TENNESSEE
DIVISION OF WATER RESOURCES

FISCAL YEAR 2019-2020
SURFACE WATER
MONITORING AND ASSESSMENT
PROGRAM PLAN

July 2019

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, 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 will be 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 create the Integrated Report (303(d) List and the 305(b) Report to EPA\).

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

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. 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 probable 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 as a whole, 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.

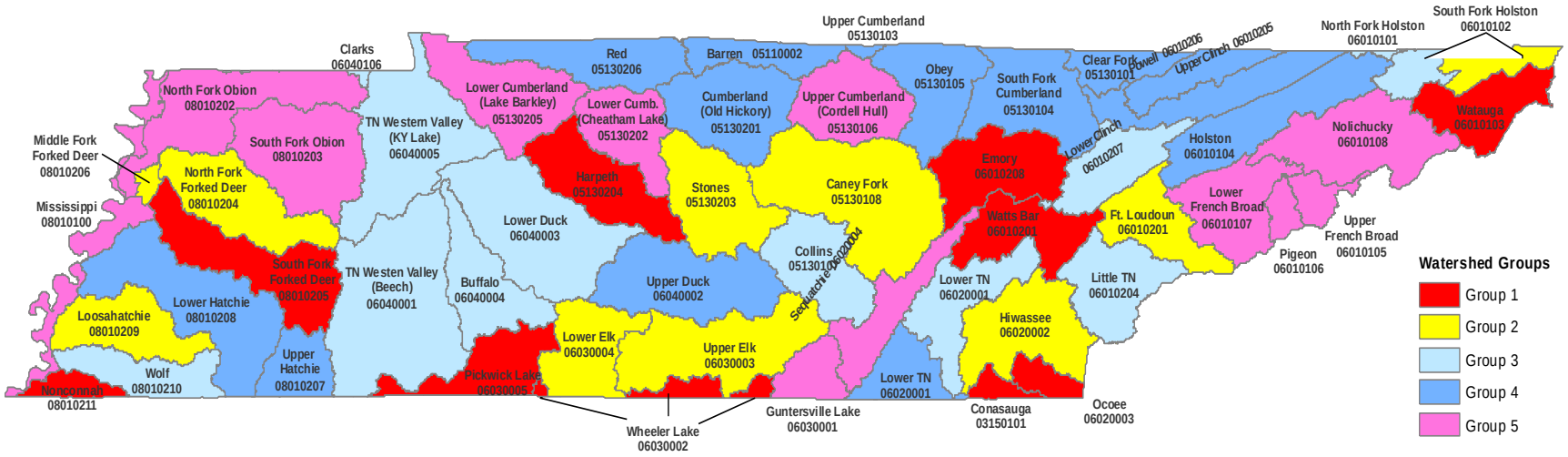


Figure 2: Tennessee Watershed Groups

Table 1. Watershed Groups and Monitoring Years

Group /Year	Watershed	HUC	EFO	Watershed	HUC	EFO
1 2001 2006 2011 2016 2021	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 2002 2007 2012 2017	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 2003 2008 2013 2018	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 2004 2009 2014 2019	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 2005 2010 2015 2020	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:

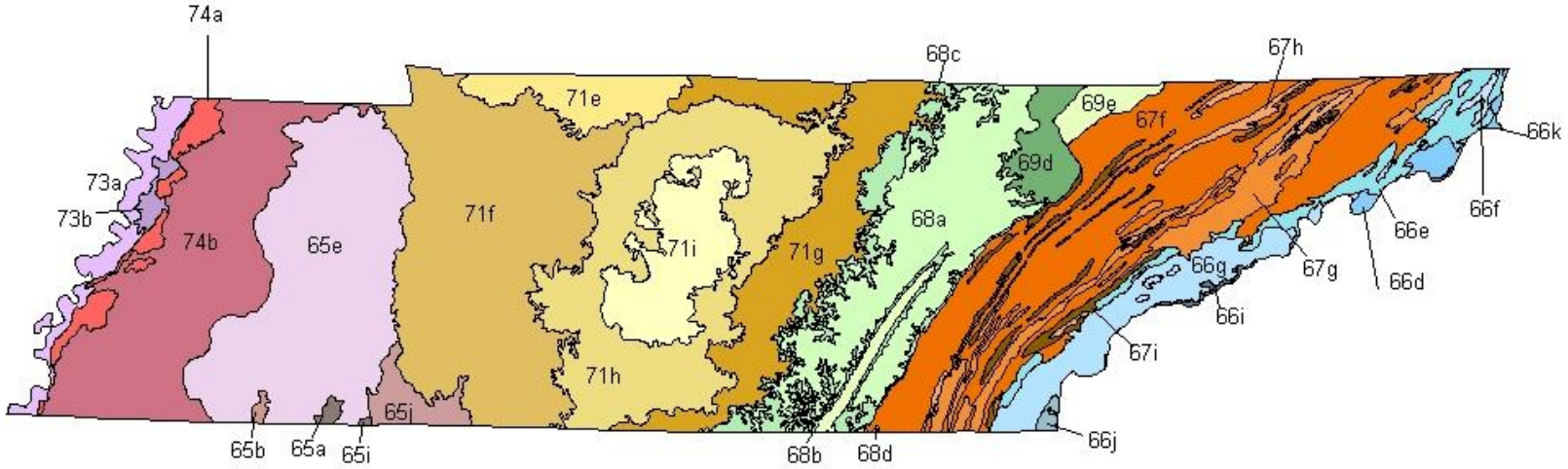
CH	Chattanooga	J	Jackson	M	Memphis
CK	Cookeville	JC	Johnson City	N	Nashville
CL	Columbia	K	Knoxville		

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. Periphyton is 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). With the exception of 69e, the majority of 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.

4. **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.

   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.

5. **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.

6. **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).

7. **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.

8. **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.

9. 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.

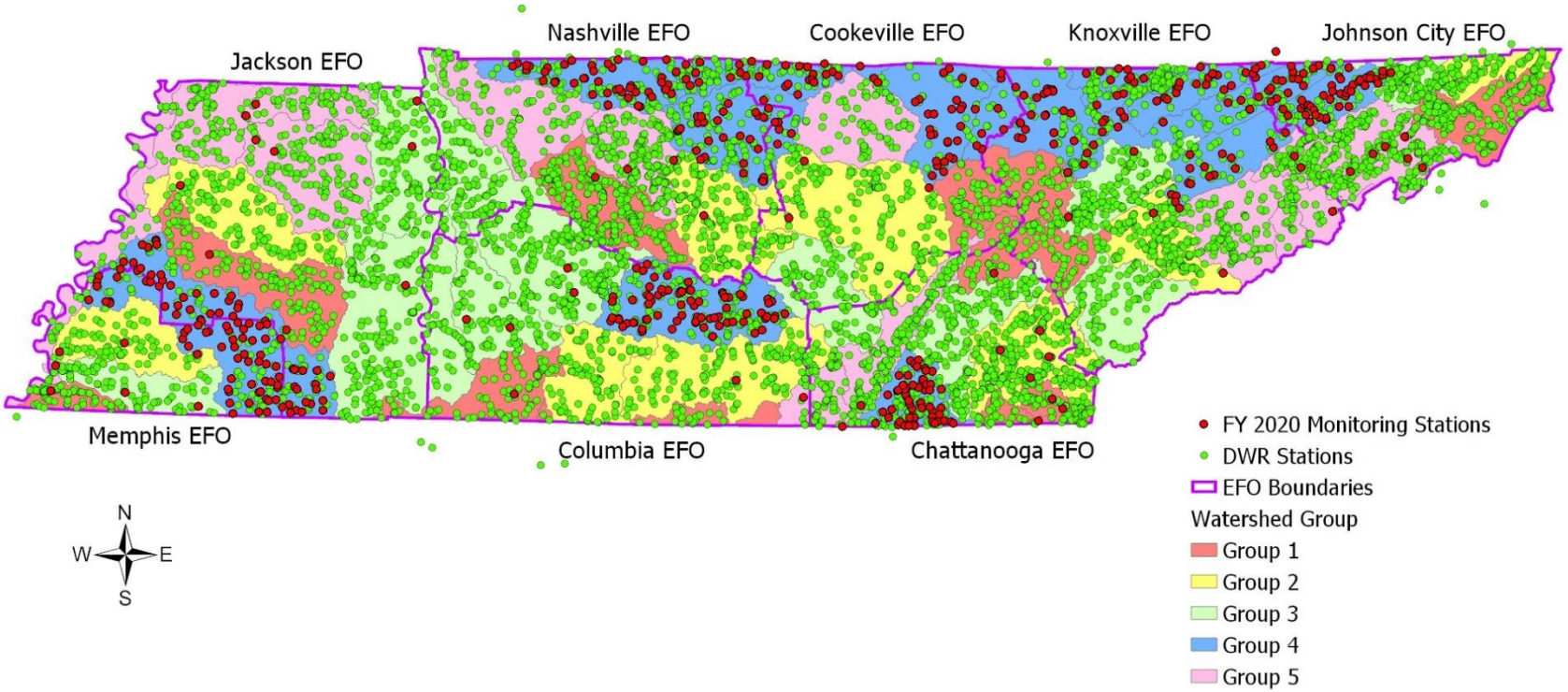


Figure 4: Water Quality Monitoring Stations in Tennessee. (Includes biological, chemical and bacteriological stations.)

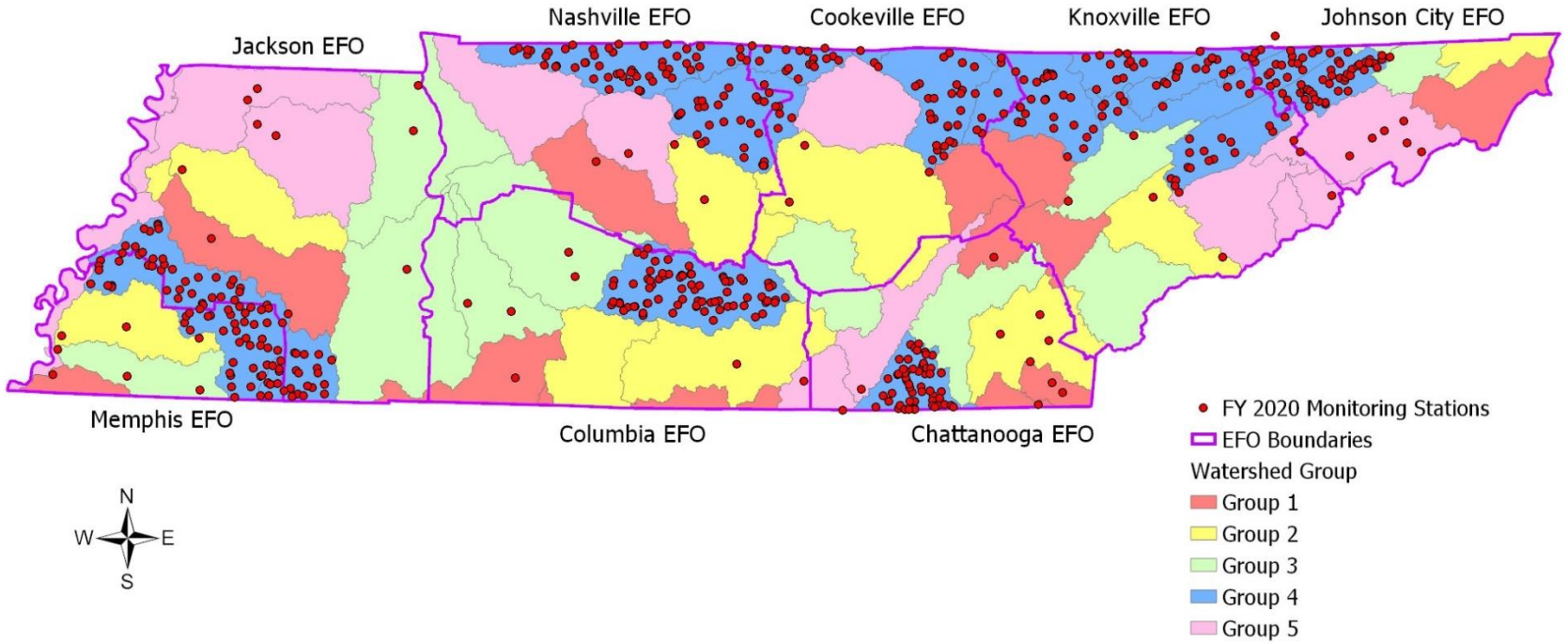


Figure 5: Monitoring Stations Scheduled to be Sampled Between July 2019 and June 2020
(Includes biological, chemical and bacteriological stations.)

Large Reservoirs (> 1000 acres)

Tennessee has 29 large reservoirs ranging from the 1,749 acre Chilhowee Reservoir on the Little Tennessee River to the 99,500 acre 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 on an every other year basis (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 73a, 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
- Periphyton (has been added to reference monitoring and may become critical in nutrient impaired streams once guidelines are developed).
- 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.
- 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 November 2016. 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 and June 2011. 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). Each year, the division submits a *Quality Assurance Project Plan* to EPA (TDEC, 2017). 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, nutrient and metal samples are analyzed by the TDH Environmental Laboratories. Organic chemical, routine inorganic samples and most bacteriological and periphyton samples are analyzed by contract labs. The biological laboratory follows the 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. 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. A minimum of 10% of all data entry and statistical calculations are verified.
7. 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 annually.

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.

Quality Assurance for Chemical Field Collections as specified in the 2018 QSSOP:

1. Duplicates, field, 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 at each station.
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 biologists training workshop.

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 second 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. 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) http://tn.gov/environment/article/wr-water-resources-data-viewer GIS mapping tool to reflect previous, current and potential stream mitigation projects across the state. The information for is updated daily.

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 is 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 and habitat data and detailed information for over 7700 monitoring stations into the WQX framework.

Macroinvertebrate and, periphyton data from 1996 through July 2017 are temporarily stored in the division's Access water quality database. DWR is uploading current biological data into an Oracle platform and is in the process of migrating earlier data from the Access Database. The chemical and bacteriological data are accessible to the public on the Division's permit data

viewer: http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34510: in the ambient monitoring tab.

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, 2013). 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, 2013).

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, 2018).

- 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 preferred 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.

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, 2018).

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 2018 (TDEC-WQOGB, 2018).

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 (or a score of 28 or 30 in subregion 73a), 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 on the TDEC website http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34304:1963060327755:::::

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.
Over 7,700 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 137 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.	Continued regional monitoring to enhance existing data. Incorporate criteria base on diurnal patterns (duration and frequency of minimum). Consideration of 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.	Continued refinement.
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.	As resources allow, compose study group of appropriate professionals. . Review existing data and look for data gaps. Investigate options for development of criteria guidelines.
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 periphyton at reference streams in 2008. Formed workgroup with KY, GA and AL to develop regional diatom index...	Investigate feasibility of developing guidelines for nonwadeable rivers as resources allow. Incorporate diatom index in nutrient assessments.
106 monitoring workplan.	Used GIS mapping and assessment database to streamline development of monitoring workplan and assist field staff in planning.	Develop capability of automatic sample progress tracking through Waterlog.

Goal	Milestone	Future Plans
Electronic data reporting and tracking.	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. Chemical, bacteriological and fish tissue data are available to public through data-viewers. Chemical, bacteriological, fish tissue and habitat data are uploaded to WQX. Assessment data are uploaded to ATTAINS.	Migrate historic biological data to new system. Make macroinvertebrate, diatom and habitat data public facing. Upload macroinvertebrate and diatom data to WQX.

I. Water Quality Reports

Waterbodies will continue to be monitored to fulfill data needs for water quality standards, TMDLs, ATTAINS Integrated Report, and special projects. Progress will be tracked quarterly and provided to the DWR division head for review. An annual report will be submitted to EPA annually by December 31, 2019.

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. http://tdeconline.tn.gov/dwr/ Surface water chemical and bacteriological results may be viewed at http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34510:

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 2018 303(d) list was approved by EPA in July 2018. Due to the limited nature of a 303(d) list, Tennessee chooses to publish the 2018 List of Impaired Waters. This list includes all impaired waters regardless of their TMDL status or Category. The Final 2018 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. http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34304:0:dataviewers.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. 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. 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 will be reviewed annually and updated if needed. 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. The last update was in November 2017 and there have been no major revisions. 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 states IT divisions assistance.
- The division is working with the state and contract laboratories to develop the ability to electronically transfer data.
- 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 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 320 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 based 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.

1. 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 collection for EPF in state Fiscal Year 2019 (July1, 2018– June 30, 2019) was $9,298,245 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 FY19 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 a, Kentucky and Georgia for an N-STEPS grant to aid in periphyton index development as part of its nutrient criteria development plan.

2. Salary Ranges

The division has been historically plagued by two problems generally associated with low salaries: the difficulty to retain trained staff and to recruit well-qualified replacements. 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. Job classifications have been revised 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 2020.

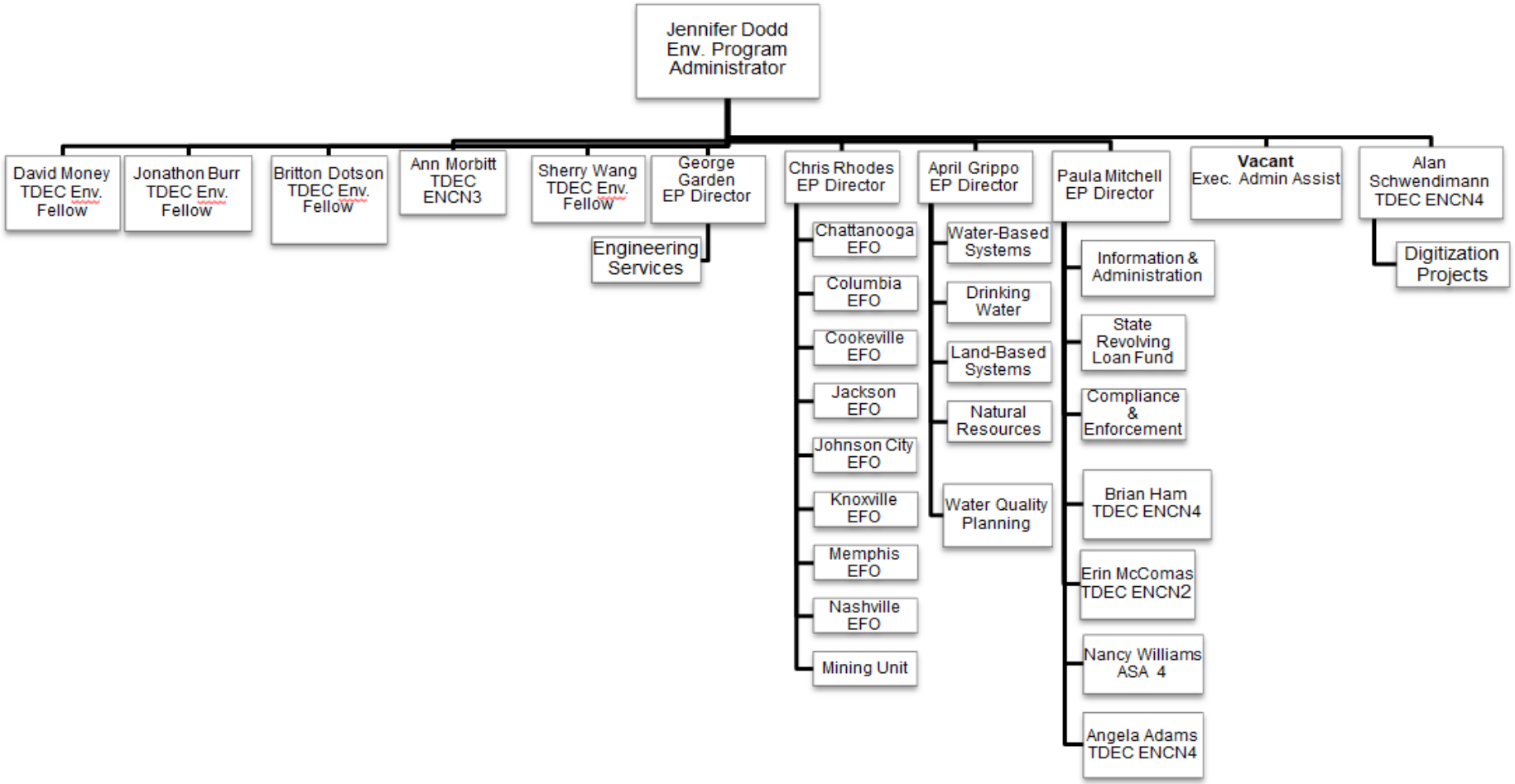
Table 7. Salary Grades for Positions in TDEC DWR (updated 7/1/2019)

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	$4,873.00	$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



3. 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 increased six fold and biological monitoring has more than doubled (Table 8). New procedures such as continuous monitoring, rapid periphyton surveys and probabilistic monitoring have been used to supplement targeted biological 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 $1,492,509 is obligated for employee salaries and benefits in support of this program in the state in FY2018-FY2019. Another $245,895 is allocated to travel, printing, utility, communication, maintenance, professional service, rent, insurance, vehicle, and equipment expenses. Indirect charges are estimated at $330,143.

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 1998 to 2018

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Chemical & Bacteriological Sample Collections	705	1386	2805	2758	2615	2921	3540	3205	3302	3981	3600	4000	3600	3700	4482	4146	4876	3072	4456	4480	2694
Quality Assurance Sample Collections	76	66	196	159	339	325	628	585	763	941	900	713	776	930	618	637	429	354	346	329	251
Rapid Biological Stations (Biorecon)	86	394	602	672	318	365	183	162	285	248	338	318	223	288	157	433	335	225	130	192	177
Intensive Biological Stations (SQSH)	150	100	222	176	94	330	113	256	226	267	332	353	367	257	247	274	192	377	370	449	314
Habitat Assessments	236	494	824	848	412	695	504	386	462	497	612	597	512	525	361	674	530	673	585	588	460
Periphyton Stations	0	0	94	14	80	154	121	0	2	120	60	72	22	55	10	39	54	39	18	29	12
Antidegradation Surveys	2	5	11	5	5	49	33	17	97	81	2	59	51	18	12	16	7	19	26	20	12
Probabilistic Monitoring Stations	0	0	50	50	75	95	313	2	0	90	0	0	90	0	0	0	0	0	0	0	0

*Pending - not all data analyzed or uploaded.

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

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

The division maintains a statewide monitoring system consisting of approximately 7,700 stations. In addition, new stations are created every year to increase the number of assessed streams. Approximately 670 stations will be monitored in FY 2019 - 2020. 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.

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 and First Order (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. Ecoregion and FECO reference streams located in the Group 3 Watersheds in FY 2019-2020 are in Appendix A.

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

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

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 (or 12 or less in Ecoregion 73a) 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 have 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 flow or habitat alteration, channelization, culverting, or hard armoring with no change in management of hydrology.

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 4 watershed streams will be monitored by EFOs in FY 2019-2020(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	303(d)*	Long Term Trend Stations	Water-shed Sites	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	
Ammonia Nitrogen as N		X	X		X	O	X	O	
Arsenic, As	X†				X	O	X	O	O
Cadmium, Cd	X†				X	O	X	O	O
Chromium, Cr	X†				X	O	X	O	O
$CBOD_5$		X				O		O	
Color, Apparent					X		X		
Color, True					X		X		
Conductivity (field)	X	X	X	X	X	X	X	X	
Copper, Cu	X†				X	O	X	O	
Dissolved Oxygen (field)	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	O	O	O	
Iron, Fe	X†				X	O	X	O	O
Lead, Pb	X†				X	O	X	O	O
Manganese, Mn	X†				X	O	X	O	O
Mercury, Hg	X†					O	O	O	O
Nickel, Ni	X†					O	X	O	O
Nitrogen NO_3 & NO_2		X	X		X	O	X	O	O
pH (field)	X	X	X	X	X	X	X	X	
Residue, Dissolved					X	O	X	O	
Residue, Settleable						O	O	O	
Residue, Suspended	X		O	X	X	O	X	O	
Residue, Total						O	X	O	
Selenium, Se	X				X	O	X	O	O
Sulfates					X (68a & 69de)	O	X (68a & 69de)	O	O
Temperature (field)	X	X	X	X	X	X	X	X	
Hardness ($CaCO_3$) by calculation	X				X	O	X	O	O
Total Kjeldahl Nitrogen		X	X		X	O	X	O	O
Total Organic Carbon	X				X	O	X	O	O
Total Phosphorus (Total Phosphate)		X	X		X	O	X	O	O
Turbidity (field or lab)			O	X	X	O	X	O	O
Zinc, Zn	X†				X	O	X	O	O
Biorecon					X			X (or SQSH)	
SQSH			X (or biorecon)		X	X (or biorecon) unless listed for 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.
R – Recommended if time allows.
† – Sample for pollutant on 303(d) List.
* - Minimally sample parameters for which stream is 303(d) listed.

QC samples (trip and field blank) are only collected for parameters requested at other sites in the same sample trip.

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, Nitrogen, Nitrogen ortho-phosphorus and $CBOD_5$**

Nitrate and Nitrite are collected at waterbodies with drinking water use designation.

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. 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, one to five year cycle. A list of fish tissue stations to be sampled in 2019-20 appears in Table 12. Parameters to be sampled are listed in Table 13. TDEC DWR, TVA, TWRA 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. 2019 – 2020 Fish Tissue Sampling Sites

STATION ID	RESERVOIR NAME/STREAM NAME	LOCATION	PARAMETERS	TARGET SPECIES	Agency
BSAND007.4HN	Big Sandy River/ KY Lake	Big Sandy Embayment Of Kentucky Lake Downstream Of Poplar Creek	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
BUFFA017.7PE	Buffalo River	Old Hwy 13 D/S Lobelville Near Gaging Station	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
CHATT000.9HM	Chattanooga Creek	L&N and Southern Railroad Bridge at Rendering Plant	Metals, Organics	Channel Catfish, Largemouth Bass	TDEC/ TDH
CUMBE216.4DA	Cumberland River/Old Hickory Reservoir	Old Hickory Reservoir at Dam	Metals, Organics	Channel Catfish, Largemouth Bass	TDEC/ TDH
CUMBE241.0WS	Cumberland River/Old Hickory Reservoir	Old Hickory Reservoir D/S Gallatin Fossil Plant.	Metals, Organics	Channel Catfish, Largemouth Bass	TDEC/ TDH
ECO68A26	Daddys Creek	U/S Hebbertsburg Road Crossing Catoosa TN Devils Breakfast Table	Mercury, Selenium	Smallmouth Bass, Rock Bass	TDEC/ TDH
DUCK022.5HU	Duck River	0.5 Mile U/S Hite Ford	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
DUCK249.5CE	Duck River/Normandy Reservoir	Normandy Reservoir Near Dam	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
ELK041.5GS	Elk River	D/S Richland Creek at Hanna Ward Bridge	Metals, Organics	Channel Catfish, Smallmouth Bass	TVA
ELK135.0FR	Elk River/Tims Ford Reservoir	Tims Ford Reservoir Near Marble Plains	Metals, Organics	Channel Catfish, Largemouth Bass	TVA

STATION ID	RESERVOIR NAME/STREAM NAME	LOCATION	PARAMETERS	TARGET SPECIES	Agency
ELK150.0FR	Elk River/Tims Ford Reservoir.	Tims Ford Reservoir at Maple Bend	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
FBROA033.0SV	French Broad River/Douglas Reservoir	Douglas Reservoir Near Dam	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
FBROA051.0JE	French Broad River/Douglas Reservoir	Douglas Reservoir near Indian Creek and Douglas Estates	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
FBROA077.5CO	French Broad River	Hwy 321 Bridge at Junction with Hwy 160 Northeast of Newport (Boyer Island)	Metals, Organics	Channel Catfish, Smallmouth Bass	TVA
HATCH004.6TI	Hatchie River	D/S Indian Creek	Metals, Organics	Buffalo, Catfish	TDEC/ TDH
LTENN033.6BT	Little Tennessee River/Chilhowee Reservoir	Chilhowee Reservoir at Dam	Mercury, Selenium	Smallmouth Bass	NPS/ TDEC
LTENN037.0BT	Little Tennessee River/Chilhowee Reservoir	Chilhowee Reservoir Abrams Creek Embayment	Mercury, Selenium	Smallmouth Bass	NPS/ TDEC
LITTL036.3BT	Little River	GSMP upstream of the Wye.	Mercury, Selenium	Bass	NPS/ TDEC
LITTL030.8BT	Little River	Townsend	Mercury, Selenium	Bass	NPS/ TDEC
LPIGE025.5SV	Middle Prong Little Pigeon River	GSMP near Greenbrier Ranger Station	Mercury, Selenium	Bass	NPS/ TDEC
LIPIGE022.9SV	Middle Prong Little Pigeon River	Pittman Center	Mercury, Selenium	Bass	NPS/TDEC
NOLIC008.5HA	Nolichucky River	Hurley Island	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
NOLIC097.5UC	Nolichucky River	U/S Chestoa Bridge	Mercury, Selenium	Smallmouth Bass Rockbass	TDEC/TDH

STATION ID	RESERVOIR NAME/STREAM NAME	LOCATION	PARAMETERS	TARGET SPECIES	Agency
OBEY008.0CY	Obey River/Dale Hollow Lake	Dale Hollow Reservoir Near Dam	Metals, Organics	Channel Catfish, Largemouth Bass	TDEC/TDH
OBEY036.4CY	Obey River/Dale Hollow Lake.	Dale Hollow Reservoir at Lillyvale	Metals, Organics	Channel Catfish, Largemouth Bass	TDEC/TDH
PIGEO007.6CO	Pigeon River	Tannery Island U/S of Newport	Metals, Organics	Channel Catfish, Smallmouth Bass	TVA
SFHOL001.1SU	South Fork Holston River	Ridgefields Bridge in Kingsport (U/S North Fork D/S Meade)	Metals, Organics	Largemouth Bass, Smallmouth Bass Catfish	TDEC/ TDH
SFHOL003.9SU	South Fork Holston River	Hwy 126 Bridge Near Kingsport	Metals, Organics	Largemouth Bass, Smallmouth Bass Catfish	TDEC/ TDH
SFHOL008.5SU	South Fork Holston River/Fort Patrick Reservoir	Fort Patrick Henry Reservoir at Dam	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
SFHOL018.8SU	South Fork Holston River/Boone Reservoir	Boone Reservoir Dam	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
SFHOL027.0SU	South Fork Holston River/Boone Reservoir	Boone Reservoir one Mile U/S Devault Road Bridge 10	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
TENNE200.0HD	Tennessee River/Kentucky Lake	Kentucky Reservoir Near Hamburg	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
WATAU006.0SU	Watauga River/Boone Reservoir	Boone Reservoir (Watauga Embayment In) at Pickens Bridge	Metals, Organics	Channel Catfish, Largemouth Bass	TVA
TBD	Nolichucky River	TBD based on spring analysis	Mercury	Bass Species	TDEC/ TDH
TBD	Pigeon River	TBD based on spring analysis	Mercury	Bass Species	TDEC

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 2019-2020, 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 planning to participate in the NWCA again during the 2021 survey.

In 2013, 2016 and 2018, 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 2016 and 2018 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. The only grant deliverables remaining include current field work being conducted and wetland database entry scheduled to be finished by the end of the 2018 grant and the 2016 grant extension in September of 2019.

F. Southeast Monitoring Network Sites in Tennessee FY 2019 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.

VI. LITERATURE CITED

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APPENDIX A:

MONITORING STATIONS SCHEDULED TO BE SAMPLED BETWEEN JULY 2019 AND JUNE 2020

Projected Monitoring Stations for 2019-2020

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
ECO66G12	Sheeds Creek	SEMN	TN03150101012_0510	Chattanooga EFO		4	4		2	1	2
PINEY005.0RH	Watts Bar Reservoir	Ambient	TN06010201001_1000	Chattanooga EFO	4	4	4				
TENNE444.0MI	Nickajack Reservoir	Ambient/ 303(d)	TN06020001001_1000	Chattanooga EFO	4	4	4				
FECO68C12	Ellis Gap Branch	FECO	TN06020001001T_0100	Chattanooga EFO		4	4	2	2	1	2
NMSTR000.3HM	North Market Street Branch	303(d)	TN06020001001T_0200	Chattanooga EFO	12	12			1		1
HUGDE000.1MI	Hugden Branch	303(d)	TN06020001001T_0500	Chattanooga EFO				1			1
LOOKO4.3T0.8HM	Unnamed Trib to Lookout Creek	303(d)	TN06020001003_0300	Chattanooga EFO	12	12			1		1
BLACK000.7HM	Black Creek	303(d)	TN06020001003_0400	Chattanooga EFO	12	12			1		1
LOOKO010.8_GA	Lookout Creek	Watershed	TN06020001003_1000	Chattanooga EFO				1			1
FRIAR000.8HM	Friar Branch	303(d)	TN06020001007_0100	Chattanooga EFO	12	12			1		1
FRIAR002.5HM	Friar Branch	303(d)	TN06020001007_0100	Chattanooga EFO	12	12			1		1
POE001.4HM	Poe Branch	303(d)	TN06020001007_0110	Chattanooga EFO	12	12			1		1
FRIAR3.2T1.6HM	Unnamed Trib to Friar Branch	303(d)	TN06020001007_0120	Chattanooga EFO				1			1
SCHIC10.4T1.0HM	Unnamed Trib to South Chickamauga Creek	303(d)	TN06020001007_0200	Chattanooga EFO	12	12			1		1
MACKE000.6HM	Mackey Branch	303(d)	TN06020001007_0300	Chattanooga EFO	12	12			1		1
RSPRI000.3HM	Ryall Springs Branch	303(d)	TN06020001007_0310	Chattanooga EFO	12	12			1		1
HURRI004.2HM	Hurricane Creek	Watershed	TN06020001007_0400	Chattanooga EFO				1			1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
JOHNS001.2HM	Johnson Branch	Watershed	TN06020001007_0410	Chattanooga EFO				1			1
WCHIC000.1HM	West Chickamauga Creek	Watershed	TN06020001007_0500	Chattanooga EFO	12	12			1		1
SCHIC004.9HM	South Chickamauga Creek	303(d)	TN06020001007_1000	Chattanooga EFO	12	12			1		1
SCHIC000.4HM	South Chickamauga Creek	Ambient	TN06020001007_1000	Chattanooga EFO	4	4	4				
SCHIC015.8HM	South Chickamauga Creek	303(d)	TN06020001007_2000	Chattanooga EFO	12	12			1		1
TENNE477.0HM	Chickamauga Reservoir	Ambient	TN06020001020_1000	Chattanooga EFO	4	4	4				
TENNE503.3RH	Chickamauga Reservoir	Ambient	TN06020001020_1000	Chattanooga EFO	4	4	4				
TENNE529.5RH	Chickamauga Reservoir	Ambient	TN06020001020_1000	Chattanooga EFO	4	4	4				
NCHIC7.4T0.7HM	Unnamed trib to North Chickamauga Creek	303(d)	TN06020001067_0100	Chattanooga EFO	12			1			1
PITTS000.8HM	Pitts Branch	303(d)	TN06020001067_0200	Chattanooga EFO				1			1
NINEM000.6HM	Ninemile Branch	303(d)	TN06020001067_0210	Chattanooga EFO	12	12			1		1
NINEM002.7HM	Ninemile Branch	303(d)	TN06020001067_0215	Chattanooga EFO				1			1
FWATE000.8HM	Falling Water Creek	Watershed	TN06020001067_0300	Chattanooga EFO	12	12			1		1
LFWAT002.7HM	Little Falling Water Creek	303(d)	TN06020001067_0310	Chattanooga EFO	12	12	12		1		1
STAND001.3SE	Standifer Creek	303(d)	TN06020001067_0600	Chattanooga EFO	12		12	1			1
BRYME001.3SE	Brymer Creek	Watershed	TN06020001067_0700	Chattanooga EFO	12		12	1			1
CAIN002.7SE	Cain Creek	Watershed	TN06020001067_0800	Chattanooga EFO				1			1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
MOSSY000.1SE	Mossy Creek	Watershed	TN06020001067_0810	Chattanooga EFO				1			1
FREDR000.1SE	Fredrick Creek	Watershed	TN06020001067_0811	Chattanooga EFO				1			1
COOPE001.7HM	Cooper Creek	Watershed	TN06020001067_0900	Chattanooga EFO				1			1
NCHIC012.4HM	North Chickamauga Creek	Watershed	TN06020001067_1000	Chattanooga EFO	12	12			1		1
HOGSK000.1HM	Hogskin Branch	303(d)	TN06020001067_1100	Chattanooga EFO			12	1			1
POE002.4HM	Poe Branch	Watershed	TN06020001067_1200	Chattanooga EFO				1			1
LICK000.7HM	Lick Branch	Watershed	TN06020001067_1300	Chattanooga EFO				1			1
ROGER000.5HM	Rogers Branch	303(d)	TN06020001067_1400	Chattanooga EFO				1			1
NCHIC018.7HM	North Chickamauga Creek	303(d)	TN06020001067_2000	Chattanooga EFO	12			1			1
NCHIC023.9HM	North Chickamauga Creek	Watershed	TN06020001067_3000	Chattanooga EFO					1		1
NCHIC029.5HM	North Chickamauga Creek	Watershed	TN06020001067_4000	Chattanooga EFO	12			1			1
SHOAL001.4HM	Shoal Creek	303(d)	TN06020001087_1000	Chattanooga EFO	12	12			1	1	1
SHOAL000.1HM	Shoal Creek	303(d)	TN06020001087_1000	Chattanooga EFO	12	12					
STANL000.1HM	Stanley Branch	303(d)	TN06020001109_0100	Chattanooga EFO					1		1
FRUED000.5HM	Fruedenberg Creek	303(d)	TN06020001109_0200	Chattanooga EFO	12	12	12		1		1
SHORT000.1HM	Short Creek	303(d)	TN06020001109_0300	Chattanooga EFO	12	12			1		1
BEE000.8HM	Bee Branch	303(d)	TN06020001109_0400	Chattanooga EFO	12	12			1		1
MIDDL003.5HM	Middle Creek	Watershed	TN06020001109_1000	Chattanooga EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreconn Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
MIDDL000.1HM	Middle Creek	Watershed	TN06020001109_1000	Chattanooga EFO	12	12					
CITIC0.7T0.7HM	Unnamed Trib to Citico Creek	Advisory/ 303(d)	TN060200011240_0100	Chattanooga EFO	12	12			1		1
CITICO001.0HM	Citico Creek	Advisory	TN060200011240_1000	Chattanooga EFO	12	12			1		1
DOBBS000.3HM	Dobbs Branch	303(d)	TN060200011244_0100	Chattanooga EFO	12	12		1		1	1
CHATT5.5T0.1HM	Unnamed trib to Chattanooga Creek	303(d)	TN060200011244_0200	Chattanooga EFO	12	12	12		1		1
MCFAR000.2HM	McFarland Spring Branch	303(d)	TN060200011244_0300	Chattanooga EFO	12	12			1		1
GILLE001.3HM	Gillespie Springs Branch	303(d)	TN060200011244_0400	Chattanooga EFO	12	12		1		1	1
CHATT004.2HM	Chattanooga Creek	Advisory/ 303(d)	TN060200011244_1000	Chattanooga EFO	12	12					
CHATT001.7HM	Chattanooga Creek	Advisory/ 303(d)	TN060200011244_1000	Chattanooga EFO	12	12					
CHATT000.9HM	Chattanooga Creek	Ambient/ 303(d)	TN060200011244_1000	Chattanooga EFO	12	12	12				
CHATT007.9HM	Chattanooga Creek	Advisory/ 303(d)	TN060200011244_2000	Chattanooga EFO					1		1
CHATT005.1HM	Chattanooga Creek	Advisory/ 303(d)	TN060200011244_2000	Chattanooga EFO	12	12					
RWATE003.0MI	Running Water Creek	Watershed	TN060200011441_1000	Chattanooga EFO				1			1
MULLE005.0MI	Mullens Creek	Watershed	TN06020001397_1000	Chattanooga EFO					1		1
SSUCK000.1MI	South Suck Creek	303(d)	TN06020001421_0100	Chattanooga EFO	12			1			1
NSUCK000.1MI	North Suck Creek	Watershed	TN06020001421_0200	Chattanooga EFO	12			1			1
CONNE002.2HM	Conner Creek	Watershed	TN06020001421_0220	Chattanooga EFO				1			1
SUCK000.3HM	Suck Creek	Watershed	TN06020001421_1000	Chattanooga EFO	12			1			1
MOUNT4.3T0.2HM	UT to Mountain Creek	Watershed	TN06020001426_0100	Chattanooga EFO					1		1
STRIN000.6HM	Stringers Branch	Advisory/ 303(d)	TN06020001426_0200	Chattanooga EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
STRIN004.6HM	Stringers Branch	Advisory/ 303(d)	TN06020001426_0200	Chattanooga EFO	12	12					
MOUNT001.5HM	Mountain Creek	303(d)	TN06020001426_1000	Chattanooga EFO	12	12			1		1
MOUNT004.7HM	Mountain Creek	303(d)	TN06020001426_1000	Chattanooga EFO	12	12			1		1
HIWAS013.4MM	Hiwassee River Embayment of Chickamauga Reservoir	Ambient	TN06020002008_1000	Chattanooga EFO	4	4	4				
CANE001.5MM	Cane Creek	Ambient	TN06020002081_0100	Chattanooga EFO	4	4	4				
OOSTA028.4MM	Oostanaula Creek	Ambient	TN06020002083_3000	Chattanooga EFO	4	4	4				
OCOEE001.0PO	Ocoee River	Ambient	TN06020003001_1000	Chattanooga EFO	4	4	4				
ECO66G20	Rough Creek	SEMN	TN06020003013.55_0400	Chattanooga EFO		4	4		2	1	2
OCOEE019.6PO	Ocoee River	Ambient	TN06020003013_1000	Chattanooga EFO	4	4	4				
SEQUA006.3MI	Sequatchie River	Ambient	TN06020004001_1000	Chattanooga EFO	4	4	4				
TENNE416.5MI	Guntersville Reservoir	Ambient	TN06030001055_1000	Chattanooga EFO	4	4	4				
ECO68C20	Crow Creek	SEMN	TN06030001067_1000	Chattanooga EFO		4	4		2	1	2
ELK133.0FR	Elk River	Ambient	TN06030003015_1000	Columbia EFO	4	4	4				
SHOAL032.2LW	Shoal Creek	Ambient	TN06030005078_1000	Columbia EFO	4	4	4				
DUCK145.8MY	Duck River	Watershed	TN06040002001_1000	Columbia EFO	12	12			1		1
tbd30	Silver Creek	Watershed	TN06040002002_0100	Columbia EFO					1		1
GLOBE001.6MY	Globe Creek	303(d)	TN06040002002_0300	Columbia EFO	12	12	12		1		1
EFGLO000.4ML	East Fork Globe Creek	303(d)	TN06040002002_0310	Columbia EFO	12	12	12		1		1
VICKR000.1ML	Vickrey Branch	303(d)	TN06040002002_0311	Columbia EFO	12	12	12		1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
EFGLO002.5ML	East Fork Globe Creek	303(d)	TN06040002002_0315	Columbia EFO	12	12	12		1		1
MOORE002.2ML	Mooresville Creek	Watershed	TN06040002002_0320	Columbia EFO					1		1
BEAR000.2MY	Bear Creek	Watershed	TN06040002002_0330	Columbia EFO					1		1
SFFOU001.1MY	South Fork Fountain Creek	Watershed	TN06040002002_0400	Columbia EFO				1			1
HURRI000.2MY	Hurricane Creek	303(d)	TN06040002002_0700	Columbia EFO					1		1
FOUNT014.2MY	Fountain Creek	303(d)	TN06040002002_3000	Columbia EFO	12	12			1		1
CEDAR001.5MY	Cedar Creek	303(d)	TN06040002008_1000	Columbia EFO	12	12			1		1
RICH000.5ML	Rich Creek	303(d)	TN06040002010_0100	Columbia EFO	12	12			1	1	1
DUCK186.9ML	Duck River	Discharge	TN06040002010_1000	Columbia EFO	12	12			1		1
DUCK180.0ML	Duck River	Watershed	TN06040002010_1000	Columbia EFO	12	12			1		1
EROCK001.8ML	East Rock Creek	303(d)	TN06040002012_0100	Columbia EFO	12	12			1		1
tbd31	Mud Creek	Watershed	TN06040002012_0120	Columbia EFO				1			1
BELFA001.3ML	Belfast Creek	Watershed	TN06040002012_0140	Columbia EFO				1			1
EROCK020.8BE	East Rock Creek	Watershed	TN06040002012_0150	Columbia EFO					1		1
SANDE000.2ML	Sanders Creek	303(d)	TN06040002012_0500	Columbia EFO					1		1
SNELL000.3ML	Snell Branch	303(d)	TN06040002012_0700	Columbia EFO				1			1
WRIGH000.1ML	Wright Branch	Watershed	TN06040002012_0800	Columbia EFO					1		1
BROCK001.4ML	Big Rock Creek	Watershed	TN06040002012_1000	Columbia EFO		12			1		1
BROCK015.8ML	Big Rock Creek	303(d)	TN06040002012_2000	Columbia EFO	12	12			1		1
BROCK020.1ML	Big Rock Creek	303(d)	TN06040002012_3000	Columbia EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
LHURR000.9BE	Little Hurricane Creek	303(d)	TN06040002020_0100	Columbia EFO		12			1		1
tbd32	Powell Creek	Watershed	TN06040002020_0200	Columbia EFO					1		1
DUCK216.2BE	Duck River	303(d)	TN06040002020_1000	Columbia EFO	12	12			1	1	1
LSINK001.0BE	Little Sinking Creek	303(d)	TN06040002021_0100	Columbia EFO					1		1
SINKI001.2BE	Sinking Creek	Watershed	TN06040002021_1000	Columbia EFO					1		1
SINKI008.6BE	Sinking Creek	Watershed	TN06040002021_2000	Columbia EFO					1		1
DAVIS000.2BE	Davis Branch	303(d)	TN06040002024_0100	Columbia EFO					1		1
SUGAR002.7BE	Sugar Creek	Watershed	TN06040002024_1000	Columbia EFO		12			1		1
NHERM000.1BE	New Herman Fork	Watershed	TN06040002026_0300	Columbia EFO				1			1
MUD000.1BE	Mud Creek	Watershed	TN06040002026_0600	Columbia EFO				1			1
BOMAR000.6BE	Bomar Creek	303(d)	TN06040002027_0200	Columbia EFO	12	12			1		1
BUTLE000.2BE	Butler Creek	Watershed	TN06040002027_0300	Columbia EFO					1		1
LFLAT000.2BE	Little Flat Creek	Watershed	TN06040002027_0500	Columbia EFO					1		1
DUCK220.2BE	Duck River	303(d)	TN06040002027_1000	Columbia EFO	12	12			1	1	1
DUCK229.2BE	Duck River	Watershed	TN06040002027_2000	Columbia EFO	12	12			1	1	1
THOMP001.4BE	Thompson Creek	Watershed	TN06040002028_1000	Columbia EFO				1			1
SHIPM000.8BE	Shipman Creek	Watershed	TN06040002030_0400	Columbia EFO				1			1
DUCK248.0BE	Duck River	Ambient/ 303(d)	TN06040002030_1000	Columbia EFO	12	12	12		1		1
BREWE000.5CE	Brewer Creek	Watershed	TN06040002032_0110	Columbia EFO				1			1
tbd33	Eaton Branch	Watershed	TN06040002032_0200	Columbia EFO				1			1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreconn Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
CLEAR001.1CE	Clear Branch	303(d)	TN06040002032_0300	Columbia EFO	12	12			1		1
MUDDY000.1CE	Muddy Branch	303(d)	TN06040002032_0310	Columbia EFO	12	12			1		1
PARKS001.0CE	Parks Creek	Watershed	TN06040002032_0600	Columbia EFO					1		1
DUCK265.4CE	Duck River	Watershed	TN06040002032_1000	Columbia EFO				1			1
DUCK268.6CE	Duck River	Watershed	TN06040002032_2000	Columbia EFO	12	12			1		1
DUCK275.8CE	Duck River	Watershed	TN06040002032_3000	Columbia EFO	12	12			1		1
BBUCK001.3BE	Bell Buckle Creek	303(d)	TN06040002033_0300	Columbia EFO	12	12			1		1
BBUCK000.6BE	Bell Buckle Creek	303(d)	TN06040002033_0300	Columbia EFO	12	12			1		1
MUSE001.1BE	Muse Branch	303(d)	TN06040002033_0600	Columbia EFO					1		1
WARTR001.2BE	Wartrace Creek	303(d)	TN06040002033_1000	Columbia EFO	12	12			1		1
WARTR005.6BE	Wartrace Creek	303(d)	TN06040002033_1000	Columbia EFO	12	12			1		1
NOAH002.1BE	Noah Fork	Watershed	TN06040002034_1200	Columbia EFO	12	12			1		1
tbd34	Panhandle Branch	Watershed	TN06040002034_1220	Columbia EFO				1			1
GARRI011.9BE	Garrison Fork Creek	Watershed	TN06040002034_2000	Columbia EFO				1			1
tbd35	Benford Creek	Watershed	TN06040002038_0200	Columbia EFO				1			1
HURRI001.8BE	Hurricane Creek	303(d)	TN06040002038_0300	Columbia EFO	12	12			1	1	1
FALL001.2BE	Fall Creek	303(d)	TN06040002038_1000	Columbia EFO	12			1			1
WEAKL000.2BE	Weakly Creek	303(d)	TN06040002039_0200	Columbia EFO	12				1		1
WEAKL004.8BE	Weakly Creek	303(d)	TN06040002039_0250	Columbia EFO	12	12			1		1
ALEXA000.7BE	Alexander Creek	303(d)	TN06040002039_0300	Columbia EFO	17				1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
NFORK003.4BE	North Fork Creek	303(d)	TN06040002039_1000	Columbia EFO	12						
NFORK004.7BE	North Fork Creek	303(d)	TN06040002039_2000	Columbia EFO	12	12			1		1
NFORK009.4BE	North Fork Creek	303(d)	TN06040002039_3000	Columbia EFO	12	12			1		1
WILSO000.7ML	Wilson Creek	303(d)	TN06040002046_1000	Columbia EFO	12	12			1	1	1
LICK001.8ML	Lick Creek	Watershed	TN06040002047_0300	Columbia EFO	12	12			1		1
SPRIN001.3ML	Spring Creek	303(d)	TN06040002047_1000	Columbia EFO	12			1			1
THICK002.0ML	Thick Creek	Watershed	TN06040002048_0100	Columbia EFO					1		1
CANEY001.9ML	Caney Creek	Watershed	TN06040002048_1000	Columbia EFO					1		1
ECO71I14	Little Flat Creek	ECO	TN06040002049_0200	Columbia EFO		4	4	2	2	1	2
WALLA000.8WI	Wallace Branch	303(d)	TN06040002049_0400	Columbia EFO	12			1			1
ECO71I10	Flat Creek	ECO	TN06040002049_2000	Columbia EFO		4	4	2	2	1	2
FECO71H01	Unnamed Trib to Riley Creek	FECO	TN06040002053_0100	Columbia EFO		4	4	2	2	1	2
WOLF001.2CE	Wolf Creek	Watershed	TN06040002502_0200	Columbia EFO				1			1
SHANK000.8CE*	Shanklin Branch	303(d)	TN06040002502_0220	Columbia EFO							
tbd36	Hunt Creek	Watershed	TN06040002502_0400	Columbia EFO				1			1
LDUCK000.1CE	Little Duck River	Advisory/ 303(d)	TN06040002502_1000	Columbia EFO	12 & 5/30	12			1		1
LDUCK004.2CE	Little Duck River	Advisory/ 303(d)	TN06040002502_2000	Columbia EFO	12 & 5/30	12			1	1	1
CRUMP003.0CE	Crumpton Creek	Watershed	TN06040002571_1000	Columbia EFO				1			1
BOBO001.6CE	Bobo Creek	Watershed	TN06040002582_1000	Columbia EFO				1			1
BBIGB008.5MY	Big Bigby Creek	Ambient	TN06040003019_2000	Columbia EFO	4	4	4				

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
DUCK113.9MY	Duck River	Ambient	TN06040003024_1000	Columbia EFO	4	4	4				
BUFFA073.1WE	Buffalo River	Ambient	TN06040004002_1000	Columbia EFO	4	4	4				
ECO71F19	Brush Creek	SEMN	TN06040004013_0600	Columbia EFO		4	4		2	1	2
BTRAM006.5MA	Big Trammel Creek	Watershed	TN05110002010_1000	Cookeville EFO	12	12			1		1
WFLON004.0MA	West Fork Long Creek	Discharge	TN05110002024_0400	Cookeville EFO	12	12			1	1	1
LONG014.4MA	Long Creek	Watershed	TN05110002024_1000	Cookeville EFO	12	12			1	1	1
LSLIC001.5MA	Little Salt Lick Creek	Watershed	TN05110002027_0200	Cookeville EFO	12	12			1	1	1
LHUNG000.8MA	Long Hungry Creek	303(d)	TN05110002027_0300	Cookeville EFO	12	12			1		1
LONG003.3MA	Long Fork	Watershed	TN05110002027_0400	Cookeville EFO	12	12			1	1	1
FECO71G02	Unnamed Trib to Long Fork	FECO	TN05110002027_0420	Cookeville EFO		4	4	2	2	1	2
TOWN001.1MA	Town Creek	303(d)	TN05110002027_0431	Cookeville EFO	12	12			1	1	1
TOWN001.3MA	Town Creek	303(d)	TN05110002027_0431	Cookeville EFO	12	12			1	1	1
WOAK011.5MA	White Oak Creek	303(d)	TN05110002027_0435 & TN05110002027_0436	Cookeville EFO	12	12			1		1
SLICK007.5MA	Salt Lick Creek	Discharge	TN05110002027_1000	Cookeville EFO	12	12			1		1
SLICK014.6MA	Salt Lick Creek	Discharge	TN05110002027_2000	Cookeville EFO	12	12			1	1	1
SLICK016.1MA	Salt Lick Creek	Watershed	TN05110002027_2000	Cookeville EFO	12	12			1		1
LTRAC002.3CY	Little Trace Creek	Watershed	TN05110002031_0200	Cookeville EFO	12			1			1
LTRAC005.0CY	Little Trace Creek	303(d)	TN05110002031_0250	Cookeville EFO	12	12	12		1		1
TRACE002.3CY	Trace Creek	Watershed	TN05110002031_0300	Cookeville EFO	12	12			1		1
LINE008.3_KY	Line Creek	Watershed	TN05110002031_1000	Cookeville EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
PUNCH005.1MA	Puncheon Creek	Watershed	TN05110002804_1000	Cookeville EFO				1			1
PROCT000.5CY	Proctor Creek	Watershed	TN05130103001_0100	Cookeville EFO				1			1
MCFAR005.9CY	McFarland Creek	Watershed	TN05130103001_0200	Cookeville EFO				1			1
CUMBE381.1CY	Cumberland River	Ambient	TN05130103001_1000	Cookeville EFO	4	4	4				
THOMP004.8PI	Thompson Creek	Discharge	TN05130104010_0100	Cookeville EFO	12	12			1		1
ROCK024.8PI	Rock Creek	303(d)	TN05130104010_1000	Cookeville EFO				1			1
SPRUC004.2FE	Spruce Creek	Watershed	TN05130104019_0630	Cookeville EFO				1			1
NWOAK014.7FE	North White Oak Creek	Watershed	TN05130104019_2000	Cookeville EFO				1			1
BLACK002.0SC	Black Creek	Watershed	TN05130104026_0100	Cookeville EFO				1			1
SPCLE007.6FE	South Prong Clear Fork River	Watershed	TN05130104026_0600	Cookeville EFO				1			1
LAURE002.8FE	Long Branch	Watershed	TN05130104026_0640	Cookeville EFO				1			1
NPCLE003.9FE	North Prong Clear Fork River	Watershed	TN05130104026_0700	Cookeville EFO				1			1
CROOK000.1FE	Crooked Creek	Watershed	TN05130104026_0800	Cookeville EFO	12	12			1		1
OBEY002.1CY	Obey River	Ambient/ 303(d)	TN05130105001_1000	Cookeville EFO	4	4	4				
BEAGL008.3OV	Big Eagle Creek	Watershed	TN05130105002T_0400	Cookeville EFO				1			1
LEAGL000.4OV	Little Eagle Creek	Watershed	TN05130105002T_0420	Cookeville EFO				1			1
CUB000.7OV	Cub Creek	303(d)	TN05130105015_0300	Cookeville EFO	12		12	1			1
tbd17	Dry Hollow Creek	Watershed	TN05130105015_0500	Cookeville EFO				1			1
PCAMP000.7OV	Puncheon Camp Creek	Watershed	TN05130105015_0600	Cookeville EFO				1			1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
NETTL002.5OV	Nettle Carrier Creek	Watershed	TN05130105015_0800	Cookeville EFO				1			1
WFOBE008.0OV	West Fork Obey River	Watershed	TN05130105015_1000	Cookeville EFO	12	12			1		1
WFOBE016.5OV	West Fork Obey River	Watershed	TN05130105015_2000	Cookeville EFO	12	12			1	1	1
LCRAB001.9FE	Little Crab Creek	Watershed	TN05130105019_0100	Cookeville EFO				1			1
PCOVE001.3FE	Poplar Cove Creek	Watershed	TN05130105019_0200	Cookeville EFO				1			1
ROCKC004.7FE	Rockcastle Creek	303(d)	TN05130105019_0300	Cookeville EFO	12	12			1	1	1
ROCKC004.9FE	Rock Castle	303(d)	TN05130105019_0300	Cookeville EFO	12	12			1		1
BCOVE000.1FE	Buffalo Cove Creek	Watershed	TN05130105019_0310	Cookeville EFO				1			1
HURRI003.1FE	Hurricane Creek	Watershed	TN05130105019_0700	Cookeville EFO				1			1
LPINE001.2PU*	Little Piney Creek	303(d)	TN05130105019_0710	Cookeville EFO							
LHURR001.2OV	Little Hurricane Creek	Watershed	TN05130105019_0720	Cookeville EFO				1			1
LOOPE001.0OV*	Looper Branch	303(d)	TN05130105019_0721	Cookeville EFO							
CHARL000.7OV*	Charlie Branch	303(d)	TN05130105019_0800	Cookeville EFO							
MEADO005.0PU	Meadow Creek	303(d)	TN05130105019_0900	Cookeville EFO				1			1
MEADO011.9CU	Meadow Creek	303(d)	TN05130105019_0950	Cookeville EFO				1			1
EFOBE012.6FE	East Fork Obey River	Watershed	TN05130105019_1000	Cookeville EFO	12	12			1		1
BLAUR004.7FE	Big Laurel Creek	303(d)	TN05130105019_1300	Cookeville EFO			12		1		1
LLAUR000.4FE	Little Laurel Creek	303(d)	TN05130105019_1310	Cookeville EFO			12		1		1
BPINE000.1FE	Big Piney Creek	Watershed	TN05130105019_1400	Cookeville EFO	12	12			1		1
BINDI000.6FE	Big Indian Creek	Watershed	TN05130105019_1600	Cookeville EFO				1			1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
EFOBE025.8FE	East Fork Obey River	303(d)	TN05130105019_2000	Cookeville EFO	12		12	1			1
EFOBE039.6OV	East Fork Obey River	303(d)	TN05130105019_3000	Cookeville EFO	12		12		1		1
LICK001.2PI	Lick Creek	Watershed	TN05130105033_0100	Cookeville EFO				1			1
CANEY000.8FE	Caney Creek	Watershed	TN05130105033_0200	Cookeville EFO				1			1
RFWOL000.2FE	Rotten Fork Wolf River	Watershed	TN05130105033_0300	Cookeville EFO				1			1
JESSE000.1FE	Jesse Creek	Watershed	TN05130105033_0620	Cookeville EFO				1			1
WOLF022.2PI	Wolf River	Watershed	TN05130105033_1000	Cookeville EFO	12	12			1		1
TOWN000.1PI	Town Branch	303(d)	TN05130105033_1400	Cookeville EFO	12	12	12		1	1	1
TOWN000.8PI	Town Branch	303(d)	TN05130105033_1400	Cookeville EFO	12	12			1		1
WOLF042.3FE	Wolf River	Watershed	TN05130105033_2000	Cookeville EFO				1			1
CFORK011.2SM	Caney Fork River	Ambient	TN05130108001_1000	Cookeville EFO	4	4	4				
ECO71H17	Clear Fork Creek	SEMN	TN05130108004_0200	Cookeville EFO		4	4		2	1	2
ROCKY002.6TR	Rocky Creek	Watershed	TN05130201001T_0700	Cookeville EFO				1			1
WILBU001.3SM	Wilburn Creek	303(d)	TN05130201001T_0900	Cookeville EFO				1			1
PLUNK000.9SM	Plunkett Creek	303(d)	TN05130201001T_1300	Cookeville EFO	12	12			1		1
STONE000.4TR	Ward Branch	Watershed	TN05130201001T_1500	Cookeville EFO				1			1
PEYTO002.7SM	Peyton Creek	Watershed	TN05130201026_1000	Cookeville EFO					1		1
LICK000.5SM	Lick Creek	Watershed	TN05130201027_0100	Cookeville EFO					1		1
DIXON002.8SM	Dixon Creek	Watershed	TN05130201027_1000	Cookeville EFO					1		1
LGOOS002.0TR	Little Goose Creek	303(d)	TN05130201028_0100	Cookeville EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
LGOOS006.5TR	Little Goose Creek	303(d)	TN05130201028_0150	Cookeville EFO	12	12			1		1
HICKE000.9TR	Hickerson Creek	Discharge	TN05130201028_0200	Cookeville EFO	12	12	12		1		1
MFGOO000.7TR	Middle Fork	Watershed	TN05130201028_0300	Cookeville EFO	12				1		1
ECHO000.9MA	Echo Creek	Watershed	TN05130201028_0310	Cookeville EFO				1			1
CARR000.1MA	Carr Creek	303(d)	TN05130201028_0320	Cookeville EFO	12	12			1		1
DRYF000.1MA	Dry Fork	Watershed	TN05130201028_0700	Cookeville EFO				1			1
GOOSE004.5TR	Goose Creek	303(d)	TN05130201028_1000	Cookeville EFO	12	12			1		1
BEECH010.0DE	Beech River Embayment	Ambient	TN06040001802_1000	Jackson EFO	4	4	4				
TENNE066.3HN	Kentucky Reservoir	Ambient	TN06040005020_1000	Jackson EFO	4	4	4				
BSAND015.3BN	Big Sandy River	Ambient	TN06040005027_1000	Jackson EFO	4	4	4				
NFOBI005.9OB	North Fork Obion River	Ambient	TN08010202009_1000	Jackson EFO	4	4	4				
NFOBI010.7OB	North Fork Obion River	Ambient	TN08010202009_2000	Jackson EFO	4	4	4				
SFOBI005.8OB	South Fork Obion River	Ambient	TN08010203001_1000	Jackson EFO	4	4	4				
MFOBI004.5WY	Middle Fork Obion River	Ambient	TN08010203015_1000	Jackson EFO	4	4	4				
NFFDE005.3DY	North Fork Forked Deer River	Ambient	TN08010204001_1000	Jackson EFO	4	4	4				
SFFDE027.7HY	South Fork Forked Deer River	Ambient	TN08010205010_1000	Jackson EFO	4	4	4				
HATCH186.2MC	Hatchie River	Watershed	TN08010207001_2000	Jackson EFO	12	12					
CYPRE002.6MC	Cypress Creek	303(d)	TN08010207031_1000	Jackson EFO	12	12			1	1	1
CROOK005.0MC	Crooked Creek	Watershed	TN08010207031_1300	Jackson EFO				1			1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
OXFOR001.0MC	Oxford Creek	Watershed	TN08010207031_1400	Jackson EFO					1		1
MUDDY002.0MC	Muddy Creek	Watershed	TN08010207031_1600	Jackson EFO					1		1
ROLAN002.0MC	Roland Creek	Watershed	TN08010207031_1620	Jackson EFO				1			1
LMUDD001.8MC	Little Muddy Creek	Watershed	TN08010207031_1650	Jackson EFO				1			1
INDIA001.7MC	Indian Creek	Watershed	TN08010207031_1800	Jackson EFO				1			1
CYPRE006.9MC	Cypress Creek	Watershed	TN08010207031_2000	Jackson EFO					1		1
CYPRE014.0MC	Cypress Creek	303(d)	TN08010207031_3000	Jackson EFO	12	12	12		1		1
CYPRE018.8MC*	Cypress Creek	303(d)	TN08010207031_4000	Jackson EFO							
NAIL000.5MC	Nail Creek	Watershed	TN08010207034_0300	Jackson EFO					1		1
MOSSE012.1MC	Mosses Creek	Watershed	TN08010207034_1000	Jackson EFO					1		1
KISE001.0MC	Kise Creek	Watershed	TN08010207035_0200	Jackson EFO				1			1
HAMES000.1MC	Hamestring Creek	Watershed	TN08010207035_0300	Jackson EFO				1			1
ROSE003.5MC	Rose Creek	303(d)	TN08010207035_0600	Jackson EFO	12	12			1	1	1
FECO65E05	Unnamed Trib to Tuscumbia River	FECO	TN08010207044_0100	Jackson EFO	4	4	4	2	2	1	2
TUSCU008.4MC	Tuscumbia River	303(d)	TN08010207044_1000	Jackson EFO	12	12			1	1	1
CSPRI002.3LE	Copper Springs Creek	303(d)	TN08010208001_0200	Jackson EFO	12	12			1		1
HATCH40.7T1.6LE	Alston Creek	303(d)	TN08010208001_0300	Jackson EFO	12	12			1		1
HATCH48.0T1.2LE	Unnamed Trib to Hatchie River	303(d)	TN08010208001_0400	Jackson EFO	12	12			1		1
PENNY000.7MN	Pennycost Creek	Watershed	TN08010208001_0500	Jackson EFO					1		1
HATCH073.7HY	Hatchie River	Watershed	TN08010208001_2000	Jackson EFO	12	12	12				

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
HATCH126.9HR	Hatchie River	Ambient	TN08010208001_3000	Jackson EFO	4	4	4				
BMUDD004.3HY	Big Muddy Creek	303(d)	TN08010208007_1000	Jackson EFO	12	12			1		1
LONDO000.7HY*	London Creek	303(d)	TN08010208009_0100	Jackson EFO							
MORRI000.5HY	Morris Branch	303(d)	TN08010208009_0200	Jackson EFO					1		1
JETER000.1HY	Jeter Creek	Watershed	TN08010208009_0400	Jackson EFO					1		1
PRAIR001.3HY	Prairie Creek	303(d)	TN08010208009_0410	Jackson EFO	12	12			1		1
POPLA014.7HY	Poplar Creek	303(d)	TN08010208009_1000	Jackson EFO					1		1
BEAR008.6HY	Bear Creek	303(d)	TN08010208011_1000	Jackson EFO	12	12			1		1
LPINE000.2CS	Little Piney Creek	Watershed	TN08010208027_0300	Jackson EFO					1		1
PINEY014.6CS*	Piney Creek	303(d)	TN08010208027_2000	Jackson EFO							
TURKE001.4MN	Turkey Branch	303(d)	TN08010208030_0100	Jackson EFO					1		1
BBLAC003.7MN	Big Black Creek	Watershed	TN08010208030_1000	Jackson EFO					1		1
SUGAR001.5HY	Sugar Creek	303(d)	TN08010208031_1000	Jackson EFO	12	12			1		1
CYPRE004.3HY	Cypress Creek	303(d)	TN08010208032_1000	Jackson EFO	12	12	12		1		1
CAMP001.9LE	Camp Creek	303(d)	TN08010208033_0100	Jackson EFO	12	12			1		1
LAGOO003.0HY	Lagoon Creek	303(d)	TN08010208033_1000	Jackson EFO	12	12			1		1
ONELS1.1T0.6LE	Old Channel of Nelson Creek	303(d)	TN08010208034_0100	Jackson EFO	12	12	12		1		1
NELSO001.1LE	Nelson Creek	303(d)	TN08010208034_0200	Jackson EFO	12	12	12		1		1
HYDE001.0LE	Hyde Creek	303(d)	TN08010208034_0300	Jackson EFO	12	12	12		1		1
CANE002.5LE	Cane Creek	303(d)	TN08010208034_1000	Jackson EFO	12	12	12		1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
CANE012.5LE	Cane Creek	303(d)	TN08010208034_2000	Jackson EFO	12	12	12		1		1
CANE017.4LE	Cane Creek	303(d)	TN08010208034_3000	Jackson EFO	12	12			1		1
RICE000.8HY	Rice Branch	Watershed	TN08010208062_0200	Jackson EFO					1		1
JEFFE003.4HY*	Jeffers Creek	303(d)	TN08010208062_1000	Jackson EFO							
RICHL001.7HY	Richland Creek	303(d)	TN08010208072_1000	Jackson EFO	12	12			1		1
CARTE002.8HY	Carter Creek	303(d)	TN080102081866_1000	Jackson EFO	12	12			1		1
LMUDD006.7HY	Little Muddy Creek	303(d)	TN08010208946_1000	Jackson EFO	12	12			1		1
NFHOL004.6SU	North Fork Holston River	Ambient	TN06010108001_1000	Johnson City EFO	4	4	4				
SFHOL001.1SU	South Fork Holston River	Ambient	TN06010102001_1000	Johnson City EFO	4	4	4				
BEAVE001.0SU	Boone Reservoir	Ambient	TN06010102006_1000	Johnson City EFO	4	4	4				
BEAVE015.3SU	Beaver Creek	Ambient	TN06010102042_0400	Johnson City EFO	4	4	4				
DOE001.1CT	Doe River	Ambient	TN06010103013_1000	Johnson City EFO	4	4	4				
CLOUD002.7HS	Cloud Creek	Watershed	TN06010104004T_0700	Johnson City EFO	12				1		1
SMOUN000.6HS	Stone Mountain Branch	303(d)	TN06010104004T_0800	Johnson City EFO	12				1		1
RENFR000.6HS	Renfroe Creek	303(d)	TN06010104004T_0900	Johnson City EFO	12				1		1
STOCK001.9HS	Stock Creek	303(d)	TN06010104004T_1100	Johnson City EFO					1		1
CANEY003.0HS	Caney Creek	Watershed	TN06010104004T_1200	Johnson City EFO	12	12			1		1
CANEY008.0HS	Caney Creek	303(d)	TN06010104004T_1250	Johnson City EFO	12				1		1
CROCK001.1HS	Crockett Creek	303(d)	TN06010104004T_1300	Johnson City EFO	12	12			1		1
LOUDE000.6HS	Louderback Creek	Watershed	TN06010104004T_1410	Johnson City EFO					1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
DODSO002.6HS	Dodson Creek	303(d)	TN06010104004T_1450	Johnson City EFO	12			1			1
HONEY001.7HS	Honeycutt Creek	Watershed	TN06010104004T_1500	Johnson City EFO	12	12			1		1
TFORK000.1HS	Three Forks Branch	303(d)	TN06010104004T_1510	Johnson City EFO	12			1			1
ROBER000.7HS	Robertson Creek	Watershed	TN06010104004T_1600	Johnson City EFO	12	12			1		1
WALKE000.2HS	Walker Branch	303(d)	TN06010104004T_1610	Johnson City EFO	5			1			1
WAR000.9HS	War Creek	303(d)	TN06010104004T_1700	Johnson City EFO	5			1			1
SINKI001.1HS	Sinking Creek	303(d)	TN06010104011_0100	Johnson City EFO	5				1		1
WASHB000.2HS	Washboard Creek	303(d)	TN06010104011_0200	Johnson City EFO	5			1			1
FORGE000.8HS	Forgey Creek	303(d)	TN06010104011_0300	Johnson City EFO	12	12			1	1	1
SURGO000.1HS	Surgoinsville Creek	303(d)	TN06010104011_0400	Johnson City EFO	12	12			1		1
SPOIN001.7HS	Stoney Point Creek	303(d)	TN06010104011_0500	Johnson City EFO	12	12			1		1
BRADL002.1HS	Bradley Creek	303(d)	TN06010104011_0600	Johnson City EFO	12	12			1		1
RENFR000.2HS	Renfroe Creek	303(d)	TN06010104011_0610	Johnson City EFO	12	12	12		1		1
SEVIE000.8HS	Sevier Branch	Watershed	TN06010104011_0700	Johnson City EFO				1			1
HORD000.4HS	Hord Creek	303(d)	TN06010104011_0800	Johnson City EFO	12	12			1		1
ALEXA000.2HS	Alexander Creek	303(d)	TN06010104011_0900	Johnson City EFO	12	12			1		1
ALEXA001.4HS	Alexander Creek	303(d)	TN06010104011_0950	Johnson City EFO	12	12			1	1	1
SMITH000.9HS	Smith Creek	303(d)	TN06010104011_1100	Johnson City EFO	12	12			1	1	1
ARNOT000.3HS	Arnott Branch	303(d)	TN06010104011_1300	Johnson City EFO		12			1		1
ARNOT001.6HS	Arnott Branch	Watershed	TN06010104011_1350	Johnson City EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
SLATE000.2SU	Slate Branch	303(d)	TN06010104011_1400	Johnson City EFO	5			1			1
LAURE000.3HS	Laurel Run Creek	303(d)	TN06010104011_1600	Johnson City EFO	5			1			1
HUNT001.0HS	Hunt Creek	303(d)	TN06010104011_1900	Johnson City EFO	12	12			1		1
HOLST131.5HS	Holston River	Ambient/ 303(d)	TN06010104011_2000	Johnson City EFO	4	4	4				
TERRI000.8HS	Terrill Creek	Watershed	TN06010104011_2100	Johnson City EFO				1			1
NORTH000.1HS	North Fork	303(d)	TN06010104012_0100	Johnson City EFO	12	12			1		1
GRASS000.6HS	Grassy Fork	Watershed	TN06010104012_0110	Johnson City EFO				1			1
BEECH003.8HS	Beech Creek	303(d)	TN06010104012_1000	Johnson City EFO	12	12			1		1
ECO6702	Fisher Creek	SEMN	TN06010104015_0100	Johnson City EFO		4	4	2	2	1	2
MARSH000.2HS	Marshall Creek	303(d)	TN06010104015_0300	Johnson City EFO	5			1			1
CANEY005.0HS	Caney Creek	303(d)	TN06010104015_0500	Johnson City EFO	12	12			1	1	1
STANL000.1HS	Stanley Creek	303(d)	TN06010104015_0600	Johnson City EFO	12	12			1	1	1
BIG7.6T0.1HS	Unnamed Trib to Big Creek	303(d)	TN06010104015_0700	Johnson City EFO	12	12			1		1
BIG002.0HS	Big Creek	Watershed	TN06010104015_1000	Johnson City EFO	12	12			1		1
LPVAL000.9HS	Little Poor Valley Creek	Watershed	TN06010104017_0100	Johnson City EFO				1			1
PVALL006.3HS	Poor Valley Creek	303(d)	TN06010104017_1000	Johnson City EFO	12	12			1	1	1
NOLIC020.8GE	Nolichucky River	Ambient	TN06010108001_3000	Johnson City EFO	4	4	4				
ECO66E09	Clark Creek	SEMN	TN06010108010_3200	Johnson City EFO		4	4		2	1	2
NOLIC097.5UC	Nolichucky River	Ambient	TN06010108010_5000	Johnson City EFO	4	4	4				
BLIME000.5GE	Big Limestone Creek	Ambient	TN06010108030_1000	Johnson City EFO	4	4	4				

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreconn Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
LICK001.0GE	Lick Creek	Ambient	TN06010108035_1000	Johnson City EFO	4	4	4				
SINKI000.5GE	Sinking Creek	Ambient	TN06010108064_1000	Johnson City EFO	4	4	4				
RICHL001.3GE	Richland Creek	Ambient	TN06010108102_1000	Johnson City EFO	4	4	4				
LLIME007.0WN	Little Limestone Creek	Ambient	TN06010108510_2000	Johnson City EFO	4	4	4				
CLINC166.5T0.2HK	Unnamed Trib to Clinch River	303(d)	TN06010205013_0200	Johnson City EFO					1		1
tbd26	Big Creek	Watershed	TN06010205013_0400	Johnson City EFO					1		1
SWAN000.5HK	Swan Creek	303(d)	TN06010205013_0500	Johnson City EFO					1		1
RHEA000.2HK	Rhea Branch	303(d)	TN06010205013_0600	Johnson City EFO	5				1		1
BRIER000.5HK	Brier Creek	303(d)	TN06010205013_0700	Johnson City EFO	12	12			1		1
GROCK000.1HK	Greasy Rock Creek	303(d)	TN06010205013_0800	Johnson City EFO	12	12			1		1
CLINC175.8HK	Clinch River	Watershed	TN06010205013_1000	Johnson City EFO	12	12			1		1
PANTH000.1HK	Panther Creek	303(d)	TN06010205013_1100	Johnson City EFO	12			1			1
EFPAN000.1HK	East Fork Panther Creek	303(d)	TN06010205013_1120	Johnson City EFO	12	12			1		1
RICHA000.7HK	Richardson Creek	Watershed	TN06010205013_1300	Johnson City EFO	12	12			1		1
BYRD001.5HS	Byrd Creek	Watershed	TN06010205013_1320	Johnson City EFO					1		1
RICHA000.2HK	Richardson Creek	Watershed	TN06010205014_0300	Johnson City EFO	12			1			1
FGAP000.9HK	Flat Gap Creek	303(d)	TN06010205014_0500	Johnson City EFO	12		12		1		1
LWAR000.1HK	Little War Creek	Watershed	TN06010205014_0600	Johnson City EFO	12			1			1
CLINC189.7T0.1HK	Unnamed Trib to Clinch River	303(d)	TN06010205016_0100	Johnson City EFO	5			1			1
NFCLI000.1HK	North Fork Clinch River	303(d)	TN06010205016_0200	Johnson City EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
WAR000.6HK	War Creek	Watershed	TN06010205016_0400	Johnson City EFO	12	12			1		1
CLINC189.8HK	Clinch River	Ambient/ 303(d)	TN06010205016_1000	Johnson City EFO	12	12	12		1		1
BLACK000.1HK	Blackwater Creek	303(d)	TN06010205057_1000	Johnson City EFO	12	12			1		1
BLACK016.9HK	Blackwater Creek	Watershed	TN06010205057_2000	Johnson City EFO					1		1
ECO67F16	Hardy Creek	ECO	TN06010206 In VA	Johnson City EFO	4	4	4	2	2	1	2
FECO67F04	Sutton Branch	FECO	TN06010206007_0500	Johnson City EFO	4	4	4	2	2	1	2
ECO67F23	Martin Creek	ECO	TN06010206007_0700	Johnson City EFO	4	4	4	2	2	1	2
MULBE000.3HK	Mulberry Creek	303(d)	TN06010206007_0800	Johnson City EFO	12	12			1	1	1
LMULB000.3HK	Little Mulberry Creek	303(d)	TN06010206007_0810	Johnson City EFO	12	12			1		1
POWEL103.3HK	Powell River	Ambient	TN06010206007_2000	Johnson City EFO	4	4	4				
ECO67F14	Powell River	ECO	TN06010206007_2000	Johnson City EFO	4	4	4	2	2	1	2
tbd1	Gum Fork	Watershed	TN05130101007_0200	Knoxville EFO					1		1
JELLI026.0SC	Jellico Creek	Watershed	TN05130101007_1000	Knoxville EFO					1		1
CLEAR021.0CA	Clear Fork	Watershed	TN05130101015_1000	Knoxville EFO					1		1
CLEAR020.7CA	Clear Fork	Watershed	TN05130101015_1000	Knoxville EFO	12	12	12				
CLEAR030.5CA	Clear Fork	303(d)	TN05130101015_2000	Knoxville EFO	5						
WOAK000.7CA	White Oak Creek	303(d)	TN05130101016_0100	Knoxville EFO	12	12			1		1
DAVIS000.6CA	Davis Creek	303(d)	TN05130101016_0200	Knoxville EFO	12	12			1		1
ROCK000.4CA	Rock Creek	Watershed	TN05130101016_0300	Knoxville EFO					1		1
LOUSE000.2CA	Louse Creek	Watershed	TN05130101016_0400	Knoxville EFO					1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
STINK000.3CA	Stinking Creek	Watershed	TN05130101016_0500	Knoxville EFO	5				1		1
ECO69E04	Stinking Creek	ECO	TN05130101016_0550	Knoxville EFO		4	4	2	2	1	2
LAURE000.1CA	Laurel Fork	Watershed	TN05130101016_0600	Knoxville EFO					1		1
*	No Business Branch	Watershed	TN05130101016_0700	Knoxville EFO							
HICKO001.4CA	Hickory Creek	Watershed	TN05130101016_1000	Knoxville EFO	12	12			1		1
HICKO010.1CA	Hickory Creek	303(d)	TN05130101016_2000	Knoxville EFO	5				1		1
EFORK000.1CA	Elk Fork Creek	303(d)	TN05130101091_0100	Knoxville EFO	12	12			1		1
LELK000.1CA	Little Elk Creek	303(d)	TN05130101091_0200	Knoxville EFO	12	12			1		1
ELK002.0CA	Elk Fork Creek	303(d)	TN05130101091_1000	Knoxville EFO	5				1		1
ELK002.0CA	Elk Creek	303(d)	TN05130101091_1000	Knoxville EFO	12	12			1		1
WILLIA006.2SC	Williams Creek	Watershed	TN05130104013_0210	Knoxville EFO					1		1
tbd6	Bandy Creek	Discharge	TN05130104013_0300	Knoxville EFO					1		1
*	No Business Creek	Watershed	TN05130104013_0500	Knoxville EFO							
BSFOR070.0SC	Big South Fork Cumberland River	Watershed	TN05130104013_1000	Knoxville EFO	12	12			1		1
ECO68A03	Laurel Fork of Station Camp Creek	SEMN	TN05130104016_0100	Knoxville EFO		4	4	2	2	1	2
*	Station Camp Creek	Watershed	TN05130104016_1000	Knoxville EFO							
*	Laurel Fork	Watershed	TN05130104019_0600	Knoxville EFO							
CFORK003.8SC	Clear Fork River	Watershed	TN05130104026_1000	Knoxville EFO	12	12			1		1
BWOLF000.1MG	Black Wolf Creek	Watershed	TN05130104032_0100	Knoxville EFO					1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
BCAMP002.2MG	Bone Camp Creek	Watershed	TN05130104032_0500	Knoxville EFO					1		1
LITTL000.1MG	Little Creek	Watershed	TN05130104032_0600	Knoxville EFO					1		1
WOAK005.7MG	White Oak Creek	Watershed	TN05130104032_1000	Knoxville EFO					1		1
WOAK015.7MG	White Oak Creek	Watershed	TN05130104032_2000	Knoxville EFO	12	12			1		1
PHILL000.3SC	Phillips Branch	Discharge	TN05130104037_0100	Knoxville EFO	12	12			1		1
PROCK001.0SC	Paint Rock Creek	Watershed	TN05130104037_0300	Knoxville EFO					1		1
ECO69D06	Round Rock Creek	ECO	TN05130104037_0610	Knoxville EFO		4	4	2	2	1	2
NEW008.8SC	New River	Watershed	TN05130104037_1000	Knoxville EFO	12	12			1		1
SMOKY002.5SC	Smoky Creek	Watershed	TN05130104037_1850	Knoxville EFO					1		1
ECO69D05	New River	ECO	TN05130104037_3000	Knoxville EFO		4	4	2	2	1	2
MILL000.6SC	Mill Creek	Watershed	TN05130104038_0200	Knoxville EFO					1		1
BRIMS009.2SC	Brimstone Creek	Watershed	TN05130104038_1000	Knoxville EFO					1		1
BRIMS013.9SC	Brimstone Creek	Watershed	TN05130104038_2000	Knoxville EFO					1		1
STRAI001.9SC	Straight Fork	Watershed	TN05130104044_0500	Knoxville EFO					1		1
BUFFA004.2SC	Buffalo Creek	Watershed	TN05130104044_1000	Knoxville EFO					1		1
NFPIN000.3SC	North Fork Pine Creek	Advisory	TN05130104048_0200	Knoxville EFO	5						
LITTO000.2SC	Litton Fork Pine Creek	Advisory	TN05130104048_0300	Knoxville EFO	5						
EFPIN000.1SC	East Fork Pine Creek	Advisory	TN05130104048_0400	Knoxville EFO	5						
PINE10.0T0.4SC	Unnamed Trib to East Fork Pine Creek	Advisory	TN05130104048_0410	Knoxville EFO	5						

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
SFPIN000.3SC	South Fork Pine Creek	Advisory	TN05130104048_0500	Knoxville EFO	5						
PINE002.5SC	Pine Creek	303(d)	TN05130104048_1000	Knoxville EFO	5				1		1
PINE003.6SC	Pine Creek	Advisory	TN05130104048_2000	Knoxville EFO	12	12			1		1
PINE006.5SC	Pine Creek	Advisory/ 303(d)	TN05130104048_2000	Knoxville EFO	12	12			1	1	1
PINE007.9SC	Pine Creek	Advisory/ 303(d)	TN05130104048_3000	Knoxville EFO	12	12			1	1	1
LOVE002.2KN	Love Creek	303(d)	TN06010104001_0100	Knoxville EFO	12	12			1		1
ROSEB000.6KN	Roseberry Creek	303(d)	TN06010104001_0500	Knoxville EFO	5				1		1
BUFFA000.2GR	Buffalo Creek	Watershed	TN06010104001_0600	Knoxville EFO	12	12			1		1
LOST000.7JE	Lost Creek	303(d)	TN06010104001_0800	Knoxville EFO	12	12			1	1	1
BEAVE000.4JE	Beaver Creek	303(d)	TN06010104001_0900	Knoxville EFO	12	12			1	1	1
HOLST001.8KN	Holston River	Watershed	TN06010104001_1000	Knoxville EFO	12	12					
New station TBD by EFO downstream of Valley Proteins possible old TVA at RM 0.1	Lyon Creek	Discharge	TN06010104001_1300	Knoxville EFO					1		1
SWANP000.8KN	Swanpond Creek	303(d)	TN06010104001_1400	Knoxville EFO	5				1		1
HOLST051.9GR instead of HOLST051.1GR	Holston River	303(d)	TN06010104001_2000	Knoxville EFO	12	12					
FALL003.2HA	Fall Creek	303(d)	TN06010104004T_1900	Knoxville EFO	12	12			1		1
STUBB002.5HA	Stubblefield Creek	303(d)	TN06010104004T_2220	Knoxville EFO					1		1
TURKE001.7HA	Turkey Creek	Advisory/ 303(d)	TN06010104004T_2300	Knoxville EFO	12	12			1		1
MOSSY001.3JE	Mossy Creek	303(d)	TN06010104004T_2600	Knoxville EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
RICHL000.8GR	Richland Creek	303(d)	TN06010104018_1000	Knoxville EFO	12	12			1		1
LFLAT000.3KN	Little Flat Creek	303(d)	TN06010104019_0100	Knoxville EFO	5				1		1
CROOK000.2UN	Crooked Run	Watershed	TN06010104019_0999	Knoxville EFO	5						
FLAT000.4KN	Flat Creek	303(d)	TN06010104019_1000	Knoxville EFO	12	12			1	1	1
FLAT013.0UN	Flat Creek	303(d)	TN06010104019_1000	Knoxville EFO	12	12			1		1
FLAT015.3UN	Flat Creek	303(d)	TN06010104019_2000	Knoxville EFO	5				1		1
FBROA095.9CO	French Broad River	Ambient	TN06010105001_4000	Knoxville EFO	4	4	4				
FBROA003.8KN	French Broad River	Ambient	TN06010107001_1000	Knoxville EFO	4	4	4				
TENNE643.3KN	Fort Loudoun Reservoir	Ambient	TN06010201020_1000	Knoxville EFO	4	4	4				
ECO66G05	Little River	SEMN	TN06010201032_3000	Knoxville EFO		4	4		2	1	2
ECO67F13	White Creek	SEMN	TN06010205001T_0300	Knoxville EFO		4	4	2	2	1	2
ECO67F27	Indian Creek	ECO	TN06010205011_1000	Knoxville EFO		4	4	2	2	1	2
CLINC159.7CL	Clinch River	Watershed	TN06010205013_1000	Knoxville EFO	12	12		1			1
BSYCA009.8CL	Big Sycamore Creek	303(d)	TN06010205059_1000	Knoxville EFO					1		1
LSYCA001.6CL	Little Sycamore Creek	303(d)	TN06010205061_1000	Knoxville EFO	12	12			1		1
LSYCA002.6CL	Little Sycamore Creek	303(d)	TN06010205061_1000	Knoxville EFO	12	12			1		1
OLLIS000.1CA	Ollis Creek	Watershed	TN06010205064_0100	Knoxville EFO					1		1
BIG017.8CA	Big Creek	303(d)	TN06010205064_2000	Knoxville EFO	12	12			1	1	1
TITUS000.1CA	Titus Creek	Watershed	TN06010205305_0200	Knoxville EFO					1		1
COVE018.0CA	Cove Creek	Watershed	TN06010205305_1000	Knoxville EFO					1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
OTOWN003.0CL	Old Town Creek	303(d)	TN06010206006_0100	Knoxville EFO	5				1		1
GAP008.1CL	Gap Creek	303(d)	TN06010206006_0250	Knoxville EFO	12	12			1		1
BLAIR000.1CL	Blairs Creek	Watershed	TN06010206006_0300	Knoxville EFO					1		1
POWEL065.5CL	Powell River	Watershed	TN06010206006_1000	Knoxville EFO	12	12					
LITTL000.1CL	Little Creek	303(d)	TN06010206007_0100	Knoxville EFO	12	12			1		1
POWEL067.8CL	Powell River	Watershed	TN06010206007_1000	Knoxville EFO					1		1
RUSSE000.5CL	Russell Creek	303(d)	TN06010206008_1000	Knoxville EFO	12	12			1		1
RUSSE003.0CL	Russell Creek	303(d)	TN06010206008_2000	Knoxville EFO	12	12			1		1
INDIA000.1CL	Indian Creek	Watershed	TN06010206024_1000	Knoxville EFO	12	12			1		1
CAWOO000.2CL	Cawood Branch	303(d)	TN06010206026_0100	Knoxville EFO	12	12			1		1
RUSSE000.3CL	Russell Branch	303(d)	TN06010206026_0200	Knoxville EFO	12	12			1		1
DAVIS011.1CL	Davis Creek	303(d)	TN06010206026_1000	Knoxville EFO	12	12			1	1	1
DAVIS016.2CL	Davis Creek	303(d)	TN06010206026_2000	Knoxville EFO	5				1		1
DAVIS020.5CL	Davis Creek	303(d)	TN06010206026_3000	Knoxville EFO	12	12			1		1
DAVIS022.6CL	Davis Creek	303(d)	TN06010206026_4000	Knoxville EFO	12	12			1		1
DAVIS024.1CL	Davis Creek	303(d)	TN06010206026_5000	Knoxville EFO	5				1		1
CLINC010.0RO	Clinch River Arm of Watts Bar Reservoir	Ambient	TN06010207001_1000	Knoxville EFO	4	4	4				
ECO67F06	Clear Creek	SEMN	TN06010207019_0200	Knoxville EFO		4	4		2	1	2
CAPUC001.9CA	Capuchin Creek	Watershed	TN05130101007 0100	Knoxville EFO					1		1
NEW045.0AN	New River	Watershed	TN05130104037 2000	Knoxville EFO	12	12	12				

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreccon Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
SKIPP001.3HR	Skipper Creek	Watershed	TN08010207001_0100	Memphis EFO				1			1
MAGBE001.8HR	Magbee Branch	Watershed	TN08010207001_0400	Memphis EFO				1			1
HATCH174.2HR	Hatchie River	Discharge	TN08010207001_1000	Memphis EFO	12	12			1		1
COLON001.8HR	Colonel Fork	303(d)	TN08010207003_0100	Memphis EFO	12	12			1		1
COLON4.1T0.5HR	Unnamed Trib to Colonel Fork	303(d)	TN08010207003_0120	Memphis EFO					1		1
MUDDY001.1HR	Muddy Creek	303(d)	TN08010207003_1000	Memphis EFO	12	12			1		1
LHATC003.1HR	Little Hatchie Creek	Watershed	TN08010207035_1000	Memphis EFO	12	12			1	1	1
TSPRI001.4HR	Talley Spring Branch	303(d)	TN08010207072_0300	Memphis EFO					1		1
CYPRE005.5HR	Cypress Creek	Watershed	TN08010207072_1000	Memphis EFO	12	12			1		1
DRY001.0HR	Dry Branch	303(d)	TN08010208001_0600	Memphis EFO							
HAYES003.3HR	Hayes Branch	Watershed	TN08010208001_0700	Memphis EFO					1		1
WADE002.2HR	Wade Creek	Watershed	TN08010208001_0800	Memphis EFO					1		1
HATCH009.1TI	Hatchie River	Ambient	TN08010208001_1000	Memphis EFO	4	4	4				
*	Unnamed Trib to Cub Creek	303(d)	TN08010208001_1110	Memphis EFO							
CUB005.3HR	Cub Creek	303(d)	TN08010208001_1150	Memphis EFO	12	12	12		1		1
SHORT1.7T0.1HR	Short Creek	Discharge	TN08010208001_1500	Memphis EFO		12	12		1		1
SHORT004.7HR*	Short Creek	303(d)	TN08010208001_1550	Memphis EFO							
GAMBL002.1HR	Gamble Branch	303(d)	TN08010208001_1700	Memphis EFO							
HICKO001.7HR	Hickory Creek	303(d)	TN08010208001_1800	Memphis EFO	12	12			1		1
HATCH038.6TI	Hatchie River	Watershed	TN08010208001_2000	Memphis EFO	12	12	12		1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreconn Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
HATCH055.0TI	Hatchie River	Watershed	TN08010208001_2000	Memphis EFO	12	12	12		1		1
HATCH147.9HR	Hatchie River	Watershed	TN08010208001_3000	Memphis EFO	12	12	12		1		1
MYRON001.8TI	Myron Creek	303(d)	TN08010208002_0500	Memphis EFO	12	12			1		1
MYRON1.7T0.6TI	Unnamed Trib to Myron Creek	303(d)	TN08010208002_0510	Memphis EFO	12	12			1		1
CANE001.9TI	Cane Branch	303(d)	TN08010208002_0600	Memphis EFO	12	12			1		1
HURRI000.4TI	Hurricane Creek	Watershed	TN08010208002_0900	Memphis EFO		12			1		1
EFHUR000.1TI	East Fork Hurricane Creek	Watershed	TN08010208002_0910	Memphis EFO		12			1		1
INDIA1C5.0TI	Indian Creek	303(d)	TN08010208002_1000	Memphis EFO	12	12			1		1
PRICE002.2FA	Price Branch	Watershed	TN08010208007_0100	Memphis EFO	12	12			1		1
CATRO003.1FA	Catron Creek	303(d)	TN08010208007_0200	Memphis EFO	12	12			1		1
SMART001.0FA	Smart Creek	303(d)	TN08010208007_0300	Memphis EFO	12	12			1		1
BMUDD7.2T0.6HY	Unnamed Trib to Big Muddy Creek	303(d)	TN08010208007_0400	Memphis EFO	12	12			1		1
BMUDD014.1FA	Big Muddy Creek	303(d)	TN08010208007_2000	Memphis EFO	12	12			1		1
LITTL001.3FA	Little Creek	303(d)	TN08010208011_0100	Memphis EFO	12	12			1		1
BEAR009.6FA	Bear Creek	303(d)	TN08010208011_2000	Memphis EFO	12	12			1		1
ODAIN000.3HR*	Oak Dain Creek	303(d)	TN08010208015_0100	Memphis EFO							
CLEAR003.4HR	Clear Creek	Watershed	TN08010208015_1000	Memphis EFO		12			1		1
POTTE000.4HR	Potters Creek	303(d)	TN08010208017_0100	Memphis EFO					1		1
PRUN001.0HR	Pleasant Run	Watershed	TN08010208017_1000	Memphis EFO		12					
EFSPR007.7HR	East Fork Spring Creek	Watershed	TN08010208019_0400	Memphis EFO				1			1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreccon Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
ECO65E11	West Fork Spring Creek	ECO	TN08010208019_0500	Memphis EFO		4	4	2	2	1	2
SAULS006.0HR	Saulsbury Creek	Watershed	TN08010208019_0510	Memphis EFO				1			1
CASH001.0HR	Cash Creek	Watershed	TN08010208019_0520	Memphis EFO				1			1
ECO65E10	Marshall Creek	ECO	TN08010208019_0610	Memphis EFO		4	4	2	2	1	2
SPRIN004.0HR	Spring Creek	Watershed	TN08010208019_1000	Memphis EFO	12	12			1		1
HUDSO000.3HR*	Hudson Branch	303(d)	TN08010208024_0210	Memphis EFO							
STEWA001.0HR	Stewart Branch	Watershed	TN08010208024_0400	Memphis EFO					1		1
DRY000.3HR	Dry Branch	Watershed	TN08010208024_0500	Memphis EFO					1		1
PORTE004.4HR	Porters Creek	Watershed	TN08010208024_1000	Memphis EFO				1			1
PINEY002.0HR*	Piney Creek	303(d)	TN08010208027_1000	Memphis EFO							
GRAYS7.0T0.9HR*	Unnamed Trib to Grays Creek	303(d)	TN08010208028_0100	Memphis EFO							
DRY001.2HR*	Dry Creek	303(d)	TN08010208029_0100	Memphis EFO							
SANDY000.7HR	Sandy Creek	Watershed	TN08010208029_0200	Memphis EFO				1			1
CYPRE000.8HR	Cypress Creek	Watershed	TN08010208029_0400	Memphis EFO				1			1
PUGH000.6HR	Pugh Creek	Watershed	TN08010208029_0500	Memphis EFO				1			1
CLOVE002.1HR	Clover Creek	303(d)	TN08010208029_1000	Memphis EFO	12	12			1		1
CAMP001.9LE	Camp Creek	303(d)	TN08010208033_0100	Memphis EFO	12	12			1		1
CANE002.5LE	Cane Creek	303(d)	TN08010208034_1000	Memphis EFO	12	12	12		1		1
FLAT001.8TI	Flat Creek	303(d)	TN08010208056_1000	Memphis EFO	12	12			1		1
MATHI004.6TI	Mathis Creek	303(d)	TN08010208065_1000	Memphis EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
PUGH000.2HR	Pugh Creek	303(d)	TN08010208066_0100	Memphis EFO	12	12			1		1
RICHL001.8TI	Richland Creek	303(d)	TN08010208073_1000	Memphis EFO	12	12			1		1
TOWN002.3TI	Town Creek	303(d)	TN08010208896_1000	Memphis EFO	12	12			1		1
LOOSA005.0SH	Loosahatchie River	Ambient	TN08010209001_1000	Memphis EFO	4	4	4				
LOOSA1C28.6SH	Loosahatchie River	Ambient	TN08010209004_1000	Memphis EFO	4	4	4				
LOOSA1C53.6FA	Loosahatchie River	Ambient	TN08010209011_2000	Memphis EFO	4	4	4				
WOLF000.7SH	Wolf River	Ambient	TN08010210001_1000	Memphis EFO	4	4	4				
WOLF031.4SH	Wolf River	Ambient	TN08010210003_1000	Memphis EFO	4	4	4				
WOLF072.6FA	Wolf River	Ambient	TN08010210009_2000	Memphis EFO	4	4	4				
NONCO001.8SH	Nonconnah Creek	Ambient	TN0801021100711_1000	Memphis EFO	4	4	4				
WOLFP000.1AN*	Wolfpen Branch	Watershed	TN05130104037_1110	Mining Section							
NEW045.0AN	New River	Watershed	TN05130104037_2000	Mining Section			4				
CUCKL001.7CA	Cuckle Creek	303(d)	TN06010205001T_0200	Mining Section					1		1
THOMP001.5CA	Thompson Creek	303(d)	TN06010205064_0110	Mining Section					1		1
BRUCE004.0CA	Bruce Creek	303(d)	TN06010205COVELAKET_0100	Mining Section					1		1
RHOUS001.2HS	Red House Branch	Watershed	TN06010104004T 0600	Mining Section					1		1
WFDRA43.9T1.4SR*	Unnamed Trib to West Fork Drakes Creek	303(d)	TN05110002008_0550	Nashville EFO							
DONOH000.4SR	Donoho Branch	303(d)	TN05110002008_0600	Nashville EFO	12	12			1		1
WFDRA034.9SR	West Fork Drakes Creek	303(d)	TN05110002008_1000	Nashville EFO					1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
MFDRA27.6T0.2SR	Unnamed Trib to Middle Fork Drakes Creek	303(d)	TN05110002009_0200	Nashville EFO	12	12			1		1
MFDRA027.6SR	Middle Fork Drakes Creek	303(d)	TN05110002009_2000	Nashville EFO	5				1		1
DAVIS000.8SR*	Davis Branch	303(d)	TN05110002010_0300	Nashville EFO							
LTRAM006.0SR	Little Trammel Creek	Discharge	TN05110002010_0500	Nashville EFO	12	12					
LTRAM008.7SR	Little Trammel Creek	303(d)	TN05110002010_0550	Nashville EFO	12	12			1		1
*	City Lake Portland	303(d)	TN05110002CITYLKPO_1000	Nashville EFO							
*	City Lake Westmoreland	303(d)	TN05110002CTYLKW_1000	Nashville EFO							
CUMBE262.9WS	Old Hickory Reservoir	Ambient	TN05130201001_1000	Nashville EFO	4	4	4				
RANKI001.7SR	Rankin Branch	303(d)	TN05130201001T_0100	Nashville EFO	12	12			1		1
TOWN000.3SR	Town Creek	303(d)	TN05130201001T_0200	Nashville EFO	12	12			1		1
CUMBE246.5T1.5SR	Unnamed Trib to Old Hickory Reservoir	303(d)	TN05130201001T_0400	Nashville EFO	12	12			1		1
BRUNL001.5WS	Brunley Branch	303(d)	TN05130201001T_1600	Nashville EFO					1		1
DFORK001.2WS	Dry Fork Branch	303(d)	TN05130201001T_1700	Nashville EFO					1		1
SSPRI000.1WS	Silver Spring Branch	303(d)	TN05130201011_0100	Nashville EFO					1		1
FECO71I06	Unnamed Trib to Cedar Creek	FECO	TN05130201011_0200	Nashville EFO		4		2	2	1	2
CEDAR5.6T0.9WS*	Unnamed Trib to Cedar Creek	303(d)	TN05130201011_1100	Nashville EFO							
BLACK000.1WS	Black Branch	303(d)	TN05130201013_0300	Nashville EFO	12	12			1		1
SPRIN024.8WS	Spring Creek	303(d)	TN05130201013_3000	Nashville EFO	5						
FECO71I02	Young Branch	FECO	TN05130201015_0300	Nashville EFO		4	4	2	2	1	2

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
ECO71I12	Cedar Creek	ECO/303(d)	TN05130201015_1000	Nashville EFO	5	4	4	2	2	1	2
NEAL000.1WS	Neal Branch	303(d)	TN05130201021_0300	Nashville EFO	5						
BLOG000.6WS	Beech Log Creek	303(d)	TN05130201021_0400	Nashville EFO	5						
RLICK019.4WS	Round Lick Creek	303(d)	TN05130201021_2000	Nashville EFO	12	12			1		1
RLICK021.0WS	Round Lick Creek	303(d)	TN05130201021_3000	Nashville EFO	5				1		1
DESHE000.4SR	Deshea Creek	Watershed	TN05130201035_0100	Nashville EFO					1		1
BLEDS009.9SR	Bledsoe Creek	Watershed	TN05130201035_1000	Nashville EFO	12						
LIBER001.3SR	Liberty Branch	303(d)	TN05130201041_0100	Nashville EFO	12	12			1		1
ECAMP005.0SR	East Camp Creek	303(d)	TN05130201041_1000	Nashville EFO					1		1
DRAKE5.3T0.4SR*	Unnamed Trib to Drakes Creek	303(d)	TN05130201047_0100	Nashville EFO							
DRAKE6.1T0.2SR*	Unnamed Trib to Drakes Creek	303(d)	TN05130201047_0200	Nashville EFO							
DRAKE007.4SR	Drakes Creek	Watershed	TN05130201047_1000	Nashville EFO					1		1
SINKI000.1WS	Sinking Creek	303(d)	TN05130201055_0200	Nashville EFO	12	12			1		1
CUMBE174.5DA	Cheatham Reservoir	Ambient	TN05130202001_2000	Nashville EFO	4	4	4				
STONE003.9DA	Stones River	Ambient	TN05130203001_1000	Nashville EFO	4	4	4				
WFSTO006.2RU	West Fork Stones River	Ambient	TN05130203018_1000	Nashville EFO	4	4	4				
HARPE040.5CH	Harpeth River	Ambient	TN05130204009_1000	Nashville EFO	4	4	4				
DUNBA000.3MT	Dunbar Cave Creek	303(d)	TN05130206002_0100	Nashville EFO					1		1
ELK003.4RN	Elk Fork Creek	303(d)	TN05130206002_0200	Nashville EFO					1		1
SPRIN001.3RN	Spring Creek	303(d)	TN05130206002_0300	Nashville EFO	12	12			1	1	1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habitat Freq
BUZZA001.3RN	Buzzard Creek	303(d)	TN05130206002_0400	Nashville EFO	12	12			1		1
ECO71E14	Passenger Creek	ECO	TN05130206002_0600	Nashville EFO		4	4	2	2	1	2
SSPRI000.1MT	Seven Springs	303(d)	TN05130206002_0700	Nashville EFO	12	12			1		1
RED000.4MT	Red River	303(d)	TN05130206002_1000	Nashville EFO	12	12			1		1
RED025.4MT	Red River	303(d)	TN05130206002_2000	Nashville EFO	12	12			1		1
RED025.5MT	Red River	Ambient/ 303(d)	TN05130206002_3000	Nashville EFO	4	4	4		1		1
RED032.9RN	Red River	303(d)	TN05130206002_3000	Nashville EFO	12	12			1		1
RED044.0RN	Red River	303(d)	TN05130206002_4000 & _5000	Nashville EFO	12	12			1		1
CSPRI001.4RN	Chambers Spring Branch	303(d)	TN05130206003_0100	Nashville EFO					1		1
PEPPE000.4RN	Peppers Branch	303(d)	TN05130206003_0300	Nashville EFO					1		1
ECO71E18	Santee Creek	ECO	TN05130206003_0500	Nashville EFO		4	4	2	2	1	2
FECO71E02	Savage Branch	FECO	TN05130206003_0600	Nashville EFO		4	4	2	2	1	2
SULPH000.1RN	Sulphur Fork	Ambient	TN05130206003_1000	Nashville EFO	4	4	4				
WARTR000.3RN*	Wartrace Creek	303(d)	TN05130206003_1100	Nashville EFO							
WARTR001.1RN*	Wartrace Creek	303(d)	TN05130206003_1150	Nashville EFO					1		1
BLACK000.4RN	Black Branch	303(d)	TN05130206003_1200	Nashville EFO					1		1
CARR001.4RN	Carr Creek	303(d)	TN05130206003_1300	Nashville EFO	5				1		1
CARR10.4T0.3RN	Unnamed Trib to Carr Creek	303(d)	TN05130206003_1320	Nashville EFO	12	12			1		1
CARR005.2RN	Carr Creek	303(d)	TN05130206003_1350	Nashville EFO	5						
CARR010.0RN	Carr Creek	303(d)	TN05130206003_1355	Nashville EFO	12	12			1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
ECO71E19	Calebs Creek	ECO	TN05130206003_1400	Nashville EFO		4	4	2	2	1	2
MILLE007.3RN	Millers Creek	303(d)	TN05130206003_1550	Nashville EFO					1		1
ECO71E17	Brush Creek	ECO	TN05130206003_1700	Nashville EFO		4	4	2	2	1	2
SULPH021.2RN	Sulphur Fork	Discharge	TN05130206003_2000 & _3000	Nashville EFO	12	12			1		1
SULPH023.3RN	Sulphur Fork	303(d)	TN05130206003_4000	Nashville EFO	12	12			1		1
HONEY006.0RN	Honey Run	Watershed	TN05130206019_0300	Nashville EFO	12	12			1		1
EMPSO000.2RN	Empson Branch	303(d)	TN05130206019_0320	Nashville EFO	12	12			1		1
FREY000.5RN	Frey Branch	303(d)	TN05130206019_0321	Nashville EFO	12	12			1		1
HONEY009.5RN	Honey Run	Watershed	TN05130206019_0350	Nashville EFO					1		1
SFRED012.0RN	South Fork Red River	303(d)	TN05130206019_1000	Nashville EFO	5						
SFRED023.4RN	South Fork Red River	Watershed	TN05130206019_2000	Nashville EFO					1		1
SUMME006.7SR	Summers Branch	303(d)	TN05130206024_0150	Nashville EFO	12	12			1		1
BUNTI000.4RN	Buntin Branch	303(d)	TN05130206024_0200	Nashville EFO					1		1
RED081.8RN	Red River	303(d)	TN05130206024_1000	Nashville EFO	12	12			1		1
RED093.0SR	Red River	Watershed	TN05130206024_2000	Nashville EFO					1		1
RED095.6SR	Red River	Watershed	TN05130206024_3000	Nashville EFO					1		1
FLETC003.8MT	Fletchers Fork	Watershed	TN05130206034_0100	Nashville EFO					1		1
RACCO000.1MT	Raccoon Branch	Watershed	TN05130206034_0110	Nashville EFO					1		1
PINEY000.4MT	Piney Fork	Watershed	TN05130206034_0200	Nashville EFO					1		1
JORDA000.7MT	Jordan Creek	Watershed	TN05130206034_0210	Nashville EFO					1		1

DWR Station ID	Water Name	Project	WBID	EFO	Bacti Freq.	Nutrients Freq.	Metals Freq.	Bioreco n Freq.	SQSH Freq	Diatom Freq.	Habita t Freq
*	Noahs Spring Branch	303(d)	TN05130206034_0300	Nashville EFO							
LWEST002.8MT	Little West Fork	303(d)	TN05130206034_1000	Nashville EFO	12	12			1		1
LWEST010.5MT	Little West Fork	303(d)	TN05130206034_2000	Nashville EFO					1		1
SPRIN000.6MT	Spring Creek	303(d)	TN05130206039_0100	Nashville EFO	12	12			1		1
SPRIN13.7T0.4MT	Unnamed Trib to Spring Creek	303(d)	TN05130206039_0110	Nashville EFO	12	12			1		1
SPRIN009.8MT	Spring Creek	303(d)	TN05130206039_0150	Nashville EFO	12	12			1		1
WFRED005.0MT	West Fork Red River	303(d)	TN05130206039_1000	Nashville EFO	12	12			1		1

*No samples collected, waterbodies will be evaluated following guidelines in the Consolidated Assessment and Listing Methodology (TDEC, 2018)