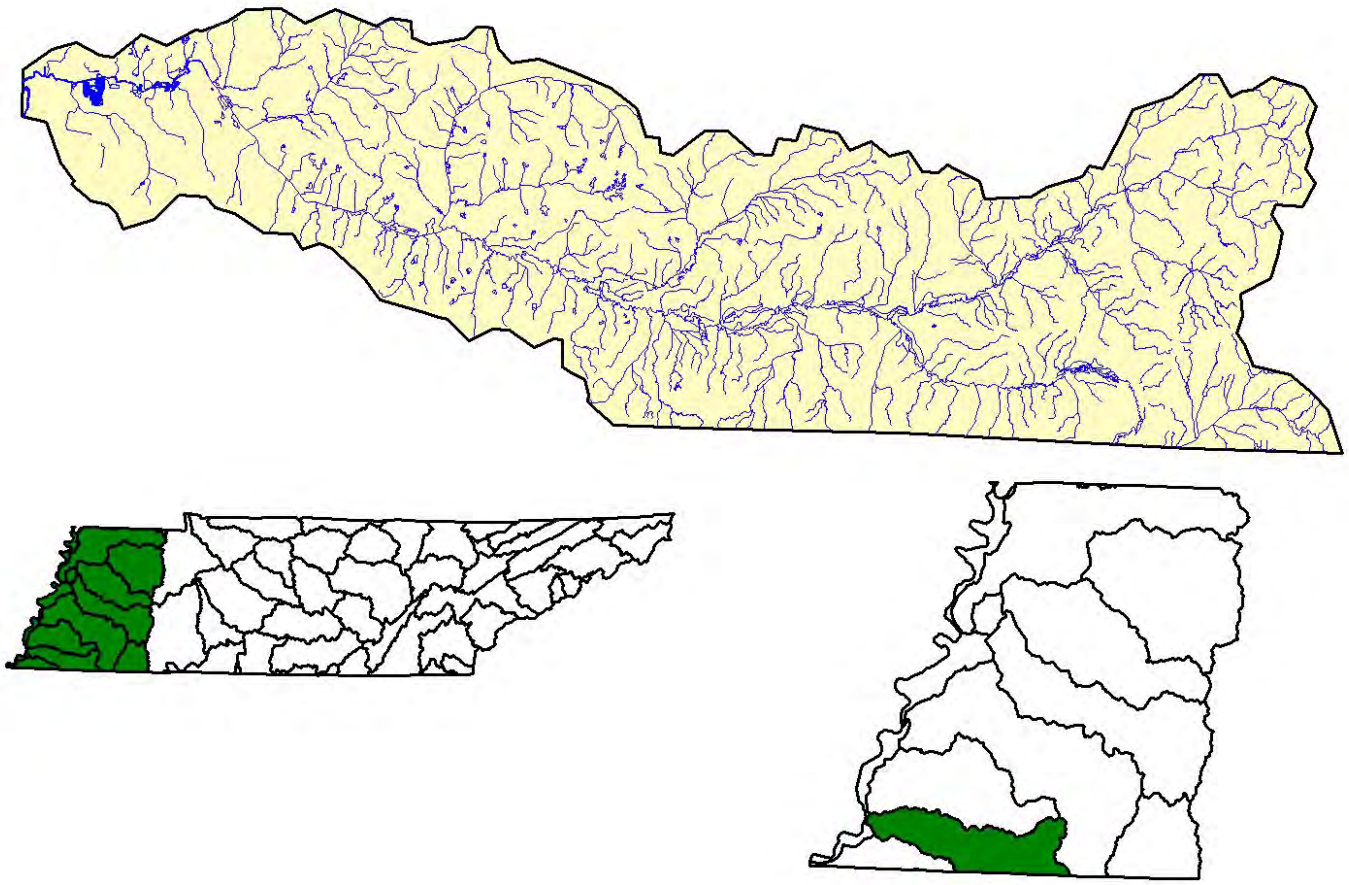
WOLF RIVER WATERSHED (08010210) OF THE MISSISSIPPI RIVER BASIN

WATERSHED WATER QUALITY MANAGEMENT PLAN



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER POLLUTION CONTROL
WATERSHED MANAGEMENT SECTION

WOLF RIVER WATERSHED
WATER QUALITY MANAGEMENT PLAN

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GLOSSARY

1Q20. The lowest average 1 consecutive days flow with average recurrence frequency of once every 20 years.

30Q2. The lowest average 3 consecutive days flow with average recurrence frequency of once every 2 years.

7Q10. The lowest average 7 consecutive days flow with average recurrence frequency of once every 10 years.

303(d). The section of the federal Clean Water Act that requires a listing by states, territories, and authorized tribes of impaired waters, which do not meet the water quality standards that states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology.

305(b). The section of the federal Clean Water Act that requires EPA to assemble and submit a report to Congress on the condition of all water bodies across the Country as determined by a biennial collection of data and other information by States and Tribes.

AFO. Animal Feeding Operation.

Ambient Sites. Those sites established for long term instream monitoring of water quality.

ARAP. Aquatic Resource Alteration Permit.

Assessment. The result of an analysis of how well streams meet the water quality criteria assigned to them.

Bankfull Discharge. The momentary maximum peak flow before a stream overflows its banks onto a floodplain.

Basin. An area that drains several smaller watersheds to a common point. Most watersheds in Tennessee are part of the Cumberland, Mississippi, or Tennessee Basin (The Conasauga River and Barren River Watersheds are the exceptions).

Benthic. Bottom dwelling.

Biorecon. A qualitative multihabitat assessment of benthic macroinvertebrates that allows rapid screening of a large number of sites. A Biorecon is one tool used to recognize stream impairment as judged by species richness measures, emphasizing the presence or absence of indicator organisms without regard to relative abundance.

BMP. An engineered structure or management activity, or combination of these, that eliminates or reduces an adverse environmental effect of a pollutant.

BOD. Biochemical Oxygen Demand. A measure of the amount of oxygen consumed in the biological processes that break down organic and inorganic matter.

CAFO. Concentrated Animal Feeding Operation.

Designated Uses. The part of Water Quality Standards that describes the uses of surface waters assigned by the Water Quality Control Board. All streams in Tennessee are designated for Recreation, Fish and Aquatic Life, Irrigation, and Livestock Watering and Wildlife. Additional designated uses for some, but not all, waters are Drinking Water Supply, Industrial Water Supply, and Navigation.

DMR. Discharge Monitoring Report. A report that must be submitted periodically to the Division of Water Pollution Control by NPDES permitees.

DO. Dissolved oxygen.

EPA. Environmental Protection Agency. The EPA Region 4 web site is http://www.epa.gov/region4/

Field Parameter. Determinations of water quality measurements and values made in the field using a kit or probe. Common field parameters include pH, DO, temperature, conductivity, and flow.

Fluvial Geomorphology. The physical characteristics of moving water and adjoining landforms, and the processes by which each affects the other.

HUC-8. The 8-digit Hydrologic Unit Code corresponding to one of 54 watersheds in Tennessee.

HUC-10. The 10-digit NRCS Hydrologic Unit Code. HUC-10 corresponds to a smaller land area than HUC-8.

HUC-12. The 12-digit NRCS Hydrologic Unit Code. HUC-12 corresponds to a smaller land area than HUC-10.

MRLC. Multi-Resolution Land Classification.

MS4. Municipal Separate Storm Sewer System.

Nonpoint Source (NPS). Sources of water pollution without a single point of origin. Nonpoint sources of pollution are generally associated with surface runoff, which may carry sediment, chemicals, nutrients, pathogens, and toxic materials into receiving waterbodies. Section 319 of the Clean Water Act of 1987 requires all states to assess the impact of nonpoint source pollution on the waters of the state and to develop a program to abate this impact.

NPDES. National Pollutant Discharge Elimination System. Section 402 of the Clean Water Act of 1987 requires dischargers to waters of the U.S. to obtain NPDES permits.

NRCS. Natural Resources Conservation Service. NRCS is part of the federal Department of Agriculture. The NRCS home page is http://www.nrcs.usda.gov

Point Source. Any discernable, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture (Clean Water Act Section 502(14)).

Q Design. The average daily flow that a treatment plant or other facility is designed to accommodate.

Reference Stream (Reference Site). A stream (site) judged to be least impacted. Data from reference streams are used for comparisons with similar streams.

SBR. Sequential Batch Reactor.

Stakeholder. Any person or organization affected by the water quality or by any watershed management activity within a watershed.

STATSGO. State Soil Geographic Database. STATSGO is compiled and maintained by the Natural Resources Conservation Service.

STORET. The EPA repository for water quality data that is used by state environmental agencies, EPA and other federal agencies, universities, and private citizens. STORET (Storage and Retrieval of National Water Quality Data System) data can be accessed at http://www.epa.gov/storet/

TDA. Tennessee Department of Agriculture. The TDA web address is http://www.state.tn.us/agriculture

TDEC. Tennessee Department of Environment and Conservation. The TDEC web address is http://www.tdec.net

TMDL. Total Maximum Daily Load. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of the amount to the pollutant's sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation includes a margin of safety to ensure that the waterbody can be used for the purposes the State has designated. The calculation must also account for seasonal variation in water quality. A TMDL is required for each pollutant in an impaired stream as described in Section 303 of the Federal Clean Water Act of 1987. Updates and information on Tennessee's TMDLs can be found at http://www.tdec.net/wpc/tmdl/

TMSP. Tennessee Multi-Sector Permit.

USGS. United States Geological Survey. USGS is part of the federal Department of the Interior. The USGS home page is http://www.usgs.gov/.

WAS. Waste Activated Sludge.

Water Quality Standards. A triad of designated uses, water quality criteria, and antidegradation statement. Water Quality Standards are established by Tennessee and approved by EPA.

Watershed. A geographic area which drains to a common outlet, such as a point on a larger stream, lake, underlying aquifer, estuary, wetland, or ocean.

WET. Whole Effluent Toxicity.

WWTP. Waste Water Treatment Plant

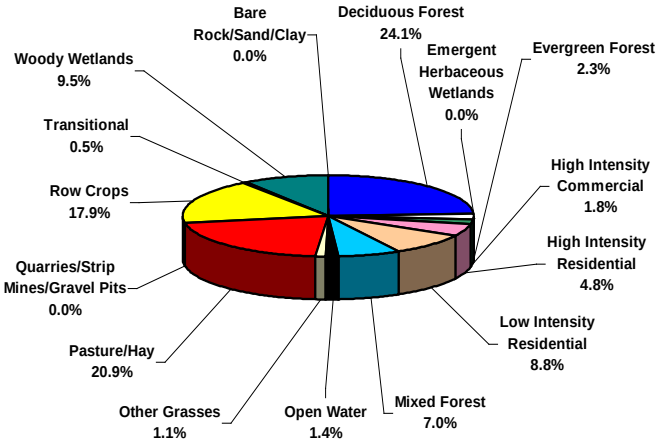
Summary – Wolf River

In 1996, the Tennessee Department of Environment and Conservation Division of Water Pollution Control adopted a watershed approach to water quality. This approach is based on the idea that many water quality problems, like the accumulation of point and nonpoint pollutants, are best addressed at the watershed level. Focusing on the whole watershed helps reach the best balance among efforts to control point sources of pollution and polluted runoff as well as protect drinking water sources and sensitive natural resources such as wetlands. Tennessee has chosen to use the USGS 8-digit Hydrologic Unit Code (HUC-8) as the organizing unit.

The Watershed Approach recognizes awareness that restoring and maintaining our waters requires crossing traditional barriers (point *vs.* nonpoint sources of pollution) when designing solutions. These solutions increasingly rely on participation by both public and private sectors, where citizens, elected officials, and technical personnel all have opportunities to participate. The Watershed Approach provides the framework for a watershed-based and community-based approach to address water quality problems.

Chapter 1 of the Wolf River Watershed Water Quality Management Plan discusses the Watershed Approach and emphasizes that the Watershed Approach is not a regulatory program or an EPA mandate; rather it is a decision-making process that reflects a common strategy for information collection and analysis as well as a common understanding of the roles, priorities, and responsibilities of all stakeholders within a watershed. Traditional activities like permitting, planning and monitoring are also coordinated in the Watershed Approach.

A detailed description of the watershed can be found in Chapter 2, to include information on location, population, hydrology, land use and natural and cultural resources. The Tennessee portion of the Wolf River Watershed is approximately 561 square miles and includes parts of three Tennessee counties. A part of the Mississippi River drainage basin, the watershed has 1,025 stream miles and 177 lake acres in Tennessee.



Land Use Distribution in the Tennessee Portion of the Wolf River Watershed.

There are four greenways and two wildlife management areas located in the watershed. Over twenty rare plant and animal species have been documented in the watershed, including three rare fish species and three rare mussel species.

A review of water quality sampling and assessment is presented in Chapter 3. Using the Watershed Approach to Water Quality, 234 sampling events occurred in the Tennessee portion of the Wolf River Watershed in 1999-2000. These were conducted at ambient, ecoregion or watershed monitoring sites. Monitoring results support the conclusion that 10% of total stream miles fully support designated uses.

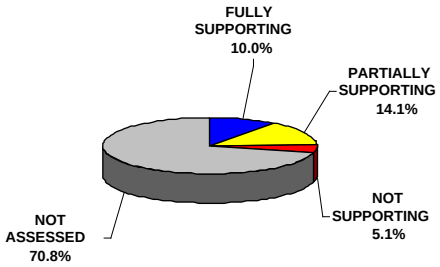


Figure 3-5. Water Quality Assessment of Streams and Rivers in the Tennessee Portion of the Wolf River Watershed. Assessment data are based on the 2002 Water Quality Assessment of 1,025.2 miles in the watershed.

Also in Chapter 3, a series of maps illustrate Overall Use Support in the watershed, as well as Use Support for the individual uses of Fish and Aquatic Life Support, Recreation, Irrigation, and Livestock Watering and Wildlife. Another series of maps illustrate streams that are listed for impairment by specific causes (pollutants) such as Siltation, Pathogens, Organic Enrichment/Low Dissolved Oxygen and Lead/Metals.

Point and Nonpoint Sources are addressed in Chapter 4. Chapter 4 is organized by HUC-10 subwatersheds. Maps illustrating the locations of STORET monitoring sites and USGS stream gauging stations are presented in each subwatershed.

Figure 4-1. The Tennessee Portion of the Wolf River Watershed is Composed of Three USGS-Delineated Subwatersheds (10-Digit Subwatersheds).

Point source contributions to the Tennessee portion of the Wolf River Watershed consist of 18 individual NPDES-permitted facilities, 11 of which discharge into streams that have been listed on the 1998 303(d) list. Other point source permits in the watershed are Aquatic Resource Alteration Permits (50), Tennessee Multi-Sector Permits (41), Mining Permits (3), and Ready-Mix Concrete Plant Permits (6). Agricultural operations include cattle, chicken, hog, and sheep farming. Maps illustrating the locations of NPDES and ARAP permit sites are presented in each subwatershed.

Chapter 5 is entitled *Water Quality Partnerships in the Wolf River Watershed* and highlights partnerships between agencies and between agencies and landowners that are essential to success. Programs of federal agencies (Natural Resources Conservation Service, U.S. Fish and Wildlife Service, U.S. Geological Survey and USCOE Memphis District), and state agencies (TDEC Division of Water Supply, and Tennessee Department of Agriculture) are summarized. Local initiatives of active watershed organizations (Tennessee Water Sentinels) are also described.

Point and Nonpoint source approaches to water quality problems in the Tennessee portion of the Wolf River Watershed are addressed in Chapter 6. Chapter 6 also includes comments received during public meetings, along with an assessment of needs for the watershed.

The full Wolf River Watershed Water Quality Management Plan can be found at: http://www.state.tn.us/environment/wpc/watershed/wsmplans/

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

1.1 Background

1.2 Watershed Approach to Water Quality
1.2.A. Components of the Watershed Approach
1.2.B. Benefits of the Watershed Approach

1.1 BACKGROUND. The Division of Water Pollution Control is responsible for administration of the Tennessee Water Quality Control Act of 1977 (TCA 69–3–101). Information about the Division of Water Pollution Control, updates and announcements, may be found at http://www.state.tn.us/environment/wpc/index.html, and a summary of the organization of the Division of Water Pollution Control may be found in Appendix I.

The mission of the Division of Water Pollution Control is to abate existing pollution of the waters of Tennessee, to reclaim polluted waters, to prevent the future pollution of the waters, and to plan for the future use of the waters so that the water resources of Tennessee might be used and enjoyed to the fullest extent consistent with the maintenance of unpolluted waters.

The Division monitors, analyzes, and reports on the quality of Tennessee's water. In order to perform these tasks more effectively, the Division adopted a Watershed Approach to Water Quality in 1996.

This Chapter summarizes TDEC's Watershed Approach to Water Quality.

1.2 WATERSHED APPROACH TO WATER QUALITY. The Watershed Approach to Water Quality is a coordinating framework designed to protect and restore aquatic systems and protect human health more effectively (EPA841-R-95-003). The Approach is based on the concept that many water quality problems, like the accumulation of pollutants or nonpoint source pollution, are best addressed at the watershed level. In addition, a watershed focus helps identify the most cost-effective pollution control strategies to meet clean water goals. Tennessee's Watershed Approach, updates and public participation opportunities, may be found on the web at http://www.state.tn.us/environment/wpc/wshed1.htm.

Watersheds 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).

Four main features are typical of the Watershed Approach: 1) Identifying and prioritizing water quality problems in the watershed, 2) Developing increased public involvement, 3) Coordinating activities with other agencies, and 4) Measuring success through increased and more efficient monitoring and other data gathering.

Typically, the Watershed Approach meets the following description (EPA841-R-95-003):

- Features watersheds or basins as the basic management units
- Targets priority subwatersheds for management action
- Addresses all significant point and nonpoint sources of pollution
- Addresses all significant pollutants
- Sets clear and achievable goals
- Involves the local citizenry in all stages of the program
- Uses the resources and expertise of multiple agencies
- Is not limited by any single agency's responsibilities
- Considers public health issues

An additional characteristic of the Watershed Approach is that it complements other environmental activities. This allows for close cooperation with other state agencies and local governments as well as with federal agencies such as the Tennessee Valley Authority and the U.S. Army Corps of Engineers, U.S. Department of Agriculture (*e.g.*, Natural Resources Conservation Service, United States Forest Service), U.S. Department of the Interior (*e.g.* United States Geological Survey, U.S. Fish and Wildlife Service, National Park Service). When all permitted dischargers are considered together, agencies are better able to focus on those controls necessary to produce measurable improvements in water quality. This also results in a more efficient process: It encourages agencies to focus staff and financial resources on prioritized geographic locations and makes it easier to coordinate between agencies and individuals with an interest in solving water quality problems (EPA841-R-003).

The Watershed Approach is not a regulatory program or a new EPA mandate; rather it is a decision making process that reflects a common strategy for information collection and analysis as well as a common understanding of the roles, priorities, and responsibilities of all stakeholders within a watershed. The Watershed Approach utilizes features already in state and federal law, including:

- Water Quality Standards
- National Pollutant Discharge Elimination System (NPDES)
- Total Maximum Daily Loads (TMDLs)
- Clean Lakes Program
- Nonpoint Source Program
- Groundwater Protection

Traditional activities like permitting, planning, and monitoring are also coordinated in the Watershed Approach. A significant change from the past, however, is that the Watershed Approach encourages integration of traditional regulatory (point source pollution) and nonregulatory (nonpoint sources of pollution) programs. There are additional changes from the past as well:

THE PAST	WATERSHED APPROACH
Focus on fixed-station ambient monitoring	Focus on comprehensive watershed monitoring
Focus on pollutant discharge sites	Focus on watershed-wide effects
Focus on WPC programs	Focus on coordination and cooperation
Focus on point sources of pollution	Focus on all sources of pollution
Focus on dischargers as the problem	Focus on dischargers as an integral part of the solution
Focus on short-term problems	Focus on long-term solutions

Table 1-1. Contrast Between the Watershed Approach and the Past.

This approach places greater emphasis on all aspects of water quality, including chemical water quality (conventional pollutants, toxic pollutants), physical water quality (temperature, flow), habitat quality (channel morphology, composition and health of benthic communities), and biodiversity (species abundance, species richness).

1.2.A. Components of the Watershed Approach. Tennessee is composed of fifty-five watersheds corresponding to the 8-digit USGS Hydrologic Unit Codes (HUC-8). These watersheds, which serve as geographic management units, are combined in five groups according to year of implementation.

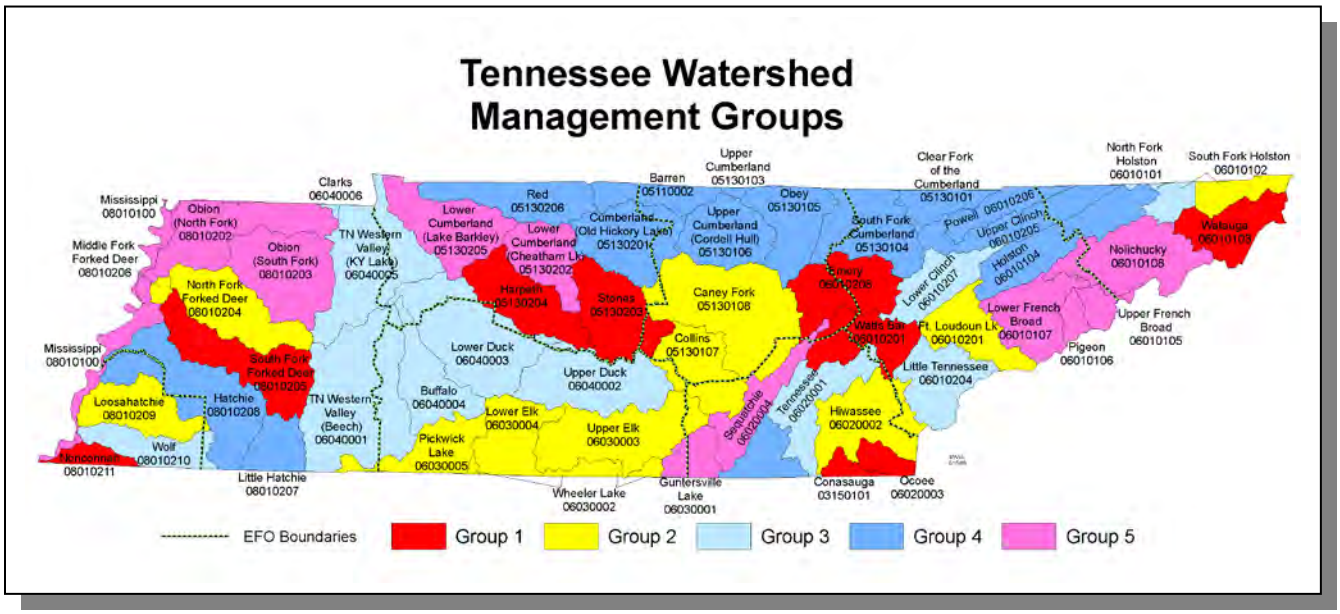


Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

Each year, TDEC conducts monitoring in one-fifth of Tennessee's watersheds; assessment, priority setting and follow-up monitoring are conducted in another one fifth of watersheds; modeling and TMDL studies in another one fifth; developing management plans in another one fifth; and implementing management plans in another one fifth of watersheds.

GROUP	WEST TENNESSEE	MIDDLE TENNESSEE	EAST TENNESSEE
1	Nonconnah South Fork Forked Deer	Harpeth Stones	Conasauga Emory Ocoee Watauga Watts Bar
2	Loosahatchie Middle Fork Forked Deer North Fork Forked Deer	Caney Fork Collins Lower Elk Pickwick Lake Upper Elk Wheeler Lake	Fort Loudoun Hiwassee South Fork Holston (Upper) Wheeler Lake
3	Tennessee Western Valley (Beech River) Tennessee Western Valley (KY Lake) Wolf River	Buffalo Lower Duck Upper Duck	Little Tennessee Lower Clinch North Fork Holston South Fork Holston (Lower) Tennessee (Upper)
4	Lower Hatchie Upper Hatchie	Barren Obey Red Upper Cumberland (Cordell Hull Lake) Upper Cumberland (Old Hickory Lake) Upper Cumberland (Cumberland Lake)	Holston Powell South Fork Cumberland Tennessee (Lower) Upper Clinch Upper Cumberland (Clear Fork)
5	Mississippi North Fork Obion South Fork Obion	Guntersville Lake Lower Cumberland (Cheatham Lake) Lower Cumberland (Lake Barkley)	Lower French Broad Nolichucky Pigeon Upper French Broad

Table 1-2. Watershed Groups in Tennessee's Watershed Approach.

In succeeding years of the cycle, efforts rotate among the watershed groups. The activities in the five year cycle provide a reference for all stakeholders.

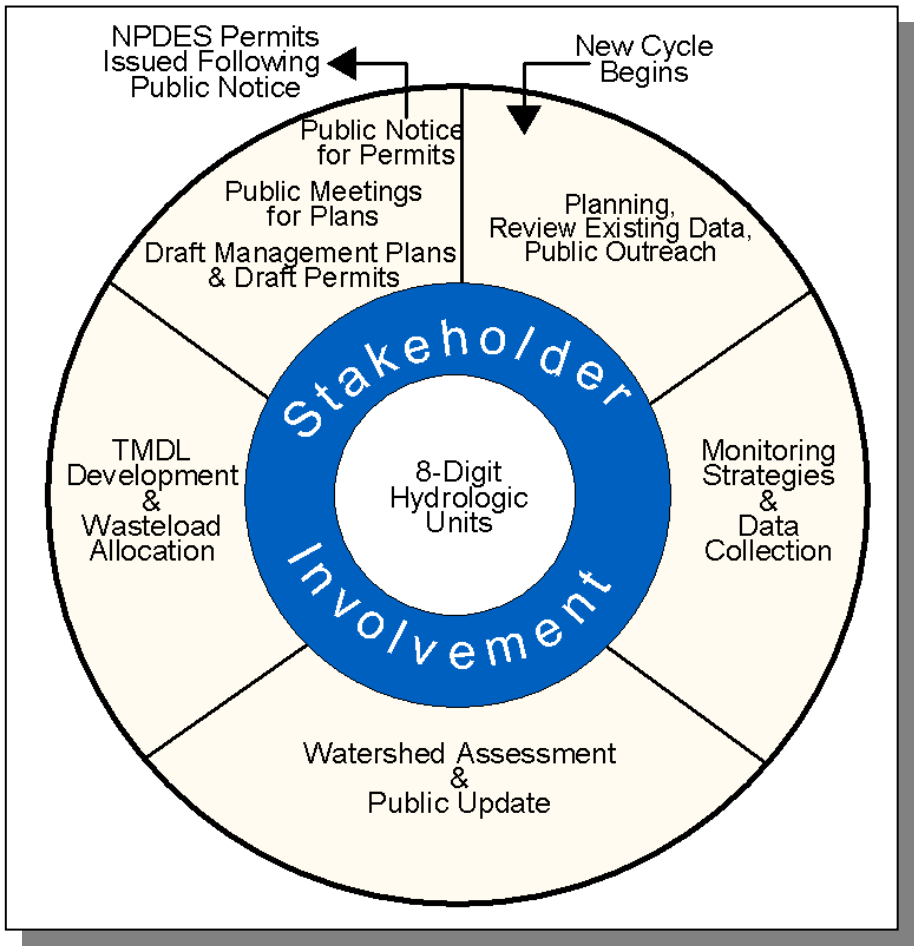


Figure 1-2. The Watershed Approach Cycle.

The six key activities that take place during the 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 rivers and streams. Reviewing all existing data and comparing agencies' work plans guide the development of an effective monitoring strategy.

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

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

4. Wasteload Allocation/TMDL Development. Monitoring data are used to determine nonpoint source contributions and pollutant loads for permitted dischargers releasing wastewater to the watershed. Limits are set to assure that water quality is protected.

5. Permits. Issuance and expiration of all discharge permits are synchronized based on watersheds. Currently, 1700 permits have been issued in Tennessee under the federally delegated National Pollutant Discharge Elimination System (NPDES).

6. Watershed Management Plans. These plans include information for each watershed including general watershed description, water quality goals, major water quality concerns and issues, and management strategies.

Public participation opportunities occur throughout the entire five year cycle. Participation in Years 1, 3 and 5 is emphasized, although additional meetings are held at stakeholder's request. People tend to participate more readily and actively in protecting the quality of waters in areas where they live and work, and have some roles and responsibilities:

- Data sharing
- Identification of water quality stressors
- Participation in public meetings
- Commenting on management plans
- Shared commitment for plan implementation

1.2.B. Benefits of the Watershed Approach. The Watershed Approach fosters a better understanding of the physical, chemical and biological effects on a watershed, thereby allowing agencies and citizens to focus on those solutions most likely to be effective. The Approach recognizes the need for a comprehensive, ecosystem-based approach that depends on local governments and local citizens for success (EPA841-R-95-004). On a larger scale, many lessons integrating public participation with aquatic ecosystem-based programs have been learned in the successful Chesapeake Bay, Great Lakes, Clean Lakes, and National Estuary Programs.

Benefits of the Watershed Approach include (EPA841-R-95-004):

- Focus on water quality goals and ecological integrity rather than on program activities such as number of permits issued.

- Improve basis for management decisions through consideration of both point and nonpoint source stressors. A watershed strategy improves the scientific basis for decision making and focuses management efforts on basins and watersheds where they are most needed. Both point and nonpoint control strategies are more effective under a watershed approach because the Approach promotes timely and focused development of TMDLs.

- Enhance program efficiency, as the focus becomes watershed. A watershed focus can improve the efficiency of water management programs by facilitating consolidation of programs within each watershed. For example, handling all point source dischargers in a watershed at the same time reduces administrative costs due to the potential to combine hearings and notices as well as allowing staff to focus on more limited areas in a sequential fashion.

- Improve coordination between federal, state and local agencies including data sharing and pooling of resources. As the focus shifts to watersheds, agencies are better able to participate in data sharing and coordinated assessment and control strategies.

- Increase public involvement. The Watershed Approach provides opportunities for stakeholders to increase their awareness of water-related issues and inform staff about their knowledge of the watershed. Participation is via three public meetings over the five-year watershed management cycle as well as meetings at stakeholder's request. Additional opportunities are provided through the Department of Environment and Conservation homepage and direct contact with local Environmental Assistance Centers.

- Greater consistency and responsiveness. Developing goals and management plans for a basin or watershed with stakeholder involvement results in increased responsiveness to the public and consistency in determining management actions. In return, stakeholders can expect improved consistency and continuity in decisions when management actions follow a watershed plan.

Additional benefits of working at the watershed level are described in the Clean Water Action Plan (EPA-840-R-98-001), and can be viewed at http://www.cleanwater.gov/action/toc.html.

The Watershed Approach represents awareness that restoring and maintaining our waters requires crossing traditional barriers (point *vs.* nonpoint sources of pollution) when designing solutions. These solutions increasingly rely on participation by both public and private sectors, where citizens, elected officials and technical personnel all have opportunity to participate. This integrated approach mirrors the complicated relationships in which people live, work and recreate in the watershed, and suggests a comprehensive, watershed-based and community-based approach is needed to address these (EPA841-R-97-005).

CHAPTER 2

DESCRIPTION OF THE WOLF RIVER WATERSHED

2.1. Background

2.2. Description of the Watershed
2.2.A. General Location
2.2.B. Population Density Centers

2.3. General Hydrologic Description
2.3.A. Hydrology
2.3.B. Dams

2.4. Land Use

2.5. Ecoregions and Reference Streams

2.6. Natural Resources
2.6.A. Rare Plants and Animals
2.6.B. Wetlands

2.7. Cultural Resources
2.7.C. Greenways
2.7.E. Wildlife Management Area

2.8. Tennessee Rivers Assessment Project

2.1. BACKGROUND. The Wolf River and Watershed are named for the red wolf, which was abundant in Southwest Tennessee when the first settlers arrived. The Chickasaw name, “Blackbird River,” was replaced once French mappers began recording what they saw.

This Chapter describes the location and characteristics of the Tennessee portion of the Wolf River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Wolf River Watershed is located in Tennessee and Mississippi. The Tennessee portion of the Wolf River Watershed (68.5% of the entire watershed) includes parts of Fayette, Hardeman, and Shelby Counties.

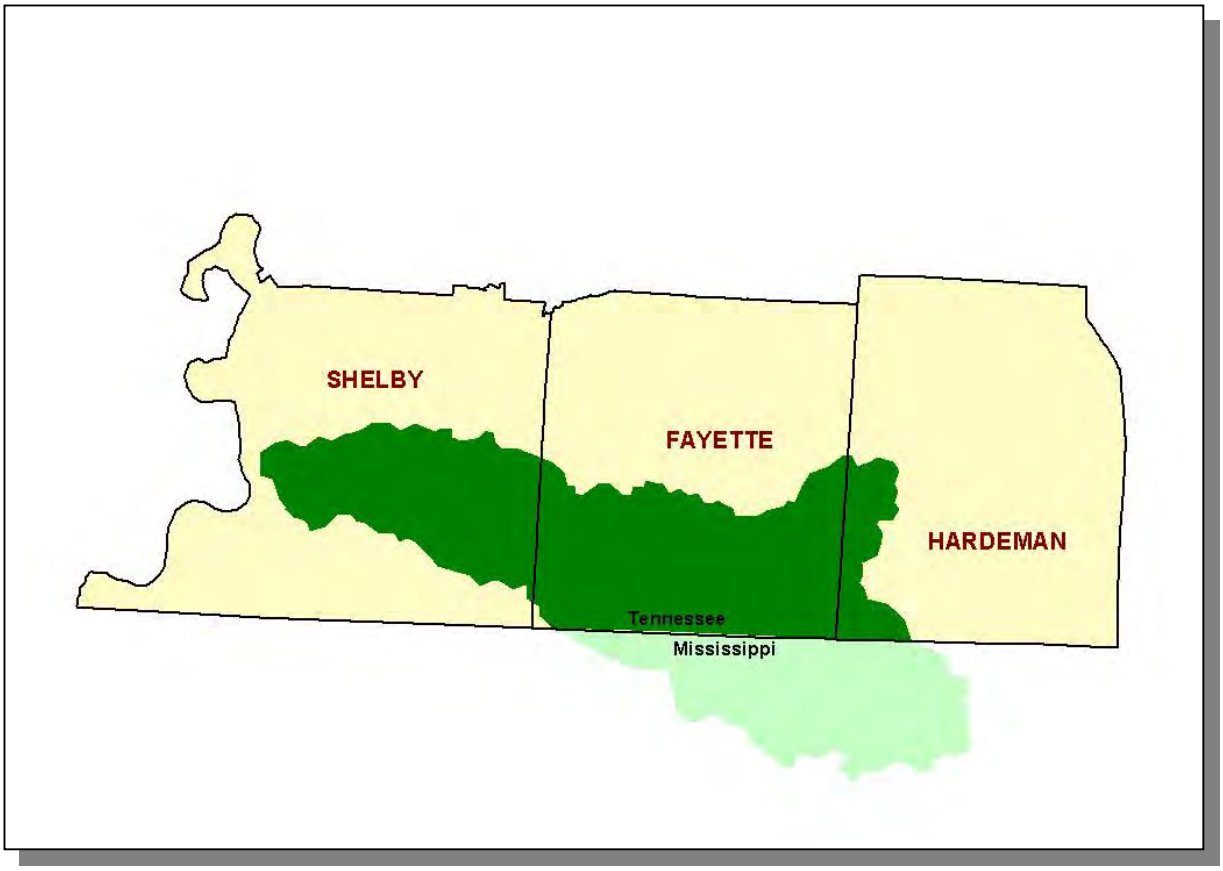


Figure 2-1. General Location of the Tennessee Portion of the Wolf River Watershed. *Dark green, Tennessee portion (561 square miles); light green, Mississippi portion (258 square miles).*

COUNTY	% OF WATERSHED IN EACH COUNTY
Fayette	52.2
Shelby	38.6
Hardeman	9.2

Table 2-1. The Wolf River Watershed Includes Parts of Three West Tennessee Counties. *Percentages are calculated for Tennessee portion of watershed*

2.2.B. Population Density Centers. Five state highways and two interstates serve the major communities in the Tennessee portion of the Wolf River Watershed.

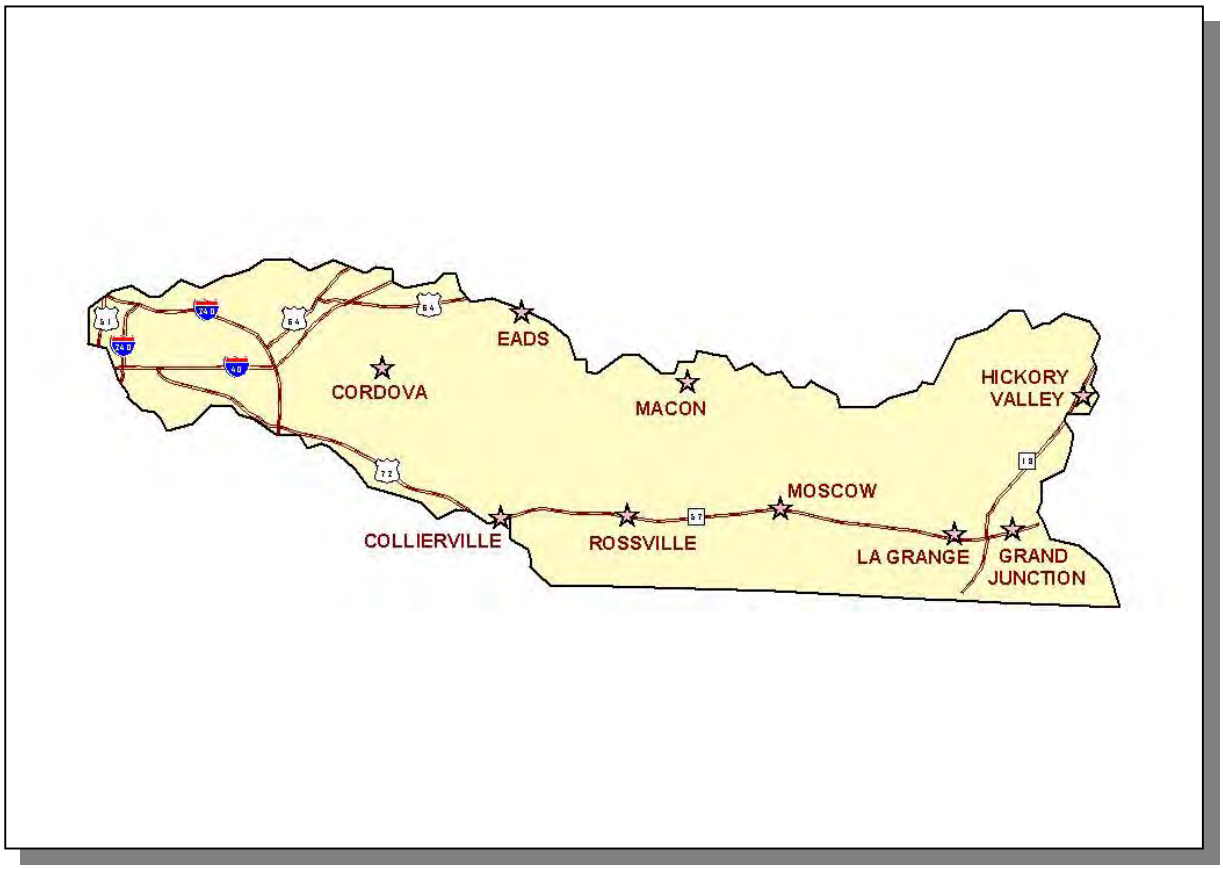


Figure 2-2. Municipalities and Roads in the Tennessee Portion of the Wolf River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Collierville	25,629	Shelby
Moscow	395	Fayette
Rossville	384	Fayette
Grand Junction	356	Fayette/Hardeman
La Grange	162	Fayette
Hickory Valley	160	Hardeman

Table 2-2. Communities and Populations in the Tennessee Portion of the Wolf River Watershed. *Population based on 1999 census (Tennessee 2001/2002 Blue Book). Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Wolf River Watershed, designated 08010210 by the USGS, drains approximately 819 square miles, 561 square miles of which are in Tennessee, and empties to the Mississippi River Watershed (08010100).

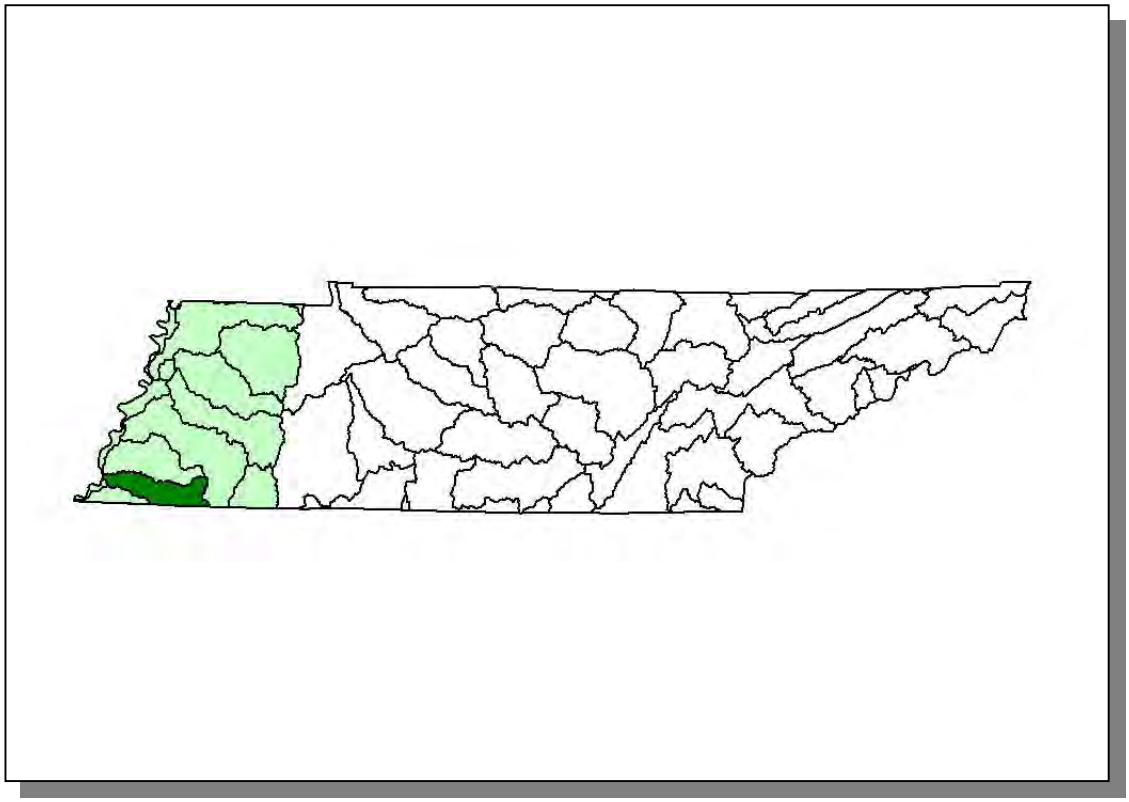


Figure 2-3. The Wolf River Watershed is Part of the Mississippi River Basin.

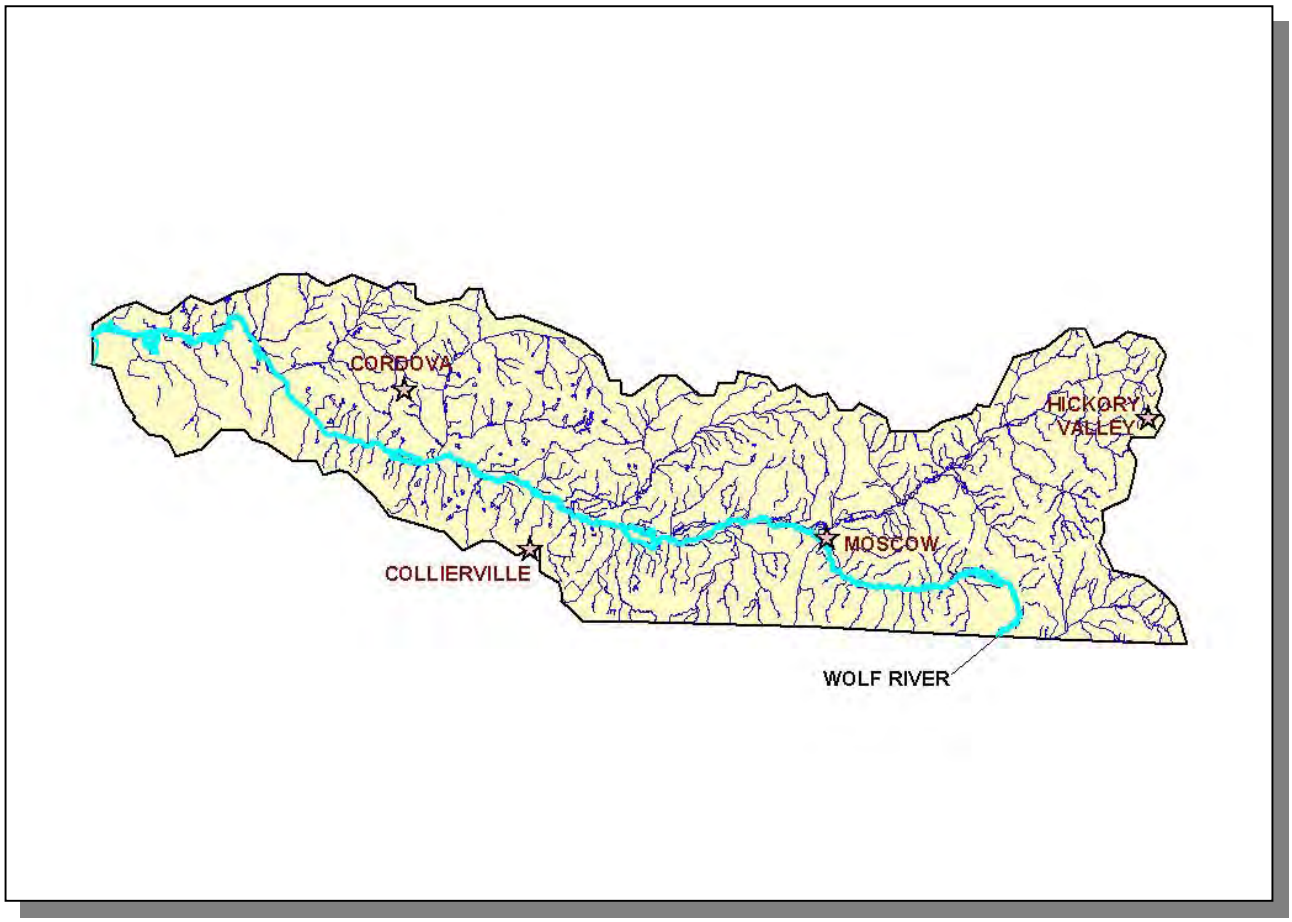


Figure 2-4. Hydrology in the Tennessee Portion of the Wolf River Watershed. *There are 1,025 stream miles in the Tennessee portion of the Wolf River Watershed as catalogued in the assessment database. An additional 407 stream miles are located in the Mississippi portion of the watershed as catalogued in the River Reach File 3 database. 177 lake acres are located in the entire Tennessee portion of the watershed as catalogued in the assessment database. Location of the Wolf River and the cities of Collierville, Cordova, Hickory Valley and Moscow are shown for reference.*

2.3.B. Dams. There are 61 dams inventoried by TDEC Division of Water Supply in the Tennessee Portion of the Wolf River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

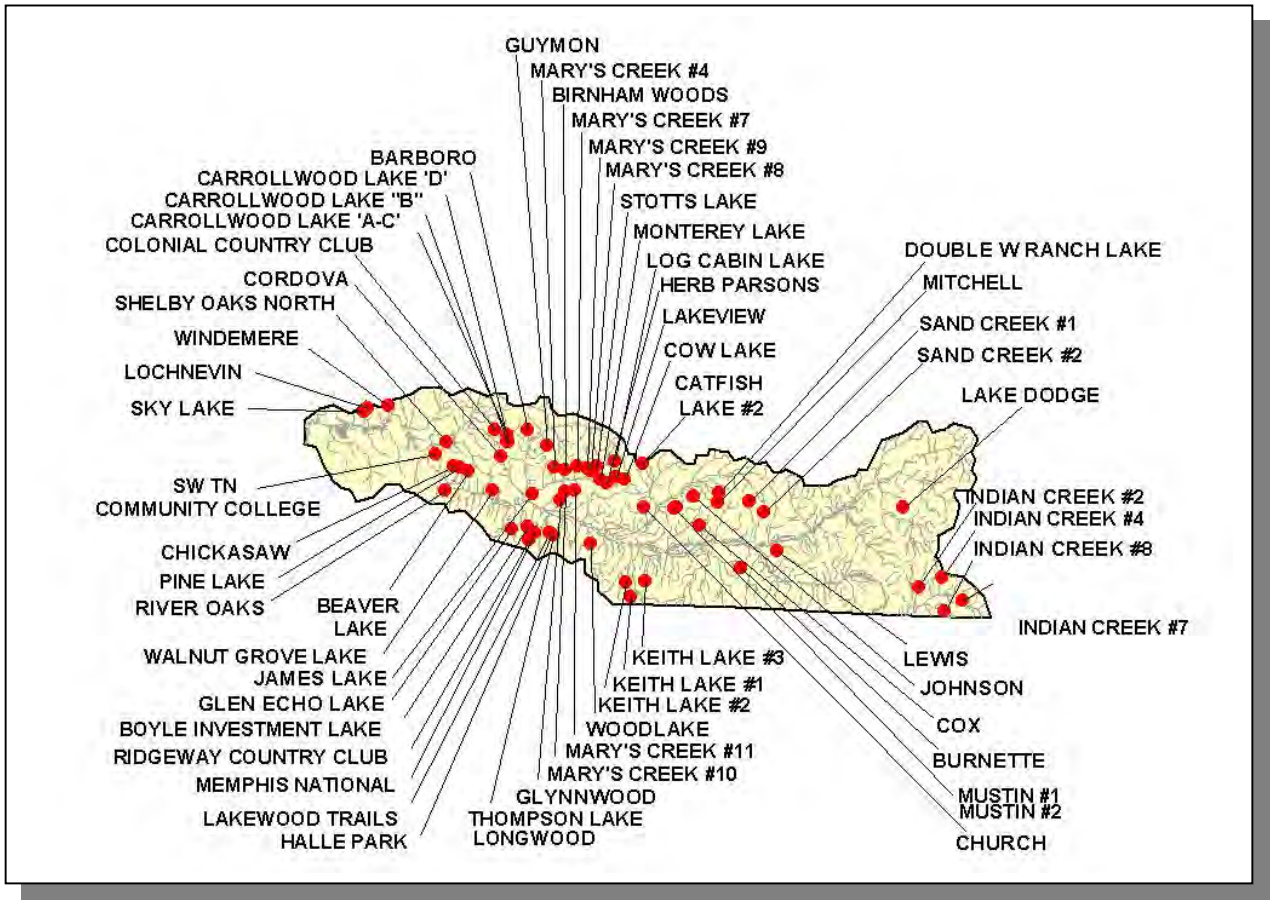


Figure 2-5. Location of Inventoried Dams in the Tennessee Portion of the Wolf River Watershed. *More information is provided in Appendix II and on the TDEC homepage at http://gwidc.memphis.edu/website/dws/.*

2.4. LAND USE. Land Use/Land Cover information was provided by EPA Region 4 and was interpreted from 1992 Multi-Resolution Land Cover (MRLC) satellite imagery.

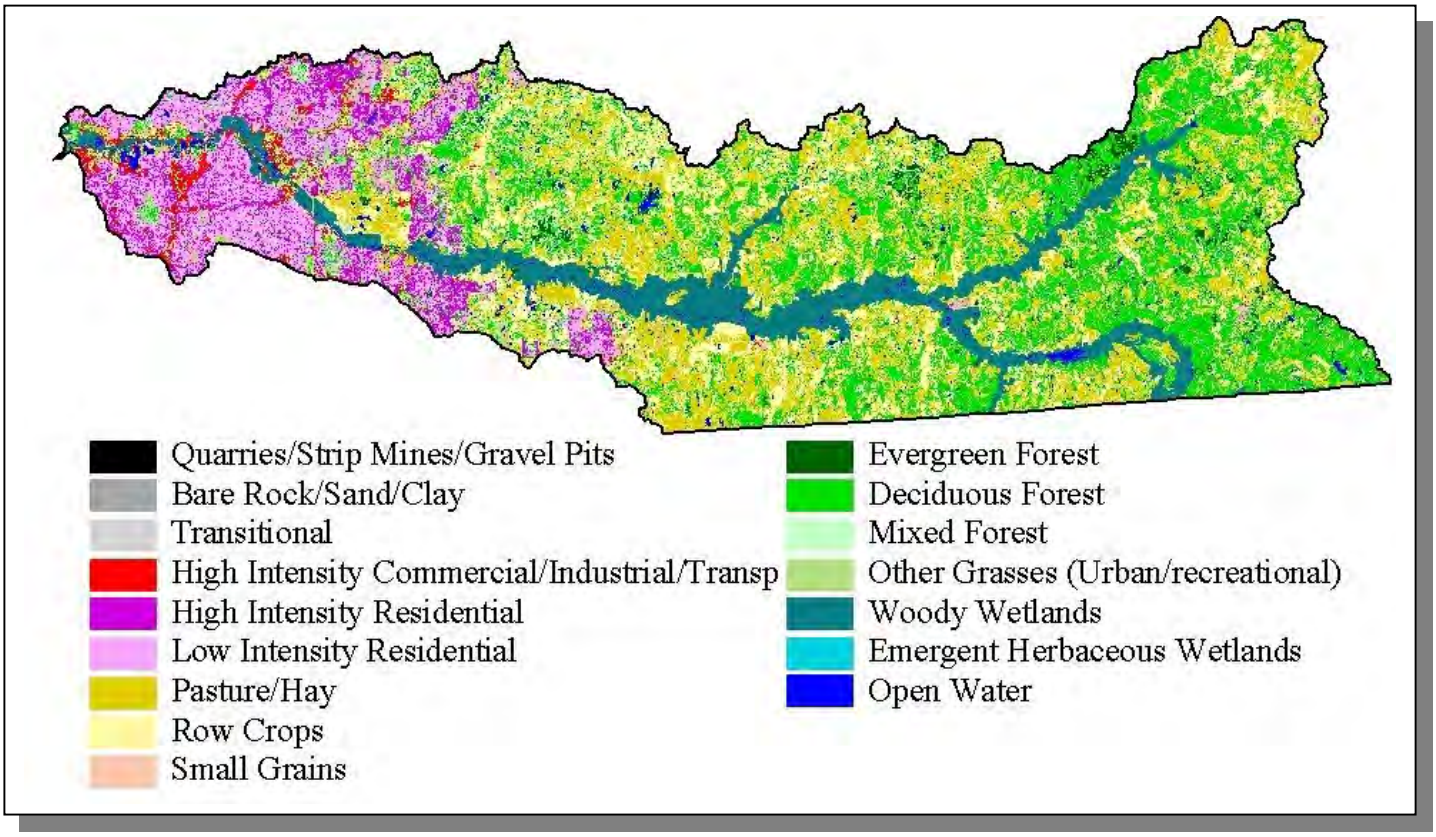


Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery in the Tennessee Portion of the Wolf River Watershed.

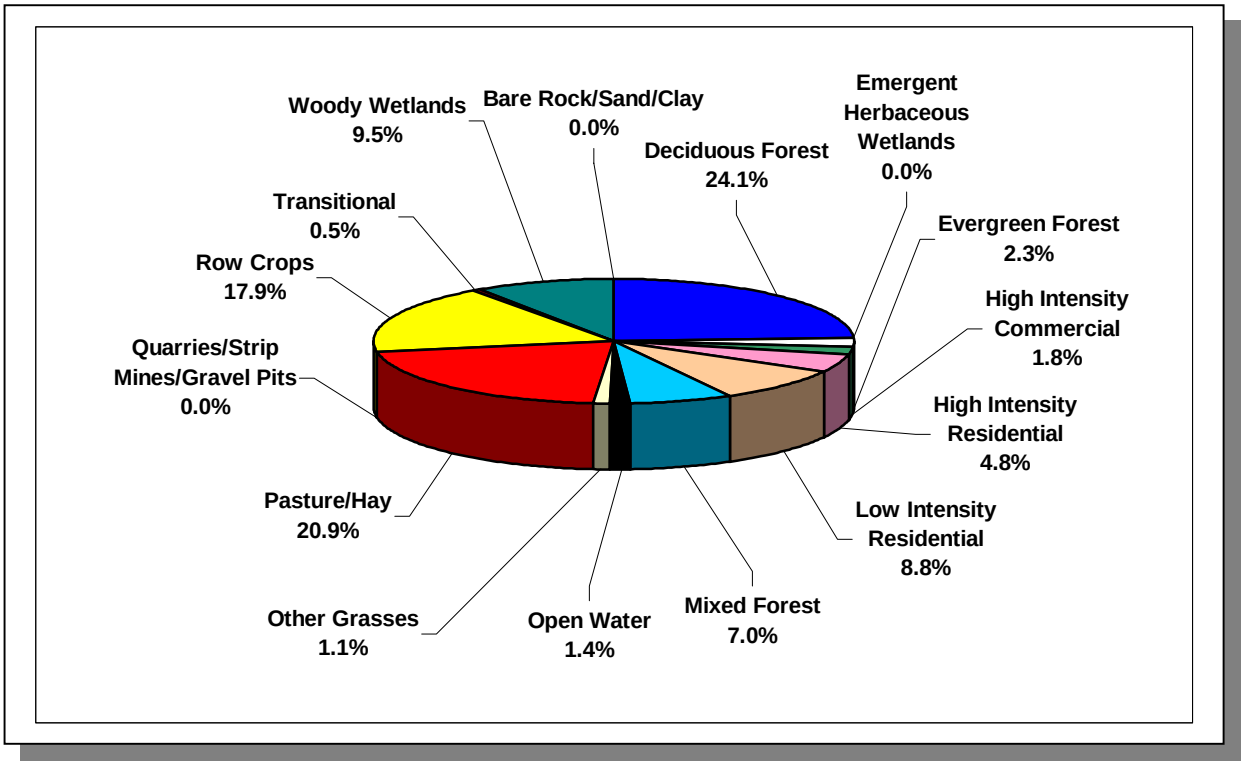


Figure 2-7. Land Use Distribution in the Tennessee Portion of the Wolf River Watershed. *More information is provided in Appendix II.*

2.5. ECOREGIONS AND REFERENCE STREAMS. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plant and animal life. Ecoregions serve as a spatial framework for the assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregion studies can aid the selection of regional stream reference sites, identifying high quality waters, and developing ecoregion-specific chemical and biological water quality criteria.

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Tennessee portion of the Wolf River Watershed lies within 3 Level III ecoregions (Southeastern Plains, Mississippi Alluvial Plain, and Mississippi Valley Loess Plain) and contains 3 Level IV subecoregions:

- **Southeastern Plains and Hills (65e)** contain north-south trending bands of sand and clay formations. Tertiary-age sand, clay, and lignite are to the west, with Cretaceous fine sand, fossiliferous micaceous sand, and silty clays to the east. Elevations reach over 650 feet with more rolling topography and relief than the Loess Plains (74b) to the west. Streams have increased gradient, sandy substrates, and distinct faunal characteristics. Natural vegetation is oak-hickory forest, grading into oak-hickory-pine to the south.

- **Northern Mississippi Alluvial Plain (73a)** within Tennessee is a relatively flat region of the Quaternary alluvial deposits of sand, silt, clay, and gravel. It is bounded distinctly on the east by the Bluff Hills (74a), and on the west by the Mississippi River. Average elevations are 200-300 feet with little relief. Most of the region is in cropland, with isolated areas of deciduous forest. Soybeans, cotton, corn, sorghum, and vegetables are the main crops. The natural vegetation consists of Southern floodplain forest (oak, tupelo, bald cypress). The two main distinctions in the Tennessee portion of the ecoregion are between areas of loamy, silty, and sandy soils with better drainage, and areas of more clayey soils of poor drainage that may contain wooded swamp-land and oxbow lakes. Waterfowl, raptors, and migratory songbirds are relatively abundant in the region.

- **Loess Plains (74b)** are gently rolling, irregular plains, 250-500 feet in elevation, with loess up to 50 feet thick. The region is a productive agricultural area of soybeans cotton, corn, milo, and sorghum crops, along with livestock and poultry. Soil erosion can be a problem on the steeper, upland Alfisol soils. Bottom soils are mostly silty Entisols. Oak-hickory and southern floodplain forests are the natural vegetation types, although most of the forest cover has been removed for cropland. Some less-disturbed bottomland forest and cypress-gum swamp habitats still remain. Several large river systems with wide floodplains; the Obion, Forked Deer, Hatchie, Loosahatchie, and Wolf, cross the region. Streams are low-gradient and murky with silt and sand bottoms. Most of the streams have been channelized.

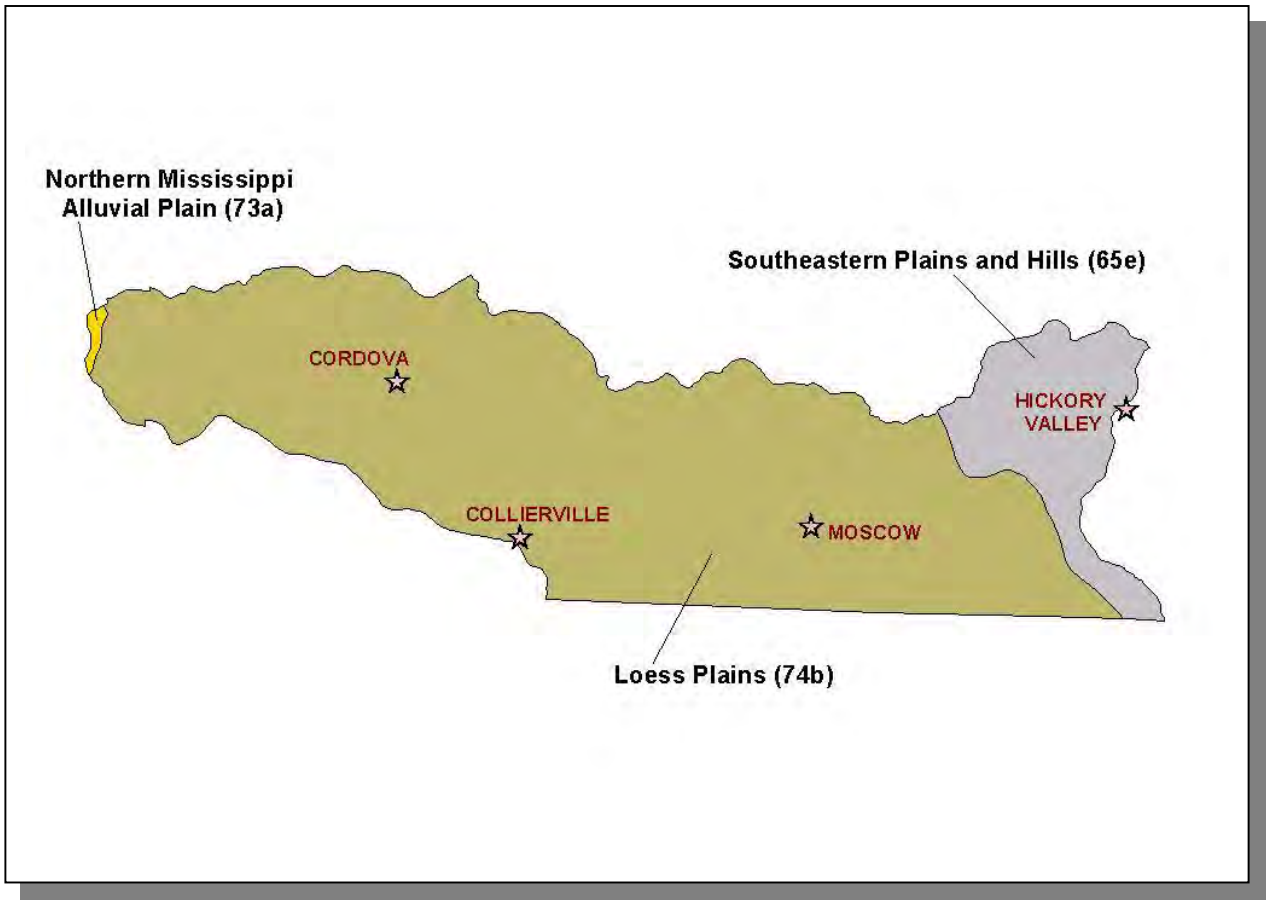


Figure 2-8. Level IV Ecoregions in the Tennessee Portion of the Wolf River Watershed. *Locations of Collierville, Cordova, Hickory Valley, and Moscow are shown for reference.*

Each Level IV Ecoregion has at least one reference stream associated with it. A reference stream represents a least impacted condition and may not be representative of a pristine condition.

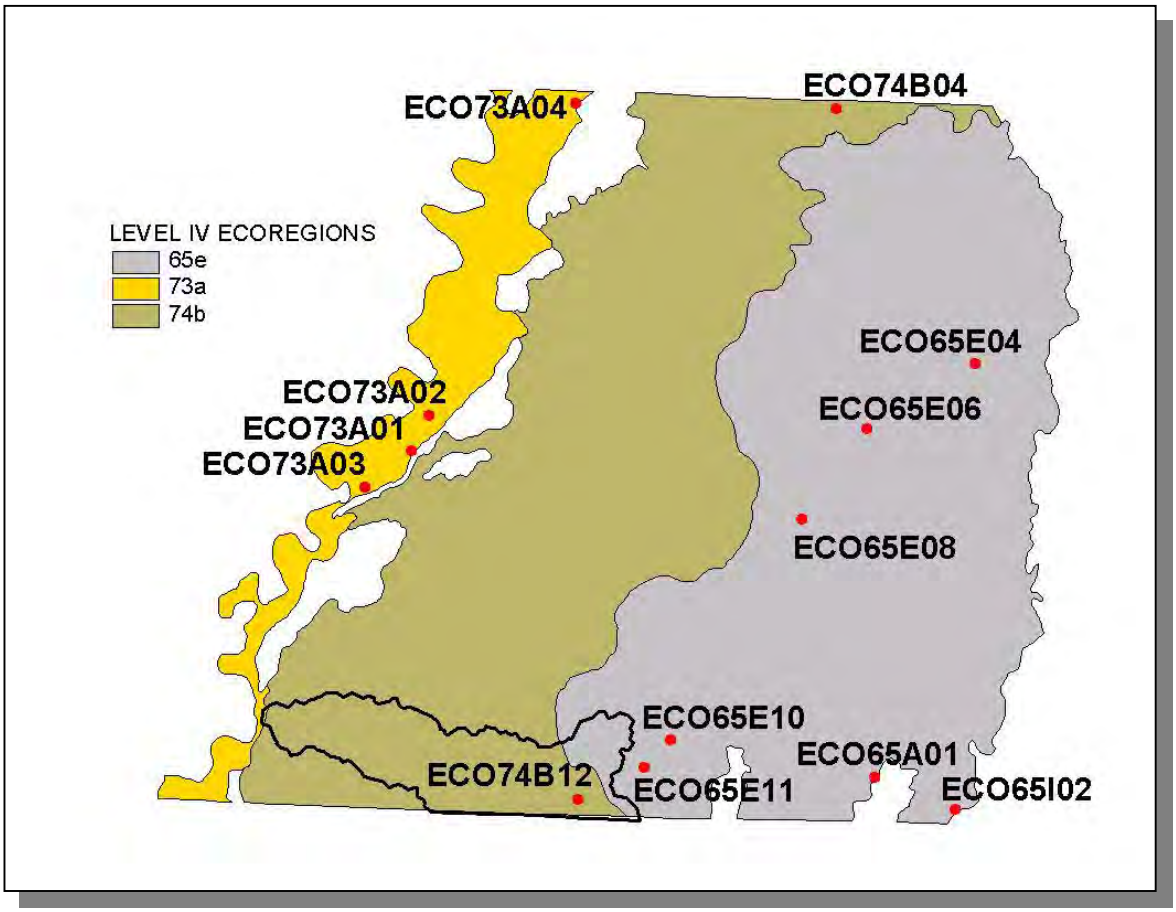


Figure 2-9. Ecoregion Monitoring Sites in Level IV Ecoregions 65e, 73a, and 74b in Tennessee. *The Tennessee portion of the Wolf River Watershed boundary is shown for reference. More information is provided in Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Rare Plants and Animals. The Heritage Program in the TDEC Division of Natural Heritage maintains a database of rare species that is shared by partners at The Nature Conservancy, Tennessee Wildlife Resources Agency, the US Fish and Wildlife Service, and the Tennessee Valley Authority. The information is used to: 1) track the occurrence of rare species in order to accomplish the goals of site conservation planning and protection of biological diversity, 2) identify the need for, and status of, recovery plans, and 3) conduct environmental reviews in compliance with the federal Endangered Species Act.

GROUPING	NUMBER OF RARE SPECIES
Mussels	3
Amphibians	1
Birds	5
Fish	3
Mammals	2
Reptiles	1
Plants	9
Total	**24**

Table 2-3. There are 24 Known Rare Plant and Animal Species in the Tennessee Portion of the Wolf River Watershed.

In the Tennessee Portion of the Wolf River Watershed, there are 3 rare fish species and 4 rare mussel species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Ammocrypta beani	Naked Sand Darter		D
Cycleptus elongatus	Blue Sucker	MC	T
Noturus stigmosus	Northern Madtom	MC	D
Lampsilis silquoidea	Fatmucket		
Obovaria jacksoniana	Southern Hickorynut		
Villosa vibex	Southern Rainbow		

Table 2-4. Rare Aquatic Species in the Tennessee Portion of the Wolf River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service; MC, Management Concern for U.S. Fish and Wildlife Service. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; T, Listed Threatened by the Tennessee Wildlife Resources Agency; D, Deemed in Need of Management by the Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/nh/data.php.*

2.6.B. Wetlands. The Division of Natural Heritage maintains a database of wetland records in Tennessee. These records are a compilation of field data from wetland sites inventoried by various state and federal agencies. Maintaining this database is part of Tennessee's Wetland Strategy, which is described at:

http://www.state.tn.us/environment/nh/wetlands/

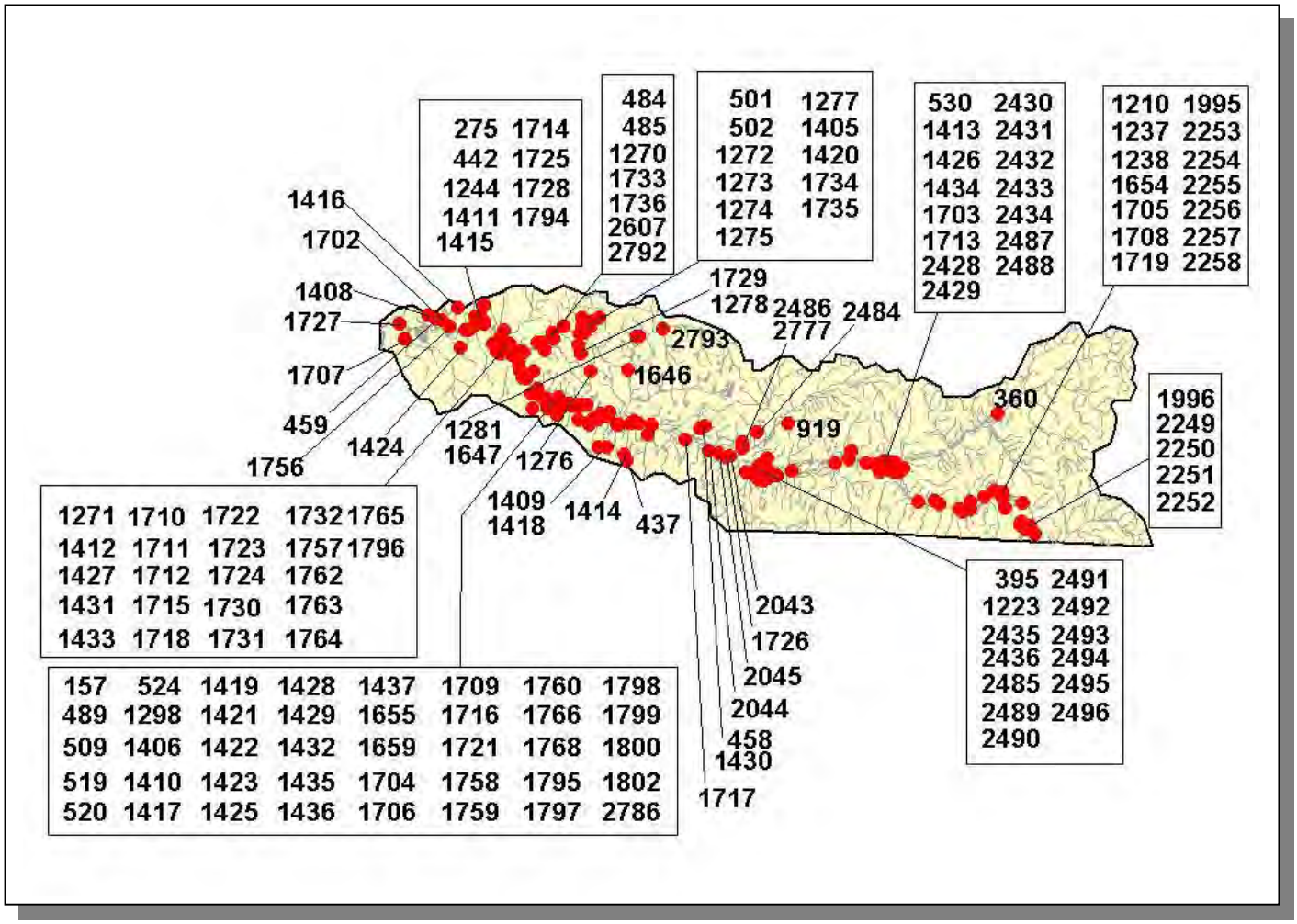


Figure 2-10. Location of Wetland Sites in TDEC Division of Natural Heritage Database in the Tennessee Portion of the Wolf River Watershed. ***This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands****. More information is provided in Appendix II.*

2.7. CULTURAL RESOURCES.

2.7.A. Greenways. The Wolf River Watershed has at least four greenways/trails:

- Lafayette park Trail in Rossville
- Lakeland Greenway System
- Mississippi River Trail in Memphis
- Vollintine-Evergreen Trail in Memphis

More information about greenways and trails in the watershed may be found at:

http://www2.state.tn.us/tdec/GREENWAYS/tnmap.htm

2.7.B. Wildlife Management Area. The Tennessee Wildlife Resources Agency manages two wildlife management areas in the Tennessee portion of the Wolf River Watershed.

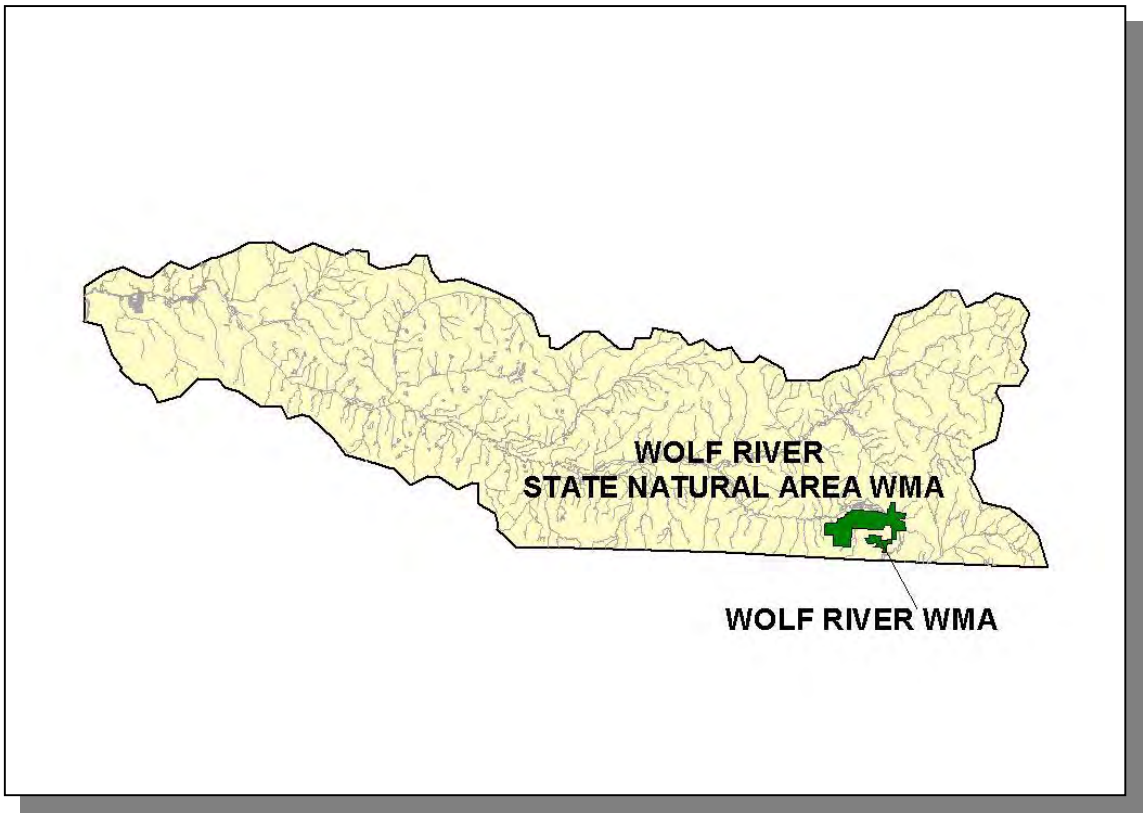


Figure 2-11. TWRA Manages Wildlife Management Areas in the Tennessee Portion of the River Watershed.

2.8. Tennessee Rivers Assessment Project. The Tennessee Rivers Assessment is part of a national program operating under the guidance of the National Park Service's Rivers and Trails Conservation Assistance Program. The Assessment is an inventory of river resources, and should not be confused with "Assessment" as defined by the Environmental Protection Agency. A more complete description can be found in the Tennessee Rivers Assessment Summary Report, which is available from the Department of Environment and Conservation and on the web at:

http://www.state.tn.us/environment/wpc/publications/riv/

STREAM	NSQ	RB	RF		STREAM	NSQ	RB	RF
Alexander Creek	3				May Creek	3		
Clear Creek	2				Mount Tena Creek	3		
Cypress Creek	4				North Fork Creek	2		
Early Grove Creek	3				North Fork Wolf River	1,3	2	
Fletcher Creek	4				Sandy Creek	3		
Golden Creek	4				Shaws Creek	3		
Grays Creek	4		2		Stout Creek	3		
Grissum Creek	3,4				Teague Branch Sandy Creek	3		
Harrison Creek	4				Unnamed Tributary to Wolf River	2	2	
Johnson Creek	3				Wolf River	1,3	2	
Marys Creek	2							

Table 2-5. Stream Scoring from the Tennessee Rivers Assessment Project in the Wolf River Watershed.

Categories: NSQ, Natural and Scenic Qualities
RB, Recreational Boating
RF, Recreational Fishing

Scores: 1. Statewide or greater Significance; Excellent Fishery
2. Regional Significance; Good Fishery
3. Local Significance; Fair Fishery
4. Not a significant Resource; Not Assessed

CHAPTER 3

WATER QUALITY ASSESSMENT OF THE WOLF RIVER WATERSHED

3.1 Background

3.2 Data Collection
- 3.2.A Ambient Monitoring Sites
- 3.2.B Ecoregion Sites
- 3.2.C Watershed Screening Sites
- 3.2.D Special Surveys

3.3 Status of Water Quality
- 3.3.A Assessment Summary
- 3.3.B Use Impairment Summary

3.1. BACKGROUND. Section 305(b) of The Clean Water Act requires states to report the status of water quality every two years. Historically, Tennessee's methodologies, protocols, frequencies and locations of monitoring varied depending upon whether sites were ambient, ecoregion, or intensive survey. Alternatively, in areas where no direct sampling data existed, water quality may have been assessed by evaluation or by the knowledge and experience of the area by professional staff.

In 1996, Tennessee began the watershed approach to water quality protection. In the Watershed Approach, resources—both human and fiscal—are better used by assessing water quality more intensively on a watershed-by-watershed basis. In this approach, water quality is assessed in year three of the watershed cycle, following one to two years of data collection. More information about the Watershed Approach may be found in Chapter 1 and at http://www.state.tn.us/environment/wpc/watershed/

The assessment information is used in the 305(b) Report (The Status of Water Quality in Tennessee) and the 303(d) list as required by the Clean Water Act.

The 305(b) Report documents the condition of the State's waters. Its function is to provide information used for water quality based decisions, evaluate progress, and measure success.

Tennessee uses the 305(b) Report to meet four goals (from 2002 305(b) Report):

1. Assess the general water quality conditions of rivers, streams, lakes and wetlands

2. Identify causes of water pollution and the sources of pollutants

3. Specify waters which have been found to pose human health risks due to elevated bacteria levels or contamination of fish

4. Highlight areas of improved water quality

EPA aggregates the state use support information into a national assessment of the nation's water quality. This aggregated use support information can be viewed at EPA's "Surf Your Watershed" site at http://www.epa.gov/surf/

The 303(d) list is a compilation of the waters of Tennessee that fail to support some or all of their classified uses. The 303(d) list does not include streams determined to be fully supporting designated uses as well as streams the Division of Water Pollution Control cannot assess due to lack of water quality information. Also absent are streams where a control strategy is already in the process of being implemented.

Once a stream is placed on the 303(d) list, it is considered a priority for water quality improvement efforts. These efforts not only 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. If a stream is on the 303(d) list, the Division of Water Pollution Control cannot use its regulatory authority to allow additional sources of the same pollutant(s) for which it is listed.

States are required to develop Total Maximum Daily Loads (TMDLs) for 303(d)-listed waterbodies. The TMDL process establishes the maximum amount of a pollutant that a waterbody can assimilate without exceeding water quality standards and allocates this load among all contributing pollutant sources. The purpose of the TMDL is to establish water quality objectives required to reduce pollution from both point and nonpoint sources and to restore and maintain the quality of water resources.

The current 303(d) List is available on the TDEC homepage at:
http://www.state.tn.us/environment/wpc/publications/2004_303dlist.pdf

and information about Tennessee's TMDL program may be found at:
http://www.state.tn.us/environment/wpc/tmdl/.

This chapter provides a summary of water quality in the Tennessee portion of the Wolf River Watershed, summarizes data collection and assessment results, and describes impaired waters.

3.2. DATA COLLECTION. Comprehensive water quality monitoring in the Upper Duck River Watershed was conducted in 1999-2000. Data are from one of four site types: (1) Ambient sites, (2) Ecoregion sites, (3) Watershed sites, or (4) Aquatic Resources Alteration Permit (ARAP) inspection sites.

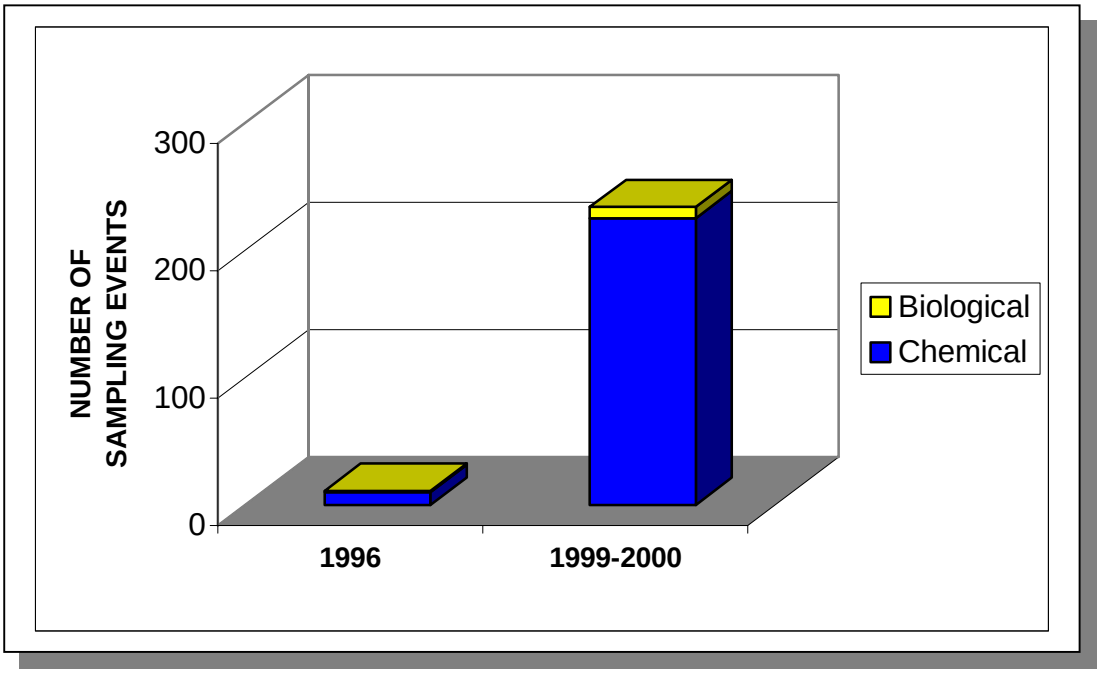


Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (1999-2000) in the Tennessee Portion of the Wolf River Watershed.

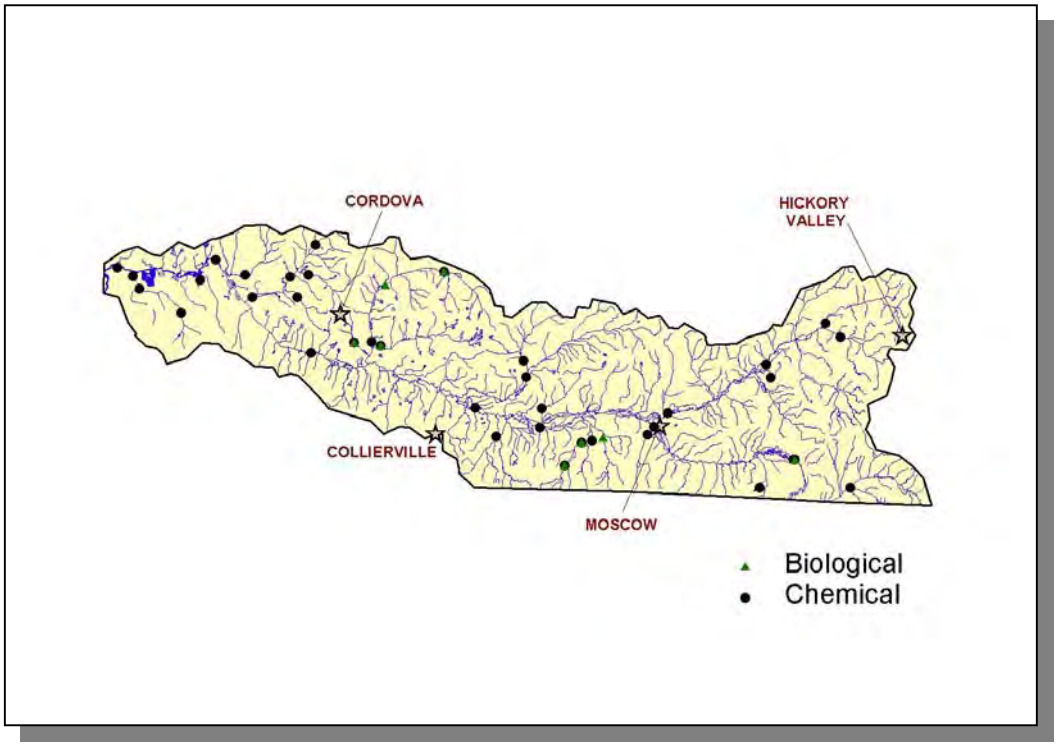


Figure 3-2. Location of Monitoring Sites in the Tennessee Portion of the Wolf River Watershed. *Locations of Collierville, Cordova, Hickory Valley, and Moscow are shown for reference.*

	1996	**1999-2000**
Biological	1	9
Chemical	10	225
Total	**11**	**234**

Table 3-1. Number of Sampling Events in the Tennessee Portion of the Wolf River Watershed During the Data Collection Phase of the Watershed Approach.

3.2.A. Ambient Monitoring Sites. These fixed-station chemical monitoring sites are sampled quarterly or monthly by the Environmental Field Office-Memphis staff (this is in addition to samples collected by water and wastewater treatment plant operators). Samples are analyzed by the Tennessee Department of Health, Division of Environmental Laboratory Services. Ambient monitoring data are used to assess water quality in major bodies of water where there are NPDES facilities and to identify trends in water quality. Water quality parameters traditionally measured at ambient sites in the Tennessee portion of the Wolf River Watershed are provided in Appendix IV.

Data from ambient monitoring stations are entered into the STORET (Storage and Retrieval) system administered by EPA.

3.2.B. Ecoregion Sites. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plants and animals. The delineation phase of the Tennessee Ecoregion Project was completed in 1997 when the ecoregions and subecoregions were mapped and summarized (EPA/600/R-97/022). There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee (see Chapter 2 for more details). The Tennessee portion of the Wolf River Watershed lies within 3 Level III ecoregions (Southeastern Plains, Mississippi Alluvial Plain, and Mississippi Valley Loess Plains) and contains 3 subecoregions (Level IV):

- Southeastern Plains and Hills (65e)
- Northern Mississippi Alluvial Plain (73a)
- Loess Plains (74b)

Ecoregion reference sites are chemically monitored using methodology outlined in the Division's Chemical Standard Operating Procedure (Standard Operating Procedure for Modified Clean Technique Sampling Protocol). Macroinvertebrate samples are collected in spring and fall. These biological sample collections follow methodology outlined in the Tennessee Biological Standard Operating Procedures Manual. Volume 1: Macroinvertebrates and EPA's Revision to Rapid Bioassessment Protocols for use in Streams and Rivers.

Ecoregion stations are scheduled to be monitored during the watershed sampling time period.

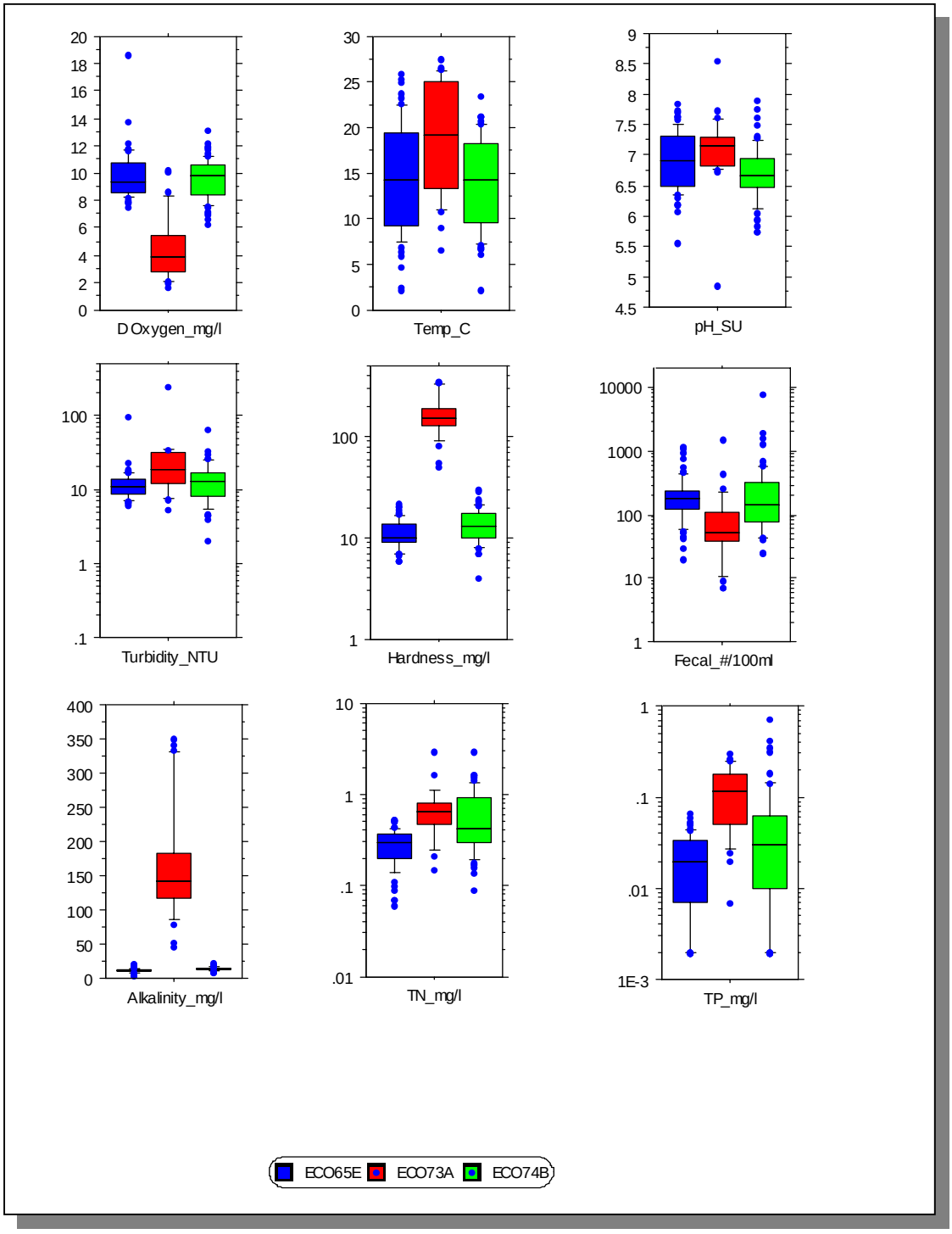


Figure 3-3. Select Chemical Data Collected in the Tennessee portion of the Wolf River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. Fecal, fecal coliform bacteria; TN, Total Nitrogen; TP, Total Phosphorus.*

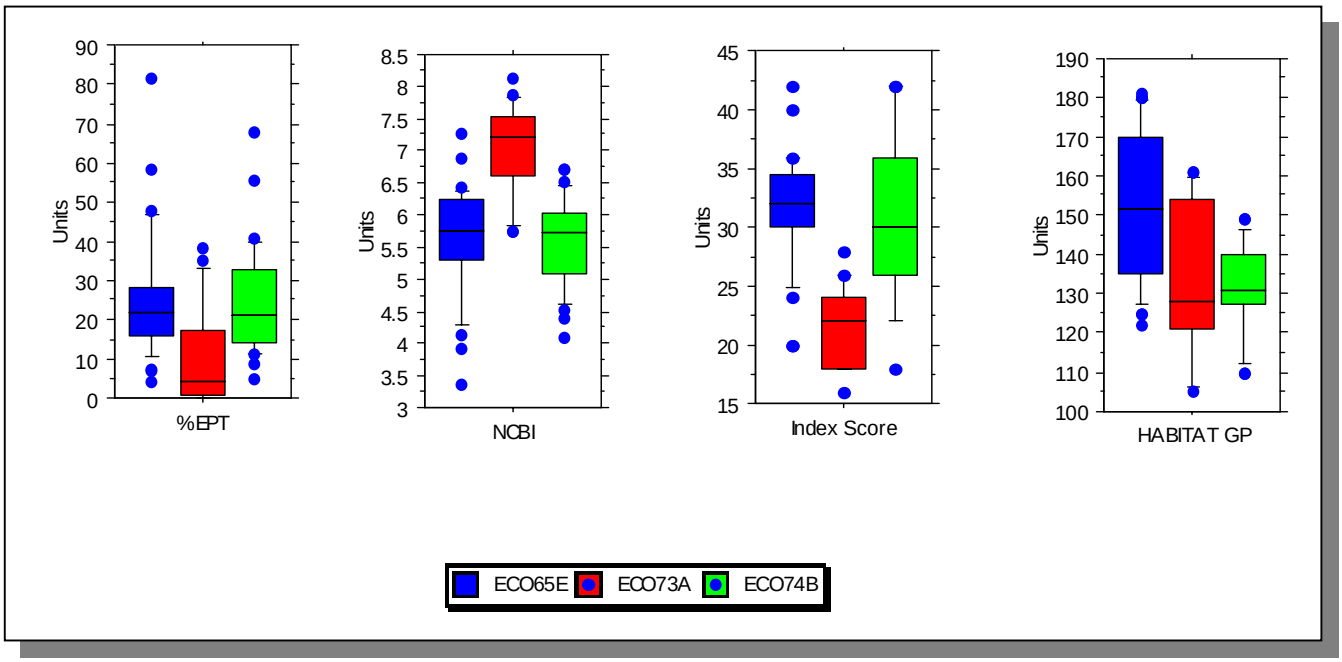


Figure 3-4. Benthic Macroinvertebrate and Habitat Scores for the Tennessee Portion of the Wolf River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. NCBI, North Carolina Biotic Index. Index Score and Habitat Riffle/Run scoring system are described in TDEC's Quality System Standard Operating Procedure for Macroinvertebrate Surveys (2002).*

3.2.C. Watershed Screening Sites. Activities that take place at watershed sites are benthic macroinvertebrate stream surveys, physical habitat determinations and/or chemical monitoring. Following review of existing data, watershed sites are selected in Year 1 of the watershed approach when preliminary monitoring strategies are developed. Additional sites may be added in Year 2 when additional monitoring strategies are implemented.

A Biological Reconnaissance (BioRecon) is used as a screening tool to describe the condition of water quality, in general, by determining the absence or presence of clean water indicator organisms, such as EPT (Ephemeroptera [mayfly], Plecoptera [stonefly], Trichoptera [caddisfly]). Factors and resources used for selecting BioRecon sites are:

- The current 303(d) list,
- HUC-10 maps (every HUC-10 is scheduled for a BioRecon)
- Land Use/Land Cover maps
- Topographic maps
- Locations of NPDES facilities
- Sites of recent ARAP activities.

An intensive multiple or single habitat assessment involves the regular monitoring of a station over a fixed period of time. Intensive surveys (Rapid Bioassessment Protocols) are performed when BioRecon results warrant it.

3.2.D. Special Surveys. These investigations are performed when needed and include:

- ARAP in-stream investigation
- Time-of-travel dye study
- Sediment oxygen demand study
- Lake eutrophication study

3.3. STATUS OF WATER QUALITY. Overall use support is a general description of water quality conditions in a water body based on determination of individual use supports. Use support determinations, which can be classified as monitored or evaluated, are based on:

- Data less than 5 years old (monitored)
- Data more than 5 years old (evaluated)
- Knowledge and experience of the area by technical staff (evaluated)
- Complaint investigation (monitored, if samples are collected)
- Other readily available Agencies' data (monitored)
- Readily available Volunteer Monitoring data (monitored, if certain quality assurance standards are met)

All readily available data are considered, including data from TDEC Environmental Field Offices, Tennessee Department of Health (Aquatic Biology Section of Laboratory Services), Tennessee Wildlife Resources Agency, National Park Service, Tennessee Valley Authority, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Geological Survey, U.S. Forest Service, universities and colleges, the regulated community, and the private sector.

The assessment is based on the degree of support of designated uses as measured by compliance with Tennessee's water quality standards.

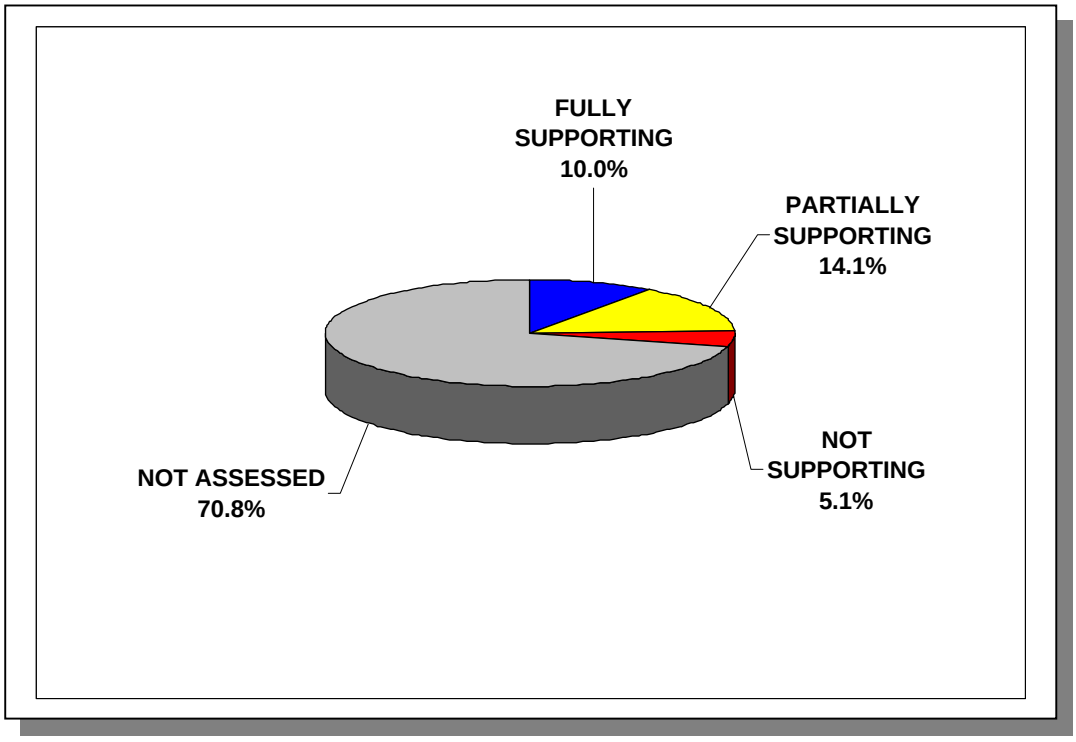


Figure 3-5. Water Quality Assessment of Streams and Rivers in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment of 1,025.2 miles in the watershed. More information is provided in Appendix III.*

3.3.A. Assessment Summary.

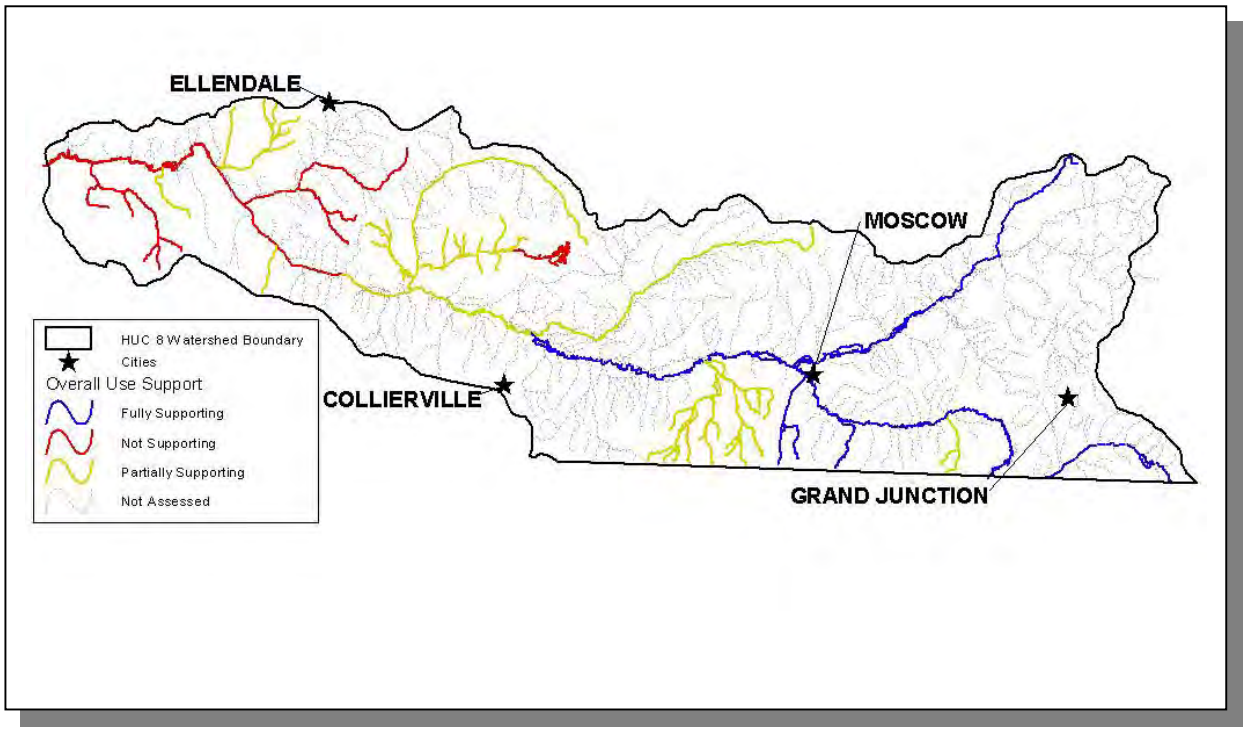


Figure 3-6a. Overall Use Support Attainment in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

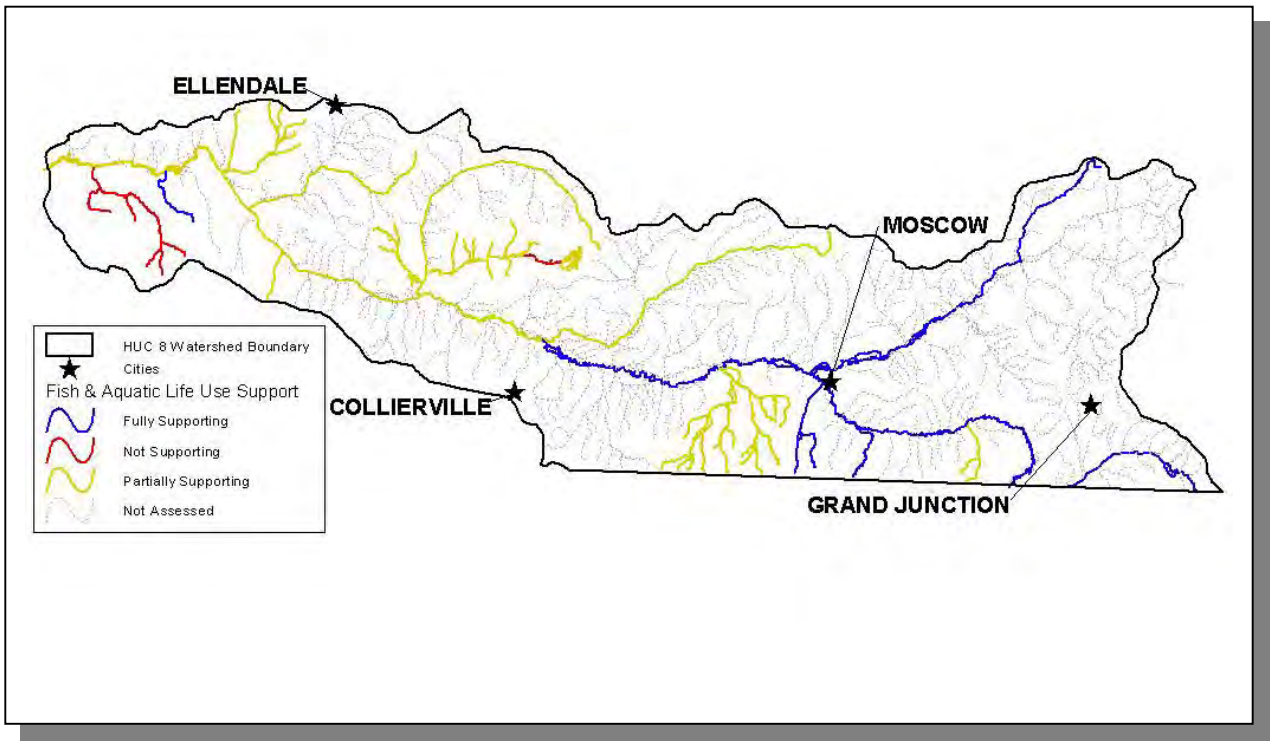


Figure 3-6b. Fish and Aquatic Life Use Support Attainment in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

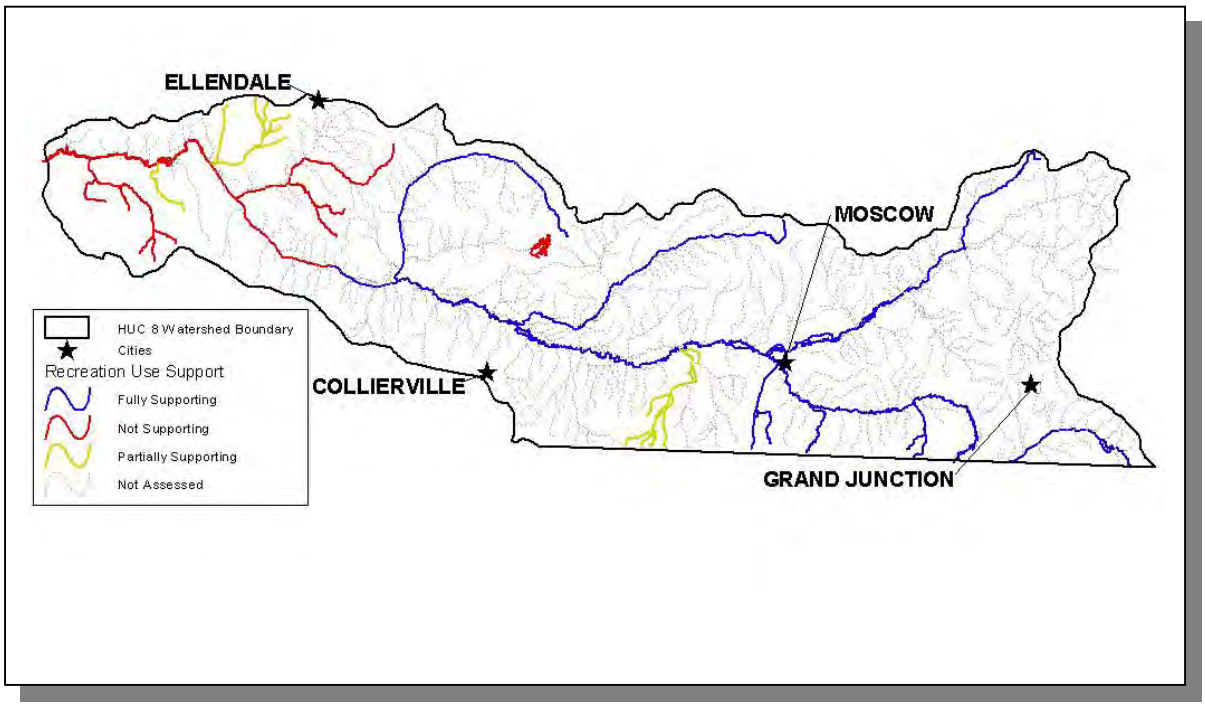


Figure 3-6c. Recreation Use Support Attainment in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

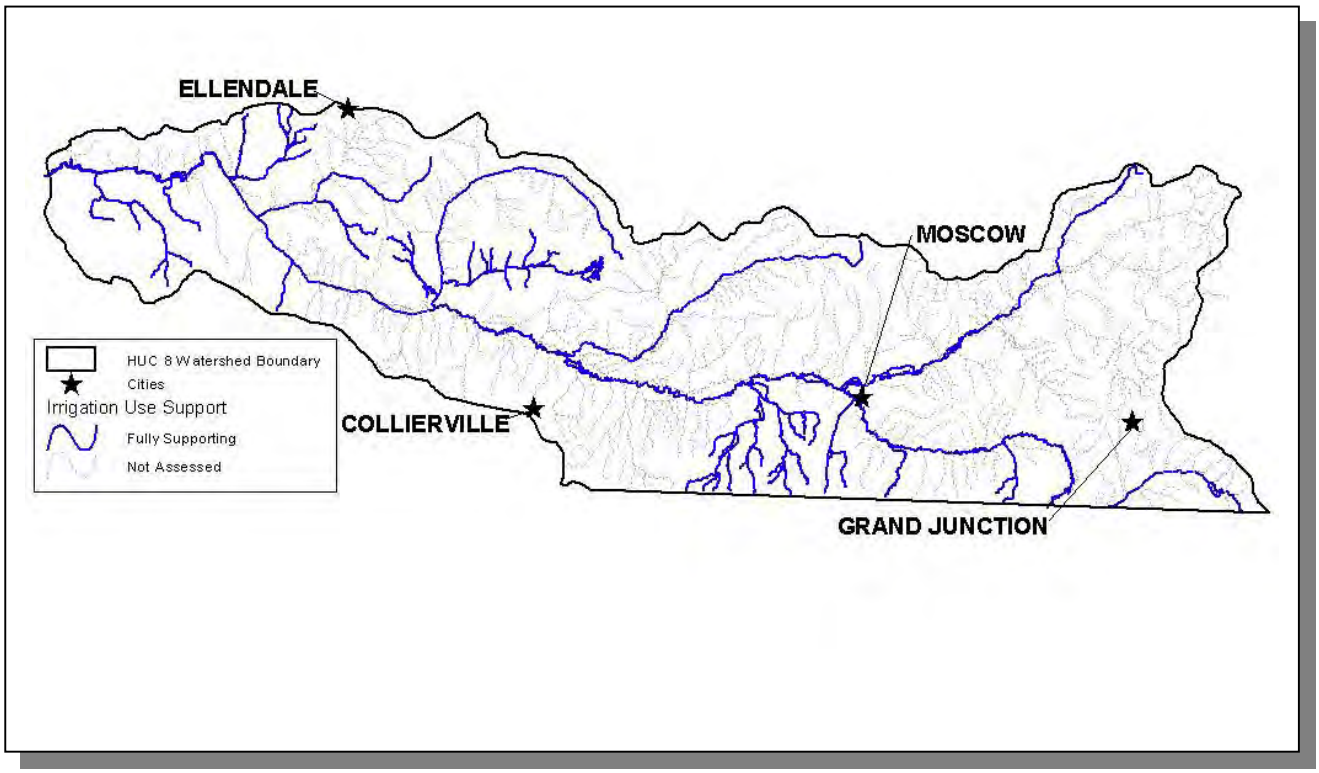


Figure 3-6d. Irrigation Use Support Attainment in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

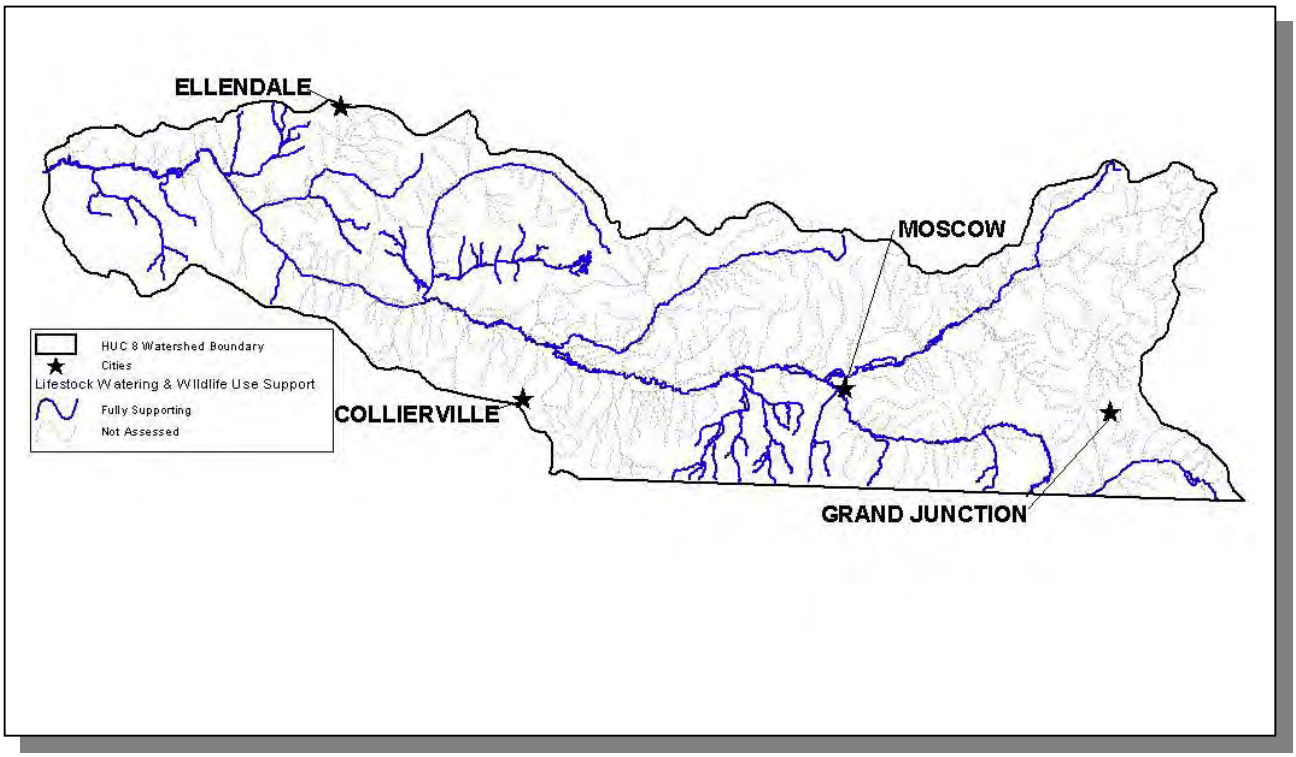


Figure 3-6e. Livestock Watering and Wildlife Use Support Attainment in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

3.3.B. Use Impairment Summary.

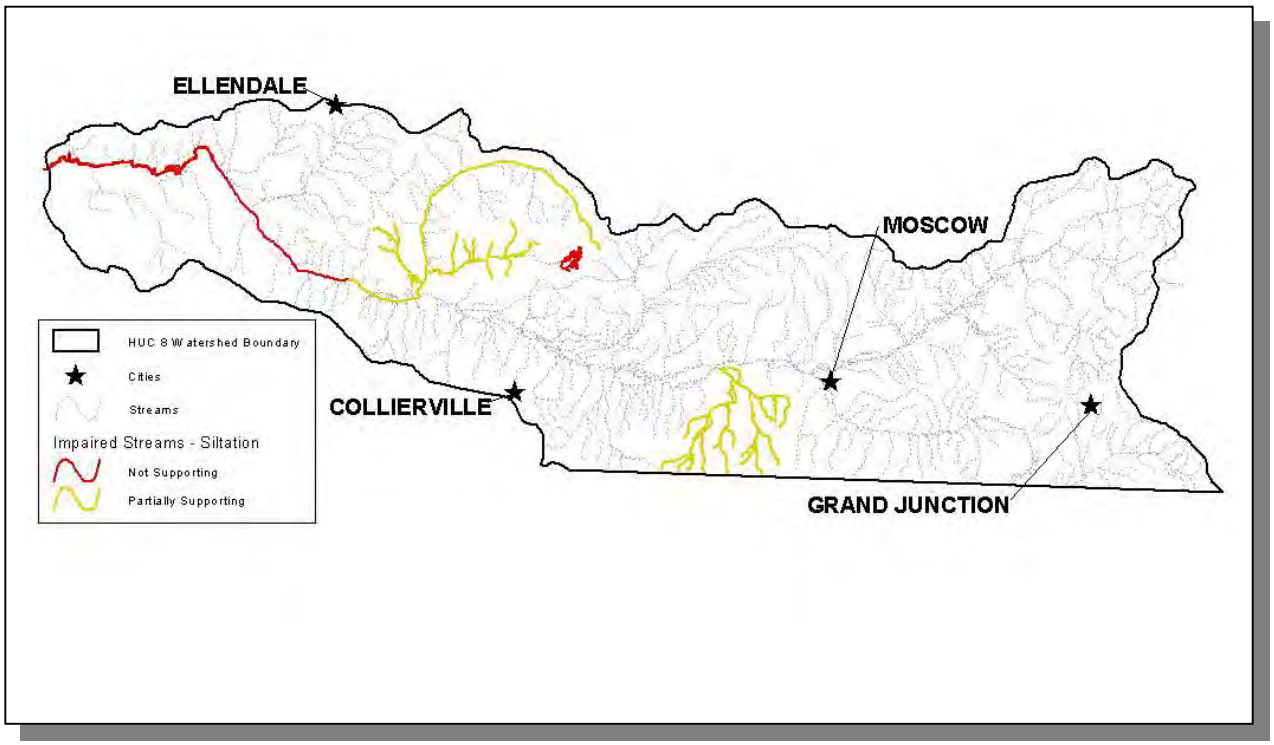


Figure 3-7a. Impaired Streams Due to Siltation in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

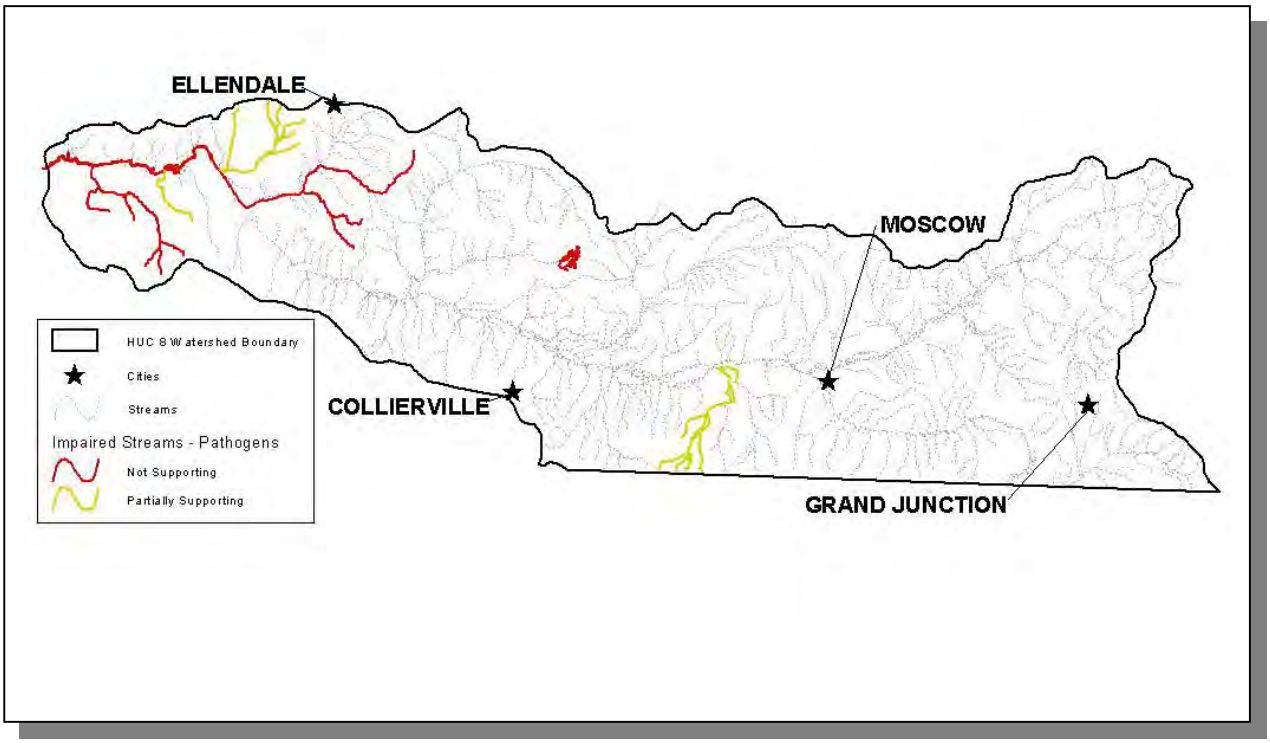


Figure 3-7b. Impaired Streams Due to Pathogens in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

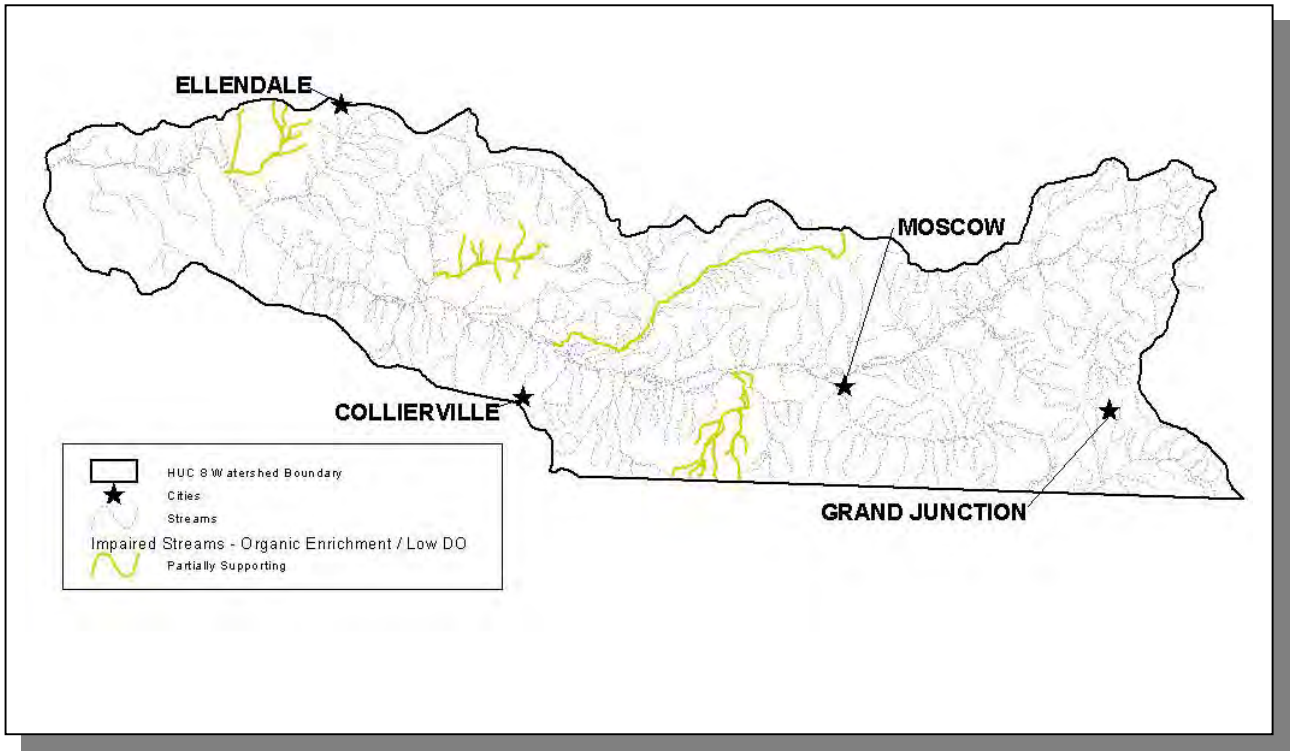


Figure 3-7c. Impaired Streams Due to Organic Enrichment or Low Dissolved Oxygen in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

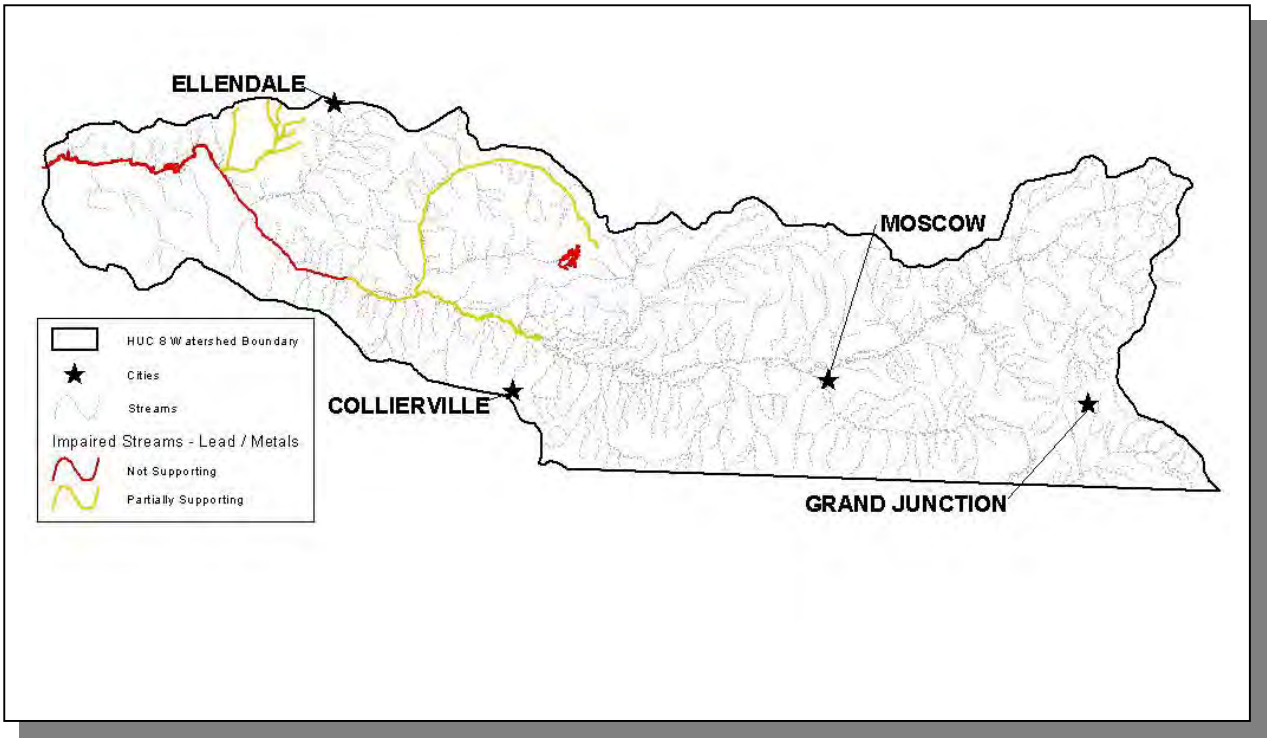


Figure 3-7d. Impaired Streams Due to Lead/Metals in the Tennessee Portion of the Wolf River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Locations of Collierville, Ellendale, Grand Junction, and Moscow are shown for reference. More information is provided in Appendix III.*

The listing of impaired waters that do not support designated uses (the 303(d) list) is traditionally submitted to EPA every two years. A copy of the most recent 303(d) list may be downloaded from: http://www.state.tn.us/environment/water.htm.

Since the year 2002, the 303(d) list is compiled by using EPA's ADB (Assessment Database) software developed by RTI (Research Triangle Institute). The ADB allows for a more detailed segmentation of waterbodies. While this results in a more accurate description of the status of water quality, it makes it difficult when comparing water quality assessments with and without using this tool. A more meaningful comparison will be between assessments conducted in Year 3 of each succeeding five-year cycle.

The ADB was used to create maps that illustrate water quality. These maps may be viewed on TDEC's homepage at http://www.state.tn.us/environment/water.htm.

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE WOLF RIVER WATERSHED

4.1 Background.

4.2. Characterization of HUC-10 Subwatersheds
4.2.A. 0801021001 (Wolf River)
4.2.B. 0801021002 (North Fork Wolf River)
4.2.C. 0801021003 (Wolf River)

4.1. BACKGROUND. This chapter is organized by HUC-10 subwatershed, and the description of each subwatershed is divided into four parts:

i. General description of the subwatershed
ii. Description of point source contributions
ii.a. Description of facilities discharging to water bodies listed on the 2002 303(d) list
iii. Description of nonpoint source contributions

The Tennessee portion of the Wolf River Watershed (HUC 08010210) has been delineated into three HUC 10-digit subwatersheds.

Information for this chapter was obtained from databases maintained by the Division of Water Pollution Control or provided in the WCS (Watershed Characterization System) data set. The WCS used was version 2.0 (developed by Tetra Tech, Inc for EPA Region 4) released in 2003.

WCS integrates with ArcView® v3.x and Spatial Analyst® v1.1 to analyze user-delineated (sub)watersheds based on hydrologically connected water bodies. Reports are generated by integrating WCS with Microsoft® Word. Land Use/Land Cover information from 1992 MRLC (Multi-Resolution Land Cover) data are calculated based on the proportion of county-based land use/land cover in user-delineated (sub)watersheds. Nonpoint source data in WCS are based on agricultural census data collected 1992–1998; nonpoint source data were reviewed by Tennessee NRCS staff.

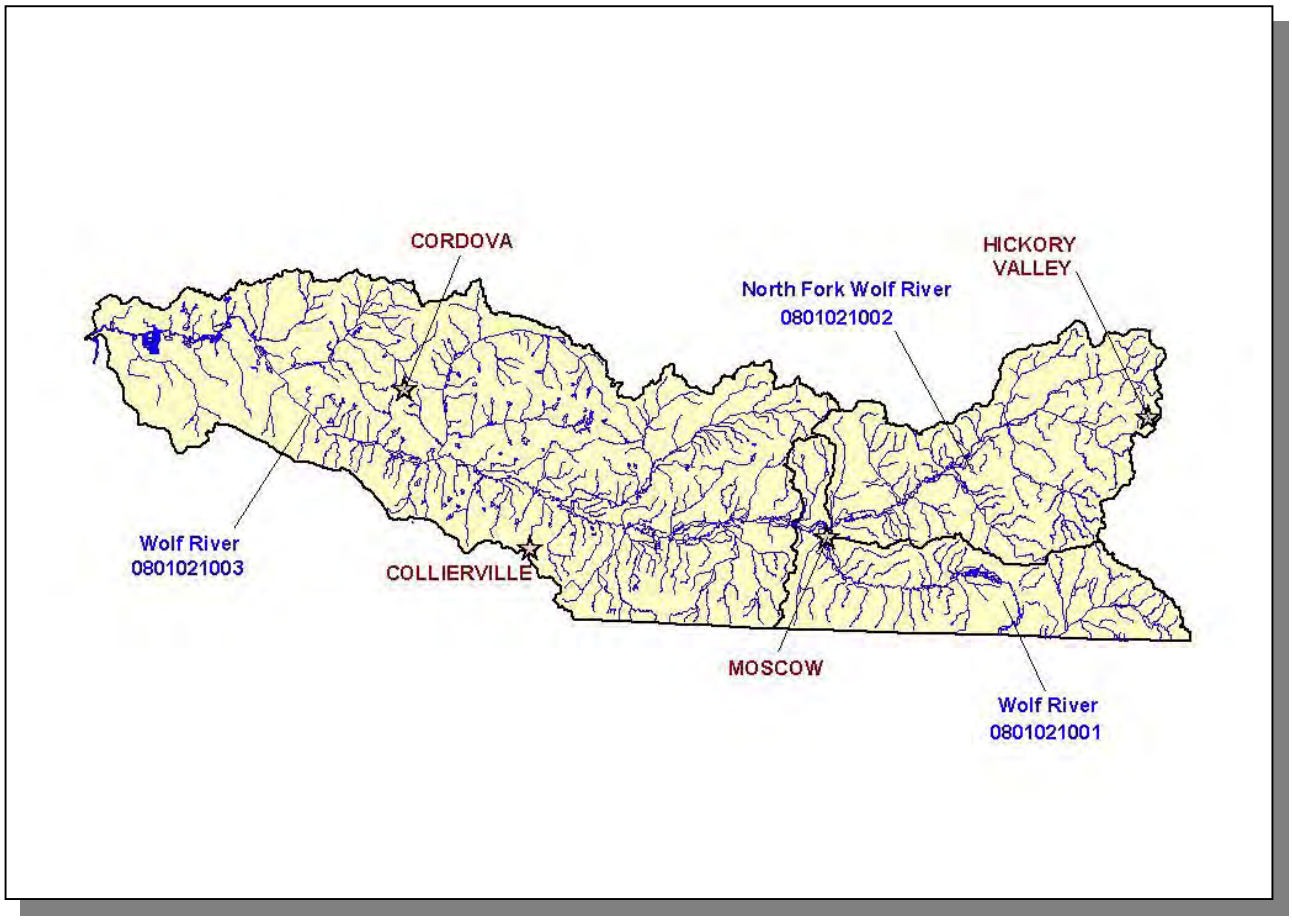


Figure 4-1. The Tennessee Portion of the Wolf River Watershed is Composed of Three USGS-Delineated Subwatersheds (10-Digit Subwatersheds). *Locations of Collierville, Cordova, Hickory Valley, and Moscow are shown for reference.*

4.2. CHARACTERIZATION OF HUC-10 SUBWATERSHEDS. The Watershed Characterization System (WCS) software and data sets provided by EPA Region IV were used to characterize each subwatershed in the Wolf River Watershed.

HUC-10	HUC-12	
0801021001	080102100104 (Indian Creek)	080102100106 (Stafford Creek)
	080102100105 (Wolf River)	
0801021002	080102100201 (Upper North Fork Wolf River)	080102100202 (Upper North Fork Wolf River)
0801021003	080102100301 (Wolf River)	080102100305 (Grays Creek)
	080102100302 (Grissum Creek)	080102100306 (Wolf River)
	080102100303 (Shaws Creek)	080102100307 (Wolf River)
	080102100304 (Wolf River)	080102100308 (Fletcher Creek)

Table 4-1. HUC-12 Drainage Areas are Nested Within HUC-10 Drainages. *NRCS worked with USGS to delineate the HUC-10 and HUC-12 drainage boundaries.*

4.2.A. 0801021001 (Wolf River).

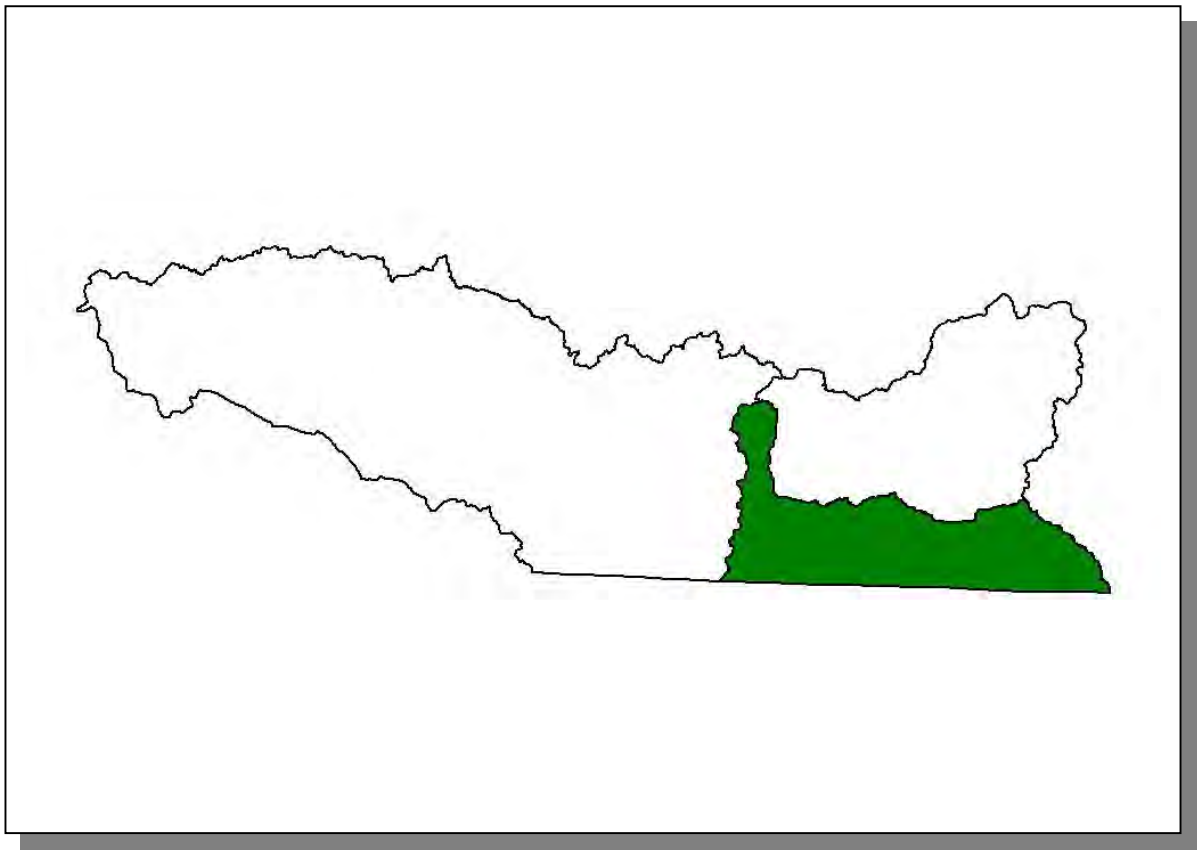


Figure 4-2. Location of Subwatershed 0801021001. *All Wolf River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.A.i. General Description.

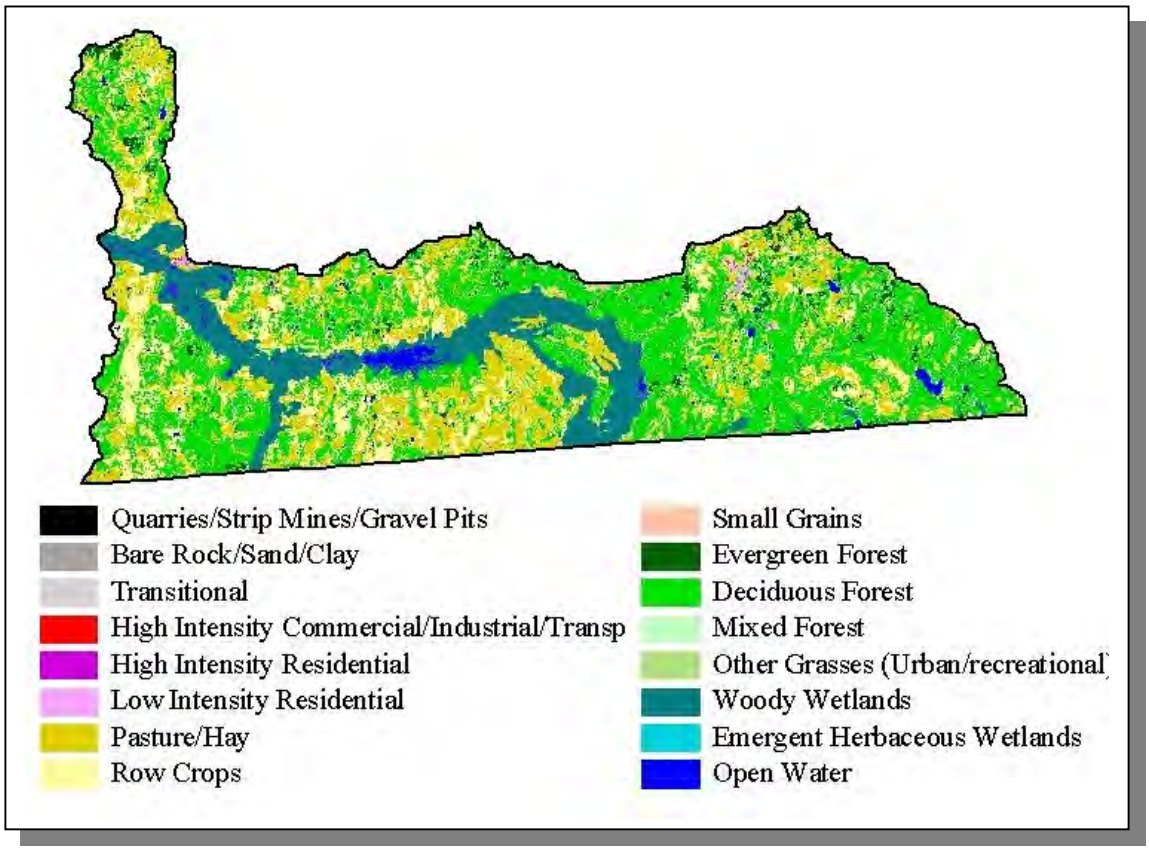


Figure 4-3. Illustration of Land Use Distribution in Subwatershed 0801021001.

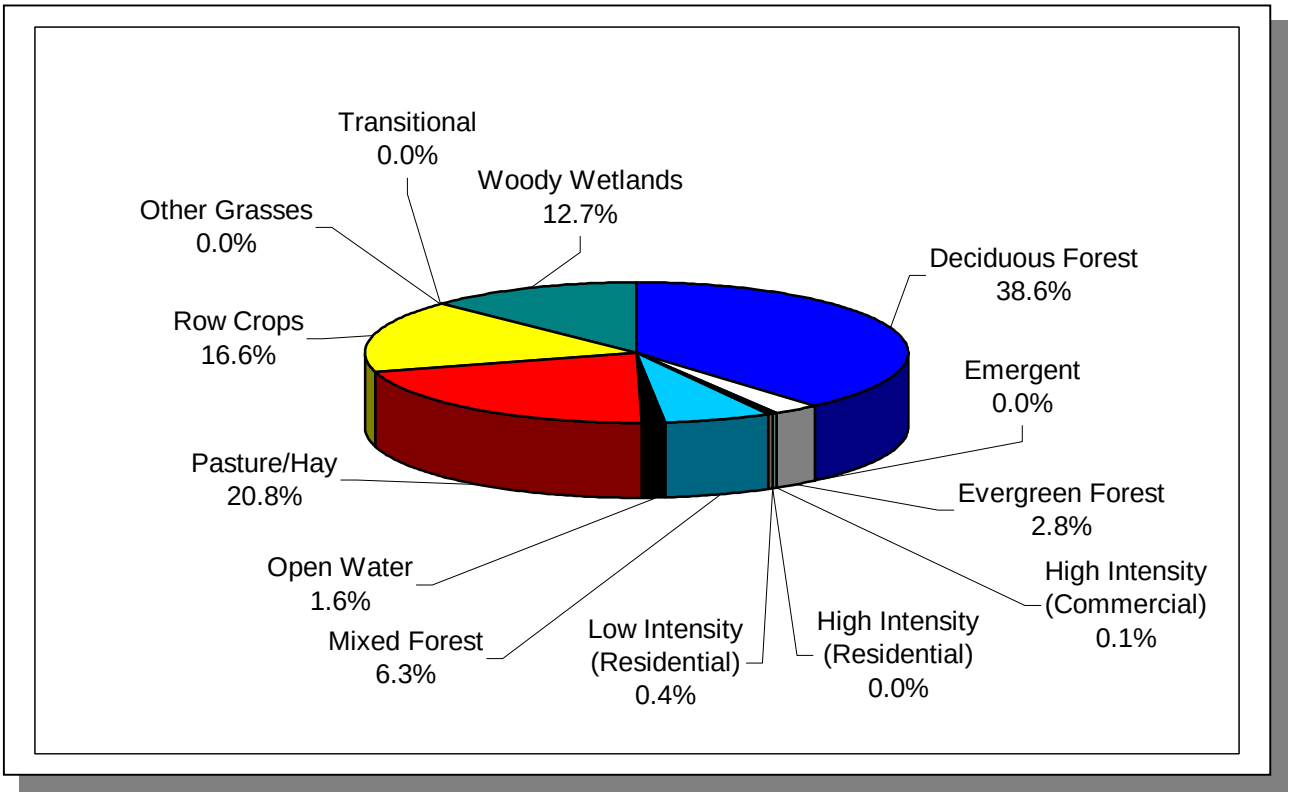


Figure 4-4. Land Use Distribution in Subwatershed 0801021001. *More information is provided in Appendix IV.*

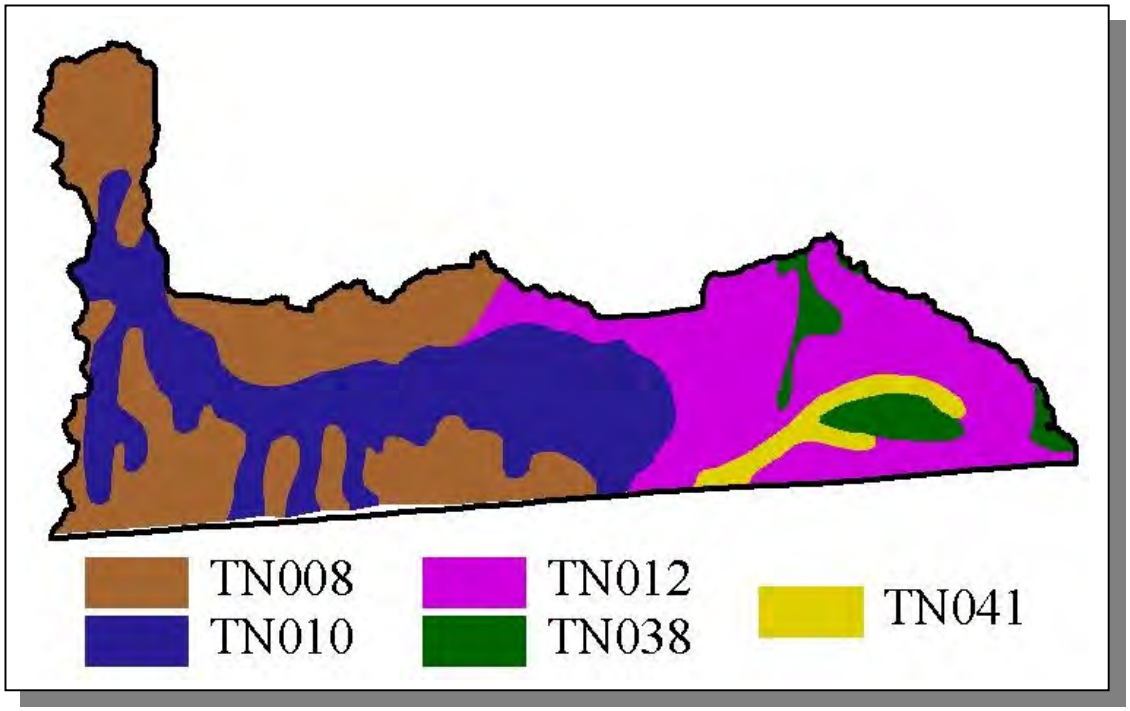


Figure 4-5. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0801021001.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN008	2.00	C	1.38	5.20	Silty Loam	0.48
TN010	81.00	C	1.33	5.11	Silty Loam	0.44
TN012	1.00	C	2.52	5.13	Silty Loam	0.39
TN038	9.00	C	1.65	5.20	Silty Loam	0.46
TN041	59.00	C	1.35	4.98	Silty Loam	0.34

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0801021001. *More details are provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Fayette	25,559	29,412	28,806	8.67	22.17	2,551	2,499	12.7
Hardeman	23,377	24,702	28,105	2.8	654	691	787	20.3
Totals	**48,936**	**54,114**	**56,911**		**2,871**	**3,242**	**3,286**	**14.5**

Table 4-3. Population Estimates in Subwatershed 0801021001.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Grand Junction	Hardeman	357	189	163	24	2
La Grange	Fayette	171	91	10	69	12
Moscow	Fayette	414	196	194	2	0
Totals		**942**	**476**	**367**	**95**	**14**

Table 4-4. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0801021001.

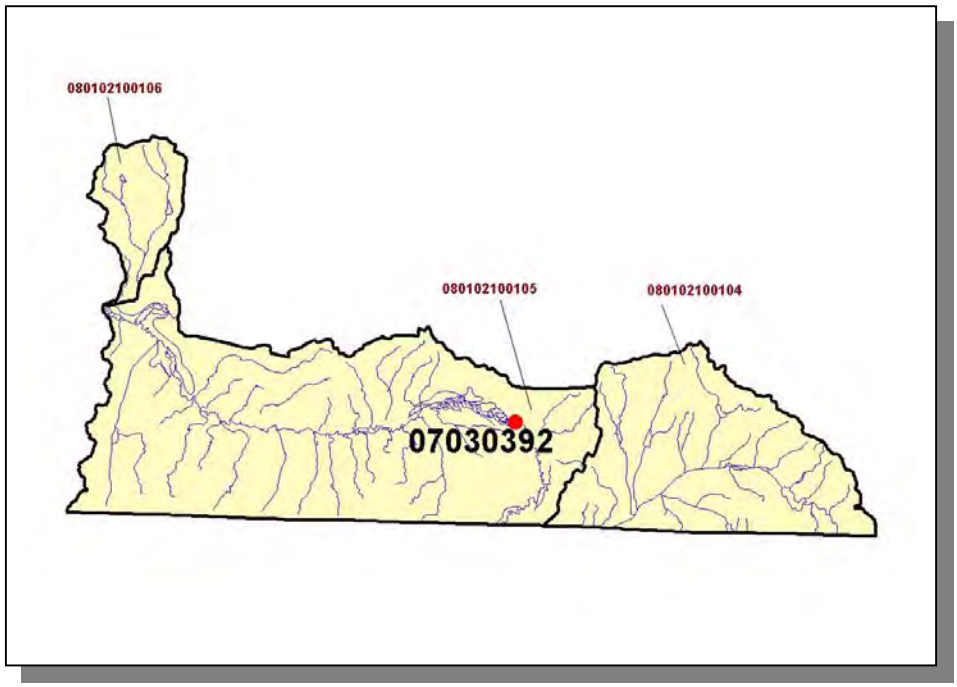


Figure 4-6. Location of Historical Streamflow Data Collection Sites in Subwatershed 0801021001. *Subwatershed 080102100104, 080102100105, and 080102100106 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

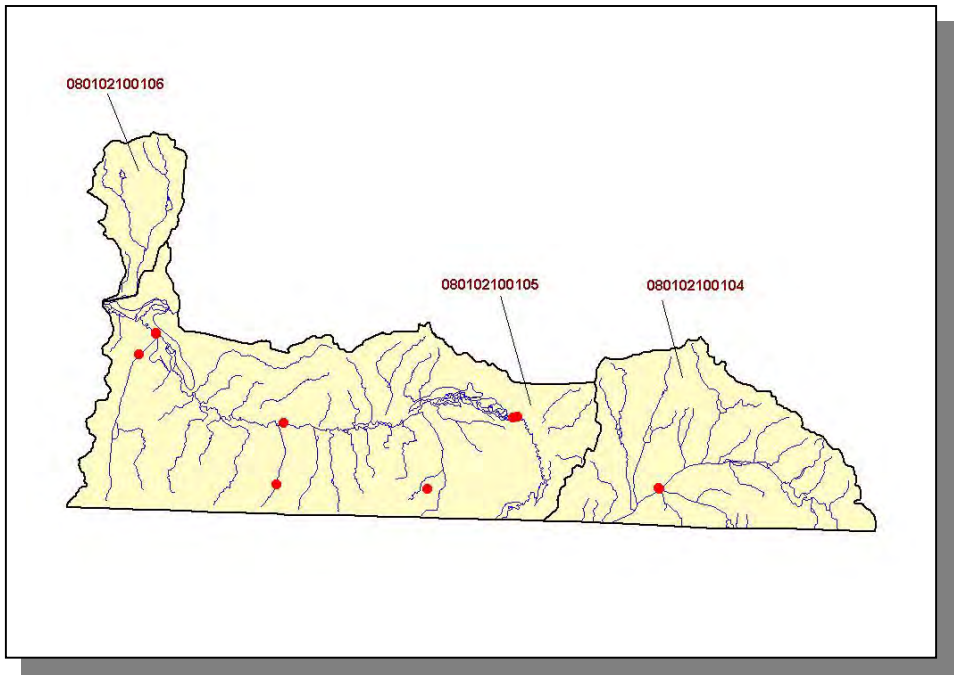


Figure 4-7. Location of STORET Monitoring Sites in Subwatershed 0801021001. *Subwatershed 080102100104, 080102100105, and 080102100106 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.A.ii Point Source Contributions.

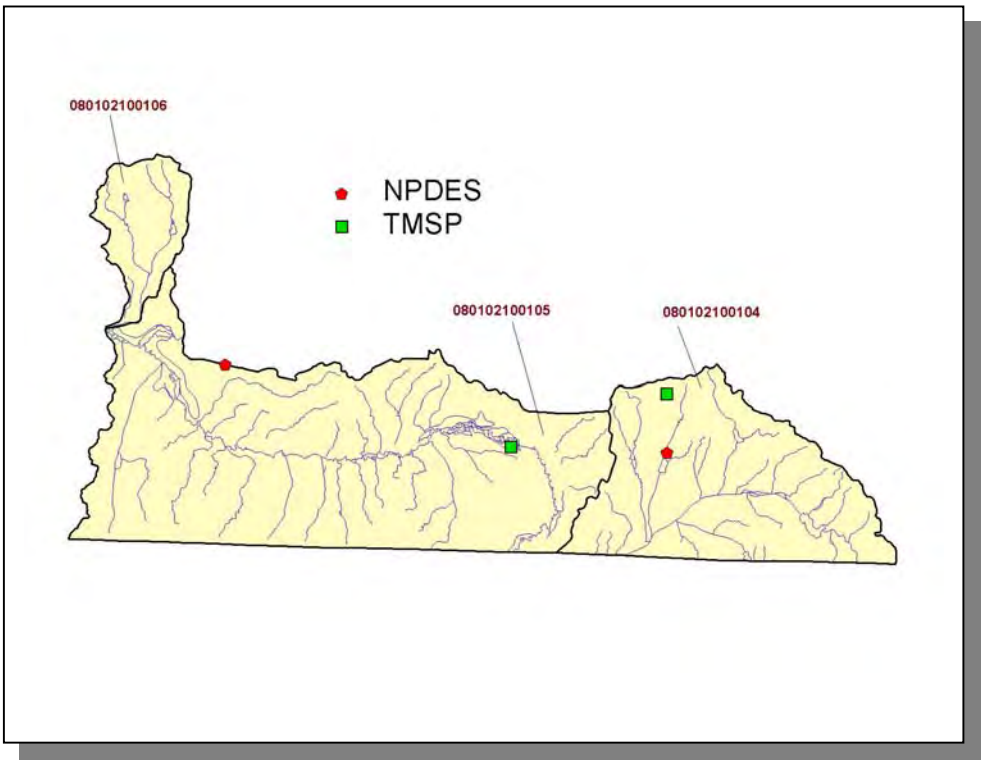


Figure 4-8. Location of Active Point Source Facilities in Subwatershed 0801021001. *Subwatershed 080102100104, 080102100105, and 080102100106 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

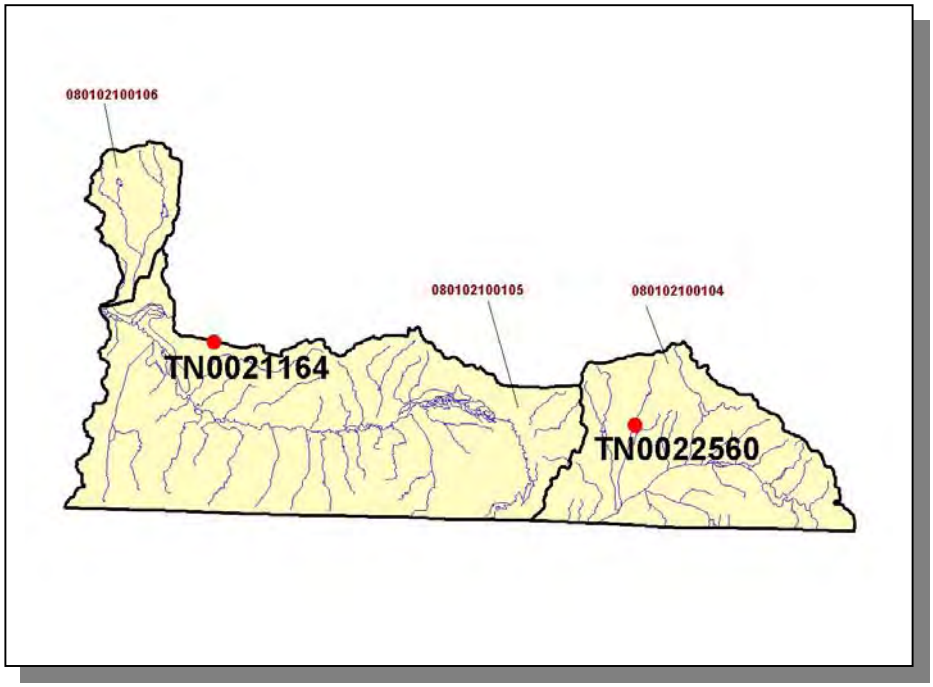


Figure 4-9. Location of NPDES Facilities in Subwatershed 0801021001. *Subwatershed 080102100104, 080102100105, and 080102100106 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-10. Location of TMSP Facilities in Subwatershed 0801021001. *Subwatershed 080102100104, 080102100105, and 080102100106 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens Sold	Hogs	Sheep
2,054	3,737	98	<5	<5	2,755	21

Table 4-5. Summary of Livestock Count Estimates in Subwatershed 0801021001. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Fayette	152.0	152.0	1.1	3.3
Hardeman	247.1	247.1	5.0	18.6
Total	**399.1**	**399.1**	**6.1**	**21.9**

Table 4-6. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 0801021001.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.69
Grass (Hayland)	1.27
Legumes (Hayland)	0.65
Legumes, Grass (Hayland)	0.22
Grass, Forbs, Legumes (Mixed Pasture)	0.87
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	16.73
Cotton (Row Crops)	13.01
Sorghum (Row Crops)	3.04
Soybeans (Row Crops)	10.94
Fruit (Horticultural)	0.39
Wheat (Close-Grown Cropland)	5.64
Summer Fallow (Other Cropland)	6.11
Other Cropland not Planted	2.35
Conservation Reserve Program Lands	0.84
Non-Agricultural Land Use	0.00
Farmsteads and Ranch Headquarters	0.36

Table 4-7. Annual Estimated Total Soil Loss in Subwatershed 0801021001.

4.2.B. 0801021002 (North Fork Wolf River).

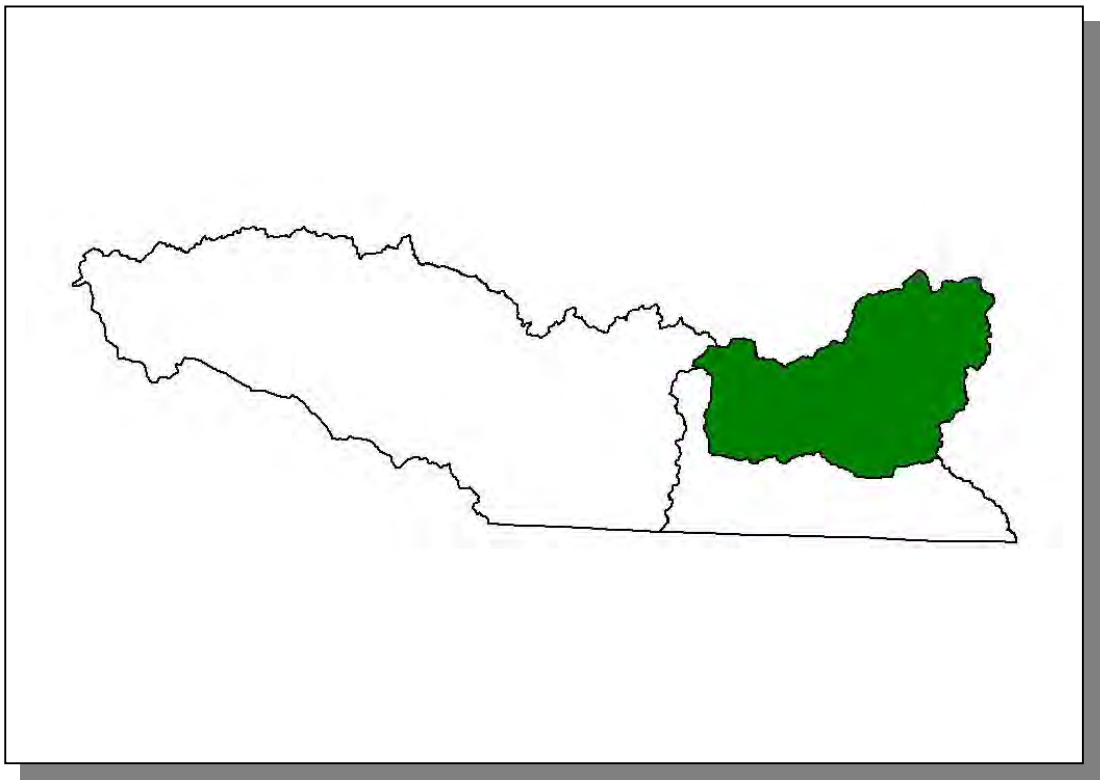


Figure 4-11. Location of Subwatershed 0801021002. *All Wolf River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.B.i. General Description.

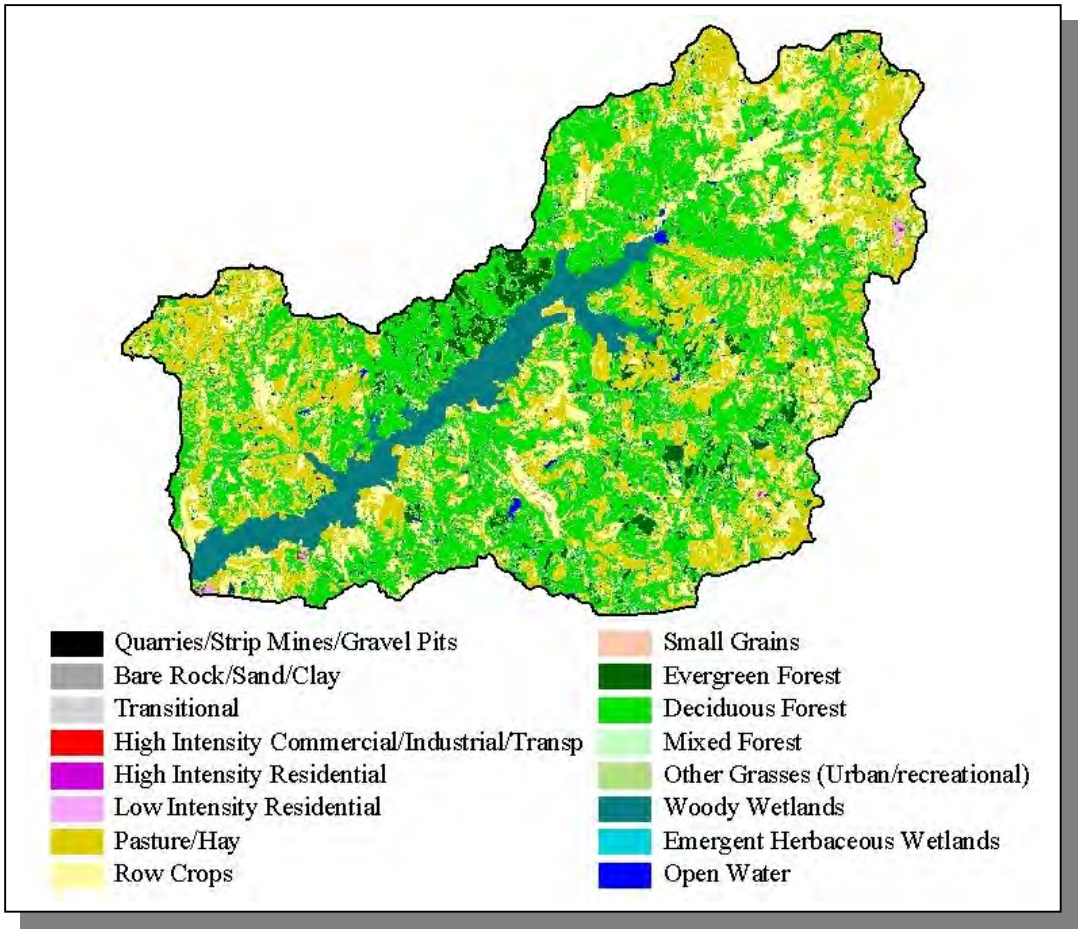


Figure 4-12. Illustration of Land Use Distribution in Subwatershed 0801021002.

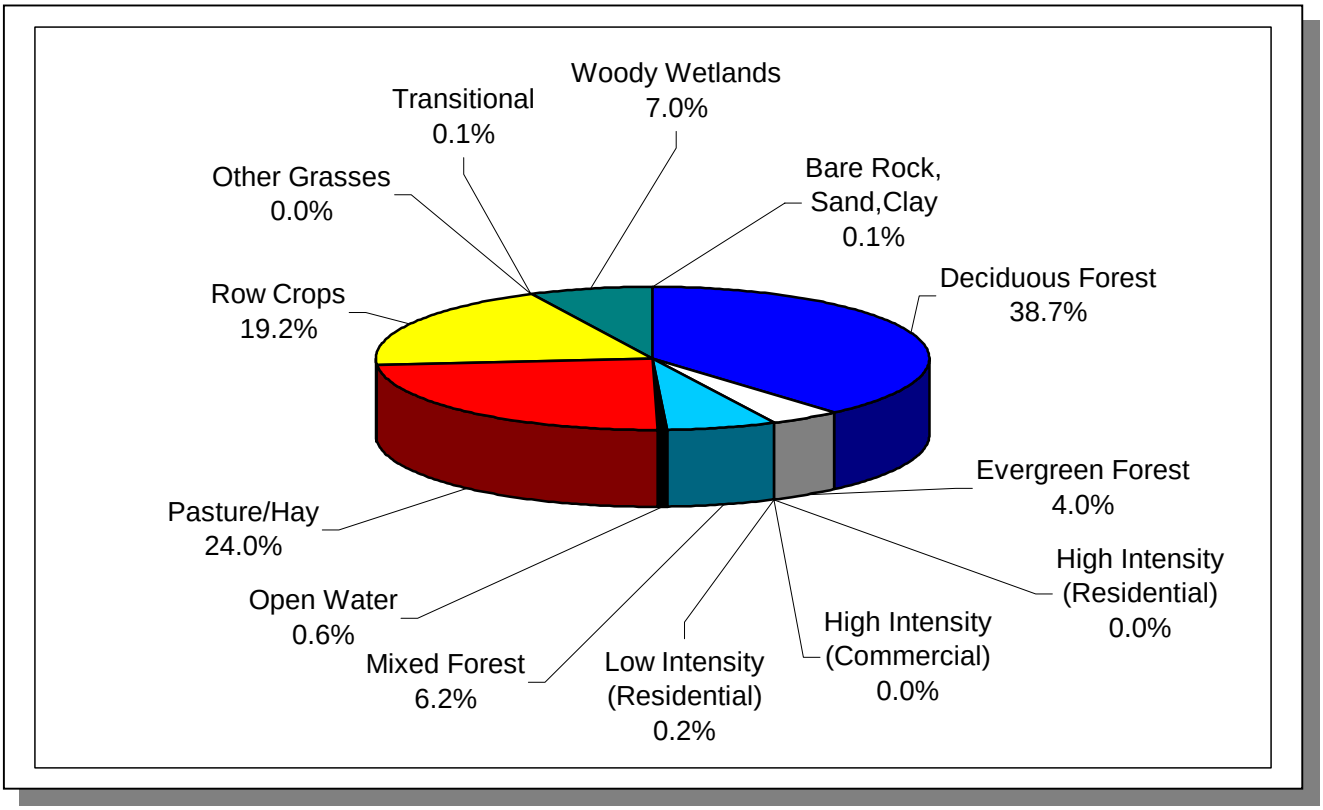


Figure 4-13. Land Use Distribution in Subwatershed 0801021002. *More information is provided in Appendix IV.*

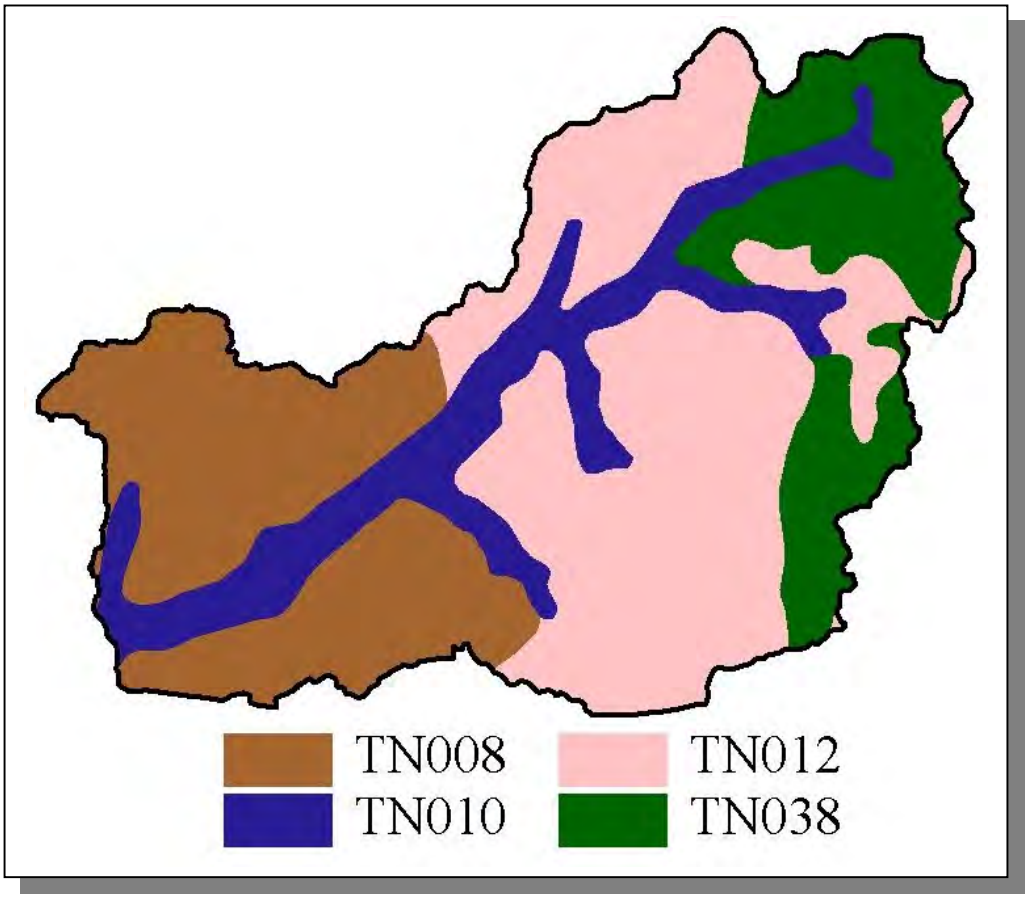


Figure 4-14. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0801021002.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN008	2.00	C	1.38	5.20	Silty Loam	0.48
TN010	81.00	C	1.33	5.11	Silty Loam	0.44
TN012	1.00	C	2.52	5.13	Silty Loam	0.39
TN038	9.00	C	1.65	5.20	Silty Loam	0.46

Table 4-8. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0801021002. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Fayette	25,559	29,412	28,806	12.98	3,318	3,818	3,739	12.7
Hardeman	23,377	24,702	28,105	5.18	1,211	1,280	1,456	20.2
Totals	**48,936**	**54,114**	**56,911**		**4,529**	**5,098**	**5,195**	**14.7**

Table 4-9. Population Estimates in Subwatershed 0801021002.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Grand Junction	Hardeman	357	189	163	24	2
Hickory Valley	Hardeman	147	67	1	66	0
La Grange	Fayette	171	91	10	69	12
Moscow	Fayette	414	196	194	2	0
Williston	Fayette	383	146	9	133	4
Totals		**1,472**	**689**	**377**	**294**	**18**

Table 4-10. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0801021002.

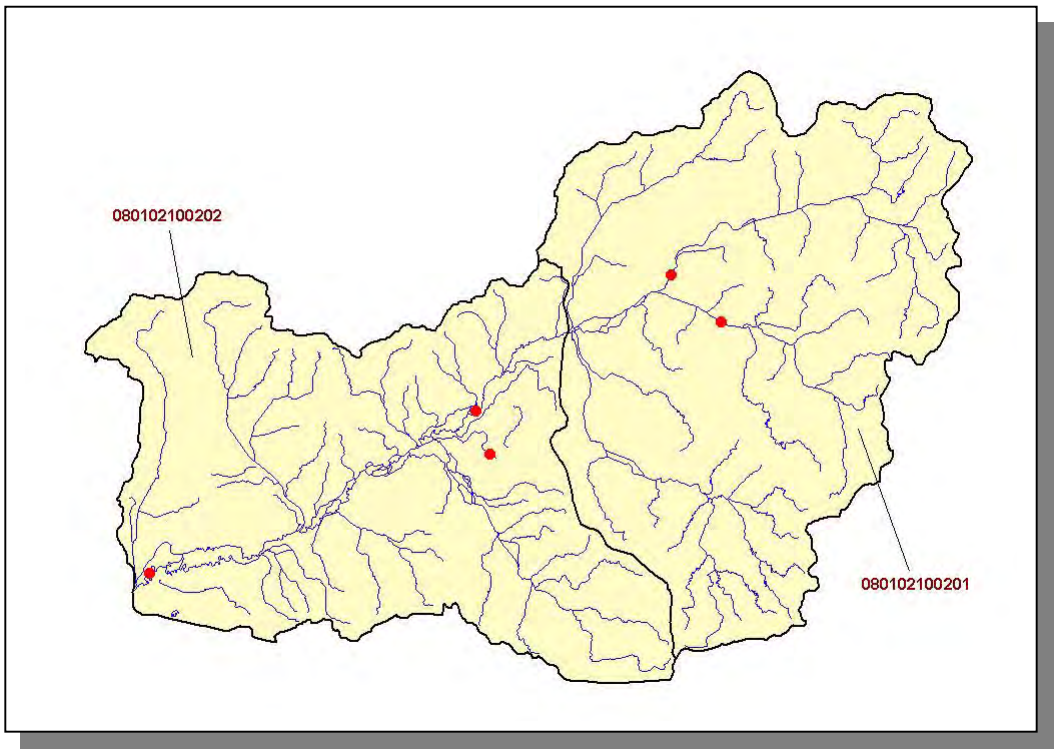


Figure 4-15. Location of STORET Monitoring Sites in Subwatershed 0801021002. *Subwatershed 080102100201 and 080102100202 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.B.ii. Point Source Contributions.

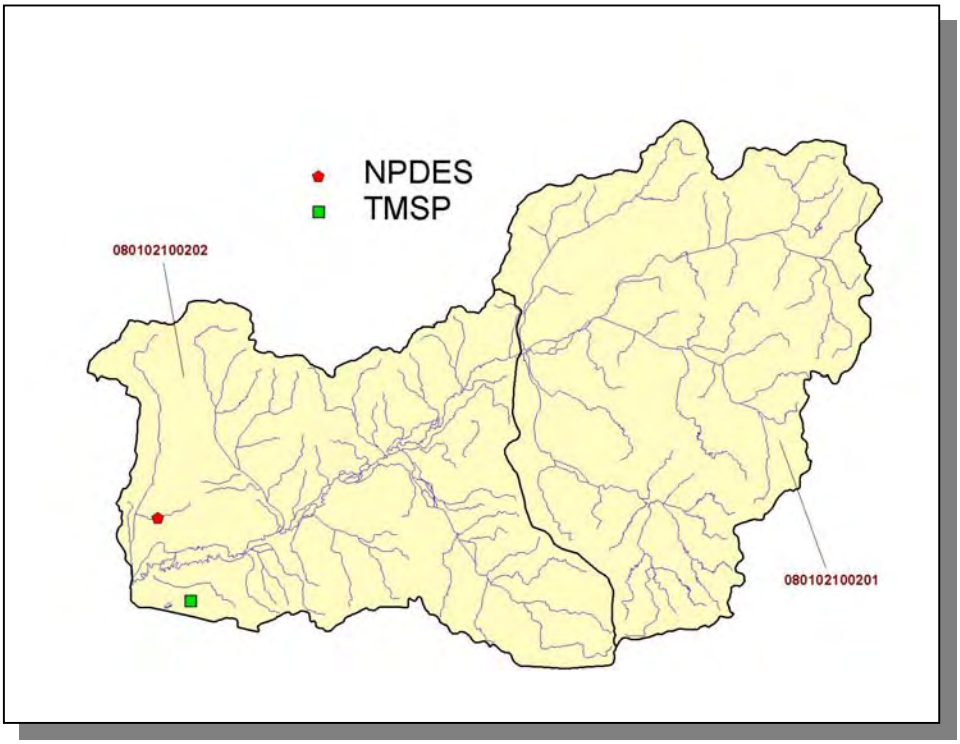


Figure 4-16. Location of Active Point Source Facilities in Subwatershed 0801021002. *Subwatershed 080102100201 and 080102100202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

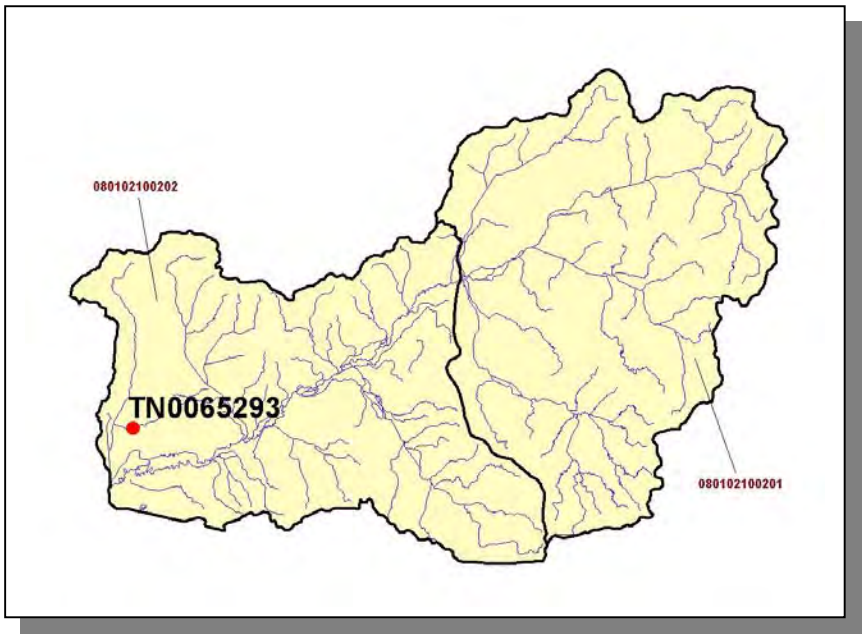


Figure 4-17. Location of NPDES Facilities in Subwatershed 0801021002. *Subwatershed 080102100201 and 080102100202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

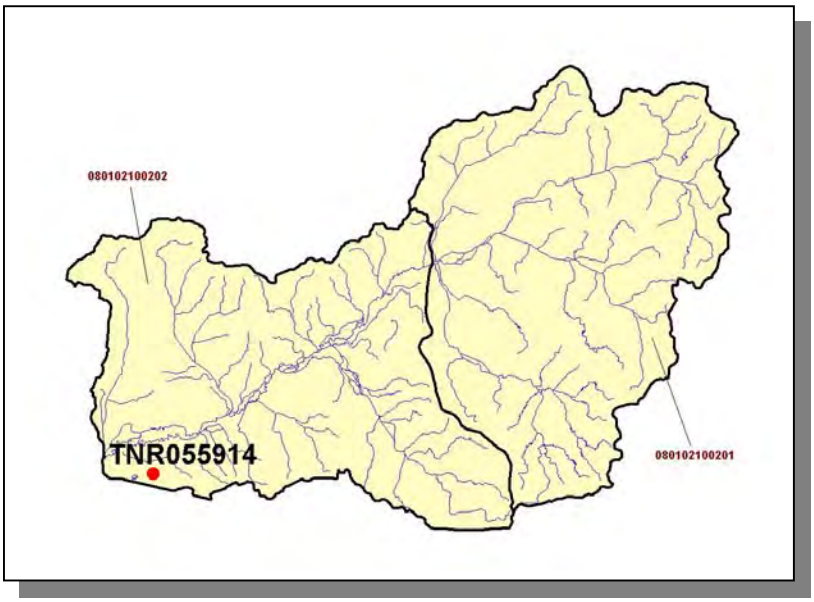


Figure 4-18. Location of TMSP Facilities in Subwatershed 0801021002. *Subwatershed 080102100201 and 080102100202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens Sold	Hogs	Sheep
3,662	6,647	148	8	<5	4,628	45

Table 4-11. Summary of Livestock Count Estimates in Subwatershed 0801021002. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Fayette	152.0	152.0	1.1	3.3
Hardeman	247.1	247.1	5.0	18.6
Total	**399.1**	**399.1**	**6.1**	**21.9**

Table 4-12. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0801021002.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.65
Grass (Hayland)	0.35
Legumes (Hayland)	0.16
Legumes, Grass (Hayland)	0.22
Grass, Forbs, Legumes (Mixed Pasture)	0.85
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	17.38
Cotton (Row Crops)	13.67
Sorghum (Row Crops)	3.04
Soybeans (Row Crops)	10.7
Fruit (Horticultural)	0.39
Wheat (Close-Grown Cropland)	6.14
Summer Fallow (Other Cropland)	6.11
Other Cropland not Planted	2.25
Conservation Reserve Program Lands	0.40
Farmsteads and Ranch Headquarters	0.36

Table 4-13. Annual Estimated Total Soil Loss in Subwatershed 0801021002.

4.2.C. 0801021003 (Wolf River).

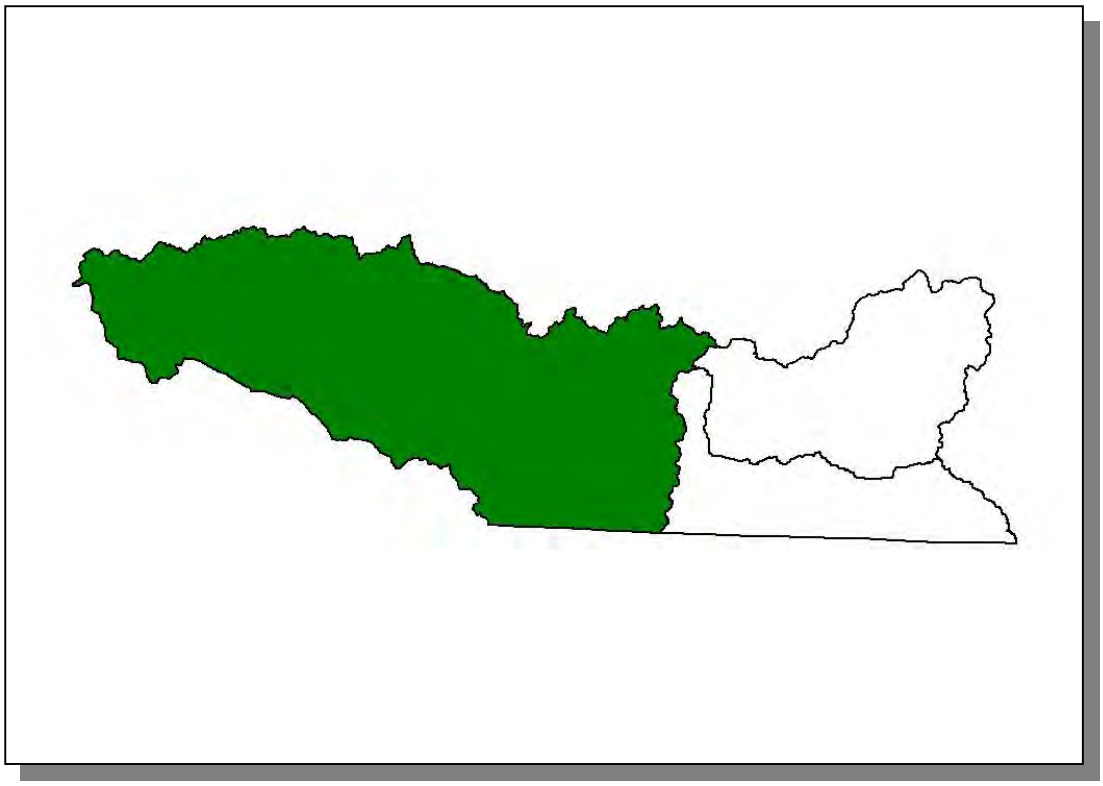


Figure 4-19. Location of Subwatershed 0801021003. *All Wolf River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.C.i. General Description.

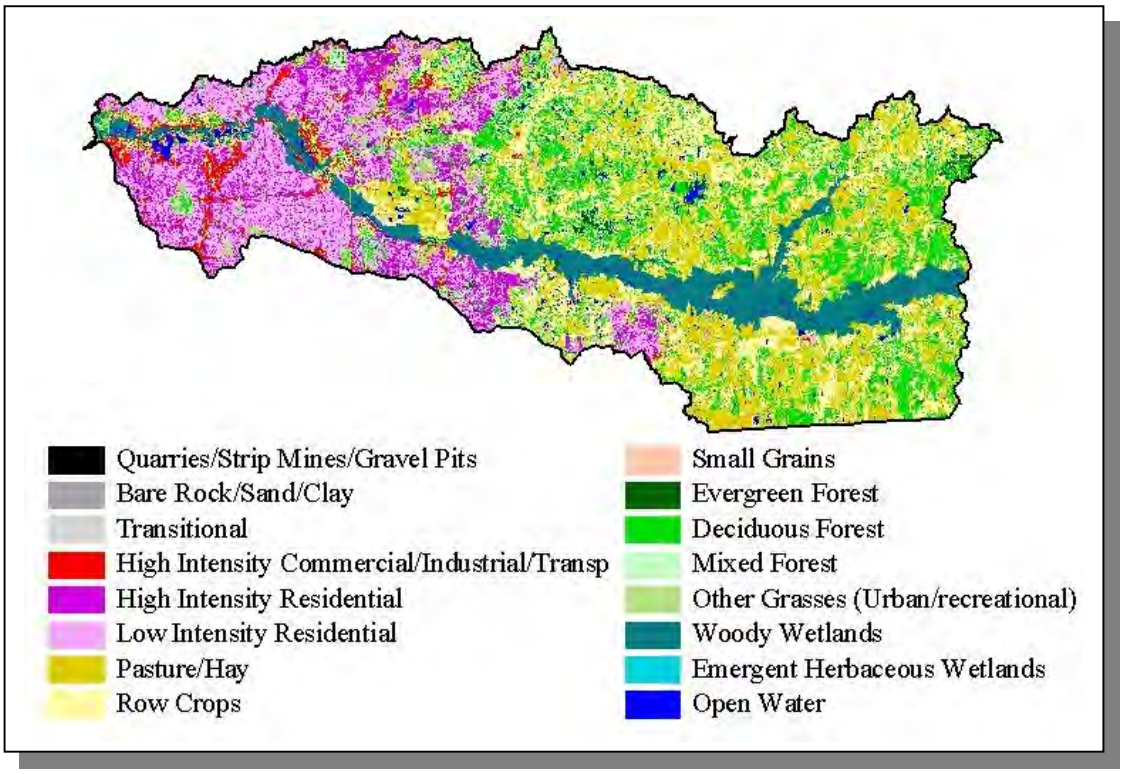


Figure 4-20. Illustration of Land Use Distribution in Subwatershed 0801021003.

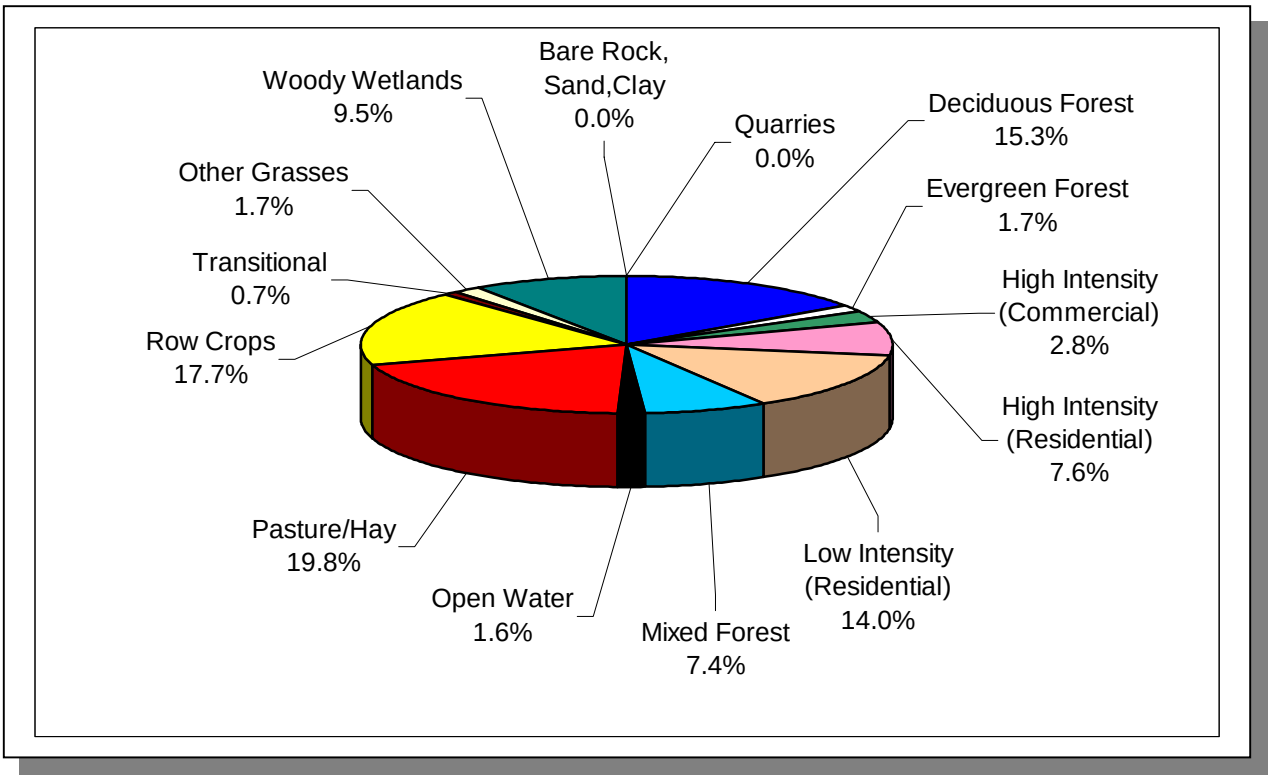


Figure 4-21. Land Use Distribution in Subwatershed 0801021003. *More information is provided in Appendix IV.*

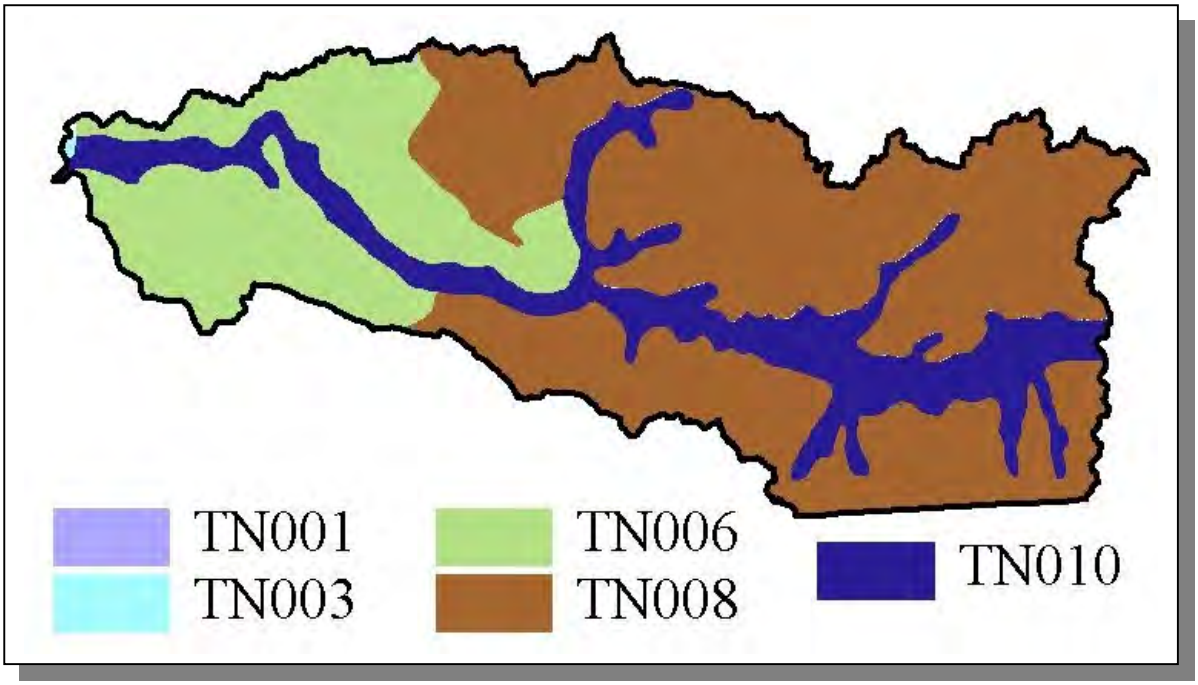


Figure 4-22. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0801021003.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN001	14.00	C	2.31	7.00	Silty Loam	3.03
TN003	62.00	C	0.50	6.65	Silty Clay	0.33
TN006	0.00	C	1.30	5.42	Silty Loam	0.48
TN008	2.00	C	1.38	5.20	Silty Loam	0.48
TN010	81.00	C	1.33	5.11	Silty Loam	0.44

Table 4-14. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0801021003. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Fayette	25,559	29,412	28,806	20.42	5,219	6,006	5,882	12.7
Shelby	826,330	865,318	897,472	26.44	218,464	228,771	237,272	8.6
Totals	**851,889**	**894730**	**926,278**		**223,683**	**234,777**	**243,154**	**8.7**

Table 4-15. Population Estimates in Subwatershed 0801021003.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Bartlett	Shelby	26,989	8,807	8,545	217	45
Collierville	Shelby	14,427	4,613	4,512	84	17
Germantown	Shelby	32,893	11,131	11,017	114	0
Lakeland	Shelby	1,204	475	319	154	2
Memphis	Shelby	610,337	248,573	247,138	793	642
Piperton	Fayette	621	256	23	224	9
Total		**686,471**	**273,855**	**271,554**	**1,586**	**715**

Table 4-16. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0801021003.

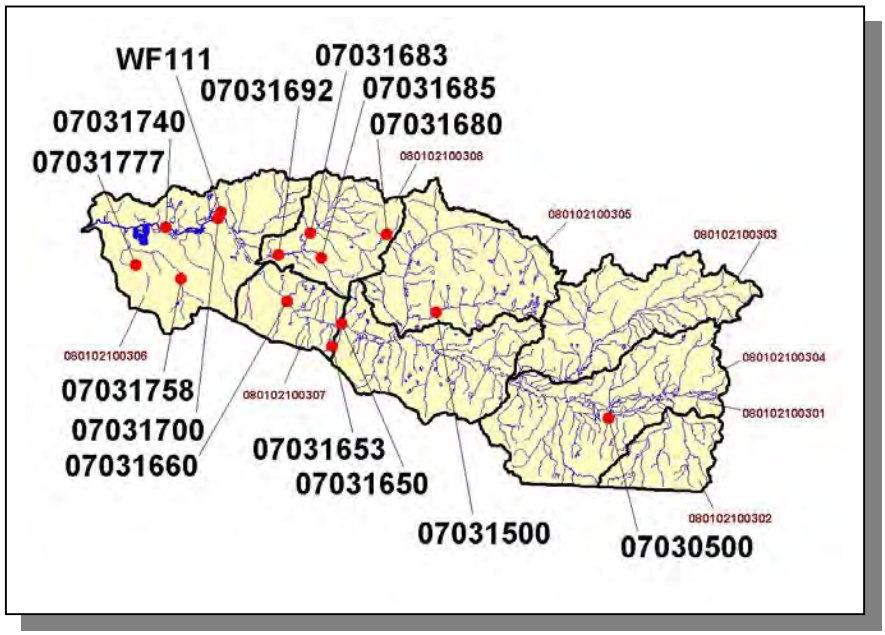


Figure 4-23. Location of Historical Streamflow Data Collection Sites in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information is provided in Appendix IV.*

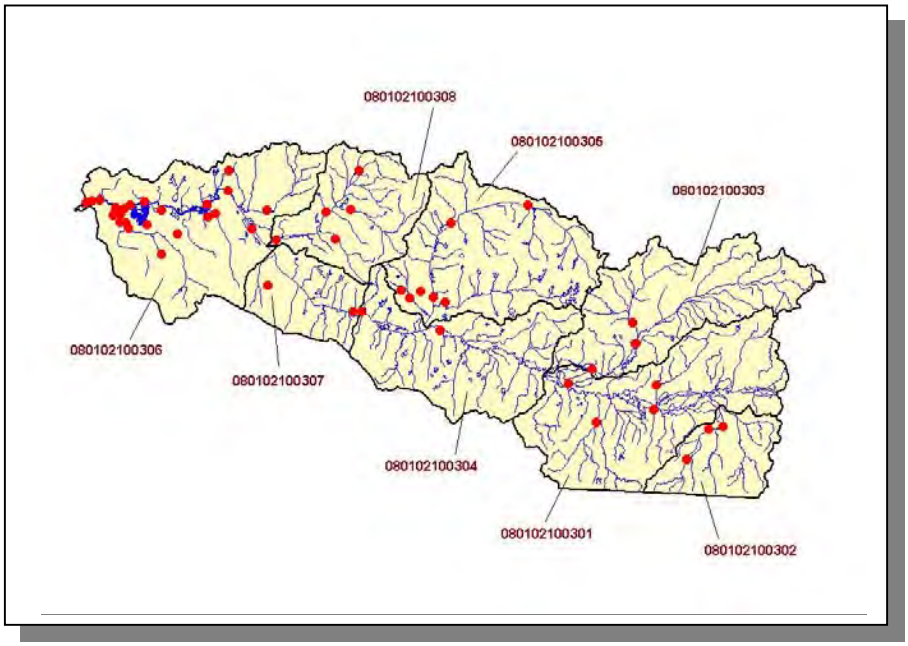


Figure 4-24. Location of STORET Monitoring Sites in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.C.ii. Point Source Contributions.

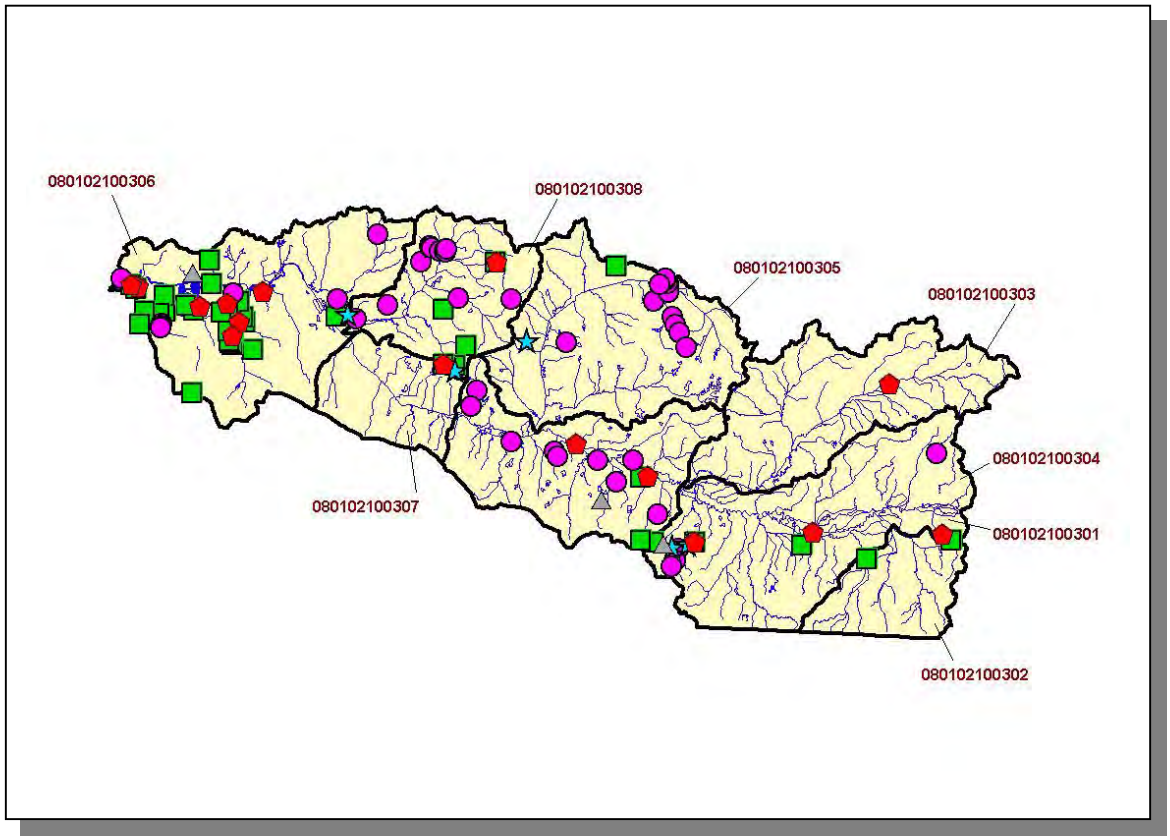


Figure 4-25. Location of Active Point Source Facilities in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

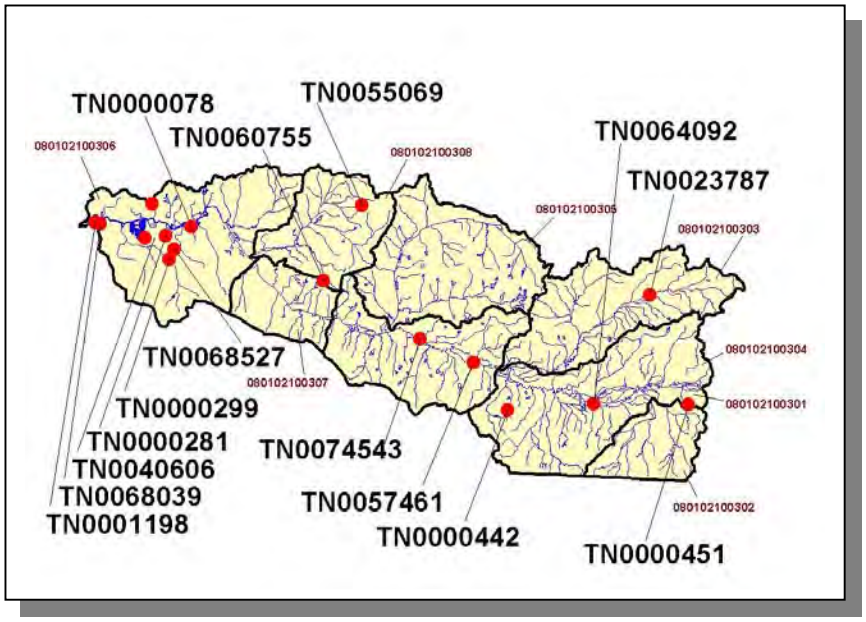


Figure 4-26. Location of NPDES Facilities in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

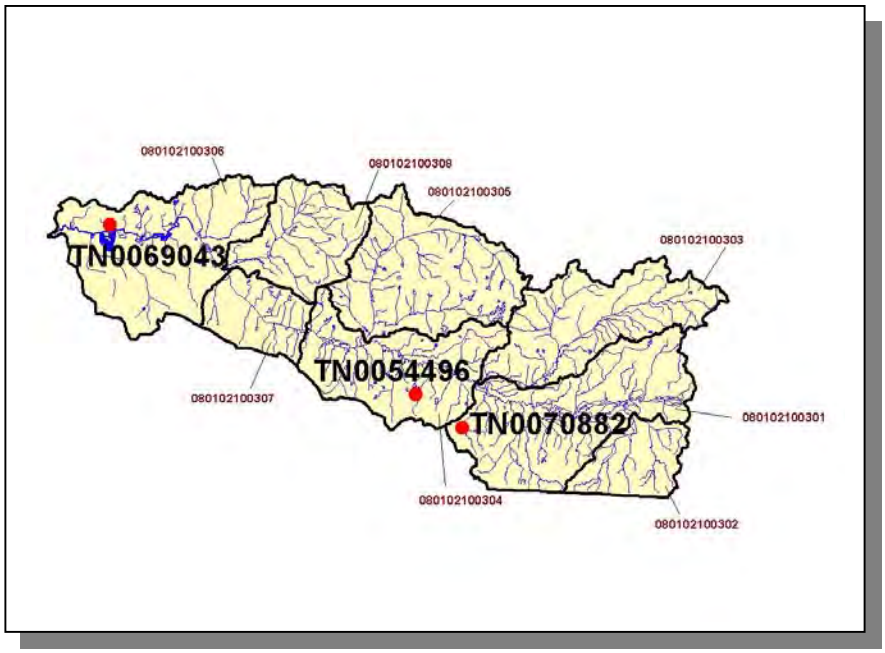


Figure 4-27. Location of Active Mining Facilities in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

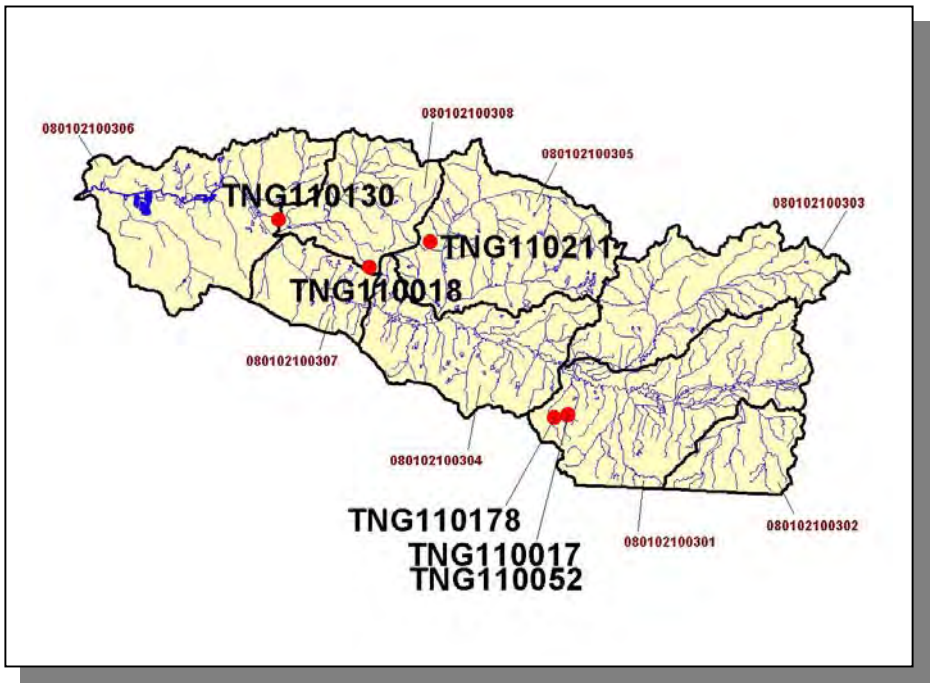


Figure 4-28. Location of Ready Mix Concrete Plants in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

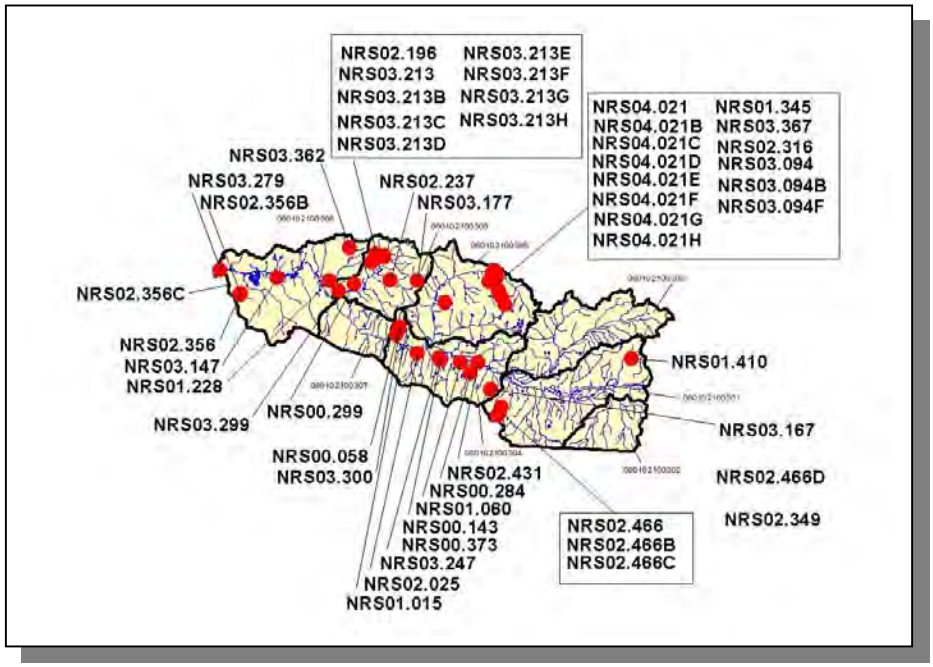


Figure 4-29. Location of ARAP Sites (Individual Permits) in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

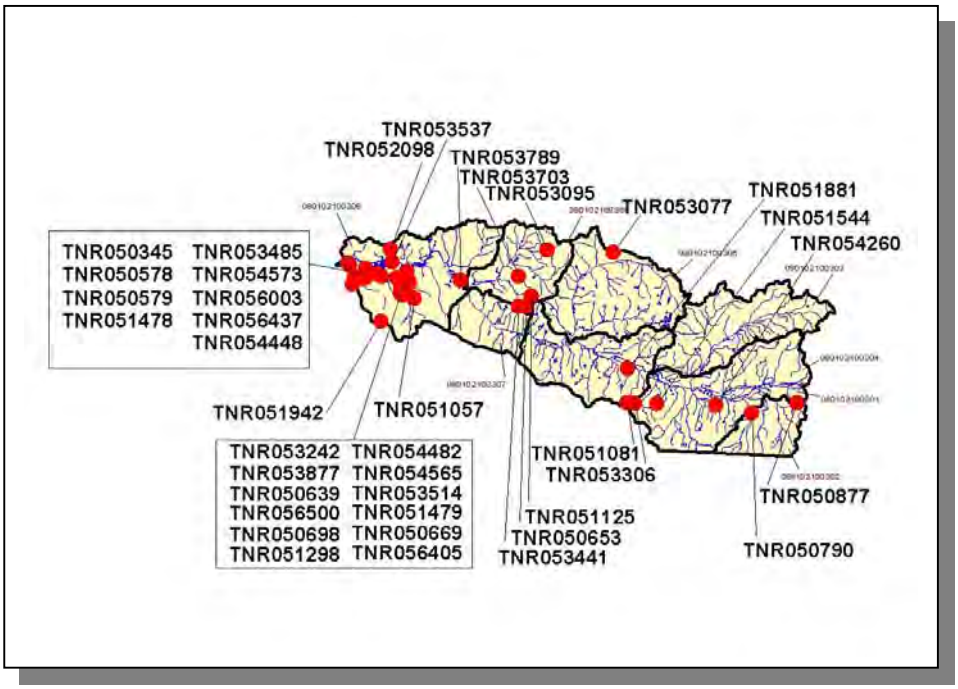


Figure 4-30. Location of TMSP Facilities in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.C.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There are eleven NPDES facilities discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0801021003:

- TN0023787 (Southwest School STP) discharges to an Unnamed Tributary @ RM 0.8 to Shaws Creek @ RM 13.1
- TN0057461 (Collierville STP) discharges to Wolf River @ RM 30.9
- TN0074543 (Collierville NW STP) discharges to Wolf River @ RM 25.3
- TN0000078 (Penn Specialty Chemicals) discharges to Wolf River @ RM6.9
- TN0068527 (Crompton Corporation) discharges to Workhouse bayou
- TN0000299 (Buckeye Technologies) discharges to Cypress Creek @ RM 4.1, 4.3, and 4.4
- TN0000281 (Southern Cotton Oil Company) discharges to an Unnamed Tributary @ RM 0.5, 0.6, and 0.7 to Workouse bayou @ RM 4.5
- TN0040606 (Buckman Laboratories) discharges to City Storm Sewer to Cypress Creek @ RM 1.2 and 2.2
- TN0068039 (Memphis Hardwood Flooring) discharges to Wolf River @ RM 1.5 and to Memphis Storm Sewer and WWC to Wolf River @ RM 1.5
- TN0001198 (KTG) discharges to Wolf River Lagoon and Marble Bayou Pump Station

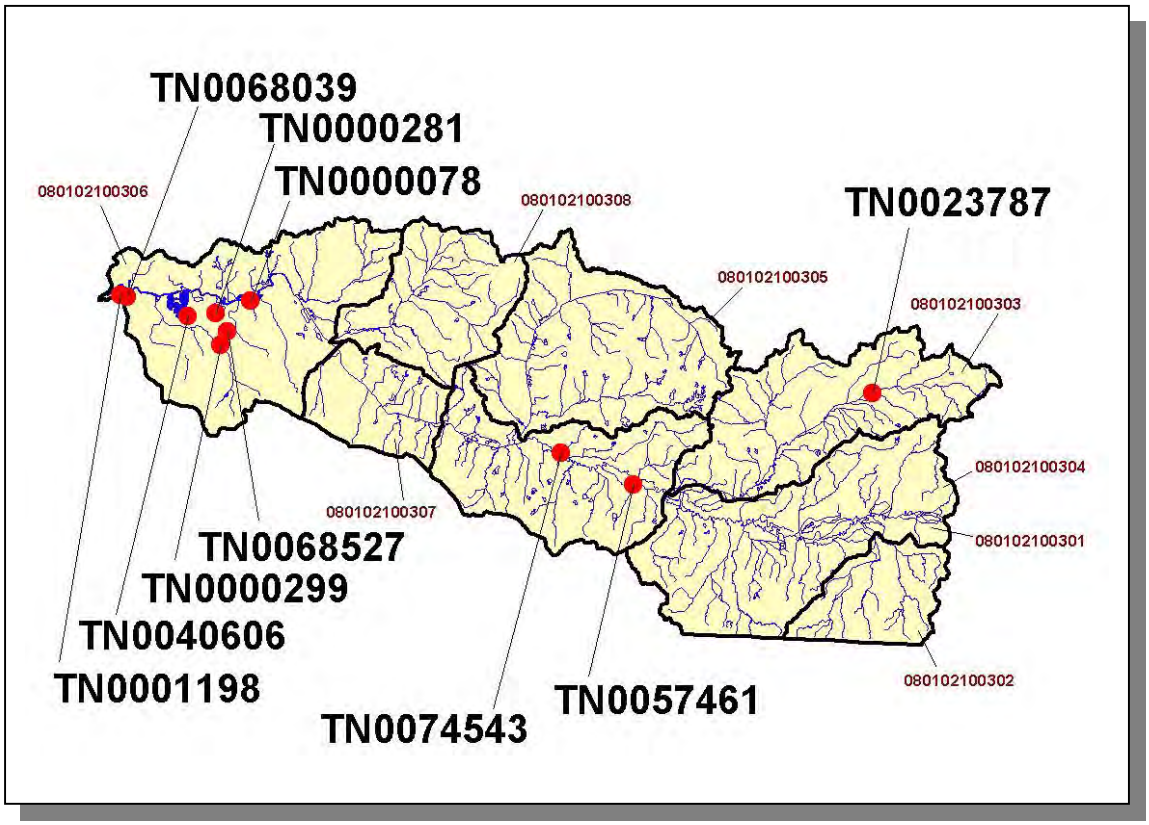


Figure 4-31. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0801021003. *Subwatershed 080102100301, 080102100302, 080102100303, 080102100304, 080102100305, 080102100306, 080102100307, and 080102100308 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0023787			0		0.02
TN0057461	151	155	160	145	3.5
TN0074543	151	155	160	145	3.0
TN0000078	206	207	210	195	
TN0068527					
TN0000299				0	
TN0000281					
TN0001317					
TN0040606				0	
TN0068039					
TN0001198					

Table 4-17. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0801021003. *Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.*

PERMIT #	TOTAL P	pH	TOC	TSS	OIL and GREASE	$CBOD_5$	COD
TN0000078		X		X	X		X
TN0068527	X	X	X		X	X	
TN0000281				X	X	X	
TN0040606		X	X	X			

Table 4-18. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0801021003. *TOC, Total Organic Carbon; $CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day).*

PERMIT #	WET	$CBOD_5$	FECAL COLIFORM	*E. COLI*	NH_3	TRC	TSS	SETTLEABLE SOLIDS	OIL and GREASE	DO	pH
TN0023787		X	X	X	X	X	X	X		X	X
TN0057461	X	X	X	X		X	X	X		X	X
TN0074543	X	X	X	X		X	X	X		X	X
TN0000078	X	X				X	X		X		X
TN0000299	X										X
TN0000281							X		X		X
TN0001317						X	X		X		X
TN0040606	X								X		
TN0068039							X		X		X
TN0001198											X

Table 4-19. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0801021003. *WET, Whole Effluent Toxicity; $CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids.*

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens Sold	Hogs	Sheep
6,291	11,565	325	16	<5	8,179	94

Table 4-20. Summary of Livestock Count Estimates in Subwatershed 0801021003. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Fayette	152.0	152.0	1.1	3.3
Shelby	111.6	111.6	0.0	0.0
Totals	**263.6**	**263.6**	**1.1**	**3.3**

Table 4-21. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0801021003.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.40
Grass (Hayland)	0.29
Legumes (Hayland)	2.85
Legumes, Grass (Hayland)	0.22
Grass, Forbs, Legumes (Mixed Pasture)	0.47
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	11.49
Cotton (Row Crops)	10.05
Sorghum (Row Crops)	4.91
Soybeans (Row Crops)	11.12
Fruit (Horticultural)	0.39
Wheat (Close-Grown Cropland)	3.63
Summer Fallow (Other Cropland)	12.43
Other Vegetable and Truck Crops	5.87
Other Cropland not Planted	5.64
Conservation Reserve Program Lands	0.67
Non-Agricultural Land Use	0.00
Farmsteads and Ranch Headquarters	0.32

Table 4-22. Annual Estimated Total Soil Loss in Subwatershed 0801021003.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE WOLF RIVER WATERSHED

5.1 Background

5.2 Federal Partnerships
- **5.2.A. Natural Resources Conservation Service**
- **5.2.B. United States Geological Survey**
- **5.2.C. United States Fish and Wildlife Service**
- **5.2.D. U.S. Amy Corps of Engineers-Memphis District**

5.3 State Partnerships
- **5.3.A. TDEC Division of Water Supply**
- **5.3.B. Tennessee Department of Agriculture**

5.4 Local Initiatives
- **5.4.A. Tennessee Water Sentinels**

5.1. BACKGROUND. The Watershed Approach relies on participation at the federal, state, local and nongovernmental levels to be successful. Two types of partnerships are critical to ensure success:

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the Tennessee Portion of the Wolf River Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS.

5.2.A. Natural Resources Conservation Service. The Natural Resources Conservation Service (NRCS), an agency of the U.S. Department of Agriculture, provides technical assistance, information, and advice to citizens in their efforts to conserve soil, water, plant, animal, and air resources on private lands.

Performance Results System (PRS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRS may be viewed at http://prms.nrcs.usda.gov/prs. From the opening menu, select "Reports" in the top tool bar. Next, select "2004 Reports" if it's active, and "2003 PRMS Reports" if it's not. Pick the conservation treatment of interest on the page that comes up and reset the date to 2004 Reports if it is not set there. Pick the conservation practice of interest. In the location drop box of the page that comes up, select "Tennessee" and click on the "Refresh" button. In the "By" drop box that comes up, select "Hydrologic Unit" and click on the "Refresh" button. The report of interest can now be viewed.

The data can be used to determine broad distribution trends in service provided to customers by NRCS conservation partnerships. These data do not show sufficient detail to enable evaluation of site-specific conditions (e.g., privately-owned farms and ranches) and are intended to reflect general trends.

CONSERVATION PRACTICE	TOTAL	
	FEET	ACRES
Land Treatment: Buffers		18
Grazing/Forages Practices		376

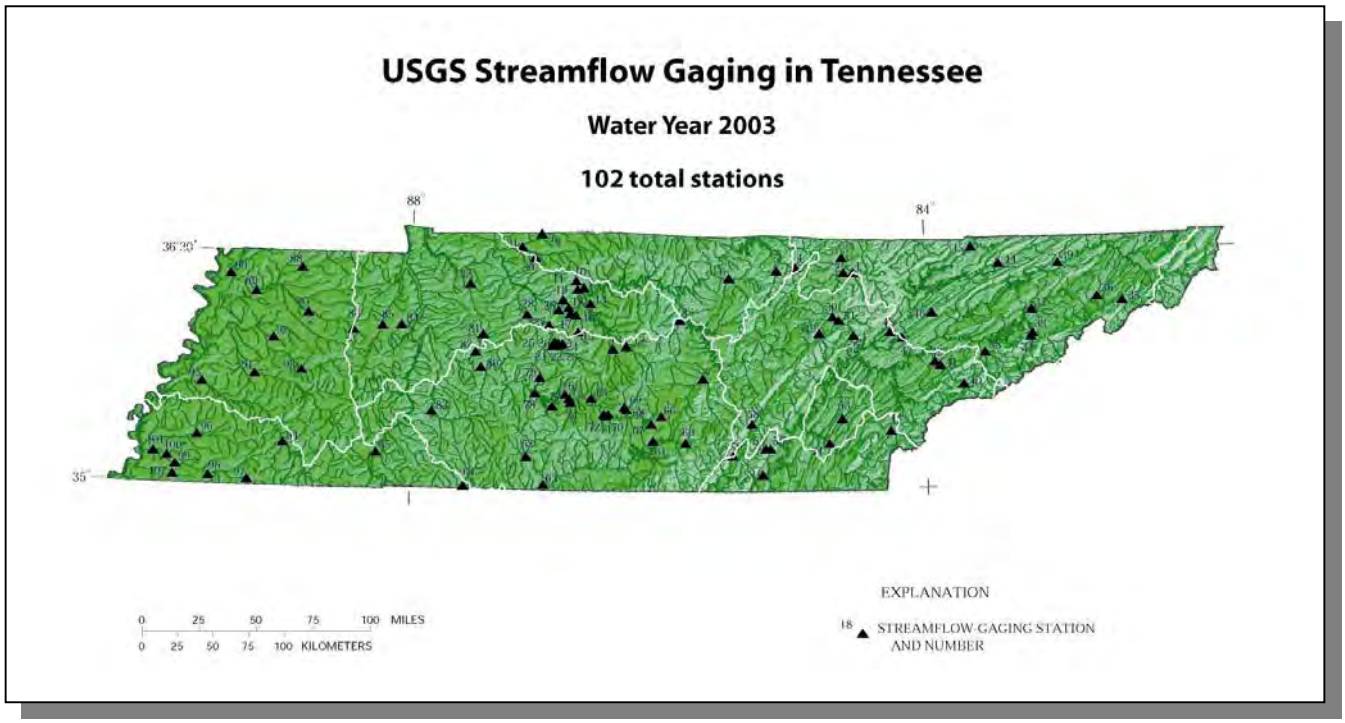
Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Wolf River Watershed. *Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period. More information is provided in Appendix V.*

5.2.B. United States Geological Survey Water Resources Programs – Tennessee District The U.S. Geological Survey (USGS) provides relevant and objective scientific studies and information for public use to evaluate the quantity, quality, and use of the Nation's water resources. In addition to providing National assessments, the USGS also conducts hydrologic studies in cooperation with numerous Federal, State, and local agencies to address issues of National, regional, and local concern. Please visit http://water.usgs.gov/ for an overview of the USGS, Water Resources Discipline.

The USGS collects hydrologic data to document current conditions and provide a basis for understanding hydrologic systems and solving hydrologic problems. In Tennessee, the USGS records streamflow continuously at more than 102 gaging stations equipped with recorders and makes instantaneous measurements of streamflow at many other locations. Ground-water levels are monitored Statewide, and the physical, chemical, and biologic characteristics of surface and ground waters are analyzed. USGS activities also

include the annual compilation of water-use records and collection of data for National baseline and water-quality networks. National programs conducted by the USGS include the National Atmospheric Deposition Program (http://bqs.usgs.gov/acidrain/), National Stream Quality Accounting Network (http://water.usgs.gov/nasqan/), and the National Water-Quality Assessment Program (http://water.usgs.gov/nawqa/). For specific information on the Upper and Lower Tennessee NAWQA studies, please visit http://tn.water.usgs.gov/lten/tenn.html

USGS Water Resources Information on the Internet. Real-time and historical streamflow, water levels, and water-quality data at sites operated by the Tennessee District can be accessed at http://waterdata.usgs.gov/tn/nwis/nwis. Data can be retrieved by county, hydrologic unit code, or major river basin using drop-down menus. Contact Donna Flohr at (615) 837-4730 or dfflohr@usgs.gov for specific information about streamflow data. Recent publications by the USGS staff in Tennessee can be accessed by visiting http://tn.water.usgs.gov/pubpg.html. This web page provides searchable bibliographic information to locate reports and other products about specific areas.



5.2.C. U.S. Fish and Wildlife Service. The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. The U.S. Fish and Wildlife Service (Service) works with State and Federal agencies and Tribal governments, helps

corporate and private landowners conserve habitat, and cooperates with other nations to halt illegal wildlife trade. The Service also administers a Federal Aid program that distributes funds annually to States for fish and wildlife restoration, boating access, hunter education, and related projects across America. The funds come from Federal excise taxes on fishing, hunting, and boating equipment.

Endangered Species Program

Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available under the ESA, including prohibitions on killing, harming or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program. For a complete listing of endangered and threatened species in Tennessee, please visit the Service's website at http://www.fws.gov/cookeville/.

Recovery is the process by which the decline of an endangered or threatened species is stopped and reversed, and threats to the species' survival are eliminated, so that long-term survival in nature can be ensured. The goal of the recovery process is to restore listed species to a point where they are secure and self-sustaining in the wild and can be removed from the endangered species list. Under the ESA, the Service and National Marine Fisheries Service were delegated the responsibility of carrying out the recovery program for all listed species.

In an effort to preclude the listing of a rare species, the Service engages in proactive conservation efforts for unlisted species. The program covers not only formal candidates but other rare species that are under threat. Early intervention preserves management options and minimizes the cost of recovery.

Partners for Fish and Wildlife Program

The U.S. Fish and Wildlife Service established the Partners for Fish and Wildlife Program to restore historic habitat types that benefit native fishes and wildlife. The program adheres to the concept that restoring or enhancing habitats such as wetlands or other unique habitat types will substantially benefit federal trust species on private lands by providing food and cover or other essential needs. Federal trust species include threatened and endangered species, as well as migratory birds (e.g. waterfowl, wading birds, shorebirds, neotropical migratory songbirds).

Participation is voluntary and various types of projects are available. Projects include livestock exclusion fencing, alternate water supply construction, streambank stabilization, restoration of native vegetation, wetland restoration/enhancement, riparian zone reforestation, and restoration of in-stream aquatic habitats.

HOW TO PARTICIPATE

- Interested landowners contact a Partners for Fish and Wildlife Biologist to discuss the proposed project and establish a site visit.
- A visit to the site is then used to determine which activities the landowner desires and how those activities will enhance habitat for trust resources. Technical advice on proposed activities is provided by the Service, as appropriate.
- Proposed cost estimates are discussed by the Service and landowner.
- A detailed proposal which describes the proposed activities is developed by the Service biologist and the landowner. Funds are competitive, therefore the proposal is submitted to the Service's Ecosystem team for ranking and then to the Regional Office for funding.
- After funding is approved, the landowner and the Service co-sign a Wildlife Extension Agreement (minimum 10-year duration).
- Project installation begins.
- When the project is completed, the Service reimburses the landowner after receipts and other documentation are submitted according to the Wildlife Extension Agreement.

For more information regarding the Endangered Species and Partners for Fish and Wildlife programs, please contact the Tennessee Ecological Services Field Office at (931)-528-6481 or visit their website at http://www.fws.gov/cookeville/.

5.2.D. United States Army Corps of Engineers-Memphis District. The Memphis District, U.S. Army Corps of Engineers is one of six districts in the Mississippi Valley Division. The District's area of responsibility encompasses 25,000 square miles, portions of six states, 15 major watersheds, and approximately 3 million citizens. The Memphis District's mission is to offer flood damage reduction throughout the region, provide navigation to 355 miles of the Mississippi River, provide environmental stewardship through our Regulatory and Civil Works programs, conduct emergency response to disasters, and to perform other authorized Civil Works projects.

Regulatory Program

The U.S. Army Corps of Engineers has been involved in regulating certain activities in the nation's water since 1890. Prior to 1968, the primary thrust for the regulatory program was the protection of navigation. As a result of new laws and judicial decisions, the program has evolved to one that considers the full public interest by balancing the favorable impacts against detrimental impacts.

Section 10 of the Rivers and Harbors Act of 1899 **-** requires approval prior to the accomplishment of any work in or over navigable waters of the United States, or which affects the course, location, condition or capacity of such waters. Typical activities requiring Section 10 permits are:

- Construction of piers, wharves, bulkheads, dolphins, marinas, ramps, and cable/pipeline crossings.
- Dredging and excavation

The Wolf River is considered navigable under Section 10 criteria for a distance of 15 miles above its mouth.

Section 404 of the Clean Water Act - requires approval prior to discharging dredged or fill material into the waters of the United States. Typical activities requiring Section 404 permits are:

- Depositing of fill or dredged material in waters of the U.S. or adjacent wetlands.
- Site development fill for residential, commercial, or recreational developments.
- Construction of revetments, groins, breakwaters, levees, dams, dikes, and weirs.
- Placement of riprap and road fills.

Civil Works Program

The Corps' ongoing Civil Works responsibilities date back to the early 1800's when Congress authorized the removal of navigation hazards and obstacles. Over the years, succeeding Administrations and Congresses have expanded the Corps' missions to include most all water-related planning, development, and construction areas where a Federal interest is involved. Funds for Congressionally Authorized Projects are provided through Energy and Water Appropriations Acts and through contributions from non-Federal entities for specific projects.

Civil Works projects may also be funded under the Continuing Authorities Program (CAP). Congress has provided the Corps with standing authorities to study and build specific water resources projects for specific purposes and with specified spending limits. CAP projects are usually implemented in a faster time frame, are limited in complexity, have Federal cost limits, are approved by the Division Commander, and do not need Congressional authorization.

The Memphis District completed construction of the Wolf River and Tributaries, Tennessee and Mississippi (House Document No.76, 85th Congress) flood control project in 1964. Construction involved channel enlargement and realignment from the mouth of the Wolf River to the mouth of Gray's Creek. The project greatly increased the flood control capacity of the lower 22 miles of the Wolf River in the channelized section.

Flood control and drainage improvements in the lower reaches of the basin have dramatically impacted the quantity and quality of fish and wildlife habitat. The prior work significantly reduced seasonal flooding, eliminated large amounts of riparian and fishery habitat, and initiated erosion, headcutting, and long term drying of adjacent wetlands. The erosion and headcutting have extended approximately eight miles up the main channel and tributaries. These factors have caused and will continue to cause a rapid loss to fishery habitat, adjacent wetlands, seasonally flooded bottomland hardwoods, and riparian habitat.

The Memphis District, Shelby County, and the Chickasaw Basin Authority have initiated construction on the Wolf River, Memphis, Tennessee (Section 101, Water Resources Development Act 2000) project to arrest the headcut and preserve wildlife habitat. The ecosystem restoration project includes six main channel stabilization weirs, 18 tributary weirs, two cutoff prevention weirs, trails, wildlife corridors, and three boat ramps.

Additional Information

To obtain additional information about the District, please refer to the home page at: http://www.mvm.usace.army.mil, or contact the following offices:

Public Affairs Office (General Information):	(901) 544-3348
Regulatory Branch:	(901) 544-3473
Environmental Branch	(901) 544-3857

For additional information concerning the Wolf River project please contact Mr. Richard Hite at (901) 544-0706, or richard.l.hite@mvm02.usace.army.mil.

5.3. STATE PARTNERSHIPS.

5.3.A. TDEC Division of Water Supply. The Source Water Protection Program, authorized by the 1996 Amendments to the Safe Drinking Water Act, outline a comprehensive plan to achieve maximum public health protection. According to the plan, it is essential that every community take these six steps:

1) Delineate the drinking water source protection area
2) Inventory known and potential sources of contamination within these areas
3) Determine the susceptibility of the water supply system to these contaminants
4) Notify and involve the public about threats identified in the contaminant source inventory and what they mean to their public water system
5) Implement management measures to prevent, reduce or eliminate threats
6) Develop contingency planning strategies to deal with water supply contamination or service interruption emergencies (including natural disaster or terrorist activities).

Source water protection has a simple objective: to prevent the pollution of the lakes, rivers, streams, and ground water (wells and springs) that serve as sources of drinking water before they become contaminated. This objective requires locating and addressing potential sources of contamination to these water supplies. There is a growing recognition that effective drinking water system management includes addressing the quality and protection of the water sources.

Source Water Protection has a significant link with the Watershed Management Program goals, objectives and management strategies. Watershed Management looks at the health of the watershed as a whole in areas of discharge permitting, monitoring and protection. That same protection is important to protecting drinking water as well. Communication and coordination with a multitude of agencies is the most critical factor in the success of both Watershed Management and Source Water Protection.

Watershed management plays a role in the protection of both ground water and surface water systems. Watershed Management is particularly important in areas with karst (limestone characterized by solution features such as caves and sinkholes as well as disappearing streams and spring), since the differentiation between ground water and surface water is sometimes nearly impossible. What is surface water can become ground water in the distance of a few feet and vice versa.

Source water protection is not a new concept, but an expansion of existing wellhead protection measures for public water systems relying on ground water to now include surface water. This approach became a national priority, backed by federal funding, when the Safe Drinking Water Act amendments (SDWA) of 1996 were enacted. Under this Act, every public drinking water system in the country is scheduled to receive an assessment of both the sources of potential contamination to its water source of the threat these sources may pose by the year 2003 (extensions were available until 2004). The assessments are intended to enhance the protection of drinking water supplies within existing programs at the federal, state and local levels. Source water

assessments were mandated and funded by Congress. Source water protection will be left up to the individual states and local governments without additional authority from Congress for that progression.

As a part of the Source Water Assessment Program, public water systems are evaluated for their susceptibility to contamination. These individual source water assessments with susceptibility analyses are available to the public at http://www.state.tn.us/environment/dws as well as other information regarding the Source Water Assessment Program and public water systems.

For further discussion on ground water issues in Tennessee, the reader is referred to the Ground Water Section of the 305(b) Water Quality Report at:

http://www.state.tn.us/environment/water.htm.

The intent of this report is to provide the public with an overall characterization of ground water quality and hydrogeology for Tennessee.

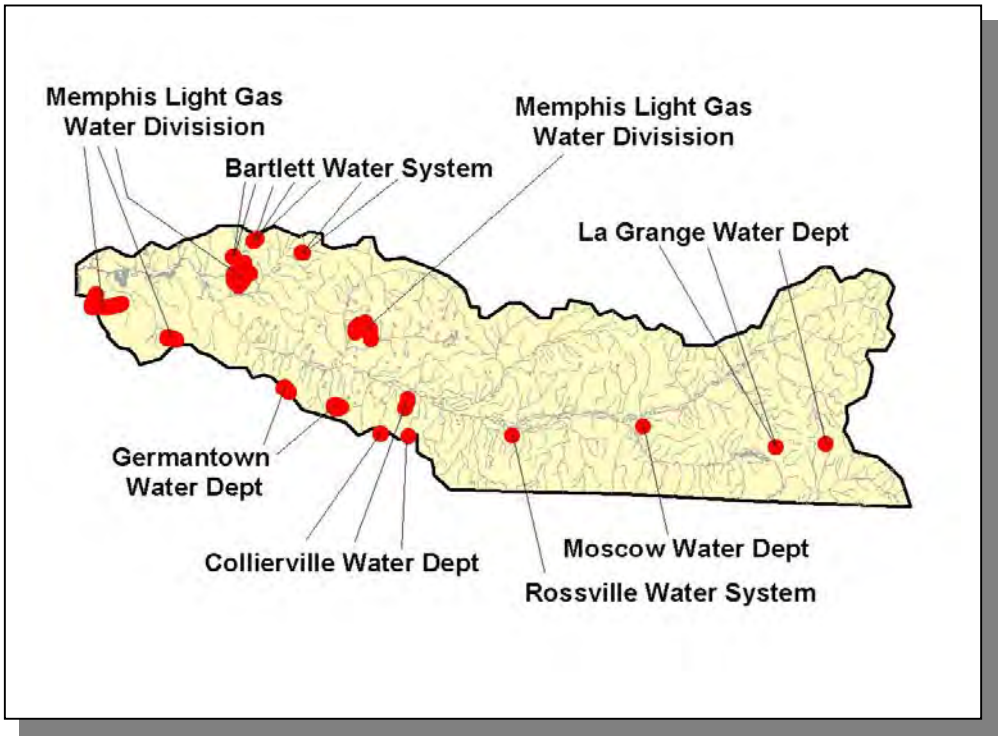


Figure 5-1. Locations of Community and Public Groundwater Supply Intakes in the Tennessee Portion of the Wolf River Watershed.

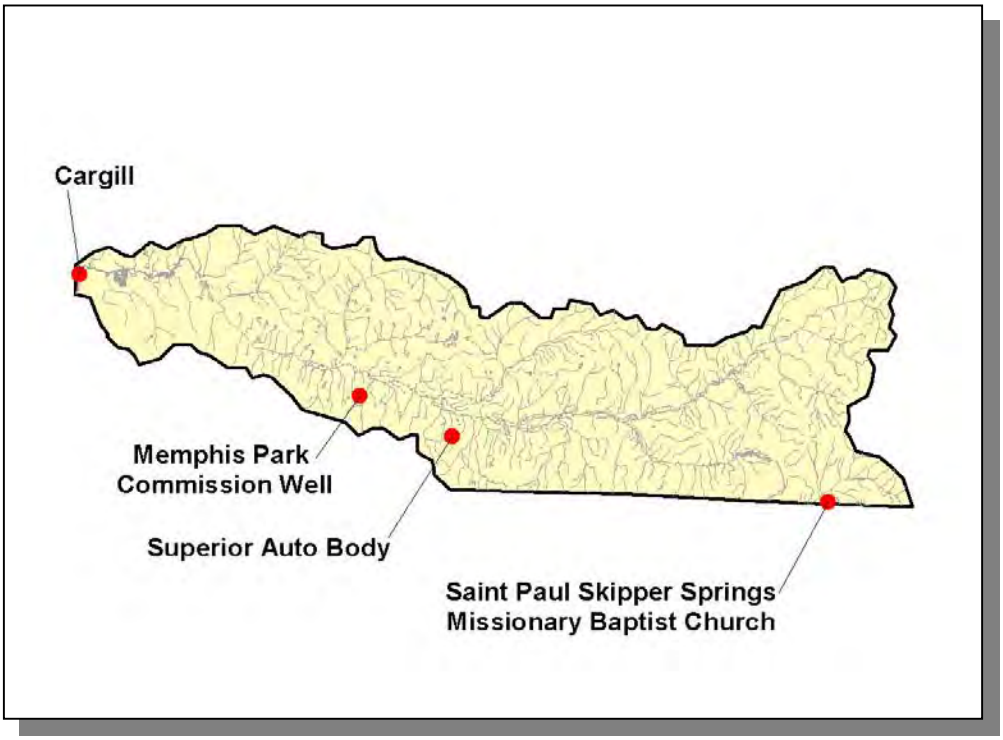


Figure 5-2. Locations of UIC (Underground Injection Control) Sites in the Tennessee Portion of the Wolf River Watershed. *Injection wells include stormwater sinkholes modified for drainage, commercial/industrial septic tanks, and large capacity septic tanks.*

5.3.B. Tennessee Department of Agriculture. The Tennessee Department of Agriculture's Water Resources Section consists of the federal Section 319 Nonpoint Source Program and the Agricultural Resources Conservation Fund Program. Both of these are grant programs which award funds to various agencies, non-profit organizations, and universities that undertake projects to improve the quality of Tennessee's waters and/or educate citizens about the many problems and solutions to water pollution. Both programs fund projects associated with what is commonly known as "nonpoint source pollution."

The Tennessee Department of Agriculture's Nonpoint Source Program (TDA-NPS) has the responsibility for management of the federal Nonpoint Source Program, funded by the US Environmental Protection Agency through the authority of Section 319 of the Clean Water Act. This program was created in 1987 as part of the reauthorization of the Clean Water Act, and it established funding for states, territories and Indian tribes to address NPS pollution. Nonpoint source funding is used for installing Best Management Practices (BMPs) to stop known sources of NPS pollution, training, education, demonstrations and water quality monitoring. The TDA-NPS Program is a non-regulatory program, promoting voluntary, incentive-based solutions to NPS problems. The TDA-NPS Program basically funds three types of programs:

- BMP Implementation Projects. These projects aid in the improvement of an impaired waterbody, or prevent a non-impaired water from becoming listed on the 303(d) List.

- Monitoring Projects. Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Wolf River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program (U.S. Environmental Protection Agency Assistance Agreements C9994674-00-0, C9994674-01-0, and C9994674-02-0).

- Educational Projects. The intent of educational projects funded through TDA-NPS is to raise the awareness of landowners and other citizens about practical actions that can be taken to eliminate nonpoint sources of pollution to the waters of Tennessee.

The Tennessee Department of Agriculture Agricultural Resources Conservation Fund Program (TDA-ARCF) provides cost-share assistance to landowners across Tennessee 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. Additionally, a portion of the TDA-ARCF is used to implement information and education projects statewide, with the focus on landowners, producers, and managers of Tennessee farms and forests.

Participating contractors in the program are encouraged to develop a watershed emphasis for their individual areas of responsibility, focusing on waters listed on the

Tennessee 303(d) List as being impaired by agriculture. Current guidelines for the TDA-ARCF are available. Landowners can receive up to 75% of the cost of the BMP as a reimbursement.

Since January of 1999, the Department of Agriculture and the Department of Environment and Conservation have had a Memorandum of Agreement whereby complaints received by TDEC concerning agriculture or silviculture projects would be forwarded to TDA for investigation and possible correction. Should TDA be unable to obtain correction, they would assist TDEC in the enforcement against the violator. More information forestry BMPs is available at: http://tennessee.gov/agriculture/forestry/BMPs.pdf, and the complaint form is available at: http://tennessee.gov/environment/wpc/logform.php.

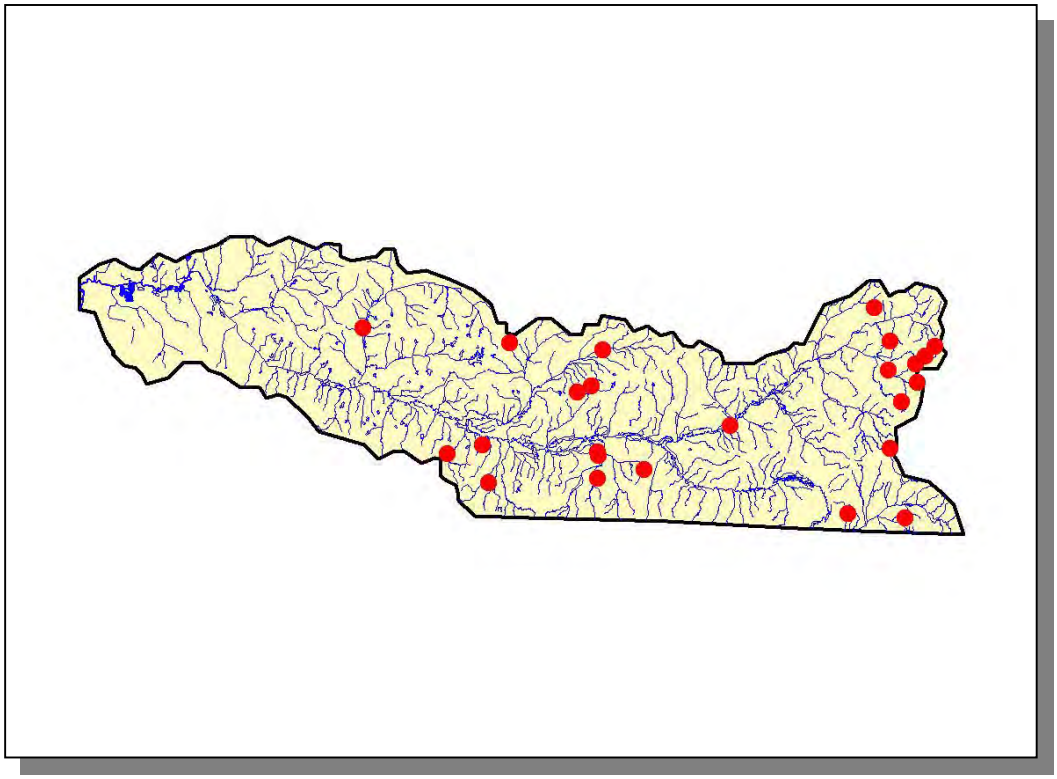


Figure 5-3. Location of BMPs installed from 1999 through 2003 in the Tennessee Portion of the Wolf River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. *More information is provided in Appendix V.*

5.4. LOCAL INITIATIVES.

5.4.A. Tennessee Water Sentinels. The Tennessee Water Sentinels (TWS) is a water quality initiative of the national Sierra Club. There are 33 projects operating in 13 states. Its purpose is to engage Sierra Club members and the general public in the protection of local streams. The TWS project is working to protect the Wolf River and its tributaries as well as other streams. TWS does this by auditing the public records on file at TDEC's Memphis Environmental Assistance Center. TWS targets the Tennessee Multi-Sector General Permits and the Construction Storm Water General Permits in these audits. These audits yield much information regarding a given permit holder's compliance with the terms and conditions of a given permit. In addition, storm water sampling from a public access point is occasionally conducted. These samples are analyzed at a laboratory. The information from the audits as well as the sampling data is compiled into a report that is submitted to EPA, TDEC, Local Government, the media and the public. The purpose of these reports is to assist TDEC in insuring that the Wolf River, and other streams these permit holders discharge to, be as clean as possible.

If you wish to help the Tennessee Water Sentinels, or to read the reports that have been released, please contact James H. Baker, Project Director, at:
http://tennessee.sierraclub.org/chickasaw/chickws.htm

CHAPTER 6

RESTORATION PRIORITIES IN THE WOLF RIVER WATERSHED

6.1. Background

6.2. Comments from Public Meetings
6.2.A. Year 1 Public Meeting
6.2.B. Year 3 Public Meeting
6.2.C. Year 5 Public Meeting

6.3. Approaches Used
6.3.A. Point Sources
6.3.B. Nonpoint Sources

6.1. BACKGROUND.

The Watershed Water Quality Management Plan serves as a comprehensive inventory of resources and stressors in the watershed, a recommendation for control measures, and a guide for planning activities in the next five-year watershed cycle and beyond. Water quality improvement will be a result of implementing both regulatory and nonregulatory programs.

In addition to the NPDES program, some state and federal regulations, such as the TMDL and ARAP programs, address point and nonpoint issues. Construction and MS4 storm water rules (implemented under the NPDES program) have transitioned from Phase 1 to Phase 2. More information on storm water rules may be found at: http://www.state.tn.us/environment/wpc/stormh2o/MS4.htm.

This Chapter addresses point and nonpoint source approaches to water quality problems in the Tennessee portion of the Wolf River Watershed.

6.2. COMMENTS FROM PUBLIC MEETINGS. Watershed meetings are open to the public, and most meetings were represented by citizens who live in the watershed, NPDES permitees, business people, farmers, and local river conservation interests. Locations for meetings were chosen after consulting with people who live and work in the watershed. Everyone with an interest in clean water is encouraged to be a part of the public meeting process. The times and locations of watershed meetings are posted at: The times and locations of watershed meetings are posted at: http://www.state.tn.us/environment/wpc/watershed/public.php.

6.2.A. Year 1 Public Meeting. The first Wolf River Watershed public meeting was held October 15, 1998 at the Collierville Town Hall. The goals of the meeting were to: (1) present, and review the objectives of, the Watershed Approach, (2) introduce local, state, and federal agency and nongovernment organization partners, (3) review water quality monitoring strategies, and (4) solicit input from the public.

Major Concerns/Comments

- Headcutting from dredging that leads to erosion and high sedimentation
- The Wolf River will go the way of the Loosahatchie
- Loss of the Wolf River as part of Shelby/Fayette County Heritage
- Legacy pollutants
- Consequences of building in the floodplain
- Lack of effective mechanism for outreach and education

6.2.B. Year 3 Public Meeting. The second Wolf River Watershed public meeting was held April 10, 2001 at Collierville Town Hall. The goals of the meeting were to: (1) provide an overview of the watershed approach, (2) review the monitoring strategy, (3) summarize the most recent water quality assessment, (4) discuss the TMDL schedule and citizens' role in commenting on draft TMDLs, and (5) discuss BMPs and other nonpoint source tools available through the Tennessee Department of Agriculture 319 Program and NRCS conservation assistance programs.

Major Concerns/Comments

- Sediment problems are moving to sites upstream of known problems
- Loss of wetlands
- Headcutting of Wolf River is drying existing wetlands
- Contaminated fish
- Urbanization affecting tributaries and wetlands (lost to development)
- Aquifer contamination
- Aquifer exposed due to headcutting
- Groundwater recharge/discharge compromised

6.2.C. Year 5 Public Meeting.

To be announced

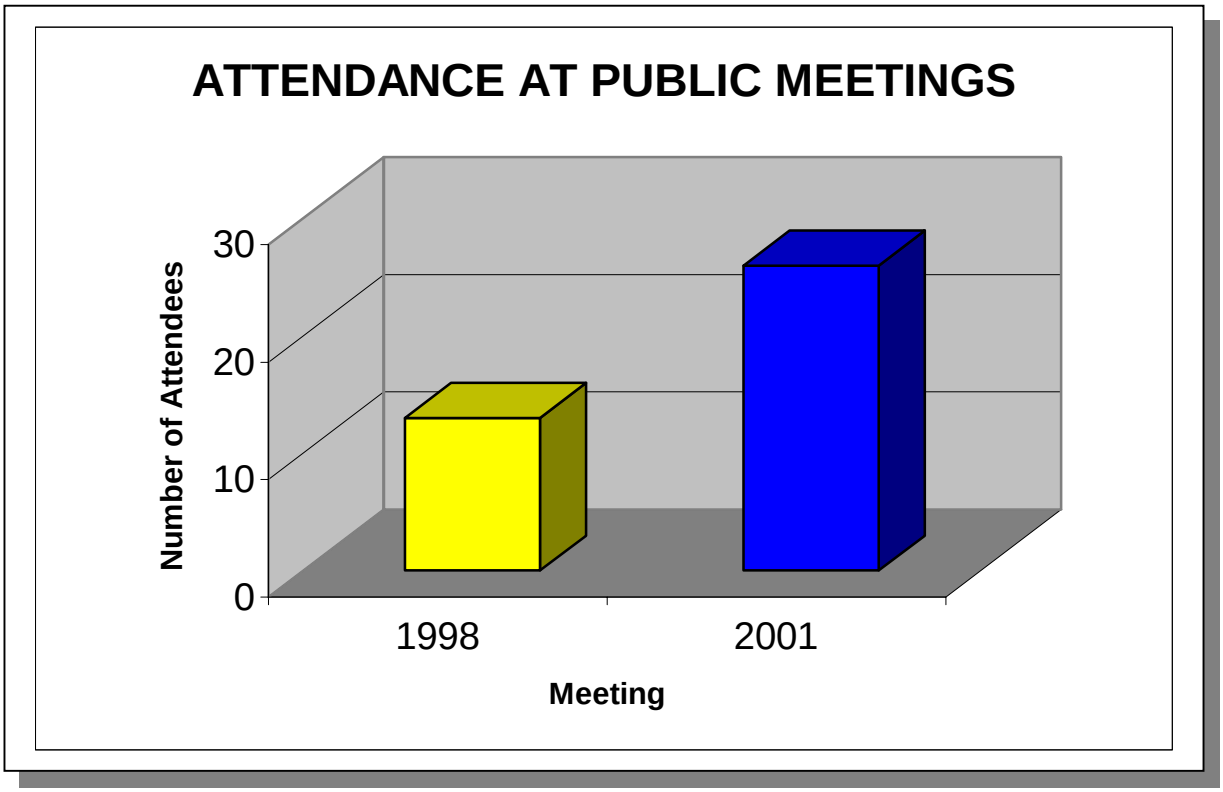


Figure 6-1. Attendance at Public Meetings in the Wolf River Watershed. *Attendance numbers do not include TDEC personnel.*

6.3. APPROACHES USED.

6.3.A. Point Sources. Point source contributions to stream impairment are primarily addressed by NPDES and ARAP permit requirements and compliance with the terms of the permits. Notices of NPDES and ARAP draft permits available for public comment can be viewed at http://www.state.tn.us/environment/wpc/wpcppo/. Discharge monitoring data submitted by NPDES-permitted facilities may be viewed at http://www.epa.gov/enviro/html/pcs/pcs_query_java.html.

The purpose of the TMDL program is to identify remaining sources of pollution and allocate pollution control needs in places where water quality goals are still not being achieved. TMDL studies are tools that allow for a better understanding of load reductions necessary for impaired streams to return to compliance with water quality standards. More information about Tennessee's TMDL program may be found at: http://www.state.tn.us/environment/wpc/tmdl/.

Approved TMDL:

Wolf River, Fletcher Creek, Cypress Creek, and Grissum Creek TMDL.
TMDL for fecal coliform in the Wolf River Watershed approved March 6, 2003: http://www.state.tn.us/environment/wpc/tmdl/approvedtmdl/wolffec04.pdf

TMDLs are prioritized for development based on many factors.

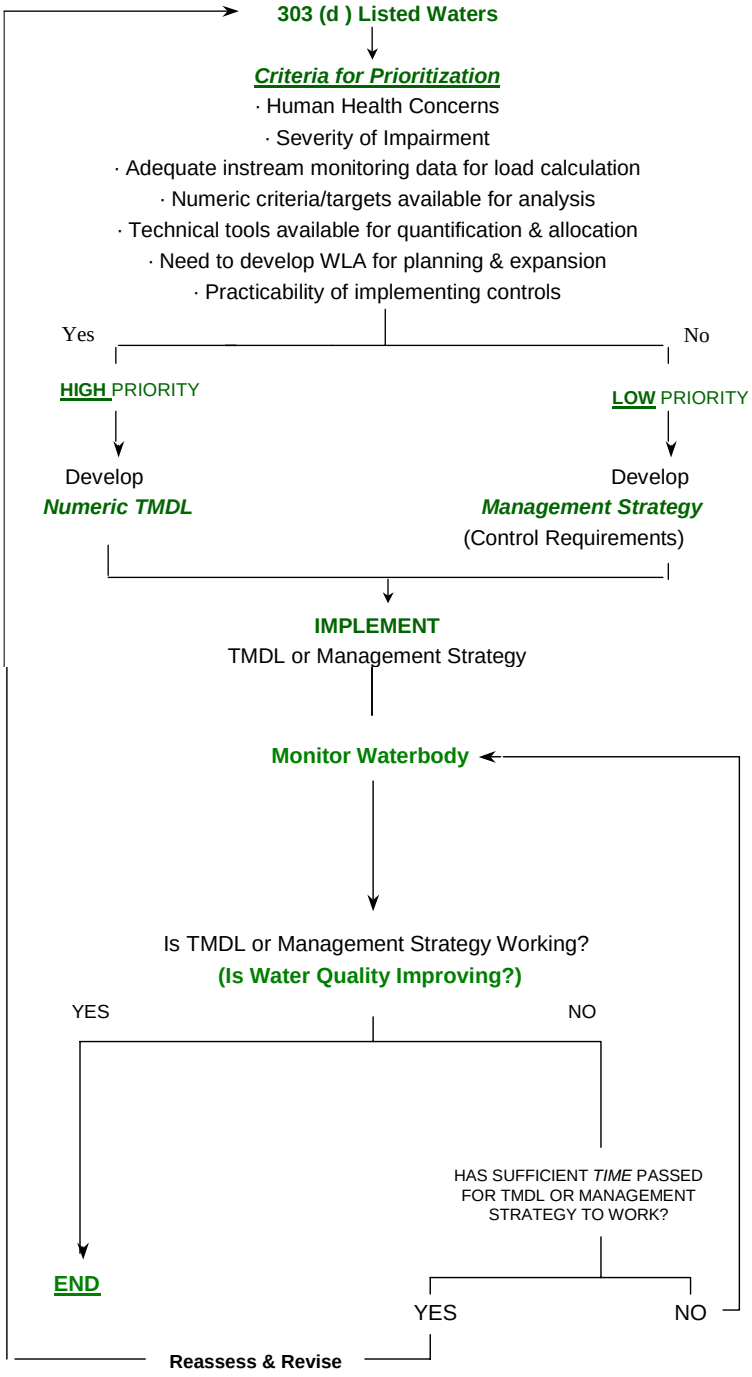


Figure 6.2. Prioritization scheme for TMDL Development.

6.3.B. Nonpoint Sources

Common nonpoint sources of pollution include urban runoff, riparian vegetation removal, and inappropriate land development, agricultural, and road construction practices. Since nonpoint pollution exists essentially everywhere rain falls, existing point source regulations can have only a limited effect. Other measures are, therefore, necessary.

There are several state and federal regulations that address some of the contaminants impacting waters in the Tennessee portion of the Wolf River Watershed. Most of these are limited to only point sources: a pipe or ditch. Often, controls of point sources are not sufficient to protect waters, so other measures are necessary. Some measures include efforts by landowners and volunteer groups and the possible implementation of new regulations. Many agencies, such as the Tennessee Department of Agriculture (TDA) and the Natural Resources Conservation Service (NRCS), offer financial assistance to landowners for corrective actions (like Best Management Practices) that may be sufficient for recovery of impacted streams. Many nonpoint problems will require an active civic involvement at the local level geared towards establishment of improved zoning guidelines, building codes, streamside buffer zones and greenways, and general landowner education.

The following text describes types of impairments, possible causes, and suggested improvement measures. Restoration efforts should not be limited to only those streams and measures suggested below.

6.3.B.i. Sedimentation.

6.3.B.i.a. From Construction Sites. Construction activities have historically been considered "nonpoint sources." In the late 1980's, EPA designated them as being subject to NPDES regulation if more than 5 acres were being disturbed. In the spring of 2003, that threshold became 1 acre. The general permit issued for such construction sites establishes conditions for maintenance of the sites to minimize pollution from storm water runoff, including requirements for installation and inspection of erosion controls. Also, the general permit imposes more stringent inspection and self-monitoring requirements on sites in the watershed of streams that are already impaired due to sedimentation. Examples in the Tennessee portion of the Wolf River Watershed are Grays Creek and Marys Creek. Regardless of the size, no construction site is allowed to cause a condition of pollution.

Construction sites within a sediment-impaired watershed may also have higher priority for inspections by WPC personnel, and are likely to have enforcement actions for failure to control erosion.

6.3.B.i.b. From Channel and/or Bank Erosion. Many streams within the Wolf River Watershed suffer from varying degrees of streambank erosion. When steam channels are altered, or large tracts of land are cleared, storm water runoff, will cause banks to become unstable and highly erodable. Heavy livestock traffic can also severely disturb banks. Destabilized banks contribute to sediment load and to the loss of beneficial

riparian vegetation to the stream. Some inappropriate agricultural practices have impacted the hydrology and morphology of stream channels in this watershed.

Several agencies such as the NRCS, the U.S. Army Corps of Engineers, and TDA, as well as watershed citizen groups, are working to stabilize portions of stream banks using bioengineering and other techniques. Many of the affected streams, like Grays Creek, could benefit from these types of projects. Other methods or controls that might be necessary to address common problems are:

Voluntary activities

- Re-establish bank vegetation.
- Establish off-channel watering areas for livestock by moving watering troughs and feeders back from stream banks.
- Limit cattle access to streams and bank vegetation.

Additional strategies

- Increase efforts in the Master Logger program to recognize impaired streams and require more effective management practices.
- Better community planning for the impacts of development on small streams, especially development in growing areas (examples: Grays Creek, Fletcher Creek, Mays Creek, and numerous unnamed tributaries).
- Limit livestock access to streams and bank vegetation (example: Alexander Creek).
- Require post-construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion (examples: Grays Creek and Fletcher Creek).
- Implement additional restrictions on logging in streamside management zones.
- Limit clearing of stream and ditch banks (examples: Grays Creek, Fletcher Creek, and many unnamed tributaries). *Note: Permits may be required for any work along streams.*
- Limit road and utilities crossings of streams.
- Restrict the use of off-highway vehicles on stream banks and in stream channels.

6.3.B.i.c. From Agriculture and Silviculture. The Water Quality Control Act exempts normal agricultural and silvicultural practices that do not result in a point source discharge. Nevertheless, efforts are being made to address impacts due to these exempted practices.

The Master Logger Program has been in place for several years to train loggers how to install Best Management Practices that lessen the impact of logging activities on streams. Recently, laws and regulations were enacted which established that these BMPs must be used or the Commissioners of the Departments of Environment and Conservation and of Agriculture would be permitted to stop the logging operation that, upon failing to install these BMPs, was causing impacts to streams.

Since the Dust Bowl era, the agriculture community has strived to protect the soil from wind and soil erosion. Agencies such as the Natural resources Conservation Service (NRCS), the University of Tennessee Agricultural Extension Service, and the Tennessee

Department of Agriculture have worked to identify better ways of farming, to educate the farmers, and to install the methods that address the sources of some of the impacts due to agriculture. Cost sharing is available for many of these measures.

Many sediment problems traceable to agricultural practices also involve riparian loss due to close row cropping or pasture clearing for grazing. Agriculturally impacted streams that could benefit from the establishment of riparian buffer zones include Golden Creek, Grays Creek, and Russell Creek.

6.3.B.ii. Pathogen Contamination.

Possible sources of pathogens are inadequate or failing septic tank systems, overflows or breaks in public sewer collection systems, poorly disinfected discharges from sewage treatment plants, and fecal matter from pets, livestock and wildlife washed into streams and storm drains. Permits issued by the Division of Water Pollution Control regulate discharges from point sources and require adequate control for these sources. Individual homes are required to have subsurface, on-site treatment (i.e., septic tank and field lines) if public sewers are not available. The Division of Ground Water Protection and delegated county health departments regulate septic tanks and field lines. In addition to discharges to surface waters, businesses may employ either subsurface or surface disposal of wastewater. The Division of Water Pollution Control regulates surface water disposal.

Currently, 6 stream systems in the Tennessee portion of the Wolf River Watershed are known to have excessive pathogen contamination. They are Harrington Creek, Workhouse Bayou, lower portions of the Wolf River, Grissum Creek, Fletcher Creek, and Cypress Creek. Except for Grissum Creek, all are centered around urban areas, with bacterial contamination that is believed to be coming from storm water runoff, failing septic systems, sewage collection system leaks, and treatment plant operation failures.

Other measures that may be necessary to control pathogens are:

Voluntary activities

- Off-channel watering of livestock.
- Limiting livestock access to streams.
- Improve and educate on the proper management of animal waste from feeding operations.

Enforcement strategies

- Strengthen enforcement of regulations governing on-site wastewater treatment.
- Determine timely and appropriate enforcement for non-complying sewage treatment plants, large and small, and their collection systems.
- Identify Concentrated Animal Feeding Operations not currently permitted.

Additional strategies

- Develop intensive planning in areas where sewer is not available and treatment by subsurface disposal is not an option due to poor soils, floodplains, or high water tables.

- Develop and enforce leash laws and controls on pet fecal material. The City of Memphis has a "Pet Poop" program in place as part of their MS4 permit activities.
- Greater efforts by sewer utilities to identify leaking lines or overflowing manholes.
- Several small municipal Separate Storm Sewer Systems (MS4s) in the watershed have received Phase II Storm Water Management Permits. These MS4s will be taking on more local responsibility for management of surface water resources in their jurisdictions.

6.3.B.iii. Excessive Nutrients and/or Dissolved Oxygen Depletion.

These two impacts are usually listed together because high nutrients often contribute to low dissolved oxygen within a stream. Since nutrients often have the same source as pathogens, the measures previously listed can also address many of these problems. Elevated nutrient loadings are also often associated with urban runoff from impervious surfaces, from fertilized lawns and croplands, and faulty sewage disposal processes. Nutrients are often transported with sediment, so many of the measures designed to reduce sediment runoff will also aid in preventing organic enrichment of streams and lakes.

Other sources of nutrients can be addressed by:

Voluntary activities

- Educate homeowners and lawn care companies in the proper application of fertilizers.
- Encourage landowners, developers, and builders to leave stream buffer zones. Streamside vegetation can filter out many nutrients and other pollutants before they reach the stream. These riparian buffers are also vital along livestock pastures. Examples of streams in Tennessee that could benefit are mainstem Wolf River, Grays Creek, and Fletcher Creek.
- Use grassed drainage ways that can remove fertilizer before it enters streams.
- Use native plants for landscaping since they don't require as much fertilizer and water.

Physical changes to streams can prevent them from providing enough oxygen to biodegrade the materials that are naturally present. A few additional actions can address this problem:

- Maintain shade over a stream. Cooler water can hold more oxygen and retard the growth of algae. As a general rule, all stream channels suffer from some canopy removal. An intact riparian zone also acts as a buffer to filter out nutrient loads before they enter the water.
- Discourage impoundments. Ponds and lakes do not aerate water. *Note: Permits may be required for any work on a stream, including impoundments.*

Regulatory strategies.

- Strengthen enforcement of regulations governing on-site wastewater treatment.

- Impose more stringent permit limits for nutrients discharged from sewage treatment plants (including mainstem of the Wolf River in Tennessee).
- Timely and appropriate enforcement for noncomplying sewage treatment plants, large and small, and their collection system.
- Identify Concentrated Animal Feeding Operations not currently permitted.
- Several small municipal Separate Storm Sewer Systems (MS4s) in the watershed have received Phase II Storm Water Management Permits. These MS4s will be taking on more local responsibility for management of surface water resources in their jurisdictions.

6.3.B.iv. Toxins and Other Materials.

Although some toxic substances are discharged directly into waters of the state from a point source, much of these materials are washed in during rainfalls from an upland location, or via improper waste disposal that contaminates groundwater. In the Tennessee portion of the Wolf River Watershed, a relatively small number of streams are damaged by storm water runoff from industrial facilities or urban areas. More stringent inspection and regulation of permitted industrial facilities, and local storm water quality initiatives and regulations, could help reduce the amount of contaminated runoff reaching state waters.

Many materials enter our streams due to apathy, or lack of civility or knowledge by the public. Litter in roadside ditches, garbage bags tossed over bridge railings, paint brushes washed off over storm drains, and oil drained into ditches are all blatant examples of pollution in streams.

Some of these problems can be addressed by:

Voluntary activities

- Provide public education.
- Paint warnings on storm drains that connect to a stream.
- Sponsor community clean-up days.
- Landscape public areas.
- Encourage public surveillance of their streams and reporting of dumping activities to their local authorities.

Enforcement strategies

- Prohibit of illicit discharges to storm drains.
- Strengthen litter law enforcement at the local level.

6.3.B.v. Habitat Alteration.

The alteration of the habitat within a stream can have severe consequences. Whether it is the removal of the vegetation providing a root system network for holding soil particles together, the release of sediment, which increases the bed load and covers benthic life and fish eggs, the removal of gravel bars, “cleaning out” creeks with heavy equipment, or the impounding of the water in ponds and lakes, many alterations impair the use of

the stream for designated uses. Habitat alteration also includes the draining or filling of wetlands. The Wolf River Conservancy is an important organization that helps to conserve and enhance the Wolf River as a natural resource.

Individual landowners and developers are responsible for the vast majority of stream alterations. Some measures that can help address these problems are:

Voluntary activities

- Sponsor litter pickup days to remove litter that might enter streams.
- Organize stream cleanups removing trash, limbs and debris before they cause blockage.
- Avoid use of heavy equipment to “clean out” streams.
- Plant native vegetation along streams to stabilize banks and provide habitat.
- Encourage developers to avoid extensive use of culverts in streams.

Current regulations

- Restrict modification of streams by such means as culverting, lining, or impounding.
- Require mitigation for impacts to streams and wetlands when modifications are allowed.
- Several small municipal Separate Storm Sewer Systems (MS4s) in the watershed have received Phase II Storm Water Management Permits. These MS4s will be taking on more local responsibility for management of surface water resources in their jurisdictions. Their permits include a requirement to implement a stream buffer program.

Additional Enforcement

- Increased enforcement may be needed when violations of current regulations occur.

APPENDIX II

ID	NAME	HAZARD		ID	NAME	HAZARD
247001	Herb Parsons	2		797036	River Oaks	1
247002	Burnette	3		797038	Barboro	L
247005	Catfish lake #2	L		797039	Mary's Creek #9	S
247006	Keith Lake #1	3		797043	Glen Echo Lake	H
247007	Keith Lake #2	3		797051	Memphis National	2
247008	Keith Lake #3	3		797052	Mary's Creek #10	2
247009	Lewis	3		797054	Guymon	L
247010	Sand Creek #2	2		797055	Birnham Woods	2
247014	Double W Ranch Lake	3		797069	Mary's Creek #4	3
247015	Lakeview	O		797073	Lochnevin	1
247017	Cow lake	L		797077	Colonial Country Club	1
247019	Log Cabin Lake	L		797078	Stotts Lake	S
247022	Monterey Lake	2		797017	Woodlake	2
247024	Johnson	S		797025	SW TN Community College	3
247028	Mitchell	3		797053	Mary's Creek #11	2
247030	Sand Creek #1	3		797080	Cordova	1
247036	Mustin #1	3		797081	Carrollwood Lake 'D'	2
247039	Mustin #2	2		797085	Carrollwood Lake'A-C'	2
357004	Indian Creek #8	3		797088	Thompson Lake	1
357010	Indian Creek #2	3		797093	Longwood	2
357011	Indian Creek #7	3		247035	Church	3
797013	Ridgeway Country Club	1		797102	Mary's Creek #7	2
797015	Walnut Grove Lake	2		797090	Lakewood Trails	2
797016	Sky Lake	1		797104	Shelby Oaks North	3
797019	Boyle Investment Lake	S		797094	Carrollwood Lake 'B'	2
797022	Beaver Lake	1		797018	Glynnwood	2
797023	Pine Lake	3		247034	Lake Dodge	3
797024	Chickasaw	3		247050	Cox	3
797027	Mary's Creek #8	S		797108	Halle Park	3
797028	Windemere	1		357021	Indian Creek #4	2
797031	James Lake	2				

Table A2-1. Inventoried Dams in the Tennessee Portion of the Wolf River Watershed. *Hazard Codes: (H, 1), High; (S, 2), Significant; (L, 3), Low; O, Too Small. TDEC only regulates dams indicated by a numeric hazard score.*

LAND COVER/LAND USE	ACRES	% OF WATERSHED
Open Water	5,121	1.41
Other Grasses	3,973	1.09
Pasture/Hay	76,040	20.88
Row Crops	65,091	17.87
Woody Wetlands	34,469	9.47
Emergent Herbaceous Wetlands	1	0.00
Deciduous Forest	87,657	24.07
Mixed Forest	25,335	6.96
Evergreen Forest	8,551	2.35
High Intensity: Commercial/Industrial	6,488	1.78
High Intensity: Residential	17,348	4.76
Low Intensity: Residential	32,151	8.83
Quarries/Strip Mines/Gravel Pits	108	0.03
Bare Rock/Sand/Clay	137	0.04
Transitional	1,690	0.46
Total	**364,160**	**100.00**

Table A2-2. Land Use Distribution in the Tennessee Portion of the Wolf River Watershed. *Data are from Multi-Resolution Land Characterization (MRLC) derived by applying a generalized Anderson level II system to mosaics of Landsat thematic mapper images collected every five years.*

ECOREGION	REFERENCE STREAM	WATERSHED (HUC)	
Blackland Prairie (65a)	Unnamed Tributary To Muddy Creek	Little Hatchie River	08010207
Southeastern Plains and Hills (65e)	Blunt Creek (65E04)	TWV-KY Lake	06040005
	Griffin Creek (65E06)	NF Forked Deer River	08010204
	Harris Creek (65E08)	SF Forked Deer River	08010205
	Marshall Creek (65E10)	Hatchie River	08010208
	West Fork Spring Creek (65E11)	Hatchie River	08010208
Fall Line Hills (65i)	Battles Branch (65I02)	TWV-Beech River	06040001
Northern Mississippi Alluvial Plain (73a)	Cold Creek (73A01)	Mississippi River	08010100
	Old bed Forked Deer River (73A02)	Mississippi River	08010100
	Cold Creek (73A03)	Mississippi River	08010100
	Bayou du Chien (73A04)	Obion River	08010202
Loess Plains (74b)	Powell Creek (74B04)	Obion River	08010202
	Wolf River (74B12)	Wolf River	08010210

Table A2-3. Ecoregion Monitoring Sites in Ecoregions 65a, 65e, 65i, 73a, and 74b.

CODE	NAME	AGENCY	AGENCY ID
157	TDEC/DNH Riverwoods Site	TDEC/DNH	
275	TDOT SR14 Mitigation Site	TDOT	
360	TDOT LaGrange Road Mitigation/Permit Site	TDOT	
395	TDOT SR 57 Permit Site	TDOT	
437	TDOT/WPC Wolf River WPC Permit Site	TDEC/WPC	
442	TDEC/WPC Hickory Hill Road/Shelby Drive Mitigation Site	TDEC/WPC	
458	TDEC/WPC Wolf Creek Tributary Permit/Mitigation Site	TDEC/WPC	
459	TDEC/WPC Wolf Creek Tributary Permit/Mitigation Site	TDEC/WPC	
484	TDEC/WPC Fletcher Creek Permit Site	TDEC/WPC	
485	TDEC/WPC Fletcher Creek Mitigation Site	TDEC/WPC	
489	TDEC/WPC Sweetbriar Creek Permit/Mitigation Site	TDEC/WPC	
501	TDEC/WPC Tributary to Fletcher Creek Permit Site	TDEC/WPC	
502	TDEC/WPC Tributary to Fletcher Creek Mitigation Site	TDEC/WPC	
509	TDEC/WPC Tributary to Wolf River Permit/Mitigation Site	TDEC/WPC	
519	TDEC/WPC Terminus Road Permit Site	TDEC/WPC	
520	TDEC/WPC Wolf River Permit/Mitigation Site	TDEC/WPC	
524	TDOT Wolf River Mitigation Site	TDOT	
530	TDOT McKinstry Road Site	TDOT	
919	USFWS Lower Wolf River Site	USFWS	
1210	TWRA Site	TWRA	
1223	TWRA Wolf River 2 Site	TWRA	
1237	TWRA Site	TWRA	
1238	TWRA Site	TWRA	
1244	TWRA Site	TWRA	
1270	USACOE Fletcher Creek Site	USACOE-Memphis	
1271	USACOE Fletcher Creek 95-003 [TS] Site	USACOE-Memphis	
1272	USACOE Fletcher Creek 95-006 [TF] Site	USACOE-Memphis	
1273	USACOE Fletcher Creek 95-011 [TD] Site	USACOE-Memphis	
1274	USACOE Fletcher Creek 95-013 [TF] Site	USACOE-Memphis	
1275	USACOE Fletcher Creek 95-014 [TF] Site	USACOE-Memphis	
1276	USACOE Fletcher Creek 96-000 [TF] Site	USACOE-Memphis	
1277	USACOE Fletcher Creek 96-002 [TF] Site	USACOE-Memphis	
1278	USACOE Fletcher Creek 96-003 [TF] Site	USACOE-Memphis	
1281	USACOE Grays Creek (TN) 95-007 [TD] Site	USACOE-Memphis	
1298	USACOE Isolated Water (Pond) Site	USACOE-Memphis	
1405	USACOE Unknown 19-006 [TD] Site	USACOE-Memphis	
1406	USACOE Wolf River Site	USACOE-Memphis	
1408	USACOE Wolf River Site	USACOE-Memphis	
1409	USACOE Wolf River Site	USACOE-Memphis	
1410	USACOE Wolf River-73 Site	USACOE-Memphis	
1411	USACOE Wolf River-74-TF Site	USACOE-Memphis	
1412	USACOE Wolf River-75 [TF] Site	USACOE-Memphis	
1413	USACOE Wolf River-83 Site	USACOE-Memphis	
1414	USACOE Wolf River 93-000Site	USACOE-Memphis	
1415	USACOE Wolf River 94-007 [TD] Site	USACOE-Memphis	
1416	USACOE Wolf River 94-008 [TF] Site	USACOE-Memphis	
1417	USACOE Wolf River 94-011 [TS] Site	USACOE-Memphis	
1418	USACOE Wolf River 94-012 [TF] Site	USACOE-Memphis	
1419	USACOE Wolf River 94-013 [TD] Site	USACOE-Memphis	
1420	USACOE Wolf River 94-015 [TD] Site	USACOE-Memphis	

CODE	NAME	AGENCY	AGENCY ID
1421	USACOE Wolf River 95-003 [TF] Site	USACOE-Memphis	
1422	USACOE Wolf River 95-004 [TF] Site	USACOE-Memphis	
1423	USACOE Wolf River 95-005 [TF] Site	USACOE-Memphis	
1424	USACOE Wolf River 95-007 [TS] Site	USACOE-Memphis	
1425	USACOE Wolf River 95-010 [TF] Site	USACOE-Memphis	
1426	USACOE Wolf River 95-011 [TS] Site	USACOE-Memphis	
1427	USACOE Wolf River 95-012 [TS] Site	USACOE-Memphis	
1428	USACOE Wolf River 95-013 [TS] Site	USACOE-Memphis	
1429	USACOE Wolf River 95-014 [TD] Site	USACOE-Memphis	
1430	USACOE Wolf River 95-015 [TD] Site	USACOE-Memphis	
1431	USACOE Wolf River 95-021 [TF] Site	USACOE-Memphis	
1432	USACOE Wolf River 95-023 [TS] Site	USACOE-Memphis	
1433	USACOE Wolf River 95-027 [TF] Site	USACOE-Memphis	
1434	USACOE Wolf River 95-031 [TD] Site	USACOE-Memphis	
1435	USACOE Wolf River 95-033 [TF] Site	USACOE-Memphis	
1436	USACOE Wolf River 95-034 [TF] Site	USACOE-Memphis	
1437	USACOE Wolf River 96-000 [TF] Site	USACOE-Memphis	
1646	USACOE Grays Creek-1 (FL) Site	USACOE-Memphis	
1647	USACOE Grays Creek-2 (TF) Site	USACOE-Memphis	
1654	USACOE Wolf River Harbor-91 Site	USACOE-Memphis	
1655	USACOE Wolf River-29 Site	USACOE-Memphis	
1659	USACOE Gregory Grace and Associates Site	USACOE-Memphis	
1702	USACOE Wolf River-59 Site	USACOE-Memphis	
1703	USACOE Wolf River-61 Site	USACOE-Memphis	
1704	USACOE Wolf River-63 Site	USACOE-Memphis	
1705	USACOE Wolf River-67 (FL) Site	USACOE-Memphis	
1706	USACOE Wolf River-71 (FL) Site	USACOE-Memphis	
1707	USACOE Wolf River-51 Site	USACOE-Memphis	
1708	USACOE Wolf River-53 Site	USACOE-Memphis	
1709	USACOE Wolf River-54 Site	USACOE-Memphis	
1710	USACOE Wolf River-55 Site	USACOE-Memphis	
1711	USACOE Wolf River-28 Site	USACOE-Memphis	
1712	USACOE Wolf River-28 Site	USACOE-Memphis	
1713	USACOE Wolf River-30 Site	USACOE-Memphis	
1714	USACOE Wolf River-31 Site	USACOE-Memphis	
1715	USACOE Wolf River-33 Site	USACOE-Memphis	
1716	USACOE Wolf River-37 Site	USACOE-Memphis	
1717	USACOE Wolf River-39 Site	USACOE-Memphis	
1718	USACOE Wolf River-43 Site	USACOE-Memphis	
1719	USACOE Wolf River-42 Site	USACOE-Memphis	
1721	USACOE Wolf River-46 Site	USACOE-Memphis	
1722	USACOE Wolf River-47 Site	USACOE-Memphis	
1723	USACOE I-40/Wolf River Wetlands Determination Site	USACOE-Memphis	
1724	USACOE Hatchie River-42 Site	USACOE-Memphis	
1725	USACOE Wolf River-4 Site	USACOE-Memphis	
1726	USACOE Wolf River-6 Site	USACOE-Memphis	
1727	USACOE Wolf River-17 Site	USACOE-Memphis	
1728	USACOE Wolf River-19 Site	USACOE-Memphis	
1729	USACOE Fletcher Creek-1 Site	USACOE-Memphis	
1730	USACOE Fletcher Creek-1 Site	USACOE-Memphis	
1731	USACOE Fletcher Creek-4 Site	USACOE-Memphis	

CODE	NAME	AGENCY	AGENCY ID
1732	USACOE Fletcher Creek-6 Site	USACOE-Memphis	
1733	USACOE Fletcher Creek-7 Site	USACOE-Memphis	
1734	USACOE Fletcher Creek 95-011 [TD] Site	USACOE-Memphis	
1735	USACOE Fletcher Creek 95-011 [TD] Mitigation Site	USACOE-Memphis	
1736	USACOE Fletcher Creek-9 Site	USACOE-Memphis	
1756	USACOE Wolf River-60 Site	USACOE-Memphis	
1757	USACOE Wolf River-60 Site	USACOE-Memphis	
1758	USACOE Wolf River-63 Site	USACOE-Memphis	
1759	USACOE Wolf River-63 Mitigation Site	USACOE-Memphis	
1760	USACOE Wolf River-73 (TF) Site	USACOE-Memphis	
1762	USACOE Wolf River-75 (FL) Site	USACOE-Memphis	
1763	USACOE Wolf River-75 (FL) Site	USACOE-Memphis	
1764	USACOE Wolf River-80-TDSite	USACOE-Memphis	
1765	USACOE Wolf River-80-TDSite	USACOE-Memphis	
1766	USACOE Wolf River 95-004 [TF] Site	USACOE-Memphis	
1768	USACOE Wolf River 95-014 [TD] Site	USACOE-Memphis	
1794	USACOE Wolf River-66 Site	USACOE-Memphis	
1795	USACOE Wolf River-48 Site	USACOE-Memphis	
1796	USACOE Wolf River-49 Site	USACOE-Memphis	
1797	USACOE Wolf River-34 Area 1 Site	USACOE-Memphis	
1798	USACOE Wolf River-34 Site	USACOE-Memphis	
1799	USACOE Wolf River-34 Area 3 Site	USACOE-Memphis	
1800	USACOE Wolf River-34 Area 4 Site	USACOE-Memphis	
1802	USACOE Wolf River-48A Site	USACOE-Memphis	
1995	TWRA Ghost River Site	TWRA	
1996	TWRA Ghost River Site	TWRA	
2043	TWRA Wolf River 2 Site	TWRA	
2044	TWRA Wolf River 2 Site	TWRA	
2045	TWRA Wolf River Site	TWRA	
2249	TWRA Ghost River Site	TWRA	
2250	TWRA Ghost River Site	TWRA	
2251	TWRA Ghost River Site	TWRA	
2252	TWRA Ghost River Site	TWRA	
2253	TWRA Ghost River Site	TWRA	
2254	TWRA Ghost River Site	TWRA	
2255	TWRA Ghost River Site	TWRA	
2256	TWRA Ghost River Site	TWRA	
2257	TWRA Ghost River Site	TWRA	
2258	TWRA Ghost River Site	TWRA	
2428	TWRA Wolf River 2 Site	TWRA	
2429	TWRA Wolf River 2 Site	TWRA	
2430	TWRA Wolf River 2 Site	TWRA	
2431	TWRA Wolf River 2 Site	TWRA	
2432	TWRA Wolf River 2 Site	TWRA	
2433	TWRA Wolf River 2 Site	TWRA	
2434	TWRA Wolf River 2 Site	TWRA	
2435	TWRA Wolf River 2 Site	TWRA	
2436	TWRA Wolf River 2 Site	TWRA	
2484	TWRA Wolf River 2 Site	TWRA	
2485	TWRA Wolf River 2 Site	TWRA	
2486	TWRA Wolf River 2 Site	TWRA	

CODE	NAME	AGENCY	AGENCY ID
2487	TWRA Wolf River 2 Site	TWRA	
2488	TWRA Wolf River 2 Site	TWRA	
2489	TWRA Wolf River 2 Site	TWRA	
2490	TWRA Wolf River 2 Site	TWRA	
2491	TWRA Wolf River 2 Site	TWRA	
2492	TWRA Wolf River 2 Site	TWRA	
2493	TWRA Wolf River 2 Site	TWRA	
2494	TWRA Wolf River 2 Site	TWRA	
2495	TWRA Wolf River 2 Site	TWRA	
2496	TWRA Wolf River 2 Site	TWRA	
2607	TDOT Kirby Parkway, Macon Road to Stage Road Site	TDOT	93.795
2777	Wolf River Mitigation Bank	USFWS	
2786	USACOE Wolf River 96-059 [TF] Site	USACOE-Memphis	960470590
2792	USACOE Fletcher Creek 97-059 [TS] Site	USACOE-Memphis	970630590
2793	USACOE Grays Creek 98-095 [TS] Site	USACOE-Memphis	980170950

Table A2-4. Wetland Sites in the Tennessee Portion of the Wolf River Watershed in TDEC Database. *TDEC, Tennessee Department of Environment and Conservation; USACOE-Memphis, United States Army Corps of Engineers-Memphis District; WPC, Water Pollution Control; TDOT, Tennessee Department of Transportation; USFWS, United States Fish and Wildlife Service; TWRA, Tennessee Wildlife Resources Agency; DNH, Division of Natural Heritage.* ***This table represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands in the watershed.***

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Clear Creek	TN08010210009_0400	3.5
Golden Creek	TN08010210009_0500	7.8
Indian Creek	TN08010210019_1000	8.7
North Fork Wolf River	TN08010210020_1000	31.9
Wolf River	TN08010210004_1000	26.5
Wolf River	TN08010210009_1000	24.0

Table A3-1a. Streams Fully Supporting Designated Uses in the Tennessee Portion of the Wolf River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Grays Creek	TN08010210022_1000	15.8
Grissum Creek	TN08010210005_1000	17.9
Harrington Creek	TN08010210001_0100	16.5
Marys Creek	TN08010210022_0300	17.4
Shaws Creek	TN08010210021_1000	20.1
Stout Creek	TN08010210005_0200	6.7
Sweetbriar Creek	TN08010210002_0100	2.5
Teague Branch	TN08010210005_0100	17.0
Unnamed trib to Grays Creek	TN08010210022_0100	8.4
Unnamed trib to Wolf River	TN08010210009_0100	4.9
Wolf River	TN08010210002_2000	3.8
Wolf River	TN08010210003_1000	9.7
Workhouse Bayou	TN08010210001_0300	3.7

Table A3-1b. Streams Partially Supporting Designated Uses in the Tennessee Portion of the Wolf River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Cypress Creek	TN08010210032_1000	13.6
Fletcher Creek	TN08010210023_1000	10.7
Marys Creek	TN08010210022_0350	2.5
Unnamed trib to Fletcher Creek	TN08010210023_0200	6.5
Wolf River	TN08010210001_1000	12.8
Wolf River	TN08010210002_1000	6.3

Table A3-1c. Streams Not Supporting Designated Uses in the Tennessee Portion of the Wolf River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Alexander Creek	TN08010210021_0100	21.8
Beasley Creek	TN08010210020_0500	29.3
Early Grove Creek	TN08010210009_0300	2.5
Field Creek	TN08010210022_0200	7.4
Hargis Branch	TN08010210020_0100	8.9
Harrison Creek	TN08010210001_0200	4.6
Hurricane Creek	TN08010210004_0100	12.5
Johnson Creek	TN08010210003_0100	10.4
May Creek	TN08010210020_0310	27.1
McKinnie Creek	TN08010210020_0300	35.1
Misc tribs to Fletcher Creek	TN08010210023_0999	18.7
Misc. tribs to Grays Creek	TN08010210022_0999	39.8
Misc. tribs to Indian Creek	TN08010210019_0999	25.1
Misc. tribs to North Fork Wolf River	TN08010210020_0999	58.5
Misc. tribs to Shaws Creek	TN08010210021_0999	55.9
Misc. tribs to Wolf River	TN08010210001_0999	17.9
Misc. tribs to Wolf River	TN08010210003_0999	37.1
Misc. tribs to Wolf River	TN08010210009_0999	47.0
Misc. tribs. To Wolf River	TN08010210002_0999	48.8
Moody Creek	TN08010210019_0300	3.1
Morrison Creek	TN08010210004_0300	2.9
Mount Tena Creek	TN08010210009_0200	2.5
North Fork Creek	TN08010210020_0400	39.0
Russell Creek	TN08010210004_0500	12.8
Sandy Branch	TN08010210019_0200	4.8
Stafford Creek	TN08010210004_0200	10.5
Unnamed trib to Fletcher Creek	TN08010210023_0100	23.1
Unnamed trib to Indian Creek	TN08010210019_0100	6.5
Unnamed trib to Wolf River	TN08010210004_0400	23.6
Unnamed trib to Wolf River	TN08010210004_0600	9.5
Unnamed tribs to Wolf River	TN08010210004_0999	54.9
Watkins Creek	TN08010210020_0200	19.8
White Station Creek	TN08010210002_0200	4.6

Table A3-1d. Streams Not Assessed in the Tennessee Portion of the Wolf River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Herb Parsons Lake	TN08010210HERBPARSON_1000	177

Table A3-1e. Lakes Not Assessed in the Tennessee Portion of the Wolf River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Grays Creek	TN08010210022_1000	15.8	Partial
Grissum Creek	TN08010210005_1000	17.9	Partial
Marys Creek	TN08010210022_0300	17.4	Partial
Stout Creek	TN08010210005_0200	6.7	Partial
Teague Branch	TN08010210005_0100	17.0	Partial
Unnamed trib to Grays Creek	TN08010210022_0100	8.4	Partial
Wolf River	TN08010210001_1000	12.8	Not supporting
Wolf River	TN08010210002_1000	6.3	Not supporting
Wolf River	TN08010210002_2000	3.8	Partial

Table A3-2a. Stream Impairment Due to Siltation in the Tennessee Portion of the Wolf River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Cypress Creek	TN08010210032_1000	13.6	Not supporting
Fletcher Creek	TN08010210023_1000	10.7	Not supporting
Grissum Creek	TN08010210005_1000	17.9	Partial
Harrington Creek	TN08010210001_0100	16.5	Partial
Unnamed trib to Fletcher Creek	TN08010210023_0200	6.5	Not supporting
Wolf River	TN08010210001_1000	12.8	Not supporting
Workhouse Bayou	TN08010210001_0300	3.7	Partial

Table A3-2b. Stream Impairment Due to Pathogens in the Tennessee Portion of the Wolf River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Grissum Creek	TN08010210005_1000	17.9	Partial
Harrington Creek	TN08010210001_0100	16.5	Partial
Marys Creek	TN08010210022_0300	17.4	Partial
Shaws Creek	TN08010210021_1000	20.1	Partial
Stout Creek	TN08010210005_0200	6.7	Partial

Table A3-2c. Stream Impairment Due to Organic Enrichment/Low Dissolved Oxygen in the Tennessee Portion of the Wolf River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Grays Creek	TN08010210022_1000	15.8	Partial
Harrington Creek	TN08010210001_0100	16.5	Partial
Wolf River	TN08010210001_1000	12.8	Not supporting
Wolf River	TN08010210002_1000	6.3	Not supporting
Wolf River	TN08010210002_2000	3.8	Partial
Wolf River	TN08010210003_1000	9.7	Partial

Table A3-2d. Stream Impairment Due to Lead/Metals in the Tennessee Portion of the Wolf River Watershed.

APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-10 SUBWATERSHEDS (ACRES)		
	01	02	03
Bare Rock/Sand/Clay		52	84
Deciduous Forest	21,765	31,029	34,863
Emergent Herbaceous Wetlands	1		
Evergreen Forest	1,569	3,174	3,809
High Intensity: Commercial/Industrial/Transportation	53	29	6,406
High Intensity: Residential	17	15	17,316
Low Intensity: Residential	218	132	31,801
Mixed Forest	3,570	4,937	16,828
Open Water	889	497	3,735
Other Grasses: Urban/Recreational	1		3,972
Pasture/Hay	11,710	19,236	45,094
Row Crops	9,348	15,399	40,344
Transitional	28	59	1,602
Woody Wetlands	7,164	5,651	21,654
Quarries/Strip Mines/Gravel Pits			108
Total	**56,333**	**80,211**	**227,616**

Table A4-1. Land Use Distribution in the Tennessee Portion of the Wolf River Watershed by HUC-10. *Data are from 1992 Multi-Resolution Land Characterization (MRLC) derived by applying a generalized Anderson Level II system to mosaics of Landsat thematic mapper images collected every five years.*

HYDROLOGIC SOIL GROUPS
GROUP A SOILS have low runoff potential and high infiltration rates even when wet. They consist chiefly of sand and gravel and are well to excessively drained.
GROUP B SOILS have moderate infiltration rates when wet and consist chiefly of soils that are moderately deep to deep, moderately to well drained, and moderately coarse to coarse textures.
GROUP C SOILS have low infiltration rates when wet and consist chiefly of soils having a layer that impedes downward movement of water with moderately fine to fine texture.
GROUP D SOILS have high runoff potential, very low infiltration rates, and consist chiefly of clay soils.

Table A4-2. Hydrologic Soil Groups in Tennessee as Described in WCS.

STATION	HUC-10	AGENCY	STREAM NAME	AREA (SQ MILES)	LOW FLOW (CFS)		
					1Q10	7Q10	3Q20
07030392	0801021001	USGS	Wolf River	210			
WF111	0801021003	USACOE	Wolf River				
07030500	0801021003	USGS	Wolf River	503	121	124	114
07031500	0801021003	USGS	Marys Creek	13.6	-	-	0
07031650	0801021003	USGS	Wolf River	699	206	210	195
07031653	0801021003	USGS	Wolf River				
07031660	0801021003	USGS	Wolf River	709			
07031680	0801021003	USGS	Fletcher Creek				
07031683	0801021003	USGS	Fletcher Creek				
07031685	0801021003	USGS	Fletcher Creek	3.18			
07031692	0801021003	USGS	Fletcher Creek	30.5			
07031700	0801021003	USGS	Wolf River	770	137	160	137
07031740	0801021003	USGS	Wolf River	788			
07031758	0801021003	USGS	Cypress Creek				
07031777	0801021003	USGS	Lick Creek				

Table A4-3. Historical Streamflow Data Summary Based on Mean Daily Flows in the Tennessee Portion of the Wolf River Watershed*. USGS, United States Geological Survey; USACOE, United States Army Corps of Engineers. Additional information may be found at:* http://nwis.waterdata.usgs.gov/tn/nwis/discharge

AGENCY	STATION	ALIAS	LOCATION	HUC-10
TDEC	EGROV001.6FA	EARLY001.6FA	Early Grove Creek @ RM 1.6	0801021001
TDEC	GOLDE000.7FA	GOLDEN00.7	Golden Creek @ RM 0.7	0801021001
TDEC	INDIA004.7HR		Indian Creek @ RM 4.7	0801021001
TDEC	INDIA006.0HR	001687	Indian Creek @ RM 6.0	0801021001
TDEC	WOLF1T1.6FA	WOLF001.4SH	UT to Wolf River @ RM 1.6	0801021001
TDEC	WOLF064.0FA	003926	Wolf River @ RM 53.7	0801021001
TDEC	WOLF057.5FA	WOLF057.5	Wolf River @ RM 57.5	0801021001
TDEC	WOLF072.6FA	003927	Wolf River @ RM 72.6	0801021001
TDEC	ECO74B12		Wolf River @ RM 72.7	0801021001
TDEC	WOLF057.5FA	WOLF57.5	Wolf River at RM 57.5	0801021001
TDEC	BEASL002.1FA		Beasley Creek @ RM 2.1	0801021002
TDEC	MAY001.4FA		May Creek @ RM 1.4	0801021002
TDEC	MCKIN000.5FA		McKinney Creek @ RM 0.5	0801021002
TDEC	NFWOL011.4FA		North Fork Wolf River @ RM 11.4	0801021002
TDEC	NFWOL002.4FA	002003	North Fork Wolf River @ RM 2.4	0801021002
TDEC	ALEXA000.8FA		Alexander Creek @ RM 0.8	0801021003
TDEC	CYPRE000.4SH	000806	Cypress Creek @ RM 0.4	0801021003
TDEC	CYPRE000.4SH		Cypress Creek @ RM 0.4	0801021003
TDEC	CYPRE001.2SH		Cypress Creek @ RM 1.2	0801021003
TDEC	FLETC000.6SH	001305	Fletcher Creek @ RM 0.6	0801021003
TDEC	FLETC2T1.4SH		UT to Fletcher Creek @ RM 1.4	0801021003
TDEC	FLETC003.8SH		Fletcher Creek @ RM 3.8	0801021003
TDEC	FLETC005.2SH		Fletcher Creek @ RM 5.2	0801021003
TDEC	GRAYS001.7SH	GRAYS01.7	Grays Creek @ RM 1.7	0801021003
TDEC	GRAYS010.0SH		Gray's Creek @ RM 10.0	0801021003
TDEC	GRAYS005.8SH		Grays Creek @ RM 5.8	0801021003
TDEC	GRISS002.7FA	001407	Grissum Creek @ RM 2.7	0801021003
TDEC	GRISS004.7FA		Grissum Creek @ RM 4.7	0801021003
TDEC	HARRI001.8SH	001438	Harrington Creek @ RM 1.8	0801021003
TDEC	HARRI000.5SH	001440	Harrison Creek @ RM 0.5	0801021003
TDEC	WOLF001.5SH	003845	Highway 51 Bridge Near Mouth	0801021003
TDEC	HURRI001.1FA		Hurricane Creek @ RM 1.1	0801021003
TDEC	LBAYO000.1SH	LEATHBAYOU0.01	Leath Bayou/Bellvue, Wolf River	0801021003
TDEC	MARYS001.0SH		Marys Creek @ RM 1.0	0801021003
TDEC	RUSSE001.5FA		Russell Creek @ RM 1.5	0801021003
TDEC	SHAWS007.2FA	002385	Shaws Creek @ RM 7.2	0801021003
TDEC	SHAWS003.48FA	SHAWSCREEK03.48	Shaws Creek @ RM 3.48	0801021003
TDEC	STOUT001.2FA		Stout Creek @ RM 1.2	0801021003
TDEC	FLETC3T2.3SH		UT to Fletcher Creek @ RM 2.3	0801021003
TDEC	GRAYS1T2.1SH		UT to Grays Creek @ RM 2.1	0801021003
TDEC	WOLF000.3SH	SHELBY208009	Wolf River @ RM 0.3	0801021003
TDEC	WOLF000.75H	003843	Wolf River @ RM 0.75	0801021003
TDEC	WOLF001.5SH	003845	Wolf River @ RM 1.5	0801021003

AGENCY	STATION	ALIAS	LOCATION	HUC-10
TDEC	WOLF012.0SH	TISSUE13	Wolf River @ RM 12.0	0801021003
TDEC	WOLF018.9SH	SHELBY208012	Wolf River @ RM 18.9	0801021003
TDEC	WOLF019.2SH	TISSUE08	Wolf River @ RM 19.2	0801021003
TDEC	WOLF003.25SH	003860	Wolf River @ RM 3.25	0801021003
TDEC	WOLF031.8SH	003925	Wolf River @ RM 31.8	0801021003
TDEC	WOLF004.1SH	TISSUE16	Wolf River @ RM 4.1	0801021003
TDEC	WOLF044.4FA	WOLF44.4	Wolf River @ RM 44.4	0801021003
TDEC	WOLF007.2SH	TISSUE15	Wolf River @ RM 7.2	0801021003
TDEC	WOLF009.3SH	WOLF09.3	Wolf River @ RM 9.3	0801021003
TDEC	WOLF044.4FA	WOLF44.4	Wolf River at Rossville	0801021003
TDEC	WORKH000.3SH	003950	Workhouse Bayou @ RM 0.3	0801021003
USEPA	470354B		Depositional Area Downgradient from Drums at Old Bellvue Dump	0801021003
USEPA	470354E		Depositional Area Downgradient from Drums at Old Bellvue Dump	0801021003
USEPA	470354D		Downgradient from Drums at Old Bellvue Dump Near Center at West 2nd Street	0801021003
USEPA	470354G		Downgradient from Drums at Old Bellvue Dump Near Center at West 2nd ST	0801021003
USEPA	470354C		Downgradient from Fiber Drums at SW Corner of Old Bellvue Dump	0801021003
USEPA	470354F		Downgradient from Fiber Drums at SW Corner of Old Bellvue Dump	0801021003
USEPA	470334G		Leachate Near Wolf River At Old Bellvue Dump	0801021003
USEPA	470334O		Leachate Stream Near Oxbow between Dump at Old Bellvue Dump	0801021003
USEPA	470334Q		Leath Bayou North of Chicago School Playground at Old Bellvue Dump	0801021003
USEPA	470190Q		Lower Road to Lehman Roberts Co	0801021003
USEPA	470378C		Memphis HWSI - Refined Metals	0801021003
USEPA	470380E		Memphis HWSI at Aaron Steel Salvage Co	0801021003
USEPA	470380F		Memphis HWSI at Aaron Steel Salvage Co	0801021003
USEPA	470382D		Memphis HWSI at Biggs Landfill	0801021003
USEPA	470362A		Memphis, TN At Wolf River Precision Motor Works	0801021003
USEPA	470392A		Memphis, TN HWSI At Central Hardware	0801021003
USEPA	470334A		Pond At NW Section of Old Bellvue Dump	0801021003
USEPA	470398A		Raleigh/LaGrange Road Landfill at Cordova, TN	0801021003
USEPA	470398B		Raleigh/LaGrange Road Landfill at Cordova, TN	0801021003
USEPA	470190S		SE Corner of Endrin Pit Near Dirt Road	0801021003
USEPA	470334J		Sediment From Creek 150 yards from Chelsea Ave at Old Bellvue Dump	0801021003
USEPA	470334L		Sediment from Creek Near Confluence with Leath Bayou at Old Bellvue Dump	0801021003
USEPA	470334H		Sediment from Oxbow at Toe of Dump Slope at Old Bellvue Dump	0801021003
USEPA	470334C		Soil Above Oxbow at Old Bellvue Dump	0801021003
USEPA	470334E		Soil Between Oxbow Arms at Old Bellvue Dump	0801021003

AGENCY	STATION	ALIAS	LOCATION	HUC-10
USEPA	470334P		Soil From East Bank of Cypress Creek at Old Bellvue Dump	0801021003
USEPA	470334B		Soil From East Side of Old Bellvue Dump	0801021003
USEPA	470334R		Soil From School Playground at Old Bellvue Dump	0801021003
USEPA	470334N		Soil from Stain and Black Tarlike Material at Old Bellvue Dump	0801021003
USEPA	470334M		Soil From West Bank of Creek Near CC-3S at Old Bellvue Dump	0801021003
USEPA	470334K		Soil from West Bank of Cypress Creek at Old Bellvue Dump	0801021003
USEPA	470334F		Soil from West End Near Levee Road at Old Bellvue Dump	0801021003
USEPA	470334D		Soil South of Oxbow at Old Bellvue Dump	0801021003
USEPA	470190R		SW Corner of Endrin Pit Near Dirt Road	0801021003
USEPA	470254A		V-Notch Weir Downstream of Creek Mining	0801021003
USEPA	470254B		V-Notch Weir Upstream of Creek Mining	0801021003
USEPA	470390A		Warford Street Near Jackson Auto Parts at Memphis, TN	0801021003
USEPA	470390C		Warford Street Near VELSICOL Cemical Company at Memphis, TN	0801021003
USEPA	470390B		Warford Street Near VELSICOL Chemical Company at Memphis, TN	0801021003
USEPA	470396A		West Bank of Ditch Along Elvis Presley Blvd	0801021003

Table A4-4. STORET Water Quality Monitoring Stations in the Tennessee Portion of the Wolf River Watershed. *RM, River Mile; TDEC, Tennessee Department of Environment and Conservation; USEPA, United States Environmental Protection Agency. UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	HUC-10
TN0022560	Grand Junction Oxidation Lagoon	4952	Sewerage System	Minor	Sandy Branch Creek @ RM 3.0	0801021001
TN0021164	Moscow STP	4952	Sewerage System	Minor	Wolf River @ RM 57.3	0801021001
TN0065293	Northwest Tennessee Headstart Center	4952	Sewerage System	Minor	UT @ RM 0.4 to North Fork Wolf River @ RM 2.6	0801021002
TN0000451	Troxel Manufacturing	3499	Fabricated Metal Products	Minor	UT @ RM 0.9 to wetlands near Wolf River @ RM 49.0	0801021003
TN0023787	Southwest School	4952	Sewerage System	Minor	UT @ RM 0.8 to Shaws Creek @ RM 13.1	0801021003
TN0064092	Rossville STP	4952	Sewerage System	Major	Wolf River @ RM 43.7	0801021003
TN0000442	A.O.C.	2821	Plastic Material, Synthetic Resins, Nonvulcanizable Elastomers	Minor	UT @ RM 2.2 to Wolf River @ RM 33.3	0801021003
TN0057461	Collierville STP	4952	Sewerage System	Major	Wolf River @ RM 30.9	0801021003
TN0074543	Collierville NW STP	4952	Sewerage System	Major	Wolf River @ RM 25.3	0801021003
TN0055069	Dogwood Village	4952	Sewerage System	Minor	UT @ RM 0.6 to Gray's Creek @ RM 8.1	0801021003
TN0060755	Standard Construction Co.	2951	Asphalt Paving	Minor	UT @ RM 3.1 to Fletcher Creek @ RM 2.7	0801021003
TN0000078	Penn Specialty Chemicals	2869	Industrial Organic Chemicals	Minor	Wolf River @ RM 6.9	0801021003
TN0068527	Chemtura Corporation	2899	Chemicals and Chemical Preparation	Minor	Workhouse Bayou	0801021003
TN0000299	Buckeye Technologies	2611	Pulp Mills	Minor	Cypress Creek @ RM 4.1, 4.3, and 4.4	0801021003
TN0000281	Southern Cotton Oil Co.	2079	Shortening, table Oils, Margarine, and Other Edible Fats and Oils	Minor	UT @ RM 0.5 (Outfall 001, SW1), RM 0.6 (Outfall 002, SW2), RM0.7 (Outfall 003, 005, 007, 008, 009, 010) to Workouse Bayou @ RM 4.5	0801021003
TN0040606	Buckman Laboratories	2899	Chemicals and Chemical Preparations	Minor	City Storm Sewer to Cypress Creek @ RM 1.2 and RM 2.2	0801021003
TN0068039	Memphis Hardwood Flooring	2426	Hardwood, Dimension, and Flooring Mills	Minor	Wolf River @ RM 1.5 (Outfall 001), and Memphis Storm Sewer and WWC (Outfall 002) to Wolf River @ RM 1.5	0801021003
TN0001198	K.T.G.	2621	Paper Mills	Minor	Wolf River Lagoon and Marble Bayou Pump Station	0801021003

Table A4-5. NPDES Permittees in the Tennessee Portion of the Wolf River Watershed. *SIC, Standard Industrial Classification; MADI, Major Discharge Indicator; RM, River Mile; UT, Unnamed Tributary; WWC, Wet Weather Conveyance.*

FACILITY NUMBER	PERMITEE	SIC	SIC NAME	WATERBODY	HUC-10
TN0069043	Metro Materials (Chelsea Plant)	1442	Construction Sand Mining	Wolf River	0801021003
TN0070882	Metro Materials (Crestview Plant)	1442	Construction Sand Mining	Wolf River	0801021003
TN0054496	Standard Construction Co. (Frank Road Plant)	1442	Gravel Mining	UT to Wolf River	0801021003

Table A4-6. Active Permitted Mining Sites in the Tennessee Portion of the Wolf River Watershed. *SIC, Standard Industrial Classification; UT, Unnamed Tributary.*

FACILITY NUMBER	PERMITEE	WATERBODY	HUC-10
TNG110018	Lone Star Industries, Inc.	Ditch to Fletcher Creek to Wolf River	0801021003
TNG110017	Lone Star Industries, Inc.	WWC to UT to Wolf River	0801021003
TNG110052	City Concrete Company	UT to Wolf River	0801021003
TNG110178	MMC Materials, Inc.	UT to Wolf River	0801021003
TNG110211	Metro Materials, Inc.	Metro Storm Sewer to Gray Creek	0801021003
TNG110130	Titan Concrete Pleasant View Plant	Harrington Creek	0801021003

Table A4-7. Ready Mix Concrete Plants in the Tennessee Portion of the Wolf River Watershed. *SIC, Standard Industrial Classification.*

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-10
NRS03.279	Shelby	Wetland Alteration	Wolf River	0801021003
NRS03.174	Shelby	Stream Relocation	Wolf River	0801021003
NRS03.299	Fayette	Wetland Fill	Wetland	0801021003
NRS03.362	Shelby	Road Improvements	Harrington Creek	0801021003
NRS02.196	Shelby	Box Culvert	UT to Fletcher Creek	0801021003
NRS03.213C	Shelby	Road Extension	Fletcher Creek	0801021003
NRS03.213	Shelby	Road Extension	Fletcher Creek	0801021003
NRS03.213D	Shelby	Road Extension	UT to Fletcher Creek	0801021003
NRS03.213E	Shelby	Road Extension	UT to Fletcher Creek	0801021003
NRS03.213F	Shelby	Road Extension	UT to Fletcher Creek	0801021003
NRS03.213G	Shelby	Road Extension	UT to Fletcher Creek	0801021003
NRS03.213B	Shelby	Road Extension	UT to Fletcher Creek	0801021003
NRS03.213H	Shelby	Road Extension	UT to Fletcher Creek	0801021003
NRS03.300	Shelby	Bank Stabilization	Timber Creek	0801021003
NRS03.177	Shelby	Levee Repair	Fletcher Creek	0801021003
NRS03.247	Shelby	Levee Realignment	Wolf River	0801021003
NRS00.373	Shelby	Stream Relocation	Wolf River	0801021003
NRS02.431	Shelby	Grade Control Channel Weirs (3)	Wolf River	0801021003
NRS03.367	Shelby	Box Culvert Maintenance	Grays Creek	0801021003
NRS03.167	Shelby	SR-205 Bridge Widening	UT to Wolf River	0801021003
NRS04.021H	Shelby	Stream Relocation	Wetland	0801021003
NRS04.021B	Shelby	Stream Relocation	Wetland to Grays Creek	0801021003
NRS04.021G	Shelby	Stream Relocation	Wetland to Grays Creek	0801021003
NRS04.021	Shelby	Stream Relocation	Wetland to Grays Creek	0801021003
NRS04.021F	Shelby	Stream Relocation	Wetland	0801021003
NRS04.021E	Shelby	Stream Relocation	Grays Creek	0801021003
NRS04.021D	Shelby	Stream Relocation	Grays Creek	0801021003
NRS04.021C	Shelby	Stream Relocation	Grays Creek	0801021003
NRS01.410	Shelby	Wetland Alteration	Isolated Wetland	0801021003
NRS02.466B	Shelby	Stream Alteration	Wolf River	0801021003
NRS02.466C	Shelby	Stream Alteration	Wolf River	0801021003
NRS02.466	Shelby	Stream Alteration	Wolf River	0801021003
NRS02.466D	Shelby	Stream Alteration	Isolated Wetland	0801021003
NRS01.345	Shelby	Wetland Fill	Isolated Wetland	0801021003
NRS03.094	Shelby	Road Alignment	Wetland and UT to Grays Creek	0801021003
NRS03.094F	Shelby	Road Alignment	Wetland and UT to Grays Creek	0801021003
NRS03.094B	Shelby	Road Alignment	Wetland	0801021003
NRS02.316	Shelby	Bridge Repair	Grays Creek	0801021003
NRS00.284	Shelby	Stream Relocation	Wolf River	0801021003
NRS01.060	Shelby	Wetland Fill	Isolated	0801021003
NRS02.349	Shelby	Stream Relocation	UT to Grays Creek	0801021003
NRS00.143	Shelby	Wetland Fill	Mitigation Site	0801021003
NRS02.025	Shelby	Wetland Fill	Isolated	0801021003
NRS00.058	Shelby	Dredging Barge Slip	McKellar Lake	0801021003
NRS02.237	Shelby	Isolated Wetland Fill	Isolated	0801021003

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-10
NRS00.299	Fayette	Channel Improvement for Flood Control	Morrison Creek	0801021003
NRS01.228	Shelby	Culvert	Wolf River	0801021003
NRS02.356C	Shelby	Rip-Rap	UT to Lick Creek	0801021003
NRS02.356B	Shelby	Rip Rap	UT to Lick Creek	0801021003
NRS02.356	Shelby	Bank Stabilization	UT to Lick Creek	0801021003

Table A4-8. Individual ARAP Permits Issued January 2000 Through June 2004 in the Tennessee Portion of the Wolf River Watershed. *UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	SECTOR	RECEIVING STREAM	AREA*	HUC-10
TNR050248	Sequentia, Incorporated	Y, P	Sandy Branch	3.5	0801021001
TNR053822	Shirlo, Incorporated	C	Ten-Mile Bayou	9	0801021001
TNR055914	Glasteel Division of Stabilt America	Y	North Fork Wolf River	1.63	0801021002
TNR053485	Wilson Lumber Company	A	Municipal Storm Sewer System	3.91	0801021003
TNR050877	The Troxel Company	AA, Y	Wolf River	99	0801021003
TNR050790	Rossville Auto Parts	M	UT to Wolf River	5.9	0801021003
TNR054260	Eggo Company	U	UT @ RM 0.7 to Wolf River @ RM 41.4	97	0801021003
TNR051544	A.O.C.	C, P	WWC to UT to Wolf River	10	0801021003
TNR053306	Constar, Incorporated	Y	Wolf River	3.6	0801021003
TNR051081	McGinnes Oil Company	P	Municipal Storm Sewer System	1.38	0801021003
TNR051881	Craig Lumber Company	A	Wolf River	20	0801021003
TNR053077	FKI Logistics Integration	AA, AB	UT to Grays Creek	4	0801021003
TNR053095	United Parcel Service	P	UT(s) to Fletcher Creek	8	0801021003
TNR051125	Quality Concrete Products	E	Fletcher Creek	22	0801021003
TNR050653	Block USA	E	Fletcher Creek @ RM 2.7	8	0801021003
TNR053441	Standard Construction	D	UT to Fletcher Creek	14.9	0801021003
TNR053703	FedEx	S, P	Municipal Storm Sewer System	7.8	0801021003
TNR053789	Americoach Tours	P	Fletcher Creek	2	0801021003
TNR051057	Velsicol Chemical Corporation	C, K	Cypress Creek	68	0801021003
TNR053242	Memphis Leewood Yard	P	Workhouse Bayou	5	0801021003
TNR053877	Trimac Transportation	P	Wolf River	2.18	0801021003
TNR050639	Warford St. Auto Parts	M	UT to Workhouse bayou	3	0801021003
TNR056500	McKenzie Auto Parts	M	Cypress Creek	23.89	0801021003
TNR050698	Fastner Manufacturing-Purchased Parts	AA	Municipal Storm Sewer System	2.06	0801021003
TNR051298	Buckeye Technologies	B	Cypress Creek	45.2	0801021003
TNR054482	Steelcraft Corporation	AB	Cypress Creek	4.25	0801021003
TNR054565	New Tech Packaging	B	Cypress Creek	5.7	0801021003
TNR053514	Cummins Engine Co.	AB	Cypress Creek	8.62	0801021003
TNR051479	Mr. Complete Auto parts	M	Cypress Creek	2	0801021003
TNR050669	Hartwell Brothers	A	Municipal Storm Sewer System	7	0801021003
TNR056405	Don Payne Cylinder Head Service	AB	Cypress Creek	0.75	0801021003
TNR053537	Lehman Roberts Plant #4	D	Wolf River	52.5	0801021003
TNR052098	Forest Hill Dairy	U, P	Lick Creek, Cypress Creek, Wolf River	4	0801021003
TNR051942	Christie Cut Stone Co.	AD	Municipal Storm Sewer System	2	0801021003
TNR050578	Mid-Town Auto Parts and Salvage	M, N	Kilowatt Lake	32.67	0801021003

FACILITY NUMBER	FACILITY NAME	SECTOR	RECEIVING STREAM	AREA*	HUC-10
TNR051478	Complete Auto Parts and Salvage	M	Cypress Creek	6.5	0801021003
TNR054573	Memphis Area Transit Authority	P	Wolf River	26	0801021003
TNR056003	Memphis Auto Parts and Truck Salvage	M	UT to Cypress Creek	6.1	0801021003
TNR050579	Owens Corning	D	UT to Cypress Creek	5.72	0801021003
TNR054448	Conwood Company	U, P	Unknown	7	0801021003
TNR050345	Memphis Hardwood Flooring Company	A, AB	Wolf River	10	0801021003
TNR056437	K.T.G.	B	Wolf River Lagoon	6.5	0801021003

Table A4-9. Active Permitted TMSP Facilities in the Tennessee Portion of the Wolf River Watershed. *Area, acres of property associated with industrial activity; RM River Mile; UT, Unnamed Tributary; WWC, Wet Weather Conveyance. Sector details may be found in Table A4-11.*

SECTOR	TMSP SECTOR NAME
A	Timber Products Facilities
AA	Facilities That Manufacture Metal Products including Jewelry, Silverware and Plated Ware
AB	Facilities That Manufacture Transportation Equipment, Industrial or Commercial Machinery
AC	Facilities That Manufacture Electronic and Electrical Equipment and Components, Photographic and Optical Goods
AD	Facilities That Are Not Covered Under Sectors A Thru AC (Monitoring Required)
AE	Facilities That Are Not Covered Under Sectors A Thru AC (Monitoring Not Required)
B	Paper and Allied Products Manufacturing Facilities
C	Chemical and Allied Products Manufacturing Facilities
D	Asphalt Paving, Roofing Materials, and Lubricant Manufacturing Facilities
E	Glass, Clay, Cement, Concrete, and Gypsum Product Manufacturing Facilities
F	Primary Metals Facilities
G	Metal Mines (Ore Mining and Dressing) (RESERVED)
H	Inactive Coal Mines and Inactive Coal Mining-Related Facilities
I	Oil or Gas Extraction Facilities
J	Construction Sand and Gravel Mining and Processing and Dimension Stone Mining and Quarrying Facilities
K	Hazardous Waste Treatment Storage or Disposal Facilities
L	Landfills and Land Application Sites
M	Automobile Salvage Yards
N	Scrap Recycling and Waste and Recycling Facilities
O	Steam Electric Power Generating Facilities
P	Vehicle Maintenance or Equipment Cleaning areas at Motor Freight Transportation Facilities, Passenger Transportation Facilities, Petroleum Bulk Oil Stations and Terminals, the United States Postal Service, or Railroad Transportation Facilities
Q	Vehicle Maintenance Areas and Equipment Cleaning Areas of Water Transportation Facilities
R	Ship or Boat Building and Repair Yards
S	Vehicle Maintenance Areas, Equipment Cleaning Areas or From Airport Deicing Operations located at Air Transportation Facilities
T	Wastewater Treatment Works
U	Food and Kindred Products Facilities
V	Textile Mills, Apparel and other Fabric Product Manufacturing Facilities
W	Furniture and Fixture Manufacturing Facilities
X	Printing and Platemaking Facilities
Y	Rubber and Miscellaneous Plastic Product Manufacturing Facilities
Z	Leather Tanning and Finishing Facilities

Table A4-10. TMSP Sectors and Descriptions.

APPENDIX V

CONSERVATION PRACTICE	AMOUNT	
	FEET	ACRES
Alley Cropping		
Contour Buffer Strips		
Crosswind Trap Strips		
Field Borders		
Filter Strips		
Grassed Waterways		
Hedgerow Plantings		
Herbaceous Wind Barriers		
Riparian Forest Buffers		18
Streambank and Shoreline Protection		
Windbreaks and Shelterbelts		
Total Conservation Buffers		**18**

Table A5-1a. Conservation Buffers Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Wolf River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2003 through September 30, 2004 reporting period.*

NUTRIENT MANAGEMENT PLANS APPLIED	ACRES
Feed Management	0
Irrigation Management	0
Water Management	0
Nutrient Management	0
Waste Utilization	0

Table A5-1b. Nutrient Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Wolf River Watershed. *Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period.*

PARAMETER	ACRES
Acres of Pest Management Systems Applied	0

Table A5-1c. Pest Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Wolf River Watershed. *Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period.*

CONSERVATION PRACTICE	AMOUNT	
	Feet	Acres
Fence		
Firebreak		
Forest Harvest Management		
Heavy Use Area Protection		
Pasture and Hay Planting		
Prescribed Grazing		280
Range Planting		
Use Exclusion		96
Pipeline		
Prescribed Burning		
Total		**376**

Table A5-1d. Grazing/Forages Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Wolf River Watershed. *Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period.*

PRACTICE	NRCS CODE	NUMBER OF BMPs
Cover Crop	340	2
Diversion	362	3
Grade Stabilization Structure	410	3
No-Till	329	1
Pasture/Hay Planting	512	9
Pond	378	6

Table A5-2. Best Management Practices Installed by Tennessee Department of Agriculture and Partners in the Tennessee Portion of the Wolf River Watershed.