TENNESSEE
DIVISION OF WATER RESOURCES

FISCAL YEAR 2021-2022
SURFACE WATER
MONITORING AND ASSESSMENT
PROGRAM PLAN

July 2021

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 2018.

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

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

Data are collected and interpreted in order to:

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

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

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

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

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

A. Monitoring Program Strategy

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

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

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

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

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

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

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

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

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

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

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

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

B. Monitoring Objectives

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

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

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

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

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

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

5. Establish trends in water quality.

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

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

8. Provide data for TMDL studies.

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

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

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

12. Identify and protect wetlands.

C. Monitoring Design

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

Watersheds

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

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

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

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

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

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

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

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

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

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

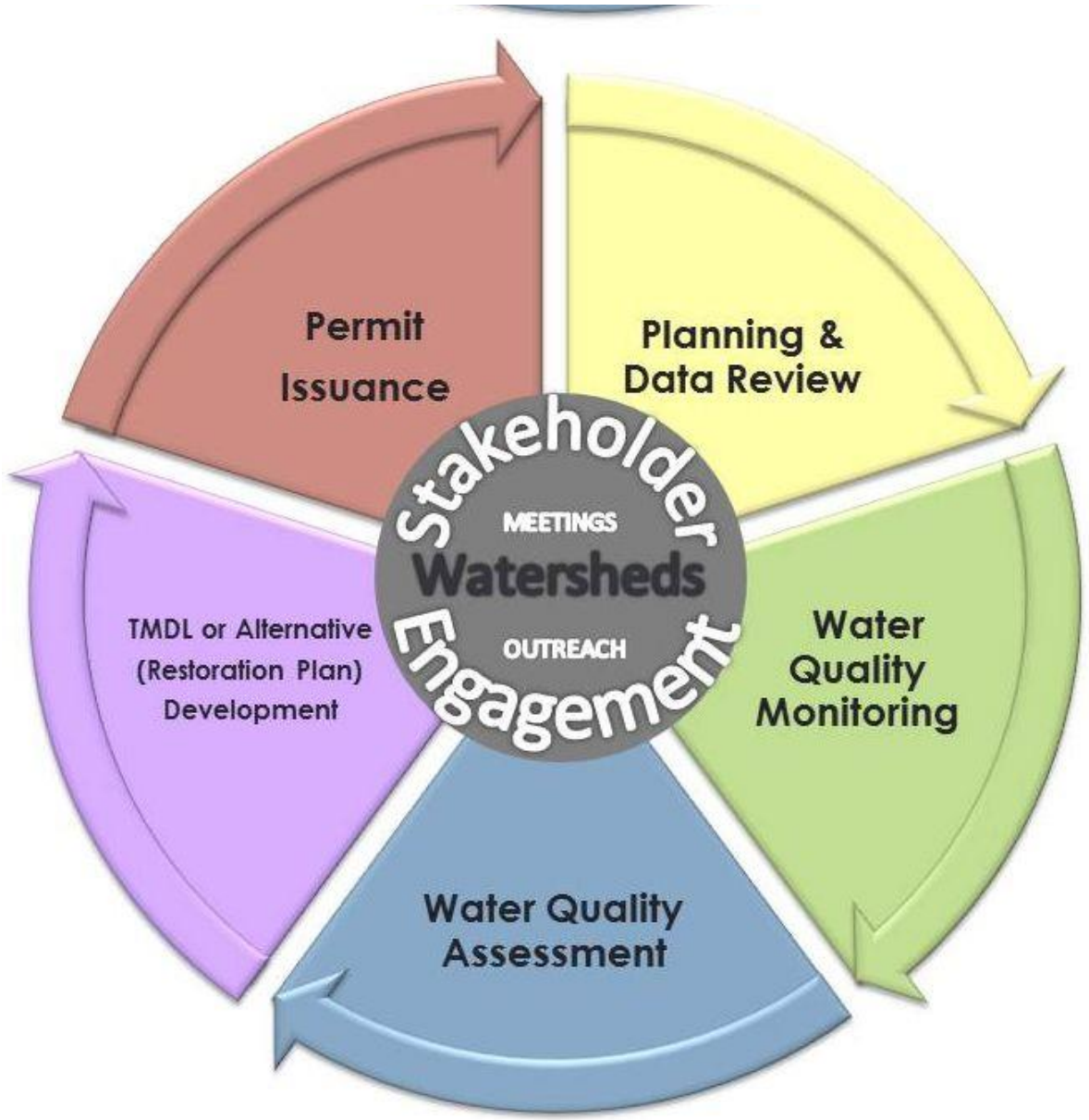


Figure 1: Graphic Representation of the Watershed Approach.

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

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

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

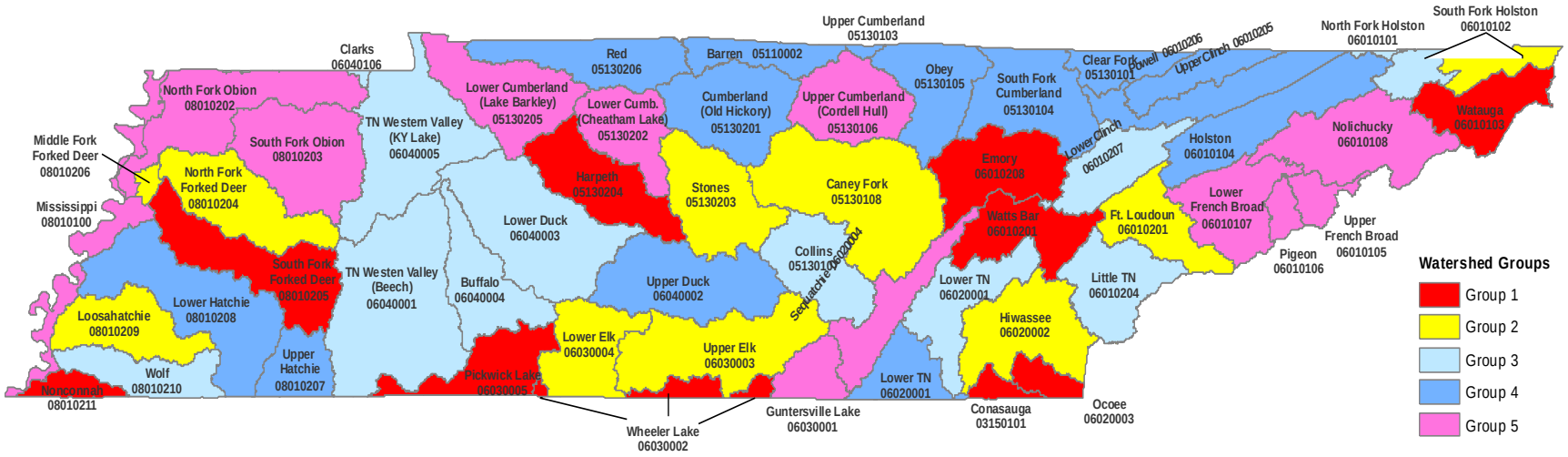


Figure 2: Tennessee Watershed Groups

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

Group/Year	Watershed	HUC	EFO	Watershed	HUC	EFO
1 2001-02 2006-07 2011-12 2016-17 2021-22	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 1997-98 2002-3 2007-8 2012-13 2017-18 2022-23	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 1998-99 2003-4 2008-9 2013-14 2018-19 2023-24	Collins	05130107	CK, CH, CL	TN Western Valley (Beech)	06040001	J
	N. Fork Holston	06010101	JC	Lower Duck	06040003	CL
	S. Fork Holston (d/s Boone Dam)	06010102	JC	Buffalo	06040004	CL, N
	Little Tennessee (Tellico)	06010204	K	TN Western Valley (KY Lake)	06040005	N, J
	Lower Clinch	06010207	K	Wolf	08010210	M
	Tennessee (Chickamauga)	06020001	CH	Clarks	06040006	J
4 1999-2000 2004-5 2009-10 2014-15 2019-20 2024-25	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
	Red	05130206	N	Lower Hatchie	08010208	J,M

Group/Year	Watershed	HUC	EFO	Watershed	HUC	EFO
5 2000-1 2005-6 2010-11 2015-16 2020-21 2025-26	Lower Cumberland (Cheatham)	05130202	N	Nolichucky	06010108	JC, K
	Lower Cumberland (Lake Barkley)	05130205	N	Sequatchie	06020004	CH
	Upper Cumberland (Cordell Hull)	05130106	CK, N	Guntersville	06030001	CH, CL
	Upper French Broad	06010105	K	Mississippi	08010100	M, J
	Pigeon	06010106	K	Obion	08010202	J
	Lower French Broad	06010107	K	Obion South Fork	08010203	J

Key to EFOs:

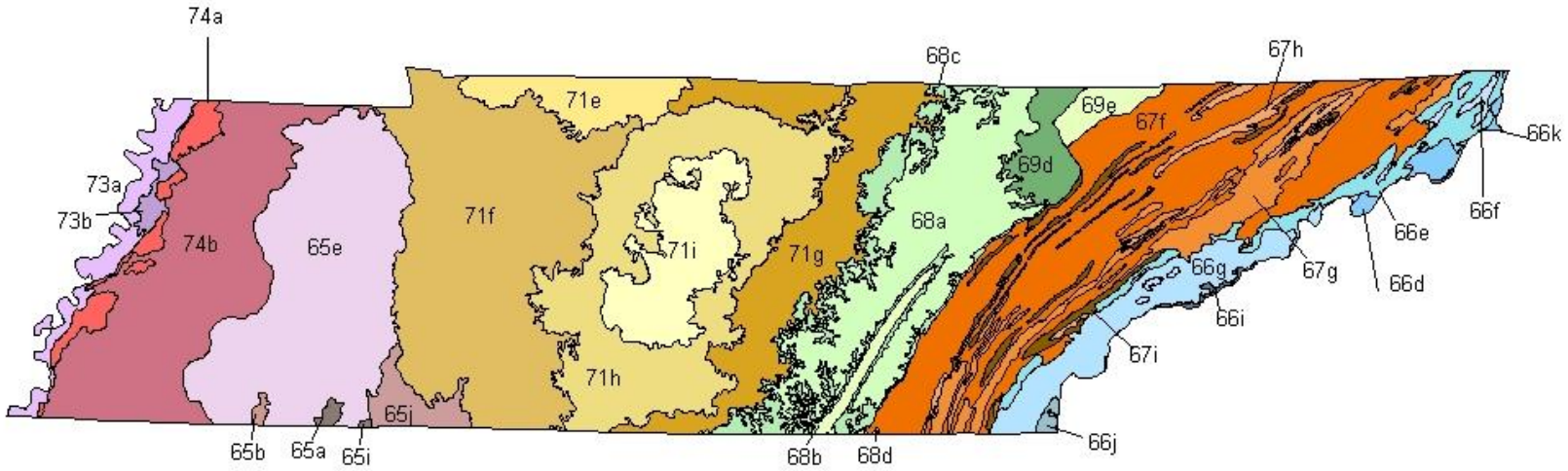
CH	Chattanooga	J	Jackson	M	Memphis
CK	Cookeville	JC	Johnson City	N	Nashville
CL	Columbia	K	Knoxville		

Ecoregions

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

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

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



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

Figure 3: Level IV Ecoregions in Tennessee

D. Monitoring Priorities

The division maintains a statewide monitoring system consisting of approximately 7,700 stations (Figure 4) sampled on a rotating basis. In addition, new stations are created every year to increase the number of assessed streams. Stations are sampled monthly, quarterly, semi-annually, or annually depending on the objectives of the project. Within each watershed cycle, the locations of monitoring stations are coordinated between the central office and staff in the eight Environmental Field Offices (EFOs) and the Mining Unit located across the state, based on the following priorities (Figure 5).

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

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

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

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

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

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

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

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

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

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

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

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

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

In some circumstances, waters may be considered not supporting based on factors other than recent data (CALM, 2018). When developing the draft monitoring workplan, waterbodies that are proposed as candidates to be evaluated rather than monitored because they fall under this category are specifically identified. A brief rationale for not monitoring these waterbodies is provided (e.g. hard armoring, upstream impoundment) that includes an explanation of why staff feel that conditions have not changed.

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

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

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

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

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

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

5. **TMDL:** Effectiveness monitoring for completed TMDLs in the watershed group is coordinated between the Watershed Planning Unit (WPU) manager and the EFOs to meet objectives for each TMDL. The frequency and parameters monitored for TMDL monitoring depends on the specific TMDL. Detailed information about TMDLs can be found in the department's 106 Monitoring QAPP, (TDEC, 2017), and in the document *Monitoring to Support TMDL Development* (2001).

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

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

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

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

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

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

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

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

b. **NPDES Monitoring**: Tennessee is requiring some permitted dischargers to conduct upstream and downstream biological and habitat monitoring consistent with the division's macroinvertebrate QSSOP (TDEC, 2017). These data are submitted to the state for evaluation. In this way, Tennessee can supplement its monitoring program and permitted dischargers can take the lead in providing information about their receiving stream.

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

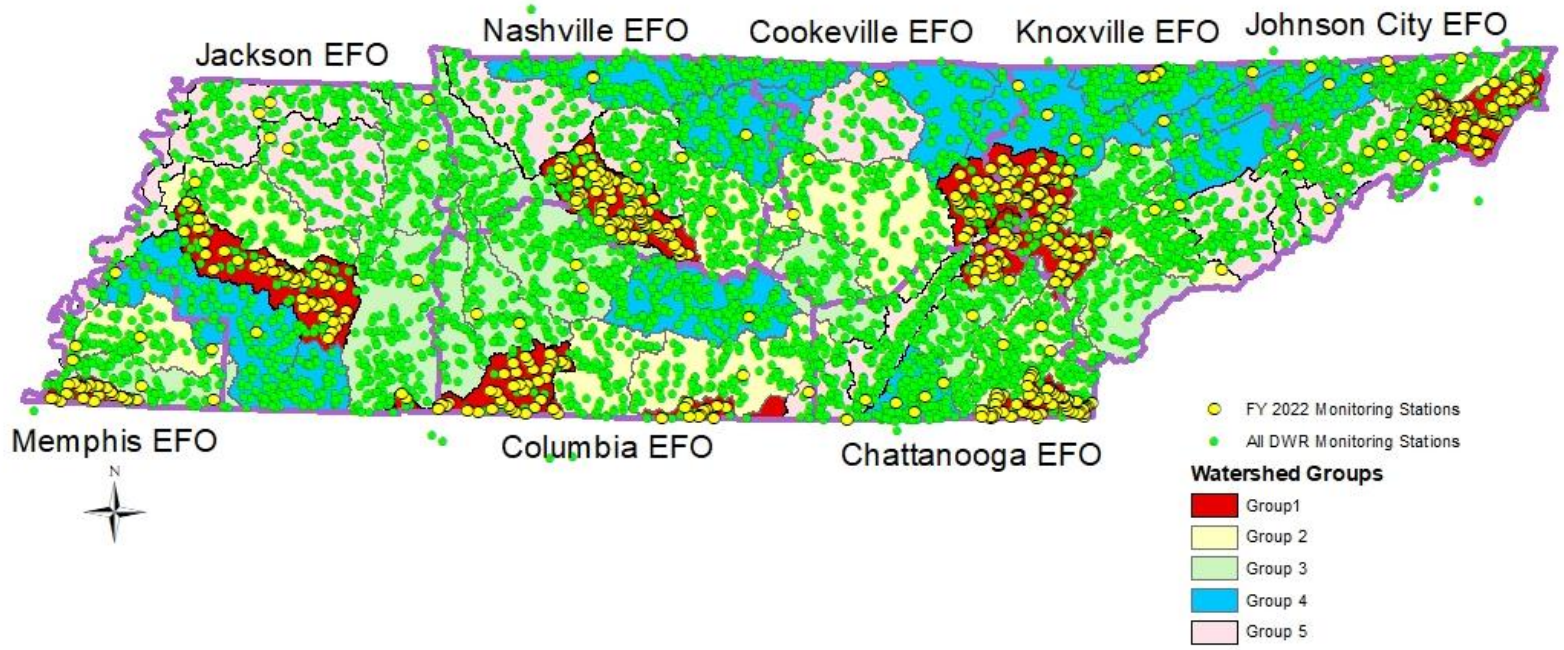


Figure 4: Water Quality Monitoring Stations in Tennessee. (Includes biological, chemical and bacteriological stations.)

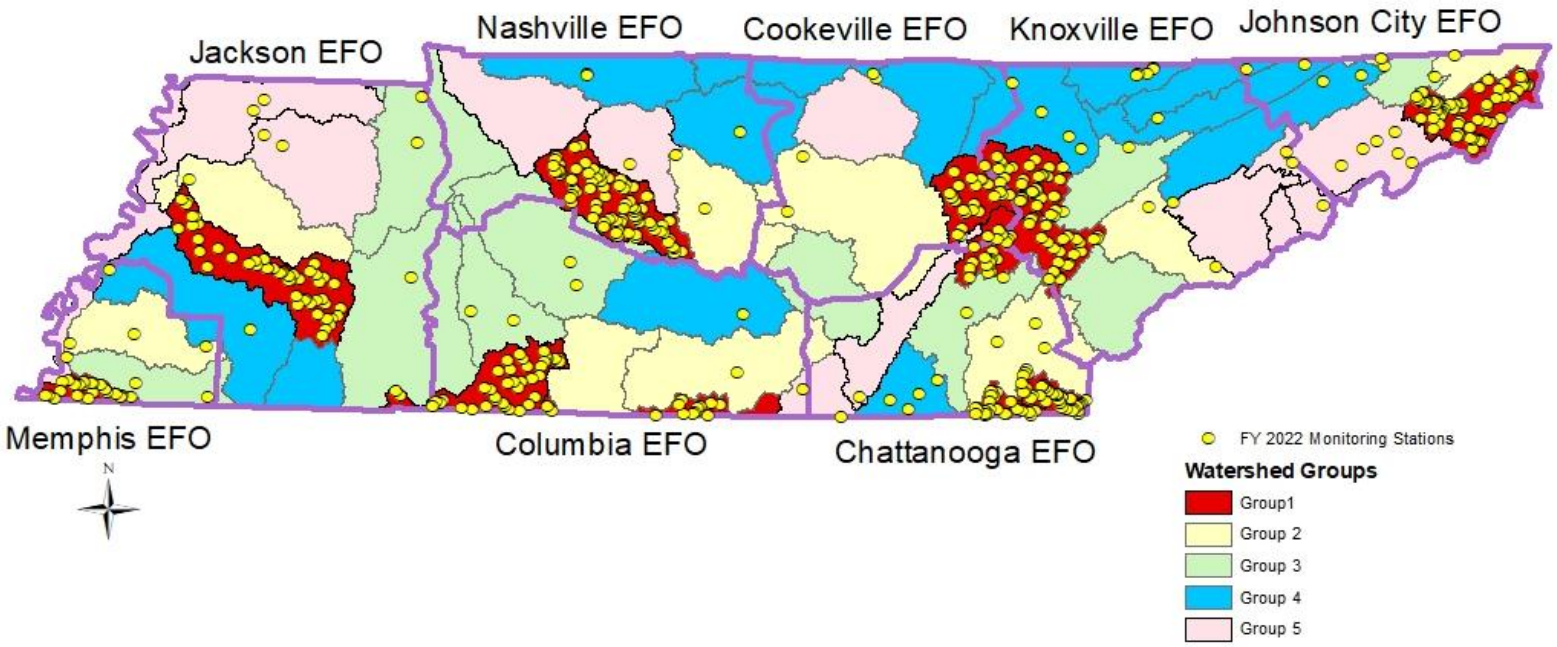


Figure 5: **Monitoring Stations Scheduled to be Sampled Between July 2021and June 2022 (FY22)**
(Includes biological, chemical and bacteriological stations.)

Large Reservoirs (> 1000 acres)

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

Table 2: Reservoirs sampled by TVA

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

Table 3: Reservoirs sampled by USACE

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

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

Table 4: TVA Sample Schedule

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

Medium Reservoirs (251- 1000 acres)

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

Small Reservoirs (< 250 acres)

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

E. Critical and Secondary Water Quality Indicators

a. Biological Water Quality Indicators Critical Biological

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

Semi-quantitative Single Habitat macroinvertebrate samples (SQSH) are used for stream antidegradation category evaluations, TMDLs, permit compliance and enforcement, nutrient impaired streams as well as reference stream monitoring to refine biocriteria guidelines. In recent years this type of sampling has increased for routine watershed surveys. Regional biointegrity goals based on a multi-metric index composed of seven biometrics have been calculated and provide guidelines for each bioregion (TDEC, 2017).

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

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

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

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

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

For most biorecons, the three biorecon biometrics are:

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

In bioregion 73, the three biorecon metrics are:

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

b. Secondary Biological

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

2. **Habitat/Physical**

a. Critical

Habitat assessments adapted from protocols by Barbour et al. (1999) are conducted in conjunction with all biological monitoring and some chemical monitoring. The division has found these especially useful in assessing impairment due to riparian loss, erosion and sedimentation. The division's macroinvertebrate QSSOP (TDEC, 2017) defines regional

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

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

b. Secondary Physical/Habitat

- Canopy Cover
- Stream Profile
- Particle Count
- Flow

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

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

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

F. Quality Management and Assurance Plans

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

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

TDEC DWR has developed three Quality System Standard Operating Procedures (QSSOP) for use as guidance for collecting water pollution control data and appropriate quality control in the state. The *QSSOP for Macroinvertebrate Stream Survey* (TDEC, 2017) was first published in March of 2002 and was revised in October 2006, June 2011, and August 2017. It is currently being revised to reflect changes in taxonomy and metric calibration. The *QSSOP for Chemical and Bacteriological Sampling of Surface Waters* was first published in March of 2004 and revised in 2009, June 2011 (TDEC, 2011) and July 2018 (TDEC, 2018). The *QSSOP for Periphyton Stream Surveys* was completed in 2010 (TDEC, 2010) and is currently under revision Each year the *Quality Assurance Project Plan* to EPA (TDEC, 2020) 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 is trained on field techniques outlined in the documents during the division's annual meeting and during biological workshops. Biological, some routine inorganic nutrient and metal samples are analyzed by the TDH Environmental Laboratories. Organic chemical, some routine inorganic samples, some macroinvertebrate samples and most bacteriological and periphyton samples are analyzed by contract labs. The biological laboratory follows the TDEC QSSOP for macroinvertebrate (TDEC, 2017) and for periphyton (TDEC, 2010) sample analysis. The state and contract chemistry and bacteriological laboratories have standard operating procedures which follow approved EPA methodologies. That chemical laboratories performing chemical analysis must maintain NELAC or ISO/IEC 17025 for surface waters and have drinking water certification or the equivalent for *E. coli* analysis. Contract biological laboratories must meet TDEC QC and testing requirements and have 10% of sample processing and taxonomy QC'd by the state laboratory. EPA audits the state laboratories on a regular schedule.

Quality Assurance Guidelines for Macroinvertebrate Surveys as specified in the 2017 QSSOP:

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

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

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

Quality Assurance for Chemical Field Collections as specified in the 2018 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 data are stored in EPA's Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS). ATTAINS is being used for the fourth time this year and replaces the previous EPA system, the Assessment Database (ADB). ATTAINS is also the EPA water quality assessment reporting tool replacing the previous narrative 303(d) List and 305(b) Reports. ATTAINS also replaces EPA's old TMDL tracking system and provides alternative restoration plans relating them to individual assessment units. Assessments are geo-referenced and maps are provided to help users find streams within specific watersheds. Streams are color coded according to their water quality status.

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

In the early 1970s, EPA developed the national water quality STOrage and RETrieval database called STORET. This database allowed for easy access to bacteriological and chemical information collected throughout the state and nation. TDEC Water Pollution Control station locations and chemical and bacteriological data were uploaded into the database quarterly. In September 2009, EPA ceased support of the current format that data are uploaded to STORET.

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

In 2009, EPA developed the Water Quality Exchange (WQX), to replace STORET. WQX is a framework that is intended to make it easier for States, Tribes, and others to submit and share water quality monitoring data over the internet. DWR has successfully loaded chemical and bacteriological data (post 2009), as well as all electronically available fish tissue, macroinvertebrate taxa, habitat data and detailed information for over 7800 monitoring stations into the WQX framework. Historic qualitative macroinvertebrate data (pre 2017) are being uploaded as it is transferred from paper to electronic format. Historic and current diatom data will be uploaded to WQX starting in 2021.

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

H. Data Analysis/Assessment of Water Quality

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

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

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

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

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

Water Quality Standards

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

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

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

Classification + Criteria + Antidegradation = Standards

1. Stream-use Classification

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

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

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

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

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

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

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

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

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

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

2. Water Quality Criteria and Assessment Methodologies

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

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

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

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

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

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

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

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

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

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

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

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

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

a. Metals and Organics Criteria

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

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

b. Pathogens

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

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

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

c. Dissolved Oxygen

For streams identified as trout streams, including tailwaters, the minimum DO standard is 6.0 mg/L. Streams designated as supporting a naturally reproducing population of trout have a DO standard of not less than 8.0 mg/L. This also includes tributaries to naturally

reproducing trout streams as well as all streams in the Great Smoky Mountains National Park. The DO standard in the Blue Ridge Mountains (Ecoregion 66) is 7.0 mg/L. In the Mississippi Valley Alluvial Plain (Ecoregion 73a) the minimum DO is 4.0 mg./L as long as an average of 5.0 mg/L is sustained. Everywhere else in the state the DO standard is 5.0 mg/L. If the source of the low DO is a natural condition, such as ground water, spring, or wetland, then the low DO is considered a natural condition and not pollution.

d. Nutrients

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

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

e. Suspended Solids/Siltation

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

The division has developed regional expectations based on reference data for the individual habitat parameters most associated with sedimentation including embeddedness and sediment deposition. These values are published in the macroinvertebrate QSSOP (TDEC, 2017) 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, 2017).

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

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

Diatom monitoring has recently been implemented as a supplement to macroinvertebrate monitoring for streams which may have elevated nutrients. A regional diatom index is targeted to be completed for the 2021 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, 2017) provides guidance for completing a habitat assessment and how to evaluate the results. Habitat scores calculated by division biologists are compared to the guidelines developed from the ecoregion reference stream data. Streams with habitat scores lower than the guidance for the region are considered impaired, unless biological integrity meets expectations. If biological integrity meets ecoregional expectations, then poor habitat is not considered impairment.

h. pH

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

3. Antidegradation

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

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

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

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

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

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

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

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

- Waters within state or national parks, wildlife refuges, wilderness areas or natural areas.
- State Scenic Rivers or Federal Wild and Scenic Rivers.
- Federally designated critical habitat or other waters with documented non-experimental populations of state or federally listed threatened or endangered aquatic or semi-aquatic plants or animals.
- Waters within areas designated Lands Unsuitable for Mining.
- Waters with naturally reproducing trout.

- Waters with exceptional biological diversity as evidenced by a score of 40 or 42 on the TMI, provided that the sample is considered representative of overall stream conditions.
- Other waters with outstanding ecological or recreational value as determined by the Department.

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

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

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

4. Categorization of Use Support and Assessment Process

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

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

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

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

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

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

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

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

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

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

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

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

The division continues to increase its reliance on rapid biological assessments. These assessments provide a quick and accurate assessment of the general water quality and aquatic life use support in a stream. However, biological assessments do not provide information to pinpoint specific toxic pollutants or bacterial levels in water. The challenge in the next few years will be to combine biological assessments with chemical and bacteriological data so that both use support status and accurate cause and source information can be generated.

5. Data Sources

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

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

6. Data Use

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

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

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

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

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

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

Chemical Data	Biological Data	Physical Data	Sediment And Tissue Data
Compliance monitoring performed at the approximately 1,100 permitted dischargers in Tennessee. Data collected as a result of complaint investigations, fish kills, spills, and in support of enforcement activities.	Rapid biological surveys completed in association with the watershed project. These are performed primarily in tributary streams as a means of monitoring biological integrity.	Temperature and turbidity data collected throughout Tennessee.	Sediment and fish tissue data collected at various sites across Tennessee.
Approximately 8000 stations are established by the division to support the watershed approach.	Ecoregion biological monitoring. Benthic and fish IBI scores calculated at many sites.	Quantitative assessments of habitat made in conjunction with biological surveys.	EPA's report *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States.*
Data collected at the division's 129 ecoregion reference (ECO & FECO) sites. (These stations provide a baseline to which other sites within that ecoregion can be compared.)	Bioassay studies of effluent toxicity at most major NPDES dischargers. Many minor facilities also do this type testing.	Time-of-travel studies of flow, dissolved oxygen sags and BOD decay rates.	Locations of existing fishing advisories in Tennessee.
Chemical data collected by other entities.	Biological data collected by other entities.	Physical data collected by other entities.	Sediment and tissue data collected by other entities.

Future Assessment Goals

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

Table 6. Future Assessment Goals

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

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

Goal	Milestone	Future Plans
	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.	
106 monitoring workplan.	Used GIS mapping and assessment database to streamline development of monitoring workplan and assist field staff in planning. Begin incorporating diatom sampling as second biological indicator when nutrient samples are collected. Began including waters downstream of active and historic landfills in monitoring plans. Added historically clean reservoirs to fish monitoring as part of watershed cycle.	Develop system for creating monitoring plan and sample tracking through Waterlog.
Electronic data reporting	Developed electronic field sheets for chemical, bacteriological and biological sampling and reporting. Updated data storage to increase efficiency, enhance reporting capabilities and increase quality assurance.	Migrate remaining historic biological data (diatom and qualitative macroinvertebrate data) to new system. Make macroinvertebrate, diatom and habitat data public facing. Upload diatom data and historic qualitative

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

I. Water Quality Reports

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

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

As required by Section 303(d) of the Clean Water Act, a list of the lakes, rivers, and streams in Tennessee that fail to meet one or more water quality standards along with pollutant information and TMDL prioritization is complied. Tennessee meets this regulatory requirement through the documentation of water quality assessment determinations and submission of these data through the EPA ATTAINS system. Tennessee's Final 2020 303(d) list was approved by EPA in April 2020. Due to the limited nature of a 303(d) list, Tennessee chooses to publish the 2020 List of Impaired Waters. This list includes all impaired waters regardless of their TMDL status or Category. The Final 2020 List of Impaired Waters may be found on TDEC's website.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 insure adequate information is provided during that cycle.
d. The location of monitoring stations is coordinated with other state and federal agencies to eliminate duplication of effort.
e. At the end of each monitoring cycle, the plan is reviewed to make sure monitoring needs were covered. Uncompleted sampling or data gaps are incorporated into the next monitoring cycle or might be contracted to the state laboratory for completion.

2. Monitoring Objectives

During evaluation of monitoring objectives, the division strives to:

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

3. Monitoring Design

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

a. The antidegradation survey process is reviewed and updated based on feedback from field staff.

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

4. Critical and Non-Critical Water Quality Indicators

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

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

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

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

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

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

5. Quality Assurance

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

The division developed and implemented a document entitled *Quality Systems Standard Operating Procedures for Macroinvertebrate Surveys* (including collections, habitat assessments

and laboratory analyses) in 2002. This manual is reviewed annually and updated if needed. The SOP was last revised in 2017 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 2018 and is currently under revision. Staff are trained on protocols annually during the DWR statewide meeting or during the biologist workshop**.**

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

The division has developed written tutorials for completing electronic sample request (SPERT) and biological field forms (BSERT) and uploading to the division's database. A method's document for waterbody assessment and listing (CALM, 2018), has also been developed. The division uses the state laboratory for chemical, bacteriological and biological analyses. The division also uses contract laboratories. The state laboratory has developed standard operating procedures that meet the division's needs and are in accordance with EPA policy. EPA routinely inspects the state laboratory. Contract laboratories are required to follow approved EPA methods and QC practices. The division has a policy to maintain chain of custody on all samples.

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

The division developed and implemented their first *Quality Assurance Project Plan* in 2009. This manual is reviewed annually and submitted to EPA for approval if there are major revisions. The last update was in September 2020. 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) that will enhance quality assurance, statistical data analyses, assessments, reporting and data availability.
- The online assessment database 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 at http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34510

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 eight Central Office Sections, eight Environmental Field Offices (EFOs) 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 316 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.

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

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

Tennessee uses an enterprise accounting and personnel management software called EDISON. It effectively manages the state's personnel, fiscal, travel, training, property, and inventory into a

single integrated system and allows more accurate and consistent tracking of program expenditures.

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

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

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

Current Funding

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

In 1991, the state legislature passed a law creating the Environmental Protection Fund (EPF) which requires the division to charge fees for certain services such as the annual maintenance of NPDES permits, plans and specs reviews, issuance of aquatic resource alteration permits (ARAP), and gravel dredging permits. Money collected from civil penalties and damages assessments are added to this fund as well. EPF funds have been used to add staff and upgrade the salaries of existing staff. The estimated collection for EPF in state Fiscal Year 2021 (July1, 2020– June 30, 2021) is $10,135,095.62 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 FY20 grant. The State of Tennessee uses a performance partnership grant (PPG) that includes the water pollution effort under CWA§106 as part of the PPG. The state continues to use substantial effort funded with state dollars to address water quality assessments and regulation for water pollution control within Tennessee. State funds that are not explicitly reflected in the grant application will not be tracked with the PPG, but these funds are still available for Division of Water Resources state program efforts.

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

Salary Ranges

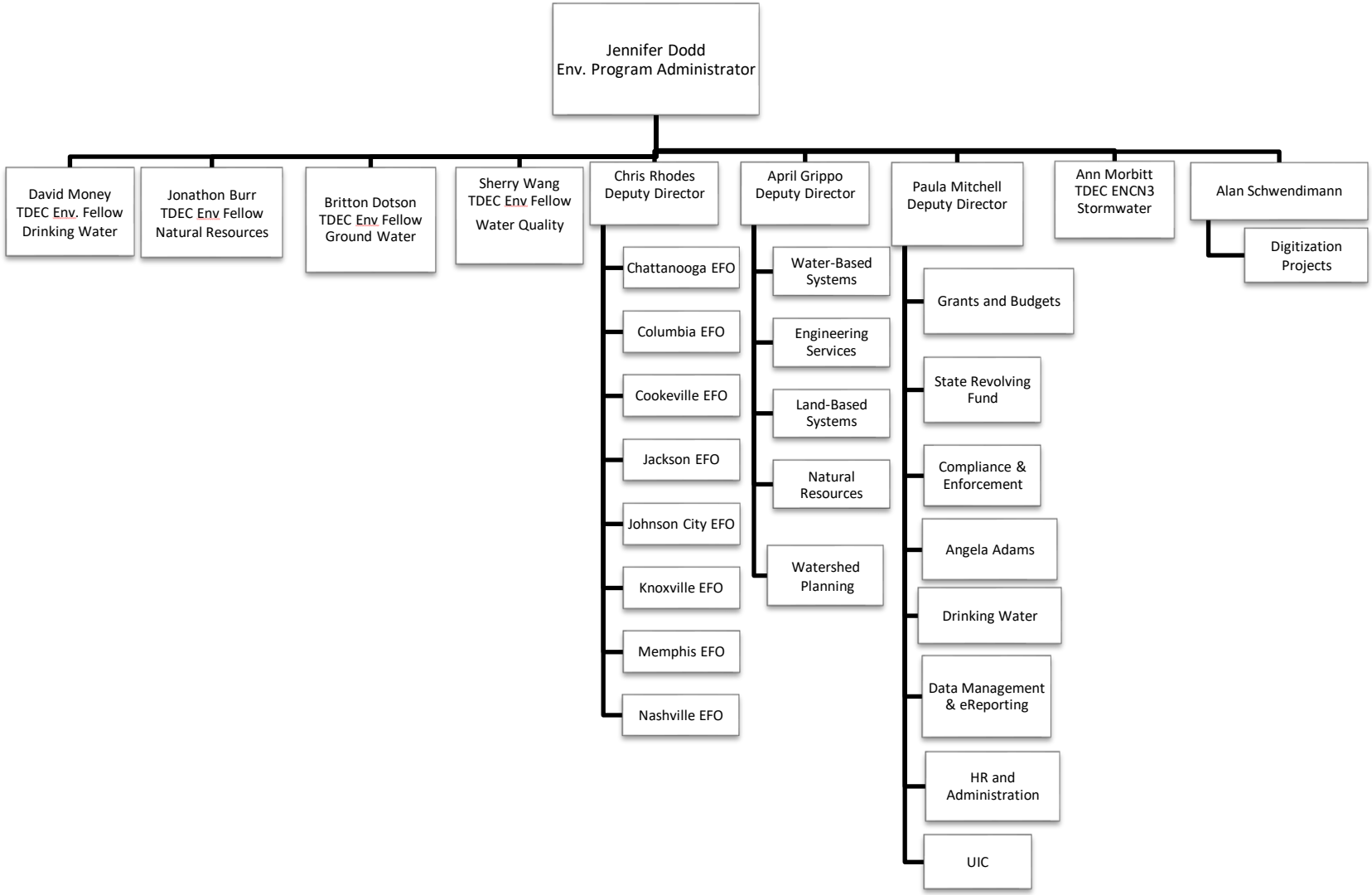
On April 24, 2012 the Governor signed into law the Tennessee Excellence in Accountability Management Act. It effectively established a new hiring system that requires agencies to define minimum qualifications and to identify specific knowledge, skills, abilities, and competencies required for each position. It also overhauled the state's performance evaluation system to provide performance standards and goals. Furthermore, the agency conducted job evaluations and revised job classifications to reflect the move toward allowing career tracks for both technical staff as well as management positions. Table 7 reflects the current FY salary information and position class titles for 2021.

Table 7. Salary Grades for Positions in TDEC DWR (updated 7/1/2021)

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

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

Division of Water Resources



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

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

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

106 grant project activities in Tennessee are funded by state appropriation and EPA grant dollars. An estimated $2,384,035 is obligated for employee salaries and benefits in support of this program in the state in FY2020-FY2021. Another $319,263 is allocated to travel, printing, utility, communication, maintenance, professional service, rent, insurance, vehicle, and equipment expenses. Indirect charges are estimated at $458,656.

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

Table 8. Water Quality Monitoring From 2000 to 2020

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Chemical & Bacteriological Events	3000	2917	2954	3246	4168	3790	4065	4922	4500	4713	4376	4630	5100	4783	5305	3426	4802	5168	5202	5231	5555
Rapid Macroinvertebrate Samples (Biorecon)	602	672	318	365	183	162	285	248	338	318	223	288	157	433	335	225	130	210	161	257	130
Intensive Macroinvertebrate Samples (SQSH)	222	176	94	330	113	256	226	267	332	353	367	257	247	274	192	377	370	408	470	586	615
Habitat Assessments	824	848	412	695	504	386	462	497	612	597	512	525	361	674	530	673	585	611	641	688	612
Samples	94	14	80	154	121	0	2	120	60	72	22	55	10	39	54	39	18	23	59	28	77
Antidegradation Surveys	11	5	5	49	33	17	97	81	2	59	51	18	12	16	7	19	26	17	6	74	14
Probabilistic Monitoring Events	50	50	75	95	313	2	0	90	0	0	90	0	0	0	0	0	0	0	0	0	0
Fish Tissue Samples	6	0	3	5	0	2	25	70	44	88	207	12	68	31	55	74	76	18	29	118	79

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

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

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

The division maintains a statewide monitoring system consisting of approximately 7,900 stations. In addition, new stations are created every year to increase the number of assessed streams. Approximately 539 stations will be monitored in FY 2021- 2022. Stations are sampled monthly, quarterly, and semi-annually, depending on the requirements of the project. Within each watershed cycle, monitoring stations are coordinated between the central office and staff in the eight regional Environmental Field Offices (EFOs) and the Mining Unit based on the following priorities. A list of these stations is located in Appendix A. Additional streams may be added for sampling as the monitoring year progresses. Most large streams have at least one station. A list of parameters to be sampled is provided in Table 11.

After determining the watersheds to be monitored in a given year, monitoring resources are prioritized as follows: Details of monitoring priorities is found in Section I D and Tennessee's Consolidated Assessment and Listing Methodology (CALM, 2018) https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html .

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

A. Monitoring Frequency

1. Antidegradation Monitoring Frequency

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

2. Posted Waters Monitoring Frequency

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

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

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

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

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

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

4. **Monitoring Frequency for Impaired Waters**

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

Monitoring impaired waters provides a great deal of information:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Important notes about this process:

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

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

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

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

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

Nutrient Sampling

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

Pathogen Sampling

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

Total Suspended Solids Sampling

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

Metals Sampling

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

* Dependent on Hardness

5. Sampling Downstream of Major Discharges and CAFO's

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

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

6. TMDL Development Monitoring

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

7. Special Projects

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

8. Watershed Stream Monitoring

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

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

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

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

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

Group 1watershed will be monitored by EFOs in FY 2021-2022 (Appendix A).

Table 11 provides the parameters list for each project for sampling. The *QSSOP for Chemical and Bacteriological Sampling of Surface Water* (TDEC, 2018, draft) describes chemical and bacteriological sampling, field parameter readings, and flow measurement procedures. The *QSSOP for Macroinvertebrate Stream Surveys* (TDEC, 2017) describes protocols for collection of benthic macroinvertebrate samples and habitat assessment. The *QSSOP for Periphyton Stream Surveys* (TDEC, 2010) describes protocols for collection of periphyton sampling.

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

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

Table 11. Parameter List for the Water Column

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

Parameter	TMDLs				Ref. Sites ECO, FECO & SEMN	303(d)*	Long Term Trend Stations	Watershed Sites	Landfills	Trip and Field Blanks
	Metals †/pH	DO	Nutrients	Pathogens						
						pathogens				
Habitat Assessment					X	X		X		
Chlorophyll *a* (Non-wadeable)		R	X			R for nutrient in non-wadeable				
Periphyton (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, 2017) describes protocols for collection of benthic macroinvertebrate samples and habitat assessment. The Watershed Unit is responsible for the coordination of survey activities. Macroinvertebrate sampling is listed in Appendix A.

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

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

2. Diatom Surveys

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

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. A list of fish tissue stations to be sampled in 2021-22appears in Table 12. Parameters to be sampled are listed in Table 13. TDEC DWR, TVA, TWRA, NPS and DOE regularly discuss fish monitoring surveys in the state. Data from these surveys help the division assess water quality and determine the issuance of fishing advisories.

Table 12. 2021– 2022 Fish Tissue Sampling Sites

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
BRM36.0	Beech Reservoir	Forebay	Hg PCB, DDT	Catfish, Largemouth Bass	TVA
CFORK28.0OB	Center Hill Reservoir	Near Dam	Hg+Se	Black Bass, Walleye, Crappie	TDH
FWATE005.2PU	Center Hill Reservoir	Downstream Peter Cave Branch	Hg+Se	Black Bass, Walleye, Crappie	TDH

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
CFORK058.9OB	Center Hill Reservoir	Hwy 70/Sligo Bridge	Hg+Se	Black Bass, Walleye, Crappie	TDH
CUMBE185.7DA	Cheatham Reservoir	Bordeaux Bridge Nashville	106 metals/organics	LMB and catfish	TDH
CUMBE191.1DA	Cheatham Reservoir	Shelby Street Bridge Nashville	106 metals/organics	LMB and catfish	TDH
HRM55.0	Cherokee Reservoir	Forebay	Hg and PCB	Catfish, Largemouth Bass	TVA
HRM76.0	Cherokee Reservoir	Mid Reservoir	Hg and PCB	Catfish, Largemouth Bass	TVA
HWR8.5	Chickamauga Reservoir	Hwy 58	Hg and PCB	Catfish, Largemouth Bass	TVA
TRM472.3	Chickamauga Reservoir	Forebay	Hg and PCB	Catfish, Largemouth Bass	TVA
TRM518-529	Chickamauga Reservoir	Inflow	Hg and PCB	Catfish, Largemouth Bass	TVA
TRM490.5	Chickamauga Reservoir	Mid reservoir	Hg and PCB	Catfish, Largemouth Bass	TVA
TRM605.5	Fort Loudoun Reservoir	Forebay	Hg and PCB	Catfish, Largemouth Bass	TVA
TRM652	Fort Loudoun Reservoir	Inflow	Hg and PCB	Catfish, Largemouth Bass	TVA
TRM624.6	Fort Loudoun Reservoir	Mid reservoir	Hg and PCB	Catfish, Largemouth Bass	TVA
HiwasseeRM37.0	Hiwassee River	Patty Station Road	Hg and PCB	Catfish, Largemouth Bass	TVA
HRM118.7	Holston River	Surgoinsville	Hg PCB, DDT	Catfish, Largemouth Bass	TVA
LITTL008.9BT	Little River	Rockford (upstream Hwy 33)	106 0Metals + Organics	Catfish	TDH/TDEC
MCKEL001.8SH	McKellar Lake	Entire lake	106 metals/organics,(dioxin on cats)	game/catfish/rough (buffalo or carp)	TDHTDEC/TDH
MCKEL001.8SH	McKellar Lake	Entire lake	106 metals/organics,(dioxin on cats)	game/catfish/rough (buffalo or carp)	TDEC/TDH
MISSI724.6SH	Mississippi River (not completed FY20-21 due to equipment failure)	Memphis South Plant	106 metals/organics,(dioxin on cats)	game/catfish/rough (buffalo or carp)	TDEC/TDH

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
MISSI735.0SH	Mississippi River (not completed FY20-21 due to equipment failure)	Near I-40	106 metals/organics,(dioxin on cats)	game/catfish/rough (buffalo or carp)	TDEC/TDH
MISSI754.0SH	Mississippi River (not completed FY20-21 due to equipment failure)	Meeman Shelby State Park	106 metals/organics,(dioxin on cats)	game/catfish/rough (buffalo or carp)	TDEC/TDH
NONCO001.8SH	Nonconnah Creek	Rivergate Road	106 Metals + Organics	Catfish, Largemouth Bass	TDH
NFHRM4.6	North Fork Holston River	Cloud Ford	Hg PCB, DDT	Catfish, Black Bass	TVA
ORM2.5	Ocoee River	Benton Pike	Hg and PCB	Catfish, Spotted Bass	TVA
REELF00002LA	Reelfoot Lake (not completed FY20-21)	Lower Blue Basin at Rays Camp	106 metals and organics	Bass/Crappie	TDEC/TDHTDH
REELF00005OB	Reelfoot Lake (not completed FY20-21)	Upper Blue Basin Mouth of Walnut Log Ditch	106 metals and organics	Crappie	TDEC/TDHTDH
SFHR51.0	South Holston Reservoir	Forebay	Hg PCB, DDT	Catfish, Largemouth Bass	TVA
SFHR62.5	South Holston Reservoir	Mid reservoir	Hg PCB, DDT	Catfish, Largemouth Bass	TVA
LTRM1.0	Tellico Reservoir	Forebay	Hg and PCB	Catfish, Largemouth Bass	TVA
LTRM15.0	Tellico Reservoir	Mid reservoir	Hg and PCB	Catfish, Largemouth Bass	TVA
WRM45.5	Watauga Reservoir	Mid Reservoir	Hg PCB, DDT	Catfish, Largemouth Bass	TVA
WRM37.4	Watauga Reservoir	Forebay	Hg PCB, DDT	Catfish, Largemouth Bass	TVA
ELK170.0FR	Woods Reservoir	Near Dam	Organics	Catfish	TDH
ROLLI000.0FR	Woods Reservoir	Rollins Creek embayment	Organics	Catfish	TDH
BRADL000.0CE	Woods Reservoir	Bradley Creek Embayment	Organics	Catfish	TDH

STATION ID	WATERBODY	LOCATION	PARAMETER	TARGET SPECIES*	Agency
BRUM000.0FR	Woods Reservoir	Brumalow Creek Embayment	Organics	Catfish	TDH

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 (limited)
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 http://tn.gov/assets/entities/environment/attachments/water_fish-advisories.pdf

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 2021-2022, 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 enable 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 is currently participating in the 2021 NWCA cycle. Site reconnaissance has been completed and the first surveys will begin July 15, 2021 and will be completed by September 1, 2021.

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 will be collected in the summer of 2021 under the 2019 WPDG, and the associated database expansion will be delivered to TDEC

in September 2021. Due to COVID-19-related field delays TDEC is requesting 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. These extension requests were submitted to EPA in June 2021. The only remaining wetland deliverable for the 2017 grant include fieldwork to obtain data on bedrock-dominated stream channels and ongoing improvements to the TN Stream Quantification Tool based on a working group (currently underway). The remaining deliverables for the 2019 WPDG include improvements to the TN SQT based on the above-mentioned working group, development of a training course for the updated SQT protocol, and additional data collection for the State's wetland reference database. These tasks are scheduled to be completed by September 2023.

F. Southeast Monitoring Network Sites in Tennessee

FY 2020 106 Supplemental Monitoring Initiatives

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

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

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

1. Project Objectives

a. Establish annual monitoring at 10 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 10 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 periphyton in April. Conduct habitat assessments concurrent with biological monitoring (Table 14).

e. Analyze biological data to species level.

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

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

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

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

Table 14. Southeast Monitoring Network Sites – Tennessee

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

III. WASTE LOAD ALLOCATION/TMDL DEVELOPMENT

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

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

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

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

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

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

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

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

A. Complaints

The division investigates and attempts to resolve over 2200 complaints each year. Most of these are filed by private citizens who wish to convey information concerning suspected pollution events. As such, these complaint investigations are an important source of information. The division places a high priority on the investigation of these reports. Staff are assigned to this activity for the investigation to be accomplished in a timely and efficient manner. Due to its sporadic nature, complaint investigations are difficult to plan and often divert staff from other program needs.

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

B. Fish Kills, Waste Spills, and other Emergencies

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

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

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

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

V. COMPLIANCE MONTORING

A. Facility Inspection Schedule

The information in Appendix B reflects the proposed activities in the areas of compliance assurance and operation and maintenance (O & M) inspections for FY 21-22. These inspections have been coordinated to fulfill the data needs of the permits, O & M, and enforcement programs. Major facilities are inspected at a rate of once every two years and minor facilities are inspected at a rate of once every five years. Facilities in noncompliance with permit limits will be given priority scheduling if needed, but all facilities will be inspected according to the time frames set out in the EPA Enforcement Workplan. Inspections are entered into Waterlog and flowed into ICIS-NPDES within 40 days of inspection completion. The DWR NPDES inspection year reflects EPA's fiscal year, October 1, 2021– September 30, 2022.

B. Pretreatment Inspections and Audits

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

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

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

C. Distribution of Audits to be Performed

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

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

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

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

D. Whole Effluent Toxicity Testing

Biomonitoring in Tennessee has two distinct stages. For the first ten years of biomonitoring (1978 - 1988), the division documented the presence of toxicity in industrial and municipal effluents and established the need to include whole effluent toxicity (WET) limits in NPDES permits. The science and need for this program are well established and most discharger permits incorporate these limits. The division's biomonitoring efforts have shifted more toward compliance assurance and enforcement activities. The state will require environmental field offices (EFOs) to conduct inspections on 2.5% of major and minor facilities with WET permit limits on an annual basis. There are 410 individual permitted facilities that have WET limits incorporated into their permit. Toxicity tests are sent directly by EFOs to ESC Lab Sciences for analyses in 2021-2022.

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APPENDIX A:

MONITORING STATIONS SCHEDULED TO BE SAMPLED

Projected Monitoring Stations for 2021-2022

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN031501010 12_0100	SUGAR008.2 BR	4 A	Sugar Creek	Chattanooga EFO			1		12	12	
303d	TN031501010 12_0200	MILL000.1B R	5	Mill Creek	Chattanooga EFO			1	1	12	12	
303d	TN031501010 12_0210	OFORT004.1 PO	4 A	Old Fort Creek	Chattanooga EFO			1		12	12	
303d	TN031501010 12_0300	BPLAY000.3 PO	4 A	Ball Play Creek	Chattanooga EFO			1		12	12	
Watershed	TN031501010 12_0400	MINNE000.3 PO	1	Minnewauga Creek	Chattanooga EFO		1			12	12	
Watershed	TN031501010 12_0500	JACKS000.2 PO	1	Jacks River	Chattanooga EFO		1	1	1	12	12	
SEMN	TN031501010 12_0510	ECO66G12	1	Sheeds Creek	Chattanooga EFO		2	2	1		4	4
Watershed	TN031501010 12_1000	CONAS054.4 PO	1	Conasauga River	Chattanooga EFO			1		12	12	
Watershed	TN031501010 12_2000	CONAS061.4 PO	1	Conasauga River	Chattanooga EFO			1	1	12	12	
303d	TN031501010 21_0100	MILLS004.9 BR	4 A	Mills Creek	Chattanooga EFO			1	1	12	12	
303d	TN031501010 21_0110	COUNC000.3 BR	2	Council Spring	Chattanooga EFO		1					
303d	TN031501010 21_0120	MAROO001. 3BR	5	Maroon Branch	Chattanooga EFO			1	1	12	12	
303d	TN031501010 21_0200	WEATH000. 6BR	4 A	Weatherly Branch	Chattanooga EFO			1		12	12	
303d	TN031501010 21_0300	JERRY001.2 BR	4 A	Jerry Branch	Chattanooga EFO			1	1	12	12	
303d	TN031501010 21_0400	RHILL000.2 BR	5	Red Hill Branch	Chattanooga EFO			1		12	12	
303d	TN031501010 21_0500	BLACK000.4 BR	5	Blackburn Branch	Chattanooga EFO			1		12	12	
303d	TN031501010 21_0600	WOLF001.0 BR	4 A	Wolf Branch	Chattanooga EFO			1		12	12	
303d	TN031501010 21_0700	COAHU45.4 T0.7BR	4 A	Unnamed Trib to Coahulla Creek	Chattanooga EFO			1		12	12	
303d	TN031501010 21_0800	HICKS002.3 BR	5	Hicks Branch	Chattanooga EFO			1		12	12	
303d	TN031501010 21_0900	COAHU41.9 T0.8BR	4 A	Unnamed Trib to Coahulla Creek	Chattanooga EFO			1		12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN031501010 21_1000	COAHU030. 2BR	5	Coahulla Creek	Chattanooga EFO			1		12	12	
303d	TN031501010 21_1100	TATE000.3B R	4 A	Tate Branch	Chattanooga EFO			1		12	12	
303d	TN031501010 21_2000	COAHU043. 9BR	5	Coahulla Creek	Chattanooga EFO			1		12	12	
Ambient	TN060102010 01_1000	PINEY005.0 RH	4 A	Watts Bar Reservoir	Chattanooga EFO					4	4	4
303d	TN060102010 01T_0100	CRACK000.6 RH	5	Cracker Creek	Chattanooga EFO			1	1	12	12	
303d	TN060102010 01T_0200	WOLF003.1 RH	5	Wolf Creek	Chattanooga EFO			1		12	12	
Ambient	TN060102010 20_1000	TENNE529.5 RH	4 A	Fort Loudoun Reservoir	Chattanooga EFO					4	4	4
Ambient	TN060102010 20_1000	TENNE503.3 RH	4 A	Fort Loudoun Reservoir	Chattanooga EFO					4	4	4
Ambient	TN060102010 20_1000	TENNE477.0 HM	4 A	Fort Loudoun Reservoir	Chattanooga EFO					4	4	4
Watershed	TN060102010 40_3000	WHITE011.5 RH	2	Whites Creek	Chattanooga EFO			1				
Watershed	TN060102010 41_0400	MOCCA000. 9RH	2	Moccasin Creek	Chattanooga EFO			1				
Watershed	TN060102010 41_0500	BUMBE002.9 RH	2	Bumbee Creek	Chattanooga EFO		1					
Watershed	TN060102010 41_0600	DUSKI003.0 RH	2	Duskin Creek	Chattanooga EFO		1					
Watershed	TN060102010 41_0800	SOAK000.1R H	2	Soak Creek	Chattanooga EFO			1		12	12	
Watershed	TN060102010 41_0820	DUNLA004.2 BL	2	Dunlap Creek	Chattanooga EFO		1					
Watershed	TN060102010 41_0840	LPINE003.7 RH	2	Little Piney Creek	Chattanooga EFO		1					
Watershed	TN060102010 41_0900	VANS000.6R H	1	Vans Creek	Chattanooga EFO			1	1	12	12	
Watershed	TN060102010 41_1000	PINEY006.6 RH	1	Piney River	Chattanooga EFO			1		12	12	
303d	TN060102010 41_2000	PINEY008.1 RH	5	Piney Creek	Chattanooga EFO			1	1	12	12	
303d	TN060102014 62_0100	LFORD000.3 RH	5	Laurel Ford Branch	Chattanooga EFO			1		12	12	
303d	TN060102014 62_1000	TOWN000.5 RH	5	Town Creek	Chattanooga EFO			1	1	12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN060102015 26_1000	MUDDY002. 6RH	5	Muddy Creek	Chattanooga EFO			1		12	12	
Watershed	TN060102015 33_1000	CAMP001.4 RH	2	Camp Creek	Chattanooga EFO			1				
Ambient	TN060200010 01_1000	TENNE444.0 MI	5	Nickajack Reservoir	Chattanooga EFO					4	4	4
Ambient	TN060200010 07_1000	SCHIC000.4 HM	5	South Chickamauga Creek	Chattanooga EFO					4	4	4
Ambient	TN060200011 244_1000	CHATT000.9 HM	5	Chattanooga Creek	Chattanooga EFO					4	4	4
Ambient	TN060200020 08_1000	HIWAS013.4 MM	5	Hiwassee River Embayment of Chickamauga Reservoir	Chattanooga EFO					4	4	4
Ambient	TN060200020 81_0100	CANE001.5 MM	5	Cane Creek	Chattanooga EFO					4	4	4
Ambient	TN060200020 83_3000	OOSTA028.4 MM	5	Oostanaula Creek	Chattanooga EFO					4	4	4
303d	TN060200030 01_0100	FOURM001. 2PO	5	Fourmile Creek	Chattanooga EFO			1	1	12	12	
303d	TN060200030 01_0150	FOURM002. 4PO	5	Fourmile Creek	Chattanooga EFO			1	1	12	12	
303d	TN060200030 01_0200	CLOUD000.5 PO	5	Cloud Branch	Chattanooga EFO			1		12	12	
303d	TN060200030 01_0300	COOKS001.3 PO	5	Cookson Creek	Chattanooga EFO			1		12	12	
303d	TN060200030 01_0310	HORNS000.1 PO	5	Horns Creek	Chattanooga EFO			1		12	12	
303d	TN060200030 01_0400	FRY000.1PO	5	Fry Branch	Chattanooga EFO			1	1	12	12	
Ambient-Grp1/ 303d	TN060200030 01_1000	OCOEE001.0 PO	4C	Ocoee River	Chattanooga EFO					4	4	4
Ambient-Grp1/ 303d	TN060200030 01_1000	OCOEE004.0 PO	4C	Ocoee River	Chattanooga EFO					12	12	12
Watershed	TN060200030 04T_0100		1	Prince Branch	Chattanooga EFO	1						
Watershed	TN060200030 04T_0200		1	Mitchell Branch	Chattanooga EFO	1						
Watershed	TN060200030 04T_0300		1	Tollgate Branch	Chattanooga EFO	1						
Watershed	TN060200030 04T_0400	INDIA000.1a PO	1	Indian Creek	Chattanooga EFO		1					

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
Watershed	TN060200030 10_1000	BAKER002.6 PO	1	Baker Creek	Chattanooga EFO		1					
303d	TN060200030 13.5_1000	OCOEE024.8 PO	5	Ocoee Number 2 Reservoir	Chattanooga EFO			1		12 & 5/30	12	12
Watershed	TN060200030 13.55_0100	ROCK000.2P O	1	Rock Creek	Chattanooga EFO			1	1	12	12	
Watershed	TN060200030 13.55_0200	LAURE000.1 PO	1	Laurel Creek	Chattanooga EFO			1	1	12	12	
Watershed	TN060200030 13.55_0300	1		Williams Creek	Chattanooga EFO	1						
SEMN	TN060200030 13.55_0400	ECO66G20	1	Rough Creek	Chattanooga EFO		2	2	1		4	4
303d	TN060200030 13.55_1000	OCOEE026.6 PO	5	Ocoee River	Chattanooga EFO			1		12 & 5/30	12	12
Watershed	TN060200030 13.5T_0100	ROGER000.1 PO	1	Rogers Branch	Chattanooga EFO		1					
Watershed	TN060200030 13.5T_0200	GASSA000.1 PO	1	Gassaway Creek	Chattanooga EFO		1					
Watershed	TN060200030 13.5T_0300	1		Little Gassaway Creek	Chattanooga EFO	1						
303d	TN060200030 13.7_1000	OCOEE029.3 PO	5	Ocoee Number 3 Reservoir	Chattanooga EFO					12	12	12
Watershed	TN060200030 13.7T_0100	BRUSH003.5 PO	1	Brush Creek	Chattanooga EFO			1		12	12	
303d	TN060200030 13.7T_0300	GRASS001.1 PO	5	Grassy Creek	Chattanooga EFO			1	1	12	12	
Watershed	TN060200030 13.7T_0400	TUMBL000.9 PO	1	Tumbling Creek	Chattanooga EFO			1		12	12	
Watershed	TN060200030 13.7T_0410	1		Unnamed Trib to Tumbling Creek	Chattanooga EFO	1						
Watershed	TN060200030 13_0100	MADDE000. 2PO	1	Madden Branch	Chattanooga EFO		1					
Watershed	TN060200030 13_0200		1	Little Caney Branch	Chattanooga EFO	1						
Watershed	TN060200030 13_0300	CANEY000.1 PO	1	Caney Creek	Chattanooga EFO			1		12	12	
Watershed	TN060200030 13_0400	GOFOR000.2 PO	1	Goforth Creek	Chattanooga EFO			1	1	12	12	
Ambient-Grp1/ 303d	TN060200030 13_1000	OCOEE019.6 PO	5	Ocoee River	Chattanooga EFO			1	1	12	12	12
303d	TN060200030 14_0100	NPOTA003.3 PO	5	North Potato Creek	Chattanooga EFO			1	1	12	12	12

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN060200030 14_0100	NPOTA002.8 PO	5	North Potato Creek	Chattanooga EFO			1	1	12	12	12
303d	TN060200030 14_0100	NPOTA004.6 PO	5	North Potato Creek	Chattanooga EFO			1		12	12	12
303d	TN060200030 14_0100	NPOTA001.0 PO	5	North Potato Creek	Chattanooga EFO			1	1	12	12	12
303d	TN060200030 14_0110	BURRA000.3 PO	5	Burra Burra Creek	Chattanooga EFO			1		12	12	12
303d	TN060200030 14_0140	ELLIS000.1P O	5	Ellis Branch	Chattanooga EFO			1	1	12	12	12
Watershed	TN060200030 14_0150	NPOTA006.0 PO	2	North Potato Creek	Chattanooga EFO			1				
303d	TN060200030 14_0210	BELLT000.3 PO	5	Belltown Creek	Chattanooga EFO			1	1	12	12	
303d	TN060200030 14_1000	OCOEE035.6 PO	5	Ocoee River	Chattanooga EFO			1	1	12	12	12
Watershed	TN060200030 14_2000	OCOEE037.3 PO	1	Ocoee River	Chattanooga EFO			1	1	12	12	12
Watershed	TN060200030 35_0100	CLEAR000.1 PO	1	Clear Creek	Chattanooga EFO			1	1	12	12	
Watershed	TN060200030 35_0200	COON000.1P O	1	Coon Creek	Chattanooga EFO		1					
Watershed	TN060200030 35_0300		1	Long Branch	Chattanooga EFO	1						
Watershed	TN060200030 35_1000	GREAS000.4 PO	1	Greasy Creek	Chattanooga EFO			1		12	12	
Watershed	TN060200030 45_0100		1	Penitentiary Branch	Chattanooga EFO	1						
Watershed	TN060200030 45_1000	BIG006.4PO	1	Big Creek	Chattanooga EFO		1			12		
Watershed	TN060200030 92_1000	ROCK000.1P O	1	Rock Creek	Chattanooga EFO			1	1	12	12	
Watershed	TN060200033 76_1000	SYLCO002.3 PO	1	Sylco Creek	Chattanooga EFO		1					
Ambient	TN060200040 01_1000	SEQUA006.3 MI	5	Sequatchie River	Chattanooga EFO					4	4	4
Ambient	TN060300010 55_1000	TENNE416.5 MI	1	Guntersville Reservoir	Chattanooga EFO					4	4	4
SEMN	TN060300010 67_1000	ECO68C20	1	Crow Creek	Chattanooga EFO			2	1		4	4
Ambient	TN051301030 01_1000	CUMBE381. 1CY	1	Cumberland River	Cookeville EFO					4	4	4

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
Ambient	TN05130105001_1000	OBEY002.1CY	5	Obey River	Cookeville EFO					4	4	4
Ambient	TN05130108001_1000	CFORK011.2SM	5	Caney Fork River	Cookeville EFO					4	4	4
SEMN	TN05130108004_0200	ECO71H17	2	Clear Fork Creek	Cookeville EFO			2	1	4	4	4
Watershed	TN06010201040_0300	SANDY005.0CU	2	Sandy Creek	Cookeville EFO			1				
Watershed	TN06010201040_0510	FALL002.3CU	2	Fall Creek	Cookeville EFO			1				
Watershed	TN06010201040_0520	MAMMY000.1CU	2	Mammys Creek	Cookeville EFO			1				
Watershed	TN06010208005_0111	LMEAD000.4CU	2	Little Meadow Branch	Cookeville EFO			1				
Watershed	TN06010208007_0100	OTTER003.3CU	2	Otter Creek	Cookeville EFO			1		12	12	
Watershed	TN06010208007_0200	FOX002.1CU	2	Fox Creek	Cookeville EFO			1				
303d	TN06010208007_0210		5	Scantling Branch	Cookeville EFO	1						
Watershed	TN06010208007_0300	ELMOR000.1CU	2	Elmore Creek	Cookeville EFO			1				
FECO	TN06010208007_0310	FECO68A03	2	South Fork Elmore Creek	Cookeville EFO		2	2	1	4	4	4
303d	TN06010208007_2000	OBED020.8CU	5	Obed River	Cookeville EFO			1	1	12	12	
Watershed	TN06010208008_0200	NBUSI005.0CU	2	No Business Creek	Cookeville EFO			1				
Watershed	TN06010208008_3000	CLEAR014.8CU	1	Clear Creek	Cookeville EFO			1		12	12	
303d	TN06010208013_0200	LOBED000.7CU	5	Little Obed River	Cookeville EFO			1		12	12	12
303d	TN06010208013_0400	BDROW001.4CU	5	Black Drowning Creek	Cookeville EFO			1	1	12	12	12
303d	TN06010208013_0410	MEADO000.8CU	5	Meadow Creek	Cookeville EFO			1				
303d	TN06010208013_0420	COPEL000.5CU	5	Copeland Creek	Cookeville EFO			1				
303d	TN06010208013_0500	SCOTT001.2CU	5	Scott Creek	Cookeville EFO			1				
Watershed	TN06010208013_0800		2	Gould Creek	Cookeville EFO							

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN060102080 13_1000	OBED036.9C U	5	Obed River	Cookeville EFO			1		12	12	
303d	TN060102080 13_2000		4 A	Obed River	Cookeville EFO	1						
Watershed	TN060102080 15_0100	YELLO001.3 CU	2	Yellow Creek	Cookeville EFO			1				
Watershed	TN060102080 15_0110	ROGER000.1 CU	2	Rogers Creek	Cookeville EFO			1				
Watershed	TN060102080 15_0200	TBD bugs only	3	Crabapple Branch	Cookeville EFO			1				
Watershed	TN060102080 15_0400	TBD bugs only	2	Clear Branch	Cookeville EFO			1				
303d	TN060102080 15_0600	LICK000.5C U	5	Lick Creek	Cookeville EFO			1	1	12	12	
Watershed	TN060102080 15_0610	LONG000.1C U	2	Long Branch	Cookeville EFO			1				
Watershed	TN060102080 15_0700	BASSE001.3 CU	2	Basses Creek	Cookeville EFO			1		12	12	
303d	TN060102080 15_0900	BYRD002.6C U	5	Byrd Creek	Cookeville EFO			1	1	12	12	12
Watershed	TN060102080 15_0920	THREE000.4 CU	2	Threemile Creek	Cookeville EFO			1				
303d	TN060102080 15_0930	ONEMI001.6 CU	4 A	One Mile Creek	Cookeville EFO			1	1	12	12	12
ECO	TN060102080 15_1000	ECO68A26	5	Daddys Creek	Cookeville EFO		2	2	1	4	4	4
Watershed	TN060102080 15_1000	DADDY009.1 CU	5	Daddys Creek	Cookeville EFO			1		12	12	12
Watershed	TN060102080 15_1100	NORTH000.3 CU	2	North Creek	Cookeville EFO			1		12	12	12
Watershed	TN060102080 15_1110	BROWN000. 1CU	2	Brown Creek	Cookeville EFO			1				
303d	TN060102080 15_1111		4 C	Bagwell Branch	Cookeville EFO	1						
303d	TN060102080 15_1150		4 C	North Creek	Cookeville EFO	1						
Watershed	TN060102080 15_2000	DADDY020.1 CU	1	Daddys Creek	Cookeville EFO			1		12	12	12
Watershed	TN060300021 03_0200	COTTS003.4 LW	1	Cotts Creek	Columbia EFO			1	1	12	12	
Watershed	TN060300021 03_1000	SECON022.0 LW	1	Second Creek	Columbia EFO			1	1	12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN060300021 124_1000	HESTE007.2 LI	5	Hester Creek	Columbia EFO			1		12	12	
303d	TN060300021 149_0100	CSPRI000.6L I	5	Cottrell Spring Branch	Columbia EFO			1	1	12	12	
303d	TN060300021 149_0110	MASON000. 2LI	5	Mason Branch	Columbia EFO			1	1	12	12	
303d	TN060300021 149_0200	HARBI000.4 LI	5	Harbin Branch	Columbia EFO			1	1	12	12	
303d	TN060300021 149_0300	TROTT000.5 LI	5	Trotters Branch	Columbia EFO			1	1	12	12	
303d	TN060300021 149_0600	BHUCK000.2 LI	5	Big Huckleberry Creek	Columbia EFO			1	1	12	12	
303d	TN060300021 149_0610	LHUCK000.7 LI	5	Little Huckleberry Creek	Columbia EFO			1	1			
303d	TN060300021 149_1000	FLINT056.5 LI	5	Flint River	Columbia EFO			1	1	12	12	12
303d	TN060300021 216_0200	WALKE002. 8LI	5	Walker Creek	Columbia EFO			1	1	12	12	12
303d	TN060300021 216_0210	WASHB000. 8LI	5	Washburn Branch	Columbia EFO			1				
303d	TN060300021 216_0211	HARPE001.2 LI	5	Harper Creek	Columbia EFO			1	1	12	12	
303d	TN060300021 216_0221		4C	Unnamed Trib to Hancock Branch	Columbia EFO	1						
Ambient	TN060300030 15_1000	ELK133.0FR	5	Elk River	Columbia EFO					4	4	4
303d	TN060300050 74_0100	LBLUE006.0 LW	5	Little Bluewater Creek	Columbia EFO			1	1	12	12	
Watershed	TN060300050 74_0200	DIXON000.4 LW	3	Dixon Branch	Columbia EFO			1	1	12	12	
303d	TN060300050 74_1000	BLUEW020. 5LW	5	Bluewater Creek	Columbia EFO			1				
Watershed	TN060300050 78_0200	CLACK000.4 LW	2	Clack Branch	Columbia EFO			1				
Watershed	TN060300050 78_0400	WOLF001.6 LW	3	Wolf Creek	Columbia EFO			1				
303d	TN060300050 78_0410		4C	Unnamed Trib to Wolf Creek	Columbia EFO	1						
AmbientGrp1	TN060300050 78_1000	SHOAL022.3 LW	1	Shoal Creek	Columbia EFO			1	1	4	4	4
Watershed	TN060300050 81_0100	LONG000.3L W	2	Long Branch	Columbia EFO			1				

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN060300050 81_1000	SHOAL046.2 LW	5	Shoal Creek	Columbia EFO			1		12	12	12
303d	TN060300050 82_0100	TTOWN000. 6LW	5	Tripptown Branch	Columbia EFO			1	1	12	12	
303d	TN060300050 82_0200	BFSHO002.5 LW	5	Beeler Fork	Columbia EFO			1				
303d	TN060300050 82_0300	DLAND000.1 LW	5	Dry Land Creek	Columbia EFO			1				
303d	TN060300050 82_1000	SHOAL054.8 LW	5	Shoal Creek	Columbia EFO			1		12	12	
303d	TN060300050 82_2000	SHOAL056.1 LW	5	Shoal Creek	Columbia EFO			1		12	12	
303d	TN060300050 84_0100	CRAWF001. 3LW	5	Crawfish Creek	Columbia EFO			1	1	12	12	
Watershed	TN060300050 84_1000	LSHOA001.5 LW	1	Little Shoal Creek	Columbia EFO			1	1	12	12	12
303d	TN060300050 85_1000	CROWS000. 4LW	5	Crowson Creek	Columbia EFO			1	1	12	12	12
Watershed	TN060300050 86_0200	PINEY003.2 LW	3	Piney Branch	Columbia EFO			1				
Watershed	TN060300050 86_0300	GRAND000.7 LW	2	Granddaddy Creek	Columbia EFO			1				
Watershed	TN060300050 86_0500	SPRIN001.8L W	2	Spring Creek	Columbia EFO			1				
Watershed	TN060300050 86_1000	KNOB001.0L W	2	Knob Creek	Columbia EFO			1	1	12	12	
Watershed	TN060300050 87_0200	RPATC000.1 LW	3	Reed Patch Creek	Columbia EFO			1				
303d	TN060300050 87_0300	AARON000.1 LW	5	Aaron Branch	Columbia EFO			1				
Watershed	TN060300050 87_1000	CHISH001.5 LW	2	Chisholm Creek	Columbia EFO			1	1	12	12	
Watershed	TN060300050 89_0100	SHAWN000. 9WE	2	Shawnette Creek	Columbia EFO			1				
Watershed	TN060300050 89_0400	TBD bugs only	2	Sweetwater Branch	Columbia EFO			1				
Watershed	TN060300050 89_1000	FACTO005.1 LW	2	Factory Creek	Columbia EFO			1	1	12	12	12
Watershed	TN060300050 92_1000	HOLLY000.6 WE	2	Holly Creek	Columbia EFO			1				
Watershed	TN060300050 93_0400	FBUTL000.3 WE	2	First Butler Creek	Columbia EFO			1				

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN060300050 93_0500	TBD bugs only	3	Middle Butler Creek	Columbia EFO			1				
303d	TN060300050 93_0600	LBUTL000.8 WE	5	Last Butler Creek	Columbia EFO			1				
ECO	TN060300050 93_0700	ECO71F27	1	Swanegan Branch	Columbia EFO		2	2	1		4	4
303d	TN060300050 93_1000	BUTLE009.3 WE	5	Butler Creek	Columbia EFO			1				
Watershed	TN060300050 95_0100	TBD bugs only	3	Dry Branch	Columbia EFO			1				
303d	TN060300050 95_1000	LCYPR014.6 WE	5	Little Cypress Creek	Columbia EFO			1				
Watershed	TN060300050 98_0100	MAY002.7W E	3	May Branch	Columbia EFO			1				
Watershed	TN060300050 98_1000	TBD bugs only	2	Middle Cypress Creek	Columbia EFO			1				
Watershed	TN060300050 99_0100	TBD bugs only	3	Cooper Branch	Columbia EFO			1				
Watershed	TN060300050 99_1000	CYPRE023.5 WE	2	Cypress Creek	Columbia EFO			1				
Watershed	TN060300051 06_0100	GRASS000.4 WE	2	Grassy Creek	Columbia EFO		2	2	1		4	4
Watershed	TN060300051 06_0200	RFSEC000.2 WE	3	Right Fork	Columbia EFO			1				
Watershed	TN060300051 06_0300	TALLY000.2 WE	3	Talley Branch	Columbia EFO			1				
Watershed	TN060300051 06_1000	SECON010.5 WE	2	Second Creek	Columbia EFO		2	2	1		4	4
Watershed	TN060300053 09_1000	POND000.3L W	2	Pond Creek	Columbia EFO			1				
Ambient	TN060400020 30_1000	DUCK248.0B E	5	Duck River	Columbia EFO					4	4	4
Ambient	TN060400030 19_2000	BBIGB008.5 MY	5	Big Bigby Creek	Columbia EFO					4	4	4
Ambient	TN060400030 24_1000	DUCK113.9 MY	5	Duck River	Columbia EFO					4	4	4
Ambient	TN060400040 02_1000	BUFFA073.1 WE	1	Buffalo River	Columbia EFO					4	4	4
SEMN	TN060400040 13_0600	ECO71F19	1	Brush Creek	Columbia EFO			2	1		4	4
FECO	TN060300050 01T_0200	FECO65J01	1	Haw Branch	Jackson EFO		2	2	1		4	4

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
ECO	TN060300055 60_1000	ECO65J04	1	Pompeys Branch	Jackson EFO		2	2	1		4	4
Ambient	TN060400018 02_1000	BEECH010.0 DE	1	Beech River Embayment	Jackson EFO					4	4	4
Ambient	TN060400050 20_1000	TENNE066.3 HN	1	Kentucky Reservoir	Jackson EFO					4	4	4
Ambient	TN060400050 27_1000	BSAND015.3 BN	5		Jackson EFO					4	4	4
Ambient	TN080102020 09_1000	NFOBI005.9 OB	5	North Fork Obion River	Jackson EFO					4	4	4
Ambient	TN080102020 09_2000	NFOBI010.7 OB	5	North Fork Obion River	Jackson EFO					4	4	4
Ambient	TN080102030 01_1000	SFOBI005.8 OB	5	South Fork Obion River	Jackson EFO					4	4	4
Ambient	TN080102030 15_1000	MFOBI004.5 WY	5	Middle Fork Obion River	Jackson EFO					4	4	4
Ambient	TN080102040 01_1000	NFFDE005.3 DY	5	North Fork Forked Deer River	Jackson EFO					4	4	4
303d Landfill	TN080102050 01_0200	MILL001.1L E	5	Mill Creek	Jackson EFO			1		12	12	12
303d	TN080102050 01_0300	CHAMB002. 4LE	5	Chambers Branch	Jackson EFO			1				
303d	TN080102050 01_1000	SFFDE008.2 LE	5	South Fork Forked Deer River	Jackson EFO			1	1	12	12	12
303d	TN080102050 03_0100	SFFDE19.8T 0.2HY	5	Unnamed Trib to South Fork Forked Deer River	Jackson EFO	1						
303d	TN080102050 03_1000	SFFDE013.5 LE	5	South Fork Forked Deer River	Jackson EFO			1	1	12	12	12
303d	TN080102050 05_0100	LNIXO002.9 HY	5	Little Nixon Creek	Jackson EFO					12	12	12
303d	TN080102050 05_0200	MERID001.7 HY	5	Meridian Creek	Jackson EFO			1		12	12	12
303d	TN080102050 05_0210		5	Briar Creek	Jackson EFO	1						
303d	TN080102050 05_0300		5	Pond Creek	Jackson EFO	1						
303d	TN080102050 05_0310		5	Unnamed Trib to Pond Creek	Jackson EFO	1						
303d	TN080102050 05_0400		5	Lost Creek	Jackson EFO	1						

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN080102050 05_1000	NIXON002.2 HY	5	Nixon Creek	Jackson EFO			1	1	12	12	12
303d	TN080102050 10_0100		5	Kail Creek	Jackson EFO	1						
303d	TN080102050 10_0200		5	Jacobs Creek	Jackson EFO	1						
Ambient-Grp1/ 303d	TN080102050 10_1000	SFFDE027.7 HY	5	South Fork Forked Deer River	Jackson EFO			1	1	4	4	4
303d	TN080102050 11_1000	MUD001.3H Y	5	Mud Creek	Jackson EFO	1						
303d	TN080102050 12_0100		5	Pearsons Creek	Jackson EFO	1						
303d	TN080102050 12_0200		5	Conneley Creek	Jackson EFO	1						
303d	TN080102050 12_0300	ADAIR001.1 MN	5	Adair Branch	Jackson EFO			1				
303d	TN080102050 12_0500		5	Central Creek	Jackson EFO	1						
303d	TN080102050 12_0600	ANDER000.5 MN	5	Anderson Branch	Jackson EFO			1		12	12	12
303d	TN080102050 12_0700	BOND001.0 MN	5	Bond Creek	Jackson EFO			1		12	12	12
303d	TN080102050 12_0800		5	Cane Creek	Jackson EFO	1						
303d	TN080102050 12_0900	HICKS000.8 MN	5	Hicks Creek	Jackson EFO			1		12	12	12
303d	TN080102050 12_1000	SFFDE040.2 MN	5	South Fork Forked Deer River	Jackson EFO			1	1	12	12	12
303d	TN080102050 12_1000	SFFDE049.8 MN	5	South Fork Forked Deer River	Jackson EFO			1	1	12	12	12
303d	TN080102050 12_1100	JOHNS001.4 MN	5	Johnson Creek	Jackson EFO			1		12	12	12
303d	TN080102050 12_1200	CUB001.2M N	5	Cub Creek	Jackson EFO	1				12		
303d	TN080102050 12_1250	CUB002.0M N	5	Cub Creek	Jackson EFO			1	1	12	12	12
303d	TN080102050 12_1300	CYPRE002.0 MN	5	Cypress Creek	Jackson EFO			1				
303d	TN080102050 12_1400	PANTH001.9 MN	5	Panther Creek	Jackson EFO			1		12	12	12
Watershed	TN080102050 17_1000	MERID001.0 MN	2	Meridian Creek	Jackson EFO		1					

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN08010205017_2000		4C	Meridian Creek	Jackson EFO	1						
303d	TN08010205017_3000		5	Meridian Creek	Jackson EFO	1						
303d	TN08010205018_0100	JONES002.0MN	5	Jones Creek	Jackson EFO			1		12	12	12
303d	TN08010205018_0200		5	Moore Branch	Jackson EFO	1						
303d	TN08010205018_0300		5	Finger Creek	Jackson EFO	1						
303d	TN08010205018_0400	JONES001.4CS	5	Jones Creek	Jackson EFO			1		12	12	12
Watershed	TN08010205018_0500	CLARK001.5CS	2	Clarks Creek	Jackson EFO			1				
303d	TN08010205018_0600	TURKE001.0CS	5	Turkey Creek	Jackson EFO			1		12	12	12
Watershed	TN08010205018_0900	BEAR001.0MN	2	Bear Creek	Jackson EFO			1				
Watershed	TN08010205018_0910	ALLEN001.0MN	2	Allen Creek	Jackson EFO			1				
303d	TN08010205018_1000	SFFDE062.9MN	5	South Fork Forked Deer River	Jackson EFO			1		12	12	12
303d	TN08010205018_1100	HUNTE001.8MN	5	Hunters Creek	Jackson EFO			1				
303d	TN08010205018_1200		5	Unnamed Trib to South Fork Forked Deer	Jackson EFO	1						
Watershed	TN08010205018_2000	SFFDE066.6CS	1	South Fork Forked Deer River	Jackson EFO			1	1	12	12	12
303d	TN08010205022_0100		5	Webb Branch	Jackson EFO	1						
303d	TN08010205022_0300		5	Melton Branch	Jackson EFO	1						
Watershed	TN08010205022_1000	SUGAR001.8CS	2	Sugar Creek	Jackson EFO			1	1	12	12	12
Watershed	TN08010205023_0100	JACKS000.5CS	2	Jacks Creek	Jackson EFO			1				
303d	TN08010205023_0110		5	Dry Branch	Jackson EFO	1						
Watershed	TN08010205023_0120	SANDY000.5CS	2	Sandy Creek	Jackson EFO			1				

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN080102050 23_0130	SPRIN001.4 CS	2	Spring Creek	Jackson EFO			1				
Watershed	TN080102050 23_0140	SLIPS000.6C S	2	Sweet Lips Creek	Jackson EFO			1				
303d	TN080102050 23_0200	TAR003.0CS	5	Tar Creek	Jackson EFO			1				
303d	TN080102050 23_0300	HUGGI003.3 MC	5	Huggins Creek	Jackson EFO			1				
303d	TN080102050 23_0310		5	Bushel Branch	Jackson EFO	1						
Watershed	TN080102050 23_0320	BILLI000.3 MC	3	Billies Creek	Jackson EFO			1				
303d	TN080102050 23_0330		5	Hogwallow Creek	Jackson EFO	1						
303d	TN080102050 23_0400		5	Horse Creek	Jackson EFO	1						
Watershed	TN080102050 28_0200	HARRI002.2 MN	1	Harris Creek	Jackson EFO			1	1			
303d	TN080102050 28_0210		5	Cotton Grove Creek	Jackson EFO	1						
ECO	TN080102050 28_0220	ECO65E19	2	Trace Creek	Jackson EFO		2	2	1		4	4
303d	TN080102050 28_0230		5	Jones Creek	Jackson EFO	1						
303d	TN080102050 28_0300	BEAR002.0 MN	5	Bear Creek	Jackson EFO			1				
Watershed	TN080102050 28_0400	SPENC001.2 HE	2	Spencer Creek	Jackson EFO			1				
303d	TN080102050 28_0410		5	McHaney Branch	Jackson EFO	1						
303d	TN080102050 28_0420		5	Unnamed Trib to Spencer Creek	Jackson EFO	1						
303d	TN080102050 28_0500		5	Bell Branch	Jackson EFO	1						
303d	TN080102050 28_0600		5	Unnamed Trib to the North Fork of the South Fork Forked Deer	Jackson EFO	1						
Watershed	TN080102050 28_0700	MFORK001. 7HE	2	Middle Fork Creek	Jackson EFO			1				
303d	TN080102050 28_0800		5	Marlin Creek	Jackson EFO	1						

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN080102050 28_1000	NFFDE001.4 MN	5	North Fork of the South Fork Forked Deer River	Jackson EFO			1				
303d	TN080102050 31_0100		5	Lick Creek	Jackson EFO	1						
303d	TN080102050 31_0200		5	Bear Creek	Jackson EFO	1						
303d	TN080102050 31_1000	BLACK001.6 CK	5	Black Creek	Jackson EFO			1		12	12	12
303d	TN080102050 36_0100		5	Tisdale Creek	Jackson EFO	1						
303d	TN080102050 36_0110	HALLS008.0 LE	5	Halls Creek	Jackson EFO	1				12		
303d	TN080102050 36_0200		5	Sumrow Creek	Jackson EFO	1						
303d	TN080102050 36_1000	HALLS001.2 LE	5	Halls Creek	Jackson EFO			1		12	12	12
Ambient	TN080102080 01_3000	HATCH126.9 HR	1	Hatchie River	Jackson EFO					4	4	4
Ambient	TN060101010 01_1000	NFHOL004.6 SU	5	North Fork Holston River	Johnson City EFO					4	4	4
Ambient	TN060101020 01_1000	SFHOL001.1 SU	5	South Fork Holston River	Johnson City EFO					4	4	4
Ambient	TN060101020 06_1000	BEAVE001.0 SU	4A	Boone Reservoir	Johnson City EFO					4	4	4
Ambient	TN060101020 42_2000	BEAVE015.3 SU	5	Beaver Creek	Johnson City EFO					4	4	4
Advisory	TN060101030 01_1000	WATAU011. 0WN	4A	Watauga Embayment of Boone Reservoir	Johnson City EFO					12	12	
303d	TN060101030 01T_0100	DARR001.2S U	5	Darr Creek	Johnson City EFO			1		5/30*		
303d	TN060101030 06_0100	CARRO000.7 WN	5	Carroll Creek	Johnson City EFO			1	1	12	12	12
303d	TN060101030 06_1000	BOONE001.7 WN	5	Boones Creek	Johnson City EFO			1	1	12	12	
303d	TN060101030 08_0100	LICK000.9C T	5	Lick Creek	Johnson City EFO			1		5/30*		
303d	TN060101030 08_0200	CAMPB000.7 CT	5	Campbell Branch	Johnson City EFO			1	1	12	12	
Watershed	TN060101030 08_0300	ROCKY000. 3CT	3	Rocky Branch	Johnson City EFO			1		12	12	12

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN060101030 08_0400	DAVIS000.9 CT	4 A	Davis Branch	Johnson City EFO			1	1	12	12	
303d	TN060101030 08_0800	GAP000.1CT	5	Gap Creek	Johnson City EFO			1	1	12	12	
303d	TN060101030 08_1000	WATAU015. 6WN	5	Watauga River	Johnson City EFO			1		12	12	12
303d	TN060101030 08_1000	WATAU017. 3CT	5	Watauga River	Johnson City EFO			1		12	12	12
303d	TN060101030 08_2000	WATAU023. 4CT	5	Watauga River	Johnson City EFO			1		12	12	12
303d	TN060101030 08_3000	WATAU031. 5CT	5	Watauga River	Johnson City EFO			1		12	12	
303d Landfill	TN060101030 09_1000	BRUSH000.7 WN	5	Brush Creek	Johnson City EFO			1		12	12	12
303d Landfill	TN060101030 09_1000	BRUSH007.9 WN	5	Brush Creek	Johnson City EFO			1		12	12	12
303d	TN060101030 11_0100	POWDE000. 4CT	5	Powder Branch	Johnson City EFO			1	1	12	12	
303d	TN060101030 11_0200	TOLL000.3C T	4 A	Toll Branch	Johnson City EFO			1		12	12	
Watershed	TN060101030 11_0300	DRY001.6CT	1	Dry Creek	Johnson City EFO			1		12	12	
303d	TN060101030 11_1000	BUFFA000.2 CT	4 A	Buffalo Creek	Johnson City EFO			1		5/30*		
Watershed	TN060101030 11_2000	BUFFA007.0 UC	1	Buffalo Creek	Johnson City EFO			1		12	12	
Watershed	TN060101030 13_0100	LAURE000.1 CT	1	Laurel Fork	Johnson City EFO			1		12	12	
Watershed	TN060101030 13_0150		1	Laurel Fork	Johnson City EFO	1						
ECO	TN060101030 13_0155	ECO66D03	1	Laurel Fork	Johnson City EFO		2	2	1	4	4	4
Watershed	TN060101030 13_0200	BUCK000.1C T	1	Buck Creek	Johnson City EFO			1		12	12	
Watershed	TN060101030 13_0210	SHELL000.1 CT	1	Shell Creek	Johnson City EFO			1		12	12	
303d	TN060101030 13_0300	HAMPT000. 1CT	5	Hampton Creek	Johnson City EFO			1	1	12	12	
303d	TN060101030 13_0500	GEORG000. 2CT	5	George Creek	Johnson City EFO			1	1	12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN060101030 13_0600	ROARI000.1 CT	5	Roaring Creek	Johnson City EFO			1	1	12	12	
Watershed	TN060101030 13_0800	LDOE000.3C T	1	Little Doe River	Johnson City EFO			1		12	12	
Watershed	TN060101030 13_0810	TIGER000.1 CT	1	Tiger Creek	Johnson City EFO			1	1	12	12	
303d	TN060101030 13_0811	GOUGE000. 1CT	5	Gouge Branch	Johnson City EFO	1						
303d	TN060101030 13_0820	SIMER000.1 CT	5	Simerly Creek	Johnson City EFO			1		12	12	
Watershed	TN060101030 13_0821	SCOVE000.1 CT	3	Sally Cove Creek	Johnson City EFO		1					
Watershed	TN060101030 13_0900		2	Bear Wallow Hollow Trib	Johnson City EFO	1						
Ambient/ 303d	TN060101030 13_1000	DOE001.1CT	5	Doe River	Johnson City EFO			1		12	12	12
Watershed	TN060101030 13_2000	DOE018.8CT	1	Doe River	Johnson City EFO			1	1	12	12	
ECO	TN060101030 13_3000	ECO66D05	1	Doe River	Johnson City EFO		2	2	1	4	4	4
303d	TN060101030 20T_0200	SINK000.7J O	5	Sink Branch	Johnson City EFO			1	1	12	12	
FECO	TN060101030 20T_0510	FECO66D01	1	Black Branch	Johnson City EFO		2	2	1	4	4	4
FECO	TN060101030 20T_0600	FECO66D07	1	Little Stony Creek	Johnson City EFO		2	2	1	4	4	4
Watershed	TN060101030 27_0200		1	Bearwallow Creek	Johnson City EFO	1						
Watershed	TN060101030 27_0300		1	Heaton Branch	Johnson City EFO	1						
Watershed	TN060101030 27_1000	ELK004.6CT	1	Elk River	Johnson City EFO			1		12	12	
Watershed	TN060101030 29_1000	WATAU053. 6JO	1	Watauga River	Johnson City EFO	1						
Watershed	TN060101030 34_0100		1	Hopper Creek	Johnson City EFO	1						
Watershed	TN060101030 34_0200	TBD bugs only	1	Fall Branch	Johnson City EFO			1				
303d	TN060101030 34_0300	TOWN000.3J O	5	Town Creek	Johnson City EFO			1	1	12	12	
303d	TN060101030 34_0300	TOWN000.9J O	5	Town Creek	Johnson City EFO			1	1	12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN060101030 34_0310	GOOSE000.0 JO	5	Goose Creek	Johnson City EFO			1		12	12	
303d	TN060101030 34_0311	CROOK000. 2JO	5	Crooked Branch	Johnson City EFO		1					
303d	TN060101030 34_0312	CORN000.1J O	5	Corn Creek	Johnson City EFO			1				
303d	TN060101030 34_0320	FURNA000.1 JO	5	Furnace Creek	Johnson City EFO			1				
303d	TN060101030 34_0400	FORGE000.4 JO	5	Forge Creek	Johnson City EFO			1				
Watershed	TN060101030 34_0410	ROARI000.1 JO	3	Roaring Creek	Johnson City EFO			1				
Watershed	TN060101030 34_0900	VAUGH000. 1JO	1	Vaught Creek	Johnson City EFO			1		12		
303d	TN060101030 34_1000	ROAN007.5J O	5	Roan Creek	Johnson City EFO			1	1	12	12	
Watershed	TN060101030 34_1300	MILL000.4J O	1	Mill Creek	Johnson City EFO			1		12		
303d	TN060101030 34_2000	ROAN011.8J O	5	Roan Creek	Johnson City EFO			1	1	12	12	
303d	TN060101030 34_3000	ROAN018.2J O	5	Roan Creek	Johnson City EFO			1		12	12	
Watershed	TN060101030 37_0400	CAMPB000.4 JO	1	Campbell Creek	Johnson City EFO			1		12	12	
Cat 3 previously FS FAL	TN060101030 37_0600	SLABT000.1 JO	3	Slabtown Branch	Johnson City EFO		1					
Watershed	TN060101030 37_1000	DOE001.2JO	1	Doe Creek	Johnson City EFO			1		12	12	
ECO	TN060101030 38_1000	ECO66F08	1	Stony Creek	Johnson City EFO		2	2	1	4	4	4
Watershed	TN060101030 38_1000	STONY000.3 CT	1	Stony Creek	Johnson City EFO			1		12	12	
Watershed	TN060101030 38_1000	STONY008.5 CT	1	Stony Creek	Johnson City EFO			1		12	12	
303d	TN060101030 46_0100	CATBI000.2 WN	5	Catbird Creek	Johnson City EFO			1				
Contact Advisory/ 303d	TN060101030 46_1000	SINKI000.6C T	4A	Sinking Creek	Johnson City EFO			1		12	12	
Watershed	TN060101030 52_1000	COBB002.1J O	1	Cobb Creek	Johnson City EFO			1		12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN060101030 61_1000	REEDY001.8 WN	4A	Reedy Creek	Johnson City EFO			1		12	12	
Watershed	TN060101031 74_1000		1	Big Laurel Branch	Johnson City EFO	1						
Contact Advisory/ 303d	TN060101036 35_0100	CASH_G0.1 WN	4A	Cash Hollow Creek	Johnson City EFO			1		12 and 5/30*	12	
303d	TN060101036 35_0200	COBB000.1 WN	4A	Cobb Creek	Johnson City EFO			1		12	12	
303d	TN060101036 35_1000	KNOB000.8 WN	5	Knob Creek	Johnson City EFO			1	1	12	12	
Ambient	TN060101040 11_2000	HOLST131.5 HS	5	Holston River	Johnson City EFO					4	4	4
SEMN	TN060101040 15_0100	ECO6702	2	Fisher Creek	Johnson City EFO			2	1		4	4
Ambient	TN060101080 01_3000	NOLIC020.8 GE	5	Nolichucky River	Johnson City EFO					4	4	4
SEMN	TN060101080 10_3200	ECO66E09	1	Clark Creek	Johnson City EFO			2	1		4	4
Ambient	TN060101080 10_5000	NOLIC097.5 UC	5	Nolichucky River	Johnson City EFO					4	4	4
Ambient	TN060101080 30_1000	BLIME000.5 GE	4A	Big Limestone Creek	Johnson City EFO					4	4	4
Ambient	TN060101080 35_1000	LICK001.0G E	4A	Lick Creek	Johnson City EFO					4	4	4
Ambient	TN060101080 64_1000	SINKI000.5G E	4A	Sinking Creek	Johnson City EFO					4	4	4
Ambient	TN060101081 02_1000	RICHL001.3 GE	4A	Richland Creek	Johnson City EFO					4	4	4
Ambient	TN060101085 10_2000	LLIME007.0 WN	5	Little Limestone Creek	Johnson City EFO					4	4	4
Ambient	TN060102050 16_1000	CLINC189.8 HK	4C	Clinch River	Johnson City EFO					4	4	4
Ambient	TN060102060 07_2000	POWEL103. 3HK	5		Johnson City EFO					4	4	4
Ambient	TN060101050 01_4000	FBROA095.9 CO	1	French Broad River	Knoxville EFO					4	4	4
Ambient	TN060101070 01_1000	FBROA003.8 KN	1	French Broad River	Knoxville EFO					4	4	4
303d	TN060102010 01_1000	TENNE568.2 RO	4A	Watts Bar Reservoir	Knoxville EFO					12	12	12

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d Fish advisory	TN060102010 01_2000	TENNE602.0 LO	5	Watts Bar Reservoir	Knoxville EFO					12	12	12
303d	TN060102010 09_1000	RILEY003.7 RO	5	Riley Creek	Knoxville EFO			1		5/30*		
303d	TN060102010 11_1000	PROCK003.1 RO	4 A	Paint Rock Creek	Knoxville EFO			1	1	5/30*		
303d	TN060102010 13_0100	MUD001.9M O	4 A	Mud Creek	Knoxville EFO			1		12	12	
303d	TN060102010 13_0200	GREAS000.5 MO	4 A	Greasy Branch	Knoxville EFO			1		5/30*		
303d	TN060102010 13_1000	POND008.3L O	4 A	Pond Creek	Knoxville EFO			1		12	12	
303d	TN060102010 13_2000	POND013.9 MO	5	Pond Creek	Knoxville EFO			1	1	12	12	
303d	TN060102010 15_0100	BACON000.1 LO	5	Bacon Creek	Knoxville EFO			1	1	12	12	
303d	TN060102010 15_1000	SWEET003.1 LO	4 A	Sweetwater Creek	Knoxville EFO			1	1	12	12	
303d Landfill	TN060102010 15_2000	SWEET010.4 LO	5	Sweetwater Creek	Knoxville EFO			1		12	12	12
303d	TN060102010 15_3000	SWEET019.4 MO	5	Sweetwater Creek	Knoxville EFO			1		12	12	
Ambient	TN060102010 20_1000	TENNE643.3 KN	4 A	Fort Loudoun Reservoir	Knoxville EFO					4	4	4
SEMN	TN060102010 32_4000	ECO66G05	1	Little River	Knoxville EFO			2	1		4	4
303d	TN060102010 38_1000	TOWN000.5 LO	5	Town Creek	Knoxville EFO			1		12	12	
Watershed	TN060102010 40_0500	PINEY000.2 RO	2	Piney Creek	Knoxville EFO			1				
303d	TN060102010 40_0600	BLACK003.3 RO	5	Black Creek	Knoxville EFO			1	1	12	12	12
Watershed	TN060102010 40_1000	WHITE006.1 RO	2	Whites Creek	Knoxville EFO			1				
303d	TN060102010 64_1000	STAMP003.0 RO	4 A	Stamp Creek	Knoxville EFO			1		5/30*		
303d	TN060102010 65_1000	STEEK000.7 LO	4 A	Steekee Creek	Knoxville EFO			1	1	12	12	
FECO	TN060102010 70_0100	FECO67F05	2	Cave Spring Branch	Knoxville EFO		2	2	1		4	4

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
303d	TN06010201070_1000	WOLF002.7RO	5	Wolf Creek	Knoxville EFO			1		5/30*		
303d	TN06010201087_1000	HINES002.7LO	4A	Hines Creek	Knoxville EFO			1		5/30*		
Cat 3 previously FS FAL	TN06010201088_1000	HOTCH001.0LO	3	Hotchkiss Creek	Knoxville EFO			1				
303d	TN06010201149_1000	POLEC001.4LO	5	Polecat Creek	Knoxville EFO			1		12	12	
Cat 3 previously FS FAL	TN06010201617_1000	POSTO001.3RO	3	Postoak Creek	Knoxville EFO			1				
303d	TN06010201620_1000	CARDI000.6RO	5	Cardiff Creek	Knoxville EFO			1		12	12	12
303d	TN06010201621_1000	CANEY004.3RO	4A	Caney Creek	Knoxville EFO			1	1	12	12	
Cat 3 previously FS FAL	TN06010201669_1000	MUDDY001.1LO	3	Muddy Creek	Knoxville EFO			1		12	12	
SEMN	TN06010205001T_0300	ECO67F13	1	White Creek	Knoxville EFO			2	1		4	4
Ambient Landfill	TN06010207001_1000	CLINC010.0RO	5	Clinch River Arm of Watts Bar Reservoir	Knoxville EFO					4	4	4
SEMN	TN06010207019_0200	ECO67F06	1	Clear Creek	Knoxville EFO			2	1		4	4
Fish Advis/ 303d	TN06010208001_1000	EMORY000.9RO	5	Emory River Embayment of Watts Bar Reservoir	Knoxville EFO					12		12
Fish Advis/ 303d	TN06010208001_2000	EMORY002.1RO	5	Emory River Embayment of Watts Bar Reservoir	Knoxville EFO					12	12	12
Fish Advis/ 303d	TN06010208001_3000	EMORY004.0RO	5	Emory River Embayment of Watts Bar Reservoir	Knoxville EFO					12		12
Fish Advis/ 303d	TN06010208001_4000	EMORY018.3MG	5	Emory River	Knoxville EFO					12	12	12
Fish Advis/ 303d	TN06010208001_5000	EMORY022.0MG	5	Emory River	Knoxville EFO			1				
303d	TN06010208004_0100	MUD000.7MG	5	Mud Creek	Knoxville EFO			1				
Watershed	TN06010208004_0200	FLAT000.7MG	1	Flat Fork	Knoxville EFO			1		12	12	12

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN06010208004_0210		1	Emory Gap Branch	Knoxville EFO	1						
Watershed	TN06010208004_0220		1	North Prong Flat Fork	Knoxville EFO	1						
ECO	TN06010208004_0250	ECO69D03	1	Flat Fork	Knoxville EFO		2	2	1		4	4
Watershed	TN06010208004_0255		1	Flat Fork	Knoxville EFO	1						
303d	TN06010208004_0400	SUMME000.7MG	5	Summers Branch	Knoxville EFO			1				
303d	TN06010208004_1000	CROOK004.2MG	5	Crooked Fork	Knoxville EFO			1	1	12	12	
303d	TN06010208004_2000	CROOK006.3MG?	4A	Crooked Fork	Knoxville EFO					12	12	
ECO	TN06010208005_0100	ECO68A27	1	Island Creek	Knoxville EFO		2	2	1		4	4
Watershed	TN06010208005_0400	ROCK001.4MG	1	Rock Creek	Knoxville EFO			1		12		
Watershed	TN06010208005_0500	GREAS000.5MG	1	Greasy Creek	Knoxville EFO			1				
Watershed	TN06010208005_1000	EMORY027.7MG	1	Emory River	Knoxville EFO			1		12	12	12
Watershed	TN06010208005_2000	TBD bugs only	3	Emory River	Knoxville EFO			1				
Watershed	TN06010208007_1000	OBED009.2MG	1	Obed River	Knoxville EFO			1				
Watershed	TN06010208008_0400	WHITE004.2MG	2	White Creek	Knoxville EFO			1				
Watershed	TN06010208008_0410	COOK000.1MG	3	Cook Creek	Knoxville EFO		1					
Watershed	TN06010208008_0420		3	Witt Creek	Knoxville EFO							
FECO	TN06010208008_0431	FECO68A01	1	Douglas Branch	Knoxville EFO		2	2	1		4	4
Watershed	TN06010208008_0500	LCLEA002.3MG	1	Little Clear Creek	Knoxville EFO			1		12	12	
ECO	TN06010208008_1000	ECO68A08	1	Clear Creek	Knoxville EFO		2	2	1		4	4
Watershed	TN06010208020_4000	CORCH010.3MG	2	Crab Orchard Creek	Knoxville EFO			1				
Watershed	TN06010208021_1000	CLIFT000.2MG	2	Clifty Creek	Knoxville EFO		1					

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN060102080 41_0100	BITTE000.2 MG	1	Bitter Creek	Knoxville EFO			1		12	12	
Watershed	TN060102080 41_2000	LEMOR004. 5MG	2	Little Emory River	Knoxville EFO			1				
Watershed	TN060102080 08_1000	CLEAR008.6 MG		Clear Creek	Knoxville EFO			1				
Watershed	TN060102080 20_1000	CORCH000. 2MG		Crab Orchard Creek	Knoxville EFO			1				
303d	TN060102080 04_1000	CROOK06.3 MG	5	Crooked Fork	Knoxville EFO					12	12	12
303d	TN060102080 04_2000	CROOK016. 9MG	5	Crooked Fork	Knoxville EFO			1				
303d Landfill	TN060102010 15_2000	SWEET018.7 MO		Sweetwater Creek	Knoxville EFO			1	1	12	12	
Ambient	TN080102080 01_1000	HATCH009.1 TI	1	Hatchie River	Memphis EFO					4	4	4
Ambient	TN080102090 01_1000	LOOSA005.0 SH	5	Loosahatchie River	Memphis EFO					4	4	4
Ambient	TN080102090 04_1000	LOOSA1C28 .6SH	5	Loosahatchie River	Memphis EFO					4	4	4
Ambient	TN080102090 11_2000	LOOSA1C53 .6FA	5	Loosahatchie River	Memphis EFO					4	4	4
Ambient	TN080102100 01_1000	WOLF000.7S H	5	Wolf River	Memphis EFO					4	4	4
Ambient	TN080102100 03_1000	WOLF031.4S H	1	Wolf River	Memphis EFO					4	4	4
Ambient	TN080102100 09_2000	WOLF072.6F A	1	Wolf River	Memphis EFO					4	4	4
303d	TN080102110 0711_0200	CANE001.0S H	5	Cane Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0711_0300	BLACK000.2 SH	5	Black Bayou	Memphis EFO					5/30*		
303d	TN080102110 0711_0400	TENMI001.0 SH	5	Tenmile Creek	Memphis EFO					12	12	12
303d	TN080102110 0711_0500	HURRI000.4 SH	5	Hurricane Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0711_0500	HURRI003.8 SH	5	Hurricane Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0711_0600	DAYS000.5S H	5	Days Creek	Memphis EFO					12	12	12

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
Fish Advis/ 303d/ Ambient	TN080102110 0711_1000	NONCO001. 8SH	5	Nonconnah Creek	Memphis EFO					12	12	12
303d	TN080102110 0711_2000	NONCO006. 9SH	5	Nonconnah Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0711_3000	NONCO012. 1SH	5	Nonconnah Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0720_0100	NONCO15.3 T0.5SH	5	Unnamed Trib to Nonconnah Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0720_0200	NONCO17.7 T0.1SH	4 A	Unnamed Trib to Nonconnah Creek	Memphis EFO					5/30*		
303d	TN080102110 0720_0300	NONCO27.2 T0.4SH	5	Unnamed Trib to Nonconnah Creek	Memphis EFO			1		12	12	
303d	TN080102110 0720_0400	NONCO23.2 T0.4SH	5	Unnamed Trib to Nonconnah Creek	Memphis EFO			1		12	12	
303d	TN080102110 0720_0410	NONCO23.2 T0.1T0.3SH	5	Unnamed Trib to Unnamed Trib. To Noconnah Creek	Memphis EFO			1	1	12	12	12
303d	TN080102110 0720_0500	NONCO18.3 T0.9SH	5	Unnamed Trib to Nonconnah Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0720_1000	NONCO017. 0SH	5	Nonconnah Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0720_2000	NONCO020. 9SH	5	Nonconnah Creek	Memphis EFO			1		12	12	12
303d	TN080102110 0720_3000	NONCO023. 2SH	5	Nonconnah Creek	Memphis EFO			1	1	12	12	12
303d Landfill	TN080102111 76_1000	JOHNS000.5 SH	5	Johns Creek	Memphis EFO			1		12	12	12
303d Landfill	TN080102111 76_1000	JOHNS006.6 SH	5	Johns Creek	Memphis EFO					12	12	12
SEMN	TN051301040 16_0100	ECO68A03	2	Laurel Fork of Station Camp Creek	Mining Section			2	1		4	4
303d	TN060102080 20_0100	SMITH000.2 MG	4 A	Smith Branch	Mining Section			1				12
303d	TN060102080 20_0400	GOLLI000.1 MG	5	Golliher Creek	Mining Section			1				12
303d	TN060102080 20_0500	FMILL000.2 MG	5	Fagan Mill Creek	Mining Section			1				12
303d	TN060102080 20_0600	LLAUR000.2 MG	4 A	Little Laurel Creek	Mining Section			1				12

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
Watershed	TN060102080 20_3000	CORCH003. 1MG	3	Crab Orchard Creek	Mining Section			1				
Watershed	TN060102080 20_3000	CORCH003. 1MG	3	Crab Orchard Creek	Mining Section			1				
303d	TN051301010 15_2000	CLEAR030.5 CA	5	Clear Fork Cumberland River	Mining Section							4
303d	TN051301010 15_3000	CLEAR037.3 CL		Clear Fork Cumberland River	Mining Section							4
303d	TN051301040 37_1300	FECO69D01		UT to New River	Mining Section							4
303d	TN051301040 37_1000	NEW008.8SC		New River	Mining Section							4
303d	TN051301040 37_2000	NEW045.0A N		New River	Mining Section							4
303d	TN051301040 37_1850	SMOKY002. 5SC		Smoky Creek	Mining Section							4
303d	TN051301010 15_0700	STRAI000.1 CL	5	Straight Creek	Mining Section							4
303d	TN051301010 15_0800	TACKE000.5 CA		Tackett Creek	Mining Section							4
303d	TN051301010 15_0600	VALLE000.1 CL		Valley Creek	Mining Section							4
Ambient	TN051302010 01_1000	CUMBE262. 9WS	1	Old Hickory Reservoir	Nashville EFO					4	4	4
Ambient	TN051302020 01_2000	CUMBE174. 5DA	1	Cheatham Reservoir	Nashville EFO					4	4	4
Ambient	TN051302030 01_1000	STONE003.9 DA	5	Stones River	Nashville EFO					4	4	4
Ambient	TN051302030 18_1000	WFSTO006.2 RU	1	West Fork Stones River	Nashville EFO					4	4	4
Cat 3 previously FS FAL	TN051302040 01_0500	DOG000.2C H	3	Dog Creek	Nashville EFO			1		12	12	12
303d	TN051302040 01_0600		4 C	Unnamed trib to Harpeth River	Nashville EFO	1						
303d	TN051302040 01_0700	TRACE003.5 DI	4 A	Trace Creek	Nashville EFO			1	1	12	12	
303d	TN051302040 01_0800	LEATH001.3 CH	5	Leatherwood Creek	Nashville EFO			1		12	12	12
Watershed	TN051302040 01_1000	HARPE009.7 CH	1	Harpeth River	Nashville EFO			1				

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreccon	SQSH	Diatom	E. coli	Nutrients	Metals
Watershed	TN05130204001_1000	HARPE032.2CH	1	Harpeth River	Nashville EFO			1		12	12	
303d	TN05130204002_0200		4C	Unnamed Trib to Jones Creek	Nashville EFO	1						
303d	TN05130204002_0400	WHALL000.1DI	5	Will Hall Creek	Nashville EFO			1		5/30*		
303d	TN05130204002_0410	CREEC_G0.1DI	5	Creech Hollow Branch	Nashville EFO	1						
303d	TN05130204002_0411		4C	Wildcat Hollow Branch	Nashville EFO	1						
Watershed	TN05130204002_0415	CREEC_G0.7DI	1	Creech Hollow Branch	Nashville EFO			1		12		
Watershed	TN05130204002_0450	WHALL001.5DI	2	Will Hall Creek	Nashville EFO			1				
303d	TN05130204002_0600		5	Unnamed trib to Jones Creek	Nashville EFO	1						
303d	TN05130204002_0700		4A	Spicer Branch		1						
Watershed	TN05130204002_1000	JONES003.3DI	1	Jones Creek	Nashville EFO			1	1	12	12	
Watershed	TN05130204002_1100	LJONE002.4DI	1	Little Jones Creek	Nashville EFO			1		12	12	
Watershed	TN05130204002_1200	SFORK002.5DI	2	Sulphur Fork Creek	Nashville EFO			1				
303d	TN05130204002_1300	TOWN001.7DI	5	Town Branch	Nashville EFO			1		5/30*		
303d	TN05130204002_1600		5	Unnamed Tributary to Jones Creek	Nashville EFO	1						
303d	TN05130204002_2000	JONES014.4DI	5	Jones Creek	Nashville EFO			1	1	12	12	
303d	TN05130204002_3000	JONES019.8DI	5	Jones Creek	Nashville EFO			1	1	12	12	12
303d	TN05130204002_3000	JONES021.9DI	5	Jones Creek	Nashville EFO			1	1			
Watershed	TN05130204006_0200	LTURN000.6DI	2	Little Turnbull Creek	Nashville EFO			1		12	12	
Watershed	TN05130204006_0700	BARRE001.5DI	3	Barren Fork	Nashville EFO			1				
Watershed	TN05130204006_0800	PARKE000.5DI	2	Parker Creek	Nashville EFO			1				
Watershed	TN05130204006_1000	TURNB000.2CH	1	Turnbull Creek	Nashville EFO			1	1	12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
Watershed	TN051302040 06_1100	NAILS000.2 DI	3	Nails Creek	Nashville EFO			1				
Watershed	TN051302040 06_1200	BEAVE000.3 DI	1	Beaverdam Creek	Nashville EFO			1	1	12	12	12
Watershed	TN051302040 06_1240	FIVEM000.7 DI	3	Fivemile Creek	Nashville EFO			1				
Watershed	TN051302040 06_2000	BTURN003.8 DI	3	Big Turnbull Creek	Nashville EFO			1		12	12	
Watershed	TN051302040 09_0100	TURNE001.0 CH	2	Turner Creek	Nashville EFO			1				
303d	TN051302040 09_0400	FLAT000.7D A	5	Flat Creek	Nashville EFO			1				
303d	TN051302040 09_0600		5	Murray Branch	Nashville EFO	1						
303d	TN051302040 09_0700		5	Brown Creek	Nashville EFO	1						
303d	TN051302040 09_0900	TRACE000.4 DA	4 A	Trace Creek	Nashville EFO			1				
AmbientGrp1	TN051302040 09_1000	HARPE040.5 CH	1	Harpeth River	Nashville EFO			1	1	4	4	4
303d	TN051302040 09_1100	BEECH000.7 DA	4 A	Beech Creek	Nashville EFO			1				
Watershed	TN051302040 09_1200	BRUSH000.5 CH	2	Brush Creek	Nashville EFO			1				
Watershed	TN051302040 09_1210	WFBRU000. 8CH	1	West Fork Brush Creek	Nashville EFO			1	1	12	12	
Watershed	TN051302040 09_1211	FLATR001.4 WI	3	Flatrock Branch	Nashville EFO			1				
Watershed	TN051302040 09_1212	FLATR001.6 WI	3	Flatrock Branch	Nashville EFO			1				
303d	TN051302040 09_2000	HARPE045.0 CH	5	Harpeth River	Nashville EFO			1	1	12	12	
303d	TN051302040 09_3000	HARPE065.6 WI	5	Harpeth River	Nashville EFO			1	1	12	12	
303d	TN051302040 10_0200	SHARP6.0T0 .1DA	4 C	Unnamed Trib to South Harpeth River	Nashville EFO	1						
303d	TN051302040 10_0300		5	Unnamed Trib to South Harpeth River	Nashville EFO	1						
Watershed	TN051302040 10_0500	EFORK000.6 DA	2	East Fork Creek	Nashville EFO			1				
Watershed	TN051302040 10_0700	SHARP001.3 WI	2	South Harpeth Creek	Nashville EFO			1	1	12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d Landfill	TN051302040 10_0720	ARKAN000.1 WI	4 A	Arkansas Creek	Nashville EFO			1		12	12	12
FECO	TN051302040 10_0730	FECO71F05	1	Kelley Creek	Nashville EFO		2	2	1		4	4
Watershed	TN051302040 10_1000	SHARP003.0 CH	1	South Harpeth River	Nashville EFO			1	1	12	12	
Watershed	TN051302040 10_1100	HCAMP000. 2WI	2	Hunting Camp Creek	Nashville EFO			1				
303d	TN051302040 13_0100	HSPRI000.8 WI	5	Hatcher Spring Creek	Nashville EFO			1				
303d	TN051302040 13_0200	POLK000.8 WI	5	Polk Creek	Nashville EFO			1		5/30*		
303d	TN051302040 13_0300		5	Unnamed Trib to West Harpeth River	Nashville EFO	1						
303d	TN051302040 13_0400	WHARP21.5 T0.5WI	5	Unnamed Trib to West Harpeth River	Nashville EFO			1				
303d	TN051302040 13_0500	KENNE000.1 WI	4 A	Kennedy Creek	Nashville EFO			1				
303d	TN051302040 13_0600	WHARP18.1 T0.7WI	5	Unnamed Trib to West Harpeth River	Nashville EFO			1				
303d	TN051302040 13_0700	MURFR001. 0WI	5	Murfrees Fork	Nashville EFO			1		5/30*		
303d	TN051302040 13_0710	RATTL000.2 WI	5	Rattlesnake Branch	Nashville EFO			1	1	12	12	
303d	TN051302040 13_0720	CAYCE000.1 WI	4 A	Cayce Branch	Nashville EFO			1				
303d	TN051302040 13_0730	WPMUR000. 3WI	4 A	West Prong Murfrees Fork	Nashville EFO			1		12	12	
303d	TN051302040 13_0750	MURFR004. 0WI	5	Murfrees Fork	Nashville EFO			1		12	12	
Watershed	TN051302040 13_0800	LEIPE002.0 WI	1	Leipers Fork	Nashville EFO			1		12	12	
Watershed	TN051302040 13_0830	BURNS000.1 WI	2	Burns Branch	Nashville EFO			1				
Watershed	TN051302040 13_0840	GARRI000.4 WI	3	Garrison Creek	Nashville EFO			1				
Watershed	TN051302040 13_0860	PINEW000.4 WI	2	Pinewood Branch	Nashville EFO			1		12	12	
Watershed	TN051302040 13_1000	WHARP000. 3WI	1	West Harpeth River	Nashville EFO			1		12	12	
303d	TN051302040 13_2000	WHARP013. 2WI	5	West Harpeth River	Nashville EFO			1		12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
Watershed	TN051302040 13_3000	WHARP022. 4WI	3	West Harpeth River	Nashville EFO			1				
303d	TN051302040 16_0100	LYNNW000. 7WI	5	Lynnwood Creek	Nashville EFO			1		5/30*		
303d	TN051302040 16_0200	SPENC000.0 WI	5	Spencer Creek	Nashville EFO			1		5/30*		
303d	TN051302040 16_0210	SPSPE001.2 WI	4 A	South Prong Spencer Creek				1				
303d	TN051302040 16_0300	LIBER000.2 WI	5	Liberty Creek	Nashville EFO			1		5/30*		
303d	TN051302040 16_0350		5	Liberty Creek	Nashville EFO	1						
303d	TN051302040 16_0400		5	Unnamed Trib to Harpeth River	Nashville EFO	1						
303d	TN051302040 16_0500	WATSO001. 0WI	4 A	Watson Branch	Nashville EFO			1				
Watershed	TN051302040 16_0600	MAYES000.8 WI	1	Mayes Creek	Nashville EFO			1	1	12	12	
Watershed	TN051302040 16_0800	ARRIN001.8 WI	1	Arrington Creek	Nashville EFO			1	1	12	12	
303d	TN051302040 16_0810	PAIGE000.3 WI	5	Paige Branch	Nashville EFO			1				
303d	TN051302040 16_0900	MCCRO000. 6WI	5	McCrory Creek	Nashville EFO			1		12	12	
303d	TN051302040 16_1000	HARPE084.5 WI	5	Harpeth River	Nashville EFO			1	1	12	12	
Watershed	TN051302040 16_1100	STARN000.6 WI	1	Starnes Creek	Nashville EFO			1	1	12	12	
303d	TN051302040 16_1300	FIVEM000.8 WI	4 A	Fivemile Creek	Nashville EFO			1		5/30*		
303d	TN051302040 16_1350		5	Fivemile Creek	Nashville EFO	1						
303d	TN051302040 16_1400	DONEL000.5 WI	5	Donelson Creek	Nashville EFO			1				
303d	TN051302040 16_1500	HARPE88.6T 0.4WI	5	Unnamed Trib to Harpeth River	Nashville EFO			1				
303d	TN051302040 16_1600		5	Sharps Branch	Nashville EFO	1						
303d	TN051302040 16_2000	HARPE085.5 WI	5	Harpeth River	Nashville EFO			1		12	12	
303d	TN051302040 16_3000	HARPE089.1 WI	4 A	Harpeth River				1		12	12	

Project	WBID	DWR Station ID	Cat	Name	EFO	Evaluate**	Bioreco n	SQ SH	Diato m	E. coli	Nutrie nts	Metals
303d	TN051302040 16_4000	HARPE100.1 WI	4 A	Harpeth River	Nashville EFO			1		12	12	
Watershed	TN051302040 18_0100	NELSO000.5 WI	1	Nelson Creek	Nashville EFO			1		12	12	
Watershed	TN051302040 18_0200	CONCO002. 1RU	2	Concord Creek	Nashville EFO			1				
303d	TN051302040 18_0220		5	Unnamed Trib to Concord Creek	Nashville EFO	1						
303d	TN051302040 18_0300	KELLE000.3 RU	4 A	Kelley Creek	Nashville EFO			1		5/30*		
303d	TN051302040 18_0400	CHEAT000.1 RU	4 A	Cheatham Branch	Nashville EFO			1				
Watershed	TN051302040 18_0500	OVERA000.7 WI	1	Overall Creek	Nashville EFO			1		12	12	
303d/ECO	TN051302040 18_1000	ECO71I15	5	Harpeth River	Nashville EFO		2	2	1	5/30*	4	4
303d	TN051302040 18_2000	HARPE110.7 WI	4 A	Harpeth River	Nashville EFO			1		12	12	12
303d	TN051302040 18_3000	HARPE114.5 RU	5	Harpeth River	Nashville EFO			1		12	12	
303d	TN051302040 21_0100	OTTER000.8 DA	5	Otter Creek	Nashville EFO			1	1	12	12	
303d	TN051302040 21_0200		5	Unnamed Trib to Little Harpeth River	Nashville EFO	1						
303d	TN051302040 21_0300	LHARP11.3T 0.2WI	5	Unnamed Trib to Little Harpeth River	Nashville EFO			1				
303d	TN051302040 21_0400	BEECH000.4 WI	4 A	Beech Creek	Nashville EFO			1				
303d	TN051302040 21_1000	LHARP001.0 WI	4 A	Little Harpeth River	Nashville EFO			1		12	12	
303d	TN051302040 21_2000	LHARP011.2 WI	5	Little Harpeth River	Nashville EFO			1				
Ambient	TN051302060 02_3000	RED025.5M T	5	Red River	Nashville EFO					4	4	4
Ambient	TN051302060 03_1000	SULPH000.1 RN	1	Sulphur Fork	Nashville EFO					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, 2018)