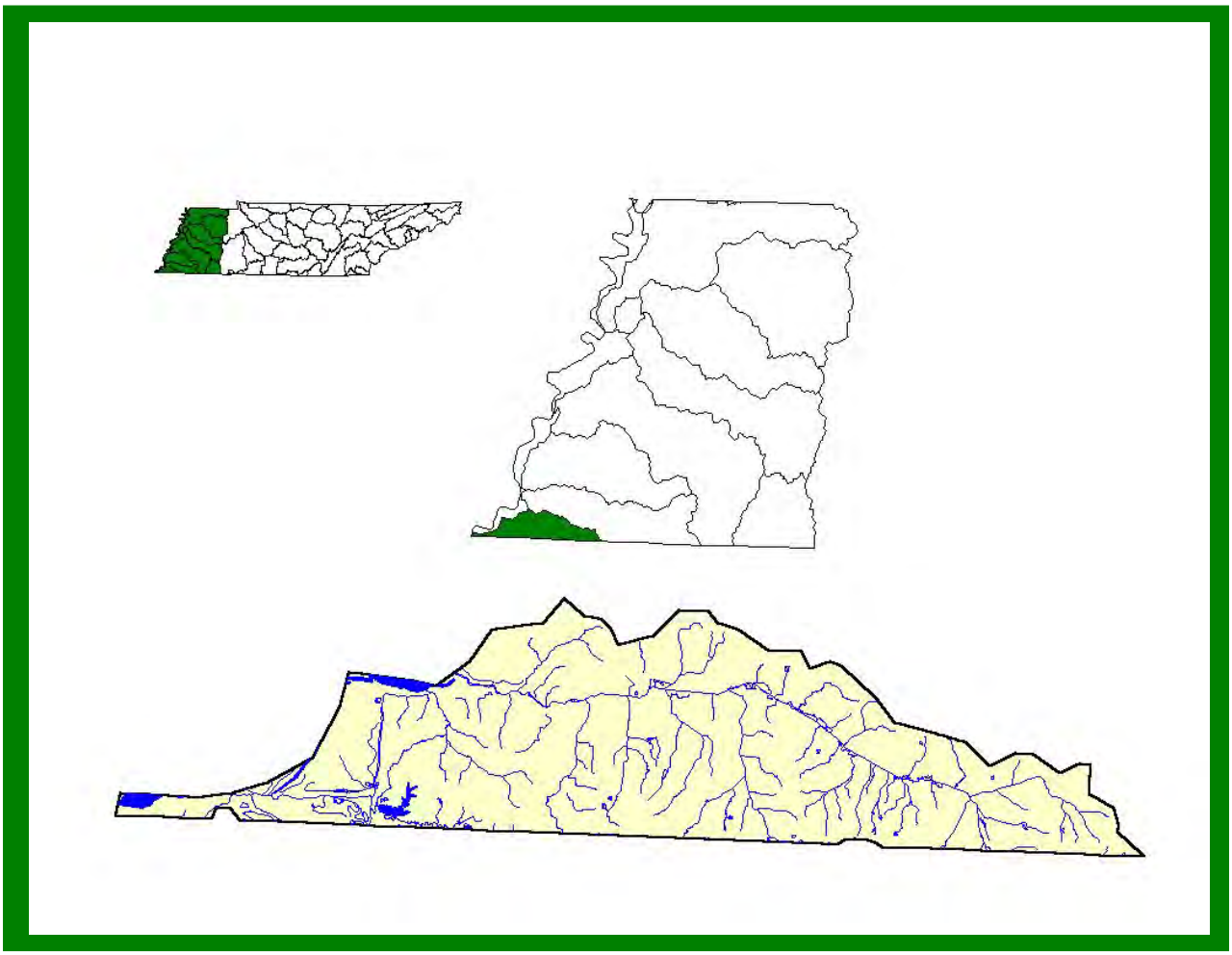
NONCONNAH CREEK WATERSHED (08010211) OF THE MISSISSIPPI RIVER BASIN WATER QUALITY MANAGEMENT PLAN



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

August 20, 2002

NONCONNAH CREEK 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

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

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.

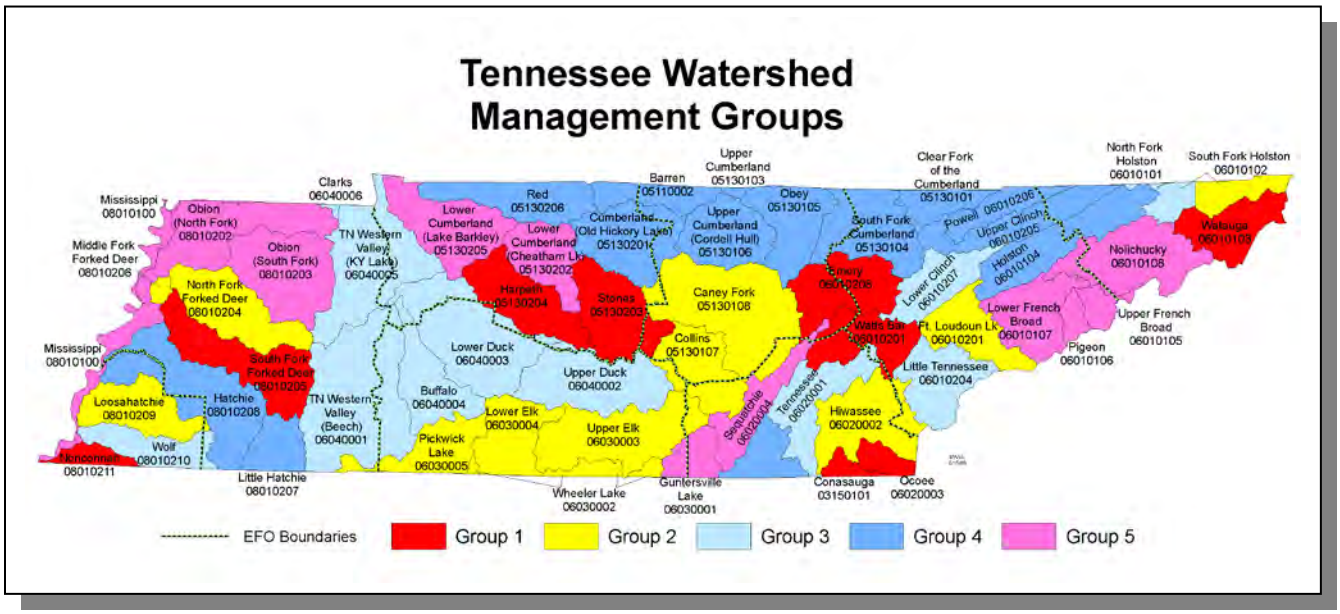

Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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.

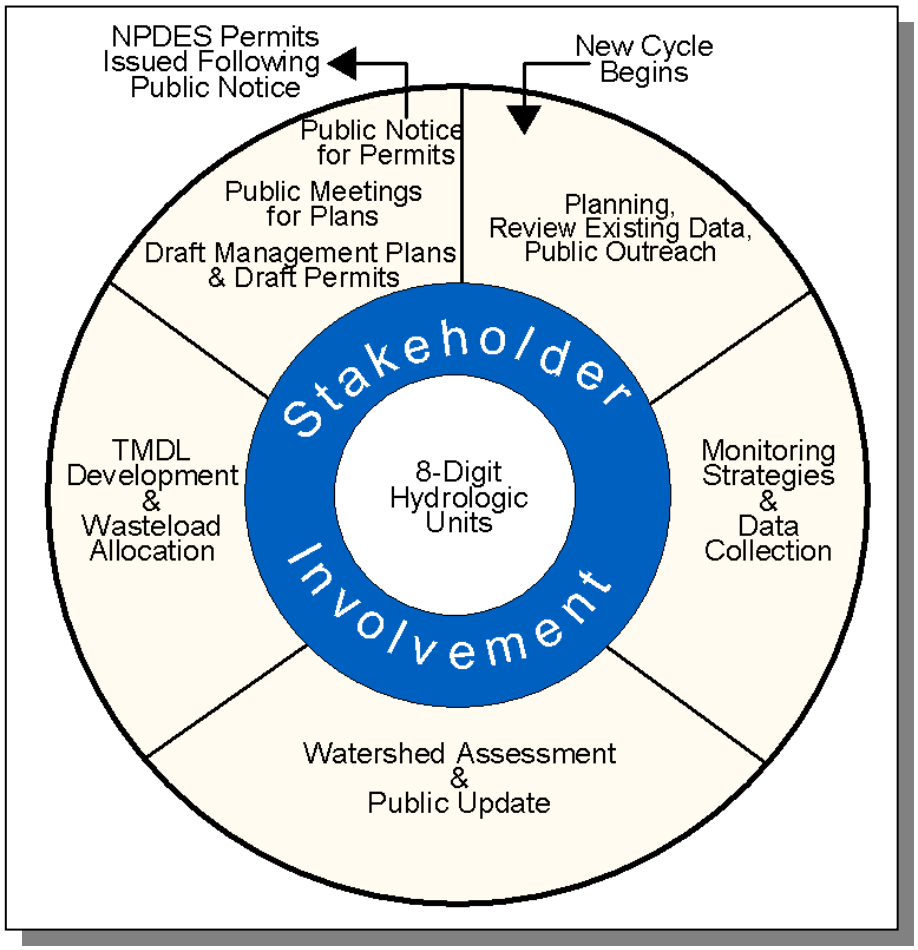

Figure 1-2. The Watershed Approach Cycle.

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 NONCONNAH CREEK WATERSHED

2.1 BACKGROUND.

The Nonconnah Creek watershed is heavily urbanized and supports very little recreational fishing, hunting, or boating. It contains areas of low gradient, murky streams with sand and silt bottoms that are mostly channelized. Smaller streams in the watershed have localized reaches of high gradient and small areas of gravel substrate that create aquatic habitats that are distinct from others in the area. Unique, isolated fish assemblages more typical of upland habitats can be found in these stream reaches.

This Chapter describes the location and characteristics of the Nonconnah Creek Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Tennessee portion of the Nonconnah Creek watershed is located in the western portion of the state and includes parts of Shelby and Fayette counties. The watershed extends into Mississippi.

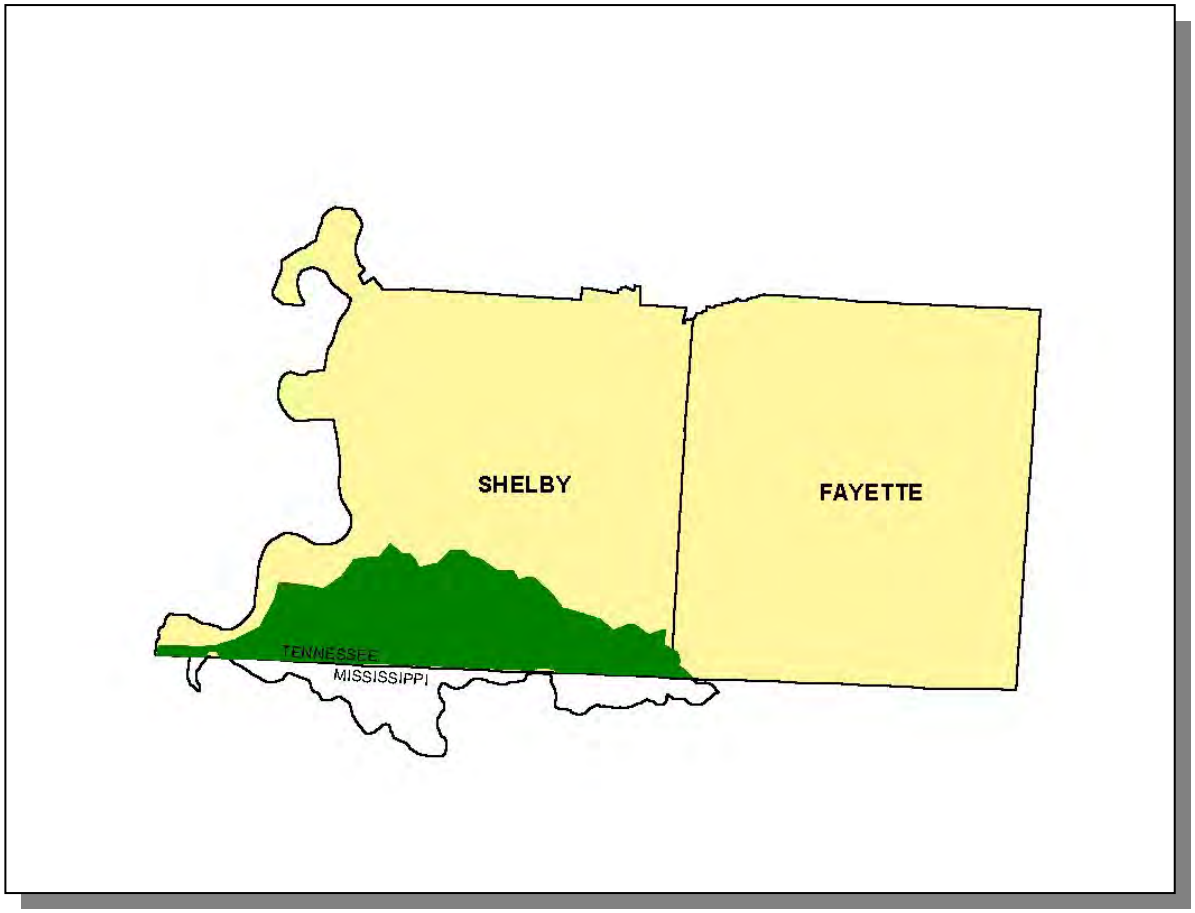

Figure 2-1. General Location of the Nonconnah Creek Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Shelby	99.4
Fayette	0.6

Table 2-1. The Nonconnah Creek Watershed Includes Parts of Two West Tennessee Counties. *An additional twenty-four percent of the watershed extends into Mississippi.*

2.2.B. Population Density Centers. Two interstates (I-40, I-55) and four state highways serve the major communities in the Nonconnah Creek Watershed.

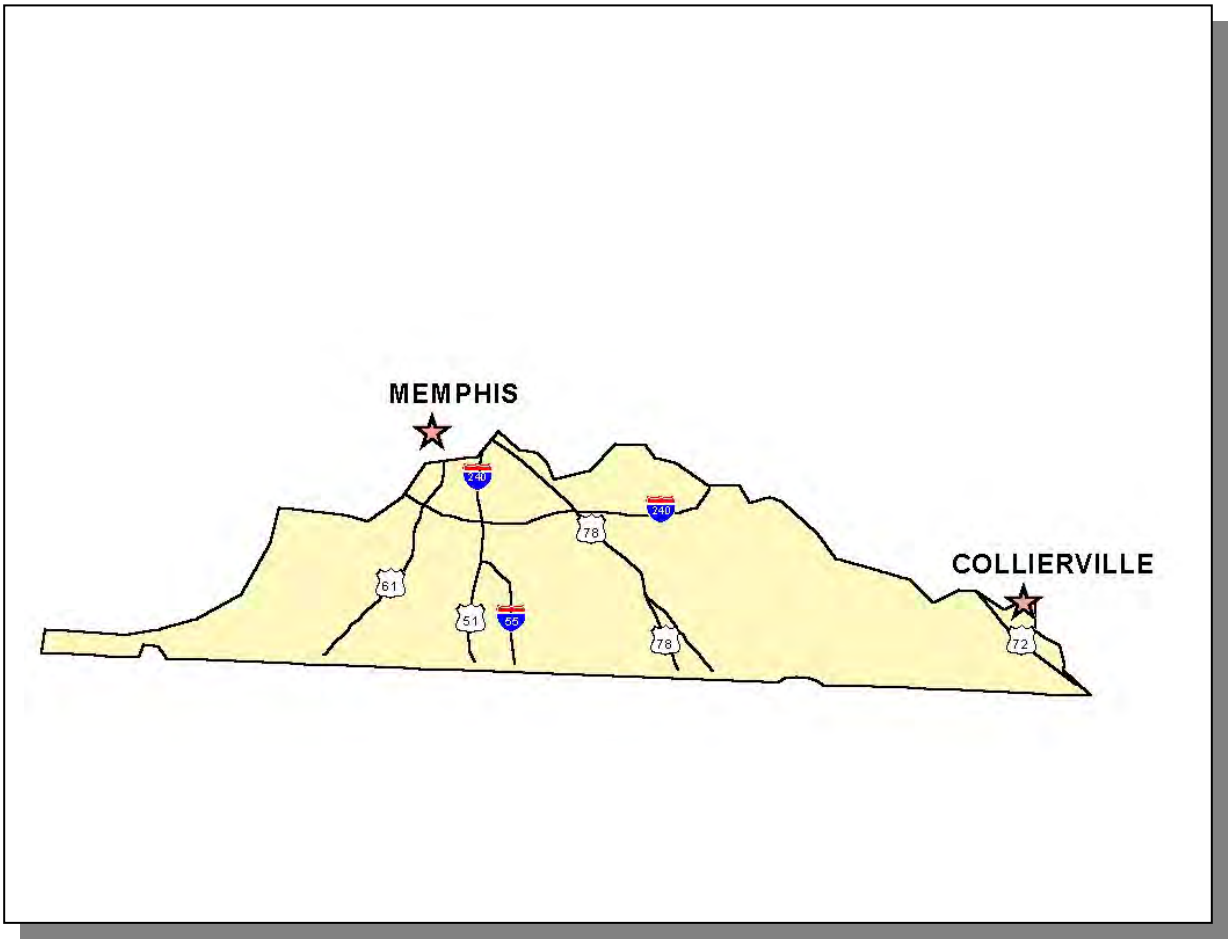

Figure 2-2. Municipalities and Roads in the Nonconnah Creek Watershed.

MUNICIPALITY	POPULATION	COUNTY
Memphis*	610,337	Shelby
Collierville	14,427	Shelby

Table 2-2. Municipalities in the Nonconnah Creek Watershed. *Population based on 1990 census (Tennessee Blue Book). Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Nonconnah Creek Watershed, designated the Hydrologic Unit Code 08010211 by the USGS, is approximately 281 square miles (184 square miles in Tennessee) and drains to the Mississippi River.

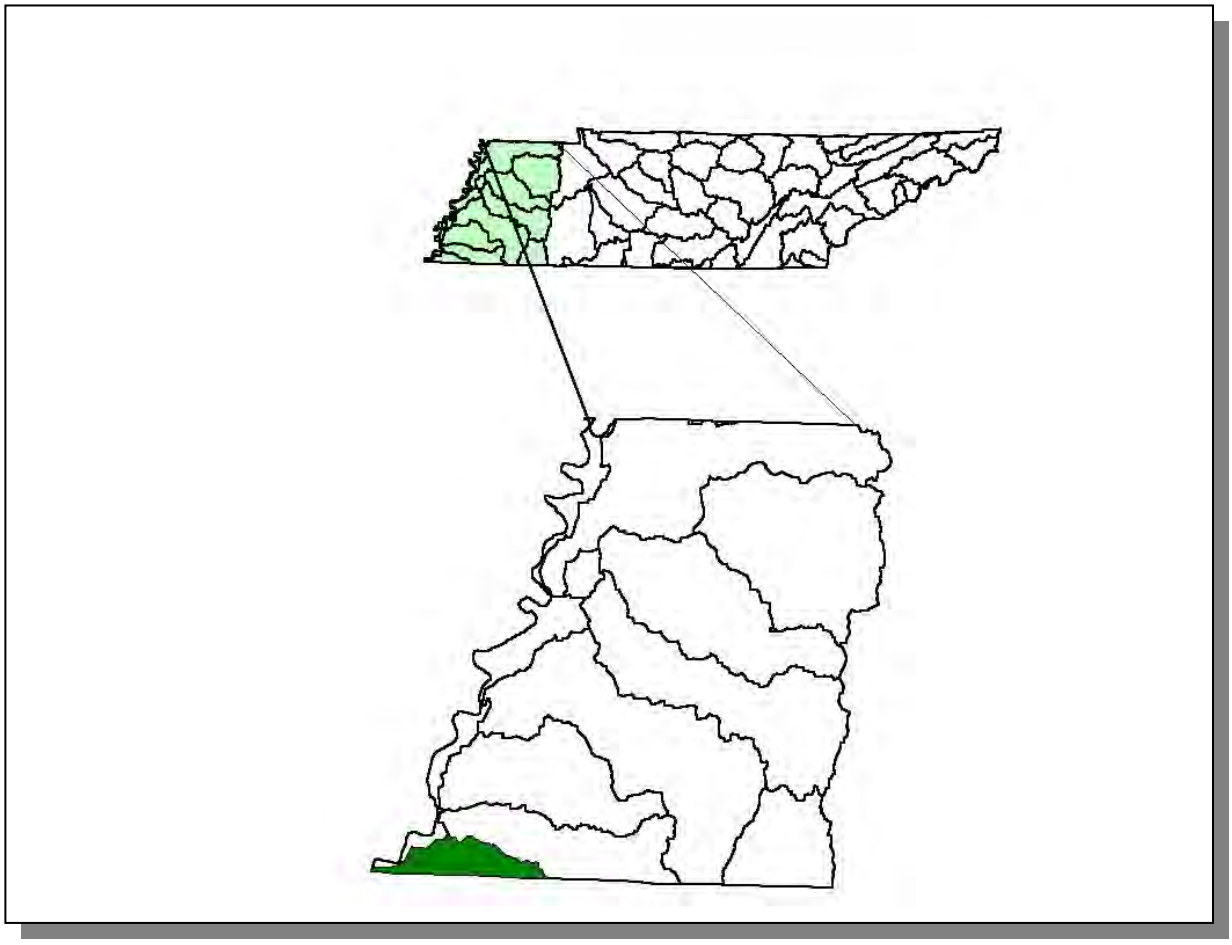

Figure 2-3. The Nonconnah Creek Watershed is part of the Mississippi River Basin.

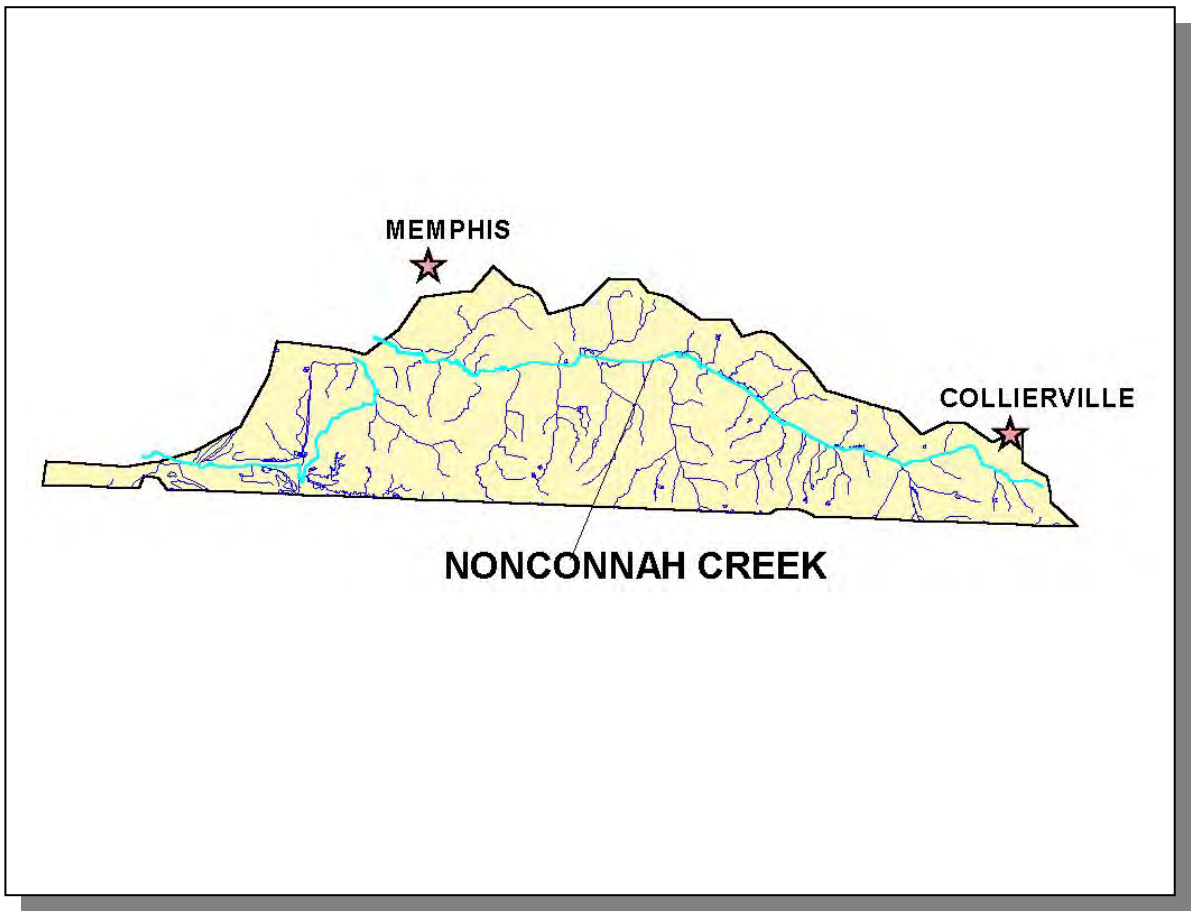

Figure 2-4. Hydrology in the Nonconnah Creek Watershed. *There are 257 stream miles recorded in River Reach File 3 in the Nonconnah Creek Watershed in Tennessee (382 total stream miles in Tennessee and Mississippi). Locations of Collierville and Memphis are shown for reference.*

2.3.B. Dams. There are 18 dams inventoried by TDEC Division of Water Supply in the Nonconnah Creek Watershed. These dams either retain at least 30 acre-feet of water or have structures at least 20 feet high. Additional dams may be found in the watershed.

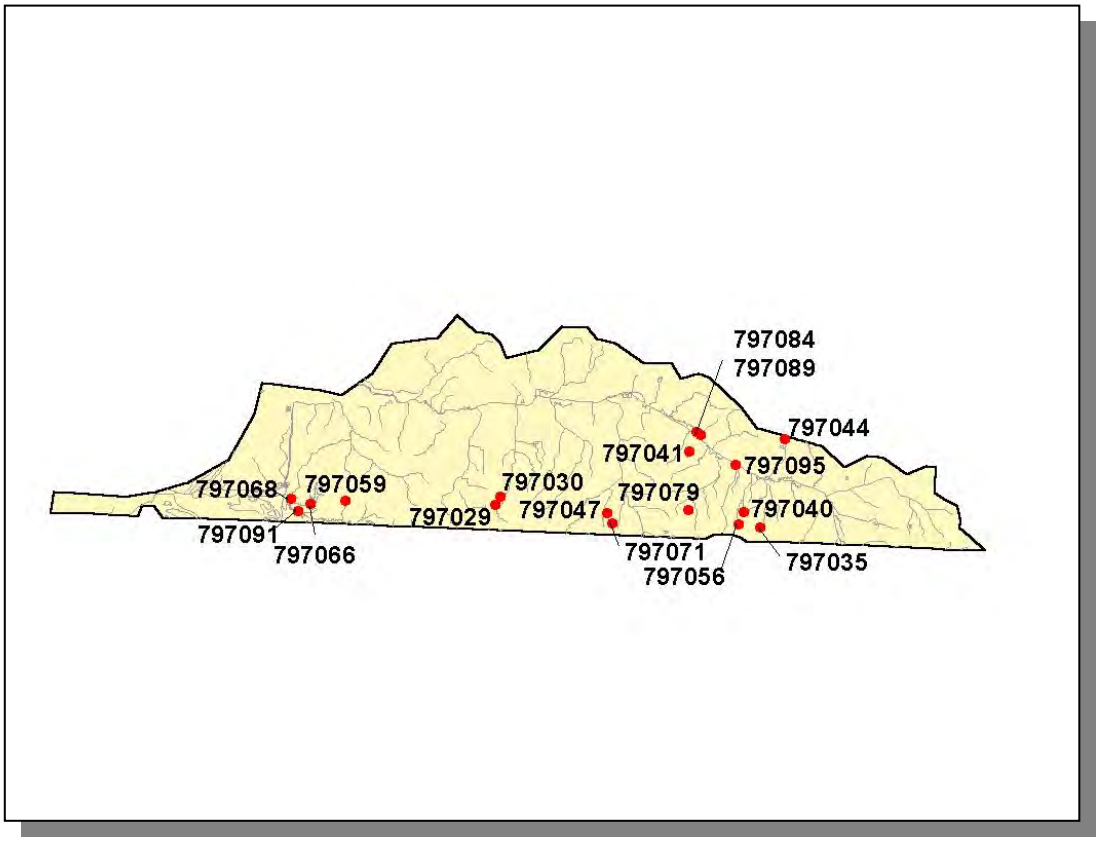

Figure 2-5. Location of Inventoried Dams in the Nonconnah Creek Watershed*. More information is provided in Nonconnah-Appendix II.*

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.

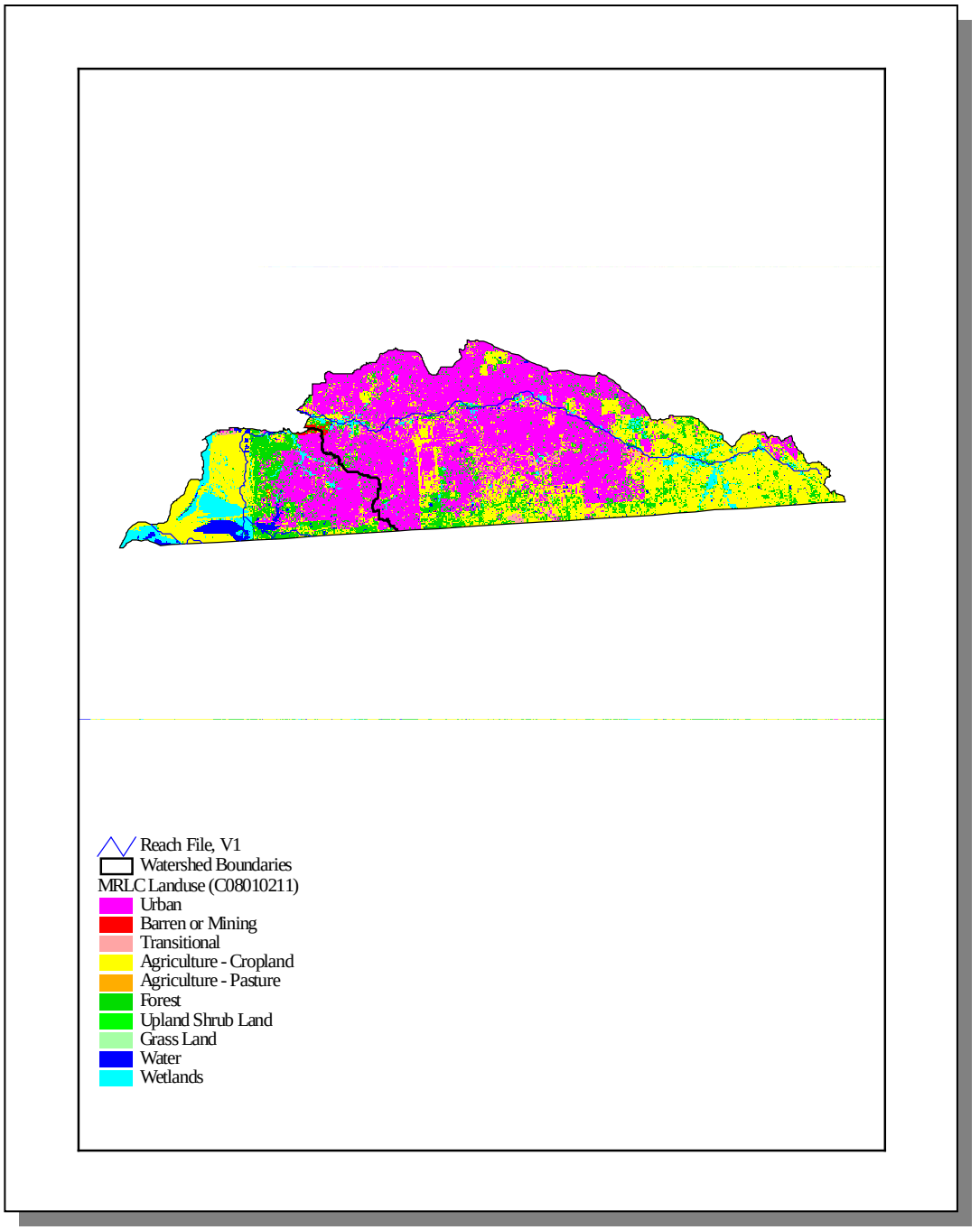

Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

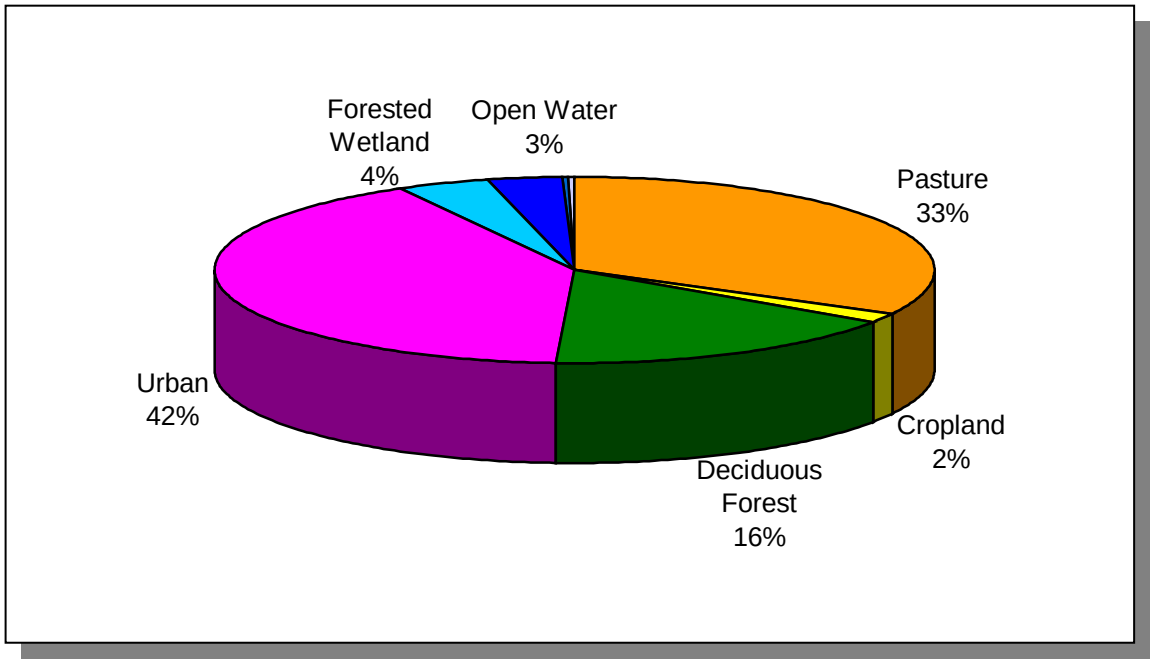

Figure 2-7. Land Use Distribution in the Nonconnah Creek Watershed. *More information is provided in Nonconnah-Appendix II.*

2.5 ECOREGIONS AND REFERENCE STREAMS Ecoregions are defined as 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 include 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 Nonconnah Creek Watershed lies within 2 Level III ecoregions (Mississippi Alluvial Plain, Mississippi Valley Loess Plains) and contains 3 Level IV subecoregions (Griffen, Omernik, Azavedo, 1997):

- The Northern Mississippi Alluvial Plain (73a) within Tennessee is a relatively flat region of 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 some 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.

- The Bluff Hills (74a) consist of sand, clay, silt, and lignite, and are capped by loess greater than 60 feet deep. The disjunct region in Tennessee encompasses those thick loess areas that are generally the steepest, most dissected, and forested. The carved loess has a mosaic of microenvironments, including dry slopes and ridges, moist slopes, ravines, bottomland areas, and small cypress swamps. While oak-hickory is the general forest type, some of the undisturbed bluff vegetation is rich in mesophytes, such as beech and sugar maple, with similarities to hardwood forests of eastern Tennessee. Smaller streams of the Bluff Hills have localized reaches of increased gradient and small areas of gravel substrate that create aquatic habitats that are distinct from those of the Loess Plains (74b) to the east. Unique, isolated fish assemblages more typical of upland habitats can be found in these stream reaches. Gravels are also exposed in places at the base of the bluffs.

- The 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, and most have been channelized.

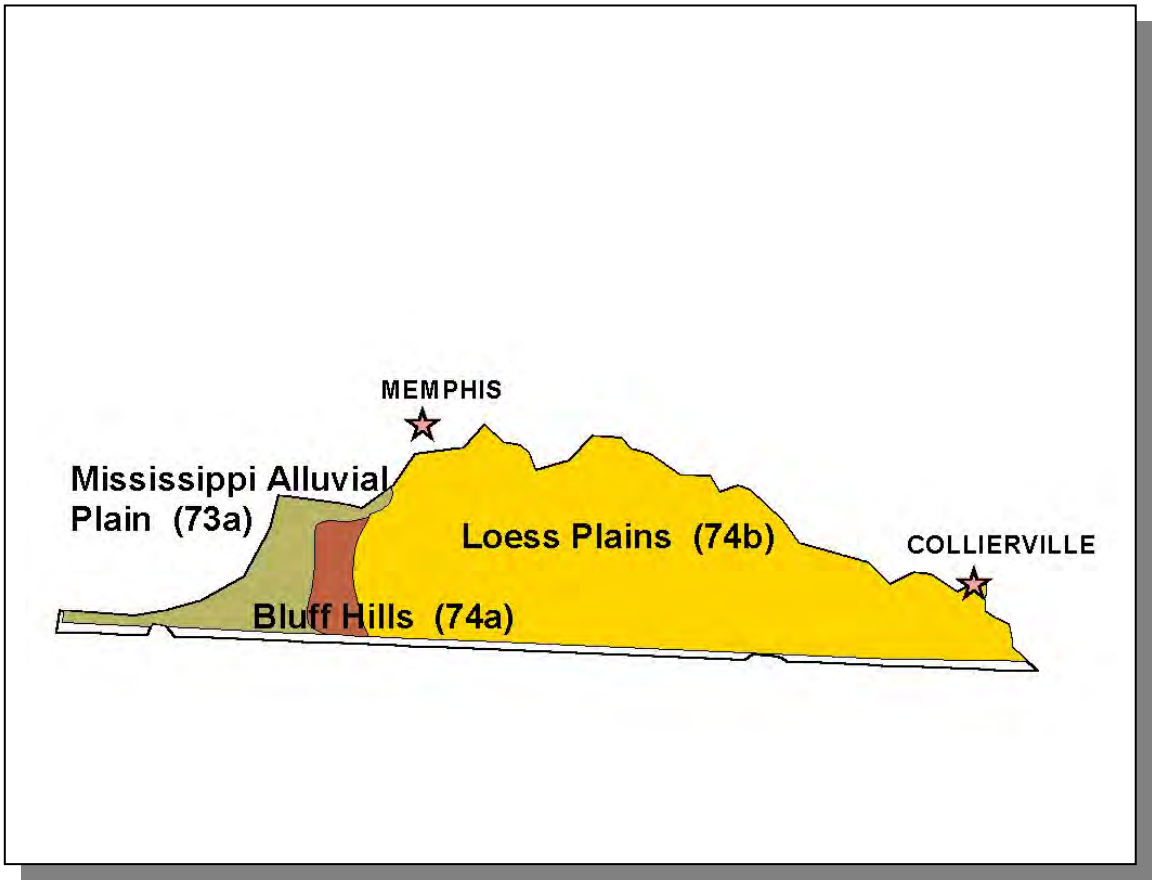

Figure 2-8. Level IV Ecoregions in the Nonconnah Creek Watershed. *Locations of Collierville and Memphis are shown for reference.*

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.

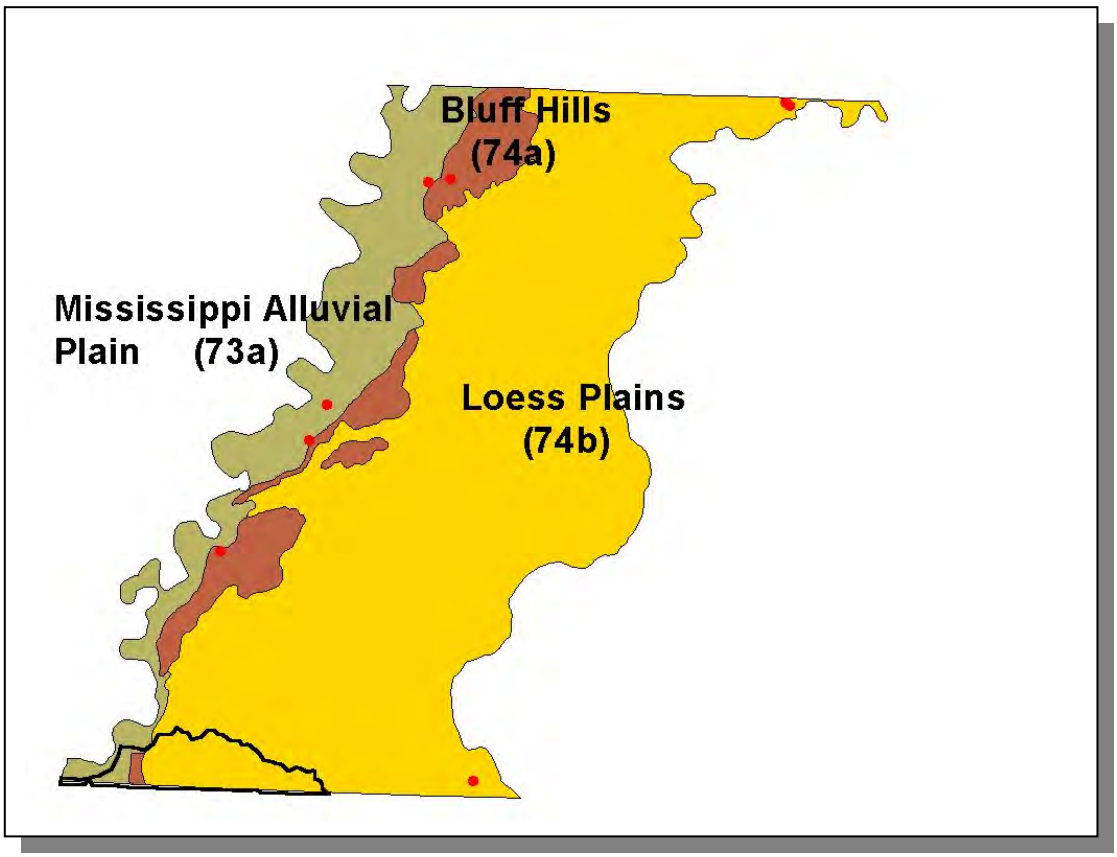

Figure 2-9. Ecoregion Monitoring Sites in Level IV Ecoregions 73a, 74a, and 74b. *The Nonconnah Creek Watershed is shown for reference. More information is provided in Nonconnah-Appendix II.*

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
Crustaceans	0
Insects	0
Mussels	0
Snails	1
Amphibians	1
Birds	4
Fish	0
Mammals	0
Reptiles	0
Plants	1
Total	**7**

Table 2-3. There are 7 Documented Rare Plant and Animal Species in the Nonconnah Creek Watershed. Additional rare plant and animal species may be present.

Additionally, in the Nonconnah Creek Watershed, there is one rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Triodopsis multilineata	Striped whitelip		

Table 2-4. Rare Aquatic Species in the Nonconnah Creek Watershed.

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/epo/wetlands/strategy.zip.

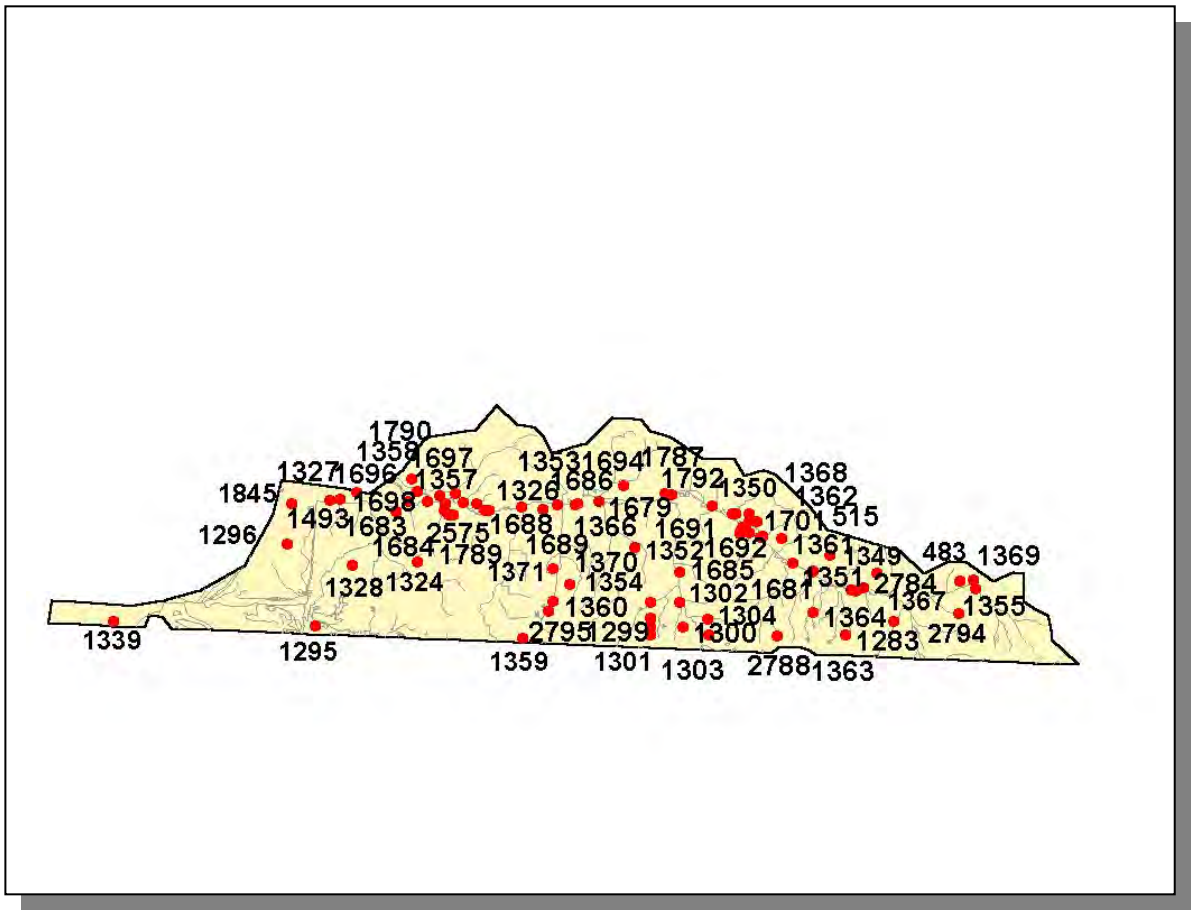

Figure 2-10. Location of Wetland Sites in TDEC Division of Natural Heritage Database in Nonconnah Creek Watershed. There may be additional wetland sites in the watershed. *More information is provided in Nonconnah-Appendix II.*

2.7. CULTURAL RESOURCES.

2.7.A. Interpretive Areas. Some sites representative of the cultural heritage are under state or federal protection:

- T. O. Fuller State Park, an 1100 acre park located 11 miles south of Memphis
- McKellar Park
- Oak Forest Memorial Gardens
- Pine Hills Park

In addition, many local interpretive areas are common, including Lichterman Nature Center and Audubon Park in Memphis.

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/riv

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Cypress Creek	4			Johns Creek	4		2
Days Creek	4			Nonconnah Creek	4	3	2,4
Harbor Channel		1		Tenmile Creek	4		
Horn Lake Cutoff	4		2,4	Unnamed Tributary to Nonconnah Creek	3		
Hurricane Creek	4						

Table 2-5. Stream Scoring from the Tennessee Rivers Assessment Project.

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 as a fishery

CHAPTER 3

WATER QUALITY ASSESSMENT OF THE NONCONNAH CREEK WATERSHED

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, following one to two years of data collection. More information about the Watershed Approach may be found at:

http://www.state.tn.us/environment/wpc/wshed1.htm.

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 2000 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/OW/resources/9698/tn.html

The 303(d) list is a compilation of the waters of Tennessee that are water quality limited and fail to support some or all of their classified uses. Water quality limited streams are those that have one or more properties that violate water quality standards. Therefore, the water body is considered to be impacted by pollution and is not fully meeting its designated 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).

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

This chapter provides a summary of water quality in the Nonconnah Creek Watershed, and summarizes data collection, assessment results and a description of impaired waters.

3.2 DATA COLLECTION. Comprehensive water quality monitoring in the Nonconnah Creek Watershed was conducted in 1996 and 1997. Data were collected from 13 sites and were from two types of site: 1)Ambient or 2)Watershed.

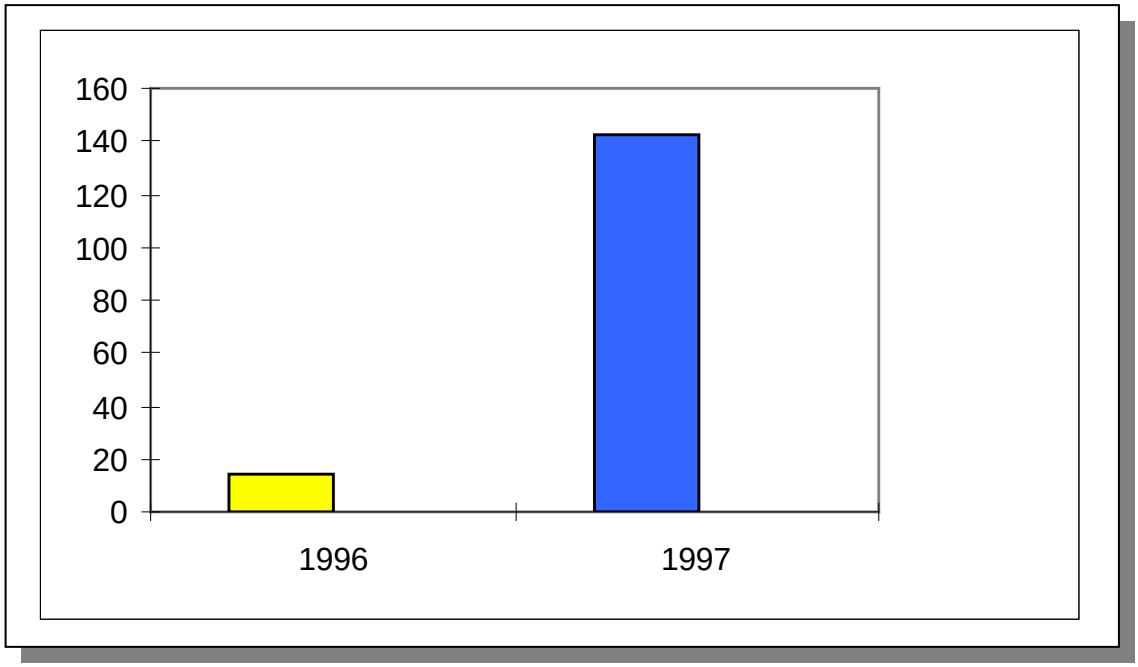

Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (1997) in the Nonconnah Creek Watershed.

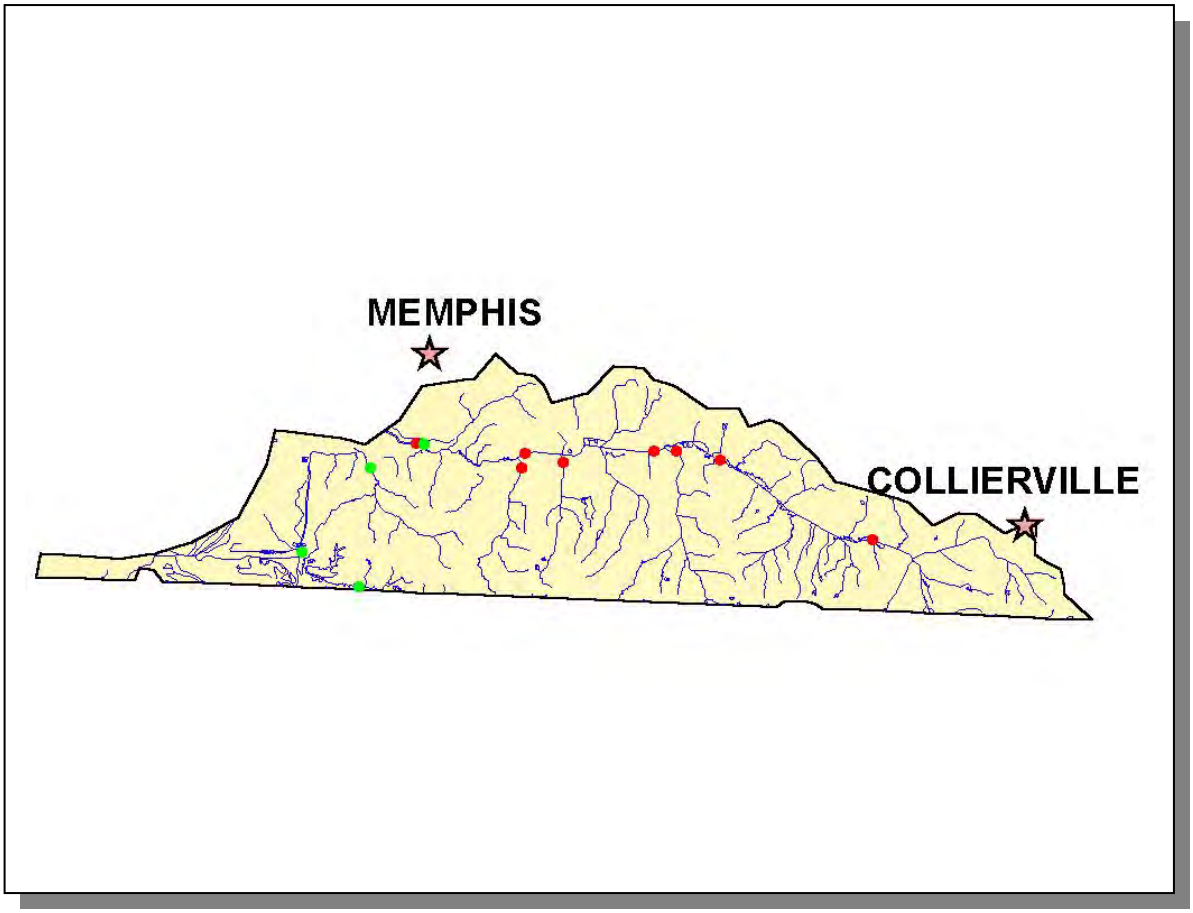

Figure 3-2. Location of Monitoring Sites in the Nonconnah Creek Watershed. *Red, Watershed Monitoring Sites; Green, Ambient Monitoring Sites. Locations of Collierville and Memphis are shown for reference.*

TYPE	NUMBER	TOTAL NUMBER OF SAMPLING EVENTS		
		CHEMICAL ONLY	BIOLOGICAL ONLY	BIOLOGICAL PLUS CHEMICAL (FIELD PARAMETERS)
Ambient	5	14		
Watershed	8	143		
Totals	**13**	**157**		

Table 3-1. Monitoring Sites in the Nonconnah Creek 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 Assistance Center-Memphis Water Pollution Control 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 measured in the Nonconnah Creek Watershed are provided in Nonconnah-Appendix IV.

Data from ambient monitoring stations are entered into the STORET (Storage and Retrieval) system administered by EPA. Some ambient monitoring stations are scheduled to be monitored as watershed sampling sites.

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 Nonconnah Creek Watershed lies within 2 Level III ecoregions (Mississippi Alluvial Plains and Mississippi Valley Loess Plains) and contains 3 subecoregions (Level IV):

- Northern Mississippi Alluvial Plain (73a)
- Bluff Hills (74a)
- 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 as Watershed sampling sites.

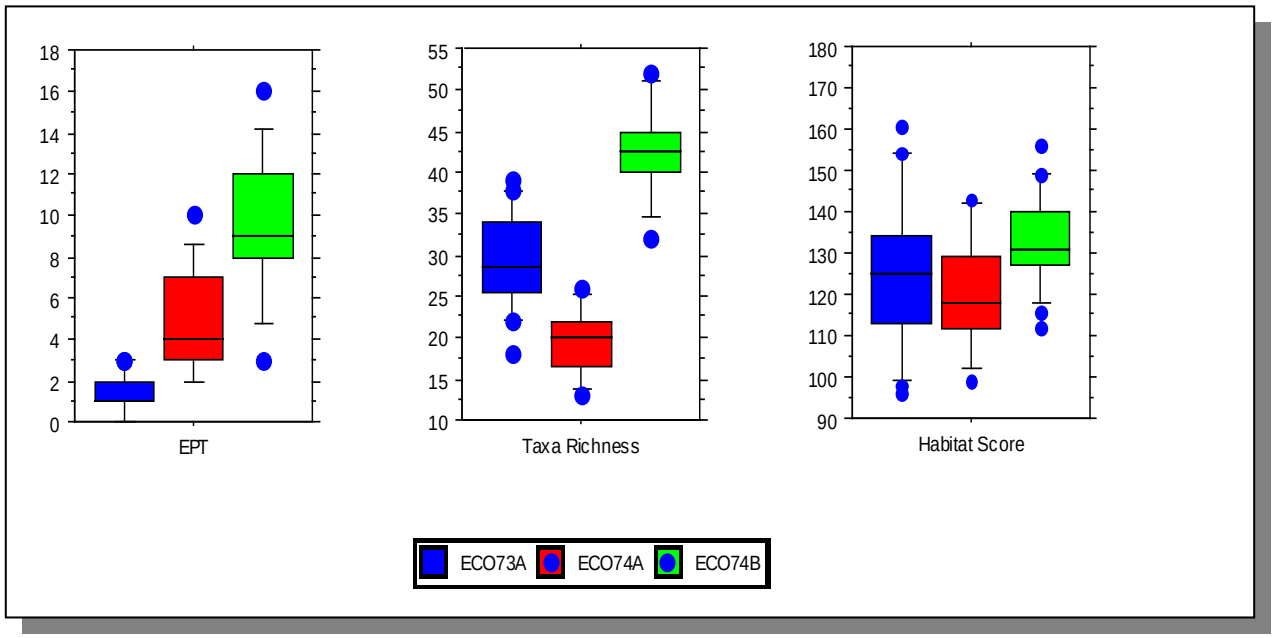

Figure 3-3. Benthic Macroinvertebrate and Habitat Scores for Nonconnah Creek Ecoregion RBP III Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. EPT and Taxa scores are number of genus observed; habitat score is calculated as described in EPA 841-D-97-002*

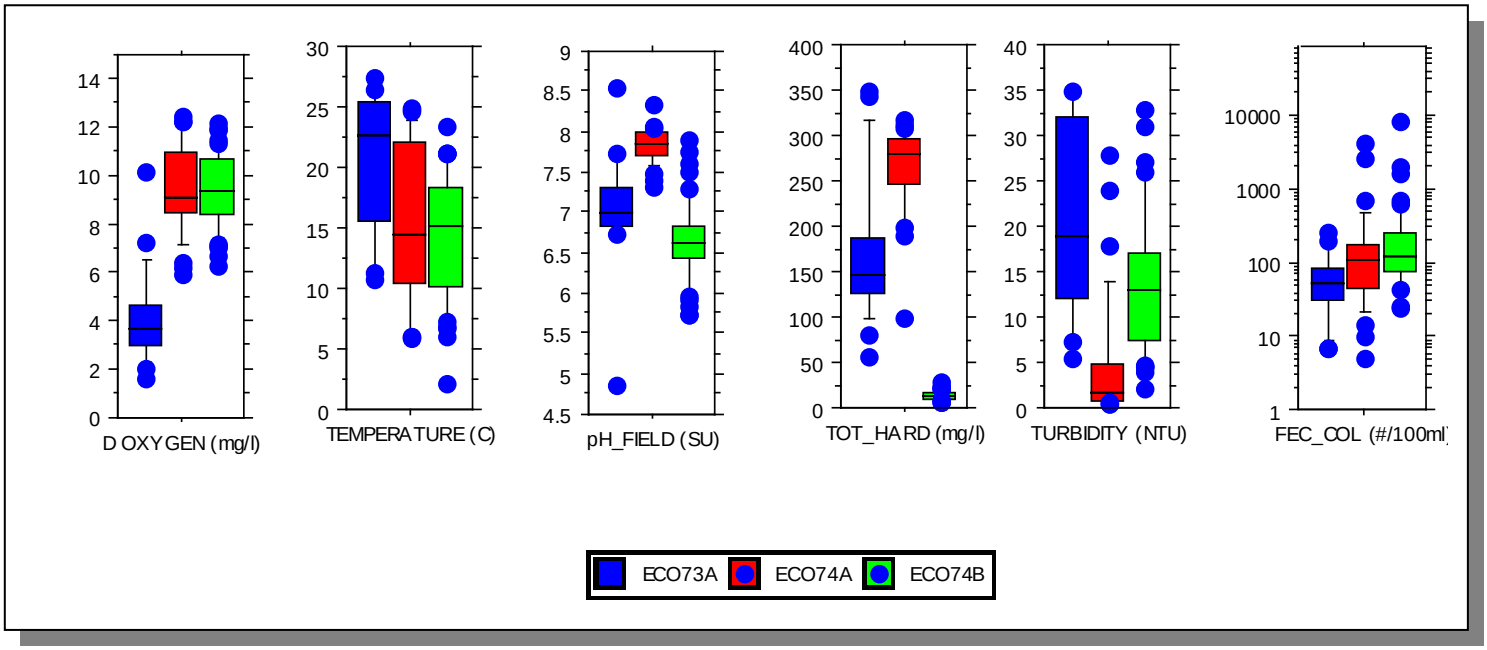

Figure 3-4. Select Chemical Data Collected in Nonconnah Creek Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots.*

3.2.C. Watershed Sites. Activities that take place at watershed sites are benthic macroinvertebrate biological 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 [mayflies], Plecoptera [stoneflies], Trichoptera [caddisflies]). Factors and resources used for selecting BioRecon sites are:

- The current 303(d) list,
- HUC-11 maps (every HUC-11 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 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 include:

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

These special surveys are performed when needed.

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 Assistance Centers, 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.

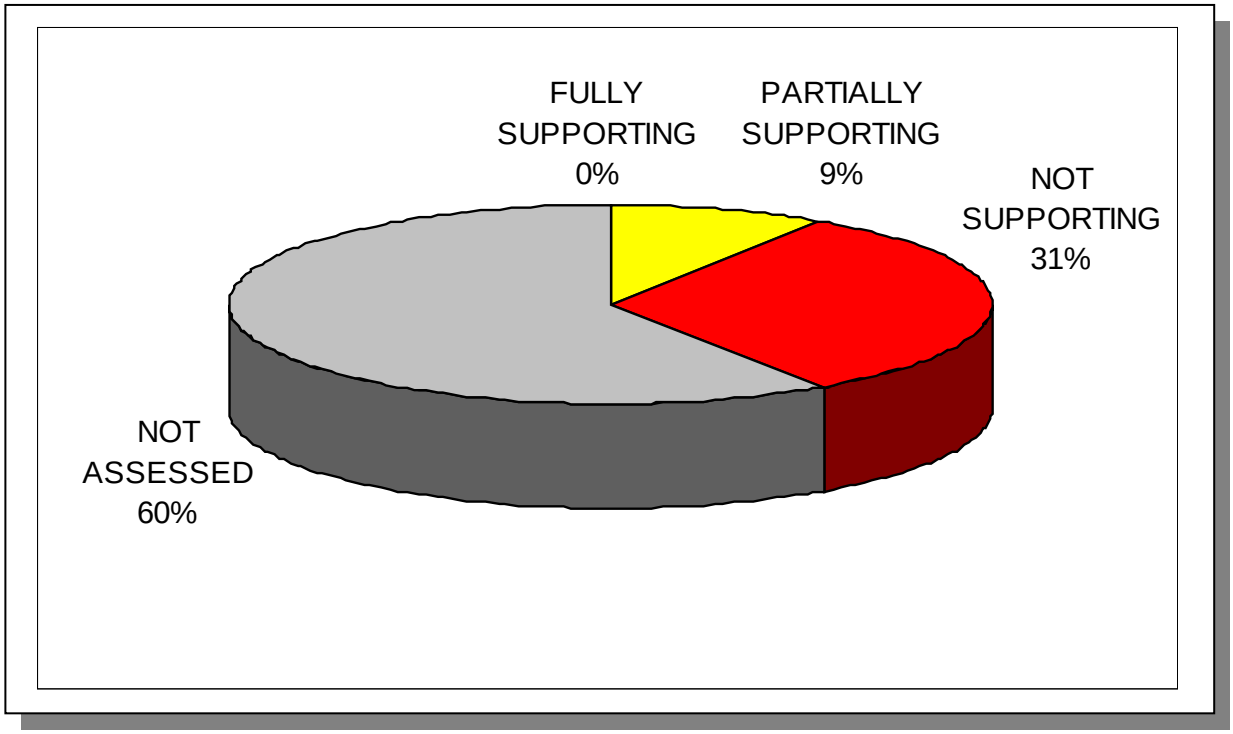

Figure 3-5. Water Quality Assessment for Rivers and Streams in the Nonconnah Creek Watershed. *Assessment data (stream miles) are based on the 2000 Water Quality Assessment*

3.3.A. Assessment Summary.

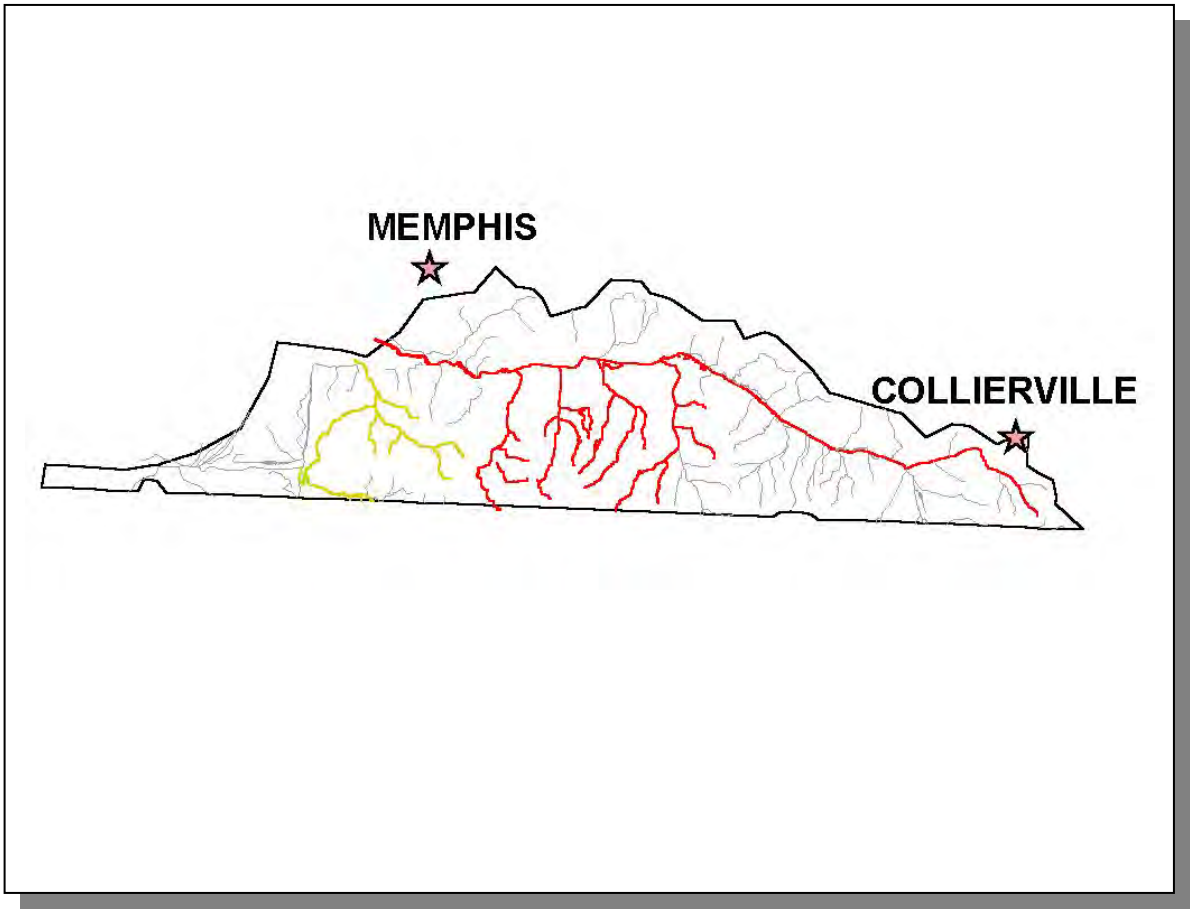

Figure 3-6a. Overall Use Support Attainment in the Nonconnah Creek Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Collierville and Memphis are shown for reference. More information is provided in Nonconnah-Appendix III.*

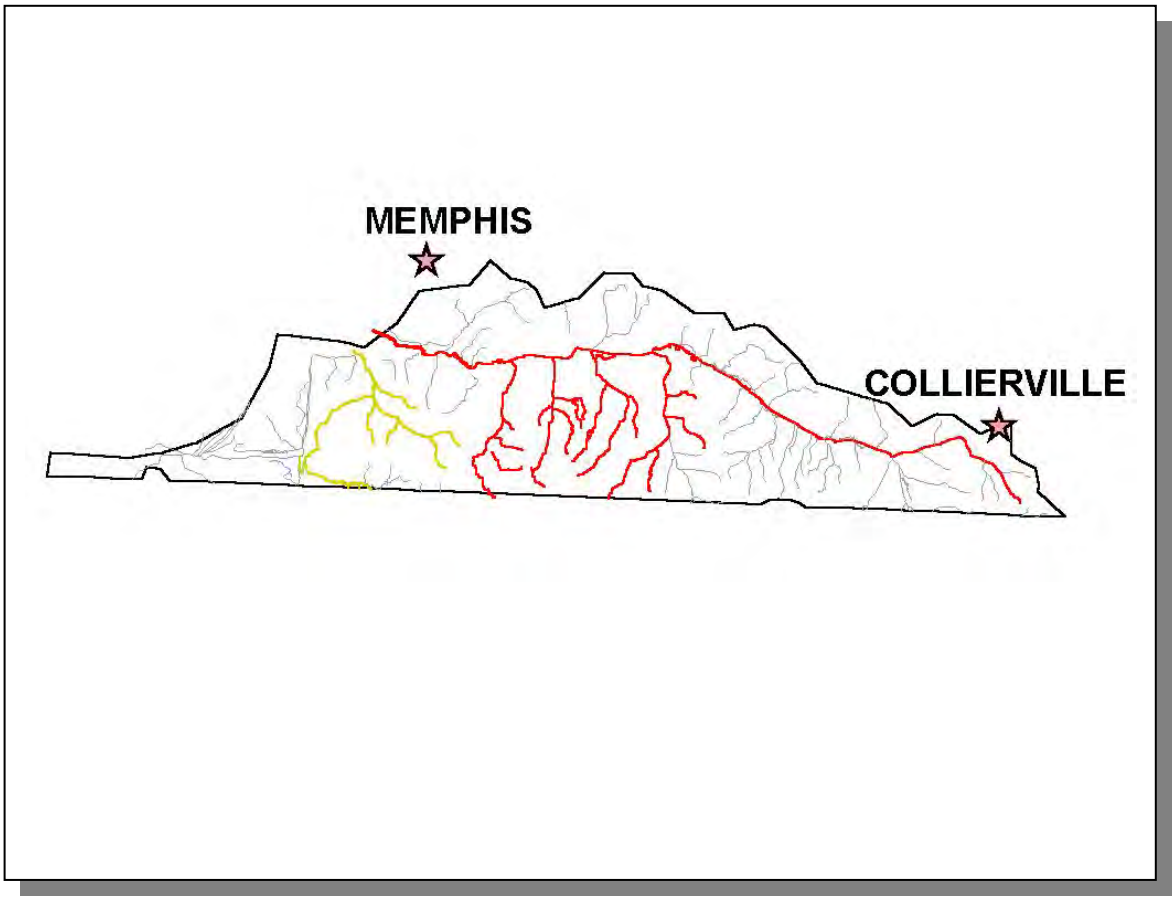

Figure 3-6b. Fish and Aquatic Life Use Support Attainment in the Nonconnah Creek Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Collierville and Memphis are shown for reference.*

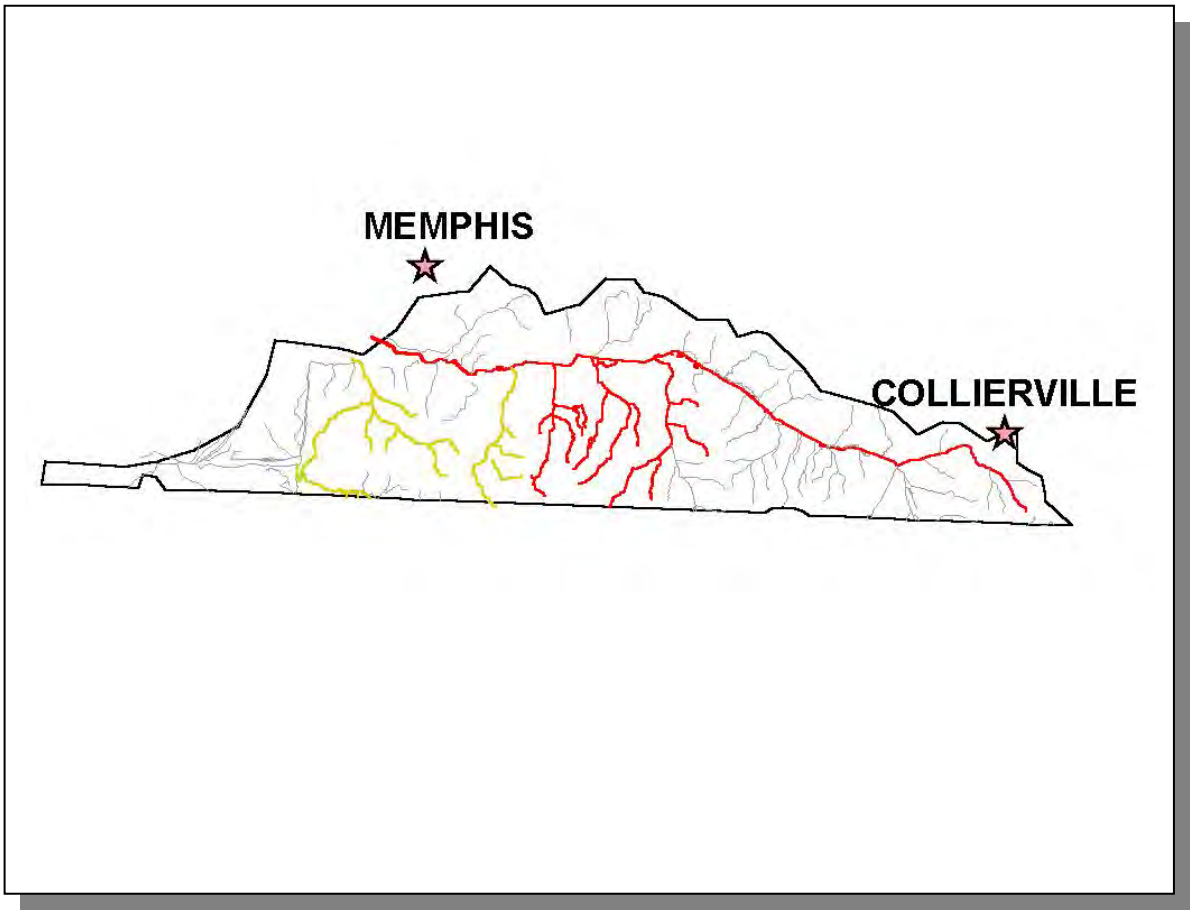

Figure 3-6c. Recreation Use Support Attainment in the Nonconnah Creek Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Red, Does Not Support Designated Use; Yellow, Partially Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Collierville and Memphis are shown for reference.*

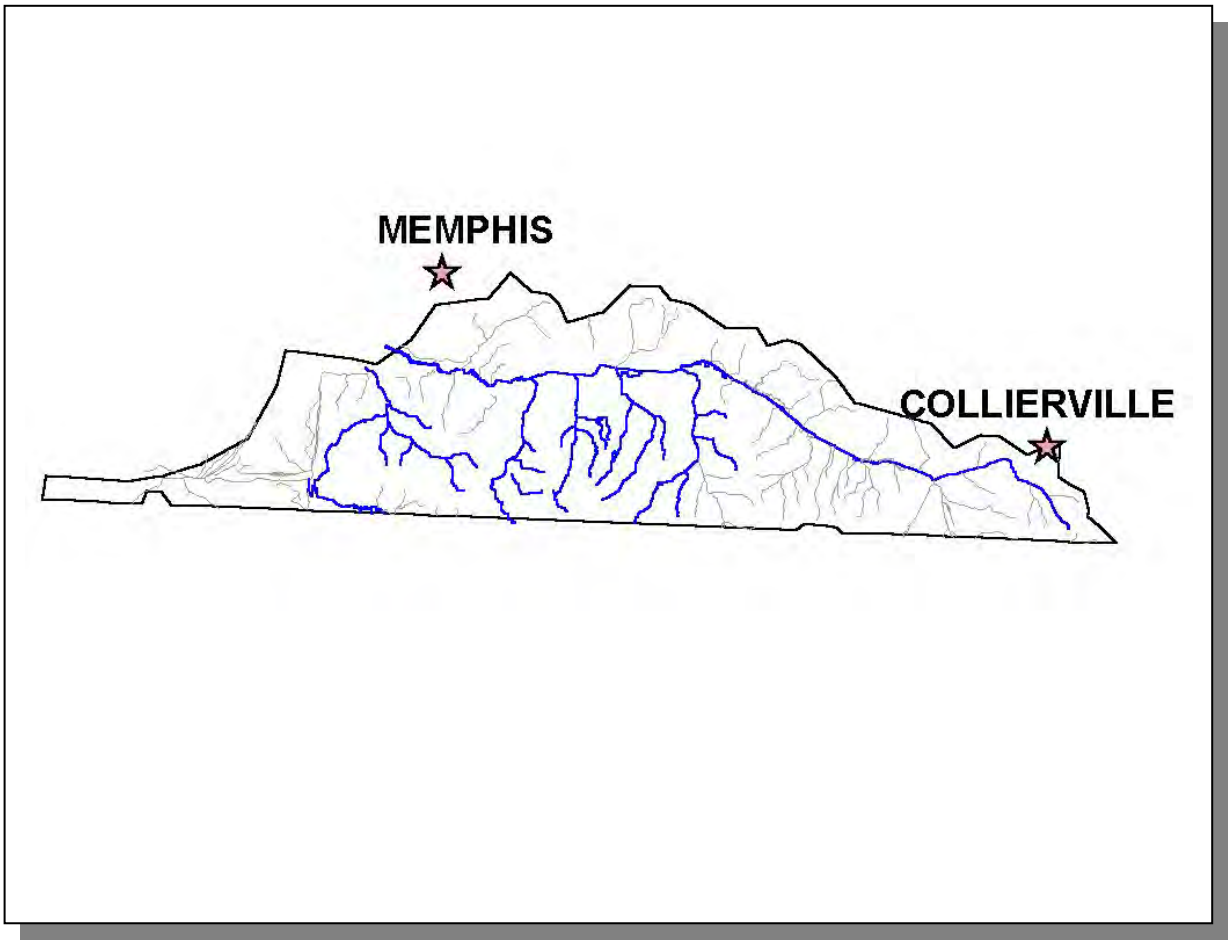

Figure 3-6d. Irrigation Use Support Attainment in the Nonconnah Creek Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Collierville and Memphis are shown for reference*

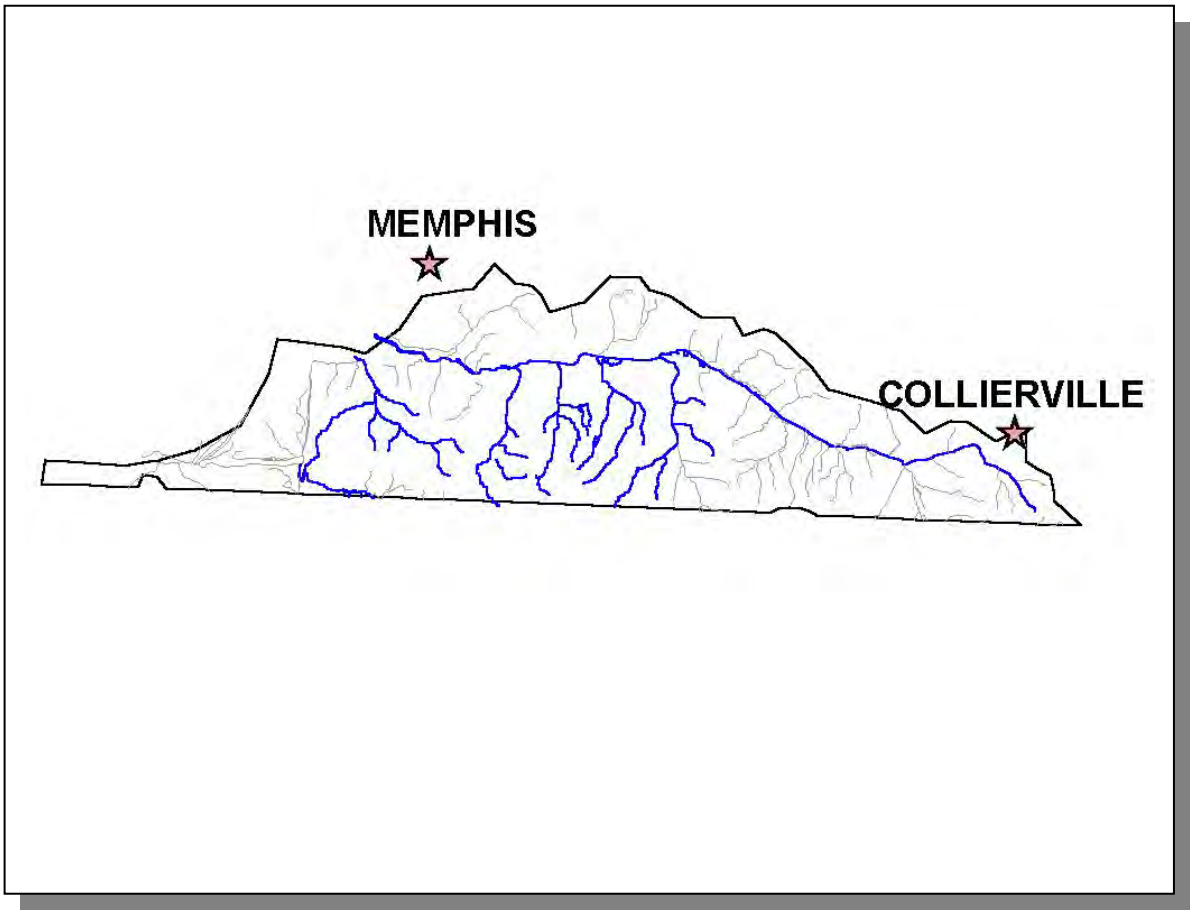

Figure 3-6e. Livestock Watering and Wildlife Use Support Attainment in the Nonconnah Creek Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Collierville and Memphis are shown for reference.*

3.3.B. Use Impairment Summary.

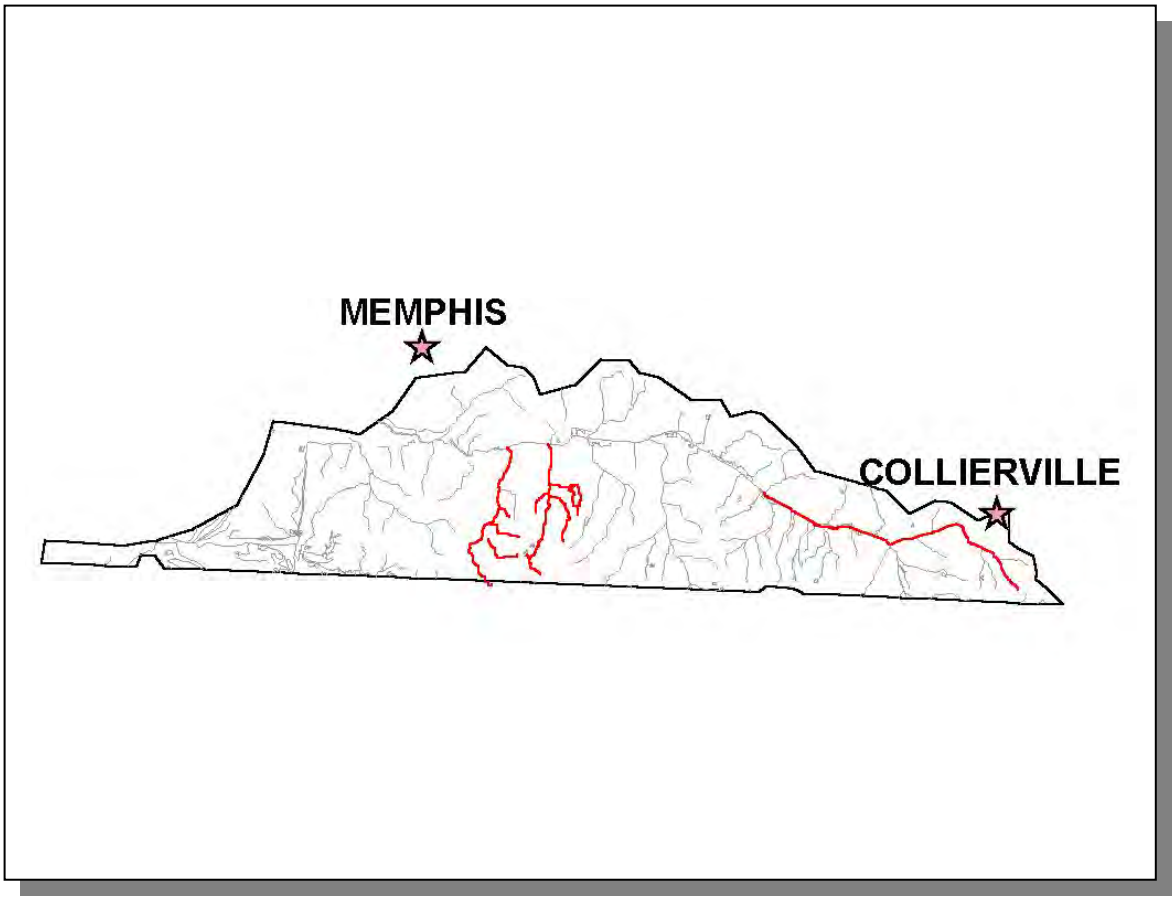

Figure 3-7a. Impaired Streams Due to Habitat Alteration in the Nonconnah Creek Watershed. *Assessment data are based on the 2000 Water Quality Assessment.; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Collierville and Memphis are shown for reference. More information is provided in Nonconnah-Appendix III.*

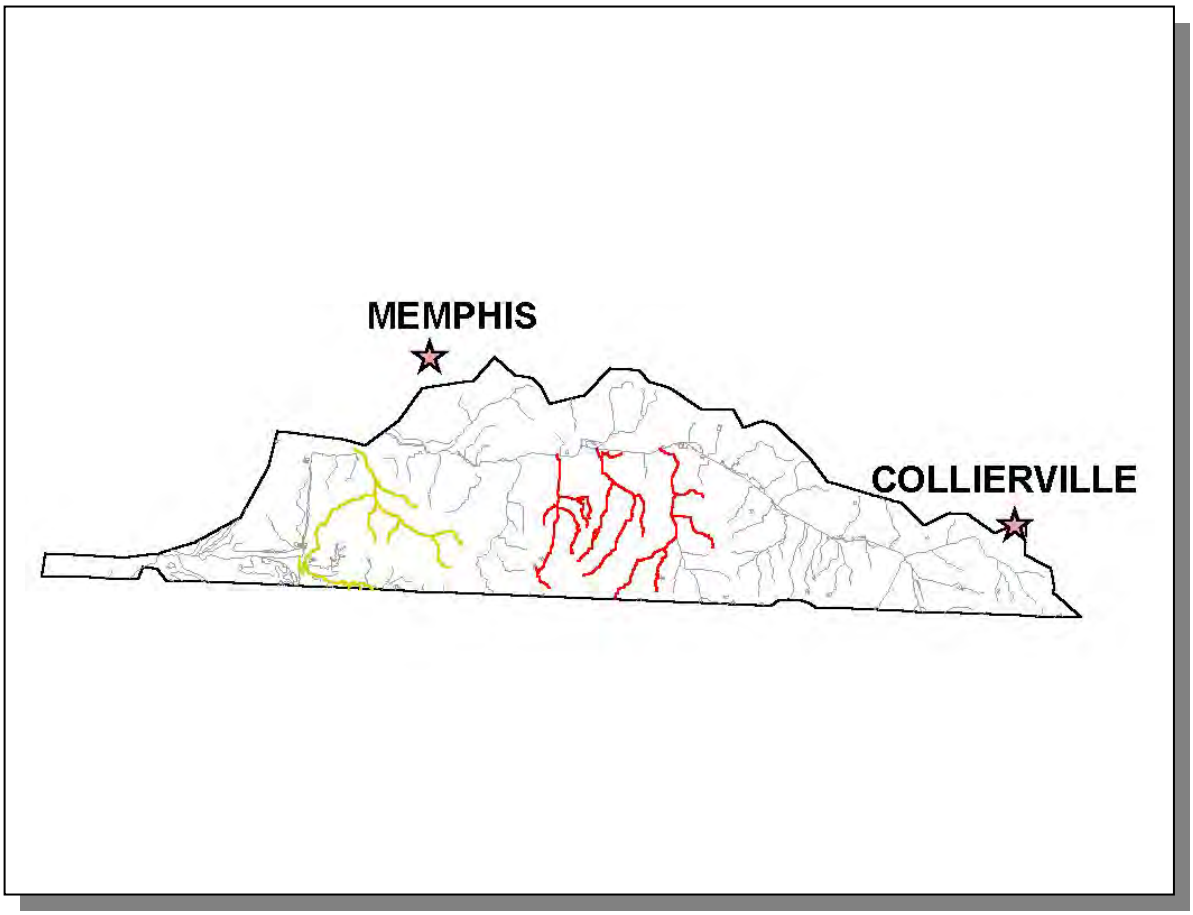

Figure 3-7b. Impaired Streams Due to Organic Enrichment/Low Dissolved Oxygen Levels in the Nonconnah Creek Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Collierville and Memphis are shown for reference. More information is provided in Nonconnah-Appendix III.*

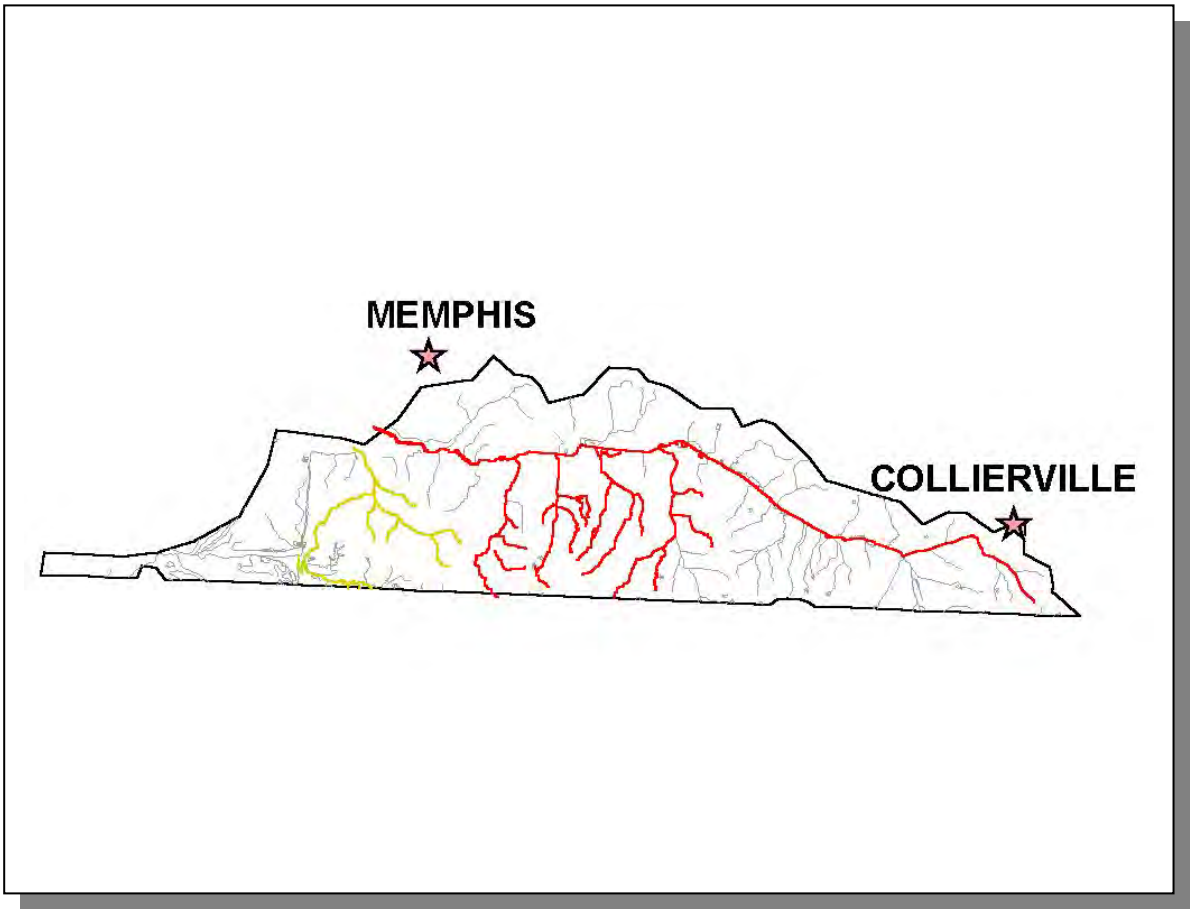

Figure 3-7c. Impaired Streams Due to Pathogens in the Nonconnah Creek Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Collierville and Memphis are shown for reference. More information is provided in Nonconnah-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

In the year 2002 and beyond, the 303(d) list will be 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.

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE NONCONNAH CREEK WATERSHED

4.1 BACKGROUND. This chapter is organized by HUC-11 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 1998 303(d) list
iii. Description of nonpoint source contributions

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 1.1 beta (developed by Tetra Tech, Inc for EPA Region 4) released in 2000.

WCS integrates with ArcView® v3.1 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.

4.2. CHARACTERIZATION OF HUC-11 SUBWATERSHEDS. The Watershed Characterization System (WCS) software and data sets provided by EPA Region IV were used to characterize each subwatershed in the Nonconnah Creek Watershed. HUC-14 polygons were aggregated to form the HUC-11 boundaries for data analysis.

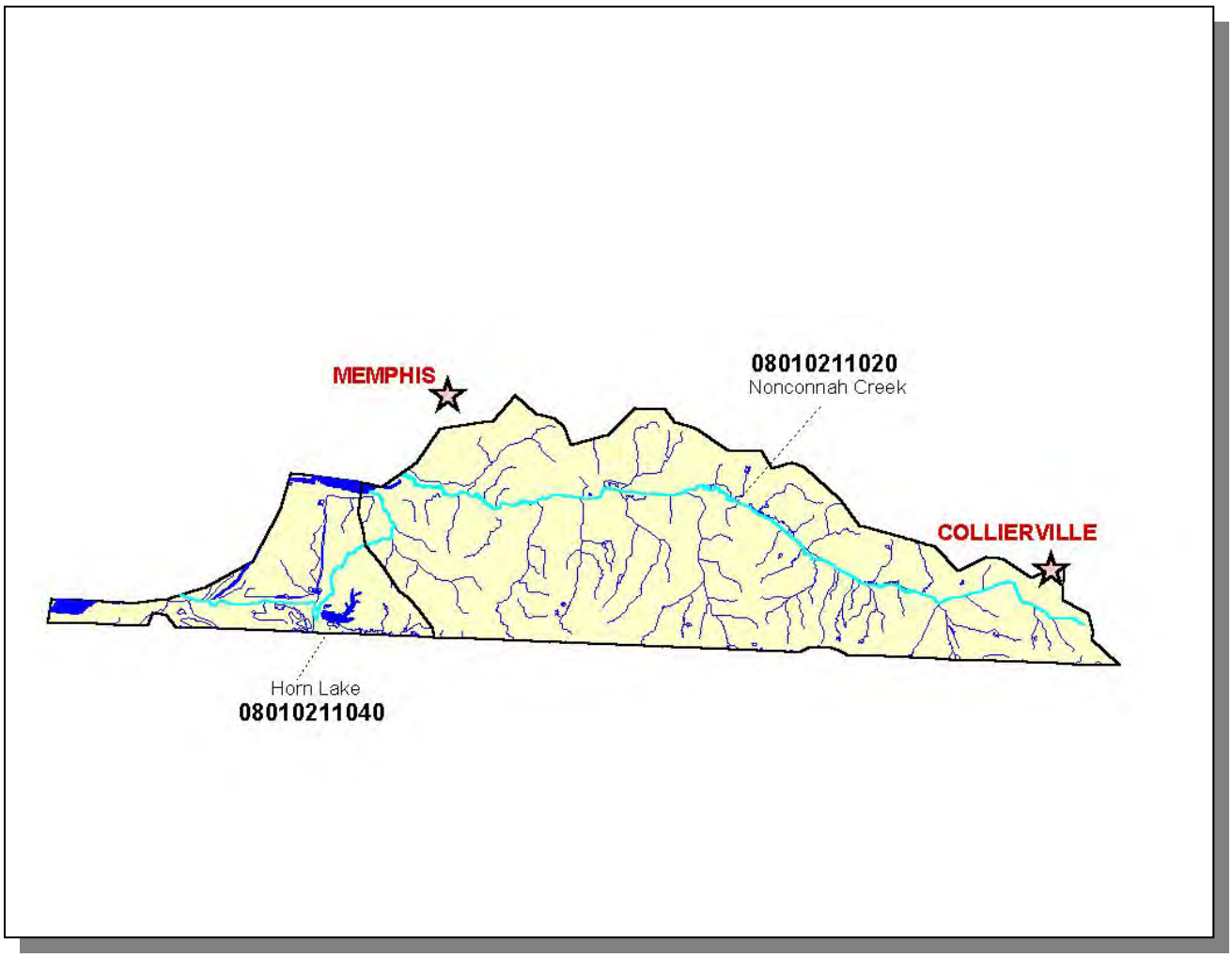

Figure 4-1. The Nonconnah Creek Watershed is Composed of Two USGS-Delineated Subwatersheds (11-Digit Subwatersheds). *Locations of Nonconnah Creek, Memphis, and Collierville are shown for reference.*

HUC-11	HUC-14
08010211020	08010211010010 (Nonconnah Creek) 08010211010020 (Nonconnah Creek) 08010211010030 (Nonconnah Creek)
08010211040	08010211020010 (Cypress Creek) 08010211030010 (Horn Lake Creek) 08010211030020 (Horn Lake)

Table 4-1. HUC-14 Drainage Areas are Nested Within HUC-11 Drainages. *USGS delineated the HUC-11 drainage areas. NRCS inventories and manages the physical database for HUC-14 drainage areas.*

4.2.A. 08010211020.

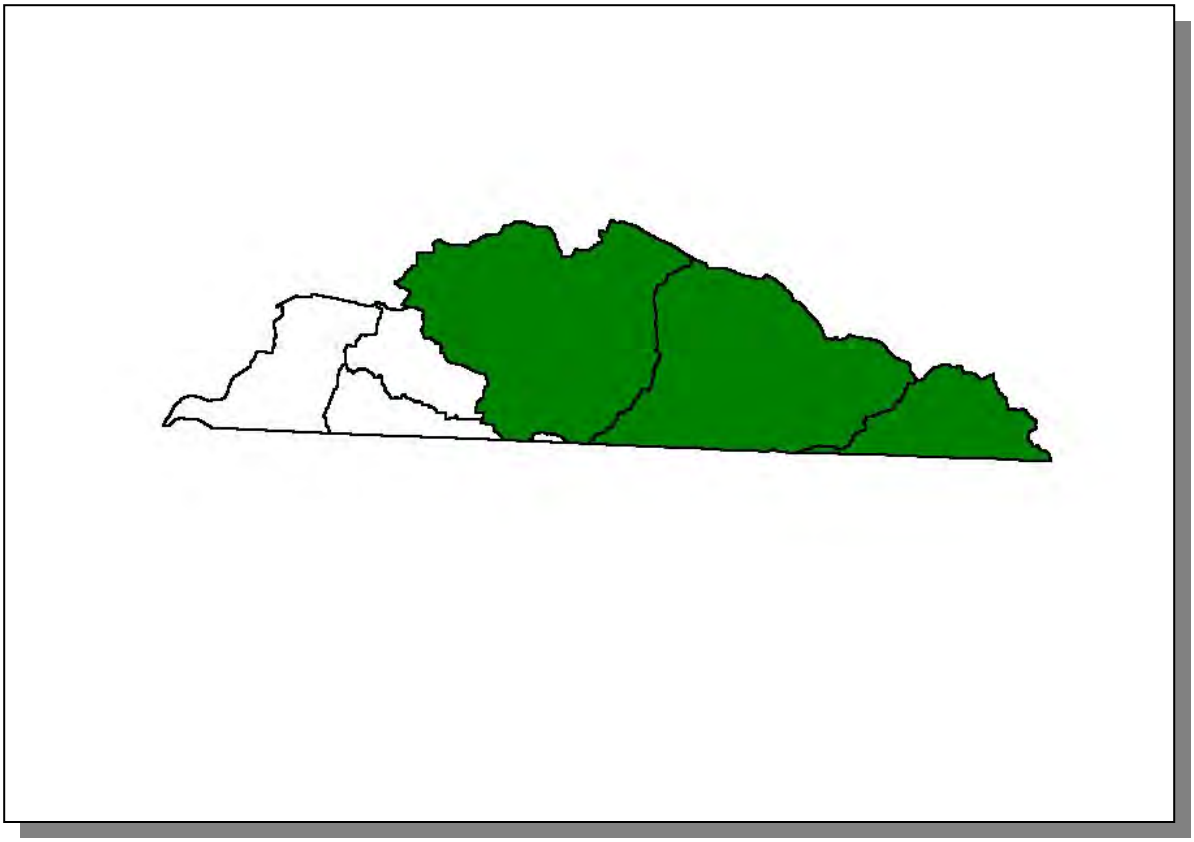

Figure 4-2. Location of Subwatershed 08010211020. *All Nonconnah Creek HUC-14 subwatershed boundaries are shown for reference.*

4.2.A.i. General Description.

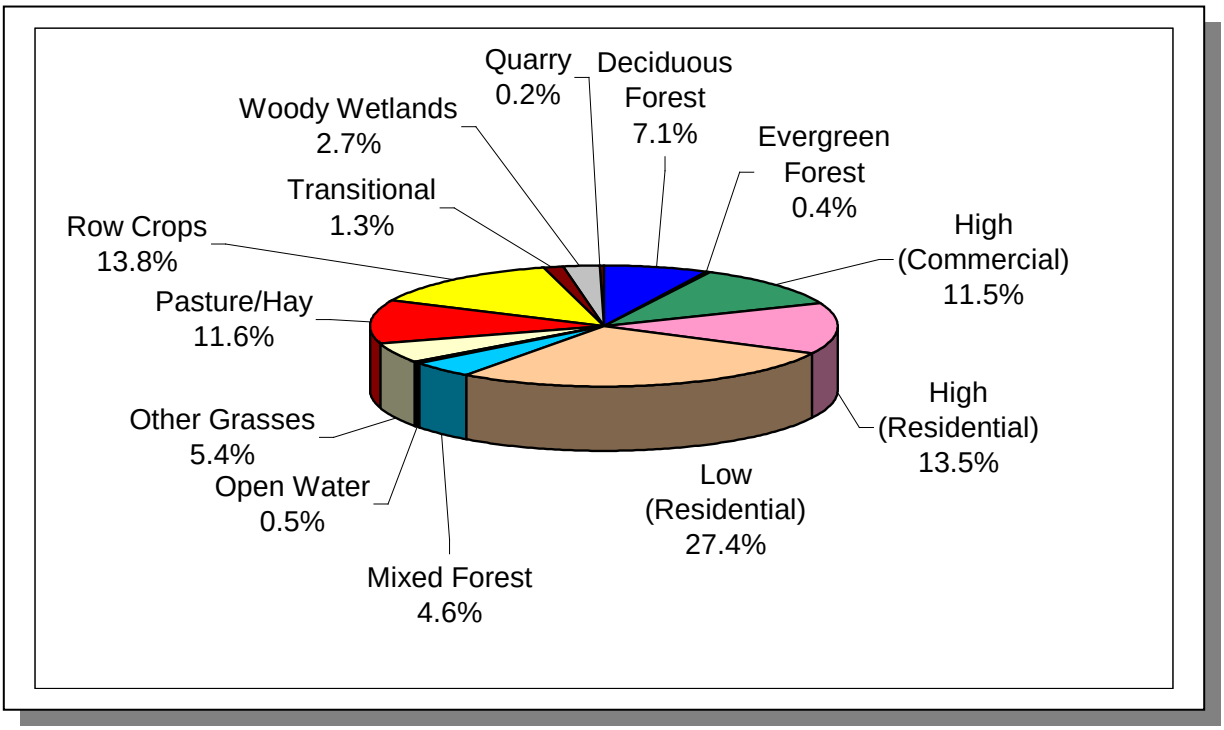

Figure 4-3. Land Use Distribution in Subwatershed 08010211020. *More information is provided in Nonconnah-Appendix IV.*

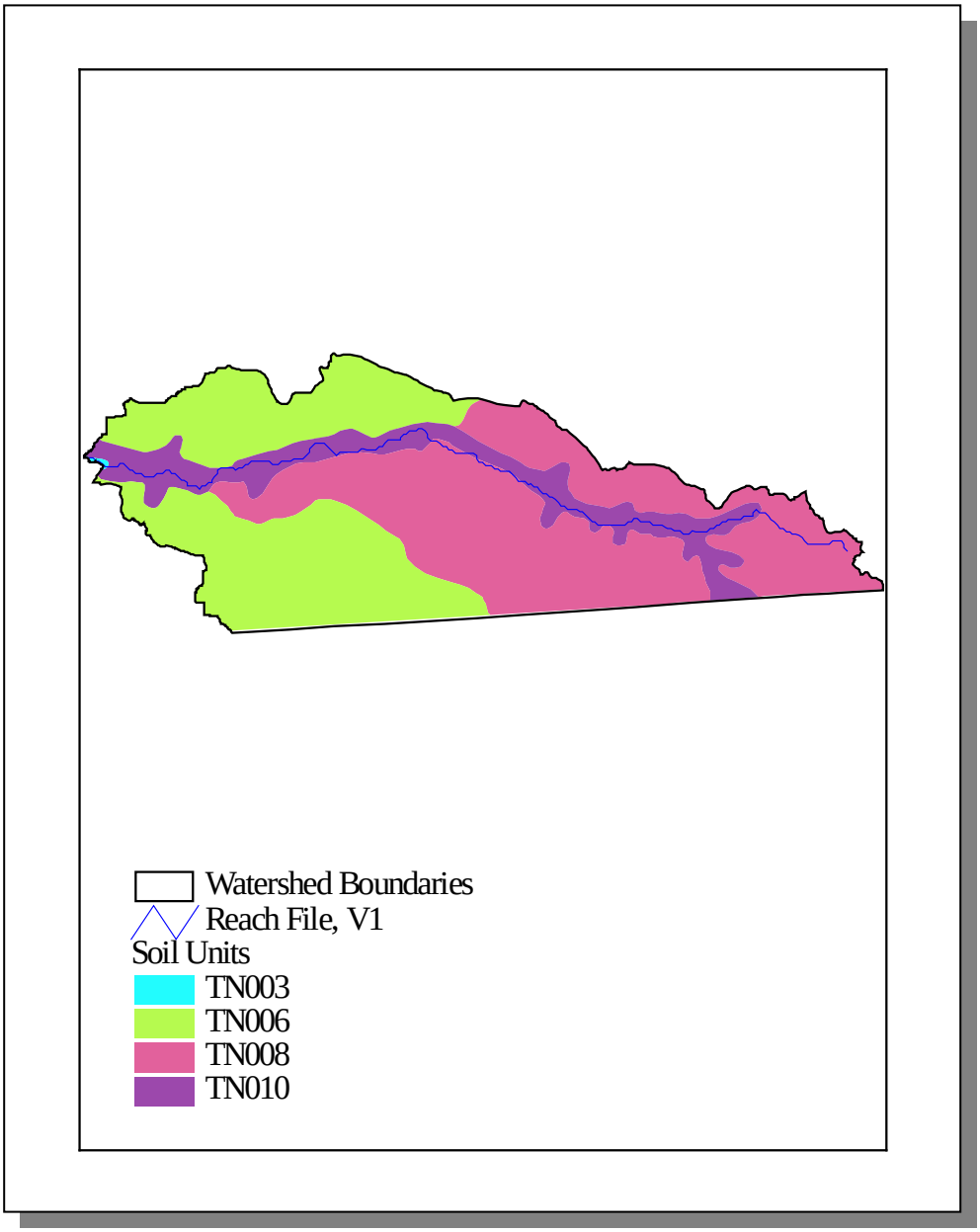

Figure 4-4. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 08010211020.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN003	62.0	C	0.50	6.65	Silty Clay	0.33
TN006	0.0	C	1.30	5.42	Silty Loam	0.48
TN008	2.0	C	1.38	5.20	Silty Loam	0.48
TN010	81.0	C	1.33	5.11	Silty Loam	0.44

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 08010211020. *More details are provided in Nonconnah-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Fayette	25,559	29,412	0.14	35	40	14.3
Shelby	826,330	865,318	17.73	146,521	153,435	4.7
Totals	**851,889**	**894,730**		**146,556**	**153,475**	**4.7**

Table 4-3. Population Estimates in Subwatershed 08010211020.

NUMBER OF HOUSING UNITS						
Populated Place	**County**	**Population**	**Total**	**Public Sewer**	**Septic Tank**	**Other**
Collierville	Shelby	14,427	4,613	4,512	84	17
Germantown	Shelby	32,893	11,131	11,017	114	0
Memphis	Shelby	610,337	248,573	247,138	793	642
Piperton	Fayette	621	256	23	224	9
Totals		**658,278**	**264,573**	**262,690**	**1,215**	**668**

Table 4-4. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 08010211020.

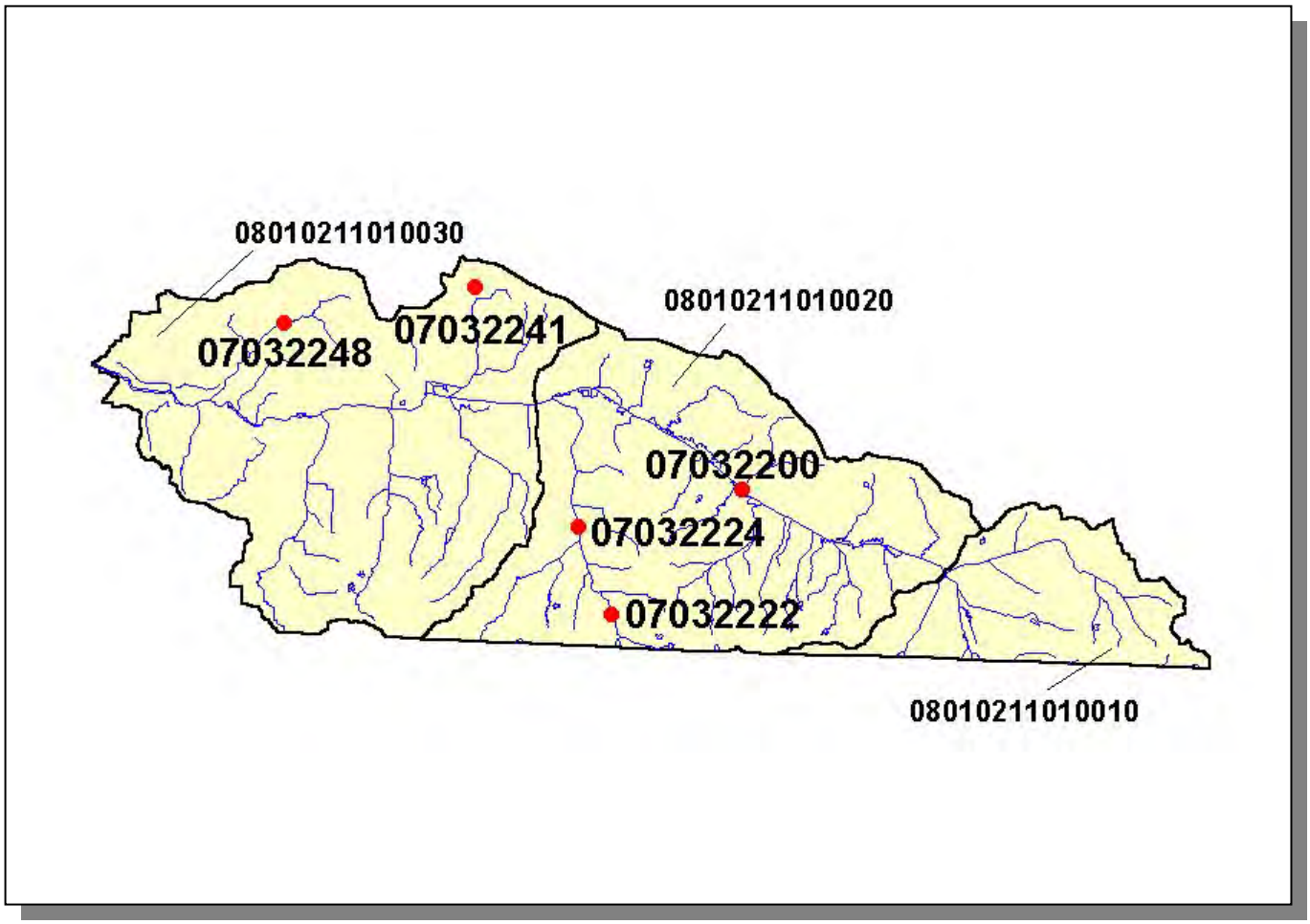

Figure 4-5. Location of Historical Streamflow Data Collection Sites in Subwatershed 08010211020. *Subwatershed 08010211010010, 08010211010020, and 08010211010030 boundaries are shown for reference. More information is provided in Nonconnah-Appendix IV.*

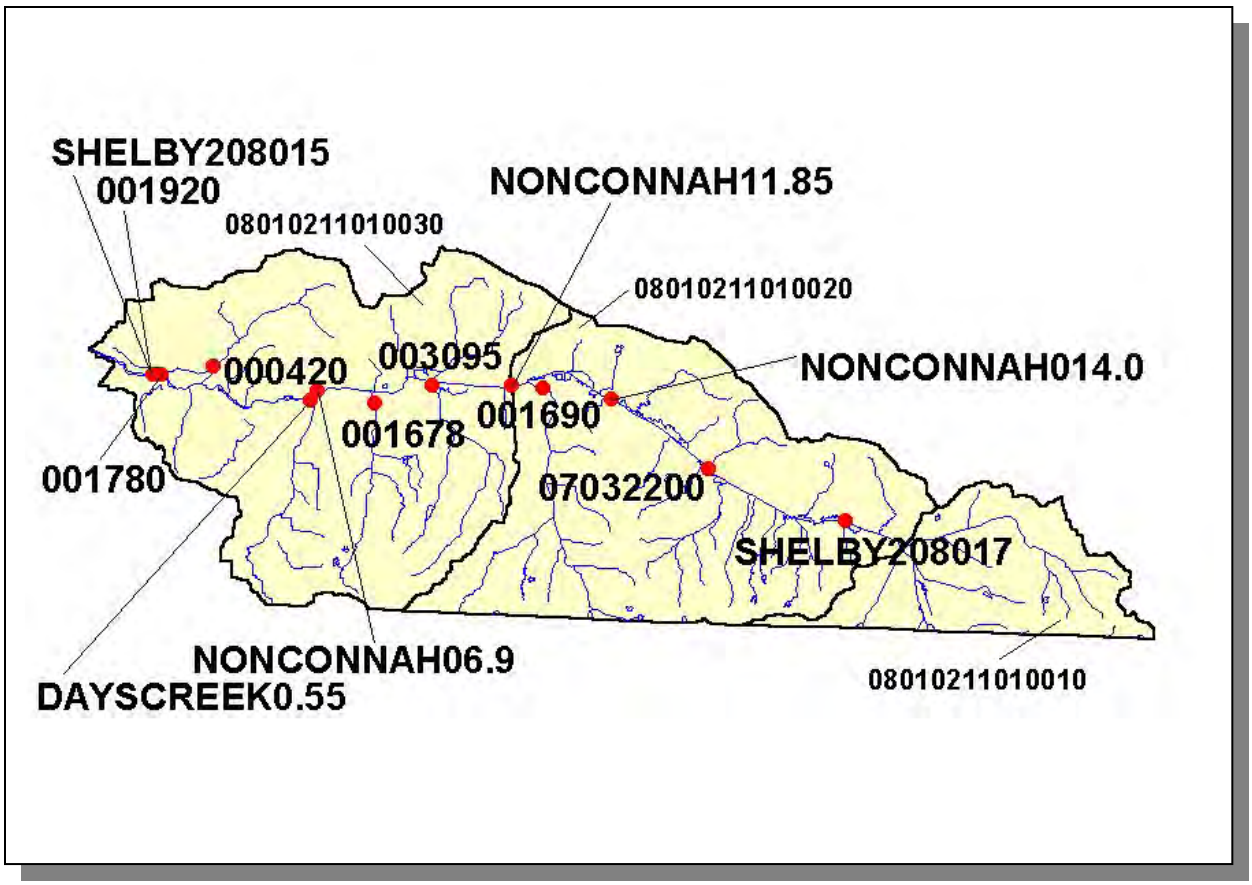

Figure 4-6. Location of STORET Monitoring Sites in Subwatershed 08010211020. *Subwatershed 08010211010010, 08010211010020, and 08010211010030 boundaries are shown for reference. More information is provided in Nonconnah-Appendix IV.*

4.2.A.ii Point Source Contributions.

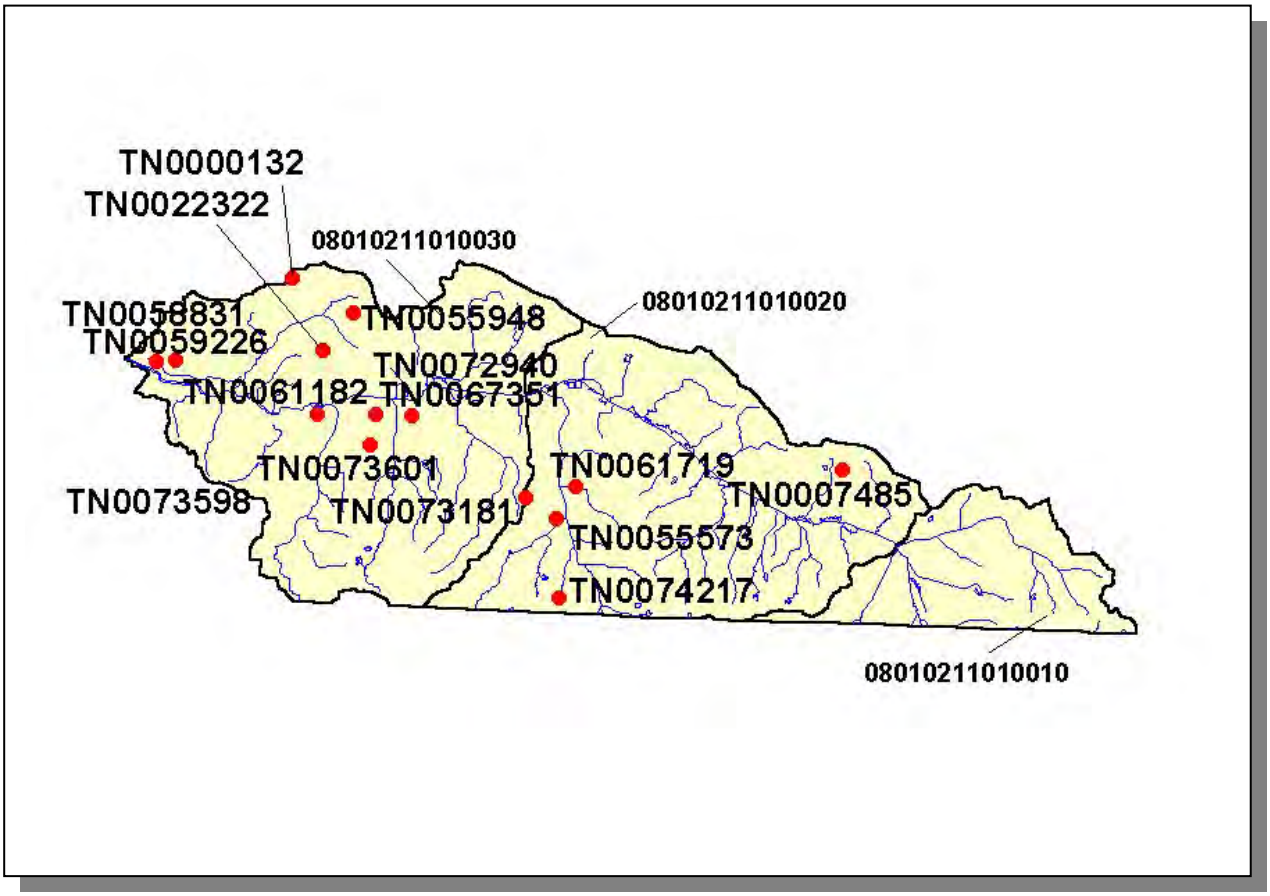

Figure 4-7. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 08010211020. *Subwatershed 08010211010010, 08010211010020, and 08010211010030 boundaries are shown for reference. More information, including the names of facilities, is provided in Nonconnah-Appendix IV.*

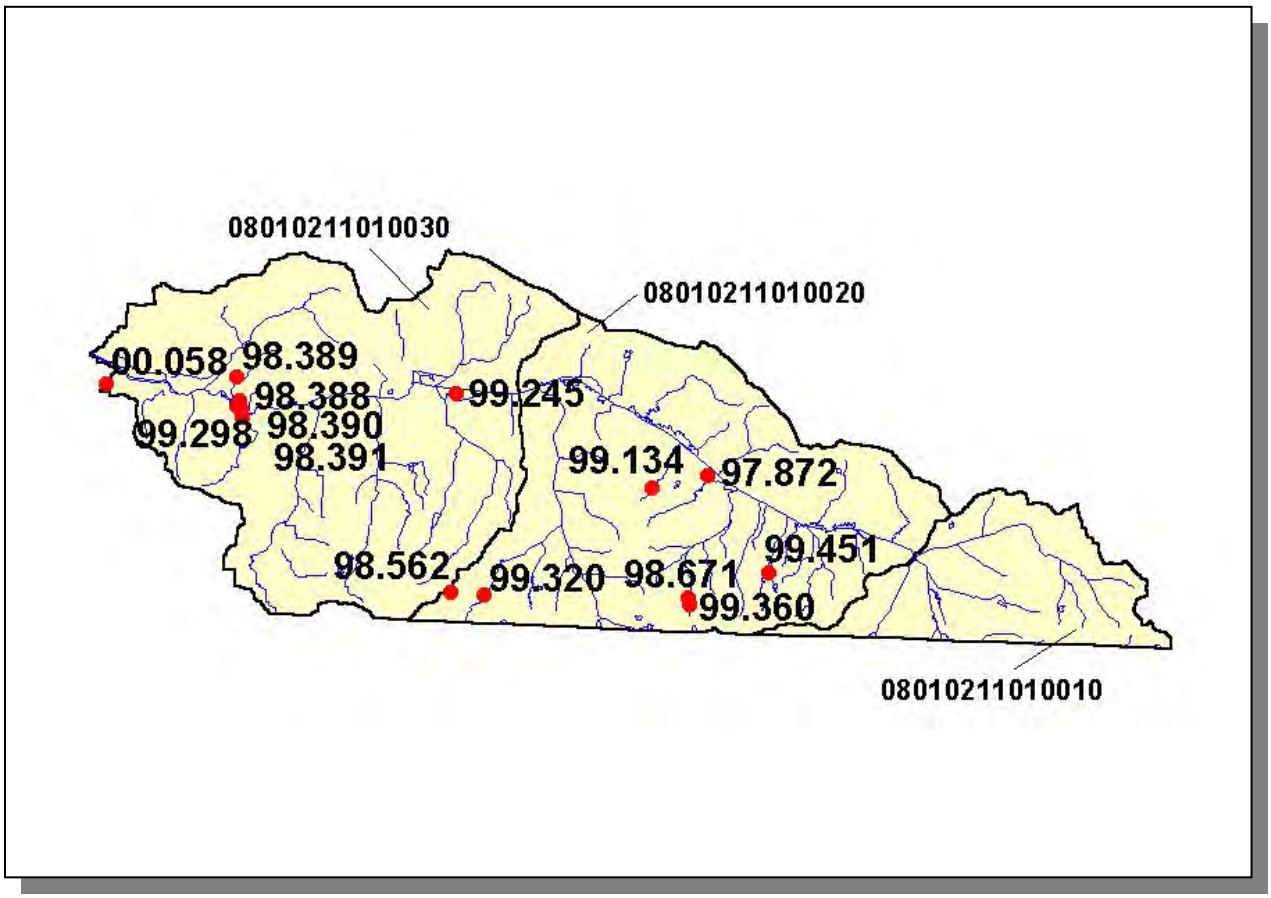

Figure 4-8. Location of ARAP Sites (Individual Permits) in Subwatershed 08010211020. *Subwatershed 08010211010010, 08010211010020, and 08010211010030 boundaries are shown for reference. More information is provided in Nonconnah-Appendix IV.*

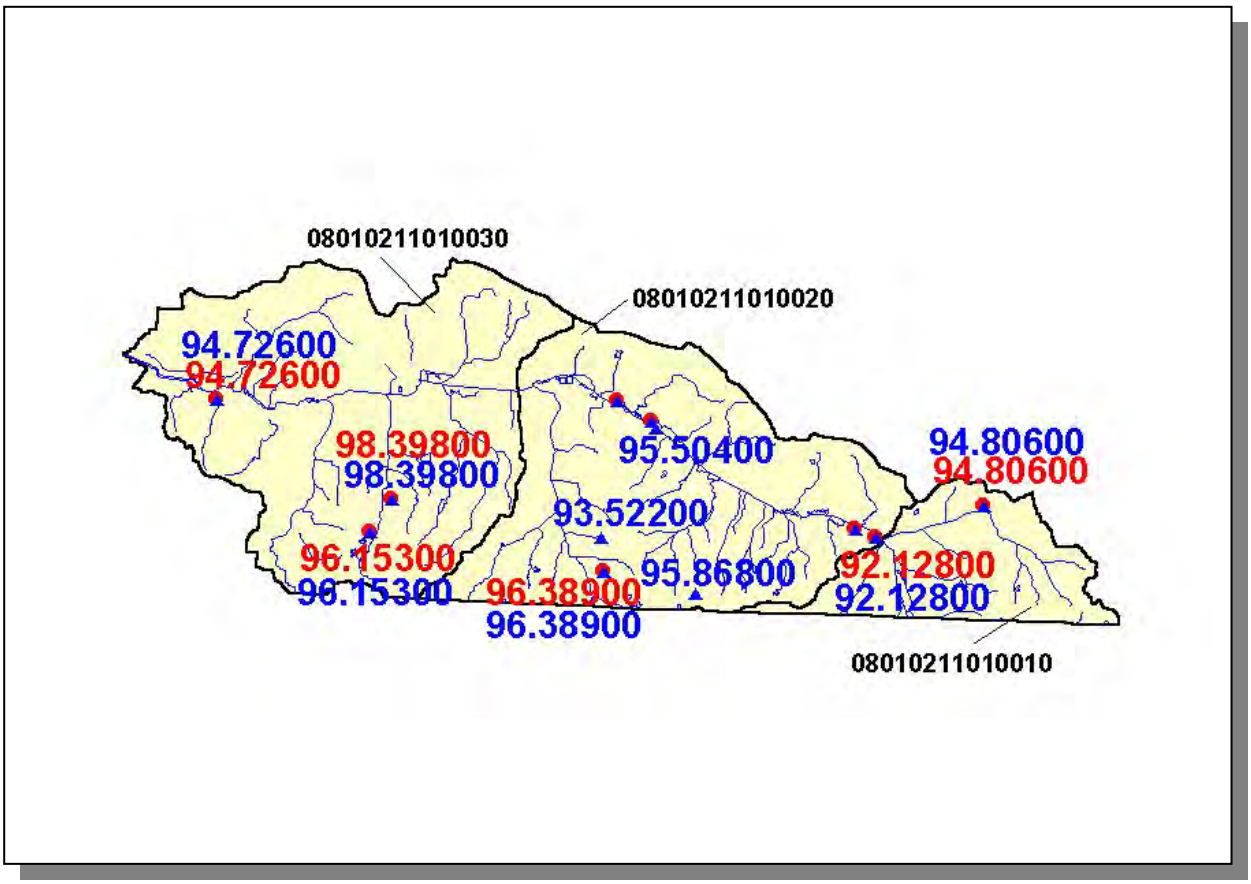

Figure 4-9. Location of Wetland Impact and Mitigation Sites in Subwatershed 08010211020. *Impact (Blue Triangle) and mitigation (Red Circle) sites are from ARAP database. Subwatershed 08010211010010, 08010211010020, and 08010211010030 boundaries are shown for reference. More information is provided in Nonconnah-Appendix IV.*

4.2.A.ii.a. Dischargers to Waterbodies Listed on the 1998 303(d) List.

There are fifteen NPDES facilities discharging to water bodies listed on the 1998 303(d) list in Subwatershed 08010211020:

- TN0000132 discharges to Mile 1.2 of a Wet Weather Conveyance to Cane Creek @ RM 2.8
- TN0022322 discharges to Nonconnah Creek @ RM 6.9
- TN0055573 discharges to Johns Creek @ RM 4.0
- TN0055948 discharges to a Wet Weather Conveyance to an Unnamed Tributary to Cane Creek @ RM 4.1
- TN0058831 discharges to Nonconnah Creek @ RM 1.25
- TN0059226 discharges to Nonconnah Creek @ RM 0.2, Latham Bayou @ Mi 1.2, and McKellar Lake @ Mi 0.5, Mi 6.2 of an Unnamed Tributary, and Mi 0.3 of a Tributary to Latham Bayou
- TN0061182 discharges to a drainage ditch to Nonconnah Creek @ RM 5.6
- TN0061719 discharges to a ditch to Johns Creek @ RM 3.6

- TN0007485 discharges to Mile 2.6 of an Unnamed Tributary to Nonconnah Creek @ RM 19.7
- TN0067351 discharges to Unnamed Tributaries to Nonconnah and Hurricane Creeks and to Hurricane Creek
- TN0072940 discharges to a Tributary to Nonconnah Creek, Days Creek, Hurricane Creek, and Nonconnah Creek
- TN0073181 discharges to Unnamed Tributary to Johns Creek @ RM 3.05
- TN0073598 discharges to a Ditch to Nonconnah Creek and to Hurricane Creek
- TN0073601 discharges to a drainage ditch to Nonconnah Creek
- TN0074217 discharges to a Drainage Ditch to Johns Creek Lateral "B"

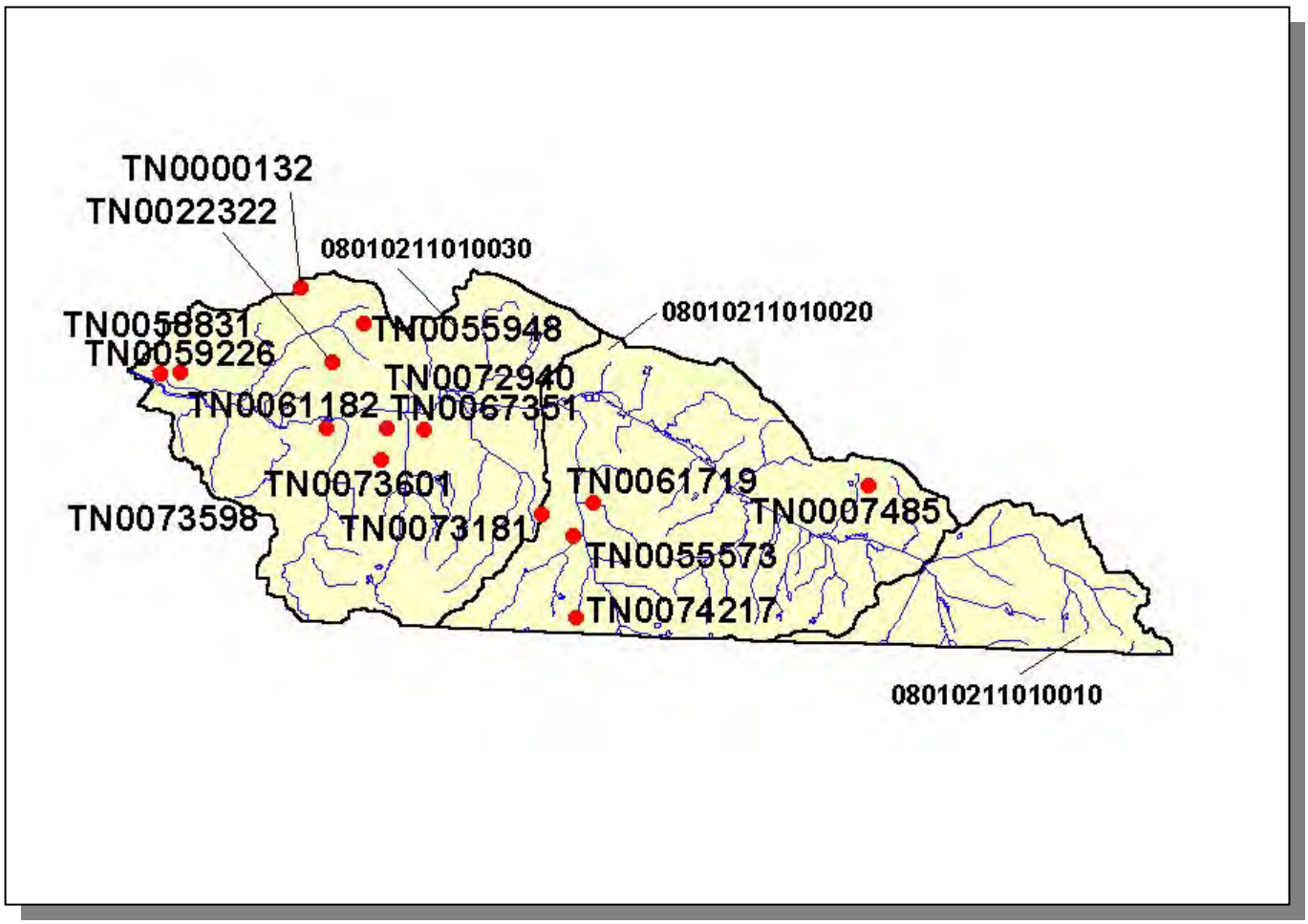

Figure 4-10. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 08010211020. *Subwatershed 08010211010010, 08010211010020, and 08010211010030 boundaries are shown for reference. The names of facilities are provided in Nonconnah-Appendix IV.*

PERMIT #	7Q10	1Q20	30Q2	QLTA	QDESIGN
TN0000132	0	0	0	2.0088	
TN0022322	0	0	0	3.36	
TN0055573	0	0	0	0.4178	
TN0055948	0	0	0	0.065	
TN0058831	0	0	0	0.0247	
TN0059226	0	0	0	0.0746	
TN0061182	0	0	0	0.0021	
TN0061719	0	0	0	0.0015	
TN0066966	0	0	0		0.007
TN0067351	0	0	0	7.58	
TN0072940	0	0	0	0.0002	
TN0073181	0	0	0	0.0012	
TN0073598	0	0	0	0.2507	
TN0073601	0	0	0	0.00053	
TN0074217	0	0	0	0.00165	

Table 4-5. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 08010211020. *Data are in million gallons per day (MGD). 30Q2 data were calculated using data in Flow Duration and Low Flows of Tennessee Streams Through 1992 .*

PERMIT #	$CBOD_5$	FECAL	NH_3	METAL
TN0055573			X	X
TN0055948	X		X	
TN0059226	X		X	
TN0061182	X			
TN0061719				X
TN0067351	X			
TN0073598	X			

Table 4-6. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 08010211020.

PERMIT #	Ag	As	Cd	Cr	Cu	Fe	Hg	Ni	Pb	Se	Zn	TRC	COD	TSS	SETTLEABLE SOLIDS	BOD
TN0000132														X		X
TN0022322														X		
TN0055573					X						X					
TN0059226												X	X			
TN0061182														X	X	
TN0061719						X										
TN0067351														X	X	X
TN0073181	X	X	X	X	X		X	X	X	X	X			X		
TN0073598														X		
TN0073601														X		
TN0074217												X		X		

Table 4-7a. Inorganic Parameters Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 08010211020.

PERMIT #	O&G	ETHYL-BENZENE	BENZENE	TOLUENE	XYLENE	PHENOL
TN0000132	X					
TN0022322	X					
TN0059226	X	X	X	X	X	X
TN0061182	X					
TN0067351	X	X	X	X	X	
TN0073598	X					
TN0073601	X					
TN0074217	X					

Table 4-7b. Organic Parameters Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 08010211020.

PERMIT #	Cu	Cr	Hg	Pb	Se	Zn	TSS	BOD	TRC	SETTLEABLE SOLIDS	DMR DATES
TN0000132								1			01/1990-09/1999
TN0022322							4				01/1995-06/2000
TN0055573	22			11		23	4		1	2	07/1990-09/1999
TN0067351							3	5			01/1998-06/2000
TN0073181	16	2	2	3	1	21	25				06/1995-06/1999
TN0073598							3	2			01/1996-06/2000
TN0074217							1		1		01/1997-12/1999

Table 4-8a. Number of Permit Violations Based on DMR Data for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 08010211020.

PERMIT #	O&G	ETHYL-BENZENE	BENZENE	TOLUENE	XYLENE	PHENOL	DMR DATES
TN0000132	8						01/1990-09/1999
TN0022322	3						01/1995-06/2000
TN0059226	6	3	1	1	1	7	01/1998-06/2000
TN0067351	2						01/1998-06/2000

Table 4-8b. Number of Permit Violations Based on DMR Data for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 08010211020.

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)			
Beef Cow	Cattle	**Chickens**	**Sheep**
205	412	14	68

Table 4-9. Summary of Livestock Count Estimates in Subwatershed 08010211020. *According to the 1997 Census of Agriculture, "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Fayette	152	152	1.1	3.3
Shelby	111.6	111.6	0	0
Totals	**263.6**	**263.6**	**1.1**	**3.3**

Table 4-10. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 08010211020.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	6.00
Soybeans (Row Crops)	12.05
Cotton (Row Crops)	10.63
Other Cropland not Planted	8.37
Grass (Pastureland)	0.36
Forest Land (Not Grazed)	0.00
Non Agricultural Land Use	0.00
Sorghum (Row Crops)	4.91
Other Vegetable and Truck Crop	5.87
Wheat (Close Grown Cropland)	4.23
Grass (Hayland)	0.09
Legume (Hayland)	4.46
Summer Fallow (Other Cropland)	12.43
Grass, Forbs, Legumes (Mixed Pasture)	0.24
Farmsteads and Ranch Headquarters	0.45
Conservation Reserve Program Land	0.79
Forest Land (Grazed)	0.00
Legume Grass (Hayland)	0.22
Fruit (Horticultural)	0.39

Table 4-11. Annual Estimated Total Soil Loss in Subwatershed 08010211020.

4.2.B. 08010211040.

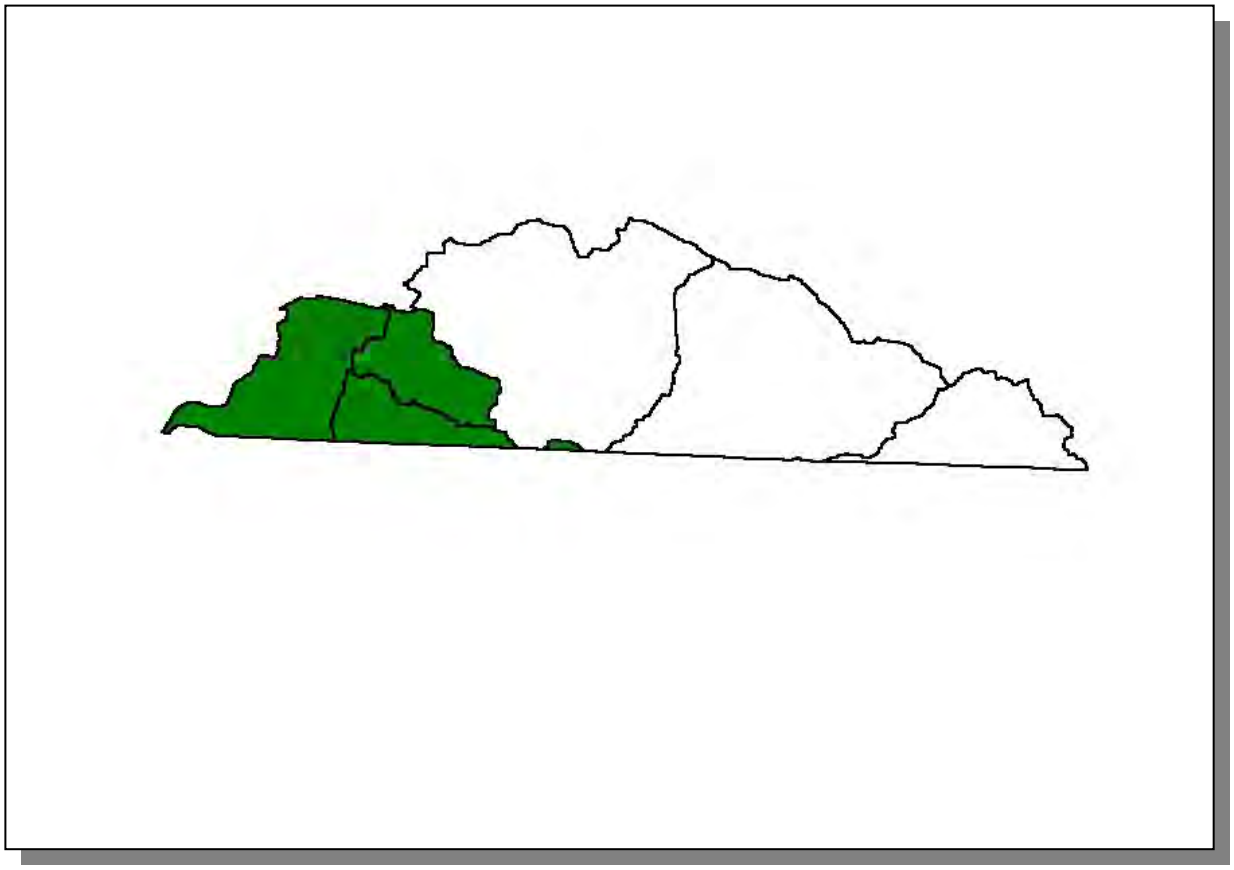

Figure 4-11. Location of Subwatershed 08010211040. *All Nonconnah HUC-14 subwatershed boundaries are shown for reference.*

4.2.B.i. General Description.

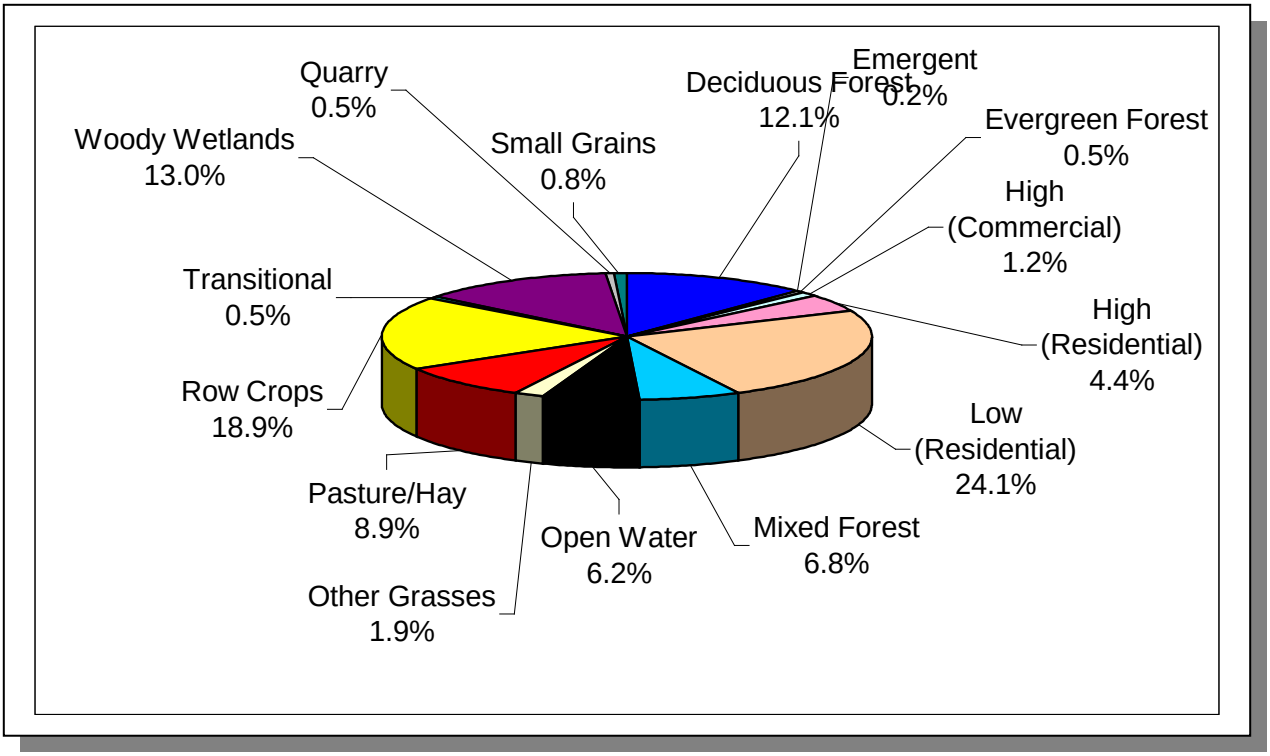

Figure 4-12. Land Use Distribution in Subwatershed 08010211040. *More information is provided in Nonconnah-Appendix IV.*

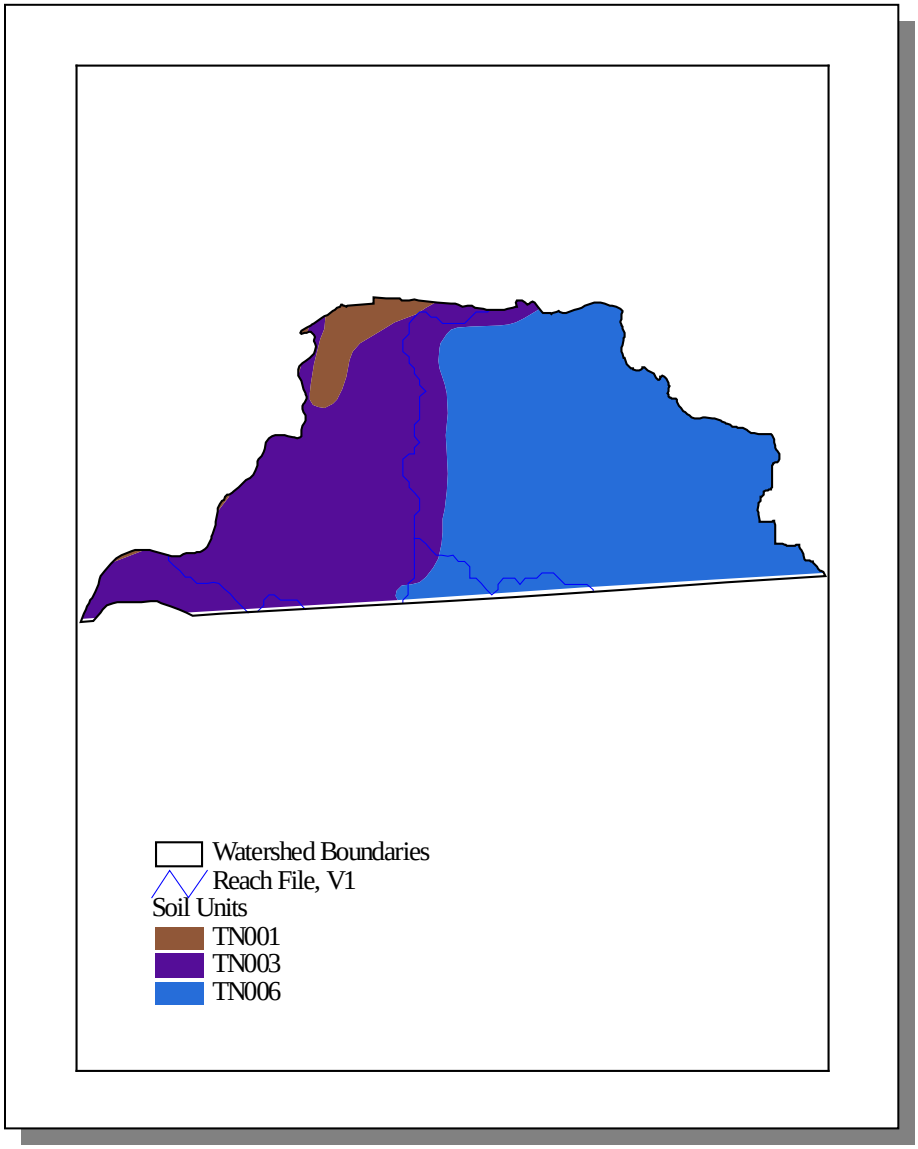

Figure 4-13. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 08010211040.

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	0.33
TN003	62.00	C	0.50	6.65	Silty Clay	0.33
TN006	0.00	C	1.30	5.42	Silty Loam	0.48

Table 4-12. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 08010211040. *More information is provided in Nonconnah-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Shelby	826,330	865,318	5.3	43,798	45,865	4.7

Table 4-13. Population Estimates in Subwatershed 08010211040.

			NUMBER OF HOUSING UNITS			
Populated Place	**County**	**Population**	**Total**	**Public Sewer**	**Septic Tank**	**Other**
Memphis	Shelby	610,337	248,573	247,138	793	642

Table 4-14. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 08010211040.

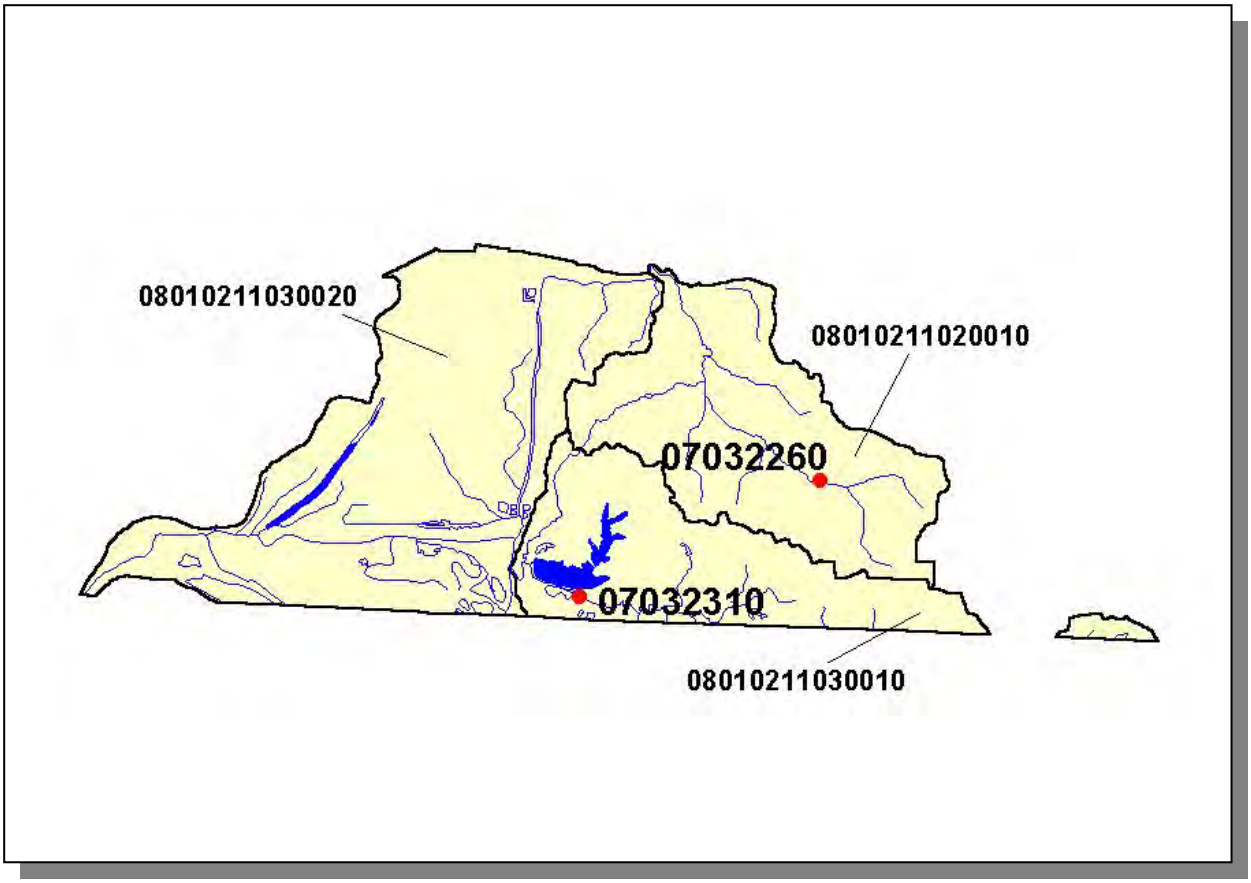

Figure 4-14. Location of Historical Streamflow Data Collection Sites in Subwatershed 08010211040. *Subwatershed 08010211020010, 08010211030010, and 08010211030020 boundaries are shown for reference. More information is provided in Nonconnah-Appendix IV.*

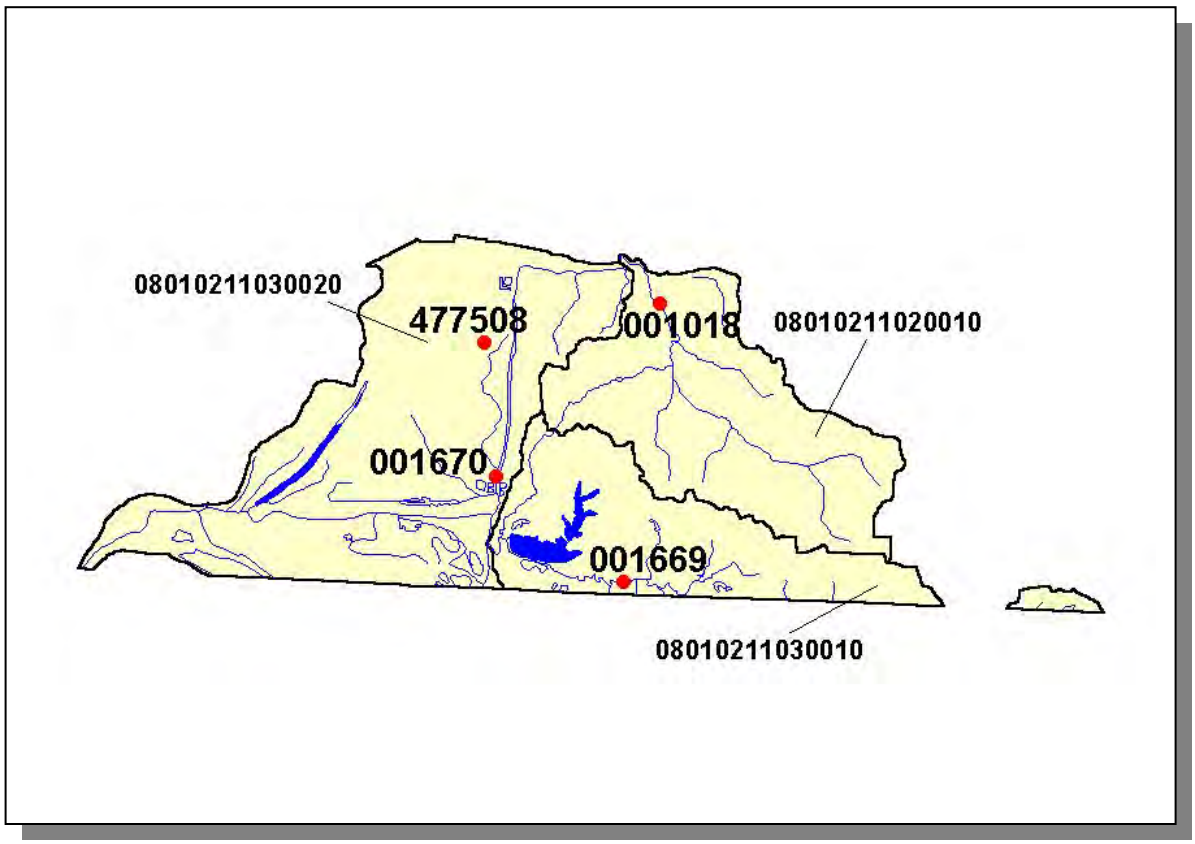

Figure 4-15. Location of STORET Monitoring Sites in Subwatershed 08010211040. *Subwatershed 08010211020010, 08010211030010, and 08010211030020 boundaries are shown for reference. More information is provided in Nonconnah-Appendix IV.*

4.2.B.ii. Point Source Contributions.

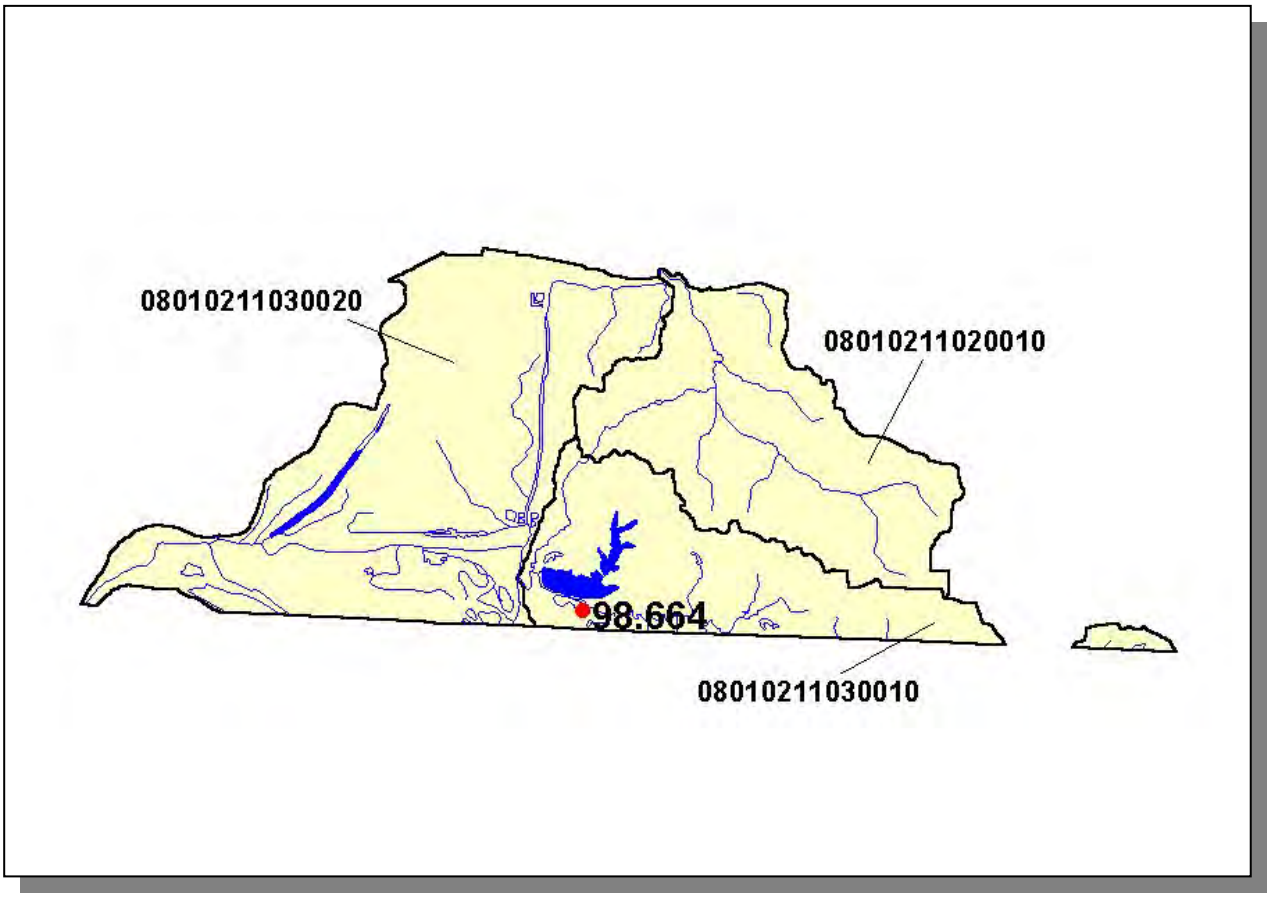

Figure 4-16. Location of ARAP Sites (Individual Permits) in Subwatershed 08010211040. *Subwatershed 08010211020010, 08010211030010, and 08010211030020 boundaries are shown for reference. More information is provided in Nonconnah-Appendix IV.*

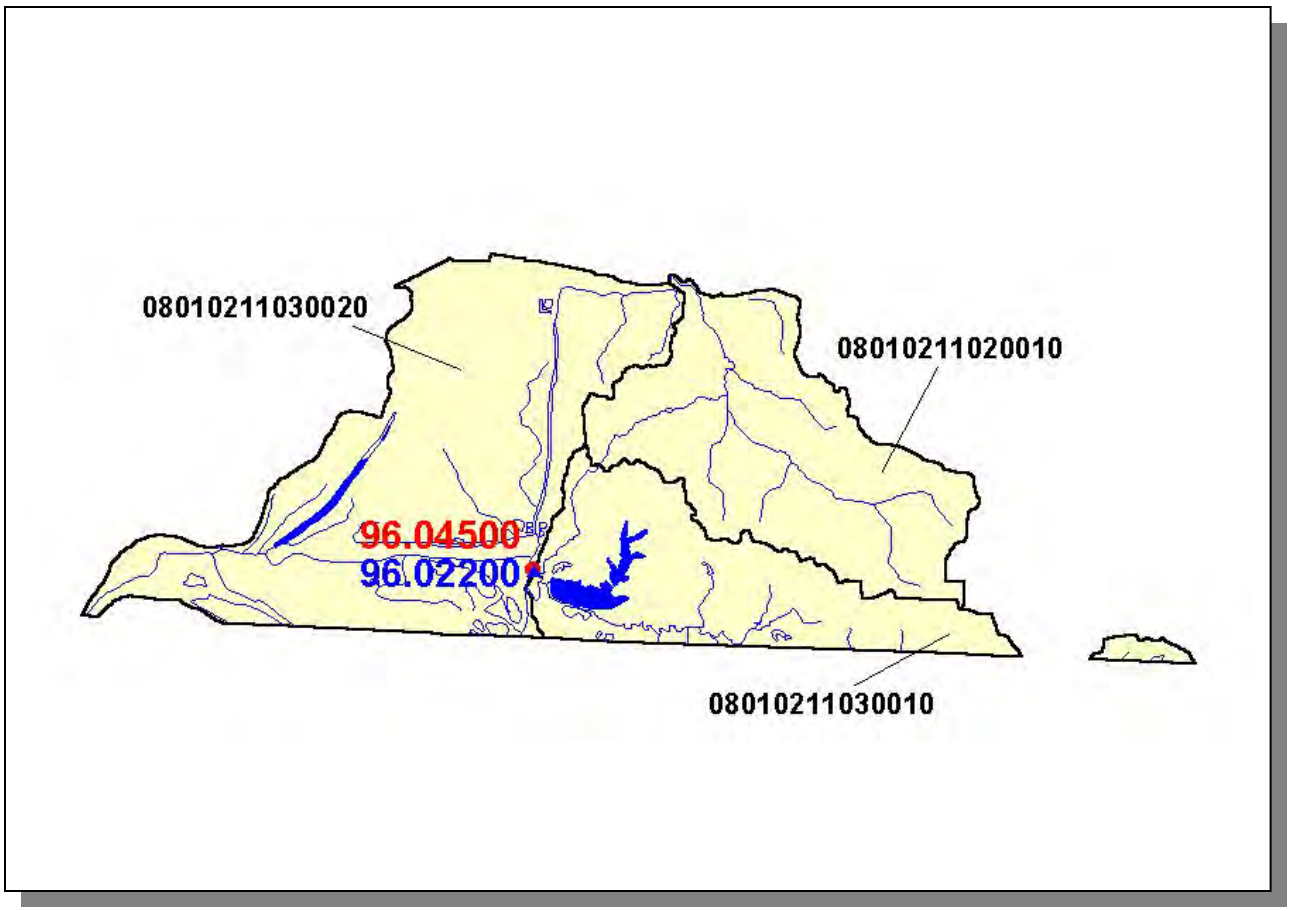

Figure 4-17. Location of Wetland Impact and Mitigation Sites in Subwatershed 08010211040. *Impact (Blue Triangle) and mitigation (Red Circle) sites are from ARAP database. Subwatershed 08010211020010, 08010211030010, and 08010211030020 boundaries are shown for reference. More information is provided in Nonconnah-Appendix IV.*

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)			
Beef Cow	**Cattle**	**Chickens**	**Sheep**
45	88	<5	17

Table 4-15. Summary of Livestock Count Estimates in Subwatershed 08010211040. *According to the 1997 Census of Agriculture, "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Shelby	111.6	111.6	0	0

Table 4-16. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 08010211040.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	5.91
Soybeans (Row Crops)	12.07
Cotton (Row Crops)	10.64
Other Cropland not Planted	8.41
Grass (Pastureland)	0.36
Forest Land (Not Grazed)	0.00
Non Agricultural Land Use	0.00
Sorghum (Row Crops)	4.91
Other Vegetable and Truck Crop	5.87
Wheat (Close Grown Cropland)	4.24
Grass (Hayland)	0.09
Legume (Hayland)	4.49
Summer Fallow (Other Cropland)	12.43
Grass, Forbs, Legumes (Mixed Pasture)	0.23
Farmsteads and Ranch Headquarters	0.45
Conservation Reserve Program Land	0.79
Forest Land (Grazed)	0.00

Table 4-17. Annual Estimated Total Soil Loss in Subwatershed 08010211040.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE NONCONNAH CREEK WATERSHED

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 Nonconnah Creek 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 Measurement System (PRMS) 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 PRMS may be viewed at http://sugarberry.itc.nrcs.usda.gov/netdynamics/deeds/index.html. From the PRMS Products Menu, select "Products," then select "Conservation Treatments." Select the desired program and parameters and choose "Generate Report."

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	ACRES
Conservation Buffer	0
Erosion Control	0
Irrigation Management	0
Nutrient Management Applied	0
Pest Management	0
Prescribed Grazing	0
Salinity and Alkalinity Control	0
Tree and Shrub Practices	0
Tillage and Residue Management	0
Wildlife Habitat Management	0
Wetlands Created, Restored, and Enhanced	0
Total	**0**

Table A5-1. Landowner Conservation Practices in Partnership with NRCS in Tennessee Portion of Nonconnah Creek Watershed. *Data are from PRMS for October 1, 1999 through September 30, 2000 reporting period.*

5.2.B. United States Geological Survey Water Resource Programs—Tennessee District.

The U.S. Geological Survey (USGS) provides relevant, objective scientific studies and information to evaluate the quantity, quality, and use of the Nation's natural resources. In addition to national assessments, the USGS also conducts hydrologic investigations in cooperation with numerous federal, state, and local agencies to address issues of local, regional, and national concern.

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 60 gaging stations equipped with recorders and makes instantaneous measurements of streamflow at many other stations. Groundwater levels are monitored statewide, and the physical, chemical and biological 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, National Stream Quality Accounting Network, and the National Water-Quality Assessment Program.

Continuous Streamflow Information—Nonconnah Creek Basin

- 07032200 Nonconnah Creek near Germantown, TN

For streamflow data, contact Donna Flohr at (615) 837-4730.

More information on the activities of the USGS can be obtained by accessing the Tennessee District home page on the World Wide Web at http://tenn.er.usgs.gov/

5.2.C. United States Army Corps of Engineers - Memphis District. Memphis is one of six Districts in the Mississippi Valley Division of the Corps of Engineers. The District's area of responsibility encompasses 25,000 square miles, portions of six states, 15 major drainage basins and approximately 3 million citizens. Responsibilities also include maintaining a 355-mile-long, 9-feet-deep by 300-feet-wide Mississippi River channel from Cairo, Illinois to the mouth of the White River in Arkansas.

The majority of the District's missions center around the Mississippi River and Tributaries Project with three primary mission areas - flood control, navigation, and environmental stewardship. The District also has regulatory authority, within its geographical boundaries, over activities involving discharge of dredged or fill material in waters of the U.S. under Section 404 of the Clean Water Act, and any activity affecting the course, condition, or capacity of navigable waters under Section 10 of the Rivers and Harbors Act.

Area Project with an Influence on Water Quality

One of the District's projects located in west Tennessee inadvertently plays a role in preserving water quality in a majority urban surrounding. The Nonconnah Creek project has a three-fold purpose: flood control, environmental enhancement, and recreation enhancement. Proposed flood control features will provide a 100-year level of protection for a highly urbanized area in Memphis, Tennessee. Part of the flood control work includes providing bank protection along critical bend ways and at bridge crossings to prevent historical channel bottom and bank erosion from polluting the stream's waters with turbidity and sediment build-ups. Some of the protective works at bridges dually perform as a low-level weir, causing a pooling effect upstream of the bridge crossings. A stabilization weir has also been constructed at the confluence of the mouth of Nonconnah Creek with McKellar Lake. The weir reduces the amount of sediment load transfer into McKellar Lake and protects the Nonconnah Creek channel banks from further erosion upstream endangering a major road and railroad crossing. Reducing the sediment load decreases the amount of annual dredging needed at the confluence with McKellar Lake by 40 percent or more.

Environmental enhancement features of the Nonconnah Creek Project include acquisition of a 33-acre wetlands area, which will naturally be converted into an outdoor classroom for area students and residents. The area will consist of a nature trail and foot bridges to allow easier access and visibility to one of the last and largest wooded stances along the creek.

Recreational features of the project include acquisition of over bank lands (by the project sponsor) adjacent to the creek for placement of bike/hike trails. Purchasing the lands will preclude future development immediately adjacent to the creek and the resulting effect of increased runoff and associated impairments to water quality.

Cooperation with the Tennessee Department of Environment and Conservation, Division of Water Pollution Control

Before a project is constructed in west Tennessee, an Environmental Assessment (EA) is conducted in the planning phase and/or in the pre-construction phase depending on

the length of time since the project was authorized for construction. The EA is reviewed by TDEC and any comments or concerns are addressed by the District in a timely manner. It has also become common practice to engage TDEC in an on-site reconnaissance of the proposed project site to address ways to safeguard water quality while constructing project features.

Environmental Education

The Memphis District is very active in environmental educational opportunities provided to local residents and students. District environmental personnel unite with the Ducks Unlimited organization and similar groups by participating in the "Great Outdoors Festival" held annually at the Agri-Center in Memphis. District personnel also attend local school career days and conduct presentations at local colleges to educate young people about the District's environmental stewardship projects proposed in the Memphis Metropolitan area and on-going projects in eastern Arkansas. The District is dedicated to providing solutions to the challenges facing the area's groundwater supply and surface water quality.

To obtain additional information about the District, please refer to the home page at: www.mvm.usace.army.mil.

5.3 STATE PARTNERSHIPS.

5.3.A. TDEC Division of Water Supply. Congress, the Environmental Protection Agency, and the states are increasing their emphasis on the prevention of pollution, particularly in the protection of the raw water sources for public water systems. The initial step toward prevention of contamination of public water supplies came with the Federal Safe Drinking Water Act Amendments of 1986. At that time, each state was required to develop a wellhead protection program to protect the water source of public water systems relying on groundwater (wells or springs). The new Source Water Assessment provisions of the Federal Safe Drinking Water Act of 1996 Amendments expanded the scope of protection beyond groundwater systems to include protection of the waters supplying surface water systems.

More information may be found at: www.state.tn.us/environment/dws

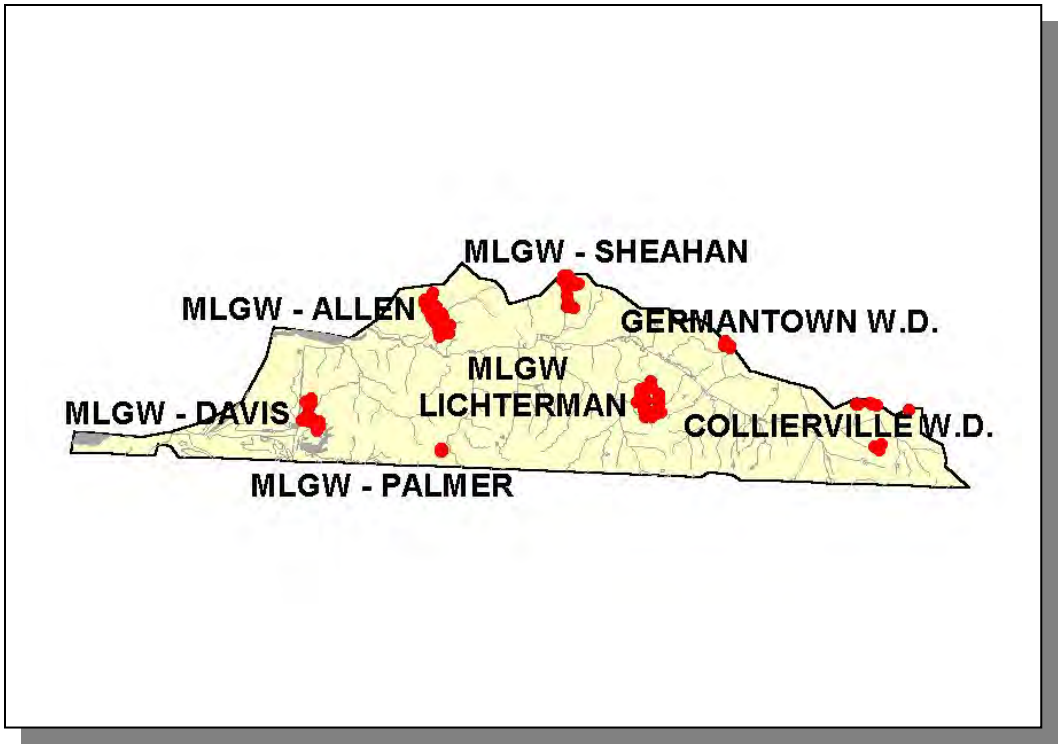

Figure A5-1. Location of Communities Using Groundwater for Water Supply in Nonconnah Creek Watershed.

A "wellhead" is the source area for the water, which is withdrawn through a well or spring, similar to the concept of the head of a river. To protect the water supply, it is important to know from where the water flowing to that well or spring is coming. Source water/wellhead protection areas for public water systems using groundwater are generally based on hydrologic considerations and/or modeling. Source water protection areas for public water systems using surface water are based on the portion of the watershed area upstream of the water intake.

There are three basic steps involved in a wellhead protection program: 1) defining the wellhead protection area, 2) inventorying the potential contaminant sources within that area, and 3) developing a wellhead protection plan. The official designation of wellhead protection areas provides valuable input and emphasis to government agencies in the siting of facilities and the prioritization and cleanup of contaminated sites.

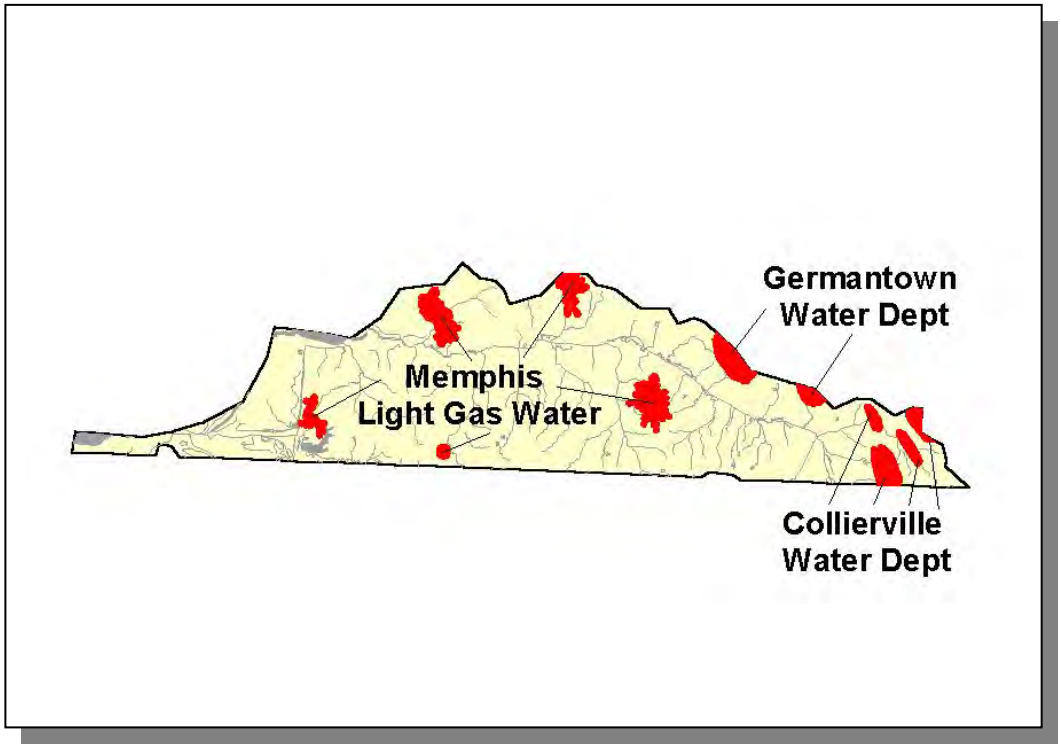

Figure A5-2. Communities in the Wellhead Protection Program in Nonconnah Creek Watershed.

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.

- 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.

The Tennessee Department of Agriculture has spent $6,384 for Agriculture BMPs in the Nonconnah Creek Watershed since 1998. Additional information is provided in Nonconnah-Appendix V.

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.

CHAPTER 6

FUTURE DIRECTIONS IN THE NONCONNAH CREEK WATERSHED

6.1 BACKGROUND.

The Watershed 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 stormwater rules (implemented under the NPDES program) are transitioning from Phase 1 to Phase 2. More information on stormwatrer 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 Nonconnah Creek 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 frequently 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: http://www.state.tn.us/environment/wpc/public.htm.

6.2.A. Year 1 Public Meeting. The first Nonconnah Creek Watershed public meeting was held October 1, 1996. 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

- Development and growth pressure
- Nonpoint source impacts on urban streams
- Floodplain encroachment
- Streambank erosion
- Contamination of groundwater from polluted surface water
- Wetland loss
- Too stringent controls on new development
- Cumulative effects of pollutants

6.2.B. Year 3 Public Meeting. The second Nonconnah Creek public meeting was held June 2, 1998 at Perimeter Park in Memphis. 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

- STP bypasses and overflows by Germantown and Collierville
- Difficult to find NPS solutions in an urban watershed
- Development and growth pressure
- Wetland loss

6.2.C. Year 5 Public Meeting. The third Nonconnah Creek Watershed public meeting was held August 20, 2002 at the Environmental Assistance Center (Memphis). The meeting featured eight educational stations:

- Draft Watershed Water Quality Management Plan
- Benthic macroinvertebrate samples and interpretation
- Smart Board with interactive GIS maps
- "Watershed Approach" (self-guided slide show)
- "How We Monitor Streams" (self-guided slide show)
- "Why We Do Biological Sampling" (self-guided slide show)
- Landowner Assistance Programs (NRCS and TDA)
- Stormwater Management Programs (City of Memphis)

In addition, citizens had the opportunity to make formal comments on the Draft Year 2002 303(d) List.

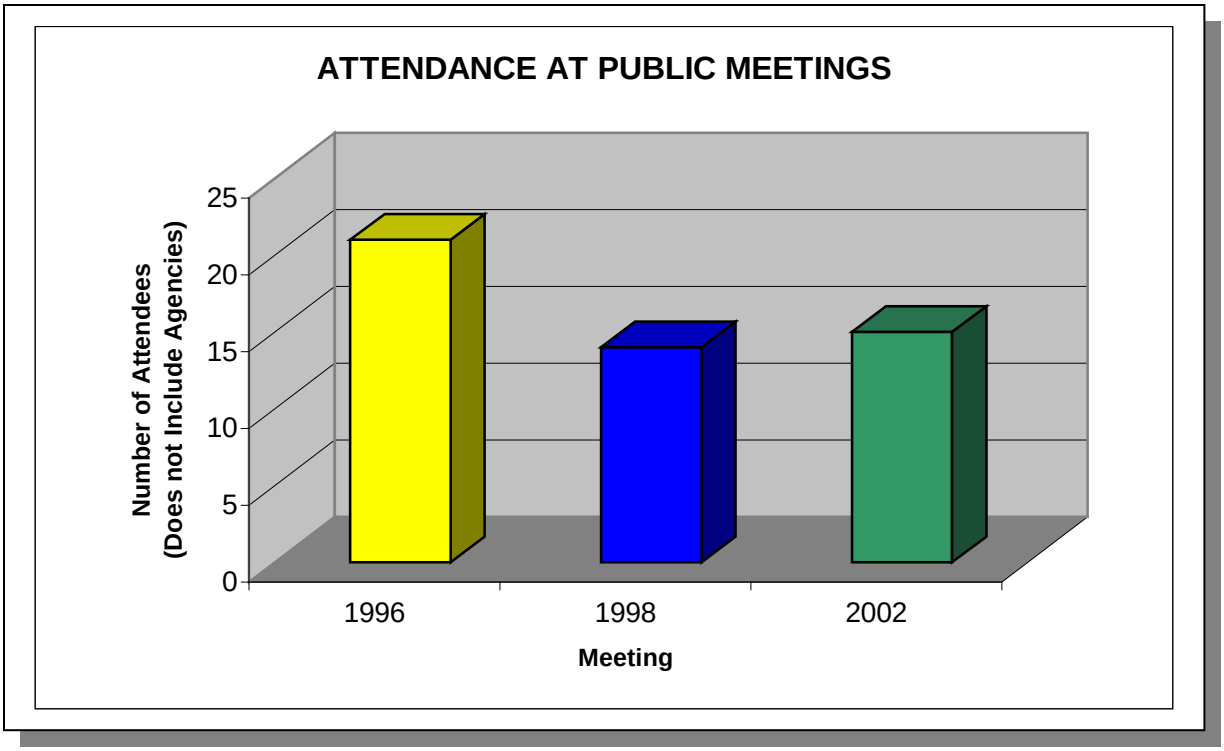

Figure 6-1. Attendance at Public Meetings in the Nonconnah Creek Watershed. *Attendance numbers do not include agency personnel.*

Figure 6-2. Participants at the Nonconnah Creek Watershed Meeting Interacted with Staff at Eight Educational Stations.

6.3. ASSESSMENT OF NEEDS.

6.3.A. Point Sources. Currently, the NPDES permitted point sources have not been found to be significant loading sources to an impacted stream in the Nonconnah Creek Watershed. The majority of these point sources are the result of noncontact coolong water discharges from industrial facilities. None of the major municipal sewage plants in the area have discharges in Nonconnah Creek or its tributaries.

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/index.html. 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.htm

> **Nonconnah Creek TMDL- Approved December 18, 2001.** Total Maximum Daily Loads (TMDLs) for fecal coliform in Nonconnah Creek Watershed located in southwestern Tennessee:
> http://www.state.tn.us/environment/wpc/Noncon05.pdf

TMDLs are prioritized for development based on many factors.

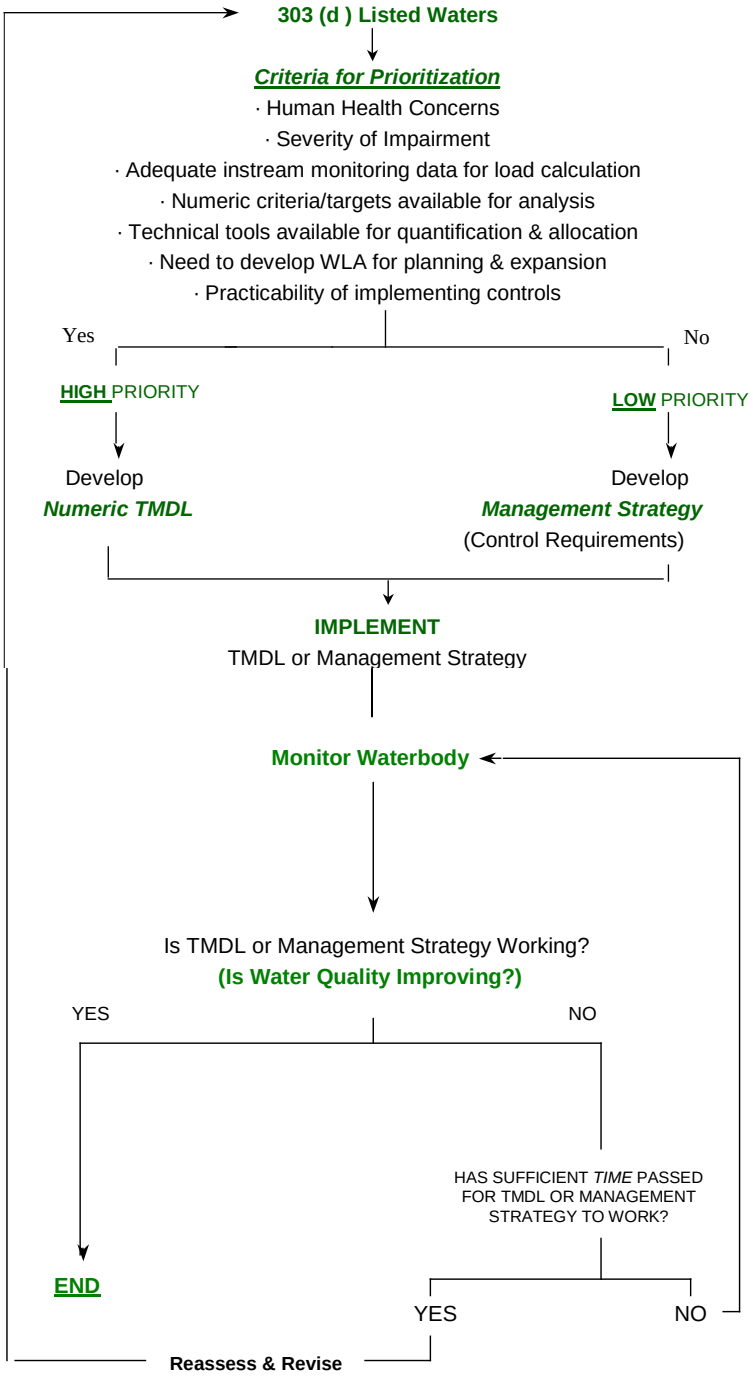

Figure 6.3. Prioritization scheme for TMDL Development.

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 and drains to a stream, existing point source regulations can have only a limited effect, so other measures are necessary.

There are several state and federal regulations that can address some of the contaminants impacting Nonconnah Creek. 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, like voluntary efforts by landowners and volunteer groups. Many agencies, including the Tennessee Department of Agriculture and 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 certain types of impairments, causes, suggested improvement measures, and control strategies. The suggested measures and streams are only examples and efforts should not be limited to only those streams and measures mentioned.

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 are disturbed. The general permit issued for such construction sites sets out conditions for maintenance of the sites to minimize pollution from stormwater, including requirements for inspection of the erosion prevention and sedimentation controls in use at the site. The general permit also imposes more stringent inspection and self-monitoring requirements on sites in the watershed of streams that are impaired due to siltation.

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. The downstream portion of Nonconnah Creek is severely impaired by siltation. Construction activities in the watershed may therefore be monitored more closely, subject to resource availability.

The same measures, which are currently required of all sites of 5 acres or more, can also be required on a site-by-site basis for smaller sites. New federal requirements will reduce the size of the sites subject to construction stormwater permitting to one acre, and local regulations may already address smaller sites. Regardless of the size, no construction site is allowed to cause a condition of pollution.

Due to population growth and development within the upper Nonconnah Creek Watershed during the last decade, sediment erosion and riparian destruction from

construction activities has become one of the main sources of stream impairment. The rapid pace of these activities have put a substantial strain on the ability of the state's limited resources to adequately inspect and monitor these sites. The establishment of local stormwater management agencies within larger urbanized areas in the next couple of years should aid in regulation and controlling runoff from construction activities. The City of Memphis currently has its own MS4 (Municipal Separate Storm Sewer System) program. Other municipalities within Shelby County are currently slated to develop their own MS4 programs as well. Part of the mandate for these MS4 programs will be to draft zoning and building codes designed to address sediment pollution.

Additional non-regulatory strategies for controlling sediment runoff for residents to consider include the immediate re-vegetation of any bare area, including ditches beside driveways, and the covering of topsoil piles.

6.3.B.i.b. From Channel and/or Bank Erosion. Due to past channelization of portions of Nonconnah Creek and many of its tributaries, the channels are unstable. Many channels in the watershed are incising at a rapid rate. Methods or controls that might be necessary to address these problems are:

Strategies

- Re-establishment of bank vegetation, primarily along the main stem of Nonconnah Creek.
- Better community planning of development impacts on small streams, especially development in rapidly growing areas (examples are Johns Creek, Tenmile Creek, and unnamed tributaries to Nonconnah Creek).
- Restrictions requiring post construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion, (for example, the main stem Nonconnah Creek).
- Prohibition on clearing of stream banks.
- Additional restriction to road and utilities crossings of streams.
- Restrictions on the use of off-highway vehicles on stream banks and in stream channels.

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, and fecal matter in streams and storm drains due to pets, livestock and wildlife. Permits issued by the Division of Water Pollution Control regulate discharges from point sources. These permits require adequate control of these sources, and require subsurface, on-site treatment (i.e., septic tank and field lines) if public sewers are not available. Septic tank and field lines in the Nonconnah Creek watershed are regulated by the Memphis Shelby County Health Department. 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 disposal.

Other measures that may be necessary to control pathogens are:

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

- Timely and appropriate enforcement for non-complying sewage treatment plants, large and small, and their collection systems.
- Greater efforts by sewer utilities to identify leaking lines or overflowing manholes particularly along the main stem of Nonconnah Creek.
- Restrict development in areas where sewer is not available to those sites with appropriate soils.
- Discourage the creation of "duck holes" that attract waterfowl.
- Develop and enforce leash laws and controls on pet fecal material.

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 and from fertilized lawns and croplands.

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.
- Use grassed drainageways 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. Johns Creek, Tenmile Creek, Cane Creek, Hurricane Creek, and the main stem of Nonconnah Creek suffer from canopy removal.
- Discourage impoundments. Ponds and lakes do not aerate water. *Note: Permits are required for any work on a stream, including impoundments.*

6.3.B.iv. Toxins and Other Materials.

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 examples of pollution in streams. Some can be addressed by:

Voluntary activities

- Providing public education.
- Painting warnings on storm drains that connect to a stream.
- Sponsoring community clean-up days.
- Landscaping of public areas.
- Encouraging public surveillance of their streams and reporting of dumping activities to their local authorities.

Needing regulation

- Prohibition of illicit discharges to storm drains (local MS4 programs will help address this).
- Litter laws and stronger 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.

Most of the tributaries in the lower reaches of Nonconnah Creek within Memphis city limits have been concrete lined. This contributes to erosion problems in the downstream sections of the natural portions of the channels due to increased velocities in the concrete portion. Examples of streams affected by habitat alteration are Black Bayou, Days Creek, Johns Creek, and Tenmile Creek. A large portion of Hurricane Creek flows through Memphis International Airport and has been severely impacted by habitat alteration. Much of the channel is lined with concrete, and some areas have concrete structures to control the flow and create pools.

Measures that can help address this problem are:

Voluntary activities

- Sponsoring litter pickup days to remove litter that might enter streams.
- Organizing stream cleanups removing trash, limbs and debris before they cause blockage.
- Avoiding use of heavy equipment to "clean out" streams.
- Planting vegetation along streams to stabilize banks and provide habitat.
- Encouraging developers to avoid extensive culverts in streams and the relocation of stream channels. *Permits are required for these activities in stream channels.*

Current regulations

- Restrict modification of streams by such means as culverting, lining, relocating, or impounding.
- Require mitigation for impacts to streams and wetlands when modifications are allowed.

Additional Enforcement

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

APPENDIX II

ID	NAME	HAZARD
797029	MCKELLAR PARK LAKE 'A'	2
797030	MCKELLAR PARK LAKE 'B'	2
797035	HAMILTON	L
797040	JAMIESON	L
797041	NOLAN	B
797044	AINTREE FARMS LK (HUNT)	2
797047	DOUGLAS	3
797056	GILL (OLD OPTIMIST CAMP)	S
797059	MAY	S
797066	CORO LK	2
797068	MALLARD LAKE	2
797071	COWARD	L
797079	LAKE BENNINGTON	1
797084	WATERGROVE	3
797086	RIVERDALE PLAZA	O
797089	WILLOUGHBY WOODS	2
797091	ROBCO	Q
797095	STANSELL "A"	O

Table A2-1. Inventoried Dams in the Nonconnah Creek Watershed. *Hazard Codes: F, Federal; High (H, 1); Significant, (S, 2); Low, (L, 3); Breached, (B); O, Too Small. TDEC only regulates dams indicated by a numeric hazard score.*

LAND COVER/LAND USE	SQUARE MILES	% OF WATERSHED
Open Water	6.6	2.5
Forested Wetlands	8.0	4.3
Nonforested	0.8	0.4
Pasture	63.0	32.9
Cropland	3.3	1.7
Scrub Shrub	0.0	0.0
Deciduous Forest	31.6	16.4
Mixed Forest	0.3	0.2
Coniferous Forest	0.0	0.0
Urban	78.7	41.6
Barren Land	0.0	0.0
Strip Mines	0.0	0.0
Cloud/Shadow	0.0	0.0
Forested Dead Wetlands	0.0	0.0
Total	**192.4**	**100.0**

Table A2-2. Land Use Distribution in Nonconnah Creek 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)
Northern Mississippi Alluvial Plain (73a)	Cold Creek	Mississippi	(08010100)
	Middle Fork, Forked Deer River	Mississippi	(08010100)
Bluff Hills (74a)	Sugar Creek	Mississippi	(08010100)
	Paw Paw Creek	Lower Obion	(08010202)
	Unnamed Trib to Running Reelfoot Bayou	Lower Obion	(08010202)
Loess Plains (74b)	Terrapin Creek	Lower Obion	(08010202)
	Powell Creek	Lower Obion	(08010202)
	Wolf River	Wolf	(08010210)

Table A2-3. Ecoregion Monitoring Sites in Level IV Ecoregions 73a, 74a, and 74b.

CODE	NAME	AGENCY	AGENCY ID
483	TDEC/WPC BYHALIA ROAD PERMIT SITE	TDEC/WPC	
515	TDEC/WPC NONCONNAH CREEK PERMIT SITE	TDEC/WPC	
1283	USACOE HACKS CROSS ROAD I50 AC SITE	USACOE-MEMPHIS	
1295	USACOE HORN LAKE CREEK 95-017 [TS] SITE	USACOE-MEMPHIS	
1296	USACOE HORN LAKE CREEK 96-000 [TF] SITE	USACOE-MEMPHIS	
1299	USACOE JOHNS CREEK 95-000 [TF] SITE	USACOE-MEMPHIS	
1300	USACOE JOHNS CREEK 95-002 [TF] SITE	USACOE-MEMPHIS	
1301	USACOE JOHNS CREEK 95-003 [TF] SITE	USACOE-MEMPHIS	
1302	USACOE JOHNS CREEK 96-000 [TD] SITE	USACOE-MEMPHIS	
1303	USACOE JOHNS CREEK 96-003 [TF] SITE	USACOE-MEMPHIS	
1304	USACOE JOHNS CREEK 96-004 [TF] SITE	USACOE-MEMPHIS	
1324	USACOE MCKELLAR LAKE 95-003 [TF] SITE	USACOE-MEMPHIS	
1326	USACOE MCKELLAR LAKE 95-007 [TF] SITE	USACOE-MEMPHIS	
1327	USACOE MCKELLAR LAKE 96-000 [TF] SITE	USACOE-MEMPHIS	
1328	USACOE MCKELLAR LAKE 96-001 [TF] SITE	USACOE-MEMPHIS	
1339	USACOE MISSISSIPPI RIVER 94-005 [TD] SITE	USACOE-MEMPHIS	
1349	USACOE NONCONNAH CREEK SITE	USACOE-MEMPHIS	
1350	USACOE NONCONNAH CREEK SITE	USACOE-MEMPHIS	
1351	USACOE NONCONNAH CREEK-64 (TF) SITE	USACOE-MEMPHIS	
1352	USACOE NONCONNAH CREEK 94-000 [TD] SITE	USACOE-MEMPHIS	
1353	USACOE NONCONNAH CREEK 94-001 [TF] SITE	USACOE-MEMPHIS	
1354	USACOE NONCONNAH CREEK 94-002 [TF] SITE	USACOE-MEMPHIS	
1355	USACOE NONCONNAH CREEK 94-004 [TF] SITE	USACOE-MEMPHIS	
1356	USACOE NONCONNAH CREEK 94-005 [TF] SITE	USACOE-MEMPHIS	
1357	USACOE NONCONNAH CREEK 94-006 [TD] SITE	USACOE-MEMPHIS	
1358	USACOE NONCONNAH CREEK 95-004 [TS] SITE	USACOE-MEMPHIS	
1359	USACOE NONCONNAH CREEK 95-011 [TS] SITE	USACOE-MEMPHIS	
1360	USACOE NONCONNAH CREEK 95-012 [TF] SITE	USACOE-MEMPHIS	
1361	USACOE NONCONNAH CREEK 95-014 [TD] SITE	USACOE-MEMPHIS	
1362	USACOE NONCONNAH CREEK 95-019 [TF] SITE	USACOE-MEMPHIS	
1363	USACOE NONCONNAH CREEK 95-026 [TD] SITE	USACOE-MEMPHIS	
1364	USACOE NONCONNAH CREEK 96-002 [TF] SITE	USACOE-MEMPHIS	
1365	USACOE NONCONNAH CREEK 96-006 [TF] SITE	USACOE-MEMPHIS	
1366	USACOE NONCONNAH CREEK 96-011 [TF] SITE	USACOE-MEMPHIS	
1367	USACOE NONCONNAH CREEK 96-012 [TD] SITE	USACOE-MEMPHIS	
1368	USACOE NONCONNAH CREEK 96-014 [TF] SITE	USACOE-MEMPHIS	
1369	USACOE NONCONNAH CREEK 96-015 [TF] SITE	USACOE-MEMPHIS	
1370	USACOE NONCONNAH CREEK 96-016 [TF] SITE	USACOE-MEMPHIS	
1371	USACOE NONCONNAH/HURRICANE CREEK-52A (FL) SITE	USACOE-MEMPHIS	
1493	USACOE-LMM MCKELLAR LAKE 95-007 [TF]	USFWS	
1679	USACOE NONCONNAH CREEK-56-TD SITE	USACOE-MEMPHIS	
1680	USACOE NONCONNAH CREEK-62 (TF) SITE	USACOE-MEMPHIS	
1681	USACOE NONCONNAH CREEK-64 (TF) SITE	USACOE-MEMPHIS	
1683	USACOE NONCONNAH CREEK 94-001 [TF] MITIGATION SITE	USACOE-MEMPHIS	
1684	USACOE NONCONNAH CREEK 94-001 [TF] SITE	USACOE-MEMPHIS	
1685	USACOE JOHNS CREEK-2 SITE	USACOE-MEMPHIS	
1686	USACOE NONCONNAH CREEK/TEN MILE CREEK-32 SITE	USACOE-MEMPHIS	
1687	USACOE (MEMPHIS) REGULATORY BRANCH SITE	USACOE-MEMPHIS	
1688	USACOE NONCONNAH CREEK-25 SITE	USACOE-MEMPHIS	
1689	USACOE NONCONNAH CREEK-27 SITE	USACOE-MEMPHIS	
1690	USACOE NONCONNAH CREEK, QUINCE ROAD SITE	USACOE-MEMPHIS	

CODE	NAME	AGENCY	AGENCY ID
1691	USACOE NONCONNAH CREEK-33 SITE	USACOE-MEMPHIS	
1692	USACOE NONCONNAH CREEK-37 SITE	USACOE-MEMPHIS	
1693	USACOE NONCONNAH CREEK-39 SITE	USACOE-MEMPHIS	
1694	USACOE NONCONNAH CREEK-40	USACOE-MEMPHIS	
1695	USACOE NONCONNAH CREEK-43 SITE	USACOE-MEMPHIS	
1696	USACOE NONCONNAH CREEK-4 SITE	USACOE-MEMPHIS	
1697	USACOE NONCONNAH CREEK-7 SITE	USACOE-MEMPHIS	
1698	USACOE NONCONNAH CREEK-12 SITE	USACOE-MEMPHIS	
1699	USACOE NONCONNAH CREEK-14 SITE	USACOE-MEMPHIS	
1700	USACOE NONCONNAH CREEK-16 SITE	USACOE-MEMPHIS	
1701	USACOE NONCONNAH CREEK-20	USACOE-MEMPHIS	
1787	USACOE-REGULATORY BRANCH-MEMPHIS SITE	USACOE-MEMPHIS	
1788	USACOE NONCONNAH CREEK-34 SITE	USACOE-MEMPHIS	
1789	USACOE NONCONNAH CREEK-42 SITE	USACOE-MEMPHIS	
1790	USACOE NONCONNAH CREEK-47 SITE	USACOE-MEMPHIS	
1791	USACOE NONCONNAH CREEK-2 SITE	USACOE-MEMPHIS	
1792	USACOE NONCONNAH CREEK-15 SITE	USACOE-MEMPHIS	
1793	USACOE NONCONNAH CREEK-18 SITE	USACOE-MEMPHIS	
1845	NRCS SITE	NRCS STATE OFC	
2575	TWRA WOLF RIVER SITE	TWRA	
2784	USACOE NONCONNAH CREEK 96-067 [TS] SITE	USACOE-MEMPHIS	960340670
2788	USACOE JOHN'S CREEK 96-054 [TS] SITE	USACOE-MEMPHIS	960300510
2789	USACOE NONCONNAH CREEK 97-061 [TD] SITE	USACOE-MEMPHIS	970340610
2790	USACOE NONCONNAH CREEK 97-088 [TD] SITE	USACOE-MEMPHIS	970340880
2794	USACOE NONCONNAH CREEK 98-080 [TD] SITE	USACOE-MEMPHIS	980340800
2795	USACOE NONCONNAH CREEK 98-096 [TF] SITE	USACOE-MEMPHIS	980340960

Table A2-4. Wetland Sites in Nonconnah Creek Watershed in TDEC Database. *TDEC, Tennessee Department of Environment and Conservation; WPC, Water Pollution Control; USACOE, United States Army Corps of Engineers, USFWS, United States Fish and Wildlife Service; TWRA, Tennessee Wildlife Resources Agency.*

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Cypress Creek	TN08010211007_1000	18.2
Horn Lake Creek	TN08010211001_2000	5.2

Table A3-1a. Streams Partially Supporting Designated Uses in Nonconnah Creek Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Days Creek	TN0801021100711_0600	10.6
Hurricane Creek	TN0801021100711_0500	13.3
Johns Creek	TN08010211176_1000	13.7
Nonconnah Creek	TN0801021100711_2000	5.0
Nonconnah Creek	TN0801021100711_3000	4.1
Nonconnah Creek	TN0801021100720_1000	8.3
Nonconnah Creek	TN0801021100720_2000	12.6
Tenmile Creek	TN0801021100711_0400	13.3

Table A3-1b. Streams Not Supporting Designated Uses in Nonconnah Creek Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Black Bayou	TN0801021100711_0300	7.9
Cane Creek	TN0801021100711_0200	7.2
Horn Lake Creek	TN08010211001_1000	10.3
Horn Lake Creek Misc tribs	TN08010211001_0999	13.1
Horn Lake Cutoff	TN08010211001_0100	16.4
Latham Bayou	TN0801021100711_0100	2.8
Misc tribs to Nonconnah Creek	TN0801021100711_0999	12.1
Misc Tribs to Nonconnah Creek	TN0801021100720_0999	74.4
Unnamed Tribs. to Johns Creek	TN08010211176_0100	8.7

Table A3-1c. Streams Not Assessed in Nonconnah Creek Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Days Creek	TN0801021100711_0600	10.6	Not supporting
Hurricane Creek	TN0801021100711_0500	13.3	Not supporting
Nonconnah Creek	TN0801021100720_2000	12.6	Not supporting

Table A3-2a. Stream Impairment Due to Habitat Alterations in Nonconnah Creek Watershed. *Data is based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Cypress Creek	TN08010211007_1000	18.2	Partial
Horn Lake Creek	TN08010211001_2000	5.2	Partial
Hurricane Creek	TN0801021100711_0500	13.3	Not supporting
Johns Creek	TN08010211176_1000	13.7	Not supporting
Tenmile Creek	TN0801021100711_0400	13.3	Not supporting

Table A3-2b. Stream Impairment Due to Organic Enrichment/Low DO in Nonconnah Creek Watershed. *Data is based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Cypress Creek	TN08010211007_1000	18.2	Partial
Days Creek	TN0801021100711_0600	10.6	Not supporting
Horn Lake Creek	TN08010211001_2000	5.2	Partial
Hurricane Creek	TN0801021100711_0500	13.3	Not supporting
Johns Creek	TN08010211176_1000	13.7	Not supporting
Nonconnah Creek	TN0801021100711_2000	5.0	Not supporting
Nonconnah Creek	TN0801021100711_3000	4.1	Not supporting
Nonconnah Creek	TN0801021100720_1000	8.3	Not supporting
Nonconnah Creek	TN0801021100720_2000	12.6	Not supporting
Tenmile Creek	TN0801021100711_0400	13.3	Not supporting

Table A3-2c. Stream Impairment Due to Pathogens in Nonconnah Creek Watershed. *Data is based on Year 2000 Water Quality Assessment.*

APPENDIX IV

LAND USE/LAND COVER	AREA IN HUC-11 SUBWATERSHED (ACRES)	
	020	**040**
Deciduous Forest	6,730	3,616
Emergent Herbaceous Wetlands	34	58
Evergreen Forest	341	141
High Intensity: Commercial/Industrial	10,968	363
High Intensity: Residential	12,868	1,310
Low Intensity: Residential	26,039	7,192
Mixed Forest	4,360	2,029
Open Water	474	1,859
Other Grasses: Urban/Recreational	5,104	576
Pasture/Hay	11,030	2,649
Row Crops	13,130	5,658
Transitional	1,204	158
Quaries/Strip Mines	223	145
Woody Wetlands	2,503	3,899
Small Grains		250
Total	**95,088**	**29,904**

Table A4-1. Land Use Distribution in Nonconnah River Watershed by HUC-11. *Data is 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-11	NAME	AREA (SQ. MILES)	PERIOD OF OBSERVATIONS	FLOW (CFS)		
					Min	Max	Mean
07032200	08010211020	Nonconnah Creek	68.2	10/01/69-09/30/94	0.0	5,900.0	108.0
07032222	08010211020	Johns Creek	5.8	03/15/75-07/10/85	0.0	474.0	10.0
07032224	08010211020	Johns Creek	19.4	05/22/75-07/10/85	0.0	2,330.0	31.0
07032241	08010211020	Black Bayou	0.6	12/20/74-09/30/83	0.0	75.0	2.0
07032248	08010211020	Cane Creek @ East Person Ave.	5.0	12/03/74-07/06/85	1.0	506.0	11.0
07032260	08010211040	Cypress Creek @ Neely Road	3.2	02/26/75-07/09/85	0.0	360.0	5.0
07032310	08010211040	Horn Lake Creek @ Goodman, TN	49.4		0.54		

Table A4-3. Historical USGS Streamflow Data Summary Based on Mean Daily Flows in Nonconnah Creek Watershed. *Min, absolute minimum flow for period of record.*

PARAMETER ID	PARAMETER NAME
00010	Water Temperature (Degrees Centigrade)
00060	Flow, Stream, Mean Daily (cfs)
00061	Flow, Stream, Instantaneous (cfs)
00065	Stream Stage (Feet)
00078	Transparency, Secchi Disc (Meters)
00080	Color (Platinum-Cobalt Units)
00094	Specific Conductance, Field (μmhos/cm @ 25^{o} C)
00095	Specific Conductance, Field (μmhos/cm @ 25^{o} C)
00299	Oxygen, Dissolved, Analysis by Probe (mg/L)
00300	Oxygen, Dissolved (mg/L)
00310	BOD 5 Day @ 20^{o} C (mg/L)
00335	COD (Low Level) in .025 N $K_2Cr_2O_7$ (mg/L)
00340	COD (High Level) in .025 N $K_2Cr_2O_7$ (mg/L)
00400	pH (Standard Units)
00410	Alkalinity, Total (mg/L as $CaCO_3$)
00431	Alkalinity, Total Field (mg/L as $CaCO_3$)
00515	Residue, Total Filtrable (mg/L)
00530	Residue, Total Nonfiltrable (mg/L)
00605	Nitrogen, Organic, Total (mg/L as N)
00608	Nitrogen Ammonia , Dissolved (mg/L as N)
00610	Nitrogen Ammonia , Total (mg/L as N)
00613	Nitrite Nitrogen, Dissolved (mg/L as N)
00619	Ammonia, Unionized (Calculated From Temp-pH-NH_4; mg/L)
00620	Nitrate Nitrogen, Total (mg/L as N)
00623	Nitrogen, Kjeldahl, Dissolved (mg/L as N)
00625	Nitrogen, Kjeldahl, Total (mg/L as N)
00630	Nitrite Plus Nitrate, Total (1 Determination mg/L as N)
00631	Nitrite Plus Nitrate, Dissolved (1 Determination mg/L as N)
00665	Phosphorus, Total (mg/L as P)
00666	Phosphorus, Dissolved (mg/L as P)
00671	Phosphorus, Dissolved Orthophosphate (mg/L as P)
00680	Carbon, Total Organic (mg/L as C)
00900	Hardness, Total (mg/L as $CaCO_3$)
00915	Calcium, Dissolved (mg/L as Ca)
00916	Calcium, Total (mg/L as Ca)
00925	Magnesium, Dissolved (mg/L as Mg)
00927	Magnesium, Total (mg/L as Mg)
00929	Sodium, Total (mg/L as Na)
00930	Sodium, Dissolved (mg/L as Na)
00935	Potassium, Dissolved (mg/L as K)
00937	Potassium, Total (mg/L as K)
00940	Chloride, Total In Water (mg/L)
00941	Chloride, Dissolved in Water (mg/L)
00945	Sulfate, Total (mg/L as SO_4)
00946	Sulfate, Dissolved (mg/L as SO_4)
00950	Fluoride, Dissolved (mg/L as F)
00955	Silica, Dissolved (mg/L as SiO_2)
01002	Arsenic, Total (μg/L as As)
01007	Barium, Total (μg/L as Ba)
01025	Cadmium, Dissolved (μg/L as Cd)
01027	Cadmium, Total (μg/L as Cd)
01034	Chromium, Total (μg/L as Cr)
01040	Copper, Dissolved (μg/L as Cu)

01042	Copper, Total (μg/L as Cu)
01045	Iron, Total (μg/L as Fe)
01046	Iron, Dissolved (μg/L as Fe)
01049	Lead, Dissolved (μg/L as Pb)
01051	Lead, Total (μg/L as Pb)
01065	Nickel, Dissolved (μg/L as Ni)
01067	Nickel, Total (μg/L as Ni)
01075	Silver Dissolved (μg/L as Ag)
01077	Silver Total (μg/L as Ag)
01090	Zinc, Dissolved (μg/L as Zn)
01092	Zinc, Total (μg/L as Zn)
01105	Aluminum, Total (μl as Al)
01106	Aluminum, Dissolved (μl as Al)
01147	Selenium, Total (μl as Se)
31613	Fecal Coliform (Membrane Filter, M-FC Agar at 44.5^{o} C, 24 h)
31616	Fecal Coliform (Membrane Filter, M-FC Broth at 44.5^{o} C)
31625	Fecal Coliform (Membrane Filter, M-FC, 0.7 UM)
31673	Fecal Streptococci, (Membrane Filter, KF Agar, at 35^{o}C, 48h)
32211	Chlorophyll-A, Spectrophotometric, Acid, Corrected (μg/L)
39086	Alkalinity, Water, Dissolved, Field Titration (mg/l as $CaCO_3$)
70300	Residue, Total Filtable (Dried at 180^{o}C, as mg/L)
70507	Phosphorus, in Total Orthophosphate (mg/L as P)
71845	Nitrogen, Ammonia, Total (mg/L as NH_4)
71890	Mercury, Dissolved (μg/L as Hg)
71900	Mercury, Total (μg/L as Hg)
80154	Suspended Sediment (Evaporation at 110^{o}C, as mg/L)
82078	Turbitity, Field (as Nephelometric Turbidity Units, NTU)
82079	Turbitity, Lab (as Nephelometric Turbidity Units, NTU)

Table A4-4a. Water Quality Parameters and Codes.

PARAMETER ID	SUBWATERSHED (HUC-11)	
	020	040
00010	a,b,c,d,e,f,g,h,i,j,k,l,m	o,p,q
00061	i	
00094	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00095	a,i	
00300	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00310	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00335	a,c,d,j,m	
00400	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00410	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00515	a,c	
00530	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00610	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00619	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00630	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00665	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00900	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
00927	j	
01002	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
01027	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
01034	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
01042	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
01045	j	
01051	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
01067	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
01092	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
31616	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q
71900	a,b,c,d,e,f,g,h,j,k,l,m	o,p,q

Table A4-4b. Water Quality Parameters Monitored in Nonconnah Creek Watershed.

CODE	STATION	ALIAS	AGENCY	LOCATION
a	SHELBY208015	NONCO001.8SH	TDEC	Nonconnah Creek @ RM 2.1
b	000420	CANE000.6SH	TDEC	Cane Creek @ RM 6.6
c	001690	JOHNS000.5SH	TDEC	Johns Creek @ RM 0.5
d	SHELBY208017	NONCO020.9SH	TDEC	Nonconnah Creek @ RM 21.0
e	DAYSCREEK0.55	DAYS000.5SH	TDEC	Days Creek @ RM 0.55
f	001678	HURRI000.4SH	TDEC	Hurricane Creek @ RM 0.4
g	NONCONNAH06.9	NONCO006.9SH	TDEC	Nonconnah Creek @ RM 6.9
h	003095	TMILE000.1SH	TDEC	Tenmile Creek @ RM 0.1
i	07032200		USGS	Nonconnah Creek Near Germantown
j	001920	NONCO002.2SH	TDEC	Nonconnah Creek @ RM2.2
k	001780	LATHA000.1SH	TDEC	Latham Creek @ RM 0.1
l	NONCONNAH11.85	NONCO011.85SH	TDEC	Nonconnah Creek @ RM 11.85
m	NONCONNAH14.0	NONCO014.0SH	TDEC	Nonconnah Creek @ RM 14.0
n	477508		TVA	
o	001670	HORNL000.0SH	TDEC	Horn Lake Cutoff
p	001669	HORNL004.0SH	TDEC	Horn lake Creek @ RM 4.0
q	001018	CCSOU001.1SH	TDEC	Cypress Creek @RM 1.6

Table A4-4c. Water Quality Monitoring Stations in Nonconnah Creek Watershed. *TDEC, Tennessee Department of Environment and Conservation; TVA, Tennessee Valley Authority; USGS, United States Geologic Survey.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	EFFLUENT DESCRIPTION	SUBWATERSHED
TN0000132	Hunt-Wesson, Inc.	2079	Edible Fats and Oils	Minor	Non-Contact Cooling Water, Storm Water	08010211020
TN0022322	USDSA Defense Depot	9711	National Security	Minor	Stormwater Runoff	08010211020
TN0055573	Coors Brewing Co.	2082	Malt Beverages	Minor	Non-Process Wastewater, Stormwater Runoff	08010211020
TN0055948	Cochran Corporation	2048	Prepared Animal Feed	Minor	Vapor Condenser Water, Stormwater Runoff	08010211020
TN0058831	Drexel Chemical Corp.	2879	Pesticides and Agricultural Chemicals	Minor	Non-Contact Cooling Water	08010211020
TN0059226	Williams Refining, LLC	2911	Petroleum Refining	Minor	Cooling Tower and Boiler Blowdown, Filter Backwash, Softener Regeneration, Steam Condensate, Stormwater Runoff	08010211020
TN0061182	Con-Way SW Express	4213	Trucking	Minor	Non-Process Wastewater, Stormwater Runoff	08010211020
TN0061719	Protein Technologies	2075	Soybean Oil Mills	Minor	Non-Process Wastewater	08010211020
TN0074845	Saddles Restaurant	4952	Sewerage Systems	Minor	Treated Municipal Wastewater	08010211020
TN0067351	Federal Express Corp.	4513	Air Courier Services	Minor	Non-Process Wastewater, Stormwater Runoff	08010211020
TN0072940	Memphis International Airport	4581	Airports and Terminal Services	Minor	Non-Process Wastewater, Stormwater Runoff	08010211020
TN0073181	Southern Fabricators	3714	Motor Vehicle Parts	Minor	Stormwatrer Runoff	08010211020
TN0073598	TN Air National Guard	9711	National Security	Minor	Non-Process Wastewater, Stormwater Runoff	08010211020
TN0073601	AMR	4581	Airports and Terminal Services	Minor	Non-Process Wastewater	08010211020

TN0074217	Memphis Light, Gas and Water-Capleville	4932	Gas and Other Services	Minor	Non-Process Wastewater	08010211020

Table A4-5. Active Permitted Point Source Facilities in Nonconnah Creek Watershed. *SIC, Standard Industrial Classification; MADI, Major Discharge Indicator.*

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-11
97.872	Shelby	Stream Relocation, Culverts	Tributary to Nonconnah Creek	08010211020
98.388	Shelby	Culvert Extension	Tributary to Nonconnah Creek	08010211020
98.389	Shelby	Culvert Extension	Tributary to Nonconnah Creek	08010211020
98.390	Shelby	Culvert Extension	Tributary to Nonconnah Creek	08010211020
98.391	Shelby	Culvert Extension	Tributary to Nonconnah Creek	08010211020
98.562	Shelby	Wetland Fill	Wetland	08010211020
98.671	Shelby	Stream Relocation, Detention	Tributary to Nonconnah Creek	08010211020
99.134	Shelby	Stream Relocation	Tributary to Nonconnah Creek	08010211020
99.245	Shelby	Stream Relocation	Tributary to Tenmile Creek	08010211020
99.298	Shelby	Bank Stabilization	Tributary to Nonconnah Creek	08010211020
99.320	Shelby	Stream Relocation	Tributary to Johns Creek	08010211020
99.360	Shelby	Stream Relocation	Tributary to Nonconnah Creek	08010211020
99.451	Shelby	Stream Relocation	Tributary to Nonconnah Creek	08010211020
00.058	Shelby	Dredging	McKellar Lake	08010211020
98.664	Shelby	Bridge Scour Repair	Horn Lake Creek	08010211040

Table A4-6. Individual ARAP Permits Issued January 1994 Through June 2000 in Nonconnah Creek Watershed.

PERMIT #	COUNTY	DATE ISSUED	SITE	IMPACTED ACRES	IMPACTED WATER	MITIGATION	HUC-11
92.12800	Shelby	01/12/93	SR 385	Temporary	Nonconnah Ck		08010211020
93.52200	Shelby	09/20/93	Hickory Hill Rd	0.5	Wolf River	Off-Site	08010211020
94.72600	Shelby	12/19/94	Brooks Road	0.5	Nonconnah Ck	On-Site	08010211020
94.80600	Shelby	05/23/95	North of Nonconnah Ck	0.1	Nonconnah Ck	On-Site	08010211020
95.50400	Shelby	11/20/95	SE of Kirby Rd	2.0	Nonconnah Ck	Off-Site	08010211020
95.86800	Shelby	06/12/96	S of Holmes Rd	0.029	Isolated Wetland	Off-Site	08010211020
96.15300	Shelby	05/13/96	S of Shelby Dr.	0.27	Isolated Wetland	On-Site	08010211020
96.38900	Shelby			0.128	Johns Creek	On-Site	08010211020
98.39800	Shelby	10/23/98	Nonconnah Ck @ Hwy 52-A	23.5	Nonconnah and Hurricane Creeks	On-Site	08010211020
	Shelby	11/18/91	Nonconnah Parkway	5.6	Nonconnah Ck	On-Site	08010211020
	Shelby	07/05/90	Nonconnah Parkway	16.5	Nonconnah Ck	On-Site	08010211020
	Shelby	12/01/93	SR 385	6.63	Nonconnah Ck		08010211020
96.02200	Shelby	05/13/96	Frank Pidgeon Industrial Park	0.40 acres	Isolated Wetland	On-Site	08010211040

Table A4-7. Individual ARAP Permits Issued for Impacting Wetlands in Nonconnah Creek Watershed.

PERMIT #	COUNTY	IMPACTED ACREAGE	MITIGATED ACREAGE	SITE	HUC-11
92.12800	Shelby			SR 385	08010211020
94.72600	Shelby	0.5	40.0	Brooks Road	08010211020
94.80600	Shelby	0.1	0.1	North of Nonconnah Ck	08010211020
96.15300	Shelby	0.27	0.81	S of Shelby Dr.	08010211020
96.38900	Shelby	0.128	0.384		08010211020
98.39800	Shelby	23.5	74.0	Nonconnah Ck @ Hwy 52-A	08010211020
	Shelby	5.6	6.35		08010211020
	Shelby	16.5	50.0		08010211020
	Shelby	6.63	29.5		08010211020
96.04500	Shelby	0.04		Farmingdale and Kimbrough Roads	08010211040

Table A4-8. Individual ARAP Permits Issued for Mitigating Wetlands in Nonconnah Creek Watershed.

APPENDIX V

CONSERVATION PRACTICE	UNITS	AMOUNT
Alley Cropping	Acres	0
Contour Buffer Strips	Acres	0
Crosswind Trap Strips	Acres	0
Grassed Waterways	Acres	0
Filter Strips	Acres	0
Riparian Forest Buffers	Acres	0
Streambank and Shoreline Protection	Feet	0
Windbreaks and Shelterbelts	Feet	0
Hedgerow Plantings	Feet	0
Herbaceous Wind Barriers	Feet	0
Field Borders	Feet	0

Table A5-1a. Conservation Buffers Conservation Practices in Partnership with NRCS in Tennessee Portion of Nonconnah Creek Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 1999 through September 30, 2000 reporting period.*

PRACTICE	COUNTY	NUMBER OF BMPs
Grade Stabilization Structure	Shelby	1
Winter Cover	Shelby	1

Table A5-2. Best Management Practices Installed by Tennessee Department of Agriculture and Partners in Nonconnah Creek Watershed.