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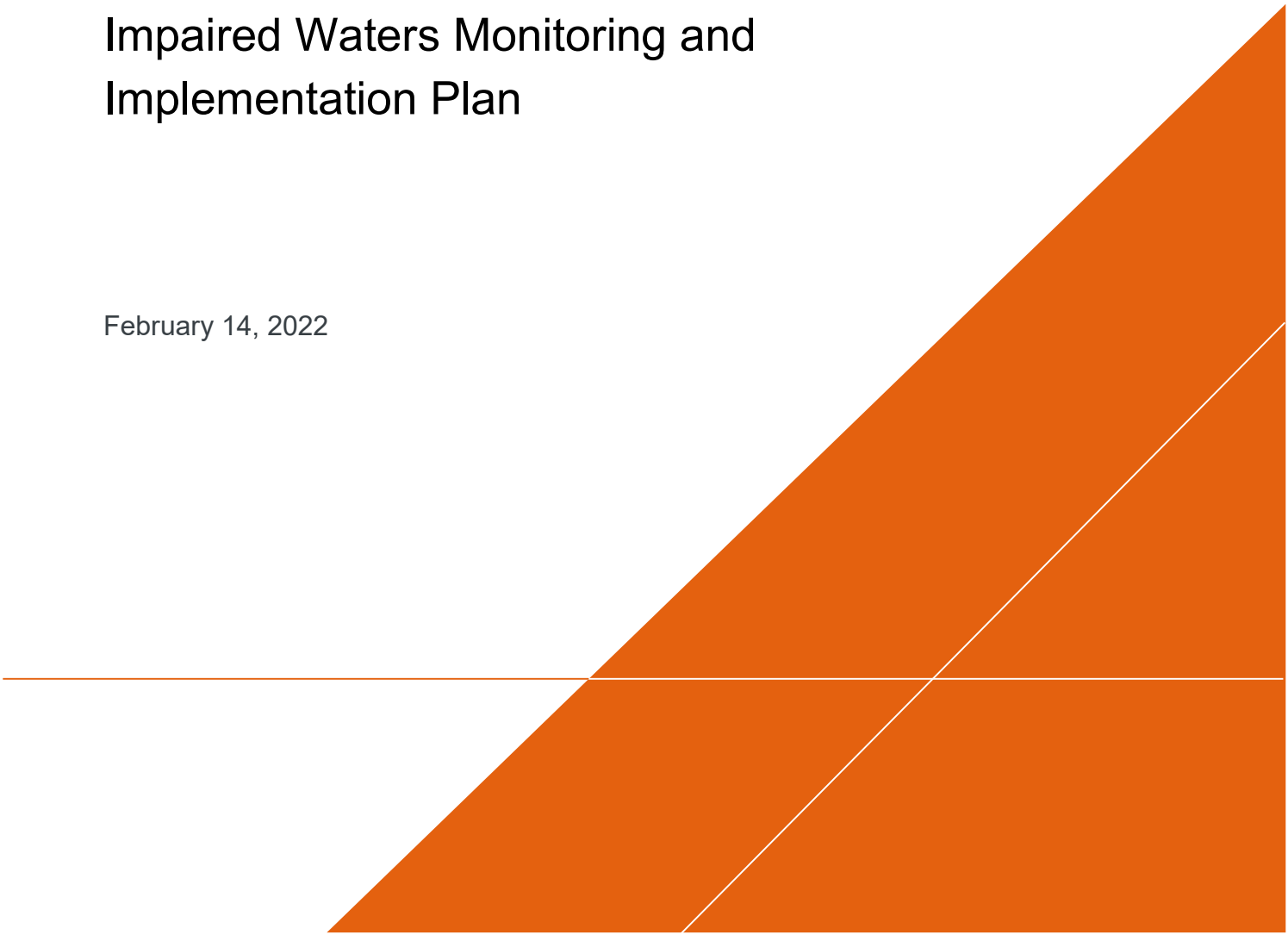
Athens-Clarke County, Georgia

2021 ANNUAL REPORT

Impaired Waters Monitoring and Implementation Plan

February 14, 2022



2021 ANNUAL REPORT

Impaired Waters Monitoring and Implementation Plan

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EXECUTIVE SUMMARY

Athens-Clarke County, Georgia developed and implemented an Impaired Waters Monitoring and Implementation Plan and Sampling Quality Assurance Plan in October 2015 as part of its Municipal Separate Storm Sewer System National Pollutant Discharge Elimination System permit requirements. As part of the Plan, fecal coliform bacteria, total suspended solids, and pH are regularly measured at sampling stations representative of impaired reaches within the permit area.

Data collected from initiation of monitoring efforts in October 2015 through fourth quarter 2016 were presented in the 2016 Annual Report. Data collected in 2017 were presented in the 2017 Annual Report, data collected in 2018 was presented in the 2018 Annual Report, data collected in 2019 was presented in the 2019 Annual Report, and data collected in 2020 was presented in the 2020 Annual Report. This annual report includes sampling results from November 2020 for the November to April monitoring period and sampling results from three quarters of 2021: one from November to April, and two from May to October. This report also includes analyses of pollutant of concern (POC) trends since initiation of monitoring.

Results collected from November 2020 through September 2021 indicated that all but four of the 26 pH levels measured between the two Kingswood Branch sampling stations attained state water quality standards. As discussed in the 2020 Annual Report, pH sampling at Kingswood Branch will be discontinued in 2022 since pH is no longer listed as an impairment on Kingswood Branch and because continued monitoring through 2021 consistently indicates pH in Kingswood Branch is meeting state water quality standards.

For Noketchee Creek all but 3 of the pH levels met state standards. For East Sandy Creek, all but 2 of the measurements taken in November 2021 met state standards. For Carr Creek, five of the twelve measurements were below the state minimum standard.

January 26, 2021 results for TSS at stations CA-1, CED-1, and MO-1 were high due to heavy rains and thunderstorms within the watershed at the time of sampling. Portions of the CA-1, CED-1 and MO-1 watersheds received over 1 inch of rainfall in 24 hours (NWS NOAA 2022).

Fecal coliform results in November 2020 and January 2021 consistently met the state standard. Almost all fecal coliform results exceeded the state standard in June and September (except for station UT-1 in June).

In some cases, the exceedance of state standards for FC were due in part to the lower geometric mean criteria. During the May – October season, the state standard for geometric mean is 200 CFU/100 mL. During the November – April season, the state standard for geometric mean is 1,000 CFU/100 mL. Geometric means exceeded the state standard of 1,000 CFU/100 mL for 2 of the 26 stations in November and 1 of the 26 stations in January. In June 2021, results from all stations except UT-1 exceeded the FC geometric mean standard of no greater than 200 CFU/100 mL. In September 2021, results from all stations exceeded the standard. However, many results for June 2021 and September 2021 also exceeded the higher standard of 1,000 CFU/100mL.

Saturated soils from over 1 inch of rainfall on June 20, 2021 likely contributed to elevated fecal coliform concentrations in the June 21 and June 22 samples. Samples on June 21 were collected between 8:05

and 10:50 AM and rainfall on June 21, 2021 totaled less than 0.2 inches at all stations except WTR-2 which was slightly higher. June 22, 2021 rainfall totaled 0.2 inches to 0.4 inches on saturated soils from the previous two days. Saturated conditions increase the possibility of leakage from septic drainage fields and sanitary sewers due to rainwater infiltration. Increased runoff contributes fecal coliform from wildlife and domestic animal sources.

The largest concentrations (≥16,000 CFU/100 mL) for the September geomean were measured on September 9 (HC-1, KB-1, and KB-3) and September 21 (HC-1 and KB-3). Rainfall totals for September 8 ranged from 0.2 inches to over 0.7 inches in the headwaters of North Oconee and Middle Oconee watersheds with totals 0.03 to 0.4 inches near the monitoring locations. Sampling on September 9 occurred between 9:05 and 9:27 AM at HC-1, KB-1, and KB-3. Rainfall totals on September 9 were 0 to 0.2 inches. Because of the small drainage areas and relatively low rainfall totals at HC-1, KB-1 and KB-3, it is unclear if rainfall on September 8 contributed to elevated fecal coliform concentrations in the September 9 samples. The Middle Oconee River Watershed Management Plan (Arcadis-Tetra Tech April 2018b), including Kingswood Branch and Hunnicutt Creek, identified the following fecal coliform sources: pets, wild animals, farms, leaky sewer pipes, and septic systems. There may also be some contribution to fecal coliform levels in the Middle Oconee River Watershed from sources in the headwaters outside of the Athens-Clarke County boundary.

Athens-Clarke County Government (ACCGOV) has implemented best management practices, including initiatives in pet waste management, sewer evaluations, septic system management, and bacteria source tracking, to help reduce fecal coliform and sediment loads to receiving waters, as well as to maintain acceptable levels of pH. Best management practices are considered effective given that substantial progress has been made by ACCGOV over the reporting period. Examples of this progress include: millions of feet of sewer lines have been cleaned, sewer inflow and infiltration studies have been completed to detect areas of potential leaks, approximately 877 miles of roadways were swept as part of street sweeping programs (resulting in removal of 1,625 cubic yards of debris), construction sites were inspected for proper erosion and sediment controls, pet waste education materials were distributed, and septic system education and outreach programs continued to gain momentum. A bacterial source tracking study was also conducted from 2015 through 2017, and results are being used to target appropriate fecal coliform reduction strategies. Results from this study suggest that human sources of fecal coliform are a consistent contributor in Tanyard Creek, Brooklyn Creek, and Trail Creek, and are either not a contributor or are a negligible contributor of fecal coliform in Carr Creek, Cedar Creek, Hunnicut Creek, Kingswood Branch, and unnamed tributary to Middle Oconee River. In 2018, nine Watershed Management Plans (WMPs) were completed for Bear Creek, East Fork Trail Creek, Malcolm Branch, Middle Oconee River, North Oconee River, Sandy Creek, Sulphur Spring Branch, Turkey Creek, and Walton Creek.

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ACRONYMS AND ABBREVIATIONS

ACC	Athens-Clarke County, Georgia
ACCGOV	Athens-Clarke County Government
BioF	biota - fish communities
BioM	biota - macroinvertebrates
BMP	best management practice
BST	bacteria source tracking
CFU	colony forming units
EPA	U.S. Environmental Protection Agency
EPD	Georgia Environmental Protection Division
FC	fecal coliform bacteria
GIS	geographic information system
IWMIP	Impaired Waters Monitoring and Implementation Plan
mg	milligrams
mL	milliliter
MPN	most probable number
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
POC	pollutant of concern
PUD	Public Utilities Department
QA/QC	quality assurance/quality control
RDII	rainfall-dependent inflow and infiltration
SQAP	Sampling Quality Assurance Plan
SSES	sanitary sewer field evaluations and survey
TSS	total suspended solids
WMP	Watershed Management Plan

1 INTRODUCTION

Athens-Clarke County (ACC) is classified as a small Municipal Separate Storm Sewer System (MS4) community with a population greater than 10,000 and is permitted under the General National Pollutant Discharge Elimination System (NPDES) Stormwater Permit No. GAG610000 (Georgia Department of Natural Resources 2017). The General NPDES Stormwater Permit for small MS4s (Permit) requires MS4 communities such as ACC to develop and implement an Impaired Waters Monitoring and Implementation Plan (IWMIP) for impaired waters within the permitted area. Permittees must identify impaired waters located within its permitted area using the latest approved 305(b)/303(d) List of Waters, which contains MS4 outfalls or waters within 1 linear mile downstream of MS4 outfalls. Permittees are also required to identify POCs, which are the water quality parameter(s) for which the identified impaired waters are listed as not meeting its designated uses, such as fishing or drinking water.

Athens-Clarke County Government (ACCGOV) identified a total of 19 impaired reaches in the ACC Permit area (i.e., ACC jurisdictional area). Seventeen of the 19 reaches are listed as impaired for fecal coliform bacteria (FC), three reaches are listed as impaired for sediment impacts to fish biota (BioF), two reaches are listed and impaired for sediment impacts to macroinvertebrate biota, and three reaches are listed as impaired for pH (Table 1; Georgia Department of Natural Resources 2020). Thus, the POCs identified for the ACC MS4 Permit area are FC, pH, and sediment (BioF and BioM). The reach names, locations, designated uses, impairment parameters (or POCs), extent (length of impaired reach), and potential causes are listed in Table 1.

Table 1. Impaired Stream Reaches with MS4 Outfalls within 1 Linear Mile in Athens-Clarke County, Georgia

Reach Name	Location	Designated Use	Impairment Parameter(s)	Extent (miles)	Potential Causes
Brooklyn Creek	Headwaters to Middle Oconee River, Athens	Fishing	FC	2	Urban runoff
Carr Creek	Headwaters to North Oconee River, Athens	Fishing	BioF, Bio M, FC, pH	2	Industrial facility, urban runoff
Cedar Creek	Headwaters to Oconee River, Athens	Fishing	FC, Bio F*	4	Urban runoff
Cloverhurst Branch	Headwaters to Tanyard Branch (Athens)	Fishing	FC	2	Urban runoff
East Fork Trail Creek	Headwaters to West Fork Trail Creek, Athens	Fishing	FC	3	Urban runoff
East Sandy Creek	Long Branch to Sandy Creek	Fishing	pH	4	Non-point sources
Hunnicutt Creek	Headwaters to Middle Oconee River, Athens	Fishing	FC	1	Urban runoff
Kingswood Branch	Tributary to McNutt Creek, Athens	Fishing	FC	1	Urban runoff

Reach Name	Location	Designated Use	Impairment Parameter(s)	Extent (miles)	Potential Causes
McNutt Creek	Headwaters at GA 316 and Dials Mill Road to Middle Oconee River	Fishing	FC	12	Non-point sources, urban runoff
Middle Oconee River	Big Bear Creek to McNutt Creek	Fishing	FC, BioM	12	Non-point sources
Middle Oconee River	McNutt Creek to North Oconee River	Fishing	FC	4	Urban runoff
Noketchee Creek	Headwaters to Sandy Creek	Fishing	pH, BioF	5	Non-point sources, urban runoff
North Oconee River	Sandy Creek to Trail Creek	Drinking Water	FC	2	Non-point sources
North Oconee River	Trail Creek to Oconee River	Fishing	FC	8	Municipal facility, urban runoff
Oconee River	Confluence of North and Middle Oconee Rivers, Athens to Barnett Shoals Dam	Fishing	FC	4	Urban runoff
Tanyard Creek	Upstream North Oconee River, Athens	Fishing	FC	1	Urban runoff
Trail Creek	East Fork Trail Creek to North Oconee River, Athens	Fishing	FC	2	Urban runoff
Tributary to Middle Oconee River	Downstream closed UGA Botanical Gardens Landfill (Milledgeville Ave. Site), Athens	Fishing	FC	1	Non-point sources, urban runoff
West Fork Trail Creek	Athens	Fishing	FC	3	Urban runoff

*BioF impairment was added for Cedar Creek in the 2020 list.
Source: Georgia Department of Natural Resources 2020

In 2015, ACCGOV developed and implemented an IWMIP and Sampling and Quality Assurance Plan (SQAP), referred to collectively as the Plan, to monitor and track POCs and to select initial best management practices (BMPs) to help reduce concentrations of the identified POCs. The Georgia Environmental Protection Division (EPD) approved the final IWMIP and SQAP in January 2016. ACCGOV began implementation of the Plan in October 2015, and implementation is ongoing. Combined with ACCGOV's ongoing Watershed Improvement Program, the Plan ultimately helps improve water quality and monitors progress toward removing the impaired waters from the 303(d) List.

In addition to satisfying MS4 Permit requirements, impaired water monitoring data are being collected in accordance with the SQAP component of the Plan (January 2016) to be submitted to EPD for consideration in 305(b)/303(d) listing decisions. Impaired waters monitoring data will be evaluated annually to help identify potential concentration trends and sources of POCs. Furthermore, the monitoring data are being used to help assess current watershed conditions and develop Watershed Management Plans (WMPs), as well as to help guide appropriate stormwater public education and

outreach efforts. Results will be evaluated regularly to monitor progress toward delisting the streams from the Georgia 303(d) list.

2 METHODS

Impaired waters were sampled and tested for identified POCs according to the detailed methods described in the ACC IWMIP and SQAP (Arcadis-Tetra Tech January 2016). Data collection began in October 2015 and is ongoing. As mentioned in the Executive Summary, the 2021 Annual Report includes detailed results from November 2020 to October 2021 but also includes an analysis of POC trends since initiation of data collection.

The data collected and evaluated as part of this annual report extends from November 2020 to October 2021. Sampling results were compared to applicable Georgia numeric criteria to determine compliance with water quality standards. In addition to sampling data collection and evaluation, ACCGOV implemented BMPs designed to improve water quality for the identified POCs and impaired reaches.

2.1 Impaired Waters Sampling

2.1.1 Study Area

The study area includes the following 19 impaired reaches within the ACC permitted area (Figure 1):

1. Brooklyn Creek
2. Carr Creek
3. Cedar Creek
4. East Fork Trail Creek
5. East Sandy Creek
6. Hunnicutt Creek
7. Kingswood Branch
8. McNutt Creek
9. Middle Oconee River (section one)
10. Middle Oconee River (section two)
11. Noketchee Creek
12. North Oconee River (section one)
13. North Oconee River (section two)
14. Oconee River
15. Tanyard Creek
16. Cloverhurst Branch
17. Trail Creek
18. West Fork Trail Creek
19. Unnamed tributary to Middle Oconee River.

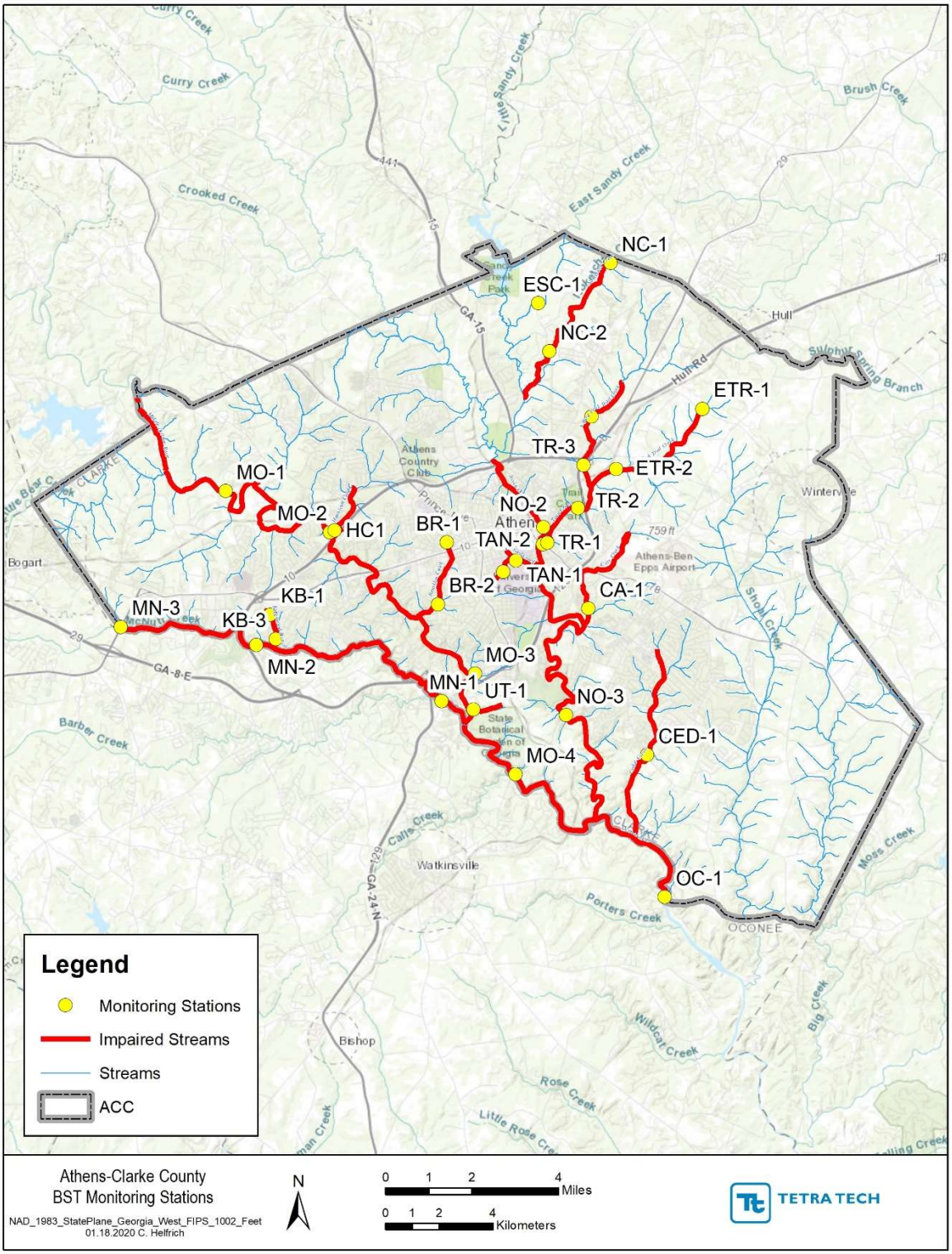

Figure 1. Impaired Stream Reaches within 1 Linear Mile of MS4 Outfalls and Sampling Stations in Athens-Clarke County, Georgia

2.1.2 Sampling Stations

The sampling station locations were selected to represent the 19 impaired reaches within 1 linear mile of MS4 outfalls and where water quality data were collected historically. The impaired streams are sampled at 29 stations. The sampling stations, along with their geographic coordinates, are listed in Table 2.

Table 2. Sampling Stations in Impaired Stream Reaches in Athens-Clarke County, Georgia

Station ID	Impaired Reach	Criterion Exceeded	Latitude	Longitude
BR-1	Brooklyn Creek	FC	33.9547	-83.3993
BR-2	Brooklyn Creek	FC	33.9376	-83.4021
CA-1	Carr Creek	BioF, FC, pH	33.9364	-83.3518
CED-1	Cedar Creek	FC, BioF	33.8958	-83.3321
ETR-1	East Fork Trail Creek	FC	33.9918	-83.3136
ETR-2	East Fork Trail Creek	FC	33.975	-83.3426
ESC-1	East Sandy Creek	pH	34.0211	-83.3686
HC-1	Hunnicutt Creek	FC	33.9581	-83.4367
KB-1	Kingswood Branch	FC	33.9347	-83.4584
KB-3	Kingswood Branch	FC	33.9279	-83.4565
MN-1	McNutt Creek	FC	33.9107	-83.401
MN-2	McNutt Creek	FC	33.9263	-83.463
MN-3	McNutt Creek	FC	33.9314	-83.5098
MO-1	Middle Oconee	FC, BioM	33.969	-83.4733
MO-2	Middle Oconee	FC	33.9576	-83.4383
MO-3	Middle Oconee	FC	33.9183	-83.3898
MO-4	Middle Oconee	FC	33.8904	-83.3763
NC-1	Noketchee Creek	BioF, pH	34.0322	-83.3444
NC-2	Noketchee Creek	BioF, pH	34.0077	-83.3649
NO-2	North Oconee River	FC	33.959	-83.3669
NO-3	North Oconee River	FC	33.9068	-83.3593
OC-1	Oconee River	FC	33.8563	-83.3263
TAN-1	Tanyard Creek	FC	33.9497	-83.3761
TAN-2	Cloverhurst Branch	FC	33.9466	-83.3804
TR-1	Trail Creek	FC	33.9642	-83.3553
TR-3	Trail Creek	FC	33.9542	-83.3671
WTR-1	West Fork Trail Creek	FC	33.9896	-83.3509
WTR-2	West Fork Trail Creek	FC	33.9761	-83.3534
UT-1	Unnamed tributary to Middle Oconee River	FC	33.908	-83.386

2.1.3 Sampling Parameters and Schedule

Sampling methods include in-situ pH measurements for stations KB-1, KB-3, NC-1, NC-2, CA-1, and ESC-1; grab sampling for FC analytical testing at all stations except NC-1, NC-2, and ESC-1; and sampling for total suspended solids (TSS) at stations CA-1, CED-1, NC-1, NC-2, and MO-1. Sample parameters, sample types, sampling stations, total number of stations sampled, and sampling schedule are listed in Table 3.

Table 3. Sampling Parameters and Schedule

Parameter	Sample Type	Stations Sampled	Total Number of Stations Sampled	Sampling Schedule
FC	Grab	BR-1, BR-2, CA-1, CED-1, ETR-1, ETR-2, HC-1, KB-1, KB-3, MN-1, MN-2, MN-3, MO-1, MO-2, MO-3, MO-4, NO-2, NO-3, OC-1, TAN-1, TAN-2, TR-1, TR-3, WTR-1, WTR-2, UT-1	26	4 geometric means/year = 16 grab samples = (4 grab samples/1 geometric mean) x (4 samples/year)
pH	In-situ	KB-1, KB-3, NC-1, NC-2, CA-1, ESC-1	6	20 samples per year
TSS	Grab	CA-1, CED-1, NC-1, NC-2, MO-1	4	4 samples per year (1 sample collected each calendar quarter)

Georgia water quality standards for the sampled parameters and impaired reaches designated uses are provided in Table 4. Sampling results are compared to the state standards to evaluate attainment of these criteria.

Table 4. Georgia Water Quality Standards for Sampled Parameters

Parameter	Standard	Source
Fecal Coliform Bacteria	May–Oct <200 colonies/100 mL as geometric mean and 4,000 colonies/100 mL as a single sample maximum	GA Water Quality Standards
	Nov–Apr <1,000 colonies/100 mL and 4,000 as a single sample maximum	
pH	Between 6.0 and 8.5	GA Water Quality Standards
TSS	No quantitative standard in Georgia	NA

2.1.4 Sampling Methods

Sampling methods included in-situ water quality measurements for pH and grab samples for laboratory analyses of FC and TSS. Sampling protocols are described in detail in Section 3.1, Sampling Methods, of the ACC Plan (Arcadis-Tetra Tech January 2016) and adhere to the requirements of the Water Protection Branch Quality Assurance Manual (Georgia Department of Natural Resources 1999) and Title 40 of the Code of Federal Regulations, Part 136. Sampling included quality assurance/quality control (QA/QC) procedures such as the collection of blank and duplicate samples and the completion

of chain-of-custody forms for grab samples submitted to the laboratory for analysis. These QA/QC protocols are described in the SQAP (Section 3 of the IWMIP and SQAP).

Sampling personnel maintained field records during sampling events. Field records include completed field forms that provide information on sample location, date, time, weather conditions at the time of sampling, names of sampling personnel, observed field conditions, problems encountered, and any corrective actions taken as a result. Refer to Section 3.3.2, Field Records, of the Plan for additional details on the field records collected for each sampling event.

2.2 Best Management Practices

BMPs have been implemented in ACC to control and reduce POC concentrations. ACCGOV has many ongoing programmatic BMPs in place to reduce FC levels and prevent other POCs from entering streams in ACC. These BMPs and associated efforts are documented in the Unified Government of Athens-Clarke County Watershed Protection Plan 2020-2021 Annual Report (Jacobs 2021), ACC's NPDES Phase II 2021 Annual Report, and in the ACC Plan. In addition to ongoing programmatic BMPs, ACCGOV has conducted bacteria source tracking (BST) to assist in identifying the primary sources of FC measured in streams. Results will be used to focus management efforts in a cost-effective manner. BST commenced in November 2015 and was completed in October 2017.

The summaries below describe BMP progress made by ACCGOV in 2021. Progress made before 2021 is described in previous IWMIP Annual Reports.

2.2.1 Pet Waste Management Initiatives

This section discusses the activities ACC has undertaken to document, understand, and address pet waste management in ACC.

- During the reporting period, ACCGOV staff distributed brochures on pet waste/bag dispensers to promote public education on proper pet waste management. ACCGOV staff continues to actively monitor for pet waste "hot spots" in downtown Athens and beyond.
- The Stormwater Department passes out pet waste bag dispensers with bags for dog owners to clip to their leashes. They give these out at any tabling events they attend, and they supply animal shelters and hospitals with boxes of pet waste bags for dog adoption goody bags.
- The Leisure Services Department installs pet waste stations in public parks and at public trailheads. They maintain approximately 20 stations weekly.
- The ACC Stormwater Department is currently working with the ACC Solid Waste Department to find a pedestrian trash can design for downtown Athens that incorporates a pet waste bag dispenser. New cans will be installed at a later date.

2.2.2 Sanitary Sewer Evaluation

Due to the high levels of FC in ACC, a key source control measure for 303(d)-listed streams identified in the ACCGOV Public Utilities' Department (PUD) Watershed Protection Plan was maintenance and evaluation of sanitary sewer lines. Consequently, the following activities were undertaken to maintain and evaluate sanitary sewer lines in ACC.

2.2.2.1 Sewer Maintenance

- In 2021, PUD used Rodder trucks to clean 1,428,764 feet of sewer line, flush/vacuum trucks to clean 1,319,472 feet of sewer line, and camera trucks to inspect 280,727 feet of sewer line. In addition, 720,140 feet of easements and right-of-way were cleared, and 30,511 feet of sewer line were treated for root control in March.
- PUD made condition and capacity upgrades to approximately 3,325 total linear feet of 8 inch, 12 inch, 18-inch, and 24-inch gravity sewer line and appurtenances within the Tanyard Creek watershed. This work included the relocation of two poor condition vitrified clay lines previously encroaching on Tanyard Creek. These lines were removed from private property and relocated to the adjacent public streets away from the creek eliminating the possibility of further impacts to the creek.
- PUD's on-call contractor installed new sewer in Rear Arch Street.
- PUD's on-call contractor installed upgrades to the sewer at Atlanta Highway Crossing at Ultimate Drive to realign and upsize approximately 1,200 linear feet of 10-inch line to improve condition and capacity in the area.
- PUD's on-call contractor replaced approximately 2,000 linear feet of 8-inch sewer in the vicinity of Academy sports on Timothy Road to improve these sewer line sections.
- PUD's contractor is digging a tunnel under the Loop between Alexander Street and Dairy Pac Road to upsize and realign the Upper North Oconee sewer main.
- PUD is finalizing construction plans for the Brooklyn Creek Interceptor Improvements. This project includes replacing the sewer interceptor from the trunk line at the Middle Oconee River up to King Street and increasing pipe size to provide greater capacity based on population projections for the future.
- PUD is under design on plans for the Middle Oconee Interceptor Improvements. This project includes replacing approximately 8,400 linear feet of the sewer interceptor from the treatment plant up to the vicinity of Dogwood Drive and increasing pipe size to provide greater capacity based on population projections for the future.

2.2.2.2 Sewer Evaluation Studies

- In 2015, PUD conducted a Flow Monitoring Study to identify rainfall-dependent inflow and infiltration (RDII) within the wastewater collection system.
- In 2015 and 2016, PUD performed detailed field as-built surveys of critical portions of the wastewater collection system. This information was used to update PUD's geographic information system (GIS) with accurate pipe locations, pipe materials, pipe diameters, and pipe slopes and depths.
- In 2015 and 2016, PUD updated and calibrated dynamic dry-weather and wet-weather models for most of the wastewater collection system. The entire wastewater collection system will be modeled in 2017. The results of the forecasting, flow monitoring, and modeling efforts have been used to identify both short- and long-term Service Delivery Plan Capital Improvement Projects to ensure that the wastewater collection system has adequate capacity.

- In 2016, PUD performed sanitary sewer field evaluations and surveys (SSESs) on that portion of the wastewater collection system that has the highest RDII for the purpose of identifying pipes that are in poor condition and need rehabilitation and/or replacement.
- In 2017, PUD continued to analyze results of SSES efforts to identify causes of inflow and infiltration and subsequent capital improvement projects to reduce inflow and infiltration. PUD continues to perform flow monitoring comparisons between pre-rehabilitation and post-construction activities to determine the effectiveness of the SSES program on the wastewater collection system.

2.2.3 Septic System Management

Another key source control measure for FC identified in the Watershed Protection Plan was septic system management. The following activities were undertaken to support proper management of septic systems in ACC.

- The ACC Planning Department is currently responsible for maintaining the GIS septic system inventory. This inventory is updated regularly with newly built septic systems.
- ACCGOV uses the Manual for On-Site Sewage Management Systems (Department of Human Resources, Public Health, Chapter 290-5-26, 2016) to regulate sewer management systems and septic tanks. This includes minimum design and construction standards and minimum volume requirements.
- ACCGOV continues to enforce Sections 8-6-6 and 8-6-7 of the Protected Environmental Areas Ordinance, which prohibit septic tanks in floodplains and riparian zones, respectively.
- ACC maintained a Septic System Education Program, which includes a website (http://www.accgov.com/5317/Septic-System-Education-Program) and a phone number for questions. ACC continued targeted septic tank education efforts, including continued distribution of informational materials, and a targeted social media campaign during the U.S. Environmental Protection Agency's 2021 Septic Smart Week in September.
- ACCGOV has adopted a General Sewer Use ordinance to regulate discharges to public sewers, septic tanks, and private wastewater systems. On October 5, 2018, ACC Mayor & Commission revised the Sewer Use Ordinance to include a recommendation from ACC PUD. Section 5-1-2 (b)(6) now reads "Athens-Clarke County recommends that septic tank disposal systems be inspected on intervals of not less than every five years, and maintenance performed as needed, at the owner's expense."
- ACCGOV is considering a credit to the Stormwater Utility Fee for regular septic tank pumping. This consideration is part of a larger utility fee and credit review that started in late 2018. The new credit program has not yet gone into effect.

2.2.4 Street Sweeping

ACCGOV conducted the following street sweeping activities in 2021.

- ACCGOV contracts street sweeping services on major urban roadways and throughout the Central Business District. In 2021, approximately 877 miles of roadways were swept, resulting in removal of 1,625 cubic yards of debris from roadways.

- In addition to the normal monthly routes, street sweeping occurred after a fireworks show in the downtown area in July, and during the fall months of October and November.

2.2.5 Bacterial Source Tracking

- ACCGOV implemented BST in 2015 to determine the primary source(s) of fecal bacteria in streams that are impaired due to FC. BST analysis is being undertaken as a phased approach. Phase two of the BST work was completed in October 2017.
- Results from this study suggest that human sources of FC are a consistent contributor of FC in Tanyard Creek, Brooklyn Creek, and Trail Creek, and are either not a contributor or are a negligible contributor of FC in Carr Creek, Cedar Creek, Hunnicutt Creek, Kingswood Branch, and an unnamed tributary to Middle Oconee River.
- Results from all FC samples collected from Tanyard Creek, Brooklyn Creek, and Trail Creek as a part of the BST study exceeded the May-October state standard of 200 colony forming units (CFU)/100 milliliters (mL) of drinking water supply and recreational designated uses with the highest reporting limit (16,000 most probable number [MPN]/100 mL) for all three stations from the wet weather samples. However, the wet weather samples detected the same human gene biomarker levels as the dry weather samples. These results suggest that species other than humans are also contributing to the FC levels in Tanyard Creek, Brooklyn Creek, and Trail Creek.
- Because samples from Carr Creek, Hunnicutt Creek, Kingswood Branch, and an unnamed tributary to Middle Oconee River did not detect the human gene biomarker, species other than humans are contributing to the FC levels in those Creeks.
- Potential animal sources of FC were noted during stream walks and upland evaluations conducted in 2016 and 2017 as part of the Watershed Management Planning efforts and include dog, goose, and deer throughout most parts of ACC, and livestock in rural/agricultural areas.
- Based on the results of this study, next steps for consideration include:
    - Use data and analysis from the 2016/2017 Watershed Management Planning efforts to identify the most likely species and locations contributing to FC pollution in the listed streams.
    - Conduct BST to identify non-human species contributing to FC pollution. These may include species such as dog, goose, deer, and others as needed.

2.2.6 TSS Reduction BMPs

- Construction sites were inspected for watersheds with impairments for BioF to reduce sediment loads to receiving waters.
- During the reporting period, ACCGOV continued to increase the number of inspections in the Noketchee Creek and Carr Creek watersheds (which are listed as impaired for impacts to BioF) as well as the Middle Oconee watershed (which is listed as having impaired macroinvertebrate biota [BioM] above the confluence with Big Bear Creek). Street sweeping in watersheds with impairments for BioM are being evaluated by ACCGOV. ACCGOV's current street sweeping contract includes up to 35 additional miles of street sweeping to be used as necessary. ACCGOV continues to evaluate the allocation of these miles during fiscal year planning. A typical street sweeping program involves the deployment of street sweeper fleets on targeted routes based on schedules defined by desired

load reduction goals and/or effectiveness. In ACC, the main objective is to target streets based on effectiveness.

2.2.7 Watershed Management Plans

Before 2018, the Arcadis, Tetra Tech, and ACC partnership completed watershed management documents for Brooklyn Creek, Hunnicutt Creek, Trail Creek, Tanyard Creek, Cedar Creek, Shoal Creek, Big Creek, Carr Creek, and McNutt Creek in accordance with the overarching goals of the Watershed Improvement Program. In 2018, the partnership completed WMPs for nine more watersheds, including Bear Creek, East Fork Trail Creek, Malcolm Branch, Middle Oconee River, North Oconee River, Sandy Creek, Sulphur Spring Branch, Turkey Creek, and Walton Creek. These recently completed plans will likely lead to additional initiatives to improve water quality.

The WMPs discuss the impaired water monitoring and results as they relate to characterizing the existing watershed and discussing water quality. Some of the watershed management needs and recommended management measures are tied to known impairments and/or the water quality data collected under the impaired waters monitoring program. For instance, the Middle Oconee is impaired for FC. Sampling as of the timeframe during which the WMP was being prepared (2017, finalized early 2018) confirmed issues with this. A recommended management measure identified in the WMP was MO-Res-01, also known as the Ben Burton Park Pet Waste and Managed Access Project. The project involves the augmentation of pet waste collection measures through the installation of pet waste stations and additional signage to reduce FC pollution in conjunction with construction of managed access points to the Middle Oconee River that include steps and a vegetated buffer to mitigate bank erosion. It would potentially deter park users from using unofficial access points through fencing and strategic vegetation. Benefits include nutrient uptake, runoff sediment reduction, and beautification.

3 RESULTS

Water quality monitoring data results collected during the study period are summarized below and are included in Appendix A.

3.1 Fecal Coliform

3.1.1 All Data

During the November 2020 to October 2021 period of record, a total of 480 grab samples (including duplicates and blanks) were tested for FC. Individual grab sample results were compiled and used to calculate four geometric means for 26 stations following sampling protocols (Table 5, Figure 2). Each geometric mean was computed based on results from four grab samples collected within a 30-day period, with no one grab sample collected less than 24 hours from the time of the previously collected sample. Grab samples used to compute geometric means did not overlap between the months of April and May or October and November to ensure that the results could be compared to Georgia FC water quality standards, which are presented as geometric mean criteria (Table 4).

Geometric means calculated for each station were plotted by date (Figure 2). The 2021 data set does not support statistically sound trend analysis; however, analysis that incorporates all geomeans collected since 2015 will be discussed in Section 4.2.

In Table 5, the Exceedances of Standard column indicates whether a geometric mean exceeded the standard. Each tick mark corresponds to a geometric mean in chronological order from left to right. A red tick mark indicates an exceedance, and a green tick mark indicates no exceedance of the applicable standard. In Table 5, the red and green colors of the cells containing geometric mean results indicate whether sample results exceeded the water quality standard; red values indicate an exceedance, and green values indicate no exceedance.

Table 5. Fecal Coliform Bacteria Geometric Means (November 2020 - October 2021) and Comparison to State Standards

Date	Nov-20	Jan-21	Jun-21	Sep-21	
Station	FC Geometric Mean (#21) cfu/100 mL (Nov-Apr)	FC Geometric Mean (#22) cfu/100 mL (Nov-Apr)	FC Geometric Mean (#23) cfu/100 mL (May-Oct)	FC Geometric Mean (#24) cfu/100 mL (May-Oct)	Exceedences of Standard
BR-1	1170.7	628.5	3779.3	2444.4	
BR-2	598.8	317.0	6545.9	1298.1	
CA-1	528.5	119.0	1480.2	2290.0	
CED-1	1241.5	1013.6	1372.5	2414.7	
ETR-1	325.5	482.1	688.7	213.1	
ETR-2	428.1	354.5	843.8	252.4	
HC-1	437.7	597.6	2426.7	2364.9	
KB-1	267.8	112.5	1048.8	3229.7	
KB-3	670.8	132.5	1380.3	6387.5	
MN-1	344.2	254.9	880.1	1077.9	
MN-2	418.2	219.7	1434.5	943.4	
MN-3	631.6	292.7	1332.2	1146.0	
MO-1	343.1	426.7	358.4	1019.4	
MO-2	263.9	316.2	351.4	644.8	
MO-3	257.1	429.4	332.0	672.1	
MO-4	418.7	685.1	587.1	1332.2	
NO-2	110.1	280.3	2188.7	1546.5	
NO-3	136.1	234.7	813.5	227.9	
OC-1	313.7	397.5	463.1	1394.4	
TAN-1	716.8	40.6	2726.4	1694.8	
TAN-2	827.1	96.6	4422.4	410.3	
TR-1	289.3	293.7	1622.8	1224.7	
TR-3	546.8	897.2	2975.0	1274.7	
UT-1	159.8	26.9	57.4	1096.8	
WTR-1	208.8	105.8	922.0	551.3	
WTR-2	230.0	33.6	1087.3	688.3	
State Standard	**1,000**	**1,000**	**200**	**200**	

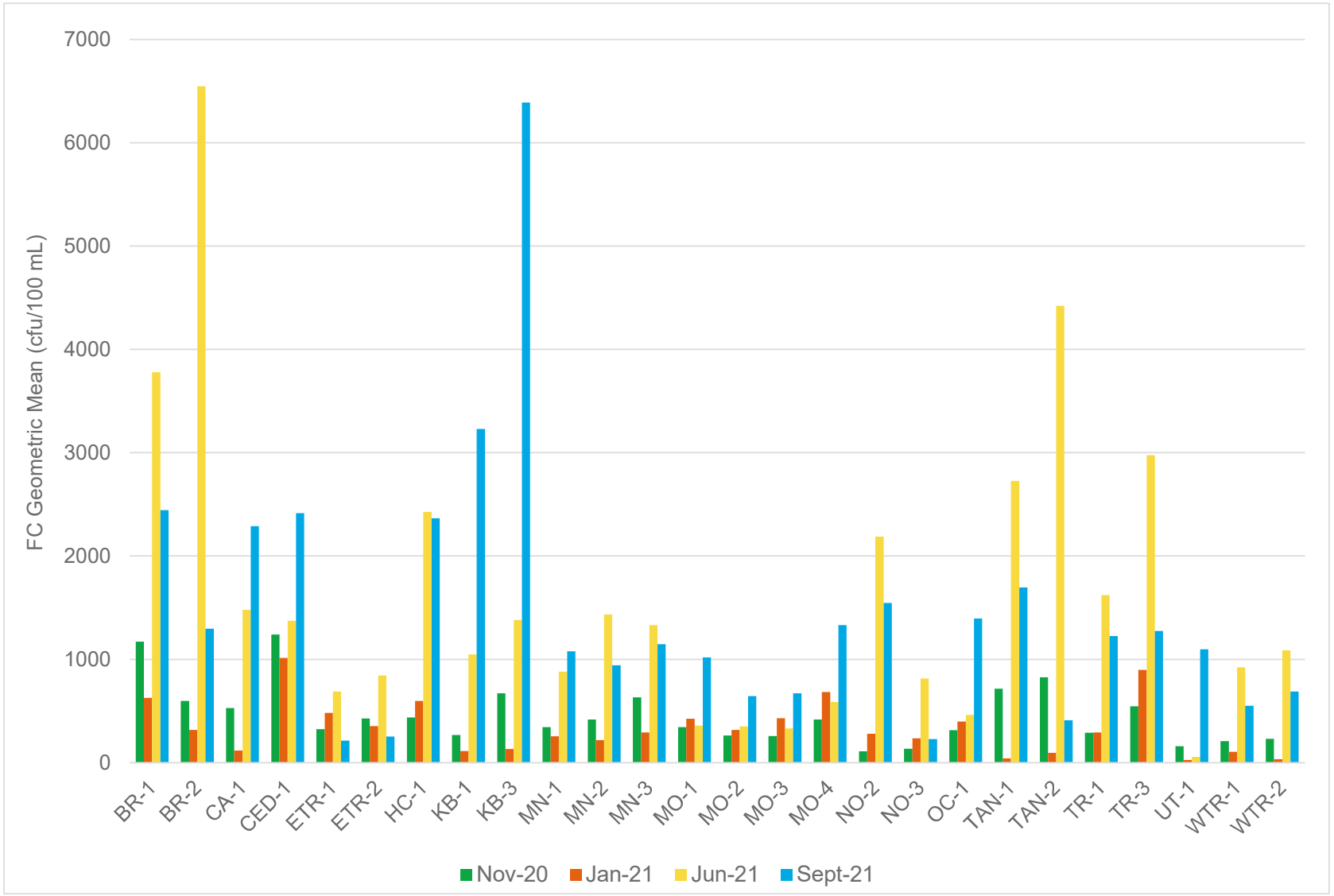

Figure 2. Fecal Coliform Geometric Means (November 2020 – October 2021)

The geometric mean for BR-1 and CED-1 exceeded the state standard of 1000 CFU/100mL for the November 2020 sampling event. The geometric mean for CED-1 exceeded the standard for the January sampling event. In June 2021, results from all stations except UT-1 exceeded the FC geometric mean standard of no greater than 200 CFU/100 mL. In September 2021, results from all stations exceeded the standard.

FC results measured for individual grab samples were compared to the state water quality standard for FC single samples: <4,000 CFU/100 mL. The stations that exhibited exceedances, as well as the percentage of station samples that exceeded this standard, are listed below:

- 28% of samples for station BR-2 exceeded the standard.
- 25% of samples for stations CED-1 and KB-3 exceeded the standard.
- 24% of samples for stations BR-1 and HC-1 exceeded the standard.
- 19% of samples for stations MO-4 and TAN-1 exceeded the standard.
- 18% of samples for station TAN-2 exceeded the standard.
- 13% of samples for stations CA-1, MN-1, MN-2, MN-3, MO-3, and OC-1 exceeded the standard.
- 12% of samples for station KB-1 exceeded the standard.
- 10% or less of samples for stations MO-2, NO-2, TR-1, TR-3, WTR-1, and WTR-2 exceeded the standard.
- 0% of samples for stations ETR-1, ETR-2, MO-1, NO-3, and UT-1 exceeded the standard.

Individual grab sample FC data for the November 2020 - October 2021 study period are provided in Appendix A. Results exceeding the standard are highlighted in red in the appendix.

3.1.2 November–April Data

Geometric means computed for FC grab samples were differentiated by either November–April or May-October timeframes to evaluate POC trends in these seasons and to compare them to applicable Georgia water quality standards. Results for the November – April period, which include data collected in November 2020 and January 2021, are presented in Table 6 and on Figure 3. In Table 6, the red and green colors of the cells containing geometric mean results indicate whether a sample exceeded the water quality standard; green values indicate no exceedance. Geometric means met the state standard of 1,000 CFU/100 mL for all but 2 of the 26 stations in November and all but 1 of the 26 stations in January.

Table 6. Fecal Coliform Bacteria Geometric Means (November 2020 and January 2021) and Exceedance of State Standards

Date	Nov-20	Jan-21	Exceedences of Standard
Station	FC Geometric Mean (#21) cfu/100 mL (Nov-Apr)	FC Geometric Mean (#22) cfu/100 mL (Nov-Apr)	
BR-1	1170.7	628.5	■■
BR-2	598.8	317.0	■■
CA-1	528.5	119.0	■■
CED-1	1241.5	1013.6	■■
ETR-1	325.5	482.1	■■
ETR-2	428.1	354.5	■■
HC-1	437.7	597.6	■■
KB-1	267.8	112.5	■■
KB-3	670.8	132.5	■■
MN-1	344.2	254.9	■■
MN-2	418.2	219.7	■■
MN-3	631.6	292.7	■■
MO-1	343.1	426.7	■■
MO-2	263.9	316.2	■■
MO-3	257.1	429.4	■■
MO-4	418.7	685.1	■■
NO-2	110.1	280.3	■■
NO-3	136.1	234.7	■■
OC-1	313.7	397.5	■■
TAN-1	716.8	40.6	■■
TAN-2	827.1	96.6	■■
TR-1	289.3	293.7	■■
TR-3	546.8	897.2	■■
UT-1	159.8	26.9	■■
WTR-1	208.8	105.8	■■
WTR-2	230.0	33.6	■■
State Standard	**1,000**	**1,000**	

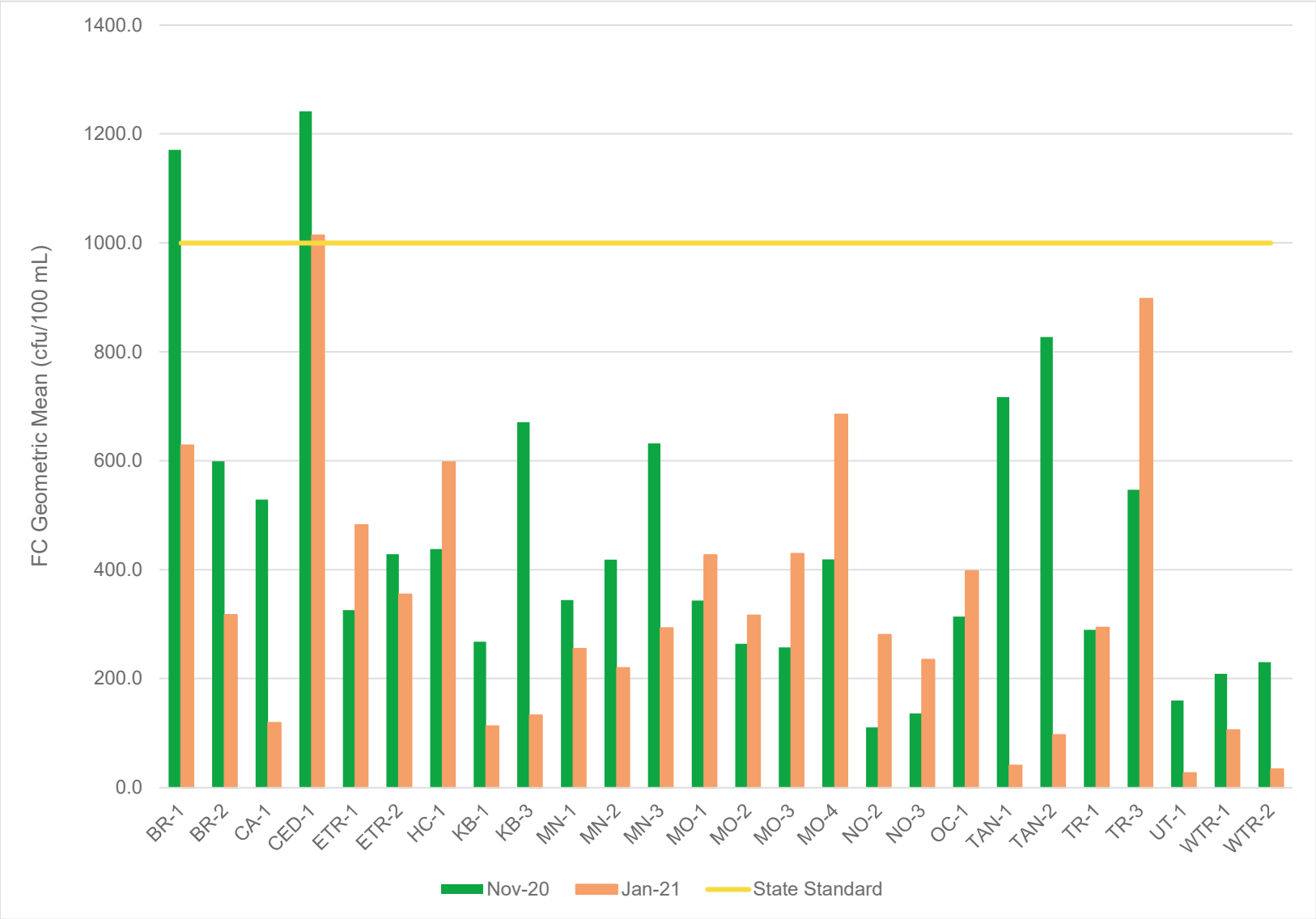

Figure 3. Fecal Coliform Geometric Means (November 2020 and January 2021)

3.1.3 May–October Data

Results for the May–October period, which include data collected in June 2021 and September 2021, are presented in Table 7 and on Figure 4. In Table 7, the red and green colors of the cells containing geometric mean results indicate whether results from a sample exceeded the water quality standard; red values indicate an exceedance, and green values indicate no exceedance. Two FC geometric means were computed during May-October for the 2021 study period. For the June sampling period, results from all stations exceeded the 200 CFU/100 mL state standard except UT-1. For the September sampling period, results from all stations exceeded the state standard.

Table 7. Fecal Coliform Bacteria Geometric Means (June 2021 and September 2021) and Exceedance of State Standards

Date	Jun-21	Sep-21	Exceedences of Standard
Station	FC Geometric Mean (#23) cfu/100 mL (May-Oct)	FC Geometric Mean (#24) cfu/100 mL (May-Oct)	
BR-1	3779.3	2444.4	
BR-2	6545.9	1298.1	
CA-1	1480.2	2290.0	
CED-1	1372.5	2414.7	
ETR-1	688.7	213.1	
ETR-2	843.8	252.4	
HC-1	2426.7	2364.9	
KB-1	1048.8	3229.7	
KB-3	1380.3	6387.5	
MN-1	880.1	1077.9	
MN-2	1434.5	943.4	
MN-3	1332.2	1146.0	
MO-1	358.4	1019.4	
MO-2	351.4	644.8	
MO-3	332.0	672.1	
MO-4	587.1	1332.2	
NO-2	2188.7	1546.5	
NO-3	813.5	227.9	
OC-1	463.1	1394.4	
TAN-1	2726.4	1694.8	
TAN-2	4422.4	410.3	
TR-1	1622.8	1224.7	
TR-3	2975.0	1274.7	
UT-1	57.4	1096.8	
WTR-1	922.0	551.3	
WTR-2	1087.3	688.3	
State Standard	**200**	**200**	

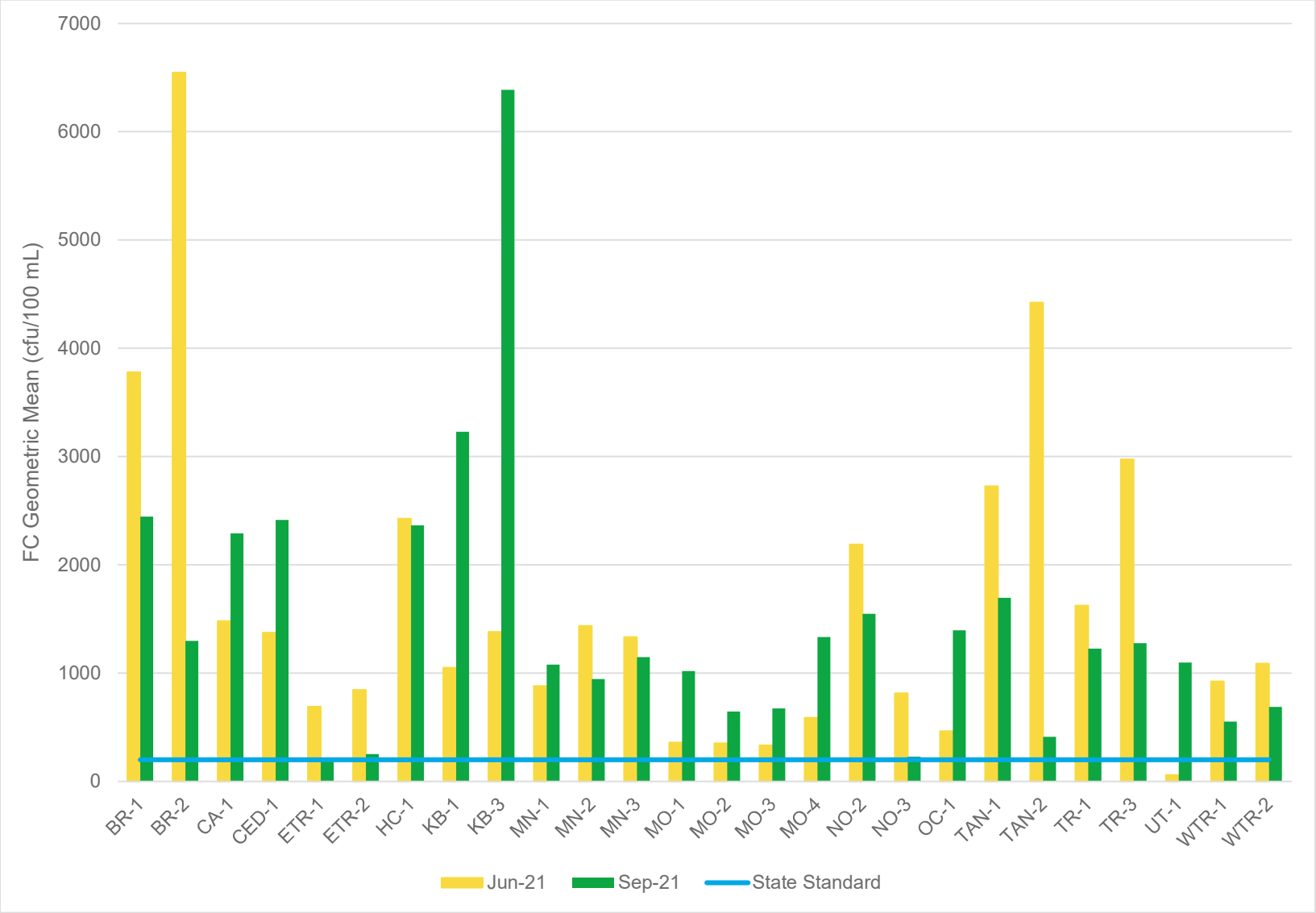

Figure 4. Fecal Coliform Geometric Means (June 2021 and September 2021)

3.2 pH

pH measurements collected for six stations during the study period are shown in Table 8 and on Figure 5. Results in green represent measurements within the standard limit, while results in red represent measurements outside of standard limits of 6.0 to 8.5. For KB-1, all but two measurements were in the standard range. For KB-3, all but two measurements were in the standard range. For CA-1, five of the twelve measurements fell below the standard range. For ESC-1, all but two measurements met the standard range. For NC-1, all measurements met the standard. For NC-2, all but three measurements were within the standard range. Only one pH measurement is being reported in June because the pH meter used to sample was damaged and gave abnormally low readings for the other three June sampling events.

Table 8. pH Measurements

Date	KB-1	KB-3	CA-1	ESC-1	NC-1	NC-2
11/9 - 11/10/2020	7.22	6.92	7.10	6.52	6.34	5.84
11/11 - 11/16/2020	6.75	6.12	5.78	7.29	6.20	6.10
11/17 - 11/18/2020	6.53	6.21	5.74	5.64	6.12	5.24
11/23 - 11/30/2020	6.61	6.57	6.12	5.82	6.24	5.70
1/19 - 1/20/2021	7.35	7.46	6.73	6.28	6.63	6.81
1/25 - 1/26/2021	6.47	6.55	5.93	6.52	6.78	6.82
2/1 – 2/2/2021	5.75	5.75	4.49	6.53	6.63	6.92
2/8 – 2/9/2021	5.56	5.81	4.21	6.62	6.56	6.78
6/23/2021	6.58	6.85	7.34	6.23	6.92	6.56
9/8 - 9/9/2021	6.77	7.10	7.22	6.71	6.50	6.78
9/15	6.63	7.23	NC*	NC*	NC*	NC*
9/21 – 9/23/2021	6.56	6.72	7.12	6.79	6.91	6.61
9/28 – 9/30/2021	7.32	7.12	6.81	6.82	6.71	6.75
Number of Samples	13	13	12	12	12	12
Min	5.56	5.75	4.21	5.64	6.12	5.24
Max	7.35	7.46	7.22	7.29	6.92	6.92
Median	6.61	6.72	6.43	6.53	6.60	6.68
Standard Deviation	0.52	0.54	1.04	0.45	0.27	0.55

*NC = not collected

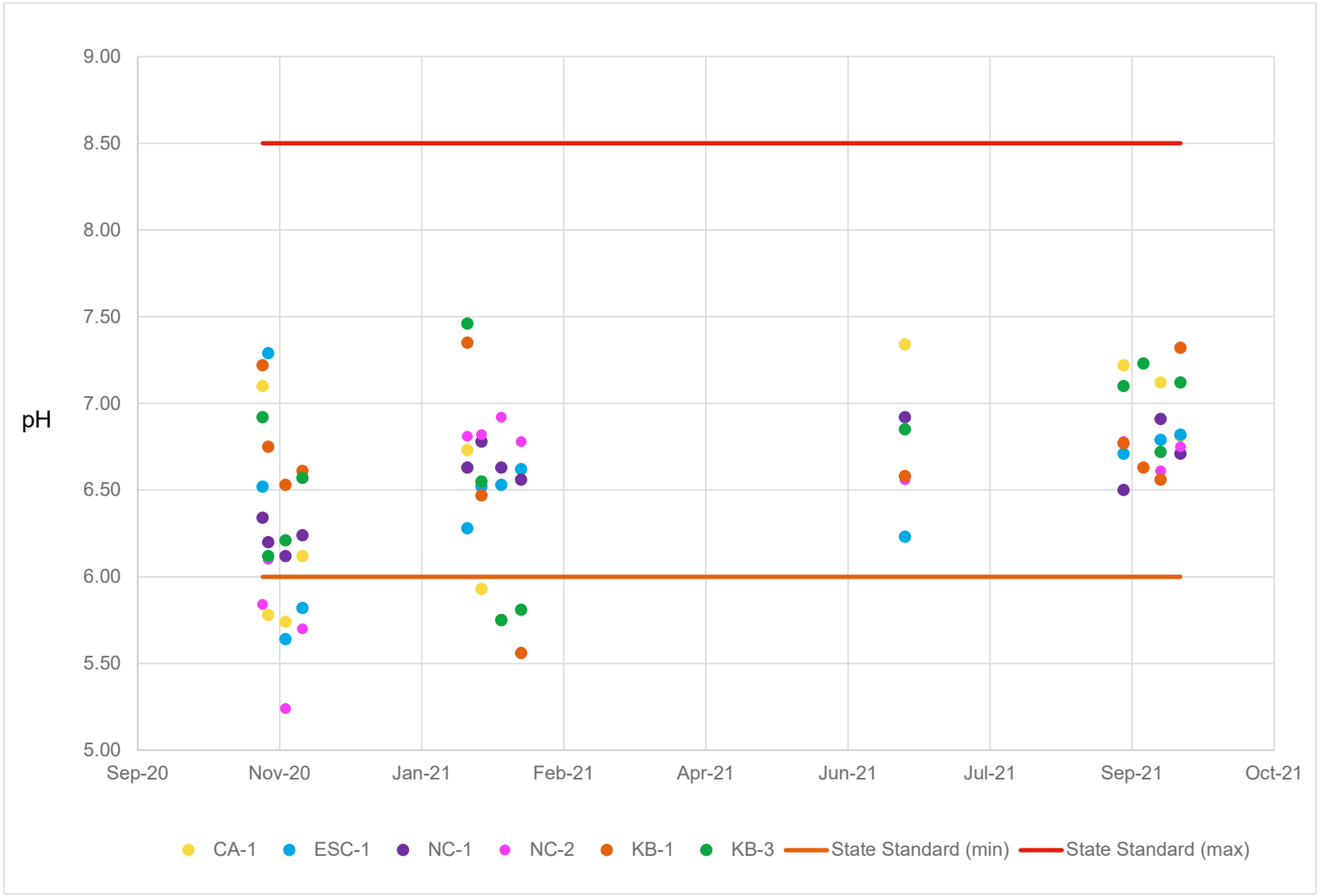

Figure 5. pH Measurements

3.3 Total Suspended Solids

TSS concentrations (milligrams [mg]/L) measured for CA-1, CED-1, NC-1, NC-2, and MO-1 for the study period are presented in Table 9 and on Figure 6. Results for stations CA-1, CED-1, and MO-1 were high in January but were low for the rest of the year, though results for the MO-1 station were slightly higher than the other stations for June and September. Results for NC-1 and NC-2 were consistently low, between 3 and 5 mg/L.

Table 9. Total Suspended Solids (mg/L) Measured at CA-1, CED-1, NC-1, NC-2, MO-1

Date	CA-1	CED-1	NC-1	NC-2	MO-1
11/2020	14.1		6.00	6.00	4.50
1/2021	69.4	78.3	3.26	3.37	59.6
6/2021	3.33	3.33	3.33	4.29	7.10
9/2021	3.16	3.00	3.23	3.13	11.4

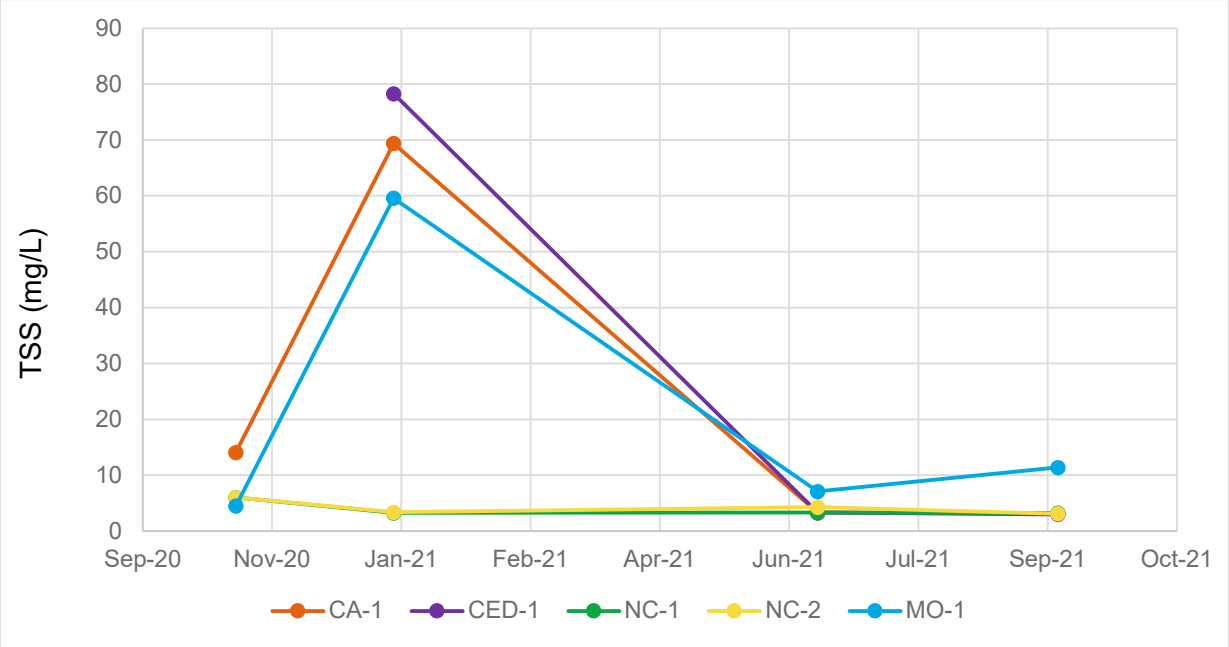

Figure 6. Total Suspended Solids Measured at CA-1, CED-1, NC-1, NC-2, and MO-1

3.4 Quality Assurance/Quality Control

QA/QC procedures were followed during the data collection, data entry, and data analysis components of the project according to the protocols described in the Plan (January 2016). The QA/QC procedures included the collection of blank and duplicate samples throughout the data collection period, completion

of chain-of-custody forms for grab samples delivered to the laboratory for analyses, calibration of the water quality meter used to measure pH in-situ before each pH sampling event, and data entry and data verification checks on the data entered into the master Excel spreadsheet. In total, 18 blank samples and 19 duplicate samples were collected and analyzed during the study period of record.

4 DISCUSSION

4.1 Sampling Results

In some cases, the exceedance of state standards for FC were due in part to the lower geometric mean criteria. During the May – October season, the state standard for geometric mean is 200 CFU/100 mL. During the November – April season, the state standard for geometric mean is 1,000 CFU/100 mL. Geometric means exceeded the state standard of 1,000 CFU/100 mL for 2 of the 26 stations in November and 1 of the 26 stations in January. In June 2021, results from all stations except UT-1 exceeded the FC geometric mean standard of no greater than 200 CFU/100 mL. In September 2021, results from all stations exceeded the standard. However, many results for June 2021 and September 2021 also exceeded the higher standard of 1,000 CFU/100mL.

Seven of 13 of the largest reported concentrations (≥ 16,000 CFU/100 mL) were measured from samples collected on June 22, 2021. Saturated soils from over 1 inch of rainfall on June 20, 2021 likely contributed to elevated fecal coliform concentrations in the June 21 and June 22 samples (Figure 7). Samples on June 21 were collected between 8:05 and 10:50 AM and rainfall on June 21, 2021 totaled less than 0.2 inches at all stations except WTR-2 which was slightly higher. June 22, 2021 rainfall totaled 0.2 inches to 0.4 inches on saturated soils from the previous two days. Saturated conditions increase the possibility of leakage from septic drainage fields and sanitary sewers due to rainwater infiltration. Increased runoff contributes fecal coliform from wildlife and domestic animal sources.

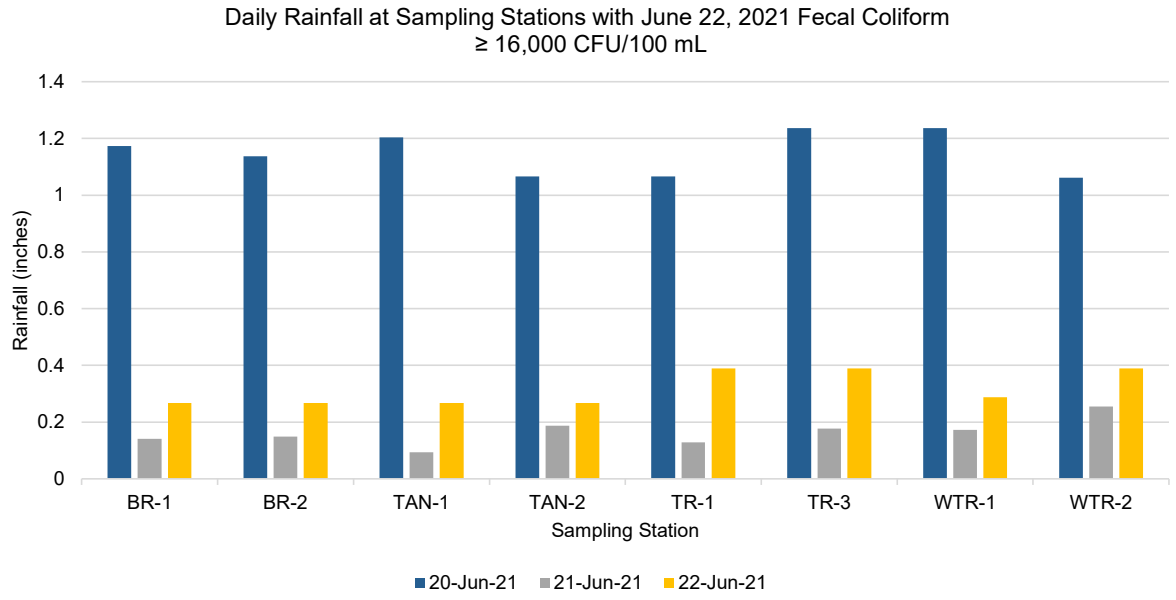

Figure 7. June 20, 21, and 22, 2021 rainfall totals. Daily totals at stations were estimated from NWS (NWS NOAA 2022).

The largest concentrations (≥16,000 CFU/100 mL) for the September geomean were measured on September 9 (HC-1, KB-1, and KB-3) and September 21 (HC-1 and KB-3). Rainfall totals for September 8 ranged from 0.2 inches to over 0.7 inches in the headwaters of North Oconee and Middle Oconee watersheds with totals 0.03 to 0.4 inches near the monitoring locations. Sampling on September 9 occurred between 9:05 and 9:27 AM at HC-1, KB-1, and KB-3. Rainfall totals on September 9 were 0 to 0.2 inches. Because of the small drainage areas and relatively low rainfall totals at HC-1, KB-1 and KB-3, it is unclear if rainfall on September 8 contributed to elevated fecal coliform concentrations in the September 9 samples. The Middle Oconee River Watershed Management Plan (Arcadis-Tetra Tech April 2018b), including Kingswood Branch and Hunnicutt Creek, identified the following fecal coliform sources: pets, wild animals, farms, leaky sewer pipes, and septic systems. There may also be some contribution to fecal coliform levels in the Middle Oconee River Watershed from sources in the headwaters outside of the Athens-Clarke County boundary.

Monthly total rainfall data in 2020 and 2021 compared with the 30-year average (1981 – 2010) are shown in Table 10.

Table 10. Monthly Rainfall Totals for Athens, Georgia (National Weather Service 2021)

	2020 Rainfall (in)	2021 Rainfall (in)	30-year Average (in)
November	2.93		4.10
January		4.65	4.05
June		3.97	4.18
September		2.02	3.94

In addition, the global COVID-19 pandemic that resulted in an increased demand on sewer systems and septic systems serving residential dwellings continued into 2021, as much of the population continued to work from home. As these systems are often sources of fecal impairments, the increase loading on these systems might contribute to more exceedances of state standards as seen in the June, and September results.

For pH measurements for KB-1, all but two measurements attained the standard range. For KB-3, all but two measurements attained the standard range. For ESC-1, two of the twelve measurements fell below the standard range. For NC-1, all measurements met the standard range. For NC-2, three of the twelve measurements fell below the standard range. For CA-1, five of the twelve measurements fell below the standard range.

TSS levels for stations CA-1, CED-1, and MO-1 were high in January but were low for the rest of the year. January 26, 2021 monitoring results for TSS at stations CA-1, CED-1, and MO-1 were high due to heavy rains and thunderstorms within the watershed at the time of sampling. Portions of the CA-1, CED-1 and MO-1 watersheds received 0.7 to 1.0 inch of rainfall in 24 hours (NWS NOAA 2022). The Middle Oconee River Watershed Management Plan identified eroding streambanks and upland areas as well as legacy

sediment from past land use practices as the major sources of sedimentation in the Middle Oconee River and MO-1 station (Arcadis-Tetra Tech April 2018b). Another potential source of excess sediment for the Middle Oconee River may be its tributary Bear Creek. The Bear Creek watershed can receive excess sediment from eroding upland areas and streambanks during rain events (Arcadis-Tetra Tech April 2018a).

The Carr Creek Watershed Management Plan identified eroding streambanks and current development that has encroached on the riparian buffer and increased impervious area and runoff as potential sources of sediment in the Carr Creek watershed and CA-1 station (Unified Government of Athens-Clarke County July 2011, Draft)

The Cedar Creek Watershed Management Plan identified eroding streambanks, significant sand and sediment accumulations from past agricultural practices in the channel that mobilize during rain events, and current development that has encroached on the riparian buffer and increased impervious area and runoff as potential sources of sediment in the Cedar Creek watershed and CED-1 station (Unified Government of Athens-Clarke County July 2011)

Results for NC-1 and NC-2 were consistently low between 3 and 6 mg/L.

4.2 BMP Effectiveness Evaluation

The effectiveness of the BMPs described in Section 2.2 was evaluated in relation to water quality monitoring results collected since implementation of the Plan in October 2015. A summary of the effectiveness evaluations completed for each BMP is provided in Table 10. In general, BMPs are considered to be successful because of the implementation progress made by ACCGOV during the reporting period. However, many variables regarding BMP effectiveness and associated uncertainties are unknown and unmeasured. As a result, the evaluation of BMP effectiveness summarized in Table 11 is considered preliminary and qualitative.

Table 11. Best Management Practices Effectiveness Evaluation

BMP Type	Targeted POCs	Implementation Status	Effectiveness Evaluation	Rationale
Pet waste stations	FC	Implemented, ongoing	Effective	ACC staff continues to actively monitor for pet waste “hot spots” and will install additional pet waste stations or move current stations based on needs.
Sewer evaluation	FC	Implemented, ongoing	Effective	About 2,748,236 feet of sewer lines cleaned by Rodder trucks and flash/vacuum trucks.
Septic system management	FC	Implemented, ongoing	Effective	ACC continued public education and outreach efforts for proper septic system management.

BMP Type	Targeted POCs	Implementation Status	Effectiveness Evaluation	Rationale
Street sweeping	FC and TSS	Implemented, ongoing	Effective	In 2020, approximately 877 miles of roadways were swept, resulting in removal of 1,625 cubic yards of debris from roadways.
TSS reduction: increased construction inspections in Noketchee Creek, Carr Creek, and Middle Oconee watersheds	TSS	Implemented, ongoing	Effective	In 2021, ACCGOV continued inspections in the Noketchee Creek and Carr Creek watersheds, as well as the Middle Oconee watershed. TSS results measured for NC-1 and NC-2 during the 2020-2021 reporting period were low. The results ranged from 3 mg/L to 6 mg/L.

Arcadis also looked at data trends over the entire monitoring period to assess general BMP effectiveness. Appendix B contains charts showing FC by stream, pH measurements, and TSS results since sampling began. Each dataset was fitted with a trendline. TSS results for MO-1 and pH results for CA-1, ESC-1, NC-1, and NC-2 were not analyzed for data trends as 2020 was the first year these samples were taken. TSS results for CED-1 were not analyzed for data trends as 2021 was the first year these samples were taken. Table 12 contains statements concerning the trend of water quality in each stream. It is difficult to make statements about water quality trends based on these trendlines. The data are scattered, producing very low R-squared values. For FC, results at all stations are fluctuating. For pH, results at Kingswood Branch are consistently meeting standards. For TSS, measurements at all stations are fluctuating.

Table 12. Trends in Water Quality by Stream

Reach	FC	pH	TSS
Brooklyn Creek	Fluctuating		
Carr Creek	Fluctuating		Fluctuating
Cedar Creek	Fluctuating		
East Fork Trail Creek	Fluctuating		
Hunnicut Creek	Fluctuating		
Kingswood Branch	Fluctuating	Consistently meets standards	
McNutt Creek	Fluctuating		
Middle Oconee River	Fluctuating		
Noketchee Creek	Fluctuating		Fluctuating

North Oconee River	Fluctuating
Oconee River	Fluctuating
Tanyard Creek	Fluctuating
Trail Creek	Fluctuating
West Fork Trail Creek	Fluctuating

Water quality in all stream reaches appears to be fluctuating. Sample measurements for all POCs are scattered around linear trendlines. Population growth, development, and aging infrastructure are possible explanations for fluctuating water quality.

5 CONCLUSIONS

It is difficult to evaluate BMP effectiveness and trends in water quality due to the limited and scattered data sets and many other unstudied variables and uncertainties. ACCGOV has made significant progress on BMP initiatives since the implementation of the Plan in October 2015. Water quality appears to be fluctuating, and ACCGOV plans to continue with significant BMP initiatives in 2022 to reduce the impacts of POCs and continue to make progress towards achieving water quality standards for receiving waters. It is possible that the fluctuating water quality improvement could be due to population growth; development; aging infrastructure; and an increase in the pet population, use of parks, and waste despite the pet waste management program. One project ACCGOV is implementing to address aging infrastructure and a growing population is the Brooklyn Creek Interceptor Improvements. The project includes replacing the sewer interceptor from the trunk line at the Middle Oconee River up to King Street, as well as increasing pipe size to provide greater capacity based on population projections for the future. Another project ACCGOV is considering is to retrofit an existing underground detention basin located on the Firefly Trail near the intersection with E. Broad Street. Runoff from Clayton Street between Pulaski and Thomas Streets and surrounding areas would be directed here and treated with a proprietary water quality practice.

ACCGOV also plans to begin implementing projects suggested in the nine WMPs completed in 2018.

PUD's contractor will be replacing 8,715 linear feet of 15" sewer pipe with 24" pipe and 288 linear feet of 12" sewer pipe from Dairy Pac Road to the north side of Kathwood Drive on Newton Bridge Road to upsize and realign the Upper North Oconee sewer main. In addition, PUD's on-call contractor will replace the sewer line at Memorial Park to upsize and realign.

In addition, it should be noted that the vast majority of pH samples collected between November 2020 and October 2021 were within state standards. If pH monitoring from November 2021 to October 2022 at CA-1, ESC-1, NC-1, NC-2 follows this trend, the potential for delisting some of these streams for pH impairment should be considered and discussed with GAEPD.

6 REFERENCES

Arcadis-Tetra Tech. 2016. Athens-Clarke County Impaired Waters Monitoring and Implementation Plan and Sampling and Quality Assurance Plan (SQAP). Prepared for Athens-Clarke County, Georgia. 54 pp. January 12.

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APPENDIX A

Water Quality Sample Results (November 2020 – October 2021)

Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
11/9/2020	1010	North Oconee	NO3			40	40		Slight brown mod flow		21	November-April
11/9/2020	1010	North Oconee	NO3	Duplicate		80	#N/A		Slight brown mod flow		21	November-April
11/9/2020	1030	Brooklyn Creek	BR2			270	270		Clear, low flow		21	November-April
11/9/2020	1037	Brooklyn Creek	BR1			1700	1700		Clear, low flow		21	November-April
11/9/2020	1044	Tanyard Creek	TAN2			300	300		Clear, low flow		21	November-April
11/9/2020	1050	Tanyard Creek	TAN1			220	220		Clear, low flow		21	November-April
11/9/2020	1125	West Trail Creek	WTR1			800	800		Clear, low flow		21	November-April
11/9/2020	1135	East Trail Creek	ETR1			220	220		Clear, low flow		21	November-April
11/9/2020	1145	East Trail Creek	ETR2			40	40		Clear, low flow		21	November-April
11/9/2020	1155	West Trail Creek	WTR2			500	500		Clear, low flow		21	November-April
11/9/2020	1204	Trail Creek	TR1			700	700		Clear, low flow		21	November-April
11/9/2020	1220	Trail Creek	TR3			230	230		Slight brown, mod flow		21	November-April
11/9/2020	1225	North Oconee	NO2			800	800		Clear, low flow		21	November-April
11/9/2020	1230	North Oconee	NO2	Blank	<	20	#N/A		Clear, low flow		21	November-April
11/10/2020	0910	McNutt Creek	MN3			1300	1300		Clear, low flow		21	November-April
11/10/2020	0910	McNutt Creek	MN3	Duplicate		1100	#N/A		Clear, low flow		21	November-April
11/10/2020	0930	Middle Oconee	MO1			300	300		Slight brown, mod flow		21	November-April
11/10/2020	0950	Hunnicutt Creek	HC1			170	170		Clear, low flow		21	November-April
11/10/2020	1000	Middle Oconee	MO2			70	70		Slight brown, low flow		21	November-April
11/10/2020	1015	Kingswood Branch	KB1			140	140		Clear, mod flow		21	November-April
11/10/2020	1020	Kingswood Branch	KB3			500	500		Clear, low flow		21	November-April
11/10/2020	1028	McNutt Creek	MN2			500	500		Clear, mod flow		21	November-April
11/10/2020	1045	McNutt Creek	MN1			300	300		Clear, mod flow		21	November-April
11/10/2020	1052	Middle Oconee	MO3			300	300		Clear, mod flow		21	November-April
11/10/2020	1110	Unnamed Tributary	UT1			340	340		Clear, low flow		21	November-April
11/10/2020	1120	Middle Oconee	MO4			300	300		Clear, mod flow		21	November-April
11/10/2020	1130	Oconee River	OC1			110	110		Clear, mod flow		21	November-April
11/10/2020	1137	Cedar Creek	CED1			800	800		Clear, low flow		21	November-April
11/10/2020	1145	Carr Creek	CA1			170	170		Clear, low flow		21	November-April
11/10/2020	1145	Carr Creek	CA1	Blank	<	20	#N/A		Clear, low flow		21	November-April
11/11/2020	0820	North Oconee	NO3			300	300	Rain	Brown and turbid, high flow		21	November-April
11/11/2020	0820	North Oconee	NO3	Duplicate		500	#N/A	Rain	Brown and turbid, high flow		21	November-April
11/11/2020	0827	Brooklyn Creek	BR2			9000	9000	Rain	Parts of water black, mod flow	2 pipes going into stream	21	November-April
11/11/2020	0835	Brooklyn Creek	BR1			5000	5000	Rain	Dark brown, mod flow		21	November-April
11/11/2020	0845	Tanyard Creek	TAN2			2400	2400	Rain	Dark brown/black water, low flow		21	November-April
11/11/2020	0852	Tanyard Creek	TAN1			3000	3000	Rain	Black, low flow		21	November-April
11/11/2020	0940	West Trail Creek	WTR1			270	270	Rain	Slight brown, mod flow		21	November-April
11/11/2020	0955	East Trail Creek	ETR1			500	500	Rain	Brown, mod flow		21	November-April
11/11/2020	1015	East Trail Creek	ETR2			500	500	Rain	Brown, mod flow		21	November-April
11/11/2020	1030	West Trail Creek	WTR2			500	500	Rain	Slight brown, mod flow		21	November-April
11/11/2020	1046	Trail Creek	TR1			700	700	Rain	Slight brown, high flow		21	November-April
11/11/2020	1057	Trail Creek	TR3			1300	1300	Rain	Brown, mod flow		21	November-April
11/11/2020	1110	North Oconee	NO2			230	230	Rain	Brown, mod flow		21	November-April
11/11/2020	1110	North Oconee	NO2	Blank	<	20	#N/A	Rain	Brown, mod flow		21	November-April
11/16/2020	0820	McNutt Creek	MN3			80	80		Clear, low flow		21	November-April
11/16/2020	0820	McNutt Creek	MN3	Duplicate		170	#N/A		Clear, low flow		21	November-April
11/16/2020	0830	Middle Oconee	MO1			110	110		Slight brown, mod flow		21	November-April
11/16/2020	0900	Hunnicutt Creek	HC1			300	300		Clear, mod flow		21	November-April
11/16/2020	0905	Middle Oconee	MO2			110	110		Slight brown, mod flow		21	November-April
11/16/2020	0925	Kingswood Branch	KB1			170	170		Clear, low flow		21	November-April
11/16/2020	0930	Kingswood Branch	KB3			300	300		Clear, low flow		21	November-April
11/16/2020	0938	McNutt Creek	MN2			340	340		Clear, low flow		21	November-April
11/16/2020	0945	McNutt Creek	MN1			40	40		Slight brown, mod flow		21	November-April
11/16/2020	1000	Middle Oconee	MO3			80	80		Slight brown, mod flow		21	November-April
11/16/2020	1025	Unnamed Tributary	UT1			40	40		Clear, low flow		21	November-April
11/16/2020	1030	Middle Oconee	MO4			80	80		Slight brown, mod flow		21	November-April
11/16/2020	1040	Oconee River	OC1			80	80		Slight brown, mod flow		21	November-April
11/16/2020	1055	Cedar Creek	CED1			1100	1100		Clear, low flow		21	November-April
11/16/2020	1108	Carr Creek	CA1			170	170		Clear, low flow		21	November-April
11/16/2020	1108	Carr Creek	CA1	Blank	<	20	#N/A		Clear, low flow		21	November-April
11/17/2020	0825	North Oconee	NO3			130	130		Slight brown, mod flow		21	November-April

Values highlighted in red represent results exceeding the state standard of a maximum of 4000 cfu/100mL for a single sample.

Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
11/17/2020	0825	North Oconee	NO3	Duplicate		130	#N/A		Clear, mod flow		21	November-April
11/17/2020	0838	Brooklyn Creek	BR2			230	230		Clear, low flow		21	November-April
11/17/2020	0847	Brooklyn Creek	BR1			1700	1700		Clear, low flow		21	November-April
11/17/2020	0855	Tanyard Creek	TAN2			500	500		Clear, low flow		21	November-April
11/17/2020	0901	Tanyard Creek	TAN1			500	500		Clear, low flow		21	November-April
11/17/2020	0947	West Trail Creek	WTR1			80	80		Clear, low flow		21	November-April
11/17/2020	0958	East Trail Creek	ETR1			340	340		Clear, low flow		21	November-April
11/17/2020	1005	East Trail Creek	ETR2			700	700		Clear, low flow		21	November-April
11/17/2020	1015	West Trail Creek	WTR2			140	140		Clear, mod flow		21	November-April
11/17/2020	1025	Trail Creek	TR1			130	130		Clear, mod flow		21	November-April
11/17/2020	1035	Trail Creek	TR3			230	230		Clear, mod flow		21	November-April
11/17/2020	1040	North Oconee	NO2			40	40		Slight brown, mod flow		21	November-April
11/17/2020	1040	North Oconee	NO2	Blank	<	20	#N/A		Slight brown, mod flow		21	November-April
11/18/2020	0906	McNutt Creek	MN3			170	170	Sunny	Clear, mod flow		21	November-April
11/18/2020	0906	McNutt Creek	MN3	Duplicate		170	#N/A	Sunny	Clear, mod flow		21	November-April
11/18/2020	0928	Middle Oconee	MO1			140	140	Sunny	Brown, mod flow		21	November-April
11/18/2020	0940	Hunnicutt Creek	HC1			300	300	Sunny	Clear, mod flow		21	November-April
11/18/2020	0942	Middle Oconee	MO2			70	70	Sunny	Slight brown, mod flow		21	November-April
11/18/2020	0954	Kingswood Branch	KB1			270	270	Sunny	Clear, low flow		21	November-April
11/18/2020	1000	Kingswood Branch	KB3			270	270	Sunny	Clear, low flow		21	November-April
11/18/2020	1009	McNutt Creek	MN2			20	20	Sunny	Clear, mod flow		21	November-April
11/18/2020	1018	McNutt Creek	MN1			130	130	Sunny	Clear, mod flow		21	November-April
11/18/2020	1032	Middle Oconee	MO3			140	140	Sunny	Slight brown, mod flow		21	November-April
11/18/2020	1048	Unnamed Tributary	UT1			20	20	Sunny	Clear, low flow		21	November-April
11/18/2020	1056	Middle Oconee	MO4			80	80	Sunny	Slight brown, mod flow		21	November-April
11/18/2020	1110	Oconee River	OC1			220	220	Sunny	Slight brown, mod flow		21	November-April
11/18/2020	1120	Cedar Creek	CED1			300	300	Sunny	Clear, mod flow		21	November-April
11/18/2020	1130	Carr Creek	CA1			300	300	Sunny	Clear, mod flow		21	November-April
11/18/2020	1130	Carr Creek	CA1	Blank	<	20	#N/A	Sunny	Clear, mod flow		21	November-April
11/23/2020	0737	North Oconee	NO3			220	220	Sunny	Brown, mod flow		21	November-April
11/23/2020	0737	North Oconee	NO3	Duplicate		130	#N/A	Sunny	Brown, mod flow		21	November-April
11/23/2020	0750	Brooklyn Creek	BR2			230	230	Sunny	Clear, mod flow		21	November-April
11/23/2020	0805	Brooklyn Creek	BR1			130	130	Sunny	Clear, low flow		21	November-April
11/23/2020	0818	Tanyard Creek	TAN2			1300	1300	Sunny	Clear, low flow		21	November-April
11/23/2020	0830	Tanyard Creek	TAN1			800	800	Sunny	Clear, low flow		21	November-April
11/23/2020	0933	West Trail Creek	WTR1			110	110	Sunny	Clear, low flow		21	November-April
11/23/2020	0943	East Trail Creek	ETR1			300	300	Sunny	Clear, mod flow		21	November-April
11/23/2020	1000	East Trail Creek	ETR2			2400	2400	Sunny	Slight brown, mod flow		21	November-April
11/23/2020	1010	West Trail Creek	WTR2			80	80	Sunny	Clear, mod flow		21	November-April
11/23/2020	1024	Trail Creek	TR1			110	110	Sunny	Slight brown, mod flow		21	November-April
11/23/2020	1035	Trail Creek	TR3			1300	1300	Sunny	Clear, mod flow		21	November-April
11/23/2020	1043	North Oconee	NO2			20	20	Sunny	Brown, mod flow		21	November-April
11/23/2020	1043	North Oconee	NO2	Blank	<	20	#N/A	Sunny	Brown, mod flow		21	November-April
11/30/2020	0818	McNutt Creek	MN3			9000	9000	Heavy rain	Brown, mod flow		21	November-April
11/30/2020	0836	Middle Oconee	MO1			3000	3000	Heavy rain	Brown, mod flow		21	November-April
11/30/2020	0850	Hunnicutt Creek	HC1			2400	2400	Heavy rain	Brown/turbid, high flow		21	November-April
11/30/2020	0850	Middle Oconee	MO2			9000	9000	Heavy rain	Brown, high flow		21	November-April
11/30/2020	0902	Kingswood Branch	KB1			800	800	Heavy rain	Slight brown, mod flow		21	November-April
11/30/2020	0902	Kingswood Branch	KB1	Duplicate		800	#N/A	Heavy rain	Slight brown, mod flow		21	November-April
11/30/2020	0910	Kingswood Branch	KB3			5000	5000	Heavy rain	Slight brown, mod flow		21	November-April
11/30/2020	0918	McNutt Creek	MN2			9000	9000	Heavy rain	Brown, high flow		21	November-April
11/30/2020	0928	McNutt Creek	MN1			9000	9000	Heavy rain	Brown, high flow		21	November-April
11/30/2020	0948	Middle Oconee	MO3			1300	1300	Heavy rain	Brown, high flow		21	November-April
11/30/2020	1004	Unnamed Tributary	UT1			2400	2400	Heavy rain	Slight brown, mod flow		21	November-April
11/30/2020	1016	Middle Oconee	MO4			16000	16000	Heavy rain	Brown, high flow		21	November-April
11/30/2020	1032	Oconee River	OC1			5000	5000	Heavy rain	Brown, high flow		21	November-April
11/30/2020	1036	Cedar Creek	CED1			9000	9000	Heavy rain	Brown, mod flow		21	November-April
11/30/2020	1046	Carr Creek	CA1			9000	9000	Heavy rain	Brown, high flow		21	November-April
11/30/2020	1046	Carr Creek	CA1	Blank	<	20	#N/A	Heavy rain	Brown, high flow		21	November-April
1/19/2021	0900	McNutt Creek	MN3			170	170	Sunny, clear skies	Clear, low flow		22	November-April
1/19/2021	0900	McNutt Creek	MN3	Duplicate		220	#N/A	Sunny, clear skies			22	November-April

Values highlighted in red represent results exceeding the state standard of a maximum of 4000 cfu/100mL for a single sample.

FC Raw Data

Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
1/19/2021	0930	Middle Oconee	MO1			130	130	Sunny, clear skies	Slight brown/turbid, mod flow		22	November-April
1/19/2021	0953	Hunnicutt Creek	HC1			170	170	Sunny, clear skies	Clear, mod flow		22	November-April
1/19/2021	0955	Middle Oconee	MO2			80	80	Sunny, clear skies	Brown/turbid, mod flow		22	November-April
1/19/2021	1004	Kingswood Branch	KB1			500	500	Sunny, clear skies	Clear, mod flow		22	November-April
1/19/2021	1011	Kingswood Branch	KB3			80	80	Sunny, clear skies	Clear, low flow		22	November-April
1/19/2021	1018	McNutt Creek	MN2			80	80	Sunny, clear skies	Clear, high flow		22	November-April
1/19/2021	1038	McNutt Creek	MN1			80	80	Sunny, clear skies	Slight brown/turbid, mod flow		22	November-April
1/19/2021	1049	Middle Oconee	MO3			170	170	Sunny, clear skies	Slight brown/turbid, mod flow		22	November-April
1/19/2021	1106	Unnamed Tributary	UT1			40	40	Sunny, clear skies	Clear, low flow		22	November-April
1/19/2021	1116	Middle Oconee	MO4			170	170	Sunny, clear skies	Slight brown, mod flow		22	November-April
1/19/2021	1130	Oconee River	OC1			80	80	Sunny, clear skies	Brown, mod flow		22	November-April
1/19/2021	1142	Cedar Creek	CED1			300	300	Sunny, clear skies	Clear, low flow		22	November-April
1/19/2021	1200	Carr Creek	CA1		<	20	10	Sunny, clear skies	Clear, mod flow		22	November-April
1/19/2021	1200	Carr Creek	CA1	Blank	<	20	#N/A	Sunny, clear skies	Clear, mod flow		22	November-April
1/20/2021	0837	North Oconee	NO3			230	230	Sunny, clear skies	Brown/turbid, high flow		22	November-April
1/20/2021	0837	North Oconee	NO3	Duplicate		170	#N/A	Sunny, clear skies	Brown/turbid, high flow		22	November-April
1/20/2021	0852	Brooklyn Creek	BR2			300	300	Sunny, clear skies	Clear, low flow		22	November-April
1/20/2021	0904	Brooklyn Creek	BR1			300	300	Sunny, clear skies	Clear, low flow		22	November-April
1/20/2021	0916	Tanyard Creek	TAN2			80	80	Sunny, clear skies	Clear, low flow		22	November-April
1/20/2021	0921	Tanyard Creek	TAN1		<	20	10	Sunny, clear skies	Clear, low flow		22	November-April
1/20/2021	1015	West Trail Creek	WTR1			230	230	Sunny, clear skies	Clear, low flow		22	November-April
1/20/2021	1025	East Trail Creek	ETR1			500	500	Sunny, clear skies	Clear, low flow		22	November-April
1/20/2021	1035	East Trail Creek	ETR2			2400	2400	Sunny, clear skies	Clear, low flow		22	November-April
1/20/2021	1045	West Trail Creek	WTR2			40	40	Sunny, clear skies	Clear, low flow		22	November-April
1/20/2021	1054	Trail Creek	TR1			1300	1300	Sunny, clear skies	Brown/turbid, mod flow		22	November-April
1/20/2021	1104	Trail Creek	TR3			800	800	Sunny, clear skies	Slight brown, mod flow		22	November-April
1/20/2021	1113	North Oconee	NO2			110	110	Sunny, clear skies	Brown, mod flow		22	November-April
1/20/2021	1113	North Oconee	NO2	Blank	<	110	#N/A	Sunny, clear skies	Brown, mod flow		22	November-April
1/25/2021	0735	North Oconee	NO3			300	300	Cloudy, slight rain	Brown, mod flow		22	November-April
1/25/2021	0735	North Oconee	NO3	Duplicate		130	#N/A	Cloudy, slight rain	Brown, mod flow		22	November-April
1/25/2021	0748	Brooklyn Creek	BR2			90	90	Cloudy, slight rain	Clear, low flow		22	November-April
1/25/2021	0755	Brooklyn Creek	BR1			800	800	Cloudy, slight rain	Clear, low flow		22	November-April
1/25/2021	0808	Tanyard Creek	TAN2			80	80	Cloudy, slight rain	Clear, low flow		22	November-April
1/25/2021	0815	Tanyard Creek	TAN1			40	40	Cloudy, slight rain	Clear, low flow		22	November-April
1/25/2021	0915	West Trail Creek	WTR1			80	80	Cloudy, slight rain	Slight brown, mod flow		22	November-April
1/25/2021	0922	East Trail Creek	ETR1			500	500	Cloudy, slight rain	Slight brown, mod flow		22	November-April
1/25/2021	0934	East Trail Creek	ETR2			220	220	Cloudy, slight rain	Slight brown, mod flow		22	November-April
1/25/2021	0946	West Trail Creek	WTR2			20	20	Cloudy, slight rain	Slight brown, low flow		22	November-April
1/25/2021	1000	Trail Creek	TR1			110	110	Cloudy, slight rain	Clear, mod flow		22	November-April
1/25/2021	1009	Trail Creek	TR3			3000	3000	Cloudy, slight rain	Slight brown, mod flow		22	November-April
1/25/2021	1016	North Oconee	NO2			110	110	Cloudy, slight rain	Brown, low flow		22	November-April
1/26/2021	0800	McNutt Creek	MN3			2400	2400	Heavy rain and thunderstorms	Very brown/turbid, high flow		22	November-April
1/26/2021	0800	McNutt Creek	MN3	Duplicate		2400	#N/A	Heavy rain and thunderstorms	Very brown/turbid, high flow		22	November-April
1/26/2021	0820	Middle Oconee	MO1			1700	1700	Heavy rain and thunderstorms	Very brown, mod flow		22	November-April
1/26/2021	0835	Hunnicutt Creek	HC1			5000	5000	Heavy rain and thunderstorms	Very brown/turbid, high flow		22	November-April
1/26/2021	0838	Middle Oconee	MO2			500	500	Heavy rain and thunderstorms	Very brown, mod flow		22	November-April
1/26/2021	0855	Kingswood Branch	KB1			800	800	Heavy rain and thunderstorms	Brown, mod flow		22	November-April
1/26/2021	0900	Kingswood Branch	KB3			500	500	Heavy rain and thunderstorms	Brown, mod flow		22	November-April
1/26/2021	0910	McNutt Creek	MN2			2800	2800	Heavy rain and thunderstorms	Very brown and turbid, high flow		22	November-April
1/26/2021	0925	McNutt Creek	MN1			3000	3000	Heavy rain and thunderstorms	Brown and turbid, mod flow		22	November-April
1/26/2021	0938	Middle Oconee	MO3			5000	5000	Heavy rain and thunderstorms	Brown and turbid, mod flow		22	November-April
1/26/2021	0952	Unnamed Tributary	UT1			130	130	Heavy rain and thunderstorms	Slight brown, mod flow		22	November-April
1/26/2021	1005	Middle Oconee	MO4			16000	16000	Heavy rain and thunderstorms	Brown and turbid, mod flow		22	November-April
1/26/2021	1020	Oconee River	OC1			1300	1300	Heavy rain and thunderstorms	Brown, mod flow		22	November-April
1/26/2021	1033	Cedar Creek	CED1			9000	9000	Heavy rain and thunderstorms	Brown, mod flow		22	November-April
1/26/2021	1045	Carr Creek	CA1			1300	1300	Heavy rain and thunderstorms	Brown, high flow		22	November-April
1/26/2021	1045	Carr Creek	CA1	Blank	<	20	#N/A	Heavy rain and thunderstorms	Brown, high flow		22	November-April
2/1/2021	0825	North Oconee	NO3			20	20	Cloudy, after rains	Brown, high flow		22	November-April
2/1/2021	0825	North Oconee	NO3	Duplicate		170	#N/A	Cloudy, after rains	Brown, high flow		22	November-April
2/1/2021	0846	Brooklyn Creek	BR2			1100	1100	Cloudy, after rains	Clear, low flow		22	November-April
2/1/2021	0858	Brooklyn Creek	BR1			500	500	Cloudy, after rains	Clear, low flow		22	November-April

Values highlighted in red represent results exceeding the state standard of a maximum of 4000 cfu/100mL for a single sample.

Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
2/1/2021	0903	Tanyard Creek	TAN2			170	170	Cloudy, after rains	Clear, low flow		22	November-April
2/1/2021	0907	Tanyard Creek	TAN1			170	170	Cloudy, after rains	Clear, low flow		22	November-April
2/1/2021	1003	West Trail Creek	WTR1			170	170	Cloudy, after rains	Slight brown, mod flow		22	November-April
2/1/2021	1015	East Trail Creek	ETR1			270	270	Cloudy, after rains	Slight brown, mod flow		22	November-April
2/1/2021	1021	East Trail Creek	ETR2			130	130	Cloudy, after rains	Slight brown, mod flow		22	November-April
2/1/2021	1038	West Trail Creek	WTR2			20	20	Cloudy, after rains	Slight brown, mod flow		22	November-April
2/1/2021	1049	Trail Creek	TR1			40	40	Cloudy, after rains	Clear, high flow		22	November-April
2/1/2021	1054	Trail Creek	TR3			90	90	Cloudy, after rains	Slight brown/green, mod flow		22	November-April
2/1/2021	1058	North Oconee	NO2			1700	1700	Cloudy, after rains	Brown, mod flow		22	November-April
2/1/2021	1058	North Oconee	NO2	Blank	<	20	#N/A	Cloudy, after rains	Brown, mod flow		22	November-April
2/2/2021	0815	McNutt Creek	MN3			60	60		Clear, mod flow		22	November-April
2/2/2021	0830	Middle Oconee	MO1			300	300		Brown, low flow		22	November-April
2/2/2021	0850	Hunnicutt Creek	HC1			500	500		Clear, low flow		22	November-April
2/2/2021	0815	Hunnicutt Creek	HC1	Duplicate		700	#N/A		Clear, mod flow		22	November-April
2/2/2021	0850	Middle Oconee	MO2			500	500		Brown, low flow		22	November-April
2/2/2021	0907	Kingswood Branch	KB1			20	20		Clear, low flow		22	November-April
2/2/2021	0912	Kingswood Branch	KB3			110	110		Clear, low flow		22	November-April
2/2/2021	0922	McNutt Creek	MN2			130	130		Slight brown, mod flow		22	November-April
2/2/2021	0938	McNutt Creek	MN1			220	220		Brown, mod flow		22	November-April
2/2/2021	0950	Middle Oconee	MO3			80	80		Brown, mod flow		22	November-April
2/2/2021	1017	Unnamed Tributary	UT1		<	20	10		Clear, low flow		22	November-April
2/2/2021	1025	Middle Oconee	MO4			270	270		Brown, mod flow		22	November-April
2/2/2021	1040	Oconee River	OC1			300	300		Brown, mod flow		22	November-April
2/2/2021	1053	Cedar Creek	CED1			230	230		Clear, mod flow		22	November-April
2/2/2021	1102	Carr Creek	CA1			140	140		Clear, mod flow		22	November-April
2/8/2021	0810	North Oconee	NO3			2200	2200	Sunny, snowed previous day	Brown, high flow		22	November-April
2/8/2021	0810	North Oconee	NO3	Duplicate		1100	#N/A	Sunny, snowed previous day	Brown, high flow		22	November-April
2/8/2021	0830	Brooklyn Creek	BR2			340	340	Sunny, snowed previous day	Clear, low flow		22	November-April
2/8/2021	0838	Brooklyn Creek	BR1			1300	1300	Sunny, snowed previous day	Clear, low flow		22	November-April
2/8/2021	0845	Tanyard Creek	TAN2			80	80	Sunny, snowed previous day	Clear, low flow		22	November-April
2/8/2021	0850	Tanyard Creek	TAN1			40	40	Sunny, snowed previous day	Clear, low flow		22	November-April
2/8/2021	0938	West Trail Creek	WTR1			40	40	Sunny, snowed previous day	Slight brown, low flow		22	November-April
2/8/2021	1002	East Trail Creek	ETR2			230	230	Sunny, snowed previous day	Clear, low flow		22	November-April
2/8/2021	1019	West Trail Creek	WTR2			80	80	Sunny, snowed previous day	Clear, low flow		22	November-April
2/8/2021	1030	Trail Creek	TR1			1300	1300	Sunny, snowed previous day	Clear, mod flow		22	November-April
2/8/2021	1036	Trail Creek	TR3			3000	3000	Sunny, snowed previous day	Slight brown, mod flow		22	November-April
2/8/2021	1040	North Oconee	NO2			300	300	Sunny, snowed previous day	Brown, low flow		22	November-April
2/8/2021	1040	North Oconee	NO2	Blank	<	20	#N/A	Sunny, snowed previous day	Brown, low flow		22	November-April
2/9/2021	0800	McNutt Creek	MN3			300	300	Cloudy	Clear, mod flow		22	November-April
2/9/2021	0820	Middle Oconee	MO1			500	500	Cloudy	Slight brown, low flow		22	November-April
2/9/2021	0840	Hunnicutt Creek	HC1			300	300	Cloudy	Clear, mod flow		22	November-April
2/9/2021	0842	Middle Oconee	MO2			500	500	Cloudy	Brown, low flow		22	November-April
2/9/2021	0852	Kingswood Branch	KB1			20	20	Cloudy	Clear, low flow		22	November-April
2/9/2021	0900	Kingswood Branch	KB3			70	70	Cloudy	Clear, low flow		22	November-April
2/9/2021	0910	McNutt Creek	MN2			80	80	Cloudy	Clear, mod flow		22	November-April
2/9/2021	0921	McNutt Creek	MN1			80	80	Cloudy	Brown, mod flow		22	November-April
2/9/2021	0932	Middle Oconee	MO3			500	500	Cloudy	Brown, low flow		22	November-April
2/9/2021	0955	Unnamed Tributary	UT1		<	20	10	Cloudy	Clear, low flow		22	November-April
2/9/2021	1005	Middle Oconee	MO4			300	300	Cloudy	Brown, low flow		22	November-April
2/9/2021	1044	Oconee River	OC1			800	800	Cloudy	Brown, low flow		22	November-April
2/9/2021		East Trail Creek	ETR1			800	800	Cloudy			22	November-April
2/9/2021	1050	Cedar Creek	CED1			1700	1700	Cloudy	Clear, mod flow		22	November-April
2/9/2021	1118	Carr Creek	CA1			110	110	Cloudy	Clear, mod flow		22	November-April
2/9/2021	0800	Carr Creek	CA1	Duplicate		110	#N/A	Cloudy	Clear, mod flow		22	November-April
6/8/2021	0720	McNutt Creek	MN3			700	700	Cloudy	Slight brown, low flow		23	May-October
6/8/2021	0745	McNutt Creek	MN3	Duplicate		220	#N/A	Cloudy	Slight brown, low flow		23	May-October
6/8/2021	0802	Middle Oconee	MO1			230	230	Cloudy	Slight brown, low flow		23	May-October
6/8/2021	0806	Hunnicutt Creek	HC1		>	16000	17000	Cloudy	Clear, low flow		23	May-October
6/8/2021	0817	Middle Oconee	MO2			170	170	Cloudy	Slight brown, low flow		23	May-October
6/8/2021	0824	Kingswood Branch	KB1			500	500	Cloudy	Clear, mod flow		23	May-October
6/8/2021	0831	Kingswood Branch	KB3			2200	2200	Cloudy	Clear, mod flow		23	May-October

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Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
6/8/2021	0850	McNutt Creek	MN2			5000	5000	Cloudy	Slight brown, mod flow		23	May-October
6/8/2021	0855	McNutt Creek	MN1			3000	3000	Cloudy	Slight brown, mod flow		23	May-October
6/8/2021	0913	Middle Oconee	MO3			500	500	Cloudy	Brown, mod flow		23	May-October
6/8/2021	0918	Unnamed Tributary	UT1			170	170	Cloudy	Clear, low flow		23	May-October
6/8/2021	0932	Middle Oconee	MO4			1100	1100	Cloudy	Brown, mod flow		23	May-October
6/8/2021	0945	Oconee River	OC1			800	800	Cloudy	Brown, mod flow		23	May-October
6/8/2021	0100	Cedar Creek	CED1			700	700	Cloudy	Clear, low flow		23	May-October
6/8/2021	1200	Carr Creek	CA1			500	500	Cloudy	Clear, mod flow		23	May-October
6/8/2021	1200	Carr Creek	CA1	Blank	<	20	#N/A	Cloudy			23	May-October
6/9/2021	0800	North Oconee	NO3			1400	1400	Cloudy	Brown, mod flow		23	May-October
6/9/2021	0800	North Oconee	NO3	Duplicate		800	#N/A	Cloudy	Brown, mod flow		23	May-October
6/9/2021	0815	Brooklyn Creek	BR2			5000	5000	Cloudy	Clear/cloudy, low flow		23	May-October
6/9/2021	0820	Brooklyn Creek	BR1			3000	3000	Cloudy	Clear, low flow		23	May-October
6/9/2021	0830	Tanyard Creek	TAN2			5000	5000	Cloudy	Clear, low flow		23	May-October
6/9/2021	0835	Tanyard Creek	TAN1			500	500	Cloudy	Clear, some black areas, low flow		23	May-October
6/9/2021	0915	West Trail Creek	WTR1			500	500	Cloudy	Clear, low flow		23	May-October
6/9/2021	0945	East Trail Creek	ETR1			300	300	Cloudy	Clear, low flow		23	May-October
6/9/2021	0958	East Trail Creek	ETR2			260	260	Cloudy	Slight brown, mod flow		23	May-October
6/9/2021	1006	West Trail Creek	WTR2			140	140	Cloudy	Slight brown, mod flow		23	May-October
6/9/2021	1014	Trail Creek	TR1			800	800	Cloudy	Clear, mod flow		23	May-October
6/9/2021	1022	Trail Creek	TR3			800	800	Cloudy	Clear, mod flow		23	May-October
6/9/2021	1030	North Oconee	NO2			1700	1700	Cloudy	Brown, low flow		23	May-October
6/9/2021	1030	North Oconee	NO2	Blank	<	20	#N/A	Cloudy			23	May-October
6/14/2021	0802	McNutt Creek	MN3			3000	3000	Sunny	Slight brown, mod flow		23	May-October
6/14/2021	0822	Middle Oconee	MO1			230	230	Sunny	Brown, low flow		23	May-October
6/14/2021	0840	Hunnicutt Creek	HC1			2400	2400	Sunny	Clear, low flow		23	May-October
6/14/2021	0840	McNutt Creek	HC1	Duplicate		1300	#N/A	Sunny	Clear, low flow		23	May-October
6/14/2021	0842	Middle Oconee	MO2			230	230	Sunny	Brown, low flow		23	May-October
6/14/2021	0900	Kingswood Branch	KB1			2200	2200	Sunny	Clear, low flow		23	May-October
6/14/2021	0907	Kingswood Branch	KB3			1100	1100	Sunny	Clear, mod flow		23	May-October
6/14/2021	0912	McNutt Creek	MN2			1100	1100	Sunny	Slight brown, mod flow		23	May-October
6/14/2021	0930	McNutt Creek	MN1			800	800	Sunny	Slight brown, mod flow		23	May-October
6/14/2021	0940	Middle Oconee	MO3			270	270	Sunny	Brown, mod flow		23	May-October
6/14/2021	1005	Unnamed Tributary	UT1			80	80	Sunny	Clear, low flow		23	May-October
6/14/2021	1012	Middle Oconee	MO4			300	300	Sunny	Brown, mod flow		23	May-October
6/14/2021	1035	Oconee River	OC1			500	500	Sunny	Brown, low flow		23	May-October
6/14/2021	1045	Cedar Creek	CED1			1300	1300	Sunny	Clear, low flow		23	May-October
6/14/2021	1057	Carr Creek	CA1			3000	3000	Sunny	Clear, mod flow		23	May-October
6/14/2021	1057	Carr Creek	CA1	Blank	<	20	#N/A	Sunny			23	May-October
6/16/2021	0806	North Oconee	NO3			230	230	Cloudy	Brown, mod flow		23	May-October
6/16/2021	0822	Brooklyn Creek	BR2			2400	2400	Cloudy	Clear/cloudy, low flow		23	May-October
6/16/2021	0830	Brooklyn Creek	BR1			800	800	Cloudy	Clear, low flow		23	May-October
6/16/2021	0845	Tanyard Creek	TAN2			900	900	Cloudy	Clear, low flow		23	May-October
6/16/2021	0852	Tanyard Creek	TAN1			1300	1300	Cloudy	Clear, some black areas, low flow		23	May-October
6/16/2021	0942	West Trail Creek	WTR1			170	170	Cloudy	Clear, low flow		23	May-October
6/16/2021	0955	East Trail Creek	ETR1			500	500	Cloudy	Clear, low flow		23	May-October
6/16/2021	1010	East Trail Creek	ETR2			1300	1300	Cloudy	Slight brown, mod flow		23	May-October
6/16/2021	1018	West Trail Creek	WTR2			260	260	Cloudy	Slight brown, mod flow		23	May-October
6/16/2021	1028	Trail Creek	TR1			300	300	Cloudy	Clear, mod flow		23	May-October
6/16/2021	1037	Trail Creek	TR3			2400	2400	Cloudy	Clear, mod flow		23	May-October
6/16/2021	1045	North Oconee	NO2			500	500	Cloudy	Brown, low flow		23	May-October
6/16/2021	1045	North Oconee	NO2	Blank	<	20	#N/A	Cloudy			23	May-October
6/17/2021	0805	Middle Oconee	MO1			130	130	Sunny	Slight brown, mod flow		23	May-October
6/17/2021	0825	Hunnicutt Creek	HC1			500	500	Sunny	Clear, mod flow		23	May-October
6/17/2021	0830	Middle Oconee	MO2			130	130	Sunny	Slight brown, low flow		23	May-October
6/17/2021	0840	Kingswood Branch	KB1			500	500	Sunny	Clear, low flow		23	May-October
6/17/2021	0854	Kingswood Branch	KB3			300	300	Sunny	Clear, low flow		23	May-October
6/17/2021	0908	McNutt Creek	MN2			1100	1100	Sunny	Clear, mod flow		23	May-October
6/17/2021	0920	McNutt Creek	MN1			500	500	Sunny	Slight brown, mod flow		23	May-October
6/17/2021	0930	Middle Oconee	MO3		<	20	10	Sunny	Slight brown, mod flow		23	May-October
6/17/2021	0945	Unnamed Tributary	UT1			20	20	Sunny	Clear, low flow		23	May-October

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Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
6/17/2021	1000	Middle Oconee	MO4			40	40	Sunny	Slight brown, mod flow		23	May-October
6/17/2021	1019	Oconee River	OC1			230	230	Sunny	Brown, mod flow		23	May-October
6/17/2021	1029	Cedar Creek	CED1			1300	1300	Sunny	Clear low flow		23	May-October
6/17/2021	1040	Carr Creek	CA1			400	400	Sunny	Clear low flow		23	May-October
6/17/2021	1040	Carr Creek	CA1	Duplicate		500	#N/A	Sunny	Clear, low flow		23	May-October
6/17/2021	1040	Carr Creek	CA1	Blank	<	20	#N/A	Sunny			23	May-October
6/21/2021	0805	North Oconee	NO3			800	800	Overcast	Brown, high flow		23	May-October
6/21/2021	0805	North Oconee	NO3	Duplicate		600	#N/A	Overcast	Brown, high flow		23	May-October
6/21/2021	0820	Brooklyn Creek	BR2			9000	9000	Overcast	Clear, low flow		23	May-October
6/21/2021	0830	Brooklyn Creek	BR1			5000	5000	Overcast	Clear, low flow		23	May-October
6/21/2021	0844	Tanyard Creek	TAN2			5000	5000	Overcast	Clear, low flow		23	May-October
6/21/2021	0855	Tanyard Creek	TAN1			5000	5000	Overcast	Clear, low flow		23	May-October
6/21/2021	0940	West Trail Creek	WTR1			500	500	Overcast	Slight brown, low flow		23	May-October
6/21/2021	0954	East Trail Creek	ETR1			500	500	Overcast	Clear, mod flow		23	May-October
6/21/2021	1010	East Trail Creek	ETR2			500	500	Overcast	Clear, mod flow		23	May-October
6/21/2021	1019	West Trail Creek	WTR2			2400	2400	Overcast	Clear, low flow		23	May-October
6/21/2021	1030	Trail Creek	TR1			1700	1700	Overcast	Clear, mod flow		23	May-October
6/21/2021	1042	Trail Creek	TR3			2400	2400	Overcast	Clear, mod flow		23	May-October
6/21/2021	1050	North Oconee	NO2			3000	3000	Overcast	Brown, mod flow		23	May-October
6/21/2021	1050	North Oconee	NO2	Blank	<	20	#N/A	Overcast			23	May-October
6/22/2021	0830	North Oconee	NO3			1700	1700	Overcast & rain	Brown, high flow		23	May-October
6/22/2021	0845	Brooklyn Creek	BR2		>	16000	17000	Overcast & rain	Slight brown, mod flow		23	May-October
6/22/2021	0845	Brooklyn Creek	BR2	Duplicate	>	16000	#N/A	Overcast & rain	Slight brown, mod flow		23	May-October
6/22/2021	0855	Brooklyn Creek	BR1		>	16000	17000	Overcast & rain	Slight brown, mod flow		23	May-October
6/22/2021	0910	Tanyard Creek	TAN2		>	16000	17000	Overcast & rain	Slight brown, some black areas, mod flow		23	May-October
6/22/2021	0922	Tanyard Creek	TAN1		>	16000	17000	Overcast & rain	Slight brown, some black areas, mod flow		23	May-October
6/22/2021	0942	West Trail Creek	WTR1		>	16000	17000	Overcast & rain	Slight brown, mod flow		23	May-October
6/22/2021	0958	East Trail Creek	ETR1			3000	3000	Overcast & rain	Slight brown, mod flow		23	May-October
6/22/2021	1015	East Trail Creek	ETR2			3000	3000	Overcast & rain	Slight brown, mod flow		23	May-October
6/22/2021	1024	West Trail Creek	WTR2			16000	16000	Overcast & rain	Slight brown, mod flow		23	May-October
6/22/2021	1035	Trail Creek	TR1		>	16000	17000	Overcast & rain	Slight brown, high flow		23	May-October
6/22/2021	1046	Trail Creek	TR3		>	16000	17000	Overcast & rain	Slight brown, high flow		23	May-October
6/22/2021	1100	North Oconee	NO2			9000	9000	Overcast & rain	Brown, mod flow		23	May-October
6/22/2021	1100	North Oconee	NO2	Blank	<	20	#N/A	Overcast & rain			23	May-October
6/22/2021	0810	McNutt Creek	MN3			5000	5000	Overcast & rain	Brown, mod flow		23	May-October
6/23/2021	0746	McNutt Creek	MN3			300	300	Cloudy	Slight brown, mod flow		23	May-October
6/23/2021	0806	Middle Oconee	MO1			2400	2400	Cloudy	Brown, mod flow		23	May-October
6/23/2021	0818	Hunnicutt Creek	HC1			1700	1700	Cloudy	Clear, mod flow		23	May-October
6/23/2021	0818	McNutt Creek	HC1	Duplicate		2400	#N/A	Cloudy	Clear, mod flow		23	May-October
6/23/2021	0820	Middle Oconee	MO2			3000	3000	Cloudy	Brown, mod flow		23	May-October
6/23/2021	0915	Kingswood Branch	KB1			2200	2200	Cloudy	Clear, low flow		23	May-October
6/23/2021	0920	Kingswood Branch	KB3			5000	5000	Cloudy	Clear, low flow		23	May-October
6/23/2021	0925	McNutt Creek	MN2			700	700	Cloudy	Slight brown, mod flow		23	May-October
6/23/2021	0932	McNutt Creek	MN1			500	500	Cloudy	Slight brown, mod flow		23	May-October
6/23/2021	0942	Middle Oconee	MO3			9000	9000	Cloudy	Brown, mod flow		23	May-October
6/23/2021	1010	Unnamed Tributary	UT1			40	40	Cloudy	Clear, low flow		23	May-October
6/23/2021	1020	Middle Oconee	MO4			9000	9000	Cloudy	Brown, mod flow		23	May-October
6/23/2021	1028	Oconee River	OC1			500	500	Cloudy	Brown, mod flow		23	May-October
6/23/2021	1040	Cedar Creek	CED1			3000	3000	Cloudy	Clear, low flow		23	May-October
6/23/2021	1057	Carr Creek	CA1			8000	8000	Cloudy	Clear, low flow		23	May-October
6/23/2021	1057	Carr Creek	CA1	Blank	<	20	#N/A	Cloudy			23	May-October
9/8/2021	0845	North Oconee	NO3			230	230	Foggy, partly cloudy	Light brown/green, mod turbid, 6in vis		24	May-October
9/8/2021	0910	Brooklyn Creek	BR2			2400	2400	Foggy, partly cloudy	Light brown, 12in vis		24	May-October
9/8/2021	0920	Brooklyn Creek	BR1			3000	3000	Foggy, partly cloudy	Clear		24	May-October
9/8/2021	0930	Tanyard Creek	TAN2			270	270	Foggy, partly cloudy	Clear		24	May-October
9/8/2021	0935	Tanyard Creek	TAN1			3000	3000	Foggy, partly cloudy	Clear		24	May-October
9/8/2021	1045	West Trail Creek	WTR1			1100	1100	Foggy, partly cloudy	Slightly gray/brown vis >1'		24	May-October
9/8/2021	1050	East Trail Creek	ETR1			140	140	Foggy, partly cloudy	Iron bacteria/deposits, clear		24	May-October
9/8/2021	1105	East Trail Creek	ETR2			260	260	Foggy, partly cloudy	Slightly gray/brown vis >1'		24	May-October

Values highlighted in red represent results exceeding the state standard of a maximum of 4000 cfu/100mL for a single sample.

Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
9/8/2021	1115	West Trail Creek	WTR2			170	170	Foggy, partly cloudy	Slightly brown		24	May-October
9/8/2021	1120	Trail Creek	TR1			3000	3000	Foggy, partly cloudy	Slightly turbid, brown/green		24	May-October
9/8/2021	1135	Trail Creek	TR3			800	800	Foggy, partly cloudy	Green/gray		24	May-October
9/8/2021	1140	North Oconee	NO2			1100	1100	Foggy, partly cloudy	Mod turb. Light brown, 6-12" vis		24	May-October
9/9/2021	0810	McNutt Creek	MN3			3000	3000	Clear/Sunny	Clear/very low turb		24	May-October
9/9/2021	0835	Middle Oconee	MO1			3000	3000	Clear/Sunny	slightly turbid 1' vis, light brown		24	May-October
9/9/2021	0905	Hunnicutt Creek	HC1			16000	16000	Clear/Sunny	light brown/clear, slightly turb		24	May-October
9/9/2021	0900	Middle Oconee	MO2			1879	1879	Clear/Sunny	light brown, mod turbid		24	May-October
9/9/2021	0920	Kingswood Branch	KB1		>	16000	17000	Clear/Sunny	Clear		24	May-October
9/9/2021	0927	Kingswood Branch	KB3		>	16000	17000	Clear/Sunny	clear		24	May-October
9/9/2021	0930	McNutt Creek	MN2			2400	2400	Clear/Sunny	clear		24	May-October
9/9/2021	0945	McNutt Creek	MN1			3000	3000	Clear/Sunny	clear/very slight turb		24	May-October
9/9/2021	0955	Middle Oconee	MO3			800	800	Clear/Sunny	slightly turbid >1' vis, light brown		24	May-October
9/9/2021	1020	Unnamed Tributary	UT1			2200	2200	Clear/Sunny	clear		24	May-October
9/9/2021	1045	Middle Oconee	MO4			3000	3000	Clear/Sunny	slightly turbid, 1' vis, light brown		24	May-October
9/9/2021	1105	Oconee River	OC1			2800	2800	Clear/Sunny	light brown, mod turbidity >1' vis		24	May-October
9/9/2021	1115	Cedar Creek	CED1			5000	5000	Clear/Sunny	clear		24	May-October
9/9/2021	1125	Carr Creek	CA1			5000	5000	Clear/Sunny	clear		24	May-October
9/13/2021	0830	North Oconee	NO3			170	170		Green/light brown, low/mod turbid, 1-2ft vis.		24	May-October
9/13/2021	0850	Brooklyn Creek	BR2			1300	1300		Clear		24	May-October
9/13/2021	0905	Brooklyn Creek	BR1			1400	1400		some sediment		24	May-October
9/13/2021	0915	Tanyard Creek	TAN2			500	500		no turbid, low flow		24	May-October
9/13/2021	0922	Tanyard Creek	TAN1			1100	1100		grey tint, low turbidity		24	May-October
9/13/2021	1015	West Trail Creek	WTR1			70	70		grey turbid.		24	May-October
9/13/2021	1025	East Trail Creek	ETR1			80	80		clear		24	May-October
9/13/2021	1040	East Trail Creek	ETR2			40	40		grey turbid, med vis		24	May-October
9/13/2021	1050	West Trail Creek	WTR2			1100	1100		greenish/clear		24	May-October
9/13/2021	1105	Trail Creek	TR1			500	500		grey low turbid		24	May-October
9/13/2021	1120	Trail Creek	TR3			500	500		grey low turbid		24	May-October
9/13/2021	1125	North Oconee	NO2			1300	1300		light brown, slightly turbid		24	May-October
9/15/2021	0950	McNutt Creek	MN3			230	230	Mostly Sunny	Clear, slight brown, low flow		24	May-October
9/15/2021	1020	Middle Oconee	MO1			500	500	Mostly Sunny	Turbid, light brown, 1ft vis		24	May-October
9/15/2021	1115	Hunnicutt Creek	HC1			230	230	Mostly Sunny	clear, low flow		24	May-October
9/15/2021	1120	Middle Oconee	MO2			500	500	Mostly Sunny	light brown, 2ft vis, turbid		24	May-October
9/15/2021	1130	Kingswood Branch	KB1			800	800	Mostly Sunny	low flow, clear		24	May-October
9/15/2021	1140	Kingswood Branch	KB3			2400	2400	Mostly Sunny	low flow, clear, schools of minnows		24	May-October
9/15/2021	1150	McNutt Creek	MN2			300	300	Mostly Sunny	low flow		24	May-October
9/15/2021	1210	McNutt Creek	MN1			300	300	Mostly Sunny	low flow, clear		24	May-October
9/15/2021	1215	Middle Oconee	MO3			300	300	Mostly Sunny	low flow, turbid, 2-3ft vis		24	May-October
9/15/2021	0100	Unnamed Tributary	UT1			1300	1300	Mostly Sunny	low flow, clear		24	May-October
9/15/2021	0115	Middle Oconee	MO4			700	700	Mostly Sunny	low flow, turbid, brown		24	May-October
9/15/2021	0130	Oconee River	OC1			300	300	Mostly Sunny	turbid, brown, 1-2ft vis		24	May-October
9/15/2021	0140	Cedar Creek	CED1			800	800	Mostly Sunny	low flow, clear		24	May-October
9/15/2021	0155	Carr Creek	CA1			500	500	Mostly Sunny	low flow, clear		24	May-October
9/15/2021	0950	McNutt Creek	MN3	Blank	<	20	#N/A	Mostly Sunny	n/a		24	May-October
9/21/2021	0755	McNutt Creek	MN3			5000	5000	Heavy rain	Brown, mod flow		24	May-October
9/21/2021	0815	Middle Oconee	MO1			2400	2400	Heavy rain	Brown, mod flow		24	May-October
9/21/2021	0830	Hunnicutt Creek	HC1		>	16000	17000	Heavy rain	Slight brown, mod flow		24	May-October
9/21/2021	0830	Hunnicutt Creek	HC1	Duplicate	>	16000	#N/A	Heavy rain	Slight brown, mod flow		24	May-October
9/21/2021	0835	Middle Oconee	MO2			800	800	Heavy rain	Brown, mod flow		24	May-October
9/21/2021	0850	Kingswood Branch	KB1			16000	16000	Heavy rain	Clear, low flow		24	May-October
9/21/2021	0855	Kingswood Branch	KB3		>	16000	17000	Heavy rain	Clear, low flow		24	May-October
9/21/2021	0905	McNutt Creek	MN2			2200	2200	Heavy rain	Slight brown, mod flow		24	May-October
9/21/2021	0921	McNutt Creek	MN1			5000	5000	Heavy rain	Slight brown, mod flow		24	May-October
9/21/2021	0939	Middle Oconee	MO3			1700	1700	Heavy rain	Brown, low flow		24	May-October
9/21/2021	0952	Unnamed Tributary	UT1			2200	2200	Heavy rain	Clear, low flow		24	May-October
9/21/2021	1005	Middle Oconee	MO4			3000	3000	Heavy rain	Brown, low flow		24	May-October
9/21/2021	1018	Oconee River	OC1			9000	9000	Heavy rain	Brown, low flow		24	May-October
9/21/2021	1032	Cedar Creek	CED1			5000	5000	Heavy rain	Clear, mod flow		24	May-October
9/21/2021	1042	Carr Creek	CA1			5000	5000	Heavy rain	Clear, some black areas, low flow		24	May-October

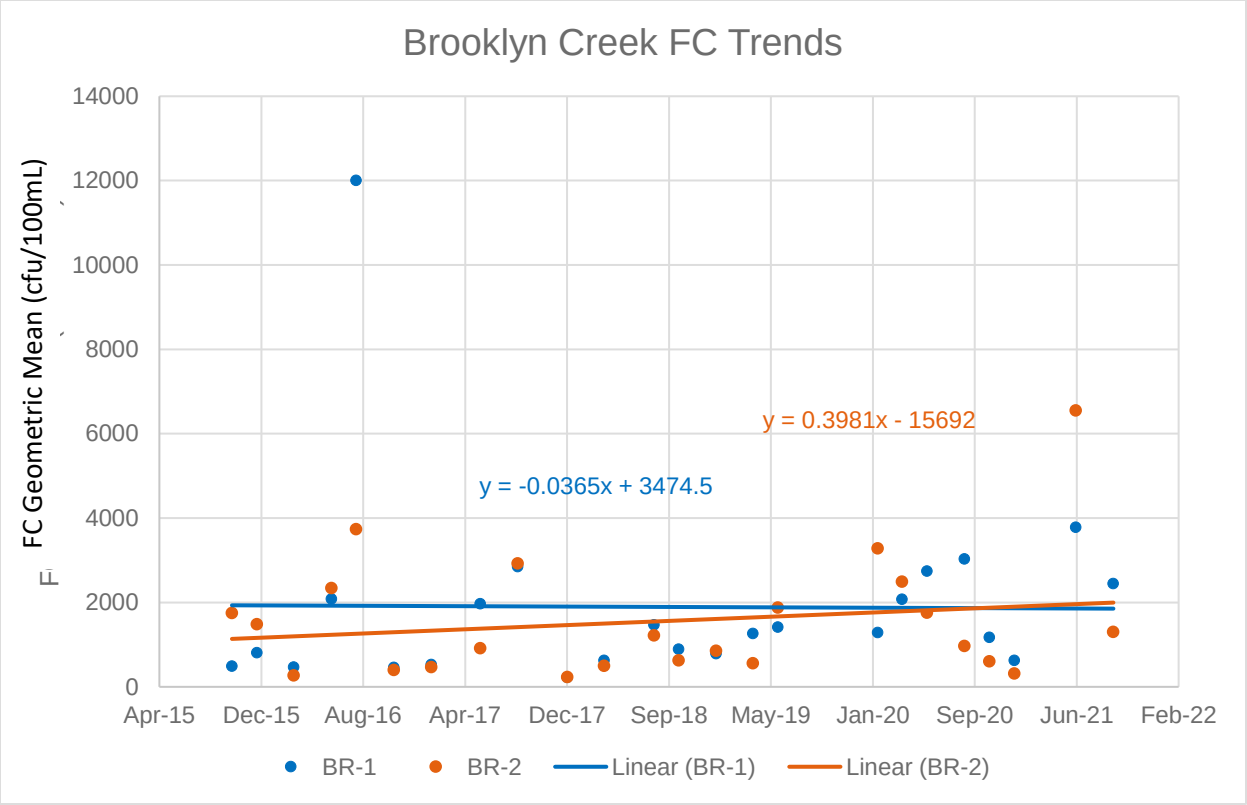
Values highlighted in red represent results exceeding the state standard of a maximum of 4000 cfu/100mL for a single sample.

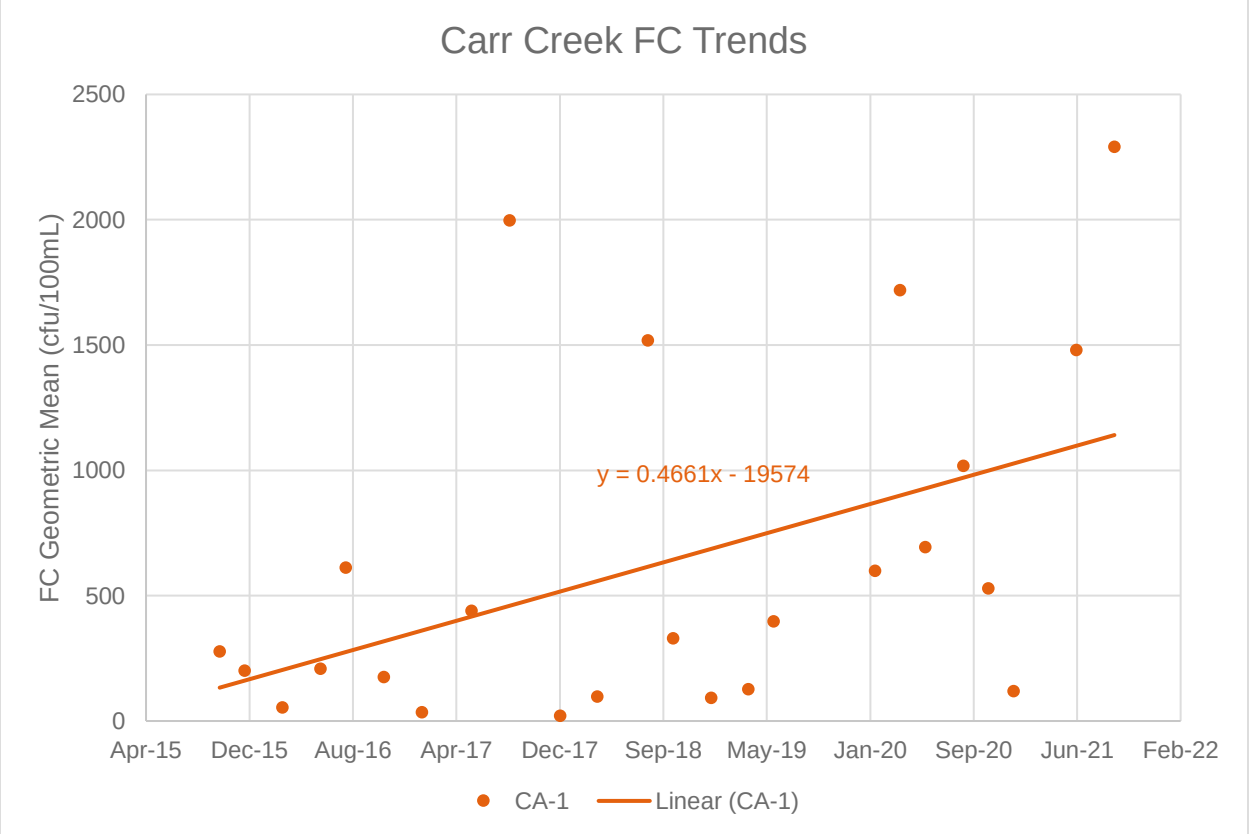
Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
9/21/2021	1050	Carr Creek	CA1	Blank	<	20	#N/A	Heavy rain			24	May-October
9/23/2021	0835	North Oconee	NO3			NA		Sunny	Brown, mod flow	Problem at the lab and analysis was not completed.		
9/23/2021	0835	North Oconee	NO3	Duplicate		NA	#N/A	Sunny	Brown, mod flow	Problem at the lab and analysis was not completed.		
9/23/2021	0850	Brooklyn Creek	BR2			NA		Sunny	clear, low flow	Problem at the lab and analysis was not completed.		
9/23/2021	0900	Brooklyn Creek	BR1			NA		Sunny	clear, low flow	Problem at the lab and analysis was not completed.		
9/23/2021	0908	Tanyard Creek	TAN2			NA		Sunny	clear, low flow	Problem at the lab and analysis was not completed.		
9/23/2021	0915	Tanyard Creek	TAN1			5000	5000	Sunny	Clear, low flow		24	May-October
9/23/2021	0953	West Trail Creek	WTR1			2400	2400	Sunny	Clear, some black/green areas, slight brown		24	May-October
9/23/2021	1010	East Trail Creek	ETR1			800	800	Sunny	Clear, low flow		24	May-October
9/23/2021	1015	East Trail Creek	ETR2			1300	1300	Sunny	Clear, low flow		24	May-October
9/23/2021	1033	West Trail Creek	WTR2			2400	2400	Sunny	Slight brown, low flow		24	May-October
9/23/2021	1042	Trail Creek	TR1			3000	3000	Sunny	Clear, mod flow		24	May-October
9/23/2021	1046	Trail Creek	TR3			3000	3000	Sunny	Clear, black/green areas, construction upstream around the creek		24	May-October
9/23/2021	1050	North Oconee	NO2			5000	5000	Sunny	Very brown, low flow		24	May-October
9/23/2021	1050	North Oconee	NO2	Blank	<	20	#N/A	Sunny			24	May-October
9/28/2021	0840	North Oconee	NO3			230	230	Sunny	Brown, mod flow		24	May-October
9/28/2021	0840	North Oconee	NO3	Duplicate		230	#N/A	Sunny	Brown, mod flow		24	May-October
9/28/2021	0855	Brooklyn Creek	BR2			700	700	Sunny	Clear, low flow		24	May-October
9/28/2021	0904	Brooklyn Creek	BR1			5000	5000	Sunny	Clear, low flow		24	May-October
9/28/2021	0910	Tanyard Creek	TAN2			300	300	Sunny	Clear, low flow		24	May-October
9/28/2021	0916	Tanyard Creek	TAN1			500	500	Sunny	Clear, low flow		24	May-October
9/28/2021	0955	West Trail Creek	WTR1			500	500	Sunny	Slight brown, some green, low flow		24	May-October
9/28/2021	1006	East Trail Creek	ETR1			230	230	Sunny	slight brown, low flow		24	May-October
9/28/2021	1015	East Trail Creek	ETR2			300	300	Sunny	clear, low flow		24	May-October
9/28/2021	1028	West Trail Creek	WTR2			500	500	Sunny	clear, low flow		24	May-October
9/28/2021	1035	Trail Creek	TR1			500	500	Sunny	clear, mod flow		24	May-October
9/28/2021	1040	Trail Creek	TR3			2200	2200	Sunny	Slight brown, construction 200ft upstream		24	May-October
9/28/2021	1046	North Oconee	NO2			800	800	Sunny	Brown, low flow		24	May-October
9/28/2021	1055	North Oconee	NO2	Blank	<	20	#N/A	Sunny			24	May-October
9/30/2021	0805	McNutt Creek	MN3			500	500	Sunny	Slight brown, low flow		24	May-October
9/30/2021	0820	Middle Oconee	MO1			300	300	Sunny	Brown, mod flow		24	May-October
9/30/2021	0840	Hunnicutt Creek	HC1			500	500	Sunny	Clear, mod flow		24	May-October
9/30/2021	0840	Hunnicutt Creek	HC1	Duplicate		230	#N/A	Sunny	Clear, mod flow		24	May-October
9/30/2021	0845	Middle Oconee	MO2			230	230	Sunny	Brown, mod flow		24	May-October
9/30/2021	0902	Kingswood Branch	KB1			500	500	Sunny	Clear, low flow		24	May-October
9/30/2021	0908	Kingswood Branch	KB3			2400	2400	Sunny	Clear, low flow		24	May-October
9/30/2021	0917	McNutt Creek	MN2			500	500	Sunny	Clear, low flow		24	May-October
9/30/2021	0928	McNutt Creek	MN1			300	300	Sunny	Slight brown, mod flow		24	May-October
9/30/2021	0940	Middle Oconee	MO3			500	500	Sunny	Slight brown, mod flow		24	May-October
9/30/2021	1020	Unnamed Tributary	UT1			230	230	Sunny	Clear, low flow		24	May-October
9/30/2021	1050	Middle Oconee	MO4			500	500	Sunny	Slight brown, mod flow		24	May-October
9/30/2021	1104	Oconee River	OC1			500	500	Sunny	Brown, low flow		24	May-October
9/30/2021	1113	Cedar Creek	CED1			1700	1700	Sunny	Slight brown, low flow		24	May-October
9/30/2021	1137	Carr Creek	CA1			2200	2200	Sunny	Clear, low flow		24	May-October
9/30/2021	1147	Carr Creek	CA1	Blank	<	20	#N/A	Sunny			24	May-October
9/30/2021	1035	North Oconee	NO3			300	300	Sunny	Brown, mod flow		24	May-October
9/30/2021	0950	Brooklyn Creek	BR2			1300	1300	Sunny	Clear, low flow		24	May-October
9/30/2021	0956	Brooklyn Creek	BR1			1700	1700	Sunny	Clear, low flow		24	May-October
9/30/2021	1007	Tanyard Creek	TAN2			700	700	Sunny	Clear, low flow		24	May-October

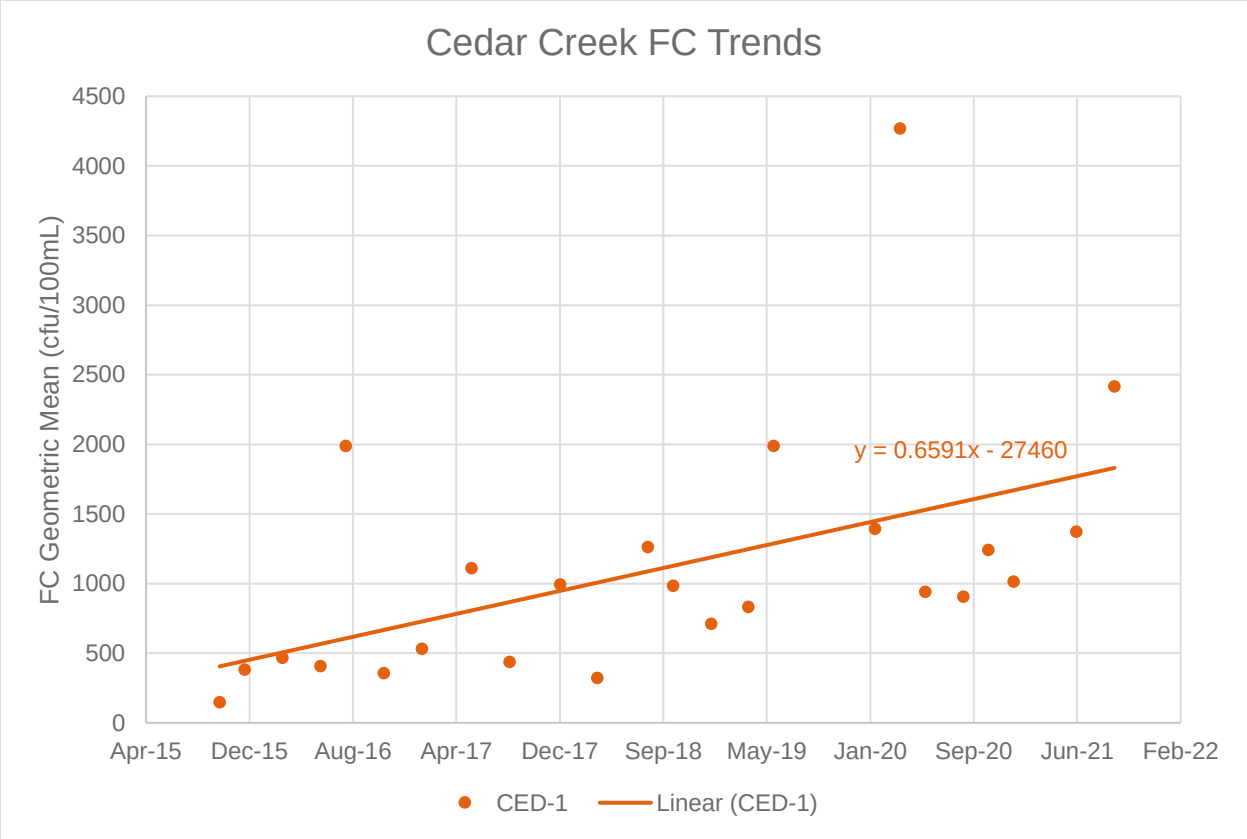
Values highlighted in red represent results exceeding the state standard of a maximum of 4000 cfu/100mL for a single sample.

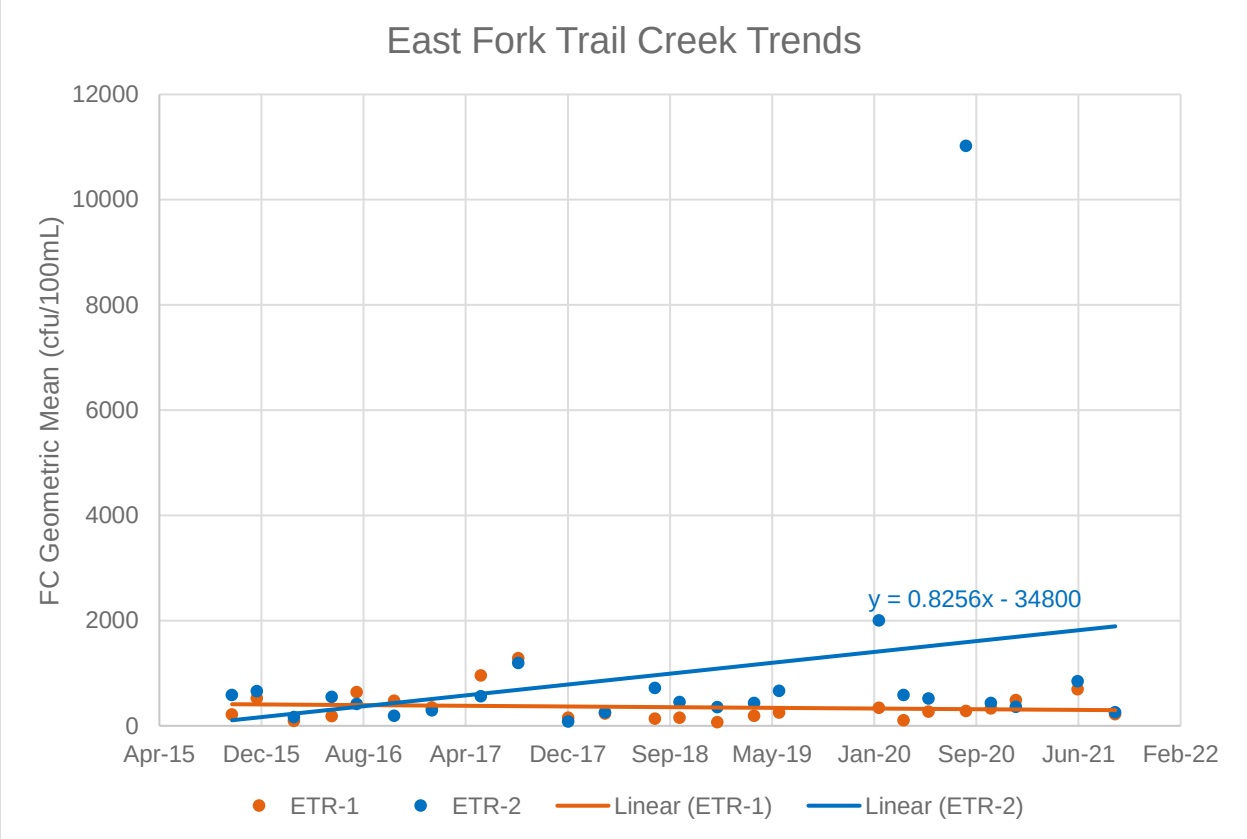
APPENDIX B

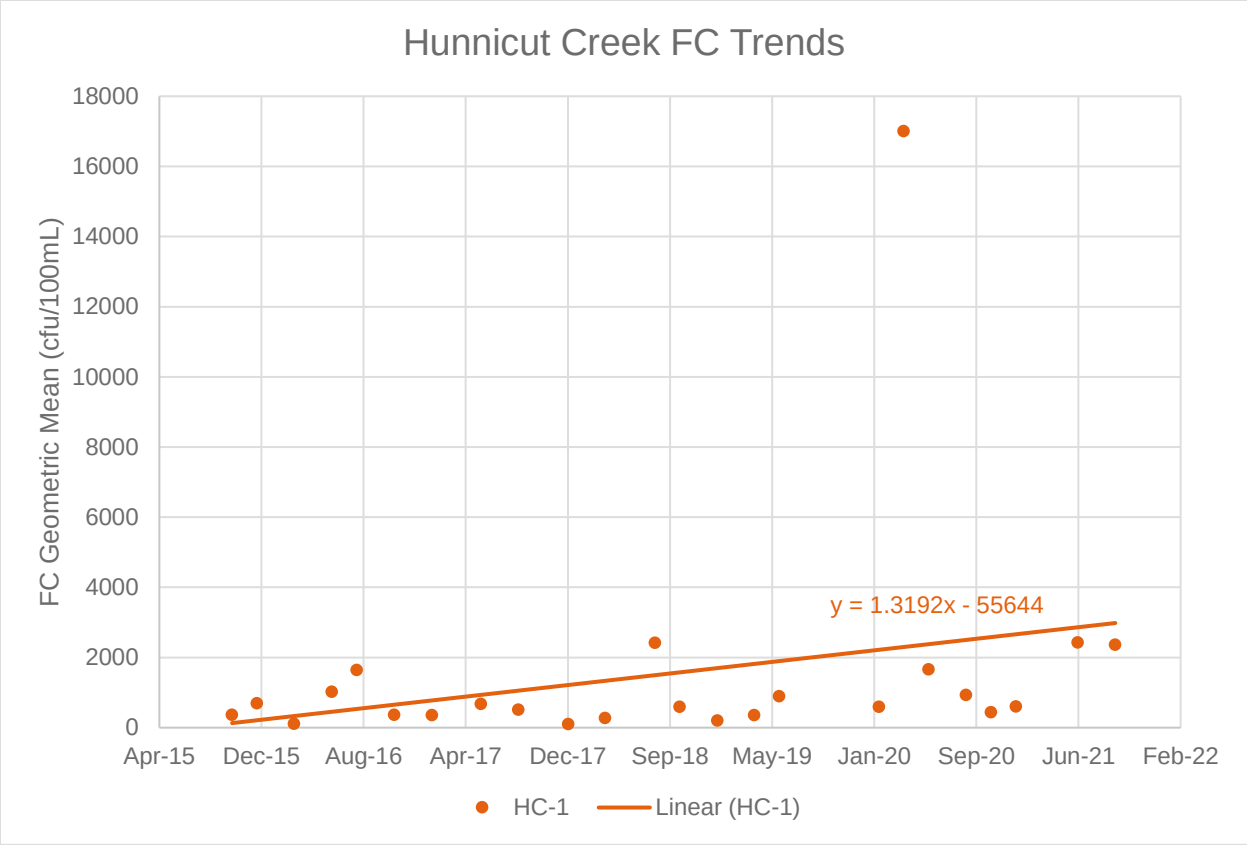
Water Quality Trends (October 2015 – October 2021)

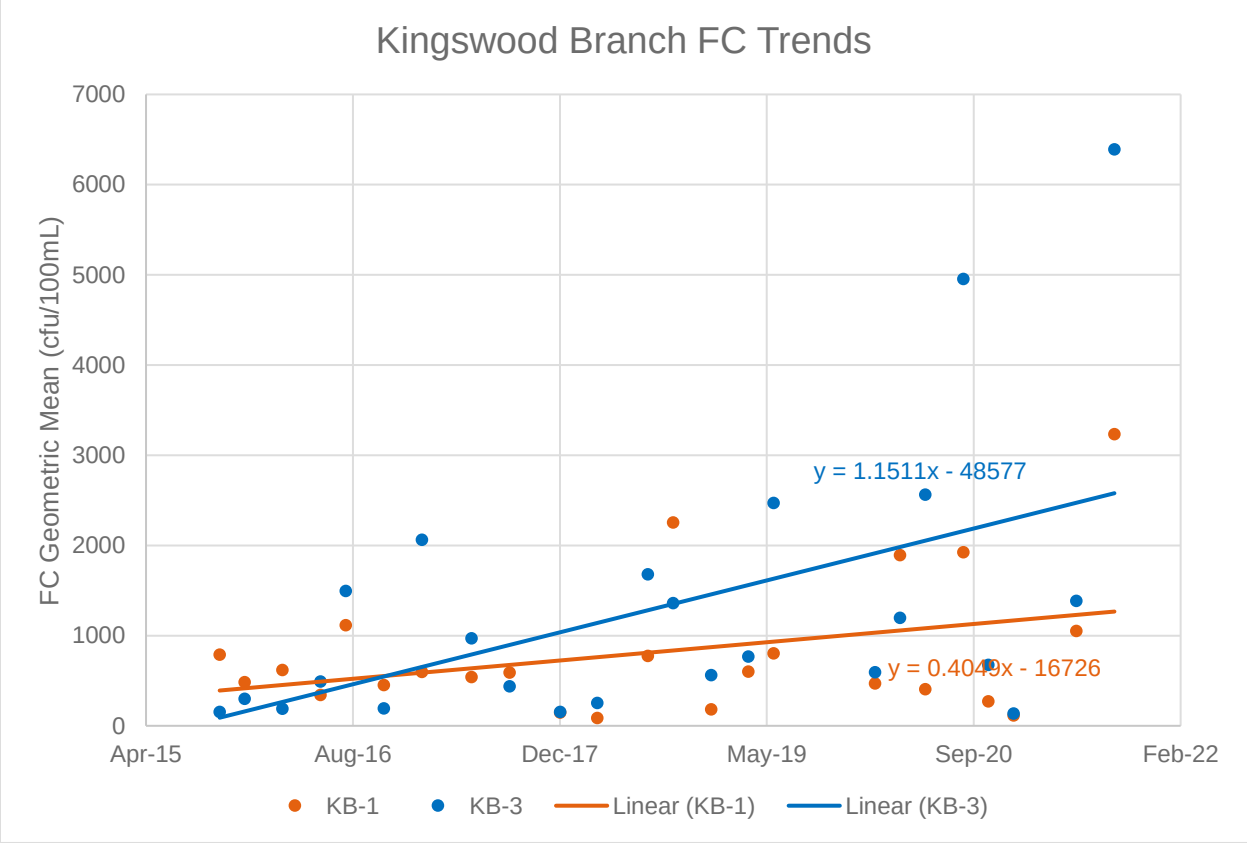

Brooklyn Creek FC Trends
FC Geometric Mean (cfu/100mL)
14000
12000
10000
8000
6000
4000
2000
0
y = 0.3981x - 15692
y = -0.0365x + 3474.5
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
BR-1
BR-2
Linear (BR-1)
Linear (BR-2)

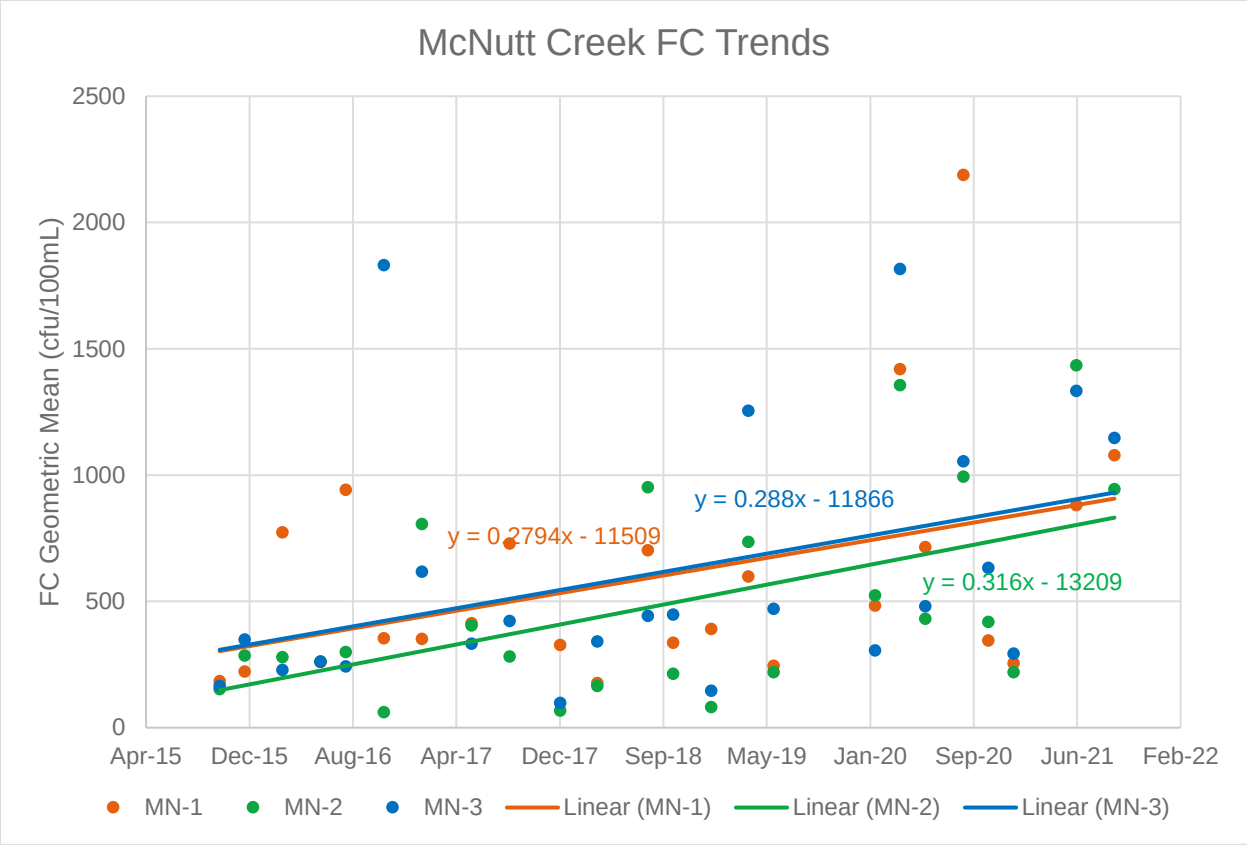

Carr Creek FC Trends
FC Geometric Mean (cfu/100mL)
2500
2000
1500
1000
500
0
y = 0.4661x - 19574
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
CA-1
Linear (CA-1)

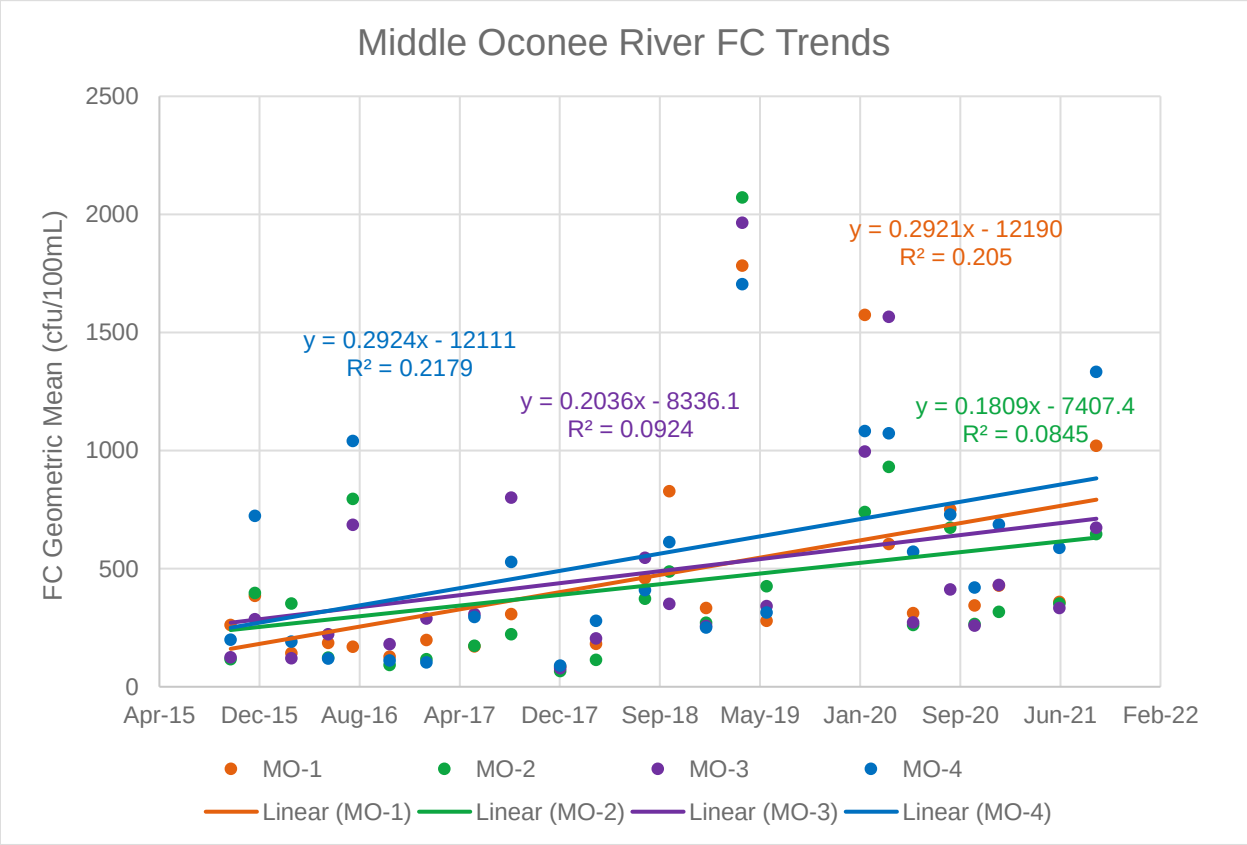

Cedar Creek FC Trends
FC Geometric Mean (cfu/100mL)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = 0.6591x - 27460
CED-1
Linear (CED-1)

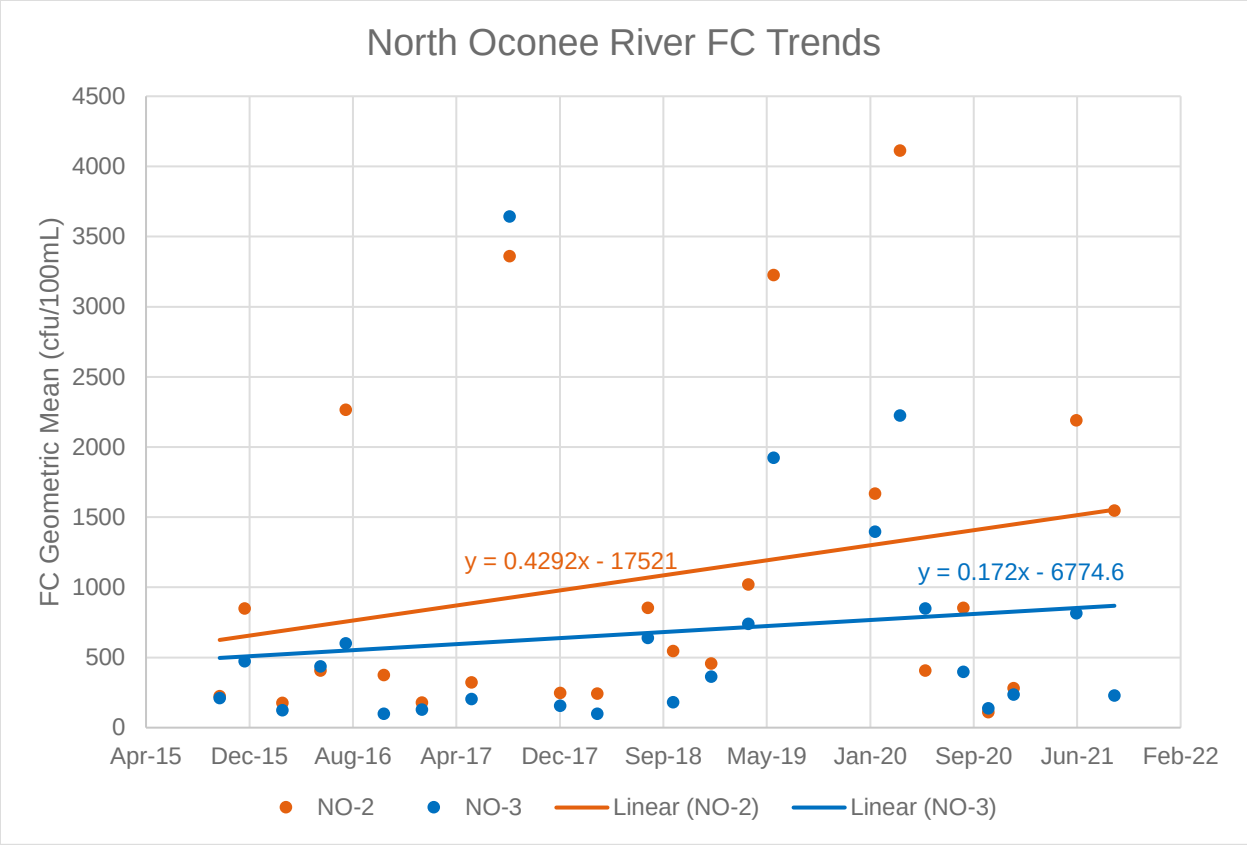

East Fork Trail Creek Trends
FC Geometric Mean (cfu/100mL)
12000
10000
8000
6000
4000
2000
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = 0.8256x - 34800
ETR-1
ETR-2
Linear (ETR-1)
Linear (ETR-2)

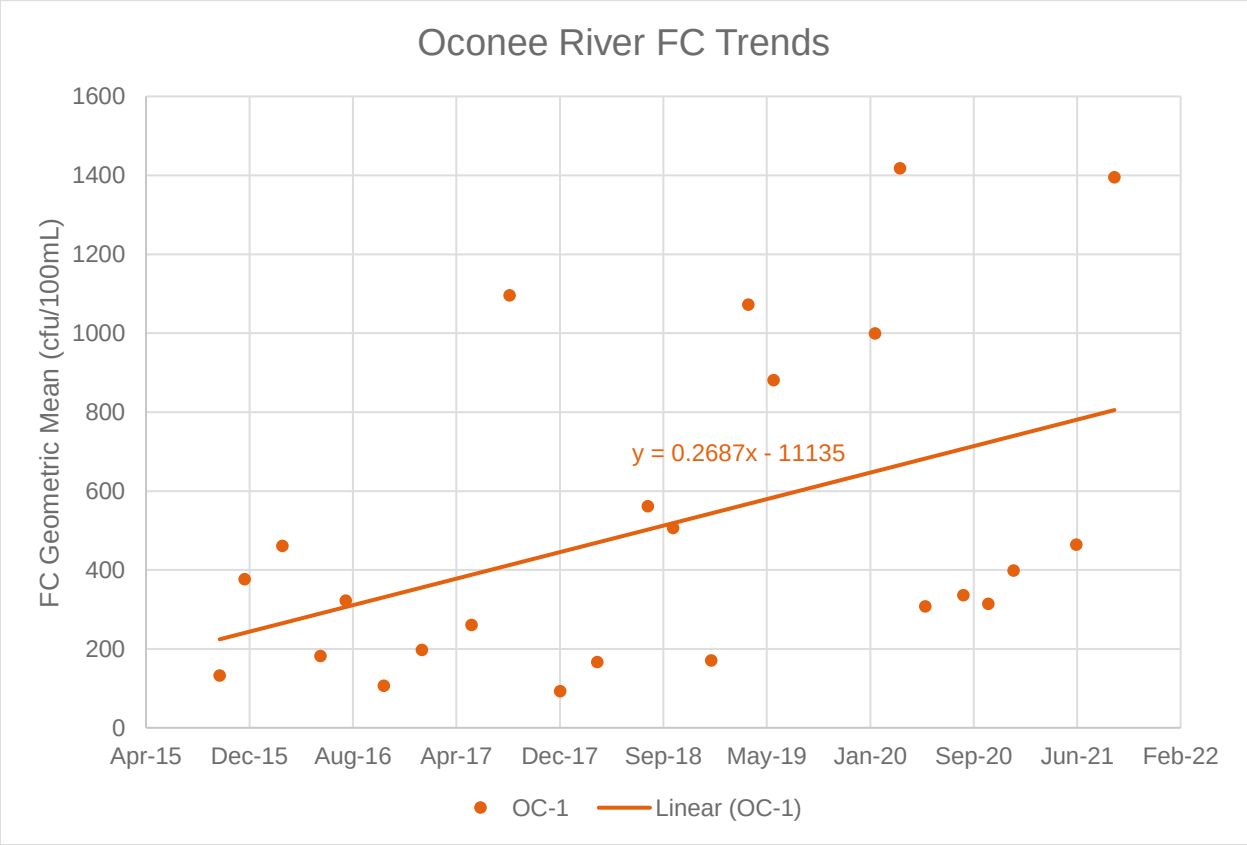

Hunnicut Creek FC Trends
FC Geometric Mean (cfu/100mL)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = 1.3192x - 55644
HC-1
Linear (HC-1)

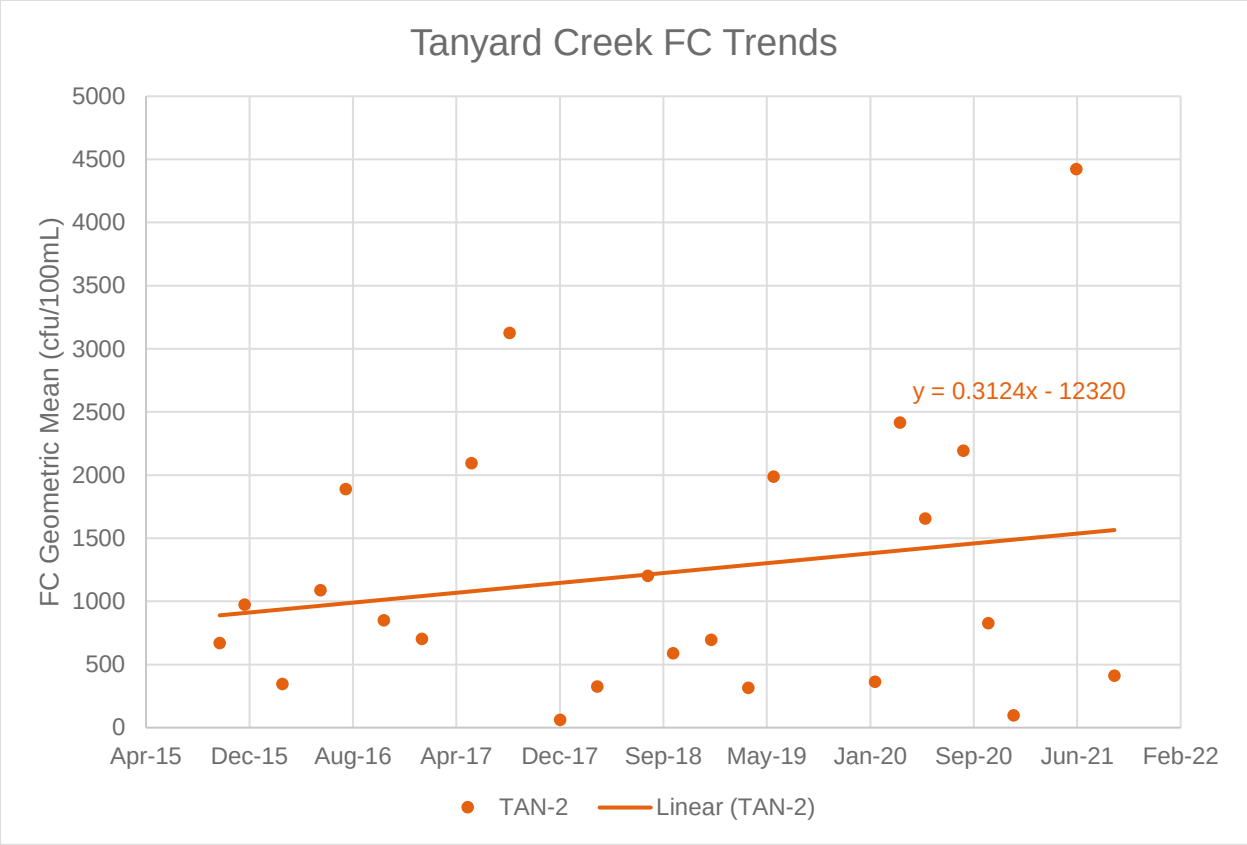

Kingswood Branch FC Trends
FC Geometric Mean (cfu/100mL)
7000
6000
5000
4000
3000
2000
1000
0
Apr-15
Aug-16
Dec-17
May-19
Sep-20
Feb-22
y = 1.1511x - 48577
y = 0.4049x - 16726
KB-1
KB-3
Linear (KB-1)
Linear (KB-3)

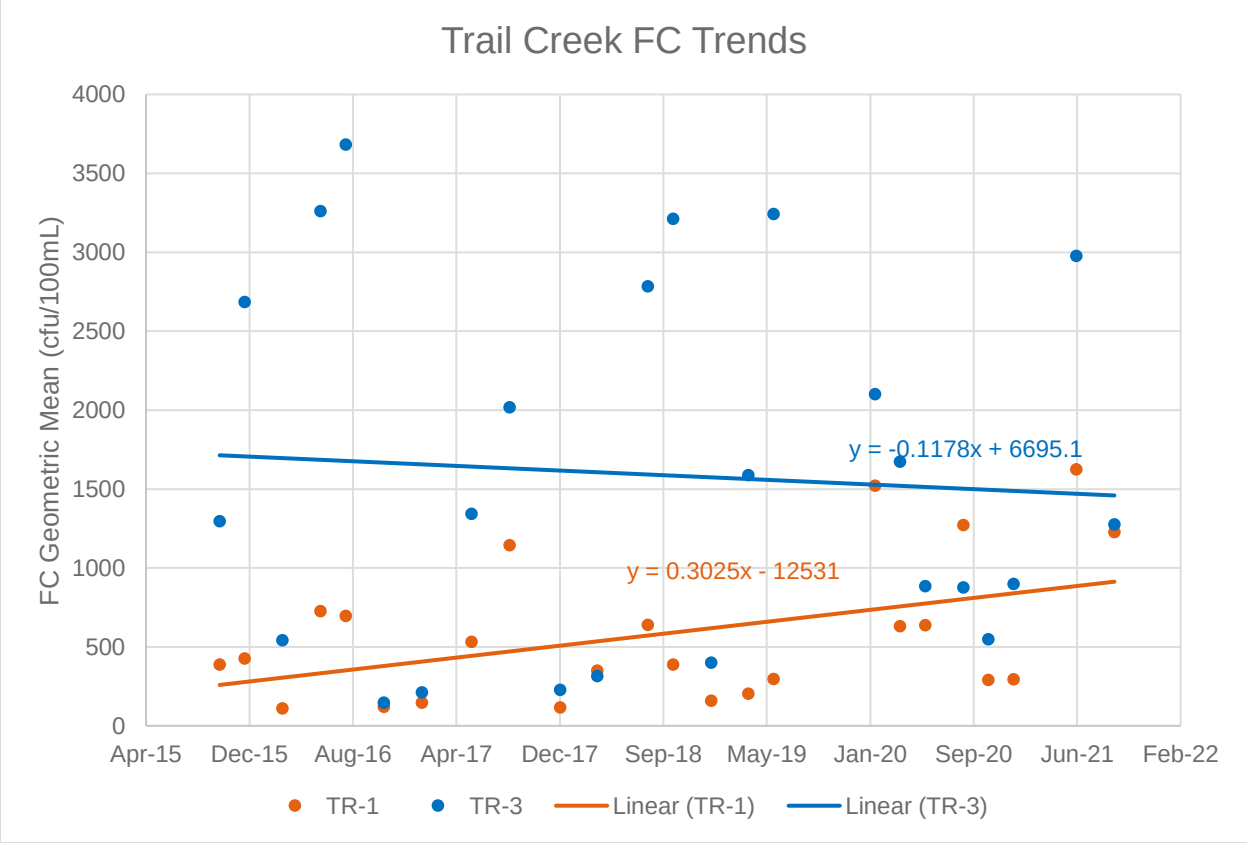

McNutt Creek FC Trends
FC Geometric Mean (cfu/100mL)
2500
2000
1500
1000
500
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = 0.2794x - 11509
y = 0.288x - 11866
y = 0.316x - 13209
MN-1
MN-2
MN-3
Linear (MN-1)
Linear (MN-2)
Linear (MN-3)

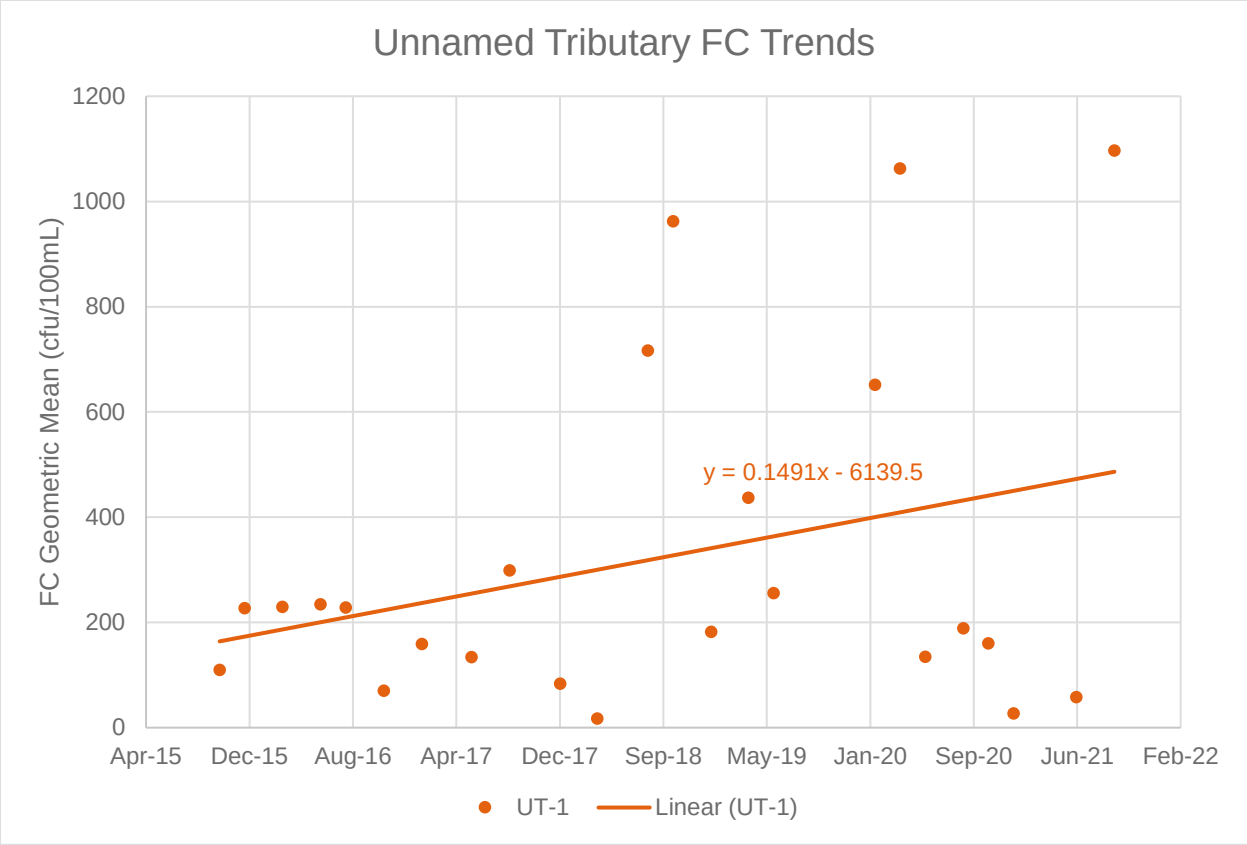

Middle Oconee River FC Trends
FC Geometric Mean (cfu/100mL)
2500
2000
1500
1000
500
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = 0.2921x - 12190
R² = 0.205
y = 0.2924x - 12111
R² = 0.2179
y = 0.2036x - 8336.1
R² = 0.0924
y = 0.1809x - 7407.4
R² = 0.0845
MO-1
MO-2
MO-3
MO-4
Linear (MO-1)
Linear (MO-2)
Linear (MO-3)
Linear (MO-4)

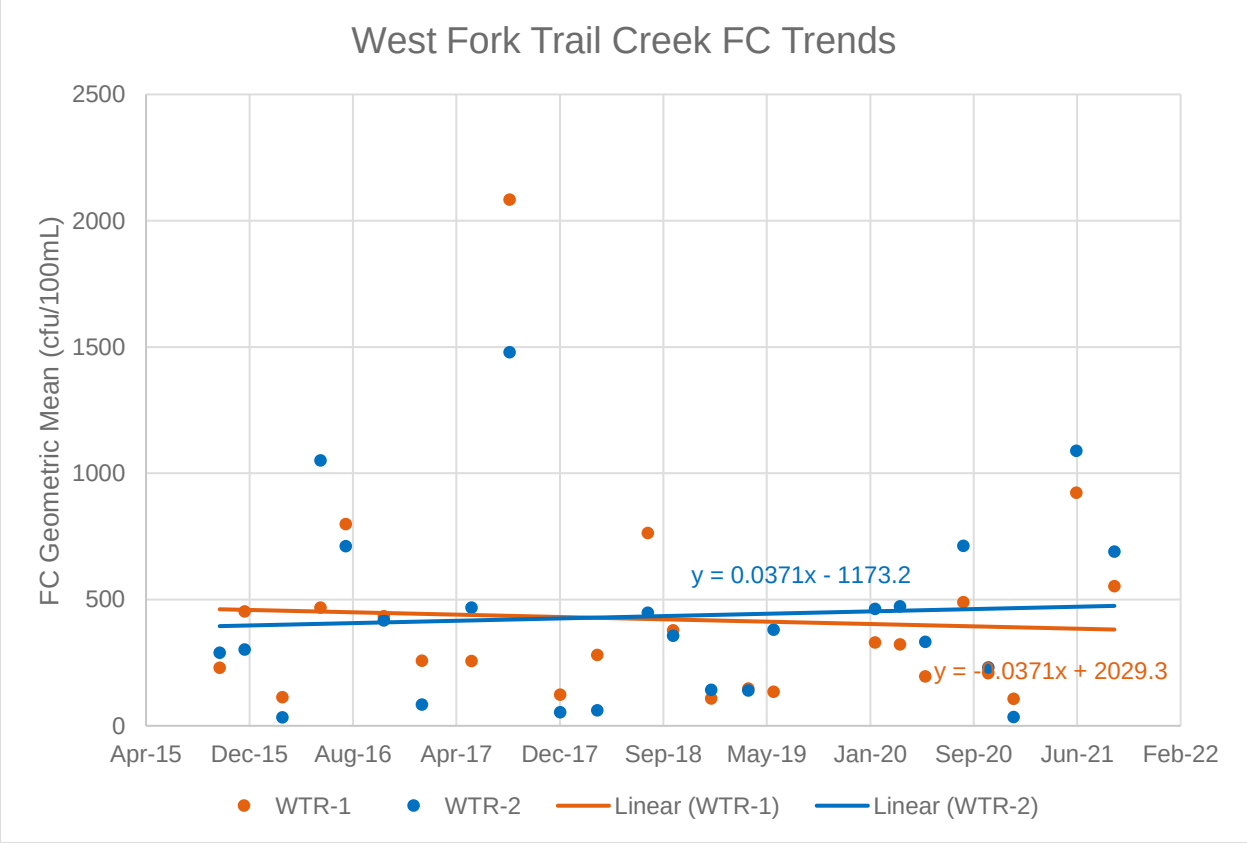

North Oconee River FC Trends
FC Geometric Mean (cfu/100mL)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = 0.4292x - 17521
y = 0.172x - 6774.6
NO-2
NO-3
Linear (NO-2)
Linear (NO-3)

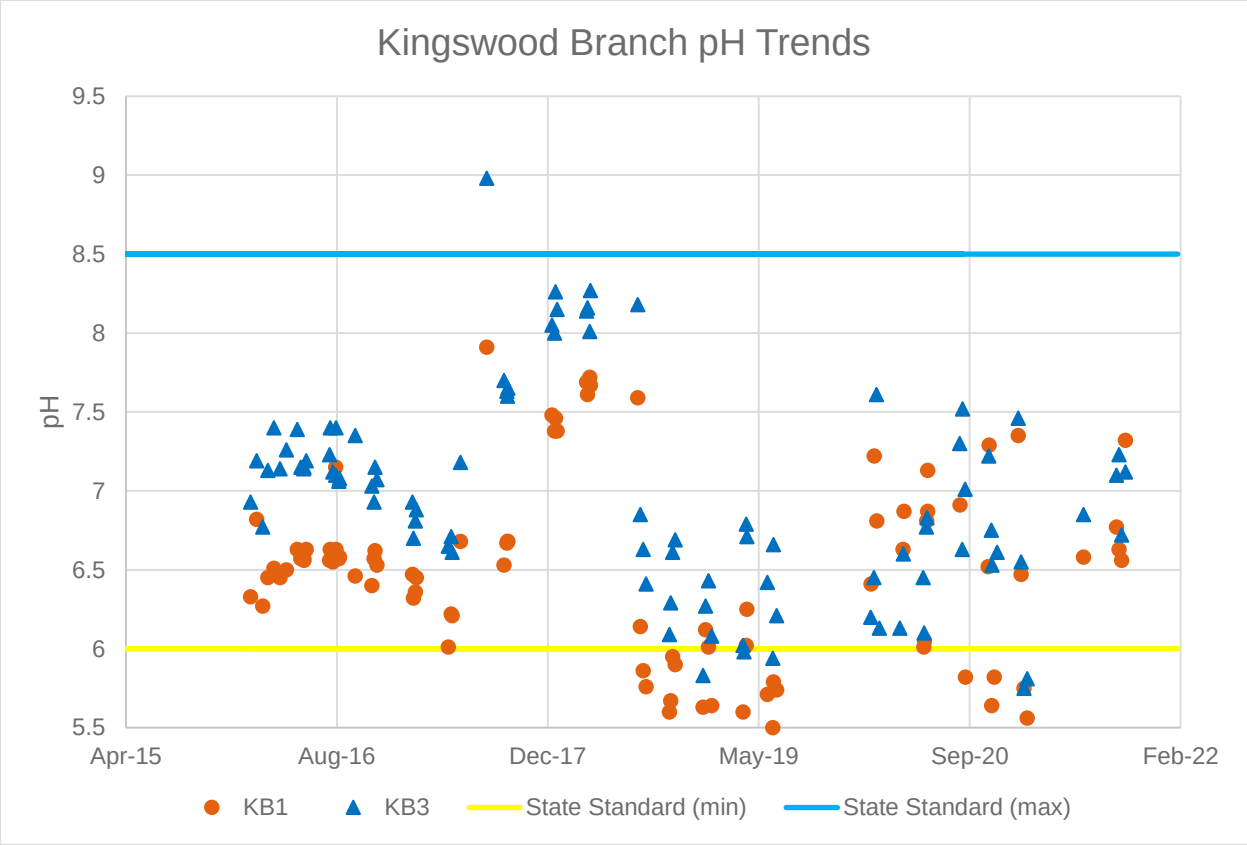

Oconee River FC Trends
FC Geometric Mean (cfu/100mL)
1600
1400
1200
1000
800
600
400
200
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = 0.2687x - 11135
OC-1
Linear (OC-1)

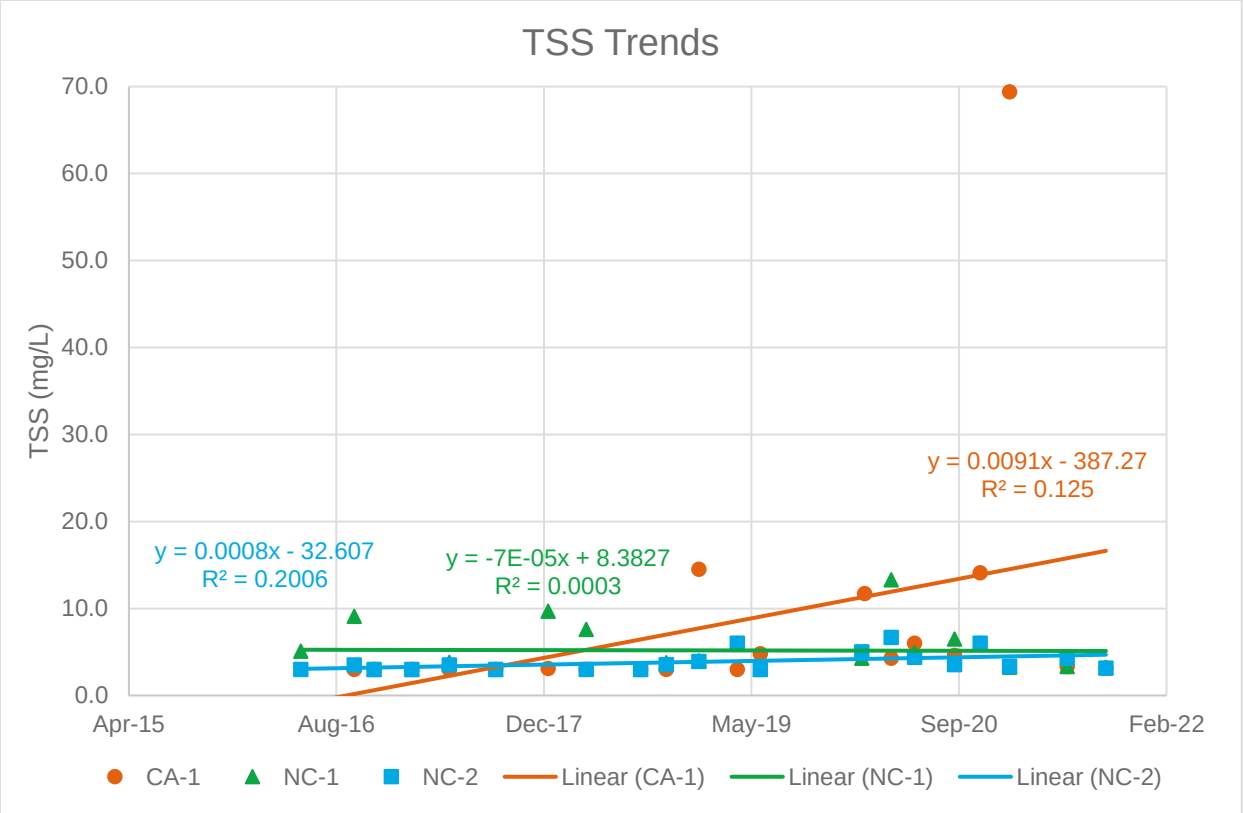

Tanyard Creek FC Trends
FC Geometric Mean (cfu/100mL)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = 0.3124x - 12320
TAN-2
Linear (TAN-2)


Trail Creek FC Trends
FC Geometric Mean (cfu/100mL)
4000
3500
3000
2500
2000
1500
1000
500
0
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
y = -0.1178x + 6695.1
y = 0.3025x - 12531
TR-1
TR-3
Linear (TR-1)
Linear (TR-3)


Unnamed Tributary FC Trends
FC Geometric Mean (cfu/100mL)
1200
1000
800
600
400
200
0
y = 0.1491x - 6139.5
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
UT-1
Linear (UT-1)


West Fork Trail Creek FC Trends
FC Geometric Mean (cfu/100mL)
2500
2000
1500
1000
500
0
y = 0.0371x - 1173.2
y = -0.0371x + 2029.3
Apr-15
Dec-15
Aug-16
Apr-17
Dec-17
Sep-18
May-19
Jan-20
Sep-20
Jun-21
Feb-22
WTR-1
WTR-2
Linear (WTR-1)
Linear (WTR-2)


Kingswood Branch pH Trends
9.5
9
8.5
8
7.5
7
6.5
6
5.5
pH
Apr-15
Aug-16
Dec-17
May-19
Sep-20
Feb-22
KB1
KB3
State Standard (min)
State Standard (max)


TSS Trends
TSS (mg/L)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Apr-15
Aug-16
Dec-17
May-19
Sep-20
Feb-22
y = 0.0091x - 387.27
R² = 0.125
y = 0.0008x - 32.607
R² = 0.2006
y = -7E-05x + 8.3827
R² = 0.0003
CA-1
NC-1
NC-2
Linear (CA-1)
Linear (NC-1)
Linear (NC-2)

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