



LFUCG Stream Monitoring Volunteer Training



Presented by
Third Rock Consultants, LLC

Updated August 2026

LFUCG Volunteer Training Overview

- Stream Monitoring Program Overview / Elements
- Scheduled Water Quality Sampling Routes / Logistics
- Water Quality Sampling Methods and Procedures
 - ✓ Water Quality Sampling Methods and Procedures
 - ✓ Collecting Grab Samples
 - ✓ Recording In Situ Measurement with a Multiparameter Meter
 - ✓ Measuring Chlorine with a Colorimeter
 - ✓ Recording Water Depth (to Estimate Flow)
 - ✓ Collecting Field Duplicates
 - ✓ Collecting Field Blanks
 - ✓ Completing a Chain-of-Custody Form
 - ✓ Recording Field Observations
 - ✓ Completing a Field Duplicate Record
- Equipment Operation / Troubleshooting



Stream Monitoring Program Overview / Elements

- Scheduled water quality grab sampling by trained volunteers / staff at all 63 sites each quarter
- Wet weather water quality grab sampling by Third Rock at 7 major watershed sites each quarter, annually at the remaining 56
- Macroinvertebrate sampling and habitat assessment by Third Rock at 7 major watershed sites annually, bi-annually at the remaining 56
- Geomorphic survey / assessment by Third Rock at all 63 sites bi-annually.
- Fish sampling by Third Rock at the 7 major watershed sites bi-annually

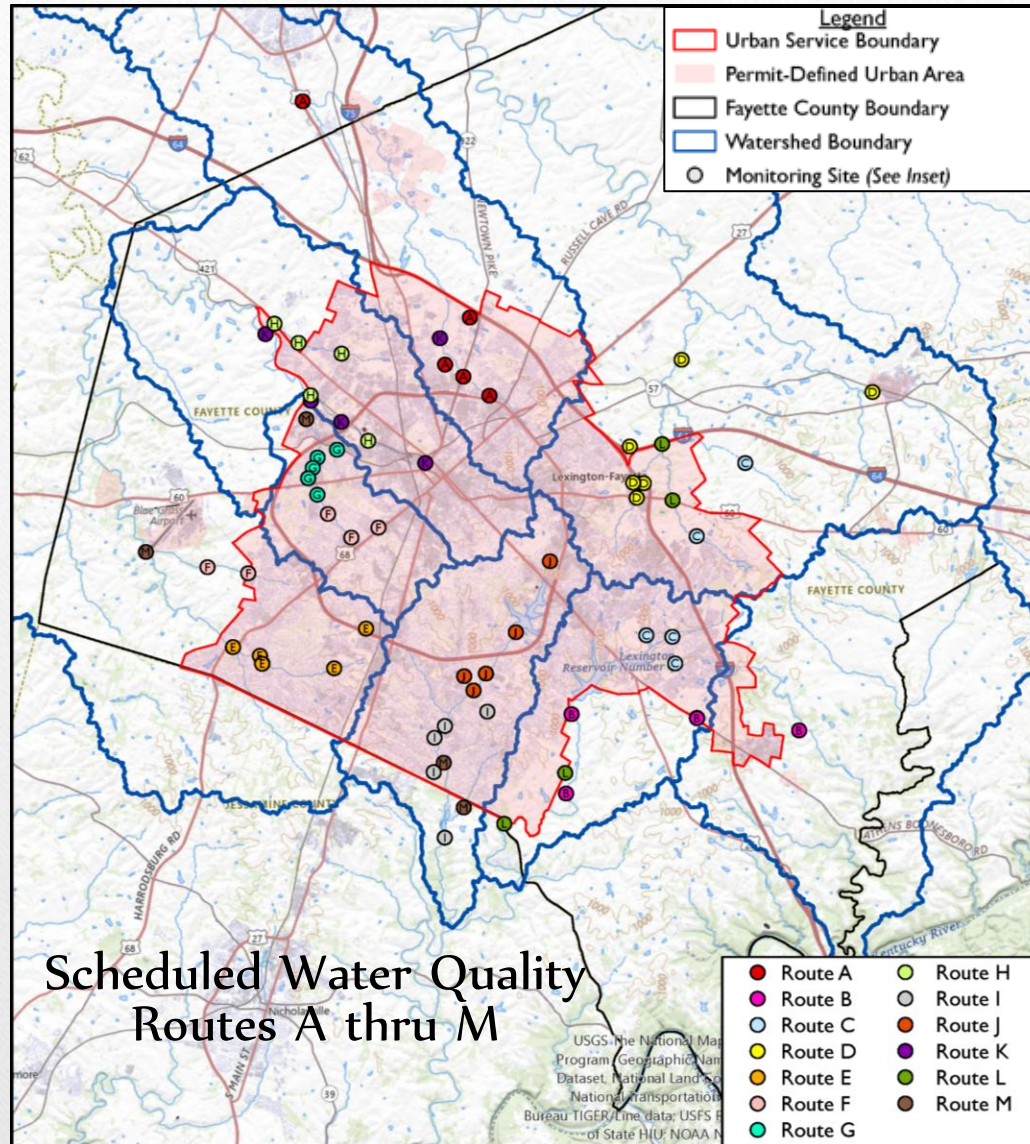


Scheduled Water Quality Sampling Routes / Logistics

More than 100 small subwatershed-scale in-stream sites were evaluated, taking into consideration the location and influence of constituent sources and previously collected water quality data. Sites were further evaluated based on proximate location on a stream and drainage size resulting in the strategic selection of 63 stream monitoring sites across 8 watersheds.

- Sites are split into 13 sampling routes labeled A - M
- Each route contains 4 - 6 sites across no more than two adjacent watersheds
- Routes A through J will be sampled by LFUCG staff and / or trained volunteers
- A route map and site guide sheets will be provided for each route





Water Quality Sampling Methods and Procedures

- Grab samples will be collected and analyzed for total suspended solids, *E. coli*, total phosphorus, ammonia-nitrogen, total Kjeldahl nitrogen, nitrate-nitrogen, and nitrite-nitrogen
- Dissolved oxygen, pH, temperature, and conductivity measurements collected *in situ* using a Hanna HI98194 Multiparameter Meter
- Chlorine will be measured using a Hanna T711 Total Chlorine Checker
- Flow estimated using the recorded depth at the staff gauge
- Field duplicate samples will be collected at a minimum of 10% of samples.
- *E. coli* field blanks will be collected once per team for each day of bacteria sample collection. Field blanks for all other parameters will be collected at a minimum of 10% of sites.



Water Quality Sampling Methods and Procedures *Cont.*

- Daily rinsate blanks will be measured for parameters or sampling methods requiring equipment rinsing between samples (*e.g.* chlorine using a Hanna Checker)
- A Chain-of-Custody (COC) form will be completed for each route
- Field observations will be recorded for each site on the reverse side of the COC.
- A Field Duplicate Record will be completed for each site at which a field duplicate is collected.



- 
- 
- Grab samples will be collected and analyzed for total suspended solids, *E. coli*, total phosphorus, ammonia-nitrogen, total Kjeldahl nitrogen, nitrate-nitrogen, and nitrite-nitrogen
 - ✓ Sample in well-mixed reach, preferably downstream of riffle (*do not disturb bottom sediment*). Do not sample ponded water.
 - ✓ Sample centroid of flow (not edge) at mid depth.
 - ✓ Approach from downstream, point bottle upstream, and submerge
 - ✓ Triple rinse unpreserved bottles with source water.
 - ✓ Fill bottles that contain preservative directly from the source water, do not triple rinse. Be careful not to overfill. If overfilled, do not pour out extra. Laboratory will pipette out extra.
 - ✓ Rinse bottle cap with water from stream prior to capping
 - ✓ Place sample in large, plastic, locking bag.
 - ✓ Place bagged sample on ice in cooler as soon as possible

—HOW-TO—
**COLLECT
STREAM WATER
SAMPLES**

U of A
DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System



[Click above to view video](#)

- Dissolved oxygen, pH, temperature, and conductivity collected *in situ* using a Hanna HI98194 Multiparameter Meter



[Click above to view video](#)

- Chlorine will be measured using a Hanna T711 Total Chlorine Checker

- ✓ Analysis requires 2 minutes and 30 seconds.
- ✓ Beware of moisture / fingerprints outside / microbubbles inside.
- ✓ If you have an error, start over.
- ✓ Triple rinse vials with DI water between measurements.



www.hannainst.com

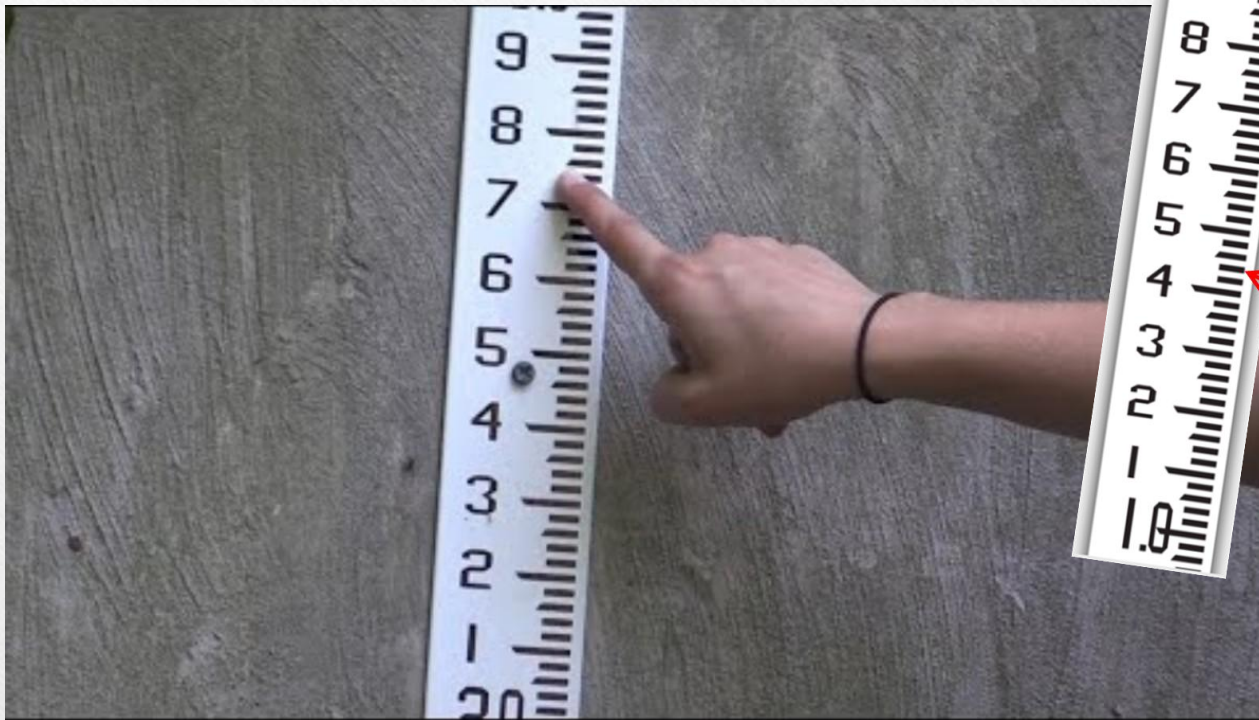


[Click above to view video](#)

- Flow will be estimated using the recorded depth at the staff gauge.
- ✓ Staff gauges have been installed at each stream site.



- ✓ Record the depth to nearest hundredth of a foot. Gauge marks are 0.01 ft apart.
- ✓ Feet and tenths are labeled numerically. Hash marks between the tenths measure hundredths.



[Click above to view video](#)

- Field duplicate samples will be collected at a minimum of 10% of sites sampled.
 - ✓ If your route has been assigned to collect field duplicate samples, collect a second, identical sample at the same time and in the same location for handling and analysis in the same manner.
 - ✓ Record *in situ* measurements for the site on the Field Duplicate Record that is not submitted to the laboratory with the chain-of-custody form.

- 
- 
- *E. coli* field blanks will be collected once per team for each day of bacteria sample collection. Field blanks for all other parameters will be collected at a minimum of 10% of sites.
 - ✓ Each team will collect at a minimum one *E. coli* blank sample per day. If your route has been assigned to collect a field duplicate, you will also collect a field blank for all other parameters.
 - ✓ Fill a second set of sample bottles labeled “Blank” with DI water. Blanks are not recorded for the multi parameter meters as DI water can damage the sensors.
 - For parameters or sampling methods requiring equipment rinsing between samples (e.g. chlorine using a Hanna Checker) daily rinsate blanks will be measured.
 - ✓ Fill chlorine vile with DI water and measure chlorine. Record the measurement on the appropriate Field Blank line of the COC.

- A Chain-of-Custody (COC) form will be completed for each route.


LEXINGTON
 Division of Water Quality, Town Branch WWTP Laboratory
 301 Jimmie Campbell Dr, Lexington, Kentucky 40504
 Chain-of-Custody Record

Sampling Date: _____ Stream Sampling Route / Kit: _____ WQ Meter ID: _____ Colorimeter ID: _____
 Sampling Lead: _____ Additional Sampler(s): _____

Lab ID	Site ID	Field Duplicate	Field Blank	Rinsate Blank	Time	Requested Analysis ¹ (✓ Checked)			In Situ Measurements							
						Bottle Size ²			Water Depth at Staff Gage (ft)	pH (SU)	Dissolved Oxygen (ppm / mg/L)	Dissolved Oxygen (% Saturation)	Specific Conductance (uS/cm)	Temperature (°C)	Total Chlorine (ppm / mg/L)	
						4 oz Na ₂ S ₂ O ₃	16 oz None	8 oz H ₂ SO ₄								
						E. coli	TSS, TP, NH ₃ -N, NO ₂ -N, NO ₃ -N	TKN								
						✓	✓	✓								
						✓	✓	✓								
						✓	✓	✓								
						✓	✓	✓								
						✓	✓	✓								
	Field Duplicate	x				✓	✓	✓	Record In Situ Measurements on attached Field Duplicate Record							
			x			✓	✓	✓								
				x												

¹ E. coli = *Escherichia coli*; TSS = Total Suspended Solids; TP = Total Phosphorus; TKN-N = Total Kjeldahl Nitrogen (as N); NH₃-N = Ammonia (as N); NO₂-N = Nitrite (as N); NO₃-N = Nitrate (as N)
² All samples are surface water collected via grab sampling and stored at < 6° C in plastic bottles.
³ H₂SO₄ = Sulfuric Acid; Na₂S₂O₃ = Sodium Thiosulfate

Relinquished by: _____ Received by: _____
 Printed Name: _____ Printed Name: _____
 Relinquished on: ____ / ____ / ____ Time: _____ Received on: ____ / ____ / ____ Time: _____
 Sampled preserved, bottles sealed, intact? Yes / No (If no, comment below)

- Field observations will be recorded for each site on the reverse side of the COC for the route.


LEXINGTON
 Division of Water Quality, Town Branch WWTP Laboratory
 301 Jimmie Campbell Dr, Lexington, Kentucky 40504
 Water Quality Sampling Field Observations

Sampling Date: _____ Sampling Route: _____ Lead Sampler: _____ Add'l Sampler(s): _____

Sampling Site ID: _____

Stream Flow?		Garbage?	Suds?	Algae?	Turbidity?		Stream Color?		
☐ Dry	☐ Seasonal Normal	☐ Present	☐ Present	☐ Present	☐ None	☐ Severe	☐ Clear	☐ Tannic	☐ Gray
☐ Pooled / No Fow	☐ Above Normal	☐ Absent	☐ Absent	☐ Absent	☐ Slight	☐ Extreme	☐ Blue	☐ Brown / Clear	☐ White
☐ Low	☐ High				☐ Moderate		☐ Brown	☐ Brown / Green	
	☐ Flood						☐ Green	☐ Green / Clear	

Sampling Site ID: _____

Stream Flow?		Garbage?	Suds?	Algae?	Turbidity?		Stream Color?		
☐ Dry	☐ Seasonal Normal	☐ Present	☐ Present	☐ Present	☐ None	☐ Severe	☐ Clear	☐ Tannic	☐ Gray
☐ Pooled / No Fow	☐ Above Normal	☐ Absent	☐ Absent	☐ Absent	☐ Slight	☐ Extreme	☐ Blue	☐ Brown / Clear	☐ White
☐ Low	☐ High				☐ Moderate		☐ Brown	☐ Brown / Green	
	☐ Flood						☐ Green	☐ Green / Clear	

Sampling Site ID: _____

Stream Flow?		Garbage?	Suds?	Algae?	Turbidity?		Stream Color?		
☐ Dry	☐ Seasonal Normal	☐ Present	☐ Present	☐ Present	☐ None	☐ Severe	☐ Clear	☐ Tannic	☐ Gray
☐ Pooled / No Fow	☐ Above Normal	☐ Absent	☐ Absent	☐ Absent	☐ Slight	☐ Extreme	☐ Blue	☐ Brown / Clear	☐ White
☐ Low	☐ High				☐ Moderate		☐ Brown	☐ Brown / Green	
	☐ Flood						☐ Green	☐ Green / Clear	

Sampling Site ID: _____

Stream Flow?		Garbage?	Suds?	Algae?	Turbidity?		Stream Color?		
☐ Dry	☐ Seasonal Normal	☐ Present	☐ Present	☐ Present	☐ None	☐ Severe	☐ Clear	☐ Tannic	☐ Gray
☐ Pooled / No Fow	☐ Above Normal	☐ Absent	☐ Absent	☐ Absent	☐ Slight	☐ Extreme	☐ Blue	☐ Brown / Clear	☐ White
☐ Low	☐ High				☐ Moderate		☐ Brown	☐ Brown / Green	
	☐ Flood						☐ Green	☐ Green / Clear	

Sampling Site ID: _____

Stream Flow?		Garbage?	Suds?	Algae?	Turbidity?		Stream Color?		
☐ Dry	☐ Seasonal Normal	☐ Present	☐ Present	☐ Present	☐ None	☐ Severe	☐ Clear	☐ Tannic	☐ Gray
☐ Pooled / No Fow	☐ Above Normal	☐ Absent	☐ Absent	☐ Absent	☐ Slight	☐ Extreme	☐ Blue	☐ Brown / Clear	☐ White
☐ Low	☐ High				☐ Moderate		☐ Brown	☐ Brown / Green	
	☐ Flood						☐ Green	☐ Green / Clear	

Field Observations - Definitions

Stream Flow

Dry	No water at all.
Pooled / No Flow	Some water, but no connection between pools.
Low	Measureable, but low flow.
Seasonal Normal	Normal flow conditions for season.
Above Normal	Flow higher than usual, but not nearing bankfull.
High	Water nearing bankfull.
Flood	Water has breeched bankfull.

Garbage

Garbage is present either in the stream or caught in the riparian vegetation adjacent to the stream.

Suds

Suds (more than just the small bubbles produced by riffles) are present and persistent in the stream.

Algae

Stream has noticeable growth of filamentous algae, or algae that grows in long strands (e.g. Cladophora)

Turbidity

None	Water is crystal clear
Slight	Water is not crystal clear, slightly cloudy
Moderate	You can see bottom in shallow, but not in pools
Severe	Only clear at very edge; can see your hand under water
Extreme	No transparency

Stream Color (*Observations should be made based on appearance in-stream, not the appearance once collected and in a bottle.*)

Clear	No discernable color to the water. You can see the substrate clearly.
Blue	Water appears blue.
Brown	Water appears muddy brown and opaque, like coffee with creamer, this is often due to turbidity from sediments.
Green	Water appears green and slightly opaque, such as from phytoplankton.
Tannic	Water appears dark, or stained, similar to tea or black coffee, but still mostly translucent.
Brown / Clear	Water appears brownish from turbidity but is not fully opaque.
Brown / Green	Water appears brownish green.
Green / Clear	Water appears slightly green but is still translucent.
Gray	Water appears gray.
White	Water appears white.

- A Field Duplicate Record will be completed for each site at which a field duplicate is collected.


LEXINGTON
 Division of Water Quality, Town Branch WWTP Laboratory
 301 Jimmie Campbell Dr, Lexington, Kentucky 40504
 Field Duplicate Record

Sampling Date: _____ Stream Sampling Route / Kit: _____ WQ Meter ID: _____ Colorimeter ID: _____
 Sampling Lead: _____ Additional Sampler(s): _____

Lab ID	Site ID	Field Duplicate	Time	Requested Analysis ¹ (✓ Checked)			In Situ Measurements							
				Bottle Size ² Preservative ³			Water Depth at Staff Gage (ft)	pH (SU)	Dissolved Oxygen (ppm / mg/L)	Dissolved Oxygen (% Saturation)	Specific Conductance (uS/cm)	Temperature (°C)	Total Chlorine (ppm / mg/L)	
				4 oz Na ₂ S ₂ O ₃	16 oz None	8 oz H ₂ SO ₄								
		X		E. coli	TSS, TP, NH ₃ -N, NO ₂ -N, NO ₃ -N	TKN								
				✓	✓	✓								

¹ E. coli = *Escherichia coli*; TSS = Total Suspended Solids; TP = Total Phosphorus; TKN-N = Total Kjeldahl Nitrogen (as N); NH₃-N = Ammonia (as N); NO₃-N = Nitrate (as N); NO₂-N = Nitrite (as N)
² All samples are surface water collected via grab sampling and stored at < 6° C in plastic bottles.
³ H₂SO₄ = Sulfuric Acid; Na₂S₂O₃ = Sodium Thiosulfate

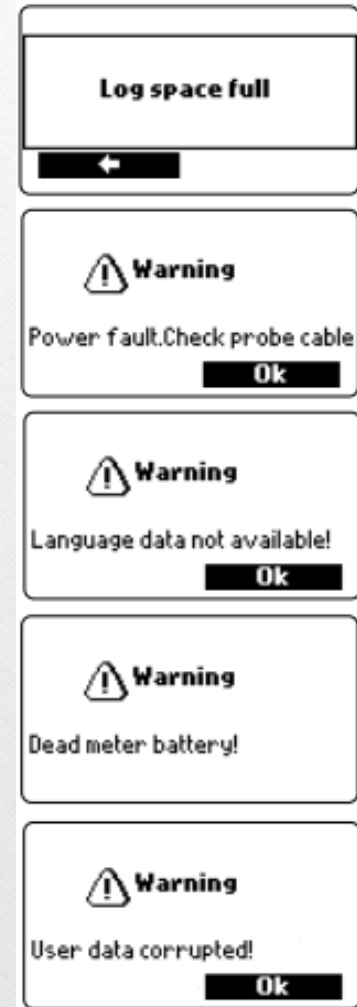
Comments / Notes:

To be submitted to LFUCG MS4 Section Manager. Do NOT submit to Town Branch Laboratory.

Equipment Operation / Trouble Shooting

Hanna HI98194 Multiparameter Meter

- Turn on, press ESC if you don't see measurements.
- Press up or down to get all results. Wait to equilibrate and record measurements shown on the screen.
- Warnings may appear as shown.
- Any critical errors that appear are identified using a numeric code, and the meter will automatically switch off
- If you encounter any warnings or errors, contact sampling lead and return meter to lab for replacement.



Hanna T711 Total Chlorine Checker

- List of potential error messages shown below and included in handout

A digital display showing the error code 'L.H.' in a black box.

Light High: There is too much light to perform a measurement. Check the preparation of zero cuvette and re-run measurement.

A digital display showing the error code 'L.Lo' in a black box.

Light Low: There is not enough light to perform a measurement. Check the preparation of zero cuvette and re-run measurement.

A digital display showing the error code 'Inv' in a black box.

Inverted Cuvettes: The sample and zero cuvette are inverted. Re-run measurement.

A digital display showing the error code '0.00' in a black box.

Under Range: Indicates that the sample absorbed less light than zero reference. Check the procedure and make sure to use the same cuvette for reference (zero) measurement. Re-run measurement.

A digital display showing the error code '3.00' in a black box.

Over Range: TA flashing value of the maximum concentration indicates the reading is over range. Record : > Result

A digital display showing the error code 'bAt' in a black box.

Battery Low: The battery is low and will need to be replaced. Replace battery with the provided screwdriver.

A digital display showing the error code 'bAd' in a black box.

Dead Battery: This indicates the battery is dead and must be replaced. Once this is displayed, normal operation of the instrument will be interrupted. Replace the battery with the provided screwdriver and restart the meter.

A digital display showing the error code 'bAt' in a black box.

Questions / Discussion

