CITY OF NORMAN

2022 ANNUAL REPORT

REPORTING PERIOD 07/01/2021 TO 06/30/2022

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

Authorization No. OKR040015

September 1, 2022

City of Norman Phase II MS4 Annual Report
Reporting Period 7/1/2021 to 6/30/2022

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Contents

Section 1: Compliance Status

1.1. Executive Summary

The FYE 2022 Phase II MS4 Annual Report 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, 2021, through June 30, 2022. 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 FYE 2022 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 1,403 inspections of 108 sites during the reporting period, and issued eight Notices of Violation (NOVs) and ten Cease and Desist Orders (CDOs) 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 31, 2021, the Stormwater Division hosted the Sixth 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 42 people attended and collected almost one-half ton 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 2022 Artful Inlets pieces. Five (5) new educational artworks were installed in April 2022. 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 Outreach

BMP	Goal	Frequency	Comments	Completion Status
Distribute informational brochure with utility bills	One brochure to 75% of all utility accounts	Annually	Distributed four (4) utility bill inserts to 100% of all utility accounts: 1. Q1: Tips for Draining Your Pool 2. Q2: You're Not Just Fertilizing Your Lawn 3. Q3: Recycle the Rain 4. Q4: Green Your Lawn Notes: All utility accounts are served	☒ Yes ☐ Partial ☐ No
Add stormwater pollution prevention information to city web site	Information posted	Annual review/ update	Information on pollution prevention tips, rain barrels, fertilizer applicator registration, and public events were posted on the City's main page throughout the Fiscal Year.	☒ Yes ☐ Partial ☐ No

Table 1. MCM 1: Public Education and Outreach				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
Operate Action Center Hotline	Receive and respond to 90% of verified complaints	Annually	Action Center complaints are received and responded to throughout the year. In FYE 2022, the Stormwater Division received 48 citizen calls through the Action Center. Response rate was 100%.	☒ Yes ☐ Partial ☐ No
Public stormwater education event	Coordinate with Environmental Services for Earth Day event	Annually	Due to inclement weather, the City's Earth Day Festival was cancelled.	☐ Yes ☐ Partial ☒ No
Educational event & materials for schools	Supply material to 2 elementary schools annually and participate in Public Works Week event at local school	Annually	Two activities involving elementary students were completed: 1. Eisenhower 5th Grade, December 8, 2021, demonstrated the EnviroScape model. 2. Loveworks and Parks, grades K-10, hands-on activity making miniature greenhouses and discussed erosion, water pollution, watersheds, and water conservation. In lieu of Public Works Week, city staff distributed stormwater educational materials to local elementary schools through the City's Environmental Control 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.	☐ Yes ☒ Partial ☐ No
Newspaper ads	Quarterly ads in local paper with water quality, pollution prevention or watershed protection information	Annually	The following topics were placed as ads in the Norman Transcript, Norman Transcript special editions, and/or the Norman Magazine in FYE 2022: 1. Love Your Lakes, July 2021 2. Stormwater Coloring Page, July 2021 3. Pet Waste is Pollution, August 2021, Discover Magazine 4. You can be the Difference, September 2021, Norman Magazine 5. When the Rain Doesn't Drain, September-November 2021, OU Game Days 6. You can be the Difference, November 2021, Norman Magazine 7. Recycle the Rain, January-April 2022, Norman Magazine 8. Eco Month Event Calendar, March 2022, Home Improvement Special 9. Green Your Lawn, March 2022, Spring Home Improvement 10. Flood Hazard Awareness, April 2022, Weather Preparedness 11. Only Rain Down the Drain, May-June 2022, Norman Magazine	☒ Yes ☐ Partial ☐ No

Table 1. MCM 1: Public Education and Outreach				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
Develop stormwater pollution prevention brochure for fertilizer use	Distribute to 75% of all utility accounts	Once	Brochure was completed in 2016 and updated in 2022. Brochure sent to fertilizer applicators in March 2022. A utility bill insert providing fertilizer use tips was also distributed to all utility accounts during Q2 and Q4. Notes: All utility accounts are served.	☒ Yes ☐ Partial ☐ No
Develop Spanish language SWPP brochure	Develop Spanish language stormwater pollution prevention informational materials	Once	Brochure was completed in 2016.	☒ Yes ☐ Partial ☐ No

Table 2. Public Participation and Involvement				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
Establish website link for receipt of email regarding stormwater issues	Respond to 90% of all emails received	Annually	pwstormwater@normanok.gov has been established, including a link from the Stormwater Division webpage, for receipt of email regarding stormwater issues. In FYE 2022, the Stormwater Division received to 23 emails. Response rate was 100%.	☒ Yes ☐ Partial ☐ No
Environmental Control Advisory Board (ECAB)	A stormwater quality representative will meet with ECAB quarterly to provide information on stormwater pollution issues.	Annually	Stormwater Division representatives have attended ECAB meetings on a monthly basis and have worked with the group on several stormwater-related issues and events.	☒ Yes ☐ Partial ☐ No
Operate Action Center Hotline	Receive and respond to 90% of verified complaints	Annually	Action Center complaints are received and responded to throughout the year. In FYE 2022, Stormwater Division received 48 citizen calls. Response rate is 100%.	☒ Yes ☐ Partial ☐ No
Public meeting for stormwater issues	Hold one public meeting annually	Annually	On October 31, 2021, the Lake Thunderbird Workshop and Cleanup Event was held, the City's program and the Thunderbird TMDL were discussed, and participants were encouraged to provide comments, ask questions and participate.	☒ Yes ☐ Partial ☐ No
Public Stormwater Education Event	Coordinate with Environmental Services for one event annually	Annually	Environmental Services Division sent educational material regarding disposal of household hazardous waste items to be distributed at the Sixth Annual Lake Thunderbird Workshop and Clean-up Event on October 31, 2021. While plans had been made in coordination with the Environmental Services Division for the City of	☒ Yes ☐ Partial ☐ No

Table 2. Public Participation and Involvement				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
			Norman Earth Day Festival, the festival was ultimately canceled due to inclement weather.	
Blue Thumb/Oklahoma Conservation Commission Partnership	Maintain working relationship with Blue Thumb and coordinate for one stormwater public education event annually	Annually	Blue Thumb volunteers discussed monitoring and volunteering opportunities at the Lake Thunderbird Workshop and Clean-up Event on October 31, 2021 and at the Pollinator Garden Tour at Eastwood Park on June 23, 2022.	☒ Yes ☐ Partial ☐ No
Lake Thunderbird TMDL public meeting	Hold one public meeting annually for education and discussion of the Lake Thunderbird TMDL	Annually	Sixth Annual Lake Thunderbird Workshop and Clean-up Event was held on October 31, 2021.	☒ Yes ☐ Partial ☐ No

Table 3. MCM 2: Illicit Discharge Detection and Elimination (IDDE)				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
Operate Action Center Hotline	Receive and respond to 90% of complaints received	Annually	Action Center complaints are received and responded to throughout the year. In FYE 2022, Stormwater Division received 48 citizen calls. Response rate was 100%.	☒ Yes ☐ Partial ☐ No
Household Hazardous Waste Collection Day	Provide annual event for the public to drop off unwanted household waste and report amount of waste collected	Annually	The City is built a standalone HHW Collection Facility which opened to the public in February 2022. The facility has collected 32,350 pounds of household hazardous waste during the reporting period and serviced 355 vehicles.	☒ Yes ☐ Partial ☐ No
Dry Weather Field Screening	90% of visual screening points inspected each year	Annually	All 63 monitoring points, visual screen points, and outfalls were inspected in FYE 2022.	☒ Yes ☐ Partial ☐ No
Illicit Discharge Investigations	Perform source investigation on all identified illicit discharges and connections	Annually	Conducted throughout the year as identified. Six (6) illicit discharges were found and eliminated in FYE 2022. Additionally, 54 grass clipping door hangers were issued in FYE 2022.	☒ Yes ☐ Partial ☐ No
Enforcement Actions	Take enforcement actions as allowed by City regulations where responsible parties for illicit discharges are identified	Annually	Enforcement actions are taken as necessary to eliminate illicit discharges. Eight NOVs and ten CDOs were issued during FYE 2022. Notes: The EDC is being updated and will address escalated enforcement, as requested by DEQ personnel.	☒ Yes ☐ Partial ☐ No
Inspect MS4 System	Visually inspect open channels and camera enclosed	Annually	During the reporting period, 21,162 inlets were inspected and 7,314 were cleaned, resulting in the removal of over 288.63 tons of debris and material.	☒ Yes ☐ Partial

Table 3. MCM 2: Illicit Discharge Detection and Elimination (IDDE)				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
	conduits. Inspect 10% of system each year		Additional channels and pipes are inspected and maintained as time and resources allow resulting in removal of 2,278.82 tons of debris and material from that infrastructure.	☐ No

Table 4. MCM 4: Construction Site Runoff Control				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
Earth Change Permit	Permit 90% of all earth disturbing operations over 1 acre in size	Annually	38 Earth Change Permits were issued in FYE 2022. Every SWP3 submitted is fully reviewed for compliance with OKR10.	☒ Yes ☐ Partial ☐ No
Construction site inspection	Inspect 90% of sites within 30 days of permit issuance and at least monthly. Perform enforcement actions as needed	Annually	100% of sites were inspected within 30 days. 1,403 inspections were conducted at 108 sites in FYE 2022. Eight NOVs and ten CDOs were issued for construction stormwater noncompliance.	☒ Yes ☐ Partial ☐ No
Education event for construction/development	Hold two events for developers, construction crews, utility contractors and engineering companies	Annually	The spring Builder's Workshop was held in-person on May 25, 2022. Notes: Due to staff turnover, the fall Builder's Workshop was not completed.	☐ Yes ☒ Partial ☐ No
Water Quality Protection Zone Ordinance (WQPZ)	Implement requirements of the Water Quality Protection Zone Ordinance including establishment and maintenance of streamside buffers	Annually	WQPZ ordinance has been established, and zones are identified as property is platted on an ongoing basis. Ten Certificates of Survey and two final plats were filed with WQPZ during the reporting period.	☒ Yes ☐ Partial ☐ No
Lake Thunderbird TMDL building/development workshop	Hold annual workshop for the building and development community on the Lake Thunderbird TMDL compliance requirements and Lake Thunderbird watershed protection	Annually	Discussion of the Lake Thunderbird TMDL compliance requirements and Lake Thunderbird watershed protection was held at the Builders Workshops on May 25, 2022.	☒ Yes ☐ Partial ☐ No

Table 5. MCM 5: Post-Construction Site Runoff from New/Redevelopment				
BMP	**Goal**	**Frequency/ Implemented**	**Comments**	**Completion Status**
Review/amend City engineering and development regulations	Remove any barriers to Low Impact Development (LID)	Review every 5 years	Review of Engineering Design Criteria and city ordinances is ongoing. Projected completion date of spring 2023.	☒ Yes ☐ Partial ☐ No
Implement WQPZ ordinance	Establish water quality protection zones in riparian areas	Annually	WQPZ ordinance has been established, and zones are identified as property is platted. Ten Certificates of Survey and two final plats were filed with WQPZ during the reporting period.	☒ Yes ☐ Partial ☐ No
Fertilizer Ordinance	Implement the Manufactured Fertilizer Ordinance to educate the public and commercial fertilizer applicators on proper fertilizer use	Annually	Letters regarding the Manufactured Fertilizer Ordinance were sent to public and commercial applicators on March 4 and May 16, 2022.	☒ Yes ☐ Partial ☐ No
Stormwater impoundment inspection	Inspect 50% of stormwater impoundments	Annually	One-hundred twenty-three (123) out of two hundred forty-five (245) identified stormwater impoundments were inspected in FYE 2022.	☒ Yes ☐ Partial ☐ No
Post-Construction Events	Include information on post-construction BMPs in construction/development events listed for MCM 4	Annually	Post-construction BMPs were discussed at the Builders Workshop on May 25, 2022.	☒ Yes ☐ Partial ☐ No

Table 6. MCM 6: Municipal Good Housekeeping				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
Develop employee training program	Provide one training session for 75% of targeted employees	Annually	This BMP is under development and is currently mostly handled on an ad hoc basis. Due to limited resources, current staff have been unable to fully implement this task.	☐ Yes ☒ Partial ☐ No
Street Sweeping	Sweep at least 2,500 curb miles annually to prevent pollutants from entering the MS4	Annually	5,024 lane miles were swept in FYE 2022.	☒ Yes ☐ Partial ☐ No
City facility stormwater inspections	Inspect half of all facilities identified as potential sources of stormwater pollution	Annually	In FYE 2022, twelve (12) out of twenty-four (24) facilities were inspected, including: 1. Lindsey Maintenance Yard 2. Traffic Control Division 3. Transit Division 4. Fleet Division	☒ Yes ☐ Partial ☐ No

Table 6. MCM 6: Municipal Good Housekeeping				
BMP	**Goal**	**Frequency**	**Comments**	**Completion Status**
			5. Animal Shelter 6. Water Reclamation Facility 7. Line Maintenance Division 8. HHW Collection Facility 9. Sanitation Transfer Facility 10. Compost Facility 11. Water Treatment Facility 12. Sanitation Maintenance Facility	
Map City facility storm sewer (SS) systems	Locate all SS inlets and outfalls at two City facilities every year	2 facilities annually until complete	SS inlets and outfalls were identified at the following facilities: 1. Lindsey Maintenance Yard 2. Traffic Control Division 3. Transit Division 4. Fleet Division 5. Animal Shelter 6. Water Reclamation Facility 7. Line Maintenance Division 8. HHW Collection Facility 9. Sanitation Transfer Facility 10. Compost Facility 11. Water Treatment Facility 12. Sanitation Maintenance Facility	☒ Yes ☐ Partial ☐ No
Spill Kits	Provide spill containment kits to 25% of City vehicles	Annually	Spill kits, spill containment devices, and other BMPs were offered during municipal good housekeeping inspections; no facilities requested materials.	☒ Yes ☐ Partial ☐ No
Employee Newsletter	Distribute stormwater pollution prevention information to City Employees through the newsletter once each quarter	Annually	The employee newsletter was discontinued in April 2021. Employees will be provided the opportunity to sign-up for the Runoff Roundup in lieu of the employee newsletter for stormwater information.	☐ Yes ☒ Partial ☐ No ☒ Change ☒ Remove
Employee education on Lake Thunderbird TMDL	Incorporate Lake Thunderbird TMDL requirements into City employee training events.	Annually	Lake Thunderbird TMDL requirements were incorporated into the virtual training sessions, into educational materials provided for MCM 1 and 4, and were discussed at the Lake Thunderbird Watershed Workshop and Cleanup Event on November 15, 2020, which included City employee as participants.	☒ Yes ☐ Partial ☐ 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 Tables 7 and 8.

Table 7. Pollutant Reductions	
Activity	**Pollutants Removed (Tons)**
Street Sweeping	1,611.68
Litter Crews	29
Storm Drain Inlet Cleaning	288.63
Channel Maintenance	2,278.82
Volunteer Clean-Up Events	1.69
Household Hazardous Waste Collection	16.18
Total	4,226

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. 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 31, 2021, 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 42 people participated and removed approximately nine hundred and twenty (920) pounds of trash and recyclables from the watershed.

During this reporting period, the City hosted a total of twenty-one (21) clean-up events, including the Lake Thunderbird Watershed Workshop and Clean-up Event, where 337 community volunteers removed over 3,150 pounds of trash, debris, and other materials our major watersheds: Canadian River and Lake Thunderbird.

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 will not be installed until fall 2022. 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).

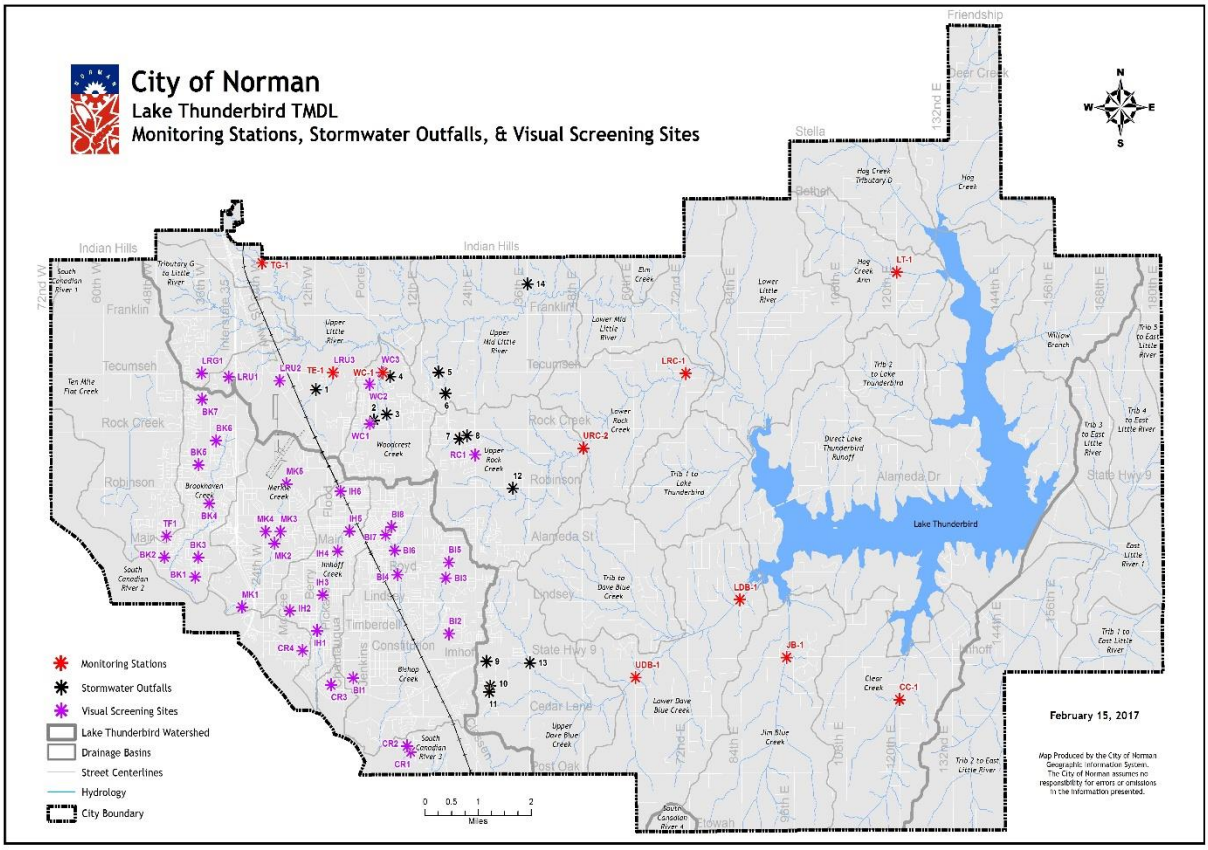
2.1.2. MCM 3: Illicit Discharge Detection and Elimination

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 below for locations). All outfalls were inspected during the reporting period. Outfall inspection forms were completed and photos taken at each outfall. One illicit discharges was identified during FYE 2022 as a result of these activities.

During FYE 2022, the City received one hundred and fifty-seven (157) citizen inquiries, either directly from the citizen, through the City Action Center, 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 FYE 2022:

Earth Change Permits:

New earth change permits issued:	38

Construction Site Inspections:

Total number of open sites at the end of reporting period:	108
Total number of inspections performed:	1,403

Construction Site Enforcement:

NOVs issued:	8
CDOs issued:	10

Stop Work Orders issued:	0
Citations issued:	0

Outreach Efforts:

Builders Workshops:	1

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 Manual update that began during the previous reporting period and continued into FYE 2022. 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. For FYE 2022, 195 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 2022, the letter was sent to public and commercial applicators on March 4 and May 16, 2022. Additionally, one-hundred twenty-three (123) stormwater detention ponds were inspected in FYE 2022

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, 1,611.68 tons of material were removed from the MS4, and 5,024 lane miles were swept. Street sweepers also respond to non-hazardous material spills and clean inlets as necessary.

During FYE 2022, stormwater training was provided to members of the Line Maintenance, Water Treatment Plant, and Stormwater and Streets Divisions. The Employee Newsletter was also used through part of the reporting period to educate personnel on stormwater issues. After the newsletter was discontinued, employees were offered the opportunity to sign up for the Runoff Roundup. 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 newsletter and/or Runoff Roundup throughout the reporting period.

2.2. Next Reporting Cycle

The next reporting period will include data from July 1, 2022, through June 30, 2023, and will encompass the reauthorized permit requirements. The Annual Report covering that period will be submitted on or before October 1, 2023. Recurring BMPs will be continued, enhancements will be investigated, and additional permit requirements will be identified for program development.

2.3. Proposed Changes

BMP activities relating to the employee newsletter for MCM 6 will be removed from the next reporting cycle.

Under the reauthorized Phase II MS4 General Permit, OKR04, which became effective on June 1, 2021, the City is now considered a Category 3 MS4. As such, the City will be required to develop and implement an industrial stormwater runoff control program by June 1, 2023. The City of Norman has hired Freese and Nichols, Inc., to review the first 5 years of monitoring data associated with the Lake Thunderbird TMDL, update the Lake Thunderbird TMDL Compliance and Monitoring Plans and the SWMP, and recommend structural controls as necessary to meet the load reduction requirements associated with the Lake Thunderbird TMDL. Part of this contract includes developing the necessary BMPs, measureable goals, and implementation plan for the new permit requirements outlined in OKR04.

Section 3: TMDLs

3.1 TMDL Compliance

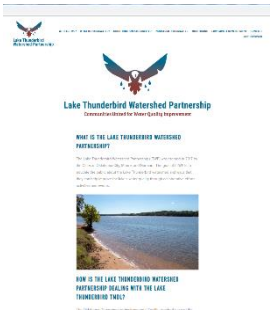
ODEQ issued a TMDL for the Lake Thunderbird watershed in November 2013. The TMDL required the Cities of Norman, Moore, and Oklahoma City to develop Compliance and Monitoring Plans to limit the amount of nitrogen, phosphorus, and sediment entering Lake Thunderbird from stormwater runoff. The City submitted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

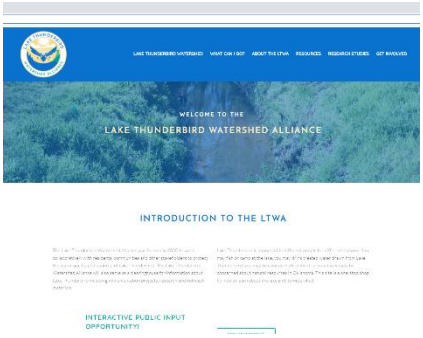
On January 26, 2016, City Council approved Contract No. K-1516-79 by and between the City of Norman and OWRB in the amount of $229,756.23. OWRB implemented the monitoring program in March 2016. Installation of stream gauging stations was completed in May 2016. Monthly monitoring is ongoing at ten (10) 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.ltwaok.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.

Pollutant Reductions Based on WTM Models in the City of Norman TMDL Compliance Plan							
Pollutant	Jim Blue	Clear Creek	Lake Thunderbird and Laterals	Little River	Rock Creek	Dave Blue	**Total for FYE 2022 (lbs)**
Phosphorus	76.7	72.7	441.6	125.6	68.8	90.4	**875.8**
TSS	2,874	2,721	16,563	53,510	31,105	31,795.2	**138,568.2**
Nitrogen	464.9	440.1	2,679	797.5	497.8	643	**5,522.3**

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	201West Gray, Bld A
City/State/Zip	Norman, OK 73069
Contact	Jason Murphy, CFM Stormwater Program Manager
Contact Phone	(405) 366-5455
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: 8-11-22

Name (printed): Darrel Pyle Title: City Manager

Appendix A: Annual Report Summary

21,162
INLETS INSPECTED

7,314
INLETS CLEANED

288
TONS OF DEBRIS REMOVED

5,024
LANE MILES SWEPT

1,612
TONS DEBRIS REMOVED

12
CITY FACILITIES INSPECTED

2
DEPARTMENTS ATTENDED STORMWATER TRAINING

29
TONS OF DEBRIS REMOVED BY LITTER CREW

21
CLEAN-UP EVENTS

337
VOLUNTEERS

3,151
POUNDS DEBRIS REMOVED

1,403
CONSTRUCTION INSPECTIONS

38
SWP3s REVIEWED

108
ACTIVE SITES

48
COMPLAINTS WERE RECEIVED THROUGH THE ACTION CENTER

UTILITY INSERTS

FOUR (4) INSERTS WERE DISTRIBUTED TO ALL UTILITY ACCOUNTS.

Q1: POOL DRAINING TIPS
Q2: FERTILIZING YOUR LAWN
Q3: RECYCLE THE RAIN
Q4: GREEN YOUR LAWN

2,279
TONS OF DEBRIS WERE REMOVED BY CHANNEL MAINTENANCE CREWS. OVER 7.8 MILLION SQUARE FEET OF CHANNELS WERE MOWED/MAINTAINED.

SPANISH P2 MATERIALS

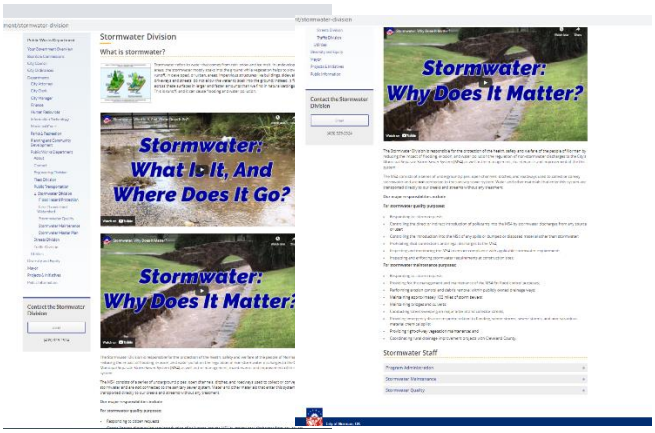
ORIGINAL MATERIALS WERE COMPLETED IN 2016. FERTILIZER BROCHURE HAS BEEN UPDATED AND TRANSLATED.

157
COMPLAINTS, EMAILS, AND OTHER REFERRALS WERE INVESTIGATED

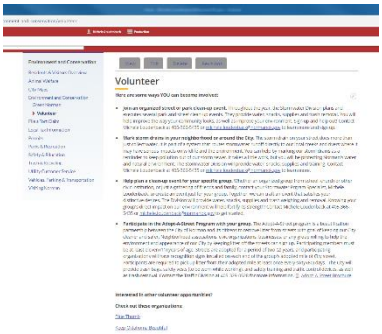
1
POLLINATOR GARDEN PLANTED IN PRAIRIE CREEK PARK

Appendix B: Supporting Documentation for MCM 1

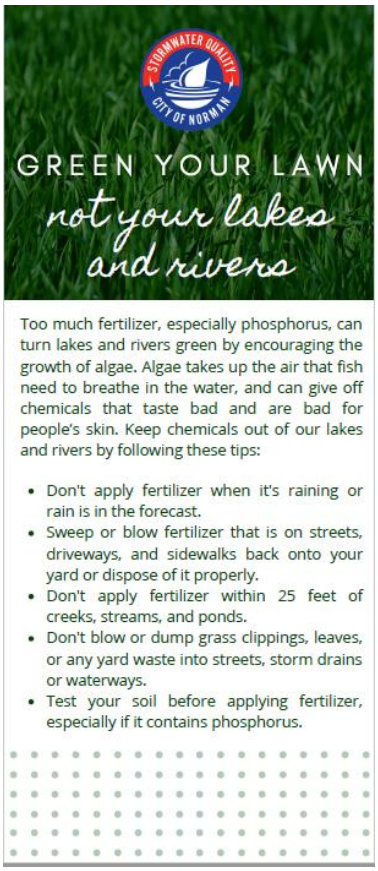
Stormwater Division Homepage



Environmental Volunteer Information from City Website.



Utility Bill Insert



Quarterly Newsletter – March 2022

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 metal 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/3pwscx6

RECYCLE THE RAIN

If you are interested in purchasing a rain barrel, the Central Oklahoma Stormwater Alliance (COSWA) is hosting it's annual rain barrel promotion. The rain barrels are made from re-purposed 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/nnm/.

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-department/stormwater-division

Stormwater Division Staff

Jason Murphy
Stormwater Program Manager
Office: 405-366-5455
Cell: (405) 365-4928

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

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

Michelle Chao, CISEC, CPSWQ
Stormwater Program Specialist
Office: (405) 366-5435
Cell: (405) 226-0693

Stuart Shumate, CSI, OCESI
Stormwater Compliance Inspector
Office: (405) 217-7777
Cell: (405) 323-7155

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

Norman Action Center

Phone: (405) 366-5396
Email: action.center@normanok.gov
Website: https://www.normanok.gov/action-center

Department of Environmental Quality

Phone: (405) 702-8100
Email: ecls-stormwaterpermitting@deq.ok.gov
Website: http://www.deq.state.ok.us/wqdnew/stormwater/index.html

March 2022

Facebook Post Examples

Appendix C: Supporting Documentation for MCM 2

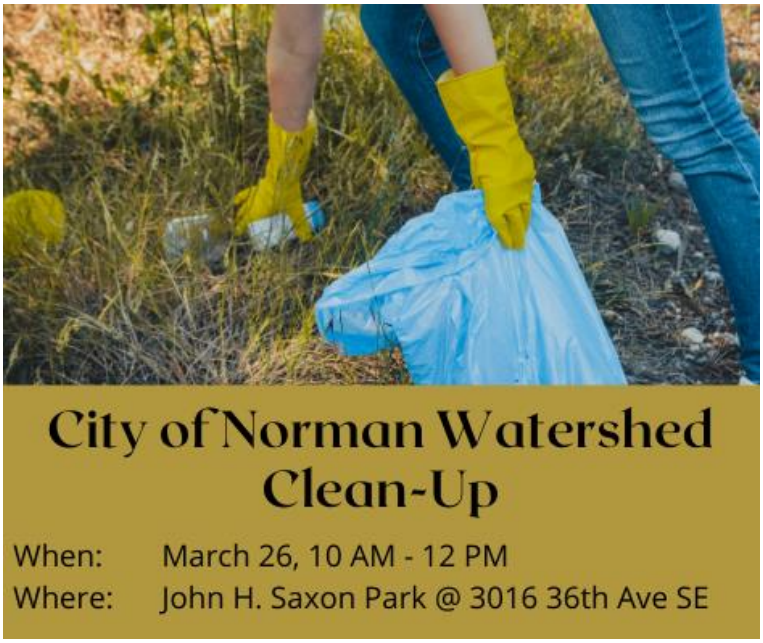
Norman Green Eco Month – April 2022

EARTH DAY 2022

Earth Day is April 22, 2022 and this spring is full of opportunities to celebrate our earth! Please join us for any (or all!) of the events we have scheduled to celebrate Earth Day and keep our watersheds clean.

March 17	Bugfest	9 AM - 12 PM @ Norman Central Library (103 W. Acres Street)
March 19	Styrofoam collection and watershed cleanup	1 AM - 5 PM @ Norman HHW Facility (3901 Chautauqua Ave) 1 - 3 PM: Styrofoam collection/drop off 3 - 4 PM: tours of HHW facility 4 - 5 PM: clean-up Chautauqua to Jenkins Register: https://bit.ly/3K9cRKG
March 26	Watershed Cleanup	10 AM - 12 PM @ John H. Saxon Park (3016 36th Ave SE) Register: https://bit.ly/3IGI4op
April 9	Clean-up event	10 AM -12 PM @ NE Lions Park (1800 Northcliff Ave) Register: https://bit.ly/35PEqcY
April 13	Composting - Trash to Treasure	6:30 - 8:00 PM @ The Well (210 James Garner)
April 16	Watershed Cleanup	10 AM - 12 PM @ Prairie Creek Park (2025 Pendleton Dr). Volunteers are welcome to help pick-up trash throughout the park or plant milkweed in the new pollinator garden. Register: https://bit.ly/3JdcMxG
April 22	EARTH DAY	
April 22-23	Artful Inlets	Lions Park (450 S Flood Ave) Join us in the third installation of Artful Inlets! Come learn about native plants, solar energy, or just watch the artists create their masterpieces. Activities will take place Saturday @ 9 AM - 12 PM.
April 24	Norman Earth Day Festival	12 - 5 PM @ Andrews Park (201 W Daws St)
April 30	E-Waste collection	9 AM - 12 PM @ Cleveland County Fairgrounds (615 E Robinson St)
May 7	Watershed Cleanup	10 AM - 12 PM @ Lake Thunderbird State Park (13101 Alameda Drive) Register: https://bit.ly/35oiEgW

Watershed Clean-up at Saxon Park – March 26, 2022



Appendix D: Supporting Documentation for MCM 3

Dry Weather Field Screening Form – Example from March 2022

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:	0-37519
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

Photos

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

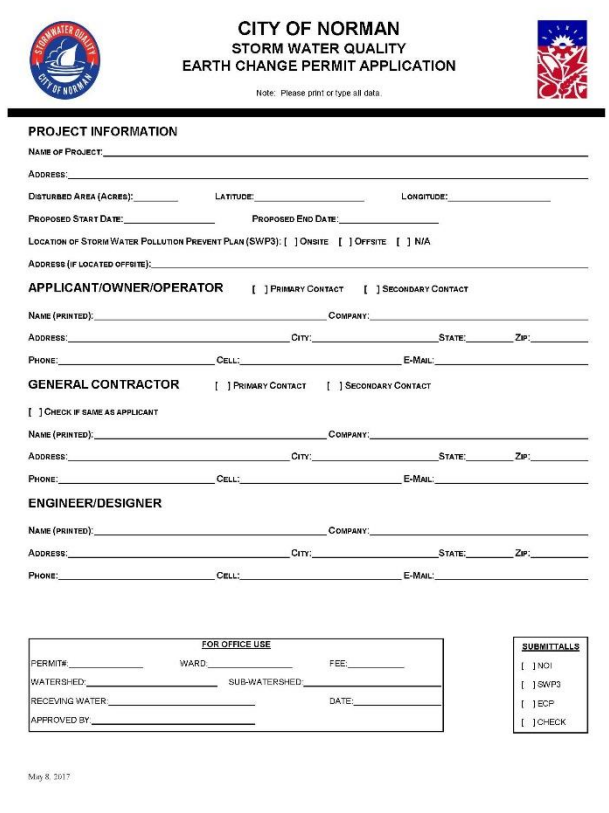
Weather Condition:	Clear Day	Temperature (F):	56
Precipitation (in):	0	Precipitation Last 72 Hours (in):	0
Precipitation Last 24 Hours (in):	0		

Contacts

No contacts to display.

Appendix E: Supporting Documentation for MCM 4

Earth Change Permit Application 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:_____

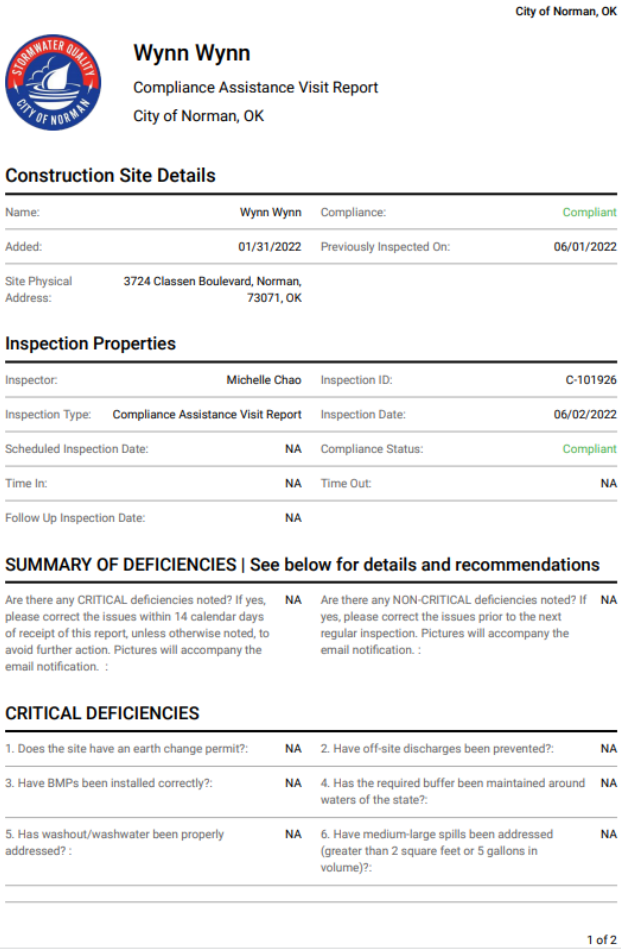
APPROVED BY:_____

SUBMITTALS

[ ] NOI
[ ] SWP3
[ ] ECP
[ ] CHECK

May 8, 2017

Construction Site Inspection Form (page 1)



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

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 Illict 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: Lake Thunderbird TMDL Monitoring Reports

Lake Thunderbird TMDL Monitoring Reports

July 2021 to June 2022

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

SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

July 2021 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
Sarah Dexter, Project Leader, sarah.dexter@owrb.ok.gov
Jason Murphy, Project Supervisor, jason.murphy@owrb.ok.gov
Lance Phillips, Streams Program Manager, lance.phillips@owrb.ok.gov
Bill Cauthron, Monitoring Coordinator, bill.cauthron@owrb.ok.gov

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY OF JULY WATER QUALITY SAMPLING

Sampling for July 2021 occurred on the sixth and was considered a base flow collection. Water samples were collected at all ten locations and discharge measurements were collected at seven locations. Mesonet data shows no precipitation on the sixth, 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 July was 2.70 inches. All water level gauges were operational for the month, except for LRC-1 due to equipment malfunction and JB-1, which was removed for upcoming 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

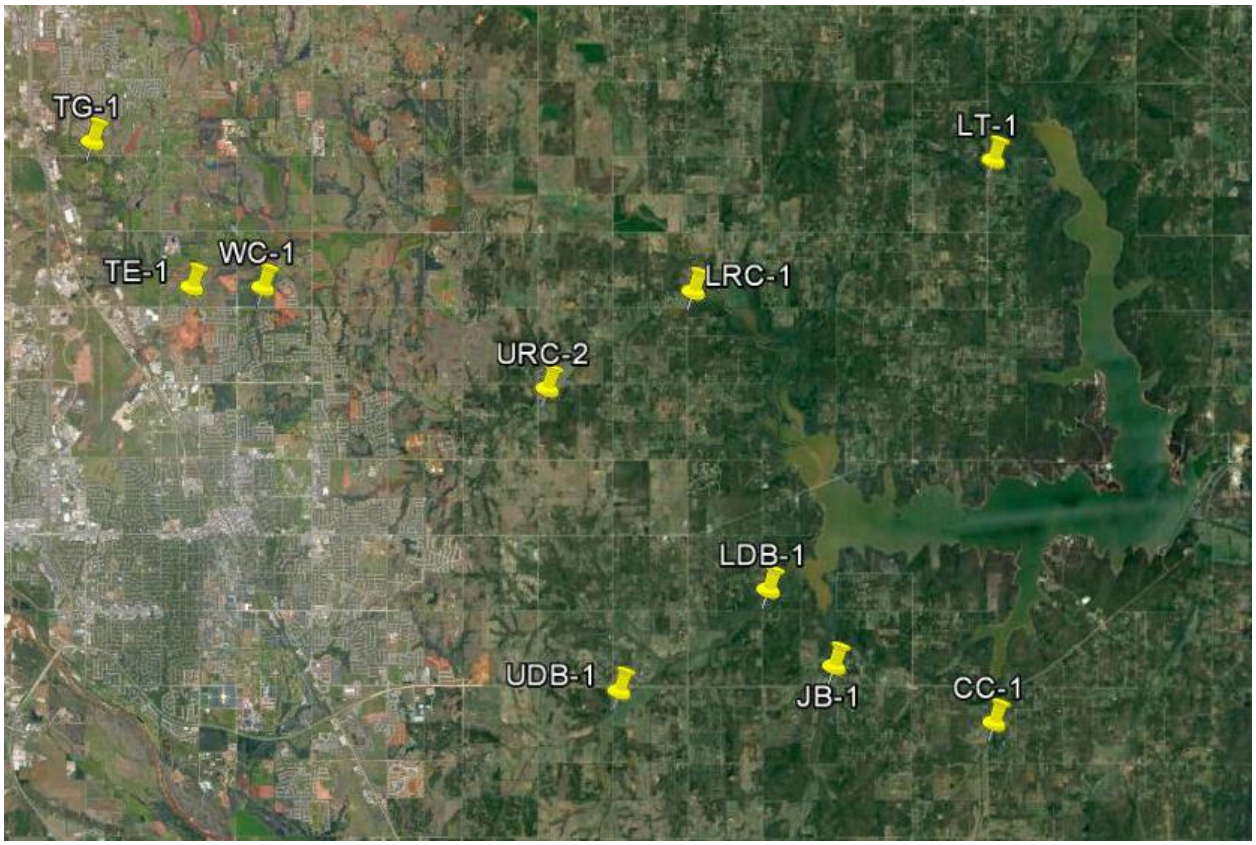


Figure 1 Monitoring Station Map

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	7/6/2021	10:25	SD	21.22	8.03	7.82	715	11	Used RP3
JB-1	Jim Blue Creek	7/6/2021	11:05	SD	21.13	7.47	7.72	721	9	Neither RP over water, orifice buried in a few inches of sand, visible bubbles when purged at arrival, used arrival stage for flow
LDB-1	Lower Dave Blue Creek	7/6/2021	11:55	SD	27.52	5.79	7.98	396	10	Much higher stage than normal but not much visible flow, not able to connect to dcp, ants clogged rain hat
LRC-1	Lower Rock Creek	7/6/2021	13:30	SD	22.56	7.11	7.76	702	12	Higher stage than normal but base flow conditions, orifice not reading correct-probably buried under riprap from construction
LT-1	Lake Laterals	7/6/2021	12:45	SD	24.30	4.21	7.36	450	21	No visual flow on downstream, minimal flow on upstream, aquatic veg common on upstream
TE-1	Little River Tributary	7/6/2021	16:35	SD	29.90	9.51	7.79	766	7	Small beaver dam upstream, not much visible flow
TG-1	Little River Tributary	7/6/2021	17:10	SD	25.84	8.95	7.71	1075	5	Downstream LEW bank starting to collapse
UDB-1	Upper Dave Blue Creek	7/6/2021	8:55	SD	20.11	7.85	7.75	936	9	Above normal flow but still base conditions, hay still on edges of bridge
URC-2	Upper Rock Creek	7/6/2021	14:55	SD	23.19	7.29	7.71	737	19	Higher stage than normal but base flow conditions
WC-1	Woodcrest Creek	7/6/2021	15:45	SD	23.75	7.88	7.63	1051	13	

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	0.36	0.25	0.050	<5.0
JB-1	Jim Blue Creek	0.11	0.44	0.050	<5.0
LDB-1	Lower Dave Blue Creek	<0.05	0.93	0.092	<5.0
LRC-1	Lower Rock Creek	0.22	0.42	0.055	<5.0
LT-1	Lake Laterals	0.08	0.86	0.073	8.0
TE-1	Little River Tributary	<0.05	0.96	0.117	<5.0
TG-1	Little River Tributary	0.40	0.51	0.091	6.0
UDB-1	Upper Dave Blue Creek	0.21	0.39	0.040	6.0
URC-2	Upper Rock Creek	0.18	0.51	0.060	18.0
WC-1	Woodcrest Creek	0.46	0.51	0.129	<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	0.37	0.22	0.046	5.0
Duplicate RPD	2.74%	12.77%	8.33%	66.67%*

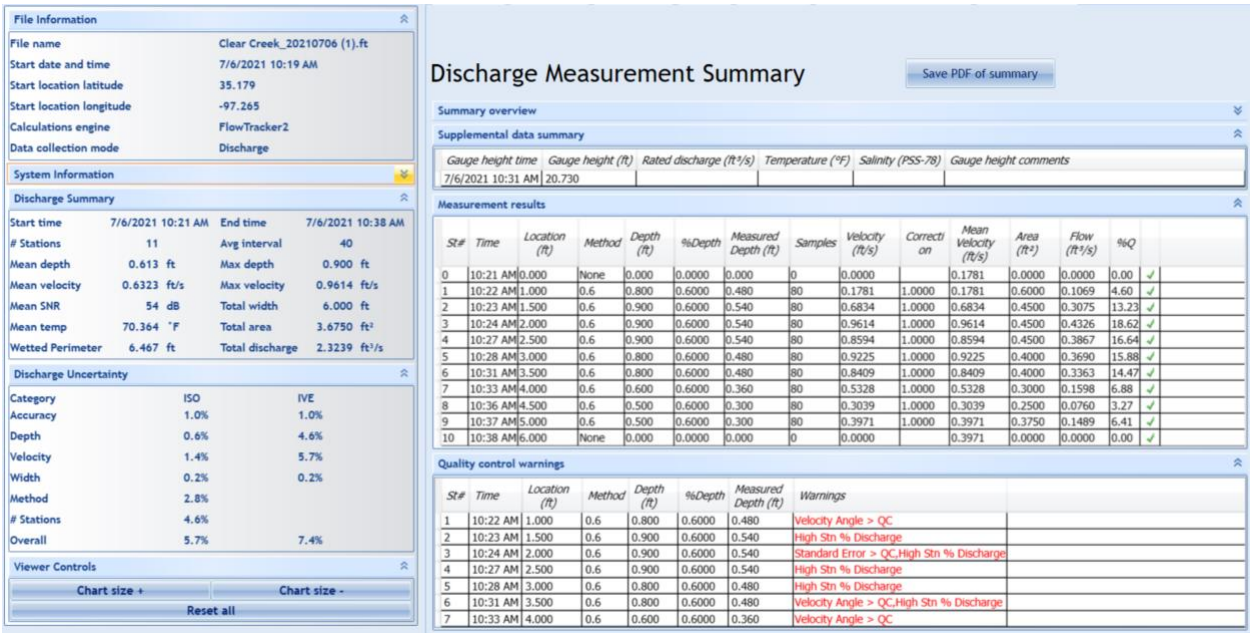
Table 3 QA/QC Data Where the Asterisk Denotes RPD 4

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	2.32	20.73
JB-1	Jim Blue Creek	2.82	16.45
LDB-1	Lower Dave Blue Creek	50.00	21.35
LRC-1	Lower Rock Creek	10.00	7.70
LT-1	Lake Laterals	0.05	4.31
TE-1	Little River Tributary	0.20	11.01
TG-1	Little River Tributary	3.85	9.15
UDB-1	Upper Dave Blue Creek	6.34	17.66
URC-2	Upper Rock Creek	3.16	11.54
WC-1	Woodcrest Creek	0.91	7.58

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Clear Creek_20210706 (1).ft
Start date and time	7/6/2021 10:19 AM
Start location latitude	35.179
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	7/6/2021 10:21 AM	End time	7/6/2021 10:38 AM
# Stations	11	Avg interval	40
Mean depth	0.613 ft	Max depth	0.900 ft
Mean velocity	0.6323 ft/s	Max velocity	0.9614 ft/s
Mean SNR	54 dB	Total width	6.000 ft
Mean temp	70.364 °F	Total area	3.6750 ft²
Wetted Perimeter	6.467 ft	Total discharge	2.3239 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.6%	4.6%
Velocity	1.4%	5.7%
Width	0.2%	0.2%
Method	2.8%	
# Stations	4.6%	
Overall	5.7%	7.4%

Viewer Controls

Chart size + | Chart size - | Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
7/6/2021 10:31 AM	20.730				

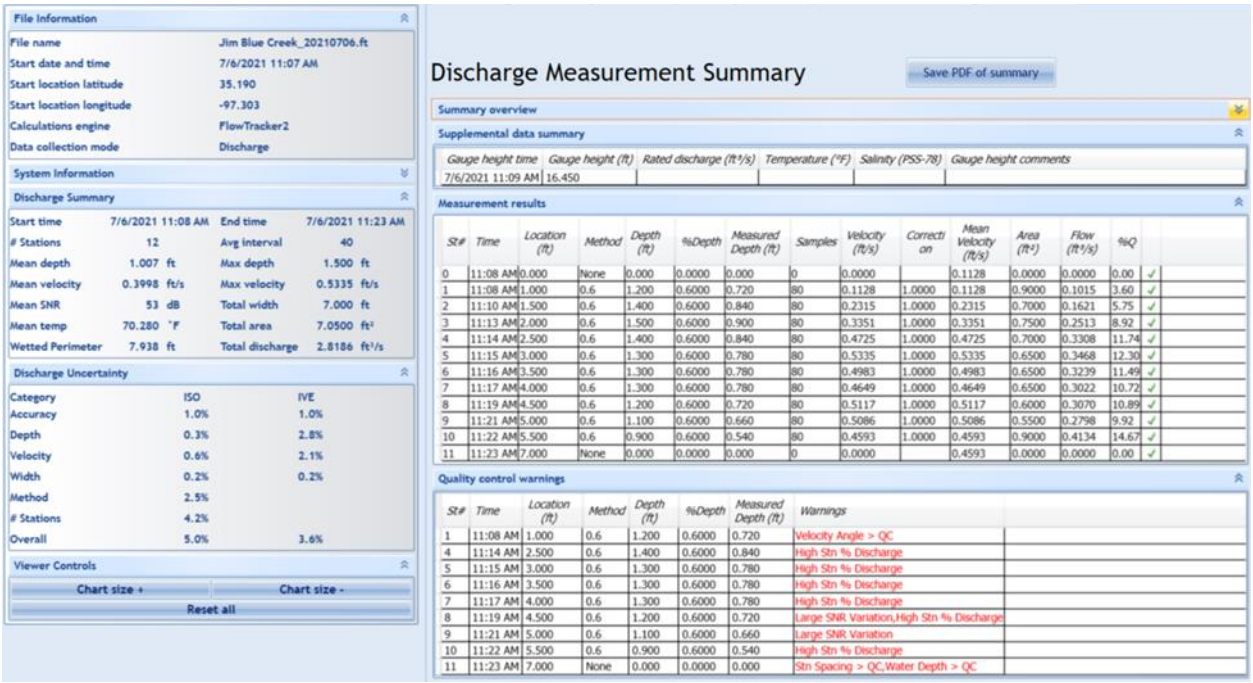
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	10:21 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.1781	0.0000	0.0000	0.00	✓
1	10:22 AM	1.000	0.6	0.800	0.6000	0.480	80	0.1781	1.0000	0.1781	0.6000	0.1069	4.60	✓
2	10:23 AM	1.500	0.6	0.900	0.6000	0.540	80	0.6834	1.0000	0.6834	0.4500	0.3075	13.23	✓
3	10:24 AM	2.000	0.6	0.900	0.6000	0.540	80	0.9614	1.0000	0.9614	0.4500	0.4326	18.62	✓
4	10:27 AM	2.500	0.6	0.900	0.6000	0.540	80	0.8594	1.0000	0.8594	0.4500	0.3867	16.64	✓
5	10:28 AM	3.000	0.6	0.800	0.6000	0.480	80	0.9225	1.0000	0.9225	0.4000	0.3690	15.88	✓
6	10:31 AM	3.500	0.6	0.800	0.6000	0.480	80	0.8409	1.0000	0.8409	0.4000	0.3363	14.47	✓
7	10:33 AM	4.000	0.6	0.600	0.6000	0.360	80	0.5328	1.0000	0.5328	0.3000	0.1598	6.88	✓
8	10:36 AM	4.500	0.6	0.500	0.6000	0.300	80	0.3039	1.0000	0.3039	0.2500	0.0760	3.27	✓
9	10:37 AM	5.000	0.6	0.500	0.6000	0.300	80	0.3971	1.0000	0.3971	0.3750	0.1489	6.41	✓
10	10:38 AM	6.000	None	0.000	0.0000	0.000	0	0.0000		0.3971	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	10:22 AM	1.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
2	10:23 AM	1.500	0.6	0.900	0.6000	0.540	High Stn % Discharge
3	10:24 AM	2.000	0.6	0.900	0.6000	0.540	Standard Error > QC,High Stn % Discharge
4	10:27 AM	2.500	0.6	0.900	0.6000	0.540	High Stn % Discharge
5	10:28 AM	3.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
6	10:31 AM	3.500	0.6	0.800	0.6000	0.480	Velocity Angle > QC,High Stn % Discharge
7	10:33 AM	4.000	0.6	0.600	0.6000	0.360	Velocity Angle > QC

Figure 2 Discharge Measurement Summary CC-1



File Information

File name	Jim Blue Creek_20210706.ft
Start date and time	7/6/2021 11:07 AM
Start location latitude	35.190
Start location longitude	-97.303
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	7/6/2021 11:08 AM	End time	7/6/2021 11:23 AM
# Stations	12	Avg interval	40
Mean depth	1.007 ft	Max depth	1.500 ft
Mean velocity	0.3998 ft/s	Max velocity	0.5335 ft/s
Mean SNR	53 dB	Total width	7.000 ft
Mean temp	70.280 °F	Total area	7.0500 ft²
Wetted Perimeter	7.938 ft	Total discharge	2.8186 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	2.8%
Velocity	0.6%	2.1%
Width	0.2%	0.2%
Method	2.5%	
# Stations	4.2%	
Overall	5.0%	3.6%

Viewer Controls

Chart size + | Chart size - | Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
7/6/2021 11:09 AM	16.450				

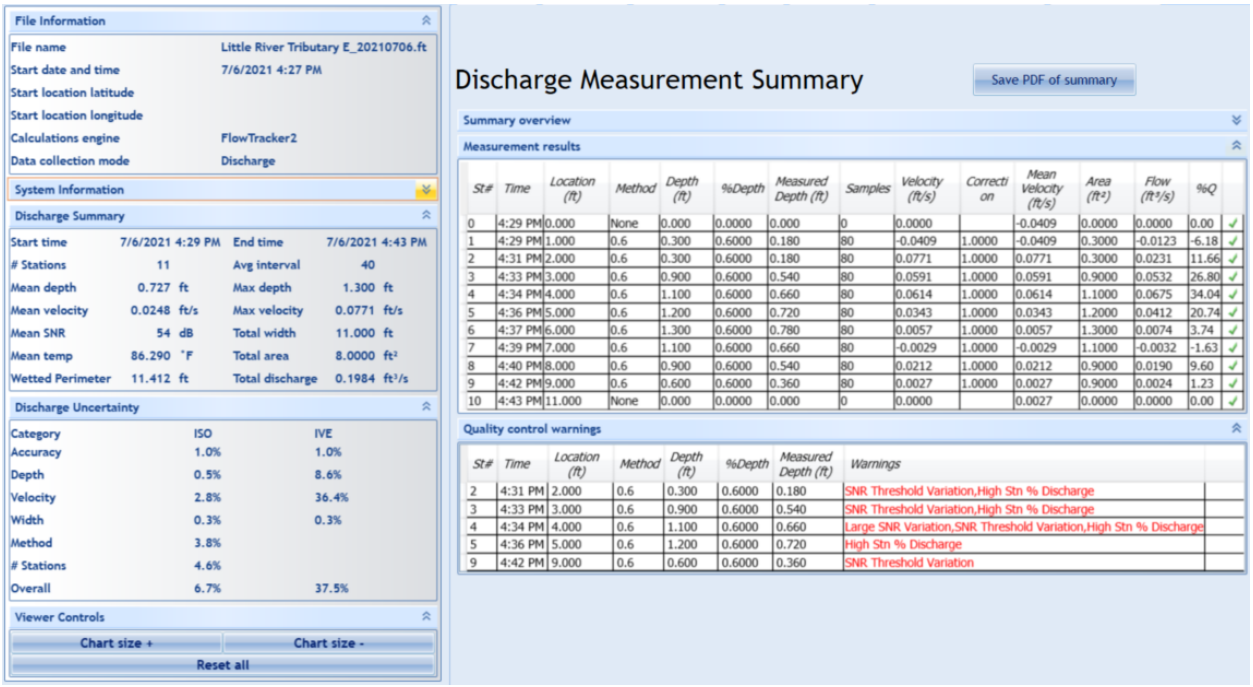
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:08 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.1128	0.0000	0.0000	0.00	✓
1	11:08 AM	1.000	0.6	1.200	0.6000	0.720	80	0.1128	1.0000	0.1128	0.9000	0.1015	3.60	✓
2	11:10 AM	1.500	0.6	1.400	0.6000	0.840	80	0.2315	1.0000	0.2315	0.7000	0.1621	5.75	✓
3	11:13 AM	2.000	0.6	1.500	0.6000	0.900	80	0.3351	1.0000	0.3351	0.7500	0.2513	8.92	✓
4	11:14 AM	2.500	0.6	1.400	0.6000	0.840	80	0.4725	1.0000	0.4725	0.7000	0.3308	11.74	✓
5	11:15 AM	3.000	0.6	1.300	0.6000	0.780	80	0.5335	1.0000	0.5335	0.6500	0.3468	12.30	✓
6	11:16 AM	3.500	0.6	1.300	0.6000	0.780	80	0.4983	1.0000	0.4983	0.6500	0.3239	11.49	✓
7	11:17 AM	4.000	0.6	1.300	0.6000	0.780	80	0.4649	1.0000	0.4649	0.6500	0.3022	10.72	✓
8	11:19 AM	4.500	0.6	1.200	0.6000	0.720	80	0.5117	1.0000	0.5117	0.6000	0.3070	10.89	✓
9	11:21 AM	5.000	0.6	1.100	0.6000	0.660	80	0.5086	1.0000	0.5086	0.5500	0.2798	9.92	✓
10	11:22 AM	5.500	0.6	0.900	0.6000	0.540	80	0.4593	1.0000	0.4593	0.9000	0.4134	14.67	✓
11	11:23 AM	7.000	None	0.000	0.0000	0.000	0	0.0000		0.4593	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	11:08 AM	1.000	0.6	1.200	0.6000	0.720	Velocity Angle > QC
4	11:14 AM	2.500	0.6	1.400	0.6000	0.840	High Stn % Discharge
5	11:15 AM	3.000	0.6	1.300	0.6000	0.780	High Stn % Discharge
6	11:16 AM	3.500	0.6	1.300	0.6000	0.780	High Stn % Discharge
7	11:17 AM	4.000	0.6	1.300	0.6000	0.780	High Stn % Discharge
8	11:19 AM	4.500	0.6	1.200	0.6000	0.720	Large SNR Variation,High Stn % Discharge
9	11:21 AM	5.000	0.6	1.100	0.6000	0.660	Large SNR Variation
10	11:22 AM	5.500	0.6	0.900	0.6000	0.540	High Stn % Discharge
11	11:23 AM	7.000	None	0.000	0.0000	0.000	Stn Spacing > QC,Water Depth > QC

Figure 3 Discharge Measurement Summary JB-1



File Information

File name	Little River Tributary E_20210706.ft
Start date and time	7/6/2021 4:27 PM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	7/6/2021 4:29 PM	End time	7/6/2021 4:43 PM
# Stations	11	Avg interval	40
Mean depth	0.727 ft	Max depth	1.300 ft
Mean velocity	0.0248 ft/s	Max velocity	0.0771 ft/s
Mean SNR	54 dB	Total width	11.000 ft
Mean temp	86.290 °F	Total area	8.0000 ft²
Wetted Perimeter	11.412 ft	Total discharge	0.1984 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.5%	8.6%
Velocity	2.8%	36.4%
Width	0.3%	0.3%
Method	3.8%	
# Stations	4.6%	
Overall	6.7%	37.5%

Viewer Controls

Chart size + | Chart size -

Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

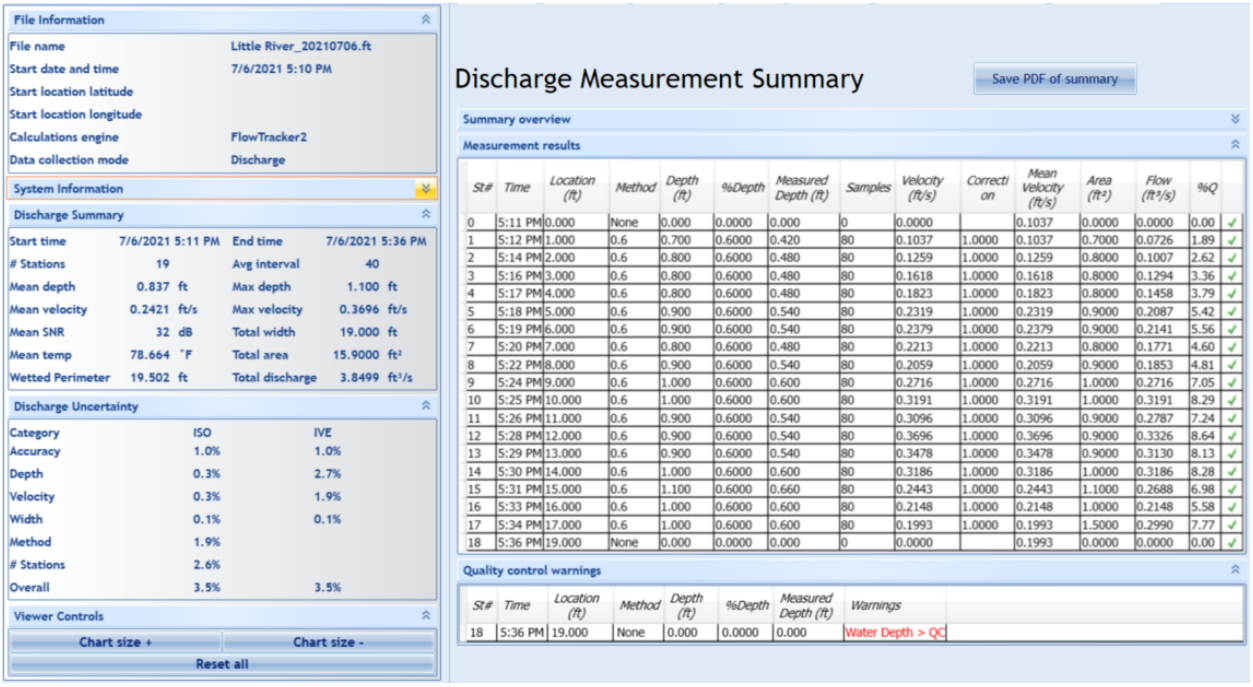
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	4:29 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0409	0.0000	0.0000	0.00	✓
1	4:29 PM	1.000	0.6	0.300	0.6000	0.180	80	-0.0409	1.0000	-0.0409	0.3000	-0.0123	-6.18	✓
2	4:31 PM	2.000	0.6	0.300	0.6000	0.180	80	0.0771	1.0000	0.0771	0.3000	0.0231	11.66	✓
3	4:33 PM	3.000	0.6	0.900	0.6000	0.540	80	0.0591	1.0000	0.0591	0.9000	0.0532	26.80	✓
4	4:34 PM	4.000	0.6	1.100	0.6000	0.660	80	0.0614	1.0000	0.0614	1.1000	0.0675	34.04	✓
5	4:36 PM	5.000	0.6	1.200	0.6000	0.720	80	0.0343	1.0000	0.0343	1.2000	0.0412	20.74	✓
6	4:37 PM	6.000	0.6	1.300	0.6000	0.780	80	0.0057	1.0000	0.0057	1.3000	0.0074	3.74	✓
7	4:39 PM	7.000	0.6	1.100	0.6000	0.660	80	-0.0029	1.0000	-0.0029	1.1000	-0.0032	-1.63	✓
8	4:40 PM	8.000	0.6	0.900	0.6000	0.540	80	0.0212	1.0000	0.0212	0.9000	0.0190	9.60	✓
9	4:42 PM	9.000	0.6	0.600	0.6000	0.360	80	0.0027	1.0000	0.0027	0.9000	0.0024	1.23	✓
10	4:43 PM	11.000	None	0.000	0.0000	0.000	0	0.0000		0.0027	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	4:31 PM	2.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation,High Stn % Discharge
3	4:33 PM	3.000	0.6	0.900	0.6000	0.540	SNR Threshold Variation,High Stn % Discharge
4	4:34 PM	4.000	0.6	1.100	0.6000	0.660	Large SNR Variation,SNR Threshold Variation,High Stn % Discharge
5	4:36 PM	5.000	0.6	1.200	0.6000	0.720	High Stn % Discharge
9	4:42 PM	9.000	0.6	0.600	0.6000	0.360	SNR Threshold Variation

Figure 4 Discharge Measurement Summary TE-1



File Information

File name	Little River_20210706.ft
Start date and time	7/6/2021 5:10 PM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	7/6/2021 5:11 PM	End time	7/6/2021 5:36 PM
# Stations	19	Avg interval	40
Mean depth	0.837 ft	Max depth	1.100 ft
Mean velocity	0.2421 ft/s	Max velocity	0.3696 ft/s
Mean SNR	32 dB	Total width	19.000 ft
Mean temp	78.664 °F	Total area	15.9000 ft²
Wetted Perimeter	19.502 ft	Total discharge	3.8499 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	2.7%
Velocity	0.3%	1.9%
Width	0.1%	0.1%
Method	1.9%	
# Stations	2.6%	
Overall	3.5%	3.5%

Viewer Controls

Chart size + | Chart size -

Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

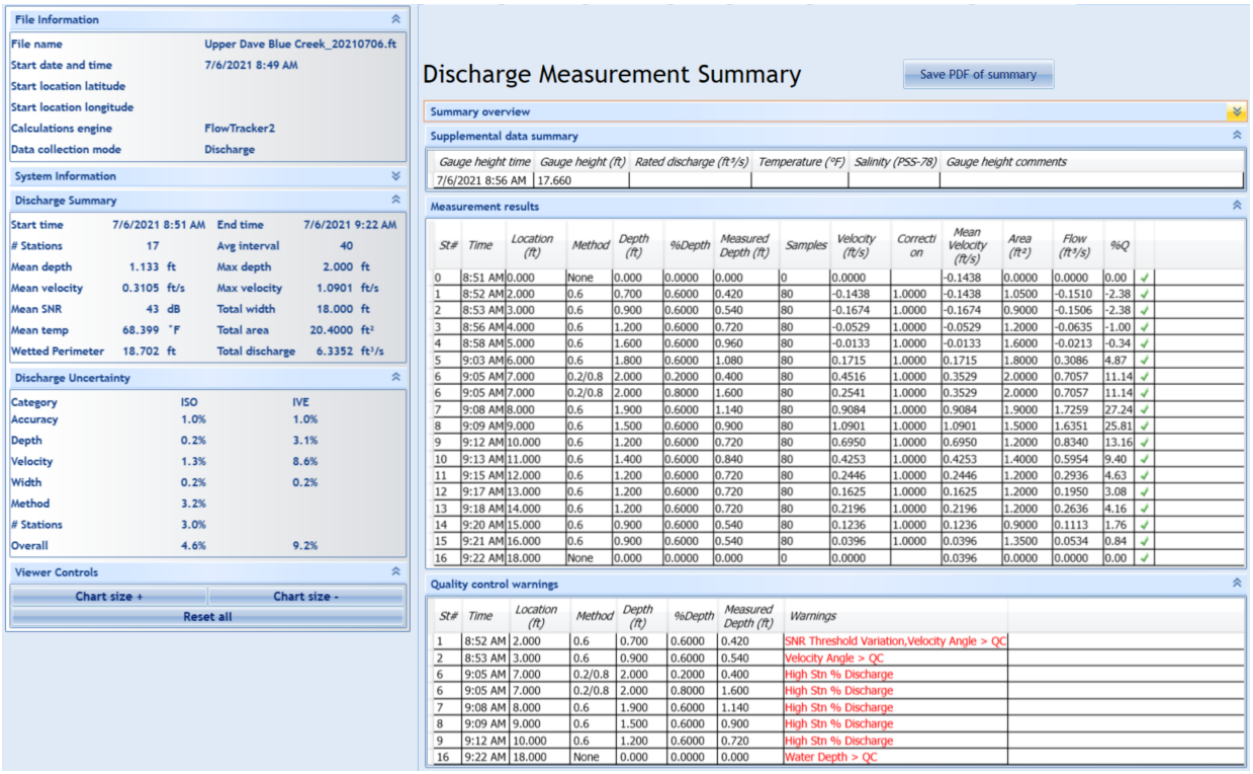
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	5:11 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.1037	0.0000	0.0000	0.00	✓
1	5:12 PM	1.000	0.6	0.700	0.6000	0.420	80	0.1037	1.0000	0.1037	0.7000	0.0726	1.89	✓
2	5:14 PM	2.000	0.6	0.800	0.6000	0.480	80	0.1259	1.0000	0.1259	0.8000	0.1007	2.62	✓
3	5:16 PM	3.000	0.6	0.800	0.6000	0.480	80	0.1618	1.0000	0.1618	0.8000	0.1294	3.36	✓
4	5:17 PM	4.000	0.6	0.800	0.6000	0.480	80	0.1823	1.0000	0.1823	0.8000	0.1458	3.79	✓
5	5:18 PM	5.000	0.6	0.900	0.6000	0.540	80	0.2319	1.0000	0.2319	0.9000	0.2087	5.42	✓
6	5:19 PM	6.000	0.6	0.900	0.6000	0.540	80	0.2379	1.0000	0.2379	0.9000	0.2141	5.56	✓
7	5:20 PM	7.000	0.6	0.800	0.6000	0.480	80	0.2213	1.0000	0.2213	0.8000	0.1771	4.60	✓
8	5:22 PM	8.000	0.6	0.900	0.6000	0.540	80	0.2059	1.0000	0.2059	0.9000	0.1853	4.81	✓
9	5:24 PM	9.000	0.6	1.000	0.6000	0.600	80	0.2716	1.0000	0.2716	1.0000	0.2716	7.05	✓
10	5:25 PM	10.000	0.6	1.000	0.6000	0.600	80	0.3191	1.0000	0.3191	1.0000	0.3191	8.29	✓
11	5:26 PM	11.000	0.6	0.900	0.6000	0.540	80	0.3096	1.0000	0.3096	0.9000	0.2787	7.24	✓
12	5:28 PM	12.000	0.6	0.900	0.6000	0.540	80	0.3696	1.0000	0.3696	0.9000	0.3326	8.64	✓
13	5:29 PM	13.000	0.6	0.900	0.6000	0.540	80	0.3478	1.0000	0.3478	0.9000	0.3130	8.13	✓
14	5:30 PM	14.000	0.6	1.000	0.6000	0.600	80	0.3186	1.0000	0.3186	1.0000	0.3186	8.28	✓
15	5:31 PM	15.000	0.6	1.100	0.6000	0.660	80	0.2443	1.0000	0.2443	1.1000	0.2688	6.98	✓
16	5:33 PM	16.000	0.6	1.000	0.6000	0.600	80	0.2148	1.0000	0.2148	1.0000	0.2148	5.58	✓
17	5:34 PM	17.000	0.6	1.000	0.6000	0.600	80	0.1993	1.0000	0.1993	1.5000	0.2990	7.77	✓
18	5:36 PM	19.000	None	0.000	0.0000	0.000	0	0.0000		0.1993	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
18	5:36 PM	19.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 5 Discharge Measurement Summary TG-1



File Information

File name	Upper Dave Blue Creek_20210706.ft
Start date and time	7/6/2021 8:49 AM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	7/6/2021 8:51 AM	End time	7/6/2021 9:22 AM
# Stations	17	Avg interval	40
Mean depth	1.133 ft	Max depth	2.000 ft
Mean velocity	0.3105 ft/s	Max velocity	1.0901 ft/s
Mean SNR	43 dB	Total width	18.000 ft
Mean temp	68.399 °F	Total area	20.4000 ft²
Wetted Perimeter	18.702 ft	Total discharge	6.3352 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	3.1%
Velocity	1.3%	8.6%
Width	0.2%	0.2%
Method	3.2%	
# Stations	3.0%	
Overall	4.6%	9.2%

Viewer Controls

Chart size + | Chart size - | Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
7/6/2021 8:56 AM	17.660				

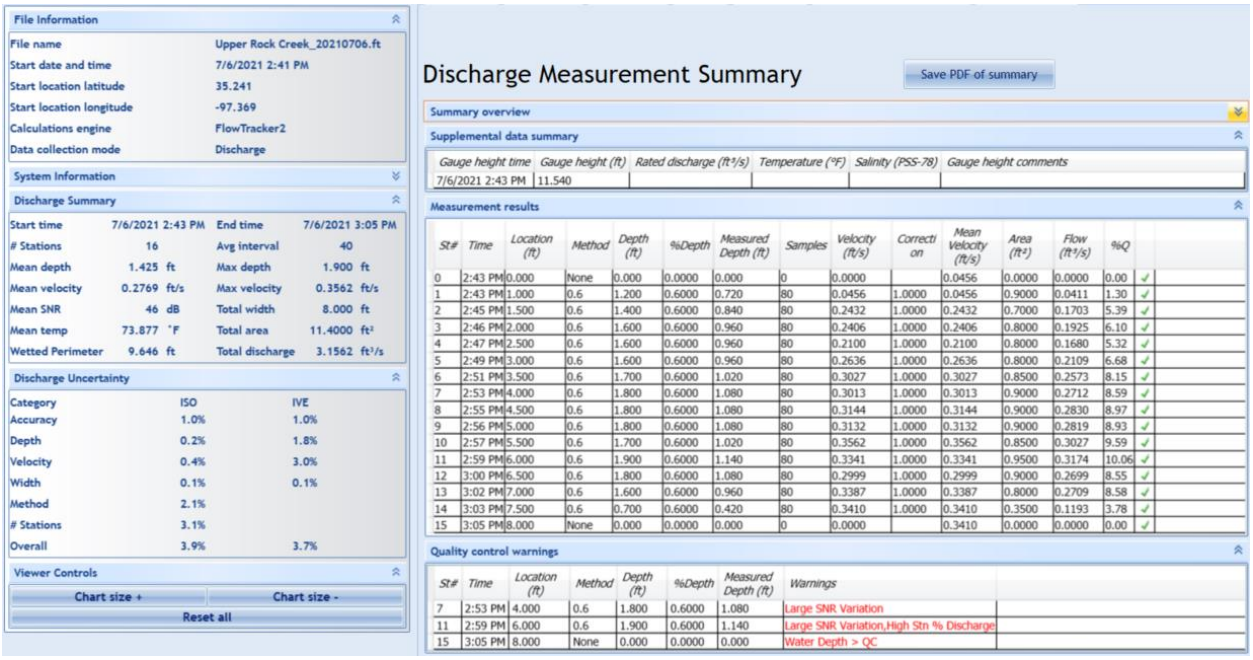
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	8:51 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.1438	0.0000	0.0000	0.00	✓
1	8:52 AM	2.000	0.6	0.700	0.6000	0.420	80	-0.1438	1.0000	-0.1438	1.0500	-0.1510	-2.38	✓
2	8:53 AM	3.000	0.6	0.900	0.6000	0.540	80	-0.1674	1.0000	-0.1674	0.9000	-0.1506	-2.38	✓
3	8:56 AM	4.000	0.6	1.200	0.6000	0.720	80	-0.0529	1.0000	-0.0529	1.2000	-0.0635	-1.00	✓
4	8:58 AM	5.000	0.6	1.600	0.6000	0.960	80	-0.0133	1.0000	-0.0133	1.6000	-0.0213	-0.34	✓
5	9:03 AM	6.000	0.6	1.800	0.6000	1.080	80	0.1715	1.0000	0.1715	1.8000	0.3086	4.87	✓
6	9:05 AM	7.000	0.2/0.8	2.000	0.2000	0.400	80	0.4516	1.0000	0.3529	2.0000	0.7057	11.14	✓
6	9:05 AM	7.000	0.2/0.8	2.000	0.8000	1.600	80	0.2541	1.0000	0.3529	2.0000	0.7057	11.14	✓
7	9:08 AM	8.000	0.6	1.900	0.6000	1.140	80	0.9084	1.0000	0.9084	1.9000	1.7259	27.24	✓
8	9:09 AM	9.000	0.6	1.500	0.6000	0.900	80	1.0901	1.0000	1.0901	1.5000	1.6351	25.81	✓
9	9:12 AM	10.000	0.6	1.200	0.6000	0.720	80	0.6950	1.0000	0.6950	1.2000	0.8340	13.16	✓
10	9:13 AM	11.000	0.6	1.400	0.6000	0.840	80	0.4253	1.0000	0.4253	1.4000	0.5954	9.40	✓
11	9:15 AM	12.000	0.6	1.200	0.6000	0.720	80	0.2446	1.0000	0.2446	1.2000	0.2936	4.63	✓
12	9:17 AM	13.000	0.6	1.200	0.6000	0.720	80	0.1625	1.0000	0.1625	1.2000	0.1950	3.08	✓
13	9:18 AM	14.000	0.6	1.200	0.6000	0.720	80	0.2196	1.0000	0.2196	1.2000	0.2636	4.16	✓
14	9:20 AM	15.000	0.6	0.900	0.6000	0.540	80	0.1236	1.0000	0.1236	0.9000	0.1113	1.76	✓
15	9:21 AM	16.000	0.6	0.900	0.6000	0.540	80	0.0396	1.0000	0.0396	1.3500	0.0534	0.84	✓
16	9:22 AM	18.000	None	0.000	0.0000	0.000	0	0.0000		0.0396	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	8:52 AM	2.000	0.6	0.700	0.6000	0.420	SNR Threshold Variation,Velocity Angle > QC
2	8:53 AM	3.000	0.6	0.900	0.6000	0.540	Velocity Angle > QC
6	9:05 AM	7.000	0.2/0.8	2.000	0.2000	0.400	High Stn % Discharge
6	9:05 AM	7.000	0.2/0.8	2.000	0.8000	1.600	High Stn % Discharge
7	9:08 AM	8.000	0.6	1.900	0.6000	1.140	High Stn % Discharge
8	9:09 AM	9.000	0.6	1.500	0.6000	0.900	High Stn % Discharge
9	9:12 AM	10.000	0.6	1.200	0.6000	0.720	High Stn % Discharge
16	9:22 AM	18.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 6 Discharge Measurement Summary UDB-1



File Information

File name	Upper Rock Creek_20210706.ft
Start date and time	7/6/2021 2:41 PM
Start location latitude	35.241
Start location longitude	-97.369
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	7/6/2021 2:43 PM	End time	7/6/2021 3:05 PM
# Stations	16	Avg interval	40
Mean depth	1.425 ft	Max depth	1.900 ft
Mean velocity	0.2769 ft/s	Max velocity	0.3562 ft/s
Mean SNR	46 dB	Total width	8.000 ft
Mean temp	73.877 °F	Total area	11.4000 ft²
Wetted Perimeter	9.646 ft	Total discharge	3.1562 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	1.8%
Velocity	0.4%	3.0%
Width	0.1%	0.1%
Method	2.1%	
# Stations	3.1%	
Overall	3.9%	3.7%

Viewer Controls

Chart size + | Chart size - | Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
7/6/2021 2:43 PM	11.540				

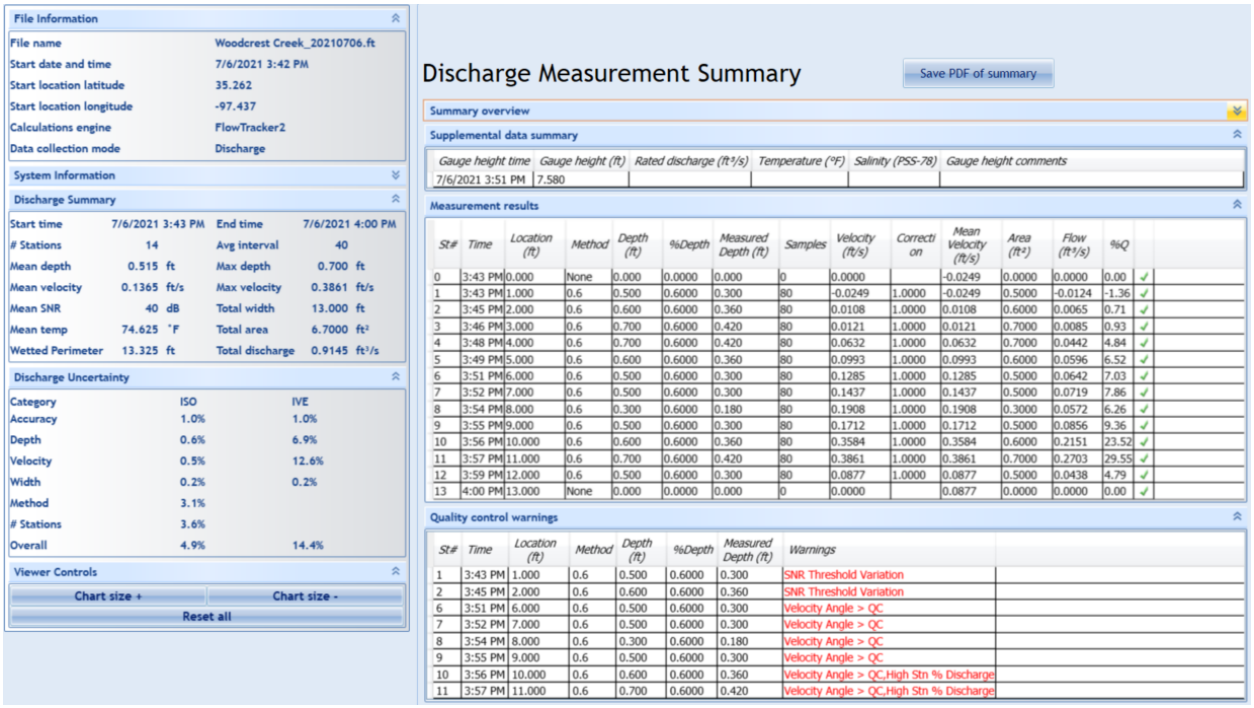
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	2:43 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0456	0.0000	0.0000	0.00	✓
1	2:43 PM	1.000	0.6	1.200	0.6000	0.720	80	0.0456	1.0000	0.0456	0.9000	0.0411	1.30	✓
2	2:45 PM	1.500	0.6	1.400	0.6000	0.840	80	0.2432	1.0000	0.2432	0.7000	0.1703	5.39	✓
3	2:46 PM	2.000	0.6	1.600	0.6000	0.960	80	0.2406	1.0000	0.2406	0.8000	0.1925	6.10	✓
4	2:47 PM	2.500	0.6	1.600	0.6000	0.960	80	0.2100	1.0000	0.2100	0.8000	0.1680	5.32	✓
5	2:49 PM	3.000	0.6	1.600	0.6000	0.960	80	0.2636	1.0000	0.2636	0.8000	0.2109	6.68	✓
6	2:51 PM	3.500	0.6	1.700	0.6000	1.020	80	0.3027	1.0000	0.3027	0.8500	0.2573	8.15	✓
7	2:53 PM	4.000	0.6	1.800	0.6000	1.080	80	0.3013	1.0000	0.3013	0.9000	0.2712	8.59	✓
8	2:55 PM	4.500	0.6	1.800	0.6000	1.080	80	0.3144	1.0000	0.3144	0.9000	0.2830	8.97	✓
9	2:56 PM	5.000	0.6	1.800	0.6000	1.080	80	0.3132	1.0000	0.3132	0.9000	0.2819	8.93	✓
10	2:57 PM	5.500	0.6	1.700	0.6000	1.020	80	0.3562	1.0000	0.3562	0.8500	0.3027	9.59	✓
11	2:59 PM	6.000	0.6	1.900	0.6000	1.140	80	0.3341	1.0000	0.3341	0.9500	0.3174	10.06	✓
12	3:00 PM	6.500	0.6	1.800	0.6000	1.080	80	0.2999	1.0000	0.2999	0.9000	0.2699	8.55	✓
13	3:02 PM	7.000	0.6	1.600	0.6000	0.960	80	0.3387	1.0000	0.3387	0.8000	0.2709	8.58	✓
14	3:03 PM	7.500	0.6	0.700	0.6000	0.420	80	0.3410	1.0000	0.3410	0.3500	0.1193	3.78	✓
15	3:05 PM	8.000	None	0.000	0.0000	0.000	0	0.0000		0.3410	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
7	2:53 PM	4.000	0.6	1.800	0.6000	1.080	Large SNR Variation
11	2:59 PM	6.000	0.6	1.900	0.6000	1.140	Large SNR Variation,High Stn % Discharge
15	3:05 PM	8.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 7 Discharge Measurement Summary URC-2



File Information

File name	Woodcrest Creek_20210706.ft
Start date and time	7/6/2021 3:42 PM
Start location latitude	35.262
Start location longitude	-97.437
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	7/6/2021 3:43 PM	End time	7/6/2021 4:00 PM
# Stations	14	Avg interval	40
Mean depth	0.515 ft	Max depth	0.700 ft
Mean velocity	0.1365 ft/s	Max velocity	0.3861 ft/s
Mean SNR	40 dB	Total width	13.000 ft
Mean temp	74.625 °F	Total area	6.7000 ft²
Wetted Perimeter	13.325 ft	Total discharge	0.9145 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.6%	6.9%
Velocity	0.5%	12.6%
Width	0.2%	0.2%
Method	3.1%	
# Stations	3.6%	
Overall	4.9%	14.4%

Viewer Controls

Chart size + | Chart size - | Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
7/6/2021 3:51 PM	7.580				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	3:43 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0249	0.0000	0.0000	0.00	✓
1	3:43 PM	1.000	0.6	0.500	0.6000	0.300	80	-0.0249	1.0000	-0.0249	0.5000	-0.0124	-1.36	✓
2	3:45 PM	2.000	0.6	0.600	0.6000	0.360	80	0.0108	1.0000	0.0108	0.6000	0.0065	0.71	✓
3	3:46 PM	3.000	0.6	0.700	0.6000	0.420	80	0.0121	1.0000	0.0121	0.7000	0.0085	0.93	✓
4	3:48 PM	4.000	0.6	0.700	0.6000	0.420	80	0.0632	1.0000	0.0632	0.7000	0.0442	4.84	✓
5	3:49 PM	5.000	0.6	0.600	0.6000	0.360	80	0.0993	1.0000	0.0993	0.6000	0.0596	6.52	✓
6	3:51 PM	6.000	0.6	0.500	0.6000	0.300	80	0.1285	1.0000	0.1285	0.5000	0.0642	7.03	✓
7	3:52 PM	7.000	0.6	0.500	0.6000	0.300	80	0.1437	1.0000	0.1437	0.5000	0.0719	7.86	✓
8	3:54 PM	8.000	0.6	0.300	0.6000	0.180	80	0.1908	1.0000	0.1908	0.3000	0.0572	6.26	✓
9	3:55 PM	9.000	0.6	0.500	0.6000	0.300	80	0.1712	1.0000	0.1712	0.5000	0.0856	9.36	✓
10	3:56 PM	10.000	0.6	0.600	0.6000	0.360	80	0.3584	1.0000	0.3584	0.6000	0.2151	23.52	✓
11	3:57 PM	11.000	0.6	0.700	0.6000	0.420	80	0.3861	1.0000	0.3861	0.7000	0.2703	29.55	✓
12	3:59 PM	12.000	0.6	0.500	0.6000	0.300	80	0.0877	1.0000	0.0877	0.5000	0.0438	4.79	✓
13	4:00 PM	13.000	None	0.000	0.0000	0.000	0	0.0000		0.0877	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	3:43 PM	1.000	0.6	0.500	0.6000	0.300	SNR Threshold Variation
2	3:45 PM	2.000	0.6	0.600	0.6000	0.360	SNR Threshold Variation
6	3:51 PM	6.000	0.6	0.500	0.6000	0.300	Velocity Angle > QC
7	3:52 PM	7.000	0.6	0.500	0.6000	0.300	Velocity Angle > QC
8	3:54 PM	8.000	0.6	0.300	0.6000	0.180	Velocity Angle > QC
9	3:55 PM	9.000	0.6	0.500	0.6000	0.300	Velocity Angle > QC
10	3:56 PM	10.000	0.6	0.600	0.6000	0.360	Velocity Angle > QC,High Stn % Discharge
11	3:57 PM	11.000	0.6	0.700	0.6000	0.420	Velocity Angle > QC,High Stn % Discharge

Figure 8 Discharge Measurement Summary WC-1

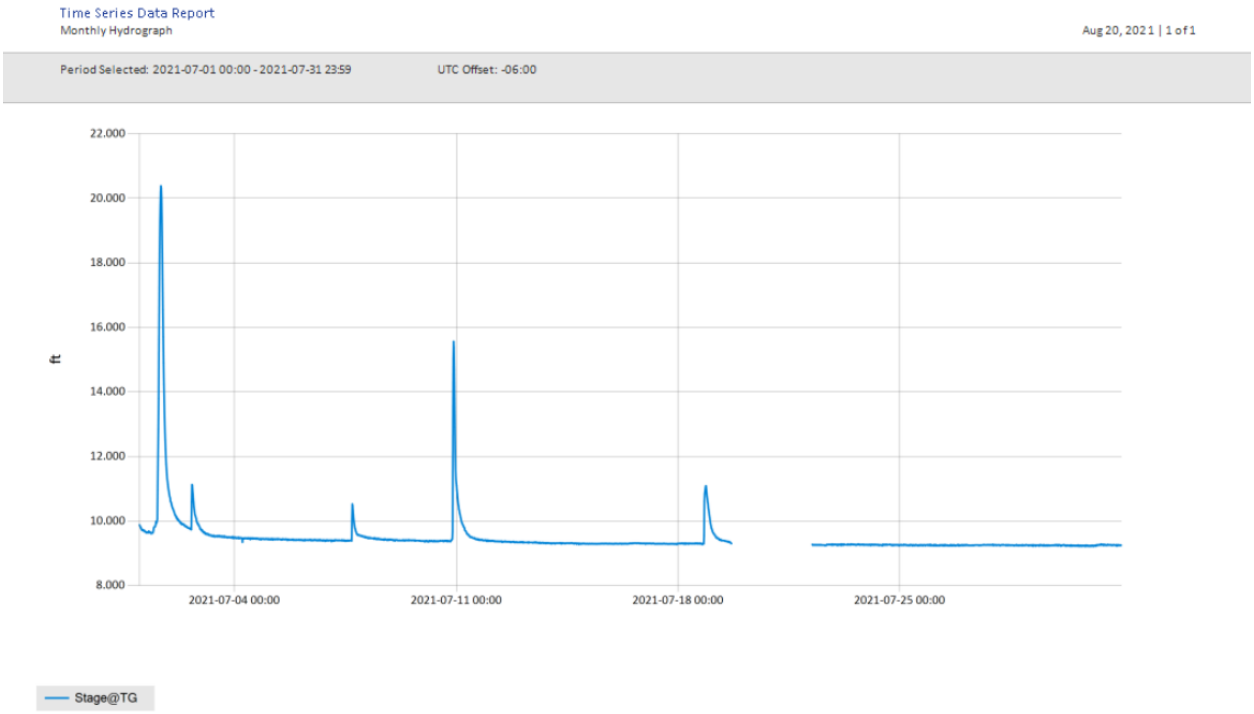


Figure 9 Monthly Hydrograph TG-1

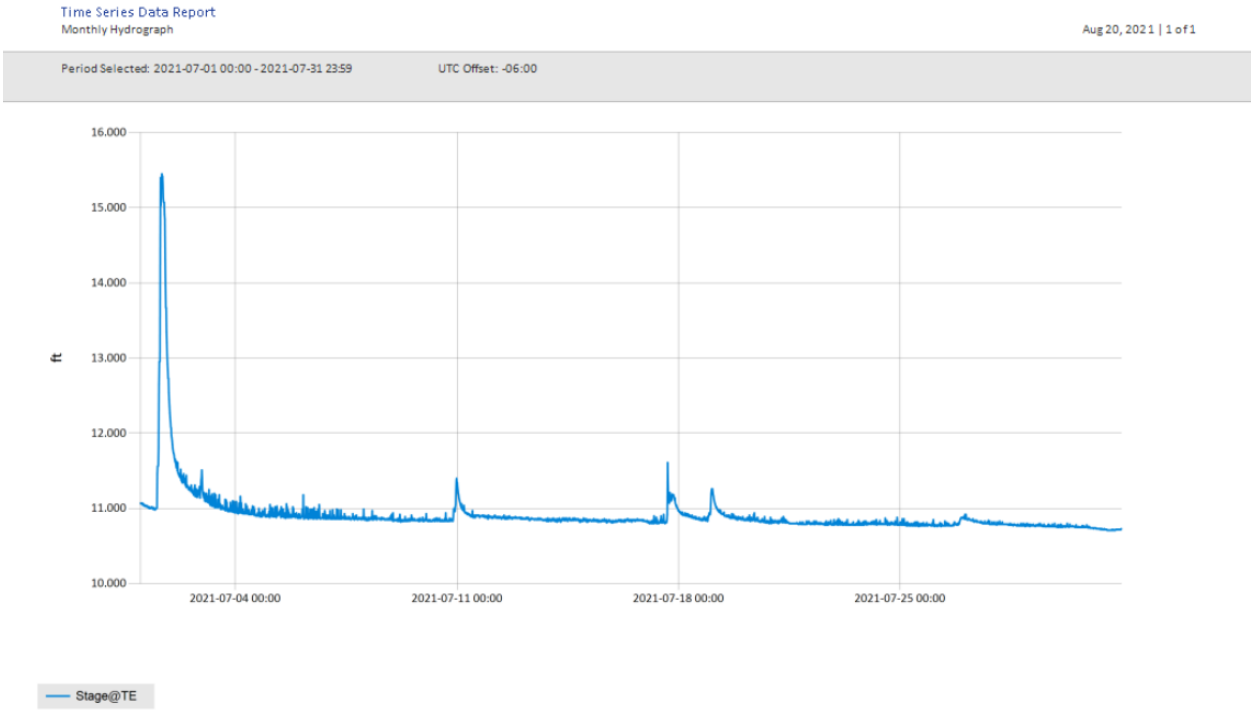


Figure 10 Monthly Hydrograph TE-1

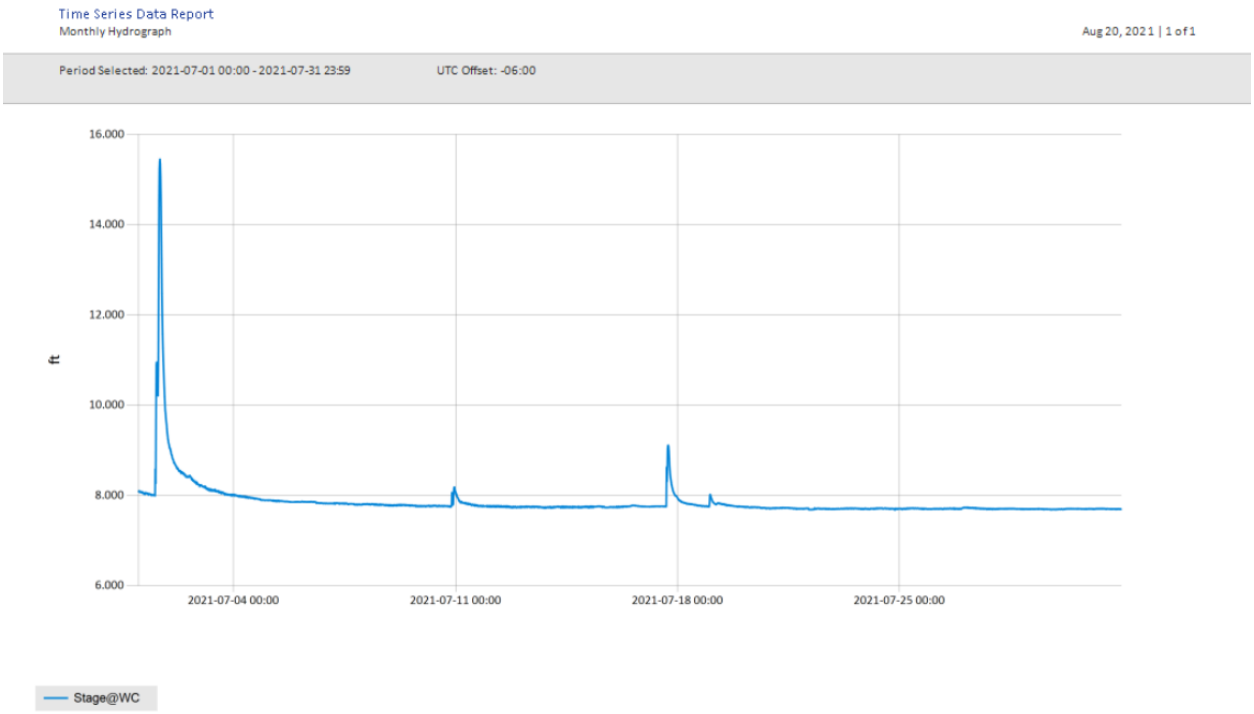


Figure 11 Monthly Hydrograph WC-1

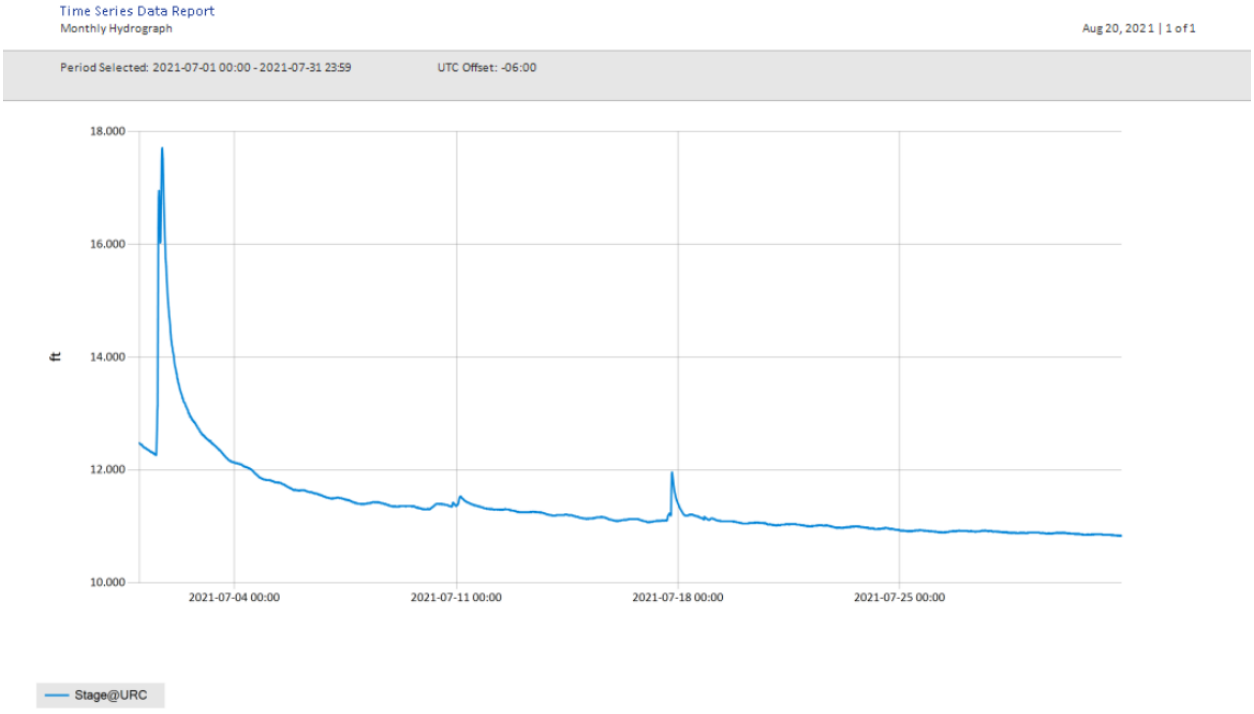


Figure 12 Monthly Hydrograph URC-2

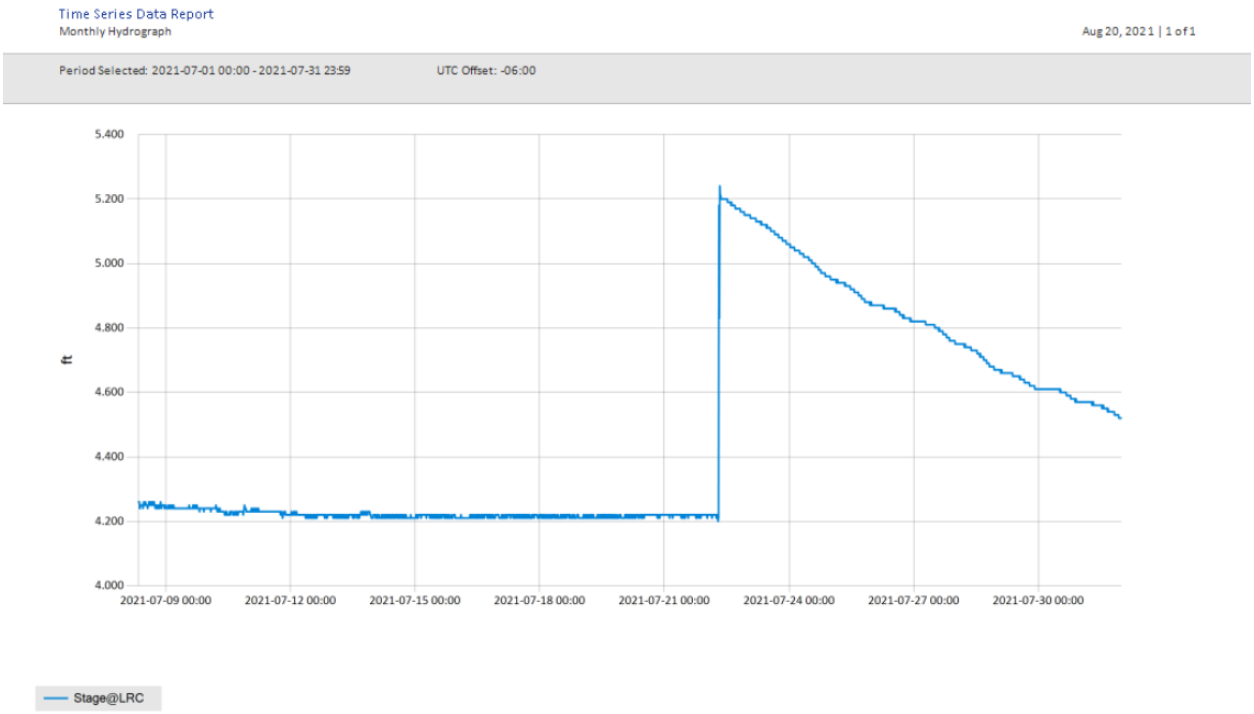


Figure 13 Monthly Hydrograph LRC-1

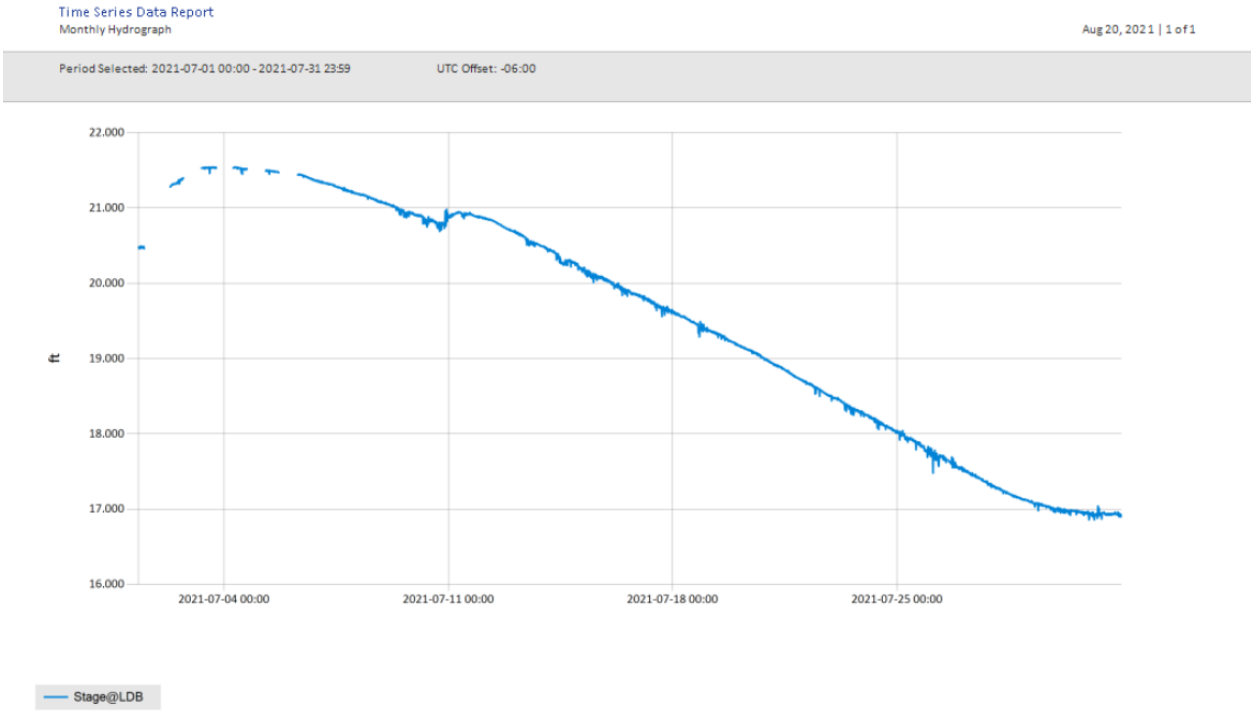


Figure 14 Monthly Hydrograph LDB-1

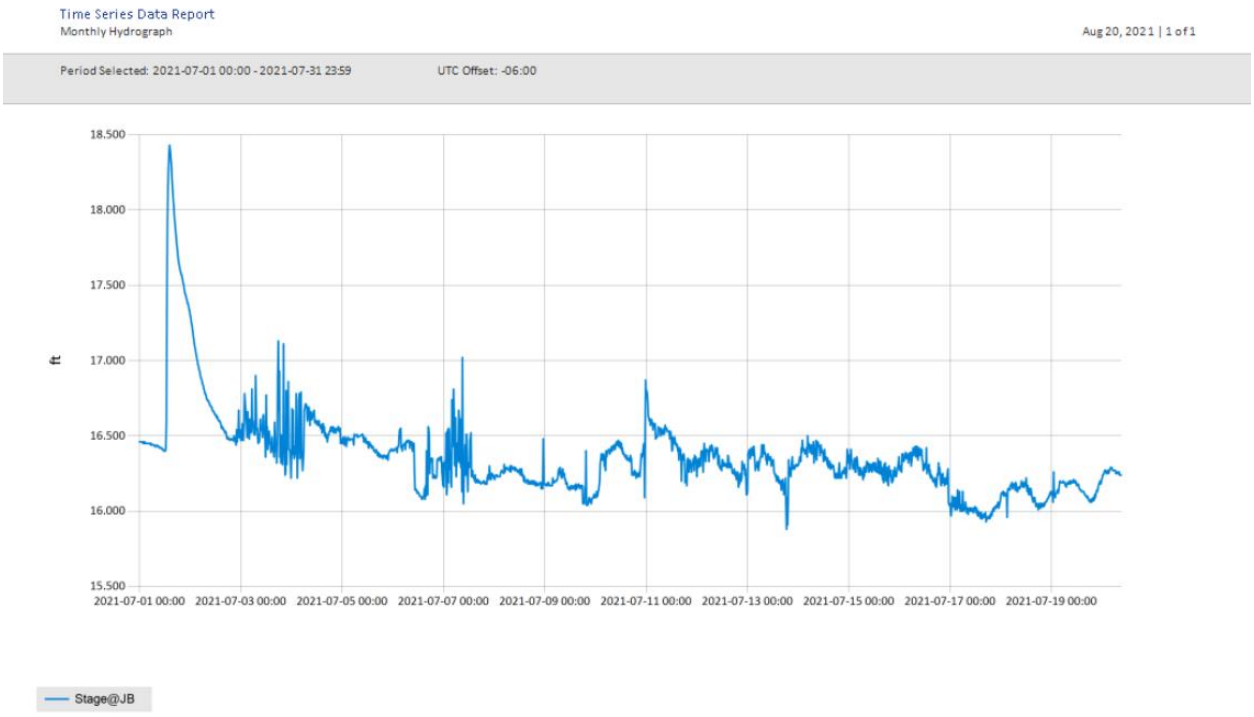


Figure 15 Monthly Hydrograph JB-1

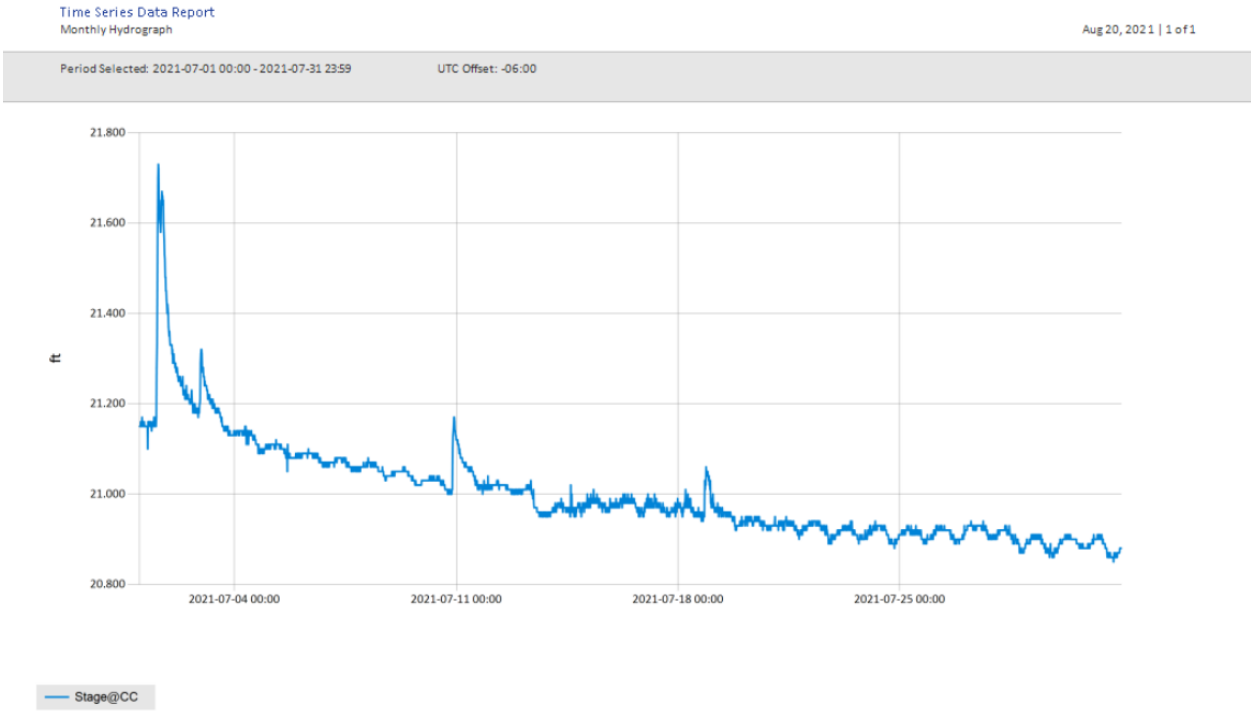


Figure 16 Monthly Hydrograph CC-1

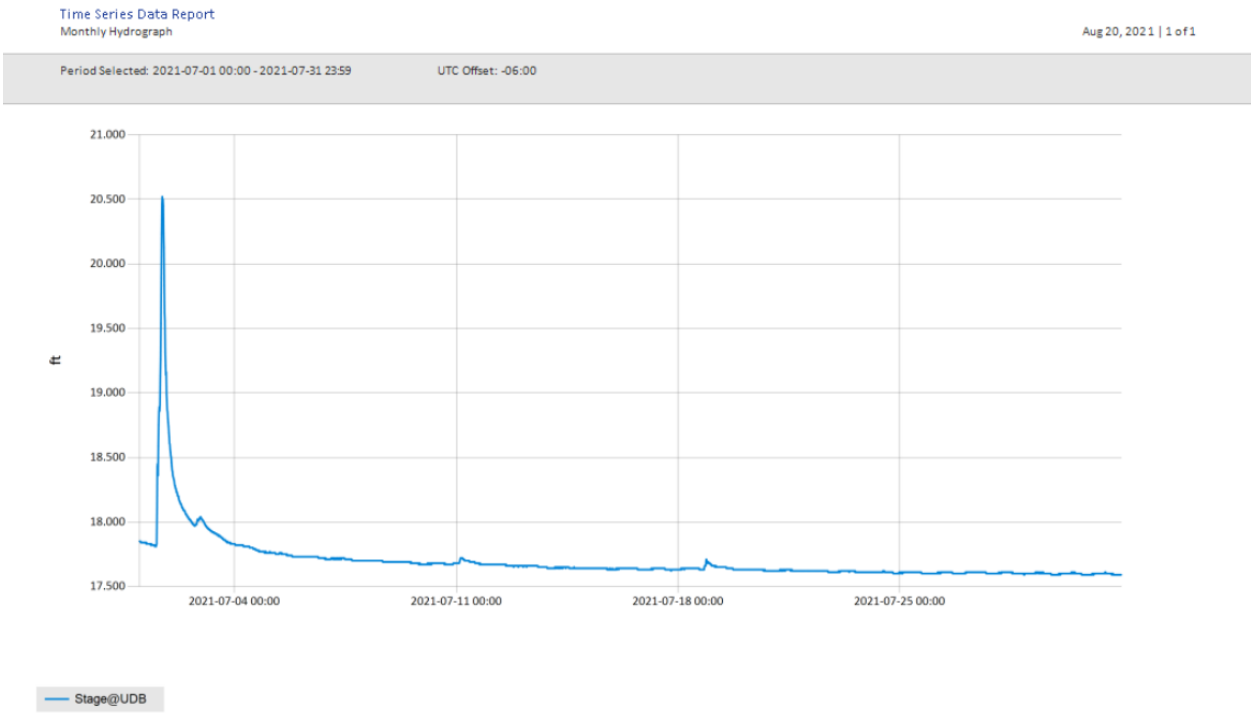


Figure 17 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — July 2021 — Time Zone: Midnight-Midnight CST

(NRMN) Norman — Nearest City: 2.1 NW Norman — County: Cleveland

Latitude: 35-14-09 — Longitude: 97-27-53 — Elevation: 1171 feet

DAY	TEMPERATURE (°F) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	89	71	75.6	71.1	0	15	98	59	87	1.77	28.76	30.01	SSW	5.9	25.1	11.41	77.1	79.3	84	77
2	82	71	75.3	71.4	0	11	98	70	88	0.01	28.78	30.02	NE	5.2	24.2	15.05	76.3	78.2	82	75
3	84	70	76.2	65.6	0	12	94	47	72	0.00	28.79	30.04	ESE	6.3	15.9	25.64	77.1	79.9	86	75
4	85	65	76.3	63.5	0	10	94	50	66	0.00	28.75	29.99	SSE	5.6	14.5	25.91	76.6	78.6	83	74
5	85	67	76.8	64.4	0	11	86	52	67	0.00	28.75	30.00	ESE	6.0	15.9	23.64	76.6	77.3	83	72
6	87	67	78.1	67.4	0	12	93	53	71	0.00	28.76	30.01	ESE	4.9	14.3	21.16	76.7	77.6	83	72
7	91*	70*	78.9*	69.9*	0*	15*	96*	46*	76*	0.00*	28.71*	29.96*	SW *	3.8*	22.0*	NA	77.9*	79.2*	86*	74*
8	92	70	81.5	70.9	0	16	98	50	73	0.00	28.71	29.95	SSE	4.1	17.3	27.68	78.5	82.0	90	74
9	89	73	81.0	70.8	0	16	88	56	72	0.00	28.76	30.00	S	9.3	27.3	28.09	79.5	84.2	91	78
10	89	70	79.6	71.9	0	15	97	62	78	0.23	28.70	29.95	SSW	10.0	33.5	18.77	78.9	83.1	88	79
11	84	69	75.3	64.6	0	11	95	49	71	0.00	28.74	29.99	NNW	8.5	21.9	23.69	77.8	80.1	84	76
12	85	63	75.1	62.6	0	9	97	42	68	0.00	28.81	30.06	SE	3.8	18.3	24.62	76.2	80.3	88	73
13	91	69	80.6	67.0	0	15	88	43	65	0.00	28.86	30.11	S	7.5	21.3	27.56	77.2	83.2	91	76
14	88	71	80.0	67.9	0	14	84	52	68	0.00	28.84	30.09	S	10.4	29.8	25.90	77.8	83.7	89	78
15	88	72	80.0	69.6	0	15	86	56	71	0.00	28.75	30.00	S	10.3	24.5	22.09	77.9	83.6	89	78
16	90	72	80.7	71.7	0	16	92	56	75	0.14	28.71	29.95	S	8.2	23.8	25.49	78.7	84.1	90	78
17	91	72	78.3	72.0	0	16	98	56	82	0.08	28.77	30.02	S	5.9	29.7	20.17	79.0	84.3	93	79
18	90	68	78.4	71.0	0	14	99	55	80	0.06	28.83	30.08	ENE	3.8	23.9	20.20	78.3	83.5	91	77
19	87	70	78.2	68.5	0	14	96	50	74	0.00	28.83	30.09	NNE	8.4	21.3	26.14	78.5	83.6	90	78
20	86	67	76.2	65.7	0	11	93	47	72	0.00	28.83	30.08	NE	7.1	19.5	24.55	77.6	83.5	90	77
21	85	63	74.9	64.3	0	9	97	49	72	0.00	28.85	30.10	ESE	4.1	12.4	22.12	76.3	83.2	90	77
22	88	64	78.2	65.9	0	11	96	48	68	0.00	28.87	30.12	SSE	5.5	16.8	22.44	76.0	83.4	90	77
23	90*	73*	81.7*	70.8*	0*	16*	89*	54*	71*	0.00*	28.81*	30.06*	SSE*	7.9*	18.1*	25.91*	77.6*	85.6*	93*	79*
24	94	76	84.5	72.4	0	20	87	47	68	0.00	28.75	30.00	S	7.8	19.7	25.96	79.0	87.6	95	81
25	95	75	84.2	71.1	0	20	88	44	67	0.00	28.72	29.97	S	6.6	31.9	25.66	79.9	89.1	96	82
26	94	72	79.6	69.6	0	18	90	48	73	0.41	28.73	29.98	ENE	5.6	46.5	20.53	79.3	87.5	97	83
27	96	74	83.3	71.8	0	20	91	44	70	0.00	28.76	30.01	ENE	4.2	16.7	21.48	79.3	84.7	91	79
28	94*	74*	84.9*	71.8*	0*	19*	89*	49*	66*	0.00*	28.80*	30.05*	SE *	5.4*	16.2*	NA	80.4*	87.7*	96*	80*
29	95	75	85.4	70.8	0	20	91	36	64	0.00	28.82	30.07	S	4.7	14.8	25.73	81.2	89.9	98	82
30	95	75	85.5	71.5	0	20	90	46	65	0.00	28.82	30.07	SSE	4.8	15.8	23.68	81.2	90.3	97	83
31	97	76	86.6	70.6	0	21	85	40	61	0.00	28.77	30.02	S	6.3	18.3	26.40	81.7	90.9	99	84
	90*	70*	79.7*	69.0*	<- Monthly Averages ->						28.78*	30.03*	S *	6.4*	46.5*	23.37*	78.3*	83.5*	90*	78*

Temperature - Highest: 97*
Lowest: 63*

Degree Days - Total HDD: 0*
Total CDD: 464*

Rainfall: Monthly Total: 2.70* in.
Greatest 24 Hr: 1.77* in.

Humidity - Highest: 99*
Lowest: 36*

Number of Days With:

Tmax ≥ 90:	15*	Rainfall ≥ 0.01 inch:	7*
Tmax ≤ 32:	0*	Rainfall ≥ 0.10 inch:	4*
Tmin ≤ 32:	0*	Avg Wind Speed ≥ 10 mph:	3*
Tmin ≤ 0:	0*	Max Wind Speed ≥ 30 mph:	3*

* Denotes incomplete record

Figure 18 July Mesonet Data

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

SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

August 2021 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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LIST OF FIGURES

SUMMARY OF AUGUST WATER QUALITY SAMPLING

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

RESULTS

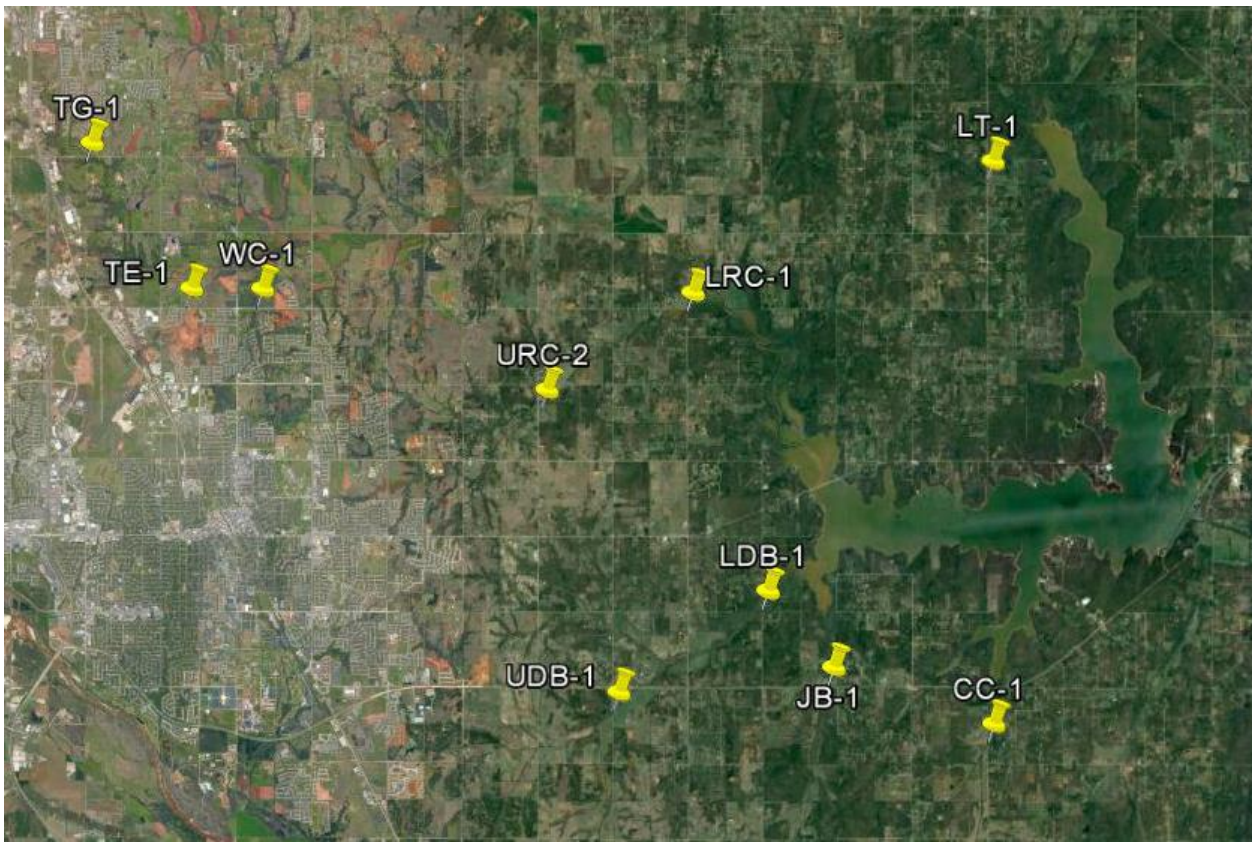


Figure 1 Monitoring Station Map

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

Table 1 Field Data Form

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
CC-1	Clear Creek	0.23	0.31	0.061	11.0
JB-1	Jim Blue Creek	0.05	0.34	0.055	<5.0
LDB-1	Lower Dave Blue Creek	<0.05	0.52	0.057	16.0
LRC-1	Lower Rock Creek	<0.05	0.28	0.041	<5.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	<0.05	0.60	0.053	<5.0
TG-1	Little River Tributary	0.08	0.40	0.045	6.0
UDB-1	Upper Dave Blue Creek	0.10	0.41	0.035	<5.0
URC-2	Upper Rock Creek	<0.05	0.39	0.048	6.0
WC-1	Woodcrest Creek	<0.05	0.28	0.050	<5.0

Table 2 Laboratory Analysis Summary

Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
Field Blank	<0.05	<0.10	<0.010	<5.0
Duplicate	0.25	0.25	0.059	11.0
Duplicate RPD	8.33%	21.43%*	3.33%	0%

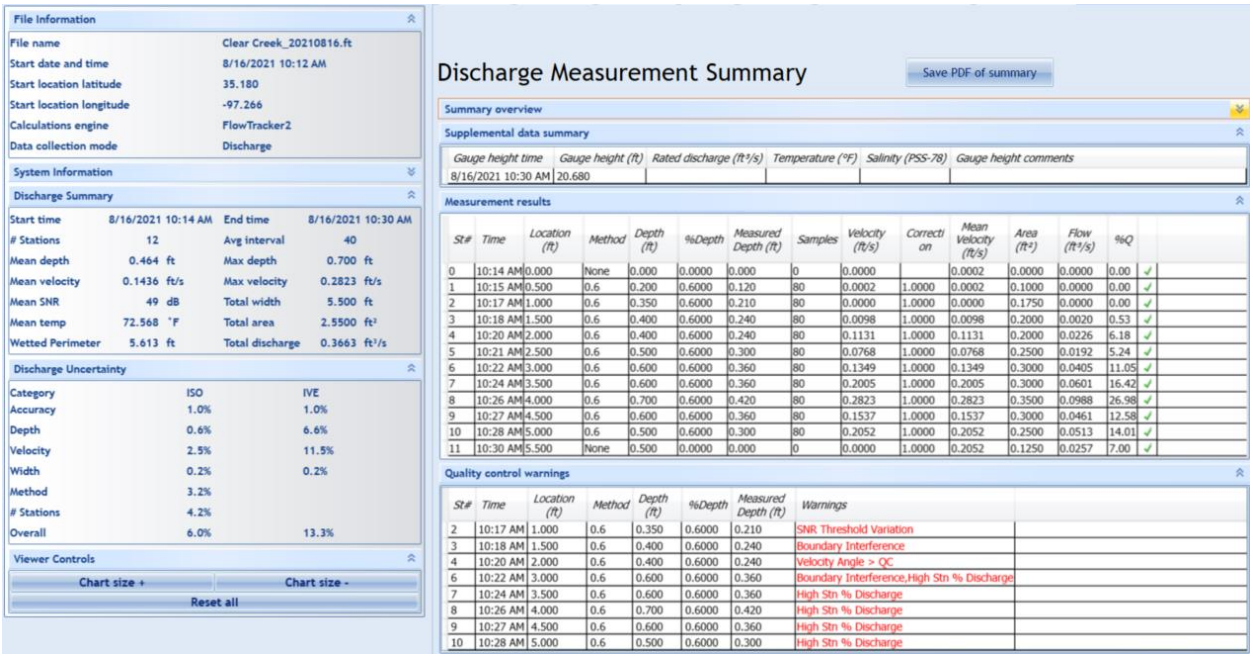
Table 3 QA/QC Data Where the Asterisk Denotes RPD 2

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues, and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.37	20.68
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	8.87	16.86
LRC-1	Lower Rock Creek	1.00	4.40
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.12	11.07
TG-1	Little River Tributary	0.96	9.17
UDB-1	Upper Dave Blue Creek	0.28	17.44
URC-2	Upper Rock Creek	0.20	10.96
WC-1	Woodcrest Creek	0.91	7.61

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Clear Creek_20210816.ft
Start date and time	8/16/2021 10:12 AM
Start location latitude	35.180
Start location longitude	-97.266
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	8/16/2021 10:14 AM	End time	8/16/2021 10:30 AM
# Stations	12	Avg interval	40
Mean depth	0.464 ft	Max depth	0.700 ft
Mean velocity	0.1436 ft/s	Max velocity	0.2823 ft/s
Mean SNR	49 dB	Total width	5.500 ft
Mean temp	72.568 °F	Total area	2.5500 ft²
Wetted Perimeter	5.613 ft	Total discharge	0.3663 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.6%	6.6%
Velocity	2.5%	11.5%
Width	0.2%	0.2%
Method	3.2%	
# Stations	4.2%	
Overall	6.0%	13.3%

Viewer Controls

Chart size + | Chart size - | Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
8/16/2021 10:30 AM	20.680				

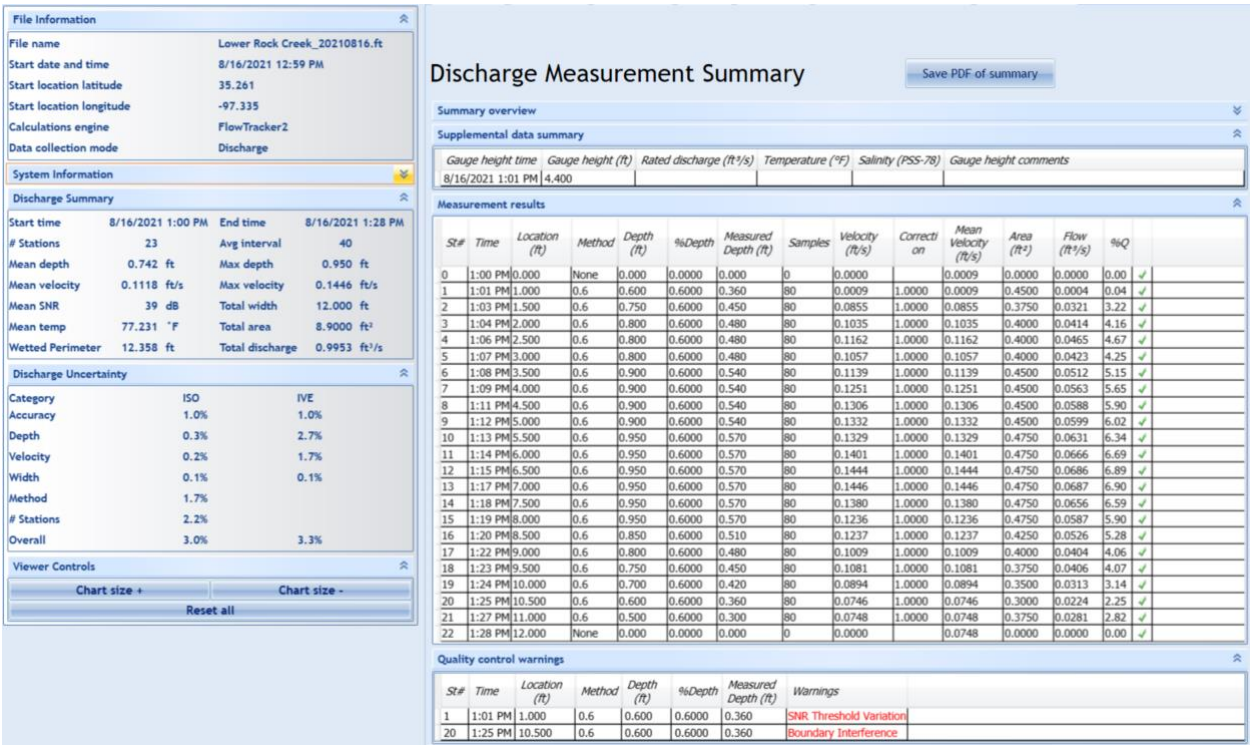
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	10:14 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0002	0.0000	0.0000	0.00	✓
1	10:15 AM	0.500	0.6	0.200	0.6000	0.120	80	0.0002	1.0000	0.0002	0.1000	0.0000	0.00	✓
2	10:17 AM	1.000	0.6	0.350	0.6000	0.210	80	0.0000	1.0000	0.0000	0.1750	0.0000	0.00	✓
3	10:18 AM	1.500	0.6	0.400	0.6000	0.240	80	0.0098	1.0000	0.0098	0.2000	0.0020	0.53	✓
4	10:20 AM	2.000	0.6	0.400	0.6000	0.240	80	0.1131	1.0000	0.1131	0.2000	0.0226	6.18	✓
5	10:21 AM	2.500	0.6	0.500	0.6000	0.300	80	0.0768	1.0000	0.0768	0.2500	0.0192	5.24	✓
6	10:22 AM	3.000	0.6	0.600	0.6000	0.360	80	0.1349	1.0000	0.1349	0.3000	0.0405	11.05	✓
7	10:24 AM	3.500	0.6	0.600	0.6000	0.360	80	0.2005	1.0000	0.2005	0.3000	0.0601	16.42	✓
8	10:26 AM	4.000	0.6	0.700	0.6000	0.420	80	0.2823	1.0000	0.2823	0.3500	0.0988	26.98	✓
9	10:27 AM	4.500	0.6	0.600	0.6000	0.360	80	0.1537	1.0000	0.1537	0.3000	0.0461	12.58	✓
10	10:28 AM	5.000	0.6	0.500	0.6000	0.300	80	0.2052	1.0000	0.2052	0.2500	0.0513	14.01	✓
11	10:30 AM	5.500	None	0.500	0.0000	0.000	0	0.0000	1.0000	0.2052	0.1250	0.0257	7.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	10:17 AM	1.000	0.6	0.350	0.6000	0.210	SNR Threshold Variation
3	10:18 AM	1.500	0.6	0.400	0.6000	0.240	Boundary Interference
4	10:20 AM	2.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC
6	10:22 AM	3.000	0.6	0.600	0.6000	0.360	Boundary Interference,High Stn % Discharge
7	10:24 AM	3.500	0.6	0.600	0.6000	0.360	High Stn % Discharge
8	10:26 AM	4.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
9	10:27 AM	4.500	0.6	0.600	0.6000	0.360	High Stn % Discharge
10	10:28 AM	5.000	0.6	0.500	0.6000	0.300	High Stn % Discharge

Figure 2 Discharge Measurement Summary CC-1



File Information

File name	Lower Rock Creek_20210816.ft
Start date and time	8/16/2021 12:59 PM
Start location latitude	35.261
Start location longitude	-97.335
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	8/16/2021 1:00 PM	End time	8/16/2021 1:28 PM
# Stations	23	Avg interval	40
Mean depth	0.742 ft	Max depth	0.950 ft
Mean velocity	0.1118 ft/s	Max velocity	0.1446 ft/s
Mean SNR	39 dB	Total width	12.000 ft
Mean temp	77.231 °F	Total area	8.9000 ft²
Wetted Perimeter	12.358 ft	Total discharge	0.9953 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	2.7%
Velocity	0.2%	1.7%
Width	0.1%	0.1%
Method	1.7%	
# Stations	2.2%	
Overall	3.0%	3.3%

Viewer Controls

Chart size + | Chart size - | Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
8/16/2021 1:01 PM	4.400				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	1:00 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0009	0.0000	0.0000	0.00	✓
1	1:01 PM	1.000	0.6	0.600	0.6000	0.360	80	0.0009	1.0000	0.0009	0.4500	0.0004	0.04	✓
2	1:03 PM	1.500	0.6	0.750	0.6000	0.450	80	0.0855	1.0000	0.0855	0.3750	0.0321	3.22	✓
3	1:04 PM	2.000	0.6	0.800	0.6000	0.480	80	0.1035	1.0000	0.1035	0.4000	0.0414	4.16	✓
4	1:06 PM	2.500	0.6	0.800	0.6000	0.480	80	0.1162	1.0000	0.1162	0.4000	0.0465	4.67	✓
5	1:07 PM	3.000	0.6	0.800	0.6000	0.480	80	0.1057	1.0000	0.1057	0.4000	0.0423	4.25	✓
6	1:08 PM	3.500	0.6	0.900	0.6000	0.540	80	0.1139	1.0000	0.1139	0.4500	0.0512	5.15	✓
7	1:09 PM	4.000	0.6	0.900	0.6000	0.540	80	0.1251	1.0000	0.1251	0.4500	0.0563	5.65	✓
8	1:11 PM	4.500	0.6	0.900	0.6000	0.540	80	0.1306	1.0000	0.1306	0.4500	0.0588	5.90	✓
9	1:12 PM	5.000	0.6	0.900	0.6000	0.540	80	0.1332	1.0000	0.1332	0.4500	0.0599	6.02	✓
10	1:13 PM	5.500	0.6	0.950	0.6000	0.570	80	0.1329	1.0000	0.1329	0.4750	0.0631	6.34	✓
11	1:14 PM	6.000	0.6	0.950	0.6000	0.570	80	0.1401	1.0000	0.1401	0.4750	0.0666	6.69	✓
12	1:15 PM	6.500	0.6	0.950	0.6000	0.570	80	0.1444	1.0000	0.1444	0.4750	0.0686	6.89	✓
13	1:17 PM	7.000	0.6	0.950	0.6000	0.570	80	0.1446	1.0000	0.1446	0.4750	0.0687	6.90	✓
14	1:18 PM	7.500	0.6	0.950	0.6000	0.570	80	0.1380	1.0000	0.1380	0.4750	0.0656	6.59	✓
15	1:19 PM	8.000	0.6	0.950	0.6000	0.570	80	0.1236	1.0000	0.1236	0.4750	0.0587	5.90	✓
16	1:20 PM	8.500	0.6	0.850	0.6000	0.510	80	0.1237	1.0000	0.1237	0.4250	0.0526	5.28	✓
17	1:22 PM	9.000	0.6	0.800	0.6000	0.480	80	0.1009	1.0000	0.1009	0.4000	0.0404	4.06	✓
18	1:23 PM	9.500	0.6	0.750	0.6000	0.450	80	0.1081	1.0000	0.1081	0.3750	0.0406	4.07	✓
19	1:24 PM	10.000	0.6	0.700	0.6000	0.420	80	0.0894	1.0000	0.0894	0.3500	0.0313	3.14	✓
20	1:25 PM	10.500	0.6	0.600	0.6000	0.360	80	0.0746	1.0000	0.0746	0.3000	0.0224	2.25	✓
21	1:27 PM	11.000	0.6	0.500	0.6000	0.300	80	0.0748	1.0000	0.0748	0.3750	0.0281	2.82	✓
22	1:28 PM	12.000	None	0.000	0.0000	0.000	0	0.0000		0.0748	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	1:01 PM	1.000	0.6	0.600	0.6000	0.360	SNR Threshold Variation
20	1:25 PM	10.500	0.6	0.600	0.6000	0.360	Boundary Interference

Figure 3 Discharge Measurement Summary LRC-1

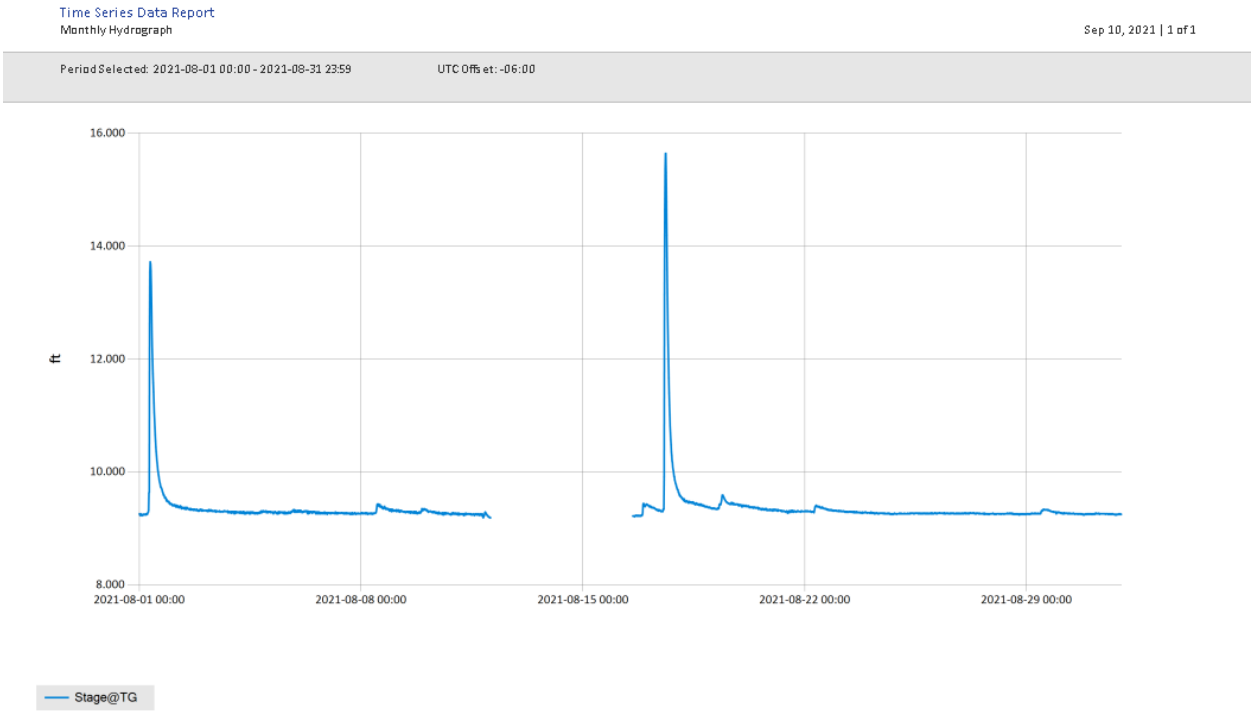


Figure 4 Monthly Hydrograph TG-1

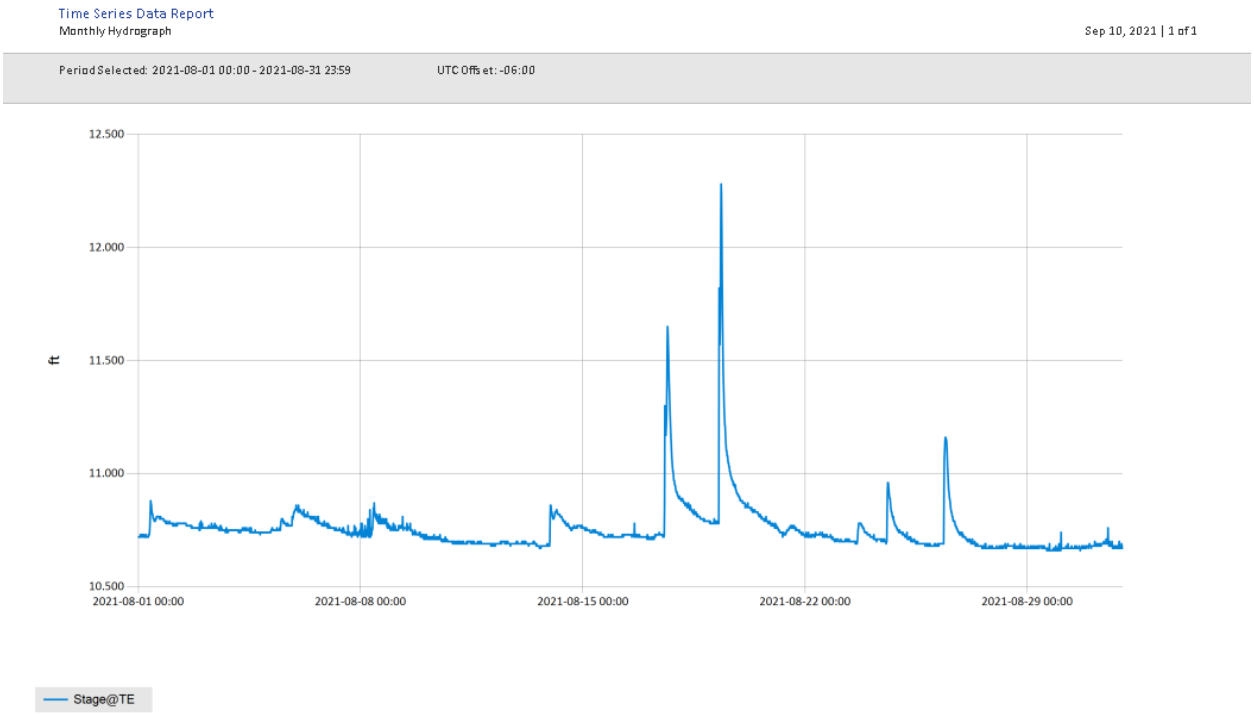


Figure 5 Monthly Hydrograph TE-1

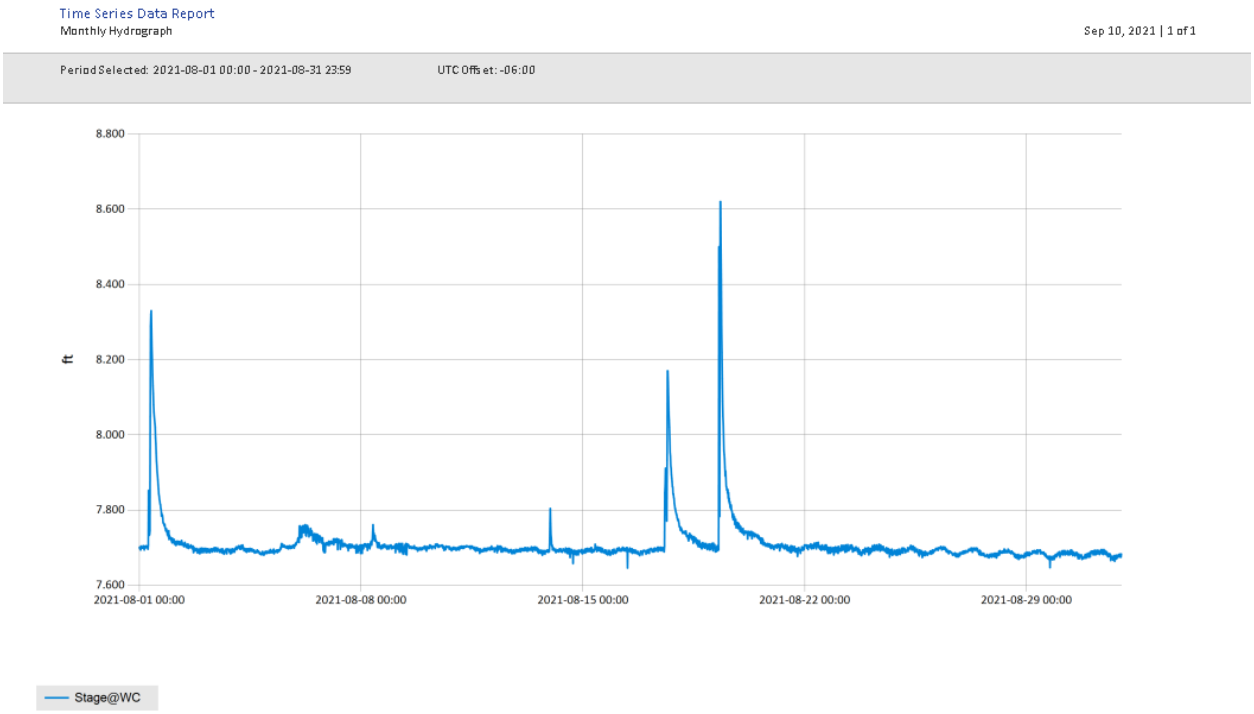


Figure 6 Monthly Hydrograph WC-1

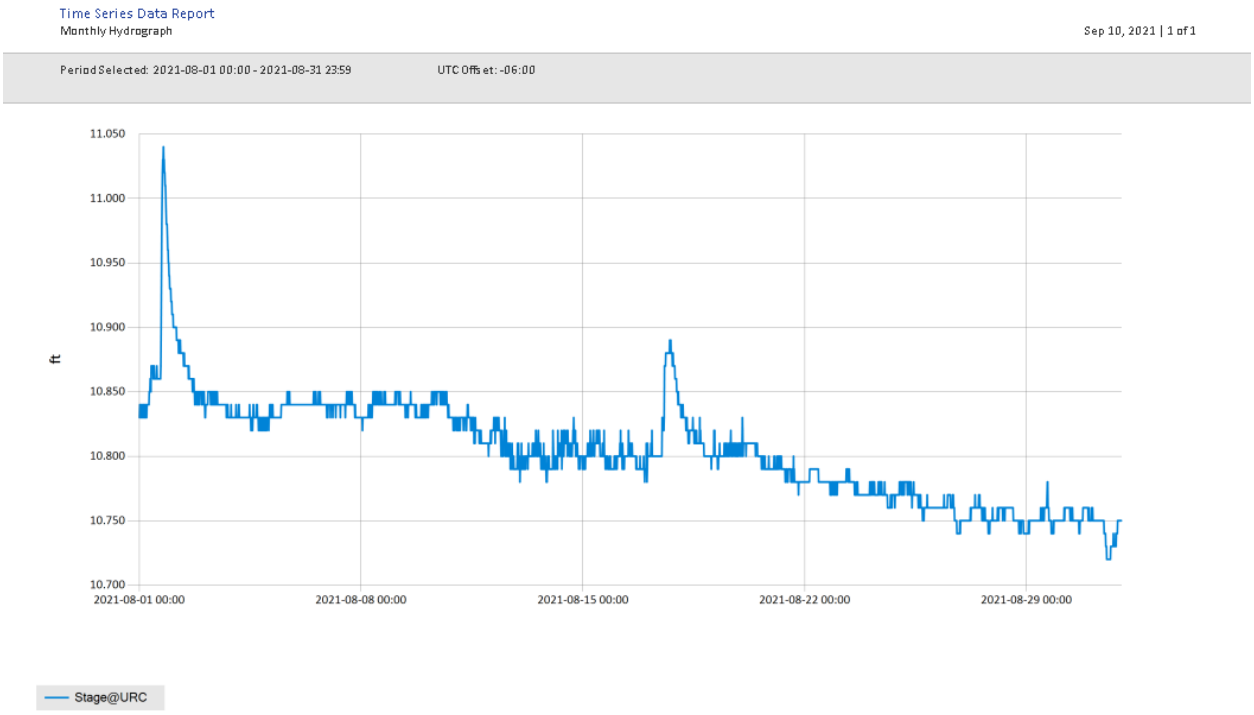


Figure 7 Monthly Hydrograph URC-2

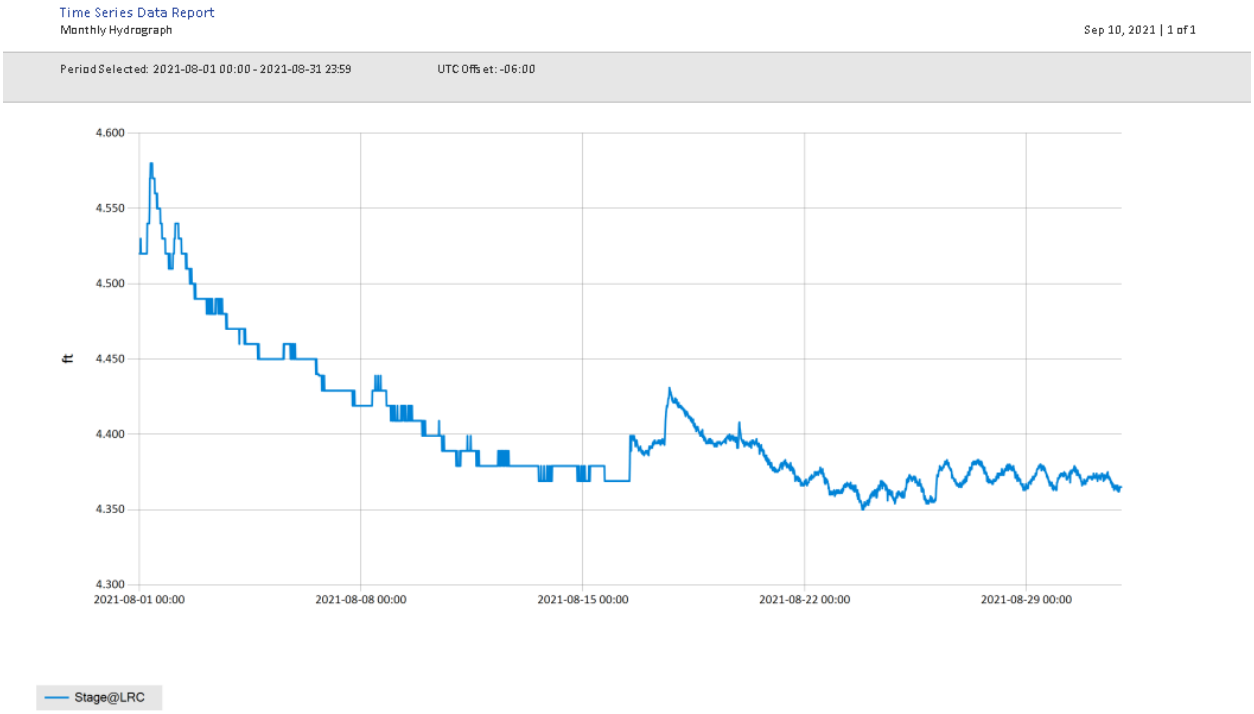


Figure 8 Monthly Hydrograph LRC-1

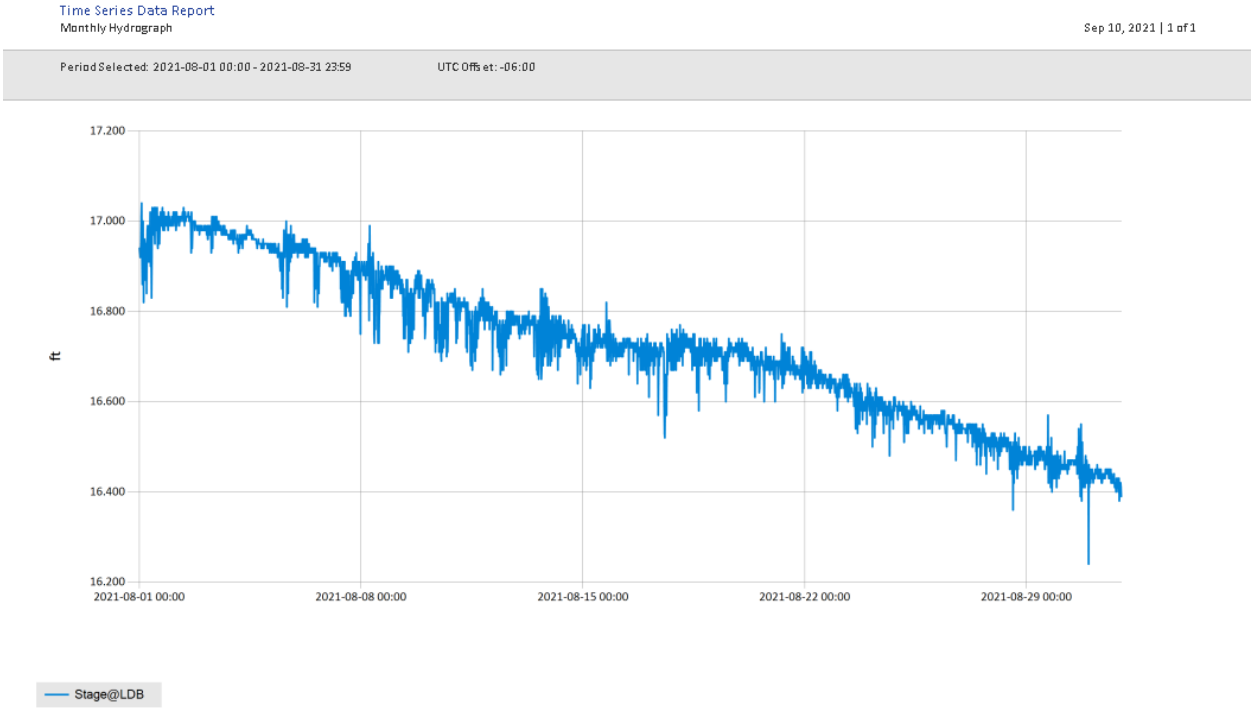


Figure 9 Monthly Hydrograph LDB-1

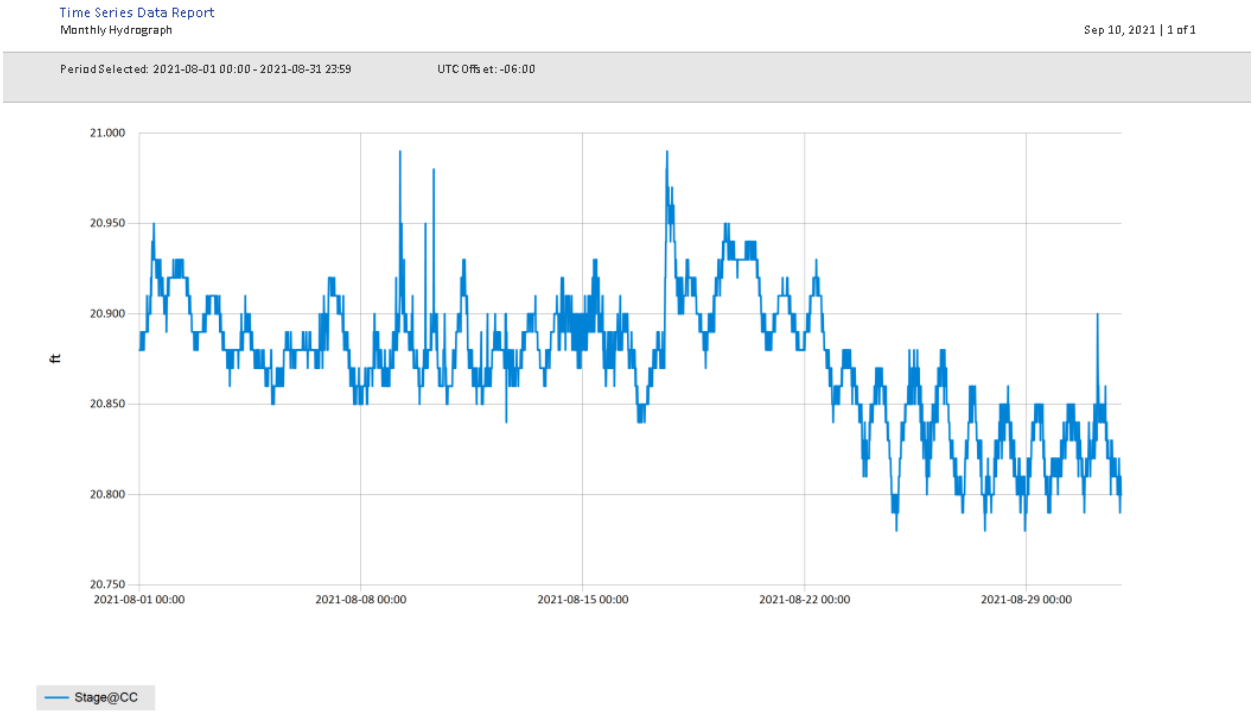


Figure 10 Monthly Hydrograph CC-1

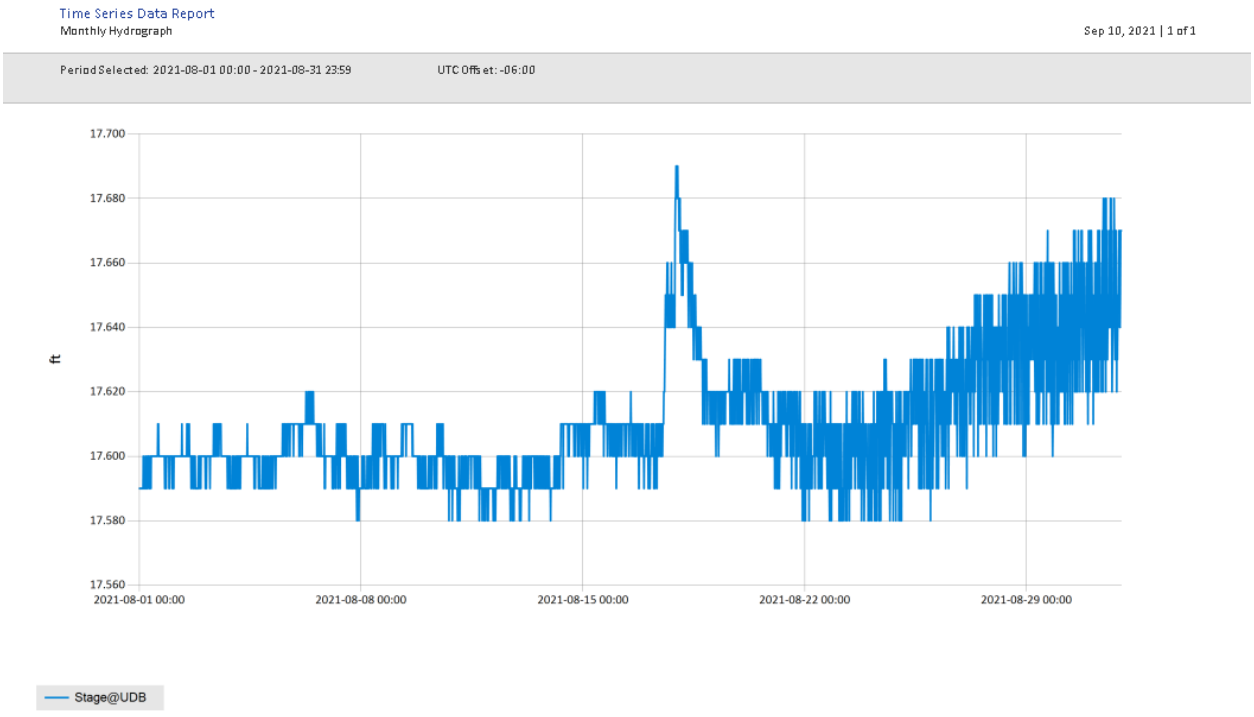


Figure 11 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — August 2021 — Time Zone: Midnight-Midnight CST

(NRMN) Norman — Nearest City: 2.1 NW Norman — County: Cleveland

Latitude: 35-14-09 — Longitude: 97-27-53 — Elevation: 1171 feet

DAY	TEMPERATURE (°F) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m²)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	86	70	76.6	68.2	0	13	96	59	76	0.11	28.84	30.09	NNE	8.7	27.7	13.64	79.7	85.9	91	82
2	84	66	75.2	61.5	0	10	89	42	65	0.00	28.85	30.10	NNE	7.9	21.2	25.20	77.7	83.4	91	77
3	86	63	75.2	61.9	0	9	95	42	66	0.00	28.81	30.06	NE	5.4	16.5	24.64	76.6	83.7	91	77
4	87	64	76.4	62.2	0	10	87	40	64	0.00	28.82	30.07	E	3.4	13.8	20.91	76.6	84.0	91	77
5	78	68	72.2	67.1	0	8	94	72	84	0.23	28.82	30.07	SE	6.0	17.5	9.80	75.4	79.5	83	76
6	92	67	79.3	68.8	0	15	96	46	73	0.00	28.75	30.00	S	8.4	21.1	24.90	76.8	80.7	90	73
7	93	73	82.8	70.6	0	18	86	50	68	0.00	28.67	29.91	S	10.0	24.9	24.53	78.8	85.0	93	78
8	92	74	82.6	71.7	0	18	95	49	71	0.08	28.63	29.88	SSE	9.7	34.6	19.22	79.2	84.5	90	80
9	95	78	85.8	72.4	0	21	80	50	65	0.00	28.64	29.89	S	12.3	26.4	24.34	80.1	86.6	94	80
10	94	78	85.6	70.6	0	21	76	47	62	0.00	28.72	29.97	S	11.8	26.5	25.97	80.8	88.1	95	82
11	95	77	85.0	67.7	0	21	74	40	58	0.00	28.72	29.97	S	10.7	28.1	25.05	80.8	88.1	95	82
12	94	77	85.1	70.2	0	21	78	47	62	0.00	28.76	30.00	S	9.5	22.6	19.61	80.7	87.5	92	82
13	95	71	81.5	68.6	0	18	95	41	67	0.17	28.85	30.10	S	6.9	33.4	21.04	81.1	87.7	96	82
14	87	70	76.5	69.2	0	14	95	52	79	0.01	28.92	30.17	SE	3.6	12.6	16.09	79.7	83.9	90	80
15	90	68	77.5	67.7	0	14	98	43	74	0.00	28.81	30.06	ESE	3.6	22.2	20.13	78.8	84.3	93	77
16	91	69	78.6	68.9	0	15	95	48	74	0.01	28.71	29.95	SSE	5.9	21.3	19.86	79.1	85.0	92	79
17	85	70	73.9	69.9	0	13	97	66	88	0.43	28.69	29.94	SE	6.6	22.9	8.27	78.0	80.8	85	77
18	85	69	76.1	70.5	0	12	97	64	84	0.00	28.74	29.98	SSE	7.9	21.8	14.88	77.4	77.8	82	75
19	84	73	76.8	73.8	0	13	98	78	91	0.42	28.71	29.96	SSE	7.9	17.2	9.34	77.9	78.1	81	76
20	94	76	84.1	73.1	0	20	91	50	71	0.00	28.60	29.84	S	10.3	22.7	22.66	79.7	80.5	86	76
21	95	74	84.2	70.8	0	19	89	47	65	0.00	28.66	29.91	S	7.5	21.7	24.21	81.0	84.7	94	77
22	95	73	84.3	71.6	0	19	92	45	68	0.00	28.72	29.97	S	7.8	20.5	23.28	81.2	86.9	95	79
23	95	73	84.6	67.5	0	19	85	35	59	0.00	28.71	29.96	S	9.6	26.0	25.33	81.1	87.4	95	80
24	96	73	84.5	68.3	0	20	78	41	60	0.00	28.70	29.95	S	9.7	24.6	24.84	80.9	87.4	95	80
25	98	74	85.7	69.4	0	21	84	38	61	0.00	28.77	30.02	S	7.5	18.6	24.58	81.6	88.6	97	81
26	96	74	85.4	69.3	0	20	85	38	60	0.00	28.80	30.05	SSE	6.7	16.1	24.38	82.0	89.4	97	82
27	94	74	83.3	69.5	0	19	87	41	65	0.00	28.74	29.99	SSE	7.9	20.1	23.25	82.1	89.2	96	83
28	93	73	81.8	68.5	0	18	85	38	66	0.00	28.76	30.00	SSE	7.8	22.2	23.46	81.9	88.5	96	82
29	92	72	80.4	69.0	0	17	92	41	71	0.00	28.75	30.00	SSE	6.6	26.0	20.74	81.3	87.7	94	82
30	94	69	79.9	69.6	0	17	96	41	74	0.00	28.65	29.90	E	3.3	23.2	19.80	80.5	87.3	95	81
31	97	71	83.6	68.8	0	19	95	33	65	0.00	28.54	29.78	S	4.7	16.2	22.53	80.8	87.9	96	81
	91	72	80.8	68.9	<- Monthly Averages ->						28.74	29.99	S	7.6	34.6	20.85	79.6	85.2	92	79

Temperature - Highest: 98
Lowest: 63

Degree Days - Total HDD: 0
Total CDD: 512

Rainfall: Monthly Total: 1.46 in.
Greatest 24 Hr: 0.43 in.

Humidity - Highest: 98
Lowest: 33

Number of Days With:

Tmax ≥ 90:	22	Rainfall ≥ 0.01 inch:	8
Tmax ≤ 32:	0	Rainfall ≥ 0.10 inch:	5
Tmin ≤ 32:	0	Avg Wind Speed ≥ 10 mph:	5
Tmin ≤ 0:	0	Max Wind Speed ≥ 30 mph:	2

* Denotes incomplete record

Figure 12 August Mesonet Data

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

SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

September 2021 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 2021 occurred on the fourteenth and was considered a base flow collection. Water samples were collected at eight locations and a discharge measurement was collected at one location. Samples were not collected at LT-1 or TE-1 because of dry conditions. Mesonet data shows no precipitation on the fourteenth, 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 September was 0.43 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

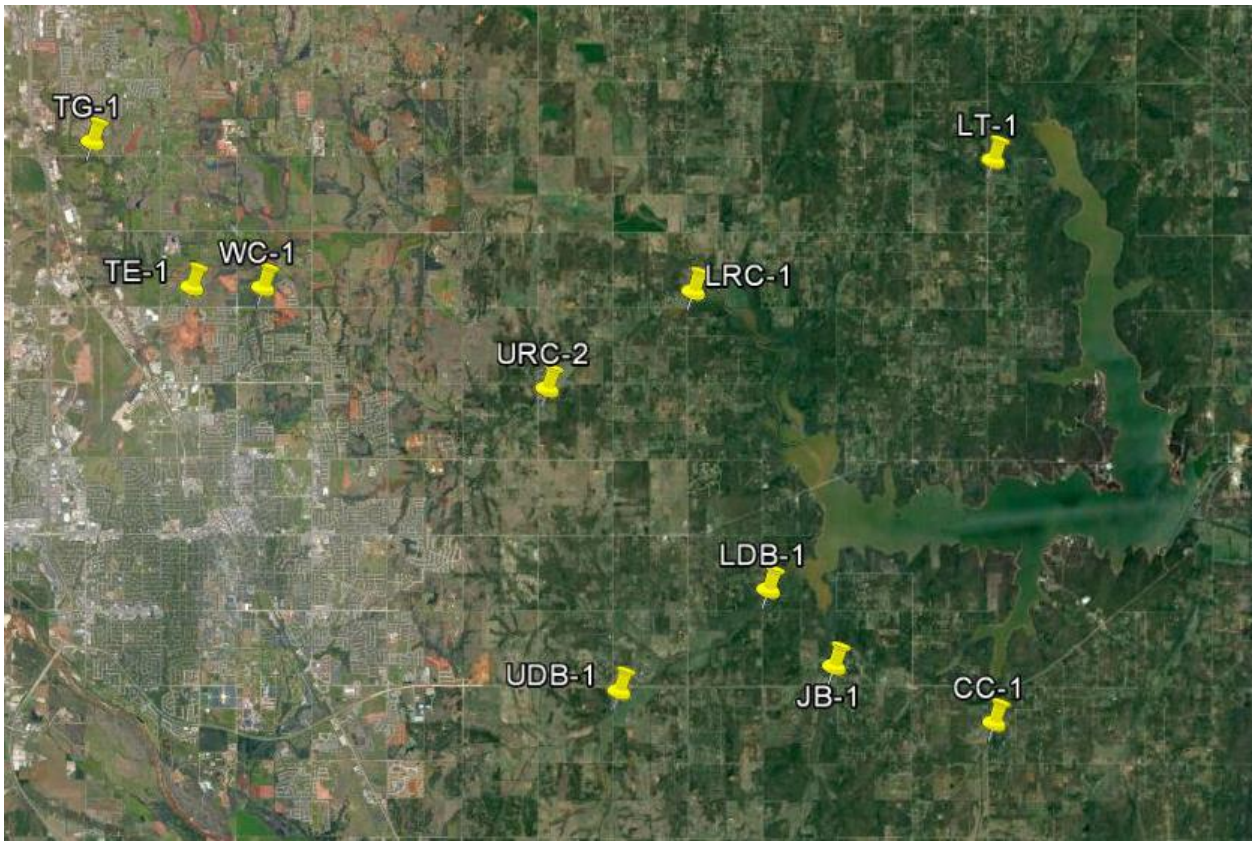


Figure 1 Monitoring Station Map

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	9/14/2021	9:50	SD	22.08	6.79	7.87	696	11	Used RP3, narrow channel, low flow, not able to take flow measurement-too shallow; changed offset for DCP
JB-1	Jim Blue Creek	9/14/2021	11:10	SD	23.95	0.99	7.61	960	20	Gauge gone, still ongoing construction, trees gone; barely flowing/connected, lots of scum near bridge/farther downstream
LDB-1	Lower Dave Blue Creek	9/14/2021	11:50	SD	23.94	3.61	7.93	690	17	Low stage, some positive flow may have been from wind
LRC-1	Lower Rock Creek	9/14/2021	12:40	SD	23.52	8.23	7.87	745	14	Low visible flow, orifice clear
LT-1	Lake Laterals	9/14/2021	12:15	SD	N/A	N/A	N/A	N/A	N/A	Completely dry
TE-1	Little River Tributary	9/14/2021	15:15	SD	N/A	N/A	N/A	N/A	N/A	Downstream completely dry (starting under bridge), orifice out of water, upstream small disconnected pools, neither RP over water
TG-1	Little River Tributary	9/14/2021	16:00	SD	26.45	10.08	7.92	1037	3	Low water level/visible flow; orifice may have been partially covered by small gravel
UDB-1	Upper Dave Blue Creek	9/14/2021	8:55	SD	21.87	5.46	7.77	949	7	Bubbler probably clogged-reading 20 at arrival, 17.46 when leaving; some scum upstream of bridge, very low stage/visible flow
URC-2	Upper Rock Creek	9/14/2021	14:00	SD	25.20	11.05	7.62	872	14	Filamentous covering bubbler, orifice clear; some scum upstream of bridge, very low flow
WC-1	Woodcrest Creek	9/14/2021	14:40	SD	23.46	3.08	7.71	1032	14	Verified tapedown, orifice clear; very low water level/visible flow, barely connected under bridge; very scummy on ds, filamentous more common on us 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	0.23	0.38	0.061	<5.0
JB-1	Jim Blue Creek	0.10	0.77	0.104	8.0
LDB-1	Lower Dave Blue Creek	<0.05	0.51	0.068	12.0
LRC-1	Lower Rock Creek	<0.05	0.22	0.036	6.0
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 Tributary	<0.05	0.30	0.038	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.28	0.036	<5.0
URC-2	Upper Rock Creek	<0.05	0.37	0.042	8.0
WC-1	Woodcrest Creek	<0.05	0.45	0.094	10.0

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	0.22	0.39	0.060	5.0
Duplicate RPD	4.44%	2.60%	1.65%	66.67%*

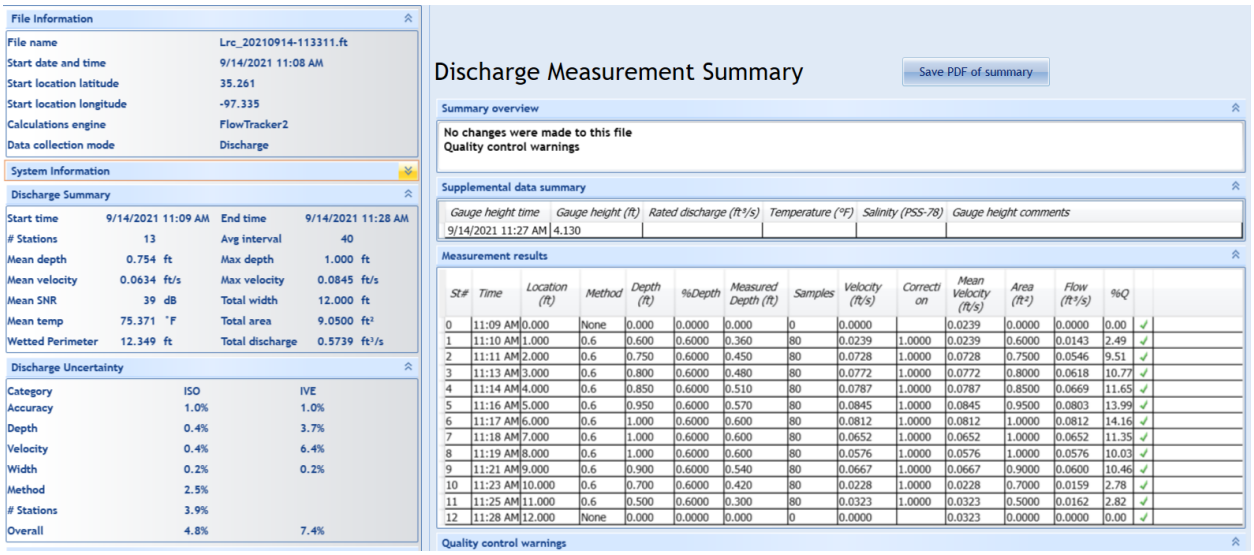
Table 3 QA/QC Data Where the Asterisk Denotes RPD 4

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	0.30	20.39
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	1.63	16.01
LRC-1	Lower Rock Creek	0.57	4.13
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	N/A	N/A
TG-1	Little River Tributary	0.02	8.97
UDB-1	Upper Dave Blue Creek	0.03	17.10
URC-2	Upper Rock Creek	0.02	10.70
WC-1	Woodcrest Creek	0.01	7.37

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Lrc_20210914-113311.ft
Start date and time	9/14/2021 11:08 AM
Start location latitude	35.261
Start location longitude	-97.335
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	9/14/2021 11:09 AM	End time	9/14/2021 11:28 AM
# Stations	13	Avg interval	40
Mean depth	0.754 ft	Max depth	1.000 ft
Mean velocity	0.0634 ft/s	Max velocity	0.0845 ft/s
Mean SNR	39 dB	Total width	12.000 ft
Mean temp	75.371 °F	Total area	9.0500 ft²
Wetted Perimeter	12.349 ft	Total discharge	0.5739 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.4%	3.7%
Velocity	0.4%	6.4%
Width	0.2%	0.2%
Method	2.5%	
# Stations	3.9%	
Overall	4.8%	7.4%

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
9/14/2021 11:27 AM	4.130				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:09 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0239	0.0000	0.0000	0.00	✓
1	11:10 AM	1.000	0.6	0.600	0.6000	0.360	80	0.0239	1.0000	0.0239	0.6000	0.0143	2.49	✓
2	11:11 AM	2.000	0.6	0.750	0.6000	0.450	80	0.0728	1.0000	0.0728	0.7500	0.0546	9.51	✓
3	11:13 AM	3.000	0.6	0.800	0.6000	0.480	80	0.0772	1.0000	0.0772	0.8000	0.0618	10.77	✓
4	11:14 AM	4.000	0.6	0.850	0.6000	0.510	80	0.0787	1.0000	0.0787	0.8500	0.0669	11.65	✓
5	11:16 AM	5.000	0.6	0.950	0.6000	0.570	80	0.0845	1.0000	0.0845	0.9500	0.0803	13.99	✓
6	11:17 AM	6.000	0.6	1.000	0.6000	0.600	80	0.0812	1.0000	0.0812	1.0000	0.0812	14.16	✓
7	11:18 AM	7.000	0.6	1.000	0.6000	0.600	80	0.0652	1.0000	0.0652	1.0000	0.0652	11.35	✓
8	11:19 AM	8.000	0.6	1.000	0.6000	0.600	80	0.0576	1.0000	0.0576	1.0000	0.0576	10.03	✓
9	11:21 AM	9.000	0.6	0.900	0.6000	0.540	80	0.0667	1.0000	0.0667	0.9000	0.0600	10.46	✓
10	11:23 AM	10.000	0.6	0.700	0.6000	0.420	80	0.0228	1.0000	0.0228	0.7000	0.0159	2.78	✓
11	11:25 AM	11.000	0.6	0.500	0.6000	0.300	80	0.0323	1.0000	0.0323	0.5000	0.0162	2.82	✓
12	11:28 AM	12.000	None	0.000	0.0000	0.000	0	0.0000		0.0323	0.0000	0.0000	0.00	✓

Quality control warnings

Figure 2 Discharge Measurement Summary LRC-1

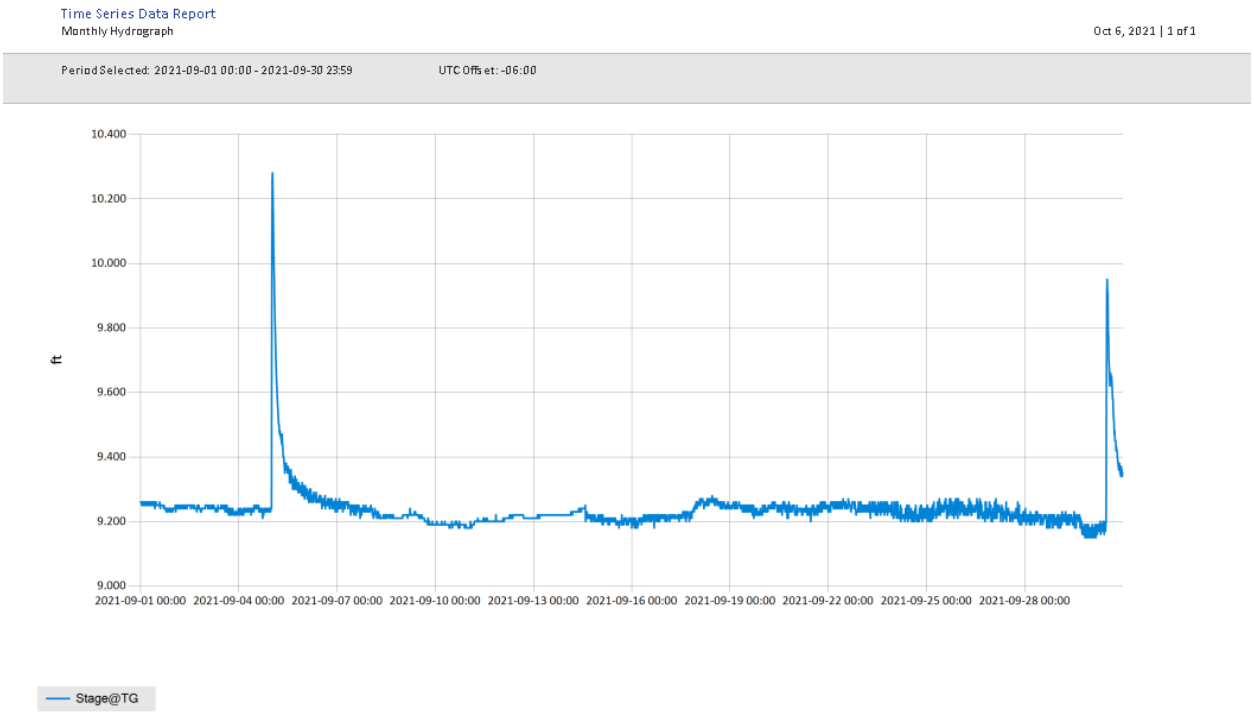


Figure 3 Monthly Hydrograph TG-1

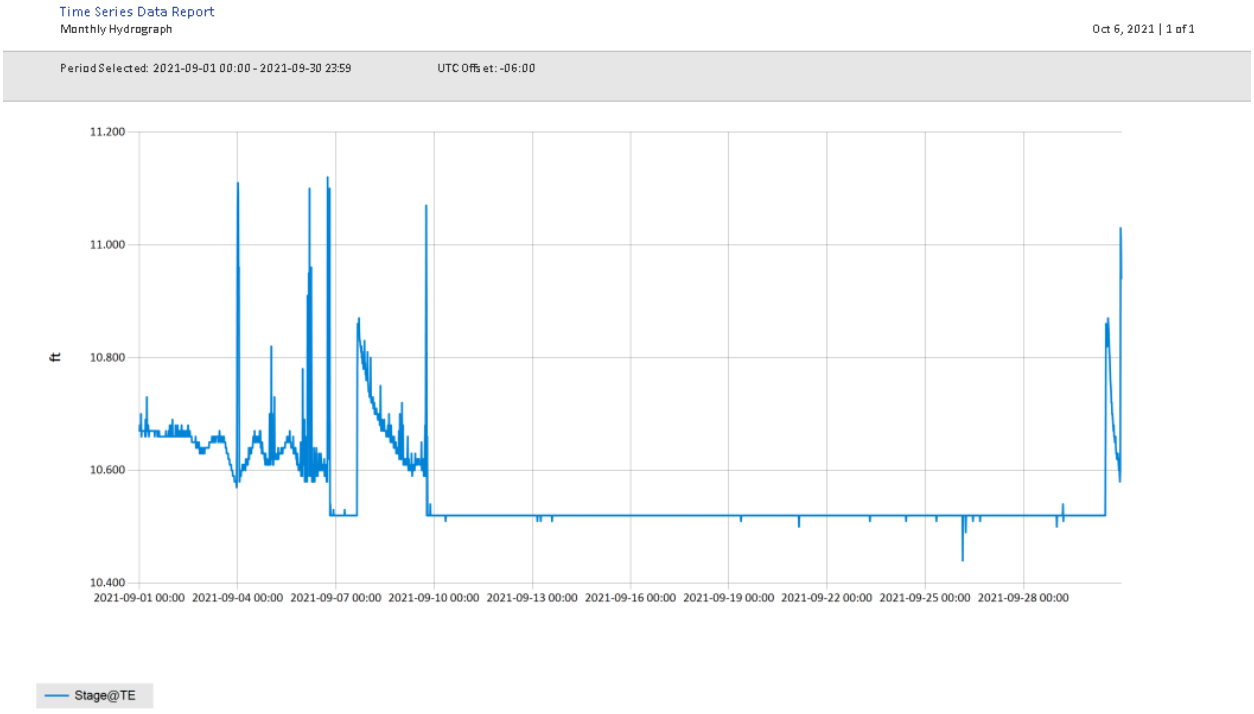


Figure 4 Monthly Hydrograph TE-1

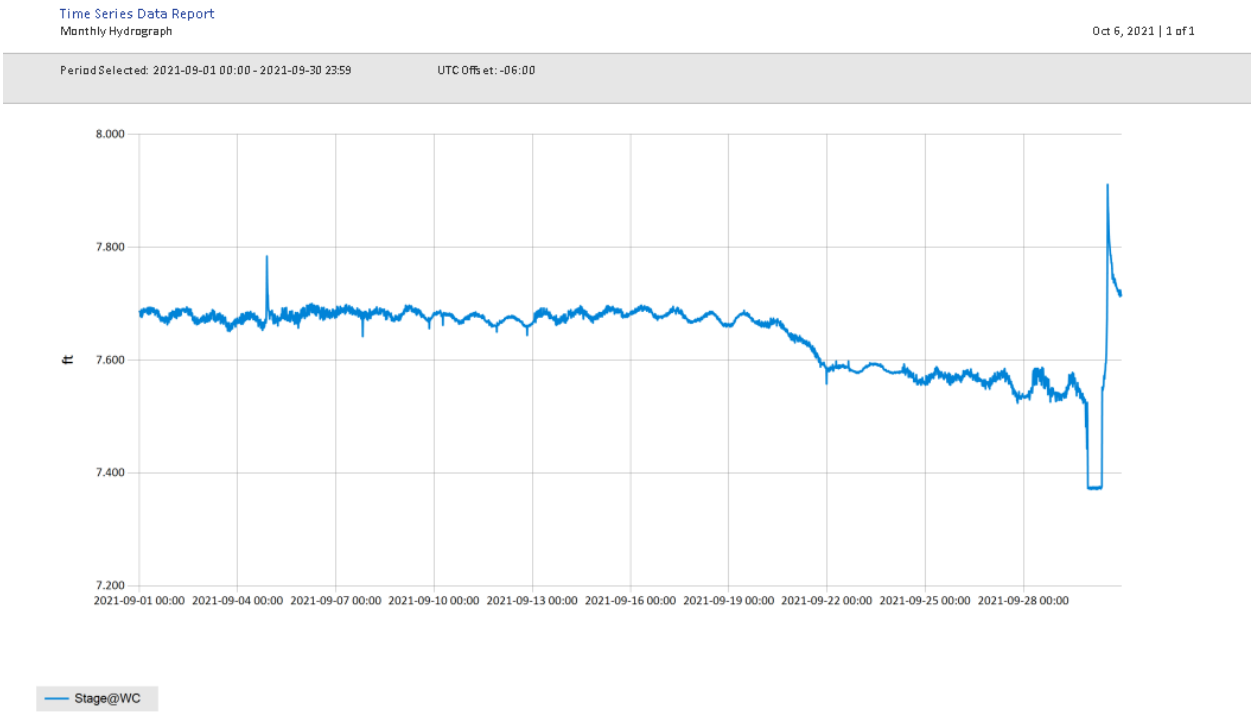


Figure 5 Monthly Hydrograph WC-1

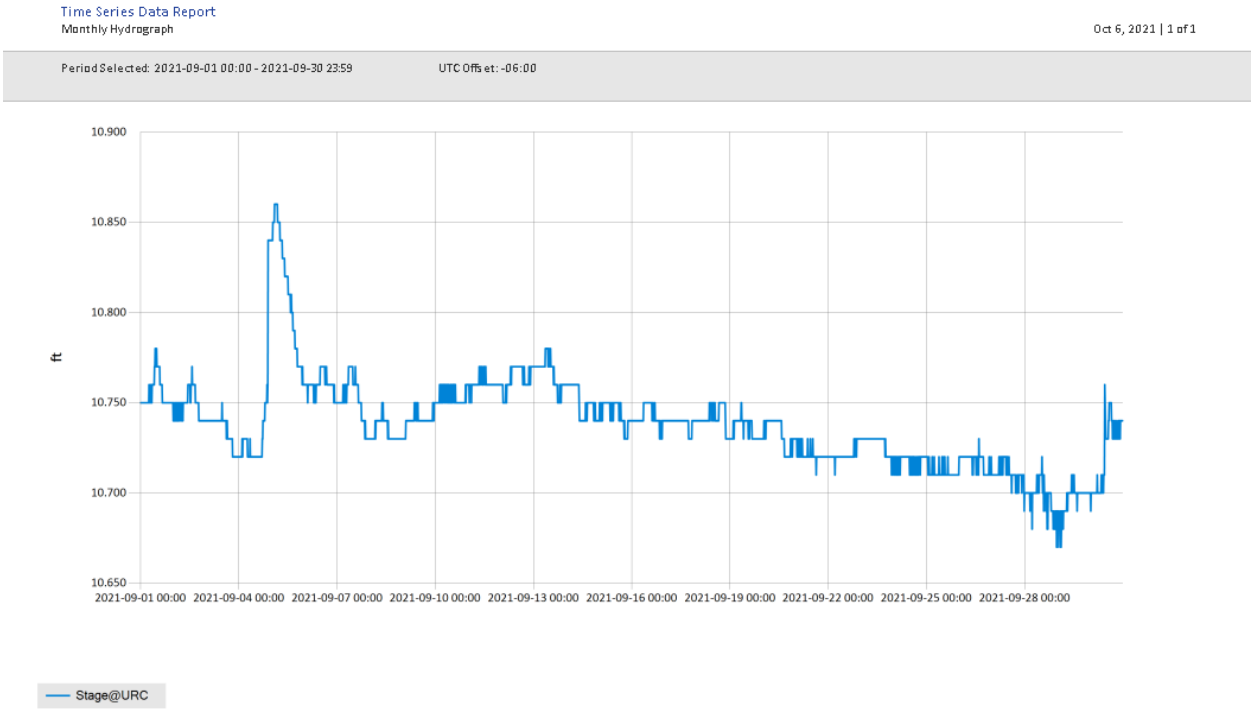


Figure 6 Monthly Hydrograph URC-2

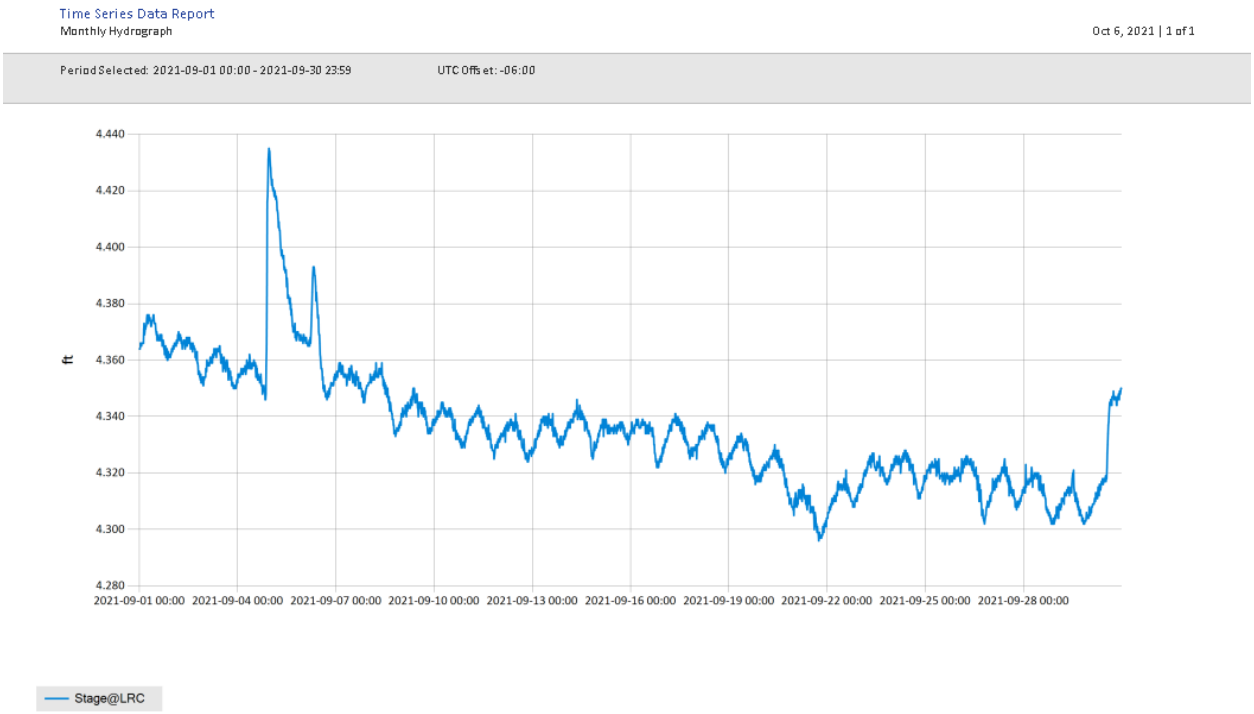


Figure 7 Monthly Hydrograph LRC-1

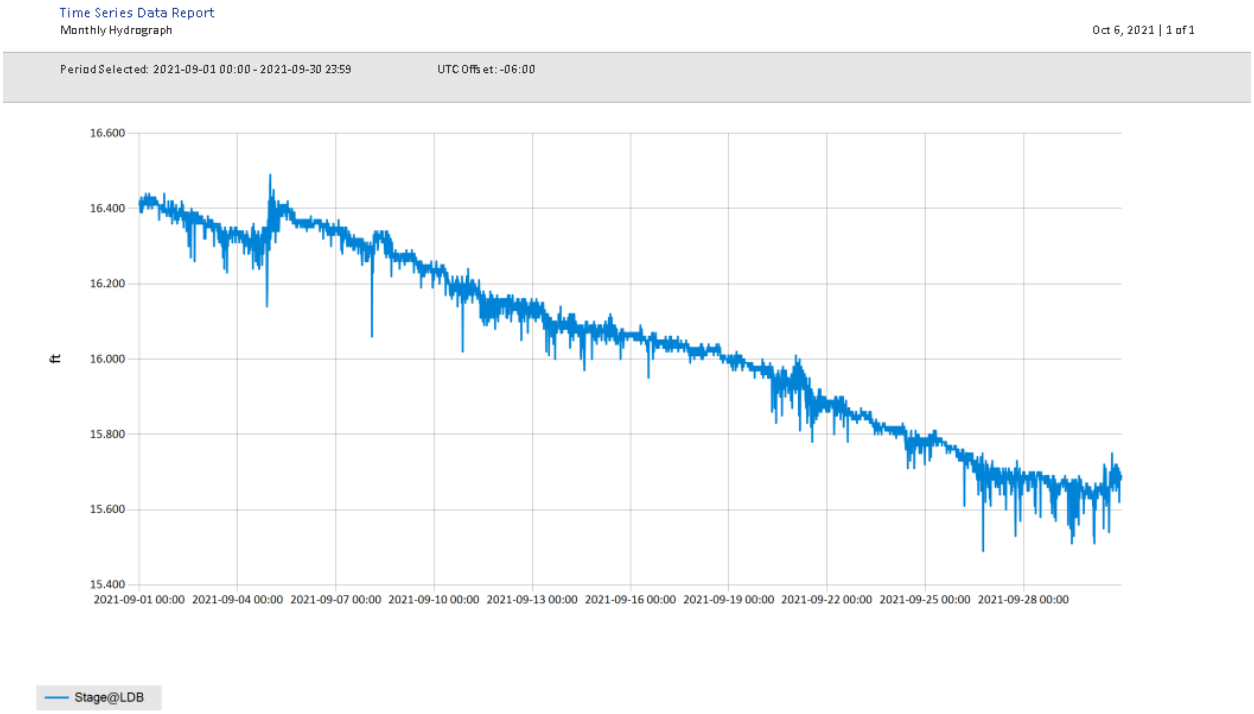


Figure 8 Monthly Hydrograph LDB-1

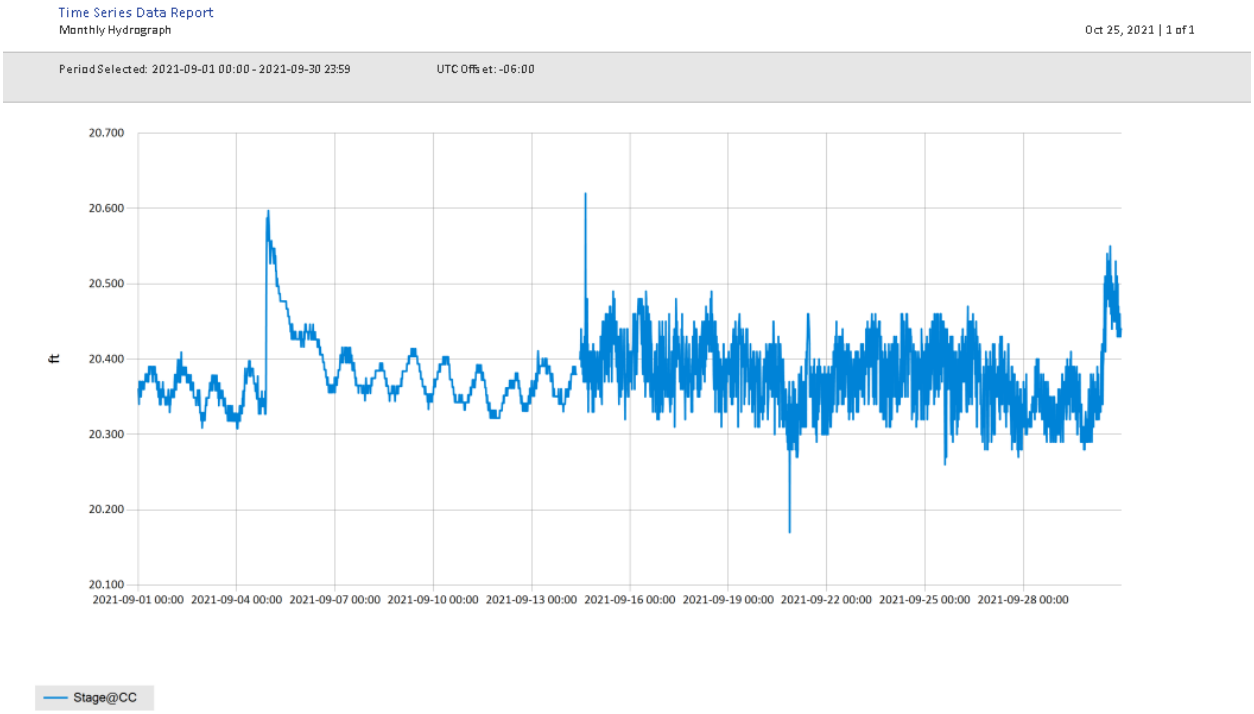


Figure 9 Monthly Hydrograph CC-1

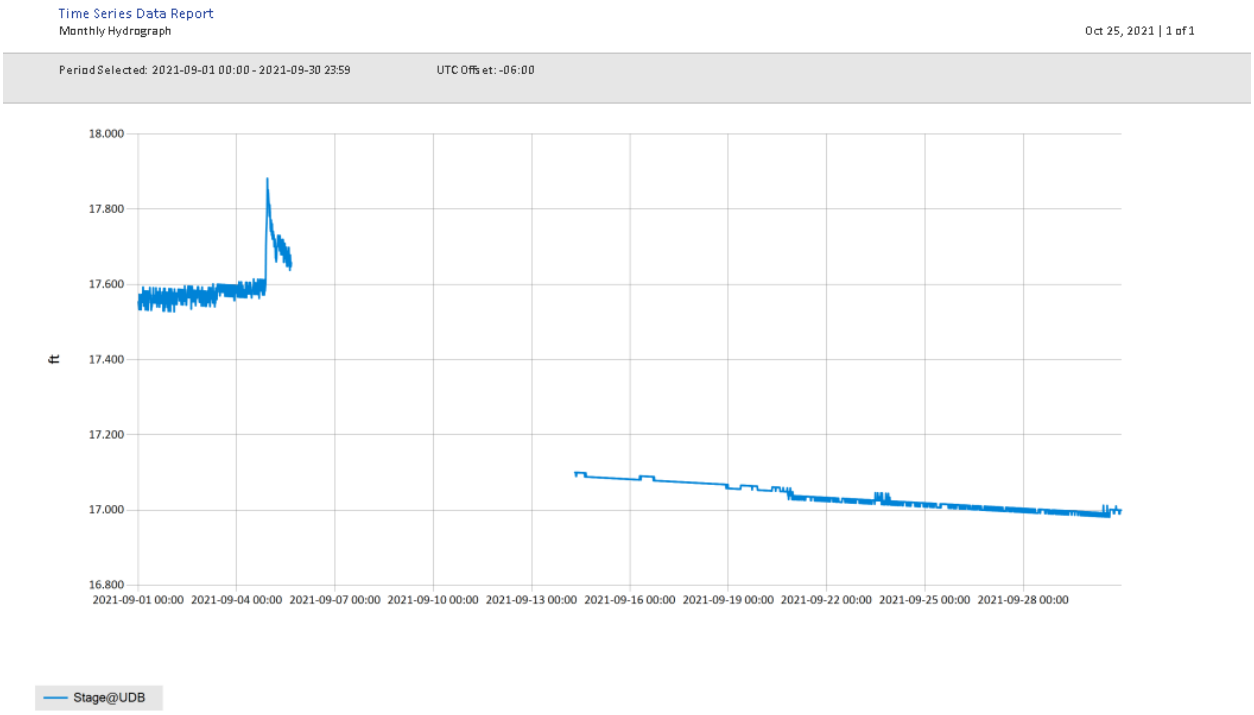


Figure 10 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — September 2021 — Time Zone: Midnight-Midnight CST

(NRMN) Norman — Nearest City: 2.1 NW Norman — County: Cleveland

Latitude: 35-14-09 — Longitude: 97-27-53 — Elevation: 1171 feet

DAY	TEMPERATURE (°F) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	98	75	86.0	69.1	0	21	82	33	60	0.00	28.58	29.82	S	5.8	17.4	22.34	81.8	88.8	96	82
2	97	75	85.4	70.3	0	21	85	37	63	0.00	28.65	29.90	SSE	8.1	21.9	22.00	82.4	88.9	95	83
3	97	76	85.3	70.1	0	21	87	41	63	0.00	28.68	29.92	S	9.1	24.9	22.09	82.5	88.8	95	83
4	97	74	83.3	70.9	0	20	94	41	68	0.07	28.67	29.91	S	8.6	20.3	19.98	82.3	88.4	95	82
5	88	68	77.6	66.4	0	13	95	40	71	0.00	28.75	29.99	NNE	7.6	17.8	21.24	81.0	86.1	92	81
6	92	63	78.0	63.9	0	12	96	42	65	0.00	28.76	30.01	SSE	5.6	23.5	22.22	78.9	84.6	92	77
7	95	68	81.7	64.1	0	16	76	40	57	0.00	28.68	29.93	S	8.0	22.1	22.24	79.5	85.1	92	78
8	89	64	77.8	55.1	0	11	81	24	49	0.00	28.78	30.03	NE	8.5	23.0	22.76	79.1	85.2	91	80
9	92	58	75.9	52.7	0	10	92	23	50	0.00	28.81	30.06	S	5.3	17.5	22.20	76.6	82.3	89	75
10	92	65	78.6	53.8	0	14	65	26	45	0.00	28.78	30.03	S	9.5	28.7	19.10	76.8	81.6	87	76
11	94	67	79.5	55.2	0	15	66	28	45	0.00	28.80	30.05	S	10.0	27.9	21.09	77.1	81.7	88	76
12	91	64	77.4	56.7	0	12	77	29	52	0.00	28.83	30.08	S	8.4	21.3	21.19	77.1	81.3	87	75
13	91	63	78.3	61.2	0	12	82	27	59	0.00	28.77	30.02	S	7.8	20.9	21.74	77.5	81.6	88	75
14	90	68	78.9	64.0	0	14	87	40	63	0.00	28.70	29.95	S	8.0	20.8	21.56	78.5	82.8	89	77
15	88	64	75.6	63.9	0	11	93	43	69	0.00	28.71	29.96	ESE	3.0	11.3	14.93	77.4	81.6	87	77
16	91*	65*	79.1*	64.2*	0*	13*	92*	36*	63*	0.00*	28.69*	29.93*	SSE*	5.9*	18.5*	20.93*	77.7*	82.5*	90*	76*
17	90*	69*	79.0*	64.5*	0*	15*	86*	41*	63*	0.00*	28.77*	30.02*	SSE*	5.4*	19.4*	NA	78.8*	83.8*	90*	78*
18	92	65	78.7	61.8	0	13	92	32	60	0.00	28.82	30.07	NE	4.5	17.7	20.11	77.7	83.1	89	77
19	93	66	80.2	63.8	0	15	90	34	61	0.00	28.68	29.93	SSE	6.0	19.9	21.13	78.1	83.5	90	77
20	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00*	NA	NA	SSE*	NA	32.9*	NA	NA	NA	NA	NA
21	81	58	70.2	44.7	0	4	68	19	43	0.00	28.96	30.22	N	15.5	35.4	22.06	75.2	80.4	84	76
22	79	48	63.9	41.3	1	0	81	21	49	0.00	29.03	30.29	N	4.0	16.7	23.00	71.7	76.4	83	70
23	84	50	68.1	42.2	0	2	86	21	44	0.00	28.84	30.09	SSE	6.0	18.3	22.19	70.8	75.4	83	68
24	87	54	70.8	43.8	0	5	68	21	41	0.00	28.79	30.04	S	6.6	20.7	17.96	71.3	75.1	81	69
25	89	55	72.3	49.1	0	7	76	24	48	0.00	28.84	30.09	SE	5.1	14.2	21.37	72.0	76.2	84	69
26	92	63	76.6	49.1	0	12	64	19	41	0.00	28.76	30.01	S	8.8	28.9	21.30	73.3	77.5	84	71
27	92	64	76.6	52.8	0	13	66	25	46	0.00	28.69	29.94	S	8.6	25.7	20.58	73.9	77.7	84	72
28	93	67	77.8	60.8	0	15	78	35	58	0.00	28.61	29.85	SSE	8.4	26.0	18.83	75.5	79.3	86	73
29	88	64	75.9	64.5	0	11	89	45	70	0.00	28.60	29.85	SE	9.5	22.8	18.96	76.2	79.6	85	75
30	75	62	67.9	65.5	0	4	98	79	92	0.36	28.75	30.00	SE	7.0	24.5	2.82	74.2	75.2	79	71
	90*	64*	77.1*	58.8*	<- Monthly Averages ->						28.75*	30.00*	S *	7.4*	35.4*	20.28*	77.1*	81.9*	88*	76*

Temperature - Highest: 98*
Lowest: 48*

Degree Days - Total HDD: 1*
Total CDD: 355*

Rainfall: Monthly Total: 0.43* in.
Greatest 24 Hr: 0.36* in.

Humidity - Highest: 98*
Lowest: 19*

Number of Days With:

Tmax ≥ 90:	19*	Rainfall ≥ 0.01 inch:	2*
Tmax ≤ 32:	0*	Rainfall ≥ 0.10 inch:	1*
Tmin ≤ 32:	0*	Avg Wind Speed ≥ 10 mph:	2*
Tmin ≤ 0:	0*	Max Wind Speed ≥ 30 mph:	2*

* Denotes incomplete record

Figure 11 September Mesonet Data

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

SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

October 2021 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 OCTOBER WATER QUALITY SAMPLING

Sampling for October 2021 occurred on the eleventh and was a combination of base flow and high flow collections. Water samples were collected at eight locations and discharge measurements were collected at three locations. The water samples from TE-1 were collected via autosampler on the tenth. Samples were not collected at LT-1 because of dry conditions, or JB-1 due to construction activity. Mesonet data shows no precipitation on the eleventh, 1.57 inches of precipitation in the 72 hours prior to sampling, and 1.65 inches of precipitation in the 72 hours after the sampling event. A second water sample was collected from TG-1 via autosampler on the thirteenth. The total rainfall amount in Norman for the month of October was 4.48 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

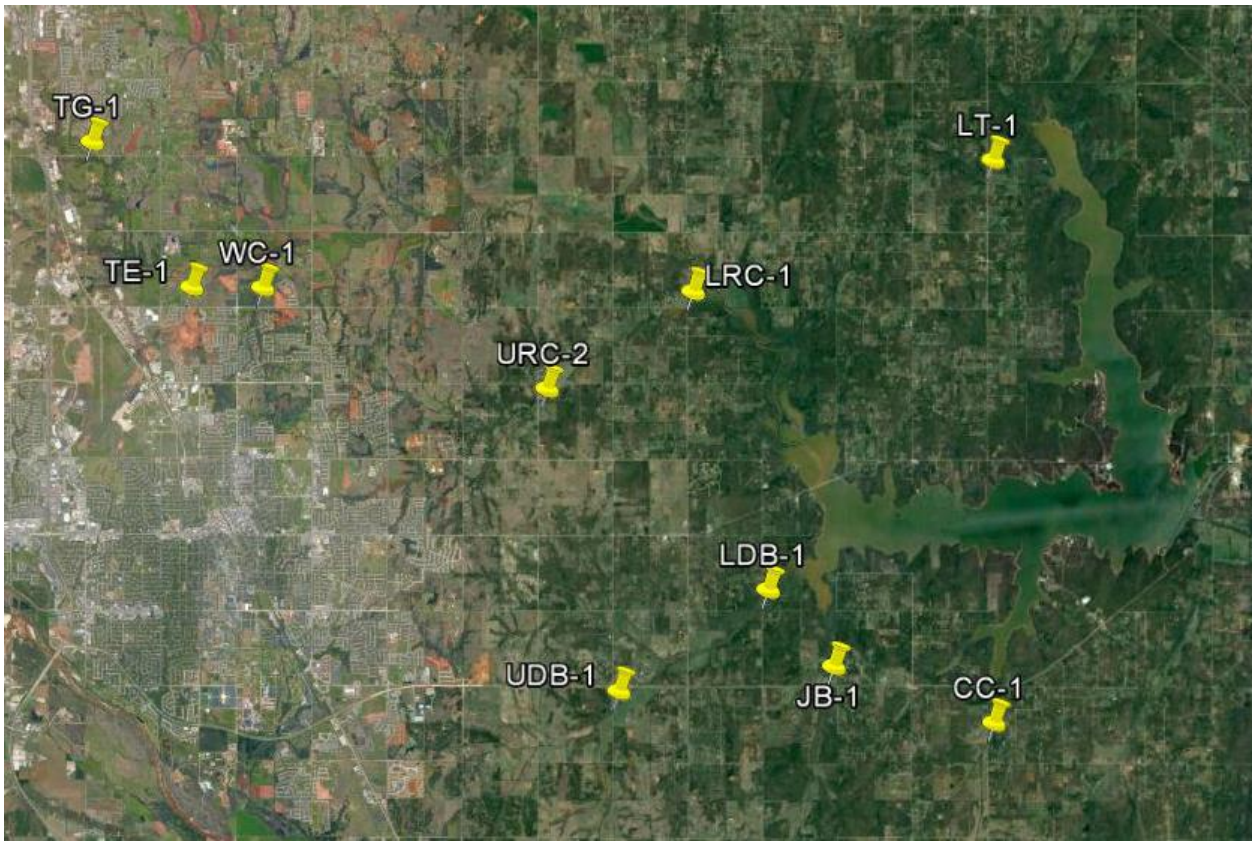


Figure 1 Monitoring Station Map

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	10/11/2021	9:25	SD	17.84	6.34	7.61	529	73	Used rp4, rp3 also over water, normal looking flow but turbid water (rain last night), orifice clear
JB-1	Jim Blue Creek	10/11/2021	10:00	SD	N/A	N/A	N/A	N/A	N/A	Construction activity at site, did not sample
LDB-1	Lower Dave Blue Creek	10/11/2021	10:15	SD	20.43	3.55	7.93	869	24	Negative visual flow, low water level, rain previous night but site looks normal, some med/large debris present
LRC-1	Lower Rock Creek	10/11/2021	11:20	SD	18.37	6.77	7.76	647	88	Water level slightly elevated, muddy and moderate debris from overnight rain, changed dcp
LT-1	Lake Laterals	10/11/2021	10:45	SD	N/A	N/A	N/A	N/A	N/A	Upstream/downstream dry with one medium size puddle (probably rainwater from previous night), did not sample
TE-1	Little River Tributary	10/10/2021	19:30	SD	*	*	7.97	566	1000	T1 collected, collected at peak; cleared out middle section of upstream beaver dam
TG-1	Little River Tributary	10/11/2021	14:40	SD	19.90	8.74	7.97	291	141	Rain overnight, above normal conditions
UDB-1	Upper Dave Blue Creek	10/11/2021	8:35	SD	18.62	5.57	7.83	936	11	Very low water level/flow, orifice just barely in water, changed offset
URC-2	Upper Rock Creek	10/11/2021	12:25	SD	20.32	4.75	7.47	156	347	Turbidity high from overnight rain event
WC-1	Woodcrest Creek	10/11/2021	13:05	SD	17.77	7.68	7.81	256	93	Normal visual flow but more turbid than usual due to overnight rain, autosampler should have collected but had power failure, orifice clear, changed dcp

Table 1 Field Data Form Where the Asterisk Denotes a Sample from an Autosampler

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
CC-1	Clear Creek	0.14	0.67	0.115	38.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.66	0.094	18.0
LRC-1	Lower Rock Creek	0.08	0.68	0.148	68.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	0.25	3.19	1.37	980
TG-1	Little River Tributary	0.19	1.02	0.236	74.0
UDB-1	Upper Dave Blue Creek	<0.05	0.48	0.064	8.0
URC-2	Upper Rock Creek	0.42	1.18	0.282	116
WC-1	Woodcrest Creek	0.46	1.23	0.313	46.0

Table 2 Laboratory Analysis Summary

Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
Field Blank	<0.05	<0.10	<0.010	<5.0
Duplicate	0.14	0.56	0.114	38.0
Duplicate RPD	0%	17.89%*	0.87%	0%

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

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues, and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.40	20.23
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.99	15.48
LRC-1	Lower Rock Creek	2.04	4.24
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	229.40	15.28
TG-1	Little River Tributary	3.57	9.28
UDB-1	Upper Dave Blue Creek	0.10	16.96
URC-2	Upper Rock Creek	0.31	10.81
WC-1	Woodcrest Creek	0.90	7.50

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

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
TG-1	Little River Tributary	10/13/2021	5:30	SD	*	*	6.87	174	833	T1 collected, peak at 17.89 @ 06:15

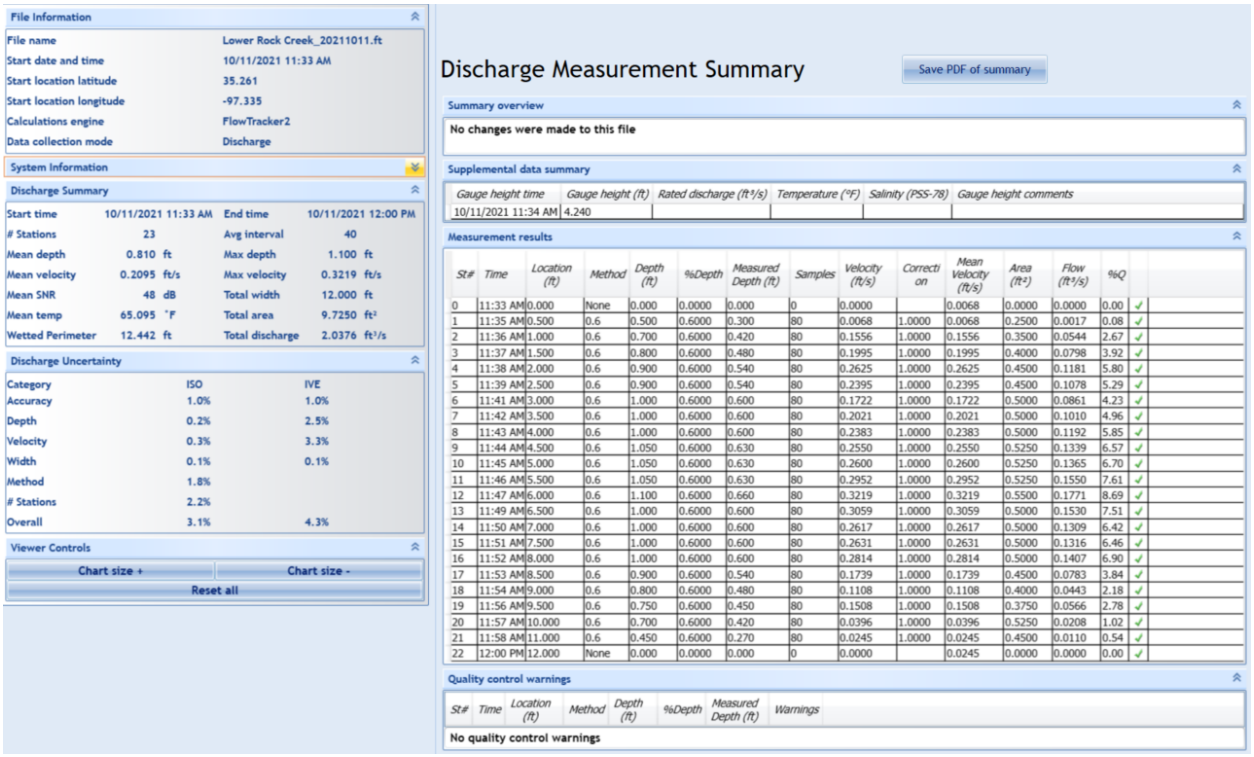
Table 5 Stormwater Field Data Form Where the Asterisk Denotes a Sample from an Autosampler

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
TG-1	Little River Tributary	0.32	2.45	0.999	2150

Table 6 Stormwater Laboratory Analysis Summary

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
TG-1	Little River Tributary	335.70	16.39

Table 7 Stormwater Station Discharge Summary



File Information

File name	Lower Rock Creek_20211011.ft
Start date and time	10/11/2021 11:33 AM
Start location latitude	35.261
Start location longitude	-97.335
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	10/11/2021 11:33 AM	End time	10/11/2021 12:00 PM
# Stations	23	Avg interval	40
Mean depth	0.810 ft	Max depth	1.100 ft
Mean velocity	0.2095 ft/s	Max velocity	0.3219 ft/s
Mean SNR	48 dB	Total width	12.000 ft
Mean temp	65.095 °F	Total area	9.7250 ft²
Wetted Perimeter	12.442 ft	Total discharge	2.0376 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	2.5%
Velocity	0.3%	3.3%
Width	0.1%	0.1%
Method	1.8%	
# Stations	2.2%	
Overall	3.1%	4.3%

Viewer Controls

Chart size + | Chart size - | Reset all

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file

Supplemental data summary

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
10/11/2021 11:34 AM	4.240				

Measurement results

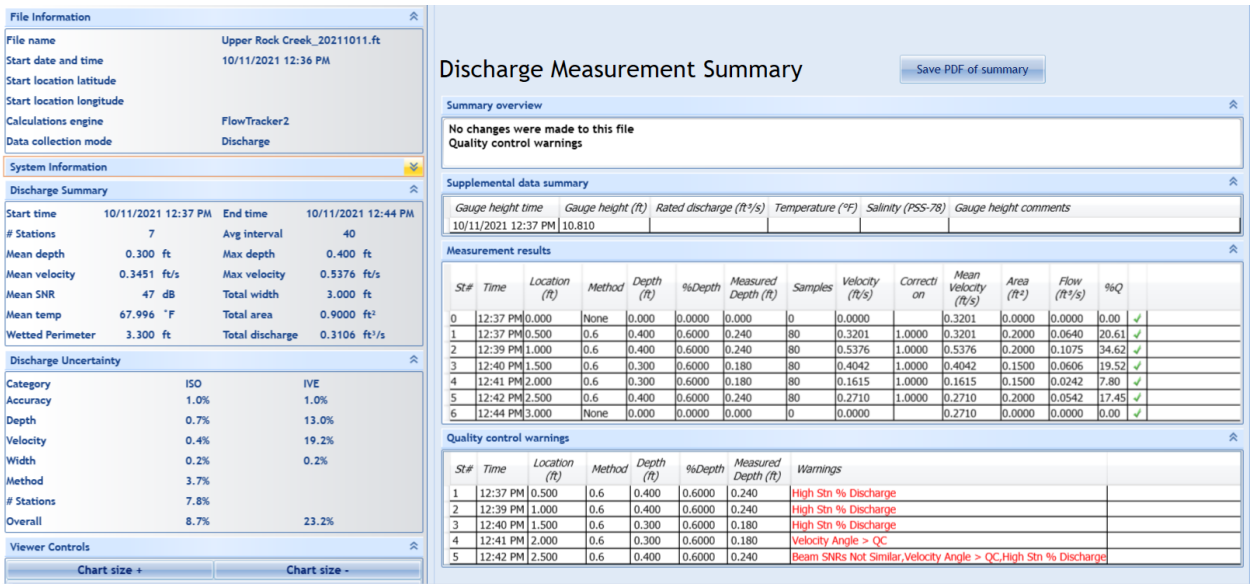
St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:33 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0068	0.0000	0.0000	0.00	✓
1	11:35 AM	0.500	0.6	0.500	0.6000	0.300	80	0.0068	1.0000	0.0068	0.2500	0.0017	0.08	✓
2	11:36 AM	1.000	0.6	0.700	0.6000	0.420	80	0.1556	1.0000	0.1556	0.3500	0.0544	2.67	✓
3	11:37 AM	1.500	0.6	0.800	0.6000	0.480	80	0.1995	1.0000	0.1995	0.4000	0.0798	3.92	✓
4	11:38 AM	2.000	0.6	0.900	0.6000	0.540	80	0.2625	1.0000	0.2625	0.4500	0.1181	5.80	✓
5	11:39 AM	2.500	0.6	0.900	0.6000	0.540	80	0.2395	1.0000	0.2395	0.4500	0.1078	5.29	✓
6	11:41 AM	3.000	0.6	1.000	0.6000	0.600	80	0.1722	1.0000	0.1722	0.5000	0.0861	4.23	✓
7	11:42 AM	3.500	0.6	1.000	0.6000	0.600	80	0.2021	1.0000	0.2021	0.5000	0.1010	4.96	✓
8	11:43 AM	4.000	0.6	1.000	0.6000	0.600	80	0.2383	1.0000	0.2383	0.5000	0.1192	5.85	✓
9	11:44 AM	4.500	0.6	1.050	0.6000	0.630	80	0.2550	1.0000	0.2550	0.5250	0.1339	6.57	✓
10	11:45 AM	5.000	0.6	1.050	0.6000	0.630	80	0.2600	1.0000	0.2600	0.5250	0.1365	6.70	✓
11	11:46 AM	5.500	0.6	1.050	0.6000	0.630	80	0.2952	1.0000	0.2952	0.5250	0.1550	7.61	✓
12	11:47 AM	6.000	0.6	1.100	0.6000	0.660	80	0.3219	1.0000	0.3219	0.5500	0.1771	8.69	✓
13	11:49 AM	6.500	0.6	1.000	0.6000	0.600	80	0.3059	1.0000	0.3059	0.5000	0.1530	7.51	✓
14	11:50 AM	7.000	0.6	1.000	0.6000	0.600	80	0.2617	1.0000	0.2617	0.5000	0.1309	6.42	✓
15	11:51 AM	7.500	0.6	1.000	0.6000	0.600	80	0.2631	1.0000	0.2631	0.5000	0.1316	6.46	✓
16	11:52 AM	8.000	0.6	1.000	0.6000	0.600	80	0.2814	1.0000	0.2814	0.5000	0.1407	6.90	✓
17	11:53 AM	8.500	0.6	0.900	0.6000	0.540	80	0.1739	1.0000	0.1739	0.4500	0.0783	3.84	✓
18	11:54 AM	9.000	0.6	0.800	0.6000	0.480	80	0.1108	1.0000	0.1108	0.4000	0.0443	2.18	✓
19	11:56 AM	9.500	0.6	0.750	0.6000	0.450	80	0.1508	1.0000	0.1508	0.3750	0.0566	2.78	✓
20	11:57 AM	10.000	0.6	0.700	0.6000	0.420	80	0.0396	1.0000	0.0396	0.5250	0.0208	1.02	✓
21	11:58 AM	11.000	0.6	0.450	0.6000	0.270	80	0.0245	1.0000	0.0245	0.4500	0.0110	0.54	✓
22	12:00 PM	12.000	None	0.000	0.0000	0.000	0	0.0000		0.0245	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings

No quality control warnings

Figure 2 Discharge Measurement Summary LRC-1



File Information

File name	Upper Rock Creek_20211011.ft
Start date and time	10/11/2021 12:36 PM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	10/11/2021 12:37 PM	End time	10/11/2021 12:44 PM
# Stations	7	Avg interval	40
Mean depth	0.300 ft	Max depth	0.400 ft
Mean velocity	0.3451 ft/s	Max velocity	0.5376 ft/s
Mean SNR	47 dB	Total width	3.000 ft
Mean temp	67.996 °F	Total area	0.9000 ft²
Wetted Perimeter	3.300 ft	Total discharge	0.3106 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.7%	13.0%
Velocity	0.4%	19.2%
Width	0.2%	0.2%
Method	3.7%	
# Stations	7.8%	
Overall	8.7%	23.2%

Viewer Controls

Chart size + | Chart size -

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
10/11/2021 12:37 PM	10.810				

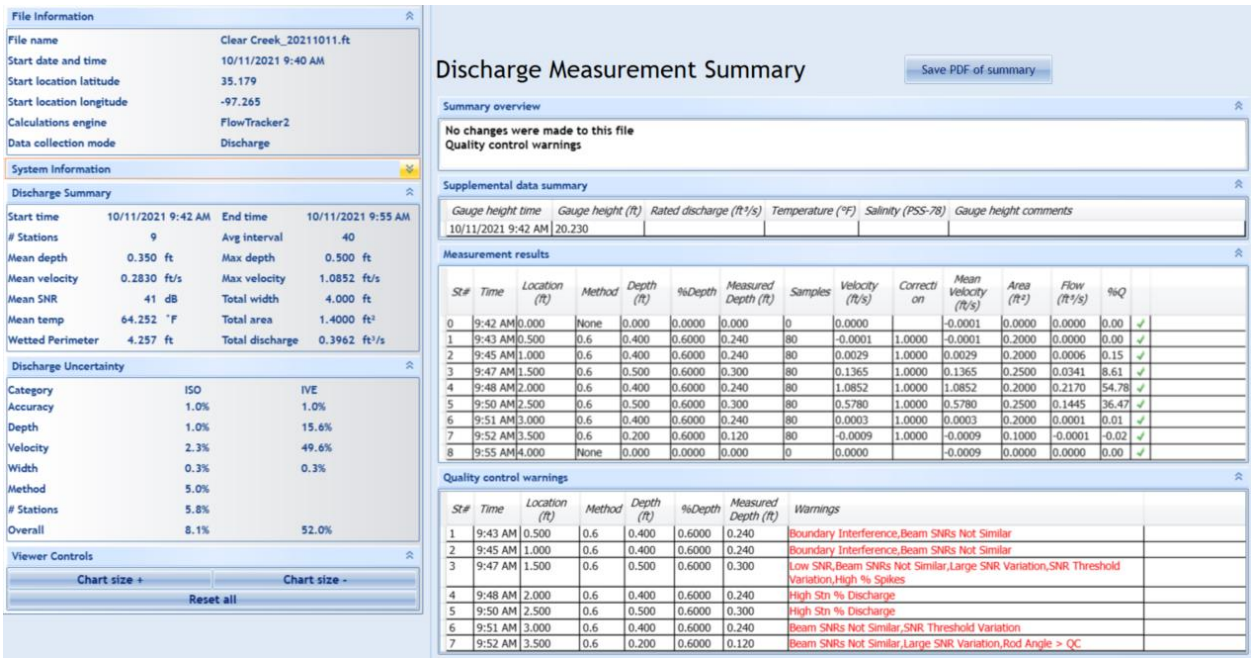
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	12:37 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.3201	0.0000	0.0000	0.00	✓
1	12:37 PM	0.500	0.6	0.400	0.6000	0.240	80	0.3201	1.0000	0.3201	0.2000	0.0640	20.61	✓
2	12:39 PM	1.000	0.6	0.400	0.6000	0.240	80	0.5376	1.0000	0.5376	0.2000	0.1075	34.62	✓
3	12:40 PM	1.500	0.6	0.300	0.6000	0.180	80	0.4042	1.0000	0.4042	0.1500	0.0606	19.52	✓
4	12:41 PM	2.000	0.6	0.300	0.6000	0.180	80	0.1615	1.0000	0.1615	0.1500	0.0242	7.80	✓
5	12:42 PM	2.500	0.6	0.400	0.6000	0.240	80	0.2710	1.0000	0.2710	0.2000	0.0542	17.45	✓
6	12:44 PM	3.000	None	0.000	0.0000	0.000	0	0.0000		0.2710	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	12:37 PM	0.500	0.6	0.400	0.6000	0.240	High Stn % Discharge
2	12:39 PM	1.000	0.6	0.400	0.6000	0.240	High Stn % Discharge
3	12:40 PM	1.500	0.6	0.300	0.6000	0.180	High Stn % Discharge
4	12:41 PM	2.000	0.6	0.300	0.6000	0.180	Velocity Angle > QC
5	12:42 PM	2.500	0.6	0.400	0.6000	0.240	Beam SNRs Not Similar,Velocity Angle > QC,High Stn % Discharge

Figure 3 Discharge Measurement Summary URC-2



File Information

File name	Clear Creek_20211011.ft
Start date and time	10/11/2021 9:40 AM
Start location latitude	35.179
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	10/11/2021 9:42 AM	End time	10/11/2021 9:55 AM
# Stations	9	Avg interval	40
Mean depth	0.350 ft	Max depth	0.500 ft
Mean velocity	0.2830 ft/s	Max velocity	1.0852 ft/s
Mean SNR	41 dB	Total width	4.000 ft
Mean temp	64.252 °F	Total area	1.4000 ft²
Wetted Perimeter	4.257 ft	Total discharge	0.3962 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.0%	15.6%
Velocity	2.3%	49.6%
Width	0.3%	0.3%
Method	5.0%	
# Stations	5.8%	
Overall	8.1%	52.0%

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
10/11/2021 9:42 AM	20.230				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	9:42 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0001	0.0000	0.0000	0.00	✓
1	9:43 AM	0.500	0.6	0.400	0.6000	0.240	80	-0.0001	1.0000	-0.0001	0.2000	0.0000	0.00	✓
2	9:45 AM	1.000	0.6	0.400	0.6000	0.240	80	0.0029	1.0000	0.0029	0.2000	0.0006	0.15	✓
3	9:47 AM	1.500	0.6	0.500	0.6000	0.300	80	0.1365	1.0000	0.1365	0.2500	0.0341	8.61	✓
4	9:48 AM	2.000	0.6	0.400	0.6000	0.240	80	1.0852	1.0000	1.0852	0.2000	0.2170	54.78	✓
5	9:50 AM	2.500	0.6	0.500	0.6000	0.300	80	0.5780	1.0000	0.5780	0.2500	0.1445	36.47	✓
6	9:51 AM	3.000	0.6	0.400	0.6000	0.240	80	0.0003	1.0000	0.0003	0.2000	0.0001	0.01	✓
7	9:52 AM	3.500	0.6	0.200	0.6000	0.120	80	-0.0009	1.0000	-0.0009	0.1000	-0.0001	-0.02	✓
8	9:55 AM	4.000	None	0.000	0.0000	0.000	0	0.0000		-0.0009	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:43 AM	0.500	0.6	0.400	0.6000	0.240	Boundary Interference,Beam SNRs Not Similar
2	9:45 AM	1.000	0.6	0.400	0.6000	0.240	Boundary Interference,Beam SNRs Not Similar
3	9:47 AM	1.500	0.6	0.500	0.6000	0.300	Low SNR,Beam SNRs Not Similar,Large SNR Variation,SNR Threshold Variation,High % Spikes
4	9:48 AM	2.000	0.6	0.400	0.6000	0.240	High Stn % Discharge
5	9:50 AM	2.500	0.6	0.500	0.6000	0.300	High Stn % Discharge
6	9:51 AM	3.000	0.6	0.400	0.6000	0.240	Beam SNRs Not Similar,SNR Threshold Variation
7	9:52 AM	3.500	0.6	0.200	0.6000	0.120	Beam SNRs Not Similar,Large SNR Variation,Rod Angle > QC

Figure 4 Discharge Measurement Summary CC-1

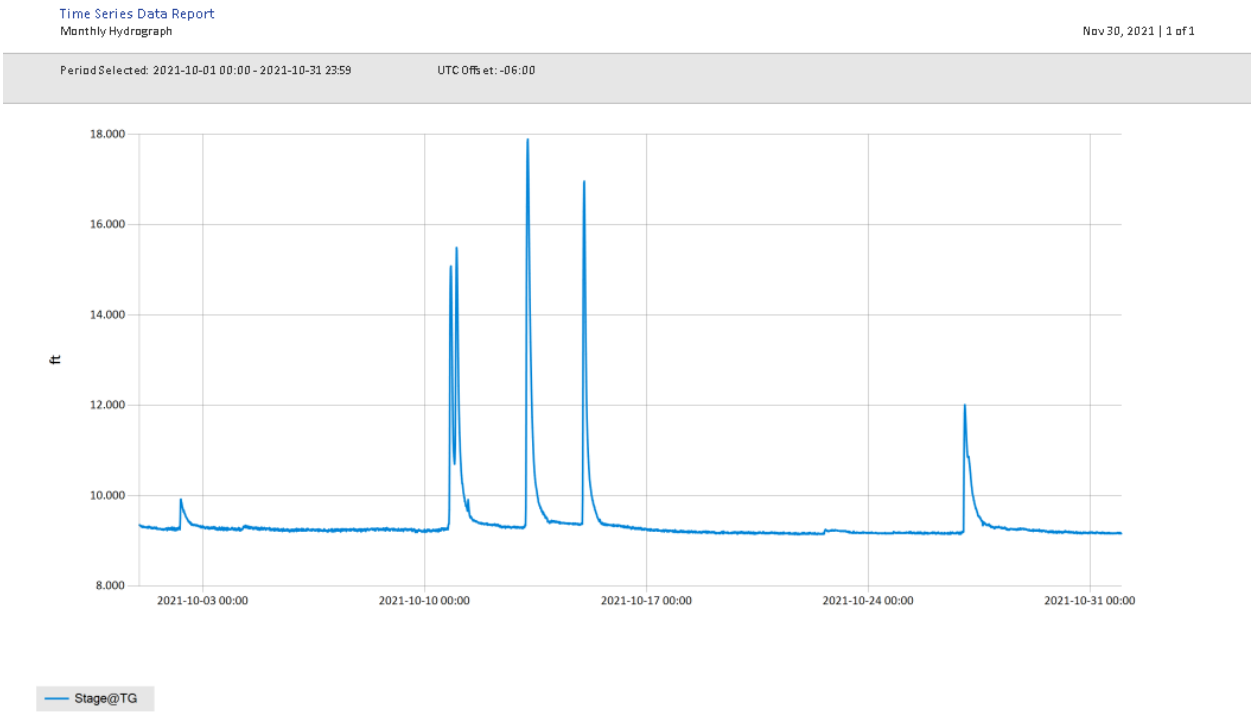


Figure 5 Monthly Hydrograph TG-1

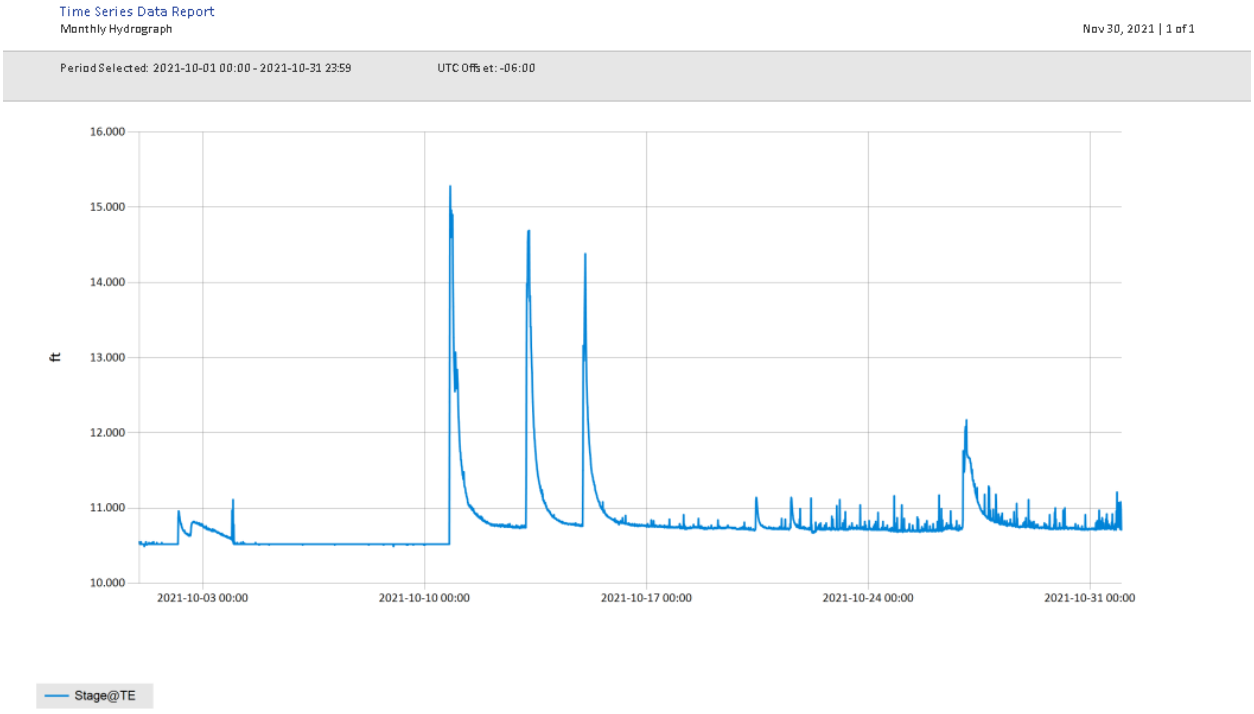


Figure 6 Monthly Hydrograph TE-1

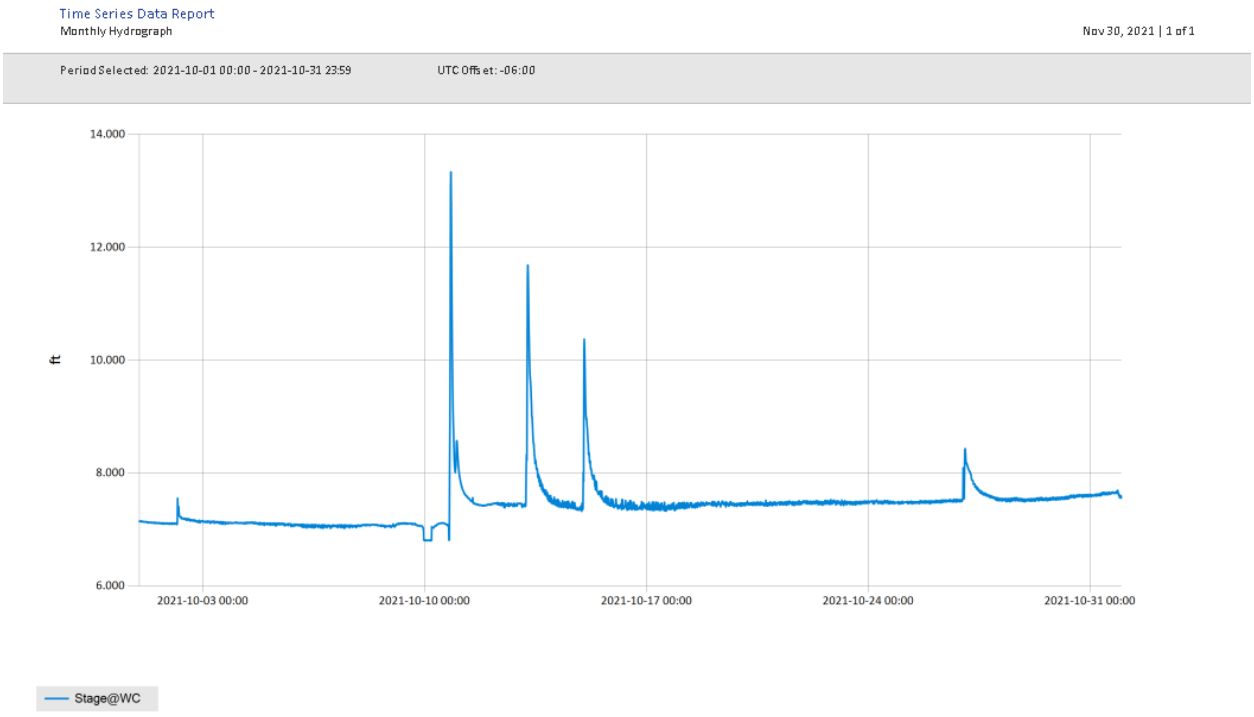


Figure 7 Monthly Hydrograph WC-1

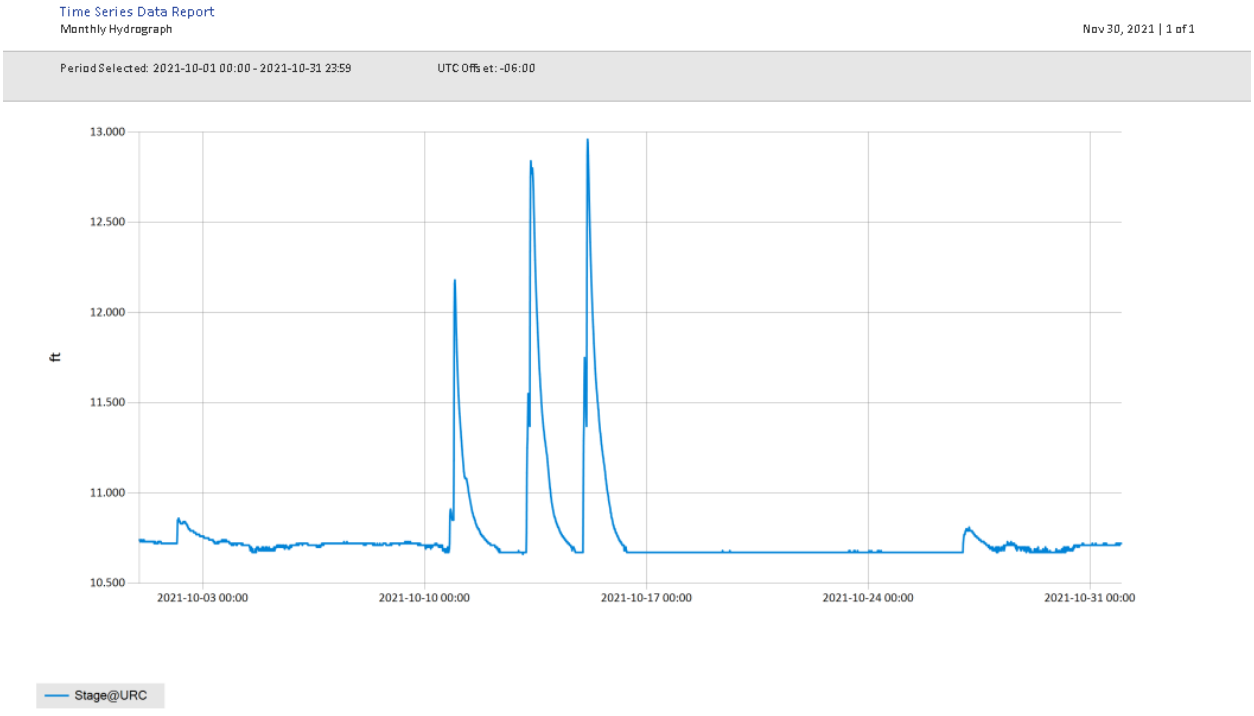


Figure 8 Monthly Hydrograph URC-2

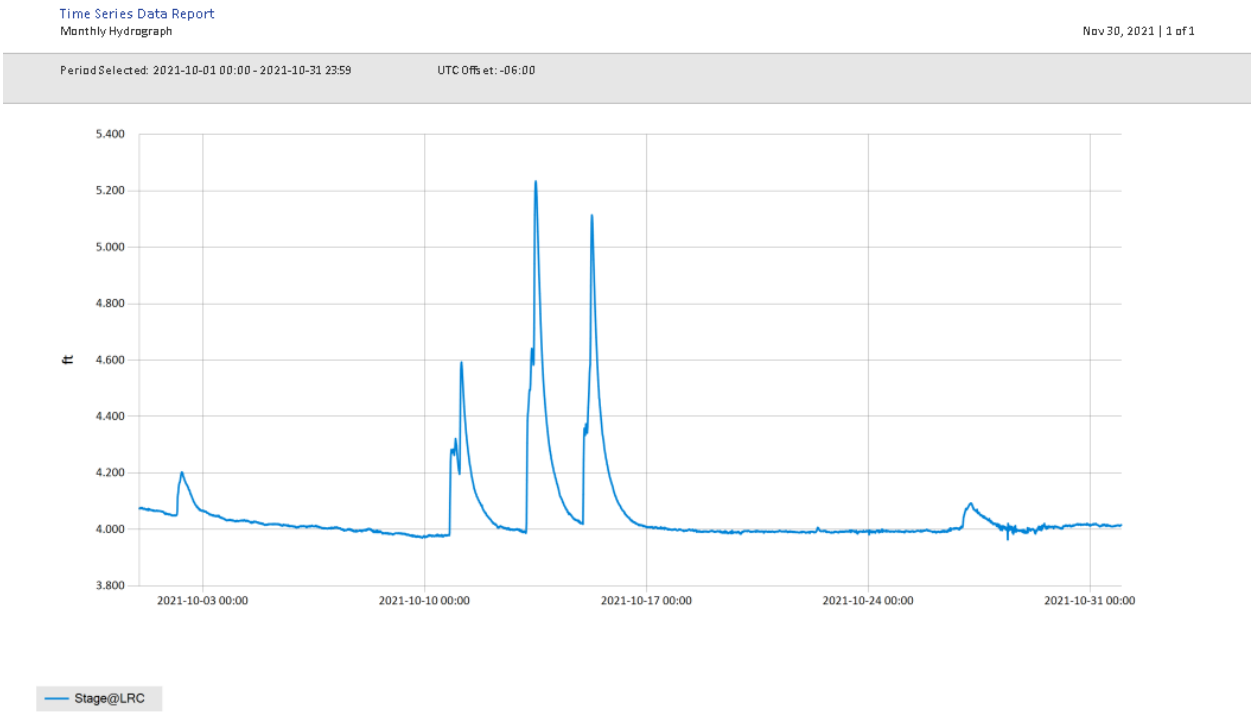


Figure 9 Monthly Hydrograph LRC-1

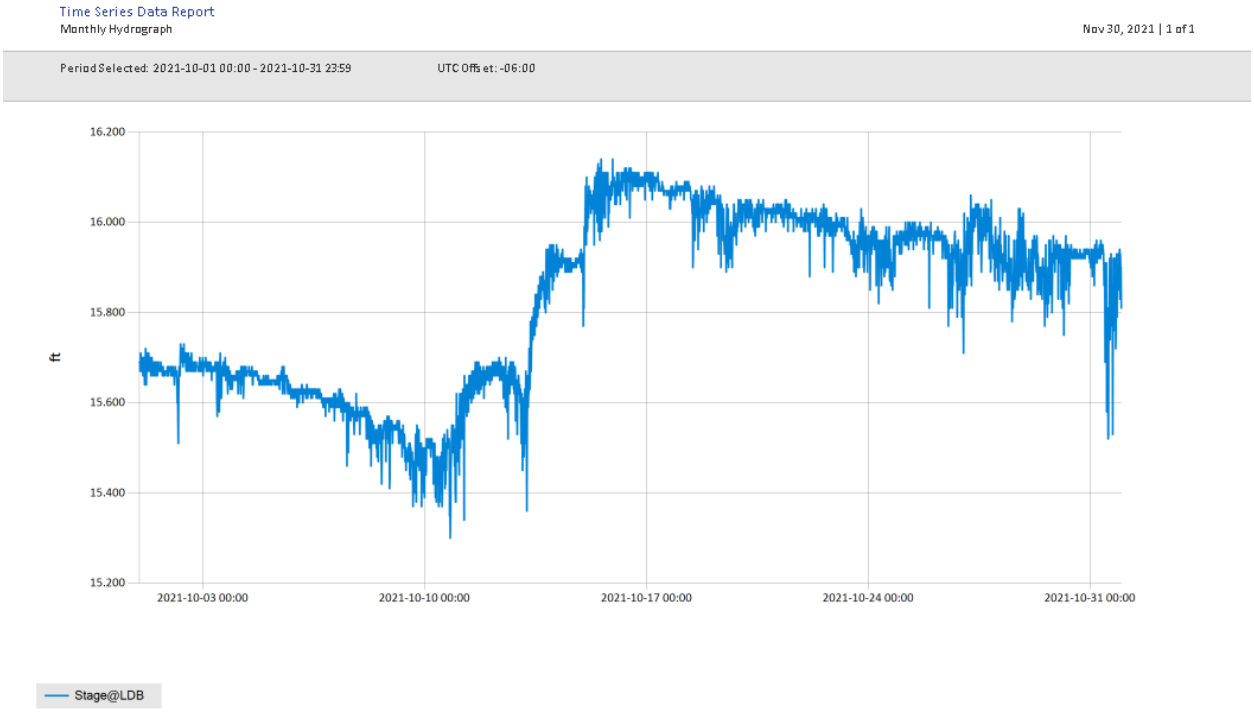


Figure 10 Monthly Hydrograph LDB-1

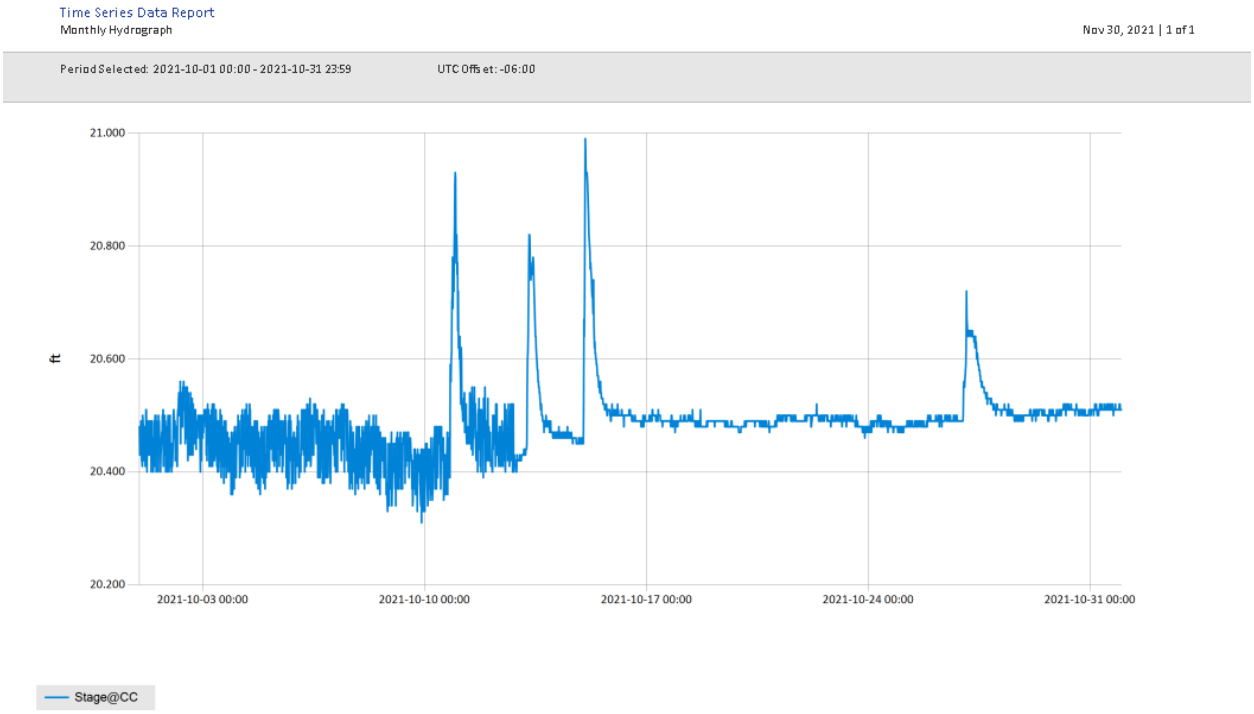


Figure 11 Monthly Hydrograph CC-1

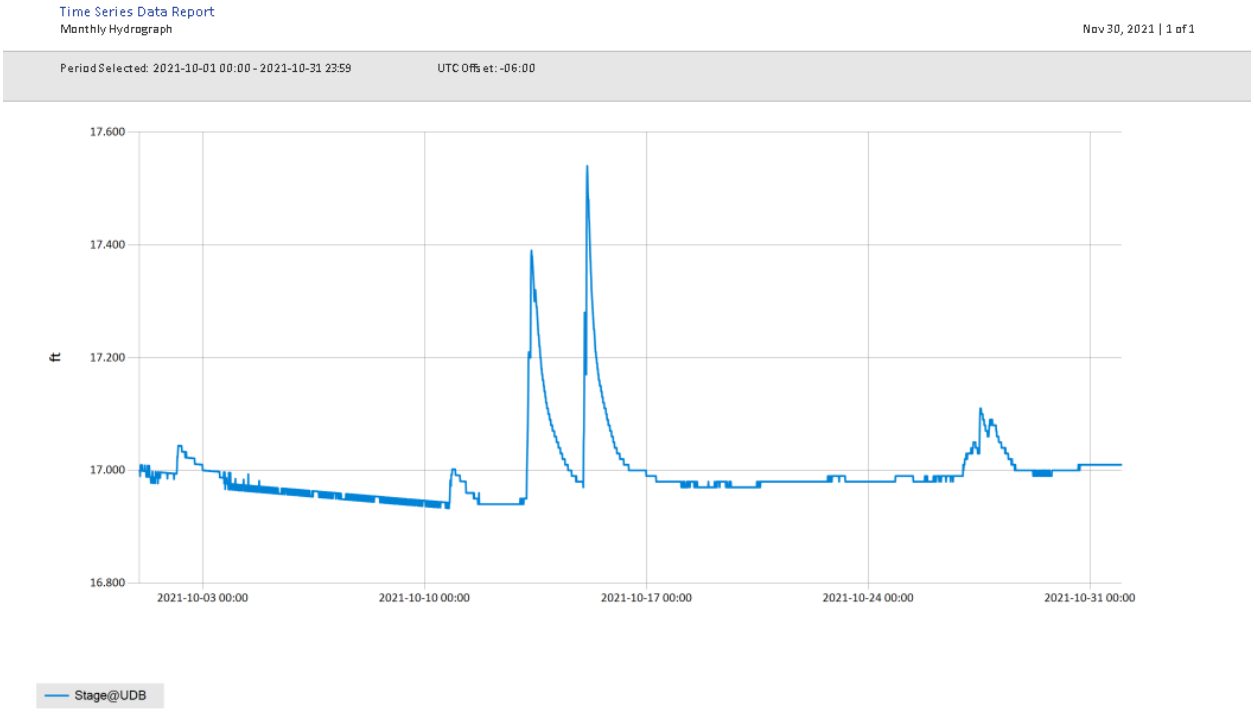


Figure 12 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — October 2021 — Time Zone: Midnight-Midnight CST

(NRMN) Norman — Nearest City: 2.1 NW Norman — County: Cleveland

Latitude: 35-14-09 — Longitude: 97-27-53 — Elevation: 1171 feet

DAY	TEMPERATURE (°F) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	75	60	66.7	62.7	0	3	99	66	88	0.01	28.82	30.07	NNE	3.1	12.5	9.03	71.6	71.2	75	68
2	79	62	68.9	61.8	0	5	98	50	80	0.22	28.79	30.04	WNW	4.0	14.2	16.94	71.5	71.9	77	68
3	82	57	68.0	54.7	0	5	98	28	68	0.01	28.81	30.06	NNW	5.4	23.8	20.47	70.3	71.9	79	66
4	86	54	69.1	49.2	0	5	90	20	56	0.00	28.82	30.07	E	3.8	15.1	20.27	68.4	72.0	81	64
5	82	52	66.7	50.2	0	2	94	31	61	0.00	28.86	30.11	ENE	4.5	18.2	19.94	67.9	72.2	80	65
6	82	53	66.9	53.3	0	3	93	33	65	0.00	28.82	30.07	NNW	3.8	16.4	18.84	67.6	72.5	81	65
7	89	52	71.6	55.0	0	6	95	31	61	0.00	28.77	30.02	S	6.2	22.7	16.62	68.1	72.6	80	66
8	94	67	79.3	58.0	0	16	73	27	51	0.00	28.68	29.93	S	11.0	27.0	18.14	70.7	75.4	82	70
9	92	68	79.5	57.0	0	15	72	27	48	0.00	28.57	29.82	S	12.5	30.2	18.58	72.0	76.7	82	72
10	85	57	72.3	62.0	0	6	98	49	72	1.57	28.41	29.64	S	13.5	56.7	13.76	71.4	75.5	80	71
11	78	55	64.8	49.0	0	2	93	27	62	0.00	28.57	29.81	WNW	7.9	26.5	19.30	68.6	69.3	74	65
12	78*	52*	67.0*	57.3*	0*	0*	90*	55*	72*	0.00*	28.59*	29.83*	SE *	12.0*	29.8*	10.19*	67.3*	66.8*	72*	61*
13	76	59	67.2	59.9	0	2	97	53	78	1.25	28.53	29.77	S	8.8	34.8	11.60	68.9	69.5	72	66
14	77	54	65.0	61.1	0	0	98	63	88	0.40	28.60	29.85	SSW	4.8	27.9	9.32	68.1	67.0	71	64
15	68	48	60.1	46.3	7	0	97	33	64	0.41	28.84	30.09	N	12.5	33.8	17.89	66.7	65.0	68	60
16	70	42	55.4	37.7	9	0	91	22	58	0.00	29.08	30.33	NW	4.2	22.0	18.89	63.1	59.9	66	54
17	76	44	59.4	40.1	5	0	90	24	54	0.00	28.99	30.24	SSW	5.8	18.6	18.31	62.1	60.8	69	54
18	73	47	60.3	41.8	5	0	78	31	53	0.00	28.82	30.07	S	8.0	23.4	17.68	62.2	61.8	69	55
19	79	57	66.8	52.4	0	3	73	47	60	0.00	28.72	29.96	SSE	11.4	27.6	17.23	63.8	65.5	73	59
20	73	49	63.2	52.5	4	0	88	43	70	0.00	28.83	30.08	S	7.6	21.6	9.91	64.5	65.8	70	63
21	72	43	58.8	42.8	7	0	92	31	60	0.00	28.94	30.20	ENE	4.1	13.8	17.15	62.3	63.4	71	56
22	78	51	63.6	50.5	1	0	88	44	64	0.01	28.79	30.04	SSE	5.8	19.6	10.61	62.6	64.0	69	60
23	84	64	73.1	62.1	0	9	89	49	70	0.00	28.55	29.79	S	11.3	27.2	15.39	65.1	68.2	75	63
24	82	53	69.6	59.4	0	3	93	44	72	0.00	28.54	29.78	S	10.9	30.9	12.55	66.8	70.2	75	66
25	75	49	61.0	51.0	3	0	97	43	72	0.00	28.73	29.98	E	6.4	16.0	16.18	64.4	66.4	73	60
26	78	55	68.7	60.5	0	2	96	64	75	0.34	28.51	29.75	SSE	13.3	44.8	9.93	65.3	67.5	72	63
27	62	55	58.4	50.8	7	0	96	49	77	0.26	28.36	29.60	NW	15.0	45.6	4.79	64.6	63.9	70	58
28	67	52	59.3	32.8	5	0	52	25	38	0.00	28.55	29.79	NW	25.3	53.7	16.15	60.4	57.6	61	54
29	66	43	55.1	28.2	11	0	63	18	37	0.00	28.72	29.97	NNW	17.3	41.7	16.82	58.4	57.7	64	53
30	73	36	53.1	35.4	11	0	88	25	56	0.00	28.68	29.92	S	3.1	12.9	16.30	57.1	57.0	65	49
31	64	43	53.0	43.9	12	0	92	52	72	0.00	28.88	30.13	NE	7.9	21.2	15.48	57.5	58.0	65	53
	77*	53*	64.9*	51.0*	<- Monthly Averages ->						28.72*	29.96*	S *	8.7*	56.7*	15.30*	65.8*	67.0*	73*	62*

Temperature - Highest: 94*
Lowest: 36*

Degree Days - Total HDD: 87*
Total CDD: 85*

Rainfall: Monthly Total: 4.48* in.
Greatest 24 Hr: 1.57* in.

Humidity - Highest: 99*
Lowest: 18*

Number of Days With:

Tmax ≥ 90:	2*	Rainfall ≥ 0.01 inch:	10*
Tmax ≤ 32:	0*	Rainfall ≥ 0.10 inch:	7*
Tmin ≤ 32:	0*	Avg Wind Speed ≥ 10 mph:	12*
Tmin ≤ 0:	0*	Max Wind Speed ≥ 30 mph:	9*

* Denotes incomplete record

Figure 13 October Mesonet Data

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

SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

November 2021 Monitoring Report

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

Contact
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SUMMARY OF NOVEMBER WATER QUALITY SAMPLING

Sampling for November 2021 occurred on the eighth and was a base flow collection. Water samples were collected at eight locations and discharge measurements were collected at five locations. Samples were not collected at LT-1 because of dry conditions, or JB-1 due to construction activity. Mesonet data shows no precipitation on the eighth, in the 72 hours prior to sampling, or in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of November was 0.41 inches. All water level gauges were operational for the month, except for JB-1 due to road construction. The gauge at LT-1 was removed in 2018 as a result of equipment malfunction. The equipment has not been replaced due to intermittent streamflow and dry conditions. Furthermore, this station is being reviewed for a possible location change.

RESULTS

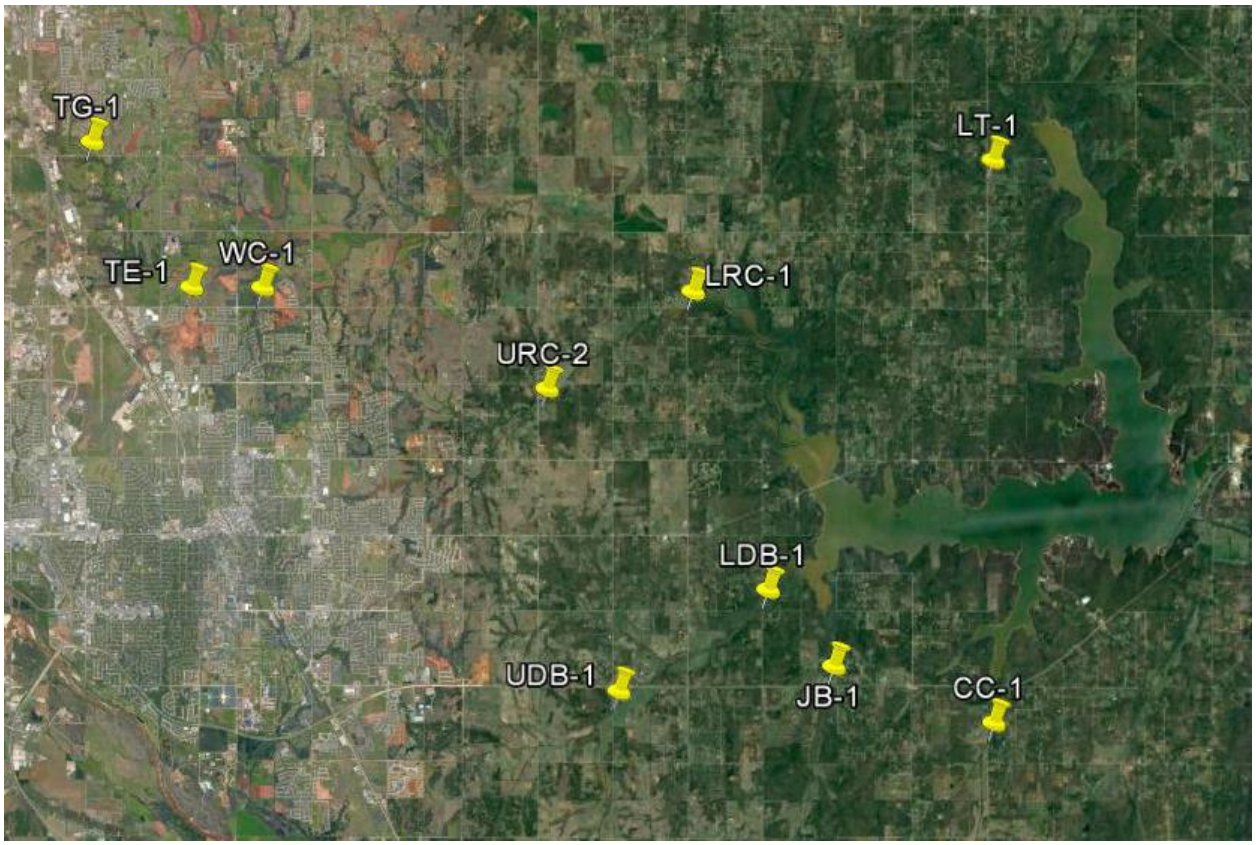


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/l)	pH	Specific Conductance (mS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	11/8/2021	9:15	SD	12.52	8.36	7.72	696	17	Low/normal conditions
JB-1	Jim Blue Creek	11/8/2021	9:35	SD	N/A	N/A	N/A	N/A	N/A	Active construction at site, did not sample. Looks as if channel has been disconnected where sampling usually occurred
LDB-1	Lower Dave Blue Creek	11/8/2021	9:45	SD	11.55	4.98	7.69	856	7	Low water level, less turbid than usual, minimal visual flow
LRC-1	Lower Rock Creek	11/8/2021	10:55	SD	12.81	7.90	7.74	742	8	Minimal visual flow, orifice clear
LT-1	Lake Laterals	11/8/2021	10:15	SD	N/A	N/A	N/A	N/A	N/A	Upstream dry, downstream small shallow pool; did not sample
TE-1	Little River Tributary	11/8/2021	12:45	SD	15.45	9.52	7.50	724	11	Very minimal flow, barely connected on downstream, scum visible on upstream; bubbler bouncing between ~11.23-10.75
TG-1	Little River Tributary	11/8/2021	13:25	SD	14.11	9.02	7.62	768	5	Low/normal flow, lots of floating leaf debris
UDB-1	Upper Dave Blue Creek	11/8/2021	8:25	SD	11.68	5.95	7.65	965	5	Low water/flow level
URC-2	Upper Rock Creek	11/8/2021	11:35	SD	13.54	5.50	7.41	807	19	Very minimal visual flow, orifice just barely under water
WC-1	Woodcrest Creek	11/8/2021	12:15	SD	14.10	4.68	7.19	645	31	Very minimal visual flow, beaver activity under bridge

Table 1 Field Data Form

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
CC-1	Clear Creek	0.06	0.22	0.039	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.32	0.076	<5.0
LRC-1	Lower Rock Creek	<0.05	0.24	0.041	8.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	<0.05	0.43	0.030	<5.0
TG-1	Little River Tributary	0.08	0.41	0.057	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.25	0.067	<5.0
URC-2	Upper Rock Creek	<0.05	0.55	0.109	7.0
WC-1	Woodcrest Creek	<0.05	0.54	0.120	14.0

Table 2 Laboratory Analysis Summary

Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
Field Blank	<0.05	<0.10	<0.010	<5.0
Duplicate	0.06	0.24	0.040	<5.0
Duplicate RPD	0%	8.70%	2.53%	0%

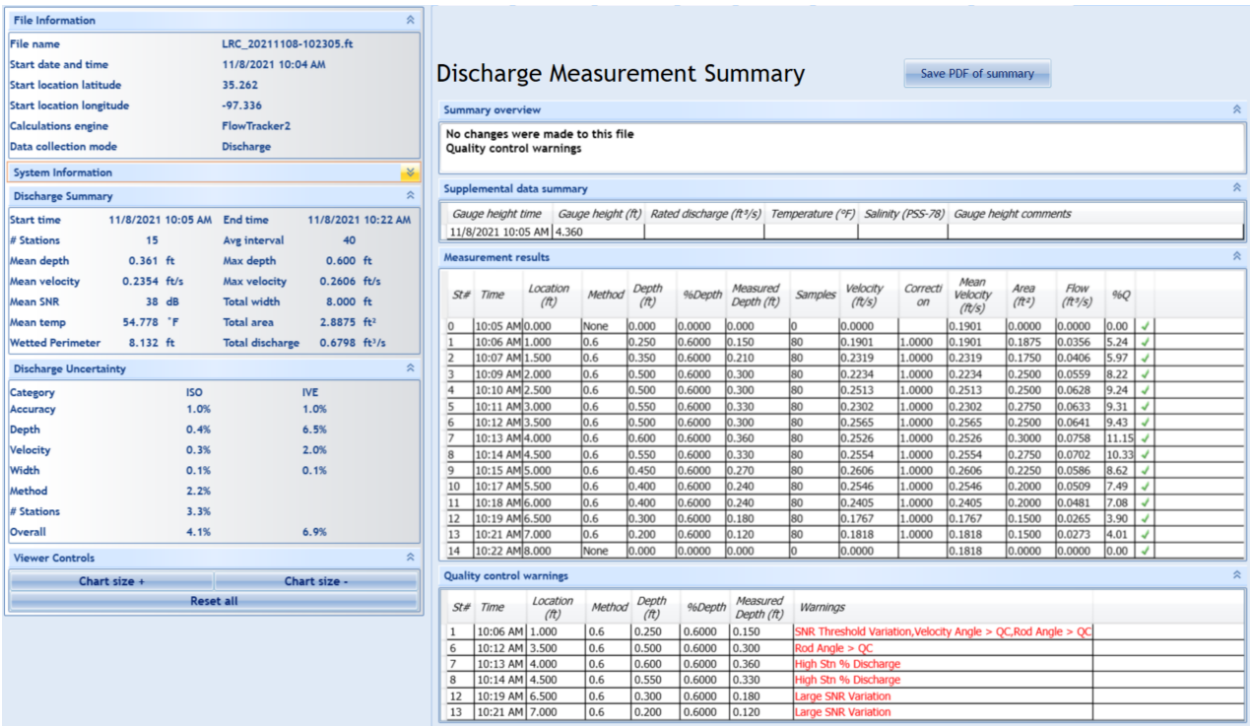
Table 3 QA/QC Data

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues, and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.67	20.46
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	1.63	16.01
LRC-1	Lower Rock Creek	0.68	4.36
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.03	11.04
TG-1	Little River Tributary	0.69	9.12
UDB-1	Upper Dave Blue Creek	0.16	17.38
URC-2	Upper Rock Creek	0.16	10.93
WC-1	Woodcrest Creek	0.06	7.63

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	LRC_20211108-102305.ft
Start date and time	11/8/2021 10:04 AM
Start location latitude	35.262
Start location longitude	-97.336
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	11/8/2021 10:05 AM	End time	11/8/2021 10:22 AM
# Stations	15	Avg interval	40
Mean depth	0.361 ft	Max depth	0.600 ft
Mean velocity	0.2354 ft/s	Max velocity	0.2606 ft/s
Mean SNR	38 dB	Total width	8.000 ft
Mean temp	54.778 °F	Total area	2.8875 ft²
Wetted Perimeter	8.132 ft	Total discharge	0.6798 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.4%	6.5%
Velocity	0.3%	2.0%
Width	0.1%	0.1%
Method	2.2%	
# Stations	3.3%	
Overall	4.1%	6.9%

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
11/8/2021 10:05 AM	4.360				

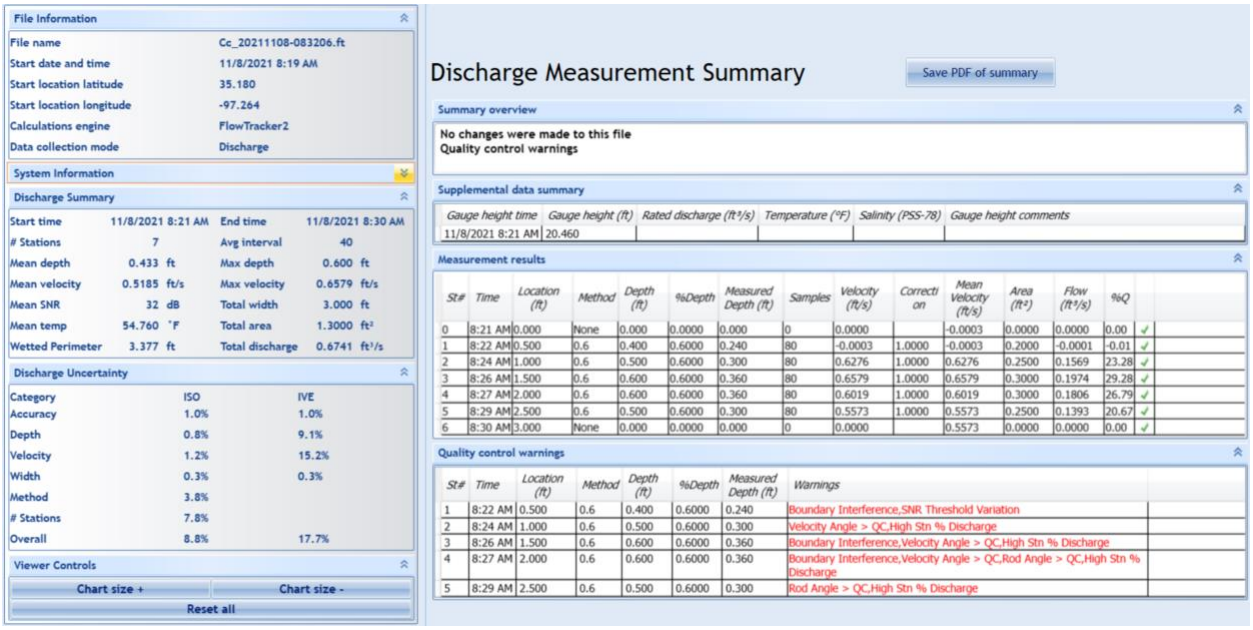
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	10:05 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.1901	0.0000	0.0000	0.00	✓
1	10:06 AM	1.000	0.6	0.250	0.6000	0.150	80	0.1901	1.0000	0.1901	0.1875	0.0356	5.24	✓
2	10:07 AM	1.500	0.6	0.350	0.6000	0.210	80	0.2319	1.0000	0.2319	0.1750	0.0406	5.97	✓
3	10:09 AM	2.000	0.6	0.500	0.6000	0.300	80	0.2234	1.0000	0.2234	0.2500	0.0559	8.22	✓
4	10:10 AM	2.500	0.6	0.500	0.6000	0.300	80	0.2513	1.0000	0.2513	0.2500	0.0628	9.24	✓
5	10:11 AM	3.000	0.6	0.550	0.6000	0.330	80	0.2302	1.0000	0.2302	0.2750	0.0633	9.31	✓
6	10:12 AM	3.500	0.6	0.500	0.6000	0.300	80	0.2565	1.0000	0.2565	0.2500	0.0641	9.43	✓
7	10:13 AM	4.000	0.6	0.600	0.6000	0.360	80	0.2526	1.0000	0.2526	0.3000	0.0758	11.15	✓
8	10:14 AM	4.500	0.6	0.550	0.6000	0.330	80	0.2554	1.0000	0.2554	0.2750	0.0702	10.33	✓
9	10:15 AM	5.000	0.6	0.450	0.6000	0.270	80	0.2606	1.0000	0.2606	0.2250	0.0586	8.62	✓
10	10:17 AM	5.500	0.6	0.400	0.6000	0.240	80	0.2546	1.0000	0.2546	0.2000	0.0509	7.49	✓
11	10:18 AM	6.000	0.6	0.400	0.6000	0.240	80	0.2405	1.0000	0.2405	0.2000	0.0481	7.08	✓
12	10:19 AM	6.500	0.6	0.300	0.6000	0.180	80	0.1767	1.0000	0.1767	0.1500	0.0265	3.90	✓
13	10:21 AM	7.000	0.6	0.200	0.6000	0.120	80	0.1818	1.0000	0.1818	0.1500	0.0273	4.01	✓
14	10:22 AM	8.000	None	0.000	0.0000	0.000	0	0.0000		0.1818	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	10:06 AM	1.000	0.6	0.250	0.6000	0.150	SNR Threshold Variation,Velocity Angle > QC,Rod Angle > QC
6	10:12 AM	3.500	0.6	0.500	0.6000	0.300	Rod Angle > QC
7	10:13 AM	4.000	0.6	0.600	0.6000	0.360	High Stn % Discharge
8	10:14 AM	4.500	0.6	0.550	0.6000	0.330	High Stn % Discharge
12	10:19 AM	6.500	0.6	0.300	0.6000	0.180	Large SNR Variation
13	10:21 AM	7.000	0.6	0.200	0.6000	0.120	Large SNR Variation

Figure 2 Discharge Measurement Summary LRC-1



File Information

File name	Cc_20211108-083206.ft
Start date and time	11/8/2021 8:19 AM
Start location latitude	35.180
Start location longitude	-97.264
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	11/8/2021 8:21 AM	End time	11/8/2021 8:30 AM
# Stations	7	Avg interval	40
Mean depth	0.433 ft	Max depth	0.600 ft
Mean velocity	0.5185 ft/s	Max velocity	0.6579 ft/s
Mean SNR	32 dB	Total width	3.000 ft
Mean temp	54.760 °F	Total area	1.3000 ft²
Wetted Perimeter	3.377 ft	Total discharge	0.6741 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.8%	9.1%
Velocity	1.2%	15.2%
Width	0.3%	0.3%
Method	3.8%	
# Stations	7.8%	
Overall	8.8%	17.7%

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
11/8/2021 8:21 AM	20.460				

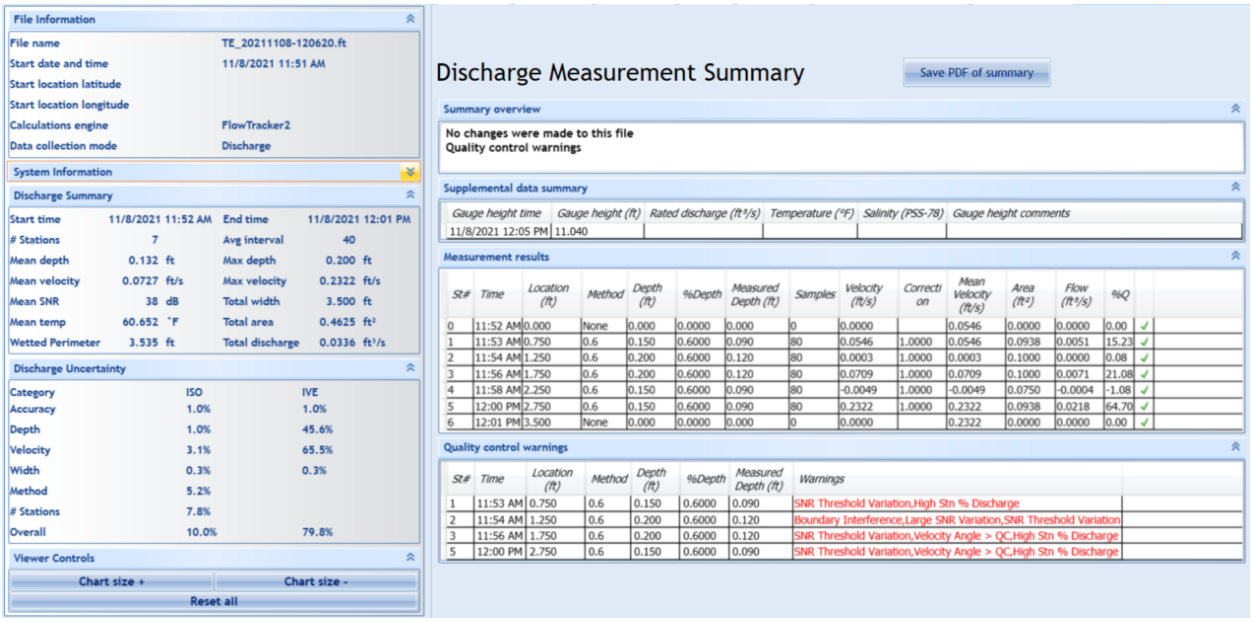
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	8:21 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0003	0.0000	0.0000	0.00	✓
1	8:22 AM	0.500	0.6	0.400	0.6000	0.240	80	-0.0003	1.0000	-0.0003	0.2000	-0.0001	-0.01	✓
2	8:24 AM	1.000	0.6	0.500	0.6000	0.300	80	0.6276	1.0000	0.6276	0.2500	0.1569	23.28	✓
3	8:26 AM	1.500	0.6	0.600	0.6000	0.360	80	0.6579	1.0000	0.6579	0.3000	0.1974	29.28	✓
4	8:27 AM	2.000	0.6	0.600	0.6000	0.360	80	0.6019	1.0000	0.6019	0.3000	0.1806	26.79	✓
5	8:29 AM	2.500	0.6	0.500	0.6000	0.300	80	0.5573	1.0000	0.5573	0.2500	0.1393	20.67	✓
6	8:30 AM	3.000	None	0.000	0.0000	0.000	0	0.0000		0.5573	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	8:22 AM	0.500	0.6	0.400	0.6000	0.240	Boundary Interference,SNR Threshold Variation
2	8:24 AM	1.000	0.6	0.500	0.6000	0.300	Velocity Angle > QC,High Stn % Discharge
3	8:26 AM	1.500	0.6	0.600	0.6000	0.360	Boundary Interference,Velocity Angle > QC,High Stn % Discharge
4	8:27 AM	2.000	0.6	0.600	0.6000	0.360	Boundary Interference,Velocity Angle > QC,Rod Angle > QC,High Stn % Discharge
5	8:29 AM	2.500	0.6	0.500	0.6000	0.300	Rod Angle > QC,High Stn % Discharge

Figure 3 Discharge Measurement Summary CC-1



File Information

File name	TE_20211108-120620.ft
Start date and time	11/8/2021 11:51 AM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	11/8/2021 11:52 AM	End time	11/8/2021 12:01 PM
# Stations	7	Avg interval	40
Mean depth	0.132 ft	Max depth	0.200 ft
Mean velocity	0.0727 ft/s	Max velocity	0.2322 ft/s
Mean SNR	38 dB	Total width	3.500 ft
Mean temp	60.652 °F	Total area	0.4625 ft²
Wetted Perimeter	3.535 ft	Total discharge	0.0336 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.0%	45.6%
Velocity	3.1%	65.5%
Width	0.3%	0.3%
Method	5.2%	
# Stations	7.8%	
Overall	10.0%	79.8%

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
11/8/2021 12:05 PM	11.040				

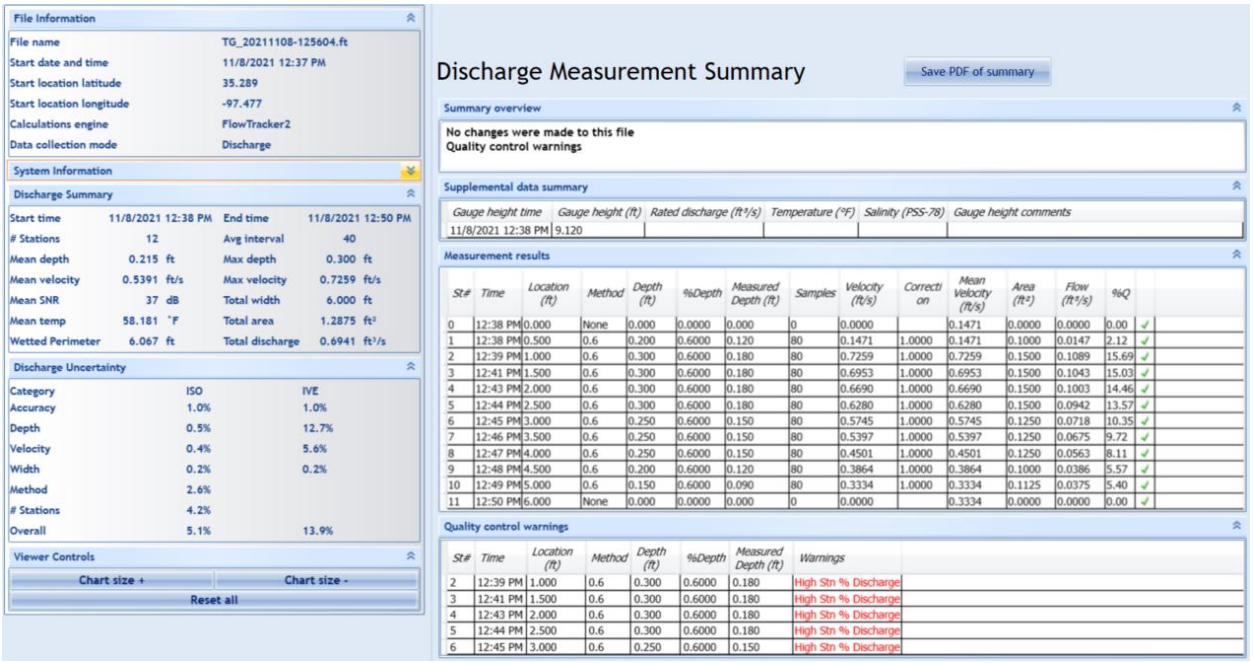
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:52 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0546	0.0000	0.0000	0.00	✓
1	11:53 AM	0.750	0.6	0.150	0.6000	0.090	80	0.0546	1.0000	0.0546	0.0938	0.0051	15.23	✓
2	11:54 AM	1.250	0.6	0.200	0.6000	0.120	80	0.0003	1.0000	0.0003	0.1000	0.0000	0.08	✓
3	11:56 AM	1.750	0.6	0.200	0.6000	0.120	80	0.0709	1.0000	0.0709	0.1000	0.0071	21.08	✓
4	11:58 AM	2.250	0.6	0.150	0.6000	0.090	80	-0.0049	1.0000	-0.0049	0.0750	-0.0004	-1.08	✓
5	12:00 PM	2.750	0.6	0.150	0.6000	0.090	80	0.2322	1.0000	0.2322	0.0938	0.0218	64.70	✓
6	12:01 PM	3.500	None	0.000	0.0000	0.000	0	0.0000		0.2322	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	11:53 AM	0.750	0.6	0.150	0.6000	0.090	SNR Threshold Variation,High Stn % Discharge
2	11:54 AM	1.250	0.6	0.200	0.6000	0.120	Boundary Interference,Large SNR Variation,SNR Threshold Variation
3	11:56 AM	1.750	0.6	0.200	0.6000	0.120	SNR Threshold Variation,Velocity Angle > QC,High Stn % Discharge
5	12:00 PM	2.750	0.6	0.150	0.6000	0.090	SNR Threshold Variation,Velocity Angle > QC,High Stn % Discharge

Figure 4 Discharge Measurement Summary TE-1



File Information

File name	TG_20211108-125604.ft
Start date and time	11/8/2021 12:37 PM
Start location latitude	35.289
Start location longitude	-97.477
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	11/8/2021 12:38 PM	End time	11/8/2021 12:50 PM
# Stations	12	Avg interval	40
Mean depth	0.215 ft	Max depth	0.300 ft
Mean velocity	0.5391 ft/s	Max velocity	0.7259 ft/s
Mean SNR	37 dB	Total width	6.000 ft
Mean temp	58.181 °F	Total area	1.2875 ft²
Wetted Perimeter	6.067 ft	Total discharge	0.6941 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.5%	12.7%
Velocity	0.4%	5.6%
Width	0.2%	0.2%
Method	2.6%	
# Stations	4.2%	
Overall	5.1%	13.9%

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
11/8/2021 12:38 PM	9.120				

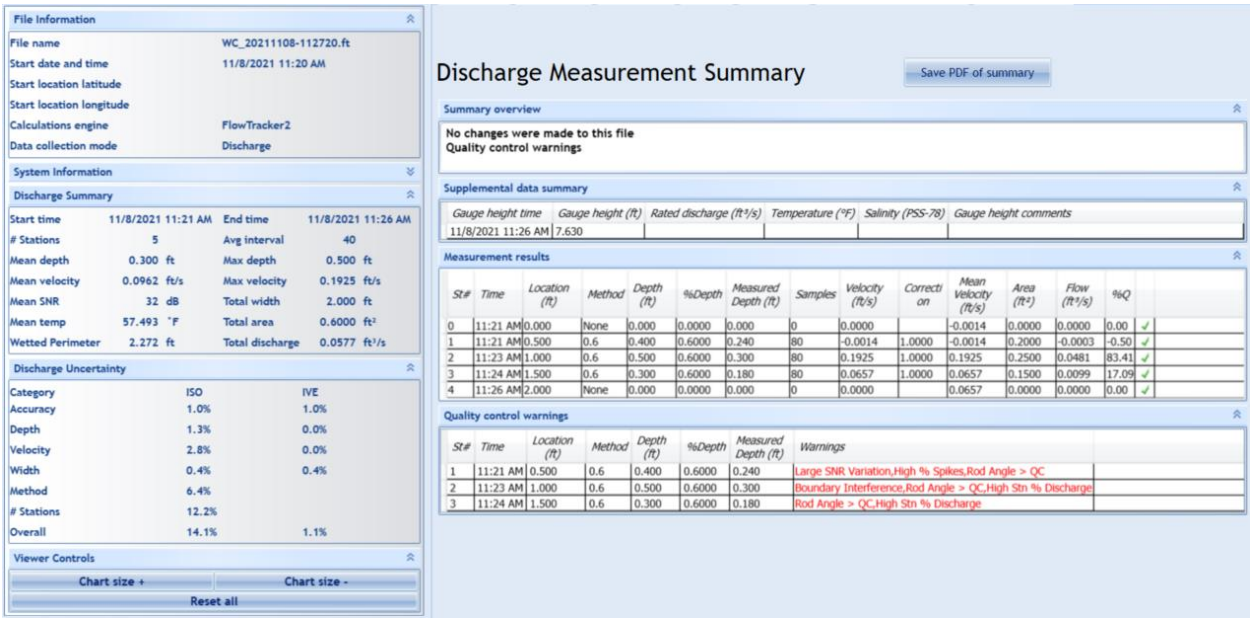
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	12:38 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.1471	0.0000	0.0000	0.00	✓
1	12:38 PM	0.500	0.6	0.200	0.6000	0.120	80	0.1471	1.0000	0.1471	0.1000	0.0147	2.12	✓
2	12:39 PM	1.000	0.6	0.300	0.6000	0.180	80	0.7259	1.0000	0.7259	0.1500	0.1089	15.69	✓
3	12:41 PM	1.500	0.6	0.300	0.6000	0.180	80	0.6953	1.0000	0.6953	0.1500	0.1043	15.03	✓
4	12:43 PM	2.000	0.6	0.300	0.6000	0.180	80	0.6690	1.0000	0.6690	0.1500	0.1003	14.46	✓
5	12:44 PM	2.500	0.6	0.300	0.6000	0.180	80	0.6280	1.0000	0.6280	0.1500	0.0942	13.57	✓
6	12:45 PM	3.000	0.6	0.250	0.6000	0.150	80	0.5745	1.0000	0.5745	0.1250	0.0718	10.35	✓
7	12:46 PM	3.500	0.6	0.250	0.6000	0.150	80	0.5397	1.0000	0.5397	0.1250	0.0675	9.72	✓
8	12:47 PM	4.000	0.6	0.250	0.6000	0.150	80	0.4501	1.0000	0.4501	0.1250	0.0563	8.11	✓
9	12:48 PM	4.500	0.6	0.200	0.6000	0.120	80	0.3864	1.0000	0.3864	0.1000	0.0386	5.57	✓
10	12:49 PM	5.000	0.6	0.150	0.6000	0.090	80	0.3334	1.0000	0.3334	0.1125	0.0375	5.40	✓
11	12:50 PM	6.000	None	0.000	0.0000	0.000	0	0.0000		0.3334	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	12:39 PM	1.000	0.6	0.300	0.6000	0.180	High Stn % Discharge
3	12:41 PM	1.500	0.6	0.300	0.6000	0.180	High Stn % Discharge
4	12:43 PM	2.000	0.6	0.300	0.6000	0.180	High Stn % Discharge
5	12:44 PM	2.500	0.6	0.300	0.6000	0.180	High Stn % Discharge
6	12:45 PM	3.000	0.6	0.250	0.6000	0.150	High Stn % Discharge

Figure 5 Discharge Measurement Summary TG-1



File Information

File name	WC_20211108-112720.ft
Start date and time	11/8/2021 11:20 AM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	11/8/2021 11:21 AM	End time	11/8/2021 11:26 AM
# Stations	5	Avg interval	40
Mean depth	0.300 ft	Max depth	0.500 ft
Mean velocity	0.0962 ft/s	Max velocity	0.1925 ft/s
Mean SNR	32 dB	Total width	2.000 ft
Mean temp	57.493 °F	Total area	0.6000 ft²
Wetted Perimeter	2.272 ft	Total discharge	0.0577 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.3%	0.0%
Velocity	2.8%	0.0%
Width	0.4%	0.4%
Method	6.4%	
# Stations	12.2%	
Overall	14.1%	1.1%

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
11/8/2021 11:26 AM	7.630				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:21 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0014	0.0000	0.0000	0.00	✓
1	11:21 AM	0.500	0.6	0.400	0.6000	0.240	80	-0.0014	1.0000	-0.0014	0.2000	-0.0003	-0.50	✓
2	11:23 AM	1.000	0.6	0.500	0.6000	0.300	80	0.1925	1.0000	0.1925	0.2500	0.0481	83.41	✓
3	11:24 AM	1.500	0.6	0.300	0.6000	0.180	80	0.0657	1.0000	0.0657	0.1500	0.0099	17.09	✓
4	11:26 AM	2.000	None	0.000	0.0000	0.000	0	0.0000		0.0657	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	11:21 AM	0.500	0.6	0.400	0.6000	0.240	Large SNR Variation,High % Spikes,Rod Angle > QC
2	11:23 AM	1.000	0.6	0.500	0.6000	0.300	Boundary Interference,Rod Angle > QC,High Stn % Discharge
3	11:24 AM	1.500	0.6	0.300	0.6000	0.180	Rod Angle > QC,High Stn % Discharge

Figure 6 Discharge Measurement Summary WC-1

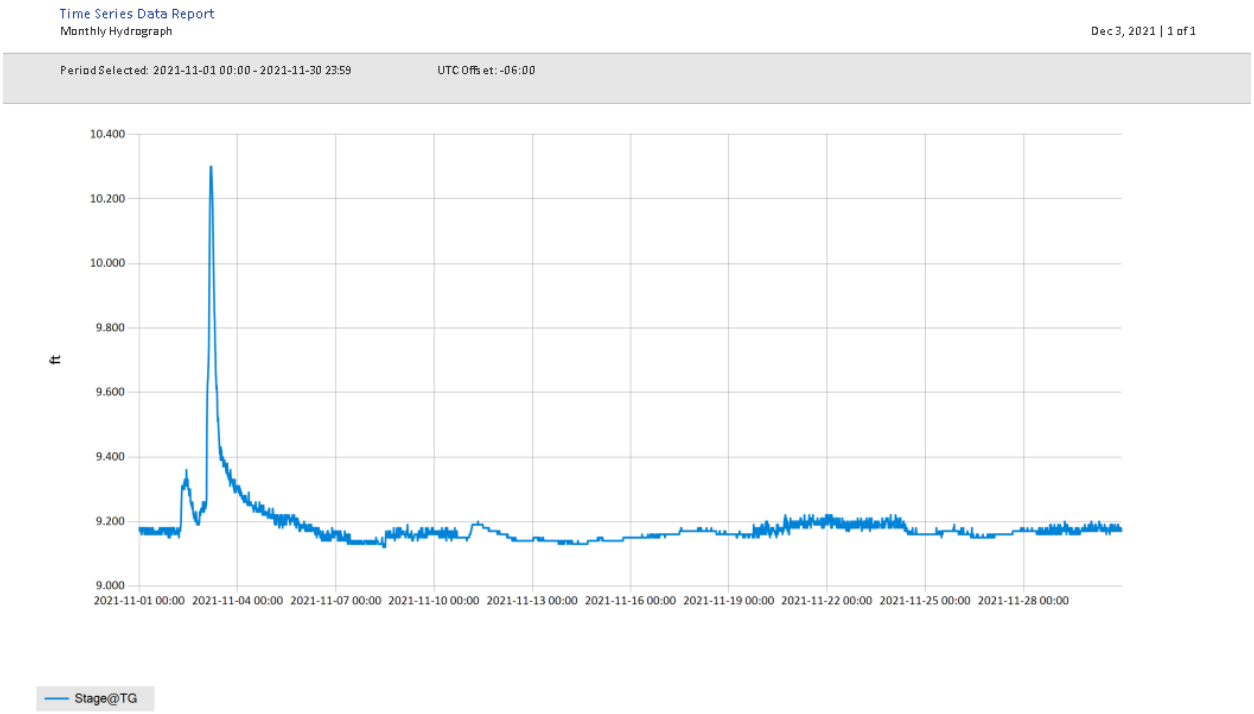


Figure 7 Monthly Hydrograph TG-1

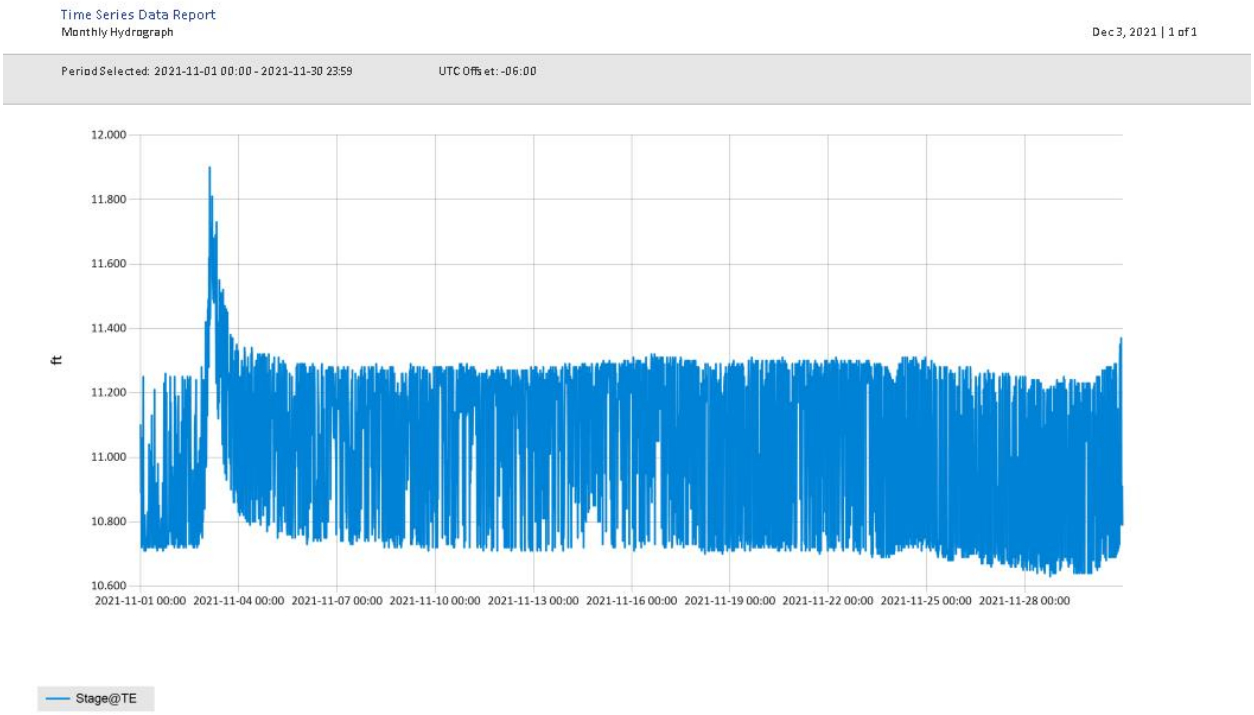


Figure 8 Monthly Hydrograph TE-1

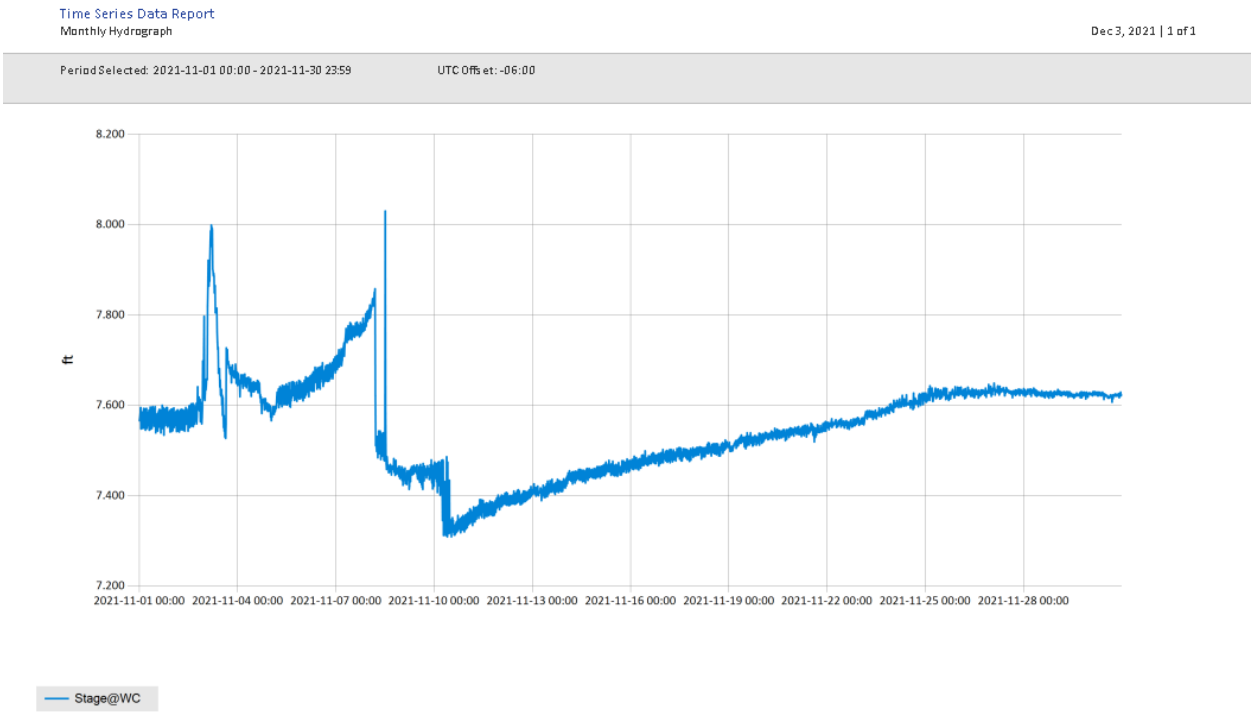


Figure 9 Monthly Hydrograph WC-1

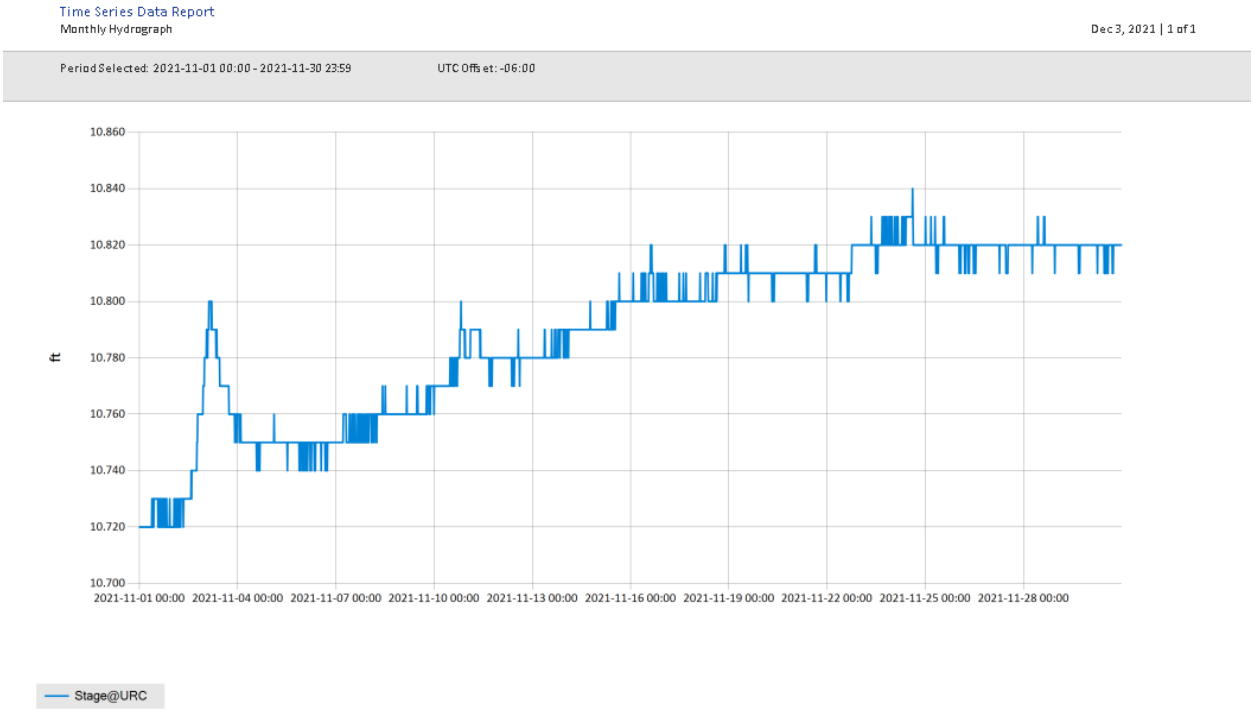


Figure 10 Monthly Hydrograph URC-2

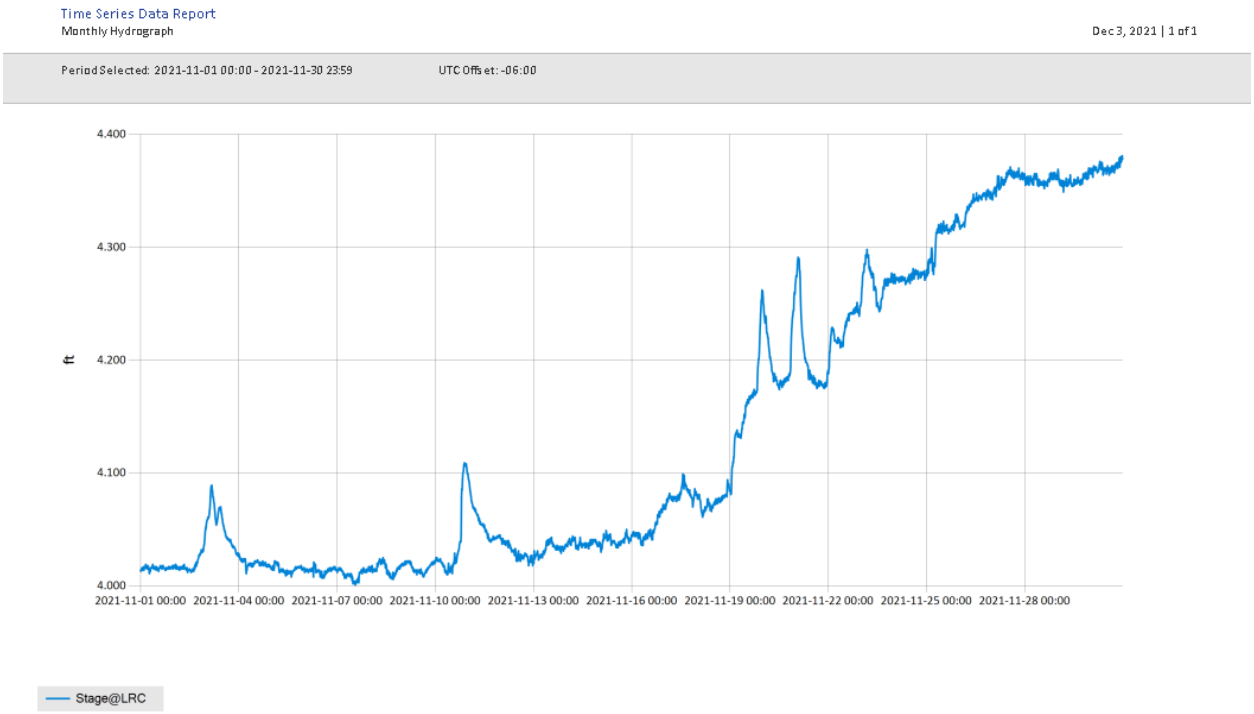


Figure 11 Monthly Hydrograph LRC-1

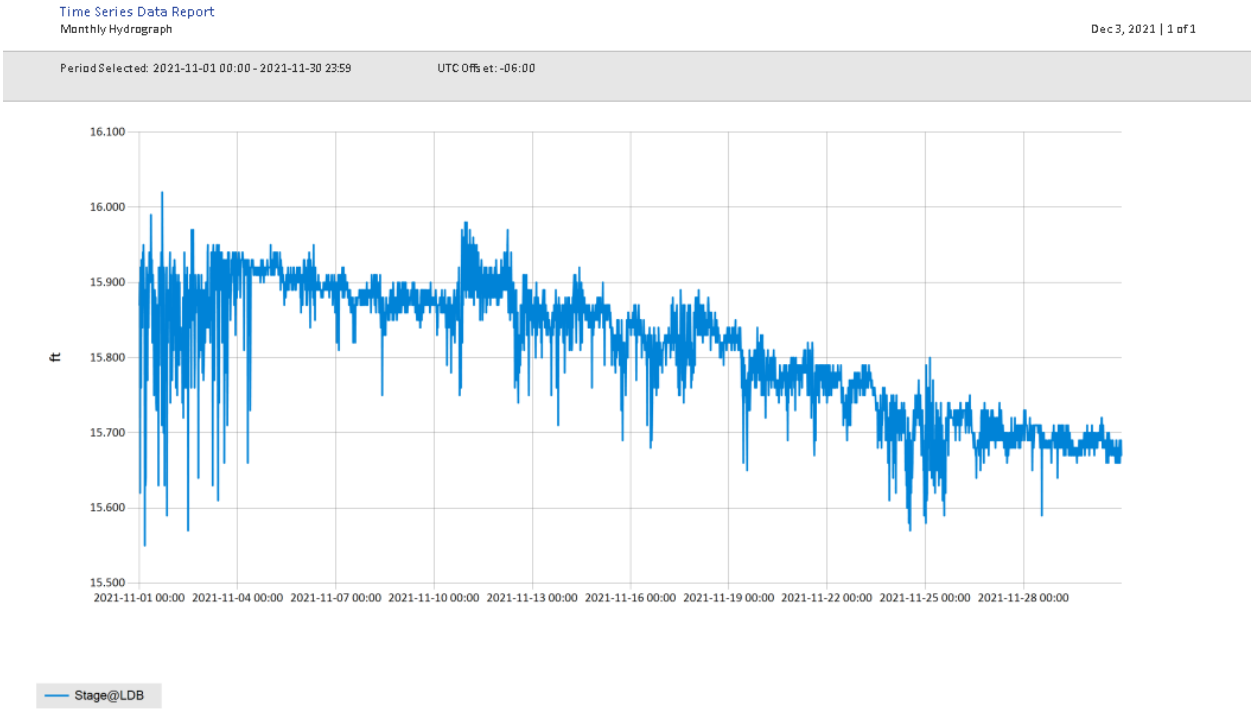


Figure 12 Monthly Hydrograph LDB-1

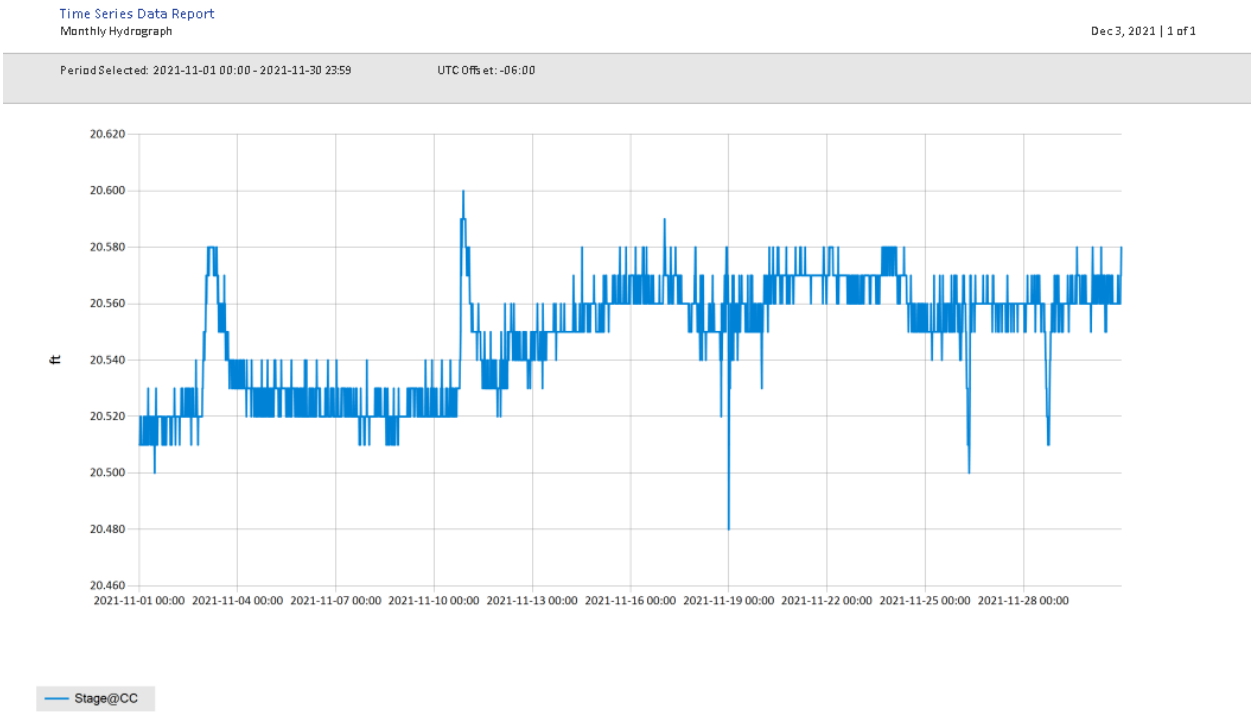


Figure 13 Monthly Hydrograph CC-1

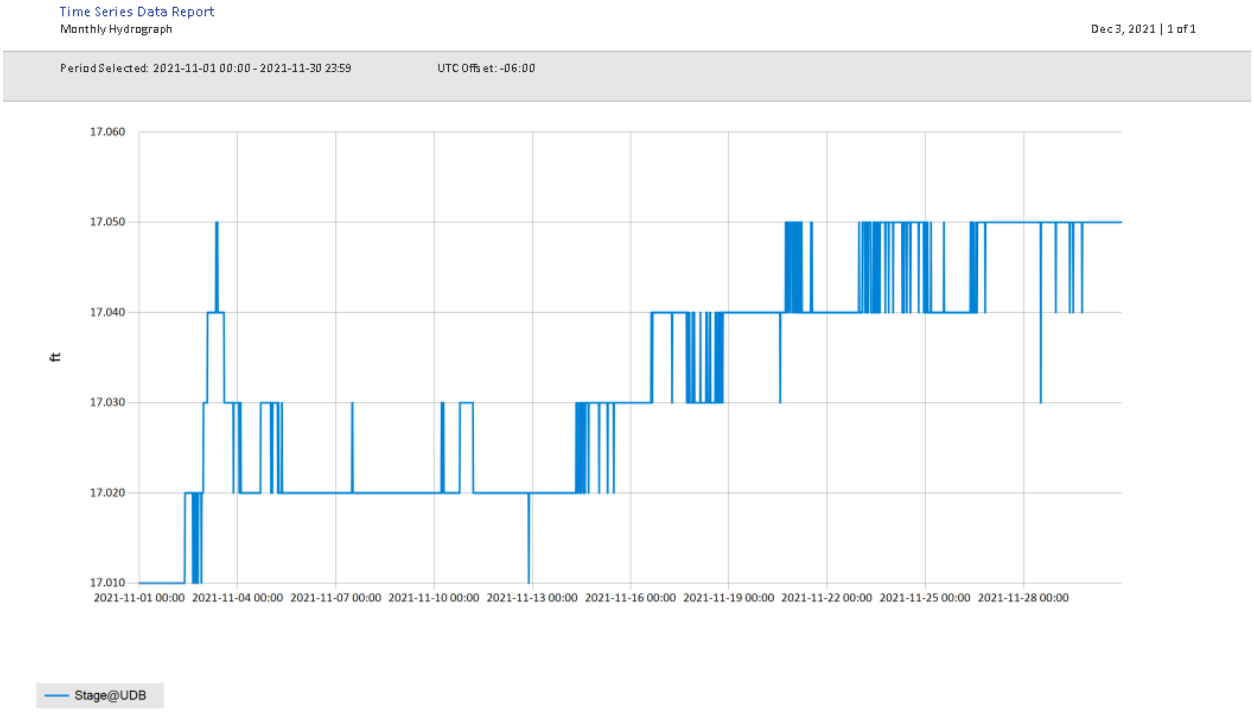


Figure 14 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — November 2021 — Time Zone: Midnight-Midnight CST

(NRMN) Norman — Nearest City: 2.1 NW Norman — County: Cleveland

Latitude: 35-14-09 — Longitude: 97-27-53 — Elevation: 1171 feet

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

Temperature - Highest: 79
Lowest: 25

Degree Days - Total HDD: 389
Total CDD: 2

Rainfall: Monthly Total: 0.41 in.
Greatest 24 Hr: 0.21 in.

Humidity - Highest: 97
Lowest: 16

Number of Days With:

Tmax ≥ 90:	0	Rainfall ≥ 0.01 inch:	2
Tmax ≤ 32:	0	Rainfall ≥ 0.10 inch:	2
Tmin ≤ 32:	6	Avg Wind Speed ≥ 10 mph:	10
Tmin ≤ 0:	0	Max Wind Speed ≥ 30 mph:	6

* Denotes incomplete record

Figure 15 November Mesonet Data

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

SY2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

December 2021 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
Sarah Dexter, Project Leader, sarah.dexter@owrb.ok.gov
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 DECEMBER WATER QUALITY SAMPLING

Sampling for December 2021 occurred on the sixth and was a base flow collection. Water samples were collected at eight locations and discharge measurements were collected at four locations. Samples were not collected at LT-1 because of dry conditions, or JB-1 due to construction activity. Mesonet data shows no precipitation on the sixth, 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 December was 0.22 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

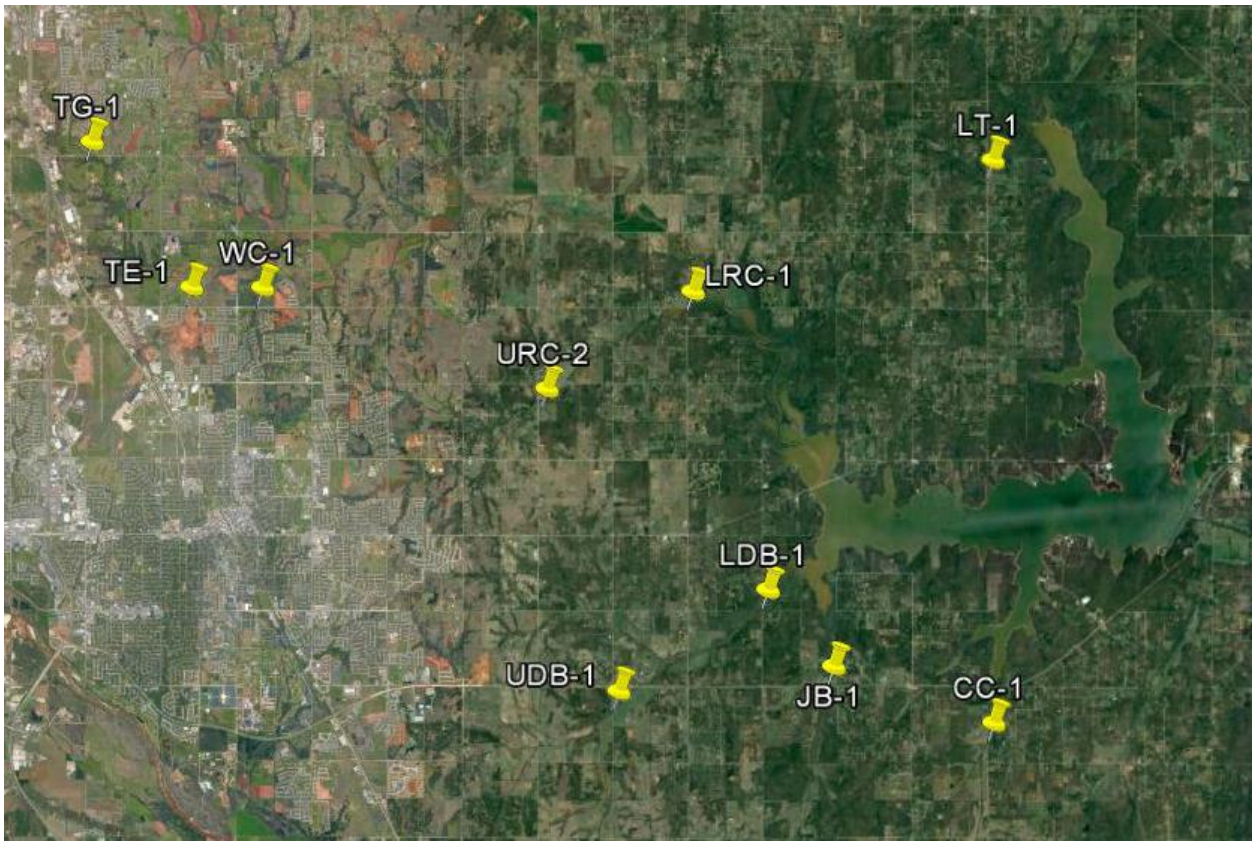


Figure 1 Monitoring Station Map

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	12/6/2021	10:10	SD	8.39	10.40	7.78	690	6	Small amount of oil sheen around rocks on LEW downstream, very similar stage to last month, low/normal conditions, used RP3
JB-1	Jim Blue Creek	12/6/2021	10:50	SD	N/A	N/A	N/A	N/A	N/A	Did not sample, active construction ongoing near channel, channel had water, new concrete culvert
LDB-1	Lower Dave Blue Creek	12/6/2021	11:10	SD	9.39	9.71	7.86	1005	4	Water very clear, minimal flow, very low water level
LRC-1	Lower Rock Creek	12/6/2021	12:10	SD	10.15	9.28	7.66	754	6	Channel more full than usual but still low flow conditions, orifice may have been slightly clogged
LT-1	Lake Laterals	12/6/2021	11:35	SD	N/A	N/A	N/A	N/A	N/A	Did not sample, upstream dry, downstream had shallow disconnected pool
TE-1	Little River Tributary	12/6/2021	15:35	SD	10.24	8.72	7.71	967	44	Very low flow, orifice may be having issues (stage bounces around ~10.65-11.3), similar stage to last month, floating debris is fallen leaves
TG-1	Little River Tributary	12/6/2021	16:20	SD	8.29	10.20	7.73	1208	3	No visible floating debris, although lots of leaves piled up in riffle section, low/normal flow
UDB-1	Upper Dave Blue Creek	12/6/2021	8:45	SD	9.38	7.27	7.67	997	3	Small amount of scum upstream of bridge, low flow, orifice clear
URC-2	Upper Rock Creek	12/6/2021	13:25	SD	8.13	9.54	7.52	881	7	Some scum upstream of bridge, very low flow
WC-1	Woodcrest Creek	12/6/2021	14:30	SD	10.17	6.08	7.42	1078	5	Scum abundant, beaver dam remnants upstream, very similar stage to last month, very low flow, orifice may be clogged

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	0.07	0.20	0.032	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.26	0.025	<5.0
LRC-1	Lower Rock Creek	<0.05	0.21	0.034	<5.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	<0.05	0.62	0.065	25.0
TG-1	Little River Tributary	<0.05	0.31	0.041	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.25	0.045	<5.0
URC-2	Upper Rock Creek	<0.05	0.38	0.049	<5.0
WC-1	Woodcrest Creek	<0.05	0.30	0.086	<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	0.07	0.24	0.032	<5.0
Duplicate RPD	0%	18.18%*	0%	0%

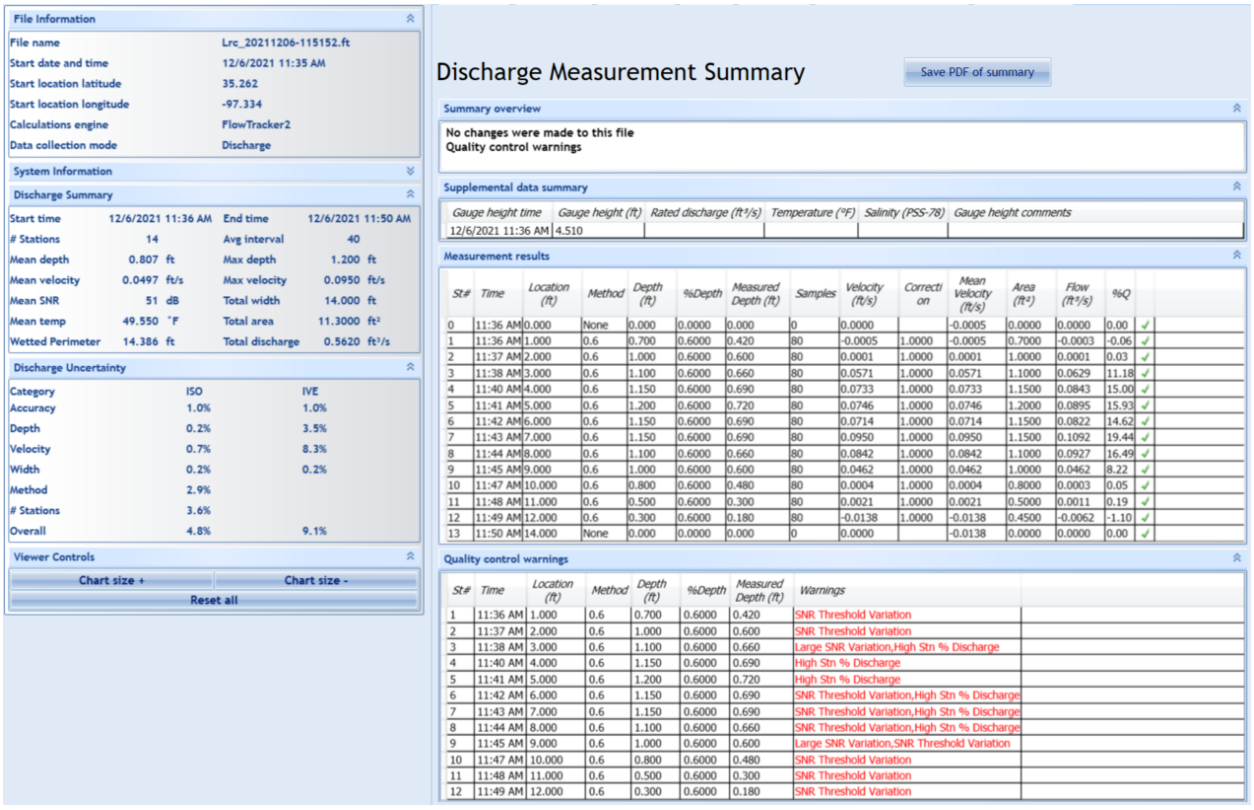
Table 3 QA/QC Data Where the Asterisk Denotes RPD 2

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues, and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.33	20.49
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	1.13	15.60
LRC-1	Lower Rock Creek	0.56	4.51
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	0.01	10.82
TG-1	Little River Tributary	0.60	8.89
UDB-1	Upper Dave Blue Creek	0.32	17.24
URC-2	Upper Rock Creek	0.01	10.76
WC-1	Woodcrest Creek	0.06	7.60

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Lrc_20211206-115152.ft
Start date and time	12/6/2021 11:35 AM
Start location latitude	35.262
Start location longitude	-97.334
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	12/6/2021 11:36 AM	End time	12/6/2021 11:50 AM
# Stations	14	Avg interval	40
Mean depth	0.807 ft	Max depth	1.200 ft
Mean velocity	0.0497 ft/s	Max velocity	0.0950 ft/s
Mean SNR	51 dB	Total width	14.000 ft
Mean temp	49.550 °F	Total area	11.3000 ft²
Wetted Perimeter	14.386 ft	Total discharge	0.5620 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	3.5%
Velocity	0.7%	8.3%
Width	0.2%	0.2%
Method	2.9%	
# Stations	3.6%	
Overall	4.8%	9.1%

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
12/6/2021 11:36 AM	4.510				

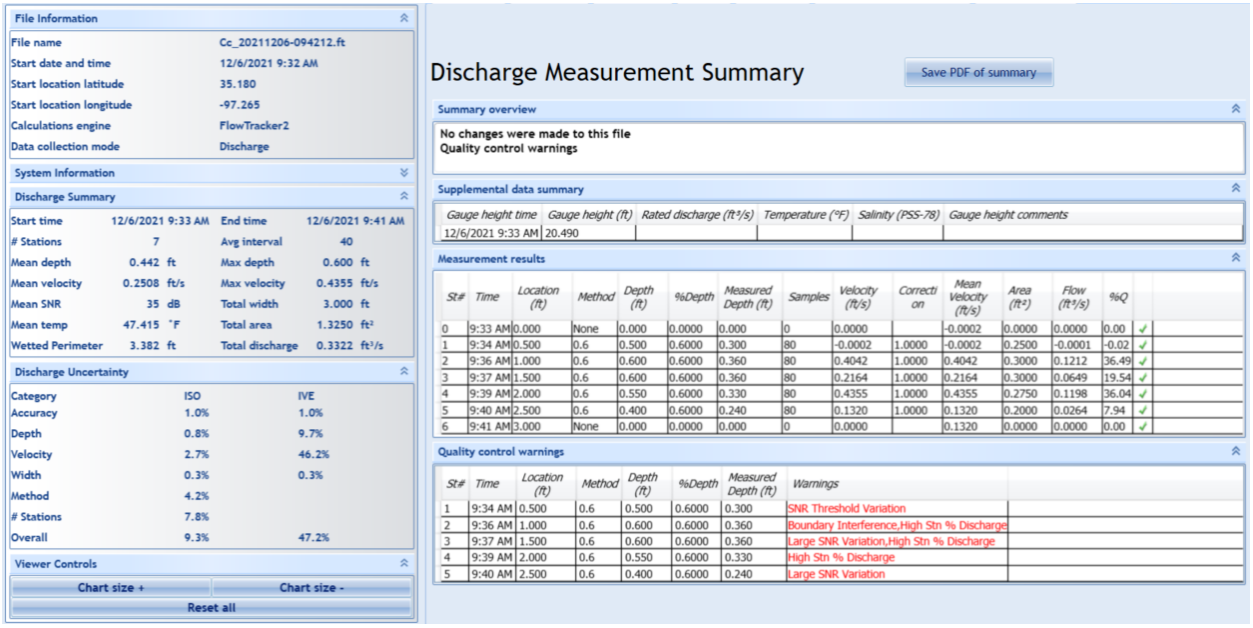
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:36 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0005	0.0000	0.0000	0.00	✓
1	11:36 AM	1.000	0.6	0.700	0.6000	0.420	80	-0.0005	1.0000	-0.0005	0.7000	-0.0003	-0.06	✓
2	11:37 AM	2.000	0.6	1.000	0.6000	0.600	80	0.0001	1.0000	0.0001	1.0000	0.0001	0.03	✓
3	11:38 AM	3.000	0.6	1.100	0.6000	0.660	80	0.0571	1.0000	0.0571	1.1000	0.0629	11.18	✓
4	11:40 AM	4.000	0.6	1.150	0.6000	0.690	80	0.0733	1.0000	0.0733	1.1500	0.0843	15.00	✓
5	11:41 AM	5.000	0.6	1.200	0.6000	0.720	80	0.0746	1.0000	0.0746	1.2000	0.0895	15.93	✓
6	11:42 AM	6.000	0.6	1.150	0.6000	0.690	80	0.0714	1.0000	0.0714	1.1500	0.0822	14.62	✓
7	11:43 AM	7.000	0.6	1.150	0.6000	0.690	80	0.0950	1.0000	0.0950	1.1500	0.1092	19.44	✓
8	11:44 AM	8.000	0.6	1.100	0.6000	0.660	80	0.0842	1.0000	0.0842	1.1000	0.0927	16.49	✓
9	11:45 AM	9.000	0.6	1.000	0.6000	0.600	80	0.0462	1.0000	0.0462	1.0000	0.0462	8.22	✓
10	11:47 AM	10.000	0.6	0.800	0.6000	0.480	80	0.0004	1.0000	0.0004	0.8000	0.0003	0.05	✓
11	11:48 AM	11.000	0.6	0.500	0.6000	0.300	80	0.0021	1.0000	0.0021	0.5000	0.0011	0.19	✓
12	11:49 AM	12.000	0.6	0.300	0.6000	0.180	80	-0.0138	1.0000	-0.0138	0.4500	-0.0062	-1.10	✓
13	11:50 AM	14.000	None	0.000	0.0000	0.000	0	0.0000		-0.0138	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	11:36 AM	1.000	0.6	0.700	0.6000	0.420	SNR Threshold Variation
2	11:37 AM	2.000	0.6	1.000	0.6000	0.600	SNR Threshold Variation
3	11:38 AM	3.000	0.6	1.100	0.6000	0.660	Large SNR Variation,High Stn % Discharge
4	11:40 AM	4.000	0.6	1.150	0.6000	0.690	High Stn % Discharge
5	11:41 AM	5.000	0.6	1.200	0.6000	0.720	High Stn % Discharge
6	11:42 AM	6.000	0.6	1.150	0.6000	0.690	SNR Threshold Variation,High Stn % Discharge
7	11:43 AM	7.000	0.6	1.150	0.6000	0.690	SNR Threshold Variation,High Stn % Discharge
8	11:44 AM	8.000	0.6	1.100	0.6000	0.660	SNR Threshold Variation,High Stn % Discharge
9	11:45 AM	9.000	0.6	1.000	0.6000	0.600	Large SNR Variation,SNR Threshold Variation
10	11:47 AM	10.000	0.6	0.800	0.6000	0.480	SNR Threshold Variation
11	11:48 AM	11.000	0.6	0.500	0.6000	0.300	SNR Threshold Variation
12	11:49 AM	12.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation

Figure 2 Discharge Measurement Summary LRC-1



File Information

File name	Cc_20211206-094212.ft
Start date and time	12/6/2021 9:32 AM
Start location latitude	35.180
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	12/6/2021 9:33 AM	End time	12/6/2021 9:41 AM
# Stations	7	Avg interval	40
Mean depth	0.442 ft	Max depth	0.600 ft
Mean velocity	0.2508 ft/s	Max velocity	0.4355 ft/s
Mean SNR	35 dB	Total width	3.000 ft
Mean temp	47.415 °F	Total area	1.3250 ft²
Wetted Perimeter	3.382 ft	Total discharge	0.3322 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.8%	9.7%
Velocity	2.7%	46.2%
Width	0.3%	0.3%
Method	4.2%	
# Stations	7.8%	
Overall	9.3%	47.2%

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 (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
12/6/2021 9:33 AM	20.490				

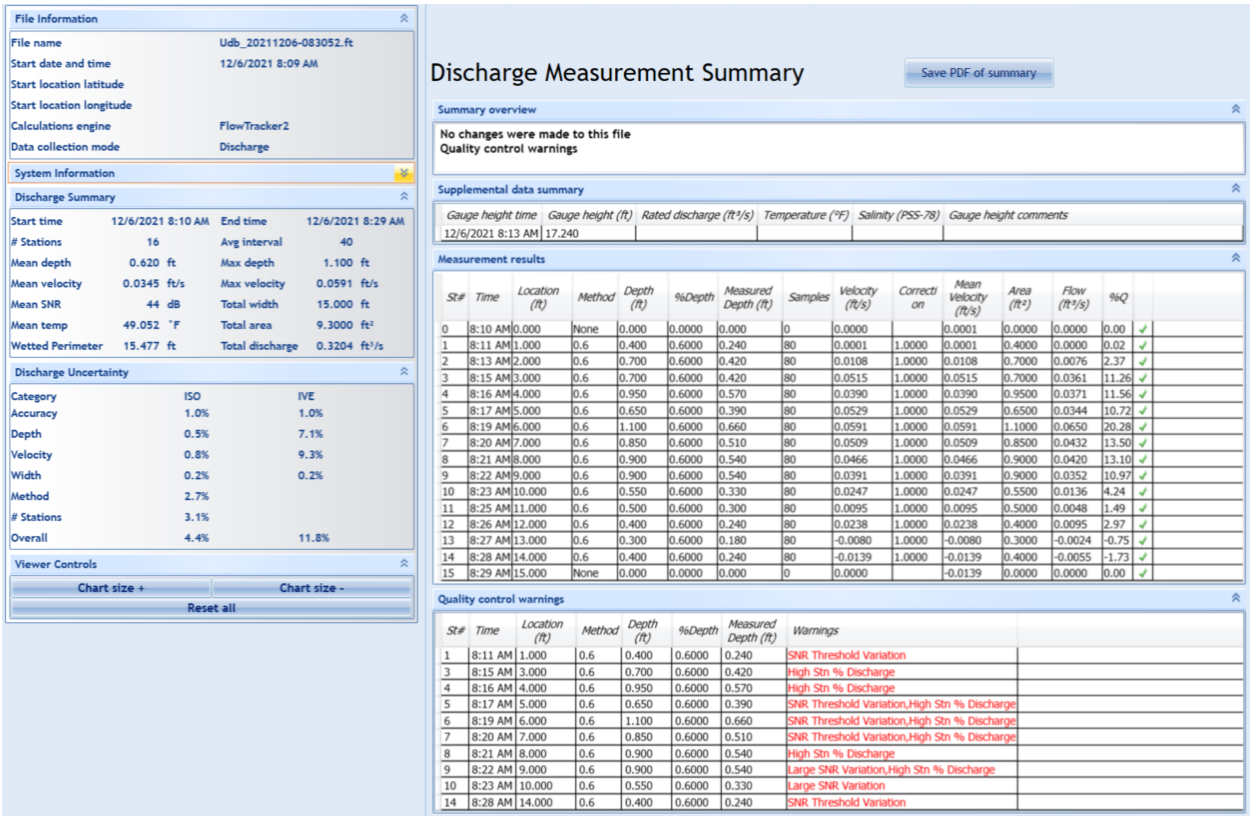
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	9:33 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0002	0.0000	0.0000	0.00	✓
1	9:34 AM	0.500	0.6	0.500	0.6000	0.300	80	-0.0002	1.0000	-0.0002	0.2500	-0.0001	-0.02	✓
2	9:36 AM	1.000	0.6	0.600	0.6000	0.360	80	0.4042	1.0000	0.4042	0.3000	0.1212	36.49	✓
3	9:37 AM	1.500	0.6	0.600	0.6000	0.360	80	0.2164	1.0000	0.2164	0.3000	0.0649	19.54	✓
4	9:39 AM	2.000	0.6	0.550	0.6000	0.330	80	0.4355	1.0000	0.4355	0.2750	0.1198	36.04	✓
5	9:40 AM	2.500	0.6	0.400	0.6000	0.240	80	0.1320	1.0000	0.1320	0.2000	0.0264	7.94	✓
6	9:41 AM	3.000	None	0.000	0.0000	0.000	0	0.0000		0.1320	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:34 AM	0.500	0.6	0.500	0.6000	0.300	SNR Threshold Variation
2	9:36 AM	1.000	0.6	0.600	0.6000	0.360	Boundary Interference,High Stn % Discharge
3	9:37 AM	1.500	0.6	0.600	0.6000	0.360	Large SNR Variation,High Stn % Discharge
4	9:39 AM	2.000	0.6	0.550	0.6000	0.330	High Stn % Discharge
5	9:40 AM	2.500	0.6	0.400	0.6000	0.240	Large SNR Variation

Figure 3 Discharge Measurement Summary CC-1



File Information

File name	Udb_20211206-083052.ft
Start date and time	12/6/2021 8:09 AM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	12/6/2021 8:10 AM	End time	12/6/2021 8:29 AM
# Stations	16	Avg interval	40
Mean depth	0.620 ft	Max depth	1.100 ft
Mean velocity	0.0345 ft/s	Max velocity	0.0591 ft/s
Mean SNR	44 dB	Total width	15.000 ft
Mean temp	49.052 °F	Total area	9.3000 ft²
Wetted Perimeter	15.477 ft	Total discharge	0.3204 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.5%	7.1%
Velocity	0.8%	9.3%
Width	0.2%	0.2%
Method	2.7%	
# Stations	3.1%	
Overall	4.4%	11.8%

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
12/6/2021 8:13 AM	17.240				

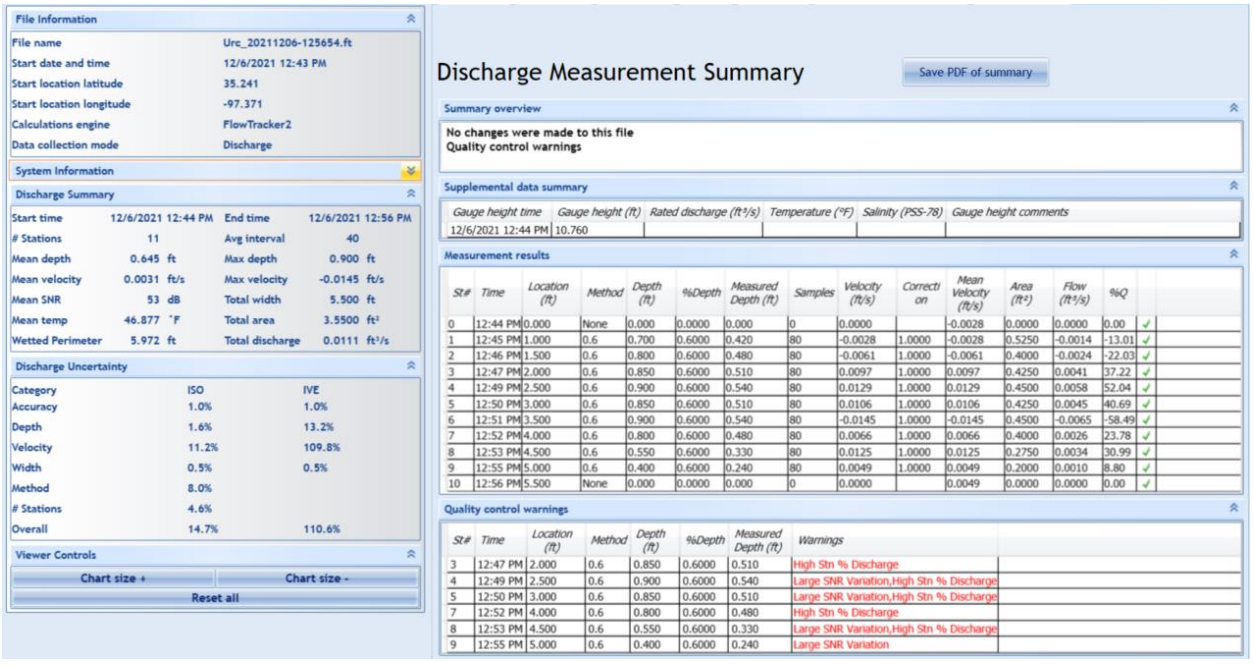
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	8:10 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0001	0.0000	0.0000	0.00	✓
1	8:11 AM	1.000	0.6	0.400	0.6000	0.240	80	0.0001	1.0000	0.0001	0.4000	0.0000	0.02	✓
2	8:13 AM	2.000	0.6	0.700	0.6000	0.420	80	0.0108	1.0000	0.0108	0.7000	0.0076	2.37	✓
3	8:15 AM	3.000	0.6	0.700	0.6000	0.420	80	0.0515	1.0000	0.0515	0.7000	0.0361	11.26	✓
4	8:16 AM	4.000	0.6	0.950	0.6000	0.570	80	0.0390	1.0000	0.0390	0.9500	0.0371	11.56	✓
5	8:17 AM	5.000	0.6	0.650	0.6000	0.390	80	0.0529	1.0000	0.0529	0.6500	0.0344	10.72	✓
6	8:19 AM	6.000	0.6	1.100	0.6000	0.660	80	0.0591	1.0000	0.0591	1.1000	0.0650	20.28	✓
7	8:20 AM	7.000	0.6	0.850	0.6000	0.510	80	0.0509	1.0000	0.0509	0.8500	0.0432	13.50	✓
8	8:21 AM	8.000	0.6	0.900	0.6000	0.540	80	0.0466	1.0000	0.0466	0.9000	0.0420	13.10	✓
9	8:22 AM	9.000	0.6	0.900	0.6000	0.540	80	0.0391	1.0000	0.0391	0.9000	0.0352	10.97	✓
10	8:23 AM	10.000	0.6	0.550	0.6000	0.330	80	0.0247	1.0000	0.0247	0.5500	0.0136	4.24	✓
11	8:25 AM	11.000	0.6	0.500	0.6000	0.300	80	0.0095	1.0000	0.0095	0.5000	0.0048	1.49	✓
12	8:26 AM	12.000	0.6	0.400	0.6000	0.240	80	0.0238	1.0000	0.0238	0.4000	0.0095	2.97	✓
13	8:27 AM	13.000	0.6	0.300	0.6000	0.180	80	-0.0080	1.0000	-0.0080	0.3000	-0.0024	-0.75	✓
14	8:28 AM	14.000	0.6	0.400	0.6000	0.240	80	-0.0139	1.0000	-0.0139	0.4000	-0.0055	-1.73	✓
15	8:29 AM	15.000	None	0.000	0.0000	0.000	0	0.0000		-0.0139	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	8:11 AM	1.000	0.6	0.400	0.6000	0.240	SNR Threshold Variation
3	8:15 AM	3.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
4	8:16 AM	4.000	0.6	0.950	0.6000	0.570	High Stn % Discharge
5	8:17 AM	5.000	0.6	0.650	0.6000	0.390	SNR Threshold Variation,High Stn % Discharge
6	8:19 AM	6.000	0.6	1.100	0.6000	0.660	SNR Threshold Variation,High Stn % Discharge
7	8:20 AM	7.000	0.6	0.850	0.6000	0.510	SNR Threshold Variation,High Stn % Discharge
8	8:21 AM	8.000	0.6	0.900	0.6000	0.540	High Stn % Discharge
9	8:22 AM	9.000	0.6	0.900	0.6000	0.540	Large SNR Variation,High Stn % Discharge
10	8:23 AM	10.000	0.6	0.550	0.6000	0.330	Large SNR Variation
14	8:28 AM	14.000	0.6	0.400	0.6000	0.240	SNR Threshold Variation

Figure 4 Discharge Measurement Summary UDB-1



File Information

File name	Urc_20211206-125654.ft
Start date and time	12/6/2021 12:43 PM
Start location latitude	35.241
Start location longitude	-97.371
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	12/6/2021 12:44 PM	End time	12/6/2021 12:56 PM
# Stations	11	Avg interval	40
Mean depth	0.645 ft	Max depth	0.900 ft
Mean velocity	0.0031 ft/s	Max velocity	-0.0145 ft/s
Mean SNR	53 dB	Total width	5.500 ft
Mean temp	46.877 °F	Total area	3.5500 ft²
Wetted Perimeter	5.972 ft	Total discharge	0.0111 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.6%	13.2%
Velocity	11.2%	109.8%
Width	0.5%	0.5%
Method	8.0%	
# Stations	4.6%	
Overall	14.7%	110.6%

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 (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
12/6/2021 12:44 PM	10.760				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	12:44 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0028	0.0000	0.0000	0.00	✓
1	12:45 PM	1.000	0.6	0.700	0.6000	0.420	80	-0.0028	1.0000	-0.0028	0.5250	-0.0014	-13.01	✓
2	12:46 PM	1.500	0.6	0.800	0.6000	0.480	80	-0.0061	1.0000	-0.0061	0.4000	-0.0024	-22.03	✓
3	12:47 PM	2.000	0.6	0.850	0.6000	0.510	80	0.0097	1.0000	0.0097	0.4250	0.0041	37.22	✓
4	12:49 PM	2.500	0.6	0.900	0.6000	0.540	80	0.0129	1.0000	0.0129	0.4500	0.0058	52.04	✓
5	12:50 PM	3.000	0.6	0.850	0.6000	0.510	80	0.0106	1.0000	0.0106	0.4250	0.0045	40.69	✓
6	12:51 PM	3.500	0.6	0.900	0.6000	0.540	80	-0.0145	1.0000	-0.0145	0.4500	-0.0065	-58.49	✓
7	12:52 PM	4.000	0.6	0.800	0.6000	0.480	80	0.0066	1.0000	0.0066	0.4000	0.0026	23.78	✓
8	12:53 PM	4.500	0.6	0.550	0.6000	0.330	80	0.0125	1.0000	0.0125	0.2750	0.0034	30.99	✓
9	12:55 PM	5.000	0.6	0.400	0.6000	0.240	80	0.0049	1.0000	0.0049	0.2000	0.0010	8.80	✓
10	12:56 PM	5.500	None	0.000	0.0000	0.000	0	0.0000		0.0049	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
3	12:47 PM	2.000	0.6	0.850	0.6000	0.510	High Stn % Discharge
4	12:49 PM	2.500	0.6	0.900	0.6000	0.540	Large SNR Variation,High Stn % Discharge
5	12:50 PM	3.000	0.6	0.850	0.6000	0.510	Large SNR Variation,High Stn % Discharge
7	12:52 PM	4.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
8	12:53 PM	4.500	0.6	0.550	0.6000	0.330	Large SNR Variation,High Stn % Discharge
9	12:55 PM	5.000	0.6	0.400	0.6000	0.240	Large SNR Variation

Figure 5 Discharge Measurement Summary URC-2

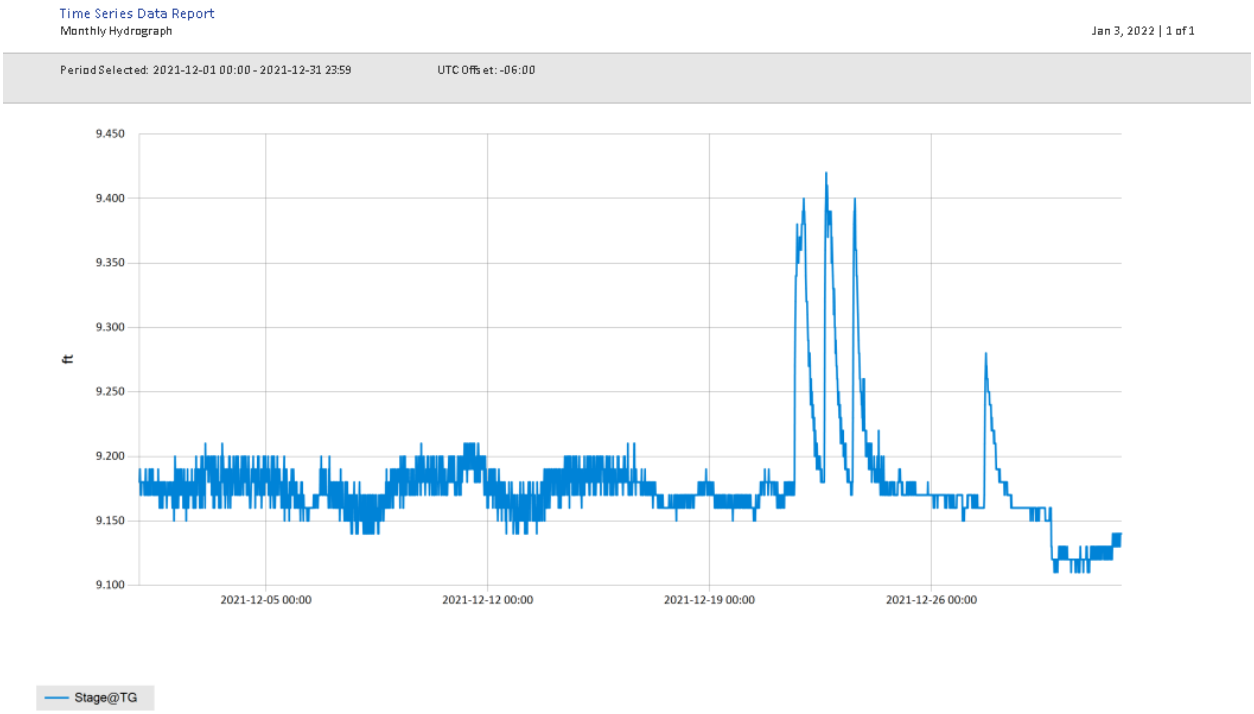


Figure 6 Monthly Hydrograph TG-1

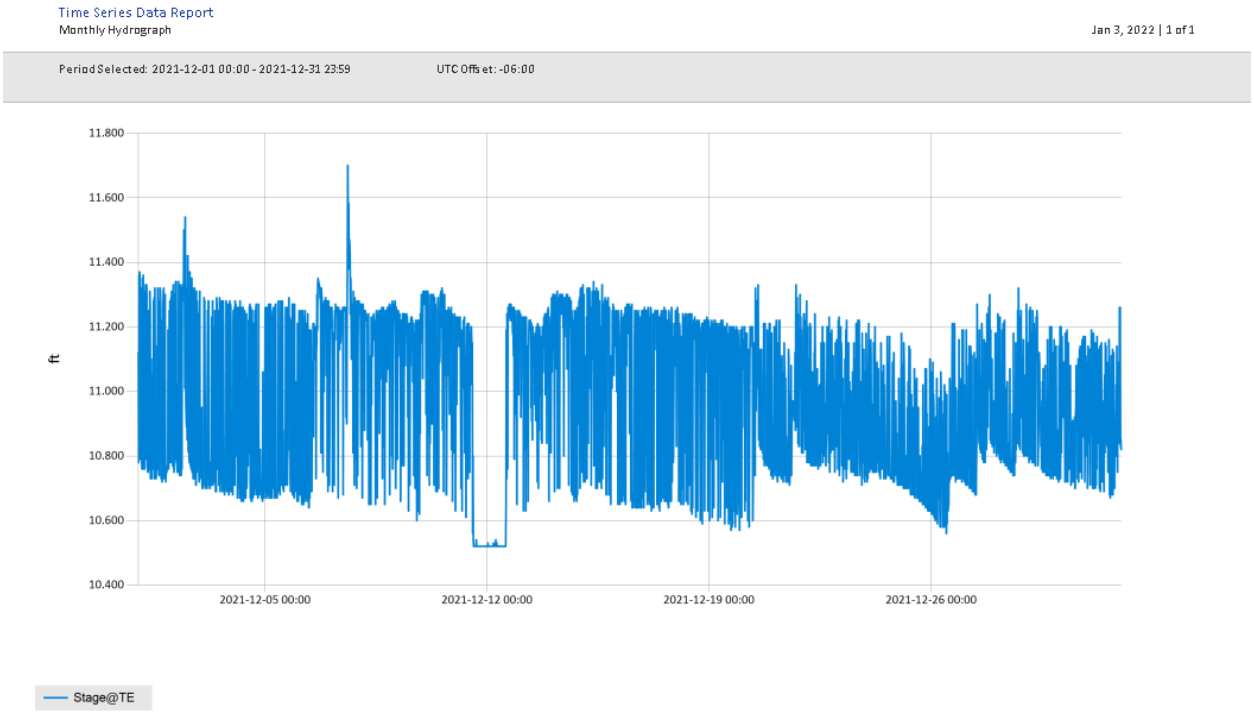


Figure 7 Monthly Hydrograph TE-1

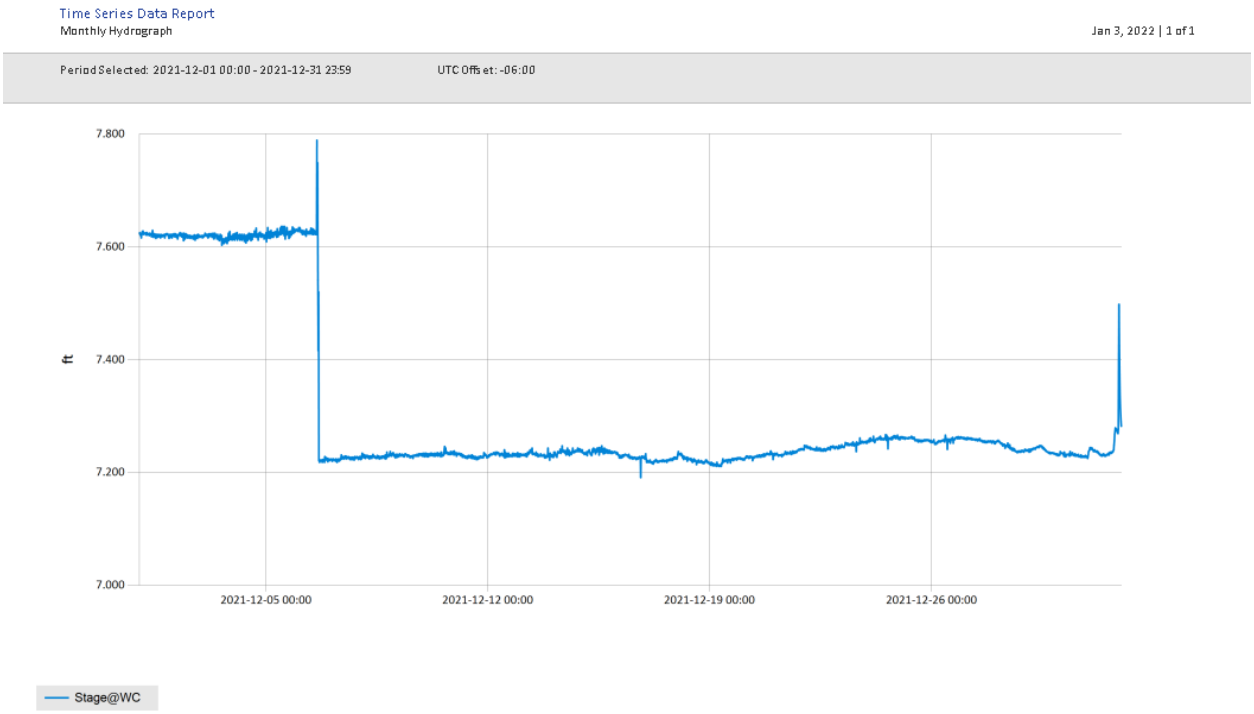


Figure 8 Monthly Hydrograph WC-1

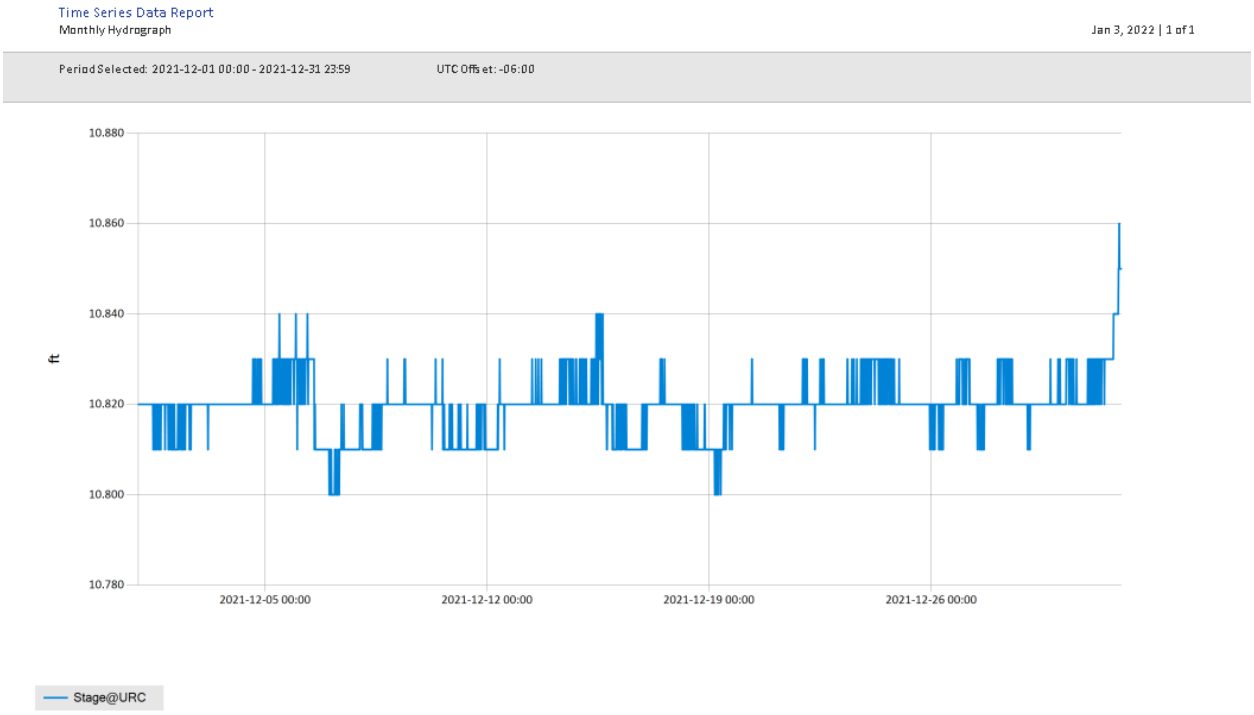


Figure 9 Monthly Hydrograph URC-2

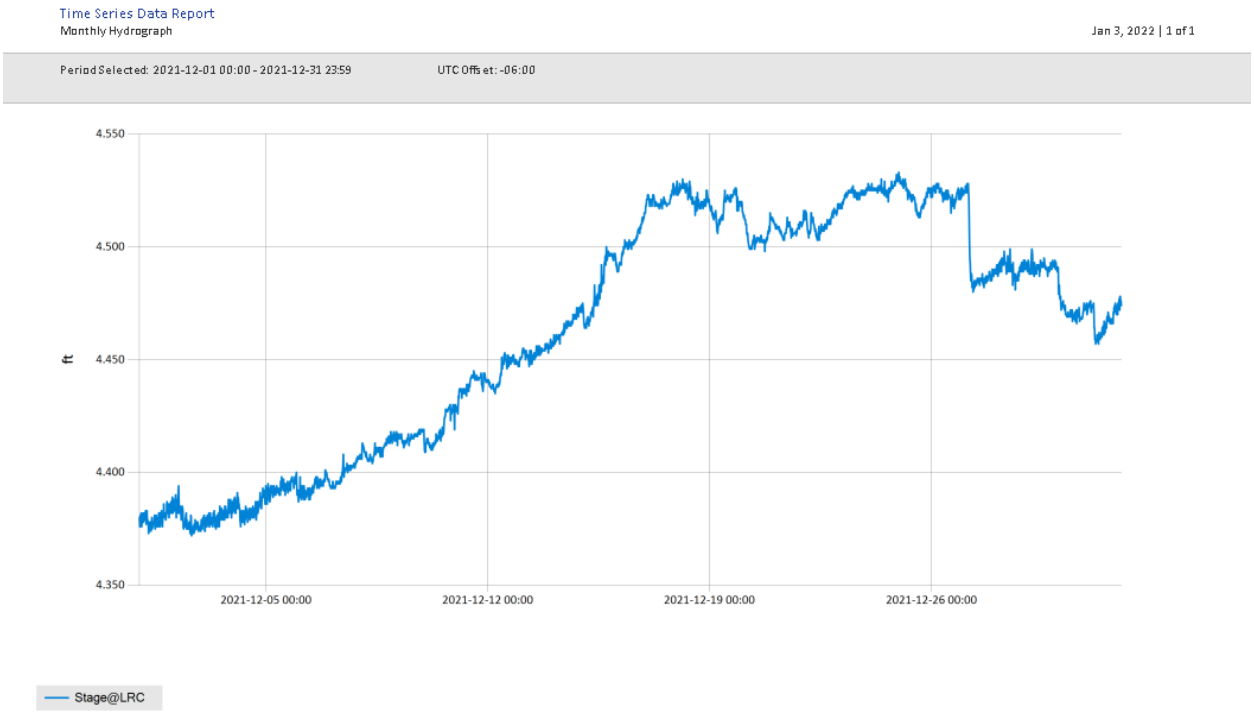


Figure 10 Monthly Hydrograph LRC-1

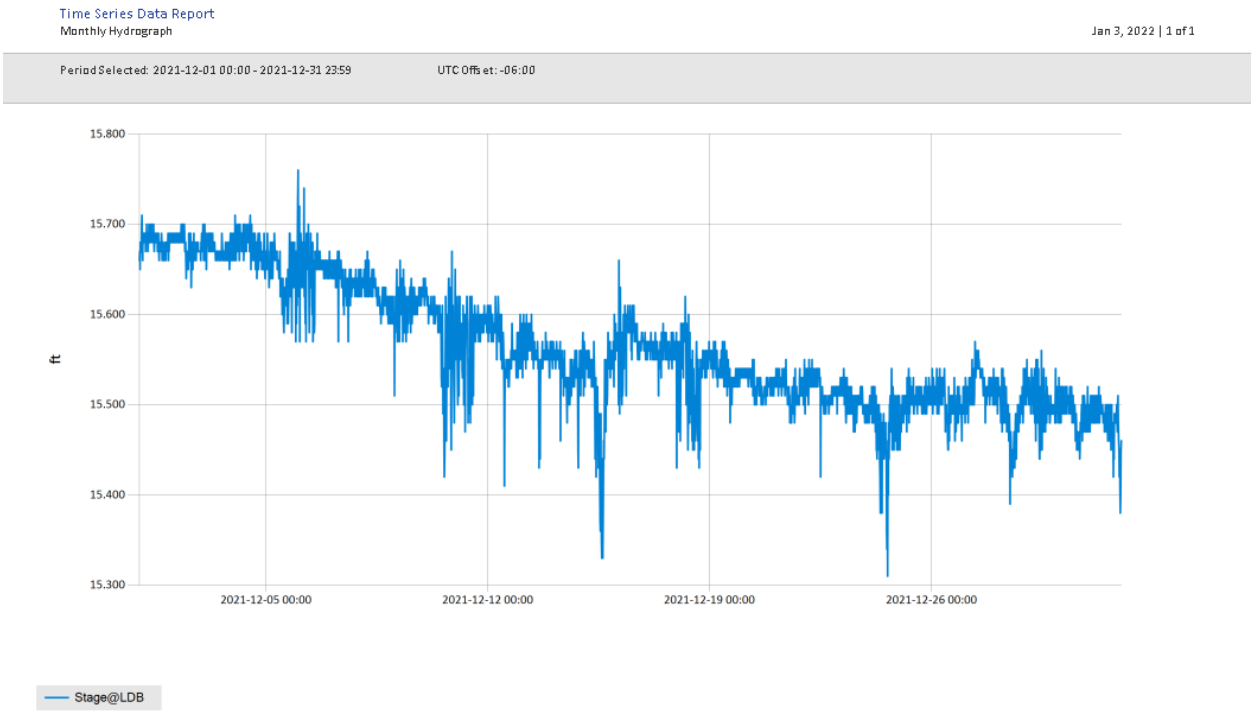


Figure 11 Monthly Hydrograph LDB-1

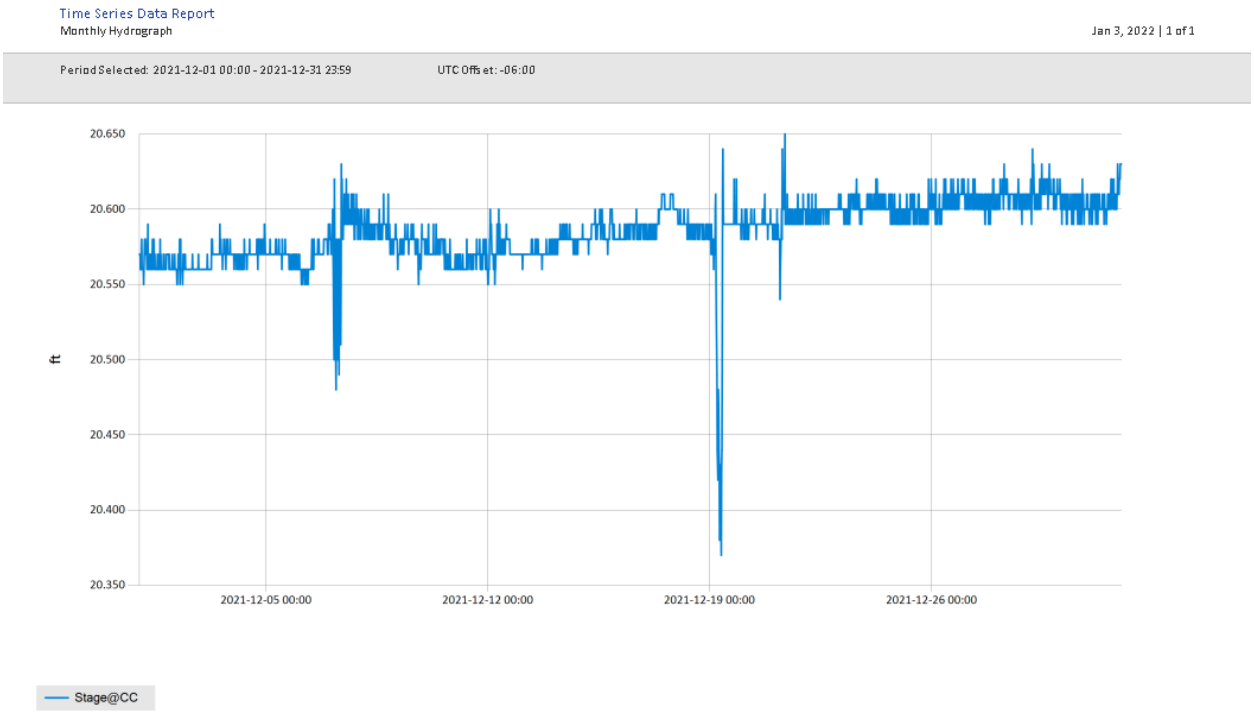


Figure 12 Monthly Hydrograph CC-1

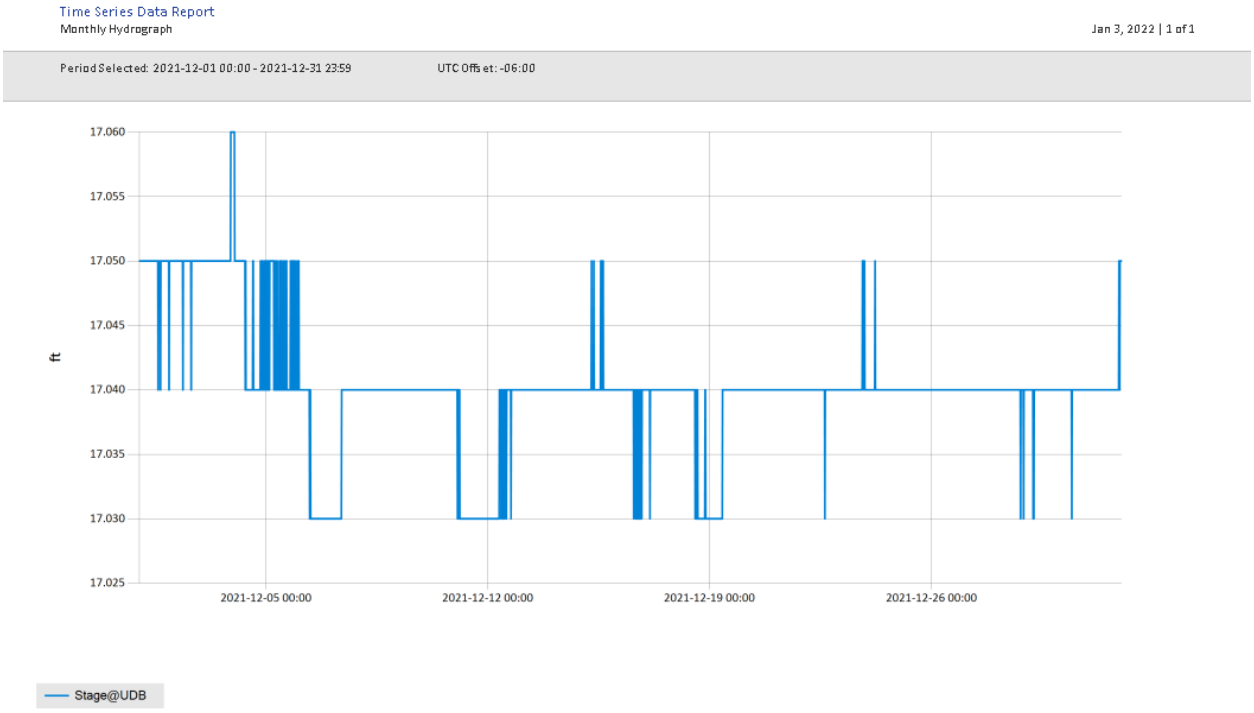


Figure 13 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — December 2021 — Time Zone: Midnight-Midnight CST

(NRMN) Norman — Nearest City: 2.1 NW Norman — County: Cleveland

Latitude: 35-14-09 — Longitude: 97-27-53 — Elevation: 1171 feet

DAY	TEMPERATURE (°F) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	71	39	53.7	38.4	10	0	90	27	61	0.00	28.81	30.06	NNW	3.6	13.1	11.45	52.2	54.4	60	49
2	78*	40*	58.4*	38.7*	6*	0*	84*	24*	52*	0.00*	28.80*	30.05*	S *	4.7*	17.0*	NA	51.8*	54.0*	61*	48*
3	76	51	61.2	50.1	2	0	93	37	70	0.00	28.70	29.95	S	5.9	14.1	10.02	54.0	56.8	62	53
4	59	47	53.7	45.6	12	0	89	66	74	0.00	28.80	30.05	NNE	6.3	16.6	3.15	54.0	55.5	57	53
5	75	43	59.2	47.9	6	0	93	37	69	0.00	28.58	29.82	SSW	10.9	40.7	10.87	54.8	56.5	61	52
6	51	30	39.8	16.2	25	0	62	28	39	0.00	28.99	30.25	N	14.1	41.8	12.02	51.9	52.8	58	48
7	49	27	38.4	20.7	27	0	69	31	50	0.00	28.79	30.04	SSE	6.0	21.7	9.38	48.7	47.3	51	43
8	60	26	43.8	35.0	22	0	90	45	73	0.00	28.69	29.94	S	7.0	28.1	10.56	48.3	47.7	53	42
9	71	49	58.1	37.1	5	0	81	23	50	0.00	28.48	29.72	S	7.9	21.2	10.56	51.1	52.5	58	48
10	80	41	61.7	40.0	4	0	75	24	47	0.01	28.40	29.63	S	14.2	46.9	5.04	52.6	54.7	59	52
11	49	33	39.5	19.8	24	0	62	26	46	0.00	28.93	30.18	NNW	10.8	33.5	12.19	49.5	50.1	54	46
12	58	30	43.4	20.0	21	0	63	20	42	0.00	28.88	30.14	S	11.3	29.8	11.95	47.2	46.5	52	42
13	67	39	51.7	29.8	12	0	69	24	46	0.00	28.86	30.12	S	10.4	24.3	11.51	48.6	49.1	55	44
14	74	51	62.3	52.6	3	0	95	39	73	0.00	28.81	30.06	S	13.2	27.9	10.07	52.1	54.4	59	50
15	77	63	69.7	60.1	0	5	91	55	73	0.00	28.62	29.86	S	14.6	45.0	5.26	56.3	59.5	63	57
16	69	41	51.0	28.0	10	0	72	24	42	0.00	28.79	30.04	NE	9.9	26.8	11.30	54.7	56.9	61	54
17	64	46	54.0	39.6	10	0	84	45	59	0.00	28.67	29.92	N	5.0	23.1	3.26	53.6	55.1	57	54
18	46	26	37.5	22.8	29	0	70	40	56	0.00	28.99	30.25	N	15.2	31.3	10.75	50.8	51.0	55	46
19	44	15	30.8	16.8	36	0	88	30	59	0.00	29.05	30.31	S	4.4	11.2	11.20	46.2	44.0	49	39
20	52	32	39.6	25.8	23	0	87	34	59	0.00	28.92	30.17	S	5.9	17.4	6.97	46.4	44.9	49	42
21	62	28	42.8	31.6	20	0	95	33	69	0.00	28.80	30.04	SSW	4.5	18.5	11.37	45.6	44.9	52	39
22	62	27	45.7	37.1	21	0	96	48	74	0.00	28.77	30.02	SSE	5.6	19.4	11.33	46.0	46.2	52	40
23	65	41	54.3	42.5	12	0	99	28	70	0.00	28.61	29.85	S	8.6	20.8	8.05	48.7	49.7	54	46
24	81	59	69.7	45.1	0	5	66	27	43	0.00	28.40	29.63	SSW	13.7	34.8	8.72	52.2	55.2	60	51
25	73	47	62.1	39.0	5	0	72	29	44	0.00	28.56	29.81	SW	6.0	25.8	9.61	54.0	57.7	61	54
26	75	41	61.9	51.3	7	0	85	51	69	0.00	28.51	29.75	S	8.7	25.4	7.46	53.4	55.8	60	51
27	67	42	54.5	27.1	11	0	96	16	40	0.00	28.57	29.81	NE	8.1	25.0	9.35	53.5	55.7	59	51
28	71	43	57.8	30.9	8	0	77	15	40	0.00	28.38	29.61	WSW	9.8	33.8	10.97	53.2	56.0	61	54
29	63	35	47.2	33.0	16	0	85	33	59	0.03	28.51	29.75	NE	4.7	19.2	9.80	51.2	52.3	57	50
30	68	28	48.0	28.0	17	0	87	20	52	0.00	28.57	29.82	S	6.6	29.9	9.39	49.1	49.3	54	44
31	63	49	55.8	41.5	9	0	93	42	61	0.18	28.45	29.69	S	7.5	27.3	3.00	50.7	51.6	54	50
	65*	39*	51.8*	35.2*	<- Monthly Averages ->						28.70*	29.95*	S *	8.5*	46.9*	9.22*	51.0*	52.2*	57*	48*

Temperature - Highest: 81*
Lowest: 15*

Degree Days - Total HDD: 411*
Total CDD: 10*

Rainfall: Monthly Total: 0.22* in.
Greatest 24 Hr: 0.18* in.

Humidity - Highest: 99*
Lowest: 15*

Number of Days With:

Tmax ≥ 90:	0*	Rainfall ≥ 0.01 inch:	3*
Tmax ≤ 32:	0*	Rainfall ≥ 0.10 inch:	1*
Tmin ≤ 32:	10*	Avg Wind Speed ≥ 10 mph:	10*
Tmin ≤ 0:	0*	Max Wind Speed ≥ 30 mph:	8*

* Denotes incomplete record

Figure 14 December Mesonet Data

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

SY-2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

January 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
Sarah Dexter, Project Leader, sarah.dexter@owrb.ok.gov
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 JANUARY WATER QUALITY SAMPLING

Sampling for January 2022 occurred on the eighteenth and was a base flow collection. Water samples were collected at nine locations and discharge measurements were collected at six locations. Samples were not collected at JB-1 due to construction activity. Mesonet data shows no precipitation on the eighteenth, 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 January was 0.71 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

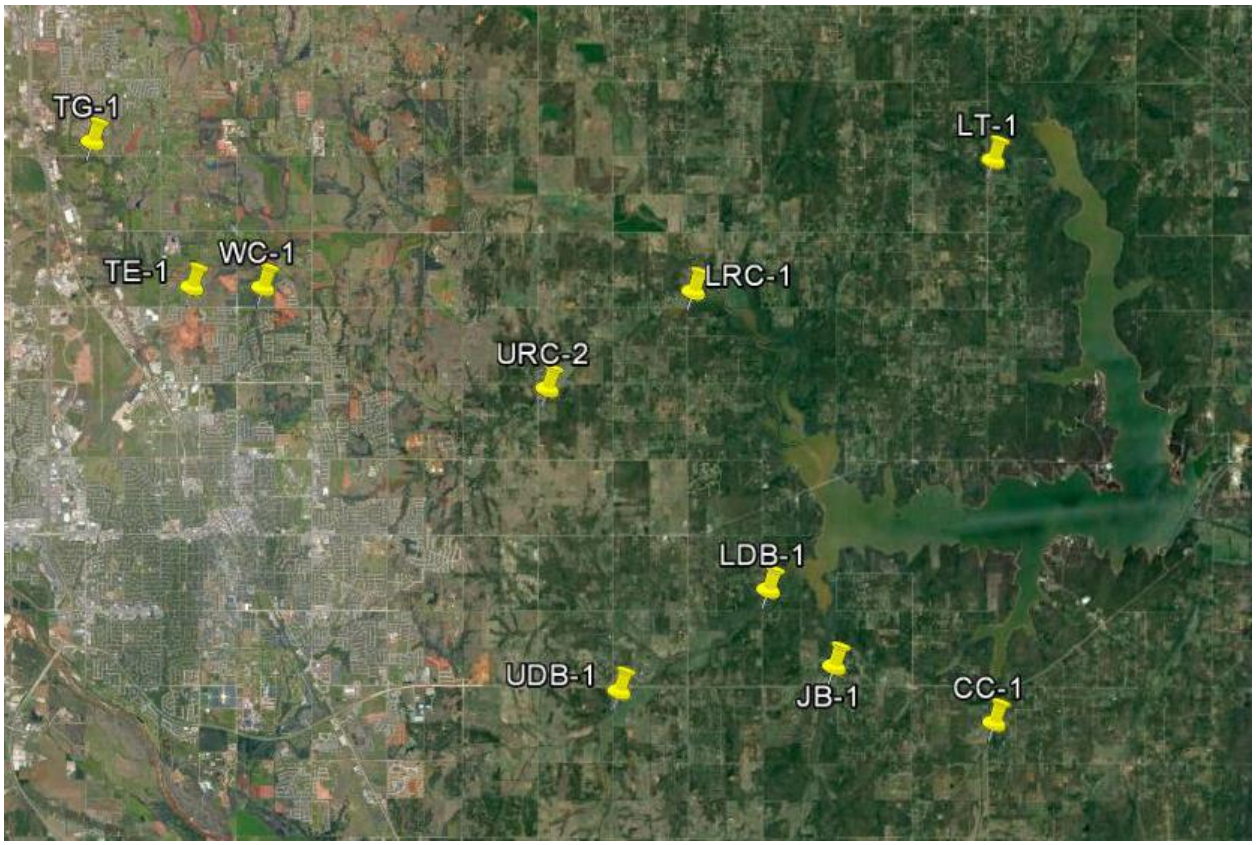


Figure 1 Monitoring Station Map

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	1/18/2022	9:40	SD	5.51	11.18	7.89	684	6	Used RP3, RP4 also over water, low water level, flow normal/low
JB-1	Jim Blue Creek	1/18/2022	10:20	SD	N/A	N/A	N/A	N/A	N/A	Did not sample, construction ongoing, no shoulder, work being done on upstream, downstream mostly dammed by rocks
LDB-1	Lower Dave Blue Creek	1/18/2022	10:30	SD	3.68	15.51	8.09	958	15	Low water level, minimal visual flow
LRC-1	Lower Rock Creek	1/18/2022	12:30	SD	5.40	11.54	7.81	762	7	Lots of filamentous algae, lots of beaver sign, possible dam visible downstream
LT-1	Lake Laterals	1/18/2022	11:10	SD	5.25	9.18	7.54	659	3	Was connected
TE-1	Little River Tributary	1/18/2022	15:25	SD	9.11	14.38	7.99	815	31	Very low stage, very minimal flow, beaver dam on upstream, bubbler still having issues bouncing around
TG-1	Little River Tributary	1/18/2022	16:25	SD	7.30	12.54	7.80	1001	7	Same tapedown as last month, low flow/water level
UDB-1	Upper Dave Blue Creek	1/18/2022	8:40	SD	3.61	10.24	7.80	1001	2	Basically same stage as last month's visit (tapedown off by 0.01ft), low flow
URC-2	Upper Rock Creek	1/18/2022	13:50	SD	8.27	18.79	8.06	885	12	Lots of filamentous algae, similar stage to last month (tapedown off by 0.03ft)
WC-1	Woodcrest Creek	1/18/2022	14:25	SD	9.20	8.76	7.43	812	17	Very low flow/stage, beaver dam remnants on upstream of bridge, filamentous more present on upstream, orifice getting close to being 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	0.08	0.13	0.017	6.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.68	0.022	15.0
LRC-1	Lower Rock Creek	<0.05	0.15	0.024	<5.0
LT-1	Lake Laterals	<0.05	0.28	0.016	<5.0
TE-1	Little River Tributary	<0.05	0.39	0.043	24.0
TG-1	Little River Tributary	0.18	0.29	0.037	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.14	0.018	10.0
URC-2	Upper Rock Creek	<0.05	0.25	0.035	8.0
WC-1	Woodcrest Creek	<0.05	0.21	0.048	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	0.09	0.16	0.018	6.0
Duplicate RPD	11.76%*	20.69%*	5.71%	0%

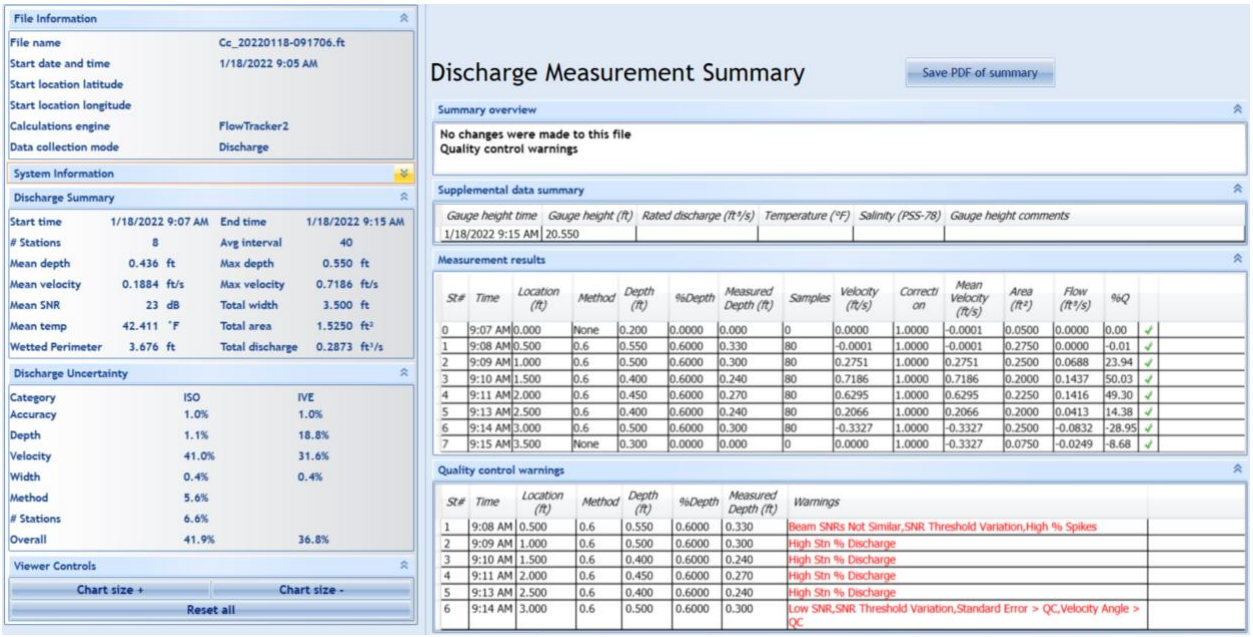
Table 3 QA/QC Data Where the Asterisk Denotes RPD 2

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues, and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.29	20.55
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.92	15.41
LRC-1	Lower Rock Creek	0.44	4.55
LT-1	Lake Laterals	0.35	4.30
TE-1	Little River Tributary	-0.03	10.83
TG-1	Little River Tributary	0.55	8.89
UDB-1	Upper Dave Blue Creek	0.32	17.23
URC-2	Upper Rock Creek	0.01	10.79
WC-1	Woodcrest Creek	0.01	7.29

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Cc_20220118-091706.ft
Start date and time	1/18/2022 9:05 AM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	1/18/2022 9:07 AM	End time	1/18/2022 9:15 AM
# Stations	8	Avg interval	40
Mean depth	0.436 ft	Max depth	0.550 ft
Mean velocity	0.1884 ft/s	Max velocity	0.7186 ft/s
Mean SNR	23 dB	Total width	3.500 ft
Mean temp	42.411 °F	Total area	1.5250 ft²
Wetted Perimeter	3.676 ft	Total discharge	0.2873 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.1%	18.8%
Velocity	41.0%	31.6%
Width	0.4%	0.4%
Method	5.6%	
# Stations	6.6%	
Overall	41.9%	36.8%

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
1/18/2022 9:15 AM	20.550				

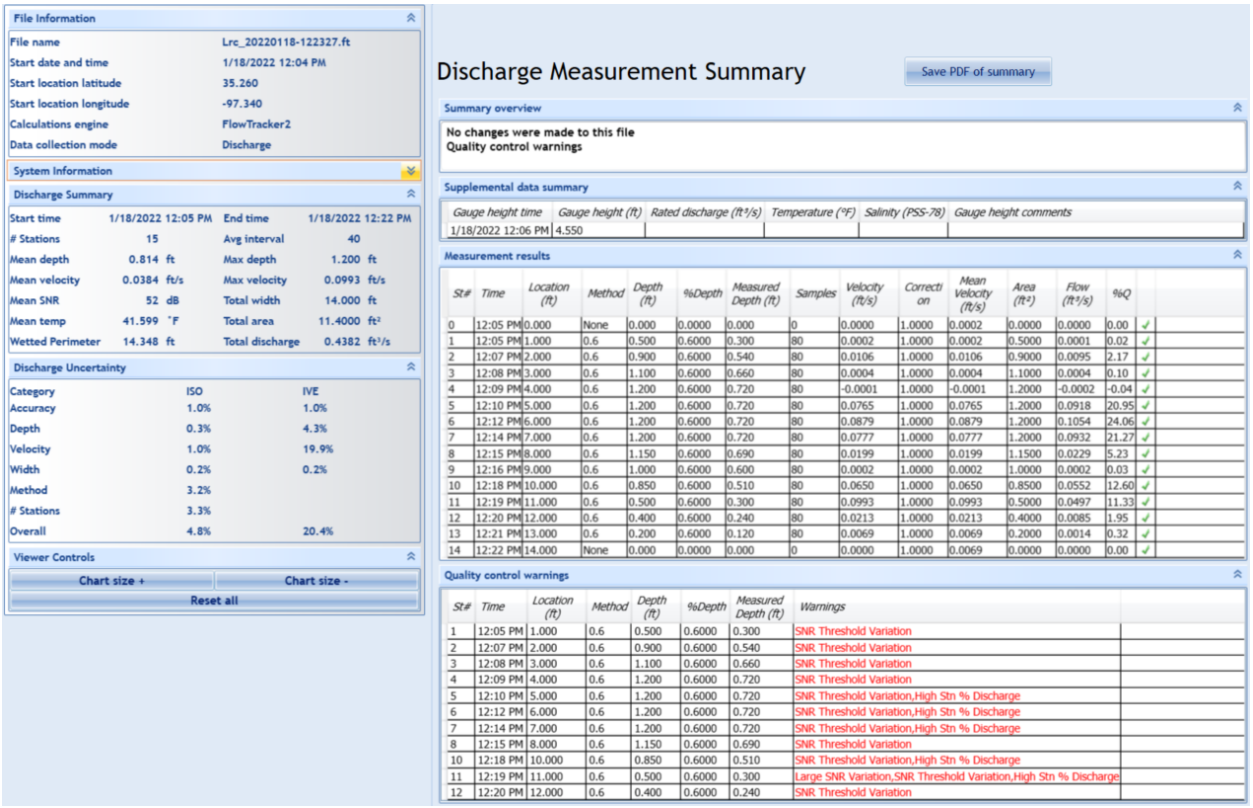
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	9:07 AM	0.000	None	0.200	0.0000	0.000	0	0.0000	1.0000	-0.0001	0.0500	0.0000	0.00	✓
1	9:08 AM	0.500	0.6	0.550	0.6000	0.330	80	-0.0001	1.0000	-0.0001	0.2750	0.0000	-0.01	✓
2	9:09 AM	1.000	0.6	0.500	0.6000	0.300	80	0.2751	1.0000	0.2751	0.2500	0.0688	23.94	✓
3	9:10 AM	1.500	0.6	0.400	0.6000	0.240	80	0.7186	1.0000	0.7186	0.2000	0.1437	50.03	✓
4	9:11 AM	2.000	0.6	0.450	0.6000	0.270	80	0.6295	1.0000	0.6295	0.2250	0.1416	49.30	✓
5	9:13 AM	2.500	0.6	0.400	0.6000	0.240	80	0.2066	1.0000	0.2066	0.2000	0.0413	14.38	✓
6	9:14 AM	3.000	0.6	0.500	0.6000	0.300	80	-0.3327	1.0000	-0.3327	0.2500	-0.0832	-28.95	✓
7	9:15 AM	3.500	None	0.300	0.0000	0.000	0	0.0000	1.0000	-0.3327	0.0750	-0.0249	-8.68	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:08 AM	0.500	0.6	0.550	0.6000	0.330	Beam SNRs Not Similar,SNR Threshold Variation,High % Spikes
2	9:09 AM	1.000	0.6	0.500	0.6000	0.300	High Stn % Discharge
3	9:10 AM	1.500	0.6	0.400	0.6000	0.240	High Stn % Discharge
4	9:11 AM	2.000	0.6	0.450	0.6000	0.270	High Stn % Discharge
5	9:13 AM	2.500	0.6	0.400	0.6000	0.240	High Stn % Discharge
6	9:14 AM	3.000	0.6	0.500	0.6000	0.300	Low SNR,SNR Threshold Variation,Standard Error > QC,Velocity Angle > QC

Figure 2 Discharge Measurement Summary CC-1



File Information

File name	Lrc_20220118-122327.ft
Start date and time	1/18/2022 12:04 PM
Start location latitude	35.260
Start location longitude	-97.340
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	1/18/2022 12:05 PM	End time	1/18/2022 12:22 PM
# Stations	15	Avg interval	40
Mean depth	0.814 ft	Max depth	1.200 ft
Mean velocity	0.0384 ft/s	Max velocity	0.0993 ft/s
Mean SNR	52 dB	Total width	14.000 ft
Mean temp	41.599 °F	Total area	11.4000 ft²
Wetted Perimeter	14.348 ft	Total discharge	0.4382 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	4.3%
Velocity	1.0%	19.9%
Width	0.2%	0.2%
Method	3.2%	
# Stations	3.3%	
Overall	4.8%	20.4%

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
1/18/2022 12:06 PM	4.550				

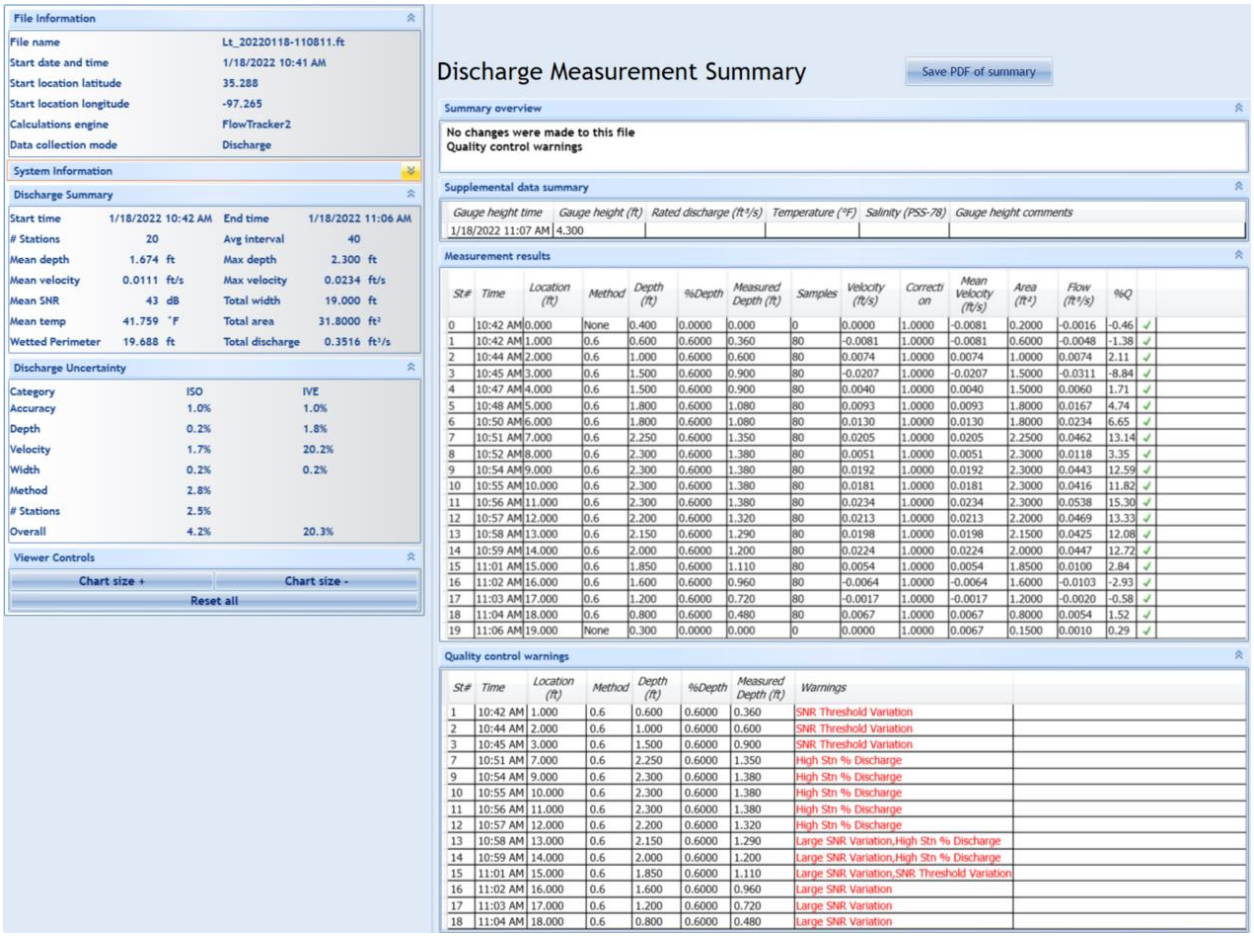
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	12:05 PM	0.000	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0002	0.0000	0.0000	0.00	✓
1	12:05 PM	1.000	0.6	0.500	0.6000	0.300	80	0.0002	1.0000	0.0002	0.5000	0.0001	0.02	✓
2	12:07 PM	2.000	0.6	0.900	0.6000	0.540	80	0.0106	1.0000	0.0106	0.9000	0.0095	2.17	✓
3	12:08 PM	3.000	0.6	1.100	0.6000	0.660	80	0.0004	1.0000	0.0004	1.1000	0.0004	0.10	✓
4	12:09 PM	4.000	0.6	1.200	0.6000	0.720	80	-0.0001	1.0000	-0.0001	1.2000	-0.0002	-0.04	✓
5	12:10 PM	5.000	0.6	1.200	0.6000	0.720	80	0.0765	1.0000	0.0765	1.2000	0.0918	20.95	✓
6	12:12 PM	6.000	0.6	1.200	0.6000	0.720	80	0.0879	1.0000	0.0879	1.2000	0.1054	24.06	✓
7	12:14 PM	7.000	0.6	1.200	0.6000	0.720	80	0.0777	1.0000	0.0777	1.2000	0.0932	21.27	✓
8	12:15 PM	8.000	0.6	1.150	0.6000	0.690	80	0.0199	1.0000	0.0199	1.1500	0.0229	5.23	✓
9	12:16 PM	9.000	0.6	1.000	0.6000	0.600	80	0.0002	1.0000	0.0002	1.0000	0.0002	0.03	✓
10	12:18 PM	10.000	0.6	0.850	0.6000	0.510	80	0.0650	1.0000	0.0650	0.8500	0.0552	12.60	✓
11	12:19 PM	11.000	0.6	0.500	0.6000	0.300	80	0.0993	1.0000	0.0993	0.5000	0.0497	11.33	✓
12	12:20 PM	12.000	0.6	0.400	0.6000	0.240	80	0.0213	1.0000	0.0213	0.4000	0.0085	1.95	✓
13	12:21 PM	13.000	0.6	0.200	0.6000	0.120	80	0.0069	1.0000	0.0069	0.2000	0.0014	0.32	✓
14	12:22 PM	14.000	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0069	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	12:05 PM	1.000	0.6	0.500	0.6000	0.300	SNR Threshold Variation
2	12:07 PM	2.000	0.6	0.900	0.6000	0.540	SNR Threshold Variation
3	12:08 PM	3.000	0.6	1.100	0.6000	0.660	SNR Threshold Variation
4	12:09 PM	4.000	0.6	1.200	0.6000	0.720	SNR Threshold Variation
5	12:10 PM	5.000	0.6	1.200	0.6000	0.720	SNR Threshold Variation,High Stn % Discharge
6	12:12 PM	6.000	0.6	1.200	0.6000	0.720	SNR Threshold Variation,High Stn % Discharge
7	12:14 PM	7.000	0.6	1.200	0.6000	0.720	SNR Threshold Variation,High Stn % Discharge
8	12:15 PM	8.000	0.6	1.150	0.6000	0.690	SNR Threshold Variation
10	12:18 PM	10.000	0.6	0.850	0.6000	0.510	SNR Threshold Variation,High Stn % Discharge
11	12:19 PM	11.000	0.6	0.500	0.6000	0.300	Large SNR Variation,SNR Threshold Variation,High Stn % Discharge
12	12:20 PM	12.000	0.6	0.400	0.6000	0.240	SNR Threshold Variation

Figure 3 Discharge Measurement Summary LRC-1



File Information

File name	Lt_20220118-110811.ft
Start date and time	1/18/2022 10:41 AM
Start location latitude	35.288
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	1/18/2022 10:42 AM	End time	1/18/2022 11:06 AM
# Stations	20	Avg interval	40
Mean depth	1.674 ft	Max depth	2.300 ft
Mean velocity	0.0111 ft/s	Max velocity	0.0234 ft/s
Mean SNR	43 dB	Total width	19.000 ft
Mean temp	41.759 °F	Total area	31.8000 ft²
Wetted Perimeter	19.688 ft	Total discharge	0.3516 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	1.8%
Velocity	1.7%	20.2%
Width	0.2%	0.2%
Method	2.8%	
# Stations	2.5%	
Overall	4.2%	20.3%

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

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
1/18/2022 11:07 AM	4.300				

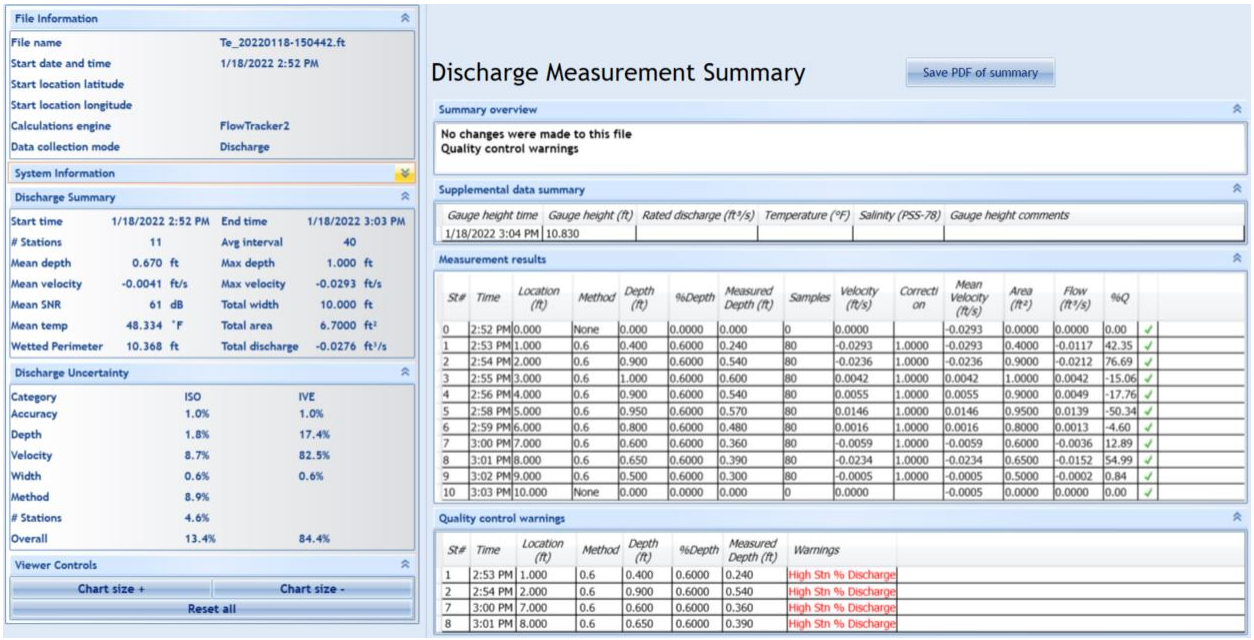
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	10:42 AM	0.000	None	0.400	0.0000	0.000	0	0.0000	1.0000	-0.0081	0.2000	-0.0016	-0.46	✓
1	10:42 AM	1.000	0.6	0.600	0.6000	0.360	80	-0.0081	1.0000	-0.0081	0.6000	-0.0048	-1.38	✓
2	10:44 AM	2.000	0.6	1.000	0.6000	0.600	80	0.0074	1.0000	0.0074	1.0000	0.0074	2.11	✓
3	10:45 AM	3.000	0.6	1.500	0.6000	0.900	80	-0.0207	1.0000	-0.0207	1.5000	-0.0311	-8.84	✓
4	10:47 AM	4.000	0.6	1.500	0.6000	0.900	80	0.0040	1.0000	0.0040	1.5000	0.0060	1.71	✓
5	10:48 AM	5.000	0.6	1.800	0.6000	1.080	80	0.0093	1.0000	0.0093	1.8000	0.0167	4.74	✓
6	10:50 AM	6.000	0.6	1.800	0.6000	1.080	80	0.0130	1.0000	0.0130	1.8000	0.0234	6.65	✓
7	10:51 AM	7.000	0.6	2.250	0.6000	1.350	80	0.0205	1.0000	0.0205	2.2500	0.0462	13.14	✓
8	10:52 AM	8.000	0.6	2.300	0.6000	1.380	80	0.0051	1.0000	0.0051	2.3000	0.0118	3.35	✓
9	10:54 AM	9.000	0.6	2.300	0.6000	1.380	80	0.0192	1.0000	0.0192	2.3000	0.0443	12.59	✓
10	10:55 AM	10.000	0.6	2.300	0.6000	1.380	80	0.0181	1.0000	0.0181	2.3000	0.0416	11.82	✓
11	10:56 AM	11.000	0.6	2.300	0.6000	1.380	80	0.0234	1.0000	0.0234	2.3000	0.0538	15.30	✓
12	10:57 AM	12.000	0.6	2.200	0.6000	1.320	80	0.0213	1.0000	0.0213	2.2000	0.0469	13.33	✓
13	10:58 AM	13.000	0.6	2.150	0.6000	1.290	80	0.0198	1.0000	0.0198	2.1500	0.0425	12.08	✓
14	10:59 AM	14.000	0.6	2.000	0.6000	1.200	80	0.0224	1.0000	0.0224	2.0000	0.0447	12.72	✓
15	11:01 AM	15.000	0.6	1.850	0.6000	1.110	80	0.0054	1.0000	0.0054	1.8500	0.0100	2.84	✓
16	11:02 AM	16.000	0.6	1.600	0.6000	0.960	80	-0.0064	1.0000	-0.0064	1.6000	-0.0103	-2.93	✓
17	11:03 AM	17.000	0.6	1.200	0.6000	0.720	80	-0.0017	1.0000	-0.0017	1.2000	-0.0020	-0.58	✓
18	11:04 AM	18.000	0.6	0.800	0.6000	0.480	80	0.0067	1.0000	0.0067	0.8000	0.0054	1.52	✓
19	11:06 AM	19.000	None	0.300	0.0000	0.000	0	0.0000	1.0000	0.0067	0.1500	0.0010	0.29	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	10:42 AM	1.000	0.6	0.600	0.6000	0.360	SNR Threshold Variation
2	10:44 AM	2.000	0.6	1.000	0.6000	0.600	SNR Threshold Variation
3	10:45 AM	3.000	0.6	1.500	0.6000	0.900	SNR Threshold Variation
7	10:51 AM	7.000	0.6	2.250	0.6000	1.350	High Stn % Discharge
9	10:54 AM	9.000	0.6	2.300	0.6000	1.380	High Stn % Discharge
10	10:55 AM	10.000	0.6	2.300	0.6000	1.380	High Stn % Discharge
11	10:56 AM	11.000	0.6	2.300	0.6000	1.380	High Stn % Discharge
12	10:57 AM	12.000	0.6	2.200	0.6000	1.320	High Stn % Discharge
13	10:58 AM	13.000	0.6	2.150	0.6000	1.290	Large SNR Variation,High Stn % Discharge
14	10:59 AM	14.000	0.6	2.000	0.6000	1.200	Large SNR Variation,High Stn % Discharge
15	11:01 AM	15.000	0.6	1.850	0.6000	1.110	Large SNR Variation,SNR Threshold Variation
16	11:02 AM	16.000	0.6	1.600	0.6000	0.960	Large SNR Variation
17	11:03 AM	17.000	0.6	1.200	0.6000	0.720	Large SNR Variation
18	11:04 AM	18.000	0.6	0.800	0.6000	0.480	Large SNR Variation

Figure 4 Discharge Measurement Summary LT-1



File Information

File name	Te_20220118-150442.ft
Start date and time	1/18/2022 2:52 PM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	1/18/2022 2:52 PM	End time	1/18/2022 3:03 PM
# Stations	11	Avg interval	40
Mean depth	0.670 ft	Max depth	1.000 ft
Mean velocity	-0.0041 ft/s	Max velocity	-0.0293 ft/s
Mean SNR	61 dB	Total width	10.000 ft
Mean temp	48.334 °F	Total area	6.7000 ft²
Wetted Perimeter	10.368 ft	Total discharge	-0.0276 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.8%	17.4%
Velocity	8.7%	82.5%
Width	0.6%	0.6%
Method	8.9%	
# Stations	4.6%	
Overall	13.4%	84.4%

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
1/18/2022 3:04 PM	10.830				

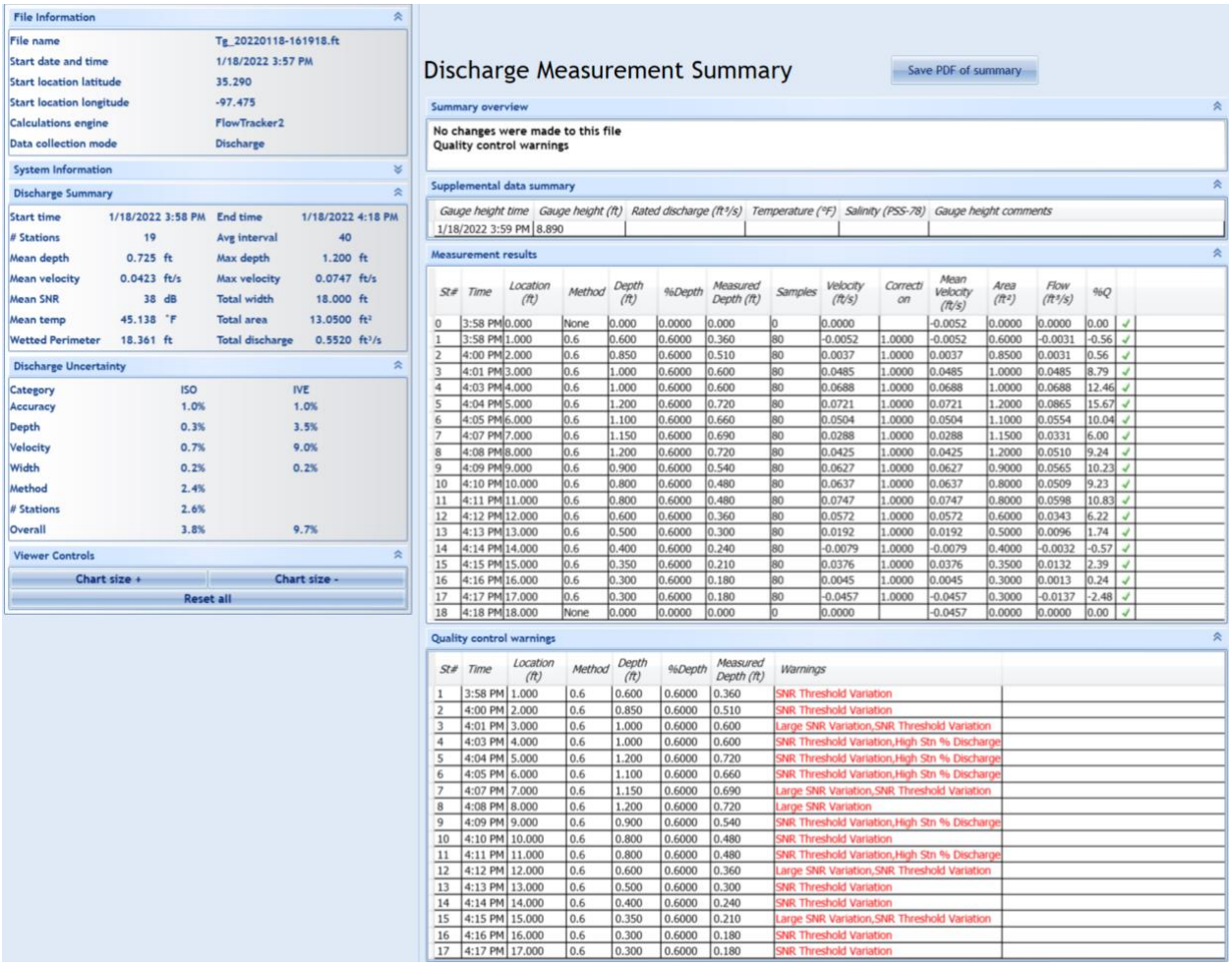
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	2:52 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0293	0.0000	0.0000	0.00	✓
1	2:53 PM	1.000	0.6	0.400	0.6000	0.240	80	-0.0293	1.0000	-0.0293	0.4000	-0.0117	42.35	✓
2	2:54 PM	2.000	0.6	0.900	0.6000	0.540	80	-0.0236	1.0000	-0.0236	0.9000	-0.0212	76.69	✓
3	2:55 PM	3.000	0.6	1.000	0.6000	0.600	80	0.0042	1.0000	0.0042	1.0000	0.0042	-15.06	✓
4	2:56 PM	4.000	0.6	0.900	0.6000	0.540	80	0.0055	1.0000	0.0055	0.9000	0.0049	-17.76	✓
5	2:58 PM	5.000	0.6	0.950	0.6000	0.570	80	0.0146	1.0000	0.0146	0.9500	0.0139	-50.34	✓
6	2:59 PM	6.000	0.6	0.800	0.6000	0.480	80	0.0016	1.0000	0.0016	0.8000	0.0013	-4.60	✓
7	3:00 PM	7.000	0.6	0.600	0.6000	0.360	80	-0.0059	1.0000	-0.0059	0.6000	-0.0036	12.89	✓
8	3:01 PM	8.000	0.6	0.650	0.6000	0.390	80	-0.0234	1.0000	-0.0234	0.6500	-0.0152	54.99	✓
9	3:02 PM	9.000	0.6	0.500	0.6000	0.300	80	-0.0005	1.0000	-0.0005	0.5000	-0.0002	0.84	✓
10	3:03 PM	10.000	None	0.000	0.0000	0.000	0	0.0000		-0.0005	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	2:53 PM	1.000	0.6	0.400	0.6000	0.240	High Stn % Discharge
2	2:54 PM	2.000	0.6	0.900	0.6000	0.540	High Stn % Discharge
7	3:00 PM	7.000	0.6	0.600	0.6000	0.360	High Stn % Discharge
8	3:01 PM	8.000	0.6	0.650	0.6000	0.390	High Stn % Discharge

Figure 5 Discharge Measurement Summary TE-1



File Information

File name	Tg_20220118-161918.ft
Start date and time	1/18/2022 3:57 PM
Start location latitude	35.290
Start location longitude	-97.475
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	1/18/2022 3:58 PM	End time	1/18/2022 4:18 PM
# Stations	19	Avg interval	40
Mean depth	0.725 ft	Max depth	1.200 ft
Mean velocity	0.0423 ft/s	Max velocity	0.0747 ft/s
Mean SNR	38 dB	Total width	18.000 ft
Mean temp	45.138 °F	Total area	13.0500 ft²
Wetted Perimeter	18.361 ft	Total discharge	0.5520 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	3.5%
Velocity	0.7%	9.0%
Width	0.2%	0.2%
Method	2.4%	
# Stations	2.6%	
Overall	3.8%	9.7%

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
1/18/2022 3:59 PM	8.890				

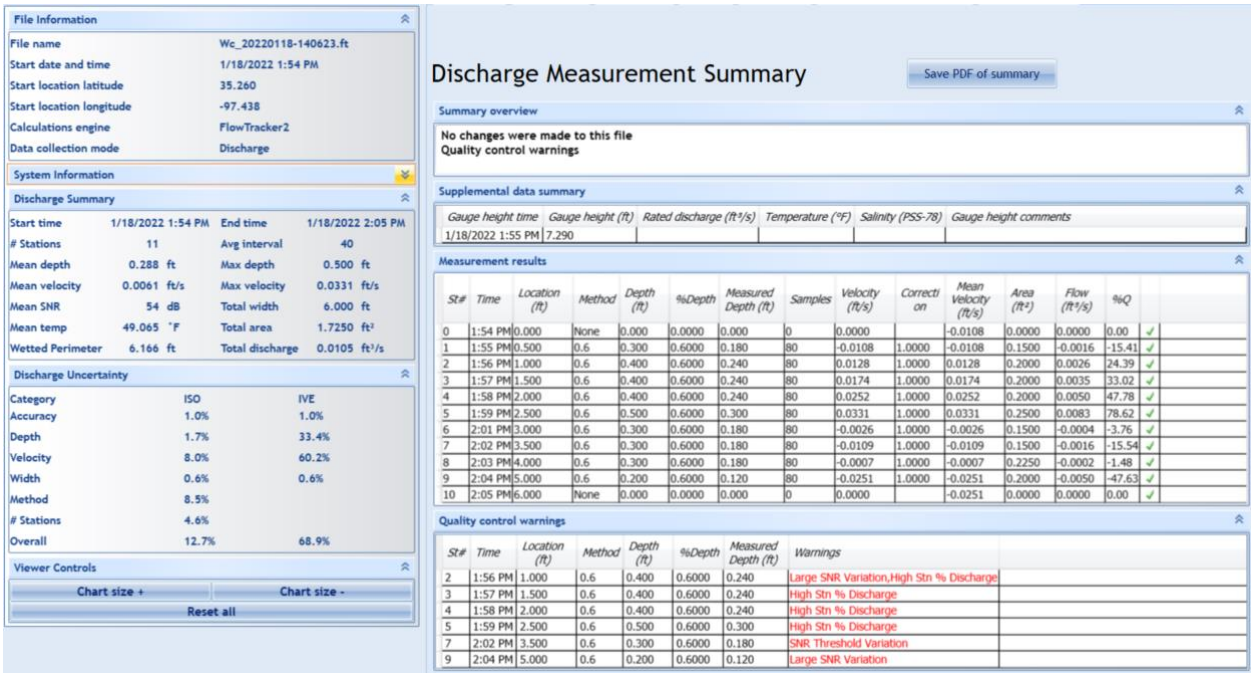
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	3:58 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0052	0.0000	0.0000	0.00	✓
1	3:58 PM	1.000	0.6	0.600	0.6000	0.360	80	-0.0052	1.0000	-0.0052	0.6000	-0.0031	-0.56	✓
2	4:00 PM	2.000	0.6	0.850	0.6000	0.510	80	0.0037	1.0000	0.0037	0.8500	0.0031	0.56	✓
3	4:01 PM	3.000	0.6	1.000	0.6000	0.600	80	0.0485	1.0000	0.0485	1.0000	0.0485	8.79	✓
4	4:03 PM	4.000	0.6	1.000	0.6000	0.600	80	0.0688	1.0000	0.0688	1.0000	0.0688	12.46	✓
5	4:04 PM	5.000	0.6	1.200	0.6000	0.720	80	0.0721	1.0000	0.0721	1.2000	0.0865	15.67	✓
6	4:05 PM	6.000	0.6	1.100	0.6000	0.660	80	0.0504	1.0000	0.0504	1.1000	0.0554	10.04	✓
7	4:07 PM	7.000	0.6	1.150	0.6000	0.690	80	0.0288	1.0000	0.0288	1.1500	0.0331	6.00	✓
8	4:08 PM	8.000	0.6	1.200	0.6000	0.720	80	0.0425	1.0000	0.0425	1.2000	0.0510	9.24	✓
9	4:09 PM	9.000	0.6	0.900	0.6000	0.540	80	0.0627	1.0000	0.0627	0.9000	0.0565	10.23	✓
10	4:10 PM	10.000	0.6	0.800	0.6000	0.480	80	0.0637	1.0000	0.0637	0.8000	0.0509	9.23	✓
11	4:11 PM	11.000	0.6	0.800	0.6000	0.480	80	0.0747	1.0000	0.0747	0.8000	0.0598	10.83	✓
12	4:12 PM	12.000	0.6	0.600	0.6000	0.360	80	0.0572	1.0000	0.0572	0.6000	0.0343	6.22	✓
13	4:13 PM	13.000	0.6	0.500	0.6000	0.300	80	0.0192	1.0000	0.0192	0.5000	0.0096	1.74	✓
14	4:14 PM	14.000	0.6	0.400	0.6000	0.240	80	-0.0079	1.0000	-0.0079	0.4000	-0.0032	-0.57	✓
15	4:15 PM	15.000	0.6	0.350	0.6000	0.210	80	0.0376	1.0000	0.0376	0.3500	0.0132	2.39	✓
16	4:16 PM	16.000	0.6	0.300	0.6000	0.180	80	0.0045	1.0000	0.0045	0.3000	0.0013	0.24	✓
17	4:17 PM	17.000	0.6	0.300	0.6000	0.180	80	-0.0457	1.0000	-0.0457	0.3000	-0.0137	-2.48	✓
18	4:18 PM	18.000	None	0.000	0.0000	0.000	0	0.0000		-0.0457	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	3:58 PM	1.000	0.6	0.600	0.6000	0.360	SNR Threshold Variation
2	4:00 PM	2.000	0.6	0.850	0.6000	0.510	SNR Threshold Variation
3	4:01 PM	3.000	0.6	1.000	0.6000	0.600	Large SNR Variation,SNR Threshold Variation
4	4:03 PM	4.000	0.6	1.000	0.6000	0.600	SNR Threshold Variation,High Stn % Discharge
5	4:04 PM	5.000	0.6	1.200	0.6000	0.720	SNR Threshold Variation,High Stn % Discharge
6	4:05 PM	6.000	0.6	1.100	0.6000	0.660	SNR Threshold Variation,High Stn % Discharge
7	4:07 PM	7.000	0.6	1.150	0.6000	0.690	Large SNR Variation,SNR Threshold Variation
8	4:08 PM	8.000	0.6	1.200	0.6000	0.720	Large SNR Variation
9	4:09 PM	9.000	0.6	0.900	0.6000	0.540	SNR Threshold Variation,High Stn % Discharge
10	4:10 PM	10.000	0.6	0.800	0.6000	0.480	SNR Threshold Variation
11	4:11 PM	11.000	0.6	0.800	0.6000	0.480	SNR Threshold Variation,High Stn % Discharge
12	4:12 PM	12.000	0.6	0.600	0.6000	0.360	Large SNR Variation,SNR Threshold Variation
13	4:13 PM	13.000	0.6	0.500	0.6000	0.300	SNR Threshold Variation
14	4:14 PM	14.000	0.6	0.400	0.6000	0.240	SNR Threshold Variation
15	4:15 PM	15.000	0.6	0.350	0.6000	0.210	Large SNR Variation,SNR Threshold Variation
16	4:16 PM	16.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation
17	4:17 PM	17.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation

Figure 6 Discharge Measurement Summary TG-1



File Information

File name	Wc_20220118-140623.ft
Start date and time	1/18/2022 1:54 PM
Start location latitude	35.260
Start location longitude	-97.438
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	1/18/2022 1:54 PM	End time	1/18/2022 2:05 PM
# Stations	11	Avg interval	40
Mean depth	0.288 ft	Max depth	0.500 ft
Mean velocity	0.0061 ft/s	Max velocity	0.0331 ft/s
Mean SNR	54 dB	Total width	6.000 ft
Mean temp	49.065 °F	Total area	1.7250 ft²
Wetted Perimeter	6.166 ft	Total discharge	0.0105 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.7%	33.4%
Velocity	8.0%	60.2%
Width	0.6%	0.6%
Method	8.5%	
# Stations	4.6%	
Overall	12.7%	68.9%

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
1/18/2022 1:55 PM	7.290				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	1:54 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0108	0.0000	0.0000	0.00	✓
1	1:55 PM	0.500	0.6	0.300	0.6000	0.180	80	-0.0108	1.0000	-0.0108	0.1500	-0.0016	-15.41	✓
2	1:56 PM	1.000	0.6	0.400	0.6000	0.240	80	0.0128	1.0000	0.0128	0.2000	0.0026	24.39	✓
3	1:57 PM	1.500	0.6	0.400	0.6000	0.240	80	0.0174	1.0000	0.0174	0.2000	0.0035	33.02	✓
4	1:58 PM	2.000	0.6	0.400	0.6000	0.240	80	0.0252	1.0000	0.0252	0.2000	0.0050	47.78	✓
5	1:59 PM	2.500	0.6	0.500	0.6000	0.300	80	0.0331	1.0000	0.0331	0.2500	0.0083	78.62	✓
6	2:01 PM	3.000	0.6	0.300	0.6000	0.180	80	-0.0026	1.0000	-0.0026	0.1500	-0.0004	-3.76	✓
7	2:02 PM	3.500	0.6	0.300	0.6000	0.180	80	-0.0109	1.0000	-0.0109	0.1500	-0.0016	-15.54	✓
8	2:03 PM	4.000	0.6	0.300	0.6000	0.180	80	-0.0007	1.0000	-0.0007	0.2250	-0.0002	-1.48	✓
9	2:04 PM	5.000	0.6	0.200	0.6000	0.120	80	-0.0251	1.0000	-0.0251	0.2000	-0.0050	-47.63	✓
10	2:05 PM	6.000	None	0.000	0.0000	0.000	0	0.0000		-0.0251	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	1:56 PM	1.000	0.6	0.400	0.6000	0.240	Large SNR Variation,High Stn % Discharge
3	1:57 PM	1.500	0.6	0.400	0.6000	0.240	High Stn % Discharge
4	1:58 PM	2.000	0.6	0.400	0.6000	0.240	High Stn % Discharge
5	1:59 PM	2.500	0.6	0.500	0.6000	0.300	High Stn % Discharge
7	2:02 PM	3.500	0.6	0.300	0.6000	0.180	SNR Threshold Variation
9	2:04 PM	5.000	0.6	0.200	0.6000	0.120	Large SNR Variation

Figure 7 Discharge Measurement Summary WC-1

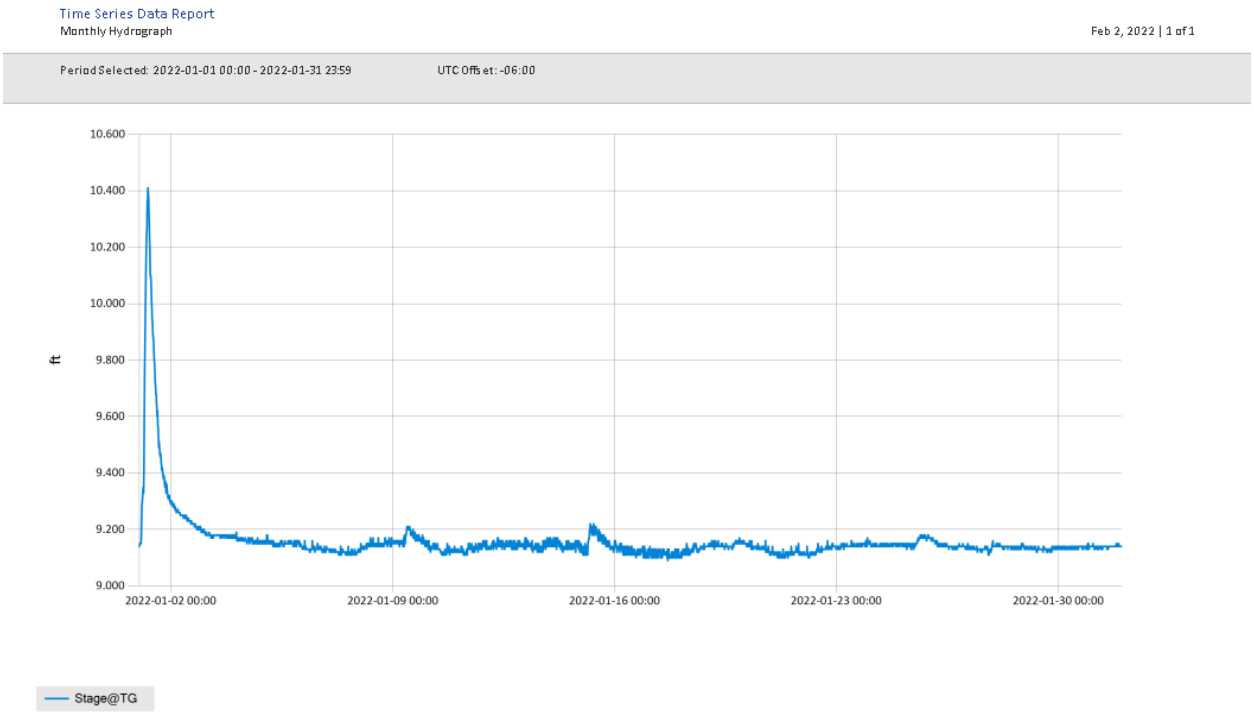


Figure 8 Monthly Hydrograph TG-1

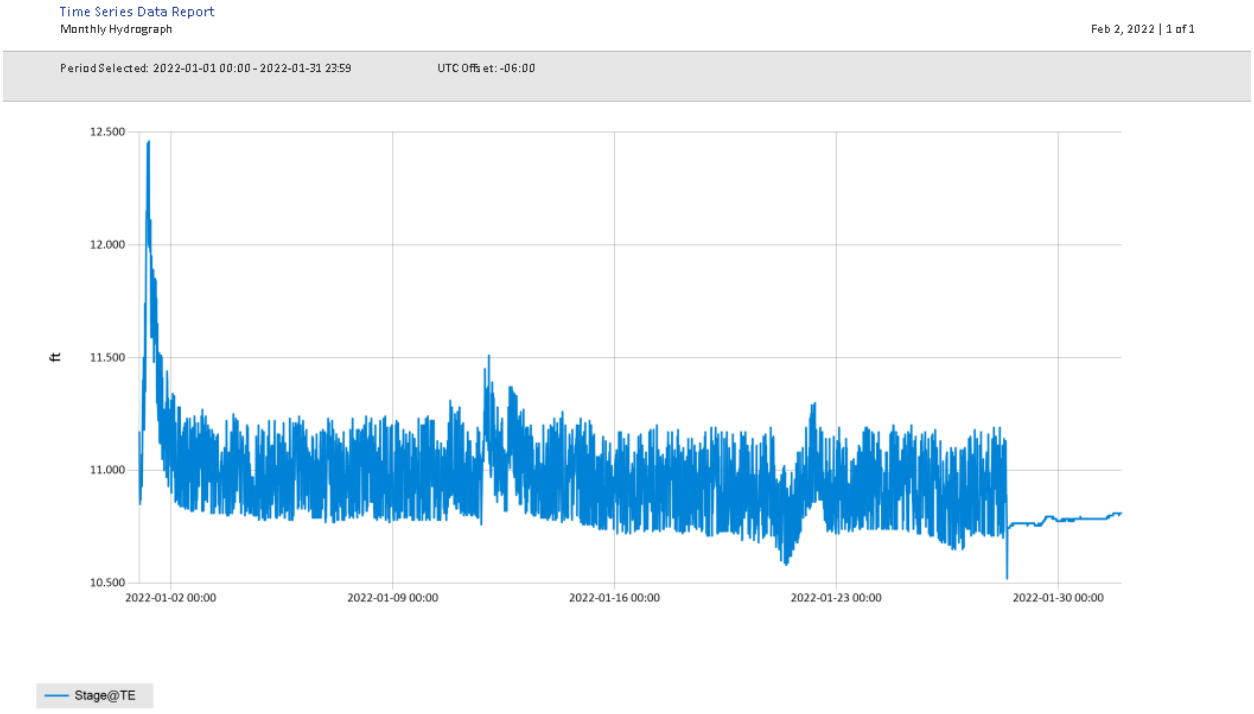


Figure 9 Monthly Hydrograph TE-1

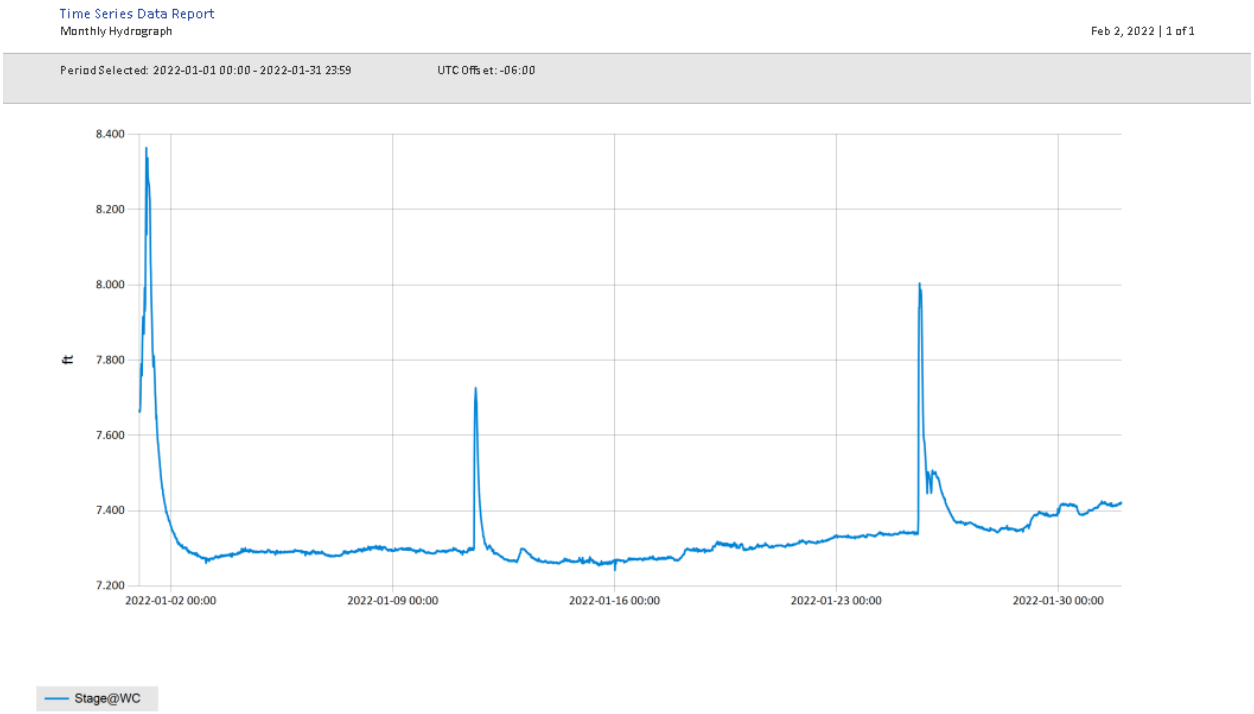


Figure 10 Monthly Hydrograph WC-1

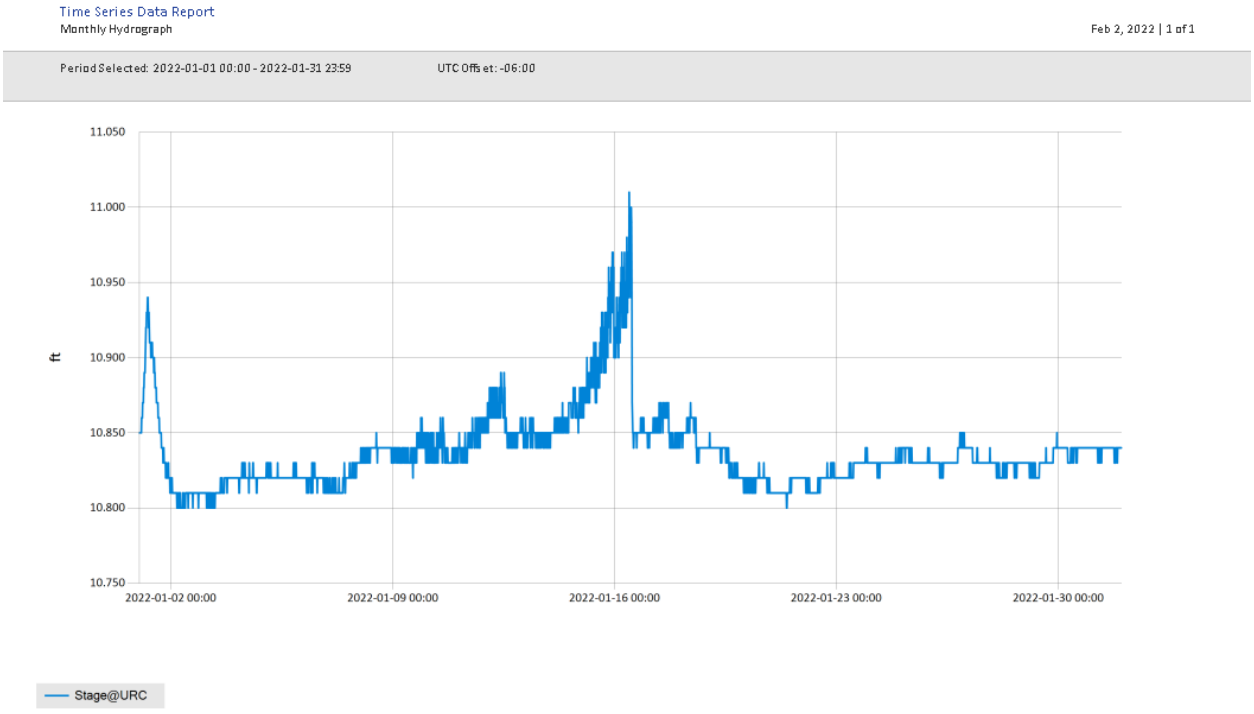


Figure 11 Monthly Hydrograph URC-2

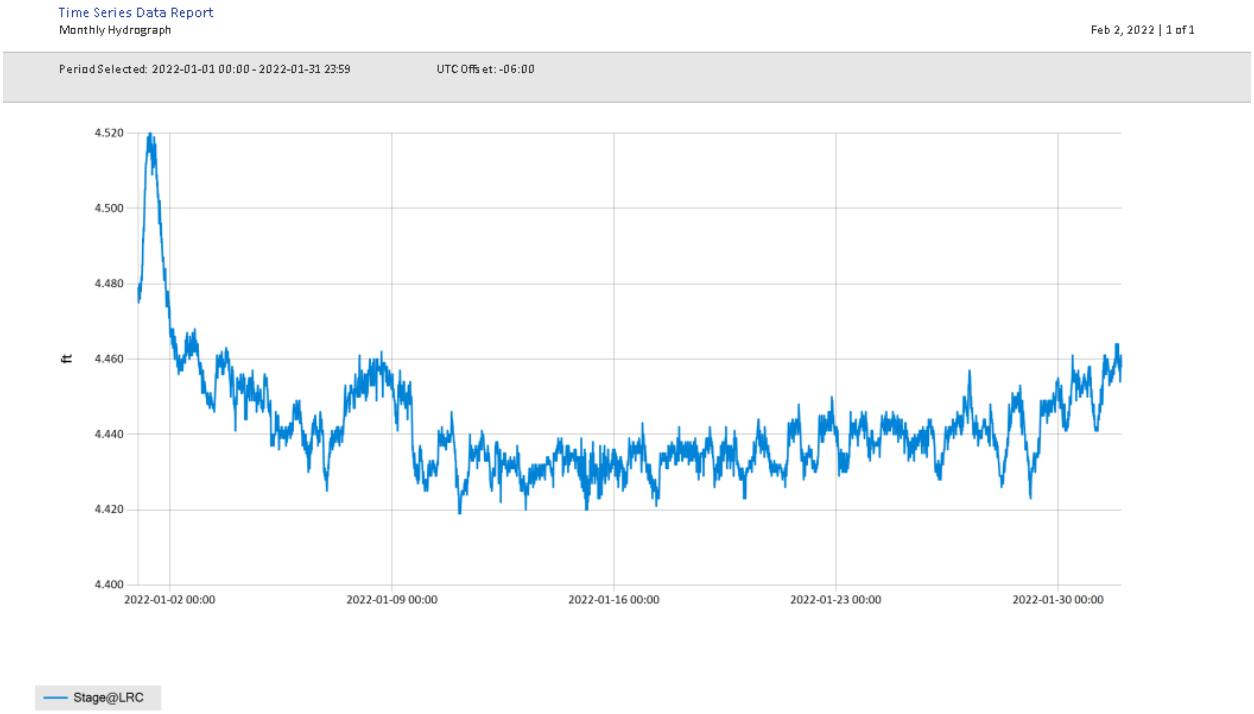


Figure 12 Monthly Hydrograph LRC-1

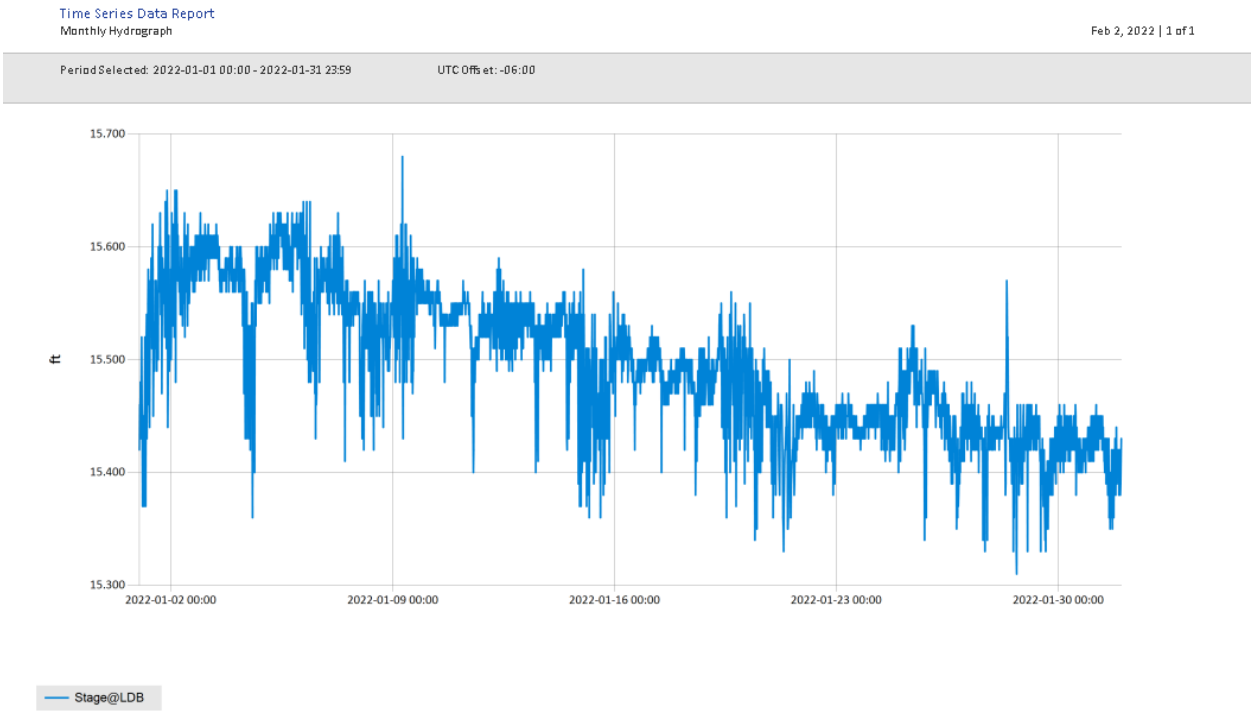


Figure 13 Monthly Hydrograph LDB-1

Figure 14 Monthly Hydrograph CC-1

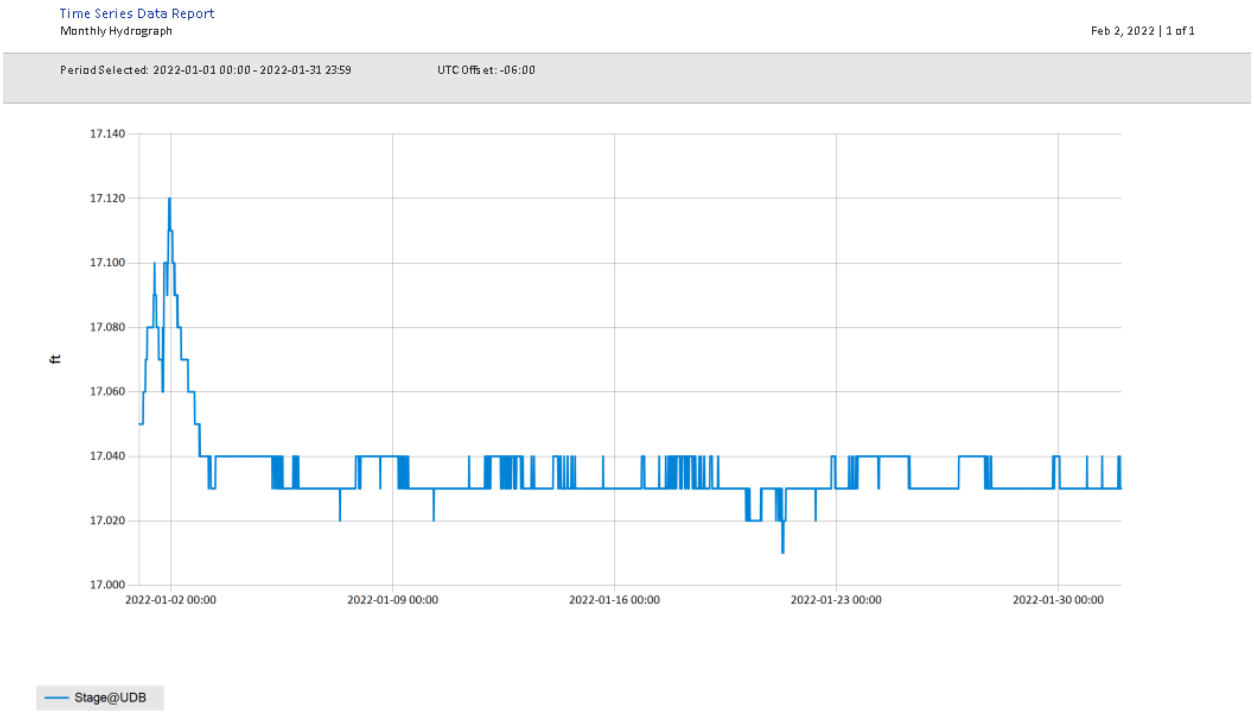


Figure 15 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — January 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) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	57	12	28.8	25.2	31	0	96	73	86	0.65	28.59	29.84	NNW	15.6	39.7	2.39	48.8	46.5	54	39
2	31	12	20.3	10.6	44	0	80	43	67	0.00	29.09	30.35	NNW	10.7	35.1	12.29	41.4	36.7	39	36
3	53	20	35.1	20.5	29	0	84	28	59	0.00	29.05	30.31	S	6.6	19.1	12.38	40.6	37.2	41	35
4	58	34	43.5	21.2	19	0	68	23	43	0.00	28.68	29.93	S	11.3	32.4	9.81	42.4	39.4	43	37
5	47	28	37.4	18.6	28	0	68	28	47	0.00	28.77	30.02	NE	11.4	25.6	11.72	42.7	40.2	44	38
6	28	15	20.8	8.3	44	0	70	46	58	0.00	28.97	30.22	N	15.7	38.3	10.92	39.7	36.4	39	35
7	41	12	26.2	15.7	38	0	79	43	65	0.00	28.88	30.14	SSE	8.4	25.9	12.37	38.3	34.4	36	33
8	55	39	47.1	45.8	18	0	99	70	95	0.01	28.63	29.88	S	12.7	27.9	1.76	42.2	41.2	46	36
9	54	25	39.1	24.0	25	0	98	28	58	0.01	29.14	30.40	N	15.5	34.9	10.08	44.0	44.1	47	40
10	55	19	35.7	12.3	28	0	77	13	43	0.00	29.35	30.62	SW	4.0	15.0	12.82	41.2	39.9	45	36
11	60	26	43.6	18.5	22	0	64	20	39	0.00	29.15	30.41	SSW	8.8	26.0	12.83	41.0	40.8	47	36
12	62	33	45.5	29.2	17	0	88	24	57	0.00	28.95	30.20	SW	5.9	19.4	12.39	43.1	43.9	50	39
13	68	35	49.5	27.9	14	0	70	24	46	0.00	28.87	30.12	WNW	5.3	18.9	12.32	43.2	44.8	51	39
14	62	35	49.6	32.2	16	0	84	32	54	0.00	28.65	29.90	SSE	11.8	48.1	6.02	44.4	46.1	50	43
15	38	23	27.8	17.5	35	0	75	58	65	0.00	28.93	30.18	NNW	22.8	44.2	2.17	41.5	41.5	47	39
16	52	16	33.0	18.9	31	0	91	26	61	0.00	28.83	30.08	NNW	5.8	20.1	13.04	40.0	39.7	45	36
17	60	24	42.7	24.8	23	0	80	28	52	0.00	28.81	30.06	S	5.5	18.6	13.08	40.7	41.5	48	36
18	69	36	49.6	28.8	13	0	82	24	47	0.00	28.54	29.78	S	7.8	22.4	11.27	43.1	44.6	50	40
19	41	20	33.6	20.4	34	0	89	38	60	0.00	28.83	30.08	N	18.4	39.9	3.11	41.8	42.0	45	39
20	28	13	19.5	0.5	44	0	57	27	44	0.00	29.27	30.54	NNE	13.6	31.3	10.09	37.9	37.2	39	36
21	39	10	24.1	1.7	40	0	67	15	42	0.00	29.15	30.41	SE	3.8	14.0	13.67	36.0	35.1	38	33
22	50	18	34.1	10.9	31	0	74	20	41	0.00	29.12	30.38	SSW	4.9	18.1	13.33	36.7	36.7	42	33
23	59	30	41.8	22.7	20	0	79	31	48	0.00	28.87	30.12	SW	4.5	13.5	13.65	38.5	39.7	47	35
24	67	26	46.0	25.5	19	0	84	19	51	0.00	28.63	29.87	SSW	6.5	31.9	13.79	39.8	42.1	49	36
25	44	28	35.8	15.7	29	0	71	28	45	0.00	28.95	30.21	NE	13.2	25.2	13.26	41.2	43.4	47	41
26	37	22	29.9	9.6	35	0	95	27	46	0.00	29.10	30.36	NE	5.7	21.6	8.00	39.7	40.9	44	38
27	43	27	33.1	27.0	30	0	92	58	79	0.04	29.04	30.30	NNW	5.7	13.9	11.87	40.4	41.2	46	38
28	52	24	36.1	21.7	27	0	89	26	60	0.00	29.17	30.44	NW	7.6	26.0	14.43	39.8	40.2	46	36
29	69	22	44.3	17.9	19	0	86	9	45	0.00	28.92	30.17	S	7.9	29.5	14.86	39.4	40.8	47	35
30	67	26	45.8	17.7	19	0	64	12	36	0.00	28.81	30.06	SSE	4.2	12.9	14.92	40.4	42.7	50	37
31	72	27	50.5	32.0	16	0	85	25	53	0.00	28.65	29.90	S	6.9	23.0	14.37	41.6	44.6	51	38
	52	24	37.1	20.1	<- Monthly Averages ->						28.92	30.17	S	9.3	48.1	10.94	41.0	40.8	46	37

Temperature - Highest: 72
Lowest: 10

Degree Days - Total HDD: 838
Total CDD: 0

Rainfall: Monthly Total: 0.71 in.
Greatest 24 Hr: 0.65 in.

Humidity - Highest: 99
Lowest: 9

Number of Days With:
Tmax ≥ 90: 0
Tmax ≤ 32: 3
Tmin ≤ 32: 25
Tmin ≤ 0: 0
Rainfall ≥ 0.01 inch: 4
Rainfall ≥ 0.10 inch: 1
Avg Wind Speed ≥ 10 mph: 12
Max Wind Speed ≥ 30 mph: 10

* Denotes incomplete record

Figure 16 January Mesonet Data

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

SY-2021 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

February 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 FEBRUARY WATER QUALITY SAMPLING

Sampling for February 2022 occurred on the twenty-second and was a base flow collection. Water samples were collected at nine locations and a discharge measurement was collected at one location. Samples were not collected at JB-1 due to construction activity. Mesonet data shows no precipitation on the twenty-second, 0.05 inches of precipitation in the 72 hours prior to sampling, and 0.02 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of February was 1.55 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

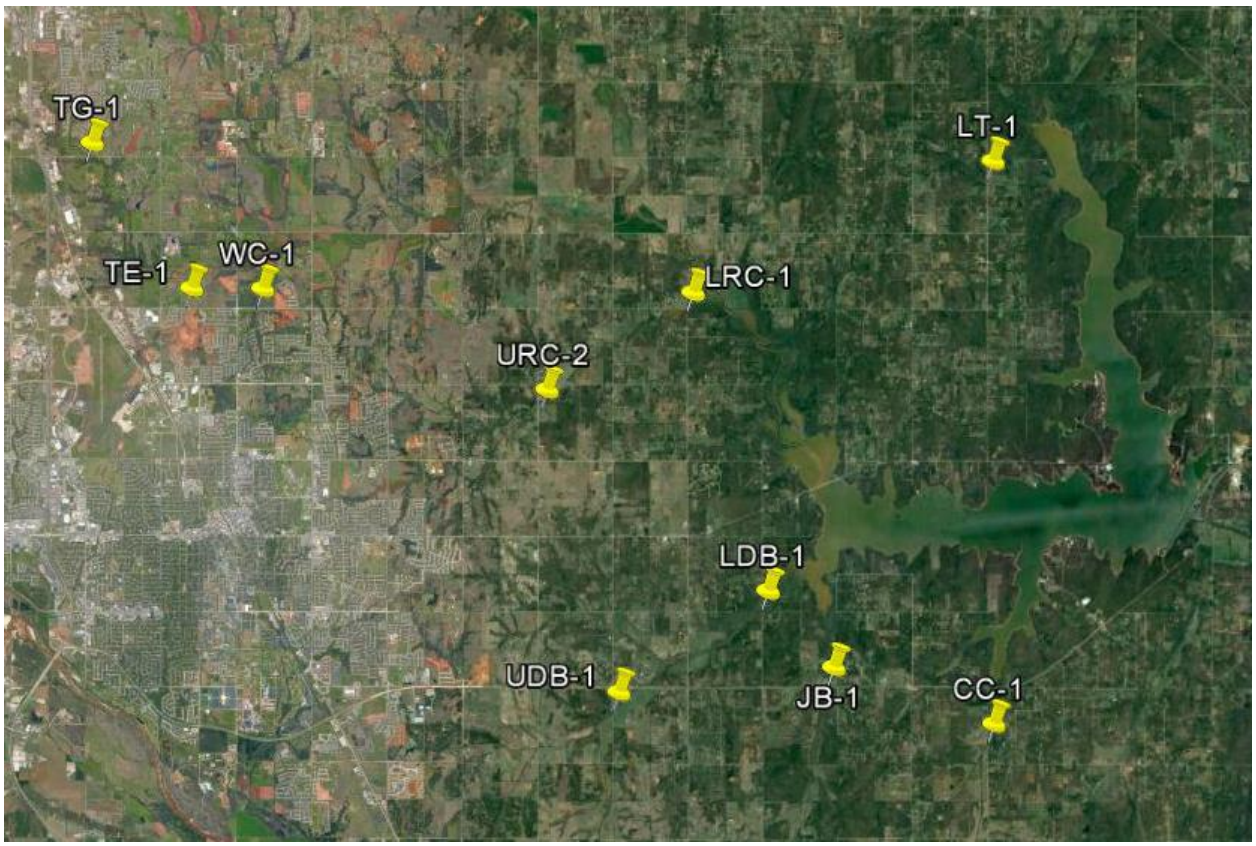


Figure 1 Monitoring Station Map

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	2/22/2022	9:30	SD	6.43	10.72	8.07	694	6	Same tapedown as December, low/normal flow conditions, used RP3, RP4 also over water
JB-1	Jim Blue Creek	2/22/2022	9:45	SD	N/A	N/A	N/A	N/A	N/A	Active construction on upstream building bridge deck/piers, water very turbid and pooled on downstream, did not sample
LDB-1	Lower Dave Blue Creek	2/22/2022	10:00	SD	8.25	10.09	7.93	603	39	Very minimal flow, very turbid
LRC-1	Lower Rock Creek	2/22/2022	11:15	SD	8.06	9.86	7.94	666	12	Beaver signs still visible on banks, dam more prominent on downstream
LT-1	Lake Laterals	2/22/2022	10:35	SD	6.84	7.30	7.67	528	3	Sampled on upstream
TE-1	Little River Tributary	2/22/2022	13:25	SD	8.26	12.21	7.91	536	110	Similar tapedown to January visit, very turbid water for low conditions, very minimal visual flow
TG-1	Little River Tributary	2/22/2022	14:05	SD	8.42	12.79	8.12	921	14	Similar tapedown to last month, verified tapedown
UDB-1	Upper Dave Blue Creek	2/22/2022	8:45	SD	8.31	7.96	7.88	835	9	Almost same stage as last month collection, foam farther downstream
URC-2	Upper Rock Creek	2/22/2022	12:15	SD	6.61	16.02	7.56	667	22	Low flow, orifice close to being out of water
WC-1	Woodcrest Creek	2/22/2022	12:55	SD	7.93	9.49	7.73	810	15	Beaver sign, low water level, foam on downstream

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	0.16	0.028	5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.16	0.50	0.058	31.0
LRC-1	Lower Rock Creek	<0.05	0.22	0.044	<5.0
LT-1	Lake Laterals	<0.05	0.28	0.018	9.0
TE-1	Little River Tributary	0.55	0.39	0.136	60.0
TG-1	Little River Tributary	0.19	0.43	0.055	17.0
UDB-1	Upper Dave Blue Creek	<0.05	0.23	0.040	13.0
URC-2	Upper Rock Creek	0.08	0.45	0.062	17.0
WC-1	Woodcrest Creek	<0.05	0.59	0.108	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	<0.05	0.15	0.028	6.0
Duplicate RPD	0%	6.45%	0%	18.18%*

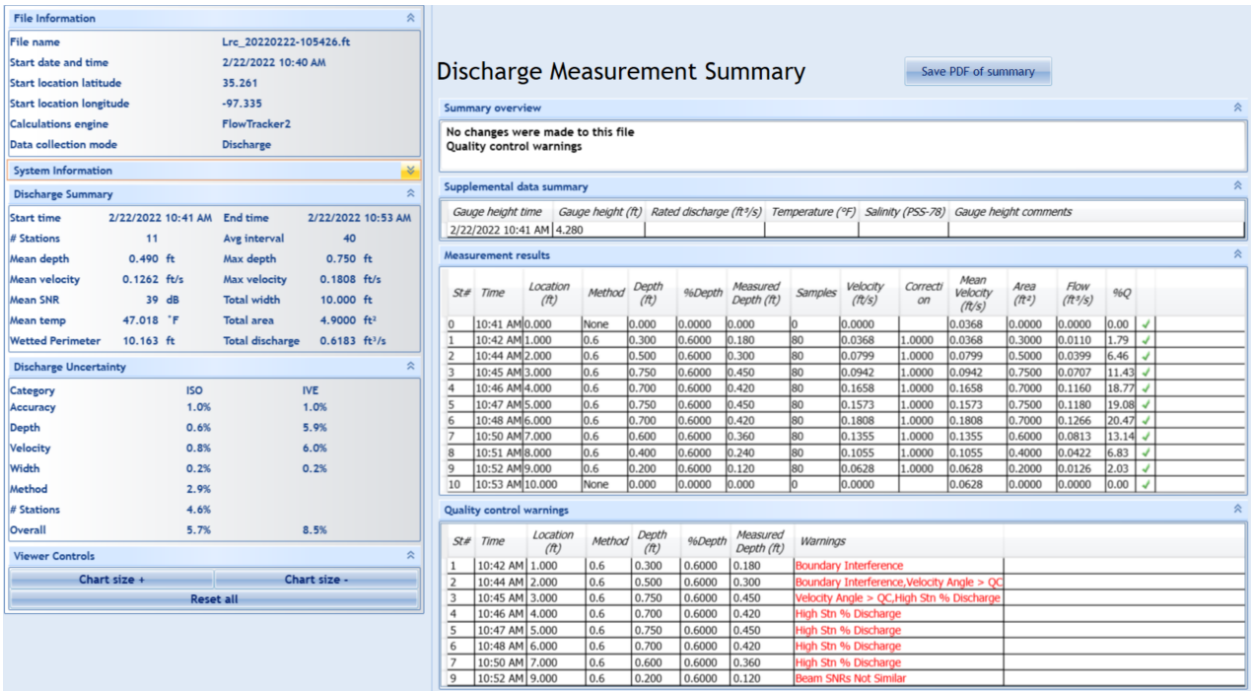
Table 3 QA/QC Data Where the Asterisk Denotes RPD 2

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	0.34	20.49
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	1.13	15.60
LRC-1	Lower Rock Creek	0.62	4.28
LT-1	Lake Laterals	0.40	4.44
TE-1	Little River Tributary	0.01	10.90
TG-1	Little River Tributary	0.55	8.94
UDB-1	Upper Dave Blue Creek	0.30	17.21
URC-2	Upper Rock Creek	0.01	10.68
WC-1	Woodcrest Creek	0.01	7.30

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Lrc_20220222-105426.ft
Start date and time	2/22/2022 10:40 AM
Start location latitude	35.261
Start location longitude	-97.335
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	2/22/2022 10:41 AM	End time	2/22/2022 10:53 AM
# Stations	11	Avg interval	40
Mean depth	0.490 ft	Max depth	0.750 ft
Mean velocity	0.1262 ft/s	Max velocity	0.1808 ft/s
Mean SNR	39 dB	Total width	10.000 ft
Mean temp	47.018 °F	Total area	4.9000 ft²
Wetted Perimeter	10.163 ft	Total discharge	0.6183 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.6%	5.9%
Velocity	0.8%	6.0%
Width	0.2%	0.2%
Method	2.9%	
# Stations	4.6%	
Overall	5.7%	8.5%

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
2/22/2022 10:41 AM	4.280				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	10:41 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0368	0.0000	0.0000	0.00	✓
1	10:42 AM	1.000	0.6	0.300	0.6000	0.180	80	0.0368	1.0000	0.0368	0.3000	0.0110	1.79	✓
2	10:44 AM	2.000	0.6	0.500	0.6000	0.300	80	0.0799	1.0000	0.0799	0.5000	0.0399	6.46	✓
3	10:45 AM	3.000	0.6	0.750	0.6000	0.450	80	0.0942	1.0000	0.0942	0.7500	0.0707	11.43	✓
4	10:46 AM	4.000	0.6	0.700	0.6000	0.420	80	0.1658	1.0000	0.1658	0.7000	0.1160	18.77	✓
5	10:47 AM	5.000	0.6	0.750	0.6000	0.450	80	0.1573	1.0000	0.1573	0.7500	0.1180	19.08	✓
6	10:48 AM	6.000	0.6	0.700	0.6000	0.420	80	0.1808	1.0000	0.1808	0.7000	0.1266	20.47	✓
7	10:50 AM	7.000	0.6	0.600	0.6000	0.360	80	0.1355	1.0000	0.1355	0.6000	0.0813	13.14	✓
8	10:51 AM	8.000	0.6	0.400	0.6000	0.240	80	0.1055	1.0000	0.1055	0.4000	0.0422	6.83	✓
9	10:52 AM	9.000	0.6	0.200	0.6000	0.120	80	0.0628	1.0000	0.0628	0.2000	0.0126	2.03	✓
10	10:53 AM	10.000	None	0.000	0.0000	0.000	0	0.0000		0.0628	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	10:42 AM	1.000	0.6	0.300	0.6000	0.180	Boundary Interference
2	10:44 AM	2.000	0.6	0.500	0.6000	0.300	Boundary Interference,Velocity Angle > QC
3	10:45 AM	3.000	0.6	0.750	0.6000	0.450	Velocity Angle > QC,High Stn % Discharge
4	10:46 AM	4.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
5	10:47 AM	5.000	0.6	0.750	0.6000	0.450	High Stn % Discharge
6	10:48 AM	6.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
7	10:50 AM	7.000	0.6	0.600	0.6000	0.360	High Stn % Discharge
9	10:52 AM	9.000	0.6	0.200	0.6000	0.120	Beam SNRs Not Similar

Figure 2 Discharge Measurement Summary LRC-1

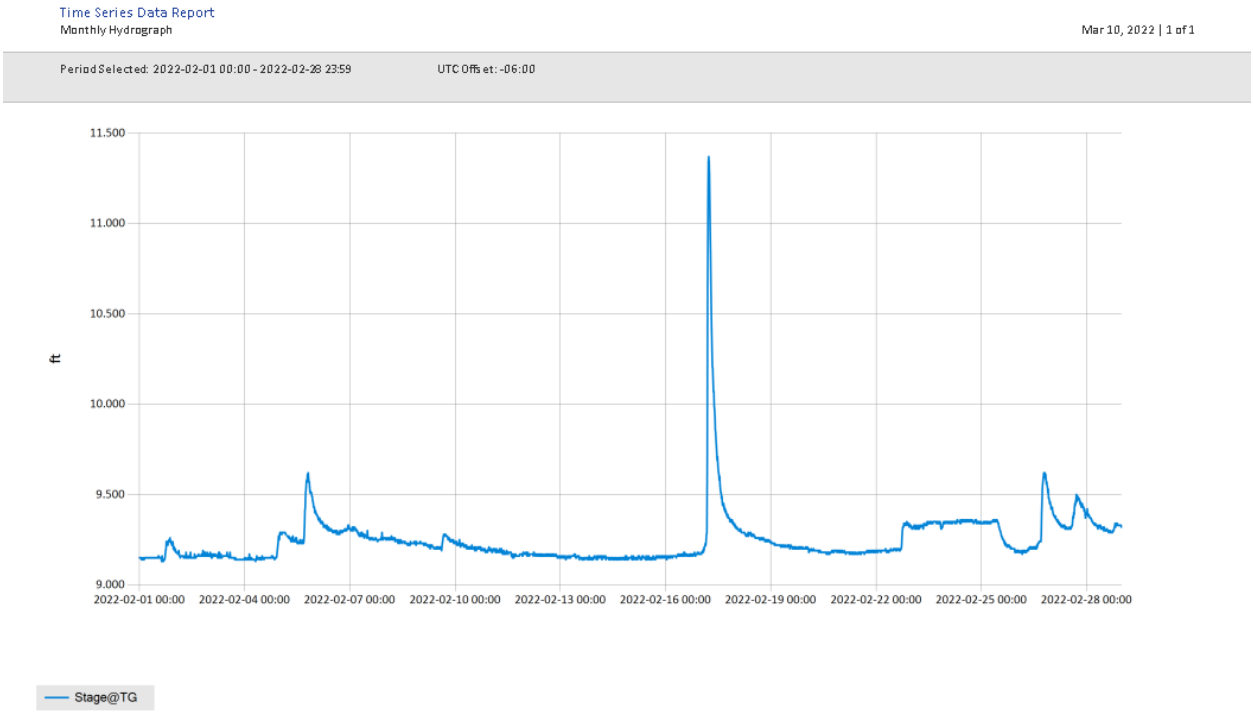


Figure 3 Monthly Hydrograph TG-1

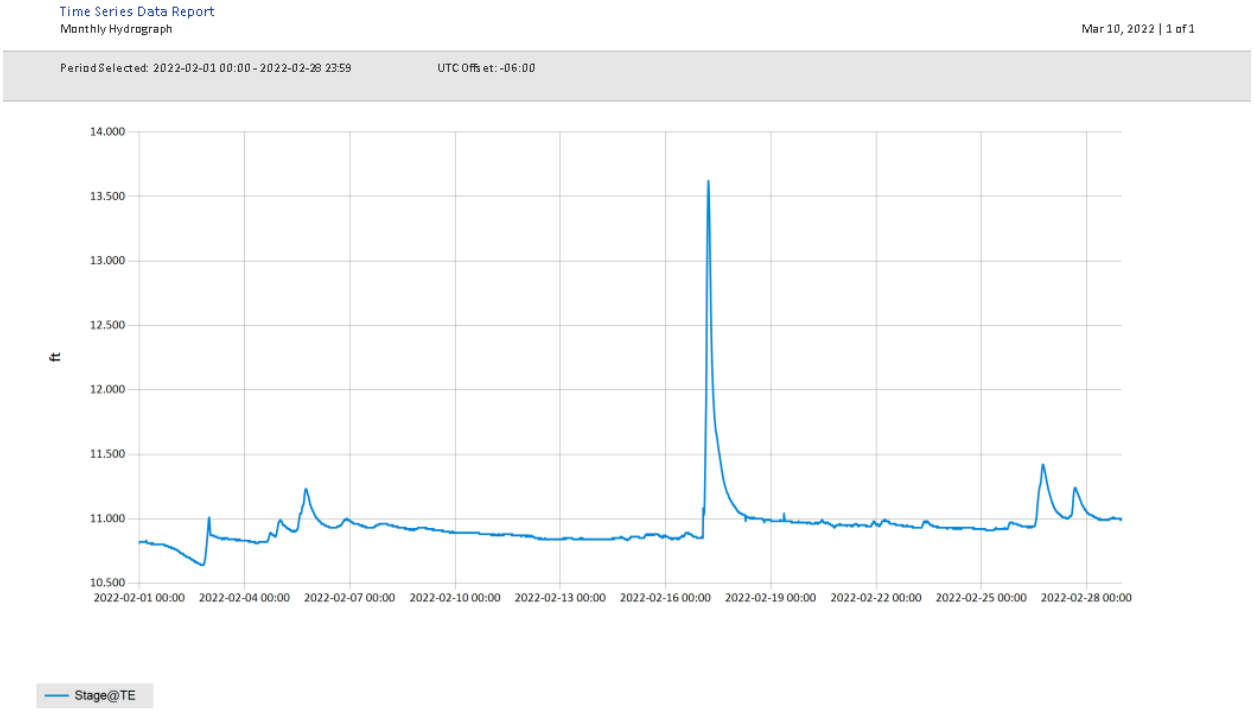


Figure 4 Monthly Hydrograph TE-1

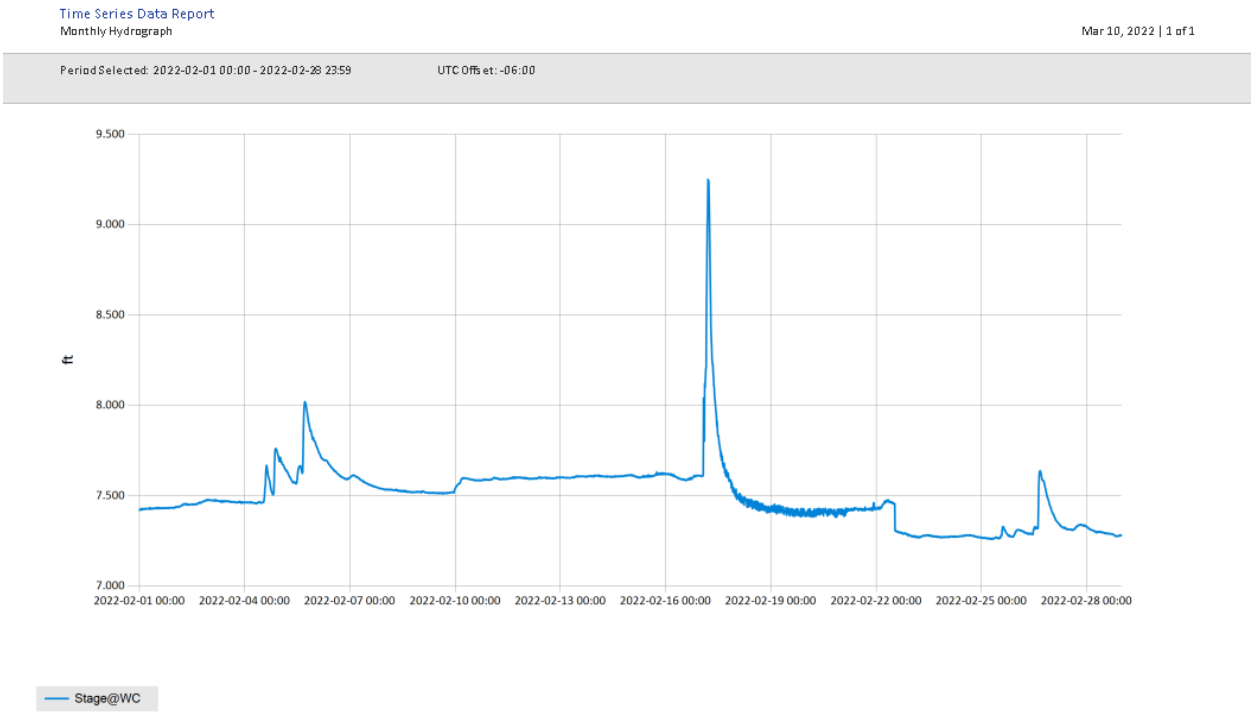


Figure 5 Monthly Hydrograph WC-1

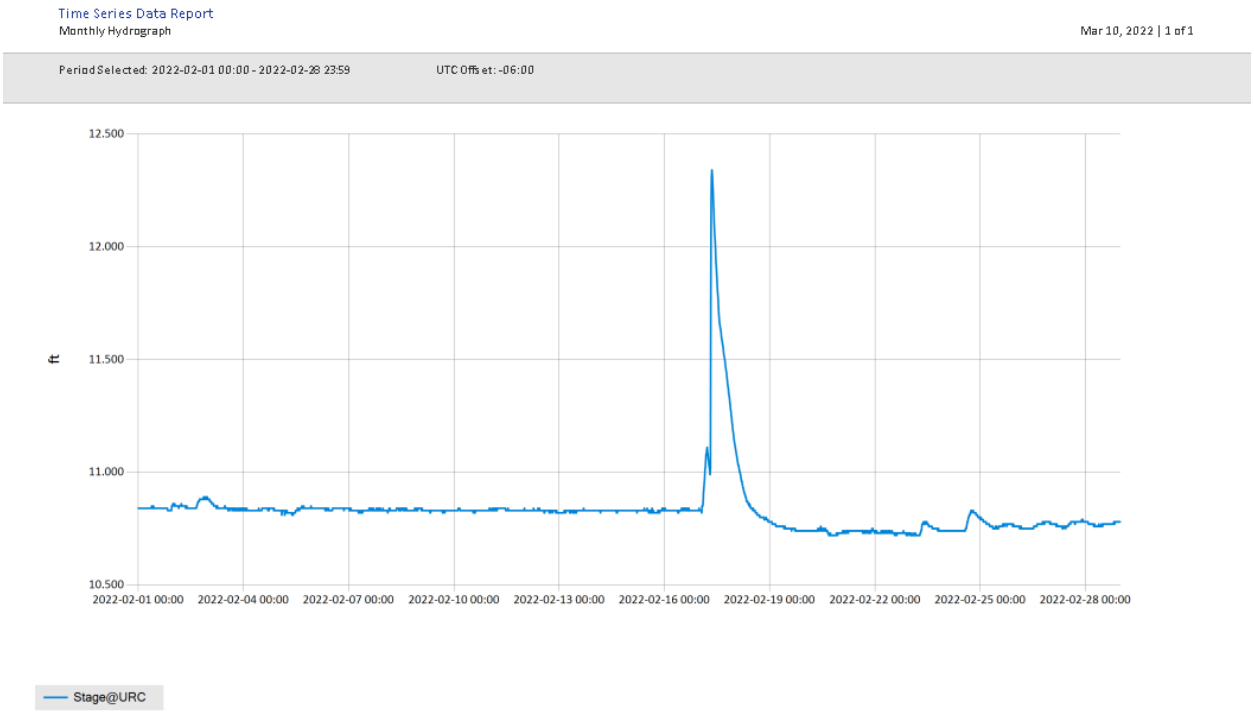


Figure 6 Monthly Hydrograph URC-2

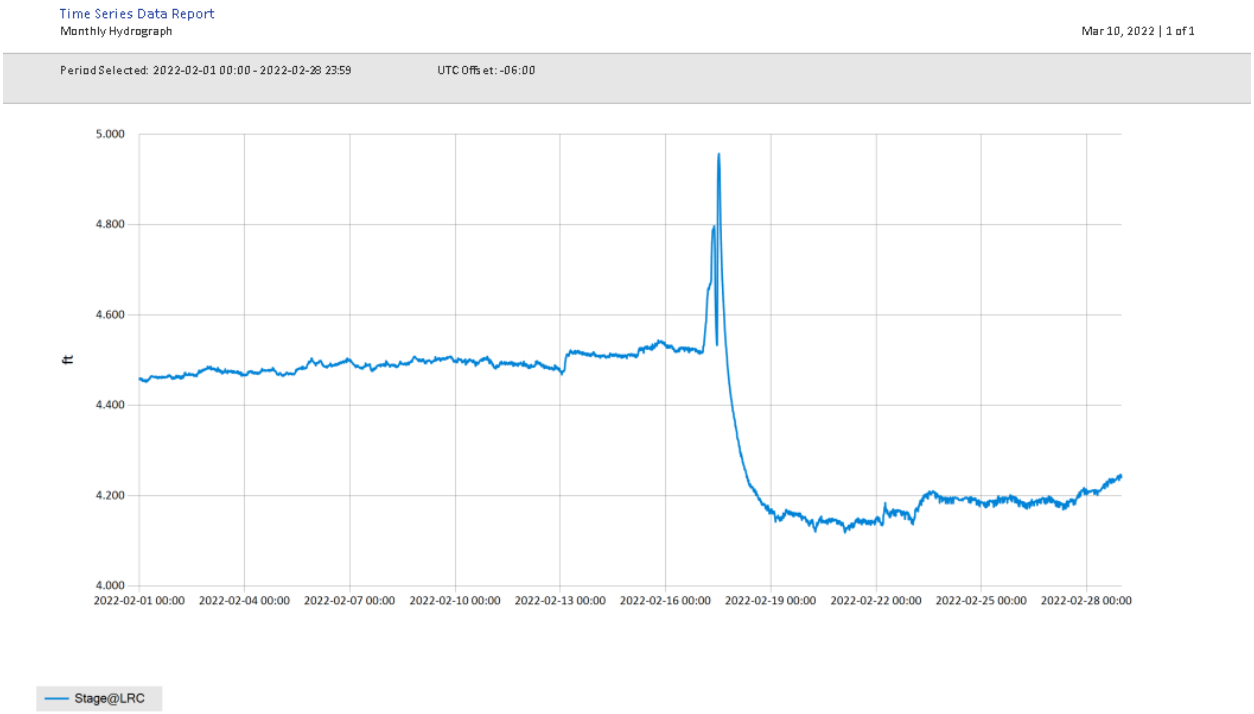


Figure 7 Monthly Hydrograph LRC-1

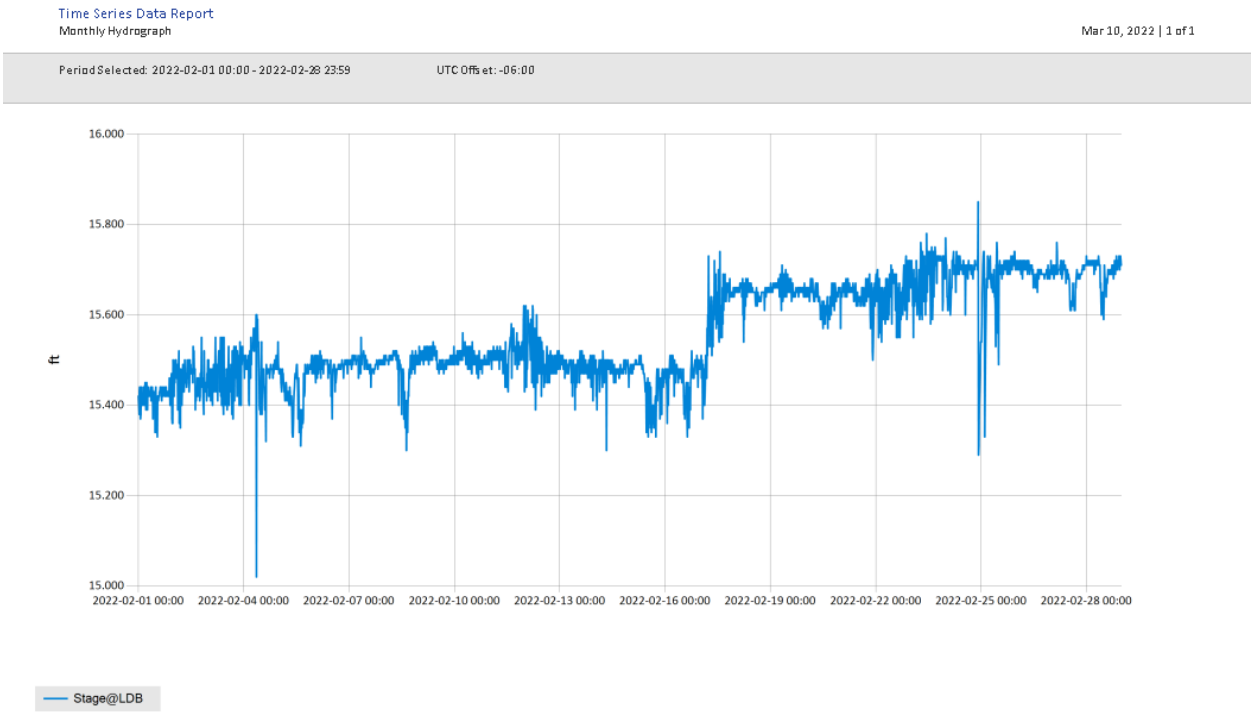


Figure 8 Monthly Hydrograph LDB-1

Figure 9 Monthly Hydrograph CC-1

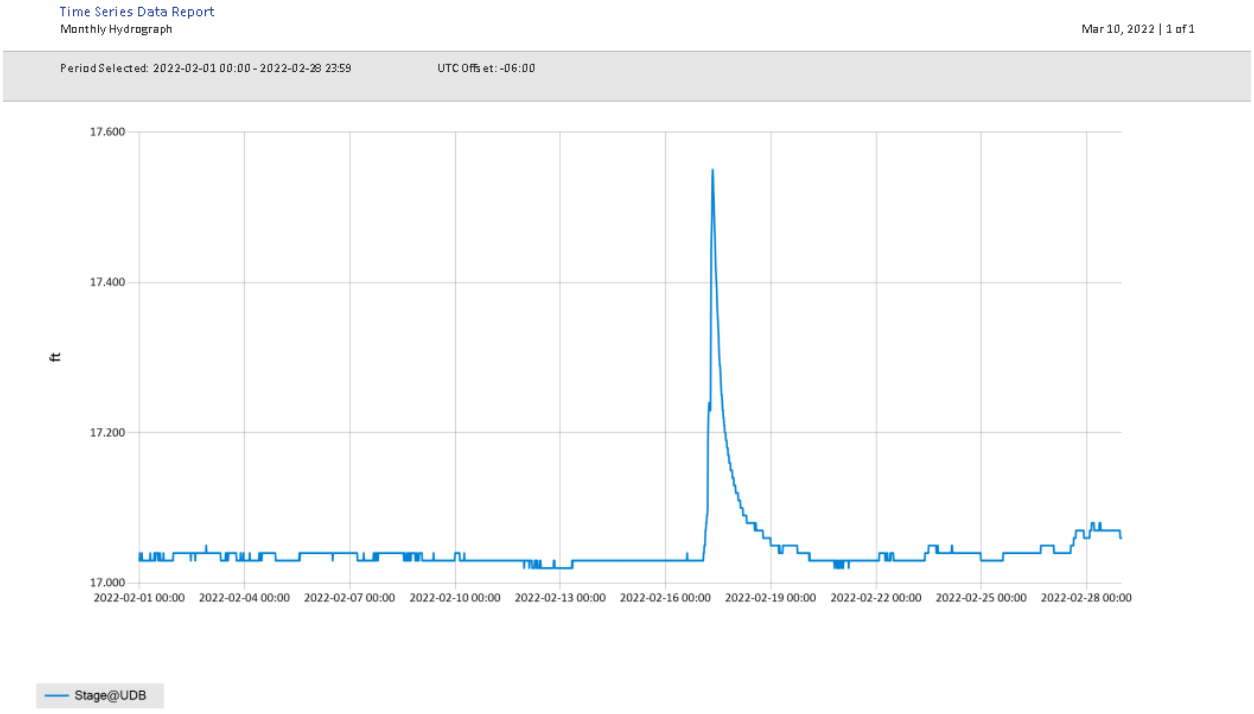


Figure 10 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — February 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) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	62	42	55.0	47.9	13	0	91	61	78	0.00	28.58	29.82	SSE	11.2	26.6	7.17	46.3	49.8	53	48
2	42	17	26.2	23.4	36	0	95	84	89	0.00	28.81	30.06	N *	NA	30.0*	2.09	43.5	44.2	50	41
3	17	14	15.3	10.5	50	0	86	77	81	0.00	29.02	30.28	N	18.2	31.6	5.45	40.3	39.6	41	39
4	31	12	21.2	10.7	44	0	88	37	65	0.08	29.27	30.54	N	8.3	23.2	16.08	40.0	38.1	39	37
5	44	14	30.1	16.9	36	0	93	33	62	0.12	29.10	30.36	S	7.4	22.2	16.20	39.1	36.8	37	36
6	49	27	36.4	24.3	27	0	86	47	62	0.02	28.94	30.19	S	6.7	18.0	14.47	39.0	36.2	38	36
7	57	25	40.9	25.0	24	0	87	29	57	0.01	29.09	30.35	SSW	7.1	19.9	15.90	39.4	38.6	45	35
8	65	34	47.6	25.4	15	0	63	21	45	0.00	28.85	30.11	SSW	8.9	28.9	16.31	41.4	40.8	47	36
9	68	29	48.5	21.0	17	0	78	14	40	0.00	28.82	30.07	WNW	5.6	18.8	16.20	41.4	41.8	49	37
10	63*	37*	50.3*	28.6*	15*	0*	66*	28*	44*	0.00*	28.80*	30.05*	NNW*	5.8*	20.0*	NA	43.1*	44.2*	51*	40*
11	65	41	51.9	29.2	12	0	57	24	43	0.00	28.68	29.92	NNE	11.7	30.9	15.51	44.1	45.3	52	40
12	46	26	33.9	10.6	29	0	52	24	38	0.00	29.17	30.43	N	13.3	39.2	15.86	43.0	44.1	48	40
13	57	29	41.2	16.8	22	0	58	22	39	0.00	29.08	30.34	NNW	7.0	17.8	16.88	41.6	42.3	50	37
14	71	36	53.0	20.8	12	0	54	14	32	0.00	28.92	30.17	S	7.7	18.9	17.02	43.1	45.6	54	38
15	69	44	56.7	34.8	8	0	59	27	45	0.00	28.74	29.98	S	15.3	37.7	16.02	45.7	49.3	55	44
16	74	57	62.8	51.2	0	0	89	42	67	0.00	28.53	29.77	S	14.4	32.9	8.49	49.1	53.1	57	50
17	62	21	30.7	24.5	23	0	98	59	78	0.91	28.85	30.10	N	18.4	43.6	5.36	45.5	44.9	55	39
18	50	17	33.3	16.4	32	0	93	24	56	0.00	29.06	30.32	SSW	5.1	17.2	18.03	41.2	39.6	45	36
19	64	27	46.4	26.0	20	0	81	24	48	0.00	29.05	30.30	S	5.9	18.8	17.99	42.8	42.8	51	37
20	69	43	54.8	27.7	9	0	68	21	37	0.00	28.73	29.97	S	13.8	31.6	16.80	45.1	44.8	50	40
21	71	50	61.3	49.6	4	0	94	44	67	0.05	28.50	29.74	S	13.4	47.6	11.30	48.3	49.9	55	46
22	62	18	27.8	14.6	25	0	84	40	58	0.00	28.87	30.12	NNW	18.2	36.5	17.76	45.9	45.9	54	40
23	20	12	14.7	7.5	49	0	88	55	73	0.00	29.13	30.39	NNE	15.1	31.7	4.80	39.1	35.8	40	34
24	23	14	18.8	15.8	47	0	93	81	88	0.00	29.00	30.26	NNE	8.5	19.4	5.36	36.8	33.2	34	33
25	31	14	23.1	11.2	43	0	82	42	62	0.02	29.24	30.50	NNE	8.2	20.7	15.63	35.6	32.0	33	31
26	38	22	29.6	19.5	35	0	79	53	66	0.16	29.15	30.41	NNE	5.1	14.3	12.08	36.0	32.4	33	32
27	55	22	38.0	17.0	27	0	82	17	48	0.16	29.12	30.39	NW	4.8	13.0	19.69	36.8	36.7	44	33
28	67	27	48.1	22.0	18	0	71	19	39	0.02	28.98	30.24	SSW	6.3	16.0	17.11	38.7	40.7	48	35
	53*	27*	39.2*	23.2*	<- Monthly Averages ->						28.93*	30.19*	S *	10.0*	47.6*	13.39*	41.8*	41.7*	47*	38*

Temperature - Highest: 74*
Lowest: 12*

Degree Days - Total HDD: 691*
Total CDD: 0*

Rainfall: Monthly Total: 1.55* in.
Greatest 24 Hr: 0.91* in.

Humidity - Highest: 98*
Lowest: 14*

Number of Days With:
Tmax ≥ 90: 0*
Tmax ≤ 32: 5*
Tmin ≤ 32: 19*
Tmin ≤ 0: 0*
Rainfall ≥ 0.01 inch: 10*
Rainfall ≥ 0.10 inch: 4*
Avg Wind Speed ≥ 10 mph: 11*
Max Wind Speed ≥ 30 mph: 11*

* Denotes incomplete record

Figure 11 February Mesonet Data

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

SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

March 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 MARCH WATER QUALITY SAMPLING

Sampling for March 2022 consisted of two sampling events. The first collection occurred during base flow conditions on the fifteenth. Water samples were collected at nine locations and discharge measurements were collected at seven locations. Samples were not collected at JB-1 due to construction activity. Mesonet data shows no precipitation on the fifteenth, 0.05 inches of precipitation in the 72 hours prior to sampling, and 0.28 inches of precipitation in the 72 hours after the sampling event. The second collection occurred during a rainfall event on the twenty-first. Water samples were collected at six permanent stations, two of which were via autosampler, as well as all seven stormwater outfalls. Discharge was measured at one location. Mesonet shows 2.03 inches of precipitation on the twenty-first, 0.02 inches of precipitation in the 72 hours prior to sampling, and 0.01 inches of precipitation in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of March was 2.65 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

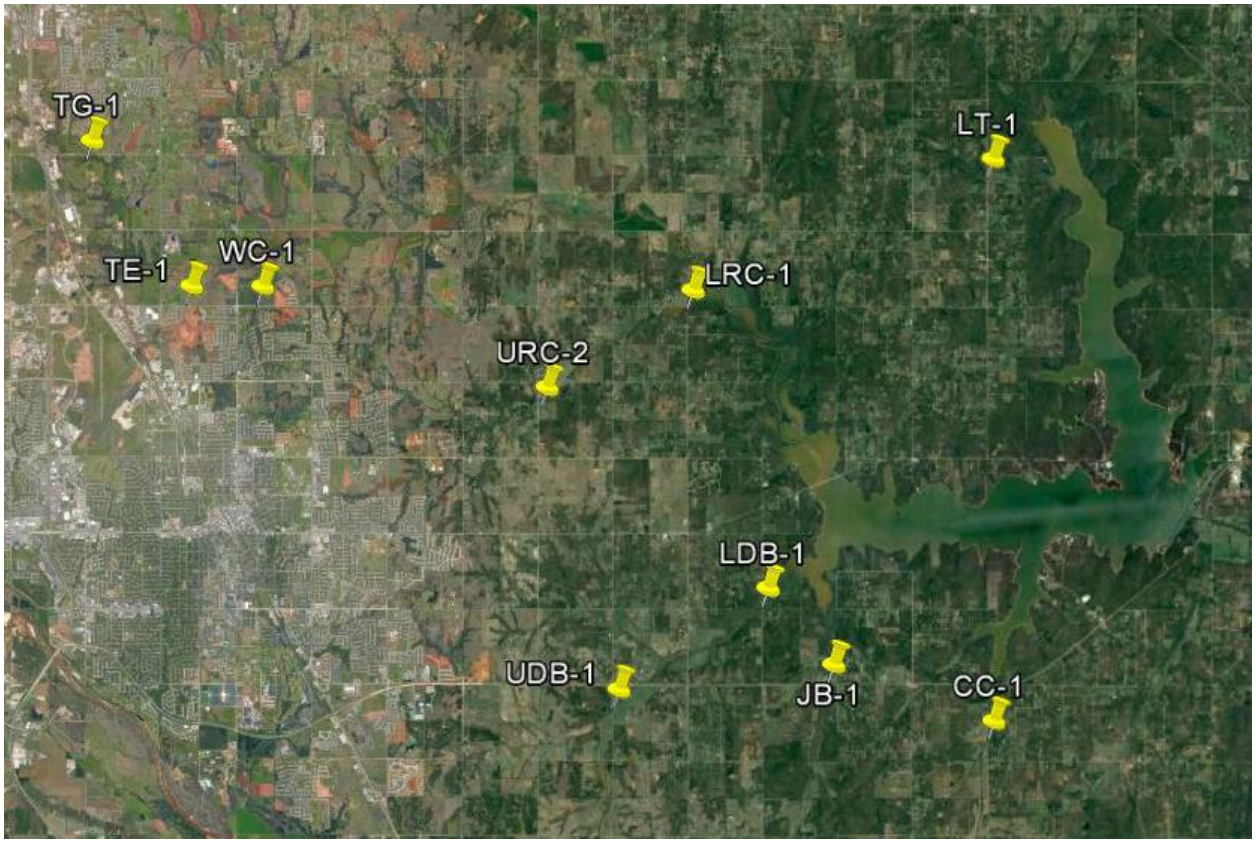


Figure 1 Monitoring Station Map

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	3/15/2022	10:30	SD	9.82	10.35	7.84	675	7	Used RP3, RP4 also over water
JB-1	Jim Blue Creek	3/15/2022	11:30	SD	N/A	N/A	N/A	N/A	N/A	Did not sample, ongoing construction on upstream, downstream pool conditions, turbid, shallow
LDB-1	Lower Dave Blue Creek	3/15/2022	11:40	SD	9.71	16.81	8.14	916	9	Not much positive visual flow, mostly none or negative
LRC-1	Lower Rock Creek	3/15/2022	13:00	SD	12.13	10.29	7.86	740	9	Verified tapedown
LT-1	Lake Laterals	3/15/2022	12:25	SD	10.48	9.43	7.73	534	2	
TE-1	Little River Tributary	3/15/2022	15:30	SD	17.49	14.47	8.12	1115	16	Very minimal visual flow, beaver dam on upstream still present, bubbly/scum on water surface
TG-1	Little River Tributary	3/15/2022	16:10	SD	15.46	18.01	8.44	1100	8	Borderline low/normal conditions, lots of filamentous algae
UDB-1	Upper Dave Blue Creek	3/15/2022	9:25	SD	9.08	8.19	7.64	960	4	Changed DCP, verified orifice clear
URC-2	Upper Rock Creek	3/15/2022	14:10	SD	12.42	15.76	7.69	874	7	Very minimal visual flow
WC-1	Woodcrest Creek	3/15/2022	14:50	SD	14.99	9.13	7.49	1063	10	Very minimal visual flow, lots of beaver sign on upstream (chewed trees, tracks)

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	0.20	0.025	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.25	0.027	<5.0
LRC-1	Lower Rock Creek	<0.05	0.13	0.031	<5.0
LT-1	Lake Laterals	<0.05	0.26	0.013	<5.0
TE-1	Little River Tributary	<0.05	0.51	0.036	11.0
TG-1	Little River Tributary	0.46	1.73	0.057	9.0
UDB-1	Upper Dave Blue Creek	<0.05	0.21	0.022	<5.0
URC-2	Upper Rock Creek	<0.05	0.29	0.036	<5.0
WC-1	Woodcrest Creek	<0.05	0.34	0.038	7.0

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	0.17	0.024	<5.0
Duplicate RPD	0%	16.22%*	4.08%	0%

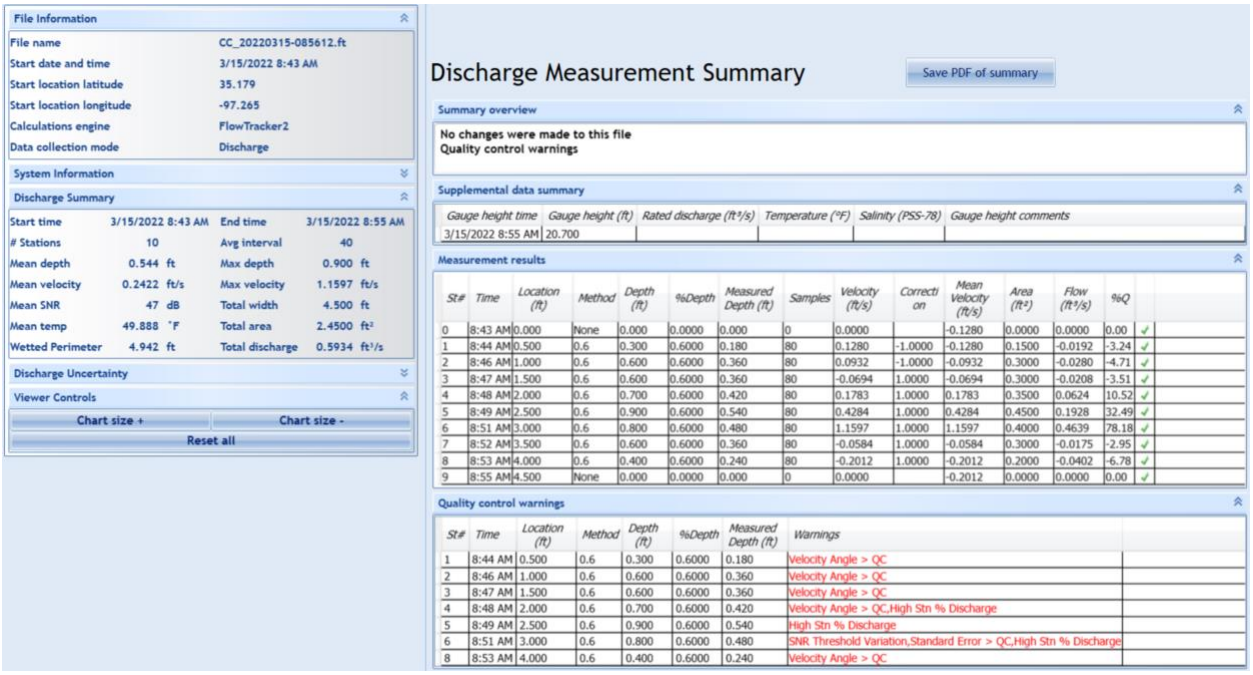
Table 3 QA/QC Data Where the Asterisk Denotes RPD 2

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.59	20.70
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	1.44	15.86
LRC-1	Lower Rock Creek	0.80	4.58
LT-1	Lake Laterals	0.60	4.59
TE-1	Little River Tributary	0.05	11.07
TG-1	Little River Tributary	0.93	9.15
UDB-1	Upper Dave Blue Creek	0.33	17.44
URC-2	Upper Rock Creek	0.06	10.91
WC-1	Woodcrest Creek	0.06	7.45

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	CC_20220315-085612.ft
Start date and time	3/15/2022 8:43 AM
Start location latitude	35.179
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	3/15/2022 8:43 AM	End time	3/15/2022 8:55 AM
# Stations	10	Avg interval	40
Mean depth	0.544 ft	Max depth	0.900 ft
Mean velocity	0.2422 ft/s	Max velocity	1.1597 ft/s
Mean SNR	47 dB	Total width	4.500 ft
Mean temp	49.888 °F	Total area	2.4500 ft²
Wetted Perimeter	4.942 ft	Total discharge	0.5934 ft³/s

Discharge Uncertainty

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
3/15/2022 8:55 AM	20.700				

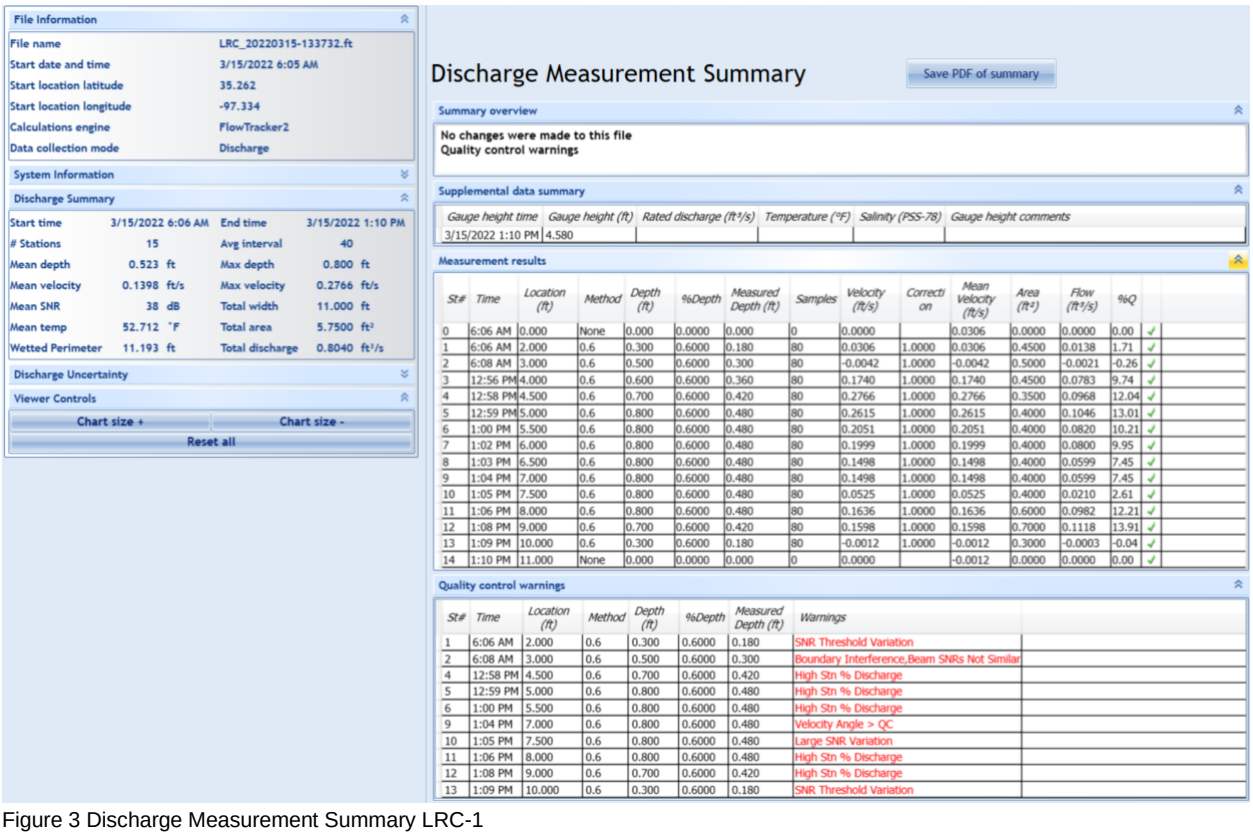
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	8:43 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.1280	0.0000	0.0000	0.00	✓
1	8:44 AM	0.500	0.6	0.300	0.6000	0.180	80	0.1280	-1.0000	-0.1280	0.1500	-0.0192	-3.24	✓
2	8:46 AM	1.000	0.6	0.600	0.6000	0.360	80	0.0932	-1.0000	-0.0932	0.3000	-0.0280	-4.71	✓
3	8:47 AM	1.500	0.6	0.600	0.6000	0.360	80	-0.0694	1.0000	-0.0694	0.3000	-0.0208	-3.51	✓
4	8:48 AM	2.000	0.6	0.700	0.6000	0.420	80	0.1783	1.0000	0.1783	0.3500	0.0624	10.52	✓
5	8:49 AM	2.500	0.6	0.900	0.6000	0.540	80	0.4284	1.0000	0.4284	0.4500	0.1928	32.49	✓
6	8:51 AM	3.000	0.6	0.800	0.6000	0.480	80	1.1597	1.0000	1.1597	0.4000	0.4639	78.18	✓
7	8:52 AM	3.500	0.6	0.600	0.6000	0.360	80	-0.0584	1.0000	-0.0584	0.3000	-0.0175	-2.95	✓
8	8:53 AM	4.000	0.6	0.400	0.6000	0.240	80	-0.2012	1.0000	-0.2012	0.2000	-0.0402	-6.78	✓
9	8:55 AM	4.500	None	0.000	0.0000	0.000	0	0.0000		-0.2012	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	8:44 AM	0.500	0.6	0.300	0.6000	0.180	Velocity Angle > QC
2	8:46 AM	1.000	0.6	0.600	0.6000	0.360	Velocity Angle > QC
3	8:47 AM	1.500	0.6	0.600	0.6000	0.360	Velocity Angle > QC
4	8:48 AM	2.000	0.6	0.700	0.6000	0.420	Velocity Angle > QC,High Stn % Discharge
5	8:49 AM	2.500	0.6	0.900	0.6000	0.540	High Stn % Discharge
6	8:51 AM	3.000	0.6	0.800	0.6000	0.480	SNR Threshold Variation,Standard Error > QC,High Stn % Discharge
8	8:53 AM	4.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC

Figure 2 Discharge Measurement Summary CC-1



File Information

File name	LRC_20220315-133732.ft
Start date and time	3/15/2022 6:05 AM
Start location latitude	35.262
Start location longitude	-97.334
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	3/15/2022 6:06 AM	End time	3/15/2022 1:10 PM
# Stations	15	Avg interval	40
Mean depth	0.523 ft	Max depth	0.800 ft
Mean velocity	0.1398 ft/s	Max velocity	0.2766 ft/s
Mean SNR	38 dB	Total width	11.000 ft
Mean temp	52.712 °F	Total area	5.7500 ft²
Wetted Perimeter	11.193 ft	Total discharge	0.8040 ft³/s

Discharge Uncertainty

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
3/15/2022 1:10 PM	4.580				

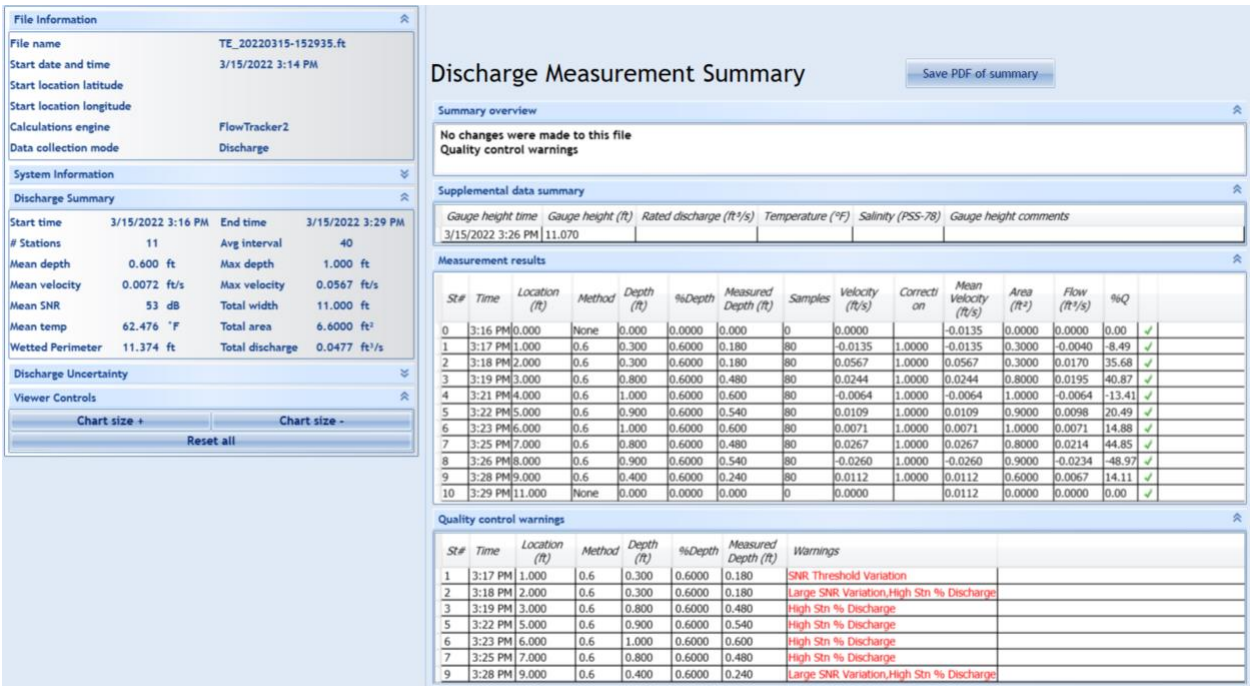
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	6:06 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0306	0.0000	0.0000	0.00	✓
1	6:06 AM	2.000	0.6	0.300	0.6000	0.180	80	0.0306	1.0000	0.0306	0.4500	0.0138	1.71	✓
2	6:08 AM	3.000	0.6	0.500	0.6000	0.300	80	-0.0042	1.0000	-0.0042	0.5000	-0.0021	-0.26	✓
3	12:56 PM	4.000	0.6	0.600	0.6000	0.360	80	0.1740	1.0000	0.1740	0.4500	0.0783	9.74	✓
4	12:58 PM	4.500	0.6	0.700	0.6000	0.420	80	0.2766	1.0000	0.2766	0.3500	0.0968	12.04	✓
5	12:59 PM	5.000	0.6	0.800	0.6000	0.480	80	0.2615	1.0000	0.2615	0.4000	0.1046	13.01	✓
6	1:00 PM	5.500	0.6	0.800	0.6000	0.480	80	0.2051	1.0000	0.2051	0.4000	0.0820	10.21	✓
7	1:02 PM	6.000	0.6	0.800	0.6000	0.480	80	0.1999	1.0000	0.1999	0.4000	0.0800	9.95	✓
8	1:03 PM	6.500	0.6	0.800	0.6000	0.480	80	0.1498	1.0000	0.1498	0.4000	0.0599	7.45	✓
9	1:04 PM	7.000	0.6	0.800	0.6000	0.480	80	0.1498	1.0000	0.1498	0.4000	0.0599	7.45	✓
10	1:05 PM	7.500	0.6	0.800	0.6000	0.480	80	0.0525	1.0000	0.0525	0.4000	0.0210	2.61	✓
11	1:06 PM	8.000	0.6	0.800	0.6000	0.480	80	0.1636	1.0000	0.1636	0.6000	0.0982	12.21	✓
12	1:08 PM	9.000	0.6	0.700	0.6000	0.420	80	0.1598	1.0000	0.1598	0.7000	0.1118	13.91	✓
13	1:09 PM	10.000	0.6	0.300	0.6000	0.180	80	-0.0012	1.0000	-0.0012	0.3000	-0.0003	-0.04	✓
14	1:10 PM	11.000	None	0.000	0.0000	0.000	0	0.0000		-0.0012	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	6:06 AM	2.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation
2	6:08 AM	3.000	0.6	0.500	0.6000	0.300	Boundary Interference,Beam SNRs Not Similar
4	12:58 PM	4.500	0.6	0.700	0.6000	0.420	High Stn % Discharge
5	12:59 PM	5.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
6	1:00 PM	5.500	0.6	0.800	0.6000	0.480	High Stn % Discharge
9	1:04 PM	7.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
10	1:05 PM	7.500	0.6	0.800	0.6000	0.480	Large SNR Variation
11	1:06 PM	8.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
12	1:08 PM	9.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
13	1:09 PM	10.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation

Figure 3 Discharge Measurement Summary LRC-1



File Information

File name	TE_20220315-152935.ft
Start date and time	3/15/2022 3:14 PM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	3/15/2022 3:16 PM	End time	3/15/2022 3:29 PM
# Stations	11	Avg interval	40
Mean depth	0.600 ft	Max depth	1.000 ft
Mean velocity	0.0072 ft/s	Max velocity	0.0567 ft/s
Mean SNR	53 dB	Total width	11.000 ft
Mean temp	62.476 °F	Total area	6.6000 ft²
Wetted Perimeter	11.374 ft	Total discharge	0.0477 ft³/s

Discharge Uncertainty

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
3/15/2022 3:26 PM	11.070				

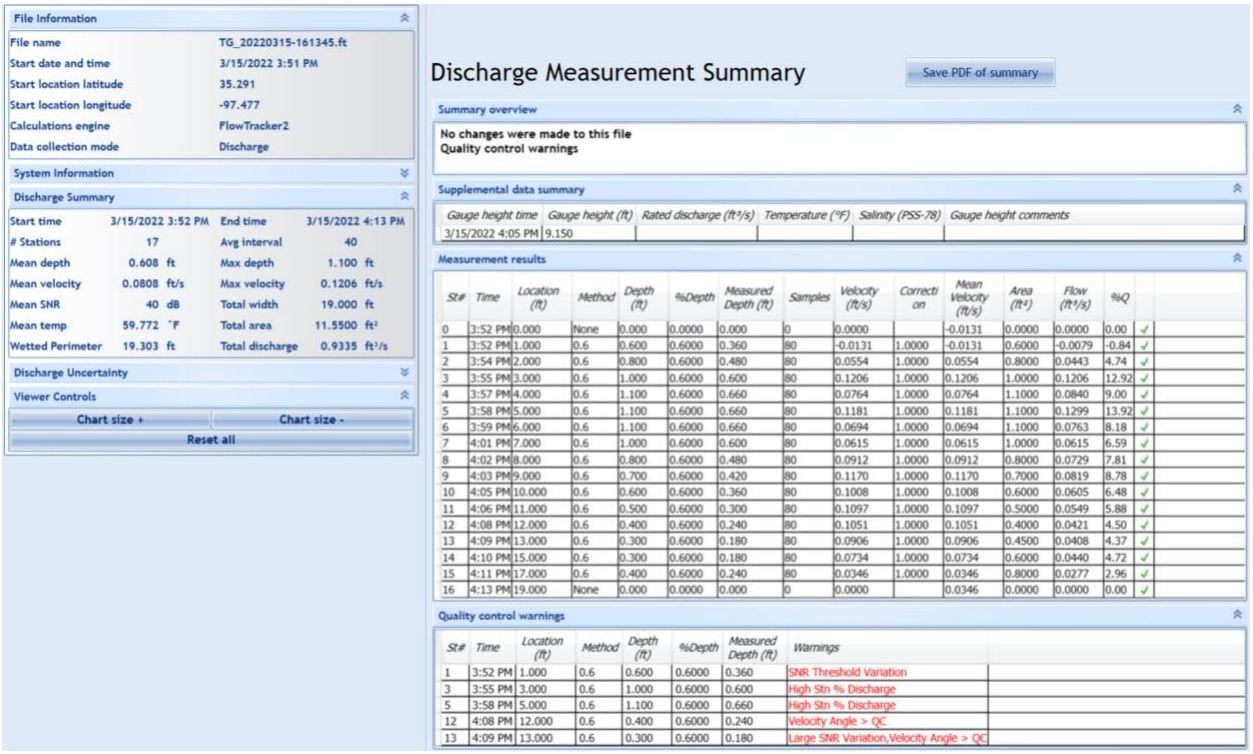
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	3:16 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0135	0.0000	0.0000	0.00	✓
1	3:17 PM	1.000	0.6	0.300	0.6000	0.180	80	-0.0135	1.0000	-0.0135	0.3000	-0.0040	-8.49	✓
2	3:18 PM	2.000	0.6	0.300	0.6000	0.180	80	0.0567	1.0000	0.0567	0.3000	0.0170	35.68	✓
3	3:19 PM	3.000	0.6	0.800	0.6000	0.480	80	0.0244	1.0000	0.0244	0.8000	0.0195	40.87	✓
4	3:21 PM	4.000	0.6	1.000	0.6000	0.600	80	-0.0064	1.0000	-0.0064	1.0000	-0.0064	-13.41	✓
5	3:22 PM	5.000	0.6	0.900	0.6000	0.540	80	0.0109	1.0000	0.0109	0.9000	0.0098	20.49	✓
6	3:23 PM	6.000	0.6	1.000	0.6000	0.600	80	0.0071	1.0000	0.0071	1.0000	0.0071	14.88	✓
7	3:25 PM	7.000	0.6	0.800	0.6000	0.480	80	0.0267	1.0000	0.0267	0.8000	0.0214	44.85	✓
8	3:26 PM	8.000	0.6	0.900	0.6000	0.540	80	-0.0260	1.0000	-0.0260	0.9000	-0.0234	-48.97	✓
9	3:28 PM	9.000	0.6	0.400	0.6000	0.240	80	0.0112	1.0000	0.0112	0.6000	0.0067	14.11	✓
10	3:29 PM	11.000	None	0.000	0.0000	0.000	0	0.0000		0.0112	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	3:17 PM	1.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation
2	3:18 PM	2.000	0.6	0.300	0.6000	0.180	Large SNR Variation,High Stn % Discharge
3	3:19 PM	3.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
5	3:22 PM	5.000	0.6	0.900	0.6000	0.540	High Stn % Discharge
6	3:23 PM	6.000	0.6	1.000	0.6000	0.600	High Stn % Discharge
7	3:25 PM	7.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
9	3:28 PM	9.000	0.6	0.400	0.6000	0.240	Large SNR Variation,High Stn % Discharge

Figure 4 Discharge Measurement Summary TE-1



File Information

File name	TG_20220315-161345.ft
Start date and time	3/15/2022 3:51 PM
Start location latitude	35.291
Start location longitude	-97.477
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	3/15/2022 3:52 PM	End time	3/15/2022 4:13 PM
# Stations	17	Avg interval	40
Mean depth	0.608 ft	Max depth	1.100 ft
Mean velocity	0.0808 ft/s	Max velocity	0.1206 ft/s
Mean SNR	40 dB	Total width	19.000 ft
Mean temp	59.772 °F	Total area	11.5500 ft²
Wetted Perimeter	19.303 ft	Total discharge	0.9335 ft³/s

Discharge Uncertainty

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
3/15/2022 4:05 PM	9.150				

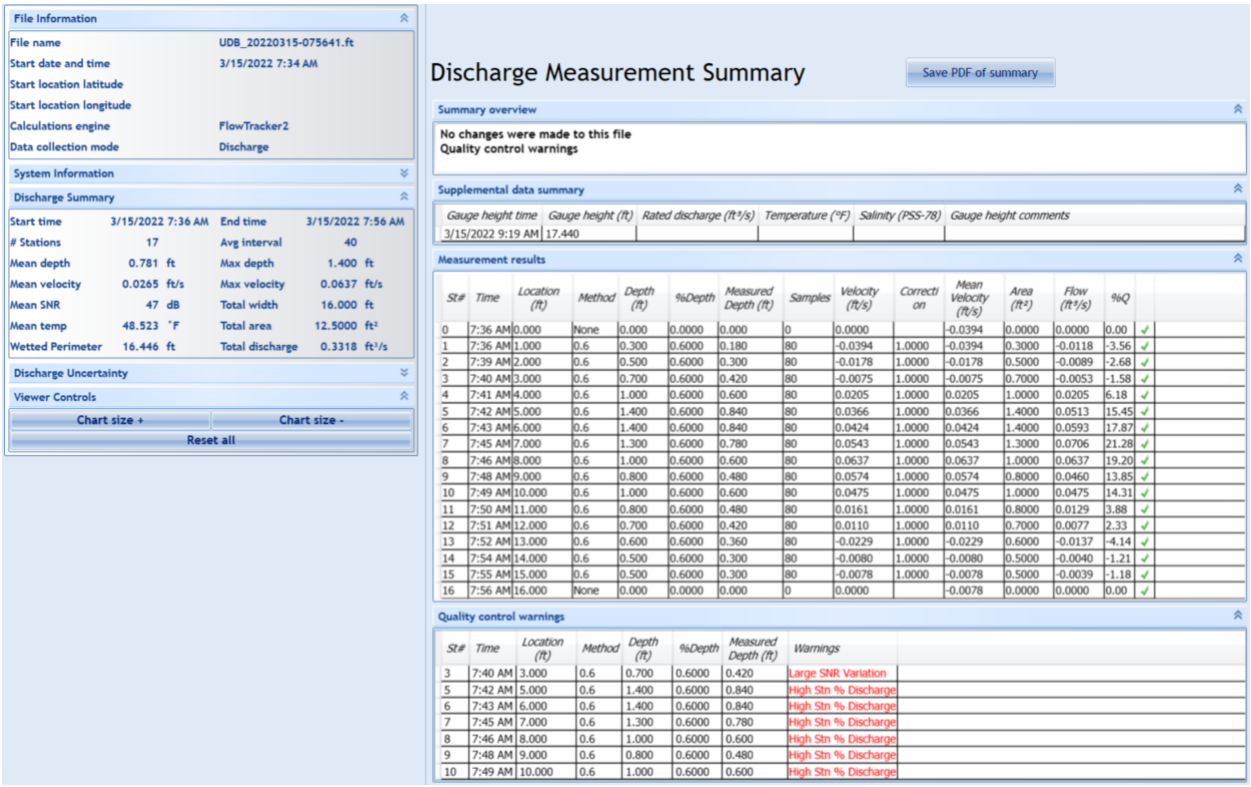
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	3:52 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0131	0.0000	0.0000	0.00	✓
1	3:52 PM	1.000	0.6	0.600	0.6000	0.360	80	-0.0131	1.0000	-0.0131	0.6000	-0.0079	-0.84	✓
2	3:54 PM	2.000	0.6	0.800	0.6000	0.480	80	0.0554	1.0000	0.0554	0.8000	0.0443	4.74	✓
3	3:55 PM	3.000	0.6	1.000	0.6000	0.600	80	0.1206	1.0000	0.1206	1.0000	0.1206	12.92	✓
4	3:57 PM	4.000	0.6	1.100	0.6000	0.660	80	0.0764	1.0000	0.0764	1.1000	0.0840	9.00	✓
5	3:58 PM	5.000	0.6	1.100	0.6000	0.660	80	0.1181	1.0000	0.1181	1.1000	0.1299	13.92	✓
6	3:59 PM	6.000	0.6	1.100	0.6000	0.660	80	0.0694	1.0000	0.0694	1.1000	0.0763	8.18	✓
7	4:01 PM	7.000	0.6	1.000	0.6000	0.600	80	0.0615	1.0000	0.0615	1.0000	0.0615	6.59	✓
8	4:02 PM	8.000	0.6	0.800	0.6000	0.480	80	0.0912	1.0000	0.0912	0.8000	0.0729	7.81	✓
9	4:03 PM	9.000	0.6	0.700	0.6000	0.420	80	0.1170	1.0000	0.1170	0.7000	0.0819	8.78	✓
10	4:05 PM	10.000	0.6	0.600	0.6000	0.360	80	0.1008	1.0000	0.1008	0.6000	0.0605	6.48	✓
11	4:06 PM	11.000	0.6	0.500	0.6000	0.300	80	0.1097	1.0000	0.1097	0.5000	0.0549	5.88	✓
12	4:08 PM	12.000	0.6	0.400	0.6000	0.240	80	0.1051	1.0000	0.1051	0.4000	0.0421	4.50	✓
13	4:09 PM	13.000	0.6	0.300	0.6000	0.180	80	0.0906	1.0000	0.0906	0.4500	0.0408	4.37	✓
14	4:10 PM	15.000	0.6	0.300	0.6000	0.180	80	0.0734	1.0000	0.0734	0.6000	0.0440	4.72	✓
15	4:11 PM	17.000	0.6	0.400	0.6000	0.240	80	0.0346	1.0000	0.0346	0.8000	0.0277	2.96	✓
16	4:13 PM	19.000	None	0.000	0.0000	0.000	0	0.0000		0.0346	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	3:52 PM	1.000	0.6	0.600	0.6000	0.360	SNR Threshold Variation
3	3:55 PM	3.000	0.6	1.000	0.6000	0.600	High Stn % Discharge
5	3:58 PM	5.000	0.6	1.100	0.6000	0.660	High Stn % Discharge
12	4:08 PM	12.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC
13	4:09 PM	13.000	0.6	0.300	0.6000	0.180	Large SNR Variation,Velocity Angle > QC

Figure 5 Discharge Measurement Summary TG-1



File Information

File name	UDB_20220315-075641.ft
Start date and time	3/15/2022 7:34 AM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	3/15/2022 7:36 AM	End time	3/15/2022 7:56 AM
# Stations	17	Avg interval	40
Mean depth	0.781 ft	Max depth	1.400 ft
Mean velocity	0.0265 ft/s	Max velocity	0.0637 ft/s
Mean SNR	47 dB	Total width	16.000 ft
Mean temp	48.523 °F	Total area	12.5000 ft²
Wetted Perimeter	16.446 ft	Total discharge	0.3318 ft³/s

Discharge Uncertainty

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
3/15/2022 9:19 AM	17.440				

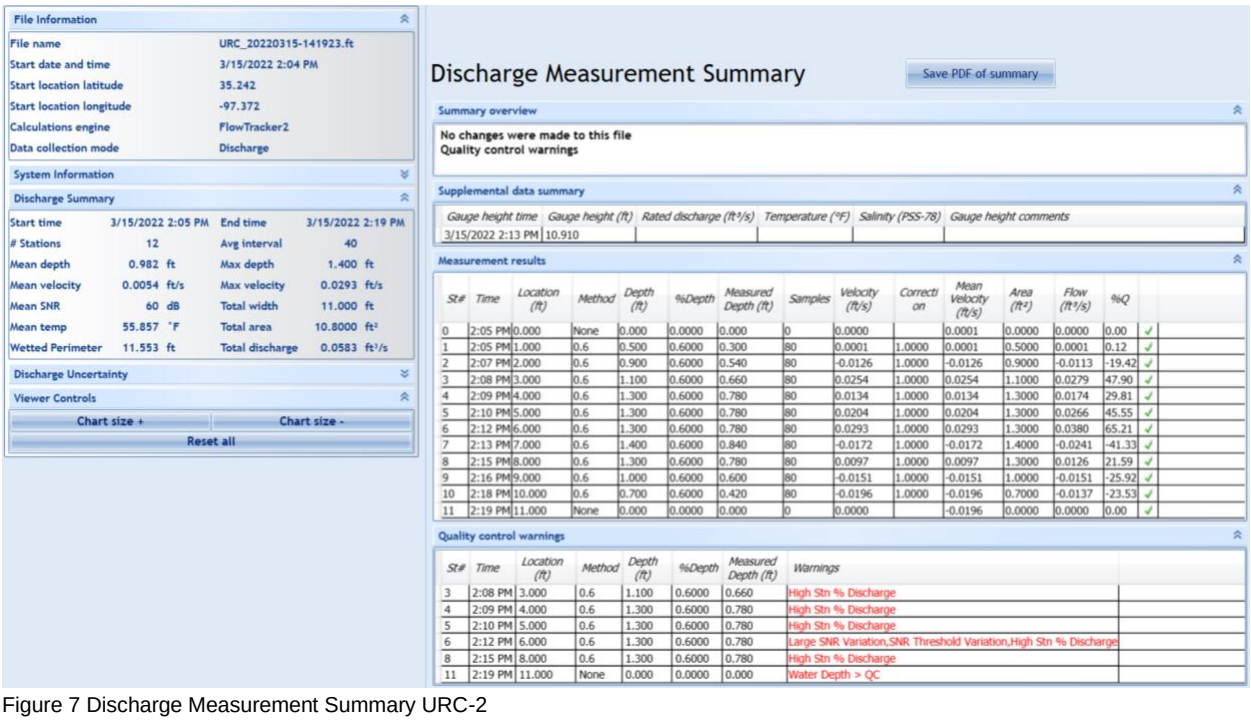
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	7:36 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0394	0.0000	0.0000	0.00	✓
1	7:36 AM	1.000	0.6	0.300	0.6000	0.180	80	-0.0394	1.0000	-0.0394	0.3000	-0.0118	-3.56	✓
2	7:39 AM	2.000	0.6	0.500	0.6000	0.300	80	-0.0178	1.0000	-0.0178	0.5000	-0.0089	-2.68	✓
3	7:40 AM	3.000	0.6	0.700	0.6000	0.420	80	-0.0075	1.0000	-0.0075	0.7000	-0.0053	-1.58	✓
4	7:41 AM	4.000	0.6	1.000	0.6000	0.600	80	0.0205	1.0000	0.0205	1.0000	0.0205	6.18	✓
5	7:42 AM	5.000	0.6	1.400	0.6000	0.840	80	0.0366	1.0000	0.0366	1.4000	0.0513	15.45	✓
6	7:43 AM	6.000	0.6	1.400	0.6000	0.840	80	0.0424	1.0000	0.0424	1.4000	0.0593	17.87	✓
7	7:45 AM	7.000	0.6	1.300	0.6000	0.780	80	0.0543	1.0000	0.0543	1.3000	0.0706	21.28	✓
8	7:46 AM	8.000	0.6	1.000	0.6000	0.600	80	0.0637	1.0000	0.0637	1.0000	0.0637	19.20	✓
9	7:48 AM	9.000	0.6	0.800	0.6000	0.480	80	0.0574	1.0000	0.0574	0.8000	0.0460	13.85	✓
10	7:49 AM	10.000	0.6	1.000	0.6000	0.600	80	0.0475	1.0000	0.0475	1.0000	0.0475	14.31	✓
11	7:50 AM	11.000	0.6	0.800	0.6000	0.480	80	0.0161	1.0000	0.0161	0.8000	0.0129	3.88	✓
12	7:51 AM	12.000	0.6	0.700	0.6000	0.420	80	0.0110	1.0000	0.0110	0.7000	0.0077	2.33	✓
13	7:52 AM	13.000	0.6	0.600	0.6000	0.360	80	-0.0229	1.0000	-0.0229	0.6000	-0.0137	-4.14	✓
14	7:54 AM	14.000	0.6	0.500	0.6000	0.300	80	-0.0080	1.0000	-0.0080	0.5000	-0.0040	-1.21	✓
15	7:55 AM	15.000	0.6	0.500	0.6000	0.300	80	-0.0078	1.0000	-0.0078	0.5000	-0.0039	-1.18	✓
16	7:56 AM	16.000	None	0.000	0.0000	0.000	0	0.0000		-0.0078	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
3	7:40 AM	3.000	0.6	0.700	0.6000	0.420	Large SNR Variation
5	7:42 AM	5.000	0.6	1.400	0.6000	0.840	High Stn % Discharge
6	7:43 AM	6.000	0.6	1.400	0.6000	0.840	High Stn % Discharge
7	7:45 AM	7.000	0.6	1.300	0.6000	0.780	High Stn % Discharge
8	7:46 AM	8.000	0.6	1.000	0.6000	0.600	High Stn % Discharge
9	7:48 AM	9.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
10	7:49 AM	10.000	0.6	1.000	0.6000	0.600	High Stn % Discharge

Figure 6 Discharge Measurement Summary UDB-1



File Information

File name	URC_20220315-141923.ft
Start date and time	3/15/2022 2:04 PM
Start location latitude	35.242
Start location longitude	-97.372
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	3/15/2022 2:05 PM	End time	3/15/2022 2:19 PM
# Stations	12	Avg interval	40
Mean depth	0.982 ft	Max depth	1.400 ft
Mean velocity	0.0054 ft/s	Max velocity	0.0293 ft/s
Mean SNR	60 dB	Total width	11.000 ft
Mean temp	55.857 °F	Total area	10.8000 ft²
Wetted Perimeter	11.553 ft	Total discharge	0.0583 ft³/s

Discharge Uncertainty

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
3/15/2022 2:13 PM	10.910				

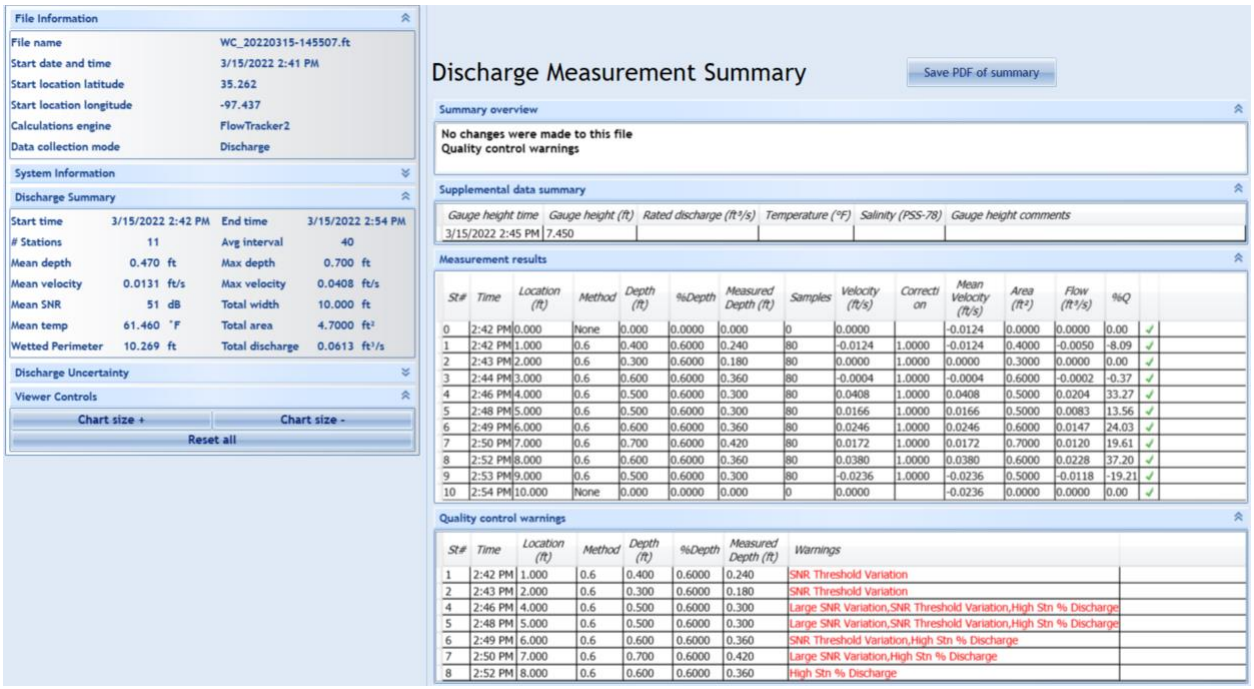
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	2:05 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0001	0.0000	0.0000	0.00	✓
1	2:05 PM	1.000	0.6	0.500	0.6000	0.300	80	0.0001	1.0000	0.0001	0.5000	0.0001	0.12	✓
2	2:07 PM	2.000	0.6	0.900	0.6000	0.540	80	-0.0126	1.0000	-0.0126	0.9000	-0.0113	-19.42	✓
3	2:08 PM	3.000	0.6	1.100	0.6000	0.660	80	0.0254	1.0000	0.0254	1.1000	0.0279	47.90	✓
4	2:09 PM	4.000	0.6	1.300	0.6000	0.780	80	0.0134	1.0000	0.0134	1.3000	0.0174	29.81	✓
5	2:10 PM	5.000	0.6	1.300	0.6000	0.780	80	0.0204	1.0000	0.0204	1.3000	0.0266	45.55	✓
6	2:12 PM	6.000	0.6	1.300	0.6000	0.780	80	0.0293	1.0000	0.0293	1.3000	0.0380	65.21	✓
7	2:13 PM	7.000	0.6	1.400	0.6000	0.840	80	-0.0172	1.0000	-0.0172	1.4000	-0.0241	-41.33	✓
8	2:15 PM	8.000	0.6	1.300	0.6000	0.780	80	0.0097	1.0000	0.0097	1.3000	0.0126	21.59	✓
9	2:16 PM	9.000	0.6	1.000	0.6000	0.600	80	-0.0151	1.0000	-0.0151	1.0000	-0.0151	-25.92	✓
10	2:18 PM	10.000	0.6	0.700	0.6000	0.420	80	-0.0196	1.0000	-0.0196	0.7000	-0.0137	-23.53	✓
11	2:19 PM	11.000	None	0.000	0.0000	0.000	0	0.0000		-0.0196	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
3	2:08 PM	3.000	0.6	1.100	0.6000	0.660	High Stn % Discharge
4	2:09 PM	4.000	0.6	1.300	0.6000	0.780	High Stn % Discharge
5	2:10 PM	5.000	0.6	1.300	0.6000	0.780	High Stn % Discharge
6	2:12 PM	6.000	0.6	1.300	0.6000	0.780	Large SNR Variation,SNR Threshold Variation,High Stn % Discharge
8	2:15 PM	8.000	0.6	1.300	0.6000	0.780	High Stn % Discharge
11	2:19 PM	11.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 7 Discharge Measurement Summary URC-2



File Information

File name	WC_20220315-145507.ft
Start date and time	3/15/2022 2:41 PM
Start location latitude	35.262
Start location longitude	-97.437
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	3/15/2022 2:42 PM	End time	3/15/2022 2:54 PM
# Stations	11	Avg interval	40
Mean depth	0.470 ft	Max depth	0.700 ft
Mean velocity	0.0131 ft/s	Max velocity	0.0408 ft/s
Mean SNR	51 dB	Total width	10.000 ft
Mean temp	61.460 °F	Total area	4.7000 ft²
Wetted Perimeter	10.269 ft	Total discharge	0.0613 ft³/s

Discharge Uncertainty

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
3/15/2022 2:45 PM	7.450				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	2:42 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0124	0.0000	0.0000	0.00	✓
1	2:42 PM	1.000	0.6	0.400	0.6000	0.240	80	-0.0124	1.0000	-0.0124	0.4000	-0.0050	-8.09	✓
2	2:43 PM	2.000	0.6	0.300	0.6000	0.180	80	0.0000	1.0000	0.0000	0.3000	0.0000	0.00	✓
3	2:44 PM	3.000	0.6	0.600	0.6000	0.360	80	-0.0004	1.0000	-0.0004	0.6000	-0.0002	-0.37	✓
4	2:46 PM	4.000	0.6	0.500	0.6000	0.300	80	0.0408	1.0000	0.0408	0.5000	0.0204	33.27	✓
5	2:48 PM	5.000	0.6	0.500	0.6000	0.300	80	0.0166	1.0000	0.0166	0.5000	0.0083	13.56	✓
6	2:49 PM	6.000	0.6	0.600	0.6000	0.360	80	0.0246	1.0000	0.0246	0.6000	0.0147	24.03	✓
7	2:50 PM	7.000	0.6	0.700	0.6000	0.420	80	0.0172	1.0000	0.0172	0.7000	0.0120	19.61	✓
8	2:52 PM	8.000	0.6	0.600	0.6000	0.360	80	0.0380	1.0000	0.0380	0.6000	0.0228	37.20	✓
9	2:53 PM	9.000	0.6	0.500	0.6000	0.300	80	-0.0236	1.0000	-0.0236	0.5000	-0.0118	-19.21	✓
10	2:54 PM	10.000	None	0.000	0.0000	0.000	0	0.0000		-0.0236	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	2:42 PM	1.000	0.6	0.400	0.6000	0.240	SNR Threshold Variation
2	2:43 PM	2.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation
4	2:46 PM	4.000	0.6	0.500	0.6000	0.300	Large SNR Variation,SNR Threshold Variation,High Stn % Discharge
5	2:48 PM	5.000	0.6	0.500	0.6000	0.300	Large SNR Variation,SNR Threshold Variation,High Stn % Discharge
6	2:49 PM	6.000	0.6	0.600	0.6000	0.360	SNR Threshold Variation,High Stn % Discharge
7	2:50 PM	7.000	0.6	0.700	0.6000	0.420	Large SNR Variation,High Stn % Discharge
8	2:52 PM	8.000	0.6	0.600	0.6000	0.360	High Stn % Discharge

Figure 8 Discharge Measurement Summary WC-1

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	3/21/2022	16:30	SD	11.75	8.78	7.56	304	213	Used RP3, RP4 also over water, bankfull channel
LRC-1	Lower Rock Creek	3/21/2022	20:45	JW	*	*	7.69	221	1000	Collected T2 at 6.598 @ 20:45 , peak at 6.904 @ 21:45
TE-1	Little River Tributary	3/21/2022	15:25	SD	12.20	9.71	7.92	291	1000	Out of banks, weird backflow on REW (eddy conditions)
TG-1	Little River Tributary	3/21/2022	18:15	JW	*	*	N/A	N/A	1000	Collected T2 at 19.12 @ 18:15, collected at second peak, first peak 17.63 @ 13:30; SpCon and pH data lost
URC-2	Upper Rock Creek	3/21/2022	15:55	SD	11.59	7.59	7.45	579	111	Not flowing as heavily as expected
WC-1	Woodcrest Creek	3/21/2022	15:00	SD	12.24	9.88	8.12	152	779	Bankfull channel, floating debris mostly leaf debris
SW-01	Stormwater Outfall 01	3/21/2022	15:12	CH	12.30	9.78	7.55	194	885	This site was the most flooded of the outfalls. Turbidity much higher at this site than the others
SW-02	Stormwater Outfall 02	3/21/2022	15:55	CH	13.10	9.60	7.14	283	53	
SW-03	Stormwater Outfall 03	3/21/2022	16:16	CH	12.70	9.46	7.24	419	336	Lots of dog feces on downstream side of bridge on right bank, was being washed into creek
SW-04	Stormwater Outfall 04	3/21/2022	16:40	CH	11.80	10.12	7.35	208	441	Lots of foam. Some road construction equipment and orange tubing just upstream of site
SW-05	Stormwater Outfall 05	3/21/2022	17:00	CH	11.70	8.98	7.27	281	163	
SW-06	Stormwater Outfall 06	3/21/2022	17:33	CH	11.20	8.93	7.29	267	153	Not much water coming into the storage pond. Pond was fairly full and pretty muddy
SW-07	Stormwater Outfall 07	3/21/2022	18:00	CH	12.70	10.09	7.64	455	58	Storming heavily at this site and rain water was entering the drain quickly from the road and the upstream storage pond

Table 5 Stormwater Field Data Form Where the Asterisk Denotes a Sample from an Autosampler

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	0.26	2.25	0.633	152
LRC-1	Lower Rock Creek	0.19	3.17	1.09	1250
URC-2	Upper Rock Creek	0.09	1.07	0.223	86.0
WC-1	Woodcrest Creek	0.73	2.33	0.833	772
TE-1	Little River Tributary	0.64	1.89	0.824	795
TG-1	Little River Tributary	0.41	3.44	1.14	1610
SW-01	Stormwater Outfall 01	0.46	1.61	0.703	567
SW-02	Stormwater Outfall 02	0.82	1.84	0.314	66.0
SW-03	Stormwater Outfall 03	0.46	1.82	0.494	431
SW-04	Stormwater Outfall 04	1.92	2.36	0.631	251
SW-05	Stormwater Outfall 05	2.07	2.05	0.484	86.0
SW-06	Stormwater Outfall 06	1.21	1.33	0.154	74.0
SW-07	Stormwater Outfall 07	0.22	0.65	0.100	91.0

Table 6 Stormwater Laboratory Analysis Summary

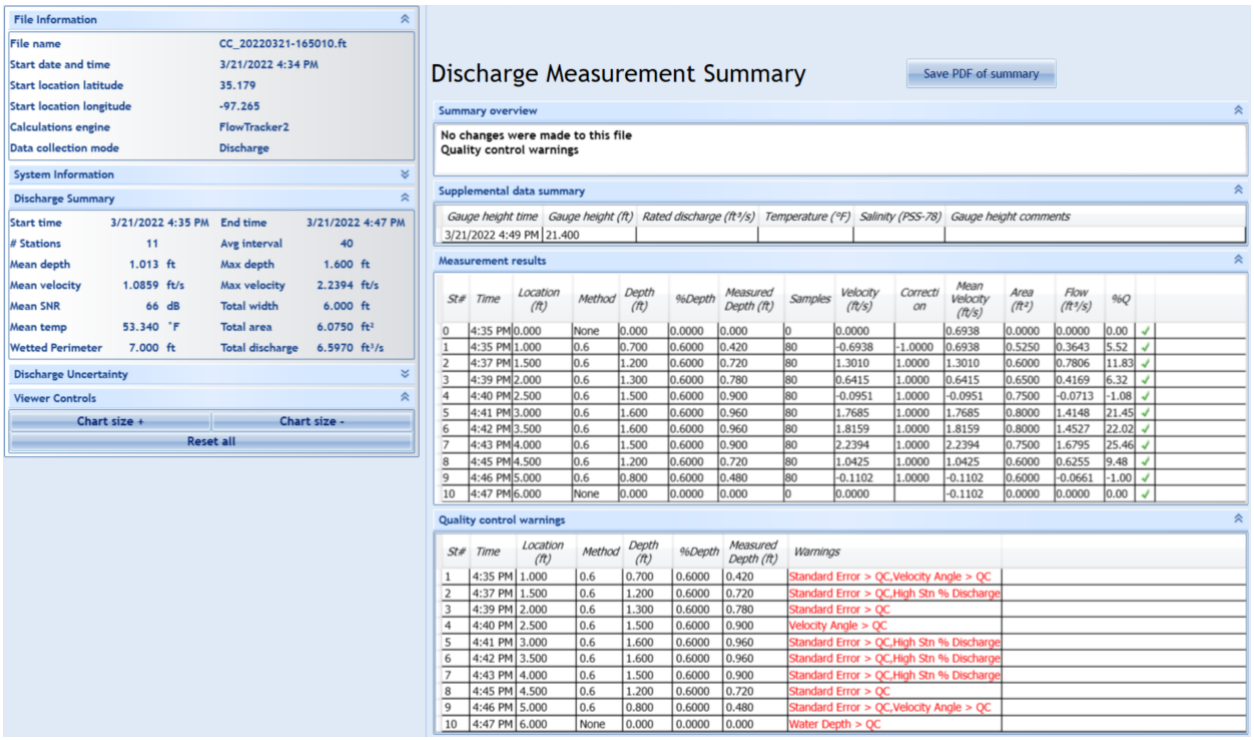
Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
Duplicate	0.25	2.16	0.628	174
Duplicate RPD	3.92%	4.08%	0.79%	13.50%*

Table 7 Stormwater QA/QC Data Where the Asterisk Denotes RPD 2

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	6.60	21.40
LRC-1	Lower Rock Creek	5.92	6.60
URC-2	Upper Rock Creek	3.50	11.63
WC-1	Woodcrest Creek	43.63	10.58
TE-1	Little River Tributary	161.70	14.70
TG-1	Little River Tributary	675.90	19.12

Table 8 Stormwater Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	CC_20220321-165010.ft
Start date and time	3/21/2022 4:34 PM
Start location latitude	35.179
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	3/21/2022 4:35 PM	End time	3/21/2022 4:47 PM
# Stations	11	Avg interval	40
Mean depth	1.013 ft	Max depth	1.600 ft
Mean velocity	1.0859 ft/s	Max velocity	2.2394 ft/s
Mean SNR	66 dB	Total width	6.000 ft
Mean temp	53.340 °F	Total area	6.0750 ft²
Wetted Perimeter	7.000 ft	Total discharge	6.5970 ft³/s

Discharge Uncertainty

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
3/21/2022 4:49 PM	21.400				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	4:35 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.6938	0.0000	0.0000	0.00	✓
1	4:35 PM	1.000	0.6	0.700	0.6000	0.420	80	-0.6938	-1.0000	0.6938	0.5250	0.3643	5.52	✓
2	4:37 PM	1.500	0.6	1.200	0.6000	0.720	80	1.3010	1.0000	1.3010	0.6000	0.7806	11.83	✓
3	4:39 PM	2.000	0.6	1.300	0.6000	0.780	80	0.6415	1.0000	0.6415	0.6500	0.4169	6.32	✓
4	4:40 PM	2.500	0.6	1.500	0.6000	0.900	80	-0.0951	1.0000	-0.0951	0.7500	-0.0713	-1.08	✓
5	4:41 PM	3.000	0.6	1.600	0.6000	0.960	80	1.7685	1.0000	1.7685	0.8000	1.4148	21.45	✓
6	4:42 PM	3.500	0.6	1.600	0.6000	0.960	80	1.8159	1.0000	1.8159	0.8000	1.4527	22.02	✓
7	4:43 PM	4.000	0.6	1.500	0.6000	0.900	80	2.2394	1.0000	2.2394	0.7500	1.6795	25.46	✓
8	4:45 PM	4.500	0.6	1.200	0.6000	0.720	80	1.0425	1.0000	1.0425	0.6000	0.6255	9.48	✓
9	4:46 PM	5.000	0.6	0.800	0.6000	0.480	80	-0.1102	1.0000	-0.1102	0.6000	-0.0661	-1.00	✓
10	4:47 PM	6.000	None	0.000	0.0000	0.000	0	0.0000		-0.1102	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	4:35 PM	1.000	0.6	0.700	0.6000	0.420	Standard Error > QC,Velocity Angle > QC
2	4:37 PM	1.500	0.6	1.200	0.6000	0.720	Standard Error > QC,High Stn % Discharge
3	4:39 PM	2.000	0.6	1.300	0.6000	0.780	Standard Error > QC
4	4:40 PM	2.500	0.6	1.500	0.6000	0.900	Velocity Angle > QC
5	4:41 PM	3.000	0.6	1.600	0.6000	0.960	Standard Error > QC,High Stn % Discharge
6	4:42 PM	3.500	0.6	1.600	0.6000	0.960	Standard Error > QC,High Stn % Discharge
7	4:43 PM	4.000	0.6	1.500	0.6000	0.900	Standard Error > QC,High Stn % Discharge
8	4:45 PM	4.500	0.6	1.200	0.6000	0.720	Standard Error > QC
9	4:46 PM	5.000	0.6	0.800	0.6000	0.480	Standard Error > QC,Velocity Angle > QC
10	4:47 PM	6.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 9 Stormwater Discharge Measurement Summary CC-1

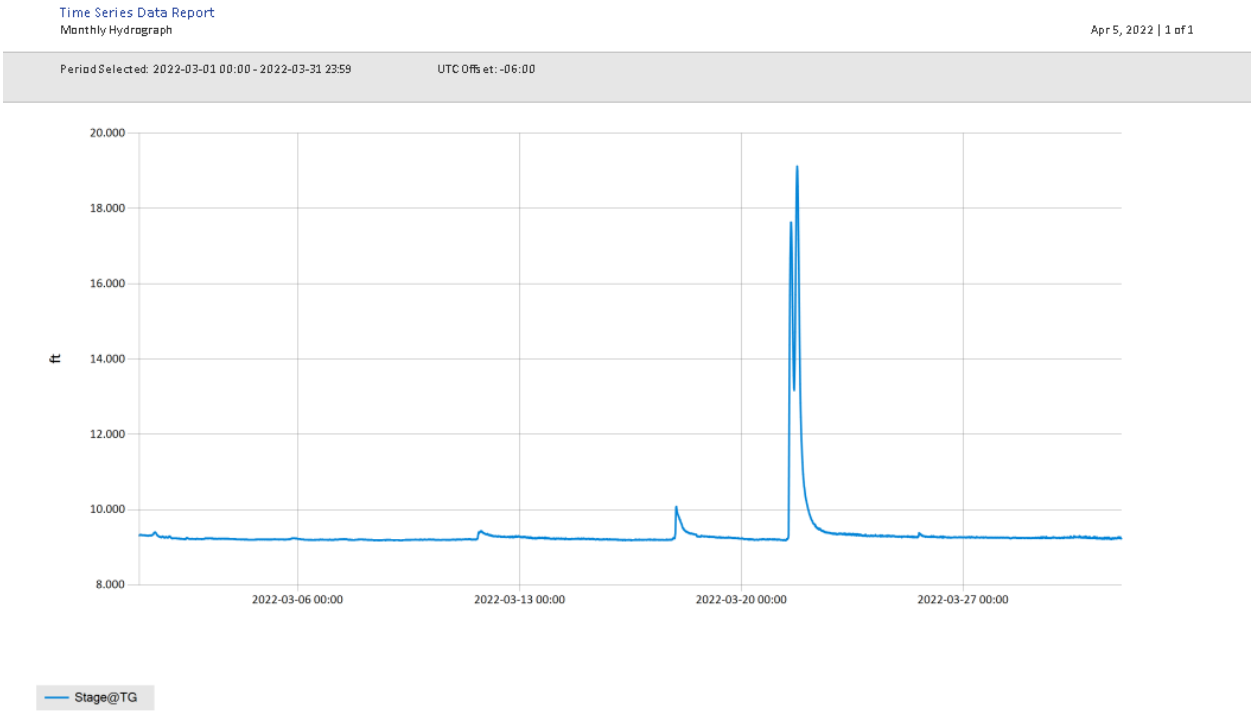


Figure 10 Monthly Hydrograph TG-1

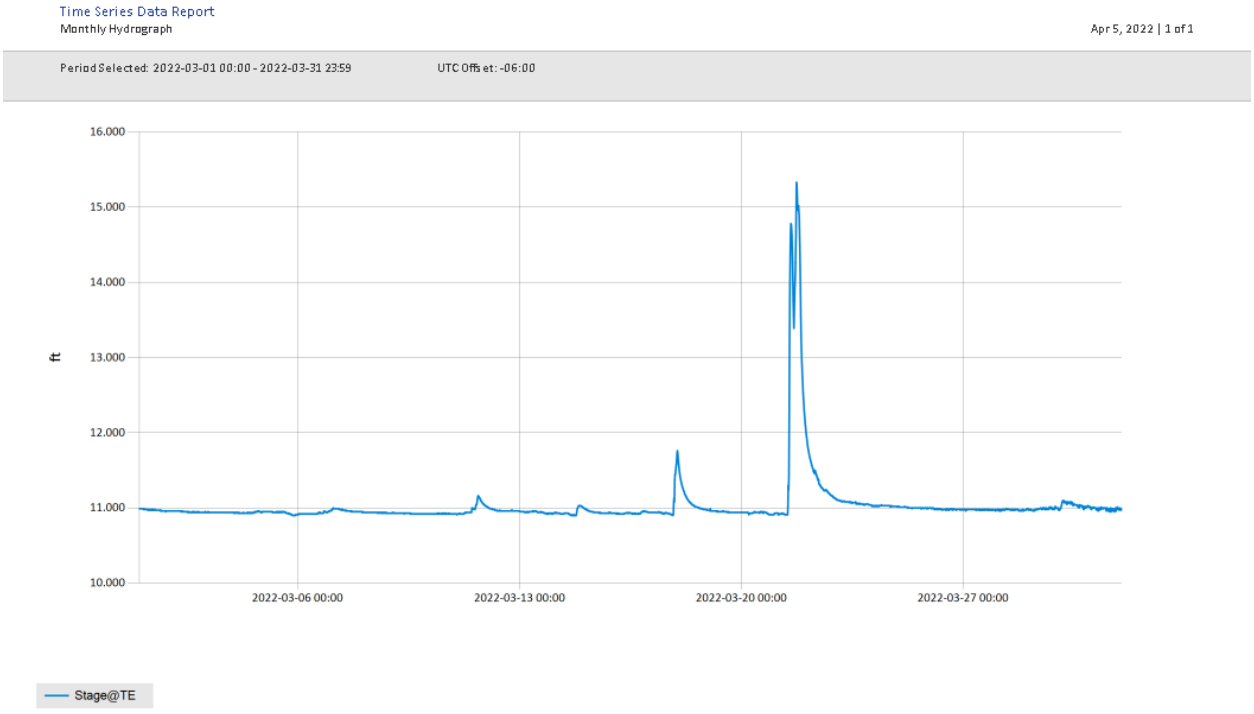


Figure 11 Monthly Hydrograph TE-1

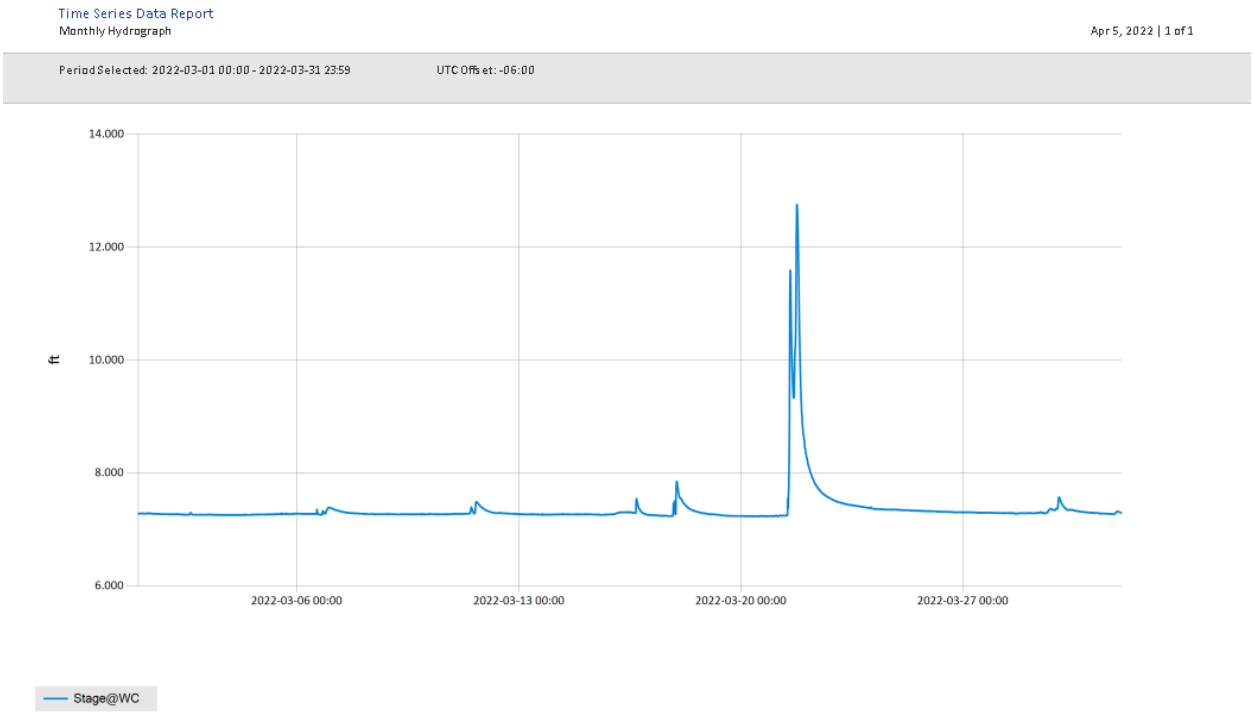


Figure 12 Monthly Hydrograph WC-1

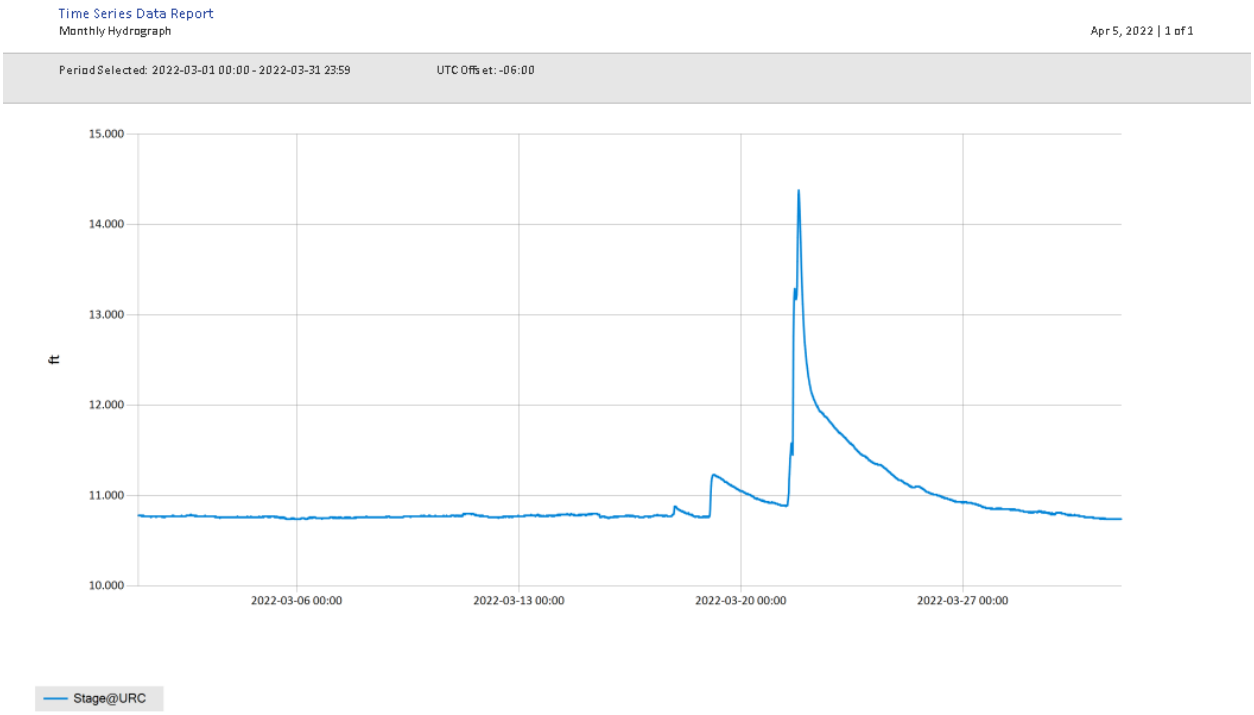


Figure 13 Monthly Hydrograph URC-2

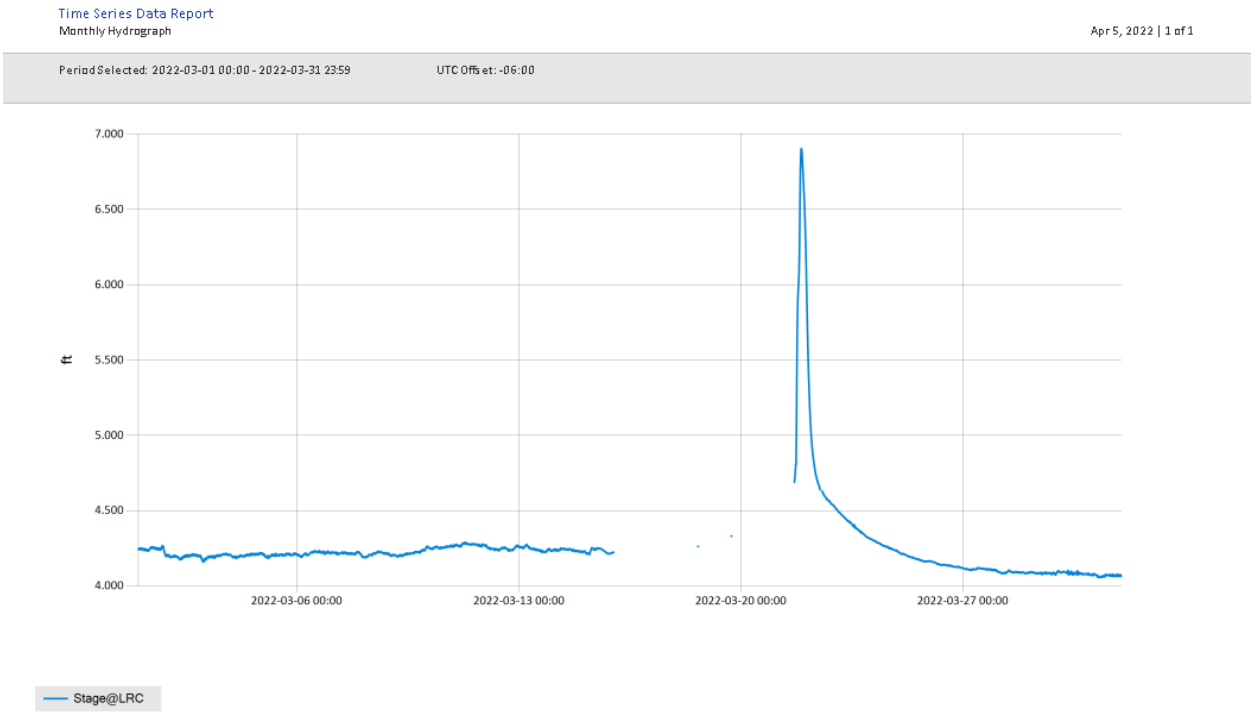


Figure 14 Monthly Hydrograph LRC-1

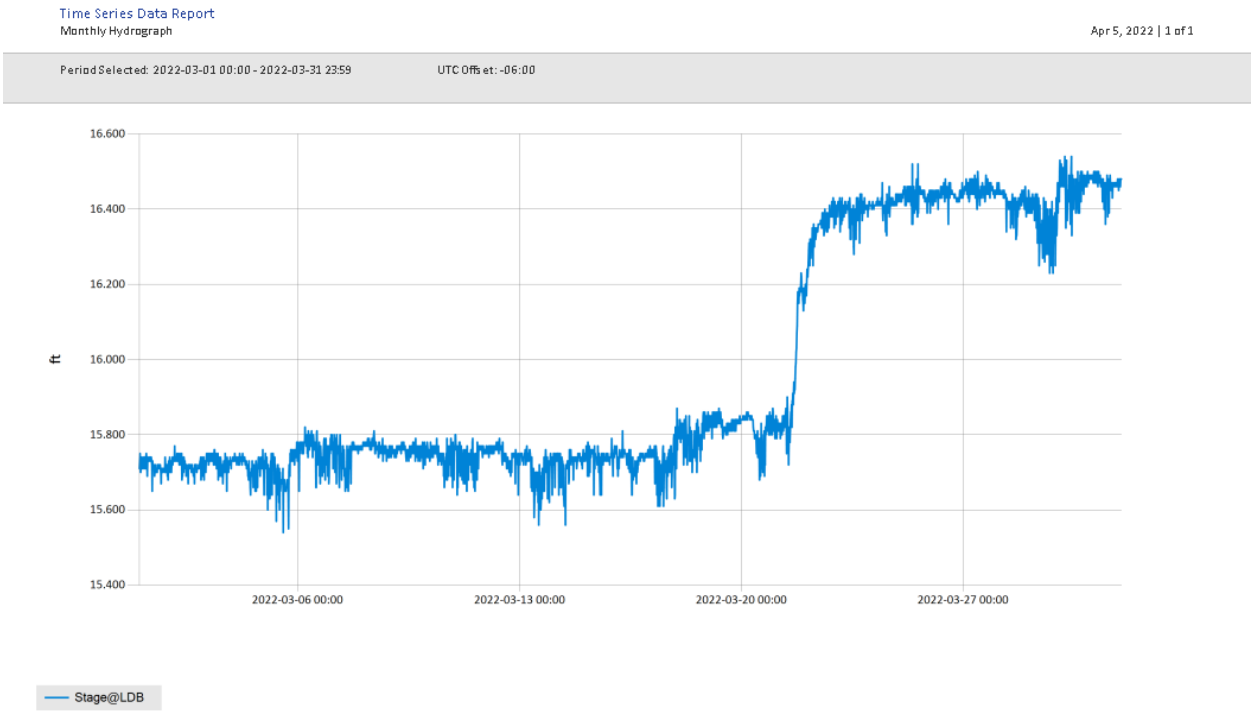


Figure 15 Monthly Hydrograph LDB-1

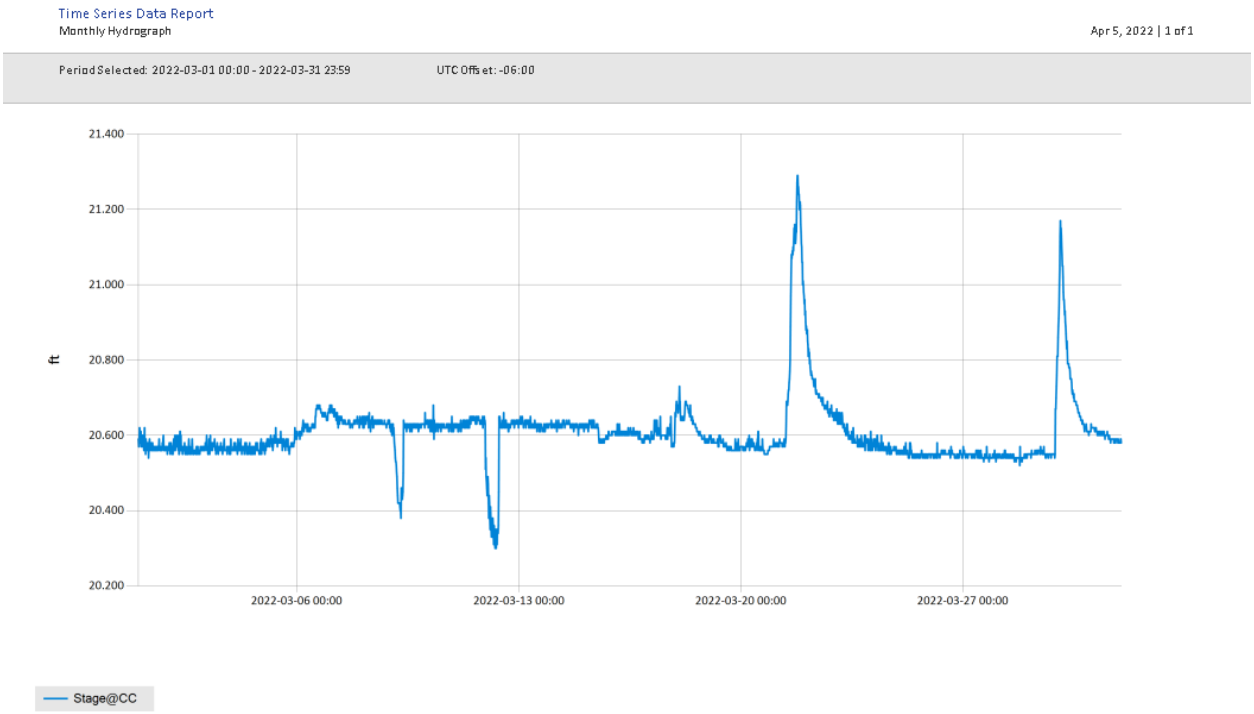


Figure 16 Monthly Hydrograph CC-1

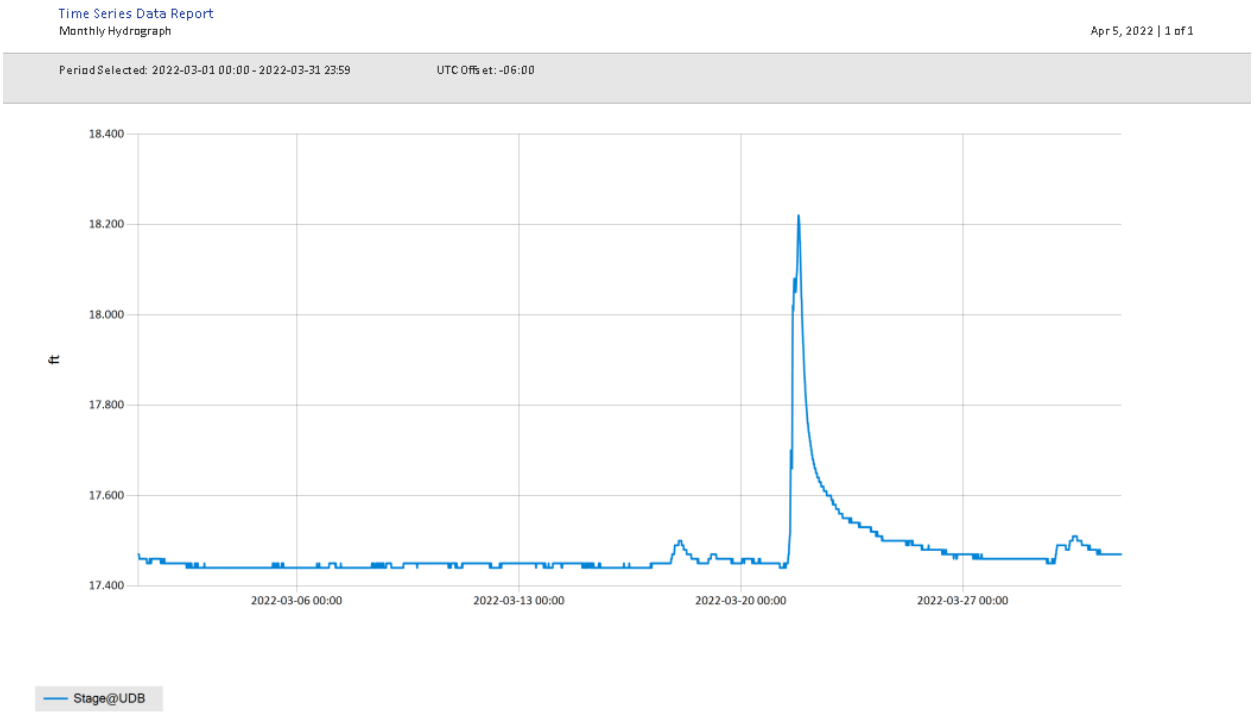


Figure 17 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — March 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) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	75	30	53.3	22.6	13	0	79	11	37	0.00	28.89	30.15	S	5.2	15.1	20.00	41.4	43.8	52	37
2	77	33	55.1	26.3	10	0	78	12	39	0.00	28.88	30.13	SSW	4.0	16.6	19.66	43.5	46.1	55	38
3	79	40	60.4	30.0	5	0	61	15	35	0.00	28.86	30.11	S	6.0	19.7	19.79	45.5	48.7	57	40
4	77	51	63.0	48.0	1	0	83	35	59	0.00	28.74	29.99	SSE	11.7	28.3	12.78	48.7	52.9	59	47
5	82	50	67.2	43.0	0	1	87	11	52	0.00	28.58	29.82	S	15.3	37.0	17.44	52.3	58.1	65	54
6	50	32	37.4	29.7	24	0	94	54	74	0.12	28.77	30.02	NNW	15.2	29.0	4.24	48.4	49.8	56	44
7	41	26	33.1	22.5	31	0	83	47	66	0.00	29.03	30.29	NNW	13.2	33.5	18.78	44.5	43.6	48	40
8	44	25	33.7	20.4	30	0	81	26	60	0.00	28.88	30.13	NNE	4.6	16.4	9.65	43.6	42.0	47	39
9	56	23	40.0	22.7	26	0	86	27	54	0.00	28.78	30.03	ESE	4.5	19.5	20.98	43.2	44.0	54	36
10	55	28	38.3	26.8	23	0	79	48	64	0.00	28.77	30.01	N	11.2	32.0	15.96	44.4	46.0	52	41
11	35	23	27.4	18.7	36	0	94	45	71	0.05	29.00	30.26	N	13.3	32.6	10.85	41.4	40.3	44	38
12	56	17	38.1	15.1	28	0	86	18	45	0.05	29.06	30.31	S	7.1	25.3	21.75	40.4	39.8	47	35
13	67	34	51.3	15.9	14	0	48	11	27	0.00	28.83	30.08	S	13.9	33.7	21.99	43.2	45.2	53	38
14	66	46	54.9	38.7	9	0	84	29	57	0.00	28.71	29.95	S	13.0	29.4	10.69	46.1	49.3	55	45
15	67	44	53.6	38.0	10	0	78	36	57	0.00	28.89	30.15	NNW	8.5	23.4	21.01	48.1	52.9	61	48
16	79	40	60.9	38.4	6	0	90	18	50	0.00	28.65	29.89	S	10.8	30.2	21.65	49.1	54.2	62	47
17	73	48	62.7	45.2	4	0	93	31	55	0.26	28.43	29.66	SSE	12.8	35.4	11.81	51.6	56.7	60	53
18	59	36	46.2	33.2	17	0	93	27	64	0.02	28.71	29.96	NNW	18.5	38.7	11.94	49.3	50.2	56	46
19	73	35	54.3	26.4	11	0	81	13	40	0.00	28.87	30.12	SW	7.2	24.6	22.84	48.2	50.0	60	41
20	80	48	64.2	27.7	1	0	47	13	27	0.00	28.79	30.04	SSE	12.6	36.2	22.23	50.5	55.4	64	48
21	61	51	55.3	43.4	9	0	99	22	71	2.03	28.49	29.73	SSE	10.5	30.9	2.00	51.2	54.6	57	53
22	54	41	44.4	38.4	18	0	99	59	80	0.01	28.49	29.72	NW	17.0	36.6	5.45	49.4	50.7	53	47
23	54	33	44.0	25.6	21	0	72	30	50	0.00	28.68	29.92	NW	15.6	40.6	22.28	47.0	46.4	51	42
24	62	32	47.0	25.5	18	0	81	18	48	0.00	28.70	29.95	NW	7.8	25.7	23.53	47.3	46.5	53	40
25	71	35	52.5	32.8	12	0	83	20	51	0.00	28.85	30.10	NE	6.0	24.9	23.25	48.5	48.9	57	40
26	73	41	57.9	29.0	8	0	70	18	37	0.00	28.81	30.06	E	7.0	16.7	23.29	50.9	51.6	60	44
27	78	48	61.0	34.7	2	0	49	26	38	0.00	28.71	29.96	ENE	10.4	21.3	22.68	52.8	53.3	61	46
28	84	49	65.6	45.4	0	1	65	30	49	0.00	28.61	29.86	SSE	11.6	26.9	22.44	54.8	55.4	62	48
29	79	59	70.1	56.8	0	4	92	49	64	0.11	28.35	29.58	S	17.1	48.7	17.35	58.3	61.7	68	57
30	63	38	50.7	37.9	15	0	94	39	63	0.00	28.36	29.60	NNW	15.6	40.3	10.97	55.7	56.5	62	50
31	58	33	45.5	29.1	19	0	79	32	55	0.00	28.63	29.88	NW	8.5	26.0	23.92	51.8	52.1	60	45
	65	38	51.3	31.9	<- Monthly Averages ->						28.74	29.98	S	10.8	48.7	17.20	48.1	49.9	56	44

Temperature - Highest: 84
Lowest: 17

Degree Days - Total HDD: 423
Total CDD: 6

Rainfall: Monthly Total: 2.65 in.
Greatest 24 Hr: 2.03 in.

Humidity - Highest: 99
Lowest: 11

Number of Days With:

Tmax ≥ 90:	0	Rainfall ≥ 0.01 inch:	8
Tmax ≤ 32:	0	Rainfall ≥ 0.10 inch:	4
Tmin ≤ 32:	9	Avg Wind Speed ≥ 10 mph:	19
Tmin ≤ 0:	0	Max Wind Speed ≥ 30 mph:	14

* Denotes incomplete record

Figure 18 March Mesonet Data

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

SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

April 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
Sarah Dexter, Project Leader, sarah.dexter@owrb.ok.gov
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Bill Cauthron, Monitoring Coordinator, bill.cauthron@owrb.ok.gov

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SUMMARY OF APRIL WATER QUALITY SAMPLING

Sampling for April 2022 occurred during base flow conditions on the twelfth. Water samples were collected at nine locations and a discharge measurement was collected at one location. Samples were not collected at JB-1 due to construction activity. Mesonet data shows no precipitation on the twelfth, 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 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

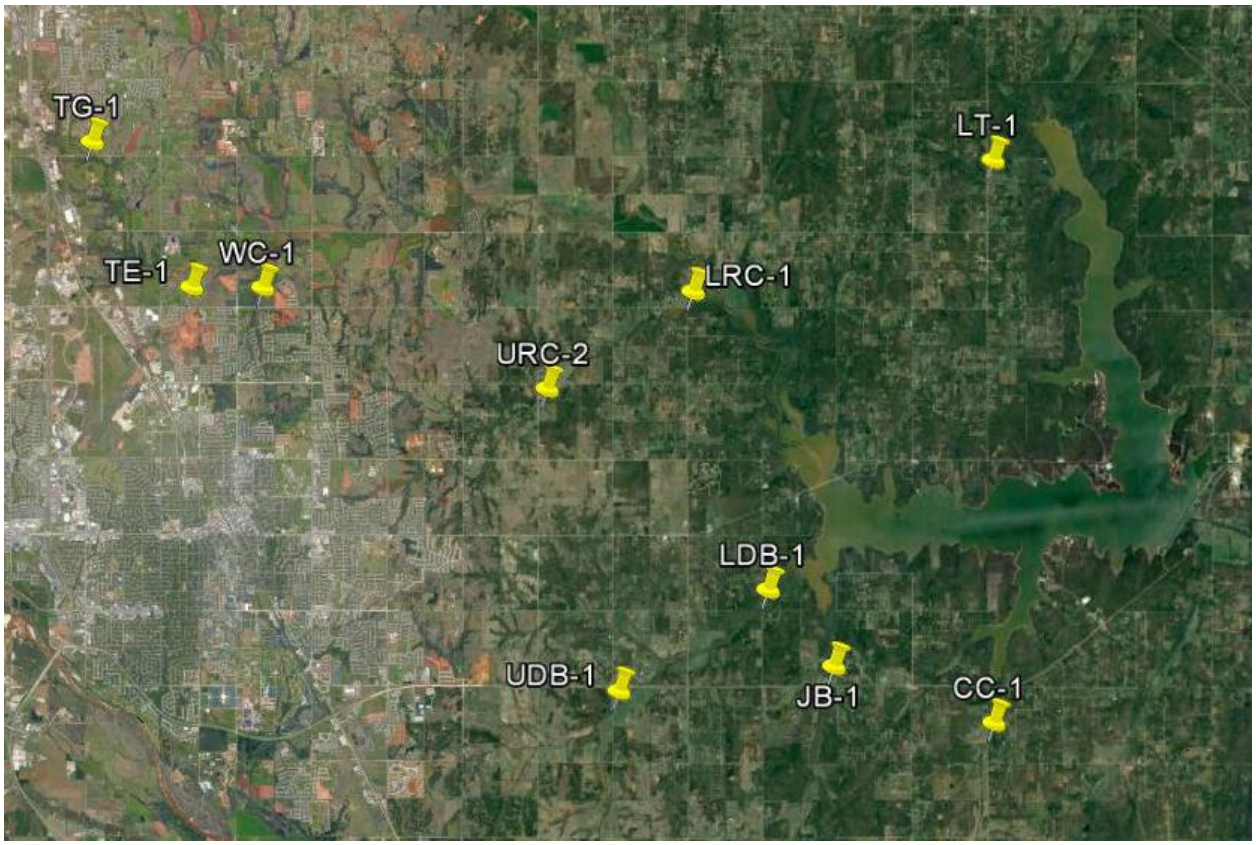


Figure 1 Monitoring Station Map

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	4/12/2022	9:15	SD	17.1	8.31	7.76	686	8	Used RP3, RP4 also over water; same tapedown as Feb collection, aquatic vegetation common
JB-1	Jim Blue Creek	4/12/2022	9:50	SD	N/A	N/A	N/A	N/A	N/A	Construction ongoing, did not sample; water very turbid, pool conditions on downstream
LDB-1	Lower Dave Blue Creek	4/12/2022	10:05	SD	17.0	8.14	7.79	860	66	Very turbid water, lots of small floating debris and scum under bridge, positive visual flow
LRC-1	Lower Rock Creek	4/12/2022	11:05	SD	18.0	7.98	7.78	712	4	Lower stage than expected, normal looking conditions, beaver sign still present on banks, dam broken on downstream
LT-1	Lake Laterals	4/12/2022	10:35	SD	18.0	5.00	7.44	606	4	Low/normal visual flow
TE-1	Little River Tributary	4/12/2022	14:10	SD	23.0	11.65	7.90	748	27	Lower stage than expected, beaver dam still present on upstream
TG-1	Little River Tributary	4/12/2022	15:00	SD	22.0	12.69	8.03	1166	5	Low/normal conditions, much lower stage than expected, floating debris present above bridge
UDB-1	Upper Dave Blue Creek	4/12/2022	8:40	SD	17.0	7.10	7.78	913	9	Orifice clear
URC-2	Upper Rock Creek	4/12/2022	11:55	SD	19.0	7.27	7.58	744	33	Similar stage to last month's visit, lower stage than expected, cow in channel upstream exited upon arrival
WC-1	Woodcrest Creek	4/12/2022	13:30	SD	21.2	9.63	7.65	1073	7	Very low stage, similar to Feb and Jan collections, small floating debris and scum present on upstream only

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	0.25	0.039	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	<0.05	0.56	0.080	48.0
LRC-1	Lower Rock Creek	<0.05	0.34	0.042	6.0
LT-1	Lake Laterals	<0.05	0.41	0.030	<5.0
TE-1	Little River Tributary	<0.05	0.59	0.050	16.0
TG-1	Little River Tributary	<0.05	0.42	0.039	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.30	0.034	5.0
URC-2	Upper Rock Creek	<0.05	0.71	0.082	28.0
WC-1	Woodcrest Creek	<0.05	0.44	0.048	9.0

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	0.22	0.039	<5.0
Duplicate RPD	0%	12.77%	0%	0%

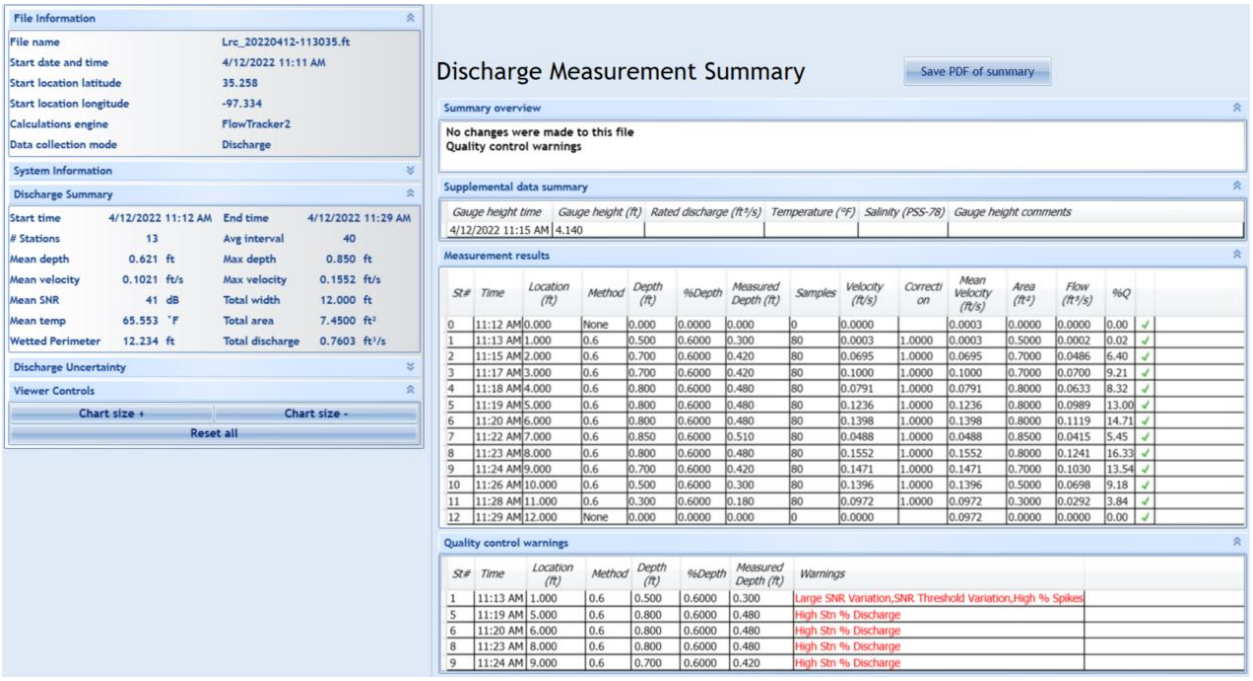
Table 3 QA/QC Data

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	0.34	20.49
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	2.28	16.51
LRC-1	Lower Rock Creek	0.76	4.14
LT-1	Lake Laterals	0.35	4.30
TE-1	Little River Tributary	0.01	10.91
TG-1	Little River Tributary	0.60	8.97
UDB-1	Upper Dave Blue Creek	0.12	17.30
URC-2	Upper Rock Creek	0.05	10.85
WC-1	Woodcrest Creek	0.01	7.29

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Lrc_20220412-113035.ft
Start date and time	4/12/2022 11:11 AM
Start location latitude	35.258
Start location longitude	-97.334
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	4/12/2022 11:12 AM	End time	4/12/2022 11:29 AM
# Stations	13	Avg interval	40
Mean depth	0.621 ft	Max depth	0.850 ft
Mean velocity	0.1021 ft/s	Max velocity	0.1552 ft/s
Mean SNR	41 dB	Total width	12.000 ft
Mean temp	65.553 °F	Total area	7.4500 ft²
Wetted Perimeter	12.234 ft	Total discharge	0.7603 ft³/s

Discharge Uncertainty

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
4/12/2022 11:15 AM	4.140				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:12 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0003	0.0000	0.0000	0.00	✓
1	11:13 AM	1.000	0.6	0.500	0.6000	0.300	80	0.0003	1.0000	0.0003	0.5000	0.0002	0.02	✓
2	11:15 AM	2.000	0.6	0.700	0.6000	0.420	80	0.0695	1.0000	0.0695	0.7000	0.0486	6.40	✓
3	11:17 AM	3.000	0.6	0.700	0.6000	0.420	80	0.1000	1.0000	0.1000	0.7000	0.0700	9.21	✓
4	11:18 AM	4.000	0.6	0.800	0.6000	0.480	80	0.0791	1.0000	0.0791	0.8000	0.0633	8.32	✓
5	11:19 AM	5.000	0.6	0.800	0.6000	0.480	80	0.1236	1.0000	0.1236	0.8000	0.0989	13.00	✓
6	11:20 AM	6.000	0.6	0.800	0.6000	0.480	80	0.1398	1.0000	0.1398	0.8000	0.1119	14.71	✓
7	11:22 AM	7.000	0.6	0.850	0.6000	0.510	80	0.0488	1.0000	0.0488	0.8500	0.0415	5.45	✓
8	11:23 AM	8.000	0.6	0.800	0.6000	0.480	80	0.1552	1.0000	0.1552	0.8000	0.1241	16.33	✓
9	11:24 AM	9.000	0.6	0.700	0.6000	0.420	80	0.1471	1.0000	0.1471	0.7000	0.1030	13.54	✓
10	11:26 AM	10.000	0.6	0.500	0.6000	0.300	80	0.1396	1.0000	0.1396	0.5000	0.0698	9.18	✓
11	11:28 AM	11.000	0.6	0.300	0.6000	0.180	80	0.0972	1.0000	0.0972	0.3000	0.0292	3.84	✓
12	11:29 AM	12.000	None	0.000	0.0000	0.000	0	0.0000		0.0972	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	11:13 AM	1.000	0.6	0.500	0.6000	0.300	Large SNR Variation,SNR Threshold Variation,High % Spikes
5	11:19 AM	5.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
6	11:20 AM	6.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
8	11:23 AM	8.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
9	11:24 AM	9.000	0.6	0.700	0.6000	0.420	High Stn % Discharge

Figure 2 Discharge Measurement Summary LRC-1

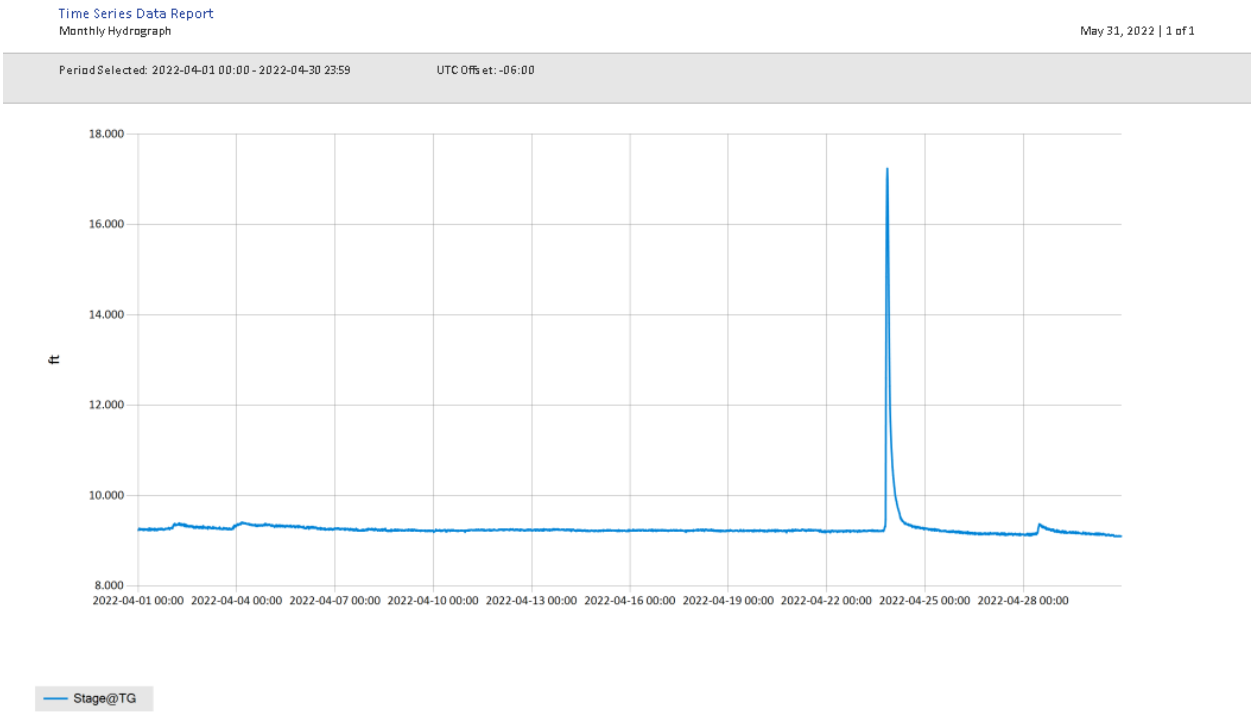


Figure 3 Monthly Hydrograph TG-1

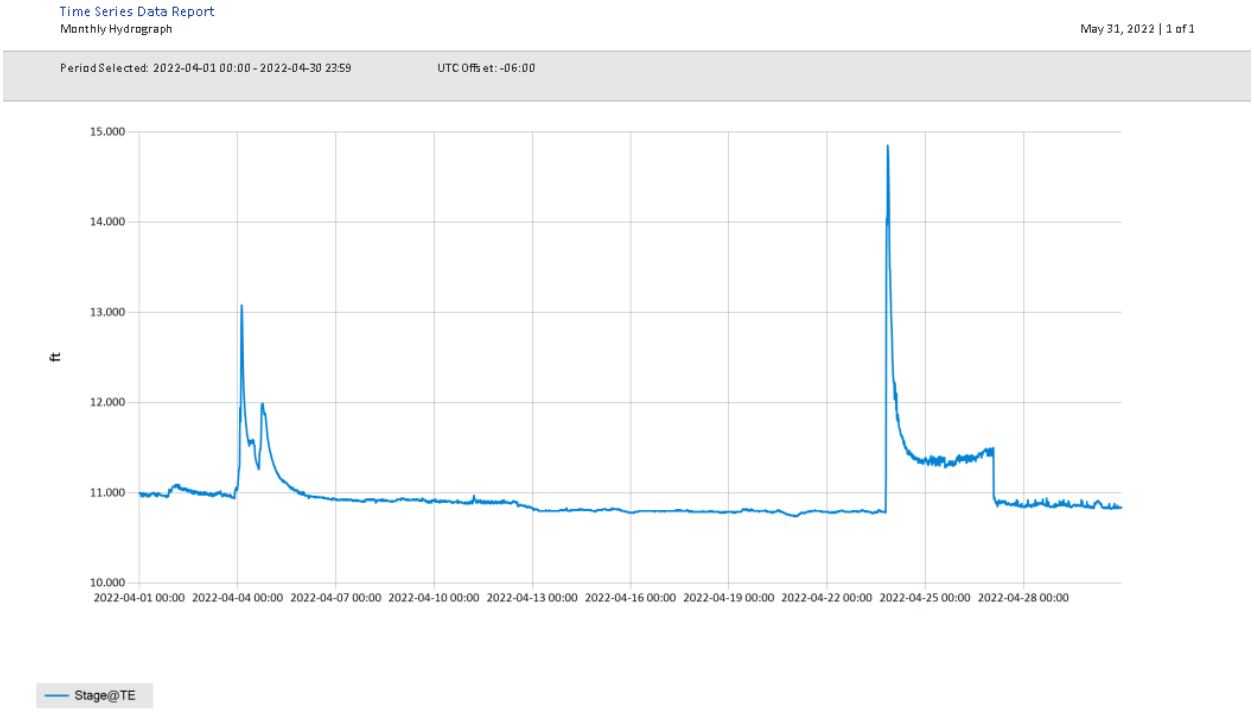


Figure 4 Monthly Hydrograph TE-1

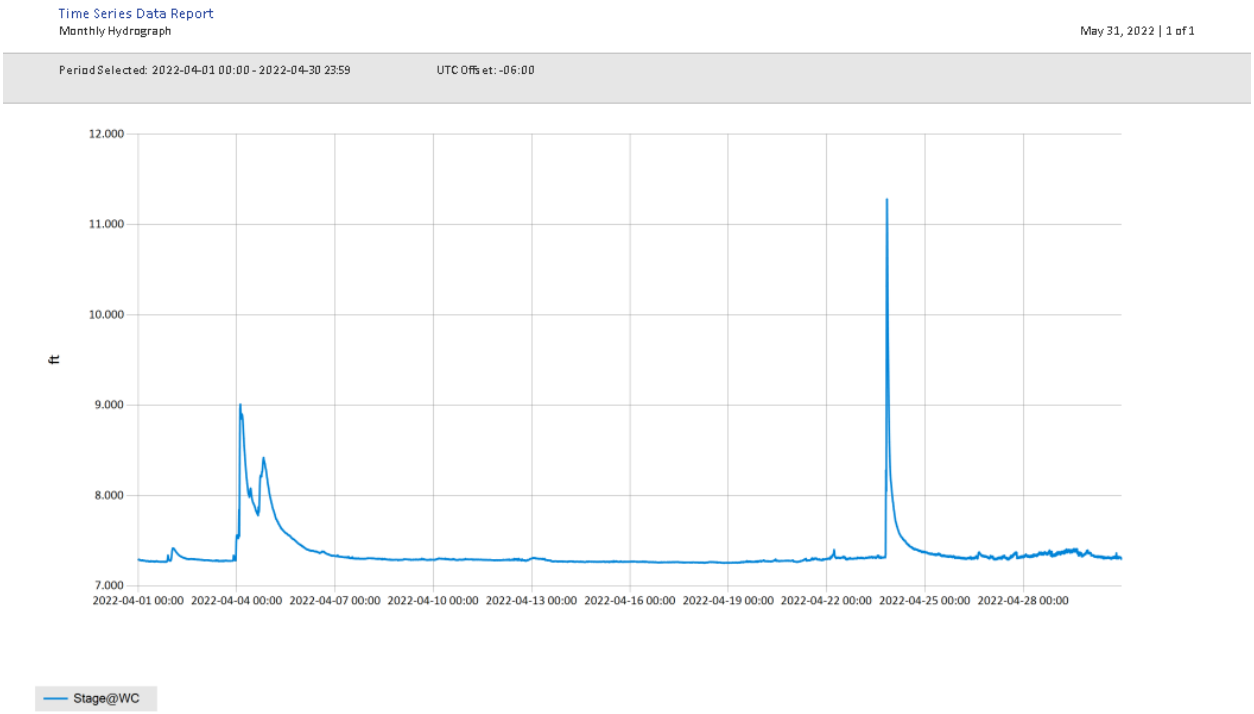


Figure 5 Monthly Hydrograph WC-1

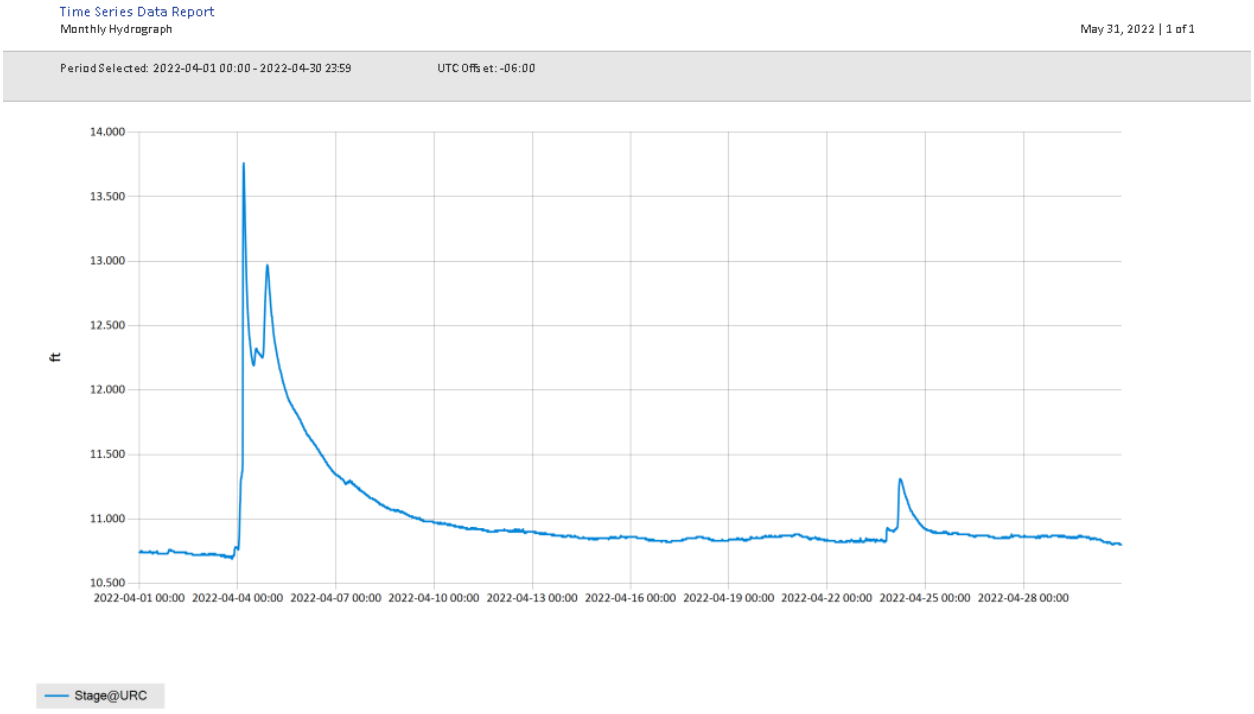


Figure 6 Monthly Hydrograph URC-2

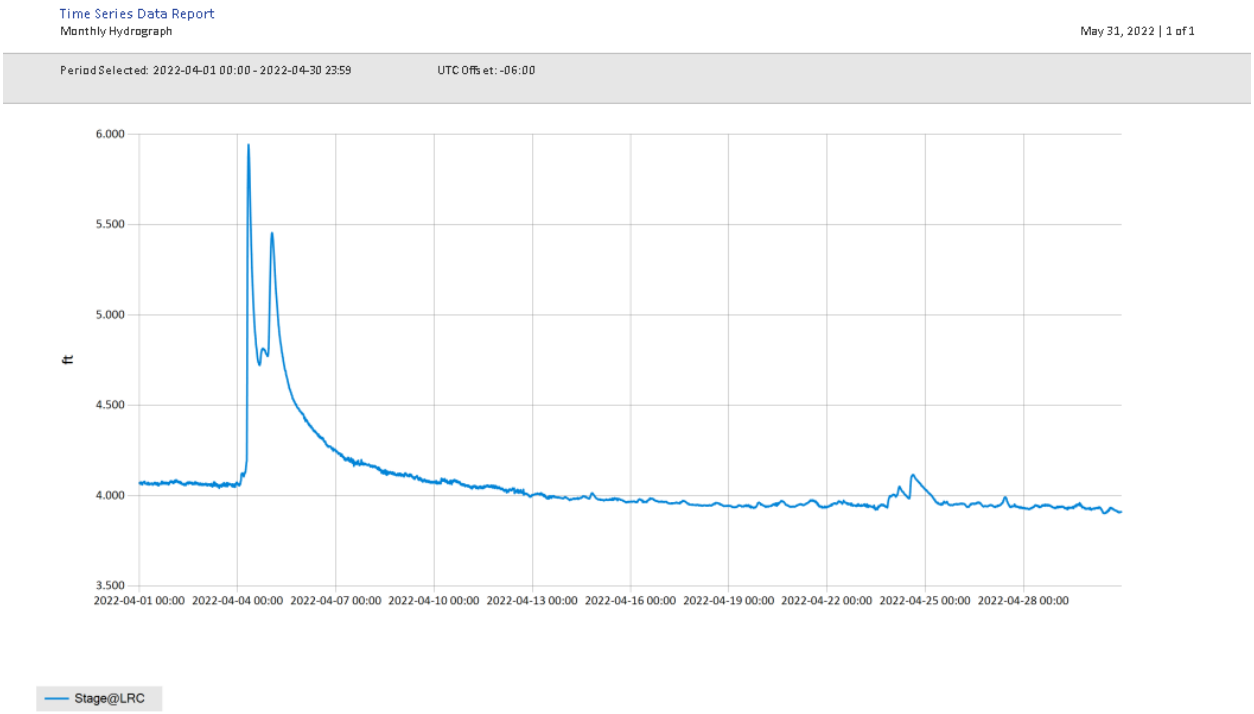


Figure 7 Monthly Hydrograph LRC-1

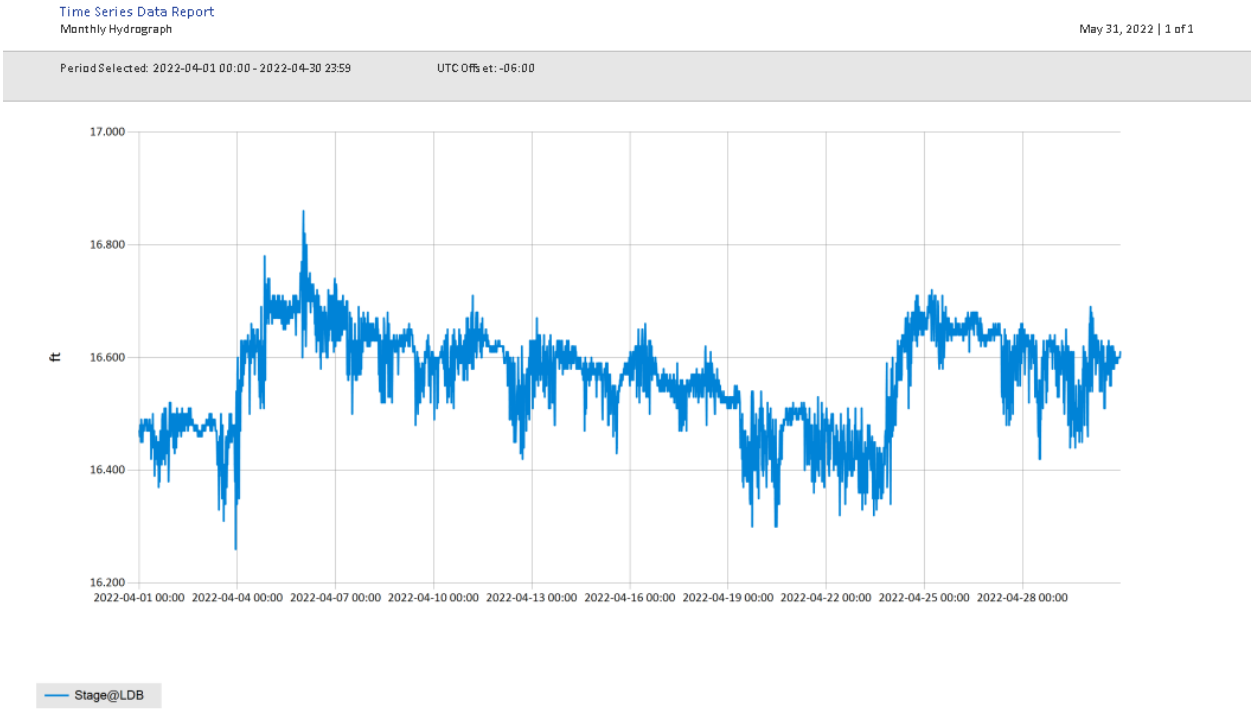


Figure 8 Monthly Hydrograph LDB-1

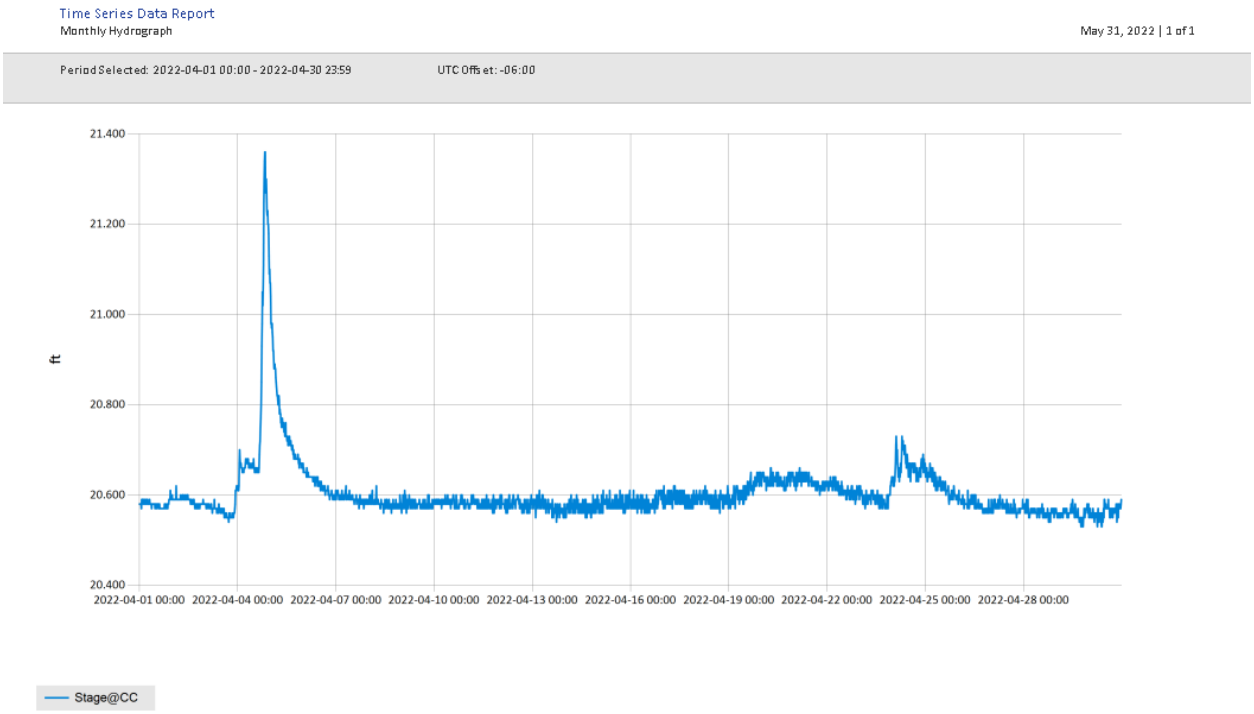


Figure 9 Monthly Hydrograph CC-1

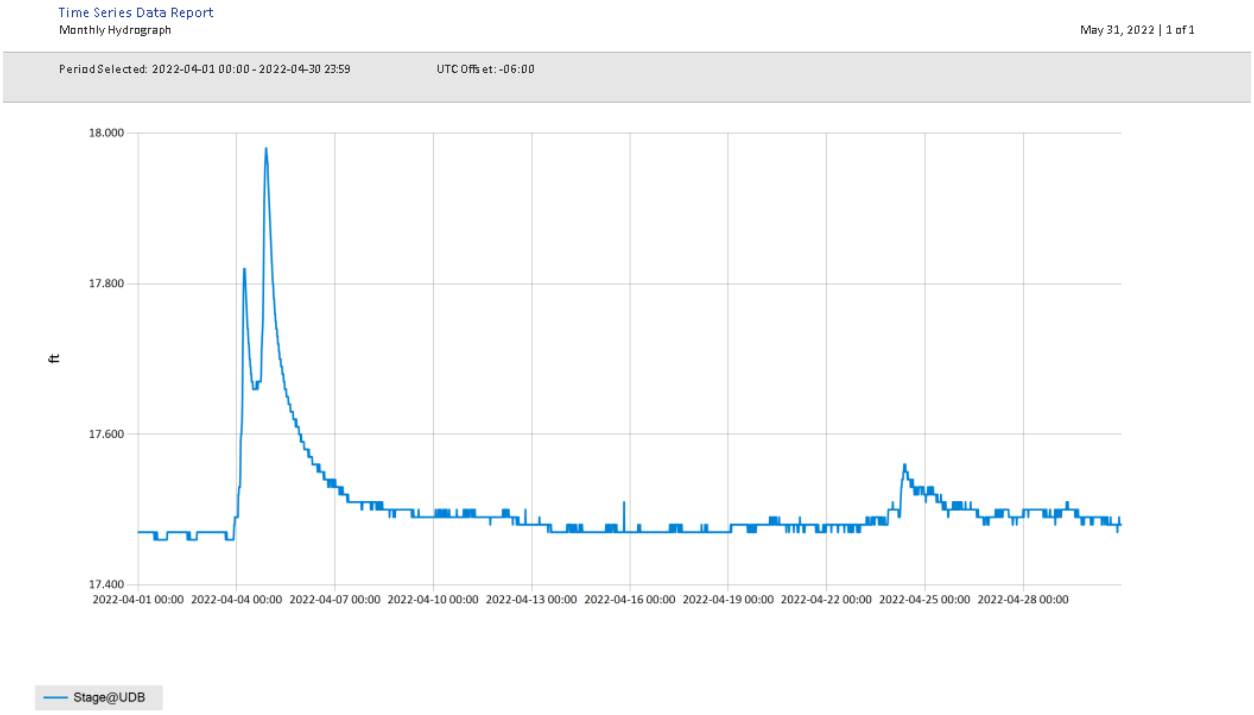


Figure 10 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — April 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) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	69	36	52.3	36.0	13	0	84	31	57	0.10	28.72	29.96	SE	9.3	23.5	19.82	52.3	54.2	63	46
2	73	41	58.6	43.5	8	0	98	28	62	0.02	28.80	30.05	NNE	5.5	19.1	24.51	54.8	58.3	67	50
3	82	51	66.5	47.6	0	2	88	30	53	0.13	28.63	29.87	S	11.2	43.1	23.17	56.6	61.7	71	53
4	59	52	57.0	54.8	9	0	98	81	93	1.28	28.56	29.80	NE	7.1	20.8	2.43	57.1	59.5	64	57
5	83	52	64.3	53.8	0	2	99	34	74	0.01	28.30	29.53	SSW	10.8	52.3	18.86	57.8	60.7	68	56
6	67	50	58.0	26.0	7	0	65	11	34	0.00	28.69	29.94	NW	18.0	49.8	25.07	56.7	57.6	63	53
7	63*	40*	52.2*	24.5*	14*	0*	67*	17*	37*	0.00*	28.88*	30.14*	NW *	16.8*	41.7*	22.96*	53.6*	51.4*	56*	47*
8	62	38	50.0	22.4	15	0	69	18	36	0.00	28.90	30.15	NW	13.5	36.5	25.72	52.3	49.5	55	44
9	83	32	61.2	28.4	8	0	85	13	35	0.00	28.64	29.88	S	11.0	34.3	25.69	52.6	52.5	63	42
10	82	62	71.4	49.0	0	7	74	30	46	0.00	28.36	29.60	S	13.1	32.7	18.51	57.0	61.6	69	55
11	72	57	63.6	52.7	0	0	92	46	68	0.00	28.50	29.74	NE	9.2	24.8	15.84	59.1	64.0	70	60
12	83	60	73.3	63.7	0	6	93	53	73	0.00	28.35	29.58	S	16.3	38.3	20.32	61.7	67.2	75	61
13	69	40	56.6	32.5	10	0	74	25	41	0.00	28.56	29.80	N	15.0	41.2	23.84	60.9	66.0	71	61
14	70	35	55.3	26.4	13	0	71	17	37	0.00	28.80	30.05	SSE	8.0	24.6	25.30	57.3	61.3	70	52
15	86	57	70.5	49.5	0	6	78	31	49	0.00	28.56	29.80	S	12.9	35.4	25.10	59.9	66.1	75	58
16	71	51	54.9	39.5	4	0	81	42	57	0.00	28.74	29.99	NNE	14.3	33.2	8.93	59.7	64.4	69	60
17	68	47	57.9	43.6	7	0	79	42	60	0.00	28.74	29.98	NE	8.4	24.9	22.95	59.1	63.9	71	59
18	66	40	52.3	36.3	12	0	90	31	59	0.00	29.03	30.28	NNE	9.8	21.9	24.64	58.6	62.4	70	55
19	69	43	57.3	39.3	9	0	78	37	52	0.00	28.81	30.06	SSE	13.7	38.4	19.29	58.0	61.6	68	55
20	93	58	73.0	54.3	0	10	96	15	59	0.00	28.49	29.73	SSE	13.7	33.9	19.51	61.1	66.6	75	61
21	83	68	75.0	65.1	0	11	87	54	72	0.00	28.73	29.98	SSE	13.8	33.7	18.43	64.3	70.3	76	66
22	79	69	73.5	62.9	0	9	83	57	70	0.00	28.72	29.97	SSE	16.2	36.8	9.60	65.3	70.4	73	68
23	78	65	70.9	61.3	0	7	99	58	73	0.82	28.52	29.76	S	15.9	56.7	11.15	64.9	69.2	73	67
24	66	51	57.3	49.1	7	0	94	48	75	0.06	28.68	29.93	NNE	8.9	27.3	4.67	62.4	62.6	68	59
25	67	47	55.8	36.4	8	0	89	27	51	0.00	28.98	30.24	NNE	12.0	28.9	26.69	59.8	58.6	64	53
26	71	40	58.3	32.6	10	0	82	21	41	0.00	29.07	30.33	SSE	6.1	17.2	27.51	59.7	58.5	67	50
27	75*	48*	62.9*	48.9*	4*	0*	78*	47*	61*	0.00*	28.85*	30.10*	SSE*	10.2*	29.4*	NA	60.1*	60.5*	68*	53*
28	79	61	69.7	59.2	0	5	89	58	70	0.01	28.63	29.87	SSE	11.8	32.7	16.59	62.5	66.1	72	61
29	83	67	73.4	64.4	0	10	85	58	74	0.00	28.40	29.64	S	15.5	36.0	18.18	64.7	69.6	77	65
30	75	53	65.5	44.9	1	0	78	32	49	0.00	28.63	29.87	NW	9.7	27.8	26.12	64.8	70.5	78	64
	74*	50*	62.3*	44.9*	<- Monthly Averages ->						28.68*	29.92*	SSE*	11.9*	56.7*	19.70*	59.2*	62.2*	69*	56*

Temperature - Highest: 93*
Lowest: 32*

Degree Days - Total HDD: 158*
Total CDD: 75*

Rainfall: Monthly Total: 2.43* in.
Greatest 24 Hr: 1.28* in.

Humidity - Highest: 99*
Lowest: 11*

Number of Days With:

Tmax ≥ 90:	1*	Rainfall ≥ 0.01 inch:	8*
Tmax ≤ 32:	0*	Rainfall ≥ 0.10 inch:	4*
Tmin ≤ 32:	1*	Avg Wind Speed ≥ 10 mph:	20*
Tmin ≤ 0:	0*	Max Wind Speed ≥ 30 mph:	18*

* Denotes incomplete record

Figure 11 April Mesonet Data

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

SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

May 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
Sarah Dexter, Project Leader, sarah.dexter@owrb.ok.gov
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 MAY WATER QUALITY SAMPLING

Sampling for May 2022 consisted of three sampling events. The first collection occurred during high flow conditions on the third, where water samples were collected via autosampler at two locations. Mesonet data shows no precipitation on the third, 2.34 inches of precipitation in the 72 hours prior to sampling, and 2.02 inches of precipitation in the 72 hours after the sampling event. The second collection occurred during base flow conditions on the seventeenth. Water samples were collected at nine locations and discharge was measured at seven locations. Samples were not collected at JB-1 due to construction activity. Mesonet shows no precipitation on the seventeenth, in the 72 hours prior to sampling, or in the 72 hours after the sampling event. The third collection also occurred during high flow conditions on the twenty-fourth. Water samples were collected at eight locations, one of which was via autosampler, as well as all seven stormwater outfalls. Discharge measurements were also collected at four locations. Mesonet shows 1.44 inches of precipitation on the twenty-fourth, 0.75 inches of precipitation in the 72 hours prior to sampling, and 0.84 inches of precipitation in the 72 hours after sampling. The total rainfall amount in Norman for the month of May was 7.39 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

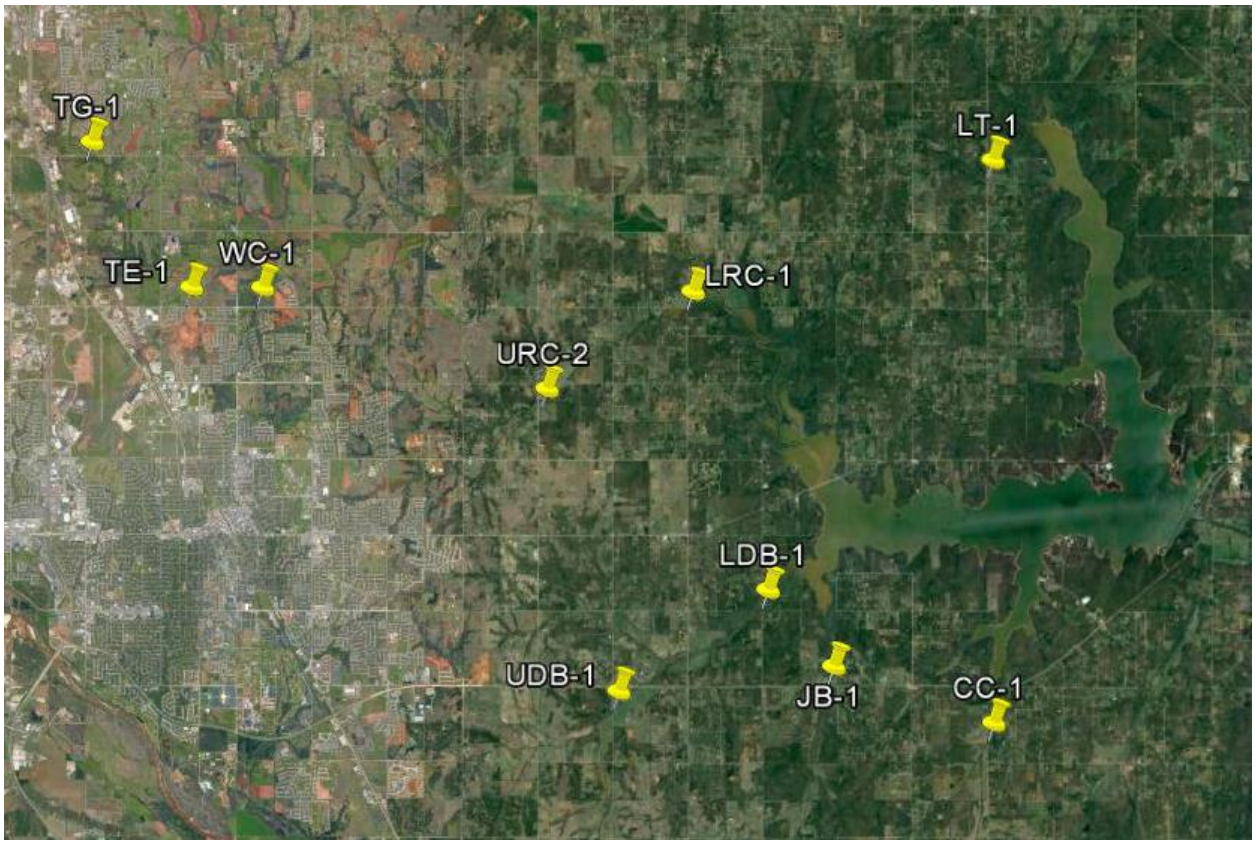


Figure 1 Monitoring Station Map

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	5/17/2022	11:58	SD	22.15	8.09	7.86	689	6	Used RP3, RP4 also over water; DCP not connecting- changed power cords; low/normal conditions
JB-1	Jim Blue Creek	5/17/2022	13:05	SD	N/A	N/A	N/A	N/A	N/A	Construction ongoing; did not sample. Pool conditions on downstream
LDB-1	Lower Dave Blue Creek	5/17/2022	13:30	SD	25.00	4.43	7.88	857	64	One autosampler bottle triggered from 5/5, spilled sample
LRC-1	Lower Rock Creek	5/17/2022	15:30	SD	26.36	8.38	7.94	757	8	Solar panel gone, autosampler batteries gone, wires cut, DCP has no power, orifice buried; replaced panel on 5/18
LT-1	Lake Laterals	5/17/2022	14:52	SD	28.50	5.96	7.74	712	28	No visual flow; lots of filamentous, very shallow on upstream
TE-1	Little River Tributary	5/18/2022	11:03	SD	24.45	5.48	7.70	1050	26	Orifice was pulled out of water after tapedown, secured back in water- changed DCP/offset
TG-1	Little River	5/18/2022	9:40	SD	22.98	6.30	7.82	1169	3	Low/normal conditions
UDB-1	Upper Dave Blue Creek	5/17/2022	10:19	SD	21.25	6.61	7.87	937	8	Tree under bridge; normal/low flow conditions
URC-2	Upper Rock Creek	5/17/2022	16:12	SD	26.20	5.85	7.65	859	12	Orifice of autosampler came loose- resecured
WC-1	Woodcrest Creek	5/18/2022	12:30	SD	24.39	6.97	7.64	1105	15	Autosampler orifice probably clogged

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	0.15	0.29	0.053	<5.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.09	0.87	0.110	49.0
LRC-1	Lower Rock Creek	<0.05	0.33	0.045	<5.0
LT-1	Lake Laterals	<0.05	1.68	0.230	22.0
TE-1	Little River Tributary	<0.05	0.49	0.046	19.0
TG-1	Little River	<0.05	0.39	0.032	<5.0
UDB-1	Upper Dave Blue Creek	0.11	0.29	0.043	<5.0
URC-2	Upper Rock Creek	<0.05	0.54	0.073	10.0
WC-1	Woodcrest Creek	0.07	0.39	0.089	9.0

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	0.26	0.054	<5.0
Duplicate RPD	6.45%	10.91%	1.87%	0%

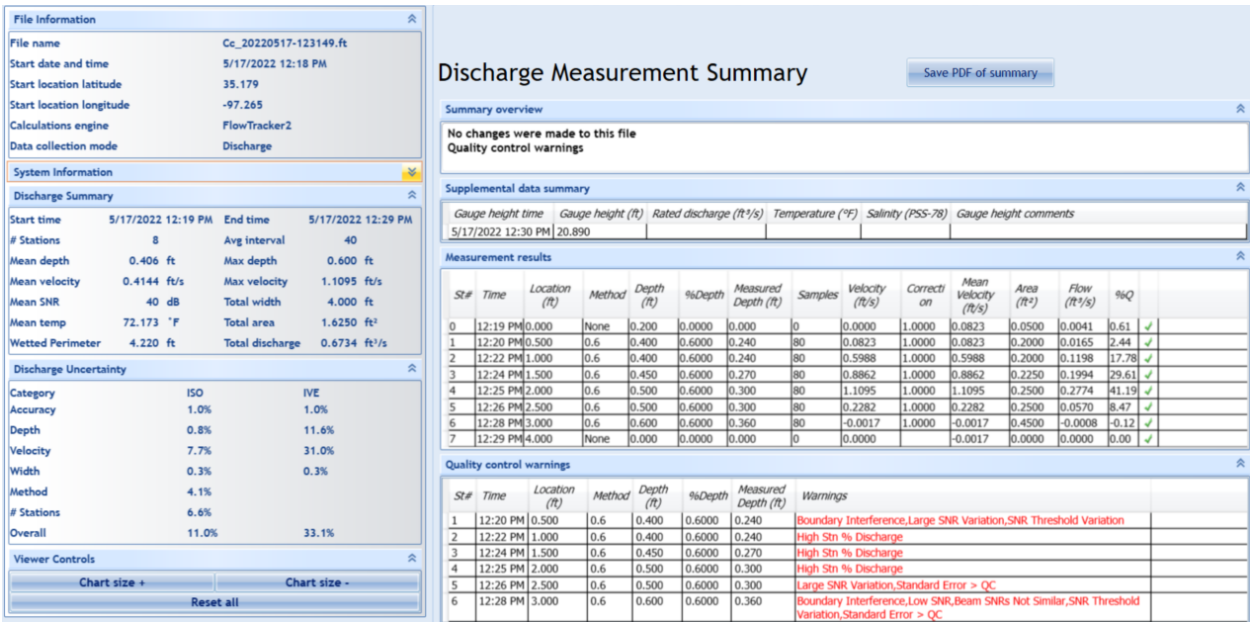
Table 3 QA/QC Data

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.67	20.89
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	49.63	17.28
LRC-1	Lower Rock Creek	0.75	4.29
LT-1	Lake Laterals	0.01	4.19
TE-1	Little River Tributary	0.03	10.99
TG-1	Little River	0.83	9.09
UDB-1	Upper Dave Blue Creek	-0.11	17.54
URC-2	Upper Rock Creek	0.08	10.95
WC-1	Woodcrest Creek	0.09	7.61

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Cc_20220517-123149.ft
Start date and time	5/17/2022 12:18 PM
Start location latitude	35.179
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/17/2022 12:19 PM	End time	5/17/2022 12:29 PM
# Stations	8	Avg interval	40
Mean depth	0.406 ft	Max depth	0.600 ft
Mean velocity	0.4144 ft/s	Max velocity	1.1095 ft/s
Mean SNR	40 dB	Total width	4.000 ft
Mean temp	72.173 °F	Total area	1.6250 ft²
Wetted Perimeter	4.220 ft	Total discharge	0.6734 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.8%	11.6%
Velocity	7.7%	31.0%
Width	0.3%	0.3%
Method	4.1%	
# Stations	6.6%	
Overall	11.0%	33.1%

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
5/17/2022 12:30 PM	20.890				

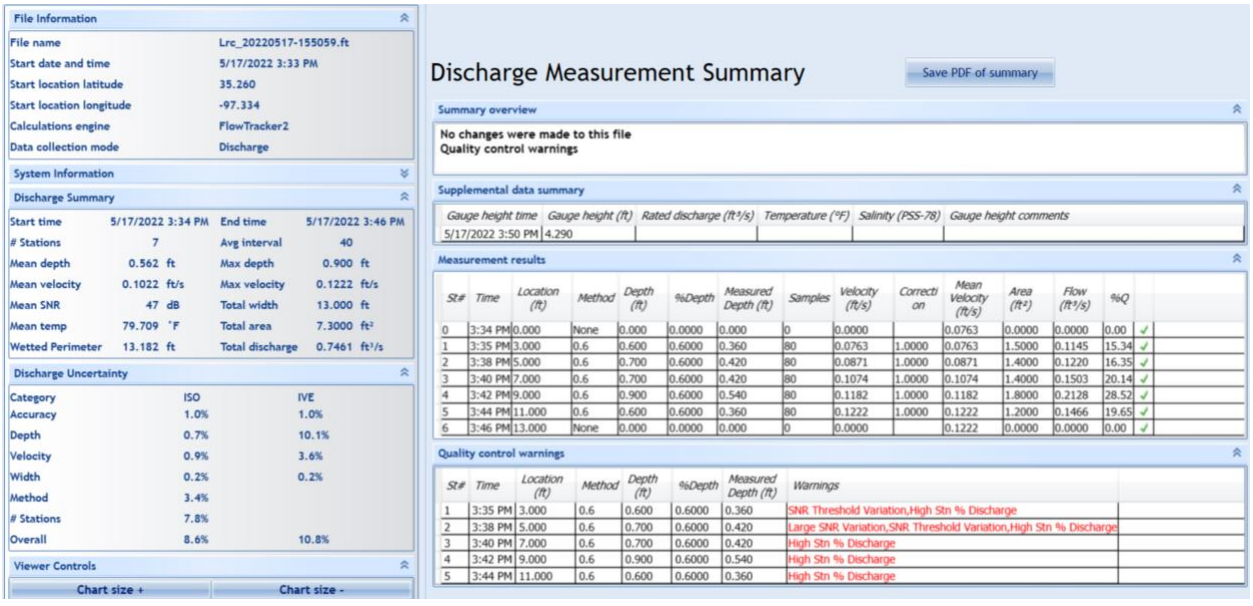
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	12:19 PM	0.000	None	0.200	0.0000	0.000	0	0.0000	1.0000	0.0823	0.0500	0.0041	0.61	✓
1	12:20 PM	0.500	0.6	0.400	0.6000	0.240	80	0.0823	1.0000	0.0823	0.2000	0.0165	2.44	✓
2	12:22 PM	1.000	0.6	0.400	0.6000	0.240	80	0.5988	1.0000	0.5988	0.2000	0.1198	17.78	✓
3	12:24 PM	1.500	0.6	0.450	0.6000	0.270	80	0.8862	1.0000	0.8862	0.2250	0.1994	29.61	✓
4	12:25 PM	2.000	0.6	0.500	0.6000	0.300	80	1.1095	1.0000	1.1095	0.2500	0.2774	41.19	✓
5	12:26 PM	2.500	0.6	0.500	0.6000	0.300	80	0.2282	1.0000	0.2282	0.2500	0.0570	8.47	✓
6	12:28 PM	3.000	0.6	0.600	0.6000	0.360	80	-0.0017	1.0000	-0.0017	0.4500	-0.0008	-0.12	✓
7	12:29 PM	4.000	None	0.000	0.0000	0.000	0	0.0000		-0.0017	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	12:20 PM	0.500	0.6	0.400	0.6000	0.240	Boundary Interference,Large SNR Variation,SNR Threshold Variation
2	12:22 PM	1.000	0.6	0.400	0.6000	0.240	High Stn % Discharge
3	12:24 PM	1.500	0.6	0.450	0.6000	0.270	High Stn % Discharge
4	12:25 PM	2.000	0.6	0.500	0.6000	0.300	High Stn % Discharge
5	12:26 PM	2.500	0.6	0.500	0.6000	0.300	Large SNR Variation,Standard Error > QC
6	12:28 PM	3.000	0.6	0.600	0.6000	0.360	Boundary Interference,Low SNR,Beam SNRs Not Similar,SNR Threshold Variation,Standard Error > QC

Figure 2 Discharge Measurement Summary CC-1



File Information

File name	Lrc_20220517-155059.ft
Start date and time	5/17/2022 3:33 PM
Start location latitude	35.260
Start location longitude	-97.334
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/17/2022 3:34 PM	End time	5/17/2022 3:46 PM
# Stations	7	Avg interval	40
Mean depth	0.562 ft	Max depth	0.900 ft
Mean velocity	0.1022 ft/s	Max velocity	0.1222 ft/s
Mean SNR	47 dB	Total width	13.000 ft
Mean temp	79.709 °F	Total area	7.3000 ft²
Wetted Perimeter	13.182 ft	Total discharge	0.7461 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.7%	10.1%
Velocity	0.9%	3.6%
Width	0.2%	0.2%
Method	3.4%	
# Stations	7.8%	
Overall	8.6%	10.8%

Viewer Controls

Chart size + | Chart size -

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
5/17/2022 3:50 PM	4.290				

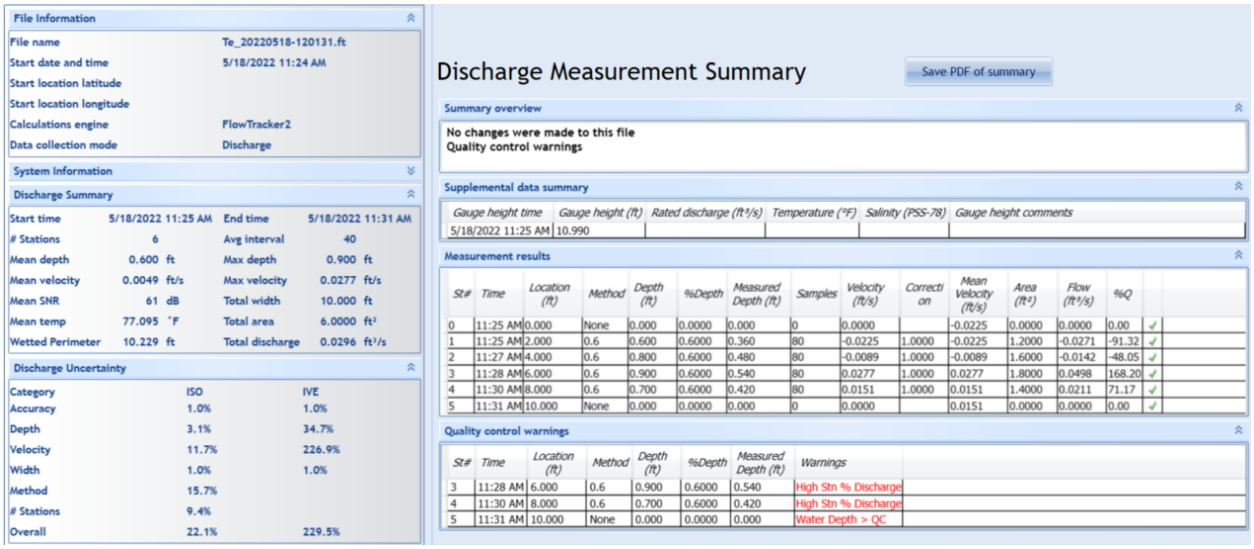
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	3:34 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0763	0.0000	0.0000	0.00	✓
1	3:35 PM	3.000	0.6	0.600	0.6000	0.360	80	0.0763	1.0000	0.0763	1.5000	0.1145	15.34	✓
2	3:38 PM	5.000	0.6	0.700	0.6000	0.420	80	0.0871	1.0000	0.0871	1.4000	0.1220	16.35	✓
3	3:40 PM	7.000	0.6	0.700	0.6000	0.420	80	0.1074	1.0000	0.1074	1.4000	0.1503	20.14	✓
4	3:42 PM	9.000	0.6	0.900	0.6000	0.540	80	0.1182	1.0000	0.1182	1.8000	0.2128	28.52	✓
5	3:44 PM	11.000	0.6	0.600	0.6000	0.360	80	0.1222	1.0000	0.1222	1.2000	0.1466	19.65	✓
6	3:46 PM	13.000	None	0.000	0.0000	0.000	0	0.0000		0.1222	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	3:35 PM	3.000	0.6	0.600	0.6000	0.360	SNR Threshold Variation,High Stn % Discharge
2	3:38 PM	5.000	0.6	0.700	0.6000	0.420	Large SNR Variation,SNR Threshold Variation,High Stn % Discharge
3	3:40 PM	7.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
4	3:42 PM	9.000	0.6	0.900	0.6000	0.540	High Stn % Discharge
5	3:44 PM	11.000	0.6	0.600	0.6000	0.360	High Stn % Discharge

Figure 3 Discharge Measurement Summary LRC-1



Discharge Measurement Summary

Save PDF of summary

File Information

File name	Te_20220518-120131.ft
Start date and time	5/18/2022 11:24 AM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/18/2022 11:25 AM	End time	5/18/2022 11:31 AM
# Stations	6	Avg interval	40
Mean depth	0.600 ft	Max depth	0.900 ft
Mean velocity	0.0049 ft/s	Max velocity	0.0277 ft/s
Mean SNR	61 dB	Total width	10.000 ft
Mean temp	77.095 °F	Total area	6.0000 ft²
Wetted Perimeter	10.229 ft	Total discharge	0.0296 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	3.1%	34.7%
Velocity	11.7%	226.9%
Width	1.0%	1.0%
Method	15.7%	
# Stations	9.4%	
Overall	22.1%	229.5%

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
5/18/2022 11:25 AM	10.990				

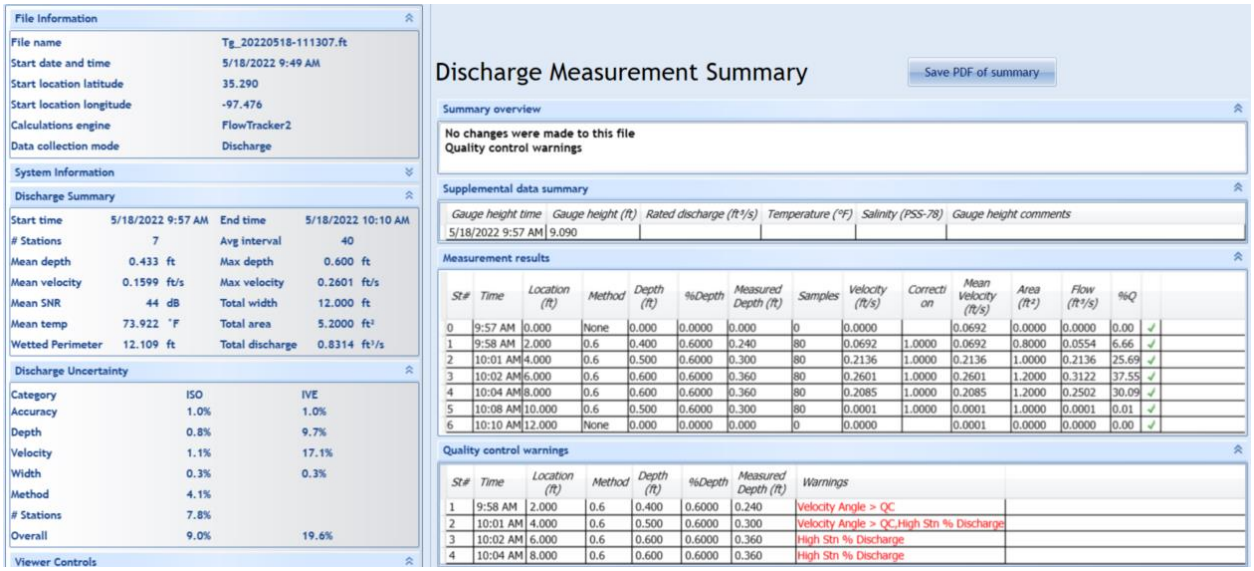
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:25 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0225	0.0000	0.0000	0.00	✓
1	11:25 AM	2.000	0.6	0.600	0.6000	0.360	80	-0.0225	1.0000	-0.0225	1.2000	-0.0271	-91.32	✓
2	11:27 AM	4.000	0.6	0.800	0.6000	0.480	80	-0.0089	1.0000	-0.0089	1.6000	-0.0142	-48.05	✓
3	11:28 AM	6.000	0.6	0.900	0.6000	0.540	80	0.0277	1.0000	0.0277	1.8000	0.0498	168.20	✓
4	11:30 AM	8.000	0.6	0.700	0.6000	0.420	80	0.0151	1.0000	0.0151	1.4000	0.0211	71.17	✓
5	11:31 AM	10.000	None	0.000	0.0000	0.000	0	0.0000		0.0151	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
3	11:28 AM	6.000	0.6	0.900	0.6000	0.540	High Stn % Discharge
4	11:30 AM	8.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
5	11:31 AM	10.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 4 Discharge Measurement Summary TE-1



Discharge Measurement Summary

Save PDF of summary

File Information

File name	Tg_20220518-111307.ft
Start date and time	5/18/2022 9:49 AM
Start location latitude	35.290
Start location longitude	-97.476
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/18/2022 9:57 AM	End time	5/18/2022 10:10 AM
# Stations	7	Avg interval	40
Mean depth	0.433 ft	Max depth	0.600 ft
Mean velocity	0.1599 ft/s	Max velocity	0.2601 ft/s
Mean SNR	44 dB	Total width	12.000 ft
Mean temp	73.922 °F	Total area	5.2000 ft²
Wetted Perimeter	12.109 ft	Total discharge	0.8314 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.8%	9.7%
Velocity	1.1%	17.1%
Width	0.3%	0.3%
Method	4.1%	
# Stations	7.8%	
Overall	9.0%	19.6%

Viewer Controls

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
5/18/2022 9:57 AM	9.090				

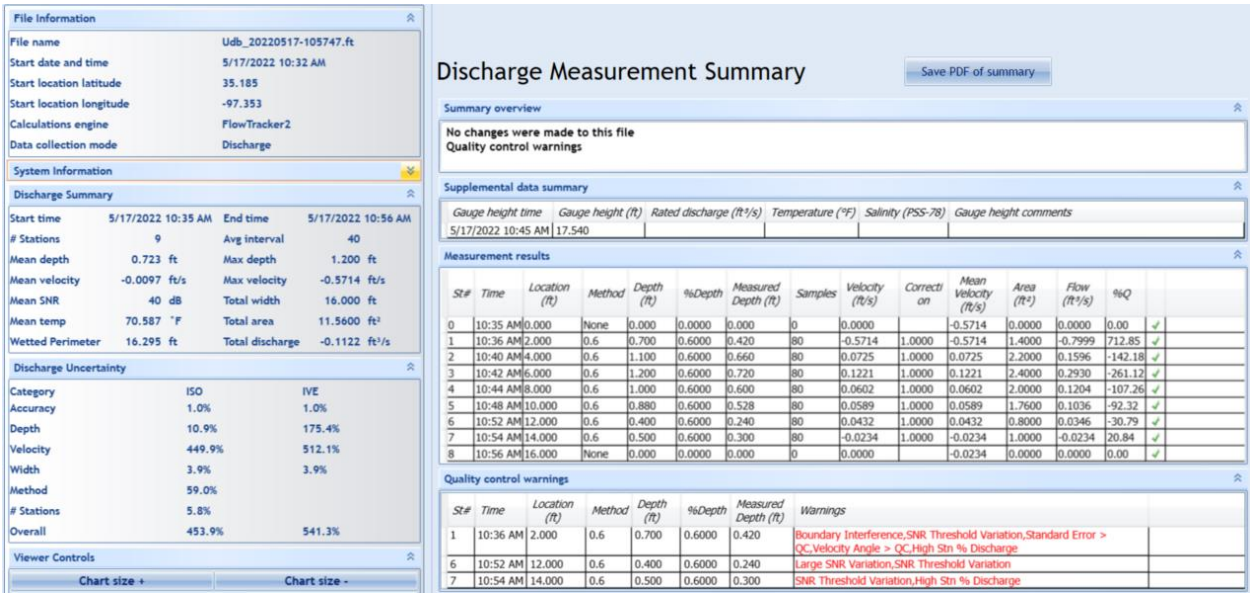
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	9:57 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0692	0.0000	0.0000	0.00	✓
1	9:58 AM	2.000	0.6	0.400	0.6000	0.240	80	0.0692	1.0000	0.0692	0.8000	0.0554	6.66	✓
2	10:01 AM	4.000	0.6	0.500	0.6000	0.300	80	0.2136	1.0000	0.2136	1.0000	0.2136	25.69	✓
3	10:02 AM	6.000	0.6	0.600	0.6000	0.360	80	0.2601	1.0000	0.2601	1.2000	0.3122	37.55	✓
4	10:04 AM	8.000	0.6	0.600	0.6000	0.360	80	0.2085	1.0000	0.2085	1.2000	0.2502	30.09	✓
5	10:08 AM	10.000	0.6	0.500	0.6000	0.300	80	0.0001	1.0000	0.0001	1.0000	0.0001	0.01	✓
6	10:10 AM	12.000	None	0.000	0.0000	0.000	0	0.0000		0.0001	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:58 AM	2.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC
2	10:01 AM	4.000	0.6	0.500	0.6000	0.300	Velocity Angle > QC,High Stn % Discharge
3	10:02 AM	6.000	0.6	0.600	0.6000	0.360	High Stn % Discharge
4	10:04 AM	8.000	0.6	0.600	0.6000	0.360	High Stn % Discharge

Figure 5 Discharge Measurement Summary TG-1



File Information

File name	Udb_20220517-105747.ft
Start date and time	5/17/2022 10:32 AM
Start location latitude	35.185
Start location longitude	-97.353
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/17/2022 10:35 AM	End time	5/17/2022 10:56 AM
# Stations	9	Avg interval	40
Mean depth	0.723 ft	Max depth	1.200 ft
Mean velocity	-0.0097 ft/s	Max velocity	-0.5714 ft/s
Mean SNR	40 dB	Total width	16.000 ft
Mean temp	70.587 °F	Total area	11.5600 ft²
Wetted Perimeter	16.295 ft	Total discharge	-0.1122 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	10.9%	175.4%
Velocity	449.9%	512.1%
Width	3.9%	3.9%
Method	59.0%	
# Stations	5.8%	
Overall	453.9%	541.3%

Viewer Controls

Chart size + | Chart size -

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
5/17/2022 10:45 AM	17.540				

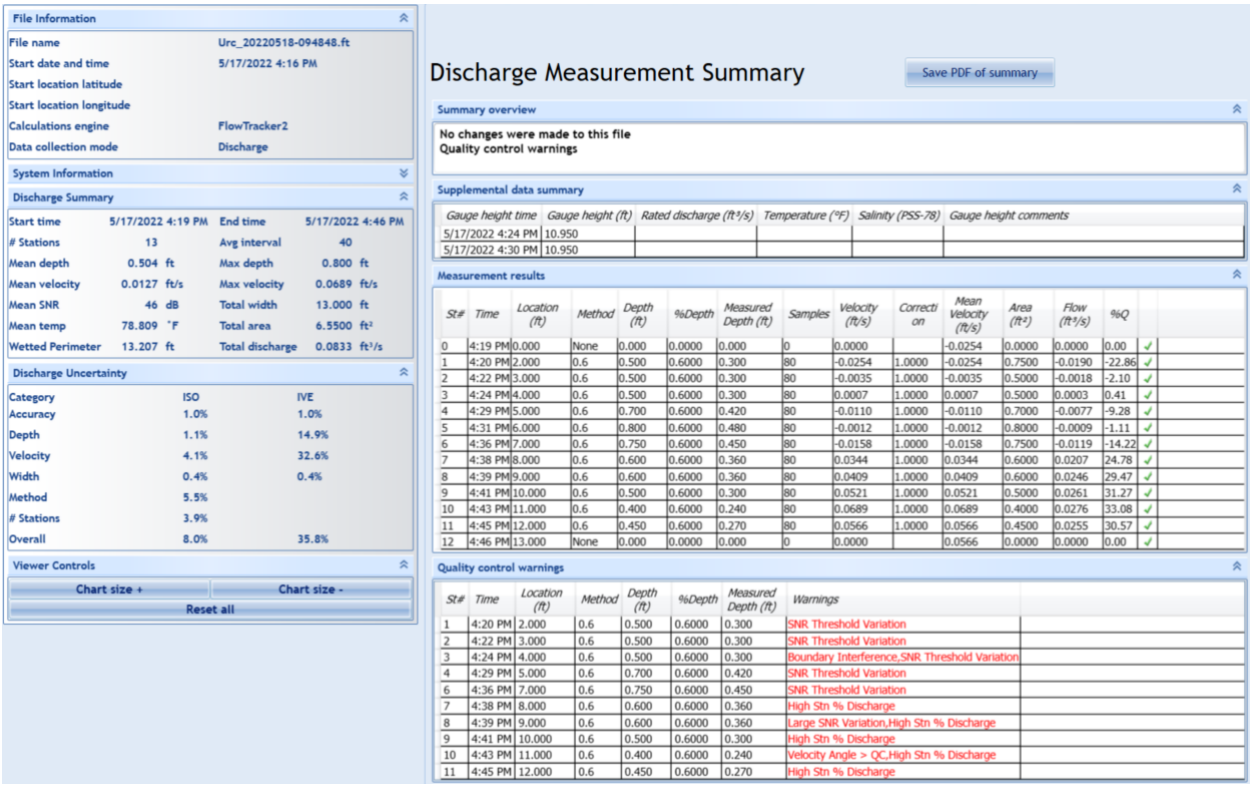
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	10:35 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.5714	0.0000	0.0000	0.00	✓
1	10:36 AM	2.000	0.6	0.700	0.6000	0.420	80	-0.5714	1.0000	-0.5714	1.4000	-0.7999	712.85	✓
2	10:40 AM	4.000	0.6	1.100	0.6000	0.660	80	0.0725	1.0000	0.0725	2.2000	0.1596	-142.18	✓
3	10:42 AM	6.000	0.6	1.200	0.6000	0.720	80	0.1221	1.0000	0.1221	2.4000	0.2930	-261.12	✓
4	10:44 AM	8.000	0.6	1.000	0.6000	0.600	80	0.0602	1.0000	0.0602	2.0000	0.1204	-107.26	✓
5	10:48 AM	10.000	0.6	0.880	0.6000	0.528	80	0.0589	1.0000	0.0589	1.7600	0.1036	-92.32	✓
6	10:52 AM	12.000	0.6	0.400	0.6000	0.240	80	0.0432	1.0000	0.0432	0.8000	0.0346	-30.79	✓
7	10:54 AM	14.000	0.6	0.500	0.6000	0.300	80	-0.0234	1.0000	-0.0234	1.0000	-0.0234	20.84	✓
8	10:56 AM	16.000	None	0.000	0.0000	0.000	0	0.0000		-0.0234	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	10:36 AM	2.000	0.6	0.700	0.6000	0.420	Boundary Interference,SNR Threshold Variation,Standard Error > QC,Velocity Angle > QC,High Stn % Discharge
6	10:52 AM	12.000	0.6	0.400	0.6000	0.240	Large SNR Variation,SNR Threshold Variation
7	10:54 AM	14.000	0.6	0.500	0.6000	0.300	SNR Threshold Variation,High Stn % Discharge

Figure 6 Discharge Measurement Summary UDB-1



File Information

File name	Urc_20220518-094848.ft
Start date and time	5/17/2022 4:16 PM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/17/2022 4:19 PM	End time	5/17/2022 4:46 PM
# Stations	13	Avg interval	40
Mean depth	0.504 ft	Max depth	0.800 ft
Mean velocity	0.0127 ft/s	Max velocity	0.0689 ft/s
Mean SNR	46 dB	Total width	13.000 ft
Mean temp	78.809 °F	Total area	6.5500 ft²
Wetted Perimeter	13.207 ft	Total discharge	0.0833 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	1.1%	14.9%
Velocity	4.1%	32.6%
Width	0.4%	0.4%
Method	5.5%	
# Stations	3.9%	
Overall	8.0%	35.8%

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
5/17/2022 4:24 PM	10.950				
5/17/2022 4:30 PM	10.950				

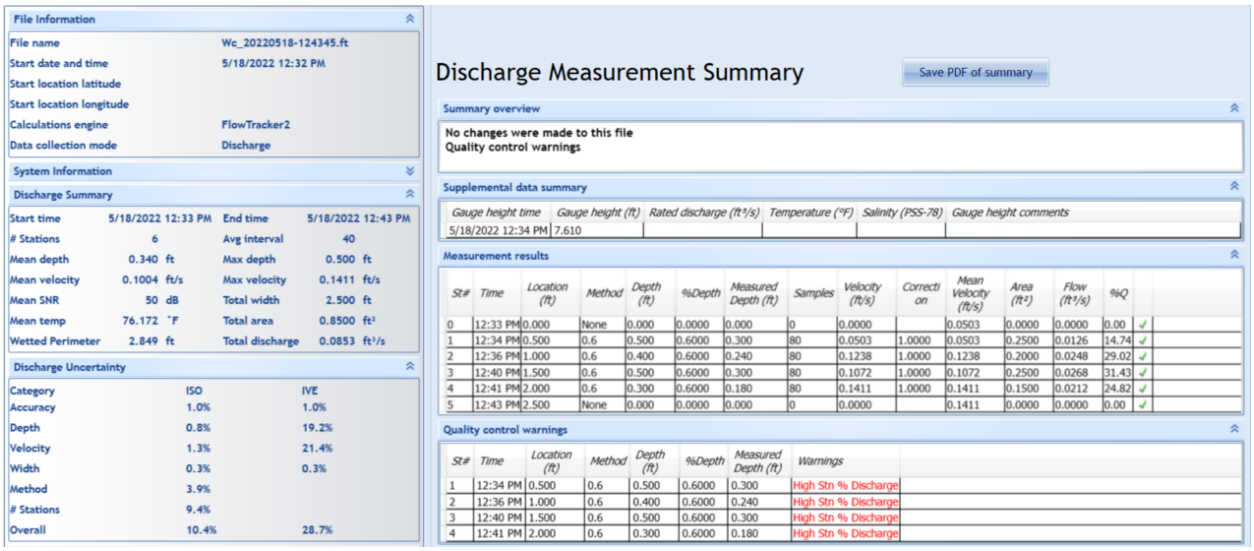
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	4:19 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0254	0.0000	0.0000	0.00	✓
1	4:20 PM	2.000	0.6	0.500	0.6000	0.300	80	-0.0254	1.0000	-0.0254	0.7500	-0.0190	-22.86	✓
2	4:22 PM	3.000	0.6	0.500	0.6000	0.300	80	-0.0035	1.0000	-0.0035	0.5000	-0.0018	-2.10	✓
3	4:24 PM	4.000	0.6	0.500	0.6000	0.300	80	0.0007	1.0000	0.0007	0.5000	0.0003	0.41	✓
4	4:29 PM	5.000	0.6	0.700	0.6000	0.420	80	-0.0110	1.0000	-0.0110	0.7000	-0.0077	-9.28	✓
5	4:31 PM	6.000	0.6	0.800	0.6000	0.480	80	-0.0012	1.0000	-0.0012	0.8000	-0.0009	-1.11	✓
6	4:36 PM	7.000	0.6	0.750	0.6000	0.450	80	-0.0158	1.0000	-0.0158	0.7500	-0.0119	-14.22	✓
7	4:38 PM	8.000	0.6	0.600	0.6000	0.360	80	0.0344	1.0000	0.0344	0.6000	0.0207	24.78	✓
8	4:39 PM	9.000	0.6	0.600	0.6000	0.360	80	0.0409	1.0000	0.0409	0.6000	0.0246	29.47	✓
9	4:41 PM	10.000	0.6	0.500	0.6000	0.300	80	0.0521	1.0000	0.0521	0.5000	0.0261	31.27	✓
10	4:43 PM	11.000	0.6	0.400	0.6000	0.240	80	0.0689	1.0000	0.0689	0.4000	0.0276	33.08	✓
11	4:45 PM	12.000	0.6	0.450	0.6000	0.270	80	0.0566	1.0000	0.0566	0.4500	0.0255	30.57	✓
12	4:46 PM	13.000	None	0.000	0.0000	0.000	0	0.0000		0.0566	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	4:20 PM	2.000	0.6	0.500	0.6000	0.300	SNR Threshold Variation
2	4:22 PM	3.000	0.6	0.500	0.6000	0.300	SNR Threshold Variation
3	4:24 PM	4.000	0.6	0.500	0.6000	0.300	Boundary Interference,SNR Threshold Variation
4	4:29 PM	5.000	0.6	0.700	0.6000	0.420	SNR Threshold Variation
6	4:36 PM	7.000	0.6	0.750	0.6000	0.450	SNR Threshold Variation
7	4:38 PM	8.000	0.6	0.600	0.6000	0.360	High Stn % Discharge
8	4:39 PM	9.000	0.6	0.600	0.6000	0.360	Large SNR Variation,High Stn % Discharge
9	4:41 PM	10.000	0.6	0.500	0.6000	0.300	High Stn % Discharge
10	4:43 PM	11.000	0.6	0.400	0.6000	0.240	Velocity Angle > QC,High Stn % Discharge
11	4:45 PM	12.000	0.6	0.450	0.6000	0.270	High Stn % Discharge

Figure 7 Discharge Measurement Summary URC-2



Discharge Measurement Summary

Save PDF of summary

File Information

File name	Wc_20220518-124345.ft
Start date and time	5/18/2022 12:32 PM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/18/2022 12:33 PM	End time	5/18/2022 12:43 PM
# Stations	6	Avg interval	40
Mean depth	0.340 ft	Max depth	0.500 ft
Mean velocity	0.1004 ft/s	Max velocity	0.1411 ft/s
Mean SNR	50 dB	Total width	2.500 ft
Mean temp	76.172 °F	Total area	0.8500 ft²
Wetted Perimeter	2.849 ft	Total discharge	0.0853 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.8%	19.2%
Velocity	1.3%	21.4%
Width	0.3%	0.3%
Method	3.9%	
# Stations	9.4%	
Overall	10.4%	28.7%

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
5/18/2022 12:34 PM	7.610				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	12:33 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0503	0.0000	0.0000	0.00	✓
1	12:34 PM	0.500	0.6	0.500	0.6000	0.300	80	0.0503	1.0000	0.0503	0.2500	0.0126	14.74	✓
2	12:36 PM	1.000	0.6	0.400	0.6000	0.240	80	0.1238	1.0000	0.1238	0.2000	0.0248	29.02	✓
3	12:40 PM	1.500	0.6	0.500	0.6000	0.300	80	0.1072	1.0000	0.1072	0.2500	0.0268	31.43	✓
4	12:41 PM	2.000	0.6	0.300	0.6000	0.180	80	0.1411	1.0000	0.1411	0.1500	0.0212	24.82	✓
5	12:43 PM	2.500	None	0.000	0.0000	0.000	0	0.0000		0.1411	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	12:34 PM	0.500	0.6	0.500	0.6000	0.300	High Stn % Discharge
2	12:36 PM	1.000	0.6	0.400	0.6000	0.240	High Stn % Discharge
3	12:40 PM	1.500	0.6	0.500	0.6000	0.300	High Stn % Discharge
4	12:41 PM	2.000	0.6	0.300	0.6000	0.180	High Stn % Discharge

Figure 8 Discharge Measurement Summary WC-1

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
URC-2	Upper Rock Creek	5/3/2022	12:12	NH	*	*	7.93	255	1000	Autosampler collected T1 on 5/2 @ 20:15 at 16.4, peak at 20:30 at 16.45
TE-1	Little River Tributary	5/3/2022	13:43	NH	*	*	7.70	259	901	Autosampler collected T1 on 5/2 @ 18:45 at 15.54, peak at 15.74 at 19:15

Table 5 First Stormwater Field Data Form Where the Asterisk Denotes a Sample from an Autosampler

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/L)	Kjeldahl Nitrogen (mg/L)	Phosphorus (mg/L)	Total Suspended Solids (mg/L)
URC-2	Upper Rock Creek	0.27	17.3	3.95	7560
TE-1	Little River Tributary	<0.05	3.72	0.656	647

Table 6 First Stormwater Laboratory Analysis Summary

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
URC-2	Upper Rock Creek	131.00	16.40
TE-1	Little River Tributary	267.20	15.54

Table 7 First Stormwater Station Discharge Summary

All rated stream discharges are provisional and subject to change.

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	5/24/2022	10:17	NH	16.0	7.31	7.48	557	75	Used RP3, RP4 also over water; took two flow measurements; DCP not working but stage rising while at site (21.08, 21.12, 21.17)
UDB-1	Upper Dave Blue Creek	5/24/2022	11:47	NH	17.2	8.38	7.54	195	1000	Took flow, stage rising while at site, 18.98 after flow; some med debris present; DCP 18.1 at arrival- may have been clogged
LDB-1	Lower Dave Blue Creek	5/24/2022	12:50	NH	16.0	7.72	7.75	568	228	17.38 after flow
URC-2	Upper Rock Creek	5/24/2022	13:29	NH	17.7	8.29	7.63	234	411	13.56 after flow
TG-1	Little River	5/24/2022	5:30	LP	*	*	*	*	529	Autosampler collected T1 at 17.84, peak at 20.24 at 6:45; flow taken
TG-1	Little River	5/24/2022	6:00	LP	*	*	*	*	641	Autosampler collected T2 at 19.43, peak at 20.24 at 6:45
TE-1	Little River Tributary	5/24/2022	10:17	LP	17.3	8.33	8.03	165	417	13.6 tapedown, flow taken
WC-1	Woodcrest Creek	5/24/2022	11:21	LP	17.6	8.69	7.73	199	161	13.18 tapedown, flow taken
LRC-1	Lower Rock Creek	5/24/2022	12:00	LP	N/A	N/A	N/A	N/A	585	14.77 tapedown, flow taken; no sonde data
SW-01	Stormwater Outfall 01	5/24/2022	10:13	CH	17.5	8.45	8.06	139	484	
SW-02	Stormwater Outfall 02	5/24/2022	10:45	CH	18.5	8.51	7.72	210	34	
SW-03	Stormwater Outfall 03	5/24/2022	11:08	CH	17.8	8.54	7.82	104	134	
SW-04	Stormwater Outfall 04	5/24/2022	11:32	CH	17.3	8.96	8.01	196	235	
SW-05	Stormwater Outfall 05	5/24/2022	12:02	CH	17.2	8.04	7.68	354	53	
SW-06	Stormwater Outfall 06	5/24/2022	13:25	CH	17.0	5.01	8.15	332	26	Pond was very full but had no flow in it
SW-07	Stormwater Outfall 07	5/24/2022	12:52	CH	19.4	6.40	8.06	294	29	

Table 8 Second Stormwater Field Data Form Where the Asterisk Denotes a Sample from an Autosampler

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	0.17	0.57	0.100	40.0
LDB-1	Lower Dave Blue Creek	0.29	0.95	0.225	144
UDB-1	Upper Dave Blue Creek	0.39	1.72	0.739	640
URC-2	Upper Rock Creek	0.33	1.73	0.392	312
LRC-1	Lower Rock Creek	0.37	1.76	0.401	488
TE-1	Little River Tributary	0.42	1.11	0.353	252
TG-1	Little River	0.36	1.65	0.680	647
TG-1	Little River	0.34	1.64	0.651	957
WC-1	Woodcrest Creek	0.43	1.27	0.398	178
SW-01	Stormwater Outfall 01	0.30	1.11	0.323	359
SW-02	Stormwater Outfall 02	0.28	1.16	0.238	52.0
SW-03	Stormwater Outfall 03	0.36	1.30	0.564	158
SW-04	Stormwater Outfall 04	0.35	1.12	0.281	122
SW-05	Stormwater Outfall 05	0.57	1.14	0.238	40.0
SW-06	Stormwater Outfall 06	0.14	0.89	0.089	20.0
SW-07	Stormwater Outfall 07	0.16	0.81	0.091	21.0

Table 9 Second Stormwater Laboratory Analysis Summary

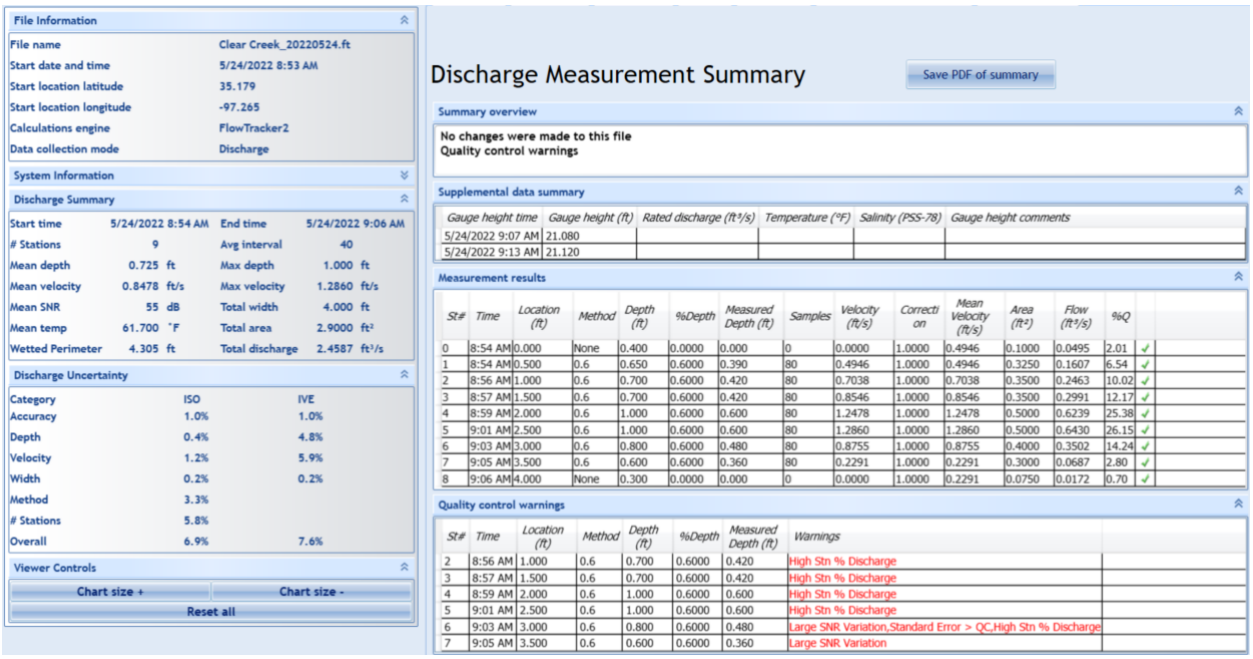
Monitoring Location Name	Nitrate and Nitrite (mg/L)	Kjeldahl Nitrogen (mg/L)	Phosphorus (mg/L)	Total Suspended Solids (mg/L)
Field Blank	<0.05	<0.10	<0.010	<5.0
Duplicate	0.17	0.55	0.099	37.0
Duplicate RPD	0%	3.57%	1.01%	7.79%

Table 10 Second Stormwater QA/QC Data

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	2.46	21.08
CC-1	Clear Creek	2.74	21.12
LDB-1	Lower Dave Blue Creek	83.96	17.42
UDB-1	Upper Dave Blue Creek	87.13	18.90
URC-2	Upper Rock Creek	54.38	13.72
LRC-1	Lower Rock Creek	355	14.77
TE-1	Little River Tributary	70	13.60
WC-1	Woodcrest Creek	375	13.18
TG-1	Little River	515	17.84
TG-1	Little River	725	19.43

Table 11 Second Stormwater Station Discharge Summary

All rated stream discharges are provisional and subject to change.



Discharge Measurement Summary

Save PDF of summary

File Information

File name	Clear Creek_20220524.ft
Start date and time	5/24/2022 8:53 AM
Start location latitude	35.179
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/24/2022 8:54 AM	End time	5/24/2022 9:06 AM
# Stations	9	Avg interval	40
Mean depth	0.725 ft	Max depth	1.000 ft
Mean velocity	0.8478 ft/s	Max velocity	1.2860 ft/s
Mean SNR	55 dB	Total width	4.000 ft
Mean temp	61.700 °F	Total area	2.9000 ft²
Wetted Perimeter	4.305 ft	Total discharge	2.4587 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.4%	4.8%
Velocity	1.2%	5.9%
Width	0.2%	0.2%
Method	3.3%	
# Stations	5.8%	
Overall	6.9%	7.6%

Viewer Controls

Chart size + | Chart size - | Reset all

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
5/24/2022 9:07 AM	21.080				
5/24/2022 9:13 AM	21.120				

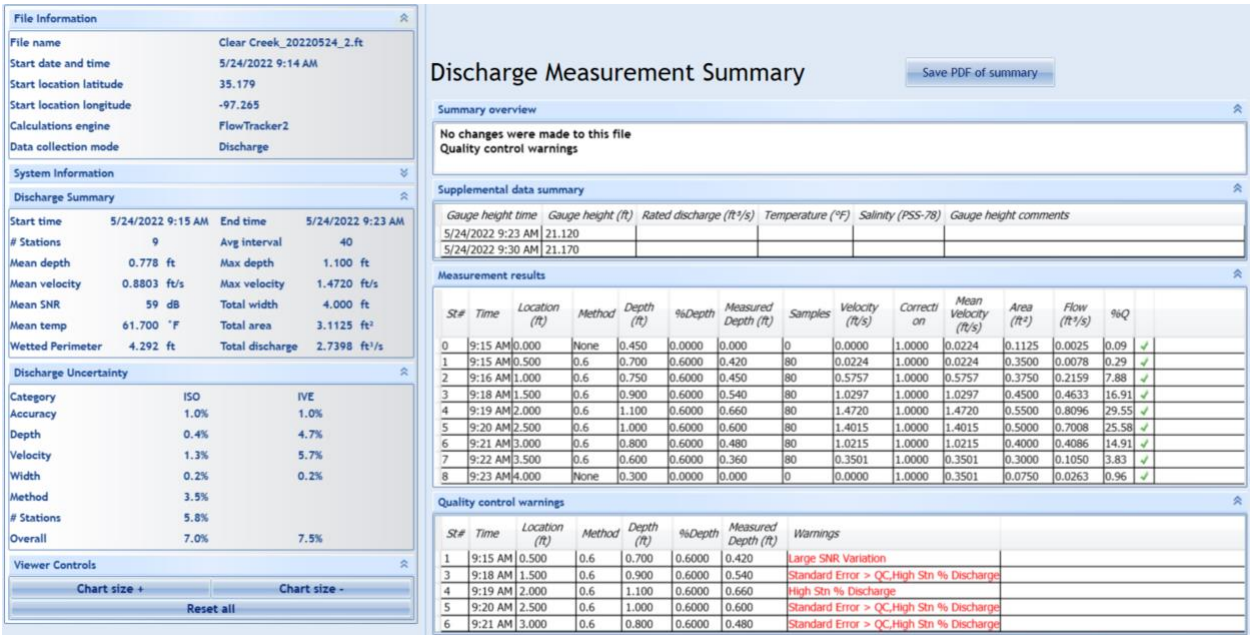
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	8:54 AM	0.000	None	0.400	0.0000	0.000	0	0.0000	1.0000	0.4946	0.1000	0.0495	2.01	✓
1	8:54 AM	0.500	0.6	0.650	0.6000	0.390	80	0.4946	1.0000	0.4946	0.3250	0.1607	6.54	✓
2	8:56 AM	1.000	0.6	0.700	0.6000	0.420	80	0.7038	1.0000	0.7038	0.3500	0.2463	10.02	✓
3	8:57 AM	1.500	0.6	0.700	0.6000	0.420	80	0.8546	1.0000	0.8546	0.3500	0.2991	12.17	✓
4	8:59 AM	2.000	0.6	1.000	0.6000	0.600	80	1.2478	1.0000	1.2478	0.5000	0.6239	25.38	✓
5	9:01 AM	2.500	0.6	1.000	0.6000	0.600	80	1.2860	1.0000	1.2860	0.5000	0.6430	26.15	✓
6	9:03 AM	3.000	0.6	0.800	0.6000	0.480	80	0.8755	1.0000	0.8755	0.4000	0.3502	14.24	✓
7	9:05 AM	3.500	0.6	0.600	0.6000	0.360	80	0.2291	1.0000	0.2291	0.3000	0.0687	2.80	✓
8	9:06 AM	4.000	None	0.300	0.0000	0.000	0	0.0000	1.0000	0.2291	0.0750	0.0172	0.70	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	8:56 AM	1.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
3	8:57 AM	1.500	0.6	0.700	0.6000	0.420	High Stn % Discharge
4	8:59 AM	2.000	0.6	1.000	0.6000	0.600	High Stn % Discharge
5	9:01 AM	2.500	0.6	1.000	0.6000	0.600	High Stn % Discharge
6	9:03 AM	3.000	0.6	0.800	0.6000	0.480	Large SNR Variation,Standard Error > QC,High Stn % Discharge
7	9:05 AM	3.500	0.6	0.600	0.6000	0.360	Large SNR Variation

Figure 9 Stormwater Discharge Measurement Summary CC-1 First Measurement



Discharge Measurement Summary

Save PDF of summary

File Information

File name	Clear Creek_20220524_2.ft
Start date and time	5/24/2022 9:14 AM
Start location latitude	35.179
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	5/24/2022 9:15 AM	End time	5/24/2022 9:23 AM
# Stations	9	Avg interval	40
Mean depth	0.778 ft	Max depth	1.100 ft
Mean velocity	0.8803 ft/s	Max velocity	1.4720 ft/s
Mean SNR	59 dB	Total width	4.000 ft
Mean temp	61.700 °F	Total area	3.1125 ft²
Wetted Perimeter	4.292 ft	Total discharge	2.7398 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.4%	4.7%
Velocity	1.3%	5.7%
Width	0.2%	0.2%
Method	3.5%	
# Stations	5.8%	
Overall	7.0%	7.5%

Viewer Controls

Chart size + | Chart size - | Reset all

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
5/24/2022 9:23 AM	21.120				
5/24/2022 9:30 AM	21.170				

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	9:15 AM	0.000	None	0.450	0.0000	0.000	0	0.0000	1.0000	0.0224	0.1125	0.0025	0.09	✓
1	9:15 AM	0.500	0.6	0.700	0.6000	0.420	80	0.0224	1.0000	0.0224	0.3500	0.0078	0.29	✓
2	9:16 AM	1.000	0.6	0.750	0.6000	0.450	80	0.5757	1.0000	0.5757	0.3750	0.2159	7.88	✓
3	9:18 AM	1.500	0.6	0.900	0.6000	0.540	80	1.0297	1.0000	1.0297	0.4500	0.4633	16.91	✓
4	9:19 AM	2.000	0.6	1.100	0.6000	0.660	80	1.4720	1.0000	1.4720	0.5500	0.8096	29.55	✓
5	9:20 AM	2.500	0.6	1.000	0.6000	0.600	80	1.4015	1.0000	1.4015	0.5000	0.7008	25.58	✓
6	9:21 AM	3.000	0.6	0.800	0.6000	0.480	80	1.0215	1.0000	1.0215	0.4000	0.4086	14.91	✓
7	9:22 AM	3.500	0.6	0.600	0.6000	0.360	80	0.3501	1.0000	0.3501	0.3000	0.1050	3.83	✓
8	9:23 AM	4.000	None	0.300	0.0000	0.000	0	0.0000	1.0000	0.3501	0.0750	0.0263	0.96	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:15 AM	0.500	0.6	0.700	0.6000	0.420	Large SNR Variation
3	9:18 AM	1.500	0.6	0.900	0.6000	0.540	Standard Error > QC,High Stn % Discharge
4	9:19 AM	2.000	0.6	1.100	0.6000	0.660	High Stn % Discharge
5	9:20 AM	2.500	0.6	1.000	0.6000	0.600	Standard Error > QC,High Stn % Discharge
6	9:21 AM	3.000	0.6	0.800	0.6000	0.480	Standard Error > QC,High Stn % Discharge

Figure 10 Stormwater Discharge Measurement Summary CC-1 Second Measurement

Station Number:
Station Name: LDB

Meas. No: 1
Date: 05/24/2022

Party: Scd ndh	Width: 43.8 ft	Processed by:
Boat/Motor:	Area: 140 ft²	Mean Velocity: 0.600 ft/s
Gage Height: 17.42 ft	G.H.Change: 0.000 ft	Discharge: 84.0 ft³/s

Area Method: Avg. Course	ADCP Depth: 0.270 ft	Index Vel.: 0.00 ft/s	Rating No.: 1
Nav. Method: Bottom Track	Shore Ens.:10	Adj.Mean Vel: 0.00 ft/s	Qm Rating: U
MagVar Method: None (0.00°)	Bottom Est: Power (0.1667)	Rated Area: 0.000 ft²	Diff.: 0.000%
Depth: Composite (BT)	Top Est: Power (0.1667)	Control1: Unspecified	
Discharge Method: None		Control2: Unspecified	
% Correction: 0.00		Control3: Unspecified	

Screening Thresholds:		ADCP:	
BT 3-Beam Solution: YES	Max. Vel.: 3.27 ft/s	Type/Freq.: RiverRay / 0 kHz	
WT 3-Beam Solution: YES	Max. Depth: 5.49 ft	Serial #: 645654	Firmware: 44.16
BT Error Vel.: 3.28 ft/s	Mean Depth: 3.21 ft	Bin Size: 50 cm	Blank: 50 cm
WT Error Vel.: 32.81 ft/s	% Meas.: 49.03	BT Mode: 0	BT Pings: 1
BT Up Vel.: 32.81 ft/s	Water Temp.: None	WT Mode: 1	WT Pings: 1
WT Up Vel.: 32.81 ft/s	ADCP Temp.: 61.4 °F	WV: 170	
Use Weighted Mean Depth: YES			

Performed Diag. Test: NO
Performed Moving Bed Test: NO
Performed Compass Calibration: NO Evaluation: NO
Meas. Location:

Project Name: LDB05242022_1.mmt
Software: 2.23.00.02

Tr.#		Edge Distance		#Ens.	Discharge						Width	Area	Time		Mean Vel.		% Bad	
		L	R		Top	Middle	Bottom	Left	Right	Total			Start	End	Boat	Water	Ens.	Bins
000	R	7	4	208	23.4	42.1	21.3	1.66	1.87	90.4	53	163	01:28	01:30	0.32	0.55	34	1
001	L	7	4	132	19.3	41.3	17.3	1.80	2.15	81.9	41	134	01:30	01:32	0.44	0.61	13	0
002	R	7	4	153	20.0	41.2	17.4	3.39	2.05	84.0	45	148	01:32	01:33	0.40	0.57	25	0
003	L	7	4	174	18.1	38.3	15.7	3.11	1.55	76.8	42	133	01:34	01:35	0.35	0.58	24	0
004	R	7	4	162	19.8	39.7	18.9	1.94	1.48	81.8	43	132	01:35	01:37	0.38	0.62	20	0
005	L	7	4	157	21.0	42.9	19.2	1.45	2.26	86.9	42	134	01:37	01:39	0.38	0.65	18	0
006	R	7	4	135	20.6	41.6	19.4	1.48	1.45	84.5	43	138	01:39	01:40	0.43	0.61	15	0
007	L	7	4	151	20.2	42.1	18.2	3.04	1.91	85.4	43	139	01:40	01:42	0.39	0.61	18	0
Mean		7	4	159	20.3	41.2	18.4	2.23	1.84	84.0	44	140	Total	00:14	0.38	0.60	21	0
SDev		0	0	24	1.55	1.48	1.68	0.804	0.313	4.01	3.8	10.7			0.04	0.03		
SD/M		0.0%	0.0%	15.1%	7.6%	3.6%	9.1%	36.0%	17.0%	4.8%	8.7%	7.6%			9.8%	5.3%		

Figure 11 Stormwater Discharge Measurement Summary LDB-1

Station Number:
Station Name: Udb

Meas. No: 1
Date: 05/24/2022

Party: Scd ndh	Width: 25.7 ft	Processed by:
Boat/Motor:	Area: 37.0 ft²	Mean Velocity: 2.39 ft/s
Gage Height: 18.90 ft	G.H.Change: 0.000 ft	Discharge: 87.1 ft³/s

Area Method: Avg. Course	ADCP Depth: 0.270 ft	Index Vel.: 0.00 ft/s	Rating No.: 1
Nav. Method: Bottom Track	Shore Ens.:10	Adj.Mean Vel: 0.00 ft/s	Qm Rating: U
MagVar Method: None (0.00°)	Bottom Est: Power (0.1667)	Rated Area: 0.000 ft²	Diff.: 0.000%
Depth: Composite (BT)	Top Est: Power (0.1667)	Control1: Unspecified	
Discharge Method: None		Control2: Unspecified	
% Correction: 0.00		Control3: Unspecified	

Screening Thresholds:		ADCP:	
BT 3-Beam Solution: YES	Max. Vel.: 6.44 ft/s	Type/Freq.: RiverRay / 0 kHz	
WT 3-Beam Solution: YES	Max. Depth: 1.88 ft	Serial #: 645654	Firmware: 44.16
BT Error Vel.: 3.28 ft/s	Mean Depth: 1.44 ft	Bin Size: 50 cm	Blank: 50 cm
WT Error Vel.: 32.81 ft/s	% Meas.: 16.53	BT Mode: 0	BT Pings: 1
BT Up Vel.: 32.81 ft/s	Water Temp.: None	WT Mode: 1	WT Pings: 1
WT Up Vel.: 32.81 ft/s	ADCP Temp.: 62.7 °F	WV: 170	
Use Weighted Mean Depth: YES			

Performed Diag. Test: NO
Performed Moving Bed Test: NO
Performed Compass Calibration: YES Evaluation: YES
Meas. Location:

Project Name: UDB05242022_1.mmt
Software: 2.23.00.02

Tr.#		Edge Distance		#Ens.	Discharge						Width	Area	Time		Mean Vel.		% Bad	
		L	R		Top	Middle	Bottom	Left	Right	Total			Start	End	Boat	Water	Ens.	Bins
001	L	4	5	184	47.7	14.9	14.5	5.83	9.75	92.7	31	44	00:23	00:24	0.38	2.10	71	0
002	R	2	5	148	55.0	17.2	17.9	3.00	8.40	102	27	40	00:25	00:26	0.43	2.53	71	0
004	R	2	5	115	34.3	10.8	12.2	4.03	8.37	69.6	26	40	00:28	00:29	0.36	1.74	57	0
005	L	2	3	138	61.6	19.2	18.5	4.31	6.00	110	27	41	00:29	00:30	0.35	2.70	50	0
006	R	2	3	151	48.1	15.0	14.3	3.85	4.63	85.9	27	40	00:31	00:33	0.28	2.16	71	0
008	R	3	3	172	33.8	10.6	10.8	6.64	5.44	67.3	20	28	00:36	00:37	0.25	2.42	78	0
009	L	3	5	171	41.6	13.0	12.6	6.71	9.15	83.1	21	27	00:37	00:39	0.26	3.07	52	0
Mean		3	4	154	46.0	14.4	14.4	4.91	7.39	87.1	26	37	Total	00:16	0.33	2.39	64	0
SDev		1	1	24	10.3	3.20	2.90	1.47	2.00	15.6	4.0	6.7			0.07	0.43		
SD/M		30.6%	25.8%	15.3%	22.4%	22.2%	20.1%	30.0%	27.1%	17.9%	15.7%	18.2%			20.8%	18.2%		

Figure 12 Stormwater Discharge Measurement Summary UDB-1

Station Number: Meas. No: 1

Station Name: URC Date: 05/24/2022

Party: scd ndh	Width: 19.4 ft	Processed by:
Boat/Motor:	Area: 52.5 ft²	Mean Velocity: 1.06 ft/s
Gage Height: 13.72 ft	G.H.Change: 0.000 ft	Discharge: 54.4 ft³/s

Area Method: Avg. Course	ADCP Depth: 0.270 ft	Index Vel.: 0.00 ft/s	Rating No.: 1
Nav. Method: Bottom Track	Shore Ens.:10	Adj.Mean Vel: 0.00 ft/s	Qm Rating: U
MagVar Method: None (0.00°)	Bottom Est: Power (0.1667)	Rated Area: 0.000 ft²	Diff.: 0.000%
Depth: Composite (BT)	Top Est: Power (0.1667)	Control1: Unspecified	
Discharge Method: None		Control2: Unspecified	
% Correction: 0.00		Control3: Unspecified	

Screening Thresholds:		ADCP:	
BT 3-Beam Solution: YES	Max. Vel.: 2.84 ft/s	Type/Freq.: RiverRay / 0 kHz	
WT 3-Beam Solution: YES	Max. Depth: 3.99 ft	Serial #: 645654	Firmware: 44.16
BT Error Vel.: 3.28 ft/s	Mean Depth: 2.76 ft	Bin Size: 50 cm	Blank: 50 cm
WT Error Vel.: 32.81 ft/s	% Meas.: 39.86	BT Mode: 0	BT Pings: 1
BT Up Vel.: 32.81 ft/s	Water Temp.: None	WT Mode: 1	WT Pings: 1
WT Up Vel.: 32.81 ft/s	ADCP Temp.: 63.4 °F	WV: 170	
Use Weighted Mean Depth: YES			

Performed Diag. Test: NO Project Name: urc 05242022 (redo)_1

Performed Moving Bed Test: NO Software: 2.23.00.02

Performed Compass Calibration: NO Evaluation: NO

Meas. Location:

Tr.#		Edge Distance		#Ens.	Discharge						Width	Area	Time		Mean Vel.		% Bad	
		L	R		Top	Middle	Bottom	Left	Right	Total			Start	End	Boat	Water	Ens.	Bins
001	R	2	2	72	17.7	23.2	13.0	2.47	1.80	58.2	14	42	02:50	02:50	0.46	1.39	53	0
002	L	2	2	77	16.4	21.2	12.3	1.62	2.08	53.6	23	60	02:50	02:51	0.69	0.90	55	0
003	R	2	2	75	14.8	20.2	10.4	2.75	2.33	50.5	14	43	02:51	02:52	0.34	1.18	52	0
005	R	2	2	94	14.9	20.4	11.6	2.75	1.94	51.7	16	47	02:53	02:54	0.45	1.09	60	0
006	L	2	2	98	20.0	24.7	15.5	1.73	2.37	64.2	25	69	02:54	02:55	0.52	0.94	59	0
008	L	2	2	89	14.3	20.3	9.64	1.13	2.68	48.1	24	55	02:56	02:57	0.56	0.87	56	0
Mean		2	2	83	16.3	21.7	12.1	2.08	2.20	54.4	19	53	Total	00:07	0.50	1.06	56	0
SDev		0	0	10	2.17	1.84	2.09	0.678	0.322	5.90	5.2	10.5			0.12	0.20		
SD/M		0.0%	0.0%	12.6%	13.3%	8.5%	17.3%	32.6%	14.6%	10.8%	26.8%	20.0%			23.5%	18.8%		

Figure 13 Stormwater Discharge Measurement Summary URC-2

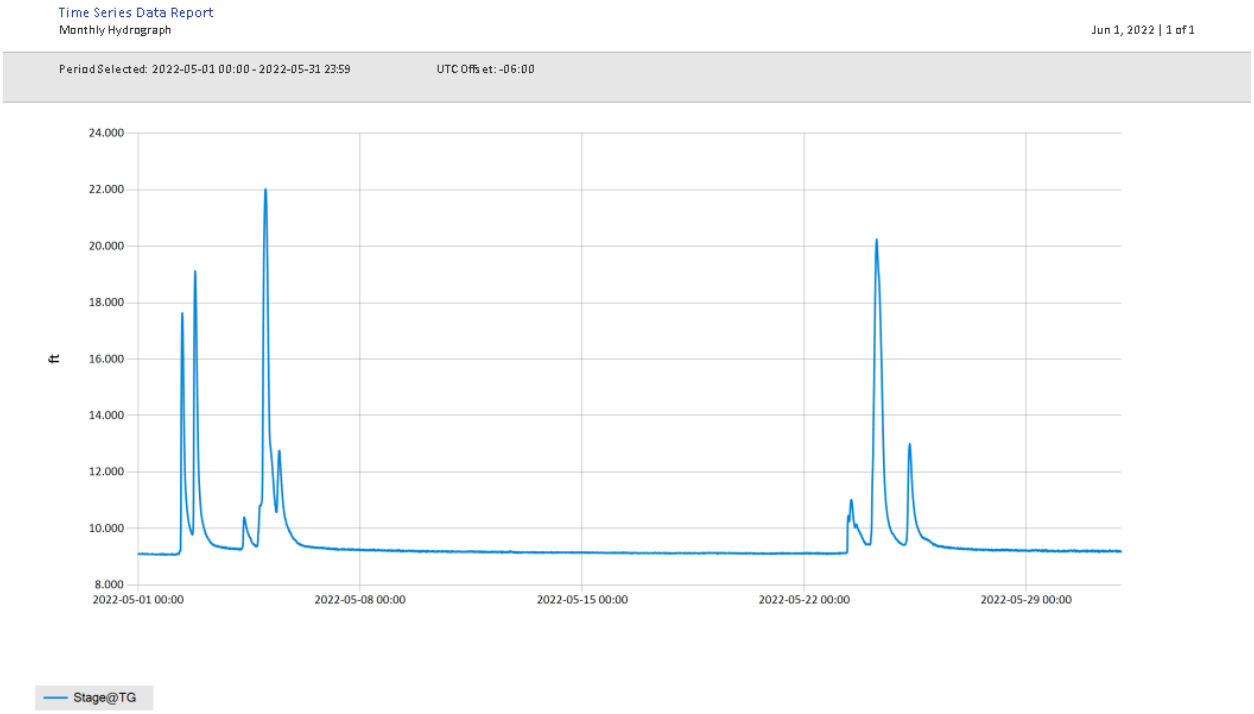


Figure 14 Monthly Hydrograph TG-1

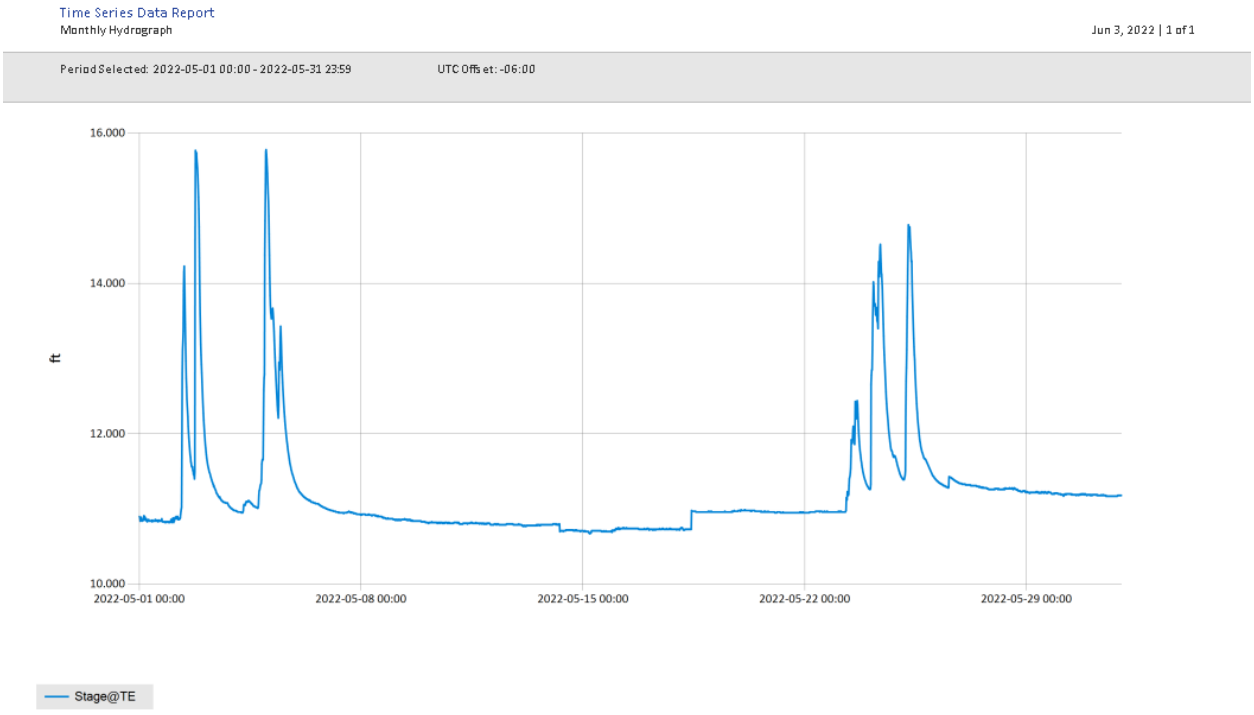


Figure 15 Monthly Hydrograph TE-1

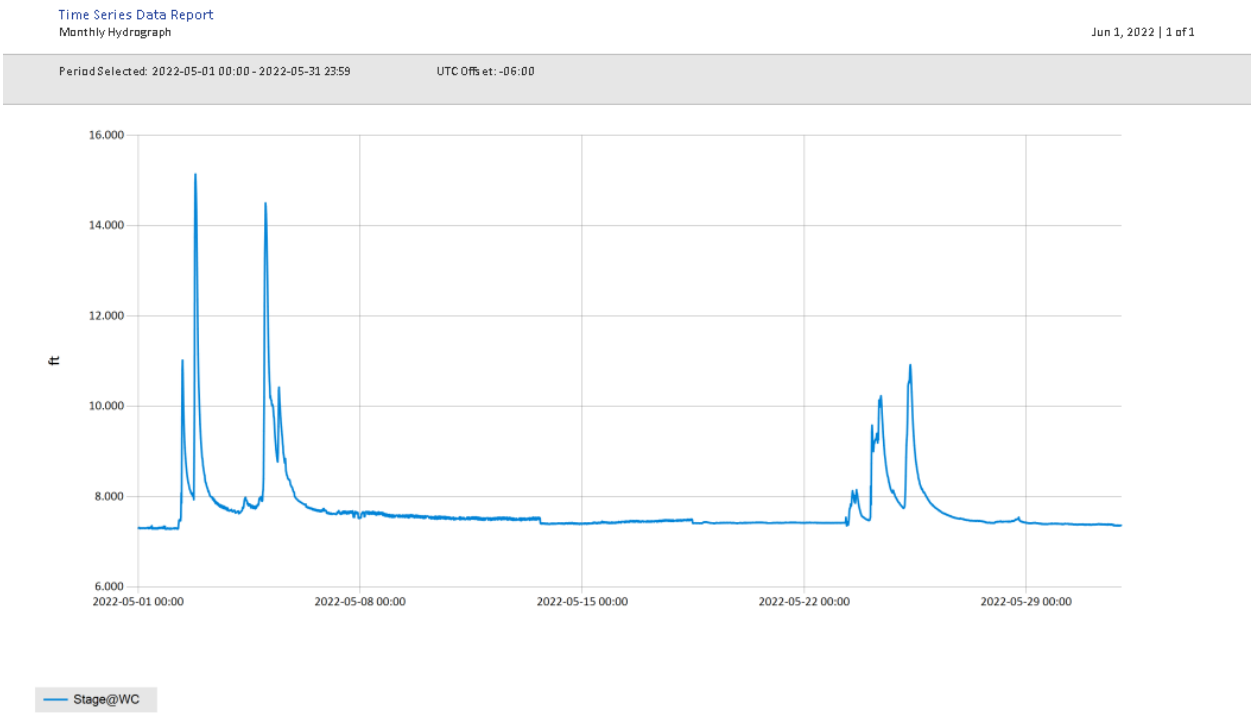


Figure 16 Monthly Hydrograph WC-1

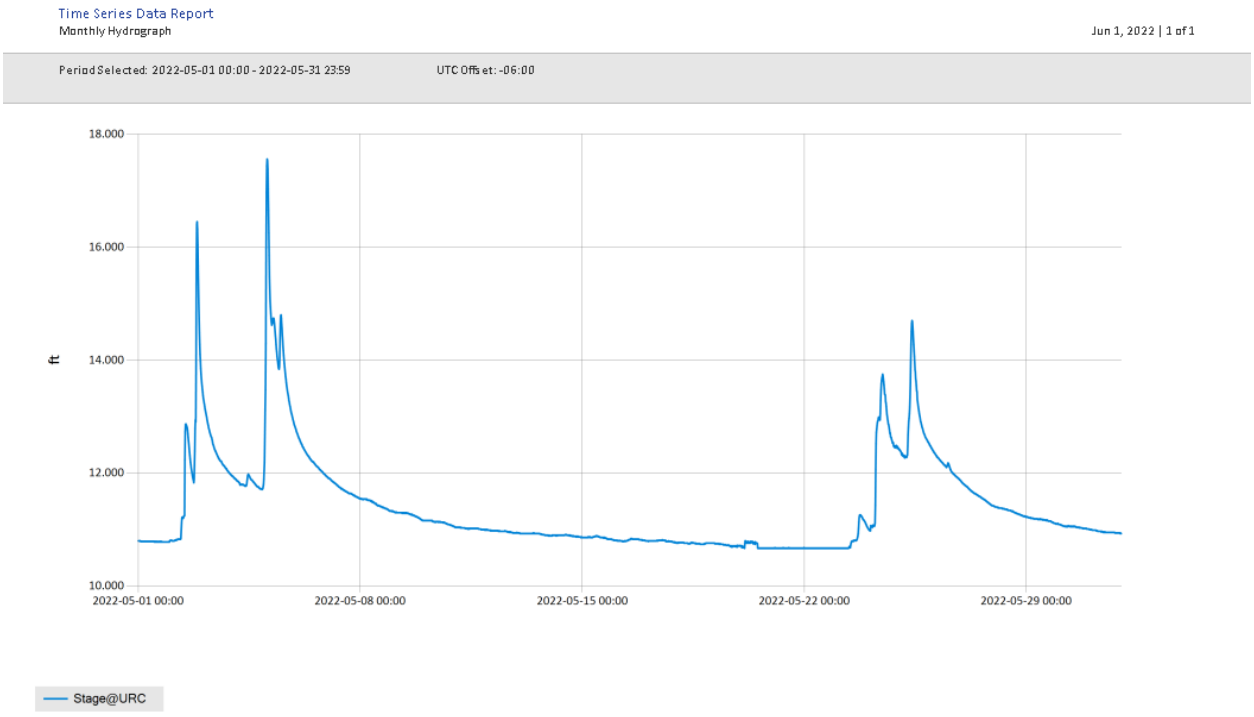


Figure 17 Monthly Hydrograph URC-2

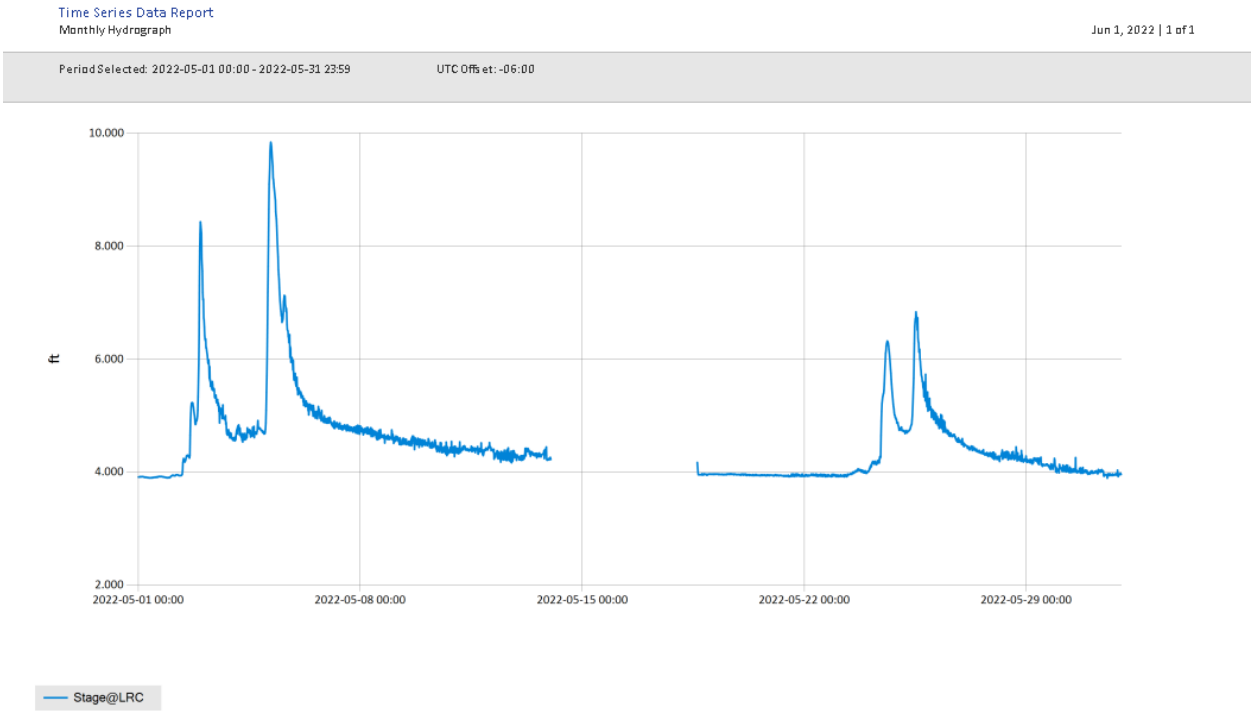


Figure 18 Monthly Hydrograph LRC-1

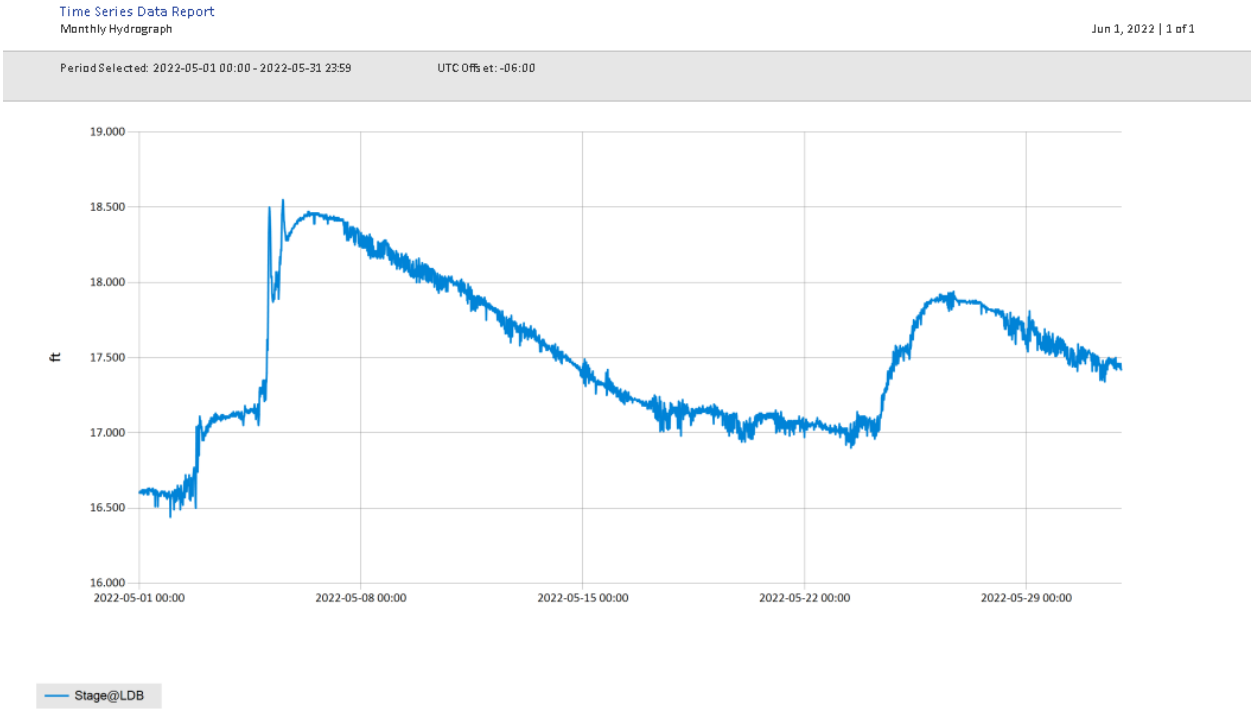


Figure 19 Monthly Hydrograph LDB-1

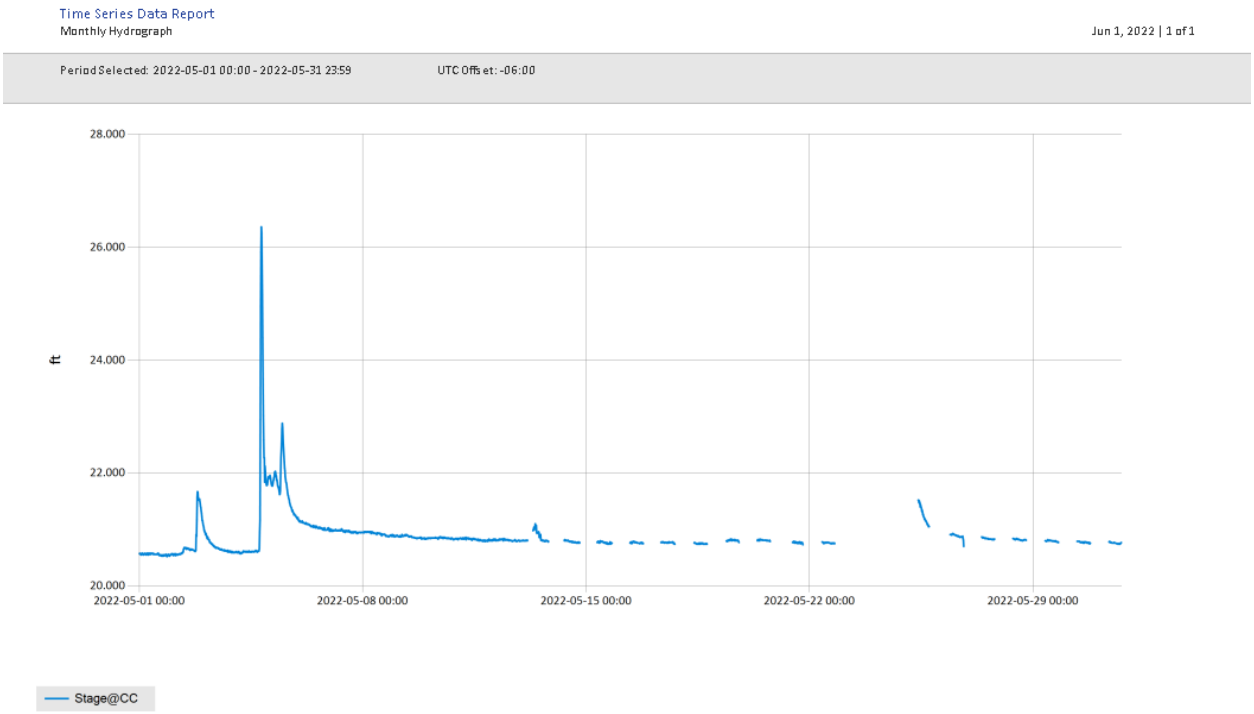


Figure 20 Monthly Hydrograph CC-1

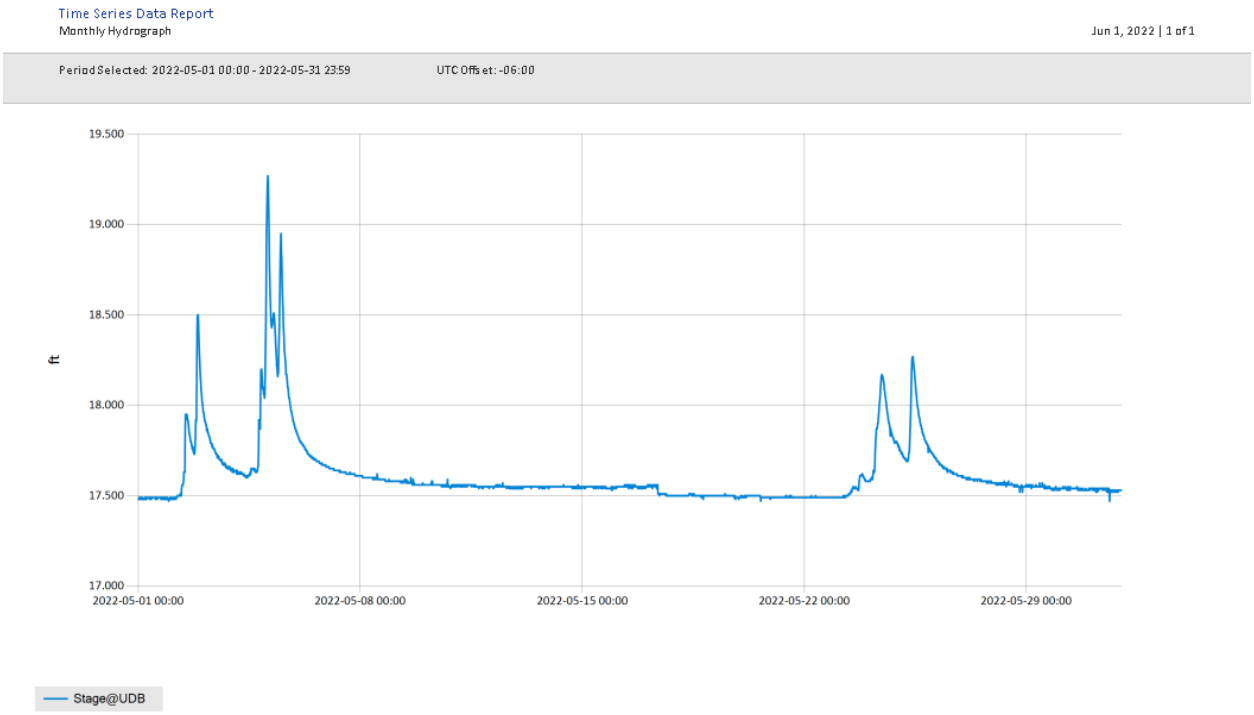


Figure 21 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — May 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) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m²)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	78	48	65.0	46.7	2	0	93	34	55	0.00	28.73	29.98	ESE	7.7	25.7	20.63	63.2	67.8	74	61
2	80	49	64.0	59.8	0	0	99	66	87	2.34	28.52	29.76	SE	12.1	47.2	9.36	63.6	66.5	71	64
3	60	46	52.4	44.6	12	0	86	61	75	0.00	28.75	29.99	NNW	10.6	27.8	17.87	60.4	61.9	67	58
4	69	52	59.9	58.1	5	0	98	76	94	1.41	28.65	29.89	E	7.7	39.0	6.86	61.2	62.1	65	59
5	64	50	59.3	55.4	8	0	98	60	88	0.61	28.61	29.85	NW	10.3	29.8	9.20	61.7	62.9	65	61
6	76	47	61.9	51.1	3	0	94	42	70	0.00	28.64	29.89	NW	5.6	14.1	27.56	62.0	64.6	74	56
7	82	56	71.0	62.4	0	4	92	63	75	0.00	28.51	29.75	SE	11.8	30.0	25.23	65.4	67.8	74	61
8	91	73	81.3	70.2	0	17	90	51	70	0.00	28.32	29.55	SSE	15.0	33.7	26.51	69.7	72.8	78	69
9	90	74	81.7	71.0	0	17	81	55	70	0.00	28.42	29.66	S	14.0	30.9	26.19	72.0	74.3	79	70
10	88	75	81.1	72.0	0	17	84	64	74	0.00	28.68	29.93	S	12.6	29.4	22.42	73.3	75.8	81	72
11	88	67	77.9	66.8	0	13	87	45	70	0.00	28.78	30.03	SSE	10.4	32.4	24.41	73.4	77.3	85	71
12	90	70	79.1	64.9	0	15	91	38	64	0.00	28.67	29.92	S	11.0	28.6	28.08	73.5	79.2	87	72
13	85	70	76.8	67.0	0	13	87	58	72	0.00	28.62	29.87	ESE	8.9	21.4	22.82	73.9	79.8	86	74
14	89	64	78.7	64.6	0	12	95	42	64	0.00	28.68	29.92	SSE	5.5	24.3	26.57	74.3	81.1	90	73
15	93	67	79.3	65.0	0	15	83	34	64	0.00	28.65	29.89	S	9.8	32.4	27.13	75.0	82.5	91	76
16	82*	60*	72.5*	60.6*	0*	6*	92*	49*	68*	0.00*	28.75*	29.99*	ESE*	7.0*	17.0*	NA	74.7*	81.5*	89*	73*
17	89	69	78.1	63.5	0	14	86	30	63	0.00	28.62	29.86	SSE	11.3	31.9	22.34	74.2	80.2	86	75
18	89	73	80.5	66.8	0	16	83	46	64	0.00	28.56	29.80	E	8.6	27.3	25.78	75.0	82.4	90	76
19	90	67	80.3	65.3	0	14	84	47	61	0.00	28.37	29.60	S	11.3	32.3	26.87	75.6	83.0	90	76
20	85	70	78.0	62.6	0	13	79	45	60	0.00	28.32	29.56	S	12.4	31.7	22.49	75.3	82.5	88	78
21	70	55	60.8	48.1	3	0	88	50	64	0.00	28.75	30.00	NNE	17.3	34.7	9.62	70.9	75.1	81	71
22	68	49	58.0	40.0	7	0	72	37	52	0.00	29.01	30.27	NNE	11.0	26.5	24.58	67.8	71.1	77	66
23	59	53	55.5	52.7	9	0	98	71	91	0.75	28.83	30.08	E	7.4	22.7	2.32	65.9	66.1	70	63
24	64	59	61.5	60.0	4	0	98	88	95	1.44	28.55	29.79	SE	8.0	26.2	3.30	64.9	64.3	66	63
25	59	53	55.3	52.5	9	0	97	82	91	0.84	28.54	29.78	W	10.0	23.7	6.40	63.8	62.9	64	61
26	76	52	63.6	49.8	1	0	91	35	64	0.00	28.67	29.91	NW	12.3	30.9	28.06	64.2	65.1	72	59
27	84	50	70.2	52.5	0	2	96	33	58	0.00	28.74	29.99	SSE	4.6	17.5	29.66	65.7	67.7	76	58
28	87	66	77.5	61.3	0	11	71	46	58	0.00	28.51	29.75	SSE	13.2	35.2	24.88	68.6	69.7	75	64
29	87	74	81.1	65.3	0	16	69	50	59	0.00	28.36	29.59	S	14.3	34.4	27.45	71.1	73.3	79	68
30	86	71	78.9	66.2	0	14	79	55	65	0.00	28.43	29.67	SSE	14.1	35.7	23.21	72.1	76.1	83	70
31	86	74	79.8	69.1	0	15	81	58	70	0.00	28.59	29.83	S	10.9	31.2	15.77	72.7	77.9	82	74
	80*	61*	71.0*	59.9*	<- Monthly Averages ->						28.61*	29.85*	S *	10.5*	47.2*	20.45*	69.2*	72.8*	79*	67*

Temperature - Highest: 93*
Lowest: 46*

Degree Days - Total HDD: 62*
Total CDD: 241*

Rainfall: Monthly Total: 7.39* in.
Greatest 24 Hr: 2.34* in.

Humidity - Highest: 99*
Lowest: 30*

Number of Days With:

Tmax ≥ 90:	5*	Rainfall ≥ 0.01 inch:	6*
Tmax ≤ 32:	0*	Rainfall ≥ 0.10 inch:	6*
Tmin ≤ 32:	0*	Avg Wind Speed ≥ 10 mph:	20*
Tmin ≤ 0:	0*	Max Wind Speed ≥ 30 mph:	16*

* Denotes incomplete record

Figure 22 May Mesonet Data

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

SY-2022 Monthly Report

Lake Thunderbird TMDL Monitoring Plan Implementation:

June 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
Sarah Dexter, Project Leader, sarah.dexter@owrb.ok.gov
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 JUNE WATER QUALITY SAMPLING

Sampling for June 2022 consisted of two sampling events. The first collection occurred during high flow conditions on the eighth, where water samples were collected via autosampler at two locations. Mesonet data shows 1.84 inches of precipitation on the eighth, 1.59 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 second collection occurred during base flow conditions on the thirteenth. Water samples were collected at nine locations and discharge was measured at six locations. Samples were not collected at JB-1 due to construction activity. Mesonet shows no precipitation on the thirteenth, 0.03 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 June was 5.39 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

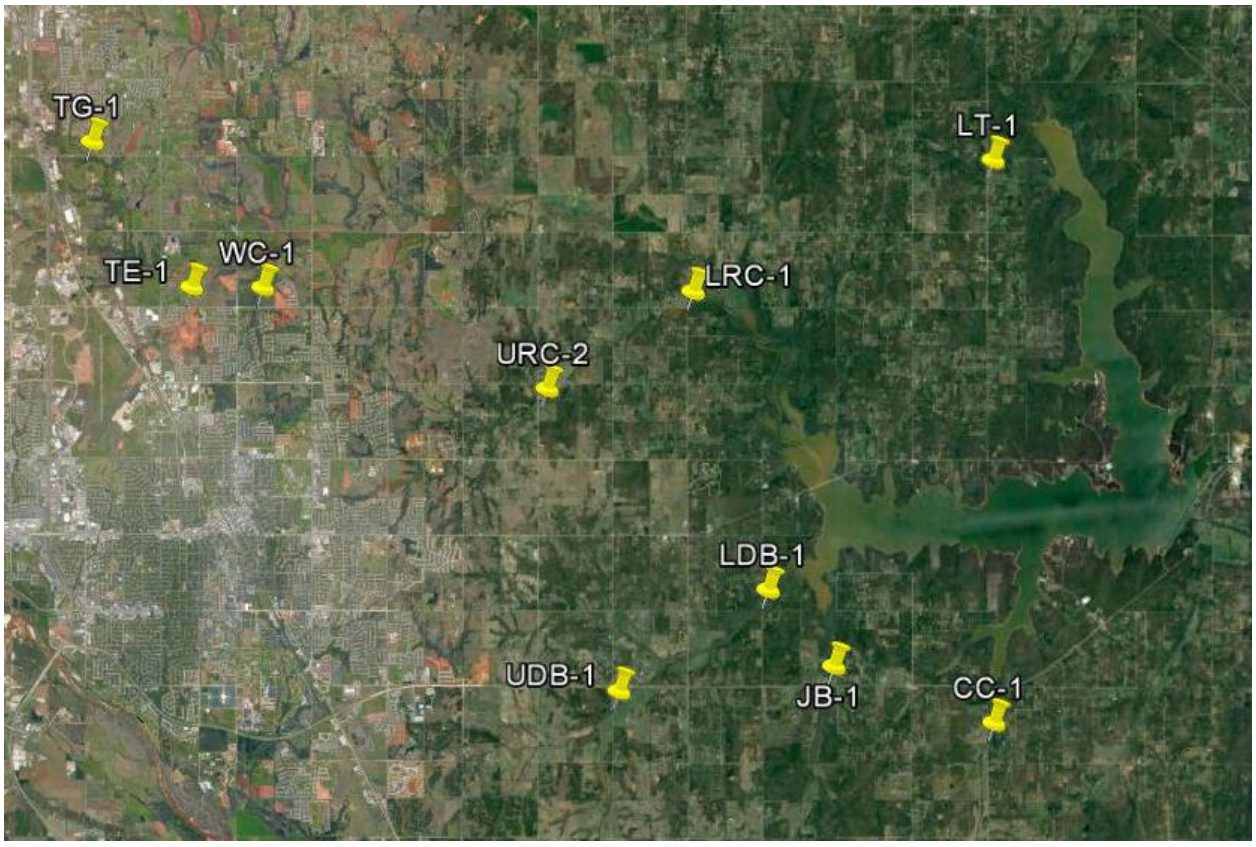


Figure 1 Monitoring Station Map

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	6/13/2022	10:44	NH	23.4	7.45	8.10	705	16	aquatic vegetation common
JB-1	Jim Blue Creek	6/13/2022	11:00	NH	N/A	N/A	N/A	N/A	N/A	construction ongoing, did not sample
LDB-1	Lower Dave Blue Creek	6/13/2022	11:31	NH	26.6	8.19	8.37	723	12	very low flow
LRC-1	Lower Rock Creek	6/13/2022	13:00	NH	26.9	7.42	8.31	659	12	normal looking conditions
LT-1	Lake Laterals	6/13/2022	13:52	NH	29.1	3.62	8.27	531	12	very little visual flow
TE-1	Little River Tributary	6/14/2022	8:20	NH	23.4	4.01	7.91	868	9	beaver dam present upstream
TG-1	Little River	6/14/2022	11:24	NH	25.9	7.15	8.22	930	4	low /normal conditions, small floating debris present
UDB-1	Upper Dave Blue Creek	6/13/2022	9:21	NH	23.6	7.07	8.27	857	9	orifice clear
URC-2	Upper Rock Creek	6/13/2022	14:30	NH	26.3	6.50	8.58	646	49	normal looking conditions
WC-1	Woodcrest Creek	6/14/2022	9:16	NH	23.7	5.73	8.04	979	10	low stage

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	0.27	0.53	0.046	10.0
JB-1	Jim Blue Creek	N/A	N/A	N/A	N/A
LDB-1	Lower Dave Blue Creek	0.20	0.57	0.058	10.0
LRC-1	Lower Rock Creek	0.20	0.44	0.055	7.0
LT-1	Lake Laterals	<0.05	0.71	0.085	12.0
TE-1	Little River Tributary	<0.05	0.52	0.058	6.0
TG-1	Little River	0.14	0.38	0.057	<5.0
UDB-1	Upper Dave Blue Creek	0.21	0.29	0.042	6.0
URC-2	Upper Rock Creek	0.17	0.69	0.076	48.0
WC-1	Woodcrest Creek	0.27	0.35	0.100	10.0

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	0.27	0.54	0.045	10.0
Duplicate RPD	0%	1.87%	2.20%	0%

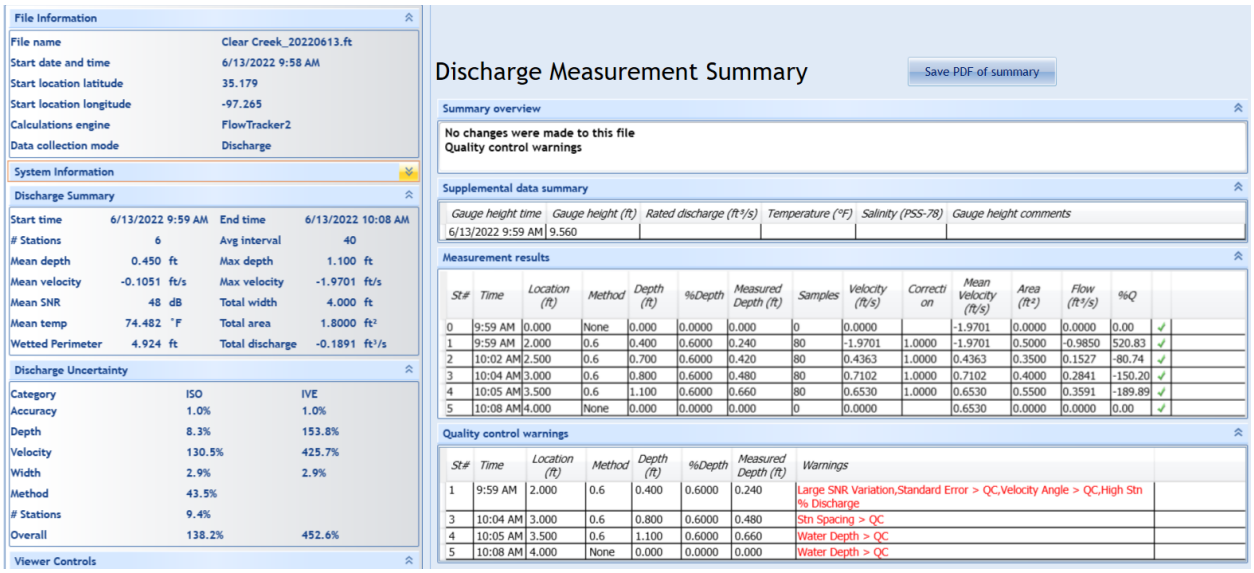
Table 3 QA/QC Data

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	-0.19	20.44
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	75.00	18.07
LRC-1	Lower Rock Creek	1.65	4.59
LT-1	Lake Laterals	0.60	4.57
TE-1	Little River Tributary	0.15	10.84
TG-1	Little River	0.50	8.74
UDB-1	Upper Dave Blue Creek	2.56	17.31
URC-2	Upper Rock Creek	1.18	11.70
WC-1	Woodcrest Creek	0.33	7.40

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.



File Information

File name	Clear Creek_20220613.ft
Start date and time	6/13/2022 9:58 AM
Start location latitude	35.179
Start location longitude	-97.265
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	6/13/2022 9:59 AM	End time	6/13/2022 10:08 AM
# Stations	6	Avg interval	40
Mean depth	0.450 ft	Max depth	1.100 ft
Mean velocity	-0.1051 ft/s	Max velocity	-1.9701 ft/s
Mean SNR	48 dB	Total width	4.000 ft
Mean temp	74.482 °F	Total area	1.8000 ft²
Wetted Perimeter	4.924 ft	Total discharge	-0.1891 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	8.3%	153.8%
Velocity	130.5%	425.7%
Width	2.9%	2.9%
Method	43.5%	
# Stations	9.4%	
Overall	138.2%	452.6%

Viewer Controls

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
6/13/2022 9:59 AM	9.560				

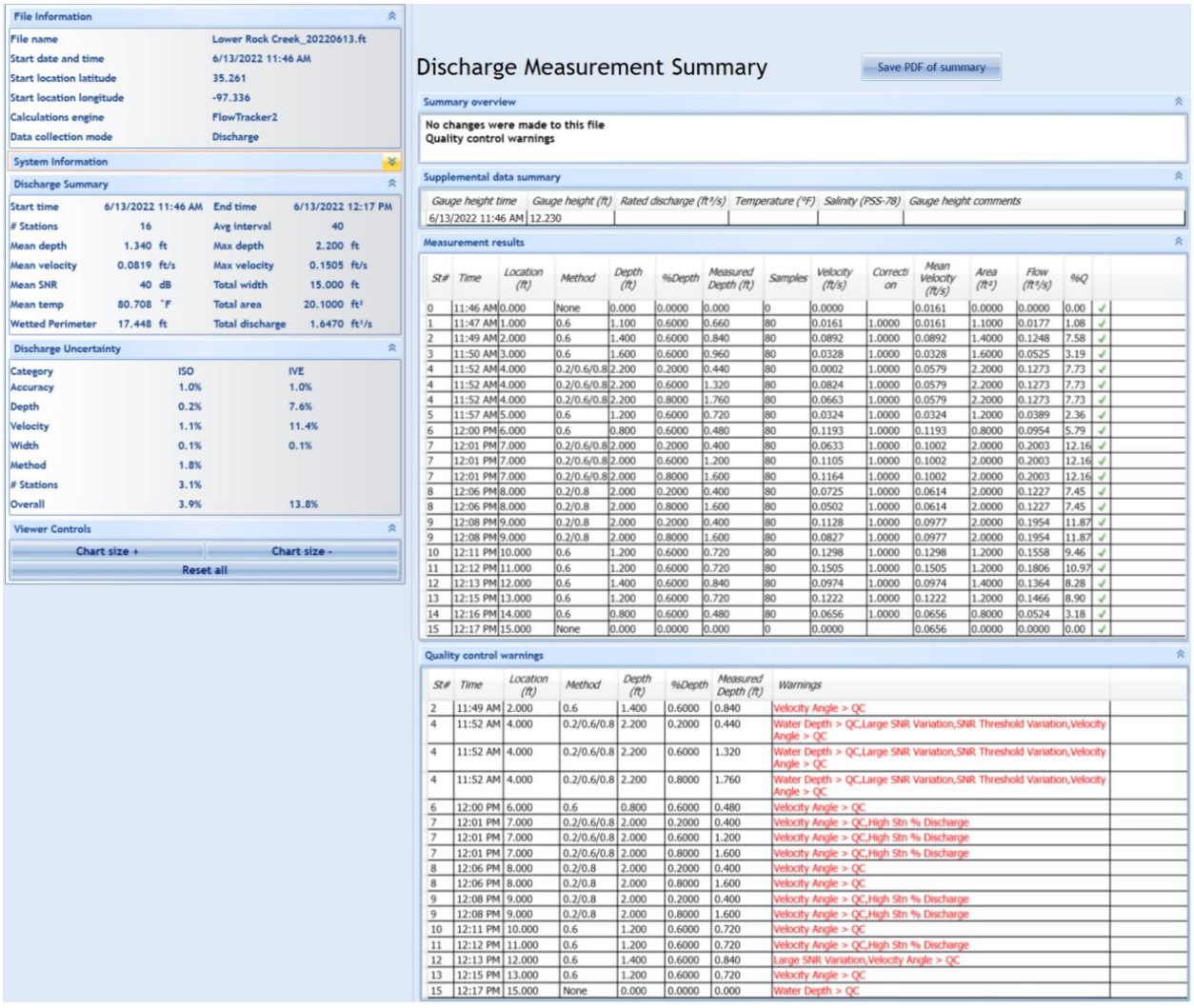
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	9:59 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-1.9701	0.0000	0.0000	0.00	✓
1	9:59 AM	2.000	0.6	0.400	0.6000	0.240	80	-1.9701	1.0000	-1.9701	0.5000	-0.9850	520.83	✓
2	10:02 AM	2.500	0.6	0.700	0.6000	0.420	80	0.4363	1.0000	0.4363	0.3500	0.1527	-80.74	✓
3	10:04 AM	3.000	0.6	0.800	0.6000	0.480	80	0.7102	1.0000	0.7102	0.4000	0.2841	-150.20	✓
4	10:05 AM	3.500	0.6	1.100	0.6000	0.660	80	0.6530	1.0000	0.6530	0.5500	0.3591	-189.89	✓
5	10:08 AM	4.000	None	0.000	0.0000	0.000	0	0.0000		0.6530	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	9:59 AM	2.000	0.6	0.400	0.6000	0.240	Large SNR Variation,Standard Error > QC,Velocity Angle > QC,High Stn % Discharge
3	10:04 AM	3.000	0.6	0.800	0.6000	0.480	Stn Spacing > QC
4	10:05 AM	3.500	0.6	1.100	0.6000	0.660	Water Depth > QC
5	10:08 AM	4.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 2 Discharge Measurement Summary CC-1



File Information

File name	Lower Rock Creek_20220613.ft
Start date and time	6/13/2022 11:46 AM
Start location latitude	35.261
Start location longitude	-97.336
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	6/13/2022 11:46 AM	End time	6/13/2022 12:17 PM
# Stations	16	Avg interval	40
Mean depth	1.340 ft	Max depth	2.200 ft
Mean velocity	0.0819 ft/s	Max velocity	0.1505 ft/s
Mean SNR	40 dB	Total width	15.000 ft
Mean temp	80.708 °F	Total area	20.1000 ft²
Wetted Perimeter	17.448 ft	Total discharge	1.6470 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	7.6%
Velocity	1.1%	11.4%
Width	0.1%	0.1%
Method	1.8%	
# Stations	3.1%	
Overall	3.9%	13.8%

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
6/13/2022 11:46 AM	12.230				

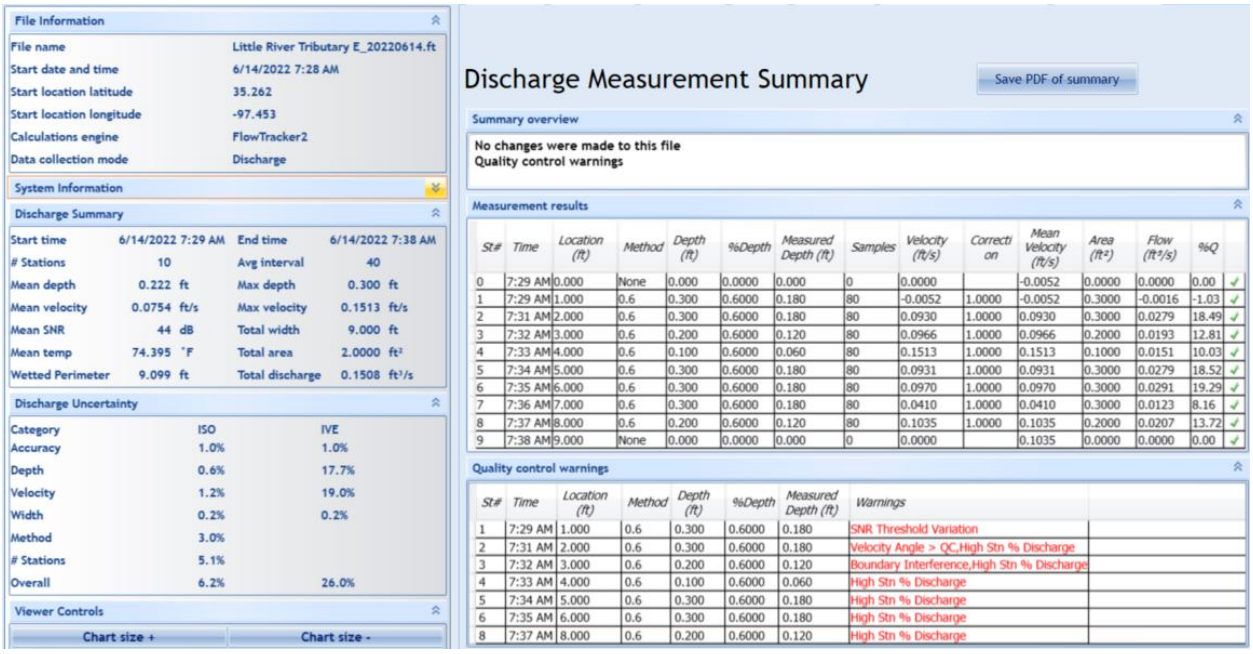
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:46 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0161	0.0000	0.0000	0.00	✓
1	11:47 AM	1.000	0.6	1.100	0.6000	0.660	80	0.0161	1.0000	0.0161	1.1000	0.0177	1.08	✓
2	11:49 AM	2.000	0.6	1.400	0.6000	0.840	80	0.0892	1.0000	0.0892	1.4000	0.1248	7.58	✓
3	11:50 AM	3.000	0.6	1.600	0.6000	0.960	80	0.0328	1.0000	0.0328	1.6000	0.0525	3.19	✓
4	11:52 AM	4.000	0.2/0.6/0.8	2.200	0.2000	0.440	80	0.0002	1.0000	0.0579	2.2000	0.1273	7.73	✓
4	11:52 AM	4.000	0.2/0.6/0.8	2.200	0.6000	1.320	80	0.0824	1.0000	0.0579	2.2000	0.1273	7.73	✓
4	11:52 AM	4.000	0.2/0.6/0.8	2.200	0.8000	1.760	80	0.0663	1.0000	0.0579	2.2000	0.1273	7.73	✓
5	11:57 AM	5.000	0.6	1.200	0.6000	0.720	80	0.0324	1.0000	0.0324	1.2000	0.0389	2.36	✓
6	12:00 PM	6.000	0.6	0.800	0.6000	0.480	80	0.1193	1.0000	0.1193	0.8000	0.0954	5.79	✓
7	12:01 PM	7.000	0.2/0.6/0.8	2.000	0.2000	0.400	80	0.0633	1.0000	0.1002	2.0000	0.2003	12.16	✓
7	12:01 PM	7.000	0.2/0.6/0.8	2.000	0.6000	1.200	80	0.1105	1.0000	0.1002	2.0000	0.2003	12.16	✓
7	12:01 PM	7.000	0.2/0.6/0.8	2.000	0.8000	1.600	80	0.1164	1.0000	0.1002	2.0000	0.2003	12.16	✓
8	12:06 PM	8.000	0.2/0.8	2.000	0.2000	0.400	80	0.0725	1.0000	0.0614	2.0000	0.1227	7.45	✓
8	12:06 PM	8.000	0.2/0.8	2.000	0.8000	1.600	80	0.0502	1.0000	0.0614	2.0000	0.1227	7.45	✓
9	12:08 PM	9.000	0.2/0.8	2.000	0.2000	0.400	80	0.1128	1.0000	0.0977	2.0000	0.1954	11.87	✓
9	12:08 PM	9.000	0.2/0.8	2.000	0.8000	1.600	80	0.0827	1.0000	0.0977	2.0000	0.1954	11.87	✓
10	12:11 PM	10.000	0.6	1.200	0.6000	0.720	80	0.1298	1.0000	0.1298	1.2000	0.1558	9.46	✓
11	12:12 PM	11.000	0.6	1.200	0.6000	0.720	80	0.1505	1.0000	0.1505	1.2000	0.1806	10.97	✓
12	12:13 PM	12.000	0.6	1.400	0.6000	0.840	80	0.0974	1.0000	0.0974	1.4000	0.1364	8.28	✓
13	12:15 PM	13.000	0.6	1.200	0.6000	0.720	80	0.1222	1.0000	0.1222	1.2000	0.1466	8.90	✓
14	12:16 PM	14.000	0.6	0.800	0.6000	0.480	80	0.0656	1.0000	0.0656	0.8000	0.0524	3.18	✓
15	12:17 PM	15.000	None	0.000	0.0000	0.000	0	0.0000		0.0656	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	11:49 AM	2.000	0.6	1.400	0.6000	0.840	Velocity Angle > QC
4	11:52 AM	4.000	0.2/0.6/0.8	2.200	0.2000	0.440	Water Depth > QC,Large SNR Variation,SNR Threshold Variation,Velocity Angle > QC
4	11:52 AM	4.000	0.2/0.6/0.8	2.200	0.6000	1.320	Water Depth > QC,Large SNR Variation,SNR Threshold Variation,Velocity Angle > QC
4	11:52 AM	4.000	0.2/0.6/0.8	2.200	0.8000	1.760	Water Depth > QC,Large SNR Variation,SNR Threshold Variation,Velocity Angle > QC
6	12:00 PM	6.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
7	12:01 PM	7.000	0.2/0.6/0.8	2.000	0.2000	0.400	Velocity Angle > QC,High Stn % Discharge
7	12:01 PM	7.000	0.2/0.6/0.8	2.000	0.6000	1.200	Velocity Angle > QC,High Stn % Discharge
7	12:01 PM	7.000	0.2/0.6/0.8	2.000	0.8000	1.600	Velocity Angle > QC,High Stn % Discharge
8	12:06 PM	8.000	0.2/0.8	2.000	0.2000	0.400	Velocity Angle > QC
8	12:06 PM	8.000	0.2/0.8	2.000	0.8000	1.600	Velocity Angle > QC
9	12:08 PM	9.000	0.2/0.8	2.000	0.2000	0.400	Velocity Angle > QC,High Stn % Discharge
9	12:08 PM	9.000	0.2/0.8	2.000	0.8000	1.600	Velocity Angle > QC,High Stn % Discharge
10	12:11 PM	10.000	0.6	1.200	0.6000	0.720	Velocity Angle > QC
11	12:12 PM	11.000	0.6	1.200	0.6000	0.720	Velocity Angle > QC,High Stn % Discharge
12	12:13 PM	12.000	0.6	1.400	0.6000	0.840	Large SNR Variation,Velocity Angle > QC
13	12:15 PM	13.000	0.6	1.200	0.6000	0.720	Velocity Angle > QC
15	12:17 PM	15.000	None	0.000	0.0000	0.000	Water Depth > QC

Figure 3 Discharge Measurement Summary LRC-1



File Information

File name	Little River Tributary E_20220614.ft
Start date and time	6/14/2022 7:28 AM
Start location latitude	35.262
Start location longitude	-97.453
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	6/14/2022 7:29 AM	End time	6/14/2022 7:38 AM
# Stations	10	Avg interval	40
Mean depth	0.222 ft	Max depth	0.300 ft
Mean velocity	0.0754 ft/s	Max velocity	0.1513 ft/s
Mean SNR	44 dB	Total width	9.000 ft
Mean temp	74.395 °F	Total area	2.0000 ft²
Wetted Perimeter	9.099 ft	Total discharge	0.1508 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.6%	17.7%
Velocity	1.2%	19.0%
Width	0.2%	0.2%
Method	3.0%	
# Stations	5.1%	
Overall	6.2%	26.0%

Viewer Controls

Chart size + | Chart size -

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file
Quality control warnings

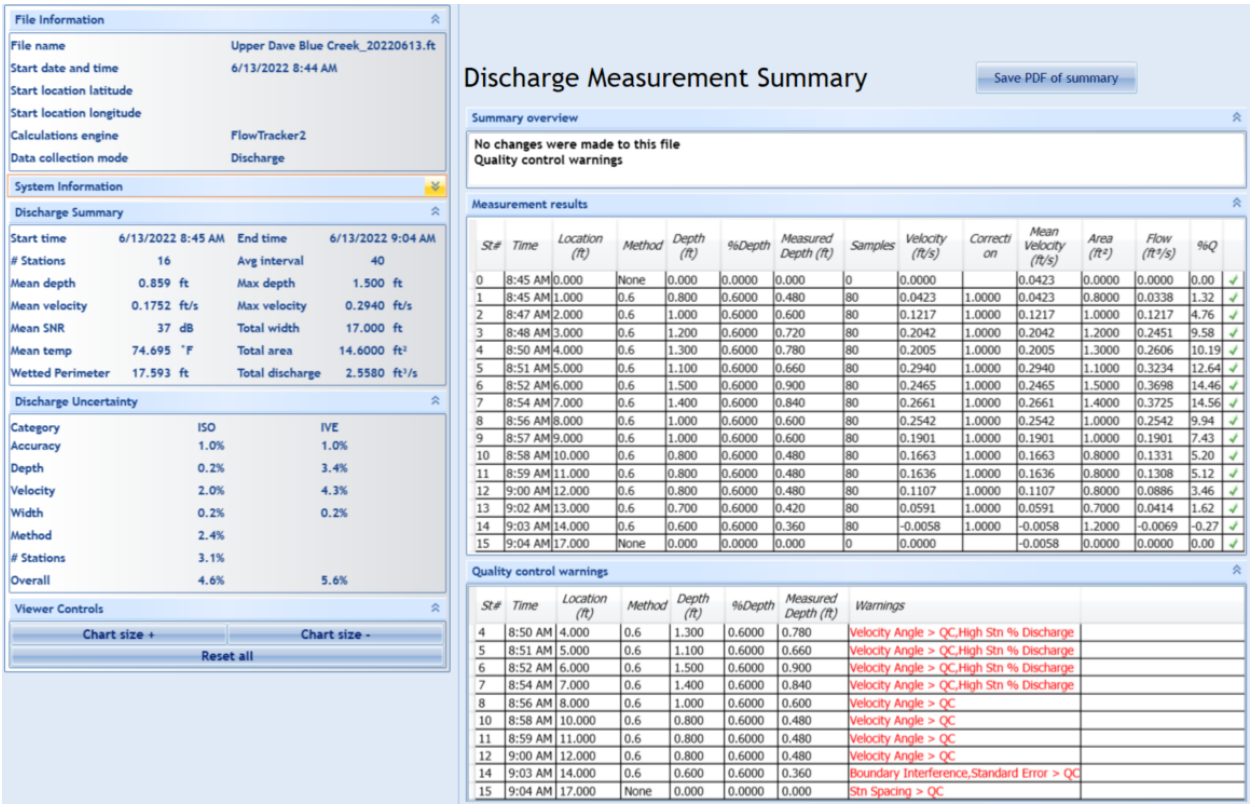
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	7:29 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		-0.0052	0.0000	0.0000	0.00	✓
1	7:29 AM	1.000	0.6	0.300	0.6000	0.180	80	-0.0052	1.0000	-0.0052	0.3000	-0.0016	-1.03	✓
2	7:31 AM	2.000	0.6	0.300	0.6000	0.180	80	0.0930	1.0000	0.0930	0.3000	0.0279	18.49	✓
3	7:32 AM	3.000	0.6	0.200	0.6000	0.120	80	0.0966	1.0000	0.0966	0.2000	0.0193	12.81	✓
4	7:33 AM	4.000	0.6	0.100	0.6000	0.060	80	0.1513	1.0000	0.1513	0.1000	0.0151	10.03	✓
5	7:34 AM	5.000	0.6	0.300	0.6000	0.180	80	0.0931	1.0000	0.0931	0.3000	0.0279	18.52	✓
6	7:35 AM	6.000	0.6	0.300	0.6000	0.180	80	0.0970	1.0000	0.0970	0.3000	0.0291	19.29	✓
7	7:36 AM	7.000	0.6	0.300	0.6000	0.180	80	0.0410	1.0000	0.0410	0.3000	0.0123	8.16	✓
8	7:37 AM	8.000	0.6	0.200	0.6000	0.120	80	0.1035	1.0000	0.1035	0.2000	0.0207	13.72	✓
9	7:38 AM	9.000	None	0.000	0.0000	0.000	0	0.0000		0.1035	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	7:29 AM	1.000	0.6	0.300	0.6000	0.180	SNR Threshold Variation
2	7:31 AM	2.000	0.6	0.300	0.6000	0.180	Velocity Angle > QC,High Stn % Discharge
3	7:32 AM	3.000	0.6	0.200	0.6000	0.120	Boundary Interference,High Stn % Discharge
4	7:33 AM	4.000	0.6	0.100	0.6000	0.060	High Stn % Discharge
5	7:34 AM	5.000	0.6	0.300	0.6000	0.180	High Stn % Discharge
6	7:35 AM	6.000	0.6	0.300	0.6000	0.180	High Stn % Discharge
8	7:37 AM	8.000	0.6	0.200	0.6000	0.120	High Stn % Discharge

Figure 4 Discharge Measurement Summary TE-1



File Information

File name	Upper Dave Blue Creek_20220613.ft
Start date and time	6/13/2022 8:44 AM
Start location latitude	
Start location longitude	
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	6/13/2022 8:45 AM	End time	6/13/2022 9:04 AM
# Stations	16	Avg interval	40
Mean depth	0.859 ft	Max depth	1.500 ft
Mean velocity	0.1752 ft/s	Max velocity	0.2940 ft/s
Mean SNR	37 dB	Total width	17.000 ft
Mean temp	74.695 °F	Total area	14.6000 ft²
Wetted Perimeter	17.593 ft	Total discharge	2.5580 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.2%	3.4%
Velocity	2.0%	4.3%
Width	0.2%	0.2%
Method	2.4%	
# Stations	3.1%	
Overall	4.6%	5.6%

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

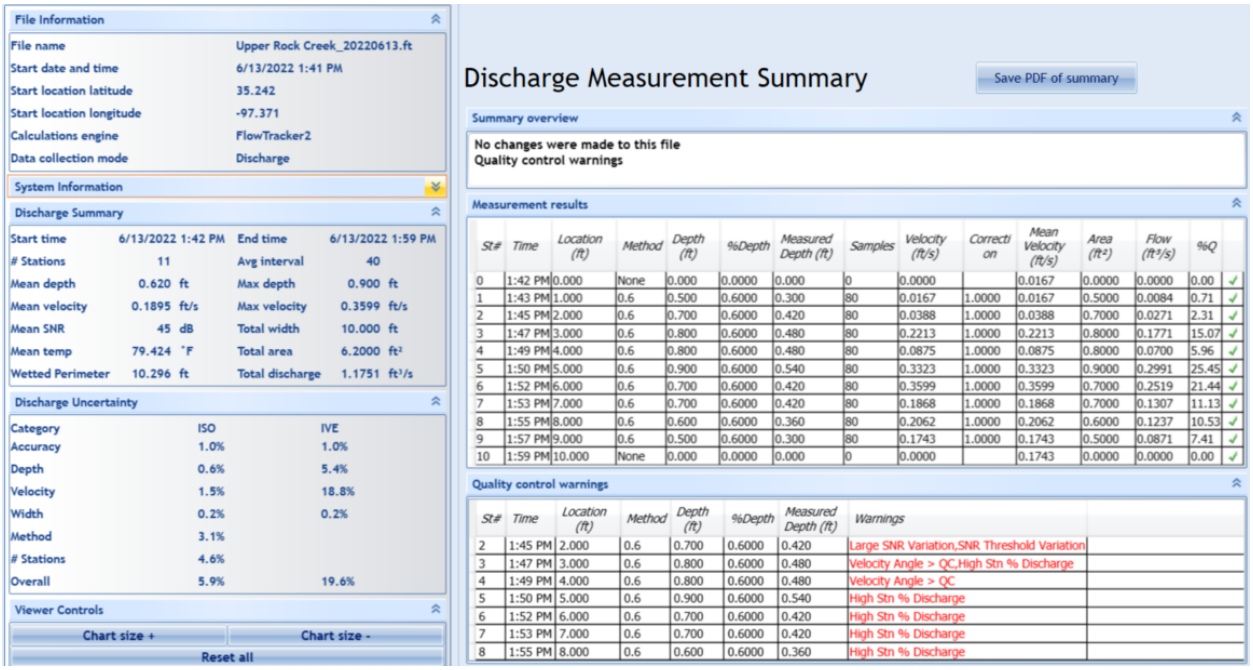
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	8:45 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0423	0.0000	0.0000	0.00	✓
1	8:45 AM	1.000	0.6	0.800	0.6000	0.480	80	0.0423	1.0000	0.0423	0.8000	0.0338	1.32	✓
2	8:47 AM	2.000	0.6	1.000	0.6000	0.600	80	0.1217	1.0000	0.1217	1.0000	0.1217	4.76	✓
3	8:48 AM	3.000	0.6	1.200	0.6000	0.720	80	0.2042	1.0000	0.2042	1.2000	0.2451	9.58	✓
4	8:50 AM	4.000	0.6	1.300	0.6000	0.780	80	0.2005	1.0000	0.2005	1.3000	0.2606	10.19	✓
5	8:51 AM	5.000	0.6	1.100	0.6000	0.660	80	0.2940	1.0000	0.2940	1.1000	0.3234	12.64	✓
6	8:52 AM	6.000	0.6	1.500	0.6000	0.900	80	0.2465	1.0000	0.2465	1.5000	0.3698	14.46	✓
7	8:54 AM	7.000	0.6	1.400	0.6000	0.840	80	0.2661	1.0000	0.2661	1.4000	0.3725	14.56	✓
8	8:56 AM	8.000	0.6	1.000	0.6000	0.600	80	0.2542	1.0000	0.2542	1.0000	0.2542	9.94	✓
9	8:57 AM	9.000	0.6	1.000	0.6000	0.600	80	0.1901	1.0000	0.1901	1.0000	0.1901	7.43	✓
10	8:58 AM	10.000	0.6	0.800	0.6000	0.480	80	0.1663	1.0000	0.1663	0.8000	0.1331	5.20	✓
11	8:59 AM	11.000	0.6	0.800	0.6000	0.480	80	0.1636	1.0000	0.1636	0.8000	0.1308	5.12	✓
12	9:00 AM	12.000	0.6	0.800	0.6000	0.480	80	0.1107	1.0000	0.1107	0.8000	0.0886	3.46	✓
13	9:02 AM	13.000	0.6	0.700	0.6000	0.420	80	0.0591	1.0000	0.0591	0.7000	0.0414	1.62	✓
14	9:03 AM	14.000	0.6	0.600	0.6000	0.360	80	-0.0058	1.0000	-0.0058	1.2000	-0.0069	-0.27	✓
15	9:04 AM	17.000	None	0.000	0.0000	0.000	0	0.0000		-0.0058	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
4	8:50 AM	4.000	0.6	1.300	0.6000	0.780	Velocity Angle > QC,High Stn % Discharge
5	8:51 AM	5.000	0.6	1.100	0.6000	0.660	Velocity Angle > QC,High Stn % Discharge
6	8:52 AM	6.000	0.6	1.500	0.6000	0.900	Velocity Angle > QC,High Stn % Discharge
7	8:54 AM	7.000	0.6	1.400	0.6000	0.840	Velocity Angle > QC,High Stn % Discharge
8	8:56 AM	8.000	0.6	1.000	0.6000	0.600	Velocity Angle > QC
10	8:58 AM	10.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
11	8:59 AM	11.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
12	9:00 AM	12.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
14	9:03 AM	14.000	0.6	0.600	0.6000	0.360	Boundary Interference,Standard Error > QC
15	9:04 AM	17.000	None	0.000	0.0000	0.000	Stn Spacing > QC

Figure 5 Discharge Measurement Summary UDB-1



File Information

File name	Upper Rock Creek_20220613.ft
Start date and time	6/13/2022 1:41 PM
Start location latitude	35.242
Start location longitude	-97.371
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	6/13/2022 1:42 PM	End time	6/13/2022 1:59 PM
# Stations	11	Avg interval	40
Mean depth	0.620 ft	Max depth	0.900 ft
Mean velocity	0.1895 ft/s	Max velocity	0.3599 ft/s
Mean SNR	45 dB	Total width	10.000 ft
Mean temp	79.424 °F	Total area	6.2000 ft²
Wetted Perimeter	10.296 ft	Total discharge	1.1751 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.6%	5.4%
Velocity	1.5%	18.8%
Width	0.2%	0.2%
Method	3.1%	
# Stations	4.6%	
Overall	5.9%	19.6%

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

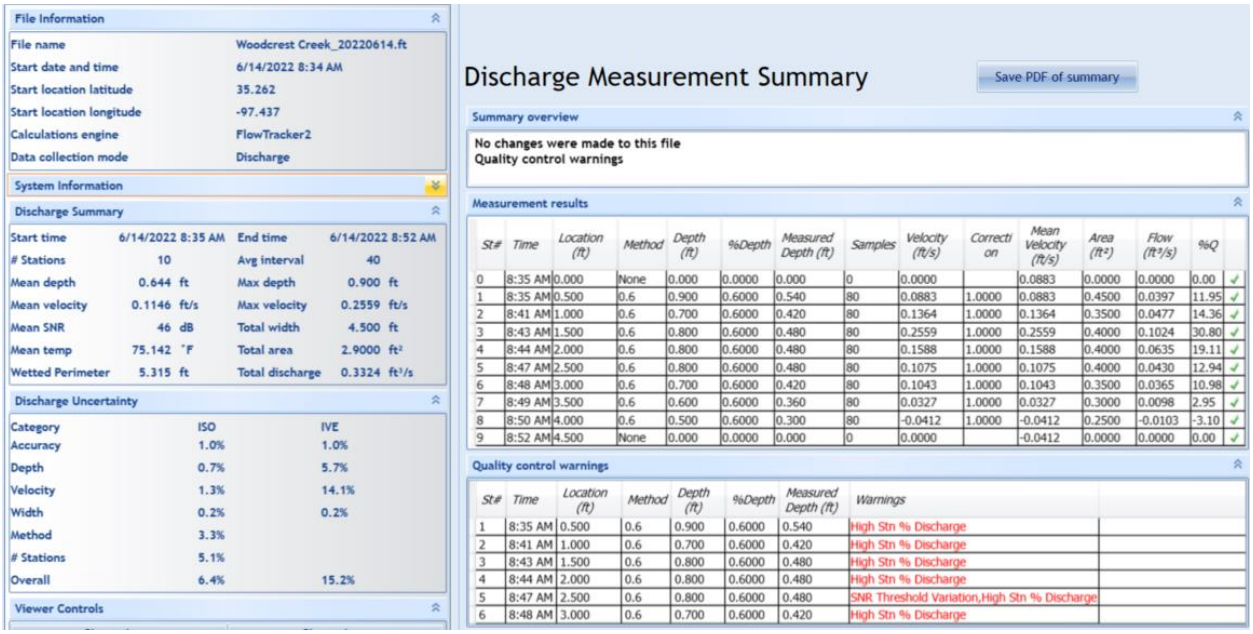
Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	1:42 PM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0167	0.0000	0.0000	0.00	✓
1	1:43 PM	1.000	0.6	0.500	0.6000	0.300	80	0.0167	1.0000	0.0167	0.5000	0.0084	0.71	✓
2	1:45 PM	2.000	0.6	0.700	0.6000	0.420	80	0.0388	1.0000	0.0388	0.7000	0.0271	2.31	✓
3	1:47 PM	3.000	0.6	0.800	0.6000	0.480	80	0.2213	1.0000	0.2213	0.8000	0.1771	15.07	✓
4	1:49 PM	4.000	0.6	0.800	0.6000	0.480	80	0.0875	1.0000	0.0875	0.8000	0.0700	5.96	✓
5	1:50 PM	5.000	0.6	0.900	0.6000	0.540	80	0.3323	1.0000	0.3323	0.9000	0.2991	25.45	✓
6	1:52 PM	6.000	0.6	0.700	0.6000	0.420	80	0.3599	1.0000	0.3599	0.7000	0.2519	21.44	✓
7	1:53 PM	7.000	0.6	0.700	0.6000	0.420	80	0.1868	1.0000	0.1868	0.7000	0.1307	11.13	✓
8	1:55 PM	8.000	0.6	0.600	0.6000	0.360	80	0.2062	1.0000	0.2062	0.6000	0.1237	10.53	✓
9	1:57 PM	9.000	0.6	0.500	0.6000	0.300	80	0.1743	1.0000	0.1743	0.5000	0.0871	7.41	✓
10	1:59 PM	10.000	None	0.000	0.0000	0.000	0	0.0000		0.1743	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	1:45 PM	2.000	0.6	0.700	0.6000	0.420	Large SNR Variation,SNR Threshold Variation
3	1:47 PM	3.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC,High Stn % Discharge
4	1:49 PM	4.000	0.6	0.800	0.6000	0.480	Velocity Angle > QC
5	1:50 PM	5.000	0.6	0.900	0.6000	0.540	High Stn % Discharge
6	1:52 PM	6.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
7	1:53 PM	7.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
8	1:55 PM	8.000	0.6	0.600	0.6000	0.360	High Stn % Discharge

Figure 6 Discharge Measurement Summary URC-2



File Information

File name	Woodcrest Creek_20220614.ft
Start date and time	6/14/2022 8:34 AM
Start location latitude	35.262
Start location longitude	-97.437
Calculations engine	FlowTracker2
Data collection mode	Discharge

System Information

Discharge Summary

Start time	6/14/2022 8:35 AM	End time	6/14/2022 8:52 AM
# Stations	10	Avg interval	40
Mean depth	0.644 ft	Max depth	0.900 ft
Mean velocity	0.1146 ft/s	Max velocity	0.2559 ft/s
Mean SNR	46 dB	Total width	4.500 ft
Mean temp	75.142 °F	Total area	2.9000 ft²
Wetted Perimeter	5.315 ft	Total discharge	0.3324 ft³/s

Discharge Uncertainty

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.7%	5.7%
Velocity	1.3%	14.1%
Width	0.2%	0.2%
Method	3.3%	
# Stations	5.1%	
Overall	6.4%	15.2%

Viewer Controls

Discharge Measurement Summary

Save PDF of summary

Summary overview

No changes were made to this file
Quality control warnings

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	8:35 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0883	0.0000	0.0000	0.00	✓
1	8:35 AM	0.500	0.6	0.900	0.6000	0.540	80	0.0883	1.0000	0.0883	0.4500	0.0397	11.95	✓
2	8:41 AM	1.000	0.6	0.700	0.6000	0.420	80	0.1364	1.0000	0.1364	0.3500	0.0477	14.36	✓
3	8:43 AM	1.500	0.6	0.800	0.6000	0.480	80	0.2559	1.0000	0.2559	0.4000	0.1024	30.80	✓
4	8:44 AM	2.000	0.6	0.800	0.6000	0.480	80	0.1588	1.0000	0.1588	0.4000	0.0635	19.11	✓
5	8:47 AM	2.500	0.6	0.800	0.6000	0.480	80	0.1075	1.0000	0.1075	0.4000	0.0430	12.94	✓
6	8:48 AM	3.000	0.6	0.700	0.6000	0.420	80	0.1043	1.0000	0.1043	0.3500	0.0365	10.98	✓
7	8:49 AM	3.500	0.6	0.600	0.6000	0.360	80	0.0327	1.0000	0.0327	0.3000	0.0098	2.95	✓
8	8:50 AM	4.000	0.6	0.500	0.6000	0.300	80	-0.0412	1.0000	-0.0412	0.2500	-0.0103	-3.10	✓
9	8:52 AM	4.500	None	0.000	0.0000	0.000	0	0.0000		-0.0412	0.0000	0.0000	0.00	✓

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
1	8:35 AM	0.500	0.6	0.900	0.6000	0.540	High Stn % Discharge
2	8:41 AM	1.000	0.6	0.700	0.6000	0.420	High Stn % Discharge
3	8:43 AM	1.500	0.6	0.800	0.6000	0.480	High Stn % Discharge
4	8:44 AM	2.000	0.6	0.800	0.6000	0.480	High Stn % Discharge
5	8:47 AM	2.500	0.6	0.800	0.6000	0.480	SNR Threshold Variation,High Stn % Discharge
6	8:48 AM	3.000	0.6	0.700	0.6000	0.420	High Stn % Discharge

Figure 7 Discharge Measurement Summary WC-1

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
URC-2	Upper Rock Creek	6/7/2022	8:00	SD	*	*	6.87	263	1000	Collected T1 @ 8:00 at 16.52, peak @ 8:45 at 17.17; second runoff event on 6/8 should have collected T4 @ 11:00 at 21.06, which was peak, but only one bottle filled
LDB-1	Lower Dave Blue Creek	6/8/2022	11:15	SD	*	*	7.61	167	1000	Collected T4 @ 11:15 at 21.39, peak @ 11:30 at 21.43

Table 5 Stormwater Field Data Form Where the Asterisk Denotes a Sample from an Autosampler

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/L)	Kjeldahl Nitrogen (mg/L)	Phosphorus (mg/L)	Total Suspended Solids (mg/L)
URC-2	Upper Rock Creek	<0.05	3.42	0.915	1440
LDB-1	Lower Dave Blue Creek	0.21	6.51	2.22	5700

Table 6 Stormwater Laboratory Analysis Summary

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
URC-2	Upper Rock Creek	130.00	16.52
LDB-1	Lower Dave Blue Creek	1550.00	21.39

Table 7 Stormwater Station Discharge Summary

All rated stream discharges are provisional and subject to change.

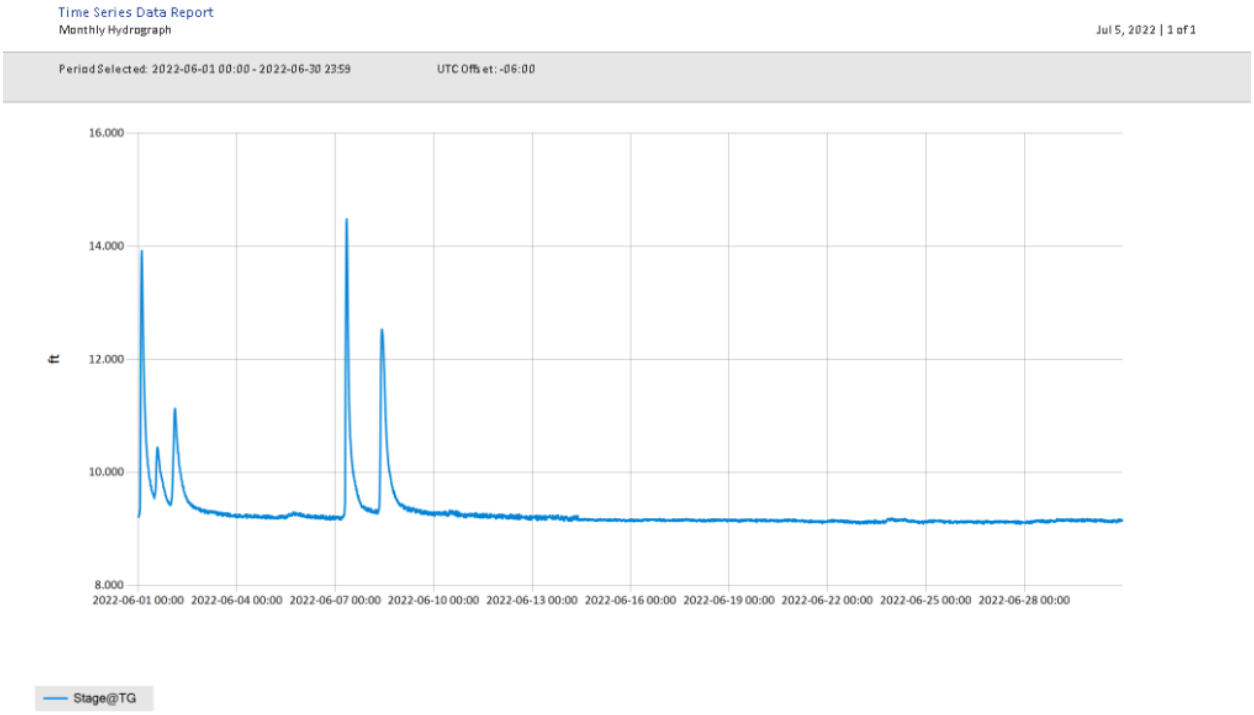


Figure 8 Monthly Hydrograph TG-1

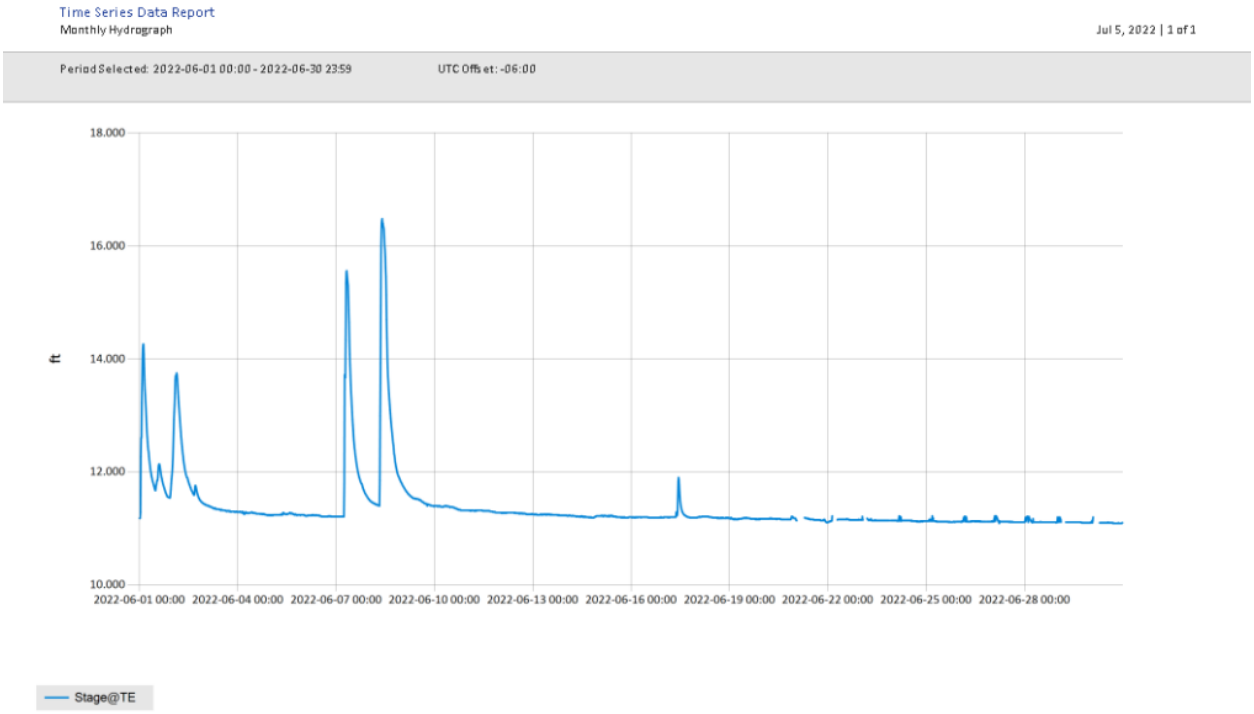


Figure 9 Monthly Hydrograph TE-1

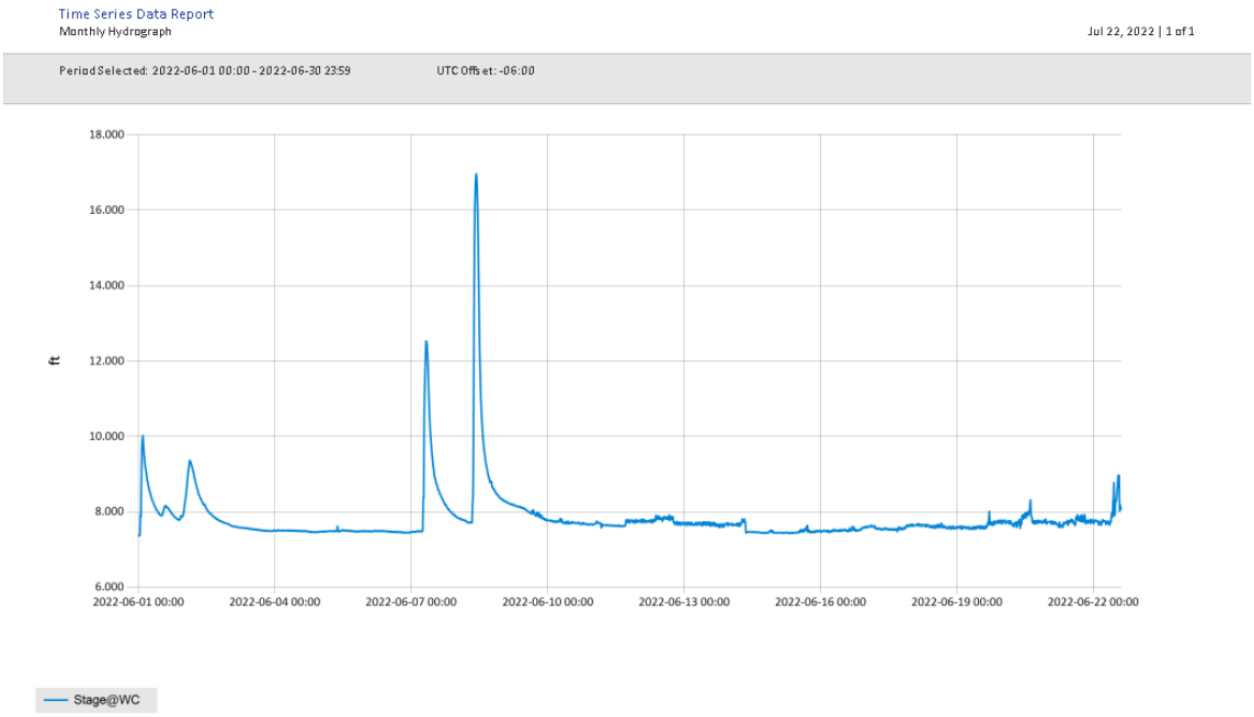


Figure 10 Monthly Hydrograph WC-1

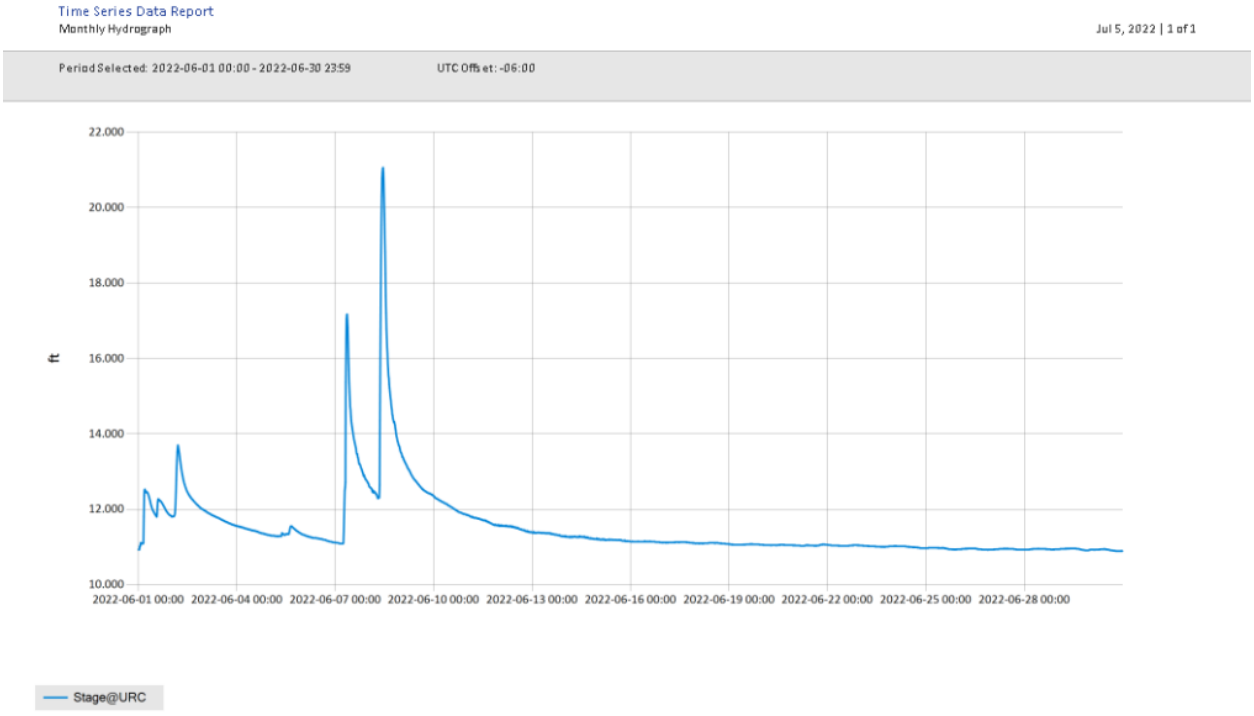


Figure 11 Monthly Hydrograph URC-2

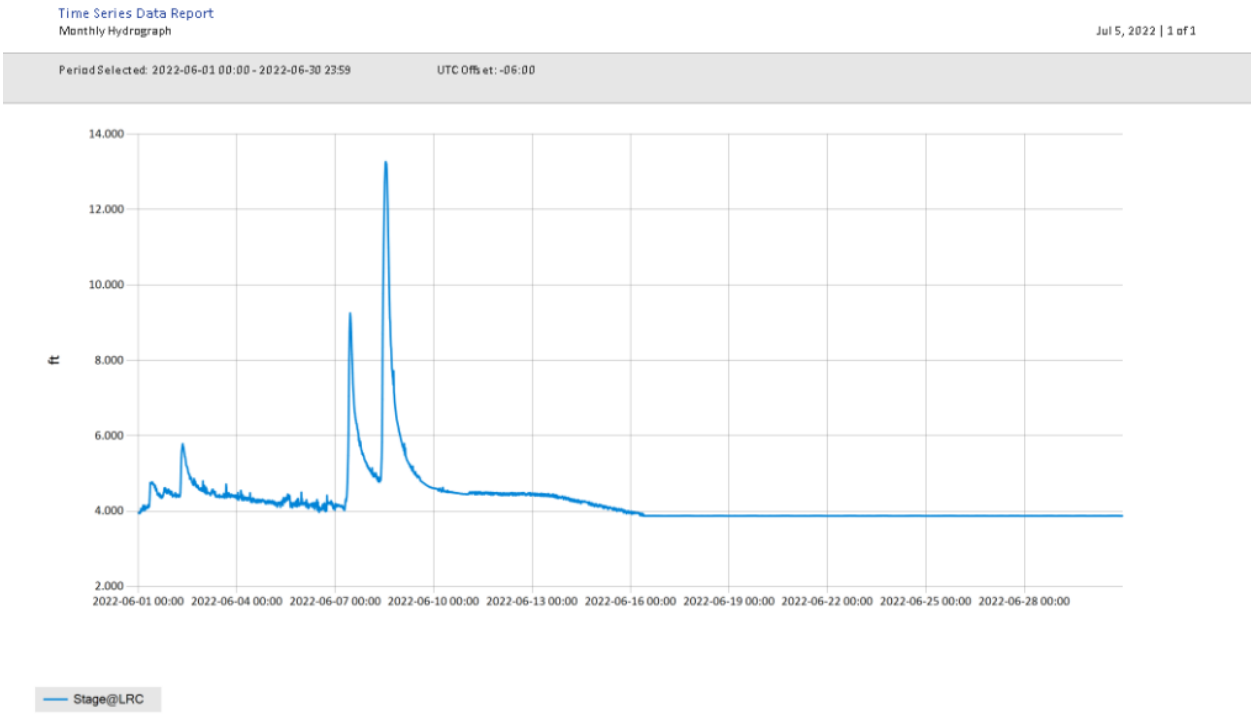


Figure 12 Monthly Hydrograph LRC-1

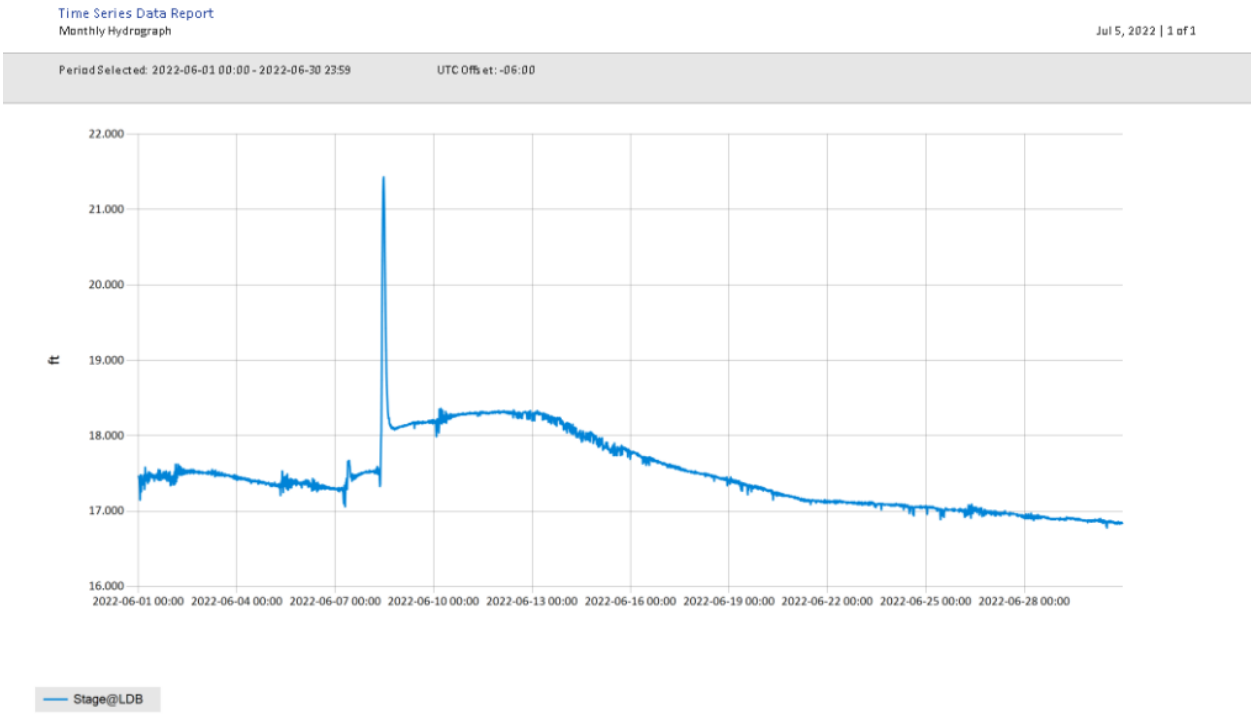


Figure 13 Monthly Hydrograph LDB-1

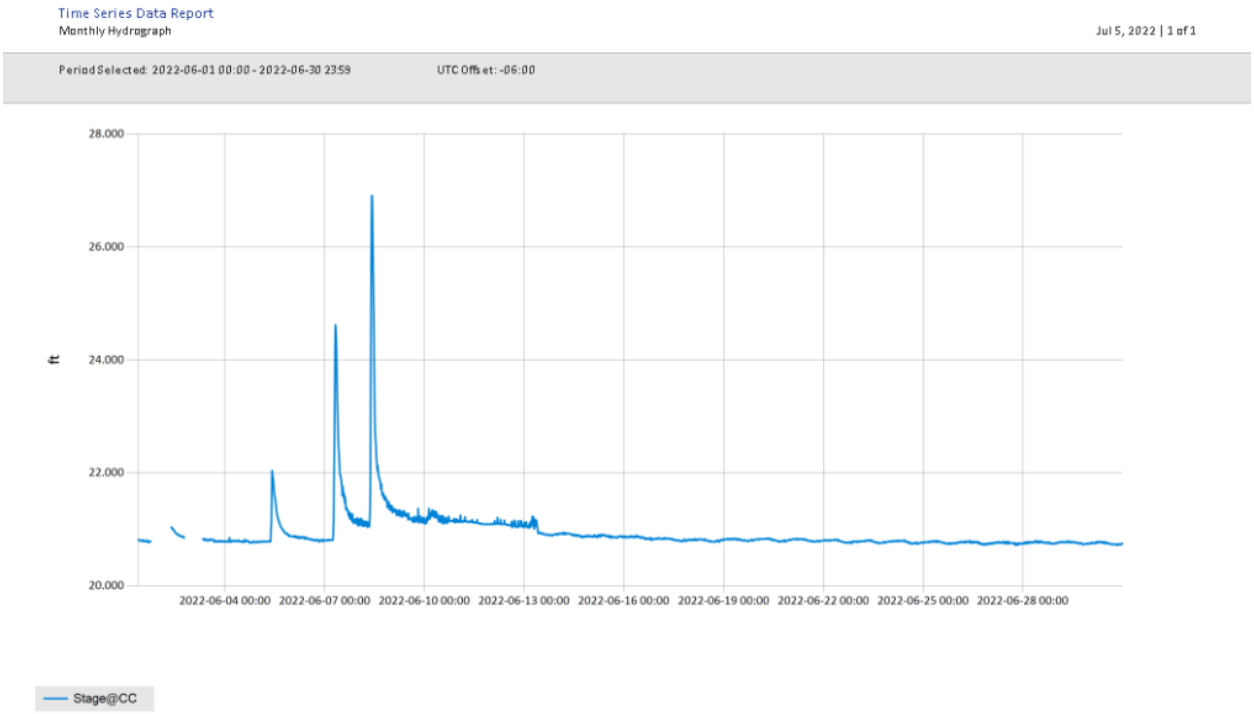


Figure 14 Monthly Hydrograph CC-1

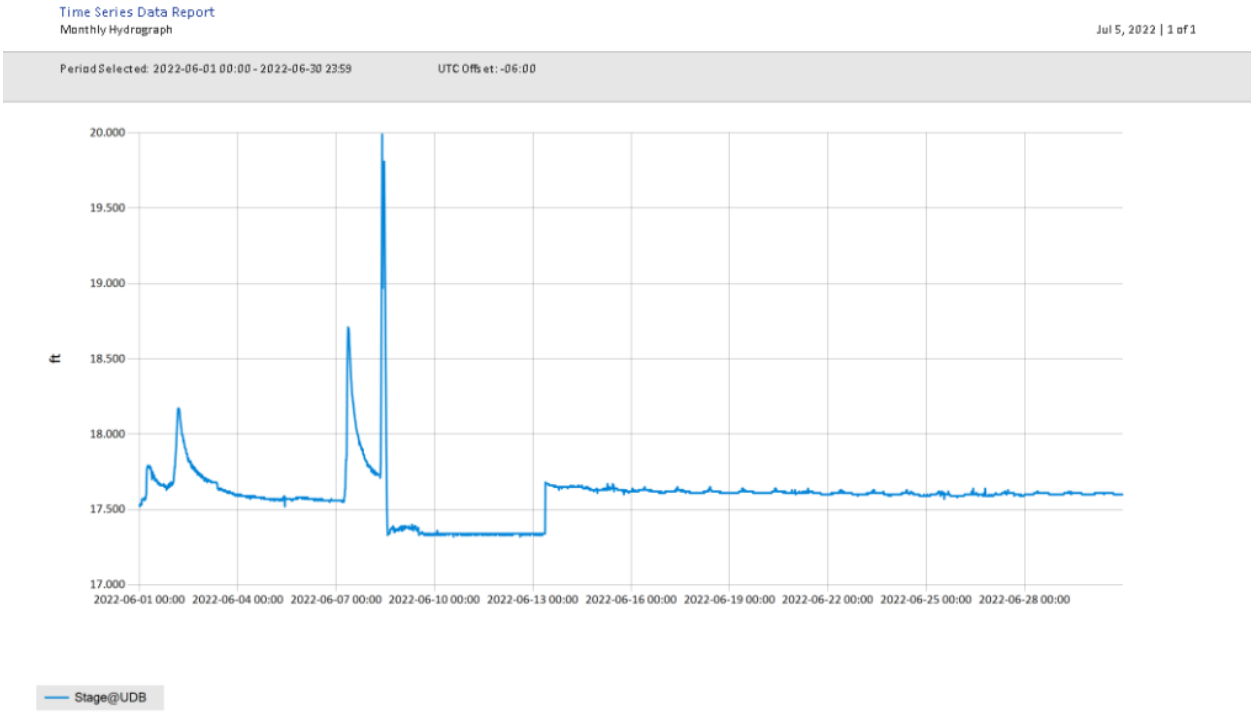


Figure 15 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY — June 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) MAX	MIN	AVG	DEWPT	DEG DAYS HDD	CDD	HUMIDITY (%) MAX	MIN	AVG	RAIN (in)	PRESSURE (in) STN	MSL	WIND SPEED (mph) DIR	AVG	MAX	SOLAR (MJ/m^2)	4" SOIL TEMPERATURES SOD	BARE	MAX	MIN
1	78	63	68.8	64.2	0	5	99	66	86	1.54	28.75	30.00	N *	NA	23.0*	14.45	71.3	74.5	78	71
2	75	59	66.1	60.3	0	2	97	64	82	0.37	28.79	30.04	NNE	6.5	18.3	15.39	70.0	72.0	76	68
3	77	62	69.7	60.1	0	4	92	54	73	0.00	28.74	29.99	E	4.6	12.6	19.35	70.2	73.0	79	68
4	84	61	72.8	64.2	0	7	94	57	76	0.00	28.62	29.87	SSE	6.6	17.8	23.00	71.0	73.3	79	68
5	80	67	72.8	65.0	0	9	93	58	77	0.00	28.47	29.70	SSE	11.6	27.4	16.44	71.5	72.1	76	70
6	88	70	79.0	69.0	0	14	92	57	72	0.00	28.46	29.70	ESE	8.1	22.4	26.93	73.1	75.9	83	69
7	84	66	76.1	70.9	0	10	97	65	85	1.59	28.59	29.83	ESE	6.5	27.9	15.53	74.2	76.2	81	73
8	80	65	72.3	68.1	0	8	98	69	87	1.84	28.70	29.94	NE	7.5	30.2	11.82	73.8	75.3	78	73
9	85	63	74.3	66.2	0	9	97	56	78	0.00	28.76	30.01	SE	5.9	19.4	27.20	73.1	76.6	85	69
10	89	68	79.1	67.6	0	14	88	51	69	0.03	28.62	29.87	S	9.3	43.3	26.87	74.9	78.8	85	73
11	94	73	83.7	73.3	0	19	94	49	73	0.00	28.53	29.77	SSE	7.7	18.3	27.51	77.0	80.5	87	75
12	98	77	87.1	69.6	0	22	70	42	57	0.00	28.49	29.73	S	11.5	26.0	27.38	78.1	79.9	85	75
13	94	78	86.1	67.9	0	21	70	39	56	0.00	28.57	29.81	S	12.0	25.7	29.07	78.3	82.4	91	75
14	91	76	83.8	67.4	0	19	74	45	59	0.00	28.58	29.82	S	13.6	31.3	28.53	77.9	84.5	91	78
15	91	76	83.2	70.0	0	19	79	55	65	0.00	28.64	29.88	S	13.0	32.3	27.51	77.9	85.1	92	79
16	91	75	83.3	70.9	0	18	81	54	67	0.00	28.79	30.03	SSE	8.3	19.0	28.25	78.6	86.8	94	80
17	94	72	83.5	67.8	0	18	89	40	62	0.00	28.80	30.05	SSE	6.2	16.2	28.02	78.7	87.5	95	80
18	92	73	83.8	70.5	0	18	87	50	66	0.00	28.79	30.04	SE	7.0	24.3	26.90	78.8	88.2	95	82
19	92	72	82.3	69.2	0	17	76	50	65	0.00	28.81	30.06	SE	9.3	22.4	27.52	78.7	88.0	94	82
20	93	73	82.8	68.6	0	18	78	44	63	0.00	28.82	30.07	SE	10.2	22.2	28.43	78.9	88.1	95	82
21	96	75	85.2	69.1	0	20	77	37	60	0.00	28.87	30.12	SSE	8.1	20.1	27.55	79.4	89.1	96	82
22	94	75	84.6	67.6	0	20	80	34	59	0.00	28.87	30.12	ESE	6.5	16.6	28.01	79.5	89.7	96	83
23	96	73	85.4	68.3	0	19	86	33	59	0.00	28.74	29.98	SSE	7.4	18.7	28.88	79.4	89.9	97	83
24	99	77	87.9	66.6	0	23	78	30	52	0.00	28.64	29.88	SSE	9.7	22.8	28.60	79.9	90.4	97	84
25	99	75	87.7	65.2	0	22	68	32	49	0.00	28.69	29.94	S	8.6	27.8	28.66	80.0	90.4	97	84
26	84	71	77.6	61.0	0	13	85	33	58	0.00	28.93	30.19	NNE	13.9	32.6	27.84	78.7	88.4	93	84
27	85	65	74.5	55.5	0	10	70	39	52	0.00	29.00	30.25	NE	8.8	20.0	26.36	76.8	85.7	92	80
28	87	65	75.6	57.6	0	11	85	22	56	0.02	28.96	30.21	SE	4.9	14.7	25.24	76.6	85.3	92	79
29	90	62	78.0	56.6	0	11	90	20	51	0.00	28.92	30.17	SE	5.5	17.3	29.31	76.1	85.9	93	79
30	96	67	82.8	58.2	0	16	64	24	45	0.00	28.77	30.02	SSE	7.9	19.9	28.87	76.9	86.7	94	80
	89	70	79.7	65.9	<- Monthly Averages ->						28.72	29.97	SSE*	8.5*	43.3*	25.18	76.3	82.7	89	77

Temperature - Highest: 99
Lowest: 59

Degree Days - Total HDD: 0
Total CDD: 434

Rainfall: Monthly Total: 5.39 in.
Greatest 24 Hr: 1.84 in.

Humidity - Highest: 99
Lowest: 20

Number of Days With:

Tmax ≥ 90:	17	Rainfall ≥ 0.01 inch:	6
Tmax ≤ 32:	0	Rainfall ≥ 0.10 inch:	4
Tmin ≤ 32:	0	Avg Wind Speed ≥ 10 mph:	7*
Tmin ≤ 0:	0	Max Wind Speed ≥ 30 mph:	5*

* Denotes incomplete record

Figure 16 June Mesonet Data