TENNESSEE
DIVISION OF WATER RESOURCES

FISCAL YEAR 2023-2024
SURFACE WATER
MONITORING AND ASSESSMENT
PROGRAM PLAN

July 2023

Tennessee Department of Environment and Conservation
Division of Water Resources
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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, macroinvertebrate and diatom 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. Major limiting factors to achieving this goal is federal 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 lakes, rivers and streams, and to determine monitoring priorities

2. **Monitoring.** Field data are collected by DWR staff for lakes, rivers and streams previously prioritized.
3. **Assessment**. Monitoring and all other relevant data are used to determine if the river, lakes and streams support their designated uses based on waterbody 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. .

6. **Watershed Water Quality Management Plans.** Previous watershed plans contained a general description, management strategies, and information relevant to water quality. The Division is currently transitioning to web-based watershed-specific mapping applications. Watershed specific information and resources may be found on the department's watersheds page. https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/tennessee-watersheds.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 and reservoirs, 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's responsibility to 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.
A major 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).

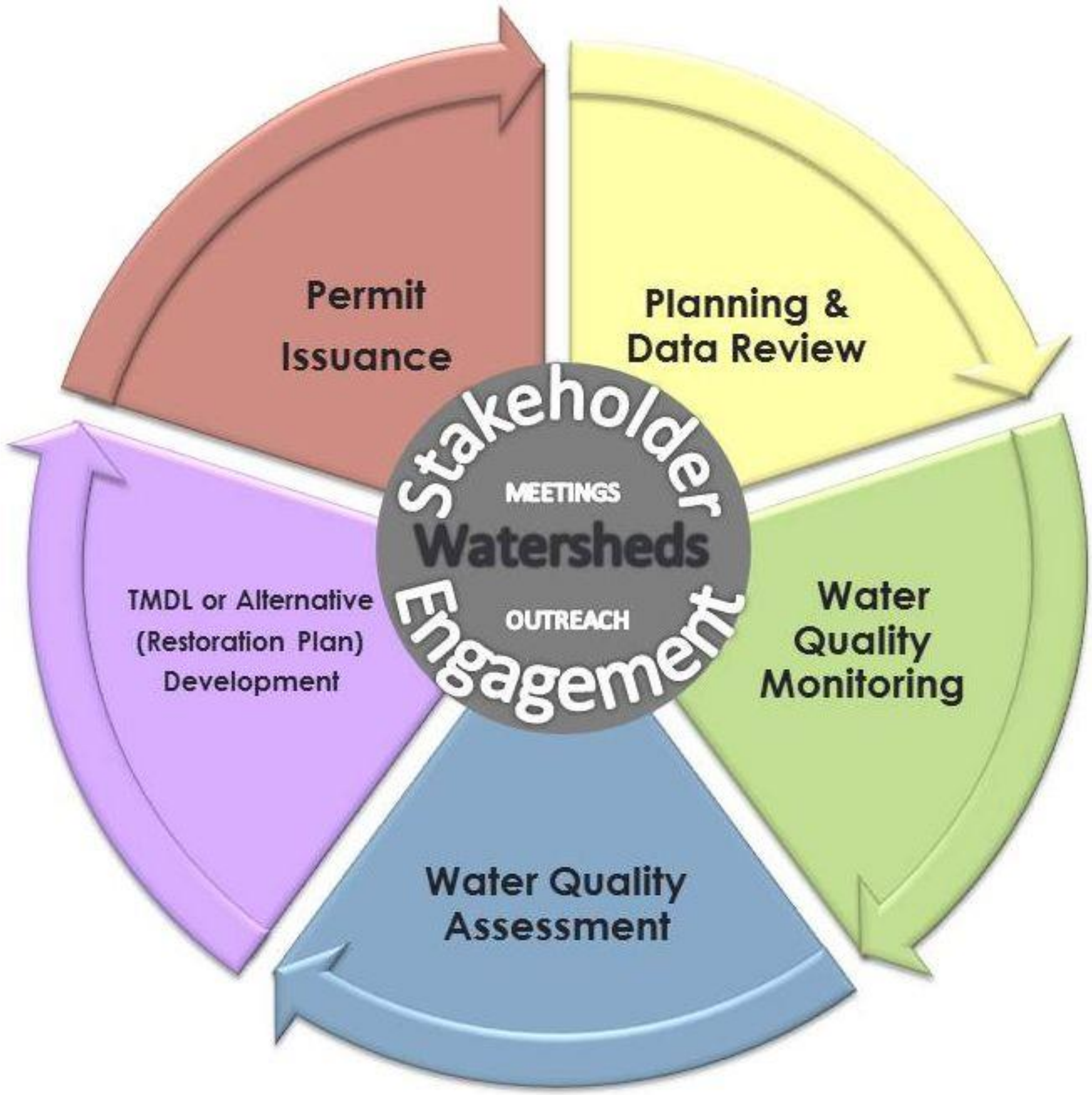


Figure 1: Graphic Representation of the Watershed Approach.

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.

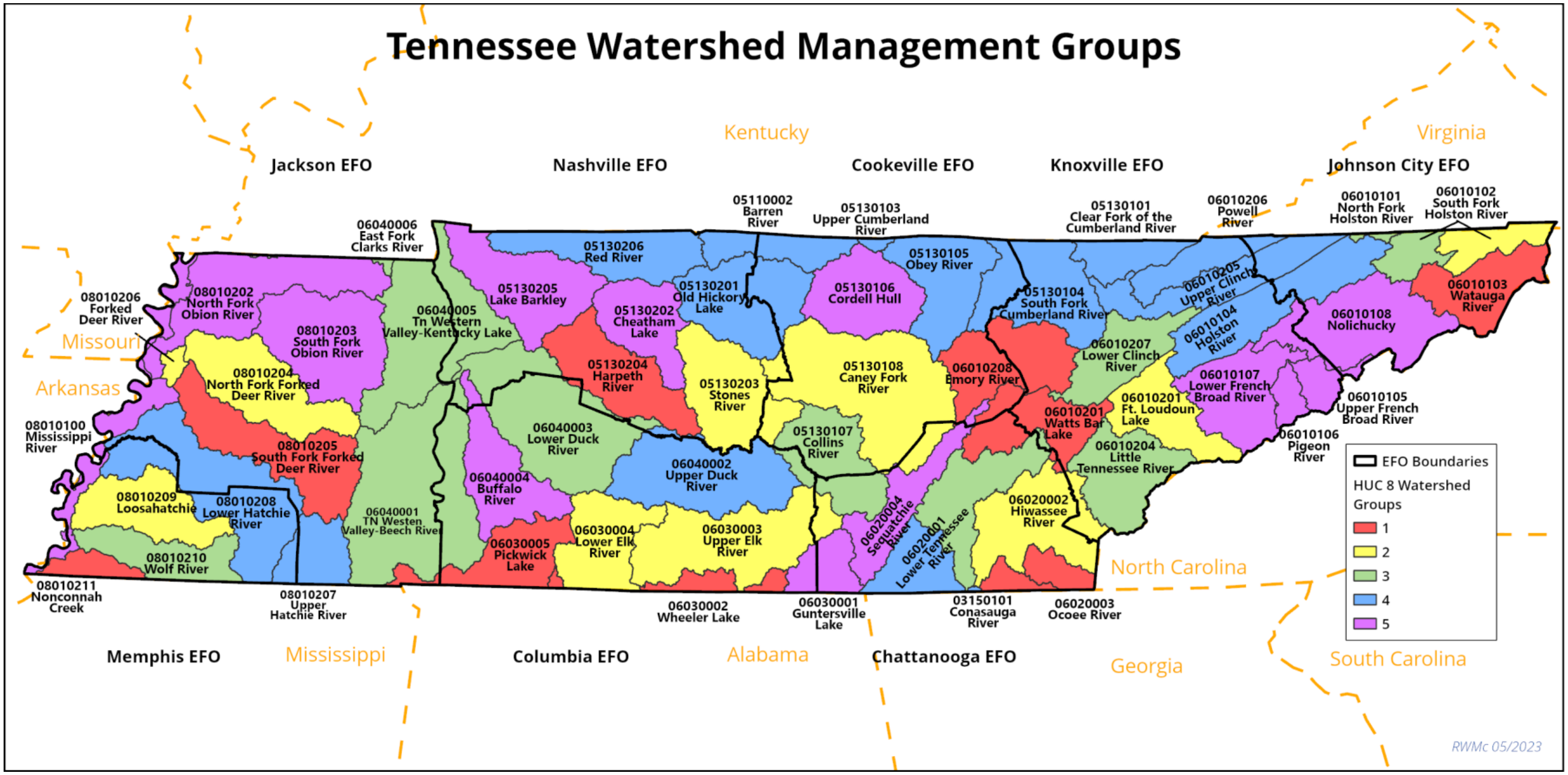


Figure 2: Tennessee Watershed Groups

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	TN Western Valley (KY Lake)	06040005	N, J
	Little Tennessee (Tellico)	06010204	K	Wolf	08010210	M
	Lower Clinch	06010207	K	Clarks	06040006	J
	Tennessee (Chickamauga)	06020001	CH			
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	Lower Cumberland (Cheatham)	05130202	N	Nolichucky	06010108	JC, K
	Lower Cumberland (Lake Barkley)	05130205	N	Sequatchie	06020004	CH

Group/ Year	Watershed	HUC	EFO	Watershed	HUC	EFO
2030-31 2035-36 2040-41	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
	Buffalo	06040004	CL, N			

Key to EFOs (Environmental Field Offices):

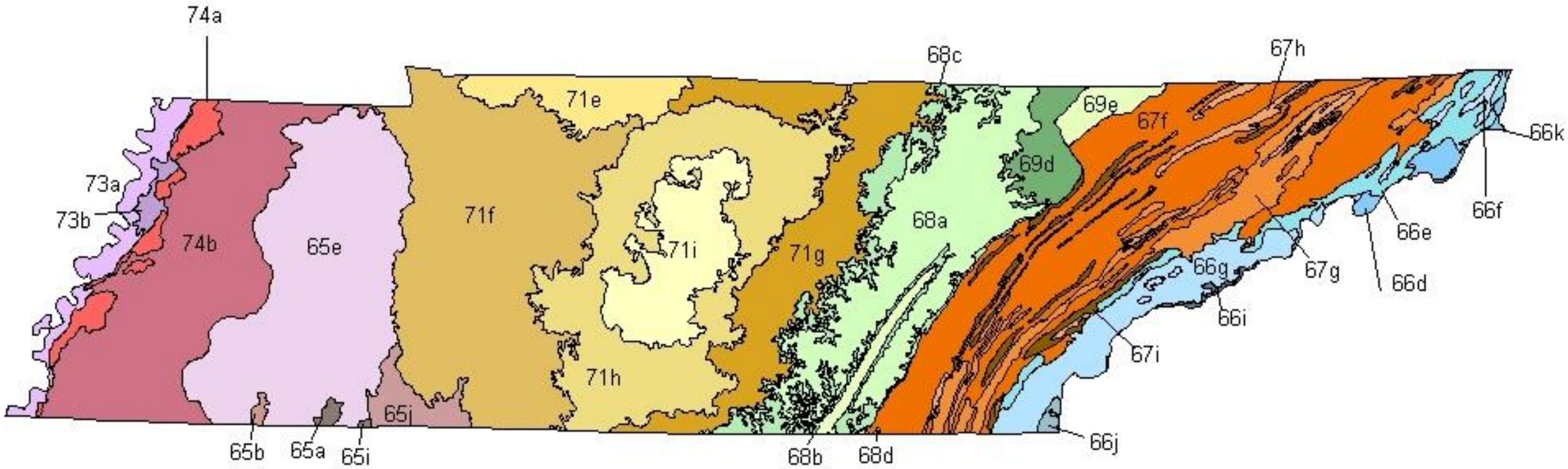
CH	Chattanooga	J	Jackson	M	Memphis
CK	Cookeville	JC	Johnson City	N	Nashville
CL	Columbia	K	Knoxville		

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, ecoregion reference 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. In 2009, headwater streams were added to the reference monitoring program. There are currently106 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 8,196 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. (For example, the Ocoee River is an impaired stream due to multiple pollutants that is also an Exceptional Tennessee Water due to its national significance as a whitewater rafting resource. Thus, its antidegradation status is both as unavailable for specific parameters and as an ETW.)

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 are 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.

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.

Fish tissue monitoring for fishing advisories is planned by a workgroup consisting of staff from DWR-TDEC, TVA, ORNL and TWRA. The workgroup meets annually to coordinate a monitoring strategy. Fish tissue sampling for TDEC is contracted to the state laboratory. The strategy includes all posted waterbodies plus those frequently fished by the public. 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 geomean 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 and being reported, 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 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 will 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 will be sampled every year according to the project plan and grant for this project, regardless of watershed cycle.

4. Sampling downstream of Major Dischargers, Landfills, and CAFO's:

During each monitoring cycle, the major dischargers, landfills, and CAFO's are identified in targeted watersheds. Because these types of facilities are directly regulated by the Department, water quality monitoring can have a direct effect on future permitting or enforcement decisions. In addition, their effect on instream water quality can be profound, and can change rapidly (as opposed to a habitat-impaired stream) – thus they are a higher priority to monitor each and every cycle.

Stations are established at those waterbodies, preferably both upstream and downstream of the facility. Even if the facility does have in-stream monitoring requirements built into their permit, the Division should collect samples during the watershed monitoring cycle to provide additional QA/QC. The pollutant of concern and the effect it would have on the receiving stream may determine the location of the station(s). (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, collection of diatoms, plus monthly nutrient monitoring. In streams, particular care should be taken to document the extent and types of algal growth.

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.

Streams below Class l and Class ll landfills, both active and inactive, are included in the annual monitoring workplan. Other types of landfills should also be reviewed for documentation of any known or potential water quality impacts. Sampling needs are coordinated with the local Division of Solid Waste Management office. Parameters of concern at landfills include elevated dissolved solids and conductivities, inorganic salts, metals, and ammonia, and should be sampled monthly. Temperature and pH data are required to interpret ammonia criteria. Hardness and total suspended solids (TSS) are required to interpret metals data. A list of minimum required parameters is provided in the QAPP and Chemical/Bacteriological Monitoring SOPs

In addition, when developing workplans prior to the next monitoring cycle, field office staff should coordinate with the Division of Remediation (DoR) to confirm that any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites currently on the 303(d) List 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.

5. TMDL Development, Model Calibration, or other Special Project Monitoring:

While not common, occasionally the Division will need specific, targeted monitoring added to the annual workplan. This might involve the development of a new regionally or parameter-specific 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).

Similarly, there may be specific situations where the typical Watershed Monitoring will not generate all the specific data needed to assist in the development or calibration of water quality models utilized by the Division. Where such a need exists, these stations and parameters should be added to the monitoring plan, after coordination between the Watershed Planning Unit (WPU) manager and the EFOs

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.

In some cases, 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 state lab or another contractor 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.

6. Watershed Monitoring:

In addition to the previous priorities, each EFO executes a more generalized Watershed Monitoring plan, designed to provide as much information about the overall health of streams and lakes within the cycle's watershed groups. This category, although at the end of the priority list, actually constitutes the bulk of Division's monitoring efforts and strategy, and in some ways represents the most important component overall.

The priorities within each Group's Watershed Monitoring plan may differ from cycle to cycle, due to considerations such as data from the previous cycle, long-term trends, new data from outside agencies, or known BMPs and restoration work. In general, higher priority for monitoring efforts will include:

- Currently impaired segments where the Department or other agency has developed control strategies and continued monitoring will be beneficial to track progress towards restoration.

- Currently impaired stream segments where previous data were close to, or indicate a trend towards supporting one or more designated uses, or the delisting of a specific parameter.

- Streams impaired for recreation, where other data are not available to evaluate ongoing conditions (e.g. overflow reports, DMRs, complaints)

- Streams impaired by, or suspected to be impaired by a water quality-related parameter, or a specific point source may be higher priorities than streams impaired by a habitat-related parameter, or a more generalized land-use source.

- Assessment of potential new reference stations in streams in relatively protected watersheds. Each year, existing reference streams are degraded by various impacts in their watersheds and have to be replaced.

- 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 or ARAP 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. This sampling would be to document improvements, but is also needed for antidegradation purposes and to confirm that the stream is a good candidate for such a project. This protects against the possibility that a good stream could be harmed by unnecessary restoration, and evaluates the effectiveness of the restoration of BMP approach.

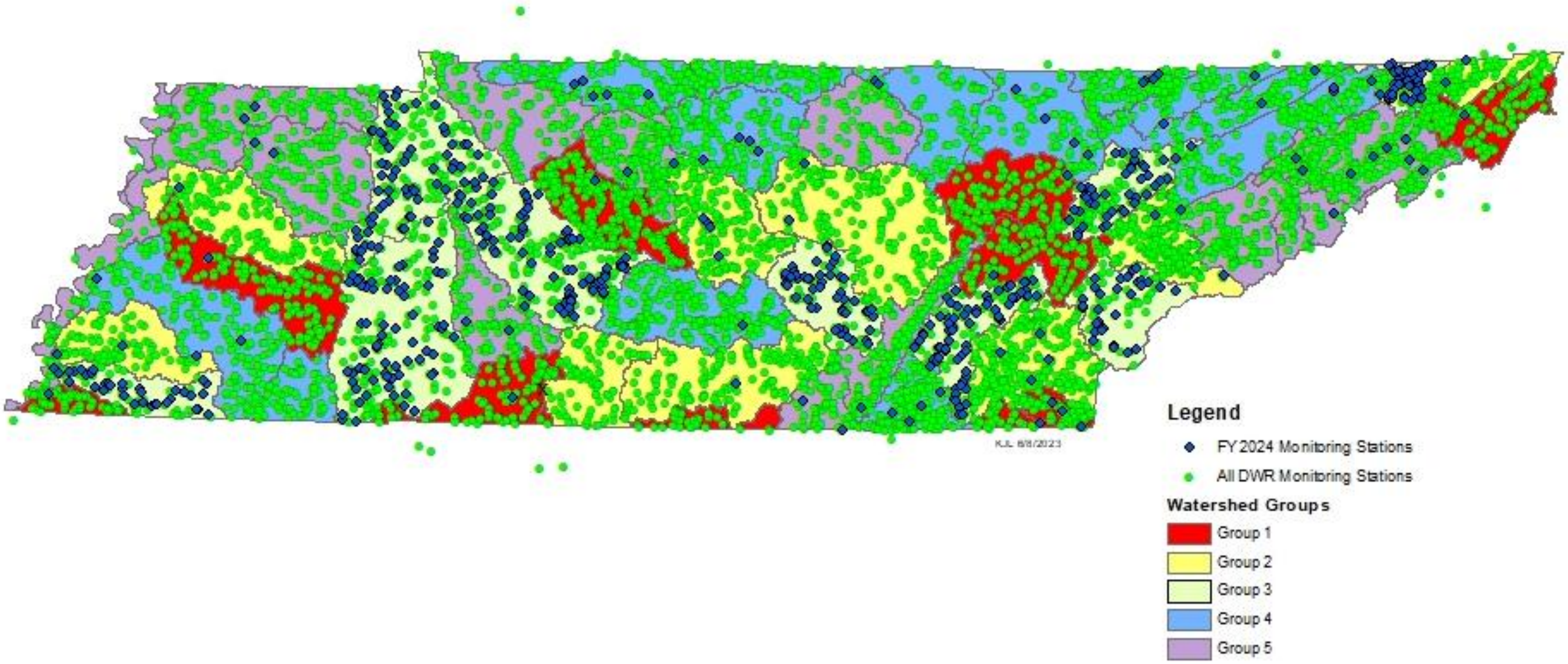


Figure 4: Water Quality Monitoring Stations in Tennessee. (Includes biological, chemical and bacteriological stations.)

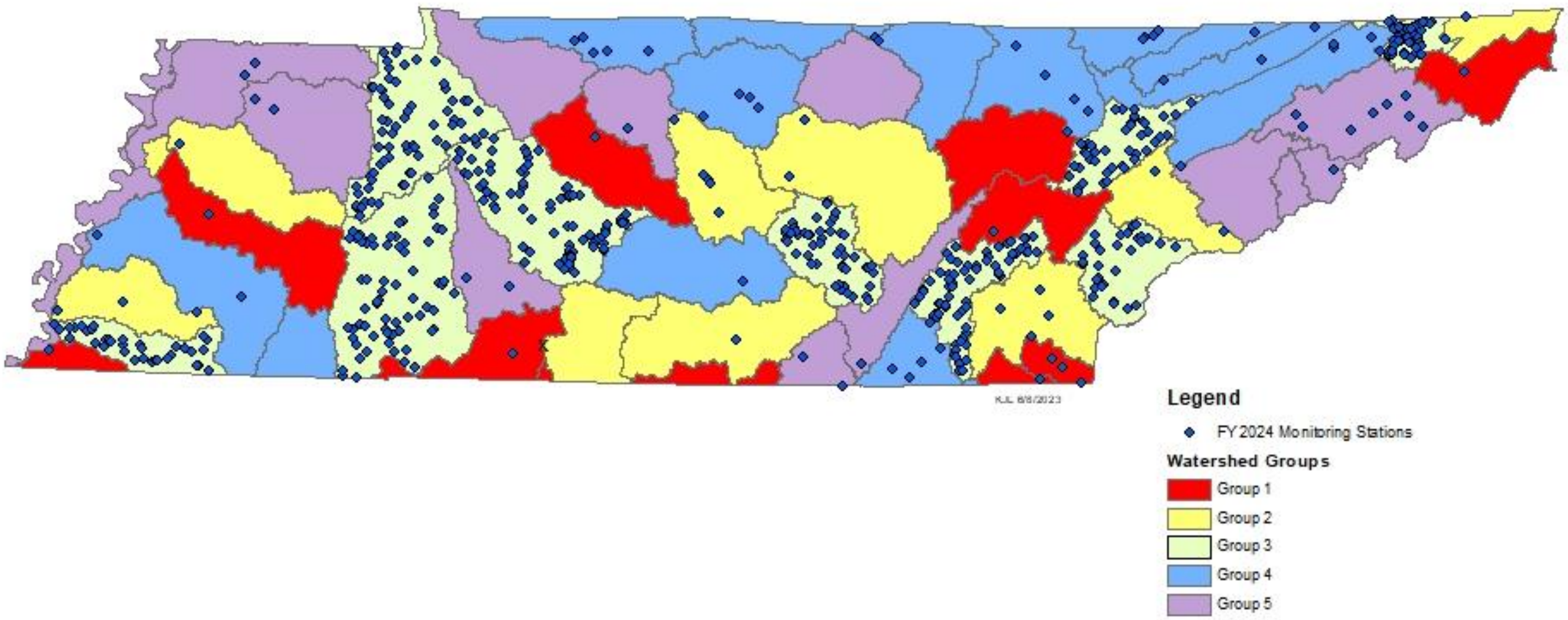


Figure 5: Monitoring Stations Scheduled to be Sampled Between July 2023and June 2024 (FY24)
(Includes biological, chemical and bacteriological stations.)

7. 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.

8. 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.

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 the 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. Fish tissue monitoring for PFAs and mercury began on these in 2022. 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). Fish tissue monitoring for mercury and PFAs commenced in 2022 on the state park lakes.

E. Critical and Secondary Water Quality Indicators

Biological Water Quality Indicators Critical

a. Macroinvertebrates

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:

- Taxa Richness (TR)
- EPT Richness (Ephemeroptera, Plecoptera, Trichoptera)
- EPT Abundance excluding *Cheumatopsyche* spp. (%EPT-Cheum)
- Modified North Carolina Biotic Index (NCBImod)
- Percent of Oligochaetes and Chironomids (%OC)
- Percent Clingers excluding *Cheumatopsyche* spp. (%Clinger-Cheum)
- Percent Tennessee nutrient tolerant organisms (%TNUTOL)

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

- Taxa Richness (TR)
- ETO Richness (Ephemeroptera, Trichoptera, Odonata)
- EPT Abundance excluding *Cheumatopsyche* spp. (%EPT-Cheum)
- Modified North Carolina Biotic Index (NCBImod)
- Percent of Oligochaetes and Chironomids (%OC)
- Percent contribution of Crustacea and Mollusca (%CRMOL)
- Percent Tennessee nutrient tolerant organisms (%TNUTOL)

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:

- Taxa Richness
- EPT Richness (Ephemeroptera, Plecoptera, Trichoptera)
- Intolerant Taxa Richness

In bioregion 73, the three biorecon metrics are:

- Taxa Richness
- ETO Richness (Ephemeroptera, Trichoptera, Odonata)
- CRMOL Richness (Crustacea and Mollusca)

b. Diatoms

The Tennessee Diatom Index (TDI) was implemented in 2022 as a second biological indicator of nutrient impairment. Diatom samples are collected along with macroinvertebrates in most streams where nutrients are collected or as a screening tool for potential nutrient impairment.

The TDI is a multi-metric index comprised of eight metrics selected for the Southeast diatom index developed by Tetra Tech (Tetra Tech, 2022). The index was a collaborative effort between USEPA, Tetra Tech, Alabama Department of Environmental Management, Georgia Department of Natural Resources, Kentucky Division of Water and TDEC to develop a nutrient sensitive index based on southeast diatom data.

Diatom data from over 1000 stations and 1500 samples across the 4-state area were processed. An extensive taxonomic harmonization effort resulted in a final set of operational taxonomic units for use in index development. Phycologists from USGS as well as Georgia College and State University provided assistance with harmonization.

More than 200 metrics using known diatom traits from a wide range of sources were generated. These metrics were combined into candidate indices using an all-possible model subsets routine. Top performing indices were selected based on overall discrimination, stressor sensitivity, and robust discrimination across ecoregions.

The final region-wide index is composed of eight metrics that reflected general disturbance sensitivity, tolerance, oxygen sensitivity, nutrient sensitivity, and motility (Table 5). The index has a discrimination efficiency around 70% and ecoregional discrimination efficiencies ranging from 50% to 100%. It is sensitive to nutrient gradients as well as general human disturbance measures.

Table 5: Tennessee Diatom Index (TDI) Metrics

Metric	Hydra Report	Description	Response to Stress
Bahls_3.pa	%SEN	% abundance of sensitive taxa	Decrease
LTNtr	%LTN	% taxa indicating low Total Nitrogen conditions	Decrease
O_3.pt	% O2tr	% taxa requiring 50% O2 saturation.	Increase
Wa_OptCat_L-1DisTot	%LAND	% taxa tolerant to general land disturbance including urbanization and ag.	Increase
Navicula.pt	%NAV	Motile taxa tolerant of fine sediment	Increase
Centric.pt	%CEN	Effects of reservoir (lentic taxa) and tolerant of nutrients	Increase
High_P.pt	% PTOL	Tolerant of TP > 0.1 mg/l.	Increase
BC_5.pa	%TOL	% abundance of highly tolerant taxa.	Increase

Tennessee further calibrated the index to Level IV ecoregions found in the state based on reference stream data to develop regional condition criteria for use in watershed assessments. The index is particularly effective in determining a biological response where nutrient levels are elevated but macroinvertebrates do not show a measurable response using the Tennessee Macroinvertebrate Index (TMI).

Metric values vary in scale depending on the units in the measurement and the ranges in the data sets. To give each metric equal weight in the index, metric values were converted to metric scores on a 100-point scale, using the effective range of each metric. The 5th and 95th percentile metric values from all sites were used as the effective ranges of metric variation in the samples. This recognized the possible range of metric values throughout the study area while discounting values that were unusually extreme and possibly outliers (Blocksom 2003). Metric scores were truncated at 0 and 100. To calculate the index, the eight metrics scores are averaged. The target TDI score is based on the 25th percentile of index scores for each ecoregion (Table 6). TDI scores below the target are considered stressed.

Table 6: TDI Target Scores by Level IV Ecoregion

Level IV ecoregion	TDI Target
73ab, 74a	40
67g, 71i, 74b	60
71eh	65
65abei, 67fhi, 71fg	70
65j, 66defijk, 68bc	75
66g, 68ad, 69de	80

Secondary Biological

- Fish Index of Biotic Integrity (IBI) Fish populations are sometimes used to supplement assessment information. Tennesse Valley Authority (TVA) sampling, metrics and scoring are used. Sampling is generally conducted by TVA or TWRA.
- Chlorophyll *a:* Chlorophyll *a* data are generally submitted by USACE and TVA primarily from large reservoirs.

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*,
- 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 December 2021. 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 and January 2022 (TDEC, 2022). The *QSSOP for Periphyton Stream Surveys* was completed in 2010 and was revised in 2023 to utilize the Tennessee Diatom Index, the document is currently in final draft. 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 workshops. Most macroinvertebrate, nutrients, routine inorganic and metals diatom, samples are analyzed by the TDH Environmental Laboratories. Organic chemical, most diatom, bacteriological and some routine inorganic samples, and macroinvertebrate samples analyzed by contract labs. All biological and chemical samples conducted by contract labs are subcontracted and reviewed/reported by the state lab. The biological laboratory and subcontractors follow the TDEC QSSOP for macroinvertebrate surveys (TDEC, 2021) and the TDH protocol for diatom identification (TDH, 2022) which is being incorporated in the TDEC diatom SOP.(TDEC, 2023 draft). 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 Diatom Stream Surveys as specified in the 2023 draft QSSOP:

The same quality assurance required for macroinvertebrate surveys is necessary for diatom 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 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, diatom data and detailed information for over 8200 monitoring stations into the WQX framework. Historic qualitative macroinvertebrate and diatom data (pre 2017) are being uploaded as it is transferred from paper to electronic format.

The chemical, fish tissue, macroinvertebrate, habitat 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 . 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 and establishing appropriate classified uses for each waterbody.

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

3. Comparison of data to applicable 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 principal 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. Details can be found in the CALM document (TDEC, 2021), which is currently under revision and will be updated later this year.:

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

Tennessee utilizes *E. coli* as the pathogen indicator since this group is generally considered more reflective of true human health risk than are fecal coliform data. A minimum of ten monthly samples, or a failing geo mean, are required to assess waterbodies as impaired due to high bacteria levels, unless the levels in a fewer number of monthly samples are very elevated, or the stream is already listed as impaired for pathogens and insufficient recent data exists to change the assessment. Streams cannot be assessed as fully supporting for Recreation without a minimum of ten monthly samples except as allowed under the evaluation or extrapolation frameworks in the CALM.

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

Division staff utilize a weight-of-evidence approach to interpreting the narrative nutrient criterion for fish and aquatic life protection. Factors considered in this approach include concentrations of nutrient parameters such as total phosphorus or nitrate+nitrite, ecosystem dominance by taxa tolerant of excessive nutrients, reductions in available habitat, excessive algal growth, biomass concentrations, harmful algae blooms, or other response variables such as significant diel oxygen swings, elevated temperatures or pH levels. Streams causing or contributing to downstream nutrient-related biological responses can also be considered impaired.

Regional nutrient goals were developed based on reference condition and are used for guidance when assessing wadeable streams (Denton et al., 2001). A numeric nutrient response based on chlorophyll *a* has been adopted for Pickwick Reservoir. Strong oxygen and temperature stratification, chlorophyll a and the Carlson's Index are used to interpret narrative nutrient criteria in other reservoirs.

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 southeast regional diatom index has been calibrated to Tennessee reference data is being used for the first time in 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 standard units (su). For nonwadeable rivers, streams, reservoirs and wetlands the pH criterion is 6.5 - 9.0 su. Also, pH values cannot fluctuate more than 1.0 in 24 hours. Waterbodies with pH values outside these ranges are considered impaired.

i. Temperature

The temperature criteria can be violated in three different ways. A (1) temperature difference from downstream to upstream, (2) a rapid rate of change, and (3) exceedance of a maximum temperature. Temperature criteria are more stringent in trout streams.

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 water,s 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 7). 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 7. 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.	Macroinvertebrate and diatom surveys for comparison to biorecon, semi-quantitative and diatom multi-metric indices. assessments	Temperature, dissolved oxygen and conductivity data collected throughout Tennessee. Increased used of continuous monitoring.	Fish tissue data collected at various sites across Tennessee.
Approximately 8200 stations are established by the division to support the watershed approach.	Ecoregion reference stream monitoring to calibrate regional guidelines based on multi-metric index scores. biological monitoring.	Qualitative 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.)			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 8.

Table 8. 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.	Continue to include diatom samples as a second biological indicator for nutrient impairment. Continue to evaluate and refine diatom index. .

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. April 2022 finalized SE regional diatom Index. October 2022 completed calibration of SE Inex for Tennessee ecoregions. Incorporated Tennessee Diatom Index (TDI) for the first time in group 4 assessments in 2022.	
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. 2021 obtained a substantial amount of existing TVA and USACE chlorophyll data to help characterize levels in reservoirs. Additional data needs were identified. 2022 contracted with Tetra Tech to develop a continuous monitoring database including analysis and visualization tools.	Explore feasibility of using chlorophyll criterion established for Pickwick Reservoir for other main-stem lower Tennessee Reservoirs. Work with TVA and UACE to fill data gaps and continue to investigate applicability of using 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 the possibility of using chlorophyll or other measures of level of reservoir eutrophication such as secchi-disc depths, pH levels and seasonal fluctuations and dissolved oxygen diel

Goal	Milestone	Future Plans
	In 2021 revised the Consolidated Assessment and Listing Methodology (CALM) guidance document, including a shift from impairment listings for specific nutrient species (total phosphate or nitrate-nitrogen) to a more general listing parameter of "nutrients" in recognition of the data limitations in precisely identifying which specific nutrient was primarily or solely responsible for observed biological responses to excess nutrients. In 2021assembled an expert stakeholder group for the USACE's J. Percy Priest Reservoir specifically to provide opinions, insight, and direction on existing data, additional data needs, and modeling. This process was put on hold in 2022 due to other commitments preventing sufficient participation from group members In 2022 expanded continuous monitoring in reservoirs and rivers. In 2021 and 2022 TDEC continued to test and incorporate the use of SPARROW nutrient loading model to inform nutrient listings, especially for more refined Source categorization.	fluctuations as a trigger point to implement the state's nutrient reduction strategy. Continue to evaluate and refine continuous monitoring techniques used in TN reservoirs Complete continuous monitoring database including analysis and visualization tools. Reconvene expert stakeholder group move forward with recommendations and actions that would assist TDEC in better understanding and addressing nutrient issues in the JPP reservoir, and beyond. Continues evaluate and refine continuous monitoring techniques used in TN reservoirs and rivers. The USGS Data Series Report is currently being drafted for the Tennessee Reservoirs Assessment. TDEC has received some data spreadsheets summarizing reservoir rankings produced as part of this study. When the full report is available TDEC will evaluate whether data compilation and/or classification scheme can be helpful in reservoir criteria development.

Goal	Milestone	Future Plans
Biocriteria	Published macroinvertebrate guidelines for wadeable streams in 2001 which were updated in 2004, 2006, 2011, 2017 and 2021. A major recalibration of metrics in 2021 based on existing changes in nomenclature and updated tolerance information. Incorporated macroinvertebrate index guidelines in 2004 WQS. Began monitoring of headwater reference streams in 2009 and published guidelines in 2017. 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. April 2022 finalized SE regional diatom Index. October 2022 completed calibration of SE Index for Tennessee ecoregions. Incorporated Tennessee Diatom Index (TDI) for the	Investigate feasibility of developing guidelines for nonwadeable rivers as resources allow. Continue to use diatom index for assessments. Consider adding reference to index as a guidance for biological response to narrative nutrient criteria in WQX. Continue to evaluate and refine diatom index.

Goal	Milestone	Future Plans
	first time in group 4 assessments in 2022	
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 Hydra.
Electronic data reporting	Developed electronic field sheets for chemical, bacteriological and biological sampling and reporting. Updated data storage to increase efficiency, enhance 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	Migrate remaining historic biological data (diatom and qualitative macroinvertebrate data) to new system. Make diatom data public facing. Upload historic (prior to 2017) diatom 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.

Goal	Milestone	Future Plans
	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. Made macroinvertebrate and habitat data public facing. Began upload of diatom taxa to WQX.	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 as outlined in the division nutrient criteria development plan (TDEC, 2019).
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 document was replaced by the Quality System Standard Operating Procedure for Diatom Stream Surveys (Draft) in 2023. The new SOP incorporates the Tennessee diatom index (TDI) and standardization of nomenclature across four southeast states. 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 and is currently under revision.

The division uses the state laboratory for most 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. All laboratories are required to be NELAC (or equivalent) certified. Taxonomists are required to have SFS certification (for semi-quantitiatve samples and diatoms) or pass in-state testing (biorecons only). 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 and is currently under review. 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.

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

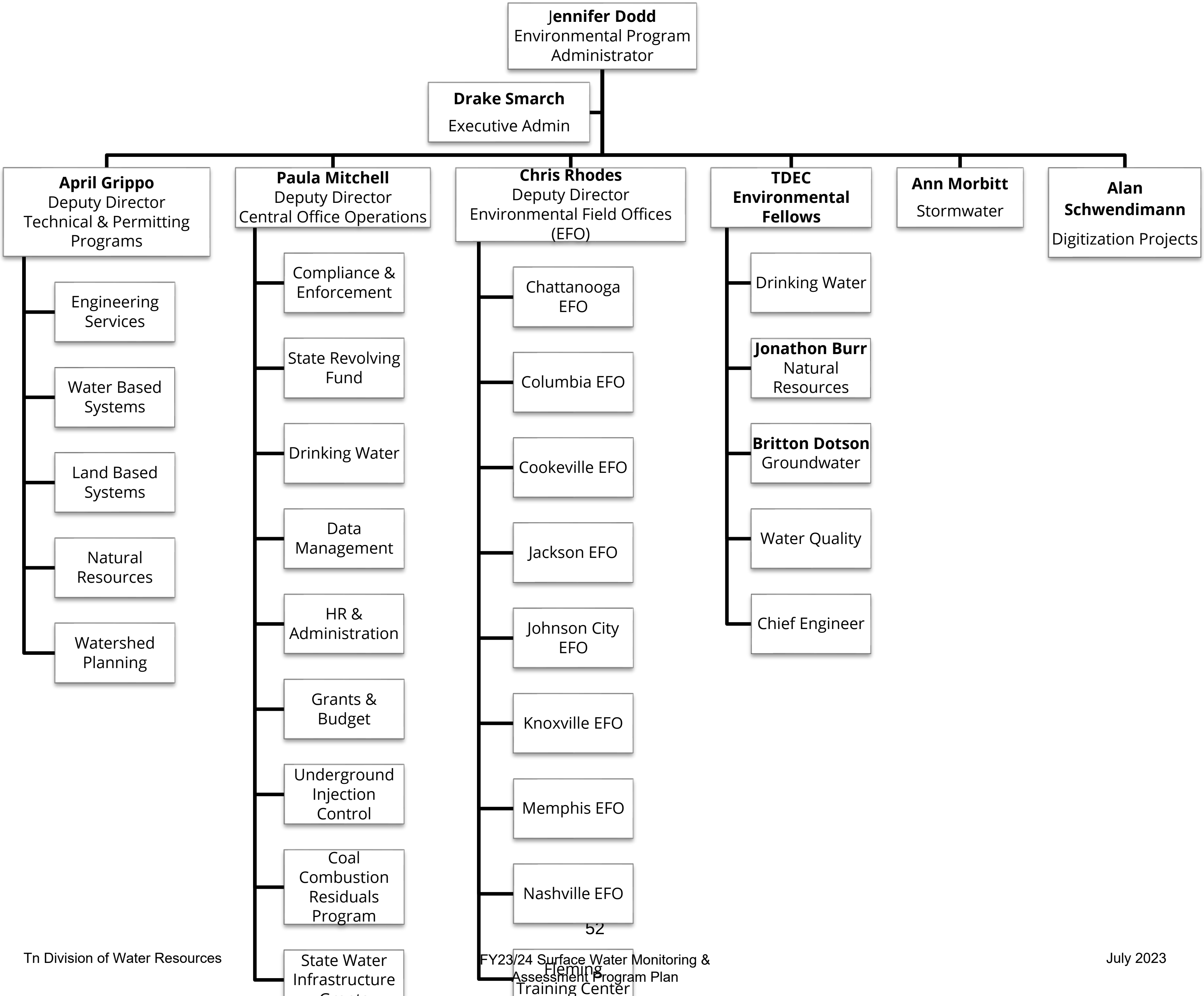
On April 24, 2012 the Governor signed into law the Tennessee Excellence in Accountability Management Act. It effectively established a new hiring system that requires agencies to define minimum qualifications and to identify specific knowledge, skills, abilities, and competencies required for each position. 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 9 reflects the current FY salary information and position class titles for 2022.

Table 9. Salary Grades for Positions in TDEC DWR (updated 7/1/2023)

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
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 **(next page)**


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 Program
State Water Infrastructure Grants
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
Fleming Training Center
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 (Table 10). Macroinvertebrate sampling 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.

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 10 Water Quality Monitoring From 2002 to 2022 (fiscal year)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chemical & Bacteriological Events	534	831	4168	774	579	584	779	747	678	829	838	866	688	790	851	806	834	917	790	786	715
Qualitative Macroinvertebrate Samples (Biorecon)	318	365	183	162	285	248	338	318	223	288	157	433	335	225	130	210	193	225	118	96	72
Intensive Macroinvertebrate Samples (SQSH)	94	330	113	256	226	267	332	353	367	257	247	274	192	377	370	408	471	537	566	589	422
Habitat Assessments	595	464	737	681	4	469	593	592	516	657	685	663	547	615	665	587	605	728	632	656	574
Diatom Samples	80	154	121	0	2	120	60	72	22	55	10	39	54	39	18	23	30	25	76	154	137
Antidegradation Surveys	5	49	33	17	97	81	2	59	51	18	12	16	7	19	26	17	6	74	14	11	
Probabilistic Monitoring Events	75	95	313	2	0	90	0	0	90	0	0	0	0	0	0	0	0	0	0	0	0
Fish Tissue Samples	0	1	0	0	20	68	45	6	135	12	65	27	55	74	76	16	29	118	79	68	43

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

The division maintains a statewide monitoring system consisting of approximately 8,200 stations. In addition, new stations are created every year. Approximately 562stations,will be monitored in FY 2023- 2024. (Watersheds in group 3 are generally farther from field offices requiring more driving time. This, along eliminating the scheduling of habitat-only site visits results in fewer stations for the same resources expenditure). Stations are sampled monthly, quarterly, and semi-annually or once during the sample year, depending on the requirements of the project and type of sample. 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 stations 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 which is currently under revision.) https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html .

1. Antidegradation
2. Posted waterbodies
3. Ecoregion reference streams/ambient monitoring (trend analysis) stations/southeast monitoring network (SEMN)
4. Sampling downstream major dischargers,landfills and CAFO's
5. TMDL development, model calibration and other special projects
6. Watershed Monitoring
    a. Currently impaired waterbody segments where the Department or other agency has developed control strategie and continued monitoring will be beneficial in order to track progress toward restoration.
    b. Currently impaired waterbodies where previous data were close to or indicated a trend towards supporting one or more designated uses, or the delisting of a specific parameter.
    c. Streams impaired for recreation where other data are not available to evaluate ongoing conditions (e.g. overflow reports, DMRs, complaints.)
    d. Streams impaired by, or suspected to be impaired by, a water quality related parameter or a specific point source may be higher priorities than streams impaired by a habitat-related parameter or more generalized land-use source.
    e. Potential new reference streams in relatively protected watersheds. Each year, existing reference streams are degraded by various impacts in their watersheds and need to be replaced.
    f. Previously Aasessed streams, especially large ones, that would likely revert to Category 3 unassessed status.
    g. Sites downstream ARAP activities or extensive nonpoint source impacts 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 or ARAP permits or a dramatic increase in impervious surfaces.

h. Unassessed stream reaches especially in third order or larger streams, or in disturbed headwaters.

i. Pre-restoration or BMP installation monitoring. This sampling would be to document improvements, but is also needed for antidegradation purposes and to confirm that the stream is a good candidate for such a project.

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.

Waterbodies posted for fish consumption are monitored at least once during each watershed cycle. A minimum of five fish of each posted species is collected and analyzed for the posted parameters.

3. Ecoregion Reference Stream, Ambient and SEMN Monitoring

Ecoregion (ECO) and headwater (FECO) reference streams within the watershed group are sampled quarterly for physical and chemical parameters. Macroinvertebrates are collected spring and fall and diatoms are collected once during the growing season.

Physical, chemical and pathogen (*E. coli*) samples are collected at all long-term monitoring or ambient stations quarterly every year 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. Other Monitoring

For other monitoring types of monitoring, frequency is determined by the type of sampling (see table 11 for parameter list by project.) If chemicals are collected, sampling is monthly. Monthly monitoring may be reduced in the case of impaired waters were results are above certain levels (QAPP, 2021). Biological samples are collected once with the season being determined by stream type and pollutant source (TDEC Macroinvertebrate QSSOP, 2021). Diatoms are collected once during the growing season (TDEC Draft Diatom QSSOP, 2023).

Monthly collections of e coli is preferred (unless the stream is posted in which case both monthly and geomean is collected.). Another acceptable sampling strategy for *E. coli* (when a stream is not posted) 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 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.

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.

There are occasions when a a biological reconnaissance (Biorecon) is appropriate although in general a quantitative sample is preferred. 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. It is most appropriate when the targeted habitat is not available for a quantitative sample, or the stream is clearly impaired or supporting. A decision flow chart is provided in the TDEC Macroinvertebrate QSSOP (2021)

A more intensive survey, collecting a Semi-Quantitative Single Habitat Bank (SQBANK) or Semi-Quantitative Single Habitat Kick (SQKICK), is the preferred method in most cases. Biometrics using relative abundance can be calculated. This method can be compared to the division's numeric translators for biocriteria.

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 to develop a Southeast diatom multi-metric index which was finalized in 2022. The index was further calibrated to TN bioregions and is being used to supplement macroinvertebrate and chemical monitoring in assessments.

3. 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. State park and TWRA fishing lakes were added to the watershed cycle in 2022. A list of fish tissue stations to be sampled in 2023-24 appears in Table 12. Parameters to be sampled are listed in Table 13. TDEC DWR, TVA, TWRA, NPS and DOR 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. 2023– 2024 Fish Tissue Sampling Sites

STATION ID	WATERBO DY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
LTENN035.0BT	Chilhowee Reservoir	Forebay	Mercury, PFAS on largest bass composite	LMB and SMB	TVA
ABRAM000.5BT	Chilhowee Reservoir	Abram Creek Embayment	Mercury, PFAS on largest bass composite	LMB and SMB	TVA
LTENN044.0BT	Calderwood Reservoir	Near dam	Mercury and PFAS on largest bass composite.	LMB and SMB	TVA
HFORK002.0HN	Holly Fork Creek	Springville Bottom Dewatering Area	Mercury, PFAS on largest bass composite	Bass and crappie	TWRA
WSAND004.4HN	West Sandy Creek	Springville Bottom Dewatering Elkhorn Road (Fishing station extends downstream to Dike)	Mercury, PFAS largest bass comp.	Bass and Crappie	TWRA
BEECH000.5WE	Beech Creek Embayment	Beech Creek Embayment Ky Reservoir	Mercury and Selenium. PFAS largest bass comp.	Largemouth Bass, Channel Cat, Crappie	TDH
BEECH002.0WE	Beech Creek	U/S Morrison Creek	Mercury and Selenium, PFAS largest bass comp.	LMB, Crappie, Cats	TDH
CYPRE000.5SH	Cypress Creek	Upstream Levee Road Pumping Station	106 metals and organics, pfas largest fish composite	Any edible species found (green sunfish only species in 2019)	TDH

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
WOLF001.8SH	Wolf River	Hw 51 Bridge Near Mouth	106 metals and organics, dioxin on largest cat comp, pfas on largest bass (or other game fish) composite.	Bass. Cats, buffalo (or carp)	TDH
WOLF015.3SH	Wolf River	Walnut Grove Road	106 metals and organics, dioxin on largest cat comp, pfas on largest bass (or other game fish) composite.	Bass. Cats, buffalo (or carp)	TDH
DUCK002.0HU	KY Lake	Duck River Embayment	Hg and SE, PFAS largest bass comp	Black Bass (LMB/SMB/Spotted)	TDH
BUFFA017.7PE	Buffalo River	Old Hwy 13 D/S Lobelville near gaging station	Bass and Catfish	Metals and Organics, PFAS	TVA
DUCK022.5HU	Duck River	Hite Ford	Bass and Catfish	Metals and Organics, PFAS	TVA
BSAND007.4HN	Kentucky Lake	Big Sandy Embayment Downstream Of Poplar Creek	Bass and Catfish	Metals and Organics, PFAS	TVA
TENNE085.0HU	Kentucky Reservoir	D/S Turkey Creek	Bass and Catfish	Metals and Organics, PFAS	TVA
TENNE200.0HD	Kentucky Reservoir	Near Hamburg	Bass and Catfish	Metals and Organics, PFAS	TVA
CLINC172.4HK	Clinch River	Swan Island	Bass and Catfish	Metals and Organics, PFAS	TVA
POWEL065.5CL	Powell River	HWY 25	Bass and Catfish	Metals and Organics, PFAS	TVA
CLINC125.0CL	Norris Reservoir	D/S Straight Creek	Bass and Catfish	Metals and Organics, PFAS	TVA

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
CLINC125.0CL	Norris Reservoi r	Forebay	Bass and Catfish	Metals and Organics, PFAS	TVA
POWEL030.0UN	Norris Reservoir	Stiners Woods	Bass and Catfish	Metals and Organics, PFAS	TVA
TENNE277.0_AL	Wheeler Reservoir	Dam	Bass and Catfish	Metals and Organics, PFAS	TVA
OCOEE012.5PO	Parksville Reservoir	Near dam	Bass and Catfish	Metals and Organics, PFAS	TVA
FWATE009.8PU	Burgess Falls State Park Reservoir	Burgess Falls 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

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 state 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 15).

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

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

Compliance assurance and operation and maintenance (O & M) 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.

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 98 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 at least 2% of major and minor facilities with WET permit limits on an annual basis. There are 312 individual permitted facilities that have WET limits incorporated into their permit. Toxicity tests are sent directly by EFOs to ESC Lab Sciences for analyses.

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APPENDIX A:

2023-24 MONITORING STATIONS SCHEDULED TO BE SAMPLED

Projected Monitoring Stations for 2023-2024

Project	Waterbody 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	
Mining	TN05130101015_0600	VALLE000.1CL	Valley Creek	MU							4
Mining	TN05130101015_0700	STRAI000.1CL	Straight Creek	MU							4
Mining	TN05130101015_0800	TACKE000.5CA	Tackett Creek	MU							4
Mining	TN05130101015_2000	CLEAR030.5CA	Clear Fork (Of The Cumberland River)	MU							4
Mining	TN05130101015_3000	CLEAR037.3CL	Clear Fork	MU							4
Ambient	TN05130103001_1000	CUMBE381.1CY	Cumberland River	CKEFO					4	4	4
SEMN	TN05130104016_0100	ECO68A03	Laurel Fork Of Station Camp Creek	MU			2	1		4	
Mining	TN05130104037_1000	NEW008.8SC	New River	MU							4
Mining	TN05130104037_1300	FECO69D01	UT to New River	MU							4
Mining	TN05130104037_1800	SMOKY002.5SC	Smoky Creek	MU							4
Mining	TN05130104037_2000	NEW045.0AN	New River	MU							4
Ambient	TN05130105001_1000	OBEY002.1CY	Obey River	CKEFO					4	4	4

Project	**Waterbody ID**	**DWR Station ID**	**Waterbody Name**	**EFO**	**Evaluate ****	**Biorecon**	**SQSH**	**Diatom**	**E. coli**	**Nutrients**	**Metals**
Watershed FS	TN05130107001_0200	RAMS000.6WA	Rams Creek	CKEFO			1				
303d	TN05130107001_0300	MARTI000.4WA	Martin Creek	CKEFO			1	1	12	12	
Watershed FS	TN05130107001_0400	DRY001.2WA	Dry Branch	CKEFO			1		12	12	
Watershed FS	TN05130107001_1000	COLLI025.8WA	Collins River	CKEFO			1		12	12	
Watershed FS	TN05130107002_0400	BSPRI000.1WA	Bluff Spring Branch	CKEFO			1				
Watershed FS	TN05130107002_1000	MOUNT001.0WA	Mountain Creek	CKEFO			1		12	12	
303d	TN05130107002_2000	MOUNT006.8WA	Mountain Creek	CKEFO			1	1	12	12	
303d	TN05130107004_0100	HGROV000.8WA	Hickory Grove Branch	CKEFO			1	1	12	12	
303d	TN05130107004_1000	CHARL001.0WA	Charles Creek	CKEFO			1	1	12	12	
303d	TN05130107006_0100	GARNE000.3WA	Garner Branch	CKEFO			1	1	12	12	
303d	TN05130107006_0200	CANEY000.9WA	Caney Branch	CKEFO			1	1	12	12	
Watershed FS	TN05130107006_0300	SPBAR000.2WA	South Prong Barren Fork	CKEFO			1				
303d	TN05130107006_0310	MUD001.3CE	Mud Creek	CKEFO			1	1	12	12	
303d	TN05130107006_0320	LIBER001.6CE	Liberty Creek	CKEFO			1	1	12	12	
Watershed FS	TN05130107006_0330	WITTY000.8WA	Witty Creek	CKEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN05130107006_0331	DUKE000.2CN	Duke Creek	CKEFO			1		12	12	
Watershed FS	TN05130107006_0332	MCMAH001.0CN	McMahan Creek	CKEFO			1		12	12	
303d	TN05130107006_0400	NPBAR002.1WA	North Prong Barren Fork	CKEFO			1	1	12	12	
Watershed FS	TN05130107006_0420	BULLP000.3WA	Bullpen Creek	CKEFO			1				
Watershed NA	TN05130107006_0500	DOG000.4WA	Dog Branch	CKEFO			1				
Watershed FS	TN05130107006_0700	OAKLA001.2WA	Oakland Branch	CKEFO			1		12	12	
Potential impairment	TN05130107006_1000	BARRE004.4WA	Barren Fork	CKEFO			1	1	12	12	12
Potential impairment	TN05130107006_1000	BARRE004.5WA	Barren Fork	CKEFO			1	1	12	12	12
Potential impairment	TN05130107006_2000	BARRE017.2WA	Barren Fork	CKEFO			1	1	12	12	
Watershed FS	TN05130107006_2000	BARRE018.3WA	Barren Fork	CKEFO			1	1	12	12	
Watershed FS	TN05130107012_0100	LOCKE000.3WA	Locke Branch	CKEFO			1	1	12	12	
303d	TN05130107012_0200	FULTZ001.3WA	Fultz Creek	CKEFO			1	1	12	12	
303d	TN05130107012_0300	LHICK000.3WA	Little Hickory Creek	CKEFO			1	1	12	12	
303d	TN05130107012_0400	WFHIC002.3WA	West Fork Hickory Creek	CKEFO			1	1	12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN05130107012_0410	MEADO001.3CE	Meadow Branch	CKEFO			1	1	12	12	
303d	TN05130107012_0500	CROWF001.4WA	Plum Creek	CKEFO			1		12	12	
303d	TN05130107012_1000	HICKO001.1WA	Hickory Creek	CKEFO			1	1	12	12	
303d	TN05130107016_0150	SAVAG006.3SE	Savage Creek	CHEFO			1	1	12	12	
Watershed FS	TN05130107016_0300	MILL001.1GY	Mill Creek	CHEFO		1					
Watershed FS	TN05130107016_0600	BERNE000.2GY	Fall Creek	CHEFO			1				
Watershed FS	TN05130107016_0700	BIG004.5GY	Big Creek	CHEFO		1			5/30*		
Watershed FS	TN05130107016_0710	RANGE003.0GY	Ranger Creek	CHEFO			1		12	12	
Watershed NA	TN05130107016_0720		Armstrong Creek	CKEFO							
Watershed FS	TN05130107016_0730	FIRES002.1GY	Firescald Creek	CHEFO					12	12	
Watershed FS	TN05130107016_0730	FIRES001.1GY	Firescald Creek	CHEFO		1			5/30*		
Watershed FS	TN05130107016_0731	PINEY001.8GY	Piney Creek	CHEFO			1		12	12	
Potential impairment	TN05130107016_0750	BIG007.2GY	Big Creek	CHEFO			1		12	12	12
303d	TN05130107016_0800	TAYLO000.2GY	Taylor Creek	CKEFO			1	1	12	12	
303d	TN05130107016_0900	SCOVE000.8GY	Savage Cove Creek	CKEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN05130107016_1000	COLLI047.0WA	Collins River	CKEFO			1		12	12	
Watershed FS	TN05130107016_1100	SCOTT001.8WA	Scott Creek	CKEFO			1		12	12	
303d	TN05130107016_2000	COLLI062.5GY	Collins River	CHEFO		1					
Watershed FS	TN05130107023_0200	DRY002.1WA	Dry Creek	CKEFO			1		12	12	
Watershed NA	TN05130107023_0220	TBD	Spring Creek	CHEFO		1					
303d	TN05130107023_0230	HE000.1SE	He Creek	CHEFO|MU		1					
303d	TN05130107023_0231	LHE000.1SE	Little He Creek	CHEFO|MU		1					
303d	TN05130107023_0232	BHE000.1SE	Big He Creek	CHEFO|MU		1					
303d	TN05130107023_0250	DRY007.5SE	Dry Creek	CHEFO|MU		1					
Watershed FS	TN05130107023_0255	DRY011.3SE	Dry Creek	CHEFO|MU			1				
Watershed FS	TN05130107023_1000	HILLS001.8WA	Hills Creek	CKEFO			1		12	12	
Ambient	TN05130108001_1000	CANEY011.2SM	Caney Fork	CKEFO					4	4	4
SEMN	TN05130108004_0200	ECO71H17	Clear Fork Creek	CKEFO			2	1		4	
Ambient	TN05130201001_1000	CUMBE262.9WS	Cumberland River	NEFO					4	4	4

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Reference	TN05130201011_0200	FECO71I06	Cedar Creek Unnamed Tributary	NEFO		2	2	1		4	
Reference	TN05130201015_0300	FECO71I02	Young Branch	NEFO		2	2	1		4	
Reference	TN05130201015_1000	ECO71I12	Cedar Creek	NEFO		2	2	1		4	
Ambient	TN05130202001_2000	CUMBE174.5DA	Cumberland River	NEFO					4	4	4
Ambient	TN05130203001_1000	STONE003.9DA	Stones River	NEFO					4	4	4
Ambient	TN05130203018_1000	WFSTO006.2RU	West Fork Stones River	NEFO					6	6	6
303d	TN05130203018_2000	WFSTO010.0RU	West Fork Stones River	NEFO					3	3	3
303d	TN05130203018_2000	WFSTO011.4RU	West Fork Stones River	NEFO					3	3	3
Watershed NA	TN05130203021_1000	MFSTO005.3RU	Middle Fork Stones River	NEFO					3	3	
Ambient	TN05130204009_1000	HARPE040.5CH	Harpeth River	NEFO					4	4	4
Reference	TN05130206002_0600	ECO71E14	Passenger Creek	NEFO		2	2	1		4	
Ambient	TN05130206002_3000	RED025.5MT	Red River	NEFO					4	4	4
Reference	TN05130206003_0500	ECO71E18	Santee Creek	NEFO		2	2	1		4	
Ambient	TN05130206003_1000	SULPH000.1RN	Sulphur Fork	NEFO					4	4	4
Reference	TN05130206003_1400	ECO71E19	Calebs Creek	NEFO		2	2	1		4	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bior econ	SQSH	Diat om	E. coli	Nutr ients	Met als
Reference	TN05130206003_1700	ECO71E17	Brush Creek	NEFO		2	2	1		4	
Watershed FS	TN06010101001_0100	SENSA000.2HS	Sensabaugh Branch	JCEFO			1				
Ambient	TN06010101001_1000	NFHOL004.6SU	North Fork Holston River	JCEFO			1	1	12	12	12
Watershed NA	TN06010101019_1000	TBD	Possum Creek	JCEFO			1				
303d	TN06010102001_0100	MADD001.2SU	Madd Branch	JCEFO			1		12	12	
303d	TN06010102001_2000	SFHOL006.7SU	South Fork Holston River	JCEFO			1	1	12	12	12
303d	TN06010102003_0100	MILL000.2SU	Mill Creek	JCEFO			1		12	12	
303d	TN06010102003_0200	HORSE9.1T0.6SU	Unnamed trib to Horse Creek	JCEFO			1		5/30*		
303d	TN06010102003_0300	FALL000.6WN	Fall Branch	JCEFO			1		12	12	
303d	TN06010102003_0400	WALKE000.1SU	Walker Fork Creek	JCEFO			1		12	12	
303d	TN06010102003_0410	LYNCH000.2SU	Lynch Branch	JCEFO			1		5/30*		
303d	TN06010102003_0420	BGAP000.0SU	Blair Gap Branch	JCEFO			1		5/30*		
303d	TN06010102003_0500	BEAR000.2SU	Bear Creek	JCEFO			1	1	12	12	
303d	TN06010102003_0600	LHORS000.3SU	Little Horse Creek	JCEFO			1		12	12	
Watershed FS	TN06010102003_0610	DOLAN001.3SU	Dolan Branch	JCEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bior econ	SQSH	Diat om	E. coli	Nutr ients	Met als
Watershe d FS	TN060101020 03_1000	HORSE000.3 SU	Horse Creek	JCEFO			1		12	12	
303d	TN060101020 03_2000	HORSE004.0 SU	Horse Creek	JCEFO			1		12	12	
303d	TN060101020 03_3000	HORSE010.7 SU	Horse Creek	JCEFO			1		12	12	
303d	TN060101020 04T_0100	RUSSE000.8 SU	Russell Creek	JCEFO			1		12	12	
Watershe d FS	TN060101020 04T_0200	SFHOL16.8T 1.3SU	Unnamed trib to Fort Patrick Henry Reservoir.	JCEFO			1				
Watershe d FS	TN060101020 04T_0300	CVALL001.4 SU	Cooks Valley Branch	JCEFO			1				
Ambient	TN060101020 06_1000	BEAVE001.0 SU	Boone Reservoir	JCEFO					4	4	4
Ambient	TN060101020 42_2000	BEAVE015.3 SU	Beaver Creek	JCEFO					4	4	4
303d	TN060101020 45_1000	FALL000.7S U	Fall Creek	JCEFO			1		12	12	
303d	TN060101020 45_2000	FALL003.6S U	Fall Creek	JCEFO			1		12	12	
303d	TN060101020 46_0100	TRANB000. 4SU	Tranbarger Branch	JCEFO			1	1	12	12	
303d	TN060101020 46_0200	GRAVE000. 3SU	Gravelly Branch	JCEFO			1	1	12	12	
303d	TN060101020 46_0400	MILLE000.4 SU	Miller Branch	JCEFO			1	1	12	12	
303d	TN060101020 46_0500	REEDY4.4T 0.2SU	Unnamed Trib to Reedy Creek		Evaluate						
303d	TN060101020 46_0600	REEDY6.5T 0.2SU	Unnamed Trib to Reedy Creek	JCEFO			1		12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bioreconn	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06010102046_0700	CLARK000.4SU	Clark Branch	JCEFO			1		12	12	
303d	TN06010102046_0800	GAINE000.3SU	Gaines Branch	JCEFO			1		12	12	
303d	TN06010102046_0900	TIMBE000.3SU	Timbertree Branch	JCEFO			1		5/30*		
303d	TN06010102046_1000	REEDY000.1SU	Reedy Creek	JCEFO			1		12	12	
Watershed FS	TN06010102046_1100	BOOZY000.1SU	Boozy Creek	JCEFO			1				
Landfill	TN06010102046_1200	REEDY14.8T0.1SU	Unnamed Trib to Reedy Creek	JCEFO			1		12	12	12
303d	TN06010102046_1300	HICKS000.2SU	Hicks Creek	JCEFO			1				
303d	TN06010102046_2000	REEDY008.0SU	Reedy Creek	JCEFO			1	1	12	12	
303d	TN06010102046_3000	REEDY015.5SU	Reedy Creek	JCEFO			1	1	12	12	
303d	TN06010102047_0100	FORD000.6WN	Ford Creek	JCEFO			1		12	12	
303d	TN06010102047_0200	RED000.0WN	Red River	JCEFO			1		5/30*		
Watershed FS	TN06010102047_1000	SINKI001.0SU	Sinking Creek	JCEFO			1				
Watershed FS	TN06010102057_0100	KENDR5.8T0.7SU	Unnamed trib to Kendrick Creek	JCEFO			1		12	12	
Potential impairment	TN06010102057_0200	STRAI000.4SU	Straight Branch	JCEFO			1		12	12	12
303d	TN06010102057_1000	KENDR000.2SU	Kendrick Creek	JCEFO			1	1	12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN06010102057_2000	KENDR005.4SU	Kendrick Creek	JCEFO			1		12	12	
303d	TN06010102702_0100	POSSU001.3WN	Possum Creek	JCEFO			1	1	12	12	
303d	TN06010102702_1000	CEDAR002.1WN	Cedar Creek	JCEFO			1	1	12	12	
303d	TN06010102729_1000	RSPRI000.4SU	Rock Springs Branch	JCEFO			1		12	12	
Ambient	TN06010103013_1000	DOE001.1CT	Doe River	JCEFO					4	4	4
Ambient	TN06010104011_2000	HOLST131.5HS	Holston River	JCEFO					4	4	4
SEMN	TN06010104015_0100	ECO6702	Fisher Creek	JCEFO			2	1		4	
Reference	TN06010104015_2000	ECO6701	Big Creek	JCEFO		2	2	1		4	
Ambient	TN06010105001_4000	FBROA095.9CO	French Broad River	KEFO					4	4	4
Ambient	TN06010107001_1000	FBROA003.8KN	French Broad River	KEFO					4	4	4
Ambient	TN06010108001_3000	NOLIC020.8GE	Nolichucky River	JCEFO					4	4	4
SEMN	TN06010108010_3200	ECO66E09	Clark Creek	JCEFO			2	1		4	
Ambient	TN06010108010_5000	NOLIC097.5UC	Nolichucky River	JCEFO					4	4	4
Ambient	TN06010108030_1000	BLIME000.5GE	Big Limestone Creek	JCEFO					4	4	4
Ambient	TN06010108035_1000	LICK001.0GE	Lick Creek	JCEFO					4	4	4

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Ambient	TN06010108064_1000	SINKI000.5GE	Sinking Creek	JCEFO					4	4	4
Ambient	TN06010108102_1000	RICHL001.3GE	Richland Creek	JCEFO					4	4	4
Ambient	TN06010108510_2000	LLIME007.0WN	Little Limestone Creek	JCEFO					4	4	4
Ambient	TN06010201001_1000	PINEY005.0RH	Piney River	CHEFO					4	4	4
Ambient	TN06010201020_1000	TENNE643.3KN	Tennessee River	KEFO					4	4	4
SEMN	TN06010201032_4000	ECO66G05	Little River	KEFO			2	1		4	
Landfill	TN06010204002_1000	FORK004.6MO	Fork Creek	KEFO			1	1	12	12	12
303d	TN06010204004_0100	BAT17.6T1.0MO	Unnamed Trib to Bat Creek	KEFO			1	1	12	12	
303d	TN06010204004_0110	BAT17.6T0.8T0.1MO	Unnamed Trib to Unnamed Trib to Bat Creek	KEFO			1		12	12	
303d	TN06010204004_0110	BAT17.6T0.8T0.8MO	Unnamed Trib to Unnamed Trib to Bat Creek	KEFO			1		12	12	
303d	TN06010204004_1000	BAT008.1MO	Bat Creek	KEFO			1		5/30*		
Landfill	TN06010204004_2000	BAT016.0MO	Bat Creek	KEFO			1	1	12	12	
Watershed FS	TN06010204015_1000	BALLP004.0MO	Ballplay Creek	KEFO	Extrapolate		1				
Watershed	TN06010204015_2000		Ballplay Creek	KEFO							

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN06010204018_0100		Jakes Creek	KEFO							
Watershed	TN06010204018_0200		Little Citico Creek	KEFO	Evaluate						
Watershed	TN06010204018_0300		Doublecamp Creek	KEFO	Evaluate						
Watershed	TN06010204018_0400		North Fork Citico Creek	KEFO	Evaluate						
Watershed	TN06010204018_0500		South Fork Citico Creek	KEFO	Evaluate						
Watershed	TN06010204018_0650		Flats Creek	KEFO	Evaluate						
303d	TN06010204020_1000		Little Tennessee River	KEFO	Evaluate						
Watershed	TN06010204038_1000		Panther Creek	KEFO	Evaluate						
Watershed	TN06010204039_0300		Kingfisher Creek	KEFO	Evaluate						
Watershed	TN06010204039_0400		Anthony Creek	KEFO	Evaluate						
Watershed	TN06010204039_0500		Mill Creek	KEFO	Evaluate						
Watershed	TN06010204039_0510		Russell Branch	KEFO	Evaluate						
Watershed	TN06010204039_0520		Forge Creek	KEFO	Evaluate						
Watershed	TN06010204039_0600		Rabbit Creek	KEFO	Evaluate						
303d	TN06010204039_1000	ABRAM008.6BT	Abrams Creek	KEFO		1					

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN06010204039_1999		Misc. tribs to Abrams Creek	KEFO	Evaluate						
Reference	TN06010204039_2000	ECO66F06	Abrams Creek	KEFO		2	2	1		4	
Watershed	TN06010204039_2999		Misc tribs to Abrams Creek	KEFO	Evaluate						
303d	TN06010204042_0100	CENTE000.3BT	Centenary Creek	KEFO			1	1	12	12	
303d	TN06010204042_0200	LNINE000.5BT	Little Ninemile Creek	KEFO			1				
303d	TN06010204042_0300	SIXMI001.6BT	Sixmile Creek	KEFO					5/30*		
Watershed	TN06010204042_0300	SIXMI005.1BT	Sixmile Creek	KEFO			1				
303d	TN06010204042_0311		Unnamed Trib to Big Springs Branch	KEFO	Evaluate						
303d	TN06010204042_1000	NINEM004.8BT	Ninemile Creek	KEFO			1	1	5/30*		
303d	TN06010204043_0200	TBD	Binfield Branch	KEFO			1				
303d	TN06010204043_0400	LBAKE000.5BT	Little Baker Creek	KEFO					5/30*		
303d	TN06010204043_1000	BAKER008.9LO	Baker Creek	KEFO			1		5/30*		
303d	TN06010204043_2000	BAKER019.1BT	Baker Creek	KEFO					5/30*		
Watershed	TN06010204043_2000	BAKER017.5BT	Baker Creek	KEFO			1				
303d	TN06010204044_0100	CANE000.5MO	Cane Creek	KEFO			1		12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN06010204044_0400	TURKE000.1MO	Turkey Creek	KEFO			1				
Reference	TN06010204044_0500	ECO66G09	North River	KEFO		2	2	1		4	
Reference	TN06010204044_0510	FECO66G01	Indian Branch	KEFO		2	2	1		4	
Watershed	TN06010204044_0600		Sycamore Creek	KEFO	Evaluate						
Watershed	TN06010204044_0700		Bald River	KEFO	Evaluate						
Watershed	TN06010204044_0800		Wildcat Creek	KEFO							
Watershed	TN06010204044_0810		Sixmile Creek	KEFO							
Watershed	TN06010204044_0900		Lyons Creek	KEFO	Evaluate						
Watershed FS	TN06010204044_1000	TELLI022.0MO	Tellico River	KEFO			1	1		1	
303d	TN06010204044_1300	SINKH002.0MO	Sinkhole Creek	KEFO			1		12	12	
Watershed FS	TN06010204044_1400	LAURE000.2MO	Laurel Creek	KEFO							
303d	TN06010204044_1500	MORGA001.6MO	Morgan Branch	KEFO							
Watershed FS	TN06010204044_2000	TELLI036.4MO	Tellico River	KEFO			1	1	12	12	
Landfill	TN06010204045_1000	NOTCH006.3MO	Notchy Creek	KEFO			1		12	12	12
Watershed	TN06010204046_1000		Slickrock Creek	KEFO	Evaluate						

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN06010204053_1000		Tallassee Creek	KEFO							
Reference	TN06010204056_0100	ECO67H06	Laurel Creek	KEFO	Evaluate	2	2	1		4	
303d	TN06010204056_0150		Laurel Creek	KEFO							
303d	TN06010204056_1000	BIG000.7MO	Big Creek	KEFO			1		5/30*		
Watershed FS	TN06010204062_1000	FOURM002.0BT	Fourmile Creek	KEFO			1				
Watershed	TN06010204062_2000		Fourmile Creek	KEFO	Evaluate						
303d	TN06010204065_1000	ISLAN003.2MO	Island Creek	KEFO			1		5/30*		
Watershed	TN06010204344_1000		Tabcat Creek	KEFO	Evaluate						
Watershed	TN06010204348_1000		Parson Branch	KEFO	Evaluate						
Watershed	TN06010204498_1000		Mulberry Creek	KEFO							
SEMN	TN06010205001T_0300	ECO67F13	White Creek	KEFO			2	1		4	
Reference	TN06010205014_1000	ECO67F17	Big War Creek	JCEFO		2	2	1		4	
Ambient	TN06010205016_1000	CLINC189.8HK	Clinch River	JCEFO					4	4	4
Ambient	TN06010206007_2000	POWEL103.3HK	Powell River	JCEFO						4	4
Ambient	TN06010207001_1000	CLINC010.0RO	Clinch River Arm of Watts Bar Reservoir	KEFO					4	4	4

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06010207004_0100	GRABL000.4KN	Grable Branch	KEFO			1				
303d	TN06010207004_1000	HICKO003.4KN	Hickory Creek	KEFO			1				
303d	TN06010207006T_1100	CLINC51.0T1.6AN	Ernies Creek	KEFO			1		5/30*		
303d	TN06010207011_0200	WILLO000.6KN	Willow Fork	KEFO			1		12	12	
303d	TN06010207011_0210	MILL000.1KN	Mill Branch	KEFO			1		5/30*		
303d	TN06010207011_0500	HINES000.2KN	Hines Branch	KEFO			1		5/30*		
303d	TN06010207011_0600	KNOB000.8KN	Knob Fork	KEFO			1	1	12	12	
303d	TN06010207011_0700	GRASS000.9KN	Grassy Creek	KEFO			1		5/30*		
303d	TN06010207011_0800	MEADO000.2KN	Meadow Creek	KEFO			1		5/30*		
303d	TN06010207011_0900	PLUMB000.3KN	Plumb Creek	KEFO			1		5/30*		
303d	TN06010207011_1000	BEAVE003.5KN	Beaver Creek	KEFO			1	1	12	12	
303d	TN06010207011_2000	BEAVE023.5KN	Beaver Creek	KEFO			1	1	12	12	
303d	TN06010207011_2000	BEAVE023.6KN	Beaver Creek	KEFO			1	1	12	12	
303d	TN06010207011_3000	BEAVE040.1KN	Beaver Creek	KEFO			1		5/30*		
Potential impairment	TN06010207014_0100	WILLI000.5KN	Williams Branch	KEFO|MU			1	1			

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed NA	TN06010207014_0300	RACCO000.4UN	Raccoon Creek	KEFO			1				
Landfill	TN06010207014_0400	NFBUL000.1UN	North Fork Bullrun Creek	KEFO			1	1	12	12	
Watershed FS	TN06010207014_0500	WGAP000.1UN	Woods Gap Branch	KEFO	Evaluate						
Landfill	TN06010207014_1000	BULLR005.2AN	Bullrun Creek	KEFO			1	1	12	12	12
303d	TN06010207014_2000	BULLR016.2KN	Bullrun Creek	KEFO			1		5/30*		
Landfill	TN06010207014_3000	BULLR031.1UN	Bullrun Creek	KEFO			1	1	12	12	12
303d	TN06010207016_0100	BUFFA004.6AN	Buffalo Creek	KEFO			1				
303d	TN06010207016_0100	BUFFA000.3AN	Buffalo Creek	KEFO			1	1	12	12	
Landfill	TN06010207016_0100	BUFFA003.9AN	Buffalo Creek	KEFO			1	1	12	12	
303d	TN06010207016_0200	BYRAM000.4AN	Byrams Fork	KEFO			1		5/30*		
303d	TN06010207016_1000	HINDS000.7AN	Hinds Creek	KEFO			1		5/30*		
303d	TN06010207016_2000	HINDS006.8AN	Hinds Creek	KEFO			1		5/30*		
303d	TN06010207016_3000	HINDS014.1AN	Hinds Creek	KEFO			1		5/30*		
SEMN	TN06010207019_0200	ECO67F06	Clear Creek	KEFO		2	2	1		4	
Watershed FS	TN06010207020_0400	INDIA002.4RO	Indian Creek	KEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed NA	TN06010207020_0450	INDIA006.6MG	Indian Creek	KEFO		1					
303d	TN06010207020_0500	COW001.4AN	Cow Creek	KEFO			1				
Landfill	TN06010207020_1000	POPLA006.7RO	Poplar Creek	KEFO			1	1			
Landfill	TN06010207020_1000	POPLA015.3RO	Poplar Creek	KEFO					12	12	12
Watershed FS	TN06010207020_1200	BRUSH001.0AN	Brushy Fork	KEFO			1				
303d	TN06010207020_1300		Mitchell Branch	KEFO			1				
Watershed NA	TN06010207020_2000	POPLA023.0AN	Poplar Creek	KEFO			1	1	12	12	
Reference	TN06010207026_0300	FECO67I12	Mill Branch	KEFO		2	2	1		4	
Landfill	TN06010207026_1000	EFPOP001.7RO	East Fork Poplar Creek	KEFO			1		12 & 5/30	12	12
303d	TN06010207026_2000	EFPOP008.6AN	East Fork Poplar Creek	KEFO			1	1	12 & 5/30	12	12
Reference	TN06010207028_0100	FECO67F02	Mill Creek	KEFO		2	2	1		4	
303d	TN06010207028_1000	CANEY001.3RO	Caney Creek	KEFO			1				
Landfill	TN06010207029_1000	COAL001.2AN	Coal Creek	KEFO			1	1	12 & 5/30	12	
303d	TN06010207029_2000	COAL005.4AN	Coal Creek	KEFO			1				
Watershed NA	TN06010207036_1000	PAWPA001.0RO	Paw Paw Creek	KEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bior econ	SQSH	Diat om	E. coli	Nutr ients	Met als
303d	TN06010207455_1000	CONNE000.9KN	Conner Creek	KEFO			1				
Ambient	TN06020001001_1000	TENNE444.0MI	Nickajack Reservoir	CHEFO					4	4	4
Ambient	TN06020001007_1000	SCHIC000.4HM	South Chickamauga Creek	CHEFO					4	4	4
Ambient	TN06020001020_1000	TENNE503.3RH	Chickamauga Reservoir	CHEFO					4	4	4
Ambient	TN06020001020_1000	TENNE477.0HM	Chickamauga Reservoir	CHEFO						4	4
Ambient	TN06020001020_1000	TENNE529.5RH	Chickamauga Reservoir	CHEFO					4	4	4
303d	TN06020001020T_0100	RATTA002.2RH	Rattan Creek	CHEFO			1		12	12	
303d	TN06020001020T_0200	GRASS002.0RH	Grassy Branch	CHEFO			1	1	12	12	
303d	TN06020001020T_0300	WATTS003.0ME	Watts Creek	CHEFO			1				
303d	TN06020001020T_0400	LICK001.5ME	Lick Branch	CHEFO			1		12	12	
303d	TN06020001020T_0510	DRY2.8T0.6HM	Unnamed Trib to Dry Branch	CHEFO			1		12	12	
303d	TN06020001020T_0600	PENNY000.1HM	Penny Branch	CHEFO			1	1	12	12	
Watershed FS	TN06020001020T_0700	THATC000.1HM	Thatch Branch	CHEFO			1				
Landfill	TN06020001020T_0800	FROGL000.8HM	Frog Level Branch	CHEFO			1	1	12	12	12
Landfill	TN06020001020T_0999	TENNE518T1.3RH	UT to Tennessee River	CHEFO			1		12	12	12

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06020001029_0100	WOLFE000.4HM	Wolfe Branch	CHEFO			1				
303d	TN06020001029_0200	SAVAN6.4T0.4HM	Unnamed Trib to Savannah Creek	CHEFO			1	1	12	12	
Watershed FS	TN06020001029_0300	RSPRI000.1HM	Runyon Spring Branch	CHEFO			1				
303d	TN06020001029_0400	LEWIS000.3HM	Lewis Branch	CHEFO			1	1	12	12	
Reference	TN06020001029_0500	FECO67H01	Taliaferro Branch	CHEFO		2	2	1		4	
303d	TN06020001029_1000	SAVAN005.0HM	Savannah Creek	CHEFO			1		12	12	
303d	TN06020001038_0100	HARDI000.4ME	Hardin Creek	CHEFO			1		12	12	
303d	TN06020001038_0200	GOODF002.4ME	Goodfield Creek	CHEFO			1	1	12	12	
303d	TN06020001038_0210	COLDW000.5ME	Coldwater Branch	CHEFO			1	1	12	12	
303d	TN06020001038_1000	DECAT000.4ME	Decatur Creek	CHEFO			1		12	12	
303d	TN06020001041_0100	TMILE002.6ME	Ten Mile Creek	CHEFO			1	1	12	12	
303d	TN06020001041_0110	HURRI001.0ME	Hurricane Creek	CHEFO			1	1	12	12	
Watershed FS	TN06020001041_0200	DFORK000.4ME	Dry Fork	CHEFO			1				
303d	TN06020001041_0500	LSEWE000.8ME	Little Sewee Creek	CHEFO			1		12	12	
303d	TN06020001041_0520	BIVIN000.6MM	Bivins Branch	CHEFO			1	1	12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bior econ	SQSH	Diat om	E. coli	Nutr ients	Met als
303d	TN06020001041_0530	SFLSE001.7MM	South Fork Little Sewee Creek	CHEFO			1		12	12	
303d	TN06020001041_0532	COLLI000.1MM	Collins Branch	CHEFO			1	1	12	12	
303d	TN06020001041_0600	DAVIS000.4ME	Davis Creek	CHEFO			1		12	12	
303d	TN06020001041_0700	BANKL000.5ME	Black Ankle Creek	CHEFO			1		12	12	
303d	TN06020001041_0800	DFORK000.5ME	Dry Fork	CHEFO			1	1	12	12	
303d	TN06020001041_0810	HUTSE000.3ME	Hutsel Branch	CHEFO			1		12	12	
303d	TN06020001041_1000	SEWEE006.1ME	Sewee Creek	CHEFO			1		5/30*		
303d	TN06020001041_2000	BSEWE004.9ME	Big Sewee Creek	CHEFO			1		5/30*		
Landfill	TN06020001047_1000	CLEAR003.3RH	Clear Creek	CHEFO			1		12	12	12
Landfill	TN06020001047_1000	CLEAR1.5T0.7RH	Clear Creek unnamed Tributary	CHEFO			1		12	12	12
303d	TN06020001048_0100	MORGA001.4RH	Morgan Creek	CHEFO			1	1	12	12	
303d	TN06020001048_0110	TIGUE004.7RH	Tigues Creek	CHEFO		1					
303d	TN06020001048_0200	POLEB005.1BL	Polebridge Creek	CHEFO		1					
303d	TN06020001048_0300	HENDE007.3BL	Henderson Creek	CHEFO			1				
Watershed	TN06020001048_0400	LAURE000.1RH	Laurel Creek	CHEFO		1					

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06020001048_0450		Laurel Creek	CHEFO	Evaluate						
Watershed FS	TN06020001048_1000	RICHL004.8RH	Richland Creek	CHEFO			1		12	12	
303d	TN06020001049_1000	LRICH002.3RH	Little Richland Creek	CHEFO			1		12	12	
Watershed FS	TN06020001057_0100	MCGIL000.1RH	McGill Creek	CHEFO			1		12	12	
Watershed FS	TN06020001057_0200	ROARI000.9RH	Roaring Creek	CHEFO			1				
Watershed FS	TN06020001057_0210	CUPP000.1BL	Cupp Creek	CHEFO		1					
303d	TN06020001057_0220	BRUSH001.1RH	Brush Creek	CHEFO			1		12	12	12
Watershed FS	TN06020001057_0250	ROARI002.3RH	Roaring Creek	CHEFO			1		12	12	
Reference	TN06020001057_0400	FECO68C13	Gilbreath Creek	CHEFO		2	2	1		4	
Watershed FS	TN06020001057_1000	SALE007.7HM	Sale Creek	CHEFO			1		12	12	
303d	TN06020001060_0200	LAURE000.6BL	Laurel Branch	CHEFO			1	1	12	12	12
Watershed FS	TN06020001060_0300	HORN000.5BL	Horn Branch	CHEFO		1					
303d	TN06020001060_0400	HALL004.8BL	Hall Creek	CHEFO			1	1	12	12	12
Watershed FS	TN06020001060_1000	ROCK000.8HM	Rock Creek	CHEFO			1				
Watershed FS	TN06020001062_0100	BPOSS000.1HM	Big Possum Creek	CHEFO			1		12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06020001062_0200	LPOSS000.1HM	Little Possum Creek	CHEFO			1	1	12	12	12
303d	TN06020001062_0300	POSSU6.5T0.5T0.1HM	Unnamed Trib to Possum Creek	CHEFO			1				
Watershed FS	TN06020001062_1000	POSSU006.0HM	Possum Creek	CHEFO			1		12	12	
Watershed FS	TN06020001064_0100	DEEP000.1HM	Deep Creek	CHEFO		1					
Watershed FS	TN06020001064_0110	WOLF001.8HM	Wolf Creek	CHEFO							
Watershed FS	TN06020001064_0200	GRAY006.7SE	Gray Creek	CHEFO		1		1			
303d	TN06020001064_0210	SAWMI000.1SE	Sawmill Creek	CHEFO			1				
303d	TN06020001064_0400	BCAMP000.1HM	Board Camp Creek	CHEFO			1		12	12	
Watershed FS	TN06020001064_1000	SODDY005.9HM	Soddy Creek	CHEFO			1		12	12	
303d	TN06020001064_2000	SODDY012.5BL	Soddy Creek	CHEFO			1	1	12	12	
Watershed FS	TN06020001086_1000	GRASS002.9HM	Grasshopper Creek	CHEFO			1		12	12	
Watershed FS	TN06020001107_1000	LSODD001.3HM	Little Soddy Creek	CHEFO			1				
Ambient	TN060200011244_1000	CHATT000.9HM	Chattanooga Creek	CHEFO					4	4	4
303d	TN06020001717_1000	YELLO002.5RH	Yellow Creek	CHEFO			1		12	12	
303d	TN06020001880_1000	ROGER000.9HM	Rogers Branch	CHEFO			1	1	12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06020001889_0100	LWOLF000.5HM	Little Wolftever Creek	CHEFO			1		12	12	
Watershed FS	TN06020001889_0110	LOOLT000.4HM	Little Ooltewah Creek	CHEFO			1				
Watershed FS	TN06020001889_0200	CHEST000.3HM	Chestnut Creek	CHEFO			1		12	12	
303d	TN06020001889_0300	WILKE000.3HM	Wilkerson Branch	CHEFO			1		12	12	
303d	TN06020001889_0400	HUNTE000.5HM	Hunter Creek	CHEFO			1				
Landfill	TN06020001889_1000	WOLFT010.8HM	Wolftever Creek	CHEFO			1		12	12	12
Watershed FS	TN06020001889_2000	WOLFT017.3HM	Wolftever Creek	CHEFO			1				
Ambient	TN06020002008_1000	HIWAS013.4MM	Hiwassee River	CHEFO					4	4	4
Ambient	TN06020002081_0100	CANE001.5MM	Cane Creek	CHEFO					4	4	4
Ambient	TN06020002083_3000	OOSTA028.4MM	Oostanaula Creek	CHEFO					4	4	4
Ambient	TN06020003001_1000	OCOEE001.0PO	Ocoee River	CHEFO					4	4	4
SEMN	TN06020003013.55_0400	ECO66G20	Rough Creek	CHEFO			2	1		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

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
SEMN	TN06030001067_1000	ECO68C20	Crow Creek	CHEFO			2	1		4	
Ambient	TN06030003015_1000	ELK133.0FR	Elk River	CLEFO					4	4	4
Ambient	TN06030005078_1000	SHOAL032.2LW	Shoal Creek	CLEFO					4	4	4
303d	TN06040001041_0200	EPDOE001.8DE	East Prong Doe Creek	JEFO			1		12	12	
303d	TN06040001043_0100	TBD	Chalk Creek	JEFO			1				
303d	TN06040001043_0200	MUD000.6HD	Mud Creek	JEFO							
303d	TN06040001043_0210	SFMUD000.6HD	South Fork Mud Creek	JEFO							
303d	TN06040001043_0220	NFMUD000.7HD	North Fork Mud Creek	JEFO	Evaluate						
303d	TN06040001043_0640	BHURR001.3HE	Big Hurricane Creek	JEFO							
303d	TN06040001043_0700	HURRI007.4HE	Hurricane Creek	JEFO							
Watershed FS	TN06040001043_0800	FLATS000.4HD	Flats Creek	JEFO							
303d	TN06040001043_1000	WOAK007.9HD	White Oak Creek	JEFO			1	1	12	12	
303d	TN06040001043_1100	MILES003.1HD	Miles Creek	JEFO|MU	Evaluate						
303d	TN06040001054_0200	OWL004.2HD	Owl Creek	JEFO			1	1	12	12	
Watershed FS	TN06040001054_0400	CLEAR002.7MC	Clear Creek	JEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Landfill	TN06040001054_1000	SNAKE007.7MC	Snake Creek	JEFO			1	1	12	12	12
303d	TN06040001054_2000	SNAKE009.4MC	Snake Creek	JEFO			1	1	12	12	12
303d	TN06040001058_0200	PISGA000.8HD	Pisgah Branch	JEFO							
Watershed FS	TN06040001058_1000	LICK002.1HD	Lick Creek	JEFO							
303d	TN06040001060_0310	DSPRI000.9MC	Donald Springs Branch	JEFO			1				
Watershed FS	TN06040001060_0400	WALDR002.0_MS	Waldrop Creek	JEFO							
Landfill	TN06040001060_1000		Chambers Creek	JEFO			1				
303d	TN06040001060_2000	CHAMB017.1MC	Chambers Creek	JEFO			1				
Watershed FS	TN06040001064_0200	TURKE009.0HD	Turkey Creek	JEFO			1				
Watershed FS	TN06040001064_0220	TBD	Steele Creek	JEFO			1				
Landfill	TN06040001064_0221	SPENC000.1HD	Spencer Branch	JEFO			1				
Watershed NA	TN06040001064_0230	TBD	Boon Creek	JEFO							
Watershed FS	TN06040001064_0260	ENGLI002.1HD	English Creek	JEFO			1				
303d	TN06040001064_0400	KERR000.4HD	Kerr Branch	JEFO			1	1	12	12	
Reference	TN06040001064_0700	FECO65J02	Unnamed Trib to Horse Creek	JEFO		2	2	1		4	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN06040001064_0900	ROGER001.6HD	Rogers Creek	JEFO			1				
Watershed FS	TN06040001064_1000	HORSE005.2HD	Horse Creek	JEFO			1		12	12	12
Watershed FS	TN06040001064_1000	HORSE008.3HD	Horse Creek	JEFO			1		12	12	12
Reference	TN06040001064_1320	ECO65J06	Right Fork Whites Creek	JEFO		2	2	1		4	
Watershed FS	TN06040001064_1400	HOLLA003.0HD	Holland Creek	JEFO			1				
Watershed NA	TN06040001064_2000	HORSE021.0HD	Horse Creek	JEFO			1				
Watershed FS	TN060400011011_1000	CROOK002.7PE	Crooked Creek	CLEFO			1				
Watershed FS	TN060400011020_1000	ROAN001.1PE	Roan Creek	CLEFO			1				
Watershed FS	TN060400011035_1000	TOMS002.3PE	Toms Creek	CLEFO			1				
Landfill	TN060400011066_0100	NFLIC000.2PE	North Fork Lick Creek	CLEFO			1			4	4
Watershed FS	TN060400011066_1000	LICK004.6PE	Lick Creek	CLEFO			1				
Watershed FS	TN060400011090_1000	CYPRE002.5PE	Cypress Creek	CLEFO			1				
303d	TN060400011163_0110	LBEEC1.6T0.3WE	Unnamed Trib to Little Beech Creek	CLEFO			1				
303d	TN060400011163_1000	BEECH004.3WE	Beech Creek	CLEFO			1				
303d	TN060400011163_2000	BEECH005.8WE	Beech Creek	CLEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN060400011163_3000	BEECH010.8WE	Beech Creek	CLEFO			1				
Landfill	TN06040001118_0100	SFBEA001.5HD	South Fork Beason Creek	JEFO			1				
Landfill	TN06040001118_0110	DOLLA000.3HD	Dollar Creek	JEFO			1	1	12	12	12
303d	TN060400011219_0100	EAGLE000.8WE	Eagle Creek	CLEFO			1				
Watershed FS	TN060400011219_1000	HARDI004.6HD	Hardin Creek	JEFO			1				
Watershed FS	TN060400011219_2000	HARDI013.9WE	Hardin Creek	CLEFO			1				
Watershed FS	TN060400011303_0900	WEATH000.3WE	Weatherford Creek	CLEFO			1				
Watershed FS	TN060400011303_1000	INDIA019.0HD	Indian Creek	JEFO			1				
Watershed FS	TN060400011303_1200	SMITH003.5HD	Smith Fork	JEFO			1				
Landfill	TN060400011303_2000	INDIA026.3WE	Indian Creek	CLEFO			1			4	4
303d	TN06040001149_1000	MUD004.4HD	Mud Creek	JEFO			1				
Watershed FS	TN060400012176_1000	STEWM005.4DE	Stewman Creek	JEFO			1				
Watershed FS	TN06040001364_1000	EAGLE004.1BN	Eagle Creek	JEFO			1				
303d	TN06040001643_0200	SFCUB002.9DE	Sulphur Fork Cub Creek	JEFO			1				
Reference	TN06040001643_0300	FECO65E04	Unnamed Trib to Cub Creek	JEFO		2	2	1		4	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06040001643_1000	CUB004.2DE	Cub Creek	JEFO							
303d	TN06040001802_0100	TURKE001.1DE	Turkey Creek	JEFO							
303d	TN06040001802_0300	FLAT001.6HE	Flat Creek	JEFO							
303d	TN06040001802_0400	CANE001.1HE	Cane Creek	JEFO			1				
303d	TN06040001802_0600	PINEY000.5HE	Piney Creek	JEFO							
Landfill	TN06040001802_0700	WOLF000.7HE	Wolf Creek	JEFO			1	1			
Ambient	TN06040001802_1000	BEECH010.0DE	Beech River Embayment	JEFO					4	4	4
303d	TN06040001802_1100	ONEMI000.7HE	Onemile Branch	JEFO							
303d	TN06040001802_1200	TOWN000.2HE	Town Branch	JEFO							
303d	TN06040001802_1300	OWL001.1HE	Owl Creek	JEFO							
Watershed FS	TN06040001802_1400	HARMO000.8HE	Harmon Creek	JEFO							
Watershed FS	TN06040001802_1500	HALEY000.7HE	Haley Creek	JEFO			1				
303d	TN06040001802_1600		Browns Creek	JEFO	Evaluate						
303d	TN06040001802_1650		Browns Creek	JEFO	Evaluate						
303d	TN06040001802_1800	BIG001.8HE	Big Creek	JEFO							

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN06040001802_1900	ARMS002.1DE	Arms Creek	JEFO			1				
303d	TN06040001802_2000	BEECH029.9HE	Beech River	JEFO			1	1	12	12	
Landfill	TN06040001802_2000	BEECH025.4HE	Beech River	JEFO			1	1	12	12	12
Watershed FS	TN06040001809_1000	RUSHI005.6DE	Rushing Creek	JEFO			1				
Landfill	TN06040001840_0100	BUCK001.4DE	Buck Branch	JEFO							
Landfill	TN06040001840_0110	BUCK1.5T0.2DE	Unnamed Trib to Buck Branch	JEFO							
Ambient	TN06040002030_1000	DUCK248.0BE	Duck River	CLEFO					4	4	4
Watershed FS	TN06040003001_0400	DUCK24.6T0.7HU	Unnamed Trib to Duck River	NEFO			1				
303d	TN06040003001_2000	DUCK015.7HU	Duck River	NEFO					12	12	12
303d	TN06040003001_2000	DUCK022.5HU	Duck River	NEFO			1	1			
Watershed FS	TN06040003005_0100	HAPPY_G0.6HI	Happy Hollow Creek	CLEFO			1				
Watershed FS	TN06040003005_0200	LPINE000.2HI	Little Piney Creek	CLEFO			1				
Watershed FS	TN06040003005_0500	WOLF000.7HI	Wolf Creek	CLEFO			1				
303d	TN06040003005_0600	DUCK31.2T0.7HI	Unnamed Trib to Duck River	CLEFO			1				
Watershed FS	TN06040003005_2000	DUCK032.2HI	Duck River	CLEFO			1		12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bioreconn	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN06040003007_0700	SULPH000.3HI	Sulphur Fork	CLEFO			1				
Watershed FS	TN06040003007_1000	BEAVE002.7HI	Beaverdam Creek	CLEFO			1				
303d	TN06040003009_0900	INDIA000.6HI	Indian Creek	CLEFO			1	1	12	12	
303d	TN06040003009_1000	DUCK088.9HI	Duck River	CLEFO			1	1	12	12	
Watershed FS	TN06040003010_1000	BSWAN003.7HI	Big Swan Creek	CLEFO			1				
Reference	TN06040003010_1100	ECO71F28	Little Swan Creek	CLEFO		2	2	1		4	
Landfill	TN06040003010_1200	INDIA000.6LS	Indian Creek	CLEFO			1	1	12	12	12
Watershed FS	TN06040003010_2000	BSWAN019.8LS	Big Swan Creek	CLEFO			1				
Watershed NA	TN06040003016_1000	DUCK105.4HI	Duck River	CLEFO			1	1	12	12	
303d	TN06040003019_0200	PATTE000.1MY	Patterson Creek	CLEFO			1				
303d	TN06040003019_0300	BBIGB12.9T0.5MY	Unnamed Trib to Big Bigby Creek	CLEFO			1				
303d	TN06040003019_0600	WFBBI001.3MY	West Fork Big Bigby Creek	CLEFO			1				
303d	TN06040003019_0700	DOG000.1MY	Dog Branch	CLEFO			1	1	12	12	
303d	TN06040003019_1000	BBIGB004.7MY	Big Bigby Creek	CLEFO			1	1	12	12	
Landfill	TN06040003019_3000	BBIGB011.1MY	Big Bigby Creek	CLEFO			1	1	12	12	12

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN06040003019_4000	BBIGB017.8MY	Big Bigby Creek	CLEFO			1				
Landfill	TN06040003023_0100	QUALI000.1MY	Quality Creek	CLEFO			1	1	12	12	12
303d	TN06040003023_0200	SUGAR000.1MY	Sugar Creek	CLEFO			1	1	12	12	12
303d	TN06040003023_0200	SUGAR001.81MY	Sugar Creek	CLEFO			1	1	12	12	12
303d	TN06040003023_0210	SUGAR5.1T0.2MY	Unnamed Trib to Sugar Creek	CLEFO			1	1	12	12	12
Landfill	TN06040003023_0250	SUGAR002.1MY	Sugar Creek	CLEFO			1	1	12	12	12
Landfill	TN06040003023_0250	SUGAR2.0T0.1MY	Sugar Creek	CLEFO			1	1	12	12	12
303d	TN06040003023_0255	SUGAR005.1MY	Sugar Creek	CLEFO			1	1	12	12	
303d	TN06040003023_1000	SUGAR001.3MY	Sugar Fork	CLEFO			1	1	12	12	
303d	TN06040003023_2000	SUGAR002.4MY	Sugar Fork	CLEFO			1	1	12	12	
303d	TN06040003024_0100		Beasley Hollow	CLEFO	Evaluate						
Watershed NA	TN06040003024_0200	GREEN005.5MY	Greenlick Creek	CLEFO			1				
Landfill	TN06040003026_1000	DUCK125.2MY	Duck River	CLEFO			1	1	12	12	12
Landfill	TN06040003026_2000	DUCK130.5MY	Duck River	CLEFO			1	1	12	12	12
303d	TN06040003027_0100	LBIGB4.1T0.1MY	Unnamed trib to Little Bigby Creek	CLEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06040003027_1000	LBIGB002.0MY	Little Bigby Creek	CLEFO			1	1	12	12	
303d	TN06040003030_0100	LYTLE2.5T0.1MY	Unnamed Trib to Lytle Creek	CLEFO			1				
303d	TN06040003030_1000	LYTLE000.6MY	Lytle Creek	CLEFO			1				
Watershed FS	TN06040003030_2000	LYTLE002.3MY	Lytle Creek	CLEFO			1				
Watershed FS	TN06040003034_0200	CARTE000.5MY	Carters Creek	CLEFO							
303d	TN06040003034_0260	COLEM000.1MY	Coleman Branch	CLEFO			1				
Watershed FS	TN06040003034_0300	MCCUT001.1MY	McCutcheon Creek	CLEFO			1				
303d	TN06040003034_0400	AENON001.6MY	Aenon Creek	CLEFO			1				
303d	TN06040003034_0410	GRASS001.4WI	Grassy Branch	NEFO			1				
303d	TN06040003034_0700	CROOK000.2MY	Crooked Creek	CLEFO			1				
303d	TN06040003034_1000	RUTHE001.6MY	Rutherford Creek	CLEFO			1	1	12	12	
303d	TN06040003034_2000	RUTHE006.2MY	Rutherford Creek	CLEFO			1	1	12	12	
303d	TN06040003034_3000	RUTHE019.3MY	Rutherford Creek	CLEFO			1	1	12	12	
303d	TN06040003034_3000	RUTHE020.0MY	Rutherford Creek	CLEFO			1	1	12	12	
303d	TN06040003041_0410	LOCUS001.0HI	Locust Fork	CLEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN06040003041_0413	YOUNG000.1HI	Younger Creek	CLEFO			1				
303d	TN06040003041_0500	SHOAL000.1MY	Shoal Branch	NEFO			1				
303d	TN06040003041_0700	SFLIC000.1WI	South Fork Lick Creek	NEFO			1				
303d	TN06040003041_0800	POTTS000.1MY	Potts Branch	CLEFO			1	1	12	12	
303d	TN06040003041_0810	POTTS0.3T0.1MY	Unnamed Trib to Potts Branch	CLEFO			1	1	12	12	
303d	TN06040003041_0900	LUNNS000.2HI	Lunns Branch	CLEFO			1		12	12	
Watershed FS	TN06040003041_1000	LICK001.0HI	Lick Creek	CLEFO			1		12	12	
303d	TN06040003041_1100	DOG001.2HI	Dog Creek	CLEFO			1	1	12	12	
303d	TN06040003050_0200	DOG001.2HI	Beaver Creek	CLEFO			1				
303d	TN06040003050_0300	GARNE000.5HI	Garner Creek	CLEFO			1	1	12	12	
Landfill	TN06040003050_0500	WPINE001.2DI	West Piney River	NEFO			1	1	12	12	12
303d	TN06040003050_0510	FIELD000.1DI	Fielder Branch	NEFO			1				
303d	TN06040003050_0600	EPINE000.2DI	East Piney River	NEFO			1	1	12	12	
303d	TN06040003050_0620	GRAB001.4DI	Grab Creek	NEFO			1	1	12	12	
303d	TN06040003050_0700	BEAR000.4HI	Bear Creek	CLEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06040003050_0710	TURKE000.1HI	Turkey Creek	NEFO			1				
303d	TN06040003050_0800	BSPRI000.4HI	Big Spring Creek	CLEFO			1	1	12	12	
303d	TN06040003050_1000	PINEY004.0HI	Piney River	CLEFO			1	1	12	12	
Watershed FS	TN06040003050_1200	MILL001.9HI	Mill Creek	CLEFO			1		12	12	
Potential impairment	TN06040003050_1300	BIRD002.1HI	Bird Creek	CLEFO			1		12	12	12
303d	TN06040003050_2000	PINEY011.4HI	Piney River	CLEFO			1	1	12	12	
303d	TN06040003050_3000	PINEY017.9HI	Piney River	CLEFO			1	1	12	12	
Watershed FS	TN06040003059_1000	SUGAR000.5HI	Sugar Creek	CLEFO			1				
Watershed FS	TN06040003060_0200	BAPTI000.2HU	Baptist Branch	NEFO			1				
Reference	TN06040003060_0610	FECO71F03	Ethridge Hollow	NEFO		2	2	1		4	
303d	TN06040003060_0700		Egypt Hollow Creek	NEFO	Evaluate						
Watershed FS	TN06040003060_1000	TUMBL002.0HU	Tumbling Creek	NEFO			1		12	12	
Watershed FS	TN06040003061_0400	LHURR000.2HU	Little Hurricane Creek	NEFO			1				
Reference	TN06040003061_1000	ECO71F29	Hurricane Creek	NEFO		2	2	1		4	
303d	TN06040003062_0400	LBLUE000.2HU	Little Blue Creek	NEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06040003062_0500	PUMPK000.4HU	Pumpkin Creek	NEFO			1				
303d	TN06040003062_1000	BLUE001.4HU	Blue Creek	NEFO			1	1	12	12	
303d	TN06040003062_2000	BLUE007.9HU	Blue Creek	NEFO			1	1	12	12	
303d	TN06040003062_3000	BLUE015.0HU	Blue Creek	NEFO			1	1	12	12	12
Watershed NA	TN06040003082_1000	SNOW000.8MY	Snow Creek	CLEFO			1				
303d	TN06040003ARROWLK_1000		Arrow Lake	CLEFO	Evaluate						
Ambient	TN06040004002_1000	BUFFA073.1WE	Buffalo River	CLEFO			1	1	4	4	4
SEMN	TN06040004013_0600	ECO71F19	Brush Creek	CLEFO		2	2	1		4	
303d	TN06040005019_0100	RABBI000.6HN	Rabbit Creek	JEFO							
303d	TN06040005019_0200	SFBLO000.8HN	South Fork Blood River	JEFO			1				
Watershed FS	TN06040005019_0300	NFBLO003.3HN	North Fork Blood River	JEFO			1				
303d	TN06040005019_1000	BLOOD015.5HN	Blood River	JEFO							
303d	TN06040005020T_0510		Unnamed trib to Ford Creek	JEFO	Evaluate						
Potential impairment	TN06040005020T_0999	LEACH_G0.4HU	Unnamed Trib to Tennessee River (Leach Hollow)	NEFO			1		12	12	12

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed FS	TN06040005020T_1100		Dardin Branch	JEFO	Evaluate						
Watershed FS	TN06040005020T_1200		Unnamed Trib to Cypress Creek	JEFO	Evaluate						
303d	TN06040005023_0300	SPRIN001.5HN	Spring Creek	JEFO			1				
303d	TN06040005023_0500	CLIFT002.3HN	Clifty Creek	JEFO			1		12	12	12
Watershed NA	TN06040005024_0100	BFORK005.6HN	Bailey Fork Creek	JEFO							
Landfill	TN06040005024_0110	TOWN000.2HN	Town Creek	JEFO			1				
Landfill	TN06040005024_0110	JBEND000.9HN	Clifty Creek/Jones Bend Creek	JEFO			1		12	12	12
303d	TN06040005024_0111	TOWN0.5T0.8HN	Unnamed Trib to Town Creek	JEFO	Evaluate						
303d	TN06040005024_0600	BRUSH000.6HN	Brushy Branch	JEFO			1				
303d	TN06040005024_0700	BEAVE002.2HN	Beaverdam Creek	JEFO							
303d	TN06040005024_1000	HFORK005.8HN	Holly Fork Creek	JEFO							
Watershed FS	TN06040005027_0100	RAMBL001.0BN	Ramble Creek	JEFO			1				
Watershed NA	TN06040005027_0200	RUSHI001.5BN	Rushing Creek	JEFO			1				
303d	TN06040005027_0300	DRY000.7BN	Dry Creek	JEFO							
303d	TN06040005027_0350		Dry Creek	JEFO	Evaluate						

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bior econ	SQSH	Diat om	E. coli	Nutr ients	Met als
Potential impairment	TN06040005027_0400	LICK001.0BN	Lick Creek	JEFO			1		12	12	12
303d	TN06040005027_0700	HUNTI003.2CR	Hunting Creek	JEFO	Evaluate						
303d	TN06040005027_0800	COTTO002.0CR	Cotton Creek	JEFO							
Reference	TN06040005027_0900	ECO65E04	Blunt Creek	JEFO		2	2	1		4	
303d	TN06040005027_1310	HROCK002.4CR	Hollow Rock Branch	JEFO							
Watershed FS	TN06040005027_1500	MARTI002.5CR	Martin Creek	JEFO			1				
Watershed FS	TN06040005027_1600	BEAR003.0HN	Bear Creek	JEFO			1				
303d	TN06040005027_1610	PANTH000.6HN	Panther Creek	JEFO			1				
303d	TN06040005027_1800	POND001.0CR	Pond Creek	JEFO							
Watershed FS	TN06040005032_0100	MAPLE000.6CR	Maple Creek	JEFO			1				
303d	TN06040005032_0150		Maple Creek	JEFO	Evaluate						
303d	TN06040005032_0300	MORRI000.5CR	Morris Creek	JEFO			1				
Reference	TN06040005032_0410	FECO65E03	Unnamed Trib to Dabbs Creek	JEFO		2	2	1		4	
Watershed FS	TN06040005032_0500	SCARC001.0HE	Scarce Creek	JEFO			1				
303d	TN06040005032_0600	OLIVE001.5HE	Olive Branch	JEFO							

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06040005032_0700	BBEAV000.8HE	Big Beaver Creek	JEFO							
303d	TN06040005032_0720	LBEAV001.3HE	Little Beaver Creek	JEFO			1	1	12	12	
303d	TN06040005032_0900	MUD003.9CR	Mud Creek	JEFO			1	1	12	12	
303d	TN06040005032_1000	BSAND043.4CR	Big Sandy River	JEFO					12	12	12
303d	TN06040005032_1100	ROAN002.7CR	Roan Creek	JEFO							
303d	TN06040005032_1200	BACON000.9CR	Bacon Creek	JEFO							
303d	TN06040005032_2000	BSAND051.2HE	Big Sandy River	JEFO			1	1	12	12	12
303d	TN06040005047_0500	WOLF001.4BN	Wolf Creek	JEFO			1				
303d	TN06040005047_0600	SYCAM001.4BN	Sycamore Creek	JEFO							
Watershed FS	TN06040005047_1000	BIRDS007.4BN	Birdsong Creek	JEFO			1				
303d	TN06040005047_1100	AMMON000.5BN	Ammon Creek	JEFO			1				
303d	TN06040005050_0100	CONLE000.1HU	Conley Branch	NEFO			1	1	12	12	
303d	TN06040005050_0200		Unnamed Trib to Trace Creek	NEFO							
303d	TN06040005050_1000	TRACE004.4HU	Trace Creek	NEFO			1	1	12	12	
303d	TN06040005050_2000	TRACE012.0HU	Trace Creek	NEFO			1	1	12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bioreconn	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06040005050_3000	TRACE016.0HU	Trace Creek	NEFO			1	1	12	12	
Potential impairment	TN06040005054_1000	LRICH002.3HU	Little Richland Creek	NEFO			1	1	12	12	12
Watershed FS	TN06040005056_0100	HALLS000.2HU	Halls Creek	NEFO			1				
303d	TN06040005056_1000	BRICH005.9HU	Big Richland Creek	NEFO			1		12	12	
Watershed NA	TN06040005059_0300	LEWIS000.8HO	Lewis Branch	NEFO			1				
Watershed NA	TN06040005059_0400	LONG001.0HO	Long Branch	NEFO			1				
Watershed FS	TN06040005059_0500	PINHO000.4HU	Pinhook Branch	NEFO			1				
Watershed FS	TN06040005059_1000	WHITE003.8HO	Whiteoak Creek	NEFO			1				
Watershed FS	TN06040005059_2000	WHITE017.1HU	Whiteoak Creek	NEFO			1				
Watershed FS	TN06040005061_1000	CANE002.5HO	Cane Creek	NEFO			1				
303d	TN06040005063_0250		South Fork Hurricane Creek	NEFO	Evaluate						
Watershed FS	TN06040005063_1000	HURRI002.7HO	Hurricane Creek	NEFO			1				
Watershed FS	TN06040005065_1000	SROCK004.2ST	Standing Rock Creek	NEFO			1				
Watershed FS	TN06040005075_1000	TURKE003.0HU	Turkey Creek	NEFO			1				
303d	TN06040005098_0100	SFEAG000.6HN	South Fork Eagle Creek	JEFO							

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
Landfill	TN06040005870_0100	CYPRE011.4T0.5BN	Unnamed Trib to Cypress Creek	JEFO							
Landfill	TN06040005870_0210	CANE000.1BN	Cane Creek	JEFO			1		12	12	12
Potential impairment	TN06040005870_0400	CANE002.5BN	Cane Creek	JEFO			1		12	12	12
Potential impairment	TN06040005870_0410	CHARL000.0BN	Charlie Creek	JEFO			1		12	12	12
303d	TN06040005870_0415		Charlie Creek	JEFO	Evaluate						
Landfill	TN06040005870_1000	CYPRE012.8BN	Cypress Creek	JEFO			1	1	12	12	12
Watershed FS	TN06040005913_0200	NFHAR001.2BN	North Fork Harmon Creek	JEFO			1				
303d	TN06040006014_0100		White Oak Creek	JEFO	Evaluate						
303d	TN06040006014_0200		Dry Creek	JEFO	Evaluate						
303d	TN06040006014_0300		Pleasant Grove Creek	JEFO	Evaluate						
303d	TN06040006014_1000		East Fork Clarks River	JEFO	Evaluate						
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

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bior econ	SQSH	Diat om	E. coli	Nutr ients	Met als
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
Ambient	TN08010205010_1000	SFFDE027.7HY	South Fork Forked Deer River	JEFO					4	4	4
Ambient	TN08010208001_1000	HATCH009.1TI	Hatchie River	MEFO					4	4	4
Ambient	TN08010208001_3000	HATCH126.9HR	Hatchie River	JEFO					4	4	4
Ambient	TN08010209001_1000	LOOSA005.0SH	Loosahatchie River	MEFO					4	4	4
Ambient	TN08010209004_1000	LOOSA1C28.6SH	Loosahatchie River Canal	MEFO					4	4	4
Ambient	TN08010209011_2000	LOOSA1C53.6FA	Loosahatchie River Canal	MEFO					4	4	4
303d	TN08010210001_0100	HARRI001.8SH	Harrington Creek	MEFO			1	1	12	12	12
303d	TN08010210001_0200	HARRI000.5SH	Harrison Creek	MEFO					12	12	
303d	TN08010210001_0300	WORKH000.3SH	Workhouse Bayou	MEFO			1	1	12	12	
303d	TN08010210002_0100		Sweetbriar Creek	MEFO	Evaluate						
303d	TN08010210002_0200	TBD	White Station Creek	MEFO							
303d	TN08010210002_0300	WOLF42.3T1.2SH	Unnamed Trib to Wolf River	MEFO			1	1	12	12	

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bioreecon	SQSH	Diatom	E. coli	Nutrients	Metals
Landfill	TN08010210002_1000	WOLF018.9SH	Wolf River	MEFO			1	1	12	12	12
303d	TN08010210002_2000		Wolf River	MEFO							
303d	TN08010210003_0100	JOHNS002.9SH	Johnson Creek	MEFO			1	1	12	12	
303d	TN08010210004_0400	WOLF45.6T1.6FA	Unnamed Trib to Wolf River	MEFO			1		12	12	
303d	TN08010210004_0410	TBD	Unnamed Trib to Unnamed trib to Wolf River	MEFO			1				
303d	TN08010210004_0500	RUSSE001.5FA	Russell Creek	MEFO			1	1	12	12	
Watershed FS	TN08010210004_1000	WOLF044.4FA	Wolf River	MEFO			1		12	12	12
303d	TN08010210005_0100	TEAGU001.4FA	Teague Branch	MEFO			1		12	12	
303d	TN08010210005_0200	STOUT001.2FA	Stout Creek	MEFO			1	1	12	12	
303d	TN08010210005_1000	GRISS002.7FA	Grissum Creek	MEFO			1	1	12	12	
Watershed FS	TN08010210009_1000	WOLF057.5FA	Wolf River	MEFO			1		12	12	12
Ambient	TN08010210009_2000	WOLF072.6FA	Wolf River	MEFO					12	12	12
Reference	TN08010210009_2000	ECO74B12	Wolf River	MEFO		2	2	1		4	
Watershed FS	TN08010210019_1000	INDIA004.7HR	Indian Creek	MEFO			1				

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Bior econ	SQSH	Diat om	E. coli	Nutr ients	Met als
Watershe d NA	TN080102100 20_0200	WATKI002.6 FA	Watkins Creek	MEFO			1				
Reference	TN080102100 20_0300	FECO74B01	Unnamed Trib to North Fork Wolf River	MEFO		2	2	1		4	
Watershe d NA	TN080102100 20_0400	MCKIN000.5 FA	McKinnie Creek	MEFO			1				
303d	TN080102100 20_0410	MAY001.4F A	May Creek	MEFO			1		12	12	
303d	TN080102100 20_0500	NFORK004. 4FA	North Fork Creek	MEFO			1		12	12	
Watershe d NA	TN080102100 20_0600	BEASL002.1 FA	Beasley Creek	MEFO			1				
Watershe d FS	TN080102100 20_1000	NFWOL002. 4FA	North Fork Wolf River	MEFO			1		12	12	12
303d	TN080102100 21_0100	ALEXA000. 8FA	Alexander Creek	MEFO			1	1	12	12	
303d	TN080102100 21_1000	SHAWS007. 2FA	Shaws Creek	MEFO			1	1	12	12	12
303d	TN080102100 22_0100	GRAYS0.8T 2.1SH	Unnamed trib to Grays Creek	MEFO			1	1	12	12	
303d	TN080102100 22_0300	MARYS001. 0SH	Marys Creek	MEFO			1	1	12	12	
303d	TN080102100 22_0350	MARYS006. 4SH	Marys Creek	MEFO			1	1	12	12	
303d	TN080102100 22_1000	GRAYS001. 7SH	Grays Creek	MEFO			1	1	12	12	
303d	TN080102100 23_0100	FLETC4.4T0 .2SH	Unnamed trib to Fletcher Creek	MEFO			1	1	12	12	12

Project	Waterbody ID	DWR Station ID	Waterbody Name	EFO	Evaluate **	Biorecon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN08010210023_0200	FLETC2.8T0.4SH	Unnamed trib to Fletcher Creek	MEFO			1	1	12	12	
303d	TN08010210023_1000	FLETC001.4SH	Fletcher Creek	MEFO			1	1	12	12	12
303d	TN08010210032_1000	CYPRE001.2SH	Cypress Creek	MEFO			1	1	12	12	12
303d	TN08010210032_2000	CYPRE006.2SH	Cypress Creek	MEFO					12	12	12
Ambient	TN080102110 0711_1000	NONCO001.8SH	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).