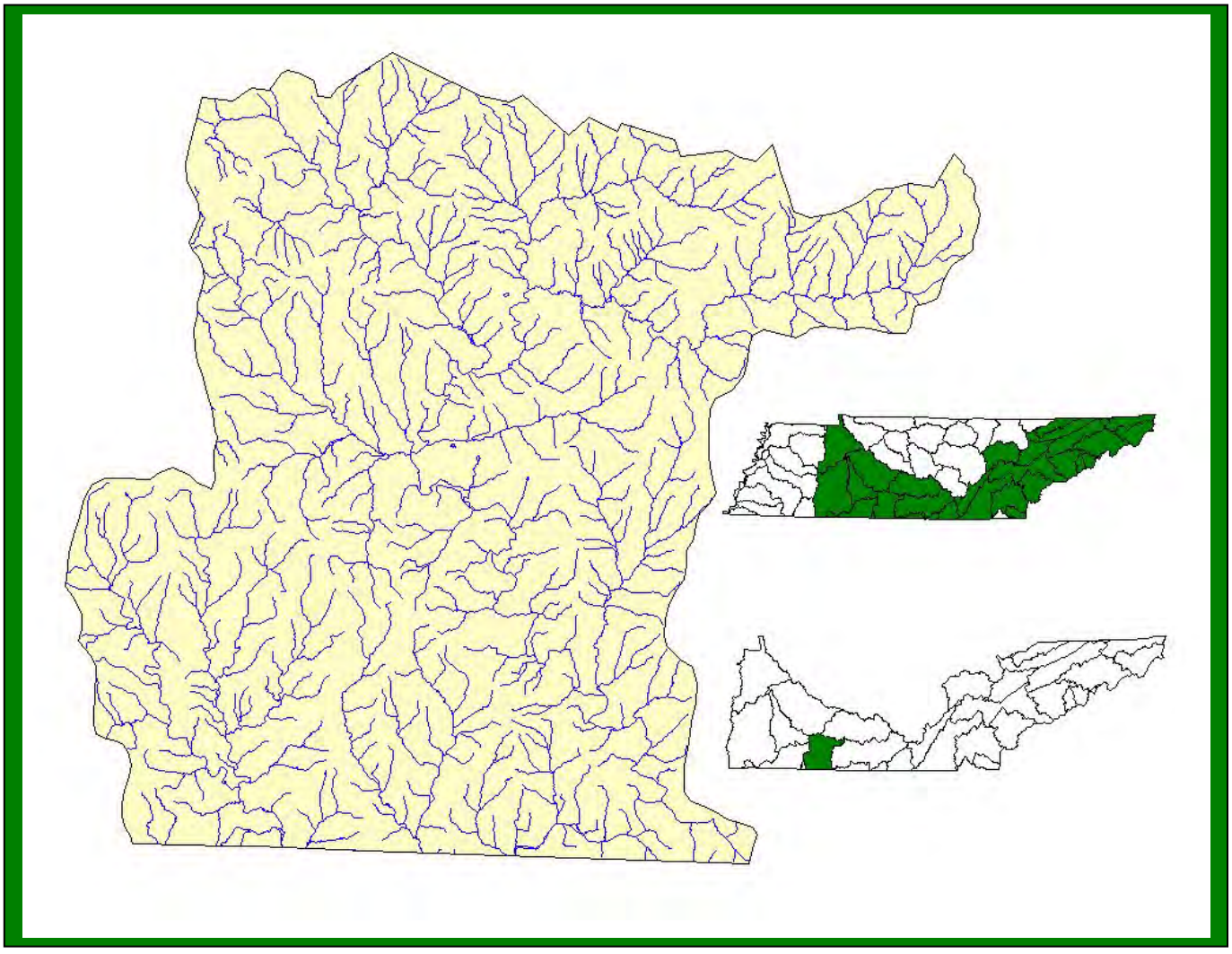
LOWER ELK RIVER WATERSHED (06030004) OF THE TENNESSEE RIVER BASIN

WATERSHED WATER QUALITY MANAGEMENT PLAN



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER POLLUTION CONTROL
WATERSHED MANAGEMENT SECTION
2003

GLOSSARY

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

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

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

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

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

AFO. Animal Feeding Operation.

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

ARAP. Aquatic Resource Alteration Permit.

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

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

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

Benthic. Bottom dwelling.

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

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

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

CAFO. Concentrated Animal Feeding Operation.

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

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

DO. Dissolved oxygen.

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

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

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

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

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

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

MRLC. Multi-Resolution Land Classification.

MS4. Municipal Separate Storm Sewer System.

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

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

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

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

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

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

SBR. Sequential Batch Reactor.

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

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

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

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

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

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

TMSP. Tennessee Multi-Sector Permit.

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

WAS. Waste Activated Sludge.

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

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

WET. Whole Effluent Toxicity.

WWTP. Waste Water Treatment Plant

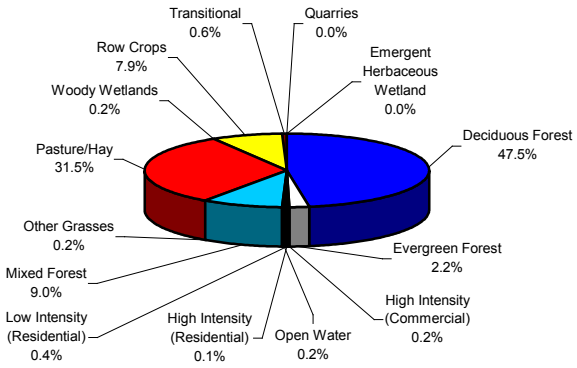
Summary – Lower Elk River

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

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

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

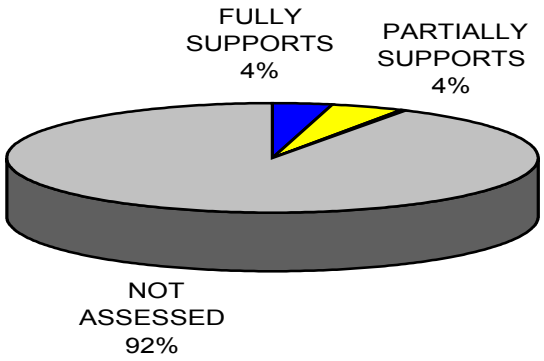
A detailed description of the watershed can be found in Chapter 2. The Tennessee portion of the Lower Elk River Watershed is approximately 715 square miles and includes parts of four Middle Tennessee counties. A part of the Lower Tennessee River drainage basin, the watershed has 1,117 stream miles.



Land Use in the Tennessee Portion of the Lower Elk River Watershed is based on MRLC Satellite Imagery.

Many local interpretive areas are common in the Lower Elk River Watershed, most notably, Giles County Park and Sam Davis Park. Eleven rare plant and animal species have been documented in the watershed, including two rare fish species, one rare mussel species, and one rare snail species. Portions of one stream in the Lower Elk River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values.

A review of water quality sampling and assessment is presented in Chapter 3. Using the Watershed Approach to Water Quality, 15 sampling sites were utilized in the Lower Elk River Watershed. These were ambient or watershed monitoring sites. Monitoring results support the conclusion that 50% of the assessed streams fully support designated uses.



Water Quality Assessment in the Tennessee Portion of the Lower Elk River Watershed is Based on the 1998 303(d) List.

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

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

HUC-10 Subwatersheds in the Tenneessee portion of the Lower Elk River Watershed.

Point source contributions to the Lower Elk River Watershed consist of three individual NPDES-permitted facilities, two of which discharge into streams that have been listed on the 1998 303(d) list. Other point source permits in the watershed are Aquatic Resource Alteration Permits (195), Tennessee Multi-Sector Permits (17) and Mining Permits (1). Agricultural operations include cattle, chicken, hog, and sheep farming. Maps illustrating the locations of NPDES and ARAP permit sites are presented in each subwatershed.

Chapter 5 is entitled *Water Quality Partnerships in the Lower Elk River Watershed* and highlights partnerships between agencies and between agencies and landowners that are essential to success. Programs of federal agencies (Natural Resources Conservation Service, U.S. Fish and Wildlife Service, U.S. Geological Survey, Tennessee Valley Authority), and state agencies (TDEC Division of Community Assistance, TDEC Division of Water Supply, Tennessee Department of Agriculture, Alabama Department of Environmental Management) are summarized. Local initiatives of active watershed organizations (Friends of the Elk River) are also described.

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

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

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

1.1 BACKGROUND. 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.

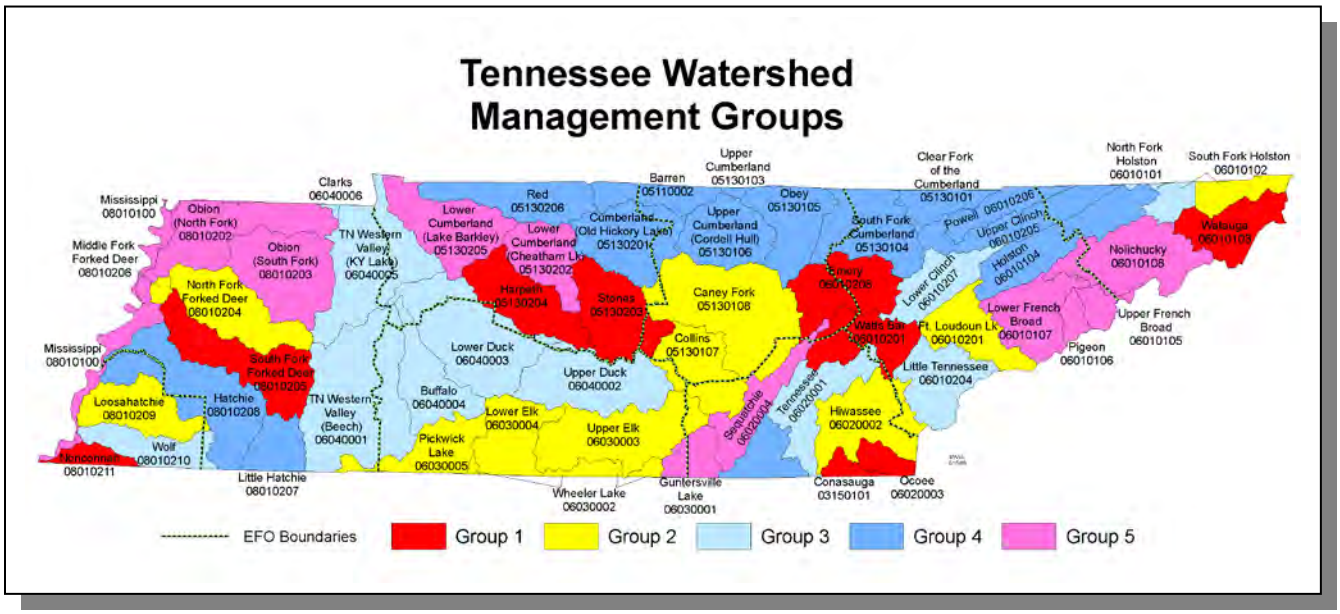


Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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.

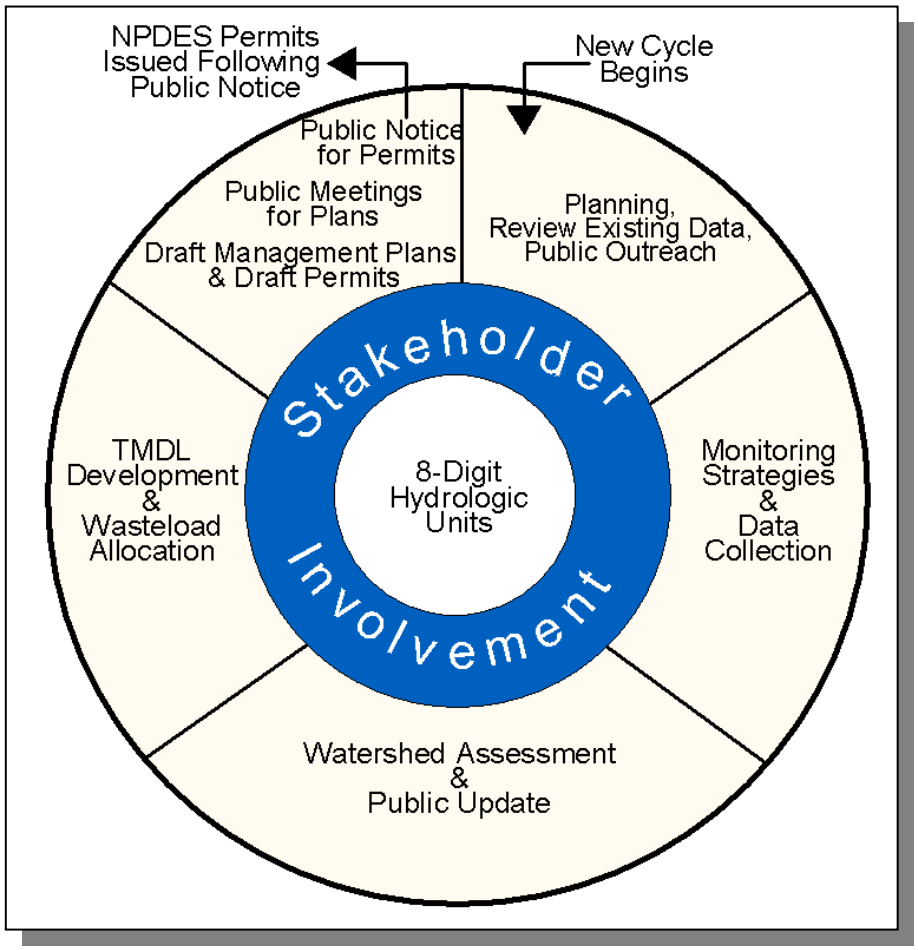


Figure 1-2. The Watershed Approach Cycle.

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 LOWER ELK RIVER WATERSHED

2.1. BACKGROUND. The Lower Elk River Watershed contains low to moderate gradient streams, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally, high densities of fish. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock and relatively clear water.

Much of the land in this watershed is used for agriculture, including row crops and pasture.

This Chapter describes the location and characteristics of the Lower Elk River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Lower Elk River Watershed is located in Middle Tennessee and includes parts of Giles, Lawrence, Marshall, and Maury Counties.

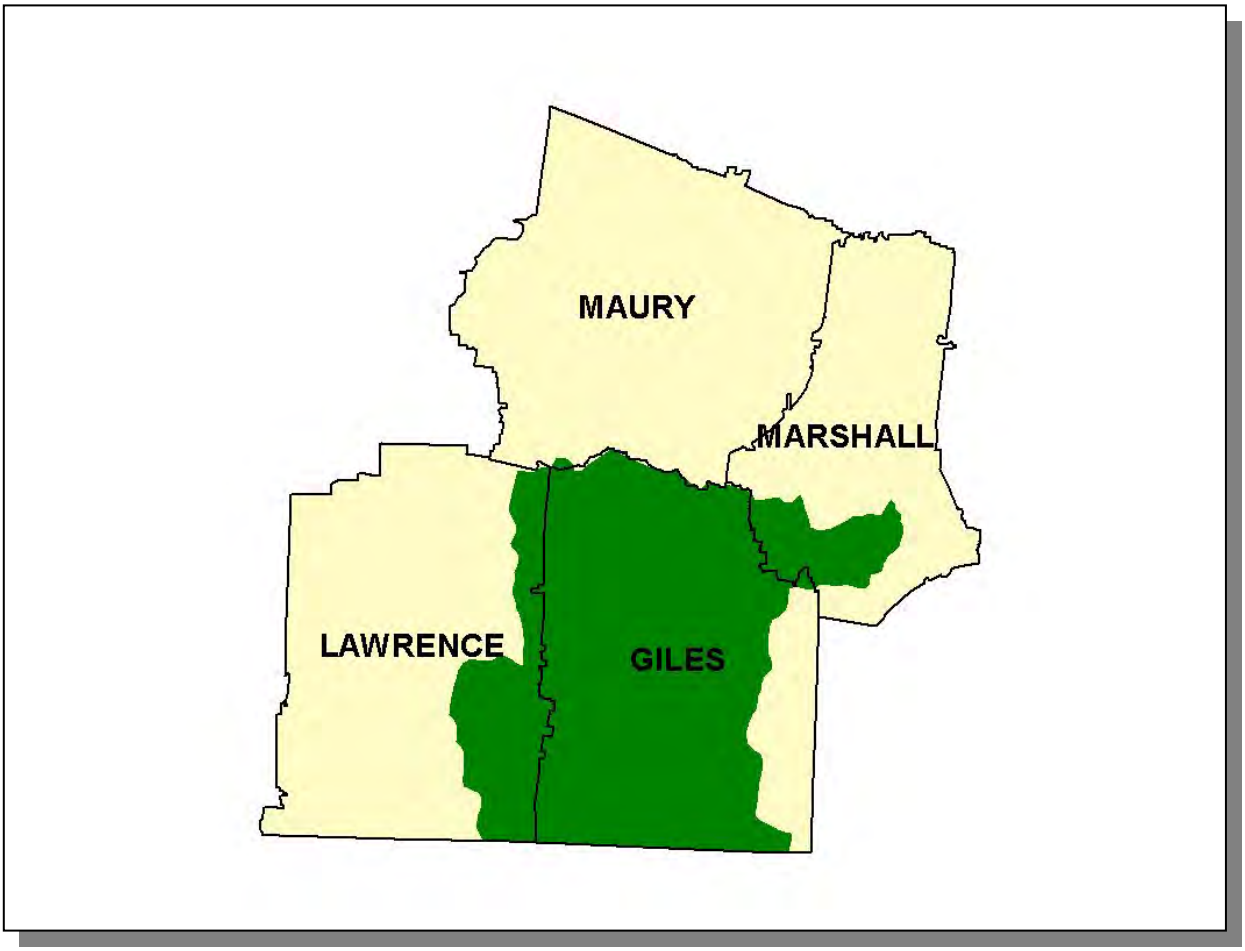


Figure 2-1. General Location of the Lower Elk River Watershed in Tennessee.

COUNTY	% OF WATERSHED IN EACH COUNTY
Giles	74.1
Lawrence	17.3
Marshall	8.4
Maury	0.2

Table 2-1. The Lower Elk River Watershed Includes Parts of Four Middle Tennessee Counties.

2.2.B. Population Density Centers. One interstate (I-65) and three state highways serve the major communities in the Tennessee Portion of the Lower Elk River Watershed.

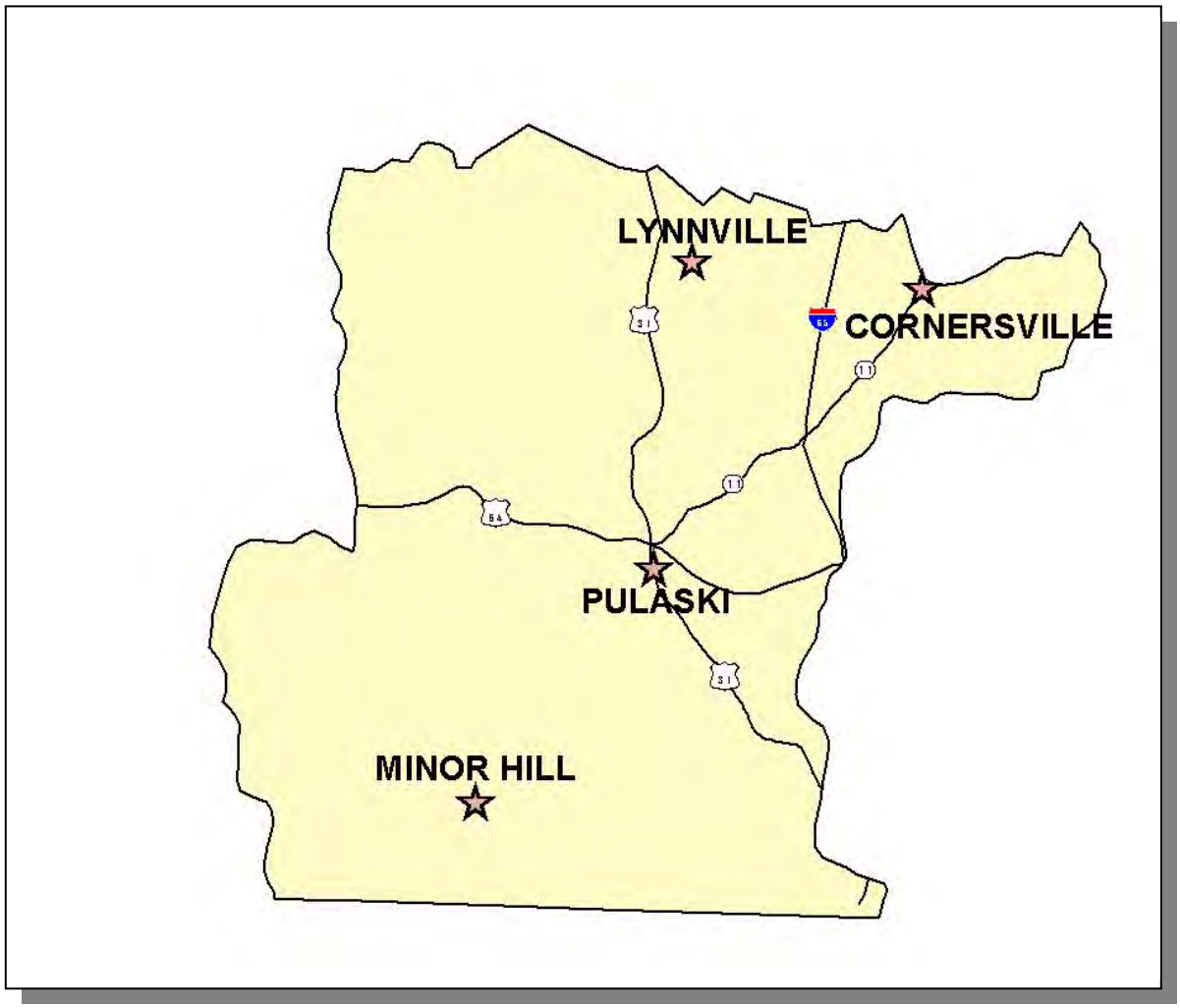


Figure 2-2. Municipalities and Roads in the Tennessee Portion of the Lower Elk River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Pulaski*	8,667	Giles
Cornersville	802	Marshall
Minor Hill	403	Giles
Lynnville	367	Giles

Table 2-2. Municipalities in the Tennessee Portion of the Lower Elk River Watershed. *Population based on 1996 census (Tennessee Blue Book). Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Lower Elk River Watershed, designated the Hydrologic Unit Code 06030004 by the USGS, drains approximately 964 square miles, 715 square miles in Tennessee, and drains to the Elk River.

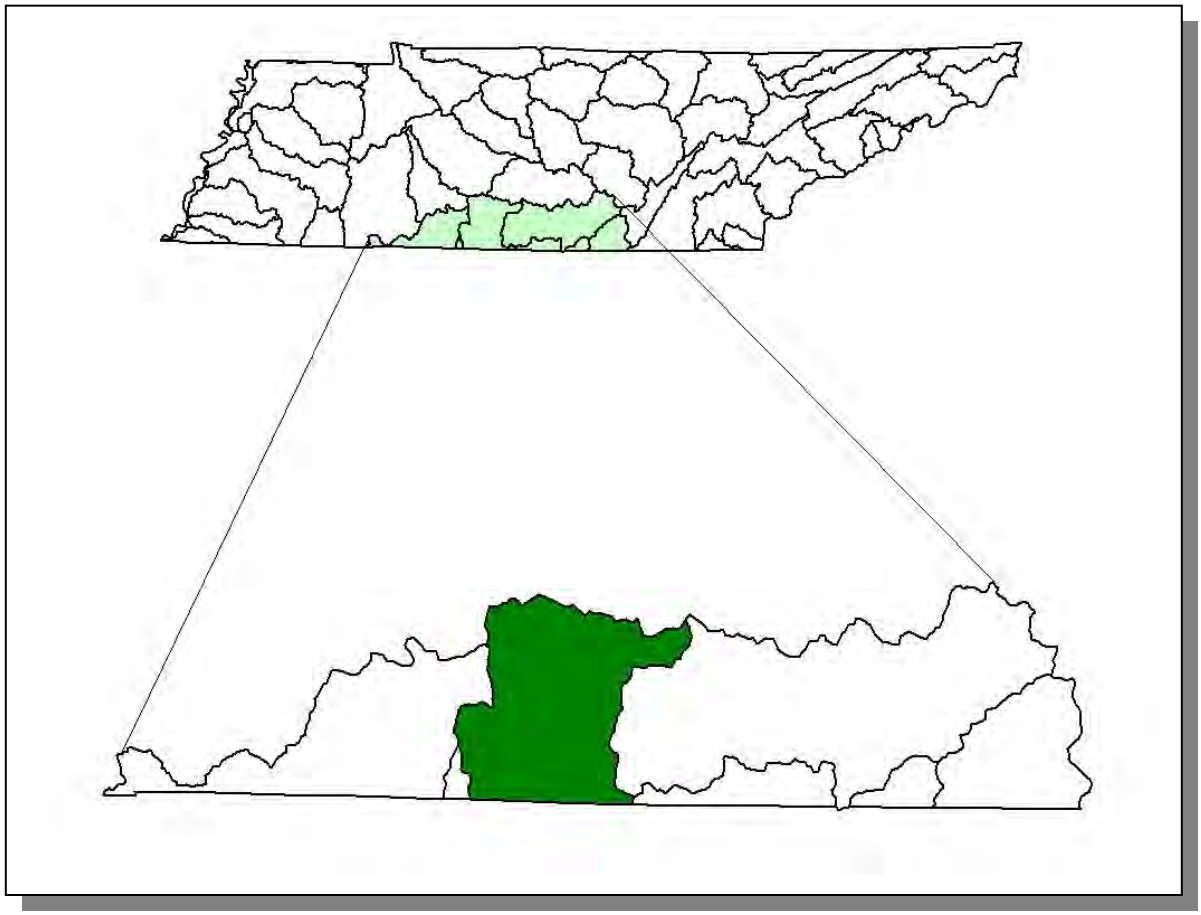


Figure 2-3. The Lower Elk River Watershed is Part of the Lower Tennessee River Basin.

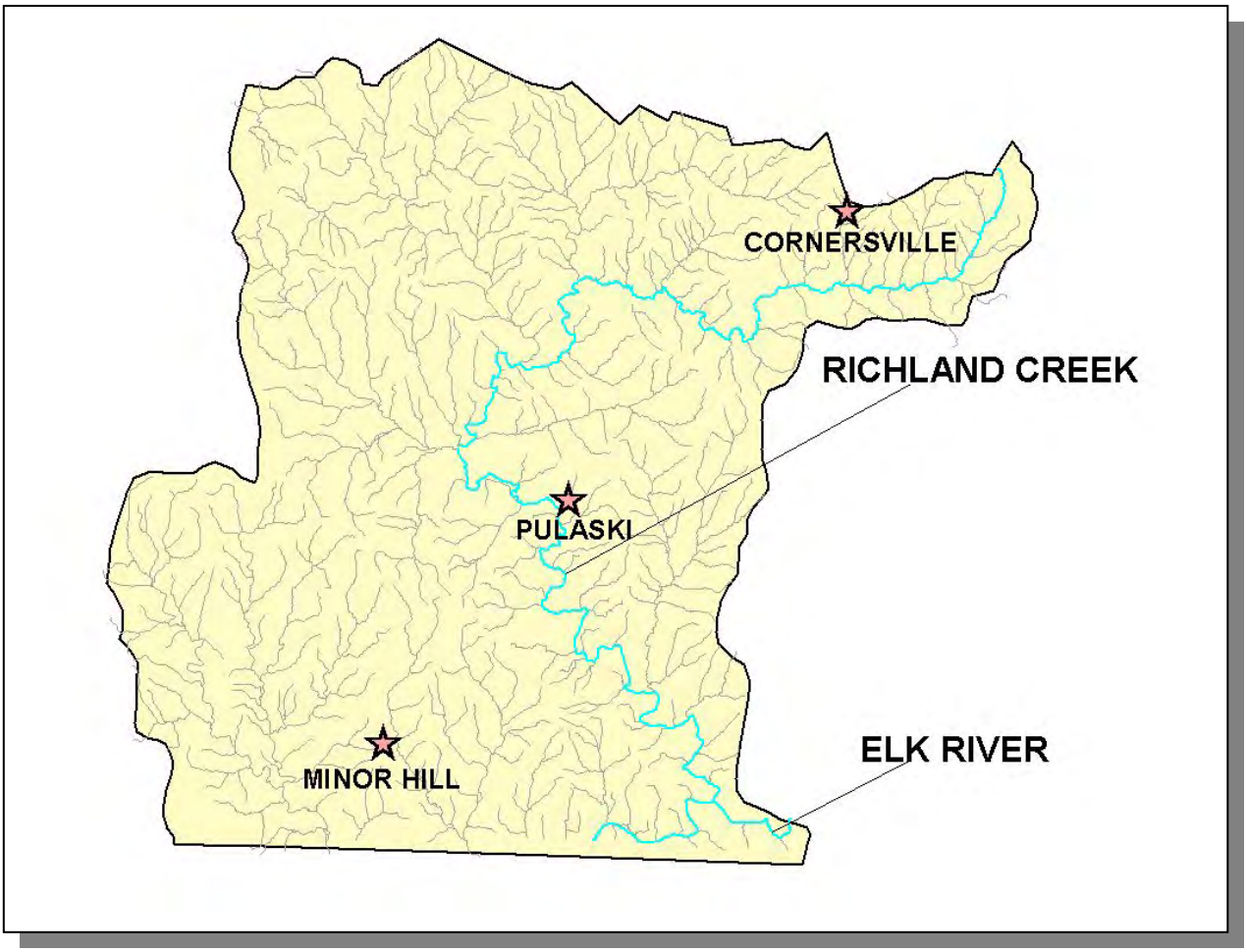


Figure 2-4. Hydrology in the Tennessee Portion of the Lower Elk River Watershed. *There are 1,552 total stream miles recorded in River Reach File 3 in the Lower Elk River Watershed. 1,117 stream miles are recorded in Tennessee. Locations of Elk River, Richland Creek, and the cities of Cornersville, Minor Hill, and Pulaski are shown for reference.*

2.3.B. Dams. There are 6 dams inventoried by TDEC Division of Water Supply in the Tennessee Portion of the Lower Elk River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

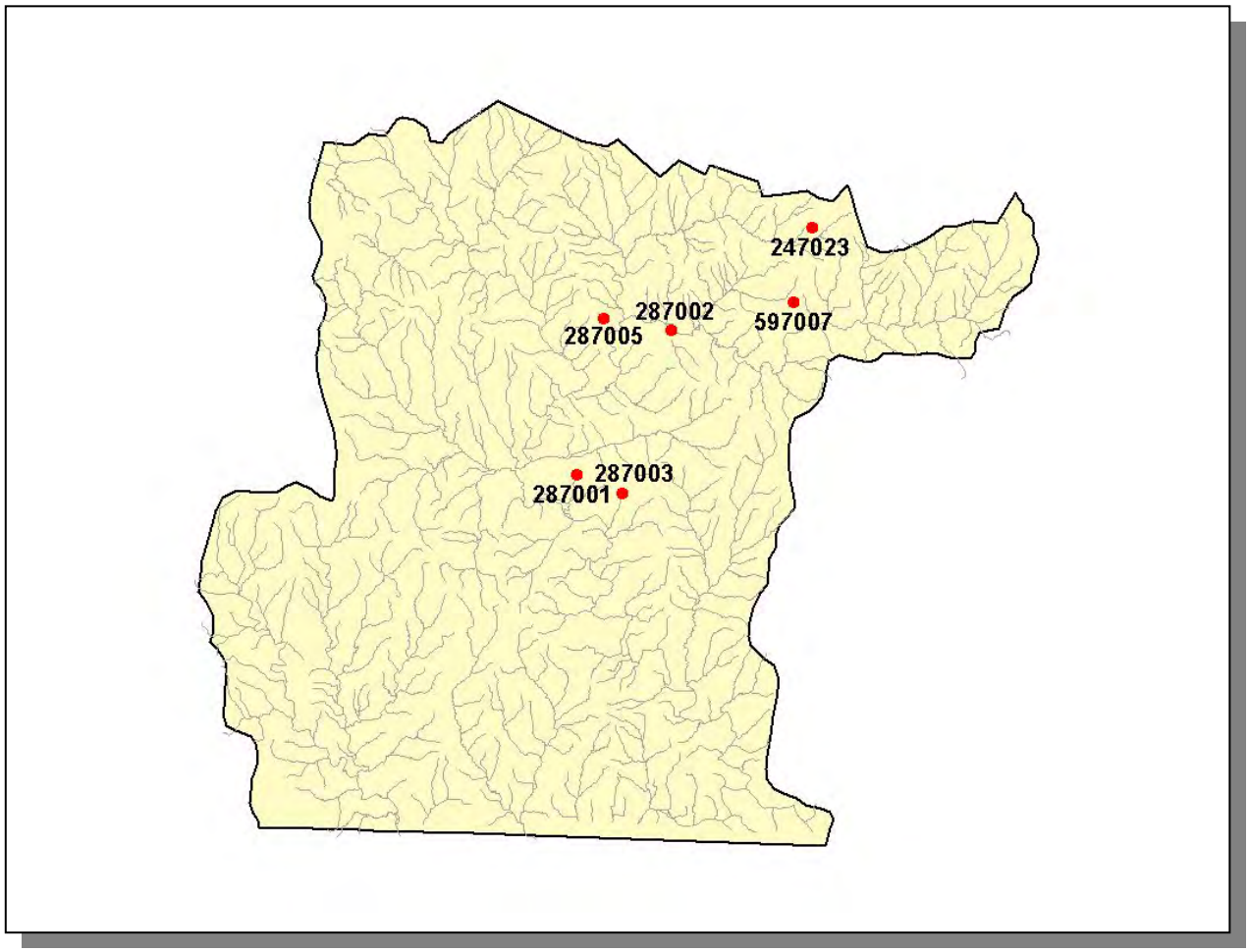


Figure 2-5. Location of Inventoried Dams in the Tennessee Portion of the Lower Elk River Watershed. *More information is provided in Lower Elk-Appendix II and on the TDEC homepage at: http://gwidc.gwi.memphis.edu/website/dams/viewer.htm*

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.

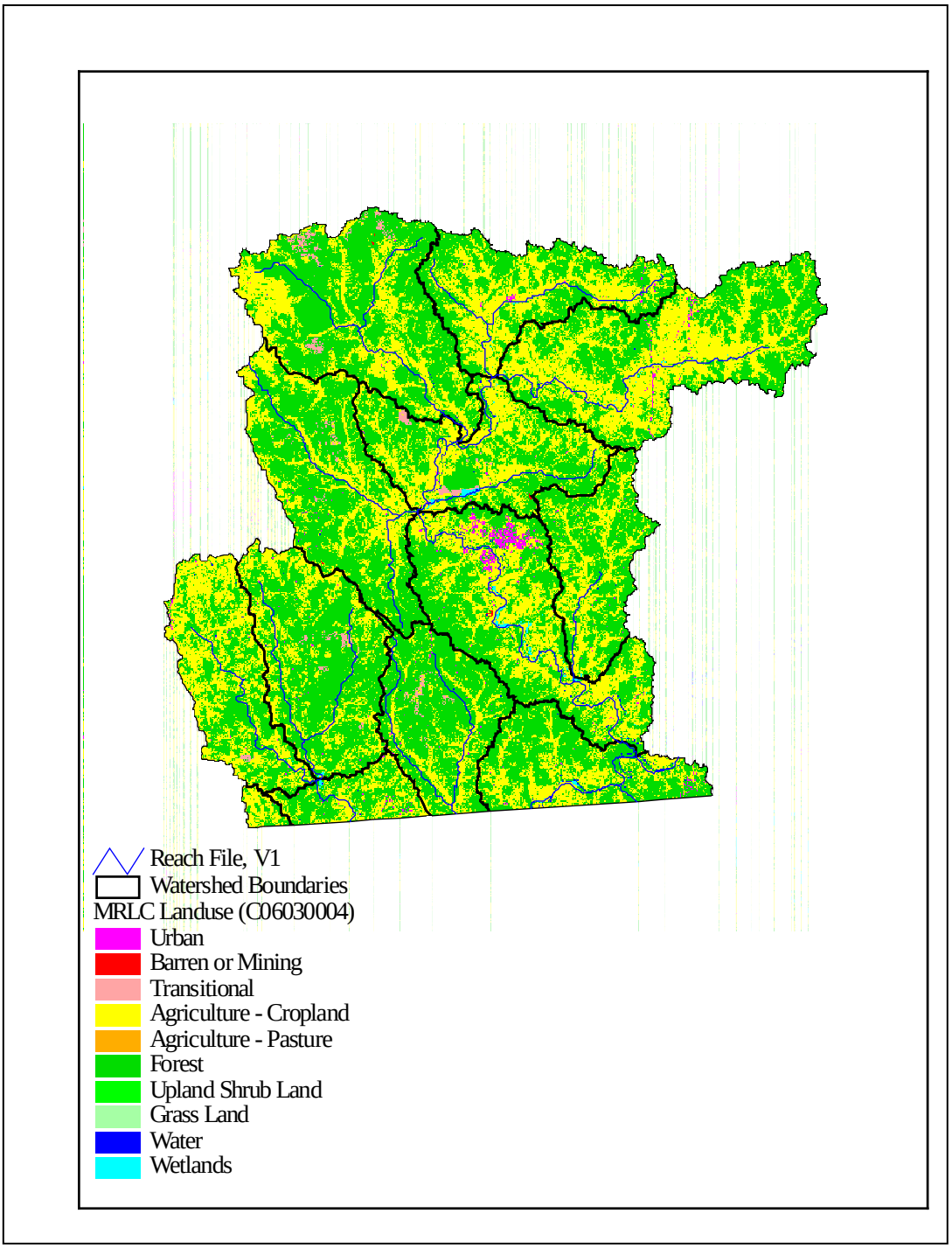


Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

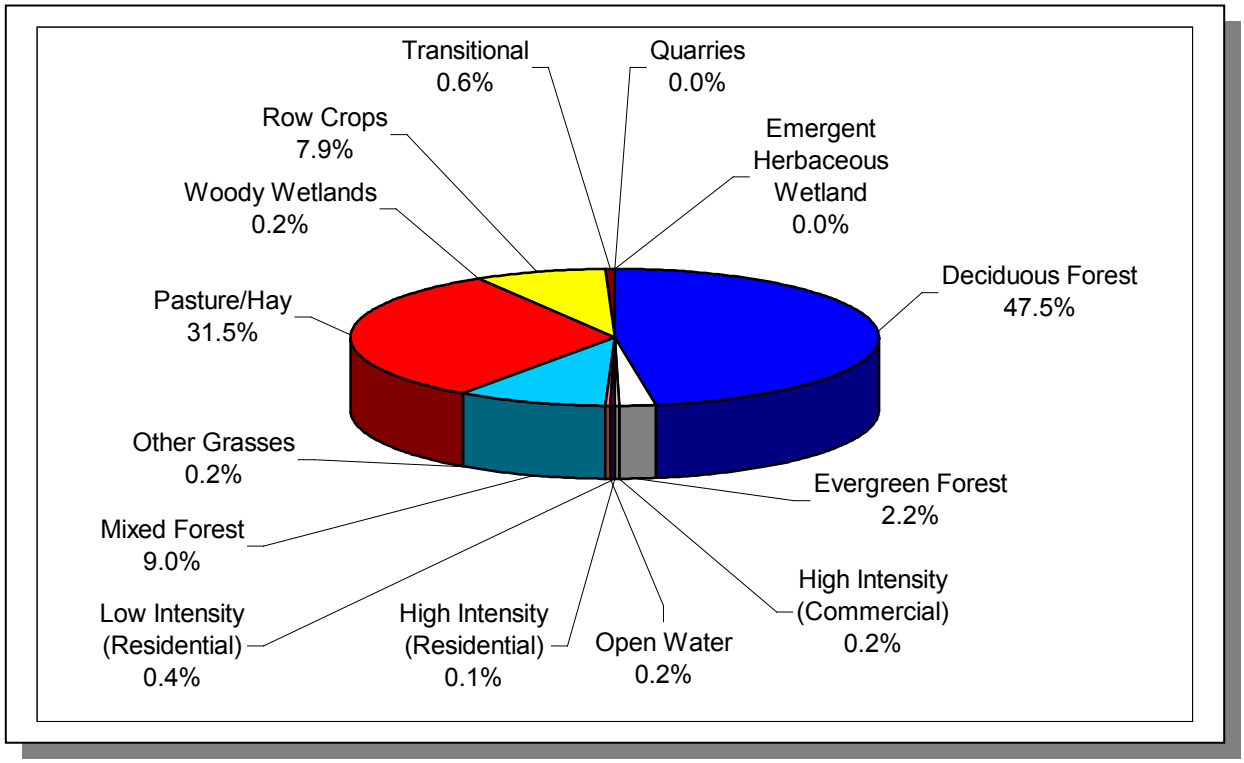


Figure 2-7. Land Use Distribution in the Tennessee Portion of the Lower Elk River Watershed. *More information is provided in Lower Elk-Appendix II.*

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 Lower Elk River Watershed lies within 1 Level III ecoregion (Interior Plateau) and contains 3 Level IV subecoregions (Griffen, Omernik, Azavedo, 1997):

- Western Highland Rim (71f) is characterized by dissected, rolling terrain of open hills, with elevations of 400 to 1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acidic and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter areas between streams and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco.

- The Eastern Highland Rim (71g) has more level terrain than the Western Highland Rim (71f), with landforms characterized as tablelands of moderate relief and irregular plains. Mississippian-age limestone, chert, shale, and dolomite predominate, and karst terrain sinkholes and depressions are especially noticeable between Sparta and McMinnville. Numerous springs and spring-associated fish fauna also typify the region. Natural vegetation for the region is transitional between the oak-hickory type to the west and the mixed mesophytic forests of the Appalachian ecoregions (68,69) to the east. Bottomland hardwoods forests were once abundant in some areas, although much of the original bottomland forest has been inundated by several large impoundments. Barrens and former prairie areas are now mostly oak thickets or pasture and cropland.

- Outer Nashville Basin (71h) is a more heterogeneous region than the Inner Nashville Basin, with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian-age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forests with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

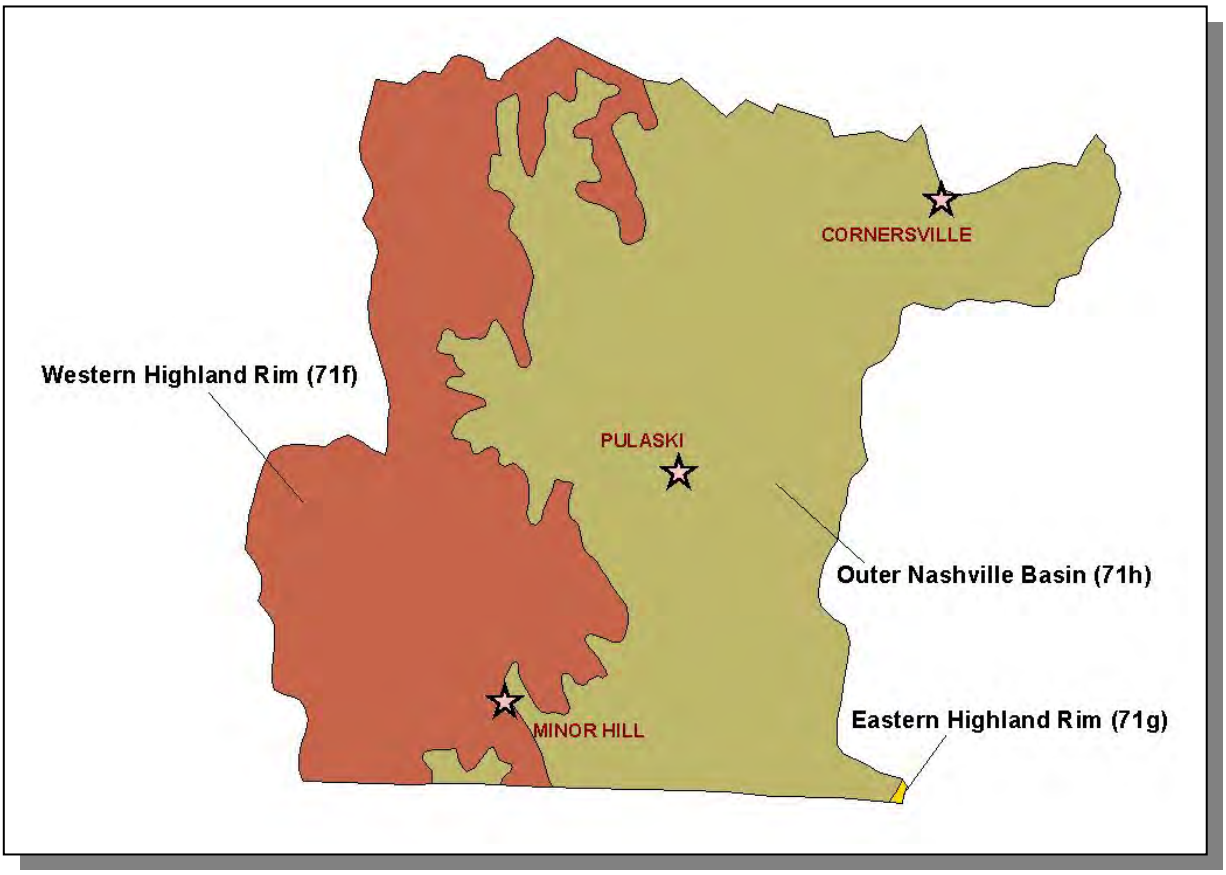


Figure 2-8. Level IV Ecoregions in the Tennessee Portion of the Lower Elk River Watershed. *Locations of Cornersville, Minor Hill, and Pulaski are shown for reference.*

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.

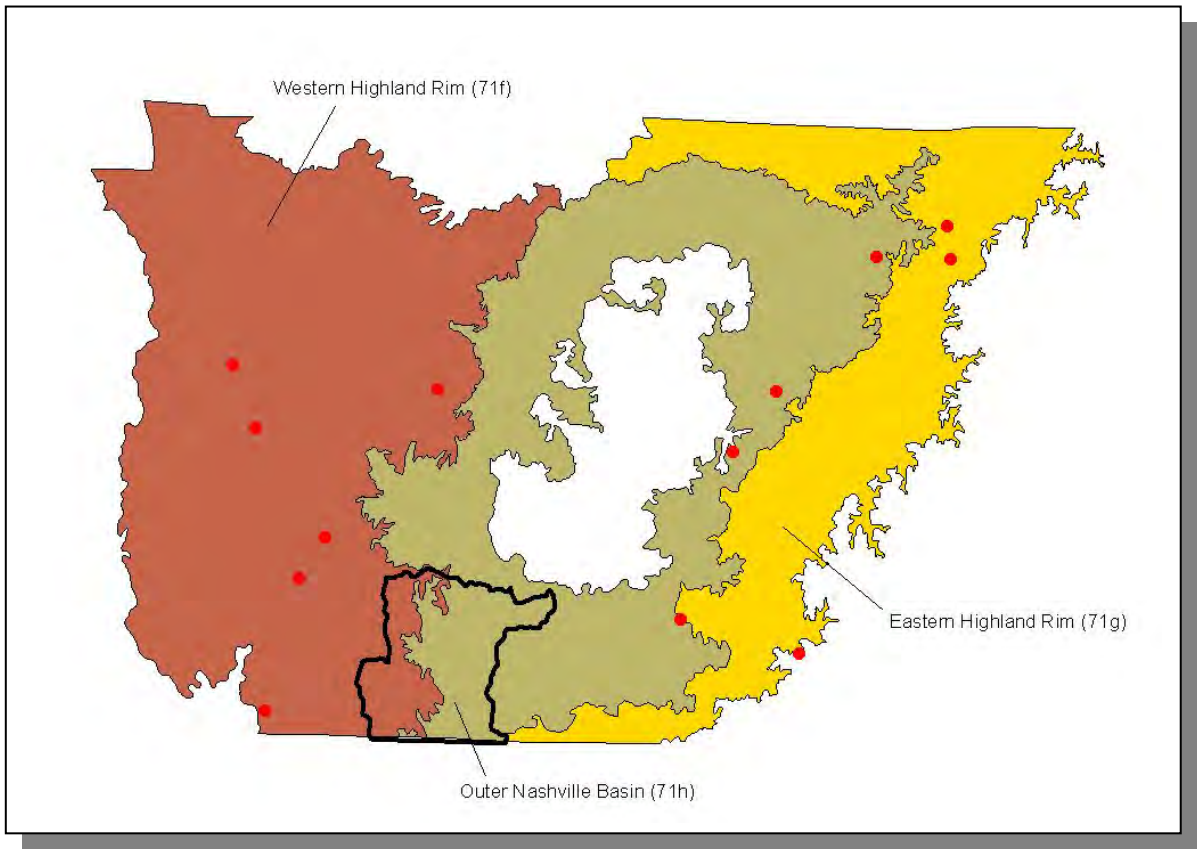


Figure 2-9. Ecoregion Monitoring Sites in the Tennessee Portion of Level IV Ecoregions 71f, 71g, and 71h. *The Tennessee Portion of the Lower Elk River Watershed is shown for reference. More information is provided in Lower Elk-Appendix II.*

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	1
Snails	1
Amphibians	0
Birds	2
Fish	2
Mammals	0
Reptiles	0
Plants	5
Total	**11**

Table 2-3. There are 11 Rare Plant and Animal Species in the Tennessee Portion of the Lower Elk River Watershed.

Additionally, in the Tennessee portion of the Lower Elk River Watershed, there are two rare fish species, one rare mussel species, and one rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Etheostoma wapiti	Boulder darter	LE	E
Percina tanasi	Snail darter	LT	T
Toxolasma cylinderellus	Pale lilliput	LE	E
Lithasia lima	Warty rocksnail		

Table 2-4. Rare Aquatic Species in the Tennessee Portion of the Lower Elk River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service; LT, Listed Threatened by the U.S. Fish and Wildlife Service. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; D, Deemed in Need of Management by the*

Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/nh/tnanimal.html.

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.

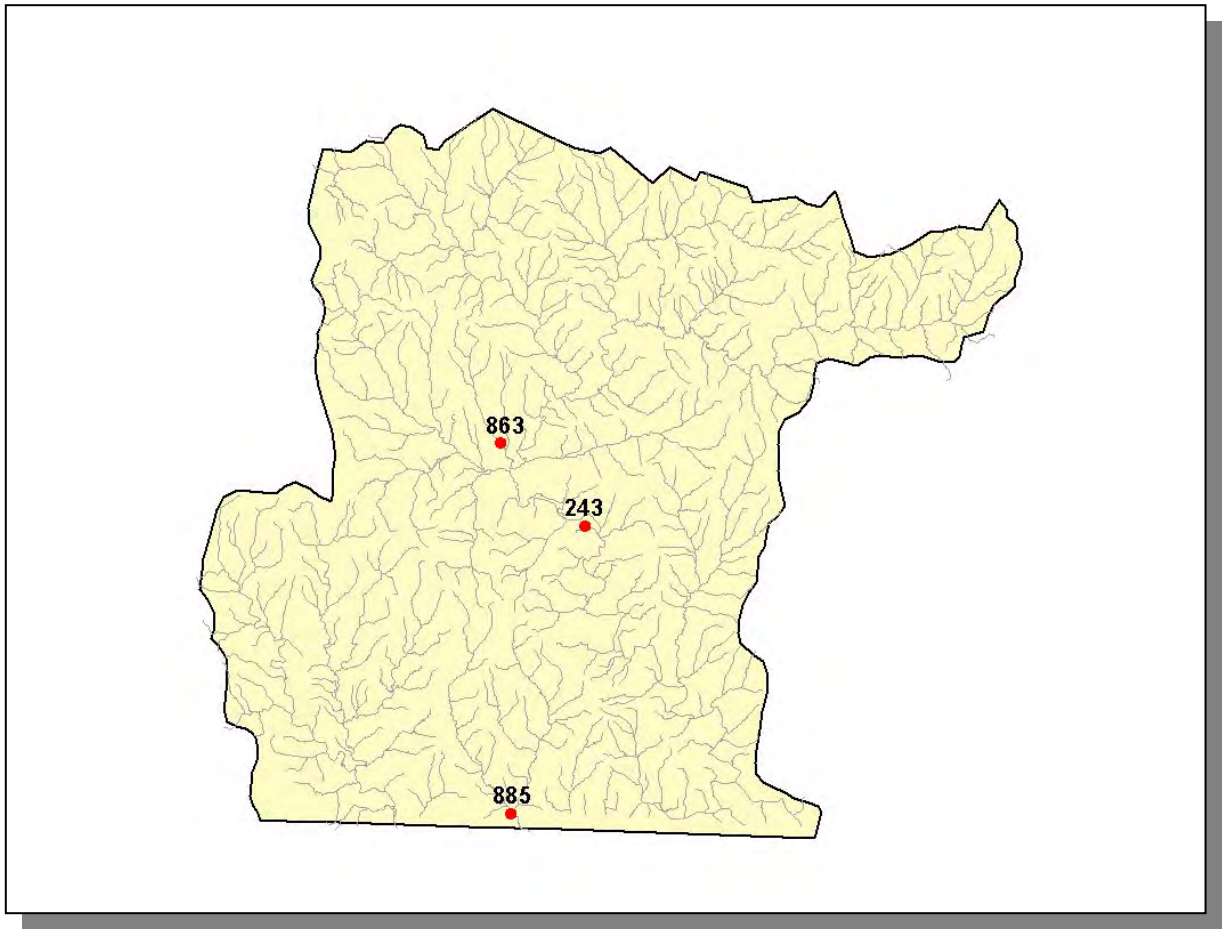


Figure 2-10. Location of Wetland Sites in TDEC Division of Natural Heritage Database in the Tennessee Portion of the Lower Elk River Watershed. This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands in the watershed*. More information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

2.7. CULTURAL RESOURCES.

2.7.A. Nationwide Rivers Inventory. The Nationwide Rivers Inventory, required under the Federal Wild and Scenic Rivers Act of 1968, is a listing of free-flowing rivers that are believed to possess one or more outstanding natural or cultural values. Exceptional scenery, fishing or boating, unusual geologic formations, rare plant and animal life, cultural or historic artifacts that are judged to be of more than local or regional significance are the values that qualify a river segment for listing. The Tennessee Department of Environment and Conservation and the Rivers and Trails Conservation Assistance branch of the National Park Service jointly compile the Nationwide Rivers Inventory from time to time (most recently in 1997). Under a 1980 directive from the President's Council on Environmental Quality, all Federal agencies must seek to avoid or mitigate actions that would have an adverse effect on Nationwide Rivers Inventory segments.

The most recent version of the Nationwide Rivers Inventory lists portions of one stream in the Lower Elk River Watershed:

Richland Creek. Scenic float stream.

RIVER	SCENIC	RECREATION
Richland Creek	X	X

Table 2-5. Attributes of Streams Listed in the Nationwide Rivers Inventory.

Additional information may be found online at http://www.ncrc.nps.gov/rtca/nri/tn.htm

2.7.B. Interpretive Areas.

Many local interpretive areas are common in the Lower Elk River Watershed, most notably, Giles County Park and Sam Davis Park.

2.8. TENNESSEE RIVERS ASSESSMENT PROJECT.

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

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

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Agnew Creek	3			Leatherwood Creek	3		
Anderson Creek	2			Long Branch Clear Fork	3		
Big Creek	3		2,3	Lynn Creek	3		
Birch Branch Creek	3			Pigeon Roost Creek	3		2
Blue Creek	2			Pole Bridge Branch Creek	3		
Brownlow Creek	2			Prosser Creek	3		
Buchanan Creek	2	3		Richland Creek	2,3	3	
Choate Creek	3			Robertson Fork Richland Creek	2		
Clear Fork E.F. Sugar Creek	3			Shannon Creek	3		
Dry Creek	3			South Fork Blue Creek	2		
Dry Weakley Creek	2			Sugar Creek	3	3	
East Fork Shoal Creek	3			Weakley Creek	3		
East Fork Sugar Creek	3			West Fork Shoal Creek	3		
Elk River	2	2		West Fork Sugar Creek	3		
Factory Creek	2			West Weakley Creek	2		
Hams Creek	2			Yokley Creek	3		
Hurricane Creek	3						

Table 2-6. 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

CHAPTER 3

WATER QUALITY ASSESSMENT OF THE LOWER ELK RIVER 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 of the watershed cycle, following one to two years of data collection. More information about the Watershed Approach may be found in Chapter 1 and at http://www.state.tn.us/environment/wpc/watershed/.

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

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

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

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

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

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

4. Highlight areas of improved water quality

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

The 303(d) list is a compilation of the waters of Tennessee that 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) for which it is listed.

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

The current 303(d) List is available on the TDEC homepage at:
http://www.state.tn.us/environment/wpc/publications/2002303dpropfinal.pdf

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

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

3.2. DATA COLLECTION. Comprehensive water quality monitoring in the Lower Elk River Watershed was conducted in 1997 and 1998. Data were collected from 18 sites and are from one of four types of sites: 1)Ambient sites, 2)Ecoregion sites, 3)Watershed sites or 4)Aquatic Resources Alteration Permit (ARAP) inspection sites.

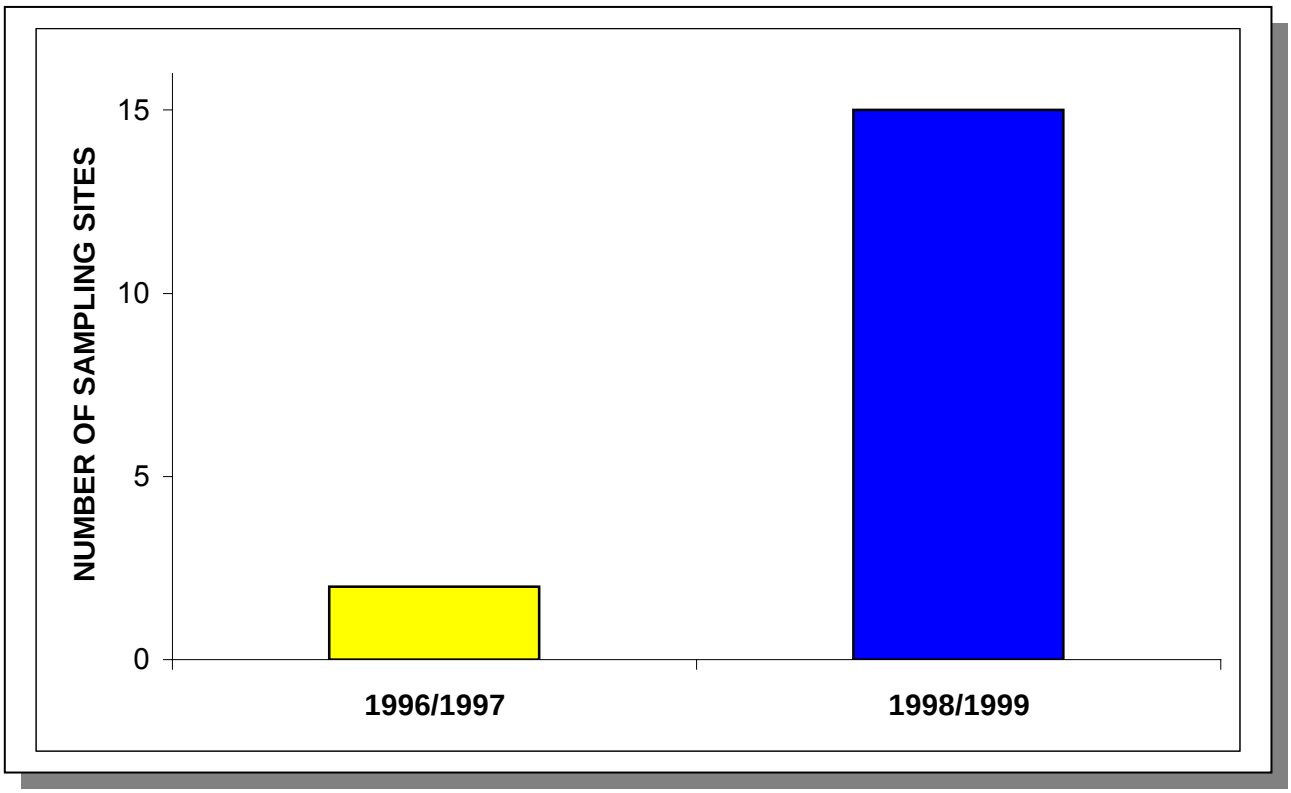


Figure 3-1. Number of Sampling Sites Using the Traditional Approach (1996/1997) and Watershed Approach (1998/1999) in the Lower Elk River Watershed.

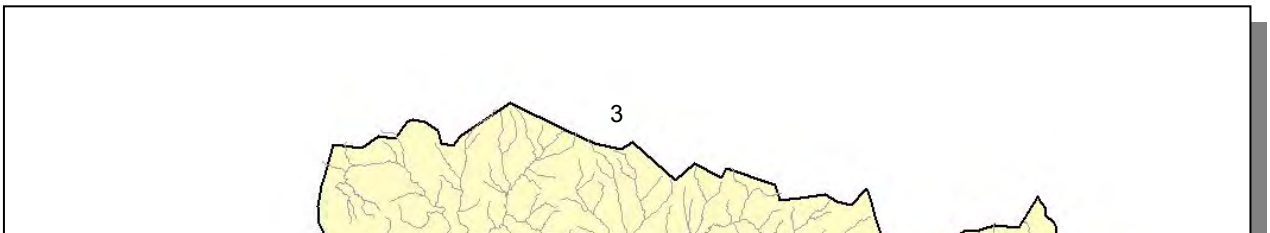


Figure 3-2. Location of Monitoring Sites in the Tennessee Portion of the Lower Elk River Watershed. *Red, Watershed Monitoring Sites; Green, Ambient Monitoring Sites. Locations of Cornersville, Minor Hill, and Pulaski are shown for reference.*

TYPE	NUMBER	TOTAL NUMBER OF SAMPLING EVENTS		
		CHEMICAL ONLY	BIOLOGICAL ONLY	OBSERVATION
Ambient	4	4	0	0
Ecoregion	0	0	0	0
Watershed	11	11	0	0
Totals	**15**	**15**	**0**	**0**

Table 3-1. Monitoring Sites in the Tennessee Portion of the Lower Elk River Watershed During the Data Collection Phase of the Watershed Approach.

In addition to the sampling events, 15 citizen complaints were investigated.

3.2.A. Ambient Monitoring Sites. These fixed-station chemical monitoring sites are sampled quarterly or monthly by the Environmental Assistance Center-Nashville and

Environmental Assistance Center-Columbia staff (this is in addition to samples collected by water and wastewater treatment plant operators). Samples are analyzed by the Tennessee Department of Health, Division of Environmental Laboratory Services. Ambient monitoring data are used to assess water quality in major bodies of water where there are NPDES facilities and to identify trends in water quality. Water quality parameters traditionally measured at ambient sites in the Lower Elk River Watershed are provided in Lower Elk-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 Lower Elk River Watershed lies within 1 Level III ecoregion (Interior Plateau) and contains 3 subecoregions (Level IV):

- Western Highland Rim (71f)
- Eastern Highland Rim (71g)
- Outer Nashville Basin (71h)

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.

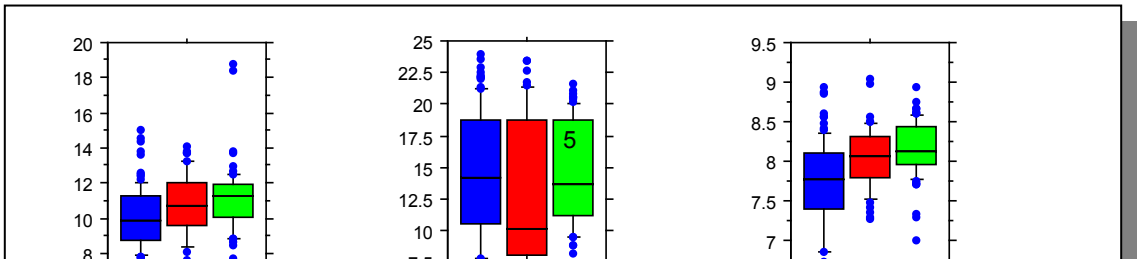


Figure 3-3. Select Chemical Data Collected in Tennessee Portion of Lower Elk River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots.* Fecal, fecal coliform bacteria; TN, Total Nitrogen; TP, Total Phosphorus.

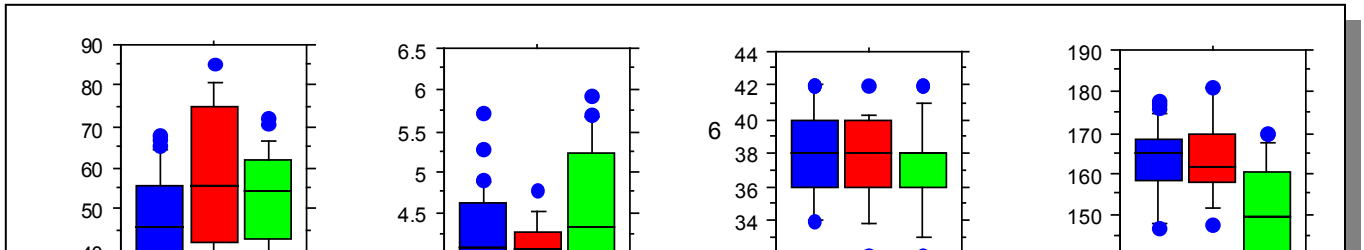


Figure 3-4. Benthic Macroinvertebrate and Habitat Scores for Tennessee Portion of Lower Elk River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. NCBI, North Carolina Biotic Index. Index Score and Habitat Riffle/Run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

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

developed. Additional sites may be added in Year 2 when additional monitoring strategies are implemented.

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

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

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

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

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

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

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

All readily available data are considered, including data from TDEC Environmental 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.

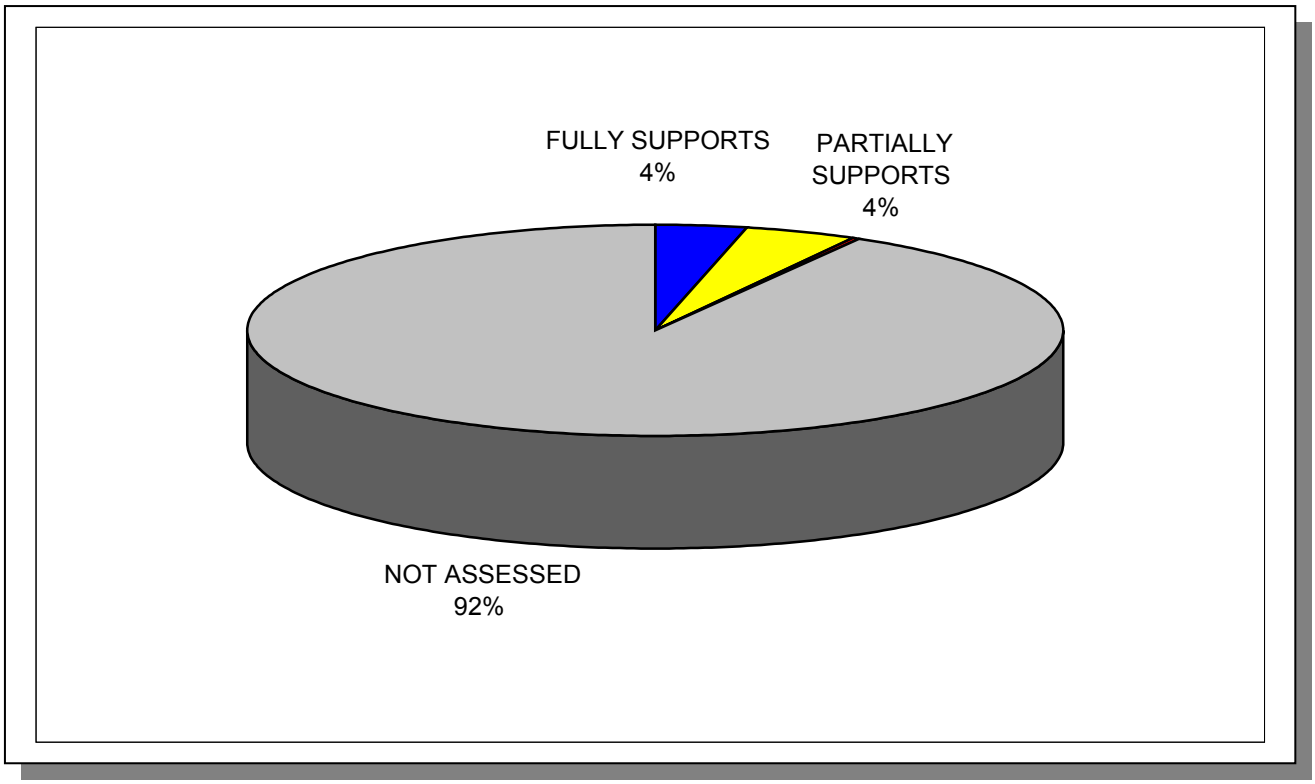


Figure 3-5. Water Quality Assessment for Streams and Rivers in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment.*

3.3.A. Assessment Summary.

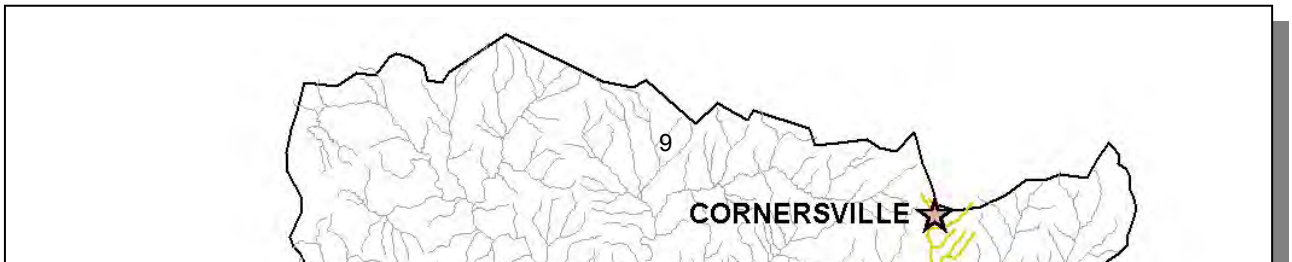


Figure 3-6a. Overall Use Support Attainment in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed.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

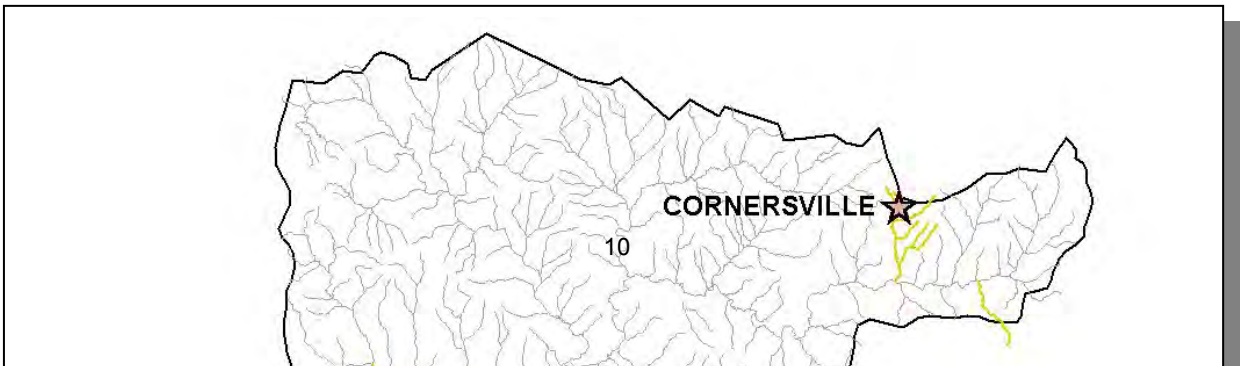


Figure 3-6b. Fish and Aquatic Life Use Support Attainment in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Cornersville, Minor Hill, and Pulaski are shown for reference.*

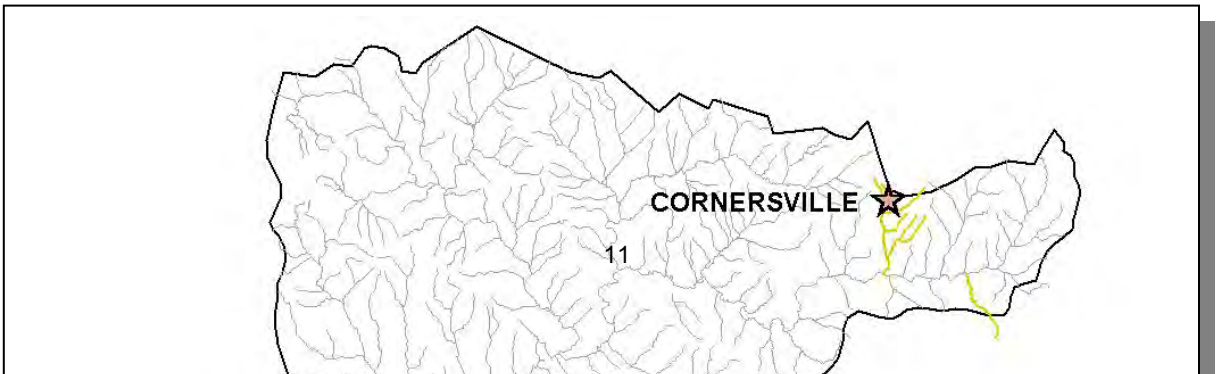


Figure 3-6c. Recreation Use Support Attainment in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Cornersville, Minor Hill, and Pulaski are shown for reference.*

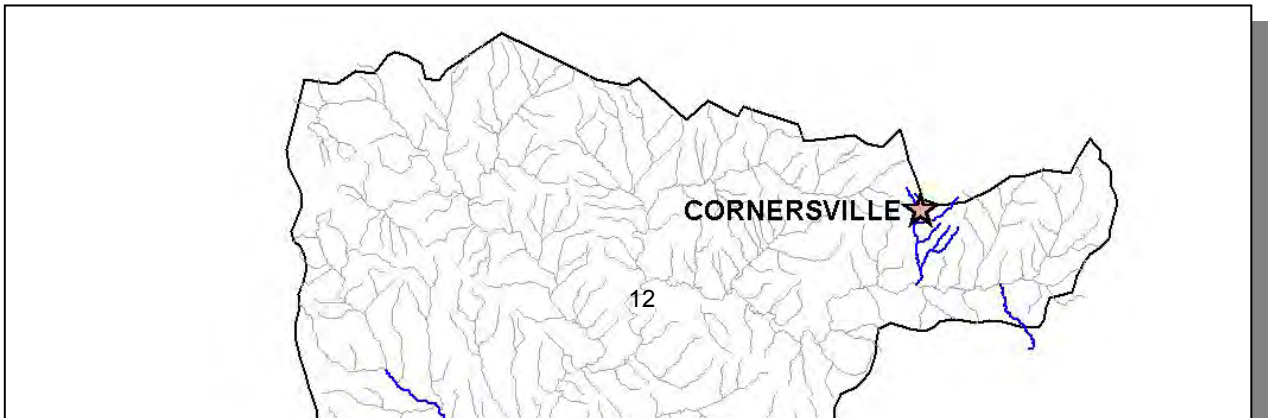


Figure 3-6d. Irrigation Use Support Attainment in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Cornersville, Minor Hill, and Pulaski are shown for reference.*

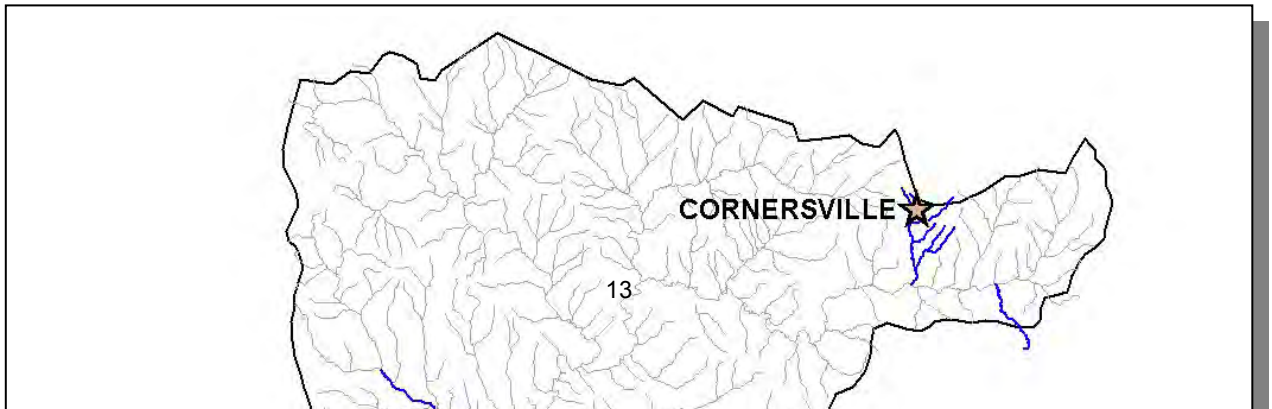


Figure 3-6e. Livestock Watering and Wildlife Use Support Attainment in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Cornersville, Minor Hill, and Pulaski are shown for reference.*

3.3.B. Use Impairment Summary.

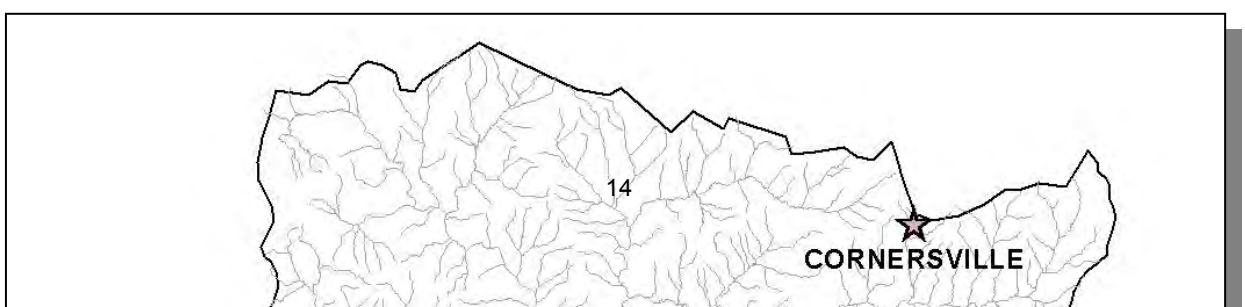


Figure 3-7a. Impaired Streams Due to Habitat Alteration in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment; Yellow, Partially Supports designated Use; Red, Does Not Support Designated Use; Cornersville, Minor Hill, and Pulaski are shown for reference. More information is provided in Lower Elk-Appendix III.*

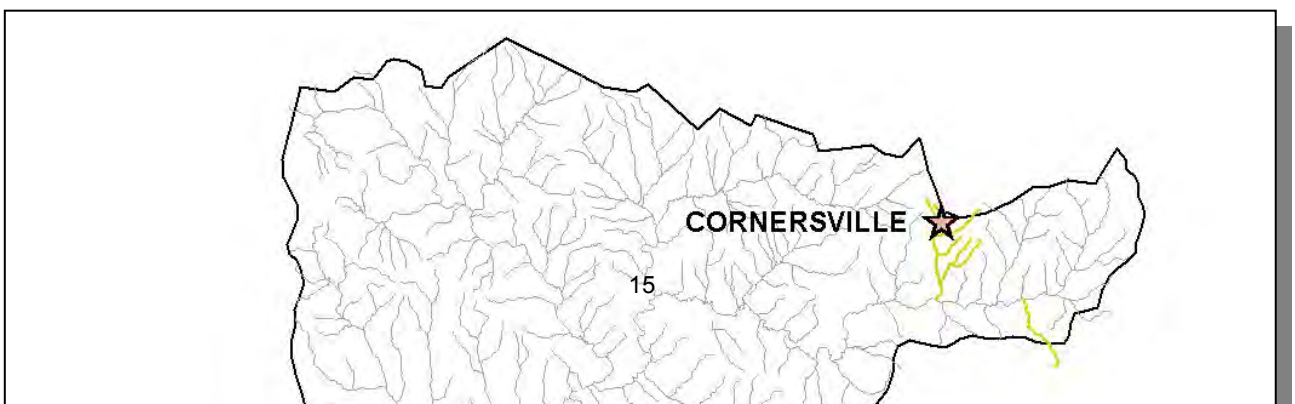


Figure 3-7b. Impaired Streams Due to Pathogens in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports designated Use; Red, Does Not Support Designated Use; Cornersville, Minor Hill, and Pulaski are shown for reference. More information is provided in Lower Elk-Appendix III.*

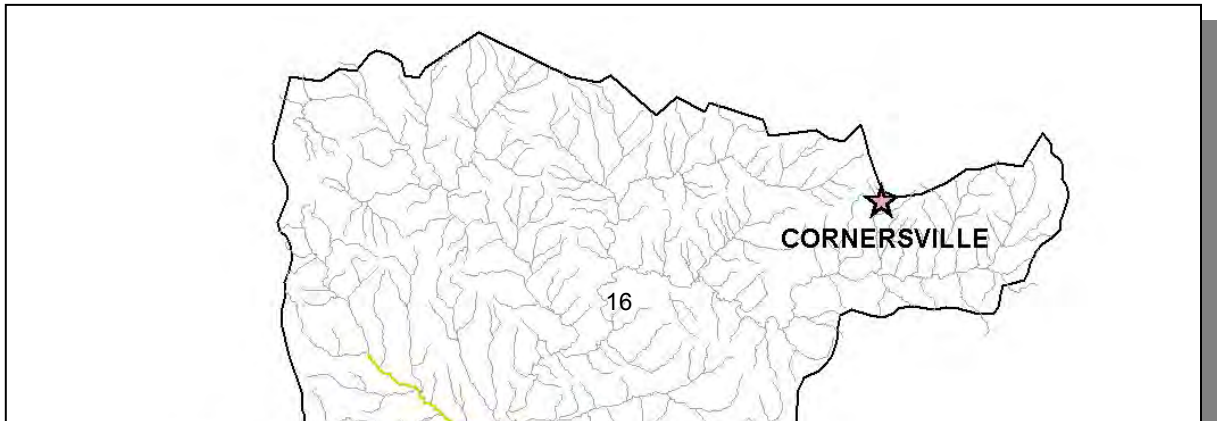


Figure 3-7c. Impaired Streams Due to Siltation in the Tennessee Portion of the Lower Elk River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Cornersville, Minor Hill, and Pulaski are shown for reference. More information is provided in Lower Elk-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.

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

3.4. FLUVIAL GEOMORPHOLOGY. Stream width, depth, and cross-sectional dimensions at bankful discharge are key parameters used in characterizing the shape and stability of rivers. Characterization of streams using the fluvial geomorphic stream classification system, which allows prediction of stream stability and physical evolution, is a valuable management tool (Rosgen, 1996).

A fluvial geomorphic curve illustrates relationships between drainage area, bankful dimensions of width, depth and cross-sectional area, and bankful discharge of stream systems that are in dynamic equilibrium. It is a tool to evaluate and predict the physical impacts of channel modifications, flow alterations, and other watershed changes, as well as determining appropriate physical parameters for stream and riparian restoration. Regional curves have been developed and applied in various regions of the country since the mid-1970's (Dunne and Leopold, 1978).

There are several benefits to using regional curves:

- Serving as a valuable regional-specific database for watershed management
- Providing an unbiased, scientific evaluation of the environmental impacts of proposed ARAP and other permitted activities
- Providing a scientific foundation for evaluating and documenting long-term geomorphic and hydrologic changes in the region
- Quantifying environmental impacts
- Suggesting the best approach to restore streams that have been modified

Ultimately, a regional curve will be created that illustrates the relationship between bankful width and drainage area.

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE LOWER ELK RIVER WATERSHED

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

i. General description of the subwatershed
ii. Description of point source contributions
ii.a. Description of facilities discharging to water bodies listed on the 1998 303(d) list
iii. Description of nonpoint source contributions

The Lower Elk River Watershed (HUC 06030004) has been delineated into four HUC 10-digit subwatersheds.

Information for this chapter was obtained from databases maintained by the Division of Water Pollution Control or provided in the WCS (Watershed Characterization System) data set. The WCS used was version 1.1 beta (developed by Tetra Tech, Inc for EPA Region 4) released in 2000.

WCS integrates with ArcView® v3.2 and Spatial Analyst® v1.1 to analyze user-delineated (sub)watersheds based on hydrologically connected water bodies. Reports are generated by integrating WCS with Microsoft® Word. Land Use/Land Cover information from 1992 MRLC (Multi-Resolution Land Cover) data are calculated based on the proportion of county-based land use/land cover in user-delineated (sub)watersheds. Nonpoint source data in WCS are based on agricultural census data collected 1992–1998; nonpoint source data were reviewed by Tennessee NRCS staff.

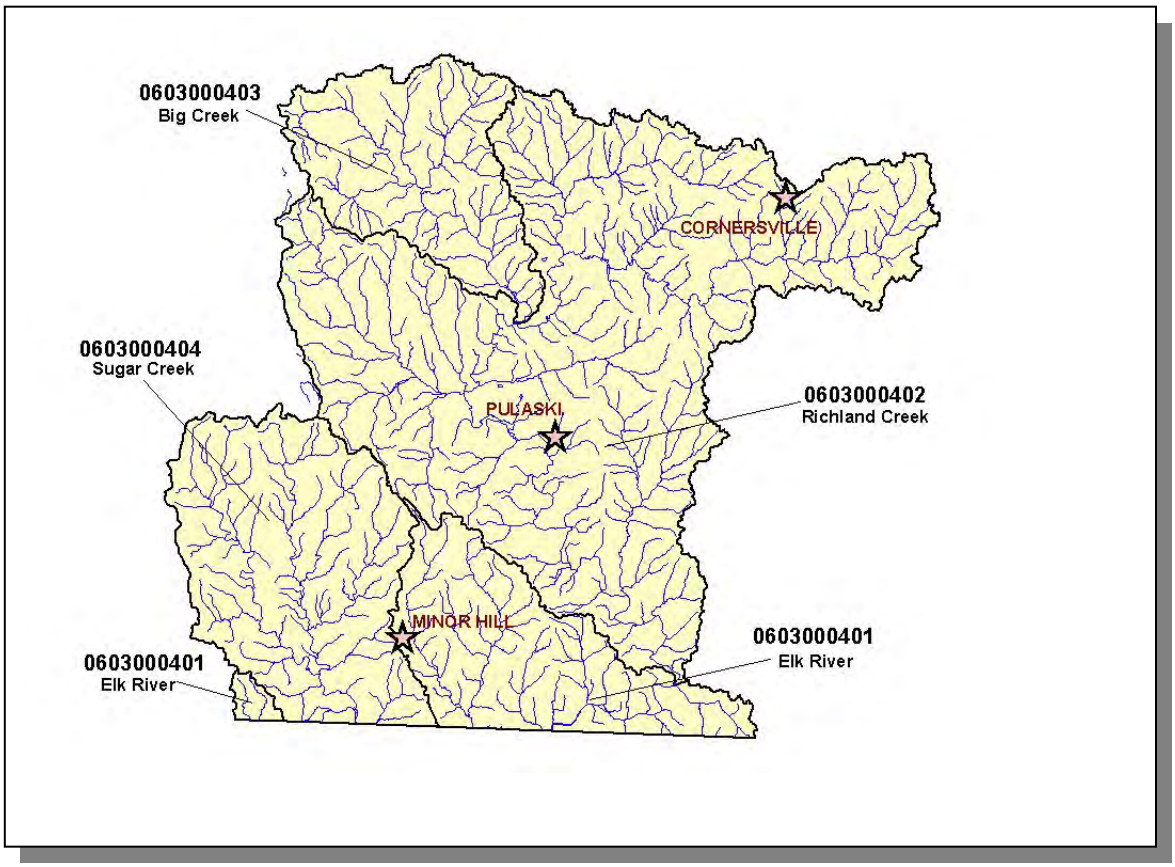


Figure 4-1. The Tennessee Portion of the Lower Elk River Watershed is Composed of Four USGS-Delineated Subwatersheds (10-Digit Subwatersheds). *Locations of Cornersville, Minor Hill, and Pulaski are shown for reference.*

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

HUC-10	HUC-12
0603000401	060300040101 (Elk River)
	060300040102 (Shoal Creek)
	060300040104 (Anderson Creek)
0603000402	060300040201 (Richland Creek)
	060300040202 (Richland Creek)
	060300040203 (Robertson Fork)
	060300040204 (Richland Creek)
	060300040205 (Weakley Creek)
	060300040206 (Richland Creek)
	060300040207 (Buchanan Creek)
	060300040208 (Richland Creek)
0603000403	060300040301 (Factory Creek)
	060300040302 (Yokely Creek)
	060300040303 (Big Creek)
0603000404	060300040401 (East Fork Sugar Creek)
	060300040402 (West Fork Sugar Creek)
	060300040403 (Sugar Creek)

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

4.2.A. 0603000401.

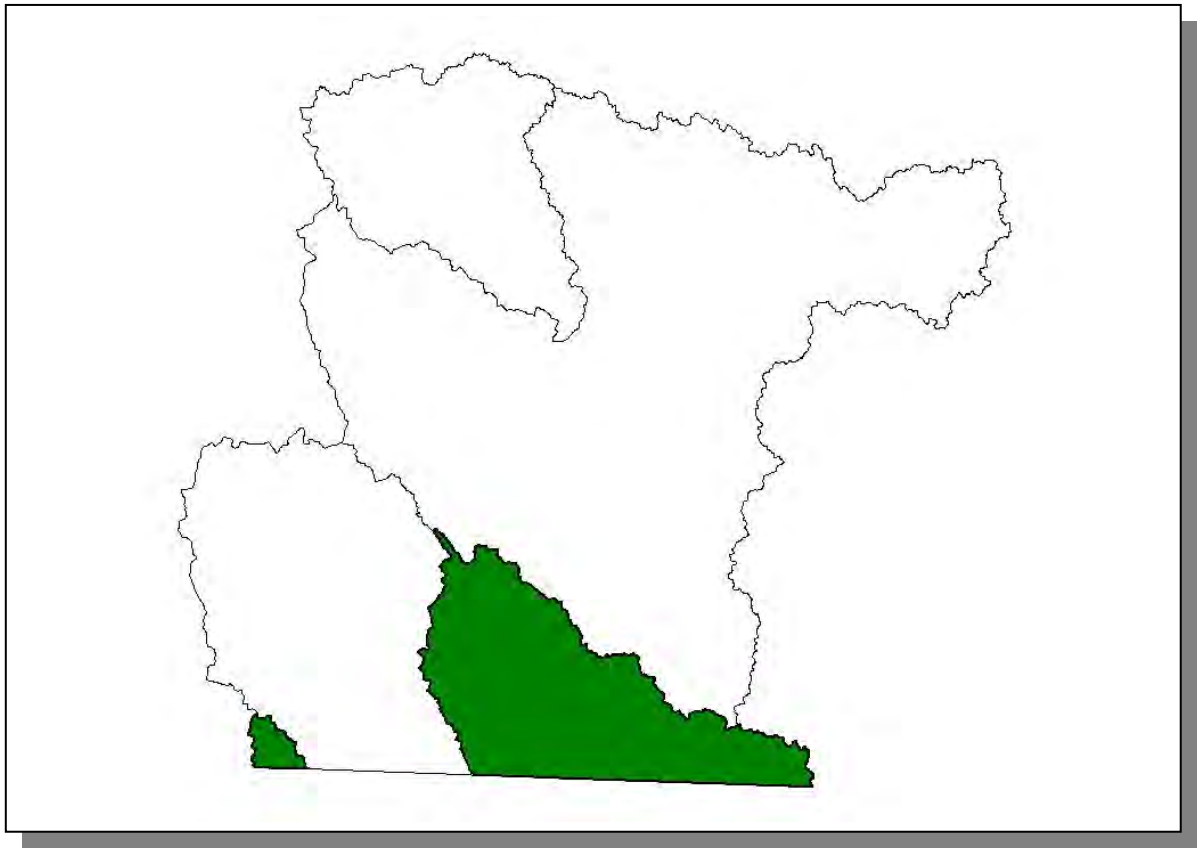


Figure 4-2. Location of Subwatershed 0603000401. *All Lower Elk HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.A.i. General Description.

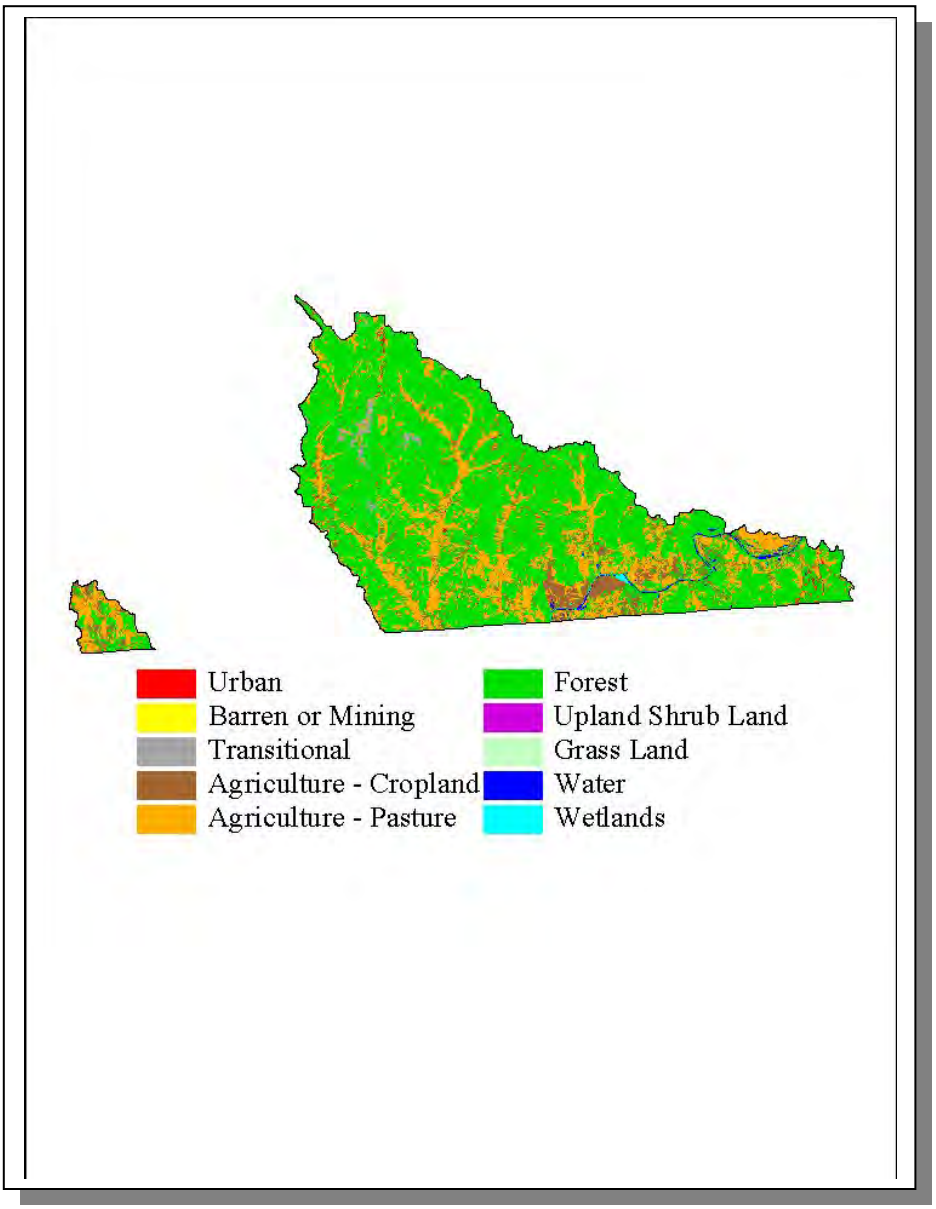


Figure 4-3. Illustration of Land Use Distribution in Subwatershed 0603000401.

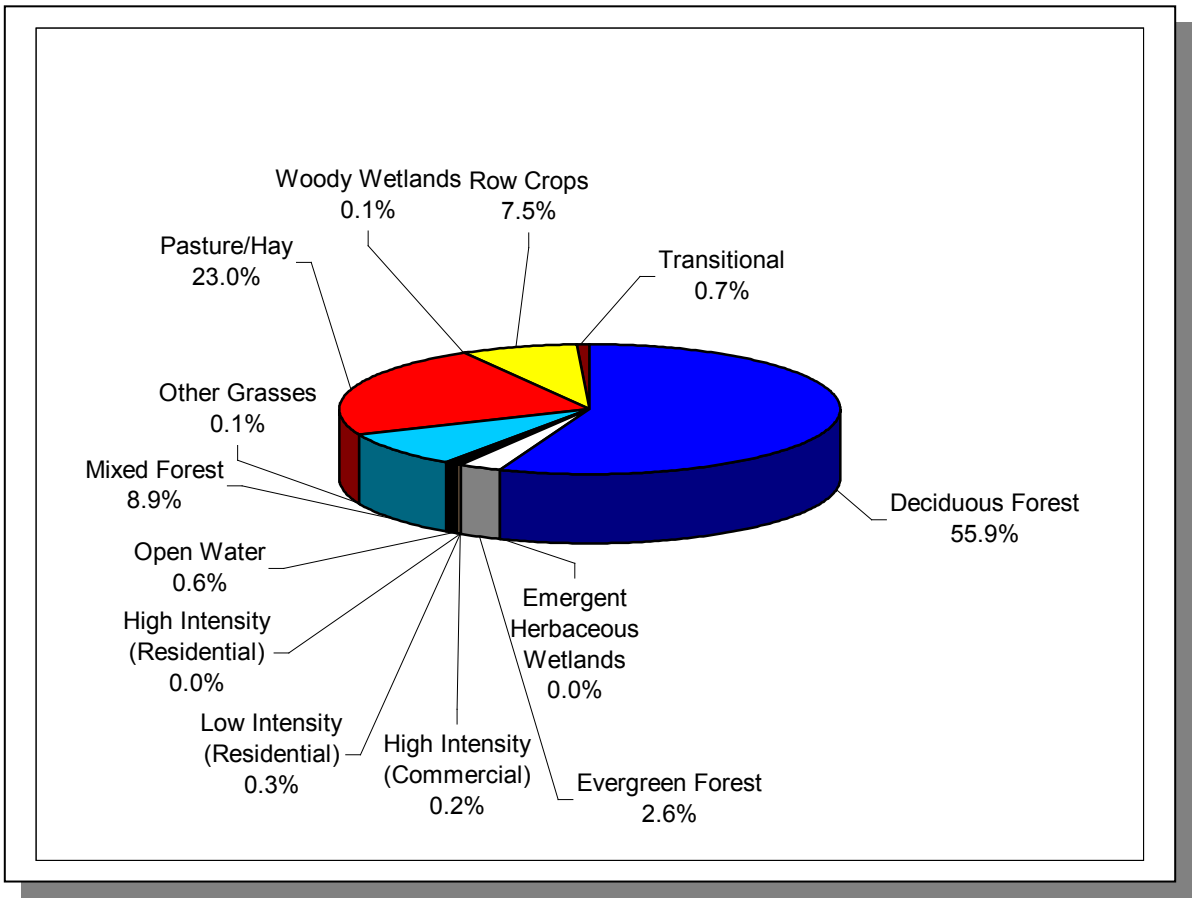


Figure 4-4. Land Use Distribution in Subwatershed 0603000401. *More information is provided in Lower Elk-Appendix IV.*

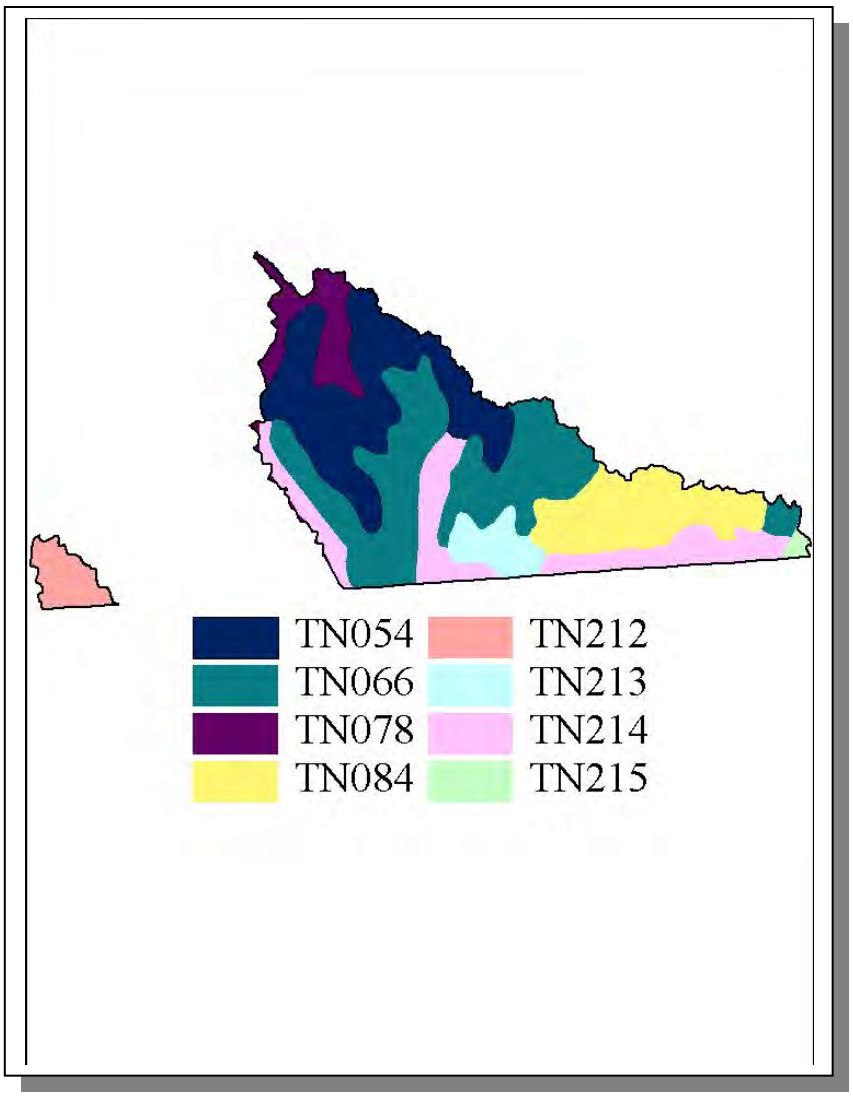


Figure 4-5. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0603000401.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN054	0.00	C	3.04	4.84	Loam	0.32
TN066	0.00	B	2.62	4.75	Loam	0.28
TN078	5.00	B	1.73	4.96	Silty Loam	0.39
TN084	0.00	C	1.80	4.99	Silty Loam	0.28
TN212	4.00	B	1.95	5.04	Silty Loam	0.38
TN213	9.00	C	1.89	5.30	Loam	0.35
TN214	0.00	B	2.52	4.86	Loam	0.32
TN215	9.00	C	1.57	5.02	Silty Loam	0.39

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0603000401. *More details are provided in Lower Elk-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		PERCENT CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Giles	25,741	28,515	12.84	3,306	3,662	10.8
Lawrence	35,303	39,095	0.4	143	158	10.5
Totals	**61,044**	**67,610**		**3,449**	**3,820**	**10.8**

Table 4-3. Population Estimates in Subwatershed 0603000401.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Ardmore	Giles	828	342	192	150	0
Minor Hill	Giles	351	186	2	182	2
Total		**1,179**	**528**	**194**	**332**	**2**

Table 4-4. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0603000401.

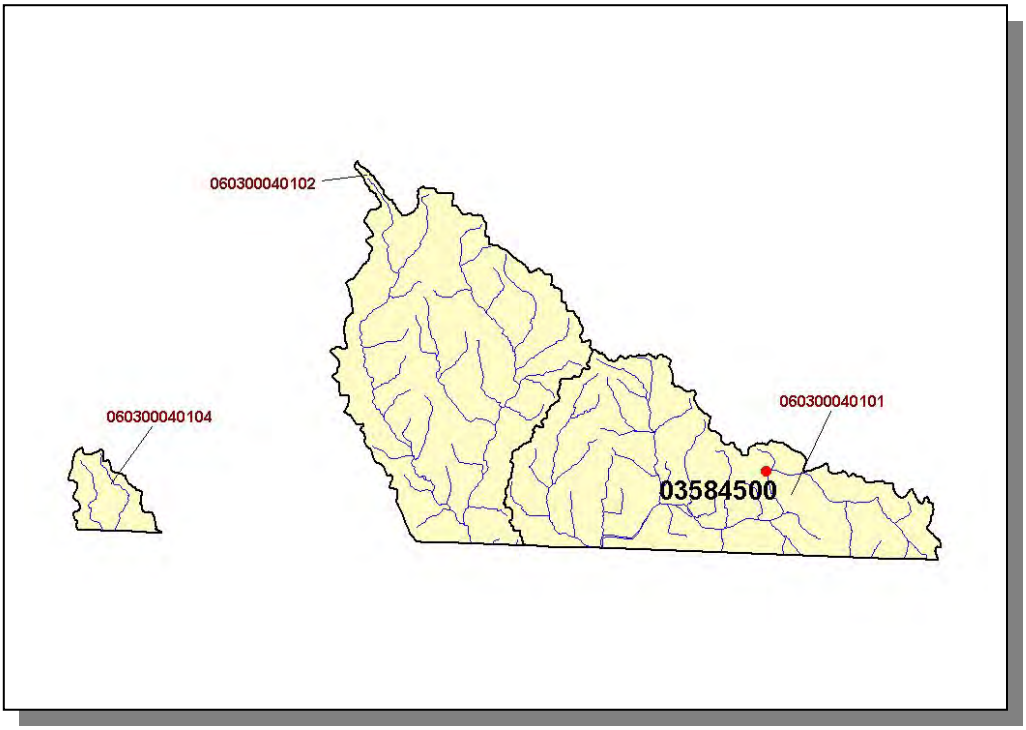


Figure 4-6. Location of Historical Streamflow Data Collection Sites in Subwatershed 0603000401. *Subwatershed 060300040101, 060300040102, and 060300040104 boundaries are shown for reference. More information is provided in Lower Elk-Appendix IV.*

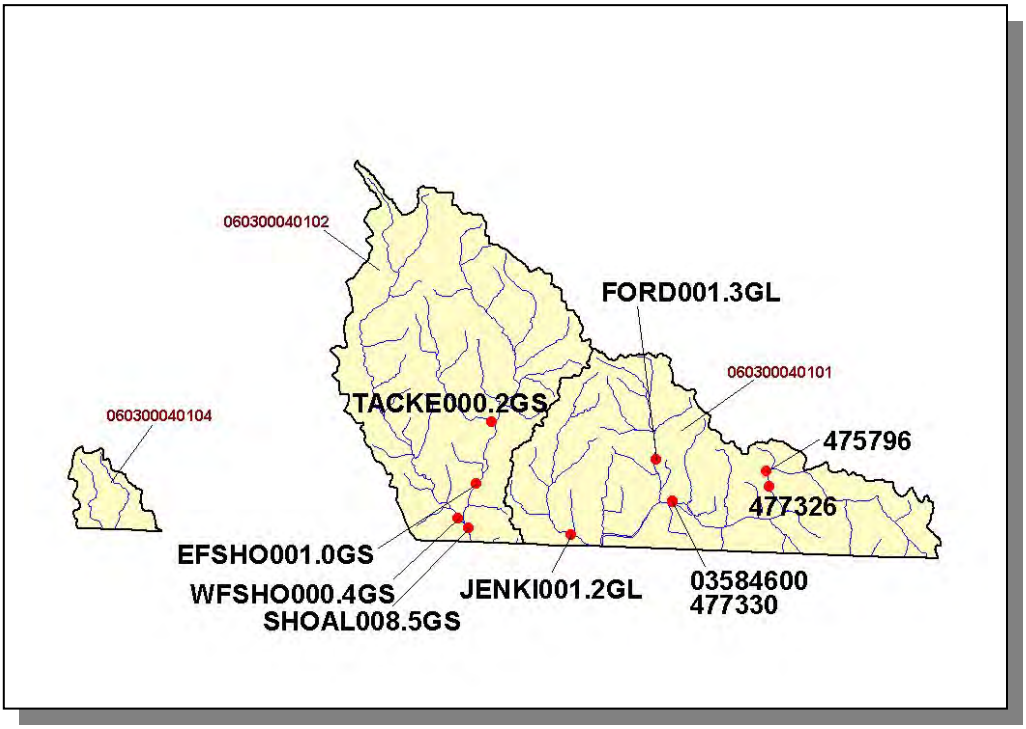


Figure 4-7. Location of STORET Monitoring Sites in Subwatershed 0603000401. *Subwatershed 060300040101, 060300040102, and 060300040104 boundaries are shown for reference. More information is provided in Lower Elk-Appendix IV.*

4.2.A.ii Point Source Contributions.

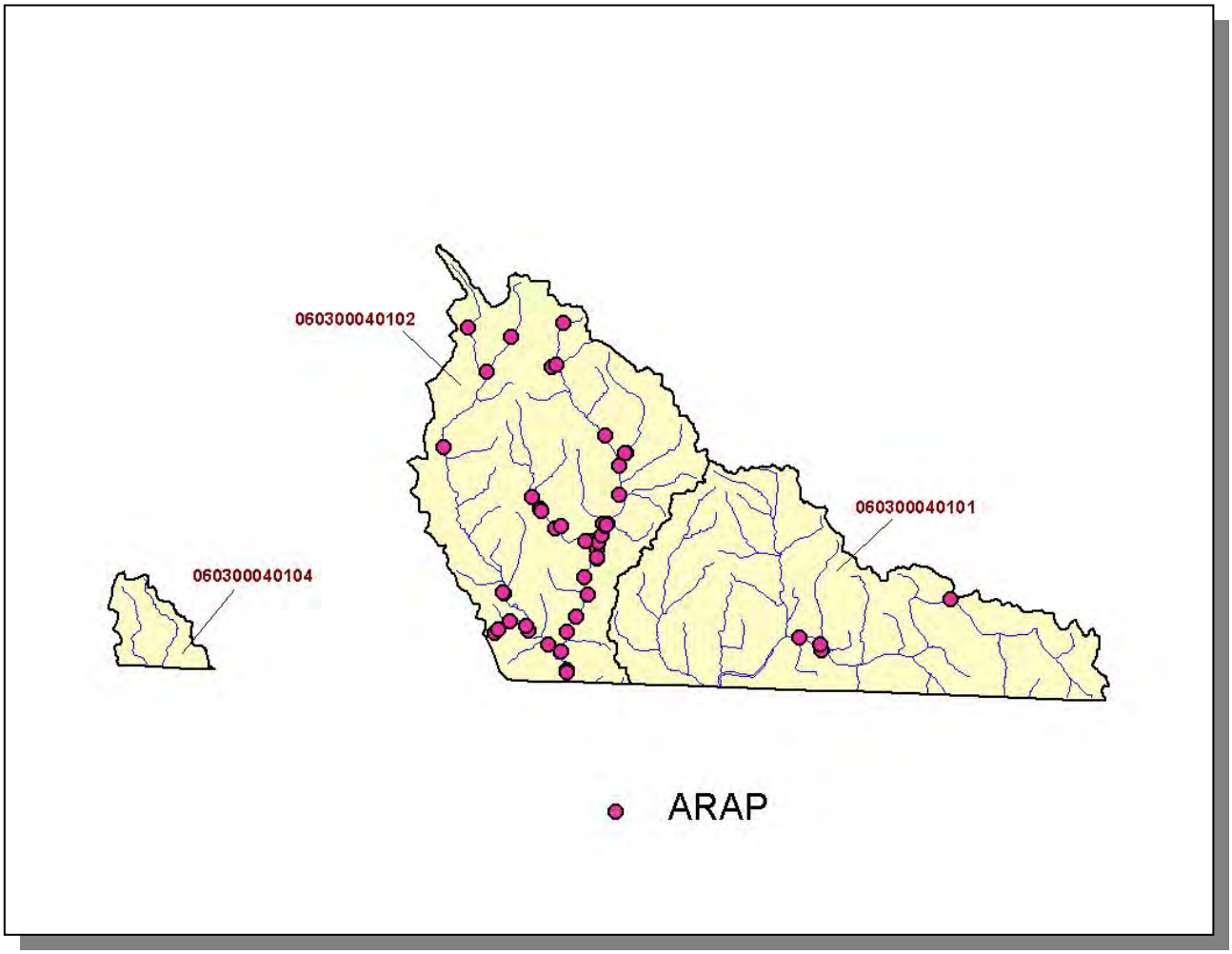


Figure 4-8. Location of Active Point Source Facilities in Subwatershed 0603000401. *Subwatershed 060300040101, 060300040102, and 060300040104 boundaries are shown for reference. More information is provided in the following charts.*

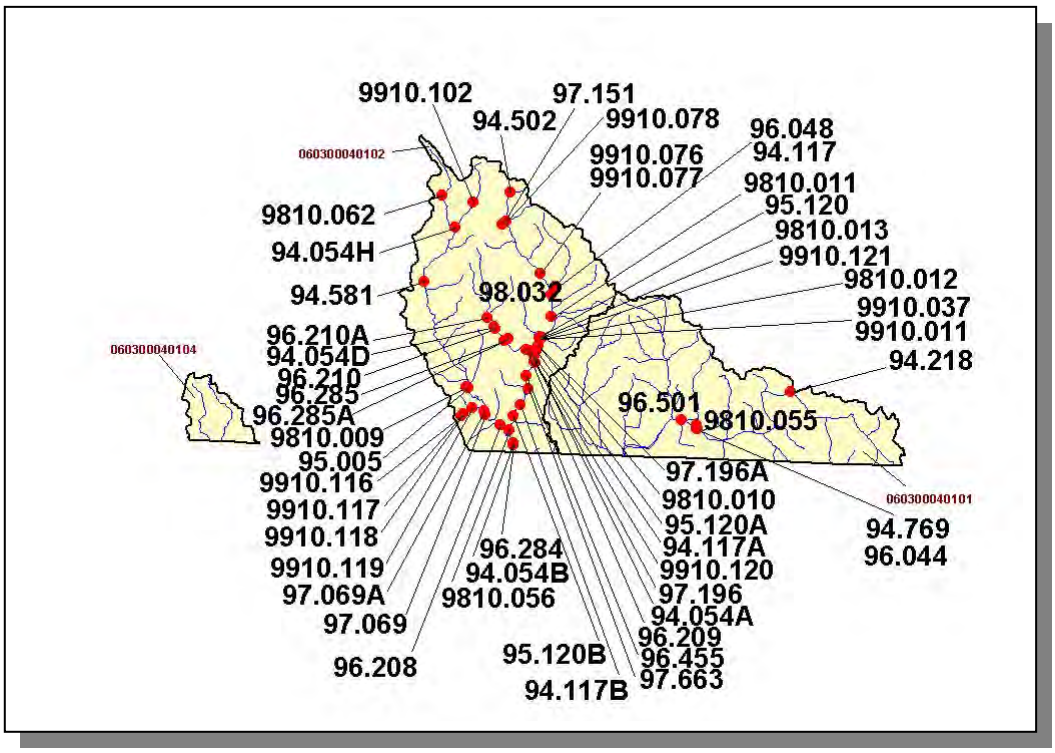


Figure 4-9. Location of ARAP Sites (Individual Permits) in Subwatershed 0603000401. *Subwatershed 060300040101, 060300040102, and 060300040104 boundaries are shown for reference. More information is provided in Lower Elk-Appendix IV.*

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens	Chickens Sold	Hogs	Sheep
3,345	7,276	301	10	110,966	956	38

Table 4-5. Summary of Livestock Count Estimates in Subwatershed 0603000401. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Giles	171.8	171.8	3.3	11.4
Lawrence	199.8	199.8	6.6	27.1
Totals	**371.6**	**371.6**	**9.9**	**38.5**

Table 4-6. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 0603000401.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	4.25
Soybeans (Row Crops)	3.93
Cotton (Row Crops)	8.07
All Other Row Crops	2.70
Grass (Hayland)	0.21
Legume/Grass (Hayland)	0.12
Grass (Pastureland)	1.03
Grass,Forbs, Legumes (Mixed Pasture)	0.77
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Wheat (Close Grown Cropland)	2.28
Barley (Close Grown Cropland)	1.08
All Other Close Grown Cropland	1.80
Other Vegetable and Truck Crops	4.29
Conservation Reserve Program Land	0.25
Summer Fallow (Other Cropland)	0.35
Other Cropland (Not Planted)	0.66
Nonagricultural Land Use	0.00
Farmsteads and Ranch Headquarters	0.32

Table 4-7. Annual Estimated Total Soil Loss in Subwatershed 0603000401.

4.2.B. 0603000402.

Figure 4-10. Location of Subwatershed 0603000402. *All Lower Elk HUC-10 subwatershed boundaries are shown for reference.*

4.2.B.i. General Description.

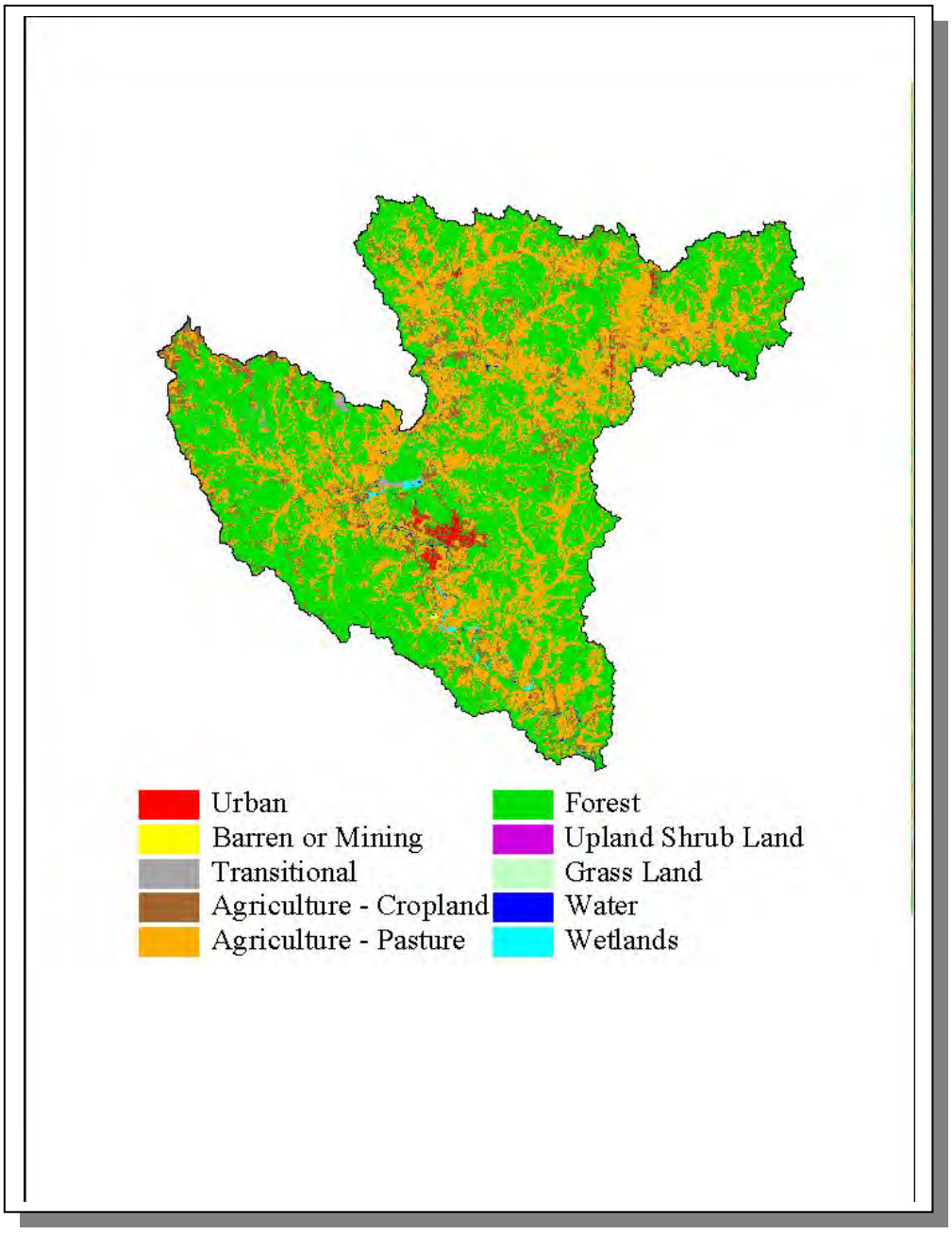


Figure 4-11. Illustration of Land Use Distribution in Subwatershed 0603000402.

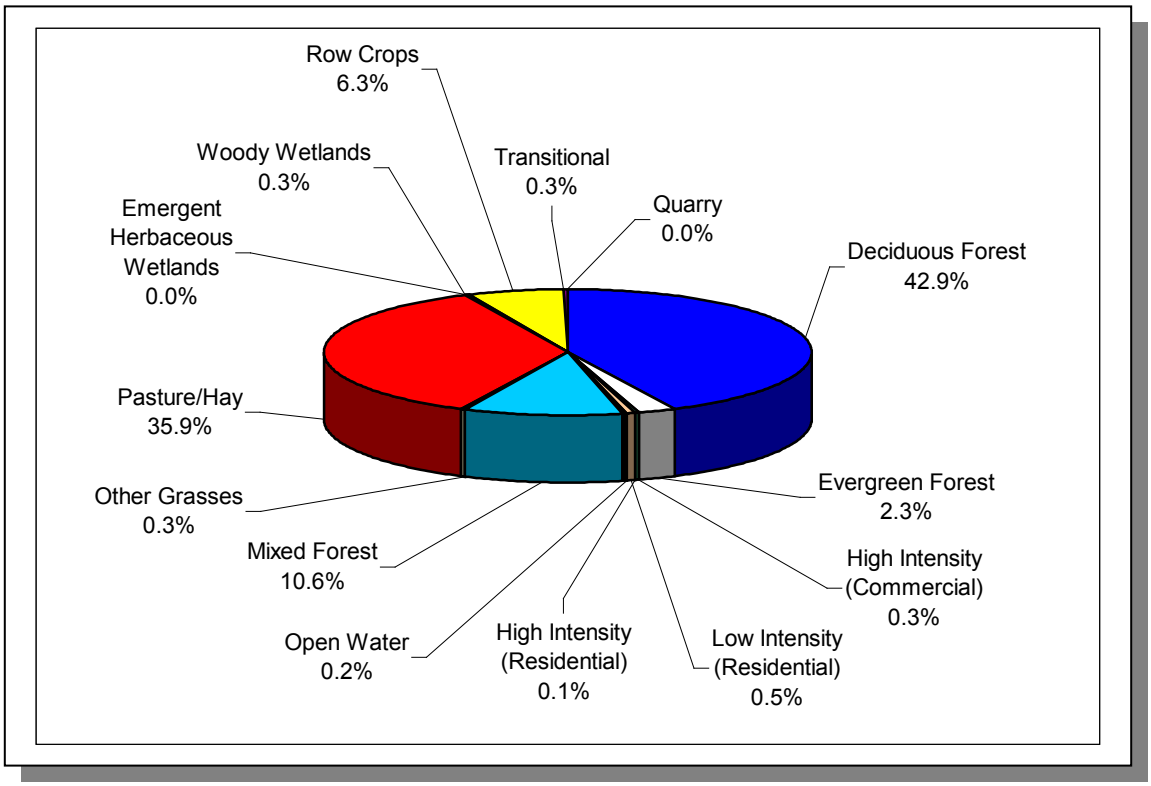


Figure 4-12. Land Use Distribution in Subwatershed 0603000402. *More information is provided in Lower Elk-Appendix IV.*

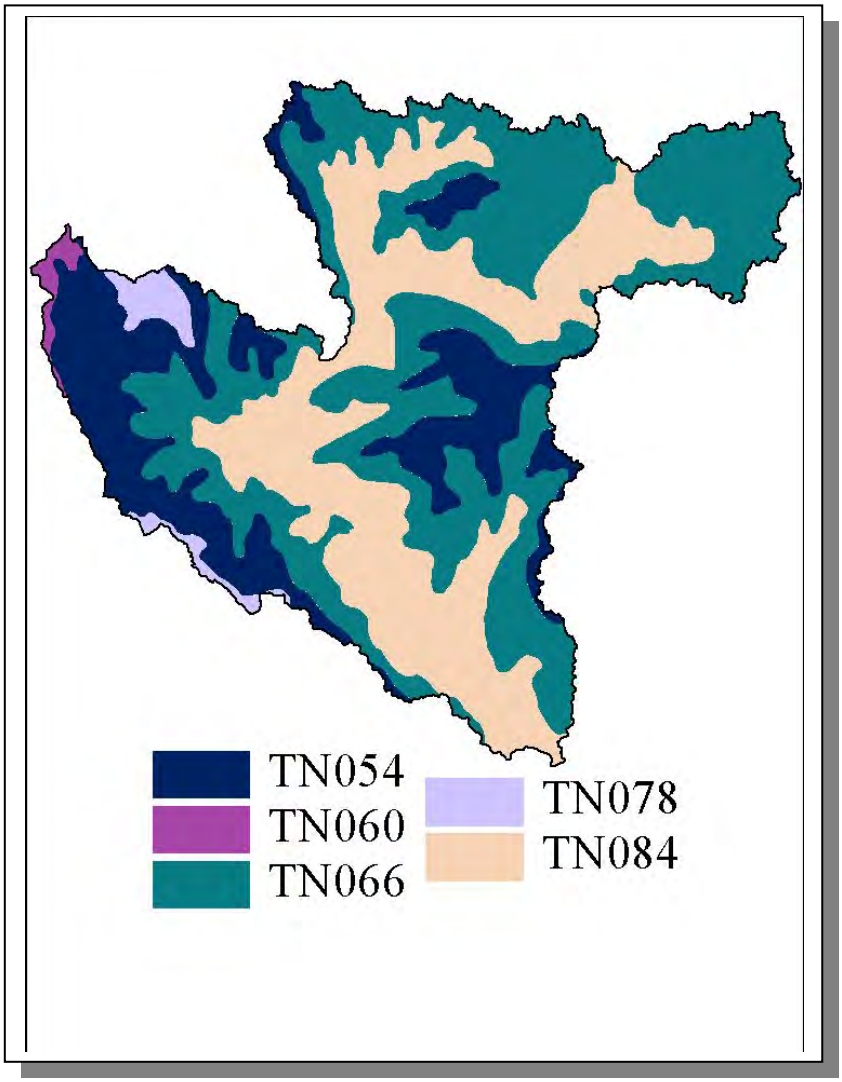


Figure 4-13. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0603000402.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN054	0.00	C	3.04	4.84	Loam	0.32
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN066	0.00	B	2.62	4.75	Loam	0.28
TN078	5.00	B	1.73	4.96	Silty Loam	0.39
TN084	0.00	C	1.80	4.99	Silty Loam	0.28

Table 4-8. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0603000402. *More information is provided in Lower Elk-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Giles	25,741	28,515	52.14	13,422	14,868	10.8
Lawrence	35,303	39,095	2.99	1,057	1,171	10.8
Marshall	21,539	25,687	15.47	3,332	3,974	19.3
Total	**82,583**	**93,297**		**17,811**	**20,013**	**12.4**

Table 4-9. Population Estimates in Subwatershed 0603000402.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Cornersville	Marshall	677	312	54	255	3
Elkton	Giles	463	184	1	183	0
Lynnville	Giles	366	167	18	145	4
Pulaski	Giles	7,895	3,545	3,283	262	0
Total		**9,401**	**4,208**	**3,356**	**845**	**7**

Table 4-10. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0603000402.

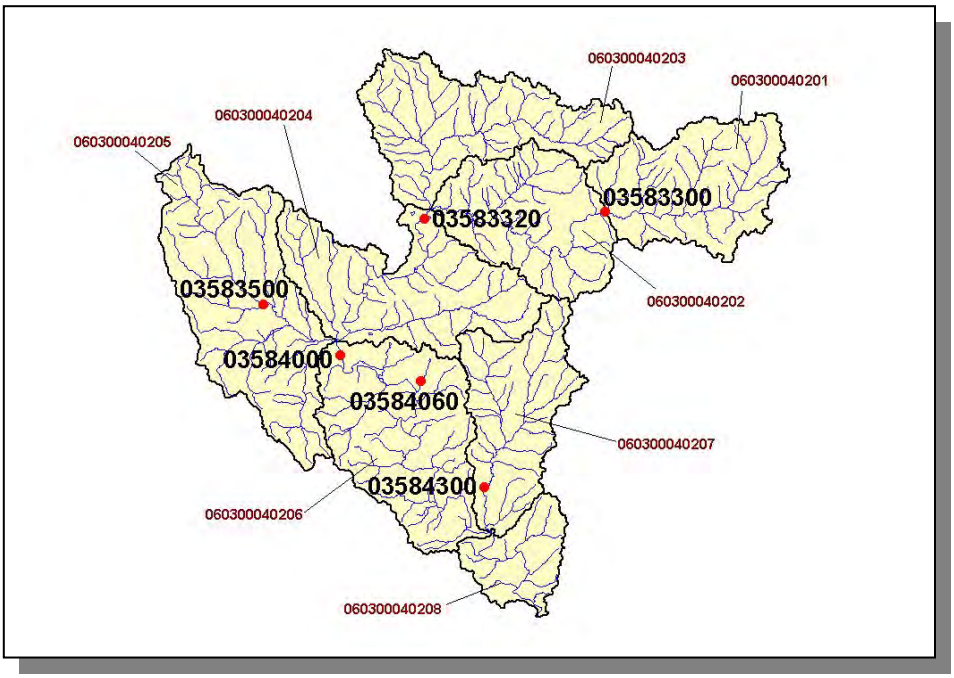


Figure 4-14. Location of Historical Streamflow Data Collection Sites in Subwatershed 0603000402. *Subwatershed 060300040201, 060300040202, 060300040203, 060300040204, 060300040205, 060300040206, 060300040207, and 060300040208 boundaries are shown for reference. More information is provided in Lower Elk-Appendix IV.*

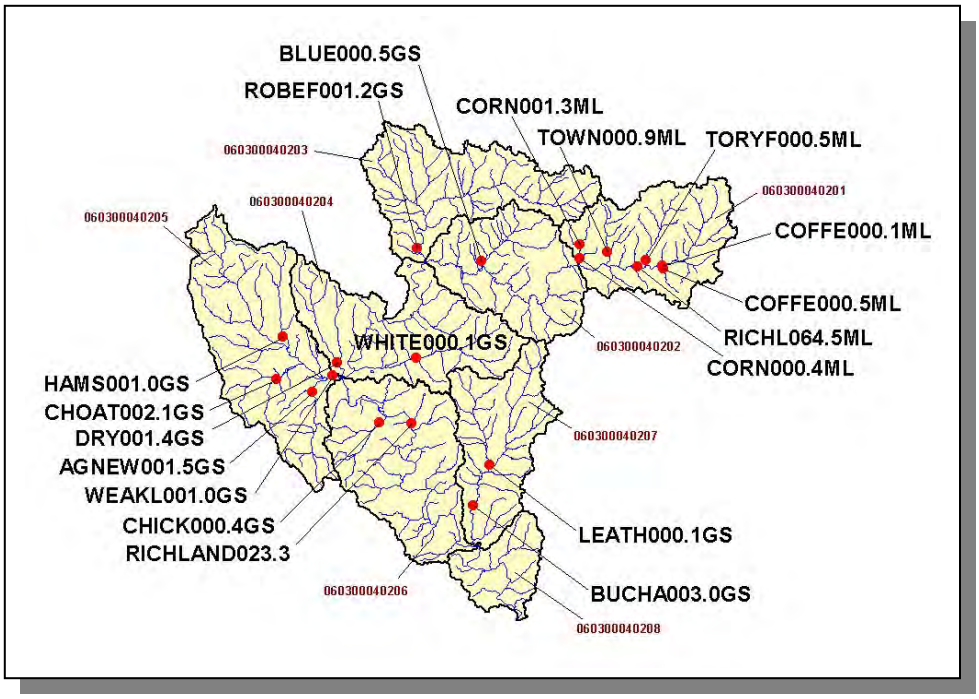


Figure 4-15. Location of STORET Monitoring Sites in Subwatershed 0603000402. *Subwatershed 060300040201, 060300040202, 060300040203, 060300040204, 060300040205, 060300040206, 060300040207, and 060300040208 boundaries are shown for reference. More information is provided in Lower Elk-Appendix IV.*

4.2.B.ii. Point Source Contributions.

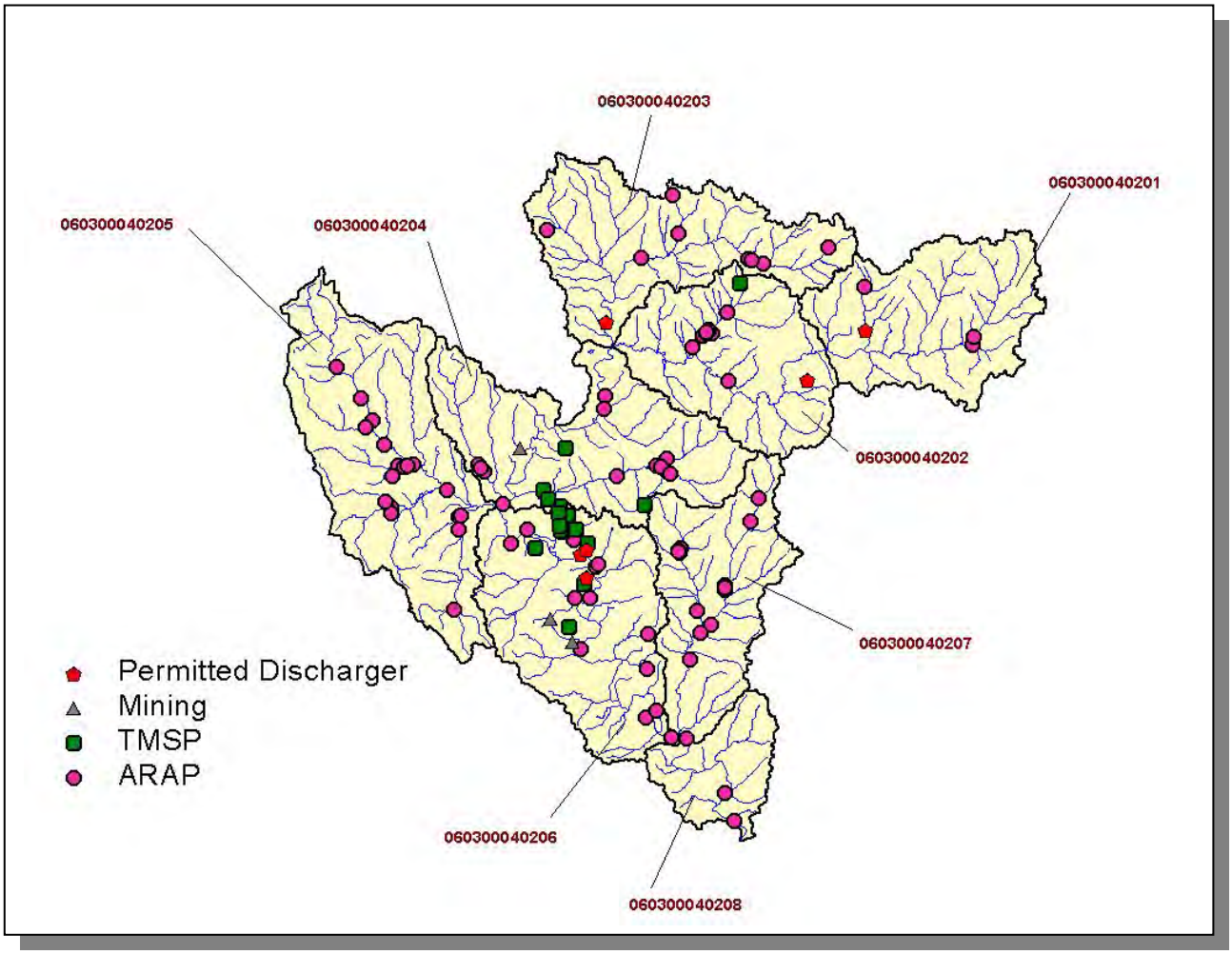


Figure 4-16. Location of Active Point Source Facilities in Subwatershed 0603000402. *Subwatershed 060300040201, 060300040202, 060300040203, 060300040204, 060300040205, 060300040206, 060300040207, and 060300040208 boundaries are shown for reference. More information is provided in the following charts.*

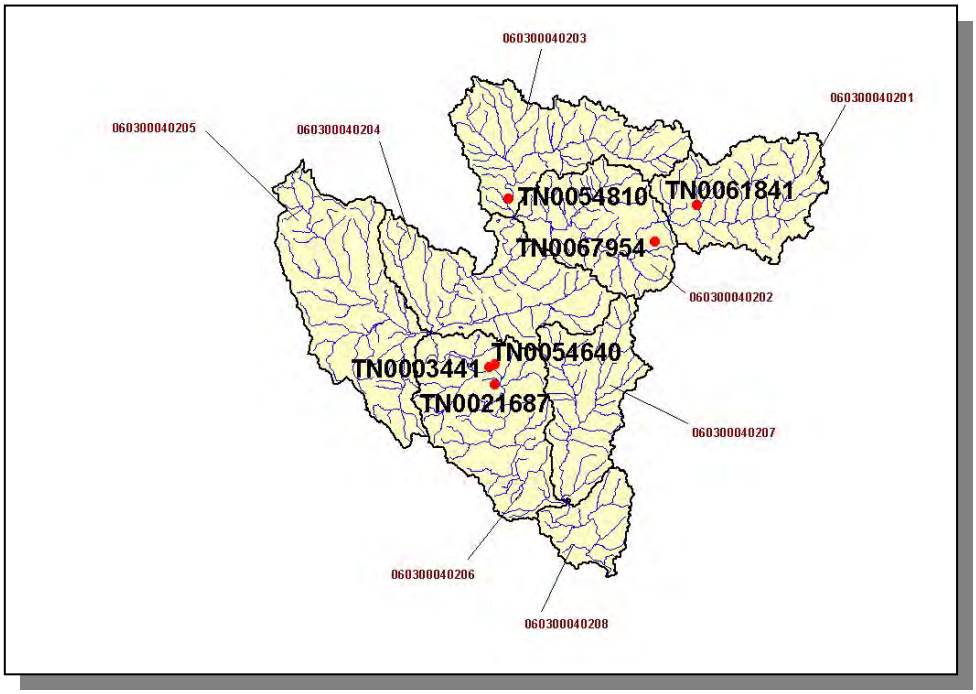


Figure 4-17. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 0603000402. *Subwatershed 060300040201, 060300040202, 060300040203, 060300040204, 060300040205, 060300040206, 060300040207, and 060300040208 boundaries are shown for reference. More information, including the names of facilities, is provided in Lower Elk-Appendix IV.*

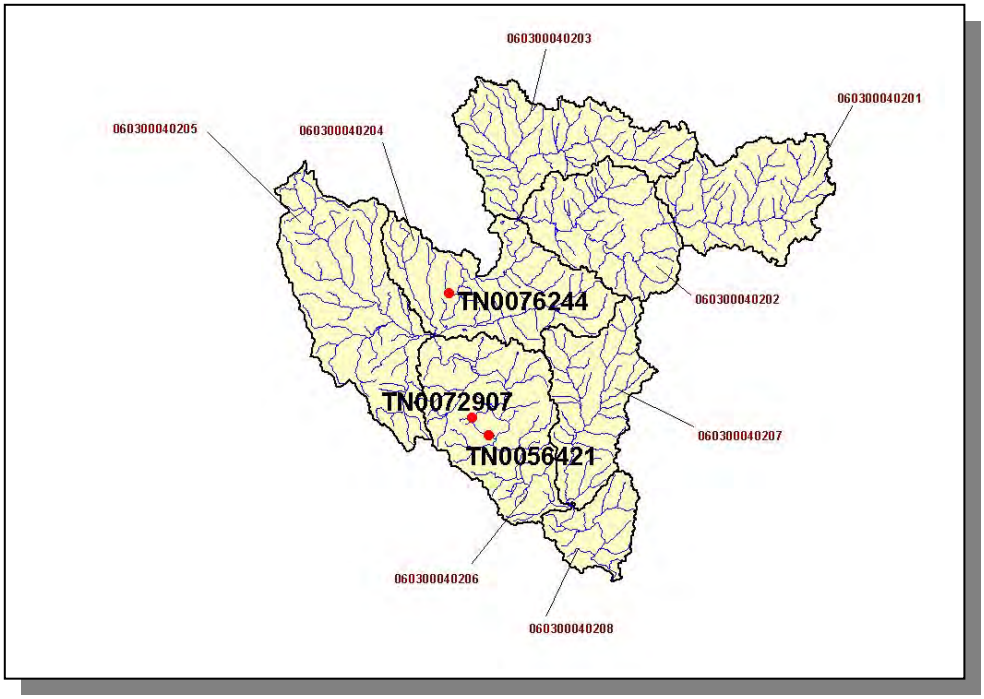


Figure 4-18. Location of Active Mining Sites in Subwatershed 0603000402. *Subwatershed 060300040201, 060300040202, 060300040203, 060300040204, 060300040205, 060300040206, 060300040207, and 060300040208 boundaries are shown for reference. More information, including the names of facilities, is provided in Lower Elk-Appendix IV.*

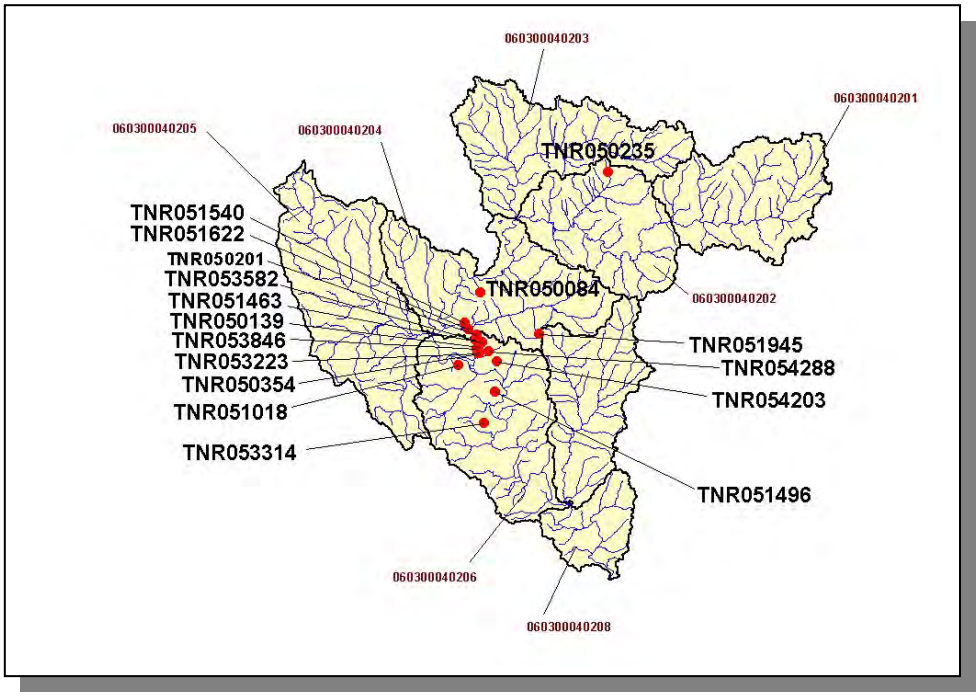


Figure 4-19. Location of TMSP Facilities in Subwatershed 0603000402. *Subwatershed 060300040201, 060300040202, 060300040203, 060300040204, 060300040205, 060300040206, 060300040207, and 060300040208 boundaries are shown for reference. More information, including the names of facilities, is provided in Lower Elk-Appendix IV.*

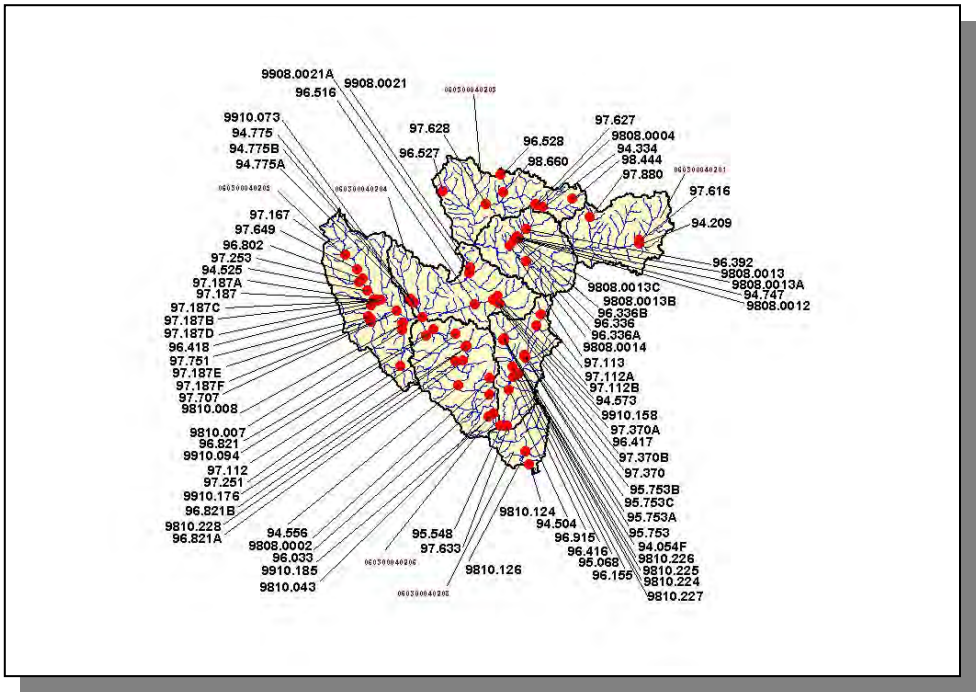


Figure 4-20. Location of ARAP Sites (Individual Permits) in Subwatershed 0603000402. *Subwatershed 060300040201, 060300040202, 060300040203, 060300040204, 060300040205, 060300040206, 060300040207, and 060300040208 boundaries are shown for reference. More information, including the names of facilities, is provided in Lower Elk-Appendix IV.*

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

There are two NPDES facilities discharging to water bodies listed on the 1998 303(d) list in Subwatershed 0603000402:

- TN0003441 (Pulaski Rubber Co.) discharges to Richland Creek @ RM 24.5
- TN0021687 (Pulaski STP) discharges to Richland Creek @ RM 23.3
- TN0054640 (TN Valley Recycling) discharges to Richland Creek @ RM 24.1

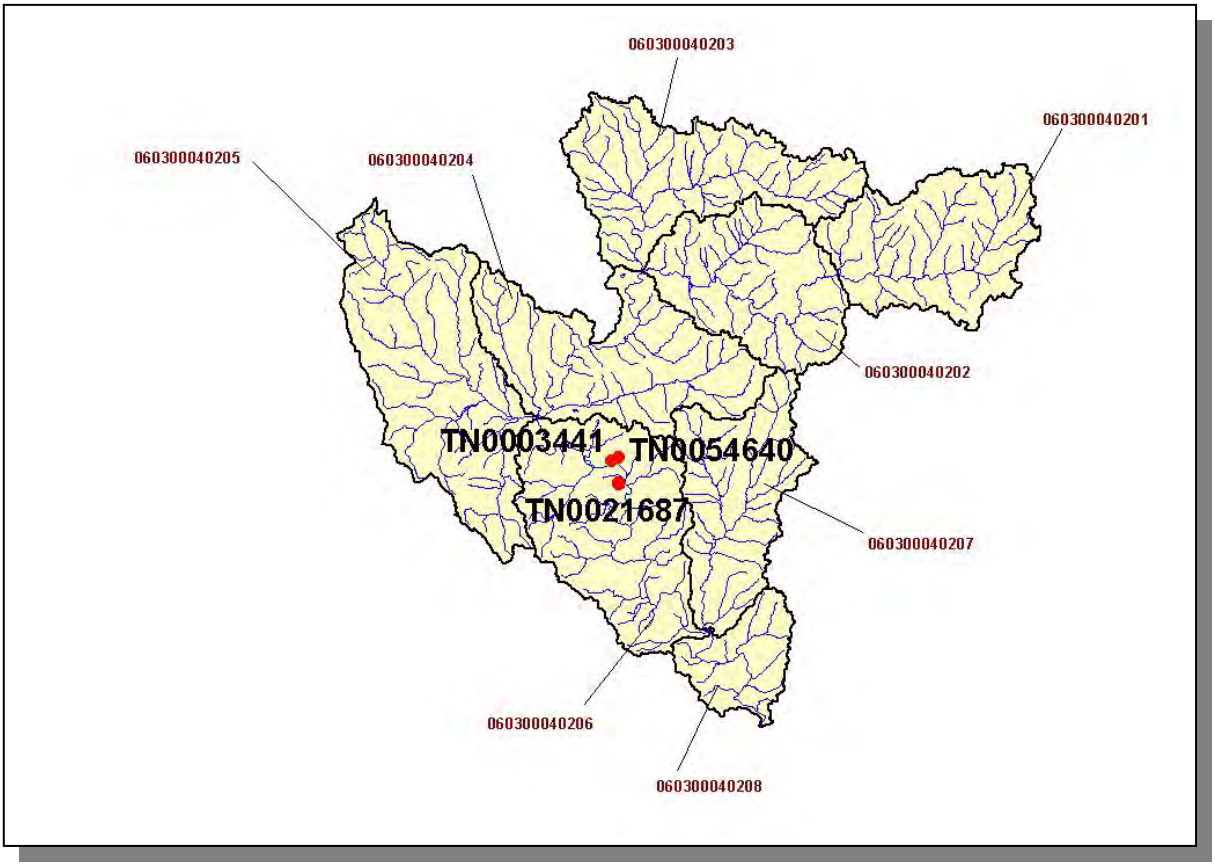


Figure 4-21. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 0603000402. *Subwatershed 060300040201, 060300040202, 060300040203, 060300040204, 060300040205, 060300040206, 060300040207, and 060300040208 boundaries are shown for reference. The names of facilities are provided in Lower Elk-Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0003441	9.24	9.63	10.08	8.53	0.07200
TN0021687				8.4	4.0
TN0054640	9.24	9.63	10.08	8.53	0.20000

Table 4-11. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0603000402. *Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.*

PERMIT #	$CBOD_5$	NH_3	Cd	Cu
TN0054640	X	X	X	X

Table 4-12. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0603000402. *$CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day).*

PERMIT #	$CBOD_5$	DO	NH_3	pH	TSS	TRC	PCB	BIO MONITORING	FECAL COLIFORM	OIL and GREASE
TN0021687	X	X	X	x	X	X		X	X	
TN0003441				X						
TN0054640				X	X		X			X

Table 4-13a. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0603000402. *TSS, Total Suspended Solids; TRC, Total Residual Chlorine; PCB, Polychlorinated Biphenyls.*

PERMIT #	Hg	Pb	Zn
TN0054640	X	X	X

Table 4-13b. Inorganic Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0603000402.

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens	Chickens Sold	Hogs	Sheep
24,700	55,512	3,326	75	32	7,269	268

Table 4-14. Summary of Livestock Count Estimates in Subwatershed 0603000402. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Giles	171.8	171.8	3.3	11.4
Lawrence	199.8	199.8	6.6	27.1
Total	**371.6**	**371.6**	**9.9**	**38.5**

Table 4-15. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0603000402.

CROPS	TONS/ACRE/YEAR
Legume/Grass (Hayland)	0.45
Grass (Hayland)	0.23
Legume (Hayland)	0.59
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Corn (Row Crops)	5.00
Soybeans (Row Crops)	4.69
Cotton (Row Crops)	8.07
All Other Row Crops	2.70
Summer Fallow (Other Cropland)	1.60
Wheat (Close Grown Cropland)	3.35
Barley (Close Grown Cropland)	1.08
All Other Close Grown Cropland	1.80
Grass (Pastureland)	0.97
Grass, Forbs, Legumes (Mixed Pasture)	0.74
Other Land in Farms (Other Farmland)	0.05
Conservation Reserve Program Lands	0.25
Other Vegetable and Truck Crops	4.29
All Other Crops not Planted	0.87
Non Agricultural Land Use	0.00
Farmsteads and Ranch Headquarters	0.41

Table 4-16. Annual Estimated Total Soil Loss in Subwatershed 0603000402.

4.2.C. 0603000403.

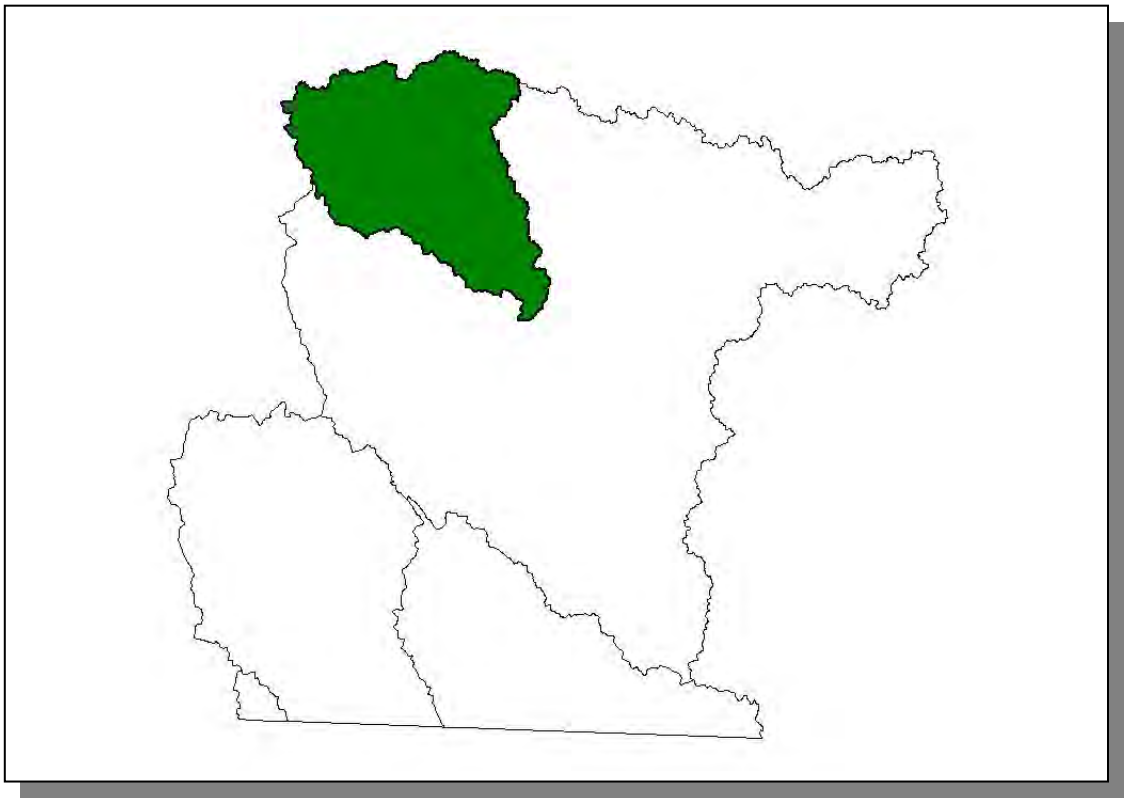


Figure 4-22. Location of Subwatershed 0603000403. *All Lower Elk HUC-10 subwatershed boundaries are shown for reference.*

4.2.C.i. General Description.

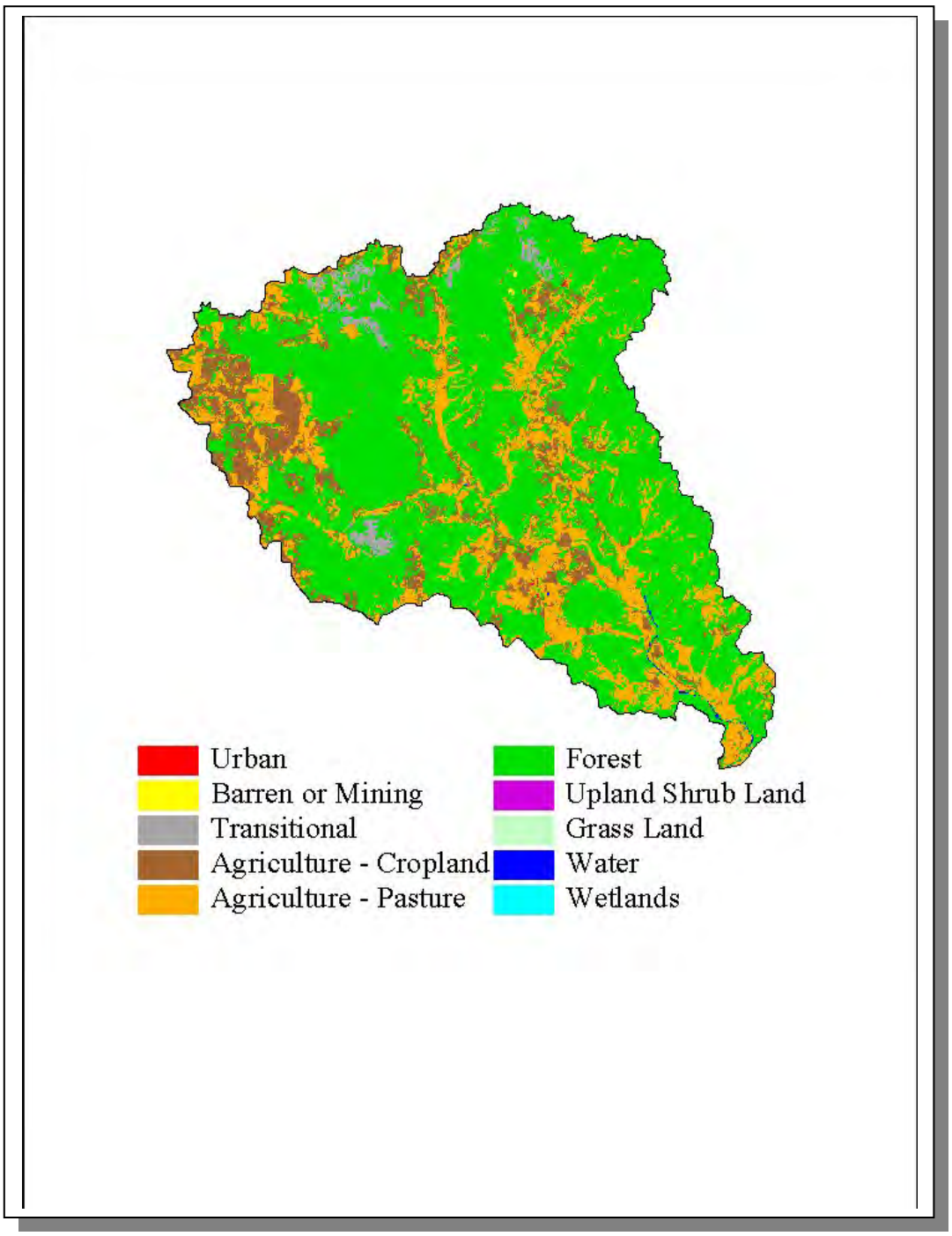


Figure 4-23. Illustration of Land Use Distribution in Subwatershed 0603000403.

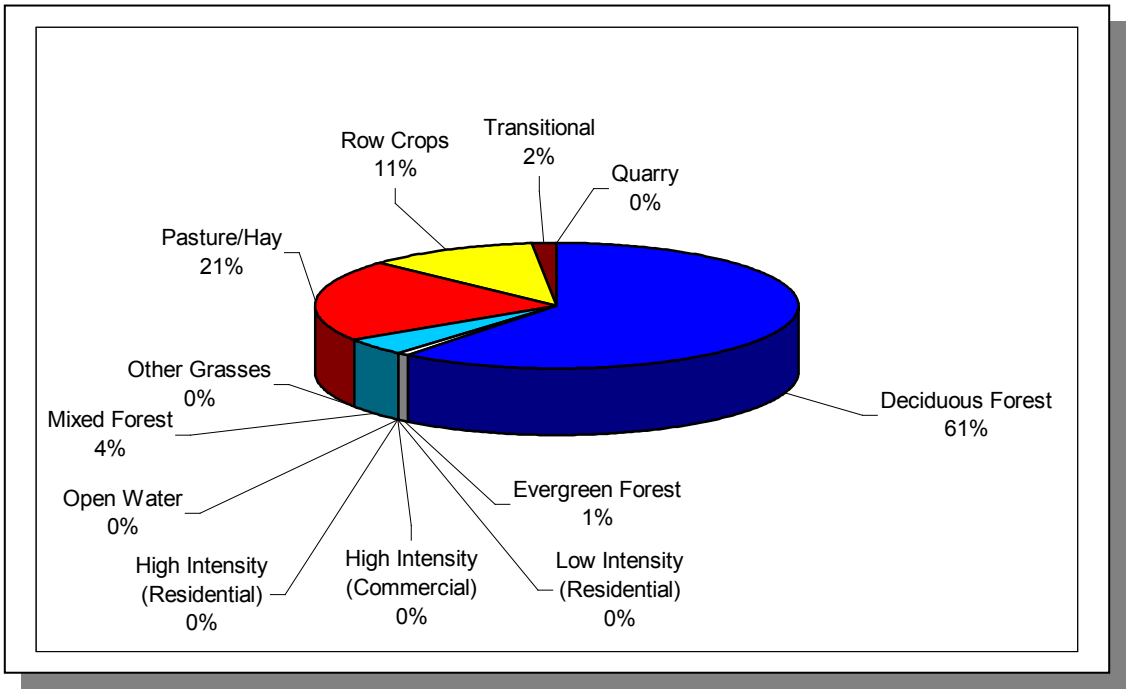


Figure 4-24. Land Use Distribution in Subwatershed 0603000403. *More information is provided in Lower Elk-Appendix IV.*

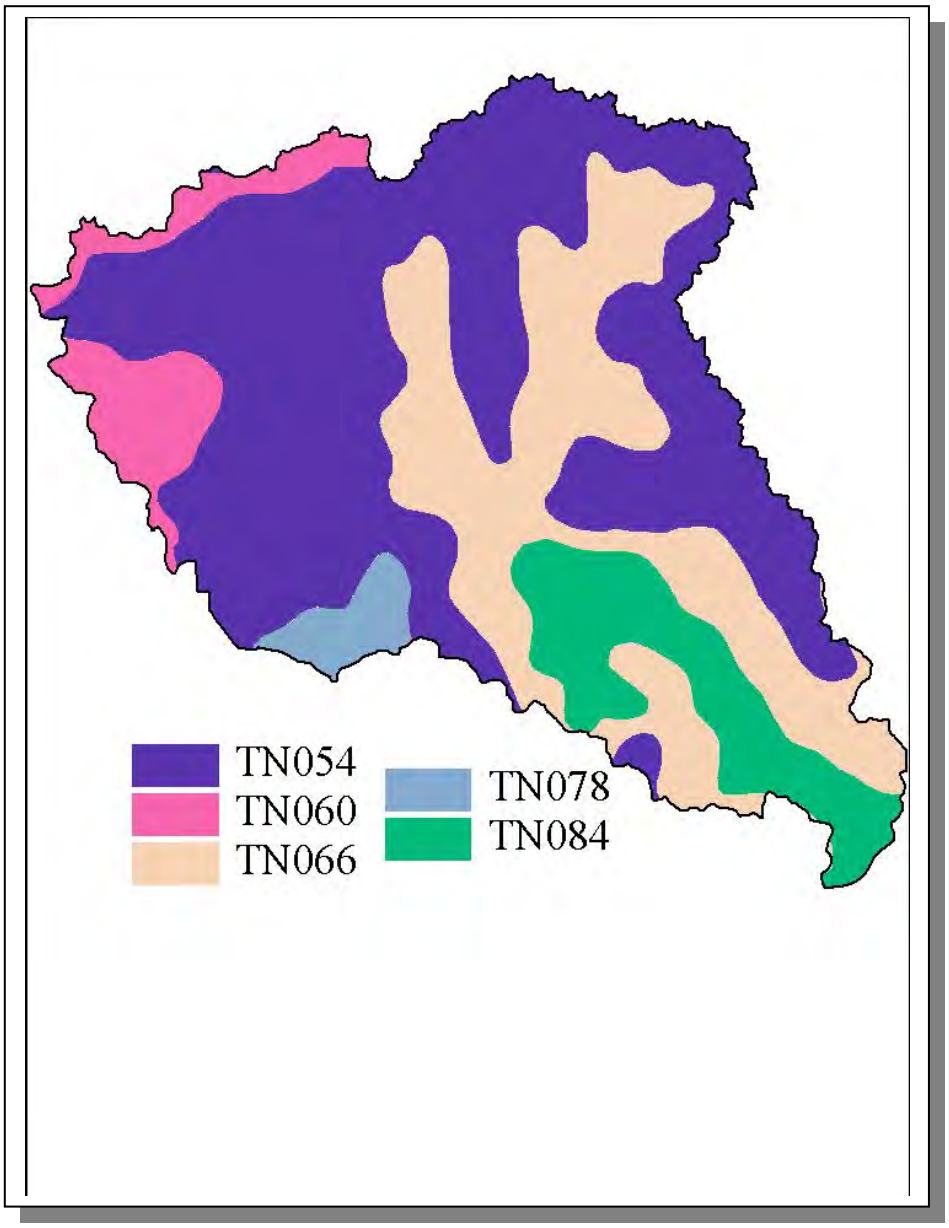


Figure 4-25. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0603000403.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN054	0.00	C	3.04	4.84	Loam	0.32
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN066	0.00	B	2.62	4.75	Loam	0.28
TN078	5.00	B	1.73	4.96	Silty Loam	0.39
TN084	0.00	C	1.80	4.99	Silty Loam	0.28

Table 4-17. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0603000403. *More information is provided in Lower Elk-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Giles	25,741	28,515	11.93	3,072	3,403	10.8
Lawrence	35,303	39,095	2.05	724	802	10.8
Maury	54,812	68,268	0.01	6	7	16.7
Total	**115,856**	**135,878**		**3,802**	**4,212**	**10.8**

Table 4-18. Population Estimates in Subwatershed 0603000403.

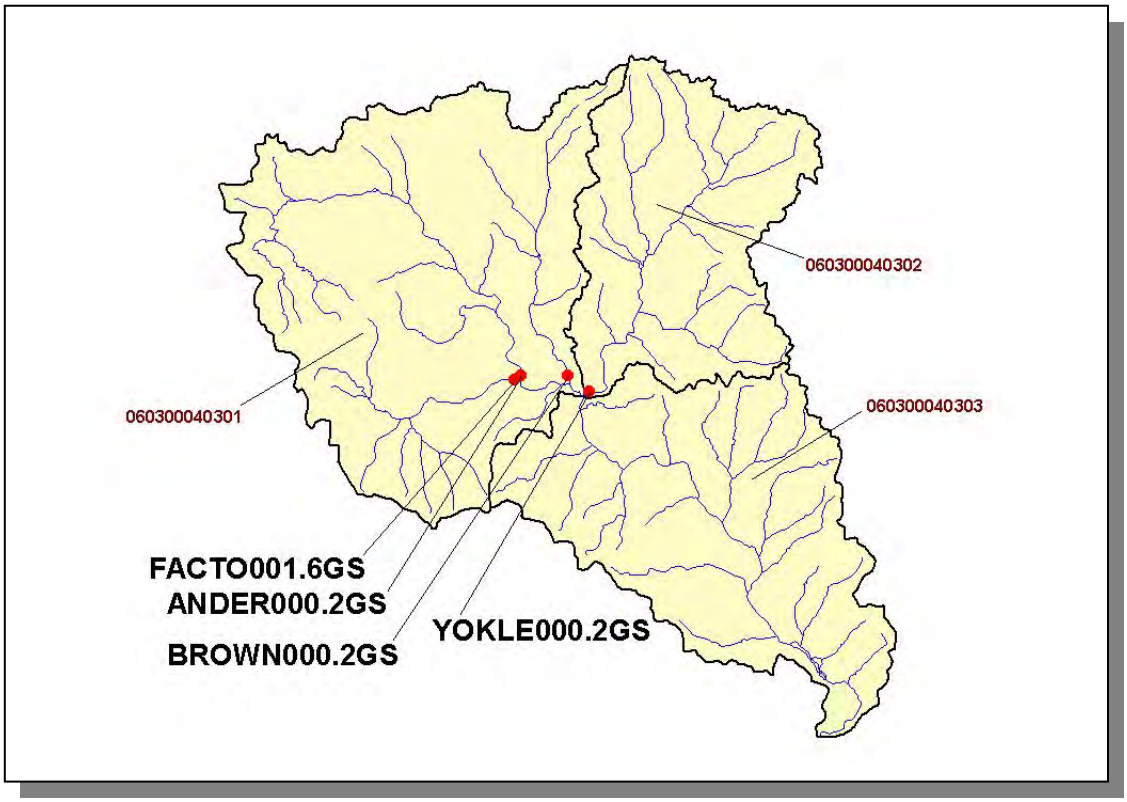


Figure 4-26. Location of STORET Monitoring Sites in Subwatershed 0603000403. *Subwatershed 06030040301, 060300040302, and 060300040303 boundaries are shown for reference. More information is provided in Lower Elk-Appendix IV.*

4.2.C.ii. Point Source Contributions.

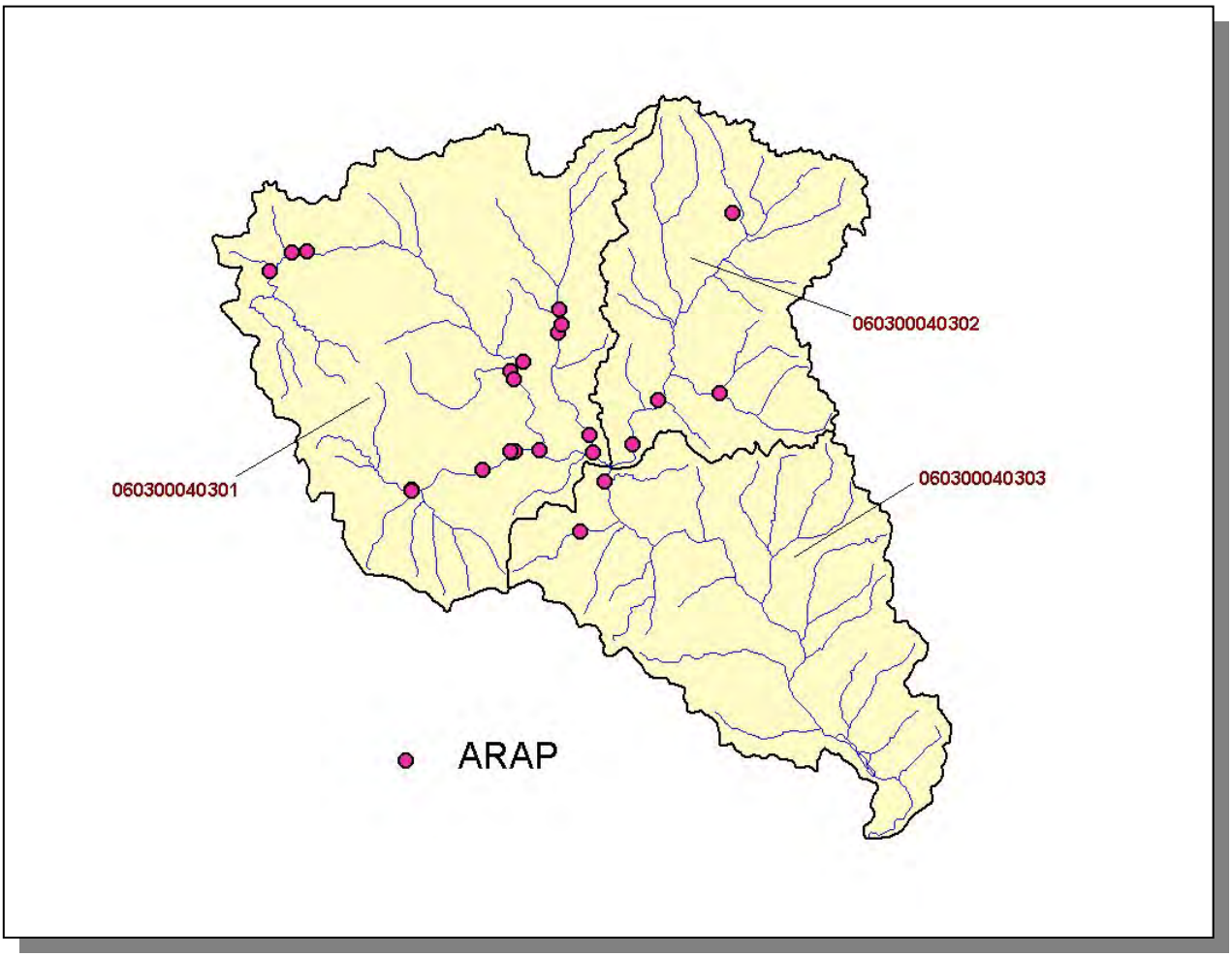


Figure 4-27. Location of Active Point Source Facilities in Subwatershed 0603000403. *Subwatershed 060300040031, 060300040032, and 060300040033 boundaries are shown for reference. More information is provided in the following charts.*

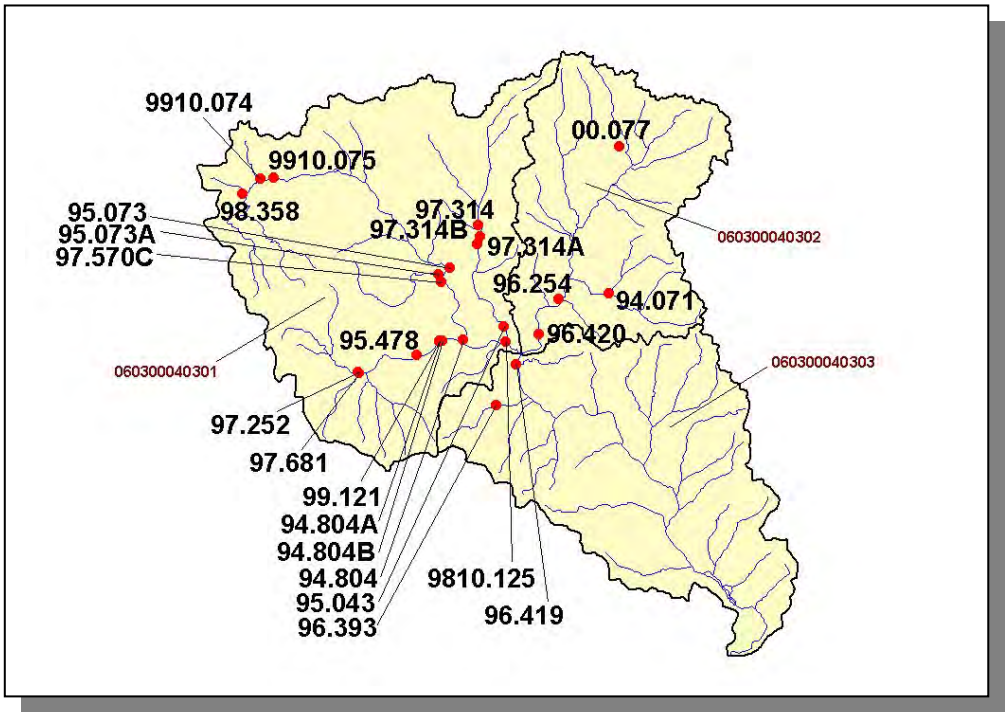


Figure 4-28. Location of ARAP Sites (Individual Permits) in Subwatershed 0603000403. *Subwatershed 060300040301, 060300040302, and 060300040303 boundaries are shown for reference. More information, including the names of facilities, is provided in Lower Elk-Appendix IV.*

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens	Chickens Sold	Hogs	Sheep
3,055	6,656	310	9	4	971	30

Table 4-19. Summary of Livestock Count Estimates in Subwatershed 0603000403. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Giles	171.8	171.8	3.3	11.4
Lawrence	199.8	199.8	6.6	27.1
McNairy	224.4	224.4	7.0	27.2
Totals	**596.0**	**596.0**	**16.9**	**65.7**

Table 4-20. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0603000403.

CROPS	TONS/ACRE/YEAR
Grass (Hayland)	0.21
Legume/Grass (Hayland)	0.18
Grass (Pastureland)	0.93
Grass, Forbs, Legumes (Mixed Pasture)	0.69
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Soybeans (Row Crops)	6.92
Corn (Row Crops)	4.39
Cotton (Row Crops)	8.07
All Other Row Crops	2.71
Wheat (Close Grown Cropland)	3.70
Barley (Close Grown Cropland)	1.08
All Other Close Grown Cropland	1.80
Conservation Reserve Program Land	0.33
Summer Fallow (Other Cropland)	0.35
Other Vegetable and Truck Crops	4.29
Farmsteads and Ranch Headquarters	1.06
Other Cropland not Planted	2.21
Nonagricultural Land Use	0.00

Table 4-21. Annual Estimated Total Soil Loss in Subwatershed 0603000403.

4.2.D. 0603000404.

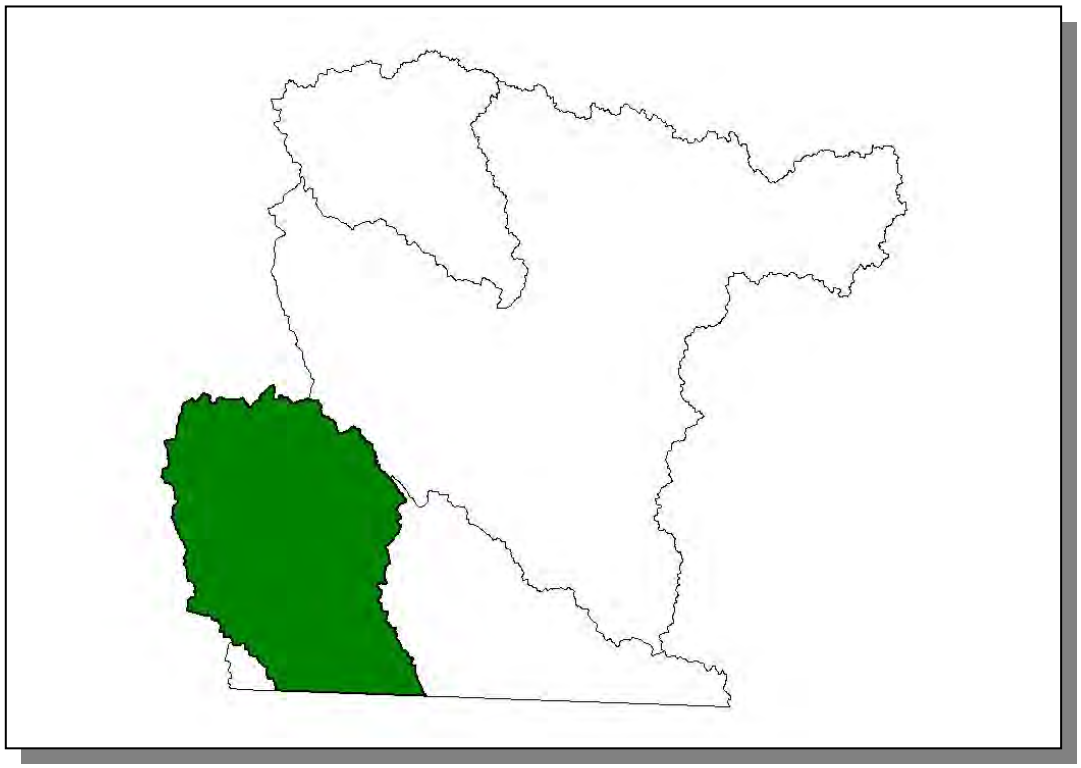


Figure 4-29. Location of Subwatershed 0603000404. *All Lower Elk HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.D.i. General Description.

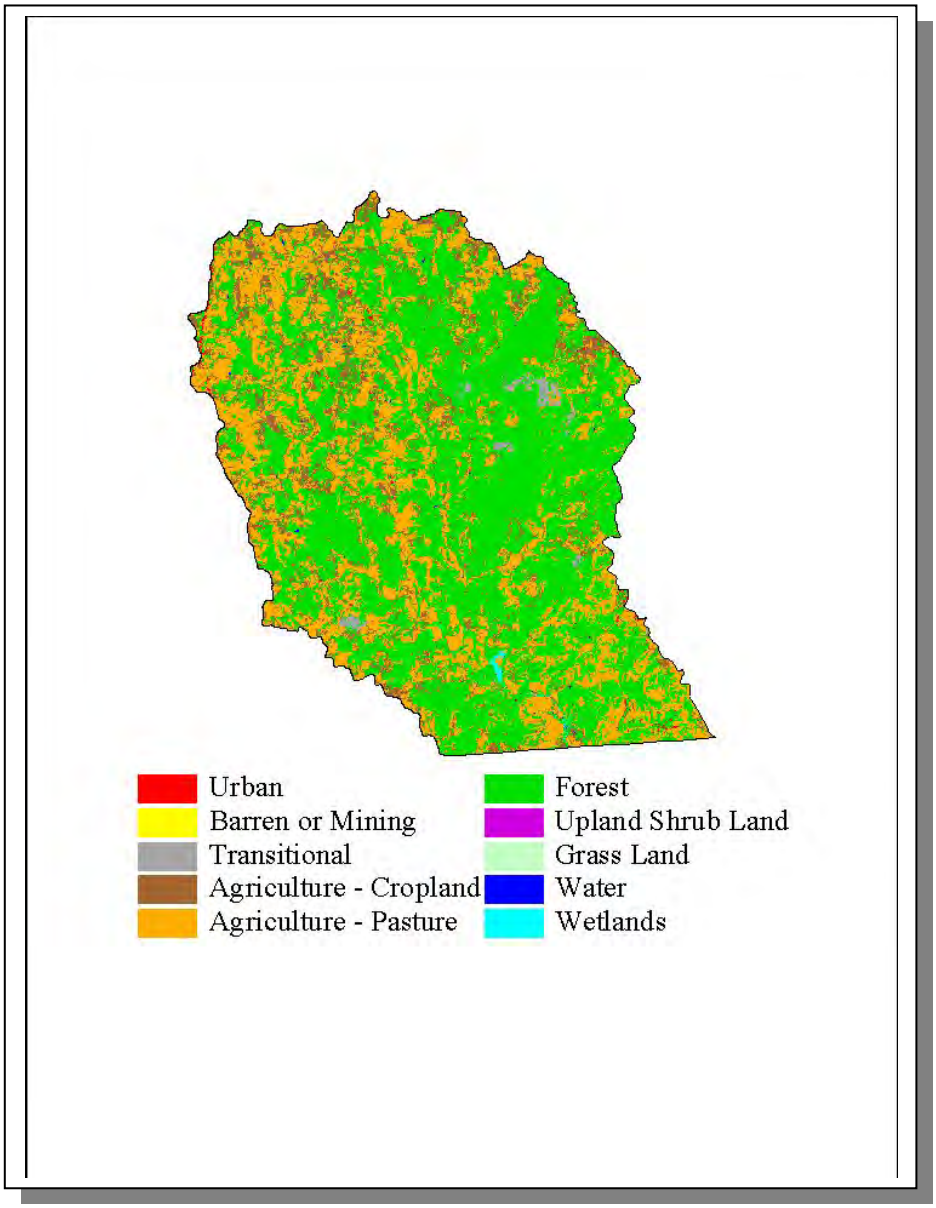


Figure 4-30. Illustration of Land Use Distribution in Subwatershed 0603000404.

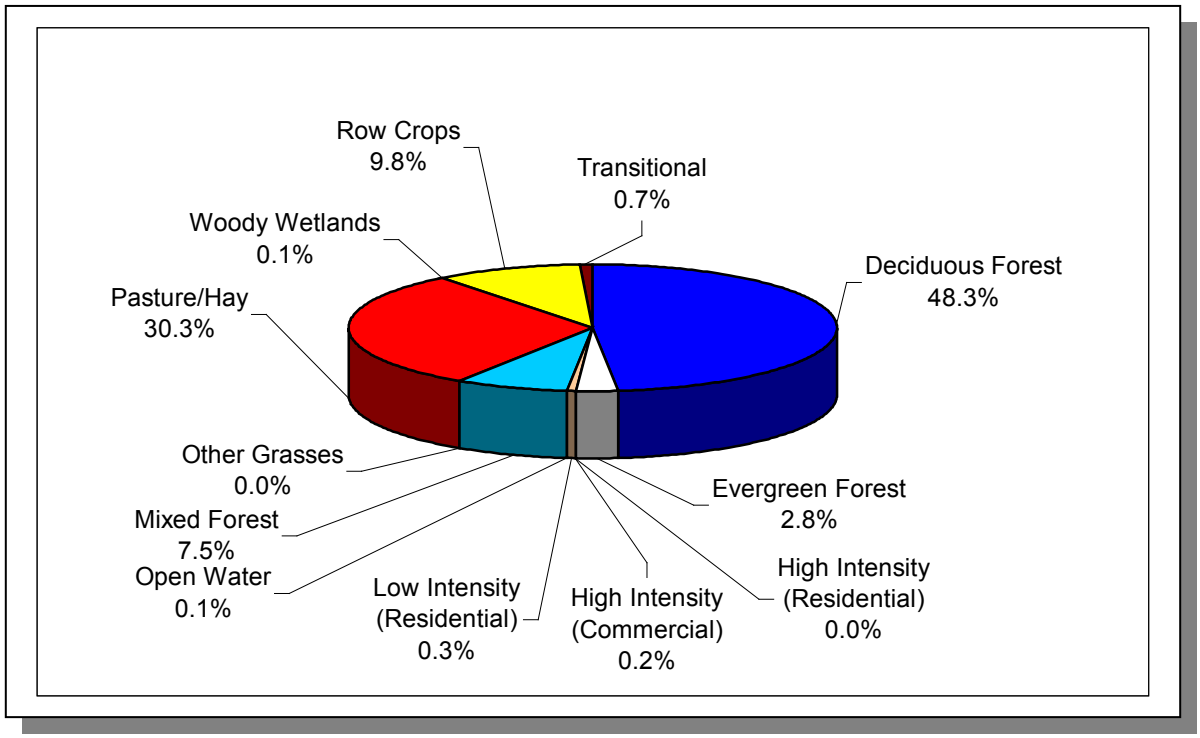


Figure 4-31. Land Use Distribution in Subwatershed 0603000404. *More information is provided in Lower Elk-Appendix IV.*

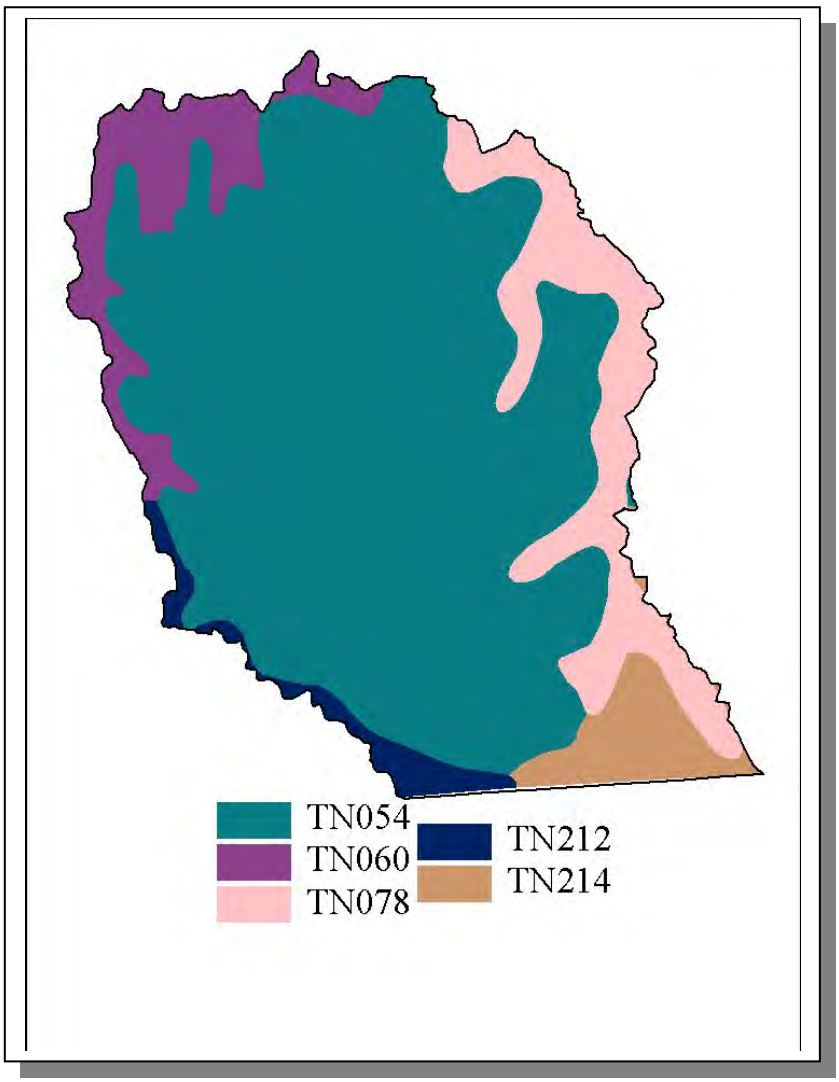


Figure 4-32. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0603000404.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN054	0.00	C	3.04	4.84	Loam	0.32
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN078	5.00	B	1.73	4.96	Silty Loam	0.39
TN212	4.00	B	1.95	5.04	Silty Loam	0.38
TN214	0.00	B	2.52	4.86	Loam	0.32

Table 4-22. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0603000404. *More information is provided in Lower Elk-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		PERCENT CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Giles	25,741	28,515	6.84	1,760	1,950	10.8
Lawrence	35,303	39,095	13.74	4,852	5,373	10.7
Total	61,044	67,610		6,612	7,323	10.8

Table 4-23. Population Estimates in Subwatershed 0603000404.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Minor Hill	Giles	351	186	2	182	2

Table 4-24. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0603000404.

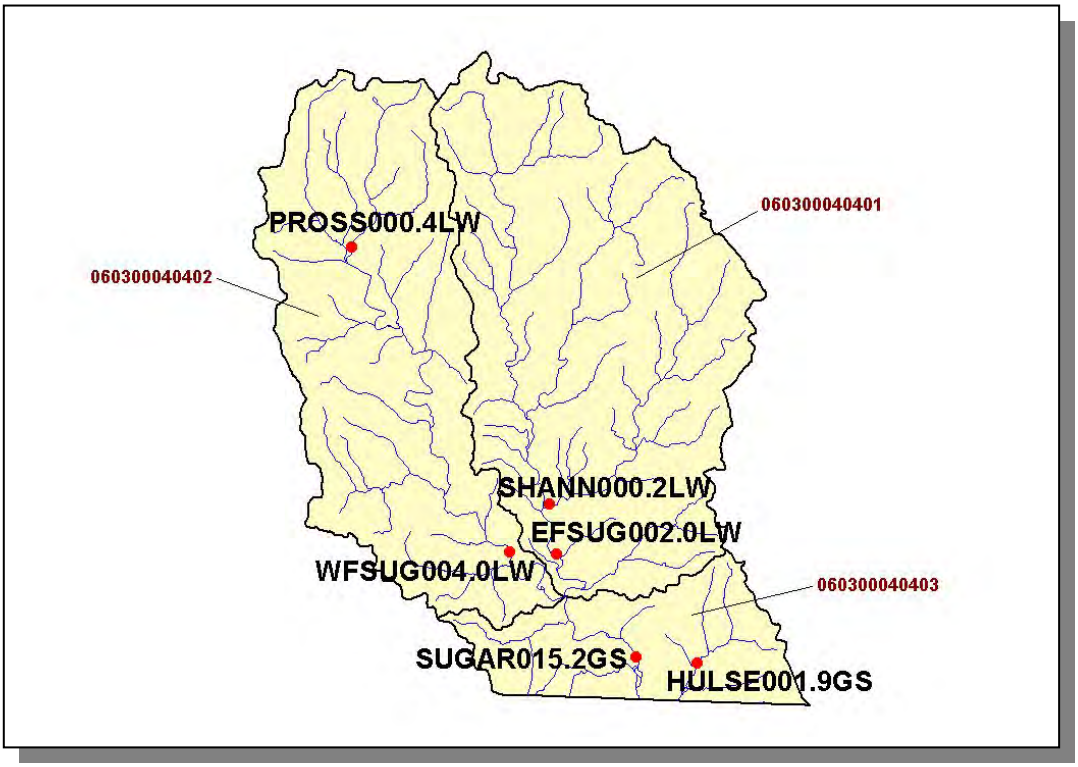


Figure 4-33. Location of STORET Monitoring Sites in Subwatershed 0603000404. *Subwatershed 060300040401, 060300040402, and 060300040403 boundaries are shown for reference. More information is provided in Lower Elk-Appendix IV.*

4.2.D.ii. Point Source Contributions.

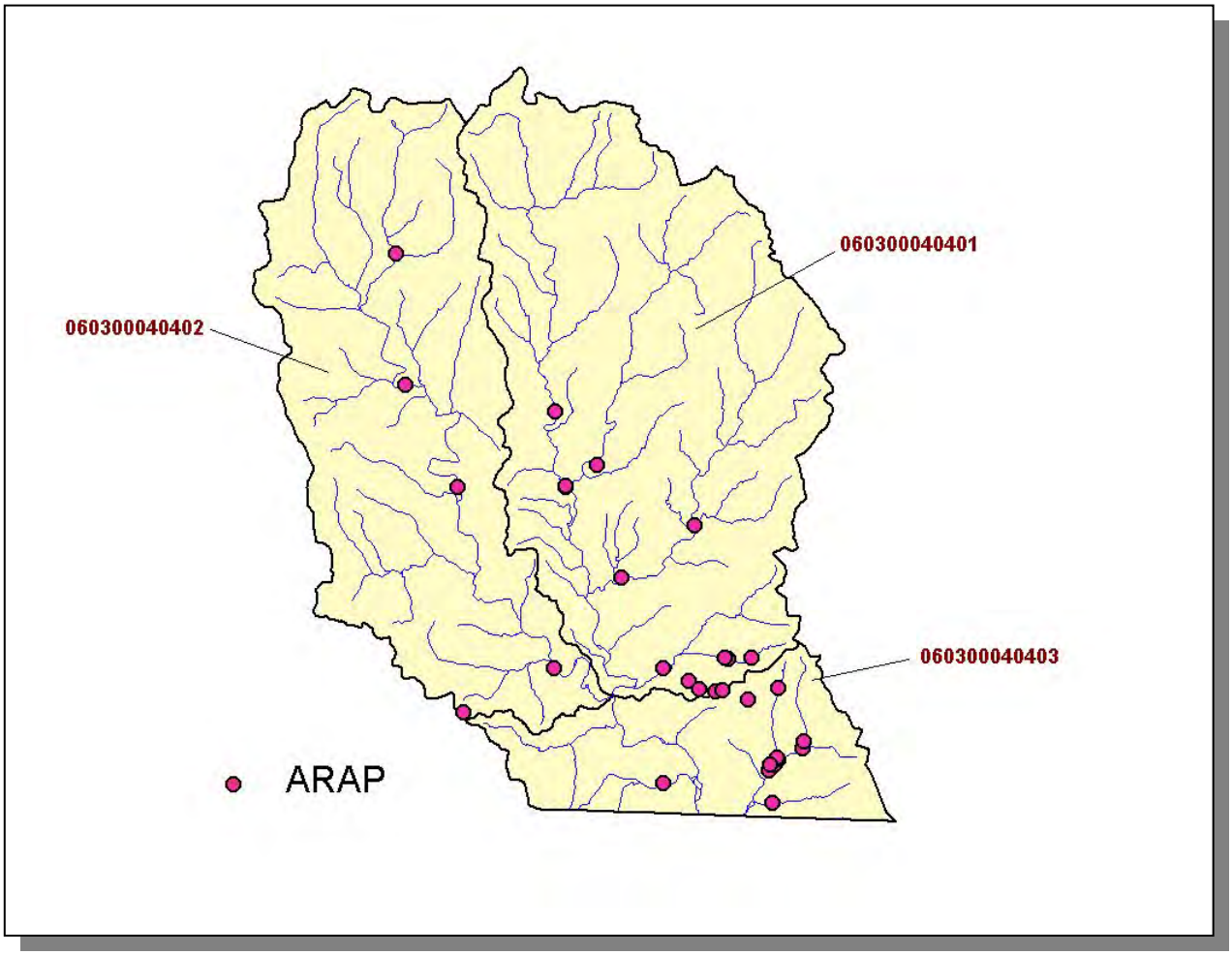


Figure 4-34. Location of Active Point Source Facilities in Subwatershed 0603000404. *Subwatershed 060300040401, 060300040402, and 060300040403 boundaries are shown for reference. More information is provided in the following charts.*

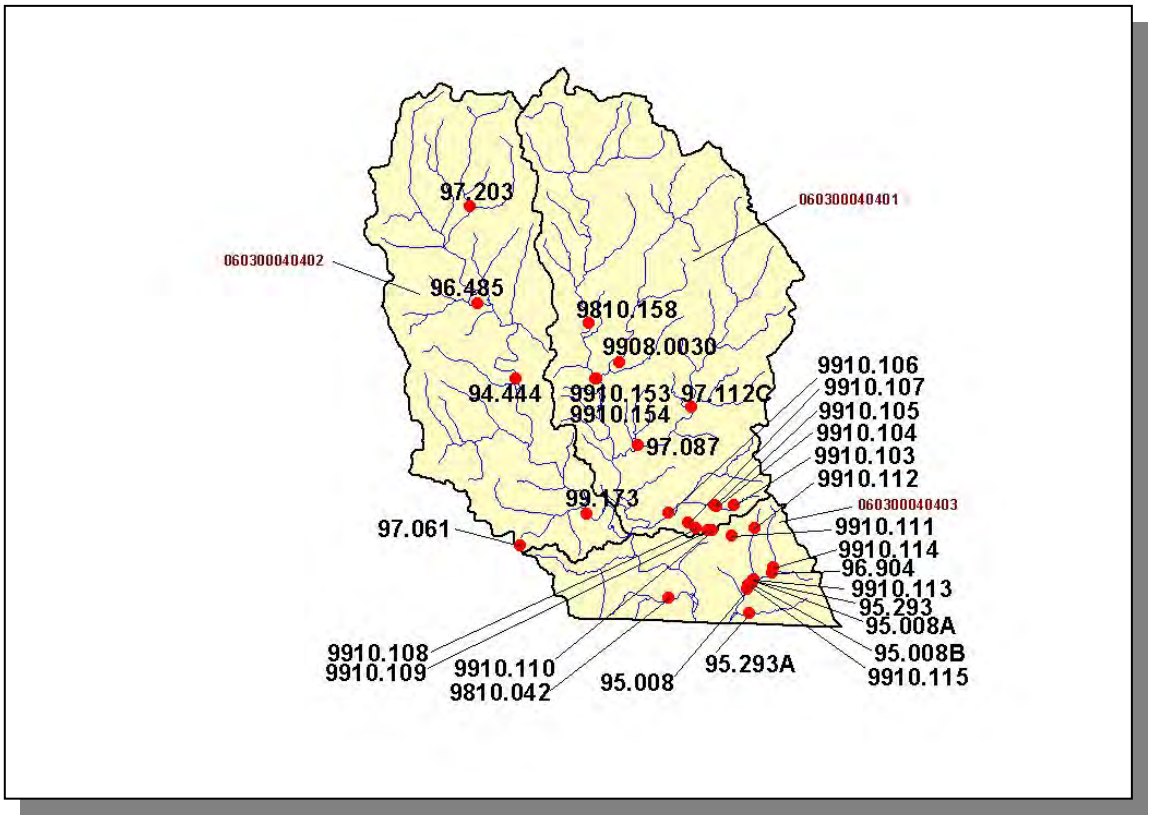


Figure 4-35. Location of ARAP Sites (Individual Permits) in Subwatershed 0603000404. *Subwatershed 060300040401, 060300040402, and 060300040403 boundaries are shown for reference. More information is provided in Lower Elk-Appendix IV.*

4.2.D.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Milk Cow	Cattle	Chickens	Chickens Sold	Hogs	Sheep
8,330	904	16,724	25	68,050	2,511	69

Table 4-25. Summary of Livestock Count Estimates in Subwatershed 0603000404. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		**REMOVAL RATE**	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Giles	171.8	171.8	3.3	11.4
Lawrence	199.8	199.8	6.6	27.1
Total	**371.6**	**371.6**	**9.9**	**38.5**

Table 4-26. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0603000404.

CROPS	**TONS/ACRE/YEAR**
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Corn (Row Crops)	5.01
Soybeans (Row Crops)	20.33
Cotton (Row Crops)	8.07
All Other Row Crops	2.70
Wheat (Close Grown Cropland)	10.09
Barley (Close Grown Cropland)	1.08
All Other Close Grown Cropland	1.80
Grass (Hayland)	0.20
Legume/Grass (Hayland)	0.46
Grass (Pastureland)	0.51
Grass, Forbs, Legumes (Mixed Pasture)	0.34
Conservation Reserve Program Land	0.68
Other Vegetable and Truck Crops	4.29
Summer Fallow (Other Cropland)	0.35
Other Cropland not Planted	9.14
Farmsteads and Ranch Headquarters	4.37
Non Agricultural Land Use	0.00

Table 4-27. Annual Soil Loss in Subwatershed 0603000404.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE LOWER ELK RIVER 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 Lower Elk River Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS.

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

Performance & Results 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://prms.nrcs.usda.gov/prms. From the opening menu, select "Reports," then select the Conservation Treatment of interest on the page that comes up. Select the desired location and time period from the drop down menus and choose "Refresh." Choose "by HUC" in the "Location" option and choose "Refresh" again.

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

CONSERVATION PRACTICE	TOTAL
Comprehensive Nutrient Management Plans (Number)	2
Conservation Buffers (Acres)	51
Erosion Reduction (Tons/Year)	34,116
Inventory and Evaluations (Number)	3
Irrigation Management (Acres)	0
Nutrient Management (Acres)	4,721
Pest Management (Acres)	3,816
Prescribed Grazing (Acres)	1,846
Residue Management (Acres)	2,025
Tree and Shrub Practices (Acres)	114
Waste Management (Number)	1
Wetlands Created, Restored, or Enhanced (Acres)	50
Wildlife Habitat (Acres)	319

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Tennessee Portion of Lower Elk River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period. More information is provided in Lower Elk-Appendix V.*

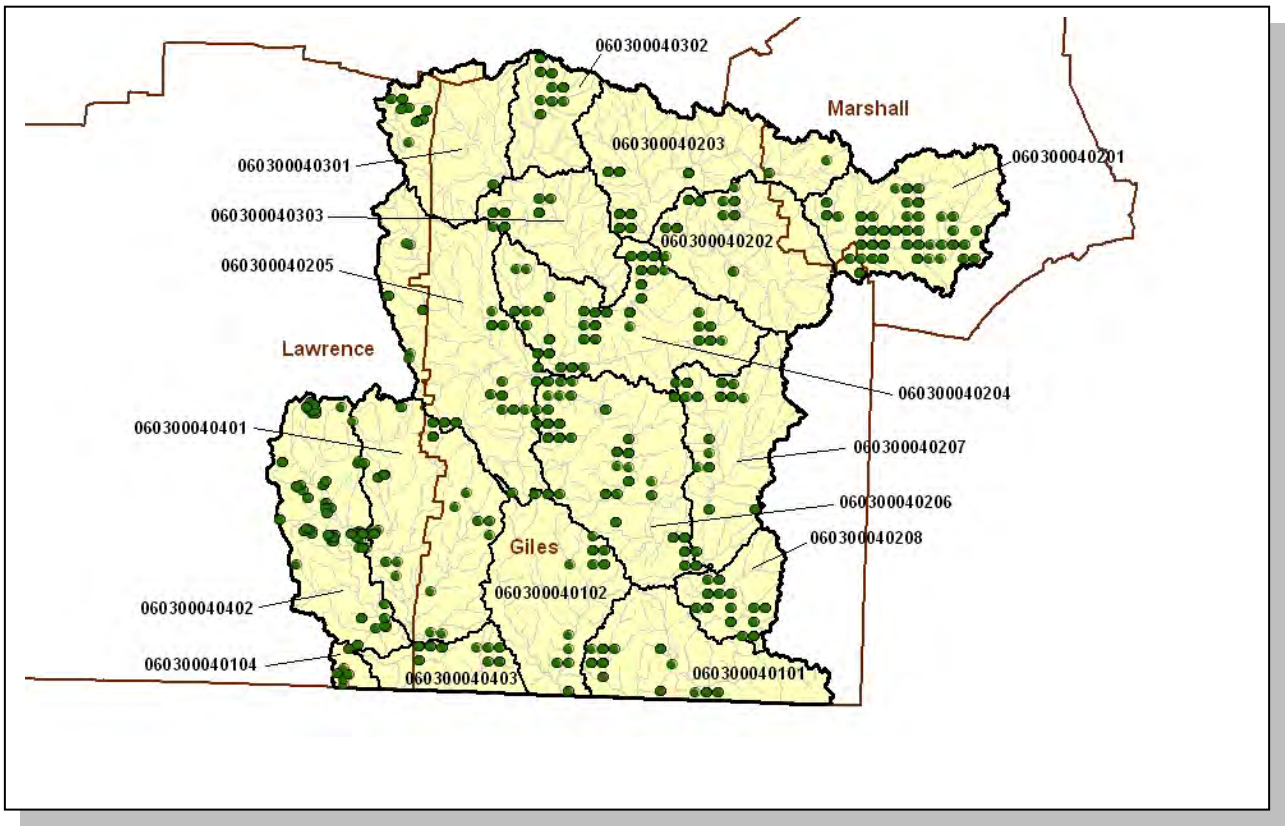


Figure 5-1. BMPs Installed by NRCS in the Lower Elk River Watershed in 2006 and 2007. Information was provided as part of Conservation Technical Assistance Grant 060701T47.
Best Management Practices applied in the watershed may be found in Appendix V.

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

The USGS collects hydrologic data to document current conditions and provide a basis for understanding hydrologic systems and solving hydrologic problems. In Tennessee, the USGS records streamflow continuously at more than 89 gaging stations equipped with recorders and makes instantaneous measurements of streamflow at many other locations. Ground-water levels are monitored Statewide, and the physical, chemical, and biologic characteristics of surface and ground waters are analyzed. USGS activities also include the annual compilation of water-use records and collection of data for National baseline and water-quality networks. National programs conducted by the USGS include the National Atmospheric Deposition Program (http://bqs.usgs.gov/acidrain/), National Stream Quality Accounting Network (http://water.usgs.gov/nasqan/), and the National Water-Quality Assessment Program (http://water.usgs.gov/nawqa/).

USGS Water Resources Information on the Internet. Real-time and historical streamflow, water levels, and water-quality data at sites operated by the Tennessee District can be accessed at http://waterdata.usgs.gov/tn/nwis/nwis. Data can be retrieved by county, hydrologic unit code, or major river basin using drop-down menus. Contact Donna Flohr at (615) 837-4730 or dfflohr@usgs.gov for specific information about streamflow data.

Recent publications by the USGS staff in Tennessee can be accessed by visiting http://tn.water.usgs.gov/pubpg.html. This web page provides searchable bibliographic information to locate reports and other products about specific areas.

5.2.C. U.S. Fish and Wildlife Service. The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. The U.S. Fish and Wildlife Service (Service) works with State and Federal agencies and Tribal governments, helps corporate and private landowners conserve habitat, and cooperates with other nations to halt illegal wildlife trade. The Service also administers a Federal Aid program that distributes funds annually to States for fish and wildlife restoration, boating access, hunter education, and related projects across America. The funds come from Federal excise taxes on fishing, hunting, and boating equipment.

Endangered Species Program. Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available

under the ESA, including prohibitions on killing, harming or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program. For a complete listing of endangered and threatened species in the Lower Elk River watershed, please visit the Service's website at http://www.cookeville.fws.gov.

Recovery is the process by which the decline of an endangered or threatened species is stopped and reversed, and threats to the species' survival are eliminated, so that long-term survival in nature can be ensured. The goal of the recovery process is to restore listed species to a point where they are secure and self-sustaining in the wild and can be removed from the endangered species list. Under the ESA, the Service and National Marine Fisheries Service were delegated the responsibility of carrying out the recovery program for all listed species. The Service is actively involved in the captive propagation and reintroduction of the Boulder darter (*Etheostoma wapiti*) in the Lower Elk River watershed. We have also completed several habitat restoration efforts for this species.

In a partnership with the Tennessee Nature Conservancy (TNC), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) Division of Natural Heritage, the Service is developing a State Conservation Agreement for Cave Dependent Species in Tennessee (SCA). The SCA targets unlisted but rare species and protects these species through a suite of proactive conservation agreements. The goal is to preclude the need to list these species under the ESA. This agreement will cover middle and eastern Tennessee and will benefit water quality in many watersheds within the State.

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

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

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

How To Participate:

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

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

5.2.D. Tennessee Valley Authority (TVA). TVA is encouraging watershed landowners to improve/protect stream riparian zones. Watersheds that are being targeted have streams listed on the 303(d) list. As a partner TVA is supplying fencing and native plants through the NRCS districts to land owners that are willing to create riparian areas along streams that livestock have had free range.

TVA supports two stakeholder coalitions in the Lower Elk River Watershed. Friends of the Elk River located in Fayetteville, TN sponsors the annual Elk River Watershed Festival that is held in the spring. This is a non-point source educational event targeted to the landowners in the Lower Elk River Watershed. Richland Creek Environmental Council is an agricultural community organization that manages and educates landowners about the benefits of Best Management Practices in the Richland Creek Watershed.

Lower Elk River Improvements. TVA is currently in the process of upgrading canoe access sites on the Elk River. The upgrades consists of repairing eroded stream banks at the access sites, graveling parking lots and closing off areas that are used for dumps.

For further information please contact http://www.tva.com or 1-800-TVA-LAND.

5.3. STATE PARTNERSHIPS.

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

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

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

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

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

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

left up to the individual states and local governments without additional authority from Congress for that progression.

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

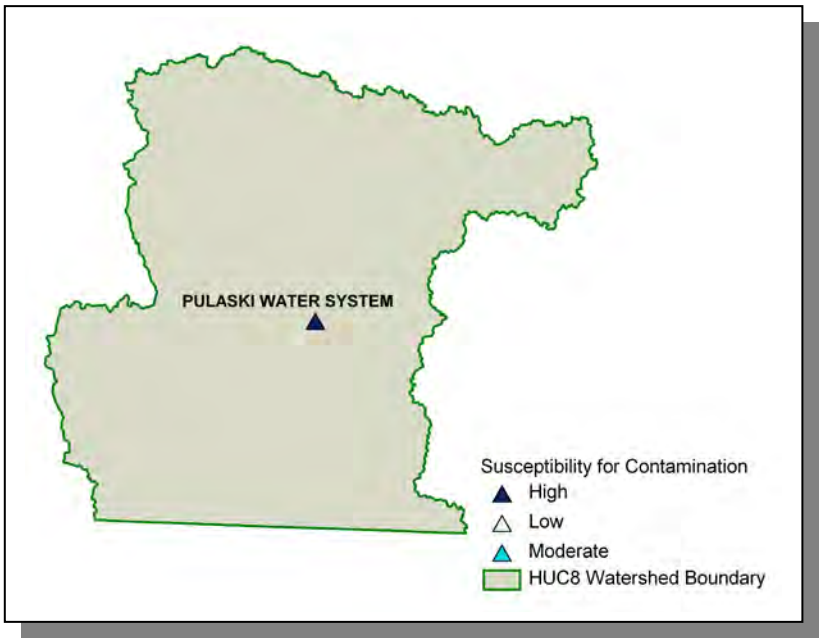


Figure 5-2. Susceptibility for Contamination in the Lower Elk River Watershed.

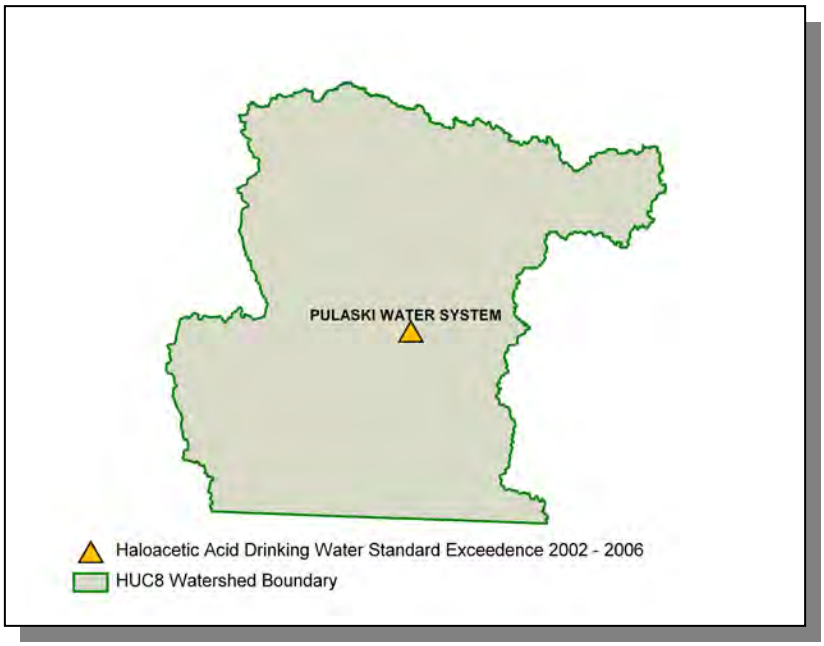


Figure 5-3. Exceedences of the Haloacetic Acid Drinking Water Standard in the Lower Elk River Watershed.

For further discussion on ground water issues in Tennessee, the reader is referred to the Ground Water Section of the 305(b) Water Quality Report at http://www.tdec.net/water.shtml.

5.3.B. State Revolving Fund. TDEC administers the state's Clean Water State Revolving Fund Program. Amendment of the Federal Clean Water Act in 1987 created the Clean Water State Revolving Fund (SRF) Program to provide low-interest loans to cities, counties, and utility districts for the planning, design, and construction of wastewater facilities. The U.S. Environmental Protection Agency awards annual capitalization grants to fund the program and the State of Tennessee provides a twenty-percent funding match. TDEC has awarded loans totaling approximately $550 million since the creation of the SRF Program. SRF loan repayments are returned to the program and used to fund future SRF loans.

SRF loans are available for planning, design, and construction of wastewater facilities, or any combination thereof. Eligible projects include new construction or upgrading/expansion of existing facilities, including wastewater treatment plants, pump stations, force mains, collector sewers, interceptors, elimination of combined sewer overflows, and nonpoint source pollution remedies.

SRF loan applicants must pledge security for loan repayment, agree to adjust user rates as needed to cover debt service and fund depreciation, and maintain financial records that follow governmental accounting standards. SRF loan interest rates range from zero percent to market rate, depending on the community's per-capita income, taxable sales, and taxable property values. Most SRF loan recipients qualify for interest rates between 2 and 4 percent. Interest rates are fixed for the life of the term of the loan. The maximum loan term is 20 years or the design life of the proposed wastewater facility, whichever is shorter.

TDEC maintains a Priority Ranking System and Priority List for funding the planning, design, and construction of wastewater facilities. The Priority Ranking List forms the basis for funding eligibility determinations and allocation of Clean Water SRF loans. Each project's priority rank is generated from specific priority ranking criteria and the proposed project is then placed on the Project Priority List. Only projects identified on the Project Priority List may be eligible for SRF loans. The process of being placed on the Project Priority List must be initiated by a written request from the potential SRF loan recipient or their engineering consultant. SRF loans are awarded to the highest priority projects that have met SRF technical, financial, and administrative requirements and are ready to proceed.

Since SRF loans include federal funds, each project requires development of a Facilities Plan, an environmental review, opportunities for minority and women business participation, a State-approved sewer use ordinance and Plan of Operation, and interim construction inspections.

For further information about Tennessee's Clean Water SRF Loan Program, call (615) 532-0445 or visit their Web site at http://www.tdec.net/srf.

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

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

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

- Monitoring Projects. Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Lower Elk River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program, and the U.S. Environmental Protection Agency Assistance Agreements C9994674-99-0, C9994674-00-0, and C9994674-01-0.

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

The Tennessee Department of Agriculture Agricultural Resources Conservation Fund Program (TDA-ARCF) provides cost-share assistance to landowners across Tennessee to install BMPs that eliminate agricultural nonpoint source pollution. This assistance is provided through Soil Conservation Districts, Resource Conservation and Development Districts, Watershed Districts, universities, and other groups. Additionally, a portion of the TDA-ARCF is used to implement information and education projects statewide, with the focus on landowners, producers, and managers of Tennessee farms and forests.

Participating contractors in the program are encouraged to develop a watershed emphasis for their individual areas of responsibility, focusing on waters listed on the Tennessee 303(d) List as being impaired by agriculture. Current guidelines for the TDA-ARCF are available. Landowners can receive up to 75% of the cost of the BMP as a reimbursement.

Since January of 1999, the Department of Agriculture and the Department of Environment and Conservation have had a Memorandum of Agreement whereby complaints received by TDEC concerning agriculture or silviculture projects would be forwarded to TDA for investigation and possible correction. Should TDA be unable to obtain correction, they would assist TDEC in the enforcement against the violator. More information about the joint policy to address Bad Actors in forestry operations is available at http://www.state.tn.us/environment/news/release/jan99/badact.htm

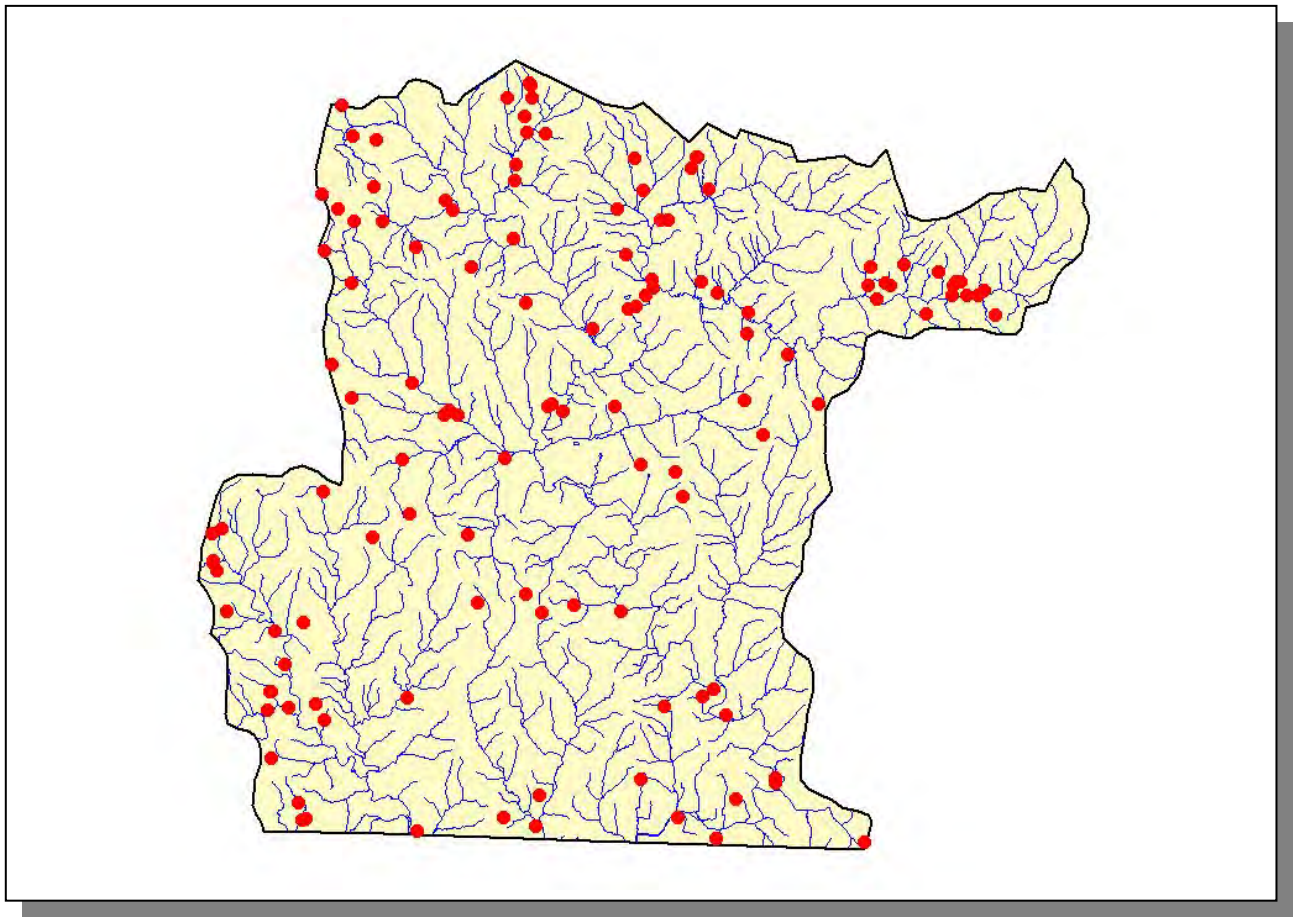


Figure 5-4. Location of BMPs installed from 1999 through 2002 in the Tennessee Portion of the Lower Elk River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs.

5.3.D. Alabama Department of Environmental Management. Alabama has a long history of water quality partnerships in the Tennessee River Basin. The most recent development affecting the role and depth of such efforts within the Valley include the creation of the Alabama Clean Water Partnership (CWP). The CWP is a coalition of public and private individuals, companies, organizations and governing bodies working together to protect and preserve water resources and aquatic ecosystems. The CWP has a presence in the Lower Elk Hydrologic Unit through the Tennessee River Basin Clean Water Partnership Steering Committee and sub-basin committees. Like similar committees established throughout the other river basins of the State, the CWP efforts in the Lower Elk Hydrologic Unit are focused on the development of new partnerships and the funding to support water quality projects.

The CWP is currently working closely with the Alabama Department of Environmental Management to facilitate stakeholder-led, long-term water quality planning efforts and to develop watershed management plans by river basin and to develop specific restoration plans for impaired waterbodies. These planning efforts will help target waterbodies and watersheds for concentrated efforts in future years.

At the time of this report, no lasting partnerships or watershed projects have emerged in the Lower Elk although citizen concern for environmental issues is growing. One of the goals of the CWP is to nurture developing partnerships and assist in the development and funding of beneficial water quality projects. With time, the Lower Elk Hydrologic Unit should benefit from the same types of activities that have developed in the Guntersville Lake, Wheeler Lake, Pickwick Lake and Bear Hydrologic Units.

For more information concerning Clean Water Partnership activities in the Tennessee Valley of Alabama, contact Vicky Mitchell, Basin Facilitator by phone at (256) 353-6146 x2, or by E-mail: sobroke@aol.com.

For information regarding Clean Water Partnership activities elsewhere in Alabama, you may contact the ADEM website http://www.adem.state.al.us, the Clean Water Partnership website http://www.cleanwaterpartnership.org or call Allison Newell, Statewide ACWP Coordinator at 1-888-3 Got H2O.

5.4. LOCAL INITIATIVES.

5.4.A. Friends of the Elk River. The group was organized in 1998 with monthly meetings to discuss manageable projects to benefit the river and citizens of Lincoln County who live in the watershed. This is not an agency that must meet certain legal requirements, but a group of concerned citizens hoping to keep residents aware of the need for clean streams and watersheds. The group meets on a regular monthly basis with additional meetings when needed.

Mission Statement: To improve and protect the natural resources of the Elk River through the cooperative efforts of local government, businesses, organizations, state and federal agencies, and general citizens.

Projects have included:

- Design and distribution of a promotional brochure with a map and facts about the river.
- Access points upgrade. New steps and slides to facilitate getting canoes into and out of the river. All this was volunteer work done by members of Friends of the Elk River using large equipment and tools owned by members.
- Access points cleanup. Partner with the Sheriff's Litter Crew for regular maintenance and litter collection.
- Provided large vandal-proof cages around metal barrels for litter collection at three of the sites.
- Three large cleanup projects:
  1. One project included 25 miles of river with one group of volunteers in canoes who cleaned the water; several groups on the banks collected litter and debris.
  2. One project focused on an especially bad illegal dump at the city limits on the river.
  3. One project centered on Norris Creek, which runs through the city and flows into the Elk River. The group removed an unusually large amount of debris because this had once been a commercial site where the creek was used for disposal.
- Canoe trip sponsored by local canoe rental businesses open to the public for the purposes of surveying needs along the river such as erosion, litter, fallen trees, and problems with water levels.
- Great American Cleanup participation. FOER has been winners of a top award for three years.
- Watershed Festival. Currently planning the second annual event. In 2002, FOER held the festival at the Lincoln County Fairground exhibit building. Approximately 200 people attended and 20+ exhibits were available. Agencies and groups participating included Tennessee Wildlife Resources Agency, Tennessee Forestry, Tennessee Department of Environment and Conservation, Wild Ducks Unlimited., UT Extension Service, 4-H Club, Interlocal Solid Waste Authority, Tennessee Valley Authority, Natural Resources Conservation Service, C.L.E.A.N., Inc., Sportsmen's Clubs, Elk River Canoe Rental, Kelso Canteen and Canoe Rental, and several private exhibitors. Partnerships have included the above agencies and the local emergency management agency, Boy Scouts, Flint River Conservancy, and local canoe and rental businesses.
- Exhibits at Lincoln County Fair, America Recycles Day, local business expo, and Non-Point Pollution workshop at Motlow College.

For more information, contact the Friends of the Elk River at:

P.O. Box 515
Fayetteville, TN 37334
e-mail: clean@fayelectric.com

CHAPTER 6

FUTURE DIRECTIONS IN THE LOWER ELK RIVER WATERSHED

6.1. BACKGROUND.

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

In addition to the NPDES program, some state and federal regulations, such as the TMDL and ARAP programs, address point and nonpoint issues. Construction and MS4 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 Lower Elk River Watershed as well as specific NPDES permittee information.

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 Lower Elk River Watershed public meeting was held April 16, 1997 in Pulaski. 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

- Effects of the Watershed Approach (cycle) on permit holders
- Nonpoint sources of pollution
- Water quality modeling not available to permitees
- The effect of naturally high phosphate in local streams on permit limits
- Sediment getting into streams

6.2.B. Year 3 Public Meeting. The second Pickwick Lake Watershed public meeting was held October 26, 1999 at the courthouse in Winchester. 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.

6.2.C. Year 5 Public Meeting. The third scheduled Lower Elk River Watershed public meeting was held October 16, 2003 at the Pulaski Recreation Center. The meeting featured six educational components:

- Overview of draft Watershed Water Quality Management Plan slide show
- Benthic macroinvertebrate samples and interpretation
- SmartBoard™ with interactive GIS maps
- "How We Monitor Streams" self-guided slide show
- "Why We Do Biological Sampling" self-guided slide show
- Tennessee Valley Authority display

In addition, citizens had the opportunity to make formal comments on the draft Watershed Water Quality Management Plan and to rate the effectiveness of the meeting.

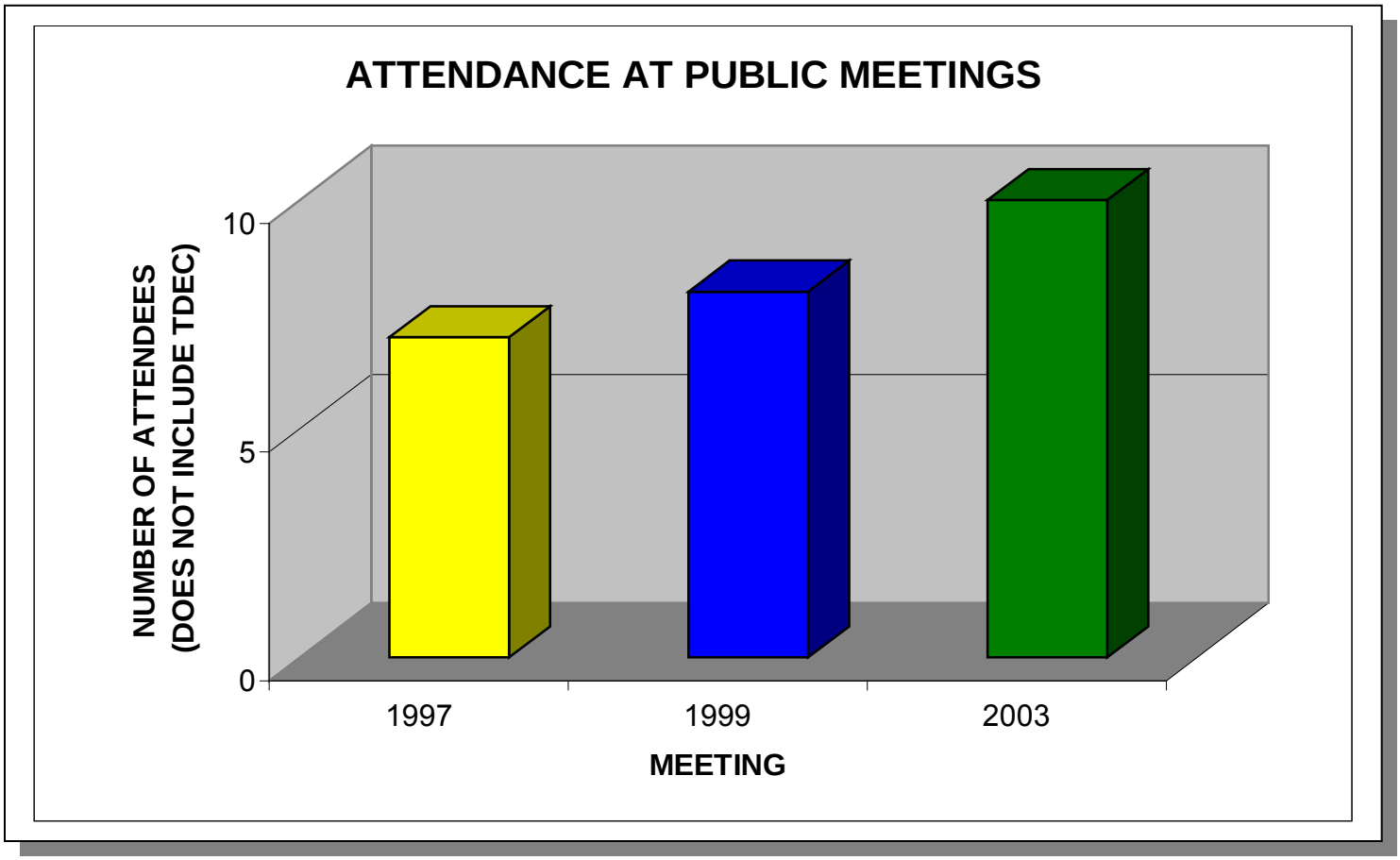


Figure 6-1. Attendance at Public Meetings in the Lower Elk River Watershed. *The 1997 and 1999 watershed meeting numbers represent Lower Elk River, Upper Elk River, Pickwick Lake and Wheeler Lake Watersheds joint meetings.*

Figure 6-2. Watershed meetings begin with an educational slide program about the watershed and a review of the draft Watershed Water Quality Management Plan.

Figure 6-3. Partners, like the Tennessee Valley Authority, are important in the watershed approach, and use the watershed meetings to communicate their activities to the public.

6.3. APPROACHES USED.

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

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

TMDLs are prioritized for development based on many factors.

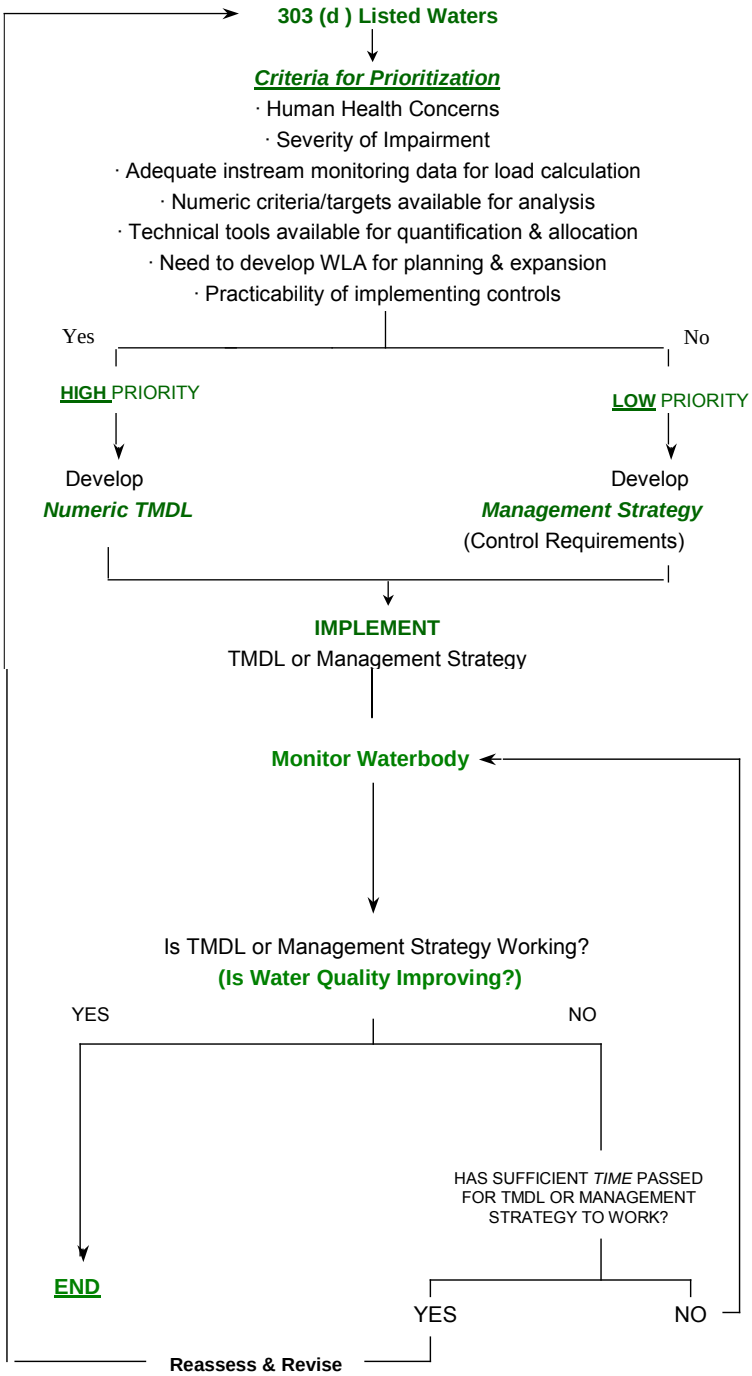


Figure 6.4. Prioritization scheme for TMDL Development.

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 address some of the contaminants impacting waters in the Lower Elk River Watershed. Most of these are limited to only point sources: a pipe or ditch. Often, controls of point sources are not sufficient to protect waters, so other measures are necessary. Some measures include voluntary efforts by landowners and volunteer groups, while others may involve new regulations. 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. In the spring of 2003, that threshold became 1 acre. The general permit issued for such construction sites sets out conditions for maintenance of the sites to minimize pollution from stormwater runoff, including requirements for installation and inspection of erosion controls. Also, the general permit imposes more stringent inspection and self-monitoring requirements on sites in the watershed of streams that are already impaired due to sedimentation. Regardless of the size, no construction site is allowed to cause a condition of pollution.

Construction sites within a sediment-impaired watershed may also have higher priority for inspections by WPC personnel, and are likely to have enforcement actions for failure to control erosion. Examples of these streams are Richland Creek and an unnamed tributary to Richland Creek located in Pulaski, TN.

The same requirements apply to sites in the drainage of high quality waters.

6.3.B.i.b. From Channel and/or Bank Erosion. Methods or controls that might be necessary to address common problems are:

Voluntary activities

- Re-establishment of bank vegetation (examples: Corn Creek, Richland Creek, and unnamed tributary to Richland Creek).
- Establish off channel watering areas for cattle by moving watering troughs and feeders back from stream banks.
- Limit cattle access to streams and bank vegetation (example: Corn Creek).

Additional strategies

- Increase efforts in the Master Logger program to recognize impaired streams and require more effective management practices.
- Community planning for the impacts of development on small streams.
- Restrictions requiring post construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion.
- More frequent construction stormwater inspections (examples: Corn Creek, Richland Creek, and unnamed tributary to Richland Creek).
- Additional restrictions on logging in streamside management zones.
- Prohibition on clearing of stream and ditch banks. *Note: Permits may be required for any work along streams.*
- 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.i.c. From Agriculture and Silviculture. Even though there is an exemption in the Water Quality Control Act stating that normal agricultural and silvicultural practices that do not result in a point source discharge do not have to obtain a permit, efforts are being made to address impacts due to these practices.

The Master Logger Program has been in place for several years to train loggers how to plan their logging activities and to install Best management Practices that lessen the impact of logging activities. Recently, laws and regulations were enacted which established the expected BMPs to be used and allows the Commissioners of the Departments of Environment and Conservation and of Agriculture to stop a logging operation that has failed to install these BMPs and so are impacting streams.

Since the Dust Bowl era, the agriculture community has strived to protect the soil from wind and soil erosion. Agencies such as the Natural Resources Conservation Service (NRCS), the University of Tennessee Agricultural Extension Service, and the Tennessee Department of Agriculture have worked to identify better ways of farming, to educate the farmers, and to install the methods that address the sources of some of the impacts due to agriculture. Cost sharing is available for many of these measures. Corn Creek and Town Creek can benefit from agricultural BMPs.

6.3.B.ii. Pathogen Contamination.

Possible sources of pathogens are inadequate or failing septic tank systems, overflows or breaks in public sewer collection systems, poorly disinfected discharges from sewage treatment plants, and fecal matter 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 and require adequate control for these sources. Individual homes are required to have subsurface, on-site treatment (i.e., septic tank and field lines) if public sewers are not available. Septic tank and field lines are regulated by the Division of Ground Water Protection within TDEC and delegated county health departments. 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:

Voluntary activities

- Off-channel watering of livestock (examples: Coffey Creek, Corn Creek, Town Creek, and Elk River).
- Limiting livestock access to streams.
- Proper management of animal waste from feeding operations.

Enforcement strategies

- 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.
- More frequent inspections of municipal sewage treatment plants (example: Town Creek).
- Identification of Concentrated Animal Feeding Operations not currently permitted, and enforcement of current regulations.
- More frequent stream monitoring (examples: Coffey Creek and Corn Creek).

Additional strategies

- Restrict development in areas where sewer is not available and treatment by subsurface disposal is not an option due to poor soils, floodplains, or high water tables.
- Develop and enforce leash laws and controls on pet fecal material.
- Greater efforts by sewer utilities to identify leaking lines or overflowing manholes.

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. More frequent stream monitoring and STP inspections can address some problems in Town Creek and Corn Creek.

Other sources of nutrients can be addressed by:

Voluntary activities

- Encourage no-till farming.
- Encourage farmers to use the proper rate of fertilizer for the soil and crop.
- Educate homeowners and lawn care companies in the proper application of fertilizers.
- Encourage landowners, developers, and builders to leave stream buffer zones. Streamside vegetation can filter out many nutrients and other pollutants before they reach the stream. These riparian buffers are also vital along livestock pastures (examples: Town Creek and Corn Creek).
- Use grassed drainage ways that can remove fertilizer before it enters streams.
- Use native plants for landscaping since they don't require as much fertilizer and water.

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

- Maintain shade over a stream. Cooler water can hold more oxygen and retard the growth of algae.
- Discourage impoundments. Ponds and lakes do not aerate water. *Note: Permits may be 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.
- Litter laws and strong 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.

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 (example: unnamed tributary to Richland Creek).
- Avoiding use of heavy equipment to “clean out” streams.
- Planting vegetation along streams to stabilize banks and provide habitat (example: unnamed tributary to Richland Creek).
- Encouraging developers to avoid extensive culverts in streams.

Current regulations

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

Additional Enforcement

- Increased enforcement may be needed when violations of current regulations occur.
- Increased ARAP inspections (example: unnamed tributary to Richland Creek).
- More frequent industrial stormwater inspections of Pulaski Industrial Park.

6.4. PERMIT REISSUANCE PLANNING

Under the *Tennessee Water Quality Control Act*, municipal, industrial and other dischargers of wastewater must obtain a permit from the Division. Approximately 1,700 permits have been issued in Tennessee under the federally delegated National Pollutant Discharge Elimination System (NPDES). These permits establish pollution control and monitoring requirements based on protection of designated uses through implementation of water quality standards and other applicable state and federal rules.

The following three sections provide specific information on municipal, industrial, and water treatment plant active permit holders in the Lower Elk River Watershed. Compliance information was obtained from EPA's Permit Compliance System (PCS). All data was queried for a five-year period between January 1, 2001 and December 31, 2006. PCS can be accessed publicly through EPA's Envirofacts website. This website provides access to several EPA databases to provide the public with information about environmental activities that may affect air, water, and land anywhere in the United States:

http://www.epa.gov/enviro/html/ef_overview.html

Stream Segment information, including designated uses and impairments, are described in detail in Chapter 3, *Water Quality Assessment of the Lower Elk River Watershed*.

6.4.A. Municipal Permits

TN0021687 Pulaski STP

Discharger rating: Major
City: Pulaski
County: Giles
EFO Name: Columbia
Issuance Date: 8/31/06
Expiration Date: 10/31/07
Receiving Stream(s): Richland Creek at mile 23.3
HUC-12: 06030004 (Lower Elk)
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: WAS to anaerobic dig to land appl or drybds to land appl

Segment	TN06030004017_2000
Name	Richland Creek
Size	26.7
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Industrial Water Supply (Supporting), Fish and Aquatic Life (Non-Supporting), Recreation (Non-Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Oil and Grease, Sedimentation/Siltation, Escherichia coli
Sources	Industrial Point Source Discharge, Municipal (Urbanized High Density Area), Site Clearance (Land Development or Redevelopment), Grazing in Riparian or Shoreline Zones, Sanitary Sewer Overflows (Collection System Failures)

Table 6-1. Stream Segment Information for Pulaski STP.

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Ammonia as N (Total)	Summer	4	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	100	lb/day	WAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	2	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	67	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	3	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	16	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	12	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	267	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	8	mg/L	MAvg Conc	3/Week	Composite	Effluent

Table 6-2a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	Winter	400	lb/day	WAvg Load	3/Week	Composite	Effluent
CBOD % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
CBOD5	Summer	25	mg/L	DMax Conc	3/Week	Composite	Effluent
CBOD5	Summer	677	lb/day	DMax Load	3/Week	Composite	Effluent
CBOD5	Summer	834	lb/day	DMax Load	3/Week	Composite	Effluent
CBOD5	Summer	20	mg/L	MAvg Conc	3/Week	Composite	Effluent
CBOD5	Summer	500	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	Summer	15	mg/L	DMin Conc	3/Week	Composite	Effluent
CBOD5	Winter	40	mg/L	DMax Conc	3/Week	Composite	Effluent
CBOD5	Winter	834	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	Winter	1334	lb/day	DMax Load	3/Week	Composite	Effluent
CBOD5	Winter	25	mg/L	DMin Conc	3/Week	Composite	Effluent
CBOD5	Winter	1168	lb/day	DMax Load	3/Week	Composite	Effluent
CBOD5	Winter	35	mg/L	MAvg Conc	3/Week	Composite	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	3/Week	Grab	Effluent
E. coli	All Year	941	#/100mL	DMax Conc	3/Week	Grab	Effluent
Flow	All Year		MGD	MAvg Load	Weekly	Continuous	Intake
Flow	All Year		MGD	DMax Load	Weekly	Continuous	Effluent
Flow	All Year		MGD	MAvg Load	Weekly	Continuous	Effluent
Flow	All Year		MGD	DMax Load	Weekly	Continuous	Intake
IC25 7day Ceriodaphnia Dubia	All Year	28.4	Percent	DMin Conc	Quarterly	Composite	Effluent
IC25 7day Fathead Minnows	All Year	28.4	Percent	DMin Conc	Quarterly	Composite	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	3/Week	Composite	Effluent
TRC	All Year	0.07	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	3/Week	Composite	Effluent
TSS	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year	1334	lb/day	WAvg Load	3/Week	Composite	Effluent
TSS	All Year	40	mg/L	WAvg Conc	3/Week	Composite	Effluent
TSS	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year	1001	lb/day	MAvg Load	3/Week	Composite	Effluent
TSS	All Year	30	mg/L	MAvg Conc	3/Week	Composite	Effluent
TSS	All Year	1501	lb/day	DMax Load	3/Week	Composite	Effluent
TSS % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
pH	All Year	9	SU	DMax Conc	Weekdays	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekdays	Grab	Effluent

Table 6-2b.

Tables 6-2a and b. Permit Limits for Pulaski STP.

Compliance History:
The following exceedences were noted in PCS:

- 54 TSS
- 27 Settleable Solids
- 1 Ammonia
- 22 CBOD
- 17 Fecal Coliform
- 28 Suspended Solids % Removal
- 2 Chlorine
- 308 Bypasses
- 207 Overflows

Enforcement:
Commissioner Order # 04-0454
Database Notes: Order issued because of chronic effluent violations from May 2002 through April 2004. This became an Agreed Order with the same case number on April 28, 2005. E&C Section received Phase I Corrective Action Plan (CAP) on August 8, 2005. Sent to Phil Simmons for review and approval. Received revised CAP/Engineering Report (ER) on 3/28/06. Received revised CAP/ER on 5/17/06. On 5/26/06, Municipal Facilities Section sent a letter approving the CAP/ER.

Comments:
None.

TN0054810 Richland School

Discharger rating: Major
City: Lynnville
County: Giles
EFO Name: Columbia
Issuance Date: 6/28/02
Expiration Date: 6/30/07
Receiving Stream(s): Robertson Fork Creek Mile 1.2
HUC-12: 06030004
Effluent Summary: Treated domestic wastewater from Outfall 001
Treatment system: Septic tank, recirculation sand filter and UV disinfection

Segment	TN06030004023_0300
Name	Robertson Fork Creek
Size	47.2
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Fish and Aquatic Life (Supporting), Recreation (Non-Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Escherichia coli
Sources	Grazing in Riparian or Shoreline Zones

Table 6-3. Stream Segment Information for Richland school.

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Ammonia as N (Total)	Summer	4	mg/L	DMax Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Summer	2	mg/L	MAvg Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	10	mg/L	DMax Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	5	mg/L	MAvg Conc	2/Month	Grab	Effluent
CBOD5	All Year	20	mg/L	DMax Conc	2/Month	Grab	Effluent
CBOD5	All Year	10	mg/L	MAvg Conc	2/Month	Grab	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	Grab	Effluent
Fecal Coliform	All Year	1000	#/100mL	DMax Conc	2/Month	Grab	Effluent
Fecal Coliform	All Year	200	#/100mL	MAvg Geo Mean	2/Month	Grab	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	2/Week	Grab	Effluent
TRC	All Year	0.5	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	2/Month	Grab	Effluent
TSS	All Year	30	mg/L	MAvg Conc	2/Month	Grab	Effluent
pH	All Year	8.5	SU	DMax Conc	2/Week	Grab	Effluent
pH	All Year	6.5	SU	DMin Conc	2/Week	Grab	Effluent

Comments:
None.

TN0061841 Cornersville Sewage Treatment Plant

Discharger rating: Major
City: Lynnville
County: Marshall
EFO Name: Columbia
Issuance Date: 3/31/02
Expiration Date: 2/26/07
Receiving Stream(s): Town Creek mile 0.9
HUC-12: 06030004 (Lower Elk)
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: A combined equalization/sludge holding basin, a sequential batch reactor (SBR), an ultraviolet disinfection chamber, and a cascade aeration unit

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Ammonia as N (Total)	Summer	2.5	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	1.7	lb/day	DMax Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	1.7	lb/day	DMax Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	1.1	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	0.9	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	2	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	4	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	2	lb/day	DMax Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	1.9	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	1.6	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	2.4	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	3.3	lb/day	DMax Load	3/Week	Composite	Effluent
CBOD % Removal	All Year	75	Percent	MAvg % Removal	3/Week	Calculated	% Removal
CBOD5	All Year	20	mg/L	DMax Conc	3/Week	Composite	Effluent
CBOD5	All Year	15	mg/L	MAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year	8	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	10	mg/L	DMin Conc	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	13	lb/day	DMax Load	3/Week	Composite	Effluent
CBOD5	All Year	13	lb/day	DMax Load	3/Week	Composite	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	3/Week	Grab	Effluent
Fecal Coliform	All Year	1000	#/100mL	DMax Conc	3/Week	Grab	Effluent
Fecal Coliform	All Year	200	#/100mL	MAvg Geo Mean	3/Week	Grab	Effluent
Flow	All Year		MGD	DMax Load	Daily	Continuous	Effluent
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Effluent
Nitrogen Total (as N)	Summer		mg/L	MAvg Conc	2/Month	Composite	Effluent
Phosphorus, Total	Summer		mg/L	MAvg Conc	2/Month	Composite	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	3/Week	Composite	Effluent
TSS	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year	33	lb/day	DMax Load	3/Week	Composite	Effluent

Table 6-4a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
TSS	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
TSS % Removal	All Year	60	Percent	MAvg % Removal	3/Week	Calculated	% Removal
pH	All Year	9	SU	DMax Conc	Weekdays	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekdays	Grab	Effluent

Table 6-4b.

Table 6-4a and b. Permit Limits for Cornersville STP.

Compliance History:
The following exceedences were noted in PCS:

- 4 Settleable Solids
- 8 Ammonia
- 4 CBOD
- 2 Fecal Coliform
- 4 Suspended Solids % Removal
- 12 Overflows
- 13 Bypasses

Comments:
None.

6.4.B. Industrial Permits

TN0054640 Tennessee Valley Recycling, LLC

Discharger rating: Minor
City: Pulaski
County: Giles
EFO Name: Columbia
Issuance Date: 7/02/04
Expiration Date: 7/02/07
Receiving Stream(s): Richland Creek below the low head dam for the Pulaski water supply at mile 24.1
HUC-12: 06030004 (Lower Elk)
Effluent Summary: Storm water runoff from Outfall 001
Treatment system: -

Segment	TN06030004017_2000
Name	Richland Creek
Size	26.7
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Industrial Water Supply (Supporting), Fish and Aquatic Life (Non-Supporting), Recreation (Non-Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Oil and Grease, Sedimentation/Siltation, Escherichia coli
Sources	Industrial Point Source Discharge, Municipal (Urbanized High Density Area), Site Clearance (Land Development or Redevelopment), Grazing in Riparian or Shoreline Zones, Sanitary Sewer Overflows (Collection System Failures)

Table 6-5. Stream Segment Information for Tennessee Valley Recycling, LLC.

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
CBOD5	All Year		mg/L	DMax Conc	Monthly	Composite	Effluent
Cd (T)	All Year		mg/L	DMax Conc	Monthly	Composite	Effluent
Cu (T)	All Year		mg/L	DMax Conc	Monthly	Composite	Effluent
Flow	All Year		MGD	DMax Load	1/Discharge	Estimate	Effluent
Flow, Totalizer	All Year		Million Gallons (3R)	DMax Load	Monthly	Recorder	Effluent
Hg (T)	All Year	0.0054	lb/day	DMax Load	1/Discharge	Composite	Effluent
Nitrogen Ammonia Total (as NH4)	All Year		mg/L	DMax Conc	Monthly	Composite	Effluent
Oil and Grease (Freon EM)	All Year	15	mg/L	DMax Conc	Monthly	Grab	Effluent
Oil and Grease (Freon EM)	All Year	10	mg/L	MAvg Conc	Monthly	Grab	Effluent
Pb (T)	All Year	1.28	mg/L	DMax Conc	1/Discharge	Composite	Effluent
Pb (T)	All Year	1.6	lb/day	DMax Load	1/Discharge	Composite	Effluent
Polychlorinated Biphenyls (PCBs)	All Year	4.8E-05	lb/day	DMax Load	1/Discharge	Composite	Effluent
Rainfall	All Year		Inches	DMax Conc	1/Discharge	Not Applicable	Effluent
Rainfall Events	All Year		Hours/Month	DMax Conc	1/Discharge	Measured	Effluent
TSS	All Year	40	mg/L	DMax Conc	Monthly	Composite	Effluent

Table 6-6a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Zn (T)	All Year	2.2	mg/L	DMax Conc	1/Discharge	Composite	Effluent
Zn (T)	All Year	2.78	lb/day	DMax Load	1/Discharge	Composite	Effluent
pH	All Year	9	SU	DMax Conc	Monthly	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Monthly	Grab	Effluent

Table 6-6b.

Tables 6-6a- b. Permit Limits for Tennessee Valley Recycling, LLC.

Compliance History:
The following exceedences were noted in PCS:

- 15 TSS
- 2 Oil & Grease
- 2 pH
- 1 Lead
- 3 Zinc.

Enforcement:
Commissioner's Order Pending!

Comments:
Receiving and processing metal scrap for recycling.

TN0003441 Pulaski Rubber Company

Discharger rating: Minor
City: Pulaski
County: Giles
EFO Name: Columbia
Issuance Date: 3/31/03
Expiration Date: 12/31/07
Receiving Stream(s): Richland Creek at mile 24.5
HUC-8: 06030004 (Lower Elk)
Effluent Summary: noncontact cooling water from Outfall 001
Treatment system: -

Segment	TN06030004017_2000
Name	Richland Creek
Size	26.7
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Industrial Water Supply (Supporting), Fish and Aquatic Life (Non-Supporting), Recreation (Non-Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Oil and Grease, Sedimentation/Siltation, Escherichia coli
Sources	Industrial Point Source Discharge, Municipal (Urbanized High Density Area), Site Clearance (Land Development or Redevelopment), Grazing in Riparian or Shoreline Zones, Sanitary Sewer Overflows (Collection System Failures)

Table 6-7. Stream Segment Information for Pulaski Rubber Company

Parameter Limits:

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
pH	All Year	9	SU	DMax Conc	2/Month	Grab	Effluent
pH	All Year	6	SU	DMin Conc	2/Month	Grab	Effluent

Table 6-8. Permit Limits for Pulaski Rubber Company

Compliance History:
None noted.

EFO Comments:
No issues.

TN0067954 Pilot Travel Centers LLC #406

Discharger rating: Minor
City: Lewisburg
County: Giles
EFO Name: Columbia
Issuance Date: 12/30/03
Expiration Date: 12/31/07
Receiving Stream(s): Wet weather conveyance to unnamed tributary to Richland Creek
HUC-8: 06030004 (Lower Elk)
Effluent Summary: Treated process wastewater from Outfall 001
Treatment system: -

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Benzene	All Year	0.5	mg/L	DMax Conc	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	15	mg/L	DMax Conc	2/Month	Grab	Effluent
TSS	All Year	40	mg/L	DMax Conc	2/Month	Grab	Effluent
pH	All Year	9	SU	DMax Conc	2/Month	Grab	Effluent
pH	All Year	6	SU	DMin Conc	2/Month	Grab	Effluent

Table 6-9. Permit Limits

Compliance History:
The following exceedences were noted in PCS:

- 8 TSS
- 1 Oil & Grease
- 1 pH.

Comments:
None.

APPENDIX II

ID	NAME	HAZARD
287001	Echo	H
287002	Clear Creek	2
287003	Lakeview	H
287005	Lake Galilee	3
247023	Marsh	3
597007	Burns Lake	L

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

LAND COVER/LAND USE	ACRES	% OF WATERSHED
Open Water	997	0.2
Other Grasses	974	0.2
Pasture/Hay	143,628	31.4
Row Crops	36,040	7.9
Woody Wetlands	899	0.2
Emergent Herbaceous Wetlands	112	0.0
Deciduous Forest	216,745	47.4
Mixed Forest	41,223	9.0
Evergreen Forest	10,249	2.2
High Intensity: Commercial/Industrial	1,085	0.2
High Intensity: Residential	244	0.1
Low Intensity: Residential	1,762	0.4
Quarries/Strip Mines/Gravel Pits	108	0.0
Transitional	2,807	0.6
Total	**456,874**	**99.8**

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

ECOREGION	REFERENCE STREAM	WATERSHED (HUC)	
Western Highland Rim (71f)	South Harpeth Creek Wolf Creek Brush Creek Swanegan Creek Little Swan Creek Hurricane Creek	Harpeth River Lower Duck River Buffalo River Pickwick Lake Lower Duck River Lower Duck River	05130204 06040003 06040004 06030005 06040003 06040003
Eastern Highland Rim (71g)	Flat Creek Spring Creek Hurricane Creek	Cordell Hull Lake Cordell Hull Lake Upper Elk River	05130106 05130106 06030003
Outer Nashville Basin (71h)	Flynn Creek Clear Fork Carson Fork	Cordell Hull Lake Caney Fork River Stones River	05130106 05130108 05130203

Table A2-3. Ecoregion Monitoring Sites in Ecoregions 71f, 71g and 71h.

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CODE	NAME	AGENCY	AGENCY ID
243	USACOE-NASHVILLE CLIENT SITE	USACOE-N	
863	USFWS W.E. MAYFIELD WRP SITE	USFWS	TRACT 1120, FARM 2904
885	USFWS JAMES LITTLE WRP SITE	USFWS	TRACT 9849, FARM 3675

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

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Elk River	TN06030004013_1000	7.4
Ford Creek	TN06030004013_0500	15.9
Jenkins Creek	TN06030004013_0300	12.5
Richland Creek	TN06030004017_1000	4.7

Table A3-1a. Streams Fully Supporting Designated Uses in Lower Elk River Watershed. *Data are based on Year 2000 Water Quality Assessment*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Coffey Branch	TN06030004043_0600	3.4
Richland Creek	TN06030004017_2000	26.7
Town Creek	TN06030004043_0400	12.5
Weakley Creek	TN06030004029_1000	7.2

Table A3-1b. Streams Partially Supporting Designated Uses in Lower Elk River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Unnamed Tributary to Richland Creek	TN06030004017_0300	3.2

Table A3-1c. Streams Not Supporting Designated Uses in Lower Elk River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Agnew Creek	TN06030004029_0100	18.2
Anderson Creek	TN06030004026_0110	27
Big Creek	TN06030004026_1000	13.1
Blue Creek	TN06030004043_0200	22.9
Britton Branch	TN06030004017_0600	5.1
Brownlow Creek	TN06030004026_0200	12.4
Buchanon Creek	TN06030004018_1000	14.9
Chicken Creek	TN06030004017_0200	12.8
Choate Creek	TN06030004029_0200	18.5
Clear Creek	TN06030004036_3200	23
Copperas Creek	TN06030004036_3100	3
Corn Creek	TN06030004043_0300	6.8
Dog Branch	TN06030004032_0220	8.8
Donahue Creek	TN06030004017_0100	6.4
Dry Creek	TN06030004043_0100	19.9
Dry Weakley Creek	TN06030004029_0500	7.7
East Fork Lynn Creek	TN06030004023_0200	10.2
East Fork Shoal Creek	TN06030004032_0200	21.7
East Fork Sugar Creek	TN06030004036_3000	13.9
Factory Creek	TN06030004026_0100	15.3
Ferguson Branch	TN06030004036_2400	5.1
Fry Branch	TN06030004023_0100	6.5
Gilbert Branch	TN06030004013_0600	5
Gimlet Creek	TN06030004029_0300	7.4
Griffin Branch	TN06030004013_0400	3.5
Hams Creek	TN06030004029_0700	11.1
Haywood Creek	TN06030004043_0700	7
Henderson Branch	TN06030004013_0100	6.3
Hulsey Branch	TN06030004036_0300	8.2
Idaho Creek	TN06030004036_2300	3.3
Leatherwood Creek	TN06030004018_0100	20
Love Branch	TN06030004036_2500	4.7
Lynn Creek	TN06030004023_1000	9.7
Mill Creek	TN06030004013_0200	0.6
Minnow Branch	TN06030004026_0400	8.9
Mint Spring Branch	TN06030004029_0510	5.5
Misc. Tribs to Big Creek	TN06030004026_0999	31.9
Misc. Tribs to Buchanon Creek	TN06030004018_0999	20.9
Misc. Tribs to E.F. Sugar Creek	TN06030004036_3999	29.1
Misc. tribs to Lynn Creek	TN06030004023_0999	18.1
Misc. Tribs to Richland Creek	TN06030004017_0999	50.4
Misc. Tribs to Weakley Creek	TN06030004029_0999	19.3
Misc. Tribs to W.F. Sugar Creek	TN06030004036_2999	12.8
Misc. Tribs. To Elk River	TN06030004013_0999	7.2
Misc. tribs. to Richland Creek	TN06030004043_0999	81.3
Mokeson Creek	TN06030004036_2200	12
Muckle Branch	TN06030004029_0600	4.4
Myrick Branch	TN06030004029_0110	3.5

New Hope Branch	TN06030004036_2100	6
Newton Branch	TN06030004018_0300	7.5
North Choate Creek	TN06030004029_0210	4.2
Oliver Branch	TN06030004018_0200	5.6
Pigeon Roost Creek	TN06030004044_1000	31.4
Pinhook Branch	TN06030004036_0200	5.3
Pleasant Run Creek	TN06030004017_0400	1.7
Prosser Creek	TN06030004036_2600	9.8
Puncheon Branch	TN06030004036_3400	7.9
Richland Creek	TN06030004043_1000	42
Robertson Fork Creek	TN06030004023_0300	47.2
Shannon Creek	TN06030004036_3300	29.4
Shoal Creek	TN06030004032_1000	1.1
Shoaly Creek	TN06030004036_2700	3
Silver Creek	TN06030004017_0700	7.5
Sugar Creek	TN06030004036_1000	6.4
Tackets Creek	TN06030004032_0210	8.3
Tory Fork	TN06030004043_0500	12.9
Unnamed Trib to Richland Creek	TN06030004017_0500	5.2
Warren Branch	TN06030004036_0100	4.5
West Fork Shoal Creek	TN06030004032_0100	29.4
West Fork Sugar Creek	TN06030004036_2000	20.7

Table A3-1d. Streams Not Assessed in Lower Elk River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
Unnamed Trib to Richland Cr	TN06030004017_0300	3.2	Not supporting

Table A3-2a. Stream Impairment Due to Habitat Alterations in Lower Elk River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
Coffey Branch	TN06030004043_0600	3.4	Partial
Richland Creek	TN06030004017_2000	26.7	Partial
Town Creek	TN06030004043_0400	12.5	Partial

Table A3-2b. Stream Impairment Due to Pathogens in Lower Elk River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
Richland Creek	TN06030004017_2000	26.7	Partial
Unnamed Trib to Richland Creek	TN06030004017_0300	3.2	Not supporting
Weakley Creek	TN06030004029_1000	7.2	Partial

Table A3-2c. Stream Impairment Due to Siltation in Lower Elk River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-10 SUBWATERSHEDS (ACRES)			
	01	02	03	04
Deciduous Forest	33,284	109,721	33,791	41,092
Emergent Herbaceous Wetlands	26	87		
Evergreen Forest	1,557	5,879	388	2,405
High Intensity: Commercial/Industrial/Transportation	109	828	16	162
High Intensity: Residential	10	226	1	10
Low Intensity: Residential	180	1,310	37	274
Mixed Forest	5,323	27,258	2,484	6,377
Open Water	373	506	59	54
Other Grasses: Urban/Recreational	79	878	8	10
Pasture/Hay	13,735	91,783	11,761	25,760
Row Crops	4,454	16,268	6,277	8,319
Transitional	439	810	1,027	560
Woody Wetlands	41	743		116
Quarries/Strip Mines		94	14	
Total	**59,610**	**256,390**	**55,861**	**85,139**

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

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

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

STATION	HUC-10	AGENCY	NAME	AREA (SQ MILES)	LOW FLOW (CFS)		
					1Q10	7Q10	3Q20
03584500	0603000401	USGS	Elk River	1,784.0	141	160	130
03583300	0603000402	USGS	Richland Creek	47.5	0.2	0.2	0.2
03583320	0603000402	USGS	Richland Creek	149.0	2.3	2.5	2.1
03583500	0603000402	USGS	Weakley Creek	24.4	3.3	3.9	3.1
03584000	0603000402	USGS	Richland Creek	366.0	14.3	15.6	13.2
03584060	0603000402	USGS	Pleasant Run Creek				
03584300	0603000402	USGS	Buchanan Creek	35.7			0

Table A4-3. Historical Streamflow Data Summary Based on Mean Daily Flows in Lower Elk River Watershed*. USGS, United States Geological Survey.*

PARAMETER	SUBWATERSHED			
	01	02	03	04
E. coli		Z		
Fecal Coliform		Z		
Total Coliform		Z		
Conductivity (Field)		Z		
DO		Z		
pH (Field)		Z		
Temperature		Z		
Biological Monitoring	A, B, D, E, F	K, L, M, N, O, P, R, S, U, V, W, X, Y, Z, #, $	α, β, δ	ε, θ, λ, μ, π, ψ

Table A4-4a. Water Quality Parameters Monitored in the Tennessee Portion of the Lower Elk River Watershed. *Codes are described in Table A4-4b.*

CODE	STATION	ALIAS	AGENCY	LOCATION
A	EFSHO001.0GS		TDEC	East Fork Shoal Creek @ RM 1.0
B	FORD001.3GL		TDEC	Ford Creek @ RM 1.3
C	JENI001.2GL		TDEC	Jenkins Creek @ RM 1.2
D	SHOAL008.5GS		TDEC	Shoal Creek @ RM 8.5
E	TACKE000.2GS		TDEC	Tacketts Branch @ RM 0.2
F	WFSHO000.4GS		TDEC	West Fork Shoal Creek @ RM 0.4
G	03584600		USGS	Elk River @ Prospect
H	475796		TVA	
I	477326		TVA	
J	477330		TVA	
K	AGNEW001.5GS		TDEC	Agnew Creek @ RM 1.5
L	BLUE000.5GS		TDEC	Blue Creek @ RM 0.5
M	BUCHA003.0GS		TDEC	Buchanon Creek @ RM 3.0
N	CHICK000.4GS		TDEC	Chicken Creek @ RM 0.4
O	CHOAT002.1GS		TDEC	Choate Creek @ RM 2.1
P	COFFE000.1ML		TDEC	Coffee Branch @ RM 0.1
Q	COFFE000.5ML		TDEC	Coffee Branch @ RM 0.5
R	CORN000.4ML		TDEC	Corn Creek @ RM 0.4
S	CORN001.3ML		TDEC	Corn Creek @ RM 1.3
T	DR001.4GS		TDEC	Dry Creek @ RM 1.4
U	HAMS001.0GS		TDEC	Ham's Creek @ RM 1.0
V	LEATH000.1GS		TDEC	Leatherwood Creek @ RM 0.1
W	RICHL064.5ML		TDEC	Richland Creek @ RM 64.5
X	ROBEF001.2GS		TDEC	Robertson Fork Creek @ RM 1.2
Y	TORYF000.5ML		TDEC	Tory Fork @ RM 0.5
Z	TOWN000.9ML		TDEC	Town Creek @ RM 0.9
#	WEAKL001.0GS		TDEC	Weakley Creek @ RM 1.0
$	WHITE000.1GS		TDEC	White Branch @ RM 0.1
£	RICHLAND023.3		TDEC	Richland Creek @ RM 23.3
α	ANDER000.2GS		TDEC	Anderson Creek @ RM 0.2
β	BROWN000.2GS		TDEC	Brownlow Creek @ RM 0.2
γ	FACTO001.2GS		TDEC	Factory Creek @ RM 1.6
δ	YOKLE000.2GS		TDEC	Yokely Creek @ RM 0.2
ε	EFSUG002.0LW		TDEC	East Fork Sugar Creek @ RM 2.0
θ	HULSE001.9GS		TDEC	Hulsey Branch @ RM 1.9
λ	PROSS000.4LW		TDEC	Prosser Creek @ RM 0.4
μ	SHANN000.2LW		TDEC	Shannon Creek @ RM 0.2
π	SUGAR015.2GS		TDEC	Sugar Creek @ RM 15.2
ψ	WFSUG004.0LW		TDEC	West Fork Sugar Creek @ RM 4.0

Table A4-4b. Water Quality Monitoring Stations in the Tennessee Portion of the Lower Elk River Watershed*. TDEC, Tennessee Department of Environment and Conservation; USGS, United States Geologic Survey; TVA, Tennessee Valley Authority; NPS, National Park Service.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	HUC-10
TN0003441	Pulaski Rubber Co.	3011	Tires and Inner Tubes	Minor	Richland Creek @ RM 24.5	0603000402
TN0021687	Richland STP	4952	Sewerage System	Major	Richland Creek @ RM 23.3	0603000402
TN0054640	TN Valley Recycling	5093	Scrap and Waste Materials	Minor	Richland Creek @ RM 24.1	0603000402
TN0054810	Richland School	4952	Sewerage System	Minor	Robertson Fork @ RM 1.2	0603000402
TN0061841	Cornersville STP	4952	Sewerage System	Minor	Town Creek @ RM 0.9	0603000402
TN0067954	Pilot Travel Center	5541	Convenience Store with Gas	Minor	Ditch to Unnamed Trib to Richland Cr	0603000402

Table A4-5. Active Permitted Point Source Facilities in the Tennessee Portion of the Lower Elk River Watershed. *SIC, Standard Industrial Classification; MADI, Major Discharge Indicator.*

FACILITY NUMBER	PERMITEE	SIC	SIC NAME	WATERBODY	HUC-10
TN0056421	Rogers Group	1422	Crushed and Broken Limestone	Donahue Branch, Everly Branch	0603000402
TN0072907	HMA Contractors	1422	Crushed and Broken Limestone	Buford Branch	0603000402
TN0076244	Vulcan Construction Materials	1422	Crushed and Broken Limestone	Unnamed Trib to Richland Creek	0603000402

Table A4-6. Active Permitted Mining Sites in the Tennessee Portion of the Lower Elk River Watershed. *SIC, Standard Industrial Classification.*

FACILITY NUMBER	FACILITY NAME	SECTOR	RECEIVING STREAM	AREA*	HUC-10
TNR050084	Hyatt Industrial Landfill	L	Richland Creek	31.5	0603000402
TNR050139	Frito-Lay, Inc.	U	Richland Creek	3.2	0603000402
TNR050201	Mid-South Auto Salvage	M	Unnamed Trib to Pigeon Roost Creek	20.2	0603000402
TNR050235	Demastus Junk Yard	M	Unnamed Trib to Mooresville Creek	18.0	0603000402
TNR050354	Arvin Meritor	AB	Unnamed Trib to Richland Creek	18.0	0603000402
TNR051018	Pulaski Rubber Company	Y	Richland Creek	3.0	0603000402
TNR051463	Magotteaux Pulaski	F	Unnamed Trib to Richland Creek	21.2	0603000402
TNR051496	Torrington/Fafnir	AB	Richland Creek	77.0	0603000402
TNR051540	Rhodia, Incorporated	C	Pigeon Roost Creek	90.0	0603000402
TNR051622	Johnson Controls	W	Pigeon Roost Creek	22.8	0603000402
TNR051945	Coastal Lumber Company	A	Unnamed Trib to Leatherwood Creek	33.0	0603000402
TNR053223	Weyerhaueser Company	B	Unnamed Trib to Richland Creek	12.0	0603000402
TNR053314	Abernathy Field Airport	S	Richland Creek	300.0	0603000402
TNR053582	TN Valley Recycling	N	Unnamed Trib to Richland Creek	2.9	0603000402
TNR053846	Valley Packaging Corp.	B	Unnamed Trib to Richland Creek	18.0	0603000402
TNR054203	Appertain Corporation	C, N, P, Y	Richland Creek	1.5	0603000402
TNR054288	Mid-America Wood	A	Richland Creek	17.8	0603000402

Table A4-7. Active Permitted TMSP Facilities in the Tennessee Portion of the Lower Elk River Watershed. *Area, acres of property associated with industrial activity. Sector details may be found in Table A4-8.*

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

Table A4-8. TMSP Sectors and Descriptions.

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-10
94.054A	Lincoln	Gravel Dredging	Tacket Branch Creek	0603000401
94.054B	Lincoln	Gravel Dredging	Shoal Creek	0603000401
94.054D	Lincoln	Gravel Dredging	Agnew Creek	0603000401
05.054H	Lincoln	Gravel Dredging	Shannon Creek	0603000401
94.117	Giles	Gravel Dredging	East Fork Creek	0603000401
94.117A	Giles	Gravel Dredging	East Fork Creek	0603000401
94.117B	Giles	Gravel Dredging	East Fork Creek	0603000401
94.218	Giles	Gravel Dredging	Elk River	0603000401
94.502	Giles	Gravel Dredging	Richland Creek	0603000401
94.581	Giles	Gravel Dredging	West Fork Shoal Creek	0603000401
94.769	Giles	Gravel Dredging	Elk River	0603000401
95.005	Giles	Gravel Dredging	West Fork Shoal creek	0603000401
95.120	Giles	Gravel Dredging	Shoal Creek	0603000401
95.120A	Giles	Gravel Dredging	Shoal Creek	0603000401
95.120B	Giles	Gravel Dredging	Shoal Creek	0603000401
96.044	Giles	Gravel Dredging	Elk River, Whitfield Island	0603000401
96.048	Giles	Gravel Dredging	East Fork Shoal Creek	0603000401
96.208	Giles	Gravel Dredging	Shoal Creek	0603000401
96.209	Giles	Gravel Dredging	Tackets Branch	0603000401
96.210	Giles	Gravel Dredging	Tackets Branch	0603000401
96.210A	Giles	Gravel Dredging	Tackets Branch	0603000401
96.284	Giles	Gravel Dredging	Shoal Creek	0603000401
96.285	Giles	Gravel Dredging	Shoal Creek	0603000401
96.285A	Giles	Gravel Dredging	Shoal Creek	0603000401
96.455	Giles	Gravel Dredging	Shoal Creek	0603000401
96.501	Giles	Launching Ramp	Elk River	0603000401
97.069	Giles	Gravel Dredging	West Fork Shoal Creek	0603000401
97.069A	Giles	Gravel Dredging	West Fork Shoal Creek	0603000401
97.151	Giles	Gravel Dredging	Dog Branch	0603000401
97.196	Giles	Gravel Dredging	East Fork Shoal Creek	0603000401
97.196A	Giles	Gravel Dredging	East Fork Shoal Creek	0603000401
97.663	Giles	Gravel Dredging	Shoal Creek	0603000401
98.032	Giles	Gravel Dredging	Dog Branch/Hanna Branch	0603000401
9810.009	Giles	Gravel Dredging	Shoal Creek	0603000401
9810.010	Giles	Gravel Dredging	East Fork Shoal Creek	0603000401
9810.011	Giles	Gravel Dredging	Dog Branch	0603000401
9810.012	Giles	Gravel Dredging	Shoal Creek	0603000401
9810.013	Giles	Gravel Dredging	Shoal Creek	0603000401
9810.055	Giles	Gravel Dredging	Elk River	0603000401
98.056	Giles	Gravel Dredging	Shoal Creek	0603000401
98.062	Giles	Gravel Dredging	Yellow Branch	0603000401
9910.011	Giles	Gravel Dredging	East Fork Shoal Creek	0603000401
9910.037	Giles	Gravel Dredging	East Fork Shoal Creek	0603000401
9910.076	Lawrence	Gravel Dredging	East Fork Shoal Creek	0603000401
9910.077	Lawrence	Gravel Dredging	Dog Branch	0603000401
9910.078	Lawrence	Gravel Dredging	Dog Branch	0603000401
9910.102	Giles	Bridge Scour Repair	Dog Branch	0603000401
9910.116	Giles	Bridge Scour Repair	West Fork Shoal Creek	0603000401

9910.117	Giles	Bridge Scour Repair	Unnamed Trib West Fork Shoal Creek	0603000401
9910.118	Giles	Bridge Scour Repair	Unnamed Trib West Fork Shoal Creek	0603000401
9910.119	Giles	Bridge Scour Repair	Unnamed Trib West Fork Shoal Creek	0603000401
9910.120	Giles	Bridge Scour Repair	East Fork Shoal Creek	0603000401
9910.121	Giles	Bridge Scour Repair	East Fork Shoal Creek	0603000401
94.054E	Lincoln	Gravel Dredging	Leatherwood Creek	0603000402
94.054F	Lincoln	Gravel Dredging	Clearwater Creek	0603000402
94.209	Marshall	Gravel Dredging	Richland Creek	0603000402
94.334	Marshall	Gravel Dredging	Robertson Fork Creek	0603000402
94.504	Giles	Gravel Dredging	Buchanan Creek	0603000402
94.525	Giles	Bridge Replacement	Weakley Creek	0603000402
94.556	Giles	Low Water Crossing with Culverts	Richland Creek	0603000402
94.573	Giles	Bank Stabilization and Gravel Dredging	North Fork Pigeon Roost Creek	0603000402
94.747	Giles	Gravel Dredging	Blue Creek	0603000402
94.775	Giles	Gravel Dredging	Dry Creek/Little Buffalo River	0603000402
94.775A	Giles	Gravel Dredging	Dry Creek/Little Buffalo River	0603000402
94.775B	Giles	Gravel Dredging	Dry Creek/Little Buffalo River	0603000402
95.068	Giles	Gravel Dredging	Buchanan Creek	0603000402
95.548	Giles	Gravel Dredging	Richland Creek	0603000402
95.753	Giles	Gravel Dredging	Buchanan Creek	0603000402
95.753A	Giles	Gravel Dredging	Buchanan Creek	0603000402
95.753B	Giles	Gravel Dredging	Buchanan Creek	0603000402
95.753C	Giles	Gravel Dredging	Buchanan Creek	0603000402
96.033	Giles	Gravel Dredging	Leatherwood creek	0603000402
96.155	Giles	Gravel Dredging	Leatherwood Creek	0603000402
96.336	Giles	Gravel Dredging	Blue Creek	0603000402
96.336A	Giles	Gravel Dredging	Blue Creek	0603000402
96.336B	Giles	Gravel Dredging	Blue Creek	0603000402
96.392	Giles	Bridge Construction	South Fork Blue Creek	0603000402
96.416	Giles	Gravel Dredging	Leatherwood Creek	0603000402
96.417	Giles	Gravel Dredging	Pigeon Creek	0603000402
96.418	Giles	Gravel Dredging	Gimlet Creek	0603000402
96.516	Giles	Gravel Dredging	Pigeon Roost Creek	0603000402
96.527	Giles	Low Water Crossing	Unnamed Trib to Lynn Creek	0603000402
96.528	Giles	Low Water Crossing	Unnamed Trib to Trigg branch	0603000402
96.802	Giles	Gravel Dredging	Dry Weakley Creek	0603000402
96.821	Giles	Gravel Dredging	Richland Creek	0603000402
96.821A	Giles	Gravel Dredging	Richland Creek	0603000402
96.821B	Giles	Gravel Dredging	Richland Creek	0603000402
96.915	Giles	Gravel Dredging	Leatherwood Creek	0603000402
97.112	Giles	Gravel Dredging	Shannon Creek, Myrick Creek, Buchanan Creek	0603000402
97.112A	Giles	Gravel Dredging	Shannon Creek, Myrick Creek, Buchanan Creek	0603000402
97.112B	Giles	Gravel Dredging	Shannon Creek, Myrick Creek, Buchanan Creek	0603000402

97.113	Giles	Gravel Dredging	Blue Creek	0603000402
97.167	Lawrence	Bridge Replacement	Dry Weakley Creek	0603000402
97.187	Giles	Gravel Dredging	Gimlet Creek	0603000402
97.187A	Giles	Gravel Dredging	Gimlet Creek	0603000402
97.187B	Giles	Gravel Dredging	Gimlet Creek	0603000402
97.187C	Giles	Gravel Dredging	Ginlet Creek	0603000402
97.187D	Giles	Gravel Dredging	Choates Creek	0603000402
97.187E	Giles	Gravel Dredging	Choates Creek	0603000402
97.187F	Giles	Gravel Dredging	Choates Creek	0603000402
97.251	Giles	Culvert	Unnamed Trib to Richland Creek	0603000402
97.253	Giles	Bridge Construction	Dry Weakley Creek	0603000402
97.370	Giles	Gravel Dredging	Pigeon Roost Creek	0603000402
97.370A	Giles	Gravel Dredging	Pigeon Roost Creek	0603000402
97.370B	Giles	Gravel Dredging	Pigeon Roost Creek	0603000402
97.616	Marshall	Gravel Dredging	Unnamed Trib to Richland Creek	0603000402
97.627	Giles	Gravel Dredging	Robertson Fork Creek	0603000402
97.628	Giles	Gravel Dredging	Robertson Fork Creek	0603000402
97.633	Giles	Gravel Dredging	Robertson Fork Creek	0603000402
97.649	Giles	Bank Stabilization	Dry Weakley Creek	0603000402
97.707	Giles	Gravel Dredging	Weakley Creek	0603000402
97.751	Giles	Gravel Dredging	Choates Creek	0603000402
97.880	Marshall	Gravel Dredging	Town Creek	0603000402
98.444	Marshall	Box Culvert	Stoners Creek	0603000402
98.660	Giles	Stream Relocation, Road Crossing	Trigg Branch	0603000402
9808.0002	Giles	Minor Road Crossing	Britton Branch	0603000402
9808.0004	Giles	Bridge Replacement	Robertson Fork Creek	0603000402
9808.0012	Giles	Gravel Dredging	Unnamed Trib to Blue Creek	0603000402
9808.0013	Giles	Gravel Dredging	Blue Creek	0603000402
9808.0013A	Giles	Gravel Dredging	Blue Creek	0603000402
9808.0013B	Giles	Gravel Dredging	Blue Creek	0603000402
9808.0013C	Giles	Gravel Dredging	Blue Creek	0603000402
9808.014	Giles	Gravel Dredging	Richland Creek	0603000402
9810.007	Giles	Gravel Dredging	Agnew Creek	0603000402
9810.008	Giles	Gravel Dredging	Ben Johnson Branch	0603000402
9810.043	Giles	Gravel Dredging	Richland Creek	0603000402
9810.124	Giles	Gravel Dredging	Richland Creek	0603000402
9810.126	Giles	Gravel Dredging	Richland Creek	0603000402
9810.224	Giles	Gravel Dredging	Leatherwood Creek	0603000402
9810.225	Giles	Gravel Dredging	Leatherwood Creek	0603000402
9810.226	Giles	Gravel Dredging	Leatherwood Creek	0603000402
9810.227	Giles	Gravel Dredging	Leatherwood Creek	0603000402
9810.228	Giles	Gravel Dredging	Richland Creek	0603000402
9908.0021	Giles	Bank Stabilization	Richland Creek	0603000402
9908.0021A	Giles	Gravel Dredging	Richland Creek	0603000402
9910.073	Giles	Gravel Dredging	Richland Creek	0603000402
9910.094	Giles	Gravel Dredging	Richland Creek	0603000402
9910.158	Giles	Gravel Dredging	Pigeon Roost Creek	0603000402
9910.176	Giles	Bank Stabilization	Unnamed Trib to Richland Creek	0603000402

9910.185	Giles	Gravel Dredging	Richland Creek	0603000402
94.071	Giles	Gravel Dredging	Mack Branch	0603000403
94.804	Giles	Gravel Dredging	Factory Creek	0603000403
94.804A	Giles	Gravel Dredging	Factory Creek	0603000403
94.804B	Giles	Gravel Dredging	Factory Creek	0603000403
94.043	Giles	Gravel Dredging	Anderson Creek	0603000403
95.073	Giles	Gravel Dredging	Anderson Creek	0603000403
95.073A	Giles	Gravel Dredging	Powdermilk Creek	0603000403
95.478	Giles	Gravel Dredging	Big Creek	0603000403
96.254	Giles	Gravel Dredging	Yokely Creek	0603000403
96.393	Giles	Gravel Dredging	Rea Branch	0603000403
96.419	Giles	Gravel Dredging	Brownlow Creek	0603000403
96.420	Giles	Gravel Dredging	Yokley Creek	0603000403
97.252	Giles	Bridge Construction	Factory Creek	0603000403
97.314	Giles	Gravel Dredging	Brownlow Branch	0603000403
97.314A	Giles	Gravel Dredging	Brownlow Branch	0603000403
97.314B	Giles	Gravel Dredging	Brownlow Branch	0603000403
97.570C	Giles	Gravel Dredging	Bradshaw Creek	0603000403
97.681	Giles	Gravel Dredging	Bradshaw Creek	0603000403
98.358	Lawrence	Debris Removal	Anderson Creek	0603000403
9810.125	Giles	Gravel Dredging	Factory Creek	0603000403
99.121	Giles	Concrete Mat	Factory Creek	0603000403
9910.074	Lawrence	Gravel Dredging	Anderson Creek	0603000403
9910.075	Lawrence	Gravel Dredging	Anderson Creek	0603000403
00.077	Giles	Gas Line Crossing	Unnamed Trib to Yokley Creek	0603000403
94.444	Lawrence	Gravel Dredging	Little Sugar Creek	0603000404
95.008	Giles	Gravel Dredging	Hulsey Branch	0603000404
95.008A	Giles	Gravel Dredging	Hulsey Branch	0603000404
95.008B	Giles	Gravel Dredging	Hulsey Branch	0603000404
95.293	Giles	Box Culverts	Hulsey Branch	0603000404
95.293A	Giles	Box Culverts	Hulsey Branch	0603000404
96.485	Lawrence	Gravel Dredging	Little Sugar Creek	0603000404
96.904	Giles	Gravel Dredging	Hulsey Branch	0603000404
97.061	Lawrence	Rip-Rap	Mockerson Creek	0603000404
97.087	Giles	Gravel Dredging	Shannon Creek	0603000404
97.112C	Giles	Gravel Dredging	Shannon Creek, Myrick Creek, Buchanan Creek	0603000404
97.203	Lawrence	Gravel Dredging	Fourmile Branch	0603000404
9810.042	Giles	Gravel Dredging	Warren Branch	0603000404
9810.158	Lawrence	Road Crossing	East Fork Sugar Creek	0603000404
99.173	Lawrence	Gravel Dredging, Stream Relocation, Debris Removal	West Fork Sugar Creek	0603000404
9908.0030	Lawrence	Minor Road Crossing	Shoal Creek	0603000404
9910.103	Giles	Bridge Scour Repair	Wray Creek	0603000404
9910.104	Giles	Bridge Scour Repair	Wray Branch	0603000404
9910.105	Giles	Bridge Scour Repair	Wray Branch	0603000404
9910.106	Giles	Bridge Scour Repair	Puncheon Branch	0603000404
9910.107	Giles	Bridge Scour Repair	Unnamed Trib to Puncheon Branch	0603000404
			Unnamed Trib	

9910.108	Giles	Bridge Scour Repair	to Puncheon Branch	0603000404
9910.109	Giles	Bridge Scour Repair	Unnamed Trib to Puncheon Branch	0603000404
9910.110	Giles	Bridge Scour Repair	Unnamed Trib to Hulsey Branch	0603000404
9910.111	Giles	Bridge Scour Repair	Hulsey Branch	0603000404
9910.112	Giles	Bridge Scour Repair	Hulsey Branch	0603000404
9910.113	Giles	Bridge Scour Repair	East Fork Hulsey Branch	0603000404
9910.114	Giles	Bridge Scour Repair	Hulsey Branch	0603000404
9910.115	Giles	Bridge Scour Repair	Unnamed Trib to West Fork Shoal Cr	0603000404
9910.153	Lawrence	Bank Stabilization	East Fork Sugar Creek	0603000404
9910.154	Giles	Bridge Scour Repair	East Fork Sugar Creek	0603000404

Table A4-9. Individual ARAP Permits Issued January 1994 Through June 2000 in the Tennessee Portion of the Lower Elk River Watershed.

APPENDIX V

CONSERVATION PRACTICE	UNITS	AMOUNT
Alley Cropping	Acres	0
Contour Buffer Strips	Acres	1
Crosswind Trap Strips	Acres	0
Field Borders	Feet	4,400
Filter Strips	Acres	20
Grassed Waterways	Acres	1
Riparian Forest Buffers	Acres	26
Streambank and Shoreline Protection	Feet	2,160
Windbreaks and Shelterbelts	Feet	0
Hedgerow Plantings	Feet	0
Herbaceous Wind Barriers	Feet	0
Total Conservation Buffers	Acres	51

Table A5-1a. Conservation Buffers Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Lower Elk River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period.*

PARAMETER	TOTAL
Erosion Reduction Applied (Acres)	3,917
Highly Erodible Land With Erosion Control Practices (Acres)	2,564
Estimated Annual Soil Saved By Erosion Control Measures (Tons/Year)	34,116
Total Estimated Soil Saved (Tons/Year)	34,116

Table A5-1b. Erosion Control Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Lower Elk River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

PARAMETER	TOTAL
Acres of AFO Nutrient Management Applied	380
Acres of Non-AFO Nutrient Management Applied	4,341
Total Acres Applied	4,721

Table A5-1c. Nutrient Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Lower Elk River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

PARAMETER	TOTAL
Acres of Pest Management Systems Applied	3,816

Table A5-1d. Pest Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of Lower Elk River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

CONSERVATION PRACTICE	ACRES
Acres Prepared for Revegetation of Forestland	26
Acres Improved Through Forest Stand Improvement	352
Acres of Tree and Shrub Establishment	114

Table A5-1e. Tree and Shrub Conservation Practices in Partnership with NRCS in the Tennessee Portion of Lower Elk River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

CONSERVATION PRACTICE	ACRES
Acres of Wetlands Created or Restored	50
Acres of Wetlands Enhanced	0
Total Acres Created, Restored, or Enhanced	50

Table A5-1f. Wetland Conservation Practices in Partnership with NRCS in the Tennessee Portion of Lower Elk River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

CONSERVATION PRACTICE	ACRES
Acres of Upland Habitat Management	319
Acres of Wetland Habitat Management	0
Total Acres Wildlife Habitat Management	319

Table A5-1g. Wildlife Habitat Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of Lower Elk River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
060300040101	327	Conservation Cover	9	Crop
	382	Fence	6	Hay (2) Pasture (4)
	512	Pasture and Hay Planting	4	Hay (2) Pasture (2)
	528	Prescribed Grazing	1	Pasture
	580	Streambank and Shoreline Protection	2	Headquarters (1) Pasture (1)
	590	Nutrient Management	4	Hay (2) Pasture (2)
	595	Pest Management	6	Crop (2) Hay (2) Pasture (2)
	645	Upland Wildlife Habitat Management	9	Crop (5) Hay (2) Pasture (2)
060300040102	329	Residue and Tillage Management No-Till/Strip Till/Direct Seed	2	Crop
	340	Cover Crop	2	Crop
	382	Fence	3	Pasture
	393	Filter Strip	1	Pasture
	511	Forage Harvest Management	3	Hay
	528	Prescribed Grazing	5	Pasture
	590	Nutrient Management	16	Crop (2) Hay (2) Pasture (9) Wildlife (3)
	595	Pest Management	10	Headquarters (1) Pasture (9)
	645	Upland Wildlife Habitat Management	4	Forest
	666	Forest Stand Improvement	5	Forest
060300040104	382	Fence	6	Crop (1) Forest (1) Pasture (4)
	412	Grassed Waterway	1	Pasture
	511	Forage Harvest Management	1	Crop
	512	Pasture and Hay Planting	1	Crop
	528	Prescribed Grazing	8	Pasture
	590	Nutrient Management	14	Crop (1) Pasture (13)

Table A5-2a.

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
060300040104	595	Pest Management	7	Pasture
	645	Upland Wildlife Habitat Management	6	Crop (2) Forest (4)
	666	Forest Stand Improvement	4	Forest
060300040201	328	Conservation Crop Rotation	14	Crop
	329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	5	Crop
	342	Critical Area Planting	1	Pasture
	382	Fence	10	Forest (2) Pasture (8)
	472	Use Exclusion	2	Wildlife
	511	Forage Harvest Management	8	Hay (7) Pasture (1)
	512	Pasture and Hay Planting	1	Crop
	516	Pipeline	3	Pasture
	528	Prescribed Grazing	33	Pasture
	533	Pumping Plant	1	Pasture
	561	Heavy Use Area Protection	2	Pasture
	574	Spring Development	1	Pasture
	578	Stream Crossing	1	Pasture
	580	Streambank and Shoreline Protection	1	Pasture
	590	Nutrient Management	77	Crop (23) Grazed Forest (1) Hay (7) Pasture (46)
	595	Pest Management	102	Crop (23) Grazed Forest (1) Hay (7) Headquarters (32) Pasture (39)
	614	Watering Facility	3	Headquarters (1) Pasture (2)
	645	Upland Wildlife Habitat Management	37	Forest (33) Wildlife (4)
	666	Forest Stand Improvement	35	Forest (33) Wildlife (2)

Table A5-2b.

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
060300040202	328	Conservation Crop Rotation	3	Crop
	382	Fence	6	Pasture
	511	Forage Harvest Management	7	Pasture
	512	Pasture and Hay Planting	7	Pasture
	516	Pipeline	1	Pasture
	528	Prescribed Grazing	10	Pasture
	590	Nutrient Management	4	Crop (1) Pasture (3)
	595	Pest Management	26	Crop (3) Hay (2) Headquarters (1) Pasture (20)
060300040203	327	Conservation Cover	16	Wildlife
	382	Fence	8	Pasture
	412	Grassed Waterway	1	Pasture
	511	Forage Harvest Management	12	Wildlife
	512	Pasture and Hay Planting	1	Pasture
	516	Pipeline	2	Pasture
	528	Prescribed Grazing	21	Pasture
	561	Heavy Use Area Protection	3	Pasture
	590	Nutrient Management	12	Pasture (11) Wildlife (1)
	595	Pest Management	7	Headquarters (1) Pasture (6)
	614	Watering Facility	3	Pasture
	645	Upland Wildlife Habitat Management	1	Wildlife
	647	Early Successional Habitat Development/Manage	14	Wildlife
060300040204	100	Comprehensive Nutrient Management Plan	1	Pasture
	313	Waste Storage Facility	1	Pasture
	327	Conservation Cover	1	Crop
	328	Conservation Crop Rotation	21	Crop
	344	Residue Management, Seasonal	2	Crop
	382	Fence	3	Pasture
	386	Field Border	1	Wildlife
	391	Riparian Forest Buffer	2	Forest (1) Water (1)
	484	Mulching	2	Crop
	511	Forage Harvest Management	19	Hay (8) Pasture (11)

Table A5-2c.

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
060300040204	512	Pasture and Hay Planting	11	Pasture
	516	Pipeline	6	Pasture
	528	Prescribed Grazing	49	Pasture
	561	Heavy Use Area Protection	5	Pasture
	580	Streambank and Shoreline Protection	2	Water
	590	Nutrient Management	26	Crop (4) Hay (7) Pasture (14) Wildlife (1)
	595	Pest Management	103	Crop (21) Hay (7) Headquarters (2) Pasture (72) Wildlife (1)
	614	Watering Facility	5	Pasture
	645	Upland Wildlife Habitat Management	9	Forest
	666	Forest Stand Improvement	2	Forest
060300040205	100	Comprehensive Nutrient Management Plan	1	Headquarters
	313	Waste Storage Facility	1	Headquarters
	327	Conservation Cover	2	Crop
	328	Conservation Crop Rotation	5	Crop
	340	Cover Crop	2	Crop
	344	Residue Management, Seasonal	2	Crop
	391	Riparian Forest Buffer	3	Crop (2) Pasture (1)
	472	Use Exclusion	3	Wildlife
	512	Pasture and Hay Planting	2	Pasture
	528	Prescribed Grazing	20	Pasture
	561	Heavy Use Area Protection	2	Pasture
	580	Streambank and Shoreline Protection	1	Pasture
	590	Nutrient Management	9	Crop (5) Pasture (2) Wildlife (2)
	595	Pest Management	13	Crop (5) Hay (4) Headquarters (1) Pasture (3)
	645	Upland Wildlife Habitat Management	28	Crop (1) Forest (18) Pasture (2) Wildlife (7)
	666	Forest Stand Improvement	20	Forest

Table A5-2d.

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
060300040206	382	Fence	4	Pasture (3) Wildlife (1)
	386	Field Border	1	Pasture
	393	Filter Strip	1	Pasture
	511	Forage Harvest Management	2	Crop
	516	Pipeline	5	Pasture
	533	Pumping Plant	1	Pasture
	561	Heavy Use Area Protection	1	Pasture
	580	Streambank and Shoreline Protection	1	Pasture
	590	Nutrient Management	27	Grazed Forest (1) Pasture (22) Wildlife (4)
	595	Pest Management	2	Pasture (1) Wildlife (1)
	614	Watering Facility	6	Pasture
	645	Upland Wildlife Habitat Management	10	Crop (2) Forest (7) Wildlife (1)
	657	Wetland Restoration	1	Wildlife
	666	Forest Stand Improvement	2	Forest
060300040207	100	Comprehensive Nutrient Management Plan	1	Pasture
	313	Waste Storage Facility	3	Pasture
	327	Conservation Cover	8	Crop
	328	Conservation Crop Rotation	31	Crop
	329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	19	Crop
	340	Cover Crop	18	Crop
	342	Critical Area Planting	1	Pasture
	382	Fence	2	Forest (1) Pasture (1)
	393	Filter Strip	4	Crop (3) Pasture (1)
	472	Use Exclusion	1	Wildlife
	511	Forage Harvest Management	2	Crop
	516	Pipeline	1	Pasture
	528	Prescribed Grazing	15	Pasture
	580	Streambank and Shoreline Protection	1	Watershed Protection
	590	Nutrient Management	43	Crop (27) Pasture (16)

Table A5-2e.

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
	595	Pest Management	44	Crop (25) Pasture (19)
	614	Watering Facility	2	Pasture
	645	Upland Wildlife Habitat Management	17	Crop (13) Forest (4)
	666	Forest Stand Improvement	1	Forest
060300040208	100	Comprehensive Nutrient Management Plan	1	Pasture
	328	Conservation Crop Rotation	9	Crop
	329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	1	Crop
	382	Fence	5	Pasture
	391	Riparian Forest Buffer	1	Pasture
	472	Use Exclusion	1	Headquarters
	511	Forage Harvest Management	4	Crop (3) Hay (1)
	512	Pasture and Hay Planting	3	Crop
	528	Prescribed Grazing	13	Pasture
	590	Nutrient Management	12	Crop (8) Pasture (3) Wildlife (1)
	595	Pest Management	32	Crop (10) Hay (3) Headquarters (1) Pasture (18)
	645	Upland Wildlife Habitat Management	3	Crop
060300040301	328	Conservation Crop Rotation	9	Crop
	329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	3	Crop
	344	Residue Management, Seasonal	7	Crop
	382	Fence	4	Pasture
	386	Field Border	7	Crop
	511	Forage Harvest Management	2	Hay
	512	Pasture and Hay Planting	7	Crop
	590	Nutrient Management	7	Crop (4) Pasture (3)
	595	Pest Management	19	Crop (11) Hay (1) Headquarters (1) Pasture (6)

Table A5-2f.

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
060300040301	612	Tree/Shrub Establishment	3	Crop (2) Pasture (1)
	645	Upland Wildlife Habitat Management	14	Crop (12) Forest (2)
	666	Forest Stand Improvement	5	Forest
060300040302	327	Conservation Cover	13	Crop
	328	Conservation Crop Rotation	7	Crop
	329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	7	Crop
	344	Residue Management, Seasonal	9	Crop
	382	Fence	17	Crop (6) Pasture (11)
	512	Pasture and Hay Planting	5	Hay (1) Pasture (4)
	516	Pipeline	1	Pasture
	528	Prescribed Grazing	10	Pasture
	561	Heavy Use Area Protection	7	Pasture
	578	Stream Crossing	1	Pasture
	590	Nutrient Management	39	Crop (16) Pasture (23)
	595	Pest Management	51	Crop (20) Pasture (31)
	612	Tree/Shrub Establishment	3	Crop
	614	Watering Facility	3	Pasture
	645	Upland Wildlife Habitat Management	13	Crop (9) Pasture (4)
060300040303	382	Fence	6	Forest (1) Pasture (5)
	590	Nutrient Management	5	Forest (1) Grazed Forest (1) Pasture (3)
	595	Pest Management	21	Forest (1) Grazed Forest (1) Headquarters (1) Pasture (18)
	645	Upland Wildlife Habitat Management	2	Forest
	666	Forest Stand Improvement	3	Forest
060300040401	328	Conservation Crop Rotation	4	Crop
	340	Cover Crop	2	Crop
	386	Field Border	2	Crop (1) Wildlife (1)

Table A5-2g.

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
060300040401	393	Filter Strip	5	Crop
	410	Grade Stabilization Structure	1	Crop
	511	Forage Harvest Management	13	Hay (8) Pasture (1) Wildlife (4)
	512	Pasture and Hay Planting	1	Pasture
	528	Prescribed Grazing	1	Pasture
	590	Nutrient Management	3	Hay
	595	Pest Management	20	Crop (4) Hay (3) Pasture (13)
	645	Upland Wildlife Habitat Management	22	Crop (2) Forest (7) Wildlife (13)
	666	Forest Stand Improvement	10	Forest (7) Wildlife (3)
060300040402	327	Conservation Cover	1	Crop
	329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	4	Crop
	378	Pond	1	Pasture
	382	Fence	2	Pasture (1) Wildlife (1)
	393	Filter Strip	1	Wildlife
	511	Forage Harvest Management	2	Hay
	580	Streambank and Shoreline Protection	1	Pasture
	590	Nutrient Management	5	Pasture
	595	Pest Management	10	Pasture
	612	Tree/Shrub Establishment	1	Crop
	614	Watering Facility	1	Pasture
	645	Upland Wildlife Habitat Management	11	Crop (1) Forest (9) Wildlife (1)
	647	Early Successional Habitat Development/Management	2	Pasture (1) Wildlife (1)
060300040403	327	Conservation Cover	8	Crop
	328	Conservation Crop Rotation	1	Crop
	329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	1	Crop
	528	Prescribed Grazing	1	Pasture

Table A5-2h.

HUC-12	NRCS PRACTICE CODE	NRCS PRACTICE NAME	NUMBER OF PRACTICES INSTALLED	LAND USE DISPLAY
060300040403	561	Heavy Use Area Protection	1	Pasture
	590	Nutrient Management	2	Crop (1) Pasture (1)
	595	Pest Management	2	Crop (1) Pasture (1)
	614	Watering Facility	1	Pasture

Table A5-2i.

Tables A5-2a-i. Best Management Practices Installed in Partnership with NRCS (2006-2007) in the Tennessee Portion of the Lower Elk River Watershed*. Information was provided as part of Conservation Technical Assistance Grant 060701T47.*

NRCS CODE	PRACTICE	NUMBER OF BMPs
312	Waste Management System	3
340	Winter Cover	12
342	Critical Area Treatment	6
378	Pond	4
378a	Pond for Rotational Grazing System	1
382	Fencing	2
512	Pasture and Hayland Planting	90
512a	Cropland Conversion	8
512b	Pasture or Hayland Renovation	2
561	Heavy Use Area	1
580	Stream Stabilization	1

Table A5-3. Best Management Practices Installed by Tennessee Department of Agriculture and Partners in the Group 2 Portion of the Tennessee Portion of the Lower Elk River Watershed.