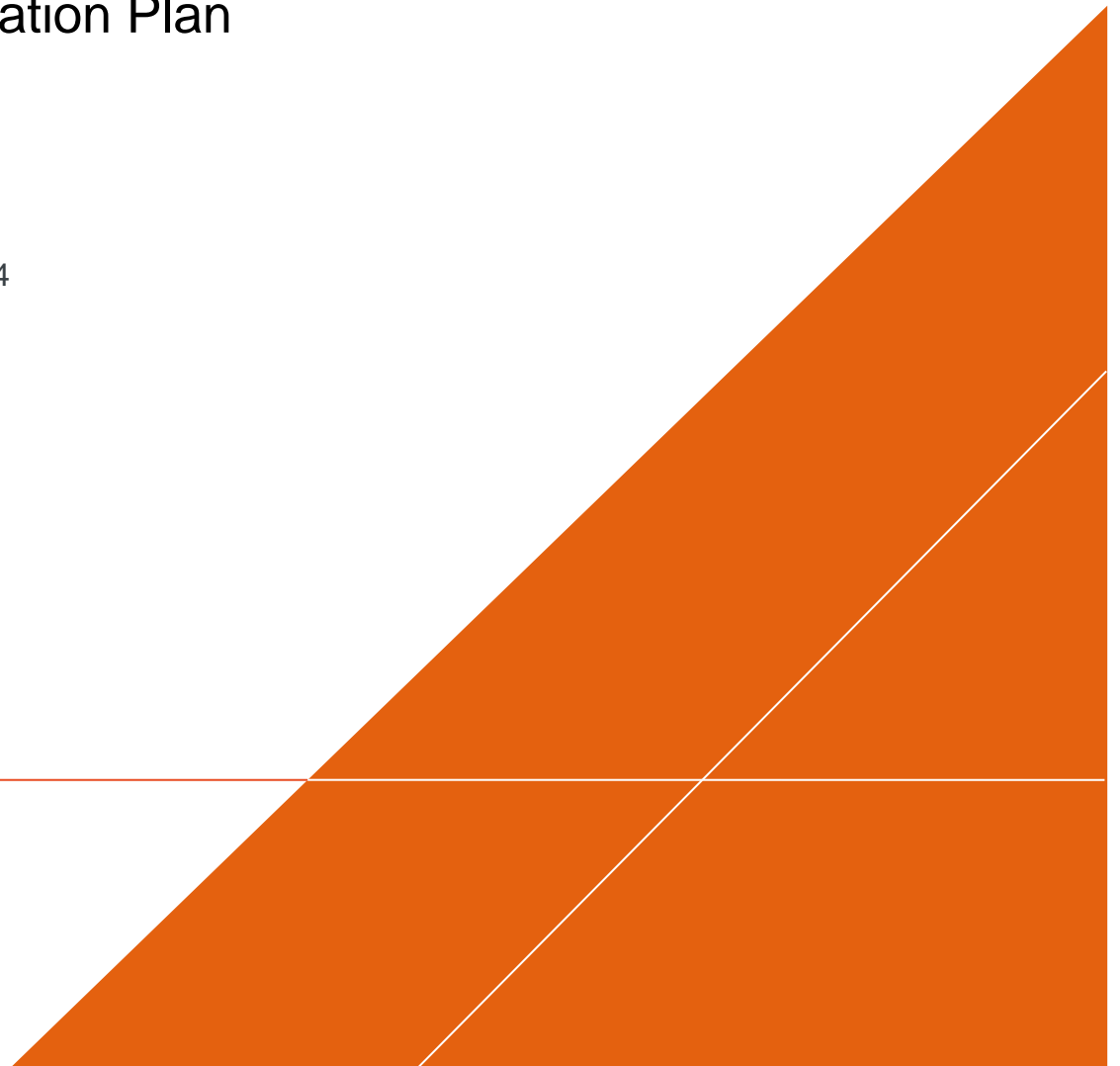




2023 FINAL ANNUAL REPORT

Impaired Waters Monitoring and Implementation Plan

February 15, 2024




Kelsey Eichbauer, PE
Staff Water Resources Engineer, Arcadis


Natalie Postel, PE
Senior Water Resources Engineer, Tetra Tech

2023 FINAL ANNUAL REPORT

Impaired Waters Monitoring and Implementation Plan

Prepared for:

Athens-Clarke County, Georgia

Department of Transportation and
Public Works

120 West Dougherty Street

Athens

Georgia 30601

Prepared by:

Arcadis U.S., Inc.

2839 Paces Ferry Rd

#900

Atlanta

Georgia 30339

Tel 770 431 8666

Fax 770 435 2666

Our Ref.:

30121090

Date:

February 15, 2024

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EXECUTIVE SUMMARY

Athens-Clarke County, Georgia developed and implemented an Impaired Waters Monitoring and Implementation Plan (IWMIP) and Sampling Quality Assurance Plan (SQAP) in October 2015 as part of its Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) permit requirements. As part of the Plan, fecal coliform (FC), total suspended solids (TSS), and pH were regularly measured at sampling stations representative of impaired reaches within the permit area.

On August 31, 2022, U.S. Environmental Protection Agency (EPA) approved an update to Georgia Environmental Protection Division's (EPD) water quality standards to include *Escherichia coli* (*E. coli*) rather than fecal coliform. Athens-Clarke County discontinued FC sampling at the end of 2022 and began *E. coli* sampling in 2023.

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 were presented in the 2018 Annual Report, data collected in 2019 were presented in the 2019 Annual Report, data collected in 2020 were presented in the 2020 Annual Report, data collected in 2021 were presented in the 2021 Annual Report, and data collected in 2022 were presented in the 2022 Annual Report. This annual report includes sampling results from four quarters of 2023: two 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.

All pH values for sampling stations CA-1 and KB-3 were within the state standards. Two pH readings for NC-2, three readings for ESC-1 and KB-1, and four readings for NC-1 fell below state standards. All of these values occurred in late November/early December 2023.

TSS levels for stations CED-1, NC-1, and NC-2 were consistently between 3 and 11 mg/L. TSS results for CA-1 were consistent with other sampling locations in February and May 2023, then spiked in August, returning to normal levels in November 2023. TSS values for MO-1 were considerably higher than all other stations, surpassing 100 mg/L in August 2023.

Significant rain was reported the day before and the day of the highest TSS levels measured in August 2023. August 8, 2023, results for TSS at station MO-1 and CA-1 may have been due to rain within the watershed at the time of sampling (NWS NOAA 2023).

In some cases, the exceedance of state standards for *E. coli* were due in part to the lower geometric mean criteria. During the May-October season, the state standard for geometric mean is 126 counts/100 mL. During the November-April season, the state standard for geometric mean is 265 counts/100 mL. Geometric means met the state standard of 265 MPN/100 mL for 17 of the 26 stations in February 2023. For the May sampling period, results from all sampling stations exceeded the 126 counts/100 mL state standard. In August, all stations except HC-1 exceeded the standard. In November, 15 of the 26 stations met the standard of 265 counts/100mL.

Eight of 20 of the largest reported concentrations (≥ 2000 MPN/100 mL) were measured from samples collected in August 2023. Portions of the MO-1 and CA-1 watersheds received about 0.25 to 0.5 inches of rain on August 7, 2023, and 1.5 to 2 inches on August 8, 2023 (NWS NOAA 2023). Saturated soils from a

cumulative 2-3 inches of rainfall on August 7-8, 2023, likely contributed to elevated *E. coli* concentrations in the August 7-9 samples. All stations received up to 0.75 inches of rain on August 14 and August 15, which may have contributed to elevated concentrations on or near these days (NWS NOAA 2023). Saturated conditions increase the possibility of leakage from septic drainage fields and sanitary sewers due to rainwater infiltration. Increased runoff contributes *E. coli* from wildlife and domestic animal sources. The largest concentrations ($\geq 8,000$ MPN/100 mL) for the May geomean were measured on May 8 (BR-1, BR-2). There had been up to 0.5 inches of rain in this area at the time (NWS NOAA 2023).

The Middle Oconee River Watershed Management Plan completed in 2018 (Arcadis-Tetra Tech April 2018b), including Kingswood Branch and Hunnicutt Creek, identified the following *E. coli* sources: pets, wild animals, farms, leaky sewer pipes, and septic systems. There may also be some contribution to *E. coli* 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 (BMPs), including initiatives in pet waste management, sewer evaluations, septic system management, and bacteria source tracking, to help reduce *E. Coli* and sediment loads to receiving waters, as well as to maintain acceptable levels of pH. BMPs 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, hundreds of miles of roadways were swept as part of street sweeping programs (resulting in removal of 1568 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, Hunnicutt 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.

CONTENTS

Executive Summary.....	1
Acronyms and Abbreviations.....	iv
1 Introduction	1
2 Methods	3
2.1 Impaired Waters Sampling	3
2.1.1 Study Area.....	3
2.1.2 Sampling Stations.....	5
2.1.3 Sampling Parameters and Schedule.....	6
2.1.4 Sampling Methods.....	6
2.2 Best Management Practices.....	7
2.2.1 Pet Waste Management Initiatives.....	7
2.2.2 Sanitary Sewer Evaluation	7
2.2.2.1 Sewer Maintenance.....	8
2.2.2.2 Sewer Evaluation Studies.....	8
2.2.3 Septic System Management	9
2.2.4 Street Sweeping	9
2.2.5 Bacterial Source Tracking	9
2.2.6 TSS Reduction BMPs.....	10
2.2.7 Watershed Management Plans	10
3 Results	11
3.1 <i>E. coli</i>	11
3.1.1 All Data	11
3.1.2 November–April Data	16
3.1.3 May–October Data	19
3.2 pH	21
3.3 Total Suspended Solids.....	24
3.4 Quality Assurance/Quality Control.....	24
4 Discussion.....	25
4.1 Sampling Results.....	25

4.2	BMP Effectiveness Evaluation	27
5	Conclusions	29
6	References	31

TABLES

Table 1.	Impaired Stream Reaches with MS4 Outfalls within 1 Linear Mile in Athens-Clarke County, Georgia	1
Table 2.	Sampling Stations in Impaired Stream Reaches in Athens-Clarke County, Georgia	5
Table 3.	Sampling Parameters and Schedule	6
Table 4.	Georgia Water Quality Standards for Sampled Parameters	6
Table 5.	<i>E. coli</i> Bacteria Geometric Means (February 2023 - November 2023) and Comparison to State Standards	12
Table 6.	<i>E. coli</i> Bacteria 90 th Percentile (February 2023 - November 2023) and Comparison to State STV Standards	15
Table 7.	<i>E. coli</i> Bacteria Geometric Means (February 2023 and November 2023) and Exceedance of State Standards	17
Table 8.	<i>E. coli</i> Bacteria Geometric Means (May 2023 and August 2023) and Exceedance of State Standards	19
Table 9.	pH Measurements	22
Table 10.	Total Suspended Solids (mg/L) Measured at CA-1, CED-1, NC-1, NC-2, MO-1	24
Table 11.	Monthly Rainfall Totals for Athens, Georgia (National Weather Service 2023)	26
Figure 7.	Monthly Rainfall Totals for Athens, Georgia (National Weather Service 2023)	26
Table 12.	Best Management Practices Effectiveness Evaluation	27
Table 13.	Trends in Water Quality by Stream	29

FIGURES

Figure 1.	Impaired Stream Reaches within 1 Linear Mile of MS4 Outfalls and Sampling Stations in Athens-Clarke County, Georgia	4
Figure 2.	<i>E. coli</i> Geometric Means (February 2023 – November 2023)	13
Figure 3.	<i>E. coli</i> Geometric Means (February 2023 and November 2023)	18
Figure 4.	<i>E. coli</i> Geometric Means (May 2023 and August 2023)	20
Figure 5.	pH Measurements	23

Figure 6. Total Suspended Solids Measured at CA-1, CED-1, MO-1, NC-1, and NC-224

APPENDICES

Water Quality Sample Results (February 2023 – November 2023)

Water Quality Trends (October 2015 – November 2023)

ACRONYMS AND ABBREVIATIONS

ACC	Athens-Clarke County, Georgia
ACCGOV	Athens-Clarke County Government
Bio F	biota - fish communities
Bio M	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. For monitoring year 2023, monitoring was conducted under the 2022 General Permit (Georgia Department of Natural Resources 2022). The 2017 General Permit expired on December 5, 2022 and the 2022 General Permit became effective on December 6, 2022. 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 pollutants of concern (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). According to the 2022 305(b)/303(d) List of Waters, 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 (Bio F), one reach is listed and impaired for sediment impacts to macroinvertebrate biota (Bio M), and three reaches are listed as impaired for pH (Table 1; Georgia Department of Natural Resources 2022). Thus, the POCs identified for the ACC MS4 Permit area are FC, pH, and sediment (Bio F and Bio M). The reach names, locations, designated uses, impairment parameters (or POCs), extent (length of impaired reach), and potential causes are listed in Table 1.

On August 31, 2022, EPA approved EPD's new water quality standards using *Escherichia coli* (*E. coli*) instead of FC as the impairment parameter (EPA 2022). This report discusses and references monitoring data using FC as the impairment parameter and *E. coli* as the water quality standard.

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	Bio F, Bio M, FC, pH	2	Industrial facility, urban runoff
Cedar Creek	Headwaters to Oconee River, Athens	Fishing	FC, Bio F	5	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	4	Urban runoff
East Sandy Creek	Long Branch to Sandy Creek	Fishing	pH	4	Non-point sources

2023 Annual Report – Impaired Waters Monitoring and Implementation Plan

Reach Name	Location	Designated Use	Impairment Parameter(s)	Extent (miles)	Potential Causes
Hunnicutt Creek	Headwaters to Middle Oconee River, Athens	Fishing	FC	2	Urban runoff
Kingswood Branch	Tributary to McNutt Creek, Athens	Fishing	FC	1	Urban runoff
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, Bio M*	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, Bio F	5	Non-point sources, urban runoff
North Oconee River	Sandy Creek to Trail Creek	Drinking Water, Fishing	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

*Bio M impairment was removed in the 2022 list.

Source: Georgia Department of Natural Resources 2022

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 (Arcadis-Tetra Tech January 2016). 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 waters 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. The 2023 Annual Report includes detailed results from February 2023 to November 2023, but also includes an analysis of POC trends since initiation of data collection.

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 stream 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. Nokatchee 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.

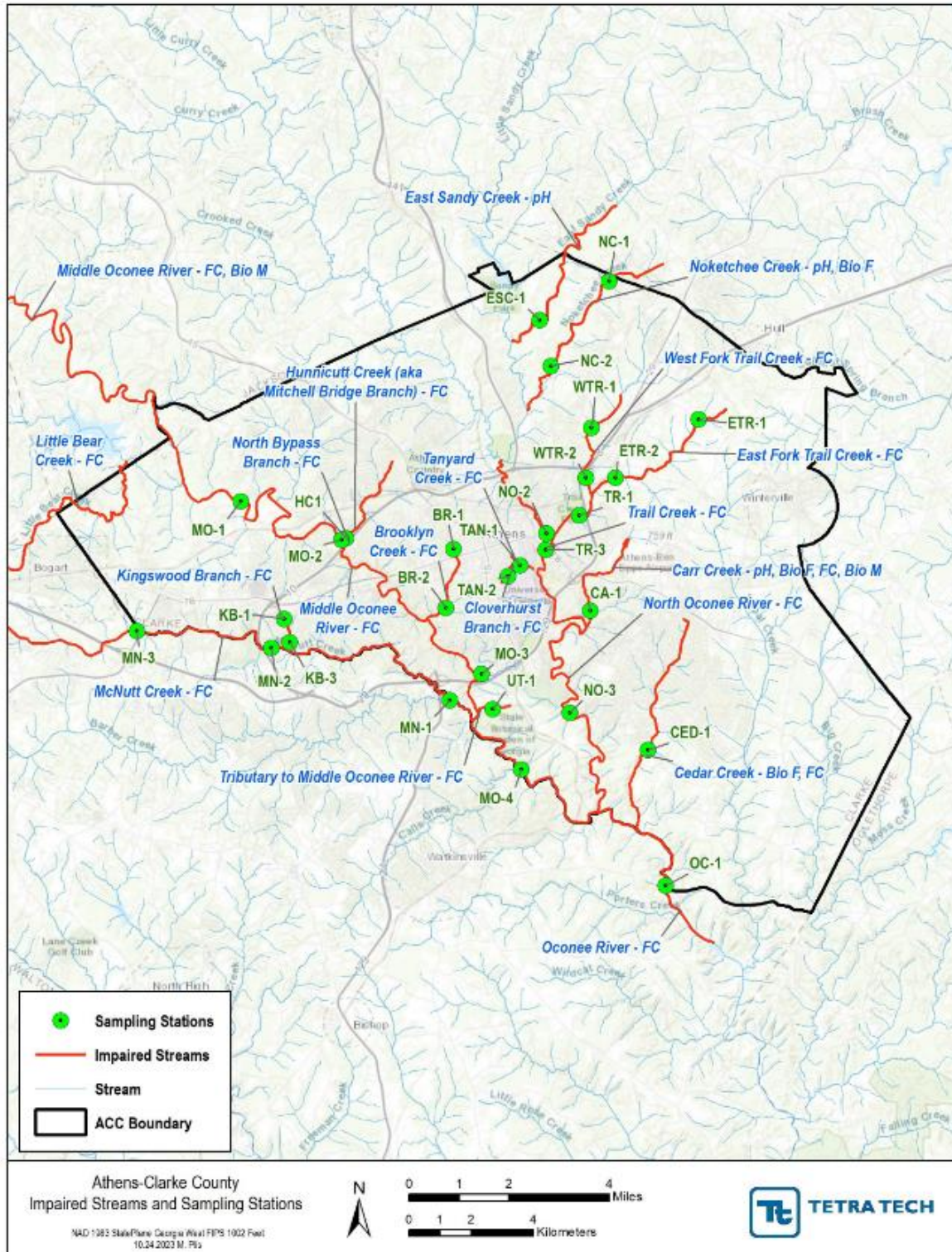


Figure 1. Impaired Stream Reaches within 1 Linear Mile of MS4 Outfalls and Sampling Stations in Athens-Clarke County, Georgia

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 were sampled at 29 stations. The sampling stations, impaired reaches, criterion exceeded, parameters sampled, 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	Parameter(s) Sampled	Latitude	Longitude
BR-1	Brooklyn Creek	FC	<i>E. coli</i>	33.9547	-83.3993
BR-2	Brooklyn Creek	FC	<i>E. coli</i>	33.9376	-83.4021
CA-1	Carr Creek	Bio F, FC, pH	<i>E. coli</i> , TSS, pH	33.9364	-83.3518
CED-1	Cedar Creek	FC, Bio F	<i>E. coli</i> , TSS	33.8958	-83.3321
ETR-1	East Fork Trail Creek	FC	<i>E. coli</i>	33.9918	-83.3136
ETR-2	East Fork Trail Creek	FC	<i>E. coli</i>	33.975	-83.3426
ESC-1	East Sandy Creek	pH	pH	34.0211	-83.3686
HC-1	Hunnicutt Creek	FC	<i>E. coli</i>	33.9581	-83.4367
KB-1	Kingswood Branch	FC	<i>E. coli</i>	33.9347	-83.4584
KB-3	Kingswood Branch	FC	<i>E. coli</i>	33.9279	-83.4565
MN-1	McNutt Creek	FC	<i>E. coli</i>	33.9107	-83.401
MN-2	McNutt Creek	FC	<i>E. coli</i>	33.9263	-83.463
MN-3	McNutt Creek	FC	<i>E. coli</i>	33.9314	-83.5098
MO-1	Middle Oconee	FC, Bio M*	<i>E. coli</i> , TSS	33.969	-83.4733
MO-2	Middle Oconee	FC	<i>E. coli</i>	33.9576	-83.4383
MO-3	Middle Oconee	FC	<i>E. coli</i>	33.9183	-83.3898
MO-4	Middle Oconee	FC	<i>E. coli</i>	33.8904	-83.3763
NC-1	Noketchee Creek	Bio F, pH	TSS, pH	34.0322	-83.3444
NC-2	Noketchee Creek	Bio F, pH	TSS, pH	34.0077	-83.3649
NO-2	North Oconee River	FC	<i>E. coli</i>	33.959	-83.3669
NO-3	North Oconee River	FC	<i>E. coli</i>	33.9068	-83.3593
OC-1	Oconee River	FC	<i>E. coli</i>	33.8563	-83.3263
TAN-1	Tanyard Creek	FC	<i>E. coli</i>	33.9497	-83.3761
TAN-2	Cloverhurst Branch	FC	<i>E. coli</i>	33.9466	-83.3804
TR-1	Trail Creek	FC	<i>E. coli</i>	33.9642	-83.3553
TR-3	Trail Creek	FC	<i>E. coli</i>	33.9542	-83.3671
WTR-1	West Fork Trail Creek	FC	<i>E. coli</i>	33.9896	-83.3509
WTR-2	West Fork Trail Creek	FC	<i>E. coli</i>	33.9761	-83.3534
UT-1	Unnamed tributary to Middle Oconee River	FC	<i>E. coli</i>	33.908	-83.386

TSS = Total Suspended Solids

*Bio M impairment was removed in the 2022 list.

2.1.3 Sampling Parameters and Schedule

Sampling methods included in-situ pH measurements for stations NC-1, NC-2, CA-1, and ESC-1; grab sampling for *E. coli* 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 # of Stations Sampled	Sampling Schedule
<i>E. coli</i>	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	NC-1, NC-2, CA-1, ESC-1	4	20 samples per year
TSS	Grab	CA-1, CED-1, NC-1, NC-2, MO-1	5	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
<i>E. coli</i>	May–Oct <126 counts/100 mL as geometric mean and statistical threshold value (STV) of 410 counts/100 mL ($\leq 10\%$ excursion in 30-day period)	GA Water Quality Standards*
	Nov–Apr <265 counts/100 mL and statistical threshold value of 861 counts/100 mL ($\leq 10\%$ excursion in 30-day period)	
pH	Between 6.0 and 8.5	GA Water Quality Standards
TSS	No quantitative standard in Georgia	NA

*Standard changed to an *E. coli* water quality standard effective August 31, 2022

2.1.4 Sampling Methods

Sampling methods included in-situ water quality measurements for pH and grab samples for laboratory analyses of *E. coli* 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 included completed field forms that provided information on sample location, date, time, weather conditions at the time of sampling, names of sampling personnel, observed water/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 *E. Coli* 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 2023. Progress made before 2023 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 has worked with the ACC Solid Waste Department to find a pedestrian trash can design for downtown Athens that incorporates a pet waste bag dispenser. The ACC Stormwater Department has worked with the ACC Solid Waste Department to install three pet waste stations in the central business district in 2023. A fourth site is being investigated.

2.2.2 Sanitary Sewer Evaluation

Due to the high levels of *E. Coli* 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 2023, PUD used Rodder trucks and flush/vacuum trucks to clean sewer line and camera trucks to inspect sewer line. In addition, easements and right-of-way were cleared, and sewer line was treated for root control in March.
- In 2022, PUD made condition and capacity upgrades to 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.
- In 2022, PUD's contractor dug a tunnel under the Loop between Alexander Street and Dairy Pac Road to upsize and realign the Upper North Oconee sewer main.
- In 2022, PUD finalized 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.
- In 2022, PUD developed design 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 *E. Coli* 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 2023.

- ACCGOV contracts street sweeping services on major urban roadways and throughout the Central Business District. In 2023, hundreds of miles of roadway were swept, resulting in removal of 1,568 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.

2023 Annual Report – Impaired Waters Monitoring and Implementation Plan

- 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.
- 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. ACC will pursue additional street sweeping starting in 2024 as revenues allow.

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 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 *E. coli*

3.1.1 All Data

During the February 2023 to November 2023 period of record, a total of 482 grab samples (including duplicates and blanks) were tested for *E. coli*. 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 *E. coli* 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 2023 data set does not support statistically sound trend analysis.

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

2023 Annual Report – Impaired Waters Monitoring and Implementation Plan

Table 5. *E. coli* Bacteria Geometric Means (February 2023 - November 2023) and Comparison to State Standards

Date	Feb-23	May-23	Aug-23	Nov-23	Exceedances of Standard
Station	<i>E. coli</i> Geometric Mean (#1) MPN/100 mL (Nov-Apr)	<i>E. coli</i> Geometric Mean (#2) MPN/100 mL (Nov-Apr)	<i>E. coli</i> Geometric Mean (#3) MPN/100 mL (May-Oct)	<i>E. coli</i> Geometric Mean (#4) MPN/100 mL (May-Oct)	
BR-1	664.6	1303.9	1262.3	357.1	■ ■ ■ ■
BR-2	308.9	1500.3	728.0	330.0	■ ■ ■ ■
CA-1	94.2	153.0	491.7	232.6	■ ■ ■ ■
CED-1	372.6	479.6	442.8	655.0	■ ■ ■ ■
ETR-1	403.4	487.7	445.9	238.5	■ ■ ■ ■
ETR-2	190.8	219.6	286.7	234.5	■ ■ ■ ■
HC-1	84.9	1532.8	100.0	240.1	■ ■ ■ ■
KB-1	257.1	612.4	842.3	395.6	■ ■ ■ ■
KB-3	318.6	904.7	1566.8	583.1	■ ■ ■ ■
MN-1	180.3	459.7	375.8	281.5	■ ■ ■ ■
MN-2	120.6	657.7	387.5	264.3	■ ■ ■ ■
MN-3	223.3	177.9	286.7	401.0	■ ■ ■ ■
MO-1	191.5	449.8	348.9	111.3	■ ■ ■ ■
MO-2	184.2	335.1	271.2	144.5	■ ■ ■ ■
MO-3	219.7	1119.3	219.7	210.9	■ ■ ■ ■
MO-4	242.6	733.0	266.9	224.3	■ ■ ■ ■
NO-2	478.7	308.5	143.7	257.3	■ ■ ■ ■
NO-3	433.9	308.8	135.2	124.7	■ ■ ■ ■
OC-1	366.0	379.6	245.8	240.7	■ ■ ■ ■
TAN-1	181.9	1162.7	425.3	169.7	■ ■ ■ ■
TAN-2	616.7	1437.8	1210.3	562.1	■ ■ ■ ■
TR-1	165.7	227.0	326.6	305.3	■ ■ ■ ■
TR-3	133.1	378.9	857.1	262.6	■ ■ ■ ■
UT-1	12.0	438.7	355.6	224.4	■ ■ ■ ■
WTR-1	93.8	214.9	835.1	430.4	■ ■ ■ ■
WTR-2	106.5	453.4	588.0	560.5	■ ■ ■ ■
State Standard	265	126	126	265	

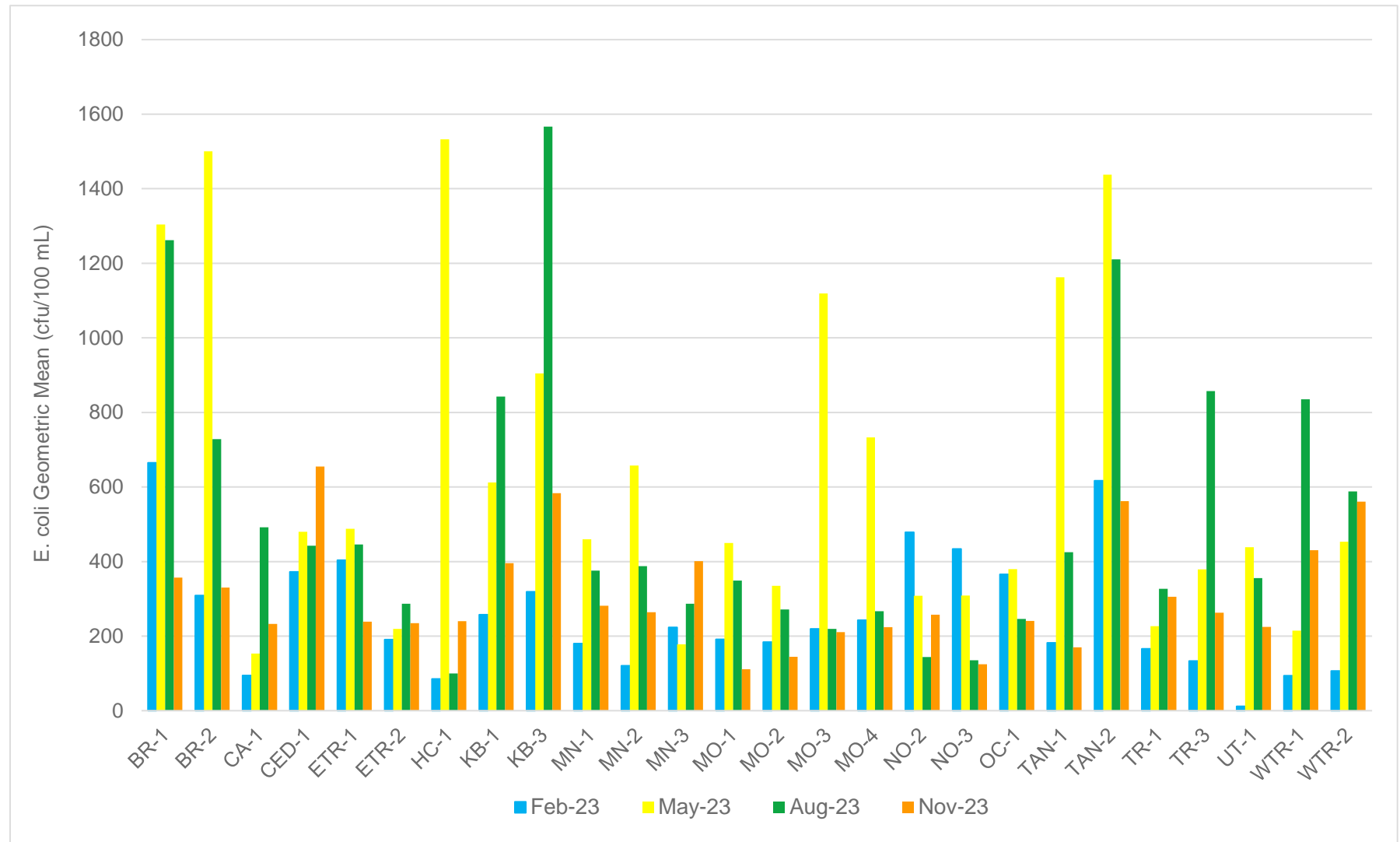


Figure 2. *E. coli* Geometric Means (February 2023 – November 2023)

The geometric mean for BR-1, BR-2, CED-1, ETR-1, KB-3, NO-2, NO-3, OC-1, and TAN-2 exceeded the *E. coli* geometric mean standard of 265 counts/100mL for November-April for the February sampling event. In May 2023, results from all stations exceeded the *E. coli* geometric mean standard of 126 counts/100 mL for May-October. In August 2023, results from all stations except HC-1 exceeded the May-October standard. The geometric mean for BR-1, BR-2, CED-1, KB-1, KB-3, MN-1, MN-3, TAN-2, TR-1, WTR-1 and WTR-2 exceeded the November-April standard for the November 2023 sampling event.

E. coli results measured for individual grab samples were compared to the state statistical threshold value (STV) water quality standard for *E. coli* single samples: <410 counts/100 mL for May-October and <861 counts/100mL for November-April. The standard dictates ≤10% excursion of the samples taken in a 30-day period. The 90th percentile was calculated from the individual samples for each station for each geomean/30-day period that sampling was completed. This value was then compared to the STV standard. Table 6 shows the comparison of these values. The Exceedances of Standard column indicates whether a 90th percentile value exceeded the STV. Each square corresponds to a geometric mean in chronological order from left to right. A red square indicates an exceedance, and a green square indicates no exceedance of the applicable STV. In addition, the red and green colors of the cells containing geometric mean values for each sample date corresponds to the Exceedances of Standard column and indicate whether sample results exceeded the water quality standard; red values indicate an exceedance, and green values indicate no exceedance.

Table 6. *E. coli* Bacteria 90th Percentile (February 2023 - November 2023) and Comparison to State STV Standards

Date	Feb-23	May-23	Aug-23	Nov-23	Exceedances of Standard
Station	<i>E. coli</i> Geometric Mean (#1)	<i>E. coli</i> Geometric Mean (#2)	<i>E. coli</i> Geometric Mean (#3)	<i>E. coli</i> Geometric Mean (#4)	
	90 th Percentile	90 th Percentile	90 th Percentile	90 th Percentile	
	MPN/100 mL (Nov-Apr)	MPN/100 mL (Nov-Apr)	MPN/100 mL (May-Oct)	MPN/100 mL (May-Oct)	
BR-1	885.0	6010.9	2159.0	719.9	■ ■ ■ ■
BR-2	936.5	6386.1	929.3	998.9	■ ■ ■ ■
CA-1	331.2	312.8	1020.1	453.1	■ ■ ■ ■
CED-1	1077.6	690.4	1278.5	1043.6	■ ■ ■ ■
ETR-1	1008.6	577.5	740.2	423.4	■ ■ ■ ■
ETR-2	233.8	307.6	905.1	327.5	■ ■ ■ ■
HC-1	113.4	2273.4	17451.3	364.3	■ ■ ■ ■
KB-1	359.8	4937.6	7441.3	1022.4	■ ■ ■ ■
KB-3	536.1	1092.3	3648.0	1185.6	■ ■ ■ ■
MN-1	327.2	931.7	457.2	1178.0	■ ■ ■ ■
MN-2	223.0	943.5	518.8	829.6	■ ■ ■ ■
MN-3	294.5	485.8	322.1	737.2	■ ■ ■ ■
MO-1	333.9	671.8	956.0	182.0	■ ■ ■ ■
MO-2	316.6	625.0	823.7	194.7	■ ■ ■ ■
MO-3	1053.8	3033.3	438.1	1169.3	■ ■ ■ ■
MO-4	865.3	2482.9	523.4	1855.5	■ ■ ■ ■
NO-2	5192.5	859.0	432.9	323.2	■ ■ ■ ■
NO-3	1478.1	503.2	198.3	528.1	■ ■ ■ ■
OC-1	1426.8	1200.7	349.4	1291.8	■ ■ ■ ■
TAN-1	282.0	1939.8	950.0	233.2	■ ■ ■ ■
TAN-2	886.6	2672.8	1802.2	829.5	■ ■ ■ ■
TR-1	239.4	279.0	1274.0	543.2	■ ■ ■ ■
TR-3	204.5	472.1	3604.8	363.7	■ ■ ■ ■
UT-1	34.7	1061.6	731.8	352.2	■ ■ ■ ■
WTR-1	312.1	275.4	3222.2	975.7	■ ■ ■ ■
WTR-2	216.4	2432.0	1818.8	1123.9	■ ■ ■ ■
State Standard	861	410	410	861	

Individual grab sample *E. coli* data for the February 2023 - November 2023 study period is provided in Appendix A.

3.1.2 November–April Data

Geometric means computed for *E. coli* 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 February and November 2023, are presented in Table 7 and on Figure 3. In Table 7, the red and green colors of the cells containing geometric means indicate whether a sample exceeded the water quality standard; green values indicate no exceedance. Geometric means met the state standard of 265 counts/100 mL for November–April for 17 of the 26 stations in February, and 15 of the 26 stations in November.

Table 7. *E. coli* Bacteria Geometric Means (February 2023 and November 2023) and Exceedance of State Standards

Date	Feb-23	Nov-23	Exceedances of Standard
Station	<i>E. coli</i> Geometric Mean (#1) MPN/100 mL (Nov-Apr)	<i>E. coli</i> Geometric Mean (#4) MPN/100 mL (Nov-Apr)	
BR-1	664.6	357.1	■ ■
BR-2	308.9	330.0	■ ■
CA-1	94.2	232.6	■ ■
CED-1	372.6	655.0	■ ■
ETR-1	403.4	238.5	■ ■
ETR-2	190.8	234.5	■ ■
HC-1	84.9	240.1	■ ■
KB-1	257.1	395.6	■ ■
KB-3	318.6	583.1	■ ■
MN-1	180.3	281.5	■ ■
MN-2	120.6	264.3	■ ■
MN-3	223.3	401.0	■ ■
MO-1	191.5	111.3	■ ■
MO-2	184.2	144.5	■ ■
MO-3	219.7	210.9	■ ■
MO-4	242.6	224.3	■ ■
NO-2	478.7	257.3	■ ■
NO-3	433.9	124.7	■ ■
OC-1	366.0	240.7	■ ■
TAN-1	181.9	169.7	■ ■
TAN-2	616.7	562.1	■ ■
TR-1	165.7	305.3	■ ■
TR-3	133.1	262.6	■ ■
UT-1	12.0	224.4	■ ■
WTR-1	93.8	430.4	■ ■
WTR-2	106.5	560.5	■ ■
State Standard	265	265	

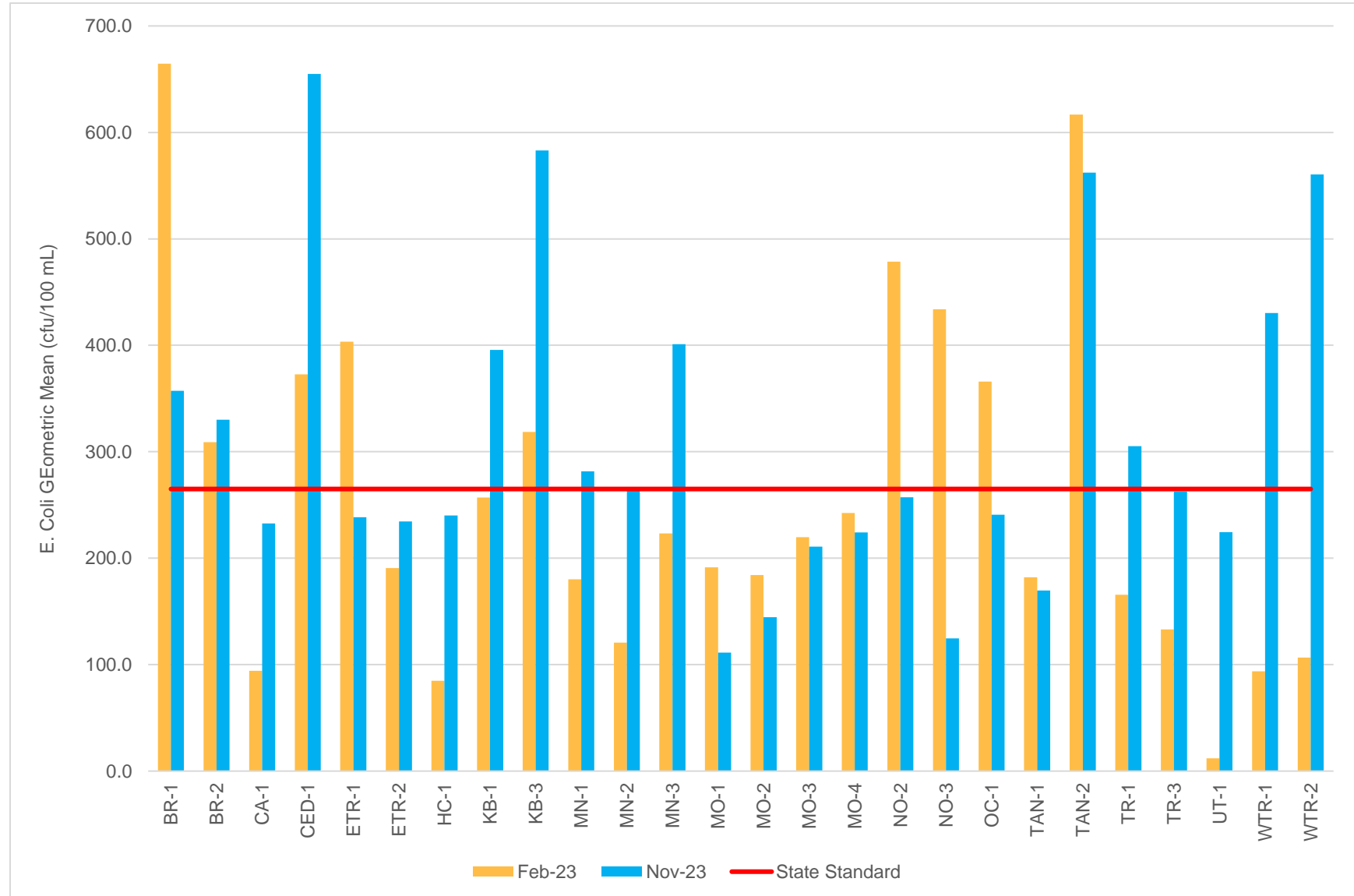


Figure 3. *E. coli* Geometric Means (February 2023 and November 2023)

3.1.3 May–October Data

Results for the May–October period, which include data collected in May 2023 and August 2023, are presented in Table 8 and on Figure 4. In Table 8, the red and green colors of the cells containing geometric mean values indicate whether results from a sample exceeded the water quality standard; red values indicate an exceedance, and green values indicate no exceedance. Two *E. coli* geometric means were computed during May–October for the 2023 study period. For the May sampling period, results from all stations exceeded the 126 counts/100 mL state standard for May–October. For the August sampling period, results from all stations except HC-1 exceeded the state standard.

Table 8. *E. coli* Bacteria Geometric Means (May 2023 and August 2023) and Exceedance of State Standards

Date	May-23	Aug-23	Exceedences of Standard
Station	<i>E. coli</i> Geometric Mean (#2) MPN/100 mL (May-Oct)	<i>E. coli</i> Geometric Mean (#3) MPN/100 mL (May-Oct)	
BR-1	1303.9	1262.3	■ ■
BR-2	1500.3	728.0	■ ■
CA-1	153.0	491.7	■ ■
CED-1	479.6	442.8	■ ■
ETR-1	487.7	445.9	■ ■
ETR-2	219.6	286.7	■ ■
HC-1	1532.8	100.0	■ ■
KB-1	612.4	842.3	■ ■
KB-3	904.7	1566.8	■ ■
MN-1	459.7	375.8	■ ■
MN-2	657.7	387.5	■ ■
MN-3	177.9	286.7	■ ■
MO-1	449.8	348.9	■ ■
MO-2	335.1	271.2	■ ■
MO-3	1119.3	219.7	■ ■
MO-4	733.0	266.9	■ ■
NO-2	308.5	143.7	■ ■
NO-3	308.8	135.2	■ ■
OC-1	379.6	245.8	■ ■
TAN-1	1162.7	425.3	■ ■
TAN-2	1437.8	1210.3	■ ■
TR-1	227.0	326.6	■ ■
TR-3	378.9	857.1	■ ■
UT-1	438.7	355.6	■ ■
WTR-1	214.9	835.1	■ ■
WTR-2	453.4	588.0	■ ■
State Standard	126	126	

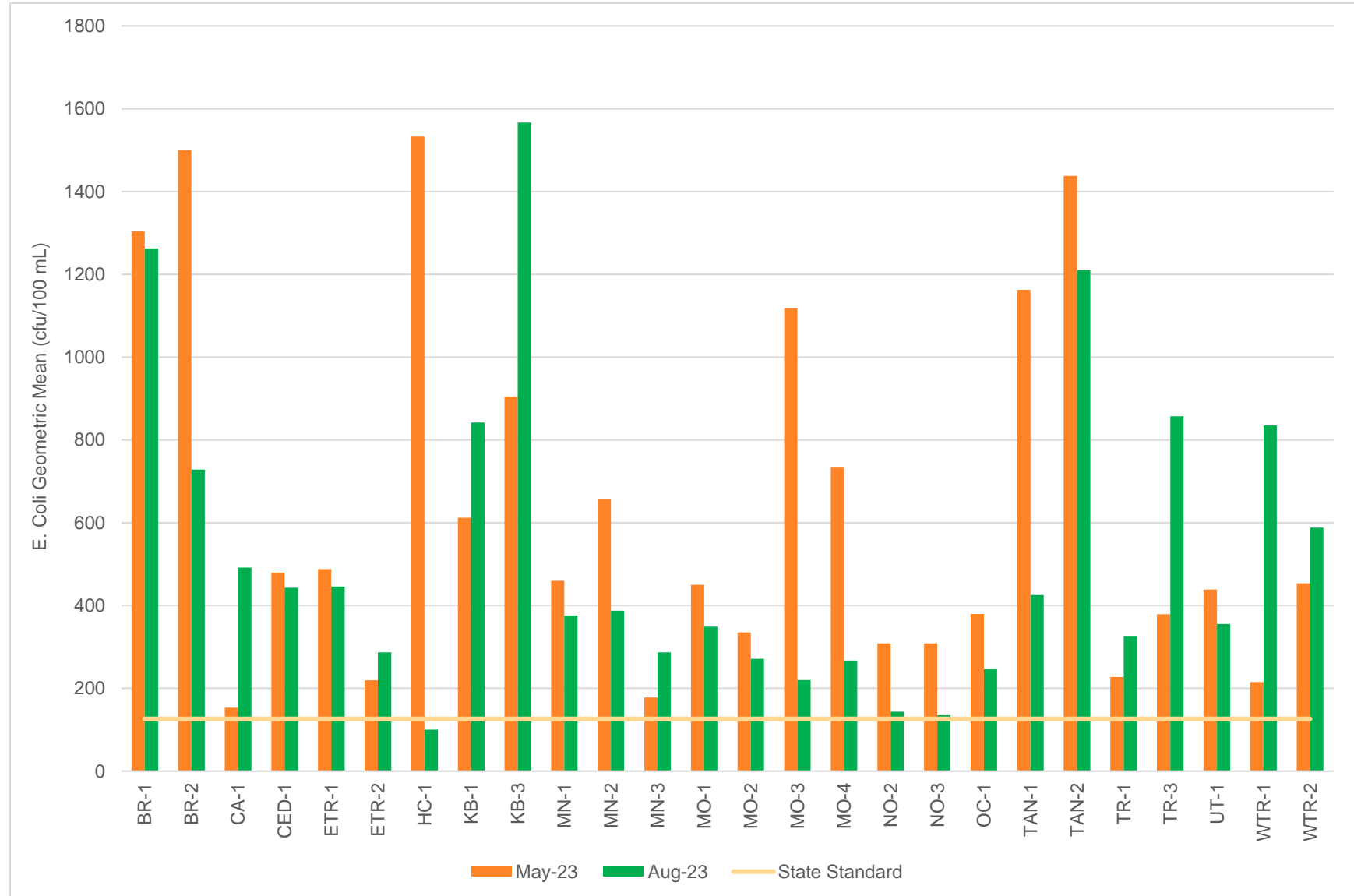


Figure 4. *E. coli* Geometric Means (May 2023 and August 2023)

3.2 pH

Twenty pH measurements collected for six stations each during the study period are shown in Table 9 and 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. All measurements for station CA-1 met the standard range. Two values for NC-2, three values for ESC-1, and four values for NC-1 fell below the standard range. These measurements were all taken between November 27 and December 14.

Table 9. pH Measurements

Date	CA-1	ESC-1	NC-1	NC-2
2/6/2023	NC*	NC*	NC*	NC*
2/7/2023	6.75	6.72	6.48	7.03
2/8/2023	NC*	NC*	NC*	NC*
2/9/2023	6.67	6.68	6.42	6.75
2/13/2023	NC*	NC*	NC*	NC*
2/14/2023	6.9	6.65	6.36	6.76
2/15/2023	NC*	NC*	NC*	NC*
2/16/2023	6.98	6.65	6.47	6.50
5/1/2023	NC*	NC*	NC*	NC*
5/2/2023	6.97	6.6	6.25	6.79
5/3/2023	NC*	NC*	NC*	NC*
5/4/2023	6.69	6.50	6.26	6.46
5/8/2023	NC*	NC*	NC*	NC*
5/9/2023	7.00	6.59	6.30	6.61
5/10/2023	NC*	NC*	NC*	NC*
5/15/2023	6.82	6.58	6.44	6.72
5/23/2023	6.96	6.30	6.37	6.24
8/7/2023	NC*	NC*	NC*	NC*
8/8/2023	7.36	6.77	6.77	6.86
8/9/2023	NC*	NC*	NC*	NC*
8/14/2023	NC*	NC*	NC*	NC*
8/15/2023	7.14	6.72	6.52	6.96
8/16/2023	NC*	NC*	NC*	NC*
8/17/2023	7.05	6.70	6.74	6.96
9/5/2023	7.20	6.74	6.84	7.12
10/30/2023	6.79	6.61	6.34	6.55
11/13/2023	NC*	NC*	NC*	NC*
11/14/2023	7.00	6.92	6.75	6.98
11/15/2023	NC*	NC*	NC*	NC*
11/16/2023	6.92	6.54	6.46	6.59
11/27/2023	NC*	NC*	NC*	NC*
11/28/2023	6.59	6.04	5.84	6.29
11/30/2023	6.65	5.68	5.70	6.33
12/11/2023	NC*	NC*	NC*	NC*
12/12/2023	6.74	5.70	5.54	5.61
12/14/2023	6.69	5.81	5.64	5.90
Number of Samples	20	20	20	20
Min	6.59	5.68	5.54	5.61
Max	7.36	6.92	6.84	7.12
Median	6.91	6.61	6.40	6.67
Standard Deviation	0.203	0.369	0.375	0.386

*NC = not collected

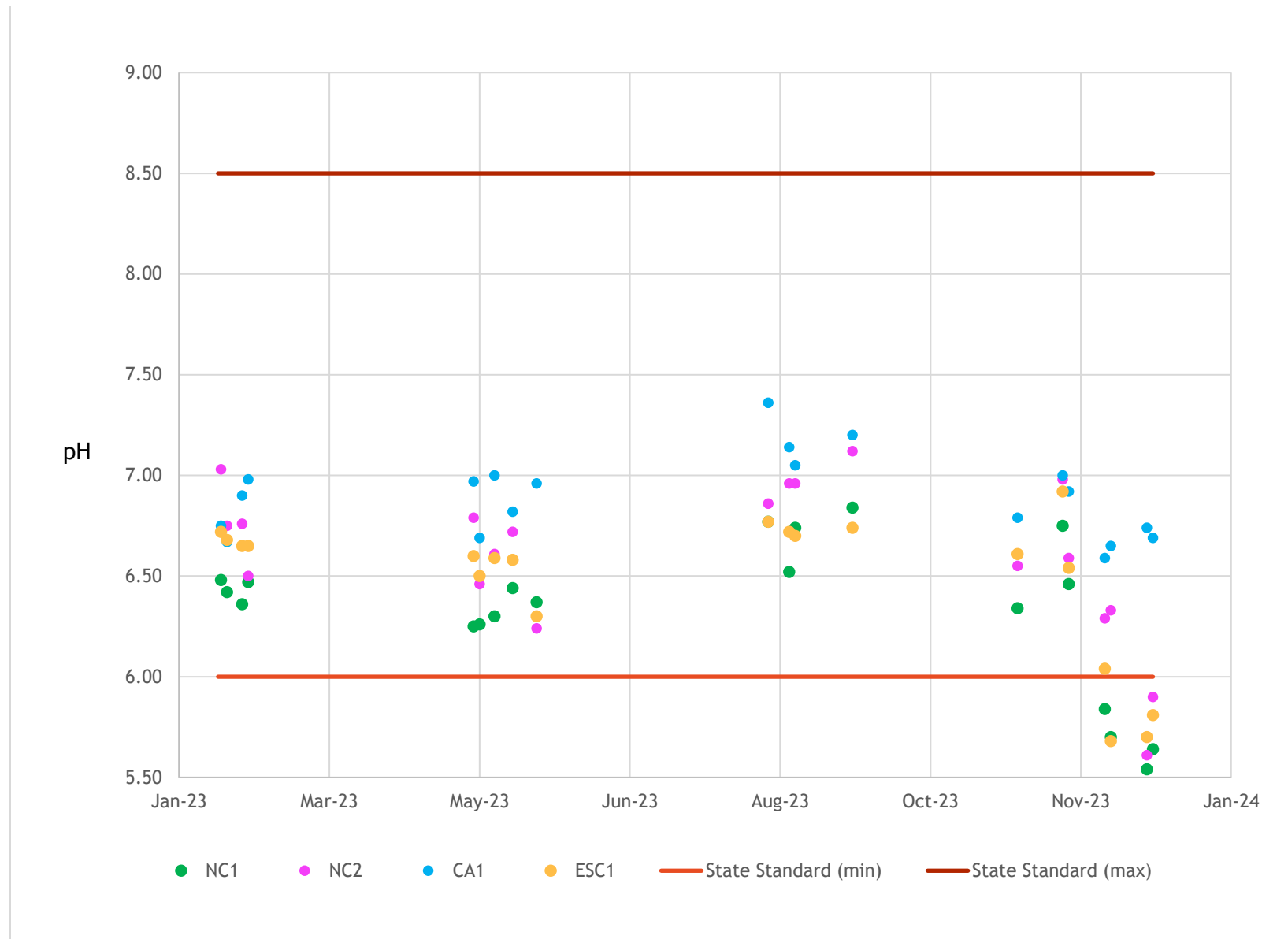


Figure 5. pH Measurements

3.3 Total Suspended Solids

Four total TSS concentrations (milligrams [mg]/liter [L]) measured for CA-1, CED-1, NC-1, NC-2, and MO-1 for the study period are presented in Table 10 and on Figure 6. Results for stations CED-1, NC-1, and NC-2 were consistently between 3 and 11 mg/L. Results for CA-1 were consistent with other sampling locations in February and May 2023, then spiked in August, returning to normal levels in November 2023. TSS values for MO-1 were considerably higher than all other stations, surpassing 100 mg/L in August 2023.

Table 10. Total Suspended Solids (mg/L) Measured at CA-1, CED-1, NC-1, NC-2, MO-1

Date	CA-1	CED-1	MO-1	NC-1	NC-2
February-23	10.5	6.0	26.0	5.0	6.0
May-23	7.7	4.3	45.0	5.0	6.2
August-23	49.7	3.8	118.4	6.0	8.3
November-23	3.0	3.3	52.4	10.7	3.3

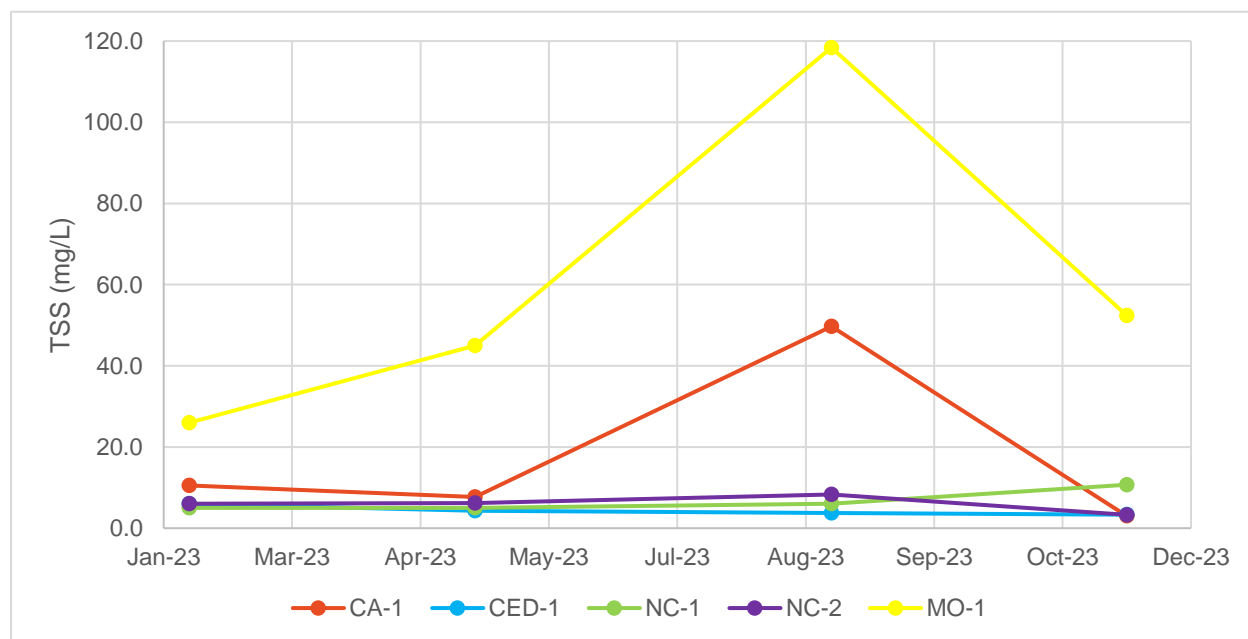


Figure 6. Total Suspended Solids Measured at CA-1, CED-1, MO-1, NC-1, and NC-2

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 and after each pH sampling event, and data entry and data verification checks on the data entered into the master Excel spreadsheet. In total, 32 blank samples and 32 duplicate samples were collected and analyzed for *E. coli* during the study period of record.

4 DISCUSSION

4.1 Sampling Results

In some cases, the exceedance of state standards for *E. coli* were due in part to the lower geometric mean criteria. During the May-October season, the geometric mean state standard is 126 counts/100 mL. During the November-April season, the geometric mean state standard is 265 counts/100 mL. Geometric means exceeded the state standard of 265 counts/100mL for 9 of the 26 stations in February and 11 of the 26 stations in November. In May 2023, results from all stations exceeded the *E. coli* geometric mean standard of 126 counts/100 mL. In August 2023, results from all stations except HC-1 exceeded the standard.

Eight of 20 of the largest reported concentrations (≥ 2000 MPN/100 mL) were measured from samples collected in August 2023. Portions of the MO-1 and CA-1 watersheds received about 0.25 to 0.5 inches of rain on August 7, 2023, and 1.5 to 2 inches on August 8, 2023 (NWS NOAA 2023). Saturated soils from a cumulative 2-3 inches of rainfall on August 7-8, 2023, likely contributed to elevated *E. coli* concentrations in the August 7-9 samples. All stations received up to 0.75 inches of rain on August 15 and August 16, which may have contributed to elevated concentrations on or after these days. Saturated conditions increase the possibility of leakage from septic drainage fields and sanitary sewers due to rainwater infiltration. Increased runoff contributes *E. coli* from wildlife and domestic animal sources.

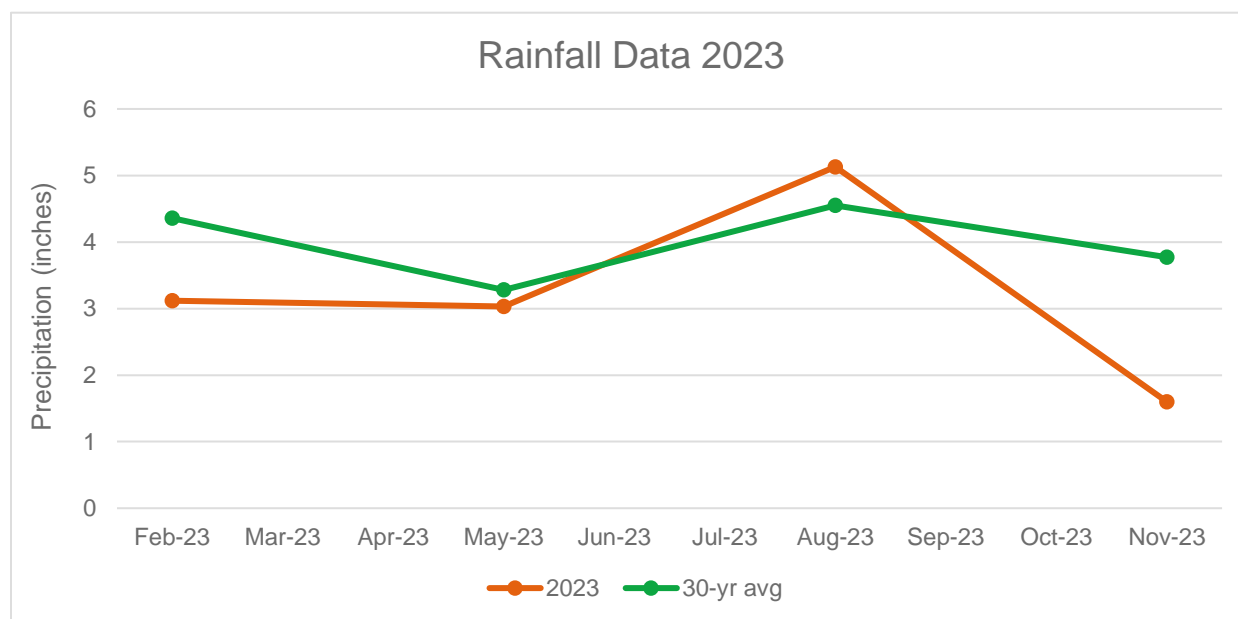
The largest concentrations ($\geq 8,000$ MPN/100 mL) for the May geomean were measured on May 8 (BR-1, BR-2). There had been up to 0.5 inches of rain in this area at the time (NWS NOAA 2023).

The Middle Oconee River Watershed Management Plan completed in 2018 (Arcadis-Tetra Tech April 2018b), including Kingswood Branch and Hunnicutt Creek, identified the following *E. coli* sources: pets, wild animals, farms, leaky sewer pipes, and septic systems. There may also be some contribution to *E. coli* levels in the Middle Oconee River Watershed from sources in the headwaters outside of the Athens-Clarke County boundary.

Monthly total rainfall data in 2023 compared with the 30-year average (1991-2020) are shown in Table 11 and Figure 7. The total rainfall for August in 2023 was greater than the 30-year average rainfall.

Table 11. Monthly Rainfall Totals for Athens, Georgia (National Weather Service 2023)

Month	2023 Rainfall (in)	30-year Average (in)
February	3.12	4.36
May	3.03	3.28
August	5.13	4.55
November	1.60	3.77

**Figure 7. Monthly Rainfall Totals for Athens, Georgia (National Weather Service 2023)**

In addition, much of the population continues to work from home, at least part time, as a result of the global COVID-19 pandemic. This results in an increased demand on sewer systems and septic systems serving residential dwellings. 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 May and August results.

All pH values for station CA-1 were within the state standards. Two pH readings for NC-2, three readings for ESC-1, and four readings for NC-1 fell below state standards. All of these values occurred in late November/early December 2023. Runoff from about 2 inches of rain from December 10-11 may have contributed to some of the low pH readings in December.

TSS levels for stations CED-1, NC-1, and NC-2 were consistently between 3 and 11 mg/L. Results for CA-1 were consistent with other sampling locations in February and May 2023, then spiked in August, returning to normal levels in November 2023. TSS values for MO-1 were considerably higher than all other stations, surpassing 100 mg/L in August 2023.

Significant rain was reported the day before and the day of the highest TSS levels measured in August 2023. August 8, 2023, results for TSS at station MO-1 and CA-1 may have been due to rain within the watershed at the time of sampling. Portions of the MO-1 and CA-1 watersheds received about 0.25 to 0.5 inches of rain on August 7, 2023, and 1.5 to 2 inches on August 8, 2023 (NWS NOAA 2023). 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).

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 11. 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 12 is considered preliminary and qualitative.

Table 12. 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. Three new pet stations have been installed in the central business district in 2023.
Septic system management	FC	Implemented, ongoing	Effective	ACC continued public education and outreach efforts for proper septic system management.
Street sweeping	FC and TSS	Implemented, ongoing	Effective	In 2023, hundreds of miles of roadways were swept, resulting in removal of 1,568 cubic yards of debris from roadways.

BMP Type	Targeted POCs	Implementation Status	Effectiveness Evaluation	Rationale
TSS reduction: increased construction inspections in Nokatchee Creek, Carr Creek, and Middle Oconee watersheds	TSS	Implemented, ongoing	Effective	In 2023, ACCGOV continued inspections in the Nokatchee Creek and Carr Creek watersheds, as well as the Middle Oconee watershed. TSS results measured for NC-1 and NC-2 during the 2023 reporting period were low. The results ranged from 3 mg/L to 11 mg/L.

Arcadis also looked at data trends over the entire monitoring period to assess general BMP effectiveness. Appendix B contains charts showing pH measurements and TSS results by stream since sampling began. TSS datasets were fitted with a trendline. Appendix B also includes charts showing the fluctuation in *E. coli* for each stream in 2023, though no trend can be determined from the *E. coli* data because it has only been collected for one year. Table 13 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 pH, results at all stations were consistently meeting standards since late 2020, until late November of 2023. For TSS, measurements at all stations are fluctuating.

Table 13. Trends in Water Quality by Stream

Reach	pH	TSS
Brooklyn Creek		
Carr Creek	Consistently meets standards since late 2020	Fluctuating
Cedar Creek		Fluctuating
East Fork Trail Creek		
East Sandy Creek	Was consistently meeting standards since late 2020. Low in November-December 2023	
Hunnicut Creek		
Kingswood Branch		
McNutt Creek		
Middle Oconee River		Fluctuating
Noketchee Creek	Was consistently meeting standards since late 2020. Low in November-December 2023	Fluctuating
North Oconee River		
Oconee River		
Tanyard Creek		
Trail Creek		
West Fork Trail Creek		

Water quality related to TSS in all stream reaches appears to be fluctuating. The pH levels in all streams appeared to consistently meet standards from late 2020 until late November 2023. 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 2024 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 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 is 50% complete and 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. A large hydrodynamic separator has been installed off of East Broad Street at the Firefly Trail. This treats runoff from approximately 20 acres of the central business district. The underdrain at a detention basin treating runoff from the fuel station at ACC Streets and Drainage has been successfully outfitted with a siphon. This maximizes the amount of runoff reduction at this site. ACC will continue to investigate retrofitting other ACC stormwater control measures with underdrain systems with upturned underdrains or siphons.

In addition, it should be noted that all of the pH samples at CA-1 collected in 2023 were within state standards. Results at ESC-1, NC-1, and NC-2 also consistently have met the state standards for the past three years, except for a few measurements at the end of 2023. Delisting these streams for pH impairment should be considered and discussed with GAEPD.

6 REFERENCES

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APPENDIX A

Water Quality Sample Results (February 2023 – November 2023)



E. coli 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
2/6/2023	0855	McNutt Creek	MN3	blank	<	10	#N/A	Sunny, 59F			1	November - April
2/6/2023	0855	McNutt Creek	MN3	Duplicate		175	#N/A	Sunny, 59F	moderate water level; moderate velocity; clear and slightly brown tint		1	November - April
2/6/2023	0958	Brooklyn Creek	BR1			471	471	Sunny, 59F	moderate water level; moderate velocity; clear	stagnant downstream; slight green color and high-water level downstream	1	November - April
2/6/2023	0940	Kingswood Branch	KB1			364	364	Sunny, 59F	moderate water level; moderate velocity; clear	heavy sand deposition	1	November - April
2/6/2023	1200	Cedar Creek	CED1			318	318	Sunny, 59F	moderate water level; moderate velocity; clear		1	November - April
2/6/2023	1214	North Oconee	NO3			231	231	Sunny, 59F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		1	November - April
2/6/2023	0855	McNutt Creek	MN3			218	218	Sunny, 59F	moderate water level; moderate velocity; clear and slightly brown tint		1	November - April
2/6/2023	1039	Middle Oconee	MO3			197	197	Sunny, 59F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/6/2023	0930	Kingswood Branch	KB3			185	185	Sunny, 59F	moderate water level; slow-moderate velocity; clear with slight brown tint	possible beaver dam downstream; heavy sand deposition	1	November - April
2/6/2023	1148	Oconee River	OC1			156	156	Sunny, 59F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		1	November - April
2/6/2023	1027	McNutt Creek	MN1			146	146	Sunny, 59F	moderate water level; moderate velocity; clear and turbid brown		1	November - April
2/6/2023	1014	Brooklyn Creek	BR2			121	121	Sunny, 59F	moderate water level; moderate velocity; clear		1	November - April
2/6/2023	1133	Middle Oconee	MO4			109	109	Sunny, 59F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/6/2023	0913	McNutt Creek	MN2			97	97	Sunny, 59F	moderate water level; moderate velocity; clear		1	November - April
2/6/2023	1102	Unnamed Tributary	UT1		<	10	5	Sunny, 59F	moderate water level; moderate velocity; clear	red and green colored pond located upstream; photos taken	1	November - April
2/7/2023	1255	Carr Creek	CA1	blank	<	10	#N/A	Sunny, 32F			1	November - April
2/7/2023	1255	Carr Creek	CA1	Duplicate		52	#N/A	Sunny, 32F	moderate water level; moderate velocity; clear with slight green tint		1	November - April
2/7/2023	1115	East Fork Trail Creek	ETR2			259	259	Sunny, 32F	moderate water level; moderate velocity; clear and slightly turbid	heavy sand deposition	1	November - April
2/7/2023	1225	Cloverhurst Branch	TAN2			233	233	Sunny, 32F	moderate water level; slow-moderate velocity; clear		1	November - April
2/7/2023	1203	North Oconee	NO2			173	173	Sunny, 32F	moderate water level; slow velocity; turbid brown; 1 ft. visibility		1	November - April
2/7/2023	1217	Tanyard Creek	TAN1			156	156	Sunny, 32F	moderate water level; moderate velocity; clear with slight green and grey tint		1	November - April
2/7/2023	0915	Middle Oconee	MO2			148	148	Sunny, 32F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/7/2023	0830	Middle Oconee	MO1			131	131	Sunny, 32F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/7/2023	1139	Trail Creek	TR1			109	109	Sunny, 32F	moderate water level; moderate velocity; clear and slightly turbid brown	heavy sand deposition	1	November - April
2/7/2023	0920	Hunnicutt Creek	HC1			98	98	Sunny, 32F	moderate water level; moderate velocity; clear		1	November - April

E. coli 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
2/7/2023	1154	Trail Creek	TR3			85	85	Sunny, 32F	moderate water level; moderate velocity; clear with slight brown tint	heavy sand deposition	1	November - April
2/7/2023	1129	West Fork Trail Creek	WTR2			52	52	Sunny, 32F	moderate water level; moderate velocity; clear with brown tint	heavy sand deposition	1	November - April
2/7/2023	1255	Carr Creek	CA1			41	41	Sunny, 32F	moderate water level; moderate velocity; clear with slight green tint		1	November - April
2/7/2023	1027	West Fork Trail Creek	WTR1			20	20	Sunny, 32F	moderate water level; moderate velocity; clear	heavy sand deposition	1	November - April
2/8/2023	0838	McNutt Creek	MN3	blank	<	10	#N/A	Overcast, 50F			1	November - April
2/8/2023	1205	Cedar Creek	CED1			1401	1401	Overcast, 50F	moderate water level; moderate velocity; clear		1	November - April
2/8/2023	0958	Brooklyn Creek	BR1			836	836	Overcast, 50F	low-moderate water level; moderate velocity; clear	stagnant water downstream and flooded into floodplain with slightly green pools	1	November - April
2/8/2023	0838	McNutt Creek	MN3	Duplicate		161	#N/A	Overcast, 50F	moderate water level; moderate velocity; clear	heavy sand deposition	1	November - April
2/8/2023	0930	Kingswood Branch	KB1			350	350	Overcast, 50F	moderate water level; moderate velocity; clear	heavy sand deposition; some surface water collected due to shallow water	1	November - April
2/8/2023	0838	McNutt Creek	MN3			228	228	Overcast, 50F	moderate water level; moderate velocity; clear	heavy sand deposition	1	November - April
2/8/2023	0912	Kingswood Branch	KB3			216	216	Overcast, 50F	moderate water level; moderate velocity; clear	slight green tint pool upstream with brown/orange fungus growing on substrate; possible beaver activity downstream; heavy sand deposition	1	November - April
2/8/2023	1132	Middle Oconee	MO4			158	158	Overcast, 50F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		1	November - April
2/8/2023	1025	McNutt Creek	MN1			148	148	Overcast, 50F	moderate water level; moderate velocity; clear	construction upstream on left bank	1	November - April
2/8/2023	1010	Brooklyn Creek	BR2			146	146	Overcast, 50F	moderate water level; moderate velocity; clear		1	November - April
2/8/2023	1149	Oconee River	OC1			109	109	Overcast, 50F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		1	November - April
2/8/2023	1214	North Oconee	NO3			98	98	Overcast, 50F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		1	November - April
2/8/2023	0904	McNutt Creek	MN2			63	63	Overcast, 50F	moderate water level; moderate velocity; clear	heavy sand deposition	1	November - April
2/8/2023	1037	Middle Oconee	MO3			52	52	Overcast, 50F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		1	November - April
2/8/2023	1105	Unnamed Tributary	UT1			20	20	Overcast, 50F	moderate water level; moderate velocity; clear	pink and green colored pond located upstream; photos taken	1	November - April
2/9/2023	1113	Carr Creek	CA1	blank	<	10	#N/A	Cloudy, 53F			1	November - April
2/9/2023	1113	Carr Creek	CA1	Duplicate		74	#N/A	Cloudy, 53F	moderate water level; moderate velocity; clear with slight grey tint	cement-like grey dust on rocks and silt on rocks on edge of banks possibly due to construction upstream; green tinted pool downstream before culvert	1	November - April
2/9/2023	1039	Cloverhurst Branch	TAN2			907	907	Cloudy, 53F	moderate water level; moderate velocity; clear	brown algae or fungus like growing on substrate	1	November - April
2/9/2023	0948	Trail Creek	TR1			240	240	Cloudy, 53F	moderate water level; moderate velocity; clear with slight green tint		1	November - April
2/9/2023	0925	East Fork Trail Creek	ETR2			175	175	Cloudy, 53F	moderate water level; moderate velocity; clear and slightly turbid		1	November - April
2/9/2023	0810	Middle Oconee	MO2			171	171	Cloudy, 53F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April

E. coli 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
2/9/2023	1027	Tanyard Creek	TAN1			156	156	Cloudy, 53F	moderate water level; slow-moderate velocity; clear with grey plume-like settled cloud on substrate near culvert and not actively flowing	photos taken of grey settled plume; project manager notified immediately; investigated immediately upstream/no evidence upstream	1	November - April
2/9/2023	0743	Middle Oconee	MO1			146	146	Cloudy, 53F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/9/2023	1013	North Oconee	NO2			121	121	Cloudy, 53F	moderate water level; slow velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/9/2023	1113	Carr Creek	CA1			110	110	Cloudy, 53F	moderate water level; moderate velocity; clear with slight grey tint	cement-like grey dust on rocks and silt on rocks on edge of banks possibly due to construction upstream; green tinted pool downstream before culvert	1	November - April
2/9/2023	1001	Trail Creek	TR3			98	98	Cloudy, 53F	moderate water level; moderate velocity; clear with slight green and brown tint; heavy sand deposition		1	November - April
2/9/2023	0939	West Fork Trail Creek	WTR2			86	86	Cloudy, 53F	moderate water level; moderate velocity; clear	heavy sand deposition	1	November - April
2/9/2023	0813	Hunnicutt Creek	HC1			85	85	Cloudy, 53F	moderate water level; moderate velocity; clear		1	November - April
2/9/2023	0906	West Fork Trail Creek	WTR1			74	74	Cloudy, 53F	moderate water level; moderate velocity; clear	heavy sand deposition	1	November - April
2/13/2023	0815	McNutt Creek	MN3	blank	<	10	#N/A	Clear, sunny, 35F	moderate water level; moderate velocity; clear with slight brown tint	recent rain event in last 24 hours	1	November - April
2/13/2023	1109	Oconee River	OC1			1785	1785	Clear, sunny, 35F	high water level; moderate velocity; turbid brown; 1/2 ft. visibility	recent rain event in last 24 hours	1	November - April
2/13/2023	1133	North Oconee	NO3			1722	1722	Clear, sunny, 35F	high water level; moderate velocity; turbid brown; 1 ft. visibility	recent rain event in last 24 hours	1	November - April
2/13/2023	0958	Middle Oconee	MO3			1421	1421	Clear, sunny, 35F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility	recent rain event in last 24 hours	1	November - April
2/13/2023	1054	Middle Oconee	MO4			1162	1162	Clear, sunny, 35F	slightly elevated; moderate velocity; turbid brown; 1/2 ft. visibility	recent rain event in last 24 hours	1	November - April
2/13/2023	0932	Brooklyn Creek	BR2			1145	1145	Clear, sunny, 35F	moderate water level; slow-moderate velocity; clear	recent rain event in last 24 hours	1	November - April
2/13/2023	0918	Brooklyn Creek	BR1			547	547	Clear, sunny, 35F	low-moderate water level; moderate velocity; clear	stagnant green/brown tinted turbid water downstream with flooded floodplain	1	November - April
2/13/2023	0845	Kingswood Branch	KB3			450	450	Clear, sunny, 35F	slightly elevated, moderate velocity; clear; grey tint upstream	recent rain event in last 24 hours; heavy sand deposition	1	November - April
2/13/2023	0947	McNutt Creek	MN1			404	404	Clear, sunny, 35F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility	recent rain event in last 24 hours; construction located upstream on left bank; photo taken	1	November - April
2/13/2023	0815	McNutt Creek	MN3	Duplicate		246	#N/A	Clear, sunny, 35F	moderate water level; moderate velocity; clear with slight brown tint	recent rain event in last 24 hours	1	November - April
2/13/2023	0815	McNutt Creek	MN3			323	323	Clear, sunny, 35F	moderate water level; moderate velocity; clear with slight brown tint	recent rain event in last 24 hours	1	November - April
2/13/2023	1122	Cedar Creek	CED1			323	323	Clear, sunny, 35F	moderate water level; moderate velocity; clear	recent rain event in last 24 hours; heavy sand deposition	1	November - April
2/13/2023	0836	McNutt Creek	MN2			262	262	Clear, sunny, 35F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility	recent rain event in last 24 hours	1	November - April
2/13/2023	0900	Kingswood Branch	KB1			98	98	Clear, sunny, 35F	moderate water level; moderate velocity; clear	recent rain event in last 24 hours; heavy sand deposition; collected some surface water because water too shallow	1	November - April

E. coli 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
2/13/2023	1026	Unnamed Tributary	UT1			41	41	Clear, sunny, 35F	moderate water level; moderate velocity; clear	recent rain event in last 24 hours; green and red colored pond located upstream of UT-1; photos taken	1	November - April
2/14/2023	1133	Carr Creek	CA1	blank	<	10	#N/A	Clear, sunny, 39F			1	November - April
2/14/2023	1046	North Oconee	NO2			7270	7270	Clear, sunny, 39F	moderate water level; slow velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/14/2023	1133	Carr Creek	CA1	Duplicate		41	#N/A	Clear, sunny, 39F	moderate water level; moderate velocity; clear with slight grey tint	silt on rocks	1	November - April
2/14/2023	1108	Cloverhurst Branch	TAN2			839	839	Clear, sunny, 39F	moderate water level; moderate velocity; clear with slight brown algae/fungus growth on substrate		1	November - April
2/14/2023	0754	Middle Oconee	MO1			402	402	Clear, sunny, 39F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/14/2023	0919	West Fork Trail Creek	WTR1			388	388	Clear, sunny, 39F	moderate water level; moderate velocity; clear	heavy sand deposition	1	November - April
2/14/2023	0824	Middle Oconee	MO2			379	379	Clear, sunny, 39F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/14/2023	1016	West Fork Trail Creek	WTR2			262	262	Clear, sunny, 39F	moderate water level; moderate velocity; clear with slight brown tint		1	November - April
2/14/2023	0944	East Fork Trail Creek	ETR1			246	246	Clear, sunny, 39F	moderate water level; moderate velocity; clear	heavy sand deposition; sampled upstream of culvert construction and storm water damage; permission granted from county to sample today 2/14/2023	1	November - April
2/14/2023	1021	Trail Creek	TR1			238	238	Clear, sunny, 39F	moderate water level; moderate velocity; clear with slight brown tint		1	November - April
2/14/2023	1036	Trail Creek	TR3			218	218	Clear, sunny, 39F	moderate water level; slow-moderate velocity; clear and slightly turbid/brown tint		1	November - April
2/14/2023	0957	East Fork Trail Creek	ETR2			169	169	Clear, sunny, 39F	moderate water level; moderate velocity; clear with slight brown and green tint		1	November - April
2/14/2023	1058	Tanyard Creek	TAN1			134	134	Clear, sunny, 39F	moderate water level; slow-moderate velocity; clear with slight grey coloring on substrate	no settled grey plume today	1	November - April
2/14/2023	0829	Hunnicutt Creek	HC1			120	120	Clear, sunny, 39F	moderate water level; moderate velocity; clear		1	November - April
2/14/2023	1133	Carr Creek	CA1			41	41	Clear, sunny, 39F	moderate water level; moderate velocity; clear with slight grey tint	silt on rocks	1	November - April
2/15/2023	0805	McNutt Creek	MN3	blank	<	10	#N/A	Overcast, 50F			1	November - April
2/15/2023	1150	North Oconee	NO3			909	909	Overcast, 50F	moderate water level; moderate velocity; turbid brown		1	November - April
2/15/2023	0920	Brooklyn Creek	BR1			906	906	Overcast, 50F	low water level; moderate velocity; clear	flow in detention basin backyard up 30 m upstream	1	November - April
2/15/2023	0805	McNutt Creek	MN3	Duplicate		135	#N/A	Overcast, 50F	low water level; slow velocity; clear with very slightly turbid brown	tree fallen upstream	1	November - April
2/15/2023	1130	Oconee River	OC1			591	591	Overcast, 50F	moderate water level; moderate velocity; turbid brown		1	November - April
2/15/2023	0843	Kingswood Branch	KB3			573	573	Overcast, 50F	low water level; slow velocity; clear with very slight grey tint		1	November - April
2/15/2023	0935	Brooklyn Creek	BR2			450	450	Overcast, 50F	moderate water level; moderate velocity; clear		1	November - April
2/15/2023	0855	Kingswood Branch	KB1			350	350	Overcast, 50F	low water level; slow velocity; clear		1	November - April

E. coli 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
2/15/2023	1115	Middle Oconee	MO4			173	173	Overcast, 50F	moderate water level; moderate velocity; turbid brown		1	November - April
2/15/2023	1003	Middle Oconee	MO3			160	160	Overcast, 50F	moderate water level; moderate velocity; turbid brown		1	November - April
2/15/2023	0805	McNutt Creek	MN3			155	155	Overcast, 50F	low water level; slow velocity; clear with very slightly turbid brown	tree fallen upstream	1	November - April
2/15/2023	1140	Cedar Creek	CED1			134	134	Overcast, 50F	moderate water level; moderate velocity; very faint turbid		1	November - April
2/15/2023	0830	McNutt Creek	MN2			132	132	Overcast, 50F	low water level; moderate velocity; clear	fresh overbank sand deposit	1	November - April
2/15/2023	0950	McNutt Creek	MN1			121	121	Overcast, 50F	moderate water level; moderate velocity; clear		1	November - April
2/15/2023	1030	Unnamed Tributary	UT1		<	10	5	Overcast, 50F	low water level; moderate velocity; clear		1	November - April
2/16/2023	1055	Cloverhurst Branch	TAN2	blank	<	10	#N/A				1	November - April
2/16/2023	1055	Cloverhurst Branch	TAN2			816	816	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; clear		1	November - April
2/16/2023	1114	Carr Creek	CA1			426	426	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; clear with grey tint	tan silt on rocks	1	November - April
2/16/2023	1030	North Oconee	NO2			345	345	Partly cloudy, 50F at 0700	moderate water level; slow velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/16/2023	1046	Tanyard Creek	TAN1			336	336	Partly cloudy, 50F at 0700	moderate water level; slow velocity; clear with grey tint		1	November - April
2/16/2023	0920	East Fork Trail Creek	ETR1			233	233	Partly cloudy, 50F at 0700	no flow; turbid brown; backwater effect upstream	culvert work blocking channel; no bypass observed for plugged channel while ongoing culvert work; permission granted from county to sample today 2/16/2023; photos taken for records and saved in project folder	1	November - April
2/16/2023	0735	Middle Oconee	MO1			175	175	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/16/2023	0943	East Fork Trail Creek	ETR2			173	173	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; turbid with slight brown and green tint		1	November - April
2/16/2023	1024	Trail Creek	TR3			173	173	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; turbid with sandy green tint bottom		1	November - April
2/16/2023	1055	Cloverhurst Branch	TAN2	Duplicate		776	#N/A	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; clear		1	November - April
2/16/2023	0908	West Fork Trail Creek	WTR1			135	135	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; clear with slight brown tint	sandy bottom	1	November - April
2/16/2023	1007	Trail Creek	TR1			121	121	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; turbid brown tint		1	November - April
2/16/2023	0810	Middle Oconee	MO2			120	120	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		1	November - April
2/16/2023	0955	West Fork Trail Creek	WTR2			110	110	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; clear		1	November - April
2/16/2023	0810	Hunnicutt Creek	HC1			52	52	Partly cloudy, 50F at 0700	moderate water level; moderate velocity; clear		1	November - April
2/22/2023	0946	East Fork Trail Creek	ETR1			359	359	Cloudy, 61F	no flow; turbid brown; backwater effect upstream due to culvert construction blocking channel; muddy downstream of culvert from culvert construction	needed to sample later because road was closed on 2/7/2023 due to flood damage and culvert construction; granted permission from county to sample on 2/22/2023 during ongoing culvert construction	1	November - April

E. coli 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
2/27/2023	0905	East Fork Trail Creek	ETR1			1287	1287	Clear, sunny, 64F	moderate water level; moderate velocity; clear	needed to sample later because road was closed due to flood damage and culvert construction on 2/9/2023; granted permission from county to sample on 2/27/2023 during ongoing culvert construction; more flow today on 2/27/2023; culvert has been reconstructed and flow is no longer constricted; still ongoing construction; heavy sand deposition; photos taken for records and saved to project folder	1	November - April
5/1/2023	0815	McNutt Creek	MN3	blank	<	10	#N/A				2	May - October
5/1/2023	1007	Middle Oconee	MO3			3654	3654	Clear, sunny 66F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility	recent rain past 24 hours	2	May - October
5/1/2023	1100	Middle Oconee	MO4			2851	2851	Clear, sunny 66F	moderate-high water level; moderate velocity; turbid brown; 1/2 ft. visibility	recent rain past 24 hours; water level slightly elevated	2	May - October
5/1/2023	1128	Oconee River	OC1			1414	1414	Clear, sunny 66F	high water level; moderate velocity; turbid brown; 1/2 ft. visibility	recent rain past 24 hours	2	May - October
5/1/2023	0938	Brooklyn Creek	BR2			1050	1050	Clear, sunny 66F	moderate water level; slow-moderate velocity; clear	recent rain past 24 hours	2	May - October
5/1/2023	0955	McNutt Creek	MN1			1019	1019	Clear, sunny 66F	moderate-high water level; moderate velocity; turbid brown	recent rain past 24 hours; ongoing construction upstream; concrete walls built to help potentially with erosion	2	May - October
5/1/2023	0839	McNutt Creek	MN2			905	905	Clear, sunny 66F	moderate-high water level; moderate velocity; clear and slight brown tint	recent rain past 24 hours; water level slightly elevated; heavy sand deposition	2	May - October
5/1/2023	0850	Kingswood Branch	KB3			886	886	Clear, sunny 66F	moderate water level; slow-moderate velocity; clear	recent rain past 24 hours; heavy sand deposition	2	May - October
5/1/2023	0923	Brooklyn Creek	BR1			657	657	Clear, sunny 66F	moderate water level; moderate velocity; clear	recent rain past 24 hours; no longer stagnant upstream; gate to sewer easement broken	2	May - October
5/1/2023	0815	McNutt Creek	MN3			583	583	Clear, sunny 66F	moderate-high water level; moderate velocity; clear and slight brown tint	recent rain past 24 hours; water level slightly elevated; heavy sand deposition	2	May - October
5/1/2023	1152	North Oconee	NO3			565	565	Clear, sunny 66F	high water level; moderate velocity; turbid brown; 1/2 ft. visibility	recent rain past 24 hours	2	May - October
5/1/2023	1141	Cedar Creek	CED1			404	404	Clear, sunny 66F	moderate water level; moderate velocity; clear	recent rain past 24 hours; heavy sand deposition	2	May - October
5/1/2023	0905	Kingswood Branch	KB1			216	216	Clear, sunny 66F	moderate water level; moderate velocity; clear	recent rain past 24 hours; heavy sand deposition	2	May - October
5/1/2023	0815	McNutt Creek	MN3	Duplicate		504	#N/A	Clear, sunny 66F	moderate-high water level; moderate velocity; clear and slight brown tint	recent rain past 24 hours; water level slightly elevated; heavy sand deposition	2	May - October
5/1/2023	1033	Unnamed Tributary	UT1			199	199	Clear, sunny 66F	moderate water level; moderate velocity; clear	recent rain past 24 hours; musty, wastewater treatment smell	2	May - October
5/2/2023	1036	Cloverhurst Branch	TAN2	blank	<	10	#N/A	Clear, sunny 46F @ 0645			2	May - October
5/2/2023	0802	Hunnicutt Creek	HC1			2481	2481	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear		2	May - October
5/2/2023	1014	North Oconee	NO2			1081	1081	Clear, sunny 46F @ 0645	moderate water level; slow velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/2/2023	1028	Tanyard Creek	TAN1			857	857	Clear, sunny 46F @ 0645	moderate water level; slow velocity; clear with grey hue/tint		2	May - October
5/2/2023	1036	Cloverhurst Branch	TAN2			727	727	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear		2	May - October

E. coli 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
5/2/2023	0800	Middle Oconee	MO2			697	697	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/2/2023	0725	Middle Oconee	MO1			529	529	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/2/2023	0941	West Fork Trail Creek	WTR2			512	512	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear with green and grey tint		2	May - October
5/2/2023	1004	Trail Creek	TR3			512	512	Clear, sunny 46F @ 0645	moderate-high water level; slow-moderate velocity; clear with brown tint	bridge construction upstream; heavy sand deposition	2	May - October
5/2/2023	0909	East Fork Trail Creek	ETR1			504	504	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear	culvert construction finished; flow returned; sampled downstream of culvert	2	May - October
5/2/2023	0950	Trail Creek	TR1			265	265	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear with brown/green tint		2	May - October
5/2/2023	0929	East Fork Trail Creek	ETR2			229	229	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear with brown tint	heavy sand deposition	2	May - October
5/2/2023	0859	West Fork Trail Creek	WTR1			228	228	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/2/2023	1100	Carr Creek	CA1			226	226	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear with grey tint		2	May - October
5/2/2023	1036	Cloverhurst Branch	TAN2	Duplicate		909	#N/A	Clear, sunny 46F @ 0645	moderate water level; moderate velocity; clear		2	May - October
5/3/2023	0813	McNutt Creek	MN3	blank	<	10	#N/A				2	May - October
5/3/2023	0822	Kingswood Branch	KB3			1112	1112	Clear, sunny 50F	moderate water level; slow-moderate velocity; clear	heavy sand deposition; stagnant upstream and downstream; stagnant pool with white sheen downstream	2	May - October
5/3/2023	0813	McNutt Creek	MN3	Duplicate		160	#N/A	Clear, sunny 50F	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/3/2023	0858	Brooklyn Creek	BR1			546	546	Clear, sunny 50F	moderate water level; moderate velocity; clear		2	May - October
5/3/2023	0911	Brooklyn Creek	BR2			520	520	Clear, sunny 50F	moderate water level; slow-moderate velocity; clear	Brooklyn Creek Interceptor Improvement project ongoing construction downstream of site	2	May - October
5/3/2023	0936	Middle Oconee	MO3			323	323	Clear, sunny 50F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/3/2023	1111	North Oconee	NO3			309	309	Clear, sunny 50F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/3/2023	0813	McNutt Creek	MN2			305	305	Clear, sunny 50F	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/3/2023	1057	Cedar Creek	CED1			275	275	Clear, sunny 50F	moderate water level; moderate velocity; clear		2	May - October
5/3/2023	0755	McNutt Creek	MN3			256	256	Clear, sunny 50F	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/3/2023	1002	Unnamed Tributary	UT1			246	246	Clear, sunny 50F	moderate water level; moderate velocity; clear	chemical treatment odor present	2	May - October
5/3/2023	0837	Kingswood Branch	KB1			243	243	Clear, sunny 50F	moderate water level; moderate velocity; clear	heavy sand deposition; recent vegetation clearing	2	May - October
5/3/2023	1043	Oconee River	OC1			243	243	Clear, sunny 50F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/3/2023	1028	Middle Oconee	MO4			238	238	Clear, sunny 50F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/3/2023	0926	McNutt Creek	MN1			209	209	Clear, sunny 50F	moderate water level; moderate velocity; clear and turbid brown; 1ft. Visibility	still ongoing construction upstream	2	May - October

E. coli Raw Data

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5/4/2023	1151	Cloverhurst Branch	TAN2	blank	<	10	#N/A				2	May - October
5/4/2023	0850	Hunnicut Creek	HC1			1789	1789	Clear, sunny 51F	moderate water level; moderate velocity; clear		2	May - October
5/4/2023	1151	Cloverhurst Branch	TAN2			860	860	Clear, sunny 51F	moderate water level; moderate velocity; clear		2	May - October
5/4/2023	1143	Tanyard Creek	TAN1			776	776	Clear, sunny 51F	moderate water level; slow velocity; clear with grey tint		2	May - October
5/4/2023	0817	Middle Oconee	MO1			384	384	Clear, sunny 51F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/4/2023	1011	East Fork Trail Creek	ETR1			384	384	Clear, sunny 51F	moderate water level; moderate velocity; clear		2	May - October
5/4/2023	1121	Trail Creek	TR3			379	379	Clear, sunny 51F	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/4/2023	1106	Trail Creek	TR1			285	285	Clear, sunny 51F	moderate water level; moderate velocity; clear with green tint		2	May - October
5/4/2023	1050	West Fork Trail Creek	WTR2			173	173	Clear, sunny 51F	moderate water level; moderate velocity; clear with grey and green tint	heavy sand deposition; homeless encampment present with barrier and signs; multiple tents present; 1 large male present; notified county and PM; data collection moved downstream of homeless encampment	2	May - October
5/4/2023	1151	Cloverhurst Branch	TAN2	Duplicate		771	#N/A	Clear, sunny 51F	moderate water level; moderate velocity; clear		2	May - October
5/4/2023	0958	West Fork Trail Creek	WTR1			132	132	Clear, sunny 51F	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/4/2023	0847	Middle Oconee	MO2			121	121	Clear, sunny 51F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/4/2023	1127	North Oconee	NO2			121	121	Clear, sunny 51F	moderate water level; slow velocity; turbid brown; 1 ft. visibility		2	May - October
5/4/2023	1027	East Fork Trail Creek	ETR2			110	110	Clear, sunny 51F	moderate water level; moderate velocity; clear with grey/green/brown tint	ongoing construction in ROW	2	May - October
5/4/2023	1207	Carr Creek	CA1			63	63	Clear, sunny 51F	moderate water level; moderate velocity; clear with grey tint	grey/brown silt present on rocks	2	May - October
5/8/2023	0750	McNutt Creek	MN3	blank	<	10	#N/A				2	May - October
5/8/2023	0917	Brooklyn Creek	BR2			8664	8664	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	high water level; moderate velocity; turbid brown; 5 inch visibility		2	May - October
5/8/2023	0905	Brooklyn Creek	BR1			8164	8164	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	high water level; fast velocity; clear and slight brown tint		2	May - October
5/8/2023	0850	Kingswood Branch	KB1			6887	6887	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate-high water level; moderate velocity; clear and milky brown		2	May - October
5/8/2023	1000	Unnamed Tributary	UT1			1259	1259	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; clear		2	May - October
5/8/2023	0838	Kingswood Branch	KB3			1046.2	1046.2	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	high water level; moderate velocity; turbid brown; 4 inch visibility		2	May - October
5/8/2023	0813	McNutt Creek	MN2			960	960	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; clear		2	May - October

E. coli 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
5/8/2023	0940	Middle Oconee	MO3			839	839	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/8/2023	0931	McNutt Creek	MN1			728	728	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; clear with slight brown tint		2	May - October
5/8/2023	1054	Cedar Creek	CED1			689	689	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/8/2023	1024	Middle Oconee	MO4			262	262	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/8/2023	0750	McNutt Creek	MN3	Duplicate		410	#N/A	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/8/2023	1104	North Oconee	NO3			145	145	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		2	May - October
5/8/2023	1041	Oconee River	OC1			86	86	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; slow-moderate velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/8/2023	0750	McNutt Creek	MN3			25.9	25.9	Sunny, partly cloudy, 73F at 1113; rainy and thunderstorms, 66F at 0750	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/9/2023	1144	Cloverhurst Branch	TAN2	blank	<	10	#N/A				2	May - October
5/9/2023	1144	Cloverhurst Branch	TAN2			2481	2481	Overcast, 66F	moderate water level; moderate velocity; clear		2	May - October
5/9/2023	1135	Tanyard Creek	TAN1			2247	2247	Overcast, 66F	moderate water level; slow velocity; clear with grey tint	5 snakes present	2	May - October
5/9/2023	0843	Hunnicutt Creek	HC1			1333	1333	Overcast, 66F	moderate water level; moderate velocity; clear	slight chemical treatment odor	2	May - October
5/9/2023	0806	Middle Oconee	MO1			733	733	Overcast, 66F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/9/2023	0945	East Fork Trail Creek	ETR1			480	480	Overcast, 66F	moderate water level; moderate velocity; clear		2	May - October
5/9/2023	0840	Middle Oconee	MO2			457	457	Overcast, 66F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/9/2023	1046	North Oconee	NO2			341	341	Overcast, 66F	moderate water level; slow velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/9/2023	1107	Trail Creek	TR3			335	335	Overcast, 66F	moderate water level; slow-moderate velocity; clear with slight brown tint		2	May - October
5/9/2023	1002	East Fork Trail Creek	ETR2			295	295	Overcast, 66F	moderate water level; slow-moderate velocity; clear with brown tint; ROW construction ongoing or about to begin; potentially replacing power lines		2	May - October

E. coli 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
5/9/2023	0718	West Fork Trail Creek	WTR2			285	285	Overcast, 66F	moderate water level; moderate velocity; clear	new WTR-2 site; located downstream of old WTR-2 site at culvert due to homeless encampment deemed unsafe and for easier access; this is sample collection 1 of 4 for this new site needed for geomean; trash odor present	2	May - October
5/9/2023	0933	West Fork Trail Creek	WTR1			246	246	Overcast, 66F	moderate water level; moderate velocity; clear	heavy sand deposition	2	May - October
5/9/2023	1018	Trail Creek	TR1			201	201	Overcast, 66F	moderate water level; moderate velocity; clear with slight brown tint		2	May - October
5/9/2023	1206	Carr Creek	CA1			110	110	Overcast, 66F	moderate water level; moderate velocity; clear		2	May - October
5/9/2023	1144	Cloverhurst Branch	TAN2	Duplicate		1785	#N/A	Overcast, 66F	moderate water level; moderate velocity; clear		2	May - October
5/10/2023	0808	McNutt Creek	MN3	blank	<	10	#N/A				2	May - October
5/10/2023	1044	Middle Oconee	MO4			1624	1624	Clear, sunny, 66F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility	rain in last 24 hours	2	May - October
5/10/2023	0954	Middle Oconee	MO3			1585	1585	Clear, sunny, 66F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility	rain in last 24 hours	2	May - October
5/10/2023	0930	Brooklyn Creek	BR2			1071	1071	Clear, sunny, 66F	moderate water level; slow velocity; clear	rain in last 24 hours; ongoing stream restoration construction downstream and possibly upstream of site; silt present on rocks	2	May - October
5/10/2023	0919	Brooklyn Creek	BR1			987	987	Clear, sunny, 66F	moderate water level; moderate velocity; clear	rain in last 24 hours	2	May - October
5/10/2023	0825	McNutt Creek	MN2			706	706	Clear, sunny, 66F	moderate water level; moderate velocity; clear	rain in last 24 hours; heavy sand deposition; deer tracks present	2	May - October
5/10/2023	1101	Oconee River	OC1			703	703	Clear, sunny, 66F	moderate water level; slow-moderate velocity; turbid brown; 1 ft. visibility	rain in last 24 hours	2	May - October
5/10/2023	1113	Cedar Creek	CED1			691	691	Clear, sunny, 66F	moderate water level; moderate velocity; clear	rain in last 24 hours; animal tracks present	2	May - October
5/10/2023	0846	Kingswood Branch	KB3			650	650	Clear, sunny, 66F	moderate water level; slow-moderate velocity; clear	rain in last 24 hours; heavy sand deposition	2	May - October
5/10/2023	1016	Unnamed Tributary	UT1			601	601	Clear, sunny, 66F	moderate water level; moderate velocity; clear	rain in last 24 hours; no chemical treatment odor today	2	May - October
5/10/2023	0902	Kingswood Branch	KB1			389	389	Clear, sunny, 66F	moderate water level; moderate velocity; clear	rain in last 24 hours; heavy sand deposition	2	May - October
5/10/2023	0808	McNutt Creek	MN3	Duplicate		259	#N/A	Clear, sunny, 66F	moderate water level; moderate velocity; clear	rain in last 24 hours; heavy sand deposition	2	May - October
5/10/2023	1121	North Oconee	NO3			359	359	Clear, sunny, 66F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility	rain in last 24 hours	2	May - October
5/10/2023	0945	McNutt Creek	MN1			288	288	Clear, sunny, 66F	moderate water level; moderate velocity; clear with brown tint	rain in last 24 hours; still ongoing construction upstream; concrete walls have been built to prevent erosion	2	May - October
5/10/2023	0808	McNutt Creek	MN3			259	259	Clear, sunny, 66F	moderate water level; moderate velocity; clear	rain in last 24 hours; heavy sand deposition	2	May - October
5/15/2023	0852	West Fork Trail Creek	WTR2			457	457	Mostly cloudy, 70F	moderate water level; moderate velocity; clear	new WTR-2 site; located downstream of old WTR-2 site at culvert due to homeless encampment deemed unsafe and for easier access; this is sample collection 2 of 4 for this new site needed for geomean; trash odor present	2	May - October
5/18/2023	0820	West Fork Trail Creek	WTR2			4352	4352	Cloudy, rain, 70F	moderate water level; moderate velocity; turbid brown	new WTR-2 site; located downstream of old WTR-2 site at culvert due to homeless encampment deemed unsafe and for easier access; this is sample collection 3 of 4 for this new site needed for geomean; trash odor present	2	May - October

E. coli 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
5/23/2023	1200	Cloverhurst Branch	TAN2	blank	<	10	#N/A				2	May - October
5/23/2023	1200	Cloverhurst Branch	TAN2			2755	2755	Overcast, 65F	low water level; slow velocity; clear		2	May - October
5/23/2023	1155	Tanyard Creek	TAN1			1223	1223	Overcast, 65F	low water level; slow velocity; slight grey tint		2	May - October
5/23/2023	0935	Hunnicutt Creek	HC1			933	933	Overcast, 65F	moderate water level; moderate velocity; clear	sewer odor	2	May - October
5/23/2023	1037	East Fork Trail Creek	ETR1			609	609	Overcast, 65F	moderate water level; moderate velocity; very slight turbid brown		2	May - October
5/23/2023	1220	Carr Creek	CA1			350	350	Overcast, 65F	moderate water level; moderate velocity; clear		2	May - October
5/23/2023	0930	Middle Oconee	MO2			327	327	Overcast, 65F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/23/2023	1130	Trail Creek	TR3			317	317	Overcast, 65F	moderate water level; moderate velocity; moderately turbid brown		2	May - October
5/23/2023	1055	East Fork Trail Creek	ETR2			313	313	Overcast, 65F	moderate water level; moderate velocity; turbid brown; 2 ft. visibility		2	May - October
5/23/2023	1030	West Fork Trail Creek	WTR1			288	288	Overcast, 65F	moderate water level; moderate velocity; very slight turbid brown		2	May - October
5/23/2023	0900	Middle Oconee	MO1			275	275	Overcast, 65F	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		2	May - October
5/23/2023	1135	North Oconee	NO2			203	203	Overcast, 65F	low water level; slow velocity; turbid brown; 18-inch visibility		2	May - October
5/23/2023	1118	Trail Creek	TR1			175	175	Overcast, 65F	moderate water level; moderate velocity; turbid brown; 2ft. Visibility		2	May - October
5/23/2023	1110	West Fork Trail Creek	WTR2			173	173	Overcast, 65F	moderate water level; moderate velocity; moderately turbid brown tint	new WTR-2 site; located downstream of old WTR-2 site at culvert due to homeless encampment deemed unsafe and for easier access; this is sample collection 4 of 4 for this new site needed for geomean; trash odor present	2	May - October
5/23/2023	1200	Cloverhurst Branch	TAN2	Duplicate		2014	#N/A	Overcast, 65F	low water level; slow velocity; clear		2	May - October
8/7/2023	1025	McNutt Creek	MN3	blank	<	10	#N/A	Mostly cloudy, 73F; rain in last 24 hours			3	May - October
8/7/2023	0948	Kingswood Branch	KB3			4611	4611	Mostly cloudy, 73F; rain in last 24 hours	low-moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/7/2023	0903	Brooklyn Creek	BR1			1872	1872	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; clear		3	May - October
8/7/2023	1120	Unnamed Tributary	UT1			907	907	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; clear		3	May - October
8/7/2023	0842	Brooklyn Creek	BR2			860	860	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; slow-moderate velocity; clear	stream restoration construction ongoing downstream	3	May - October
8/7/2023	1001	McNutt Creek	MN2			583	583	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; clear		3	May - October
8/7/2023	0929	Kingswood Branch	KB1			341	341	Mostly cloudy, 73F; rain in last 24 hours	low-moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/7/2023	1025	McNutt Creek	MN3	Duplicate		282	#N/A	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/7/2023	1200	Oconee River	OC1			327	327	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		3	May - October
8/7/2023	1045	McNutt Creek	MN1			298	298	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; clear and slightly turbid	Ongoing construction upstream; concrete walls built appear to reduce erosion	3	May - October
8/7/2023	1215	Cedar Creek	CED1			292	292	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October

E. coli 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
8/7/2023	1025	McNutt Creek	MN3			275	275	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/7/2023	1055	Middle Oconee	MO3			226	226	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/7/2023	1144	Middle Oconee	MO4			183	183	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/7/2023	1229	North Oconee	NO3			122	122	Mostly cloudy, 73F; rain in last 24 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		3	May - October
8/8/2023	1217	Cloverhurst Branch	TAN2	blank	<	10	#N/A	Mostly cloudy, 70F; rain in last 24 hours			3	May - October
8/8/2023	1110	Hunnicutt Creek	HC1		>	24192		Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; clear		3	May - October
8/8/2023	1144	Trail Creek	TR3			4884	4884	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; slightly turbid		3	May - October
8/8/2023	0737	West Fork Trail Creek	WTR2			2282	2282	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; clear and slightly turbid		3	May - October
8/8/2023	1217	Cloverhurst Branch	TAN2			2098	2098	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; clear		3	May - October
8/8/2023	1123	Trail Creek	TR1			1664	1664	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		3	May - October
8/8/2023	1240	Carr Creek	CA1			1198	1198	Mostly cloudy, 70F; rain in last 24 hours	moderate-high water level; moderate velocity; slightly turbid	water level slightly above normal	3	May - October
8/8/2023	0924	West Fork Trail Creek	WTR1			1160	1160	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; slightly turbid		3	May - October
8/8/2023	0908	East Fork Trail Creek	ETR2			1137	1137	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		3	May - October
8/8/2023	1108	Middle Oconee	MO2			884	884	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/8/2023	0936	East Fork Trail Creek	ETR1			820	820	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; clear		3	May - October
8/8/2023	1209	Tanyard Creek	TAN1			733	733	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; clear and slight grey tint		3	May - October
8/8/2023	1020	Middle Oconee	MO1			676	676	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		3	May - October
8/8/2023	1151	North Oconee	NO2			495	495	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; slow velocity; turbid brown; 1/2 ft. visibility		3	May - October
8/8/2023	1217	Cloverhurst Branch	TAN2	Duplicate		2247	#N/A	Mostly cloudy, 70F; rain in last 24 hours	moderate water level; moderate velocity; clear		3	May - October
8/9/2023	0807	McNutt Creek	MN3	blank	<	10	#N/A	Sunny, 70F; rain in last 12 hours			3	May - October
8/9/2023	0917	Brooklyn Creek	BR1			2282	2282	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/9/2023	1115	Cedar Creek	CED1			1607	1607	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/9/2023	0928	Brooklyn Creek	BR2			959	959	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear		3	May - October
8/9/2023	0842	Kingswood Branch	KB3			839	839	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/9/2023	1046	Middle Oconee	MO4			650	650	Sunny, 70F; rain in last 12 hours	moderate-high water level; moderate velocity; turbid brown; 1/2 ft. visibility		3	May - October
8/9/2023	0953	Middle Oconee	MO3			529	529	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		3	May - October

E. coli Raw Data

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8/9/2023	0944	McNutt Creek	MN1			480	480	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility	Construction upstream appears to be finished	3	May - October
8/9/2023	0900	Kingswood Branch	KB1			393	393	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/9/2023	1102	Oconee River	OC1			359	359	Sunny, 70F; rain in last 12 hours	high water level; moderate velocity; turbid brown; 4 inch visibility		3	May - October
8/9/2023	1016	Unnamed Tributary	UT1			323	323	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear	slight chemical treatment odor	3	May - October
8/9/2023	0828	McNutt Creek	MN2			292	292	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/9/2023	0807	McNutt Creek	MN3			278	278	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/9/2023	1127	North Oconee	NO3			231	231	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility		3	May - October
8/9/2023	0807	McNutt Creek	MN3	Duplicate		426	#N/A	Sunny, 70F; rain in last 12 hours	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/14/2023	0910	McNutt Creek	MN3	blank	<	10	#N/A	Sunny, 90F			3	May - October
8/14/2023	1007	Kingswood Branch	KB3			1401	1401	Sunny, 90F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/14/2023	1028	Brooklyn Creek	BR1			878	878	Sunny, 90F	moderate water level; moderate velocity; clear		3	May - October
8/14/2023	1038	Brooklyn Creek	BR2			605	605	Sunny, 90F	moderate water level; moderate velocity; clear		3	May - October
8/14/2023	1231	Cedar Creek	CED1			512	512	Sunny, 90F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/14/2023	1101	McNutt Creek	MN1			404	404	Sunny, 90F	moderate water level; moderate velocity; clear and slightly turbid; construction appears to be completed upstream		3	May - October
8/14/2023	0928	McNutt Creek	MN2			369	369	Sunny, 90F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/14/2023	0947	Kingswood Branch	KB1			359	359	Sunny, 90F	low-moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/14/2023	0910	McNutt Creek	MN3	Duplicate		282	#N/A	Sunny, 90F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/14/2023	0910	McNutt Creek	MN3			341	341	Sunny, 90F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/14/2023	1137	Unnamed Tributary	UT1			295	295	Sunny, 90F	moderate water level; moderate velocity; clear		3	May - October
8/14/2023	1201	Middle Oconee	MO4			187	187	Sunny, 90F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/14/2023	1217	Oconee River	OC1			146	146	Sunny, 90F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/14/2023	1109	Middle Oconee	MO3			121	121	Sunny, 90F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/14/2023	1239	North Oconee	NO3			121	121	Sunny, 90F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/15/2023	1320	Carr Creek	CA1	blank	<	10	#N/A				3	May - October
8/15/2023	1110	Hunnicut Creek	HC1			1723	1723	Clear, 80F at 0900; Overcast, 92F at 1200	moderate water level; moderate velocity; slightly turbid brown		3	May - October
8/15/2023	1250	Tanyard Creek	TAN1			1043	1043	Clear, 80F at 0900; Overcast, 92F at 1200	low water level; slow velocity; clear and slightly grey tint		3	May - October
8/15/2023	1300	Cloverhurst Branch	TAN2			959	959	Clear, 80F at 0900; Overcast, 92F at 1200	low water level; slow velocity; clear		3	May - October

E. coli 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
8/15/2023	1225	Trail Creek	TR3			620	620	Clear, 80F at 0900; Overcast, 92F at 1200	low water level; moderate velocity; slightly turbid brown		3	May - October
8/15/2023	0945	East Fork Trail Creek	ETR1			554	554	Clear, 80F at 0900; Overcast, 92F at 1200	low water level; moderate velocity; clear		3	May - October
8/15/2023	0955	West Fork Trail Creek	WTR1			546	546	Clear, 80F at 0900; Overcast, 92F at 1200	moderate water level; moderate velocity; slightly turbid brown		3	May - October
8/15/2023	0910	West Fork Trail Creek	WTR2			441	441	Clear, 80F at 0900; Overcast, 92F at 1200	low water level; moderate velocity; slightly turbid brown		3	May - October
8/15/2023	0920	East Fork Trail Creek	ETR2			364	364	Clear, 80F at 0900; Overcast, 92F at 1200	low water level; slow velocity; slightly turbid brown		3	May - October
8/15/2023	0855	Trail Creek	TR1			364	364	Clear, 80F at 0900; Overcast, 92F at 1200	low water level; moderate velocity; slightly turbid brown		3	May - October
8/15/2023	1320	Carr Creek	CA1			332	332	Clear, 80F at 0900; Overcast, 92F at 1200	moderate water level; moderate velocity; clear		3	May - October
8/15/2023	1230	North Oconee	NO2			288	288	Clear, 80F at 0900; Overcast, 92F at 1200	moderate water level; slow velocity; turbid brown; 1 ft. visibility		3	May - October
8/15/2023	1320	Carr Creek	CA1	Duplicate		538	#N/A	Clear, 80F at 0900; Overcast, 92F at 1200	moderate water level; moderate velocity; clear		3	May - October
8/15/2023	1140	Middle Oconee	MO1			187	187	Clear, 80F at 0900; Overcast, 92F at 1200	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/15/2023	1105	Middle Oconee	MO2			121	121	Clear, 80F at 0900; Overcast, 92F at 1200	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/16/2023	0902	McNutt Creek	MN3	blank	<	10	#N/A				3	May - October
8/16/2023	0945	Kingswood Branch	KB1			10462	10462	Sunny, 86F	moderate water level; moderate velocity; clear	heavy sand deposition; new sand deposition present	3	May - October
8/16/2023	0927	Kingswood Branch	KB3			1112	1112	Sunny, 86F	moderate water level; slow velocity; clear	heavy sand deposition; workers present about to remove excess sediment upstream of sample site	3	May - October
8/16/2023	1007	Brooklyn Creek	BR1			677	677	Sunny, 86F	moderate water level; moderate velocity; clear		3	May - October
8/16/2023	1025	Brooklyn Creek	BR2			563	563	Sunny, 86F	moderate water level; slow velocity; clear		3	May - October
8/16/2023	0920	McNutt Creek	MN2			359	359	Sunny, 86F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/16/2023	1040	McNutt Creek	MN1			345	345	Sunny, 86F	moderate water level; moderate velocity; clear and slightly turbid		3	May - October
8/16/2023	0902	McNutt Creek	MN3	Duplicate		350	#N/A	Sunny, 86F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/16/2023	0902	McNutt Creek	MN3			259	259	Sunny, 86F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/16/2023	1143	Middle Oconee	MO4			228	228	Sunny, 86F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/16/2023	1159	Oconee River	OC1			213	213	Sunny, 86F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/16/2023	1116	Unnamed Tributary	UT1			185	185	Sunny, 86F	moderate water level; moderate velocity; clear		3	May - October
8/16/2023	1050	Middle Oconee	MO3			161	161	Sunny, 86F	low-moderate water level; moderate velocity; clear; turbid brown; 1 ft. visibility		3	May - October
8/16/2023	1214	Cedar Creek	CED1			160	160	Sunny, 86F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
8/16/2023	1226	North Oconee	NO3			98	98	Sunny, 86F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
8/17/2023	1418	Cloverhurst Branch	TAN2	blank	<	1	#N/A				3	May - October
8/17/2023	1205	West Fork Trail Creek	WTR1			4106	4106	Clear, 75F at 1000	low water level; moderate velocity; very slight brown tint		3	May - October
8/17/2023	1418	Cloverhurst Branch	TAN2			1112	1112	Clear, 75F at 1000	moderate water level; slow velocity; clear		3	May - October

E. coli Raw Data

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8/17/2023	1440	Carr Creek	CA1			605	605	Clear, 75F at 1000	moderate water level; moderate velocity; clear		3	May - October
8/17/2023	1340	Trail Creek	TR3			390	390	Clear, 75F at 1000	low water level; slow velocity; clear; brown tint		3	May - October
8/17/2023	1220	East Fork Trail Creek	ETR1			313	313	Clear, 75F at 1000	moderate water level; moderate velocity; clear		3	May - October
8/17/2023	1105	Hunnicut Creek	HC1			278	278	Clear, 75F at 1000	low water level; moderate velocity; clear		3	May - October
8/17/2023	1345	North Oconee	NO2			187	187	Clear, 75F at 1000	moderate water level; slow velocity; turbid brown; 1.5 ft. visibility		3	May - October
8/17/2023	1305	West Fork Trail Creek	WTR2			161	161	Clear, 75F at 1000	low water level; slow velocity; clear; strong brown tint		3	May - October
8/17/2023	1410	Tanyard Creek	TAN1			145	145	Clear, 75F at 1000	low water level; slow velocity; clear; clear and slight gray tint		3	May - October
8/17/2023	1250	East Fork Trail Creek	ETR2			121	121	Clear, 75F at 1000	low water level; slow velocity; clear; brown tint		3	May - October
8/17/2023	1418	Cloverhurst Branch	TAN2	Duplicate		1106	#N/A	Clear, 75F at 1000	moderate water level; slow velocity; clear		3	May - October
8/17/2023	1015	Middle Oconee	MO1			109	109	Clear, 75F at 1000	moderate water level; moderate velocity; turbid brown; 1.5 ft. visibility		3	May - October
8/17/2023	1100	Middle Oconee	MO2			74	74	Clear, 75F at 1000	moderate water level; moderate velocity; turbid brown; 1.5 ft. visibility		3	May - October
8/17/2023	1315	Trail Creek	TR1			60	60	Clear, 75F at 1000	low water level; slow velocity; clear; brown tint		3	May - October
9/5/2023	1330	Cloverhurst Branch	TAN2	blank	<	1	#N/A				3	May - October
9/5/2023	0929	Middle Oconee	MO1			1076	1076	Sunny, 87F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
9/5/2023	1330	Cloverhurst Branch	TAN2			959	959	Sunny, 87F	moderate water level; slow velocity; clear		3	May - October
9/5/2023	0845	West Fork Trail Creek	WTR2			738	738	Sunny, 87F	moderate water level; moderate velocity; clear		3	May - October
9/5/2023	1003	Middle Oconee	MO2			683	683	Sunny, 87F	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		3	May - October
9/5/2023	1300	Trail Creek	TR3			457	457	Sunny, 87F	moderate water level; moderate velocity; clear	heavy sand deposition; trash odor present	3	May - October
9/5/2023	1243	Trail Creek	TR1			313	313	Sunny, 87F	moderate water level; moderate velocity; clear with slight gray tint		3	May - October
9/5/2023	1324	Tanyard Creek	TAN1			295	295	Sunny, 87F	moderate water level; moderate velocity; clear		3	May - October
9/5/2023	1206	East Fork Trail Creek	ETR1			278	278	Sunny, 87F	moderate water level; moderate velocity; clear		3	May - October
9/5/2023	1354	Carr Creek	CA1			243	243	Sunny, 87F	moderate water level; moderate velocity; clear		3	May - October
9/5/2023	1008	Hunnicut Creek	HC1			209	209	Sunny, 87F	moderate water level; moderate velocity; clear		3	May - October
9/5/2023	1131	West Fork Trail Creek	WTR1			187	187	Sunny, 87F	moderate water level; moderate velocity; clear	heavy sand deposition	3	May - October
9/5/2023	1308	North Oconee	NO2			160	160	Sunny, 87F	moderate water level; slow velocity; turbid brown; 1/2 ft. visibility		3	May - October
9/5/2023	1330	Cloverhurst Branch	TAN2	Duplicate		833	#N/A	Sunny, 87F	moderate water level; slow velocity; clear		3	May - October
9/5/2023	1227	East Fork Trail Creek	ETR2			135	135	Sunny, 87F	moderate water level; moderate velocity; clear		3	May - October
11/13/2023	0946	McNutt Creek	MN3	blank	<	10	#N/A	Sunny, 53F; rain in last 48 hours			4	November - April

E. coli 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
11/13/2023	1309	Cedar Creek	CED1			1112	1112	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; clear		4	November - April
11/13/2023	0946	McNutt Creek	MN3	Duplicate		213	#N/A	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; clear	heavy sand deposition	4	November - April
11/13/2023	1121	Brooklyn Creek	BR2			504	504	Sunny, 53F; rain in last 48 hours	moderate water level; slow-moderate velocity; clear	ongoing construction upstream for an Inceptor Improvement Project	4	November - April
11/13/2023	1111	Brooklyn Creek	BR1			393	393	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; clear		4	November - April
11/13/2023	1217	Unnamed Tributary	UT1			384	384	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; clear		4	November - April
11/13/2023	1035	Kingswood Branch	KB3			331	331	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; clear	heavy sand deposition	4	November - April
11/13/2023	1053	Kingswood Branch	KB1			231	231	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; clear	heavy sand deposition	4	November - April
11/13/2023	0946	McNutt Creek	MN3			185	185	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; clear	heavy sand deposition	4	November - April
11/13/2023	1150	Middle Oconee	MO3			132	132	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; turbid brown; 1/2 ft. visibility and slightly clear		4	November - April
11/13/2023	1245	Middle Oconee	MO4			130	130	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; slightly turbid brown and clear		4	November - April
11/13/2023	1021	McNutt Creek	MN2			110	110	Sunny, 53F; rain in last 48 hours	moderate water level; slow-moderate velocity; clear	heavy sand deposition	4	November - April
11/13/2023	1255	Oconee River	OC1			110	110	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		4	November - April
11/13/2023	1136	McNutt Creek	MN1			100	100	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; clear		4	November - April
11/13/2023	1320	North Oconee	NO3			70	70	Sunny, 53F; rain in last 48 hours	moderate water level; moderate velocity; turbid brown; 1 ft. visibility		4	November - April
11/14/2023	1145	Cloverhurst Branch	TAN2	blank	<	1	#N/A	Sunny, 65F			4	November - April
11/14/2023	1145	Cloverhurst Branch	TAN2			909	909	Sunny, 65F	low water level; slow velocity; clear		4	November - April
11/14/2023	1210	Carr Creek	CA1			487	487	Sunny, 65F		Water notes not recorded	4	November - April
11/14/2023	1000	West Fork Trail Creek	WTR1			457	457	Sunny, 65F	low water level; slow velocity; clear		4	November - April
11/14/2023	1030	East Fork Trail Creek	ETR2			350	350	Sunny, 65F	low water level; slow velocity; turbid green/tan with slight green tint; 2 ft. visibility	Beaver dam located 20 yards upstream	4	November - April
11/14/2023	0855	Hunnicutt Creek	HC1			309	309	Sunny, 65F	low water level; moderate velocity; clear		4	November - April
11/14/2023	1050	West Fork Trail Creek	WTR2			278	278	Sunny, 65F	low water level; slow velocity; clear		4	November - April
11/14/2023	1010	East Fork Trail Creek	ETR1			275	275	Sunny, 65F	low water level; slow velocity; clear		4	November - April
11/14/2023	1115	North Oconee	NO2			201	201	Sunny, 65F	moderate water level; slow velocity; 3 ft. visibility; slight green tint		4	November - April
11/14/2023	1140	Tanyard Creek	TAN1			187	187	Sunny, 65F	low water level; slow velocity; clear		4	November - April
11/14/2023	1145	Cloverhurst Branch	TAN2	Duplicate		644	#N/A	Sunny, 65F	low water level; slow velocity; clear		4	November - April
11/14/2023	1105	Trail Creek	TR3			146	146	Sunny, 65F	low water level; slow velocity; clear		4	November - April
11/14/2023	1055	Trail Creek	TR1			110	110	Sunny, 65F	low water level; slow velocity; clear		4	November - April

E. coli 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
11/14/2023	0850	Middle Oconee	MO2			96	96	Sunny, 65F	low water level; moderate velocity; nearly clear		4	November - April
11/14/2023	0800	Middle Oconee	MO1			74	74	Sunny, 65F	low water level; slow velocity; nearly clear		4	November - April
11/15/2023	0810	McNutt Creek	MN3	blank	<	1	#N/A	Overcast, 60F			4	November - April
11/15/2023	0835	Kingswood Branch	KB3			529	529	Overcast, 60F	low water level; slow velocity; clear		4	November - April
11/15/2023	1125	Cedar Creek	CED1			529	529	Overcast, 60F	low water level; slow velocity; clear		4	November - April
11/15/2023	0810	McNutt Creek	MN3			404	404	Overcast, 60F	low water level; slow velocity; slightly clear		4	November - April
11/15/2023	0810	McNutt Creek	MN3	Duplicate		301	#N/A	Overcast, 60F	low water level; slow velocity; slightly clear		4	November - April
11/15/2023	1005	Unnamed Tributary	UT1			278	278	Overcast, 60F	low water level; slow velocity; clear		4	November - April
11/15/2023	0828	McNutt Creek	MN2			243	243	Overcast, 60F	low water level; slow velocity; clear; slight tannic acid tint		4	November - April
11/15/2023	0905	Brooklyn Creek	BR1			226	226	Overcast, 60F	low water level; slow velocity; clear; slight tannic acid tint		4	November - April
11/15/2023	0848	Kingswood Branch	KB1			213	213	Overcast, 60F	low water level; slow velocity; clear		4	November - April
11/15/2023	0930	McNutt Creek	MN1			146	146	Overcast, 60F	low water level; moderate velocity; clear; slight tannic acid tint		4	November - April
11/15/2023	0915	Brooklyn Creek	BR2			134	134	Overcast, 60F	low water level; slow velocity; clear; slight tannic acid tint		4	November - April
11/15/2023	0937	Middle Oconee	MO3			63	63	Overcast, 60F	low water level; moderate velocity; clear; slight tannic acid tint		4	November - April
11/15/2023	1053	Middle Oconee	MO4			63	63	Overcast, 60F	low water level; moderate velocity; clear		4	November - April
11/15/2023	1110	Oconee River	OC1			63	63	Overcast, 60F	moderate water level; moderate velocity; clear		4	November - April
11/15/2023	1135	North Oconee	NO3			41	41	Overcast, 60F	low water level; moderate velocity; clear; slight green tint		4	November - April
11/16/2023	1156	Cloverhurst Branch	TAN2	blank	<	1	#N/A	Cloudy, 56			4	November - April
11/16/2023	0741	West Fork Trail Creek	WTR2			1375	1375	Cloudy, 56	moderate water level; moderate velocity; clear		4	November - April
11/16/2023	1023	West Fork Trail Creek	WTR1			1198	1198	Cloudy, 56	moderate water level; moderate velocity; clear		4	November - April
11/16/2023	1156	Cloverhurst Branch	TAN2			644	644	Cloudy, 56	moderate water level; moderate velocity; clear		4	November - April
11/16/2023	1101	Trail Creek	TR1			620	620	Cloudy, 56	moderate water level; moderate velocity; clear with slight green tint		4	November - April
11/16/2023	1121	Trail Creek	TR3			379	379	Cloudy, 56	moderate water level; moderate velocity; clear		4	November - April
11/16/2023	1217	Carr Creek	CA1			374	374	Cloudy, 56	moderate water level; moderate velocity; clear		4	November - April
11/16/2023	1129	North Oconee	NO2			305	305	Cloudy, 56	moderate water level; slow velocity; turbid brown; 1/2 ft. visibility		4	November - April
11/16/2023	1050	East Fork Trail Creek	ETR2			275	275	Cloudy, 56	moderate water level; moderate velocity; slightly turbid brown with slight green tint and clear		4	November - April
11/16/2023	1004	Hunnicutt Creek	HC1			231	231	Cloudy, 56	moderate water level; moderate velocity; clear		4	November - April
11/16/2023	1156	Cloverhurst Branch	TAN2	Duplicate		565	#N/A	Cloudy, 56	moderate water level; moderate velocity; clear		4	November - April
11/16/2023	1001	Middle Oconee	MO2			145	145	Cloudy, 56	moderate water level; moderate velocity; slightly turbid and clear		4	November - April

E. coli 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
11/16/2023	1143	Tanyard Creek	TAN1			145	145	Cloudy, 56	moderate water level; moderate velocity; clear with slight grey tint	grey embedded substance on substrate	4	November - April
11/16/2023	0923	Middle Oconee	MO1			98	98	Cloudy, 56	moderate water level; moderate velocity; slightly turbid and clear		4	November - April
11/16/2023	1033	East Fork Trail Creek	ETR1			97	97	Cloudy, 56	moderate water level; moderate velocity; clear		4	November - April
11/27/2023	0858	McNutt Creek	MN3	blank	<	1	#N/A	Sunny, 42F			4	November - April
11/27/2023	0938	Kingswood Branch	KB3			450	450	Sunny, 42F	moderate water level; moderate velocity; clear		4	November - April
11/27/2023	0858	McNutt Creek	MN3			393	393	Sunny, 42F	moderate water level; moderate velocity; clear		4	November - April
11/27/2023	0959	Kingswood Branch	KB1			384	384	Sunny, 42F	moderate-high water level; moderate velocity; clear		4	November - April
11/27/2023	1228	Cedar Creek	CED1			354	354	Sunny, 42F	moderate water level; moderate velocity; clear		4	November - April
11/27/2023	0858	McNutt Creek	MN3	Duplicate		311	#N/A	Sunny, 42F	moderate water level; moderate velocity; clear		4	November - April
11/27/2023	1212	Oconee River	OC1			281	281	Sunny, 42F	moderate water level; moderate velocity; clear and moderately turbid brown; 1 1/2 ft. visibility		4	November - April
11/27/2023	1053	McNutt Creek	MN1			275	275	Sunny, 42F	low water level; moderate velocity; clear		4	November - April
11/27/2023	1019	Brooklyn Creek	BR1			213	213	Sunny, 42F	moderate water level; moderate velocity; clear		4	November - April
11/27/2023	0922	McNutt Creek	MN2			169	169	Sunny, 42F	high water level; moderate velocity; clear		4	November - April
11/27/2023	1108	Middle Oconee	MO3			148	148	Sunny, 42F	moderate water level; moderate velocity; clear and moderately turbid brown; 2 ft. visibility		4	November - April
11/27/2023	1035	Brooklyn Creek	BR2			145	145	Sunny, 42F	moderate water level; slow velocity; clear	ongoing inceptor improvement project upstream	4	November - April
11/27/2023	1247	North Oconee	NO3			120	120	Sunny, 42F	moderate water level; moderate velocity; moderately turbid; 2 ft. visibility		4	November - April
11/27/2023	1155	Middle Oconee	MO4			119	119	Sunny, 42F	low-moderate water level; moderate velocity; clear and slightly turbid; 2 ft. visibility		4	November - April
11/27/2023	1130	Unnamed Tributary	UT1			109	109	Sunny, 42F	moderate-high water level; moderate velocity; clear		4	November - April
11/28/2023	1321	Cloverhurst Branch	TAN2	blank	<	1	#N/A	Sunny, 36F			4	November - April
11/28/2023	1321	Cloverhurst Branch	TAN2			538	538	Sunny, 36F	moderate water level; moderate velocity; clear		4	November - April
11/28/2023	1147	East Fork Trail Creek	ETR1			487	487	Sunny, 36F	moderate water level; moderate velocity; clear		4	November - April
11/28/2023	0818	West Fork Trail Creek	WTR2			480	480	Sunny, 36F	moderate water level; moderate velocity; clear		4	November - April
11/28/2023	1224	Trail Creek	TR1			350	350	Sunny, 36F	moderate water level; moderate velocity; clear with green tint		4	November - April
11/28/2023	1245	Trail Creek	TR3			328	328	Sunny, 36F	moderate water level; moderate velocity; clear		4	November - April
11/28/2023	1133	West Fork Trail Creek	WTR1			275	275	Sunny, 36F	moderate water level; moderate velocity; clear		4	November - April
11/28/2023	1321	Cloverhurst Branch	TAN2	Duplicate		480	#N/A	Sunny, 36F	moderate water level; moderate velocity; clear		4	November - April
11/28/2023	0910	Middle Oconee	MO1			218	218	Sunny, 36F	moderate water level; moderate velocity; slightly turbid; 1 ft. visibility		4	November - April

E. coli 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
11/28/2023	0958	Middle Oconee	MO2			216	216	Sunny, 36F	moderate water level; moderate velocity; moderately turbid brown; 1 ft. visibility		4	November - April
11/28/2023	1255	North Oconee	NO2			216	216	Sunny, 36F	moderate water level; slow velocity; turbid brown; 1 ft. visibility		4	November - April
11/28/2023	1339	Carr Creek	CA1			187	187	Sunny, 36F	moderate water level; moderate velocity; clear		4	November - April
11/28/2023	1207	East Fork Trail Creek	ETR2			168	168	Sunny, 36F	moderate water level; moderate velocity; clear with brown tint		4	November - April
11/28/2023	1311	Tanyard Creek	TAN1			121	121	Sunny, 36F	moderate water level; slow velocity; clear	gray substance settled on substrate	4	November - April
11/28/2023	1002	Hunnicutt Creek	HC1			120	120	Sunny, 36F	moderate water level; moderate velocity; clear		4	November - April
11/30/2023	1225	Cloverhurst Branch	TAN2	blank	<	1	#N/A	Sunny, 50F			4	November - April
11/30/2023	0814	West Fork Trail Creek	WTR2			538	538	Sunny, 50F	moderate water level; moderate velocity; clear		4	November - April
11/30/2023	1225	Cloverhurst Branch	TAN2	Duplicate		231	#N/A	Sunny, 50F	moderate water level; moderate velocity; clear		4	November - April
11/30/2023	0926	Hunnicutt Creek	HC1			388	388	Sunny, 50F	moderate water level; moderate velocity; clear		4	November - April
11/30/2023	1129	Trail Creek	TR1			364	364	Sunny, 50F	moderate water level; moderate velocity; clear with green tint		4	November - April
11/30/2023	1157	North Oconee	NO2			331	331	Sunny, 50F	moderate water level; slow velocity; turbid brown with green tint; 1ft. Visibility		4	November - April
11/30/2023	1225	Cloverhurst Branch	TAN2			317	317	Sunny, 50F	moderate water level; moderate velocity; clear		4	November - April
11/30/2023	1148	Trail Creek	TR3			262	262	Sunny, 50F	moderate water level; moderate velocity; clear		4	November - April
11/30/2023	1215	Tanyard Creek	TAN1			253	253	Sunny, 50F	moderate water level; slow velocity; clear	gray substance settled on substrate	4	November - April
11/30/2023	1059	East Fork Trail Creek	ETR1			249	249	Sunny, 50F	moderate water level; moderate velocity; clear		4	November - April
11/30/2023	1039	West Fork Trail Creek	WTR1			228	228	Sunny, 50F	moderate water level; moderate velocity; clear		4	November - April
11/30/2023	1117	East Fork Trail Creek	ETR2			187	187	Sunny, 50F	moderate water level; moderate velocity; clear and slightly turbid with brown/green tint		4	November - April
11/30/2023	0923	Middle Oconee	MO2			145	145	Sunny, 50F	moderate water level; moderate velocity; slightly turbid; 2 ft. visibility		4	November - April
11/30/2023	0849	Middle Oconee	MO1			97	97	Sunny, 50F	moderate water level; moderate velocity; clear and slightly turbid		4	November - April
11/30/2023	1255	Carr Creek	CA1			86	86	Sunny, 50F	moderate water level; moderate velocity; clear		4	November - April
12/11/2023	0843	McNutt Creek	MN3	blank	<	10	#N/A	Sunny, 36F; more than 1 in. of rain in last 24 hours			4	November - April
12/11/2023	1204	Middle Oconee	MO4			2595	2595	Sunny, 36F; more than 1 in. of rain in last 24 hours	high water level; moderate velocity; turbid brown; 1/2 ft. visibility		4	November - April
12/11/2023	1220	Oconee River	OC1			1725	1725	Sunny, 36F; more than 1 in. of rain in last 24 hours	high water level; moderate velocity; turbid brown; 1/2 ft. visibility		4	November - April
12/11/2023	1048	Middle Oconee	MO3			1607	1607	Sunny, 36F; more than 1 in. of rain in last 24 hours	high water level; moderate velocity; turbid brown; 4 in. visibility		4	November - April
12/11/2023	1037	McNutt Creek	MN1			1565	1565	Sunny, 36F; more than 1 in. of rain in last 24 hours	high water level; moderate velocity; turbid brown; 1/2 ft. visibility		4	November - April

E. coli Raw Data

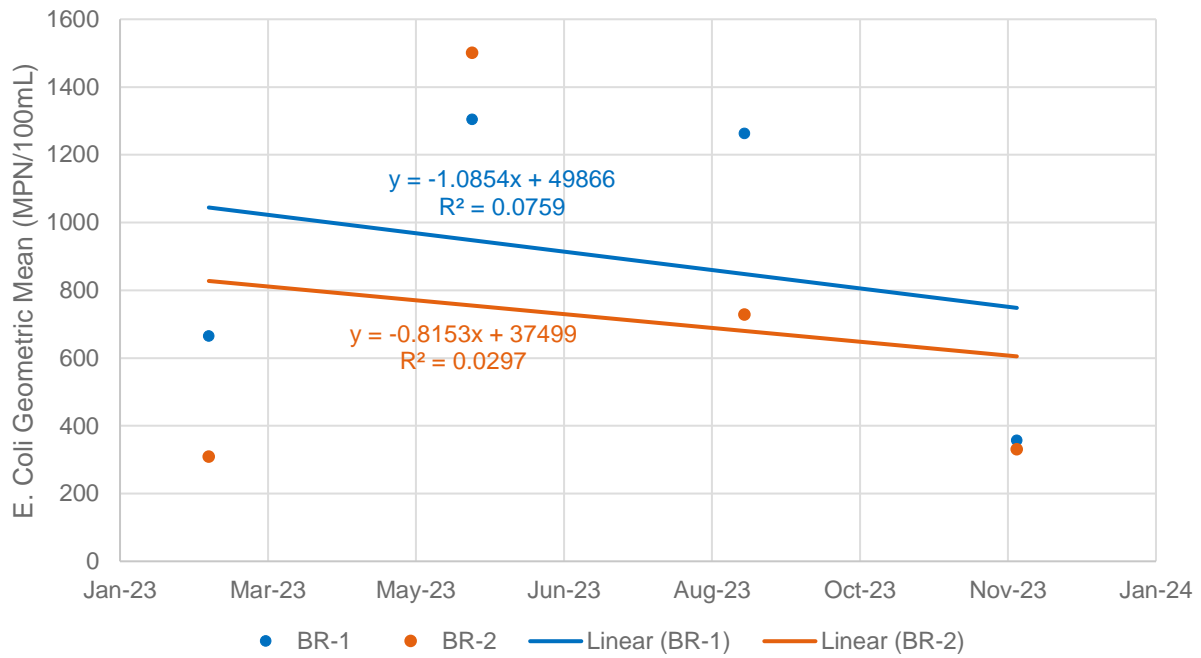
Date collected	Time collected	Stream	Station	Blank or duplicate	Less than or greater than	Reported value	Value for geomean	Weather notes	Water notes	Other notes	Geomean number	Season
12/11/2023	0931	Kingswood Branch	KB3			1467	1467	Sunny, 36F; more than 1 in. of rain in last 24 hours	moderate water level; moderate velocity; clear		4	November - April
12/11/2023	0950	Kingswood Branch	KB1			1296	1296	Sunny, 36F; more than 1 in. of rain in last 24 hours	moderate water level; moderate velocity; clear		4	November - April
12/11/2023	1022	Brooklyn Creek	BR2			1211	1211	Sunny, 36F; more than 1 in. of rain in last 24 hours	moderate water level; slow-moderate velocity; clear	ongoing inceptor improvement project upstream	4	November - April
12/11/2023	0909	McNutt Creek	MN2			1081	1081	Sunny, 36F; more than 1 in. of rain in last 24 hours	high water level; moderate velocity; slightly turbid		4	November - April
12/11/2023	1233	Cedar Creek	CED1			884	884	Sunny, 36F; more than 1 in. of rain in last 24 hours	moderate water level; moderate velocity; clear		4	November - April
12/11/2023	0843	McNutt Creek	MN3			880	880	Sunny, 36F; more than 1 in. of rain in last 24 hours	moderate water level; moderate velocity; clear		4	November - April
12/11/2023	1006	Brooklyn Creek	BR1			860	860	Sunny, 36F; more than 1 in. of rain in last 24 hours	moderate water level; moderate velocity; clear		4	November - April
12/11/2023	1243	North Oconee	NO3			703	703	Sunny, 36F; more than 1 in. of rain in last 24 hours	high water level; moderate velocity; turbid brown; 1/2 ft. visibility		4	November - April
12/11/2023	1109	Unnamed Tributary	UT1			218	218	Sunny, 36F; more than 1 in. of rain in last 24 hours	moderate water level; moderate velocity; clear		4	November - April
12/11/2023	0843	McNutt Creek	MN3	Duplicate		644	#N/A	Sunny, 36F; more than 1 in. of rain in last 24 hours	moderate water level; moderate velocity; clear		4	November - April

APPENDIX B

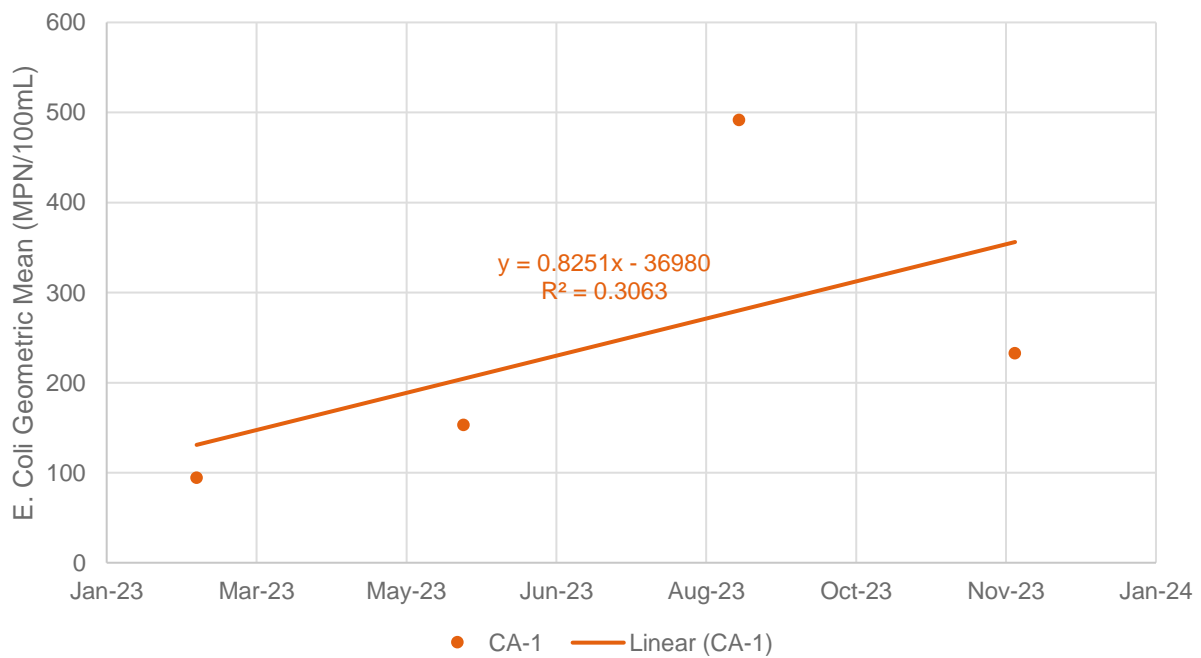
Water Quality Trends (October 2015 – November 2023)



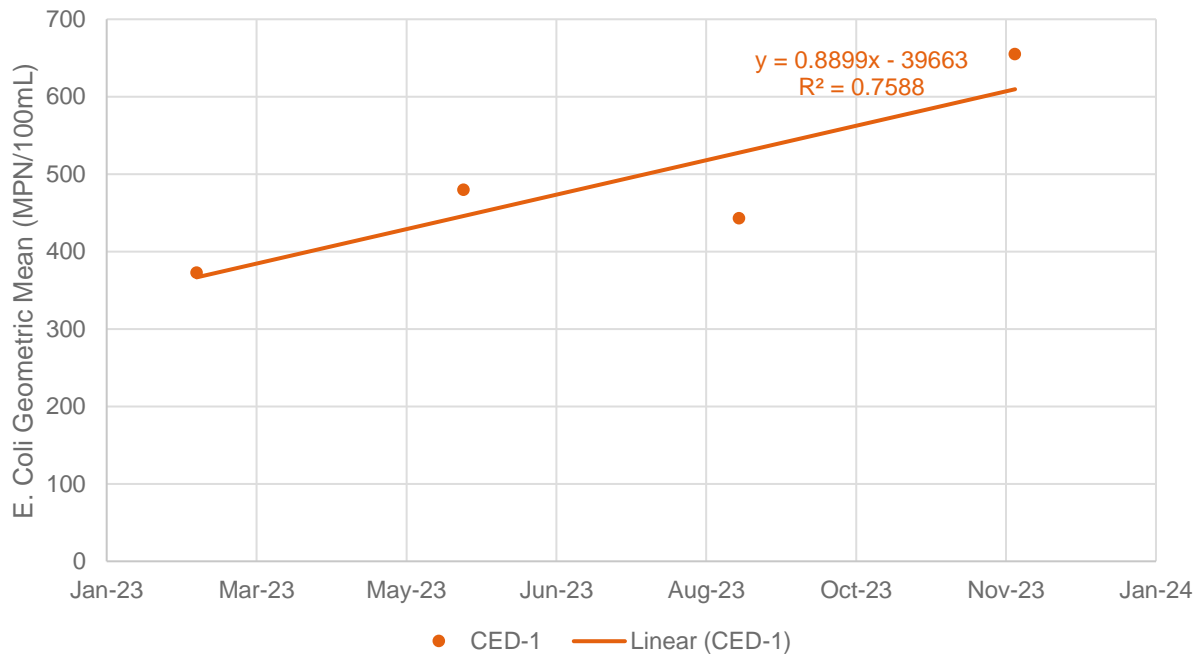
Brooklyn Creek *E. coli* Trends



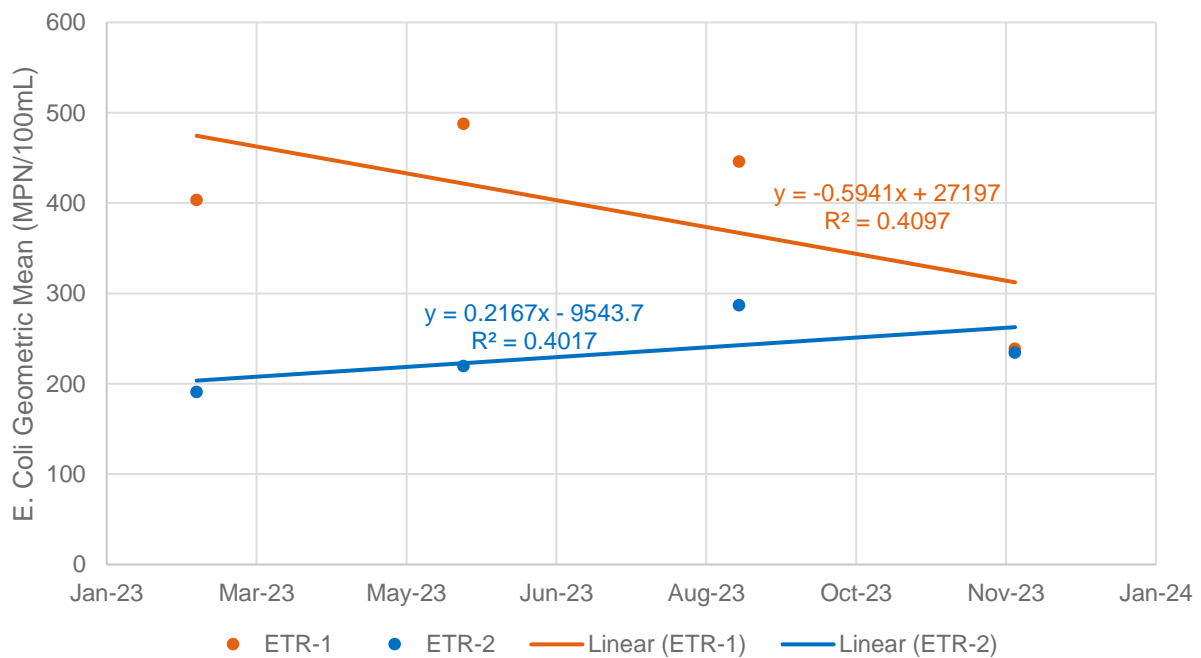
Carr Creek *E. coli* Trends



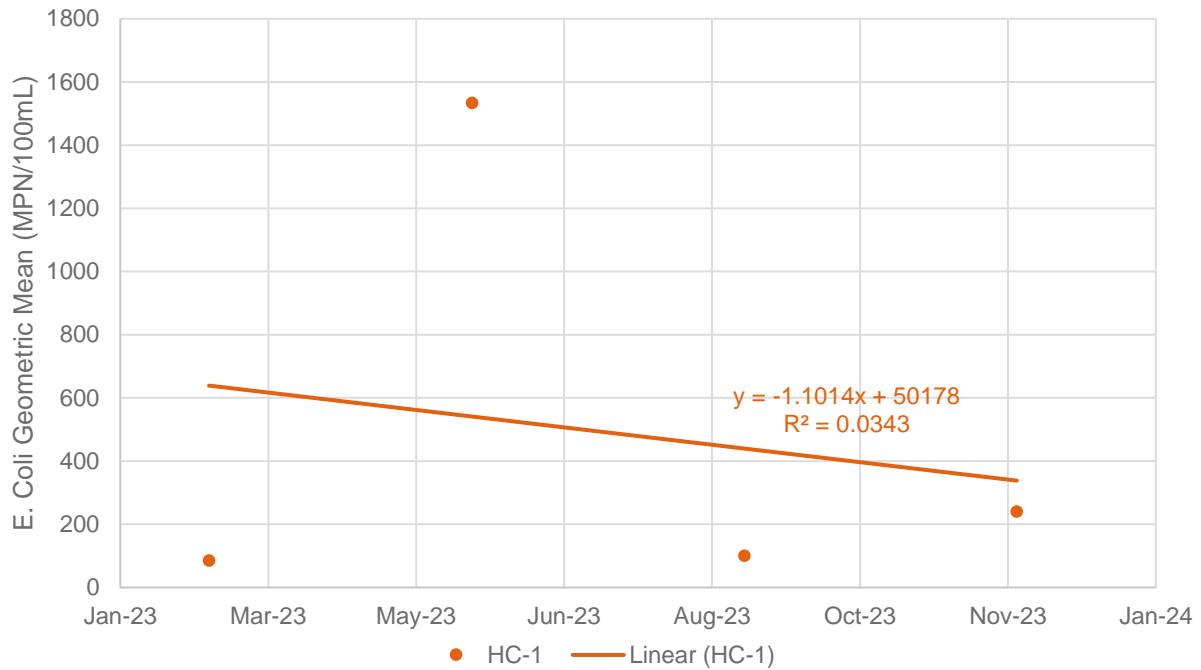
Cedar Creek *E. coli* Trends



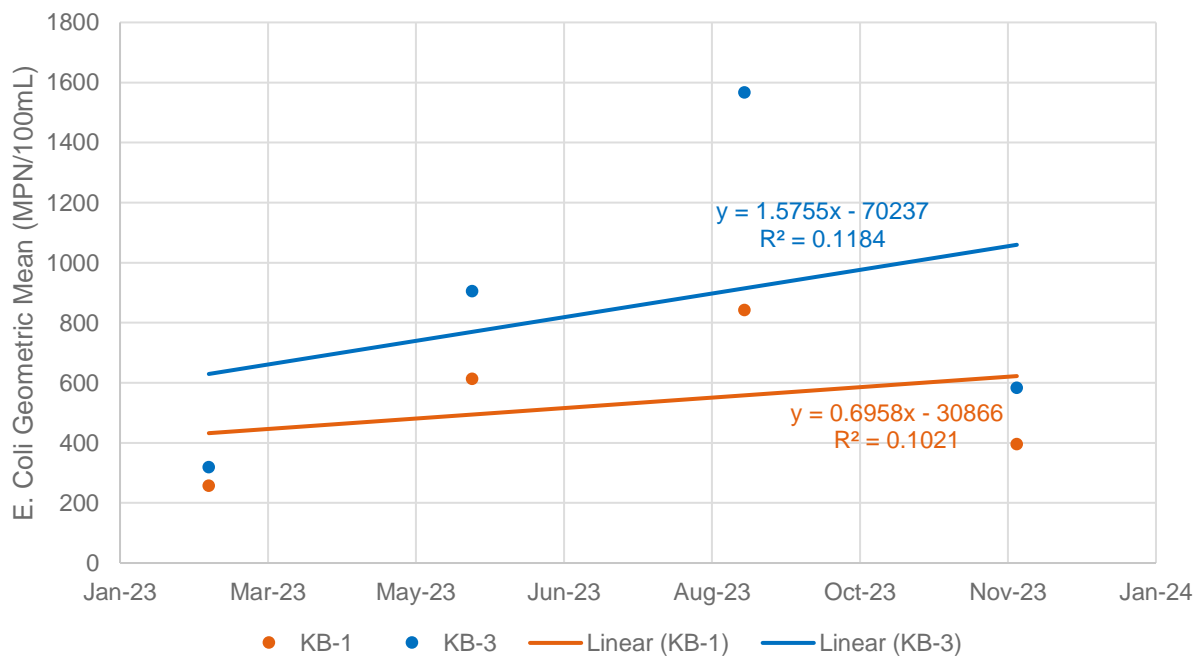
East Fork Trail Creek *E. coli* Trends



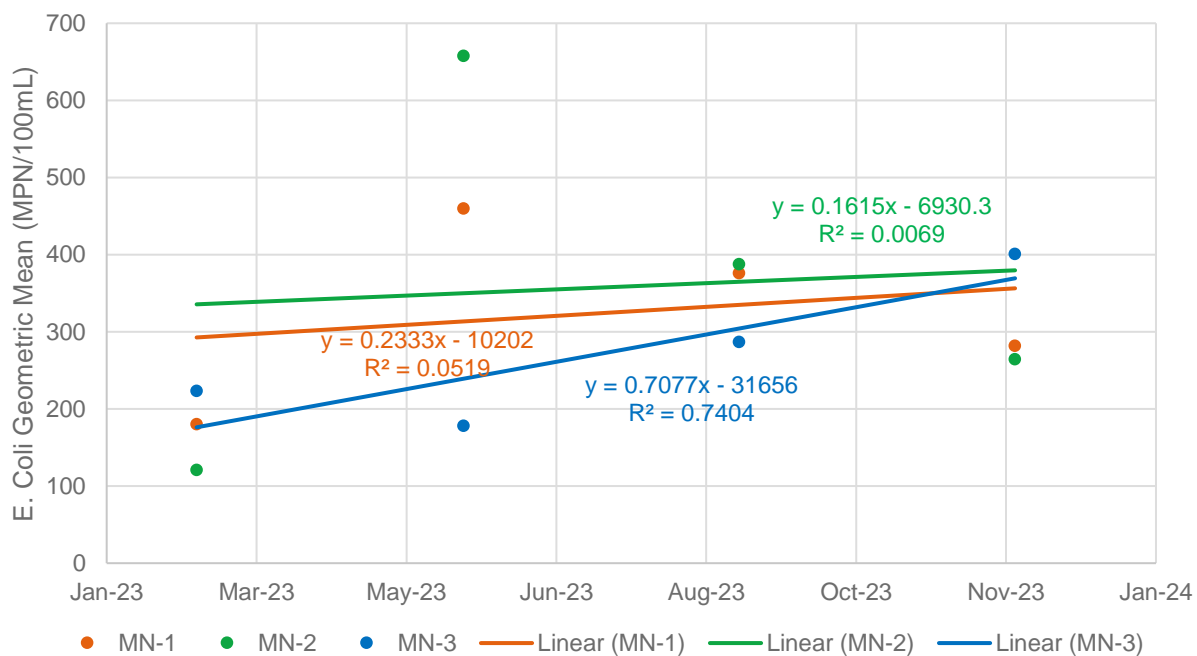
Hunnicut Creek *E. coli* Trends



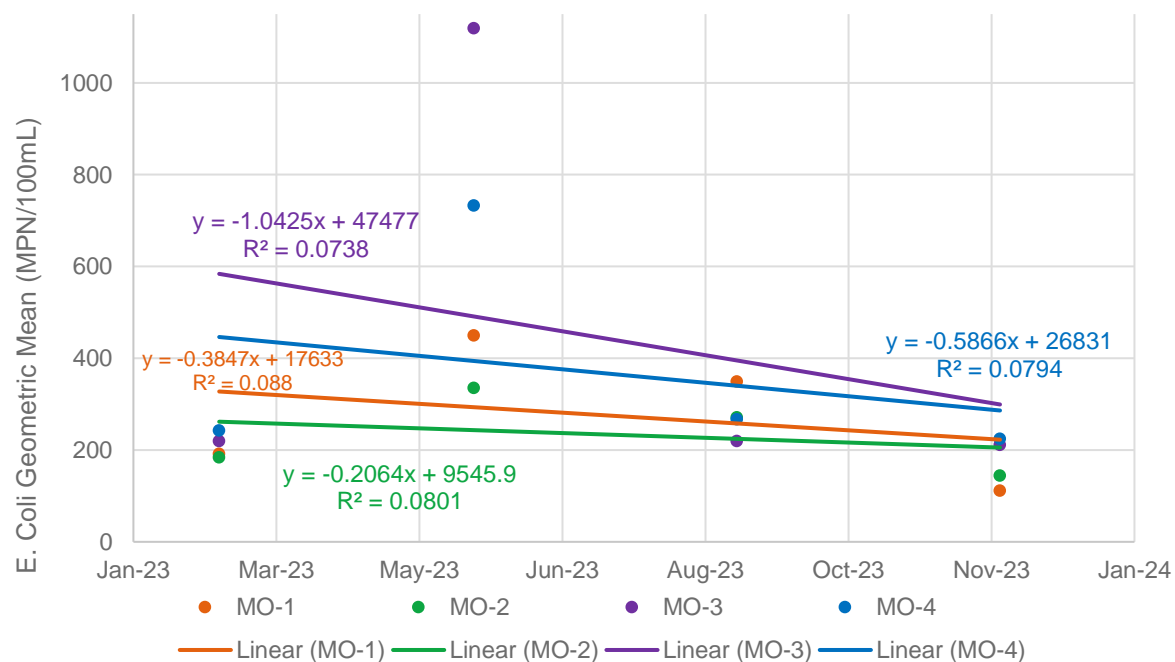
Kingswood Branch *E. coli* Trends



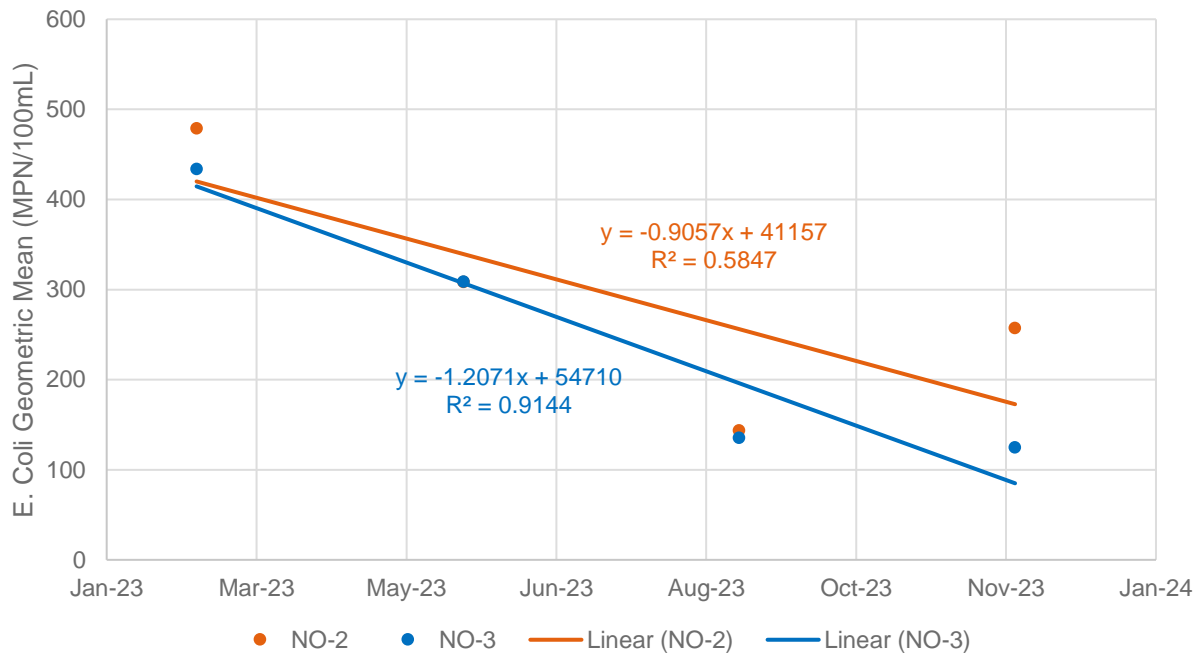
McNutt Creek *E. coli* Trends



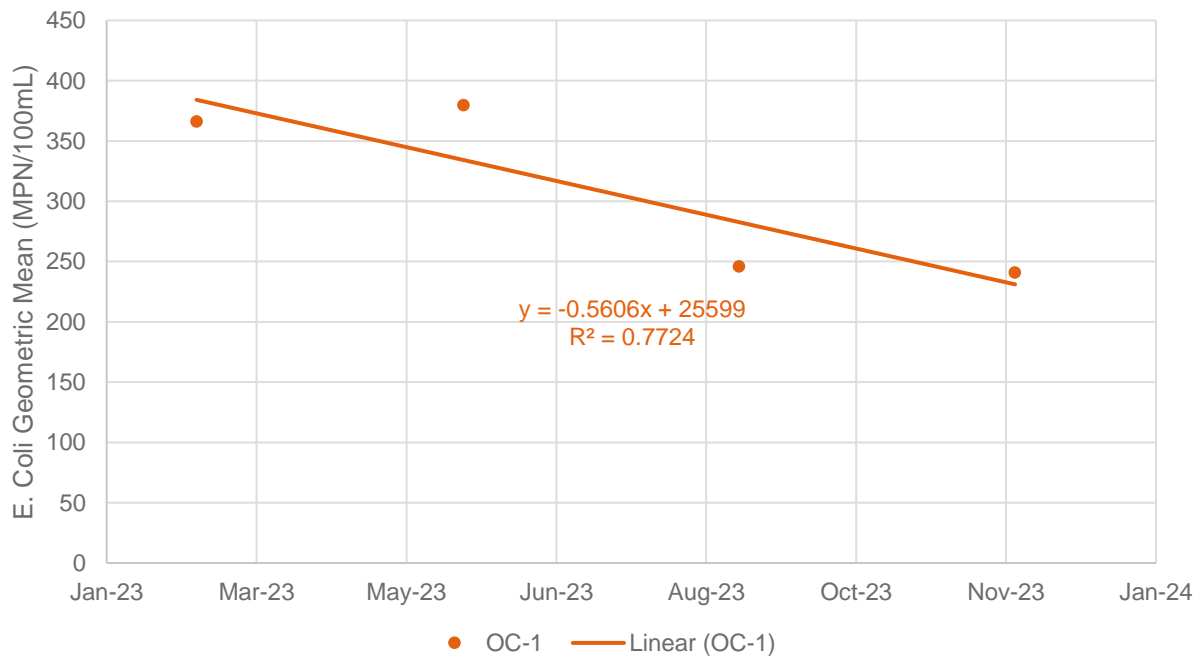
Middle Oconee River *E. coli* Trends



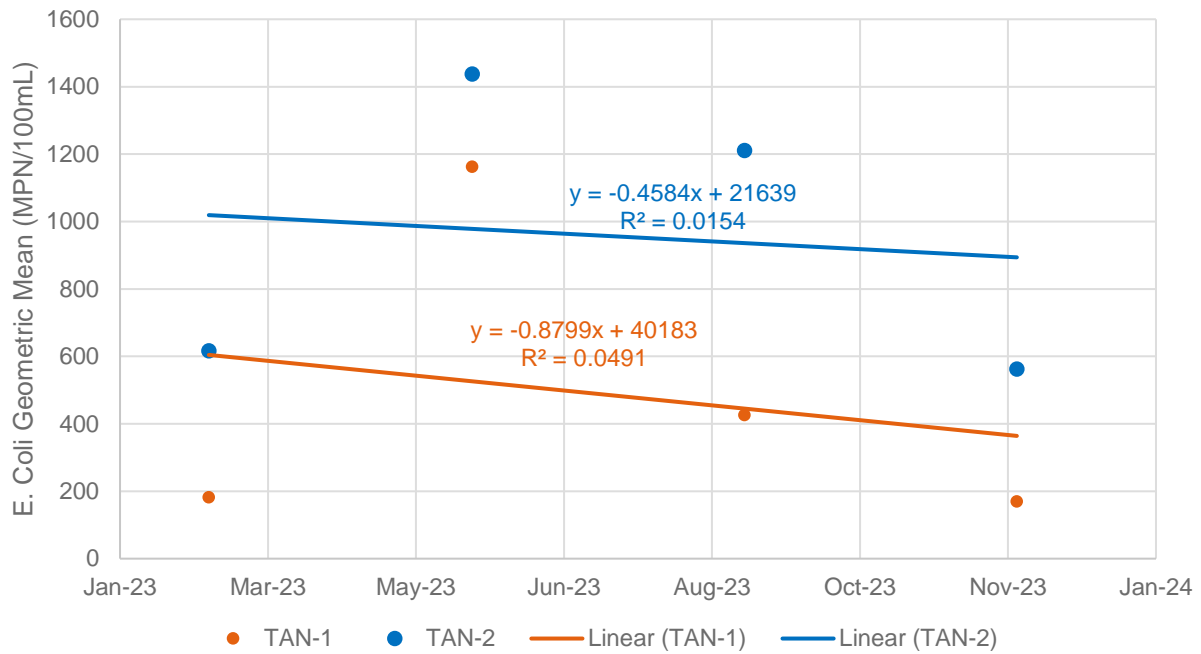
North Oconee River *E. coli* Trends



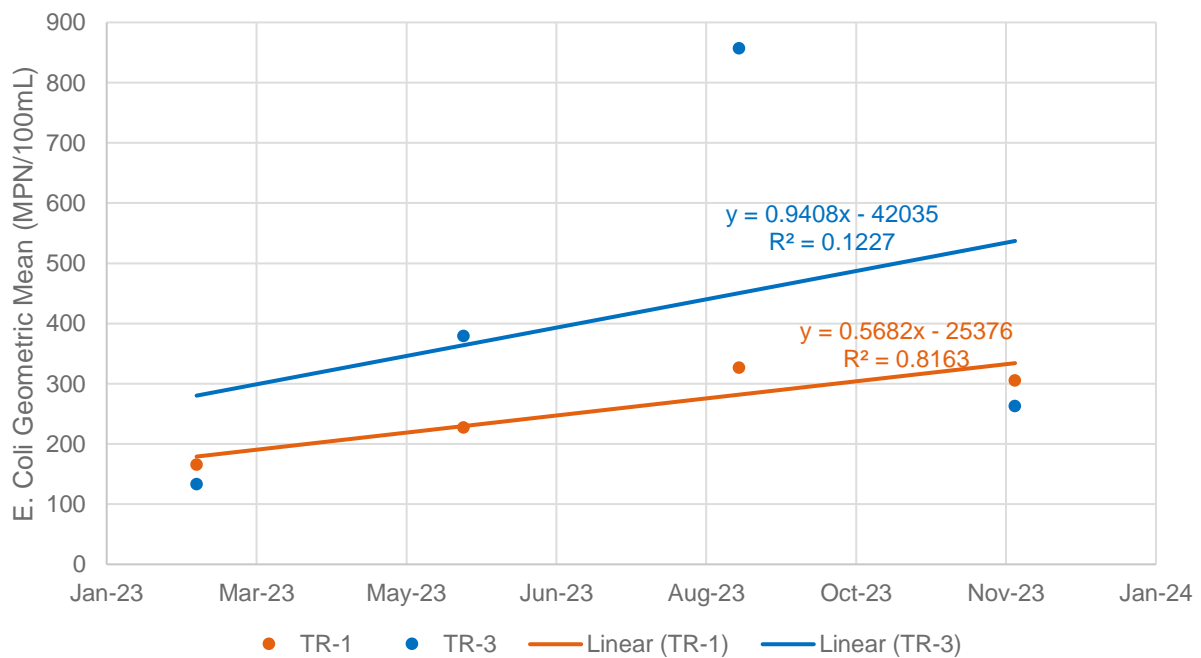
Oconee River *E. coli* Trends



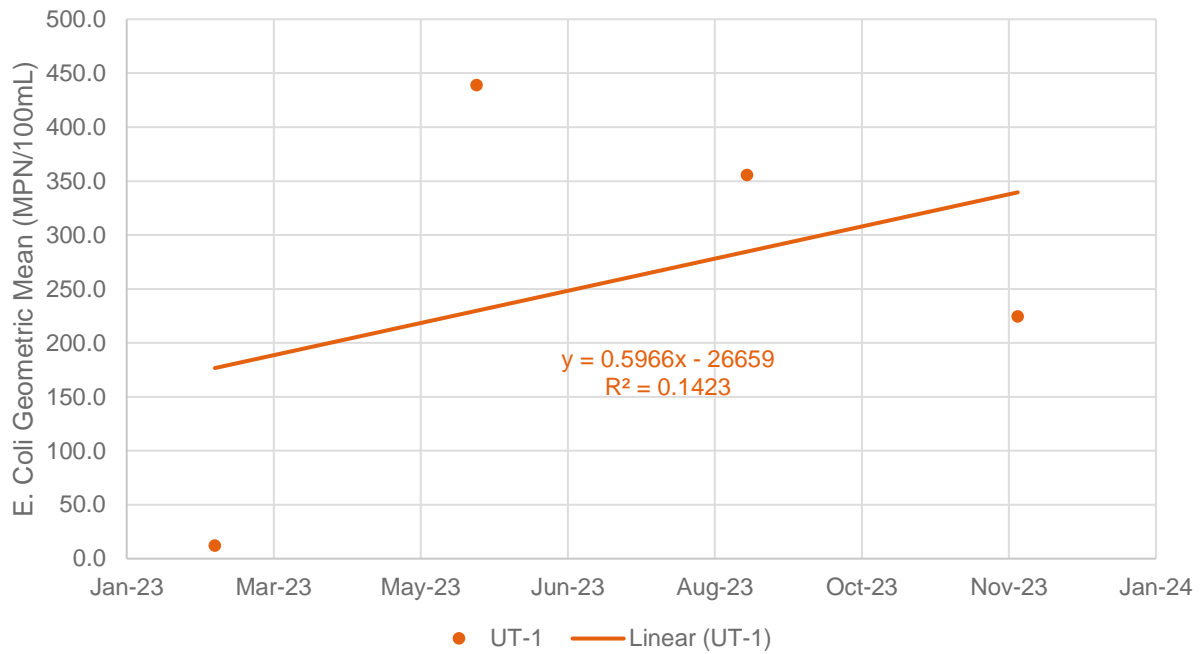
Tanyard Creek *E. coli* Trends



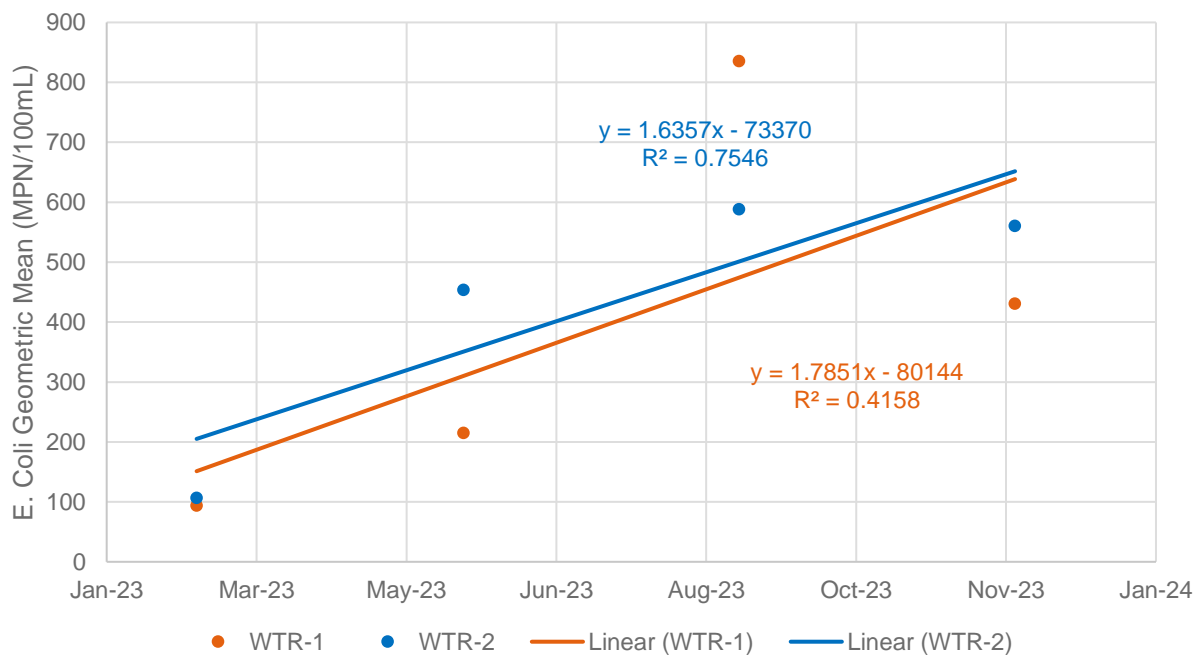
Trail Creek *E. coli* Trends



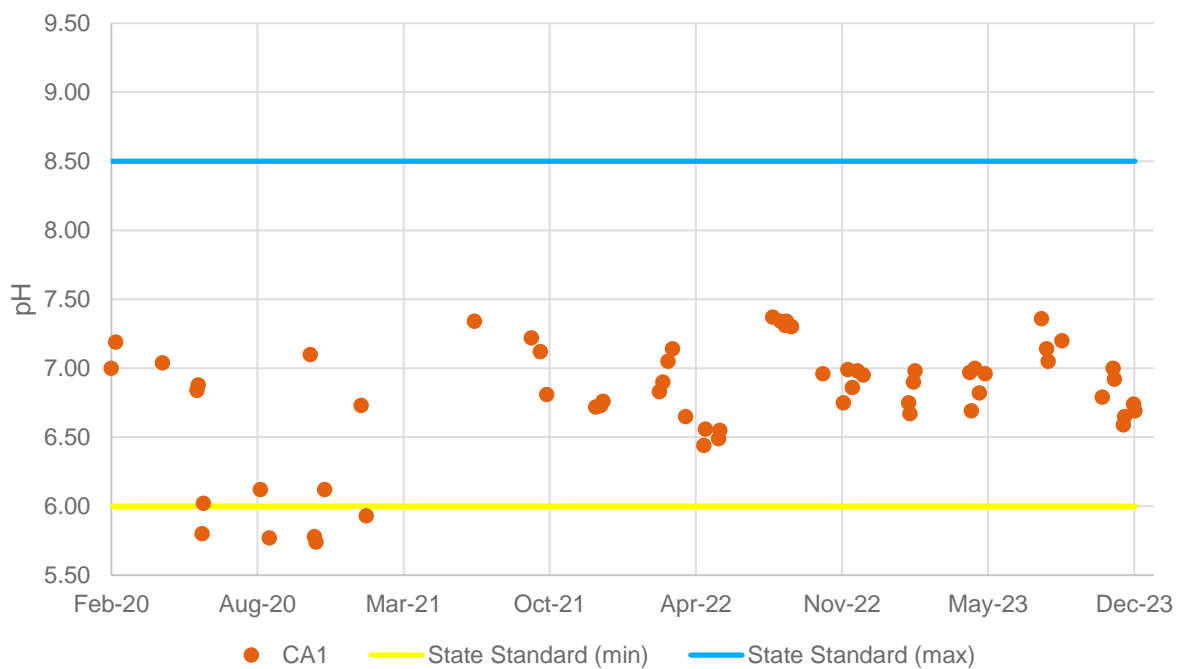
Unnamed Tributary *E. coli* Trends



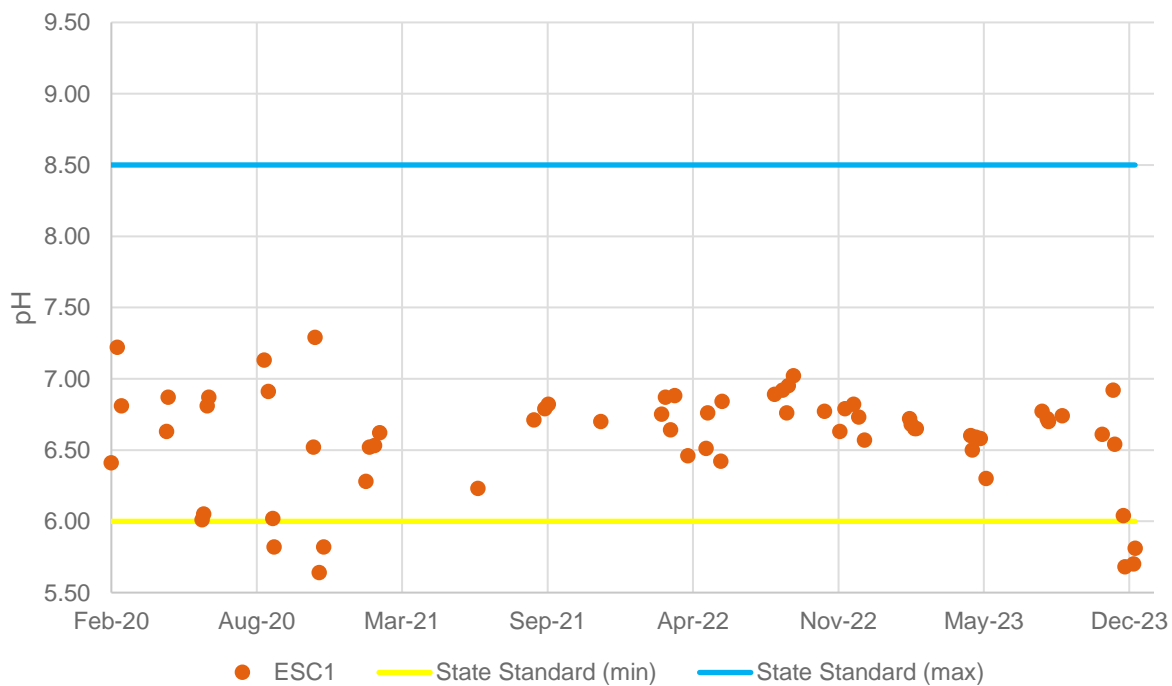
West Fork Trail Creek *E. coli* Trends



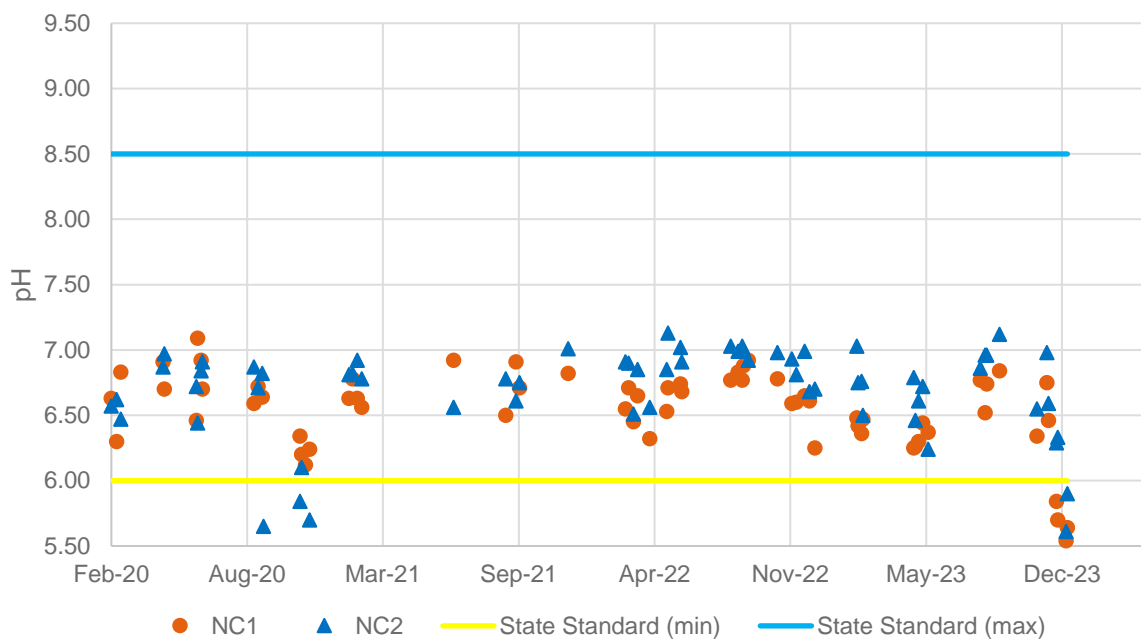
Carr Creek pH Trends



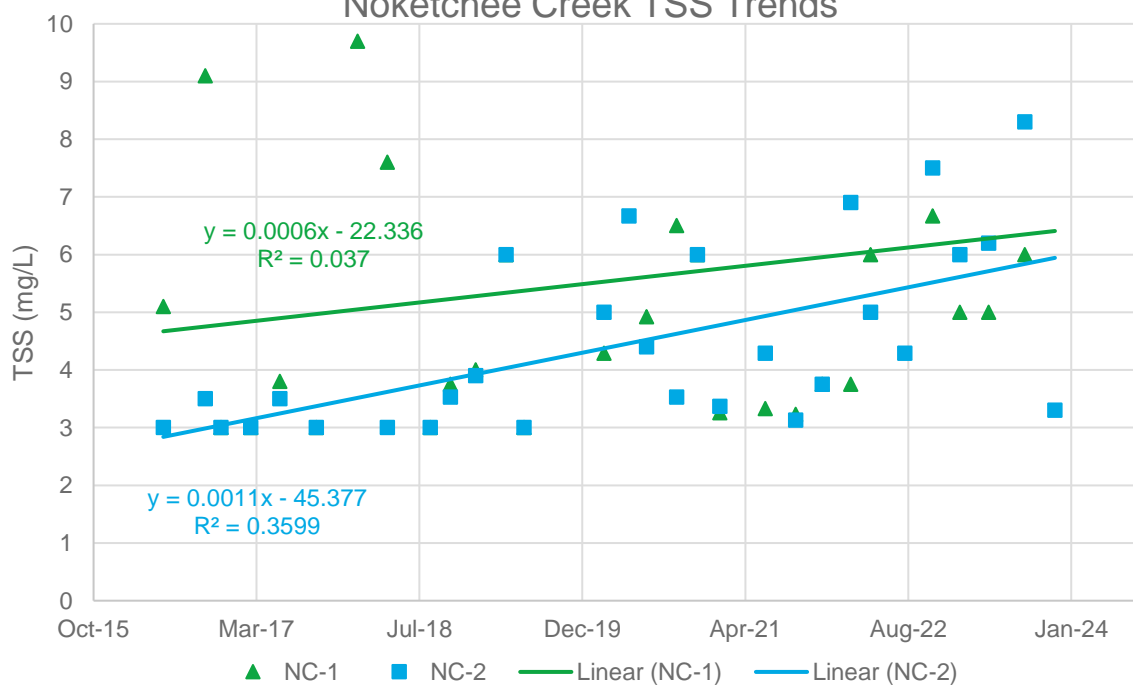
East Sandy Creek pH Trends

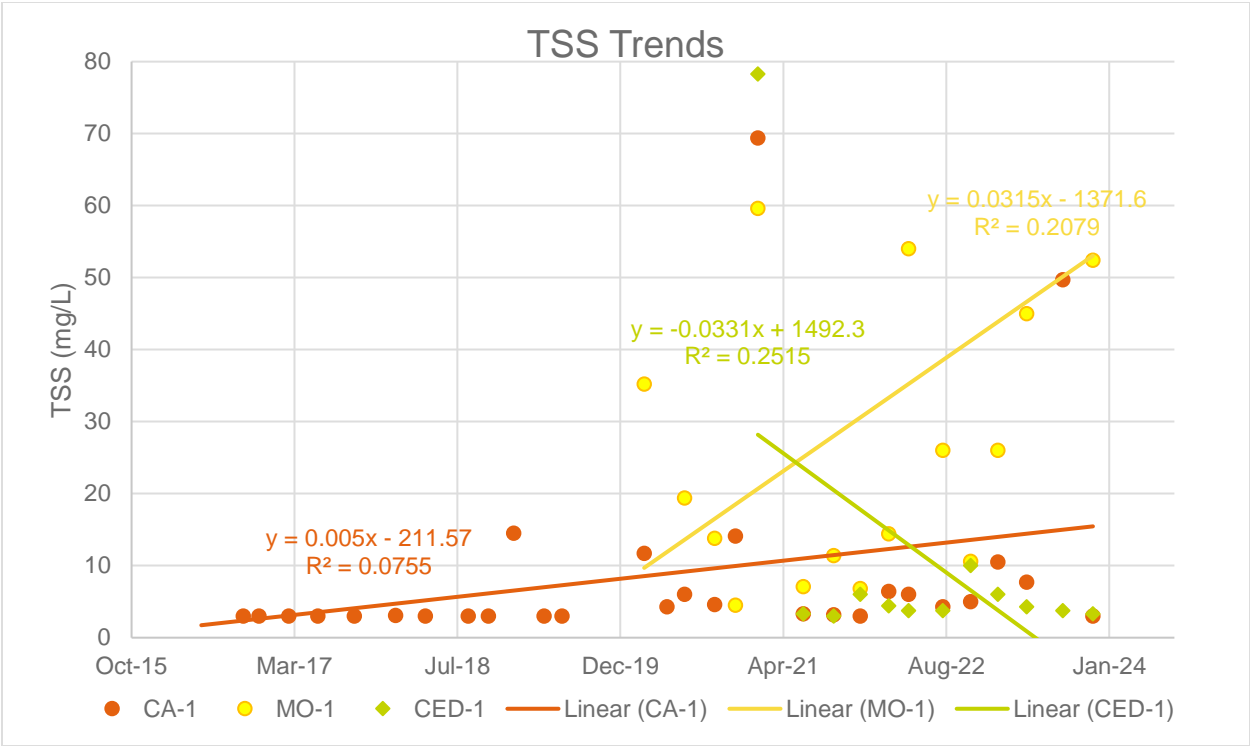


Nokatchee Creek pH Trends



Nokatchee Creek TSS Trends





Arcadis U.S., Inc.

2839 Paces Ferry Road

#900

Atlanta, Georgia 30339

Tel 770 431 8666

Fax 770 435 2666

www.arcadis.com

A decorative graphic consisting of three thin red lines. One line is horizontal, extending from the left edge of the page towards the right. Two other lines are diagonal, starting from the bottom left and extending towards the top right, intersecting the horizontal line.