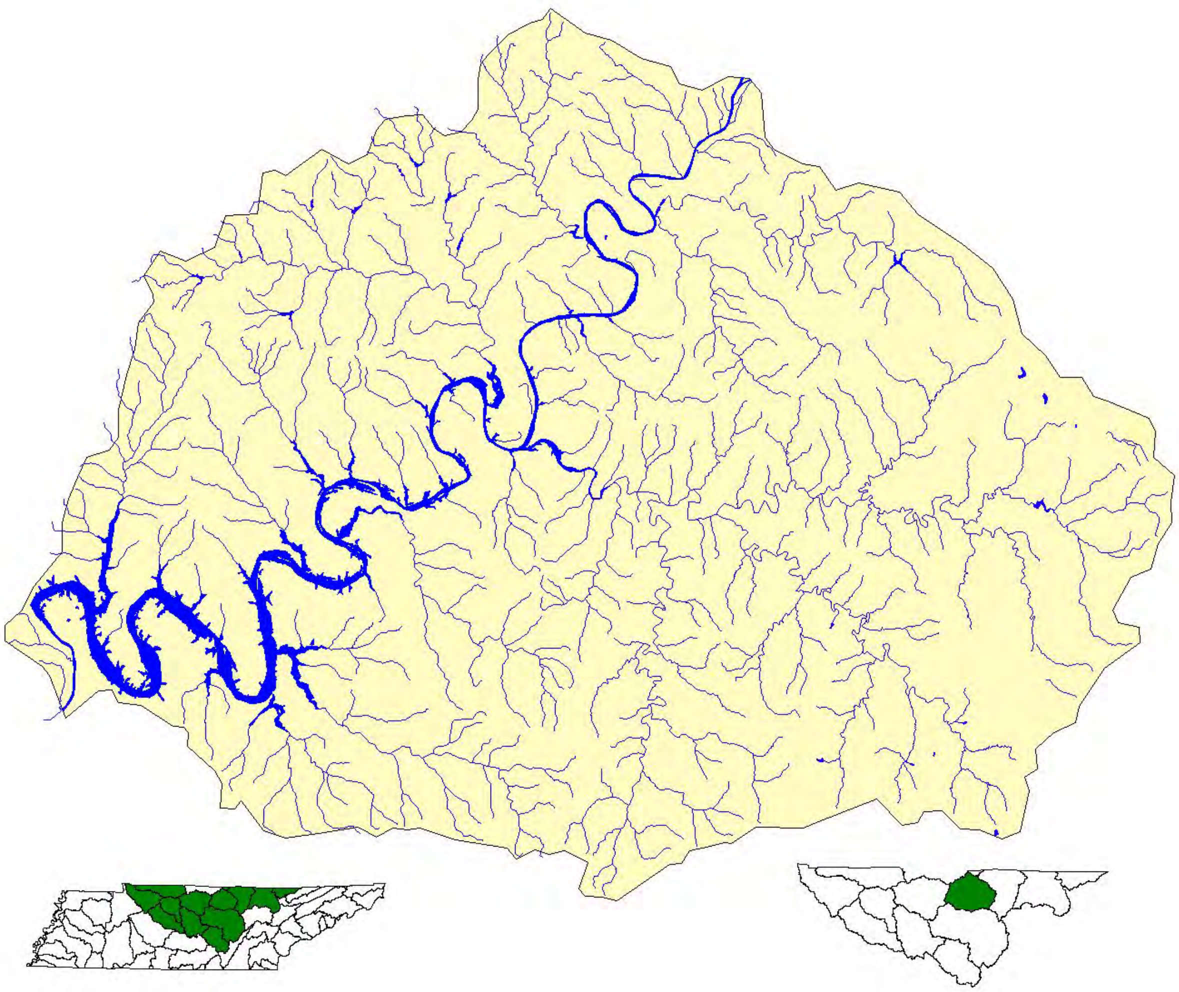
CORDELL HULL LAKE WATERSHED (05130106) OF THE CUMBERLAND RIVER BASIN

WATERSHED WATER QUALITY MANAGEMENT PLAN



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

Presented to the people of the Cordell Hull Lake Watershed by the Division of Water Pollution Control October 16, 2007.

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CORDELL HULL LAKE WATERSHED
WATER QUALITY MANAGEMENT PLAN

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GLOSSARY

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

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

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

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

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

AFO. Animal Feeding Operation.

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

ARAP. Aquatic Resource Alteration Permit.

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

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

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

Benthic. Bottom dwelling.

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

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

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

CAFO. Concentrated Animal Feeding Operation.

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

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

DO. Dissolved oxygen.

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

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

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

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

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

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

MRLC. Multi-Resolution Land Classification.

MS4. Municipal Separate Storm Sewer System.

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

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

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

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

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

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

SBR. Sequential Batch Reactor.

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

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

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

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

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

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

TMSP. Tennessee Multi-Sector Permit.

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

WAS. Waste Activated Sludge.

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

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

WET. Whole Effluent Toxicity.

WWTP. Waste Water Treatment Plant

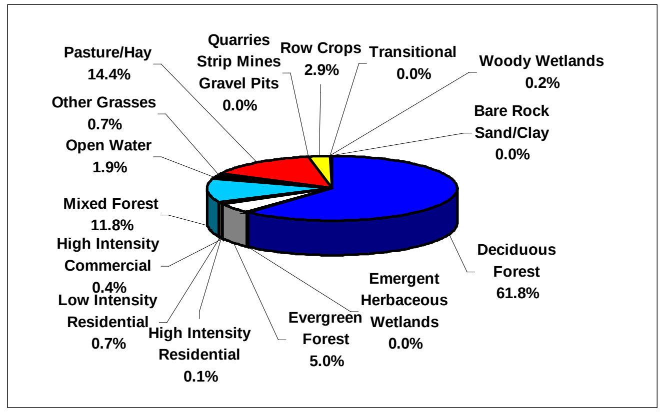
Summary – Cordell Hull Lake Watershed (05130106)

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 Cordell Hull Lake 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.

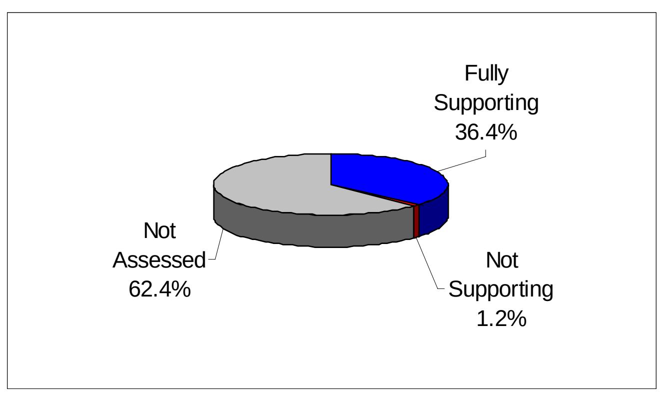
A detailed description of the watershed can be found in Chapter 2. The Cordell Hull Lake Watershed is approximately 790 square miles and includes parts of six Tennessee counties. A part of the Cumberland River drainage basin, the watershed has 893.8 stream miles and 13,901 lake acres.



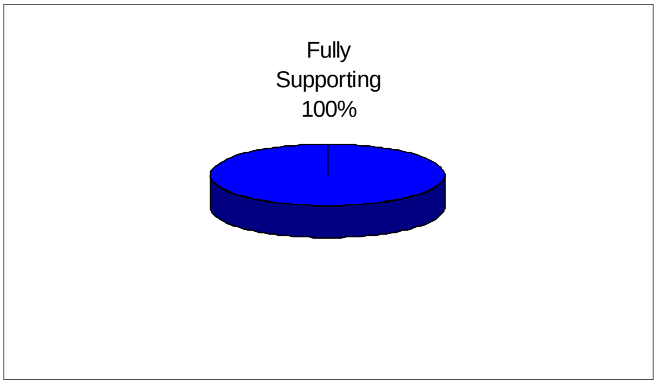
Land Use Distribution in the Cordell Hull Lake Watershed.

One designated state natural areas, three state scenic river segments, one state park, one state forest, and two wildlife management areas are located in the watershed. Forty-three rare plant and animal species have been documented in the watershed, including six rare fish species, one rare mussel species, two rare snail species, three rare amphibian species, and one rare crustacean species. Portions of four streams in the Cordell Hull Lake 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, 147 sampling events occurred in the Cordell Hull Lake Watershed in 2000-2005. These were conducted at ambient, ecoregion or watershed monitoring sites. Monitoring results support the conclusion that 78.9% of stream miles and 100% of lake acres assessed fully support one or more designated uses.



Water Quality Assessment of Streams and Rivers in the Cordell Hull Lake Watershed. Assessment data are based on the 2004 Water Quality Assessment of 893.8 stream miles in the watershed.



Water Quality Assessment of Lakes in the Cordell Hull Lake Watershed. Assessment data are based on the 2004 Water Quality Assessment of 13,901 lake acres in the watershed.

Also in Chapter 3, a series of maps illustrate overall use support in the watershed, as well as use support for the individual uses of Fish and Aquatic Life Support, Recreation, Irrigation, and Livestock Watering and Wildlife. Another series of maps illustrate streams that are listed for impairment by specific causes (organic enrichment).

Point and Nonpoint Sources are addressed in Chapter 4. Chapter 4 is organized by HUC-12 subwatersheds. Maps illustrating the locations of STORET monitoring sites and stream gauging stations are also presented in each subwatershed.

HUC-10	HUC-12
0513010601	051301060101 (Cumberland River)
	051301060102 (Cumberland River)
	051301060103 (Mill Creek)
	051301060104 (Dry Fork Creek)
	051301060105 (Brimstone Creek)
0513010602	051301060201 (Roaring River)
	051301060202 (Roaring River)
	051301060203 (Flat Creek)
	051301060204 (Spring Creek)
	051301060205 (Blackburn Fork)

HUC-10	HUC-12
0513010603	051301060301 (Cumberland River)
	051301060302 (Jennings Creek)
	051301060303 (Wartrace Creek)
	051301060304 (Cumberland River)
	051301060305 (Flynn Lick Creek)
	051301060306 (Martin Creek)
	051301060307 (Cumberland River)
	051301060308 (Defeated Creek)
	051301060309 (Cumberland River)

The Cordell Hull Lake Watershed is Composed of nineteen USGS-Delineated Subwatersheds (10-Digit Subwatersheds).

Point source contributions to the Cordell Hull Lake Watershed consist of eight individual NPDES-permitted facilities, one of which discharges into streams that have been listed on the 2004 303(d) list. Other point source permits in the watershed (as of October 16, 2007) are Tennessee Multi-Sector Permits (22), Aquatic Resource Alteration Permits (10), Mining Permits (6), Concentrated Animal Feeding Operation Permits (3), and Ready Mix Concrete Plant Permits (2). Agricultural operations include cattle, hog, and sheep farming. Maps illustrating the locations of permit sites and tables summarizing livestock practices are presented in each subwatershed.

Chapter 5 is entitled *Water Quality Partnerships in the Cordell Hull Lake Watershed* and highlights partnerships between agencies and between agencies and landowners that are essential to success. Programs of federal agencies (Natural Resources Conservation Service, U.S. Fish and Wildlife Service, U.S. Geological Survey and U.S. Army Corps of Engineers), and state agencies (TDEC/State Revolving Fund, TDEC Division of Water Supply, and Tennessee Department of Agriculture) are summarized. Local initiatives of organizations active in the watershed (Cumberland River Compact, The Nature Conservancy, and Hull-York Lakeland RC&D Council) are also described.

Point and Nonpoint source approaches to water quality problems in the Cordell Hull Lake Watershed are addressed in Chapter 6. Chapter 6 also includes comments received during public meetings, links to EPA-approved TMDLs in the watershed, and an assessment of needs for the watershed.

The full Cordell Hull Lake 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. <u>Components of the Watershed Approach.</u> 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.

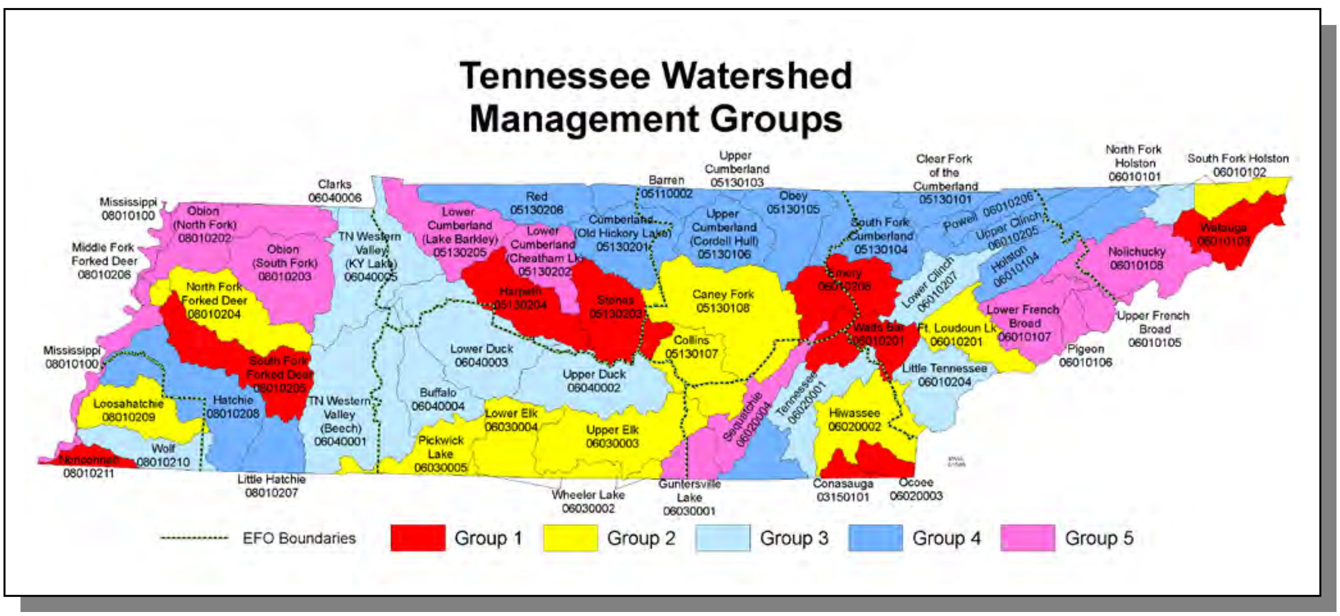


Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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.

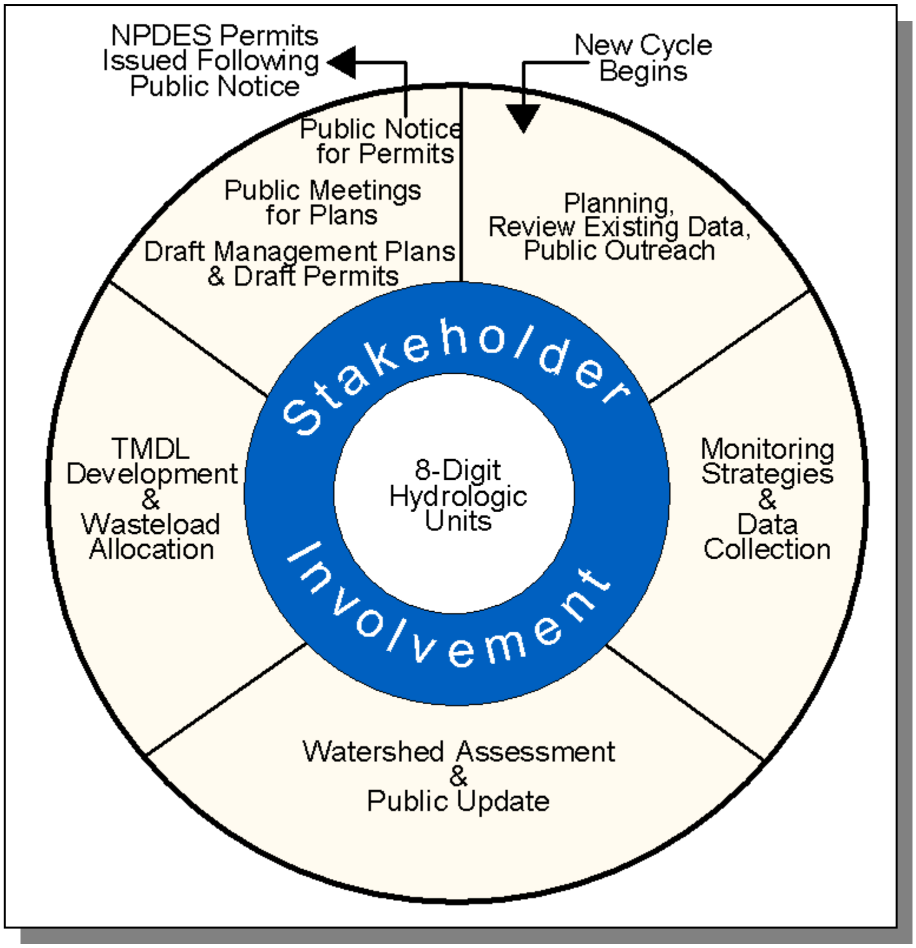


Figure 1-2. The Watershed Approach Cycle.

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 CORDELL HULL LAKE WATERSHED

2.1. BACKGROUND. The Cordell Hull Lake Watershed is named in honor of Cordell Hull, a Tennessee Congressman and Secretary of State under President Woodrow Wilson. The Lake was created when the construction of the dam was completed and closed in 1973. Cordell Hull Lake is maintained by the U.S. Army Corps of Engineers.

This Chapter describes the location and characteristics of the Cordell Hull Lake Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Cordell Hull Lake Watershed is located in Middle Tennessee and includes parts of Clay, Jackson, Macon, Overton, Putnam, and Smith Counties.

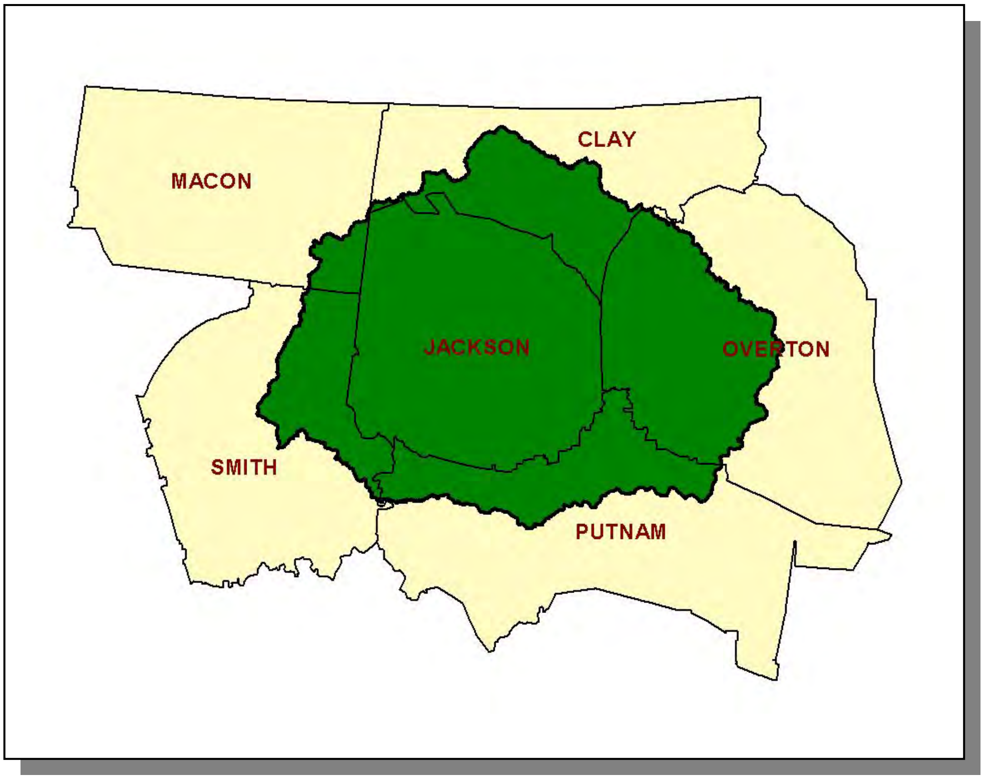


Figure 2-1. General Location of the Cordell Hull Lake Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Jackson	41.2
Overton	23.0
Putnam	13.0
Clay	11.7
Smith	9.3
Macon	1.8

Table 2-1. The Cordell Hull Lake Watershed Includes Parts of Six Middle and East Tennessee Counties.

2.2.B. Population Density Centers. Twenty highways serve the major communities in the Cordell Hull Lake Watershed.

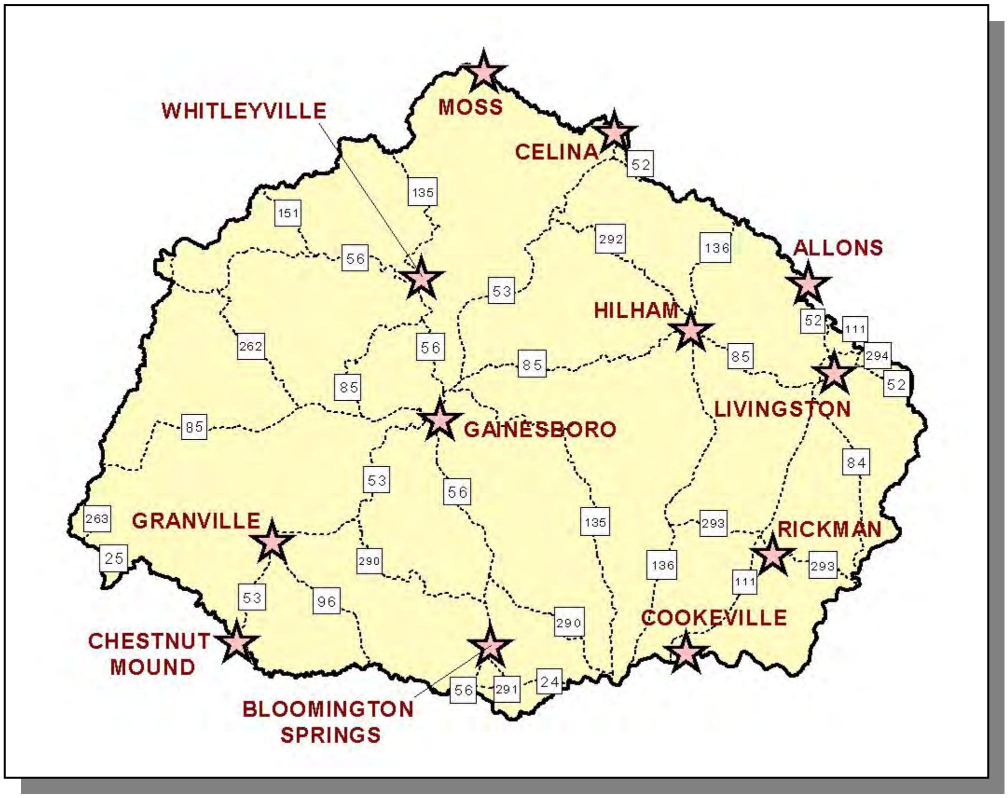


Figure 2-2. Municipalities and Roads in the Cordell Hull Lake Watershed.

MUNICIPALITY	POPULATION	COUNTY
Cookeville*	25,065	Putnam
Livingston*	3,498	Overton
Celina*	1,379	Clay
Gainesboro*	879	Jackson

Table 2-2. Municipalities in the Cordell Hull Lake Watershed. *Population based on 2000 census (Tennessee Blue Book) or http://www.hometownlocator.com. Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Cordell Hull Lake Watershed, designated 05130106 by the USGS, is approximately 790 square miles and drains to the Cumberland River.

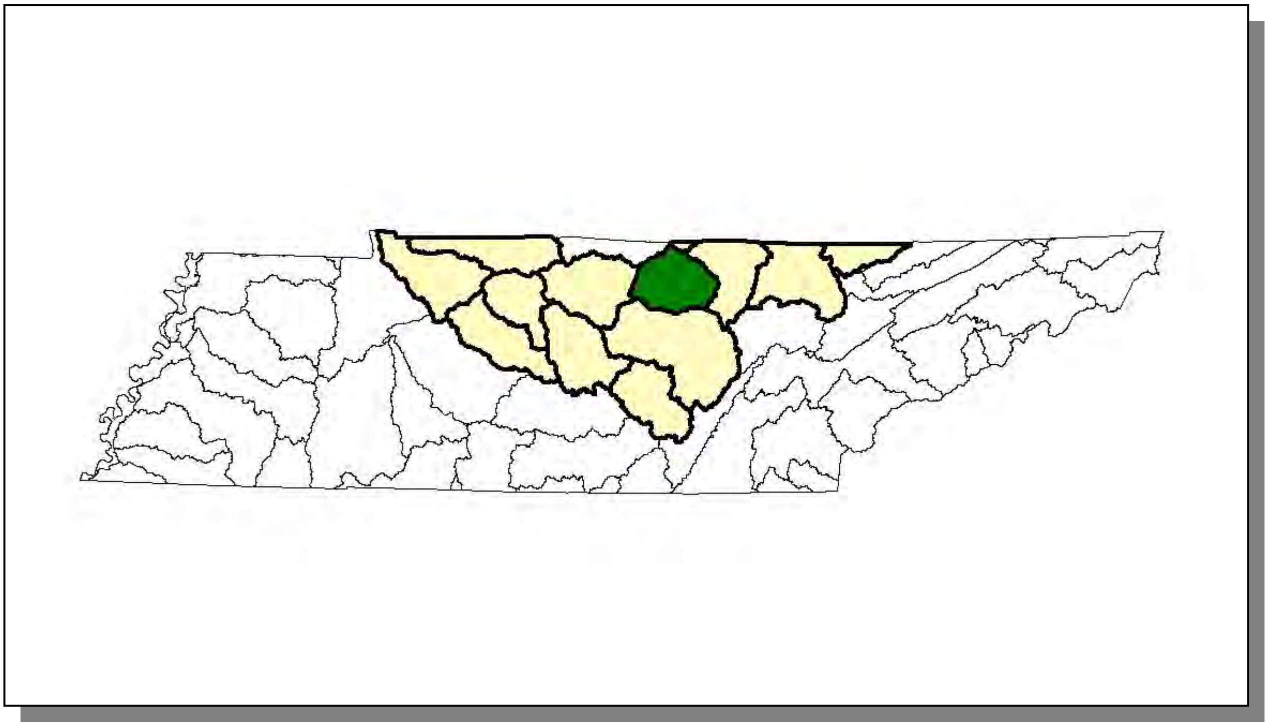


Figure 2-3. The Cordell Hull Lake Watershed is Part of the Cumberland River Basin.

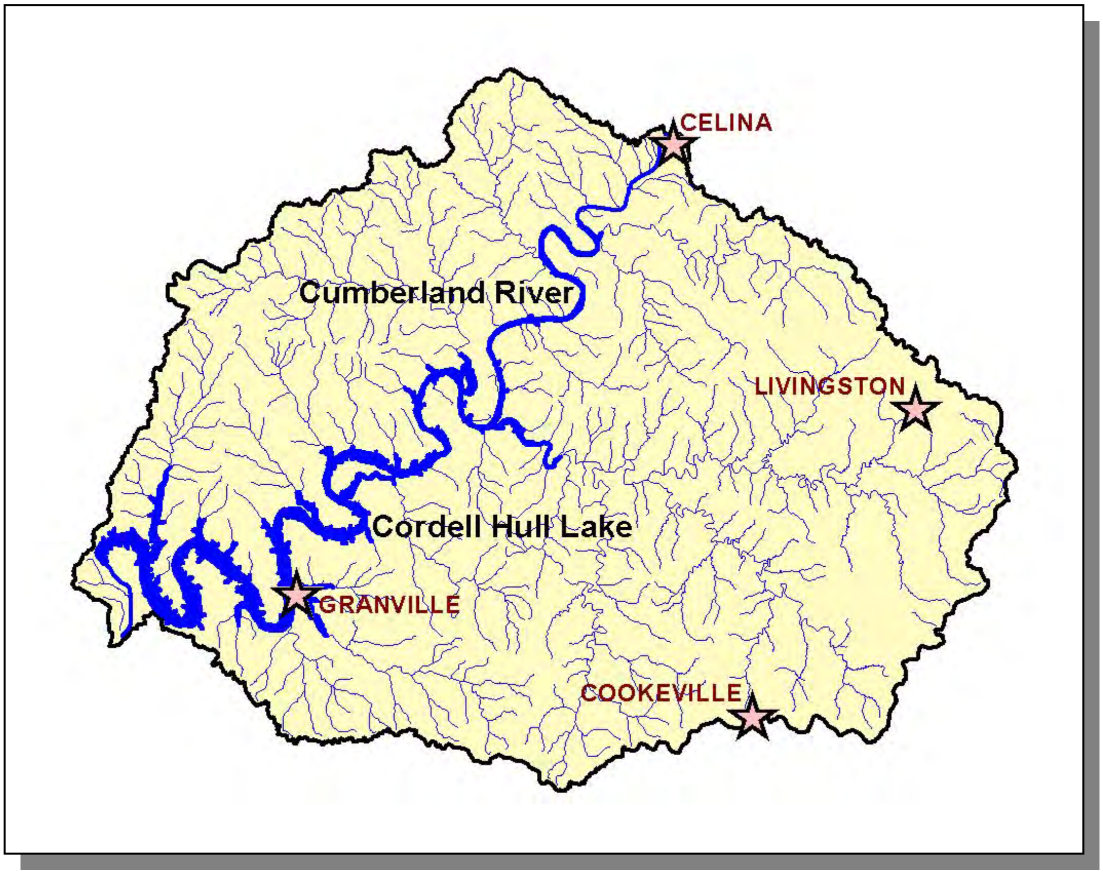


Figure 2-4. Hydrology in the Cordell Hull Lake Watershed. *There are 893.8 stream miles and 13,901 lake acres recorded in River Reach File 3 in the Cordell Hull Lake Watershed. Location of the Cumberland River including Cordell Hull Lake, and the cities of Celina, Cookeville, Granville, and Livingston are shown for reference.*

2.3.B. Dams. There are 16 dams inventoried by TDEC Division of Water Supply in the Cordell Hull Lake Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

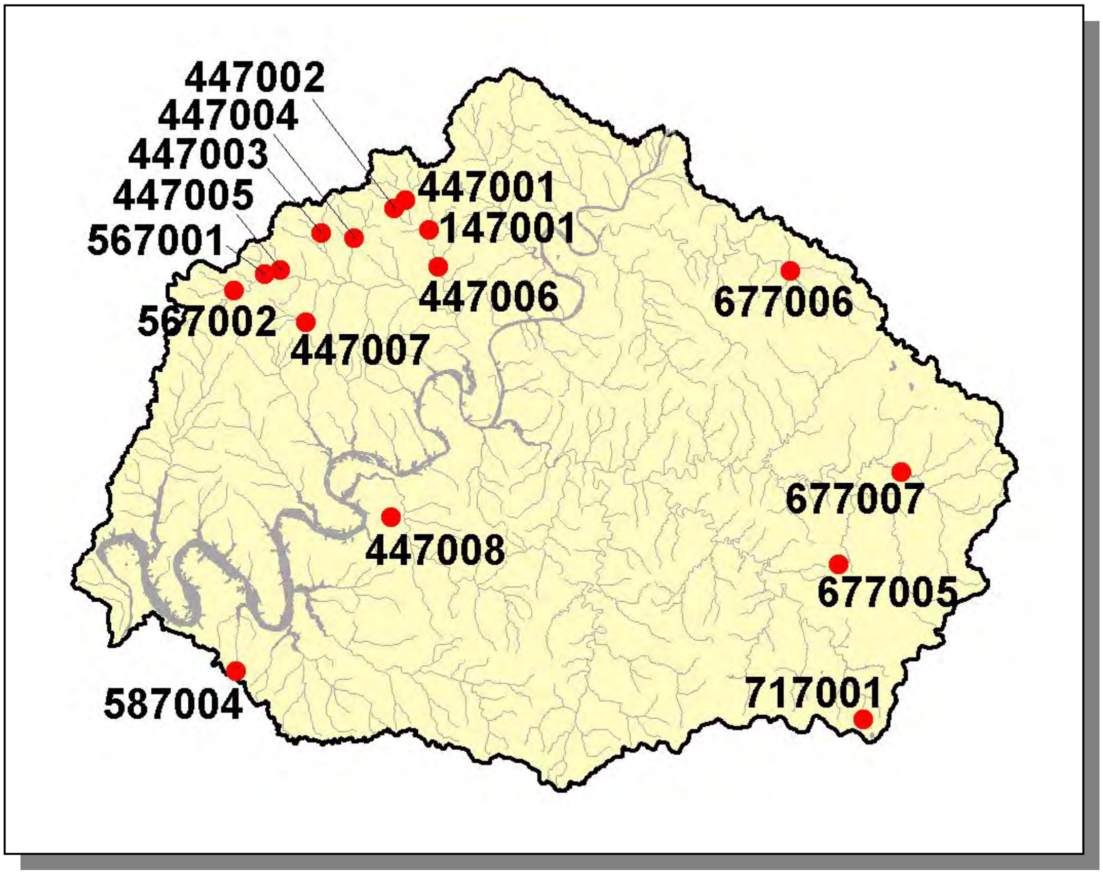


Figure 2-5. Location of Inventoried Dams in the Cordell Hull Lake Watershed. *More information, including identification of inventoried dams labeled, is provided in Appendix II and at http://gwidc.memphis.edu/website/dams/viewer.htm.*

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.

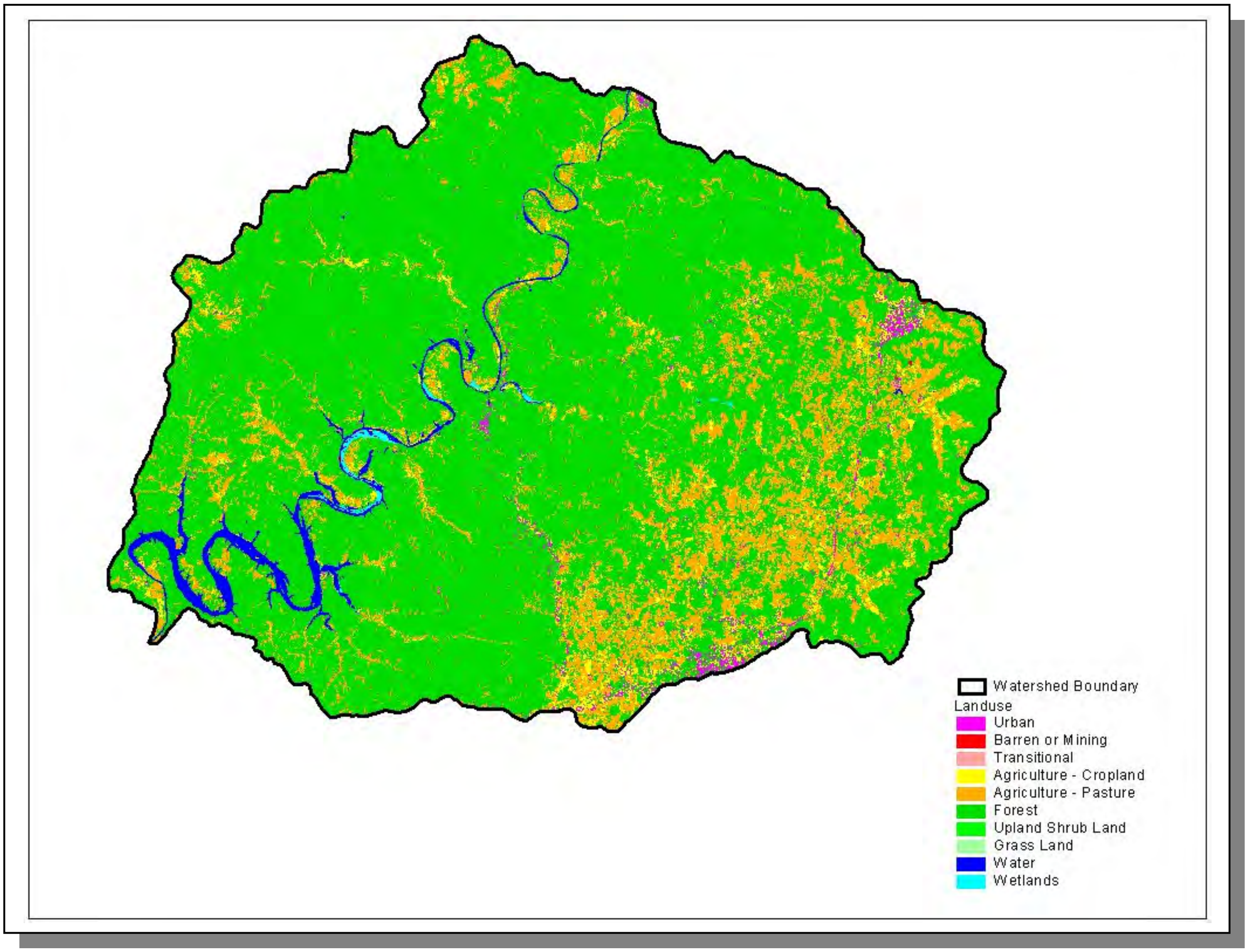


Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

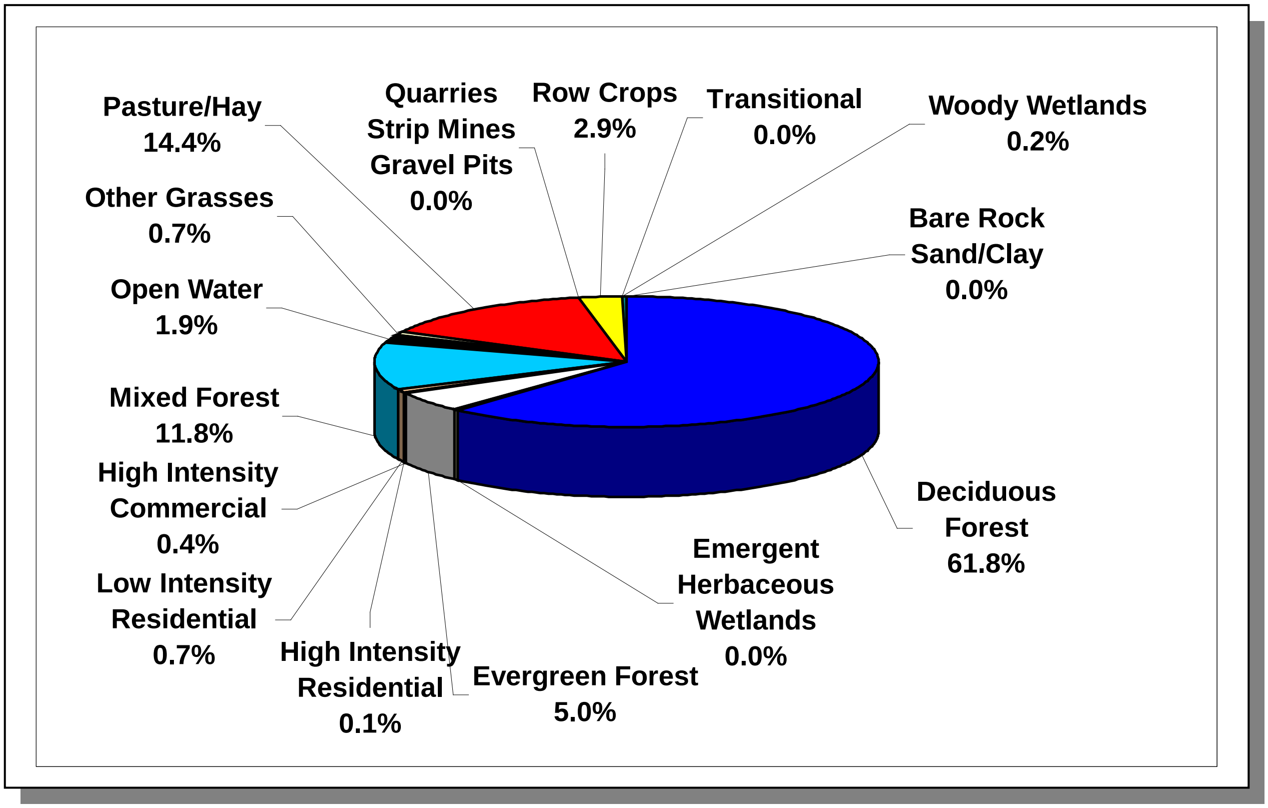


Figure 2-7. Land Use Distribution in the Cordell Hull Lake Watershed. *More information is provided in Appendix II.*

Sinkholes, springs, disappearing streams and caves characterize karst topography. The term “karst” describes a distinctive landform that indicates dissolution of underlying soluble rocks by surface water or ground water. Although commonly associated with limestone and dolomite (carbonate rocks), other highly soluble rocks such as gypsum and rock salt can be sculpted into karst terrain. In karst areas, the ground water flows through solution-enlarged channels, bedding planes and microfractures within the rock. The characteristic landforms of karst regions are: closed depressions of various size and arrangement; disrupted surface drainage; and caves and underground drainage systems. The term “karst” is named after a famous region in the former country of Yugoslavia.

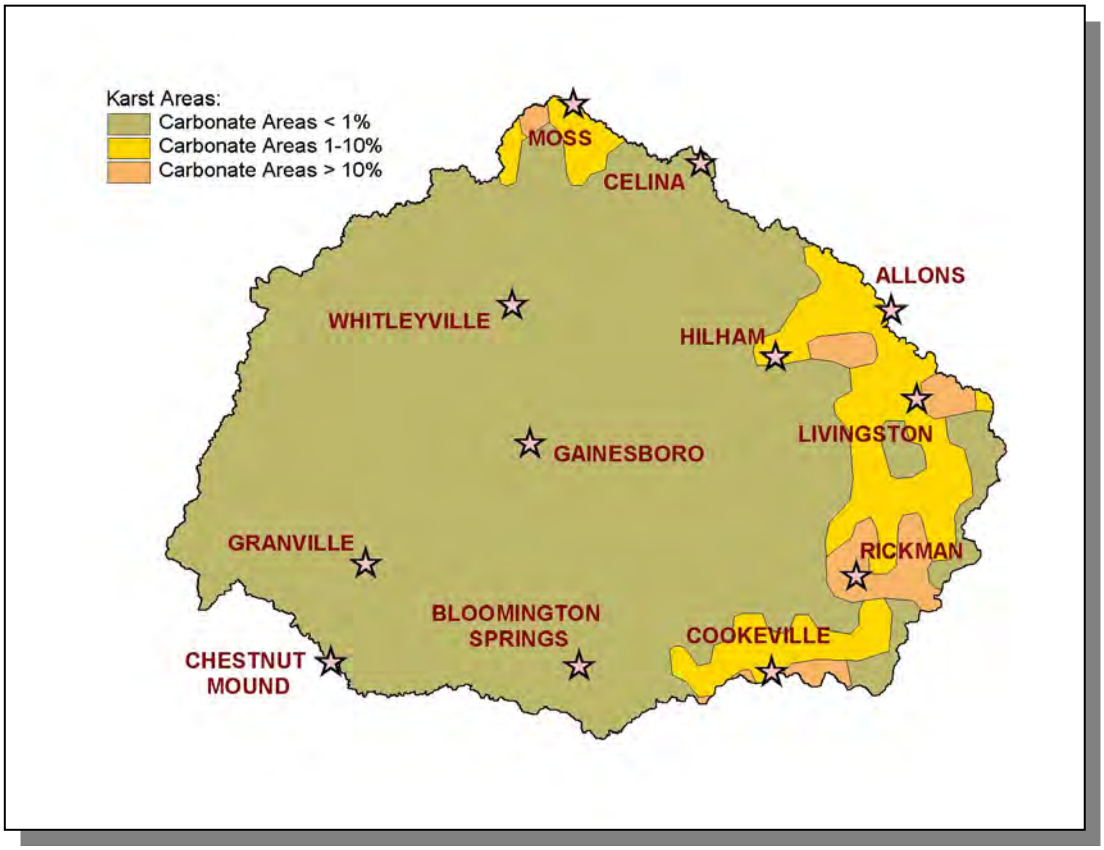


Figure 2-8. Illustration of Karst Areas in Cordell Hull Lake Watershed. *Locations of communities in the watershed are shown for reference.*

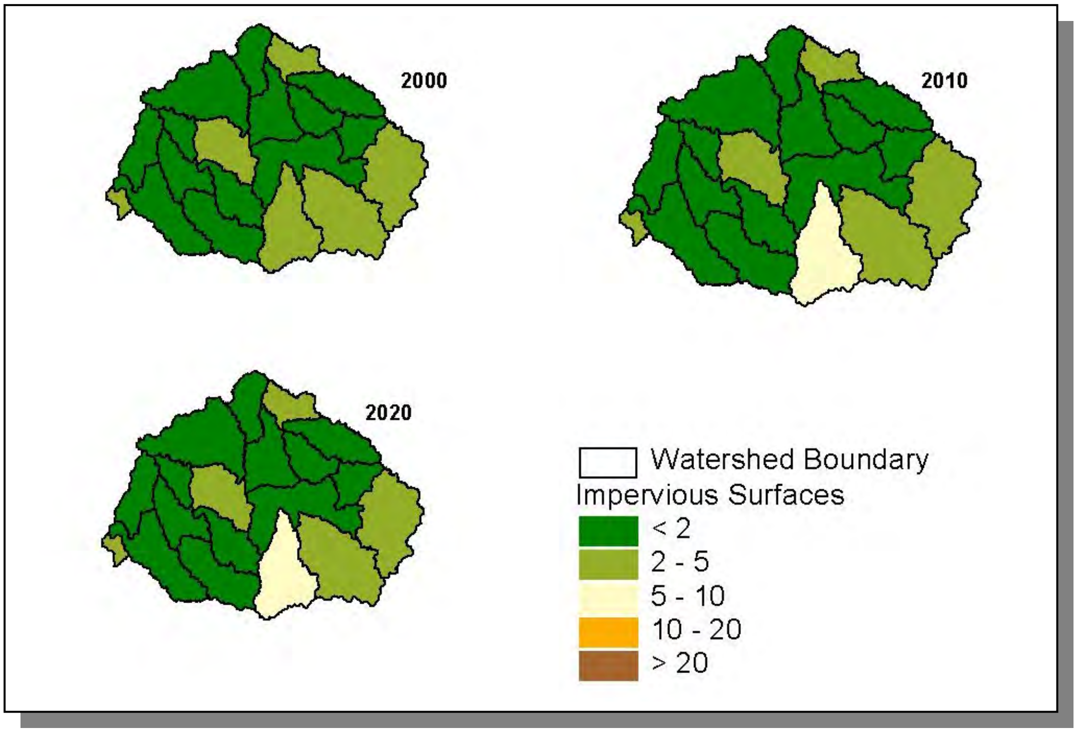


Figure 2-9. Illustration of Total Impervious Area in the Cordell Hull Lake Watershed. *All HUC-12 subwatersheds are shown. Current and projected total impervious cover (percent of total area) is provided by EPA Region 4. More information can be found at: http://www.epa.gov/ATHENS/research/impervious/*

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

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Cordell Hull Lake Watershed lies within 2 Level III ecoregions (Southwestern Appalachians and Interior Plateau) and contains 3 Level IV subecoregions:

- The **Plateau Escarpment (68c)** is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvania-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

- The **Eastern Highland Rim (71g)** has level terrain, 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 hardwood forest has been inundated by several large impoundments. Barrens and former prairie areas are now mostly oak thickets or pasture and cropland.

- The **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.

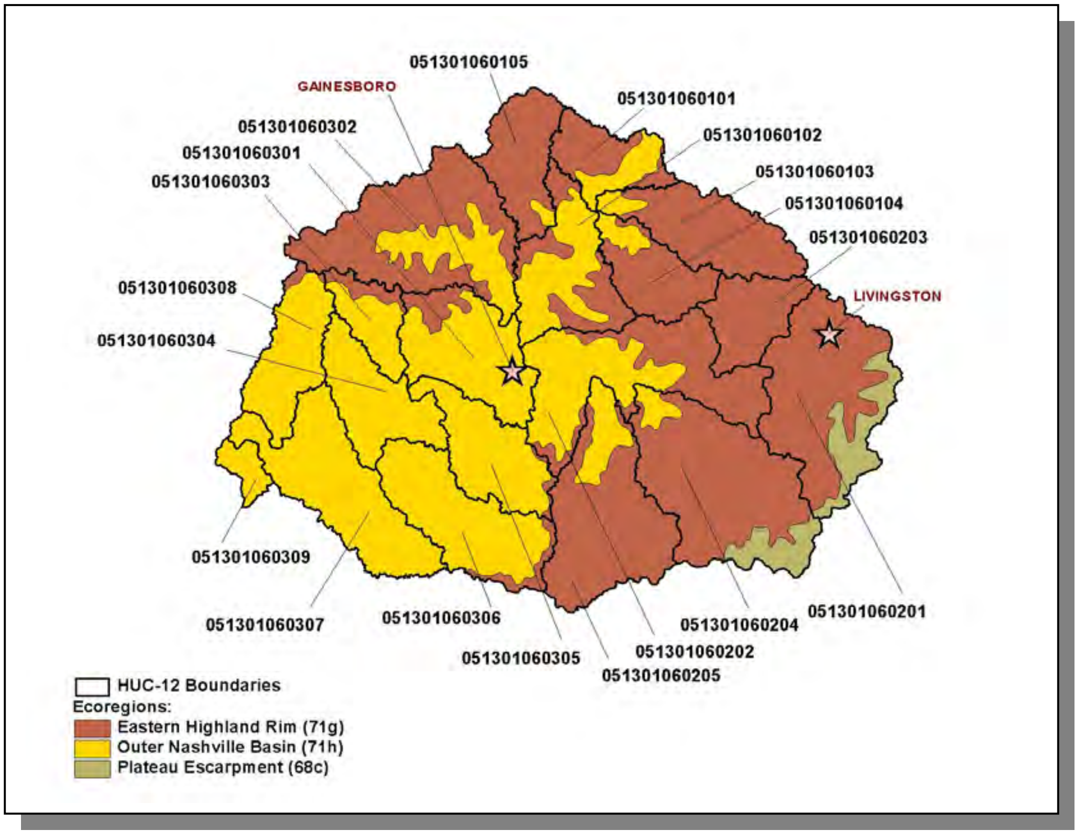


Figure 2-10. Level IV Ecoregions in the Cordell Hull Lake Watershed. *HUC-12 subwatershed boundaries and locations of Gainesboro and Livingston are shown for reference.*

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.

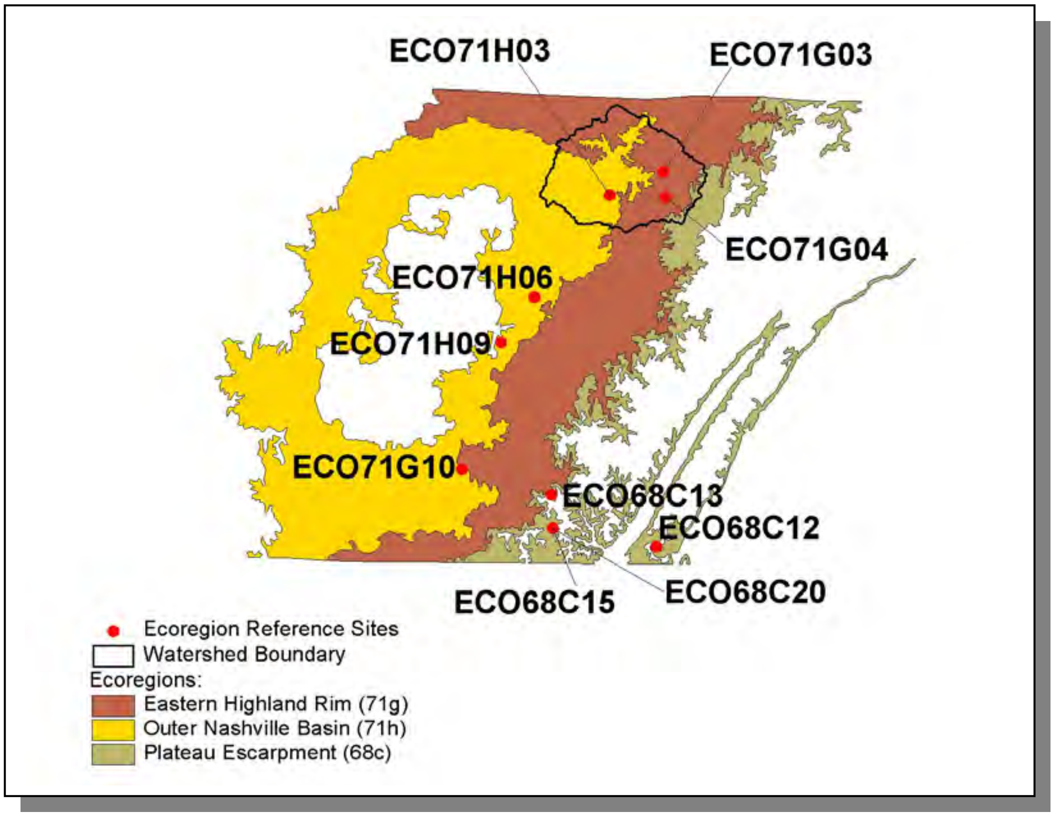


Figure 2-11. Ecoregion Monitoring Sites in Level IV Ecoregions 68c, 71g, and 71h. *The Cordell Hull Lake Watershed is shown for reference. More information, including which ecoregion reference sites were inactive or dropped prior to 01/01/2006, is provided in Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Designated State Natural Area. The Natural Areas Program was established in 1971 with the passage of the Natural Areas Preservation Act. TDEC/Division of Natural Heritage administers the State Natural Areas program. Further information may be found at at http://www.state.tn.us/environment/na/.

The Cordell Hull Lake Watershed has one Designated State Natural Area:

> **Washmorgan Hollow Class II Natural-Scientific State Natural Area** is a 73-acre natural area in Jackson County and is owned by The Nature Conservancy of Tennessee. This sheltered ravine on the Eastern Highland Rim has a rich and diverse flora uncommon in many other areas in the region. It provides excellent habitat for plants and animals alike. The narrow winding ridges are separated by steep slopes that drop between 200 and 300 feet to the bottom of the hollow. A perennial stream tumbles over a waterfall at the head of the hollow. The stream flows out of Washmorgan Hollow into Roaring River just below the confluence where Spring Creek enters Roaring River. Both of these are state scenic rivers.

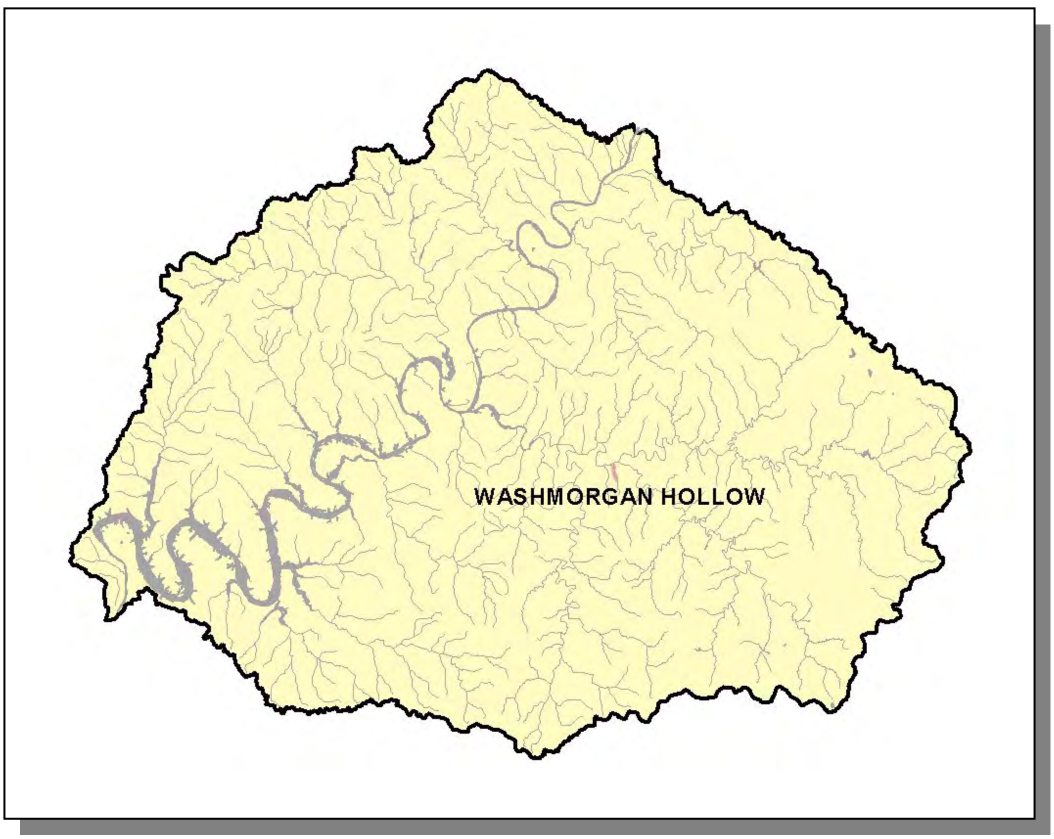


Figure 2-12. There is One Designated State Natural Area in the Cordell Hull Lake Watershed.

2.6.B. 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	1
Insects	5
Mussels	1
Snails	2
Other	1
Amphibians	3
Birds	4
Fish	6
Mammals	7
Plants	13
Total	**43**

Table 2-3. There are 43 Known Rare Plant and Animal Species in the Cordell Hull Lake Watershed.

In the Cordell Hull Lake Watershed, there are six known rare fish species, one known rare mussel species, three known rare amphibian species, and two known rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Acipenser fulvensis	Lake sturgeon		E
Ammocrypta asperella	Crystal darter		D
Cycleptus elongates	Blue sucker		T
Etheostoma cinereum	Ashy darter		T
Etheostoma obeyense	Barcheek darter		
Typhlichthys subterraneus	Southern cavefish		D
Dromus dromas	Dromedary pearlymussel	LE	E
Ambystoma barbouri	Streamside salamander		D
Aneides aeneus	Green salamander		
Hemidatcylium scutatum	Four-toed salamander		D
Lithasia armigera	Armored rocksnail		
Zonitoides lateumbilicatus	Striate gloss		

Table 2-4. Rare Aquatic Species in the Collins River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service. State Status: LT, Listed Threatened by the Tennessee Wildlife Resources Agency; 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/na/.*

2.6.C. Wetlands. The Division of Natural Areas 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/na/wetlands/

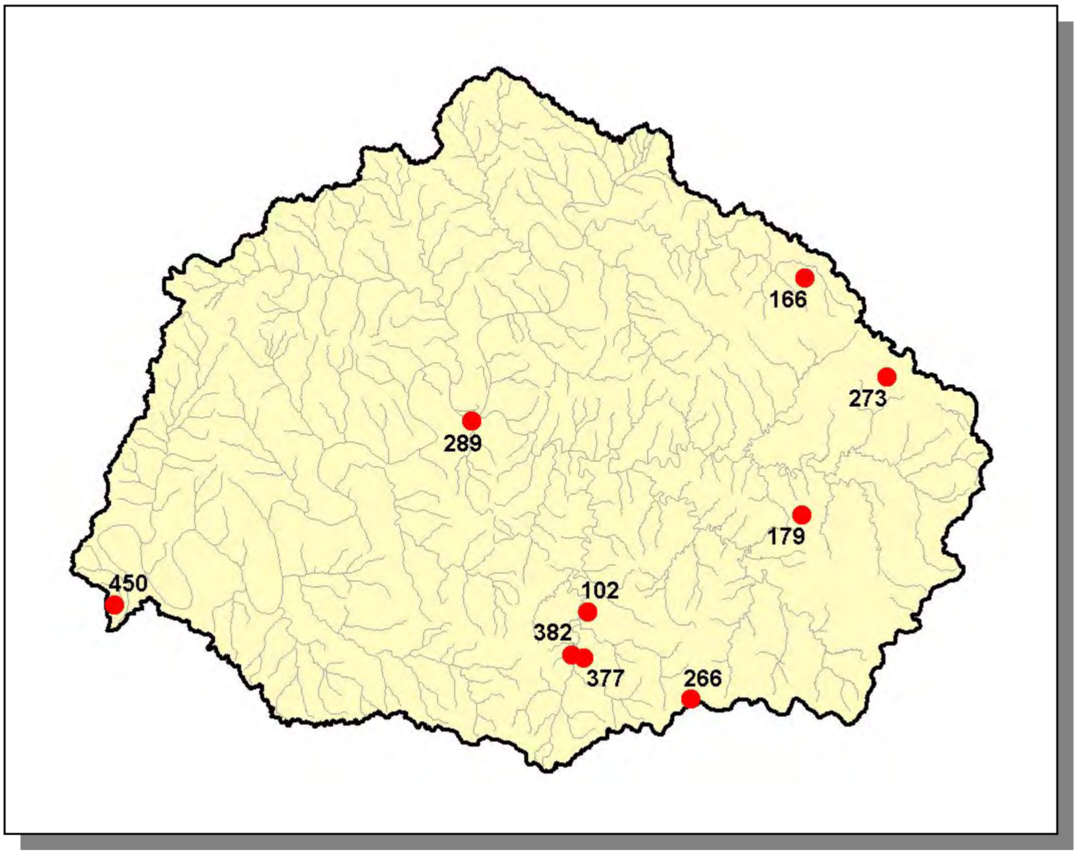


Figure 2-13. Location of Wetland Sites in TDEC Division of Natural Heritage Database in Cordell Hull Lake Watershed. This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands. *There may be additional wetland sites in the watershed. More information, including identification of wetland sites labeled, is provided in Appendix II.*

2.7. CULTURAL RESOURCES.

2.7.A. State Scenic River. Portions of Roaring River, Blackburn Fork, and Spring Creek are designated as State Scenic Rivers.

Roaring River is designated as a Class I Natural River Area (That segment from State Route 136 downstream two (2.0) miles) and a Class II Pastoral River Area (That segment downstream from the Class II Pastoral River Area to its confluence with the Cordell Hull Lake).

Blackburn Fork is designated as a Class I Natural River Area (That segment of the stream from the county road at Cummings Mill downstream one and one-half (1.5) miles) and a Class II Pastoral Area (That segment downstream from a point one and one-half (1.5) miles downstream from the county road at Cummings Mill to its confluence with Roaring River).

Spring Creek is designated as a Class I Natural River Area (That segment from Waterloo Mill downstream to the Overton-Jackson county line) and a Class II Pastoral River Area (That segment between State Highway 136 and Waterloo Mill, and that segment downstream from the Overton-Jackson county line to its confluence with Roaring River).

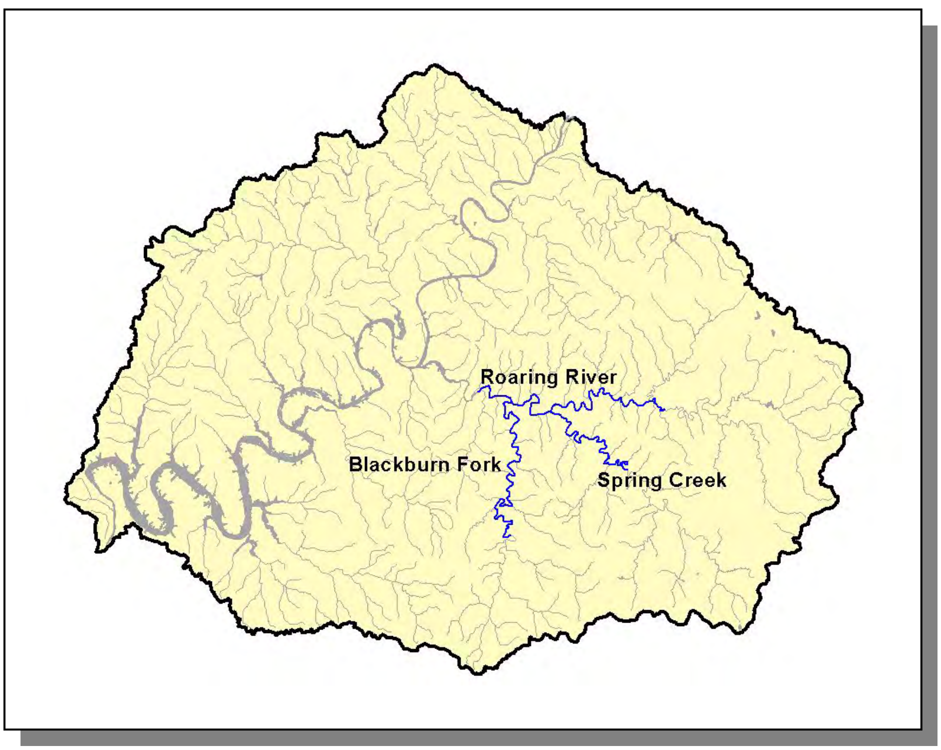


Figure 2-14. Portions of Roaring River, Blackburn Fork, and Spring Creek are Designated State Scenic Rivers*. More information can be found at http://www.state.tn.us/environment/nh/scenicrivers/.*

2.7.B. 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 four streams in the Cordell Hull Lake Watershed:

Blackburn Fork (RM 0 to RM 20) is a small, scenic stream with outstanding 75 foot Cummins Mill Falls.

Flynn Creek (RM 0 to RM 10) is a small, scenic mountain stream that supports a game fishery.

Roaring River (RM 1 to RM 39) flows through an area with sheer gorge walls, rock ledges, and gardens.

Spring Creek (RM 0 to RM 25) flows through a spectacular gorge area with intricately carved bluffs, a 35-foot waterfall, clear, sparkling water, small riffles and shallow pools, and heavily wooded banks.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE	HISTORIC	CULTURAL
Blackburn Fork	X	X	X		X		
Flynn Creek	X	X		X	X		
Roaring River	X	X	X	X	X	X	X
Spring Creek	X	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/

2.7.C. Public Lands. Some sites representative of the cultural heritage are under state or federal protection:

- Cordell Hull Refuge is operated by the U.S. Army Corps of Engineers. More information may be found at http://www.orn.usace.army.mil/op/COR/rec/.

- Cordell Hull Wildlife Management Area is a 25,000-acre area managed by TWRA in Jackson and Smith Counties.

- Dam Site Recreation Area is located in the tailwaters of Cordell Hull Lake, near Carthage. More information may be found at http://www.reserveamerica.com/jsp/commonpage.jsp?goto=/nrrs/tn/tara/newindex.html

- Defeated Creek Recreation Area is operated by the U.S. Army Corps of Engineers. More information may be found at http://www.orn.usace.army.mil/op/COR/rec/.

- Fort Blount-Williamsburg Site is an historic site on the Cumberland River in Jackson County. It was built in 1787 to protect the newly created Avery Trace and is on the National register of Historic Places. More information may be found at: http://tennesseeencyclopedia.net/imagegallery.php?EntryID=J006

- Granville Recreation Area is managed by the U.S. Army Corps of Engineers. More information may be found at http://www.orn.usace.army.mil/op/COR/rec/.

- Roaring River Recreation Area is managed by the U.S. Army Corps of Engineers. More information may be found at http://www.orn.usace.army.mil/op/COR/rec/.

- Salt Lick Creek Recreation Area is managed by the U.S. Army Corps of Engineers. More information may be found at http://www.orn.usace.army.mil/op/COR/rec/.

- Standing Stone State Forest is an 8,352-acre state forest located on the Highland Rim in Overton and Clay Counties. More information may be found at http://www.state.tn.us/agriculture/forestry/stateforests/9.html

- Standing Stone State Park covers nearly 11,000 acres on the Cumberland Plateau. More information may be found at http://www.state.tn.us/environment/parks/parks/StandingStone

- Standing Stone State Wildlife Management Area is an 8,764-acre area managed by TWRA in Overton County.

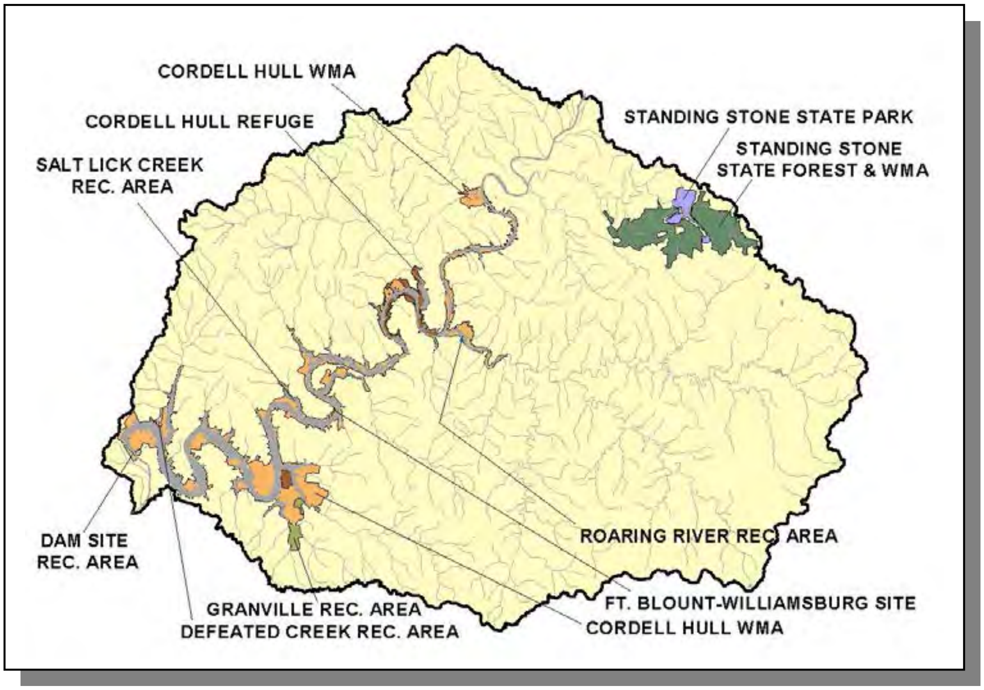


Figure 2-15. Public Lands in the Cordell Hull Lake Watershed. *Data are from Tennessee Wildlife Resources Agency. WMA, Wildlife Management Area.*

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
B;ackburn Fork Creek	2	2		Martin Creek	3	2	2
Bowman Branch	1			Mill Creek (Trib of Cumberland River)	1	2	
Brimstone Creek	1	2		Mill Creek (Trib of Spring Creek)	3	2	
Bryans creek	1			Morgan Creek	3		
Carr Creek	3		3	Morrison Creek	3		
Cumberland River	1,2	2		Pine Lick Creek	1		
Defeated Creek				Right Fork Brimstone Creek	1	2	
Dry Fork Creek	2		1	Right Fork Creek	1		
East Fork Blackburn Fork	1			Roaring River	2,3	1,2	2,3
Flat Creek	1	2	2	Salt Lick Creek		1	1
Flynn Creek	2	2	1	Spring Creek	1	2,3	
Hudson Creek	3			Sugar Creek			4
Jennings Creek	2	2	2	Town Creek	3		
Knob Creek	3			Wartrace Creek	3		3
Left Fork Brimstone Creek	1	2		West Fork Blackburn Fork	1		2
Lick Creek			4	Zollicofter Creek	3		

Table 2-6. Tennessee Rivers Assessment Project Stream Scoring in the Cordell Hull Lake Watershed.

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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 CORDELL HULL LAKE 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 2006 305(b) Report):

1. Describe the water quality assessment process

2. Categorize waters in the State by placing them in the assessment categories suggested by federal guidance

3. Identify waterbodies that pose imminent human health risks due to elevated bacteria levels or contamination of fish

4. Provide detailed information on each watershed

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://cfpub.epa.gov/surf/locate/index.cfm.

The 303(d) list is a compilation of the waters of Tennessee that fail to support some or all of their classified uses. The 303(d) list does not include streams determined to be fully supporting designated uses nor 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://tennessee.gov/environment/wpc/publications/303d2006.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 Cordell Hull Lake Watershed, summarizes data collection and assessment results, and describes impaired waters.

3.2. DATA COLLECTION. The figures and table below represent data collected in the last 5-year cycle (July 1, 2000 through June 30, 2005). Water quality data are from one of four site types: (1) Ambient sites, (2) Ecoregion sites, (3) Watershed Screening sites, or (4) Tier Evaluation sites.

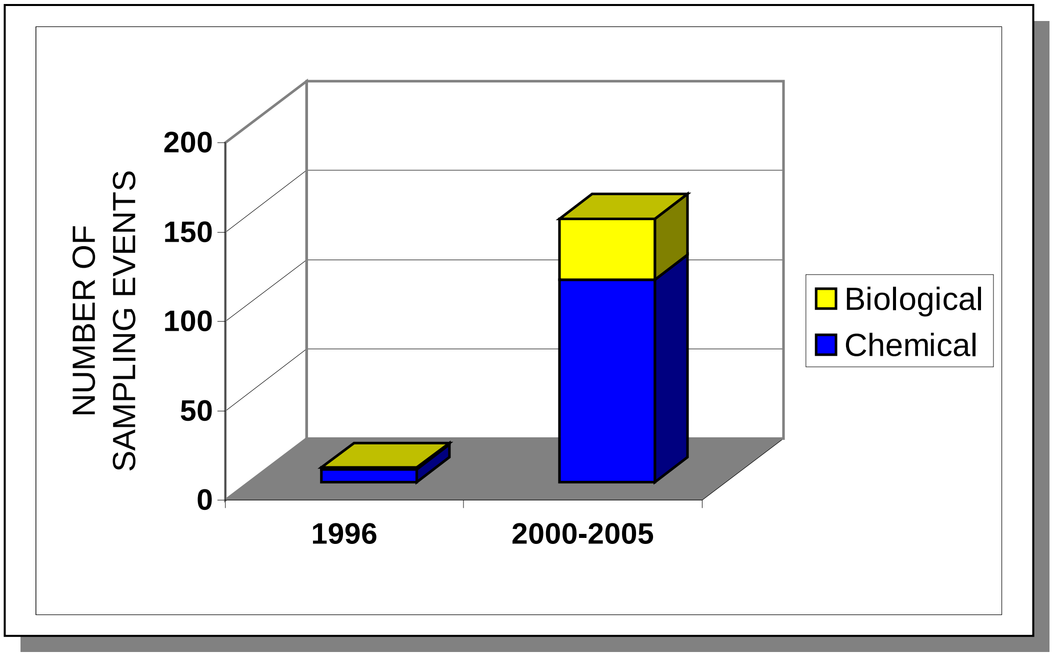

Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (July 1, 2000 through June 30, 2005) in the Cordell Hull Lake Watershed.

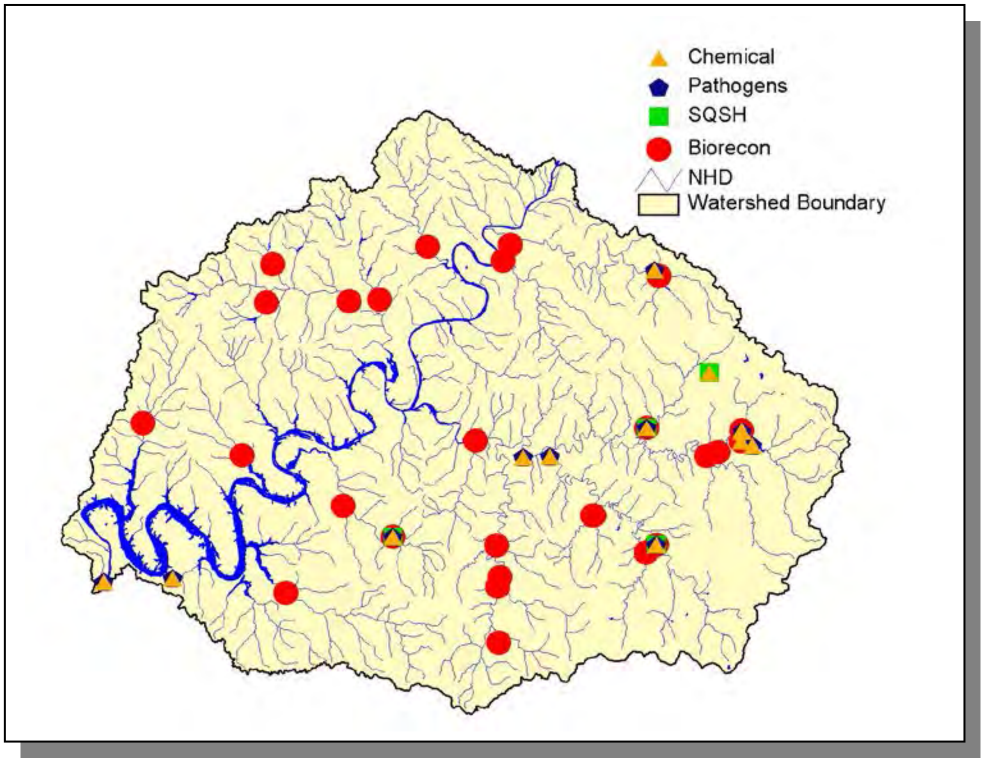

Figure 3-2. Location of Monitoring Sites in the Cordell Hull Lake Watershed (July 1, 2000 through June 30, 2005). *Pathogens include E. coli and fecal coliform; NHD, National Hydrography Dataset of Streams; SQSH, Semi-Quantitative Single Habitat Assessment.*

	1996	**2000-2005**
Biological	1	34
Chemical	7	113
Total	**8**	**147**

Table 3-1. Number of Sampling Events in the Cordell Hull Lake Watershed in the last 5-Year Cycle (July 1, 2000 through June 30, 2005).

3.2.A. Ambient Monitoring Sites. These fixed-station chemical monitoring sites are sampled quarterly or monthly by the Environmental Field Office-Cookeville and Environmental Field Office-Nashville 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 Cordell Hull Lake Watershed are provided in Appendix IV.

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

3.2.B. Ecoregion Sites. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plants and animals. The delineation phase of the Tennessee Ecoregion Project was completed in 1997 when the ecoregions and subecoregions were mapped and summarized (EPA/600/R-97/022). There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee (see Chapter 2 for more details). The Cordell Hull Lake Watershed lies within 2 Level III ecoregions (Southwestern Appalachians and Interior Plateau) and contains 3 subecoregions (Level IV):

- Plateau Escarpment (68c)
- 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 during the watershed sampling time period.

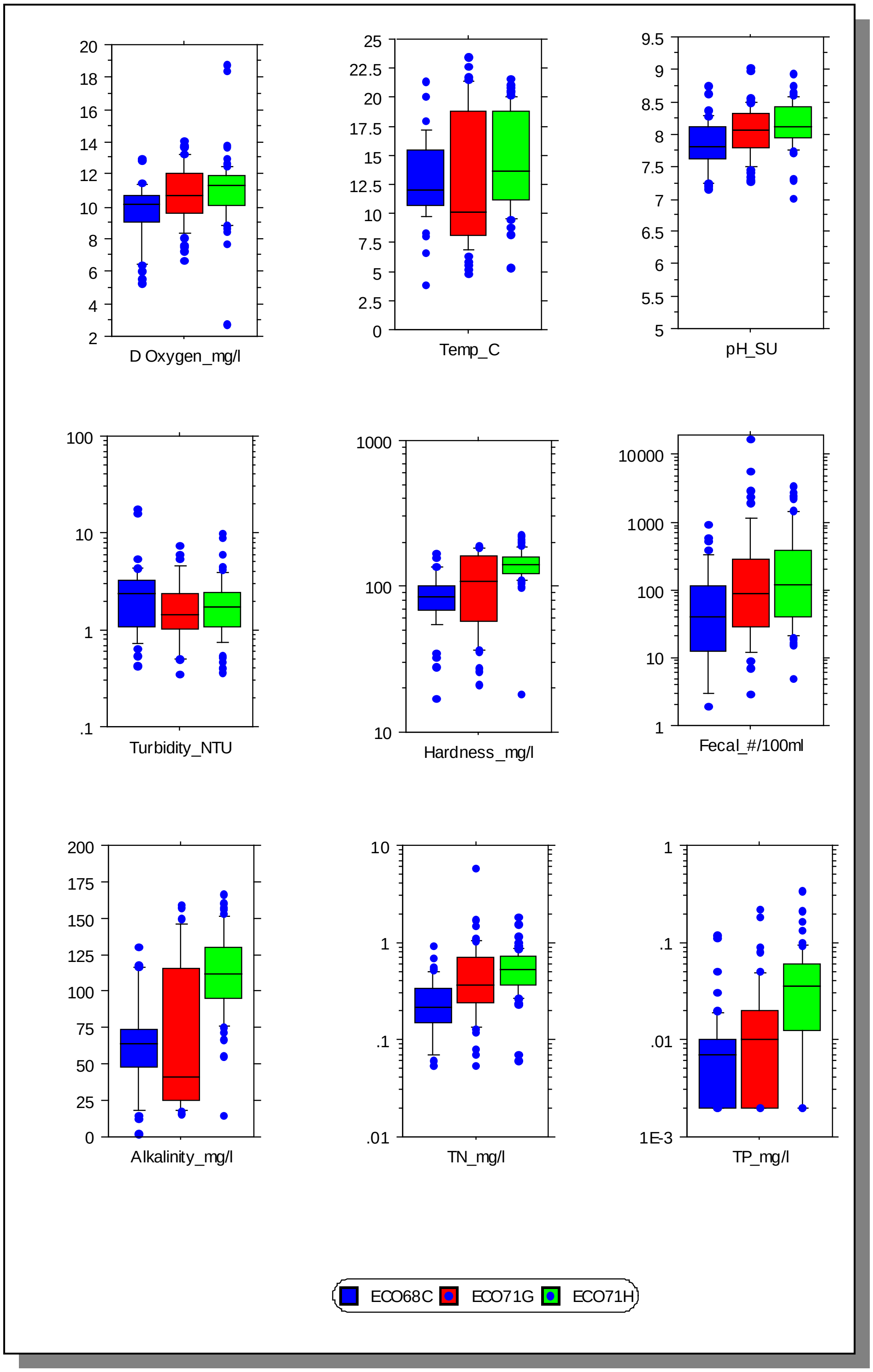
D Oxygen_mg/l
Temp_C
pH_SU
Turbidity_NTU
Hardness_mg/l
Fecal_#/100ml
Alkalinity_mg/l
TN_mg/l
TP_mg/l
ECO68C
ECO71G
ECO71H

Figure 3-3. Select Chemical Data Collected in Cordell Hull Lake 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.*

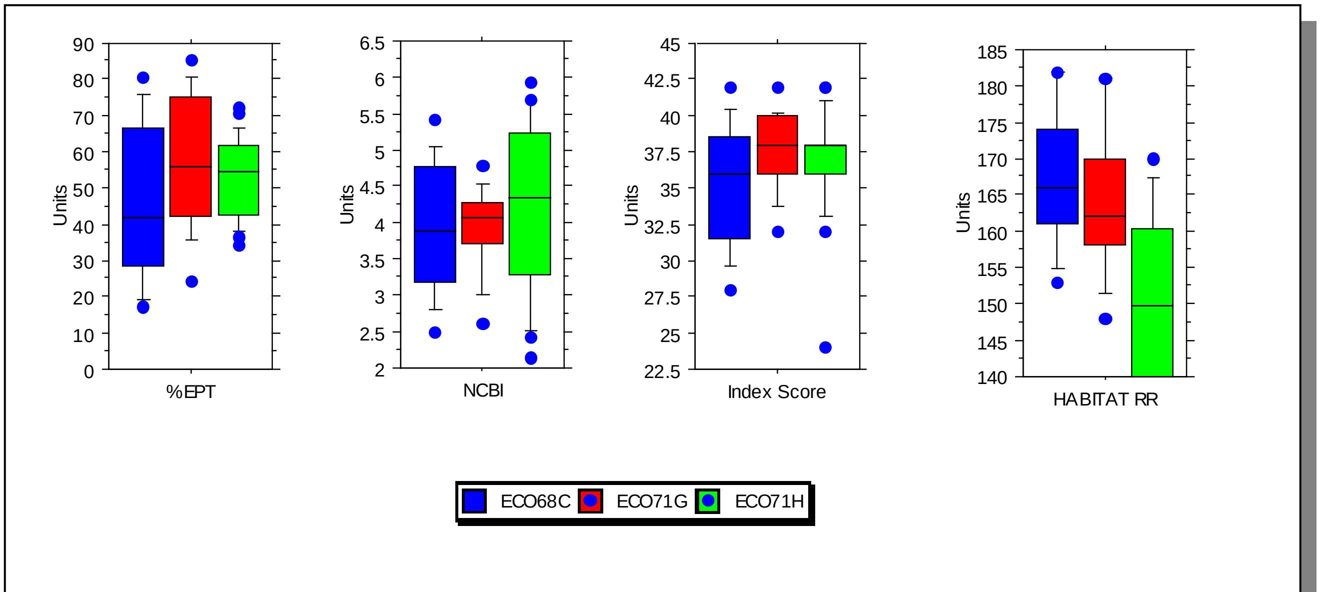

Figure 3-4. Benthic Macroinvertebrate and Habitat Scores Cordell Hull Lake Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. NCBI, North Carolina Biotic Index. Index Score and Habitat Riffle/Run scoring system are described in TDEC's* *__Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys (2006).__*

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. Use support determinations, which can be classified as monitored or evaluated, are based on:

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

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

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

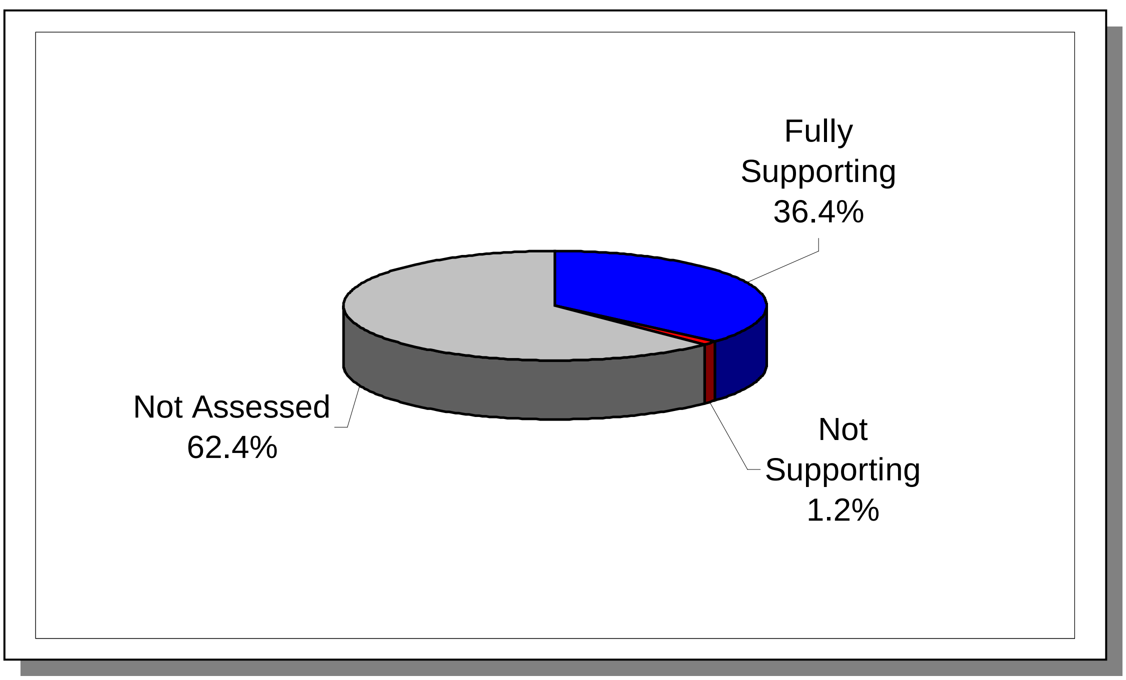

Figure 3-5. Water Quality Assessment of Streams in the Cordell Hull Lake Watershed. *Assessment data are based on the 2004 Water Quality Assessment of 893.8 stream miles in the watershed. More information is provided in Appendix III.*

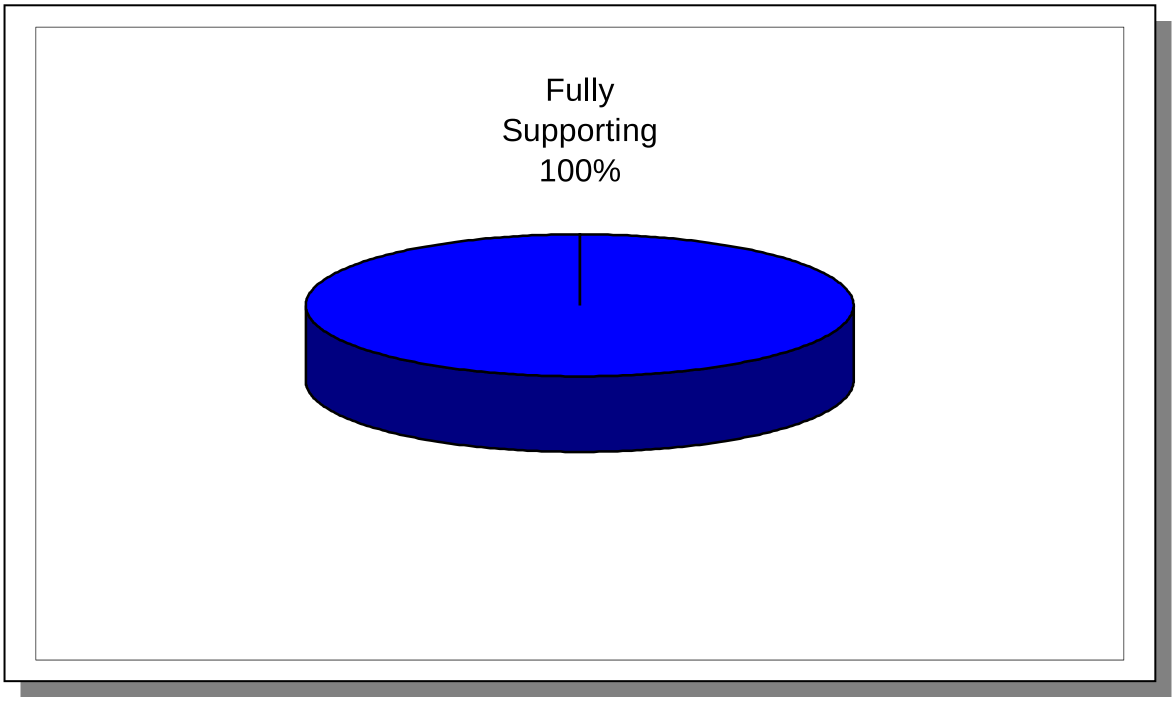

Figure 3-6. Water Quality Assessment of Lakes in the Cordell Hull Lake Watershed. *Assessment data are based on the 2004 Water Quality Assessment of 13,901 lake acres in the watershed. More information is provided in Appendix III.*

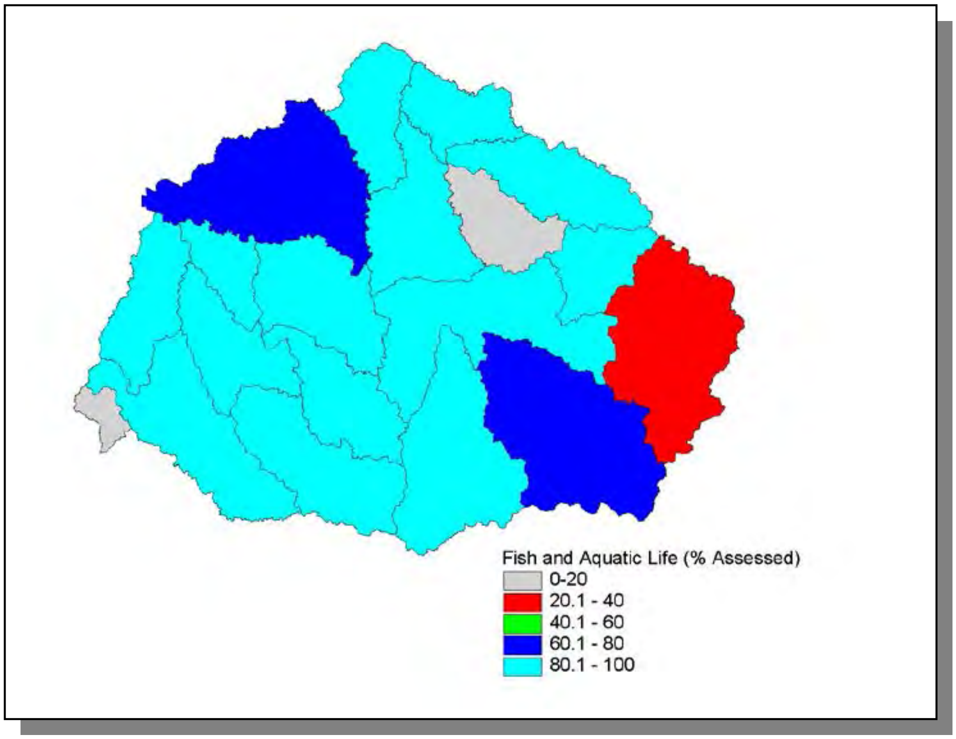

Figure 3-7. Percentage of Stream Miles Assessed for Support of Fish and Aquatic Life Designated Use in HUC-12 Subwatersheds.

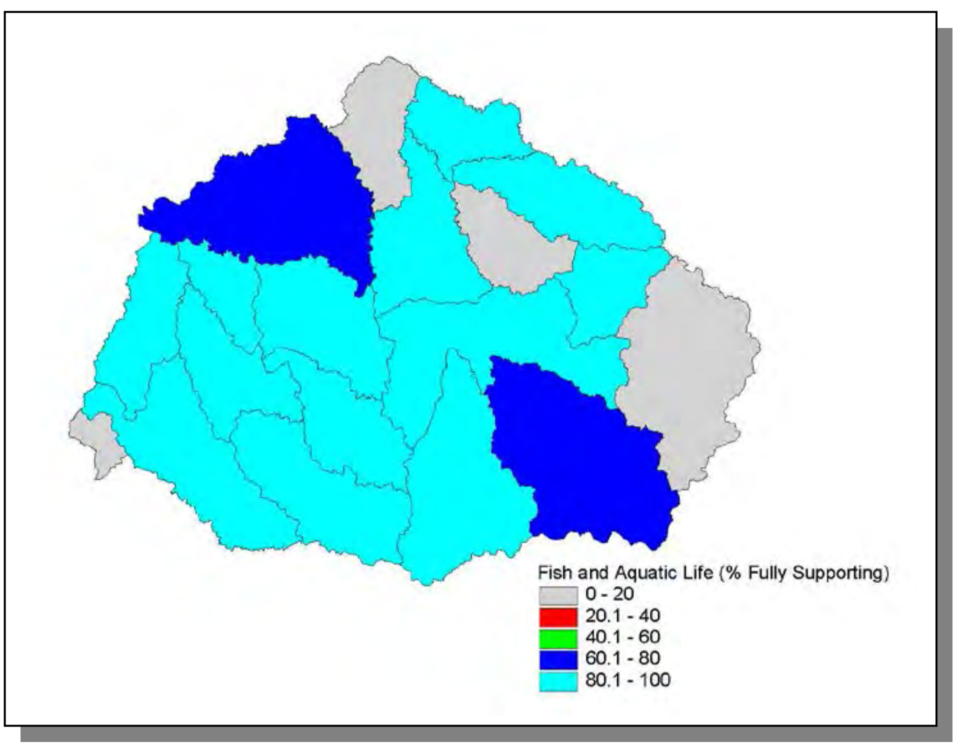

Figure 3-8. Percentage of Stream Miles Fully Supporting for Fish and Aquatic Life Designated Use in HUC-12 Subwatersheds.

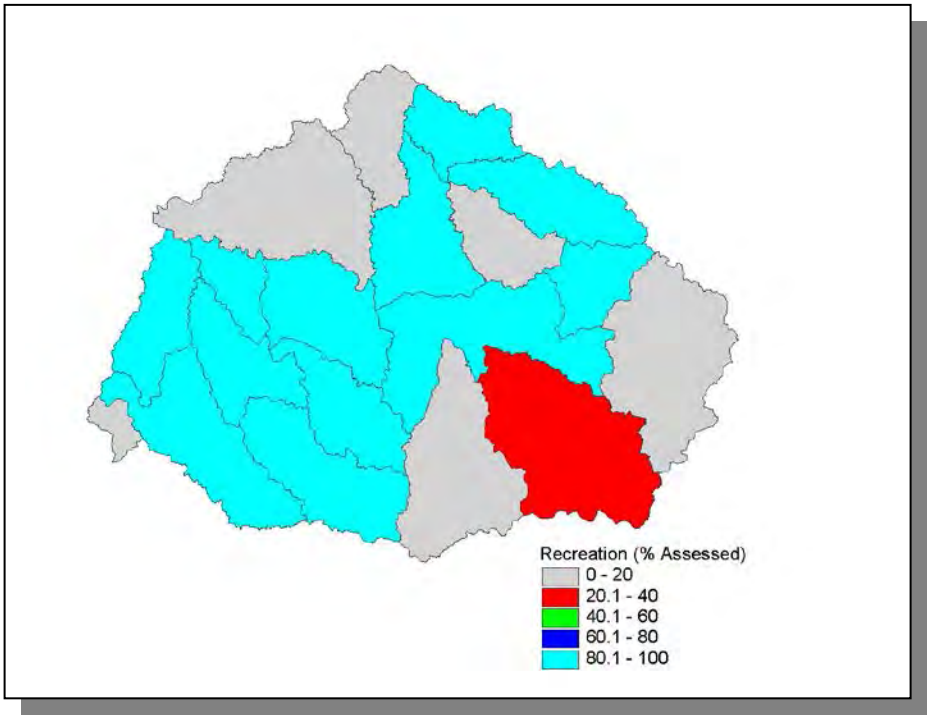

Figure 3-9. Percentage of Stream Miles Assessed for Support of Recreation Designated Use in HUC-12 Subwatersheds.

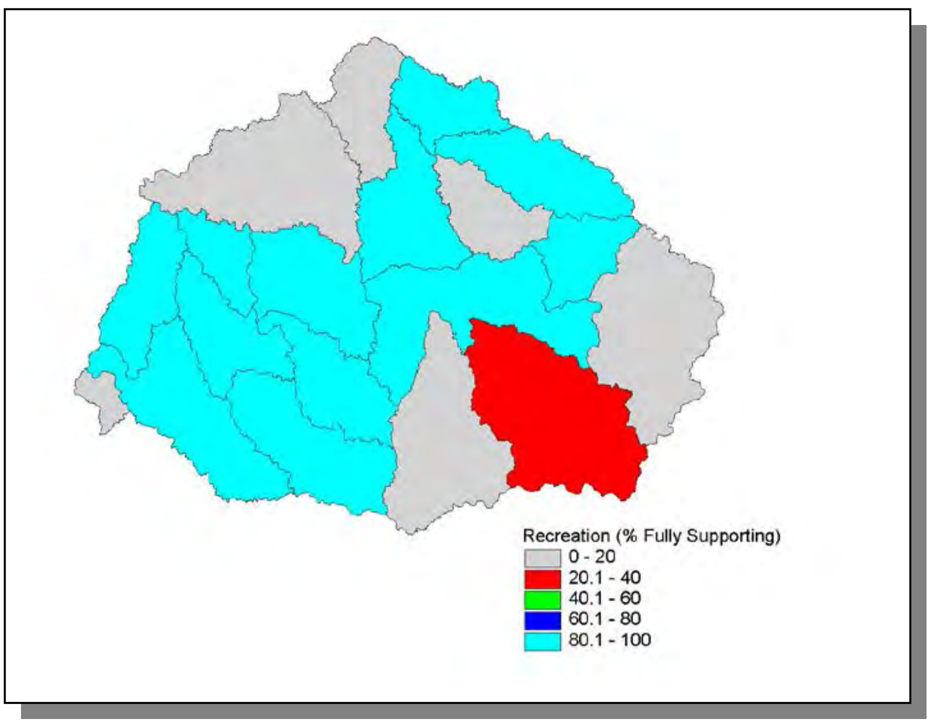

Figure 3-10. Percentage of Stream Miles Fully Supporting for Recreation Designated Use in HUC-12 Subwatersheds.

3.3.A. Assessment Summary.

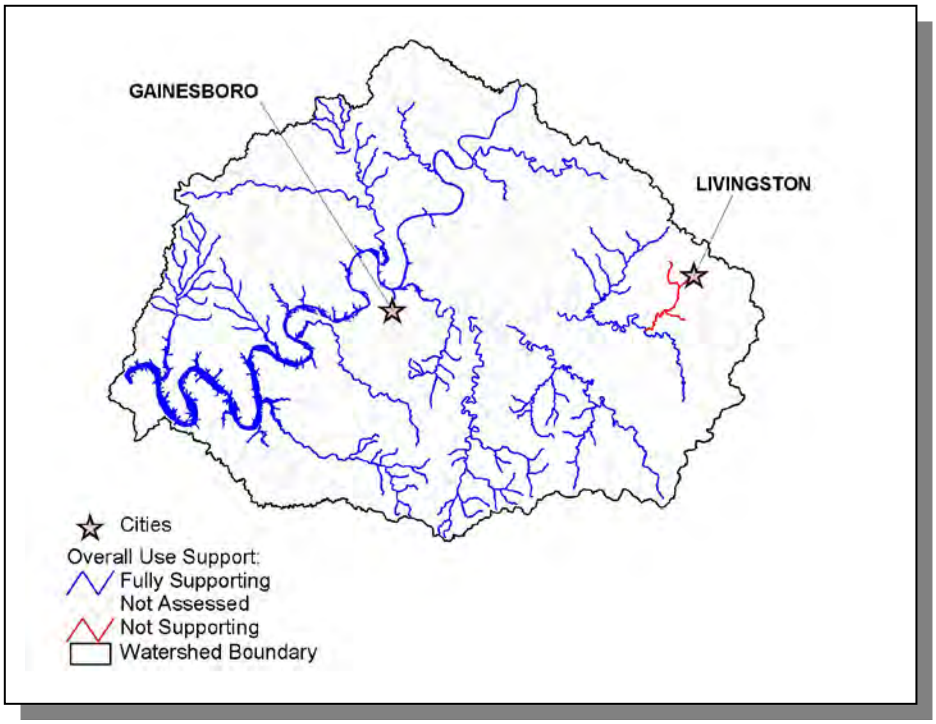

Figure 3-11. Overall Use Support Attainment in the Cordell Hull Lake Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Gainesboro and Livingston are shown for reference. More information is provided in Appendix III.*

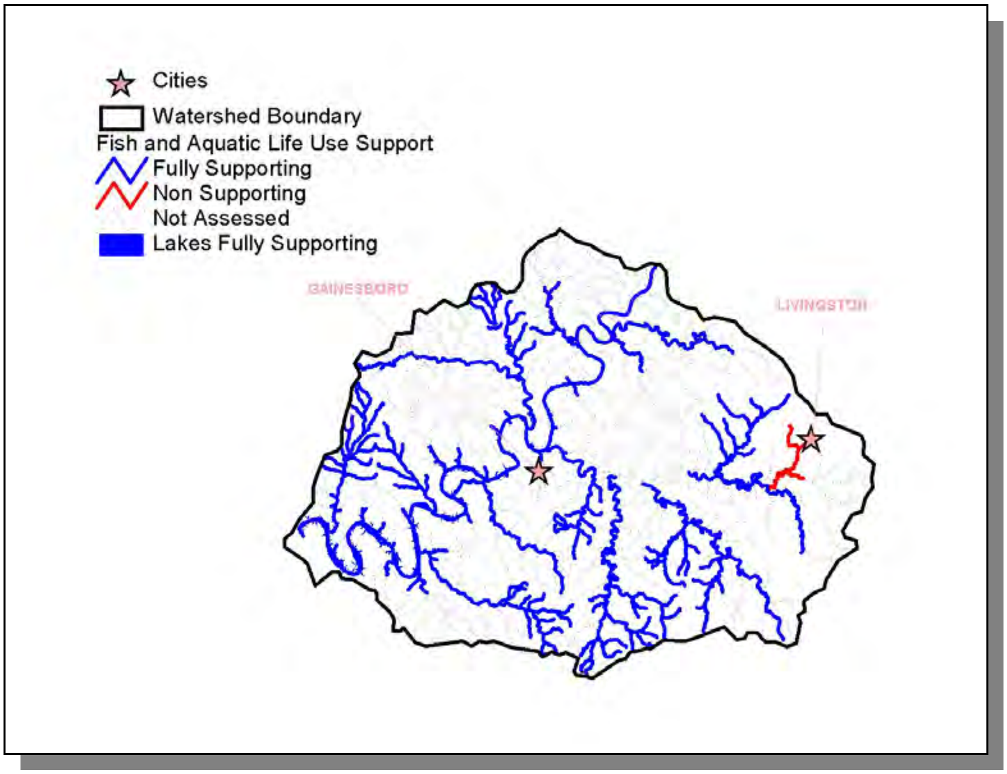

Figure 3-12. Fish and Aquatic Life Use Support Attainment in the Cordell Hull Lake Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Gainesboro and Livingston are shown for reference. More information is provided in Appendix III.*

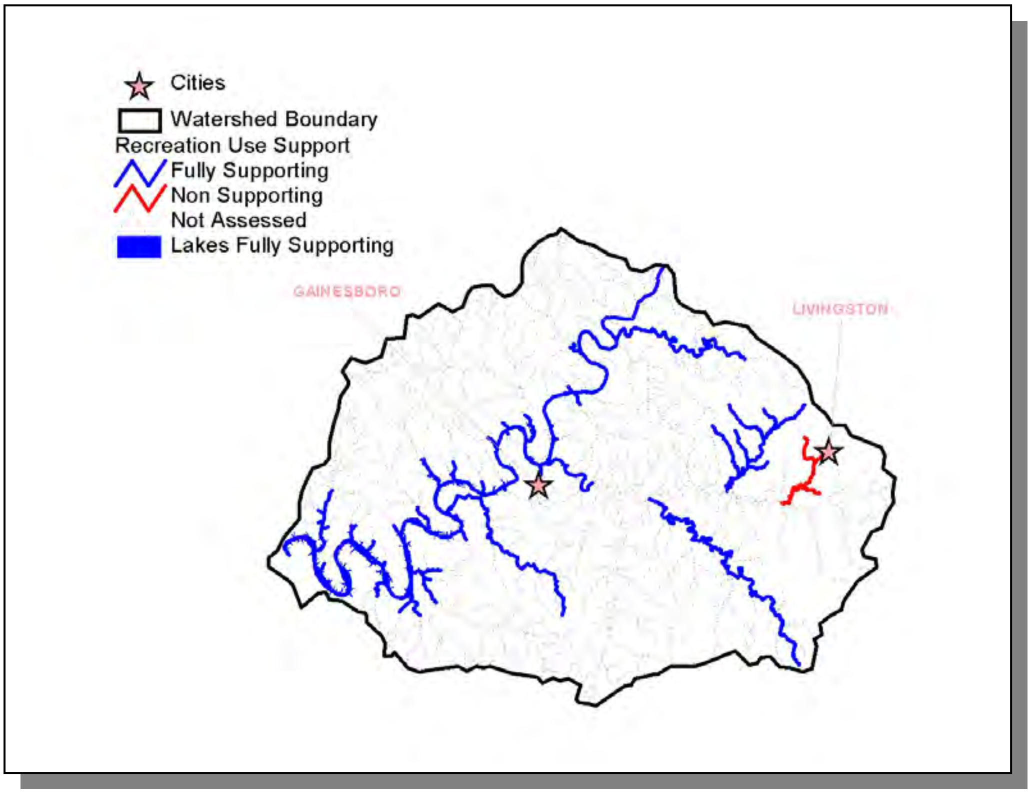

Figure 3-13. Recreation Use Support Attainment in the Cordell Hull Lake Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Gainesboro and Livingston are shown for reference. More information is provided in Appendix III.*

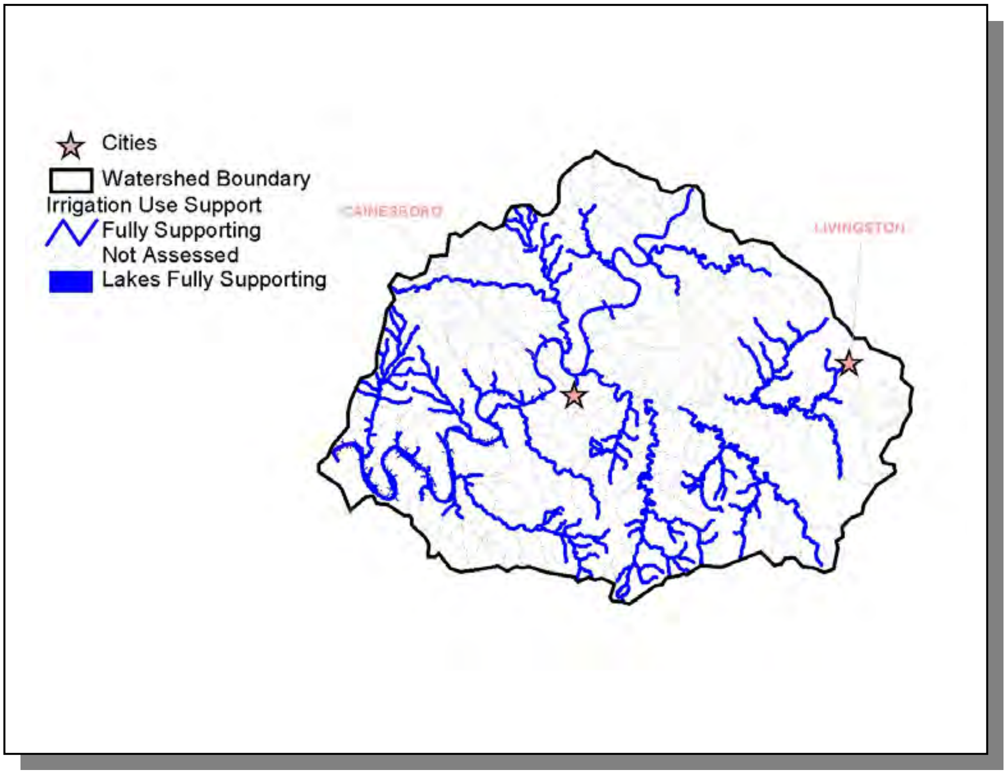

Figure 3-14. Irrigation Use Support Attainment in the Cordell Hull Lake Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Gainesboro and Livingston are shown for reference. More information is provided in Appendix III.*

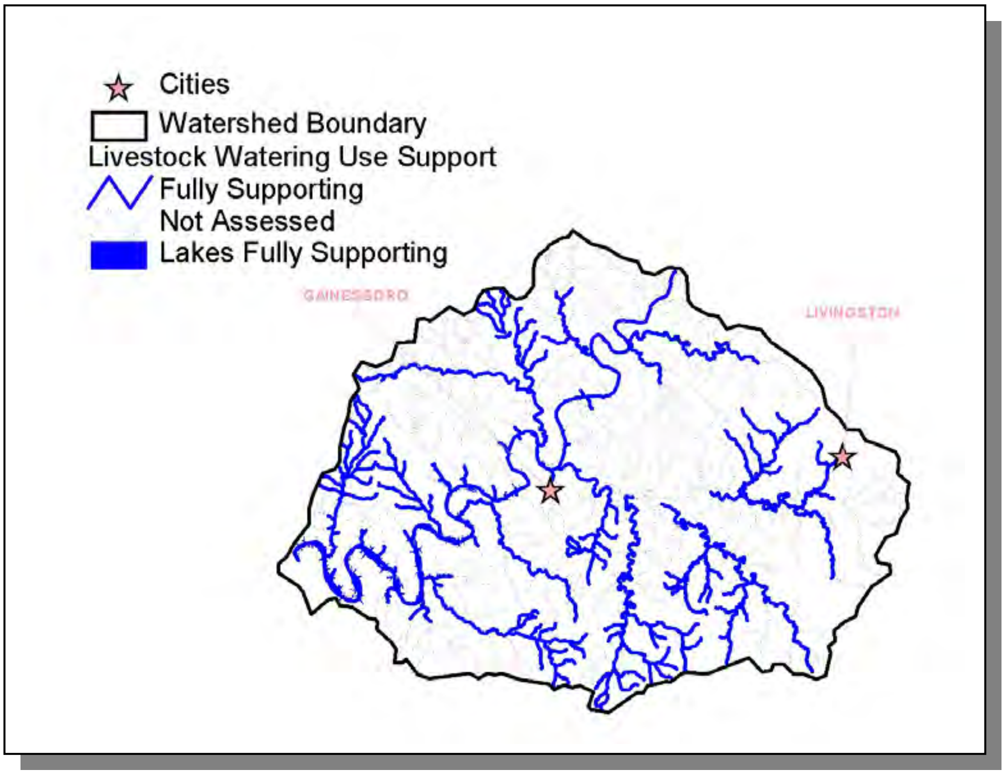

Figure 3-15. Livestock Watering and Wildlife Use Support Attainment in the Cordell Hull Lake Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Gainesboro and Livingston are shown for reference. More information is provided in Appendix III.*

3.3.B. Use Impairment Summary.

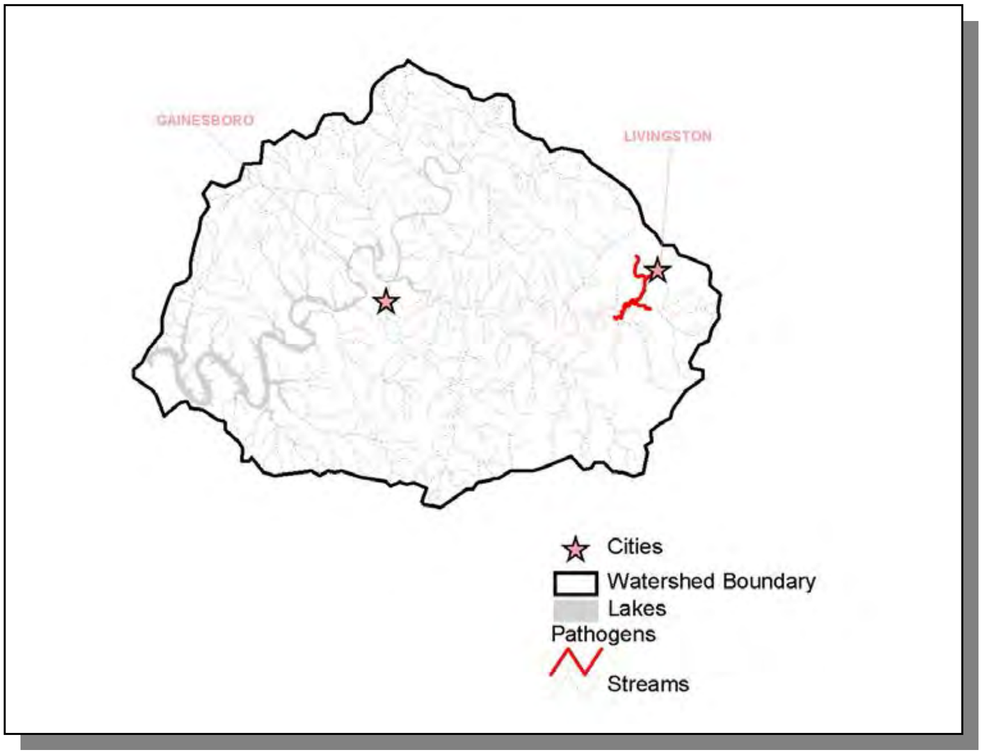

Figure 3-16. Impaired Streams Due to Organic Enrichment or Low Dissolved Oxygen in the Cordell Hull Lake Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Pathogens represent E. Coli and total fecal coliform data. Locations of Gainseboro and Livingston are shown for reference. More information is provided in Appendix III.*

The listing of impaired waters that do not support designated uses (the 303(d) list) is traditionally submitted to EPA every two years. A copy of the most recent 303(d) list may be downloaded from:
http://tennessee.gov/environment/wpc/publications/303d2006.pdf

Since the year 2002, the 303(d) list has been 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 completed 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://gis2.memphis.edu/wpc.

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE CORDELL HULL LAKE WATERSHED

4.1. BACKGROUND. This chapter is organized by HUC-12 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 2004 303(d) list
iii. Description of nonpoint source contributions

The Cordell Hull Lake Watershed (HUC 05130106) has been delineated into three HUC 10 (10-digit) subwatersheds, each of which is composed of one or more HUC-12 subwatersheds.

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

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

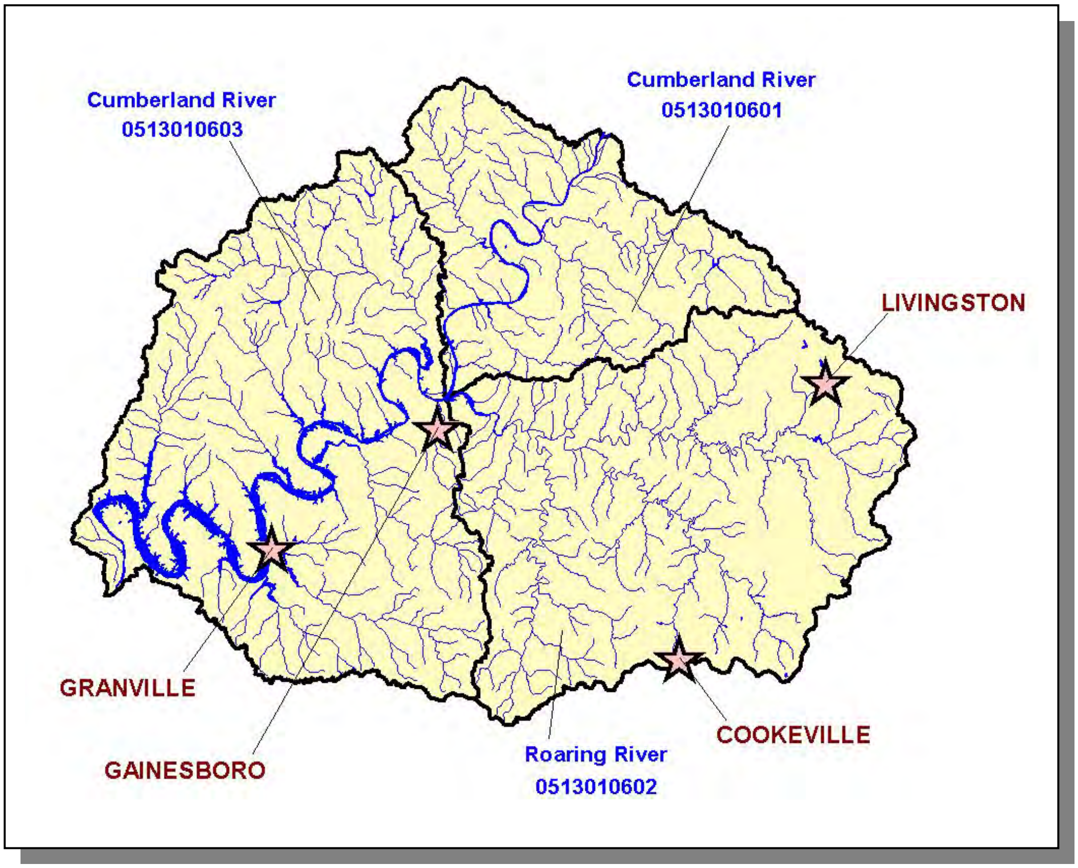

Figure 4-1. The Cordell Hull Lake Watershed is Composed of Three USGS-Delineated Subwatersheds (10-Digit Subwatersheds). *Locations of Cookeville, Gainesboro, Granville, and Livingston are shown for reference.*

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 Cordell Hull Lake Watershed.

HUC-10	HUC-12
0513010601	051301060101 (Cumberland River)
	051301060102 (Cumberland River)
	051301060103 (Mill Creek)
	051301060104 (Dry Fork Creek)
	051301060105 (Brimstone Creek)
0513010602	051301060201 (Roaring River)
	051301060202 (Roaring River)
	051301060203 (Flat Creek)
	051301060204 (Spring Creek)
	051301060205 (Blackburn Fork)
0513010603	051301060301 (Cumberland River)
	051301060302 (Jennings Creek)
	051301060303 (Wartrace Creek)
	051301060304 (Cumberland River)
	051301060305 (Flynn Lick Creek)
	051301060306 (Martin Creek)
	051301060307 (Cumberland River)
	051301060308 (Defeated Creek)
	051301060309 (Cumberland River)

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. 0513010601.

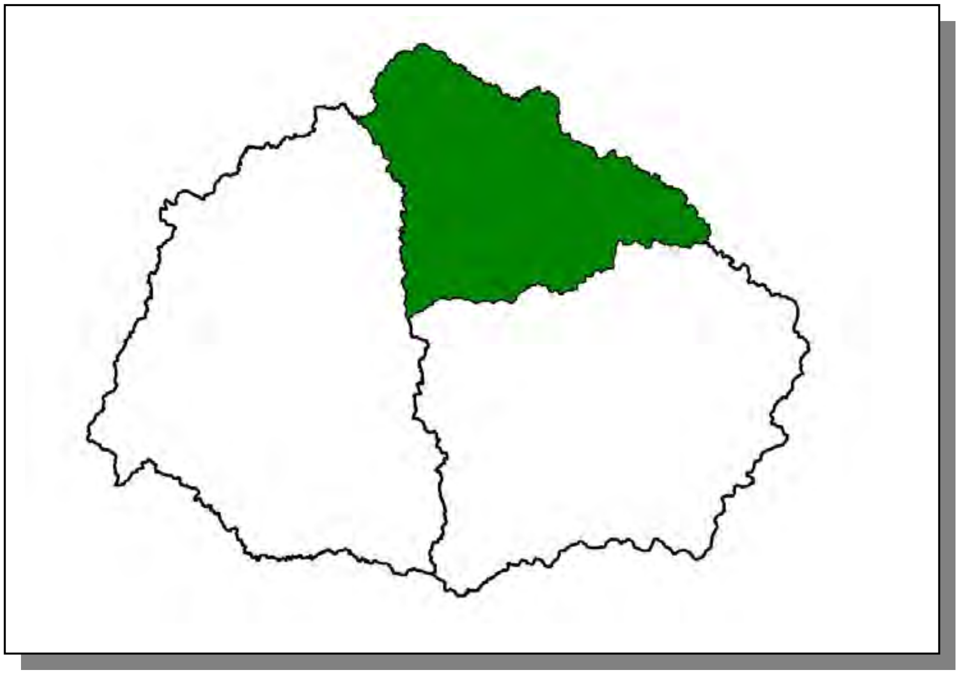

Figure 4-2. Location of Subwatershed 0513010601. *All Cordell Hull Lake HUC-10 subwatershed boundaries are shown for reference.*

4.2.A.i. 051301060101 (Cumberland River).

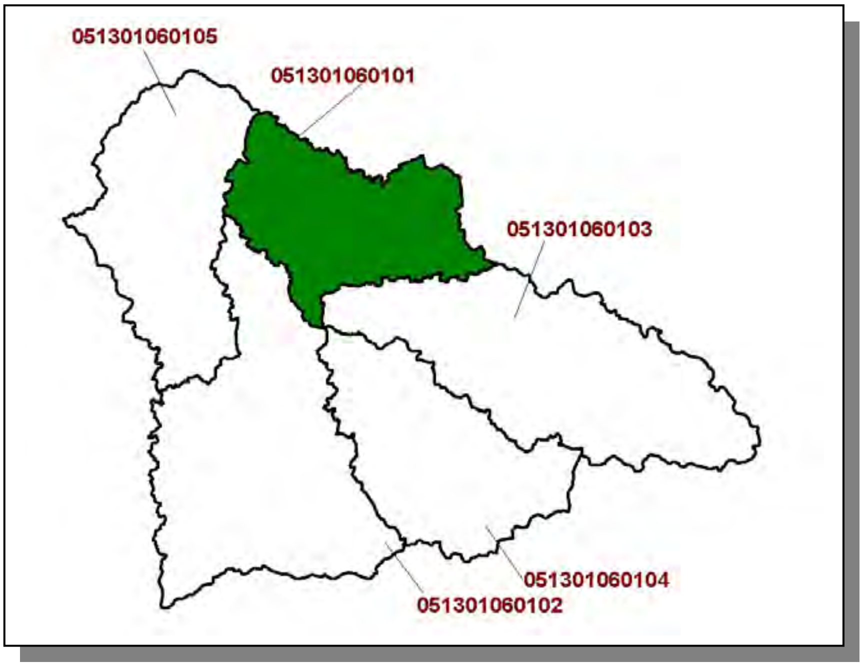

Figure 4-3. Location of Subwatershed 051301060101. *HUC-12 subwatershed boundaries are shown for reference.*

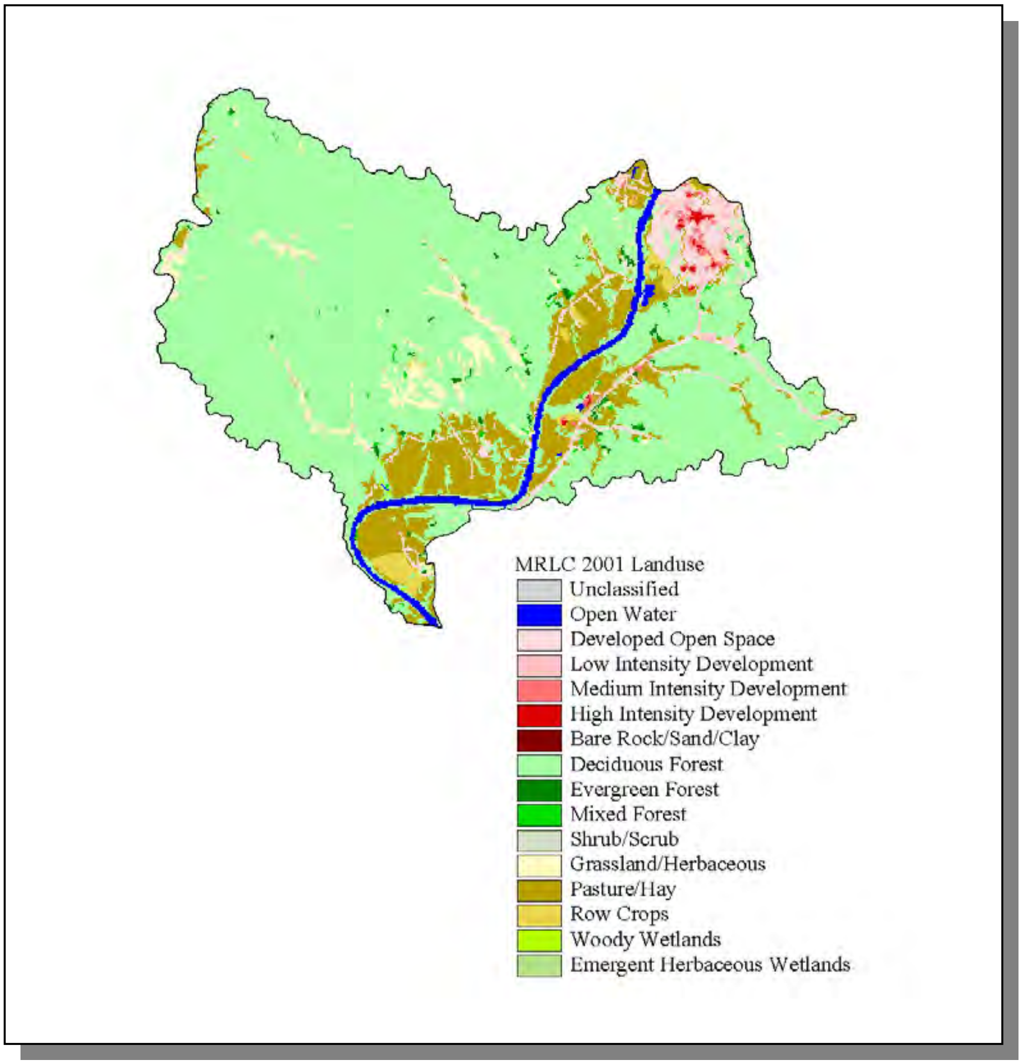

Figure 4-4. Illustration of Land Use Distribution in Subwatershed 051301060101.

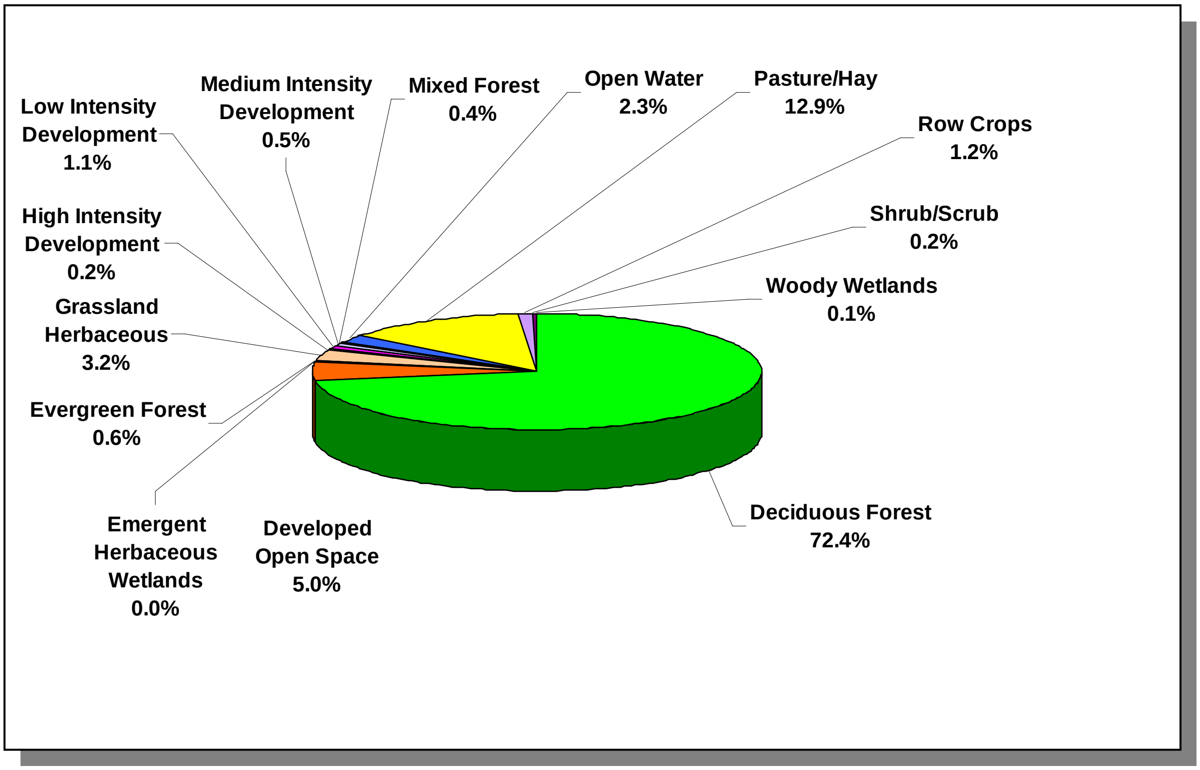

Figure 4-5. Land Use Distribution in Subwatershed 051301060101. *More information is provided in Appendix IV.*

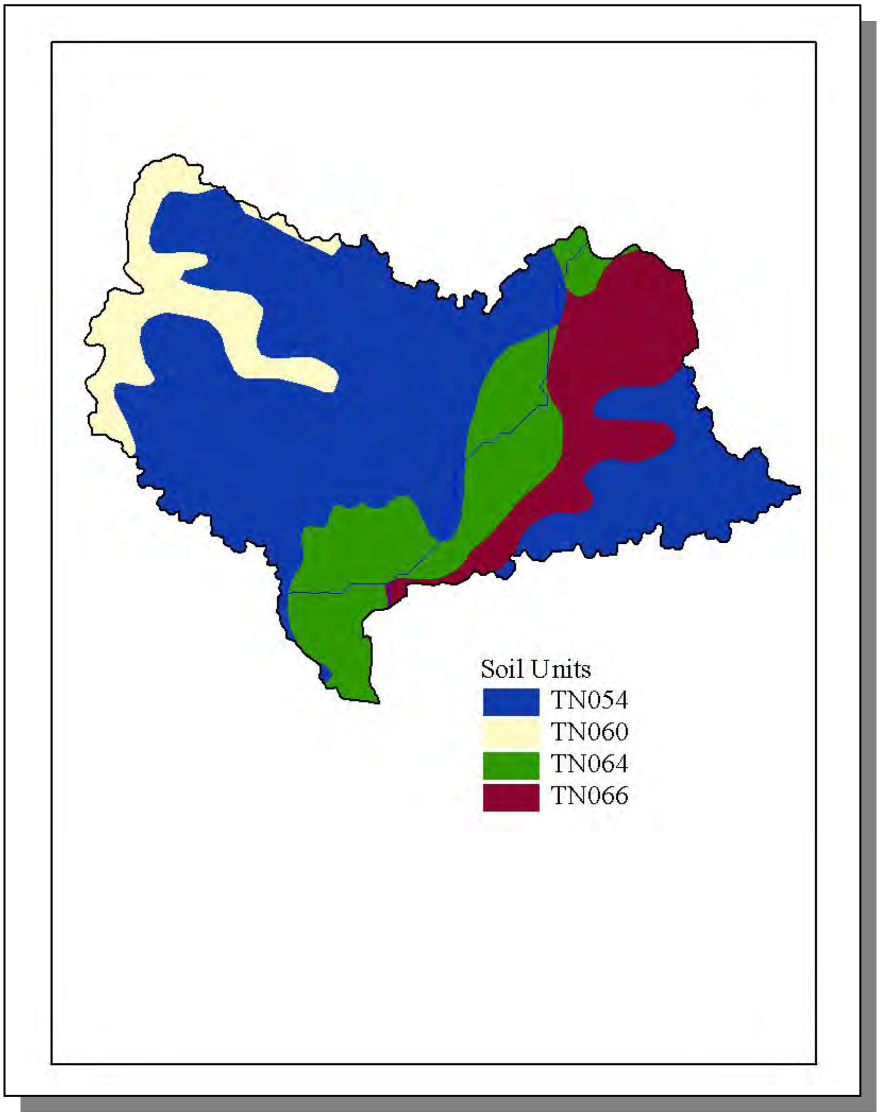

Figure 4-6. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060101.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060101. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Clay	7,238	7,311	7,976	9.01	652	659	718	10.1

Table 4-3. Population Estimates in Subwatershed 051301060101.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Celina	Clay	1,493	685	645	36	4

Table 4-4. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060101.

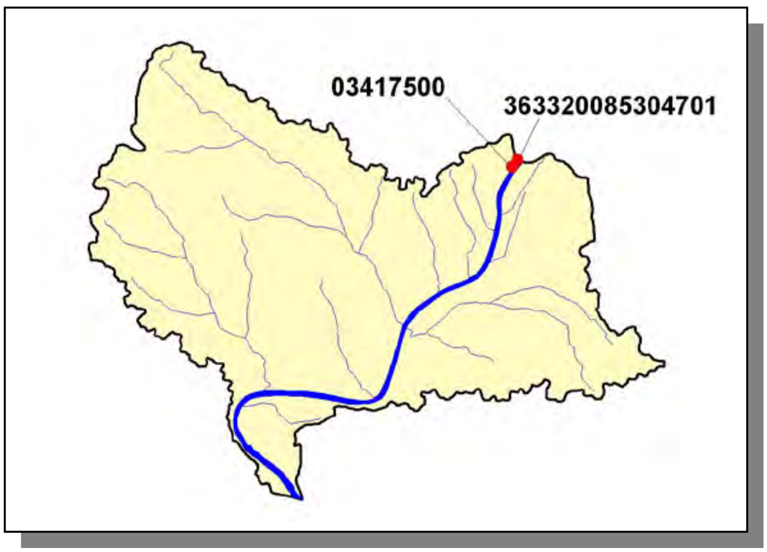

Figure 4-7. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060101. *More information is provided in Appendix IV.*

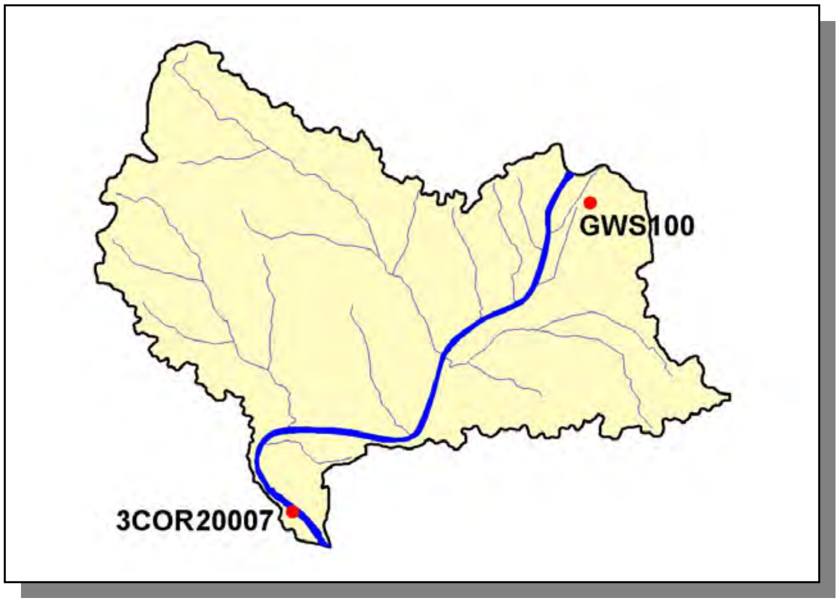

Figure 4-8. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060101. *More information, including site names and locations, is provided in Appendix IV.*

4.2.A.i.a. Point Source Contributions.

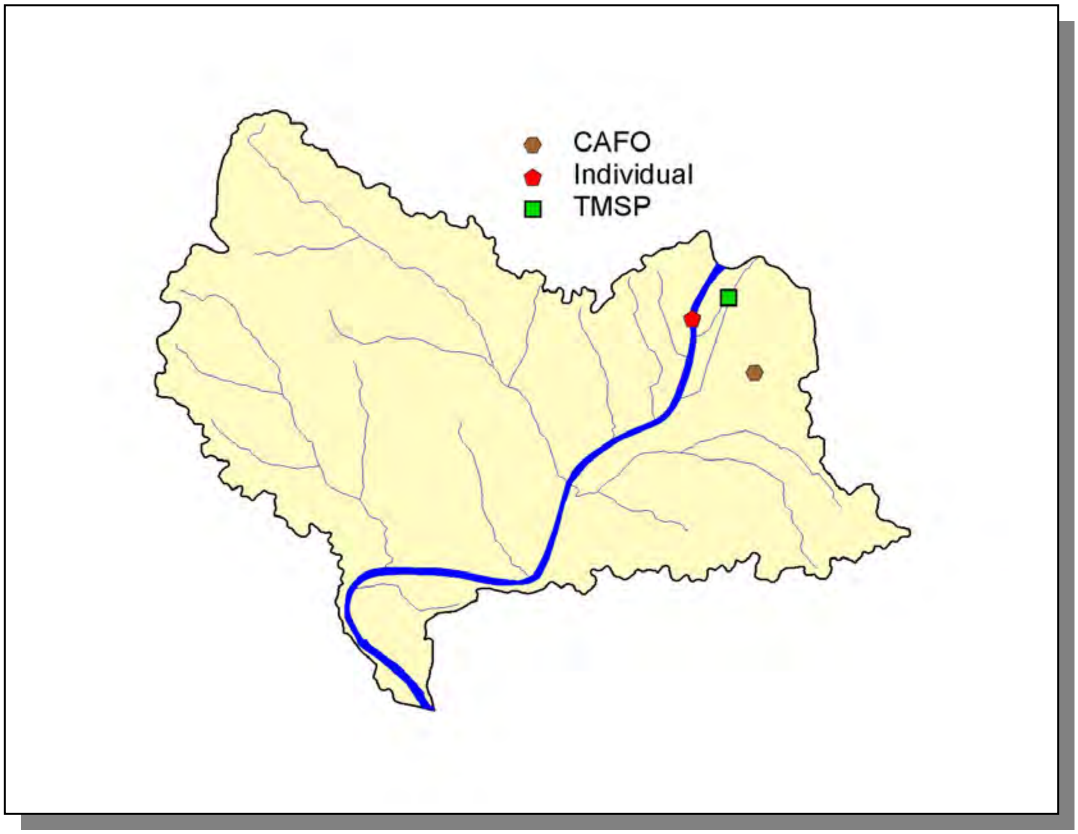

Figure 4-9. Location of Permits Issued in Subwatershed 051301060101. *More information, including the names of facilities, is provided in Appendix IV.*

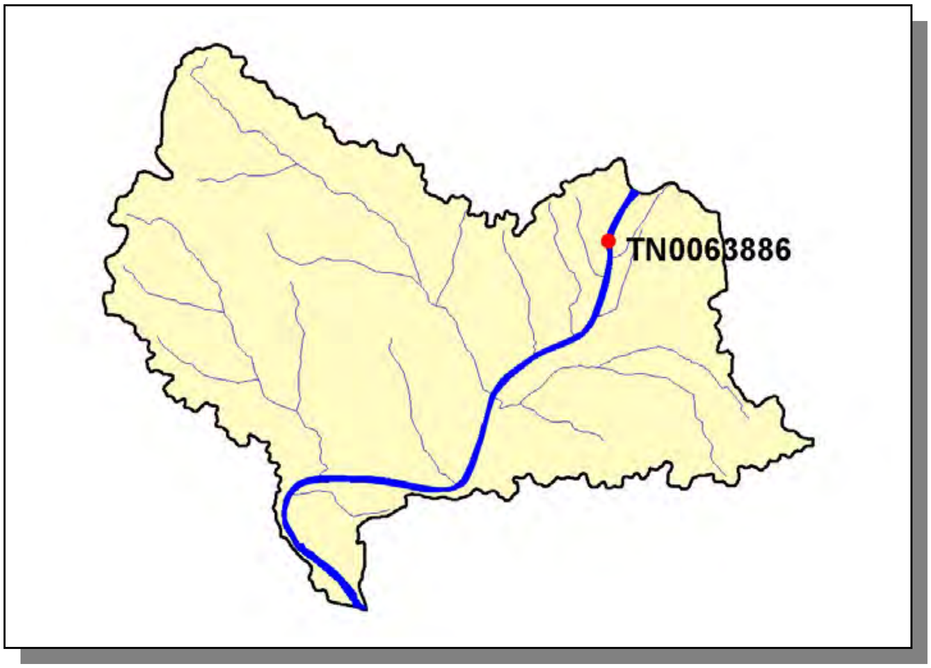

Figure 4-10. Location of Active NPDES Sites in Subwatershed 051301060101. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-11. Location of Concentrated Animal Feeding Operations (CAFO) in Subwatershed 051301060101. *More information, including the names of facilities, is provided in Appendix IV.*

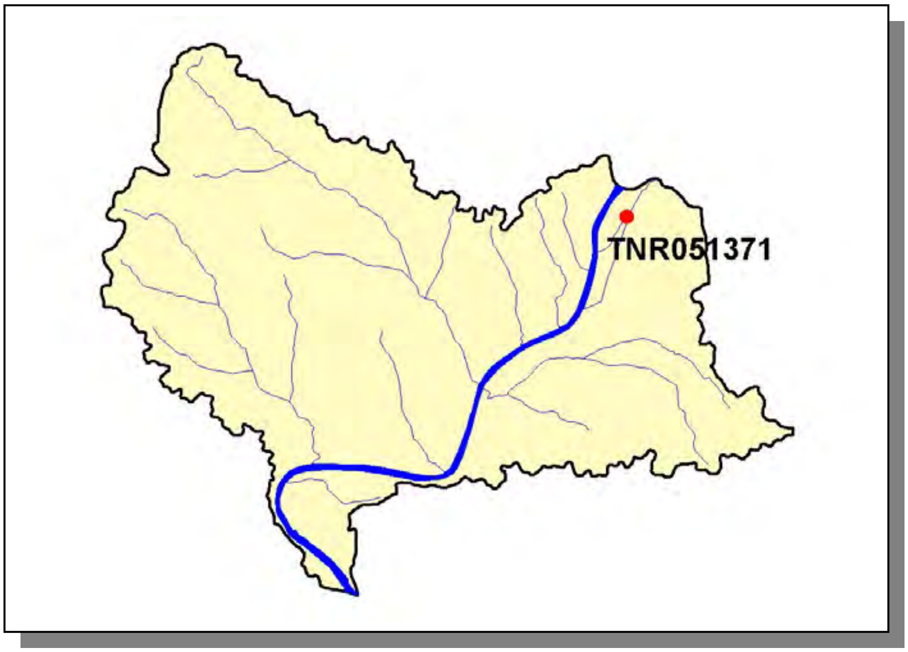

Figure 4-12. Location of TMSP Sites in Subwatershed 051301060101. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.i.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS			
Cattle	Chickens (Layers)	Hogs	Sheep
1,146	<5	14	<5

Table 4-5. Summary of Livestock Count Estimates in Subwatershed 051301060101. *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.*

LIVESTOCK COUNTS				
County	Cattle	Chickens (Layers)	Hogs	Sheep
Clay	14,574	18	174	23

Table 4-6. Summary of Livestock Count Estimates in Clay County. *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)
Clay	105.1	105.1	2.3	10.1

Table 4-7. Forest Acreage and Annual Removal Rates (1987-1994) in Clay County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.14
Grass (Hayland)	0.40
Legumes, Grass (Hayland)	0.53
Grass, Forbs, Legumes (Mixed Pasture)	1.38
Tobacco (Row Crops)	28.52
Farmsteads and Ranch Headquarters	1.56

Table 4-8. Annual Estimated Total Soil Loss in Subwatershed 051301060101.

4.2.A.ii. 051301060102 (Cumberland River).

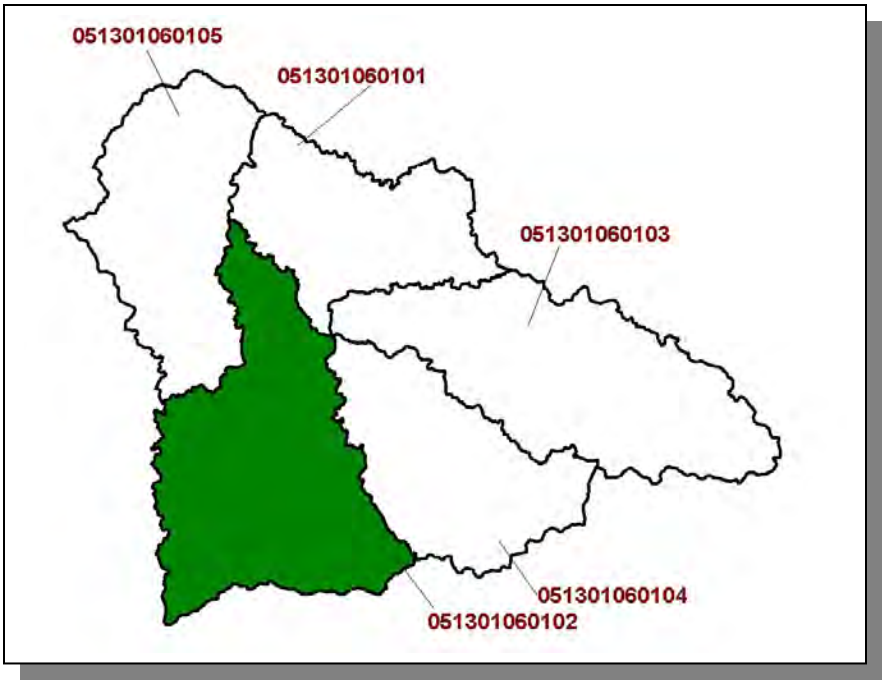

Figure 4-13. Location of Subwatershed 051301060102. *HUC-12 subwatershed boundaries are shown for reference.*

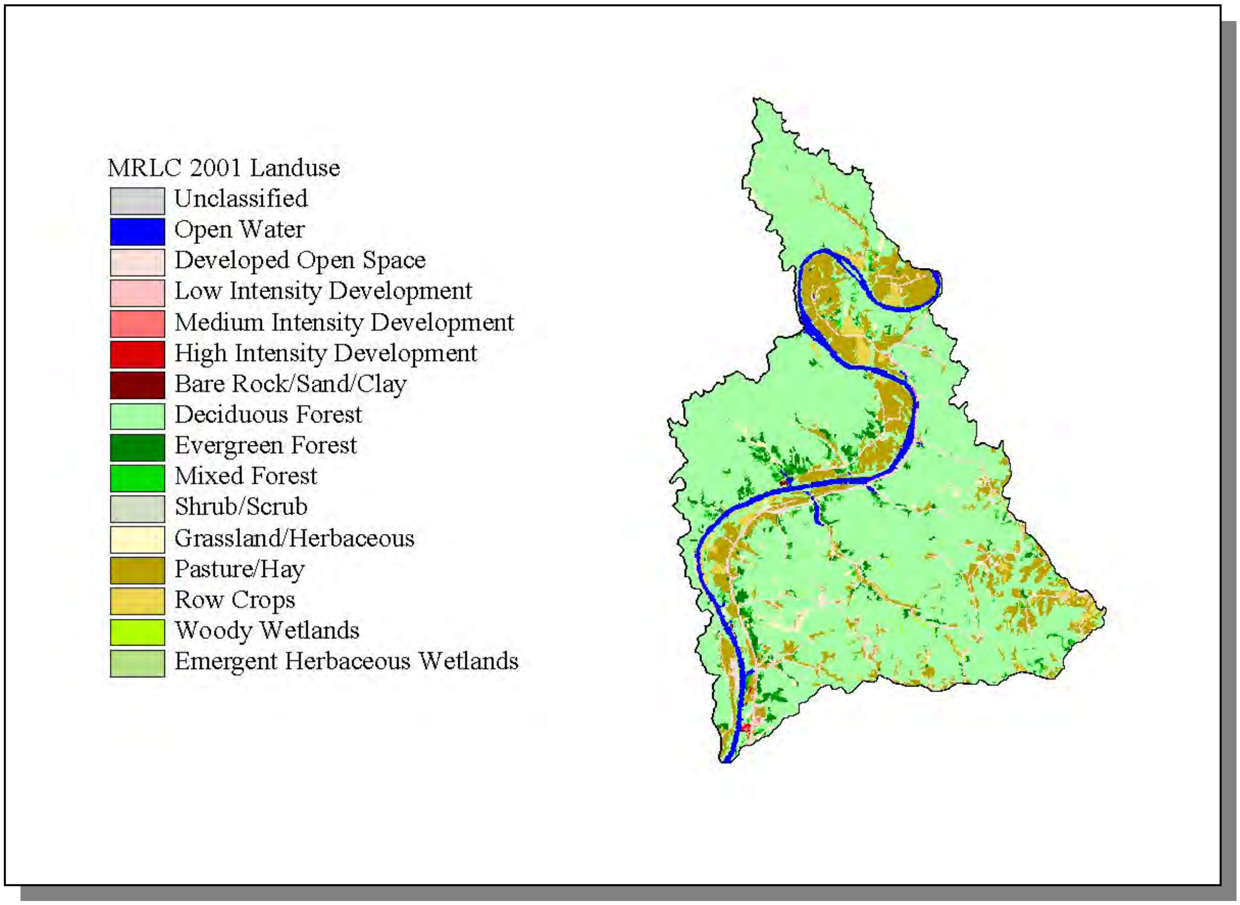

Figure 4-14. Illustration of Land Use Distribution in Subwatershed 051301060102.

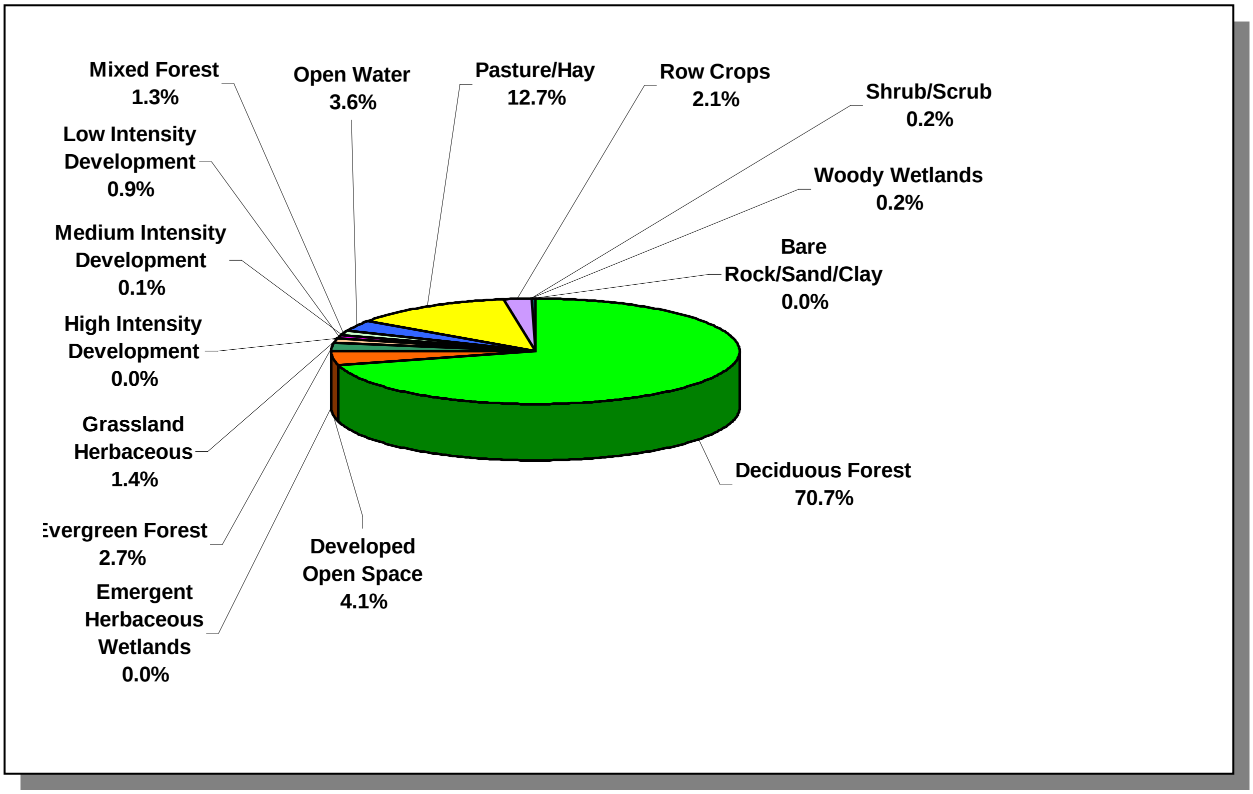

Figure 4-15. Land Use Distribution in Subwatershed 051301060102. *More information is provided in Appendix IV.*

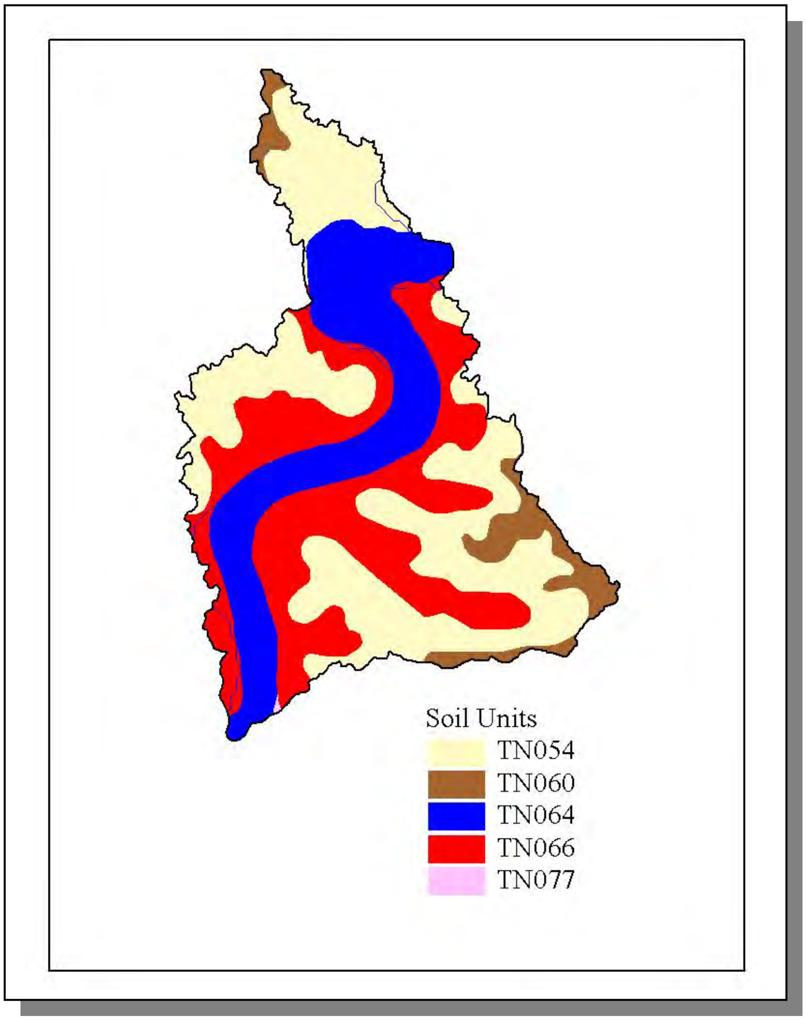

Figure 4-16. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060102.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28
TN077	4.00	C	2.16	5.03	Loam	0.34

Table 4-9. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060102. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Clay	7,238	7,311	7,976	2.48	180	182	198	10.0
Jackson	9,297	9,537	10,984	10.96	1,019	1,045	1,203	18.1
Total	**16,535**	**16,848**	**18,960**		**1,199**	**1,227**	**1,401**	**16.8**

Table 4-10. Population Estimates in Subwatershed 051301060102.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Gainesboro	Jackson	1,002	495	411	82	2

Table 4-11. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060102.

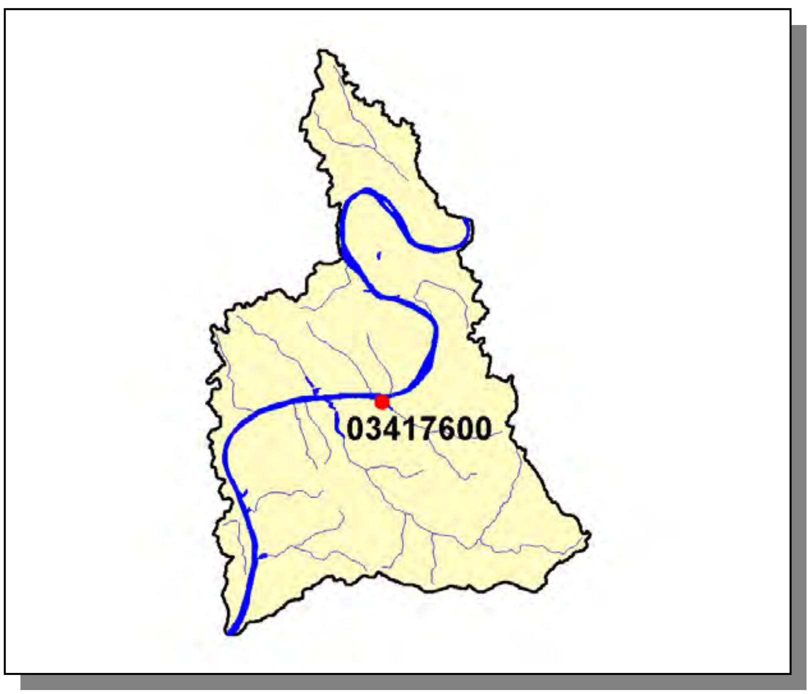

Figure 4-17. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060102. *More information is provided in Appendix IV.*

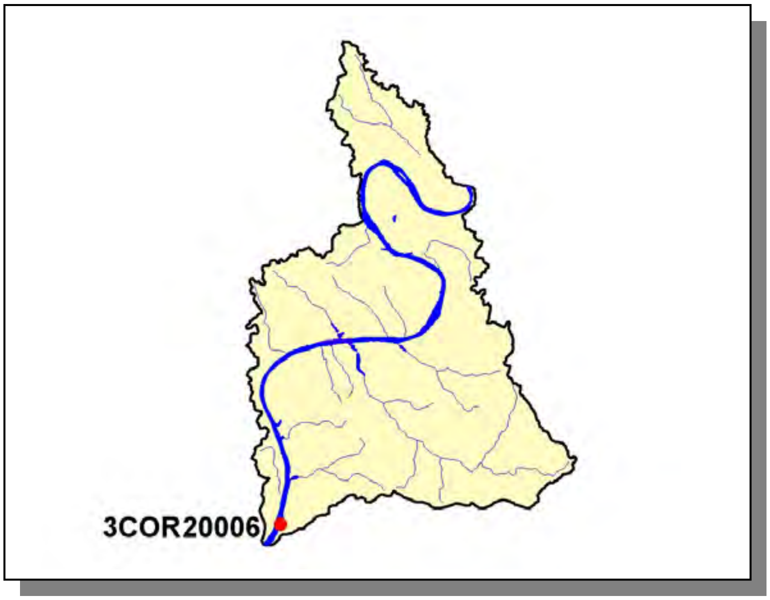

Figure 4-18. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060102. *More information, including site names and locations, is provided in Appendix IV.*

4.2.A.ii.a. Point Source Contributions.

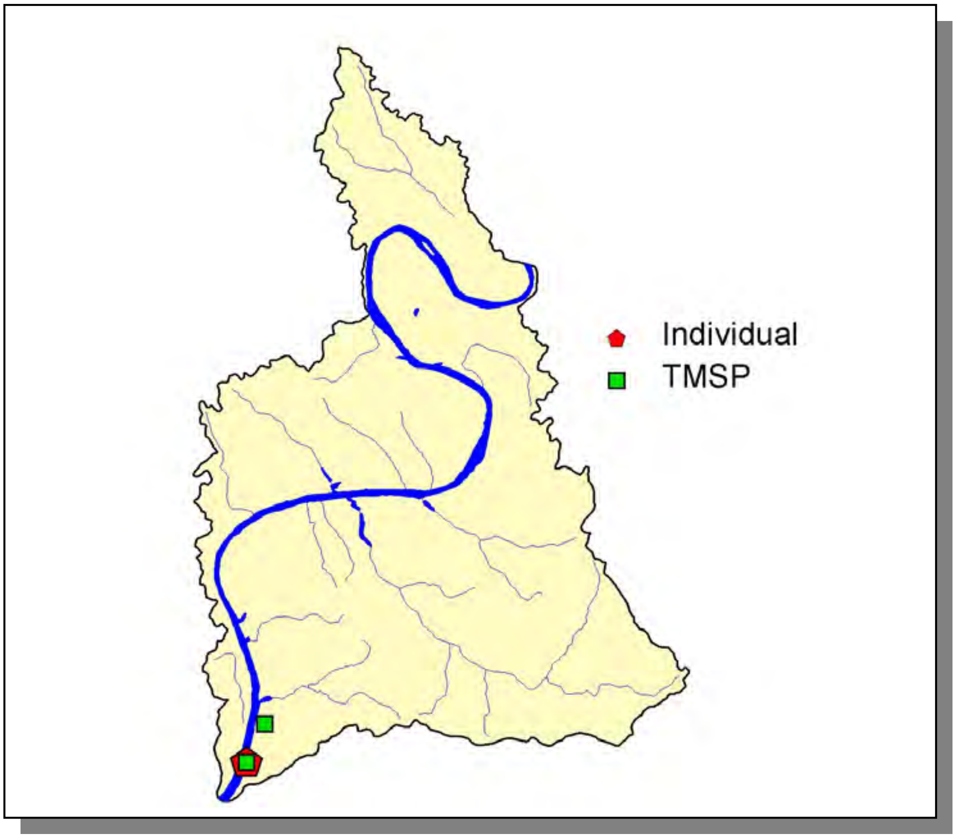

Figure 4-19. Location of Permits Issued in Subwatershed 051301060102. *More information, including the names of facilities, is provided in Appendix IV.*

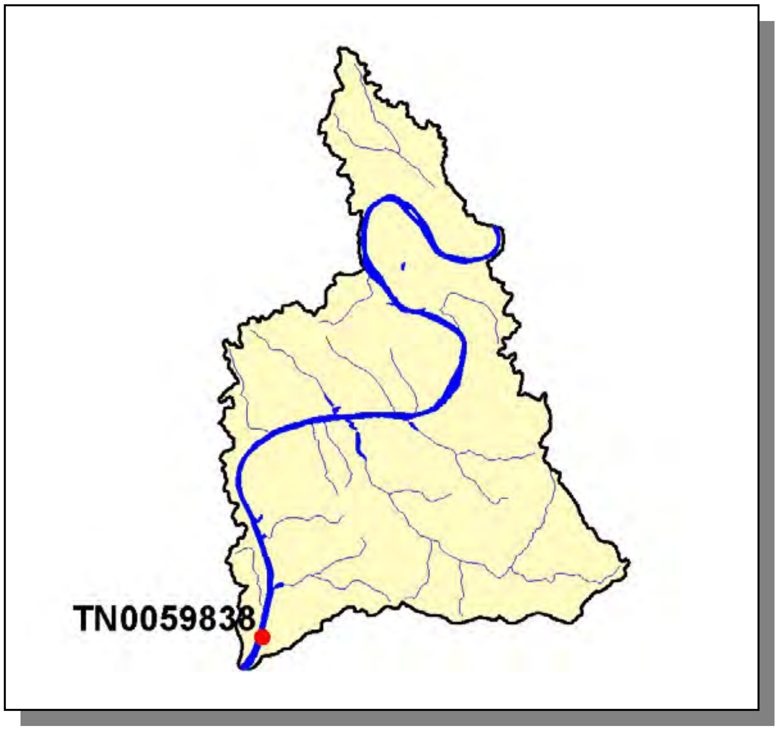

Figure 4-20. Location of Active NPDES Sites in Subwatershed 051301060102. *More information, including the names of facilities, is provided in Appendix IV.*

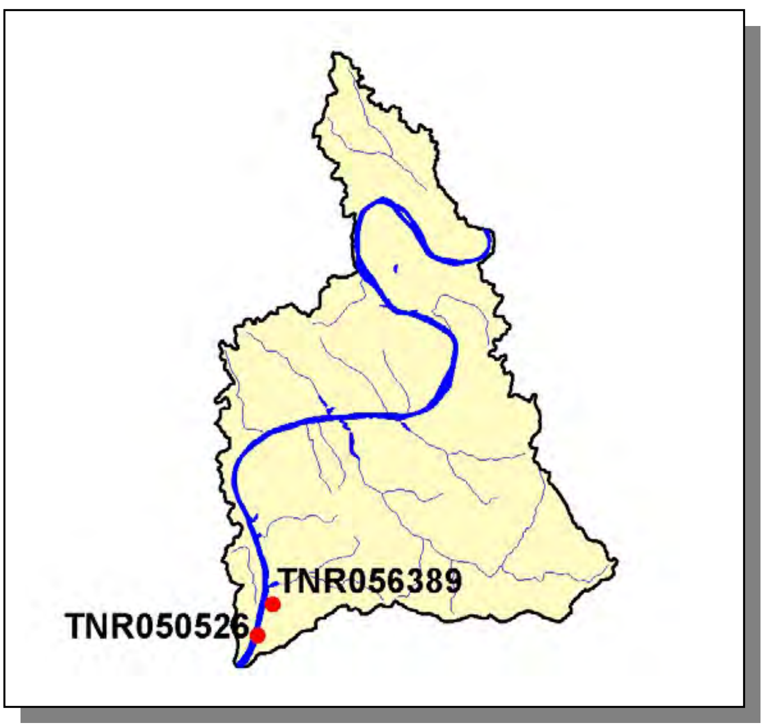

Figure 4-21. Location of TMSP Sites in Subwatershed 051301060102. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.ii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
786	1,793	<5	<5	51	5

Table 4-12. Summary of Livestock Count Estimates in Subwatershed 051301060102. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Clay	0	14,574	0	18	174	23
Jackson	6,962	12,086	10	727	403	39

Table 4-13. Summary of Livestock Count Estimates in Clay and Jackson Counties. *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)
Clay	105.1	105.1	2.3	10.1
Jackson	135.9	135.9	0.9	5.1

Table 4-14. Forest Acreage and Annual Removal Rates (1987-1994) in Clay and Jackson Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	2.07
Grass (Hayland)	0.40
Legumes (Hayland)	0.17
Legumes, Grass (Hayland)	0.53
Grass, Forbs, Legumes (Mixed Pasture)	1.89
Corn (Row Crops)	21.43
Tobacco (Row Crops)	28.52
Farmsteads and Ranch Headquarters	1.35

Table 4-15. Annual Estimated Total Soil Loss in Subwatershed 051301060102.

4.2.A.iii. 051301060103 (Mill Creek).

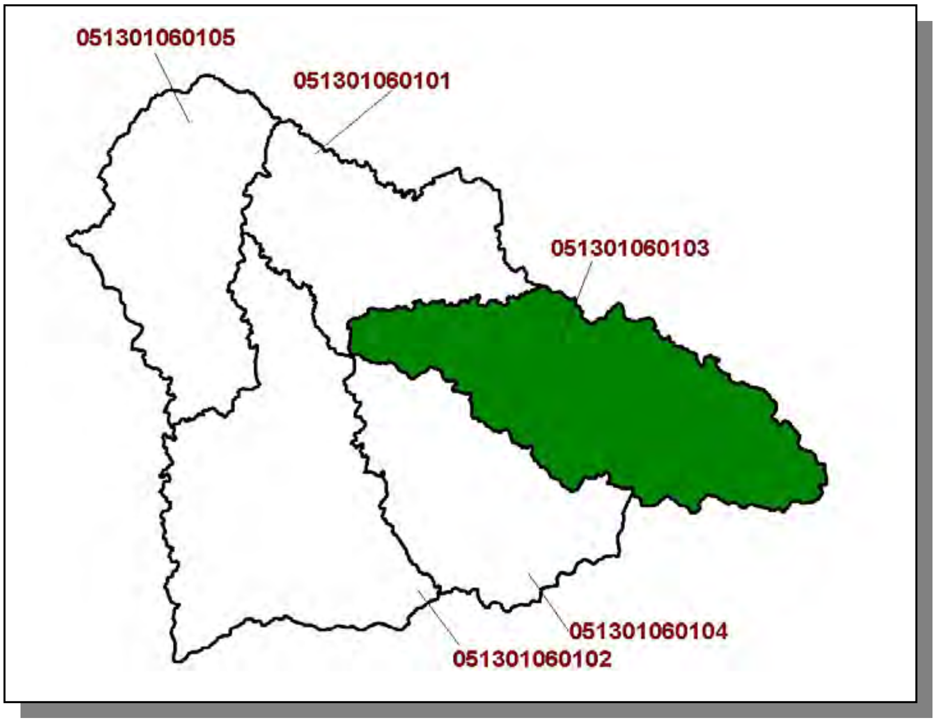

Figure 4-22. Location of Subwatershed 051301060103. *HUC-12 subwatershed boundaries are shown for reference.*

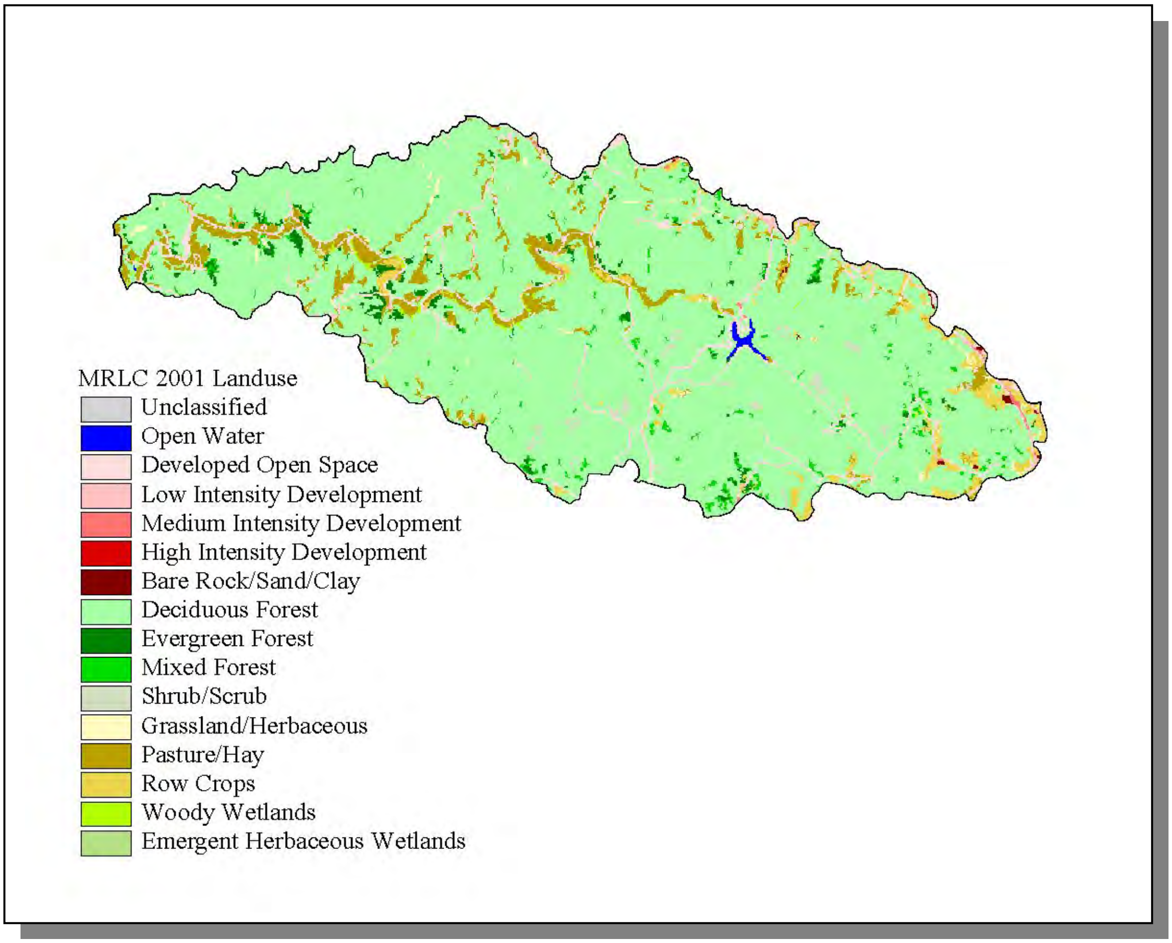

Figure 4-23. Illustration of Land Use Distribution in Subwatershed 051301060103.

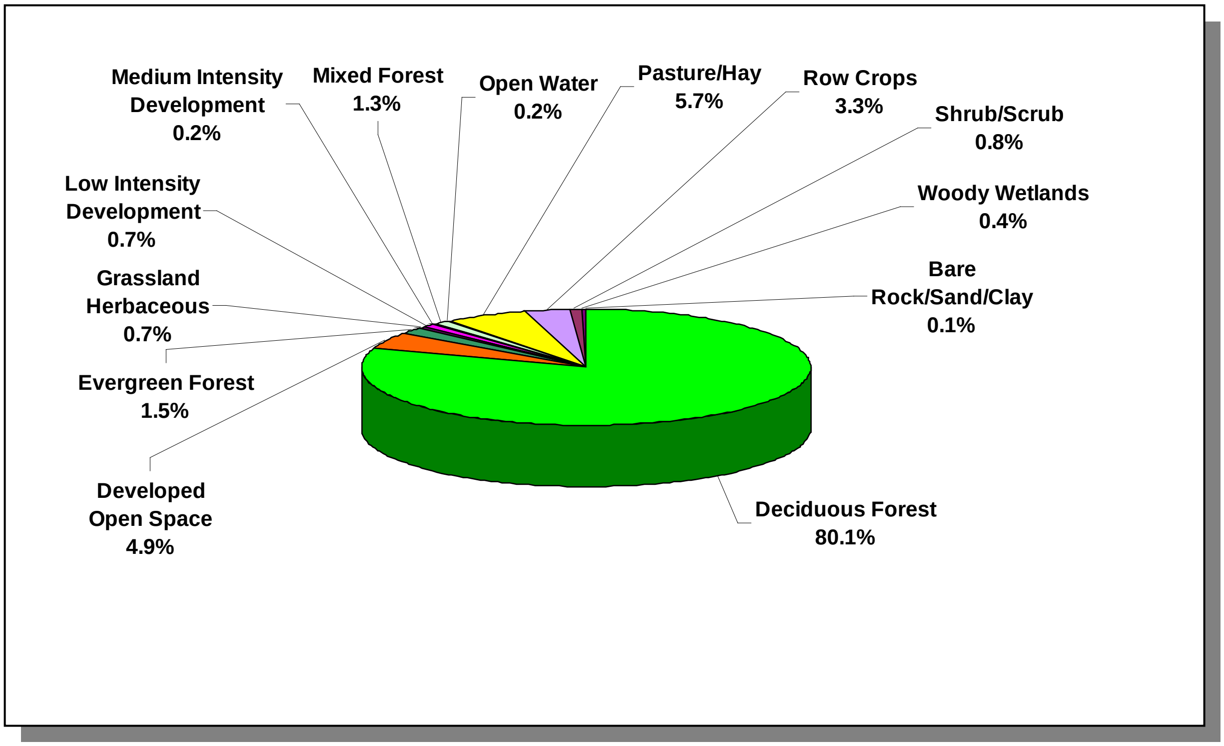

Figure 4-24. Land Use Distribution in Subwatershed 051301060103. *More information is provided in Appendix IV.*

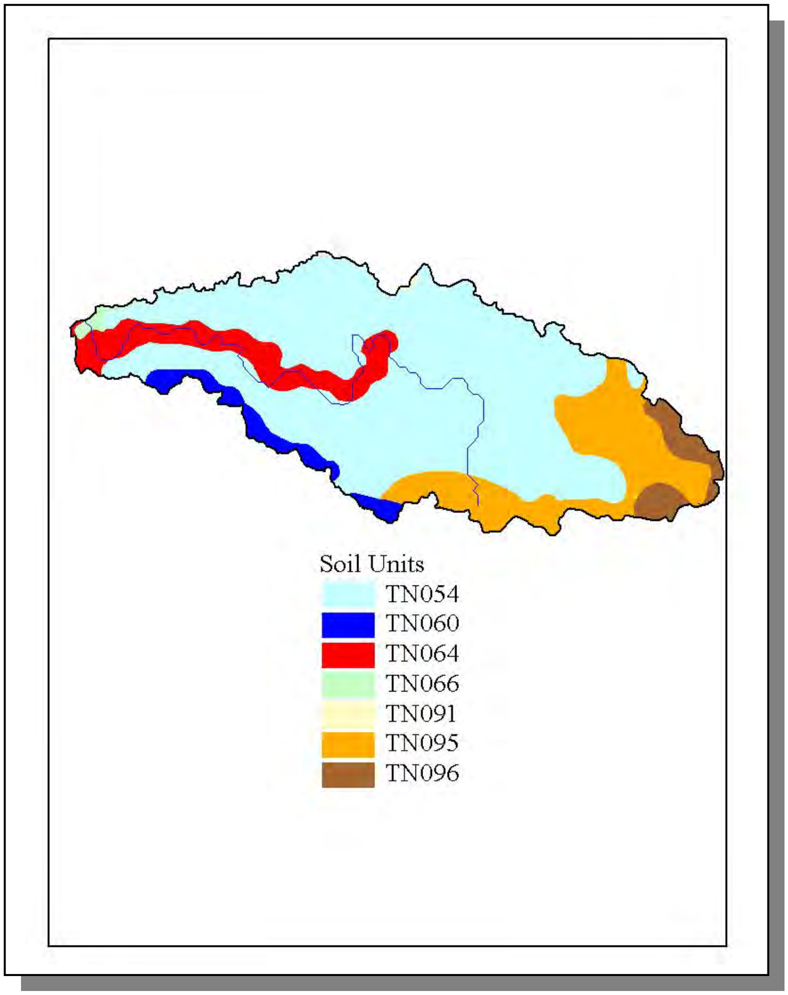

Figure 4-25. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060103.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28
TN091	0.00	B	2.95	5.86	Loam	0.34
TN095	0.00	B	2.35	5.12	Loam	0.31
TN096	19.00	C	1.22	5.16	Silty Loam	0.38

Table 4-16. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060103. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Clay	7,238	7,311	7,976	5.93	429	433	473	10.3
Overton	17,636	19,171	20,118	5.27	930	1,011	1,061	14.1
Total	**24,874**	**26,482**	**28,094**		**1,359**	**1,444**	**1,534**	**12.9**

Table 4-17. Population Estimates in Subwatershed 051301060103.

Figure 4-26. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060103. *More information, including site names and locations, is provided in Appendix IV.*

4.2.A.iii.a. Point Source Contributions.

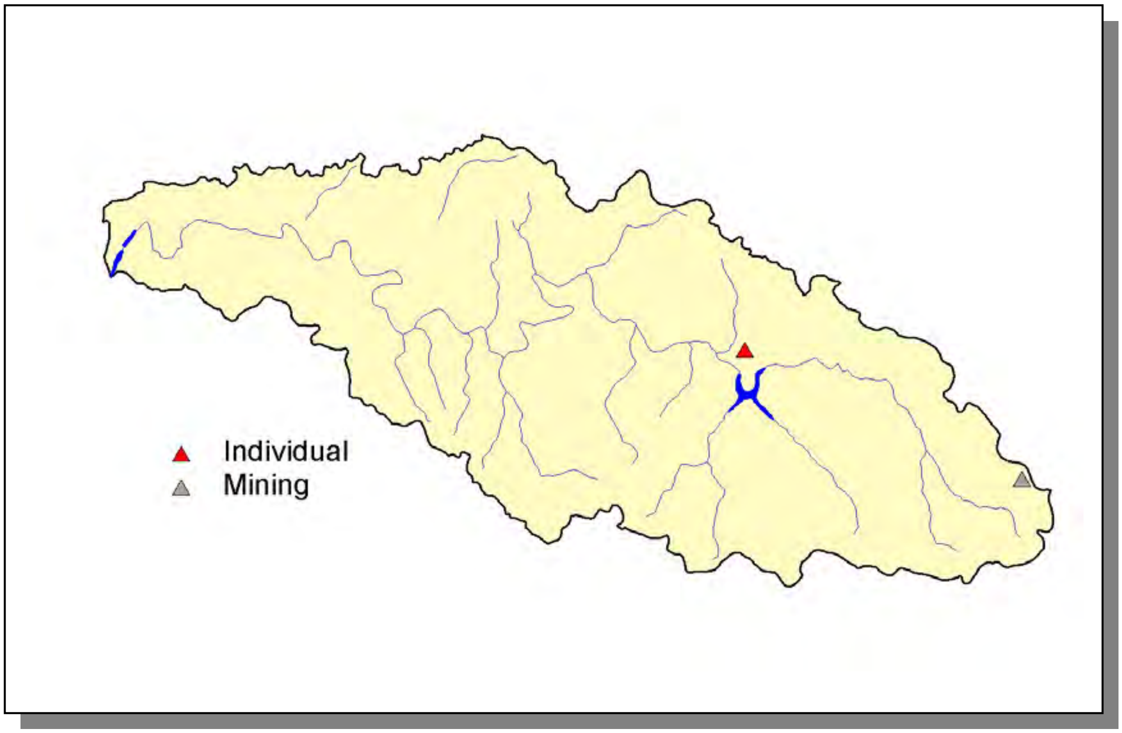

Figure 4-27. Location of Permits Issued in Subwatershed 051301060103. *More information, including the names of facilities, is provided in Appendix IV.*

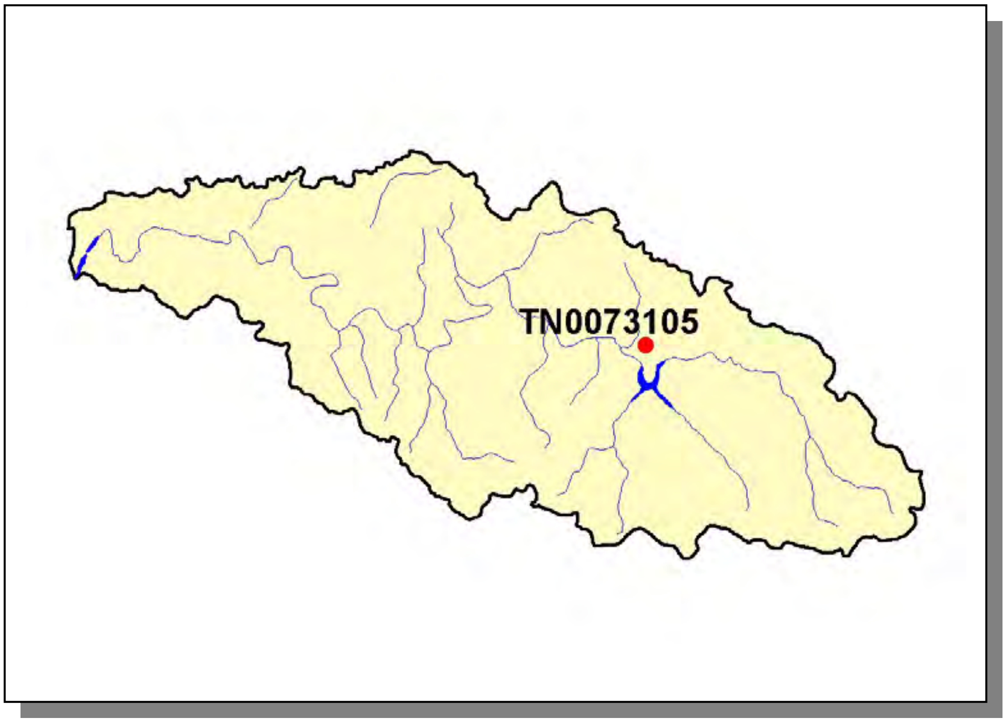

Figure 4-28. Location of Active NPDES Sites in Subwatershed 051301060103. *More information, including the names of facilities, is provided in Appendix IV.*

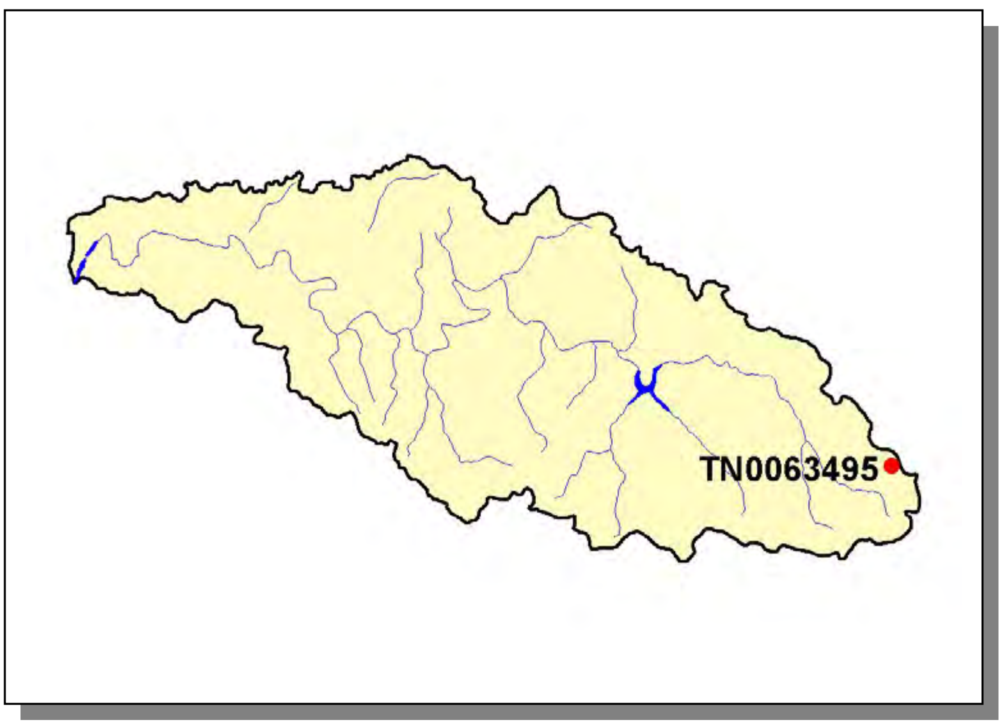

Figure 4-29. Location of Actve Mining Sites in Subwatershed 051301060103. *More information, including the names of mining operations, is provided in Appendix IV.*

4.2.A.iii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
152	640	12	<5	12	<5

Table 4-18. Summary of Livestock Count Estimates in Subwatershed 051301060103. *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.*

County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Clay	0	14,574	0	18	174	23
Overton	15,150	27,812	1,200	1,173	811	59

Table 4-19. Summary of Livestock Count Estimates in Clay and Overton Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Clay	105.1	105.1	2.3	10.1
Overton	170.3	170.3	1.7	7.0

Table 4-20. Forest Acreage and Annual Removal Rates (1987-1994) in Clay and Overton Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.62
Grass (Hayland)	0.34
Legumes, Grass (Hayland)	1.93
Grass, Forbs, Legumes (Mixed Pasture)	0.96
Corn (Row Crops)	4.35
Tobacco (Row Crops)	28.52
Soybeans (Row Crops)	10.79
Wheat (Close-Grown Cropland)	7.00
Other Vegetable and Truck Crops	21.46
Conservation Reserve Program Lands	0.46
Farmsteads and Ranch Headquarters	0.98

Table 4-21. Annual Estimated Total Soil Loss in Subwatershed 051301060103.

4.2.A.iv. 051301060104 (Dry Fork Creek).

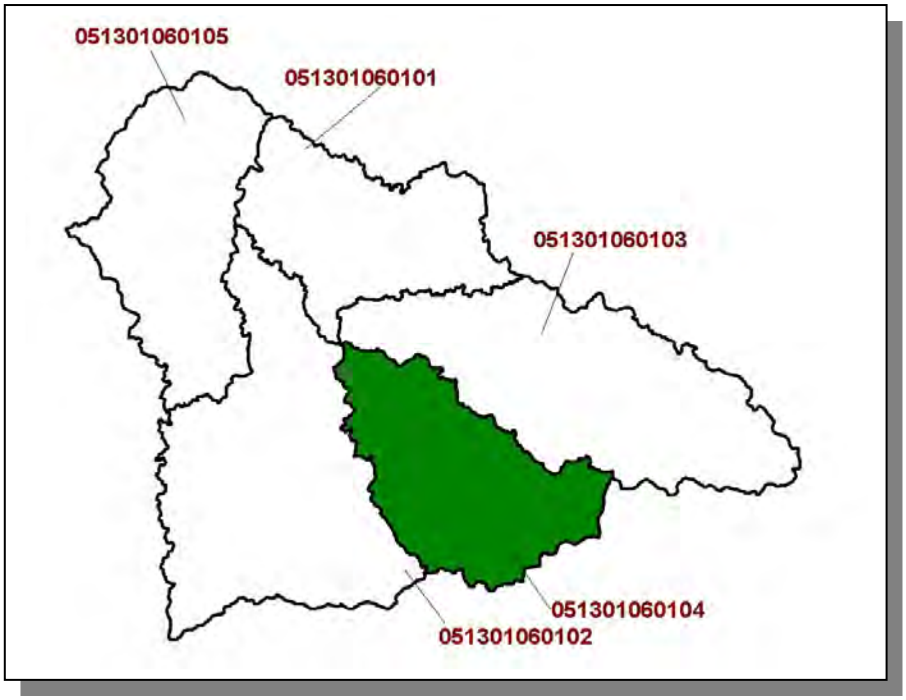

Figure 4-30. Location of Subwatershed 051301060104. *HUC-12 subwatershed boundaries are shown for reference.*

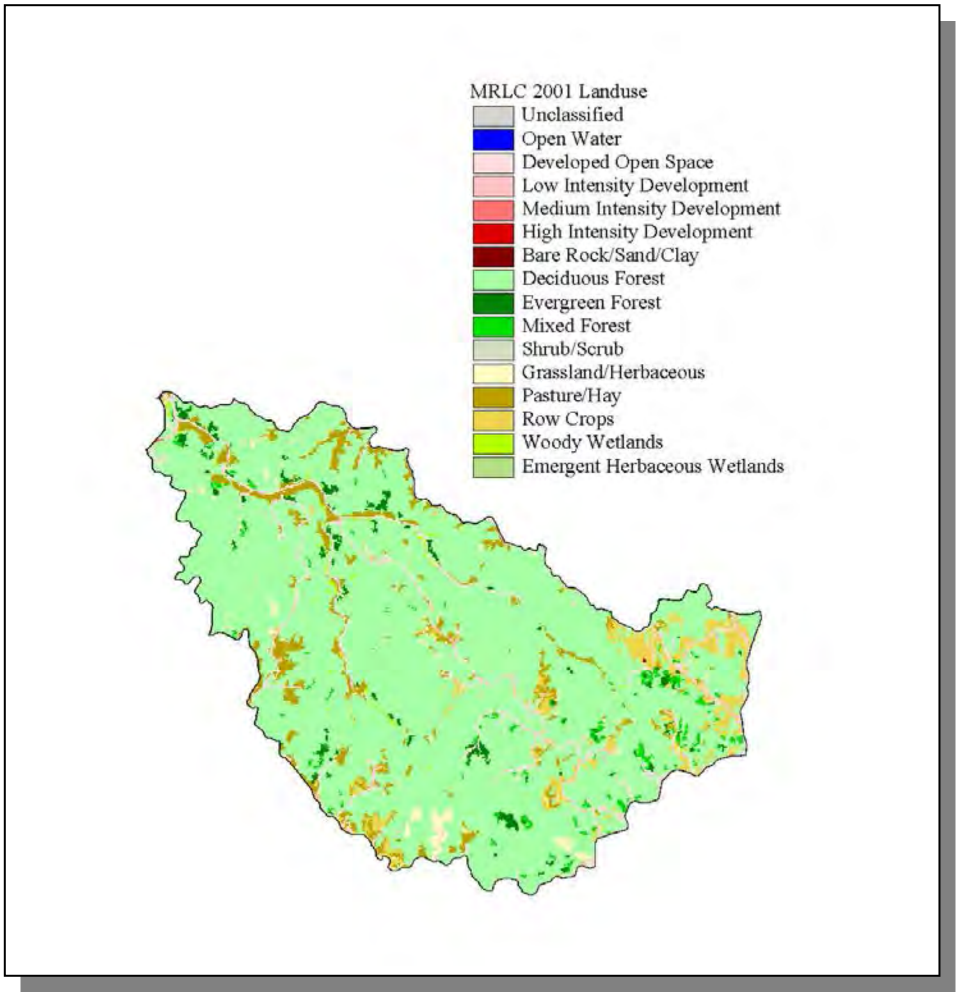

Figure 4-31. Illustration of Land Use Distribution in Subwatershed 051301060104.

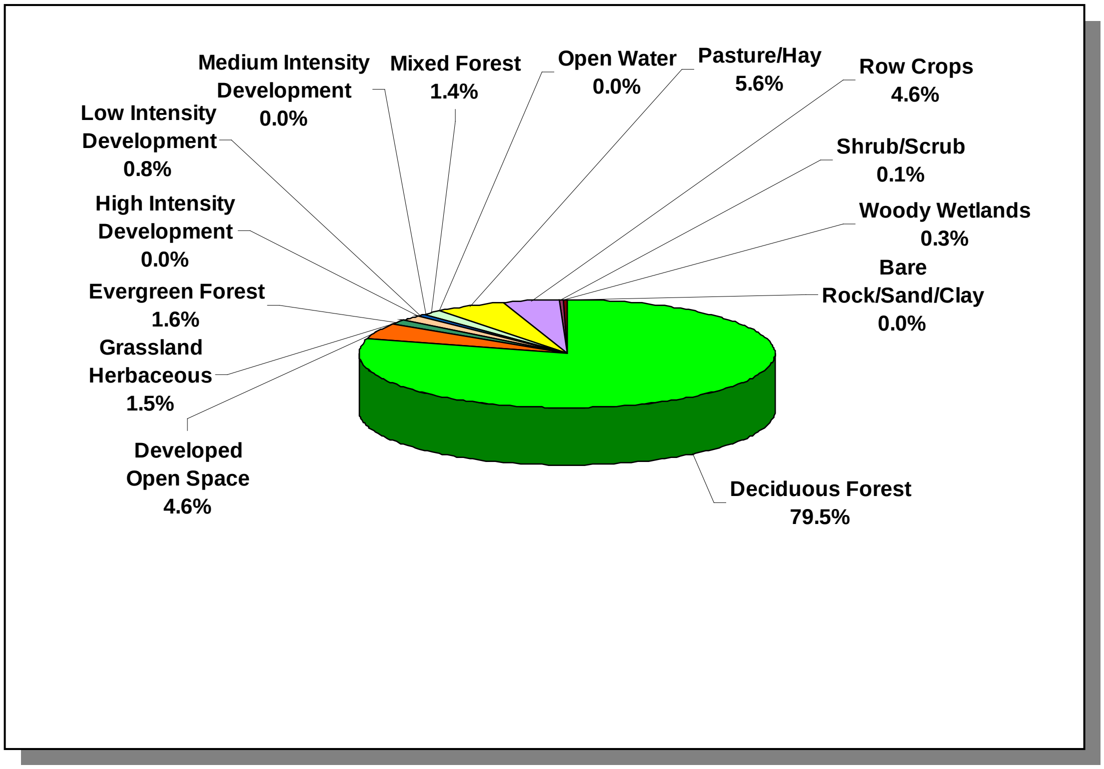

Figure 4-32. Land Use Distribution in Subwatershed 051301060104. *More information is provided in Appendix IV.*

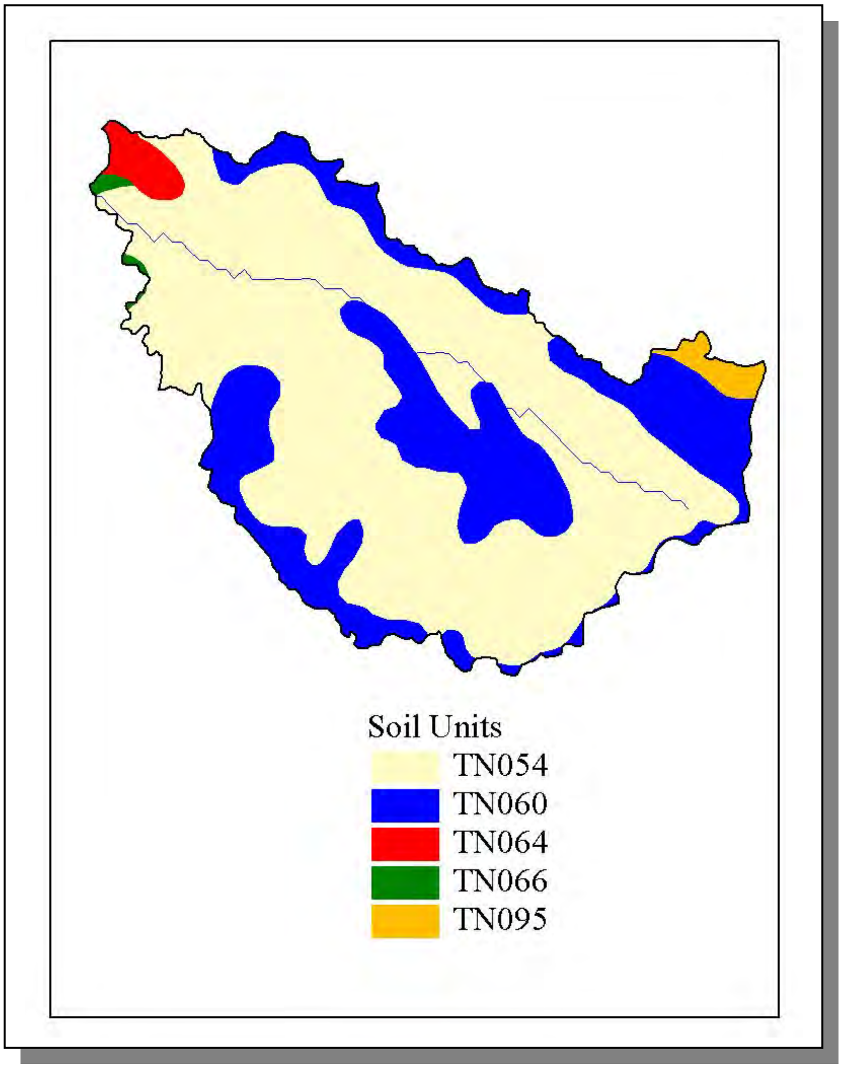

Figure 4-33. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060104.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28
TN095	0.00	B	2.35	5.12	Loam	0.31

Table 4-22. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060104. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Clay	7,238	7,311	7,976	4.62	334	338	369	10.5
Jackson	9,297	9,537	10,984	2.16	201	206	237	17.9
Overton	17,636	19,171	20,118	1.62	286	311	327	14.3
Total	**34,171**	**36,019**	**39,078**		**821**	**855**	**933**	**13.6**

Table 4-23. Population Estimates in Subwatershed 051301060104.

Figure 4-34. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060104. *More information, including site names and locations, is provided in Appendix IV.*

4.2.A.iv.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.A.iv.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
204	523	10	<5	13	<5

Table 4-24. Summary of Livestock Count Estimates in Subwatershed 051301060104. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Clay	0	14,574	0	18	174	23
Jackson	6,962	12,086	10	727	403	39
Overton	15,150	27,812	1,200	1,173	811	59

Table 4-25. Summary of Livestock Count Estimates in Clay, Jackson, and Overton Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Clay	105.1	105.1	2.3	10.1
Jackson	135.9	135.9	0.9	5.1
Overton	170.3	170.3	1.7	7.0

Table 4-26. Forest Acreage and Annual Removal Rates (1987-1994) in Clay, Jackson, and Overton Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	1.19
Grass (Hayland)	0.36
Legumes (Hayland)	0.17
Legumes, Grass (Hayland)	1.39
Grass, Forbs, Legumes (Mixed Pasture)	1.35
Corn (Row Crops)	12.79
Tobacco (Row Crops)	28.52
Soybeans (Row Crops)	10.79
Wheat (Close-Grown Cropland)	7.00
Other Vegetable and Truck Crops	21.46
Conservation Reserve Program Lands	0.46
Farmsteads and Ranch Headquarters	1.23

Table 4-27. Annual Estimated Total Soil Loss in Subwatershed 051301060104.

4.2.A.v. 051301060105 (Brimstone Creek).

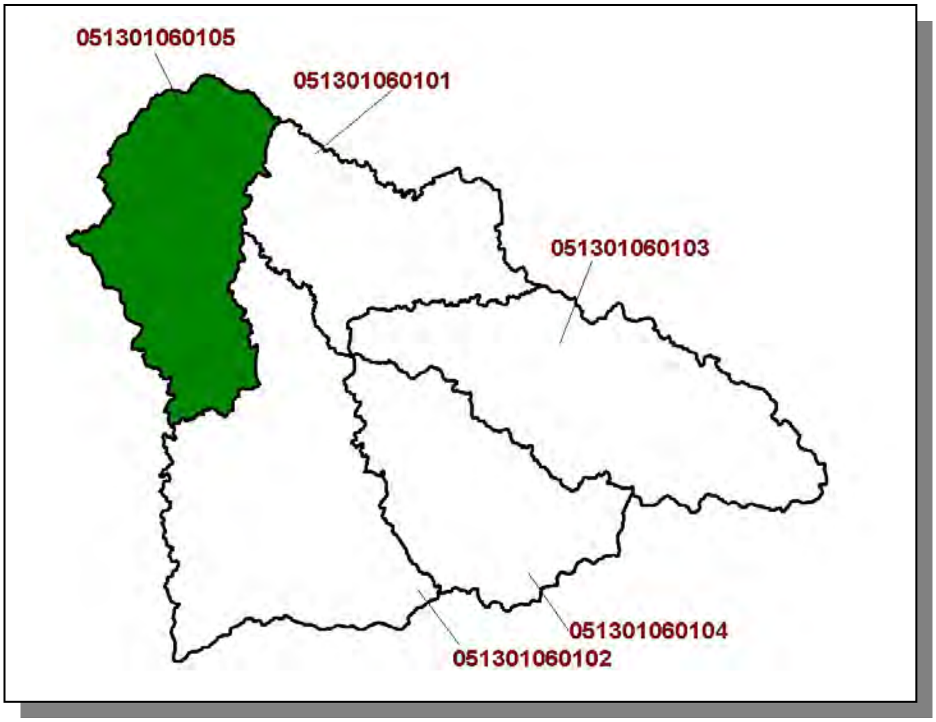

Figure 4-35. Location of Subwatershed 051301060105. *HUC-12 subwatershed boundaries are shown for reference.*

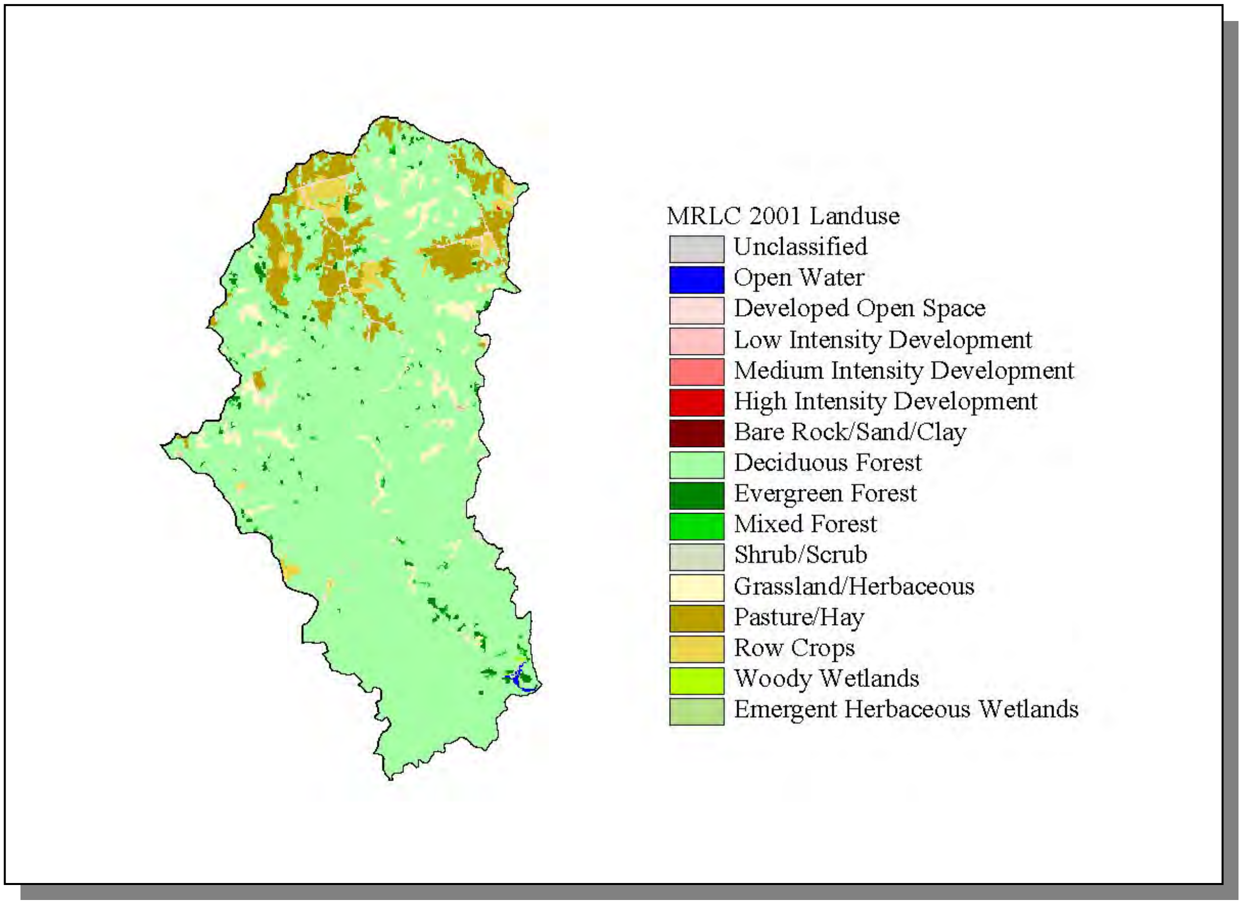

Figure 4-36. Illustration of Land Use Distribution in Subwatershed 051301060105.

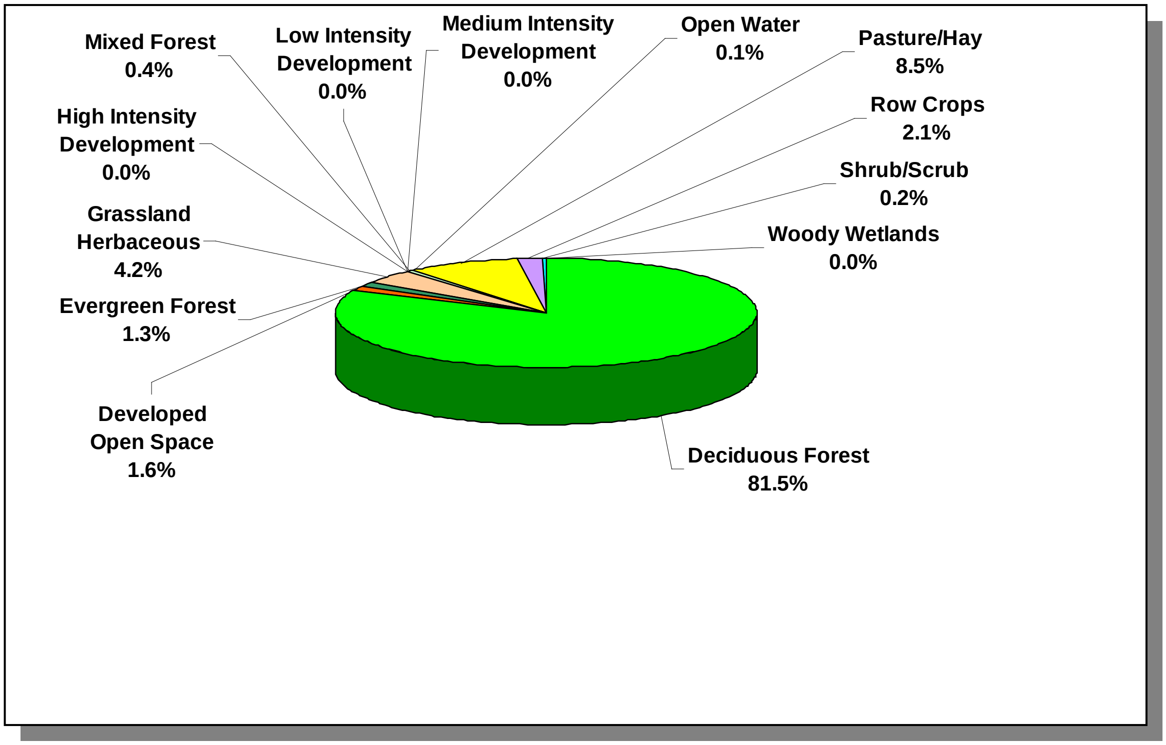

Figure 4-37. Land Use Distribution in Subwatershed 051301060105. *More information is provided in Appendix IV.*

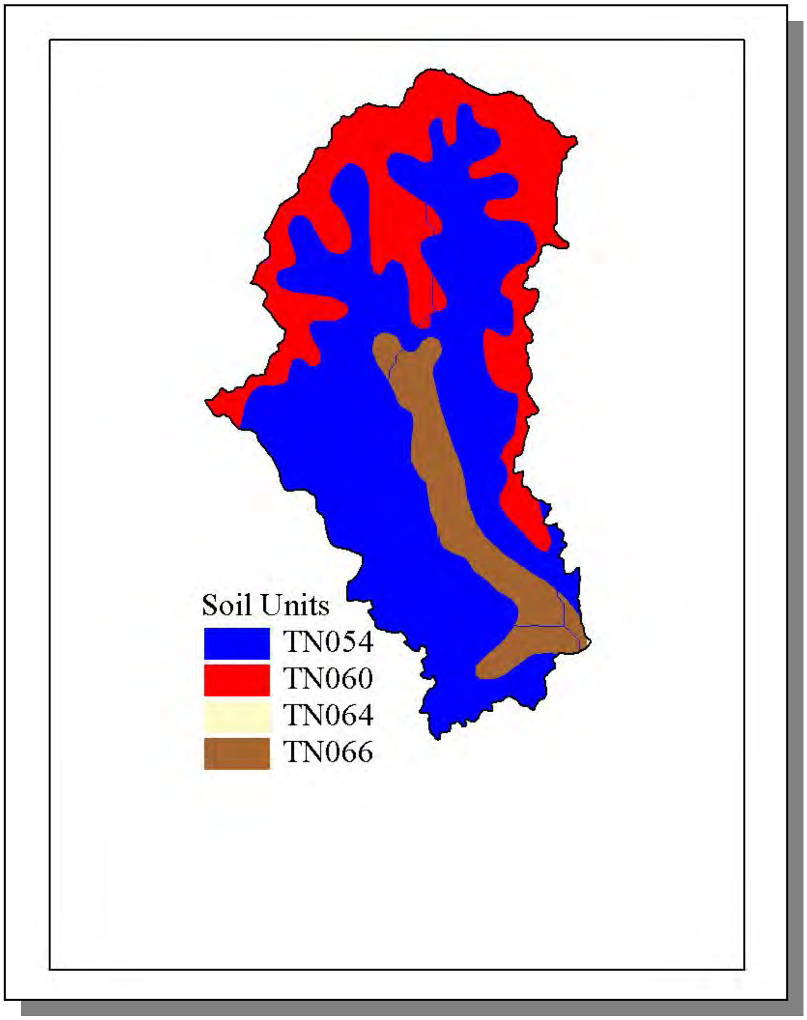

Figure 4-38. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060105.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-28. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060105. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Clay	7,238	7,311	7,976	9.32	674	681	743	10.2
Jackson	9,297	9,537	10,984	1.08	100	103	118	18.0
Total	**16,535**	**16,848**	**18,960**		**774**	**784**	**861**	**11.2**

Table 4-29. Population Estimates in Subwatershed 051301060105.

Figure 4-39. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060105. *More information, including site names and locations, is provided in Appendix IV.*

4.2.A.v.a. Point Source Contributions.

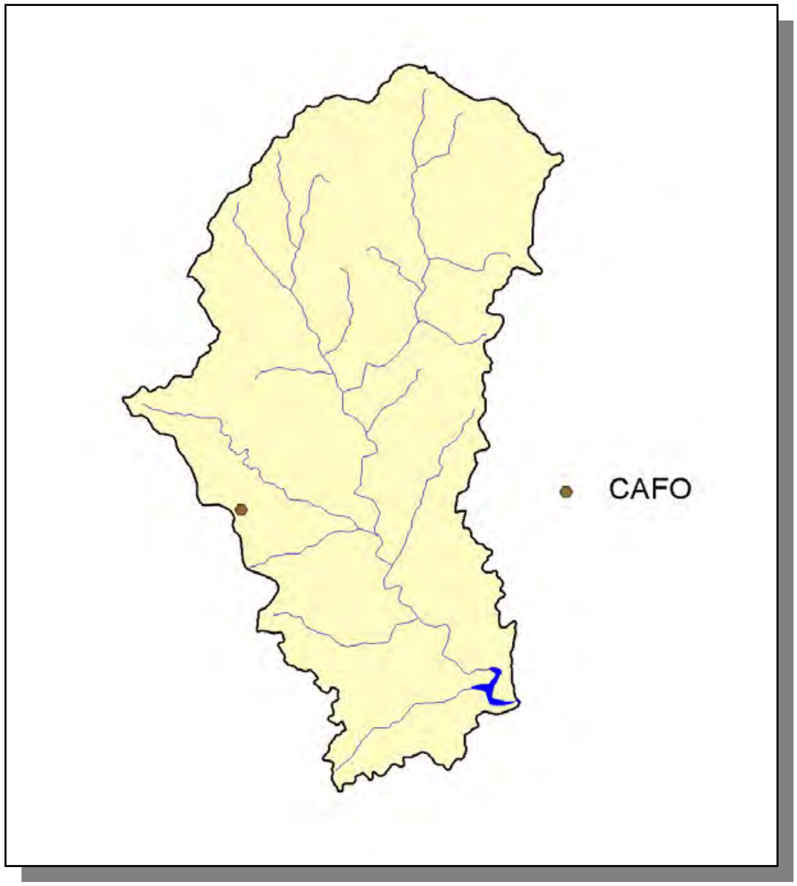

Figure 4-40. Location of Permits Issued in Subwatershed 051301060105. More information, including the names of facilities, is provided in Appendix IV.

Figure 4-41. Location of Concentrated Animal Feeding Operations (CAFO) in Subwatershed 051301060105. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.v.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS			
Cattle	Chickens (Layers)	Hogs	Sheep
1,385	<5	17	<5

Table 4-30. Summary of Livestock Count Estimates in Subwatershed 051301060105. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Clay	0	14,574	0	18	174	23
Jackson	6,962	12,086	10	727	403	39

Table 4-31. Summary of Livestock Count Estimates in Clay and Jackson Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Clay	105.1	105.1	2.3	10.1
Jackson	135.9	135.9	0.9	5.1

Table 4-32. Forest Acreage and Annual Removal Rates (1987-1994) in Clay and Jackson Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	1.28
Grass (Hayland)	0.40
Legumes (Hayland)	0.17
Legumes, Grass (Hayland)	0.53
Grass, Forbs, Legumes (Mixed Pasture)	1.46
Corn (Row Crops)	21.43
Tobacco (Row Crops)	28.52
Farmsteads and Ranch Headquarters	1.53

Table 4-33. Annual Estimated Total Soil Loss in Subwatershed 051301060105.

4.2.B. 0513010602.

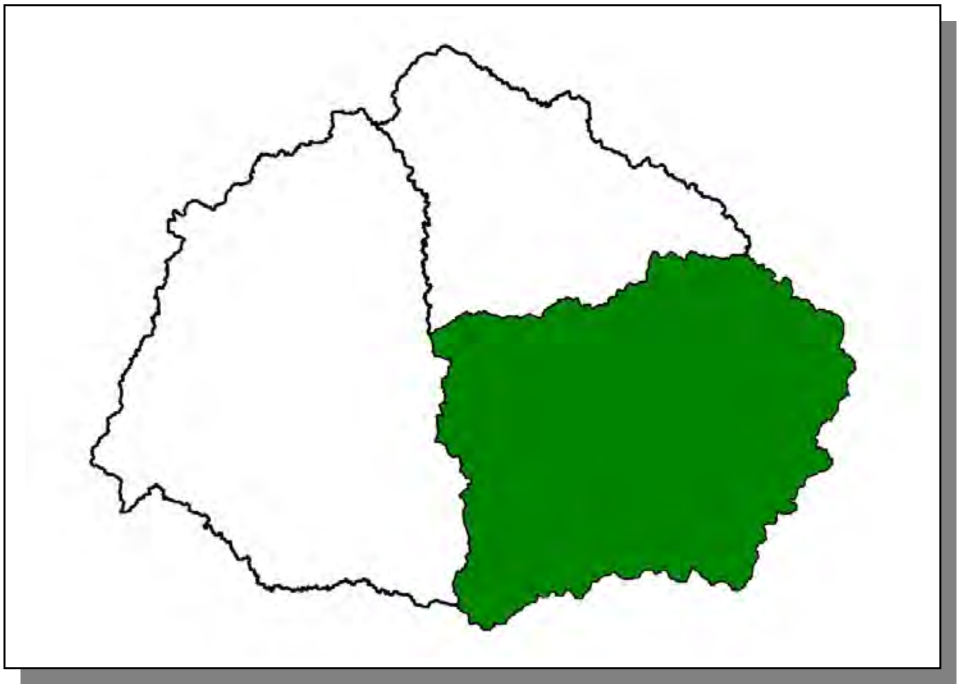

Figure 4-42. Location of Subwatershed 0513010602. *All Cordell Hull Lake HUC-10 subwatershed boundaries are shown for reference.*

4.2.B.i. 051301060201 (Roaring River).

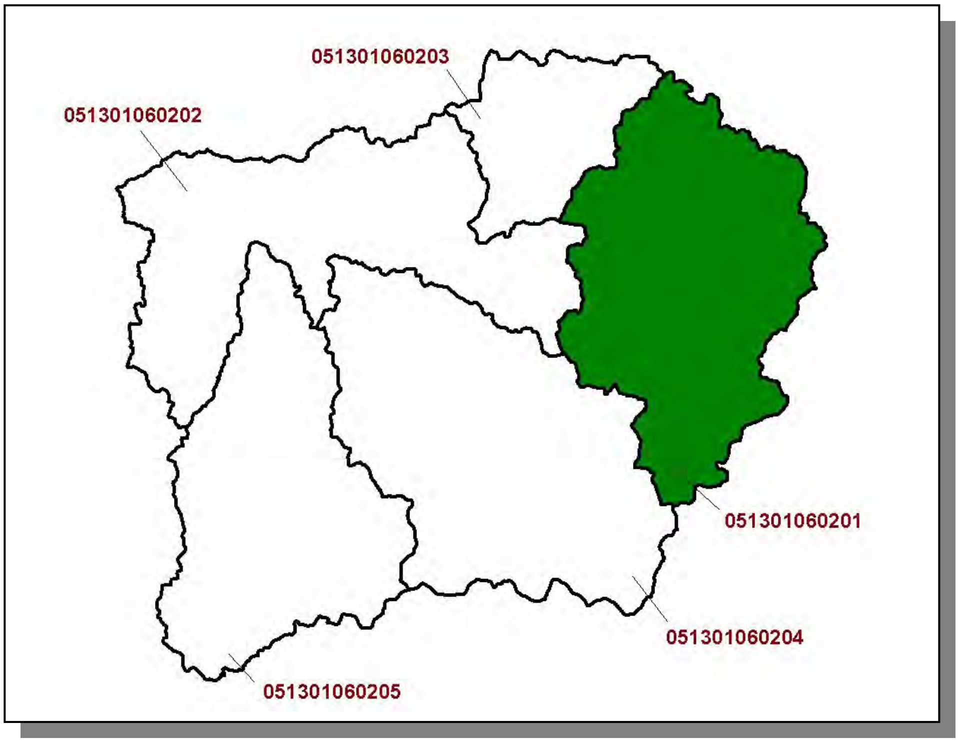

Figure 4-43. Location of Subwatershed 051301060201. *HUC-12 subwatershed boundaries are shown for reference.*

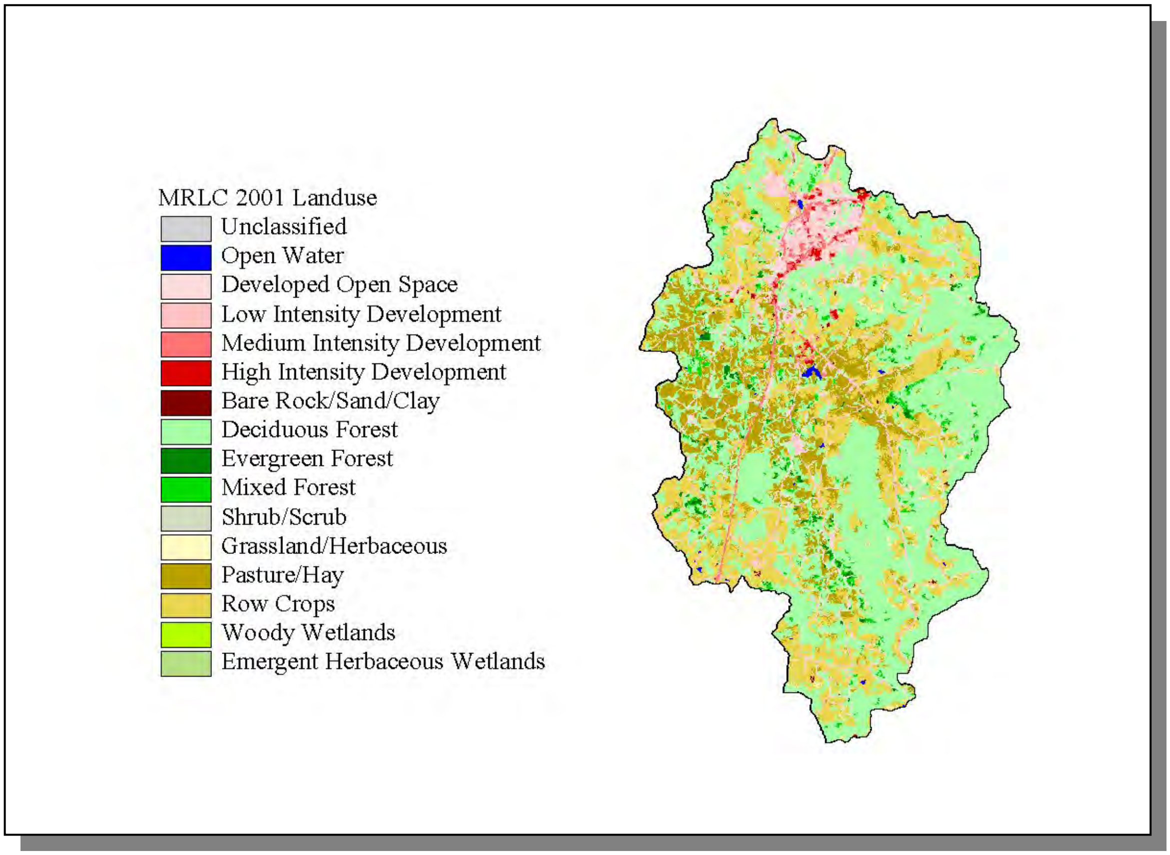

Figure 4-44. Illustration of Land Use Distribution in Subwatershed 051301060201.

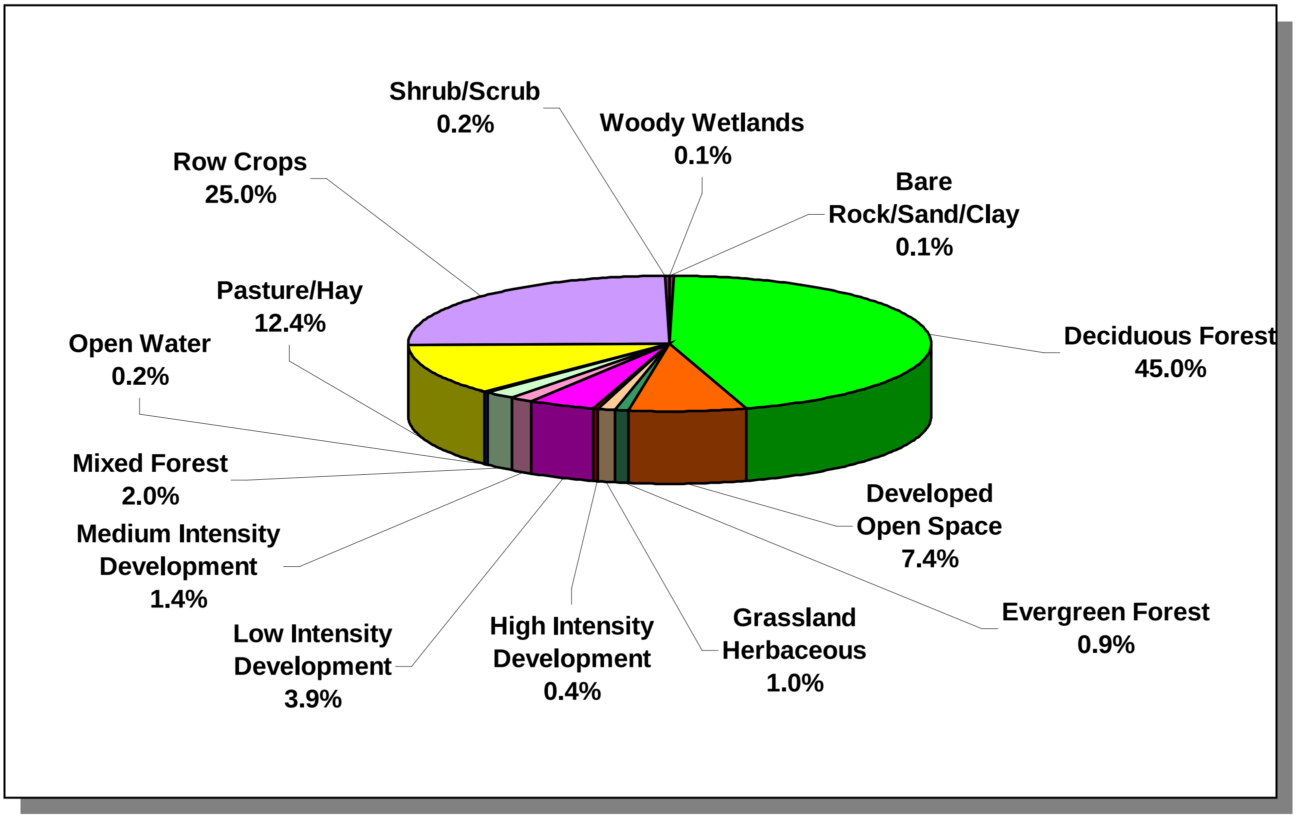

Figure 4-45. Land Use Distribution in Subwatershed 051301060201. *More information is provided in Appendix IV.*

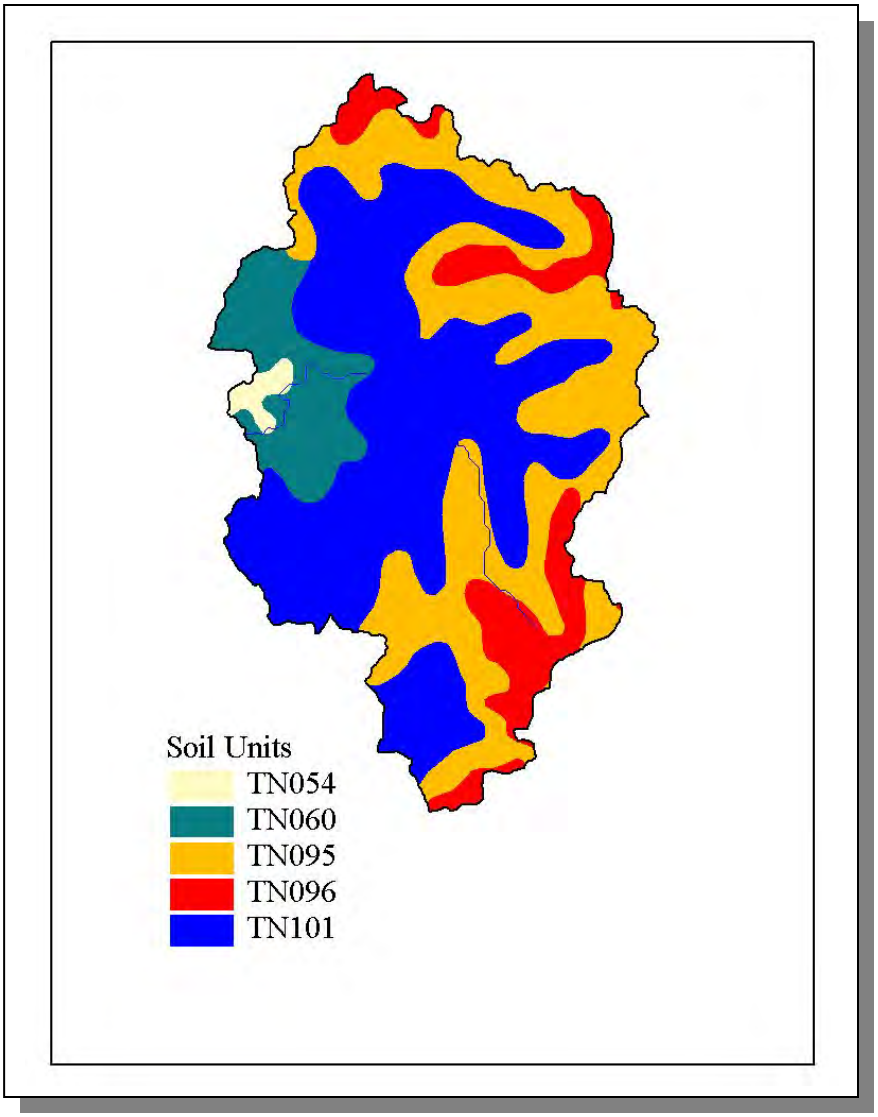

Figure 4-46. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060201.

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
TN095	0.00	B	2.35	5.12	Loam	0.31
TN096	10.00	C	1.22	5.16	Silty Loam	0.38
TN101	0.00	B	1.71	5.39	Loam	0.35

Table 4-34. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060201. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Overton	17,636	19,171	20,118	16.2	2,858	3,107	3,260	14.1

Table 4-35. Population Estimates in Subwatershed 051301060201.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Livingston	Overton	3,809	1,679	1,298	344	37

Table 4-36. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060201.

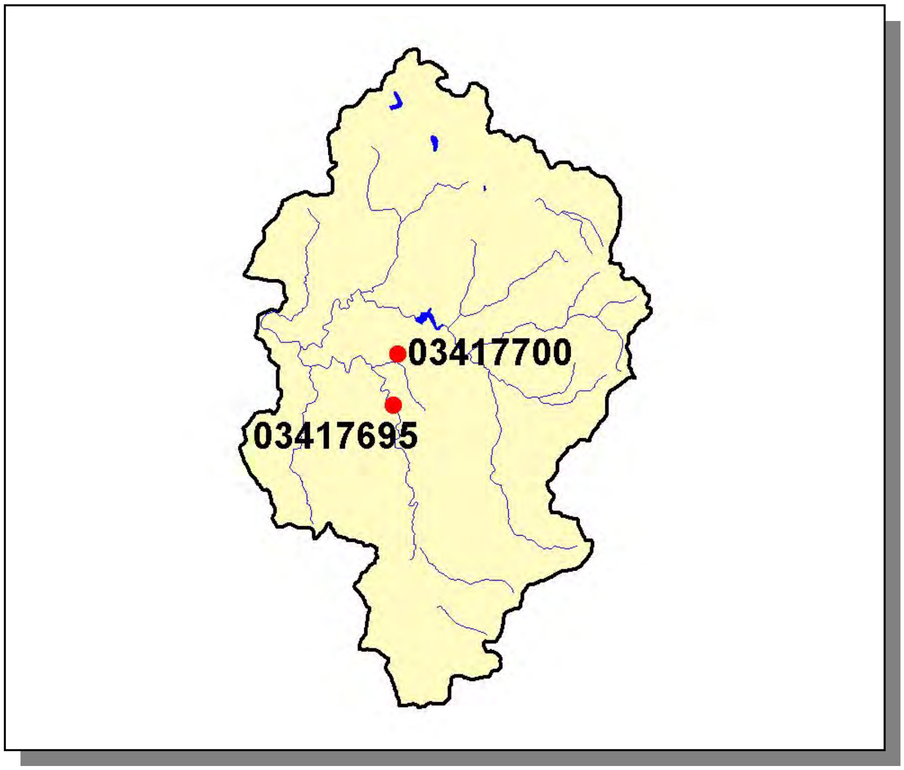

Figure 4-47. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060201. *More information is provided in Appendix IV.*

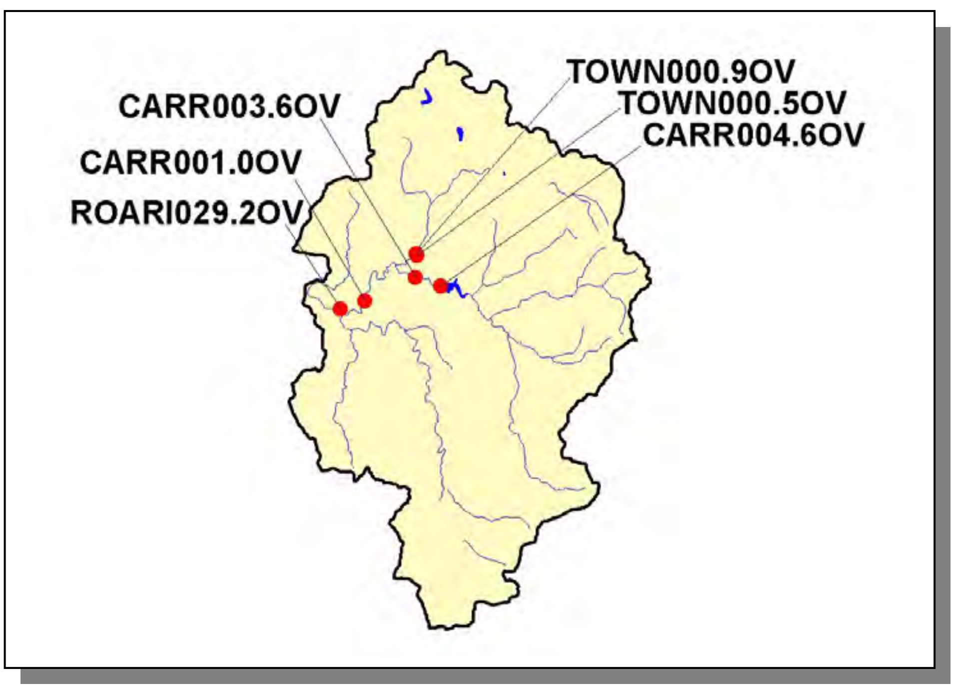

Figure 4-48. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060201. *More information, including site names and locations, is provided in Appendix IV.*

4.2.B.i.a. Point Source Contributions.

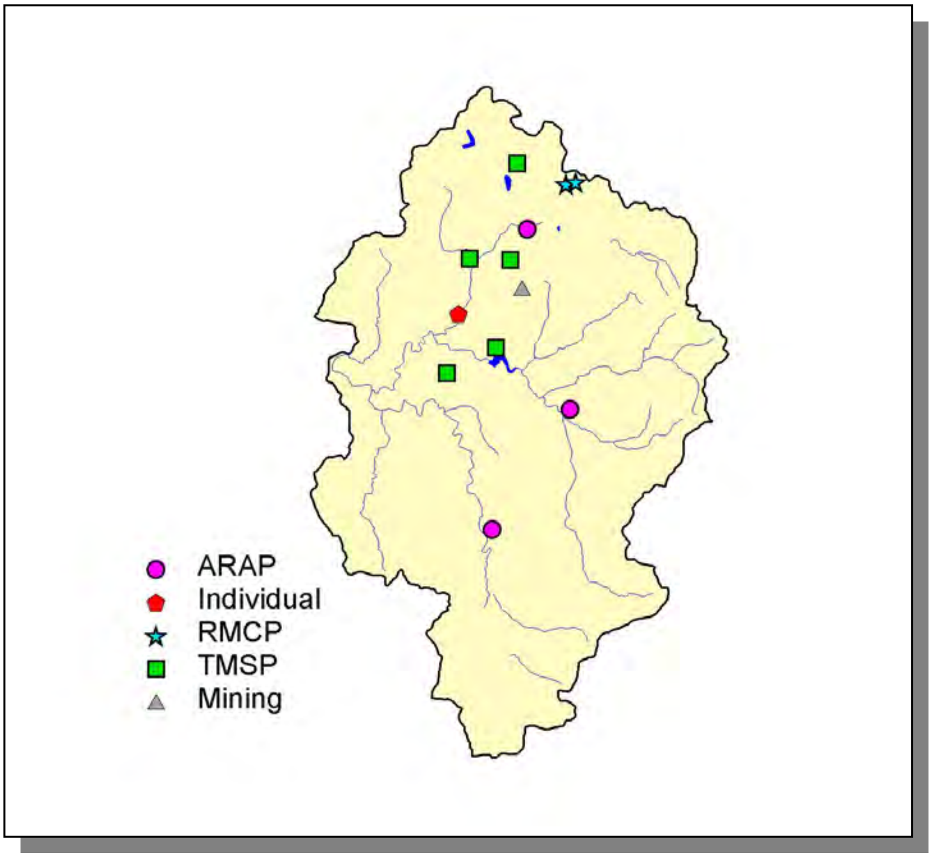

Figure 4-49. Location of Permits Issued in Subwatershed 051301060201. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-50. Location of Active NPDES Sites in Subwatershed 051301060201. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-51. Location of Active Mining Sites in Subwatershed 051301060201. *More information, including the names of mining operations, is provided in Appendix IV.*

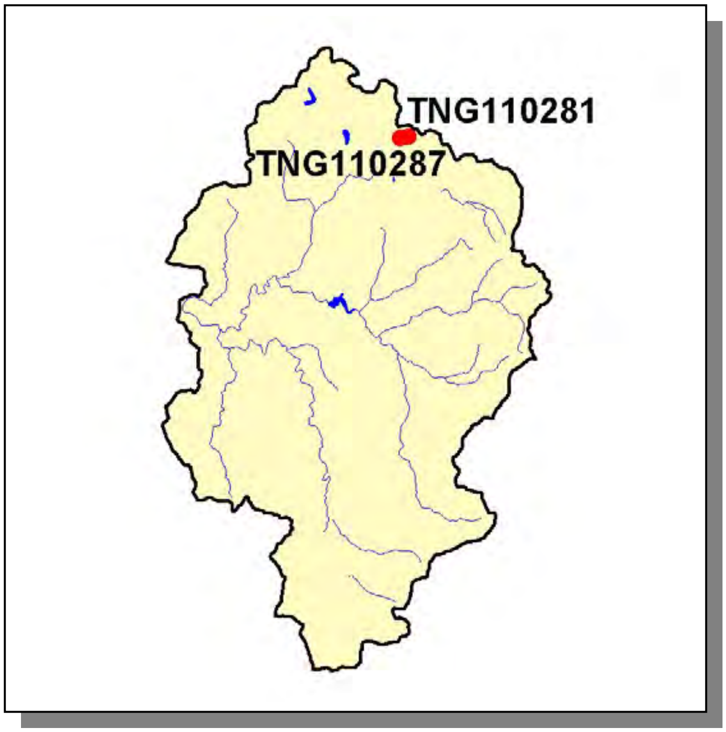

Figure 4-52. Location of Ready Mix Concrete Plants (RMCP) in Subwatershed 051301060201. *More information is provided in Appendix IV.*

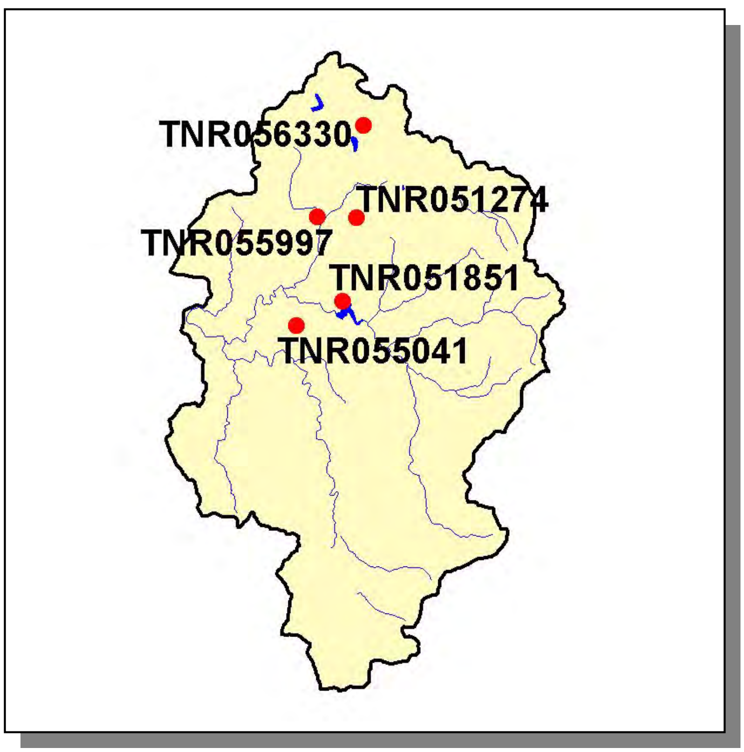

Figure 4-53. Location of TMSP Sites in Subwatershed 051301060201. *More information, including the names of facilities, is provided in Appendix IV.*

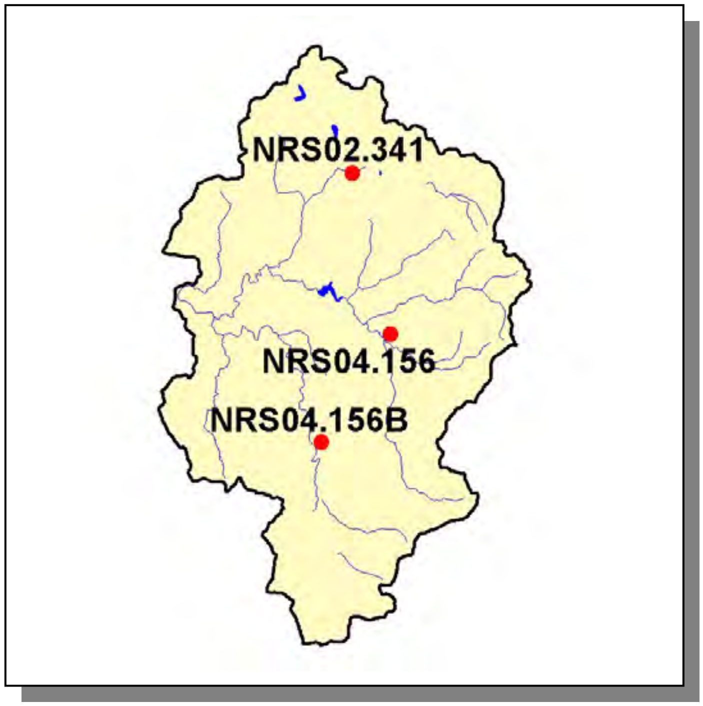

Figure 4-54. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 051301060201. *More information is provided in Appendix IV.*

4.2.B.i.a.i. Dischargers to Water Bodies Listed on the 2004 303(d) List

There is one NPDES facility discharging to water bodies listed on the 2004 303(d) list in Subwatershed 051302010201:

- TN0021873 (Livingston STP) discharges to Town Creek @ RM 0.8

Figure 4-55. Location of NPDES Dischargers to Water Bodies Listed on the 2004 303(d) List in Subwatershed 051301060201. *More information, including the names of facilities, is provided in Appendix IV.*

Permit #	3Q2	1Q10	3Q10	3Q20	7Q10
TN0021873	1.18	na	0.58	0.46	0.63

Table 4-37. Receiving Stream Low Flow Information for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 051301060201. *Data are in cubic feet per second (CFS). Data were obtained from the USGS web application StreamStats at http://water.usgs.gov/osw/streamstats/, (na, data not available)*

PERMIT #	Zn	Cu	Pb	Ni	Cd	Mo	As	Se	Flow
TN0021873	X	X	X	X	X	X	X	X	X

Table 4-38. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 051301060201.

PERMIT #	WET	$CBOD_5$	NH_3	TRC	TSS	SETTLEABLE SOLIDS	DO	pH	Hg
TN0021873	X	X	X	X	X	X	X	X	X

Table 4-39. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 051301060201. *WET, Whole Effluent Toxicity; $CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids; DO, Dissolved Oxygen.*

4.2.B.i.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
4,006	7,354	317	13	214	16

Table 4-40. Summary of Livestock Count Estimates in Subwatershed 051301060201. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Overton	15,150	27,812	1,200	1,173	811	59
Putnam	12,592	24,817	1,095	1,025	1,070	66

Table 4-41. Summary of Livestock Count Estimates in Overton and Putnam Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Overton	170.3	170.3	1.7	7.0
Putnam	152.5	152.5	3.6	16.4

Table 4-42. Forest Acreage and Annual Removal Rates (1987-1994) in Overton and Putnam Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.26
Grass (Hayland)	0.31
Legumes (Hayland)	0.23
Legumes, Grass (Hayland)	2.89
Grass, Forbs, Legumes (Mixed Pasture)	0.67
Corn (Row Crops)	4.35
Soybeans (Row Crops)	10.79
Tobacco (Row Crops)	12.38
Wheat (Close-Grown Cropland)	7.00
Other Vegetable and Truck Crops	21.46
Conservation Reserve Program Lands	0.46
Farmsteads and Ranch Headquarters	0.58

Table 4-43. Annual Estimated Total Soil Loss in Subwatershed 051301060201.

4.2.B.ii. 051301060202 (Roaring River).

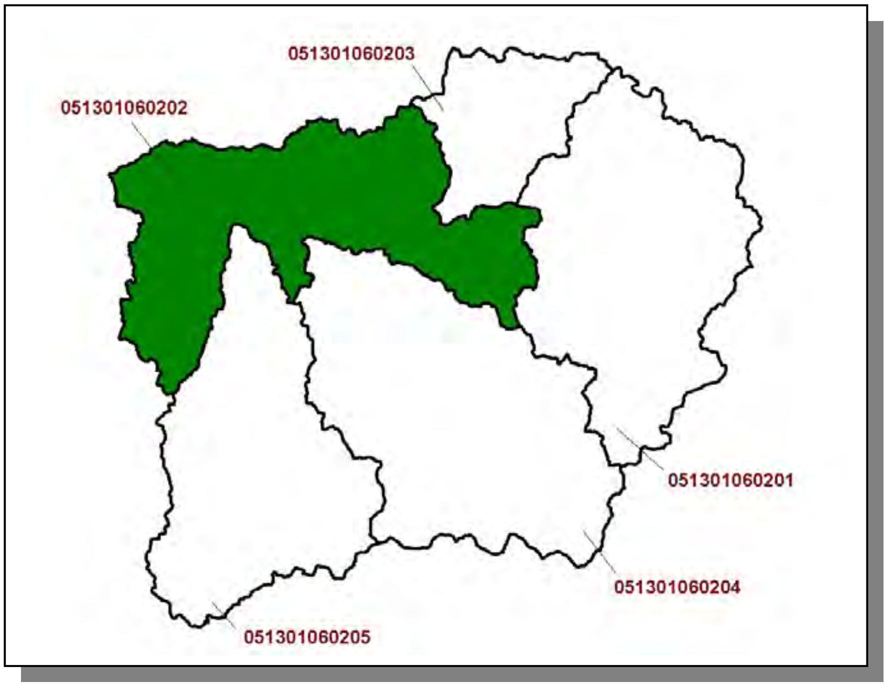

Figure 4-56. Location of Subwatershed 051301060202. *HUC-12 subwatershed boundaries are shown for reference.*

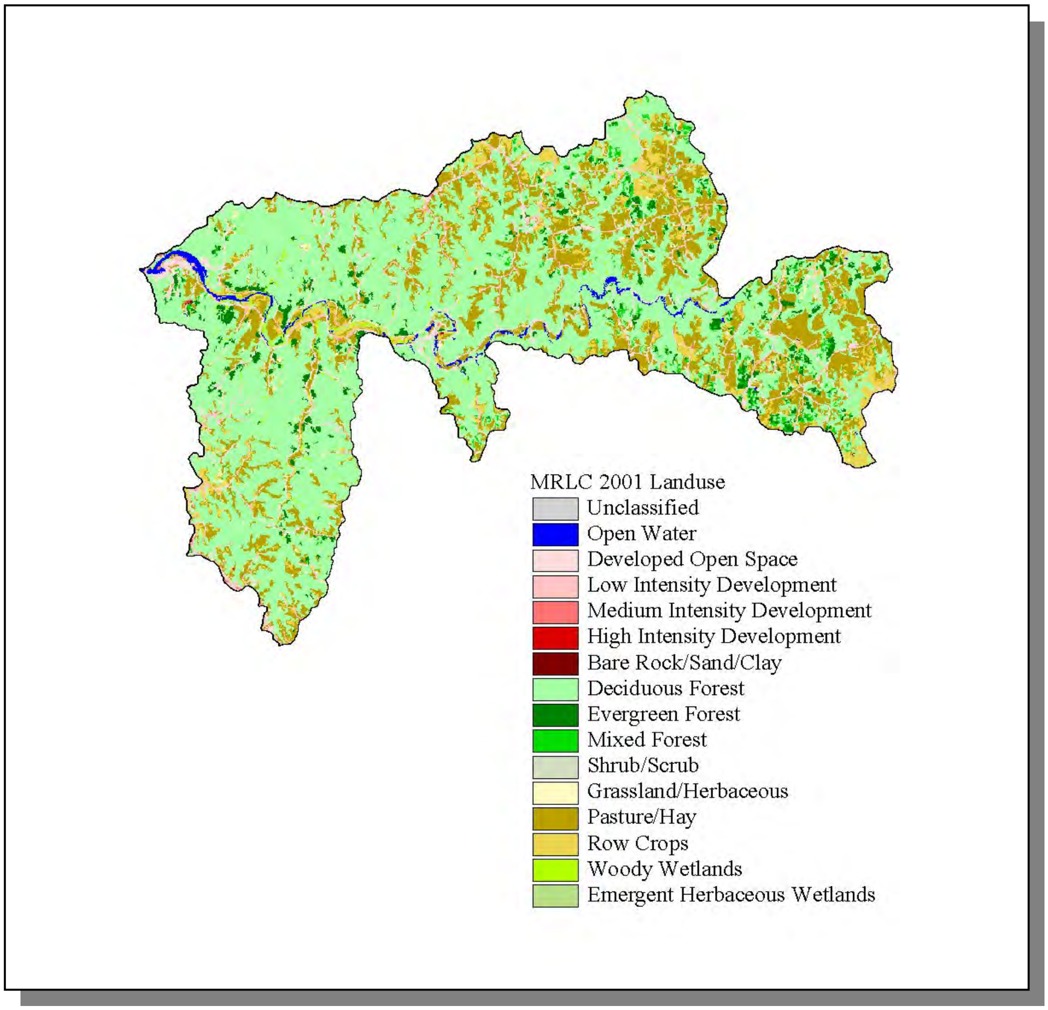

Figure 4-57. Illustration of Land Use Distribution in Subwatershed 051301060202.

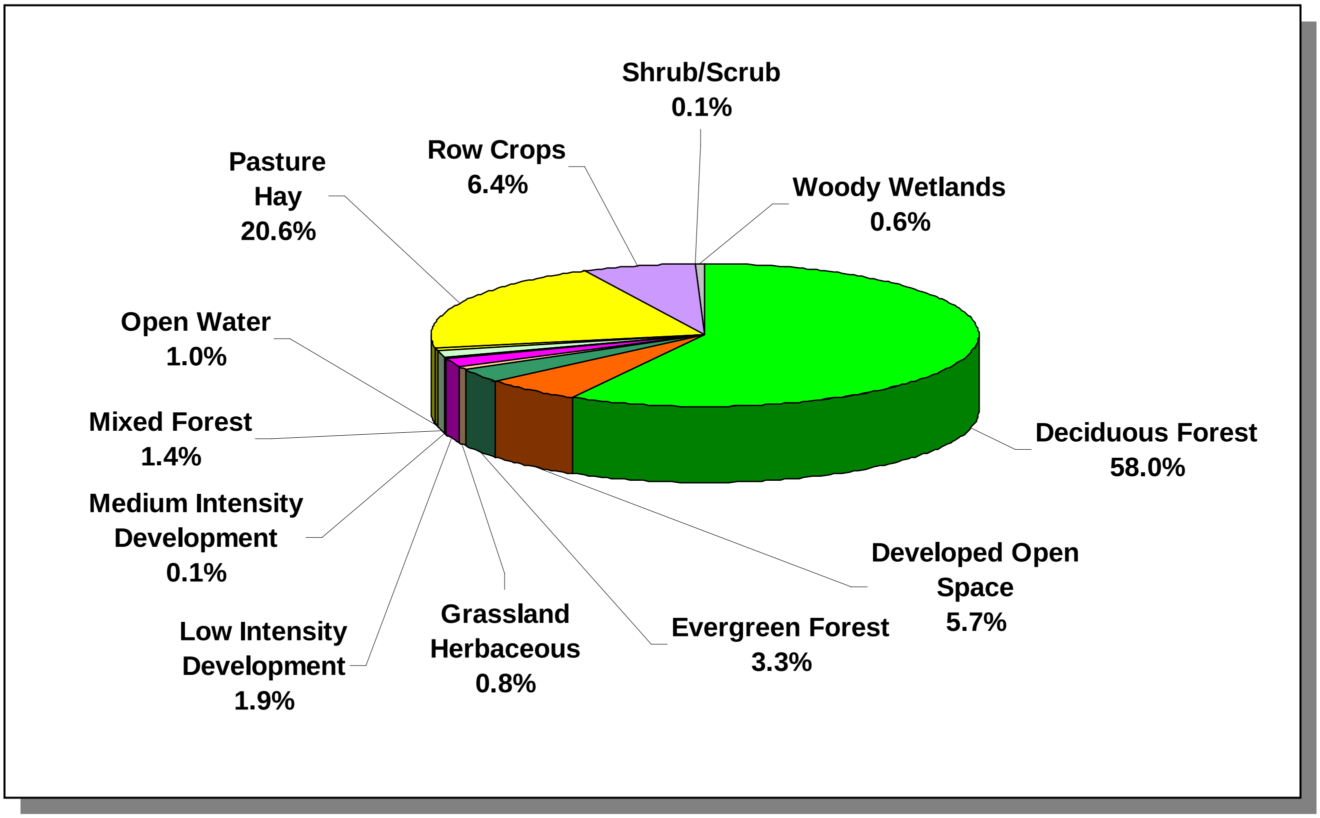

Figure 4-58. Land Use Distribution in Subwatershed 051301060202. *More information is provided in Appendix IV.*

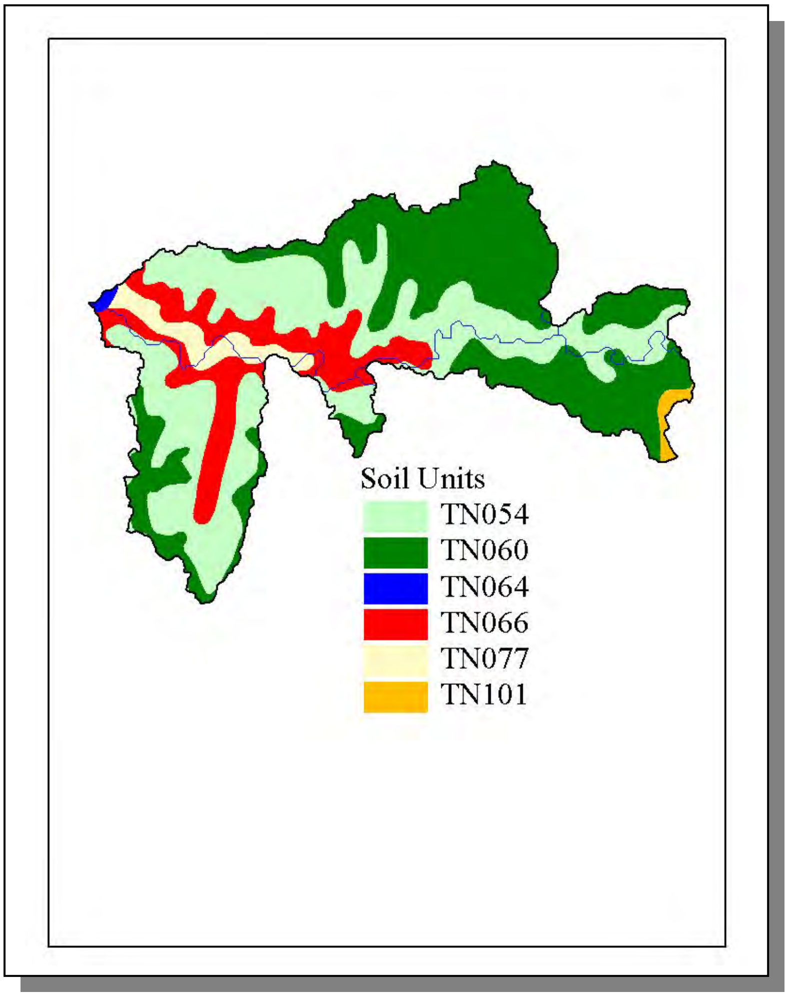

Figure 4-59. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060202.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28
TN077	4.00	C	216	5.03	Loam	0.34
TN101	0.00	B	1.71	5.39	Loam	0.35

Table 4-44. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060202. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,279	9,537	10,984	13.84	1,287	1,320	1,520	18.1
Overton	17,636	19,171	20,118	5.34	942	1,024	1,074	14.0
Total	**26,933**	**28,708**	**31,102**		**2,229**	**2,344**	**2,594**	**16.4**

Table 4-45. Population Estimates in Subwatershed 051301010202.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Gainesboro	Jackson	1,002	495	411	82	2

Table 4-46. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060202.

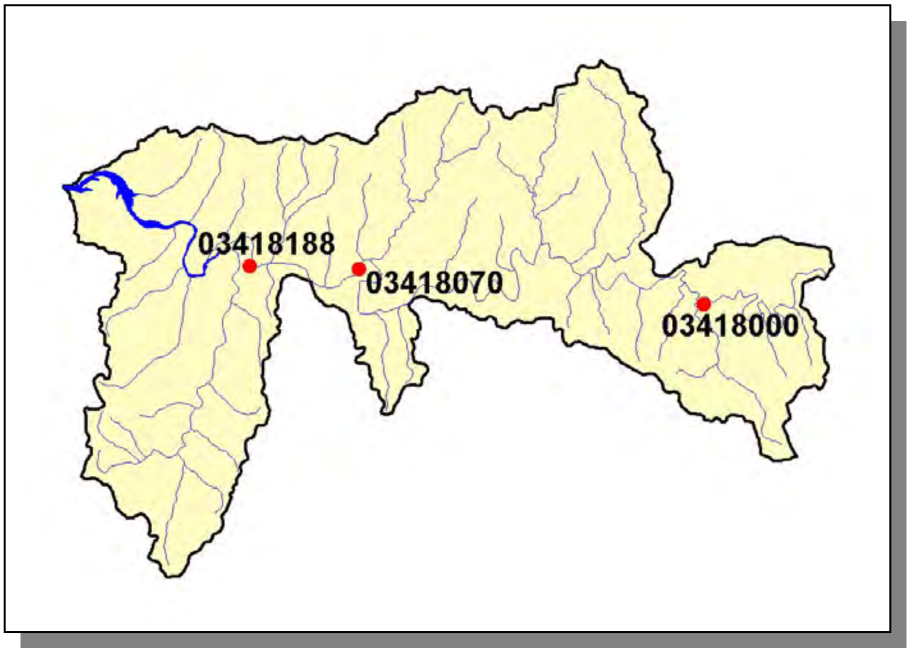

Figure 4-60. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060202. *More information is provided in Appendix IV.*

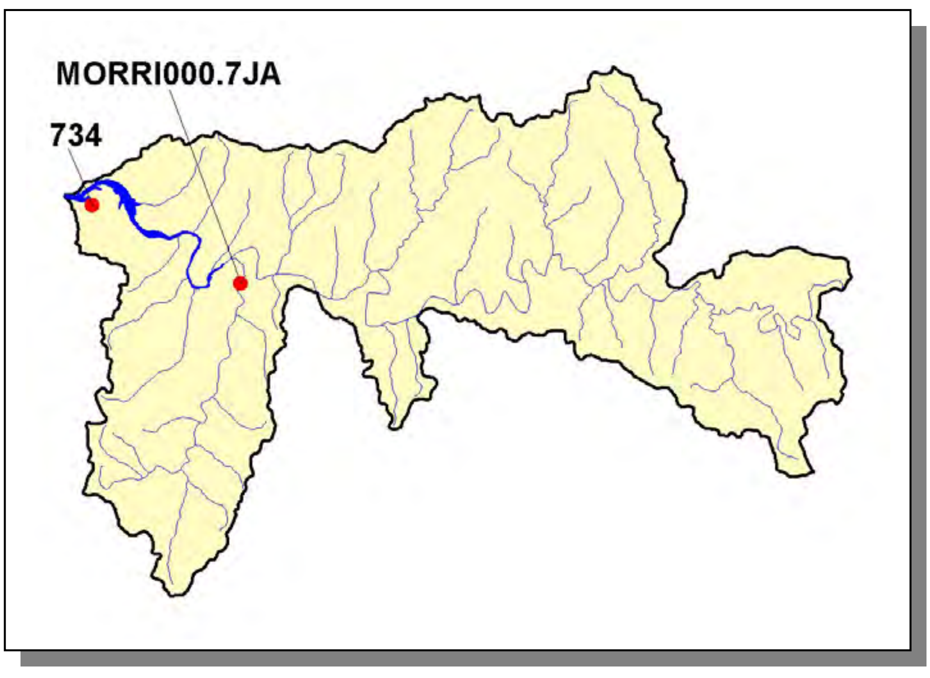

Figure 4-61. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060202. *More information, including site names and locations, is provided in Appendix IV.*

4.2.B.ii.a. Point Source Contributions.

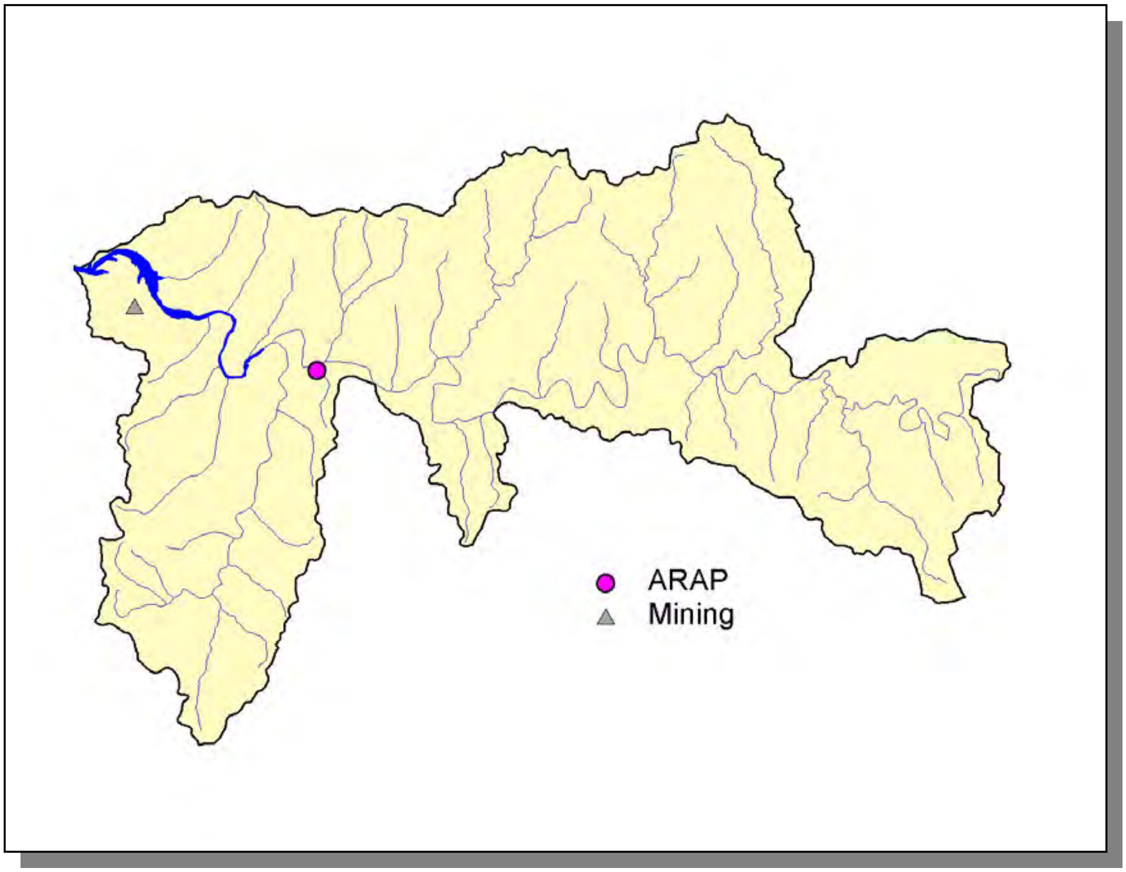

Figure 4-62. Location of Permits Issued in Subwatershed 051301060202. *More information, including the names of facilities, is provided in Appendix IV.*

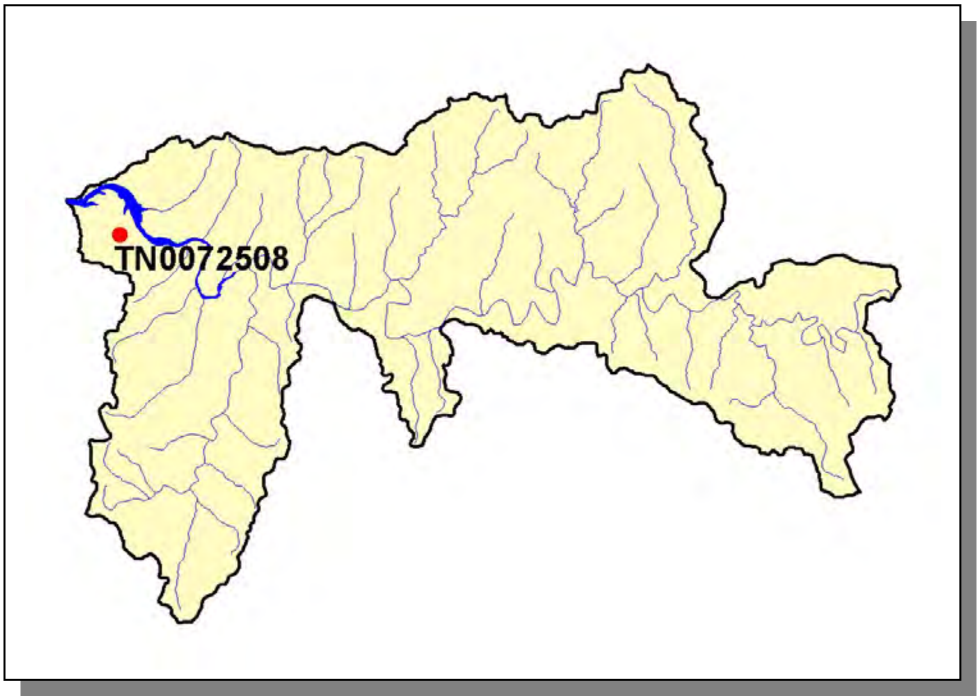

Figure 4-63. Location of Active Mining Sites in Subwatershed 051301060202. *More information, including the names of mining operations, is provided in Appendix IV.*

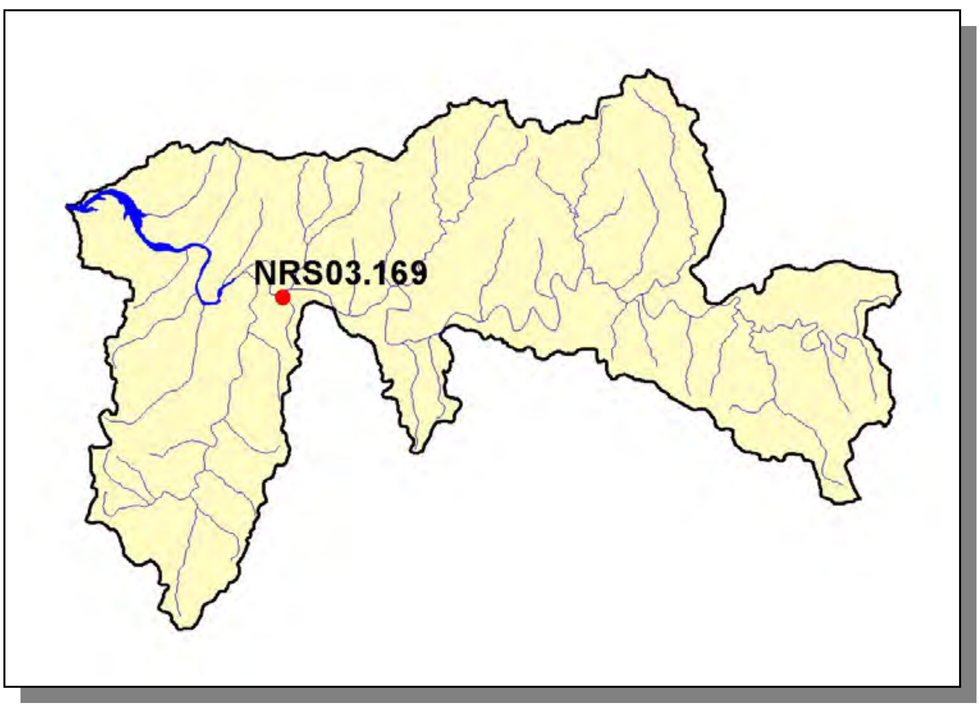

Figure 4-64. Location of Aquatic Alteration Resource Permits Sites in Subwatershed 051301060202. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.B.ii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
2,356	4,214	100	9	131	11

Table 4-47. Summary of Livestock Count Estimates in Subwatershed 051301060202. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39
Overton	15,150	27,812	1,200	1,173	811	59

Table 4-48. Summary of Livestock Count Estimates in Jackson and Overton Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Jackson	135.9	135.9	0.9	5.1
Overton	170.3	170.3	1.7	7.0

Table 4-49. Forest Acreage and Annual Removal Rates (1987-1994) in Jackson and Overton Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	1.56
Grass (Hayland)	0.31
Legumes (Hayland)	0.17
Legumes, Grass (Hayland)	2.89
Grass, Forbs, Legumes (Mixed Pasture)	1.53
Corn (Row Crops)	15.54
Soybeans (Row Crops)	10.79
Wheat (Close-Grown Cropland)	7.00
Other Vegetable and Truck Crops	21.46
Conservation Reserve Program Lands	0.46
Farmsteads and Ranch Headquarters	1.06

Table 4-50. Annual Estimated Total Soil Loss in Subwatershed 051301060202.

4.2.B.iii. 051301060203 (Flat Creek).

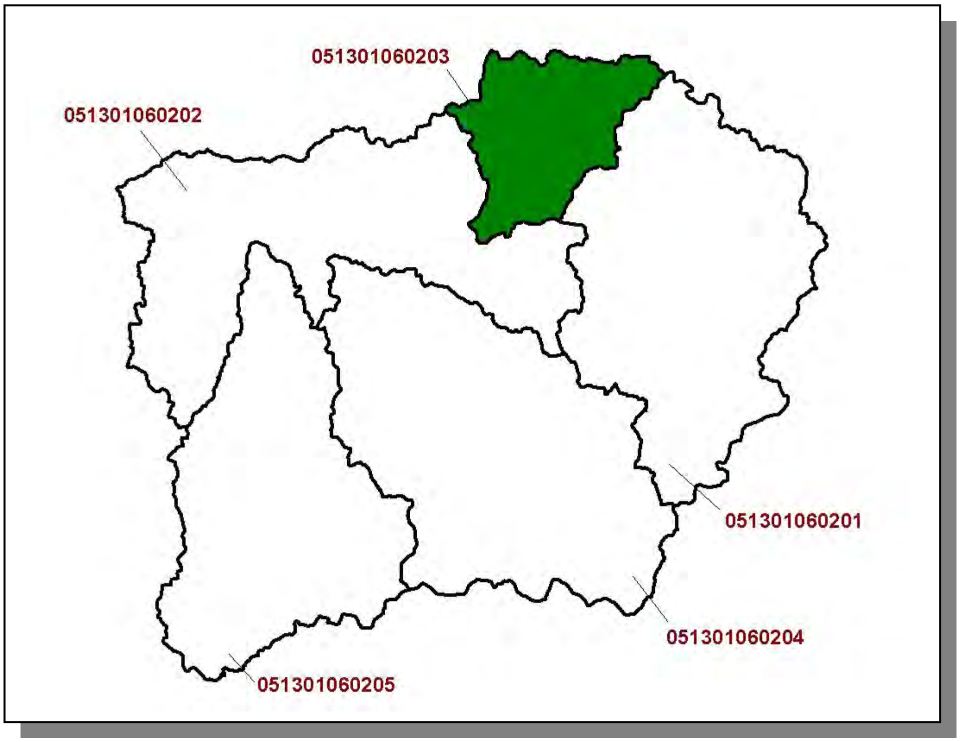

Figure 4-65. Location of Subwatershed 051301060203. *HUC-12 subwatershed boundaries are shown for reference.*

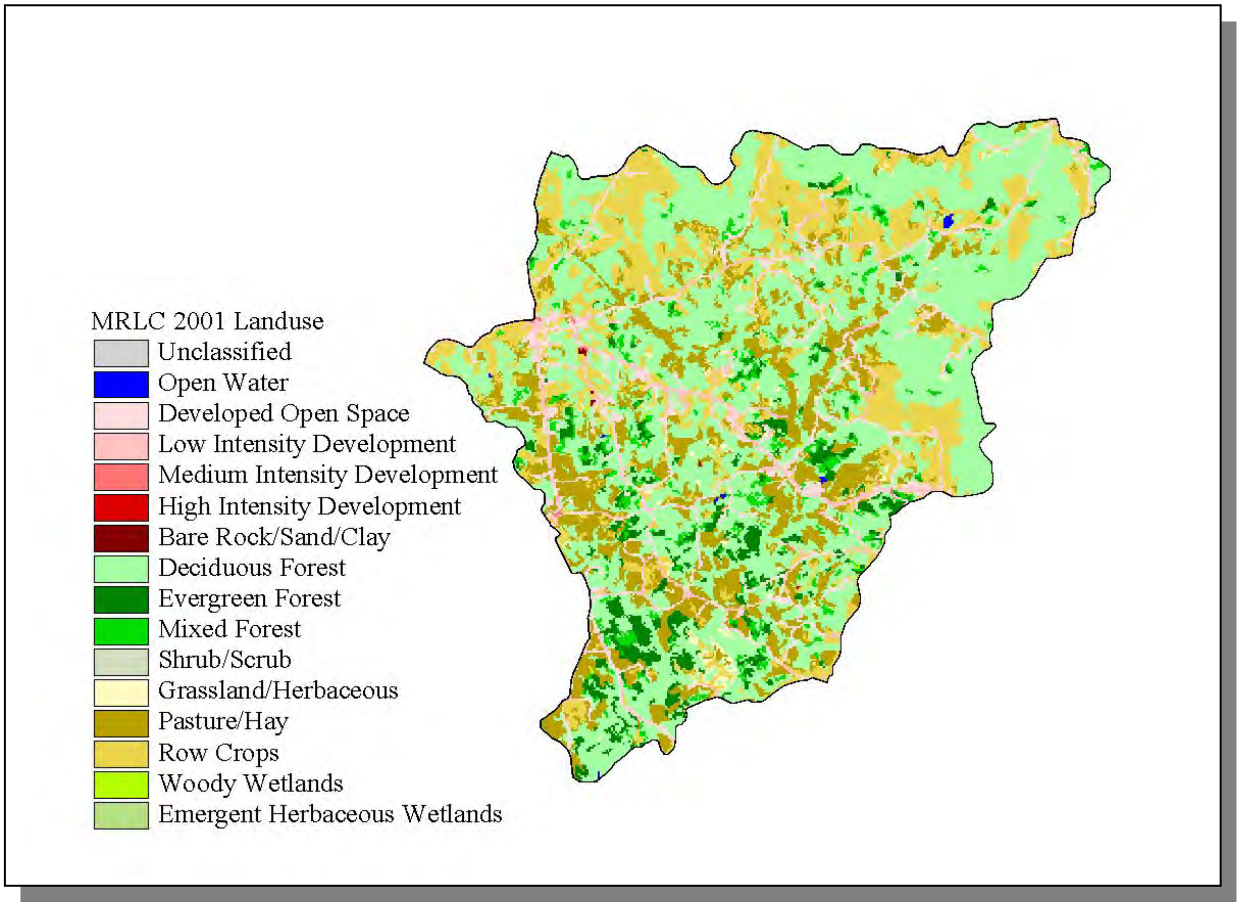

Figure 4-66. Illustration of Land Use Distribution in Subwatershed 051301060203.

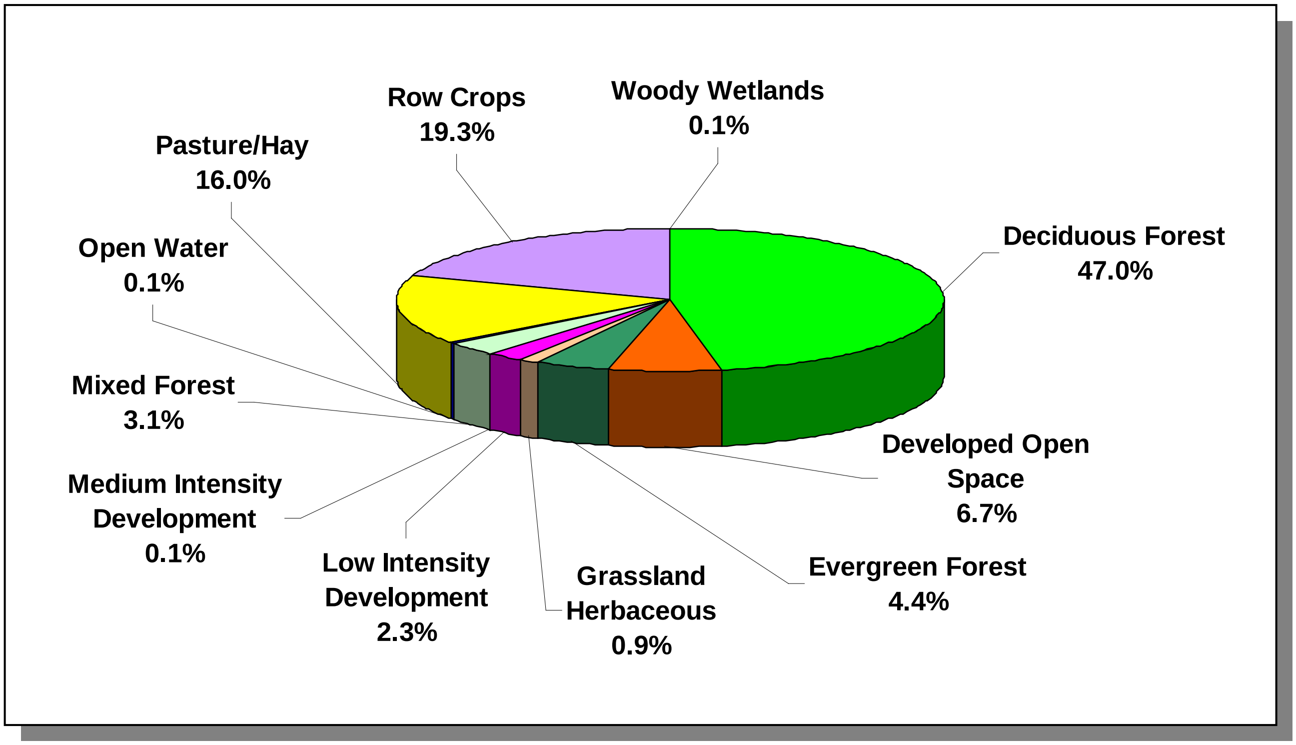

Figure 4-67. Land Use Distribution in Subwatershed 051301060203. *More information is provided in Appendix IV.*

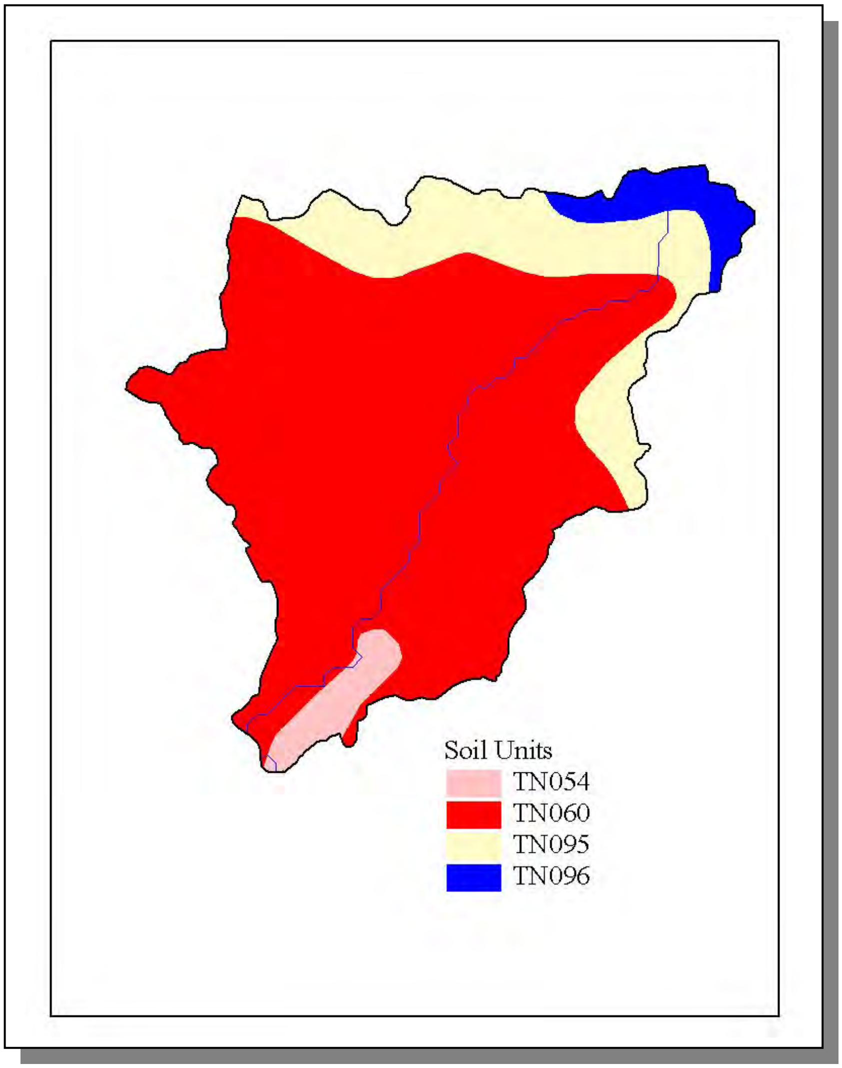

Figure 4-68. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060203.

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
TN095	0.00	B	2.35	5.12	Loam	0.31
TN096	10.00	C	1.22	5.16	Silty Loam	0.38

Table 4-51. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060203. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Overton	17,636	19,171	20,118	5.38	950	1,032	1,083	14.0

Table 4-52. Population Estimates in Subwatershed 051301060203.

Figure 4-69. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060203. *More information, including site names and locations, is provided in Appendix IV.*

4.2.B.iii.a. Point Source Contributions.

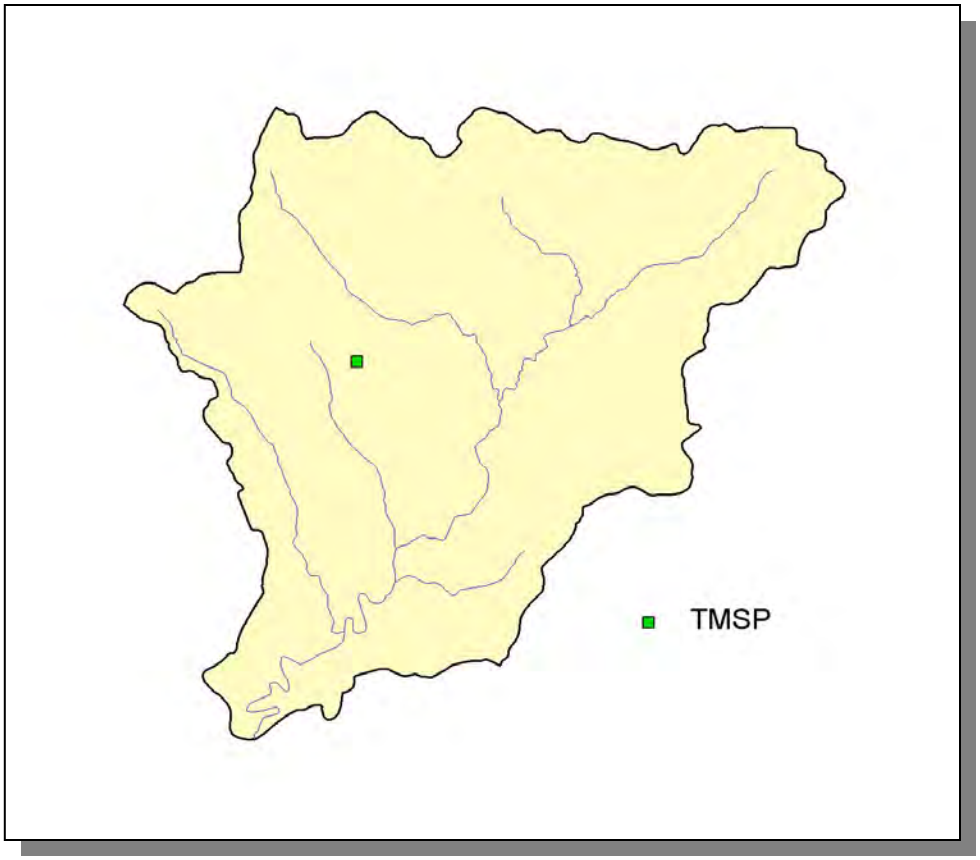

Figure 4-70. Location of Permits Issued in Subwatershed 051301060203. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-71. Location of TMSP Sites in Subwatershed 051301060203. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.B.iii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,099	2,018	87	<5	59	<5

Table 4-53. Summary of Livestock Count Estimates in Subwatershed 051301060203. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Overton	15,150	27,812	1,200	1,173	811	59

Table 4-54. Summary of Livestock Count Estimates in Overton County. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Overton	170.3	170.3	1.7	7.0

Table 4-55. Forest Acreage and Annual Removal Rates (1987-1994) in Overton County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.26
Grass (Hayland)	0.31
Legumes, Grass (Hayland)	2.89
Grass, Forbs, Legumes (Mixed Pasture)	0.67
Corn (Row Crops)	4.35
Soybeans (Row Crops)	10.79
Wheat (Close-Grown Cropland)	7.00
Other Vegetable and Truck Crops	21.46
Conservation Reserve Program Lands	0.46
Farmsteads and Ranch Headquarters	0.58

Table 4-56. Annual Estimated Total Soil Loss in Subwatershed 051301060203.

4.2.B.iv. 051301060204 (Spring Creek).

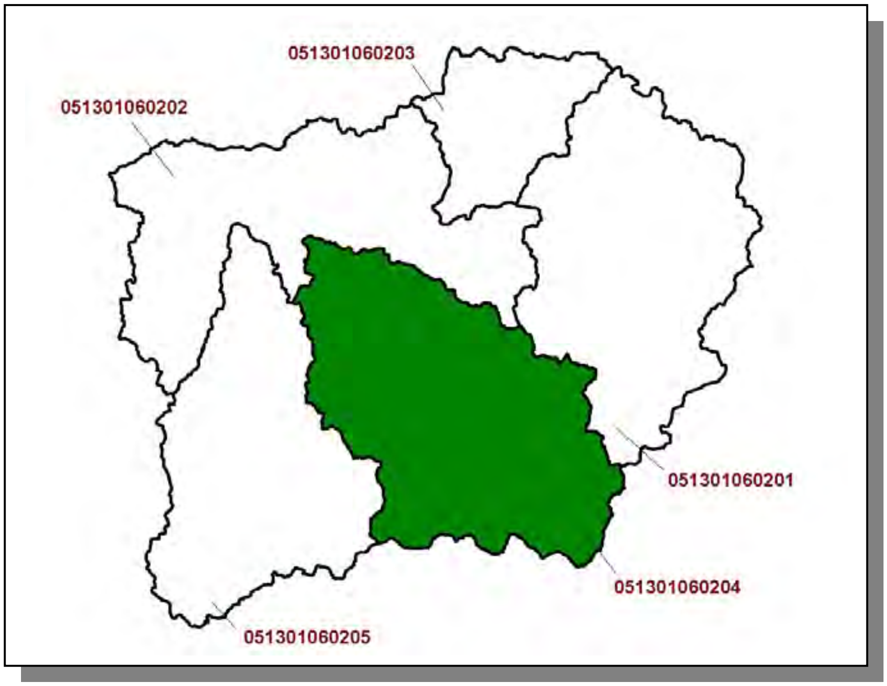

Figure 4-72. Location of Subwatershed 051301060204. *HUC-12 subwatershed boundaries are shown for reference.*

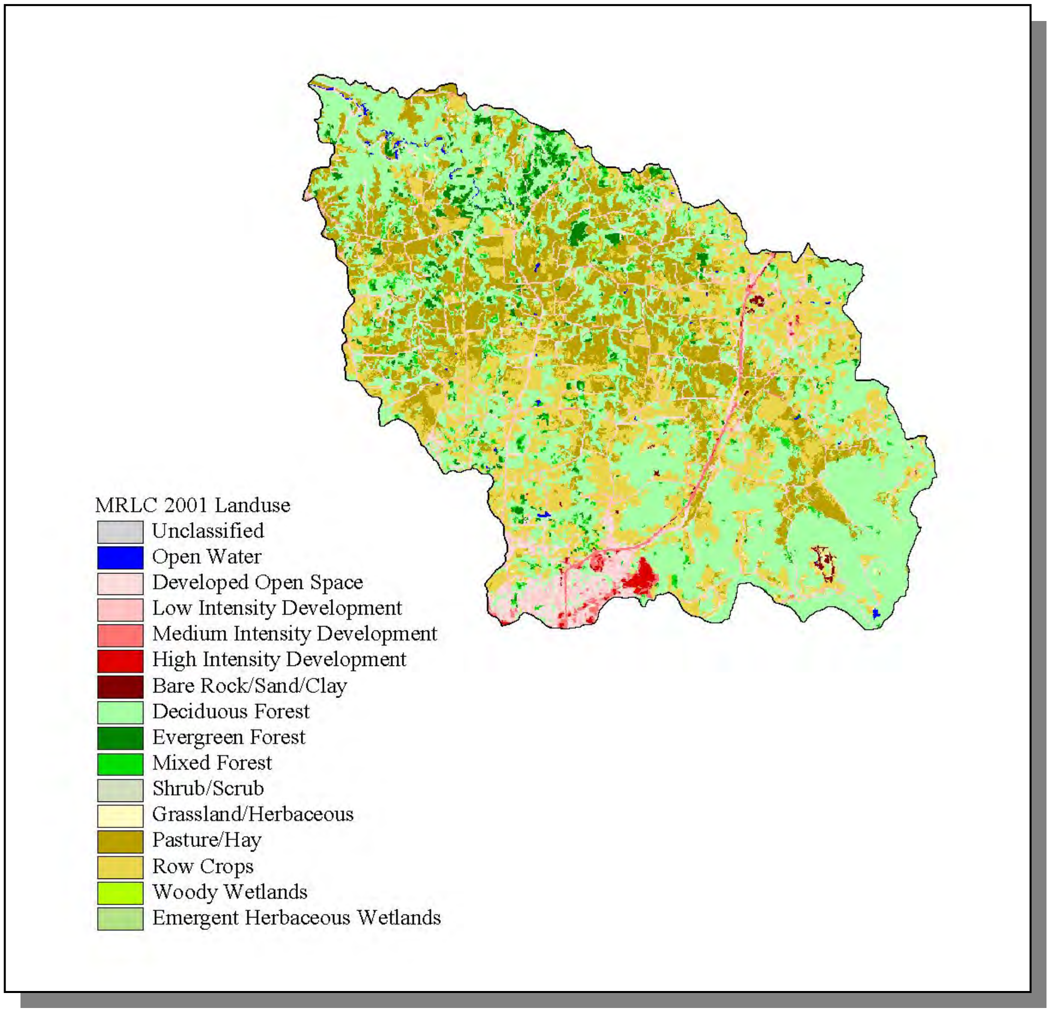

Figure 4-73. Illustration of Land Use Distribution in Subwatershed 051301060204.

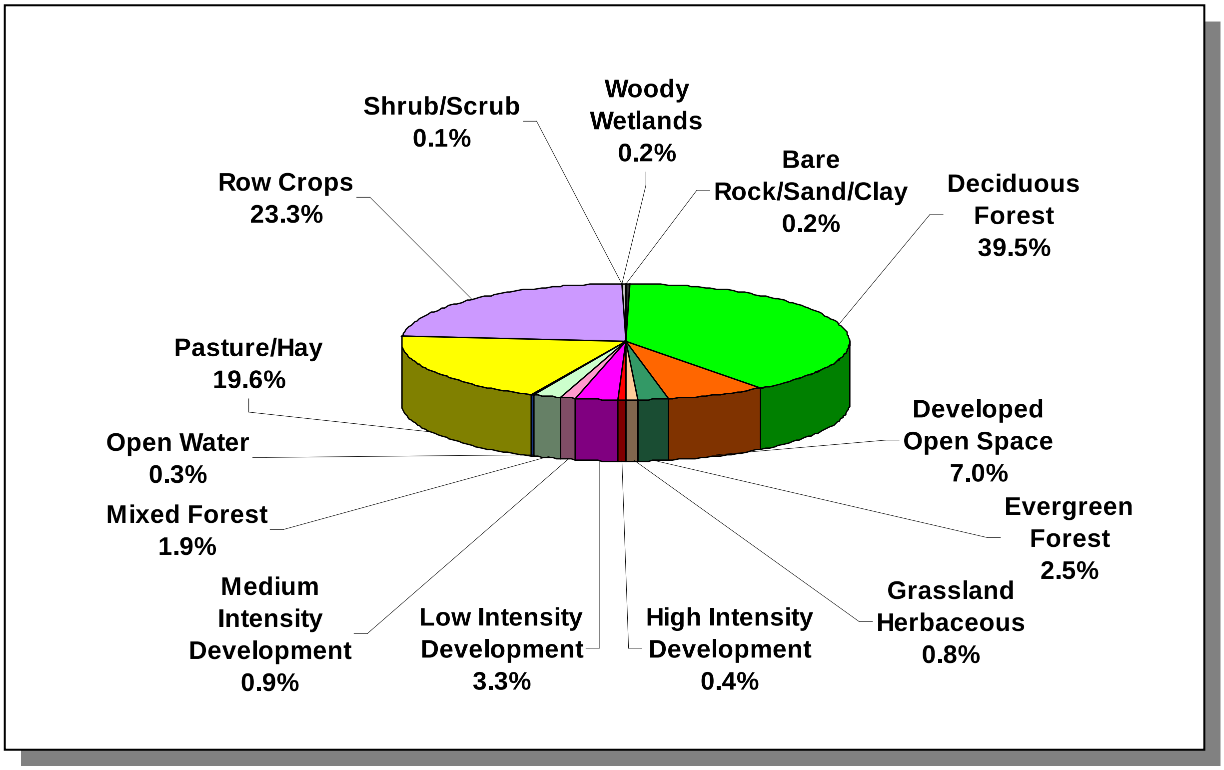

Figure 4-74. Land Use Distribution in Subwatershed 051301060204. *More information is provided in Appendix IV.*

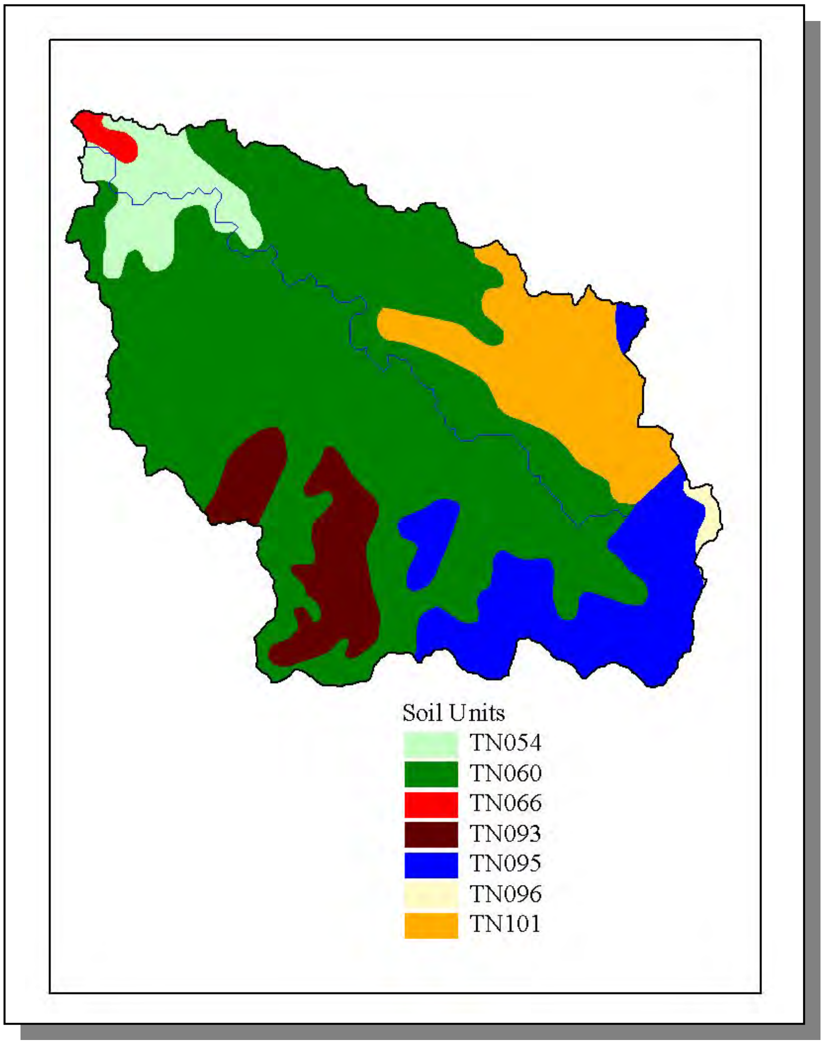

Figure 4-75. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060204.

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
TN093	0.00	B	2.43	4.95	Loam	0.36
TN095	0.00	B	2.35	5.12	Loam	0.31
TN096	10.00	C	1.22	5.16	Silty Loam	0.38
TN101	0.00	B	1.71	5.39	Loam	0.35

Table 4-57. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060204. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,279	9,537	10,984	2.92	271	278	320	18.1
Overton	17,636	19,171	20,118	5.72	1,009	1,097	1,151	14.1
Putnam	51,373	58,326	62,315	10.92	5,608	6,367	6,803	21.3
Total	**78,306**	**87,034**	**93,417**		**6,888**	**7,742**	**8,274**	**20.1**

Table 4-58. Population Estimates in Subwatershed 051301060204.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Algood	Putnam	2,399	1,016	706	308	2
Cookeville	Putnam	21,744	9,284	8,131	1,135	18
Totals		**24,143**	**10,300**	**8,837**	**8,439**	**20**

Table 4-59. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060204.

Figure 4-76. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060204. *More information is provided in Appendix IV.*

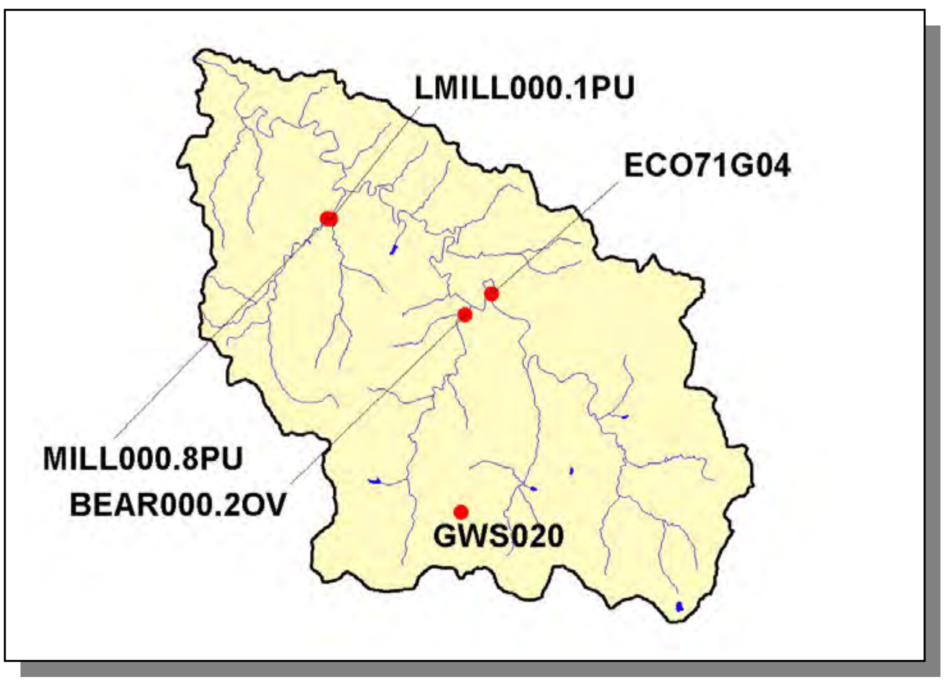

Figure 4-77. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060204. *More information, including site names and locations, is provided in Appendix IV.*

4.2.B.iv.a. Point Source Contributions.

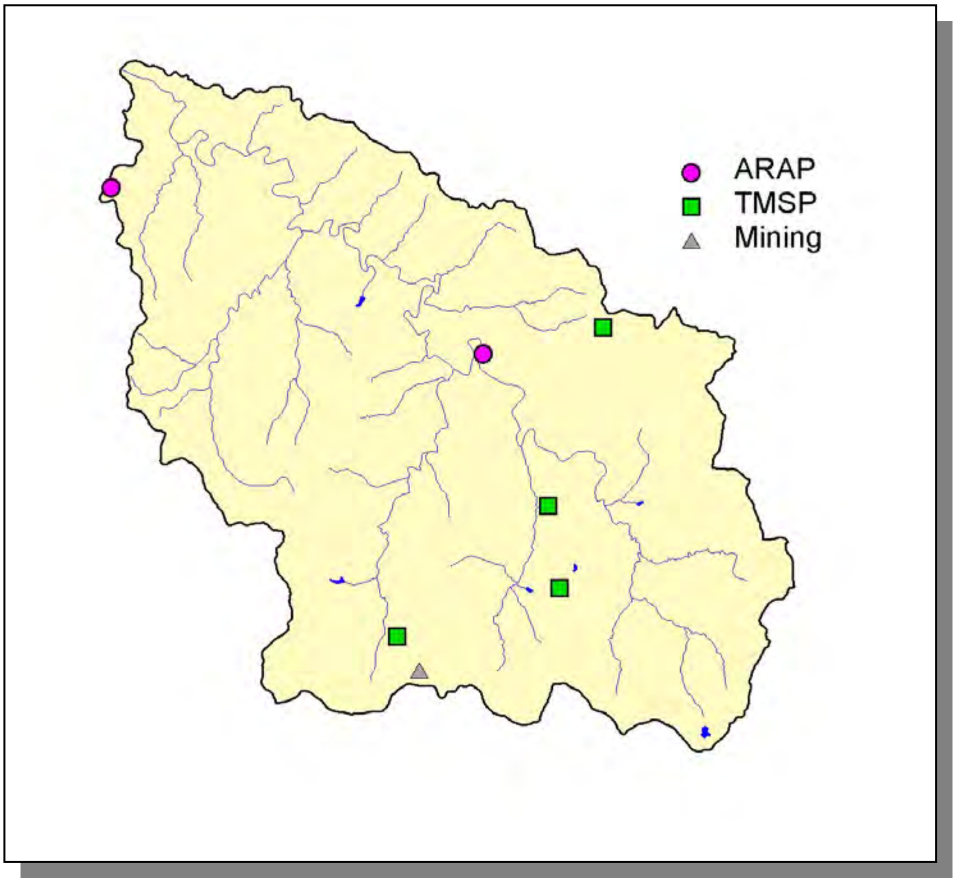

Figure 4-78. Location of Permits Issued in Subwatershed 051301060204. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-79. Location of Active Mining Sites in Subwatershed 051301060204. *More information, including the names of mining operations, is provided in Appendix IV.*

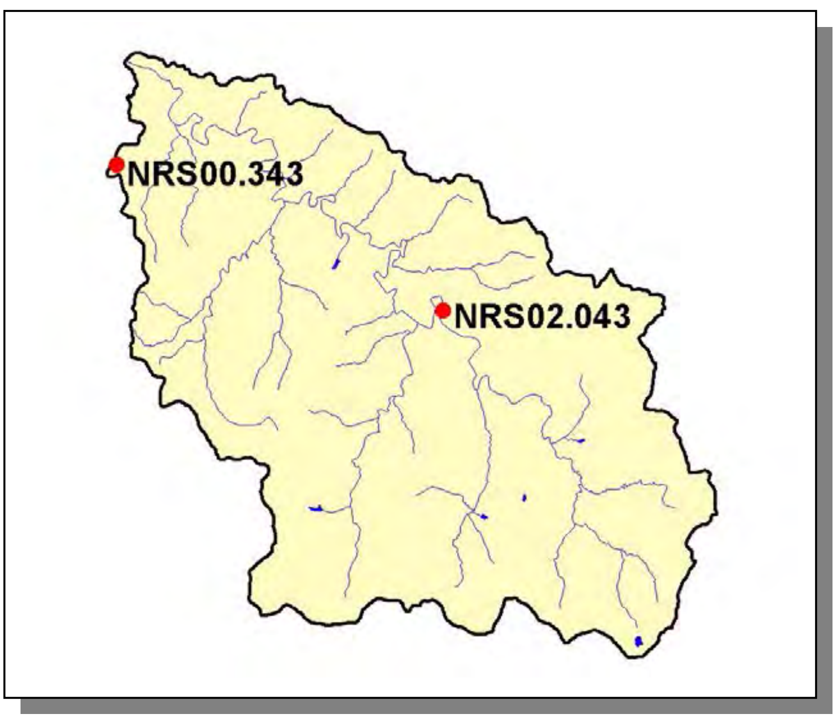

Figure 4-80. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 051301060204. *More information is provided in Appendix IV.*

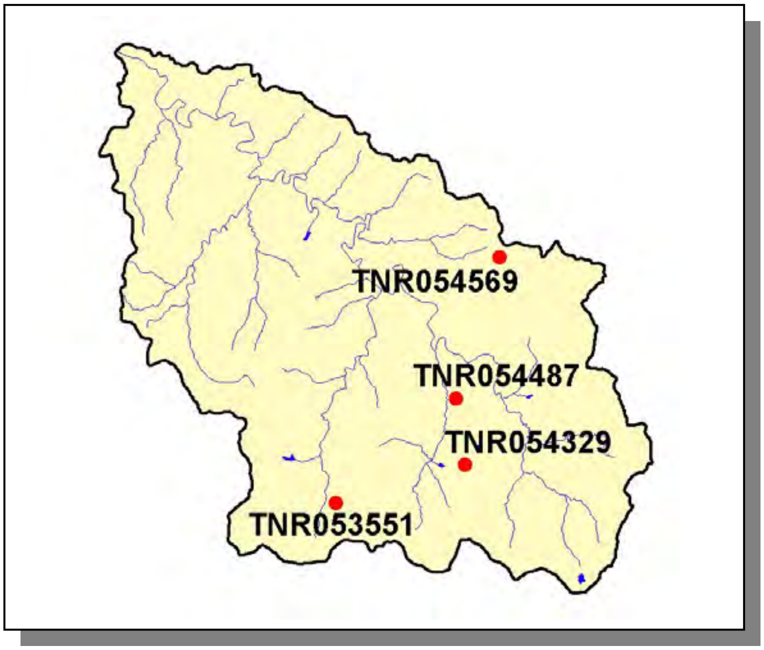

Figure 4-81. Location of TMSP Sites in Subwatershed 051301060204. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.B.iv.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
5,229	9,884	380	18	365	25

Table 4-60. Summary of Livestock Count Estimates in Subwatershed 051301060204. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39
Overton	15,150	27,812	1,200	1,173	811	59
Putnam	12,592	24,817	1,095	1,025	1,070	66

Table 4-61. Summary of Livestock Count Estimates in Jackson, Overton, and Putnam Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Jackson	135.9	135.9	0.9	5.1
Overton	170.3	170.3	1.7	7.0
Putnam	152.5	152.3	3.6	16.4

Table 4-62. Forest Acreage and Annual Removal Rates (1987-1994) in Jackson, Overton, and Putnam Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Patureland)	0.41
Grass (Pastureland)	1.42
Grass (Hayland)	1.15
Legumes, Grass (Hayland)	1.43
Legumes (Hayland)	0.22
Grass, Forbs, Legumes (Mixed Pasture)	0.99
Corn (Row Crops)	9.00
Soybeans (Row Crops)	10.79
Tobacco (Row Crops)	12.38
Wheat (Close-Grown Cropland)	7.00
Other Vegetable and Truck Crops	17.07
Conservation Reserve Program Lands	0.46
Farmsteads and Ranch Headquarters	0.46

Table 4-63. Annual Estimated Total Soil Loss in Subwatershed 051301060204.

4.2.B.v. 051301060205 (Blackburn Fork).

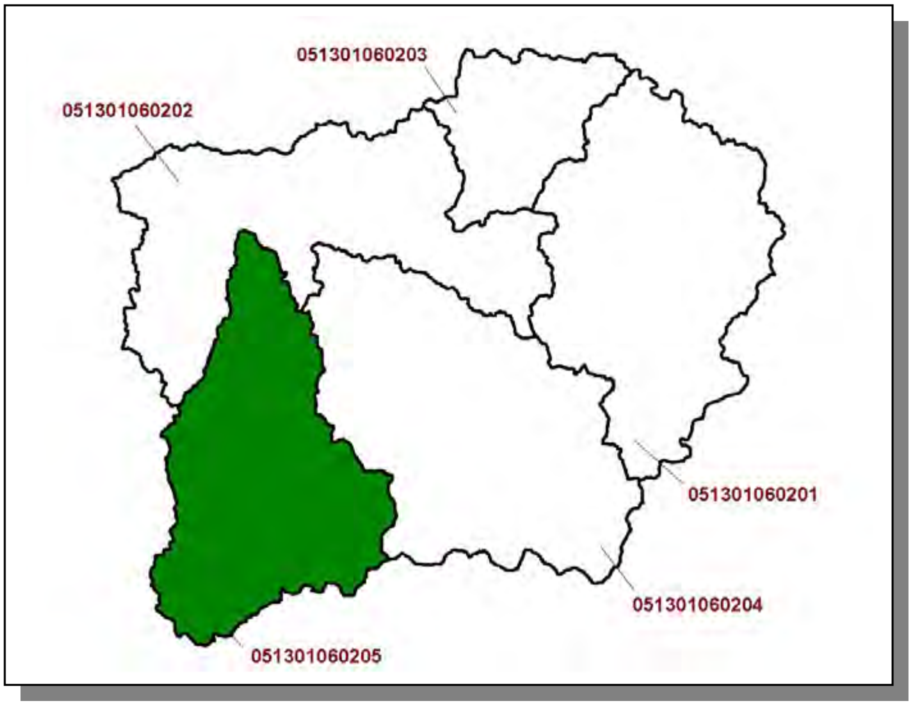

Figure 4-82. Location of Subwatershed 051301060205. *HUC-12 subwatershed boundaries are shown for reference.*

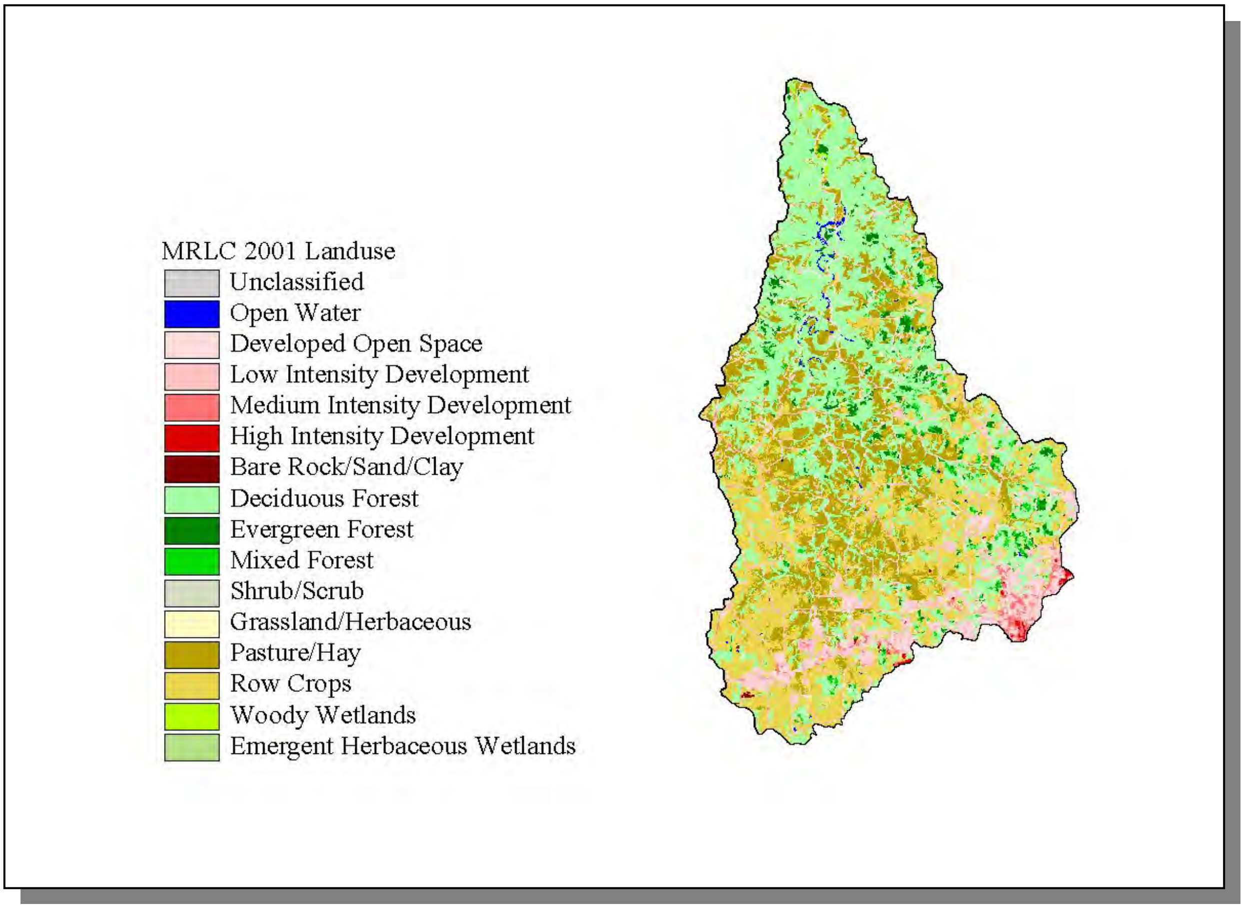

Figure 4-83. Illustration of Land Use Distribution in Subwatershed 051301060205.

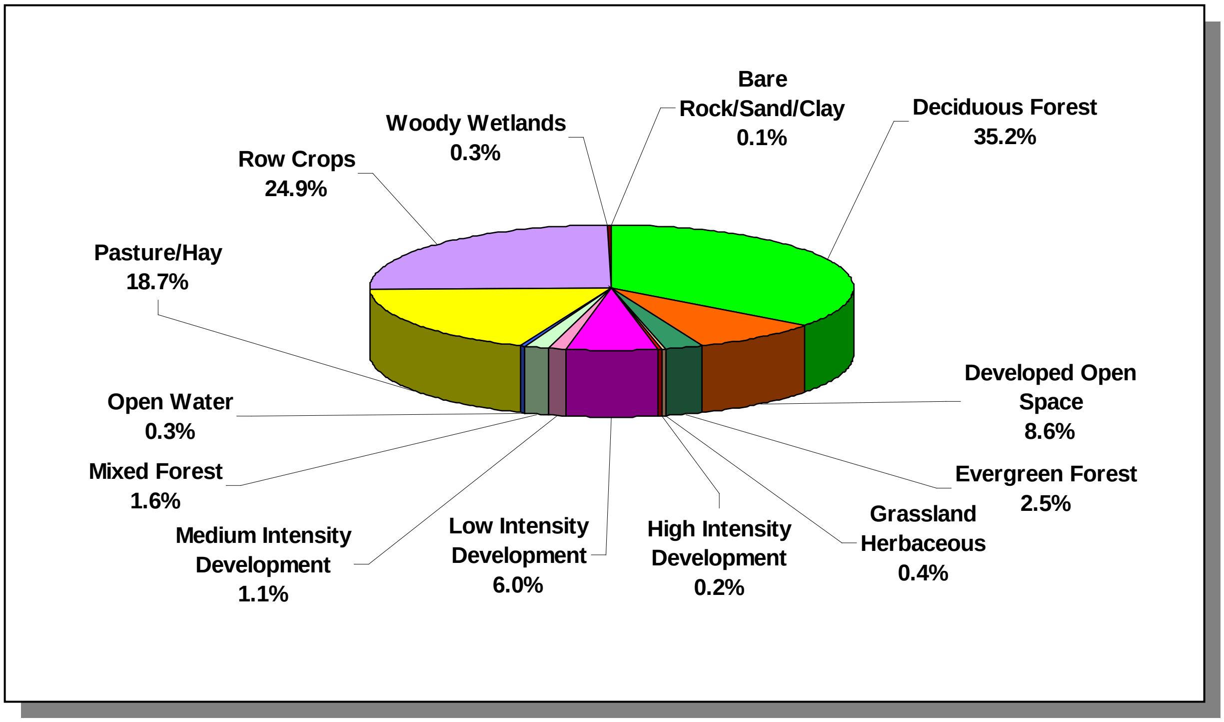

Figure 4-84. Land Use Distribution in Subwatershed 051301060205. *More information is provided in Appendix IV.*

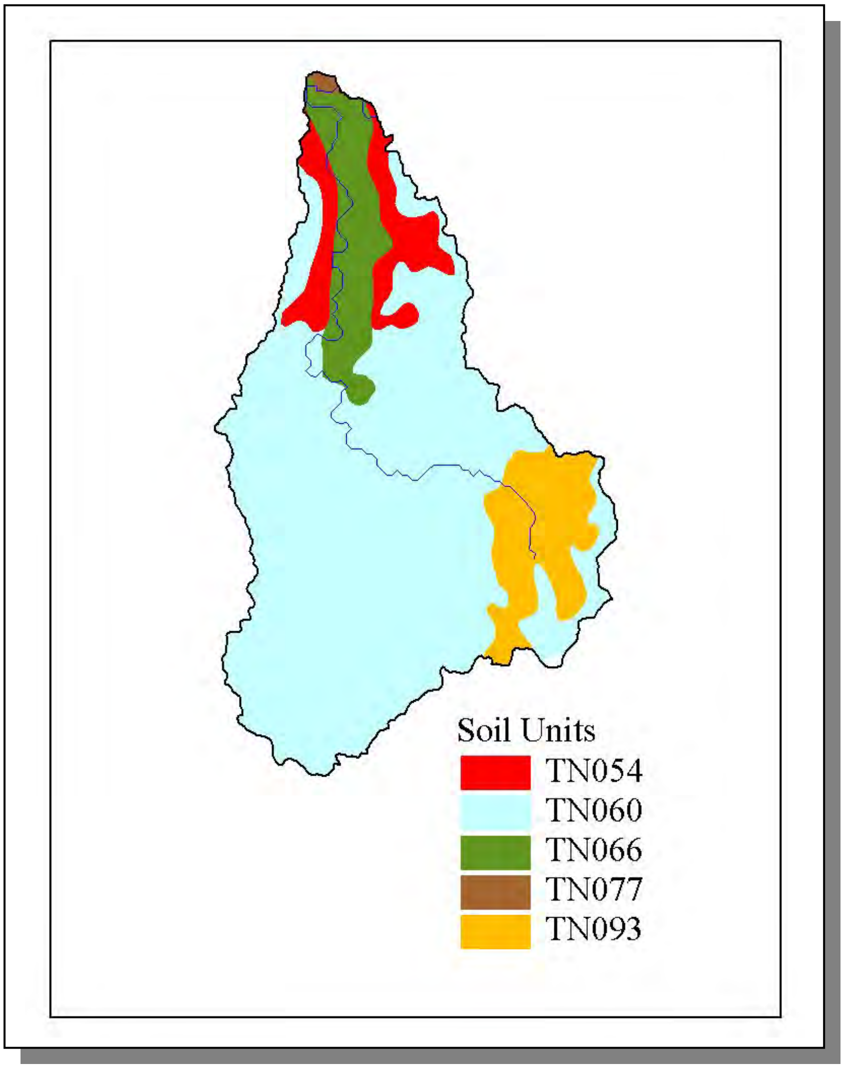

Figure 4-85. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060205.

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
TN077	4.00	C	2.16	5.03	Loam	0.34
TN093	0.00	B	2.43	4.95	Loam	0.36

Table 4-64. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060205. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,297	9,537	10,984	8.38	779	799	920	18.1
Putnam	51,373	58,326	62,315	8.72	4,479	5,085	5,433	21.3
Total	**60,670**	**67,863**	**73,299**		**5,258**	**5,884**	**6,353**	**20.8**

Table 4-65. Population Estimates in Subwatershed 051301060205.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Baxter	Putnam	1,289	579	424	153	2
Cookeville	Putnam	21,744	9,284	8,131	1,135	18
Totals		**23,033**	**9,863**	**8,555**	**1,288**	**20**

Table 4-66. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060205.

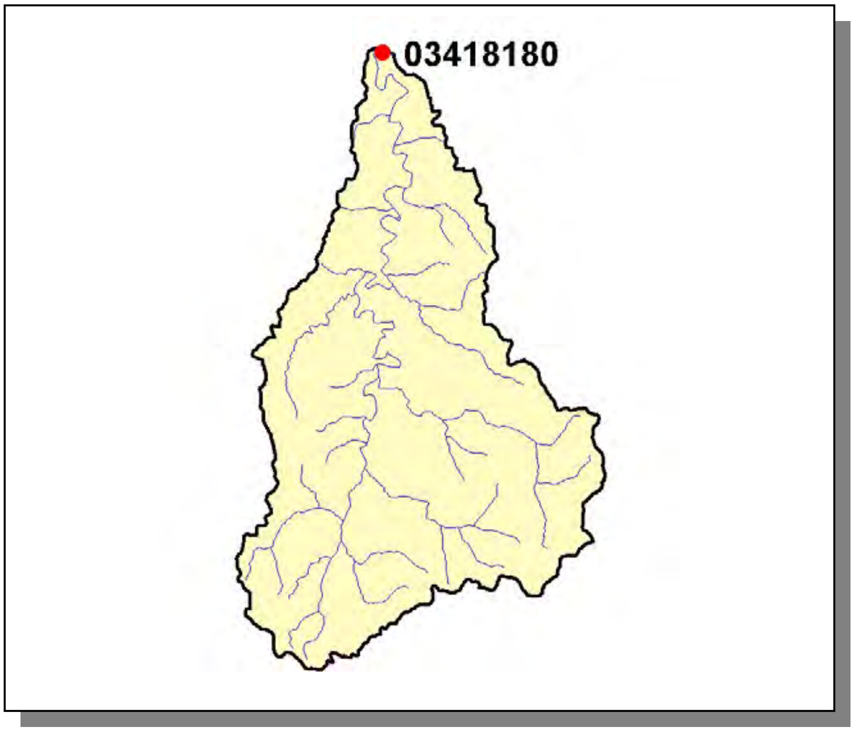

Figure 4-86. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060205. *More information is provided in Appendix IV.*

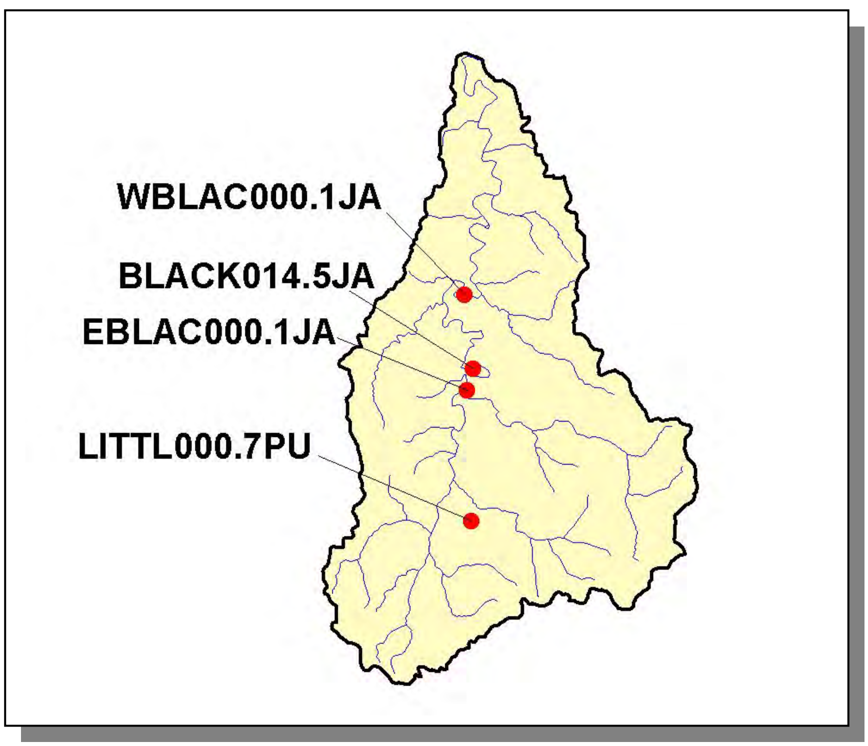

Figure 4-87. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060205. *More information, including site names and locations, is provided in Appendix IV.*

4.2.B.v.a. Point Source Contributions.

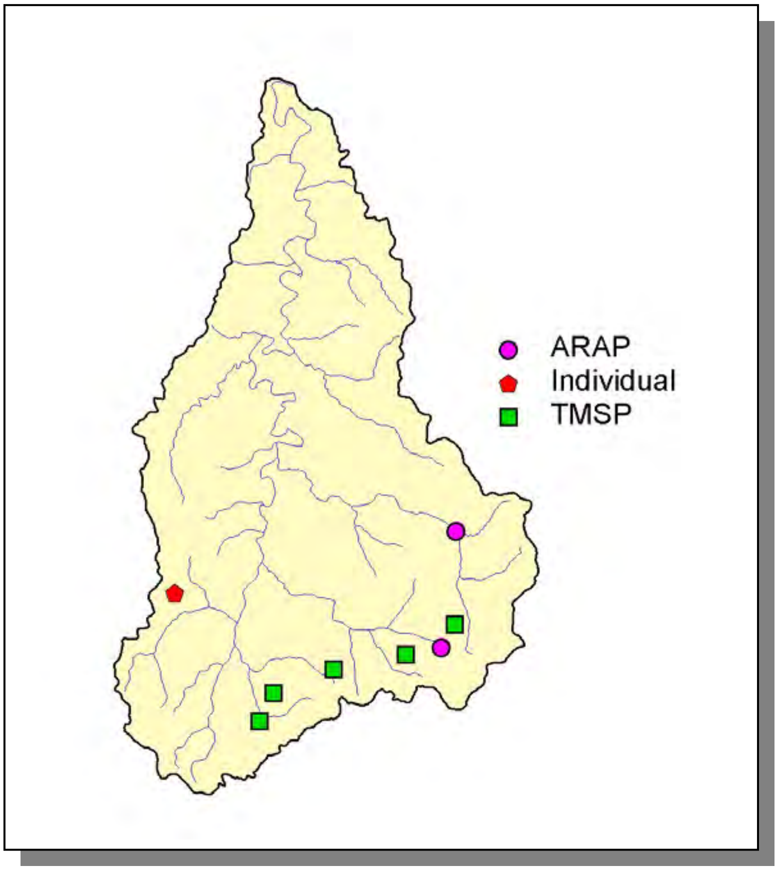

Figure 4-88. Location of Permits Issued in Subwatershed 051301060205. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-89. Location of Active NPDES Sites in Subwatershed 051301060205. *More information, including the names of facilities, is provided in Appendix IV.*

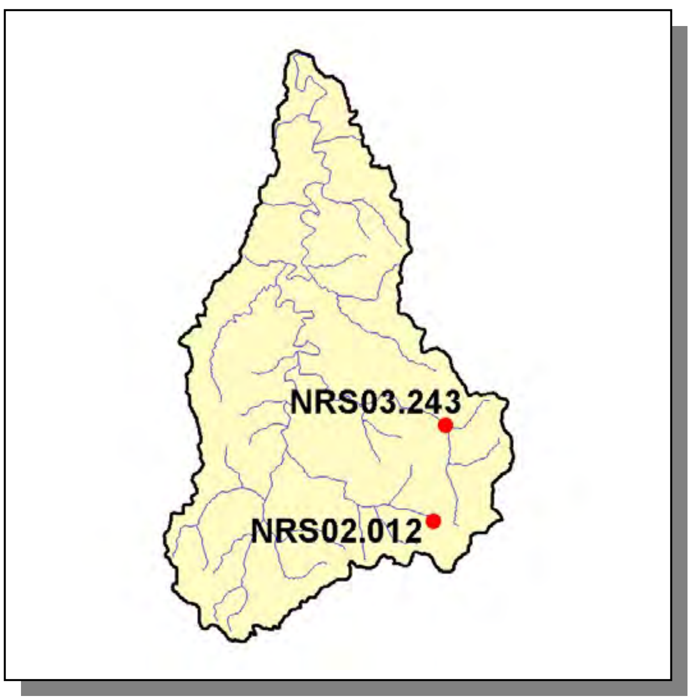

Figure 4-90. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 051301060205. *More information is provided in Appendix IV.*

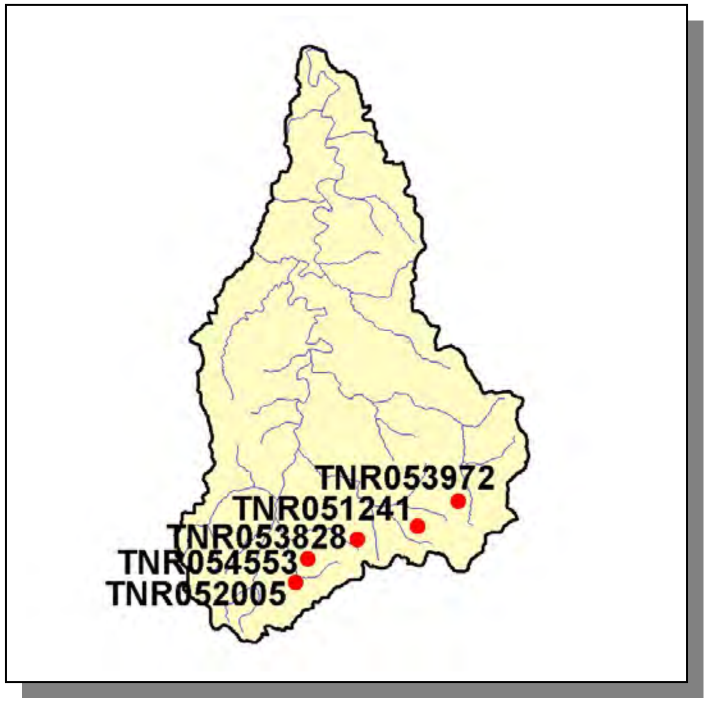

Figure 4-91. Location of TMSP Sites in Subwatershed 051301060205. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.B.v.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
4,025	7,634	241	15	308	22

Table 4-67. Summary of Livestock Count Estimates in Subwatershed 051301060205. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39
Putnam	12,592	24,817	1,095	1,025	1,070	66

Table 4-68. Summary of Livestock Count Estimates in Jackson and Putnam Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Jackson	135.9	135.9	0.9	5.1
Putnam	152.5	152.3	3.6	16.4

Table 4-69. Forest Acreage and Annual Removal Rates (1987-1994) in Jackson and Putnam Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	2.05
Grass (Hayland)	1.63
Legumes (Hayland)	0.20
Legumes, Grass (Hayland)	0.61
Grass, Forbs, Legumes (Mixed Pasture)	1.41
Corn (Row Crops)	21.43
Tobacco (Row Crops)	12.38
Other Vegetable and Truck Crops	14.60
Farmsteads and Ranch Headquarters	0.69

Table 4-70. Annual Estimated Total Soil Loss in Subwatershed 051301060205.

4.2.C. 0513010603.

Figure 4-92. Location of Subwatershed 0513010603. *All Cordell Hull Lake HUC-10 subwatershed boundaries are shown for reference.*

4.2.C.i. 051301060301 (Cumberland River).

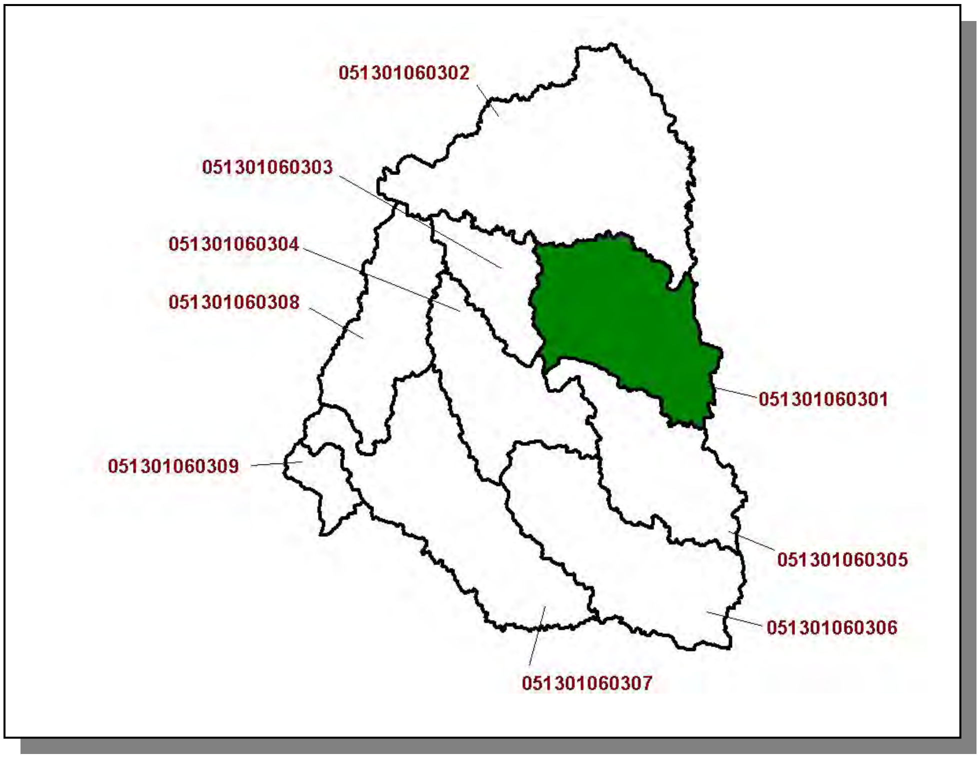

Figure 4-93. Location of Subwatershed 051301060301. *HUC-12 subwatershed boundaries are shown for reference.*

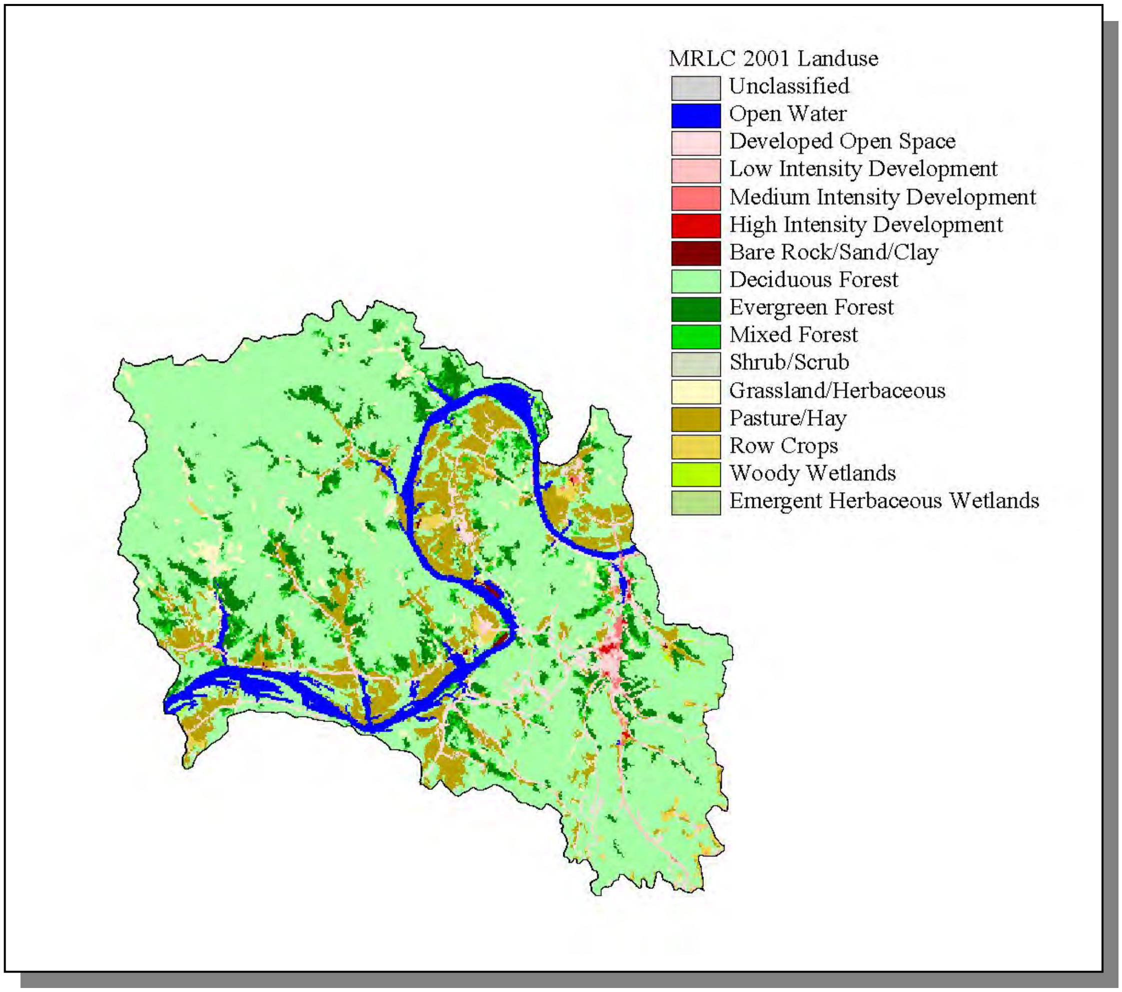

Figure 4-94. Illustration of Land Use Distribution in Subwatershed 051301060301.

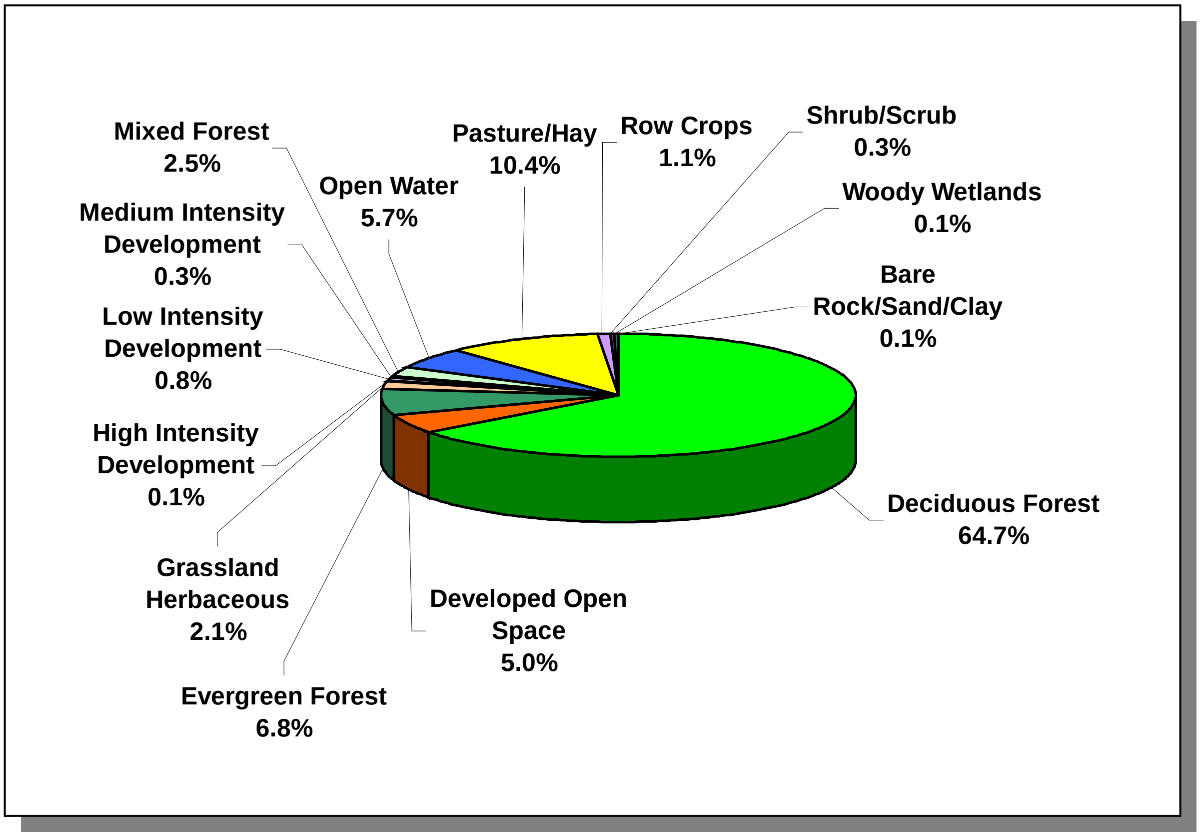

Figure 4-95. Land Use Distribution in Subwatershed 051301060301. *More information is provided in Appendix IV.*

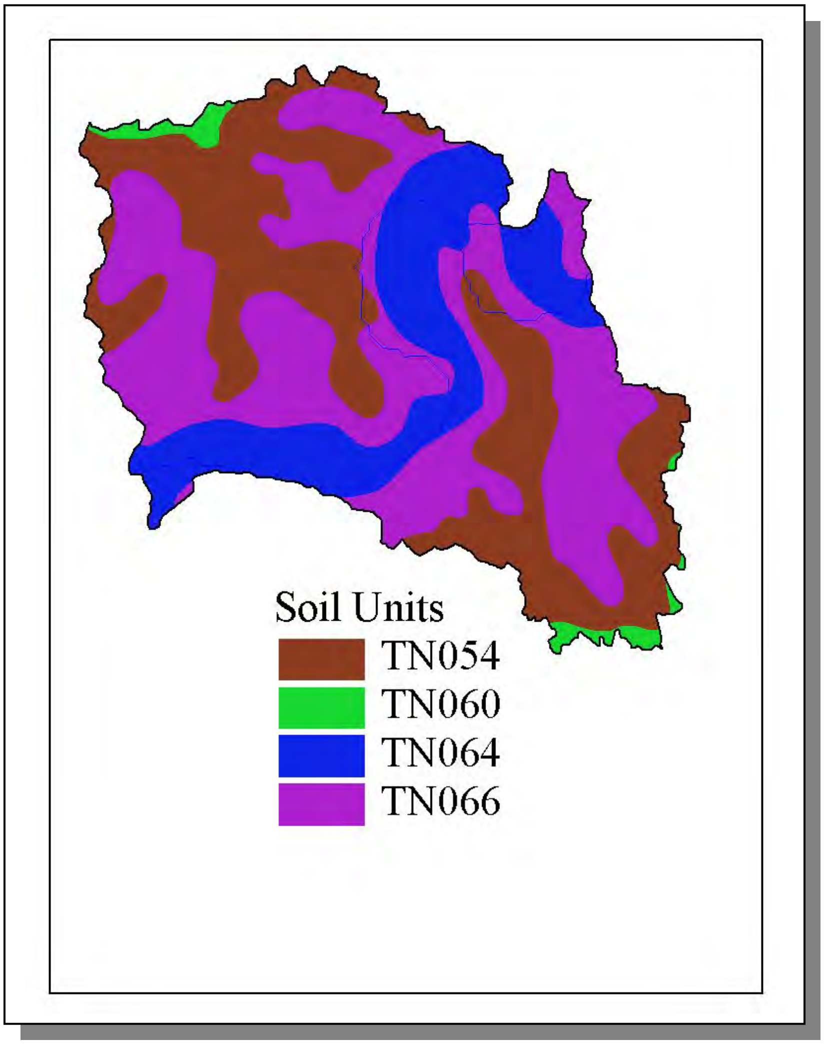

Figure 4-96. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060301.

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
TN064	19.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-71. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060301. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,297	9,537	10,984	13.41	1,247	1,279	1,473	18.1

Table 4-72. Population Estimates in Subwatershed 051301060301.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Gainesboro	Jackson	1,002	495	411	82	2

Table 4-73. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060301.

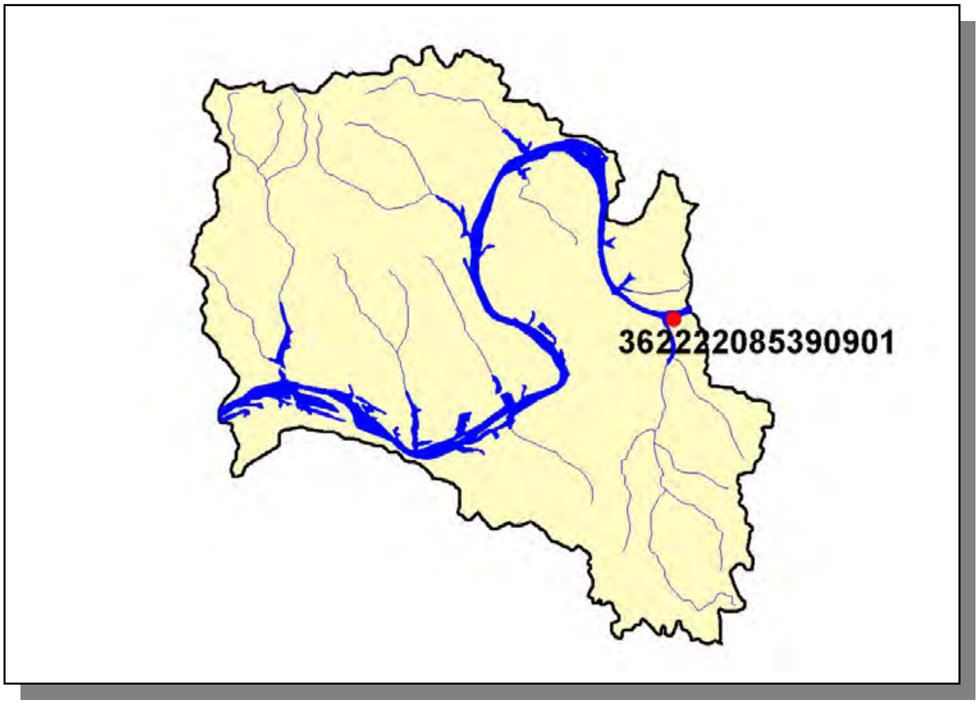

Figure 4-97. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060301. *More information is provided in Appendix IV.*

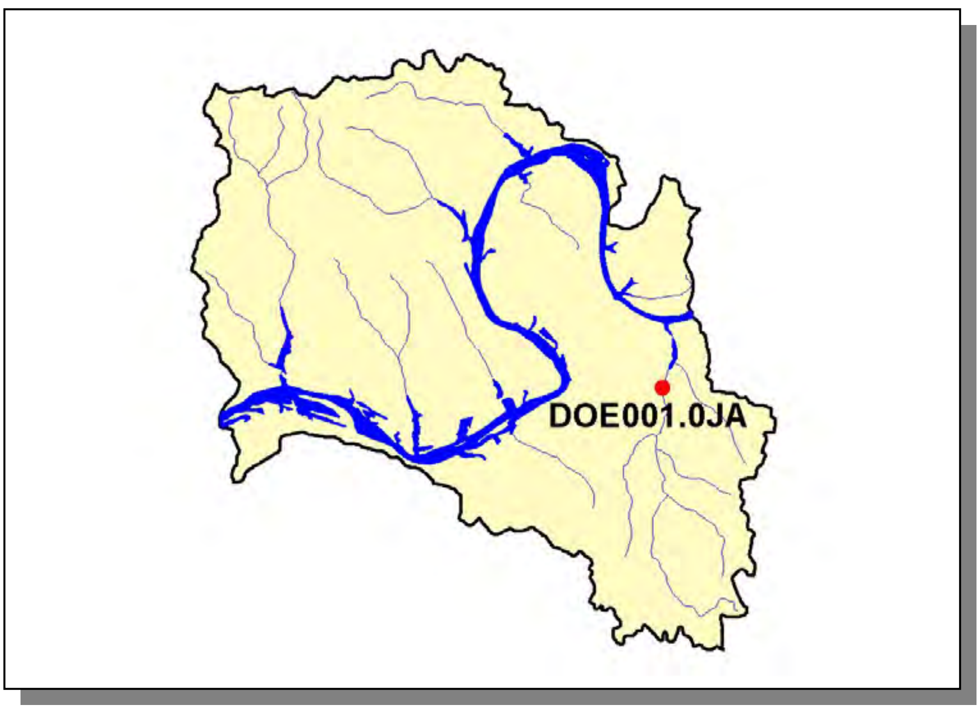

Figure 4-98. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060301. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.i.a. Point Source Contributions.

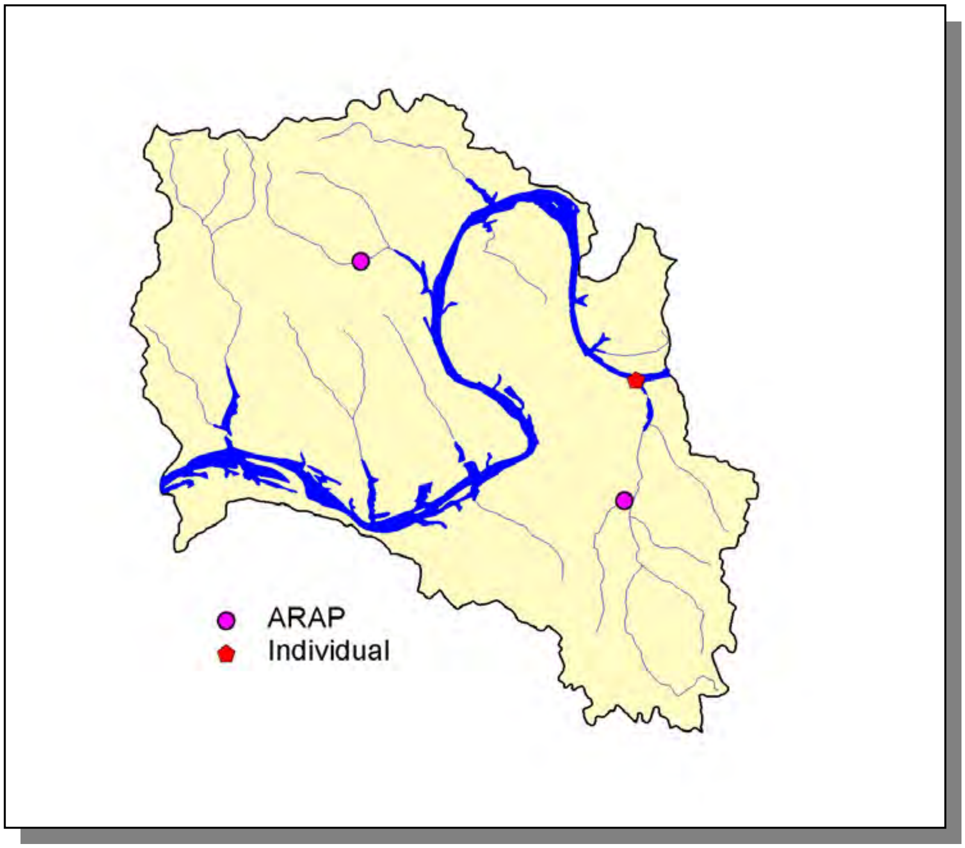

Figure 4-99. Location of Permits Issued in Subwatershed 051301060301. *More information, including the names of facilities, is provided in Appendix IV.*

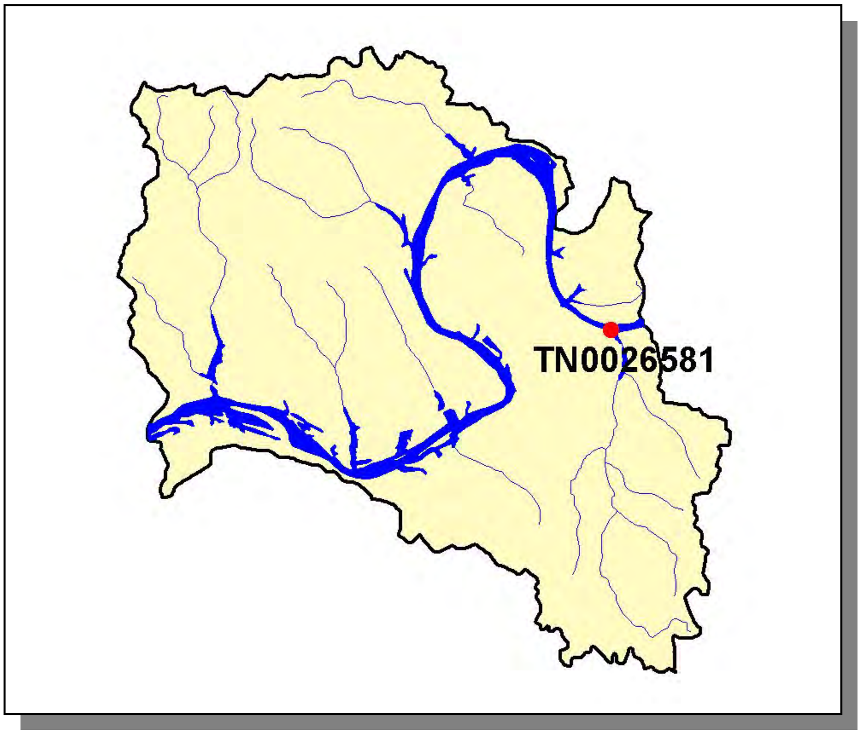

Figure 4-100. Location of Active NPDES Sites in Subwatershed 051301060301. *More information, including the names of facilities, is provided in Appendix IV.*

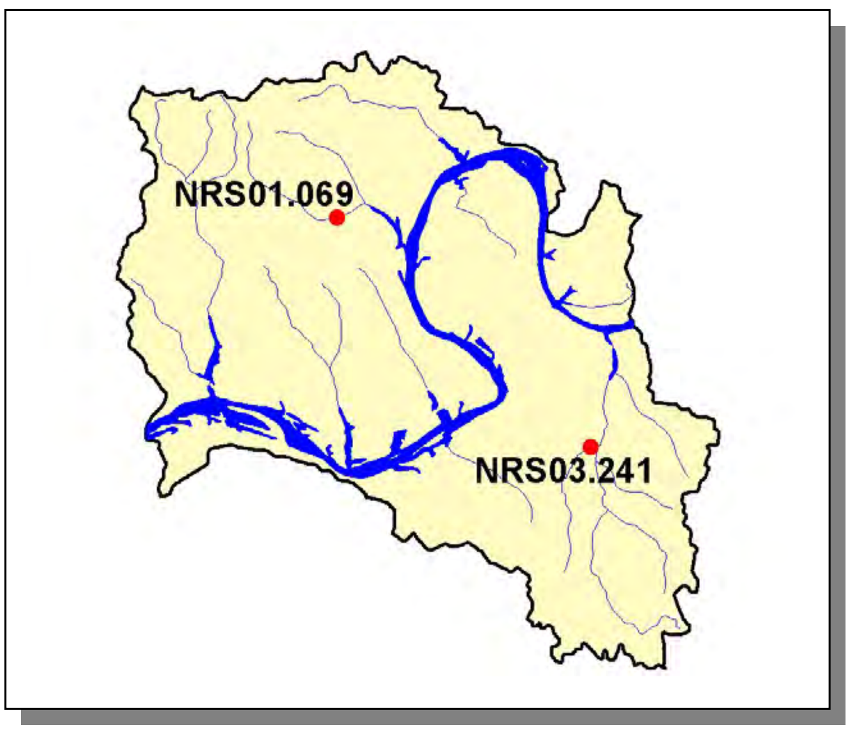

Figure 4-101. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 051301060301. *More information is provided in Appendix IV.*

4.2.C.i.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
799	1,386	<5	<5	46	<5

Table 4-74. Summary of Livestock Count Estimates in Subwatershed 051301060301. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39

Table 4-75. Summary of Livestock Count Estimates in Jackson County. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Jackson	135.9	135.9	0.9	5.1

Table 4-76. Forest Acreage and Annual Removal Rates (1987-1994) in Jackson County.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	2.24
Legumes (Hayland)	0.17
Grass, Forbs, Legumes (Mixed Pasture)	1.99
Corn (Row Crops)	21.43
Farmsteads and Ranch Headquarters	1.31

Table 4-77. Annual Estimated Total Soil Loss in Subwatershed 051301060301.

4.2.C.ii. 051301060302 (Jennings Creek).

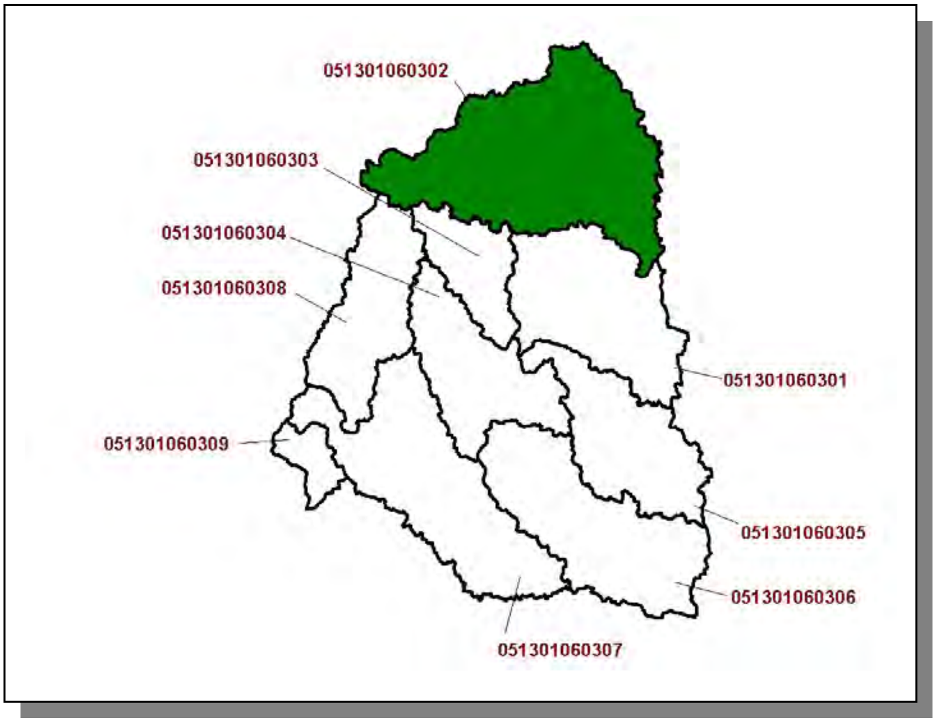

Figure 4-102. Location of Subwatershed 051301060302. *HUC-12 subwatershed boundaries are shown for reference.*

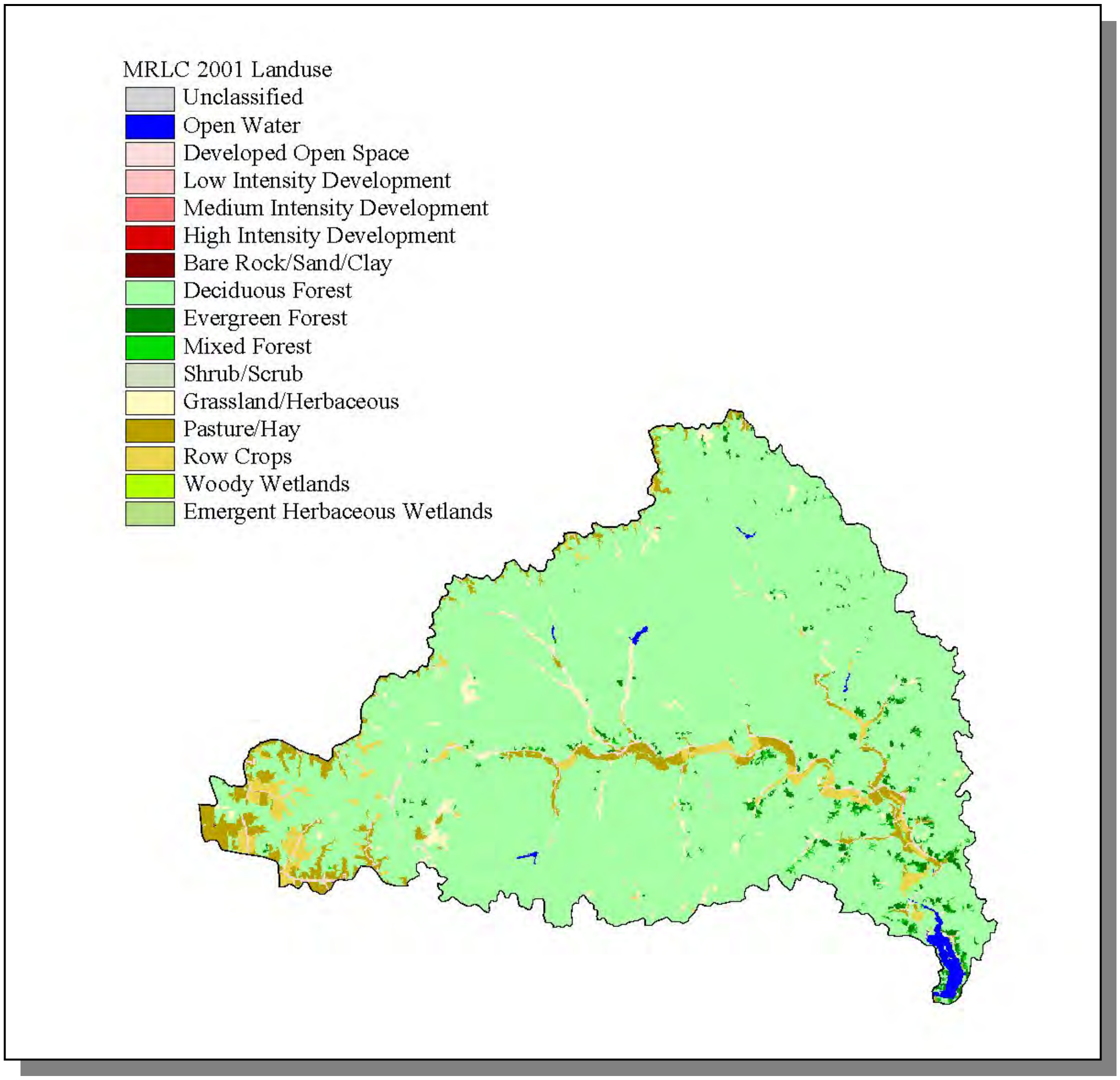

Figure 4-103. Illustration of Land Use Distribution in Subwatershed 051301060302.

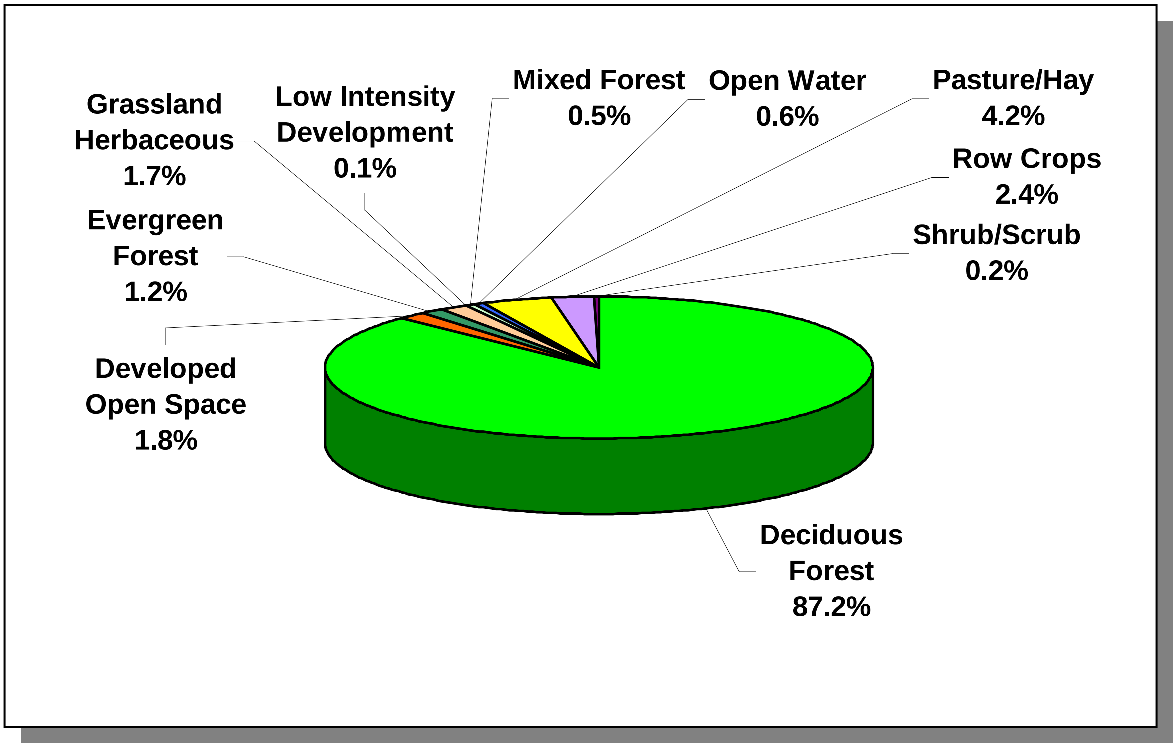

Figure 4-104. Land Use Distribution in Subwatershed 051301060302. *More information is provided in Appendix IV.*

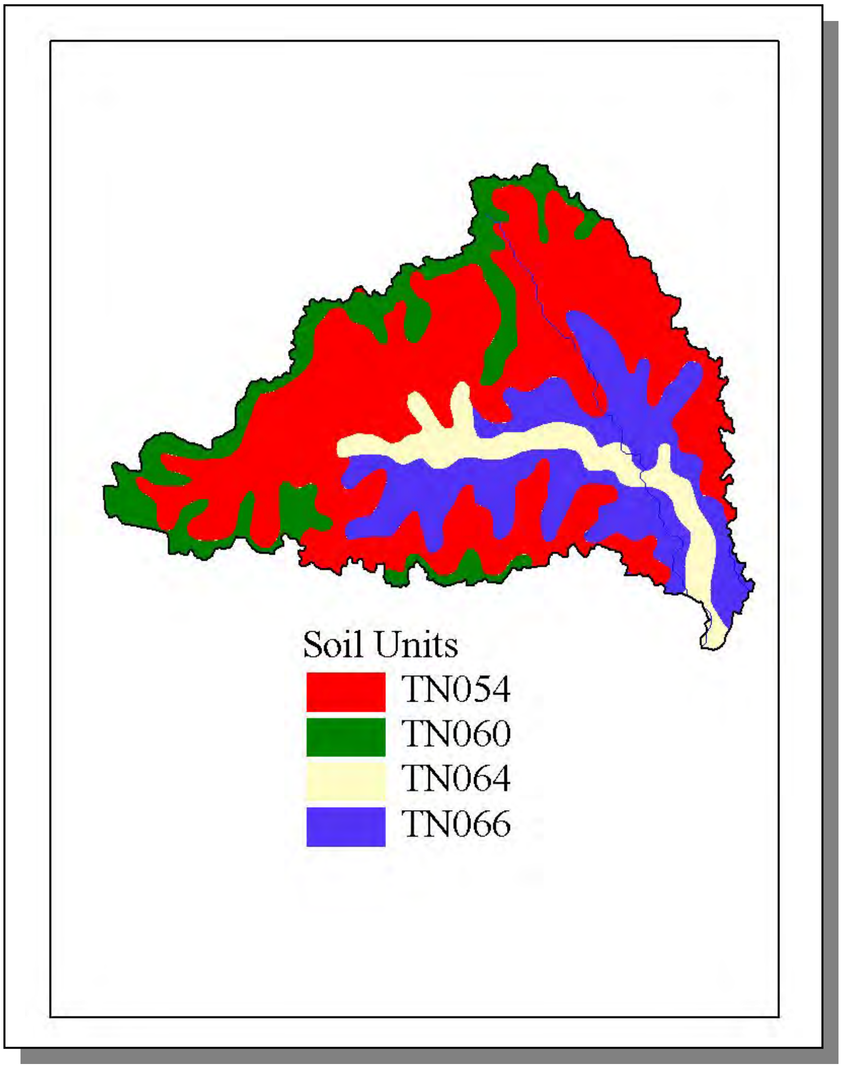

Figure 4-105. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060302.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-78. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060302. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Clay	7,238	7,311	7,976	3.74	271	274	298	10.0
Jackson	9,297	9,537	10,984	16.57	1,540	1,580	1,820	18.2
Macon	15,906	17,854	20,386	3.77	600	673	769	28.2
Total	**32,441**	**34,702**	**39,346**		**2,411**	**2,527**	**2,887**	**19.7**

Table 4-79. Population Estimates in Subwatershed 051301060302.

Figure 4-106. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060302. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.ii.a. Point Source Contributions.

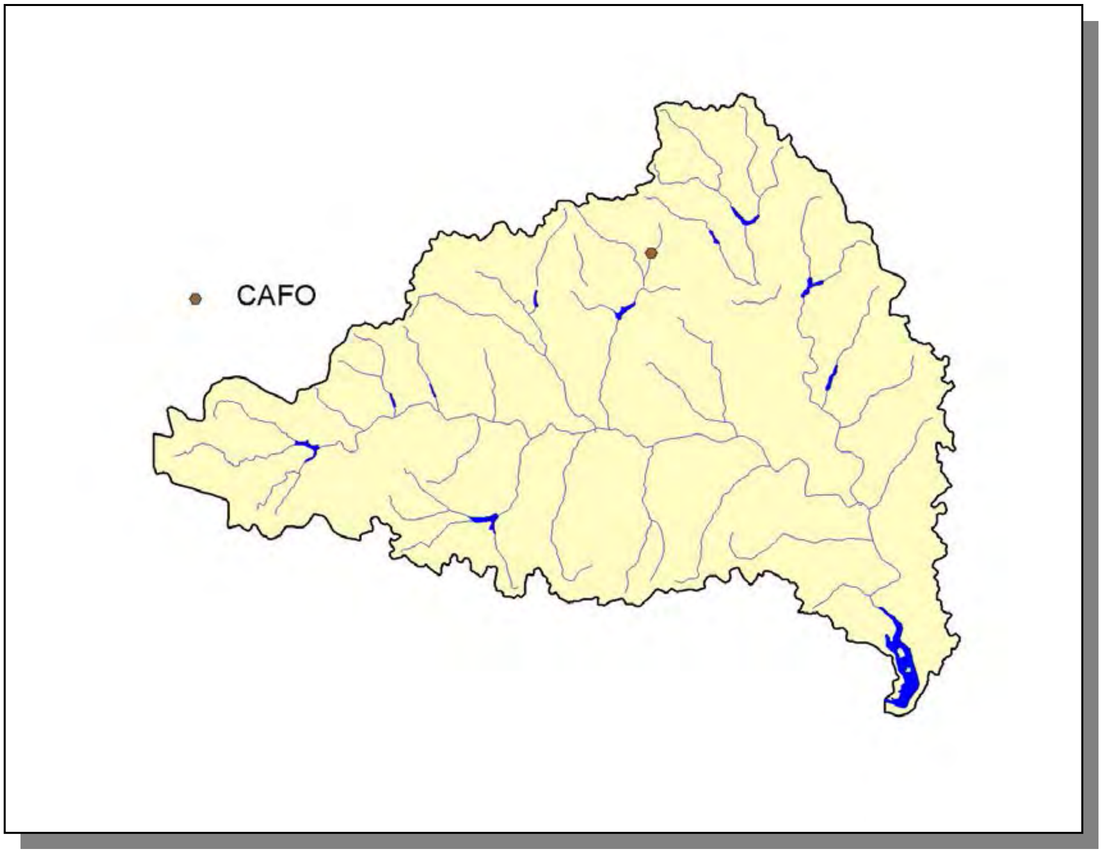

Figure 4-107. Location of Permits Issued in Subwatershed 051301060302. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-108. Location of Concentrated Animal Feeding Operations (CAFO) in Subwatershed 051301060302. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.C.ii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
871	1,652	11	<5	101	6

Table 4-80. Summary of Livestock Count Estimates in Subwatershed 051301060302. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Clay	0	14,574	0	18	174	23
Jackson	6,962	12,086	10	727	403	39
Macon	15,039	26,098	318	675	2,377	111

Table 4-81. Summary of Livestock Count Estimates in Clay, Jackson, and Macon Counties. *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.*

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.35
Grass (Pastureland)	1.80
Grass (Hayland)	0.30
Legumes, Grass (Hayland)	0.31
Legumes (Hayland)	0.16
Grass, Forbs, Legumes (Mixed Pasture)	1.76
Corn (Row Crops)	18.19
Tobacco (Row Crops)	18.95
Wheat (Close-Grown Cropland)	3.43
Other Vegetable and Truck Crops	5.48
Conservation Reserve Program Lands	0.28
Farmsteads and Ranch Headquarters	1.16

Table 4-82. Annual Estimated Total Soil Loss in Subwatershed 051301060302.

4.2.C.iii. 051301060303 (Wartrace Creek).

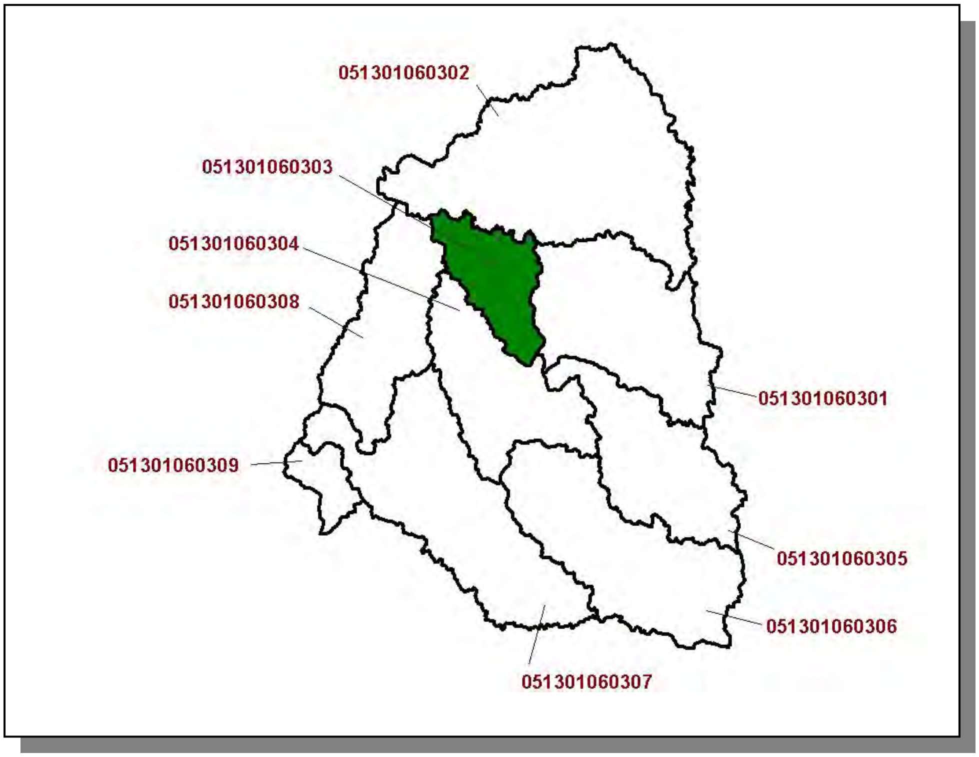

Figure 4-109. Location of Subwatershed 051301060303. *HUC-12 subwatershed boundaries are shown for reference.*

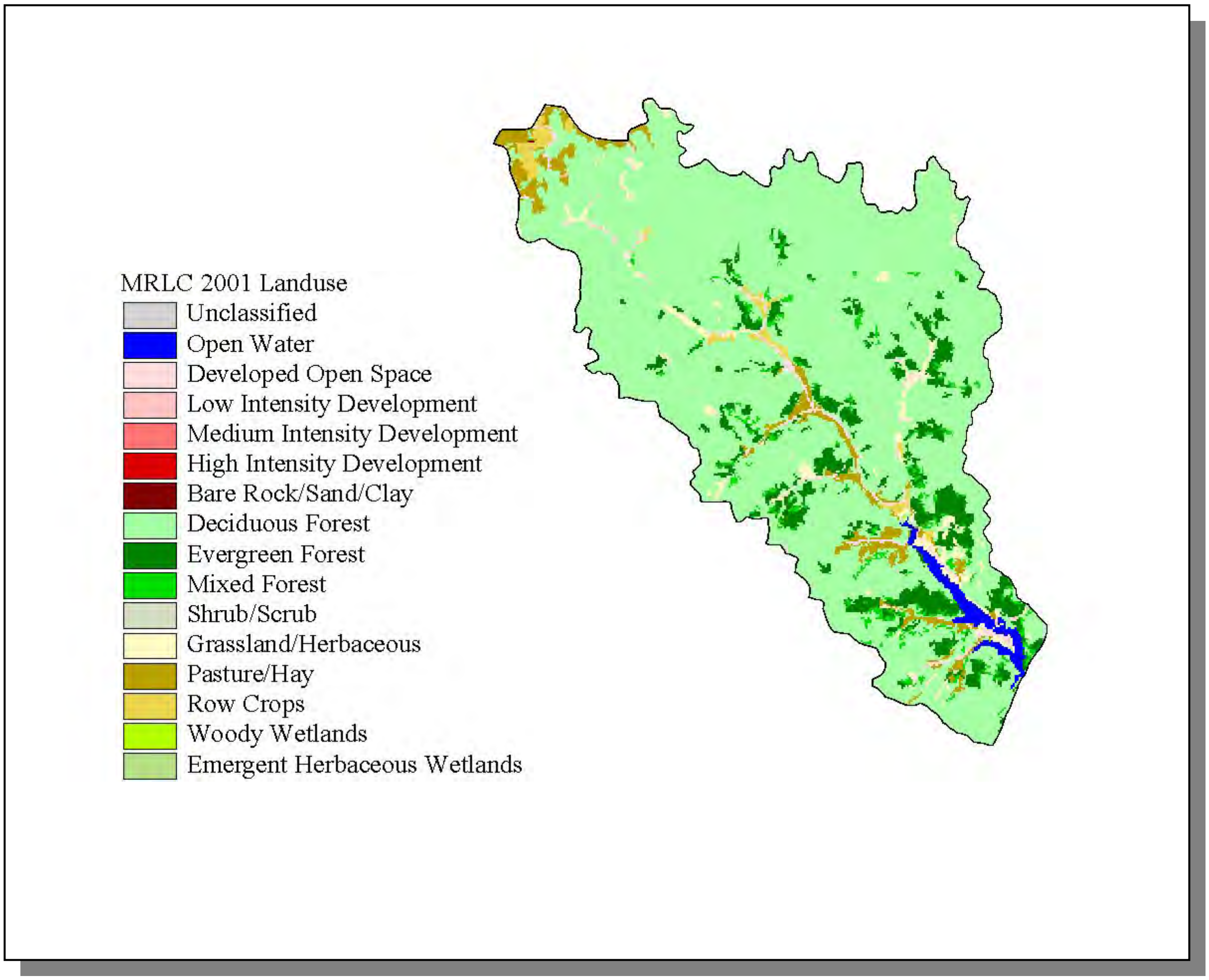

Figure 4-110. Illustration of Land Use Distribution in Subwatershed 051301060303.

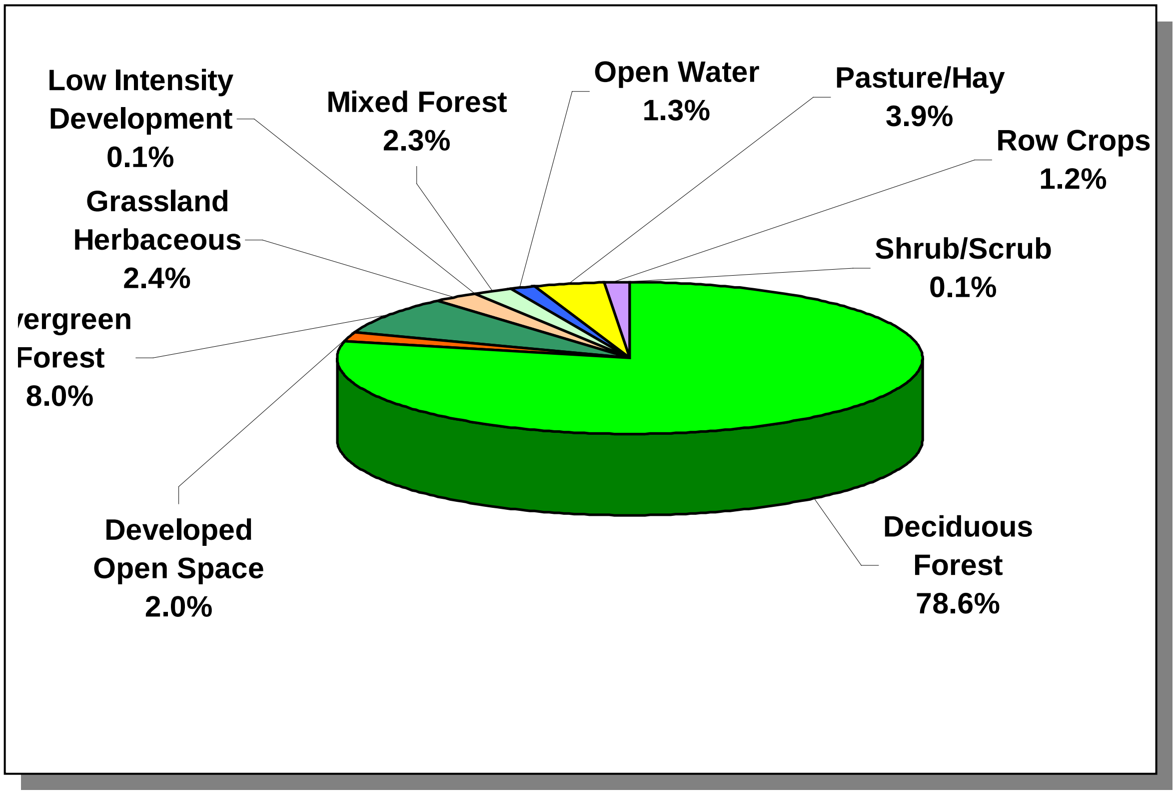

Figure 4-111. Land Use Distribution in Subwatershed 051301060303. *More information is provided in Appendix IV.*

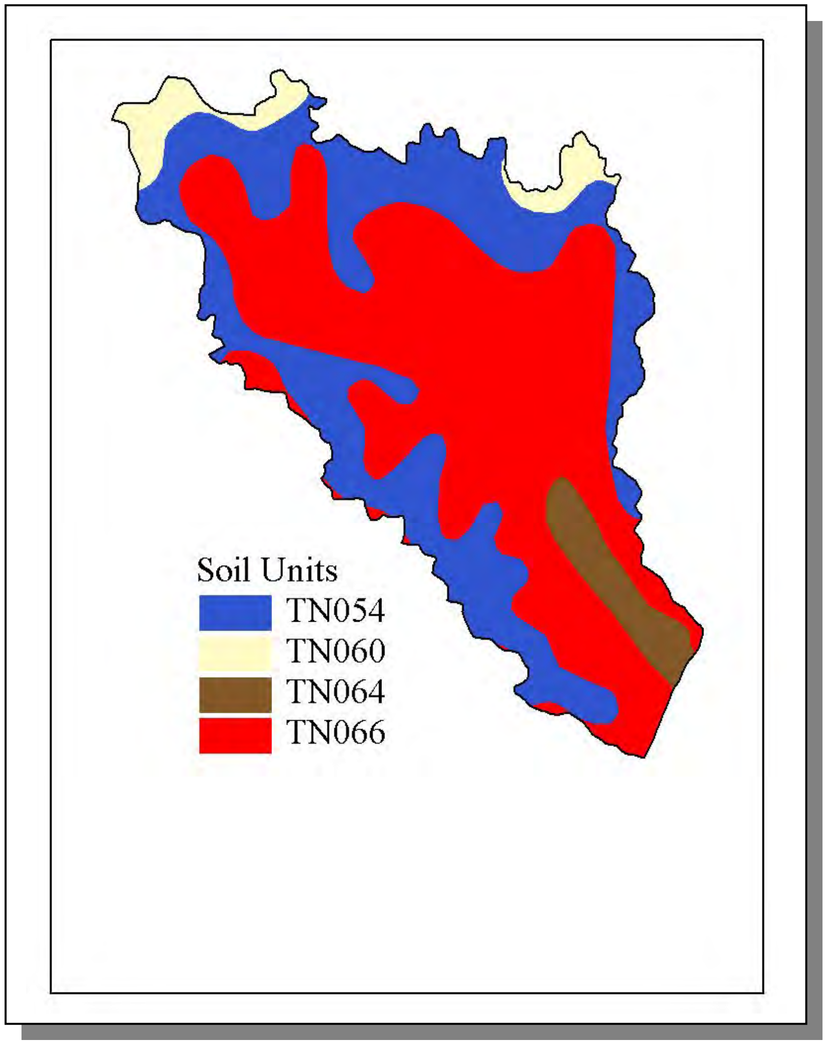

Figure 4-112. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060303.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-83. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060303. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,297	9,537	10,984	4.21	392	402	463	18.1
Macon	15,906	17,854	20,386	0.83	132	148	169	28.0
Smith	14,143	16,047	17,712	0.44	62	71	78	25.8
Total	**39,346**	**43,438**	**49,082**		**586**	**621**	**710**	**21.2**

Table 4-84. Population Estimates in Subwatershed 051301060303.

4.2.C.iii.a. Point Source Contributions.

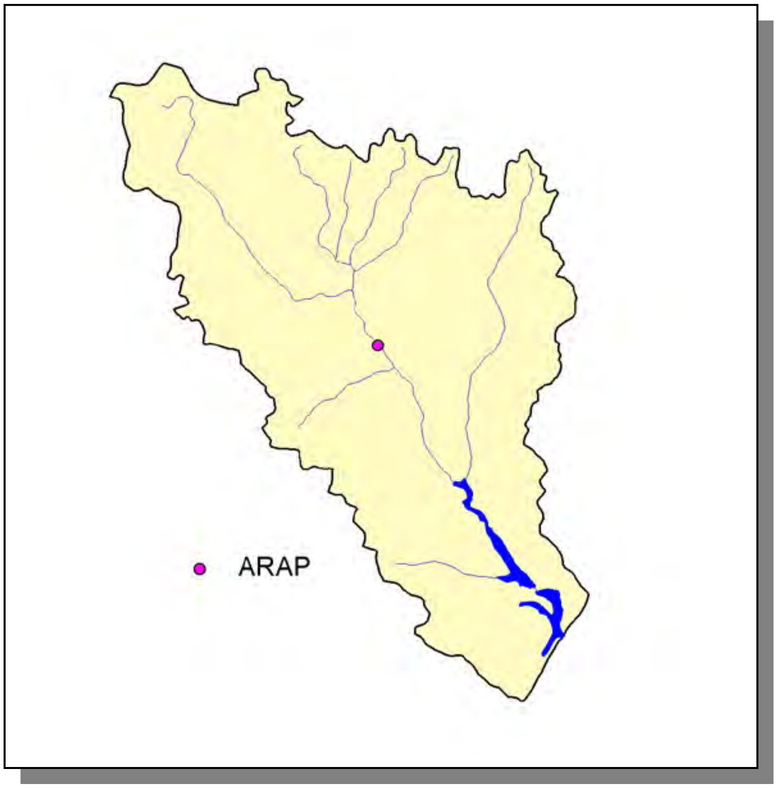

Figure 4-113. Location of Permits Issued in Subwatershed 051301060303. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-114. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 051301060303. *More information is provided in Appendix IV.*

4.2.C.iii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
270	469	<5	<5	28	<5

Table 4-85. Summary of Livestock Count Estimates in Subwatershed 051301060303. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39
Macon	15,039	26,098	318	675	2,377	111
Smith	17,187	29,672	814	683	1,883	332

Table 4-86. Summary of Livestock Count Estimates in Jackson, Macon, and Smith Counties. *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.*

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.35
Grass (Pastureland)	1.90
Grass (Hayland)	0.18
Legumes, Grass (Hayland)	0.13
Legumes (Hayland)	0.16
Grass, Forbs, Legumes (Mixed Pasture)	1.74
Corn (Row Crops)	18.56
Soybeans (Row Crops)	6.36
Tobacco (Row Crops)	9.68
Wheat (Close-Grown Cropland)	3.43
Other Vegetable and Truck Crops	5.48
Conservation Reserve Program Lands	0.28
Farmsteads and Ranch Headquarters	1.07

Table 4-87. Annual Estimated Total Soil Loss in Subwatershed 051301060303.

4.2.C.iv. 051301060304 (Cumberland River).

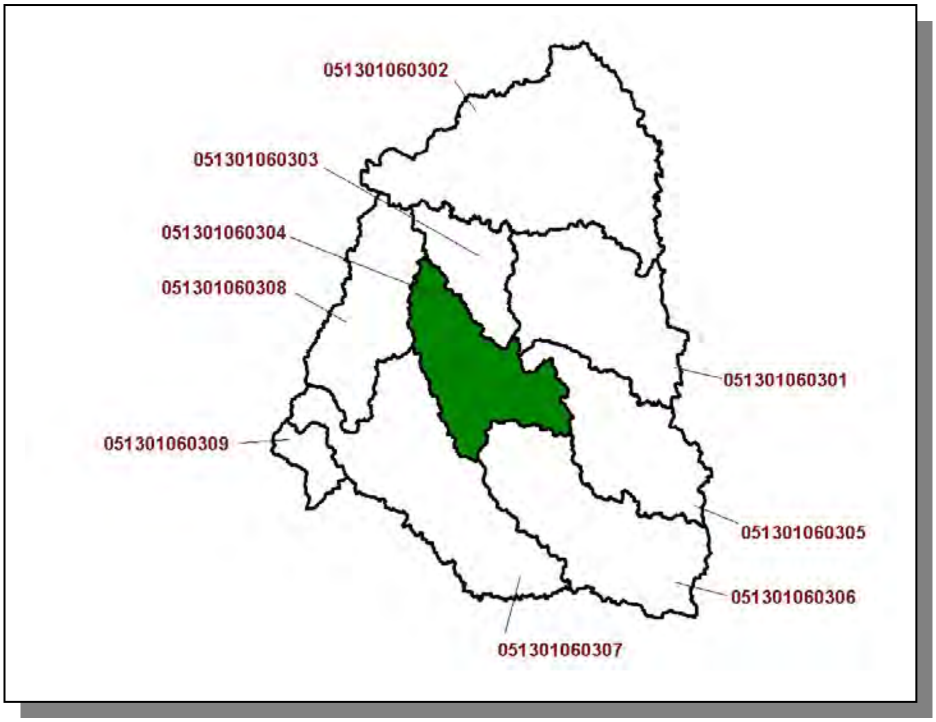

Figure 4-115. Location of Subwatershed 051301060304. *HUC-12 subwatershed boundaries are shown for reference.*

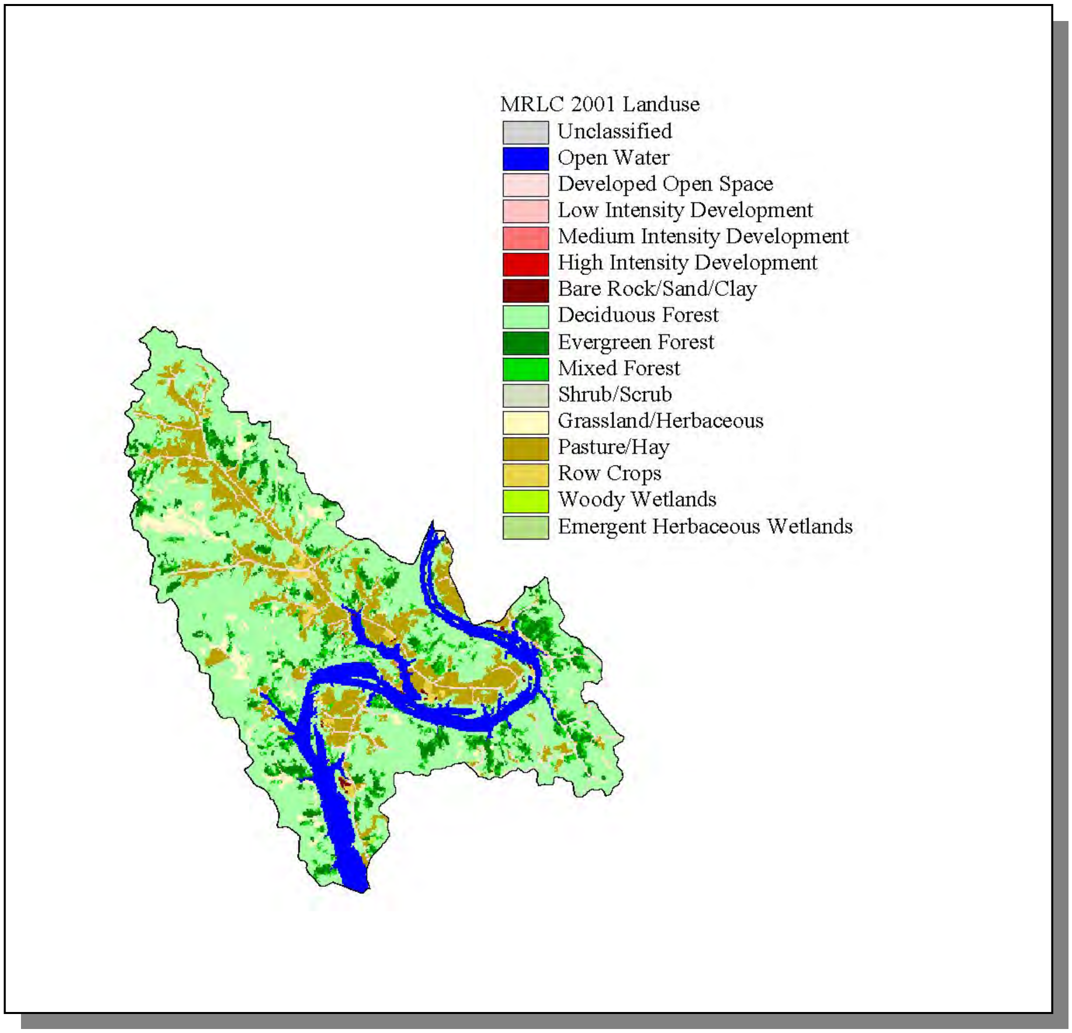

Figure 4-116. Illustration of Land Use Distribution in Subwatershed 051301060304.

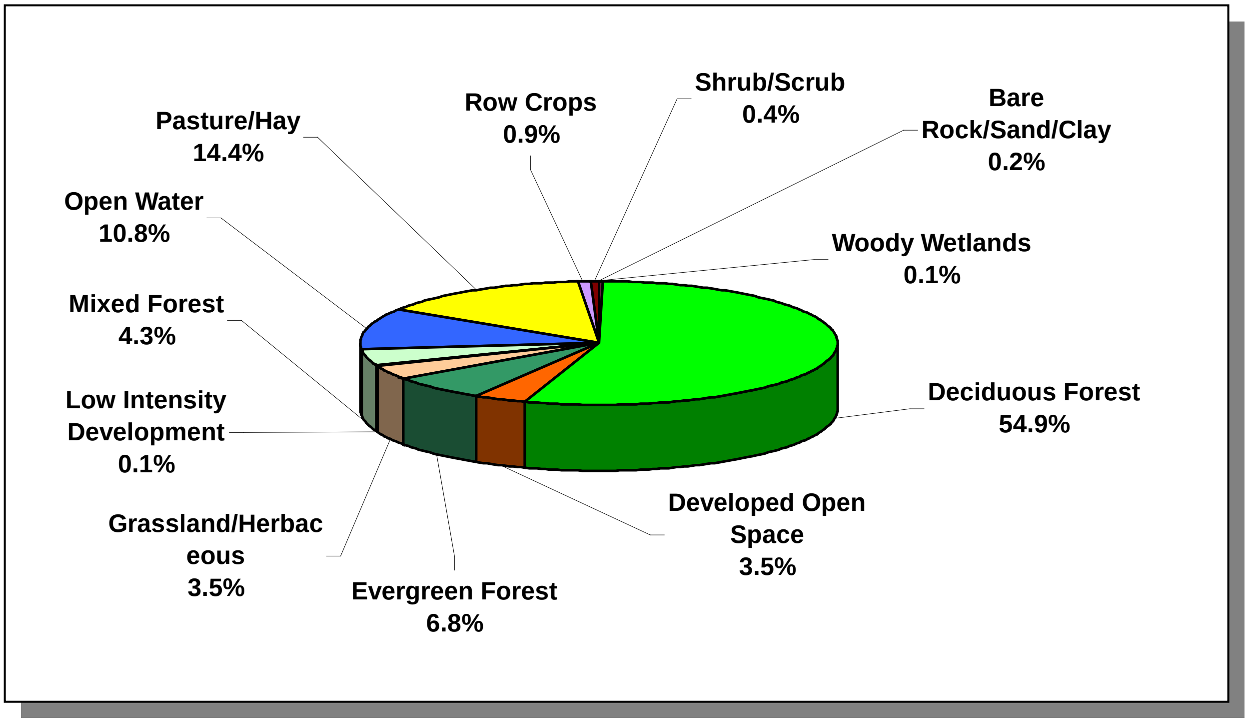

Figure 4-117. Land Use Distribution in Subwatershed 051301060304. *More information is provided in Appendix IV.*

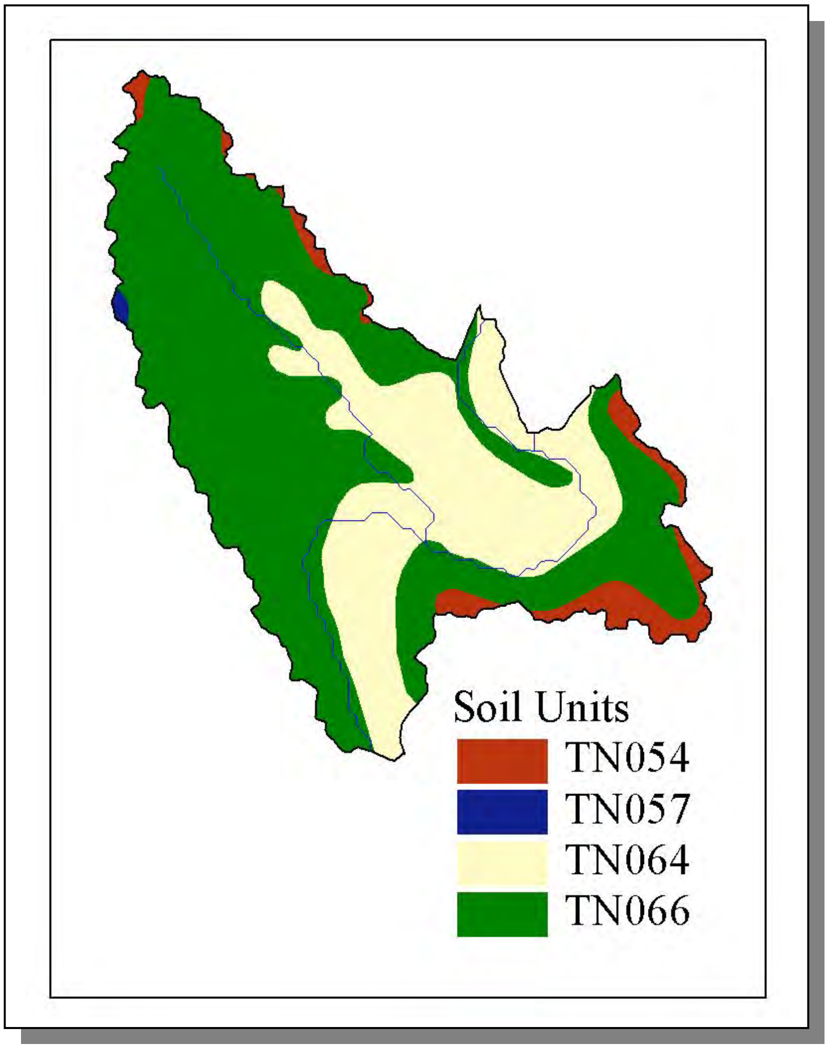

Figure 4-118. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060304.

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
TN057	0.00	C	1.15	5.01	Clayey Loam	0.33
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-88. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060304. *The definition of "Hydrologic Group" is provided in Appendix IV.*

.

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,297	9,537	10,984	8.06	749	769	885	18.2
Smith	14,143	16,047	17,712	1.9	269	305	337	25.3
Total	**23,440**	**25,584**	**28,696**		**1,018**	**1,074**	**1,222**	**20.0**

Table 4-89. Population Estimates in Subwatershed 051301060304.

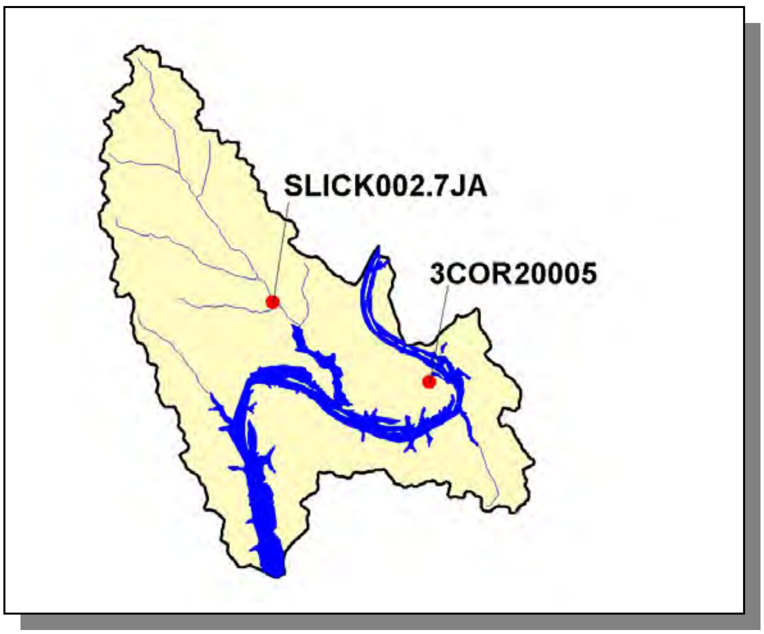

Figure 4-119. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060304. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.iv.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.C.iv.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,269	2,198	24	<5	99	14

Table 4-90. Summary of Livestock Count Estimates in Subwatershed 051301060304. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39
Smith	17,187	29,672	814	683	1,883	332

Table 4-91. Summary of Livestock Count Estimates in Jackson and Smith Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Jackson	135.9	135.9	0.9	5.1
Smith	81.0	81.0	1.1	2.6

Table 4-92. Forest Acreage and Annual Removal Rates (1987-1994) in Jackson and Smith Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	2.09
Grass (Hayland)	0.12
Legumes, Grass (Hayland)	0.11
Legumes (Hayland)	0.17
Grass, Forbs, Legumes (Mixed Pasture)	1.74
Corn (Row Crops)	21.43
Soybeans (Row Crops)	6.36
Tobacco (Row Crops)	6.96
Farmsteads and Ranch Headquarters	1.15

Table 4-93. Annual Estimated Total Soil Loss in Subwatershed 051301060304.

4.2.C.v. 051301060305 (Flynn Lake Creek).

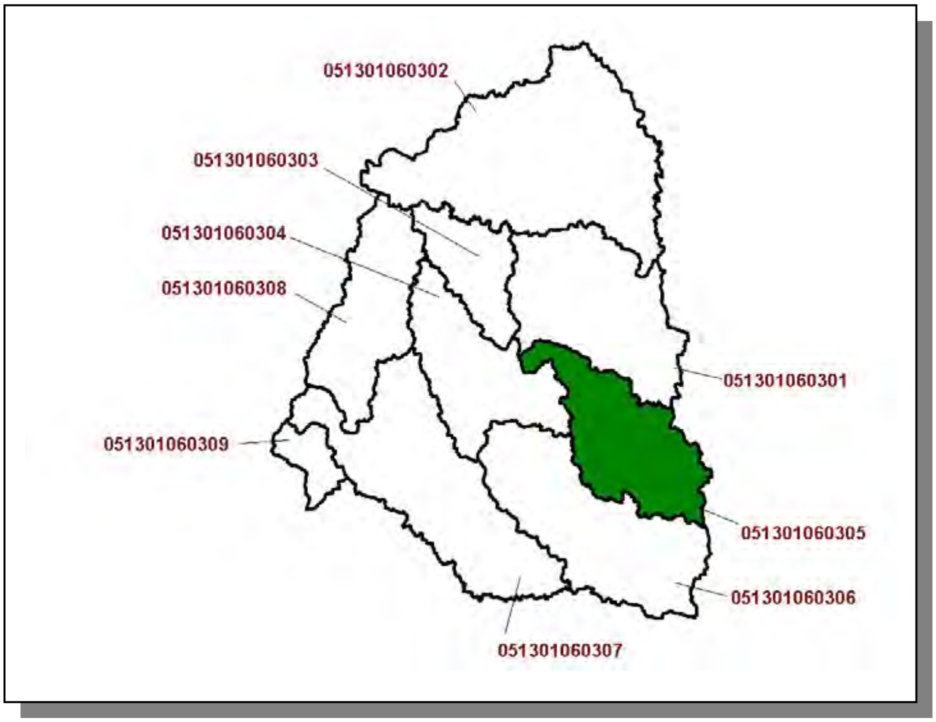

Figure 4-120. Location of Subwatershed 051301060305. *HUC-12 subwatershed boundaries are shown for reference.*

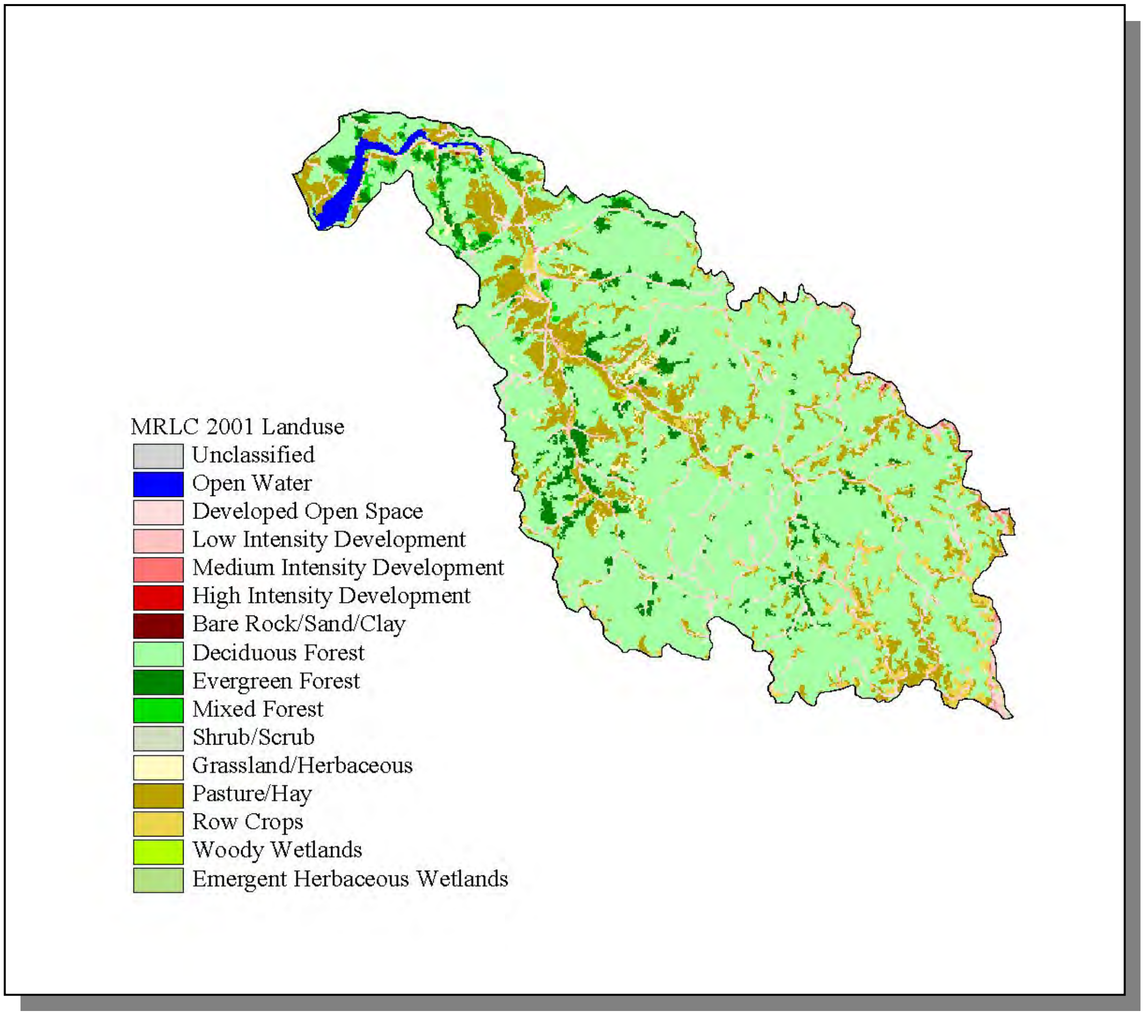

Figure 4-121. Illustration of Land Use Distribution in Subwatershed 051301060305.

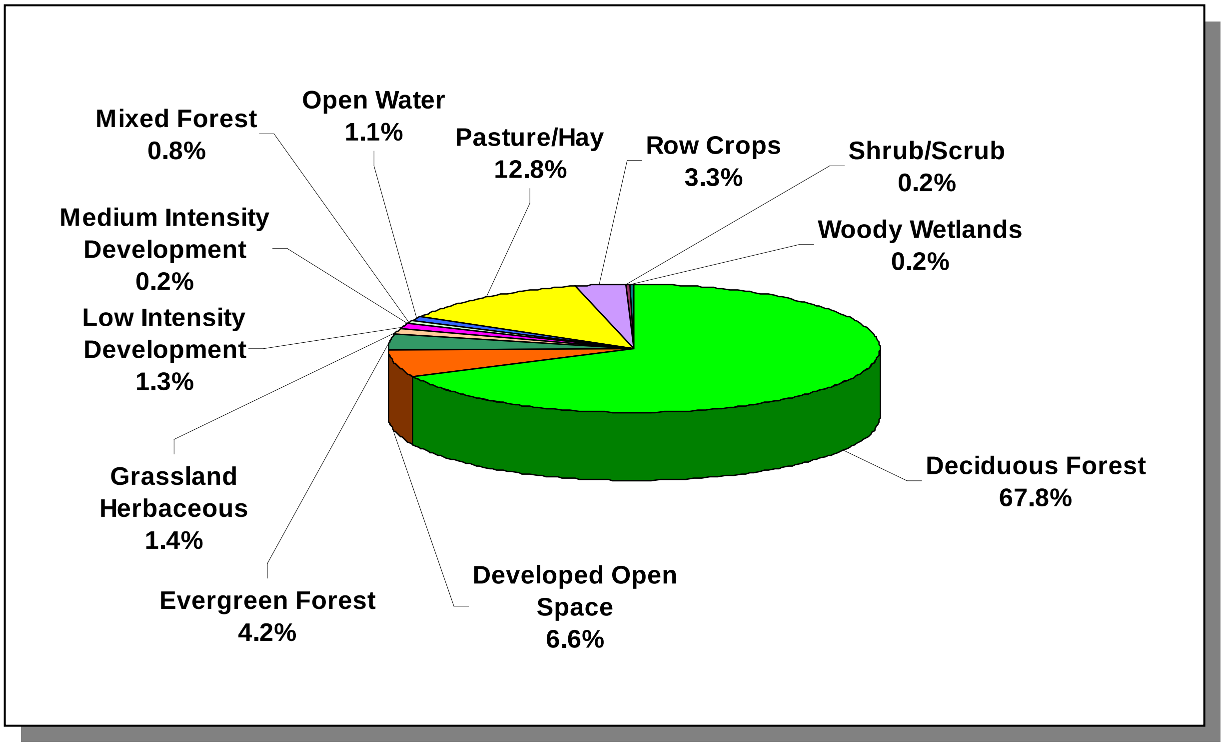

Figure 4-122. Land Use Distribution in Subwatershed 051301060305. *More information is provided in Appendix IV.*

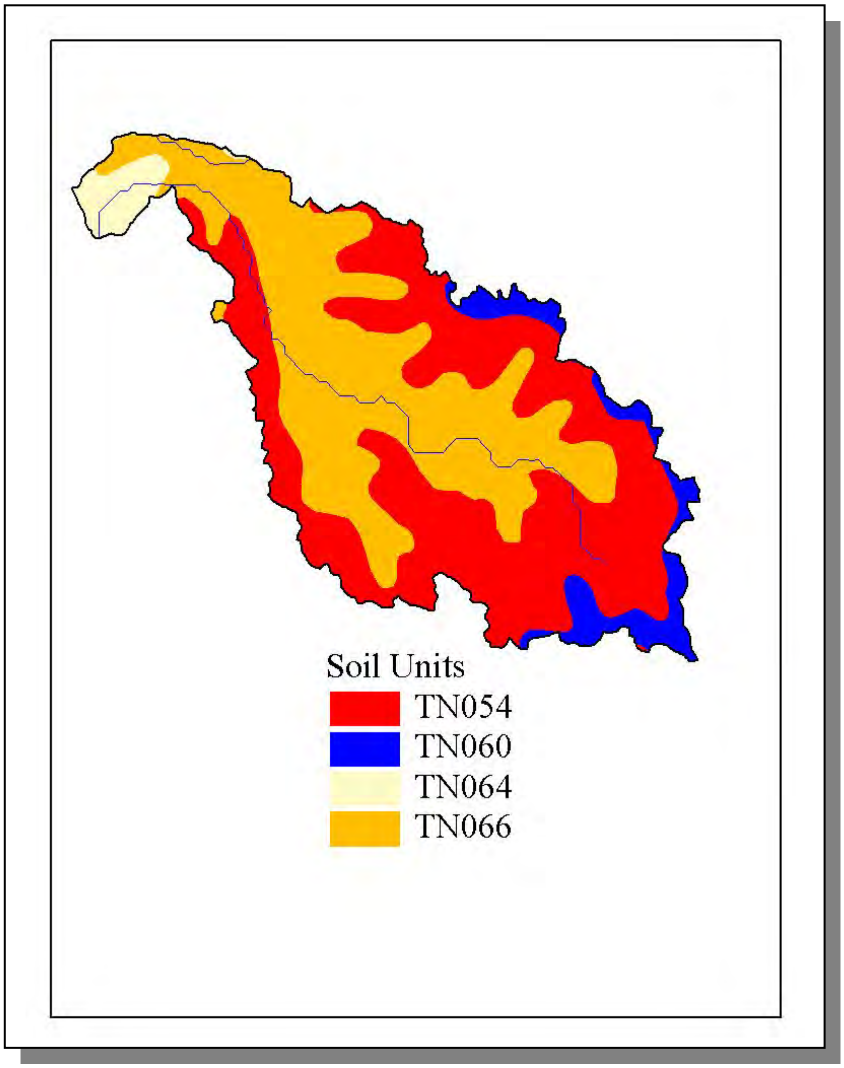

Figure 4-123. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060305.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-94. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060305. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,297	9,537	10,984	10.43	969	994	1,145	18.2

Table 4-95. Population Estimates in Subwatershed 051301060305.

Figure 4-124. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060305. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.v.a. Point Source Contributions.

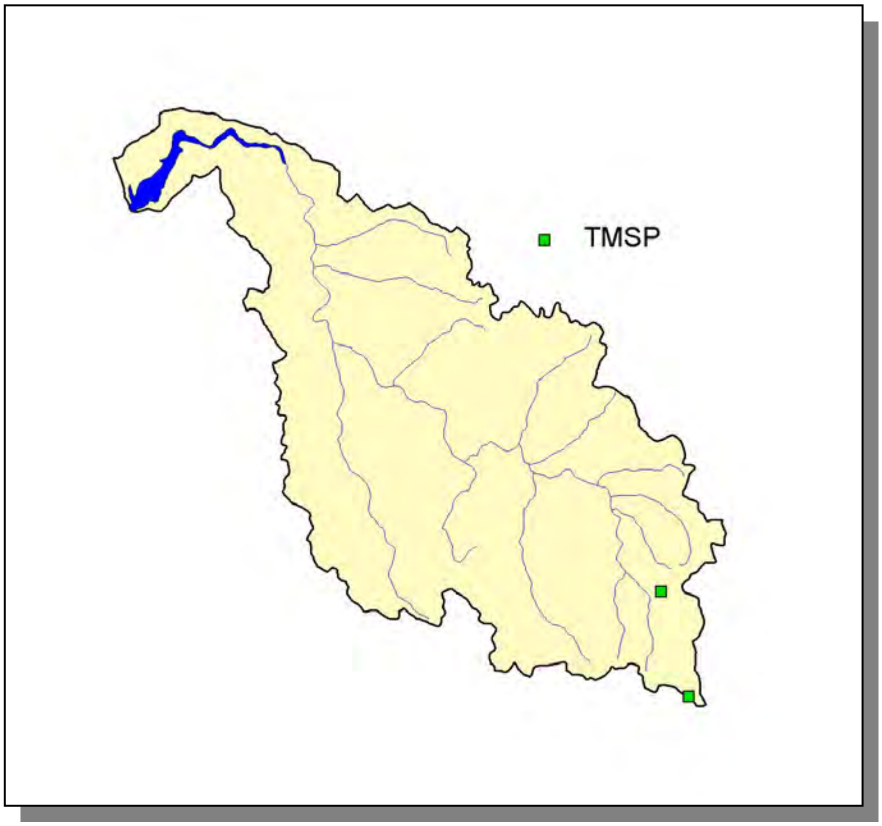

Figure 4-125. Location of Permits Issued in Subwatershed 051301060305. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-126. Location of TMSP Sites in Subwatershed 051301060305. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.C.v.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
573	995	<5	<5	33	<5

Table 4-96. Summary of Livestock Count Estimates in Subwatershed 051301060305. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39

Table 4-97. Summary of Livestock Count Estimates in Jackson County. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Jackson	135.9	135.9	0.9	5.1

Table 4-98. Forest Acreage and Annual Removal Rates (1987-1994) in Jackson County.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	2.24
Legumes (Hayland)	0.17
Grass, Forbs, Legumes (Mixed Pasture)	1.99
Corn (Row Crops)	21.43
Farmsteads and Ranch Headquarters	1.31

Table 4-99. Annual Estimated Total Soil Loss in Subwatershed 051301060305.

4.2.C.vi. 051301060306 (Martin Creek).

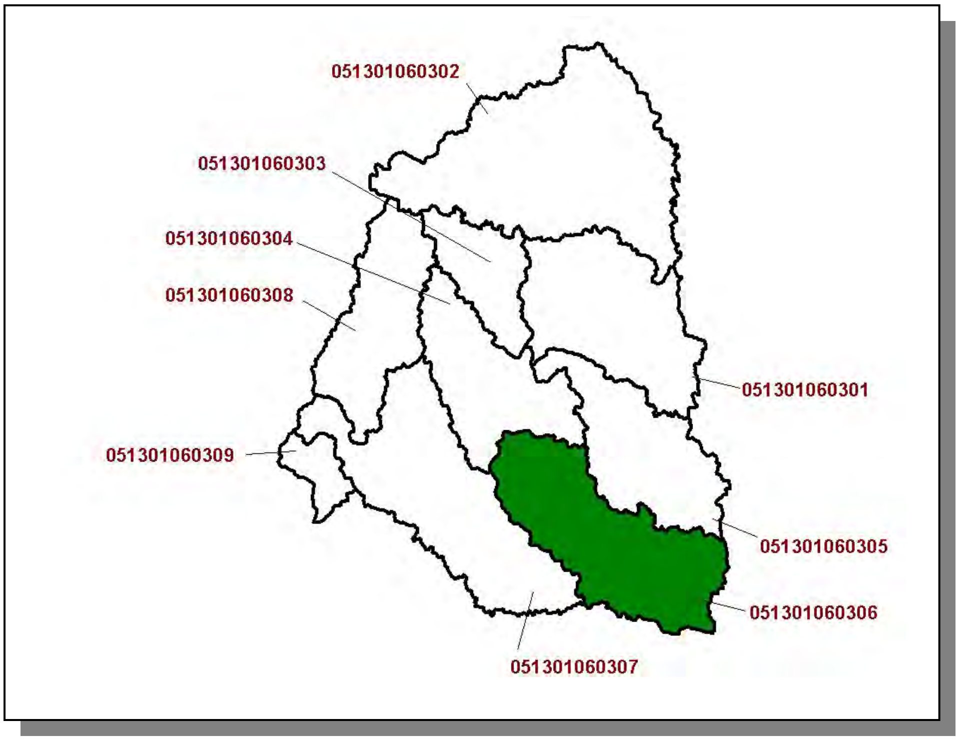

Figure 4-127. Location of Subwatershed 051301060306. *HUC-12 subwatershed boundaries are shown for reference.*

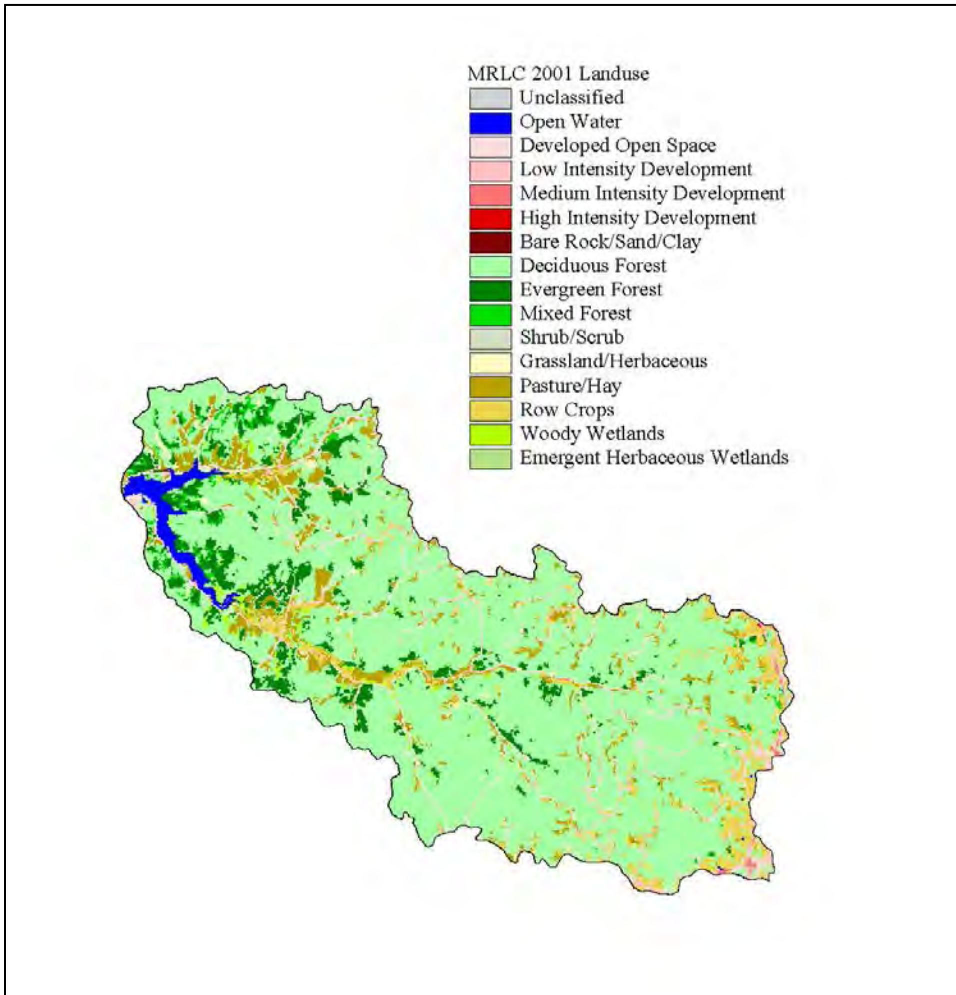

Figure 4-128. Illustration of Land Use Distribution in Subwatershed 051301060306.

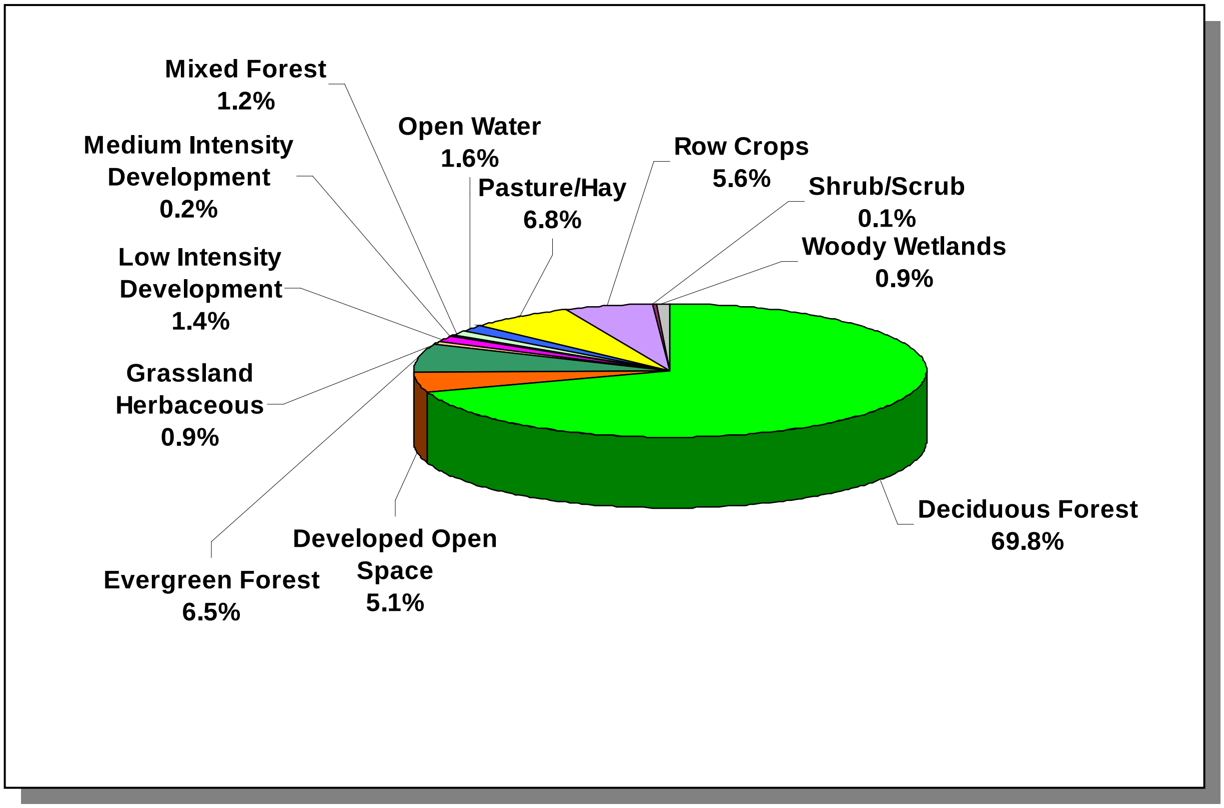

Figure 4-129. Land Use Distribution in Subwatershed 051301060306. *More information is provided in Appendix IV.*

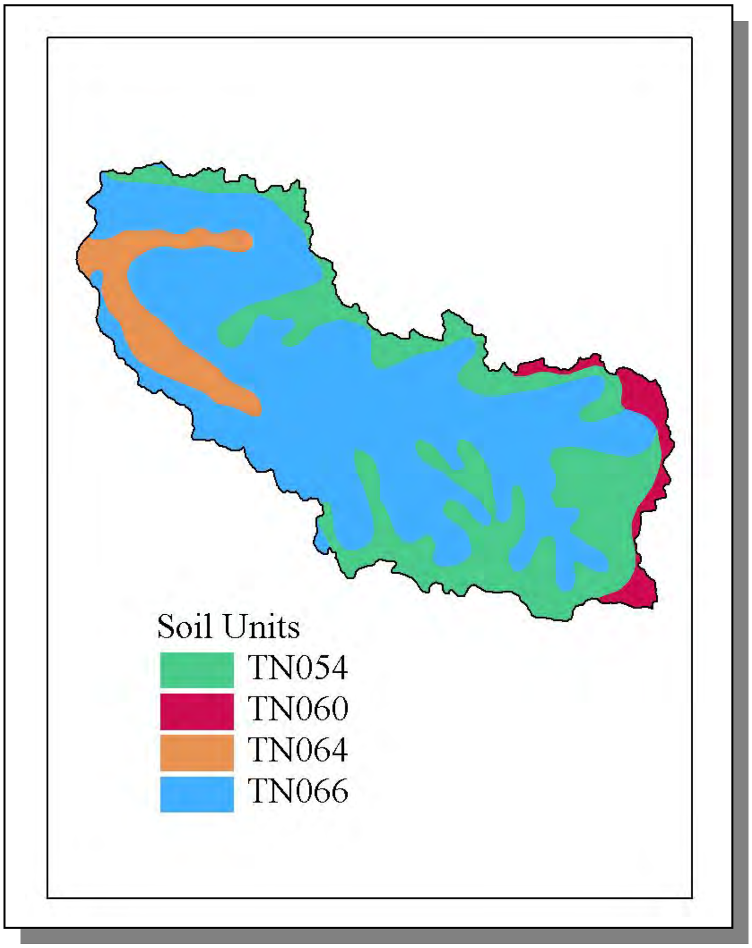

Figure 4-130. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060306.

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
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-100. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060306. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,297	9,537	10,984	6.24	580	595	686	18.3
Putnam	51,373	58,326	62,315	6.73	3,458	3,926	4,194	21.3
Total	**60,670**	**71,852**	**73,299**		**4,038**	**4,521**	**4,880**	**20.9**

Table 4-101. Population Estimates in Subwatershed 051301060306.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Baxter	Putnam	1,289	579	424	153	2

Table 4-102. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060306.

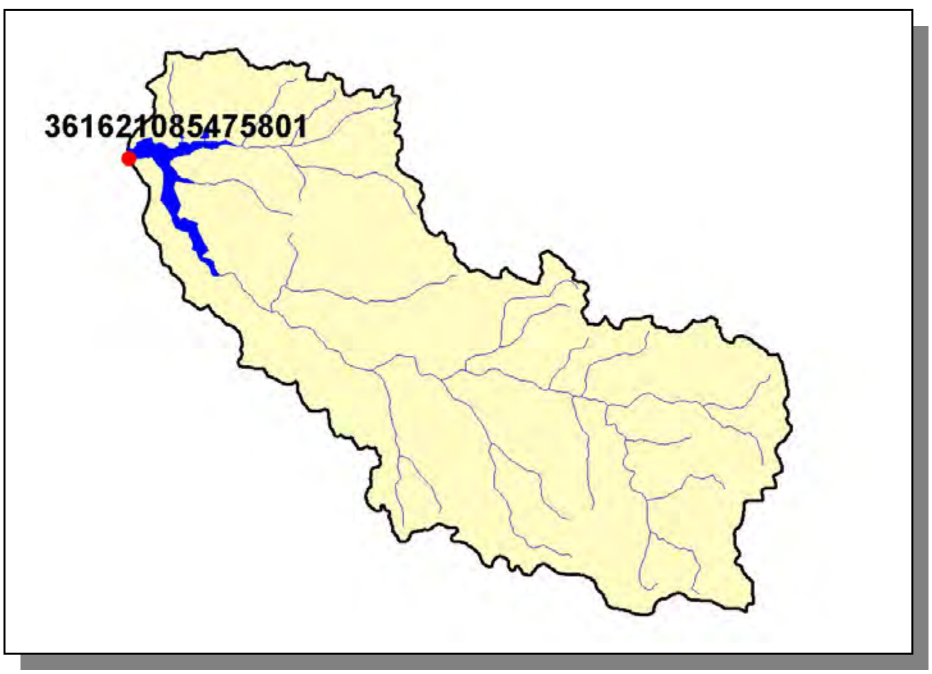

Figure 4-131. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060306. *More information is provided in Appendix IV.*

Figure 4-132. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060306. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.vi.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.C.vi.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
667	1,247	33	<5	49	<5

Table 4-103. Summary of Livestock Count Estimates in Subwatershed 051301060306. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39
Putnam	12,592	24,817	1,095	1,025	1,070	66
Smith	17,187	29,672	814	683	1,883	332

Table 4-104. Summary of Livestock Count Estimates in Jackson, Putnam, and Smith Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Jackson	135.9	135.9	0.9	5.1
Putnam	152.5	152.3	3.6	16.4
Smith	81.0	81.0	1.1	2.6

Table 4-105. Forest Acreage and Annual Removal Rates (1987-1994) in Jackson, Putnam, and Smith Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	2.04
Grass (Hayland)	1.63
Legumes (Hayland)	0.20
Legumes, Grass (Hayland)	0.61
Grass, Forbs, Legumes (Mixed Pasture)	1.40
Corn (Row Crops)	21.43
Soybeans (Row Crops)	6.36
Tobacco (Row Crops)	12.37
Other Vegetable and Truck Crops	14.60
Farmsteads and Ranch Headquarters	0.68

Table 4-106. Annual Estimated Total Soil Loss in Subwatershed 051301060306.

4.2.C.vii. 051301060307 (Cumberland River).

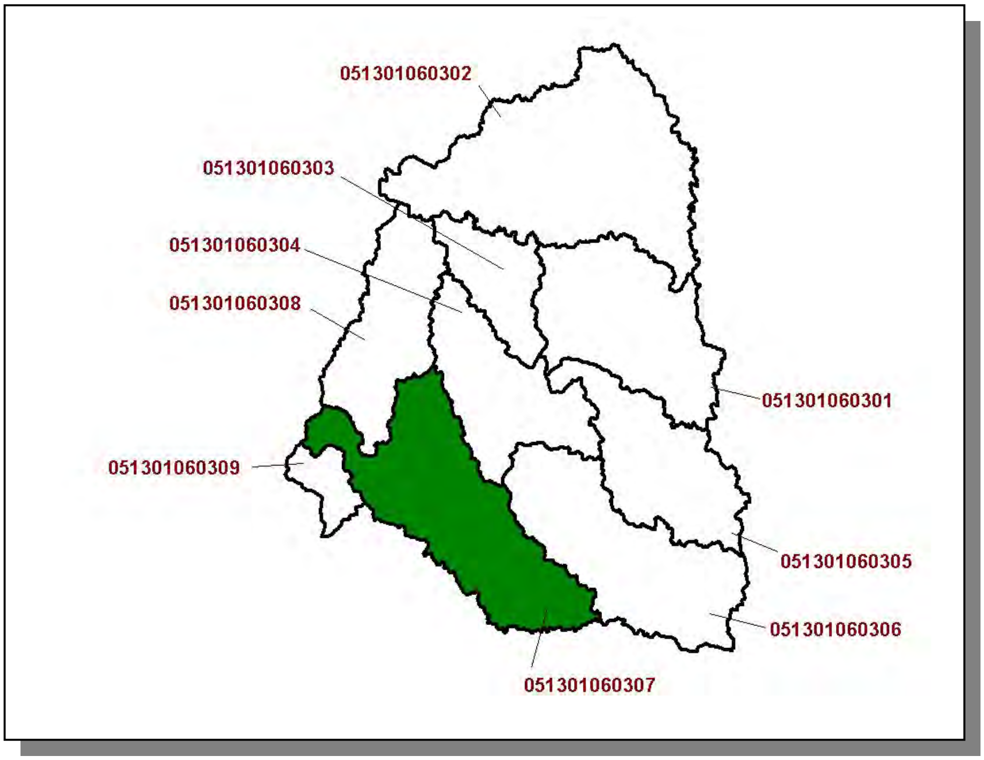

Figure 4-133. Location of Subwatershed 051301060307. *HUC-12 subwatershed boundaries are shown for reference.*

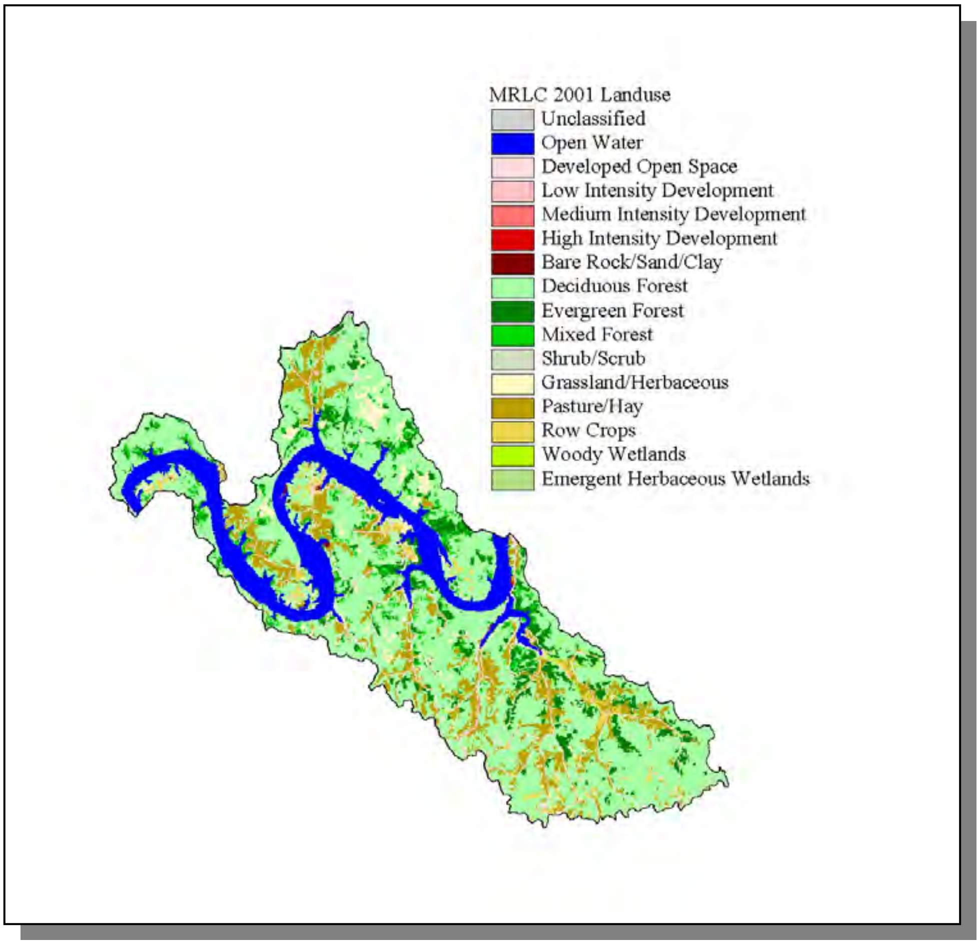

Figure 4-134. Illustration of Land Use Distribution in Subwatershed 051301060307.

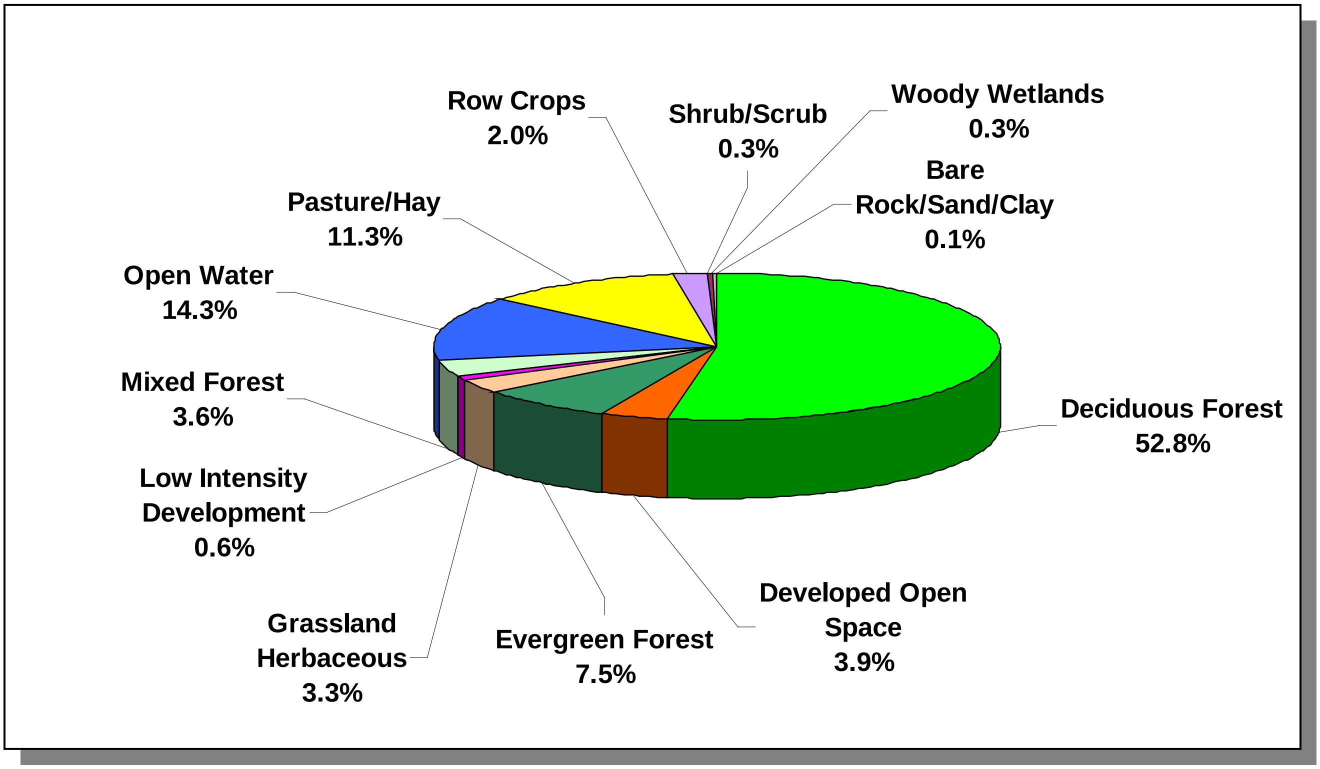

Figure 4-135. Land Use Distribution in Subwatershed 051301060307. *More information is provided in Appendix IV.*

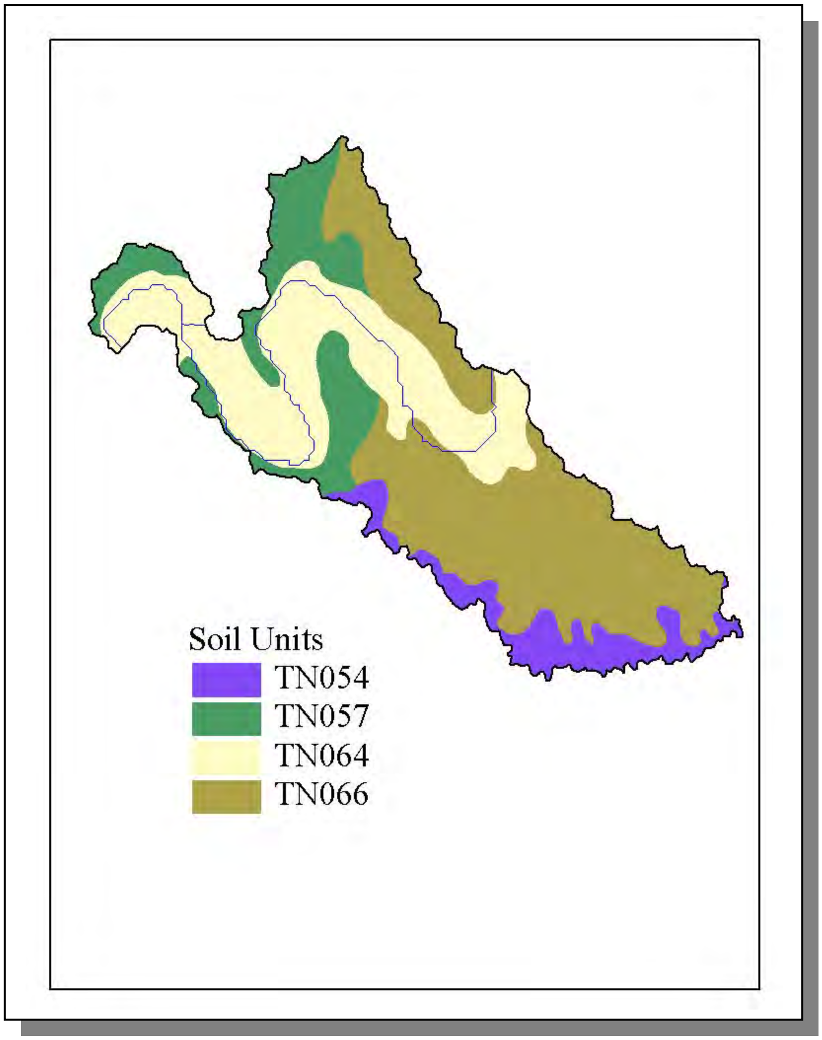

Figure 4-136. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060307.

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
TN057	0.00	C	1.14	5.01	Clayey Loam	0.33
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-107. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060307. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Jackson	9,297	9,537	10,984	1.76	163	167	193	18.4
Putnam	51,373	58,326	62,315	2.81	1,443	1,638	1,750	21.3
Smith	14,143	16,947	17,712	11.79	1,668	1,892	2,089	25.2
Total	**74,813**	**83,910**	**91,011**		**3,274**	**3,697**	**4,932**	**23.2**

Table 4-108. Population Estimates in Subwatershed 051301060307.

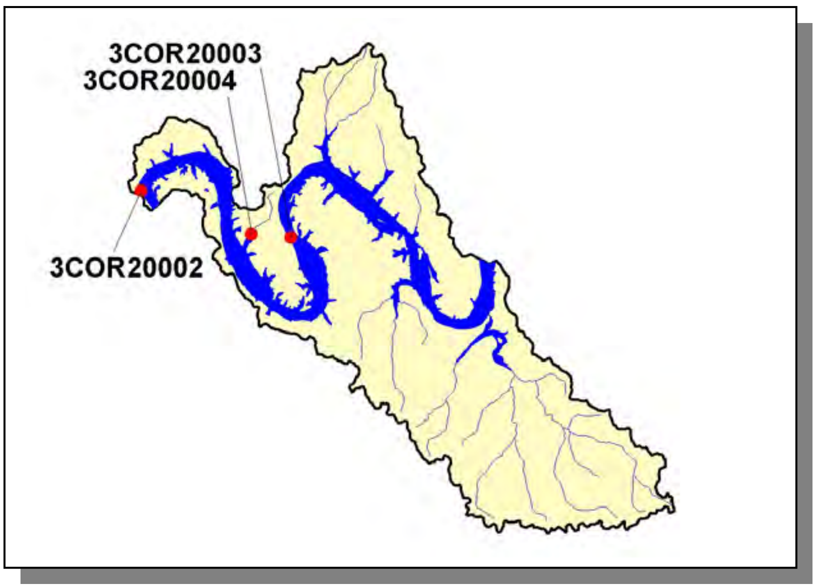

Figure 4-137. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060307. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.vii.a. Point Source Contributions.

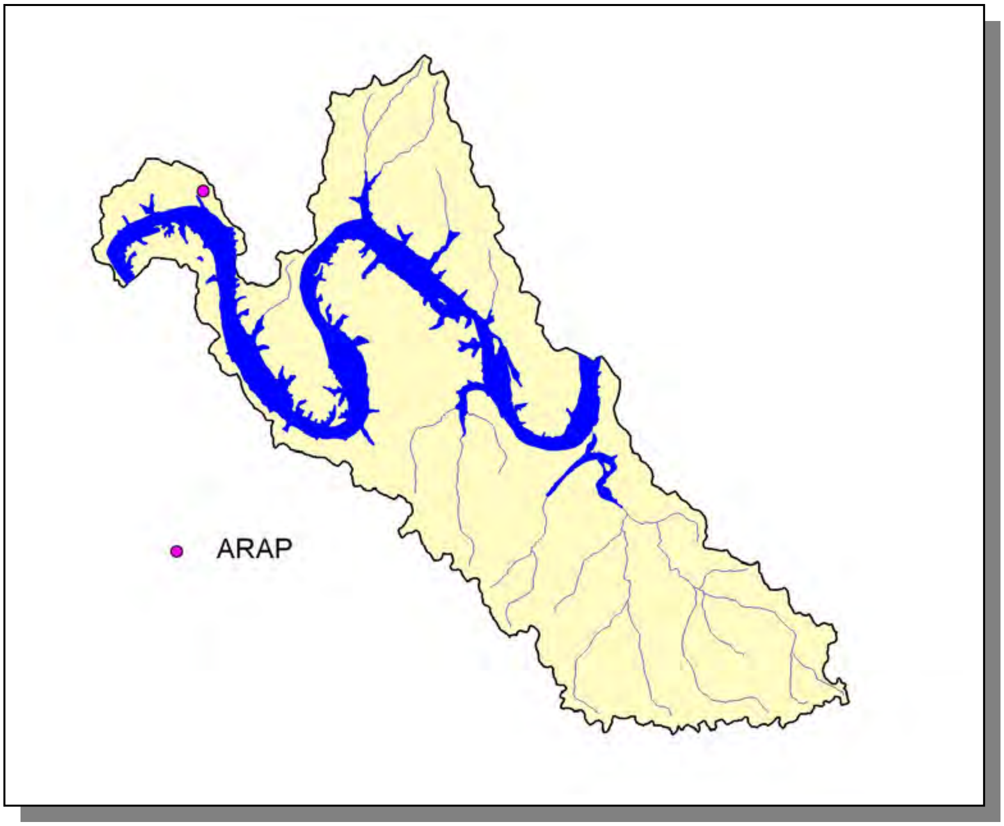

Figure 4-138. Location of Permits Issued in Subwatershed 051301060307. *More information, including the names of facilities, is provided in Appendix IV.*

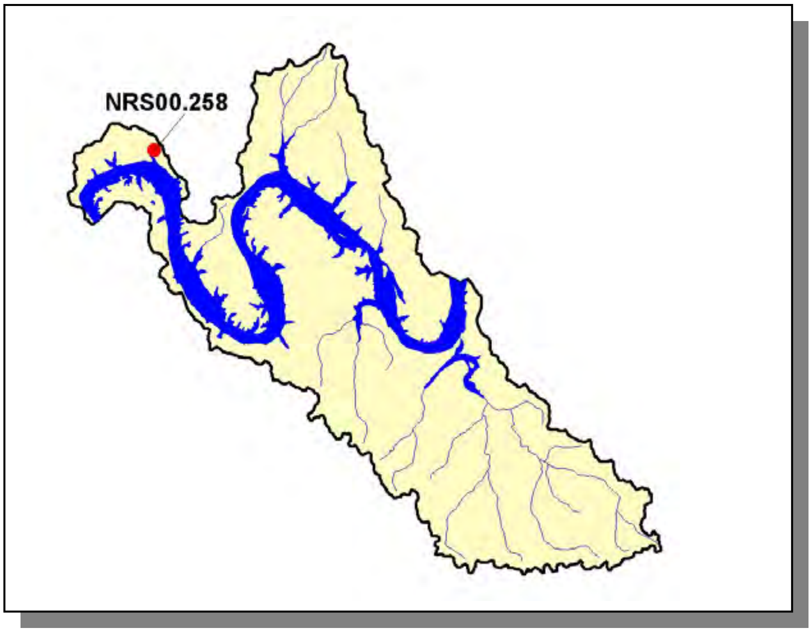

Figure 4-139. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 051301060307. *More information is provided in Appendix IV.*

4.2.C.vii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,894	3,326	97	4	199	33

Table 4-109. Summary of Livestock Count Estimates in Subwatershed 051301060307. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Jackson	6,962	12,086	10	727	403	39
Putnam	12,592	24,817	1,095	1,025	1,070	66
Smith	17,187	29,672	814	683	1,883	332

Table 4-110. Summary of Livestock Count Estimates in Jackson, Putnam, and Smith Counties. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Jackson	135.9	135.9	0.9	5.1
Putnam	152.5	152.3	3.6	16.4
Smith	81.0	81.0	1.1	2.6

Table 4-111. Forest Acreage and Annual Removal Rates (1987-1994) in Jackson, Putnam, and Smith Counties.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.41
Grass (Pastureland)	1.64
Grass (Hayland)	0.47
Legumes, Grass (Hayland)	0.22
Legukes (Hayland)	0.21
Grass, Forbs, Legumes (Mixed Pasture)	0.86
Corn (Row Crops)	21.43
Soybeans (Row Crops)	6.36
Tobacco (Row Crops)	8.22
Other Vegetable and Truck Crops	14.60
Farmsteads and Ranch Headquarters	0.49

Table 4-112. Annual Estimated Total Soil Loss in Subwatershed 051301060307.

4.2.C.viii. 051301060308 (Defeated Creek).

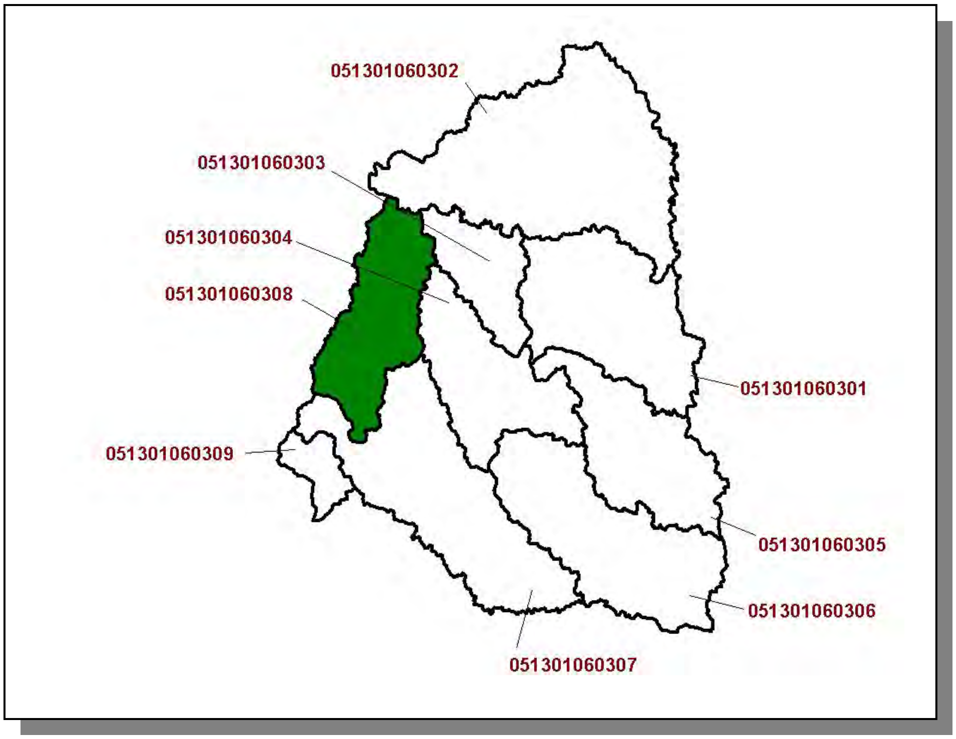

Figure 4-140. Location of Subwatershed 051301060308. *HUC-12 subwatershed boundaries are shown for reference.*

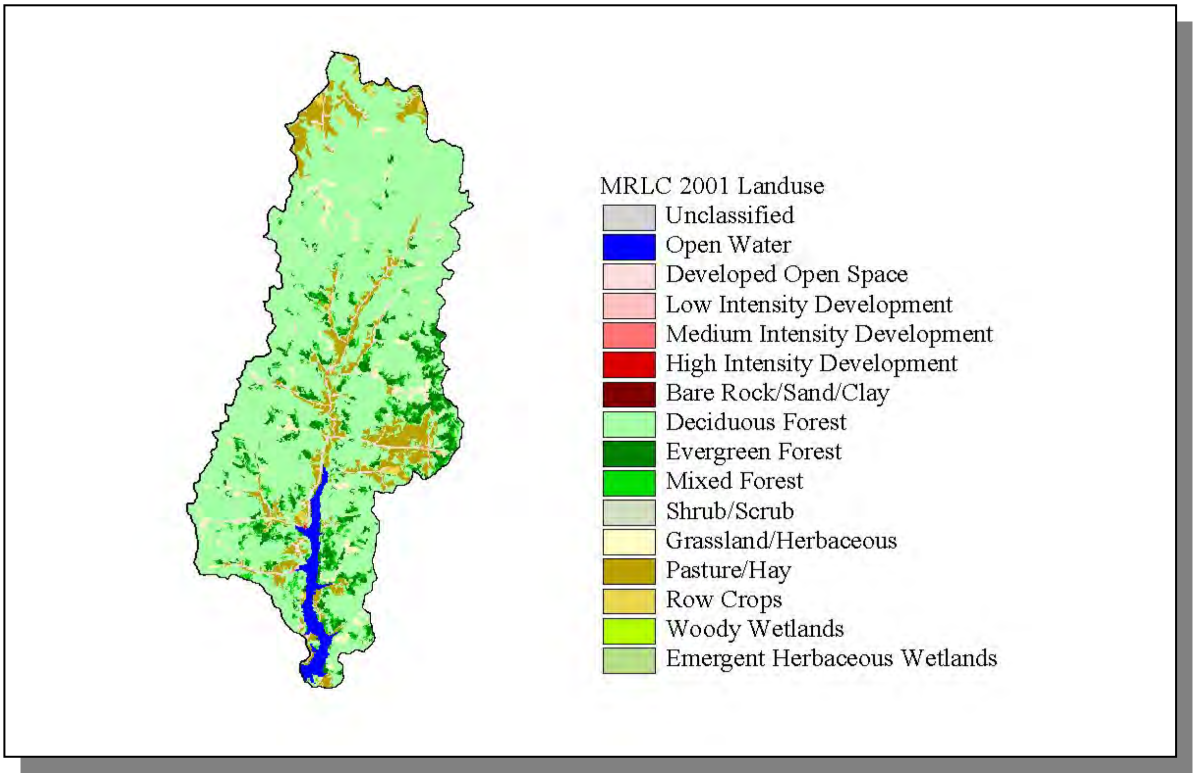

Figure 4-141. Illustration of Land Use Distribution in Subwatershed 051301060308.

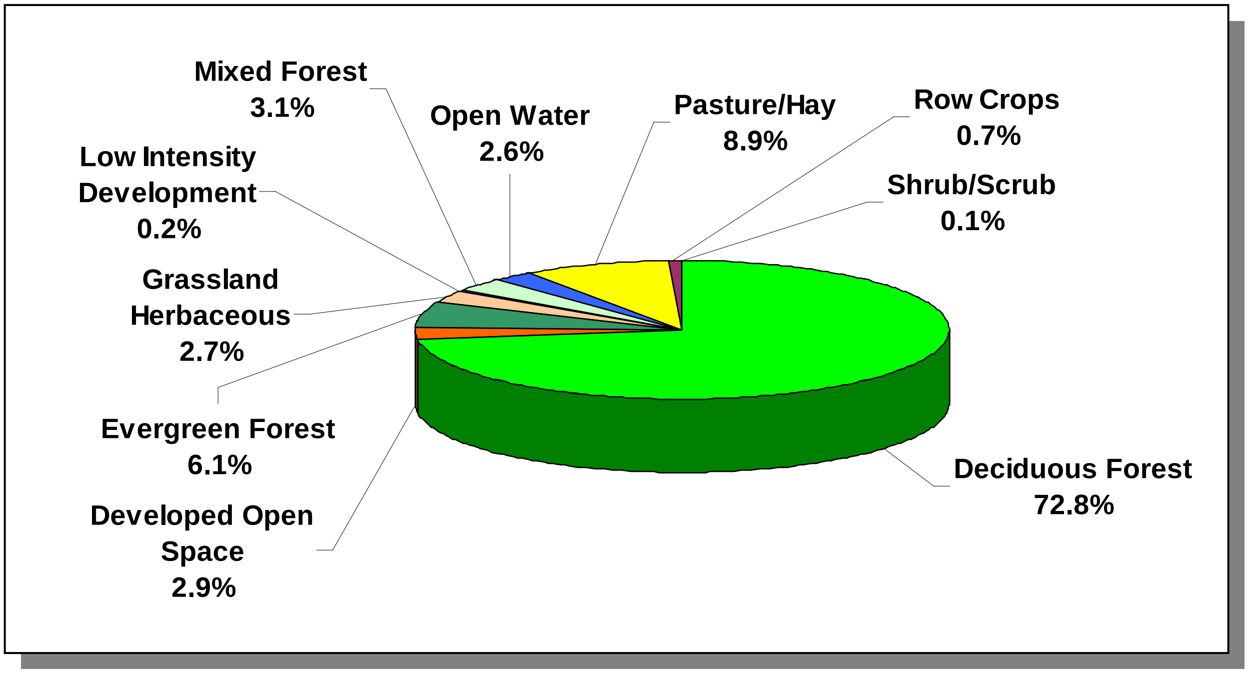

Figure 4-142. Land Use Distribution in Subwatershed 051301060308. *More information is provided in Appendix IV.*

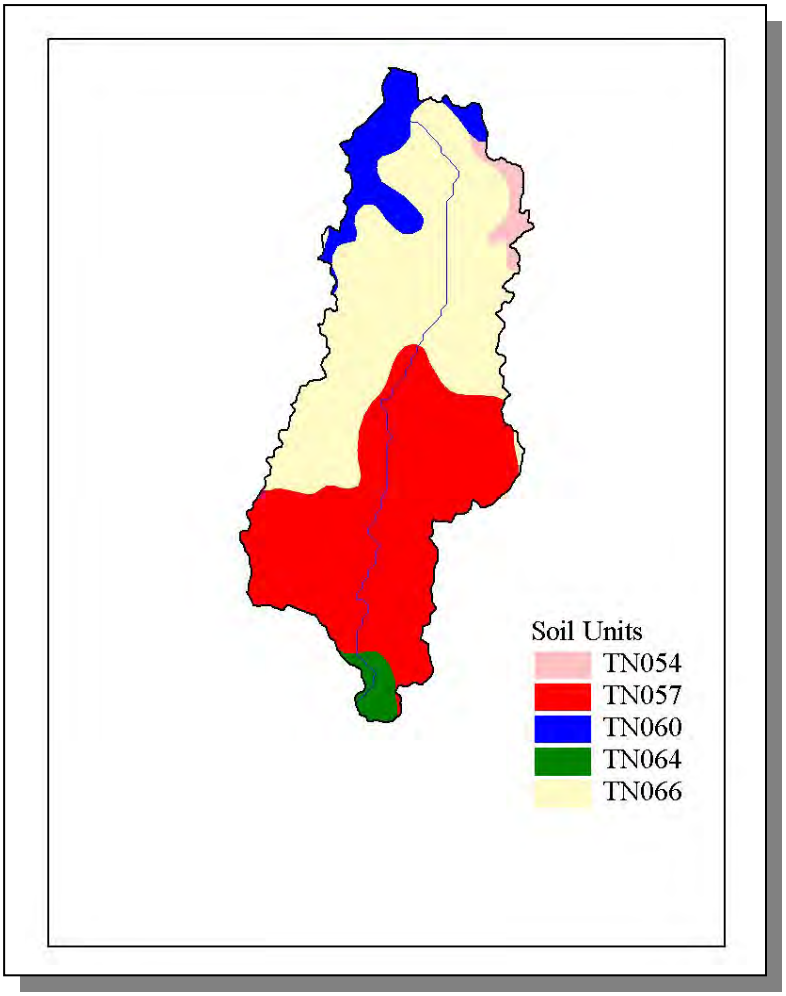

Figure 4-143. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060308.

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
TN057	0.00	C	1.14	5.01	Clayey Loam	0.33
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN064	7.00	C	1.19	5.82	Silty Loam	0.37
TN066	0.00	B	2.62	4.75	Loam	0.28

Table 4-113. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060308. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Macon	15,906	17,854	20,386	1.12	178	199	228	28.1
Smith	14,143	16,047	17,712	8.59	1,215	1,378	1,522	25.3
Total	**30,049**	**33,901**	**38,098**		**1,393**	**1,577**	**1,750**	**25.6**

Table 4-114. Population Estimates in Subwatershed 051301060308.

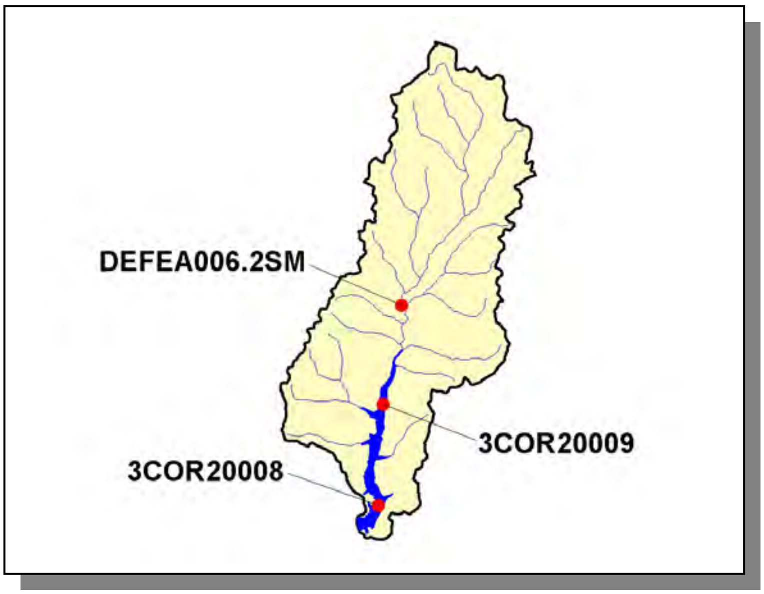

Figure 4-144. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060308. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.viii.a. Point Source Contributions.

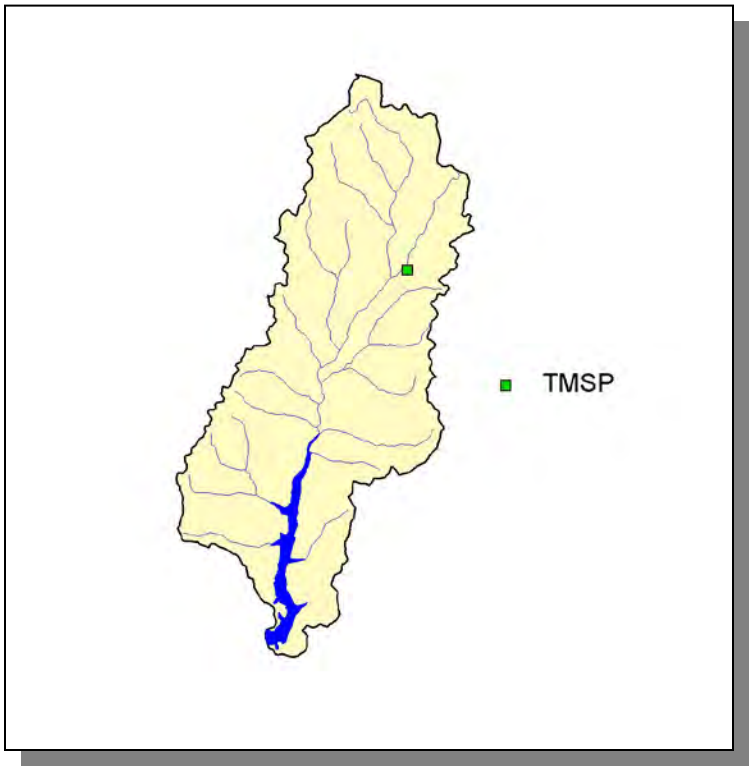

Figure 4-145. Location of Permits Issued in Subwatershed 051301060308. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-146. Location of TMSP Sites in Subwatershed 051301060308. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.C.viii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,403	2,423	61	3	163	25

Table 4-115. Summary of Livestock Count Estimates in Subwatershed 051301060308. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Macon	15,039	26,098	318	675	2,377	111
Smith	17,187	29,672	814	683	1,883	332

Table 4-116. Summary of Livestock Count Estimates in Macon and Smith Counties. *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.*

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.07
Grass (Pastureland)	1.35
Grass (Hayland)	0.13
Legumes, Grass (Hayland)	0.11
Legumes (Hayland)	0.13
Grass, Forbs, Legumes (Mixed Pasture)	0.70
Corn (Row Crops)	3.99
Soybeans (Row Crops)	6.36
Tobacco (Row Crops)	7.44
Wheat (Close-Grown Cropland)	3.43
Other Vegetable and Truck Crops	5.48
Conservation Reserve Program Lands	0.28
Farmsteads and Ranch Headquarters	0.42

Table 4-117. Annual Estimated Total Soil Loss in Subwatershed 051301060308.

4.2.C.ix. 051301060309 (Cumberland River).

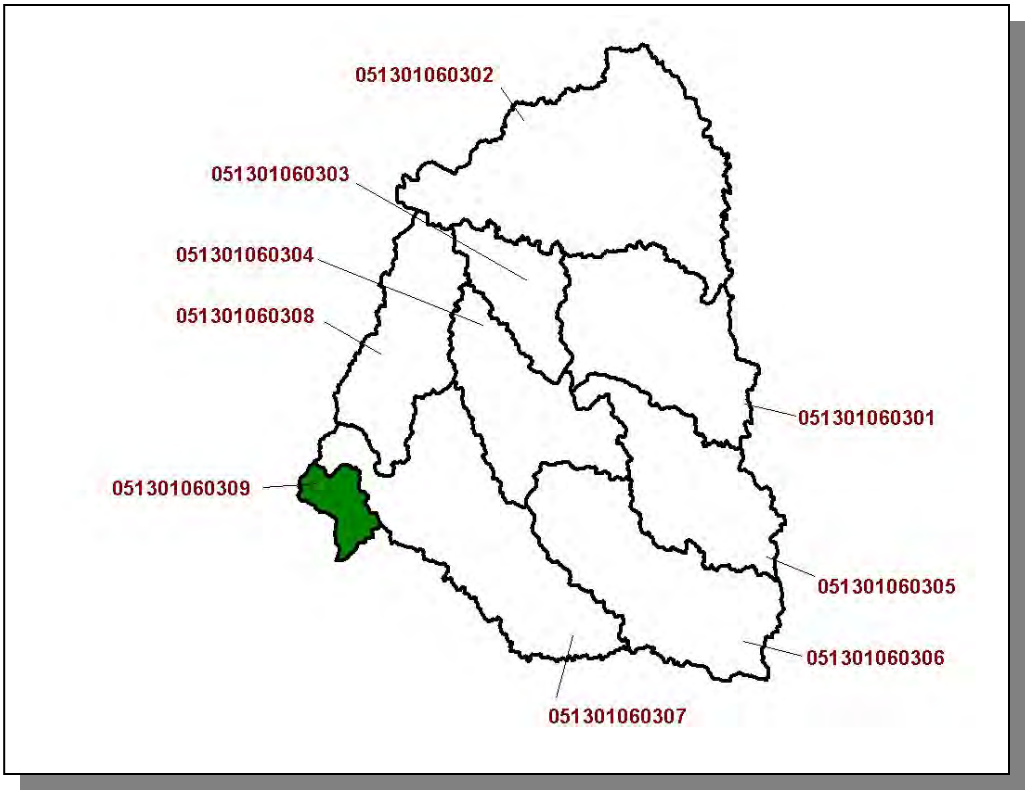

Figure 4-147. Location of Subwatershed 051301060309. *HUC-12 subwatershed boundaries are shown for reference.*

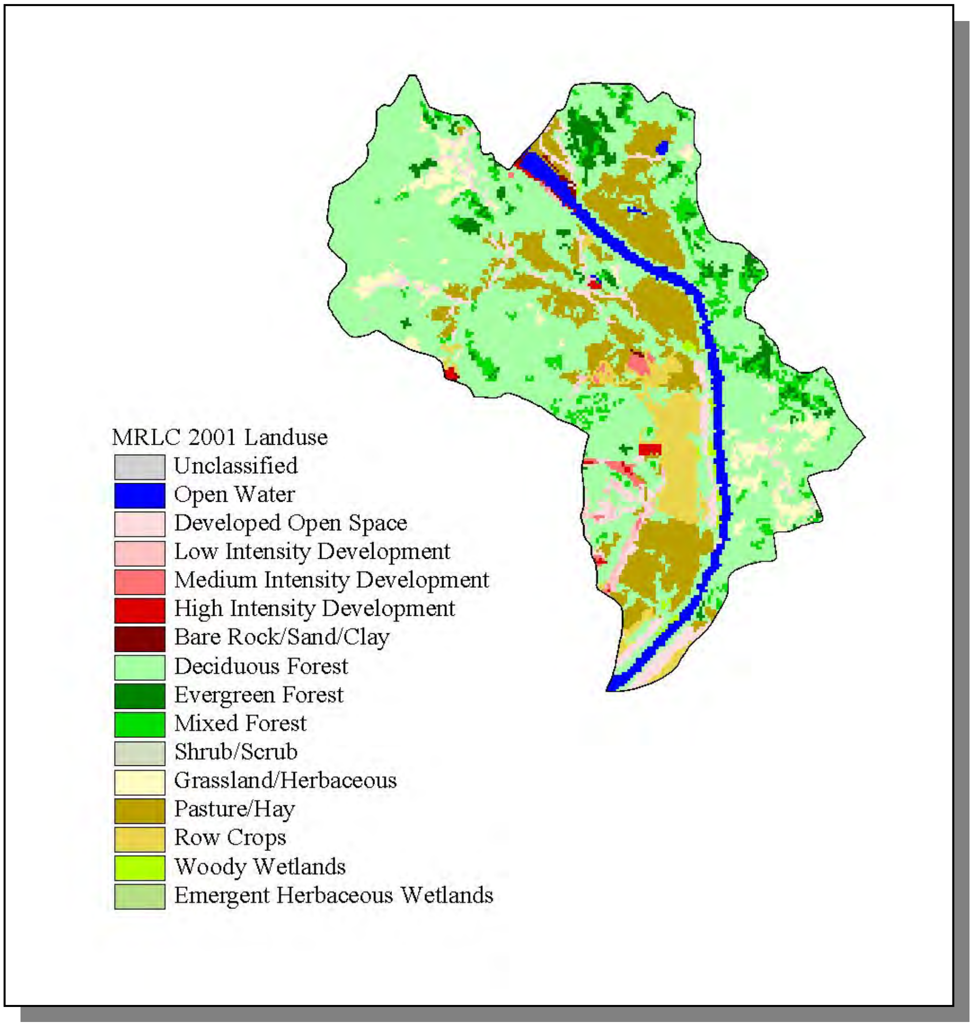

Figure 4-148. Illustration of Land Use Distribution in Subwatershed 051301060309.

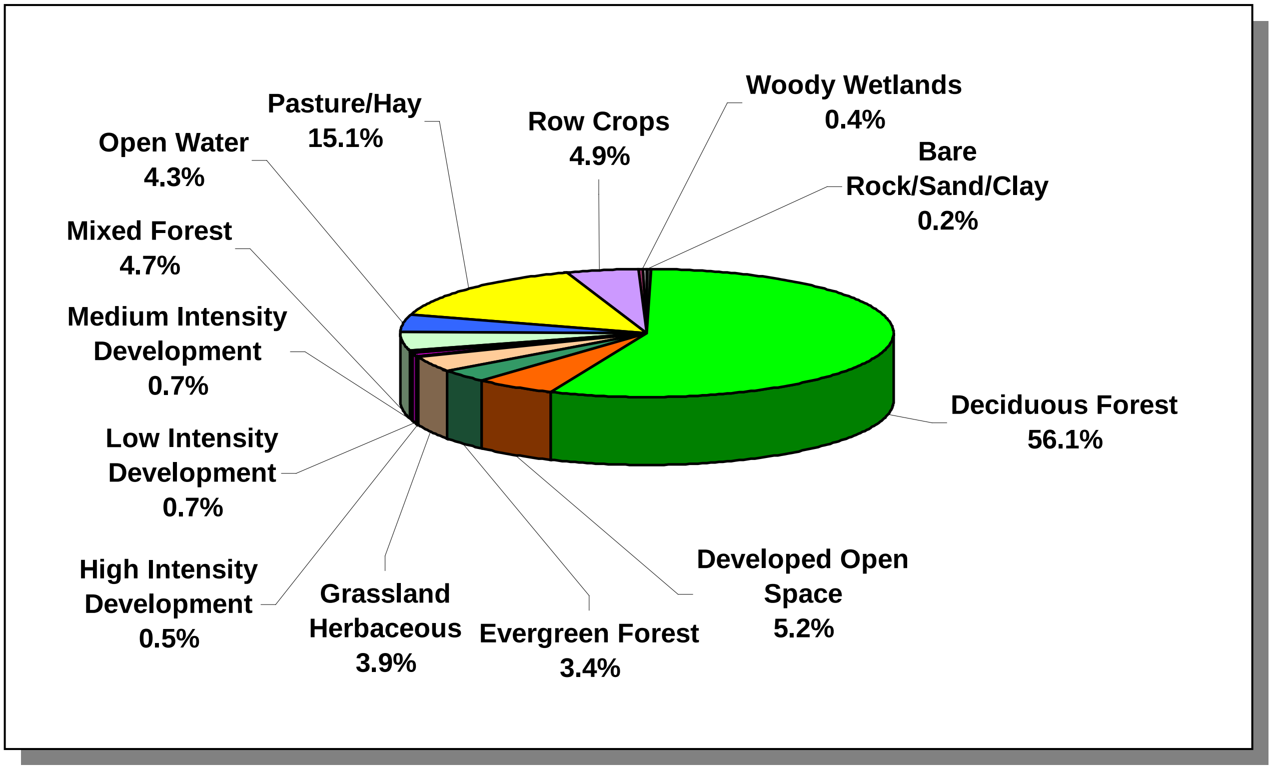

Figure 4-149. Land Use Distribution in Subwatershed 051301060309. *More information is provided in Appendix IV.*

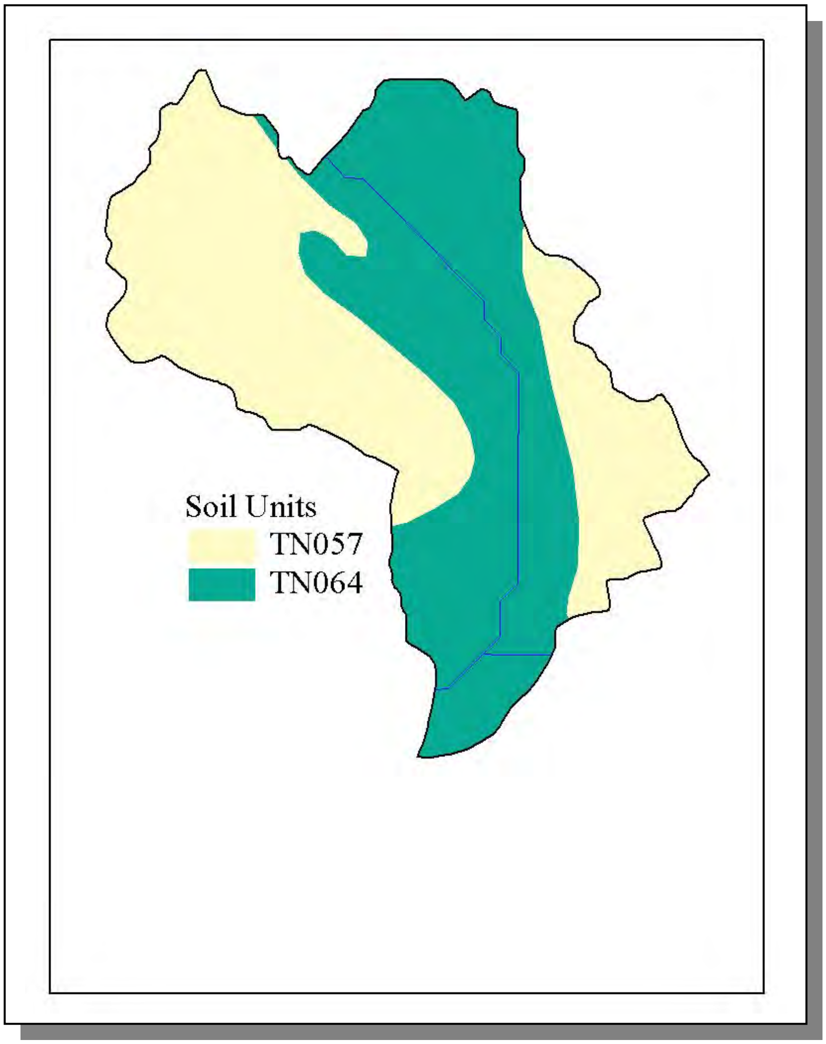

Figure 4-150. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060309.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN057	0.00	C	1.14	5.01	Clayey Loam	0.33
TN064	7.00	C	1.19	5.82	Silty Loam	0.37

Table 4-118. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 051301060309. *The definition of "Hydrologic Group" is provided in Appendix IV.*

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	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-2000)
Smith	14,143	16,047	17,712	2.19	309	351	387	25.2

Table 4-119. Population Estimates in Subwatershed 051301060309.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Carthage	Smith	2,386	1,080	1,054	23	3

Table 4-120. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 051301060309.

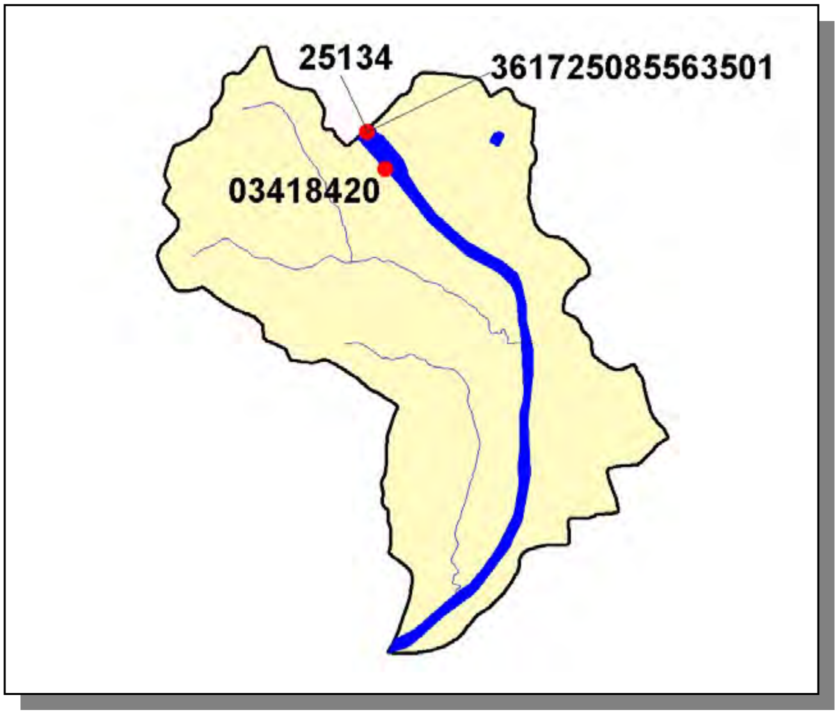

Figure 4-151. Location of Historical Streamflow Data Collection Sites in Subwatershed 051301060309. *More information is provided in Appendix IV.*

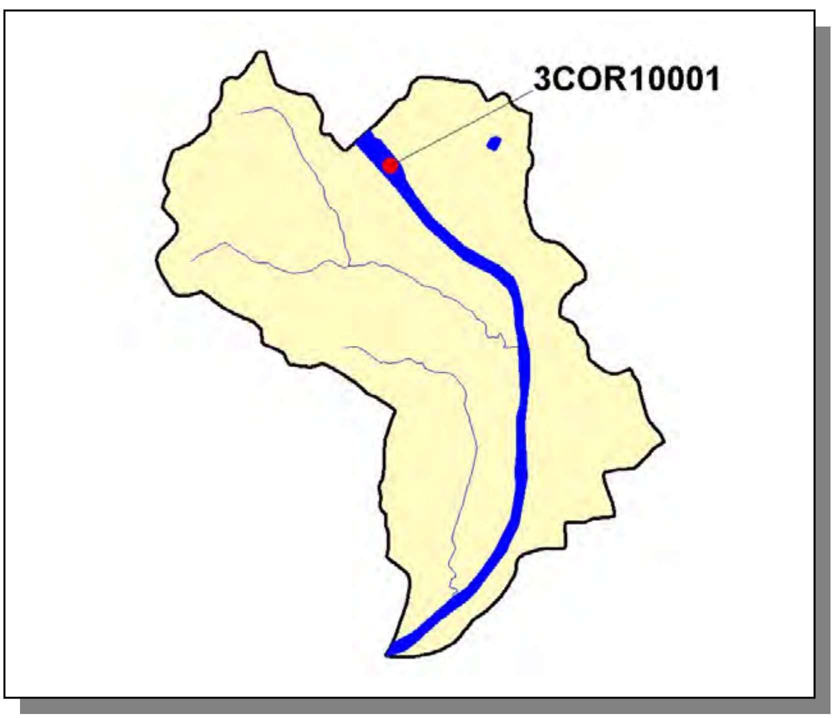

Figure 4-152. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 051301060309. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.ix.a. Point Source Contributions.

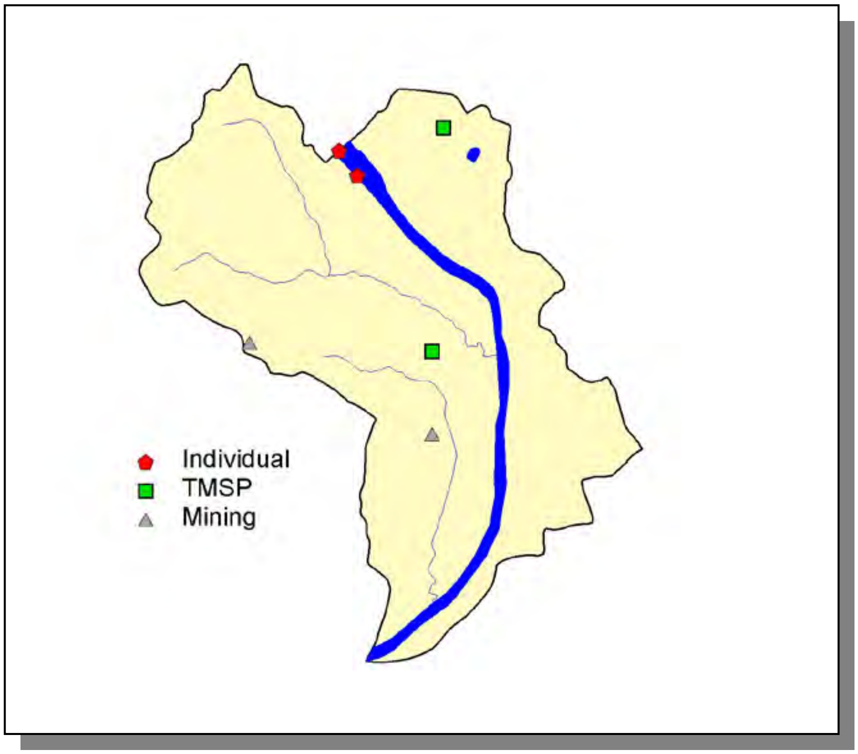

Figure 4-153. Location of Permits Issued in Subwatershed 051301060309. *More information, including the names of facilities, is provided in Appendix IV.*

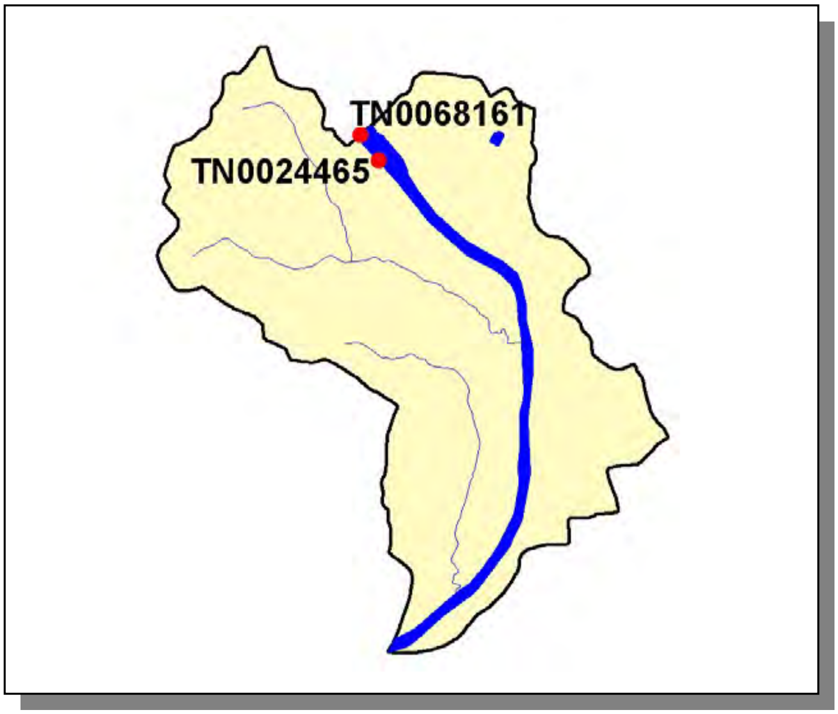

Figure 4-154. Location of Active NPDES Sites in Subwatershed 051301060309. *More information, including the names of facilities, is provided in Appendix IV.*

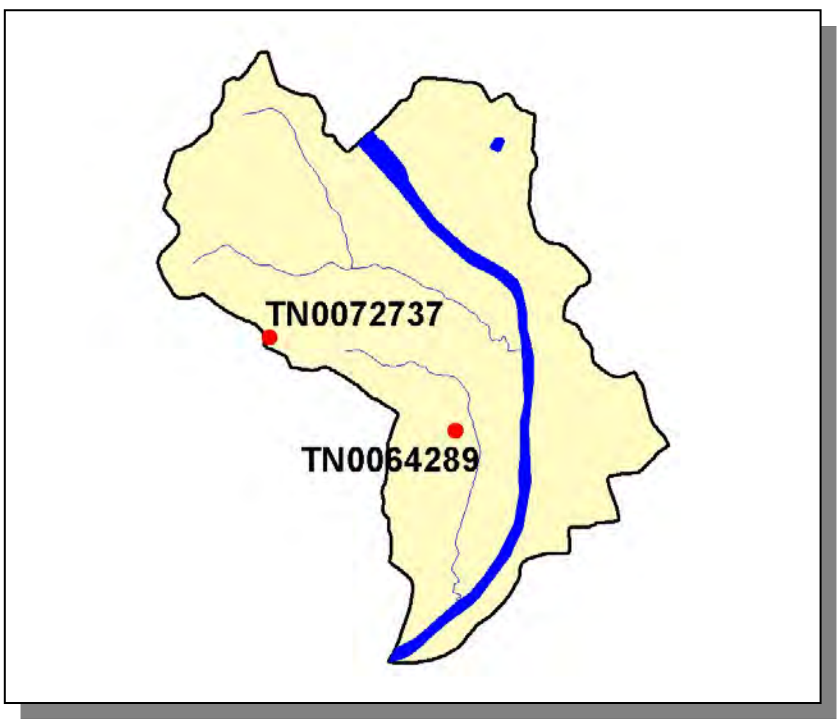

Figure 4-155. Location of Active Mining Sites in Subwatershed 051301060309. *More information, including the names of mining operations, is provided in Appendix IV.*

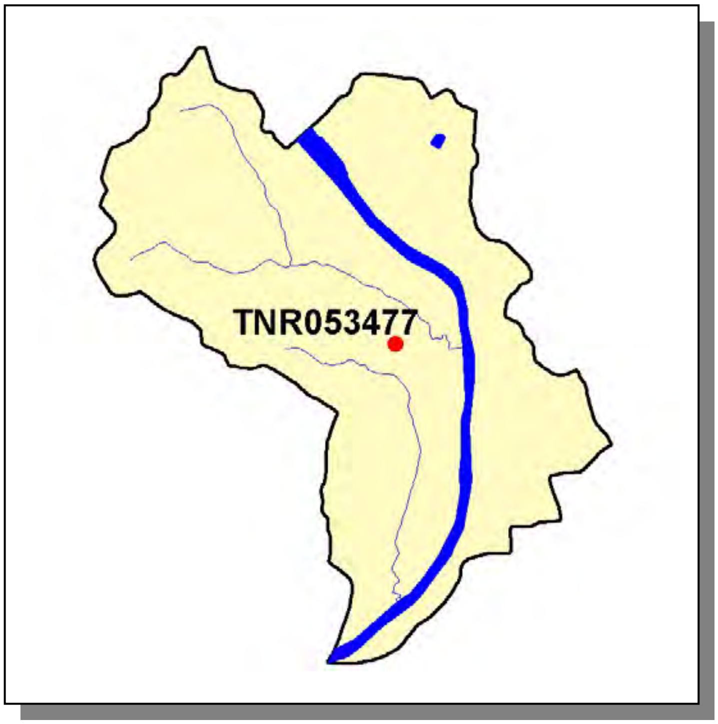

Figure 4-156. Location of TMSP Sites in Subwatershed 051301060309. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.C.ix.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
618	1,068	814	<5	68	12

Table 4-121. Summary of Livestock Count Estimates in Subwatershed 051301060309. *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.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Smith	17,187	29,672	814	683	1,883	332

Table 4-122. Summary of Livestock Count Estimates in Smith County. *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.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Smith	81.0	81.0	1.1	2.6

Table 4-123. Forest Acreage and Annual Removal Rates (1987-1994) in Smith County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.47
Grass (Hayland)	0.12
Legumes, Grass (Hayland)	0.11
Grass, Forbs, Legumes (Mixed Pasture)	0.66
Soybeans (Row Crops)	6.36
Tobacco (Row Crops)	6.96
Farmsteads and Ranch Headquarters	0.45

Table 4-124. Annual Estimated Total Soil Loss in Subwatershed 051301060309.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE CORDELL HULL LAKE 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 Cordell Hull Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS.

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

Performance Results System (PRS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRS may be viewed at http://prms.nrcs.usda.gov/prs. From the opening menu, select "Reports" in the top tool bar. You will select the time period that you are interested in and the conservation treatment of interest on the page that comes up. Depending on the time period of interest, you will have various report options to choose from, such as location, reporting period and program involved in the reporting. You may be required to "refresh" the page in order to get the current report to come up.

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	Feet	Acres	Number
Conservation Buffers	78,751	207	
Erosion Control		10,534	
Nutrient Management		12,572	
Pest Management		12,591	40
Grazing / Forages	188,053	9,994	
Tree and Shrub Practices		8,883	
Tillage and Cropping		2,397	
Waste Management Systems			1
Wildlife Habitat Management		10,208	
Water Supply	12,463		23

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2005 reporting period. More information is provided in Appendix V.*

5.2.B. United States Geological Survey – Tennessee Water Science Center Programs. The United States Geological Survey (USGS) provides relevant and objective scientific information and data for public use in evaluation of the quantity, quality, and use of the Nation's water resources. National USGS water resource assessments include the National Streamflow Information Program (http://water.usgs.gov/nsip/), National Atmospheric Deposition Network (http://bqs.usgs.gov/acidrain/), the National Stream Quality Accounting Network (http://water.usgs.gov/nasqan/), and the National Water-Quality Assessment Program (http://water.usgs.gov/nawqa). For a national overview of USGS water resources programs, please visit http://water.usgs.gov. Specific information on the Upper and Lower Tennessee River NAWQA study units can be found at http://tn.water.usgs.gov/lten/tenn.html .

In addition to National assessments, the USGS also conducts hydrologic investigations and data collection in cooperation with numerous Federal, State, and local agencies to address issues of National, regional, and local concern. Hydrologic investigations conducted by the USGS Tennessee Water Science Center address scientific questions pertaining to five general thematic topics:

1. Water Use and Availability,
2. Landforms and Ecology,
3. Watersheds and Land Use,
4. Occurrence, Fate, and Transport of Contaminants, and
5. Floods and Droughts.

In support of these investigations, the USGS Tennessee Water Science Center records streamflow continuously at more than 100 gaging stations, makes instantaneous measurements of streamflow at numerous other locations as needed or requested, monitors ground-water levels Statewide, and analyzes the physical, chemical, and biologic characteristics of surface and ground waters. In addition, the Water Science Center compiles annual water-use records for the State of Tennessee and collects a variety of data in support of National USGS baseline and other networks. More information pertaining to USGS activities in Tennessee can be accessed at http://tn.water.usgs.gov .

USGS Water Resources Information on the Internet. Real-time and historical streamflow, water-level, and water-quality data at sites operated by the USGS Tennessee Water Science Center can be accessed on-line 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 on the web page. For specific information or questions about USGS streamflow data, contact Donna Flohr at (615) 837-4730 or dfflohr@usgs.gov . Recent USGS Tennessee Water Science Center publications can be accessed by visiting http://tn.water.usgs.gov/pubpg.html . A searchable bibliographic database is also provided for locating other USGS reports and products addressing specific scientific topics.

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. The federally endangered gray bat (*Myotis grisescens*) and federally threatened bald eagle (*Haliaeetus leucocephalus*) occur in the Cordell Hull Lake (Cumberland River) watershed. There were likely numerous federally listed mussel species present in this reach of the Cumberland River. The impoundment of the river, as well as colder water temperatures associated with upstream releases from Lake Cumberland and Dale Hollow Lake dams, has seriously degraded water quality and habitat for these species. For a complete listing of endangered and threatened species in Tennessee, please visit the Service's website at http://*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.

In a partnership with the Tennessee Chapter of The Nature Conservancy (TNC), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) Division of Natural Heritage, the Service developed 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 covers 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://*cookeville.fws.gov*.

5.2.D. United States Army Corps of Engineers-Nashville District. The Nashville District, U.S. Army Corps of Engineers is one of seven districts in the Lakes and Rivers Division. The district's area is determined by the Cumberland River and the Tennessee River's watersheds and encompasses 59,000 square miles in portions of seven states. This geographic area is represented by 14 senators and 20 Congressional representatives. The Nashville District's missions include providing flood protection, recreation, hydropower, and navigation. The District also provides environmental stewardship through our Regulatory and Civil Works programs, conducts emergency response to disasters, and to performs other authorized Civil Works projects.

Within the 18,000 square mile Cumberland River Basin, overall responsibilities for the Nashville District include operation and maintenance of 10 reservoir projects. Each of these is operated for some or all of the following purposes: hydropower production, flood control, navigation, water supply, water quality, fish and wildlife, and recreation.

Within the much larger, 41,000 square mile Tennessee River Basin the Nashville District operates a series of navigation locks and has regulatory permit authority over dredge and fill activities under the Clean Water Act and the Rivers and Harbors Act.

As of 2005, the District's flood control projects have prevented more than $1.96 billion in flood damages. The District also provides flood prevention planning assistance to the states and local governments.

Lakes in the Nashville District are the most popular in the nation. More than 36 million people visited our 10 lakes last year. These recreation users had an economic impact on the region of nearly $877 million dollars. Five Nashville District lakes rank among the top 25 in Corps-wide visitation. In 2000, the District's 70 commercial concessionaires produced $1.3 million in profit, and returned more than $300,000 to the U.S. Treasury in rent payments for leases.

The Nashville District has the capacity to produce more than 914 megawatts of clean electricity, enough to power the needs of a city the size of Nashville, at nine different hydropower generations plants in the Cumberland River Basin. The District generates about $44 million in revenue from the sale of this power annually. This revenue is returned to the U.S. Treasury.

The Nashville District operates and maintains 1,175 commercially navigable river miles; almost 10% of the total within the U.S. Army Corps of Engineers. The district operates and maintains 14 navigation lock projects; nine on the Tennessee River, four on the Cumberland River, and one on the Clinch River. There are more than 40,000 commercial and recreational lockages annually. More than 74 million tons of commodities passed through these 14 locks during 2005. Wilson Lock in Alabama has the highest single lift east of the Rocky Mountains, between 93 and 100 feet, depending on the current river water level.

Regulatory Program

The U.S. Army Corps of Engineers has been involved in regulating certain activities in the nation's water since 1890. Prior to 1968, the primary thrust for the regulatory program was the protection of navigation. As a result of new laws and judicial decisions, the program has evolved to one that considers the full public interest by balancing the favorable impacts against detrimental impacts. The Nashville District annually handles more than 3,000 regulatory actions, 97% of which were evaluated in less than 60 days.

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

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

Section 404 of the Clean Water Act **-** requires approval prior to discharging dredged or fill material into the waters of the United States. Typical activities requiring Section 404 permits are:
• Depositing of fill or dredged material in waters of the U.S. or adjacent wetlands.
• Site development fill for residential, commercial, or recreational developments.
• Construction of revetments, groins, breakwaters, levees, dams, dikes, and weirs.
• Placement of riprap and road fills.

Civil Works Program

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

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

Nashville District Corps of Engineers Water Quality Program

The Nashville District Corps of Engineers collects a significant volume of physical, chemical, and biological water quality data every year. These data are collected at representative points both within all ten Nashville District lakes, on various major and/or representative inflow streams, and in the tailwaters. Where there are known water quality problems, such as seasonal low DO in certain turbine releases, monitoring is significantly intensified to track and quantify a particular problem. This information is used to make informed decisions about how a project's powerplant should operate. Baseline, continuous recording, multiparameter water quality monitors keep track of conditions at critical points on the main stem of the Cumberland River from the mouth of the Obey River near Celina, Tennessee to the tailwater of Lake Barkley in western Kentucky. The monitor at the Old Hickory Dam tailwater, in particular, provides key information, since water discharged from Old Hickory must be able to absorb inputs from Nashville which is just downstream.

The data collected by the Nashville District are used to help determine watershed water quality trends and to provide for better management of the comprehensive reservoir system. The data are essential for running predictive water quality models, a growing trend in Corps' water management practice.

Additional information concerning projects, programs, and activities of the Nashville District Corps of Engineers can be obtained on the World Wide Web at http://www.orn.usace.army.mil/

Environmental Education

Environmental education opportunities are provided to area school age children by the Nashville District Corps of Engineers. Water Quality personnel have participated in environmental awareness programs for the past several years at the majority of Nashville District lakes. These programs are organized by the local lake Resource Management staff and involve various area schools. The programs provided allow students to have a "hands on" experience in water quality surveillance techniques. Typically the programs include an interactive discussion of overall water quality issues. This is supplemented with demonstrations of sophisticated water quality instrumentation, collection and analysis of biological specimens from local aquatic environments, and viewing of reference materials and preserved specimens. The value of such environmental education is enormous, because it reaches young people early in their lives and exposes them to a scientific learning experience that is impossible to duplicate in a formal classroom. This experience hopefully contributes to a greater lifelong awareness by the individual of the importance of conserving and improving water quality and wise use of water resources.

Additional Information

To obtain additional information about the District, please refer to the home page at:
http://www.lrn.usace.army.mil/, or contact the following offices:
Public Affairs Office (General Information): (615) 736-7161
Regulatory Branch: (615) 369-7500

5.3. STATE PARTNERSHIPS.

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

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

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

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

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

Source water protection is not a new concept, but an expansion of existing wellhead protection measures for public water systems relying on ground water to now include surface water. This approach became a national priority, backed by federal funding, when the Safe Drinking Water Act amendments (SDWA) of 1996 were enacted. Under this Act, every public drinking water system in the country is scheduled to receive an assessment of both the sources of potential contamination to its water source of the threat these sources may pose by the year 2003 (extensions were available until 2004). The assessments are intended to enhance the protection of drinking water supplies within existing programs at the federal, state and local levels. Source water assessments were mandated and funded by Congress. Source water protection will be left up to the individual states and local governments without additional authority from Congress for that progression.

Tennessee's Wellhead Protection Rules were revised as of October 29, 2005 to include requirements for similar protection for public water systems using surface water sources under the heading of Drinking Water Source Protection Rule (1200-5-1-.34) in addition to the previous requirements for wellhead protection for public water systems using ground water sources. The rule addresses surface or ground water withdrawals in the vicinity of public water sources as well as potential contaminant sources threatening public water sources to reflect the amended prohibitions in the 2002 Amendments to the Tennessee Safe Drinking Water Act, TCA 68-221-771. There are additional reporting requirements of potential contaminant source inventories and emergency response for the public water systems as well. The Division of Water Supply will be able to use the Drinking Water Source Protection Rule to work in complimentary fashion with the Division of Water Pollution Control and other Departmental agencies in activities to protect public water sources.

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.

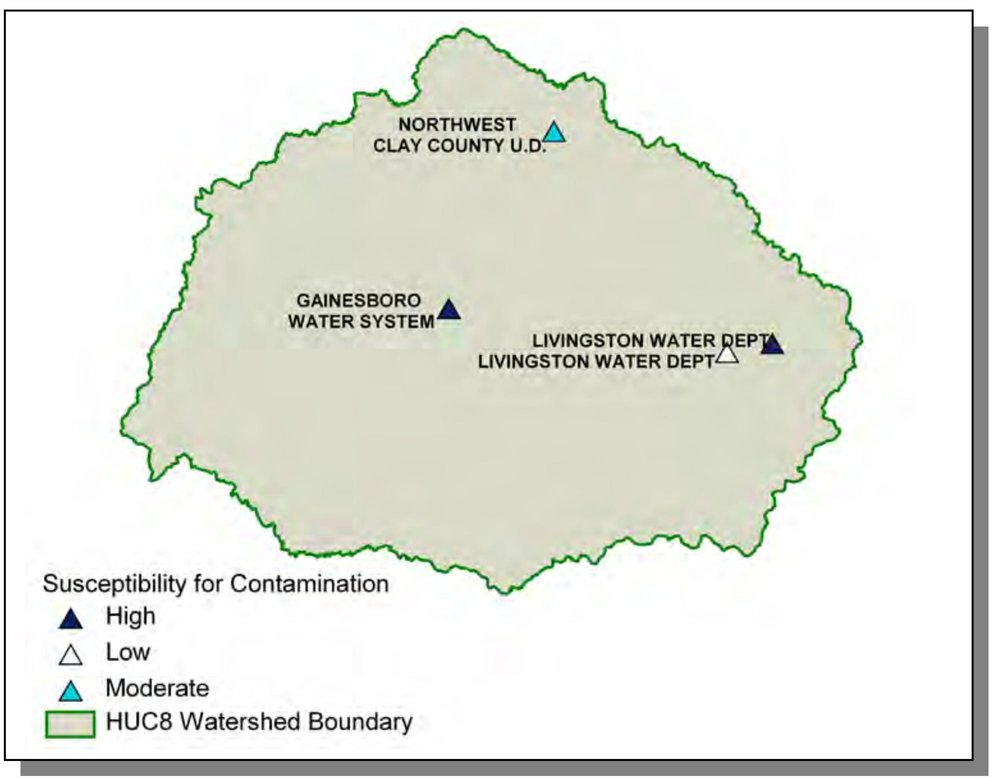

Figure 5-1. Susceptibility for Contamination in the Cordell Hull Watershed.

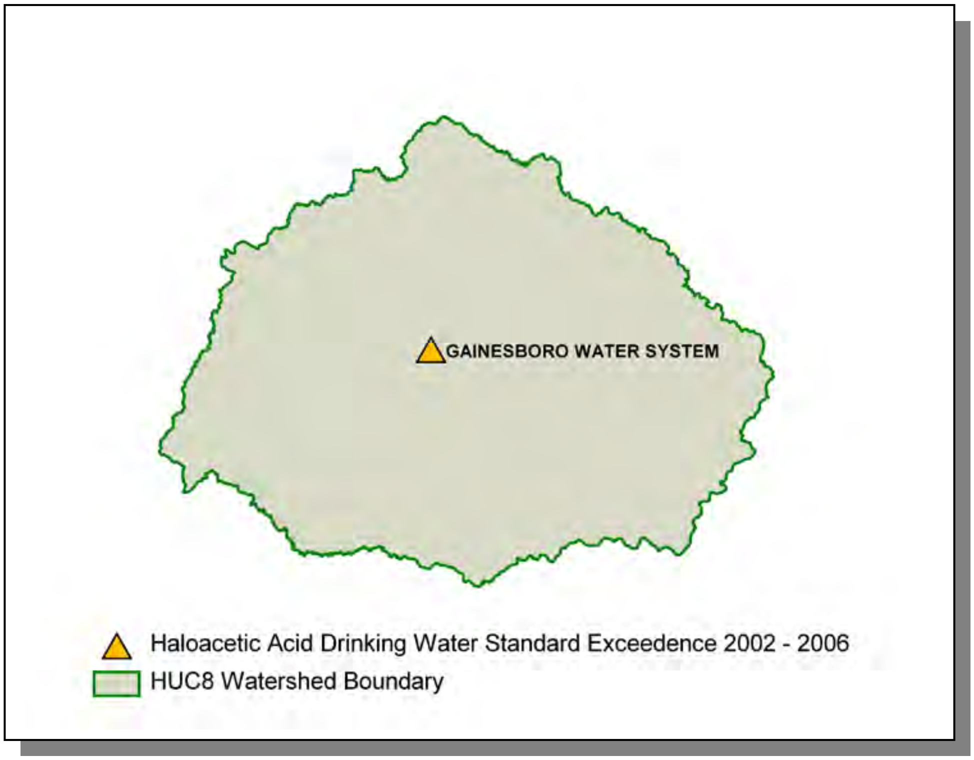

Figure 5-2. Exceedences of the Haloacetic Acid Drinking Water Standard in the Cordell Hull Watershed.

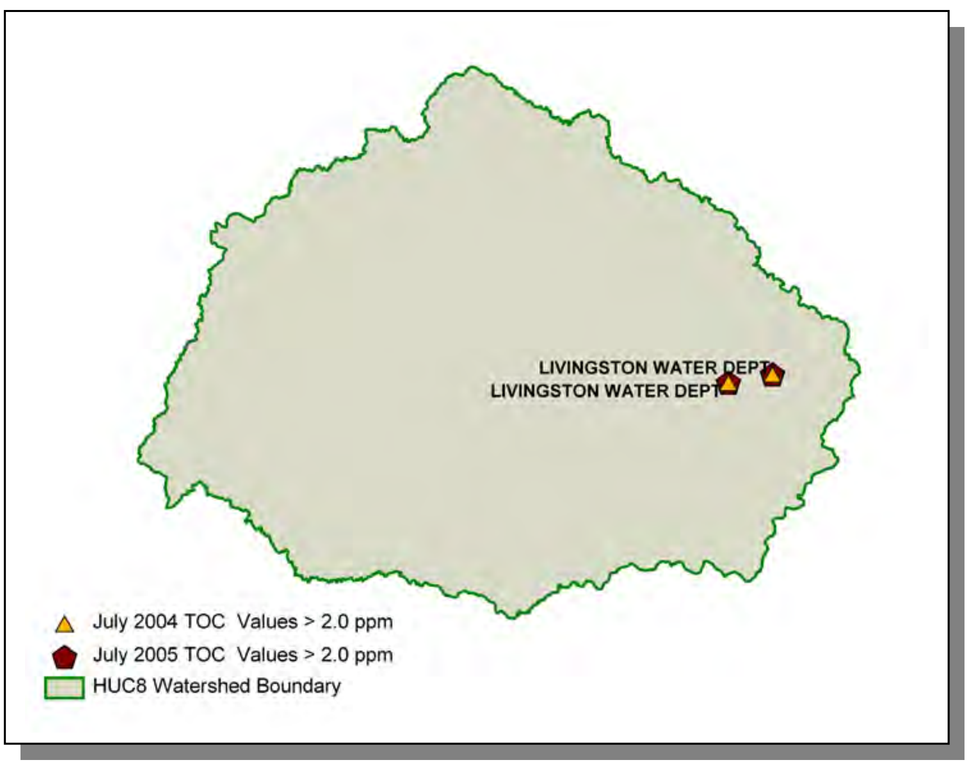

Figure 5-3. July 2004 and 2005 Raw Water Total Organic Carbon (TOC) Analysis in the Cordell Hull Watershed.

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 Cordell Hull Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program (U.S. Environmental Protection Agency Assistance Agreement C99944674-04-0).

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

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

Participating contractors in the program are encouraged to develop a watershed emphasis for their individual areas of responsibility, focusing on waters listed on the Tennessee 303(d) List as being impaired by agriculture. Current guidelines for the

TDA-ARCF are available. Landowners can receive up to 75% of the cost of the BMP as a reimbursement.

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

http://www.state.tn.us/agriculture/forestry/bmpmanual.html

The complaint form is available at:

http://www.state.tn.us/environment/wpc/forms/wqlogging_cn1274.doc

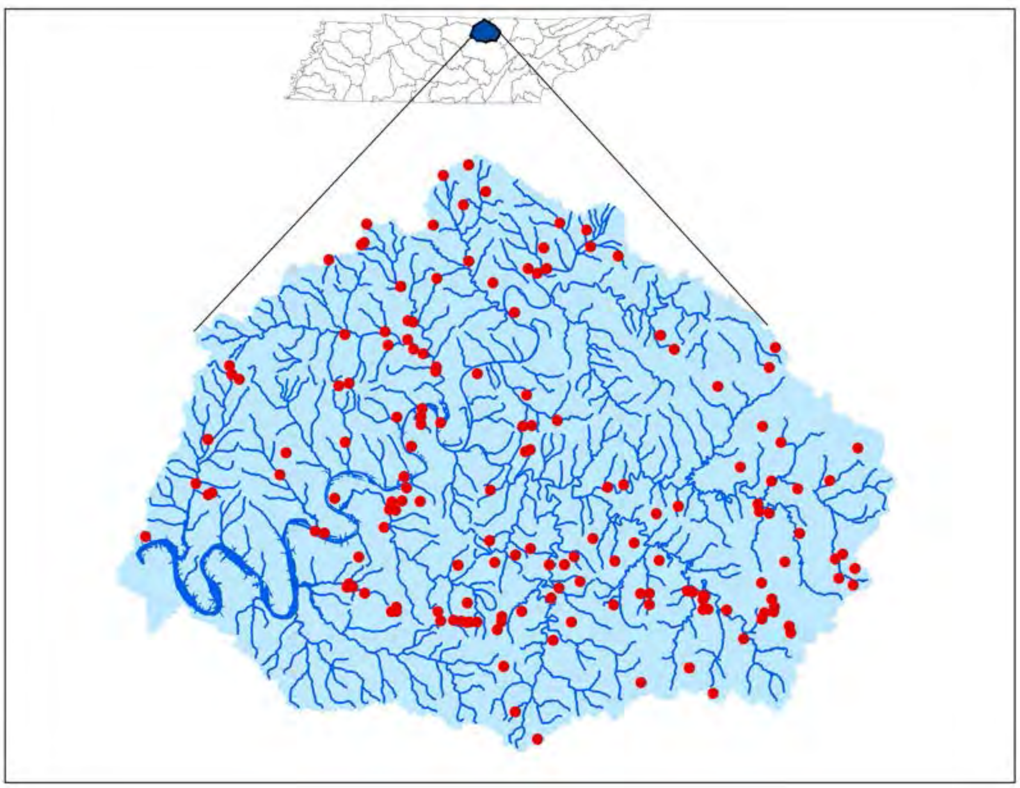

Figure 5-4. Location of BMPs installed from 1999 through 2005 in the Cordell Hull Lake Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. *More information is provided in Appendix V.*

5.4. LOCAL INITIATIVES.

5.4.A. The Cumberland River Compact. The mission of the Cumberland River Compact is to enhance the water quality of the Cumberland River and its tributaries through education and by promoting cooperation among citizens, businesses, and agencies in Kentucky and Tennessee.

We are a unique non-profit group that believes we can have both a strong economy and a healthy environment. The Compact is made up of businesses, individuals, community organizations and agencies working in the Cumberland River watershed. Over 2 million people share this watershed. Compact members work with all interested organizations and individuals to help ensure that our rivers and streams continue to provide us with clean water,bountiful crops, healthy fisheries and abundant recreational opportunities.

Since 1997, the Compact has set out to create a Watershed Outreach Program in each of the 14 watersheds that make up the Cumberland Basin. Members and staff of the Compact work with local communities to develop watershed forums where citizens can come together to learn more about their watershed and participate in developing a shared vision for the future. We welcome your interest and participation in this challenging project.

For more information about the Cumberland River Compact and to learn more about your local watershed, contact us at info@cumberlandrivercompact.org ;615-837-1151 or join us on the web at http://www.cumberlandrivercompact.org.

5.4.B. The Nature Conservancy (TNC). The Tennessee State Wildlife Action Plan (SWAP), formerly known as the Comprehensive Wildlife Conservation Strategy (CWCS), was developed by the Tennessee Wildlife Resources Agency with assistance from The Nature Conservancy in 2005. Congress mandated that each state and territory in the United States develop a SWAP as a requirement for continued receipt of federal State Wildlife Grant funding. These plans require the completion of 8 key elements of wildlife planning: 1) a list of animal species of greatest conservation need, 2) information about the distribution and abundance of species targets, 3) locations and relative conditions of key habitats, 4) descriptions of problems affecting target species and their habitats, 5) descriptions of conservation actions and priorities for conserving target species and habitats, 6) details for monitoring target species, conservation actions, and adaptive management, 7) discussion of plans to review the SWAP at specific intervals, and 8) information about coordination and implementation of the SWAP with major stakeholders. In Tennessee, the SWAP was integrated into a spatial model using Geographic Information Systems (GIS) and other database technology. Priority aquatic, terrestrial, and subterranean areas for conservation were identified across the state. Priorities were determined in the GIS model based upon relative differences in species rarity, population viability, and potential mobility of species across habitat units. Priority problems affecting species and needed conservation actions are detailed across each region of the state.

For complete information about the Tennessee SWAP, please visit:
http://www.state.tn.us/twra/cwcs/cwcsindex.html to read or download the full report.

Contact:
Chris Bullington
State Conservation Planning Manager
The Nature Conservancy, TN Chapter
2021 21st Avenue South; Suite C-400
Nashville, TN 37212
phone: (615) 383-9909 x 227

5.4.C. Hull-York Lakeland Resource Conservation and Development (RC&D) Council.
The RC&D Council mission is to *"Provide leadership to local communities to improve quality of life and conserve natural resources by organizing partners and facilitating technical and financial assistance resources".*

Hull-York Lakeland RC&D Council covers 14-counties of the Upper Cumberland area. These counties are: Macon, Clay, Pickett, Fentress, Overton, Jackson, Smith, DeKalb, Putnam, Cumberland, White, Van Buren, Warren and Cannon. Recreation in this area is dependant on a high standard of water quality. The main recreational attractions in the RC&D area are Dale Hollow Lake, Center Hill Lake, Cordell Hull Lake, and the scenic trout waters of the Caney Fork River. These resources attract large numbers of visitors to the area each year, and Hull-York Lakeland therefore has a vested interest in insuring the water quality of its watersheds.

Hull-York Lakeland RC&D Council has many local, state, federal and private partners with similar interests in the RC&D area. These partners join forces to engage in programs and projects that help individual land users and communities improve and conserve the natural resources, and engage in projects that enhance community and economic development activities. Hull-York Lakeland was the first RC&D area authorized by USDA in the state of Tennessee, and one of the first in the nation. Hull-York Lakeland was authorized in 1966.

Past projects have included Cane Creek Park and Lake in Putnam County, Camp Discovery in Jackson County, farmers markets is several counties, and emergency services consolidation projects. Current projects include a 319(h) grant for development of a watershed management plan in the Post Oak Creek Watershed. This watershed is 16,000+ acres and has been identified on the Tennessee 303(d) list of impaired waters as not meeting intended uses due to agriculture. The RC&D Council's goal is to develop a plan that identifies needs and problems in the watershed in order to have it removed from the 303(d) list, and then submit a project for funding practices that address those needs and problems.

Hull-York Lakeland RC&D Council has received a grant from the Tennessee Department of Agriculture – Agriculture Resources Conservation Fund (TDA – ARCF) with which they have purchased a tree planter in order to promote tree planting in riparian corridors to improve and enhance water quality. The Council has also received grants from TDA-ARCF, TWRA, and Quail Unlimited in order to purchase a Native Warm Season Grass

No-Till Drill. This drill was purchased in May 2006 to promote the planting of Native Warm Season Grasses in the Upper Cumberland Area to create and enhance wildlife habitat, as well as establish buffers and field borders to improve water quality.

In 2006 Hull-York Lakeland has so far received $108,442 in direct grants, and has assisted communities in the receipt of $445,692. These funds are being used to address water quality and community development issues. For more information about Hull-York Lakeland RC&D Council contact Jeff Sanders at (931) 528-6472, ext. 110, or jeff.sanders@tn.usda.gov. You can also go to the council's website at: http://www.hylrcd.org.

CHAPTER 6

RESTORATION STRATEGIES IN THE CORDELL HULL LAKE 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 storm water rules (implemented under the NPDES program) have transitioned from Phase 1 to Phase 2. More information on storm water rules may be found at: http://www.state.tn.us/environment/wpc/stormh2o/.

This Chapter addresses point and nonpoint source approaches to water quality problems in the Cordell Hull Lake Watershed.

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

6.2.A. Year 1 Public Meeting. The first Cordell Hull Lake Watershed public meeting was held as a joint meting with the Obey River Watershed September 7, 1999 at Tennessee Technological University. 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 nongovernmental organization partners, (3) review water quality monitoring strategies, and (4) solicit input from the public.

Major Concerns/Comments

- East and West Forks Obey River need protection
- Dale Hollow Lake is a discharge lake (from houseboats)
- Increased sediment from streams after a rain
- Water taste from tap has gotten worse
- Effects of unplanned growth
- Effects of factory chicken houses coming to the Dale Hollow area
- Effects of abandoned mines and wells
- Increased nutrients on West Fork Obey River from agricultural feedlots

6.2.B. Year 3 Public Meeting. The second Cordell Hull Lake Watershed public meeting was held as a joint meeting with the Obey River Watershed November 15, 2001 in the Livingston Chamber of Commerce building. The goals of the meeting were to: (1) provide an overview of the watershed approach, (2) review the monitoring strategy, (3) summarize the most recent water quality assessment, (4) discuss the TMDL schedule and citizens' role in commenting on draft TMDLs, and (5) discuss BMPs and other nonpoint source tools available through the Tennessee Department of Agriculture 319 Program and NRCS conservation assistance programs.

Major Concerns/Comments

- Decreased dissolved oxygen in Dale Hollow Lake
- Gravel removal from lower Blackburn Fork and Roaring River
- Cumulative effects of non-BMP agricultural resources
- Agriculture (cattle) too close to Livingston water supply
- Roaring River state scenic river designation is not known or appreciated by landowners
- Silt in East Fork Obey River drainage where people go four-wheeling
- TDOT projects should trigger sites to be monitored because of construction and the ensuing development

6.2.C. Year 5 Public Meeting. The third scheduled Cordull Hull Lake Watershed public meeting was held October 16, 2007 at the Smith County Chamber of Commerce Building in Carthage. The meeting was held jointly with the Barren River and Upper Cumberland River Watersheds and featured nine educational components:

- Overview of watershed approach flash video
- Benthic macroinvertebrate specimens and interpretation
- SmartBoard™ with interactive GIS maps
- “Is Your Stream Healthy” self-guided slide show
- “Why We Do Biological Sampling” self-guided slide show
- Nonpoint Source pollution self-guided slide show
- Water supply and ground water protection educational display
- Smith County Beautiful display
- Water quality and land use maps

In addition, citizens had the opportunity to make formal comments on the draft Watershed Water Quality Management Plan.

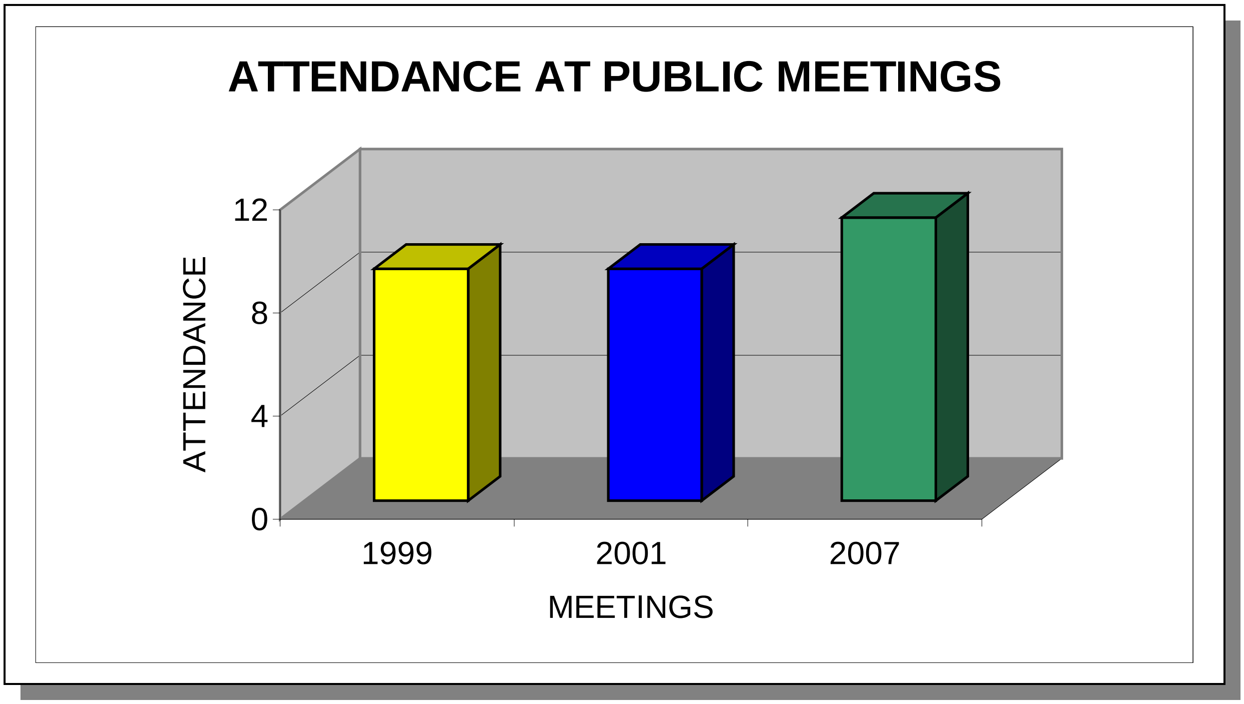

Figure 6-1. Attendance at Cordell Hull Lake Watershed Public Meetings. *Attendance numbers do not include TDEC personnel. Meetings in 1999 and 2001 represent Cordell Hull Lake and Obey River Watersheds joint meetings. Meeting in 2007 represents Cordell Hull Lake, Upper Cumberland River, and Barren River Watersheds joint meeting.*

Figure 6-2. The SmartBoard™ is an Effective Interactive Tool to Teach Citizens About the Power of GIS.

Figure 6-3. Watershed Meetings are an Effective Way to Facilitate Networking Among Consultants, Local Officials, Non-Government Organizations, Government Agencies, and Staff.

Figure 6-4. Scotty Sorrells (Division of Water Supply) explains the complicated issues involved with groundwater as a source of drinking water.

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/.

TMDLs are prioritized for development based on many factors.

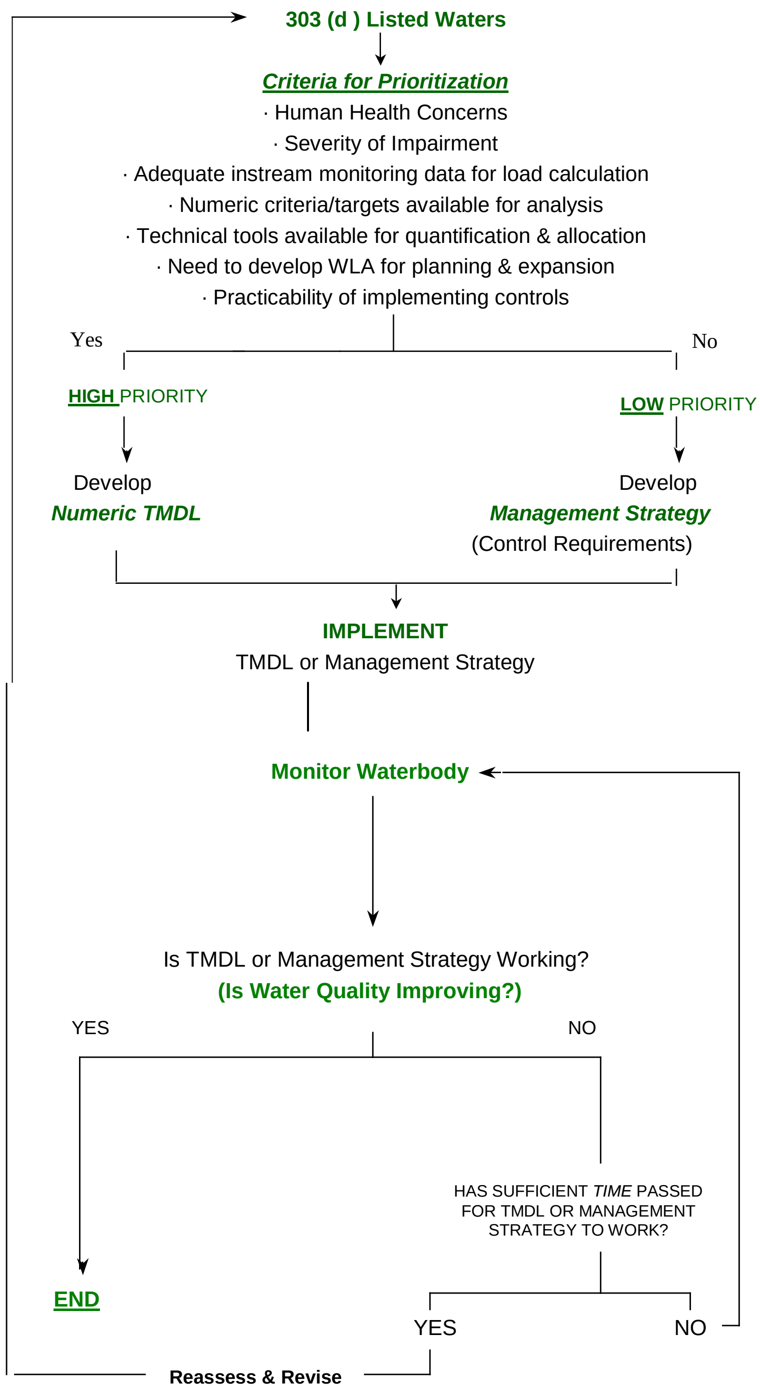

Figure 6-5. Prioritization Scheme for TMDL Development.

6.3.B. Nonpoint Sources

Common nonpoint sources of pollution in the Cordell Hull Lake Watershed include urban storm water runoff, riparian vegetation removal and other habitat alterations, as well as inappropriate land development, road construction, and agricultural practices. Since nonpoint pollution exists essentially everywhere rain falls, existing point source regulations can have only a limited effect. Other measures are, therefore, necessary.

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

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

6.3.B.i. Sedimentation.

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

Beginning in 2003, the state began requiring some municipalities to obtain coverage under a permit designed to address nonpoint runoff issues: the General NPDES Municipal Separate Storm Sewer System Permit, commonly known as MS4. This permit requires the holder to develop a comprehensive storm water management program, including the adoption of local regulatory ordinances, regular inspection of construction sites and other discharges into their storm sewers, and a variety of educational, mapping, and monitoring activities. The state audits and oversees these local MS4 programs.

6.3.B.i.b. From Channel and/or Bank Erosion. Many streams within the Cordell Hull Lake Watershed suffer from varying degrees of streambank erosion. When steam channels are altered, banks can become unstable and highly erodable. Heavy livestock traffic can also severely disturb banks. When large tracts of land are cleared of vegetation (especially trees) and replaced with impermeable surfaces like asphalt and rooftops, the large increases in the velocities and volumes of storm water runoff can also overwhelm channel and bank integrity because destabilized banks contribute to sediment loadings and to the loss of beneficial riparian vegetation.

Some inappropriate agricultural practices and overzealous land development have impacted the hydrology and morphology of stream channels in this watershed, although none severely enough to cause a loss of use impairment at this time.

Several agencies such as the NRCS and TDA, as well as citizen watershed groups, are working to stabilize portions of stream banks using bioengineering and other techniques. Many of the affected streams, like Blackburn Fork in Putnam County, Flynn Creek in Jackson County, and Spring Creek on Overton County, would benefit from these types of projects.

Some methods or controls that might be necessary to address common problems are:

Voluntary Activities

- Re-establish bank vegetation.
- Establish off-channel watering areas for livestock by moving watering troughs and feeders back from stream banks, or at least limit cattle access to restricted areas with armored bank entry (tributaries to Spring Creek in Overton County).
- Limit cattle access to streams and bank vegetation (tributaries to Blackburn Fork in Putnam County and Spring Creek in Overton County).

Regulatory Strategies

- Require post-construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion.
- Implement additional restrictions on logging in streamside management zones.
- Restrict the use of off-highway vehicles on stream banks and in stream channels.

Additional Strategies

- Increase efforts in the Master Logger program to recognize impaired streams and require more effective management practices.
- Better community planning for the impacts of development on small streams, especially development in growing areas.
- Encourage or require strong local buffer ordinances.
- Limit clearing of stream and ditch banks or other alterations. *Note: Permits may be required for any work along streams.*
- Limit road and utility crossings of streams through better site design.

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

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

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

Many sediment problems traceable to agricultural practices also involve riparian loss due to close row cropping or pasture clearing for grazing. Lack of vegetated buffers along stream corridors is a problem in some areas of the Cordell Hull Lake Watershed, due both to agricultural and residential/commercial land uses. Impacted streams that would benefit from the establishment of more extensive riparian buffer zones include Roaring River and its tributaries.

6.3.B.ii. Pathogen Contamination.

Possible sources of pathogens in streams are inadequate or failing septic tank systems, overflows or breaks in public sewer collection systems, poorly disinfected discharges from sewage treatment plants, and fecal matter from pets, livestock and wildlife washed into streams and storm drains. When fecal bacterial levels are shown to be consistently elevated to dangerously high levels, especially in streams with high potential for recreational uses, the division must post signage along the creek warning the public to avoid contact. Once pathogen sources have been identified and corrected, and pathogen level reductions are documented, the posting is lifted.

Permits issued by the Division of Water Pollution Control regulate discharges from point sources and require adequate control for these sources. Individual homes are required to have subsurface, on-site treatment (i.e., septic tank and field lines) if public sewers are not available. The Division of Ground Water Protection within the Cookeville Environmental Field Office and delegated county health departments regulate septic tanks and field lines. In addition to discharges to surface waters, businesses may employ subsurface treatment for domestic wastewater or surface discharge of treated process wastewater. The Division of Water Pollution Control regulates surface water discharges and near-surface land application of treated wastewater.

Currently, no stream systems in the Cordell Hull Lake Watershed are known to have excessive pathogen contamination, although contributions of bacterial contamination coming from storm water runoff and agricultural watersheds could be suspect for causing elevated bacterial levels in Carr Creek and Blackburn Fork.

Some measures that may be necessary to control pathogens are:

Voluntary Activities

- Clean up pet waste.
- Repair failed septic systems.
- Establish off-channel watering of livestock.
- Limit livestock access to streams and restrict stream crossings.
- Improve and educate on the proper management of animal waste from confined feeding operations.

Regulatory Strategies

- Strengthen enforcement of regulations governing on-site wastewater treatment.
- Determine timely and appropriate enforcement for non-complying sewage treatment plants, large and small, and their collection systems.
- Identify Concentrated Animal Feeding Operations not currently permitted.
- Review the pathogen limits in discharge permits to determine the need for further restriction.

Additional Strategies

- Develop intensive planning in areas where sewer is not available and treatment by subsurface disposal is not an option due to poor soils, floodplains, or high water tables.
- Develop and enforce leash laws and controls on pet fecal material.
- 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, from fertilized lawns and croplands, and faulty sewage disposal processes. Nutrients are often transported with sediment, so many of the measures designed to reduce sediment runoff will also aid in preventing organic enrichment of streams and lakes.

Dissolved oxygen depletion can also be due to the discharge of other biodegradable materials. These are limited in NPDES permits as ammonia and as either Biological Oxygen Demand (BOD) or Carbonaceous Oxygen Demand (CBOD).

Some sources of nutrients can be addressed by:

Voluntary Activities

- Educate homeowners and lawn care companies in the proper application of fertilizers.
- Encourage landowners, developers, and builders to leave stream buffer zones. Streamside vegetation can filter out many nutrients and other pollutants before they reach the stream. These riparian buffers are also vital along livestock pastures. All tributaries within agricultural areas would benefit from these practices.
- 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.
- Develop better overall storm water management in urban and residential areas, including retrofitting existing commercial lots, homes, and roadways with storm water quality and quantity BMPs. This would especially improve the urban streams and lakes currently polluted by excessive nutrient inputs.

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

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

Regulatory Strategies.

- Strengthen enforcement of regulations governing on-site wastewater treatment.
- Impose more stringent permit limits for nutrients discharged from sewage treatment plants.
- Impose timely and appropriate enforcement for noncomplying sewage treatment plants, large and small, and their collection systems.
- Identify Concentrated Animal Feeding Operations (CAFO) not currently permitted.
- Identify any Animal Feeding Operations (AFO) that contribute to stream impacts and declare them as a CAFO requiring a permit.
- Require nutrient management plans for all golf courses.

Additional Strategies

- Encourage TDA- and NRCS-sponsored educational programs targeted to agricultural landowners and aimed at better nutrient management, as well as information on technology-based application tools.

6.3.B.iv. Toxins and Other Materials.

Although some toxic substances are discharged directly into waters of the state from a point source, much of these materials are washed in during rainfalls from an upland location, or via improper waste disposal that contaminates groundwater. In the Cordell Hull Lake Watershed, Town Creek in Livingston (Overton County) receives a large amount of urban storm water runoff associated with road surfaces, parking lots, and factories. More stringent inspection and regulation of permitted industrial facilities, and local storm water quality initiatives and regulations, could help reduce the amount of contaminated runoff reaching state waters. Examples of streams that could benefit from these measures are Town Creek and Carr Creek in Overton County.

Individuals may also cause contaminants to enter streams by activities that may be attributed to apathy or the lack of knowledge or civility. Litter in roadside ditches, garbage bags tossed over bridge railings, paint brushes washed off over storm drains, and oil drained into ditches are all blatant examples of pollution in streams. To lessen the future impact to the waters of the state, each community can strive to raise its awareness for better conservation practices and prosecution of violators.

Some of these problems can be addressed by:

Voluntary activities

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

Enforcement strategies

- Continue to prohibit illicit discharges to storm drains and to search them out.
- Strengthen litter law enforcement at the local level.

Regulatory Strategies

- Increase the restrictions on storm water runoff from industrial facilities.

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.

Although large-scale public projects such as highway construction can alter significant portions of streams, individual landowners and developers are responsible for the vast majority of stream alterations.
Some measures that can help address these problems are:

Voluntary activities

- Sponsor litter pickup days to remove litter that might enter streams
- Organize stream cleanups removing trash, limbs and debris before they cause blockage.
- Avoid use of heavy equipment to "clean out" streams. Instream work other than debris removal will require an Aquatic Resource Alteration Permit (ARAP).
- Plant native vegetation along streams to stabilize banks and provide habitat.
- Encourage developers to avoid extensive use of culverts in streams.

Current regulations

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

Additional Enforcement

- Increased enforcement may be needed when violations of current regulations occur, especially for illicit gravel dredging.

6.3.B.vi. Storm Water.

MS4 discharges are regulated through the Phase I or II NPDES-MS4 permits. These permits require the development and implementation of a Storm Water Management Program (SWMP) that will reduce the discharge of pollutants to the maximum extent practicable and not cause or contribute to violations of state water quality standards. The NPDES General Permit for Discharges from Phase I and II MSF facilities can be found at:

http://www.state.tn.us/environment/wpc/stormh2o/.

For discharges into impaired waters, the MS4 General Permit requires that SWMPs include a section describing how discharges of pollutants of concern will be controlled to ensure that they do not cause or contribute to instream exceedances of water quality standards. Specific measurements and BMPs to control pollutants of concern must also be identified. In addition, MS4s must implement the proposed waste load allocation provisions of an applicable TMDL (i.e., siltation/habitat alteration, pathogens) and describe methods to evaluate whether storm water controls are adequate to meet the waste load allocation. In order to evaluate SWMP effectiveness and demonstrate compliance with specified waste load allocations, MS4s must develop and implement appropriate monitoring programs.

Some storm sewer discharges are not regulated through the NPDES MS4 program. Strategies to address runoff from in these urban areas include adapting Tennessee Growth Readiness Program (TGRP) educational materials to the watershed. TGRP is a statewide program built on existing best management practices from the Nonpoint Education for Municipal Officials program and the Center for Watershed Protection. TGRP developed the program to provide communities and counties with tools to design economically viable and watershed friendly developments. The program assists community leaders in reviewing current land use practices, determining impacts of imperviousness on watershed functions, and allowing them to understand the economics of good watershed management and site design.

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 Cordell Hull Lake Watershed. Compliance information was obtained from EPA's Permit Compliance System (PCS). All data was queried for a five-year period between August 1, 2002 and July 31, 2007. 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 Cordell Hull Lake Watershed.*

6.4.A. Municipal Permits

TN0063886 Celina STP

Discharger rating: Minor
City: Celina
County: Clay
EFO Name: Cookeville
Issuance Date: 7/1/05
Expiration Date: 5/31/09
Receiving Stream(s): Cumberland River at mile 380.7 (Cordell Hull Lake)
HUC-12: 051301060101
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: Three cell lagoon system

Segment	TN05130106005_1000
Name	Cordell Hull Lake
Size	13901
Unit	Acres
First Year on 303(d) List	-
Designated Uses	Domestic Water Supply (Supporting), Industrial Water Supply (Supporting), Fish and Aquatic Life (Supporting), Recreation (Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

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

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
BOD % removal	All Year	65	Percent	MAvg % Removal	Weekly	Calculated	%Removal
BOD5	All Year	70	mg/L	DMax Conc	Weekly	Grab	Effluent
BOD5	All Year		mg/L	DMax Conc	Weekly	Composite	Influent (Raw Sewage)
BOD5	All Year	467	lb/day	DMax Load	Weekly	Grab	Effluent
BOD5	All Year		mg/L	MAvg Conc	Weekly	Composite	Influent (Raw Sewage)
BOD5	All Year	65	mg/L	WAvg Conc	Weekly	Grab	Effluent
BOD5	All Year	434	lb/day	WAvg Load	Weekly	Grab	Effluent
BOD5	All Year	300	lb/day	MAvg Load	Weekly	Grab	Effluent
BOD5	All Year	45	mg/L	MAvg Conc	Weekly	Grab	Effluent
Bypass of Treatment (occurrences)	All Year		Occurrences/ Month	MAvg Load	Continuous	Visual	Wet Weather
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	487	#/100mL	DMax Conc	Weekly	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	Weekly	Grab	Effluent
Flow	All Year		MGD	DMax Load	Daily	Continuous	Effluent
Flow	All Year		MGD	DMax Load	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Effluent
Overflow Use Occurrences	All Year		Occurrences /Month	MAvg Load	Continuous	Visual	Non Wet Weather
Overflow Use Occurrences	All Year		Occurrences/ Month	MAvg Load	Continuous	Visual	Wet Weather
Settleable Solids	All Year	1	mL/L	DMax Conc	2/Week	Grab	Effluent
TRC	All Year	2	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	120	mg/L	DMax Conc	Weekly	Grab	Effluent
TSS	All Year		mg/L	DMax Conc	Weekly	Composite	Influent (Raw Sewage)
TSS	All Year	801	lb/day	DMax Load	Weekly	Grab	Effluent
TSS	All Year		mg/L	MAvg Conc	Weekly	Composite	Influent (Raw Sewage)
TSS	All Year	110	mg/L	WAvg Conc	Weekly	Grab	Effluent
TSS	All Year	734	lb/day	WAvg Load	Weekly	Grab	Effluent
TSS	All Year	667	lb/day	MAvg Load	Weekly	Grab	Effluent
TSS	All Year	100	mg/L	MAvg Conc	Weekly	Grab	Effluent
TSS % Removal	All Year	65	Percent	MAvg % Removal	Weekly	Calculated	% Removal
pH	All Year	9	SU	DMax Conc	2/Week	Grab	Effluent
pH	All Year	6	SU	DMin Conc	2/Week	Grab	Effluent

Table 6-2. Permit Limits for Celina STP.

Enforcement:
10/1/07 Notice of Violation: Due to the lack of an operable influent flow meter and subsequently a lack of flow proportional sampling, a Notice of Violation was issued. Reportable flow and Influent BOD are invalid from the date that the flow meter became inoperable. Flow and BOD values reported during this period do not comply with Celina's NPDES permit.

10/14/04 Agreed Order #04-0614 for NPDES violations - flow meter out for several years 1999-2004. Also had NPDES violations most of which were leaving data off the Daily Monitoring Reports as well as a couple of overflows.

Comments:
The plant is a lagoon system with few problems. There is very little industry in the area. The collection system needs attention and continual maintenance.

9/13/07 Compliance Evaluation Inspection: Not in Compliance

Comments:
Operators need to improve documentation organization, add logbooks and improve laboratory bench sheets. Influent flow meter was not working, hence the influent sampler was not meeting permit requirements.

TN0026581 Gainesboro STP

Discharger rating:	Minor
City:	Gainesboro
County:	Jackson
EFO Name:	Cookeville
Issuance Date:	4/1/04
Expiration Date:	2/28/09
Receiving Stream(s):	Cumberland River Mile 357.3
HUC-12:	051301060301
Effluent Summary:	Treated municipal wastewater from Outfall 001
Treatment system:	Activated sludge

Segment	TN05130106005_1000
Name	Cordell Hull Lake
Size	13901
Unit	Acres
First Year on 303(d) List	-
Designated Uses	Domestic Water Supply (Supporting), Industrial Water Supply (Supporting), Fish and Aquatic Life (Supporting), Recreation (Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

Table 6-3. Stream Segment Information for Gainesboro STP.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
BOD % removal	All Year	40	Percent	DMin % Removal	3/Week	Calculated	% Removal
BOD % removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
BOD5	All Year	45	mg/L	DMax Conc	3/Week	Composite	Effluent
BOD5	All Year	167	lb/day	DMax Load	3/Week	Composite	Effluent
BOD5	All Year	30	mg/L	WAvg Conc	3/Week	Composite	Effluent
BOD5	All Year	125	lb/day	MAvg Load	3/Week	Composite	Effluent
BOD5	All Year	40	mg/L	MAvg Conc	3/Week	Composite	Effluent
D.O.	All Year	1	mg/L	DMin Conc	Weekdays	Grab	Effluent
Fecal Coliform	All Year	1000	#/100mL	DMax Conc	3/Week	Composite	Effluent
Fecal Coliform	All Year	200	#/100mL	MAvg Geo Mean	3/Week	Composite	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	Weekdays	Composite	Effluent
TRC	All Year	2	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	3/Week	Composite	Effluent
TSS	All Year	125	lb/day	MAvg Load	3/Week	Composite	Effluent
TSS	All Year	167	lb/day	DMax Load	3/Week	Composite	Effluent
TSS	All Year	30	mg/L	WAvg Conc	3/Week	Composite	Effluent
TSS	All Year	40	mg/L	MAvg Conc	3/Week	Composite	Effluent
TSS % Removal	All Year	40	Percent	DMin % Removal	3/Week	Calculated	% Removal
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 6-4. Permit Limits for Gainesboro STP.

Compliance History:
The following numbers of exceedences were noted in PCS:

5 Overflows
17 Bypasses
5 Total Suspended Solids
4 Biological Oxygen Demand
2 Suspended Solids % Removal
2 Dissolved Oxygen
1 pH
1 Fecal Coliform

Comments:
The Sequential Batch Reactor is relatively new. The plant works well. The collection system is in need of work. Several of the collection system lines are very deep due to the creation of Cordell Hull Lake, (sewer lines were buried deeper after the reservoir construction). Repairs are very expensive. Like many Upper Cumberland communities, industry is disappearing.

8/30/07 Compliance Evaluation Inspection: In Compliance

Comments:
Some minor improvements needed to documentation. Raw sampler in need of maintenance, temperature at 10 degrees. Loading calculation on computerized MOR needs correction. Staffing at the WWTP is adequate. Rehab work is being performed on the collection system.

TN0021873 Livingston STP

Discharger rating:	Minor
City:	Livingston
County:	Overton
EFO Name:	Cookeville
Issuance Date:	7/1/05
Expiration Date:	3/31/09
Receiving Stream(s):	Town Creek at mile 0.8
HUC-12:	051301060201
Effluent Summary:	Treated municipal wastewater from Outfall 001
Treatment system:	Sequencing Batch Reactor to aerobic digester to land application or dry beds to landfill

Segment	TN05130106007_0710
Name	Town Creek
Size	6.2
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Recreation (Non-Supporting), Irrigation (Supporting), Fish and Aquatic Life (Non-Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Escherichia coli, Nutrient/Eutrophication Biological Indicators, Dissolved Oxygen
Sources	Municipal (Urbanized High Density Area), Sanitary Sewer Overflows (Collection System Failures)

Table 6-5. Stream Segment Information for Livingston STP.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	Summer	3	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	31	lb/day	WAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	1.5	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	2.3	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	20	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	6	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	3	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	41	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	4.5	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	61	lb/day	WAvg Load	3/Week	Composite	Effluent
Bypass of Treatment (occurrences)	All Year		Occurences/ Month	MAvg Load	Continuous	Visual	Wet Weather
CBOD % Removal	All Year	40	Percent	DMin % Removal	3/Week	Calculated	% Removal
CBOD % Removal	All Year	85	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	WAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year	203	lb/day	WAvg Load	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	10	mg/L	MAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year	135	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
D.O.	All Year	5	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	941	#/100mL	DMax Conc	3/Week	Grab	Effluent
E. coli	All Year	126	#/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	Influent (Raw Sewage)
Flow	All Year		MGD	DMax Load	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Effluent
Hg (T)	All Year	0.05	mg/L	MAvg Conc	Semi-annually	Composite	Effluent
IC25 7day Ceriodaphnia Dubia	All Year	78	Percent	DMin Conc	Semi-annually	Composite	Effluent
IC25 7day Fathead Minnows	All Year	78	Percent	DMin Conc	Semi-annually	Composite	Effluent
Overflow Use Occurences	All Year		Occurences/ Month	MAvg Load	Continuous	Visual	Non Wet Weather
Overflow Use Occurences	All Year		Occurences/ Month	MAvg Load	Continuous	Visual	Wet Weather
Settleable Solids	All Year	1	mL/L	DMax Conc	3/Week	Composite	Effluent
TRC	All Year	0.02	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	540	lb/day	WAvg Load	3/Week	Composite	Effluent
TSS	All Year	30	mg/L	MAvg Conc	3/Week	Composite	Effluent
TSS	All Year	405	lb/day	MAvg Load	3/Week	Composite	Effluent

Table 6-6a.

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	All Year	40	mg/L	WAvg Conc	3/Week	Composite	Effluent
TSS % Removal	All Year	40	Percent	DMin % Removal	3/Week	Calculated	% Removal
TSS % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	%Removal
pH	All Year	8.5	SU	DMax Conc	Weekdays	Grab	Effluent
pH	All Year	6.5	SU	DMin Conc	Weekdays	Grab	Effluent

Table 6-6b.

Tables 6-6a-b. Permit Limits for Livingston STP.

Compliance History:
The following numbers of exceedences were noted in PCS:

42 Overflows
29 Bypasses
6 Total Chlorine
4 Ammonia
2 pH
3 Dissolved Oxygen
1 Fecal Coliform
3 Total Suspended Solids
1 Carbonaceous Oxygen Demand
3 Escherichia coli

Comments:
7/25/07 Cookeville EFO Livingston STP continues to perform well. It is well staffed with experienced personnel. The plant was designed with two polishing ponds prior to discharge. This greatly improves the Sequencing Batch Reactor effluent quality through flow equalization and additional detention time. The operators are reviewing the options for pond cleanout. Suggestions were made to evaluate the feasibility of retrofitting the first pond with a sludge return line. Collection system maintenance and rehabilitation has improved since the new collection system operator took over. Manhole covers have been replaced, I/I diagnostic work has been performed and pump station upgrades to two working pumps have been competed. Laboratory has been evaluated in detail during the December 2005 inspection. The laboratory water quality has been evaluated and comparison tested against purchased laboratory grade water. The results showed that the water produced at the wastewater laboratory is suitable for the compliance monitoring testes the laboratory conducts on regular basis. A comprehensive review of the laboratory QA/QC program resulted in several recommendations and improvements. The NPDES permit has been modified to reflect the current Water Quality Criteria and remove the fecal coliform monitoring requirement. Sludge is processed in aerobic digesters and land applied as liquid. New sludge application site was approved near the airport.

Livingston Pretreatment Program

The Town of Livingston has started the development of a pretreatment program in fall of 2002. During the renewal of the permit, the city provided hardness data for calculations of the pass through limits. Assistance was provided with industry initial inspections and category classification. Advice on discharge limit application and sampling locations was provided. Oil and Grease limits for Hutchison were revised. Parker Seals now samples at an internal monitoring point to separate domestic waste from the process wastewater.

TN0073105 TDEC Standing Stone State Park

Discharger rating:	Minor
City:	Hilham
County:	Overton
EFO Name:	Cookeville
Issuance Date:	7/1/04
Expiration Date:	5/28/09
Receiving Stream(s):	Mill Creek at mile 15.0
HUC-12:	051301060103
Effluent Summary:	Treated domestic wastewater from Outfall 001
Treatment system:	Septic tank and recirculating sand filter

Segment	TN05130106018_1000
Name	Mill Creek
Size	14.3
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Fish and Aquatic Life (Supporting), Livestock Watering and Wildlife (Supporting), Recreation (Supporting), Industrial Water Supply (Supporting), Irrigation (Supporting)
Causes	N/A
Sources	N/A

Table 6-7. Stream Segment Information for TDEC Standing Stone State Park.

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	25	mg/L	DMax Conc	2/Month	Grab	Effluent
CBOD5	All Year	20	mg/L	MAvg Conc	2/Month	Grab	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	2/Month	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
Flow	All Year		MGD	DMax Load	Weekdays	Instantaneous	Effluent
Flow	All Year		MGD	MAvg Load	Weekdays	Instantaneous	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	2/Week	Grab	Effluent
TRC	All Year	0.08	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	9	SU	DMax Conc	2/Week	Grab	Effluent
pH	All Year	6	SU	DMin Conc	2/Week	Grab	Effluent

Table 6-8. Permit Limits for TDEC Standing Stone State Park.

Comments:
7/27/07 Cookeville EFO: The system is a recirculating sand filter. In the wintertime when flows are low, some BOD issues arise due to the lack of food and possibly seasonal cleaning chemicals, which may create toxic effects during periods of low waste flow, (wintertime operation is not afforded the dilution of the summertime cleaning activities). Park personnel are very pro-active, asking many questions regarding the operation of the STP.

TN0024465 USA COE Cordell Hull Dam-Damsite, Left and Right Bank

Discharger rating:	Minor
City:	Carthage
County:	Smith
EFO Name:	Cookeville
Issuance Date:	10/1/04
Expiration Date:	8/31/09
Receiving Stream(s):	Cumberland River (Cordell Hull Dam) at mile 313.2 and 313.0 (Outfalls 001 and 002)
HUC-12:	051301060309
Effluent Summary:	Treated domestic wastewater from Outfalls 001 and 002
Treatment system:	Septic tank, subsurface sand filter with chlorination

Segment	TN05130201001_1000
Name	Old Hickory Reservoir
Size	27439
Unit	Acres
First Year on 303(d) List	-
Designated Uses	Fish and Aquatic Life (Supporting), Livestock Watering and Wildlife (Supporting), Recreation (Supporting), Industrial Water Supply (Supporting), Domestic Water Supply (Supporting), Irrigation (Supporting)
Causes	N/A
Sources	N/A

Table 6-9. Stream Segment Information for US COE Cordell Hull Dam.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
BOD5	All Year	45	mg/L	DMax Conc	Monthly	Grab	Effluent
BOD5	All Year	30	mg/L	MAvg Conc	Monthly	Grab	Effluent
D.O.	All Year	1	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Ari Mean	Monthly	Grab	Effluent
Fecal Coliform	All Year	1000	#/100mL	DMax Conc	Monthly	Grab	Effluent
Fecal Coliform	All Year	200	#/100mL	MAvg Geo Mean	Monthly	Grab	Effluent
Flow	All Year		MGD	DMax Load	2/Week	Grab	Effluent
Flow	All Year		MGD	MAvg Load	2/Week	Grab	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	2/Week	Grab	Effluent
TRC	All Year	2	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	Monthly	Grab	Effluent
TSS	All Year	30	mg/L	MAvg Conc	Monthly	Grab	Effluent
pH	All Year	9	SU	DMax Conc	2/Week	Grab	Effluent
pH	All Year	6	SU	DMin Conc	2/Week	Grab	Effluent

Table 6-10. Permit Limits for US COE Cordell Hull Dam.

Comments:
7/25/07 Cookeville EFO: The bathroom sand filters exist on both sides of the dam (left and right). The sand filters are possibly over-designed. The bathrooms are rarely used. A discharge has not been observed during inspections.

6.4.B. Industrial Permits

TN0059838 Nielsen and Bainbridge - Gainsboro

Discharger rating:	Minor
City:	Gainesboro
County:	Jackson
EFO Name:	Cookeville
Issuance Date:	2/1/05
Expiration Date:	12/30/09
Receiving Stream(s):	Cordell Hull Reservoir to Cumberland River at mile 358.5
HUC-12:	051301060102
Effluent Summary:	Industrial process wastewater through Outfall 001
Treatment system:	Wastewater treatment by pH, adjustment, flocculation and clarification.

Segment	TN05130106005_1000
Name	Cordell Hull Lake
Size	13901
Unit	Acres
First Year on 303(d) List	-
Designated Uses	Domestic Water Supply (Supporting), Industrial Water Supply (Supporting), Fish and Aquatic Life (Supporting), Recreation (Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

Table 6-11. Stream Segment Information for Nielsen and Bainbridge.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ag (T)	All Year	0.43	mg/L	DMax Conc	Weekly	Grab	Effluent
Ag (T)	All Year	0.24	mg/L	MAvg Conc	Weekly	Grab	Effluent
Al (T)	All Year	10	mg/L	DMax Conc	Weekly	Grab	Effluent
Cd (T)	All Year	0.69	mg/L	DMax Conc	Weekly	Grab	Effluent
Cd (T)	All Year	0.26	mg/L	MAvg Conc	Weekly	Grab	Effluent
Cr (T)	All Year	2.77	mg/L	DMax Conc	Weekly	Grab	Effluent
Cr (T)	All Year	1.71	mg/L	MAvg Conc	Weekly	Grab	Effluent
Cu (T)	All Year	3.38	mg/L	DMax Conc	Weekly	Grab	Effluent
Cu (T)	All Year	2.07	mg/L	MAvg Conc	Weekly	Grab	Effluent
Cyanide, Total (CN-)	All Year	1.2	mg/L	DMax Conc	Weekly	Grab	Effluent
Cyanide, Total (CN-)	All Year	0.65	mg/L	MAvg Conc	Weekly	Grab	Effluent
Flow	All Year		MGD	DMax Load	Weekly	Instantaneous	Effluent
Flow	All Year		MGD	MAvg Load	Weekly	Instantaneous	Effluent
Ni (T)	All Year	3.98	mg/L	DMax Conc	Weekly	Grab	Effluent
Ni (T)	All Year	2.38	mg/L	MAvg Conc	Weekly	Grab	Effluent
Nitrite + Nitrate Total (as N)	All Year		mg/L	MAvg Conc	Monthly	Grab	Effluent
Oil and Grease (Freon EM)	All Year	52	mg/L	DMax Conc	Weekly	Grab	Effluent
Oil and Grease (Freon EM)	All Year	26	mg/L	MAvg Conc	Weekly	Grab	Effluent
Pb (T)	All Year	0.69	mg/L	DMax Conc	Weekly	Grab	Effluent
Pb (T)	All Year	0.43	mg/L	MAvg Conc	Weekly	Grab	Effluent
Phosphorus Total	All Year		mg/L	MAvg Conc	Monthly	Grab	Effluent
Sulfate (T)	All Year		mg/L	MAvg Conc	Monthly	Grab	Effluent
TSS	All Year	60	mg/L	DMax Conc	Monthly	Grab	Effluent
TSS	All Year	31	mg/L	MAvg Conc	Monthly	Grab	Effluent
Total Toxic Organics (TTO) (40CFR433)	All Year	2.13	mg/L	DMax Conc	Semi-annually	Grab	Effluent
Zn (T)	All Year	2.61	mg/L	DMax Conc	Weekly	Grab	Effluent
Zn (T)	All Year	1.48	mg/L	MAvg Conc	Weekly	Grab	Effluent
pH	All Year	9	SU	DMax Conc	Weekly	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekly	Grab	Effluent

Table 6-12. Permit Limits for Nielsen and Bainbridge.

Compliance History:
The following numbers of exceedences were noted in PCS:

1 pH
1 Total Aluminum

Comments:
Aluminum extrusion for picture frames. Cookeville EFO: Last inspection July 31, 2007. Some Architectural aluminum extrusion. Excellent self-monitoring and storm water pollution prevention.

APPENDIX II

ID	NAME	HAZARD
587004	Clifftops	1
447003	Boon-Dok	1
447004	Jennings Creek #13	1
447005	Jennings Creek #10	1
447007	Jennings Creek #15	1
567001	Chief Creek	2
567002	Jennings Creek #16	1
147001	Blue Creek Lake	3
447001	Hurricane Creek #3a	3
447002	Jennings Creek #5	2
447006	Jennings Creek #6	1
677005	Camp Monterey Lake	3
677006	Golden Pond	2
677007	Standing Stone	2
717001	F-11	S
447008	Evergreen	S

Table A2-1. Inventoried Dams in the Cordell Hull Lake Watershed. *Hazard Codes: 1, High; (S, 2), Significant; 3, Low. TDEC only regulates dams indicated by a numeric hazard score.*

LAND COVER/LAND USE	ACRES	% OF WATERSHED
Bare Rock/Sand/Clay	384	0.1
Deciduous Forest	312,942	61.4
Developed Open Space	26,069	5.1
Emergent Herbaceous Wetlands	3	0.0
Evergreen Forest	17,848	3.5
Grassland/Herbaceous	8,304	1.6
High Intensity Development	540	0.1
Low Intensity Development	8,980	1.8
Medium Intensity Development	2,000	0.4
Mixed Forest	9,216	1.8
Open Water	12,687	2.5
Pasture/Hay	62,488	12.3
Row Crops	46,326	9.1
Shrub/Scrub	1,038	0.2
Woody Wetlands	1,232	0.2
Total	**510,055**	**100.0**

Table A2-2. Land Use Distribution in Cordell Hull Lake 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 8)	
Plateau Escarpment (68c)	Ellis Gap Branch (68C12)	Lower Tennessee River	06020001
	Mud Creek (68C13)	Upper Elk River	06030003
	Crow Creek (68C15)	Guntersville Lake	06030001
	Crow Creek (68C20)	Guntersville Lake	06030001
Eastern Highland Rim (71g)	Flat Creek (71G03)	Cordell Hull Lake	05130106
	Spring Creek (71G04)	Cordell Hull Lake	05130106
	Hurricane Creek (71G10)	Upper Elk River	06030003
Inner Nashville Basin (71h)	Flynn Creek (71H03)	Cordell Hull Lake	05130106
	Clear Creek (71H06)	Caney Fork River	05130108
	Carson Fork (71H09)	Stones River	05130203

Table A2-3. Ecoregion Monitoring Sites in Ecoregions 68c, 71g, and 71h.

CODE	NAME	AGENCY	AGENY ID
102	TDEC/DNA Cummins Falls Site	TDEC/DNA	S.USTNHP 964
166	TDEC/DNA Standing Stone Sink Site	TDEC/DNA	S.USTNHP 336
179	TDEC/DNA Windle Swamp Site	TDEC/DNA	Patrick Report
266	USACOE-Nashville Client Site	USACOE-Nashville	
273	TDEC/DNA Dillon Pond Site	TDEC/DNA	
289	TDOT SR 56 Mitigation/Permit Site	TDOT	
377	TDOR SR 290 Mitigation Site	TDOT	
382	TDOT SR 290 Permit Site	TDOT	
450	TDOT SR 25 (Carthage Bypass) Mitigation/Permit Site	TDOT	

Table A2-4. Wetland Sites in the Cordell Hull Lake Watershed in TDEC Database. *TDEC, Tennessee Department of Environment and Conservation; DNA, Division of Natural Areas; TDOT, Tennessee Department of Transportation; USACOE, US Army Corps of Engineers.* ***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)
Bear Creek	TN05130106010_0300	11.7
Blackburn Fork	TN05130106008_1000	15.9
Brimstone Creek	TN05130106020_1000	8.8
Defeated Creek	TN05130106005T_0100	28.3
Dry Fork	TN05130106016_1000	4.4
East Blackburn Fork	TN05130106008_0200	12.8
Flat Creek	TN05130106007_0500	23.6
Flynn Creek	TN05130106004_1000	12.0
Jennings Creek	TN05130106021_1000	11.1
Jennings Creek	TN05130106021_2000	6.1
Little Creek	TN05130106008_0310	8.5
Martin Creek	TN05130106043_1000	29.4
Mill Creek	TN05130106010_0400	17.1
Mill Creek	TN05130106018_1000	14.3
Morrison Creek	TN05130106007_1100	19.1
Pine Lick Creek	TN05130106021_0900	23.7
Roaring River	TN05130106007_2000	19.4
Salt Lick Creek	TN05130106005T_0200	14.4
Spring Creek	TN05130106010_1000	6.2
Spring Creek	TN05130106010_2000	20.7
West Blackburn Fork	TN05130106008_0300	17.8

Table A3-1. Streams Fully Supporting Fish and Aquatic Life Designated Use in the Cordell Hull Lake Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Cordell Hull Lake	TN05130106005_1000	13,901

Table A3-2. Lakes Fully Supporting Fish and Aquatic Life Designated Use in the Cordell Hull Lake Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Carr Creek	TN05130106007_0700	4.5
Town Creek	TN05130106007_0710	6.2

Table A3-3. Streams Not Supporting Fish and Aquatic Life Designated Use in the Cordell Hull Lake Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Bowman Branch	TN05130106008_0400	4.3
Bryans Creek	TN05130106018_0200	3.5
Carr Creek	TN05130106007_0750	23.3
Cleek Branch	TN05130106007_0900	4.9
Crabtree Branch	TN05130106021_0700	6.9
Danner Branch	TN05130106010_0100	4.7
Dodson Branch	TN05130106010_0500	5.8
Doe Creek	TN05130106005T_1200	11.8
Dry Creek	TN05130106005T_0600	8.2
Dry Creek	TN05130106008_0100	6.2
Dry Fork	TN05130106004_0200	4.7
Dry Fork	TN05130106005T_1300	9.1
Dry Fork	TN05130106016_2000	5.7
Dry Hollow Branch	TN05130106007_0300	6.3
East Fork Wartrace Creek	TN05130106005T_0400	3.7
Gaw Branch	TN05130106007_0100	6.3
Hopper Creek	TN05130106007_0200	8.6
Hudson Creek	TN05130106021_0600	8.6
Hunting Creek	TN05130106021_0300	4.0
Indian Creek	TN05130106005T_0500	6.5
Knob Creek	TN05130106005T_0700	9.7
Left Fork	TN05130106020_0200	8.5
Lick Branch	TN05130106007_0400	5.3
Little Brimstone Creek	TN05130106020_0100	5.6
Little Indian Creek	TN05130106005T_1400	22.2
McBroom Branch	TN05130106043_0200	6.0
Mill Creek	TN05130106018_2000	4.8
Misc Tribs to Blackman Fork	TN05130106008_0999	11.6
Misc Tribs to Cordell Hull Reservoir	TN05130106005T_0999	102.8
Misc Tribs to Dry Fork	TN05130106016_0999	17.0
Misc Tribs to Flynn Creek	TN05130106004_0999	18.8
Misc Tribs to Jennings Creek	TN05130106021_0999	15.4
Misc Tribs to Mill Creek	TN05130106018_0999	17.6
Misc Tribs to Roaring River	TN05130106007_0999	27.4
Misc Tribs to Spring Creek	TN05130106010_0999	16.2
Morgan Creek	TN05130106018_0100	2.0
North Fork	TN05130106021_0800	4.5
Penitentiary Branch	TN05130106005T_0900	3.8
Pride Branch	TN05130106020_0400	2.4
Rector Branch	TN05130106008_0320	5.8
Rich Branch	TN05130106018_0300	3.7

Table A3-4a.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Right Fork	TN05130106016_0100	8.0
Right Fork	TN05130106020_0300	9.0
Riley Creek	TN05130106021_0100	3.0
Roaring River	TN05130106007_1000	12.7
Rush Fork	TN05130106004_0100	3.3
Shanky Branch	TN05130106005T_0800	5.8
Shaw Branch	TN05130106043_0300	3.9
Skaggs Creek	TN05130106021_0400	3.4
South Fork	TN05130106021_0200	3.0
Spring Fork Branch	TN05130106043_0100	4.3
Sugar Creek	TN05130106005T_1100	11.9
Sulphur Branch	TN05130106007_0800	4.1
Turkey Creek	TN05130106010_0200	7.0
Ward Fork Creek	TN05130106021_0500	7.0
Wartrace Creek	TN05130106005T_0300	13.9
Zollicoffer Creek	TN05130106007_0600	3.3

Table A3-4b.

Table A3-4a, b. Streams Not Assessed for Fish and Aquatic Life Designated Use in the Cordell Hull Lake Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Flat Creek	TN05130106007_0500	23.6
Flynn Creek	TN05130106004_1000	12.0
Mill Creek	TN05130106018_1000	14.3
Spring Creek	TN05130106010_1000	6.2
Spring Creek	TN05130106010_2000	20.7

Table A3-5. Streams Fully Supporting Recreation Designated Use in the Cordell Hull Lake Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Cordell Hull Lake	TN05130106005_1000	13,901

Table A3-6. Lakes Fully Supporting Recreation Designated Use in the Cordell Hull Lake Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Carr Creek	TN05130106007_0700	4.5
Town Creek	TN05130106007_0710	6.2

Table A3-7. Streams Not Supporting Recreation Designated Use in the Cordell Hull Lake Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Bear Creek	TN05130106010_0300	11.7
Blackburn Fork	TN05130106008_1000	15.9
Bowman Branch	TN05130106008_0400	4.3
Brimstone Creek	TN05130106020_1000	8.8
Bryans Creek	TN05130106018_0200	3.5
Carr Creek	TN05130106007_0750	23.3
Cleek Branch	TN05130106007_0900	4.9
Crabtree Branch	TN05130106021_0700	6.9
Danner Branch	TN05130106010_0100	4.7
Defeated Creek	TN05130106005T_0100	28.3
Dodson Branch	TN05130106010_0500	5.8
Doe Creek	TN05130106005T_1200	11.8
Dry Creek	TN05130106005T_0600	8.2
Dry Creek	TN05130106008_0100	6.2
Dry Fork	TN05130106004_0200	4.7
Dry Fork	TN05130106005T_1300	9.1
Dry Fork	TN05130106016_1000	4.4
Dry Fork	TN05130106016_2000	5.7
Dry Hollow Branch	TN05130106007_0300	6.3
East Blackburn Fork	TN05130106008_0200	12.8
East Fork Wartrace Creek	TN05130106005T_0400	3.7
Gaw Branch	TN05130106007_0100	6.3
Hopper Creek	TN05130106007_0200	8.6
Hudson Creek	TN05130106021_0600	8.6
Hunting Creek	TN05130106021_0300	4.0
Indian Creek	TN05130106005T_0500	6.5
Jennings Creek	TN05130106021_1000	11.1
Jennings Creek	TN05130106021_2000	6.1
Knob Creek	TN05130106005T_0700	9.7
Left Fork	TN05130106020_0200	8.5
Lick Branch	TN05130106007_0400	5.3
Little Brimstone Creek	TN05130106020_0100	5.6
Little Creek	TN05130106008_0310	8.5
Little Indian Creek	TN05130106005T_1400	22.2

Table A3-8a.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Martin Creek	TN05130106043_1000	29.4
McBroom Branch	TN05130106043_0200	6.0
Mill Creek	TN05130106010_0400	17.1
Mill Creek	TN05130106018_2000	4.8
Misc Tribs to Blackman Fork	TN05130106008_0999	11.6
Misc Tribs to Cordell Hull Reservoir	TN05130106005T_0999	102.8
Misc Tribs to Dry Fork	TN05130106016_0999	17.0
Misc Tribs to Flynn Creek	TN05130106004_0999	18.8
Misc Tribs to Jennings Creek	TN05130106021_0999	15.4
Misc Tribs to Mill Creek	TN05130106018_0999	17.6
Misc Tribs to Roaring River	TN05130106007_0999	27.4
Misc Tribs to Spring Creek	TN05130106010_0999	16.2
Morgan Creek	TN05130106018_0100	2.0
Morrison Creek	TN05130106007_1100	19.1
North Fork	TN05130106021_0800	4.5
Penitentiary Branch	TN05130106005T_0900	3.8
Pide Branch	TN05130106020_0400	2.4
Pine Lick Creek	TN05130106021_0900	23.7
Rector Branch	TN05130106008_0320	5.8
Rich Branch	TN05130106018_0300	3.7
Right Fork	TN05130106016_0100	8.0
Right Fork	TN05130106020_0300	9.0
Riley Creek	TN05130106021_0100	3.0
Roaring River	TN05130106007_1000	12.7
Roaring River	TN05130106007_2000	19.4
Rush Fork	TN05130106004_0100	3.3
Salt Lick Creek	TN05130106005T_0200	14.4
Shanky Branch	TN05130106005T_0800	5.8
Shaw Branch	TN05130106043_0300	3.9
Skaggs Creek	TN05130106021_0400	3.4
South Fork	TN05130106021_0200	3.0
Spring Fork Branch	TN05130106043_0100	4.3
Sugar Creek	TN05130106005T_1100	11.9
Sulphur Branch	TN05130106007_0800	4.1
Turkey Creek	TN05130106010_0200	7.0
Ward Fork Creek	TN05130106021_0500	7.0
Wartrace Creek	TN05130106005T_0300	13.9
West Blackburn Fork	TN05130106008_0300	17.8
Zollicoffer Creek	TN05130106007_0600	3.3

Table A3-8b.

Table A3-8a, b. Streams Not Assessed for Recreation Designated Use in the Cordell Hull Lake Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Bear Creek	TN05130106010_0300	11.7
Blackburn Fork	TN05130106008_1000	15.9
Bowman Branch	TN05130106008_0400	4.3
Brimstone Creek	TN05130106020_1000	8.8
Bryans Creek	TN05130106018_0200	3.5
Carr Creek	TN05130106007_0700	4.5
Carr Creek	TN05130106007_0750	23.3
Cleek Branch	TN05130106007_0900	4.9
Crabtree Branch	TN05130106021_0700	6.9
Danner Branch	TN05130106010_0100	4.7
Defeated Creek	TN05130106005T_0100	28.3
Dodson Branch	TN05130106010_0500	5.8
Doe Creek	TN05130106005T_1200	11.8
Dry Creek	TN05130106008_0100	6.2
Dry Creek	TN05130106005T_0600	8.2
Dry Fork	TN05130106004_0200	4.7
Dry Fork	TN05130106016_1000	4.4
Dry Fork	TN05130106016_2000	5.7
Dry Fork	TN05130106005T_1300	9.1
Dry Fork	TN05130106016_2000	5.7
Dry Hollow Branch	TN05130106007_0300	6.3
East Blackburn Fork	TN05130106008_0200	12.8
East Fork Wartrace Creek	TN05130106005T_0400	3.7
Flat Creek	TN05130106007_0500	23.6
Flynn Creek	TN05130106004_1000	12.0
Gaw Branch	TN05130106007_0100	6.3
Hopper Creek	TN05130106007_0200	8.6
Hudson Creek	TN05130106021_0600	8.6
Hunting Creek	TN05130106021_0300	4.0
Indian Creek	TN05130106005T_0500	6.5
Jennings Creek	TN05130106021_1000	11.1
Jennings Creek	TN05130106021_2000	6.1
Knob Creek	TN05130106005T_0700	9.7
Left Fork	TN05130106020_0200	8.5
Lick Branch	TN05130106007_0400	5.3
Little Brimstone Creek	TN05130106020_0100	5.6
Little Creek	TN05130106008_0310	8.5
Little Indian Creek	TN05130106005T_1400	22.2
Martin Creek	TN05130106043_1000	29.4
McBroom Branch	TN05130106043_0200	6.0
Mill Creek	TN05130106010_0400	17.1
Mill Creek	TN05130106018_1000	14.3
Mill Creek	TN05130106018_2000	4.8

Table A3-9a.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE(MILES)
Misc Tribs to Blackman Fork	TN05130106008_0999	11.6
Misc Tribs to Cordell Hull Reservoir	TN05130106005T_0999	102.8
Misc Tribs to Flynn Creek	TN05130106004_0999	18.8
Misc Tribs to Jennings Creek	TN05130106021_0999	15.4
Misc Tribs to Mill Creek	TN05130106018_0999	17.6
Misc tribs to Roaring River	TN05130106007_0999	27.4
Misc Tribs to Spring Creek	TN05130106010_0999	16.2
Misc. Tribs to Dry Fork	TN05130106016_0999	17.0
Morgan Creek	TN05130106018_0100	2.0
Morrison Creek	TN05130106007_1100	19.1
North Fork	TN05130106021_0800	4.5
Penitentiary Branch	TN05130106005T_0900	3.8
Pide Branch	TN05130106020_0400	2.4
Pine Lick Creek	TN05130106021_0900	23.7
Rector Branch	TN05130106008_0320	5.8
Rich Branch	TN05130106018_0300	3.7
Right Fork	TN05130106016_0100	8.0
Right Fork	TN05130106020_0300	9.0
Riley Creek	TN05130106021_0100	3.0
Roaring River	TN05130106007_1000	12.7
Roaring River	TN05130106007_2000	19.4
Rush Fork	TN05130106004_0100	3.3
Salt Lick Creek	TN05130106005T_0200	14.4
Shanky Branch	TN05130106005T_0800	5.8
Shaw Branch	TN05130106043_0300	3.9
Skaggs Creek	TN05130106021_0400	3.4
South Fork	TN05130106021_0200	3.0
Spring Creek	TN05130106010_1000	6.2
Spring Creek	TN05130106010_2000	20.7
Spring Fork Branch	TN05130106043_0100	4.3
Sugar Creek	TN05130106005T_1100	11.9
Sulphur Branch	TN05130106007_0800	4.1
Turkey Creek	TN05130106010_0200	7.0
Ward Fork Creek	TN05130106021_0500	7.0
Wartrace Creek	TN05130106005T_0300	13.9
West Blackburn Fork	TN05130106008_0300	17.8
Zollicoffer Creek	TN05130106007_0600	3.3

Table A3-9b.

Table A3-9a-b. Stream Impairment Due to Siltation in the Cordell Hull Lake Watershed.

APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)				
	0101	0102	0103	0104	0105
Bare Rock/Sand/Clay		12	25	1	
Deciduous Forest	10,987	18,751	19,739	13,272	14,595
Developed Open Space	760	1,091	1,202	765	294
Emergent Herbaceous Wetlands	1	1			
Evergreen Forest	89	703	373	270	224
Grassland/Herbaceous	492	375	180	243	755
High Intensity Development	27	12		1	1
Low Intensity Development	170	244	179	141	8
Medium Intensity Development	82	16	40	5	5
Mixed Forest	54	340	327	226	63
Open Water	342	943	48	1	19
Pasture/Hay	1,952	3,368	1,414	928	1,517
Row Crops	178	549	802	773	380
Shrub/Scrub	33	57	209	25	33
Woody Wetlands	11	48	95	48	6
Total	**15,177**	**26,511**	**24,633**	**16,700**	**17,901**

Table A4-1a.

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)				
	0201	0202	0203	0204	0205
Bare Rock/Sand/Clay	65	8	7	120	34
Deciduous Forest	20,264	24,953	7,022	19,794	13,953
Developed Open Space	3,317	2,470	1,002	3,522	3,400
Evergreen Forest	411	1,405	661	1,227	981
Grassland/Herbaceous	439	361	134	401	156
High Intensity Development	176	4		187	84
Low Intensity Development	1,763	824	342	1,644	2,392
Medium Intensity Development	627	49	11	474	454
Mixed Forest	906	602	467	965	634
Open Water	91	429	14	126	138
Pasture/Hay	5,563	8,859	2,396	9,799	7,395
Row Crops	11,263	2,772	2,880	11,651	9,855
Shrub/Scrub	80	27	3	63	4
Woody Wetlands	29	258	10	86	137
Total	**44,995**	**43,021**	**14,950**	**50,059**	**39,616**

Table A4-1b.

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)				
	0301	0302	0303	0304	0305
Bare Rock/Sand/Clay	31	1	1	33	2
Deciduous Forest	17,680	41,628	8,779	11,118	14,400
Developed Open Space	1,368	843	224	716	1,409
Emergent Herbaceous Wetlands				1	
Evergreen Forest	1,866	596	890	1,372	894
Grassland/Herbaceous	572	831	265	716	292
High Intensity Development	21				
Low Intensity Development	225	28	9	25	285
Medium Intensity Development	84	5		2	41
Mixed Forest	672	238	262	880	178
Open Water	1,547	301	150	2,193	232
Pasture/Hay	2,850	2,009	432	2,917	2,710
Row Crops	300	1,170	139	183	707
Shrub/Scrub	78	103	14	79	51
Woody Wetlands	38	12	1	22	49
Total	**27,330**	**47,765**	**11,164**	**20,256**	**21,250**

Table A4-1c.

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)			
	0306	0307	0308	0309
Bare Rock/Sand/Clay	3	32		10
Deciduous Forest	21,010	18,263	14,265	2,469
Developed Open Space	1,531	1,357	566	231
Evergreen Forest	1,947	2,600	1,191	149
Grassland/Herbaceous	257	1,141	526	170
High Intensity Development	2	2	1	20
Low Intensity Development	430	208	32	32
Medium Intensity Development	56	8	9	30
Mixed Forest	356	1,240	598	206
Open Water	488	4,932	504	189
Pasture/Hay	2,040	3,926	1,750	664
Row Crops	1,686	695	129	214
Shrub/Scrub	45	109	23	2
Woody Wetlands	270	90	4	18
Total	**30,121**	**34,605**	**19,597**	**4,405**

Table A4-1d.

Table A4-1a-d. Land Use Distribution in the Cordell Hull Lake Watershed by HUC-12. *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. *Soils are grouped into four hydrologic soil groups that describe a soil's permeability and, therefore, its susceptibility to runoff.*

STATION	HUC 10	STREAM	AREA (MI^2)	DAILY FLOW			3Q2	1Q10	3Q10	7Q10	3Q20
				AVG	MAX	MIN					
3417500	0513010601	Cumberland River	7307.00	11670.4	142000.0	69.0	na	na	na	154.0	112.0
3417700	0513010602	UT to Matthews Branch	0.49	na	na	na	na	na	na	na	na
3418000	0513010602	Roaring River	78.70	110.7	8000.0	2.4	6.2	3.5	3.8	3.9	3.3
3418070	0513010602	Roaring River	210.00	268.6	15800.0	0.0	na	na	na	na	na

Table A4-3. Stream Flow Data from USGS Gaging Stations in the Cordell Hull Lake Watershed. Data are in cubic feet per second (CFS). Data were obtained from the USGS web application StreamStats at http://water.usgs.gov/osw/streamstats. (na, data not available)

AGENCY	STATION	LOCATION	HUC-12
TDECWPC	MILL001.3CY	Mill Creek @ RM 1.3	051301060103
TDECWPC	MILL013.2OV	Mill Creek @ RM 13.2	051301060103
TDECWPC	MILL014.8OV	Mill Creek @ RM 14.8	051301060103
TDECWPC	DRY000.5CY	Dry Fork @ RM 0.5	051301060104
TDECWPC	BRIMS002.5CY	Brimstone Creek @ RM 2.5	051301060105
TDECWPC	CARR001.0OV	Carr Creek @ RM 1.0	051301060201
TDECWPC	CARR003.6OV	Carr Creek @ RM 3.6	051301060201
TDECWPC	CARR004.6OV	Carr Creek @ RM 4.6	051301060201
TDECWPC	ROARI029.2OV	Roaring River @ RM 29.2	051301060201
TDECWPC	TOWN000.5OV	Town Creek @ RM 0.5	051301060201
TDECWPC	TOWN000.9OV	Town Creek @ RM 0.9	051301060201
TDECWPC	MORRI000.7JA	Morrison Creek @ RM 0.7	051301060202
TDECWPC	ECO71G03	Flat Creek @ RM 1.8	051301060203
TDECWPC	FLAT008.3OV	Flat Creek @ RM 8.3	051301060203
TDECWPC	BEAR000.2OV	Bear Creek @ RM 0.2	051301060204
TDECWPC	ECO71G04	Spring Creek @ RM 16.2	051301060204
TDECWPC	LMILL000.1PU	Little Mill Creek @ RM 0.1	051301060204
TDECWPC	MILL000.8PU	Mill Creek @ RM 0.8	051301060204
TDECWPC	BLACK014.5JA	Blackburn Fork @ RM 14.5	051301060205
TDECWPC	EBLAC000.1JA	East Blackburn Fork @ RM 0.1	051301060205
TDECWPC	LITTL000.7PU	Little Creek @ RM 0.7	051301060205
TDECWPC	WBLAC000.1JA	West Blackburn Fork @ RM 0.1	051301060205
TDECWPC	DOE001.0JA	Doe Creek @ RM 1.0	051301060301
TDECWPC	JENNI007.2JA	Jennings Creek @ RM 7.2	051301060302
TDECWPC	PLICK000.8JA	Pine Lick Creek @ RM 0.8	051301060302
TDECWPC	SLICK002.7JA	Salt Lick Creek @ RM 2.7	051301060304
TDECWPC	ECO71H03	Flynn Creek @ RM 10.2	051301060305
TDECWPC	MARTI004.2PU	Martin Creek @ RM 4.2	051301060306
TDECWPC	DEFEA006.2SM	Defeated Creek @ RM 6.2	051301060308

Table A4-4. STORET Water Quality Monitoring Stations in the Cordell Hull Lake Watershed*. TDECWPC, Tennessee Department of Environment and Conservation Division of Water Pollution Control; UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	HUC-12
TN0063886	Celina STP	4952	Sewerage System	Minor	Cumberland River @ RM 380.2	051301060101
TN0059838	Nielsen and Bainbridge	3471	Electroplating, Plating, and Polishing	Minor	Cumberland River @ RM 358.2	051301060102
TN0073105	Standing Stone State Park	4952	Sewerage System	Minor	Mill Creek @ RM 15.0	051301060103
TN0021873	Livingston STP	4952	Sewerage System	Major	Town Creek @ RM 0.8	051301060201
TN0002593	Bon L. Mfg Company	3354	Aluminum Extruded Products	Minor	Caney Fork @ RM 8.6	051301060205
TN0026581	Gainesboro STP	4952	Sewerage System	Minor	Cumberland River @ RM 357.3	051301060301
TN0024465	USACOE Cordell Hull Dam	4952	Sewerage System	Minor	Cumberland River @ RM 313.2	051301060309
TN0068161	Cordell Hull Hydro Power Plant	4911	Electric Services	Minor	Cumberland River	051301060309

Table A4-5. NPDES Permittees in the Cordell Hull Lake Watershed. *SIC, Standard Industrial Classification; MADI, Major Discharge Indicator.*

FACILITY NUMBER	PERMITEE	COUNTY	LIVESTOCK	WATERBODY	HUC-12
TN000128	Ridgetop Farms	Clay	Poultry	Brannon Creek	051301060101
TNA00099	Running Late Farms	Clay	Poultry	Little Brimstone Creek	051301060105
TN000088	Cherry's Rooster Ridge	Clay	Poultry	Pine Lick Creek	051301060302

Table A4-6. CAFO Sites in the Cordell Hull Lake Watershed.

FACILITY NUMBER	PERMITEE	SIC	SIC NAME	WATERBODY	HUC-12
TN0063495	Livingston Limestone Co. (Allons Mine)	1422	Crushed and Broken Limestone	Mill Creek	051301060103
TN0065668	Overton County Highway Dept (Overton County Quarry)	1422	Crushed and Broken Limestone	UT to Carr Creek	051301060201
TN0072508	Livingston Limestone Co. (Gainesboro Quarry)	1422	Crushed and Broken Limestone	UT to Roaring River	051301060202
TN0063517	Rogers Group, Inc. (Algood Quarry)	1422	Crushed and Broken Limestone	UT to Bear Creek	051301060204
TN0064289	Mossy Creek Mining, LLC (Cumberland Mine)	1031	Lead and Zinc Ore	UT to Cumberland River	051301060309
TN0072737	LoJac Enterprises, Inc. (LoJac Smith County Quarry)	1422	Crushed and Broken Limestone	UT to Turkey Creek	051301060309

Table A4-7. Active Permitted Mining Sites in the Cordell Hull Lake Watershed. *SIC, Standard Industrial Classification; UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	WATERBODY	HUC-12
TNG110281	IMI Tennessee, Inc.	Unnamed Tributary	051301060201
TNG110287	Livingston Ready Mix	Sinkhole	051301060201

Table A4-8. Ready Mix Concrete Plants in the Cordell Hull Lake Watershed.

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-12
NRS04.156	Clay	Bridge Repair	Mill Creek	051301060201
NRS04.156B	Clay	Bridge Repair	Mill Creek	051301060201
NRS02.341	Overton	Replace Drainage Structure	Town Creek	051301060201
NRS02.043	Overton		Spring Creek	051301060204
NRS02.012	Putnam		Little Creek	051301060205
NRS03.243	Putnam	Bridge Replacement	East Prong Blackburn Fork Creek	051301060205
NRS01.069	Jackson	Slab Culvert	Cub Creek	051301060301
NRS03.241	Jackson	Rip-Rap	Doe Creek	051301060301
NRS03.220	Jackson	Bridge and Approaches	Wartrace Creek	051301060303
NRS00.258	Smith	Stream Relocation	Hoggstown Branch	051301060307

Table A4-9. Individual ARAP Permits Issued January 2000 Through June 2004 in the Cordell Hull Lake Watershed.

FACILITY NUMBER	FACILITY NAME	SECTOR	RECEIVING STREAM	AREA*	HUC-12
TNR051371	Sola/Hevi-Duty	AC	Obey River	10	051301060101
TNR050526	Nielsen and Bainbridge	A, AA, F	Cumberland River @ RM 358.5	14	051301060102
TNR056389	Crotty Corporation	V	Cumberland River	3.5	051301060102
TNR051274	Livingston Sawmill, Incorporated	A	Town Creek	5.9	051301060201
TNR051851	Berkline Plant 5	W	Town Creek	8.66	051301060201
TNR055041	Eaton INOAC Company	Y	Carr Creek	2.5	051301060201
TNR055997	LoJac Materials, Inc.	E	Town Creek	2	051301060201
TNR056330	Hutchinson FTS, Incorporated	AA	Sinkholes (2)	16	051301060201
TNR053830	Lester Boles Wrecker Service	M	Buffalo Branch	25	051301060203
TNR053551	United Parcel Service	P	Bear Creek	2.02	051301060204
TNR054329	Harris Metals Company	AB	Burtons Branch	0.75	051301060204
TNR054487	Forest Flavors International	C, A	Turkey Creek	2	051301060204
TNR054569	WW Manufacturing	AB	Danner Creek	11.38	051301060204
TNR051241	Russell Stover Candies	U, P	Burtons Branch	44	051301060205
TNR051279	Highway 56 Sawmill, Inc.	A	UT to Flynn Creek	4.5	051301060305
TNR052005	Preferred Pallets	A	Cane Creek	7.2	051301060205
TNR053828	LoJac Enterprises, Incorporated	D	Falling Water River	5.35	051301060205
TNR053972	Harris Metals Corporation	F	Not Reported	10	051301060205
TNR054553	Mid-South Machine and Supply	AA	West Blackburn Fork	16.5	051301060205
TNR056342	Corky's Auto Sales and Parts	M	WWC to Martin Creek	1	051301060305
TNR053189	Heavy Equipment Division	P	Cumberland River @ RM 285.0	1300	051301060308
TNR053477	Smith County Land Fill	L	UT to Cumberland River	153.37	051301060309

Table A4-10. Active Permitted TMSP Facilities in the Cordell Hull Lake Watershed. *Area, acres of property associated with industrial activity; UT, Unnamed Tributary; WWC, Wet Weather Conveyance. Sector details may be found in Table A4-11.*

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

Table A4-11. TMSP Sectors and Descriptions.

APPENDIX V

Land Treatment - Conservation Buffers					
	Contour Buffer Strips (acres)	Field Borders (feet)	Filter Strip (feet)	Streambank / Shoreline Protection (feet)	Riparian Forest Buffer (acres)
FY 2001		11151		9500	39
FY 2002		2550	1	2880	56
FY 2003	1	29950	12	9572	55
FY 2004					27
FY 2005		13132	3		29

Table A5-1a. Land Treatment Conservation Practices (Conservation Buffers), in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Erosion Control		
	Est. soil saved (tons/year)	Land Treated with erosion control measures (acres)
FY 2001	17656	3493
FY 2002	25819	3048
FY 2003	44518	3993
FY 2004		
FY 2005		

Table A5-1b. Erosion Control Conservation Practices, in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Nutrient Management				
	Waste Utilization (acres)	AFO Nutrient Mgmt Applied (acres)	Non-AFO Nutrient Mgmt. Applied (acres)	Total Applied (acres)
FY 2001		174	2155	2329
FY 2002		109	1949	2058
FY 2003		1214	2729	3942
FY 2004	103	1041		1144
FY 2005		3099		3099

Table A5-1c. Nutrient Management Conservation Practices in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Pest Management		
	Pest Mgmt. Systems (number)	Pest Mgmt. Systems (acres)
FY 2001	40	2769
FY 2002		2578
FY 2003		3410
FY 2004		1053
FY 2005		2781

Table A5-1d. Pest Management Conservation Practices in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Grazing / Forages				
	Prescribed Grazing (acres)	Fencing (feet)	Heavy Use Area Protection (acres)	Pasture and Hay Planting (acres)
FY 2001	1641			
FY 2002	1241			
FY 2003	2924			
FY 2004	871	70400	9	
FY 2005	2521	117653	3	784

Table A5-1e. Grazing/Forages Conservation Practices in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Tree & Shrub Practices				
	Land Improved through Forest Stand improvement (acres)	Total Tree & Shrub Estab. (acres)	Forestland Re-established or improved (acres)	Use Exclusion (acres)
FY 2001	1588	23	1611	
FY 2002	1439	1	1440	
FY 2003	2955	11	2966	
FY 2004	2102		2102	3
FY 2005	687		687	74

Table A5-1f. Tree and Shrub Conservation Practices in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Land Treatment - Tillage & Cropping					
	Residue Mgmt, No-till, Strip till (acres)	Tillage & Residue Mgmt Systems (acres)	Conservation Crop Rotation (acres)	Contour Farming (acres)	Cover Crop (acres)
FY 2001					
FY 2002					
FY 2003	40				
FY 2004	264	264	54		34
FY 2005	126	126	860	79	940

Table A5-1g. Land Treatment Conservation Practices (Tillage and Cropping), in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Wildlife Habitat Management		
	Upland Habitat Mgmt (acres)	Total Wildlife Habitat Mgmt Applied (acres)
FY 2001	2231	2231
FY 2002	1558	1558
FY 2003	3662	3662
FY 2004	2069	2069
FY 2005	688	688

Table A5-1h. Wildlife Habitat Management Conservation Practices in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Water Supply			
	Pipeline (ft)	Pond (number)	Watering Facility (number)
FY 2001			
FY 2002			
FY 2003			
FY 2004	4,835		4
FY 2005	7628	5	14

Table A5-1i. Water Supply Conservation Practices in Partnership with NRCS in the Cordell Hull Lake Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

COMMUNITY	AWARD DATE	AWARD AMOUNT
Cookeville	9/25/90	$ 2,650,000
Cookeville	7/14/94	$ 9,700,000
Cookeville	3/15/91	$ 960,000
Cookeville	6/28/99	$ 2,300,000
Livingston	9/25/91	$ 3,246,000

Table A5-2a. Communities in the Cordell Hull Lake Watershed that have received Clean Water State Revolving Fund Grants or Loans since the inception of the program.

COMMUNITY	AWARD DATE	AWARD AMOUNT
West Overton UD	2/03/03	$ 750,000
West Overton UD	3/30/00	$ 471,526
Livingston	6/29/04	$ 1,930,000
Livingston	9/28/05	$ 3,570,000

Table A5-2b. Communities in the Cordell Hull Lake Watershed that have received Drinking Water State Revolving Fund Grants or Loans since the inception of the program.

PRACTICE	NRCS CODE	NUMBER OF BMPs
Waste Management System	312	1
Composting Facility	317	1
Critical Area Planting	342	6
Pond	378	16
Fence	382	34
Grade Stabilization Structure	410	1
Use Exclusion	472	20
Pasture/Hay Planting	512	47
Pipeline	516	14
Prescribed Grazing	528	3
Heavy Use Area	561	40
Spring Development	574	2
Stream Crossing	578	2
Streambank Protection	580	3
Nutrient Management	590	1
Pest Management	595	1
Watering Facility	614	35
TOTAL BMPs	**-**	**227**

Table A5-3. Best Management Practices Installed by Tennessee Department of Agriculture and Partners in the Cordell Hull Lake Watershed.