stormwater management considerations, locations for drainage features and water bodies on and near the construction site must also be submitted before permit issuance. Site inspection and enforcement procedures such as referrals will be made by Stormwater Divisions staff.	Inspect <u>all</u> sites greater than 40 acres in size, sites that discharge to an impaired waterbody, sites that discharge to a TMDL waterbody, and sites that have been identified as a threat to water quality <u>at least once per month during construction.</u> Inspect <u>all other sites at least once per quarter</u> during construction.	Annual	All construction sites were inspected on a monthly basis. A total of 1,628 inspections were conducted at 102 sites.	Routine inspections is critical to ensuring consistent compliance.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No

Table 5. MCM 5: Post-Construction Management in New Development and Redevelopment						
NO.	DESCRIPTION OF ACTIVITY	MEASURABLE GOAL	FREQUENCY	COMMENTS	EVALUATION	STATUS
5.1	Section 5000 of the Engineering Design Criteria (EDC) contains requirements for the use of stormwater BMPs, with highest preference given to LID techniques and practices, for post-construction protection of water quality. The EDC should be reviewed in the first two years of the permit term to identify needed changes or additions.	Review and update code of ordinances and EDC requirements for compliance with OKR04 <u>once per permit cycle</u> .	Once per permit cycle	A review of the City of Norman's Engineering Design Criteria (EDC) was completed in 2022. The revised EDC was adopted by council and went into effect on March 28, 2023.	Ensuring the EDC and ordinances reflect the current requirements is a critical aspect to the regulatory component of the program.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
5.2	Section 5000 of the Engineering Design Criteria (EDC) contains requirements for operation and maintenance of the MS4 system including drainage, detention, and stormwater runoff from pre- and post-development activity.	Identify and maintain a log of permanent structural BMPs implemented during development and update <u>annually</u> .	Annual	A list of post-construction controls is tracked through CBI's MS4Web database. The database is updated after each inspection as needed.	MS4Web is an effective tracking and database tool which inspectors to access information and complete reports while in the field.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
5.3	Inspections of permanent post-construction stormwater controls will be performed to ensure proper function and maintenance, and to screen for illicit discharges. Either City or the operator of the permanent BMP will conduct inspections to verify proper operations and maintenance of the structural stormwater quality controls.	Inspect <u>all</u> MS4-owned permanent post-construction BMPs <u>annually</u> . Inspect <u>50%</u> of privately owned BMPs which have been identified <u>annually</u> .	Annual	During the reporting period, <ul style="list-style-type: none"> • 3 of 3 (100%) MS4-owned BMPs were inspected, and • 132 of 245 (53%) privately owned BMPs were inspected. 	Conducting routine inspections is an effective method of determining whether BMPs are properly functioning and/or maintained.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
5.4	Assess current street design, parking lot guidelines, and other requirements that affect the creation of impervious cover and implement additional guidelines or design standards to support LID design options. Provide a justification if additional guidelines are not implemented	Conduct review <u>once per permit cycle</u> .	Once per permit cycle	A review of the City of Norman's Engineering Design Criteria (EDC) was completed in 2022. The revised EDC was adopted by council and went into effect on March 28, 2023.	Ensuring the EDC and ordinances reflect the current requirements is a critical aspect to the regulatory component of the program.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No

Table 6. MCM 6: Pollution Prevention (P2)/Good Housekeeping for Municipal Operations						
NO.	DESCRIPTION OF ACTIVITY	MEASURABLE GOAL	FREQUENCY	COMMENTS	EVALUATION	STATUS
6.1	Street sweeping activities for City-owned roadways and parking lots according to established procedures.	Sweep <u>2500 curb miles annually</u> .	Annual	During the reporting period, 4,141 lane miles were swept.	This BMP is effective at removing litter, sediment and other debris from the MS4.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
6.2	Maintain a list of all city-owned facilities that are impacted by this MCM, including those that are subject to the OKR05 permit, individual NPDES/OPDES permit, or which have the potential to contribute polluted stormwater runoff.	Review and update list of facilities <u>annually</u> .	Annual	The list of facilities is updated after a facility is inspected and updated as needed.	Maintaining a current list of facilities is vital to ensuring timely and relevant inspections.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
6.3	City facility inspections will identify operations that contribute to stormwater pollution and develop operational BMPs to reduce or eliminate sources.	1. Inspect sites subject to OKR05 or an individual NPDES/OPDES permit <u>at least once per quarter</u> . 2. Inspect sites at all other City-owned facilities impacted by this program <u>at least once per year</u> .	Quarterly/annual	1. The City does not own any facilities that require an OKR05 permit. 2. The increased frequency for this BMP is scheduled for implementation starting in Permit Year 3 (June 2023-24). During the reporting period, twelve (12) out of twenty-four (24) facilities were inspected, including: <ul style="list-style-type: none"> • Parks Maintenance Facility • Westwood park Golf Course • Westwood Family Aquatic Center • Fire Station Nos. 1-9 	Routine inspections at MS4 facilities assists with compliance with stormwater regulation. It is also an excellent method of establishing lines of communications and ensuring potential stormwater issues are communicated appropriately. During the next reporting cycle, these sites will be inspected at the increased frequency.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
6.4	Selected BMPs for City operations including facility maintenance, parks, and landscape maintenance, water, and sewer line maintenance, and MS4 maintenance will be implemented.	1. Ensure BMPs are implemented for <u>all</u> routine maintenance work and water line breaks and emergency repairs until site stabilization has been implemented for City projects. Stabilization measures must be implemented within	Annual	This BMP is scheduled for implementation starting in Permit Year 3 (June 2023-24).		

		<p><u>fourteen (14) calendar days</u> of completion.</p> <p>2. Ensure <u>no</u> vehicle wash water is discharged to the MS4 of waters of the State from City-owned facilities or projects.</p>				
6.5	Emergency response spill kits will be furnished in vehicles with a spill risk.	Ensure spill kits are available for <u>all</u> Fleet, Line Maintenance, Parks Maintenance, and Sanitation vehicles and facilities (with a spill risk).	Annual	While specific requests can be made at any time, the need for spill kits and other stormwater BMPs is assessed during each inspection completed under BMP 6.3.	Ensuring that BMPs are available when needed is imperative to spill prevention and response.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
6.6	Review new flood management projects to assess impacts on water quality.	Review <u>all</u> submitted floodplain permit applications.	Annual	During the reporting period, 22 floodplain permit applications were received and reviewed for water quality impacts; 19 applications were approved, 1 application was denied, 1 application was withdrawn, and 1 application was postponed.	This permitting process is critical to ensuring flooding issues are not exacerbated with new projects.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No
6.7	Ensure contractors are required to comply with city stormwater control measures.	<ol style="list-style-type: none"> Determine which, if any, city contracts will be subject to this requirement. Develop new contract language to be incorporated into new contracts. Identify party responsible for oversight and develop inspection procedures. 	One per permit cycle	<ol style="list-style-type: none"> This BMP is scheduled for implementation starting in Permit Year 4 (June 2024-25). This BMP is scheduled for implementation starting in Permit Year 4 (June 2024-25). This BMP is scheduled for implementation starting in Permit Year 5 (June 2025-26). 		
6.8	Locate and map all SS inlets at City-Owned facilities subject to this MCM.	Map <u>two (2)</u> facilities <u>annually</u> .	Annual	<p>SS inlets and outfalls were identified at the following facilities:</p> <ul style="list-style-type: none"> • Parks Maintenance Facility • Westwood Park Golf Course • Westwood Family Aquatic Center • Fire Station Nos. 1-9 	An accurate storm sewer map is required when investigating illicit discharges an identifying areas where BMPs may be needed.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Partial <input type="checkbox"/> No

1.4. Pollutant Reduction

The City of Norman believes that BMPs currently implemented have resulted in a reduction in the discharge of pollutants to the storm sewer system. The effectiveness and efficiency of all current BMPs is and will be reviewed annually and used in the development of the Minimum Control Measure BMPs for the next five-year permit term. Pollutant recovery/reduction activities are shown below in Table 7.

Activity	Pollutants Removed (Tons)
Street Sweeping	1,182.6
Litter Crews	2,104.7
Storm Drain Inlet Cleaning	1,189.0
Channel Maintenance	144.6
Volunteer Clean-Up Events	1.6
Household Hazardous Waste Collection	47.5
E-waste Collection	17.6
Total	4,687.5

Section 2: Information/Activities

2.1. FYE 2022 Reporting Cycle

2.1.1. MCM 1 Public Education and Outreach and MCM 2 Public Participation and Involvement

The City hosts and attends several public education and outreach events throughout the year. Some of the ways stormwater messages are provided to Norman residents include utility bill inserts, newspaper ads, public meetings, Council meetings, social media, and public events like the Lake Thunderbird Watershed Workshop and Clean-up Event, Home and Garden Show, and COSWA Rain Barrel Promotion distribution event and workshop. The *Runoff Roundup*, a quarterly email newsletter, is sent to a self-selected list of stormwater stakeholders. Advertisements for the rain barrel promotions and clean-up events, as well as general information about stormwater quality, household hazardous waste disposal options, and reporting illicit discharges were placed in the *Runoff Roundup* throughout the reporting period. Staff is always excited and eager to educate the public about pollution prevention generally and stormwater pollution prevention specifically and actively look for new and impactful ways to get messaging across to targeted and general audiences.

In 2016, ODEQ approved the Lake Thunderbird Watershed TMDL Compliance and Monitoring Plans. In order to satisfy certain requirements of the Compliance Plan, the City must educate the public on the requirements of the Lake Thunderbird TMDL. On October 30, 2022, the City of Norman Stormwater Division hosted the Lake Thunderbird Watershed Workshop and Clean-up Event. The event satisfies public education requirements in both the City's Stormwater Management Program and Lake Thunderbird TMDL Compliance Plan. The goal of these events was to educate Norman citizens on Lake Thunderbird water quality and the role stormwater plays and to have them actively participate in removing pollution, in the form of trash, from the watershed. A total of 51 people participated and removed over one-thousand two-hundred (1,200) pounds of trash and recyclables from the watershed.

During this reporting period, the City hosted a total of fourteen (14) clean-up events, including the Lake Thunderbird Watershed Workshop and Clean-up Event, where 272 community volunteers

removed almost, 3,200 pounds of trash, debris, and other materials from Norman's two major watersheds: Canadian River and Lake Thunderbird.

During FY2022, in an effort to reach more citizens in an outdoor setting, a pollinator garden and two rain gardens were installed in Prairie Creek and Williams Morgan Parks respectively. This project included the installation of new educational stormwater signs, updating existing signs, and planting native, pollinator friendly plants. Due to delays in plant availability and shipping, plants for William Morgan Park were anticipated during fall 2022. Plants were received in early 2023 and the William Morgan Park rain gardens were completed in April 2023. This BMP will be further evaluated for its effectiveness in reaching and engaging citizens.



From left to right, volunteers with collected trash, and updated educational signage (Prairie Creek Park).

The City is also a member of the Central Oklahoma Stormwater Alliance (COSWA) which assists with training opportunities and public outreach activities, including radio ads and social media outreach, see Appendix H for more details.

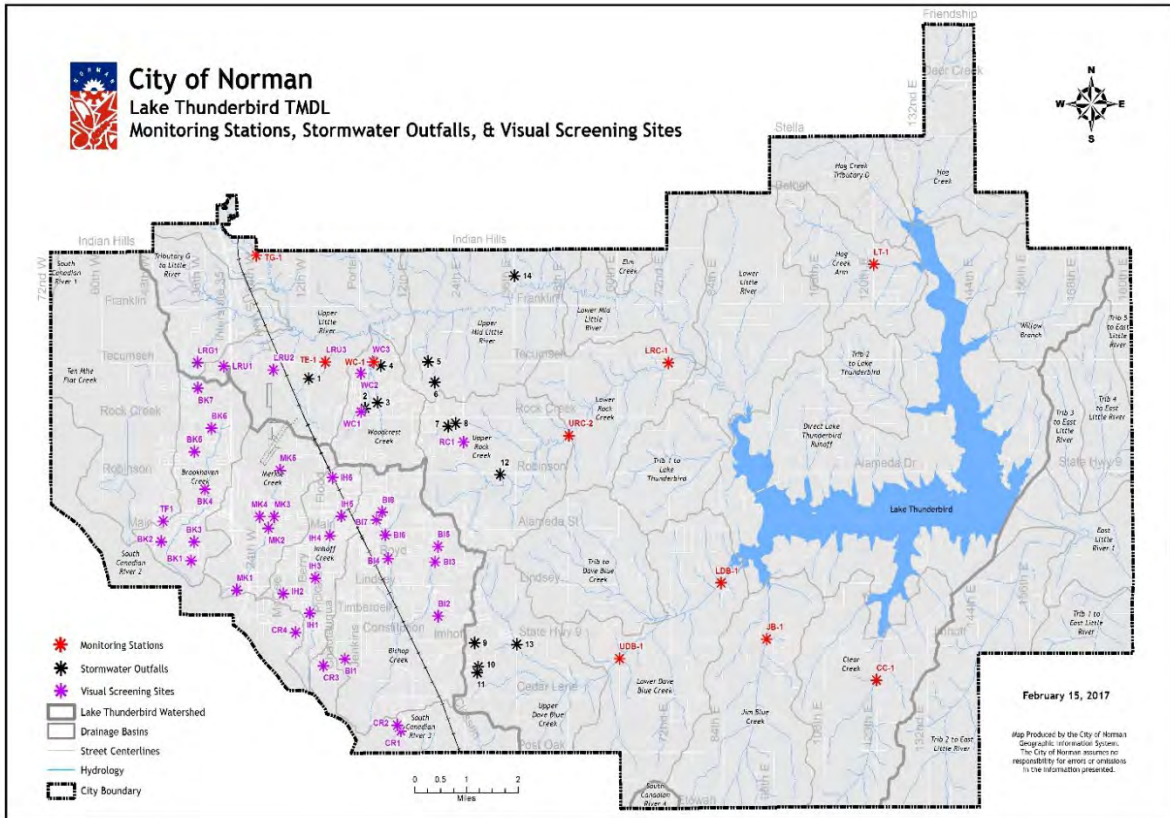
2.1.2. MCM 3: Illicit Discharge Detection and Elimination

The City's Illicit Discharge Detection and Elimination Program primarily consists of dry weather field screening, responding to citizen complaints, and addressing spills or leaks that have the potential to enter the storm sewer system.

The City has identified sixty-three (63) outfalls for dry weather field screening (see Figure 1 for locations). All outfalls were inspected during the reporting period. Outfall inspection forms were completed and photos taken at each outfall. While no illicit discharges were identified during this reporting period, a leaking waterline was identified as a result of these activities.

During the reporting period, the City received four-hundred and two (402) citizen inquiries, either directly from the citizen, through the City Action Center, through the established stormwater email, or by referral from other City staff and Council members. All complaints receive an initial investigation to verify the report and determine if the Stormwater Division has jurisdiction over the issue. Those not regulated by the Stormwater Division are referred to the appropriate department and/or State agency.

Figure 1. City of Norman MS4 Sampling and Visual Screening Points



2.1.3. MCM 4 Construction Site Runoff Control

The City’s Construction Site Runoff Control Program primarily consists of issuing Earth Change Permits to sites within city limits that disturb an acre or greater, inspecting these sites to ensure that they are in compliance with the construction stormwater requirements set out in Section 5000 of the City’s Engineering Design Criteria Manual, and issuing enforcement actions for any non-compliant sites. Additionally, in conjunction with MCMs 1 and 6, outreach is also a large part of the City’s program. Below is a summary of the activities conducted in during the reporting period:

Earth Change Permits:

New earth change permits issued: 35

Construction Site Inspections:

Total number of open sites at the end of reporting period: 102

Total number of inspections performed: 1,628

Construction Site Enforcement:

NOVs issued: 24

CDOs issued: 14

SWOs issued: 6

Citations issued: 0

Outreach Efforts:

Builders Workshops: 2

2.1.4. MCM 5 Post-Construction Stormwater Management

The City encourages the use of green infrastructure and LID practices as part of the development process and has adopted the City of Wichita/Sedgwick County LID Manual; however, a Norman-based LID/GSI manual is being developed as part of the Engineering Design Criteria (EDC) Manual update that began during the previous reporting period and continued into FYE 2022. The updated EDC, the LID/GIS components are included in Section 7000, was adopted by council and went into effect on March 28, 2023. The City has also passed a WQPZ ordinance and a Manufactured Fertilizer ordinance. Inspections of a certain number of stormwater detention ponds are also conducted annually in an attempt to address pollution from post-construction stormwater runoff. Additionally, each year the City partners with the Central Oklahoma Stormwater Alliance (COSWA) to offer discounted rain barrels to the public. During the reporting period, 84 rain barrels and composters were distributed during the City's distribution event.

The WQPZ ordinance was established to protect riparian buffer areas in the Lake Thunderbird watershed, and zones are established as property is platted. The Manufactured Fertilizer Ordinance was established to regulate the application of phosphorus in manufactured fertilizers in Norman. It requires a soil test before phosphorus-containing fertilizers can be applied, restricts fertilizer from being applied to impervious areas, and requires commercial fertilizer applicators to register with the City. Each year, a letter is sent to commercial applicators to remind them of this requirement. In FYE 2023, the letter was sent to public and commercial applicators on April 14, 2023. Additionally, one-hundred thirty-five (135) post-construction stormwater controls were inspected during the reporting period.

2.1.5. MCM 6 Municipal Good Housekeeping

As part of the Municipal Good Housekeeping Program, the City's goal is to address potential pollution sources at municipal maintenance facilities. This includes training municipal employees on topics such as spill prevention and response and general good housekeeping measures. One major activity that occurs as part of the Municipal Good Housekeeping Program is street sweeping. The City currently operates four (4) vacuum sweepers on a routine basis. During the reporting period, 1,182.63 tons of material were removed from the MS4, and 4,141 lane miles were swept. Street sweepers also respond to non-hazardous material spills and clean inlets as necessary. During FYE 2023, stormwater training was provided to construction inspectors, stormwater inspectors, and members of the Division of Environmental Resilience and Sustainability.

2.2. Next Reporting Cycle

The next reporting period will include data from July 1, 2023, through June 30, 2024, and will encompass the reauthorized permit requirements. The Annual Report covering that period will be submitted on or before October 1, 2024. Recurring BMPs will be continued, enhancements will be investigated, and additional permit requirements will be identified for program development. As outlined in Tables 1, 2, 6, BMPs 1.14, 2.1, and 6.4 regarding employee training, industrial facilities, and BMPs for city operations will be implemented in the next reporting cycle.

Section 3: TMDLs

3.1 TMDL Compliance

ODEQ issued a TMDL for the Lake Thunderbird watershed in November 2013. The TMDL required the Cities of Norman, Moore, and Oklahoma City to develop Compliance and Monitoring Plans to limit the amount of nitrogen, phosphorus, and sediment entering Lake Thunderbird from stormwater runoff. The City submitted the Compliance and Monitoring Plans (Plans) to ODEQ in November 2015. After much

review and discussion, ODEQ approved the City's Plans on September 23, 2016. On October 25, 2016, City Council approved Council Resolution R-1617-41, which adopted the Plans.

The City has been proactive in measures to reduce the contaminant load to Lake Thunderbird. In November 2009, the Norman City Council accepted the Storm Water Master Plan which recommended the establishment of Stream Planning Corridors in the Lake Thunderbird watershed to protect the creeks and streams and thereby protect lake water quality. The WQPZ was established by City ordinance in June 2011 and provided stream buffers for new development in the Lake Thunderbird watershed as recommended by the Storm Water Master Plan. A Manufactured Fertilizer Ordinance was adopted by the Norman City Council in 2013 which required that certain criteria be met in order to use fertilizer containing phosphorus in the Lake Thunderbird watershed. The Manufactured Fertilizer Ordinance also prohibits blowing, dumping, or otherwise causing grass clippings or other yard waste to be placed into gutters and storms drains. All of these steps have been taken by the City to improve the quality of stormwater runoff discharged from the City.

Implementation of the Plans has been established on a 5-year permit cycle basis. The City began the first 5-year cycle by implementing a Monitoring Plan to establish a baseline for flow and pollutant loading of streams flowing from or through the City to Lake Thunderbird. Pollutants currently being monitored are nitrogen, phosphorus, and total suspended solids. BMPs are also implemented as part of the City's Compliance Plan, primarily through establishing additional educational campaigns, enhancing existing programs, and working towards more frequent cleaning efforts. These efforts during the first 5 years were aimed at reducing pollutants in stormwater runoff at the source. The Plans and the results of the monitoring are currently under review to determine where best to establish structural BMPs during the next 5-year cycle.

On January 26, 2016, City Council approved Contract No. K-1516-79 by and between the City of Norman and OWRB in the amount of \$229,756.23. OWRB implemented the monitoring program in March 2016. Installation of stream gauging stations was completed in May 2016. Monthly monitoring is ongoing at ten (10) permanent monitoring stations. An additional fourteen (14) major stormwater outfalls have been identified, and seven (7) of these sites are sampled once per quarter.

A Lake Thunderbird Watershed TMDL Technical Working Group was established in 2016. This Working Group includes technical staff from the Cities of Moore, Norman, and Oklahoma City. The goal of the group is to collaborate on common non-structural BMPs and share information each has learned during the TMDL implementation process. In 2018, it was renamed as the Lake Thunderbird Watershed Partnership, and a branding strategy was implemented, which included a logo and tagline available for use by all three cities. Additionally, a collaborative website was developed and implemented: www.thunderbirdwatershed.org. The Partnership has allowed the three cities to collaborate on educational and participatory events. The members meet quarterly.

In September 2019, the United States Bureau of Reclamation released Funding Opportunity Announcement No. BOR-DO-19-F010, for a funding program entitled "WaterSMART Cooperative Watershed Management Program". This program provides funding for the development of watershed groups to encourage diverse stakeholders to develop local solutions to address their water management needs. On November 12, 2019, City Council approved Resolution No. R-1920-64, authorizing the submittal of a Financial Assistance Application to the BOR for the WaterSMART Cooperative Watershed Management Program Phase I Grant and to potentially enter into a financing agreement under the program. On May 5, 2020, the BOR notified staff that the grant application had been selected for funding.

On August 25, 2020, City Council approved Contract No. K-2021-37 by and between the City of Norman and Guernsey in the amount of \$85,500. Guernsey facilitated the establishment of the Lake Thunderbird Watershed Alliance (LTWA) as a 501(c)(3) nonprofit organization, as well as developed a Draft Integrated Watershed Management Plan which incorporates input from various stakeholders with historical and contemporary research activities. As part of the project, Guernsey developed an interactive website to gather information: <https://lake-thunderbird-watershed-alliance-guernsey.hub.arcgis.com/>.

The LTWA's goal is to work collaboratively with residents, communities and stakeholders to protect the water quality and quantity of Lake Thunderbird and to serve as a clearinghouse for Lake Thunderbird watershed-related implementation projects, research and outreach. Additionally, LTWA will be able to apply for grants to help landowners implement best management practices by providing cost-share funds to those landowners, both rural and urban, that commit to a change in either agricultural practices or reducing stormwater runoff. LTWA board members include representatives from several cities including Moore, Norman, Del City and Midwest City. Additional board members represent the Central Oklahoma Master Conservancy District, recreational users and watershed residents. The LTWA has developed and implemented a website (<https://www.ltwoak.org/>) and a Facebook page to educate and engage stakeholders. An Open House was held on June 15, 2021, to introduce the LTWA to the community, educate the public about the watershed and ways to help, and gather community input.

On April 10 and 25, 2023, during meetings with Freese and Nichols, Inc., recipient of Contract K-2021-39 which services included recommending location and type of potential structural water quality control measures, a draft memo was presented which outlined various BMPs and green infrastructure practices which could be utilized to address the Lake Thunderbird TMDL. Cisterns/rain barrels and rain gardens were included as practices which could be used to store and infiltrate or divert stormwater. While not included in the draft report, staff discussed the potential of encouraging residents to use compost as a soil amendment in lieu of chemical fertilizers. The draft memo also identified 3 monitoring stations as receiving the highest level of pollutants. The southern-most station, Upper Dave Blue Creek (UDB-1), had high results for total suspended solids (TSS) and consists of new development in the upper watershed transitioning to mostly agricultural and undeveloped land closer to the monitoring station. The northwestern-most station, the Little River (TG-1), had high results for phosphorus and flow but has a very limited drainage area within city limits and consists mostly of stormwater flow received from the City of Moore. The northeastern-most station, Woodcrest Creek (WC-1), which had high results for nitrogen and phosphorus, includes much of Griffin Park and Sutton Wilderness Park in the upper watershed and primarily established neighborhoods, with the exception of Montoro Ridge which is still under construction. Since fertilizers are typically not applied in Griffin Park or Sutton Wilderness Park, which comprises approximately 19% of the watershed, it was determined that the primary source of nutrients to this station is the residential neighborhoods. Based on this information, City staff developed a pilot program, Blue Neighborhoods, which incentivizes Norman residents to utilize the following practices:

1. Encouraging water conservation and improving water quality through the use of cisterns or rain barrels.
2. Improving water retention and stormwater infiltration by replacing chemical fertilizers with compost. Reducing over-application of fertilizers by conducting soil tests.
3. Improving water quality and providing pollinator habitat by planting rain gardens and pollinator pockets.

The pilot program will focus on Woodcrest Creek (WC-1) and will be available for residents of the 1 square mile between E. Tecumseh and E. Rock Creek Roads, and between N. Porter and 12th Ave NE. This area comprises approximately 31% of the total sub-watershed for Woodcrest and contains 1,356

parcels that are zoned residential or contain a residential structure with an average parcel size of 0.28 acres.

A preliminary survey was developed and mailed to reach resident of the eligible area in June 2023. The results of the survey will be evaluated in July 2023 with implementation of BMPs to be completed during FYE 2023.

Section 4: Optional Permit Coverage (MCM 7)

This MCM was not selected for this permit cycle.

4.1 Active Projects

None in the report period.

4.2 Started Projects

None in the report period.

4.3 Completed Projects

None in the report period.

Section 5: Summary/Permittee Information

5.1 Permittee Information

Permittee	City of Norman, Oklahoma
Address	225 N. Webster
City/State/Zip	Norman, OK 73069
Contact	Michele Loudenback Environmental and Sustainability Manager
Contact Phone	(405) 307-7130
Authorization No.	OKR040015
Authorization Date	November 29th, 2005

5.2 Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:  _____

Date: 9-12-23 _____

Name (printed): Darrel Pyle _____

Title: City Manager _____

Appendix A: Annual Report Summary

FY 2023 STORMWATER ANNUAL REPORT SUMMARY



1 PUBLIC MEETING

WAS HELD OCTOBER 30, 2022 AT LAKE THUNDERBIRD. VOLUNTEERS WERE INVITED TO PICKUP TRASH FROM THE PARK.

95,093

POUNDS OF HOUSEHOLD WASTE COLLECTED



12 NEWS PAPER ADS



WERE PUBLISHED IN THE NORMAN TRANSCRIPT, NORMAN TRANSCRIPT SPECIAL EDITIONS, AND/OR NORMAN MAGAZINE.

2 ACTIVITIES WITH LOCAL SCHOOLS



1. EISENHOWER ELEMENTARY 5TH GRADE CLASSES (DEMONSTRATED THE ENVIROSCAPE MODEL).
2. ANNUAL "WATER'S WORTH IT" POSTER CONTEST IN COORDINATION WITH ENVIRONMENTAL CONTROL ADVISORY BOARD.

FERTILIZER USE (P2)

THE FERTILIZER BROCHURE WAS UPDATED AND DISTRIBUTED TO ALL APPLICATORS IN APRIL 2023.

UTILITY INSERT PROVIDING FERTILIZER USE TIPS WAS DISTRIBUTED TO ALL UTILITY ACCOUNTS.



NORMAN EARTH DAY



TOOK PLACE ON APRIL 23, 2023 AND APPROX. 3,600 CITIZENS ATTENDED.



ECAB MEETINGS

WERE ATTENDED ON A MONTHLY BASIS AND STAFF WORKED WITH THE GROUP ON SEVERAL STORMWATER-RELATED ISSUES AND EVENTS.



63

DRY WEATHER FIELD SCREENING INSPECTIONS

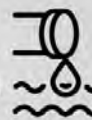
84

RAIN BARRELS DISTRIBUTED



135

POST CONSTRUCTION INSPECTIONS



23

DOOR HANGERS FOR GRASS CLIPPINGS WERE ISSUED



17,612
INLETS
INSPECTED



4,473
INLETS
CLEANED



1,189
TONS OF
DEBRIS
REMOVED

4,141
LANE MILES
SWEPT



1,183
TONS DEBRIS
REMOVED

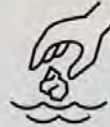
12
CITY FACILITIES
INSPECTED
FOR
POLLUTION
PREVENTION



2,105
TONS OF DEBRIS
REMOVED BY
LITTER CREW



14
CLEAN-UP
EVENTS



272
VOLUNTEERS

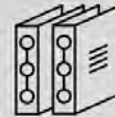


3,196
POUNDS DEBRIS
REMOVED

1,628
CONSTRUCTION
INSPECTIONS



35
SWP3s REVIEWED



102
ACTIVE SITES

79
COMPLAINTS WERE
RECEIVED
THROUGH THE
ACTION CENTER.



UTILITY INSERTS

THREE (3) INSERTS WERE
DISTRIBUTED TO ALL UTILITY
ACCOUNTS.



- DON'T BLOW IT!
- GREEN YOUR LAWN
- WHEN THE RAIN DOESN'T DRAIN

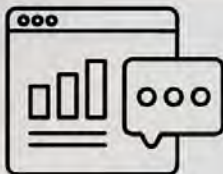


145

TONS OF DEBRIS WERE
REMOVED BY CHANNEL
MAINTENANCE CREWS. OVER
6.8 MILLION SQUARE FEET OF
CHANNELS WERE
MOWED/MAINTAINED.

BLUE NEIGHBORHOODS

IN RESPONSE TO TMDL
MONITORING RESULTS, STAFF
DEVELOPED A NEW PILOT
PROJECT TO INCENTIVIZE 'BLUE'
PRACTICES TO IMPROVE WATER
QUALITY IN RESIDENTIAL
NEIGHBORHOODS.



402
COMPLAINTS, EMAILS, AND
OTHER REFERRALS WERE
INVESTIGATED.

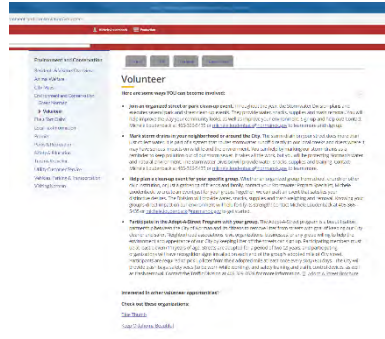
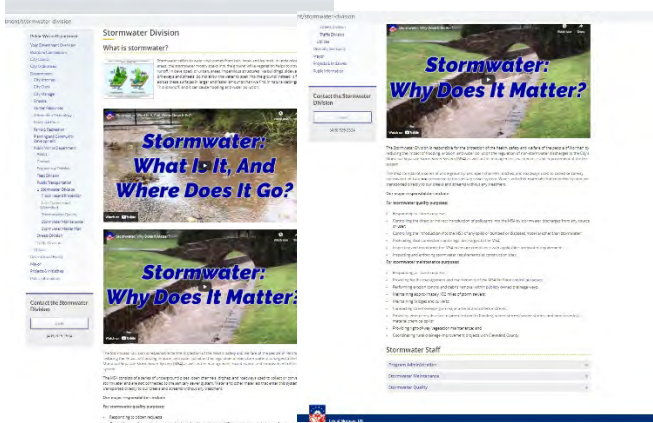
1
POLLINATOR
GARDEN PLANTED
IN WILLIAM
MORGAN PARK.



Appendix B: Supporting Documentation for MCM 1

Stormwater Division Homepage

Environmental Volunteer Information from City Website.



Utility Bill Insert

Too much fertilizer, especially phosphorus, can turn lakes and rivers green by encouraging the growth of algae. Algae takes up the air that fish need to breathe in the water, and can give off chemicals that taste bad and are bad for people's skin. Keep chemicals out of our lakes and rivers by following these tips:

- Don't apply fertilizer when it's raining or rain is in the forecast.
- Sweep or blow fertilizer that is on streets, driveways, and sidewalks back onto your yard or dispose of it properly.
- Don't apply fertilizer within 25 feet of creeks, streams, and ponds.
- Don't blow or dump grass clippings, leaves, or any yard waste into streets, storm drains or waterways.
- Test your soil before applying fertilizer, especially if it contains phosphorus.

Though fertilizers contain chemicals that are good for lawns and plants when applied at the right time and at the right amounts, too much applied to lawns and gardens at the wrong times can wash off and pollute local waterways, including Lake Thunderbird. So if you fertilize, be sure to follow our tips and comply with the City of Norman's manufactured fertilizer ordinance.

Not sure how much, if any, fertilizer you need? Contact Oklahoma State University Extension for a soil test:
<https://extension.okstate.edu/county/oklahoma/horticulture/index.html>

For more information please contact us at
 pwstormwater@normanok.gov
 (405) 329-2524

Quarterly Newsletter Example

RUNOFF ROUNDUP

March 2022



It may not seem like a stormwater problem, but pet waste is one of the top 5 contributors of bacterial pollution in urban watersheds. You can make a difference by being a responsible pet owner and following these tips:

- ❁ Carry a plastic bag with you when you walk your dog so you will be prepared to clean up after your pet. Then, throw it in the nearest trash can.
- ❁ Avoid letting your dog do his business within 200 feet of a waterbody.
- ❁ Clean up the waste in your back yard or hire someone to do it for you.
- ❁ And, of course, never throw dog waste into a storm drain!



CITY OF NORMAN STAFF UPDATES
KATRINA BOTELER
Stormwater Compliance Inspector
 Katrina graduated from the University of West Florida with a degree in Environmental Science and Management and previously worked as a stormwater inspector with the State of Florida. In her spare time, Katrina enjoys painting landscapes, constructing meal earth puzzles, and golfing. She is also a big fan of traveling the world, both near and far, looking for new experiences.

BUILDER'S CORNER

This year's Spring Builder's Workshop will be a great time to network, meet new City of Norman staff, review permit requirements, and learn about any upcoming changes. Lunch will be provided.



Join us for our Spring Builder's Workshop at: The Well, 210 James Garner Avenue
 May 25, 2022, 11:00 AM - 1:00 PM

Register online at: <https://bit.ly/8pwscx6>

RECYCLE THE RAIN

If you are interested in purchasing a rain barrel, the Central Oklahoma Stormwater Alliance (COSWA) is hosting its annual rain barrel promotion. The rain barrels are made from repurposed food-grade barrels and include a mosquito screen, spigot, and overflow valve. Rain barrels can be purchased online at: <https://upcycle-products.com/ok-programs/norm/>

Order Deadlines
 By mail: March 20, 2022
 Online: March 27, 2022

Pick-Up
 668 E. Lindsey Street
 April 1 @ 4 - 6 PM
 April 2 @ 9 AM - 1 PM



CONTACT INFORMATION

City of Norman Stormwater Division

Phone: (405) 329-2524
 Email: pwstormwater@normanok.gov
 Website: <https://www.normanok.gov/your-government/departments/public-works-departments/stormwater-division>

Stormwater Division Staff

Jason Murphy
 Stormwater Program Manager
 Office: 405-866-5455
 Cell: (405) 865-4928

Amy Shepard
 Stormwater Administrative Assistant
 Office: (405) 329-2524

Hans Osgood,
 Stormwater Maintenance Supervisor
 Office: (405) 307-7278
 Cell (405) 409-0508

Michelle Chao, CI/SE, CPSWQ
 Stormwater Program Specialist
 Office: (405) 366-3435
 Cell: (405) 226-0698

Stuart Shumate, CSI, OCE/SI
 Stormwater Compliance Inspector
 Office: (405) 217-7777
 Cell: (405) 823-7155

Katrina Boteler
 Stormwater Compliance Inspector
 Office: (405) 366-5456
 Cell: (405) 370-3295

Norman Action Center

Phone: (405) 866-5896
 Email: action.center@normanok.gov
 Website: <https://www.normanok.gov/action-center>

Department of Environmental Quality

Phone: (405) 702-8100
 Email: cdls-stormwaterpermitting@deq-ok.gov
 Website: <http://www.deq.state.ok.us/water/strmwater/index.html>

March 2022

Facebook Post Examples




Appendix C: Supporting Documentation for MCM 2

TBD

Appendix D: Supporting Documentation for MCM 3

Dry Weather Field Screening Form

City of Norman, OK



Visual Screening Site
 Outfall Inspection
 City of Norman, OK

Outfall Details

Location:	Visual Screening Site	Compliance:	Compliant
Added:	07/29/2020	Previously Inspected On:	06/18/2021

Inspection Properties

Inspector:	Michelle Chao	Inspection ID:	O-37519
Inspection Type:	Outfall Inspection	Inspection Date:	03/28/2022
Scheduled Inspection Date:	NA	Compliance Status:	Compliant
Time In:	NA	Time Out:	9:22 AM
Follow Up Inspection Date:	NA		

Site Information

Type of Site:	Visual Screen Sites	Date:	03/28/2022
Precipitation within the last 3 days?:	No		

Outfall Characteristics

Is the outfall in good condition? No

Describe:

There is erosion in the flume east of the concrete channel along Blankenship. The concrete flume directly off Blankenship is also eroded with parts of the flume having collapsed. Concrete pad on top of box structure has been undercut and parts have cracked/started to collapse.

Is flow present? Yes

Is the outfall free of staining? Yes

Is the outfall free of sediment? Yes

1 of 3



City of Norman, OK

Is the outfall free of floatable debris? No

Describe:

Floatable debris stuck in vegetation, old silt fence, concrete filled bucket, and black tubing visible in/around channel.

Vegetative Condition: Normal growth

Discharge Characteristics

Color:	Clear	Odor:	None
Clarity or Turbidity:	Can see through and can read newsprint	Is the discharge free of floating solids?:	Yes
Settled Solids (amount of material after 60 minutes):	NA	Is the discharge free of suspended solids?:	[Describe what you see]
Is the discharge free of foam?:	Yes	Is the discharge free of oil?:	Yes
Is the discharge free of other obvious indicators of stormwater pollution?:	Yes		

Field Testing Results

PH:	NA	Ammonia (mg/L):	NA
Cl2 (mg/L):	NA		

Additional Information

Algal growth present on concrete apron of box structure and in channel.

Weather

Weather Condition:	Clear Day	Temperature (F):	56
Precipitation (in):	0	Precipitation Last 72 Hours (in):	0
Precipitation Last 24 Hours (in):	0		

Contacts

No contacts to display.

2 of 3

Appendix E: Supporting Documentation for MCM 4

Earth Change Permit Application Form (page 1)

Construction Site Inspection Form (page 1)



CITY OF NORMAN
STORM WATER QUALITY
EARTH CHANGE PERMIT APPLICATION



Note: Please print or type all data.

PROJECT INFORMATION

NAME OF PROJECT: _____

ADDRESS: _____

DISTURBED AREA (ACRES): _____ LATITUDE: _____ LONGITUDE: _____

PROPOSED START DATE: _____ PROPOSED END DATE: _____

LOCATION OF STORM WATER POLLUTION PREVENT PLAN (SWP3): ONSITE OFFSITE N/A

ADDRESS (IF LOCATED OFFSITE): _____

APPLICANT/OWNER/OPERATOR PRIMARY CONTACT SECONDARY CONTACT

NAME (PRINTED): _____ COMPANY: _____

ADDRESS: _____ CITY: _____ STATE: _____ ZIP: _____

PHONE: _____ CELL: _____ E-MAIL: _____

GENERAL CONTRACTOR PRIMARY CONTACT SECONDARY CONTACT

CHECK IF SAME AS APPLICANT

NAME (PRINTED): _____ COMPANY: _____

ADDRESS: _____ CITY: _____ STATE: _____ ZIP: _____

PHONE: _____ CELL: _____ E-MAIL: _____

ENGINEER/DESIGNER

NAME (PRINTED): _____ COMPANY: _____

ADDRESS: _____ CITY: _____ STATE: _____ ZIP: _____

PHONE: _____ CELL: _____ E-MAIL: _____

FOR OFFICE USE

PERMIT#: _____ WARD: _____ FEE: _____

WATERSHED: _____ SUB-WATERSHED: _____

RECEIVING WATER: _____ DATE: _____

APPROVED BY: _____

SUBMITTALS

1 NO


2 SWP3

3 EOP

4 CHECK

Wqy 4 0017

City of Norman, OK



Wynn Wynn
Compliance Assistance Visit Report
City of Norman, OK

Construction Site Details

Name:	Wynn Wynn	Compliance:	Compliant
Added:	01/31/2022	Previously Inspected On:	06/01/2022
Site Physical Address:	3724 Classen Boulevard, Norman, 73071, OK		

Inspection Properties

Inspector:	Michelle Chao	Inspection ID:	C-101926
Inspection Type:	Compliance Assistance Visit Report	Inspection Date:	06/02/2022
Scheduled Inspection Date:	NA	Compliance Status:	Compliant
Time In:	NA	Time Out:	NA
Follow Up Inspection Date:	NA		

SUMMARY OF DEFICIENCIES | See below for details and recommendations

Are there any CRITICAL deficiencies noted? If yes, please correct the issues within 14 calendar days of receipt of this report, unless otherwise noted, to avoid further action. Pictures will accompany the email notification. : **NA**

Are there any NON-CRITICAL deficiencies noted? If yes, please correct the issues prior to the next regular inspection. Pictures will accompany the email notification. : **NA**

CRITICAL DEFICIENCIES

1. Does the site have an earth change permit?:	NA
2. Have off-site discharges been prevented?:	NA
3. Have BMPs been installed correctly?:	NA
4. Has the required buffer been maintained around waters of the state?:	NA
5. Has washout/washwater been properly addressed? :	NA
6. Have medium-large spills been addressed (greater than 2 square feet or 5 gallons in volume)? :	NA

1 of 2

Appendix F: Supporting Documentation for MCM 5

Water Quality Protection Zone Ordinance

§ 2. THAT, Section 22:429.6 shall be added as follows:

SEC. 429.6 – WP, WATERSHED PROTECTION DISTRICT

1. Description and Purpose. The Watershed Protection District encompasses areas through which water drains into the Lake Thunderbird watershed, thus affecting the water supply derived from City wells and Lake Thunderbird. The City of Norman adopts a goal of nondegradation which maintains or improves the quality of water entering the various waterways in Norman and ultimately ending in Lake Thunderbird. Pollution prevention will be assured by requiring best management practices and development restrictions, where appropriate. Land uses which could adversely affect the water supply are generally prohibited, unless acceptable alternate methods are used that can be shown to substantially reduce or eliminate their negative affect on the water supply, thereby preventing the risk of contaminants in the surface water and ground water within the Lake Thunderbird watershed, and reducing the risks to the public health.

Detention Pond Inspection Form



Detention
Default Structure Inspection
City of Norman, OK

City of Norman, OK

City of Norman, OK

Structure Details

Name:	Detention	Compliance:	Compliant
Added:	07/29/2020	Previously Inspected On:	04/26/2022
Site Physical Address:	NA		

Inspection Properties

Inspector:	Michelle Chao	Inspection ID:	S-15949
Inspection Type:	Default Structure Inspection	Inspection Date:	06/02/2022
Scheduled Inspection Date:	NA	Compliance Status:	Compliant
Time In:	NA	Time Out:	NA
Follow Up Inspection Date:	NA		
Date Resolved:	NA	Is Control Active:	Yes
Are Washouts Present:	No	Removal of Floatables Required:	No
Is Built within Specification:	Yes	Is Depth of Sediment Acceptable:	Yes
Is Downstream Erosion Present:	No	Is Erosion Present:	No
Is Illicit Discharge Present:	No	Is Outlet Clogged:	No
Is Return Inspection Recommended:	No	Is Standing Water Present:	No
Has Structural Damage:	No	Requires Maintenance:	No
Requires Repairs:	No		

Additional Information

Weather

Weather Condition:	NA	Temperature (F):	NA
Precipitation (in):	NA	Precipitation Last 72 Hours (in):	NA
Precipitation Last 24 Hours (in):	NA		

Contacts

No contacts to display.

Photos

Appendix H: Supporting Documentation for COSWA-Related Activities

COSWA Annual Report

January 1 to December 31, 2022



2022

**COSWA
ANNUAL
REPORT**

JAN 1 - DEC 31, 2022

**"OUR MISSION IS TO PROVIDE
RESOURCES AND PLATFORMS
FOR THE COSWA MEMBERSHIP
TO REDUCE THE IMPACT OF
CONTAMINATED STORM WATER
THROUGH STEWARDSHIP
ACTIVITIES, PROJECTS, &
PROGRAMS."**



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Acknowledgements

INTRODUCTION

Prior to 2020, the Central Oklahoma Stormwater Alliance (COSWA) was a casual organization of central Oklahoma municipal governments that collaborated and combined resources to satisfy their respective Oklahoma Pollutant Discharge Elimination System (OPDES) permit obligations on a regional level.

After being formalized as an Oklahoma-based 501(c)(3) non-profit organization in October 2020, COSWA Inc. is now a corporation of municipalities, public agencies, and private businesses that have united to increase public awareness of watershed management, stormwater quality, and pollution prevention, and to inspire the next generation of environmental stewards.

The activities of COSWA are dedicated to educational and charitable purposes to benefit our membership and associated communities, as well as meet our original goal of assisting our OPDES Municipal Separate Storm Sewer System (MS4) members meet one or more of the Minimum Control Measures (MCMs) required by their respective OPDES permits.

COSWA membership is open to all Oklahoma MS4 permit holders. Members are expected to vote and provide direction to the Board regarding the activities benefitting our membership. Other entities that wish to be involved with COSWA are considered Affiliates or Friends of COSWA, depending on the level of participation.

MESSAGE FROM THE BOARD



Chair
Derek Johnson



Vice-Chair
Jordan Peebles



Treasurer
Rebecca Dallen



Secretary
Hollie Thorne



At-Large Officer
Robert Bettes

It is the goal of COSWA's Board of Officers to provide members and affiliates with opportunities for open dialogue, training, outreach events, and the chance for MS4 members to share details of their respective programs with others.

The COSWA Board is dedicated to using our fiscal resources to benefit our membership, and will strive to select programs which are both cost effective and beneficial.

"An intangible element of a COSWA membership is to provide connections to other MS4 operators where their experience, program hurdles, and successes can be shared."

COSWA DIRECTORY



FY 2021-2022 Members & Affiliates

Note: Dues for FY 21-22 were set at \$100/entity, regardless of membership tier.

Members

City of Bethany
City of Choctaw
City of Del City
City of Edmond
City of Harrah
Town of Jones City
City of Midwest City

City of Moore
City of Nichols Hills
City of Noble
City of Norman
City of Oklahoma City
City of Spencer
City of Stillwater

City of The Village
City of Yukon
OK Dept. of Transportation
OK Transportation Auth.
Tinker Air Force Base
University of Oklahoma

Affiliates

Grand River Dam Authority (GRDA)
Oklahoma Department of Environmental Quality (DEQ)

COSWA DIRECTORY



FY 2022-2023 Members, Affiliates, & Friends

Note: Dues for FY 22-23 were set at specific membership tiers. **New organizations for FY 22-23.**

Members

City of Bethany
City of Choctaw
City of Del City
City of Edmond
City of Harrah
Town of Jones City
City of Midwest City

City of Moore
City of Mustang
City of Nichols Hills
City of Norman
City of Oklahoma City
City of Spencer

City of The Village
City of Yukon
OK Dept. of Transportation
OK Transportation Auth.
Tinker Air Force Base
University of Oklahoma

Affiliates

City of Noble
City of Stillwater
Assoc. of Central OK Govts.
Indian Nations Council of Govts. /
Green Country Stormwater Alliance

Grand River Dam Authority
OK Floodplain Mngrs. Assoc.
Oklahoma DEQ
Oklahoma State Univ.
Fertile Ground

Robison Wildlife Solutions
Silver Star Construction
The Watershed Movement
Watershed Life Consulting

Friends

City of Guymon
City of Muskogee
City of Newcastle

City of Nicoma Park
City of Tahlequah
City of Tulsa

Comanche County
Oklahoma County

AFFILIATE NETWORK



8 New
Affiliates
for
FY 22-23



Watershed Life Consulting



OKLAHOMA
Environmental
Quality



Thank you to our valued affiliates
for your financial support!

MEMBERSHIP REQUIREMENTS

COSWA membership is open to Oklahoma OPDES MS4 permit holders, public agencies, and private businesses.

MS4 Members' annual dues are based on the following tiered-rate structure:

- Phase II, Category 1 = \$600
- Phase II, Category 2 = \$1,200
- Phase II, Category 3 = \$1,800
- Phase I = \$2,200

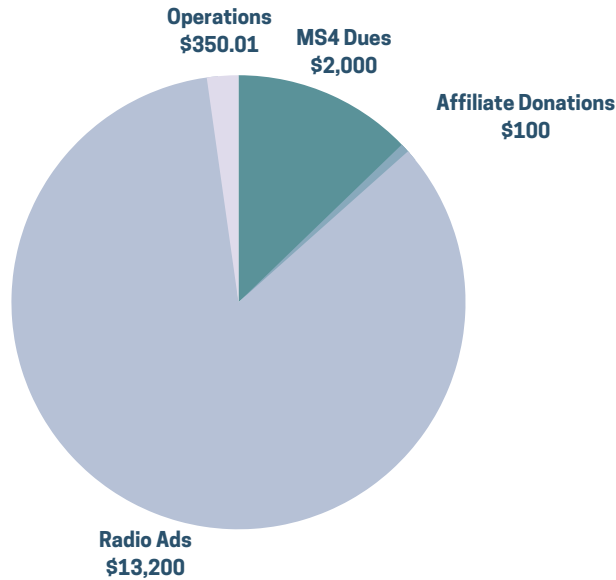
Affiliates are requested to provide a minimum annual donation of \$100.

COSWA invoices on a Fiscal Year basis (July-June). For FY 21-22, invoices were distributed in February 2022. For FY 22-23, invoices were distributed in July 2022 and were due August 1st. For FY 23-24, invoices will be distributed in July 2022 and will be due October 1st.



FINANCIALS

FY 21-22 REVENUE = \$15,650.01



DUES OR DONATIONS PROVIDED BY:

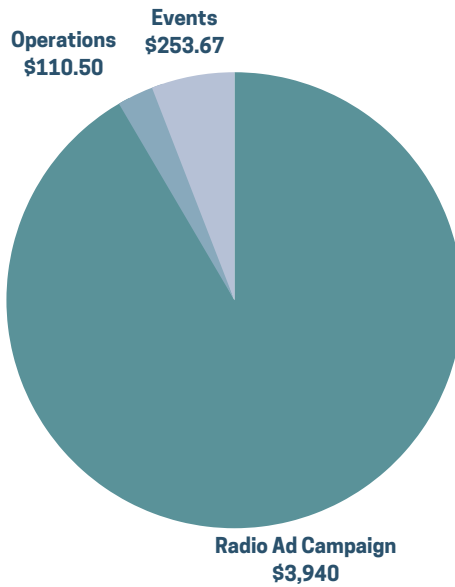
Note: Dues for FY 21-22 were set at \$100/entity, regardless of membership tier.

City of Bethany
City of Choctaw
City of Del City
City of Edmond
GRDA
City of Harrah
Town of Jones City
City of Midwest City
City of Moore
City of Nichols Hills
City of Noble

City of Norman
ODOT
City of Oklahoma City
OTA
City of Spencer
City of Stillwater
Tinker AFB
University of Oklahoma
City of The Village
City of Yukon

FINANCIALS

FY 21-22 EXPENSES = \$4,304.17

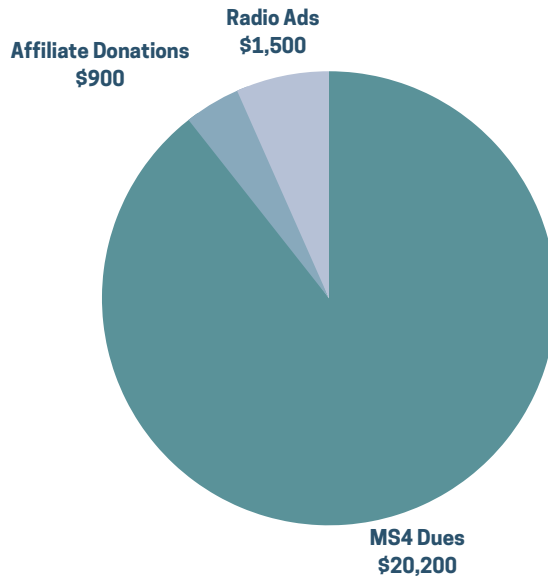


*Note: Events category does not include Home & Garden booth.
The City of Norman covered the cost for the January 2022 event.*

DATE	DESCRIPTION	EXPENSE	ACCOUNT
3/16/2022	PO Box Rental	\$83.00	Operations
3/23/2022	Check Order	\$27.50	Operations
4/26/2022	Rain Barrels (x2)	\$133.00	Events
5/4/2022	Door prizes for Industrial Storm Water Workshop	\$120.67	Events
6/2/2022	Radio Ad Invoices	\$3,980.00	Radio Advertising Campaign

FINANCIALS

FY 22-23 REVENUE = \$22,600



Note: Funds through December 2022. Radio Ad revenue was specifically dedicated to the advertising program outreach program.

DUES OR DONATIONS PROVIDED BY:

MEMBERS

City of Bethany
City of Choctaw
City of Del City
City of Edmond
City of Harrah
Town of Jones City

City of Midwest City
City of Moore
City of Nichols Hills
City of Norman
City of Oklahoma City
City of Spencer

City of The Village
City of Yukon
ODOT
OTA
Tinker Air Force Base
University of Oklahoma

AFFILIATES

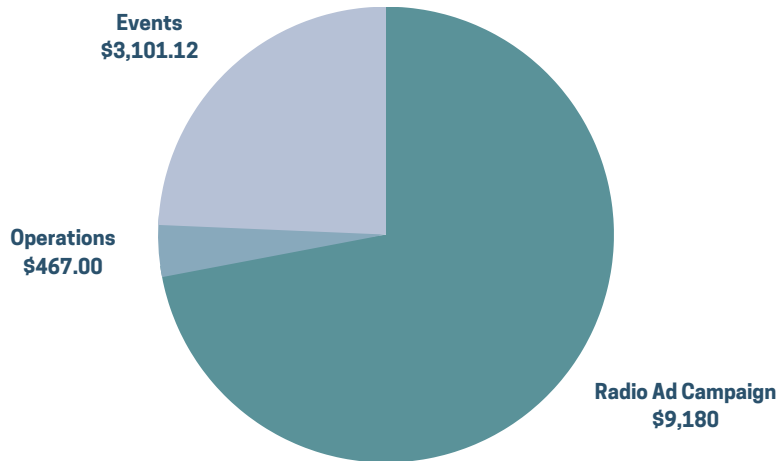
City of Noble
City of Stillwater
GRDA

INCOG / GCSA
Oklahoma DEQ
Robison Wildlife Solutions

Silver Star Construction
The Watershed Movement
Watershed Life Consulting

FINANCIALS

FY 22-23 EXPENSES = \$12,748.12



Note: Expenses through December 2022. These expenses include the expenditure of funds received in the prior fiscal year.

DATE	DESCRIPTION	EXPENSE	ACCOUNT
7/5/2022	Radio Ad Invoices	\$6,955.00	Radio Advertising Campaign
7/7/2022	12-month P.O. Box Fee	\$166.00	Operations
7/11/2022	Radio Ad Invoices	\$2,225.00	Radio Advertising Campaign
8/15/2022	Home + Garden Show Booth	\$1,528.00	Events
8/22/2022	Pay.Gov IRS Form 1023-EZ	\$275.00	Operations
11/23/2022	COSWA Bags	\$815.91	Events
12/7/2022	Catering - Christmas Party	\$489.35	Events
12/12/2022	Christmas Party Door Prizes	\$200.00	Events
12/13/2022	Christmas Party Supplies	\$67.86	Events
12/19/2022	Secretary of State Update Fee	\$26.00	Operations

BOARD MEETINGS

The Board meets the 3rd Thursday of each month.

DATE	LOCATION	TIME
January 13, 2022	Microsoft Teams	1:00 pm
February 7, 2022	Microsoft Teams	9:30 am
March 10, 2022	Microsoft Teams	9:30 am
April 19, 2022	Microsoft Teams	9:00 am
May 26, 2022	Microsoft Teams	Canceled
June 9, 2022	Microsoft Teams	8:30 am
July 7, 2022	Microsoft Teams	8:30 am
August 15, 2022	Microsoft Teams	8:30 am
September 15, 2022	Microsoft Teams	1:30 pm
October 20, 2022	Microsoft Teams	8:30 am
November 17, 2022	Microsoft Teams	8:30 am
December 15, 2022	In-person & Teams	9:00 am

MEMBERSHIP MEETINGS

Regular meetings of the membership are held once per calendar quarter.

Q1 - MARCH 15, 2022

- Virtual attendance only
- 10:00-11:30 am
- Attendees: ACOG, Bethany, Choctaw, Edmond, GRDA, Harrah, INCOG, MWC, Moore, Nichols Hills, Nicoma Park, Noble, Norman, ODOT, OKC, OK County, OTA, OU, Stillwater, Tahlequah, The Village, Yukon

Q2 - JUNE 14, 2022

- In-person only
- 10:00-11:30 am
- 28 E Main St, Rm 118, Edmond
- Attendees: Choctaw, DEQ, Edmond, MWC, Mustang, Norman, ODOT, OKC, The Village, Yukon

Q3 - SEPTEMBER 8, 2022

- In-person only
- 10:00-11:30 am
- 8726 SE 15th St, Midwest City
- Attendees: Choctaw, Del City, DEQ, Edmond, MWC, Norman, ODOT, OKC, OSU, Robison Wildlife Solutions, The Village

Q4 - DECEMBER 15, 2022

- Virtual & in-person
- 1:30-3:00 pm
- 700 S Broadway, Moore
- Attendees: Choctaw, Del City, DEQ, Edmond, MWC, Moore, Mustang, Noble, Norman, ODOT, OKC, OU, Robison Wildlife Solutions, Silver Star Construction, Spencer, The Village, Yukon



COMMITTEES



Outreach Committee

Mission: To establish outreach through training events, programs, and material development using multiple media platforms to promote the COSWA mission.

Members:

- Board Liaison - Jordan Peebles, Vice-Chair
- Committee Spokesperson - Cailyn Prather, DEQ
- Brooke Vierck, City of OKC



Events Committee

Mission: To establish COSWA's presence at community events, and provide benefits of event participation to members and participating affiliates for MS4 permit reporting.

Members:

- Board Liaison - Robert Bettes, At-Large Officer
- Committee Spokesperson - Brooke Vierck, City of OKC
- Michele Loudenback, City of Norman
- Julie Shannon, City of Yukon
- Brendan Summerville, City of Bethany
- Kathryn Thomsen, ODOT



Training & Regulatory Committee

Mission: To provide timely updates related to OPDES permit requirements, and develop opportunities for professional development via training events, presentations, and informative materials.

Members:

- Board Liaison - Derek Johnson, Chair
- Committee Spokesperson - Vacant
- Michelle Chao, City of Norman

Note: Please notify the Board if you are interested in serving on a committee.

OUTREACH BY THE NUMBERS

18 NEW MEMBERS & AFFILIATES




41 FACEBOOK FOLLOWERS



RAIN BARRELS DISTRIBUTED

1,108



1 RAIN BARREL GRANT AWARDED



RAIN BARREL MS4 RAFFLES

3

54 COMPOSTERS DISTRIBUTED



1,043,900 RADIO AD IMPRESSIONS

3,054 WEBPAGE VIEWS



1,117 WEBPAGE VISITORS

26 COMMUNITY & TRAINING EVENTS



PROGRAMS OVERVIEW

Rain Barrel Events & Online Sales

- Vendor: Upcycle Products
- 1,108 rain barrels, 54 composters, & 355 accessories distributed
- Online Sales Extension, Sept 1 - Nov 30, resulted in 1 order



Note: The following organizations held an in-person rain barrel distribution event in 2022 - City of Edmond, City of Oklahoma City, & City of Stillwater. The following organizations held a combined in-person rain barrel distribution event in 2022 - City of Bethany / City of Mustang / City of Yukon, City of Norman / City of Moore / City of Newcastle / City of Noble, & City of Choctaw / City of Midwest City.

Rain Barrel Grant Program

- Provides rain barrels for educational & promotional use
- 1 application - City of Norman, Lake Thunderbird Workshop & Cleanup held on Oct 30



Note: Applicable events or exhibits include, but are not limited to the following - storm water best practices, soil & water conservation, home & garden shows, educational institution activities, environmental workshops & conferences, OPDES MS4 raffles, or community demonstration projects.

Rain Barrel MS4 Raffle Winners

- Q2 Meeting, June 14 - City of Choctaw
- Q3 Meeting, Sept 8 - Oklahoma DEQ
- Q4 Meeting, Dec 15 - City of Edmond



Note: Winners were Jade Riddle with City of Choctaw, Paul Lyon with DEQ, and Keith Beatty with City of Edmond.

PROGRAMS OVERVIEW



COSWA Webpage

- Established in 2015
- 1,117 Visitors
- 3,054 Page Views

COSWA Social Media

- Created March 22, 2022
- 41 Followers
- 19 Total Posts
- 696 Impressions



Note: Impressions = number of times COSWA's content was displayed on a user's feed.

Radio Ad Campaign

- Total Cost = \$13,120
- "Everyday Environmentalist"
- May 16 - July 10, 2022
- 7 MS4 Ads, 1 Affiliate Ad
- 1,043,900 Impressions



Note: Ads aired on 4 radio stations - KMGL, KRXO, KOMA, & KRXO-FM HD2. The following organizations recorded a radio ad and/or contributed funds - City of Choctaw (ads/funds), City of Del City (funds), City of Edmond (ad/funds), Town of Jones (funds), City of Midwest City (ad/funds), City of Moore (ad/funds), City of Norman (ad/funds), City of Oklahoma City (ad/funds), ODOT (funds), City of The Village (funds), City of Yukon (ad/funds), Nichols Hills (funds), & DEQ (ad).

PROGRAMS OVERVIEW

2022 COMMUNITY EVENTS & TRAINING OPPORTUNITIES



OKC Home + Garden Show

January 21-23, 2022
State Fair Park, Bennet Event Center
3101 Gordon Cooper Blvd., OKC, OK
73107

oklahomacityhomeshow.com

Note: 15 volunteers from the City of Choctaw, City of Edmond, City of Midwest City, City of Moore, City of Norman, City of Oklahoma City, The Village, DEQ, & ODOT operated COSWA's booth, and distributed COSWA & MS4-specific giveaways to a portion of the 16,211 total attendees.



Industrial Storm Water Workshop

May 10-11, 2022 from 8 AM - 12:30 PM
OKC Zoo Rosser Conservation
Education Center
2000 Remington Pl, OKC, OK 73111

okc.gov/swq

Note: 2 volunteers from the City of Edmond and the City of Norman operated COSWA's booth, and distributed 76 COSWA bags to a total of 131 attendees.



B2B Case for Sustainability: Oklahoma Leadership & Sustainability at the Local and State Level

April 28, 2022 from 9-11 AM
Camp Trivera, 2508 NE 50th St,
OKC, OK 73111

thesustainabilityalliance.org



Bandalong Installation at Tinker AFB Crutcho Creek Tributary C

June 22, 2022
In-person event

stormwatersystems.com

Note: Staff from Tinker AFB and the Cities of Oklahoma City, Edmond, & Norman attended.



Photo: 2022 Home + Garden Show
(Photo provided by Jordan Peebles)

PROGRAMS OVERVIEW

2022 COMMUNITY EVENTS & TRAINING OPPORTUNITIES



OFMA Stormwater Technical Workshop

July 20, 2022 from 8 AM - 4:30 PM
NCED Conference Center
2801 OK-9, Norman, OK 73071
okflood.org

Note: COSWA attended the workshop as a presenter and distributed the COSWA Benefits brochure.



TSD Hydroseeding Demonstration: Expectations vs Reality

December 6, 2022 at 10 AM
City of Edmond Well Station
9440 E 2nd St, Edmond, OK 73007
tri-silt-dike.com



Note: Staff from the City of Edmond, City of Norman, ODOT, & Oklahoma County attended the training event.



COSWA Meeting Guest Speaker

September 8, 2022 at 10 AM
Blue-Green Algae Monitoring
Dawson McNeill, City of OKC
okc.gov/swq

Note: Refer to page 12 for the list of attendees at the September COSWA membership meeting.



COSWA Meeting Guest Speaker

December 15, 2022 at 1:30 PM
Low Impact Development (LID)
Heather Williams, WSP
wsp.com/en-us

Note: Refer to page 12 for the list of attendees at the December COSWA membership meeting.



Photo: TSD Hydroseeding Demonstration
(Photo provided by Jordan Peebles)

PROGRAMS OVERVIEW

2022 COMMUNITY EVENTS & TRAINING OPPORTUNITIES



City of Oklahoma City's Lunch & Learn Series okc.gov/swq

February 9, 2022 - Upstream Technologies

- Virtual attendees: Cities of Nichols Hills, Moore, & Oklahoma City

April 13, 2022 - Advanced Drainage Systems (ADS)

- Virtual attendees: ODEQ, Town of Jones, ODOT, City of Oklahoma City

May 24, 2022 - Storm Water Systems

- Virtual & in-person attendees: GRDA, OTA, Town of Jones, Tinker AFB, Cities of Yukon, Tulsa, The Village, Norman, Del City, Oklahoma City, Edmond, & Newcastle

June 8, 2022 - American Excelsior

- Virtual attendees: ODEQ, Cities of Moore & Oklahoma City

August 10, 2022 - Triangular Silt Dike

- Virtual attendees: Cities of Oklahoma City, Yukon, Moore, Bethany, The Village, Harrah, Norman, & Midwest City

August 23, 2022 - Iron Age Designs

- In-person attendees: Cities of Midwest City, Edmond, Norman, & Oklahoma City



City of Oklahoma City's Webinar Series (virtual only) okc.gov/swq

January 19, 2022 - Maintaining the SWP3

- Attendees: ODEQ, Cities of Moore, Nichols Hills, Midwest City, & Oklahoma City

February 16, 2022 - Industrial SWP3

- Attendees: ODEQ, Cities of Midwest City, Nichols Hills, & Oklahoma City

March 16, 2022 - OKC Beautiful Programs

- Attendees: OU, Cities of Midwest City, Moore, Oklahoma City, & Yukon

April 20, 2022 - Green Infrastructure in OKC Parks

- Attendees: ODEQ, Cities of Midwest City, Nichols Hills, Norman, & Oklahoma City

May 18, 2022 - OKR05 Permit & DEQ Perspective

- Attendees: ODEQ, OU, Cities of Midwest City, Nichols Hills, Oklahoma City, & Yukon

June 15, 2022 - Industrial Inspections

- Attendees: ODEQ, OU, Cities of Midwest City, Nichols Hills, Oklahoma City, & Yukon

July 20, 2022 - Construction Inspection Process

- Attendees: Cities of Nichols Hills & Oklahoma City

August 17, 2022 - OK River Bacteria Monitoring

- Attendees: Cities of Midwest City, Moore, Oklahoma City, & Yukon

September 21, 2022 - Compost for Erosion Control

- Attendees: ODEQ, Cities of Midwest City, Nichols Hills, Norman, Oklahoma City, & Yukon

October 19, 2022 - OKR10 Permit Reauthorization

- Attendees: ODEQ, OU, Cities of Midwest City, Nichols Hills, Norman, Oklahoma City, & Yukon

November 16, 2022 - Construction Challenges

- Attendees: ODEQ, Cities of Midwest City, Moore, Nichols Hills, Norman, Oklahoma City, & Yukon

December 21, 2022 - Improvements to Erosion & Sediment Control Design Through Performance-Based Testing

- Attendees: Cities of Midwest City, Norman, & Oklahoma City

ACKNOWLEDGEMENTS

We want to thank our members, affiliates, board members, committees, and volunteers for an incredible year of growth! Building a non-profit from the ground up is a massive undertaking and has presented several unique challenges and hurdles; however, 2022 saw a great deal of progress, including the creation and acceptance of the Bylaws, opening a bank account, purchasing a P.O. Box, developing a dues structure and budget, invoicing members, committee development, defining membership and affiliate benefits, developing a social media presence, establishing an email account, and webpage improvements. We continued our education and outreach efforts with multiple training opportunities, membership surveys, an advertising campaign, and new outreach programs, including the rain barrel grant program and the online rain barrel sales extension.

In 2023, you can expect us to maintain and expand our services in order to assist our members meet their OPDES permit requirements. If the past few years have taught us nothing else, we've learned that change is constant, especially since many of us live and work in one of the fastest growing metropolitan areas in the country! Due to these expected community and regulatory changes, our opportunities to serve will continue to evolve, and we pledge to regularly review our services to ensure our programs will provide for future opportunities as well as current needs.

We look forward to another productive year, and thank you all for your continued support and participation that helps make COSWA so successful!

Your COSWA Board -

Derek Johnson, Jordan Peebles, Rebecca Dallen, Hollie Thorne, & Robert Bettes

Connect With Us!

COSWA, Inc.

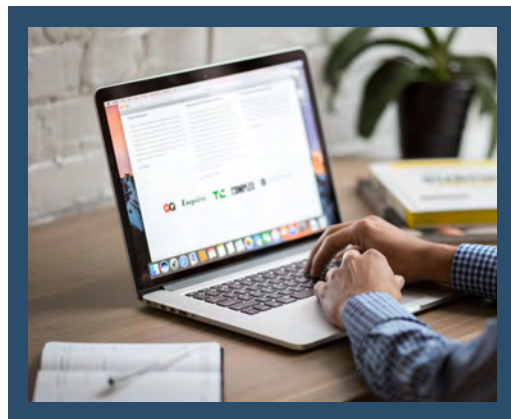
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2022 COSWA ANNUAL REPORT

Appendix I: Lake Thunderbird TMDL Monitoring Reports

Lake Thunderbird TMDL Monitoring Reports
July 2022 to June 2023

***Lake Thunderbird TMDL Monitoring Plan Implementation:
Sample Year (SY) 2022- July Report***



SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

July 2022 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

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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 JULY WATER QUALITY SAMPLING

Sampling for July 2022 occurred during base flow conditions on the fifth. Water samples were collected at eight locations and discharge was measured at six locations. Samples were not collected at JB-1 due to construction activity, or LT-1 due to dry conditions. Mesonet shows no precipitation on the fifth, no precipitation in the 72 hours prior to sampling, and 0.07 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of July was 1.19 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

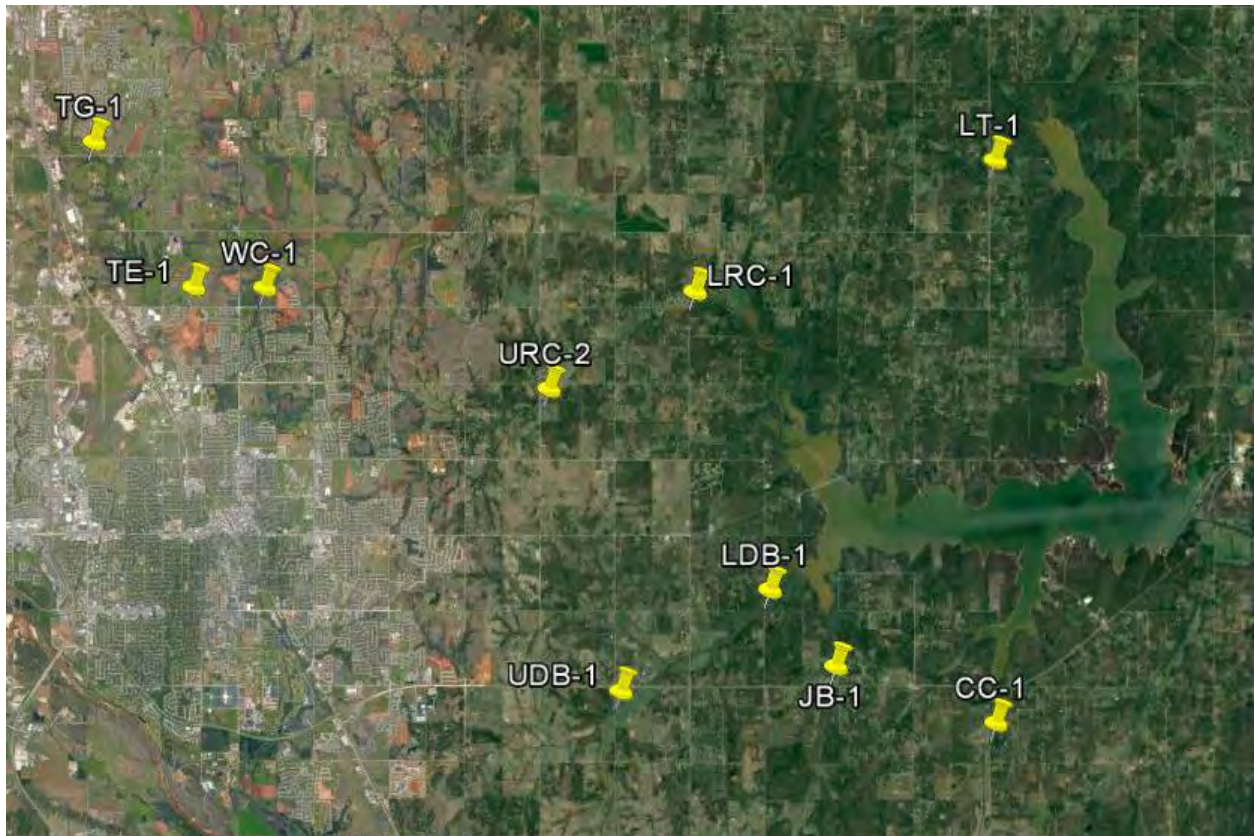


Figure 1 Monitoring Station Map

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	7/5/2022	10:24	NH	25.4	7.90	7.73	680	6	Used RP4; abundance of filamentous algae
JB-1	Jim Blue Creek	7/5/2022	11:00	NH	N/A	N/A	N/A	N/A	N/A	Under construction, did not sample
LDB-1	Lower Dave Blue Creek	7/5/2022	11:05	NH	28.5	6.15	8.19	694	14	Fair amount of floating leaves; construction water truck pumping up water from bridge
LRC-1	Lower Rock Creek	7/5/2022	12:26	NH	27.8	8.46	7.98	721	4	
LT-1	Lake Laterals	7/5/2022	11:45	NH	N/A	N/A	N/A	N/A	N/A	No water at site, did not sample
TE-1	Little River Tributary	7/6/2022	9:46	NH	25.8	2.77	7.92	1183	3	Level very low, completely dry downstream
TG-1	Little River	7/6/2022	12:46	NH	28.3	7.90	8.03	1245	2	Fair amount of filamentous algae present
UDB-1	Upper Dave Blue Creek	7/5/2022	9:09	NH	24.7	4.80	7.73	948	5	Low flow
URC-2	Upper Rock Creek	7/5/2022	14:01	NH	30.0	9.13	7.87	879	17	Normal conditions; signs of cattle upstream and under bridge
WC-1	Woodcrest Creek	7/6/2022	8:49	NH	24.7	3.68	7.59	1020	6	Water level slightly low; orifice had been clogged (stage had been fluctuating since 6/22)

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	0.16	0.20	0.049	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.49	0.040	7.0
LRC-1	Lower Rock Creek	<0.05	0.22	0.035	<5.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	<0.05	0.33	0.064	5.0
TG-1	Little River	<0.05	0.36	0.032	<5.0
UDB-1	Upper Dave Blue Creek	0.08	0.20	0.029	<5.0
URC-2	Upper Rock Creek	<0.05	0.65	0.086	14.0
WC-1	Woodcrest Creek	<0.05	0.35	0.072	15.0

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	0.16	0.20	0.048	<5.0
Duplicate RPD	0%	0%	2.06%	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	0.17	20.33
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	6.00	16.70
LRC-1	Lower Rock Creek	0.22	3.36
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.00	10.53
TG-1	Little River	0.54	8.71
UDB-1	Upper Dave Blue Creek	0.31	17.15
URC-2	Upper Rock Creek	0.04	11.08
WC-1	Woodcrest Creek	0.03	7.29

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

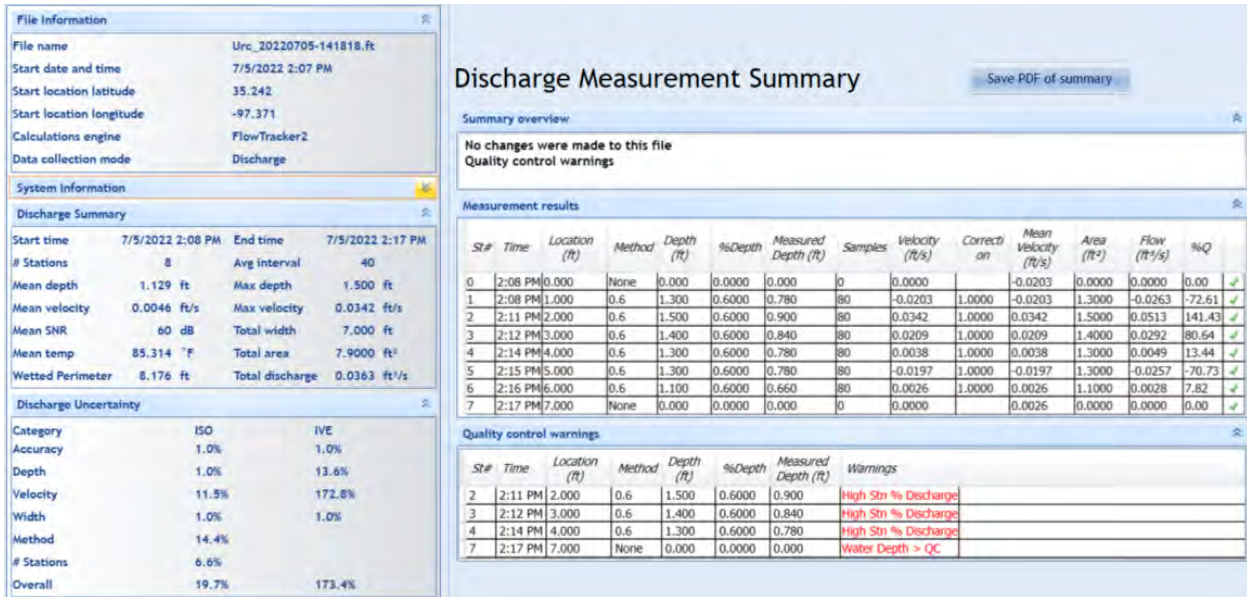


Figure 6 Discharge Measurement Summary URC-2

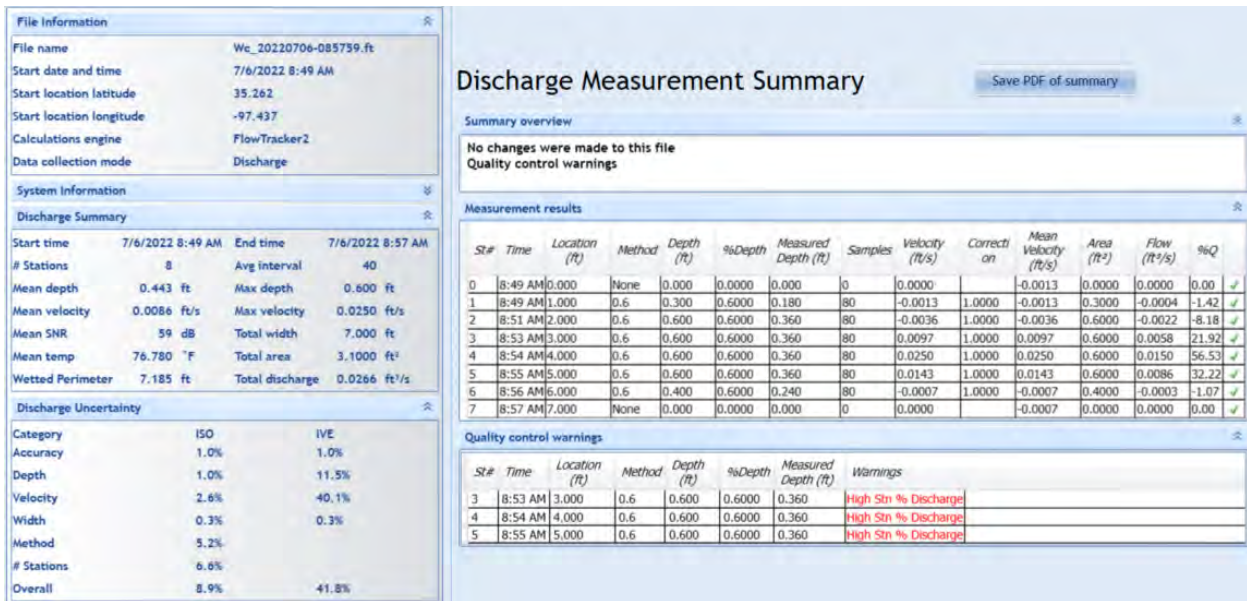
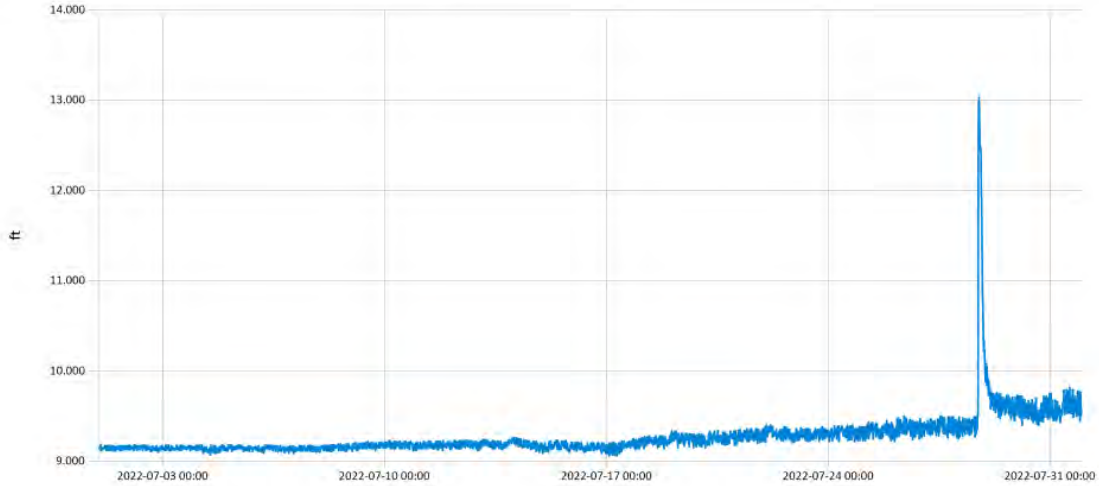


Figure 7 Discharge Measurement Summary WC-1

Period Selected: 2022-07-01 00:00 - 2022-07-31 23:59

UTC Offset: -06:00



— Stage@TG

Figure 8 Monthly Hydrograph TG-1

Period Selected: 2022-07-01 00:00 - 2022-07-31 23:59

UTC Offset: -06:00

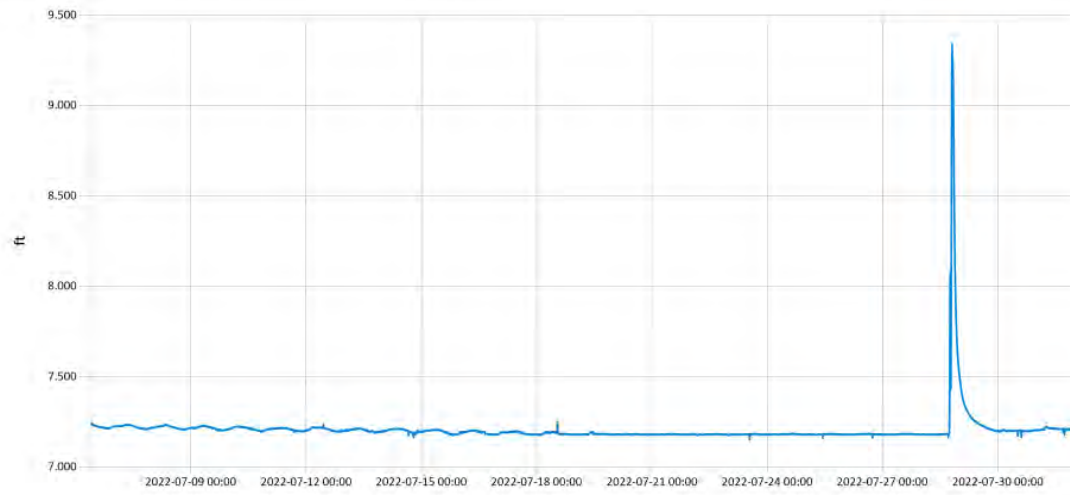


— Stage@TE

Figure 9 Monthly Hydrograph TE-1

Period Selected: 2022-07-01 00:00 - 2022-07-31 23:59

UTC Offset: -06:00



— Stage@WC

Figure 10 Monthly Hydrograph WC-1

Period Selected: 2022-07-01 00:00 - 2022-07-31 23:59

UTC Offset: -06:00

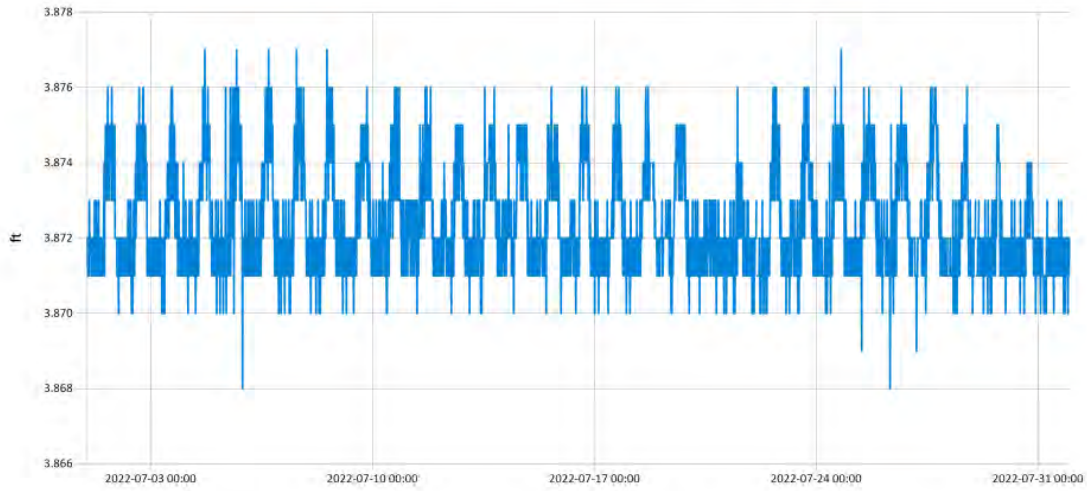


— Stage@URC

Figure 11 Monthly Hydrograph URC-2

Period Selected: 2022-07-01 00:00 - 2022-07-31 23:59

UTC Offs et: -06:00

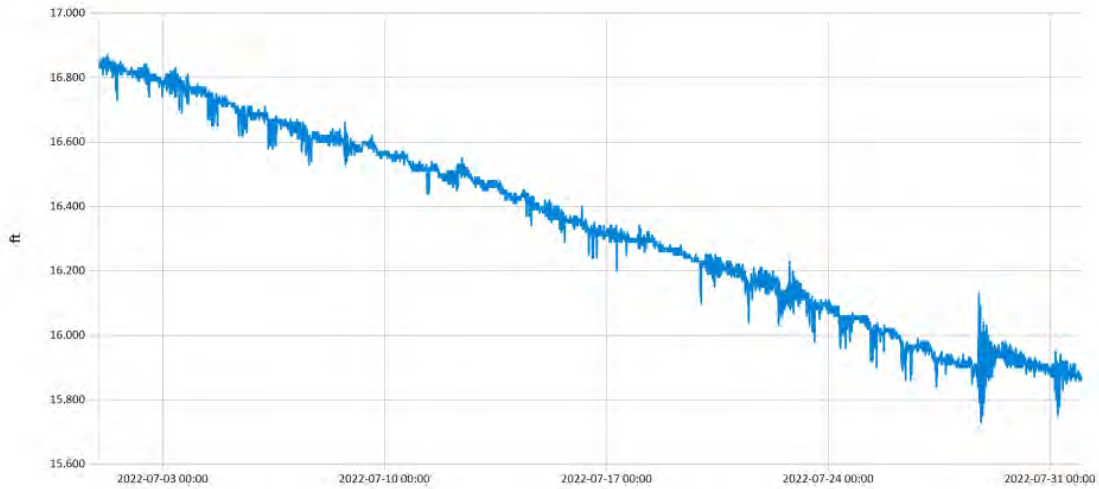


— Stage@LRC

Figure 12 Monthly Hydrograph LRC-1

Period Selected: 2022-07-01 00:00 - 2022-07-31 23:59

UTC Offs et: -06:00

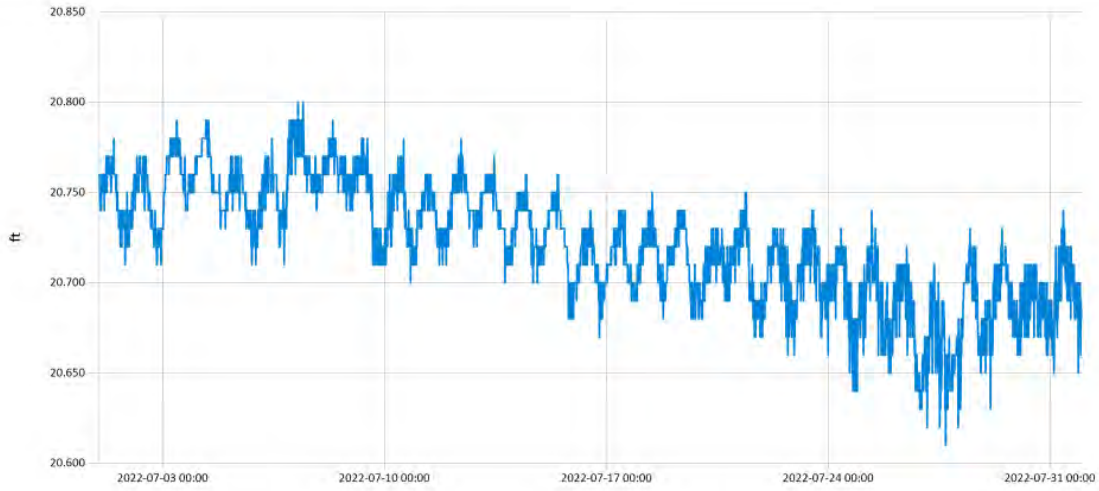


— Stage@LDB

Figure 13 Monthly Hydrograph LDB-1

Period Selected: 2022-07-01 00:00 - 2022-07-31 23:59

UTC Offs et: -06:00

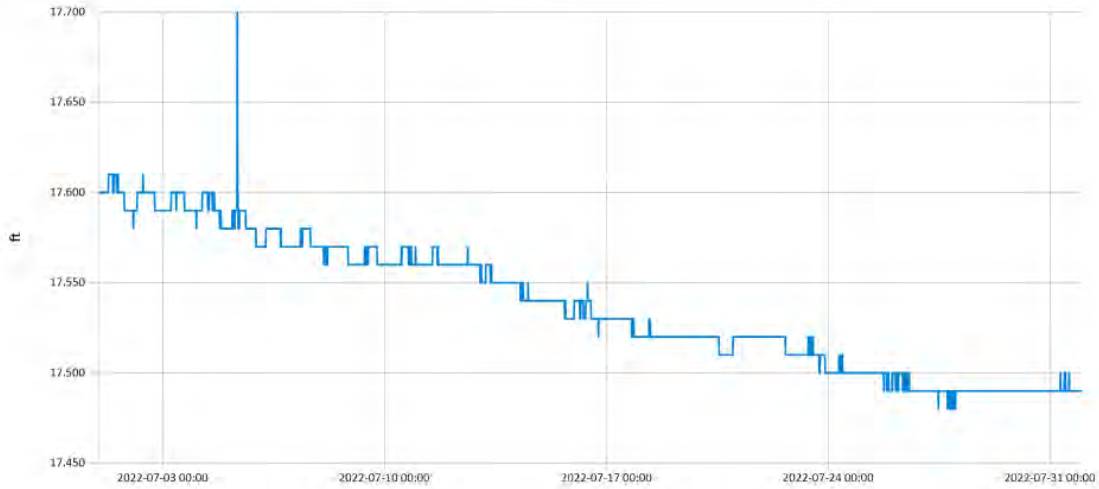


Stage@CC

Figure 14 Monthly Hydrograph CC-1

Period Selected: 2022-07-01 00:00 - 2022-07-31 23:59

UTC Offs et: -06:00



Stage@UDB

Figure 15 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY		July 2022		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	4" SOIL TEMPERATURES				
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG	(in)	STN	MSL	DIR	AVG	MAX	(MJ/m ²)	SOD	BARE	MAX	MIN	
1	96	73	85.0	66.6	0	20	80	32	56	0.00	28.71	29.95	S	8.8	20.5	28.56	78.8	88.6	95	82	
2	96	73	85.1	68.6	0	20	85	38	60	0.00	28.69	29.94	SSE	7.8	23.3	27.39	79.8	89.4	96	83	
3	98	75	85.3	69.6	0	22	83	37	61	0.00	28.74	29.99	SSE	6.6	25.4	24.06	80.8	90.2	97	85	
4	99	76	87.7	65.0	0	22	80	26	50	0.00	28.73	29.97	SSE	9.3	25.2	28.49	81.1	90.0	96	84	
5	100	79	89.3	64.3	0	24	60	31	45	0.00	28.68	29.93	S	10.3	25.8	27.92	81.4	90.5	96	85	
6	102	79	90.5	65.5	0	26	59	30	45	0.00	28.65	29.90	SSE	10.2	26.7	27.59	82.1	91.2	97	85	
7	104	78	91.1	64.3	0	26	62	27	43	0.00	28.66	29.91	S	8.9	26.0	27.60	82.7	91.7	98	86	
8	104	76	88.6	64.8	0	25	75	27	47	0.07	28.74	29.98	S	6.5	33.2	22.83	82.6	91.2	97	86	
9	98	77	87.1	67.8	0	22	79	32	55	0.00	28.83	30.08	NE	8.3	20.5	28.88	82.8	91.2	97	86	
10	97	70	83.4	65.5	0	18	88	31	58	0.00	28.78	30.03	NE	5.5	18.4	29.00	82.7	91.2	98	85	
11	100	68	85.5	65.2	0	19	90	25	55	0.00	28.67	29.91	SE	5.5	16.7	28.71	82.1	91.2	98	84	
12	95	70	83.7	66.5	0	17	85	43	58	0.00	28.74	29.98	NE	7.8	19.6	26.62	82.1	90.6	96	85	
13	97*	71*	84.5*	58.8*	0*	19*	69*	25*	44*	0.00*	28.79*	30.04*	E *	6.4*	17.4*	NA	82.7*	90.6*	96*	85*	
14	102	70	87.7	60.1	0	21	68	22	42	0.00	28.79	30.03	ESE	6.8	20.1	28.58	82.4	90.3	97	84	
15	100	74	87.5	61.6	0	22	71	25	45	0.00	28.80	30.04	S	7.5	19.7	28.31	83.3	91.1	97	85	
16	101	77	88.5	61.3	0	24	61	23	42	0.00	28.72	29.97	S	7.6	20.2	27.22	83.7	91.3	97	86	
17	105	79	91.3	64.4	0	27	64	23	44	0.00	28.63	29.87	S	6.3	18.7	23.84	84.1	91.6	97	86	
18	101	78	89.3	67.6	0	24	80	27	51	0.00	28.64	29.89	NE	8.0	18.8	27.90	85.3	92.5	99	87	
19	110	75	93.3	59.1	0	28	59	13	35	0.00	28.55	29.79	SSW	6.3	20.4	27.55	84.9	92.7	100	86	
20	98	82	89.5	65.5	0	25	76	32	46	0.00	28.59	29.83	S	6.5	20.0	11.87	84.1	91.2	94	89	
21	95	77	85.7	67.3	0	21	82	36	56	0.00	28.69	29.94	SSW	7.5	29.1	16.69	82.9	89.2	92	86	
22	100	77	86.0	67.0	0	23	73	28	56	0.00	28.73	29.98	S	8.3	31.9	23.82	83.5	89.4	95	84	
23	101	75	88.2	64.2	0	23	75	26	48	0.00	28.72	29.97	SSE	9.0	23.0	26.95	84.3	90.3	96	85	
24	103	79	90.7	64.0	0	26	61	26	43	0.00	28.71	29.96	SSE	9.2	22.4	26.82	85.0	91.5	97	86	
25	104	78	91.0	62.4	0	26	58	25	40	0.00	28.69	29.94	S	8.5	21.2	27.11	85.5	92.2	98	86	
26	104	79	91.1	60.9	0	26	55	24	38	0.00	28.68	29.92	S	9.0	24.4	26.04	85.6	92.1	98	87	
27	105	79	92.0	61.7	0	27	57	24	38	0.00	28.66	29.91	S	9.2	22.6	26.08	85.8	92.3	98	87	
28	103	75	85.1	67.0	0	24	93	27	59	1.03	28.69	29.94	S	7.6	41.2	18.64	85.0	90.2	97	86	
29	88	73	78.8	71.3	0	15	93	57	79	0.00	28.80	30.05	ENE	8.7	20.5	17.98	83.0	83.3	86	81	
30	90	73	80.0	69.2	0	16	94	46	72	0.00	28.82	30.07	ENE	6.4	16.7	18.40	82.3	83.6	91	79	
31	89	74	81.3	70.0	0	17	94	49	70	0.09	28.77	30.02	SSE	7.9	19.7	8.19	81.3	82.0	85	80	
	99*	75*	87.2*	65.1*	<- Monthly Averages ->						28.71*	29.96*	S *	7.8*	41.2*	24.65*	83.0*	90.1*	96*	85*	
Temperature - Highest: 110*					Degree Days - Total HDD: 0*					Number of Days With:											
Lowest: 68*					Total CDD: 695*					Tmax ≥ 90: 29* Rainfall ≥ 0.01 inch: 3*											
Rainfall: Monthly Total: 1.19* in.					Humidity - Highest: 94*					Tmax ≤ 32: 0* Rainfall ≥ 0.10 inch: 1*											
Greatest 24 Hr: 1.03* in.					Lowest: 13*					Tmin ≤ 32: 0* Avg Wind Speed ≥ 10 mph: 2*											
										Tmin ≤ 0: 0* Max Wind Speed ≥ 30 mph: 3*											

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* Denotes incomplete record

Figure 16 July Mesonet Data

***Lake Thunderbird TMDL Monitoring Plan Implementation:
Sample Year (SY) 2022- August Report***



SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

August 2022 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
Monitoring and Assessment Section
3800 N. Classen, Oklahoma City, Oklahoma 73118
405-530-8800

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SUMMARY OF AUGUST WATER QUALITY SAMPLING

Sampling for August 2022 occurred during base flow conditions on the tenth. Water samples were collected at seven locations, and because of extremely low water conditions no discharge measurements were collected. Samples were not collected at JB-1 due to construction activity, or LT-1 and TE-1 due to dry conditions. Mesonet shows no precipitation on the tenth, 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 August was 0.84 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

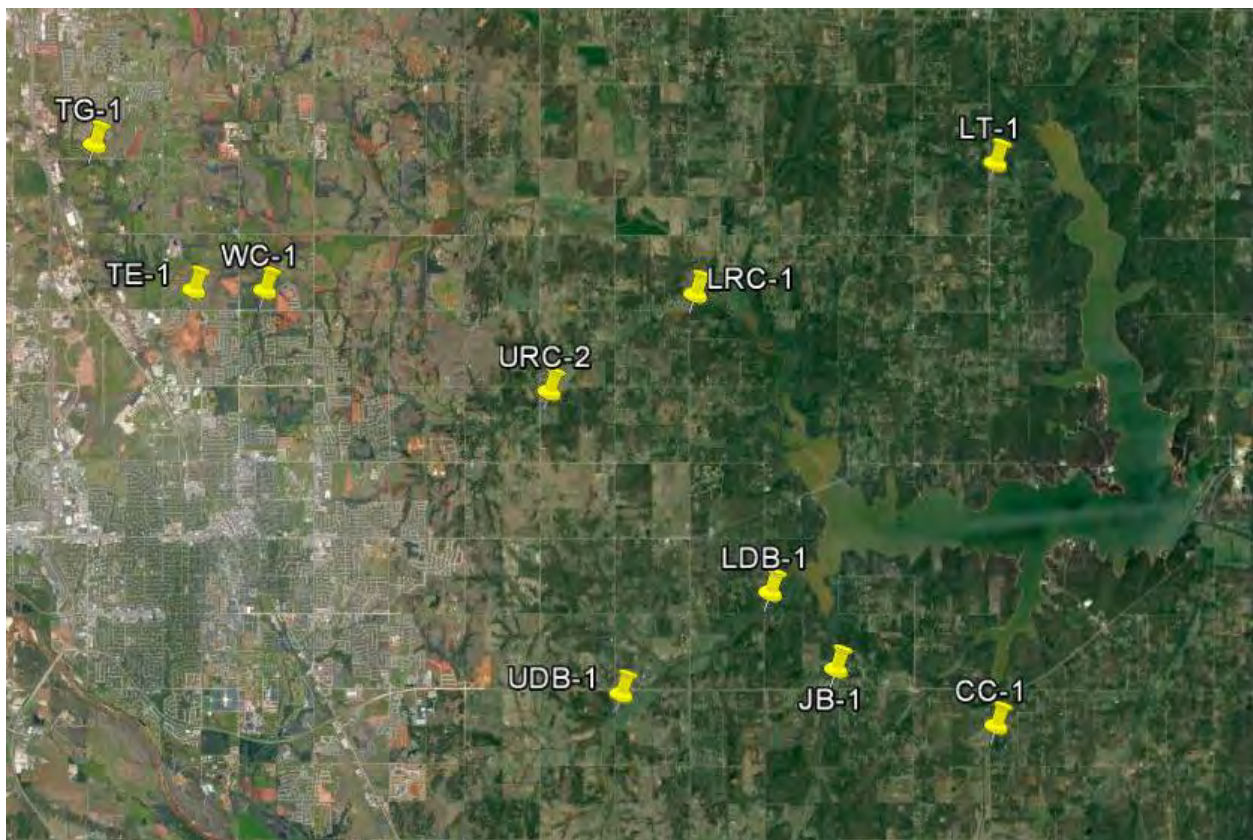


Figure 1 Monitoring Station Map

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	8/10/2022	9:00	SD	24.0	5.76	7.92	651	6	Very low water conditions, lots of vegetation on banks, orifice clear; used rp4 - only one over water
JB-1	Jim Blue Creek	8/10/2022	9:50	SD	N/A	N/A	N/A	N/A	N/A	Construction ongoing; did not sample
LDB-1	Lower Dave Blue Creek	8/10/2022	10:00	SD	28.1	3.30	8.23	596	22	Low conditions
LRC-1	Lower Rock Creek	8/10/2022	10:45	SD	26.1	5.43	7.94	651	4	Orifice out of water approx 6in; solar panel stolen, dcp not working
LT-1	Lake Laterals	8/10/2022	10:25	SD	N/A	N/A	N/A	N/A	N/A	Completely dry; did not sample
TE-1	Little River Tributary	8/10/2022	13:45	SD	N/A	N/A	N/A	N/A	N/A	Completely dry; did not sample
TG-1	Little River	8/10/2022	14:15	SD	29.1	9.70	8.25	734	2	Low conditions; orifice mostly under water
UDB-1	Upper Dave Blue Creek	8/10/2022	8:15	SD	24.3	4.81	8.19	903	11	Very low! Pool under bridge disconnected from up/downstream, very scummy upstream/under bridge, orifice in water; downstream almost dry- had small isolated pools
URC-2	Upper Rock Creek	8/10/2022	11:25	SD	27.3	9.67	7.51	955	26	Barely connected downstream/under bridge, not sure if connected farther up/downstream; orifice out of water approx 4in; scum common downstream
WC-1	Woodcrest Creek	8/10/2022	13:25	SD	27.5	7.45	8.04	882	24	Very low, barely connected under bridge on upstream side, very scummy up/downstream of bridge; orifice out of water a few inches

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	0.22	0.36	0.050	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.93	0.067	17.0
LRC-1	Lower Rock Creek	<0.05	0.25	0.035	<5.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	N/A	N/A	N/A	N/A
TG-1	Little River	<0.05	0.36	0.035	<5.0
UDB-1	Upper Dave Blue Creek	0.07	0.50	0.046	<5.0
URC-2	Upper Rock Creek	<0.05	0.71	0.105	6.0
WC-1	Woodcrest Creek	0.08	0.49	0.112	147

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	0.23	0.36	0.050	<5.0
Duplicate RPD	4.44%	0%	0%	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.

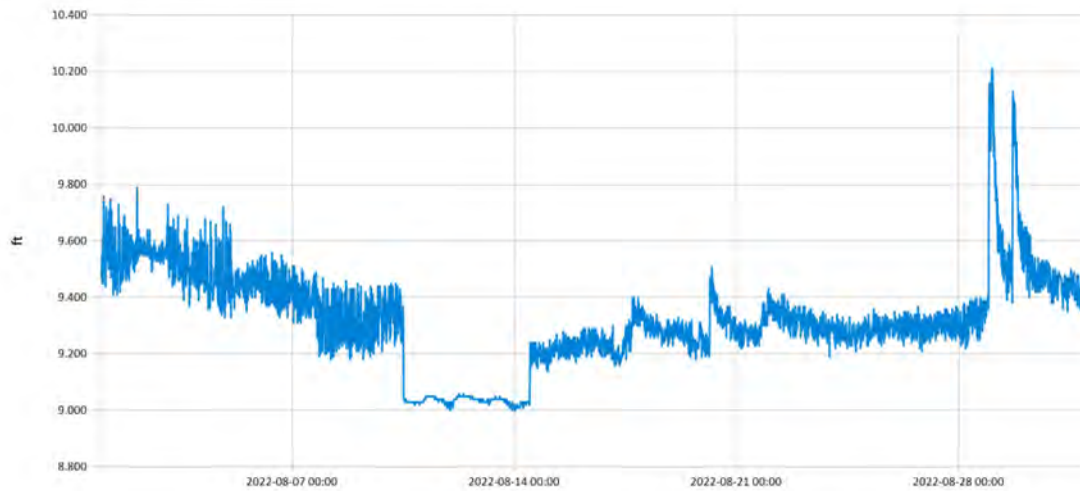
Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.38	20.32
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	1.20	15.69
LRC-1	Lower Rock Creek	0.22	3.80
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	N/A	N/A
TG-1	Little River	0.25	9.02
UDB-1	Upper Dave Blue Creek	0.00	17.07
URC-2	Upper Rock Creek	0.01	10.75
WC-1	Woodcrest Creek	0.01	7.24

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

Period Selected: 2022-08-01 00:00 - 2022-08-31 23:59

UTC Offs et: -05:00

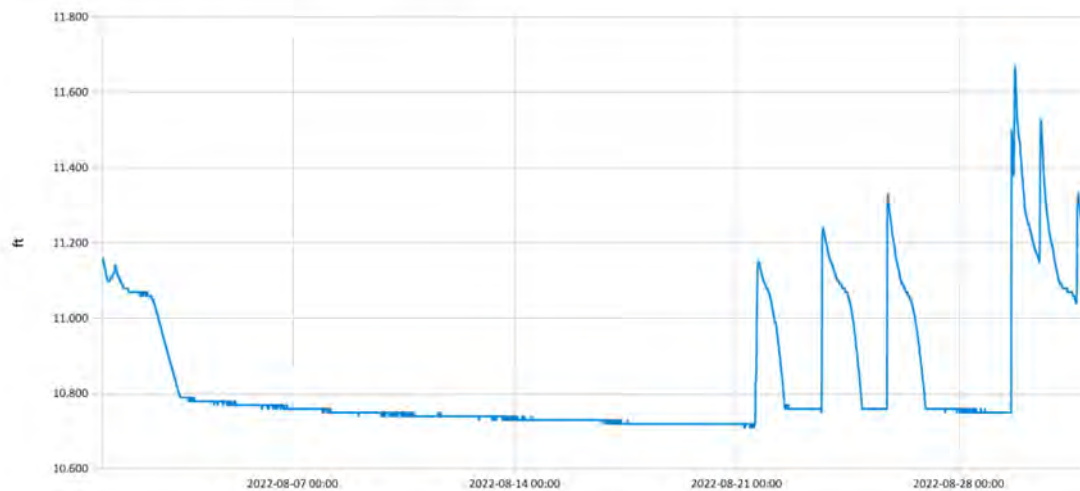


— Stage@TG

Figure 2 Monthly Hydrograph TG-1

Period Selected: 2022-08-01 00:00 - 2022-08-31 23:59

UTC Offs et: -06:00



— Stage@TE

Figure 3 Monthly Hydrograph TE-1

Period Selected: 2022-08-01 00:00 - 2022-08-31 23:59

UTC Offset: -06:00

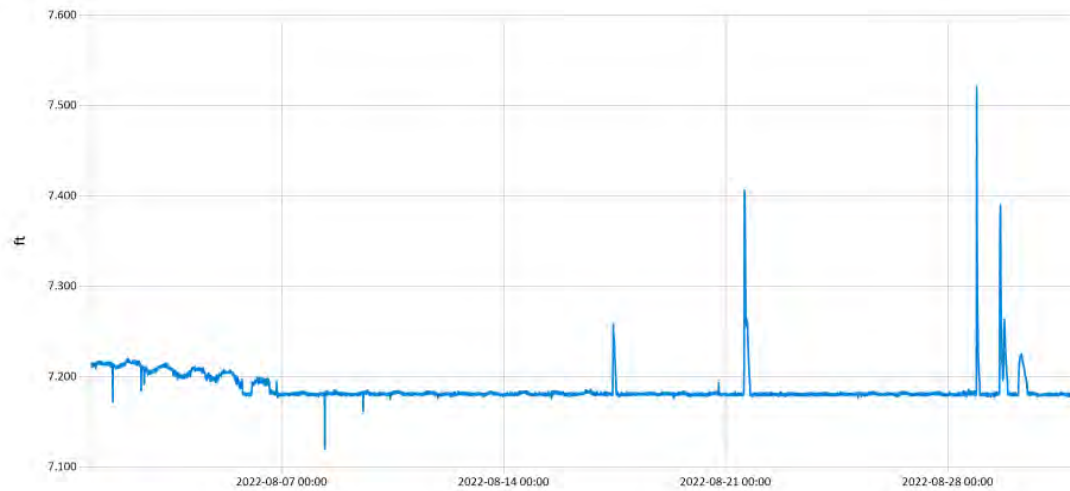


Figure 4 Monthly Hydrograph WC-1

Period Selected: 2022-08-01 00:00 - 2022-08-31 23:59

UTC Offset: -06:00

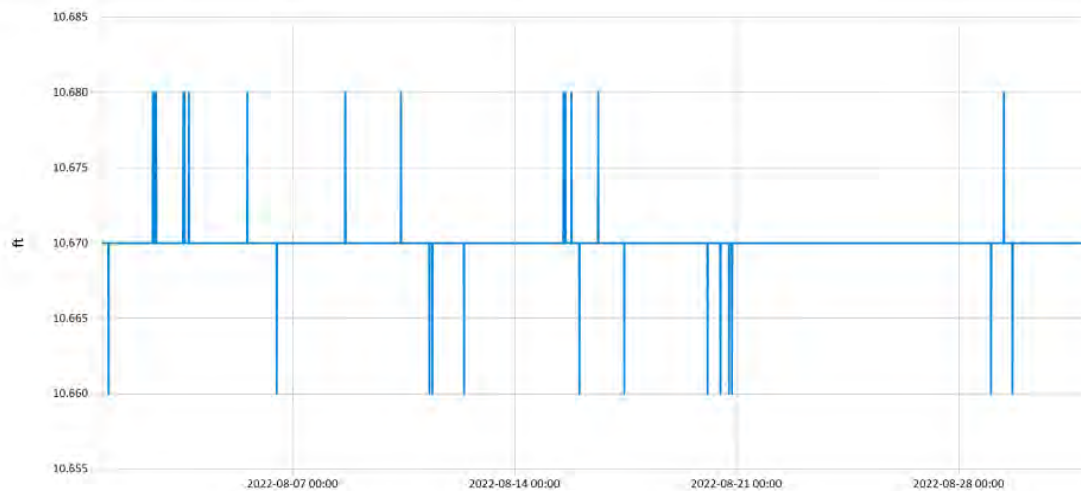
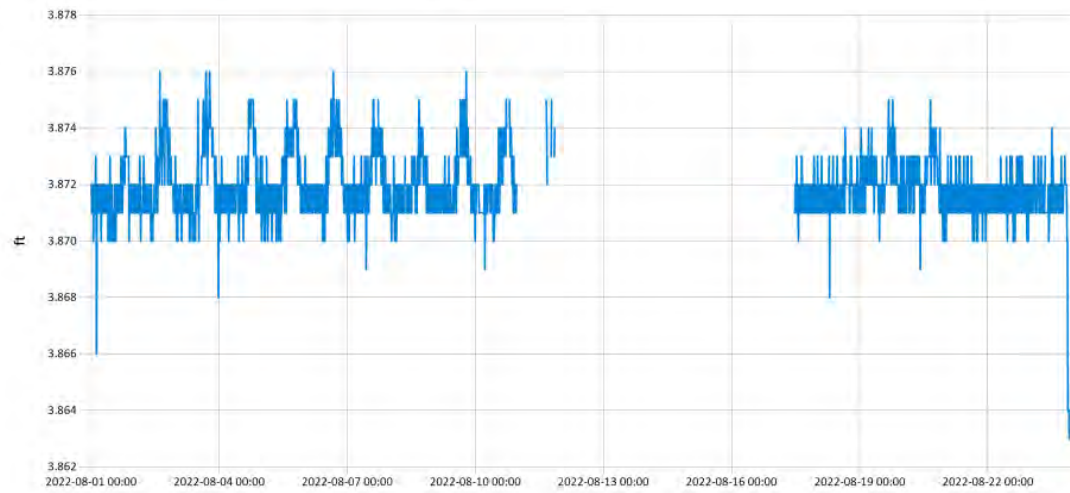


Figure 5 Monthly Hydrograph URC-2

Period Selected: 2022-08-01 00:00 - 2022-08-31 23:59

UTC Offs et: -06:00

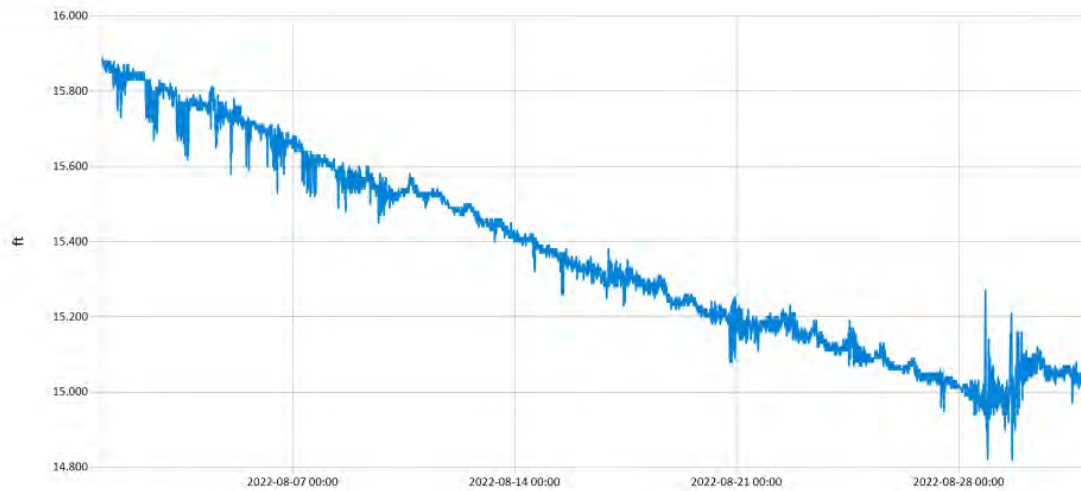


— Stage@LRC

Figure 6 Monthly Hydrograph LRC-1

Period Selected: 2022-08-01 00:00 - 2022-08-31 23:59

UTC Offs et: -06:00



— Stage@LDB

Figure 7 Monthly Hydrograph LDB-1

Period Selected: 2022-08-01 00:00 - 2022-08-31 23:59

UTC Offset: -06:00

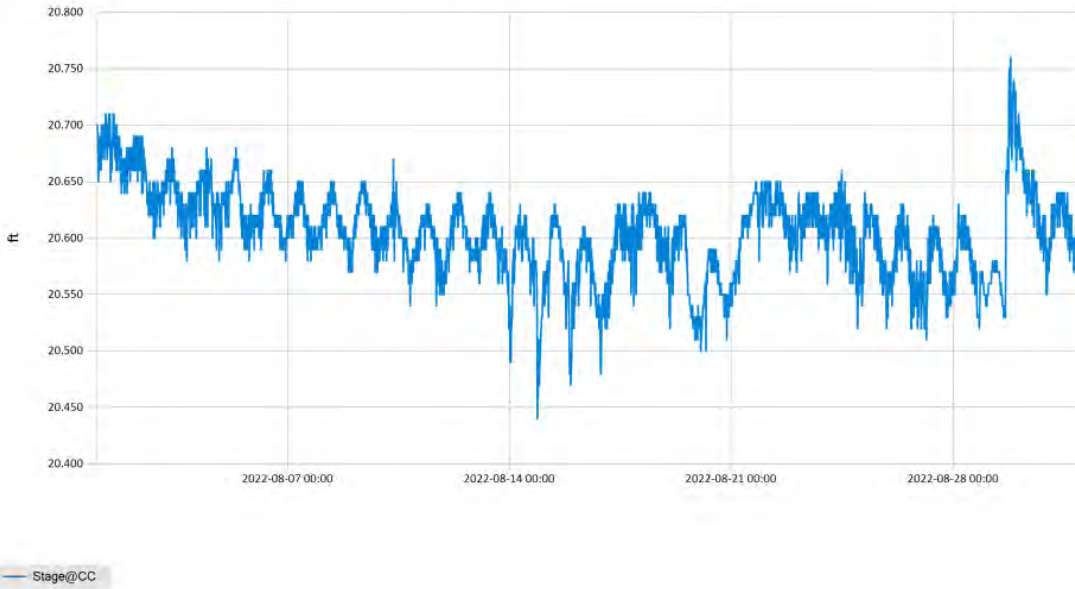


Figure 8 Monthly Hydrograph CC-1

Period Selected: 2022-08-01 00:00 - 2022-08-31 23:59

UTC Offset: -06:00



Figure 9 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY																					
August 2022																					
(NRMN) Norman																					
Nearest City: 2.1 NW Norman																					
Latitude: 35-14-09																					
Longitude: 97-27-53																					
Time Zone: Midnight-Midnight CST																					
County: Cleveland																					
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	93	79	84.0	66.1	0	21	65	40	55	0.00	28.76	30.01	S	8.8	20.9	13.55	80.0	81.5	88	78	
2	101	76	88.9	65.2	0	23	79	29	49	0.00	28.67	29.92	SSE	9.6	24.6	25.40	81.0	86.5	95	79	
3	103	80	91.0	63.3	0	26	56	27	41	0.00	28.60	29.84	S	10.2	24.7	25.25	81.9	89.3	97	83	
4	99*	80*	88.8*	67.3*	0*	24*	60*	37*	50*	0.00*	28.66*	29.91*	S *	9.6*	26.2*	18.71*	82.2*	89.0*	94*	85*	
5	103	77	90.0	65.9	0	25	81	26	48	0.01	28.70	29.95	SSE	8.3	20.8	24.20	83.2	90.0	97	84	
6	100	78	88.9	65.7	0	24	72	28	48	0.00	28.75	30.00	SSE	9.0	23.2	24.77	83.7	90.9	97	85	
7	99	76	87.7	65.8	0	22	75	34	50	0.00	28.78	30.03	SSE	8.2	21.6	23.52	83.7	90.6	96	85	
8	99	79	87.1	65.9	0	24	62	34	50	0.00	28.77	30.01	S	7.4	22.0	21.33	83.3	90.0	95	85	
9	98*	75*	83.5*	66.9*	0*	22*	75*	31*	59*	0.00*	28.78*	30.03*	SSE*	6.2*	32.0*	NA	83.7*	90.1*	98*	84*	
10	98	74	85.0	66.3	0	21	85	31	57	0.00	28.84	30.09	ENE	4.6	17.2	22.80	83.7	90.3	96	85	
11	97	68	83.5	61.8	0	17	84	27	51	0.00	28.83	30.08	NE	5.6	17.2	26.11	83.2	89.7	96	83	
12	95	71	83.2	63.2	0	18	79	30	54	0.00	28.83	30.08	ESE	5.9	21.1	25.20	83.4	89.7	96	84	
13	98	76	85.9	65.0	0	22	75	30	52	0.00	28.80	30.05	ESE	6.1	15.6	24.97	84.1	90.3	97	84	
14	100	73	86.9	59.3	0	21	64	23	42	0.00	28.73	29.97	SE	6.4	28.2	25.67	84.2	90.5	97	84	
15	100	75	87.7	63.1	0	22	69	28	46	0.00	28.68	29.93	S	6.5	21.2	22.45	83.8	90.1	96	85	
16	102	75	89.2	62.5	0	24	69	25	43	0.00	28.66	29.91	SSW	8.7	25.7	23.21	83.8	90.3	96	85	
17	80	71	74.7	67.9	0	10	92	69	80	0.08	28.79	30.04	NNE	9.4	22.7	7.43	81.8	85.6	91	82	
18	86	69	75.9	63.8	0	13	91	43	68	0.00	28.77	30.02	NE	5.9	27.2	19.83	80.6	84.0	90	80	
19	93	63	78.8	60.4	0	13	98	30	59	0.00	28.70	29.95	SSE	4.4	16.0	24.49	79.9	85.0	92	78	
20	97	70	81.8	64.1	0	18	76	33	57	0.01	28.73	29.98	S	6.7	31.9	19.42	81.2	86.2	92	81	
21	78	70	72.7	67.8	0	9	95	54	85	0.42	28.80	30.05	ENE	3.6	14.8	5.49	79.4	81.8	86	78	
22	89	70	77.4	66.5	0	15	96	40	72	0.00	28.74	29.99	NE	7.5	20.7	17.51	78.9	79.9	86	76	
23	85	69	76.6	66.0	0	12	93	50	72	0.00	28.72	29.96	NE	6.1	18.6	12.14	78.3	80.0	85	76	
24	91	67	78.6	65.1	0	14	95	40	66	0.00	28.76	30.01	ESE	4.8	17.8	17.70	78.0	81.6	89	75	
25	94	64	80.3	59.7	0	14	88	28	53	0.00	28.80	30.05	E	4.2	18.6	24.59	78.2	84.1	93	76	
26	95	65	81.4	61.2	0	15	88	31	53	0.00	28.77	30.02	SSE	3.9	16.7	22.88	78.6	85.5	93	78	
27	95	70	83.3	66.5	0	18	87	34	59	0.00	28.64	29.88	SSE	7.1	19.7	22.79	79.9	86.7	93	80	
28	98	70	84.0	68.5	0	19	83	36	62	0.02	28.56	29.80	S	10.4	42.7	14.78	80.5	86.2	91	82	
29	96	68	78.6	68.4	0	17	93	44	73	0.30	28.66	29.91	S	8.1	30.2	14.74	79.6	83.7	91	79	
30	91	67	79.6	69.0	0	14	97	48	72	0.00	28.80	30.05	NE	5.7	19.4	19.43	78.6	81.9	89	76	
31	92	72	81.2	69.9	0	17	90	47	70	0.00	28.81	30.06	E	5.4	16.4	16.27	79.6	83.9	89	78	
	95*	72*	83.1*	65.1*	<- Monthly Averages ->						28.74*	29.99*	SSE*	6.9*	42.7*	20.22*	81.4*	86.6*	93*	81*	
Temperature - Highest: 103*							Degree Days - Total HDD: 0*					Number of Days With:									
Lowest: 63*							Total CDD: 575*					Tmax ≥ 90: 26*				Rainfall ≥ 0.01 inch: 6*					
Rainfall: Monthly Total: 0.84* in.							Humidity - Highest: 98*					Tmax ≤ 32: 0*				Rainfall ≥ 0.10 inch: 2*					
Greatest 24 Hr: 0.42* in.							Lowest: 23*					Tmin ≤ 32: 0*				Avg Wind Speed ≥ 10 mph: 2*					
												Tmin ≤ 0: 0*				Max Wind Speed ≥ 30 mph: 4*					

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* Denotes incomplete record

Figure 10 August Mesonet Data

***Lake Thunderbird TMDL Monitoring Plan Implementation:
Sample Year (SY) 2022- September Report***



SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

September 2022 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
Monitoring and Assessment Section
3800 N. Classen, Oklahoma City, Oklahoma 73118
405-530-8800

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SUMMARY OF SEPTEMBER WATER QUALITY SAMPLING

Sampling for September 2022 occurred during base flow conditions on the seventh. Water samples were collected at eight locations and discharge was measured at three locations. Samples were not collected at JB-1 due to construction activity, or LT-1 due to dry conditions. Mesonet shows no precipitation on the seventh, 0.12 inches of precipitation in the 72 hours prior to sampling, and 0.03 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of September was 1.64 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

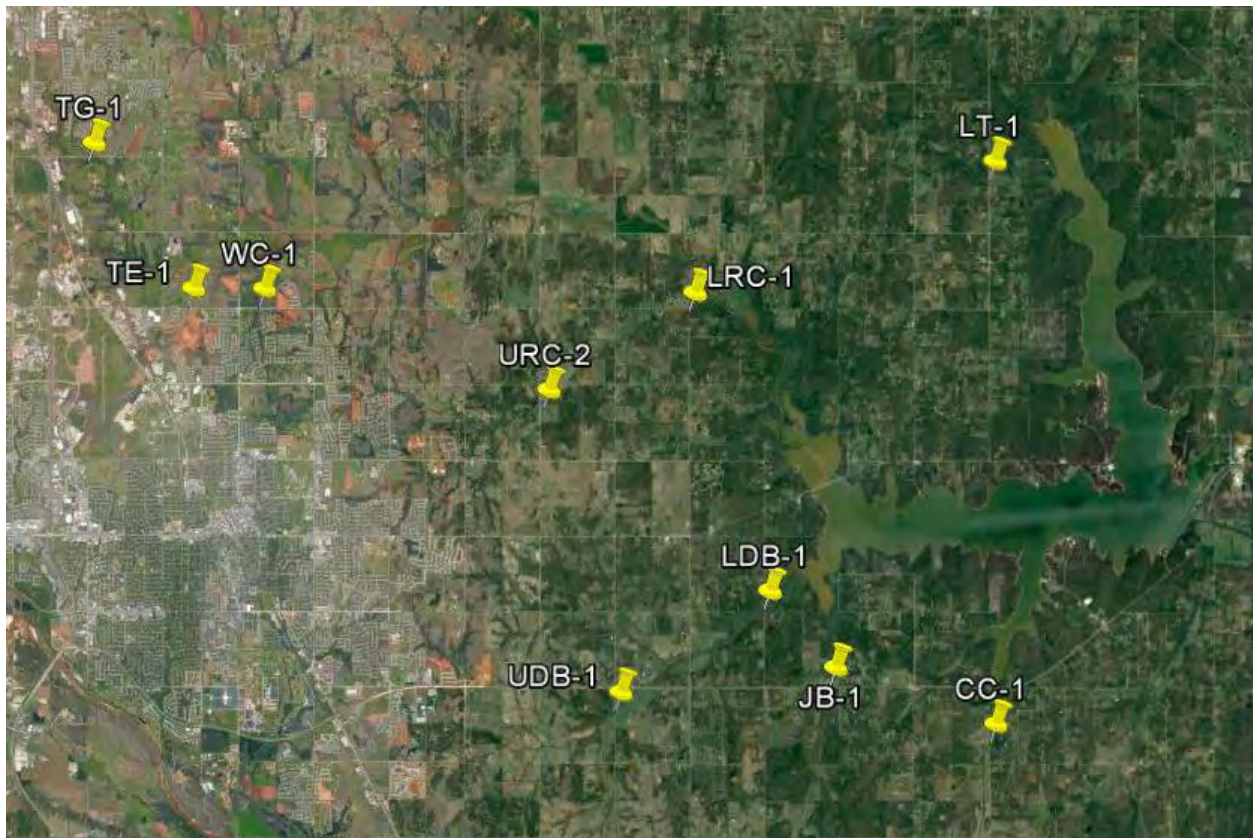


Figure 1 Monitoring Station Map

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	9/7/2022	9:05	JW	21.9	6.11	7.38	659	7	Used RP4; riparian vegetation dominates channel
JB-1	Jim Blue Creek	9/7/2022	9:15	JW	N/A	N/A	N/A	N/A	N/A	Construction - site inaccessible
LDB-1	Lower Dave Blue Creek	9/7/2022	9:35	JW	25.2	4.40	7.60	481	51	Site very low, visual flow was backwards
LRC-1	Lower Rock Creek	9/7/2022	10:55	JW	22.3	6.98	7.44	612	8	Site low; flow measurement taken upstream of bridge; DCP not responding
LT-1	Lake Laterals	9/7/2022	10:30	JW	N/A	N/A	N/A	N/A	N/A	Dry
TE-1	Little River Tributary	9/7/2022	14:05	JW	25.8	6.82	7.30	458	28	Disconnected under bridge
TG-1	Little River	9/7/2022	14:40	JW	26.4	10.31	7.71	509	6	Orifice not in water
UDB-1	Upper Dave Blue Creek	9/7/2022	8:20	JW	21.4	3.91	7.30	440	26	Extremely low flow, virtually no visible flow
URC-2	Upper Rock Creek	9/7/2022	12:30	JW	26.0	6.88	6.95	581	22	Orifice out of water; used RP2, RP1 not over water
WC-1	Woodcrest Creek	9/7/2022	13:25	JW	23.8	7.46	7.42	675	23	Orifice out of water

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	0.16	0.53	0.062	5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	1.02	0.104	38.0
LRC-1	Lower Rock Creek	<0.05	0.44	0.042	9.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	<0.05	0.66	0.080	10.0
TG-1	Little River	0.12	0.54	0.053	25.0
UDB-1	Upper Dave Blue Creek	0.08	0.56	0.081	20.0
URC-2	Upper Rock Creek	<0.05	0.75	0.098	20.0
WC-1	Woodcrest Creek	0.17	0.55	0.201	11.0

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	0.16	0.50	0.066	6.0
Duplicate RPD	0%	5.83%	6.25%	18.18%*

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	0.38	20.31
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.69	15.31
LRC-1	Lower Rock Creek	0.19	3.75
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.00	10.84
TG-1	Little River	0.71	9.84
UDB-1	Upper Dave Blue Creek	0.07	17.12
URC-2	Upper Rock Creek	0.05	10.81
WC-1	Woodcrest Creek	0.02	7.37

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

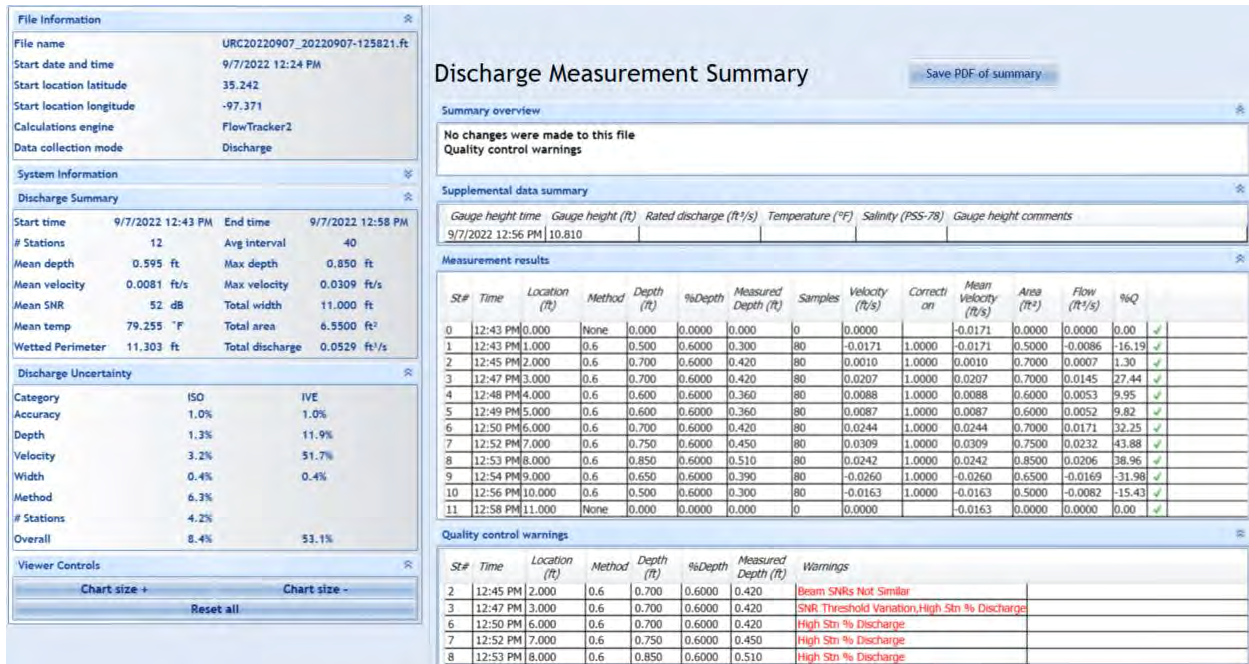
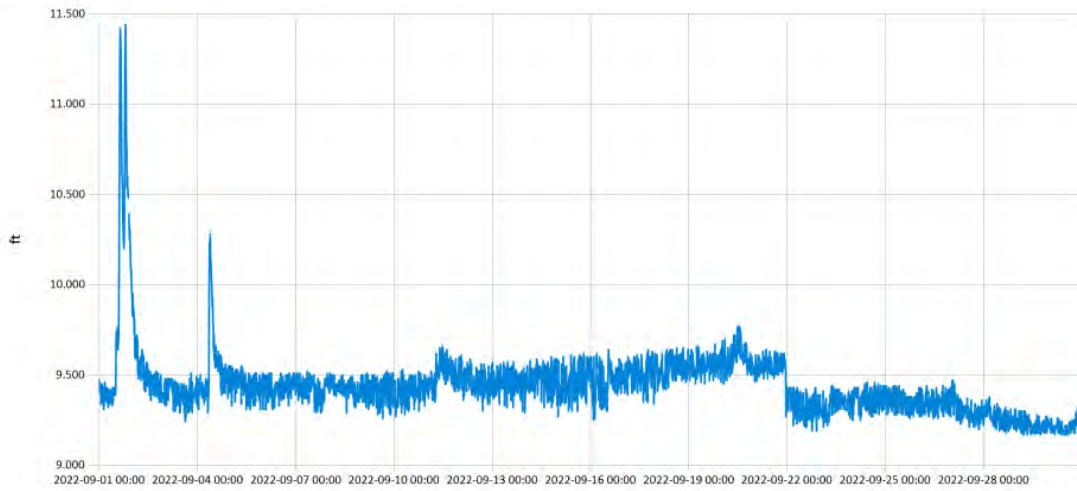


Figure 4 Discharge Measurement Summary URC-2

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UTC Offset: -06:00

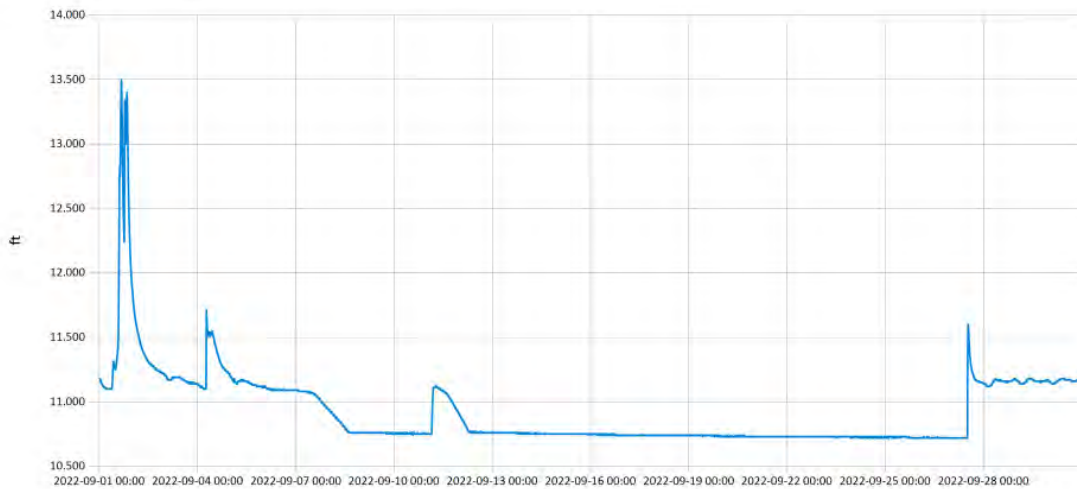


— Stage@TG

Figure 5 Monthly Hydrograph TG-1

Period Selected: 2022-09-01 00:00 - 2022-09-30 23:59

UTC Offset: -06:00

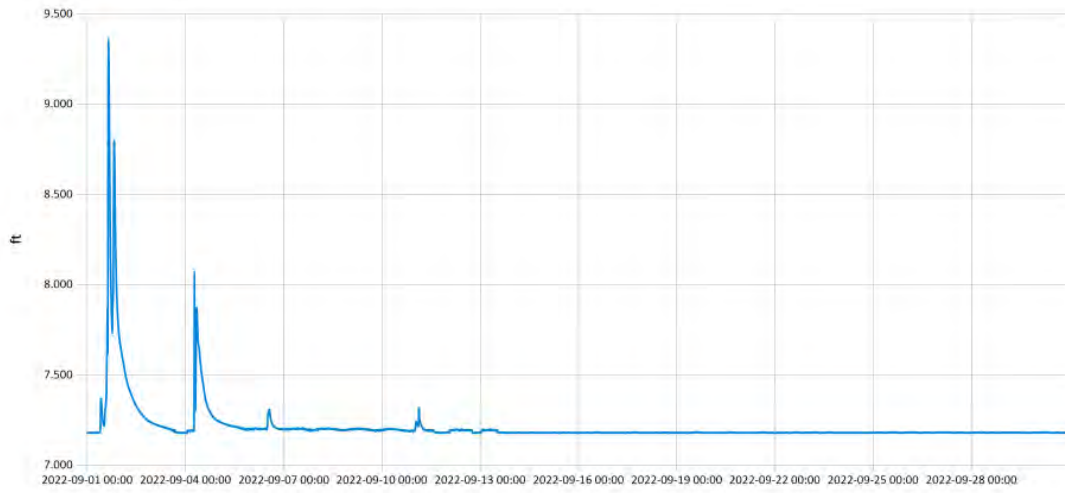


— Stage@TE

Figure 6 Monthly Hydrograph TE-1

Period Selected: 2022-09-01 00:00 - 2022-09-30 23:59

UTC Offset: -06:00

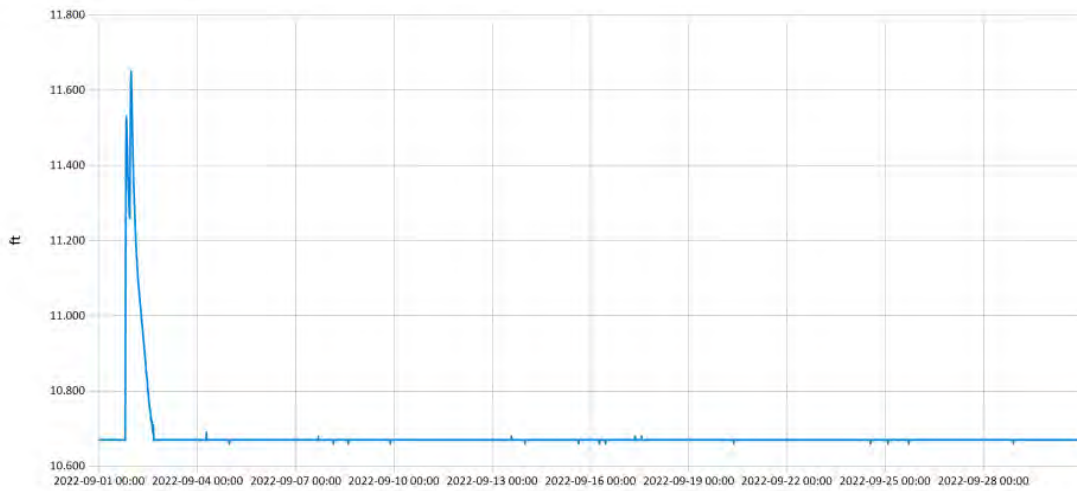


Stage@WC

Figure 7 Monthly Hydrograph WC-1

Period Selected: 2022-09-01 00:00 - 2022-09-30 23:59

UTC Offset: -06:00

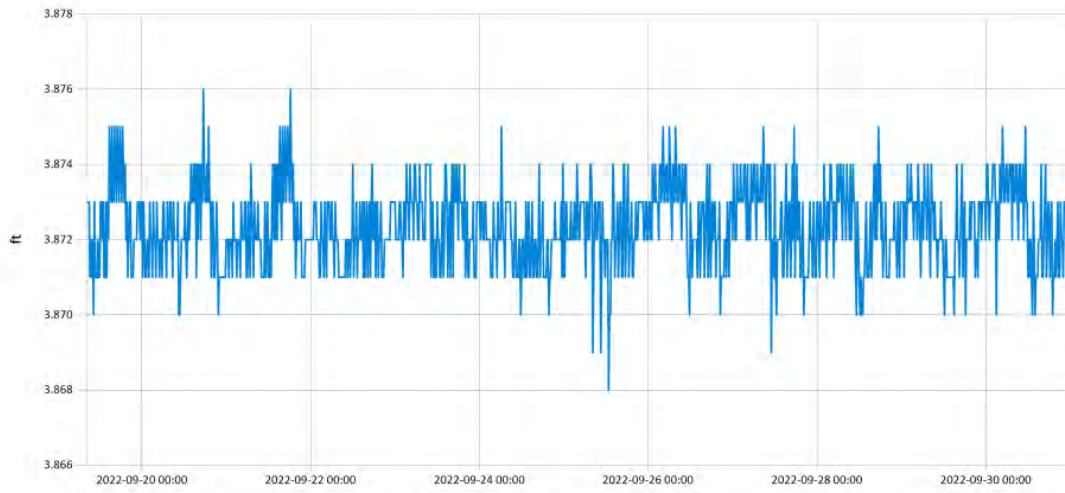


Stage@URC

Figure 8 Monthly Hydrograph URC-2

Period Selected: 2022-09-01 00:00 - 2022-09-30 23:59

UTC Offset: -06:00

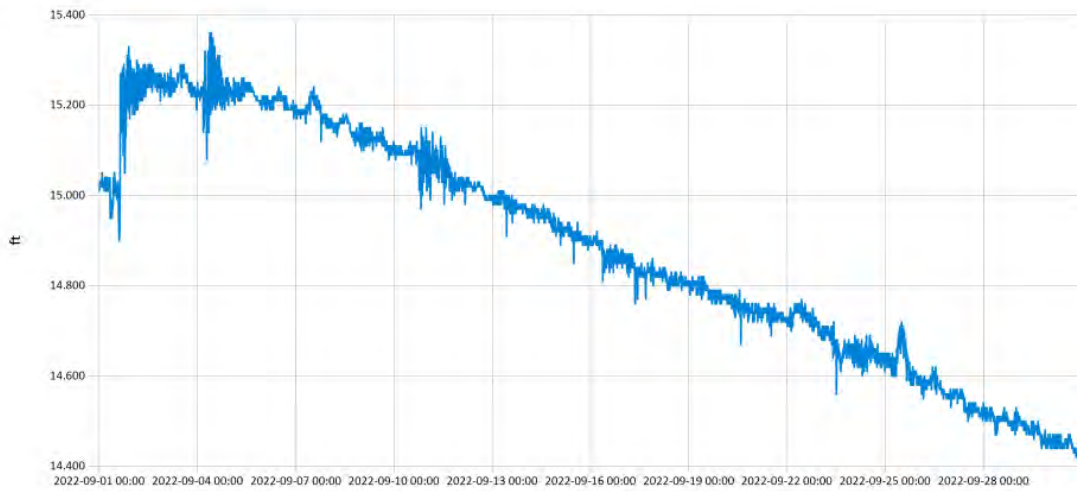


— Stage@LRC

Figure 9 Monthly Hydrograph LRC-1

Period Selected: 2022-09-01 00:00 - 2022-09-30 23:59

UTC Offset: -06:00

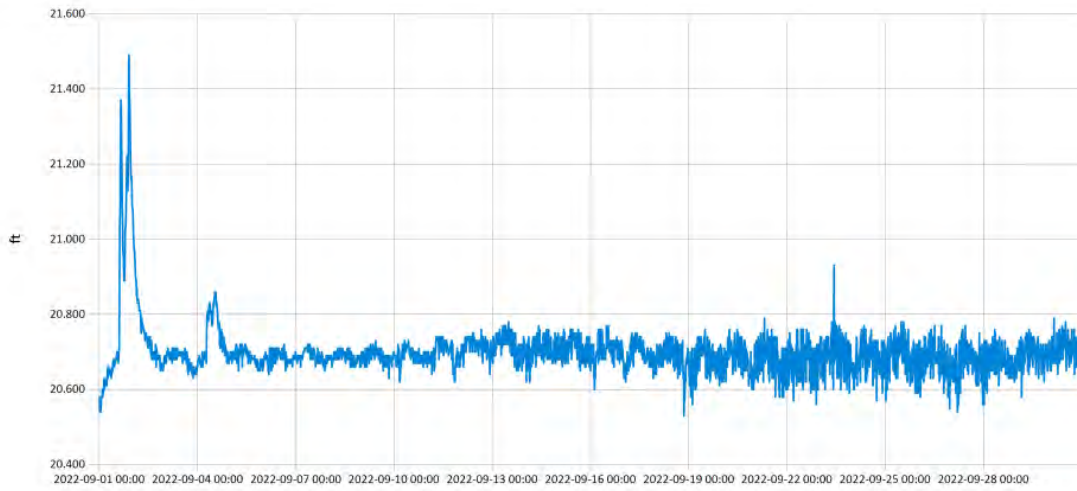


— Stage@LDB

Figure 10 Monthly Hydrograph LDB-1

Period Selected: 2022-09-01 00:00 - 2022-09-30 23:59

UTC Offset: -06:00

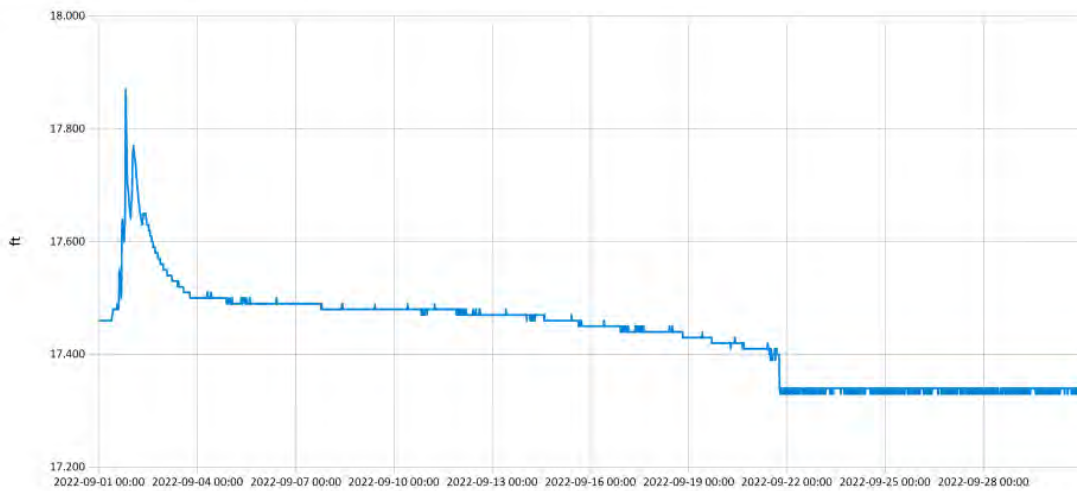


— Stage@CC

Figure 11 Monthly Hydrograph CC-1

Period Selected: 2022-09-01 00:00 - 2022-09-30 23:59

UTC Offset: -06:00



— Stage@UDB

Figure 12 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				September 2022				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	78	70	73.2	71.3	0	9	97	81	94	1.41	28.75	30.00	S	4.7	17.2	3.29	77.4	79.5	83	76	
2	93	70	80.2	70.3	0	17	97	43	75	0.01	28.72	29.96	S	5.4	14.7	21.12	77.9	79.4	86	74	
3	94	70	82.5	67.2	0	17	96	32	64	0.00	28.82	30.07	E	4.4	17.2	22.98	79.3	82.0	90	75	
4	89	65	77.1	60.7	0	12	90	20	61	0.12	28.76	30.01	NNE	4.8	37.1	22.49	78.9	81.8	88	76	
5	87	62	75.5	61.1	0	10	90	37	64	0.00	28.73	29.97	E	3.3	12.9	21.45	76.8	80.6	89	73	
6	91	64	77.1	63.4	0	12	96	39	66	0.00	28.81	30.05	NE	4.0	13.4	22.39	76.6	82.0	90	74	
7	90	65	77.6	63.1	0	12	91	40	64	0.00	28.83	30.08	NE	6.5	20.5	22.32	76.5	82.3	89	75	
8	88	62	75.3	60.8	0	10	91	39	63	0.00	28.68	29.93	E	3.8	16.2	23.09	76.1	82.3	90	75	
9	88	65	76.9	60.5	0	12	83	38	59	0.00	28.60	29.84	S	5.6	18.1	22.45	75.8	82.4	89	76	
10	89	60	72.9	58.9	0	9	94	35	65	0.03	28.77	30.02	N	7.4	30.2	19.41	74.9	81.5	88	75	
11	78	55	65.8	51.9	0	1	94	31	65	0.07	28.95	30.20	N	10.3	29.9	21.28	73.4	77.4	83	73	
12	84	50	68.5	50.0	0	2	95	28	57	0.00	28.81	30.06	SSE	3.3	13.0	22.83	70.9	76.2	85	68	
13	90	61	76.4	57.4	0	11	77	38	54	0.00	28.71	29.95	SSE	7.3	21.6	21.40	72.1	78.4	86	71	
14	90	67	77.4	55.0	0	13	63	32	47	0.00	28.77	30.02	SSE	9.1	19.3	21.30	74.0	80.3	87	74	
15	89	65	76.1	53.9	0	12	69	27	48	0.00	28.80	30.05	SSE	8.6	22.9	21.72	74.1	79.9	86	74	
16	91	67	78.7	61.2	0	14	73	40	56	0.00	28.74	29.99	SSE	9.9	26.2	20.73	74.7	80.5	87	75	
17	94	70	82.1	66.1	0	17	88	37	61	0.00	28.69	29.94	SSE	10.2	29.1	20.46	76.2	82.0	88	77	
18	95	74	83.8	66.4	0	20	84	36	58	0.00	28.71	29.96	S	9.3	23.8	20.85	77.6	83.6	89	78	
19	97*	71*	83.6*	63.1*	0*	19*	84*	25*	54*	0.00*	28.75*	30.00*	S	7.1*	18.5*	NA	77.8*	83.8*	89*	78*	
20	97	72	84.3	63.2	0	20	79	28	52	0.00	28.75	30.00	S	7.5	22.4	20.70	78.1	83.9	89	79	
21	98	75	84.7	62.4	0	21	69	30	49	0.00	28.74	29.99	S	6.7	21.5	17.40	78.3	83.9	89	80	
22	84	61	73.3	57.4	0	7	80	42	59	0.00	28.82	30.07	NNE	9.7	19.7	19.58	76.9	82.2	86	79	
23	94	57	75.0	55.4	0	10	80	27	55	0.00	28.75	30.00	SSW	7.5	23.0	20.20	75.3	79.9	86	74	
24	92	69	79.5	58.4	0	15	74	30	51	0.00	28.71	29.96	S	5.4	15.6	10.67	75.7	80.0	83	76	
25	89	62	75.0	50.4	0	10	93	21	48	0.00	28.80	30.05	NNE	8.9	27.8	20.35	74.6	79.1	84	75	
26	85	53	69.7	42.8	0	4	71	21	41	0.00	28.90	30.15	NNE	4.4	16.1	20.69	72.4	76.8	83	71	
27	91	55	75.0	43.3	0	8	63	18	35	0.00	28.87	30.12	S	6.6	22.2	19.83	72.1	76.6	83	71	
28	91	57	74.8	46.7	0	9	75	22	40	0.00	28.93	30.18	S	4.9	18.6	19.75	72.8	77.5	84	72	
29	81	60	69.4	42.8	0	5	57	26	40	0.00	28.94	30.19	SE	9.1	25.4	19.70	72.6	76.4	81	72	
30	83	57	68.7	42.9	0	5	61	26	41	0.00	28.83	30.08	SSE	7.1	18.5	19.20	71.6	75.0	81	70	
	89*	64*	76.3*	57.6*	<- Monthly Averages ->							28.78*	30.03*	S	6.8*	37.1*	19.99*	75.4*	80.2*	86*	74*
Temperature - Highest: 98*				Degree Days - Total HDD: 0*				Number of Days With:													
Lowest: 50*				Total CDD: 344*				Tmax ≥ 90: 16*				Rainfall ≥ 0.01 inch: 5*									
Rainfall: Monthly Total: 1.64* in.				Humidity - Highest: 97*				Tmax ≤ 32: 0*				Rainfall ≥ 0.10 inch: 2*									
Greatest 24 Hr: 1.41* in.				Lowest: 18*				Tmin ≤ 32: 0*				Avg Wind Speed ≥ 10 mph: 2*									
								Tmin ≤ 0: 0*				Max Wind Speed ≥ 30 mph: 2*									

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* Denotes incomplete record

Figure 13 September Mesonet Data

***Lake Thunderbird TMDL Monitoring Plan Implementation:
Sample Year (SY) 2022- October Report***



SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

October 2022 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
Monitoring and Assessment Section
3800 N. Classen, Oklahoma City, Oklahoma 73118
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SUMMARY OF OCTOBER WATER QUALITY SAMPLING

Sampling for October 2022 occurred during base flow conditions on the eleventh. Water samples were collected at seven locations and discharge was measured at three locations. Samples were not collected at JB-1 due to construction activity, or LT-1 and TE-1 due to dry conditions. Mesonet shows 0.02 inches of precipitation on the eleventh, 0.15 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 October was 2.43 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

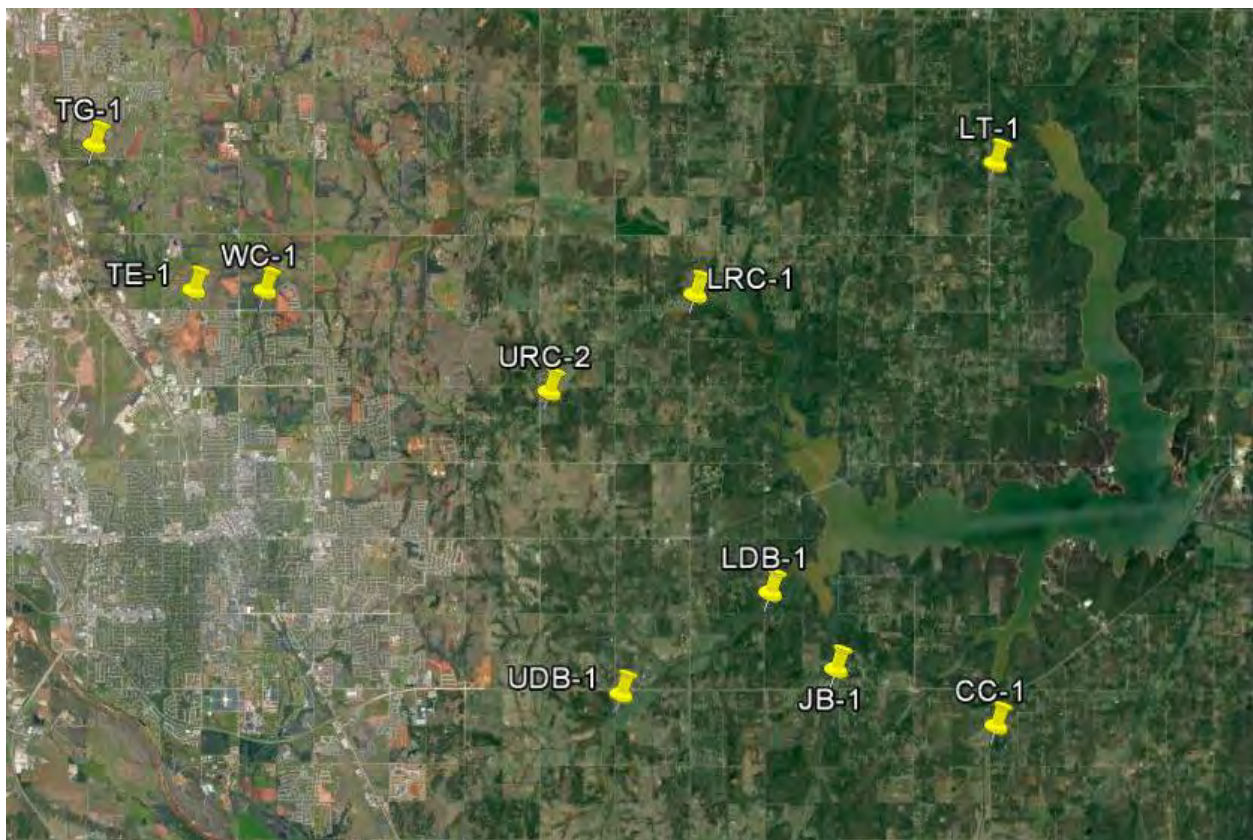


Figure 1 Monitoring Station Map

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	10/11/2022	8:55	SD	17.1	6.90	7.78	662	6	Used RP4; lots of vegetation on banks and encroaching channel; orifice partially buried in sand; 22 sample collected at approx 10:15
JB-1	Jim Blue Creek	10/11/2022	9:35	SD	N/A	N/A	N/A	N/A	N/A	Did not sample; muddy water at culvert; disconnected from channel downstream; construction still ongoing
LDB-1	Lower Dave Blue Creek	10/11/2022	9:55	SD	18.0	3.70	7.94	472	62	Very low water level; turbid; floating debris was dead leaves
LRC-1	Lower Rock Creek	10/11/2022	10:55	SD	17.4	7.38	7.82	628	10	Orifice out of water approx 8in; solar panel stolen but DCP working; raining at arrival but stopped when leaving
LT-1	Lake Laterals	10/11/2022	10:35	SD	N/A	N/A	N/A	N/A	N/A	Completely dry, did not sample
TE-1	Little River Tributary	10/11/2022	14:10	SD	N/A	N/A	N/A	N/A	N/A	Neither RP over water, completely dry under bridge, orifice not in water; water approx 40ft downstream of bridge and small pool upstream of bridge approx 30ft; did not sample
TG-1	Little River	10/11/2022	14:33	SD	19.5	9.69	8.14	947	2	Low/normal flow conditions; orifice under water; floating debris is leaves
UDB-1	Upper Dave Blue Creek	10/11/2022	8:22	SD	17.2	4.12	7.72	613	78	Collected from medium sized pool under bridge; downstream dry until the bend in channel; upstream disconnected pools; orifice out of water a few inches; RP not over water
URC-2	Upper Rock Creek	10/11/2022	12:03	SD	18.3	2.92	7.37	914	24	RP2 barely over water, channel disconnected from downstream (dry), orifice out of water a few inches; barely connected under bridge, channel may have been disconnected upstream
WC-1	Woodcrest Creek	10/11/2022	13:48	SD	22.3	2.09	7.78	1038	94	Neither RP over water, under bridge dry; sampled upstream of bridge, downstream pool approx 50ft downstream of bridge; orifice out of water; tree debris in channel on downstream of 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	<0.05	0.27	0.036	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	1.18	0.095	45.0
LRC-1	Lower Rock Creek	<0.05	0.31	0.039	5.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	N/A	N/A	N/A	N/A
TG-1	Little River	<0.05	0.43	0.023	<5.0
UDB-1	Upper Dave Blue Creek	1.32	1.74	0.115	42.0
URC-2	Upper Rock Creek	<0.05	0.72	0.085	12.0
WC-1	Woodcrest Creek	<0.05	2.51	0.543	70.0

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	<0.05	0.30	0.037	<5.0
Duplicate RPD	0%	10.53%	2.74%	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	0.22	20.37
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.11	14.26
LRC-1	Lower Rock Creek	0.06	3.75
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	N/A	N/A
TG-1	Little River	1.08	9.11
UDB-1	Upper Dave Blue Creek	N/A	N/A
URC-2	Upper Rock Creek	0.01	10.75
WC-1	Woodcrest Creek	N/A	N/A

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

File Information

File name: Little River_20221011.ft
 Start date and time: 10/11/2022 2:00 PM
 Start location latitude: 35.290
 Start location longitude: -97.478
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 10/11/2022 2:01 PM End time: 10/11/2022 2:27 PM
 # Stations: 22 Avg interval: 40
 Mean depth: 0.732 ft Max depth: 1.100 ft
 Mean velocity: 0.0773 ft/s Max velocity: 0.1180 ft/s
 Mean SNR: 29 dB Total width: 19.000 ft
 Mean temp: 67.548 °F Total area: 13.9125 ft²
 Wetted Perimeter: 19.262 ft Total discharge: 1.0757 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	2.7%
Velocity	0.4%	4.1%
Width	0.1%	0.1%
Method	1.9%	
# Stations	2.3%	
Overall	3.2%	5.0%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft ³ /s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
10/11/2022 2:15 PM	9.110				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q
0	2:01 PM	0.000	None	0.000	0.000	0.000	0	0.0000		-0.0012	0.0000	0.0000	0.00
1	2:01 PM	1.000	0.6	0.400	0.6000	0.240	80	-0.0012	1.0000	-0.0012	0.4000	-0.0005	-0.04
2	2:03 PM	2.000	0.6	0.700	0.6000	0.420	80	0.0888	1.0000	0.0888	0.7000	0.0622	5.78
3	2:04 PM	3.000	0.6	1.050	0.6000	0.630	80	0.0837	1.0000	0.0837	1.0500	0.0879	8.17
4	2:06 PM	4.000	0.6	1.100	0.6000	0.660	80	0.1180	1.0000	0.1180	0.8250	0.0973	9.05
5	2:26 PM	4.500	0.6	1.100	0.6000	0.660	80	0.0989	1.0000	0.0989	0.5500	0.0544	5.06
6	2:07 PM	5.000	0.6	1.050	0.6000	0.630	80	0.0976	1.0000	0.0976	0.7875	0.0769	7.14
7	2:08 PM	6.000	0.6	1.100	0.6000	0.660	80	0.0821	1.0000	0.0821	1.1000	0.0903	8.39
8	2:10 PM	7.000	0.6	1.100	0.6000	0.660	80	0.0801	1.0000	0.0801	1.1000	0.0881	8.19
9	2:11 PM	8.000	0.6	1.100	0.6000	0.660	80	0.0803	1.0000	0.0803	0.8250	0.0662	6.16
10	2:27 PM	8.500	0.6	1.100	0.6000	0.660	80	0.0906	1.0000	0.0906	0.5500	0.0498	4.63
11	2:12 PM	9.000	0.6	1.100	0.6000	0.660	80	0.1043	1.0000	0.1043	0.8250	0.0860	8.00
12	2:13 PM	10.000	0.6	0.950	0.6000	0.570	80	0.0891	1.0000	0.0891	0.9500	0.0846	7.87
13	2:15 PM	11.000	0.6	0.800	0.6000	0.480	80	0.0878	1.0000	0.0878	0.8000	0.0702	6.53
14	2:16 PM	12.000	0.6	0.700	0.6000	0.420	80	0.0595	1.0000	0.0595	0.7000	0.0417	3.87
15	2:17 PM	13.000	0.6	0.650	0.6000	0.390	80	0.0584	1.0000	0.0584	0.6500	0.0380	3.53
16	2:18 PM	14.000	0.6	0.550	0.6000	0.330	80	0.0584	1.0000	0.0584	0.5500	0.0321	2.98
17	2:20 PM	15.000	0.6	0.500	0.6000	0.300	80	0.0422	1.0000	0.0422	0.5000	0.0211	1.96
18	2:21 PM	16.000	0.6	0.450	0.6000	0.270	80	0.0461	1.0000	0.0461	0.4500	0.0208	1.93
19	2:22 PM	17.000	0.6	0.400	0.6000	0.240	80	0.0294	1.0000	0.0294	0.4000	0.0118	1.09
20	2:23 PM	18.000	0.6	0.200	0.6000	0.120	80	-0.0159	1.0000	-0.0159	0.2000	-0.0032	-0.29
21	2:24 PM	19.000	None	0.000	0.0000	0.000	0	0.0000		-0.0159	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	2:01 PM	1.000	0.6	0.400	0.6000	0.240	SNR Threshold Variation
2	2:03 PM	2.000	0.6	0.700	0.6000	0.420	Large SNR Variation, SNR Threshold Variation
7	2:08 PM	6.000	0.6	1.100	0.6000	0.660	Velocity Angle > QC
18	2:21 PM	16.000	0.6	0.450	0.6000	0.270	Large SNR Variation
19	2:22 PM	17.000	0.6	0.400	0.6000	0.240	SNR Threshold Variation
20	2:23 PM	18.000	0.6	0.200	0.6000	0.120	SNR Threshold Variation

Figure 4 Discharge Measurement Summary TG-1

Period Selected: 2022-10-01 00:00 - 2022-10-31 23:59

UTC Offset: -06:00

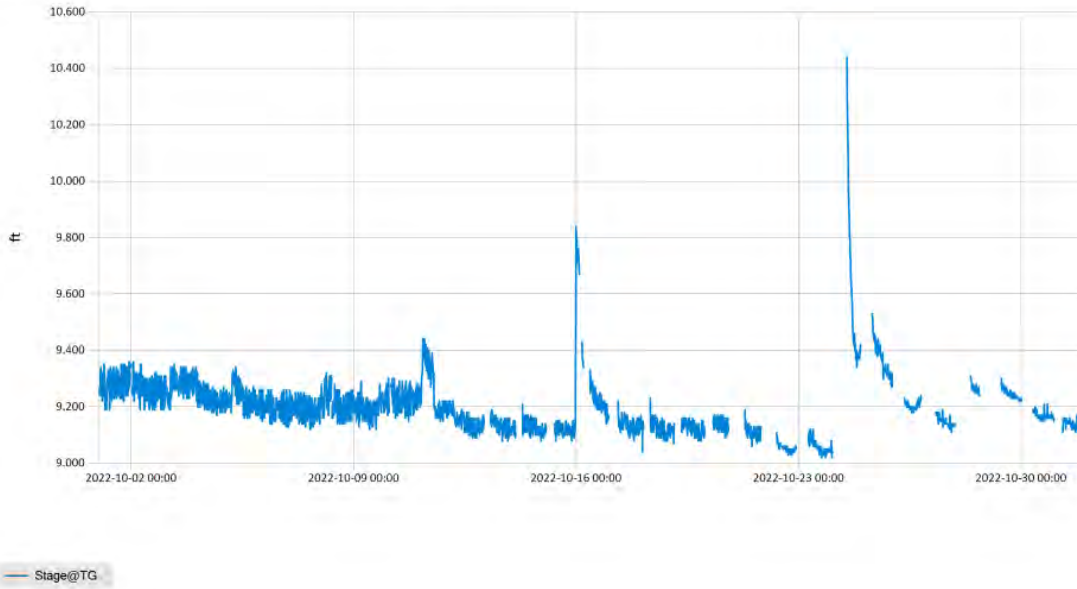


Figure 5 Monthly Hydrograph TG-1

Period Selected: 2022-10-01 00:00 - 2022-10-31 23:59

UTC Offset: -06:00

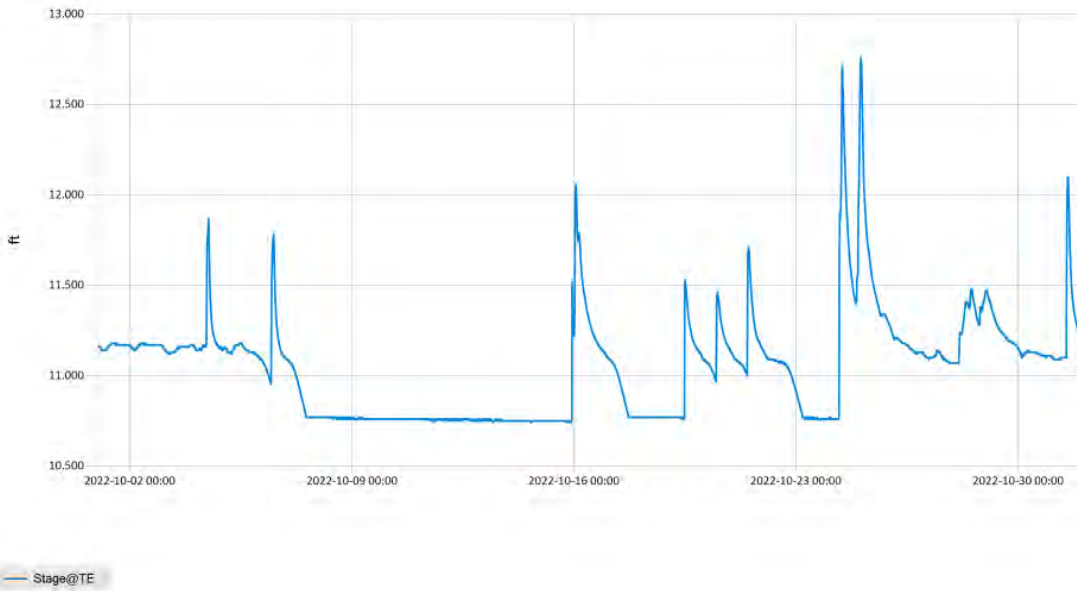
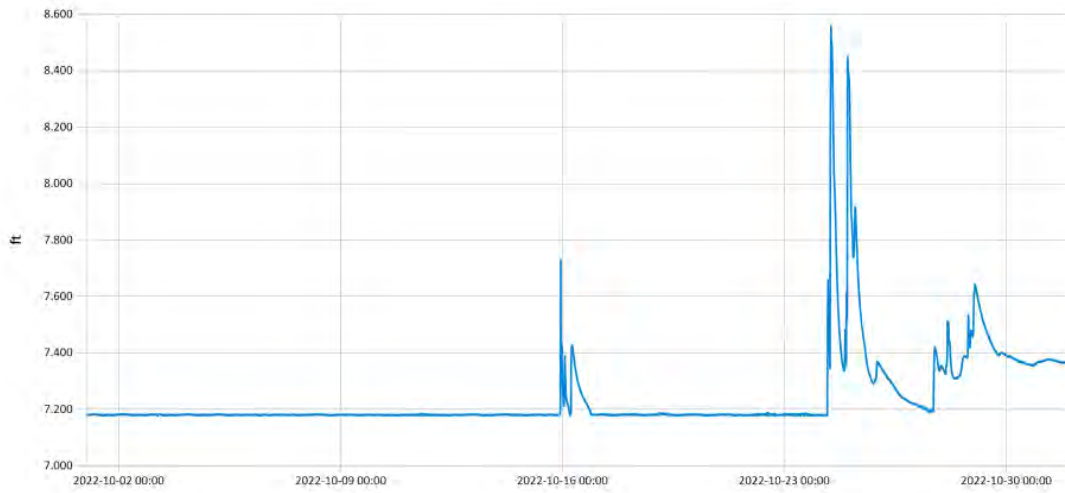


Figure 6 Monthly Hydrograph TE-1

Period Selected: 2022-10-01 00:00 - 2022-10-31 23:59

UTC Offs et: -06:00

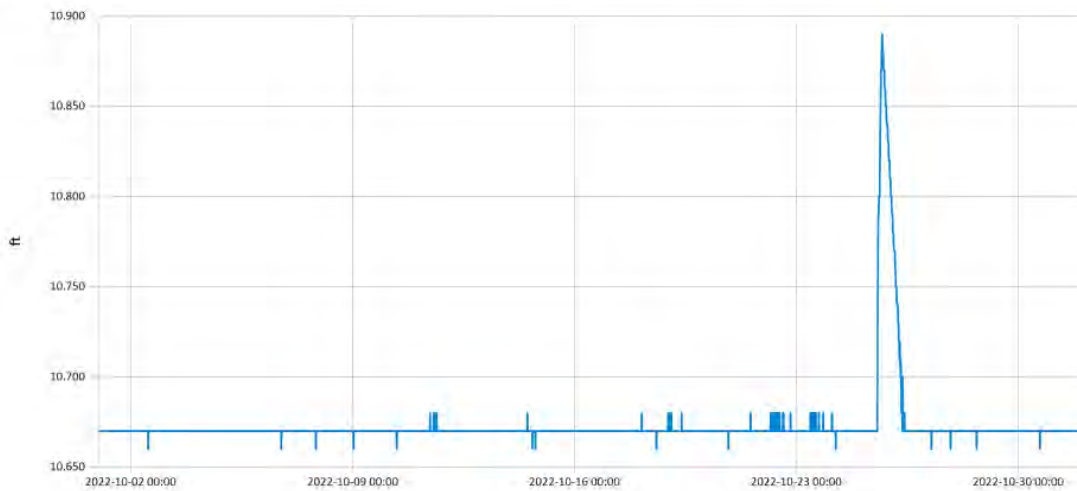


Stage@WC

Figure 7 Monthly Hydrograph WC-1

Period Selected: 2022-10-01 00:00 - 2022-10-31 23:59

UTC Offs et: -06:00

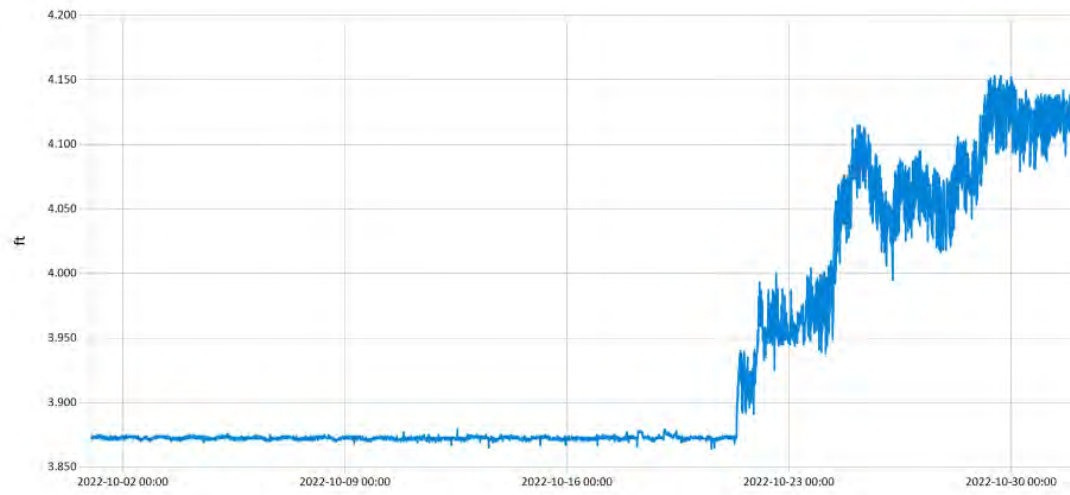


Stage@URC

Figure 8 Monthly Hydrograph URC-2

Period Selected: 2022-10-01 00:00 - 2022-10-31 23:59

UTC Offs et: -06:00



— Stage@LRC

Figure 9 Monthly Hydrograph LRC-1

Period Selected: 2022-10-01 00:00 - 2022-10-31 23:59

UTC Offs et: -06:00

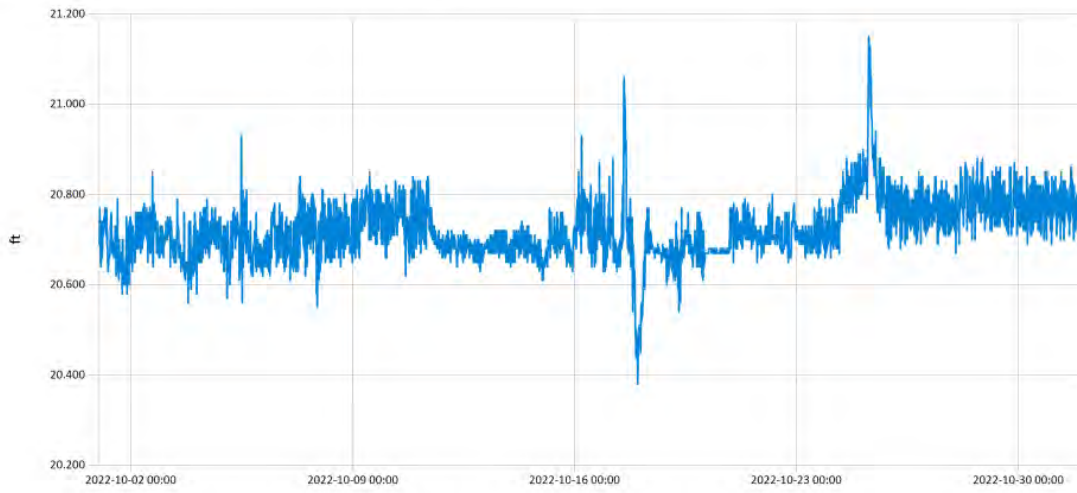


— Stage@LDB

Figure 10 Monthly Hydrograph LDB-1

Period Selected: 2022-10-01 00:00 - 2022-10-31 23:59

UTC Offset: -06:00

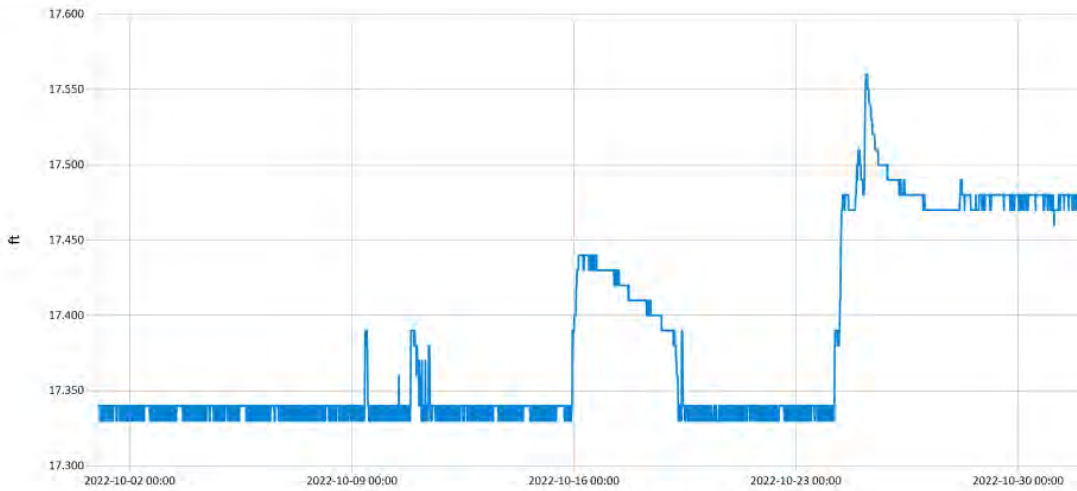


— Stage@CC

Figure 11 Monthly Hydrograph CC-1

Period Selected: 2022-10-01 00:00 - 2022-10-31 23:59

UTC Offset: -06:00



— Stage@UDB

Figure 12 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY																													
October 2022																													
(NRMN) Norman																													
Nearest City: 2.1 NW Norman																													
Latitude: 35-14-09																													
Longitude: 97-27-53																													
Time Zone: Midnight-Midnight CST																													
County: Cleveland																													
Elevation: 1171 feet																													
DAY	TEMPERATURE (°F)				DEG DAYS		HUMIDITY (%)			RAIN (in)	PRESSURE (in)		WIND SPEED (mph)		SOLAR (MJ/m ²)	4" SOIL TEMPERATURES													
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG		STN	MSL	DIR	AVG		MAX	SOD	BARE	MAX	MIN									
1	84	51	67.3	39.1	0	2	74	19	39	0.00	28.83	30.08	ESE	3.4	13.8	19.94	70.5	74.6	81	69									
2	85	48	67.8	39.6	0	2	78	16	41	0.00	28.93	30.18	E	3.5	13.9	19.82	69.2	73.6	80	67									
3	84	50	67.1	41.8	0	2	79	20	44	0.00	28.92	30.18	S	3.7	17.2	19.44	69.2	73.5	80	67									
4	84	50	67.6	44.5	0	2	82	21	48	0.00	28.85	30.10	SSE	3.9	16.2	19.24	68.8	73.0	79	67									
5	85	53	69.1	46.6	0	4	79	24	48	0.00	28.86	30.11	SSW	2.8	13.7	16.33	69.3	73.4	79	68									
6	87	59	71.2	48.6	0	8	75	22	49	0.00	28.93	30.18	NE	3.1	17.9	16.26	70.4	74.5	80	70									
7	66	55	63.3	47.5	4	0	70	29	57	0.00	29.06	30.31	N	7.7	20.9	4.71	68.5	71.1	73	69									
8	69	49	56.3	38.6	6	0	72	32	53	0.00	29.13	30.39	NNE	6.2	18.3	10.44	66.2	68.2	72	65									
9	73	55	61.5	54.3	1	0	91	55	78	0.05	29.00	30.26	SSW	4.8	15.9	10.22	66.5	67.9	71	66									
10	77	60	67.1	58.3	0	3	96	53	75	0.10	28.89	30.14	SSE	4.3	16.7	8.55	67.6	69.0	73	66									
11	78	62	67.9	60.2	0	5	95	49	78	0.02	28.73	29.97	S	9.7	32.6	12.08	68.1	69.6	73	67									
12	82	53	69.1	49.4	0	2	85	21	54	0.00	28.69	29.93	N	8.3	23.2	17.81	67.9	70.5	76	66									
13	75	45	60.8	33.6	5	0	72	17	40	0.00	28.83	30.08	N	6.7	20.9	17.90	64.0	67.6	73	62									
14	85	45	67.1	39.0	0	0	81	18	40	0.00	28.67	29.91	SW	8.0	29.3	17.77	63.6	67.4	73	61									
15	90	53	73.4	53.8	0	6	91	31	52	0.56	28.66	29.91	S	7.1	50.3	16.44	66.7	70.7	77	64									
16	69	57	62.6	50.1	2	0	90	44	65	0.15	28.85	30.11	N	8.0	23.4	4.98	66.3	66.6	72	62									
17	61	42	52.6	28.7	14	0	69	20	42	0.00	28.97	30.23	N	9.8	23.5	17.74	62.6	61.4	67	57									
18	57	36	45.2	19.5	19	0	72	17	40	0.00	29.05	30.31	N	7.1	27.2	16.77	58.3	57.8	64	53									
19	65	32	49.1	26.2	16	0	83	21	45	0.00	28.96	30.22	S	5.0	17.0	17.28	56.2	57.0	64	50									
20	77	38	57.9	36.8	8	0	85	21	49	0.00	28.71	29.95	SSE	4.2	13.7	16.78	57.9	60.1	68	53									
21	88	49	68.9	42.4	0	4	81	16	45	0.00	28.57	29.81	S	9.4	26.7	17.00	59.8	63.2	71	56									
22	91	66	76.4	49.4	0	14	53	17	40	0.00	28.40	29.63	S	14.8	37.6	16.37	63.0	67.9	73	63									
23	83	67	74.7	58.7	0	10	78	46	58	0.00	28.45	29.69	S	14.5	34.6	11.85	65.6	69.9	73	67									
24	74	51	60.9	55.8	2	0	96	61	84	1.19	28.49	29.73	NNE	12.1	44.3	4.25	64.9	66.4	70	61									
25	65	43	53.2	38.2	11	0	93	30	61	0.06	28.66	29.91	NW	12.3	40.7	16.37	60.8	58.5	62	56									
26	69	41	55.7	36.2	10	0	91	30	51	0.00	28.80	30.05	SE	6.7	18.3	16.35	58.8	56.8	64	51									
27	70	49	58.8	38.9	6	0	64	35	48	0.00	28.74	29.98	SE	11.2	27.0	14.34	59.1	58.6	64	53									
28	58	50	54.0	47.3	11	0	93	56	79	0.30	28.91	30.17	NNE	6.7	16.8	4.08	59.2	58.0	60	57									
29	64	51	56.6	49.1	8	0	91	60	77	0.00	28.84	30.09	N	7.1	19.6	5.81	59.3	57.3	60	56									
30	67	46	56.3	48.1	8	0	95	48	76	0.00	28.72	29.97	NW	5.7	17.2	10.47	59.6	57.7	62	55									
31	74	41	57.3	43.3	7	0	97	31	64	0.00	28.76	30.01	S	3.0	13.2	14.70	58.0	57.1	64	50									
← Monthly Averages →																													
	75	50	62.5	44.0							28.80	30.05	S	7.1	50.3	13.94	64.1	65.8	71	61									
Temperature - Highest: 91							Degree Days - Total HDD: 138							Number of Days With:															
Lowest: 32							Total CDD: 63							Tmax ≥ 90: 2				Rainfall ≥ 0.01 inch: 8											
Rainfall: Monthly Total: 2.43 in.							Humidity - Highest: 97							Tmax ≤ 32: 0				Rainfall ≥ 0.10 inch: 5											
														Greatest 24 Hr: 1.19 in.				Lowest: 16				Tmin ≤ 32: 1				Avg Wind Speed ≥ 10 mph: 5			
																						Tmin ≤ 0: 0				Max Wind Speed ≥ 30 mph: 6			

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* Denotes incomplete record

Figure 13 October Mesonet Data

***Lake Thunderbird TMDL Monitoring Plan Implementation:
Sample Year (SY) 2022- November Report***



SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

November 2022 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
Monitoring and Assessment Section
3800 N. Classen, Oklahoma City, Oklahoma 73118
405-530-8800

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SUMMARY OF NOVEMBER WATER QUALITY SAMPLING

Sampling for November 2022 occurred during base flow conditions on the seventh. Water samples were collected at eight locations and discharge was measured at two locations. Samples were not collected at JB-1 due to construction activity, or LT-1 due to dry conditions. Mesonet shows no precipitation on the seventh, 0.11 inches of precipitation in the 72 hours prior to sampling, and 0.40 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of November was 1.90 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

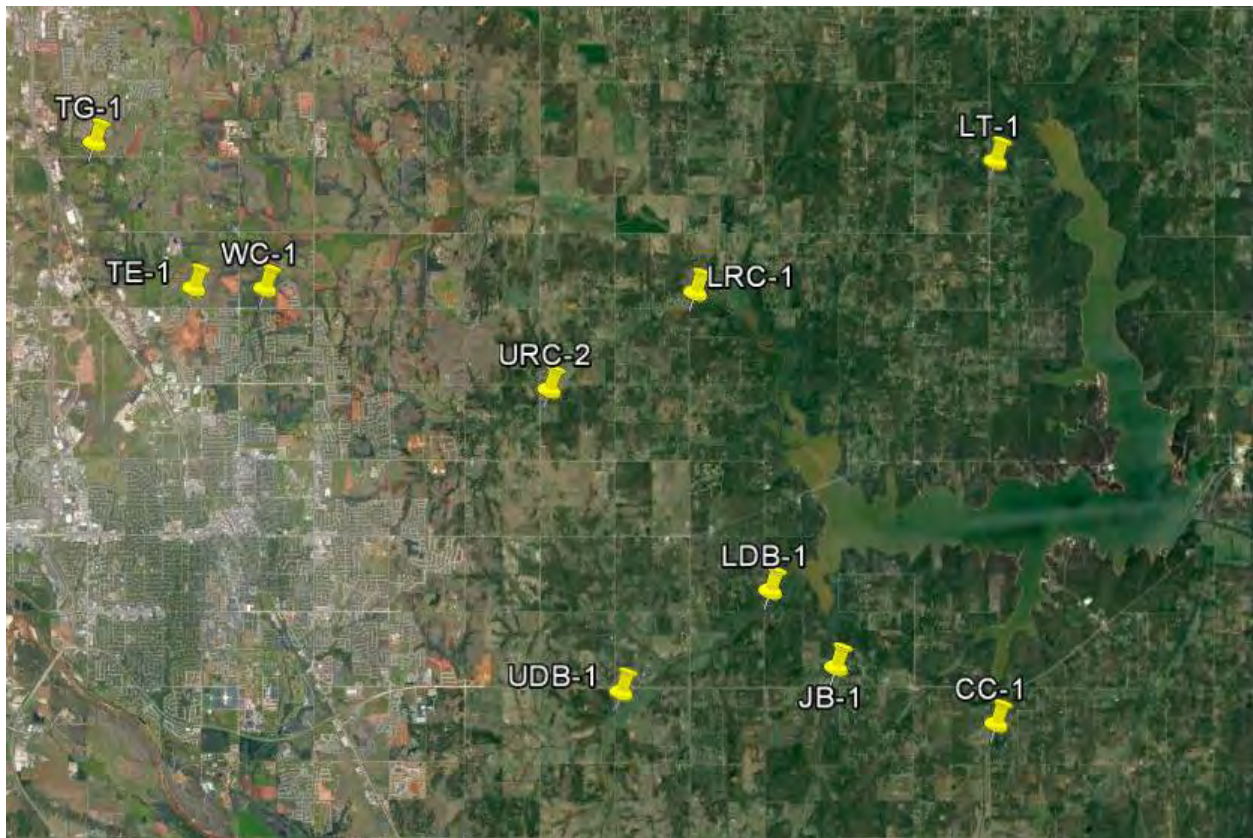


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	11/7/2022	9:10	NH	13.1	6.34	7.72	685	8	Two beaver dams- one upstream of bridge, one downstream of bridge approx 25 ft upstream of sampling area; Used RP3
JB-1	Jim Blue Creek	11/7/2022	9:50	NH	N/A	N/A	N/A	N/A	N/A	Under construction- did not sample
LDB-1	Lower Dave Blue Creek	11/7/2022	10:15	NH	12.9	2.57	7.70	645	28	Water level low ; scum on surface
LRC-1	Lower Rock Creek	11/7/2022	11:20	NH	12.5	3.61	7.59	673	10	Installed new solar panel, got rain gauge working; looked to be some oil/grease under bridge
LT-1	Lake Laterals	11/7/2022	10:45	NH	N/A	N/A	N/A	N/A	N/A	Site completely dry, did not sample
TE-1	Little River Tributary	11/7/2022	14:55	NH	14.8	9.57	7.95	542	21	Barely connected under bridge; orifice out of water
TG-1	Little River	11/7/2022	16:00	NH	14.3	8.20	7.70	651	4	Not a very prominent periphyton line; replaced battery
UDB-1	Upper Dave Blue Creek	11/7/2022	8:40	NH	12.1	2.36	7.73	674	9	Upstream not connected; water has brownish-black tint, looks like tea
URC-2	Upper Rock Creek	11/7/2022	12:40	NH	13.1	5.52	7.44	670	23	Leaves as floating debris, mostly downstream
WC-1	Woodcrest Creek	11/7/2022	14:10	NH	13.2	5.19	7.57	669	16	Beaver signs under bridge- possible early dam construction

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	<0.05	0.24	0.048	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.84	0.078	11.0
LRC-1	Lower Rock Creek	<0.05	0.35	0.076	5.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	0.08	0.25	0.031	7.0
TG-1	Little River	<0.05	0.35	0.048	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.91	0.171	6.0
URC-2	Upper Rock Creek	<0.05	0.74	0.090	14.0
WC-1	Woodcrest Creek	<0.05	0.46	0.097	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	<0.05	0.24	0.048	<5.0
Duplicate RPD	0%	0%	0%	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	0.27	20.24
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.14	13.92
LRC-1	Lower Rock Creek	1.88	4.39
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.01	10.67
TG-1	Little River	0.30	8.77
UDB-1	Upper Dave Blue Creek	0.01	16.92
URC-2	Upper Rock Creek	0.01	10.64
WC-1	Woodcrest Creek	0.01	7.49

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

Period Selected: 2022-11-01 00:00 - 2022-11-30 23:59

UTC Offset: -06:00

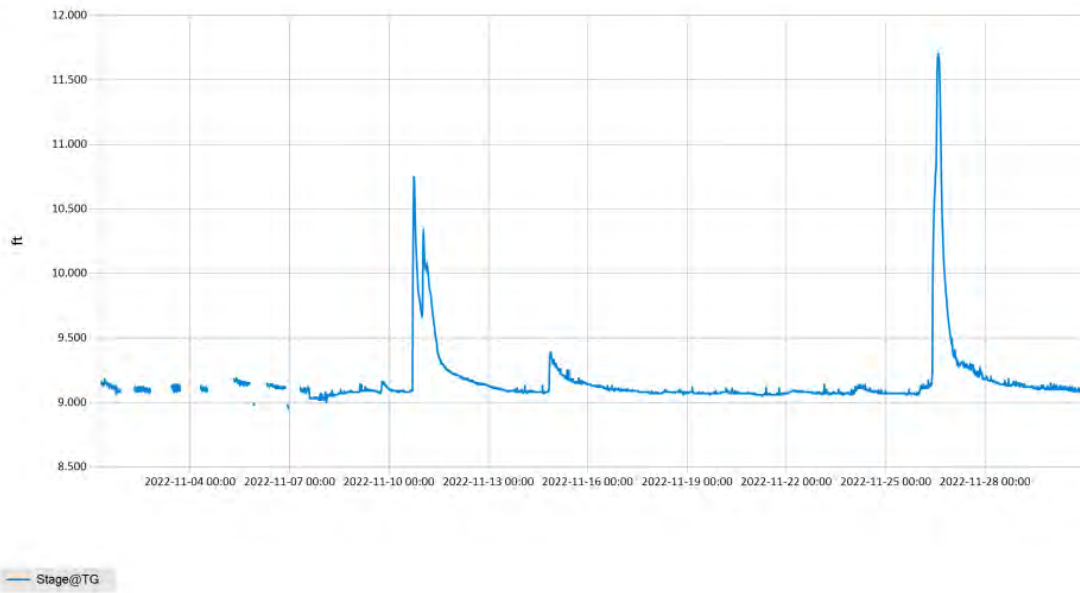


Figure 4 Monthly Hydrograph TG-1

Period Selected: 2022-11-01 00:00 - 2022-11-30 23:59

UTC Offset: -06:00

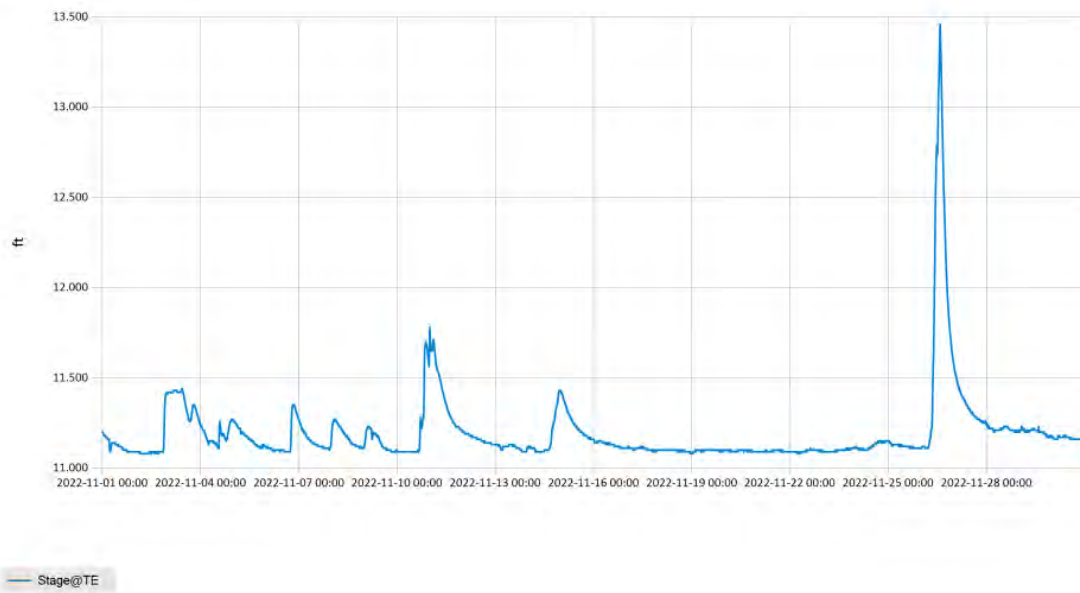


Figure 5 Monthly Hydrograph TE-1

Period Selected: 2022-11-01 00:00 - 2022-11-30 23:59

UTC Offset: -06:00

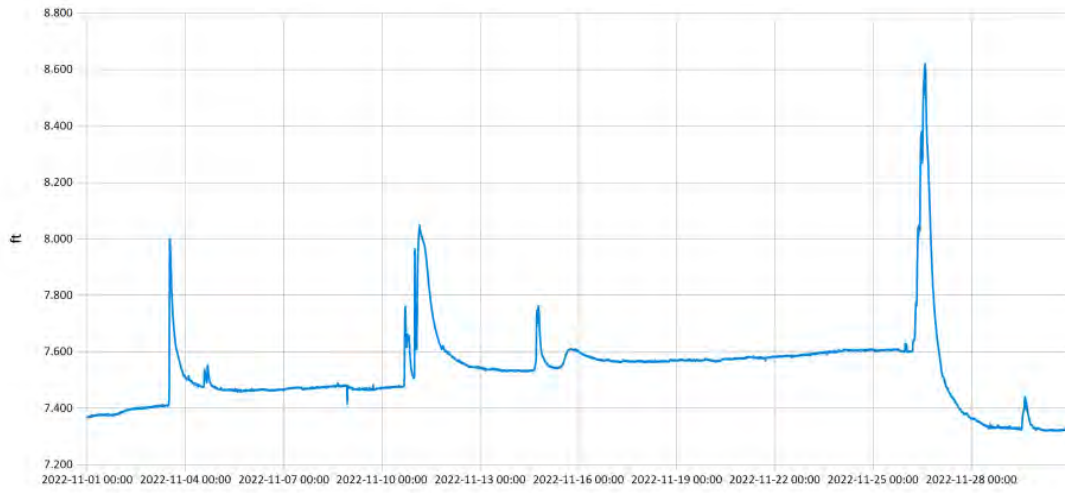


Figure 6 Monthly Hydrograph WC-1

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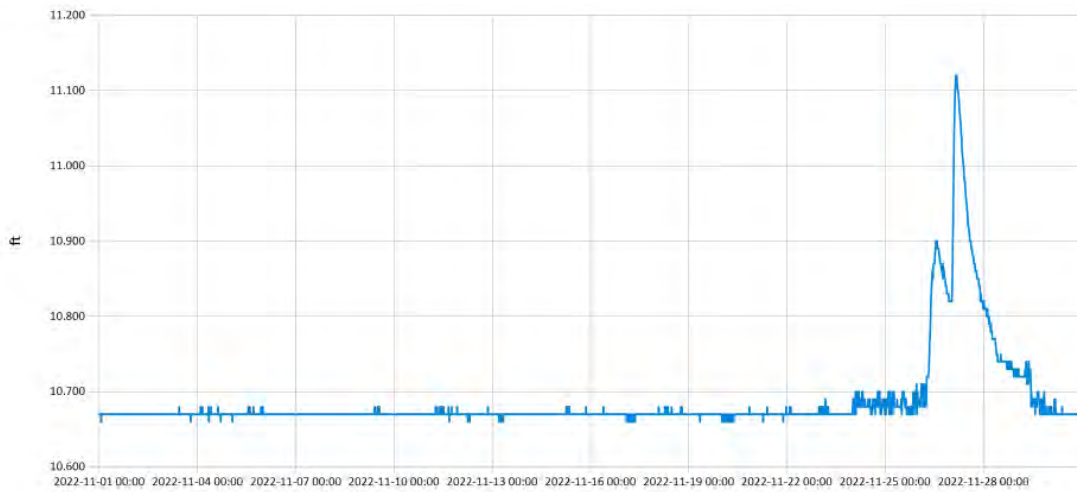
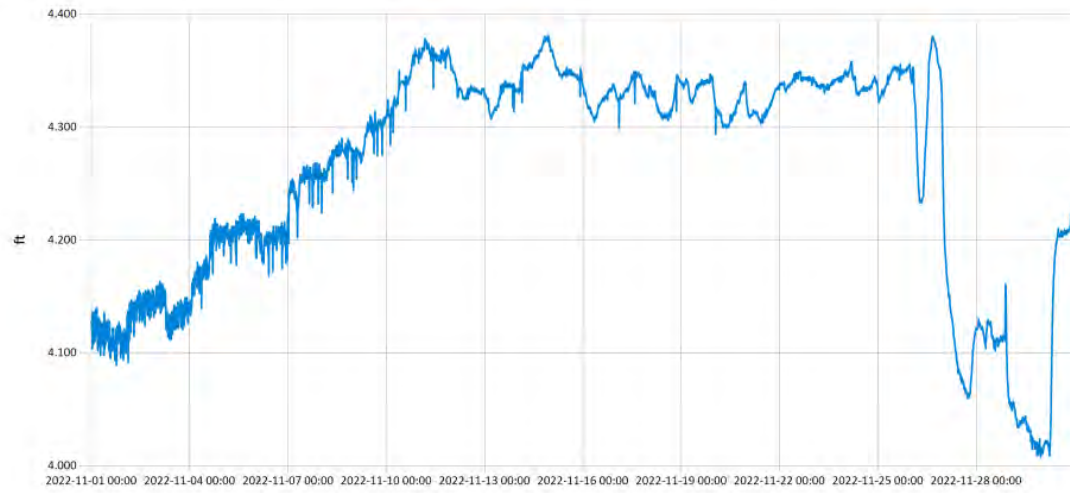


Figure 7 Monthly Hydrograph URC-2

Period Selected: 2022-11-01 00:00 - 2022-11-30 23:59

UTC Offset: -06:00

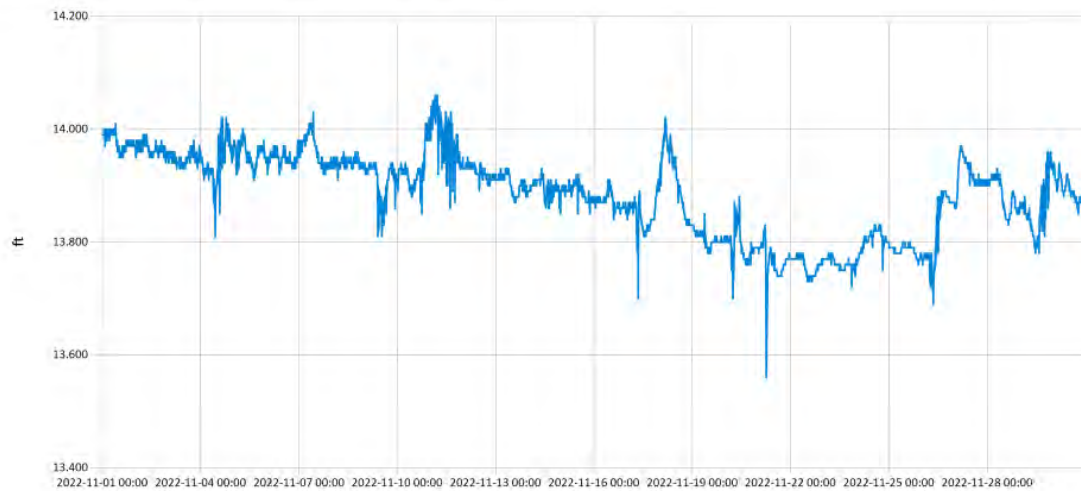


— Stage@LRC

Figure 8 Monthly Hydrograph LRC-1

Period Selected: 2022-11-01 00:00 - 2022-11-30 23:59

UTC Offset: -06:00

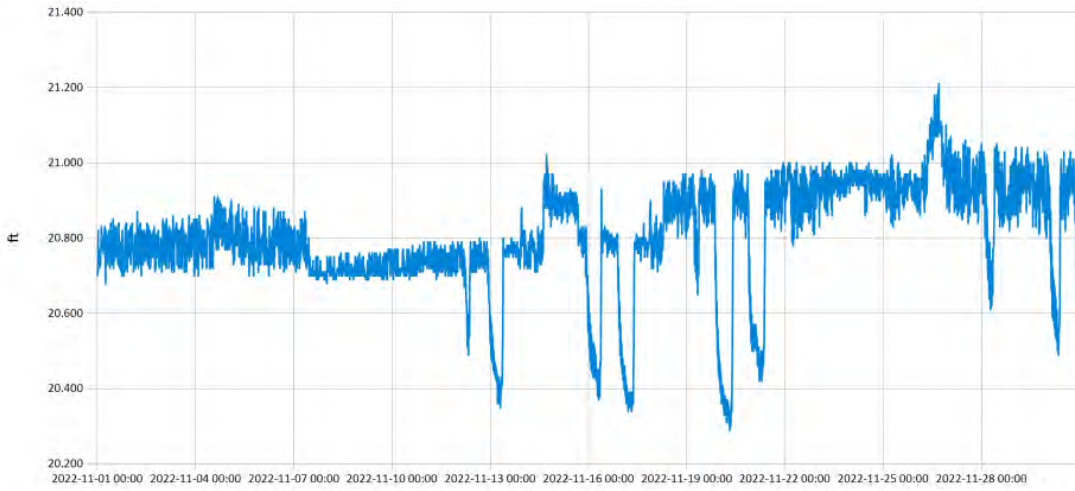


— Stage@LDB

Figure 9 Monthly Hydrograph LDB-1

Period Selected: 2022-11-01 00:00 - 2022-11-30 23:59

UTC Offset: -06:00

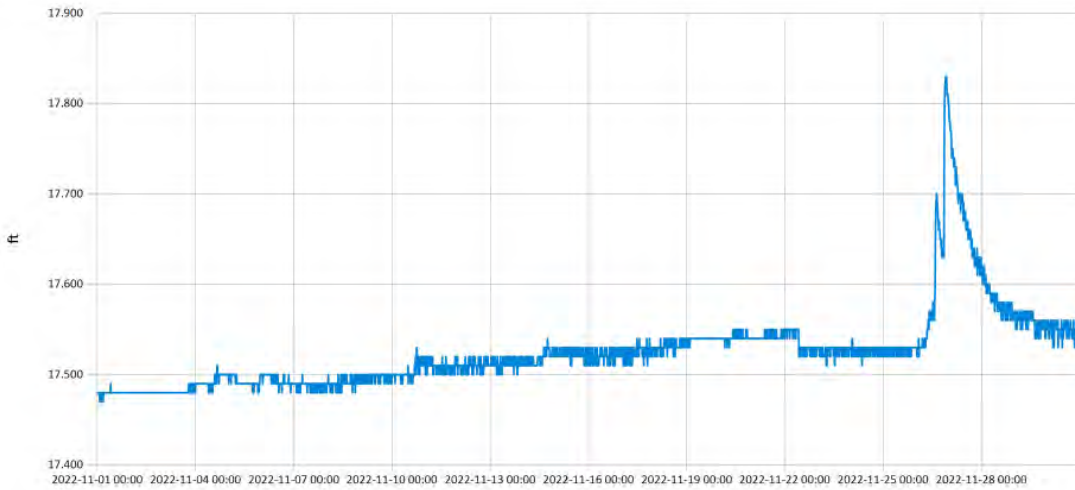


— Stage@CC

Figure 10 Monthly Hydrograph CC-1

Period Selected: 2022-11-01 00:00 - 2022-11-30 23:59

UTC Offset: -06:00



— Stage@UDB

Figure 11 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY					November 2022					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 (in)		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	76	46	62.5	48.6	4	0	88	37	63	0.00	28.86	30.11	S	5.9	19.4	14.97	58.9	59.8	67	53	
2	67	53	59.2	54.3	5	0	95	69	84	0.00	28.87	30.12	SSE	7.8	19.5	5.38	59.8	59.5	61	57	
3	72	60	67.1	61.9	0	1	91	76	84	0.00	28.70	29.94	SSE	11.0	22.8	4.40	61.4	62.1	65	59	
4	72	42	56.7	52.1	8	0	93	74	85	0.11	28.55	29.79	S	13.8	34.3	2.64	62.4	62.0	67	54	
5	60	34	48.9	37.7	18	0	95	40	68	0.00	28.57	29.81	SSE	10.0	28.9	14.92	57.6	54.7	60	49	
6	75	50	59.6	43.5	3	0	80	29	58	0.00	28.63	29.87	SSE	6.2	24.0	14.29	58.1	58.2	65	53	
7	67	50	59.6	53.2	7	0	93	69	80	0.00	28.95	30.21	NE	6.3	16.4	5.39	58.7	58.7	62	55	
8	76	66	69.0	65.6	0	6	98	72	89	0.03	28.96	30.21	SSE	9.5	22.3	5.72	62.1	64.3	67	62	
9	79	67	70.9	62.3	0	8	93	51	76	0.00	28.82	30.07	SSE	11.9	31.3	11.15	64.3	67.3	72	65	
10	69	45	61.3	57.5	8	0	96	78	88	0.37	28.65	29.90	S	12.2	27.8	3.86	64.1	64.9	67	59	
11	45	31	38.1	27.9	27	0	93	46	68	0.03	28.84	30.10	N	17.7	35.5	7.83	57.9	52.3	59	46	
12	46	25	35.3	21.7	29	0	83	35	60	0.04	29.03	30.29	NNW	6.1	16.9	14.14	52.9	46.2	51	43	
13	53	26	39.7	22.5	26	0	76	30	52	0.00	28.94	30.20	SSE	7.1	21.1	13.66	50.6	45.9	52	41	
14	40	32	36.4	29.9	29	0	96	57	78	0.20	28.84	30.09	ESE	7.9	19.1	2.61	50.4	45.6	47	44	
15	47	29	36.4	27.0	27	0	94	42	71	0.00	29.07	30.33	NNW	8.8	22.9	13.43	49.3	44.4	49	42	
16	46	26	35.0	25.5	29	0	96	40	72	0.00	29.19	30.45	NNW	5.0	19.5	13.39	47.3	43.0	48	40	
17	57	23	40.8	26.6	25	0	93	33	60	0.00	29.09	30.35	SSW	6.5	24.9	13.18	46.2	43.5	50	38	
18	38	27	31.5	16.7	33	0	81	39	55	0.00	29.18	30.45	NNE	11.8	30.0	5.05	46.3	43.4	46	41	
19	47	25	34.1	14.9	29	0	73	21	48	0.00	29.16	30.43	W	5.7	18.5	12.85	45.3	42.6	48	39	
20	50	20	35.6	18.2	30	0	90	26	53	0.00	29.14	30.40	S	4.4	15.4	13.18	43.7	41.7	47	37	
21	57	29	42.8	30.1	22	0	88	38	62	0.00	29.04	30.30	S	6.2	17.5	12.61	44.8	43.8	50	39	
22	58	36	45.3	39.6	18	0	98	57	82	0.00	28.99	30.25	S	6.4	21.0	12.39	46.8	46.7	52	43	
23	52	41	47.5	46.3	18	0	97	92	96	0.04	28.79	30.04	SSE	8.3	25.4	1.98	48.3	47.7	50	45	
24	53	45	49.5	46.4	16	0	98	76	89	0.03	28.82	30.07	NNE	9.7	24.1	3.17	50.2	50.0	51	49	
25	51	37	44.9	34.4	21	0	80	54	67	0.00	28.99	30.24	N	8.8	21.1	6.53	49.6	47.8	49	46	
26	49	44	46.6	44.0	18	0	97	63	91	1.04	28.57	29.81	WNW	6.8	19.3	1.64	49.9	48.7	50	48	
27	50	34	44.3	38.1	23	0	96	59	80	0.01	28.63	29.87	NW	9.3	24.6	9.93	49.9	48.0	50	45	
28	64	31	48.0	38.7	17	0	97	43	73	0.00	28.56	29.80	SSE	9.6	29.4	12.05	48.3	45.9	51	40	
29	68	32	50.8	39.8	15	0	86	40	67	0.00	28.54	29.78	S	16.8	36.2	11.99	50.7	50.0	55	45	
30	44	24	34.1	16.2	31	0	71	30	49	0.00	29.13	30.39	N	6.7	20.3	12.03	47.1	42.8	46	40	
	58	38	47.7	38.0	<- Monthly Averages ->					28.87	30.12	SSE	8.8	36.2	9.21	52.8	51.0	55	47		
Temperature - Highest: 79					Degree Days - Total HDD: 535					Number of Days With:											
Lowest: 20					Total CDD: 14					Tmax ≥ 90: 0					Rainfall ≥ 0.01 inch: 10						
Rainfall: Monthly Total: 1.90 in.					Humidity - Highest: 98					Tmax ≤ 32: 0					Rainfall ≥ 0.10 inch: 4						
Greatest 24 Hr: 1.04 in.					Lowest: 21					Tmin ≤ 32: 14					Avg Wind Speed ≥ 10 mph: 8						
										Tmin ≤ 0: 0					Max Wind Speed ≥ 30 mph: 5						

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* Denotes incomplete record

Figure 12 November Mesonet Data

***Lake Thunderbird TMDL Monitoring Plan Implementation:
Sample Year (SY) 2022- December Report***



SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

December 2022 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

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SUMMARY OF DECEMBER WATER QUALITY SAMPLING

Sampling for December 2022 occurred during base flow conditions on the fifth. Water samples were collected at eight locations and discharge was measured at three locations. Samples were not collected at JB-1 due to pool conditions or LT-1 due to dry conditions. Mesonet shows no precipitation on the fifth, 0.14 inches of precipitation in the 72 hours prior to sampling, and 1.10 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of December was 3.14 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

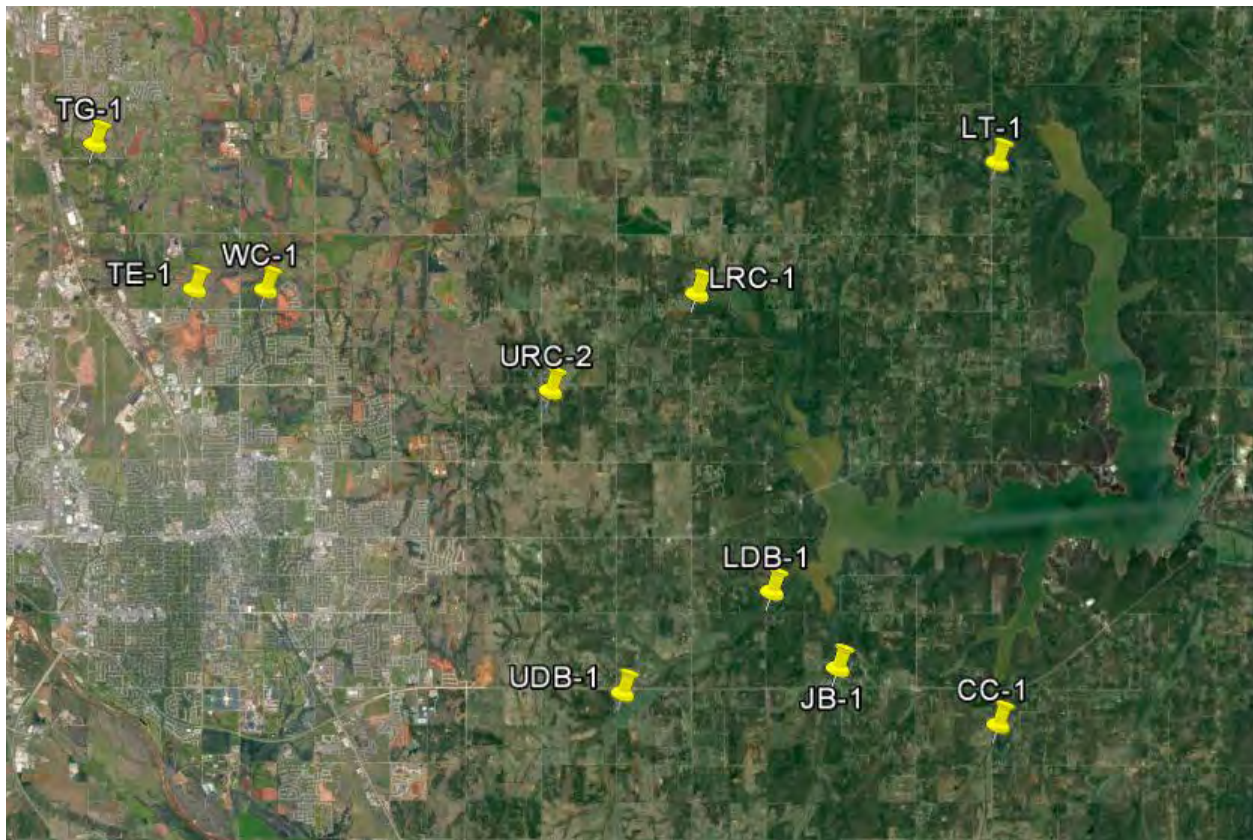


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	12/5/2022	9:12	SD	8.8	9.18	7.83	695	10	Used RP4, changed DCP at approx 9:10, new stage @ 9:30 = 20.05; beaver dam upstream of where sampling occurred approx 15ft
JB-1	Jim Blue Creek	12/5/2022	9:25	SD	N/A	N/A	N/A	N/A	N/A	Pool conditions on downstream, barely connected by a trickle, did not sample
LDB-1	Lower Dave Blue Creek	12/5/2022	9:39	SD	7.7	9.30	8.01	742	32	Very low water level
LRC-1	Lower Rock Creek	12/5/2022	10:55	SD	8.0	7.33	7.67	705	18	Beaver dam upstream of bridge; dead cow in channel at bridge LEW
LT-1	Lake Laterals	12/5/2022	10:25	SD	N/A	N/A	N/A	N/A	N/A	Completely dry, did not sample
TE-1	Little River Tributary	12/5/2022	12:36	SD	11.4	10.09	7.71	510	58	Changed DCP at approx 12:45, new stage @ 13:00 = 10.76; beaver dam approx 40ft upstream of bridge
TG-1	Little River	12/5/2022	13:15	SD	9.6	11.00	7.83	451	14	Low/normal conditions
UDB-1	Upper Dave Blue Creek	12/5/2022	8:15	SD	7.5	5.38	7.43	611	9	Very low water level, connected but barely flowing; changed DCP (at approx 8:35) new stage at 9:00 = 17.02
URC-2	Upper Rock Creek	12/5/2022	11:47	SD	9.9	2.60	7.36	662	32	Orifice close to being out of water, low water level
WC-1	Woodcrest Creek	12/5/2022	12:17	SD	10.4	4.05	7.32	796	18	Barely connected 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	<0.05	0.13	0.027	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.56	0.088	17.0
LRC-1	Lower Rock Creek	<0.05	0.25	0.045	11.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	0.19	0.52	0.068	19.0
TG-1	Little River	0.14	0.35	0.039	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.40	0.072	11.0
URC-2	Upper Rock Creek	<0.05	1.95	0.170	20.0
WC-1	Woodcrest Creek	<0.05	0.50	0.104	43.0

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	<0.05	0.14	0.028	<5.0
Duplicate RPD	0%	7.41%	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	0.06	20.23
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.11	13.74
LRC-1	Lower Rock Creek	0.23	4.40
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.01	10.76
TG-1	Little River	1.36	8.91
UDB-1	Upper Dave Blue Creek	0.01	17.01
URC-2	Upper Rock Creek	0.01	10.70
WC-1	Woodcrest Creek	0.01	7.34

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

File Information

File name: Cc_20221205-091041.ft
 Start date and time: 12/5/2022 8:58 AM
 Start location latitude: 35.177
 Start location longitude: -97.271
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 12/5/2022 8:59 AM End time: 12/5/2022 9:09 AM
 # Stations: 6 Avg interval: 40
 Mean depth: 0.640 ft Max depth: 1.000 ft
 Mean velocity: 0.0350 ft/s Max velocity: 0.1066 ft/s
 Mean SNR: 47 dB Total width: 2.500 ft
 Mean temp: 47.890 °F Total area: 1.6000 ft²
 Wetted Perimeter: 3.339 ft Total discharge: 0.0561 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.1%	17.0%
Velocity	8.6%	35.3%
Width	0.4%	0.4%
Method	6.0%	
# Stations	9.4%	
Overall	14.2%	39.2%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft ³ /s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
12/5/2022 9:10 AM	20.230				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q
0	8:59 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0001	0.0000	0.0000	0.00
1	9:00 AM	0.500	0.6	0.500	0.6000	0.300	80	-0.0001	1.0000	-0.0001	0.2500	0.0000	-0.03
2	9:02 AM	1.000	0.6	0.900	0.6000	0.540	80	-0.0002	1.0000	-0.0002	0.4500	-0.0001	-0.14
3	9:06 AM	1.500	0.6	1.000	0.6000	0.640	80	0.0271	1.0000	0.0271	0.5000	0.0135	24.12
4	9:08 AM	2.000	0.6	0.800	0.6000	0.480	80	0.1066	1.0000	0.1066	0.4000	0.0426	76.05
5	9:09 AM	2.500	None	0.000	0.0000	0.000	0	0.0000		0.1066	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:00 AM	0.500	0.6	0.500	0.6000	0.300	SNR Threshold Variation
2	9:02 AM	1.000	0.6	0.900	0.6000	0.540	Beam SNRs Not Similar, High % Spikes
3	9:06 AM	1.500	0.6	1.000	0.6000	0.640	Beam SNRs Not Similar, Large SNR Variation, High Stn % Discharge
4	9:08 AM	2.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
5	9:09 AM	2.500	None	0.000	0.0000	0.000	Water Depth > QC

Figure 2 Discharge Measurement Summary CC-1

File Information

File name: Tg_20221205-133428.ft
 Start date and time: 12/5/2022 1:08 PM
 Start location latitude:
 Start location longitude:
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 12/5/2022 1:09 PM End time: 12/5/2022 1:30 PM
 # Stations: 20 Avg interval: 40
 Mean depth: 0.336 ft Max depth: 0.500 ft
 Mean velocity: 0.1835 ft/s Max velocity: 0.2619 ft/s
 Mean SNR: 26 dB Total width: 22.000 ft
 Mean temp: 49.703 °F Total area: 7.4000 ft²
 Wetted Perimeter: 22.227 ft Total discharge: 1.3578 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.4%	7.1%
Velocity	0.3%	5.7%
Width	0.1%	0.1%
Method	2.0%	
# Stations	2.5%	
Overall	3.4%	9.2%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft ³ /s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
12/5/2022 1:34 PM	8.910				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q
0	1:09 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0005	0.0000	0.0000	0.00
1	1:09 PM	1.000	0.6	0.500	0.6000	0.300	80	0.0005	1.0000	0.0005	0.5000	0.0002	0.02
2	1:10 PM	2.000	0.6	0.500	0.6000	0.300	80	0.2109	1.0000	0.2109	0.5000	0.1055	7.77
3	1:11 PM	3.000	0.6	0.500	0.6000	0.300	80	0.2370	1.0000	0.2370	0.5000	0.1185	8.73
4	1:12 PM	4.000	0.6	0.500	0.6000	0.300	80	0.2409	1.0000	0.2409	0.5000	0.1205	8.87
5	1:14 PM	5.000	0.6	0.300	0.6000	0.180	80	0.2209	1.0000	0.2209	0.3000	0.0663	4.88
6	1:15 PM	6.000	0.6	0.300	0.6000	0.180	80	0.2230	1.0000	0.2230	0.3000	0.0669	4.93
7	1:16 PM	7.000	0.6	0.400	0.6000	0.240	80	0.2166	1.0000	0.2166	0.4000	0.0866	6.38
8	1:17 PM	8.000	0.6	0.400	0.6000	0.240	80	0.2205	1.0000	0.2205	0.4000	0.0882	6.50
9	1:18 PM	9.000	0.6	0.400	0.6000	0.240	80	0.2439	1.0000	0.2439	0.4000	0.0976	7.19
10	1:19 PM	10.000	0.6	0.200	0.6000	0.120	80	0.2337	1.0000	0.2337	0.3000	0.0701	5.16
11	1:20 PM	12.000	0.6	0.200	0.6000	0.120	80	0.0010	1.0000	0.0010	0.4000	0.0004	0.03
12	1:21 PM	14.000	0.6	0.200	0.6000	0.120	80	0.0716	1.0000	0.0716	0.3000	0.0215	1.58
13	1:23 PM	15.000	0.6	0.400	0.6000	0.240	80	0.1521	1.0000	0.1521	0.4000	0.0609	4.48
14	1:24 PM	16.000	0.6	0.450	0.6000	0.270	80	0.1618	1.0000	0.1618	0.4500	0.0728	5.36
15	1:25 PM	17.000	0.6	0.350	0.6000	0.300	80	0.1614	1.0000	0.1614	0.5000	0.0807	5.94
16	1:27 PM	18.000	0.6	0.350	0.6000	0.210	80	0.2254	1.0000	0.2254	0.5250	0.1184	8.72
17	1:28 PM	20.000	0.6	0.350	0.6000	0.210	80	0.2619	1.0000	0.2619	0.5250	0.1375	10.13
18	1:29 PM	21.000	0.6	0.200	0.6000	0.120	80	0.2264	1.0000	0.2264	0.2000	0.0453	3.33
19	1:30 PM	22.000	None	0.000	0.0000	0.000	0	0.0000		0.2264	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	1:09 PM	1.000	0.6	0.500	0.6000	0.300	Large SNR Variation, High % Spikes
10	1:19 PM	10.000	0.6	0.200	0.6000	0.120	Velocity Angle > QC
11	1:20 PM	12.000	0.6	0.200	0.6000	0.120	Large SNR Variation, SNR Threshold Variation, High % Spikes
12	1:21 PM	14.000	0.6	0.200	0.6000	0.120	Velocity Angle > QC
13	1:23 PM	15.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC
14	1:24 PM	16.000	0.6	0.450	0.6000	0.270	Velocity Angle > QC
16	1:27 PM	18.000	0.6	0.350	0.6000	0.210	Velocity Angle > QC
17	1:28 PM	20.000	0.6	0.350	0.6000	0.210	Velocity Angle > QC, High Stn % Discharge

Figure 3 Discharge Measurement Summary TG-1

File Information

File name: Lrc_20221205-112615.ft
 Start date and time: 12/5/2022 10:49 AM
 Start location latitude: 35.261
 Start location longitude: -97.335
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 12/5/2022 10:50 AM End time: 12/5/2022 11:25 AM
 # Stations: 17 Avg interval: 40
 Mean depth: 1.750 ft Max depth: 2.300 ft
 Mean velocity: 0.0082 ft/s Max velocity: 0.0344 ft/s
 Mean SNR: 45 dB Total width: 16.000 ft
 Mean temp: 46.601 °F Total area: 28.0000 ft²
 Wetted Perimeter: 17.870 ft Total discharge: 0.2301 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	2.0%
Velocity	3.2%	28.0%
Width	0.2%	0.2%
Method	1.5%	
# Stations	3.0%	
Overall	4.7%	28.0%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary

[Save PDF of summary](#)

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
12/5/2022 10:58 AM	4.400				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q
0	10:50 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0079	0.0000	0.0000	0.00
1	10:50 AM	1.000	0.6	0.850	0.6000	0.510	80	0.0079	1.0000	0.0079	0.8500	0.0667	2.93
2	10:52 AM	2.000	0.6	1.200	0.6000	0.720	80	0.0026	1.0000	0.0026	1.2000	0.0031	1.34
3	10:55 AM	3.000	0.6	1.400	0.6000	0.840	80	0.0050	1.0000	0.0050	1.4000	0.0070	3.03
4	10:56 AM	4.000	0.6	1.550	0.6000	0.930	80	-0.0089	1.0000	-0.0089	1.5500	-0.0138	-6.00
5	10:58 AM	5.000	0.2/0.8	1.850	0.2000	0.370	80	0.0056	1.0000	0.0056	1.8500	0.0014	0.63
5	10:58 AM	5.000	0.2/0.8	1.850	0.8000	1.480	80	0.0041	1.0000	0.0041	1.8500	0.0014	0.63
6	11:01 AM	6.000	0.2/0.8	2.000	0.2000	0.400	80	0.0146	1.0000	0.0017	2.0000	0.0034	1.47
6	11:01 AM	6.000	0.2/0.8	2.000	0.8000	1.600	80	-0.0112	1.0000	0.0017	2.0000	0.0034	1.47
7	11:04 AM	7.000	0.2/0.8	2.100	0.2000	0.420	80	0.0186	1.0000	0.0066	2.1000	0.0139	6.04
7	11:04 AM	7.000	0.2/0.8	2.100	0.8000	1.680	80	-0.0054	1.0000	0.0066	2.1000	0.0139	6.04
8	11:06 AM	8.000	0.2/0.8	2.250	0.2000	0.450	80	0.0167	1.0000	0.0202	2.2500	0.0455	19.77
8	11:06 AM	8.000	0.2/0.8	2.250	0.8000	1.800	80	0.0237	1.0000	0.0202	2.2500	0.0455	19.77
9	11:09 AM	9.000	0.2/0.8	2.300	0.2000	0.460	80	0.0114	1.0000	0.0114	2.3000	0.0262	11.38
9	11:09 AM	9.000	0.2/0.8	2.300	0.8000	1.840	80	-0.0117	1.0000	0.0114	2.3000	0.0262	11.38
10	11:11 AM	10.000	0.2/0.8	2.300	0.2000	0.460	80	0.0156	1.0000	0.0108	2.3000	0.0247	10.74
10	11:11 AM	10.000	0.2/0.8	2.300	0.8000	1.840	80	0.0059	1.0000	0.0108	2.3000	0.0247	10.74
11	11:13 AM	11.000	0.2/0.8	2.200	0.2000	0.440	80	0.0307	1.0000	0.0221	2.2000	0.0486	21.10
11	11:13 AM	11.000	0.2/0.8	2.200	0.8000	1.760	80	0.0134	1.0000	0.0221	2.2000	0.0486	21.10
12	11:16 AM	12.000	0.2/0.8	1.900	0.2000	0.380	80	0.0165	1.0000	0.0141	1.9000	0.0268	11.65
12	11:16 AM	12.000	0.2/0.8	1.900	0.8000	1.520	80	0.0117	1.0000	0.0141	1.9000	0.0268	11.65
13	11:18 AM	13.000	0.2/0.8	1.900	0.2000	0.380	80	0.0337	1.0000	0.0205	1.9000	0.0390	16.96
13	11:18 AM	13.000	0.2/0.8	1.900	0.8000	1.520	80	0.0074	1.0000	0.0205	1.9000	0.0390	16.96
14	11:21 AM	14.000	0.2/0.8	2.100	0.2000	0.420	80	-0.0118	1.0000	-0.0079	2.1000	-0.0167	-7.25
14	11:21 AM	14.000	0.2/0.8	2.100	0.8000	1.680	80	-0.0041	1.0000	-0.0079	2.1000	-0.0167	-7.25
15	11:23 AM	15.000	0.2/0.8	2.100	0.2000	0.420	80	0.0223	1.0000	0.0068	2.1000	0.0143	6.20
15	11:23 AM	15.000	0.2/0.8	2.100	0.8000	1.680	80	-0.0087	1.0000	0.0068	2.1000	0.0143	6.20
16	11:25 AM	16.000	None	0.000	0.0000	0.000	0	0.0000		0.0068	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	10:50 AM	1.000	0.6	0.850	0.6000	0.510	SNR Threshold Variation
4	10:56 AM	4.000	0.6	1.550	0.6000	0.930	SNR Threshold Variation
5	10:58 AM	5.000	0.2/0.8	1.850	0.2000	0.370	SNR Threshold Variation
5	10:58 AM	5.000	0.2/0.8	1.850	0.8000	1.480	SNR Threshold Variation
6	11:01 AM	6.000	0.2/0.8	2.000	0.2000	0.400	Large SNR Variation, SNR Threshold Variation
6	11:01 AM	6.000	0.2/0.8	2.000	0.8000	1.600	Large SNR Variation, SNR Threshold Variation
7	11:04 AM	7.000	0.2/0.8	2.100	0.2000	0.420	Large SNR Variation, SNR Threshold Variation
7	11:04 AM	7.000	0.2/0.8	2.100	0.8000	1.680	Large SNR Variation, SNR Threshold Variation
8	11:06 AM	8.000	0.2/0.8	2.250	0.2000	0.450	Boundary Interference, Large SNR Variation, SNR Threshold Variation, High Stn % Discharge
8	11:06 AM	8.000	0.2/0.8	2.250	0.8000	1.800	Boundary Interference, Large SNR Variation, SNR Threshold Variation, High Stn % Discharge
9	11:09 AM	9.000	0.2/0.8	2.300	0.2000	0.460	SNR Threshold Variation, High Stn % Discharge
9	11:09 AM	9.000	0.2/0.8	2.300	0.8000	1.840	SNR Threshold Variation, High Stn % Discharge
10	11:11 AM	10.000	0.2/0.8	2.300	0.2000	0.460	Large SNR Variation, SNR Threshold Variation, High Stn % Discharge
10	11:11 AM	10.000	0.2/0.8	2.300	0.8000	1.840	Large SNR Variation, SNR Threshold Variation, High Stn % Discharge
11	11:13 AM	11.000	0.2/0.8	2.200	0.2000	0.440	SNR Threshold Variation, High Stn % Discharge
11	11:13 AM	11.000	0.2/0.8	2.200	0.8000	1.760	SNR Threshold Variation, High Stn % Discharge
12	11:16 AM	12.000	0.2/0.8	1.900	0.2000	0.380	Large SNR Variation, High Stn % Discharge
12	11:16 AM	12.000	0.2/0.8	1.900	0.8000	1.520	Large SNR Variation, High Stn % Discharge
13	11:18 AM	13.000	0.2/0.8	1.900	0.2000	0.380	SNR Threshold Variation, High Stn % Discharge
13	11:18 AM	13.000	0.2/0.8	1.900	0.8000	1.520	SNR Threshold Variation, High Stn % Discharge
15	11:23 AM	15.000	0.2/0.8	2.100	0.2000	0.420	Water Depth > QC, Large SNR Variation
15	11:23 AM	15.000	0.2/0.8	2.100	0.8000	1.680	Water Depth > QC, Large SNR Variation
16	11:25 AM	16.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 4 Discharge Measurement Summary LRC-1

Period Selected: 2022-12-01 00:00 - 2022-12-31 23:59

UTC Offset: -06:00

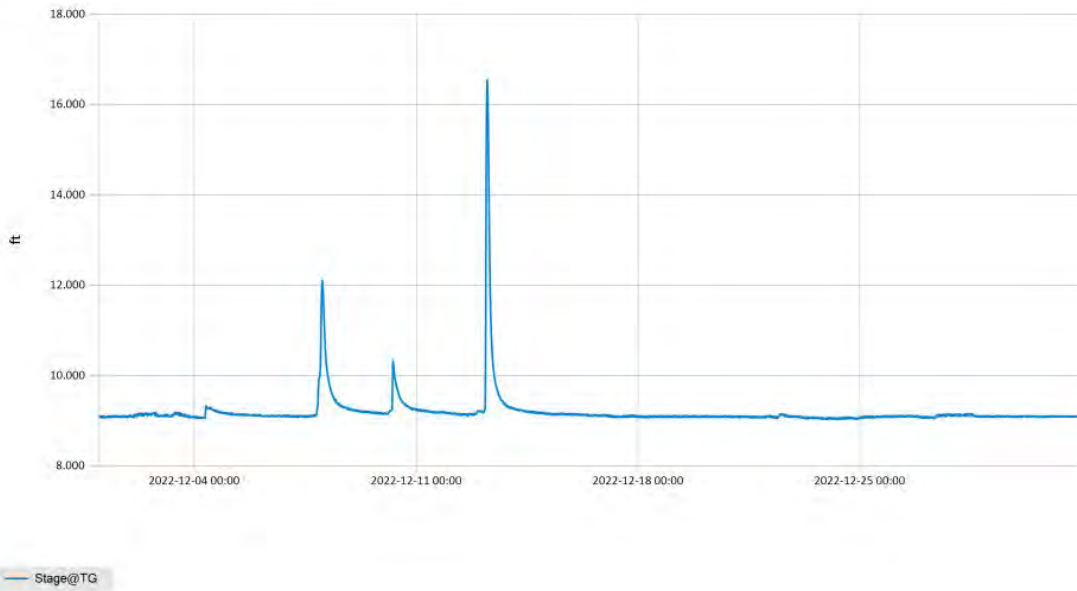


Figure 5 Monthly Hydrograph TG-1

Period Selected: 2022-12-01 00:00 - 2022-12-31 23:59

UTC Offset: -06:00

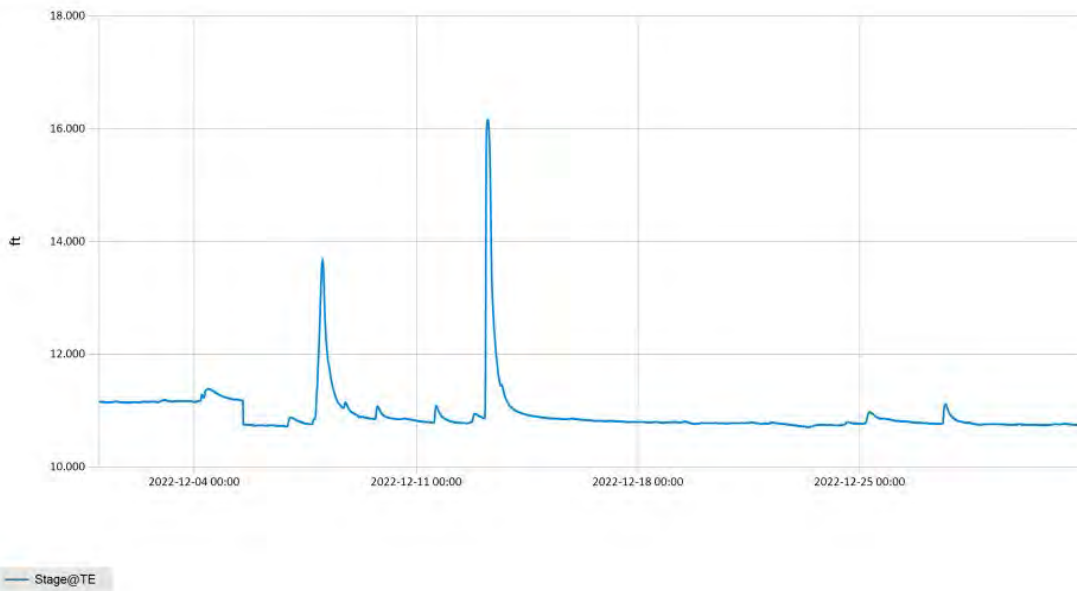


Figure 6 Monthly Hydrograph TE-1

Period Selected: 2022-12-01 00:00 - 2022-12-31 23:59

UTC Offset: -06:00

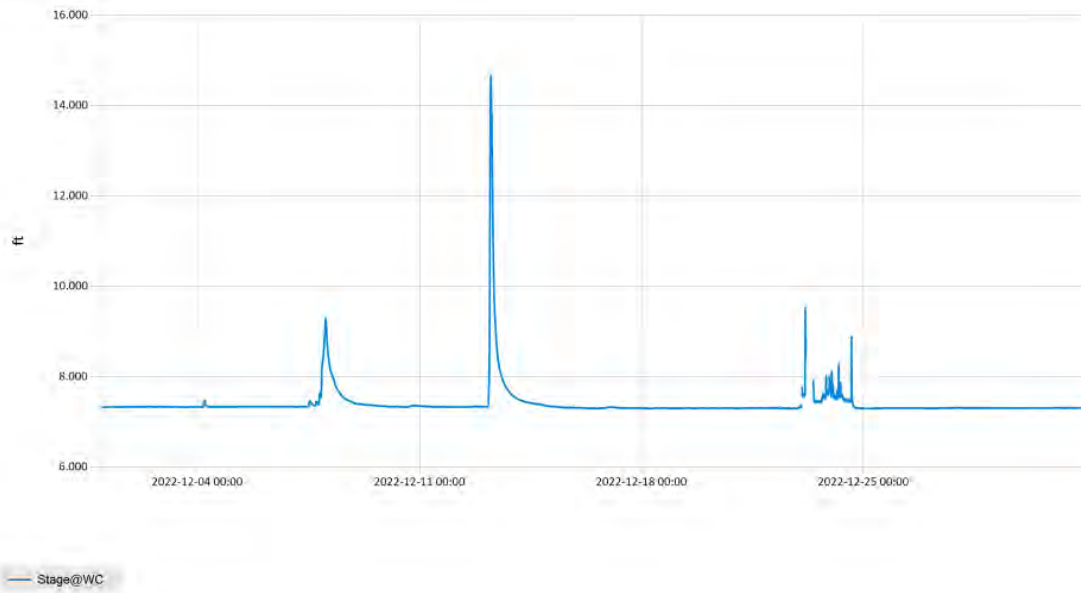


Figure 7 Monthly Hydrograph WC-1

Period Selected: 2022-12-01 00:00 - 2022-12-31 23:59

UTC Offset: -06:00

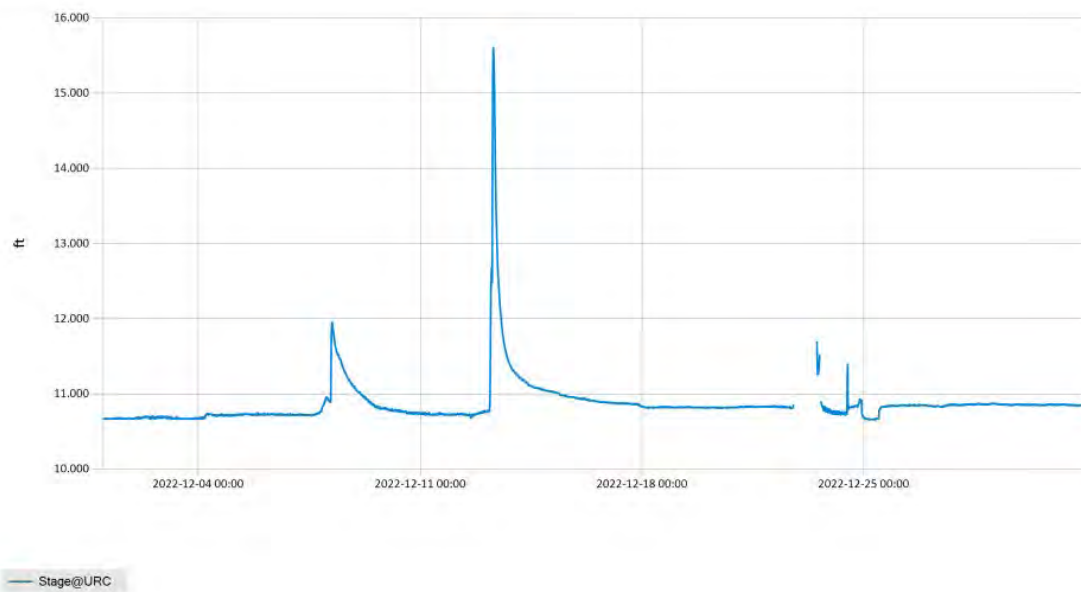
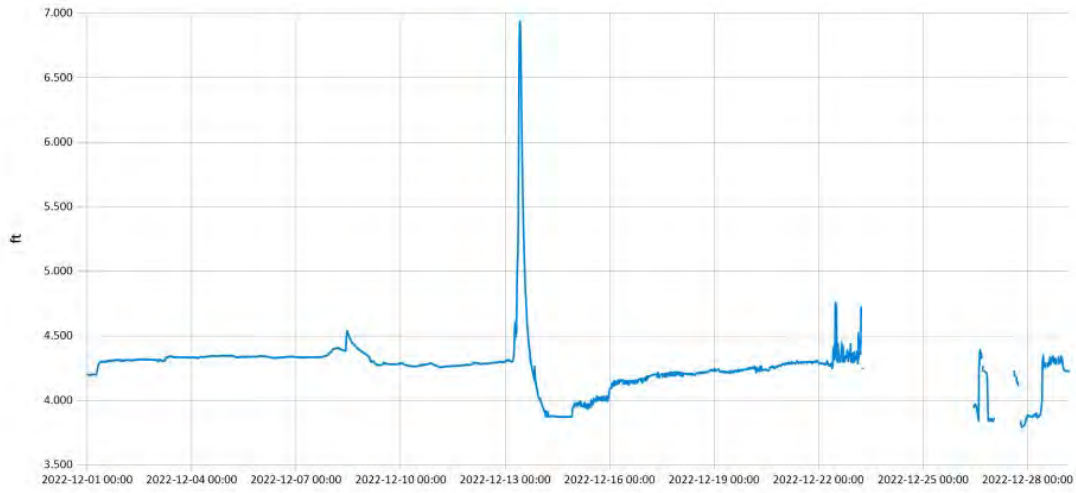


Figure 8 Monthly Hydrograph URC-2

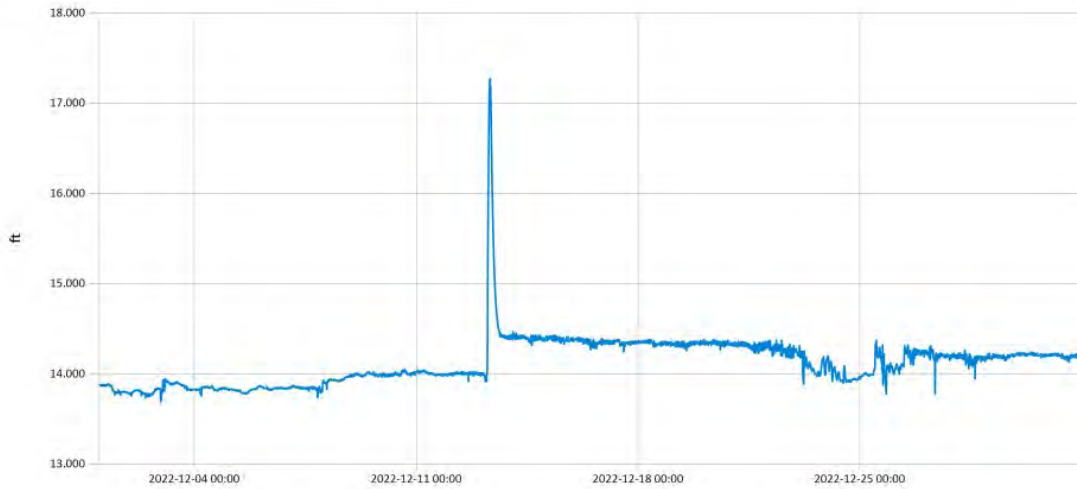
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— Stage@LRC

Figure 9 Monthly Hydrograph LRC-1

Period Selected: 2022-12-01 00:00 - 2022-12-31 23:59 UTC Offset: -06:00



— Stage@LDB

Figure 10 Monthly Hydrograph LDB-1

Period Selected: 2022-12-01 00:00 - 2022-12-31 23:59

UTC Offset: -06:00

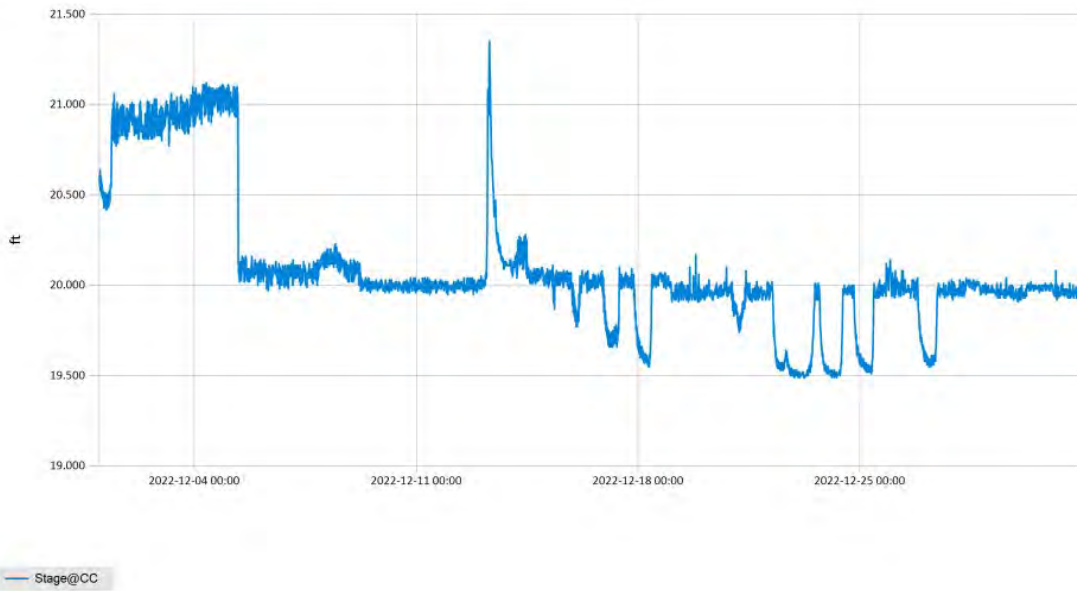


Figure 11 Monthly Hydrograph CC-1

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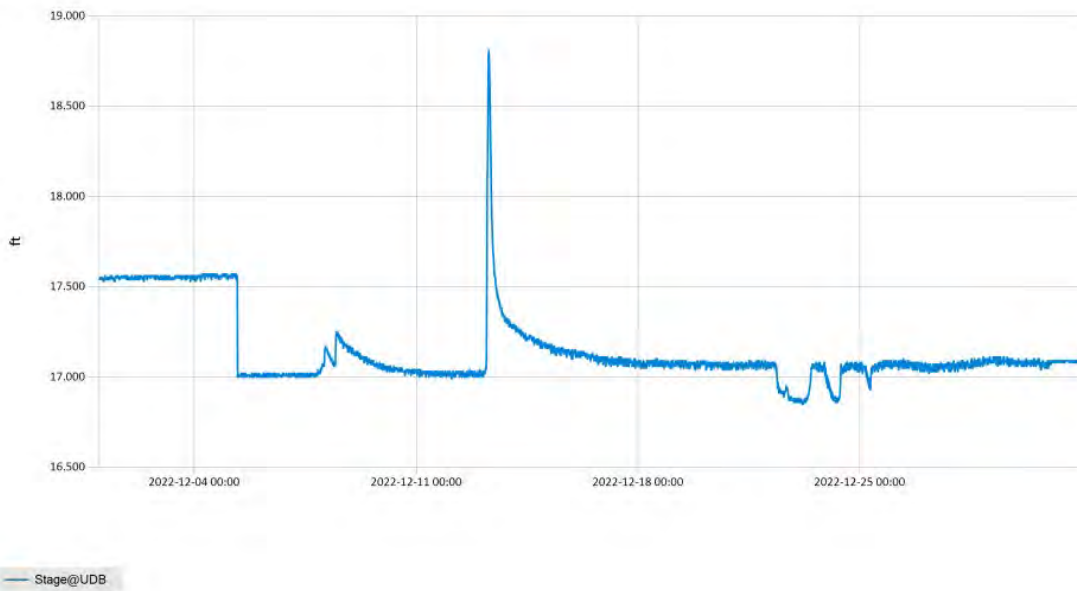


Figure 12 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				December 2022				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 (in)		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	52	31	42.1	21.1	23	0	84	21	45	0.00	28.99	30.25	S	11.3	28.4	7.88	46.1	43.1	47	39
2	59	43	51.5	48.1	14	0	97	44	89	0.02	28.73	29.97	S	13.2	41.9	3.51	48.5	48.2	51	46
3	46	31	38.0	18.5	27	0	67	26	46	0.00	29.20	30.46	N	10.5	34.7	11.16	47.7	46.1	49	43
4	51	34	41.8	31.3	23	0	88	47	67	0.12	28.92	30.17	SSE	5.6	17.0	7.99	47.1	45.5	49	43
5	74	44	57.2	48.7	6	0	98	44	76	0.00	28.52	29.76	S	8.2	20.3	9.99	49.5	50.2	56	45
6	52	41	46.7	44.4	18	0	99	82	92	0.00	28.69	29.93	NNW	6.6	17.0	3.10	50.9	51.0	52	49
7	50	41	45.6	43.7	20	0	97	86	93	0.94	28.92	30.17	NE	5.0	11.8	2.13	50.2	48.7	50	48
8	60	46	51.8	50.9	12	0	99	86	97	0.16	28.87	30.13	S	4.0	11.9	3.82	51.2	51.2	55	49
9	56	42	50.2	42.1	16	0	99	47	76	0.04	28.90	30.15	NNE	6.2	16.7	8.31	51.6	51.3	53	49
10	52	40	48.0	45.2	19	0	97	80	90	0.03	28.86	30.11	NNE	6.8	19.7	2.48	51.7	50.7	52	49
11	46	40	43.9	42.0	22	0	98	86	93	0.00	28.88	30.13	NE	5.3	13.7	1.91	50.7	48.3	49	47
12	55	46	50.5	49.5	15	0	98	92	96	0.04	28.65	29.90	SE	10.7	31.8	1.53	51.2	49.9	52	48
13	63	41	54.9	40.1	13	0	97	21	62	1.79	28.40	29.64	SW	10.3	34.6	11.02	53.0	53.7	57	50
14	46	30	38.2	22.8	27	0	72	36	54	0.00	28.57	29.81	WNW	9.9	25.5	11.14	49.3	44.7	49	41
15	46	29	37.0	21.2	27	0	73	35	53	0.00	28.73	29.98	WNW	10.9	26.2	11.41	46.6	40.3	44	38
16	45	30	36.6	14.4	27	0	65	21	42	0.00	28.84	30.09	NW	12.7	31.3	10.02	45.1	38.6	41	37
17	46	24	33.7	17.2	30	0	71	29	53	0.00	28.90	30.16	WNW	7.0	22.2	11.58	43.5	37.7	40	36
18	53	22	38.7	19.4	28	0	86	25	50	0.00	28.94	30.19	SSE	7.4	22.4	10.72	42.3	38.2	42	36
19	53	40	45.0	29.8	19	0	78	43	56	0.00	28.88	30.13	SSE	11.1	29.3	11.01	44.7	41.9	46	39
20	41	24	32.4	28.3	32	0	92	77	85	0.00	29.16	30.42	N	8.2	20.1	4.29	44.7	40.5	42	38
21	46	23	33.5	28.3	30	0	97	60	82	0.00	28.88	30.13	S	7.1	24.5	6.36	43.0	38.2	41	36
22	40	3	12.3	3.8	43	0	93	48	69	0.00	29.02	30.28	NNW	21.8	49.1	5.25	40.6	35.4	39	32
23	19	4	11.3	-4.7	53	0	65	39	48	0.00	29.37	30.64	NW	14.5	30.1	9.02	36.3	29.0	31	27
24	33	9	21.3	2.5	44	0	74	23	47	0.00	29.24	30.51	WNW	4.0	15.9	11.15	35.3	29.2	31	27
25	48	14	32.6	9.2	34	0	80	21	41	0.00	29.01	30.26	S	5.1	18.1	9.95	35.5	30.3	32	28
26	48	18	33.7	17.6	32	0	72	36	52	0.00	28.99	30.25	NNW	11.2	37.0	10.19	37.8	31.7	32	31
27	51	16	32.8	16.9	32	0	80	31	55	0.00	28.83	30.08	S	10.6	31.9	11.46	37.2	31.6	32	31
28	70	42	54.1	34.7	9	0	69	29	49	0.00	28.43	29.67	S	16.2	37.1	8.69	40.6	36.7	44	32
29	67	43	57.0	36.1	10	0	72	19	49	0.00	28.61	29.85	S	9.9	28.5	6.85	44.6	45.7	50	44
30	58	30	44.5	32.6	21	0	92	37	65	0.00	28.75	29.99	NNE	5.2	13.2	10.60	43.8	43.9	49	40
31	62	34	49.0	38.1	17	0	84	47	67	0.00	28.54	29.78	S	7.4	23.4	8.56	44.0	44.2	49	41
	51	31	40.8	28.8	<- Monthly Averages ->						28.85	30.10	S	9.2	49.1	7.84	45.3	42.4	45	40
Temperature - Highest: 74					Degree Days - Total HDD: 744					Number of Days With:										
Lowest: 3					Total CDD: 0					Tmax ≥ 90: 0					Rainfall ≥ 0.01 inch: 8					
Rainfall: Monthly Total: 3.14 in.					Humidity - Highest: 99					Tmax ≤ 32: 1					Rainfall ≥ 0.10 inch: 4					
Greatest 24 Hr: 1.79 in.					Lowest: 19					Tmin ≤ 32: 16					Avg Wind Speed ≥ 10 mph: 13					
										Tmin ≤ 0: 0					Max Wind Speed ≥ 30 mph: 10					

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* Denotes incomplete record

Figure 13 December Mesonet Data

**Lake Thunderbird TMDL Monitoring
Plan Implementation: Sample Year
(SY) 2022- January Report**



OKLAHOMA
Water Resources Board

Lake Thunderbird TMDL Monitoring Plan Implementation: January 2023 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

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SUMMARY OF JANUARY SAMPLING

Sampling for January 2023 occurred during base flow conditions on the seventeenth. Water samples were collected at eight locations and discharge was measured at four locations. Samples were not collected at JB-1 due to pool conditions or LT-1 due to dry conditions. Mesonet shows no precipitation on the seventeenth or in the 72 hours prior to sampling, and 0.32 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of January was 1.27 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

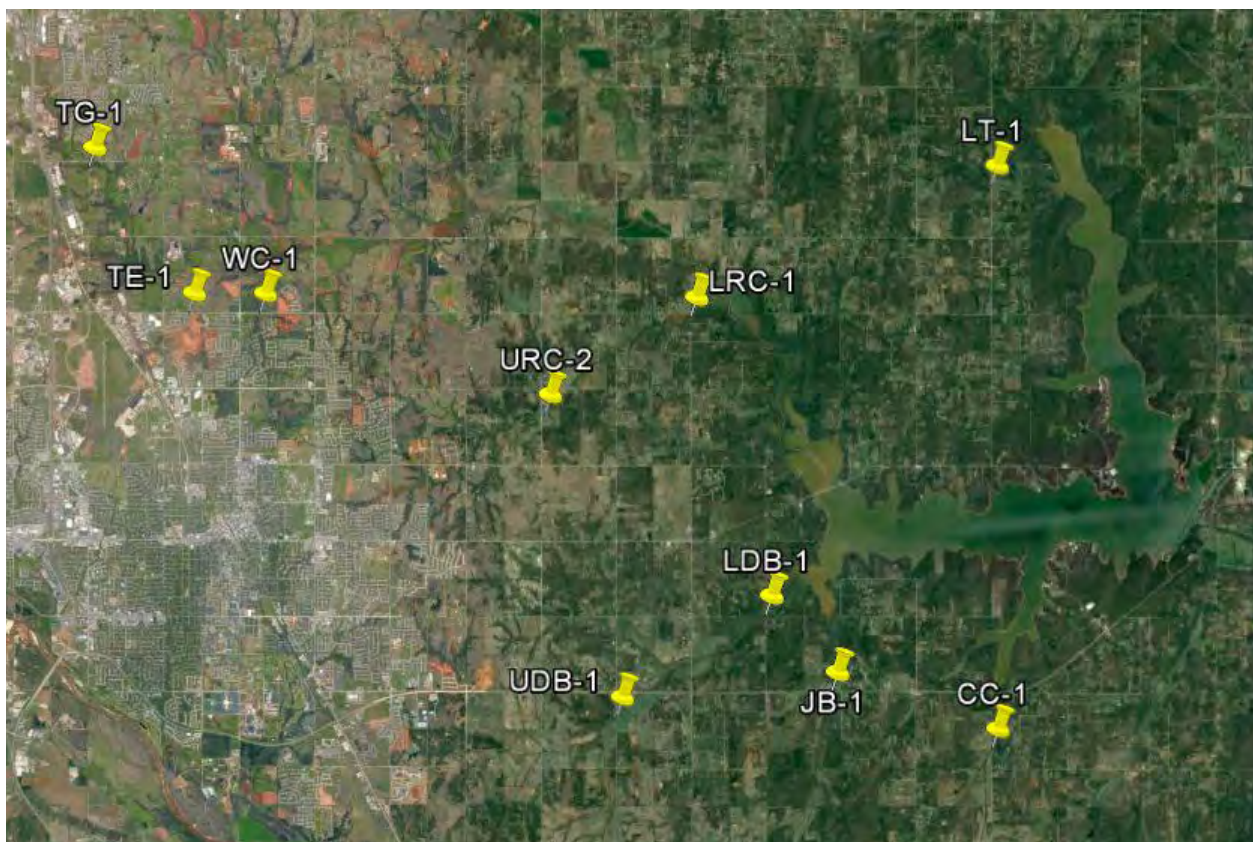


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	1/17/2023	10:38	LS	8.5	9.34	7.73	686	8	Creek appearance is nominal
JB-1	Jim Blue Creek	1/17/2023	11:15	LS	N/A	N/A	N/A	N/A	N/A	Still basically a mud puddle; construction has changed site characteristics and flow . Did not sample
LDB-1	Lower Dave Blue Creek	1/17/2023	11:36	LS	8.2	8.68	7.93	878	11	Stagnant, no visual flow
LRC-1	Lower Rock Creek	1/17/2023	13:04	LS	7.2	8.95	7.70	723	7	Replaced batteries. Someone dumped trash upstream. Very low flow
LT-1	Lake Laterals	1/17/2023	12:05	LS	N/A	N/A	N/A	N/A	N/A	Site is dry. Did not sample
TE-1	Little River Tributary	1/17/2023	15:22	LS	9.1	10.49	7.86	1009	18	Orifice partially out of water
TG-1	Little River	1/17/2023	15:52	LS	9.4	14.67	8.08	1072	5	Pools upstream where huge overturned tree is. Less debris under bridge
UDB-1	Upper Dave Blue Creek	1/17/2023	8:42	LS	7.4	6.95	7.54	929	3	Basically a pool - very gross. Lots of oil and grease. Had film layer on top
URC-2	Upper Rock Creek	1/17/2023	13:54	LS	7.1	2.60	7.25	837	14	Stagnant; did not take flow . Lots of what appears to be iron precipitate/film/oil & Grease on surface of water
WC-1	Woodcrest Creek	1/17/2023	14:35	LS	9.5	7.03	7.17	986	13	Low flow

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	<0.05	0.14	0.030	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.36	0.042	10.0
LRC-1	Lower Rock Creek	<0.05	0.19	0.027	<5.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	<0.05	0.43	0.028	<5.0
TG-1	Little River	<0.05	0.40	0.027	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.28	0.033	<5.0
URC-2	Upper Rock Creek	<0.05	0.49	0.127	5.7
WC-1	Woodcrest Creek	<0.05	0.20	0.037	<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	<0.05	0.16	0.029	<5.0
Duplicate RPD	0%	13.33%	3.39%	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	0.48	20.30
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.18	14.14
LRC-1	Lower Rock Creek	0.30	4.64
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.01	10.69
TG-1	Little River	0.63	8.78
UDB-1	Upper Dave Blue Creek	0.05	17.13
URC-2	Upper Rock Creek	0.06	10.91
WC-1	Woodcrest Creek	0.02	7.34

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

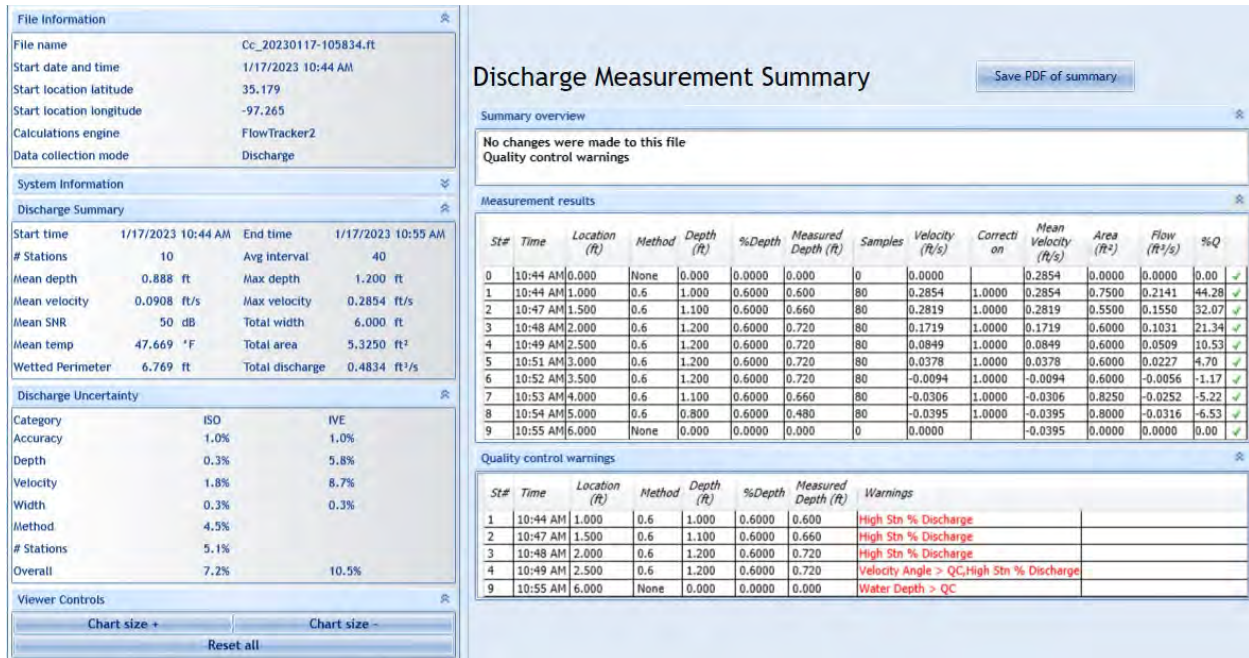


Figure 2 Discharge Measurement Summary CC-1

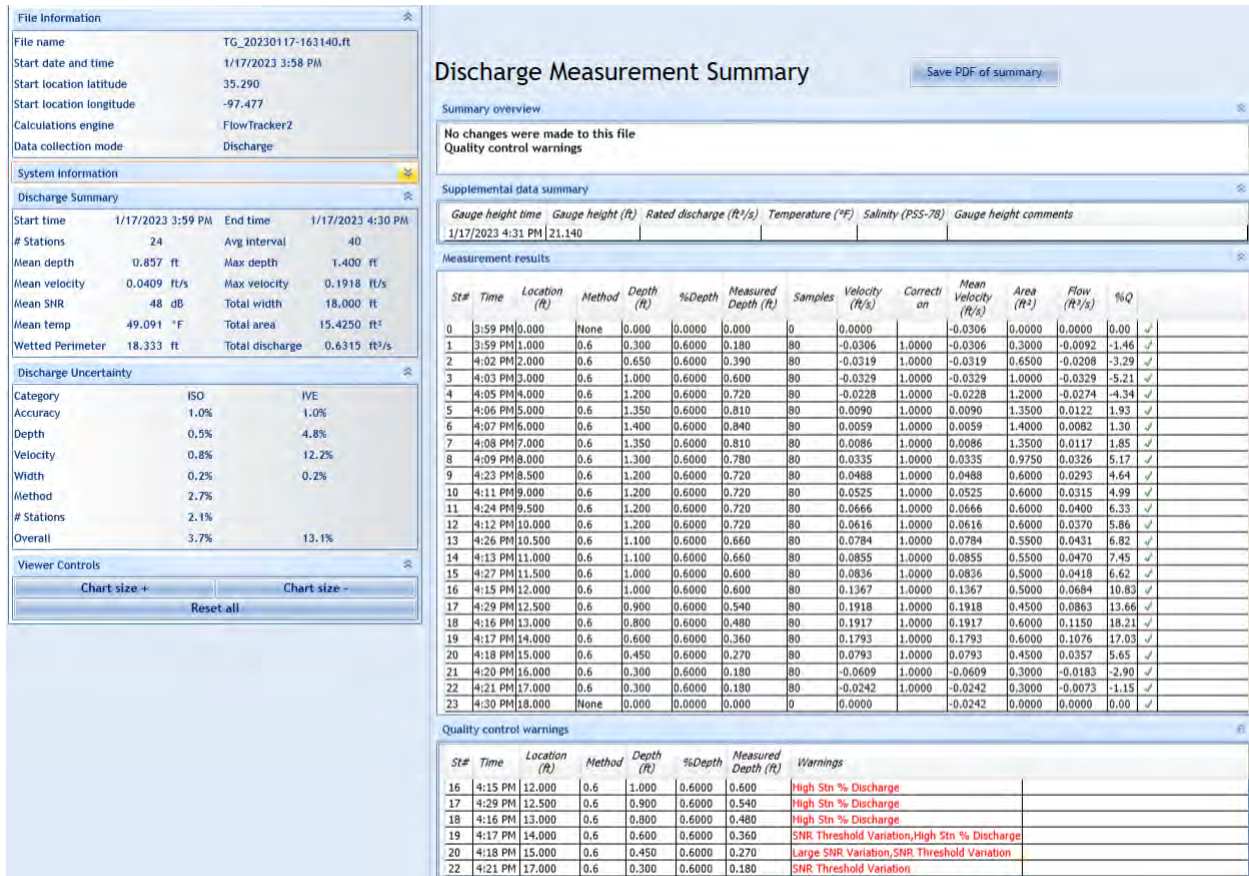


Figure 4 Discharge Measurement Summary TG-1

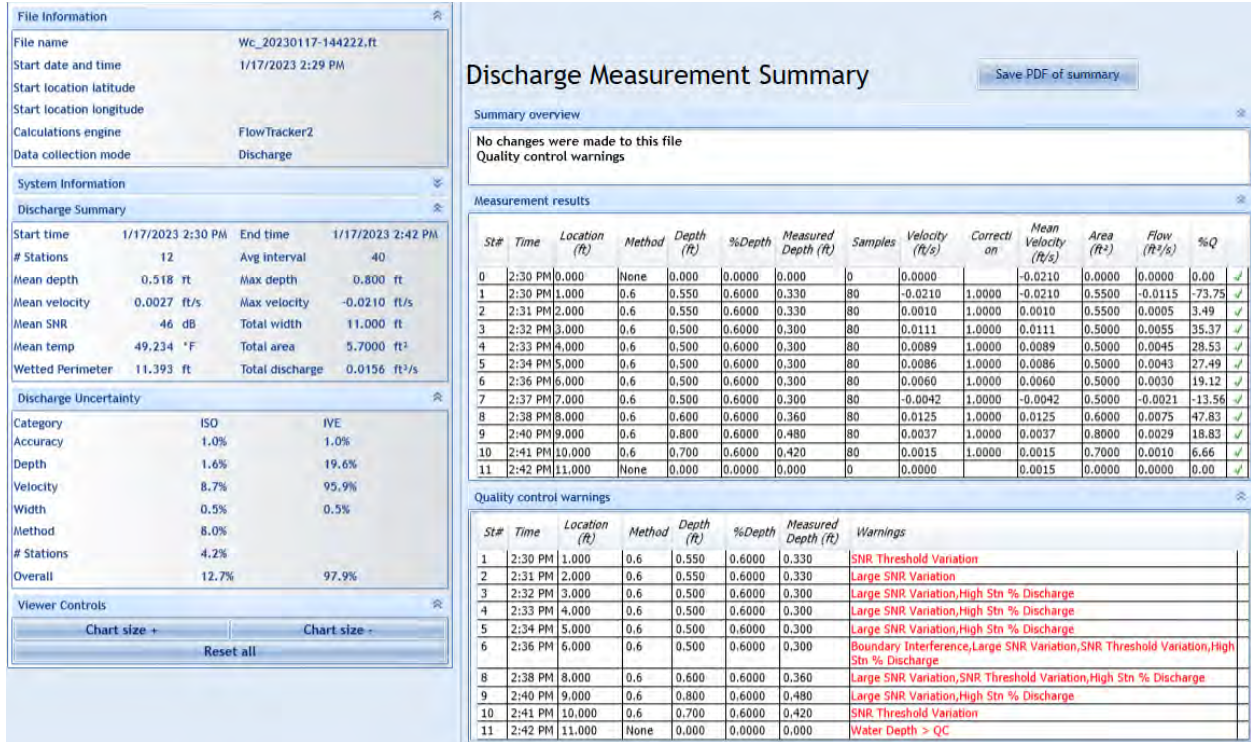


Figure 5 Discharge Measurement Summary WC-1

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UTC Offs et: -06:00

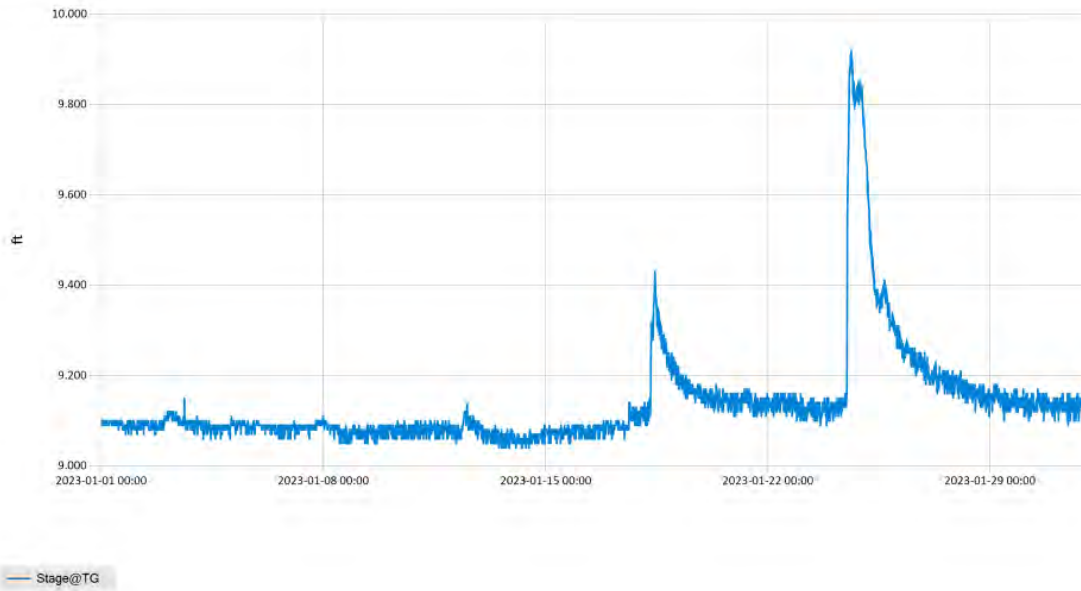


Figure 6 Monthly Hydrograph TG-1

Period Selected: 2023-01-01 00:00 - 2023-01-31 23:59

UTC Offset: -06:00

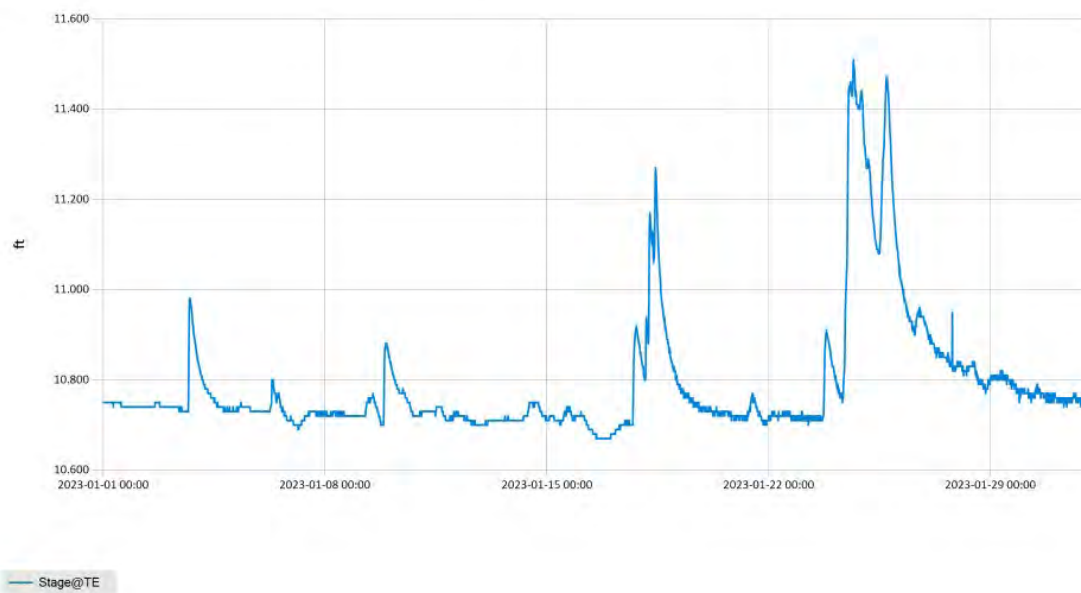
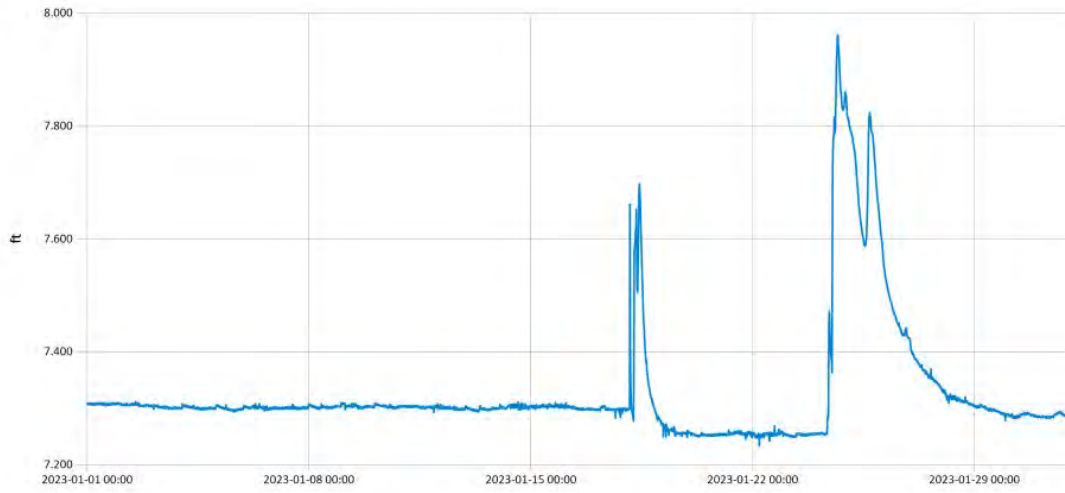


Figure 7 Monthly Hydrograph TE-1

Period Selected: 2023-01-01 00:00 - 2023-01-31 23:59

UTC Offset: -06:00



— Stage@WC

Figure 8 Monthly Hydrograph WC-1

Period Selected: 2023-01-01 00:00 - 2023-01-31 23:59

UTC Offset: -06:00

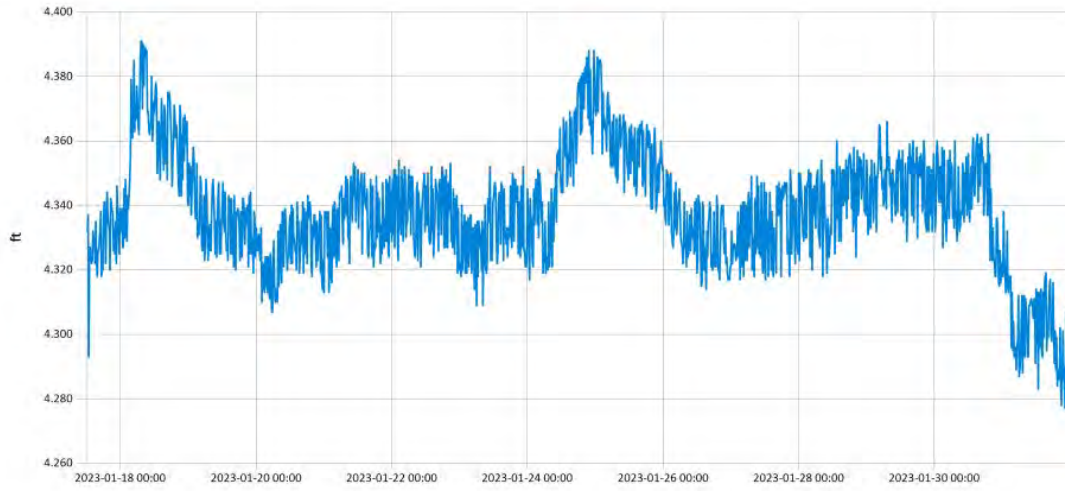


— Stage@URC

Figure 9 Monthly Hydrograph URC-2

Period Selected: 2023-01-01 00:00 - 2023-01-31 23:59

UTC Offset: -06:00

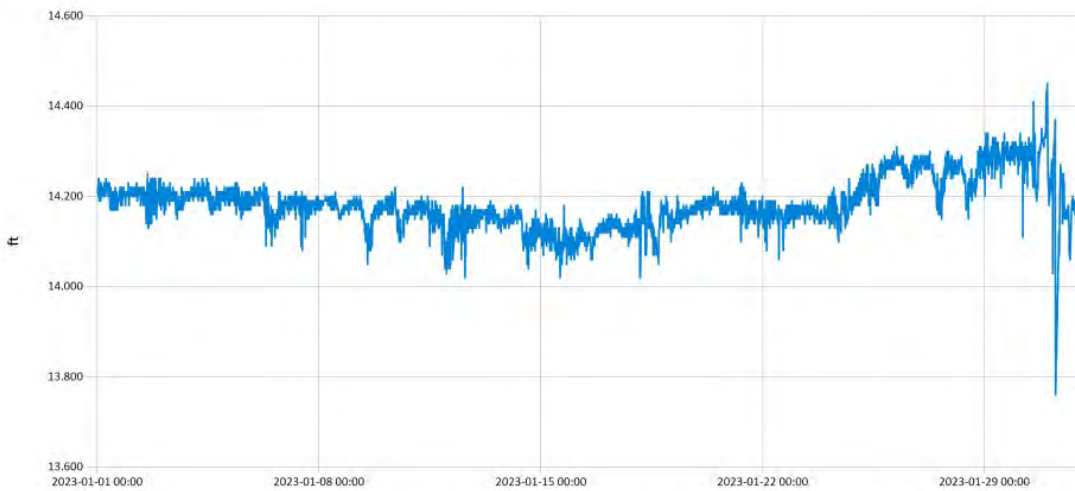


— Stage@LRC

Figure 10 Monthly Hydrograph LRC-1

Period Selected: 2023-01-01 00:00 - 2023-01-31 23:59

UTC Offset: -06:00



— Stage@LDB

Figure 11 Monthly Hydrograph LDB-1

Period Selected: 2023-01-01 00:00 - 2023-01-31 23:59

UTC Offset: -06:00



Figure 12 Monthly Hydrograph CC-1

Period Selected: 2023-01-01 00:00 - 2023-01-31 23:59

UTC Offset: -06:00

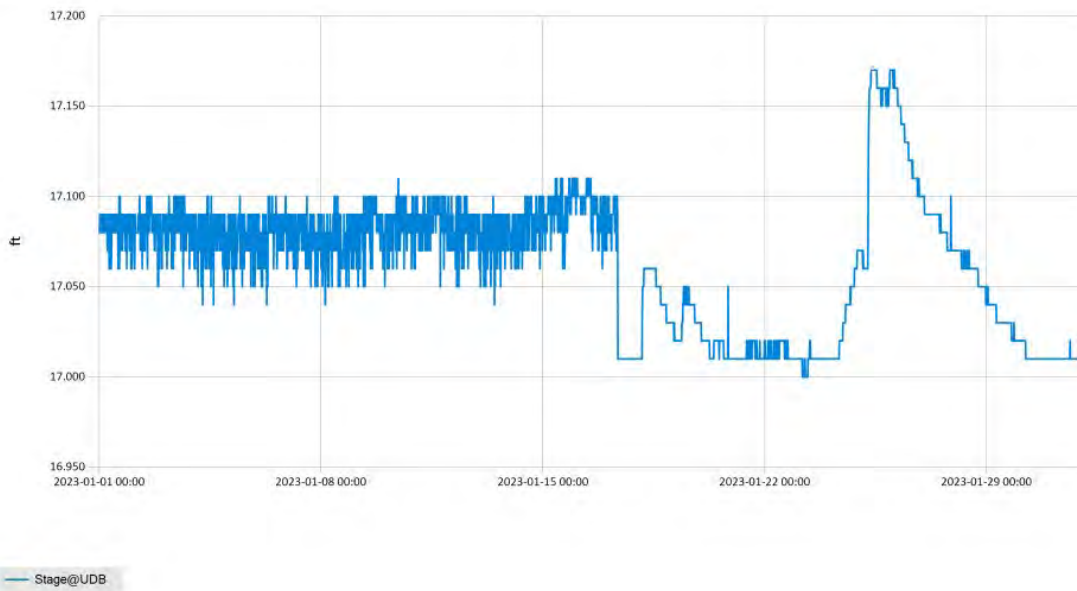


Figure 13 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				January 2023				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	4" SOIL TEMPERATURES			
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG	(in)	STN	MSL	DIR	AVG	MAX	(MJ/m ²)	SOD	BARE	MAX	MIN	
1	73	39	55.1	40.8	9	0	92	30	62	0.00	28.53	29.77	SSW	5.5	15.6	10.17	45.3	46.9	53	43	
2	71	44	60.7	55.4	7	0	97	67	83	0.00	28.47	29.71	SSE	8.7	25.4	3.72	47.9	50.8	55	46	
3	57	33	46.0	30.4	20	0	92	38	56	0.00	28.56	29.80	WNW	9.1	20.3	11.20	48.0	49.2	53	46	
4	52	27	39.4	26.2	25	0	87	34	62	0.00	28.78	30.03	W	6.4	17.1	11.48	45.1	44.7	50	41	
5	55	29	40.5	21.9	23	0	75	23	51	0.00	28.97	30.23	WNW	6.3	17.2	11.52	44.2	43.4	49	39	
6	67	32	52.1	35.7	15	0	95	41	55	0.00	28.78	30.03	S	10.6	33.7	9.84	44.7	45.6	51	40	
7	52	34	42.2	30.8	22	0	98	43	65	0.00	28.94	30.20	NNW	9.8	24.1	10.57	45.6	46.2	49	43	
8	57	26	41.5	28.0	23	0	90	35	62	0.00	29.01	30.27	S	4.3	12.9	11.83	43.9	44.1	50	39	
9	66	37	48.9	32.0	13	0	75	31	54	0.00	28.83	30.08	S	8.7	29.0	11.81	44.7	45.7	51	41	
10	71	30	52.1	32.3	14	0	91	24	53	0.00	28.60	29.84	SSW	6.5	22.0	10.36	44.8	46.2	52	41	
11	70	40	55.9	29.9	10	0	67	19	39	0.00	28.49	29.73	WNW	8.2	38.1	8.12	46.0	48.2	52	44	
12	50	30	41.2	27.8	25	0	73	38	60	0.00	28.99	30.24	NNW	16.8	42.2	10.59	45.8	47.2	50	44	
13	53	23	37.4	24.8	27	0	89	37	63	0.00	29.11	30.37	NNW	4.1	11.5	11.94	43.2	43.2	49	38	
14	59	32	45.4	24.5	19	0	67	28	46	0.00	28.85	30.10	SSE	11.8	32.1	10.99	43.7	44.2	49	40	
15	63	45	54.3	40.7	11	0	80	44	60	0.00	28.49	29.73	S	15.2	31.9	6.59	45.6	47.4	51	44	
16	67	40	57.6	34.3	12	0	69	23	43	0.00	28.42	29.65	SSW	9.6	30.2	12.10	48.4	52.1	56	49	
17	60	33	49.8	35.0	18	0	86	40	59	0.00	28.49	29.73	ESE	3.1	12.1	5.37	46.8	48.5	51	45	
18	63	38	54.5	36.6	14	0	95	24	56	0.32	28.43	29.67	SW	12.0	35.0	11.47	48.5	50.3	53	47	
19	50	32	39.9	25.6	24	0	82	41	57	0.00	28.79	30.04	WNW	10.1	31.8	12.47	46.0	44.3	48	41	
20	58	25	42.7	26.9	24	0	91	27	58	0.00	28.94	30.19	ESE	5.1	17.3	12.98	44.4	43.6	50	38	
21	56	38	45.3	33.4	18	0	86	31	64	0.02	28.72	29.96	SSE	10.7	26.8	8.36	45.8	45.8	50	44	
22	45	27	37.3	28.1	29	0	90	47	70	0.00	28.75	30.00	NW	10.9	27.3	9.23	45.0	44.3	48	42	
23	49	20	36.4	23.7	31	0	94	32	64	0.00	28.97	30.23	ESE	3.3	12.1	13.10	42.7	41.8	48	37	
24	41	32	34.9	30.2	28	0	98	53	85	0.46	28.80	30.05	ENE	7.1	15.5	1.79	43.0	40.7	44	38	
25	44	29	35.4	30.7	28	0	97	59	84	0.47	28.83	30.08	NW	10.4	20.9	9.30	41.8	38.1	41	36	
26	50	25	36.3	26.1	28	0	93	39	69	0.00	29.01	30.27	WNW	8.2	27.3	13.71	40.9	38.6	44	36	
27	57	35	44.7	24.9	19	0	63	27	47	0.00	28.84	30.10	SW	11.7	30.9	13.90	41.5	39.5	45	36	
28	63	36	49.8	38.2	16	0	86	43	65	0.00	28.66	29.91	S	13.0	32.5	13.24	43.5	43.1	49	39	
29	36	20	24.0	20.8	37	0	95	79	87	0.00	28.92	30.17	N	15.8	28.4	2.61	41.8	38.4	45	36	
30	23	18	20.3	12.0	45	0	83	64	70	0.00	29.09	30.34	N	13.7	24.1	2.97	38.3	35.0	36	34	
31	25	17	21.3	9.1	44	0	77	48	59	0.00	29.11	30.38	N	10.4	25.0	4.21	37.0	33.3	34	33	
	55	31	43.3	29.6	<- Monthly Averages ->						28.78	30.03	S	9.3	42.2	9.60	44.3	44.2	48	41	
Temperature - Highest: 73 Lowest: 17							Degree Days - Total HDD: 680 Total CDD: 0					Number of Days With: Tmax ≥ 90: 0 Rainfall ≥ 0.01 inch: 4 Tmax ≤ 32: 2 Rainfall ≥ 0.10 inch: 3 Tmin ≤ 32: 18 Avg Wind Speed ≥ 10 mph: 14 Tmin ≤ 0: 0 Max Wind Speed ≥ 30 mph: 10									
Rainfall: Monthly Total: 1.27 in. Greatest 24 Hr: 0.47 in.							Humidity - Highest: 98 Lowest: 19														

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* Denotes incomplete record

Figure 14 January Mesonet Data

**Lake Thunderbird TMDL Monitoring
Plan Implementation: Sample Year
(SY) 2022- February Report**



OKLAHOMA
Water Resources Board

Lake Thunderbird TMDL Monitoring Plan Implementation: February 2023 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
Monitoring and Assessment Section
3800 N. Classen, Oklahoma City, Oklahoma 73118
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SUMMARY OF FEBRUARY SAMPLING

Sampling for February 2023 occurred during base flow conditions on the twenty-first. Water samples were collected at nine locations, with no samples collected at JB-1 due to pool conditions. Mesonet shows no precipitation on the twenty-first or in the 72 hours prior to sampling, and 0.10 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of February was 2.19 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

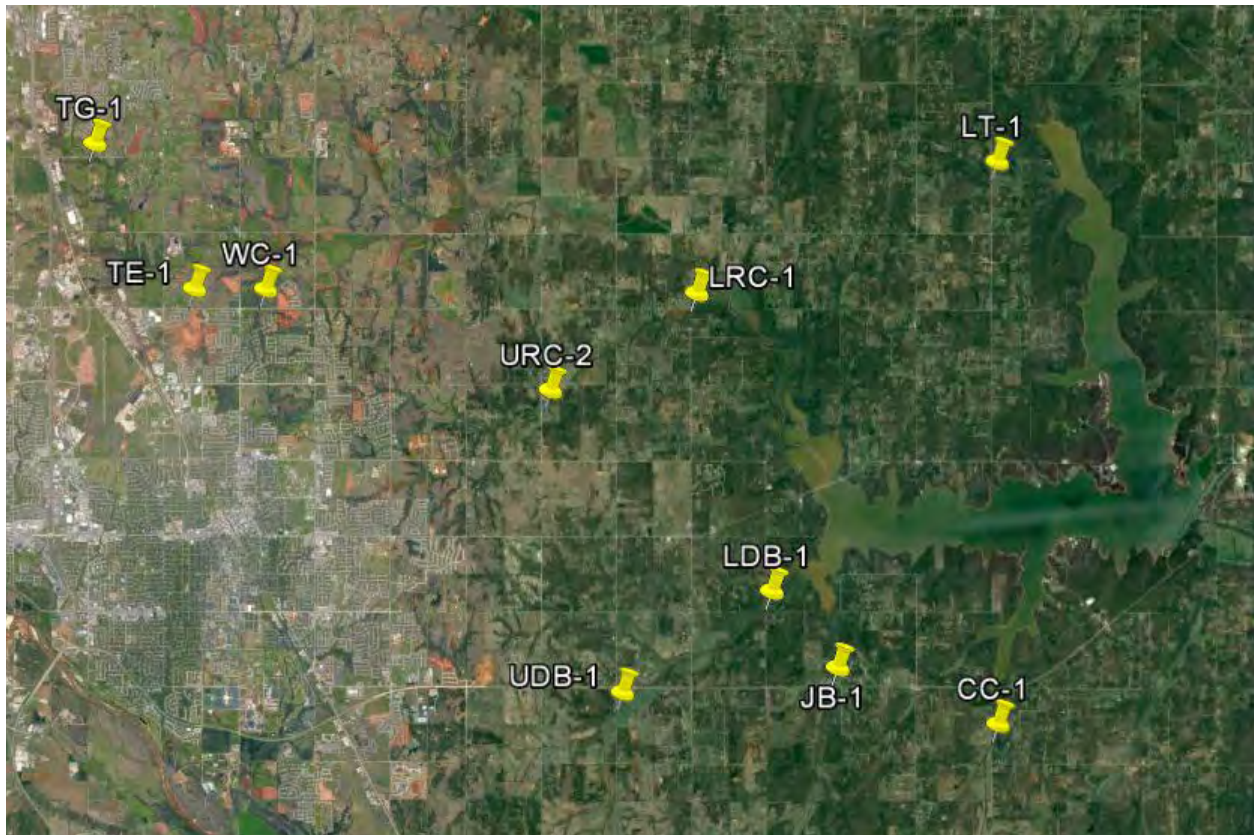


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	2/21/2023	9:12	NH	9.7	8.53	7.74	679	12	Beaver dam still present upstream of bridge
JB-1	Jim Blue Creek	2/21/2023	N/A	NH	N/A	N/A	N/A	N/A	N/A	Not sampled
LDB-1	Lower Dave Blue Creek	2/21/2023	9:32	NH	9.2	13.41	8.19	635	18	Very low ; scummy
LRC-1	Lower Rock Creek	2/21/2023	10:30	NH	8.9	10.78	7.86	637	9	Low visual flow
LT-1	Lake Laterals	2/21/2023	10:10	NH	8.6	8.34	7.52	410	5	Site had water, no visual flow ; extensive damage to guard rail on bridge from vehicle apparently striking the rail; RP still intact
TE-1	Little River Tributary	2/21/2023	12:45	NH	10.9	15.58	8.00	728	15	Water greenish
TG-1	Little River	2/21/2023	13:05	NH	11.3	14.08	8.24	868	10	
UDB-1	Upper Dave Blue Creek	2/21/2023	8:37	NH	8.6	8.90	7.72	718	13	
URC-2	Upper Rock Creek	2/21/2023	11:00	NH	8.5	8.25	7.48	545	17	Little visual flow
WC-1	Woodcrest Creek	2/21/2023	12:30	NH	11.3	11.77	7.68	756	13	Channel has shifted to right bank under bridge; beaver activity

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	<0.05	0.37	0.038	10.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.50	0.037	12.0
LRC-1	Lower Rock Creek	<0.05	0.37	0.030	7.0
LT-1	Lake Laterals	<0.05	0.52	0.030	<5.0
TE-1	Little River Tributary	0.22	0.54	0.046	12.0
TG-1	Little River	0.15	0.44	0.030	10.0
UDB-1	Upper Dave Blue Creek	<0.05	0.42	0.032	14.0
URC-2	Upper Rock Creek	<0.05	0.57	0.058	11.0
WC-1	Woodcrest Creek	<0.05	0.68	0.068	23.0

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	<0.05	0.40	0.038	9.0
Duplicate RPD	0%	7.79%	0%	10.53%

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	0.26	20.27
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.25	14.53
LRC-1	Lower Rock Creek	0.07	4.23
LT-1	Lake Laterals	0.01	4.23
TE-1	Little River Tributary	0.01	10.76
TG-1	Little River	0.55	8.73
UDB-1	Upper Dave Blue Creek	0.08	17.21
URC-2	Upper Rock Creek	0.01	10.67
WC-1	Woodcrest Creek	0.01	7.24

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

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UTC Offset: -06:00

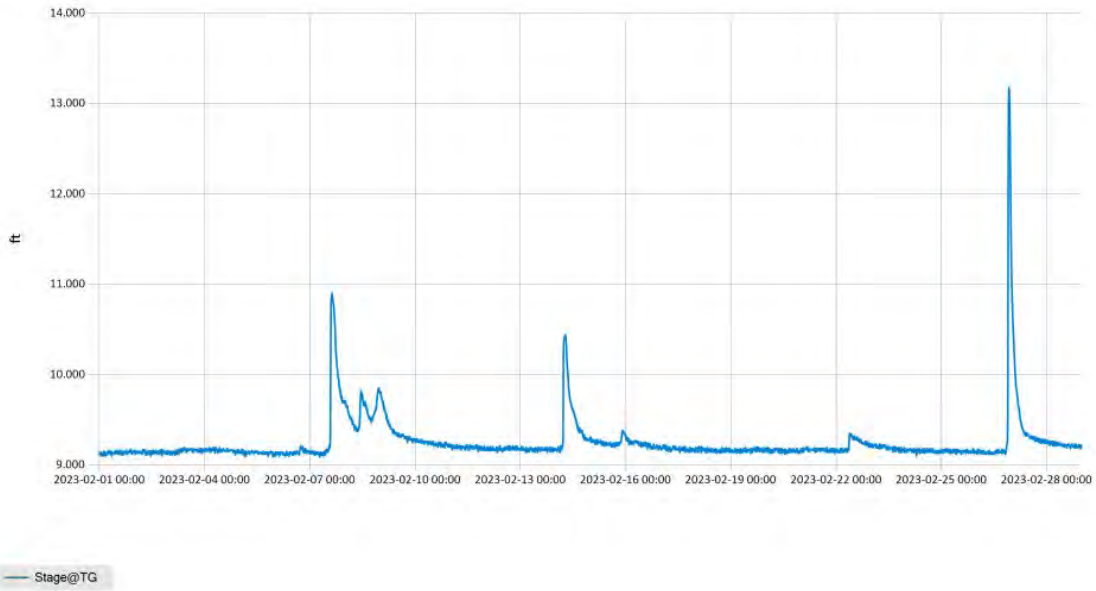


Figure 2 Monthly Hydrograph TG-1

Period Selected: 2023-02-01 00:00 - 2023-02-28 23:59

UTC Offset: -06:00

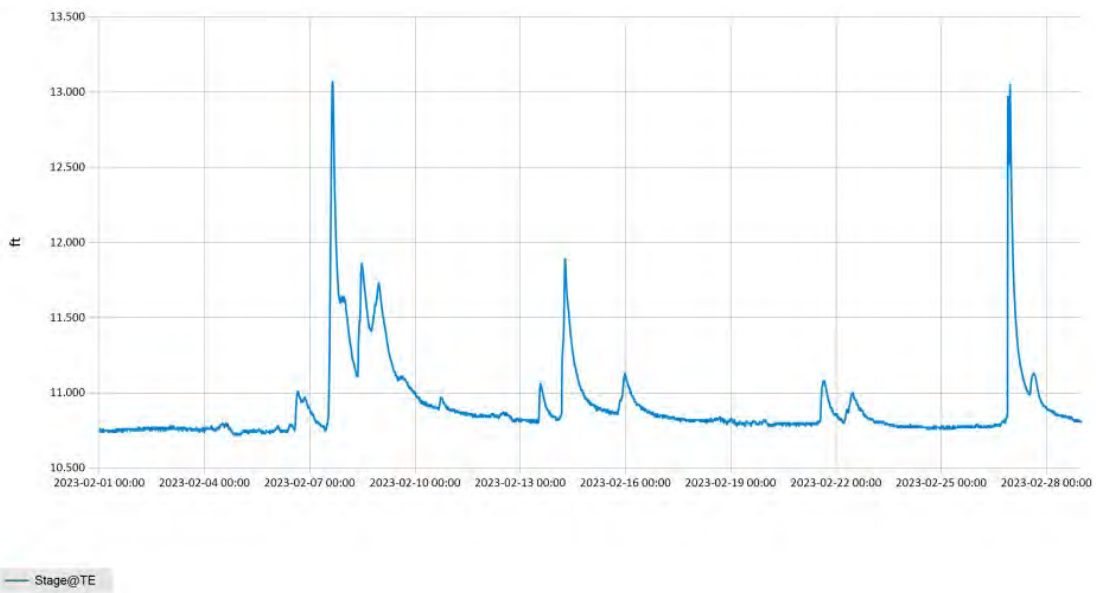
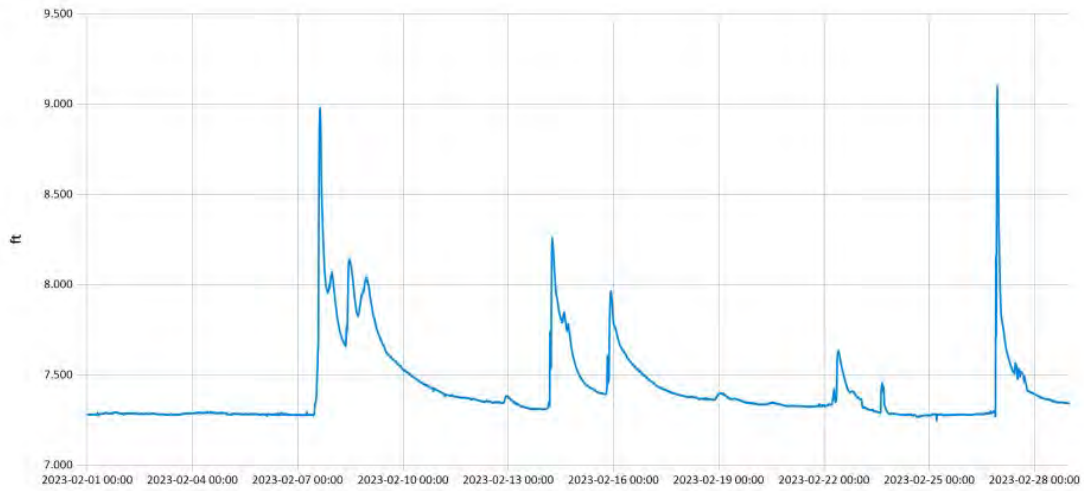


Figure 3 Monthly Hydrograph TE-1

Period Selected: 2023-02-01 00:00 - 2023-02-28 23:59

UTC Offset: -06:00



— Stage@WC

Figure 4 Monthly Hydrograph WC-1

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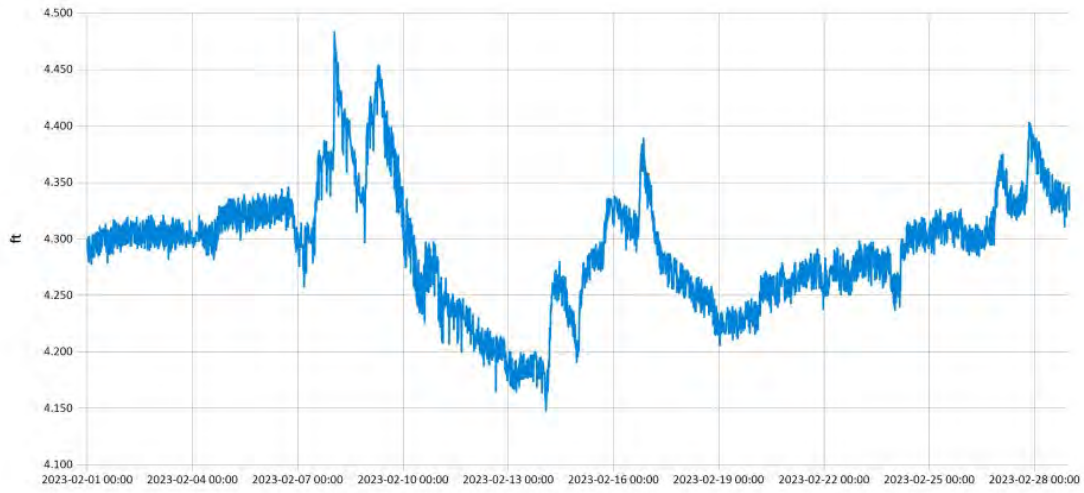
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— Stage@URC

Figure 5 Monthly Hydrograph URC-2

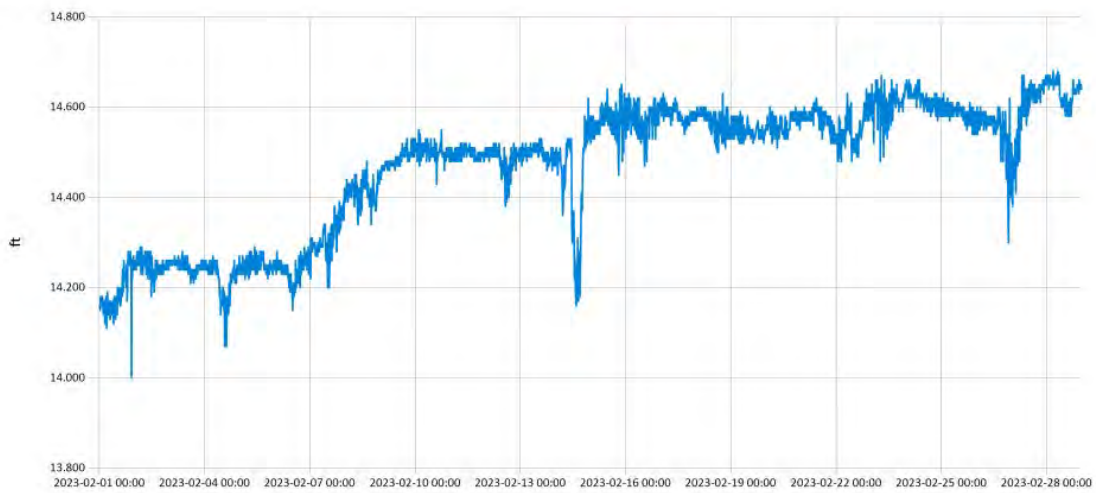
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— Stage@LRC

Figure 6 Monthly Hydrograph LRC-1

Period Selected: 2023-02-01 00:00 - 2023-02-28 23:59 UTC Offset: -06:00



— Stage@LDB

Figure 7 Monthly Hydrograph LDB-1

Period Selected: 2023-02-01 00:00 - 2023-02-28 23:59

UTC Offset: -06:00

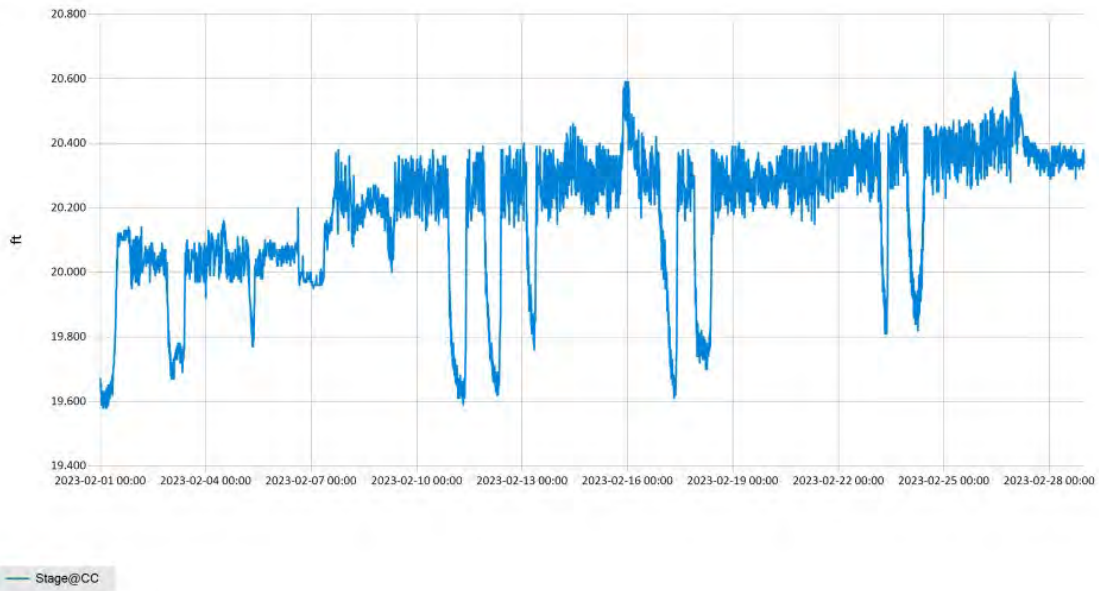


Figure 8 Monthly Hydrograph CC-1

Period Selected: 2023-02-01 00:00 - 2023-02-28 23:59

UTC Offset: -06:00

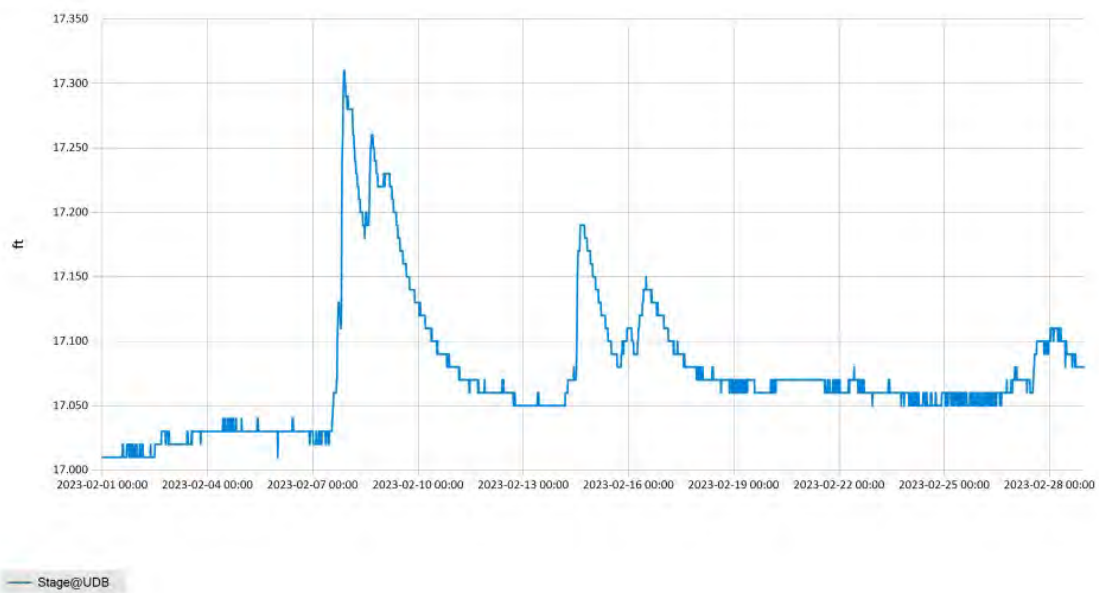


Figure 9 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				February 2023				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 (in)		PRESSURE (in)			WIND SPEED (mph)			SOLAR	4" SOIL TEMPERATURES			
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG	(in)	STN	MSL	DIR	AVG	MAX	(MJ/m ²)	SOD	BARE	MAX	MIN		
1	29	16	24.9	12.1	42	0	83	46	59	0.00	29.08	30.34	NNE	2.9	9.4	4.27	36.3	32.3	33	32		
2	45	28	33.5	24.5	29	0	88	47	70	0.04	29.06	30.32	NNW	4.9	17.8	7.97	37.9	32.9	33	33		
3	51	24	37.0	23.2	28	0	84	37	59	0.00	29.22	30.49	N	7.4	19.2	14.80	38.5	33.8	36	33		
4	61	36	46.5	32.8	16	0	83	32	61	0.00	28.93	30.19	S	11.5	32.4	13.39	40.7	38.7	45	34		
5	68	28	48.6	35.2	17	0	97	27	66	0.00	28.84	30.10	SE	5.2	20.0	14.94	41.8	42.1	49	36		
6	71*	49*	58.5*	48.3*	5*	0*	91*	41*	71*	0.00*	28.62*	29.87*	SSE*	11.7*	30.0*	NA	45.2*	48.2*	53*	44*		
7	52	39	42.4	37.7	20	0	94	56	84	0.82	28.89	30.14	NNE	12.9	33.0	1.65	45.6	45.9	51	44		
8	41	33	38.5	35.7	28	0	97	79	90	0.39	28.75	30.00	NNE	13.0	29.4	2.37	43.9	43.1	44	42		
9	52	29	40.1	32.9	25	0	97	56	77	0.02	28.84	30.09	N	10.1	28.5	15.72	42.8	43.2	49	39		
10	43	28	35.5	22.2	30	0	81	36	59	0.00	29.13	30.39	N	12.2	30.5	10.35	42.5	41.1	44	38		
11	53	24	37.6	24.8	26	0	84	34	62	0.00	29.05	30.31	NNW	3.5	9.9	16.15	40.9	40.3	48	36		
12	66	31	47.8	23.8	16	0	72	18	44	0.00	28.79	30.04	SSW	9.3	30.2	15.51	41.5	41.2	47	36		
13	65	32	49.6	30.8	16	0	80	27	51	0.00	28.68	29.92	SSE	7.3	23.1	13.71	43.0	43.5	50	37		
14	69	44	55.1	40.9	8	0	96	31	62	0.33	28.27	29.50	SW	15.5	56.6	12.88	46.1	48.8	53	46		
15	67	38	49.3	36.7	13	0	84	36	64	0.12	28.52	29.75	NE	10.2	31.8	15.40	46.1	47.7	53	42		
16	38	27	32.7	21.2	32	0	85	44	63	0.00	28.91	30.17	NW	19.6	36.0	15.37	44.1	42.0	47	38		
17	49	21	35.4	16.7	30	0	84	21	51	0.00	29.17	30.43	S	6.4	19.9	17.50	41.6	39.0	44	36		
18	47	29	39.9	20.5	27	0	62	34	46	0.00	28.99	30.24	S	10.9	28.5	6.06	41.4	37.7	40	36		
19	66	41	53.7	32.1	11	0	57	30	44	0.00	28.72	29.97	SSW	13.4	29.8	11.50	43.1	41.8	48	37		
20	69	49	59.8	43.6	6	0	69	37	56	0.00	28.56	29.80	SW	8.5	23.8	7.67	47.1	48.9	53	46		
21	76	42	61.4	42.1	6	0	77	29	51	0.00	28.37	29.60	S	9.1	30.5	8.09	47.8	48.9	53	45		
22	73	39	62.2	45.3	9	0	91	27	58	0.10	28.28	29.51	SW	14.6	35.4	15.78	51.5	54.8	59	50		
23	41	23	31.6	13.0	33	0	70	30	47	0.00	28.93	30.18	N	14.5	29.8	17.67	46.8	43.7	50	40		
24	32	26	29.2	17.3	36	0	70	48	61	0.00	29.10	30.36	NNE	11.2	26.9	4.47	43.2	38.0	40	37		
25	43	28	36.1	29.3	29	0	89	66	76	0.00	29.00	30.25	S	5.1	16.8	4.78	43.3	39.6	43	37		
26	66	42	51.2	46.5	11	0	95	34	85	0.37	28.55	29.79	S	12.7	54.8	5.53	45.8*	45.9	52	42		
27	73	46	59.2	31.7	6	0	56	20	37	0.00	28.45	29.69	W	12.0	43.3	18.68	48.4	49.6	56	43		
28	76	42	60.5	29.1	6	0	55	13	33	0.00	28.47	29.71	SW	9.5	26.0	18.92	48.8	49.3	55	43		
	57*	33*	44.9*	30.4*	<- Monthly Averages ->						28.79*	30.04*	S	10.2*	56.6*	11.52*	43.8*	42.9*	47*	39*		
Temperature - Highest: 76*							Degree Days - Total HDD: 562*							Number of Days With:								
Lowest: 16*							Total CDD: 0*							Tmax ≥ 90: 0* Rainfall ≥ 0.01 inch: 8*								
Rainfall: Monthly Total: 2.19* in.							Humidity - Highest: 97*							Tmax ≤ 32: 2* Rainfall ≥ 0.10 inch: 6*								
Greatest 24 Hr: 0.82* in.							Lowest: 13*							Tmin ≤ 32: 15* Avg Wind Speed ≥ 10 mph: 16*								
														Tmin ≤ 0: 0* Max Wind Speed ≥ 30 mph: 12*								

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* Denotes incomplete record

Figure 10 February Mesonet Data

**Lake Thunderbird TMDL Monitoring
Plan Implementation: Sample Year
(SY) 2023- March Report**



OKLAHOMA
Water Resources Board

Lake Thunderbird TMDL Monitoring Plan Implementation:

March 2023 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
Monitoring and Assessment Section
3800 N. Classen, Oklahoma City, Oklahoma 73118
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SUMMARY OF MARCH SAMPLING

Sampling for March 2023 occurred during base flow conditions on the twenty-second. Water samples were collected at nine locations and discharge was measured at seven locations. Samples were not collected at JB-1 due to pool conditions. Mesonet shows no precipitation on the twenty-second, 0.19 inches of precipitation in the 72 hours prior to sampling, and 1.03 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of March was 3.41 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

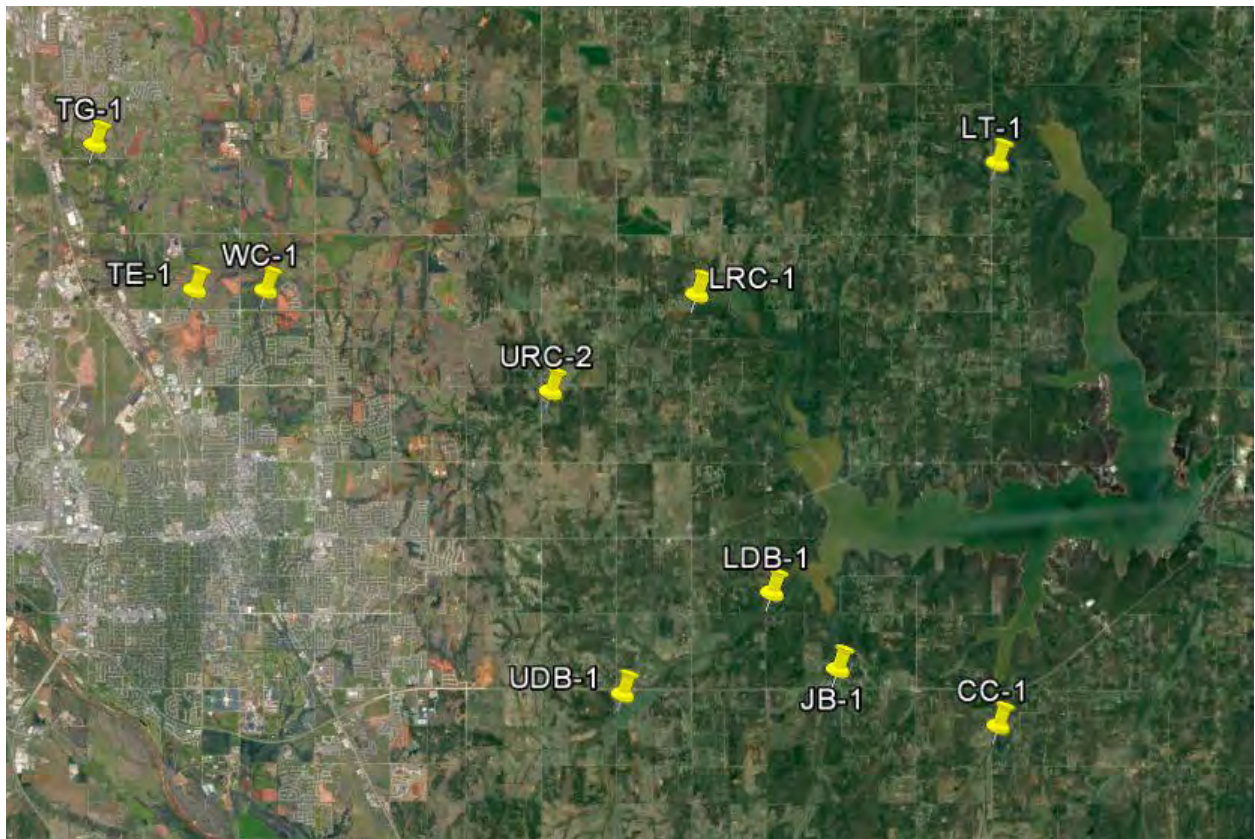


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	3/22/2023	10:05	SD	14.3	8.03	7.90	703	9	Used RP4; beaver dam still visible on upstream side of bridge
JB-1	Jim Blue Creek	3/22/2023	10:20	SD	N/A	N/A	N/A	N/A	N/A	Did not sample; barely connected downstream; water clear and had filamentous algae growing at bridge
LDB-1	Lower Dave Blue Creek	3/22/2023	10:37	SD	13.1	11.03	8.19	658	17	Lower water level but channel looked normal; small debris was petals/small leaves
LRC-1	Lower Rock Creek	3/22/2023	11:35	SD	13.9	10.21	8.01	596	14	Channel has normal flow but appears higher than usual
LT-1	Lake Laterals	3/22/2023	11:05	SD	14.1	6.93	7.72	494	2	Filamentous more present upstream of bridge; visible flow upstream of bridge; lots of tree debris on downstream
TE-1	Little River Tributary	3/22/2023	13:37	SD	16.3	14.64	8.33	762	32	Normal flow but higher stage than usual; periphyton more common upstream of bridge
TG-1	Little River	3/22/2023	14:10	SD	15.7	12.58	8.27	579	21	Normal flow but higher stage than the last few visits; fallen tree in channel upstream of bridge
UDB-1	Upper Dave Blue Creek	3/22/2023	9:15	SD	12.7	8.99	8.18	716	14	Normal channel conditions but more flow than observed the last few visits; floating debris was mostly small leaves/petals
URC-2	Upper Rock Creek	3/22/2023	12:25	SD	14.5	10.20	8.09	604	16	Periphyton more common upstream of bridge; normal looking conditions but channel more full than usual
WC-1	Woodcrest Creek	3/22/2023	13:05	SD	14.8	10.64	7.88	698	12	More visual flow than normal but normal stream conditions; periphyton more present upstream of 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	<0.05	0.19	0.031	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.39	0.035	24.0
LRC-1	Lower Rock Creek	<0.05	0.51	0.035	8.0
LT-1	Lake Laterals	<0.05	0.34	0.018	8.0
TE-1	Little River Tributary	0.41	0.61	0.057	32.0
TG-1	Little River	0.41	0.57	0.053	6.0
UDB-1	Upper Dave Blue Creek	<0.05	0.36	0.028	<5.0
URC-2	Upper Rock Creek	<0.05	0.63	0.038	6.0
WC-1	Woodcrest Creek	0.45	0.60	0.058	18.0

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	<0.05	0.18	0.031	5.0
Duplicate RPD	0%	5.41%	0%	66.67%*

Table 3 QA/QC Data Where the Asterisk Denotes RPD4

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	0.61	20.56
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.55	15.07
LRC-1	Lower Rock Creek	0.31	4.37
LT-1	Lake Laterals	0.20	4.64
TE-1	Little River Tributary	0.37	11.10
TG-1	Little River	2.19	9.15
UDB-1	Upper Dave Blue Creek	0.74	17.48
URC-2	Upper Rock Creek	0.29	11.28
WC-1	Woodcrest Creek	0.56	7.58

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

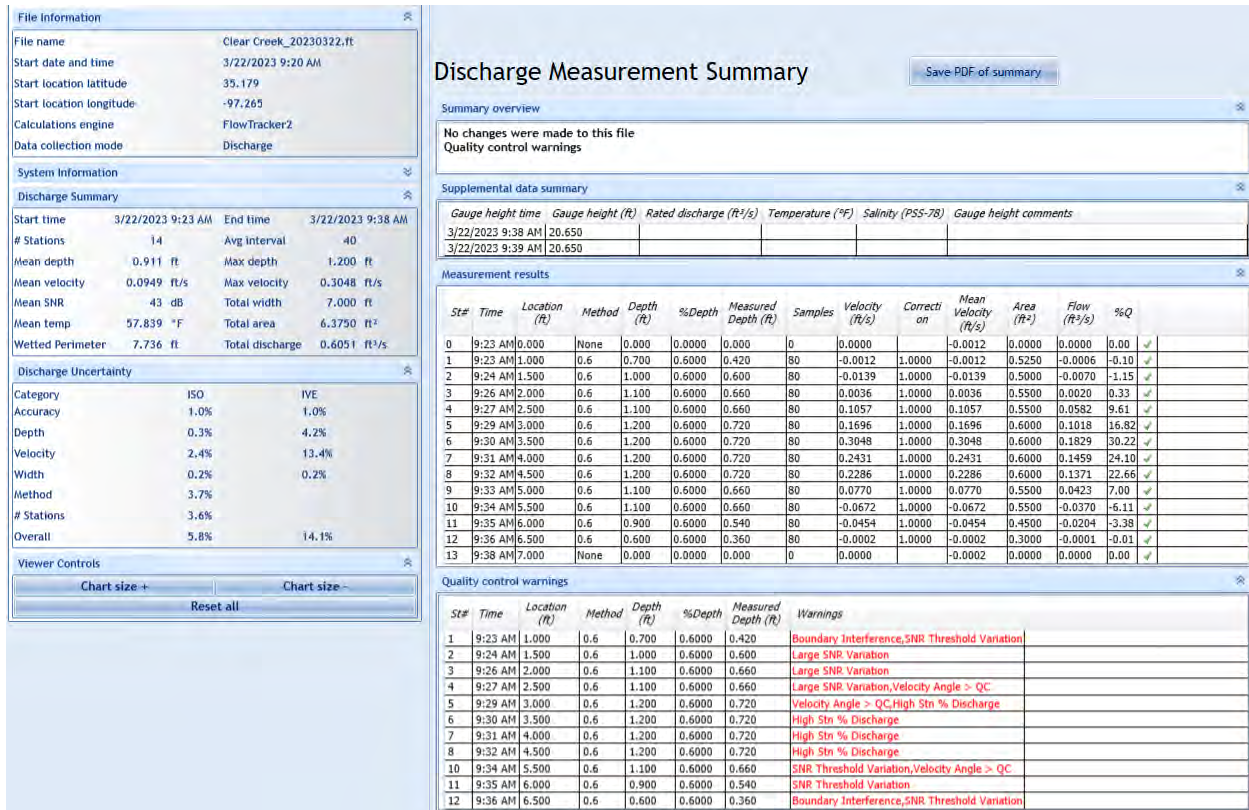


Figure 2 Discharge Measurement Summary CC-1

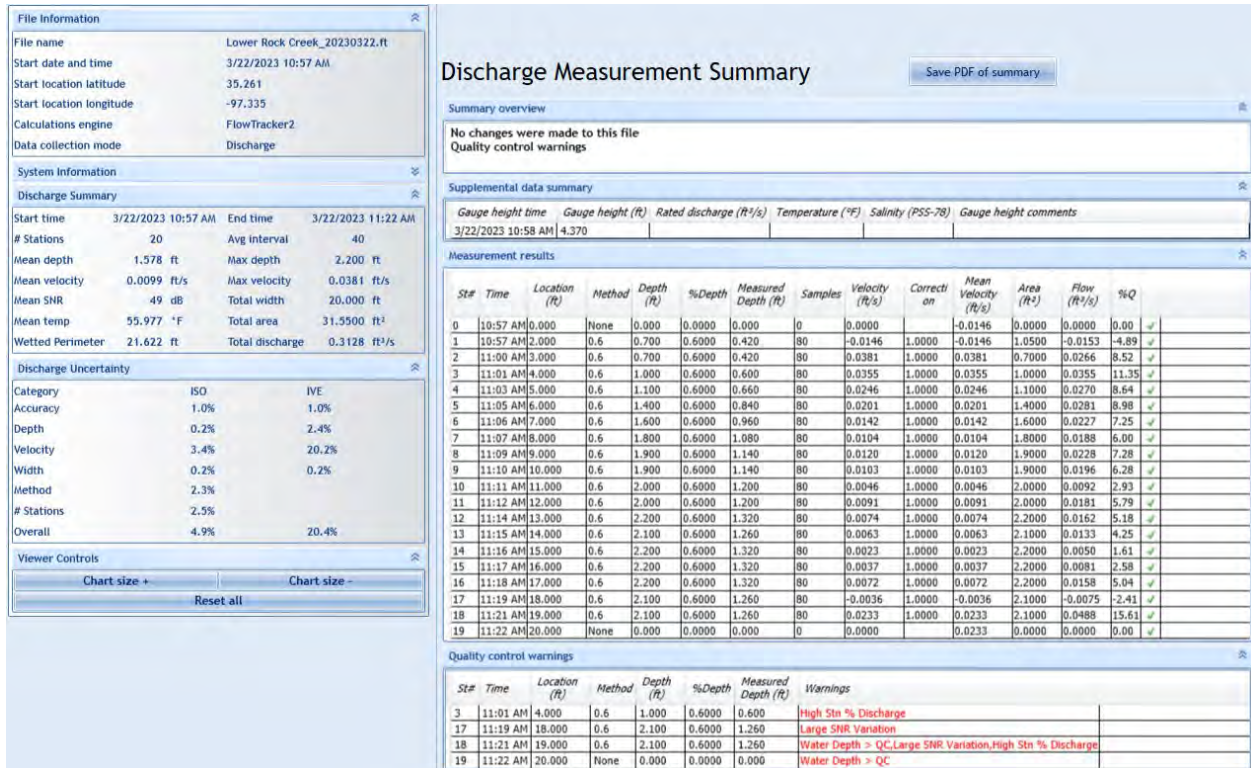


Figure 3 Discharge Measurement Summary LRC-1

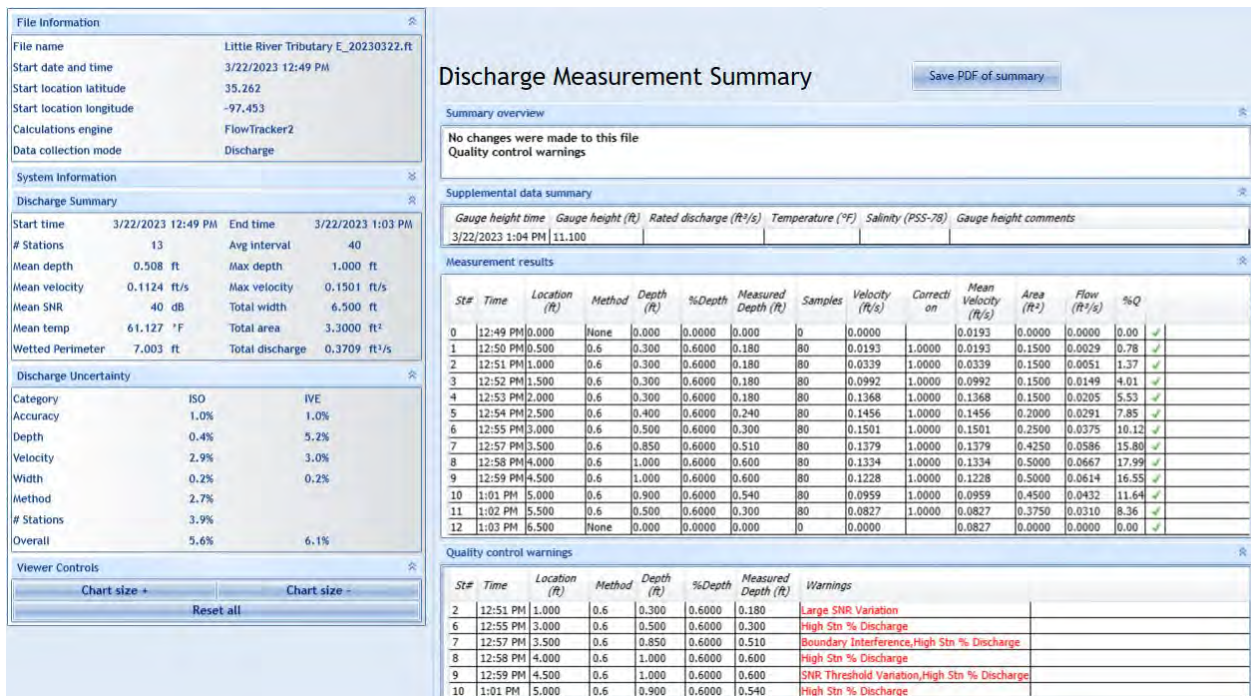


Figure 4 Discharge Measurement Summary TE-1

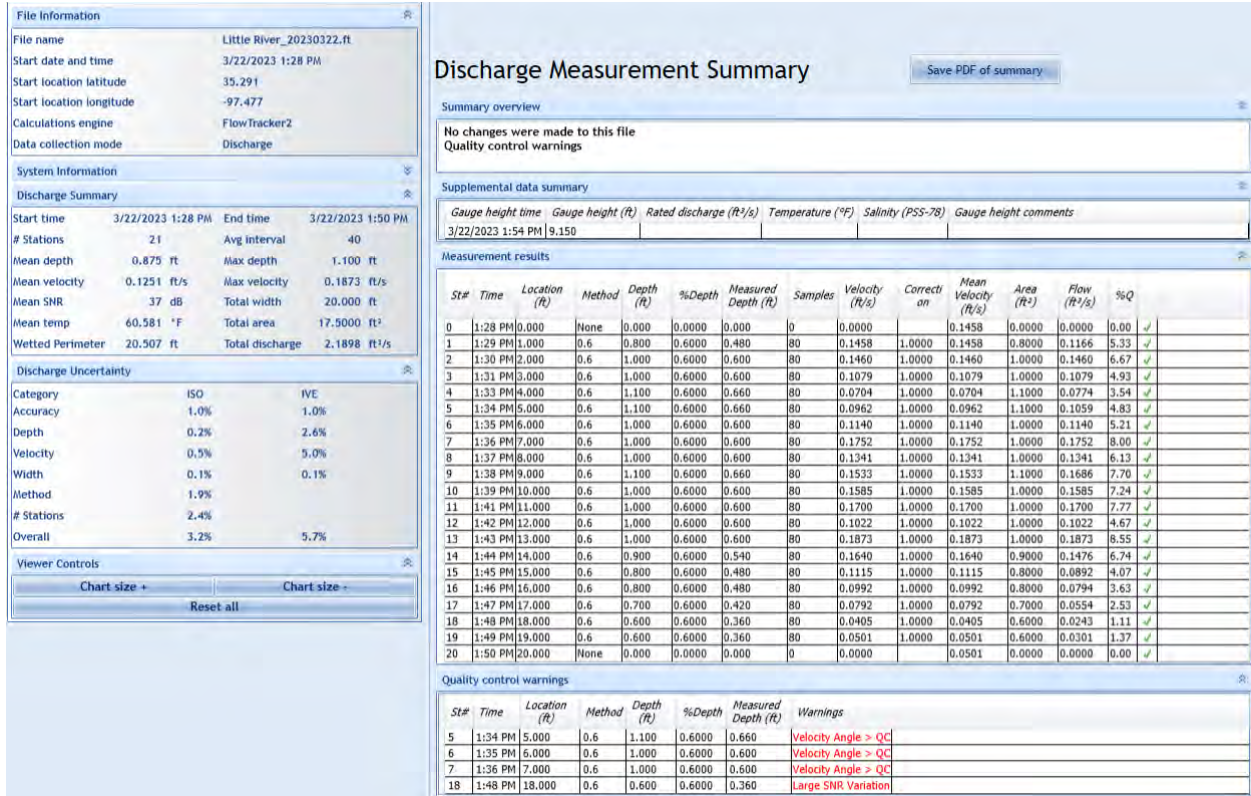


Figure 5 Discharge Measurement Summary TG-1

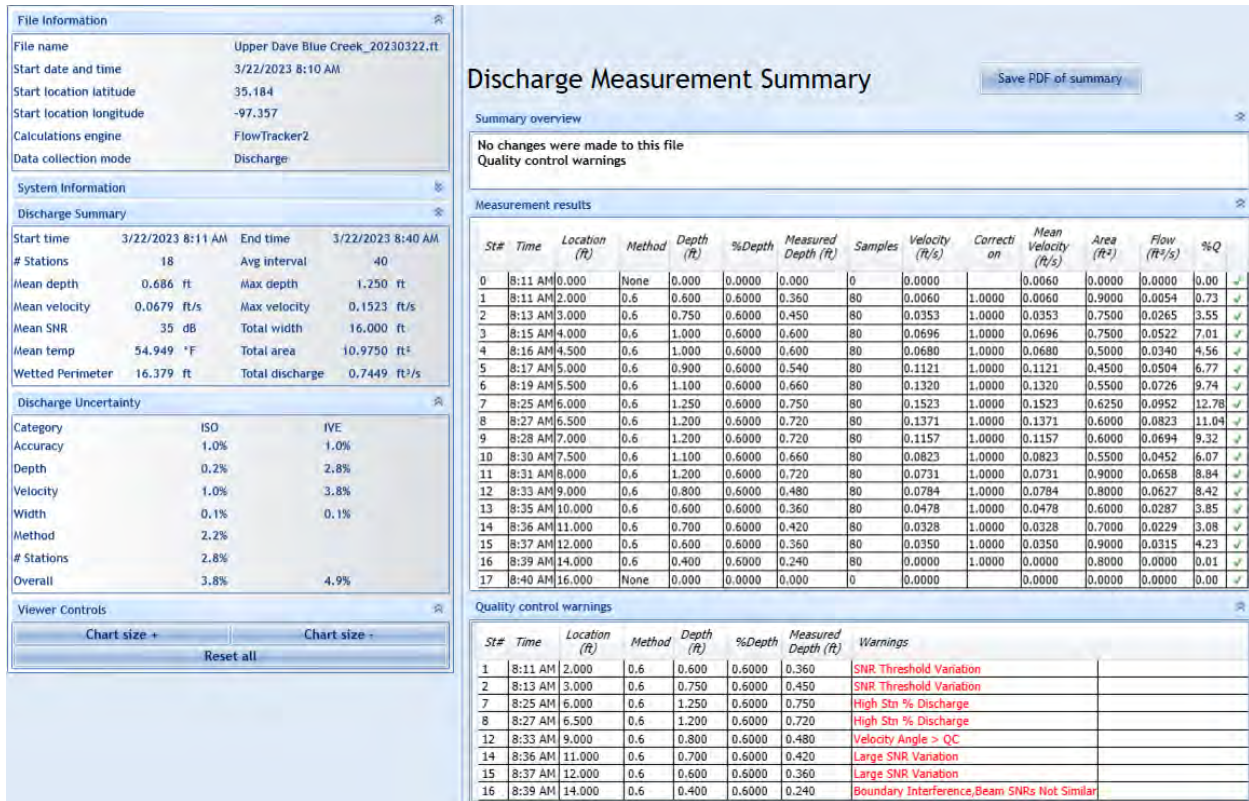


Figure 6 Discharge Measurement Summary UDB-1

File Information

File name: Upper Rock Creek_20230322.ft
 Start date and time: 3/22/2023 11:40 AM
 Start location latitude: 35.242
 Start location longitude: -97.371
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 3/22/2023 11:40 AM End time: 3/22/2023 11:54 AM
 # Stations: 12 Avg interval: 40
 Mean depth: 0.638 ft Max depth: 1.100 ft
 Mean velocity: 0.0698 ft/s Max velocity: 0.1721 ft/s
 Mean SNR: 50 dB Total width: 6.500 ft
 Mean temp: 56.928 °F Total area: 4.1500 ft²
 Wetted Perimeter: 7.083 ft Total discharge: 0.2895 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	4.5%
Velocity	1.4%	14.4%
Width	0.2%	0.2%
Method	3.5%	
# Stations	4.2%	
Overall	5.7%	15.1%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary Save PDF of summary

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
3/22/2023 11:45 AM	11.280				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q
0	11:40 AM	0.000	None	0.000	0.000	0.000	0	0.0000		-0.0002	0.0000	0.0000	0.00
1	11:41 AM	0.500	0.6	0.300	0.6000	0.180	80	-0.0002	1.0000	-0.0002	0.1500	0.0000	-0.01
2	11:42 AM	1.000	0.6	0.300	0.6000	0.180	80	-0.0001	1.0000	-0.0001	0.2250	0.0000	-0.01
3	11:44 AM	2.000	0.6	0.500	0.6000	0.300	80	0.0024	1.0000	0.0024	0.5000	0.0012	0.41
4	11:45 AM	3.000	0.6	0.700	0.6000	0.420	80	0.0127	1.0000	0.0127	0.5250	0.0067	2.31
5	11:46 AM	3.500	0.6	1.000	0.6000	0.600	80	0.0971	1.0000	0.0971	0.5000	0.0485	16.76
6	11:48 AM	4.000	0.6	1.000	0.6000	0.600	80	0.1721	1.0000	0.1721	0.5000	0.0861	29.73
7	11:49 AM	4.500	0.6	1.100	0.6000	0.660	80	0.1218	1.0000	0.1218	0.5500	0.0670	23.13
8	11:50 AM	5.000	0.6	1.000	0.6000	0.600	80	0.1122	1.0000	0.1122	0.5000	0.0561	19.38
9	11:52 AM	5.500	0.6	0.900	0.6000	0.540	80	0.0357	1.0000	0.0357	0.4500	0.0161	5.55
10	11:53 AM	6.000	0.6	0.500	0.6000	0.300	80	0.0318	1.0000	0.0318	0.2500	0.0079	2.75
11	11:54 AM	6.500	None	0.000	0.0000	0.000	0	0.0000		0.0318	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	11:41 AM	0.500	0.6	0.300	0.6000	0.180	SNR Threshold Variation
2	11:42 AM	1.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation
3	11:44 AM	2.000	0.6	0.500	0.6000	0.300	Large SNR Variation
4	11:45 AM	3.000	0.6	0.700	0.6000	0.420	Boundary Interference
5	11:46 AM	3.500	0.6	1.000	0.6000	0.600	Boundary Interference, High Stn % Discharge
6	11:48 AM	4.000	0.6	1.000	0.6000	0.600	High Stn % Discharge
7	11:49 AM	4.500	0.6	1.100	0.6000	0.660	High Stn % Discharge
8	11:50 AM	5.000	0.6	1.000	0.6000	0.600	High Stn % Discharge
10	11:53 AM	6.000	0.6	0.500	0.6000	0.300	Boundary Interference

Figure 7 Discharge Measurement Summary URC-2

File Information

File name: Woodcrest Creek_20230322.ft
 Start date and time: 3/22/2023 12:17 PM
 Start location latitude: 35.262
 Start location longitude: -97.437
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 3/22/2023 12:17 PM End time: 3/22/2023 12:33 PM
 # Stations: 14 Avg interval: 40
 Mean depth: 0.547 ft Max depth: 0.800 ft
 Mean velocity: 0.1288 ft/s Max velocity: 0.2576 ft/s
 Mean SNR: 44 dB Total width: 8.000 ft
 Mean temp: 58.849 °F Total area: 4.3750 ft²
 Wetted Perimeter: 8.252 ft Total discharge: 0.5634 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.6%	5.3%
Velocity	1.0%	7.0%
Width	0.2%	0.2%
Method	2.8%	
# Stations	3.6%	
Overall	4.8%	8.9%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary Save PDF of summary

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
3/22/2023 12:17 PM	7.580				
3/22/2023 12:36 PM	7.580				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q
0	12:17 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.1137	0.0000	0.0000	0.00
1	12:17 PM	1.000	0.6	0.400	0.6000	0.240	80	0.1137	1.0000	0.1137	0.3000	0.0341	6.05
2	12:19 PM	1.500	0.6	0.550	0.6000	0.330	80	0.1755	1.0000	0.1755	0.2750	0.0483	8.57
3	12:20 PM	2.000	0.6	0.650	0.6000	0.390	80	0.2200	1.0000	0.2200	0.3250	0.0715	12.69
4	12:22 PM	2.500	0.6	0.650	0.6000	0.390	80	0.2363	1.0000	0.2363	0.3250	0.0768	13.63
5	12:23 PM	3.000	0.6	0.750	0.6000	0.450	80	0.2220	1.0000	0.2220	0.3750	0.0833	14.78
6	12:25 PM	3.500	0.6	0.800	0.6000	0.480	80	0.2325	1.0000	0.2325	0.4000	0.0930	16.51
7	12:26 PM	4.000	0.6	0.800	0.6000	0.480	80	0.2576	1.0000	0.2576	0.4000	0.1030	18.29
8	12:27 PM	4.500	0.6	0.800	0.6000	0.480	80	0.1043	1.0000	0.1043	0.4000	0.0417	7.41
9	12:28 PM	5.000	0.6	0.800	0.6000	0.480	80	0.0579	1.0000	0.0579	0.4000	0.0232	4.11
10	12:29 PM	5.500	0.6	0.700	0.6000	0.420	80	0.0410	1.0000	0.0410	0.3500	0.0143	2.55
11	12:30 PM	6.000	0.6	0.700	0.6000	0.420	80	-0.0175	1.0000	-0.0175	0.5250	-0.0092	-1.63
12	12:31 PM	7.000	0.6	0.300	0.6000	0.180	80	-0.0553	1.0000	-0.0553	0.3000	-0.0166	-2.94
13	12:33 PM	8.000	None	0.000	0.0000	0.000	0	0.0000		-0.0553	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	12:17 PM	1.000	0.6	0.400	0.6000	0.240	Boundary Interference
2	12:19 PM	1.500	0.6	0.550	0.6000	0.330	SNR Threshold Variation
3	12:20 PM	2.000	0.6	0.650	0.6000	0.390	SNR Threshold Variation, High Stn % Discharge
4	12:22 PM	2.500	0.6	0.650	0.6000	0.390	SNR Threshold Variation, High Stn % Discharge
5	12:23 PM	3.000	0.6	0.750	0.6000	0.450	High Stn % Discharge
6	12:25 PM	3.500	0.6	0.800	0.6000	0.480	High Stn % Discharge
7	12:26 PM	4.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
8	12:27 PM	4.500	0.6	0.800	0.6000	0.480	Velocity Angle > QC

Figure 8 Discharge Measurement Summary WC-1

Period Selected: 2023-03-01 00:00 - 2023-03-31 23:59 UTC Offset: -06:00

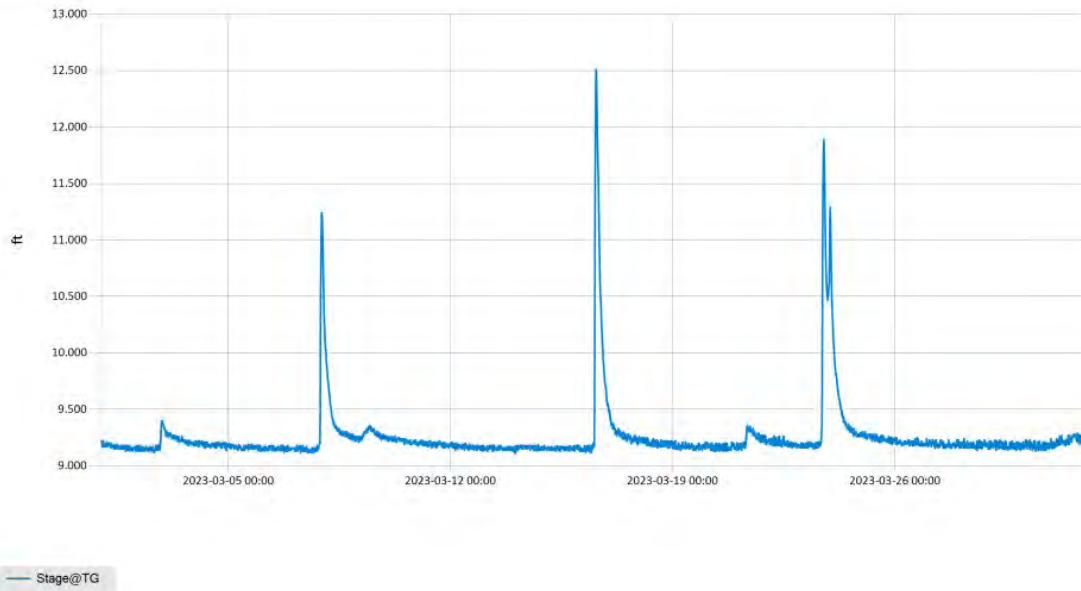


Figure 9 Monthly Hydrograph TG-1

Period Selected: 2023-03-01 00:00 - 2023-03-31 23:59 UTC Offset: -06:00

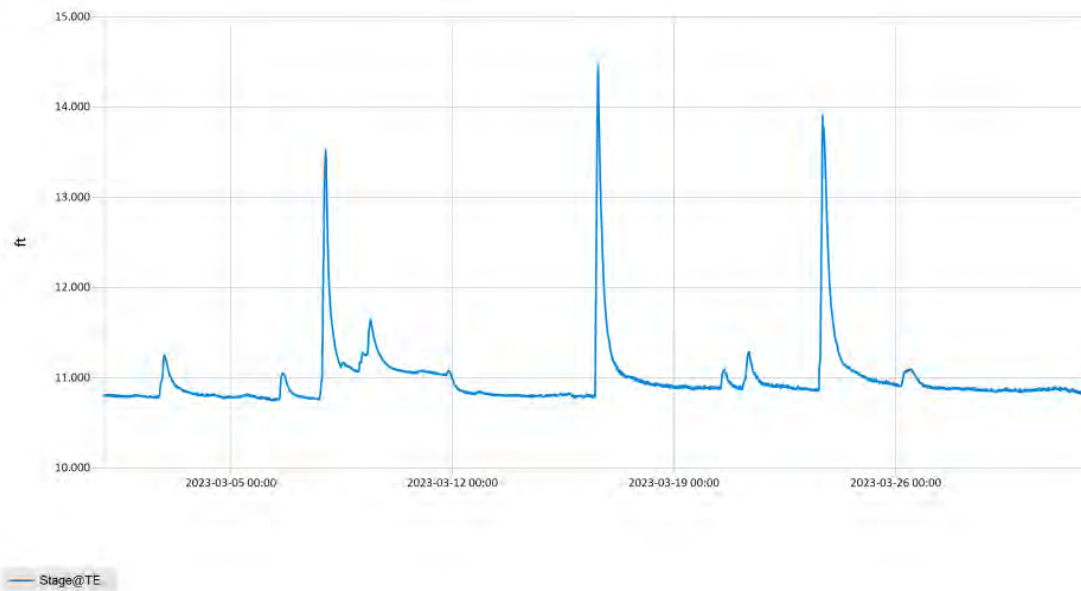


Figure 10 Monthly Hydrograph TE-1

Period Selected: 2023-03-01 00:00 - 2023-03-31 23:59 UTC Offset: -06:00

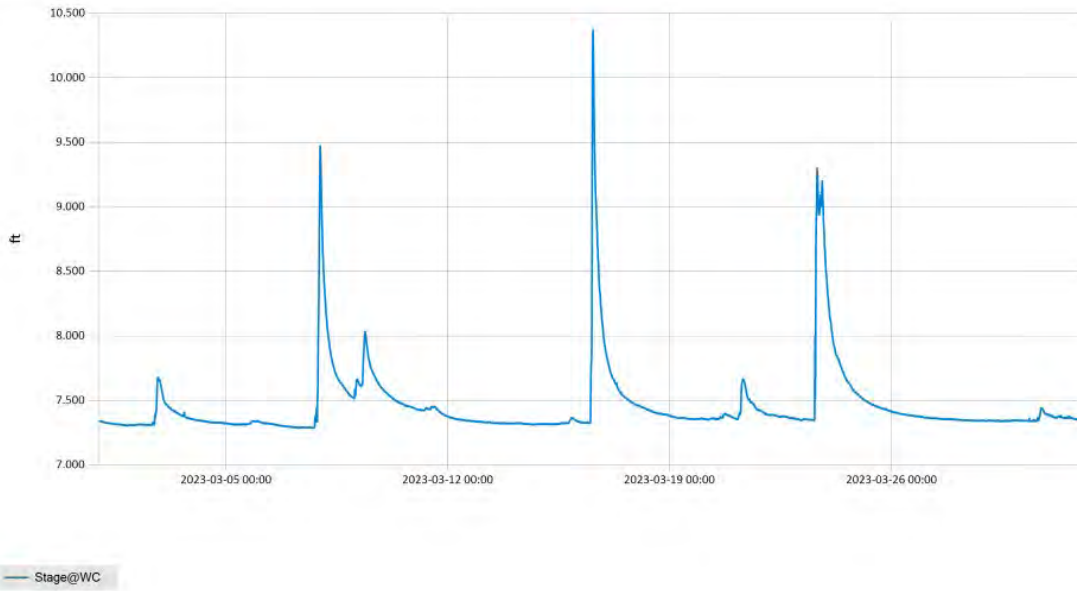


Figure 11 Monthly Hydrograph WC-1

Period Selected: 2023-03-01 00:00 - 2023-03-31 23:59 UTC Offset: -06:00

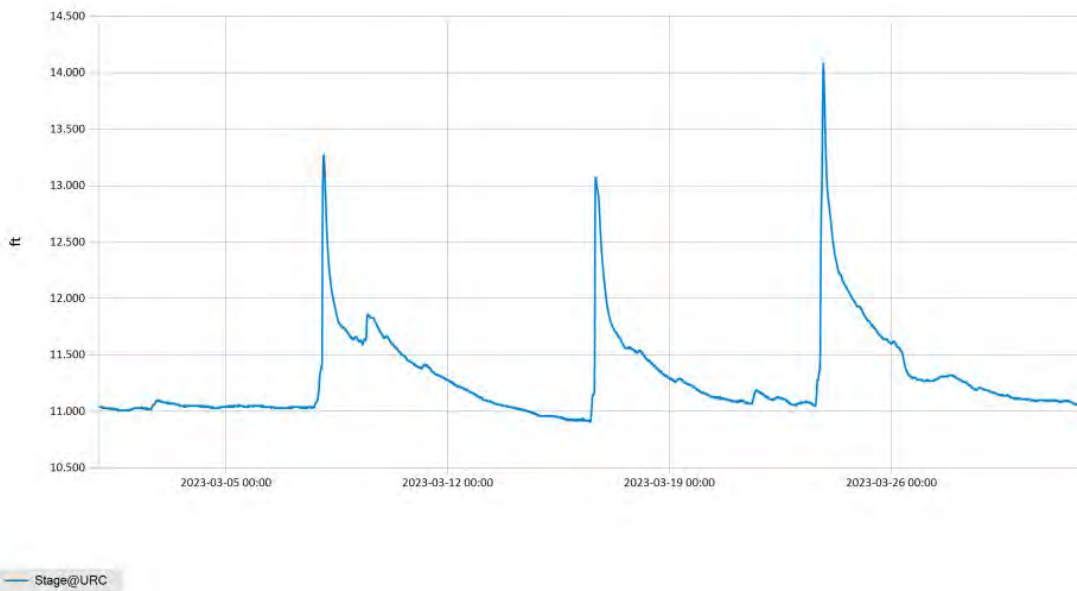
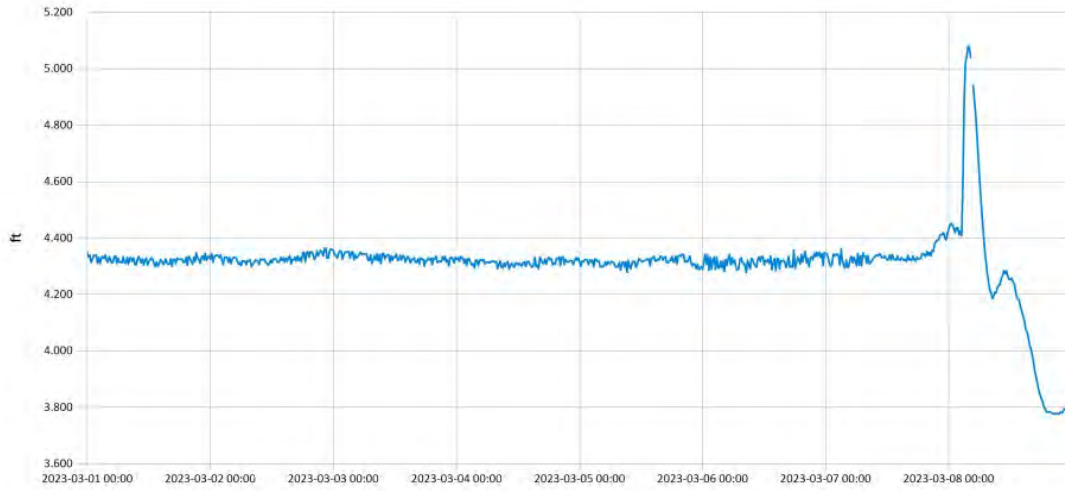


Figure 12 Monthly Hydrograph URC-2

Period Selected: 2023-03-01 00:00 - 2023-03-31 23:59

UTC Offset: -06:00

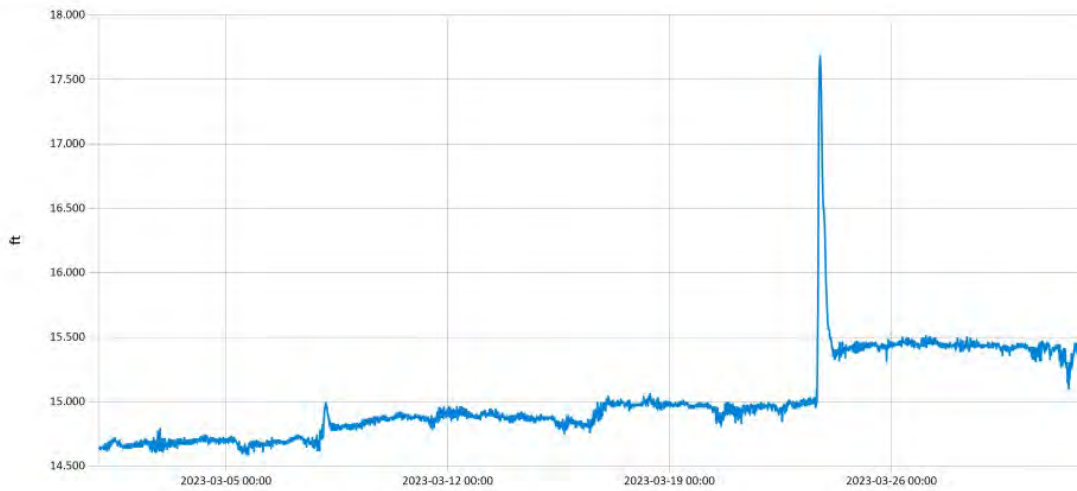


— Stage@LRC

Figure 13 Monthly Hydrograph LRC-1

Period Selected: 2023-03-01 00:00 - 2023-03-31 23:59

UTC Offset: -06:00



— Stage@LDB

Figure 14 Monthly Hydrograph LDB-1

Period Selected: 2023-03-01 00:00 - 2023-03-31 23:59

UTC Offset: -06:00

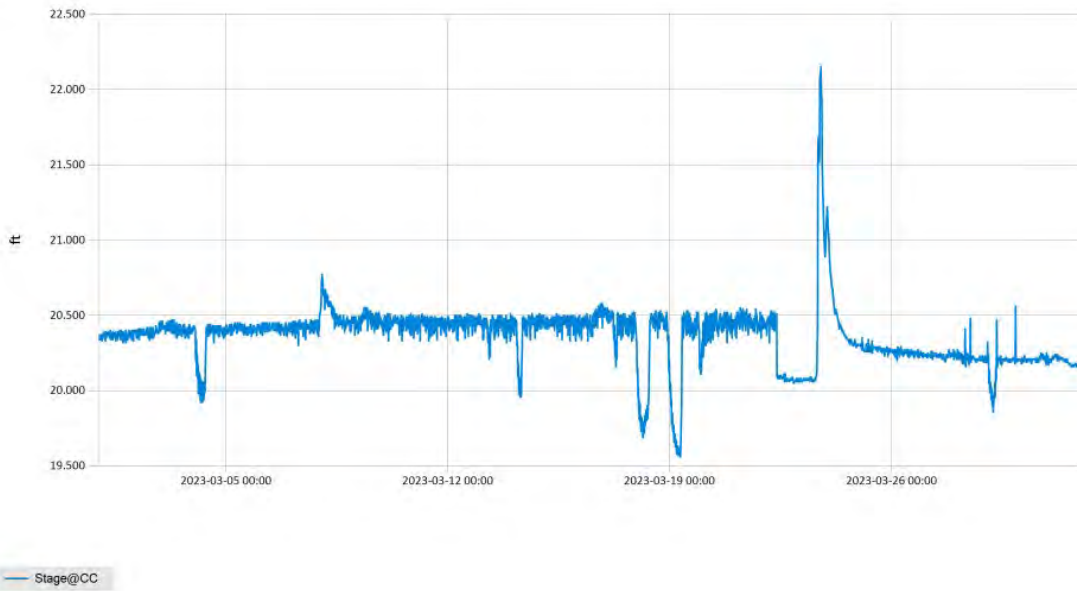


Figure 15 Monthly Hydrograph CC-1

Period Selected: 2023-03-01 00:00 - 2023-03-31 23:59

UTC Offset: -06:00

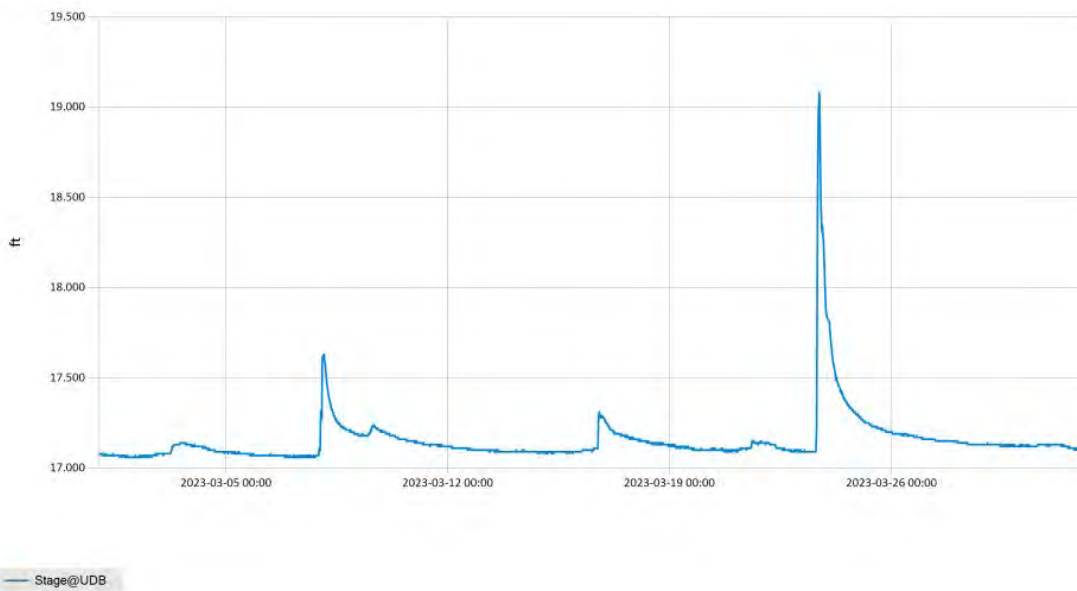


Figure 16 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				March 2023				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 (in)		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	64	47	55.6	31.7	10	0	62	30	41	0.00	28.53	29.77	NE	8.9	23.6	12.65	49.4	49.2	53	46
2	54	42	47.1	37.6	17	0	89	56	70	0.19	28.38	29.62	NE	8.8	28.7	4.83	48.4	47.0	50	44
3	61	40	48.6	30.2	14	0	85	20	53	0.00	28.43	29.67	NNW	11.4	28.4	19.07	48.4	47.8	53	44
4	69	45	55.9	37.6	8	0	76	34	51	0.00	28.65	29.89	SSE	7.0	18.4	18.94	48.8	49.3	58	42
5	78	49	63.5	44.9	2	0	85	28	55	0.00	28.65	29.90	S	12.5	33.9	17.54	51.2	52.8	58	48
6	69	51	59.8	45.1	5	0	81	40	59	0.00	28.69	29.93	S	7.0	26.5	12.05	52.8	54.4	59	51
7	53	42	47.8	39.9	18	0	96	63	75	0.73	28.82	30.06	NE	9.6	20.6	3.49	51.1	50.5	52	48
8	52	43	47.8	42.3	18	0	93	74	81	0.00	28.89	30.15	NNW	8.8	19.3	8.11	50.0	50.0	54	47
9	54	44	49.2	46.0	16	0	98	73	89	0.27	28.84	30.10	N	7.6	23.2	4.34	50.6	50.9	53	50
10	58	35	47.1	36.8	19	0	95	42	70	0.00	28.85	30.10	SE	7.0	16.7	18.51	49.9	50.5	57	44
11	80	46	60.8	49.8	2	0	92	34	70	0.00	28.44	29.68	S	15.9	30.3	16.69	52.7	54.8	61	50
12	50	37	44.0	34.8	21	0	87	50	71	0.00	28.77	30.02	N	10.9	24.5	6.87	51.1	48.9	53	45
13	44	32	38.3	21.8	27	0	74	36	52	0.00	29.02	30.28	NNE	8.1	18.5	8.29	48.0	42.9	46	40
14	55	31	42.7	28.5	22	0	83	42	58	0.00	29.02	30.27	SSE	6.1	16.4	10.70	47.4	43.3	48	39
15	67	41	53.3	37.9	11	0	77	41	57	0.00	28.76	30.01	SSE	14.0	35.8	15.28	48.5	46.4	53	41
16	67	37	51.3	43.5	13	0	94	54	75	0.97	28.57	29.81	S	19.3	42.9	4.08	50.5	50.5	55	46
17	50	31	39.8	22.4	24	0	67	33	51	0.00	28.95	30.20	N	11.2	39.3	21.49	47.0	47.1	53	42
18	46	29	36.8	17.1	28	0	69	28	46	0.00	29.12	30.38	NNE	11.7	28.9	21.85	45.6	44.5	50	40
19	48	20	36.0	13.6	31	0	71	23	42	0.00	29.17	30.43	NNE	5.8	23.0	22.40	44.6	42.5	50	37
20	56	35	45.3	27.2	20	0	61	37	50	0.00	28.84	30.09	S	14.3	37.0	11.96	45.2	42.4	47	38
21	71	44	55.3	48.8	7	0	95	55	80	0.19	28.64	29.88	S	13.8	28.3	9.65	47.4	47.8	54	43
22	80	62	70.0	60.1	0	6	92	46	73	0.00	28.62	29.86	S	12.9	28.7	13.00	53.1	57.4	62	53
23	69	47	59.4	54.8	7	0	95	65	85	1.00	28.64	29.88	S	10.4	23.2	3.87	55.1	58.1	59	55
24	53	40	46.6	43.9	19	0	98	76	91	0.02	28.51	29.75	NNE	8.5	23.2	6.41	52.3	52.9	55	51
25	67	36	50.9	39.0	14	0	99	27	69	0.01	28.57	29.81	SSW	6.1	30.7	21.56	51.2	53.3	61	46
26	61	39	48.4	32.7	15	0	80	30	56	0.00	28.73	29.98	N	11.5	24.4	21.53	51.3	51.6	57	46
27	60	34	46.5	31.8	18	0	85	30	59	0.00	28.88	30.13	NE	8.5	27.8	18.57	50.6	48.8	56	42
28	55	37	44.9	30.7	19	0	83	35	59	0.00	29.09	30.35	N	10.2	31.0	20.24	50.3	48.3	54	43
29	66	33	52.1	35.5	15	0	87	32	56	0.00	28.89	30.14	SSE	7.7	24.3	20.93	50.3	49.1	56	42
30	69	52	59.6	54.9	5	0	97	71	85	0.03	28.63	29.87	SSE	12.2	30.8	6.30	52.6	53.5	57	49
31	77	57	69.5	39.6	0	2	86	10	44	0.00	28.50	29.74	WSW	19.3	53.1	22.47	56.2	59.0	62	53
	61	41	50.8	37.4	<- Monthly Averages ->					28.74	29.99	S	10.5	53.1	13.67	50.0	49.9	55	45	
Temperature - Highest: 80				Degree Days - Total HDD: 443				Number of Days With:												
Lowest: 20				Total CDD: 8				Tmax ≥ 90: 0				Rainfall ≥ 0.01 inch: 9								
Rainfall: Monthly Total: 3.41 in.				Humidity - Highest: 99				Tmax ≤ 32: 0				Rainfall ≥ 0.10 inch: 6								
Greatest 24 Hr: 1.00 in.				Lowest: 10				Tmin ≤ 32: 5				Avg Wind Speed ≥ 10 mph: 16								
								Tmin ≤ 0: 0				Max Wind Speed ≥ 30 mph: 10								

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* Denotes incomplete record

Figure 17 March Mesonet Data

**Lake Thunderbird TMDL Monitoring
Plan Implementation: Sample Year
(SY) 2023- April Report**



OKLAHOMA
Water Resources Board

Lake Thunderbird TMDL Monitoring Plan Implementation:

April 2023 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

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SUMMARY OF APRIL SAMPLING

Sampling for April 2023 occurred during base flow conditions on the eleventh. Water samples were collected at nine locations and discharge was measured at three locations. Two samples were collected at JB-1; one on the upstream side of the road, and one on the downstream side of the road where the channel constricts. Samples were not collected at LT-1, since this station will be relocated to a different location later this year. Mesonet shows no precipitation on the eleventh, 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 April was 3.87 inches. All water level gauges were operational for the month, except for LRC-1 due to equipment malfunction, and the equipment at JB-1 will be reinstalled later this year.

RESULTS

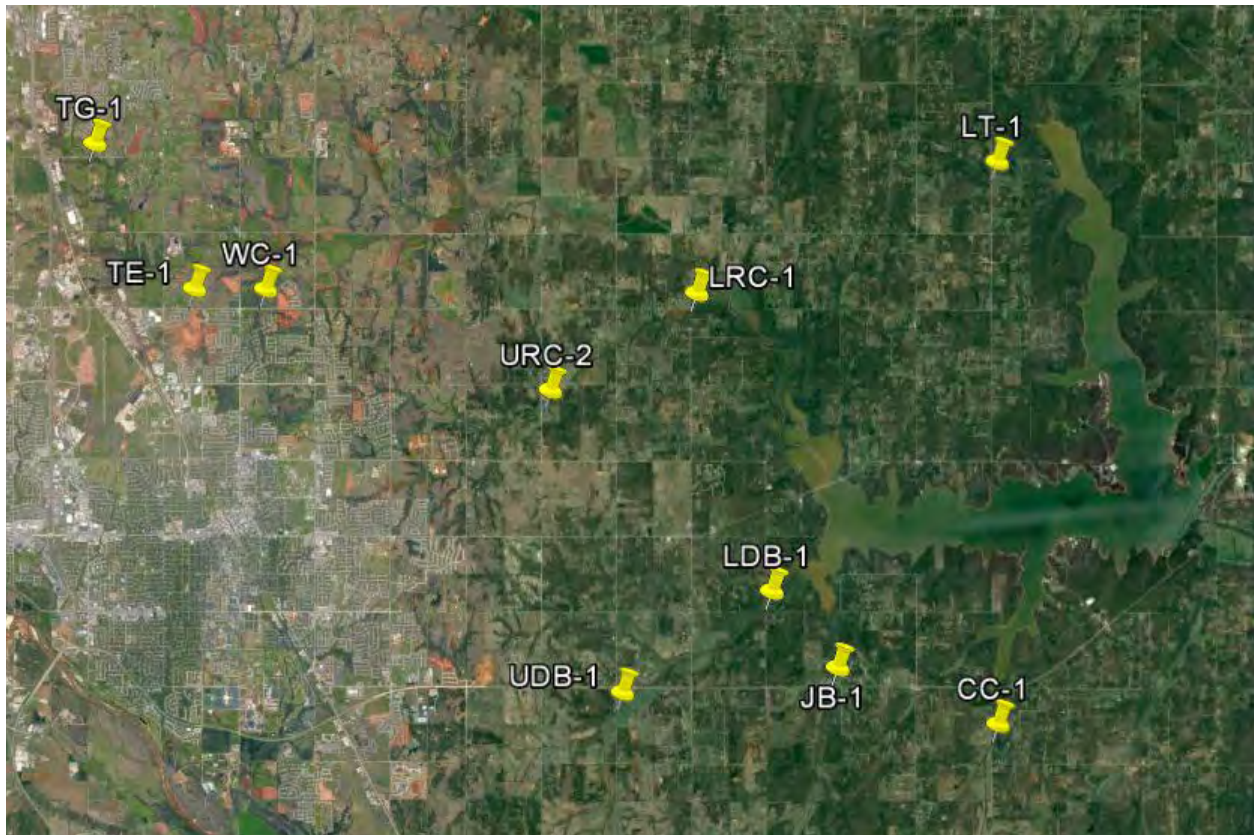


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	4/11/2023	9:13	SD	14.2	7.98	7.68	660	6	Used RP4; orifice may have been slightly clogged - purged and cleaned
JB-1	Jim Blue Creek	4/11/2023	9:30	SD	17.3	14.65	8.03	866	12	Barely connected on downstream side; flow taken on upstream side; no gauge; two samples collected - one downstream, one upstream
LDB-1	Lower Dave Blue Creek	4/11/2023	11:01	SD	16.5	8.09	7.98	901	39	Visually slightly higher than last month
LRC-1	Lower Rock Creek	4/11/2023	11:27	SD	16.5	9.39	7.92	707	10	Lots of algae growth along the banks
LT-1	Lake Laterals	4/11/2023	11:15	SD	N/A	N/A	N/A	N/A	N/A	Site not sampled; planning to relocate this location
TE-1	Little River Tributary	4/11/2023	14:02	SD	21.7	10.03	7.86	1058	23	Stage similar to last month so no flow taken; beaver dam still visible upstream of sampling location
TG-1	Little River	4/11/2023	14:23	SD	21.4	13.82	8.11	1185	2	Good amount of algae. Flow slowed upstream, constricted downstream of bridge
UDB-1	Upper Dave Blue Creek	4/11/2023	8:34	SD	14.9	7.79	7.82	908	8	Similar stage as last month
URC-2	Upper Rock Creek	4/11/2023	12:20	SD	17.9	9.06	7.61	698	15	Slightly lower than last month
WC-1	Woodcrest Creek	4/11/2023	13:45	SD	19.6	12.11	7.78	1032	3	Very similar stage to last month's collection; very low water level; algae more present upstream of 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	<0.05	0.17	0.029	9.0
JB-1	Jim Blue Creek (ds)	<0.05	0.32	0.035	10.0
JB-1	Jim Blue Creek (us)	<0.05	0.28	0.032	7.0
LDB-1	Lower Dave Blue Creek	<0.05	0.42	0.058	54.0
LRC-1	Lower Rock Creek	<0.05	0.39	0.028	12.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	<0.05	0.52	0.036	10.0
TG-1	Little River	<0.05	0.40	0.021	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.39	0.018	<5.0
URC-2	Upper Rock Creek	<0.05	0.84	0.057	10.0
WC-1	Woodcrest Creek	<0.05	0.41	0.030	16.0

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	<0.05	0.19	0.029	7.0
Duplicate RPD	0%	11.11%	0%	25%*

Table 3 QA/QC Data Where the 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	0.37	20.58
JB-1	Jim Blue Creek	0.12	N/A
LDB-1	Lower Dave Blue Creek	1.04	15.52
LRC-1	Lower Rock Creek	0.21	5.41
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.03	11.00
TG-1	Little River	0.71	9.05
UDB-1	Upper Dave Blue Creek	0.34	17.46
URC-2	Upper Rock Creek	0.20	11.13
WC-1	Woodcrest Creek	0.50	7.54

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

File Information

File name: Cc_20230411-090308.ft
 Start date and time: 4/11/2023 8:36 AM
 Start location latitude: 35.176
 Start location longitude: -97.260
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 4/11/2023 8:37 AM End time: 4/11/2023 8:57 AM
 # Stations: 15 Avg Interval: 40
 Mean depth: 0.950 ft Max depth: 1.350 ft
 Mean velocity: 0.0557 ft/s Max velocity: 0.1822 ft/s
 Mean SNR: 43 dB Total width: 7.000 ft
 Mean temp: 58.136 °F Total area: 6.6500 ft²
 Wetted Perimeter: 7.840 ft Total discharge: 0.3704 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	3.9%
Velocity	2.7%	14.5%
Width	0.2%	0.2%
Method	3.5%	
# Stations	3.3%	
Overall	5.7%	15.1%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft ³ /s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
4/11/2023 8:37 AM	20.580				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q
0	8:37 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0454	0.0000	0.0000	0.00
1	8:37 AM	0.500	0.6	0.800	0.6000	0.480	80	0.0454	1.0000	0.0454	0.4000	0.0182	4.90
2	8:39 AM	1.000	0.6	1.000	0.6000	0.600	80	0.0807	1.0000	0.0807	0.5000	0.0403	10.89
3	8:42 AM	1.500	0.6	1.100	0.6000	0.660	80	0.1693	1.0000	0.1693	0.5500	0.0931	25.13
4	8:44 AM	2.000	0.6	1.300	0.6000	0.780	80	0.1822	1.0000	0.1822	0.6500	0.1184	31.97
5	8:46 AM	2.500	0.6	1.350	0.6000	0.810	80	0.0924	1.0000	0.0924	0.6750	0.0624	16.83
6	8:48 AM	3.000	0.6	1.350	0.6000	0.810	80	0.0515	1.0000	0.0515	0.6750	0.0348	9.39
7	8:49 AM	3.500	0.6	1.300	0.6000	0.780	80	-0.0182	1.0000	-0.0182	0.6500	-0.0118	-3.19
8	8:50 AM	4.000	0.6	1.300	0.6000	0.780	80	-0.0076	1.0000	-0.0076	0.6500	-0.0050	-1.34
9	8:51 AM	4.500	0.6	1.100	0.6000	0.660	80	-0.0090	1.0000	-0.0090	0.5500	-0.0049	-1.33
10	8:53 AM	5.000	0.6	0.900	0.6000	0.540	80	0.0098	1.0000	0.0098	0.4500	0.0044	1.19
11	8:54 AM	5.500	0.6	0.800	0.6000	0.480	80	0.0557	1.0000	0.0557	0.4000	0.0223	6.02
12	8:55 AM	6.000	0.6	0.600	0.6000	0.360	80	-0.0072	1.0000	-0.0072	0.3000	-0.0022	-0.59
13	8:56 AM	6.500	0.6	0.400	0.6000	0.240	80	0.0022	1.0000	0.0022	0.2000	0.0004	0.12
14	8:57 AM	7.000	None	0.000	0.0000	0.000	0	0.0000		0.0022	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	8:37 AM	0.500	0.6	0.800	0.6000	0.480	Large SNR Variation
2	8:39 AM	1.000	0.6	1.000	0.6000	0.600	SNR Threshold Variation, High Stn % Discharge
3	8:42 AM	1.500	0.6	1.100	0.6000	0.660	SNR Threshold Variation, High Stn % Discharge
4	8:44 AM	2.000	0.6	1.300	0.6000	0.780	SNR Threshold Variation, High Stn % Discharge
5	8:46 AM	2.500	0.6	1.350	0.6000	0.810	Large SNR Variation, High Stn % Discharge
7	8:49 AM	3.500	0.6	1.300	0.6000	0.780	Large SNR Variation
9	8:51 AM	4.500	0.6	1.100	0.6000	0.660	SNR Threshold Variation
13	8:56 AM	6.500	0.6	0.400	0.6000	0.240	Large SNR Variation

Figure 2 Discharge Measurement Summary CC-1

File Information

File name: LRC_20230411-110847.It
 Start date and time: 4/11/2023 10:43 AM
 Start location latitude: 35.261
 Start location longitude: -97.335
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 4/11/2023 10:45 AM End time: 4/11/2023 11:07 AM
 # Stations: 20 Avg interval: 40
 Mean depth: 1.239 ft Max depth: 1.700 ft
 Mean velocity: 0.0088 ft/s Max velocity: -0.0675 ft/s
 Mean SNR: 52 dB Total width: 19.000 ft
 Mean temp: 62.444 °F Total area: 23.5900 ft²
 Wetted Perimeter: 19.937 ft Total discharge: 0.2072 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.4%	5.4%
Velocity	3.9%	53.3%
Width	0.3%	0.3%
Method	5.0%	
# Stations	2.5%	
Overall	6.9%	53.6%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft ³ /s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
4/11/2023 10:48 AM	4.510				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q
0	10:45 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0675	0.0000	0.0000	0.00
1	10:45 AM	1.000	0.6	0.400	0.6000	0.240	90	-0.0675	1.0000	-0.0675	0.4000	-0.0270	13.02
2	10:47 AM	2.000	0.6	0.700	0.6000	0.420	90	-0.0251	1.0000	-0.0251	0.7000	-0.0176	8.49
3	10:48 AM	3.000	0.6	0.900	0.6000	0.540	80	0.0083	1.0000	0.0083	0.9000	0.0075	3.61
4	10:50 AM	4.000	0.6	1.000	0.6000	0.600	80	0.0149	1.0000	0.0149	1.0000	0.0149	7.19
5	10:51 AM	5.000	0.6	1.100	0.6000	0.660	80	-0.0053	1.0000	-0.0053	1.1000	-0.0059	2.83
6	10:52 AM	6.000	0.6	1.250	0.6000	0.750	80	0.0082	1.0000	0.0082	1.2500	0.0102	4.94
7	10:53 AM	7.000	0.6	1.400	0.6000	0.840	80	0.0170	1.0000	0.0170	1.4000	0.0237	11.46
8	10:54 AM	8.000	0.6	1.550	0.6000	0.930	80	0.0126	1.0000	0.0126	1.5500	0.0196	9.44
9	10:55 AM	9.000	0.6	1.500	0.6000	0.900	80	-0.0296	1.0000	-0.0296	1.5000	-0.0444	21.41
10	10:57 AM	10.000	0.6	1.300	0.6000	0.780	80	0.0175	1.0000	0.0175	1.3000	0.0227	10.96
11	10:58 AM	11.000	0.6	1.350	0.6000	0.810	80	0.0010	1.0000	0.0010	1.3500	0.0013	0.65
12	10:59 AM	12.000	0.6	1.500	0.6000	0.900	80	0.0053	1.0000	0.0053	1.5000	0.0079	3.84
13	11:00 AM	13.000	0.6	1.700	0.6000	1.020	80	-0.0003	1.0000	-0.0003	1.7000	-0.0005	-0.23
14	11:01 AM	14.000	0.6	1.700	0.6000	1.020	80	0.0319	1.0000	0.0319	1.7000	0.0543	26.19
15	11:02 AM	15.000	0.6	1.600	0.6000	0.960	80	0.0319	1.0000	0.0319	1.6000	0.0511	24.67
16	11:04 AM	16.000	0.6	1.700	0.6000	1.020	80	0.0165	1.0000	0.0165	1.7000	0.0280	13.54
17	11:05 AM	17.000	0.6	1.600	0.6000	0.960	80	0.0522	1.0000	0.0522	1.6000	0.0835	40.28
18	11:06 AM	18.000	0.6	1.300	0.6000	0.780	80	-0.0172	1.0000	-0.0172	1.3000	-0.0223	-10.77
19	11:07 AM	19.000	None	0.000	0.0000	0.000	0	0.0000		-0.0172	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	10:45 AM	1.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC
5	10:51 AM	5.000	0.6	1.100	0.6000	0.660	Large SNR Variation
7	10:53 AM	7.000	0.6	1.400	0.6000	0.840	High Stn % Discharge
10	10:57 AM	10.000	0.6	1.300	0.6000	0.780	High Stn % Discharge
14	11:01 AM	14.000	0.6	1.700	0.6000	1.020	High Stn % Discharge
15	11:02 AM	15.000	0.6	1.600	0.6000	0.960	Large SNR Variation, High Stn % Discharge
16	11:04 AM	16.000	0.6	1.700	0.6000	1.020	High Stn % Discharge
17	11:05 AM	17.000	0.6	1.600	0.6000	0.960	Large SNR Variation, High Stn % Discharge
19	11:07 AM	19.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 3 Discharge Measurement Summary LRC-1

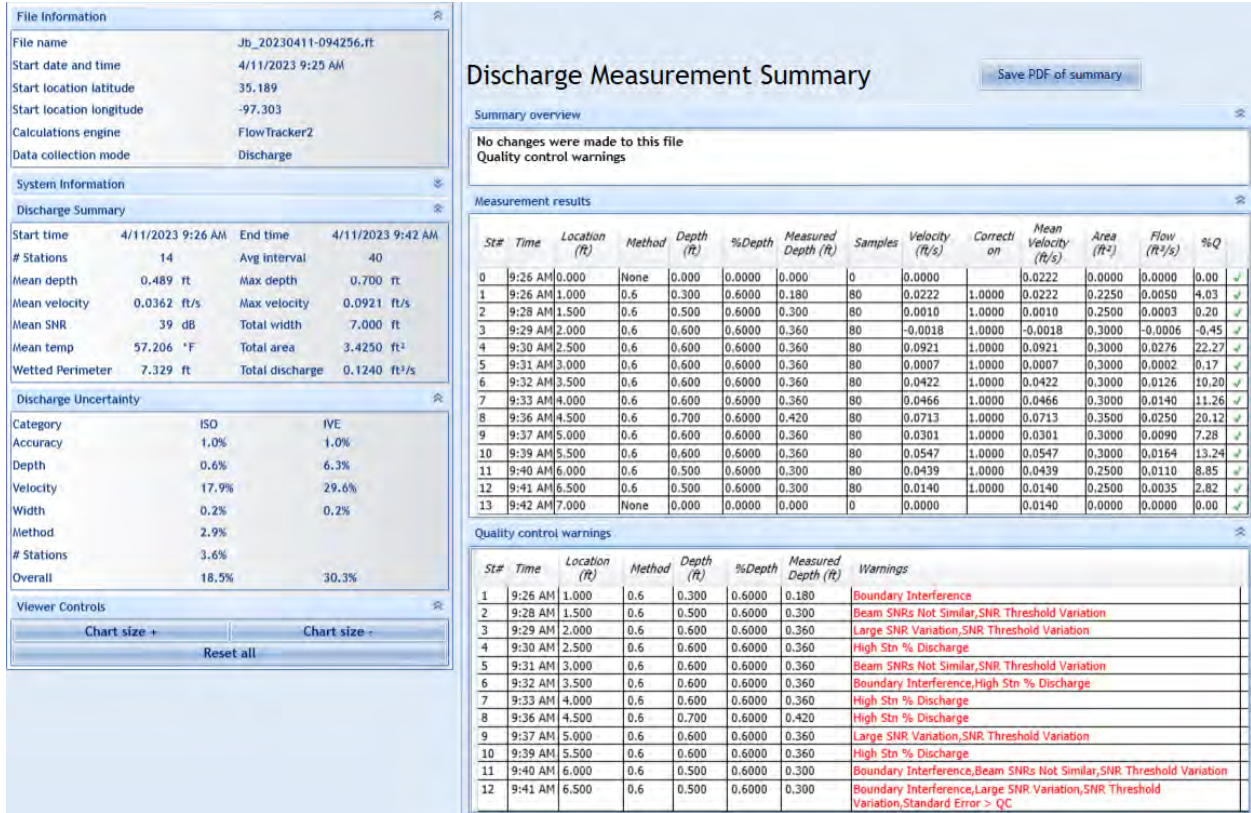
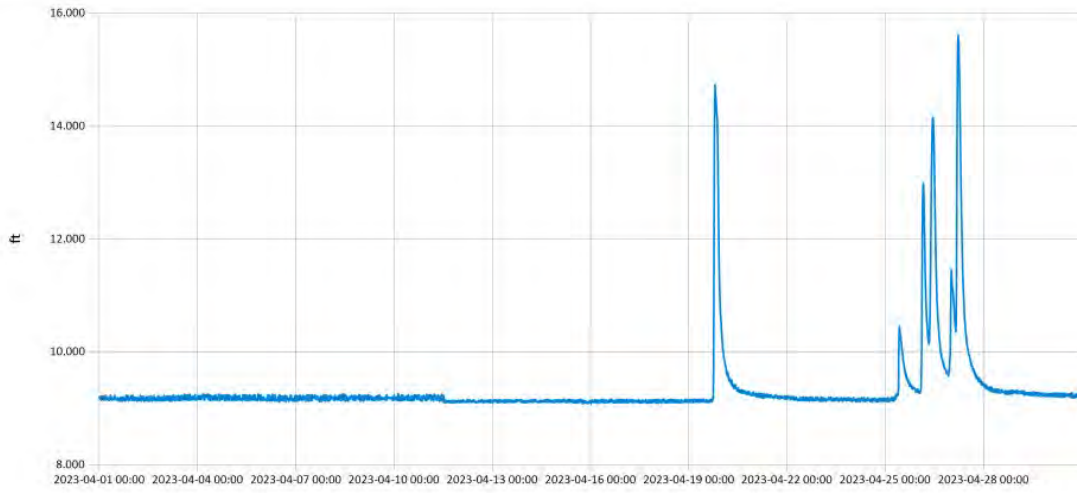


Figure 4 Discharge Measurement Summary JB-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

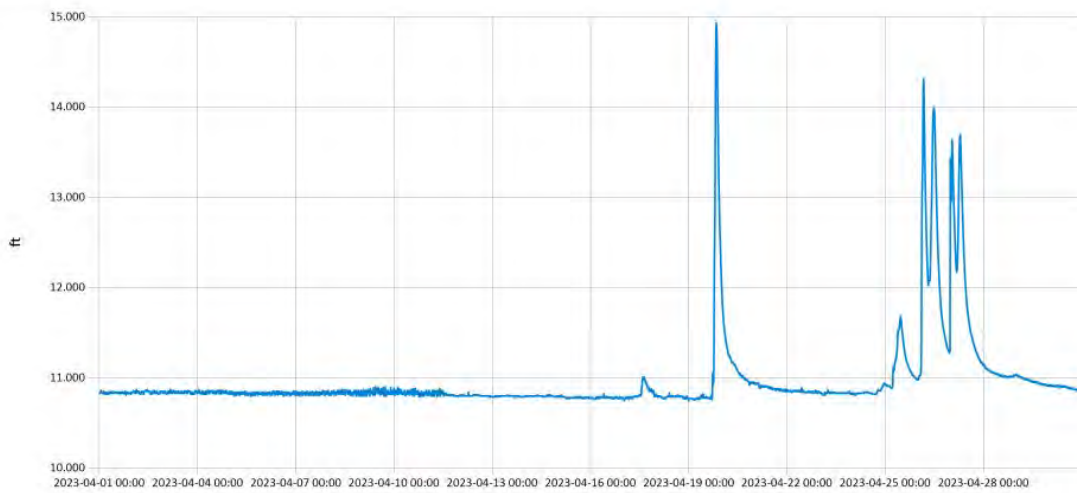


— Stage@TG

Figure 5 Monthly Hydrograph TG-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

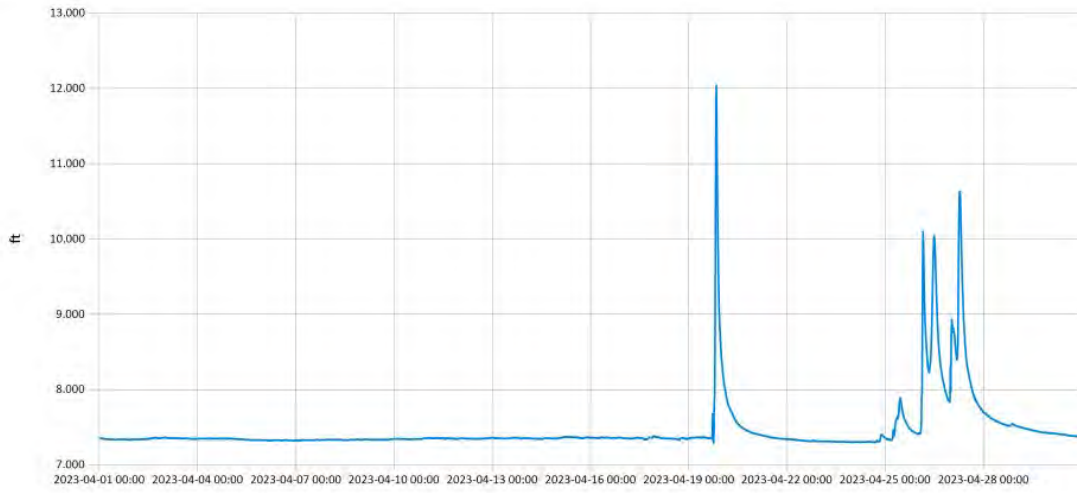


— Stage@TE

Figure 6 Monthly Hydrograph TE-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

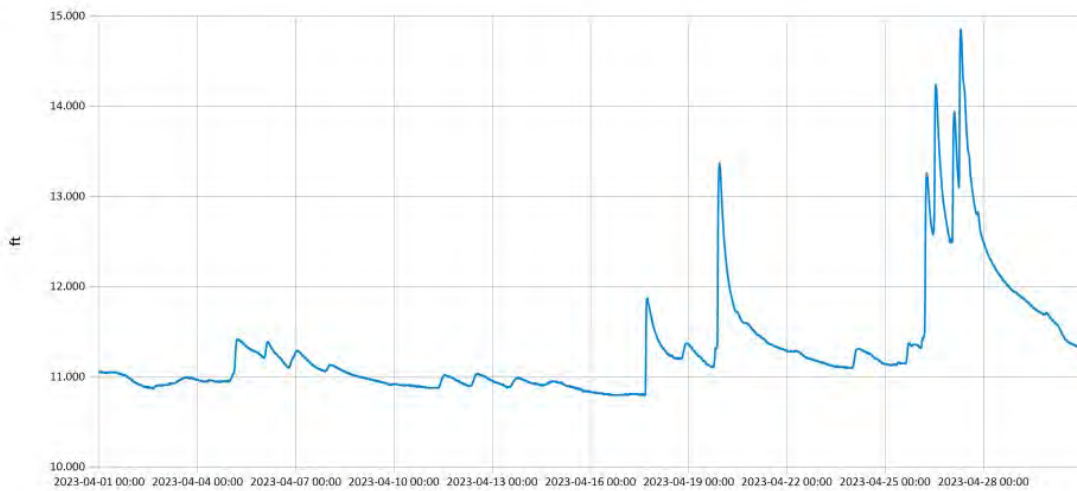


— Stage@WC

Figure 7 Monthly Hydrograph WC-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

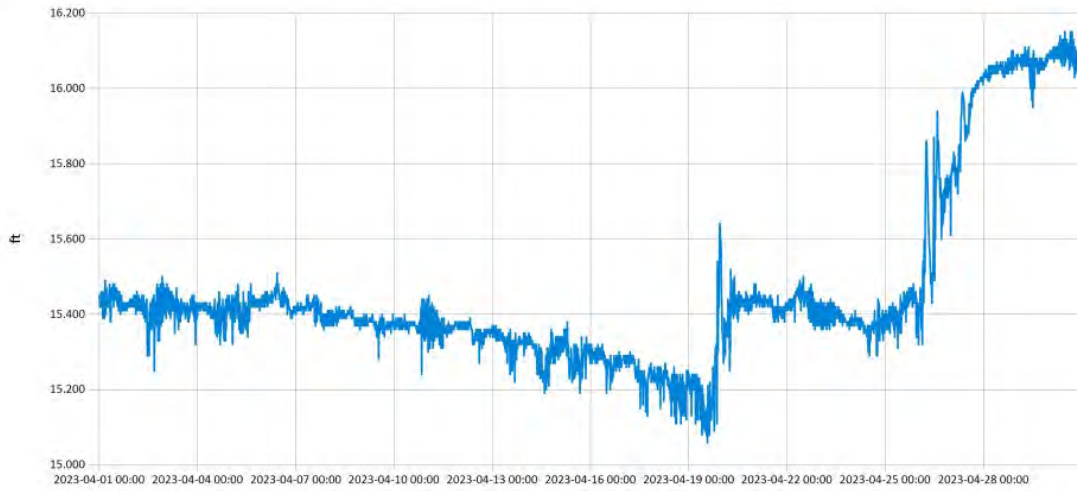


— Stage@URC

Figure 8 Monthly Hydrograph URC-2

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00

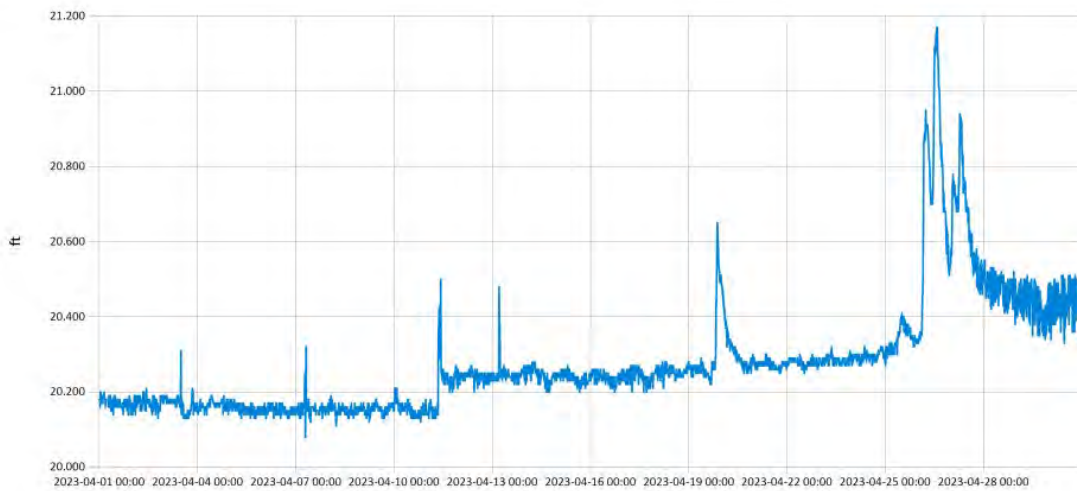


— Stage@LDB

Figure 9 Monthly Hydrograph LDB-1

Period Selected: 2023-04-01 00:00 - 2023-04-30 23:59

UTC Offset: -06:00



— Stage@CC

Figure 10 Monthly Hydrograph CC-1

Period Selected: 2023-04-01 00:00 -2023-04-30 23:59

UTC Offset: -06:00

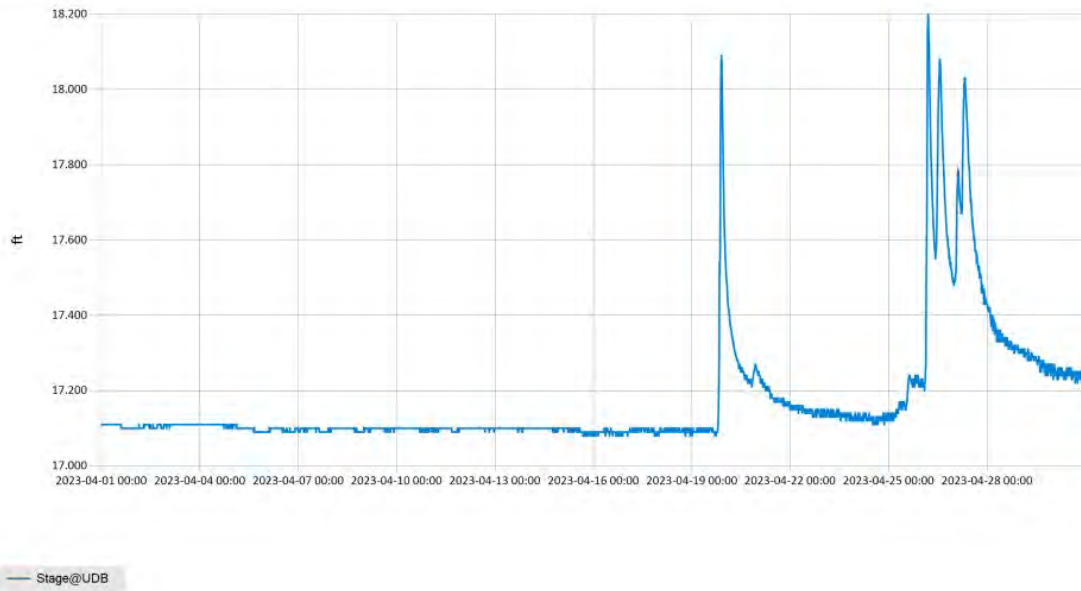


Figure 11 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				April 2023				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	66	44	55.7	28.1	10	0	48	25	35	0.00	28.88	30.13	NNW	9.1	31.2	23.95	54.3	53.7	61	47	
2	78	50	62.0	45.0	1	0	89	36	55	0.00	28.57	29.81	S	11.5	36.2	14.83	54.5	55.4	62	49	
3	85	58	71.5	49.7	0	6	94	19	55	0.00	28.34	29.58	S	11.7	26.8	24.17	57.7	63.2	72	56	
4	80	69	73.6	65.7	0	9	92	54	77	0.00	28.26	29.49	S	13.8	33.2	11.66	60.7	66.7	70	64	
5	72	38	48.7	27.6	10	0	84	28	45	0.00	28.78	30.03	NNW	13.3	33.8	24.34	58.1	61.5	66	55	
6	62	40	50.4	23.6	14	0	55	19	37	0.00	29.06	30.32	NE	8.9	24.2	19.87	54.8	56.7	64	50	
7	69	37	53.8	24.0	12	0	73	12	37	0.00	29.03	30.28	E	7.6	20.8	24.77	54.4	57.7	67	48	
8	73	42	58.5	30.3	8	0	66	16	37	0.00	28.92	30.17	ESE	4.8	14.6	24.66	55.6	61.3	72	52	
9	73	40	60.1	43.9	8	0	76	41	56	0.00	28.93	30.19	SSE	5.7	17.6	19.97	56.1	62.1	71	53	
10	76	53	64.3	51.1	0	0	94	37	65	0.00	28.98	30.24	SSE	6.9	26.6	20.79	58.9	66.0	75	59	
11	76	54	64.6	48.7	0	0	87	36	59	0.00	28.96	30.21	SSE	8.0	20.8	24.22	60.0	67.1	75	60	
12	77	51	64.4	45.8	1	0	79	32	53	0.00	28.78	30.03	S	8.8	26.1	25.14	60.3	67.0	75	59	
13	78	51	65.9	48.2	0	0	88	32	56	0.00	28.55	29.79	SSE	9.0	22.3	24.97	60.8	67.8	76	60	
14	81	59	69.2	56.3	0	5	85	48	64	0.00	28.42	29.65	S	13.6	33.5	21.14	61.9	69.0	76	63	
15	68	46	59.4	45.0	8	0	94	38	61	0.00	28.67	29.92	NNW	16.7	39.4	21.38	61.7	67.2	71	62	
16	69	37	53.1	29.9	12	0	81	19	46	0.00	28.95	30.21	NW	8.7	28.0	25.55	58.4	62.6	70	55	
17	79	38	62.1	37.6	7	0	86	24	45	0.00	28.73	29.98	S	9.3	30.5	24.82	58.0	63.9	73	54	
18	78	57	66.8	53.1	0	2	83	42	62	0.00	28.53	29.77	S	14.4	39.2	21.09	60.6	67.6	74	61	
19	84*	63*	72.0*	61.7*	0*	9*	92*	48*	71*	1.41*	28.46*	29.70*	S	15.7*	46.0*	NA	62.9*	69.7*	77*	65*	
20	74	55	65.5	43.1	1	0	78	22	47	0.03	28.66	29.91	NNW	13.2	34.7	24.17	63.0	67.2	72	60	
21	69*	47*	58.2*	33.8*	7*	0*	70*	20*	42*	0.00*	28.78*	30.03*	NNE*	5.8*	18.7*	NA	60.5*	60.5*	67*	55*	
22	53	45	48.7	32.0	16	0	79	37	54	0.01	28.86	30.11	NNE	11.1	30.0	12.22	57.8	54.8	59	52	
23	62	39	51.6	31.9	14	0	81	24	51	0.00	28.90	30.15	N	4.5	19.7	25.90	57.4	55.9	64	49	
24	63	39	51.7	39.6	14	0	90	32	67	0.09	28.83	30.08	SSE	6.1	21.5	13.80	56.8	54.7	59	50	
25	54	48	50.2	46.9	14	0	94	74	88	0.36	28.73	29.97	ESE	11.3	23.3	4.54	56.0	54.0	55	53	
26	57	50	52.6	50.7	11	0	97	83	93	1.55	28.69	29.93	E	8.9	41.7	5.14	55.4	54.5	57	53	
27	59	46	53.8	50.3	12	0	97	72	88	0.36	28.60	29.84	NW	6.8	18.6	7.25	56.0	56.6	59	55	
28	61	42	51.4	47.6	14	0	98	70	88	0.06	28.66	29.90	NNW	8.7	26.8	7.54	55.1	55.4	58	52	
29	68	47	57.4	41.8	7	0	85	37	58	0.00	28.70	29.95	NNW	11.5	27.1	26.76	55.3	57.9	65	51	
30	69	45	58.7	40.2	8	0	85	31	53	0.00	28.68	29.93	N	8.0	24.1	23.92	56.9	58.1	63	52	
	70*	48*	59.2*	42.4*	<- Monthly Averages ->							28.73*	29.98*	S	9.8*	46.0*	19.59*	58.0*	61.2*	68*	55*
Temperature - Highest: 85*				Degree Days - Total HDD: 211*				Number of Days With:													
Lowest: 37*				Total CDD: 32*				Tmax ≥ 90: 0*				Rainfall ≥ 0.01 inch: 8*									
Rainfall: Monthly Total: 3.87* in.				Humidity - Highest: 98*				Tmax ≤ 32: 0*				Rainfall ≥ 0.10 inch: 4*									
Greatest 24 Hr: 1.55* in.				Lowest: 12*				Tmin ≤ 32: 0*				Avg Wind Speed ≥ 10 mph: 12*									
								Tmin ≤ 0: 0*				Max Wind Speed ≥ 30 mph: 12*									

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* Denotes incomplete record

Figure 12 April Mesonet Data

**Lake Thunderbird TMDL Monitoring
Plan Implementation: Sample Year
(SY) 2023- May Report**



OKLAHOMA
Water Resources Board

Lake Thunderbird TMDL Monitoring Plan Implementation:

May 2023 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
Monitoring and Assessment Section
3800 N. Classen, Oklahoma City, Oklahoma 73118
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SUMMARY OF MAY SAMPLING

Sampling for May 2023 occurred during base flow conditions on the sixteenth. Water samples were collected at all ten locations and discharge was measured at one location. Mesonet shows no precipitation on the sixteenth, 1.89 inches of precipitation in the 72 hours prior to sampling, and 0.25 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of May was 3.47 inches. All water level gauges were operational for the month, except for JB-1, which will be reinstalled later this year.

RESULTS

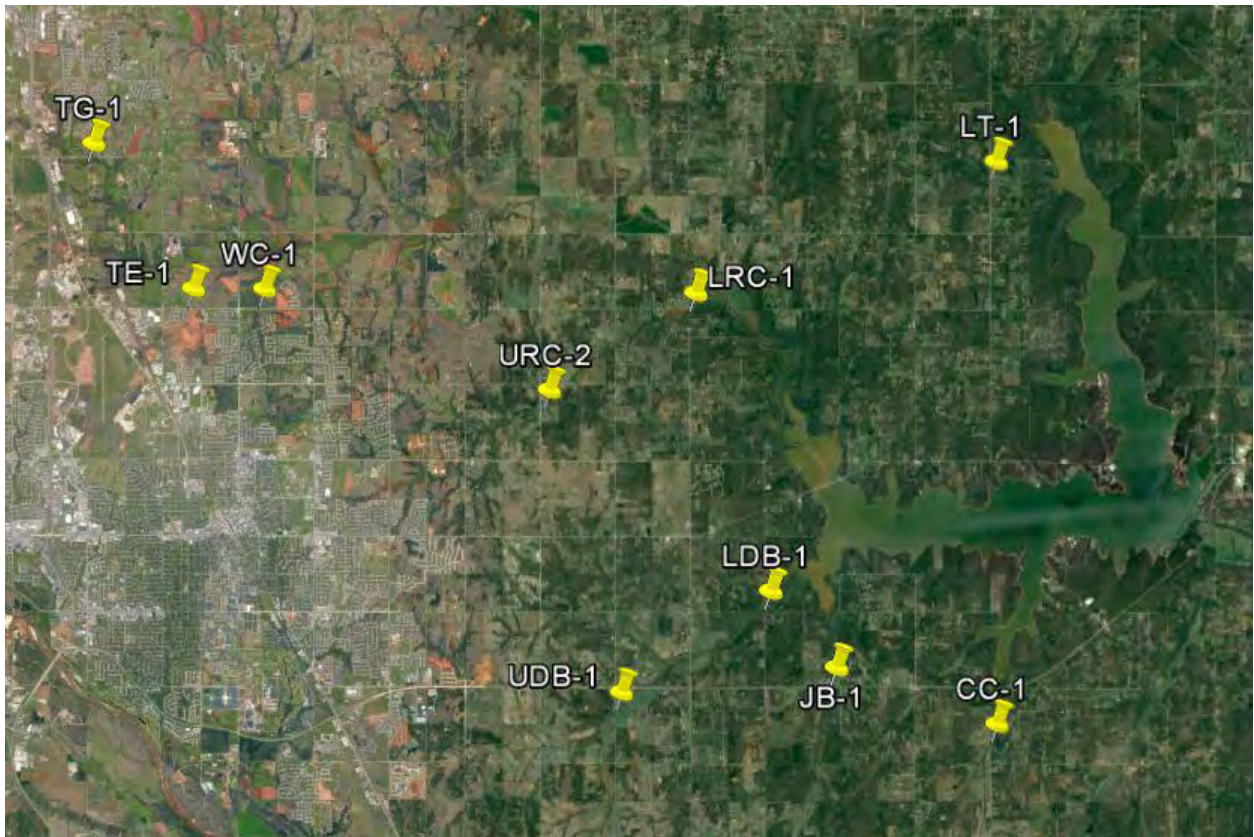


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	5/16/2023	9:30	NH	18.5	7.10	7.87	575	73	Beaver dam still present upstream of bridge; fairly turbid; slightly elevated flow ; used RP4
JB-1	Jim Blue Creek	5/16/2023	10:13	NH	18.5	6.77	7.77	574	30	Actually flow ing; sampled just dow nstream of bridge; appears to be coming dow n
LDB-1	Lower Dave Blue Creek	5/16/2023	10:32	NH	20.9	6.53	7.94	445	113	Turbid; lots of floating debris, looks to be grass clippings and leaves
LRC-1	Lower Rock Creek	5/16/2023	11:40	NH	21.1	7.72	8.11	440	69	Site very muddy; replaced batteries, unburied orifice; DCP still unavailable
LT-1	Lake Laterals	5/16/2023	11:09	NH	19.7	4.59	7.52	355	15	Water clear; guard rail still damaged
TE-1	Little River Tributary	5/16/2023	14:15	NH	21.9	6.53	7.67	472	48	Beaver dam upstream of bridge; ants in autosampler box
TG-1	Little River	5/16/2023	14:46	NH	20.3	8.16	7.99	579	15	Appears to be back at baseflow after recent rain; periphyton line; ants on autosampler
UDB-1	Upper Dave Blue Creek	5/16/2023	8:40	NH	19.9	8.09	8.10	536	40	Still coming dow n, slightly turbid
URC-2	Upper Rock Creek	5/16/2023	12:41	NH	20.9	7.66	8.15	444	60	Slight periphyton line; very muddy; some signs of cattle under bridge
WC-1	Woodcrest Creek	5/16/2023	13:21	NH	19.4	7.80	7.90	659	16	No periphyton line; appears to still be coming dow n

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	0.09	0.63	0.080	48.0
JB-1	Jim Blue Creek	<0.05	0.65	0.085	28.0
LDB-1	Lower Dave Blue Creek	0.14	1.15	0.141	80.0
LRC-1	Lower Rock Creek	0.10	0.92	0.096	58.0
LT-1	Lake Laterals	<0.05	0.81	0.068	14.0
TE-1	Little River Tributary	0.31	0.90	0.154	26.0
TG-1	Little River	0.64	0.86	0.168	8.0
UDB-1	Upper Dave Blue Creek	0.17	0.99	0.103	28.0
URC-2	Upper Rock Creek	0.11	0.84	0.087	52.0
WC-1	Woodcrest Creek	0.48	0.85	0.171	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	0.09	0.64	0.080	46.0
Duplicate RPD	0%	1.57%	0%	4.26%

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	0.31	20.43
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	19.99	17.05
LRC-1	Lower Rock Creek	2.11	4.66
LT-1	Lake Laterals	0.50	4.54
TE-1	Little River Tributary	0.03	11.03
TG-1	Little River	0.71	9.03
UDB-1	Upper Dave Blue Creek	3.01	17.75
URC-2	Upper Rock Creek	0.23	12.11
WC-1	Woodcrest Creek	3.25	7.51

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

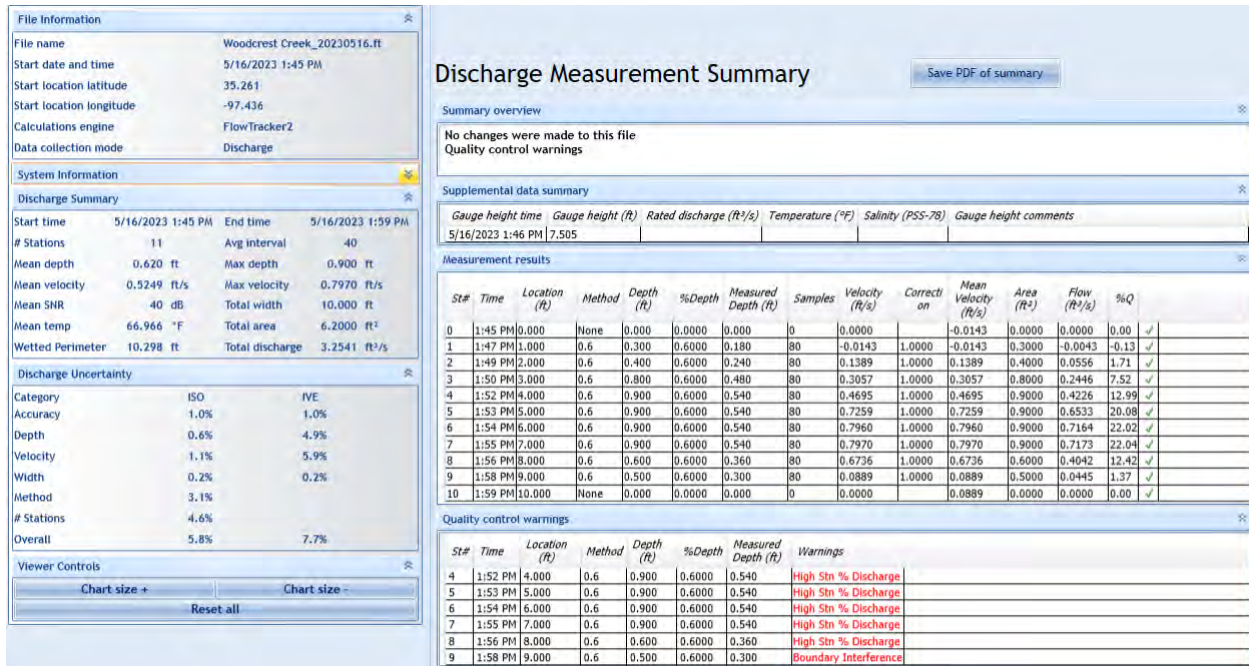


Figure 2 Discharge Measurement Summary WC-1

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UTC Offset: -06:00

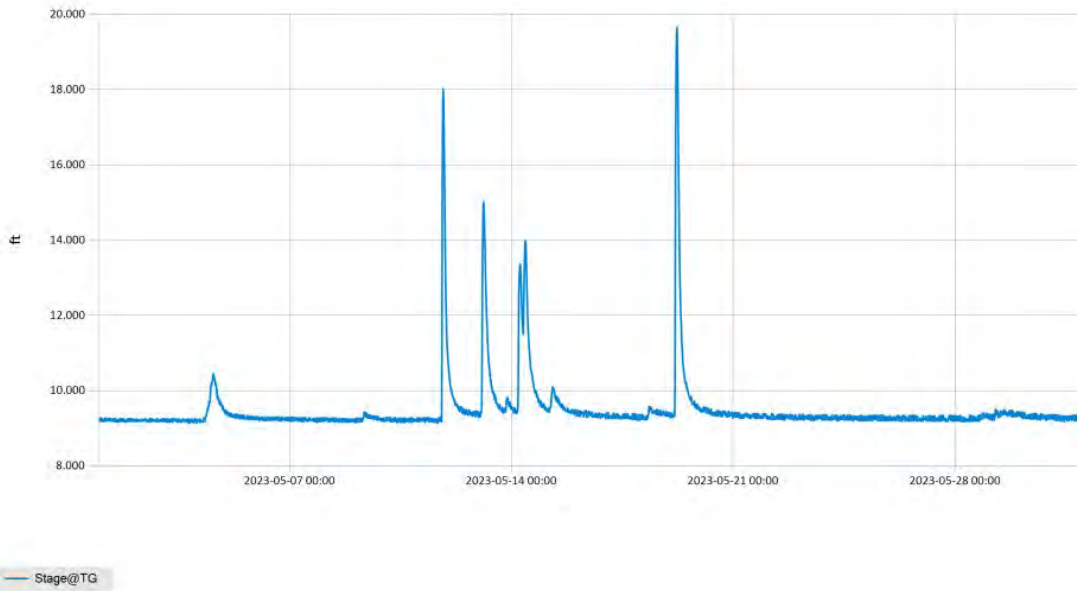


Figure 3 Monthly Hydrograph TG-1

Period Selected: 2023-05-01 00:00 - 2023-05-31 23:59

UTC Offset: -06:00

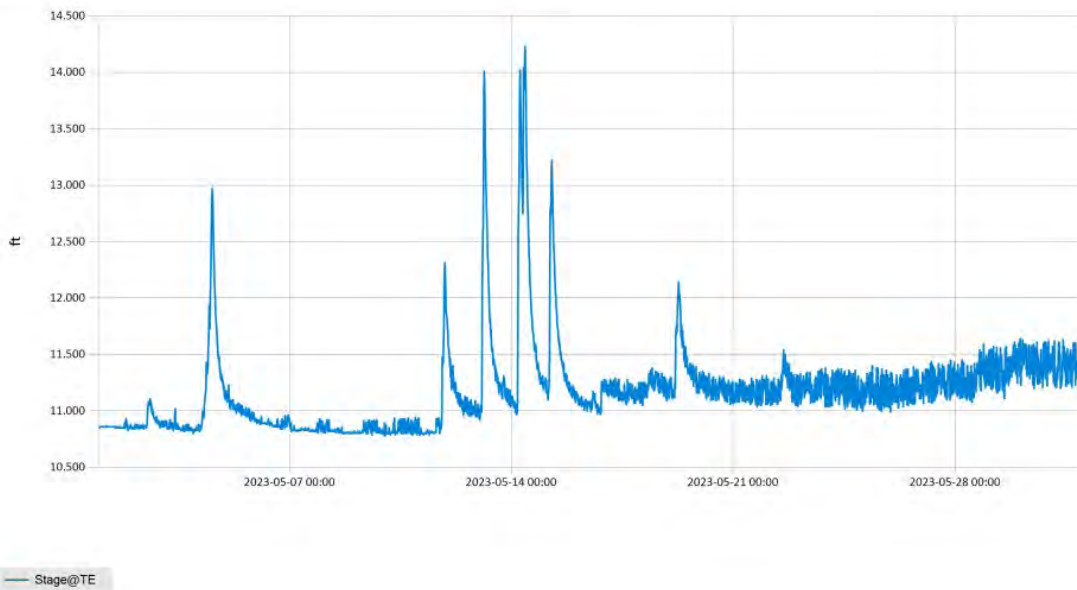


Figure 4 Monthly Hydrograph TE-1

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UTC Offset: -06:00

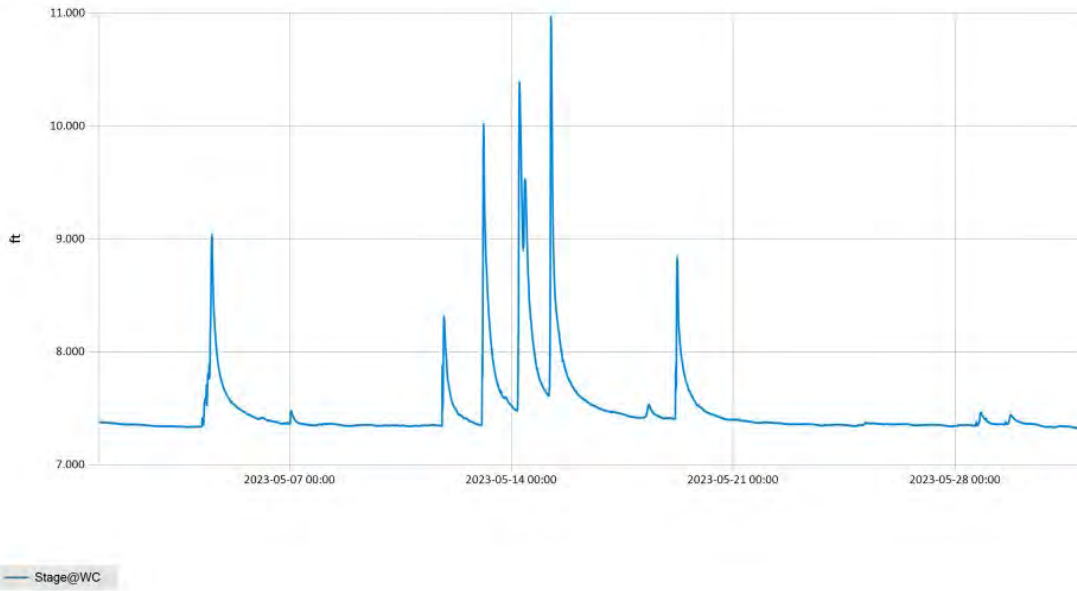


Figure 5 Monthly Hydrograph WC-1

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UTC Offset: -06:00

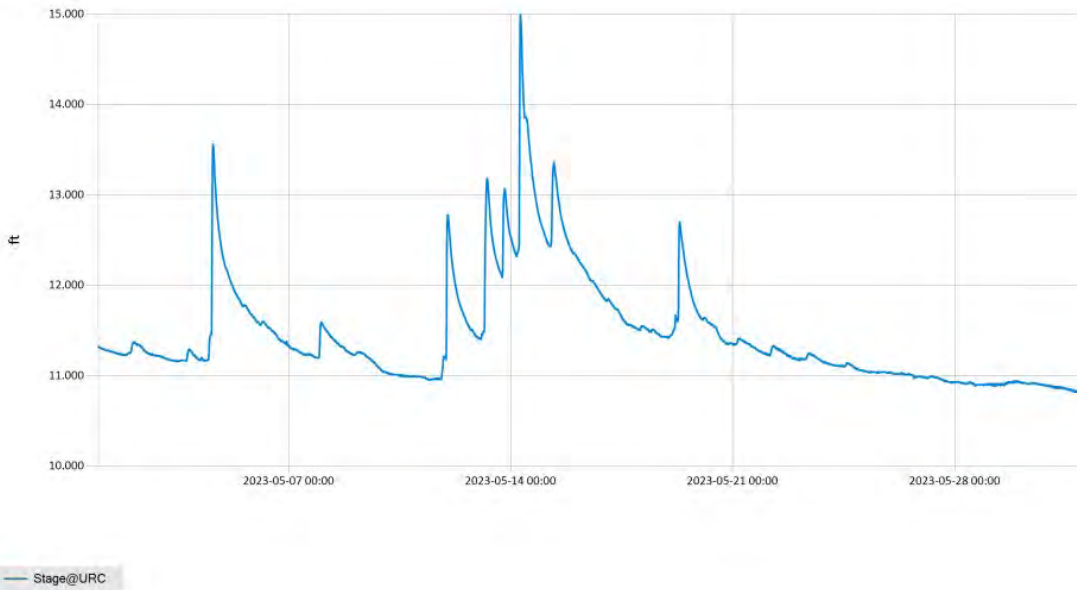
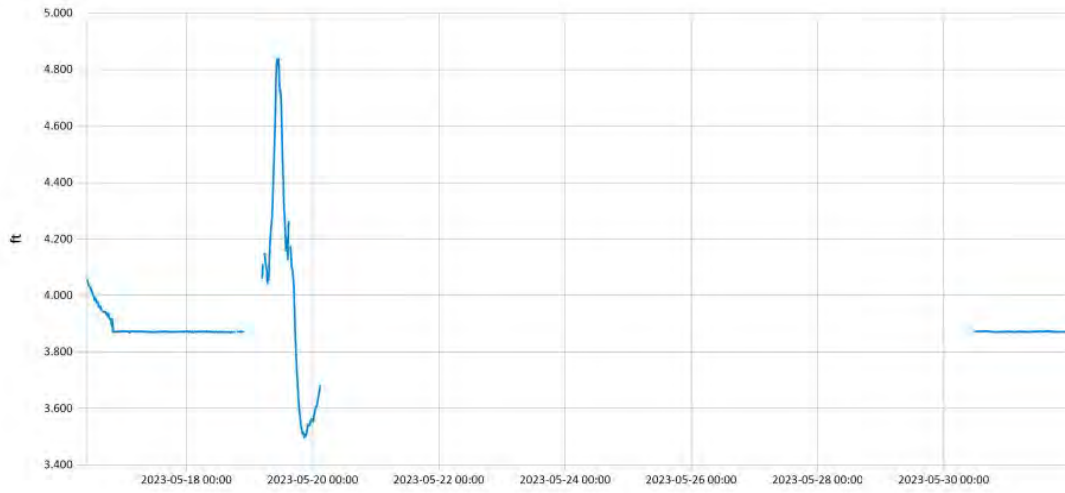


Figure 6 Monthly Hydrograph URC-2

Period Selected: 2023-05-01 00:00 - 2023-05-31 23:59 UTC Offset: -06:00



— Stage@LRC

Figure 7 Monthly Hydrograph LRC-1

Period Selected: 2023-05-01 00:00 - 2023-05-31 23:59 UTC Offset: -06:00



— Stage@LDB

Figure 8 Monthly Hydrograph LDB-1

Period Selected: 2023-05-01 00:00 - 2023-05-31 23:59

UTC Offset: -06:00

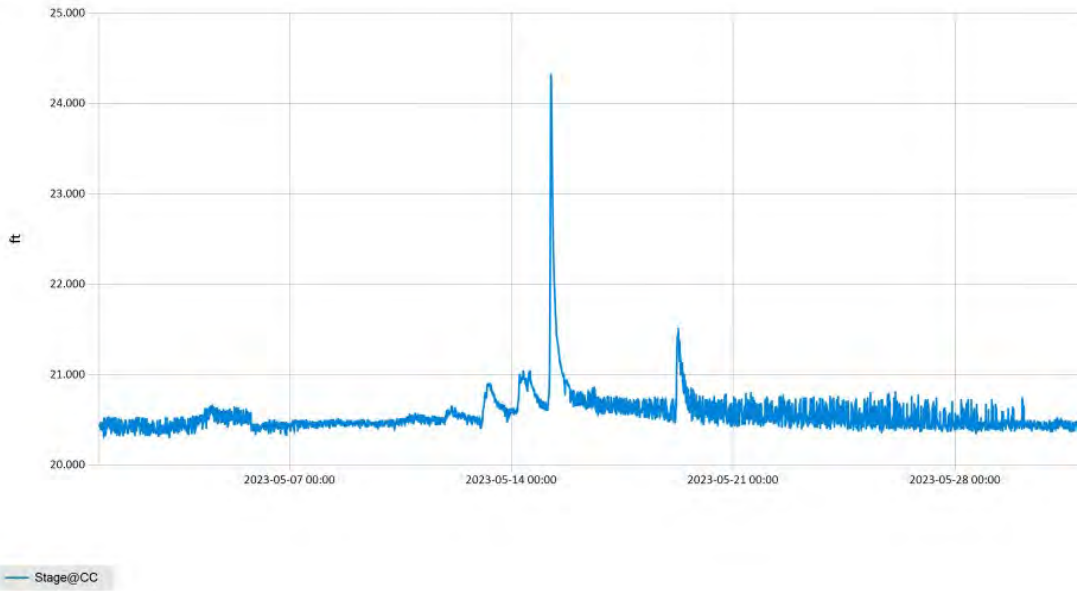


Figure 9 Monthly Hydrograph CC-1

Period Selected: 2023-05-01 00:00 - 2023-05-31 23:59

UTC Offset: -06:00

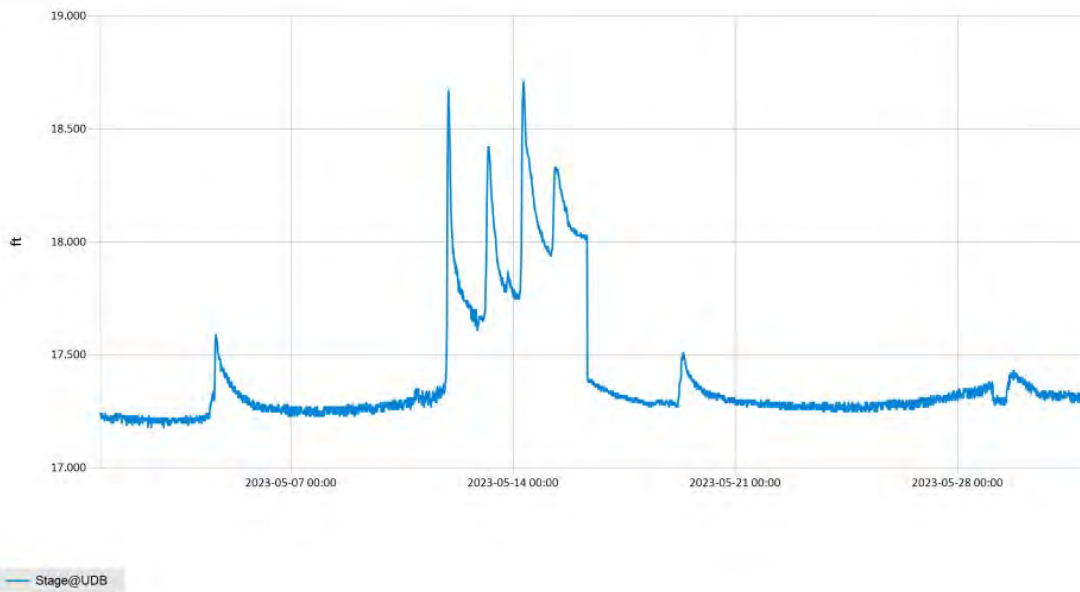


Figure 10 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				May 2023				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 (in)		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	71*	41*	57.5*	35.4*	9*	0*	79*	24*	47*	0.00*	28.71*	29.96*	NNE*	4.1*	15.7*	26.54*	57.5*	57.9*	66*	50*
2	75	45	61.7	43.6	5	0	89	31	55	0.00	28.73	29.97	NE	3.9	17.2	26.75	59.3	60.3	68	52
3	67	50	58.2	45.4	6	0	82	47	63	0.00	28.74	29.99	SSE	4.1	13.0	10.71	59.1	58.4	62	55
4	62	56	59.2	55.3	6	0	97	65	87	0.71	28.62	29.86	SE	7.6	30.1	5.32	58.9	58.6	61	57
5	90	58	74.9	62.8	0	9	99	31	72	0.00	28.53	29.77	SSE	8.5	22.7	26.58	62.5	66.1	74	59
6	87	68	78.2	64.3	0	13	94	25	64	0.00	28.60	29.84	S	10.9	49.2	25.88	66.9	70.8	76	66
7	82	64	73.4	64.1	0	8	87	54	73	0.00	28.63	29.87	S	10.6	26.9	22.29	67.4	68.9	74	64
8	85	64	75.7	63.0	0	10	89	51	66	0.00	28.62	29.86	S	7.3	19.2	26.57	69.0	70.8	76	65
9	85	70	76.0	68.0	0	12	97	57	77	0.00	28.67	29.92	SSE	8.7	21.6	23.55	70.7	73.4	80	69
10	81	66	71.4	65.0	0	8	94	59	81	0.01	28.67	29.91	ESE	5.9	21.1	14.99	70.7	73.0	79	69
11	79	65	69.5	65.1	0	7	96	73	86	0.45	28.55	29.79	SSE	7.4	34.8	10.96	69.3	70.3	74	68
12	84	70	77.2	71.3	0	12	97	66	83	0.00	28.61	29.85	S	9.1	25.7	16.83	70.4	72.4	77	69
13	83	61	69.9	64.2	0	7	96	59	83	0.87	28.77	30.01	ENE	6.6	32.9	20.39	70.9	72.9	80	67
14	77	67	71.2	67.5	0	7	98	72	89	0.79	28.87	30.12	ESE	5.0	16.2	12.24	71.1	72.6	76	70
15	74	64	69.0	65.1	0	4	97	78	87	0.23	28.91	30.17	NNW	7.3	21.9	16.07	71.2	73.6	78	71
16	71	56	63.6	56.4	1	0	96	62	78	0.00	28.81	30.06	NNW	7.7	19.5	12.87	68.8	69.4	72	67
17	76	53	65.3	58.0	0	0	97	58	79	0.00	28.70	29.95	E	4.2	13.8	24.46	68.3	69.1	76	62
18	75	62	67.3	62.4	0	3	96	70	85	0.09	28.71	29.96	ESE	4.7	12.6	10.94	69.1	68.9	73	66
19	80	56	67.0	61.5	0	3	96	61	83	0.16	28.78	30.03	N	10.0	33.9	19.78	70.0	71.0	78	67
20	72	53	62.9	50.3	2	0	86	45	65	0.00	28.96	30.22	N	7.7	21.3	27.29	68.4	66.8	73	61
21	75	52	63.9	53.5	2	0	96	49	71	0.00	28.87	30.13	SSE	3.0	12.6	23.79	68.7	67.7	75	61
22	76	56	66.3	57.1	0	1	94	52	74	0.00	28.78	30.02	SE	5.3	15.8	19.71	68.4	67.5	73	62
23	76	62	69.1	59.2	0	4	85	53	72	0.00	28.75	30.00	E	6.9	20.6	18.53	69.2	68.3	73	64
24	81	62	71.0	61.1	0	7	91	49	73	0.00	28.76	30.01	E	7.0	18.6	21.78	70.3	70.9	78	65
25	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00*	NA	NA	ESE*	NA	15.8*	NA	NA	NA	NA	NA
26	82	63	72.8	61.2	0	8	94	46	69	0.00	28.83	30.08	ESE	5.2	17.4	17.63	70.6	73.1	79	67
27	81	62	71.8	59.4	0	6	88	50	66	0.00	28.82	30.07	SE	6.0	17.4	19.08	70.8	74.0	81	68
28	80	65	69.6	60.8	0	7	95	49	75	0.09	28.76	30.01	SSE	6.6	28.3	16.24	70.6	73.6	79	69
29	79	65	70.7	63.4	0	7	91	62	78	0.07	28.69	29.94	SSE	6.9	18.4	15.87	70.6	71.7	75	69
30	85	63	74.6	64.5	0	9	96	46	73	0.00	28.68	29.93	SSE	5.6	18.7	25.81	72.0	75.4	84	67
31	86	65	76.5	65.1	0	10	96	49	70	0.00	28.67	29.91	S	7.0	21.9	24.37	73.3	78.3	85	72
79* 60* 69.2* 59.8*				<- Monthly Averages ->				28.73* 29.97*		SSE* 6.7* 49.2*		19.46*		68.1* 69.5* 75* 65*						
Temperature - Highest: 90*					Degree Days - Total HDD: 32*					Number of Days With:										
Lowest: 41*					Total CDD: 163*					Tmax ≥ 90: 1* Rainfall ≥ 0.01 inch: 10*										
Rainfall: Monthly Total: 3.47* in.					Humidity - Highest: 99*					Tmax ≤ 32: 0* Rainfall ≥ 0.10 inch: 6*										
Greatest 24 Hr: 0.87* in.					Lowest: 24*					Tmin ≤ 32: 0* Avg Wind Speed ≥ 10 mph: 3*										
										Tmin ≤ 0: 0* Max Wind Speed ≥ 30 mph: 5*										

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* Denotes incomplete record

Figure 11 May Mesonet Data

**Lake Thunderbird TMDL Monitoring
Plan Implementation: Sample Year
(SY) 2023- June Report**



OKLAHOMA
Water Resources Board

Lake Thunderbird TMDL Monitoring Plan Implementation:

June 2023 Monitoring Report

Oklahoma Water Resources Board
Water Quality Programs Division
Monitoring and Assessment Section
3800 N. Classen, Oklahoma City, Oklahoma 73118
405-530-8800

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SUMMARY OF JUNE SAMPLING

Sampling for June 2023 occurred above base flow conditions on the thirteenth. Water samples were collected at nine locations and discharge was measured at four locations. Two water samples were collected at JB-1; one on the upstream side of the road, and one on the downstream side of the road where the channel constricts. Samples were not collected at LT-1 since this station will be relocated later this year. Mesonet shows 0.15 inches of precipitation on the thirteenth, 1.28 inches of precipitation in the 72 hours prior to sampling, and 0.77 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of June was 5.13 inches. All water level gauges were operational for the month, except for JB-1, which will be reinstalled later this year.

RESULTS

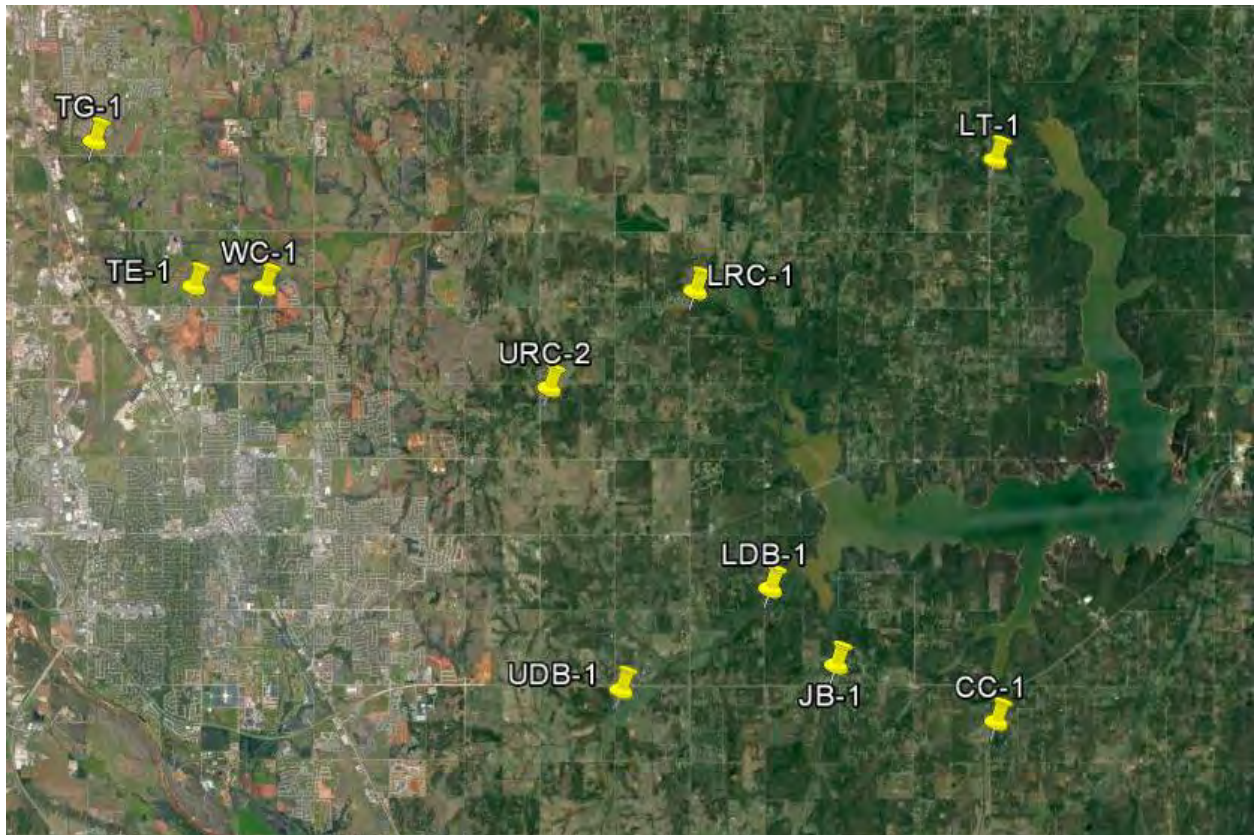


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	6/12/2023	9:59	AN	19.6	6.11	7.79	524	152	Bank full, used RP4
JB-1	Jim Blue Creek	6/13/2023	8:15	AN	18.0	6.85	7.97	884	24	Water level has come up, flow stronger; some trash on downstream, took flow on upstream
LDB-1	Lower Dave Blue Creek	6/13/2023	9:08	AN	20.5	5.35	7.96	661	120	Large amount of floating debris; bank full
LRC-1	Lower Rock Creek	6/13/2023	10:54	AN	20.4	7.73	8.11	629	35	Looks lower than usual, but appears to be flowing more
TE-1	Little River Tributary	6/13/2023	15:30	AN	25.1	7.87	8.02	365	52	Smelled like human feces under bridge; have flow measurements at this stage
TG-1	Little River	6/13/2023	16:25	AN	23.4	8.58	8.14	405	10	Appears lower than usual; debris cleared out of midstream
UDB-1	Upper Dave Blue Creek	6/13/2023	9:43	AN	19.3	7.69	8.02	456	109	Higher water level than usual; changed dcp from 21.20 to 17.52
URC-2	Upper Rock Creek	6/13/2023	11:50	AN	19.6	7.45	8.04	382	175	Used RP2, good flow
WC-1	Woodcrest Creek	6/13/2023	14:59	AN	21.7	8.14	7.97	393	30	Looks normal

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	0.25	1.14	0.201	82.0
JB-1	Jim Blue Creek (ds)	0.08	0.56	0.072	30.0
JB-1	Jim Blue Creek (us)	0.07	0.54	0.066	28.0
LDB-1	Lower Dave Blue Creek	0.24	0.72	0.117	104
LRC-1	Lower Rock Creek	0.17	0.65	0.063	38.0
TE-1	Little River Tributary	0.32	0.90	0.109	34.0
TG-1	Little River	0.43	0.65	0.096	20.0
UDB-1	Upper Dave Blue Creek	0.28	0.61	0.106	68.0
URC-2	Upper Rock Creek	0.18	1.09	0.140	132
WC-1	Woodcrest Creek	0.30	1.05	0.200	50.0

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	1.28	0.230	104
Duplicate RPD	0%	11.57%	13.46%*	23.66%*

Table 3 QA/QC Data Where the 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	0.94	20.36
JB-1	Jim Blue Creek	0.40	N/A
LDB-1	Lower Dave Blue Creek	53.88	17.38
LRC-1	Lower Rock Creek	3.63	3.69
TE-1	Little River Tributary	0.04	11.19
TG-1	Little River	0.67	8.93
UDB-1	Upper Dave Blue Creek	2.21	17.52
URC-2	Upper Rock Creek	0.04	11.74
WC-1	Woodcrest Creek	0.04	7.48

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

File Information

File name: Clear Creek_20230612.ft
 Start date and time: 6/12/2023 9:29 AM
 Start location latitude: 35.179
 Start location longitude: -97.265
 Calculations engine: FlowTracker2
 Data collection mode: Discharge

System Information

Discharge Summary

Start time: 6/12/2023 9:35 AM End time: 6/12/2023 10:11 AM
 # Stations: 16 Avg interval: 40
 Mean depth: 1.033 ft Max depth: 1.400 ft
 Mean velocity: 0.1217 ft/s Max velocity: 0.2654 ft/s
 Mean SNR: 53 dB Total width: 7.500 ft
 Mean temp: 67.384 °F Total area: 7.7500 ft²
 Wetted Perimeter: 8.463 ft Total discharge: 0.9435 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	2.8%
Velocity	1.9%	15.0%
Width	0.2%	0.2%
Method	2.7%	
# Stations	3.1%	
Overall	4.7%	15.3%

Viewer Controls

Chart size + Chart size -
 Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file
 Quality control warnings

Supplemental data summary

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q
0	9:35 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0025	0.0000	0.0000	0.00
1	9:36 AM	0.500	0.6	0.400	0.6000	0.240	80	0.0025	1.0000	0.0025	0.2000	0.0005	0.05
2	9:40 AM	1.000	0.6	0.700	0.6000	0.420	80	0.0005	1.0000	0.0005	0.3500	0.0002	0.02
3	9:45 AM	1.500	0.6	0.900	0.6000	0.540	80	-0.0527	1.0000	-0.0527	0.4500	-0.0237	-2.52
4	9:47 AM	2.000	0.6	1.000	0.6000	0.600	80	0.0362	1.0000	0.0362	0.5000	0.0181	1.92
5	9:50 AM	2.500	0.6	1.000	0.6000	0.600	80	0.0677	1.0000	0.0677	0.5000	0.0338	3.59
6	9:51 AM	3.000	0.6	1.200	0.6000	0.720	80	0.1122	1.0000	0.1122	0.6000	0.0673	7.14
7	9:54 AM	3.500	0.6	1.300	0.6000	0.780	80	0.1454	1.0000	0.1454	0.6500	0.0945	10.02
8	9:56 AM	4.000	0.6	1.400	0.6000	0.840	80	0.2492	1.0000	0.2492	0.7000	0.1745	18.49
9	9:58 AM	4.500	0.6	1.400	0.6000	0.840	80	0.1601	1.0000	0.1601	0.7000	0.1120	11.88
10	10:00 AM	5.000	0.6	1.400	0.6000	0.840	80	0.1875	1.0000	0.1875	0.7000	0.1313	13.91
11	10:02 AM	5.500	0.6	1.400	0.6000	0.840	80	0.1411	1.0000	0.1411	0.7000	0.0988	10.47
12	10:04 AM	6.000	0.6	1.300	0.6000	0.780	80	0.1182	1.0000	0.1182	0.6500	0.0768	8.14
13	10:06 AM	6.500	0.6	1.200	0.6000	0.720	80	0.2654	1.0000	0.2654	0.6000	0.1592	16.88
14	10:07 AM	7.000	0.6	0.900	0.6000	0.540	80	0.0003	1.0000	0.0003	0.4500	0.0001	0.01
15	10:11 AM	7.500	None	0.000	0.0000	0.000	0	0.0000		0.0003	0.0000	0.0000	0.00

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	9:40 AM	1.000	0.6	0.700	0.6000	0.420	SNR Threshold Variation
3	9:45 AM	1.500	0.6	0.900	0.6000	0.540	Large SNR Variation
5	9:50 AM	2.500	0.6	1.000	0.6000	0.600	Velocity Angle > QC
6	9:51 AM	3.000	0.6	1.200	0.6000	0.720	Velocity Angle > QC
7	9:54 AM	3.500	0.6	1.300	0.6000	0.780	Velocity Angle > QC, High Stn % Discharge
8	9:56 AM	4.000	0.6	1.400	0.6000	0.840	Velocity Angle > QC, High Stn % Discharge
9	9:58 AM	4.500	0.6	1.400	0.6000	0.840	Velocity Angle > QC, High Stn % Discharge
10	10:00 AM	5.000	0.6	1.400	0.6000	0.840	High Stn % Discharge
11	10:02 AM	5.500	0.6	1.400	0.6000	0.840	High Stn % Discharge
12	10:04 AM	6.000	0.6	1.300	0.6000	0.780	Velocity Angle > QC
13	10:06 AM	6.500	0.6	1.200	0.6000	0.720	Velocity Angle > QC, High Stn % Discharge
15	10:11 AM	7.500	None	0.000	0.0000	0.000	Water Depth > QC

Figure 2 Discharge Measurement Summary CC-1

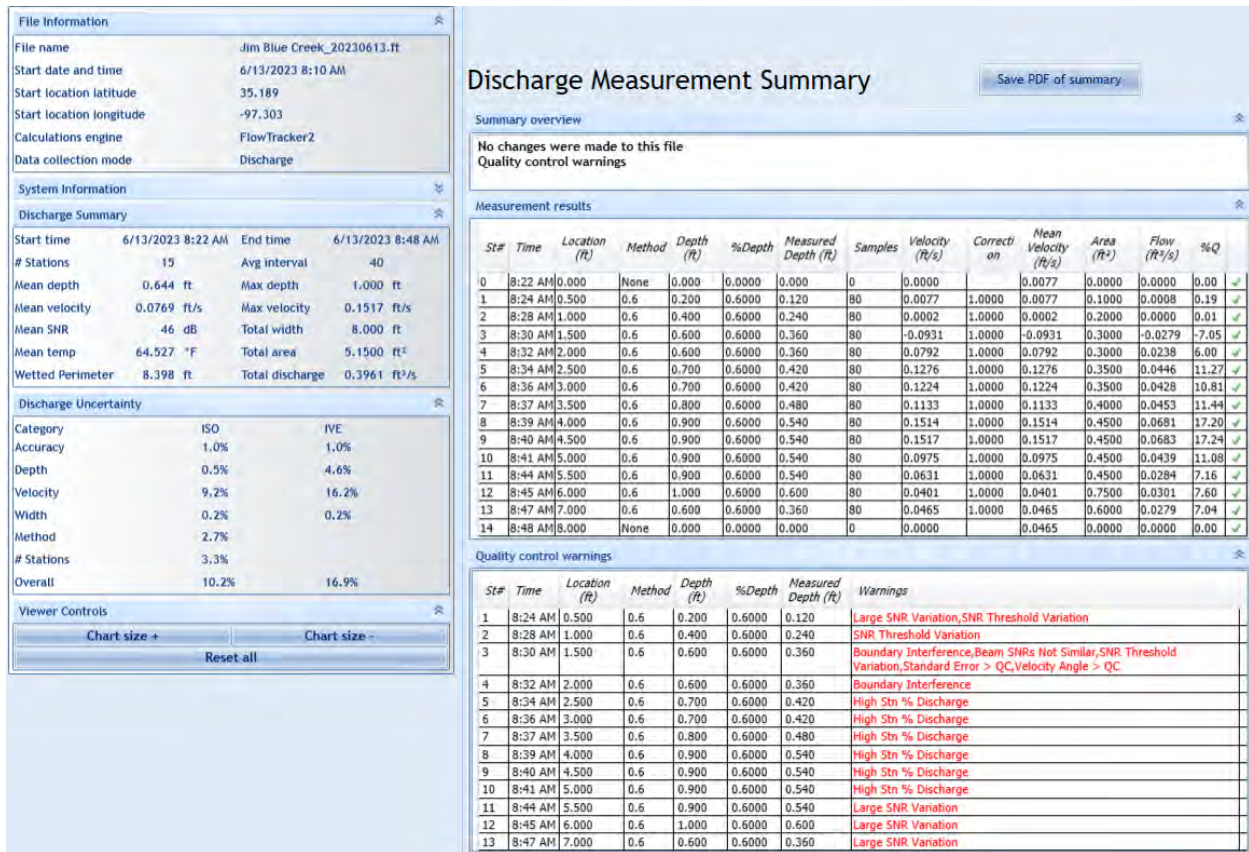


Figure 3 Discharge Measurement Summary JB-1

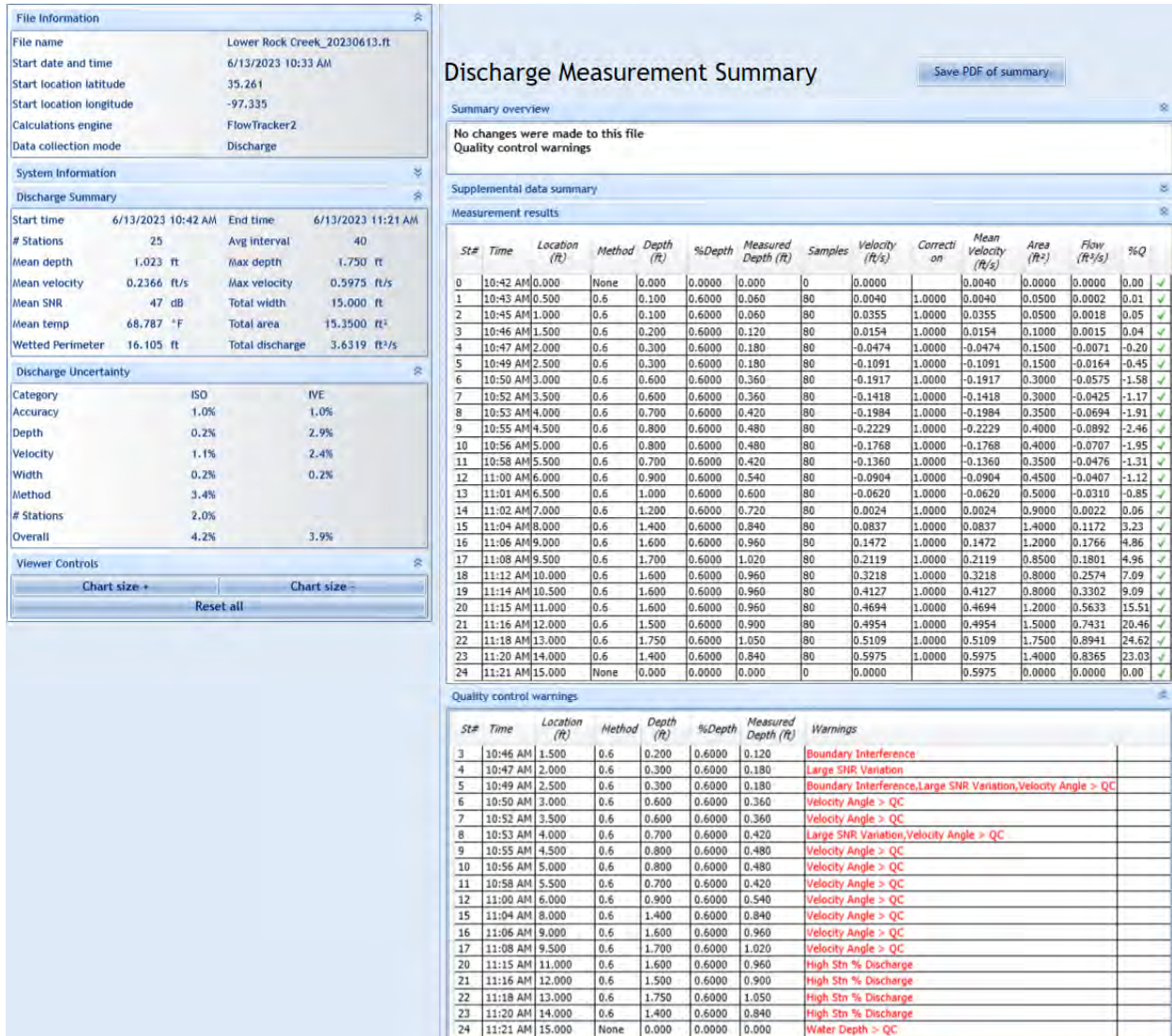


Figure 4 Discharge Measurement Summary LRC-1

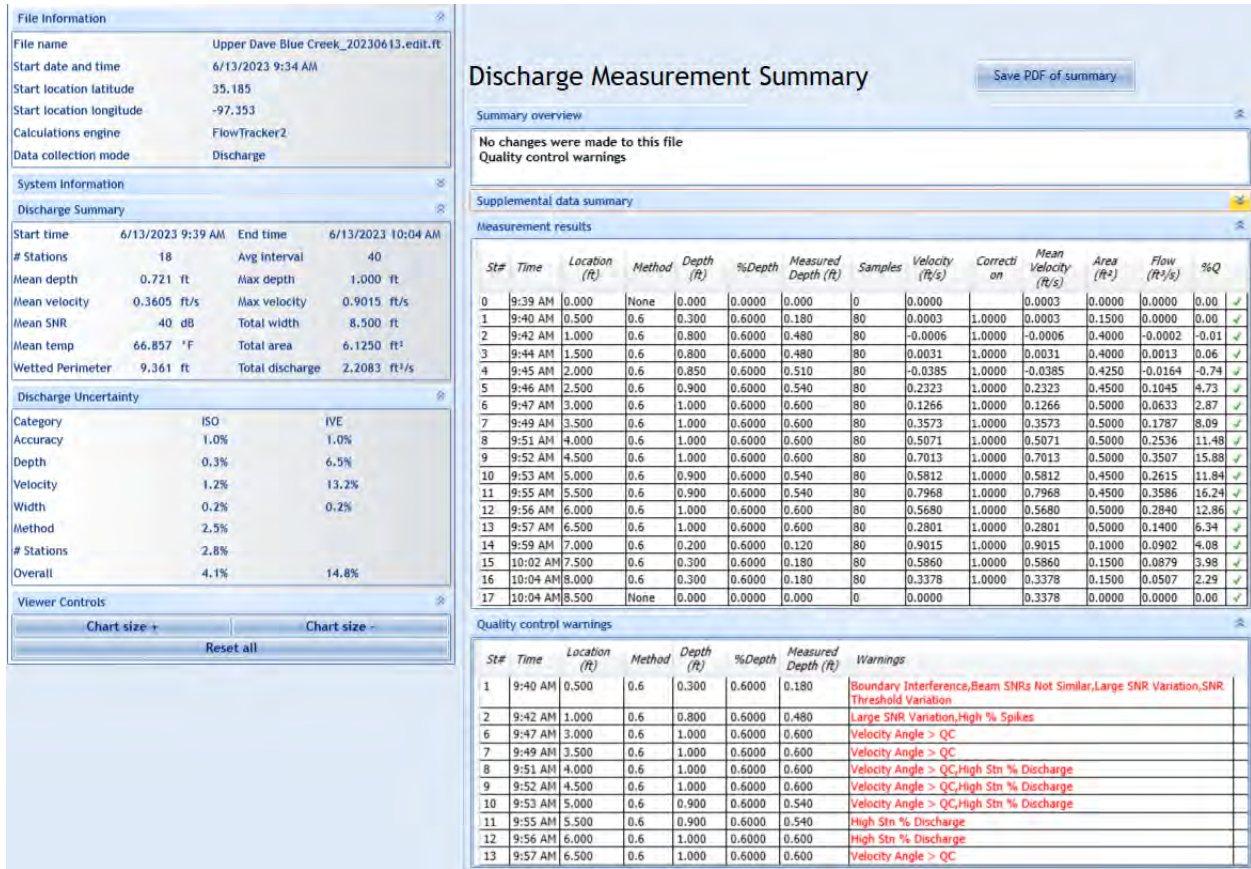
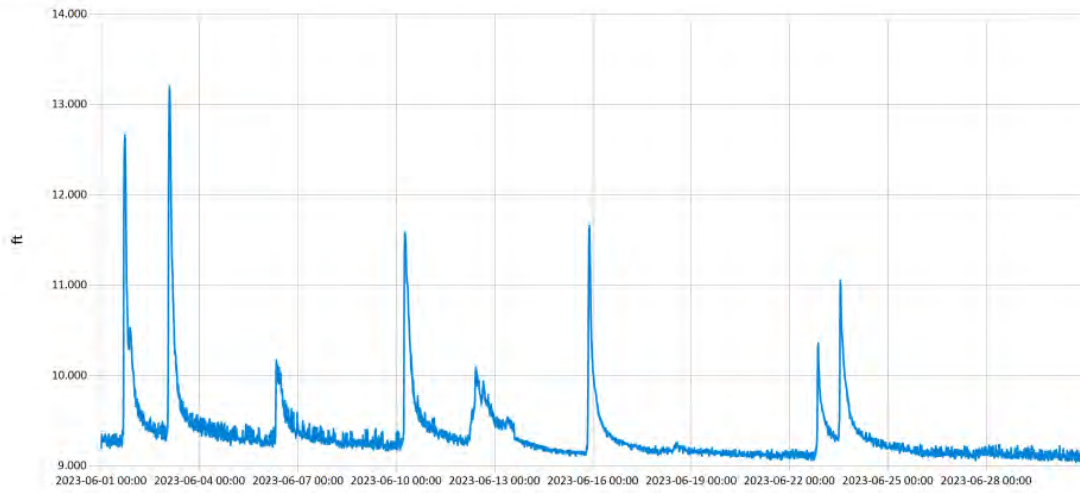


Figure 5 Discharge Measurement Summary UDB-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

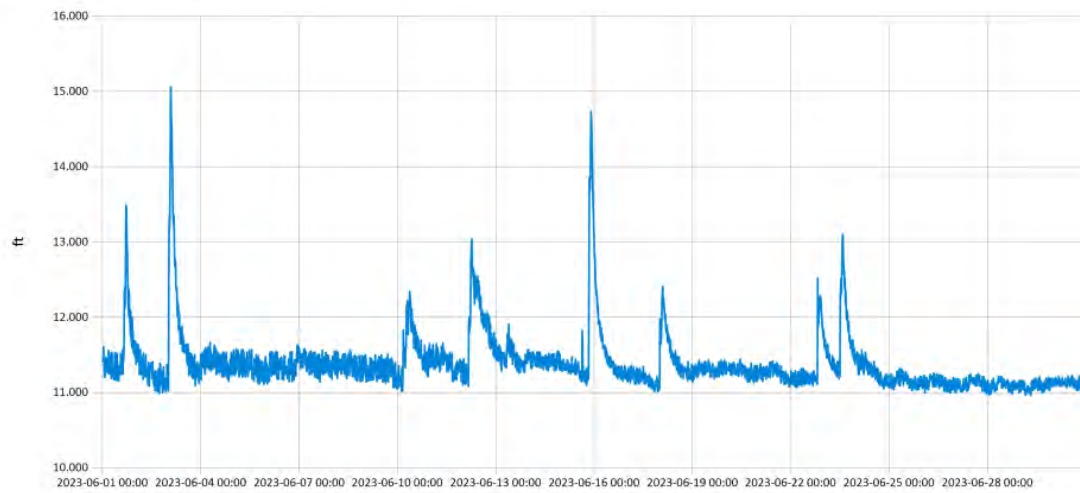


— Stage@TG

Figure 6 Monthly Hydrograph TG-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

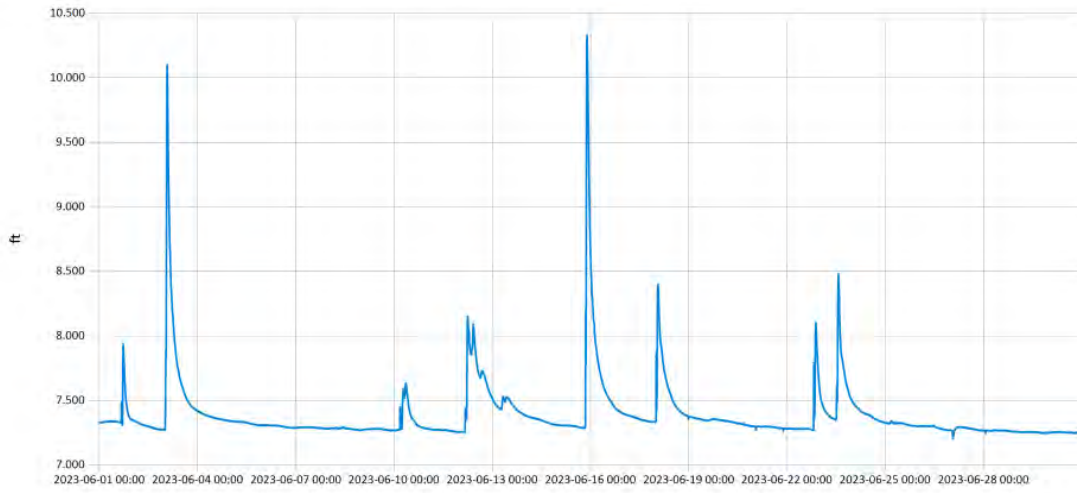
UTC Offset: -06:00



— Stage@TE

Figure 7 Monthly Hydrograph TE-1

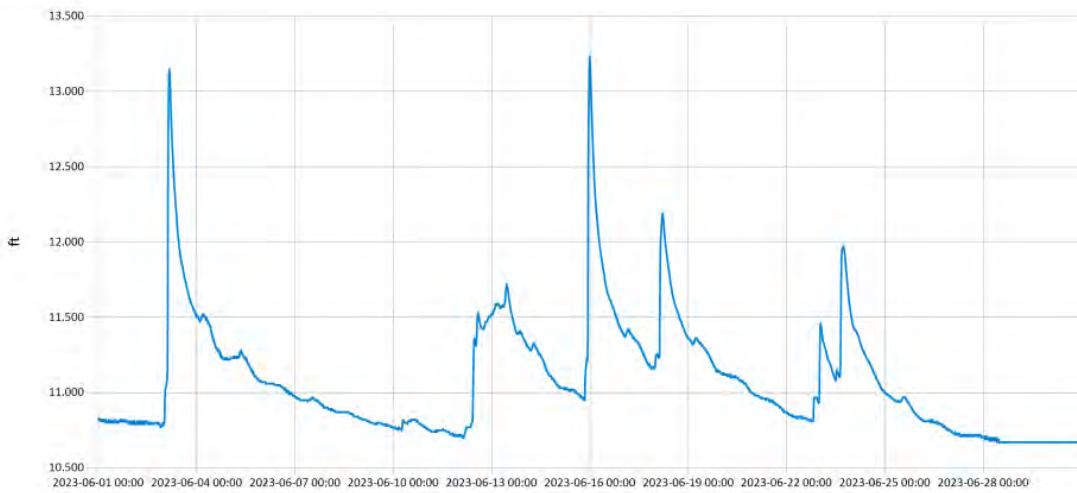
Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59 UTC Offset: -06:00



— Stage@WC

Figure 8 Monthly Hydrograph WC-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59 UTC Offset: -06:00

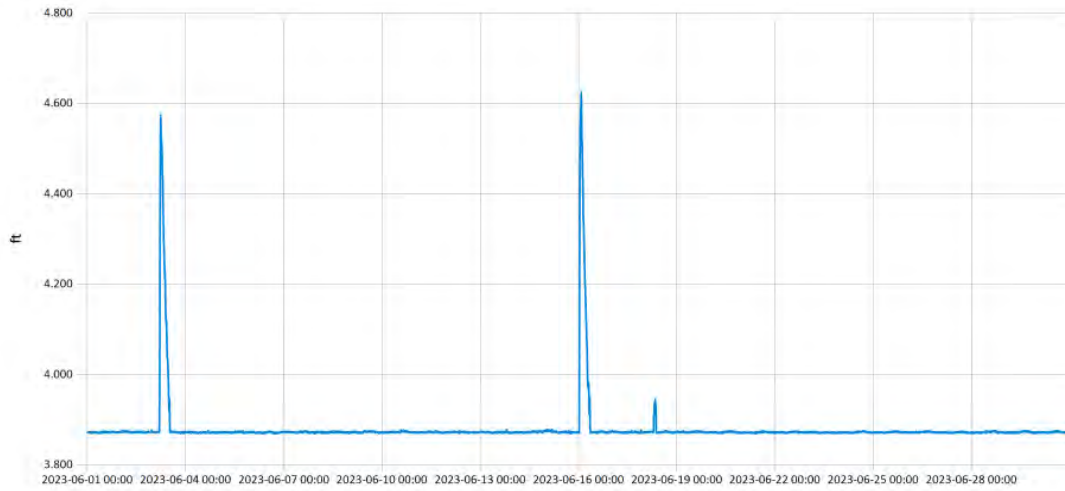


— Stage@URC

Figure 9 Monthly Hydrograph URC-2

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

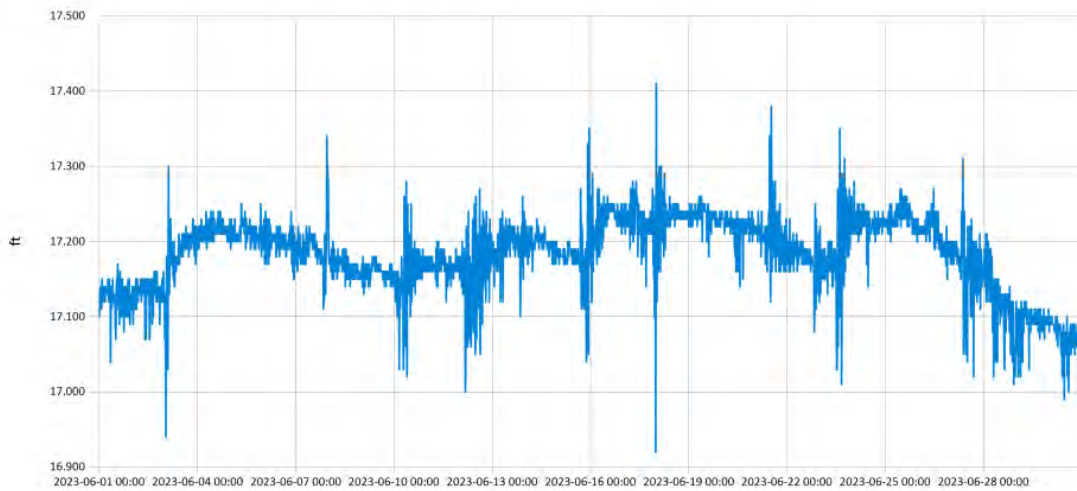


— Stage@LRC

Figure 10 Monthly Hydrograph LRC-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

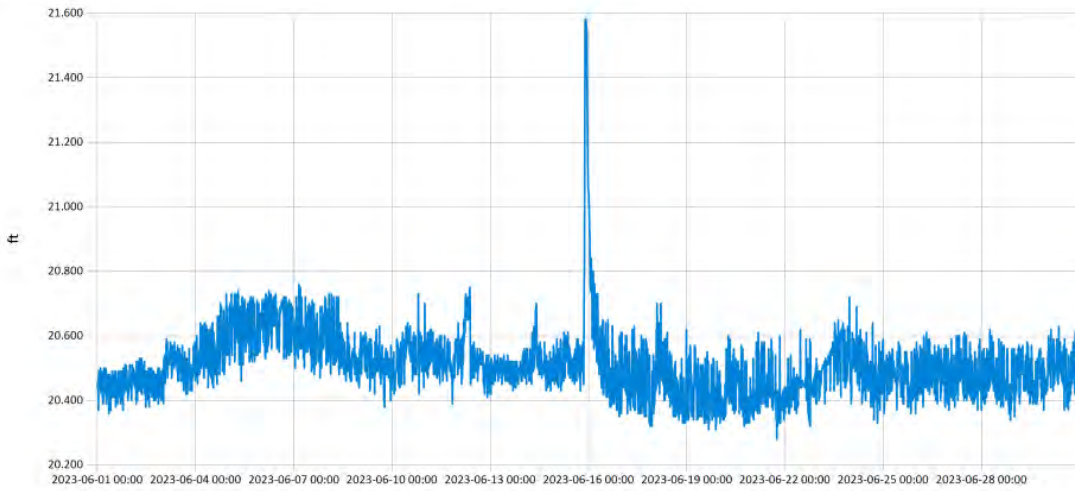


— Stage@LDB

Figure 11 Monthly Hydrograph LDB-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00

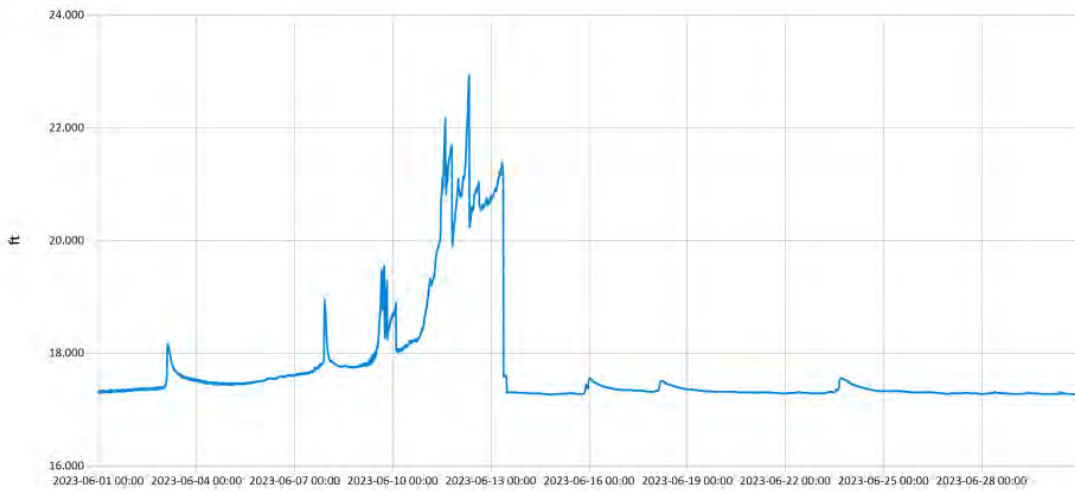


— Stage@CC

Figure 12 Monthly Hydrograph CC-1

Period Selected: 2023-06-01 00:00 - 2023-06-30 23:59

UTC Offset: -06:00



— Stage@UDB

Figure 13 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY (NRMN) Norman Latitude: 35-14-09				June 2023 Nearest City: 2.1 NW Norman Longitude: 97-27-53				Time Zone: Midnight-Midnight CST County: Cleveland 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	86	68	75.5	65.8	0	12	91	52	72	0.63	28.68	29.93	SSE	7.1	34.8	18.53	73.5	78.0	85	74							
2	86	67	76.4	64.2	0	11	88	50	67	0.00	28.67	29.91	SE	8.2	26.8	22.16	73.7	75.4	80	71							
3	79	63	70.6	64.3	0	6	97	58	82	1.10	28.65	29.90	WSW	5.0	30.0	20.94	73.4	75.0	81	70							
4	79	64	70.2	64.8	0	6	96	68	84	0.00	28.70	29.94	NE	4.3	12.1	10.51	72.9	73.4	76	71							
5	86	64	74.7	62.6	0	10	95	42	69	0.00	28.74	29.98	NW	3.7	17.4	23.47	73.1	74.2	81	68							
6	86	64	74.0	62.3	0	10	91	44	69	0.00	28.72	29.97	ENE	4.1	14.8	20.01	74.1	74.4	82	69							
7	87	62	75.0	62.4	0	10	93	39	67	0.00	28.65	29.89	ESE	3.6	19.8	23.07	74.8	75.1	82	69							
8	88	64	76.4	63.2	0	11	94	40	66	0.00	28.60	29.84	SW	4.5	20.4	25.74	75.2	76.6	84	70							
9	91	65	80.0	65.6	0	13	95	40	64	0.00	28.59	29.83	SSE	4.1	15.3	24.59	75.8	79.2	87	71							
10	86	64	75.8	65.4	0	10	94	47	72	0.29	28.54	29.78	SSE	6.4	36.6	23.62	76.4	78.8	84	73							
11	88	67	77.2	65.0	0	12	96	42	68	0.00	28.60	29.85	NNW	8.1	24.7	28.22	76.8	79.5	87	73							
12	67	61	63.4	60.4	1	0	95	81	90	0.99	28.72	29.96	NE	6.8	28.4	5.29	73.1	72.3	78	70							
13	80	61	70.6	64.2	0	5	94	62	81	0.15	28.62	29.87	SE	4.7	15.3	17.71	72.6	73.3	79	68							
14	86	66	76.0	63.7	0	11	98	40	69	0.00	28.52	29.76	NW	4.4	17.6	27.68	75.0	77.1	83	72							
15	88	64	75.2	64.8	0	11	98	44	73	0.77	28.53	29.77	ESE	7.6	84.0	21.70	75.1	75.8	83	70							
16	86	65	74.7	63.6	0	10	91	46	71	0.00	28.62	29.87	NNE	5.6	19.4	25.91	74.9	76.3	84	70							
17	86	64	77.2	67.1	0	10	97	53	72	0.13	28.63	29.87	SSE	8.7	62.1	25.51	76.0	77.6	82	72							
18	85	62	72.7	61.9	0	8	97	45	71	0.28	28.55	29.79	NW	6.0	37.0	29.06	75.6	77.2	84	70							
19	90	63	79.2	66.6	0	11	97	44	68	0.00	28.58	29.82	ESE	8.2	20.5	28.27	76.2	77.5	83	71							
20	94	74	83.6	74.1	0	19	85	58	74	0.00	28.57	29.82	ESE	10.1	20.8	26.55	78.5	79.9	86	74							
21	85	75	80.1	70.3	0	15	84	57	73	0.00	28.64	29.88	SE	9.9	46.1	23.81	79.4	80.0	84	77							
22	88	68	78.1	67.8	0	13	90	51	72	0.29	28.68	29.93	E	6.4	32.9	23.07	79.0	80.5	88	75							
23	84	67	74.8	68.3	0	10	97	61	81	0.50	28.70	29.95	SE	6.6	52.6	14.51	76.9	77.2	80	74							
24	93	70	82.1	72.2	0	16	95	53	74	0.00	28.62	29.86	SSE	7.3	18.6	26.75	77.8	78.9	85	73							
25	91	73	83.3	73.1	0	17	94	61	72	0.00	28.64	29.89	NE	7.0	20.0	23.24	79.6	80.9	85	76							
26	88	76	81.3	61.6	0	17	64	38	52	0.00	28.69	29.93	ENE	8.0	20.8	25.77	79.4	79.0	84	75							
27	90	74	81.9	70.4	0	17	87	56	69	0.00	28.62	29.86	SE	10.6	31.5	17.79	78.8	79.1	85	75							
28	97*	76*	86.6*	73.1*	0*	22*	96*	45*	67*	0.00*	28.60*	29.84*	SSE*	10.3*	23.9*	NA	79.8*	85.0*	93*	77*							
29	98	76	87.2	69.7	0	22	73	41	57	0.00	28.65	29.90	S	9.0	20.4	27.72	79.9	87.6	96	80							
30	94	77	85.2	67.8	0	20	80	37	58	0.00	28.69	29.94	SSE	7.8	20.2	25.72	79.7	88.2	95	82							
87*				67*	77.3*	66.2*	<- Monthly Averages ->				28.63*		29.88*	SSE*		6.8*	84.0*	22.65*		76.2*	78.1*	84*	73*				
Temperature - Highest: 98*							Degree Days - Total HDD: 1*							Number of Days With:													
Lowest: 61*							Total CDD: 370*							Tmax ≥ 90: 9*							Rainfall ≥ 0.01 inch: 10*						
Rainfall: Monthly Total: 5.13* in.							Humidity - Highest: 98*							Tmax ≤ 32: 0*							Rainfall ≥ 0.10 inch: 10*						
Greatest 24 Hr: 1.10* in.							Lowest: 37*							Tmin ≤ 32: 0*							Avg Wind Speed ≥ 10 mph: 3*						
														Tmin ≤ 0: 0*							Max Wind Speed ≥ 30 mph: 10*						

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* Denotes incomplete record

Figure 14 June Mesonet Data