TENNESSEE
DIVISION OF WATER RESOURCES

FISCAL YEAR 2022-2023
SURFACE WATER
MONITORING AND ASSESSMENT
PROGRAM PLAN

July 2022

Tennessee Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243

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EXECUTIVE SUMMARY

The purpose of this document is to establish overall goals and objectives for key elements of the Tennessee Department of Environment and Conservation (TDEC), Division of Water Resources Watershed Stewardship and Support Branch, surface water quality monitoring program. Information concerning ground water monitoring will be provided in a separate document by the Water Supply Branch.

The United States Environmental Protection Agency (EPA) is requiring states to implement or commit to developing a monitoring program strategy. The details of this initiative can be found in the document, *Elements of a State Monitoring and Assessment Program*, published in March 2003. This initiative is intended to serve as a tool to assist EPA and the states in determining whether a monitoring program meets the requirements of Clean Water Act Section 106 (e)(1). EPA recommended the following ten elements be included in a state's monitoring program strategy:

A. A long-term state monitoring strategy
B. Identification of monitoring objectives
C. Selection of a monitoring design
D. Identification of core and non-critical water quality indicators
E. Development of quality management and quality assurance plans
F. Use of accessible electronic data systems
G. Methodology for assessing attainment of water quality standards
H. Production of water quality reports
I. Periodic review of monitoring program
J. Identification of current and future resource needs

Tennessee spent considerable time prior to the publication of EPA's recommendations developing an effective monitoring and assessment strategy, which has been used for many years. Publication of EPA's guidance resulted in the review and refinement of the existing plan to make certain all elements were included.

Tennessee already incorporates all 10 elements in its existing monitoring strategy. Those 10 elements have been outlined in this document. Additional information on monitoring strategies, assessment and listing strategies can be found in Tennessee's Consolidated Assessment and Listing Methodology (CALM), TDEC 2021.

Tennessee has developed a nutrient criteria development plan. The division has published Quality System Standard Operating Procedures (QSSOP's) for conducting bacteriological, chemical, biological and periphyton stream surveys, as well as a Quality Assurance Project Plan for 106 Monitoring. These documents can be accessed on the Department's website at https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html

The purpose of the division's water quality monitoring program is to provide an accurate and defensible accounting of Tennessee's progress towards meeting the goals established in the federal Clean Water Act and the Tennessee Water Quality Control Act.

Data are collected and interpreted in order to:

- Assess the condition of the state's waters.
- Identify problem areas with parameter values that violate Tennessee numerical or narrative water quality standards.
- Identify causes and sources of water quality problems.
- Document areas with potential human health threats from fish tissue contamination or elevated bacteria levels.
- Establish trends in water quality.
- Gauge compliance with NPDES permit limits.
- Document damage to streams for enforcement efforts, if appropriate.
- Document baseline conditions by monitoring reference stream within the same ecoregion or watershed or for downstream comparison or prior to a potential impact.
- Assess water quality improvements based on site remediation, Best Management Practices, and other restoration strategies.
- Identify proper stream-use classification, including antidegradation policy implementation.
- Identify natural reference conditions on an ecoregion basis for refinement of water quality standards.

Since 1996, Tennessee's monitoring program has been based on a five-year watershed cycle. The first cycle was completed in 2001. The second cycle was completed in 2006. A third cycle was completed in 2011. The fourth cycle was completed in 2016. The fifth assessment cycle was completed in 2021.

Tennessee relies heavily on ecoregion reference data to assess impairment and has spent much effort in developing regional reference guidelines for wadeable streams. In 2008, the division initiated monitoring to establish reference guidelines for headwater streams. A future challenge is to develop similar guidelines for rivers, lakes, and reservoirs. A major limiting factor to this goal is funding and staff availability.

Note: All activities are funded by Section 106 Grant Funds unless otherwise noted.

I. ELEMENTS OF TENNESSEE'S SURFACE WATER MONITORING AND ASSESSMENT PROGRAM

A. Monitoring Program Strategy

The Division of Water Resources (DWR) has a comprehensive monitoring program that serves its water quality management needs and addresses all the state's surface waters including streams, rivers, lakes, reservoirs and wetlands.

In 1996, the Division of Water Pollution Control, currently DWR, adopted a watershed approach that reorganized existing programs and focused on place-based water quality management. The primary goals of the watershed approach are:

1. Provide for more focused and comprehensive water quality monitoring and assessment.
2. Assist in the calculation of pollutant limits for permitted dischargers.
3. Develop watershed water quality management strategies that integrate controls for regulated and non-regulated sources of pollution.
4. Increase public awareness of water quality issues and provide opportunities for public involvement.

There are 55 USGS eight-digit hydrologic units (HUC) in the state that have been divided into five monitoring groups for assessment purposes. One group, consisting of between 9 and 16 watersheds, is monitored and another is assessed each year**.** This allows intense monitoring of a limited number of watersheds each year with all watersheds monitored every five years. The watershed cycle provides for a logical progression from data collection and assessments through TMDL development and permit issuance. The watershed cycle coincides with the development of permits that are issued to industries, municipalities, mining and commercial entities.

The key activities involved in each five-year cycle are:

1. **Planning.** Existing data and reports from appropriate federal, state, and local agencies and citizen-based organizations are compiled and used to describe the quality of rivers and streams, and to determine monitoring priorities

2. **Monitoring.** Field data is collected by DWR staff for streams previously prioritized. These results supplement existing data and are used for water quality assessment.

3. **Assessment**. Monitoring data is used to determine if the streams support their designated uses based on stream classifications and water quality criteria. The assessment is used to develop Tennessee's List of Impaired Waters and report water quality to EPA via ATTAINS.

4. **Wasteload Allocation/TMDL**. Monitoring data are used to determine pollutant limits for permitted dischargers releasing treated wastewater to the watershed. Limits are set to ensure that water quality is protective. TMDLs are studies that determine the point and nonpoint source contributions of a pollutant in the watershed and propose strategies to achieve water quality standards.

5. **Permits.** Issuance and expiration of all discharge permits is synchronized to the five-year watershed cycle. Approximately 1,100? individual permits are issued by Tennessee under the federal National Pollutant Discharge Elimination System (NPDES).

6. **Watershed Water Quality Management Plans.** These watershed plans include a general watershed description, water quality assessment summary results, inventory of point and nonpoint sources, water quality concerns, federal, state, and local initiatives, and management strategies. Completed plans can be accessed on TDEC's website at https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/watersheds-by-basin.html

One of the advantages of this approach is that it considers all sources of pollution including discharges from industries and municipalities as well as runoff from agriculture and urban areas. Another advantage is the coordination of local, state and federal agencies and the encouragement of public participation.

B. Monitoring Objectives

Tennessee has a wealth of water resources with over 60,000 miles of rivers and streams and more than 570,000 lake and reservoir acres. Monitoring data are used to not only assess streams, but also to inform permit decisions and to assist in the development of water quality criteria. Recent physical, chemical, or biological survey results are not the only form of data available to inform the assessment process. While recent stream sample data are the ideal, there are other valid information sources, such as GIS analysis of land use, recent aerial photographs, models, self-monitoring reports, compliance inspection results, and overflow reports. Stream assessment decisions are based on multiple sources of evidence and the agency must weigh all available information to arrive at a conclusion.

TDEC's watershed approach serves as an organizational framework for systematic assessment of the state's water quality. By viewing the entire drainage area or watershed as a whole, the department is better able to schedule water quality monitoring, assessment, permitting activities, and stream restoration efforts. This unified approach affords a more in-depth study of each watershed and encourages coordination of public and governmental organizations. The watersheds are assessed on a five-year cycle that coincides with permit issuance.
The purpose of the division's water quality monitoring program is to provide a measure of Tennessee's progress towards meeting the goals established in the federal Clean Water Act and the Tennessee Water Quality Control Act. To accomplish this task, data are collected and interpreted in order to:

1. Assess the condition of the state's waters, both geographically and temporally.

2. Identify specific problem areas where parameter values violate Tennessee numerical or narrative water quality standards.

3. Identify potential causes and significant sources of water quality problems.

4. Document areas with potential human health threats from fish tissue contamination or elevated bacteria levels. Identify those areas where the public may need to be warned to avoid water contact or fish consumption.

5. Establish trends in water quality.

6. Gauge water quality conditions downstream of point source dischargers as an additional compliance check.

7. Document baseline conditions prior to a potential impact or as a reference stream for downstream or other sites within the same ecoregion and/or watershed.

8. Provide data for TMDL studies.

9. Assess water quality improvements based on site remediation, enforcement, Best Management Practices, TMDL implementation and other restoration strategies.

10. Identify proper stream-use classification, plus assist in the implementation of the Antidegradation Statement.

11. Identify natural reference conditions on an ecoregion basis for refinement of water quality standards.

12. Identify and protect wetlands.

C. Monitoring Design

The division incorporates several approaches in its surface water monitoring design. The primary monitoring design is a five-year rotational cycle (Figure 1) based on USGS eight-digit Hydrologic Unit Code (HUC) sized watersheds. Also, Tennessee relies heavily on ecoregions to serve as a geographical framework for establishing regional water quality expectations (Arnwine et al, 2000).

Watersheds

The watershed approach serves as an organizational framework for systematic assessment of the state's water quality. By viewing the entire drainage area, the division is better able to address water quality conditions through an organized schedule. This unified approach affords a more in-depth study of each watershed and encourages coordination of public and governmental organizations.

The watershed approach is a five-year cycle that has the following goals:

1. Commits to monitoring strategies that result in an accurate assessment of water quality.

2. Partners with other agencies to obtain the most current water quality and quantity data.

3. Assesses water quality based on most recent data and water quality standards.

4. Establishes TMDLs by integrating point and non-point source pollution.

5. Synchronizes discharge permit issuance to coincide with the development of TMDLs.

In attaining the watershed goals mentioned above, five major objectives are to be met:

1. Transparency in assessments and TMDLs.
2. Attain good representation of all local interests at public meetings and continue a dialogue with local interest throughout the five-year cycle.
3. Develop implementation plans for impaired waters.
4. Monitor water quality intensively within each watershed at the appropriate time in the five-year watershed cycle.
5. Establish TMDLs based on best available monitoring data and sound science.

The 55 USGS eight-digit HUC codes found in Tennessee are addressed by groups on a five-year cycle that coincides with permit issuance. Each watershed group contains between 9 and 16 watersheds (Table 1).

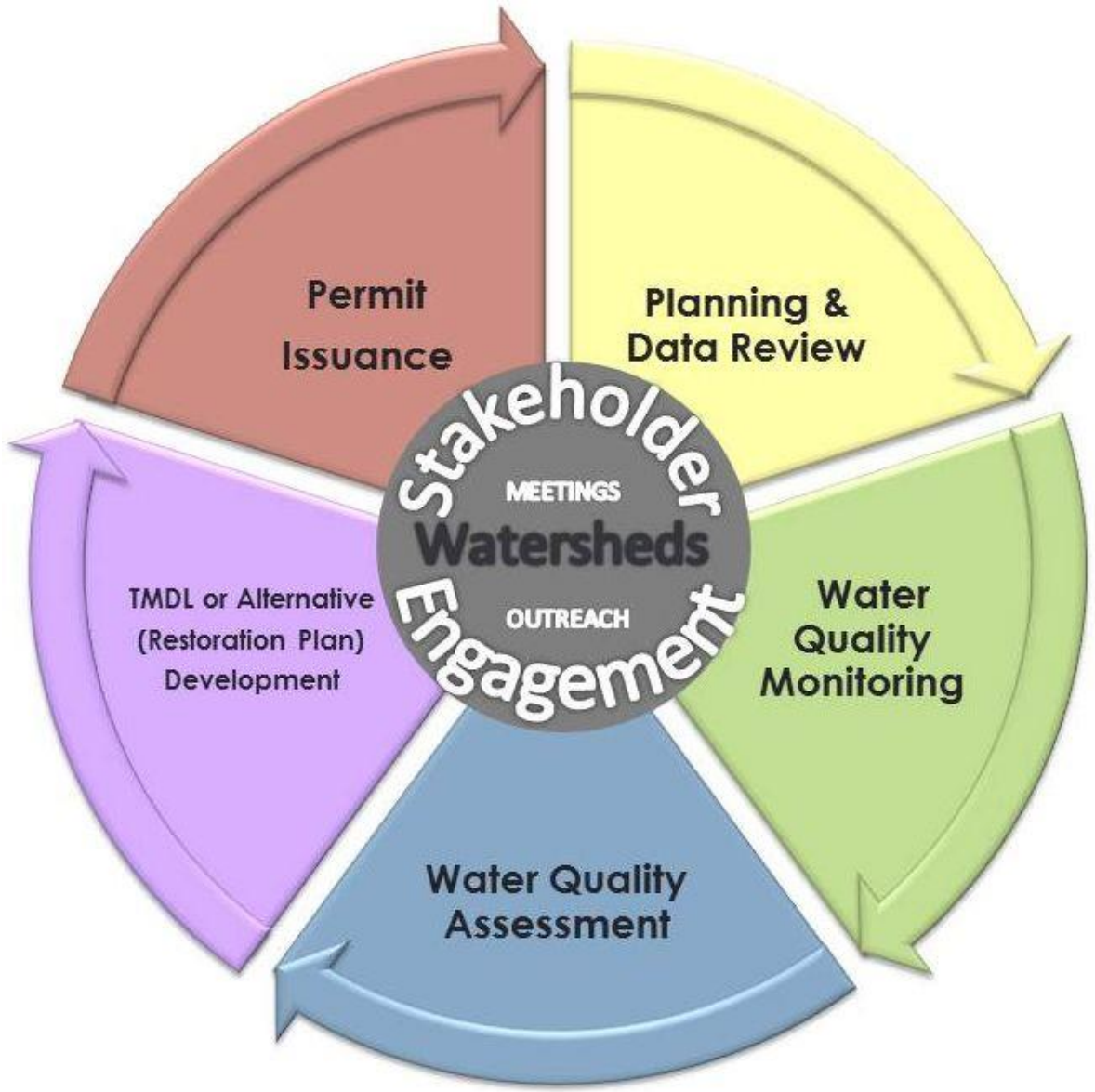


Figure 1: Graphic Representation of the Watershed Approach.

More details for the watershed approach may be found on the DWR home page https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/watershed-management-approach.html

The watershed groups and timeline are shown in Figure 2 and Table 1.

Monitoring activities are coordinated with Tennessee Valley Authority (TVA), Department of Energy (DOE), Tennessee Wildlife Resources Agency (TWRA), United States Geological Survey (USGS), National Park Service (NPS) and United States Army Corps of Engineers (USACE) to avoid duplication of effort and increase watershed coverage.

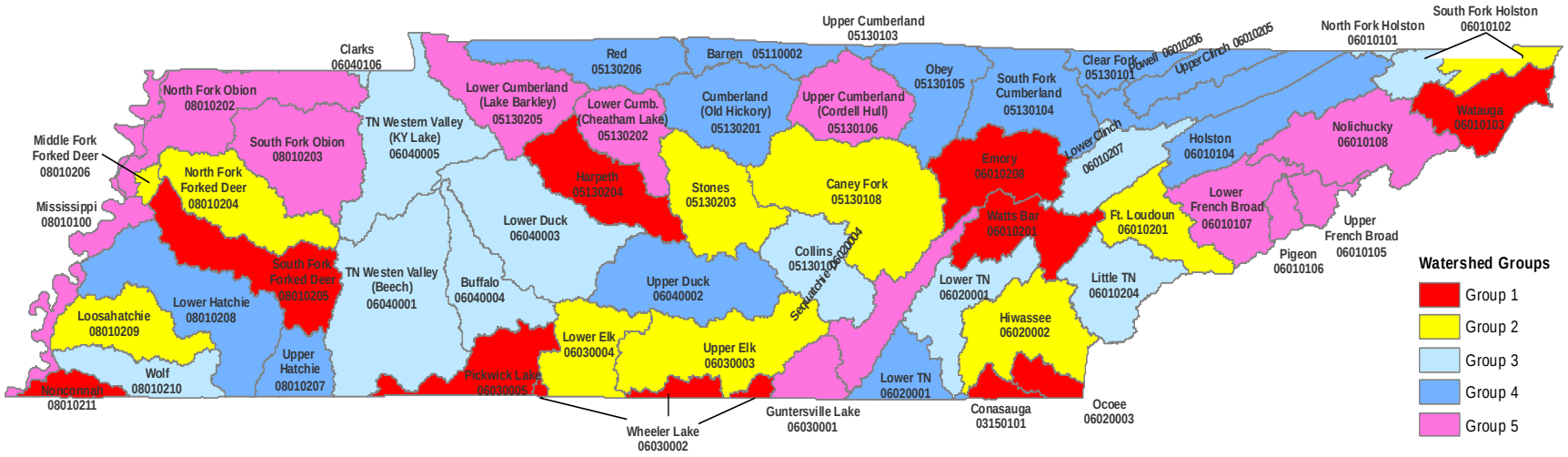


Figure 2: Tennessee Watershed Groups

Table 1. Watershed Groups and Monitoring Years (Monitoring year starts July 1 and ends July 30 the following year.)

Group/ Year	Watershed	HUC	EFO	Watershed	HUC	EFO
1 2021-22 2026-27 2031-32 2036-37 2041-42	Conasauga	03150101	CH	Ocoee	06020003	CH
	Harpeth	05130204	N	Pickwick Lake	06030005	CL, J
	Watauga	06010103	JC	Wheeler Lake	06030002	CL
	Upper TN (Watts Bar)	06010201	K, CH, CK	South Fork of the Forked Deer	08010205	J
	Emory	06010208	K, CK	Nonconnah	08010211	M
2 2022-23 2027-28 2032-33 2037-38 2042-43	Caney Fork	05130108	CK, CH, N	Upper Elk	06030003	CL
	Stones	05130203	N	Lower Elk	06030004	CL
	S. Fork Holston (u/s Boone Dam)	06010102	JC	North Fork Forked Deer	08010204	J
	Upper TN (Fort Loudoun)	06010201	K	Forked Deer	08010206	J
	Hiwassee	06020002	CH	Loosahatchie	08010209	M
3 2023-24 2028-29 2033-34 2038-39 2043-44	Collins	05130107	CK, CH, CL	TN Western Valley (Beech)	06040001	J
	N. Fork Holston	06010101	JC	Lower Duck	06040003	CL
	S. Fork Holston (d/s Boone Dam)	06010102	JC	Buffalo	06040004	CL, N
	Little Tennessee (Tellico)	06010204	K	TN Western Valley (KY Lake)	06040005	N, J
	Lower Clinch	06010207	K	Wolf	08010210	M
	Tennessee (Chickamauga)	06020001	CH	Clarks	06040006	J

Group/ Year	Watershed	HUC	EFO	Watershed	HUC	EFO
4 2024-25 2029-30 2034-35 2039-40 2044-45	Barren	05110002	N	Holston	06010104	JC, K
	Clear Fork of the Cumberland	05130101	K, MS	Upper Clinch	06010205	JC, K
	Upper Cumberland	05130103	CK	Powell	06010206	JC, K
	South Fork Cumberland	05130104	K	Tennessee (Nickajack)	06020001	CH
	Obey	05130105	CK	Upper Duck	06040002	CL
	Cumberland (Old Hickory Lake)	05130201	N	Upper Hatchie	08010207	J, M
	Red	05130206	N	Lower Hatchie	08010208	J, M
5 2020-21 2025-26 2030-31 2035-36 2040-41	Lower Cumberland (Cheatham)	05130202	N	Nolichucky	06010108	JC, K
	Lower Cumberland (Lake Barkley)	05130205	N	Sequatchie	06020004	CH
	Upper Cumberland (Cordell Hull)	05130106	CK, N	Guntersville	06030001	CH, CL
	Upper French Broad	06010105	K	Mississippi	08010100	M, J
	Pigeon	06010106	K	Obion	08010202	J
	Lower French Broad	06010107	K	Obion South Fork	08010203	J

Key to EFOs:

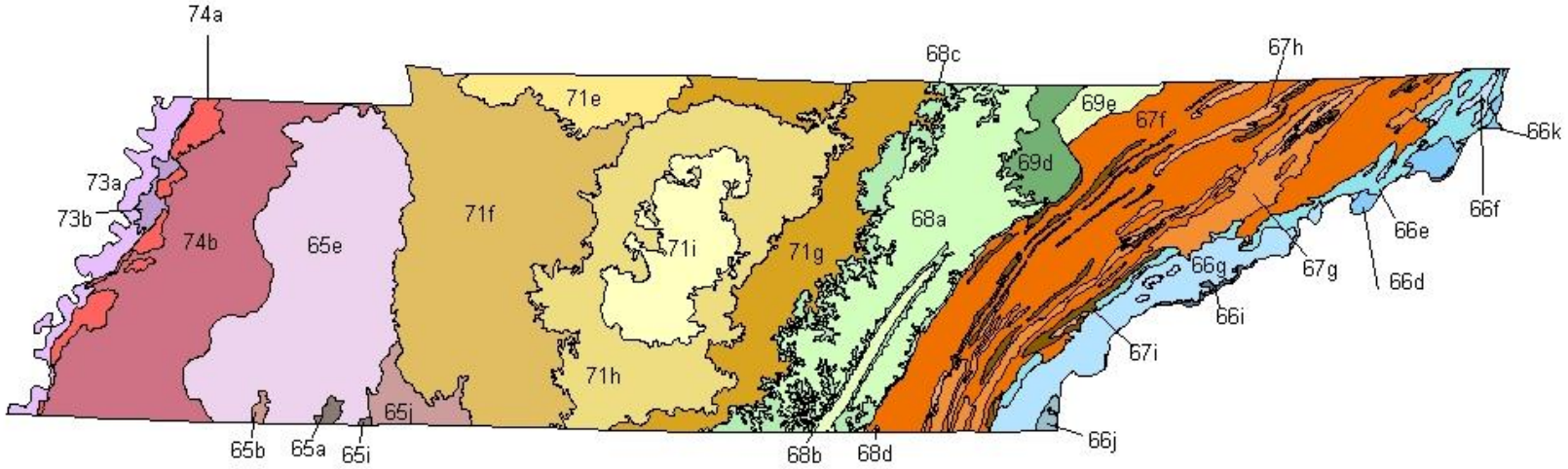
CH	Chattanooga	J	Jackson	M	Memphis
CK	Cookeville	JC	Johnson City	N	Nashville
CL	Columbia	K	Knoxville		

Ecoregions

Tennessee relies heavily on ecoregions to serve as a geographical framework for establishing regional water quality expectations (Arnwine et al, 2000). Tennessee has 31 Level IV ecoregions (Figure 3).

Since 1999, sites have been monitored as part of the five-year watershed cycle. New reference sites are added as they are located during watershed monitoring, while some of those originally selected sites have been dropped due to increased disturbances or unsuitability. Diatoms are also collected as a second biological indicator. In 2009, headwater streams were added to the reference monitoring program. There are approximately 130 active reference sites. This reference database has been used to establish regional guidelines for wadeable streams.

Six additional subregions have been delineated out of the original 25 in ecoregions 66, 68, 69 and 73 resulting in 31 Level IV ecoregions in Tennessee. In addition, the names of four subregions have been revised (65e, 66d, 69d and 73a). Except for 69e, the new subregions are very small, or the streams originate in a different subregion. Therefore, it may not be necessary or even possible to find reference streams. Until such time as reference sites can be established these subregions will be treated as part of their original subregion and/or bioregion for assessment purposes.



65a Blackland Prairie	66k Amphibolite Mountains	69e Cumberland Mountain Thrust Block
65b Flatwoods/Alluvial Prairie Margins	67f Southern Limestone/Dolomite Valleys and Low Rolling Hills	71e Western Pennyroyal Karst
65e Northern Hilly Gulf Coastal Plain	67g Southern Shale Valleys	71f Western Highland Rim
65i Fall Line Hills	67h Southern Sandstone Ridges	71g Eastern Highland Rim
65j Transition Hills	67i Southern Dissected Ridges & Knobs	71h Outer Nashville Basin
66d Southern Crystaline Ridges and Mountains	68a Cumberland Plateau	71i Inner Nashville Basin
66e Southern Sedimentary Ridges	68b Sequatchie Valley	73a Northern Holocene Meander Belts
66f Limestone Valleys and Coves	68c Plateau Escarpment	73b Northern Pleistocene Valley Trains
66g Southern Metasedimentary Mountains	68d Southern Table Plateaus	74a Bluff Hills
66i High Mountains	69d Dissected Appalachian Plateau	74b Loess Plains
66j Broad Basins		

Figure 3: Level IV Ecoregions in Tennessee

D. Monitoring Priorities

The division maintains a statewide monitoring system consisting of approximately 8,060 stations (Figure 4) sampled on a rotating basis. In addition, new stations are created every year to increase the number of assessed streams. Stations are sampled monthly, quarterly, semi-annually, or annually depending on the objectives of the project. Within each watershed cycle, the locations of monitoring stations are coordinated between the central office and staff in the eight Environmental Field Offices (EFOs) and the Mining Unit located across the state, based on the following priorities (Figure 5).

1. **Antidegradation Monitoring:** Before the division can authorize new or increased degradation in Tennessee waterbodies (some exceptions exist), the appropriate categories under the Antidegradation Policy must be determined. These categories are (1) Available Parameters or (2) Unavailable Parameters, (3) Exceptional Tennessee Waters, and (4) Outstanding National Resource Waters (ONRWs). ONRWs can only be established by promulgation by the Tennessee Board of Water Quality, Oil and Gas. Categories 1 and 2 are on a "parameter by parameter" basis considering the existing water quality of the stream. Exceptional Tennessee Waters (ETWs) must be identified by division staff based on seven identifying characteristics established in Rule 0400-40-03-.06(4). Waterbodies can be in more than one category at a time, due to the parameter-specific nature of categories 1 and 2 above.

   Streams are evaluated as needed in response to requests for new or expanded National Pollutant Discharge Elimination System (NPDES) and Aquatic Resource Alteration Permit (ARAP) individual permits, including ARAP water withdrawal applications. When the waterbody requiring an antidegradation determination does not have recent water quality data from the last five years, surveys must be done by field office staff, unless the applicant is willing to provide the needed information in a timely manner. In some circumstances, older data may be used if the field staff believes they are still valid. Because the identification of antidegradation status must be determined prior to permit issuance, this work is done on the highest priority basis.

   Streams are evaluated for antidegradation status based on a standardized ETW and Waterbody Use Support evaluation process, which includes information on specialized recreation uses, scenic values, ecological consideration, biological integrity and attainment of water quality criteria. Since permit requests generally cannot be anticipated, these evaluations are generally not included in the workplan. The number of antidegradation evaluations conducted by the state is steadily increasing as the process becomes more refined and standardized.

2. **Posted Streams**: When the department issues advisories due to elevated public health risks from excessive pathogen or contaminant levels in fish, it accepts a responsibility to monitor changes in those streams. In the case of fishing advisories, in conjunction with the monitoring cycle, field office staff should determine when tissue samples were last collected. If appropriate, the state lab is contracted to sample in the upcoming watershed year, unless another agency like TWRA or TVA are willing to do the collections. During review of field office monitoring plans for the upcoming watershed year, central office may also discuss needed tissue sampling with the field office.

   For pathogen advisories, in conjunction with the monitoring cycle, monthly *E. coli* samples, plus at least one geo mean sample (5 samples in 30 days) must be collected and analyzed. If another entity (such as an MS4 program) has already planned to collect samples, that effort can substitute for division sampling, if staff have confidence that the other entity can meet data quality objectives. However, field office staff must confirm that this sampling is taking place, remembering that the ultimate responsibility to ensure that sampling is done remains with the division.

   Field office and central office staff review fish tissue and pathogen results and jointly decide if it appears that an advisory could be proposed for lifting or new advisories issued. Additionally, field office staff have the primary responsibility to ensure that existing signs on posted waterbodies are inspected periodically (annually is preferred) and replaced if damaged or removed.

3. **Ecoregion Reference Streams, Ambient Monitoring Stations, and Southeastern Monitoring Network Trend Stations (SEMN):** Established ecoregion or headwater reference stations are monitored according to the watershed approach schedule. Each station is sampled quarterly for chemical quality and pathogens as well as in spring and fall for macroinvertebrates and habitat. Periphyton is sampled once during the growing season (April – October). Both semi-quantitative single habitat and biorecon benthic samples are collected to provide data for both biocriteria and biorecon guidelines. If watershed screening efforts indicate a potential new reference site, more intensive reference stream monitoring protocols are used to determine potential inclusion in the reference database.

   Ambient Monitoring Sites are the division's longest existing trend stations and any disruption in sampling over time reduces our ability to make comparisons. Regardless of monitoring cycle, all ambient stations must be sampled quarterly according to the set list of parameters established for this sampling effort.

Southeastern Monitoring Network Stations (SEMN): Like ambient stations, SEMN stations within each field office area must be sampled every year according to the project plan and grant for this project, regardless of watershed cycle.

Impaired segments: Water quality limited streams are those that have one or more properties that violate water quality standards. They are considered impaired by pollutants and not fully meeting designated uses. (Streams where water quality is exactly at criteria levels also have "unavailable parameters" and would be considered water quality limited, but as they are not impaired, are not appropriate for 303(d) listing.)

Like posted streams, by identifying these streams as not meeting water quality standards, the division accepts responsibility to develop control strategies and to continue monitoring in order to track progress towards restoration.

Impaired waters are monitored, at a minimum, every five years coinciding with the watershed cycle. Waters that do not support fish and aquatic life are sampled once for macroinvertebrates (semi-quantitative sample preferred) and monthly for many of the listed pollutant(s). Streams with impacted recreational uses, such as those impaired due to pathogens are sampled monthly for *E. coli*. Another acceptable sampling strategy for *E. coli* is an approach in which an initial geometric mean is collected (5 samples within a 30-day period) in the first quarter. If the geomean is well over the existing water quality criterion of 126 colony forming units, the waterbody remains impaired with no additional *E. coli* sampling needed. If the geomean results meet the water quality criterion, staff will continue with monthly samples during the remainder of the monitoring cycle. If the geomean is not substantially over the criterion, field staff may at their discretion continue monthly monitoring in the hope that additional samples will indicate that the criterion is met.

For parameters other than pathogens, resource limitations or data results may sometimes justify fewer sample collections. For example, there are cases where pollutants are at high enough levels that sampling frequency may be reduced while still providing a statistically sound basis for assessments. In other unavoidable circumstances, such as dry streams, samples cannot be collected during a monitoring cycle.

In some circumstances, waters may be considered not supporting based on factors other than recent data (CALM, 2021). When developing the draft monitoring workplan, waterbodies that are proposed as candidates to be evaluated rather than monitored because they fall under this category are specifically identified. A brief rationale for not monitoring these waterbodies is provided (e.g. hard armoring, upstream impoundment) that includes an explanation of why staff feel that conditions have not changed.

- Consistent with existing guidance, streams impacted due to flow or habitat alteration due to upstream impoundments, channelization, culverting, or hard armoring do not require new data be collected each cycle if the condition is still present. (A habitat assessment might be recommended in some situations.)

- Unassessed streams that are channelized or concrete lined can be presumed to be habitat impaired, especially if they are tributaries to habitat-impaired streams with recent data.

- Streams that scored either 20 or less on a SQSH, or a 5 or less on a biorecon in the previous assessment cycle provided that it is the consensus judgement of assessment staff that the (1) conditions in these streams have not changed and (2) that it is not possible the previous low scores were due to natural conditions such as prolonged dryness, or beaver activity. Stream assessed under this category can miss having data collected for one assessment cycle, but not for two.

When developing workplans prior to the next monitoring cycle, field office staff coordinate with the Division of Remediation (DoR) to confirm that any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites currently on Tennessee's List of Impaired Waters are being monitored by either DoR or the permittee. These water quality data are reviewed to determine if the site continues to cause or contribute to violations of water quality standards. If data are not available, sampling should be designed to document water quality and provide a rationale for delisting if improvement is observed.

4. **Sampling downstream of Major Dischargers and CAFO's:** During each monitoring cycle, the major dischargers are identified in targeted watersheds. Stations are established at those waterbodies, if the facility does not currently have in-stream monitoring requirements built into their permit. The pollutant of concern and the effect it would have on the receiving stream may determine the location of the station. (Note: stations may not be required for dischargers into very large waterways such as the Mississippi River or large reservoirs.) Frequent collection (monthly recommended) of parameters should include those being discharged, plus a semi-quantitative single habitat (SQSH) survey if the stream is wadeable. Stations downstream of STPs or industries that discharge nutrients should include a SQSH, plus monthly nutrient monitoring.

   Stations should also be established downstream of CAFOs with individual permits or others in which water quality based public complaints have been received. The emphasis should be on monitoring biointegrity (SQSH survey if the stream is wadeable or in a region in which SQBANK surveys can be done) and monthly nutrient and pathogen sampling.

5. **TMDL:** Effectiveness monitoring for completed TMDLs in the watershed group is coordinated between the Watershed Planning Unit (WPU) manager and the EFOs to meet objectives for each TMDL. The frequency and parameters monitored for TMDL monitoring depends on the specific TMDL. Detailed information about TMDLs can be found in the department's 106 Monitoring QAPP, (TDEC, 2022), and in the document *Monitoring to Support TMDL Development* (2001).

6. **Special Project Monitoring**: Occasionally, the division is given the opportunity to compete for special EPA grant resources for monitoring and other water quality research projects. If awarded, activities related to these grants become a high priority because the division is under contract to achieve the milestone set out in the workplan.

   Normally, monitoring activities related to these projects are contracted out to the state lab. However, if problems arise, field offices might be called upon if the lab is unable to fulfill the commitment. Examples of historical special studies include: sediment oxygen demand surveys, nutrient studies, ecoregion delineation, coalfield studies, air deposition surveys, reference stream monitoring, and various probabilistic monitoring designs.

7. **Watershed Monitoring**: In addition to the previous priorities, each EFO should monitor additional stations to confirm continued support of designated uses and to increase the number of assessed waterbodies. Macroinvertebrate biorecons, habitat assessments, and field measurements of DO, specific conductance, pH and temperature are conducted at the majority of these sites. These priorities include:

   - Previously assessed segments, particularly large ones, that would likely revert to Category 3 unassessed status. (Note that a single site per assessed segment is generally adequate if assessment was supporting and no changes are evident).

   - Sites below ARAP activities or extensive nonpoint source impacts in wadeable streams where biological impairment is suspected. Examples might be unpermitted activities, violations of permit conditions, failure to install or maintain BMPs, large-scale development, clusters of stormwater permits, or a dramatic increase in impervious surfaces.

   - Unassessed reaches especially in third order or larger streams or in disturbed headwaters.

8. In addition to monitoring conducted by EFO staff in conjunction with the watershed cycle, other types of monitoring include:

a. **Fish Consumption Advisory**: Fish tissue monitoring for fishing advisories is planned by a workgroup consisting of staff from DWR-TDEC, TVA, ORNL and TWRA. The workgroup historically met annually to coordinate a monitoring strategy. Fish tissue sampling for TDEC is contracted to the state laboratory.

b. **NPDES Monitoring**: Tennessee is requiring some permitted dischargers to conduct upstream and downstream biological and habitat monitoring consistent with the division's macroinvertebrate QSSOP (TDEC, 2021). These data are submitted to the state for evaluation. In this way, Tennessee can supplement its monitoring program and permitted dischargers can take the lead in providing information about their receiving stream.

c. Reservoir Monitoring: Tennessee is dependent on TVA and USACE for the majority of these data. Timeline for monitoring is dependent on availability of these agencies or federal funding if they are not available.

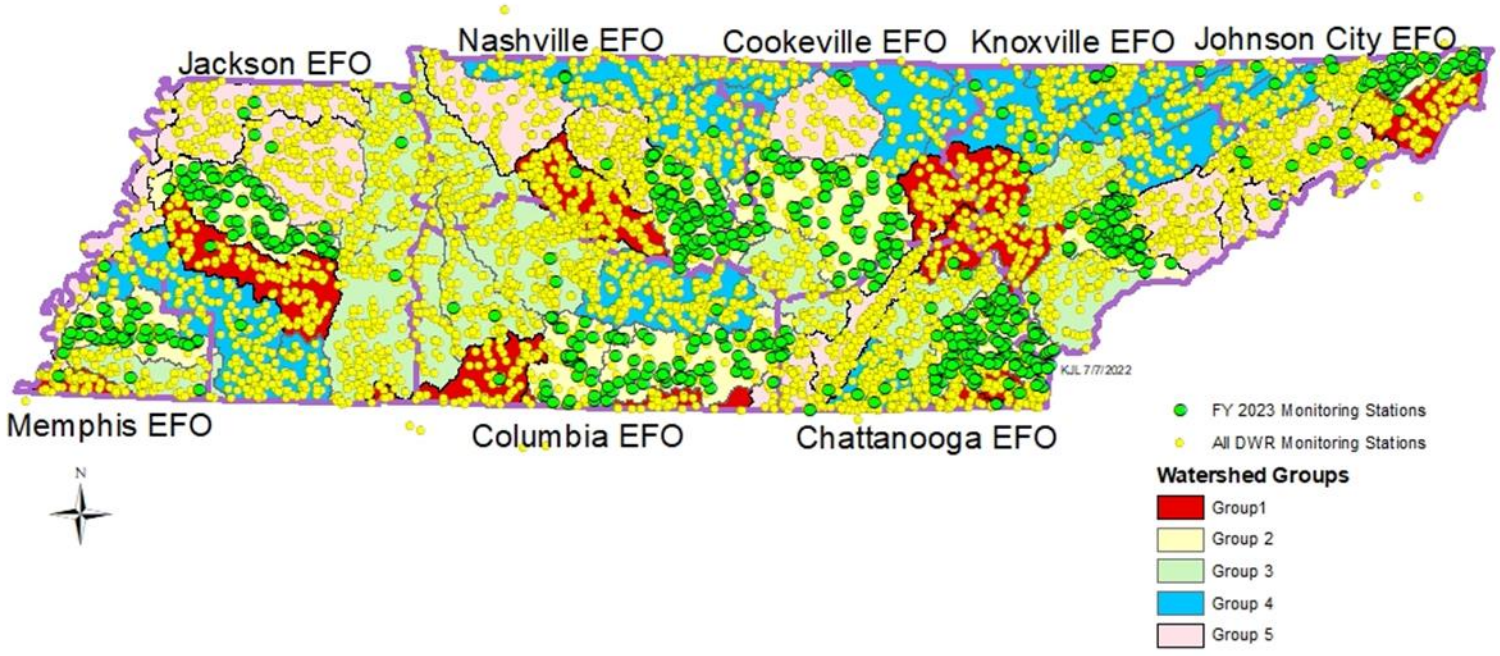


Figure 4: Water Quality Monitoring Stations in Tennessee. (Includes biological, chemical and bacteriological stations.)

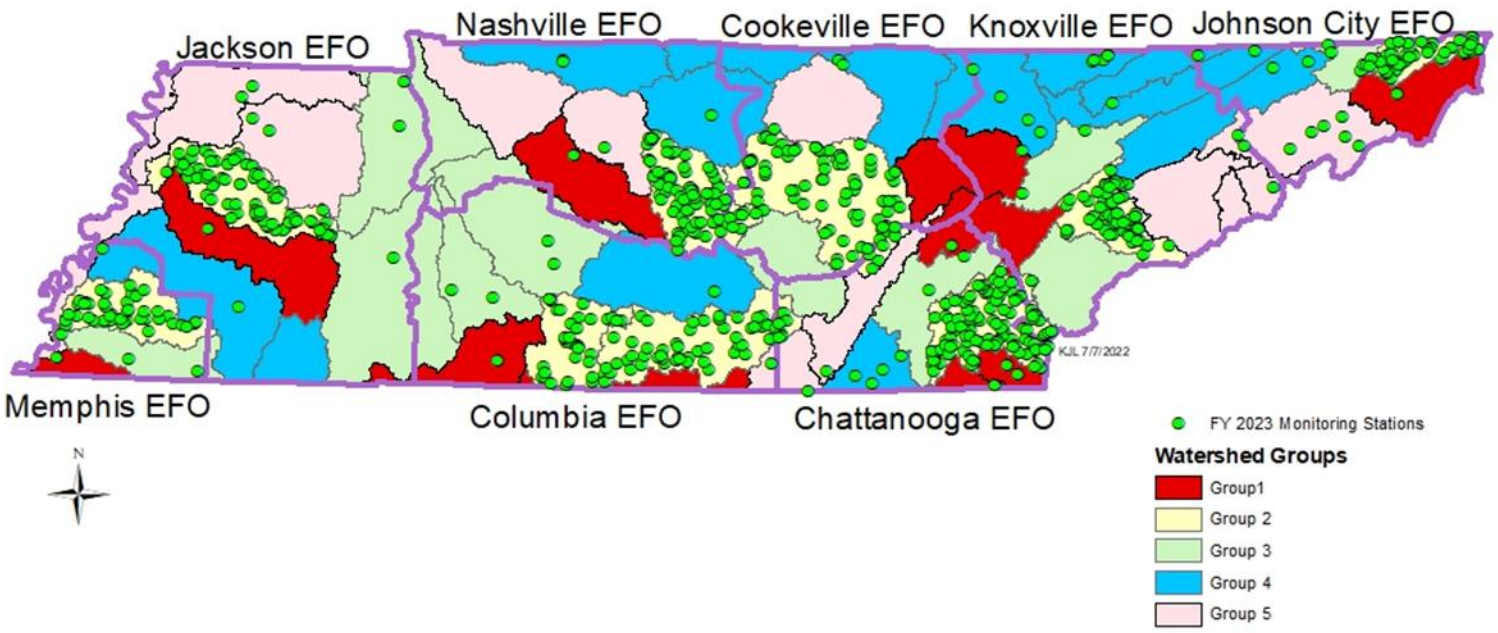


Figure 5: Monitoring Stations Scheduled to be Sampled Between July 2022and June 2023 (FY23)
(Includes biological, chemical and bacteriological stations.)

Large Reservoirs (> 1000 acres)

Tennessee has 29 large reservoirs ranging from the 1,749 acres Chilhowee Reservoir on the Little Tennessee River to the 99,500 acres Kentucky Lake on the Tennessee River. Twenty-seven of these reservoirs are managed by the Tennessee Valley Authority (TVA) (Table 2) or the U.S. Army Corps of Engineers (USACE) (Table 3). All but four are routinely monitored. Seven are shared with other states. These shared lakes include Kentucky Lake, Lake Barkley and Dale Hollow (Kentucky), South Holston Lake (Virginia), Guntersville Lake (Alabama), Pickwick Lake (Alabama and Mississippi), and Calderwood Lake (North Carolina). Expertise and data are available from TVA, USACE and Alcoa Power Generating Incorporated (APGI).

Table 2: Reservoirs sampled by TVA

Beech	Melton Hill
Blue Ridge	Nickajack
Boone	Normandy
Cherokee	Norris
Chickamauga	Parksville
Douglas	Pickwick
Ft. Loudoun	South Holston
Ft. Patrick Henry	Tellico
Great Falls	Tims Ford
Guntersville	Watauga
Hiwassee	Watts Bar
Kentucky	Wheeler

Table 3: Reservoirs sampled by USACE

Dale Hollow	Old Hickory
Center Hill	Cheatham
J. Percy Priest	Barkley
Cordell Hull	

TVA samples reservoirs in three areas: the inflow area, which is generally riverine in nature, the transition zone or mid-reservoir, and the forebay. Due to meteorological conditions and year-to-year variation, TVA samples the reservoirs for five consecutive years. After that initial consecutive five years of sample collection, sampling occurs every other year (Table 4).

Table 4: TVA Sample Schedule

Ecological indicators	**Sampling Frequency**
benthic macroinvertebrates	Late autumn/early winter
chlorophyll	Monthly
dissolved oxygen	Monthly
fish assemblage	Autumn
sediment	Once in mid-summer

Medium Reservoirs (251- 1000 acres)

Tennessee has 16 reservoirs falling in this category. Six are fishing or recreational lakes managed by the TWRA. Eight reservoirs are managed by TVA, with 3 of these routinely monitored by TVA's Vital Signs Monitoring Program. One reservoir is monitored by Alcoa Aluminum for power production and one is municipal water supply reservoir.

Small Reservoirs (< 250 acres)

Tennessee has approximately 1,500 documented reservoirs smaller than 250 acres (a total that only includes reservoirs that are permitted under the Safe Dams or ARAP programs). There are probably many more. These include one TVA managed reservoir (Wilbur Lake), municipal lakes, state parks, city parks, resorts, community developments, agricultural ponds and private lakes. There is little historic data on many of these impoundments. Although they are small, they are often in headwater areas and have the potential to affect downstream reaches. In 2006, downstream reaches of 75 of these small impoundments were monitored as part of a probabilistic study funded by 104(b)3 (Arnwine, et.al. 2006).

E. Critical and Secondary Water Quality Indicators

a. Biological Water Quality Indicators Critical Biological

The state relies heavily on macroinvertebrate monitoring for assessing fish and aquatic life use support. Two types of biological monitoring represent the critical biological indicators in Tennessee.

Semi-quantitative Single Habitat macroinvertebrate samples (SQSH) are used for stream antidegradation category evaluations, TMDLs, permit compliance and enforcement, nutrient impaired streams as well as reference stream monitoring to refine biocriteria guidelines. In recent years this type of sampling has increased for routine watershed surveys. Regional biointegrity goals based on a multi-metric index composed of seven biometrics have been calculated and provide guidelines for each bioregion (TDEC,2021).

For most bioregions, the seven semi-quantitative single habitat (SQSH) indices are:

1. Taxa Richness
2. EPT Richness (Ephemeroptera, Plecoptera, Trichoptera)
3. EPT Density – *Cheumatopsyche* spp.
4. North Carolina Biotic Index (NCBI)
5. Density of Oligochaetes and Chironomids
6. Density of Clingers – *Cheumatopsyche* spp.
7. Density of Tennessee nutrient tolerant organisms

In bioregion 73, the seven semi-quantitative single habitat (SQSH) indices are:

1. Taxa Richness
2. ETO Richness (Ephemeroptera, Trichoptera, Odonata)
3. EPT Density – *Cheumatopsyche* spp.
4. North Carolina Biotic Index (NCBI)
5. Density of Oligochaetes and Chironomids
6. Density of CRMOL (Crustacea and Mollusca)
7. Density of Tennessee nutrient tolerant organisms

Macroinvertebrate biorecons are a screening tool used for many routine watershed assessments. Biorecons have been performed at reference streams to refine biorecon guidelines. At test streams, a multi-metric index comprised of three qualitative biometrics is calculated and compared to reference guidelines for the bioregion.

For most biorecons, the three biorecon biometrics are:

1. Taxa Richness
2. EPT Richness (Ephemeroptera, Plecoptera, Trichoptera)
3. Intolerant Taxa Richness

In bioregion 73, the three biorecon metrics are:

1. Taxa Richness
2. ETO Richness (Ephemeroptera, Trichoptera, Odonata)
3. CRMOL Richness (Crustacea and Mollusca)

b. Secondary Biological

- Fish IBI
- Diatoms (have been added to the monitoring at reference site and many sites where nutrient samples are collected and may become critical in nutrient impaired streams once guidelines are developed). Tennessee is currently collaborating with other Region 4 states, EPA and Tetra Tech to develop a South East diatom index through an EPA N-Steps grant. An index, including 8 metrics is in final review by workgroup.
- Chlorophyll *a*

2. **Habitat/Physical**

a. Critical

Habitat assessments adapted from protocols by Barbour et al. (1999) are conducted in conjunction with all biological monitoring and some chemical monitoring. The division has found these especially useful in assessing impairment due to riparian loss, erosion and sedimentation. The division's macroinvertebrate QSSOP (TDEC, 2021) defines regional

expectations based on reference streams for each of the parameters addressed in the assessment.

1. Epifaunal Substrate/Available Cover
2. Embeddedness of Riffles
3. Channel Substrate Characterization
4. Velocity Depth Regimes
5. Pool Variability
6. Sediment Deposition
7. Channel Flow Status
8. Channel Alteration
9. Frequency Re-oxygenation Zones
10. Channel Sinuosity
11. Bank Stability
12. Bank Vegetative Protection
13. Riparian Vegetative Zone Width

b. Secondary Physical/Habitat

- Canopy Cover
- Stream Profile
- Particle Count
- Flow

3. **Critical and Secondary Chemical/Toxicological**

The type of chemical sampling depends on the monitoring needs. Minimally, the following are collected:

- Routine Watershed Screenings: Critical: dissolved oxygen, pH, temperature, specific conductance. Parameters are found in Table 11.
- Tennessee's List of Impaired Waters: Including, but not limited to the parameters the segment is listed for.
- Fish Consumption: Metals and/or priority organics. Metals may be limited to mercury only.
- Contact Advisory: Critical: *E. coli*, Non-critical: fecal coliform.
- Permit Compliance/Enforcement: Parameters limited in permit.
- Reference Streams: Ecoregion and FECO site parameters are found in Table 11.
- TMDL Monitoring is dependent on the type of TMDL needed.

F. Quality Management and Assurance Plans

The most recent version of TDEC's Quality Management Plan was approved by EPA in September 2020. This plan is a part of TDEC's agreement to develop and implement Standard Operating Procedures, Quality Assurance Project Plans, Data Quality Objectives, etc. EPA requires states that receive federal grant dollars to have a "Bureau Wide" Quality Management

Plan under its grant conditions. Further, EPA occasionally reviews individual Division quality management documents when it conducts semi-annual and annual reviews.

TDEC DWR has developed three Quality System Standard Operating Procedures (QSSOP) for use as guidance for collecting water pollution control data and appropriate quality control in the state. The *QSSOP for Macroinvertebrate Stream Survey* (TDEC, 2021) was first published in March of 2002 and was revised in October 2006, June 2011, August 2017 and December 2021. It is currently being revised to reflect changes in taxonomy and metric calibration. The *QSSOP for Chemical and Bacteriological Sampling of Surface Waters* was first published in March of 2004 and revised in 2009, June 2011 (TDEC, 2011), July 2018 (TDEC, 2018) and January 2022 (TDEC, 2022). The *QSSOP for Periphyton Stream Surveys* was completed in 2010 (TDEC, 2010) and is currently under revision. Each year the *Quality Assurance Project Plan* to EPA (TDEC, 2021) is reviewed and sent to EPA if major revisions are incorporated. This document describes monitoring, analyses, quality control, and assessment procedures used by the division to develop TMDLs, 305(b) and 303(d) assessments.

All documents are reviewed annually and revised as needed. A copy of any document revisions made during the year is sent to all appropriate stakeholders and posted on the website. A report is made to the Deputy Commissioner and Quality Assurance Manager of any changes that occur.

Division staff are trained on field techniques outlined in the documents during the division's annual meeting and during biological workshops. Biological, some routine inorganic nutrient and metal samples are analyzed by the TDH Environmental Laboratories. Organic chemical, some routine inorganic samples, some macroinvertebrate samples and most bacteriological and periphyton samples are analyzed by contract labs. The biological laboratory follows the TDEC QSSOP for macroinvertebrate (TDEC, 2021) and for periphyton (TDEC, 2010) sample analysis. The state and contract chemistry and bacteriological laboratories have standard operating procedures which follow approved EPA methodologies. That chemical laboratories performing chemical analysis must maintain NELAC or ISO/IEC 17025 for surface waters and have drinking water certification or the equivalent for *E. coli* analysis. Contract biological laboratories must meet TDEC QC and testing requirements and have 10% of sample processing and taxonomy QC'd by the state laboratory. EPA audits the state laboratories on a regular schedule.

Quality Assurance Guidelines for Macroinvertebrate Surveys as specified in the 2021 QSSOP:

1. 10% of habitat assessments and biological samples are repeated by a second investigator.
2. Chain of custody is maintained on all biological samples.
3. A bound log or digital sample log with backup is maintained for biological samples.
4. 10% of all biological samples are re-sorted and re-identified by a second taxonomist.
5. Reference collections are maintained at the central laboratory for each taxon found in Tennessee. New specimens are verified by outside experts.
6. Data are electronically uploaded and analyzed. Electronic QC checks are employed with questionable data and/or outliers verified with laboratory or sampling staff. Staff are trained and updated on new techniques as a group during the division's annual meeting or biologists training workshop.

8. Taxonomic staff must pass taxonomic identification tests.

Quality Assurance Guidelines for Periphyton Stream Surveys as specified in the 2010 QSSOP:

> The same quality assurance required for macroinvertebrate surveys is necessary for periphyton surveys, with the exception of the reference collections. A master collection of images of all taxa identified in the state is maintained at the central Laboratory. As with macroinvertebrates, new specimens are verified by outside experts. Taxonomic nomenclature is standardized with USGS biodata.

Quality Assurance for Chemical Field Collections as specified in the 2022 QSSOP:

1. Duplicates, field blanks, and equipment blanks, are collected at 10% of sites.
2. Trip blanks are collected at 10% of trips.
3. Temperature blanks are included in each sample cooler.
4. Water quality probes are calibrated weekly (DO is calibrated daily) and include daily post-calibrations.
5. Duplicate field measurements are recorded minimally at the first and last station each day.
6. Chain of custody is maintained on all samples.
7. Staff are trained and updated on new techniques as a group during the division's annual meeting or training workshops.

G. Data Management through Electronic Data Systems

Tennessee's water quality assessment decisions are stored in EPA's Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS). ATTAINS is being used for the fourth time this year and replaces the previous EPA system, the Assessment Database (ADB). ATTAINS is also the EPA water quality assessment reporting tool replacing the previous narrative 303(d) List and 305(b) Reports. ATTAINS also replaces EPA's old TMDL tracking system and provides alternative restoration plans relating them to individual assessment units. Assessments are geo-referenced and maps are provided to help users find streams within specific watersheds. Streams are color coded according to their water quality status in this web application https://tdeconline.tn.gov/dwr/ .

The public has access to assessment information through TDEC's online assessment database. The website links information in the assessment database to an interactive map using the Geographic Information System (GIS) *https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-data-map-viewers.html* The information is updated annually with completion of the watershed Group assessment. In addition, approved ATTAINs submissions can be viewed by the public on EPA's How's my Waterway https://mywaterway.epa.gov/.

In the early 1970s, EPA developed the national water quality STOrage and RETrieval database called STORET. This database allowed for easy access to bacteriological and chemical information collected throughout the state and nation. TDEC Water Pollution Control station locations and chemical and bacteriological data were uploaded into the database quarterly. In

September 2009, EPA ceased support of the current format that data are uploaded to STORET. The last historical data upload from TDEC WPC was sent to EPA the end of September 2009. The historical STORET data are found at https://www.epa.gov/waterdata/water-quality-data-wqx

In 2009, EPA developed the Water Quality Exchange (WQX), to replace STORET. WQX is a framework that is intended to make it easier for States, Tribes, and others to submit and share water quality monitoring data over the internet. DWR has successfully loaded chemical and bacteriological data (post 2009), as well as all electronically available fish tissue, macroinvertebrate taxa, habitat data and detailed information for over 8060 monitoring stations into the WQX framework. Historic qualitative macroinvertebrate data (pre 2017) are being uploaded as it is transferred from paper to electronic format. Historic and current diatom data will be uploaded to WQX starting in 2022.

The chemical, fish tissue and bacteriological data are accessible to the public on the Division's ambient water quality data viewer: https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-data-map-viewers.html . Macroinvertebrate, habitat and diatom data will be publicly available in the near future.

H. Data Analysis/Assessment of Water Quality

The water quality assessment process in Tennessee consists of four parts:

1. Development of clean water goals (water quality standards) either by promulgating national numeric criteria, statewide narrative criteria, or regional goals based on reference conditions.

2. Implementation of a statewide water quality monitoring program, based on a watershed cycle.

3. Comparison of data to water quality standards for each waterbody in order to assess water quality and to categorize use support.

4. Geographic referencing of all water resources with the National Hydrography Dataset (NHD).

Water Quality Standards

The *Tennessee Water Quality Control Act* requires the protection of water quality in Tennessee. Tennessee first adopted water quality standards in 1967 and has amended them several times thereafter. Water quality standards consist of two principle regulations:

1. "Use Classifications for Surface Waters", Chapter 0400-40-04
2. "General Water Quality Criteria", Chapter 0400-40-03

The three essential elements comprising water quality standards as defined by Section 303 of the Federal Clean Water Act, PL 107 - 303, are stream use classifications, water quality criteria and the antidegradation statement.

Classification + Criteria + Antidegradation = Standards

1. Stream-use Classification

Tennessee's criteria specify baseline values for particular parameters of water quality necessary for the protection and maintenance of a prescribed use classification. The State has established seven principal uses of the waters for which criteria of quality are defined.

a. Fish and Aquatic Life (FAL) - Criteria protect fish and other aquatic life such as macroinvertebrates. These criteria are based on two types of toxicity. The first is acute toxicity, which refers to the level of a contaminant that causes death in organisms in a relatively short time. The other type is chronic toxicity. Chronic criteria are based on a lower level of a contaminant that causes death over a longer period of time or has other effects such as reproductive failure or the inhibition of growth. Fish and aquatic life criteria are generally the most stringent criteria for toxic substances.

b. Recreation - This classification protects the use of streams for swimming, wading, and fishing. Threats to the public's recreational uses of waters include loss of aesthetic values, elevated pathogen levels, and the accumulation of dangerous levels of metals or organic compounds in fish tissue. Tennessee coordinates with TVA, ORNL and TWRA to monitor levels of contaminants in fish. Waterbodies that pose an unacceptable risk to human health are posted for bacteriological or fish consumption advisories.

c. Irrigation - Irrigation criteria protect the quality of water so it may be used for agricultural needs.

d. Livestock Watering and Wildlife - These criteria protect farm animals and wildlife.

e. Drinking Water Supply - Drinking water criteria ensure that water supplies contain no substances that might cause a public health threat, following conventional water treatment. Since many contaminants are difficult and expensive to remove, it is more cost-effective to keep pollutants from entering the water supply in the first place.

f. Navigation - This use is designed to protect navigational rivers and reservoirs from any alterations that would adversely affect commercial uses.

g. Industrial Water Supply - These criteria protect the quality of water used for industrial purposes.

Tennessee has approximately 60,000 stream miles and over 570,000 publicly owned lake and reservoir acres. Most are classified for at least four public uses: protection of fish and aquatic life, recreation, irrigation, and livestock watering and wildlife. These minimum use classifications comply with the Federal Water Pollution Control Act, which requires that all waters provide for the "protection and propagation of a balanced population of fish and wildlife and allow recreational activities in and on the water" (U.S. Congress, 2002).

Specific designated Use Classifications for Surface Waters in Tennessee are listed in the Rules of TDEC, Chapter 0400-40-04 (TDEC-WQOGB, 2019). All surface waters that are not specifically listed in the regulations are classified for fish and aquatic life, recreation, irrigation, livestock watering and wildlife.

2. Water Quality Criteria and Assessment Methodologies

The Water Quality Oil and Gas Board (WQOGB) have assigned specific water quality criteria to each of the designated uses. These criteria establish the level of water quality needed to support each of the designated uses. There are two types of criteria:

- **Numeric criteria** - Establish measurable thresholds for physical parameters and chemical concentrations to support classified uses.

- **Narrative criteria** - Are written descriptions of water quality. These descriptions generally state that the waters should be "free from" particular types or effects of pollution. To help provide regional interpretations of narrative criteria, guidance documents have been developed by the division for biological integrity, habitat and nutrient narrative criteria.

The regulations require that the most stringent criteria be applied to the waterbody. Typically, the most stringent criteria are for the protection of fish and aquatic life or recreational uses. General Water Quality Criteria for surface waters in Tennessee are listed in the Rules of TDEC, Chapter 0400-40-03 (TDEC-WQOGB, 2019).

Water quality assessments are the application of water quality criteria to ambient monitoring results to determine if waters are supportive of all designated uses. To facilitate this process, several provisions have been made:

To help the division interpret water quality expectations for biological integrity, nutrients and habitat, guidance documents for wadeable streams have been developed. These documents are referred to in the General Water Quality Criteria (TDEC-WQOGB,2019).

- Numeric criteria define physical and chemical conditions that are required to maintain designated uses.

- In order to make defensible assessments, data quality objectives must be met. For some parameters, a minimum number of observations are required in order to have increased confidence in the accuracy of the assessment.

- Provisions in the water quality criteria instruct staff to determine whether violations are caused by man-induced or natural conditions. Natural conditions are not considered pollution.

- The magnitude, frequency and duration of violations are considered in the assessment process.

- Streams in some ecoregions naturally go dry or subterranean during prolonged periods of low flow. Evaluations of biological integrity differentiate whether streams have been recently dry or have been affected by man-induced conditions.

- Waterbodies on Tennessee's Impaired Stream List remain on the list until sufficient recent data provide a rationale for removing the waterbody from the list.

The following guidelines are used for determining specific causes of pollution:

a. Metals and Organics Criteria

One or two chemical samples are not considered an accurate representation of stream conditions. Therefore, more than two observations are used in assessments. Acute fish and aquatic life protection criteria are used, unless a site has 12 or more chemical collections. If a site has 12 or more chemical collections, chronic criteria are applied.

Metals data are appropriately "translated" according to the water quality standards before being compared to criteria. For example, toxicity of metals is altered by stream hardness and the amount of total suspended solids in the stream. Widely-accepted methodologies are used to make these and other translations of the data. The division consults with EPA concerning the latest revisions to the national criteria and updates the state criteria as appropriate.

b. Pathogens

Waterbodies are not assessed as impaired due to high bacteria levels with less than three water samples. The only waters assessed with one or two observations are those previously listed due to elevated bacteria levels or streams with obviously gross conditions, such as failing animal waste lagoons.

E. coli data are generally considered more reflective of true pathogen risk than are fecal coliform data. During the 1997 triennial review process, Tennessee added *E. coli* criteria to its existing fecal coliform criteria. This gave the regulated community time to become accustomed to the new criteria before fecal coliform were removed during the 2003 review.

If flow data are available, low flow, dry season data are considered more meaningful than high flow, wet season data. In the absence of flow data, samples collected in late summer and fall are considered low flow or dry season samples. Wet season pathogen samples are not disregarded. They are simply given less weight than dry season pathogen samples.

c. Dissolved Oxygen

For streams identified as trout streams, including tailwaters, the minimum DO standard is 6.0 mg/L. Streams designated as supporting a naturally reproducing population of trout have a DO standard of not less than 8.0 mg/L. This also includes tributaries to naturally reproducing trout streams as well as all streams in the Great Smoky Mountains National Park. The DO standard in the Blue Ridge Mountains (Ecoregion 66) is 7.0 mg/L. In the Mississippi Valley Alluvial Plain (Ecoregion 73a) the minimum DO is 4.0 mg./L as long as an average of 5.0 mg/L is sustained. Everywhere else in the state the DO standard is 5.0 mg/L. If the source of the low DO is a natural condition, such as ground water, spring, or wetland, then the low DO is considered a natural condition and not pollution.

d. Nutrients

Regional nutrient goals were developed based on reference condition and are used for guidance when assessing wadeable streams (Denton et al., 2001). Streams are not generally assessed as impaired by nutrients unless biological or aesthetic impacts are also documented.

One or two chemical nutrient observations are considered a valid assessment only if they are supported by evidence of biological impairment. For example, if the macroinvertebrate community in a stream is very poor and/or the amount of algae present indicates organic enrichment, then one or two nutrient samples could be used to identify a suspected cause of pollution.

e. Suspended Solids/Siltation

Historically, silt has been one of the primary pollutants in Tennessee waterways. The division has experimented with multiple ways to determine stream impairment due to siltation. These methods include visual observations, chemical analysis (total suspended solids), and macroinvertebrate/habitat surveys. Biological surveys that include a habitat assessment have proven to be the most satisfactory method for identification of impairment. Through monitoring reference streams, staff found that the appearance of sediment in the water is often, but not always, associated with loss of biological integrity. Additionally, ecoregions vary in the amounts of silt that can be tolerated before aquatic life is impaired. Thus, for water quality assessment purposes, it is important to establish whether or not aquatic life is being impaired. For those streams where loss of biological integrity can be documented, the habitat assessment can determine if the stream has excessive amounts of silt.

The division has developed regional expectations based on reference data for the individual habitat parameters most associated with sedimentation including embeddedness and sediment deposition. These values are published in the macroinvertebrate QSSOP (TDEC, 2021) and reviewed annually.

f. Biological Criteria

Biological surveys using macroinvertebrates as the indicator organisms are the primary method for assessing support of the fish and aquatic life designated use in wadeable streams. Two standardized biological methods, biorecons and semi-quantitative single habitat (SQSH) samples, are used to produce a biological index score. These methods are described in the macroinvertebrate QSSOP (TDEC, 2021).

For watershed screening the most frequently utilized biological surveys have historically been qualitative biorecons. Biological scores are compared to qualitative metric values obtained in ecoregion reference streams. The principal metrics used are the total families (or genera), the number of mayfly, stonefly and caddisfly (EPT) families (or genera), and the number of pollution intolerant families (or genera) found in a stream. The biorecon index is scored on a scale that goes from 1 - 15. A score less than or equal to 5 is considered impaired. A score equal to or greater than 11 is considered supporting. Scores of 7 or 9 are ambiguous and must be supplemented with other information such as chemical data, habitat data or a more intensive biological survey.

If a more definitive assessment is needed in a wadeable stream, a single habitat, semi-quantitative sample is collected. To be comparable to ecoregions guidance, streams must be of comparable size as the reference streams in a given ecoregion and must have been sampled similarly and at least 80 percent of the upstream drainage in that ecoregion. If both biorecon and single habitat semi-quantitative data are available, and the assessments do not agree, more weight is given to the single habitat semi-quantitative samples unless it is determined the targeted habitat was naturally limiting. Streams are considered impaired where biological integrity falls below the expected range of conditions found at reference streams.

Diatom monitoring has recently been implemented as a supplement to macroinvertebrate monitoring for streams which may have elevated nutrients. A regional diatom index is targeted to be completed for the 2022 assessment period.

g. Habitat

Division staff use a standardized scoring system developed by EPA to rate the habitat in a stream (Barbour, et. al., 1999). The macroinvertebrate QSSOP (TDEC, 2021) provides guidance for completing a habitat assessment and how to evaluate the results. Habitat scores calculated by division biologists are compared to the guidelines developed from the ecoregion reference stream data. Streams with habitat scores lower than the guidance for the region are considered impaired, unless biological integrity meets expectations. If biological integrity meets ecoregional expectations, then poor habitat is not considered impairment.

h. pH

The pH criterion for wadeable streams is 6.0 - 9.0. For nonwadeable rivers, streams, reservoirs and wetlands the pH criterion is 6.5 - 9.0. Also, pH values cannot fluctuate more than 1.0 in 24 hours. Waterbodies with pH values outside these ranges are considered impaired.

3. Antidegradation

As one of the elements comprising Tennessee's water quality standards, the antidegradation statement has been contained in the criteria document since 1967. EPA has required the states, as a part of the standards process, to develop a policy and an implementation procedure for the antidegradation statement.

> "Additionally, the Tennessee Water Quality Standards shall not be construed as permitting the degradation of high-quality surface waters. Where the quality of Tennessee waters is better than the level necessary to support propagation of fish, shellfish, and wildlife, or recreation in and on the water, that quality will be maintained and protected unless the Department finds, after intergovernmental coordination and public participation, that lowering water quality is necessary to accommodate important economic or social development in the area in which the waters are located." (TDEC-WQOGB, 2019).

A three-tiered antidegradation statement was incorporated into Tennessee's 1994 revisions. In the 1997 triennial review, the three tiers were more fully defined. A procedure for determining the proper tier of a stream was developed in 1998. The evaluation took into account specialized recreation, scenic considerations, ecology, biological integrity and water quality.

Tennessee further refined the antidegradation statement in 2004 specifying that alternatives analyses must take place before new or expanded discharges can be allowed in Tier I waters.

In 2006 the antidegradation statement was revised and the Tier designations were replaced by the following categories. Additional revisions were made in 2013 and 2019 (TDEC-WQOGB, 2019).

a. Unavailable parameters exist where water quality is at, or fails to meet water quality criteria in Rule 0400-40-03-.06(2) (the criterion for one or more parameters)

b. Available parameters exist where water quality is better than the levels specified in the water quality criteria in Rule 0400-40-03-.06(3).

c. Exceptional Tennessee Waters (ETW) are waters that are in any one of the following categories (Rule 0400-40-03-.06(4)):

- Waters within state or national parks, wildlife refuges, wilderness areas or natural areas.
- State Scenic Rivers or Federal Wild and Scenic Rivers.

- Federally designated critical habitat or other waters with documented non-experimental populations of state or federally listed threatened or endangered aquatic or semi-aquatic plants or animals.
- Waters within areas designated Lands Unsuitable for Mining.
- Waters with naturally reproducing trout.
- Waters with exceptional biological diversity as evidenced by a score of 40 or 42 on the TMI, provided that the sample is considered representative of overall stream conditions.
- Other waters with outstanding ecological or recreational value as determined by the Department.

d. Outstanding National Resource Waters (ONRWs) - These Exceptional Tennessee Waters constitute an outstanding national resource due to their exceptional recreational or ecological significance. In 1998, the Water Pollution Control Board voted to accept six of the eight streams proposed for listing as ONRWs. The following streams or portions of the streams are designated as ONRWs are: Little River, Abrams Creek, West Prong Little Pigeon River, Little Pigeon River, Big South Fork Cumberland River and Reelfoot Lake (Rule 0400-40-03-.06(5).

In 1999, the Obed River was conditionally added as an ONRW. The condition placed upon the designation was that if the Obed were identified as the only viable drinking water source for Cumberland County, it would revert back to ETW status.

Information on waterbodies that have been evaluated and are identified as Exceptional Tennessee Waters is entered in the Waterlog database and is located in a dataviewer on the TDEC website https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-data-map-viewers.html

4. Categorization of Use Support and Assessment Process

In order to determine use support, it must be decided if the stream, river or reservoir meets water quality criteria. Monitored waters are compared to the most restrictive water quality standards to determine if they meet their designated uses. Generally, the most stringent criteria are for recreational use and support of fish and aquatic life.

To facilitate these analyses, all major rivers, streams, reservoirs and lakes have been placed into georeferencing sections called waterbody segments. These waterbody segments are given unique identification numbers that reference an eight-digit watershed Hydrologic Unit Code (HUC), plus a reach, and segment number.

All available water quality data are considered; however, not all data comply with state quality control standards and approved collection techniques. Assessments must be founded on scientifically sound monitoring methodologies. After use support is determined, waterbodies are placed in one of the five categories recommended by EPA.

- **Category 1** waters are those waterbody segments which have been monitored and meet water quality criteria for all uses. The biological integrity of Category 1 waters is comparable with reference streams in the same subecoregion and pathogen criteria are met. Previously these waterbodies were reported as fully supporting.

- **Category 2** waters have only been monitored for some uses and have been assessed as fully supporting of those uses but have not been assessed for the other designated uses. Often these waterbodies have been assessed and are fully supporting of fish and aquatic life but have not been assessed for recreational use. In previous assessments, these waters were assessed as fully supporting.

- **Category 3** waters have insufficient or outdated data and therefore have not been assessed. These waters are targeted for future monitoring. In previous assessments, these waterbodies were identified as not assessed.

- **Category 4** waters are waters that have been monitored and found to be impaired for one or more uses, but a TMDL is not required. These waters are included in Tennessee's List of Impaired Waters but would not appear on the 303(d) list. Category 4 has been subdivided into three subcategories. Previously, these waters were reported as either partially or non-supporting.

    - **Category 4a** impaired waters have had all necessary TMDLs approved by EPA.

    - **Category 4b** impaired waters do not require TMDL development since "other pollution control requirements required by local, State or Federal authority are expected to address all water-quality pollutants" (EPA, 2003).

    - **Category 4c** waters are those in which the impacts are not caused by a pollutant (e.g. certain habitat alterations).

- **Category 5** waters have been monitored and found not to meet one or more water quality standards. In previous assessments, these waters have been identified as partially supporting or not supporting designated uses. Category 5 waterbodies are moderately to highly impaired by pollution and need the development of TMDLs for known impairments. These waters would be included on both Tennessee's List of Impaired Waters and on the 303(d) list for EPA.

TDEC strongly prefers to base assessments on recently collected data. Judgments based on modeling or land use information are much harder to defend. With given resources, it is not possible to monitor all of Tennessee's waterbodies every two years for 305(b) reporting purposes. Therefore, monitoring and assessments are conducted on the five-year rotating schedule.

The division continues to increase its reliance on rapid biological assessments. These assessments provide a quick and accurate assessment of the general water quality and aquatic life use support in a stream. However, biological assessments do not provide information to pinpoint

specific toxic pollutants or bacterial levels in water. The challenge in the next few years will be to combine biological assessments with chemical and bacteriological data so that both use support status and accurate cause and source information can be generated.

5. Data Sources

The division uses all reliable data gathered in the state for the assessment of Tennessee's waterways. These include data from TDEC, other state and federal agencies, citizens, universities, the regulated community, and the private sector. Every year, the division issues public notices requesting water quality data for use in the statewide water quality assessment. In addition, other state and federal agencies known to have data are contacted directly for monitoring information. Tennessee regularly receives data from TVA, USGS, TWRA, and USACE. Biological and habitat data submitted by NPDES dischargers as part of permit requirements are also used.

All submitted data are considered. If data reliability cannot be established, submitted data are used to screen streams for future studies. If the data from the division and another reliable source do not agree, more weight is given to the division's data unless the other data are considerably more recent.

6. Data Use

The division's goal is to make assessments by quantifiable measures (objective) and therefore, require less professional (subjective) judgment (Table 5). DWR is accomplishing this goal as follows:

Criteria have been further refined to assist in the assessment of water quality data. The ecoregion project has dramatically reduced the uncertainty associated with the application of statewide narrative and numerical criteria.

By use of geographic referencing tools such as the National Hydrography Dataset (NHD), water segments have been further refined to allow more precise water quality assessments. Data from a sampling point are extrapolated over a much shorter distance than in the past. The decision on how far the information is applicable is made on a site-by-site basis using factors such as amount and type of data and the uniformity of the stream.

Minimum data requirements for some of the specific types of data have been set.

Critical periods have been determined for various criteria. Certain collection seasons and types of data have proven more important for the protection of specific water uses. For instance, the critical period for parameters like toxic metals or organics is the low flow season of late summer and early fall. Water contact activities like swimming and wading are most likely to occur in the summer.

Table 5. Types of Data Used in the Water Quality Assessment Process

Chemical Data	Biological Data	Physical Data	Sediment And Tissue Data
Compliance monitoring performed at the approximately 1,100 permitted dischargers in Tennessee. Data collected as a result of complaint investigations, fish kills, spills, and in support of enforcement activities.	Rapid biological surveys completed in association with the watershed project. These are performed primarily in tributary streams as a means of monitoring biological integrity.	Temperature and turbidity data collected throughout Tennessee.	Sediment and fish tissue data collected at various sites across Tennessee.
Approximately 8060 stations are established by the division to support the watershed approach.	Ecoregion biological monitoring. Benthic and fish IBI scores calculated at many sites.	Quantitative assessments of habitat made in conjunction with biological surveys.	EPA's report *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States.*
Data collected at the division's 122 ecoregion reference (ECO & FECO) sites. (These stations provide a baseline to which other sites within that ecoregion can be compared.)	Bioassay studies of effluent toxicity at most major NPDES dischargers. Many minor facilities also do this type testing.	Time-of-travel studies of flow, dissolved oxygen sags and BOD decay rates.	Locations of existing fishing advisories in Tennessee.
Chemical data collected by other entities.	Biological data collected by other entities.	Physical data collected by other entities.	Sediment and tissue data collected by other entities.

Future Assessment Goals

The division is committed to the ecoregion approach, particularly for the assessment of wadeable rivers and streams. The use of regional reference streams has proven a valuable tool in establishing guidelines for use in determining whether waterbodies meet their designated uses. The division goals, which are to continue to improve the assessment process, are listed in Table 6.

Table 6. Future Assessment Goals

Goal	Milestone	Future Plans
Dissolved oxygen in wadeable streams	Published study of regional dissolved oxygen patterns in 2003 based on diurnal and daylight monitoring. Proposed regional minimum DO criteria based on reference monitoring in 2003. Increased use of diurnal monitoring in assessment decisions.	Continue regional monitoring to enhance existing data. Increase the use of diurnal monitoring. Consider incorporating criteria based on diurnal patterns (duration and frequency of minimum). Consider criteria based on diurnal DO swings in future triennial reviews.
Nutrients in wadeable streams	Published guidance document for regional limits of total phosphorus and nitrate + nitrite in 2001. Incorporated guidance in 2004 WQS. October 2019 TDEC met with diatom index development workgroup at Southeast Water Pollution Biologists Association conference to discuss southeastern index development. On 2020 completed taxonomic harmonization of diatoms with other states consistent with USGS biodata and provided taxa lists and ancillary data to contractor, completing phase I. . Beginning FY 2020, TDEC incorporated diatom sampling in 106 monitoring workplan at watershed sites suspected of nutrient impairment.	Finalize southeastern regional diatom index. Calibration and testing of SE diatom index for TN bioregions. Incorporation of index in assessments. Continue to include diatom samples as a second biological indicator for nutrient impairment. .

Goal	Milestone	Future Plans
	June 2021 finalization of metric selection for diatom index and review of draft report submitted by Tetratech. July 2021 workgroup meeting to finalize index. July 2021 completed calibration of TN Diatom Index.	
Nutrients in lakes, rivers and non-wadeable streams	Developed criteria development plan in 2004 with revisions in 2007 and 2009. Established biomass criterion in Pickwick Reservoir in 2007. TDEC convened nutrient criteria development workgroup to revise plan – final plan was approved by EPA in September 2019.	Explore feasibility of using chlorophyll criterion established for Pickwick Reservoir for other main-stem lower Tennessee Reservoirs. Investigate applicability of using existing TVA and USACE chlorophyll data to develop chlorophyll criteria for upper main-stem Tennessee, Cumberland and tributary reservoirs based on methods used by Alabama for Pickwick. Consider possibility of using chlorophyll or other measures of reservoir eutrophication as a trigger point to implement nutrient reduction strategy.
Biocriteria	Published macroinvertebrate guidelines for wadeable streams in 2001 which were updated in 2004, 2006, 2011, 2017 and 2021. Incorporated guidelines in 2004 WQS. Began monitoring of headwater reference streams in 2009 and published guidelines in 2017.	Investigate feasibility of developing guidelines for nonwadeable rivers as resources allow. Finalize regional diatom index and calibrate for TN bioregions Recalibration of macroinvertebrate indices in

Goal	Milestone	Future Plans
	Began monitoring of diatoms at reference streams in 2008. Collaborated on a N-steps grant to develop a regional diatom index with KY, GA, AL, EPA and Tetratech. Incorporated diatom monitoring as a second biological response variable at streams with elevated nutrients in monitoring workplans starting in 2019.	accordance with recent changes in nomenclature
106 monitoring workplan.	Used GIS mapping and assessment database to streamline development of monitoring workplan and assist field staff in planning. Begin incorporating diatom sampling as second biological indicator when nutrient samples are collected. Began including waters downstream of active and historic landfills in monitoring plans. Added historically clean reservoirs to fish monitoring as part of watershed cycle.	Develop system for creating monitoring plan and sample tracking through Waterlog.
Electronic data reporting	Developed electronic field sheets for chemical, bacteriological and biological sampling and reporting. Updated data storage to increase efficiency, enhance	Migrate remaining historic biological data (diatom and qualitative macroinvertebrate data) to new system. Make macroinvertebrate, diatom and habitat data public facing.

Goal	Milestone	Future Plans
	reporting capabilities and increase quality assurance. Made chemical, bacteriological and fish tissue data available to public through data-viewers. Chemical, bacteriological, fish tissue, macroinvertebrate taxa and habitat data are uploaded to WQX. Assessment data are uploaded to ATTAINS. Uploaded macroinvertebrate and habitat data to WQX. Developed capability of automatic calculation and scoring of biorecon metrics. Developed capability of automatic calculation and scoring of SQSH metrics.	Upload diatom data and historic qualitative macroinvertebrate taxa to WQX. Develop capability of automatic calculation and index scoring of uploaded diatom taxa. Create event link for chemical and biological data. Build statistical range outlier check by station for chemical parameters. Capture water quality criteria violations in chemical data table. Create tables, graphs and other tools for statistical reporting of data through Waterlog.

I. Water Quality Reports

Waterbodies will continue to be monitored to fulfill data needs for water quality standards, TMDLs, ATTAINS Integrated Report, advisories, and special projects such as the southeast regional monitoring network. Progress will be tracked quarterly and provided to the DWR division head for review. A report will be submitted to EPA annually by December 31.

The ATTAINS Integrated Report submitted to EPA details the support status of Tennessee waters as well as sources and causes of pollution. Twenty percent of the state's watersheds are assessed each year with information in uploaded annually to the EPA ATTAINs database. Information for each assessed water body is available through the division's online assessment database. *https://tdeconline.tn.gov/dwr/*. Surface water chemical and bacteriological results may be viewed at https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-data-map-viewers.html As resources allow, compose study group of appropriate professionals. Review existing data and look for data gaps.

As required by Section 303(d) of the Clean Water Act, a list of the lakes, rivers, and streams in Tennessee that fail to meet one or more water quality standards along with pollutant information and TMDL prioritization is complied. Tennessee meets this regulatory requirement through the documentation of water quality assessment determinations and submission of these data through the EPA ATTAINS system. Tennessee's Final 2022 Impaired and Threatened Waters list was approved by EPA in April 2022. Due to the limited nature of an Impaired and Threatened Waters list, Tennessee chooses to publish the 2022 List of Impaired and Threatened Waters. This list includes all impaired waters regardless of their TMDL status or Category. The Final 2022 List of Impaired and Threatened Waters may be found on TDEC's publications website; https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html.

Tennessee's water quality standards require the incorporation of the antidegradation policy into regulatory decisions (Chapter 0400-40-03-.06). Part of the responsibility the policy places on the division is identification of Exceptional Tennessee Waters. In Exceptional Tennessee Waters, degradation cannot be authorized unless (1) there is no reasonable alternative to the proposed activity that would render it non-degrading and (2) the activity is in the economic or social interest of the public.

The division has compiled a database of streams based on the characteristics of Exceptional Tennessee Waters (ETW) set forth in the regulation by the Tennessee Board of Water Quality, Oil and Gas. In general, these characteristics are streams with good water quality, important ecological values, valuable recreational uses, and/or outstanding scenery. Wherever possible, the division has utilized objective measures to apply these characteristics and the basis for each ETW designation is provided. The dataviewer is on the TDEC website. https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-data-map-viewers.html

Reports routinely produced by the division include technical publications, informational publications, criteria development reports, and standard operating procedures. In addition to reports, the division is committed to communicating information effectively. To reach this goal, the following products, among others, are provided as part of the reporting process:

- Access to on-line water quality data
- Water quality assessment reports and on-line assessment database
- Data and interpretation for NPDES permit support
- Technical data sets for consultants/researchers
- Spatial and mapping data using Geographical Information System (GIS) tools
- Public outreach information, including the Internet
- Presentations at professional, scientific, citizen and school group meetings

J. Monitoring Program Evaluation

The division evaluates its monitoring program during each planning and assessment cycle and incorporates changes as needed to provide the most comprehensive and effective plan possible with available resources.

1. Evaluation of Monitoring Program Strategy

During development of the annual monitoring workplan, both central office and EFO staff provide input into monitoring needs:

a. The monitoring plan is reviewed to make sure all sampling and assessment priorities are covered.
b. The ATTAINS is used to look for unassessed segments which are incorporated into the monitoring plan whenever possible.
c. During the monitoring plan development, Central Office and EFO staff coordinates location of monitoring stations and type of samples collected to ensure adequate information is provided during that cycle.
d. The location of monitoring stations is coordinated with other state and federal agencies to eliminate duplication of effort.
e. At the end of each monitoring cycle, the plan is reviewed to make sure monitoring needs were covered. Uncompleted sampling or data gaps are incorporated into the next monitoring cycle or might be contracted to the state laboratory for completion.

2. Monitoring Objectives

During evaluation of monitoring objectives, the division strives to:

a. Determine where additional or more current data are needed to enhance the assessment process.
b. Target unassessed segments or those that were originally assessed qualitatively. Incorporate biological monitoring whenever possible to assess fish and aquatic life use support.
c. Develop or refine guidelines for narrative criteria: Refine wadeable streams and develop criteria for rivers, lakes and reservoirs (see nutrient workplan for details).
d. Biological: Refine wadeable streams and develop criteria for rivers, lakes and reservoirs.
e. Habitat: Refine wadeable streams and develop criteria for rivers, lakes and reservoirs.
f. Continue to refine regional numeric criteria whenever possible. Develop diurnal guidelines for dissolved oxygen levels.
g. Revisit monitoring sites every five years to look for changes.
h. Monitor below sites where BMPs or other restoration activities have taken place to assess effectiveness of improvement strategy.
i. Look for opportunities to analyze trends in water quality.

3. Monitoring Design

The division reviews the monitoring program during each cycle to ensure it is efficient and effective in generating data that serve management decision needs and meets the state's water quality management objectives.

a. The antidegradation survey process is reviewed and updated based on feedback from field staff.
b. Ecoregion reference sites are re-evaluated annually. New sites are added whenever possible. Existing sites are dropped if data show the water quality has degraded, the site is not typical of the region, or does not reflect the best attainable conditions. Data from other states are used to test suitability of reference sites. Currently the state is reviewing river, lake and reservoir data to target reference conditions in these systems.
c. Watershed groupings are reviewed and revised if needed to ensure staffing is available for adequate coverage.
d. Periodically, probabilistic monitoring results are compared to targeted monitoring results to check for bias in watershed assessment. Results from both types of monitoring are used in an integrated approach.

4. Critical and Non-Critical Water Quality Indicators

The division reviews both critical and non-critical water quality indicators minimally every three years as part of the triennial review process.

a. Biological guidelines for wadeable streams - New biometrics are tested for possible inclusion or replacement of existing index metrics. Additional reference data are incorporated, and biometric ranges are adjusted if needed. Bioregions are tested and boundaries are adjusted if appropriate. Guidelines for rivers, lakes and reservoirs are currently in the initial development stage.

b. Nutrient guidelines - Additional reference data are incorporated, and regional guidelines are adjusted if appropriate. Nutrient regions are tested, and boundaries are adjusted if needed. Regional recommendations are tested against biological community data to test protectiveness. Guidelines for rivers, lakes and reservoirs are currently in the initial development stage.

c. Habitat guidelines - Additional reference data are incorporated, and regional guidelines are adjusted if appropriate. Regional recommendations are tested against biological community data to test protectiveness. Guidelines for rivers, lakes and reservoirs are currently in the development stage.

d. Other narrative criteria are reviewed to determine whether guidelines can be developed using regional reference data.

e. Incorporation of national numeric criteria. Changes are incorporated into the state criteria during the triennial review process. Criteria are reviewed to determine effectiveness of statewide approach versus regionalization.

5. Quality Assurance

The division is committed to ensuring the scientific quality of its monitoring and laboratory activities.

The division developed and implemented a document entitled *Quality Systems Standard Operating Procedures for Macroinvertebrate Surveys* (including collections, habitat assessments and laboratory analyses) in 2002. This manual is reviewed annually and updated if needed. The SOP was last revised in 2021 and is currently under revision to reflect changes in nomenclature and revised metric calibrations. Staff are trained on protocols during the annual statewide meeting or during the biologist workshop.

The division developed and implemented a document entitled *Quality Systems Standard Operating Procedures for Chemical and Bacteriological Sampling of Surface Waters* in 2003. This manual is reviewed annually and updated as needed. The manual was last revised in 2022 and is currently under revision. Staff are trained on protocols annually during the DWR statewide meeting or during the biologist workshop**.**

The division has developed a document entitled *Quality Standard Operating Procedures for Periphyton Stream Surveys* in 2010. This manual is currently under revision to incorporate the SE diatom index and standardization of nomenclature with the SE workgroup. Staff are trained on protocols during the annual statewide meeting or during the biologist workshops**.**

The division has developed written tutorials for completing electronic sample request (SPERT) and biological field forms (BSERT) and uploading to the division's database. A method's document for waterbody assessment and listing (CALM, 2021), has also been developed. The division uses the state laboratory for chemical, bacteriological and biological analyses. The division also uses contract laboratories. The state laboratory has developed standard operating procedures that meet the division's needs and are in accordance with EPA policy. EPA routinely inspects the state laboratory. Contract laboratories are required to follow approved EPA methods and QC practices. The division has a policy to maintain chain of custody on all samples.

Duplicate collections are completed at 10% of biological and chemical monitoring stations. Field blanks and equipment blanks are collected at 10% of stations. Trip blanks are collected at 10% of trips.

The division developed and implemented their first *Quality Assurance Project Plan* in 2009. This manual is reviewed annually and submitted to EPA for approval if there are major revisions. The last update was in December 2021. Staff are trained on protocols during the annual statewide meeting and/or biologist workshop.

6. Data Management

The division uses electronic formats to store data and assessment information.

The state water quality database is reviewed continuously and updated as needed to increase comprehensiveness and ease of use.

- New updates for STORET/WQX, ADB/ATTAINS and GIS are incorporated as they become available, and time allows with the state's IT divisions assistance.

- The division is working with the state and contract laboratories to develop the ability to electronically transfer data.
- The division is using 106 supplemental funds to develop an integrated biological and chemical database (Waterlog/Hydra) that will enhance quality assurance, statistical data analyses, assessments, reporting and data availability.
- The online assessment dataviewer is updated regularly to provide current public access to water quality information and may be viewed at https://tdeconline.tn.gov/dwr/
- Surface water chemical and bacteriological results as well as fish tissue data may be viewed on Ambient Water Quality Monitoring Data at https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-data-map-viewers.html

7. Reporting

The division uses feedback from EPA, other state and federal agencies as well as the private and public sectors to improve and enhance the reporting process whenever possible. Data are uploaded to WQX.

K. Support and Infrastructure Planning and Resource

An organizational chart for the Division of Water Resources is illustrated in Figure 6. The division has nine Central Office Sections, eight Environmental Field Offices (EFOs), the Fleming Training Center, and the Mining Unit (MU), which includes the Mining Section, Oil and Gas Section and Abandoned Mine Lands Section with statewide responsibility.

The division currently has 403 full-time staff. There are also 12 members of the Water Quality, Oil and Gas Board. Division staff is divided by activities associated with the Clean Water Act, Safe Drinking Water Act and various state program efforts including Safe Dams, Oil and Gas Well Drilling, Abandoned Mine Land Reclamations, Water Well driller regulation, Underground Waste Disposal, Operator Certifications and Training, and the activities associated with the State Revolving Loan Fund and State Water Infrastructure Grants Program.

The division's full-time central office staff process permits, develop water quality planning documents and water quality standards, develop standard operating procedures, oversee quality assurance programs, coordinate monitoring activities and water quality assessments with environmental field offices, recommend fish consumption and bacteriological advisories, prepare special recovery plans called Total Maximum Daily Loads (TMDLs), track compliance and prepare enforcement documents as needed, conduct hydraulic and hydrologic modeling to determine assimilative capacity, manage data, review plans and manage administrative needs of the division. The Mining Unit staff process permits, review plans, conduct inspections, as well as conduct water quality monitoring and ensure compliance for the Division's surface mining, land reclamation, and oil and gas programs.

Water quality monitoring, especially fixed-station and compliance, is generally performed by EFO staff. Data management and review take place both in the central office and in the EFOs. Water quality assessment is also a collaborative effort.

Tennessee uses an enterprise accounting and personnel management software called EDISON. It effectively manages the state's personnel, fiscal, travel, training, property, and inventory into a single integrated system and allows more accurate and consistent tracking of program expenditures.

Program accomplishments are tracked by each field office and most sections in the division with data entry through the Water Pollution Control Information Management System (WATERLOG). These data are used by the state's performance base budgeting measurements and for the division's reports to the Water Quality, Oil and Gas Board, Bureau of Environment, and to EPA.

Performance-based measures of the department are summarized quarterly for each environmental division and reported to the Department of Finance and Administration.

A summary annual report is produced prior to development of the next year's budget by the governor. It is available for review by the state's General Assembly when the budget is acted upon. Additional management use of data is important to the division to support expenditure state appropriation revenue and fee collections.

Current Funding

The cost of a full-time technical employee including benefits will be about $90,000 for the year, with indirect costs approximately $21,700.

In 1991, the state legislature passed a law creating the Environmental Protection Fund (EPF) which requires the division to charge fees for certain services such as the annual maintenance of NPDES permits, plans and specs reviews, issuance of aquatic resource alteration permits (ARAP), and gravel dredging permits. Money collected from civil penalties and damages assessments are added to this fund as well. EPF funds have been used to add staff and upgrade the salaries of existing staff. The estimated collection for EPF in state Fiscal Year 2022 (July1, 2021– June 30, 2022) is $10,215,163.00. for the regulatory program areas for water pollution control.

The division matched only the required amount for our Clean Water Act §106 grant money for the federal FFY21 grant. The State of Tennessee uses a performance partnership grant (PPG) that includes the water pollution effort under CWA§106 as part of the PPG. The state continues to use substantial effort funded with state dollars to address water quality assessments and regulation for water pollution control within Tennessee. State funds that are not explicitly reflected in the grant application will not be tracked with the PPG, but these funds are still available for Division of Water Resources state program efforts.

Special projects such as probabilistic monitoring, Southeast Monitoring Network, and electronic data migration are generally funded by 106 supplemental grants. The division has partnered with Alabama, Kentucky and Georgia for an N-STEPS grant to aid in periphyton index development as part of its nutrient criteria development plan.

Salary Ranges

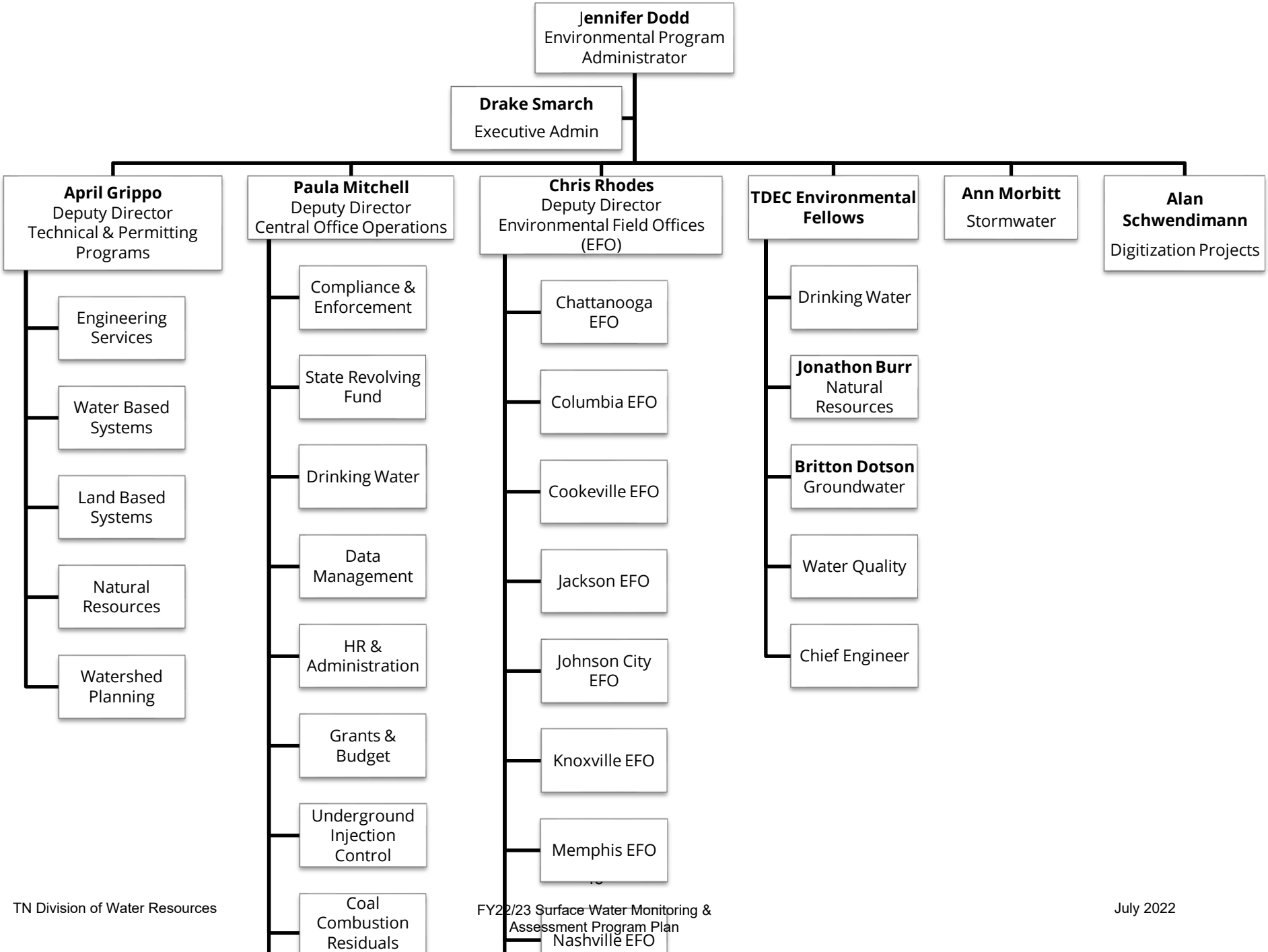
On April 24, 2012 the Governor signed into law the Tennessee Excellence in Accountability Management Act. It effectively established a new hiring system that requires agencies to define minimum qualifications and to identify specific knowledge, skills, abilities, and competencies required for each position. It also overhauled the state's performance evaluation system to provide performance standards and goals. Furthermore, the agency conducted job evaluations and revised job classifications to reflect the move toward allowing career tracks for both technical staff as well as management positions. Table 7 reflects the current FY salary information and position class titles for 2022.

Table 7. Salary Grades for Positions in TDEC DWR (updated 7/1/2022)

Class Title	Min. Monthly Salary	Max. Monthly Salary
TDEC-ENV CONSULTANT 1	$4,296.00	$6,872.00
TDEC-ENV CONSULTANT 2	$4,510.00	$7,217.00
TDEC-ENV CONSULTANT 3	$4,973.00	$7,955.00
TDEC-ENV CONSULTANT 4	$5,483.00	$8,772.00
TDEC-ENV PROTECTION SPEC 1*	$3,365.00	$5,385.00
TDEC-ENV PROTECTION SPEC 2*	$4,091.00	$6,546.00
TDEC-ENV PROTECTION SPEC 3	$4,510.00	$7,217.00
TDEC-ENVIRONMENTAL FELLOW	$6,391.00	$11,505.00
TDEC-ENVIRONMENTAL MANAGER 1	$4,296.00	$6,872.00
TDEC-ENVIRONMENTAL MANAGER 2	$4,510.00	$7,217.00
TDEC-ENVIRONMENTAL MANAGER 3	$4,973.00	$7,955.00
TDEC-ENVIRONMENTAL MANAGER 4	$5,483.00	$8,772.00
TDEC-ENVIRONMENTAL SCIENTIST 3	$4,091.00	$6,546.00
TDEC-ENVIRONMENTAL SCIENTIST1*	$3,365.00	$5,385.00
Class Title	Min. Monthly Salary	Max. Monthly Salary
TDEC-ENVIRONMENTAL SCIENTIST2*	$3,710.00	$5,938.00
ENVIRONMENTAL PROGRAM DIRECTOR	$6,391.00	$11,505.00
ENVIRONMENTAL PROGRAM ADMINISTRATOR	$7,047.00	$12,685.00

* Flex position that will re-classify to a more advanced working position after completion of probationary period.

Division of Water Resources Organizational Chart Figure 6


Jennifer Dodd
Environmental Program Administrator
Drake Smarch
Executive Admin
April Grippo
Deputy Director
Technical & Permitting Programs
Engineering Services
Water Based Systems
Land Based Systems
Natural Resources
Watershed Planning
Paula Mitchell
Deputy Director
Central Office Operations
Compliance & Enforcement
State Revolving Fund
Drinking Water
Data Management
HR & Administration
Grants & Budget
Underground Injection Control
Coal Combustion Residuals
Chris Rhodes
Deputy Director
Environmental Field Offices (EFO)
Chattanooga EFO
Columbia EFO
Cookeville EFO
Jackson EFO
Johnson City EFO
Knoxville EFO
Memphis EFO
Nashville EFO
TDEC Environmental Fellows
Drinking Water
Jonathon Burr
Natural Resources
Britton Dotson
Groundwater
Water Quality
Chief Engineer
Ann Morbitt
Stormwater
Alan Schwendimann
Digitization Projects

1. Future Planning and Needs Assessment for Tennessee's Water Monitoring and Assessment Program

Tennessee has traditionally had a strong water quality monitoring and assessment program. In the last 20 years, water quality chemical and bacteriological monitoring have almost doubled since 2000 (Table 8). Although the number of macroinvertebrate samples are relatively consistent (around 700 samples), the sample type is shifting from qualitative screening samples to more rigorous quantitative samples. This reduces field time, freeing sampling staff for other activities and yields more robust data that can be used for multiple purposes. New procedures such as continuous monitoring and diatom surveys are increasingly being used to supplement traditional macroinvertebrate and chemical monitoring.

It is evident that Tennessee already spends a great deal of time, effort and money on water quality monitoring. However, a significant funding gap does exist if EPA requirements and guidance are to be met. Without a steady source of federal funding in addition to current funding, it is not likely that program activities will expand or that any significant increase in the percentage of waterbodies monitored and assessed will be feasible. Additional staffing and funding must be permanent and not in the form of competitive or temporary grants to expand programs. Tennessee is not expecting additional funding from other sources for these activities over the next ten years. Therefore, federal funding increases would be vital to implementation of all or part of the following water quality monitoring goals (Table 9).

106 grant project activities in Tennessee are funded by state appropriation and EPA grant dollars. An estimated $4,042,801 is obligated for employee salaries and benefits in support of this program in the state in FY2022. Another $638,526 is allocated to travel, printing, utility, communication, maintenance, professional service, rent, insurance, vehicle, and equipment expenses. Indirect charges are estimated at $1,002,210.

The grant money for Clean Water Act §106 is now part of a performance partnership grant and is no longer a stand-alone grant. Activities for the Water Quality Management Planning under Clean Water Act §604(b) are discussed as a separate work plan

Table 8. Water Quality Monitoring From 2001 to 2021 (calander year)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Chemical & Bacteriological Events	2917	2954	3246	4168	3790	4065	4922	4500	4713	4376	4630	5100	4783	5305	3426	4802	5168	5202	5231	5555	4864
Rapid Macroinvertebrate Samples (Biorecon)	672	318	365	183	162	285	248	338	318	223	288	157	433	335	225	130	210	161	257	130	85
Intensive Macroinvertebrate Samples (SQSH)	176	94	330	113	256	226	267	332	353	367	257	247	274	192	377	370	408	470	586	615	477
Habitat Assessments	848	412	695	504	386	462	497	612	597	512	525	361	674	530	673	585	611	641	688	612	511
Diatom Samples	14	80	154	121	0	2	120	60	72	22	55	10	39	54	39	18	23	59	28	77	148
Antidegradation Surveys	5	5	49	33	17	97	81	2	59	51	18	12	16	7	19	26	17	6	74	14	11
Probabilistic Monitoring Events	50	75	95	313	2	0	90	0	0	90	0	0	0	0	0	0	0	0	0	0	0
Fish Tissue Samples	0	3	5	0	2	25	70	44	88	207	12	68	31	55	74	76	18	29	118	79	41

Table 9. Projected Funds Necessary to Increase Wadeable Stream Assessment by 5% Annually

Year	Approximate number of assessed stream miles reassessed annually if plan is funded	Additional stream miles to achieve 5% increase from previous year	Additional stations added (based on average 1 station per 11 stream miles)	Additional staff needed (Personnel Costs)	Indirect Costs (Based on 0.23%)	Additional laboratory analysis including QC	Cumulative federal dollars needed above existing funding
2006	6,059	303	28	2 Field = $154,800	$35,604	$38,000	$223,510
2007	6,362	318	29	2 CO (1 PAS, 1 TMDL) = $154,800	$35,604	$43,000	$430,740
2008	6,680	334	30			$44,000	$475,020
2009	7,014	351	32	2 Field = $154,800	$35,604	$46,000	$684,970
2010	7,365	368	33			$47,000	$731,970
2011	7,733	387	35			$53,000	$784,970
2012	8,120	406	37	2 Field and 2 CO (1 PAS, 1 TMDL) = $309,600	$71,208	$55,000	$1,189,709
2013	8,256	426	39			$57,000	$1,246,709
2014	8,952	448	41			$60,000	$1,306,709
2015	9,400	470	43	2 Field = $154,800	$35,604	$62,000	$1,511,659
2016	9,870	493	45			$68,000	$1,579,659
2017	10,363	518	47			$70,000	$1,649,659
2018	10,881	544	49	2 Field = $154,800	$35,604	$72,000	$1,885,619
2019	11,425	571	52			$75,000	$1,960,619
2020	11,996	600	54			$78,000	$2,038,619
2021	12,595.	630	57	2 Field = $206, 642	$47,528	$91,000	$2,383,789
2022	13,225	661	60	2 Field =$216, 974	$49,904	$95,000	$2, 478789
2023	13,886	694	63	$227,822	$52,399	$99,750	$2,602,728

II. STREAM, RIVER, RESERVOIR, LAKE, AND WETLAND MONITORING

The division maintains a statewide monitoring system consisting of approximately 8,060 stations. In addition, new stations are created every year to increase the number of assessed streams. Approximately 720 stations will be monitored in FY 2022- 2023. Stations are sampled monthly, quarterly, and semi-annually, depending on the requirements of the project. Within each watershed cycle, monitoring stations are coordinated between the central office and staff in the eight regional Environmental Field Offices (EFOs) and the Mining Unit based on the following priorities. A list of these stations is located in Appendix A. Additional streams may be added for sampling as the monitoring year progresses. Most large streams have at least one station. A list of parameters to be sampled is provided in Table 11.

After determining the watersheds to be monitored in a given year, monitoring resources are prioritized as follows: Details of monitoring priorities is found in Section I D and Tennessee's Consolidated Assessment and Listing Methodology (CALM, 2021) https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html .

1. Antidegradation Monitoring
2. Posted Streams
3. Ecoregion Reference Streams/Ambient Monitoring Stations/SEMN
4. Tennessee's List of Impaired Waters Monitoring
5. Sampling downstream Major Dischargers and CAFO's
6. TMDL Development Monitoring
7. Special Project Monitoring
8. Watershed Monitoring
    a. Previously Assessed Streams
    b. Sites downstream large scale or dense ARAP activities
    c. Unassessed Stream Reaches
    d. Pre-restoration or BMP installation monitoring.

A. Monitoring Frequency

1. Antidegradation Monitoring Frequency

Since permit requests generally cannot be anticipated, antidegradation surveys are conducted as needed. Streams are evaluated for antidegradation status based on a standardized evaluation process, which includes information on specialized recreation uses, scenic values, federally listed threatened or endangered aquatic species, critical habitat, ecological consideration, biological integrity and water quality.

2. Posted Waters Monitoring Frequency

Waterbodies posted for pathogens advisories are sampled monthly for *E. coli* with at least one geomean (5 samples in 30 days). Streams posted for water contact must be monitored at a minimum every five years. If another responsible party will be monitoring the stream, then the EFO does not need to sample the stream. The failure of

another party to sample the stream places the burden back on the EFO to monitor the stream. There is no acceptable reason for failure to monitor a stream posted for water contact.

3. **Ecoregion Reference Stream, Ambient and SEMN Monitoring**

   Ecoregion (ECO) and headwater (FECO) Reference streams within the watershed group are sampled quarterly for physical, chemical and pathogen. Macroinvertebrates are collected spring and fall and periphyton are collected once.

   Physical, chemical and pathogen (*E. coli*) samples are collected at all long-term monitoring or ambient stations quarterly regardless of watershed group.

   All Southeastern Regional Network Monitoring Stations (SEMN) regardless of watershed are monitored every year. See Section F for the monitoring plan and stations list.

4. **Monitoring Frequency for Impaired Waters**

   Streams, rivers, or reservoirs that have one or more properties that violate water quality standards and thus do not meet the designated uses are included in the Tennessee List of Impaired Waters are monitored, at a minimum, every five years coinciding with the watershed cycle.

   Monitoring impaired waters provides a great deal of information:

- Documentation of current conditions, which may change from year to year. This documentation can provide a rationale for "delisting" a stream from the List of Impaired Waters or may just confirm the water's impairment status.
  - Sampling can provide data for pre or post TMDL evaluation. Data can be used for model calibration.
  - Surveys can document the need for enforcement actions.
  - Data can assist in the evaluation of the effectiveness of BMPs or help target BMP installation for maximum effectiveness.
  - Results over time can provide insight into historical water quality trends.
  - Conditions may represent a human health threat.

For these reasons, the monitoring of impaired waters is identified as a high priority for division field staff. The division's intended goal is to collect new data on these waters, unless there is a compelling reason for not doing so. Streams impacted due to upstream impoundments, culverting, or hard armoring do not require new data be collected each cycle if the alteration is still present.

Waters that do not support fish and aquatic life are sampled once for macroinvertebrates (semi-quantitative sample preferred) and monthly for the listed pollutant(s). Streams with multiple listed segments are sampled monthly for the listed pollutant for each segment. Streams that scored either 20 or less on a SQSH, or a 5 or less on a biorecon in the previous assessment cycle can be assessed as "Not Supporting Based On Factors Other Than Recent Data" provided that it is the consensus judgement of assessment staff is that (1) the conditions in these streams have not changed, and (2) that it is not possible the previous low scores were due to natural conditions such as prolonged dryness, or beaver activity. Streams assessed under this category can miss data collection for one assessment cycle, but not two.

Streams with impacted recreational uses, such as those impaired due to pathogens are sampled monthly for *E. coli.* Another acceptable sampling strategy for *E. coli* is an approach in which an initial geometric mean is collected (5 samples within a 30-day period) in the first quarter. If the geomean is well over the existing water quality criterion of 126 colony forming units, the waterbody remains impaired with no additional *E. coli* sampling need. If results meet the water quality criterion, staff will continue with monthly samples during the remainder of the monitoring cycle. If the geomean is not substantially over the criterion, field staff may at their discretion continue monthly monitoring in the hope that additional samples will indicate that the criterion is met.

Resource limitations or data results may sometimes justify fewer sample collections. For example, there are cases where pollutants are at high enough levels that sampling frequency may be reduced while still providing a statistically sound basis for assessments. In some other cases, as outlined in Tennessee's Consolidated Assessment and Listing Document (CALM) monitoring may be appropriately bypassed during a monitoring cycle.

a. List of Impaired Waters **requiring no additional monitoring**

All impaired waters in targeted watersheds must be accounted for in the annual monitoring workplan. If a field office is proposing to bypass monitoring of an impaired stream, an appropriate rationale must be provided and included in the workplan.

It is recommended that the EFO verify the condition of the stream at least every other cycle. Streams impacted by poor biology, habitat alterations, or siltation due to habitat alterations must still be monitored at least once (habitat assessment, plus SQSH or biorecon). Streams posted for water contact must be monitored every cycle.

There are individual sites where conditions may justify retaining the impaired status of the stream without additional sampling during an assessment cycle. The reasons may include, but are not limited to, the following:

- Data has been collected by the division or another agency <u>within</u> the last five years and water quality is thought to be unchanged. If another division or agency has collected stream samples the EFO should follow up with that division or agency to retrieve the data and forward it to WPU.

- Another agency or a discharger has accepted responsibility for monitoring the stream and will provide the data to the division. During the planning process for each watershed cycle, field staff should recommend to the permitting section those streams where it would be appropriate for monitoring to be performed by a discharger. Where permits are up for renewal, such conditions could be added.

- The stream is known to be dry or without flow during the majority of the year that sampling is being scheduled. Should an impaired stream be dry during two consecutive cycles, consideration should be given to requesting the stream be delisted on the basis of low flow.

- Impounded streams impacted by impoundments, culverting, or hard armoring with no change in management of hydrology if the alteration is still present.

b. Impaired waters where additional sampling may be limited or discontinued

There are individual sites where initial results may justify a discontinuation of sampling. The reasons are limited to the following:

- Where emergency resource constraints may require that sampling be restricted after a monitoring cycle is initiated, but before it is completed. Discontinuation of monitoring on this basis must be approved in advance by the Deputy Director. Before requesting a halting of sampling in impaired waters, assistance from the Department of Health's Aquatic Biology section should be considered. Such requests should be coordinated through the Watershed Planning Unit.

- Initial stream sampling documents elevated levels of pollutants indicating, with appropriately high statistical confidence, that the applicable water quality criteria are still being violated. (Note – rain event sampling is inappropriate for this purpose.)

- The levels of pollutants that indicate continued water quality standards violations with statistical confidence are provided in Table 10. For example, if three samples are collected and all three values exceed the levels in the far right hand column, then sampling for that parameter may be halted, as there is a very high probability that criteria would be exceeded in future sampling. If all three samples do not exceed the level provided in the table, then at least four more samples must be collected. If all seven samples exceed the levels in the middle column of the table, then sampling may cease. If all seven samples do not exceed the value in the table, then all sampling must be completed.

Important notes about this process:

- This process only applies to chemical parameters or bacteriological results. Streams impacted by poor biology, habitat alterations, or siltation due to habitat alterations must still be monitored at least once (habitat assessment, plus SQSH or biorecon), flow permitting unless evaluated ad not supporting as defined above.

- Rain event samples cannot be used to justify a reduction in sampling frequency.

- The division is not establishing new criteria with Table 10 and the numbers in the table should not be used independently to assess streams. These numbers, which are based on the actual criteria, simply indicated the statistical probability that the criteria have been exceeded by a dataset when the numbers of observations are considered.

- Where streams are impacted by multiple pollutants, all parameters must exceed the values in Table 10 before sampling can be halted.

Table 10. Sampling Frequency Guidance for Parameters Associated with Impaired Waters

Nutrient Sampling

Nitrite-Nitrate	**Number of Samples**		
	10	7	3
73a	< 0.49	0.49 - 0.68	>0.68
74a, 65j, 68a	< 0.28	0.28 - 0.40	>0.40
74b	< 1.49	1.49 - 2.08	>2.08
65a, 65b, 65e, 65i	< 0.43	0.43 - 0.60	>0.60
71e	< 4.35	4.35 - 6.09	>6.09
71f	< 0.32	0.32 - 0.56	>0.56
71g, 71h, 71i	< 1.15	1.15 - 1.61	>1.61
68b	< 0.54	0.54 - 0.75	>0.75
69d	< 0.34	0.34 - 0.47	> 0.47
67f, 67g, 67h, 67i	< 1.53	1.53 - 2.14	>2.14
66d	< 0.63	0.63 - 0.88	>0.88
66e, 66f, 66g, 68c	<0.38	0.38 - 0.54	>0.54
Total Phosphate	**Number of Samples**		
	10	7	3
73a	<0.25	0.25 - 0.44	>0.44
74a	<0.12	0.12 - 0.21	>0.21
74b	<0.10	0.1 - 0.18	>0.18
65a, 65b, 65e, 65i, 65j, 71e, 68b, 67f, 67h, 67i	<0.04	0.04 - 0.07	>0.07
71f, 71g	<0.03	0.03 - 0.053	>0.053
71h. 71i	<0.18	0.18 - 0.32	>0.32
68a, 68c, 69d, 66f	<0.02	0.02 - 0.035	>0.035
67g	<0.09	0.09 - 0.16	>0.16
66d, 66e, 66g	<0.01	0.01 - 0.018	>0.018

Pathogen Sampling

E Coli	Number of Samples		
	10	7	3
Statewide	<941	941 - 1647	>1647

Total Suspended Solids Sampling

TSS	Number of Samples		
	10	7	3
65a, 67i, 73a	<64	64 - 112	>112
65e, 65i, 74b	<29	29 - 51	>51
65b, 67g, 68c, 71e, 71g, 71i, 74a	<13	13 - 23	>23
65j, 66d, 66e, 66f, 66g, 67f, 67h, 68a, 68b, 69d, 71f, 71h	<10	10 - 18	>18

Metals Sampling

Metals	Number of Samples		
	10	7	3
Chromium (hexavalent)	<11	11 - 19.5	>19.5
Mercury	<0.77	0.77 - 1.35	>1.35
Aluminum	<338	338 - 592	>592
Iron	<1218	1218 - 2132	>2132
Manganese	<185	185 - 325	>325
Copper* 65e, 65j, 66d, 66e, 66g, 68a, 74b	<1.25	1.25 - 2.19	>2.19
Copper* 66f, 71f	<4.44	4.44 - 7.77	>7.77
Copper* 67f, 67h, 67i, 68b, 68c, 71g, 71h, 73a	<11.6	11.6 - 20.3	>20.3
Copper* 67g, 71e, 74a	<18.0	18.0 - 31.5	>31.5
Lead* 65e, 65j, 66d, 66e, 66g, 68a, 74b	<0.19	0.19 - 0.33	>0.33
Lead* 66f, 71f	<1.02	1.02 - 1.79	>1.79
Lead* 67f, 67h, 67i, 68b, 68c, 71g, 71h, 73a	<3.51	3.15 - 6.14	>6.14
Lead* 67g, 71e, 74a	<6.07	6.07 - 10.6	>10.6
Zinc* 65e, 65j, 66d, 66e, 66g, 68a, 74b	<16.8	16.8 - 29.4	>29.4
Zinc* 66f, 71f	<58.9	58.9 - 103	>103
Zinc* 67f, 67h, 67i, 68b, 68c, 71g, 71h, 73a	<153	153 - 268	>268
Zinc* 67g, 71e, 74a	<237	237 - 415	>415

* Dependent on Hardness

5. Sampling Downstream of Major Discharges and CAFO's

Water quality information is needed downstream of Major Facilities with NPDES permits and CAFO's. Parameters sampled should include those being discharged (including nutrients if WWTP) and SQSH. If the facility has in-stream monitoring requirements in their permits their data may be used. (Note: stations may not be required for dischargers into very large waterways such as the Mississippi River or large reservoirs.)

Stations should also be established downstream of CAFOs with an emphasis on monitoring biointegrity (SQSH survey if the stream is wadeable) and monthly nutrient and pathogen monitoring.

6. TMDL Development Monitoring

Waterbody monitoring is required to develop TMDLs. The frequency and parameters monitored for TMDL monitoring depends on the specific TMDL and is coordinated with the Watershed Planning Unit.

7. Special Projects

Except for the Southeast Monitoring Network stations, most special project monitoring activities will be contracted to TDH State Lab.

8. Watershed Stream Monitoring

a. In addition to the previous priorities, each EFO should monitor additional stations to confirm continued support of designated uses and to increase the number of assessed waterbodies. Macroinvertebrate biorecons, habitat assessments, and field measurements of DO, specific conductance, pH and temperature are conducted at the majority of these sites. These priorities include:

- Previously assessed segments, particularly large ones, that would likely revert to Category 3 unassessed status. (Note that a single site per assessed segment is generally adequate if assessment was supporting and no changes are evident).

- Sites below ARAP activities or extensive nonpoint source impacts in wadeable streams where biological impairment is suspected. Examples might be unpermitted activities, violations of permit conditions, failure to install or maintain BMPs, large-scale development, clusters of stormwater permits, or a dramatic increase in impervious surfaces.

- Unassessed reaches especially in third order or larger streams or in disturbed headwaters.

- Pre-restoration or BMP monitoring. In most cases this sampling would be to document improvements but might also be needed to confirm that the stream is a good candidate for such a project. This protects against the possibility that a supporting stream could be harmed by unnecessary restoration.

Group 2 watershed will be monitored by EFOs in FY 2022-2023 (Appendix A).

Table 11 provides the parameters list for each project for sampling. The *QSSOP for Chemical and Bacteriological Sampling of Surface Water* (TDEC, 2022) describes chemical and bacteriological sampling, field parameter readings, and flow measurement procedures. The *QSSOP for Macroinvertebrate Stream Surveys* (TDEC, 2021) describes protocols for collection of benthic macroinvertebrate samples and habitat assessment. The *QSSOP for Periphyton Stream Surveys* (TDEC, 2010) describes protocols for collection of periphyton sampling.

b. Watershed Monitoring Projects 319(h) and 106 Grant Funds

Selected watershed sites will be monitored as part of a watershed strategy integrating point and non-point sources of pollution. These sites and strategies are described more completely in specific 319(h) and 106 grant applications. TDEC's partnership with the Non-point Source Program at the Tennessee Department of Agriculture has resulted in several contracts being awarded to TDEC involving watershed monitoring.

Table 11. Parameter List for the Water Column

Parameter	TMDLs				Ref. Sites ECO, FECO & SEMN	303(d)*	Long Term Trend Stations	Watershed Sites	Landfills	Trip and Field Blanks
	Metals †/pH	DO	Nutrients	Pathogens						
Acidity, Total	X (pH)							O		
Alkalinity, Total	X (pH)				X	O	X	O		
Aluminum, Al	X†					O	X	O	X	O
Ammonia Nitrogen as N		X	X		X	O	X	O	X	O
Arsenic, As	X†				X	O	X	O	X	O
Cadmium, Cd	X†				X	O	X	O	X	O
Chloride					X		X		X	
Chromium, Cr	X†				X	O	X	O	X	O
$CBOD_5$		X				O		O		
Color, Apparent					X		X			
Color, True					X		X			
Conductivity (field)	X	X	X	X	X	X	X	X	X	
Copper, Cu	X†				X	O	X	O	X	O
Dissolved Oxygen (field)	X	X	X	X	X	X	X	X	X	
Diurnal DO		X	X							
E. Coli				X	O	O	X	O		
Flow	O	O	O	O	O, X SEMN	O	O	O		
Iron, Fe	X†				X	O	X	O	X	O
Lead, Pb	X†				X	O	X	O	X	O
Manganese, Mn	X†				X	O	X	O	X	O
Mercury, Hg	X†					O	O	O	X	O
Nickel, Ni	X†					O	X	O	X	O
Nitrogen NO_3 & NO_2		X	X		X	O	X	O	X	O
pH (field)	X	X	X	X	X	X	X	X	X	
Residue, Dissolved					X	O	X	O	X	
Residue, Settleable						O	O	O		
Residue, Suspended	X		X	X	X	O	X	O	X	
Residue, Total						O	X	O	X	
Selenium, Se	X				X	O	X	O	X	O
Sulfates					X(68a,69de), SEMN	O	X(68a,69de)	O		O
Temperature (field)	X	X	X	X	X	X	X	X	X	
Hardness ($CaCO_3$) by calculation	X				X	O	X	O	X	O
Total Kjeldahl Nitrogen		X	X		X	O	X	O	X	O
Total Organic Carbon	X		X		X	O	X	O		
Total Phosphorus (Total Phosphate)		X	X		X	O	X	O	X	O
Turbidity (field or lab)			X	X	X	O	X	O		
Zinc, Zn	X†				X	O	X	O	X	O
Biorecon					X			X (or SQSH)		
SQSH			X (or biorecon)		X	X (or biorecon) unless listed for				

Parameter	TMDLs				Ref. Sites ECO, FECO & SEMN	303(d)*	Long Term Trend Stations	Watershed Sites	Landfills	Trip and Field Blanks
	Metals †/pH	DO	Nutrients	Pathogens						
						pathogens				
Habitat Assessment					X	X		X		
Chlorophyll *a* (Non-wadeable)		R	X			R for nutrient in non-wadeable				
Diatoms (Wadeable)		R	X		X	R for nutrients in wadeable				

Optional (O) – Not collected unless the waterbody has been previously assessed as impacted by that substance or if there are known or probable sources of the substance. For the blanks, the optional parameter is included every 10th time (field blank) or 10th trip (trip blank) the parameter is collected.
R – Recommended if time allows.
† – Sample for pollutant on EPA Approved List of Impaired and Threatened Waters.
* - Minimally parameters for which stream is EPA Approved List of Impaired and Threatened Waters must be sampled.

The following parameters are never requested unless there is specific reason to do so: antimony, barium, beryllium, calcium, magnesium, potassium, silver, sodium, boron, silica, total coliform, fecal coliform, enterococcus, fecal strep, cyanide, ortho-phosphorus and $CBOD_5$

Nitrogen (nitrate) and nitrogen (nitrite) should only be collected at waterbodies with designated use of drinking water unless other specific reason to do so.

QC samples (trip and field blank) are only collected for parameters requested at other sites in the same sample trip unless otherwise specified above to not sample.

B. Monitoring Activities

1. Macroinvertebrate Surveys

There are several levels of stream surveys undertaken by the division to fulfill various information needs. These surveys are a very important source of information for the 305(b) report, toxics monitoring, compliance and enforcement activities, and other division information needs.

The division utilizes standardized stream survey methodologies. The surveys performed rely heavily on biological data instead of chemical data. The *QSSOP for Macroinvertebrate Stream Surveys* (TDEC, 2021) describes protocols for collection of benthic macroinvertebrate samples and habitat assessment. The Watershed Planning Unit is responsible for the coordination of survey activities. Macroinvertebrate sampling is listed in Appendix A.

A biological reconnaissance (Biorecon) is often performed when a brief visit to a stream is appropriate. The biorecon is a field-based assessment that yields relatively small amounts of data in a short amount of time. These surveys can be used for a water quality assessment in which the presence or absence of clean water indicator organisms reflects the degree of support of designated uses.

A more intensive survey, collecting a Semi-Quantitative Single Habitat Bank (SQBANK) or Semi-Quantitative Single Habitat Kick (SQKICK), is used when a quantifiable assessment of the benthic community is needed. Biometrics using relative abundance can be calculated. This method can be compared to the division's numeric translators for biocriteria. Both biorecon and intensive surveys are valuable when information beyond long-term trend monitoring is needed concerning a specific location.

2. Diatom Surveys

Diatoms are early indicators of nutrient enrichment. Changes in the diatom community generally occur before macroinvertebrate populations are affected. The division has conducted diatom surveys in reference streams for years in order to build an expected baseline. In 2019, diatom sampling was incorporated in streams with evidence of nutrient enrichment where macroinvertebrate communities did not show a response. TN in collaboration with Ky, Al, Ga, EPA and Tetratech is in the final stages of developing a SE diatom multi-metric index. After calibration to TN bioregions, the index will be used to supplement macroinvertebrate and chemical monitoring in assessments.

Fish Tissue Monitoring

Fish tissue samples are often the best way to document chronic low levels of persistent contaminants. In the mid-1980's, sites were selected that had shown significant problems in the past and would benefit from regularly scheduled monitoring. Additional sites were added in areas of concern. In 2019, other heavily fished waterbodies with no history of contamination were added to the watershed cycle. A list of fish tissue stations to be sampled in 2022-23 appears in Table 12. Parameters to be sampled are listed in Table 13. TDEC DWR, TVA, TWRA, NPS and DOE regularly discuss fish monitoring surveys in the state. Data from these surveys help the division assess water quality and determine the issuance of fishing advisories.

Table 12. 2022– 2023 Fish Tissue Sampling Sites

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
CUMBE206.7DA	Cheatham Reservoir	Lytle Farms area u/s Stones River d/s Old Hickory Dam (work upstream from ramp)	Mercury, PCBs, PFAS	Bass (LMB, SMB and.or Spotted), Catfish	TDH

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
CUMBE149.0DA	Cheatham Reservoir	Cheatham Dam	Mercury, PCBs, PFAS	Bass (LMB, SMB and.or Spotted), Catfish	TDH
EFSTO010.2RU	East Fork Stones River Walter Hill Reservoir)	Uptream Walter Hill dam	Mercury and PFAS	Bass	TDH
HIWAS018.6MM	Hiwassee River	U/S Highway 11 Bridge U/S Bowater D/S Oostanaula Creek	Mercury and Se and PFAS on largest comp.	Largemouth Bass	TDH
HIWAS023.0BR	Hiwassee River	Cleveland Waterworks Intake	Mercury and Se and PFAS on largest comp. PFAS on largest LMB comp.	Largemouth Bass	TDH
NFFDE009.8DY	North Fork Forked Deer	Hwy 412	106 metals and organics PFAS on largest LMB comp.	Largemouth Bass, Channel Cat	TDH
NFFDE020.5GI	North Fork Forked Deer	Old Hwy 104	106 metals and organics, PFAS on largest LMB comp.	Largemouth Bass, Channel Cat	TDH
LOOSA005.0SH	Loosahatchie River	First Br on Loosahatchie River at North Watkins Road Crossin	106 organics, metals, (dioxin on largest cat sample), PFAS on largest game fish sample	Game fish and cats	TDH
MISSI724.6SH	Mississippi River	Memphis South Plant	106 organics, metals, (dioxin on largest cat sample), PFAS on largest game fish sample	Game fish/catfish/buffalo	TDH

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
MISSI735.0SH	Mississippi River	Near I-40	106 organics, metals, (dioxin on largest cat sample), PFAS on largest game fish sample	Game fish/catfish/buffalo	TDH
MISSI754.0SH	Mississippi River	Meeman Shelby State Park	106 organics, metals, (dioxin on largest cat sample), PFAS on largest game fish sample	Game fish/catfish/buffalo	TDH
STONE038.0RU	Sones River (Percy Priest Embayment)	Near Jefferson Springs	Mercury and PFAS	Bass	TDH
ELK135.0FR	Tims Ford Reservoir	Tims Ford Reservoir Near Marble Plains	Bass and Catfish	Metals and Organics, PFAS	TVA
ELK150.0FR	Tims Ford Reservoir	Tims Ford Reservoir at Maple Bend	Bass and Catfish	Metals and Organics, PFAS	TVA
DUCK249.5CE	Normandy Reservoir	Near Dam	Bass and Catfish	Metals and Organics, PFAS	TVA
SFHOL000.5SU	Fort Patrick Reservoir	Near Dam	Bass and Catfish	Metals and Organics, PFAS	TVA
FBROA077.5CO	French Broad River	HWY 321	Bass and Catfish	Metals and Organics, PFAS	TVA
NOLIC008.5HA	Nolichucky River	Hurley Island	Bass and Catfish	Metals and Organics, PFAS	TVA
PIGEO007.6CO	Pigeon River	Tannery Island	Bass and Catfish	Metals and Organics, PFAS	TVA
FBROA033.0SV	Douglas Reservoir	Forebay	Bass and Catfish	Metals and Organics, PFAS	TVA
FBROA051.0JE	Douglas Reservoir	Near Indian Creek and Douglas Estates	Bass and Catfish	Metals and Organics, PFAS	TVA

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
SFHOL018.8SU	Boone Reservoir	Dam	Bass and Catfish	Metals and Organics, PFAS	TVA
SFHOL027.0SU	Boone Reservoir	Boone Reservoir one Mile U/S Devault Road Bridge	Bass and Catfish	Metals and Organics, PFAS	TVA
WATAU006.0SU	Boone Reservoir	Boone Reservoir (Watauga Embayment In) at Pickens Bridge - Surface	Bass and Catfish	Metals and Organics, PFAS	TVA
TENNE425.5MI	Nickajack Reservoir	Dam	Bass and Catfish	Metals and Organics, PFAS	TVA
TENNE469.0HM	Nickajack Reservoir	Nickajack Reservoir at Dupont Hwy (Chickamauga Tailwater)	Bass and Catfish	Metals and Organics, PFAS	TVA
TBD	Great Falls Reservoir	Rock Island State Park	Mercury, Selenium and PFAS	Bass	TWRA
TBD	Burgess Falls State Park Reservoir	Burgess Falls State Park	Mercury, Selenium and PFAS	Bass	TWRA (Tentative)
TBD	Fall Creek Falls Lake	Fall Creek Falls State Parkd	Mercury, Selenium and PFAS	Bass	TWRA (Tentative)
TBD	Couchville Lake	Long Hunter State Park	Mercury, Selenium and PFAS	Bass	TWRA (Tentative)

Table 13. Analyses for Fish Tissue *

Weight (Pounds)		Chlordane, total		Selenium
Length (Inches)		CIS Chlordane		Zinc
Lipid Content (Percent)		Trans Chlordane		Methoxychlor
PCBs		CIS Nonachlor		Dioxins
Aldrin		Trans Nonachlor		Furans
Dieldrin		Alpha BHC		PFAS
DDT, total		Gamma BHC		
O, P - DDE		Hexachlorobenzene		

P, P - DDE		Arsenic		
O, P - DDD		Cadmium		
P, P - DDD		Chromium		
O, P - DDT		Copper		
P, P - DDT		Mercury		
Endrin		Lead		

* Fish Tissue results reported in mg/kg, wet weight except for dioxins which are reported in ng/kg. Metals are analyzed by Tennessee Department of Health (TDH), Laboratory Services and organics by contract laboratories.

C. Stream and Reservoir Posting

The TDEC Commissioner is identified in the Tennessee Water Quality Control Act as having the authority to post bodies of water based on public health concerns. The Commissioner has delegated authority to the Director of the Division of Water Resources. This authority is carried out with assistance from TWRA and TVA. Bacteriological contamination is the major reason for posting a stream against water contact recreation. The major reason for posting a stream against the consumption of fish is bioaccumulation of carcinogens. The most current list of posted streams can be found in on https://www.tn.gov/content/tn/environment/program-areas/wr-water-resources/watershed-stewardship/bacteriological-and-fishing-advisories.html

D. Sediment Sampling

The division collected a considerable number of sediment samples from 1984 - 1994. However, analysis of the data has been handicapped by a lack of sediment criteria. When criteria become available, analysis of sediment samples will be a more widely used component of long-term trend monitoring. During FY 2022-2023, sediment samples will be collected on an as-needed basis.

E. Wetlands Monitoring

Tennessee has approximately 787,000 acres of wetlands. The division has identified 54,811 impacted wetland acres. Historically, the largest single cause of impacts to existing wetlands was loss of hydrologic function due to channelization and leveeing. Presently, development such as roads, subdivisions and commercial centers are impacting wetlands more than other activity.

Tennessee received a grant from EPA to develop a protocol for wetland assessment. Tennessee has completed its development of a rapid assessment methodology for wetlands. The Tennessee Rapid Assessment Methodology (TRAM) is based on models developed as part of the Hydrogeomorphic (HGM) approach for assessing wetland function. Tennessee has now developed rapid assessment forms for depression, riverine, flat and slope wetlands. Tennessee is continuing to use the TRAM as a component of a wetland conditional assessment within the state.

The TRAM has provided a method to quickly assess existing wetland resource value which has aided in assessing the ecological consequences of §401 and ARAP permitting decisions. The

Division of Water Resources Waterlog database has enabled the permitting program to track compliance and provide a source of wetland impact and mitigation data for use by agencies involved in wetland monitoring and research.

Tennessee Tech University was awarded an EPA grant to assess wetland mitigation in Tennessee and update their previous study from the late 1990's. The fieldwork for this assessment has been completed.

In 2016 TDEC participated in the EPA's National Wetland Condition Assessment (NWCA) and participated in the 2021 NWCA cycle, with fieldwork completed between April and August, 2021. Final reporting requirements will be submitted to EPA at the close-out of the NWCA grant cycle after September 30, 2022.

In 2013, 2017 and 2019, TDEC was awarded EPA Wetland Program Development Grants (WPDG) to continue to build a sustainable and focused wetland program for the state of Tennessee. A key component of the 2013 grant was to develop a Wetland Program Plan built on the EPA's Core Elements Framework. This plan was completed in 2019 and outlines TDEC's objectives and goals for wetlands and streams in Tennessee. In addition, through the 2017 and 2019 WPDG's the Division was awarded EPA grant funding to identify and catalogue wetland reference sites. The objectives and grant deliverables that have been accomplished include producing an ecological classification of wetlands in Tennessee based on the Ecological Systems classification and the National Vegetation Classification systems published by NatureServe, developing and populating a database for data collected at wetland reference sites, and selecting and conducting vegetation sampling at reference standard sites representing the diversity of wetland plant communities in Tennessee within Level III EPA Ecoregions across the state. Reference standard sites that were selected targeted globally rare and under sampled wetland types in Tennessee. These data will contribute to the improvement of wetland assessment methods and mitigation targets in Tennessee. These data were collected under the 2017 WPDG in the summer of 2020 and the associated database was delivered to TDEC by the contracting state agency in September 2020. Data from additional sites were collected in the summer of 2021 under the 2019 WPDG, and the associated database expansion was delivered to TDEC in September 2021. Due to COVID-19-related field delays and restrictions on in-person meetings, TDEC received a one-year no-cost extension of the 2017 WPDG until September 2022 and a one-year no-cost extension of the 2019 WPDG until September 2023 to complete the remaining deliverables. There are currently no remaining deliverables for the 2017 WPDG, and final reporting requirements will be submitted to EPA at the close-out of the grant after September 30, 2022. The remaining deliverables for the 2019 WPDG include the ongoing development of a training course for the SQT protocol. This task is scheduled to be completed by September 2023.

In addition, in 2020, the TDEC Commissioner requested a review of the TN Stream Quantification Tool (SQT). The University of Tennessee, TDEC, and USACE are currently leading a workgroup of stream mitigation stakeholders focusing on revisions/improvements to the TN SQT. These updates are expected to improve the tool to prevent functional loss from 401 Water Quality Certifications and compensatory mitigation projects across the state. The Division of Water Resources provided a white paper summary of the proposed revisions to the TDEC Commissioner in November 2021. Most recently, the University of Tennessee collected field data using the existing method and the proposed method from a variety of reference sites, in

order to compare the resulting scores from each. These results were present by the University of Tennessee to TDEC in spring of 2022, and to the larger stakeholder working group in late May 2022. A joint field exercise with the US Army Corps of Engineers Nashville District and the University of Tennessee is to be scheduled in the next few weeks to do a "test drive" of the newly proposed method.

F. Southeast Monitoring Network Sites in Tennessee

FY 2020 106 Supplemental Monitoring Initiatives

During the Southeastern Water Pollution Biologist Association (SWPBA) annual meeting, in November 2011, the potential for stream community changes resulting from variations in hydrology and termperature as a result of changing climate was a focus of the Southeastern Water Pollution Biologist Association (SWPBA). The result was the creation of an interagency workgroup consisting of freshwater biologists from the eight EPA region IV states and the Tennessee Valley Authority (TVA) interested in developing a joint reference stream monitoring network. Staff from EPA, USFS and USGS are also on the committee to provide technical support and advise. Although two goals of the group are to assess existing responses to climate change and identify climate-sensitive indicators, it was agreed that a reference network with consistent sampling methodology would be useful for establishing regional reference conditions and consistency in assessments of shared watersheds and ecoregions.

Each of the EPA region IV states and TVA agreed to target and monitor reference streams beginning in 2013 and continue annual monitoring indefinitely. Existing monitoring programs will be adjusted at key reference sites to include additional parameters so that monitoring will be consistent for all sites in the network. At a minimum, sampling will include macroinvertebrates, habitat assessments, field parameters, flow and continuous temperature monitoring. Some agencies, including TDEC alos collect periphyton, water quality, channel profiles and continuous flow. TVA has agreed to sample fish at sites draining into the Tennessee River.
Protocols and selection of vulnerable streams were based on studies done by the Northeast Regional Monitoring Network. Existing data will be mined where available.

The goal is to establish a minimum of 30 reference sites in protected watersheds where land-use is not expected to change significantly for at least 20 years. Tennessee has agreed to monitor 11 sites in ecoregions 66, 67, 68 and 71 (Table 14). Eleven sites will enable some statistical determinations using sate data in addition to analysis of grouped data.

1. Project Objectives

a. Establish annual monitoring at 11 reference streams consistent with protocols agreed upon by Southeast Monitoring Network.

b. Develop a formal interagency partnership to develop a monitoring program that is done consistently, long-term and can withstand changes in staff.

c. Combine data with other SE states for statistical interpretation of current reference condition and changes over time in undisturbed systems.

d. Determine whether stream communities are being affected by variables such as changes in hydrology, temperature or riparian vegetation species.

e. Distinguish natural variation from other stressors.

f. Isolate biometrics/taxa that would be related to extreme weather events.

g. Detect changes early in a way that informs management strategies such as restoration and adaption.

2. Methodology

a. Develop a joint inter-agency monitoring plan.

b. Select 11 established reference sites based on agreed upon reference criteria in ecoregions 66, 67, 68 and 71.

c. Deploy two continuous monitoring temperature and water level (barometric pressure) probes at each site (both water and air).

d. Monitor each site in April and September for macroinvertebrates and diatoms in April. Conduct habitat assessments concurrent with biological monitoring (Table 14).

e. Analyze biological data to species level.

f. Monitor each site four times annually (January, April, July, September) for standard TDEC-DWR ecoregion reference water quality parameters as well as any additional parameters specified by SE monitoring group.

g. Measure flow and field parameters quarterly at each site.

h. Download continuous monitoring data from both air and water probes quarterly.

All field sampling and sample collection will be conducted by trained Environmental Scientists with Tennessee Department of Environment and Conservation (TDEC), Division of Water Resources. Macroinvertebrate analyses to species level will be contracted to Aquatic Resources Center through the Aquatic Biology Section, Tennessee Department of Health (TDH). Diatom analysis will be contracted through the Aquatic Biology Section. Chemical analysis will be completed by the Inorganic Chemistry Section, TDH or by contracted lab. Data will be maintained and publicly available in a joint database with data from other agencies in the monitoring network.

Table 14. Southeast Monitoring Network Sites – Tennessee

Station	Stream	EFO	Latitude	Longitude	HUC	ECOIV	Drainage sq mi.	% Forest	Protected Drainage
ECO66E09	Clark Creek	JC	36.15077	-85.5291	TN06010108	66E	9.2	96	Sampson Mtn. Wilderness Cherokee NF
ECO66G05	Little River	K	35.65333	-83.5773	TN06010201	66G	34.9	100	Great Smoky Mtns. NP
ECO66G12	Sheeds Creek	CH	35.00305	-84.6122	TN03150101	66G	5.7	99	Big Frog Wilderness Cherokee NF
ECO66G20	Rough Creek	CH	35.05386	-84.48031	TN06020003	66G	6.04		
ECO6702	Fisher Creek	JC	36.4900	-82.9403	TN06010104	67F	11.6		
ECO67F06	Clear Creek	K	36.21361	-84.0597	TN06010207	67F	4.59		
ECO67F13	White Creek	K	36.34361	-83.89166	TN06010205	67F	3.1	91	Chuck Swann Wildlife Management Area
ECO68A03	Laurel Fork Station Camp Creek	CK/MS	36.51611	-84.6981	TN05130104	68A	5.9	90	Big South Fork NRRA
ECO68C20	Crow Creek	CH	35.1155	-85.9111	TN06030001	68C	18.4	95	Carter State Natural Area
ECO71F19	Brush Creek	CL	35.4217	-87.5355	TN06040004	71F	13.3		
ECO71H17	Clear Fork Creek	CK	35928651	-85.992117	TN05130108	71H	14.3		

III. WASTE LOAD ALLOCATION/TMDL DEVELOPMENT

A. Waste load Allocations/TMDL Development – (State Appropriations, 106 Funds, and 319(h) Funds)

Wasteload Allocations. Prior to issuance of NPDES permits, the limits for specific chemical constituents of the effluent must be determined. In those cases where there is a TMDL in place, NPDES permit limits cannot exceed the limits set by the TMDL.

A Total Maximum Daily Load (TMDL) is a study that 1) identifies the sources of pollutants in a water body, 2) quantifies the amount of the pollutants, and (3) recommends regulatory or other actions that may need to be taken in order for the stream to no longer be polluted. Following are actions that might be recommended:

- Re-allocate limits on the sources of pollutants documented as impacting streams. It might be necessary to lower the amount of pollutants being discharged under NPDES permits or to require the installation of other control measures, if necessary, to insure that standards will be met.

- For sources the Division does not have regulatory authority over, such as ordinary agricultural and forestry activities, provide information and technical assistance to other state and federal agencies that work directly with these groups to install appropriate BMPs.

Even for impaired waters, TMDL development is not considered appropriate for all bodies of water. Additionally, in cases involving pollution sources in other states, the recommendation may be that another state or EPA develops the TMDL.

319(h) Funds. The Tennessee Department of Agriculture administers the 319 (h) grant program.

IV. COMPLAINTS, FISH KILLS, WASTE SPILLS AND OTHER EMERGENCIES

A. Complaints

The division investigates and attempts to resolve over 2,100 complaints each year. Most of these are filed by private citizens who wish to convey information concerning suspected pollution events. As such, these complaint investigations are an important source of information. The division places a high priority on the investigation of these reports. Staff are assigned to this activity for the investigation to be accomplished in a timely and efficient manner. Due to its sporadic nature, complaint investigations are difficult to plan and often divert staff from other program needs.

On occasion, a formal 118(a) complaint is filed with the Commissioner's office. When the complaint involves water pollution, a formal process coordinated by the Enforcement and Compliance Section is begun. The division investigates the complaint and develops a formal response, which is then approved by the Commissioner's office.

B. Fish Kills, Waste Spills, and other Emergencies

The Federal Emergency Management Agency (FEMA) requires that each state have an Emergency Management Plan (EMP). Employees of the State are required to serve under emergency situations. The State has instituted the Tennessee Emergency Management Agency (TEMA) program for coordinating emergency response to spills of materials that may adversely affect Tennessee's waters. The main responsibilities are to respond in all emergency situations including, but not limited to:

1. Disasters, including natural and accidental; for example, truck wrecks or train derailment, structural or mechanical failure, fish kills due to spills or bypassing from wastewater treatment plants, etc.
2. War-related emergency (conventional or nuclear)
3. Resource crises (for example, shortage of water treatment plant chemicals)

When a fish kill is reported to the division, the ensuing investigation is often a joint effort between the division and the Tennessee Wildlife Resources Agency (TWRA). When arriving on-site, a preliminary attempt is made to determine whether the fish kill is due to natural conditions or human causes. If the fish kill appears related to pollution, division staff members collect samples, take photographs, and inspect nearby facilities for potential pollutant sources. The TWRA officer counts and identifies the dead fish and calculates a monetary value of the damage to the fishery. An enforcement package is prepared if a source can be identified and turned over to the Enforcement and Compliance Section of DWR. A detailed list of waste spills and fish kills will be kept for environmental indicator purposes.

Organizational changes in TDEC have resulted in the creation within each EFO of an Emergency Response Team (ERT). If a waste spill has occurred, the ERT responds to major emergencies; teams usually have a DWR staff member and staff from other divisions. Moderate emergencies may be handled by DWR or the ERT, depending on the ERT's decision. Minor emergencies are handled by DWR. As soon as the major emergency is over, the ERT turns over the follow-up activities and remediation efforts to DWR or Solid Waste Management (SWM) as appropriate. DWR may recommend containment and mitigation efforts on-site.

V. COMPLIANCE MONTORING

A. Facility Inspection Schedule

The information in Appendix B reflects the proposed activities in the areas of compliance assurance and operation and maintenance (O & M) inspections for FY 22-23. These inspections have been coordinated to fulfill the data needs of the permits, O & M, and enforcement programs. Major facilities are inspected at a rate of once every two years and minor facilities are inspected at a rate of once every five years. Facilities in noncompliance with permit limits will be given priority scheduling if needed, but all facilities will be inspected according to the time frames set out in the EPA Enforcement Workplan. Inspections are entered into Waterlog and flowed into ICIS-NPDES within 40 days of inspection completion. The DWR NPDES inspection year reflects EPA's fiscal year, October 1, 2022– September 30, 2023.

B. Pretreatment Inspections and Audits

As part of the state's NPDES permit program, the division has developed and administers the pretreatment program. The intent of the pretreatment program is to prevent interference with, or inhibitions of, the pollutant removal performance of the wastewater treatment facility; provide protection for sludge disposal, provide protection for the receiving stream; and enforce categorical pretreatment standards.

Currently the division has 101 active pretreatment programs. The progress of each developing program is being tracked.

The State has the approval authority to overview the POTW's (Publicly Owned Treatment Works) pretreatment program to (1) determine whether the POTW is properly implementing and enforcing pretreatment program requirements, (2) identify any pretreatment program areas that may require improvement subsequent to program approval and (3) evaluate program progress and need for modifications.

C. Distribution of Audits to be Performed

The division is on a five-year cycle for pretreatment audits. During a five-year cycle, Central Office staff will perform a pretreatment audit on each POTW pretreatment program. In the remaining four years, the EFO staff will be responsible for conducting two pretreatment compliance inspections (PCIs) and two technical assistance visits (TAVs). While TAVs are not mandated by the EPA, they play an important role in providing facilities the

opportunity to ask questions and stay in contact with the division. Therefore, the TAVs are conducted during those years not allocated to audits or inspections.

The TAVs conducted at sites with approved programs will, at a minimum, require the inspector to gather enough information to properly complete the WENDB (Water Enforcement National Data Base) data sheet and the RNC/SNC (Reportable Non-Compliance/Significant Non-Compliance) information required by Appendix A of the E-Reporting Rule. It is recommended that PCIs be conducted the first and third year following an audit, and TAVs be conducted the second and fourth years. TAVs will also be conducted at sites under development to answer any questions that the municipality may have, plus at sites that have been inactivated to verify status.

The Central Office performs pretreatment audits and assists the field offices with PCI's and TAV's as needed. The Central Office also oversees any developing/reactivating programs.

D. Whole Effluent Toxicity Testing

Biomonitoring in Tennessee has two distinct stages. For the first ten years of biomonitoring (1978 - 1988), the division documented the presence of toxicity in industrial and municipal effluents and established the need to include whole effluent toxicity (WET) limits in NPDES permits. The science and need for this program are well established and most discharger permits incorporate these limits. The division's biomonitoring efforts have shifted more toward compliance assurance and enforcement activities. The state will require environmental field offices (EFOs) to conduct inspections on 2.5% of major and minor facilities with WET permit limits on an annual basis. There are 309 individual permitted facilities that have WET limits incorporated into their permit.

VI. LITERATURE CITED

Arnwine, D.H., J.I. Broach, L.K. Cartwright and G.M. Denton. 2000. *Tennessee Ecoregion Project.* Tennessee Department of Environment and Conservation, Division of Water Pollution Control. Nashville, Tennessee.

Arnwine, D.H., K.J. Sparks, and R.R. James. 2006. *Probabilistic Monitoring of Streams Below Small Impoundments in Tennessee.* Tennessee Department of Environment and Conservation, Division of Water Pollution Control. Nashville, Tennessee.

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers*. EPA 841-B-99-002. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

Denton, G.M., D.H. Arnwine and S.H. Wang. 2001. *Development of Regionally-Based Interpretations of Tennessee's Narrative Nutrient Criterion*. Tennessee Department of Environment and Conservation, Division of Water Pollution Control. Nashville, Tennessee.

Tennessee Department of Environment and Conservation. 2001. *Monitoring to Support TMDL Development*. Division of Water Pollution Control, Watershed Management Section. Nashville, TN.

_____. 2019. *Tennessee's Plan for Nutrient Criteria Development.* Division of Water Pollution Control. Nashville, Tennessee.

_____. 2010 . *Quality System Standard Operating Procedure for Periphyton Stream Surveys.* Division of Water Pollution Control. Nashville, Tennessee

_____. 2021. Quality Assurance Project Plan for 106 Monitoring in the Division of Water Pollution Control. Volume I. Version 12. Division of Water Resources. Nashville, Tennessee.

_____. 2021 Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys. Division of Water Resources. Nashville, Tennessee.

_____2019. Board of Water Quality, Oil and Gas Rules of the Tennessee Department of Environment and Conservation Chapter 0400-40-03 General Water Quality Criteria, Division of Water Resources, Nashville, Tennessee.

_____2019. Board of Water Quality, Oil and Gas Rules of the Tennessee Department of Environment and Conservation Chapter 0400-40-04 Use Classifications for Surface Waters.

_____.2022. *Final 2022 List of Impaired and Threatened Waters in Tennessee.* Division of Water Resources. Nashville. Tennessee.

_____. 2022. Quality System Standard Operating Procedure for Chemical and Bacteriological Sampling of Surface Water. Division of Water Pollution Control. Nashville, Tennessee.

_____. 2021. *Tennessee's Consolidated Assessment and Listing Methodology (CALM)*. Division of Water Resources. Nashville. Tennessee.

Tennessee Secretary of State. 1994. *The Tennessee Water Quality Control Act of 1977 including the 1994 Amendments.* Planning and Standards Section, Division of Water Pollution Control. Nashville, Tennessee.

U.S. Congress. 2002. *Federal Water Pollution Control Act as Amended Through P.L. 107-303. 33 U.S.C.* 1251 et. seq. Washington, D.C.

U.S. Department of Army, Charleston District, Corps of Engineers, 2002.*Regulatory Division Standard Operating Procedure*. Charleston, SC.

U.S. Environmental Protection Agency. 2003. *Elements of a State Water Monitoring and Assessment Program.* EPA 841-B-03-003. Office of Water. Office of Wetlands, Oceans and Watersheds. Assessment and Watershed Protection Division. Washington, D.C.

____.2022. *Information Concerning 2022 Clean Water Act Section 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions.* Office of Water. Office of Wetlands, Oceans and Watersheds. Assessment and Watershed Protection Division. Watershed Branch. Washington, D.C.

APPENDIX A:

MONITORING STATIONS SCHEDULED TO BE SAMPLED

Projected Monitoring Stations for 2022-2023

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
SEMN	TN03150101012_0510	ECO66G12	Sheeds Creek	CHEFO			2	1		4	4
	TN05130101015_0600	VALLE000.1CL	Valley Creek	MU							4
	TN05130101015_0700	STRAI000.1CL	Straight Creek	MU							4
	TN05130101015_0800	TACKE000.5CA	Tackett Creek	MU							4
	TN05130101015_2000	CLEAR030.5CA	Clear Fork Cumberland River	MU							4
	TN05130101015_3000	CLEAR037.3CL	Clear Fork Cumberland River	MU							4
Ambient	TN05130103001_1000	CUMBE381.1CY	Cumberland River	CKEFO						4	4
SEMN	TN05130104016_0100	ECO68A03	Laurel Fork Of Station Camp Creek	MU			2	1		4	4
	TN05130104037_1000	NEW008.8SC	New River	MU							4
	TN05130104037_1300	FECO69D01	UT to New River	MU							4
	TN05130104037_1850	SMOKY002.5SC	Smoky Creek	MU							4
	TN05130104037_2000	NEW045.0AN	New River	MU							4
Ambient	TN05130105001_1000	OBEY002.1CY	Obey River	CKEFO						4	4
FS or previously FS	TN05130108001_0100	SNOW001.4SM	Snow Creek	CKEFO			Evaluate FS				
FS or previously FS	TN05130108001_0200	FERGU000.8SM	Ferguson Branch	CKEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN05130108 001_0600	MULHE001.3 SM	Mulherrin Creek	CKEFO			SQSH				
Impaired/ 303(d)	TN05130108 001_0700	CANEY8.9T0. 3SM	Caney Fork River unnamed trib	MU			SQSH				
Ambient	TN05130108 001_1000	CANEY011.2 SM	Caney Fork River	CKEFO					4	4	4
FS or previously FS	TN05130108 002_0200	GOOSE000.3 DB	Goose Creek	CKEFO			Evalua te FS				
Impaired/ 303(d)	TN05130108 002_2000	HICKM013.0 SM	Hickman Creek	CKEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN05130108 002_2000	HICKM013.5 DB	Hickman Creek	CKEFO					12	12	12
Impaired/ 303(d)	TN05130108 002_2000	HICKM013.7 DB	Hickman Creek	CKEFO			SQSH	1	12	12	12
FS or previously FS	TN05130108 004_0100	DRY000.6DB	Dry Creek	CKEFO			SQSH				
SEMN	TN05130108 004_0200	ECO71H17	Clear Fork Creek	CKEFO		2	2	1		4	4
Eco/FEC O Reference	TN05130108 004_0221	FECO71H04	Unnamed Trib to Wilmouth Creek	CKEFO		2	2	1		4	4
FS or previously FS	TN05130108 004_0300	SAUND000.6 WS	Saunders Fork	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130108 004_0310	SAUND000.6 WS	Hurricane Creek	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130108 004_0400	New Station	Rocky Branch	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130108 004_0600	New Station	Purtle Creek	NEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN05130108 004_0800	HELTO000.3 DB	Helton Creek	CKEFO			SQSH				
FS or previously FS	TN05130108 004_1000	SMITH001.8S M	Smith Fork Creek	CKEFO			SQSH				
FS or previously FS	TN05130108 004_1000	SMITH018.5D B	Smith Fork Creek	CKEFO			SQSH				
FS or previously FS	TN05130108 012_0100	WOLF001.4D B	Wolf Creek	CKEFO			SQSH				
Impaired/ 303(d)	TN05130108 012_1000	CFORK021.3 DB	Caney Fork River	CKEFO							
Impaired/ 303(d)	TN05130108 013_1000	CFORK058.9 DB	Center Hill Reservoir	CKEFO							
FS or previously FS	TN05130108 019_1000	PINE005.7DB	Pine Creek	CKEFO			SQSH				
FS or previously FS	TN05130108 021_1000	SINK006.1DB	Sink Creek	CKEFO			SQSH				
FS or previously FS	TN05130108 024_0100	LAURE002.1 VA	Laurel Creek	CKEFO			SQSH				
FS or previously FS	TN05130108 024_1000	ROCKY009.2 VA	Rocky River	CKEFO			SQSH				
Impaired/ 303(d)	TN05130108 024_3000	ROCKY022.2 VA	Rocky River	CKEFO							
Impaired/ 303(d)	TN05130108 024_4000	ROCKY024.5 VA	Rocky River	CKEFO							
Impaired/ 303(d)	TN05130108 025_0200	CLIFF002.1WH	Cliff Creek	CKEFO			SQSH		12	12	
Impaired/ 303(d)	TN05130108 025_0400	HVALL000.3 WH	Hickory Valley Branch	CKEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130108 025_1000		Caney Fork River	CKEFO	1						

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
NA (> 10 miles or _K)	TN05130108025_2000		Caney Fork River	CKEFO							
FS or previously FS	TN05130108027_0200	POLEB003.2BL	Polebridge Creek	CHEFO		Biorecon					
FS or previously FS	TN05130108027_0300	GARDN001.5BL	Gardner Creek	CHEFO		Biorecon					
FS or previously FS	TN05130108027_0500	MEADO000.3BL	Meadow Creek	CHEFO		Biorecon					
Impaired/ 303(d)	TN05130108027_0600	FALLS000.3VA	Fall Creek	CKEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130108027_0600	FALLS000.5VA	Fall Creek	CKEFO			look for black precipitant but no SQSH				
FS or previously FS	TN05130108027_0700	PINEY001.9VA	Piney Creek	CKEFO			SQSH		12	12	
Impaired/ 303(d)	TN05130108027_0750	PINEY012.6VA	Piney Creek	CKEFO			SQSH	1	12	12	12
FS or previously FS	TN05130108027_0800	DRY007.2VA	Dry Fork	CKEFO			SQSH look for Fe/Mn precipitates		12	12	12
Impaired/ 303(d)	TN05130108027_0850		Dry Fork	CKEFO							
FS or previously FS	TN05130108027_1000	CANE004.5VA	Cane Creek	CKEFO	1		Eval FS				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN05130108027_2000	CANE016.7VA	Cane Creek	CKEFO			SQSH		12	12	
D/S WWTP	TN05130108033_0100	LCANE000.1CU	Little Cane Creek	CHEFO			SQSH				
FS or previously FS	TN05130108033_0200	BEAVE001.8BL	Beaverdam Creek	CHEFO		Biorecon					
FS or previously FS	TN05130108033_0210	LBEAV000.8BL	Little Beaverdam Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN05130108033_0300	TAFT000.1BL	Taft Creek	CHEFO			SQSH	1	12	12	
FS or previously FS	TN05130108033_0400	GLADE001.2BL	Glade Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130108033_0410	MILL000.8BL	Mill Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130108033_0420	BRADD000.8BL	Bradden Creek	CHEFO			SQSH	1	12	12	
FS or previously FS	TN05130108033_0450	GLADE011.7BL	Glade Creek	CHEFO		Biorecon					
Impaired/ 303(d)	TN05130108033_0600	BEE2.1T0.5VA	Unnamed Trib to Bee Creek	CKEFO	1						
Impaired/ 303(d)	TN05130108033_2000	BEE007.0BL	Bee Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130108033_3000	BEE012.4BL	Bee Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN05130108036_0100	CLIFT001.0WH	Clifty Creek	CKEFO			SQSH look Mn black or pot eval NS				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
D/S WWTP	TN05130108036_0400	New Station	Whiteoak Branch	CKEFO							
D/S Major Discharger	TN05130108036_0500	WILKE001.8CU	Wilkerson Creek	CKEFO			SQSH				
FS or previously FS	TN05130108036_0600	DUNCA001.0CU	Duncan Creek	CKEFO			SQSH				
FS or previously FS	TN05130108036_0700	CANEY147.8CU	Unnamed trib to Caney Fork River	CKEFO			Evaluate FS				
FS or previously FS	TN05130108036_0800	New station	Hughes Creek	CKEFO			SQSH				
FS or previously FS	TN05130108036_0900	TBD	Laurel Creek	CKEFO			SQSH in wet season				
Impaired/ 303(d)	TN05130108036_0910	MEADO000.5CU	Meadow Creek	CKEFO			SQSH				
D/S Landfill	TN05130108036_0920	FLYNN000.3CU	Flynn Creek	CKEFO			SQSH		12	12	12
FS or previously FS	TN05130108036_1000	CANEY112.0WH	Caney Fork River	CKEFO			SQSH		12	12	
FS or previously FS	TN05130108036_1000	CANEY130.0WH	Caney Fork River	CKEFO			SQSH		12	12	
FS or previously FS	TN05130108036_1100	PUNCH002.0CU	Puncheoncamp Creek	CKEFO							
NA (> 10 miles or _K)	TN05130108036_2000		Caney Fork River	CKEFO							
Impaired/ 303(d)	TN05130108043_0100	CHERR000.9WH	Cherry Creek	CKEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
NA (> 10 miles or _K)	TN05130108043_0300	BRIDG000.2WH	Bridge Creek	CKEFO			SQSH				
Impaired/303(d)	TN05130108043_0500	BSPRI000.1WH	Blue Spring Creek	CKEFO			SQSH				
Impaired/303(d)	TN05130108043_0600	WILDC000.1WH	Wildcat Creek	CKEFO			Evaluate NS				
Impaired/303(d)	TN05130108043_1000	CALFK010.0WH	Calfkiller River	CKEFO			SQSH		12	12	12
Impaired/303(d)	TN05130108043_1000	CALFK014.6WH	Calfkiller River	CKEFO			SQSH		12	12	12
FS or previously FS	TN05130108043_2000	CALFK022.0WH	Calfkiller River	CKEFO			SQSH		12	12	
FS or previously FS	TN05130108043_3000	CALFK038.0PU	Calfkiller River	CKEFO			SQSH		12	12	
Impaired/303(d)	TN05130108043_4000	CALFK040.4PU	Calfkiller River	CKEFO			SQSH		12	12	
FS or previously FS	TN05130108045_0100	CANE006.0PU	Cane Creek	CKEFO			SQSH				
Impaired/303(d)	TN05130108045_0150	CANE011.7PU	Cane Creek	CKEFO			SQSH	1	12	12	
Impaired/303(d)	TN05130108045_0300	HUDGE000.7PU	Hudgens Creek	CKEFO			SQSH				
Impaired/303(d)	TN05130108045_0400	PROOS000.6PU	Pigeon Roost Creek	CKEFO			SQSH		12	12	
Impaired/303(d)	TN05130108045_0400	PROOS002.0PU	Pigeon Roost Creek	CKEFO			SQSH	1	12	12	12
Impaired/303(d)	TN05130108045_0450	PROOS002.4PU	Pigeon Roost Creek	CKEFO					12	12	12
Impaired/303(d)	TN05130108045_0450	PROOS002.6PU	Pigeon Roost Creek	CKEFO			SQSH	1			

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN05130108 045_0500	POAK000.7WH	Post Oak Creek	CKEFO			SQSH				
FS or previously FS	TN05130108 045_0550	POAK002.3WH	Post Oak Creek	CKEFO			SQSH				
Impaired/ 303(d)	TN05130108 045_1000	FWATE009.6PU	Falling Water River	CKEFO			SQSH	1	12	12	
FS or previously FS	TN05130108 045_2000	FWATE028.4PU	Falling Water River	CKEFO			SQSH		12	12	
Impaired/ 303(d)	TN05130108 045_3000	FWATE040.1PU	Falling Water River	CKEFO			SQSH		12	12	12
Impaired/ 303(d)	TN05130108 045_3000		Falling Water River				SQSH		12	12	12
FS or previously FS	TN05130108 048_0100	LINDI000.2PU	Little Indian Creek	CKEFO	1		Evalua te FS				
FS or previously FS	TN05130108 048_1000	INDIA002.3PU	Indian Creek	CKEFO	1		Evalua te FS				
Impaired/ 303(d)	TN05130108 053_1000	TAYLO002.4WH	Taylor Creek	CKEFO					12	12	
Impaired/ 303(d)	TN05130108 053_1000	TAYLO003.2WH	Taylor Creek	CKEFO			SQSH				
FS or previously FS	TN05130108 097_0100	MAXWE001.4PU	Maxwell Branch	CKEFO			SQSH				
Impaired/ 303(d)	TN05130108 097_2000	MLICK015.3PU	Mine Lick Creek	CKEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130108 097_2000	MLICK015.5PU	Mine Lick Creek	CKEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130108 684_1000	FALL004.6DB	Fall Creek	CKEFO			SQSH		12	12	12
Impaired/ 303(d)	TN05130108 684_2000	FALL005.5DB	Fall Creek	CKEFO			SQSH		12	12	12
Ambient	TN05130201 001_1000	CUMBE262.9WS	Cumberland River	NEFO					4	4	4

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Ambient	TN05130202001_2000	CUMBE174.5DA	Cumberland River	NEFO					4	4	4
Impaired/303(d)	TN05130203001_0100	MCCRO001.5DA	McCrory Creek	NEFO			SQSH	1			
Impaired/303(d)	TN05130203001_0150		McCrory Creek	NEFO	1						
Ambient	TN05130203001_1000	STONE003.9DA	Stones River	NEFO			SQSH	1	4	4	4
D/S Major Discharger	TN05130203003_1000		Percy Priest Reservoir	NEFO							
Impaired/303(d)	TN05130203003_2000		Percy Priest Reservoir	NEFO							
Impaired/303(d)	TN05130203003T_0200	FINCH001.4RU	Finch Branch	NEFO			SQSH		12		
Smaller NA or Pre restoration/BMPs	TN05130203010_0100	RFORK001.3RU	Rocky Fork Creek	NEFO			SQSH				
Impaired/303(d)	TN05130203010_0200	OLIVE001.0RU	Olive Branch	NEFO			SQSH				
Impaired/303(d)	TN05130203010_0300	HARTS000.4RU	Harts Branch	NEFO			SQSH	1	12	12	
Impaired/303(d)	TN05130203010_0310	RSPRI001.9RU	Rock Spring Branch	NEFO			SQSH				
Impaired/303(d)	TN05130203010_1000	STEWA006.2RU	Stewarts Creek	NEFO			SQSH	1	12	12	12
Impaired/303(d)	TN05130203010_1000	STEWA004.4RU	Stewarts Creek	NEFO			SQSH	1	12	12	
Impaired/303(d)	TN05130203010_1000	STEWA005.3RU	Stewarts Creek	NEFO			SQSH	1	12	12	12
Impaired/303(d)	TN05130203010_2000	STEWA009.8RU	Stewarts Creek	NEFO			SQSH	1	12	12	
D/S Major Discharger	TN05130203010_3000	STEWA016.7RU	Stewarts Creek	NEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN05130203015_0100	PUCKE001.9RU	Puckett Creek	NEFO			SQSH				
Smaller NA or Pre restoration/BMPs	TN05130203015_1000	OVERA005.3RU	Overall Creek	NEFO			SQSH	1			
D/S x ARAP/BMPs	TN05130203015_2000	OVERA009.4RU	Overall Creek	NEFO			SQSH				
Impaired/303(d)	TN05130203018_0100	SINKI000.2RU	Sinking Creek	NEFO			SQSH	1	12	12	
D/S x ARAP/BMPs	TN05130203018_0200	TBD	Lytle Creek	NEFO			SQSH				
Impaired/303(d)	TN05130203018_0210	CHRIS000.7RU	Christmas Creek	NEFO			SQSH		12	12	
Impaired/303(d)	TN05130203018_0300	DFORK001.9RU	Dry Fork Creek	NEFO			SQSH		12	12	
Impaired/303(d)	TN05130203018_0400	WFSTO36.0T1.6RU	Unnamed Trib to West Fork Stones River	NEFO		Biorecon					
Impaired/303(d)	TN05130203018_0500	PANTH001.5RU	Panther Creek	NEFO			SQSH				
Impaired/303(d)	TN05130203018_0600	WFSTO20.5T0.8RU	Unnamed Trib to West Fork Stones River	NEFO			SQSH	1			
Ambient	TN05130203018_1000	WFSTO006.2RU	West Fork Stones River	NEFO			SQSH	1	12	12	12
Impaired/303(d)	TN05130203018_2000	WFSTO010.0RU	West Fork Stones River	NEFO			SQSH	1	12	12	12
Impaired/303(d)	TN05130203018_3000	WFSTO011.4RU	West Fork Stones River	NEFO			SQSH	1	12	12	12

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
D/S x ARAP/BMPs	TN05130203018_4000	New Station Bridge Station?	West Fork Stones River	NEFO			SQSH				
D/S x ARAP/BMPs	TN05130203018_5000	WFSTO024.0RU	West Fork Stones River	NEFO			SQSH				
D/S x ARAP/BMPs	TN05130203018_6000	WFSTO030.4RU	West Fork Stones River	NEFO			SQSH				
D/S x ARAP/BMPs	TN05130203018_7000	WFSTO032.3RU	West Fork Stones River	NEFO			SQSH				
D/S x ARAP/BMPs	TN05130203021_0100	HURRI002.3RU	Hurricane Creek	NEFO			SQSH				
D/S x ARAP/BMPs	TN05130203021_0200	BUZZA001.0RU	Buzzard Branch	NEFO			SQSH	1	12	12	
NA (> 10 miles or _K)	TN05130203021_0300	LONG001.3RU	Long Creek	NEFO			SQSH				
D/S WWTP	TN05130203021_1000	MFSTO005.3RU	Middle Fork Stones River	NEFO			SQSH		12	12	
Impaired/303(d)	TN05130203022_0100	TOWN000.1RU	Town Creek	NEFO			SQSH	1	12	12	
Impaired/303(d)	TN05130203022_0200	LSPRI000.8RU	Lees Spring Branch	NEFO			SQSH				
Impaired/303(d)	TN05130203022_1000	LYTLE000.6RU	Lytle Creek	NEFO			SQSH		12	12	
Impaired/303(d)	TN05130203022_2000	LYTLE008.7RU	Lytle Creek	NEFO			SQSH		12	12	
D/S Landfill	TN05130203023_0100	WADES000.7RU	Wades Branch	NEFO			SQSH		12	12	12
D/S x ARAP/BMPs	TN05130203023_0200	BUSHM002.2RU	Bushman Creek	NEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN05130203 023_0210	BUSHM3.4T0 .2RU	Unnamed Trib to Bushman Creek	NEFO			SQSH				
Impaired/ 303(d)	TN05130203 023_0310	BEAR000.8R U	Bear Branch	NEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130203 023_1000	EFSTO009.1 RU	East Fork Stones River	NEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN05130203 023_1000	EFSTO008.0 RU	East Fork Stones River	NEFO			SQSH	1			
Posted Fish	TN05130203 023_1000	EFSTO011.0 RU	East Fork Stones River	NEFO					12	12	12
Posted Fish	TN05130203 023_1000	EFSTO010.2 RU	East Fork Stones River	NEFO					12	12	12
Impaired/ 303(d)	TN05130203 023_1000	EFSTO010.1 RU	East Fork Stones River	NEFO			SQSH	1			
Impaired/ 303(d)	TN05130203 023_1000	EFSTO011.9 RU	East Fork Stones River	NEFO					12	12	12
Posted Fish	TN05130203 023_2000	EFSTO026.6 RU	East Fork Stones River	NEFO			SQSH	1	12	12	
Smaller NA or Pre restoratio n/BMPs	TN05130203 025_0100	REED003.1R U	Reed Creek	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130203 025_0200	MURRA001.1 RU	Murray Branch	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130203 025_1000	CRIPP000.4R U	Cripple Creek	NEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
NA (> 10 miles or _K)	TN05130203025_2000	CRIPP003.0RU	Cripple Creek	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130203025_3000	CRIPP008.6RU	Cripple Creek	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130203026_0200	MCKNI001.2RU	McKnight Branch	NEFO			SQSH				
Eco/FECO Reference	TN05130203026_0210	FECO71I03	Unnamed Trib to McKnight Branch	NEFO		2	2	1		4	4
NA (> 10 miles or _K)	TN05130203026_0600	DOOLI001.1CN	Doolittle Creek	NEFO			SQSH				
Eco/FECO Reference	TN05130203026_0900	FECO71H02	Unnamed Trib to East Fork Stones River	CKEFO		2	2	1		4	4
FS or previously FS	TN05130203026_1000	EFSTO044.3CN	East Fork Stones River	CKEFO			SQSH	1	12	12	
FS or previously FS	TN05130203026_1000	EFSTO028.0RU	East Fork Stones River	NEFO			SQSH	1	12	12	
D/S Major Discharger	TN05130203026_2000	EFSTO045.2CN	East Fork Stones River	CKEFO			SQSH	1	12	12	
FS or previously FS	TN05130203026_3000	EFSTO050.9CN	East Fork Stones River	CKEFO			SQSH	1	12	12	
Eco/FECO Reference	TN05130203027_0100	FECO71H03	Haws Spring Fork	CKEFO		2	2	1		4	4
FS or previously FS	TN05130203027_0200	BRAWL002.3CN	Brawleys Fork	CKEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN05130203027_1000	CARSO000.1CN	Carson Fork	CKEFO			SQSH				
Eco/FECO Reference	TN05130203027_2000	ECO71H09	Carson Fork	CKEFO		2	2	1		4	4
Impaired/303(d)	TN05130203029_0100	JARMA000.3RU	Jarman Branch	NEFO			SQSH	1	12	12	
Impaired/303(d)	TN05130203029_0200	BRADL8.2T1.4RU	Unnamed Trib to Bradley Creek	NEFO			SQSH		12	12	
Impaired/303(d)	TN05130203029_0300	BRADL008.4T0.2RU	Unnamed trib to Bradley Creek	NEFO			SQSH		12	12	
NA (> 10 miles or _K)	TN05130203029_0400	DRY000.4RU	Dry Fork	NEFO			SQSH				
D/S x ARAP/BMPs	TN05130203029_1000	BRADL002.0RU	Bradley Creek	NEFO			SQSH				
FS or previously FS	TN05130203032_0200	CEDAR000.3WS	Cedar Branch	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130203032_0500	FLORI002.4WS	Florida Creek	NEFO			SQSH				
FS or previously FS	TN05130203032_1000	FALL003.6RU	Fall Creek	NEFO			SQSH	1			
D/S x ARAP/BMPs	TN05130203032_2000	FALL018.8WS	Fall Creek	NEFO			SQSH				
NA (> 10 miles or _K)	TN05130203033_0110	GLADE_S0.5WS	Glade Creek of Sinking Creek	NEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN05130203033_0200	EFHUR002.2WS	East Fork Hurricane Creek	NEFO	1		Evaluate FS				
D/S WWTP	TN05130203033_1000	HURRI001.2WS	Hurricane Creek	NEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130203035_0100	SCOTT000.1DA	Scotts Creek	NEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130203035_0300	DRY000.1DA	Dry Fork Creek	NEFO			SQSH				
Impaired/ 303(d)	TN05130203035_0400	STONE1.9T0.1DA	Unnamed trib to Stoners Creek	NEFO			SQSH				
Impaired/ 303(d)	TN05130203035_1000	STONE000.9DA	Stoners Creek	NEFO			SQSH		12	12	
Impaired/ 303(d)	TN05130203035_2000	STONE002.0DA	Stoners Creek	NEFO			SQSH		5/30*		
FS or previously FS	TN05130203036_0100	EBHUR000.1RU	East Branch Hurricane Creek	NEFO			SQSH				
Impaired/ 303(d)	TN05130203036_0200	WBHUR000.1DA	West Branch Hurricane Creek	NEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130203036_1000	HURRI003.7RU	Hurricane Creek	NEFO			SQSH	1	12	12	
FS or previously FS	TN05130203230_0100	NORTH002.0WS	North Creek	NEFO			SQSH				
Impaired/ 303(d)	TN05130203232_0100	NFSUG000.1WS	North Fork Suggs Creek	NEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN05130203232_0110	ANTHO000.6WS	Anthony Branch	NEFO			SQSH		12	12	
Impaired/ 303(d)	TN05130203232_1000	SUGGS007.5WS	Suggs Creek	NEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN05130203 539_0100	WFHAM000.5 DA	West Fork Hamilton Creek	NEFO			SQSH		12	12	
Impaired/ 303(d)	TN05130203 539_1000	EFHAM001.1 DA	East Fork Hamilton Creek	NEFO			SQSH		12	12	
Ambient	TN05130204 009_1000	HARPE040.5 CH	Harpeth River	NEFO					4	4	4
Ambient	TN05130206 002_3000	RED025.5MT	Red River	NEFO					4	4	4
Ambient	TN05130206 003_1000	SULPH000.1 RN	Sulphur Fork	NEFO					4	4	4
Ambient	TN06010101 001_1000	NFHOL004.6 SU	North Fork Holston River	JCEFO					4	4	4
Ambient	TN06010102 001_1000	SFHOL001.1 SU	South Fork Holston River	JCEFO					4	4	4
Ambient	TN06010102 006_1000	BEAVE001.0 SU	Boone Reservoir	JCEFO					12	12	12
Impaired/ 303(d)	TN06010102 006T_0100	GAMMO000. 7SU	Gammon Creek	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06010102 006T_0200	WAGNE001.9 SU	Wagner Creek	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06010102 006T_0300	CANDY001.7 SU	Candy Creek	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06010102 012_0100	SFHOL35.2T 0.6SU	Unnamed Trib to South Fork Holston River	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06010102 012_0200	PADDL000.1 SU	Paddle Creek	JCEFO			SQSH		5/30*		
Impaired/ 303(d)	TN06010102 012_0300	SFHOL43.5T 0.7SU	Unnamed Trib to South Fork Holston River	JCEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN060101020 12_0400	MORRE000.1 SU	Morrell Creek	JCEFO			SQSH		12	12	
TMDL	TN060101020 12_0500	HATCH000.5 SU	Hatcher Creek	JCEFO			SQSH		12	12	
Eco/FEC O Reference	TN060101020 12_0600	ECO6707	Possum Creek	JCEFO		2	2	1		4	4
Impaired/ 303(d)	TN060101020 12_0610	MILLE000.9S U	Miller Branch	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020 12_0700	DRY001.0SU	Dry Creek	JCEFO			SQSH		12	12	12
TMDL	TN060101020 12_0750	DRY001.3SU	Dry Creek	JCEFO			SQSH		12	12	12
TMDL	TN060101020 12_0800	INDIA001.3S U	Indian Creek	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020 12_0810	BARM000.1C T	Big Arm Branch	JCEFO			SQSH		5/30*		
Impaired/ 303(d)	TN060101020 12_0820	BOOHE000.0 SU	Booher Creek	JCEFO			SQSH		5/30*		
Impaired/ 303(d)	TN060101020 12_0830	WOODS000. 6SU	Woods Branch	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020 12_0900	WEAVE000.2 SU	Weaver Branch	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN060101020 12_1000	SFHOL039.5 SU	South Fork Holston River	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020 14_0100	THOMA000.1 SU	Thomas Creek	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020 14_1000	SFHOL049.2 SU	South Fork Holston River	JCEFO	1		TVA				
Posted Fish	TN060101020 15_1000		South Holston Reservoir	JCEFO							
FS or previously FS	TN060101020 231.0_0100		Unnamed Trib to Beaverdam Creek	JCEFO	1		Evalua te FS				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN060101020231.0_0200		Chalk Branch	JCEFO	1		Evaluate FS				
FS or previously FS	TN060101020231.0_0300		Fagall Branch	JCEFO	1		Evaluate FS				
Eco/FECO Reference	TN060101020231.0_0400	FECO66E03	Birch Branch	JCEFO		2	2	1		4	4
Impaired/ 303(d)	TN060101020231.0_0500	PARKS000.3JO	Parks Branch	JCEFO	1		Eval FS FAL		5/30*		
FS or previously FS	TN060101020231.0_0700		East Fork Beaverdam Creek	JCEFO	1		Evaluate FS				
Eco/FECO Reference	TN060101020231.0_1000	ECO66F07	Beaverdam Creek	JCEFO		2	2	1		4	4
FS or previously FS	TN060101020231.0_1100		Buck Ridge Branch	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020231.0_2000	BEAVE016.7JO	Beaverdam Creek	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020231.0_2000	BEAVE014.0JO	Beaverdam Creek	JCEFO			SQSH		12	12	
FS or previously FS	TN060101020250_0100	OWENS000.1JO	Owens Branch	JCEFO			SQSH		12	12	
Eco/FECO Reference	TN060101020250_0200	FECO66F01	Unnamed Trib to Laurel Creek	JCEFO		2	2	1		4	4
Eco/FECO Reference	TN060101020250_0400	ECO66E04	Gentry Creek	JCEFO		2	2	1		4	4
FS or previously FS	TN060101020250_0500	ATCHI000.1JO	Atchison Branch	JCEFO			SQSH		12	12	12

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN060101020250_0600	DRYST000.2JO	Dry Stone Branch	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN060101020250_0800	CORUM000.1JO	Corum Branch	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020250_0900	FLATW000.1JO	Flatwood Branch	JCEFO			SQSH		12	12	
FS or previously FS	TN060101020250_1000	LAURE007.0JO	Laurel Creek	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020250_1200	SHING000.1JO	Shingletown Branch	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020250_1400	WATER000.1JO	Waters Branch	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020250_2000	LAURE010.6JO	Laurel Creek	JCEFO			SQSH		12	12	
TMDL	TN060101020041_0110	NICEL000.2SU	Nicely Branch	JCEFO			SQSH				
Impaired/ 303(d)	TN060101020041_0150	SINKI000.9SU	Sinking Creek	JCEFO			SQSH			12	12
TMDL	TN060101020041_1000	BEIDL000.8SU	Beidleman Creek	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020042_0100	LINVI000.3SU	Linville Branch	JCEFO			SQSH			12	12
Impaired/ 303(d)	TN060101020042_0110	EVANS000.4SU	Evans Creek	JCEFO			SQSH				
Impaired/ 303(d)	TN060101020042_0200	BACK000.5SU	Back Creek	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN060101020042_0300	STEEL000.3SU	Steele Creek	JCEFO	1						
TMDL	TN060101020042_0350	STEEL011.0SU	Steele Creek	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN060101020042_0400	LITTL000.2SU	Little Creek	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN060101020042_0500	CEDAR000.3SU	Cedar Creek	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN060101020042_0700	WHITE001.5SU	Whitetop Creek	JCEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06010102 042_1000	BEAVE001.8 SU	Beaver Creek	JCEFO			SQSH	1	12	12	12
Ambient	TN06010102 042_2000	BEAVE015.3 SU	Beaver Creek	JCEFO			SQSH	1	12	12	12
FS or previously FS	TN06010102 0540_0300	BJACO001.9 SU	Big Jacob Creek	JCEFO			SQSH				
D/S Major Discharge r	TN06010102 0540_0400	LJACO001.5 SU	Little Jacob Creek	JCEFO			SQSH		12	12	
TMDL	TN06010102 0540_0500	SHARP001.5 SU	Sharps Creek	JCEFO			SQSH		12	12	
Eco/FEC O Reference	TN06010102 0540_0600	FECO67G11	North Prong Fishdam Creek	JCEFO		2	2	1		4	4
Impaired/ 303(d)	TN06010102 0540_0800	PSPRI001.4S U	Painter Spring Branch	JCEFO			SQSH		12	12	
Impaired/ 303(d)	TN06010102 237_0100	BOOHE000.1 SU	Booher Creek	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06010102 237_0110	ROBIN000.1S U	Robinson Creek	JCEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06010102 237_1000	MUDDY000.7 SU	Muddy Creek	JCEFO			SQSH	1	12	12	
Ambient	TN06010103 013_1000	DOE001.1CT	Doe River	JCEFO					4	4	4
Ambient	TN06010104 011_2000	HOLST131.5 HS	Holston River	JCEFO					4	4	4
SEMN	TN06010104 015_0100	ECO6702	Fisher Creek	JCEFO			2	1		4	4
Ambient	TN06010105 001_4000	FBROA095.9 CO	French Broad River	KEFO					4	4	4
Ambient	TN06010107 001_1000	FBROA003.8 KN	French Broad River	KEFO					4	4	4
Ambient	TN06010108 001_3000	NOLIC020.8G E	Nolichucky River	JCEFO					4	4	4
SEMN	TN06010108 010_3200	ECO66E09	Clark Creek	JCEFO			2	1		4	4

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Ambient	TN060101080010_5000	NOLIC097.5UC	Nolichucky River	JCEFO					4	4	4
Ambient	TN060101080030_1000	BLIME000.5GE	Big Limestone Creek	JCEFO					4	4	4
Ambient	TN060101080035_1000	LICK001.0GE	Lick Creek	JCEFO					4	4	4
Ambient	TN060101080064_1000	SINKI000.5GE	Sinking Creek	JCEFO					4	4	4
Ambient	TN060101080102_1000	RICHL001.3GE	Richland Creek	JCEFO					4	4	4
Ambient	TN060101080510_2000	LLIME007.0WN	Little Limestone Creek	JCEFO					4	4	4
Ambient	TN060102010001_1000	PINEY005.0RH	Piney River	CHEFO					4	4	4
Posted Fish	TN060102010020_1000	TENNE643.3KN	Fort Loudoun Reservoir	KEFO					12	12	12
Posted Fish	TN060102010020_2000	TENNE652.0KN	Fort Loudoun Reservoir	KEFO							
Impaired/ 303(d)	TN060102010020T_0100	TOLL000.3KN	Toll Creek	KEFO	1		Evaluate NS				
D/S Major Discharger	TN060102010022_1000	New Station u/s of reservoir influence.	Gallagher Creek	MU			SQSH				
Impaired/ 303(d)	TN060102010026_0100	RODDY000.6BT	Roddy Branch	KEFO			SQSH		5/30*		
Impaired/ 303(d)	TN060102010026_0110	CANEY000.1BT	Caney Branch	KEFO	1		Evaluate NS				
Impaired/ 303(d)	TN060102010026_0300	HOLLY000.5BT	Hollybrook Branch	KEFO			SQSH		12	12	
Impaired/ 303(d)	TN060102010026_0400	PISTO000.2BT	Pistol Creek	KEFO			April 2022 SQSH by		12	12	12

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
							Maryville				
Impaired/ 303(d)	TN06010201026_0410	SPRIN001.2BT TBD	Springfield Branch	KEFO			April 2022 SQSH by Maryville @ RM 1.2	1			
Impaired/ 303(d)	TN06010201026_0410	SPRIN000.3BT	Springfield Branch	KEFO					12	12	
Impaired/ 303(d)	TN06010201026_0420	BROWN000.4BT TBD	Brown Creek	KEFO			April 2022 SQSH by Maryville @ RM 0.4	1			
Impaired/ 303(d)	TN06010201026_0420	BROWN001.0BT	Brown Creek	KEFO			April 2022 SQSH by Maryville		12	12	12
Impaired/ 303(d)	TN06010201026_0421	DUNCA001.0BT	Duncan Branch	MU			SQSH				
Impaired/ 303(d)	TN06010201026_0430	CULTO001.1BT	Culton Creek	KEFO			SQSH	1	12	12	
D/S Landfill	TN06010201026_0431	LBANK000.8BT	Laurel Bank Branch	KEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06010201026_0500	RUSSE000.9BT	Russell Branch	KEFO			SQSH				
Posted Fish	TN06010201026_1000	LITTL002.6KN	Little River	KEFO			Too big for bugs?		12	12	12

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Posted Fish	TN06010201026_2000	LITTL007.6BT	Little River	KEFO					12	12	12
Posted Fish	TN06010201026_2000	LITTL009.6BT	Little River	KEFO			SQSH				
FS or previously FS	TN06010201027_0100	REED000.1BT	Reed Creek	KEFO			SQSH				
Eco/FECO Reference	TN06010201027_0130	ECO66E17	Double Branch	KEFO		2	2	1		4	4
FS or previously FS	TN06010201027_0150	REED003.9BT	Reed Creek	KEFO							
FS or previously FS	TN06010201027_0160	SMITH000.1BT	Smith Branch	KEFO			SQSH				
Impaired/303(d)	TN06010201027_0300	ROCKY000.8BT	Rocky Branch	KEFO			SQSH		5/30*		
Impaired/303(d)	TN06010201027_0400	PEPPE000.7BT	Peppermint Branch	KEFO			SQSH		5/30*		
Posted Fish	TN06010201027_1000	LITTL017.4BT	Little River	KEFO			SQSH		12	12	
TMDL	TN06010201028_0100	SPICE000.4BT	Spicewood Branch	KEFO			SQSH				
Impaired/303(d)	TN06010201028_0300	SFCRO000.1BT	South Fork Crooked Creek	KEFO			SQSH				
D/S x ARAP/BMPs	TN06010201028_0400	NFCRO001.0BT	North Fork Crooked Creek	KEFO			SQSH				
Impaired/303(d)	TN06010201028_0500	FLAG000.1BT	Flag Branch	KEFO			SQSH		5/30*		
Impaired/303(d)	TN06010201028_1000	CROOK001.1BT	Crooked Creek	KEFO			SQSH		5/30*		
Impaired/303(d)	TN06010201031_1000	HESSE000.4BT	Hesse Creek	KEFO			SQSH		12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN060102010 31_2000		Hesse Creek	KEFO	1		Evalua te FS				
FS or previously FS	TN060102010 32_0300	CARR001.0B T	Carr Creek	KEFO			SQSH				
FS or previously FS	TN060102010 32_0350		Carr Creek	KEFO	1		Evalua te FS				
FS or previously FS	TN060102010 32_0500		Fish Camp Prong	KEFO	1		Evalua te FS				
Impaired/ 303(d)	TN060102010 32_0510		Goshen Prong	KEFO	1		Evalua te NS		Eval FS		
FS or previously FS	TN060102010 32_0520		Silers Creek	KEFO	1		Evalua te FS				
Impaired/ 303(d)	TN060102010 32_0530		Unnamed Trib to Fish Camp Prong	KEFO	1		Evalua te NS		Eval FS		
D/S Major Discharge r	TN060102010 32_0600		Middle Prong Little River	KEFO	1		Evalua te FS				
FS or previously FS	TN060102010 32_0610		Lynn Camp Prong	KEFO	1		Evalua te FS				
FS or previously FS	TN060102010 32_0620		Sams Creek	KEFO	1		Evalua te FS				
FS or previously FS	TN060102010 32_0630		Thunderhea d Prong	KEFO	1		Evalua te FS				
FS or previously FS	TN060102010 32_0640		West Prong Little River	KEFO	1		Evalua te FS				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Eco/FECO Reference	TN06010201032_0641	FECO66G03	Laurel Creek	KEFO		2	2	1		4	4
Impaired/303(d)	TN06010201032_0700	DRY000.1BT	Dry Branch	KEFO			Dry				
Impaired/303(d)	TN06010201032_0800	SHORT000.1BT	Short Creek	KEFO			SQSH	1	12	12	
Impaired/303(d)	TN06010201032_0820	TIPTO000.1BT	Tipton Branch	KEFO			SQSH		12	12	
FS or previously FS	TN06010201032_0998		Misc. Tribs to Little River	KEFO			Evaluate FS				
Posted Fish	TN06010201032_1000	LITTL027.0BT	Little River	KEFO			SQSH				
FS or previously FS	TN06010201032_1200		Catron Branch	KEFO			Evaluate FS				
FS or previously FS	TN06010201032_1300		Mids Branch	KEFO			Evaluate FS				
FS or previously FS	TN06010201032_1400		Bearwallow Branch	KEFO			Evaluate FS				
Posted Fish	TN06010201032_2000	LITTL030.8BT	Little River	KEFO			SQSH				
Posted Fish	TN06010201032_3000	LITTL035.6BT	Little River	KEFO			SQSH				
Eco/FECO Reference	TN06010201032_4000	ECO66G05	Little River	KEFO		2	2	1		4	4
Impaired/303(d)	TN06010201033_0100	LELLE000.2BT	Little Ellejoy Creek	KEFO			SQSH	1	12	12	
Impaired/303(d)	TN06010201033_0200	PITNE000.8BT	Pitner Creek	KEFO			SQSH		5/30*		
TMDL	TN06010201033_0600	MILLS001.0BT	Millstone Creek	KEFO			SQSH				
Impaired/303(d)	TN06010201033_1000	ELLEJ000.1BT	Ellejoy Creek	KEFO			SQSH		5/30*		

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06010201033_2000	ELLEJ008.0BT	Ellejoy Creek	KEFO			SQSH		5/30*		
Impaired/ 303(d)	TN06010201034_0200	WILDW000.1BT	Wildwood Branch	KEFO			SQSH		5/30*		
Impaired/ 303(d)	TN06010201034_1000	NAILS000.7BT	Nails Creek	KEFO			SQSH		5/30*		
Impaired/ 303(d)	TN06010201037_1000	LTURK002.1KN	Little Turkey Creek	KEFO			SQSH				
Impaired/ 303(d)	TN06010201066_0100	CASTE000.5KN	Casteel Branch	KEFO			SQSH				
FS or previously FS	TN06010201066_0300		Sevier Branch	KEFO	1		Evaluate FS				
Impaired/ 303(d)	TN06010201066_0400	GRAND000.5KN	Grandview Branch	KEFO					12		
Impaired/ 303(d)	TN06010201066_0500	MCCAL000.2KN	McCall Branch	KEFO			SQSH				
Impaired/ 303(d)	TN06010201066_0600	HBLUF000.1KN	High Bluff Branch	KEFO					5/30*		
Impaired/ 303(d)	TN06010201066_1000	STOCK003.2KN	Stock Creek	KEFO			SQSH		5/30*		
Impaired/ 303(d)	TN06010201066_1200	GUNN_G0.5KN	Gunn Hollow Branch	KEFO					5/30*		
Impaired/ 303(d)	TN06010201066_2000	STOCK005.6KN	Stock Creek	KEFO			SQSH		5/30*		
Posted Pathogen	TN06010201067_0100	EFTHI000.1KN	East Fork Third Creek	KEFO			SQSH		12 & 5/30	12	12
Posted Pathogen	TN06010201067_1000	THIRD001.0KN	Third Creek	KEFO			SQSH	1	12 & 5/30	12	12
Impaired/ 303(d)	TN06010201080_0100	WHITE000.5KN	Whites Creek	KEFO			SQSH	1	12	12	
Posted Pathogen	TN06010201080_1000	FIRST000.1KN	First Creek	KEFO			SQSH		12 & 5/30	12	
Impaired/ 303(d)	TN06010201083_1000	FLOYD002.1BT	Floyd Creek	KEFO			SQSH		5/30*		

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06010201089_0110	FLENN0.9T0.5KN	Unnamed Trib to Flenniken Branch	KEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06010201090_0100	LACKE1.8T1.5BT	Unnamed Trib to Lackey Creek	KEFO			SQSH				
Impaired/ 303(d)	TN06010201090_1000	LACKE002.5BT	Lackey Creek	KEFO			SQSH				
Posted Pathogen	TN06010201097_1000	SECON000.1KN	Second Creek	KEFO			SQSH	1	12 & 5/30	12	
Impaired/ 303(d)	TN06010201 1015_1000	CLOYD002.8LO	Cloyd Creek	KEFO					12	12	
Impaired/ 303(d)	TN06010201 1015_1000	CLOYD001.5LO	Cloyd Creek	KEFO			SQSH	1			
Impaired/ 303(d)	TN06010201 1330_1000	SINKI002.1KN	Sinking Creek	KEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06010201 1334_0100	TMILE000.3KN	Ten Mile Creek	KEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06010201340_1000	TURKE002.6KN	Turkey Creek	KEFO			SQSH		12	12	
Impaired/ 303(d)	TN06010201697_1000	FOURT001.2KN	Fourth Creek	KEFO			SQSH		5/30*		
Impaired/ 303(d)	TN06010201719_1000	WILLI000.7KN	Williams Creek	KEFO			SQSH		12	12	
Impaired/ 303(d)	TN06010201721_1000	BAKER000.3KN	Baker Creek	KEFO			SQSH	1	12	12	
Posted Pathogen	TN06010201723_1000	GOOSE000.8KN	Goose Creek	KEFO			SQSH		12 & 5/30	12	12
Impaired/ 303(d)	TN06010201983_1000	POLEC001.0BT	Polecat Creek	KEFO			SQSH		12	12	
SEMN	TN06010205001T_0300	ECO67F13	White Creek	KEFO			2	1		4	4
Ambient	TN06010205016_1000	CLINC189.8HK	Clinch River	JCEFO					4	4	4
Ambient	TN06010206007_2000	POWEL103.3HK	Powell River	JCEFO					4	4	4

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Ambient	TN06010207001_1000	CLINC010.0RO	Clinch River	KEFO					4	4	4
SEMN	TN06010207019_0200	ECO67F06	Clear Creek	KEFO			2	1		4	4
Ambient	TN06020001001_1000	TENNE444.0MI	Tennessee River	CHEFO					4	4	4
Ambient	TN06020001007_1000	SCHIC000.4HM	South Chickamauga Creek	CHEFO					4	4	4
Ambient	TN06020001020_1000	TENNE477.0HM	Tennessee River	CHEFO					4	4	4
Ambient	TN06020001020_1000	TENNE503.3RH	Tennessee River	CHEFO					4	4	4
Ambient	TN06020001020_1000	TENNE529.5RH	Tennessee River	CHEFO					4	4	4
Ambient	TN060200011244_1000	CHATT000.9HM	Chattanooga Creek	CHEFO					4	4	4
Impaired/ 303(d)	TN06020002001_0100	AGENC002.3ME	Agency Creek	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002001_0200	GUNST003.0ME	Gunstocker Creek	CHEFO			SQSH		12	12	
FS or previously FS	TN06020002001_1000		Hiwassee River Embayment of Chickamauga Reservoir	CHEFO							
Posted Fish	TN06020002001_2000		Hiwassee River Embayment of Chickamauga Reservoir	CHEFO							
Impaired/ 303(d)	TN06020002002_0100	SUGAR000.7ME	Sugar Creek	CHEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06020002 002_1000	LICK002.0BR	Lick Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 005_0100	BFOX000.5B R	Black Fox Creek	CHEFO			SQSH	1	12	12	
Eco/FEC O Reference	TN06020002 005_0300	ECO67G12	Dry Creek	CHEFO		2	2	1		4	4
FS or previously FS	TN06020002 005_0400	BRYME001.3 BR	Brymer Creek	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002 005_0410	SPRIN001.3B R	Spring Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 005_0410	SPRIN000.1B R	Spring Branch	CHEFO			SQSH		12	12	12
D/S Landfill	TN06020002 005_0500	HARRI001.5B R	Harris Creek	CHEFO			SQSH		12	12	12
D/S Landfill	TN06020002 005_0500	HARRI004.8B R	Harris Creek	CHEFO			SQSH		12	12	12
FS or previously FS	TN06020002 005_0600	RUNNE000.8 BR	Runner Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 005_0800	BIGSB000.6B R	Bigsby Creek	CHEFO			SQSH				
FS or previously FS	TN06020002 005_0900	GREAS000.8 BR	Greasy Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 005_1000	CANDI008.1B R	Candies Creek	CHEFO					12	12	
Impaired/ 303(d)	TN06020002 005_1000	CANDI012.3B R	Candies Creek	CHEFO			SQBA NK				
Impaired/ 303(d)	TN06020002 005_1100	BEAVE000.5 BR	Beaverdam Branch	CHEFO			SQSH		12	12	
FS or previously FS	TN06020002 005_1200	CANDI6.3T0. 5BR	Unnamed Trib to Candies Creek	CHEFO			Eval FS				
Impaired/ 303(d)	TN06020002 005_1300		Unnamed Trib to	CHEFO	1		Eval NS				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
			Candies Creek								
FS or previously FS	TN06020002005_2000	CANDI017.6BR	Candies Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002005_3000	CANDI033.1BR	Candies Creek	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002008_0100	BACON001.6PO	Bacon Branch	CHEFO			If too nasty! Complete SS and habitat		12	12	
Impaired/ 303(d)	TN06020002008_0200	HIWAS18.8T0.5BR	Unnamed Trib to Hiwassee River	CHEFO			SQSH				
Posted Fish	TN06020002008_1000	HIWAS013.4MM	Hiwassee River Embayment of Chickamauga Reservoir	CHEFO					4	4	4
Posted Fish	TN06020002008_2000	HIWAS018.6MM	Hiwassee River Embayment of Chickamauga Reservoir	CHEFO					12	12	12
FS or previously FS	TN06020002008_3000	HIWAS023.0BR	Hiwassee River	CHEFO							
FS or previously FS	TN06020002008_3000	HIWAS037.0PO	Hiwassee River	CHEFO			SQKICK				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06020002 009_0100	LSMOU000.6 BR	Little South Mouse Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 009_0200	FILLA000.3B R	Fillauer Creek	CHEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06020002 009_0300	WMILL000.8B R	Woolen Mill Branch	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 009_1000	SMOUS003.5 BR	South Mouse Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 009_2000	SMOUS012.7 BR	South Mouse Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 012_0100	FMILE000.1B R	Five Mile Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 012_0200	LCHAT000.3 BR	Little Chatata Creek	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002 012_0300	RATTL001.3B R	Rattlesnake Branch	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 012_1000	CHATA002.0 BR	Chatata Creek	CHEFO			SQSH		12	12	12
FS or previously FS	TN06020002 014_0100	LSCHE000.7 BR	Little South Chestuee Creek	CHEFO			SQSH				
D/S Landfill	TN06020002 014_0110	CARSO001.0 BR	Carson Creek	CHEFO			SQSH				
D/S Landfill	TN06020002 014_0111		Unnamed Trib to Carson Creek	CHEFO							
Impaired/ 303(d)	TN06020002 014_0200	LONDO002.2 BR	London Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 014_1000	SCHES001.8 BR	South Chestuee Creek	CHEFO			SQSH		12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06020002 014_2000	SCHES013.9 BR	South Chestuee Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 018_0200	DAIRY001.2P O	Dairy Branch	CHEFO	1						
Impaired/ 303(d)	TN06020002 018_0300	SICCO000.7P O	Siccowee Branch	CHEFO			SQSH		12	12	
FS or previously FS	TN06020002 018_0400	GEE000.9PO	Gee Creek	CHEFO		Biorecon					
FS or previously FS	TN06020002 018_0500	SPRIN000.5P O	Spring Creek	CHEFO			SQSH		12	12	
NA (> 10 miles or _K)	TN06020002 018_0510	BULLE001.3 MO	Bullet Creek	KEFO			SQSH				
Impaired/ 303(d)	TN06020002 018_0550	SPRIN012.9 MO	Spring Creek	KEFO			SQSH				
FS or previously FS	TN06020002 018_0600	CHILD000.2P O	Childers Creek	CHEFO		Biorecon					
FS or previously FS	TN06020002 018_0700	TOWEE005.9 PO	Towee Creek	CHEFO			SQSH				
FS or previously FS	TN06020002 018_0800	LOSS003.6P O	Loss Creek	CHEFO		Biorecon					
Impaired/ 303(d)	TN06020002 018_0900	COKER005.4 MO	Coker Creek	CHEFO			SQSH				
FS or previously FS	TN06020002 018_0900	COKER002.7 PO	Coker Creek	CHEFO			SQSH				
FS or previously FS	TN06020002 018_0910	BARNE000.1 MO	Barney Creek	KEFO		Biorecon					
Impaired/ 303(d)	TN06020002 018_0950	COKER011.1 MO	Coker Creek	KEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN06020002018_0955	COKER012.1MO	Coker Creek	KEFO			SQSH				
NA (> 10 miles or _K)	TN06020002018_0998		Misc. Tribs to Coker Creek	KEFO			Evaluate FS				
FS or previously FS	TN06020002018_1000	HIWAS042.7PO	Hiwassee River	CHEFO					12 & 5/30	12	
FS or previously FS	TN06020002018_1100	BRUSH000.1PO	Brushy Creek	CHEFO		Biorecon					
FS or previously FS	TN06020002018_1200	TURTL000.1PO	Turtletown Creek	CHEFO			SQSH	1	12	12	
Eco/FECO Reference	TN06020002018_1210	FECO66J03	Unnamed Trib to Turtletown Creek	CHEFO		2	2	1		4	4
Eco/FECO Reference	TN06020002018_1220	FECO66J02	Negro Creek	CHEFO		2	2	1		4	4
Eco/FECO Reference	TN06020002018_1220	FECO66J01	Negro Creek	CHEFO		2	2	1		4	4
FS or previously FS	TN06020002018_1300	WOLF001.5PO	Wolf Creek	CHEFO		Biorecon					
FS or previously FS	TN06020002018_1400	SMITH002.9PO	Smith Creek	CHEFO		Biorecon					
FS or previously FS	TN06020002018_1500	BLOST003.4PO	Big Lost Creek	CHEFO		Biorecon					
FS or previously FS	TN06020002018_1600	JUNEB000.1PO	Junebug Creek	CHEFO		Biorecon					

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN06020002018_1700	PELL001.4PO	Pell Branch	CHEFO			SQSH				
FS or previously FS	TN06020002018_1800	LILLA000.8PO	Lillard Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002018_1900	HORTO002.4PO	Horton Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002018_2000	HIWAS048.0PO	Hiwassee River	CHEFO					12 & 5/30	12	
Impaired/ 303(d)	TN06020002018_3000	HIWAS059.0PO	Hiwassee River	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002018_4000	HIWAS062.5PO	Hiwassee River	CHEFO			SQSH		12	12	
Ambient	TN06020002081_0100	CANE001.5MM	Cane Creek	CHEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06020002081_0150	CANE006.5MM	Cane Creek	CHEFO			SQSH	1	12	12	12
FS or previously FS	TN06020002081_0400	SHOAL000.2MO	Shoal Creek	KEFO			SQSH				
FS or previously FS	TN06020002081_0500	POWDE000.2MO	Powdermill Branch	KEFO			SQSH				
FS or previously FS	TN06020002081_0600	STEER000.1MO	Steer Creek	KEFO		Biorecon					
Impaired/ 303(d)	TN06020002081_0700	DRY000.6MO	Dry Creek	KEFO			SQSH				
Impaired/ 303(d)	TN06020002081_1000	CONAS006.8MM	Conasauga Creek	CHEFO			SQSH		12	12	12
FS or previously FS	TN06020002081_2000	CONAS032.4MO	Conasauga Creek	KEFO			SQSH				
Impaired/ 303(d)	TN06020002082_0300	MIDDL004.6MM	Middle Creek	CHEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06020002082_0800	CARSO001.0MO	Carson Branch	KEFO	1						

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06020002 082_0900	LCHES001.6 MM	Little Chestuee Creek	CHEFO			SQSH	1	12	12	
D/S Major Discharge r	TN06020002 082_1000	CHEST021.2 MM	Chestuee Creek	CHEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06020002 082_1100	BURGE000.4 MM	Burger Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 082_1200	TFOEM001.8 MM	Tom Foeman Creek	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002 082_1300	BFOOT000.5 MM	Big Foot Branch	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002 082_2000	CHEST041.4 MM	Chestuee Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 083_0300	CSPRI000.5 MM	Cedar Springs Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 083_0400	SOKEY000.1 MM	Sokey Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 083_0500	BLACK000.3 MM	Black Branch	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002 083_0510	WALKE000.6 MM	Walker Branch	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002 083_0600	MFORK000.5 MM	Meadow Fork Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 083_0700	JOHNS000.1 MM	Johnson Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 083_1000	OOSTA005.8 MM	Oostanaula Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 083_2000	OOSTA018.0 MM	Oostanaula Creek	CHEFO			SQSH		12	12	
Ambient	TN06020002 083_3000	OOSTA028.4 MM	Oostanaula Creek	CHEFO					12	12	12
Ambient	TN06020002 083_3000	OOSTA031.8 MM	Oostanaula Creek	CHEFO			SQSH	1			
Impaired/ 303(d)	TN06020002 083_4000	OOSTA037.1 MM	Oostanaula Creek	CHEFO			SQSH	1	12	12	12

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06020002 083_5000	OOSTA041.0 MM	Oostanaula Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 084_0100	BSPRI000.2M M	Blue Spring Branch	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 084_0200	LSPRI000.4M M	Latham Spring Branch	CHEFO			SQSH		12	12	
FS or previously FS	TN06020002 084_0300	EFNMO000.3 MM	East Fork North Mouse Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002 084_0400	LNMOU002.4 MM	Little North Mouse Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 084_0500	DVALL000.2 MM	Dry Valley Creek	CHEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06020002 084_1000	NMOUS024.3 MM	North Mouse Creek	CHEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06020002 084_2000		North Mouse Creek	CHEFO							
Impaired/ 303(d)	TN06020002 084_2000	NMOUS025.4 MM	North Mouse Creek	CHEFO			SQSH	1	12	12	12
FS or previously FS	TN06020002 084_3000	NMOUS007.3 MM	North Mouse Creek	CHEFO			SQSH		12	12	12
D/S Landfill	TN06020002 085_0100	MEADO000.2 MM	Meadow Branch	CHEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06020002 085_0110	MEADO1.0T0 .3MM	Unnamed Trib to Meadow Branch	CHEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06020002 085_1000	SPRIN003.8 MM	Spring Creek	CHEFO			SQSH		12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN06020002087_0100	SHORT000.6MM	Short Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002087_0200	BRUSH000.5MM	Brush Creek	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06020002087_0300	SHOAL000.4MM	Shoal Creek	CHEFO			SQSH				
Impaired/ 303(d)	TN06020002087_0600	ROGER18.3T0.3MM	Unnamed Trib to Rogers Creek	CHEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06020002087_1000	ROGER014.2MM	Rogers Creek	CHEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06020002088_1000	PRICE004.4ME	Price Creek	CHEFO			SQSH		12	12	
Ambient	TN06020003001_1000	OCOEE001.0PO	Ocoee River	CHEFO					4	4	4
SEMN	TN06020003013.55_0400	ECO66G20	Rough Creek	CHEFO			2	1		4	4
Ambient	TN06020003013_1000	OCOEE019.6PO	Ocoee River	CHEFO					4	4	4
Ambient	TN06020004001_1000	SEQUA006.3MI	Sequatchie River	CHEFO					4	4	4
Ambient	TN06030001055_1000	TENNE416.5MI	Tennessee River	CHEFO					4	4	4
SEMN	TN06030001067_1000	ECO68C20	Crow Creek	CHEFO			2	1		4	4
Impaired/ 303(d)	TN06030003001_0100	REEVE001.0GS	Reeves Branch	CLEFO			SQSH		12	12	
Impaired/ 303(d)	TN06030003001_0300	CARR001.1LI	Carr Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030003001_0400	MOLIN002.9LI	Molino Creek	CLEFO			SQSH				
NA (> 10 miles or _K)	TN06030003001_0500	SINKI000.6GS	Sinking Creek	CLEFO							

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
D/S Major Discharger	TN06030003001_1000	ELK077.0LI	Elk River	CLEFO			SQSH				
Impaired/ 303(d)	TN06030003003_1000	KELLY001.4GS	Kelly Creek	CLEFO			SQSH		12	12	
NA (> 10 miles or _K)	TN06030003006_0100		Pinnel Creek	CLEFO							
FS or previously FS	TN06030003006_1000	COLDW001.3LI	Coldwater Creek	CLEFO			SQSH				
FS or previously FS	TN06030003010_0100	STEPH000.4LI	Stephens Creek	CLEFO			SQSH				
NA (> 10 miles or _K)	TN06030003010_0200	TUCKE001.3LI	Tucker Creek	CLEFO			SQSH			12	
Impaired/ 303(d)	TN06030003010_0400	SHELT000.8LI	Shelton Creek	CLEFO	1						
NA (> 10 miles or _K)	TN06030003010_0500	DUKES000.5LI	Dukes Creek	CLEFO							
Impaired/ 303(d)	TN06030003010_0700	STEWA000.6LI	Stewart Creek	CLEFO			SQSH				
D/S Major Discharger	TN06030003010_1000	ELK093.9LI	Elk River	CLEFO			SQSH	1	12	12	12
D/S Major Discharger	TN06030003010_1000	ELK089.7LI	Elk River	CLEFO			SQSH	1	12	12	12
FS or previously FS	TN06030003010_2000	ELK105.5LI	Elk River	CLEFO			SQSH				
NA (> 10 miles or _K)	TN06030003012_0200	TBD	Factory Branch	CLEFO			SQSH				
Impaired/ 303(d)	TN06030003012_0400	ROBIN000.3FR	Robinson Creek	CLEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06030003 012_1000	BEANS001.3 FR	Beans Creek	CLEFO			SQSH				
FS or previously FS	TN06030003 015_0100	FARRI001.5M R	Farris Creek	CLEFO			SQSH				
Ambient	TN06030003 015_1000	ELK133.0FR	Elk River	CLEFO					4	4	4
D/S Major Discharge r	TN06030003 016_1000	BFORK005.0 FR	Tims Ford Reservoir	CLEFO					12		
D/S Landfill	TN06030003 026_1000	DRY002.5FR	Dry Creek	CLEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06030003 030_1000	BFORK010.1 FR	Boiling Fork Creek	CLEFO					12		
Impaired/ 303(d)	TN06030003 032_1000	WAGNE001.4 FR	Wagner Creek	CLEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06030003 032_1000	WAGNE002.5 FR	Wagner Creek	CLEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06030003 035_1000		Elk River	CLEFO	1						
Posted Fish	TN06030003 036_1000		Woods Reservoir	CLEFO							
Impaired/ 303(d)	TN06030003 041_0100	YELLO000.8F R	Yellow Branch	CLEFO			SQSH		12	12	
FS or previously FS	TN06030003 041_1000	ELK187.4FR	Elk River	CLEFO			SQSH				
Eco/FEC O Reference	TN06030003 043_1000	ECO68C13	Mud Creek	CLEFO		2	2	1		4	4
Impaired/ 303(d)	TN06030003 044_0100	BWILL000.2C E	Betsy Willis Creek	CLEFO			SQSH		12	12	
FS or previously FS	TN06030003 044_0400	LAURE000.1 GY	Laurel Creek	CHEFO			SQSH				
NA (> 10 miles or _K)	TN06030003 044_0600	DRY001.9GY	Dry Creek	CHEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06030003 044_0700	CALDW000.1 GY	Caldwell Creek	CHEFO		Biorecon		1	12	12	
Impaired/ 303(d)	TN06030003 044_0710	GILLI001.2G Y	Gilliam Creek	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06030003 044_0712	GILLI1.3T2.3 GY	Unnamed Trib to Gilliam Creek	CHEFO			SQSH		12	12	
Impaired/ 303(d)	TN06030003 044_0713	TRUSS1.7T0. 7GY	Trussel Creek	CHEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06030003 044_1000	ELK195.3GY	Elk River	CHEFO			SQSH	1	12	12	
D/S Major Discharge r	TN06030003 049_1000	BEANS002.7 CE	Beans Creek	CLEFO			SQSH				
D/S Landfill	TN06030003 051_1000	BRADL001.5 CE	Bradley Creek	CLEFO			SQSH	1		12	
Impaired/ 303(d)	TN06030003 053_0100	BLUE000.1F R	Blue Creek	CLEFO			SQSH				
D/S WWTP	TN06030003 053_1000	ROCK005.8F R	Rock Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030003 053_2000	ROCK009.4F R	Rock Creek	CLEFO			SQSH		12	12	12
Impaired/ 303(d)	TN06030003 053_2000	ROCK011.0C E	Rock Creek	CLEFO			SQSH		12	12	12
Eco/FEC O Reference	TN06030003 055_1000	ECO71G10	Hurricane Creek	CLEFO		2	2	1		4	4
Impaired/ 303(d)	TN06030003 056_0100	WFMUL001.4 LI	West Fork Mulberry Creek	CLEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06030003 056_0200	EFMUL000.7 LI	East Fork Mulberry Creek	CLEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06030003 056_0250	EFMUL011.9 MR	East Fork Mulberry Creek	CLEFO			SQSH	1	12	12	12

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
NA (> 10 miles or _K)	TN06030003056_0255	EFMUL015.1MR	East Fork Mulberry Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030003059_0100	LNORR000.1LI	Little Norris Creek	CLEFO			SQSH	1		12	
FS or previously FS	TN06030003059_1000	NORRI001.2LI	Norris Creek	CLEFO			SQSH				
NA (> 10 miles or _K)	TN06030003060_0200		Craighead Creek	CLEFO							
NA (> 10 miles or _K)	TN06030003060_0400	WCANE000.6ML	West Cane Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030003060_0600	SAUND000.1ML	Saunders Creek	CLEFO		Biorecon					
Impaired/ 303(d)	TN06030003060_1000	CANE003.8LI	Cane Creek	CLEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06030003063_1000	SWAN000.8LI	Swan Creek	CLEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06030003063_2000	SWAN008.2LI	Swan Creek	CLEFO			SQSH	1	12	12	
NA (> 10 miles or _K)	TN06030003064_0400	EFBRA001.1LI	East Fork Bradshaw Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030003064_1000	BRADS001.3LI	Bradshaw Creek	CLEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06030003065_1000	INDIA000.9GS	Indian Creek	CLEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06030003085_1000	CHILD001.8FR	Childer Creek	CLEFO		Biorecon					
FS or previously FS	TN06030003435_1000	ROLLI002.4FR	Rollins Creek	CLEFO	1						
Impaired/ 303(d)	TN06030003552_1000	GUM001.6FR	Gum Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030003567_1000	HESSE000.8FR	Hessey Branch	CLEFO			SQSH		12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06030004 013_1000	ELK041.5GS	Elk River	CLEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06030004 017_0300	EVERL000.3 GS	Everly Branch	CLEFO		Biorecon					
Impaired/ 303(d)	TN06030004 017_0600	RICHL26.9T0 .1GS	Unnamed Trib to Richland Creek	CLEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06030004 017_0700	RICHL24.4T0 .1GS	Unnamed Trib to Richland Creek	CLEFO		Biorecon					
Impaired/ 303(d)	TN06030004 017_0800	PRUN000.1G S	Pleasant Run Creek	CLEFO			SQSH		12	12	
D/S x ARAP/BM Ps	TN06030004 017_1000	RICHL002.0G S	Richland Creek	CLEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06030004 017_2000	RICHL023.2G S	Richland Creek	CLEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN06030004 017_2000	RICHL029.9G S	Richland Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030004 018_0100	LEATH000.1 GS	Leatherwoo d Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030004 018_1000	BUCHA003.0 GS	Buchanon Creek	CLEFO			SQSH	1		12	12
NA (> 10 miles or _K)	TN06030004 023_0120	EVANS_G1.0 GS	East Fork Lynn Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030004 023_1000	RFORK001.2 GS	Robertson Fork Creek	CLEFO			SQSH	1	12	12	
D/S Major Discharge r	TN06030004 026_0110	ANDER004.4 GS	Anderson Creek	CLEFO		Biorecon					
D/S Major Discharge r	TN06030004 026_0110	ANDER000.2 GS	Anderson Creek	CLEFO		Biorecon					

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN06030004026_0111	ANDER5.2T0.1GS	Unnamed Trib to Anderson Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030004026_0112	FANNY000.1GS	Fanny Branch	CLEFO			SQSH				
FS or previously FS	TN06030004026_0115	TBD	Anderson Creek	CLEFO			SQSH				
NA (> 10 miles or _K)	TN06030004026_0116	TBD	Anderson Creek	CLEFO			SQSH				
FS or previously FS	TN06030004026_0300	YOKLE000.1GS	Yokley Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030004026_1000	BIG003.7GS	Big Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030004029_1000	WEAKL000.6GS	Weakley Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030004032_0100	WFSHO000.4GS	West Fork Shoal Creek	CLEFO			SQSH	1		12	
Impaired/ 303(d)	TN06030004032_0200	EFSHO001.0GS	East Fork Shoal Creek	CLEFO			SQSH	1		12	
Impaired/ 303(d)	TN06030004036_0300	WFSUG003.0LW	West Fork Sugar Creek	CLEFO			SQSH	1		12	12
Impaired/ 303(d)	TN06030004036_0400	EFSUG002.0LW	East Fork Sugar Creek	CLEFO			SQSH	1		12	
D/S x ARAP/BMPs	TN06030004036_0420	CLEAR000.3LW	Clear Creek	CLEFO			SQSH				
NA (> 10 miles or _K)	TN06030004036_0430	SHANN000.2LW	Shannon Creek	CLEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN06030004 036_1000	SUGAR015.2 GS	Sugar Creek	CLEFO			SQSH	1		12	12
Impaired/ 303(d)	TN06030004 043_0100	DRY001.4GS	Dry Creek	CLEFO			SQSH				
NA (> 10 miles or _K)	TN06030004 043_0200	BLUE000.5G S	Blue Creek	CLEFO			SQSH				
Impaired/ 303(d)	TN06030004 043_0300	CORN000.4M L	Corn Creek	CLEFO			SQSH		12	12	
Impaired/ 303(d)	TN06030004 043_0400	TOWN000.8 ML	Town Creek	CLEFO			SQSH		12	12	
Impaired/ 303(d)	TN06030004 043_0600	COFFE000.2 ML	Coffey Branch	CLEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN06030004 043_1000	RICHL039.6G S	Richland Creek	CLEFO			SQSH		12	12	
Impaired/ 303(d)	TN06030004 043_1000	RICHL064.5M L	Richland Creek	CLEFO			SQSH		12	12	
Impaired/ 303(d)	TN06030004 044_1000	PROOS000.7 GS	Pigeon Roost Creek	CLEFO			SQSH		12	12	12
Ambient	TN06030005 078_1000	SHOAL032.2 LW	Shoal Creek	CLEFO					4	4	4
Ambient	TN06040001 802_1000	BEECH010.0 DE	Beech River	JEFO					4	4	4
Ambient	TN06040002 030_1000	DUCK248.0B E	Duck River	CLEFO					4	4	4
Ambient	TN06040003 019_2000	BBIGB008.5 MY	Big Bigby Creek	CLEFO					4	4	4
Ambient	TN06040003 024_1000	DUCK113.9M Y	Duck River	CLEFO					4	4	4
Ambient	TN06040004 002_1000	BUFFA073.1 WE	Buffalo River	CLEFO					4	4	4
SEMN	TN06040004 013_0600	ECO71F19	Brush Creek	CLEFO			2	1		4	4
Ambient	TN06040005 020_1000	TENNE066.3 HN	Tennessee River	JEFO					4	4	4

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Ambient	TN060400050027-1000	BSAND015.3BN	Big Sandy River	JEFO					4	4	4
Ambient	TN08010202009_1000	NFOBI005.9OB	North Fork Obion River	JEFO					4	4	4
Ambient	TN08010202009_2000	NFOBI010.7OB	North Fork Obion River	JEFO					4	4	4
Ambient	TN08010203001_1000	SFOBI005.8OB	South Fork Obion River	JEFO					4	4	4
Ambient	TN08010203015_1000	MFOBI004.5WY	Middle Fork Obion River	JEFO					4	4	4
Ambient	TN08010204001_1000	NFFDE005.3DY	North Fork Forked Deer River	JEFO					4	4	4
Impaired/ 303(d)	TN08010204003_0100	CAIN000.8DY	Cain Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204003_0200	LPOND001.0CK	Little Pond Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204003_0300	TUCKE000.8CK	Tucker Creek	JEFO			SQSH		12	12	
Impaired/ 303(d)	TN08010204003_1000	POND001.1DY	Pond Creek	JEFO			SQSH		12	12	12
Impaired/ 303(d)	TN08010204004_0100	PARKE001.0DY	Parker Ditch	JEFO			SQSH				
Impaired/ 303(d)	TN08010204004_0200	BETHE001.8DY	Bethel Branch	JEFO			SQSH		12	12	
Impaired/ 303(d)	TN08010204004_0300	SQUIR001.9GI	Squirt Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204004_0400	ELIZA002.2DY	Eliza Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204004_0500	NASH002.8DY	Nash Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204004_1000	NFFDE009.8DY	North Fork Forked Deer River	JEFO	1		Evaluate NS				
Posted Fish	TN08010204004_2000	NFFDE025.5GI	North Fork Forked Deer River	JEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN08010204 005_0100	ODELL000.3 CK	Odell Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 005_0200	RICE000.4CK	Rice Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 005_0300	MILLE001.0D Y	Miller Creek	JEFO			SQSH	1		12	
Impaired/ 303(d)	TN08010204 005_1000	STOKE002.7 DY	Stokes Creek	JEFO			SQSH	1		12	
Impaired/ 303(d)	TN08010204 007_0100	BUCK003.1C K	Buck Creek	JEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010204 007_1000	MFFDE005.2 CK	Middle Fork Forked Deer River	JEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010204 009_0100	SAND001.8C K	Sand Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 009_0200	CYPRE6.0T.0 1CK	Unnamed Trib to Cypress Creek	JEFO	1		Eval NS				
Impaired/ 303(d)	TN08010204 009_1000	CYPRE000.9 CK	Cypress Creek	JEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010204 010_0100	BARNE001.2 GI	Barnett Branch	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_0200	DUFFY000.3 MN	Duffy's Branch	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_0300	DRY001.3GI	Dry Branch	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_0400	CROOK000.8 MN	Crooked Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_0500	POPLA000.4 MN	Poplar Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_0600	JOHNS001.2 MN	Johnson Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_0700	DYER001.9M N	Dyer Creek	JEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010204 010_0800	MOIZE001.3 MN	Moize Creek	JEFO			SQSH	1	12	12	12

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN08010204 010_0900	DLOAC001.8 MN	De Loach Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_1000	MFFDE023.4 GI	Middle Fork Forked Deer River	JEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010204 010_1100	MATTH001.5 MN	Matthews Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_1200	BEECH001.8 CK	Beech Creek	JEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010204 010_1300	WARRE001.3 CK	Warren Ditch	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 010_2000	MFFDE025.3 MN	Middle Fork Forked Deer River	JEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010204 010_3000	MFFDE037.0 MN	Middle Fork Forked Deer River	JEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010204 013_1000	GILME001.0 MN	Gilmers Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 014_0100	DRY000.3MN	Dry Creek	JEFO			SQSH	1	12	12	
Eco/FECO Reference	TN08010204 014_0400	ECO65E06	Griffin Creek	JEFO		2	2	1		4	4
FS or previously FS	TN08010204 014_0500	CANE002.3H E	Cane Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 014_0600	SPRIN000.8H E	Spring Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 014_0700	TYLER000.5 HE	Tyler Branch	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 014_0800	SIMMO000.2 HE	Simmons Branch	JEFO	1						
Impaired/ 303(d)	TN08010204 014_0900	COURT000.9 HE	Courtney Branch	JEFO			SQSH				
D/S x ARAP/BMPs	TN08010204 014_1000	MFFDE055.2 HE	Middle Fork Forked Deer River	JEFO			SQSH	1			

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN08010204014_1100	DRY001.0HE	Dry Branch	JEFO							
D/S x ARAP/BMPs	TN08010204014_1200	GURLE001.0HE	Gurley Creek	JEFO			SQSH				
Impaired/303(d)	TN08010204014_1300	EUBAN000.9MN	Eubanks Branch	JEFO	1						
FS or previously FS	TN08010204014_1400	SPRIN001.0MN	Spring Creek	JEFO			SQSH				
Impaired/303(d)	TN08010204015_1000	TURKE000.8MN	Turkey Creek	JEFO			SQSH				
Impaired/303(d)	TN08010204016_1000	SUGAR001.0GI	Sugar Creek	JEFO			SQSH		12	12	12
Impaired/303(d)	TN08010204017_0100	DAVIS000.9GI	Davis Creek	JEFO			SQSH	1	12	12	
Impaired/303(d)	TN08010204017_0110	REAGA000.4GI	Reagan Creek	JEFO			SQSH	1	12	12	
Impaired/303(d)	TN08010204017_1000	BUCK001.2GI	Buck Creek	JEFO			SQSH		12	12	
Impaired/303(d)	TN08010204020_0100	NFFDE28.9T1.7GI	Unnamed Trib to North Fork Forked Deer River	JEFO			SQSH				
Impaired/303(d)	TN08010204020_0200	ROGER001.5GI	Rogers Branch	JEFO			SQSH				
Impaired/303(d)	TN08010204020_0300	NFFDE43.5T0.4GI	Unnamed Trib to North Fork Forked Deer	JEFO	1		Evaluate NS				
Impaired/303(d)	TN08010204020_0500	BEE001.1GI	Bee Creek	JEFO			SQSH				
Impaired/303(d)	TN08010204020_0600	HOG001.4GI	Hog Creek	JEFO			SQSH				

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN08010204 020_0700	WALLS001.0 GI	Wallsmith Branch	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 020_0800	PARKE001.7 GI	Parker Branch	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 020_0900	CAIN002.1GI	Cain Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 020_1000	NFFDE035.7 GI	North Fork Forked Deer River	JEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010204 020_2000	NFFDE036.5 GI	North Fork Forked Deer River	JEFO							
Impaired/ 303(d)	TN08010204 020_3000	NFFDE047.7 GI	North Fork Forked Deer River	JEFO	1		Eval NS				
Impaired/ 303(d)	TN08010204 021_0100	DRY000.3GI	Dry Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 021_0200	COW000.4GI	Cow Creek	JEFO			SQSH		12	12	
Impaired/ 303(d)	TN08010204 021_1000	MUD002.1GI	Mud Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 022_0100	HARRI001.9D Y	Harris Creek	JEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010204 022_0200	DOAKV3.4T0. 5DY	Unnamed Trib to Doakville Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 022_1000	DOAKV002.0 DY	Doakville Creek	JEFO			SQSH		12	12	
Impaired/ 303(d)	TN08010204 023_0100	LEWIS002.5D Y	Old Lewis Creek	JEFO			SQSH				
Impaired/ 303(d)	TN08010204 023_0200	JONES001.2 DY	Jones Creek	JEFO			SQSH		12	12	12
Impaired/ 303(d)	TN08010204 023_0210	LIGHT002.2D Y	Light Creek	JEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010204 023_1000	LEWIS000.3D Y	Lewis Creek	JEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN08010204 HUMBOLDT LK_1000		Humboldt Lake	JEFO							
Ambient	TN08010205 010_1000	SFFDE027.7 HY	South Fork Forked Deer River	JEFO					4	4	4
Impaired/ 303(d)	TN08010206 001_1000	FDEER018.2 DY	Forked Deer River	JEFO							
Ambient	TN08010208 001_1000	HATCH009.1 TI	Hatchie River	MEFO					4	4	4
Ambient	TN08010208 001_3000	HATCH126.9 HR	Hatchie River	JEFO					4	4	4
Impaired/ 303(d)	TN08010209 001_0100	TODD001.6S H	Todd Creek	MEFO			SQSH	1	12	12	
Posted Fish	TN08010209 001_1000	LOOSA005.0 SH	Loosahatchi e River	MEFO			SQSH by TDH Lab AB	1	12	12	12
Impaired/ 303(d)	TN08010209 002_0100	LOOSA10.8T 1.3SH	Unnamed Trib to Loosahatchi e River	MEFO							
Impaired/ 303(d)	TN08010209 002_0200	ROCKY000.9 SH	Rocky Branch	MEFO			SQSH	1	12	12	
D/S WWTP	TN08010209 002_0300	SCOTT001.7 SH	Scotts Creek	MEFO			SQSH		12	12	
Impaired/ 303(d)	TN08010209 002_0400	OLIVE001.3S H	Oliver Creek	MEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010209 002_0500	BUCKH002.1 SH	Buckhead Creek	MEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010209 002_0700	HOWAR002.1 SH	Howard Creek	MEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010209 002_0800	TBD	Trib to Loosahatchi e River @ Bolen Huse Rd.	MEFO			SQSH	1			

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN08010209 002_0900	TBD	Trib to Loosahatchi e River @ Egypt Central	MEFO			SQSH	1			
Posted Fish	TN08010209 002_1000	LOOSA1C15. 8SH	Loosahatchi e River	MEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010209 002_1100	TBD	Trib to Loosahatchi e River @ Hawkins Mill Rd	MEFO			SQSH	1			
Impaired/ 303(d)	TN08010209 002_2000	LOOSA1C22. 7SH	Loosahatchi e River	MEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010209 003_0100	HALL001.4S H	Hall Creek	MEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010209 003_0200	CYPRE013.7 FA	Cypress Creek	MEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010209 003_0210	CYPRE002.9 T0.2SH	Unnamed Trib to Cypress Creek	MEFO	1						
Impaired/ 303(d)	TN08010209 003_0220	CYPRE002.7 T0.9SH	Unnamed Trib to Cypress Creek	MEFO	1						
Impaired/ 303(d)	TN08010209 003_1000	CLEAR001.8 SH	Clear Creek	MEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010209 004_0100	BANKL001.6 FA	Black Ankle Creek	MEFO			SQSH	1	12	12	12
D/S Major Discharge r	TN08010209 004_0200	WEBER001.3 FA	Weber Branch	MEFO			SQSH	1			
Ambient	TN08010209 004_1000	LOOSA1C28. 6SH	Loosahatchi e River	MEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010209 007_1000	LOOSA1C42. 5FA	Loosahatchi e River	MEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
FS or previously FS	TN08010209008_1000	LOOSA1C38.3T1.9FA	Unnamed Trib to Loosahatchie River	MEFO			SQSH	1	12	12	
Impaired/303(d)	TN08010209010_1000	JONES001.6FA	Jones Creek	MEFO			SQSH	1	12	12	
Impaired/303(d)	TN08010209011_0200	KINGS000.4FA	Kings Creek	MEFO			SQSH	1	12	12	
Impaired/303(d)	TN08010209011_1000	LOOSA1C48.3FA	Loosahatchie River	MEFO			SQSH	1	12	12	12
Ambient	TN08010209011_2000	LOOSA1C53.6FA	Loosahatchie River	MEFO			SQSH	1	12	12	12
NA (> 10 miles or _K)	TN08010209012_0100	TBD	Unnamed Trib to Bennett Creek	MEFO			SQSH				
Impaired/303(d)	TN08010209012_1000	BENNE000.2FA	Bennett Creek	MEFO			SQSH				
Impaired/303(d)	TN08010209014_1000	LAURE1C3.7FA	Laurel Creek	MEFO			SQSH	1	12	12	
Impaired/303(d)	TN08010209015_1000	LCYPR003.3FA	Little Cypress Creek	MEFO			SQSH	1	12	12	
Impaired/303(d)	TN08010209016_0100	WBEAV1C1.1SH	West Beaver Creek	MEFO			SQSH	1	12	12	
NA (> 10 miles or _K)	TN08010209016_0110	TBD	Hebron Creek	MEFO			SQSH				
Impaired/303(d)	TN08010209016_0200	MBEAV1C6.4TI	Middle Beaver Creek	MEFO			SQSH	1	12	12	12
FS or previously FS	TN08010209016_0210	KELLY001.0TI	Kelly Branch	MEFO			SQSH	1		12	
Impaired/303(d)	TN08010209016_0300	EBEAV1C2.1FA	East Beaver Creek	MEFO			SQSH	1	12	12	

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Impaired/ 303(d)	TN08010209 016_0310	BAXTE001.0 TI	Baxter Bottom	MEFO	1						
Impaired/ 303(d)	TN08010209 016_1000	BEAVE1C1.0 SH	Beaver Creek	MEFO			SQSH		12	12	
Impaired/ 303(d)	TN08010209 021_0100	JAKES000.3S H	Jakes Creek	MEFO			SQSH		12	12	
Impaired/ 303(d)	TN08010209 021_0110	BEAR001.2S H	Bear Creek	MEFO			SQSH		12	12	12
Impaired/ 303(d)	TN08010209 021_0200	ROYST1C0.9 SH	Royster Creek	MEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010209 021_0300	NFORK000.6 SH	North Fork Creek	MEFO			SQSH	1	12	12	12
Eco/FEC O Reference	TN08010209 021_0500	FECO74B04	Bull Branch	MEFO		2	2	1		4	4
Impaired/ 303(d)	TN08010209 021_0600	CROOK1C1.3 SH	Crooked Creek Canal	MEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010209 021_0610	TBD	Unnamed Trib to Crooked Creek Canal	MEFO							
Impaired/ 303(d)	TN08010209 021_1000	BIG1C1.0SH	Big Creek	MEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010209 021_2000	BIG1C8.4SH	Big Creek	MEFO			SQSH	1	12	12	
Impaired/ 303(d)	TN08010209 021_3000	BIG1C15.8SH	Big Creek	MEFO			SQSH	1	12	12	12
Impaired/ 303(d)	TN08010209 021_4000	BIG1C21.5TI	Big Creek	MEFO			SQSH	1	12	12	12
Ambient	TN08010210 001_1000	WOLF000.7S H	Wolf River	MEFO					4	4	4
Ambient	TN08010210 003_1000	WOLF031.4S H	Wolf River	MEFO					4	4	4
Ambient	TN08010210 009_2000	WOLF072.6F A	Wolf River	MEFO					4	4	4

Project	TNW Monitoring ID	DWR Station ID	Waterbody Name	EFO	Evaluate**	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Ambient	TN08010211 00711_1000	NONCO001.8 SH	Nonconnah Creek	MEFO					4	4	4

*Horton Rule for E coli, geomean collected first quarter, followed by monthly sampling if levels pass criteria.
**No samples collected, waterbodies will be evaluated following guidelines in the Consolidated Assessment and Listing Methodology (TDEC, 2021).