STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0435

DAVID W. SALYERS, P.E.
COMMISSIONER

BILL LEE
GOVERNOR

MEMORANDUM

TO: Governor Bill Lee
Governor of the State of Tennessee

Lieutenant Governor Randy McNally
Speaker of the Senate

Speaker Cameron Sexton
Speaker of the House of Representatives

FROM: David W. Salyers, P.E.
Commissioner

DATE: January 31, 2022

SUBJECT: Annual Report on Potable Water Supplies in Tennessee Watersheds

Tennessee Code Annotated § 69-3-107 requires the Department of Environment and Conservation to prepare an annual report on the protection of potable water supplies in Tennessee watersheds.

Attached is your copy of this year's report.

Department of Environment & Conservation

PROTECTION OF POTABLE WATER SUPPLIES IN TENNESSEE WATERSHEDS

2021 Report

Prepared by:

Tennessee Department of Environment and Conservation
Division of Water Resources

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1.0 INITIALS AND ACRONYMS

ARAP	Aquatic Resource Alteration Permit
ARCF	Agricultural Resources Conservation Fund
BMP	Best Management Practice
CAFO	Concentrated Animal Feeding Operation
CPCRI	Clinch-Powell Clean Rivers Initiative
CTA	Conservation Technology Assistance
CWSRF	Clean Water State Revolving Fund
DOI	Department of Interior
DWSRF	Drinking Water State Revolving Fund
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERIC	Eastern Region Initiative on the Clinch
ETSU	East Tennessee State University
FSA	Farm Services Agency
GIS	Geographic Information System
HAB	Hazardous Algal Bloom
HDSS	High Definition Stream Survey
HUC	Hydrologic Unit Code
LID	Low Impact Development
LUM	Lands Unsuitable for Mining
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NPS	NonPoint Source
NRCS	Natural Resources Conservation Service
OSMRE	Office of Surface Mining, Reclamation, and Enforcement
PED	Petition Evaluation Document
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
QLP	Qualifying Local Program
RRAT	Runoff Reduction Assessment Tool
SDWA	Safe Drinking Water Act
SOC	Synthetic Organic Compound
SRF	State Revolving Fund

Initials & Acronyms (continued)

SWAP	Source Water Assessment Plan
TDA	Tennessee Department of Agriculture
TDEC	Tennessee Department of Environment and Conservation
TDH	Tennessee Department of Health
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TOC	Total Organic Carbon
TSMP	Tennessee Stream Mitigation Program
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
UD	Utility District
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
UT	University of Tennessee
WRTAC	Water Resources Technical Advisory Committee
WTRBA	West Tennessee River Basin Authority

2.0 INTRODUCTION

The Tennessee Department of Environment and Conservation (TDEC) prepared this report to fulfill the requirements of Tennessee Water Quality Control Act, T.C.A. 69-3-107(24) as amended in 2006:

> *69-3-107. Duties and authority of the commissioner.*
>
> *In addition to any power, duty, or responsibility given to the commissioner under this part, the commissioner has the power, duty, and responsibility to:*
>
> *(24) "Perform a thorough and ongoing study of, and prepare recommendations regarding options for, the protection of watersheds and the control of sources of pollution in order to assure the future quality of potable drinking water supplies throughout the state. The department is authorized to use information and studies from state, federal and local governments and other sources of reliable scientific data. Initial findings and recommendations shall be presented to the governor and the general assembly no later than February 1, 2007, and annually thereafter."*

This report presents a summary of some of the activities within the Division of Water Resources that TDEC uses in protecting water quality. As this report illustrates, TDEC: 1) has posted Watershed Water Quality Management Plans (watershed inventory reports) on the TDEC website, 2) reports on the status of water quality biennially, and 3) updates its water quality standards triennially. The documents associated with these three activities describe the condition of Tennessee's 55 watersheds and establish the criteria used to assess water quality in the state. In addition, TDEC requires public water systems to update source water protection/wellhead protection plans annually and submit updated reports/plans triennially.

This report is a summary of these documents as well as TDEC's ongoing programs to protect watersheds and control sources of pollution and—through a series of maps—illustrates the threats to drinking water supplies. Finally, as required by the 2006 amendment, several recommendations are presented for further protection of potable water supplies. A more thorough description of the items contained in the report is found on the department's web site.

Division of Water Resources Page:
https://www.tn.gov/environment/program-areas/wr-water-resources-home.html

Division of Water Resources, Watershed Stewardship Page:
https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship.html

Division of Water Resources, Watershed Management Approach Page:
https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/watershed-management-approach.html

Division of Water Resources, Water Quality Page:
https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality.html

Division of Water Resources, Drinking Water Program Page:
https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/drinking-water-redirect.html

Division of Water Resources, Source Water Assessment Page:
https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/source-water-assessment.html

Tennessee Department of Environment and Conservation American Rescue Plan Page
https://www.tn.gov/environment/arp.html

Activities related to watershed protection since the last Watershed Protection Report (2020) include:

- In state fiscal year 2021, the State Revolving Fund (SRF) loan program awarded 16 different communities low-interest loans totaling $84,739,000 for infrastructure improvements to drinking water and wastewater systems. These loans came with over $470,000 dollars in loan forgiveness.

- In 2020, TDEC was awarded funding from the Environmental Protection Agency in support of implementation of the Tennessee Nutrient Reduction Strategy. Through this grant, Tennessee is in the process of partnering with the Nature Conservancy (TNC), Tennessee Technological University (TTU), Middle Tennessee State University (MTSU) and Clean Water Ops in order to support the overall goal of understanding nutrients in Tennessee and reducing nutrient loss to the Gulf of Mexico. Due to the many restrictions in place regarding COVID-19, projects were delayed. In 2021, all projects were extended through calendar year 2022 in order to complete projects and to add in additional outreach components.

    - TNC - Advancing Nutrient Reduction Though Soil Health Outreach
    - TTU - Compilation and Analysis of long-term nitrogen and phosphorous monitoring data in Tennessee
    - MTSU – Create a Public Education Campaign Addressing Water Quality
    - Clean Water Ops - Municipal Wastewater Treatment Facility Optimization, Nutrient Reduction, and Energy Savings

- TDEC continues to mine its centralized databases for spatial information to create new GIS layers. Many of these layers are incorporated into GIS-based web applications that can be shared with staff and the public to provide better service and transparency. TDEC is looking into ways to coordinate with other state agencies to share data in various portals and data exchanges.

- TDEC is continuing to implement solutions to create a more mobile workforce that can conduct business from the field and on-the-go in order to increase efficiency and effectiveness.

- TDEC, through its UT facilitator, taught 11 Level I and 4 Level II classes along with and 9 recertification classes and an online offering of Level 1 recertification (totaling 2,953 students) in the Erosion Prevention and Sediment Control Training and Certification Program. The training is available to anyone interested in becoming certified for the purpose of conducting erosion protection and sediment control inspections for sites covered by a stormwater construction permit issued by TDEC and for anyone interested in preparation of Stormwaters Pollution Prevention Plans that are required to be submitted with a Notice of Intent for future construction activities. The training classes (Level I, Level II, and recertification) for contractors, developers, engineers, and other professionals are held virtually and in person across the state.

- A Green Development Grant cycle opened August 11, 2014 and all projects will be complete by January of 2022. Local governments in Tennessee were invited to submit proposals for grant funding to assist in implementing green infrastructure development projects. Green infrastructure refers to the use of systems and practices that use or mimic natural processes to infiltrate, re-use stormwater runoff generated at the site, or evapotranspire. Green infrastructure can be used in a wide range of landscape applications in place of, or in addition to, more traditional stormwater control measures. A total of $103,080 in grant funds were awarded to local governments through a competitive process for projects. In addition, the grant provides for outreach and education designed to promote green development in Tennessee communities. The grants required a 20 percent local match.

- TDEC continued to work with the TVA to implement riparian restoration projects in the Upper Elk River watershed and will expand into the Upper Duck River watershed. This multi-agency collaboration included TDEC, Tennessee Department of Agriculture (TDA), TVA, U.S. Fish and Wildlife Service (USFWS), Tennessee Wildlife Resources Agency (TWRA), Natural Resources Conservation Service (NRCS), Farm Services Administration (FSA), and Tennessee Stream Mitigation Program (TSMP).

- TDEC awarded two 604(b) Planning Grants in 2021:

    - East Tennessee Development District for a rural community engagement project in Cocke, Monroe and Union Counties in Tennessee.

    - Greater Nashville Regional Council for the development of watershed-based plans for a rapidly urbanizing middle Tennessee Region.

- TDEC, as part of a multi-agency collaboration to restore connectivity in aquatic ecosystems, reviews candidate river barriers such as culverts and low-head dams for removal or restoration. The members of the committee (TWRA, United States Army Corps of Engineers (USACE), TVA, TNC, USFWS, TDEC, Cumberland River Compact, American Rivers and others) meet twice per year to prioritize the list and seek funding to implement barrier removal. The prioritized list typically represents older roadway and driveway culverts and concrete or masonry weir-type structures, normally only a few feet tall that were built many years ago to power gristmills and small industries. The list does not include farm dams (unless requested by the owner/operator), water supply lakes or power-generating dams.

  Low head or run-of-river dams present a safety hazard to the public because of their capability of producing dangerous recirculating currents, large hydraulic forces, and other hazardous conditions sufficient to trap and drown victims immediately downstream from the overflowing water. Increasing numbers of kayakers, canoers, rafters, boaters, anglers, and swimmers are often unaware of, or underestimate, the dangerous forces and currents that these dams or similar hydraulic structures can produce. This type of barrier removal also eliminates barriers to fish migration, relieves stagnation, improves water quality, and increases biodiversity.

  In 2015 and 2016, two low-head dams in Davidson County were removed from Seven Mile Creek and Richland Creek. In 2017, a decrepit low head dam on the Roaring River in Jackson County was removed by the TWRA.

In 2019 through 2020, TDEC soft launched the Water Use Portal with University of Memphis. This Portal was funded by a USGS grant to capture regulated pumpage and water withdrawals in Tennessee. Public water systems were the first to participate in using the portal. Public water systems are required to submit monthly pumpage data from their facilities. There are currently 347 active systems reporting in the Portal.

- TDEC continued a collaborative project with the stakeholders, USGS, and EPA to explore TMDL or alternative plan options for the Harpeth River watershed. EPA delivered an initial Water Quality Analysis Simulation Program (WASP) model at the end of 2020 and worked with TDEC throughout 2021 to understand and improve on the modeling process. TDEC will continue to collaborate with the stakeholders in order to move this project forward in 2022.

- TDEC has been working with water systems to identify ones vulnerable to Harmful Algal Blooms (HAB) by sharing a list of indicators provided by EPA. Thirty-two systems were identified and TDEC continues to work to form partnerships with those systems and the private sector to address them. Sampling was conducted in the spring and summer of 2017. No significant occurrence of HAB and associated cyanotoxins were detected. TDEC continues surveillance and monitoring efforts through the use of EPA's Cyanobacteria Assessment Network (CyAN) and in 2018 formed a TN HAB interagency workgroup which includes stakeholders from USGS, USACE, TVA, TDA, TDH, TWRA, Tennessee State University (TSU), Middle Tennessee State University (MTSU), Tennessee Tech University, and Vanderbilt University. The Workgroup is tasked, in part, with evaluating predictive tools for HABs, and assisting in development of a response plan for a HABs toxic release in TN which includes agency roles, responsibilities and resources. TDEC has also employed USGS to assist TDEC in development and refinement of HAB model software.

- In 2018, Tennessee Gov. Bill Haslam assembled stakeholders from federal, state and local governments, as well as industry, academia, environmental advocacy groups and public utilities to develop a statewide plan for future water availability in Tennessee. The plan, named TN H2O, includes an assessment of current water

resources and recommendations to help ensure Tennessee has an abundance of water resources to support future and economic growth. More about the TN H2O Plan can be found here: https://www.tn.gov/environment/program-areas/wr-water-resources/tnh20.html

- TDEC delivered a final modeling report to the Duck River Agency and TVA as they continue to develop an Environmental Assessment on the effects of altered releases from Normandy Dam.

- A new general permit was issued on December 18, 2020, to fulfill the mandate of Public Chapter 589, specific to watershed activities where the site-specific design has been developed through full application of Tennessee's NRCS Practice Standard 580, Streambank and Shoreline Protection; and, NRCS Engineering Field Handbook, Chapter 16, Streambank and Shoreline Protection (NRCS Streambank Standards) – provided the activities are subject to NRCS oversight as a federal action. It is a general permit that requires the applicant to notify the Commissioner of the planned activity and receive a notice of coverage from the Commissioner prior to implementing the activity in accordance with the terms and conditions of the General Permit per Rule 0400-40-07-.04(1).

- The Division of Water Resources operates a Tennessee Plant Optimization Program free for all Tennessee municipalities. The program provides resources to support water and wastewater operators in achieving optimization in energy use and nutrient removal for their facilities through low-and-no-cost measures. Participants in this program are experiencing substantial cost savings and nutrient reduction in effluent. They've had additional successes: affordably avoiding rate increases, negating the need for costly capital improvements, and leveraging ongoing cost-savings for infrastructure and capital improvements. Four additional plants were included in the program in 2021.

- TDEC convenes the Nutrient Strategy Task Force of representatives from academia, state and local agencies, wastewater treatment plant operators, the private sector, and non-governmental organizations. Together, the task force is working to:
    - Prioritize watersheds

- Set nutrient load reduction goals
- Ensure effectiveness of point source permits
- Encourage nutrient reductions from urban runoff
- Establish monitoring programs to evaluate effectiveness
- Document and report implementation activities

3.0 TENNESSEE WATERSHEDS

3.1 Definition

A watershed can be defined as the entire land area that ultimately drains into a particular watercourse or body of water. Watersheds vary in shapes and sizes and are appropriate as organizational units because they are readily identifiable landscape units with readily identifiable boundaries that integrate terrestrial, aquatic, and geologic processes. Focusing on the whole watershed helps reach the best balance among efforts to control point source pollution and polluted runoff as well as protect drinking water sources and sensitive natural resources such as wetlands (EPA-840-R-98-001).

In the early 1970's, the USGS delineated 55 hydrologic watershed boundaries (HUC-8s, or 8-digit Hydrologic Unit Codes) within Tennessee. Proper names, as well as a unique grouping of numbers, are used to identify watersheds. For each watershed, this number is called the watershed's Hydrologic Unit Code, or HUC. The HUC can range from 2 to 16 digits long, more digits indicating that a smaller portion of the watershed is represented.

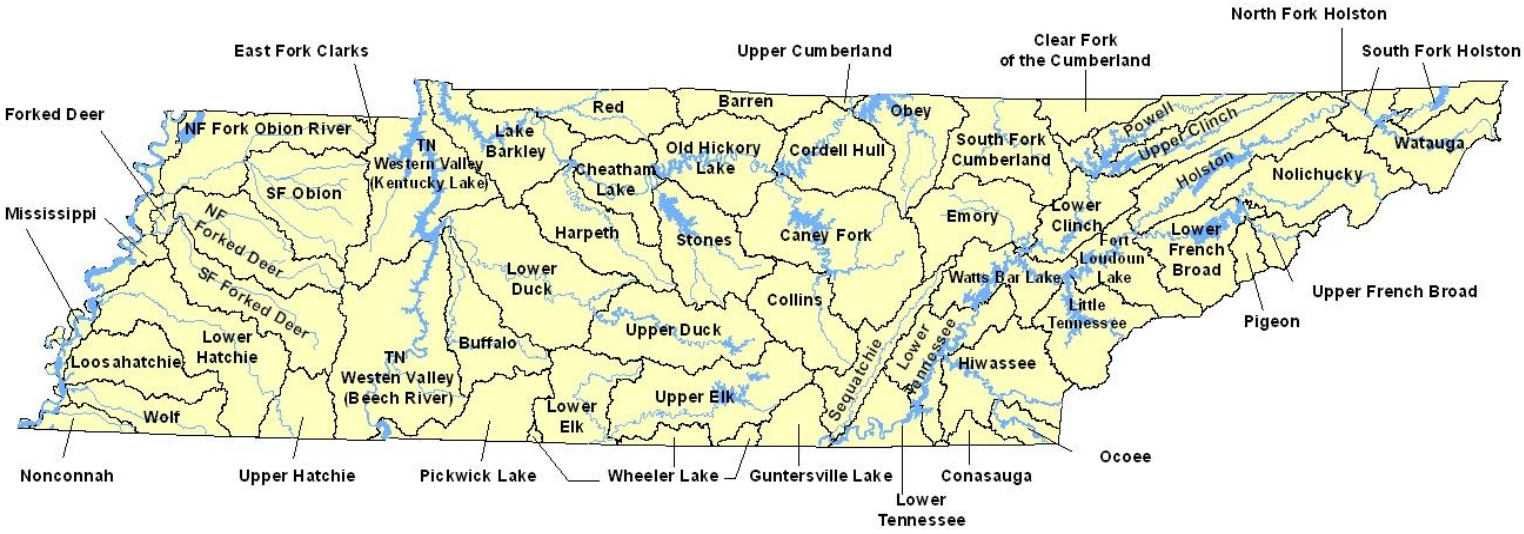

Figure 1 Watersheds in Tennessee: *Tennessee contains all or part of 55 HUC-8 watersheds which were delineated by the United States Geological Survey (USGS).*

3.2 The Watershed Approach

In 1996, Tennessee began the watershed approach with the goals of making processes more Efficient (administratively), more Effective (consistent with basic ecological principles), and more Equitable (increase consistency in management decisions). Today, the division continues to apply these 3-E principles as we synchronize planning, monitoring, water quality assessment, TMDL development, restoration plan development and permitting activities through a 5 year watershed cycle.

In Tennessee, activities such as permitting, planning, and monitoring are coordinated using the Watershed Approach. This Approach utilizes features already in state and federal law, such as Water Quality Standards, the permitting program (National Pollutant Discharge Elimination System, or NPDES), TMDLs, Nonpoint Source Program, and groundwater monitoring.

3.3 Watershed Planning

The 55 watersheds in Tennessee have been organized into five groups based on the year of implementation in a five-year cycle. The Division of Water Resources bases its activities for each group by the group's position in the cycle. The cycle also coincides with the issuance and duration of discharge permits.

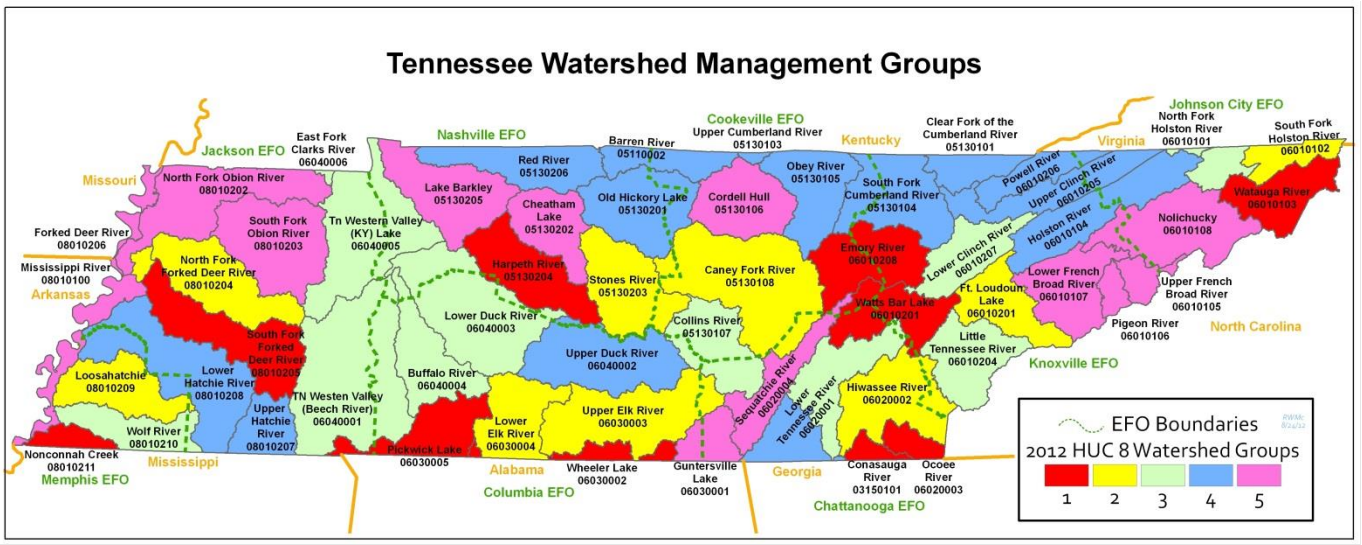

Figure 2 Watershed Management Groups in Tennessee: *Tennessee's watersheds are organized into five groups in the Watershed Approach.*

More information about Tennessee's Watershed Management Approach can be found on the department's website at: https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/watershed-management-approach/watershed-management-cycle.html

Figure 3 Watershed Approach Cycle: *Tennessee uses a five-year watershed cycle for watershed protection.*

The five key activities that take place during the five-year management cycle are:

1. Planning and Existing Data Review. Existing data and reports from appropriate agencies and organizations are compiled and used to describe the current conditions and status of lakes, rivers and streams. Reviewing existing data and comparing agencies' work plans guide the development of an effective monitoring strategy.

2. Water Quality Monitoring. Field data are collected for streams in the watershed. These data supplement existing data and are used for the water quality assessment.

3. Water Quality Assessment. Monitoring data are used to determine the status of the stream's designated use supports.

4. TMDL or Alternative (Restoration Plan) Development. Monitoring data and models (hydrologic and/or water quality) are used to analyze pollutant loads for permitted dischargers releasing wastewater in the watershed and to determine nonpoint source pollution contributions. The resulting TMDLs establish maximum allowable loadings of pollutants that a waterbody can receive while still meeting water quality standards. Alternatives to TMDLs that lead to waterbodies meeting water quality standards are also considered.

5. Permit Issuance. Issuance and expiration of discharge permits are synchronized based on watersheds. Currently, over 1,700 permits have been issued in Tennessee under the federally delegated National Pollutant Discharge Elimination System (NPDES) permit program.

Stakeholder involvement opportunities occur throughout the entire five-year cycle. Division of Water Resources Staff attend outreach events as opportunities become available. Tennessee's Watershed Approach, Watershed Water Quality Management Plans, updates, and public participation opportunities, are found on the web at: https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/watershed-management-approach.html

4.0 POINT AND NONPOINT SOURCE POLLUTION CHALLENGES TO WATERSHED PROTECTION

Water quality is impacted by both point and nonpoint source pollution. Tennessee uses the Watershed Approach to integrate point and nonpoint contributions in order to understand the challenges and identify the solutions necessary to improve water quality.

4.1 Point Sources of Pollution

Point Source pollutants are typically discharged through a discreet conveyance like a pipe or ditch. In the Clean Water Act, a point source is defined as any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, conduit, tunnel, well, discrete fissure, container, rolling stock, Concentrated Animal Feeding Operation (CAFO), landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

The Division of Water Resources has the authority to regulate this type of discharge through its NPDES program. Permits issued to municipalities, industries, and some agricultural operations are based on the protection of criteria set out in the state's water quality standards. More information about the point source permitting program is available at: https://www.tn.gov/environment/permit-permits/water-permits1/npdes-permits.html

4.1.A An Issue of Concern

Waters With Unavailable Parameters: Tennessee's list of impaired streams is a compilation of the streams and lakes in Tennessee's watersheds that are water quality-limited for a parameter or expected to exceed water quality standards in the next two years and need additional pollution controls. Water quality-limited streams are those that have one or more properties that violate water quality standards after consideration and implementation of technology-based effluent limitations. They are considered impaired by pollution and not fully meeting designated uses, and therefore unavailable for additional pollutant loading for that parameter.

Once a stream has been placed on the impaired list, it is considered a priority for water quality improvement efforts. These efforts include traditional regulatory approaches such as permit issuance, but also include efforts to control pollution sources that have historically been exempted from regulations, such as certain agricultural and forestry activities.

TDEC uses its regulatory authority to control point source pollution that are causes of impairment in watersheds. A new list of impaired waters was submitted to EPA in 2020.

TDEC's 2020 303(d) List of Impaired Waters can be found on the division's publications page: https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html

Stormwater: Stormwater runoff is generated from rain and snowmelt events that flow over land or impervious surfaces and does not soak into the ground. The runoff can pick up pollutants such as nutrients, pathogens, suspended sediment, metals, pesticides, organic material, and floating trash. The U.S. Environmental Protection Agency (EPA) and state water quality agencies recognized the significant impact that stormwater runoff has on surface waters.

As a result, the EPA promulgated the Phase I (1990) and Phase II (1999) NPDES stormwater regulations. These regulations enabled the EPA and authorized state permitting authorities to issue and enforce NPDES stormwater permits that require best management practices to control and treat pollutants from specific stormwater runoff discharges generated from industrial, construction and municipal activities.

The EPA has granted authorization to the state of Tennessee, Division of Water Resources, to implement the NPDES stormwater permitting program(s). Operators of specific industrial activities, construction activities and municipal systems are required to obtain, or receive coverage under, a Tennessee NPDES permit prior to discharging stormwater. More information about Tennessee's stormwater program can be found at: https://www.tn.gov/environment/permit-permits/water-permits1/npdes-permits1/npdes-stormwater-permitting-program.html

- **Stormwater Discharges from Industrial Activities**

  Runoff from rainfall or snowmelt that comes in contact with industrial activities such as material handling and storage, equipment maintenance and cleaning, and other industrial activities can pick up pollutants, and transport them directly to a nearby storm sewer systems or directly into surface waters. Tennessee's NPDES stormwater program requires operators to obtain permits for discharges from specific categories of industrial activity. In general, the permits require industrial site operators to make

sure proper stormwater controls and practices are in place and maintained to minimize or eliminate the transport of pollutants into surface waters.

- **Stormwater Discharges from Construction Activities**

  As stormwater flows over construction sites it can pick up pollutants like sediment, debris, and chemicals and transport them to nearby storm sewer systems or directly into surface waters. Tennessee requires construction site operators to obtain NPDES permits for discharges from construction activities that disturb one or more acres, and discharges from smaller sites that are part of a larger common plan of development or sale. The permits require that construction site operators implement proper stormwater controls to minimize or eliminate the transport of pollutants into surface waters.

- **Tennessee Qualifying Local Programs**

  A Qualifying Local Program (QLP) is a municipal stormwater management program that has been formally approved by the Tennessee Department of Environment and Conservation, Division of Water Resources, as having met specific federal and state NPDES erosion and sediment control program requirements together with a system acceptable to the department for sharing information as to the construction sites authorized by the qualified local program. A construction site operator located within the jurisdiction of an approved QLP who has obtained local authorization from such program shall be authorized under the *Tennessee's General NPDES Permit for Discharges of Stormwater Associated with Construction Activities*.

  The purpose of the QLP is to establish a streamlined and efficient process for managing discharges of stormwater associated with construction activities by eliminating duplication of effort between the State of Tennessee's and the local stormwater management programs. Obtaining QLP status is voluntary but encouraged. In 2021 Tennessee's QLPs included the Cities of Bristol, Cleveland, Cookeville, Franklin, Kingsport, Knoxville and Washington County.

- **Stormwater Discharges from Municipal Systems**

  Stormwater discharge from municipal systems is stormwater runoff that is transported through municipal separate storm sewer systems (MS4s) and discharges

to surface waters. To reduce or prevent harmful pollutants from being washed or dumped into the MS4s certain operators are required to obtain National Pollutant Discharge Elimination System (NPDES) permits and develop stormwater management programs that include stormwater controls to minimize the discharge of pollutants from the storm sewer system into surface waters.

The 1990 Phase I regulation requires NPDES permit coverage to address stormwater runoff from "medium" and "large" MS4s serving populations of 100,000 or greater. The 1999 Phase II program expanded the Phase I program by requiring additional operators of "small" MS4s located within the boundaries of "urbanized areas" as defined by the U.S. Bureau of the Census. Phase II also includes non-traditional MS4s such as public universities, departments of transportation, hospitals and prisons. Based on the 2010 Census and applicable water quality data there are 107 regulated stormwater collection systems operators in Tennessee.

Mining: Mining activity from coal and non-coal mine sites discharge mine treated wastewater and stormwater runoff. The Division's Mining Section issues NPDES permits for both coal and non-coal mining facilities with stringent effluent limits for the protection of the receiving streams and their classified uses. Activities at mine sites may also involve disturbance of water features such as streams and wetlands. These activities require an Aquatic Resource Alteration Permit (ARAP) and 401 Certification from the Division's Mining Section. Controlling these sources is critical to protecting waters and watersheds in our state.

Operators who engage in mineral mining and surface disturbances, as per the 1972 Tennessee Surface Mining Law, are required to obtain a state surface mining permit from the Tennessee Division of Water Resources - Mining Section. An NPDES permit must accompany the surface mining permit. In all counties, mining of the following minerals requires a surface mining permit: clay, stone, phosphate rock, metallic ore and any other solid material or substance of commercial value found in natural deposits on or in the earth. There are some exemptions for other minerals. More information about TDEC's mining program can be found at:
https://www.tn.gov/environment/permit-permits/water-permits.html .

Coal mining has a long history of economic importance to the Cumberland Plateau and east Tennessee communities, as well as a legacy of environmental impact.

Siltation/sedimentation, acid mine drainage (AMD), and metals from improper mining practices and controls can and has impacted some streams. Coal mining operations are required to conduct reclamation of the mine site. All such operations and permits must be in accordance with the federal Surface Mine Control and Reclamation Act of 1977 (SMCRA) and be consistent with the stream buffer zone requirement that the General Assembly enacted in 2009 known as the Responsible Miners' Act of Tennessee. This law prohibits mining or disposal of waste or overburden material into a stream or within 100 feet on either side of the stream. While wastewater and stormwater discharges from coal mines are regulated under the NPDES program in Tennessee, surface mining permits for coal mining in Tennessee are presently issued by the U.S. Department of Interior, Office of Surface Mining Reclamation and Enforcement (OSMRE).

In May of 2018, the Tennessee General Assembly passed the Primacy and Reclamation Act of Tennessee. This Act directed the Governor to pursue regulatory oversight over surface coal mining in the state, or Primacy. The Department is presently developing a state permitting and regulatory surface coal mining program that is as stringent and protective as the federal counterpart.

On October 1, 2010, the State of Tennessee filed a Lands Unsuitable for Mining (LUM) petition with the federal government requesting ridgelines on land managed for public use on the Northern Cumberland Plateau be deemed unsuitable for surface coal mining. The petition area reflected a ridgetop corridor encompassing 67,326 acres notable for its old growth forest as well as a diverse array of habitats and wildlife, some of which are considered rare or threatened. These lands are managed by the state for hunting, hiking, wildlife viewing, and other outdoor recreational activities. The petition asked the federal government to help prevent surface coal mining on these ridgelines to protect their important cultural, recreational, and scientific resources for future generations. Preventing surface mining on these ridgelines would also provide essential protection for vital headwater streams that supply key river systems, including Exceptional Tennessee Waters and Outstanding National Resource Waters.

On December 11, 2015, OSMRE and the Department of the Interior (DOI), upon finding merit to the state's petition, announced a draft proposal and draft EIS along with a 45-day public comment period, and released six action alternatives. Initially, the preferred alternative

chosen was Alternative 3. Under this alternative, OSMRE would have designated as unsuitable for surface coal mining all public lands in the State's petition. This would have included 505 miles of ridgelines with a 1200-foot corridor (600 feet on either side of each ridgeline) for a total of 67,326 acres. It would not have prohibited underground mining and auger mining that was based outside the petition area and would have allowed re-mining. Under this alternative, there was the potential to eliminate 183.7 of the 201.6 miles of high wall identified by re-mining.

Upon receiving public comments and subsequent evaluation by OSMRE, Alternative 4 was chosen. This alternative, the Expanded Corridor with Potential Re-mining and Road Access Alternative, designated 569 miles of ridgeline (1200-foot corridor) and includes 76,133 acres for protection. It included the ridgelines proposed in the state's petition plus additional ridgelines identified by OSMRE. With this new alternative, 219.5 miles of high wall are now subject to re-mining. This is an actual increase in the potential re-mining areas when compared to Alternative 3 with the added benefit of increased acreage and ridgelines for any new surface disturbance.

More information about the Lands Unsuitable for Mining petition is available at:
http://www.osmre.gov/programs/rcm/TNLUM.shtm

4.1.B Restoration Programs and Tools

Total Maximum Daily Loads (TMDLs). Section 303(d) of the Clean Water Act establishes the TMDL program which: 1) quantifies the amount of a pollutant in a stream, 2) identifies the sources of the pollutant, and 3) recommends regulatory or other actions that may need to be taken in order for the stream to cease being polluted. Some of the actions that might be taken are:

- Reallocation of 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 ensure that water quality standards will be met.

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

More information on Tennessee's TMDLs program is available on the TDEC web site: https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/tennessee-s-total-maximum-daily-load--tmdl--program.html

Abandoned Mine Lands (AML) Program: Abandoned coal mines pose serious threats to public health, safety and welfare as well as degrade the environment. The TDEC Abandoned Mine Lands Section accomplishes three important goals: 1) the removal of dangerous health and safety hazards that threaten the citizens of Tennessee, 2) the improvement of the aquatic environment, and 3) the restoration of the abandoned mine lands to make them available for economic development, recreation, and other uses. Problems typically addressed by the Abandoned Mine Lands Program include open or improperly filled mine shafts, dilapidated mine buildings and equipment, toxic mine refuse and acid mine drainage, landslides, coal refuse fires, highwalls and subsidence. Tennessee Code Annotated Section 59-8-324 authorizes the program. Although current mining operations often reclaim some scars from old mining operations during re-mining, this represents a small portion of the abandoned mine lands, and it rarely addresses the more serious threats to human health and safety for which the AML Program was established. More information can be found on the TDEC web site at: https://www.tn.gov/environment/program-areas/wr-water-resources/mining-information---permits.html.

State Revolving Fund (SRF) Loan Program. The Clean Water SRF program has awarded over 2 billion dollars in low-interest, subsidized loans since its inception in 1987. The program was created through an amendment to the Clean Water Act in an effort to address critical water infrastructure needs for cities, counties, and utility districts as assistance for the planning, design, and construction of sanitary wastewater facilities. Annually, loan dollars are provided to SRF by the U.S. EPA through capitalization grants which the State of Tennessee matches at 20% and from the state's revolving base. Revolving base dollars come from loan repayments returned to the program and are used

to further support water infrastructure needs. Tennessee annually publishes information on how we intend to use these dollars in the Intended Use Plan, and what communities are seeking funding from SRF, on the Priority Ranking List. Interested persons can visit the SRF website for more information.

The Drinking Water SRF program is Tennessee's drinking water infrastructure financing tool that brings needed aid to Tennessee communities for failing and aging drinking water infrastructure. Safe and healthy drinking water facilities are key to supporting our communities, particularly in rural TN. SRF can and does assist these communities in ensuring health and safety standards are met and facilities have the necessary means to supply the citizenry with clean drinking water. Like the Clean Water SRF program, Drinking Water (DW) SRF is a useful tool that provides millions of dollars in subsidized, low-interest loans annually to Tennessee communities in need of water infrastructure financing.

The DWSRF has awarded over 300 million dollars to communities since its inception in 1996, as part of the Safe Drinking Water Act. The DWSRF provides subsidized, low-interest loans to cities, counties, and other utilities for the planning, design, and construction of public drinking water facilities. Annually, loan dollars are provided to SRF by the U.S. EPA through capitalization grants which the State of Tennessee matches at 20% and from the state's revolving base. Revolving base dollars come from loan repayments returned to the program and used to further support drinking water infrastructure needs. Tennessee annually publishes information on how we intend to use these dollars in the Intended Use Plan, and what communities are seeking funding from SRF, on the Priority Ranking List.
Interested persons can visit the SRF website for more information. The U.S. EPA awards annual capitalization grants to fund the program, and the State of Tennessee provides a twenty-percent funding match. More information can be found on the SRF web site at:
https://www.tn.gov/environment/program-areas/wr-water-resources/srfp.html

American Rescue Plan Water Infrastructure Investment Plan. In March of 2021, Congress passed the American Rescue Plan (ARP) Act. This Act provided $1.9 trillion in COVID-19 relief for state and local governments, hard-hit in industries, and communities; tax changes affecting individuals and business; and other provisions. ARP provided Tennessee state government with $3.91 billion and Tennessee local governments $2.28 billion between cities and counties.

In August 2021, Tennessee's Financial Stimulus Accountability Group (FSAG) dedicated $1.35 billion of Tennessee's Fiscal Recovery Funds from the American Rescue Plan (ARP) to water, wastewater, and stormwater infrastructure projects. TDEC's Water Infrastructure Investment Plan (WIIP) provides three primary strategies for disbursing ARP funds: formula-based non-competitive grants to counties and eligible cities; state-initiated strategic projects; and competitive grants to eligible subrecipient stakeholders.

TDEC will solicit and award the non-competitive grants in spring 2022 to eligible subrecipients including all counties and cities that own water or wastewater systems or have a permitted stormwater program. The primary purpose of the grant will be to address critical system needs or priority areas of concerns and to prepare systems for future funding opportunities such as the Bi-Partisan Infrastructure Law and SRF Program. State investment of ARP funds in water infrastructure is one piece of a larger strategy to build reliable and sustainably operated water systems that support water quality and safe drinking. More information can be found on the ARP web site at: https://www.tn.gov/environment/arp.html

4.2 Nonpoint Sources of Pollution

Nonpoint sources are diffuse pollution sources (i.e., without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by stormwater. The Division of Water Resources works with the Tennessee Department of Agriculture (TDA), UT-Extension, and the US Department of Agriculture Natural Resources Conservation Service (NRCS) to encourage farmers to install Best Management Practices (BMPs). The installation of these BMPs is voluntary and there are often cost-share opportunities for farmers. Financial assistance to control nonpoint sources of pollution is offered by the Tennessee Department of Agriculture (TDA) and the Natural Resources Conservation Service (NRCS).

Two grant programs make up TDA's Land and Water Stewardship Section: the Nonpoint Source Program (TDA-NPS) and the Agricultural Resources Conservation Fund (TDA-ARCF). Both fund proposals from agencies, non-profit organizations (watershed groups), and universities that will reduce water pollution.

The TDA-NPS program administers the Section 319(h) of the Federal Clean Water Act. The program is non-regulatory, promoting voluntary, incentive-based solutions. It funds three types of projects:

1. BMP Implementation Projects. These projects improve an impaired waterbody, or prevent waters from becoming impaired.
2. Monitoring Projects. Up to 20% of the available grant funds can assist water quality monitoring efforts in Tennessee streams, both in the state's watershed monitoring program, and also in performing before-and-after monitoring following BMP installation, so that water quality improvements can be verified. TDEC Division of Water Resources receives some funds from TDA to conduct water quality monitoring.
3. Educational Projects. These projects raise public awareness of practical steps that can be taken to eliminate nonpoint sources of pollution.

The TDA-ARCF provides cost-share assistance to Tennessee landowners to install BMPs that eliminate agricultural nonpoint source pollution. This assistance is provided through Soil Conservation Districts, Resource Conservation and Development Districts, Watershed Districts, universities, and other groups. In addition, a part of the TDA-ARCF is used to fund educational projects statewide, with a focus on landowners, producers, and managers of farms and forests. More information is available at: https://www.tn.gov/agriculture/forests/ag-forests-forest-protection/ag-forests-water-quality.html

NRCS, a federal agency that is a part of TDA, provides technical advice and money to landowners willing to install BMPs in accordance with programs described in the federal Farm Bill. Local District Conservationists (approximately one per county) work with landowners to identify voluntary projects that qualify for funding.

NRCS employees provide technical assistance based on sound science and suited to a landowner's specific needs. The agency provides financial assistance for many voluntary conservation activities. The Conservation Technical Assistance (CTA) program provides voluntary conservation technical assistance to land-users, communities, units of state and

local government, and other federal agencies in planning and implementing conservation systems. More information about NRCS conservation programs is available at: http://www.nrcs.usda.gov/

5.0 DRINKING WATER

Safeguarding human health by ensuring safe drinking water for the people of Tennessee is a primary mission of TDEC. The Division of Water Resources is responsible for administering the provisions of the Tennessee Safe Drinking Water Act as well as the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101). The Tennessee Board of Water Quality, Oil, and Gas administers both the Tennessee Safe Drinking Water Act and the Water Quality Control Act.

5.1 Drinking Water Supply

TDEC's Division of Water Resources has responsibility for regulating public water systems and ensuring that Tennessee's citizens have safe drinking water. As a part of this responsibility, the division has developed a Source Water Protection Program for public water systems. A water system works with TDEC personnel as well as other states in (those cases where the source water protection area crosses state lines), federal, and local agencies and non-governmental organizations to promote success of the source water protection program.

An important step toward prevention of contamination of public water supplies is the federal Safe Drinking Water Act Amendments of 1986. At that time, each state was required to develop a wellhead protection program to protect the water source of public water systems relying on groundwater (wells or springs). The new source water assessment provisions in the federal Safe Drinking Water Act of 1996 Amendments expanded the scope of protection beyond groundwater systems to include protection of the waters supplying surface water systems.

Water sources for Tennessee's public drinking water supplies vary considerably across the state. The predominant source of water for West Tennessee is groundwater, whereas in Middle Tennessee it is surface water. East Tennessee relies on both groundwater and

surface water, with the groundwater sources frequently being springs. Appendix A contains a listing of water systems and their water sources.

Approximately 2/3 of the community public water systems using groundwater in Middle and East Tennessee have had at least one source determined to be under the direct influence of surface water. This means that these sources of groundwater are located close enough to a source of surface water to receive direct surface water recharge and are thus considered at risk from surface water contaminants and pathogens.

Each year, all public water suppliers are required to review their wellhead or source water protection area for any changes that may have occurred. These are reported to the state in three-year intervals.

5.2 Threats to Water Sources

As the sources for our drinking water vary across the state, so do the types of threats to which those water sources may be subject. The State–EPA Nutrient Innovations Task Group released a document in August 2009 entitled "An Urgent Call to Action" which is available at: https://www.epa.gov/sites/production/files/documents/nitgreport.pdf

Water systems threatened by nutrients, pathogens, and Total Organic Carbon (TOC) are illustrated in Appendix B.

Typical groundwater threats are chemical contaminants such as petroleum products and derivatives. These would include gasoline constituents and chlorinated solvents. For groundwater impacted by surface water, surface water contaminants play a role as well. Typical surface water concerns include siltation/sedimentation, pathogens, and nutrients.

5.2.A Drought Impact

In recent years, Tennessee had a number of water systems influenced by drought which caused some systems to institute water restrictions. Many of these water systems were impacted—not by their diminishing water—but by hydraulic or treatment capacity issues due, in large part, to the amount of irrigation of lawns, gardens, and car washing. In some

cases, assimilative capacity is the major determining factor in setting minimum flow/discharge rates for streams. This, in turn, has an effect on the amount of water that can be drawn by water treatment plants. The Division developed a web page to provide information to the citizens of Tennessee regarding drought and impacts that drought has on Tennessee's water supplies.

The website is at: https://www.tn.gov/environment/program-areas/wr-water-resources/drought-updates.html

5.2.B Emerging Problems

Across the U.S., emerging problems are:

- Cryptosporidium
- Disinfection byproducts
- Human and veterinary pharmaceuticals
- Synthetic Organic Compounds (SOCs)
- Harmful Algal Blooms
- Per- and polyfluoroalkyl substances (PFAS)

Cryptosporidium: Tennessee's drinking water providers have concluded the first round of source water sampling under the Long-Term Surface Water Treatment Rule. The second round of sampling concluded in 2021. This sampling was required to determine a system's source water susceptibility for Cryptosporidium and to determine if additional treatment is necessary. As of December 2021, 36 public water systems were required to provide additional treatment as a result of the monitoring. As of December 1, 2009, community systems relying on groundwater are required to maintain disinfection at a level for 4-log-removal of viruses (99.99%) and continuously monitor effective chlorine residual as a part of the new Ground Water Rule. Very small community and non-community systems (churches, schools, restaurants, and industries) using groundwater are required to complete source water monitoring when bacteria have been detected within the system.

Disinfection Byproducts: Disinfection byproducts are tested under the Disinfection Byproducts Rule which relates to the age of the treated water and chlorine's reaction with

naturally occurring organics. As of January 1, 2010, wholesale water systems are required to work with purchasing water systems where the purchasing system has violations from disinfection byproducts (trihalomethanes and haloacetic acids) when the water the purchasing system is receiving is already at or more than 60% of the drinking water standard. (Disinfection byproducts are the result of chlorine's reaction with organic molecules in the source water). The removal of organic carbon in the water treatment process is critical to maintaining the drinking water standards for trihalomethanes and haloacetic acids. Watershed protection is crucial in preventing the compromise of supplying streams by excessive organic loadings. There continues to be a small number of systems that purchase water from other systems that have had disinfection byproduct concentrations slightly above the standards.

Pharmaceuticals: Over the past decade, water quality surveys have indicated that numerous areas of the United States, including Tennessee, have pharmaceuticals and steroid hormones in their waterways. Additional studies have linked the exposure of fish and amphibians to natural and synthetic steroids to reproductive and endocrine disruption (estrogens and/or androgens). Within the State of Tennessee, little is currently known about the potential for pharmaceutical compounds and/or endocrine disrupting compounds to contaminate drinking water supplies. Therefore, TDEC began a project to sample raw (untreated) water from all community water system's source water. In this project we surveyed waters in Tennessee (surface water and groundwater) for the presence of both pharmaceutical compounds and endocrine disrupting compounds. EPA funded this project through an EPA grant through 2011.

While this is a national concern, no water systems in Tennessee were identified with pharmaceuticals above any published health-based standards or other guidance-based levels. In addition, no drinking water supplies in Tennessee are currently known to be compromised by high levels of cryptosporidium, disinfection byproducts, or pharmaceuticals in Tennessee.

Synthetic Organic Compounds: Tennessee's EPA-approved SOC monitoring waiver program required that community and non-transient non-community water systems sample for a reduced number of SOCs during the growing season in 2014, 2015 or 2016 (current monitoring period). Systems were sent letters in April of 2014 notifying them which SOCs

were to be sampled based on United State Geological Survey pesticide surveys relative to the counties that the systems' source water protection areas fell within and type of water source (surface water, groundwater under the influence of surface water or true groundwater sources). A substantial number of systems chose to do their sampling in 2014 and 2015. A new round of sampling began in 2017 and ran until the end of June 2019.

Harmful Algal Blooms (HAB): Harmful algal blooms (HAB) are mass populations of cyanobacteria / blue-green algae that are capable of producing toxin. Cyanobacteria are organisms that fix nitrogen and most photosynthesize to produce oxygen. Their ecologic role is to consume nutrients and produce oxygen to improve water quality. These organisms are a necessary part of natural surface water ecology. However, when a tipping point is reached in water quality, nutrient load is high and warmer weather conditions prevail, water losses its oxygen content and promotes the conditions for overgrowth of cyanobacteria.

The exact trigger for toxin production from these cyanobacteria is variable among species. Some release toxin as the cells die or become stressed while others may not release toxin, even though they contain toxin generating capacities within them.

When toxins are released into the environment, they may persist long after the cyanobacteria have moved away. These toxins can accumulate in the food chain, especially shellfish, and can cause illness in humans and animals when contacted by bare skin, inhaled or ingested. In addition to producing toxins, cyanobacteria can pose treatment challenges for public water systems including taste and odor, water treatment plant performance issues, shortened filter run times, and increased disinfection byproduct precursors.

In 2017, the Tennessee Department of Environment and Conservation (TDEC) and the Tennessee Department of Health (TDH), collected water sample from 33 public drinking water facilities and 16 recreational large and small impoundments, farm ponds and wetlands. Multiple species of cyanobacteria and types of toxins were identified in low concentrations.

In 2018, the Tennessee HAB interagency working group was formed as a subgroup to the Tennessee Nutrient Reduction Taskforce. The TN interagency work group has representatives from multiple state and federal agencies, universities, and public water systems. The focus and charge of the subgroup is to share ongoing research and activities

related to HABS, Identify who in the state is monitoring HAB related parameters and at what frequency, and assist in development of response plan for a HABs toxic release in TN

PFAS:

Per- and polyfluoroalkyl substances (PFAS) are a group of more than 3000 man-made chemicals that include Perfluorooctanoic acid (PFOA), Perfluorooctanesulfonic acid (PFOS), and the trademarked PFAS chemical, GenX. PFAS has been manufactured and used in a variety of industries around the world, including in the United States since the 1940s. Historically, PFOA and PFOS have been the most extensively produced and studied of these chemicals. All PFAS chemicals are persistent in the environment and in the human body – meaning they don't break down and they can accumulate over time. There is evidence that exposure to PFAS can lead to adverse human health effects.

In 2015 and 2016, as part of sampling requirements associated with the Third Unregulated Contaminant Monitoring Rule (UCMR3), finished drinking water from 136 community drinking water systems in the state of Tennessee was sampled for Perfluorobutanesulfonic acid (PFBS), PFOA, Perfluoroheptanoic acid (PFHpA), Perfluorononanoic acid (PFNA), PFOS, and Perfluorohexane sulfonic acid (PFHxS). EPA selected these six PFAS compounds for inclusion in UCMR3 due to known widespread use, occurrence and persistence in the environment. More than five hundred samples were collected by Tennessee public water systems and only two, had detectable concentrations of PFAS above the Minimum Reporting Level (MRL). The MRL is defined by the National Water Quality Lab as the smallest measured concentration of a substance that can be reliably measured by using a given analytical method. The two samples that had detectable concentrations of PFAS were well below the Health Advisory Level published by the U.S. Environmental Protection Agency. Additionally, the Department of Defense has voluntarily sampled a number of military bases around the state for the presence of several PFAS chemicals. The results of that effort indicate that shallow ground water contamination with PFAS has occurred at several sites.

The Tennessee Department of Environment and Conservation (TDEC) will initiate a statewide effort to sample all public drinking water system sources for 29 PFAS. The initial assessment, which began in December 2021, will help TDEC determine the potential presence and concentration of PFAS compounds in source waters throughout the state. Should detections of PFAS occur in raw source water, TDEC will conduct follow-up sampling of the respective system's finished drinking water. TDEC's statewide drinking water source assessment

strategy and FAQs regarding the sampling effort are available on the TDEC Sampling for PFAS page.

5.3 Other Issues

5.3.A Karst

Tennessee has an abundance of karst (Figure 4) which is highly susceptible to contamination. Karst is characterized by rock formations with sinkholes, springs, disappearing streams and caves; as well as by rapid, highly directional groundwater flow in discrete channels or conduits. Karst systems may be easily contaminated since the waters can travel long distances through conduits with no chance for natural filtering processes of soil or bacterial action to diminish the contamination. Transport times across entire karst flow systems may be as short as hours or weeks; orders of magnitude faster than that in porous media (e.g., sand) aquifers.

A common misconception is that groundwater is safe from contamination, but there is an increasing awareness that groundwater needs to be monitored and protected as a valuable resource. Groundwater can be quite vulnerable to contamination, particularly in limestone areas or in unconfined sand aquifers (water bearing zones). This vulnerability is particularly true for contamination from the highly mobile and widely used volatile organics (chlorinated solvents and gasoline components) and pathogenic microorganisms (bacteria and protozoa).

Water in karst areas is not distinctly surface water or groundwater. In unconfined or poorly confined conditions, karst aquifers have very high flow and contaminant transport rates under rapid recharge conditions such as storm events. This is a particular concern for public water systems using wells or springs in karst areas where pathogenic organisms that would not be present in true groundwater can survive in groundwater under the influence of surface water. TDEC concluded an EPA-funded study of karst terrain in five subwatersheds in the Red River Watershed (in Montgomery, Robertson, and Stewart Counties) in 2011.

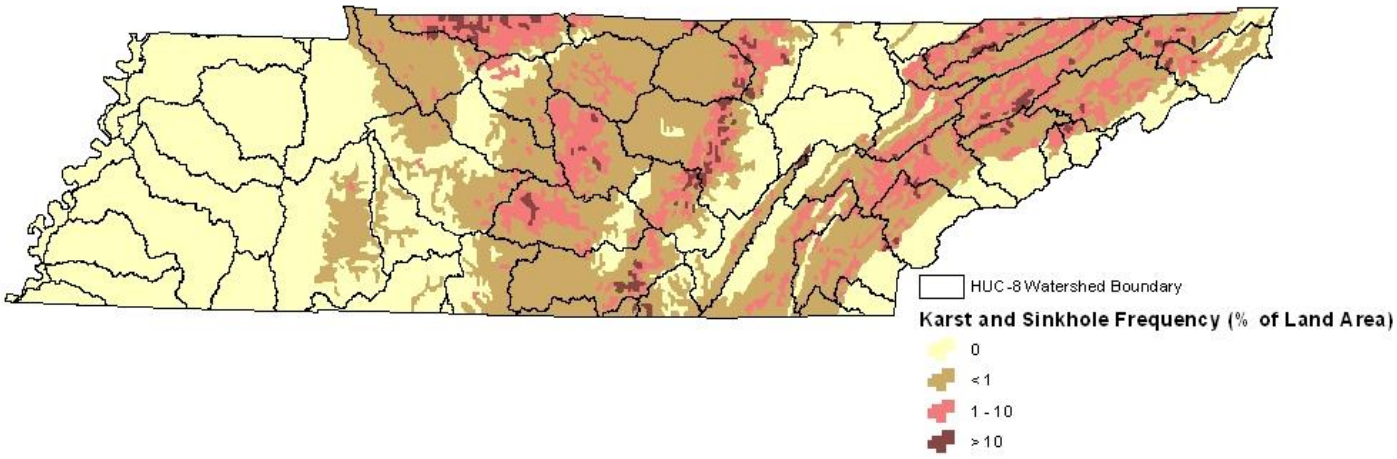

Figure 4 Karst Areas of Tennessee

5.3.B Mercury in Bridges

As part of an ongoing investigation, TDEC identified 103 locations scattered throughout Wayne, Hickman, and Lewis Counties where re-purposed panels used on bridges contain elemental mercury. The bridges consist of former mercury cell parts from a former chlor-alkali plant that the county highway departments and local residents installed as small bridges on public roads and private driveways. The panels contain mercury on the underside of the bridges in grout-like material similar to concrete. The identified locations include 89 bridges, 13 locations with loose panels (not used as bridges), and one location where a panel is part of a roadway retaining wall.

Remedial actions performed to-date include stabilization of the identified bridges to prevent further release of mercury, and remedial actions are ongoing to remove and replace these bridges in a manner that allows transportation access to county residents. The remedial actions on 82 bridges were completed as of 2018. Samples of surface water, wetlands, and fish tissue do not indicate the need for stream postings or fish consumption advisories; however, the evaluation of area streams and fish will continue as the remedial contractor removes the remaining bridges.

In October 2017, the remedial contractor chose not to bid for completion of the remaining bridges, so a new contractor is continuing this work. TDEC expects that the new contractor will complete the remaining bridges in 2020.

5.3.C Regional Water Supply Planning

TDEC partnered with the federal and state agencies, nongovernmental organizations and other regional planning experts to form a Water Resources Technical Advisory Committee (WRTAC) and to initiate a water resources planning pilot in two areas significantly impacted by the drought of 2007.

WRTAC was authorized by the Tennessee Water Resources Information Act in 2008. One of the first tasks that the committee completed was the development of a framework for regional water supply planning.

To fulfill a portion of the commissioner's charge to the WRTAC, the committee has produced a "Statewide System of Basic Hydrologic and Water System Information," and produced the "Regional Water Supply Plans Approval Process for Tennessee". The WRTAC reports can all be found on the TDEC web site at:

https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-regional-planning.html.

6.0 WATER QUALITY

6.1 Surface Waters

The Division of Water Resources monitors surface waters and compares results with the criteria set out in Tennessee's Water Quality Standards (Rule Chapter 400-40-03). A number of specific surveys are conducted, including studies of in-stream biological communities, chemical studies, probabilistic studies, and documentation of contaminant levels in sediment and fish flesh. The fish and bacteriological data generated by the division are used by TDEC to issue advisories to the public when levels of contaminants exceed those considered to be protective of public health.

Tennessee continues to set the national example for states using EPA's Assessment, Total Maximum Daily Load (TMDL) Tracking and Implementation System (ATTAINS). The ATTAINS system allows for quick and easy standardized reporting of various water quality summary

statistics and metrics. This system allows Tennessee to continue to meet the national reporting deadline. Tennessee is currently finalizing the 2022 ATTAINS data in preparation for the upcoming April 1st, 2022 deadline.

Tennessee developed an online StoryMap tool that will help convey the current water quality story and information to citizens. https://storymaps.arcgis.com/stories/dd05f7aa5fe24fd7b2bb17e52a968070 This tool will summarize the status of water quality and the leading causes of impairment and will serve as Tennessee's virtual 305(b) report. Examples of these data from the DRAFT 2022 ATTAINS information are included in Figures 5-8.

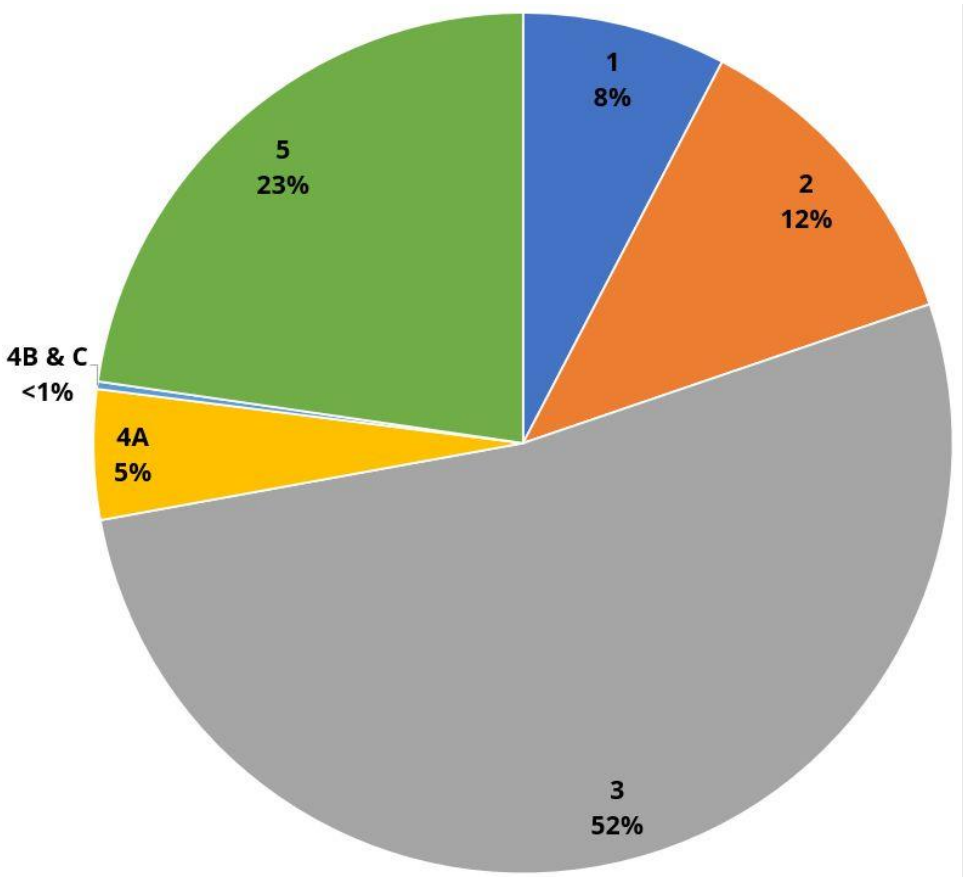

Figure 5 Water Quality Category Status of Rivers & Streams in Tennessee: *Data from TN DRAFT 2022 ATTAINS information.*

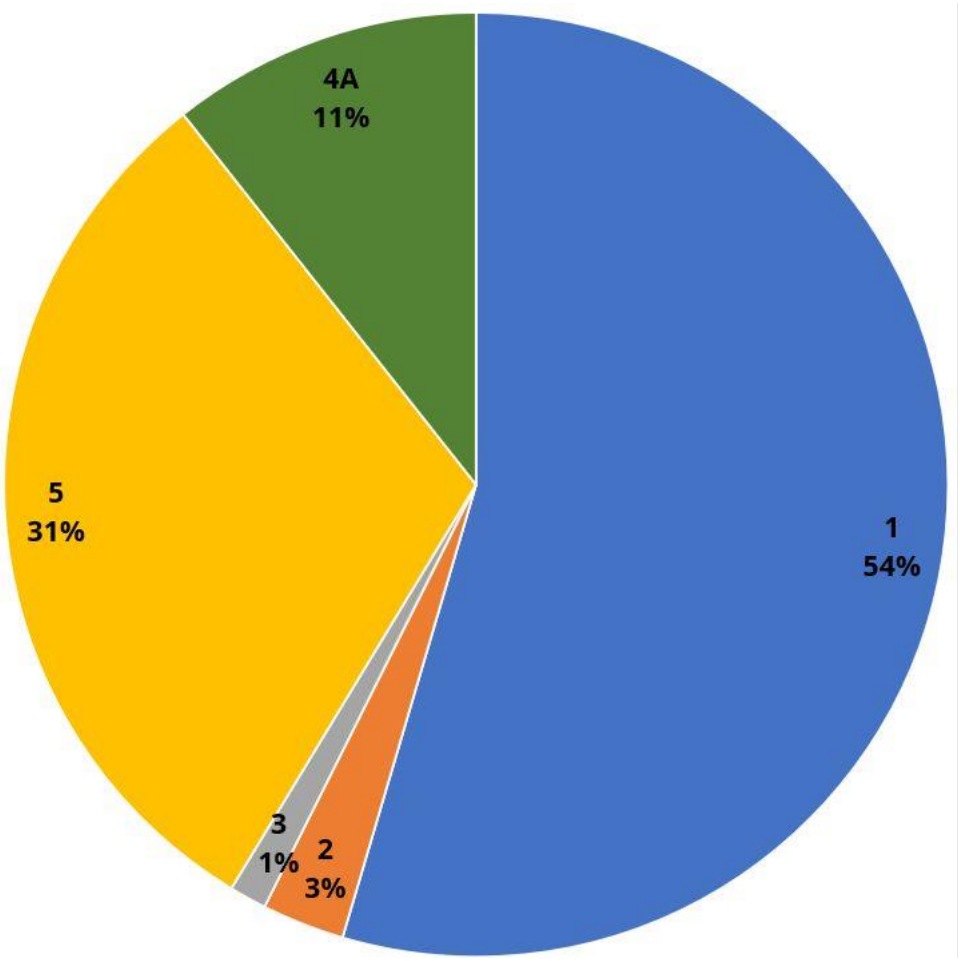

Figure 6 Water Quality Category Status of Lakes & Reservoirs in Tennessee: *Data from TN DRAFT 2022 ATTAINS information.*

Integrated Report Categories:

Category 1: waters are fully supporting of all designated uses. These streams, rivers, and reservoirs have been monitored and meet the most stringent water quality criteria for all designated uses for which they are classified. The biological integrity of Category 1 waters is favorably comparable with reference streams in the same subecoregion and pathogen concentrations are at acceptable levels.

Category 2: waters are fully supporting of some designated uses, but have not been assessed for all uses. In many cases, these waterbodies have been monitored and are fully supporting of fish and aquatic life but have not been assessed for recreational use.

Category 3: waters are not assessed due to insufficient or outdated data. However, streams previously identified as impaired are not moved to this category simply because data are old.

Category 4: waters are impaired, but a TMDL has been completed or is not required. Category 4 has been further subdivided into three subcategories.

Category 4a: impaired waters that have already 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." An example of a 4b stream might be where a discharge point will be moved in the near future to another waterbody with more assimilative capacity.

Category 4c: impaired waters in which the impacts are not caused by a pollutant (e.g., flow alterations).

Category 5: waters have been monitored and found not to meet one or more water quality standards. These waters have been identified as not supporting their designated uses. Category 5 waterbodies are moderately to highly impaired by

pollution and need to have TMDLs developed. These waters are included in the 303(d) List of impaired waters in Tennessee.

The past 305(b) Reports are available at:
https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html

The 2022 ATTAINS data indicate that pathogens, habitat alterations, siltation, and nutrients are the leading causes of impairment in Tennessee streams.

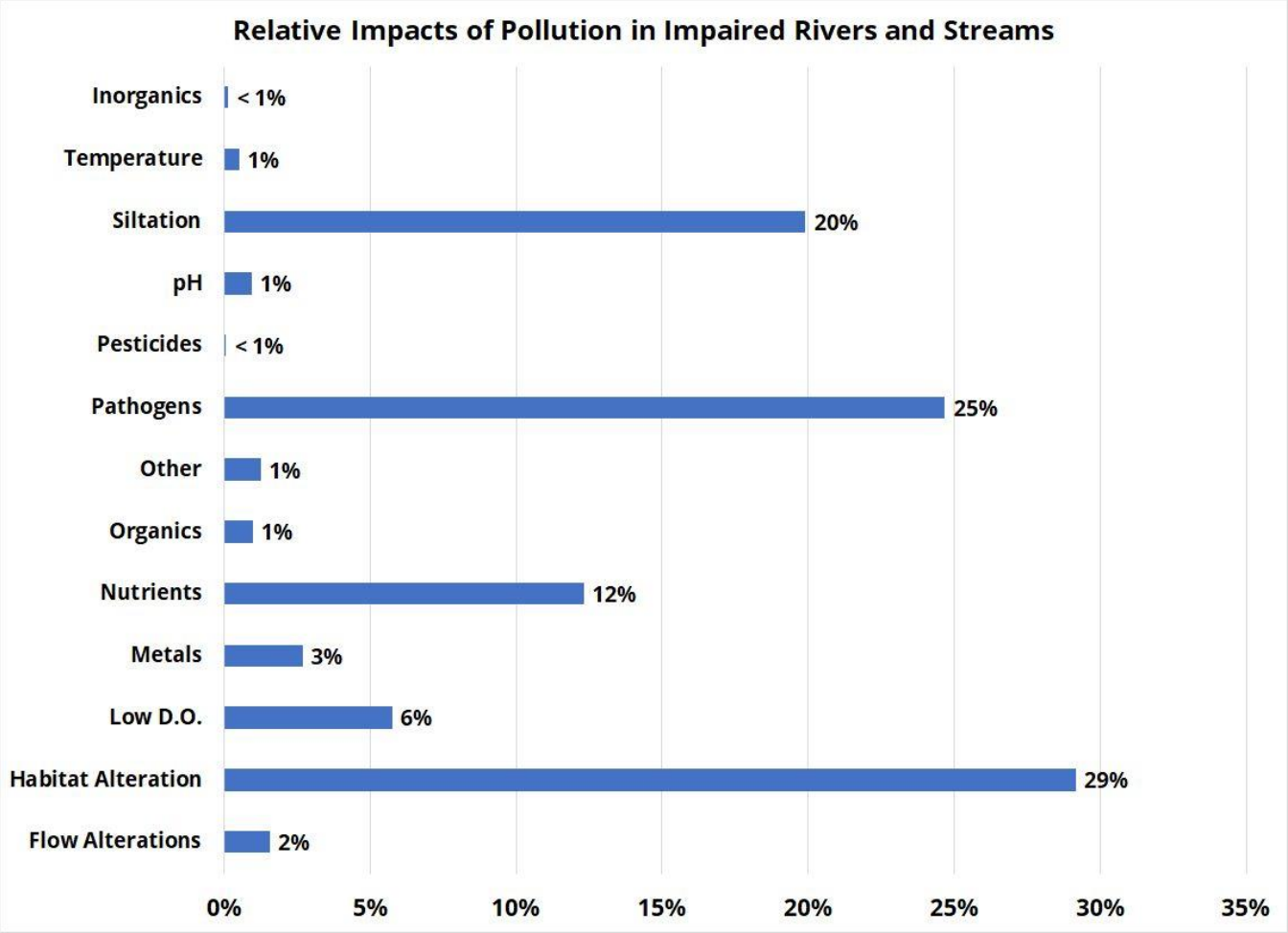

Figure 7 Relative Impacts of Pollution on Impaired Rivers & Streams in Tennessee: *Data from TN DRAFT 2022 ATTAINS information.*

The 2022 ATTAINS data identify metals and organics as the leading causes of impairments in Tennessee lakes.

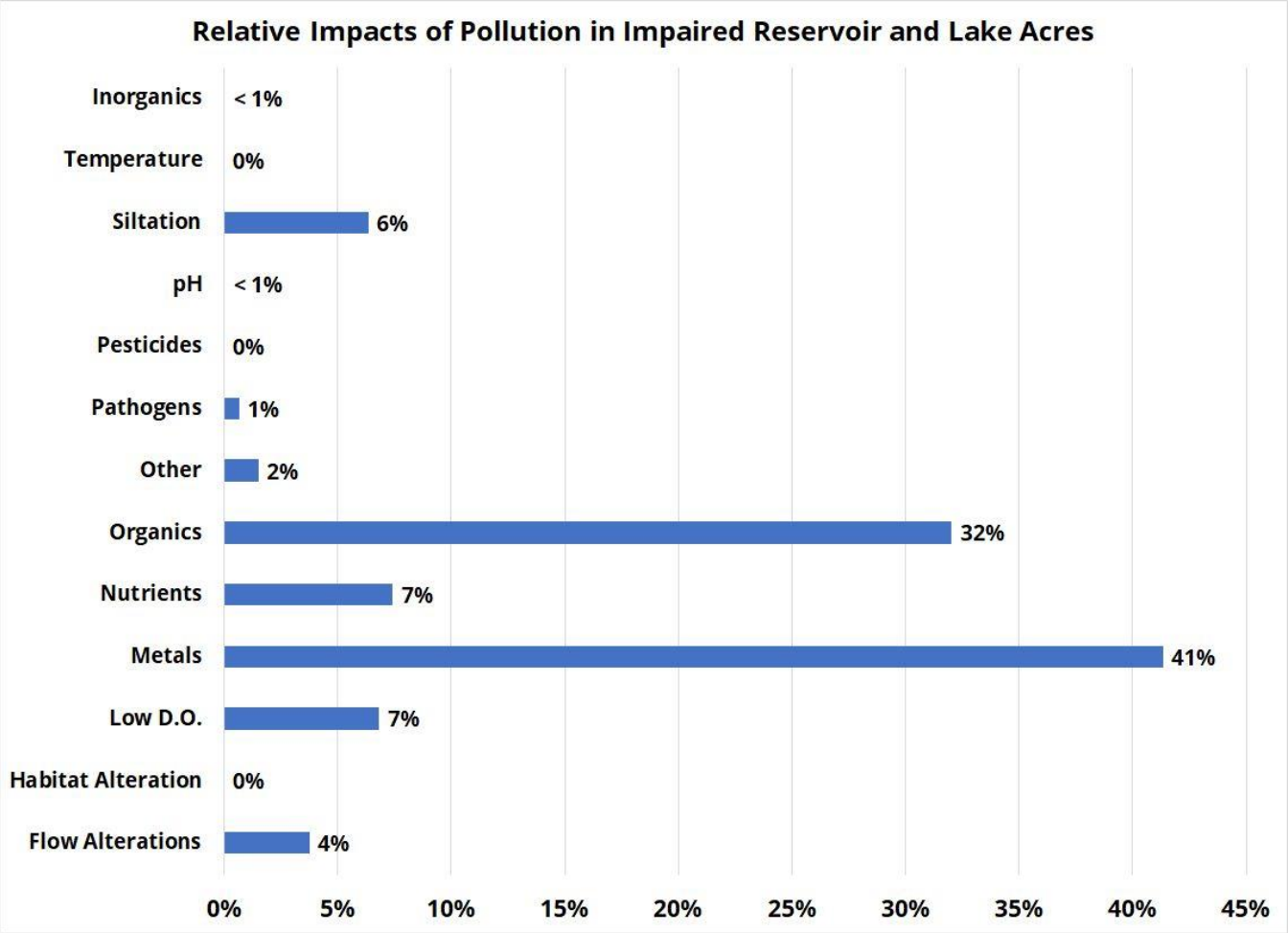

Figure 8 Relative Impacts of Pollution on Impaired Lakes & Reservoirs in Tennessee: *Data from TN DRAFT 2022 ATTAINS information.*

The Division of Water Resources also prepares a list of Impaired and Threatened Waters in Tennessee from the ATTAINS data. The List is a compilation of the lakes, rivers, and streams in Tennessee that either fail to meet, or are soon expected to fail to meet, one or more water quality standards. In addition, the list provides pollutant information and TMDL prioritization for impaired and threatened segments. The new DRAFT version of the List reflects the results of a reassessment of the Group 2 and 3 watersheds that took place in 2020-2021. Tennessee

will submit the updated list and ATTAINS data to EPA by April 1, 2022. The current EPA approved 2020 list of Impaired and Threatened Waters is available at: https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html

Additional information about surface water monitoring in Tennessee watersheds is found in the Watershed Water Quality Management Plans. These plans are available for viewing at: https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/tennessee-watersheds.html

6.2 Groundwater

The Division of Water Resources' Drinking Water Unit is responsible for reviewing wellhead protection plans, administering the Underground Injection Control program, and ambient groundwater monitoring. The Division also conducts an enforcement program which requires water suppliers to meet requirements of the Safe Drinking Water Act with respect to water quality and information reporting. More information, including water withdrawal of groundwater, is at:

https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-withdrawal-registration-program.html

The Division of Water Resources' Drinking Water Unit produces a report that describes the status of groundwater quality. The most recent report is posted at: https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/drinking-water-redirect.html.

6.3 Source Water Assessment

Section 1453 of the 1996 Safe Drinking Water Act (SDWA) Amendments required that all states establish Source Water Assessment Programs (SWAP), and submit a plan to EPA by February 6, 1999 detailing how they would:

- Delineate source water protection areas
- Inventory significant contaminants in these areas
- Determine the susceptibility of each public water supply to contamination

Tennessee's Source Water Assessment Plan was approved in November of 1999. By April of 2003, the source water assessments of the community groundwater systems and the source water assessments for the community and non-community surface water systems were completed. Shortly thereafter, they were sent to the public water systems and made available on the TDEC website (https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/source-water-assessment.html). The source water assessments for the non-community groundwater systems have also been completed.

The assessments are intended to enhance the protection of drinking water supplies within existing programs at the federal, state and local levels. Tennessee's SWAP efforts are being used to improve the existing source water protection efforts.

Source water protection areas for public water systems using surface water have been based on the portion of the watershed area upstream of the water intake using time of travel (the time it takes for water to travel a given distance) and a 1000-foot corridor on either side of the stream.

All water systems in Tennessee are required to update source water protection plans on a regular basis as required by rule. In 2014 Tennessee updated the reporting requirements in TCA 0400-45-01-.35, requiring source water protection plans to be reviewed and updated as necessary every year with a report submitted to the state every three years.

7.0 CITIZEN INVOLVEMENT

Through public hearings, meetings, and other types of public information sessions, the public provides input on proposed actions that affect watersheds and potable water quality. There are several opportunities for citizens to be involved:

- Outreach - Participate in a watershed event hosted by the Division or visit a Division booth at various outreach events across the state. Information about events are shared on Facebook.

- Comment on proposed Water Quality Standards. Water Quality Standards are updated every three years, following a series of public hearings across the state. Public comments are considered before a final recommendation is made to the Tennessee Board of Water Quality, Oil and Gas for approval. The last update was in 2020.

- Comment throughout the year on draft permits during a public comment period and/or attend public hearings. Draft permits and notices of public hearings are placed on public notice and posted at: https://www.tn.gov/environment/ppo-public-participation/ppo-public-participation/ppo-water.html.

- Comment on the proposed list of impaired waters. Meetings are held in order to seek public comment on the draft list. Following the meetings, the Division of Water Resources submits the list to EPA for approval. This list is compiled every two years. The most recent public meeting was held in January 2022.

- Comment on proposed TMDLs that are placed on public notice and posted at: https://www.tn.gov/environment/ppo-public-participation/ppo-public-participation/ppo-water.html.

- Address the Tennessee Board of Water Quality, Oil and Gas. The Board has traditionally assigned April and October as the months for the public to make comments (oral or written) on any water quality issue. Board meeting schedules and

agendas are posted at https://www.tn.gov/environment/about-tdec/boards-and-commissions/board-tennessee-board-of-water-quality--oil-and-gas.html.

The public can navigate through a list of public participation opportunities at: https://www.tn.gov/environment/ppo-public-participation/ppo-public-participation/ppo-water.html.

Comments on any issue are welcomed at any time and may be made by filling out the form at: https://www.tn.gov/environment/ask-tdec-form.html

8.0 RECOMMENDATIONS

The 2006 amendment to the Water Quality Control Act requires that recommendations be presented to the Governor and the General Assembly annually. TDEC's recommendations are:

- Continue close communication with Tennessee's congressional delegation on matters involving water resource management, clean water programs, and funding. This includes federal lead and copper regulations.

- Tennessee's infrastructure, including municipal water/wastewater distribution, collection, transport and treatment systems, are critically important to the protection of public health and the environment. Across the state there are numerous aging systems in need of major repair. The costs for this work can be very difficult for these systems to bear on their own. Federal support for water and wastewater infrastructure in Tennessee has contributed significantly over the years to water quality improvement but needs still exceed available funds.

- The State Revolving Loan Programs are an option for funding water or wastewater infrastructure needs. Tennessee should continue to support the State Revolving Loan Program, as well as take advantage of any new federal programs that become available such as grants under the Water Infrastructure Improvements for the Nation (WIIN) Act,, America's Water Infrastructure Act (AWIA), and the Bi-Partisan Infrastructure Law (BIL). State match for these grants is essential to Tennessee being able to leverage significant federal funds for local systems, utilities, and residents.

- Drought management is essential in Tennessee. The legislature should work with TDEC and other agencies to implement the recommendations of the Tennessee H2O Plan of 2018 on outreach, developing a process for evaluating and prioritizing the recommendations, and initiating a regular cycle of updates for a water plan.

- Excess nutrient loads in Tennessee waters are becoming a larger threat for human and environmental health. Nutrients come from numerous sources, so multiple stakeholders will need to work together to solve the problem. The legislature should support the work of multi-disciplinary stakeholders in collaborating for the development and implementation of a statewide nutrient management strategy focused on reducing Tennessee's loading of nitrogen and phosphorus to waters of the state, the Mississippi River, and ultimately the Gulf of Mexico.

APPENDIX A – WATER SYSTEMS & THEIR SOURCES

Water System Name	County	Source Type	Source Name	Watershed Name	Population
CLARKSVILLE WATER	Montgomery	Surface Water	CUMBERLAND RVR	Lake Barkley	215421
ERIN WATER DEPARTMENT	Montgomery	Surface Water	CUMBERLAND RIVER	Lake Barkley	7283
CUNNINGHAM EAST MONT WAT	Montgomery	Surface Water	CUMBERLAND RIVER	Lake Barkley	25
FORT CAMPBELL WATER SYSTEM	Montgomery	Surface Water	BOILING SPRING	Red River	40000
LAFAYETTE WATER SYSTEM	Macon	Surface Water	ADAMS SPRING	Barren River	19146
LAFAYETTE WATER SYSTEM	Macon	Spring	SPRING CREEK SP	Barren River	19146
RED BOILING SPRINGS WATER	Macon	Spring	SABEN SPRING	Barren River	5823
RED BOILING SPRINGS WATER	Macon	Spring	MCCLELLAN SPRING	Barren River	5823
BYRDSTOWN WATER DEPT	Pickett	Surface Water	ALE HOLLOW LAKE (OBEY RIVER	Obey River	7060
CELINA WATER SYSTEM	Clay	Surface Water	OBEY RIVER	Obey River	5644
LIVINGSTON WATER DEPT	Clay	Surface Water	CUMBERLAND RIVER	Cordell Hull	14388
NORTHWEST CLAY COUNTY UTILITY	Clay	Surface Water	CUMBERLAND RIV	Cordell Hull	4048
BLOOMINGDALE UTILITY DISTRICT	Sullivan	Surface Water	REEDY CREEK	South Fork Holston River	13239
KINGSPORT WATER DEPT	Sullivan	Surface Water	SOUTH HOLSTON R	South Fork Holston River	103427
BLUFF CITY WATER DEPARTMENT	Sullivan	Spring	UNDERWOOD SPRING	South Fork Holston River	2810
BRISTOL DEPTARTMENT OF	Sullivan	Surface Water	SO. FK. HOLSTON RIVER	South Fork Holston River	33199
BRISTOL-BLUFF CITY UTILITY DIS	Sullivan	Surface Water	S FORK HOLSON RIVER	South Fork Holston River	5868
MOUNTAIN CITY WATER DEPT.	Johnson	Surface Water	SILVER LAKE SURF	South Fork Holston River	11191
MOUNTAIN CITY WATER DEPT.	Johnson	Spring	SILVERLAKE SP	South Fork Holston River	11191

CARDERVIEW UTILITY DISTRICT	Johnson	Well	WELL #1	Watauga River	1077
CARDERVIEW UTILITY DISTRICT	Johnson	Well	WELL #2	Watauga River	1077
CARDERVIEW UTILITY DISTRICT	Johnson	Well	WELL #3	Watauga River	1077
MOUNTAIN CITY WATER DEPT.	Johnson	Surface Water	LOWE SPRING	Watauga River	11191
MOUNTAIN CITY WATER DEPT.	Johnson	Spring	RAMBO SPRING	Watauga River	11191
BROWNLOW UTILITY DISTRICT	Johnson	Well	ELL #1 (STONE MOUNTAIN WEL	Watauga River	599
COLD SPRINGS UTILITY DISTRICT	Johnson	Spring	COLE SPRING	Watauga River	879
HUNTSVILLE UTILITY DISTRICT	Scott	Surface Water	FLAT CREEK IMPD	South Fork Cumberland	12477
HUNTSVILLE UTILITY DISTRICT	Scott	Surface Water	NEW RIVER	South Fork Cumberland	12477
ONEIDA W&S COMM	Scott	Surface Water	HOWARD BAKER LK	South Fork Cumberland	11282
CLEARFORK UTILITY DISTRICT	Claiborne	Well	WELL #1	Clear Fork of the	1391
CLEARFORK UTILITY DISTRICT	Claiborne	Well	WELL #2	Clear Fork of the	1391
CLAIBORNE UTILITIES DISTRICT	Claiborne	Surface Water	NORRIS LK. - CLINCH RIVER	Upper Clinch River	16217
ARTHUR SHAWANEE	Claiborne	Surface Water	POWELL RIVER	Powell River	9967
ARTHUR SHAWANEE	Claiborne	Surface Water	DAVIS CREEK IMPOUNDMENT	Powell River	9967
SNEEDVILLE U D	Hancock	Well	FLAT GAP MINE	Upper Clinch River	2304
FIRST UTILITY DISTRICT OF HAWK	Hawkins	Surface Water	HORD CREEK	Holston River	21075
FIRST UTILITY DISTRICT OF HAWK	Hawkins	Surface Water	HOLSTON RIVER	Holston River	21075
MOORESBURG UTILITY DISTRICT	Hawkins	Spring	MOORESBURG UTILITY SPRING	Holston River	1762
ROGERSVILLE WATER SYSTEM	Hawkins	Well	WELL #1	Holston River	11443
ROGERSVILLE WATER SYSTEM	Hawkins	Surface Water	BIG CREEK	Holston River	11443
ROGERSVILLE WATER SYSTEM	Hawkins	Well	TOWN KNOB WELL	Holston River	11443

PERSIA UTILITY DISTRICT	Hawkins	Surface Water	WELLS 1, 2, 3, 4	Holston River	4486
LAKEVIEW UD WEST	Hawkins	Well	PRESSMAN'S HOME WELL #1	Holston River	2656
LAKEVIEW UD WEST	Hawkins	Well	PRESSMAN'S HOME WELL #2	Holston River	2656
LAKEVIEW UD WEST	Hawkins	Well	PRESSMAN'S HOME WELL #3	Holston River	2656
SURGOINSVILLE UTILITY DISTRICT	Hawkins	Spring	JENNINGS SPRING	Holston River	2544
SURGOINSVILLE UTILITY DISTRICT	Hawkins	Well	JENNINGS WELL	Holston River	2544
FIRST U.D. OF HAWKINS CO #2	Hawkins	Well	LIBERTY WELL	Holston River	637
FIRST U.D. OF HAWKINS CO #2	Hawkins	Well	PROSPERITY WELL	Holston River	637
LAKEVIEW UD EAST	Hawkins	Well	ATHOWOMINEE WELL #1	Holston River	1249
LAKEVIEW UD EAST	Hawkins	Well	THOWOMINEE WELL # 2 HIROST	Holston River	1249
JELLICO WATER DEPT	Campbell	Surface Water	MINE IMPOUDMENT	Clear Fork of the	5366
JELLICO WATER DEPT	Campbell	Well	CREEKMORE-HOUSLEY WELL #3	Clear Fork of the	5366
JELLICO WATER DEPT	Campbell	Well	CREEKMORE-HOUSLEY WELL #1	Clear Fork of the	5366
CARYVILLE-JACKSBORO	Campbell	Well	STONEY FORK WELLS	South Fork Cumberland	11902
CARYVILLE-JACKSBORO	Campbell	Well	STONEY FORK WELLS	South Fork Cumberland	11902
CARYVILLE-JACKSBORO	Campbell	Surface Water	NORRIS LAKE	Upper Clinch River	11902
CARYVILLE-JACKSBORO	Campbell	Spring	CAVE SPRING	Upper Clinch River	11902
LA FOLLETTE UTILITIES BOARD	Campbell	Surface Water	NORRIS LAKE	Upper Clinch River	26807
DEERFIELD RESORT WATER	Campbell	Well	WELL 1 A&B CONDO	Powell River	1088
DEERFIELD RESORT WATER	Campbell	Well	WELL 10 DEER HILL	Powell River	1088
DEERFIELD RESORT WATER	Campbell	Well	ELL 2 DEER LAKE-CUNNINGHA	M Powell River	1088
DEERFIELD RESORT WATER	Campbell	Well	WELL 3 C&D CONDOS	Powell River	1088

DEERFIELD RESORT WATER	Campbell	Well	WELL 4 SKYLINE CONDOS	Powell River	1088
DEERFIELD RESORT WATER	Campbell	Well	WELL 5 BIG PINE	Powell River	1088
DEERFIELD RESORT WATER	Campbell	Well	ELL 6 OFFICE/RESTAURANT/POO	Powell River	1088
DEERFIELD RESORT WATER	Campbell	Well	WELL 9 HILTY	Powell River	1088
HENDERSON WATER DEPT.	Chester	Well	5 WELLS	South Fork Forked Deer	9036
HENDERSON WATER DEPT.	Chester	Well	5 WELLS	South Fork Forked Deer	9036
HENDERSON WATER DEPT.	Chester	Well	5 WELLS	South Fork Forked Deer	9036
TRENTON WATER SYSTEM	Chester	Well	WELLS	South Fork Forked Deer	5295
COLLINWOOD WATER DEPT	Wayne	Well	BALL PARK WELL	Pickwick Lake	1922
CLIFTON WATER DEPT	Wayne	Surface Water	TENNESSEE RIVER	TN Westen Valley-Beech	3843
COLLINWOOD WATER DEPT	Wayne	Spring	SPRING #1	TN Westen Valley-Beech	1922
COLLINWOOD WATER DEPT	Wayne	Spring	SPRING #2	TN Westen Valley-Beech	1922
COLLINWOOD WATER DEPT	Wayne	Spring	SPRING #3	TN Westen Valley-Beech	1922
COLLINWOOD WATER DEPT	Wayne	Spring	SPRING #4	TN Westen Valley-Beech	1922
COLLINWOOD WATER DEPT	Wayne	Well	WELL 1	TN Westen Valley-Beech	1922
WAYNESBORO WATER SYSTEM	Wayne	Surface Water	GREEN RIVER	Buffalo River	4194
WAYNESBORO WATER SYSTEM	Wayne	Well	GEISSLER WELL	Buffalo River	4194
MILLINGTON WATER DEPT	Tipton	Well	2 WELLS	Mississippi River	8355
MILLINGTON WATER DEPT	Tipton	Well	2 WELLS	Mississippi River	8355

Table A-1 Water Systems, Their Watershed(s), Sources and Population Served

APPENDIX B – WATER SYSTEMS & THEIR THREATS

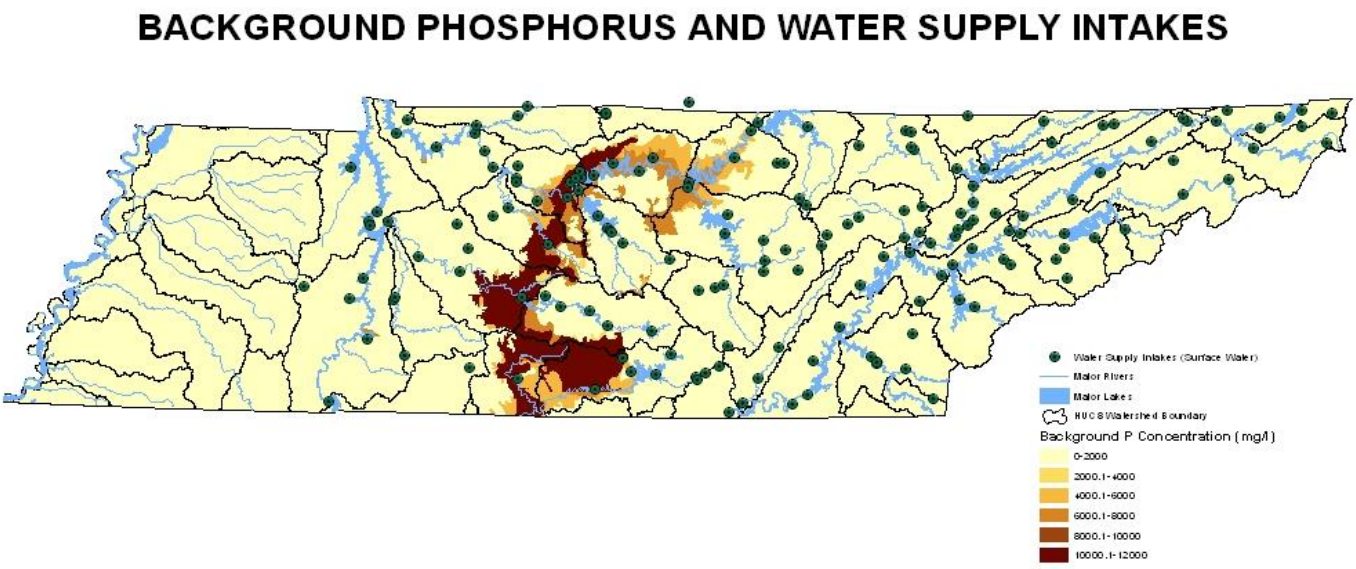

Figure B-1 Water Supply Intakes & Background Phosphorus Concentrations - *Background phosphorus data are from United States Geological Survey and represents bed sediment sample concentrations as described in Scientific Investigations Map 3102 (published 2010).*

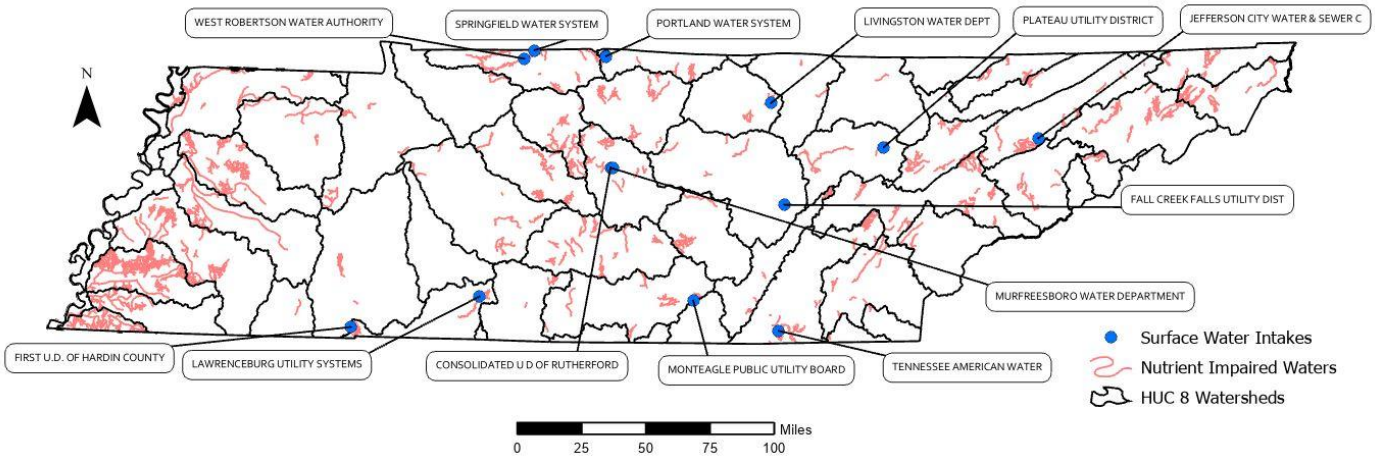

Figure B-2 Surface Water Supply Intakes Located on Nutrient-Impaired Surface Waters. *Causes of nutrient impairments are nitrates, nitrites, phosphates, phosphorus (total) or nutrient/eutrophication and are based on the 2016 303(d) List. UD, Utility District.*

Public Water Supply	Source
CONSOLIDATED U D OF RUTHERFORD	Percy Priest Reservoir
FALL CREEK FALLS UTILITY DIST	Bee Creek
FIRST U.D. OF HARDIN COUNTY	Pickwick Reservoir
JEFFERSON CITY WATER & SEWER C	Mossy Creek
LAWRENCEBURG UTILITY SYSTEMS	Shoal Creek
LIVINGSTON WATER DEPT	Carr Creek
MONTEAGLE PUBLIC UTILITY BOARD	Trussel Creek
MURFREESBORO WATER DEPARTMENT	Percy Priest Reservoir
PLATEAU UTILITY DISTRICT	Flat Fork
PORTLAND WATER SYSTEM	Donoho Branch
PORTLAND WATER SYSTEM	Donoho Branch
SPRINGFIELD WATER SYSTEM	Red River
TENNESSEE AMERICAN WATER	Citico Creek
WEST ROBERTSON WATER AUTHORITY	Red River

Table B-1 Surface Water Supply Intakes Located on Nutrient-Impaired Surface Waters. *Causes of nutrient impairments are nitrates, nitrites, phosphates, phosphorus (total) or nutrient/eutrophication and are based on the 2016 303(d) List.*

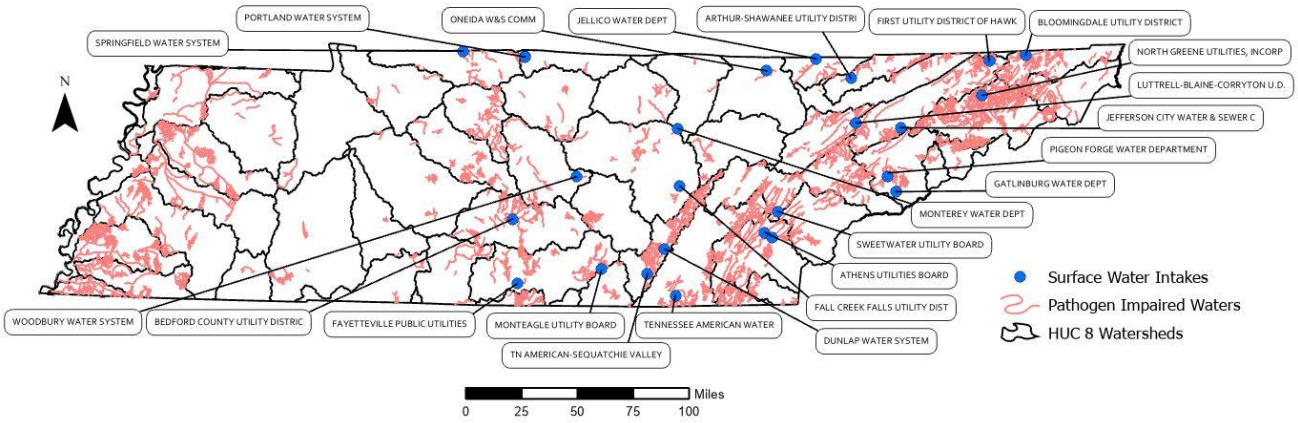

Figure B-3 Water Supply Intakes Located on Pathogen-Impaired Surface Waters. *Cause of pathogen impairment is E. coil and is based on the draft 2016 303(d) List.*

PUBLIC WATER SYSTEM	SOURCE
ARTHUR-SHAWANEE UTILITY DISTRI	DAVIS CREEK IMPOUNDMENT
ATHENS UTILITIES BOARD	OOSTANAULA CREEK
BEDFORD COUNTY UTILITY DISTRIC	DUCK RIVER
BLOOMINGDALE UTILITY DISTRICT	REEDY CREEK
DUNLAP WATER SYSTEM	SEQUATCHIE RIV.
ENGLEWOOD WATER DEPT	MIDDLE CREEK
FALL CREEK FALLS UTILITY DIST	BEE CREEK IMPOUNDMENT
FAYETTEVILLE PUBLIC UTILITIES	ELK RIVER
FIRST UTILITY DISTRICT OF HAWK	HORD CREEK
GATLINBURG WATER DEPT	LITTLE PIGEON R
JEFFERSON CITY WATER & SEWER C	MOSSY CREEK
JELLICO WATER DEPT	MINE IMPOUDMENT
LUTTRELL-BLAINE-CORRYTON U.D.	GRAVESTON MILL SPRING POND
MA_NAME	NAME
MONTEAGLE PUBLIC UTILITY BOARD	LAKE LOUISA
MONTEREY WATER DEPT	MEADOW CREEK LK
NORTH GREENE UTILITIES, INCORP	LICK CREEK
ONEIDA W&S COMM	HOWARD BAKER LK
PIGEON FORGE WATER DEPARTMENT	WALDEN'S CREEK
PORTLAND WATER SYSTEM	DRAKES CREEK
PORTLAND WATER SYSTEM	CITY LAKE
SPRINGFIELD WATER SYSTEM	RED RIVER
SWEETWATER UTILITY BOARD	SWEETWATER CK
TENNESSEE AMERICAN WATER	TENNESSEE RIVER
TN AMERICAN-SEQUATCHIE VALLEY	SEQUATCHIE RIV.
WOODBURY WATER SYSTEM	E FORK STONES R

Table B-2 Water Supply Intakes Located on Pathogen-Impaired Surface Waters. *Cause of pathogen impairment is E. coli and is based on the 2016 303(d) List.*

PUBLIC WATER SYSTEM	SOURCE	#TOC EXCEEDANCES
AEDC COMPLEX-WATER PLANT	WOODS RESERVOIR	4
ANDERSON COUNTY WATER AUTHORITY	CLINCH RIVER	1
ASHLAND CITY WATER DEPT	CUMBERLAND RIVER	4
BEDFORD COUNTY UD	DUCK RIVER	2
BIG CREEK UTILITY DISTRICT	RANGER CREEK	12
BLOOMINGDALE UTILITY DISTRICT	REEDY CREEK	1
BRISTOL DEPT. UTILITIES	SO. HOLSTON RIVER	1
BYRDSTOWN WATER DEPT	DALE HOLLOW LAKE	1
CAMDEN WATER DEPT	TENNESSEE RIVER	3
CARTHAGE WATER SYSTEM	CUMBERLAND RVR	2
CHEMOURS-NEW JOHNSONVILLE	TENNESSEE RIVER	7
CITY OF MARYVILLE WATER AND SE	LITTLE RIVER	1
CLAIBORNE UTILITIES DISTRICT	NORRIS LK. - CLINCH RIVER	2
CLARKSVILLE WATER DEPARTMENT	CUMBERLAND RIVER	4
CLIFTON WATER DEPT	TENNESSEE RIVER	2
COLUMBIA POWER AND WATER	DUCK RIVER	4
CONS UD OF RUTHERFORD	EAST FK STONES RIVER	10
COOKEVILLE WATER DEPT	CENTER HILL LAKE	9
CROSSVILLE WATER DEPT	HOLIDAY HILLS LAKE	4
CROSSVILLE WATER DEPT	MEADOW PARK LAKE	4
CUMBERLAND UTILITY DISTRICT	LITTLE EMORY RIVER	1
CUNNINGHAM EAST	CUMBERLAND RIVER	12
DEKALB UTILITY DISTRICT #1	TENNESSEE RIVER	13
DOVER WATER DEPT	CUMBERLAND RIVER	3
DUCK RIVER UTILITY COMMISSION	NORMANDY LAKE	4
DUNLAP WATER SYSTEM	SEQUATCHIE RIV.	1
ENGLEWOOD WATER DEPT	MIDDLE CREEK	3
ERIN WATER DEPARTMENT	CUMBERLAND RIVER	2
FAYETTEVILLE PUBLIC UTILITIES	ELK RIVER	1
FIRST U.D. OF HARDIN COUNTY	TENNESSEE RIVER	9
FIRST UTIL DIST OF KNOX COUNTY	SINKING CREEK EMBAYMENT	1
FORT CAMPBELL WATER SYSTEM	BOILING SPRING	6
FRANKLIN WATER DEPT	HARPETH RIVER	4
GALLATIN WATER DEPARTMENT	CUMBERLAND RIVER	4
GLADEVILLE UTILITY DISTRICT	2 WELLS	2
HALLSDALE-POWELL UTILITY DISTR	MELTON HILL RESERVOIR	1
HARPETH VALLEY U D	CUMBERLAND RIVER	3
HARRIMAN UTILITY BOARD	EMORY RIVER	2
HARTSVILLE-TROUDALE	CUMBERLAND RIVER	4

PUBLIC WATER SYSTEM	SOURCE	#TOC EXCEEDANCES
HENDERSONVILLE U D	OLD HICKORY LAKE	8
JAMESTOWN WATER DEPT	N. WHITE OAK CREEK	8
JELLICO WATER DEPT	MINE IMPOUDMENT	2
KINGSTON WATER SYSTEM	TN RIVER/WATTS BAR LAKE	2
KNOXVILLE UTILITIES BOARD-KUB	TENNESSEE RIVER	8
LA VERGNE WATER SYSTEM	PERCY PRIEST LAKE	11
LAFAYETTE WATER SYSTEM	BARREN RIVER	1
LAGUARDO UTILITY DISTRICT	WELL	17
LAWRENCEBURG UTILITY SYSTEMS	SHOAL CRK / HOPE SPRINGS WATER	2
LEBANON WATER SYSTEM	CUMBERLAND RIVER	1
LENOIR CITY UTILITY BOARD	TENNESSEE RIVER	1
LEWISBURG WATER SYSTEM	DUCK RIVER	3
LEXINGTON WATER SYSTEMS	BEECH LAKE	12
LIVINGSTON WATER DEPT	CUMBERLAND RIVER	2
MADISON SUBURBAN UD	CUMBERLAND RIVER	4
MCMINNVILLE WATER DEPT	BARREN FORK RIV	1
METRO LYNCHBURG/MOORE CO	TIMS FORD LAKE	2
MONTEAGLE PUBLIC UTILITY BOARD	LAUREL LAKE	2
MONTEREY WATER DEPT	CITY LAKE	8
MORRISTOWN WATER SYSTEM	RHOLSTON RIVER	2
MURFREESBORO WATER DEPT	E FORK STONES RIVER	12
NASHVILLE WATER DEPT	CUMBERLAND RIVER - HARRINGTON	4
NASHVILLE WATER DEPT	CUMBERLAND RIVER - OMOHUNDRO	3
NEW JOHNSONVILLE WATER DEPT	KY LAKE	3
NEWPORT UTILITIES BOARD	FRENCH BROAD RIVER	3
NORTH GREENE UTILITIES, INCORP	LICK CREEK	5
NORTH STEWART UTILITY DISTRICT	CUMBERLAND RIVER	9
NORTH U.D. OF DECATUR/BENTON C	TN RIVER	4
NORTH WEST UTILITY DISTRICT	SODDY CK EMB	3
NORTHEAST KNOX U D	HOLSTON RIVER	2
OLIN CORPORATION	HIWASSEE RIVER	1
ONEIDA W&S COMM	HOWARD BAKER LK	12
PARSONS WATER DEPARTMENT	BEECH RIVER	3
PIGEON FORGE WATER DEPT	DOUGLAS LAKE	1
PLATEAU UTILITY DISTRICT	CROOKED FORK CREEK	1
ROGERSVILLE WATER SYSTEM	BIG CREEK	6
SEWANEE UTILITY DISTRICT	LAKE O'DONNELL	3
SHELBYVILLE WATER SYSTEM	DUCK RIVER	4
SMITH UTILITY DISTRICT	CANEY FORK RIVER	2

PUBLIC WATER SYSTEM	SOURCE	#TOC EXCEEDANCES
SMITHVILLE WATER SYSTEM	CENTER HILL LAKE	3
SMYRNA WATER SYSTEM	STONES RIVER	11
SOUTH PITTSBURG WATER SYSTEM	TENNESSEE RIVER	59
SONTARA, OLD HICKORY INC	OLD HICKORY LAKE	6
SPARTA WATER SYSTEM	CALFKILLER RIVER	1
SPENCER WATER SYSTEM	LAUREL LAKE	6
SPRING HILL WATER DEPT	DUCK RIVER	3
TENNESSEE AMERICAN WATER	TENNESSEE RIVER	2
TN AMERICAN-SEQUATCHIE VALLEY	SEQUATCHIE RIVer	1
TRACY CITY WATER SYSTEM	BIG FIERY GIZZARD CREEK	4
TURNEY CENTER	DUCK RIVER	1
WARREN COUNTY UTILITY DISTRICT	COLLINS RIVER	1
WATER AUTH. OF DICKSON COUNTY	TURNBULL CREEK	1
WATER AUTH. OF DICKSON COUNTY	CUMBERLAND RIVER	4
WEST KNOX UTILITY DISTRICT	MELTON HILL OLD	2
WEST ROBERTSON WATER AUTHORITY	RED RIVER	1
WEST WARREN-VIOLA U. D.	BARREN FORK RIV	4
WEST WILSON UTILITY DISTRICT	CUMBERLAND RIVER	2
WHITE HOUSE UTILITY DISTRICT	CUMBERLAND RIVER	3
WINCHESTER WATER SYSTEM	TIMS FORD LAKE	4
WOODBURY WATER SYSTEM	EAST FK STONES RIVER	1

Table B-3e Communities with Water Supply Intakes Exceeding 2 Parts Per Million
Total Organic Carbon *Time period for data is January 1, 2018 through December 31, 2018.*

APPENDIX C – SOURCE WATER PROTECTION AREAS

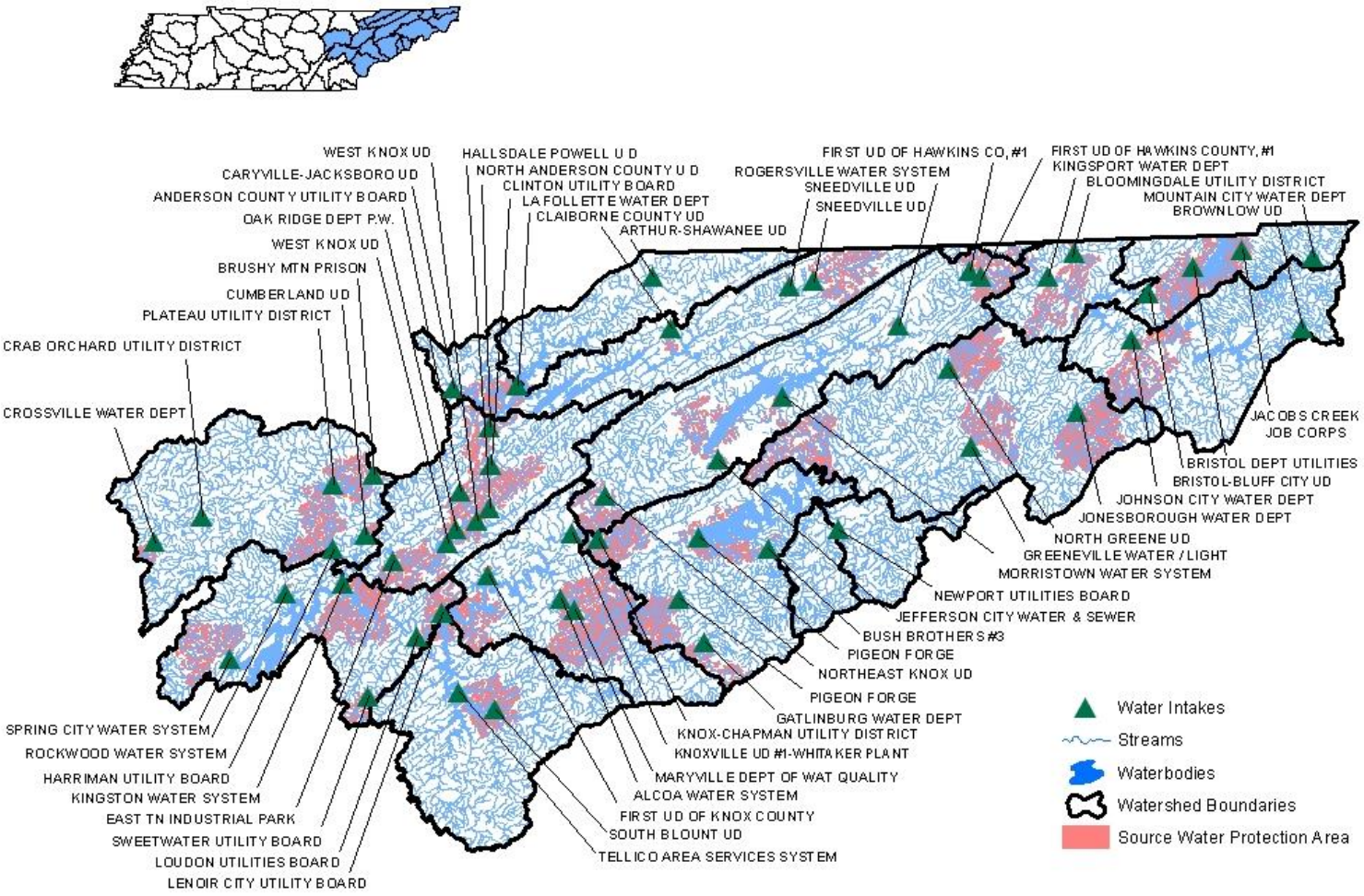

Figure C-1 Source Water Protection Areas in Upper Tennessee River Watersheds. *(Watershed HUCs beginning with 0601) TDEC continues to delineate additional Source Water Protection Areas in Tennessee as required by the Safe Drinking Water Act of 1996.*

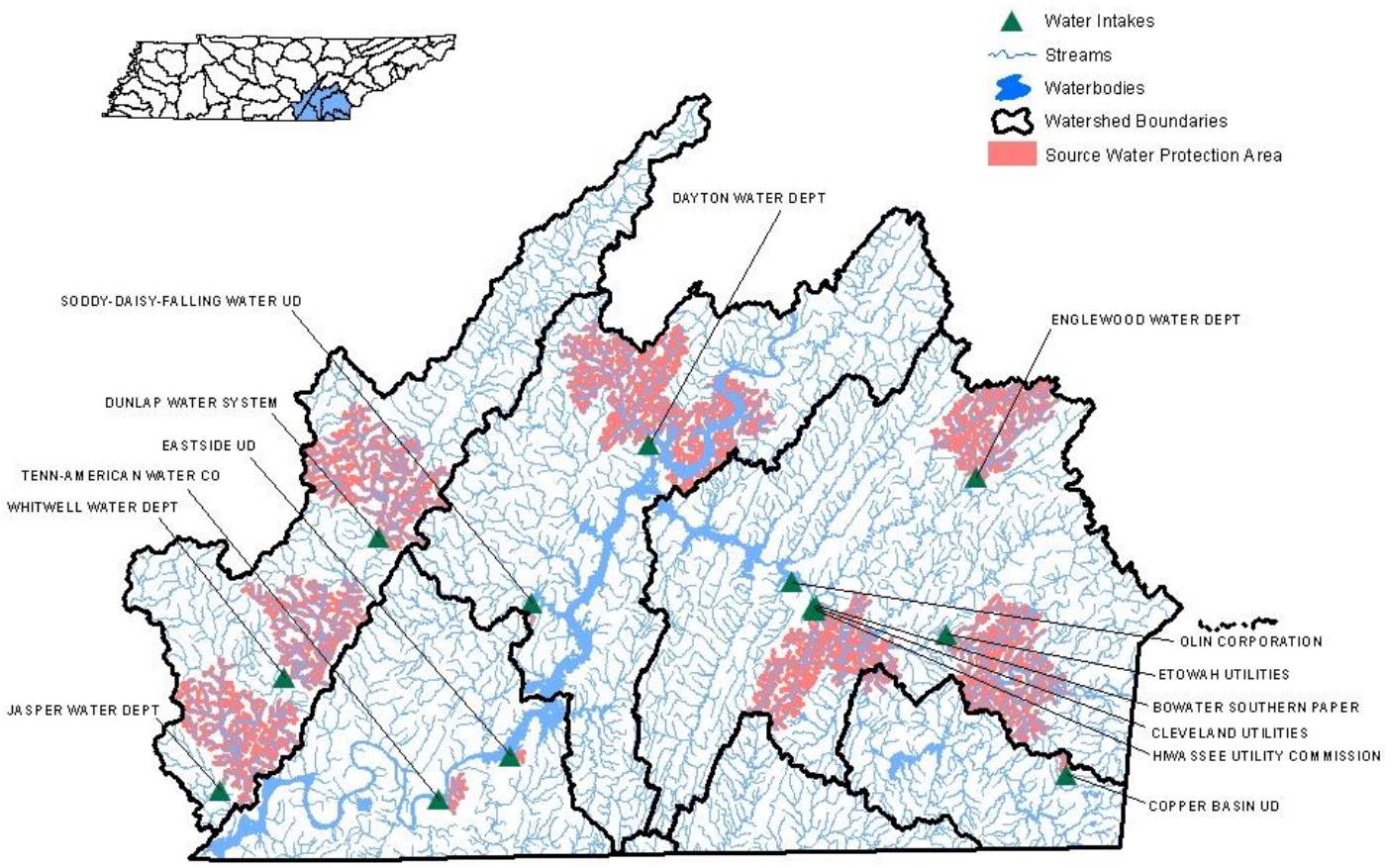

Figure C-2 Source Water Protection Areas in Tennessee River Watersheds. *(Watershed HUCs beginning with 0602) TDEC continues to delineate additional Source Water Protection Areas in Tennessee as required by the Safe Drinking Water Act of 1996.*

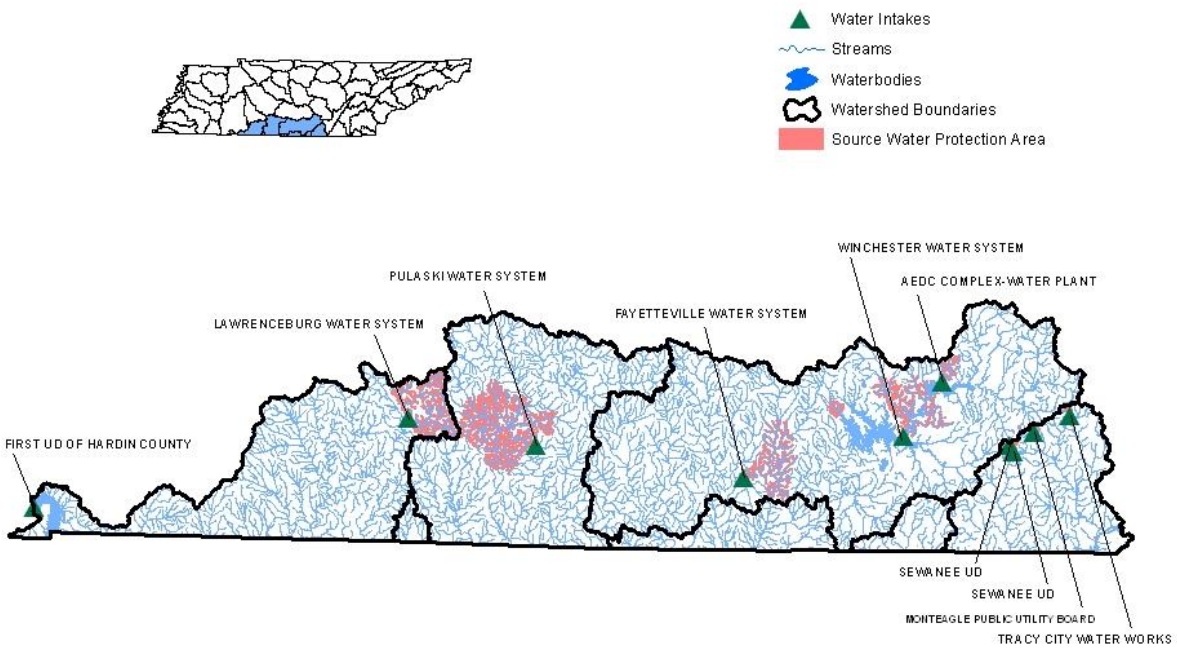

Figure C-3 Source Water Protection Areas in Middle Tennessee River Watersheds. *(Watershed HUCs beginning with 0603) TDEC continues to delineate additional Source Water Protection Areas in Tennessee as required by the Safe Drinking Water Act of 1996.*

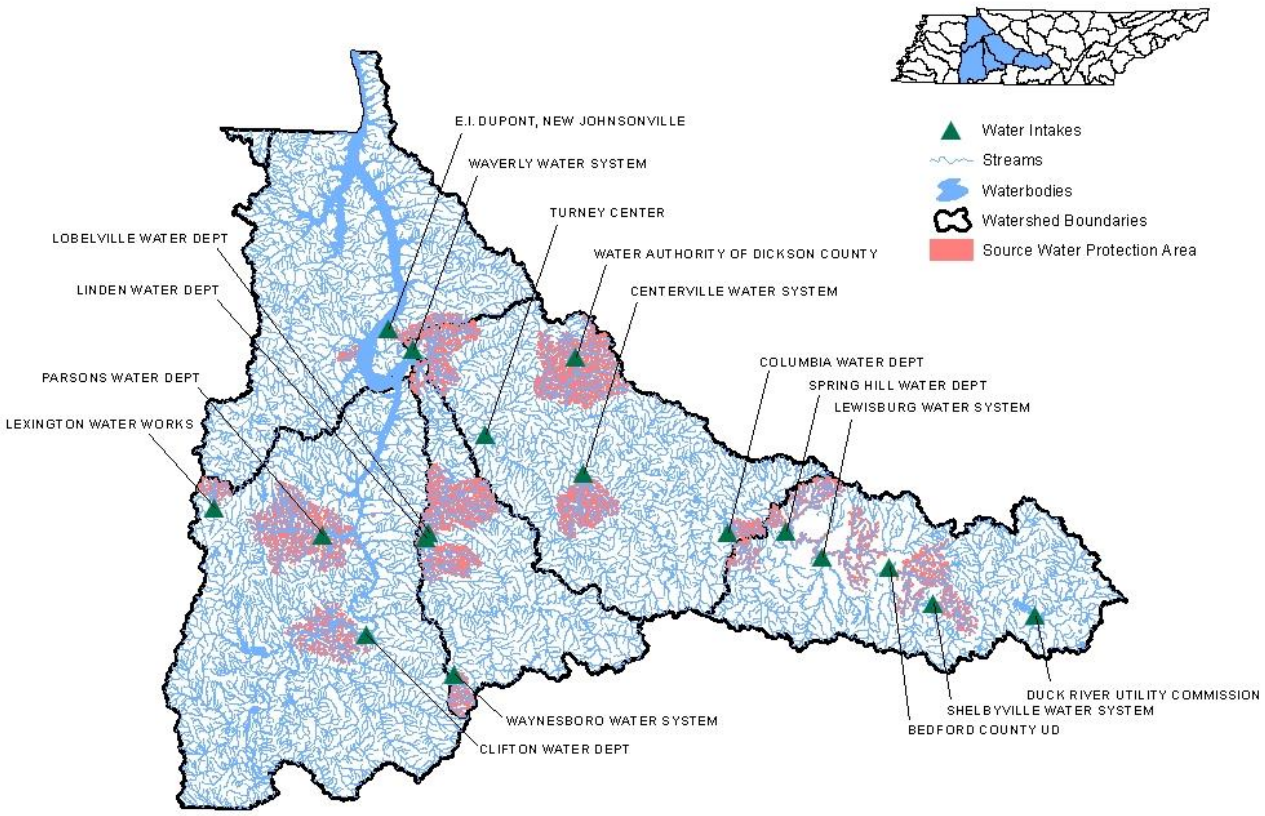

Figure C-4 Source Water Protection Areas in Lower Tennessee River Watersheds. *(Watershed HUCs beginning with 0604) TDEC continues to delineate additional Source Water Protection Areas in Tennessee as required by the Safe Drinking Water Act of 1996.*

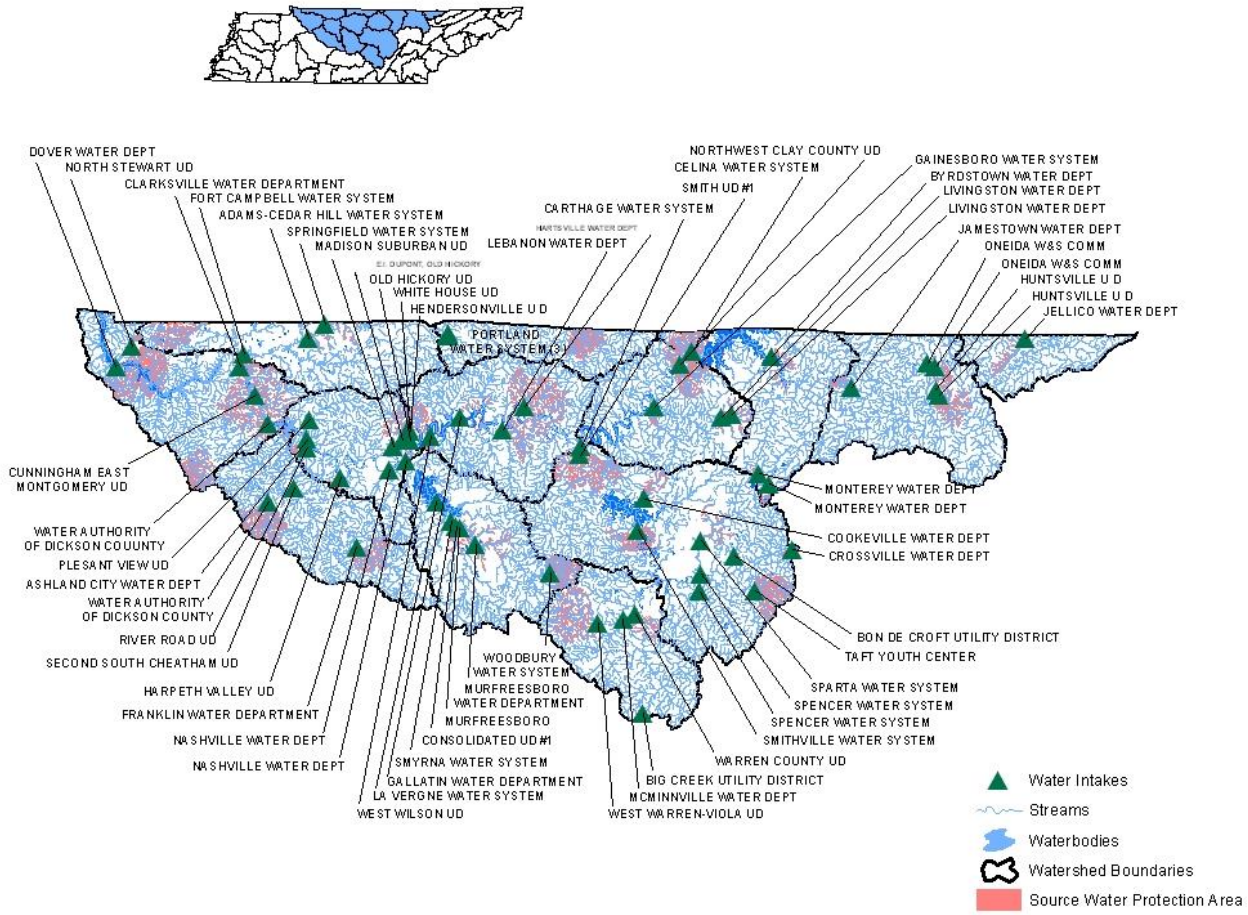

Figure C-5 Source Water Protection Areas in Cumberland River and Barren River Watersheds. *(Watershed HUCs beginning with 0511 & 0513) TDEC continues to delineate additional Source Water Protection Areas in Tennessee as required by the Safe Drinking Water Act of 1996.*