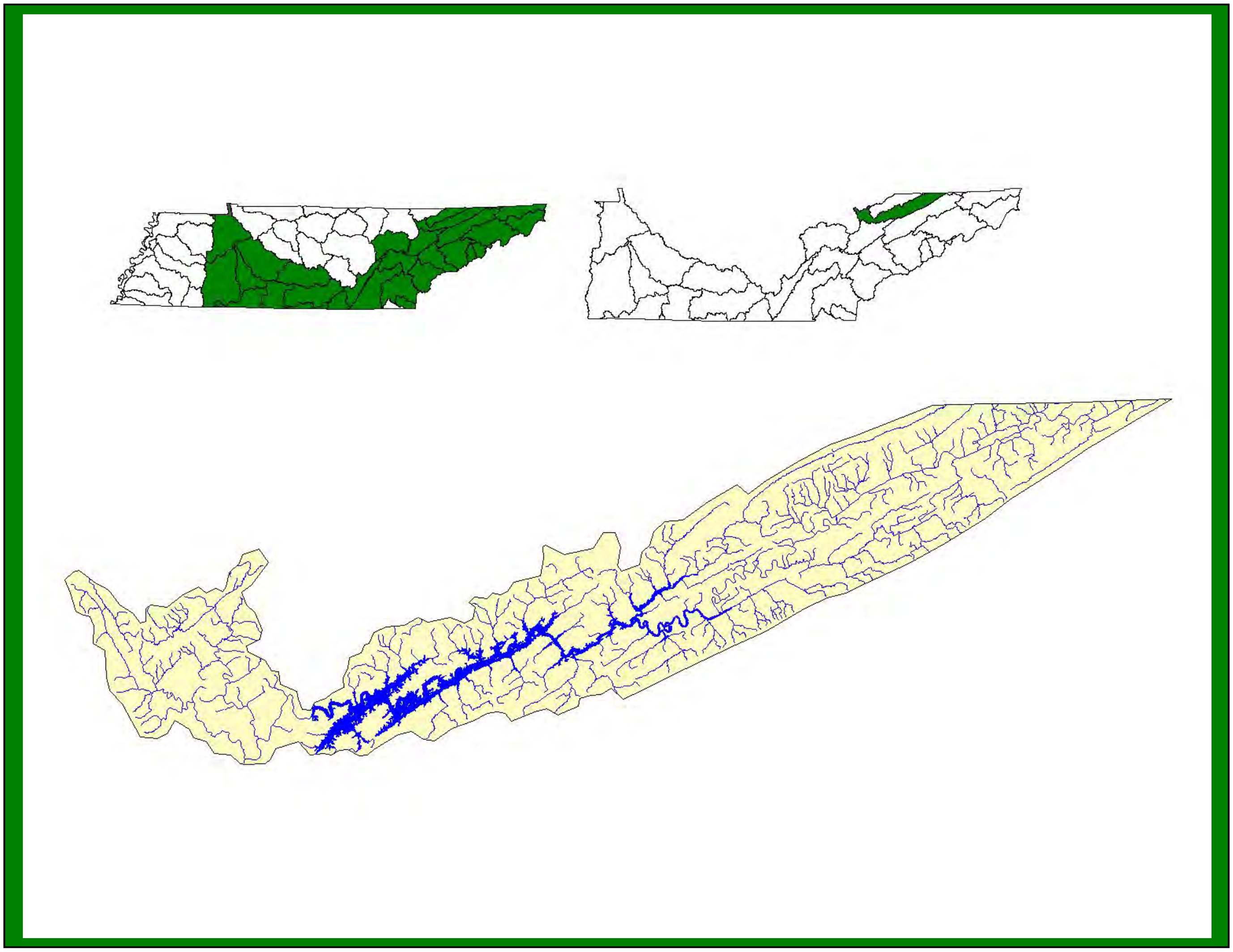
UPPER CLINCH RIVER WATERSHED (06010205) OF THE TENNESSEE RIVER BASIN

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 Upper Clinch River Watershed by the Division of Water Pollution Control October 30, 2007.

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UPPER CLINCH RIVER WATERSHED
WATER QUALITY MANAGEMENT PLAN

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GLOSSARY

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

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

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

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

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

AFO. Animal Feeding Operation.

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

ARAP. Aquatic Resource Alteration Permit.

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

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

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

Benthic. Bottom dwelling.

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

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

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

CAFO. Concentrated Animal Feeding Operation.

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

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

DO. Dissolved oxygen.

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

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

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

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

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

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

MRLC. Multi-Resolution Land Classification.

MS4. Municipal Separate Storm Sewer System.

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

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

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

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

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

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

SBR. Sequential Batch Reactor.

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

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

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

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

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

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

TMSP. Tennessee Multi-Sector Permit.

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

WAS. Waste Activated Sludge.

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

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

WET. Whole Effluent Toxicity.

WWTP. Waste Water Treatment Plant

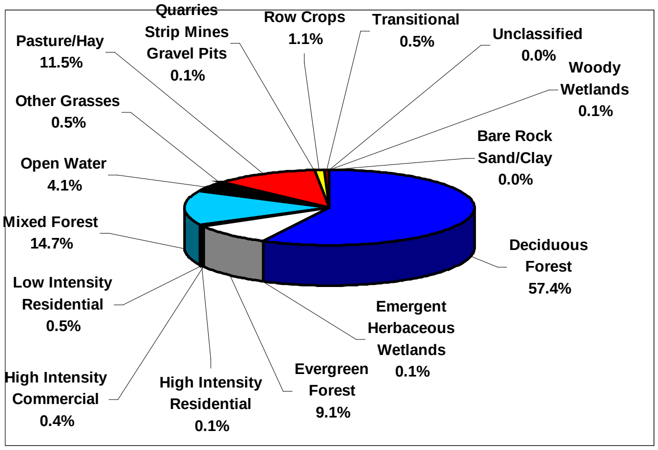
Summary – Upper Clinch River Watershed (06010205)

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

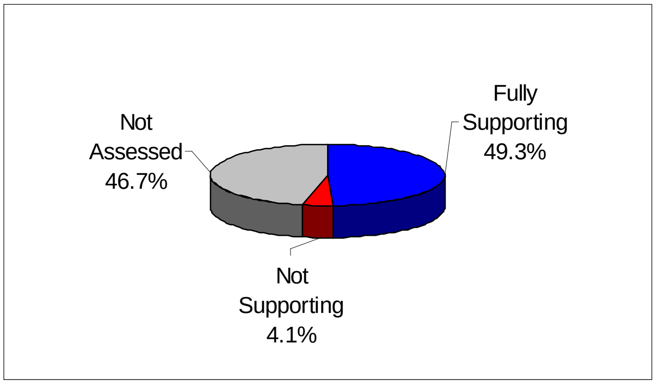
A detailed description of the watershed can be found in Chapter 2. The Upper Clinch River Watershed is approximately 1,944 square miles (709 mi^2 in Tennessee) and includes parts of seven Tennessee counties. A part of the Tennessee River drainage basin, the watershed has 757.1 stream miles and 34,681 lake acres in Tennessee.



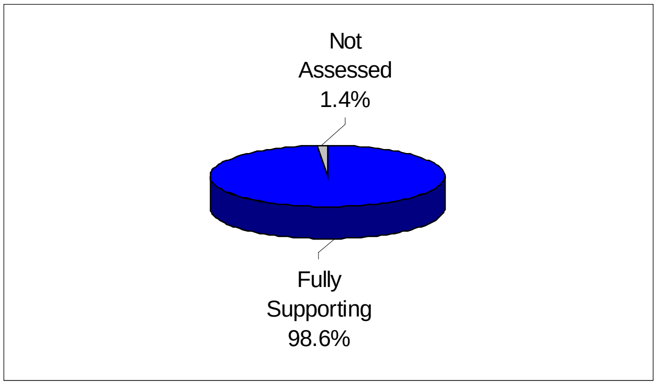
Land Use Distribution in the Tennessee Portion of the Upper Clinch River Watershed.

Three state parks and four wildlife management areas are located in the watershed. Eighty-one rare plant and animal species have been documented in the watershed, including fourteen rare fish species, twenty rare mussel species, and two rare snail species. A portion of one stream in the Upper Clinch River Watershed is 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, 416 sampling events occurred in the Upper Clinch River Watershed in 2000-2005. These were conducted at ambient, ecoregion or watershed monitoring sites. Monitoring results support the conclusion that 95.1% of stream miles assessed fully support one or more designated uses.



Water Quality Assessment of Streams and Rivers in the Tennessee Portion of the Upper Clinch River Watershed. Assessment data are based on the 2004 Water Quality Assessment of 757.1 stream miles in the watershed.



Water Quality Assessment of Lakes in the Tennessee Portion of the Upper Clinch River Watershed. Assessment data are based on the 2004 Water Quality Assessment of 34,681 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 (pathogens).

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
0601020501	060102050101 (Norris Lake)
	060102050102 (Norris Lake)
	060102050103 (Norris Lake)
	060102050104 (Norris Lake)
	060102050105 (Big Creek)
	060102050106 (Cove Creek)
0601020505	060102050502 (Clinch River)
	060102050503 (War Creek)
	060102050504 (Blackwater Creek)
	060102050505 (Clinch River)
	060102050506 (Richardson Creek)
	060102050507 (Panther Creek)
0601020507	060102050702 (North Fork Clinch River)
0601020508	060102050801 (Clinch River)
	060102050802 (Big War Creek)
	060102050803 (Indian Creek)
	060102050804 (Clinch River)
0601020509	060102050901 (Big Sycamore Creek)
	060102050902 (Little Sycamore Creek)
	060102050903 (Sycamore Creek)

The Tennessee Portion of the Upper Clinch River Watershed is Composed of twenty USGS-Delineated Subwatersheds (12-Digit Subwatersheds).

Point source contributions to the Tennessee portion of the Upper Clinch River Watershed consist of eight individual NPDES-permitted facilities, four of which discharge into streams that have been listed on the 2004 303(d) list. Other point source permits in the watershed (as of October 30, 2007) are Tennessee Multi-Sector Permits (13), Aquatic Resource Alteration Permits (8), Mining Permits (8), Ready Mix Concrete Plant Permits (3), and Water Treatment Plant Permits (1). 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 Upper Clinch River Watershed* and highlights partnerships between agencies and between agencies and landowners that are essential to success. Programs of federal agencies (Natural Resources Conservation Service, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Army Corps of Engineers, and Tennessee Valley Authority), and state agencies (TDEC/State Revolving Fund, TDEC Division of Water Supply, Tennessee Department of Agriculture, Tennessee Stream Mitigation Program, and Virginia Department of Environmental Quality) are summarized. Local initiatives of organizations active in the watershed (The Nature Conservancy, Clinch-Powell RC&D Council, and Cumberland Mountain RC&D Council) are also described.

Point and Nonpoint source approaches to water quality problems in the Upper Clinch River 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 Upper Clinch River Watershed Water Quality Management Plan can be found at: http://www.state.tn.us/environment/wpc/watershed/wsmplans/

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

1.1 Background

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

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

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

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

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

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

Watersheds are appropriate as organizational units because they are readily identifiable landscape units with readily identifiable boundaries that integrate terrestrial, aquatic, and geologic processes. Focusing on the whole watershed helps reach the best balance among efforts to control point source pollution and polluted runoff as well as protect drinking water sources and sensitive natural resources such as wetlands (EPA-840-R-98-001).

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

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

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

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

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

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

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

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

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

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

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

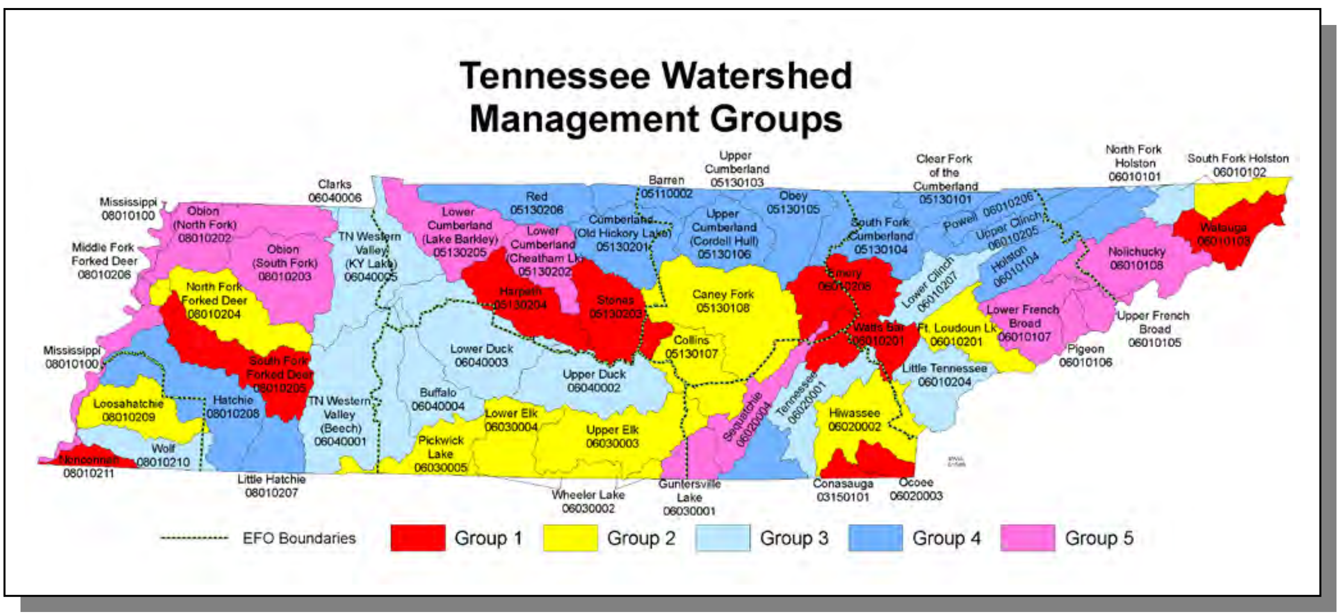


Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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

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

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

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

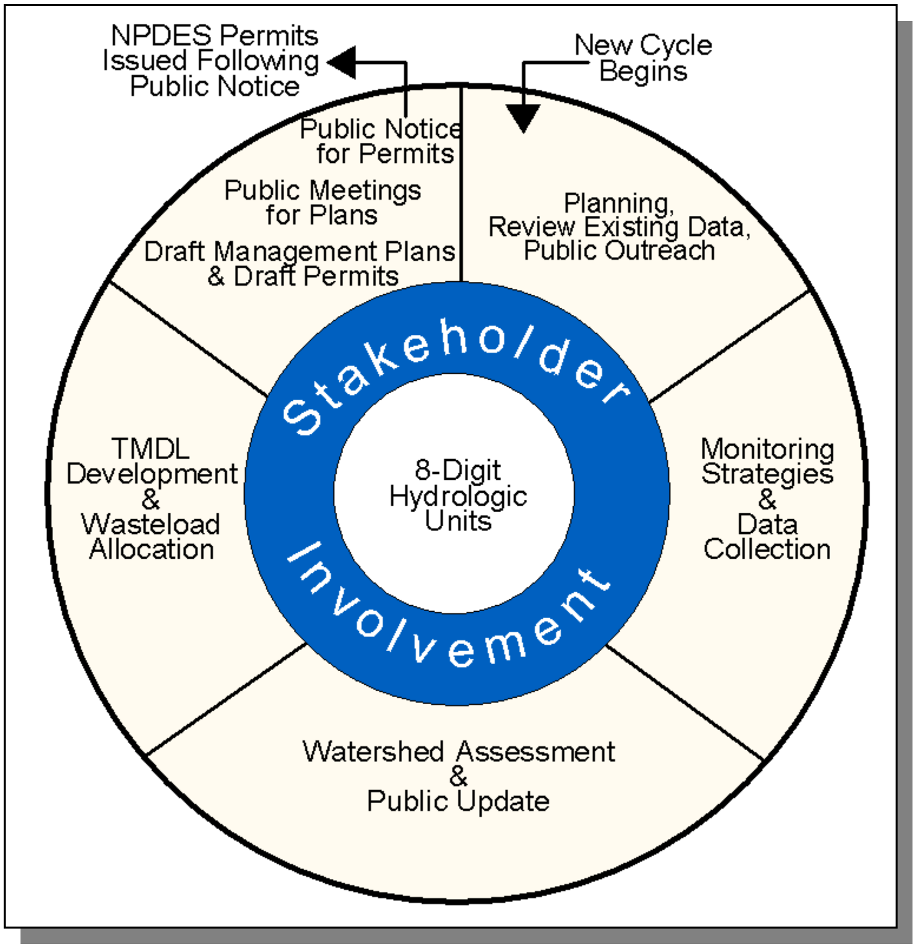


Figure 1-2. The Watershed Approach Cycle.

The six key activities that take place during the cycle are:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAPTER 2

DESCRIPTION OF THE UPPER CLINCH RIVER WATERSHED

2.1. Background

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

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

2.4. Land Use

2.5. Ecoregions and Reference Streams

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

2.7. Cultural Resources
2.7.A. Nationwide Rivers Inventory
2.7.B. Public Lands

2.8. Tennessee Rivers Assessment Project

2.1. BACKGROUND.

The Clinch River and Watershed are named for one of the first explorers from the Transylvania Land Company to see the river. Dr. Thomas Walker, an explorer and Long Hunter, explored much of the Clinch River Valley in the 1760's. Originally called Pellisipi by Native Americans, the Clinch River originates in the mountains of Southwestern Virginia.

This Chapter describes the location and characteristics of the Upper Clinch River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Tennessee portion of the Upper Clinch River Watershed is located in East Tennessee and includes parts of Anderson, Campbell, Claiborne, Hancock, Grainger, Hawkins, and Union Counties.

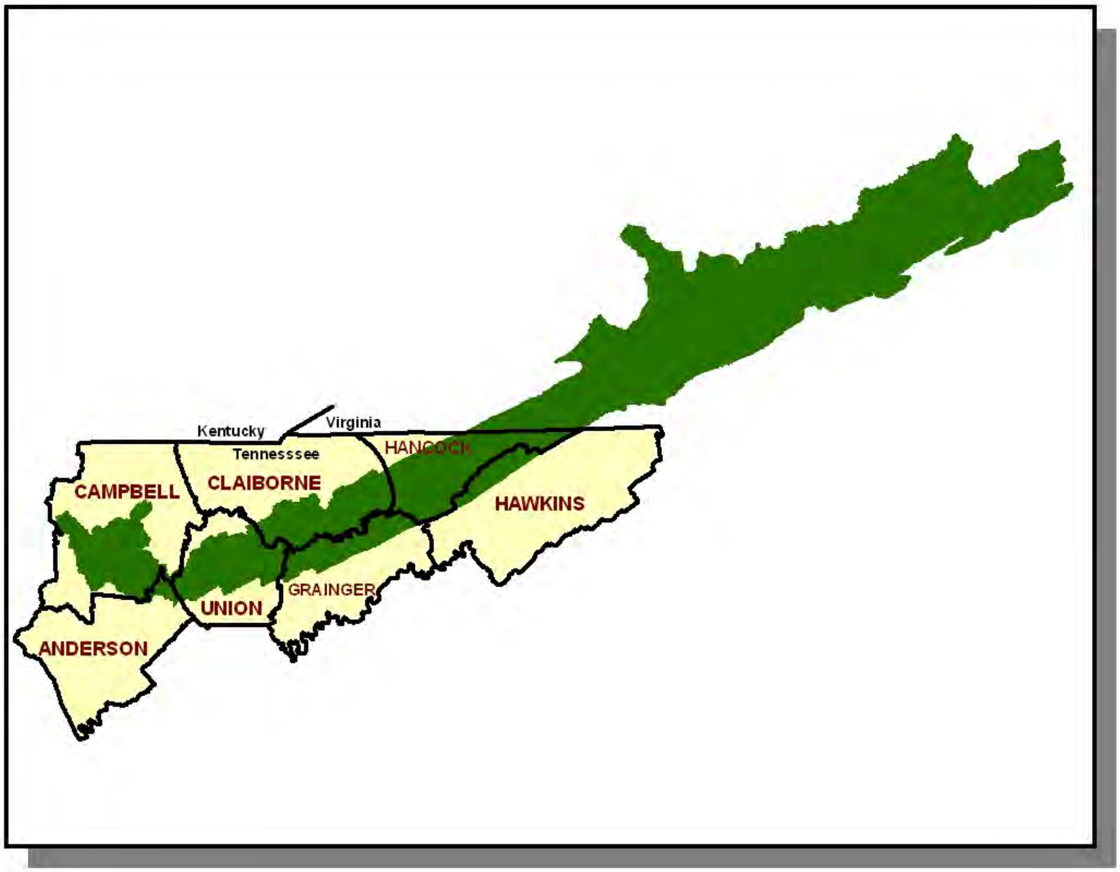


Figure 2-1. General Location of the Upper Clinch River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Hancock	24.8
Campbell	19.8
Claiborne	18.6
Union	17.7
Grainger	11.7
Hawkins	5.9
Anderson	1.5

Table 2-1. The Tennessee Portion of the Upper Clinch River Watershed Includes Parts of Seven East Tennessee Counties.

2.2.B. Population Density Centers. Thirteen highways serve the major communities in the Tennessee portion of the Upper Clinch River Watershed.

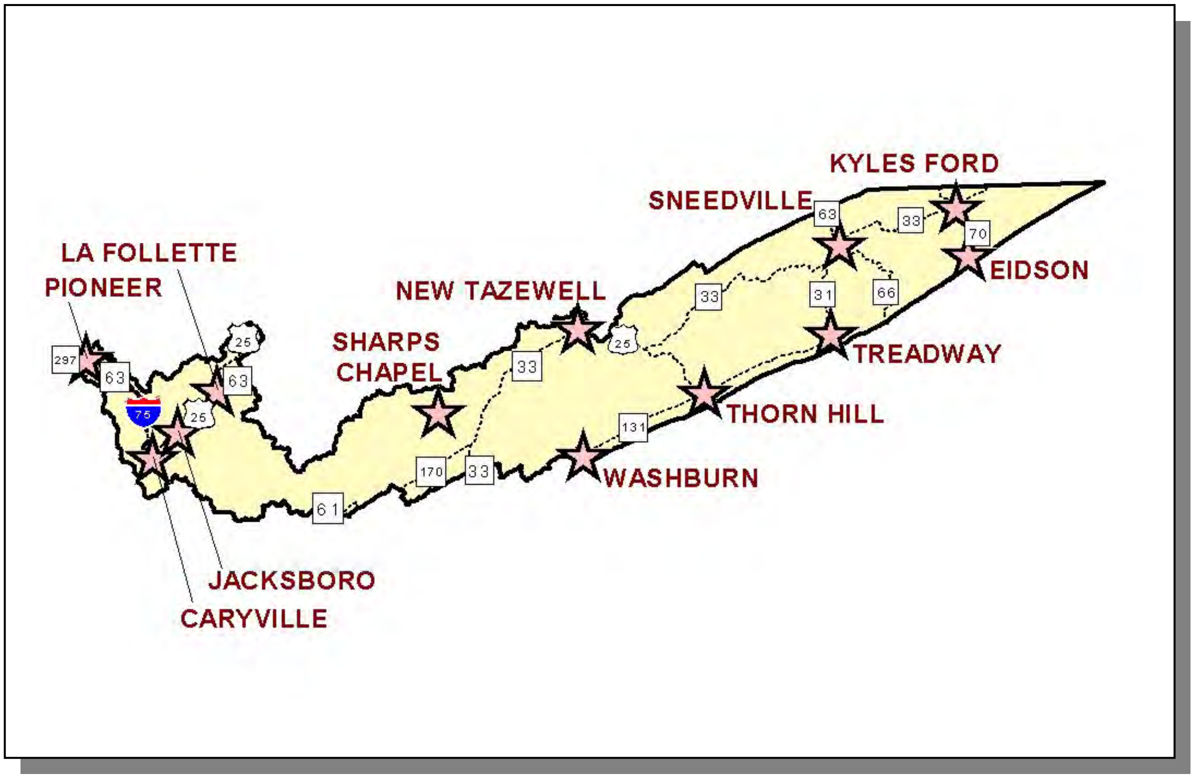


Figure 2-2. Communities and Roads in the Tennessee Portion of the Upper Clinch River Watershed.

MUNICIPALITY	POPULATION	COUNTY
LaFollette	3,885	Campbell
New Tazewell	2,871	Claiborne
Caryville	2,258	Campbell
Jacksboro*	1,887	Campbell
Sneedville*	1,351	Hancock

Table 2-2. Municipalities in the Tennessee Portion of the Upper Clinch River 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 Upper Clinch River Watershed, designated 06010205 by the USGS, is approximately 1,944 square miles (709 square miles in Tennessee) and drains to the Tennessee River.

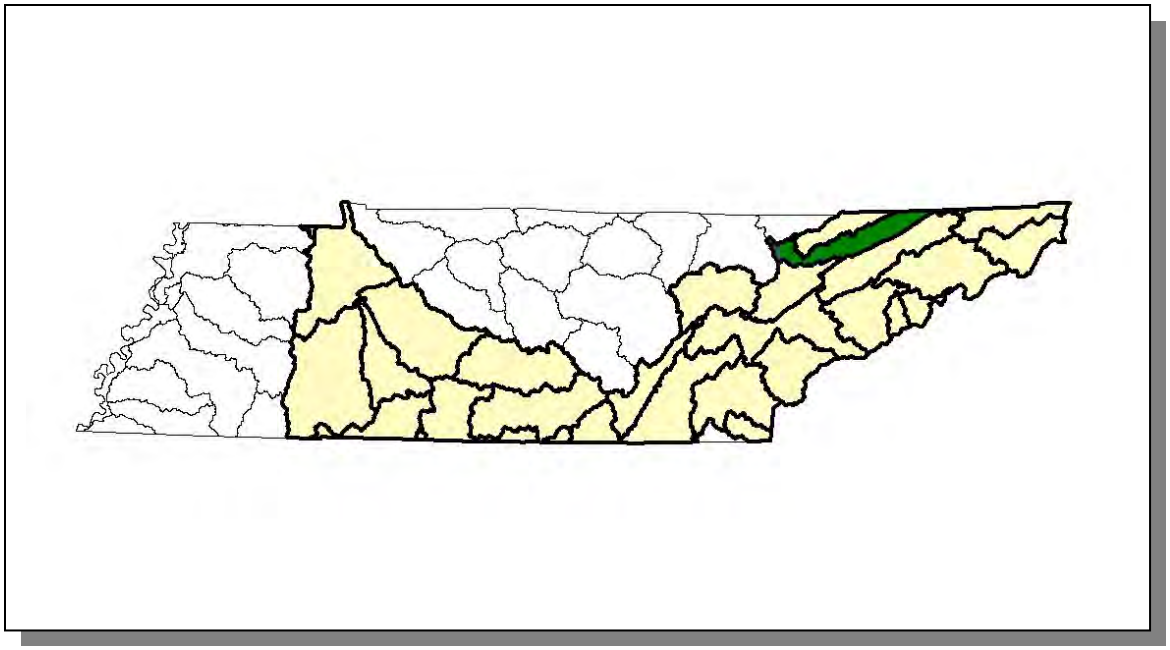


Figure 2-3. The Upper Clinch River Watershed is Part of the Tennessee River Basin.

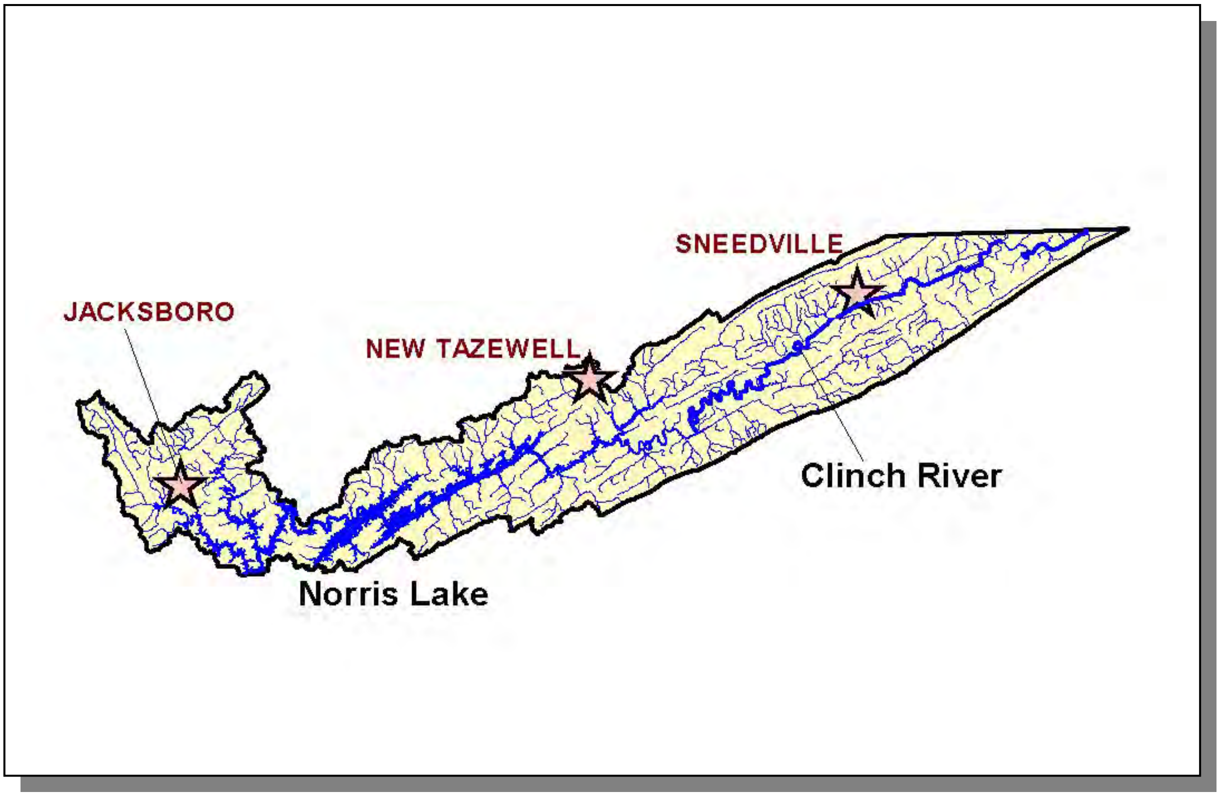


Figure 2-4. Hydrology in the Tennessee Portion of the Upper Clinch River Watershed. *There are 757.1 stream miles and 34,681 lake acres recorded in River Reach File 3 in the Tennessee portion of the Upper Clinch River Watershed. Location of the Clinch River including Norris Lake, and the cities of Jacksboro, New Tazewell, and Sneedville are shown for reference.*

2.3.B. Dams. There are 7 dams inventoried by TDEC Division of Water Supply in the Tennessee portion of the Upper Clinch River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

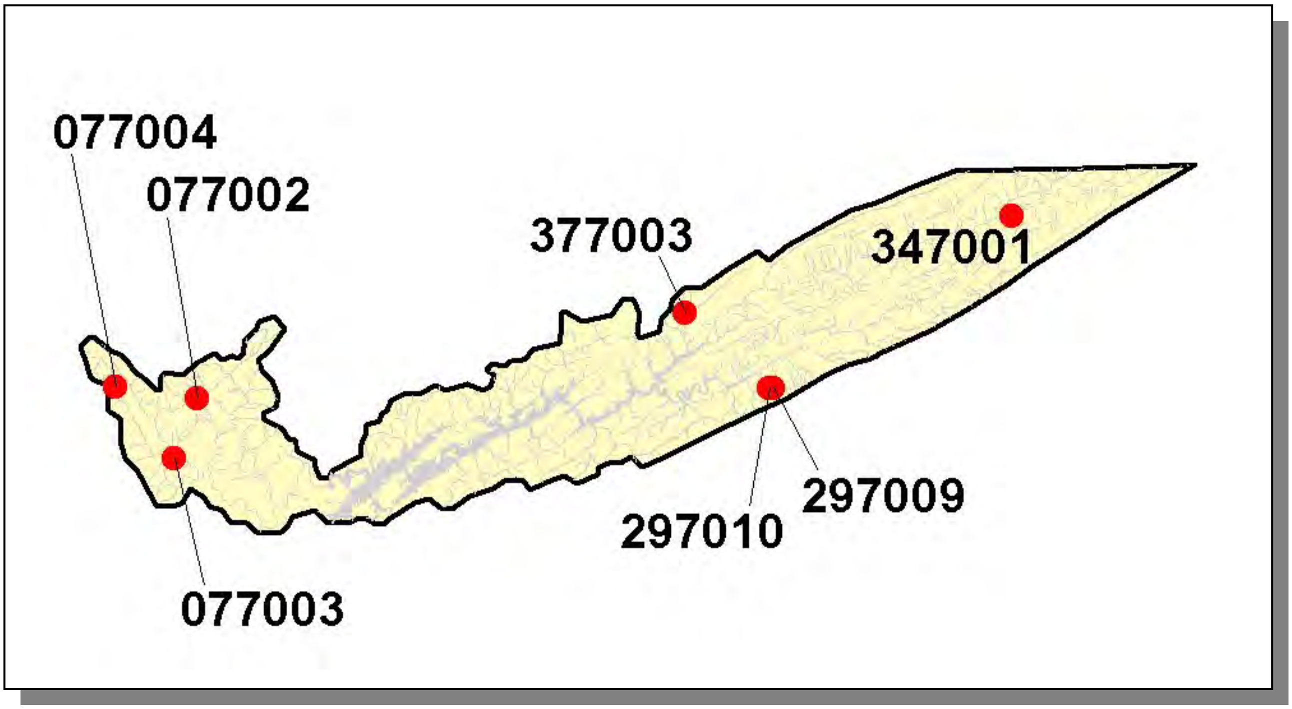


Figure 2-5. Location of Inventoried Dams in the Tennessee Portion of the Upper Clinch River Watershed. *More information, including identification of inventoried dams labeled, is provided in Appendix II and at http://gwidc.memphis.edu/website/dams/viewer.htm.*

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.

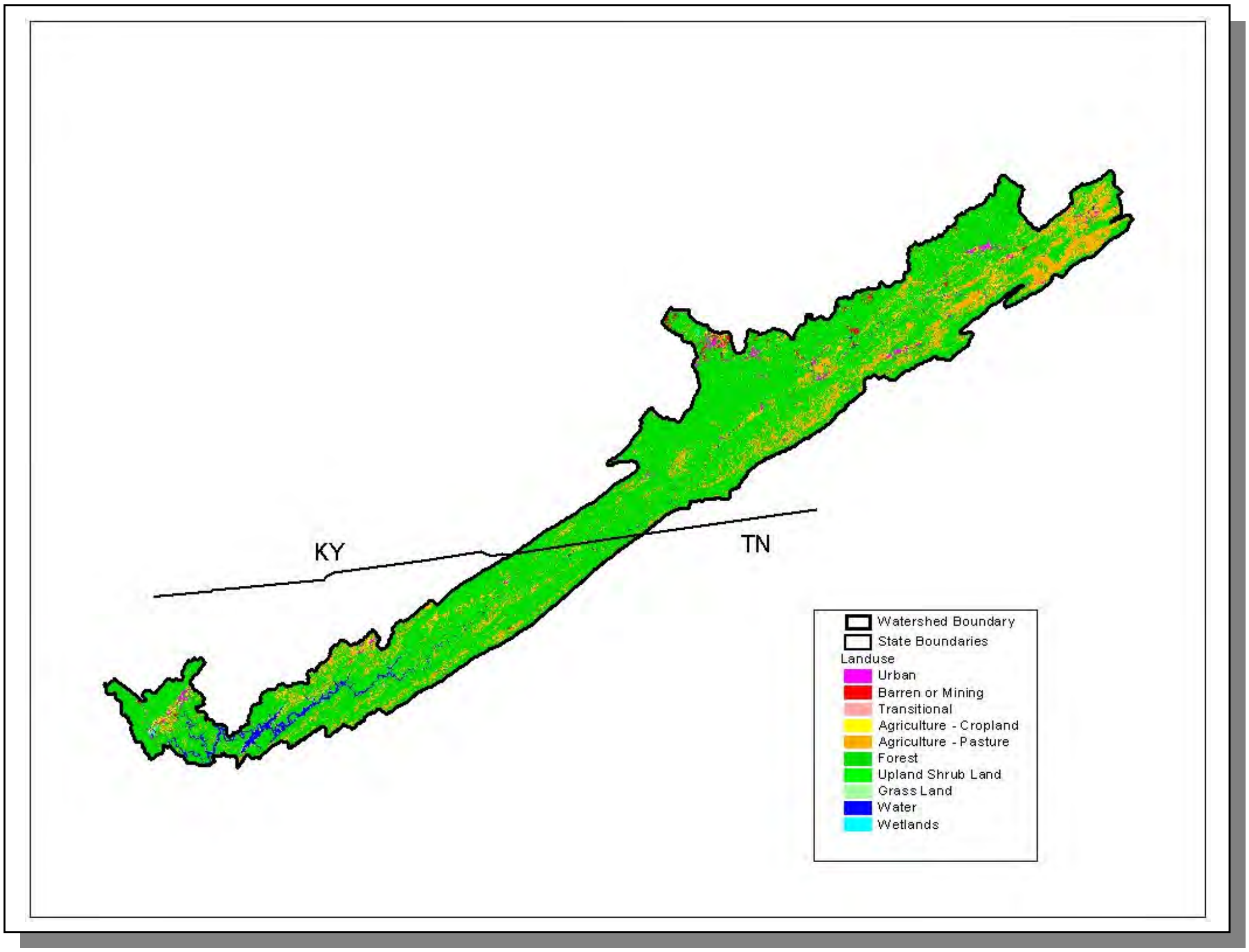


Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

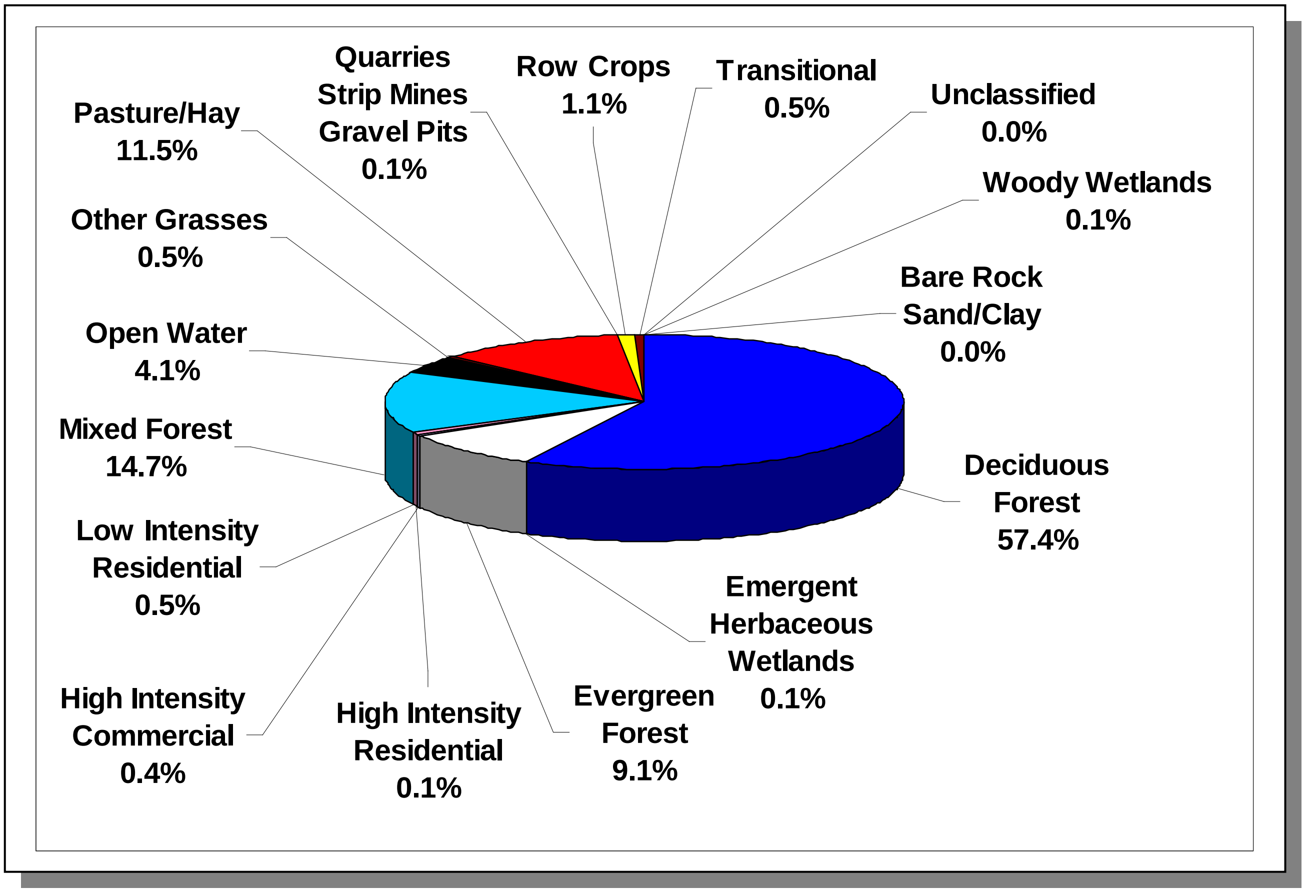


Figure 2-7. Land Use Distribution in the Tennessee Portion of the Upper Clinch River Watershed. *More information is provided in Appendix II.*

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.

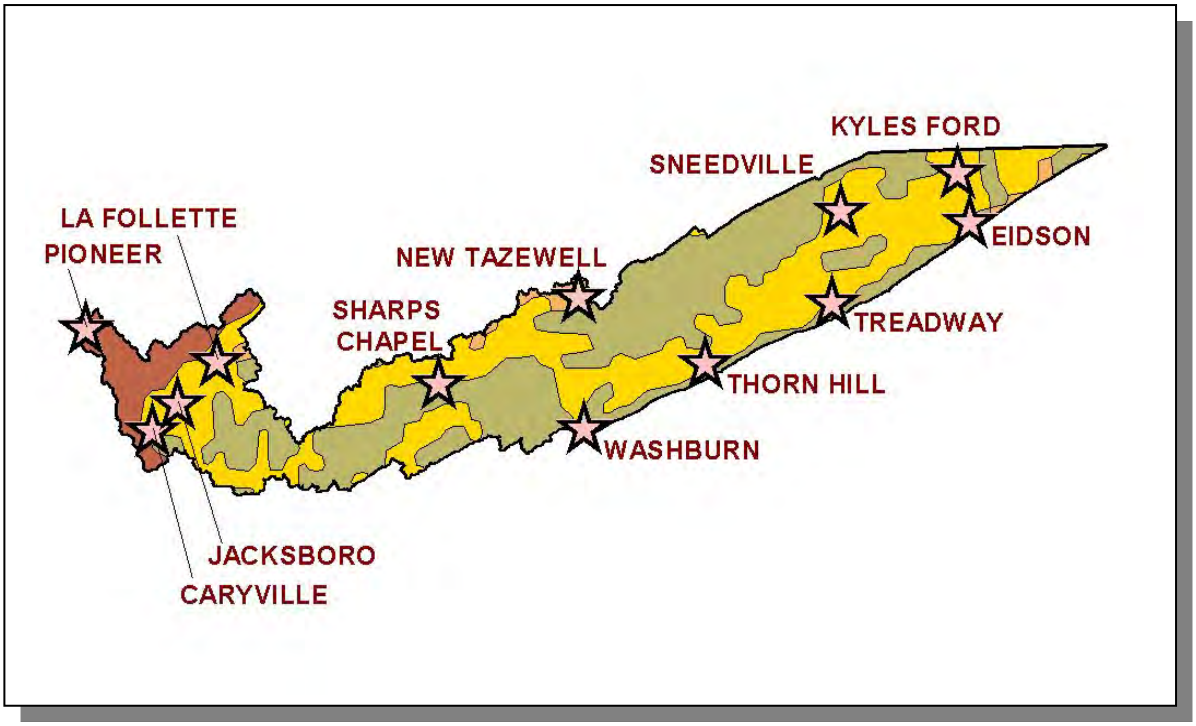


Figure 2-8. Illustration of Karst Areas in the Tennessee Portion of the Upper Clinch River Watershed. *Locations of communities in the watershed are shown for reference.*

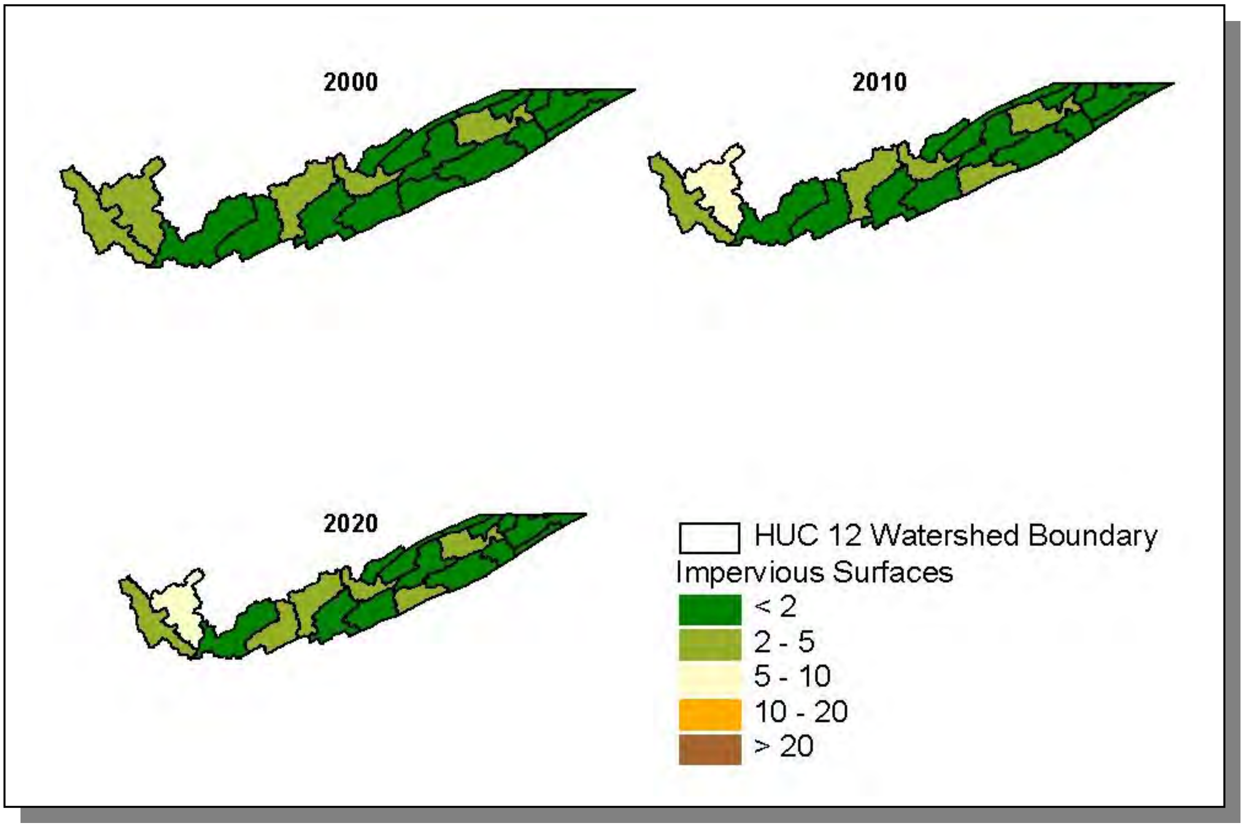


Figure 2-9. Illustration of Total Impervious Area in the Tennessee Portion of the Upper Clinch River Watershed. *All HUC-12 subwatersheds are shown. Current and projected total impervious cover (percent of total area) is provided by EPA Region 4. More information can be found at: http://www.epa.gov/ATHENS/research/impervious/*

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 Tennessee portion of the Upper Clinch River Watershed lies within 2 Level III ecoregions (Ridge and Valley and Central Appalachians) and contains 4 Level IV subecoregions:

- The **Southern Limestone / Dolomite Valleys and Low Rolling Hills (67f)** form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the solids vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests, and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

- The **Southern Sandstone Ridges (67h)** ecoregion encompasses the major sandstone ridges, but these ridges also have areas of shale and siltstone. The steep, forested ridges have narrow crests, and the soils are typically stony, sandy, and of low fertility. The chemistry of streams flowing down the ridges can vary greatly depending on the geologic material. The higher elevation ridges are in the north, including Wallen Ridge, Powell Mountain, Clinch Mountain, and Bays Mountain. White Oak Mountain in the south has some sandstone on the west side, but abundant shale and limestone as well. Grindstone Mountain, capped by the Gizzard Group sandstone, is the only remnant of Pennsylvanian-age strata in the Ridge and Valley of Tennessee.

- The **Southern Dissected Ridges and Knobs (67i)** contain more crenulated, broken, or hummocky ridges, compared to smoother, more sharply pointed sandstone ridges. Although shale is common, there is a mixture and interbedding of geologic materials. The ridges on the east side of Tennessee's Ridge and Valley tend to be associated with the Ordovician-age Sevier shale, Athens shale, and Holston and Lenoir limestones. These can include calcareous shale, limestone, siltstone, sandstone, and conglomerate. In the central and western part of the ecoregion, the shale ridges are associated with the Cambrian-age Rome Formation: shale and siltstone with beds of sandstone. Chestnut oak forests and pine forests are typical for the higher elevations of the ridges, with areas of white oak, mixed mesophytic forest, and tulip poplar on the lower slopes, knobs, and draws.

- The **Cumberland Mountains (69d)**, in contrast to the sandstone-dominated Cumberland Plateau (68a) to the west and southwest, are more highly dissected, with narrow-crested steep slopes, and younger Pennsylvanian-age shales, sandstones, siltstones, and coal. Narrow, winding valleys separate the mountain ridges, and relief is often 2000 feet. Cross Mountain, west of Lake City, reaches 3534 feet in elevation. Soils are generally well-drained, loamy, and acidic, with low fertility. The natural vegetation is a mixed mesophytic forest, although composition and abundance vary greatly depending on aspect, slope position, and degree of shading from adjacent land masses. Large tracts of land are owned by lumber and coal companies, and there are many areas of stripmining.

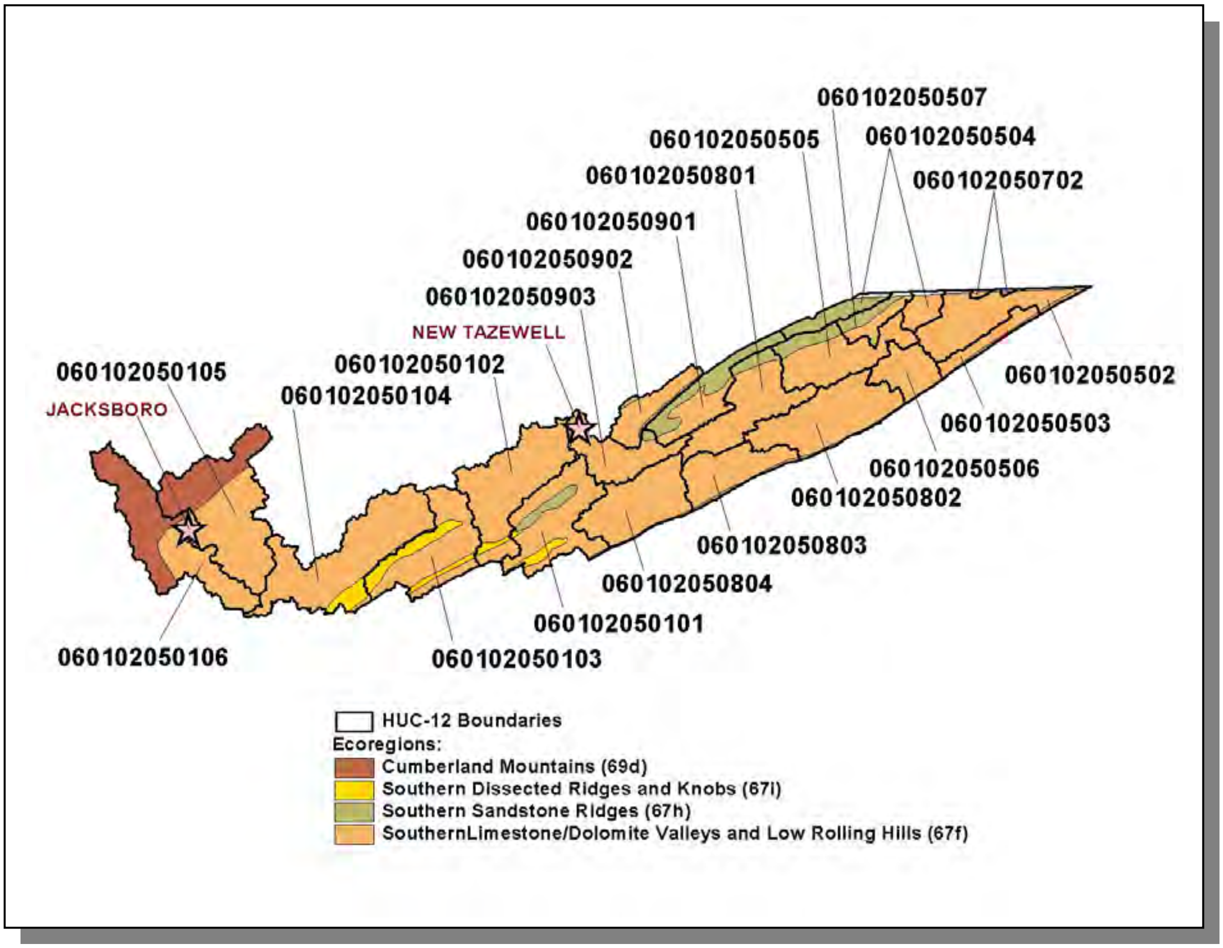


Figure 2-10. Level IV Ecoregions in the Tennessee Portion of the Upper Clinch River Watershed. *HUC-12 subwatershed boundaries and locations of Jacksboro and New Tazewell are shown for reference.*

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.

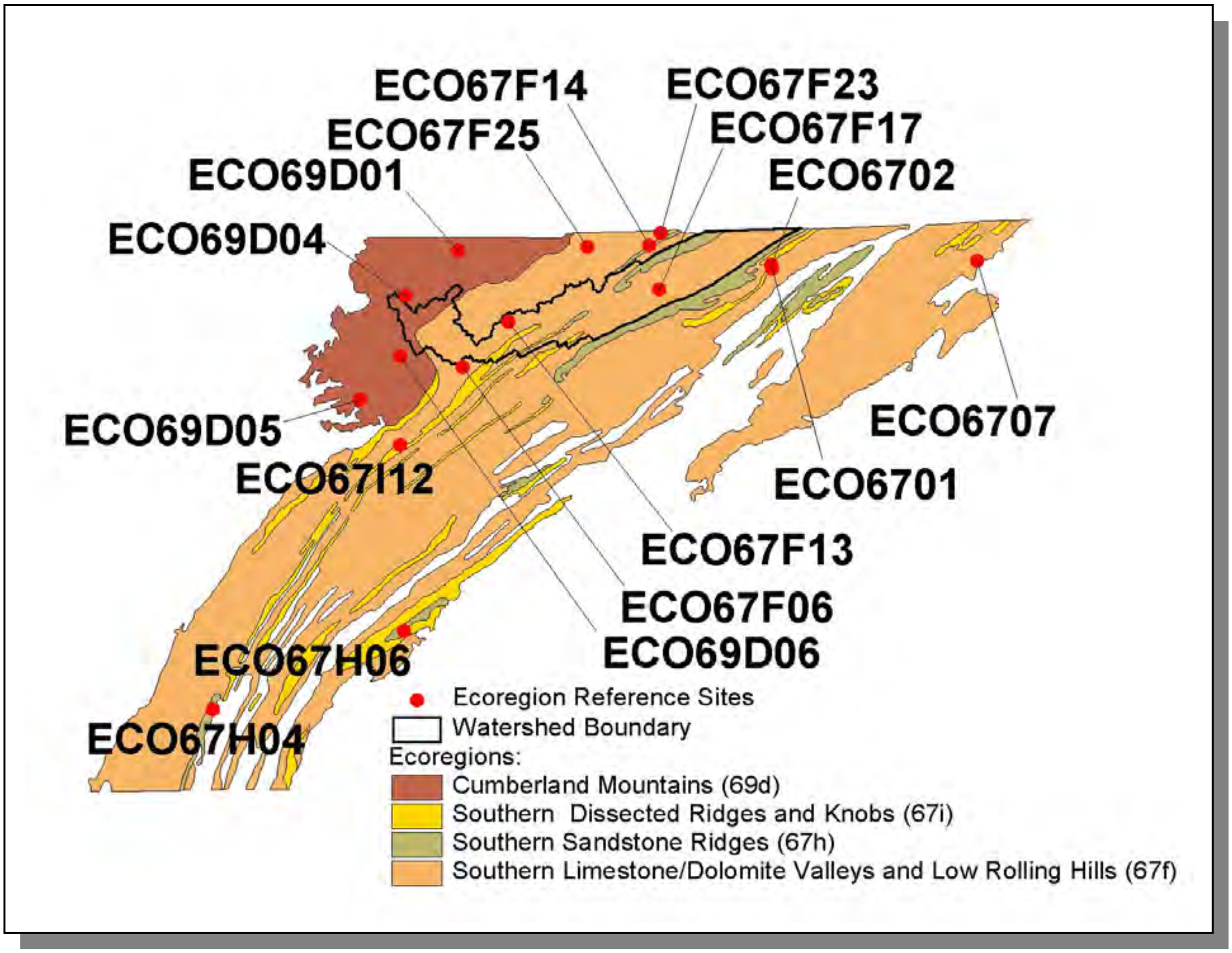


Figure 2-11. Ecoregion Monitoring Sites in Level IV Ecoregions 67f, 67h, 67i, and 69d. *The Tennessee portion of the Upper Clinch River Watershed is shown for reference. More information, including which ecoregion reference sites were inactive or dropped prior to 01/01/2006, is provided in Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. 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
Insects and Spiders	4
Mussels	20
Snails	2
Amphibians	4
Birds	4
Fish	14
Mammals	11
Plants	22
Total	**81**

Table 2-3. There are 81 Known Rare Plant and Animal Species in the Tennessee Portion of the Upper Clinch River Watershed.

In the Tennessee portion of the Upper Clinch River Watershed, there are fourteen known rare fish species, twenty known rare mussel species, and two known rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERA L STATUS	STATE STATUS
Acipenser fulvescens	Lake sturgeon		E
Carpiodes velifer	Highfin carpsucker		D
Cycleptus elongates	Blue sucker		T
Cyprinella monacha	Spotfin chub	LT	T
Erimystax cahni	Slender chub	LT	T
Eteostoma cinereum	Ashy darter		T
Etheostoma denocourti	Golden darter		
Etheostoma Tippecanoe	Tippecanoe darter		D
Notropus albizonatus	Palezone shiner	LE	E
Noturus flavipinnis	Yellowfin madtom		E
Noturus stanauli	Pygmy madtom	LE	E
Percina aurantiaca	Tangerine darter		D
Percina burtoni	Blotchside darter		D
Phoxinus tennesseensis	Tennessee dace		D
Conradilla caelata	Birdwing pearlymussel	LE	E
Cumberlandia monodonta	Spectaclecase		
Cyprogenia irrorata	Eastern fanshell pearlymussel	LE	E
Dromus dromas	Dromedary pearlymussel	LE	E
Epioblasma brevidens	Cumberlandian combshell	LE	E
Epioblasma capsaeformis	Oyster mussel	LE	E
Epioblasma triquerta	Snuffbox		
Fusconaia cuneolus	Fine-rayed pigtoe	LE	E
Fusconaia edgariana	Shiny pigtoe	LE	E
Hemistena lata	Cracking pearlymussel	LE	E
Lampsilis abrupta	Pink mucket	LE	E
Lexingtonia dolabelloides	Slabside pearlymussel	C	
Obovaria subrotunda	Round hickorynut		
Plethobasus cyphyus	Sheepnose		
Pleurobema oviforme	Tennessee clubshell		
Pleurobema plenum	Rough pigtoe	LE	E
Pleurobema rubrum	Pyramid pigtoe		
Ptychobranchus subtentum	Fluted kidneyshell	C	
Quadrula cylindrica strigillata	Rough rabbitsfoot pearlymussel		
Villosa perpurpurea	Purple bean	LE	E
Anthearnia anthonyi	Anthony's riversnail	LE	E
Io fluvialis	Spiny riversnail		

Table 2-4. Rare Aquatic Species in the Upper Clinch River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service; LT, Listed Threatened by the U.S. Fish and Wildlife Service; C, Candidate species for listing by the U.S. Fish and Wildlife Service. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; T, Listed Threatened by the Tennessee Wildlife Resources Agency D; Deemed in Need of Management by the Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/na/.*

2.6.B. 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/

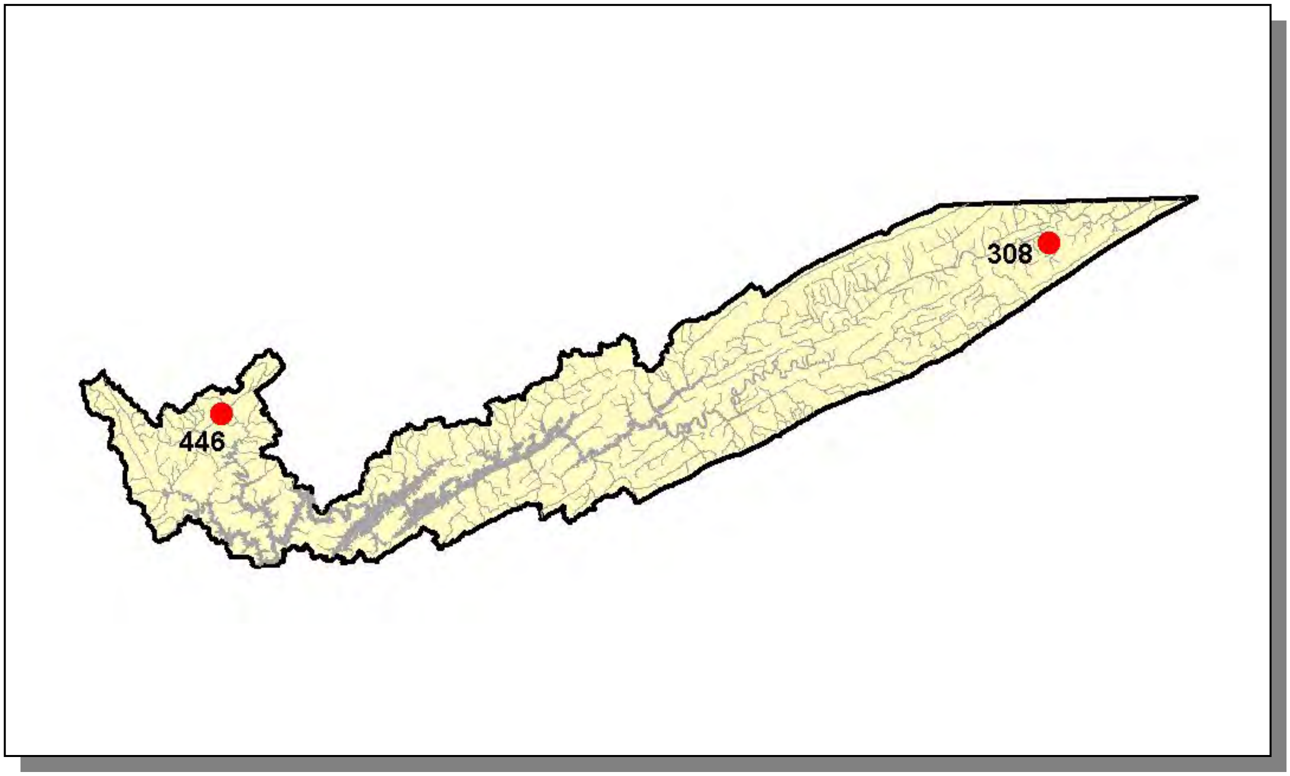


Figure 2-12. Location of Wetland Sites in TDEC Division of Natural Heritage Database in the Tennessee Portion of the Upper Clinch River Watershed. This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands. *There may be additional wetland sites in the watershed. More information, including identification of wetland sites labeled, is provided in Appendix II.*

2.7. CULTURAL RESOURCES.

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

The most recent version of the Nationwide Rivers Inventory lists portions of one stream in the Tennessee portion of the Upper Clinch River Watershed:

> Clinch River (RM 130 to RM 156) has numerous archaeological sites, long shallow shoal areas, and deep pools. The upper reach provides for an excellent pastoral float and has habitat for the most diverse mussel fauna in the world.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE
Clinch River	X	X	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.B. Public Lands. Some sites representative of the cultural heritage are under state or federal protection:

- Andersonville Boat Dock is located on Norris Lake. More information may be found at http://www.andersonvilleboatdock.com/.

- Big Ridge State Park is a 3,687-acre park located in Maynardville. More information about Big Ridge State Park may be found at http://www.state.tn.us/environment/parks/parks/BigRidge/index.php.

- Campbell County Park is located in Jacksboro.

- Chuck Swan Wildlife Management Area is a 26,000-acre property managed by TWRA in the northwest portion of Union county.

- Cove Creek Wildlife Management Area is a 2,450-acre area managed by TWRA in Campbell County.

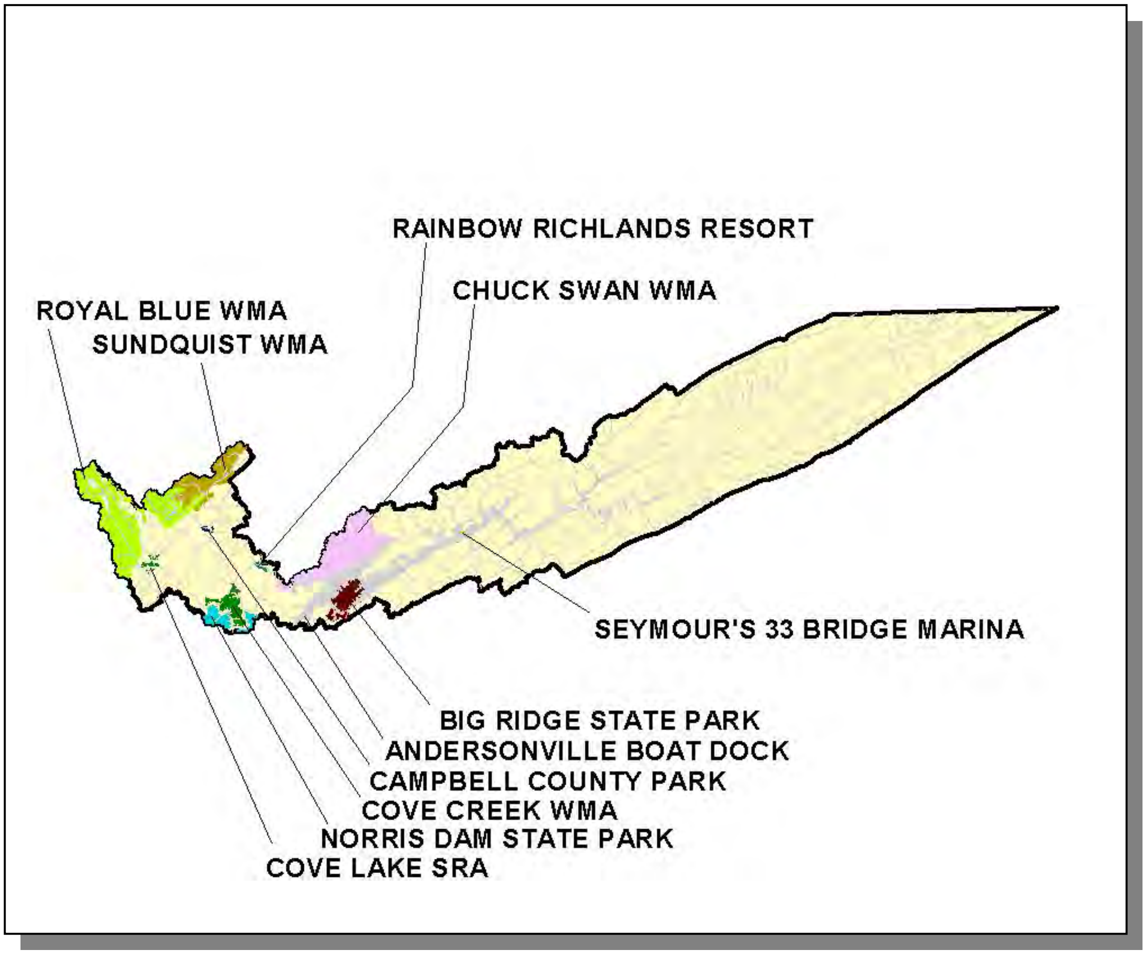
- Cove Lake State Recreation Area is a 673-acre state park located in Campbell County. More information may be found at http://www.state.tn.us/environment/parks/parks/CoveLake.

- Norris Dam State Park is a 4,038-acre state park located in Lake City. More information about the park may be found at http://www.state.tn.us/environment/parks/parks/NorrisDam.

- Rainbow Richlands Resort is a 384-acre resort in Campbell County.

- Royal Blue Wildlife Management is a 50,000-acre area managed by TWRA in Campbell and Scott Counties.

- Sundquist Wildlife Management Area is a 73,000-acre area managed by TWRA in Anderson, Campbell, and Scott Counties.



igure 2-12. Public Lands in the Tennessee Portion of the Upper Clinch River Watershed. *Data are from Tennessee Wildlife Resources Agency. SRA, State Recreation Area; 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
Ball Creek	1		1	North Fork Clinch River	2		2
Big barren Creek	4			Ollis Creek			
Big Creek	3			Puncheon Camp Creek	3		1
Big War Creek			2	Richardson Creek	3		1
Blackwater creek	2			Sweet Creek	2		
Clinch River	1	2	2	Sycamore Creek	2		
Cove Creek	4			War Creek	3		
Indian Creek	3			Williams creek	3		

Table 2-6. Tennessee Rivers Assessment Project Stream Scoring in the Upper Clinch River Watershed.

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

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

CHAPTER 3

WATER QUALITY ASSESSMENT OF THE UPPER CLINCH RIVER WATERSHED

3.1 Background

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

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

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

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

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

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

Tennessee uses the 305(b) Report to meet four goals (from 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 Tennessee portion of the Upper Clinch River 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.

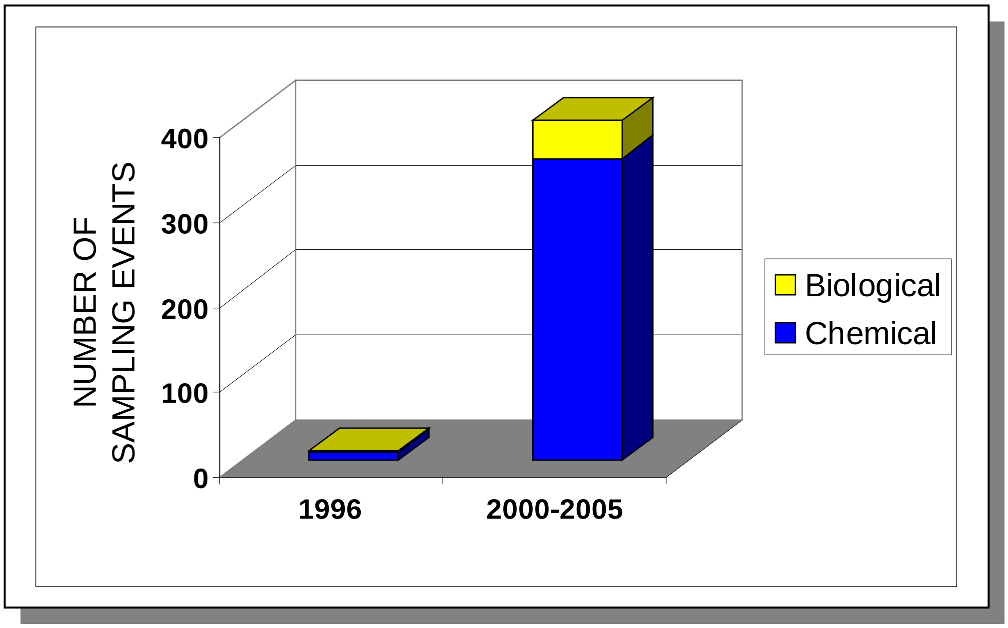


Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (July 1, 2000 through June 30, 2005) in the Tennessee Portion of the Upper Clinch River Watershed.

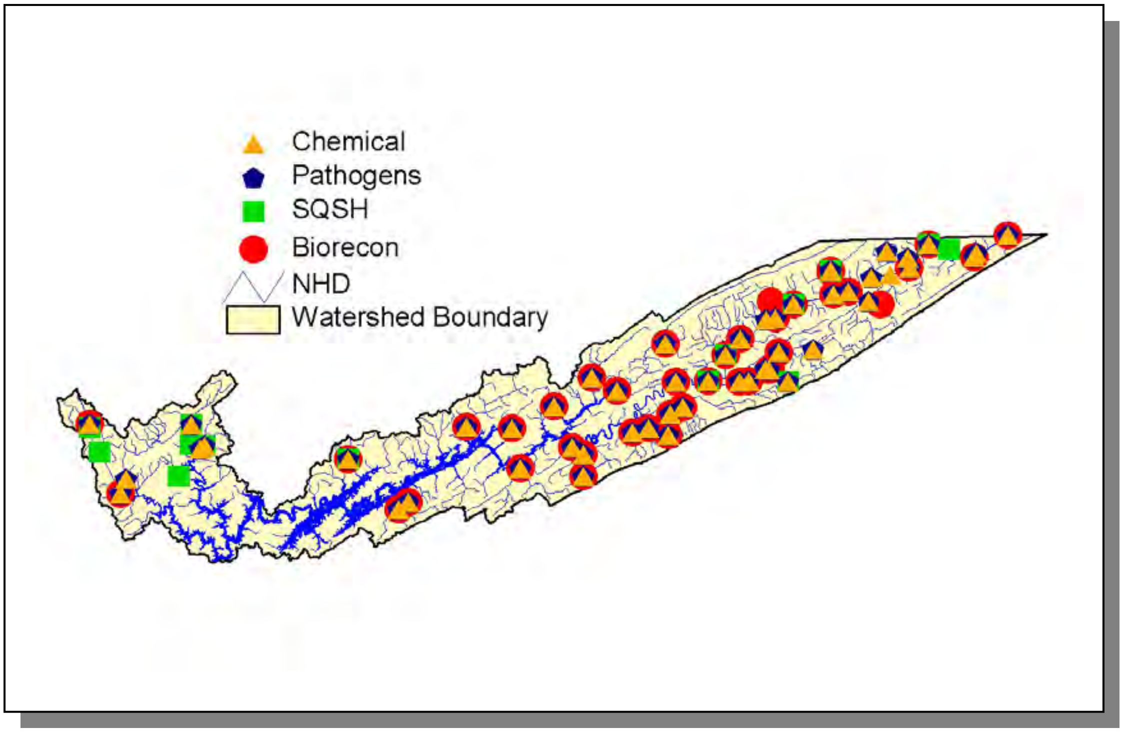


Figure 3-2. Location of Monitoring Sites in the Tennessee Portion of the Upper Clinch River Watershed (July 1, 2000 through June 30, 2005). *Pathogens include E. coli and fecal coliform; NHD, National Hydrography Dataset of Streams; SQSH, Semi-Quantitative Single Habitat Assessment.*

	1996	**2000-2005**
Biological	2	67
Chemical	9	349
Total	**11**	**416**

Table 3-1. Number of Sampling Events in the Tennessee Portion of the Upper Clinch River 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-Knoxville staff (this is in addition to samples collected by water and wastewater treatment plant operators). Samples are analyzed by the Tennessee Department of Health, Division of Environmental Laboratory Services. Ambient monitoring data are used to assess water quality in major bodies of water where there are NPDES facilities and to identify trends in water quality. Water quality parameters traditionally measured at ambient sites in the Tennessee portion of the Upper Clinch River Watershed are provided in Appendix IV.

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

3.2.B. Ecoregion Sites. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plants and animals. The delineation phase of the Tennessee Ecoregion Project was completed in 1997 when the ecoregions and subecoregions were mapped and summarized (EPA/600/R-97/022). There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee (see Chapter 2 for more details). The Tennessee portion of the Upper Clinch River Watershed lies within 2 Level III ecoregions (Ridge and Valley and Central Appalachians) and contains 4 subecoregions (Level IV):

- Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)
- Southern Sandstone Ridges (67h)
- Southern Dissected Ridges and Knobs (67i)
- Cumberland Mountains (69d)

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

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

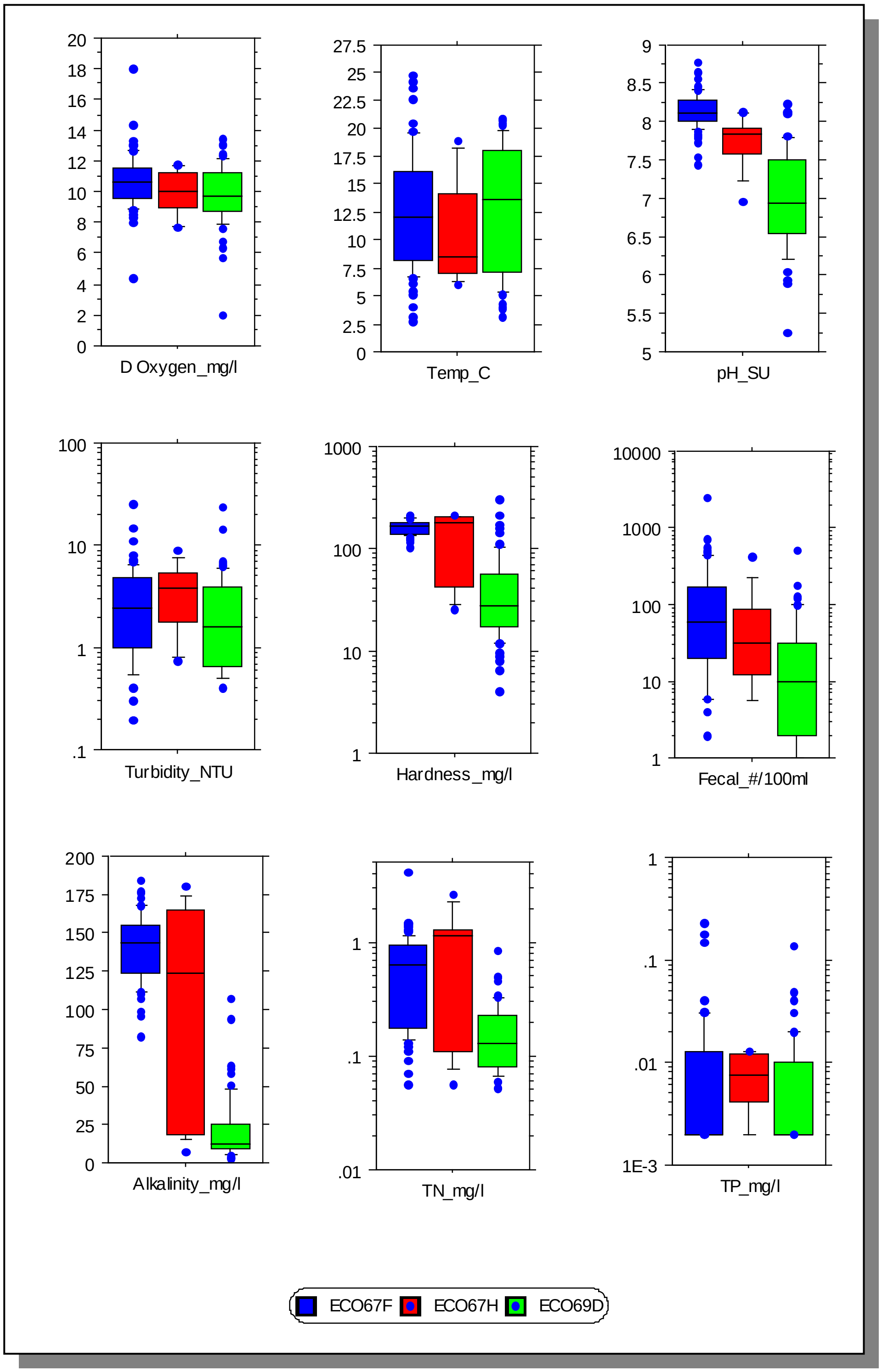


Figure 3-3. Select Chemical Data Collected in the Tennessee Portion of Upper Clinch River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th*

percentiles. Extreme values are also shown as dots. Fecal, fecal coliform bacteria; TN, Total Nitrogen; TP, Total Phosphorus.

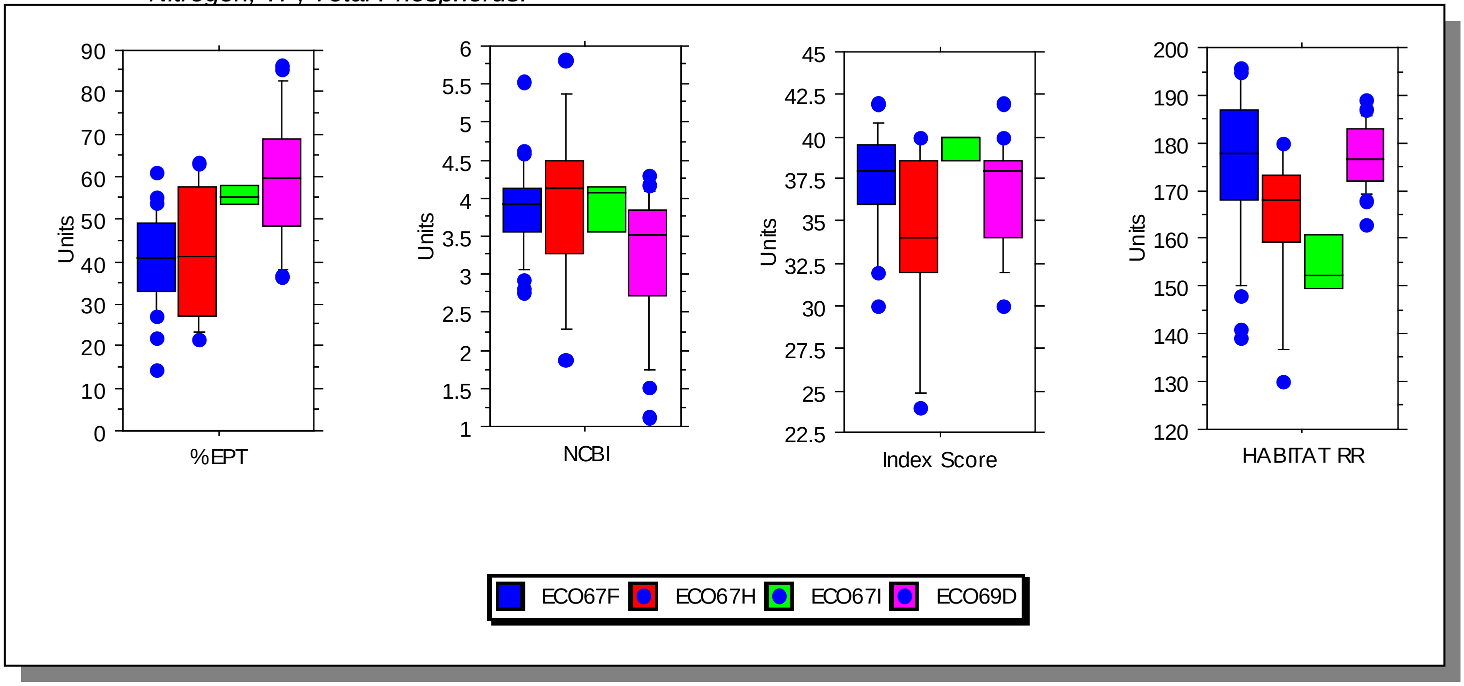


Figure 3-4. Benthic Macroinvertebrate and Habitat Scores for the Tennessee Portion of Upper Clinch River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. NCBI, North Carolina Biotic Index. Index Score and Habitat Riffle/Run scoring system are described in TDEC's Quality System Standard Operating Procedure for Macroinvertebrate 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. Overall use support is a general description of water quality conditions in a water body based on determination of individual use supports. Use support determinations, which can be classified as monitored or evaluated, are based on:

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

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

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

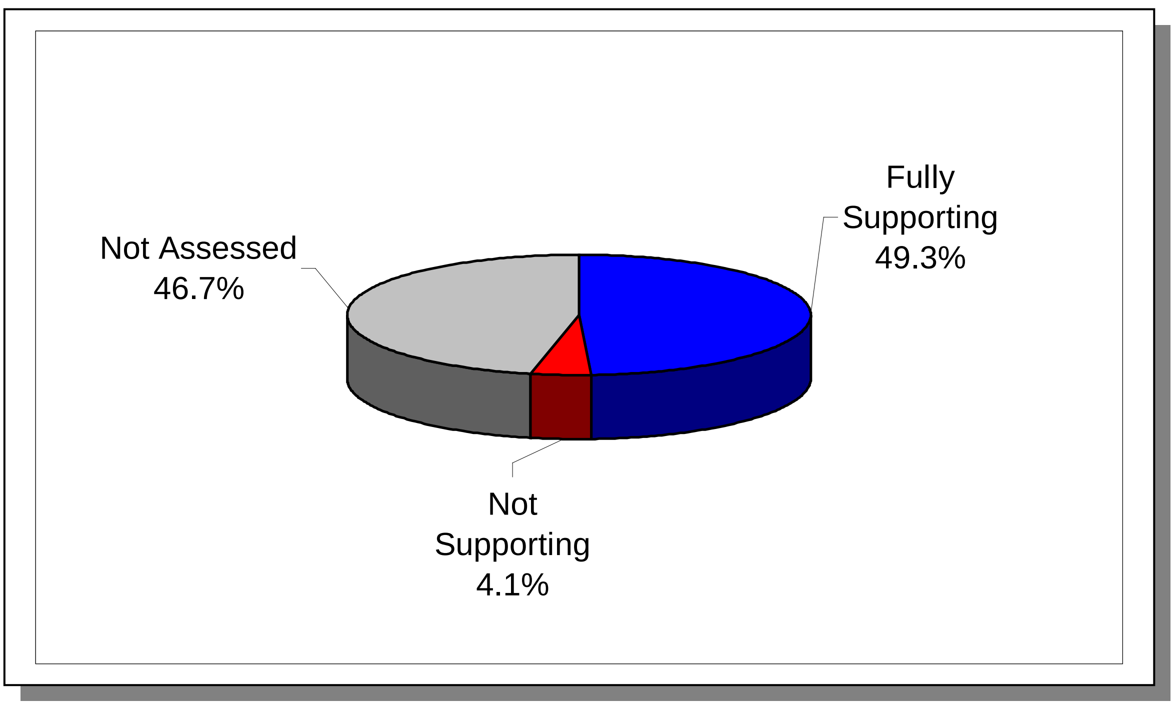


Figure 3-5. Water Quality Assessment of Streams in the Tennessee Portion of the Upper Clinch River Watershed. *Assessment data are based on the 2004 Water Quality Assessment of 757.1 stream miles in the watershed. More information is provided in Appendix III.*

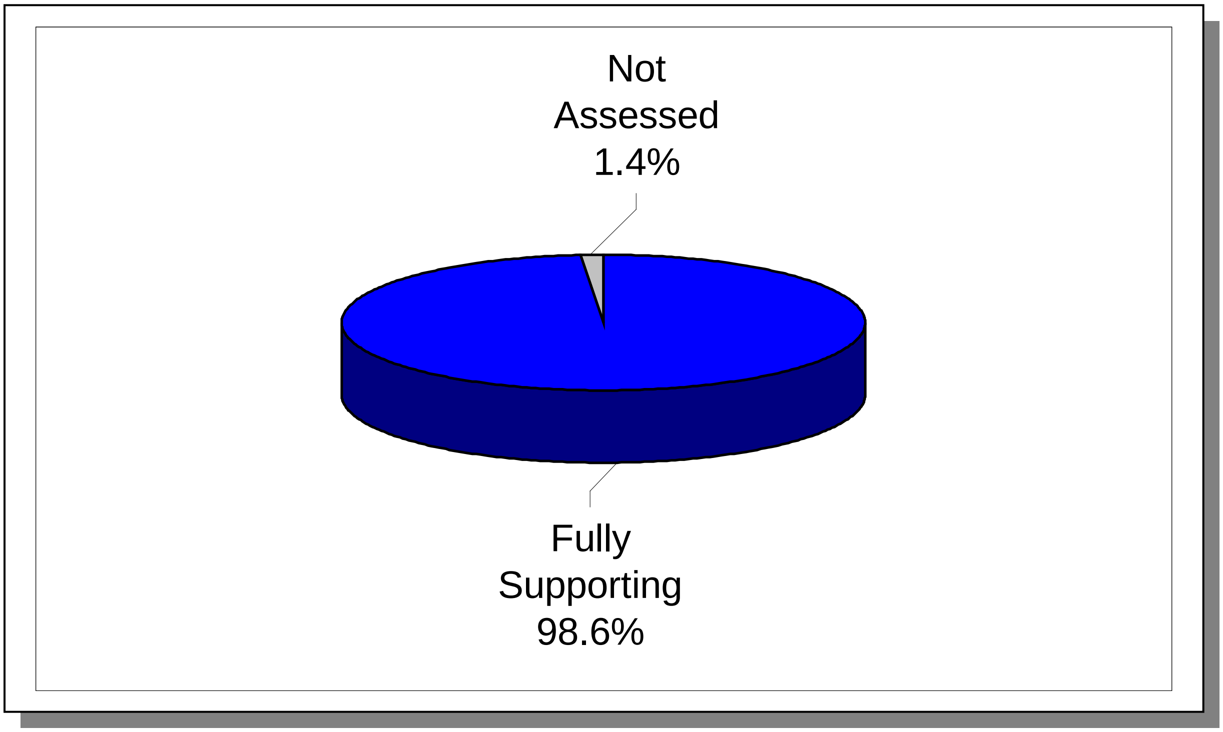


Figure 3-6. Water Quality Assessment of Lakes in the Tennessee Portion of the Upper Clinch River Watershed. *Assessment data are based on the 2004 Water Quality Assessment of 34,681 lake acres in the watershed. More information is provided in Appendix III.*

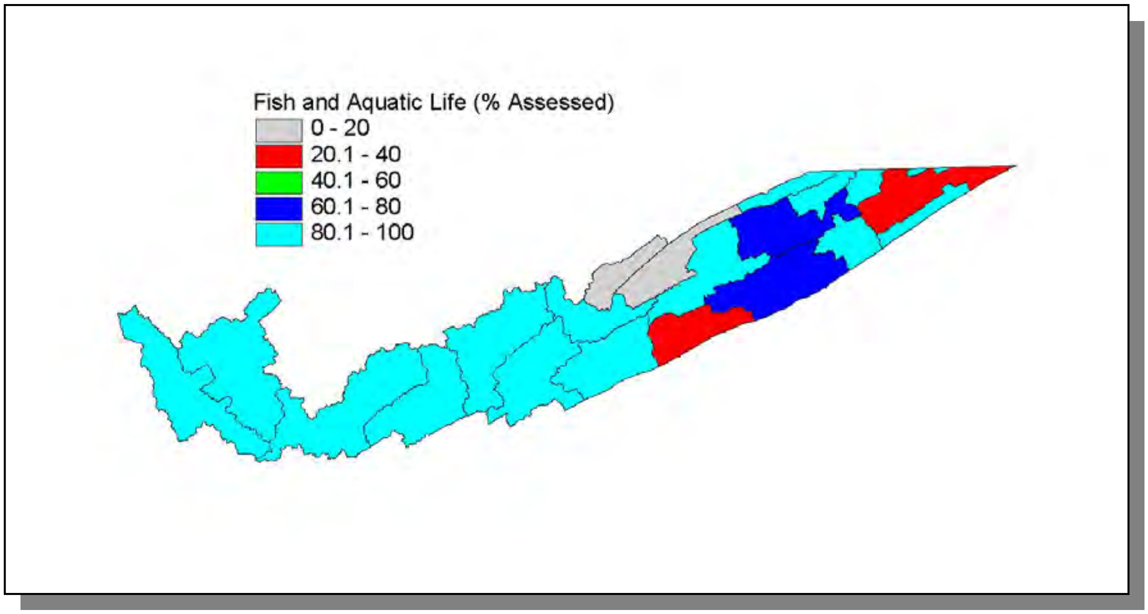


Figure 3-7. Percentage of Stream Miles Assessed for Support of Fish and Aquatic Life Designated Use in HUC-12 Subwatersheds.

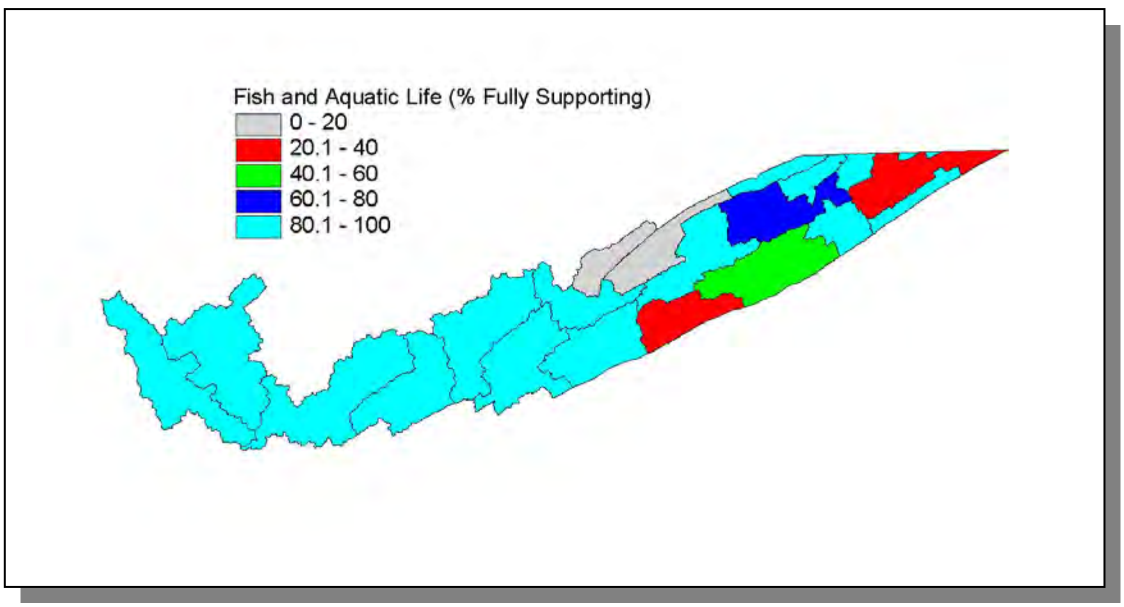


Figure 3-8. Percentage of Stream Miles Fully Supporting for Fish and Aquatic Life Designated Use in HUC-12 Subwatersheds.

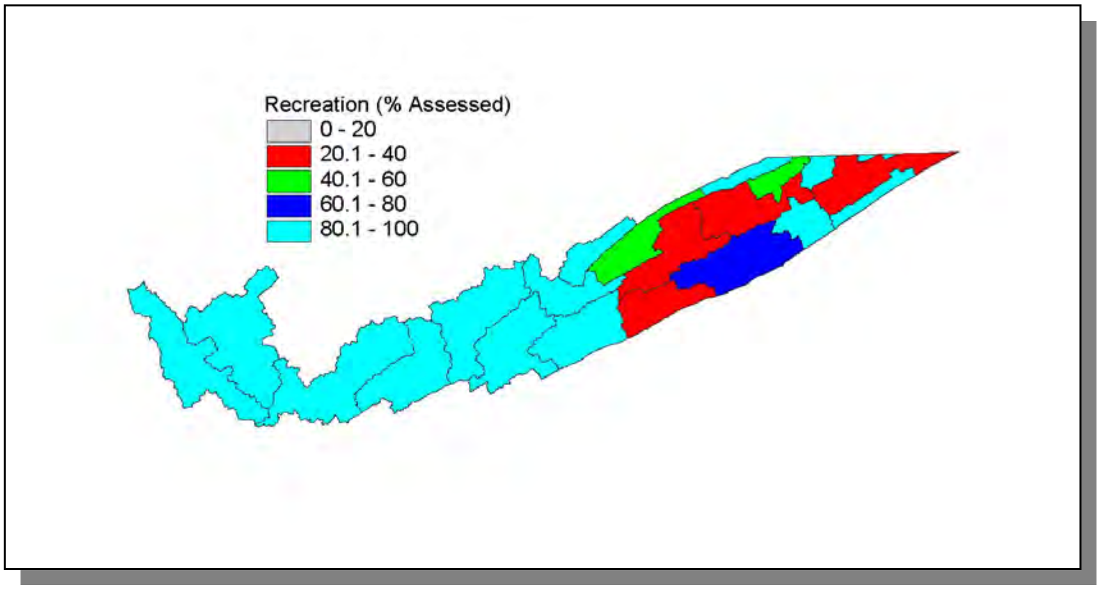


Figure 3-9. Percentage of Stream Miles Assessed for Support of Recreation Designated Use in HUC-12 Subwatersheds.

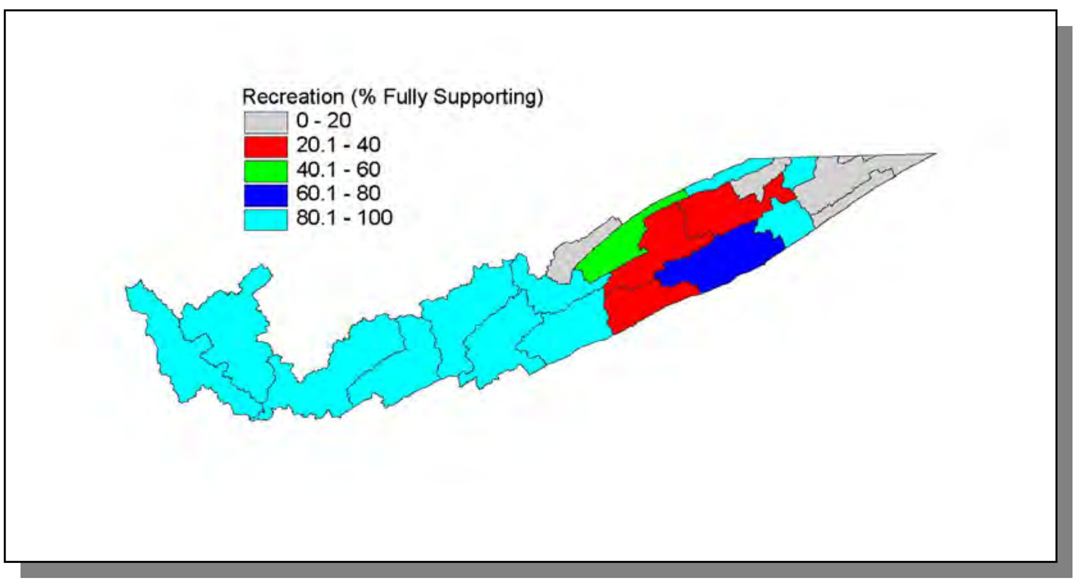


Figure 3-10. Percentage of Stream Miles Fully Supporting for Recreation Designated Use in HUC-12 Subwatersheds.

3.3.A. Assessment Summary.

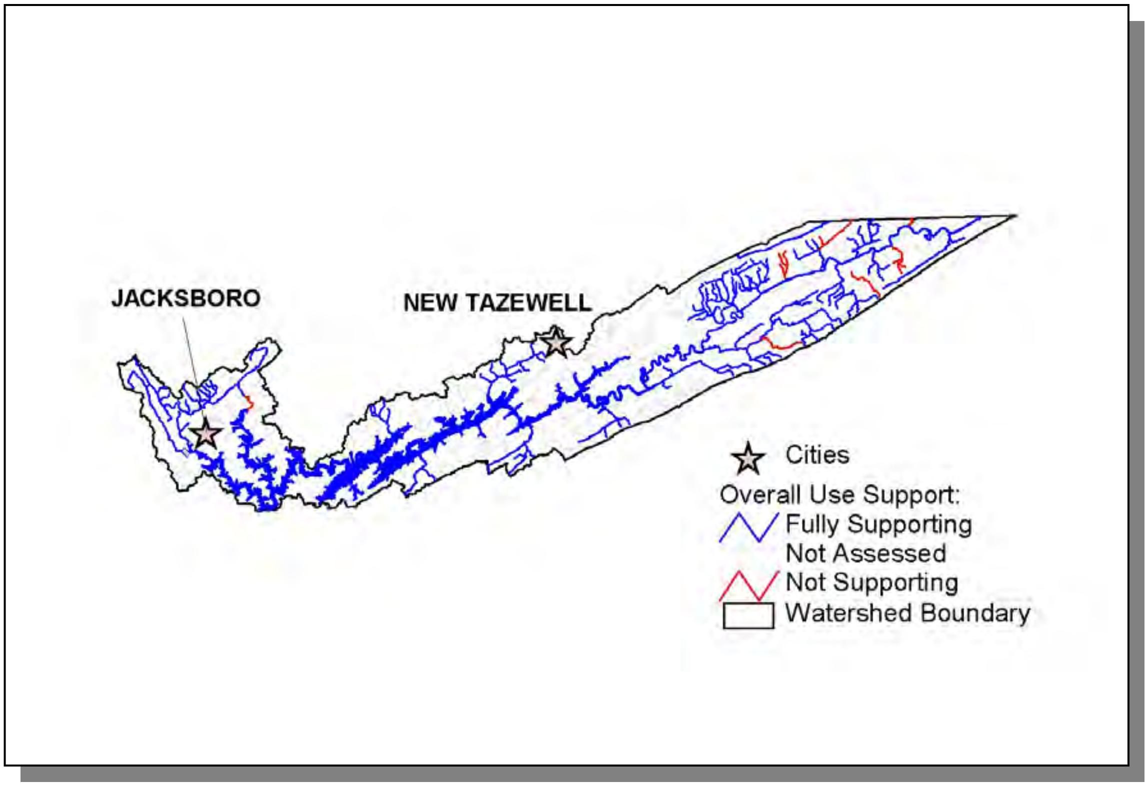


Figure 3-11. Overall Use Support Attainment in the Tennessee Portion of the Upper Clinch River Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Jacksboro and New Tazewell are shown for reference. More information is provided in Appendix III.*

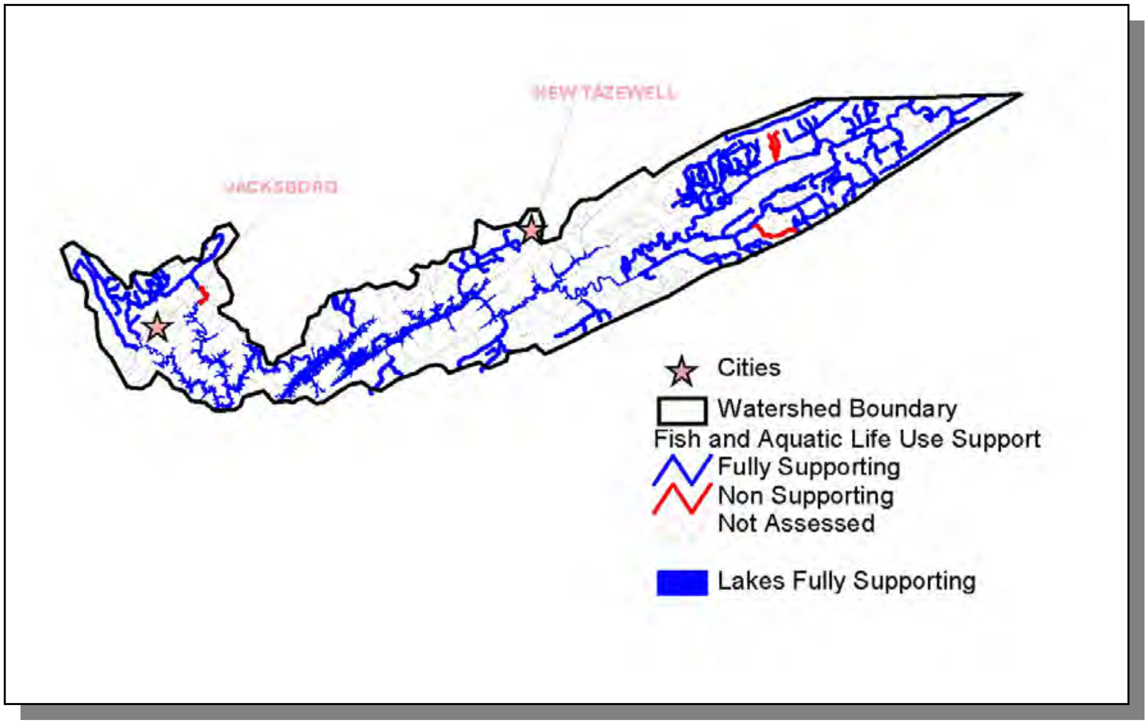


Figure 3-12. Fish and Aquatic Life Use Support Attainment in the Tennessee Portion of the Upper Clinch River Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Jacksboro and New Tazewell are shown for reference. More information is provided in Appendix III.*

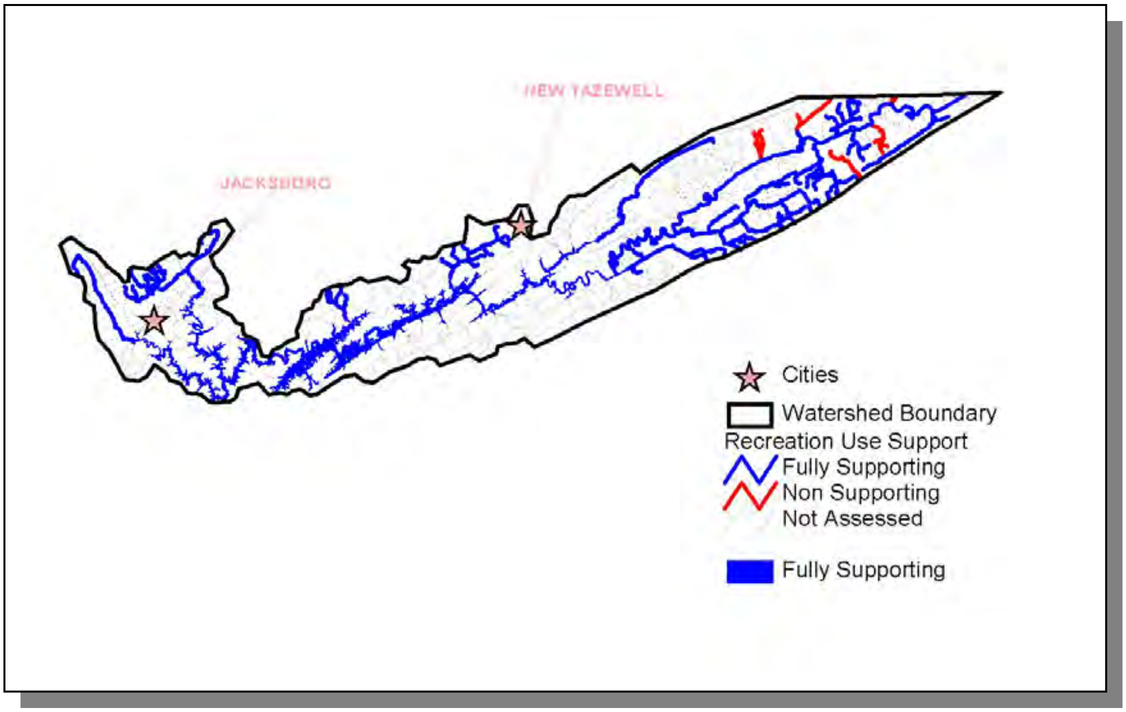


Figure 3-13. Recreation Use Support Attainment in the Tennessee Portion of the Upper Clinch River Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Jacksboro and New Tazewell are shown for reference. More information is provided in Appendix III.*

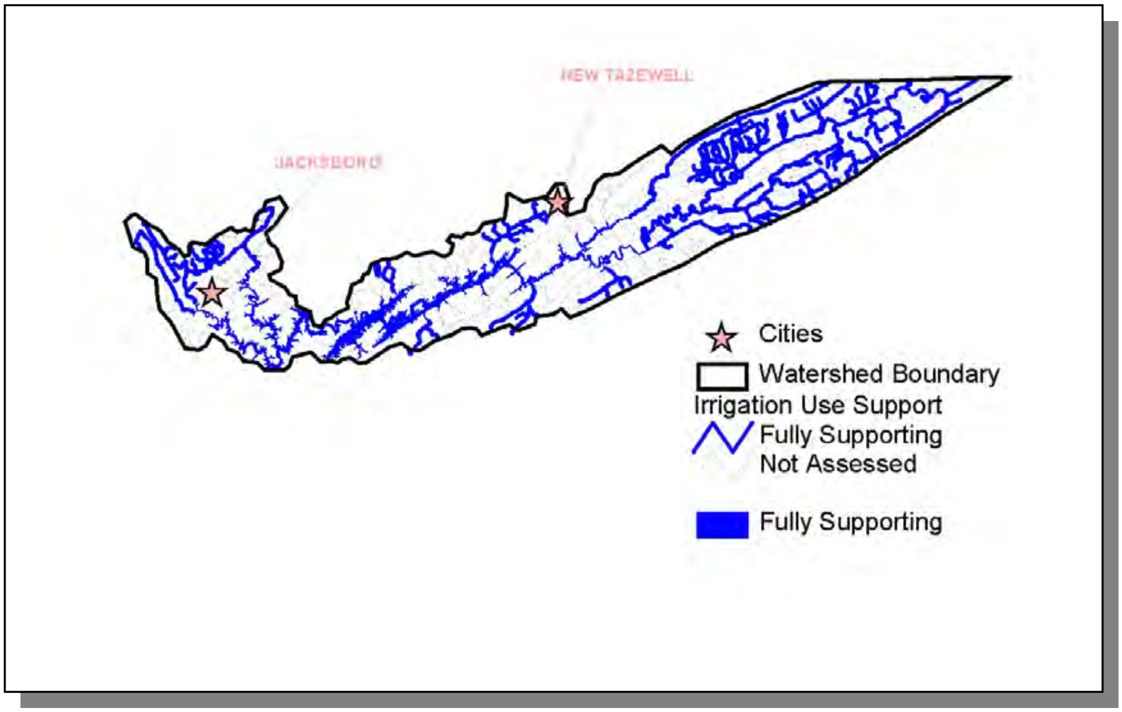


Figure 3-14. Irrigation Use Support Attainment in the Tennessee Portion of the Upper Clinch River Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Jacksboro and New Tazewell are shown for reference. More information is provided in Appendix III.*

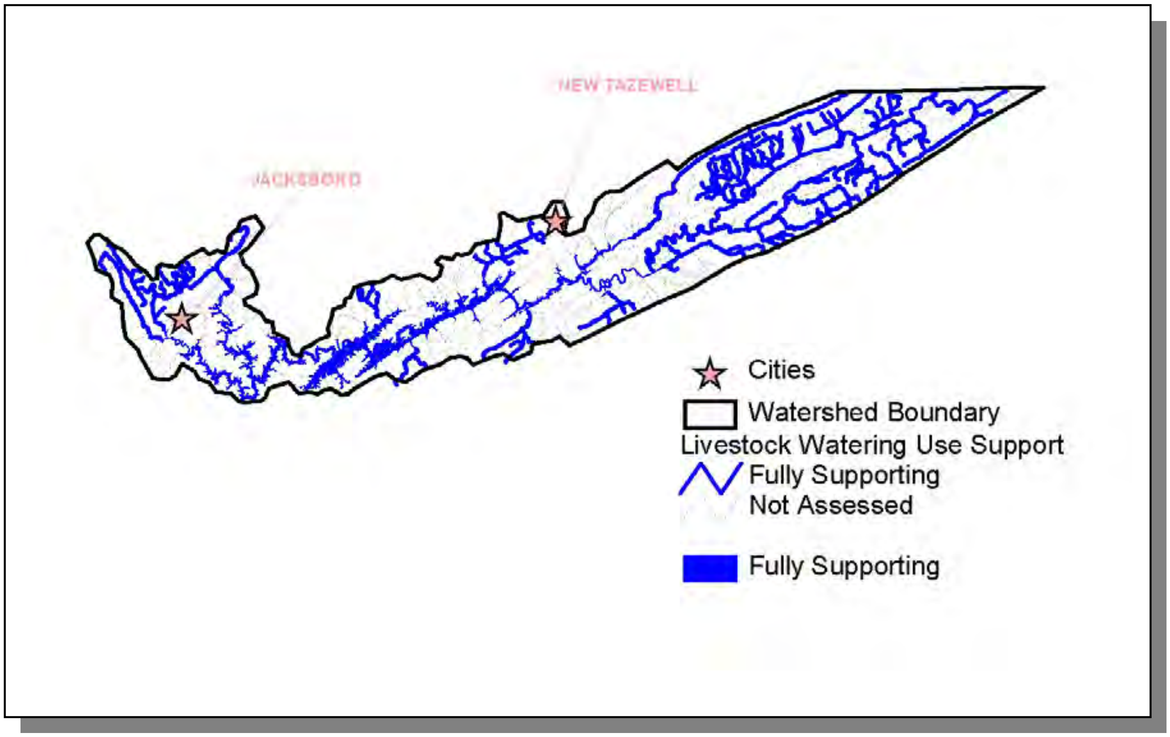


Figure 3-15. Livestock Watering and Wildlife Use Support Attainment in the Tennessee Portion of the Upper Clinch River Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Jacksboro and New Tazewell are shown for reference. More information is provided in Appendix III.*

3.3.B. Use Impairment Summary.

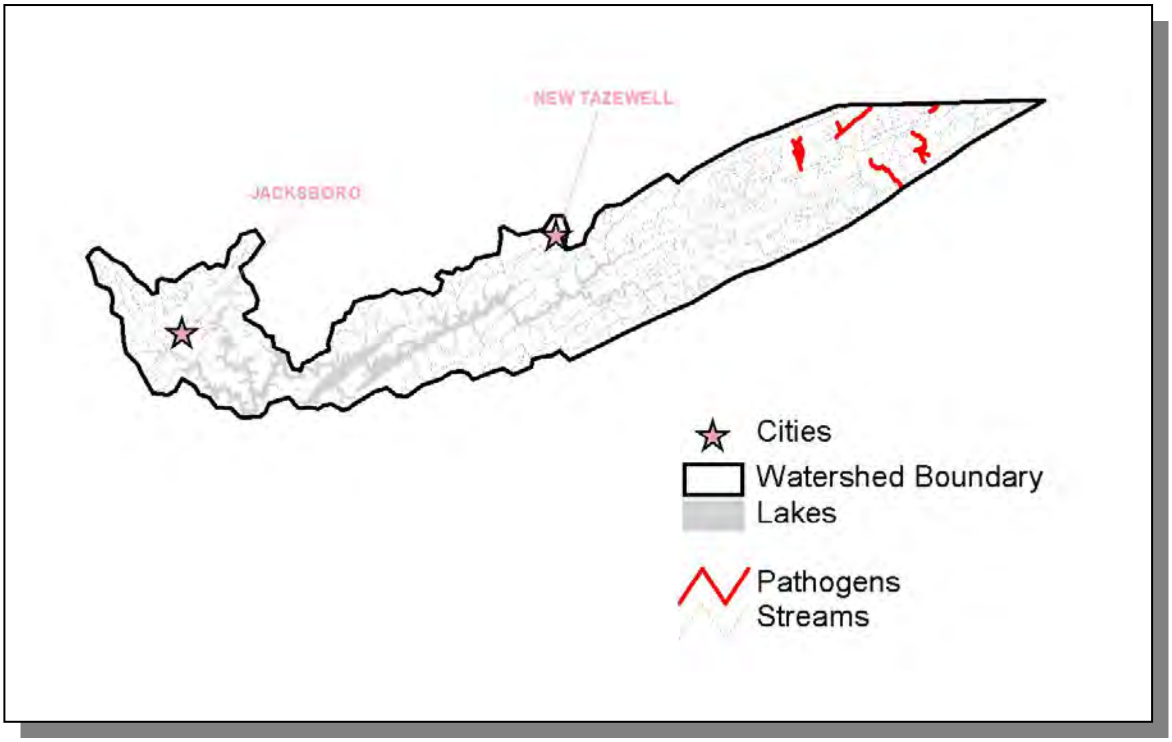


Figure 3-16. Impaired Streams Due to Pathogens in the Clinch River Watershed. *Assessment data are based on the 2004 Water Quality Assessment. Pathogens represent E. Coli and total fecal coliform data. Locations of Jacksboro and New Tazewell are shown for reference. More information is provided in Appendix 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 UPPER CLINCH RIVER WATERSHED

4.1 Background.

4.2. Characterization of HUC-10 Subwatersheds
4.2.A. 0601020501 (Clinch River)
4.2.B. 0601020505 (Clinch River)
4.2.C. 0601020507 (North Fork Clinch River)
4.2.D. 0601020508 (Clinch River)
4.2.E. 0601020509 (Sycamore Creek)

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 Tennessee portion of the Upper Clinch River Watershed (HUC 06010205) has been delineated into five 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.

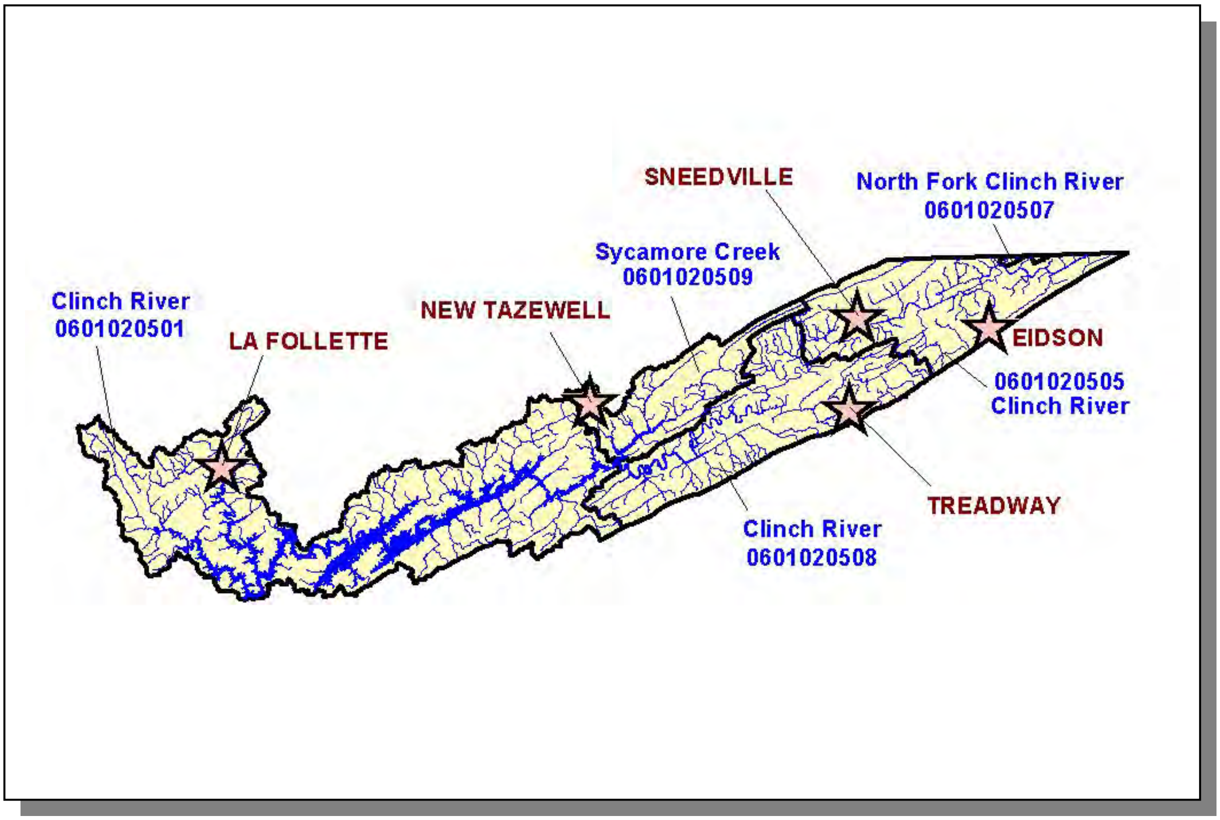


Figure 4-1. The Tennessee Portion of the Upper Clinch River Watershed is Composed of Five USGS-Delineated Subwatersheds (10-Digit Subwatersheds). *Locations of Eidson, La Follette, New Tazewell, Sneedville, and Treadway are shown for reference.*

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

HUC-10	HUC-12
0601020501	060102050101 (Norris Lake)
	060102050102 (Norris Lake)
	060102050103 (Norris Lake)
	060102050104 (Norris Lake)
	060102050105 (Big Creek)
	060102050106 (Cove Creek)
0601020505	060102050502 (Clinch River)
	060102050503 (War Creek)
	060102050504 (Blackwater Creek)
	060102050505 (Clinch River)
	060102050506 (Richardson Creek)
	060102050507 (Panther Creek)
0601020507	060102050702 (North Fork Clinch River)
0601020508	060102050801 (Clinch River)
	060102050802 (Big War Creek)
	060102050803 (Indian Creek)
	060102050804 (Clinch River)
0601020509	060102050901 (Big Sycamore Creek)
	060102050902 (Little Sycamore Creek)
	060102050903 (Sycamore Creek)

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

4.2.A. 0601020501.

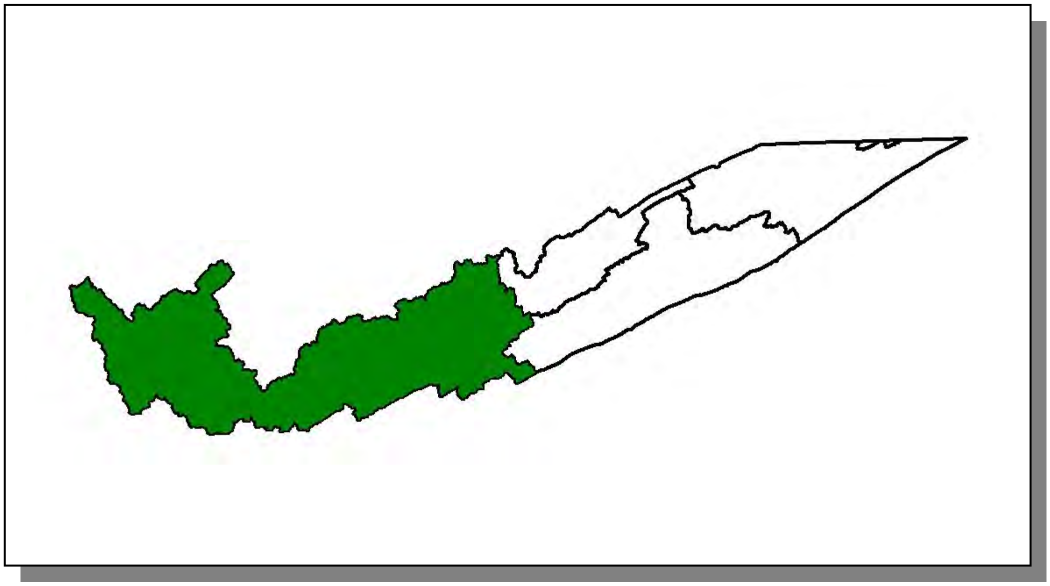


Figure 4-2. Location of Subwatershed 0601020501. *All Upper Clinch River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.A.i. 060102050101 (Norris Lake).

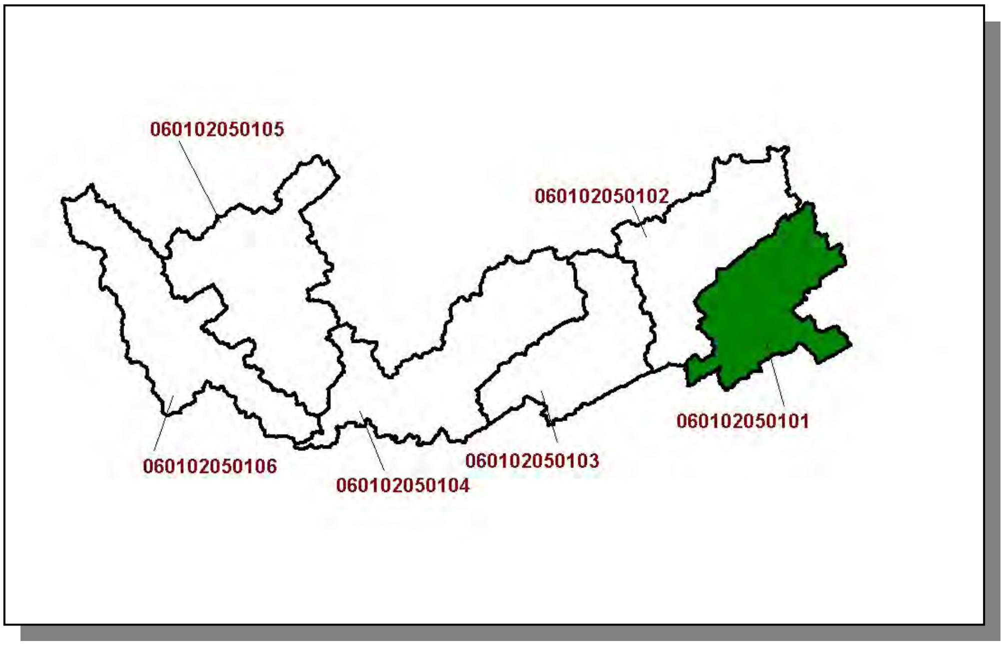


Figure 4-3. Location of Subwatershed 060102050101. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

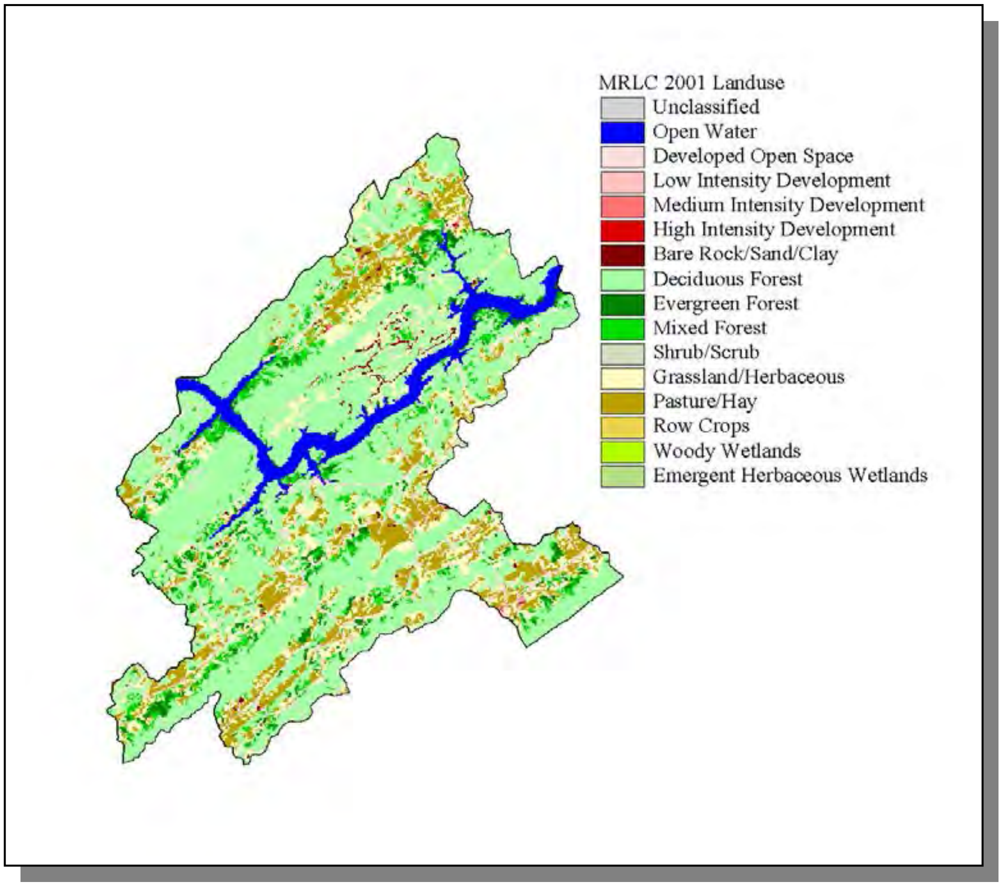


Figure 4-4. Illustration of Land Use Distribution in Subwatershed 060102050101.

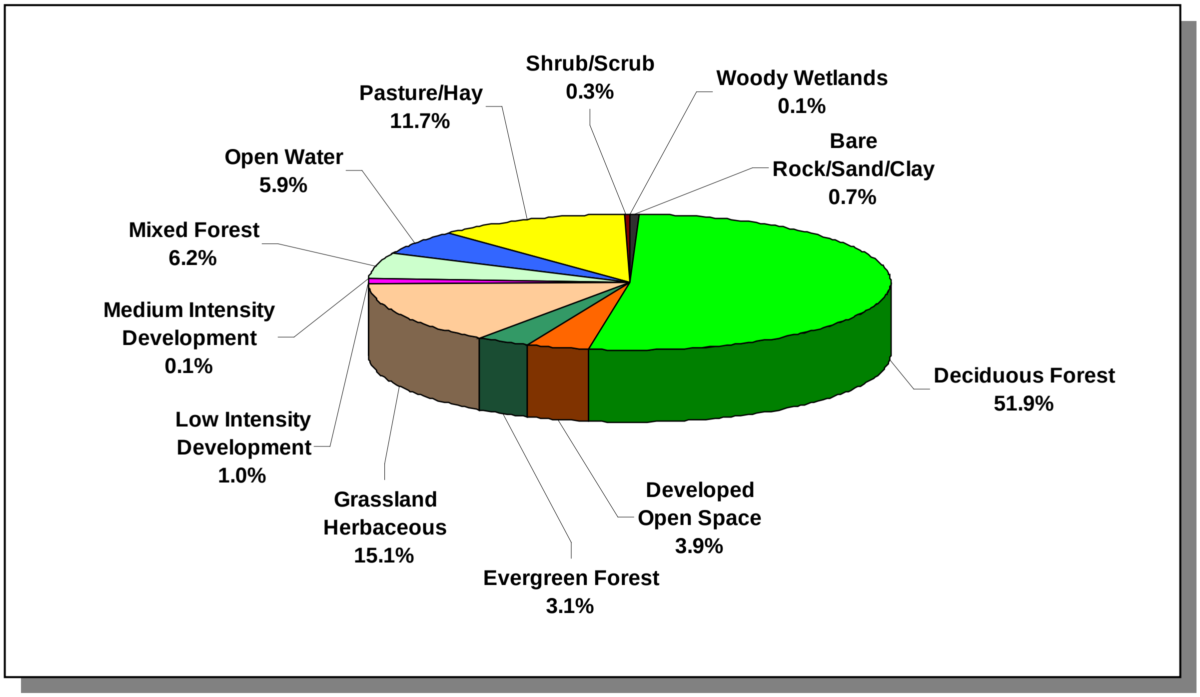


Figure 4-5. Land Use Distribution in Subwatershed 060102050101. *More information is provided in Appendix IV.*

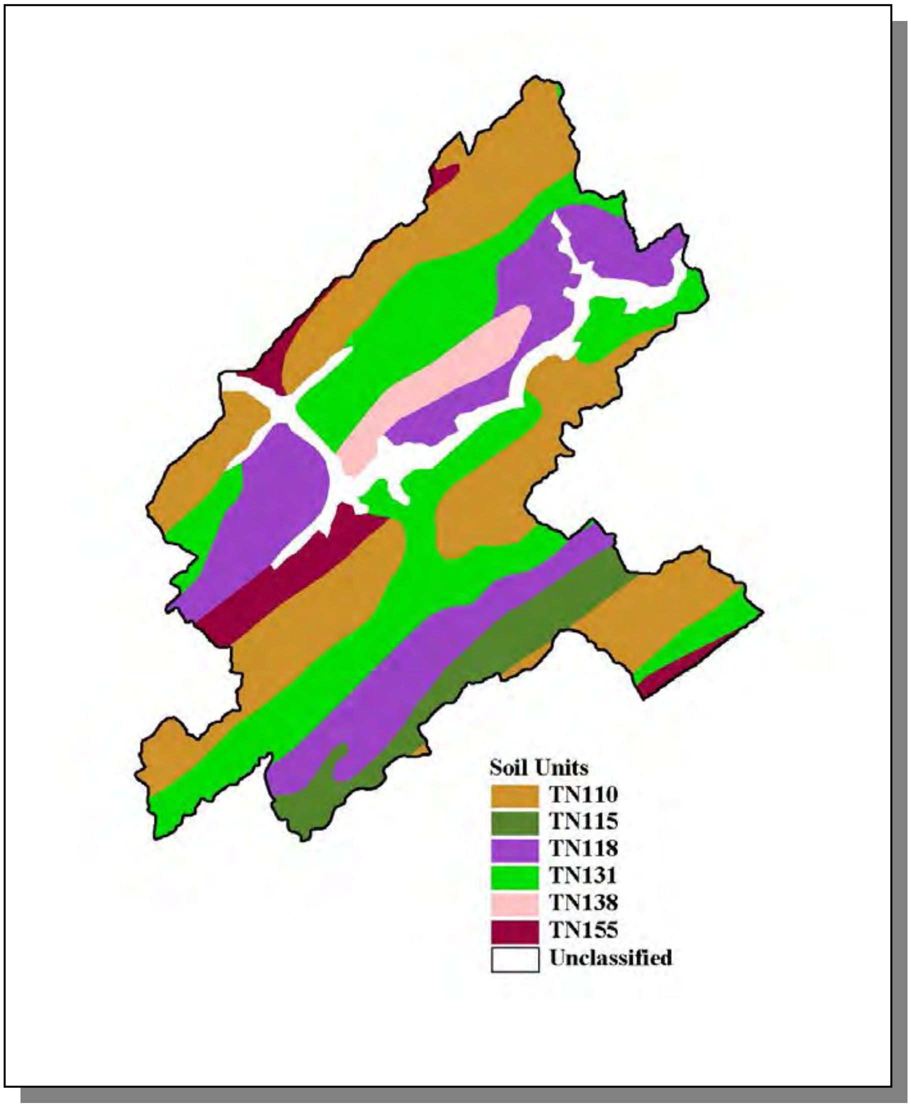


Figure 4-6. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050101.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN115	0.00	C	1.41	5.15	Silty Loam	0.36
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN155	0.00	C	1.71	5.31	Loam	0.32

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050101. *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)
Claiborne	26,137	28,963	29,862	3.77	987	1,093	1,127	14.2
Grainger	17,095	19,456	20,659	7.46	1,275	1,451	1,540	20.8
Union	13,694	15,956	17,808	2.47	338	394	440	30.2
Total	**56,926**	**64,375**	**68,329**		**2,600**	**2,938**	**3,107**	**19.5**

Table 4-3. Population Estimates in Subwatershed 060102050101.

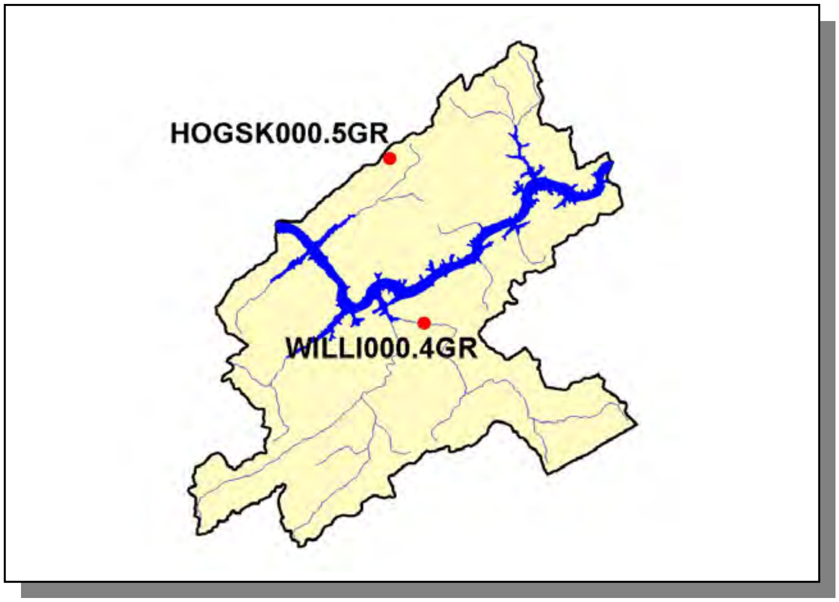


Figure 4-7. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050101. *More information, including site names and locations, is provided in Appendix IV.*

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

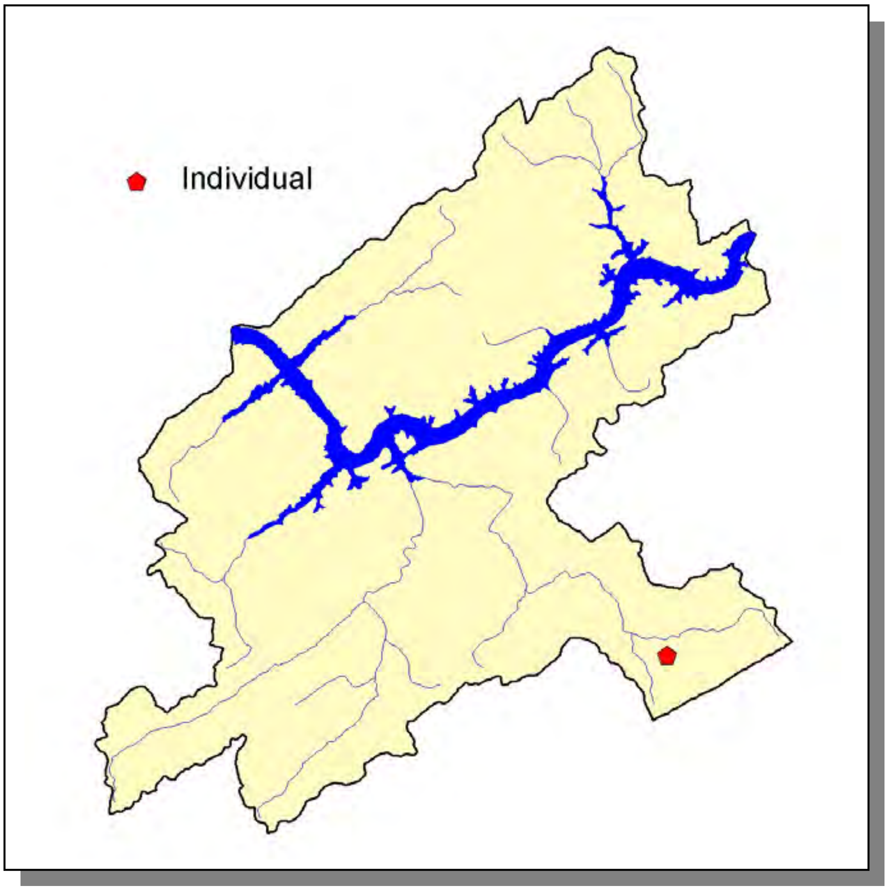


Figure 4-8. Location of Permits Issued in Subwatershed 060102050101. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-9. Location of Active NPDES Sites in Subwatershed 060102050101. *More information, including the names of facilities, is provided in Appendix IV.*

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

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,181	2,320	79	<5	34	17

Table 4-4. Summary of Livestock Count Estimates in Subwatershed 060102050101. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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
Claiborne	18,697	36,566	1,082	420	0	165
Grainger	12,115	23,927	942	1,184	510	195
Union	5,540	10,575	105	981	93	96

Table 4-5. Summary of Livestock Count Estimates in Claiborne, Grainger, and Union Counties. *According to According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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)
Claiborne	167.6	167.6	2.6	12.1
Grainger	102.6	102.6	0.3	1.8
Union	102.5	102.5	0.1	0.0

Table 4-6. Forest Acreage and Annual Removal Rates (1987-1994) in Claiborne, Grainger, and Union Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.70
Grass (Hayland)	0.65
Legumes, Grass (Hayland)	0.60
Grass, Forbs, Legumes (Mixed Pasture)	0.68
Corn (Row Crops)	5.69
Tobacco (Row Crops)	7.21
Farmsteads and Ranch Headquarters	0.45

Table 4-7. Annual Estimated Total Soil Loss in Subwatershed 060102050101.

4.2.A.ii. 060102050102 (Norris Lake).

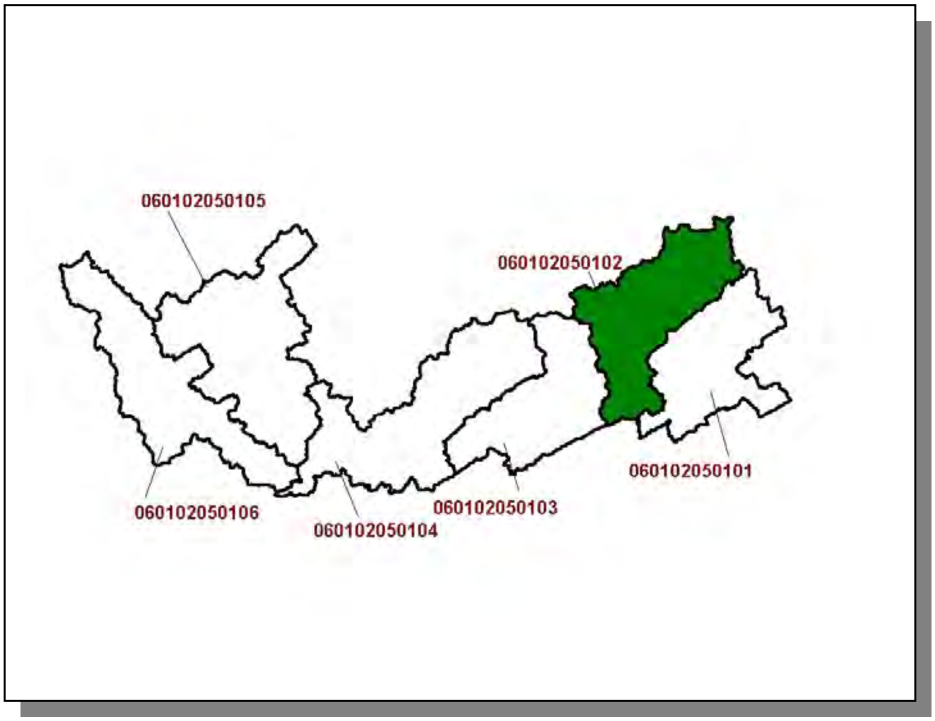


Figure 4-10. Location of Subwatershed 060102050102. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

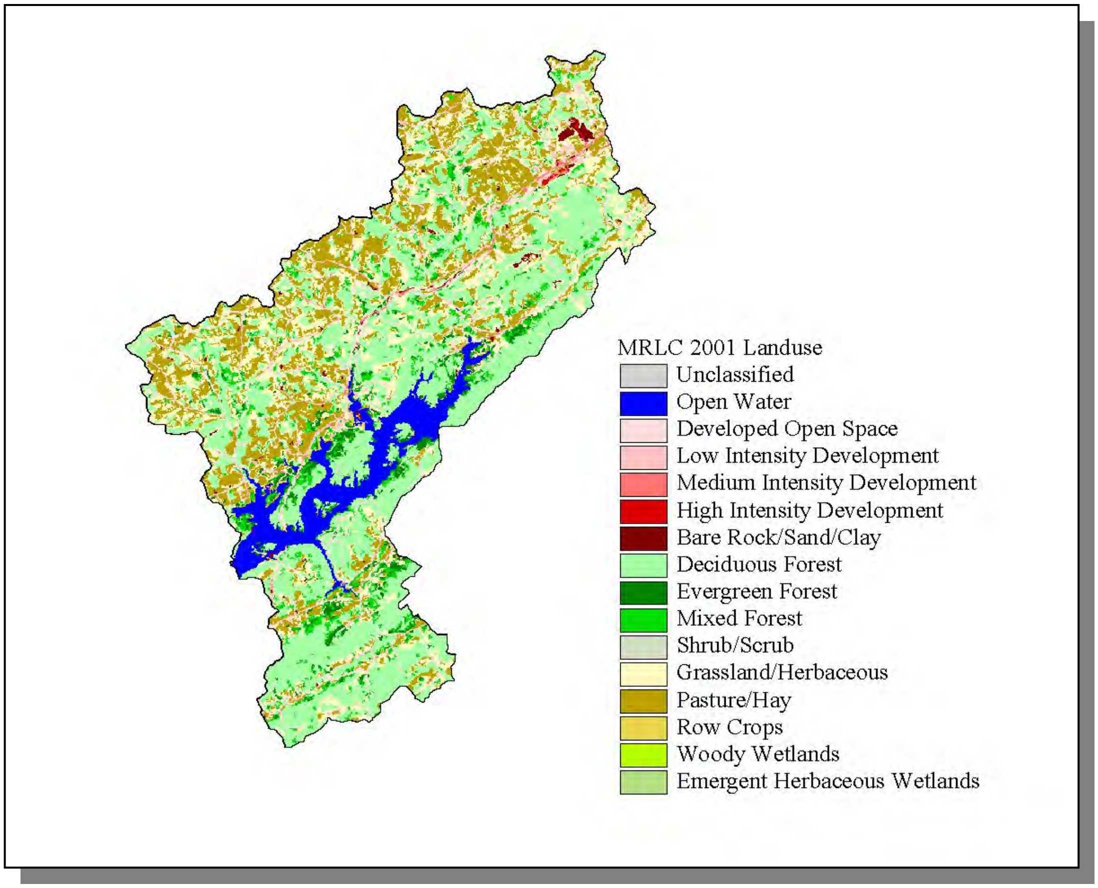


Figure 4-11. Illustration of Land Use Distribution in Subwatershed 060102050102.

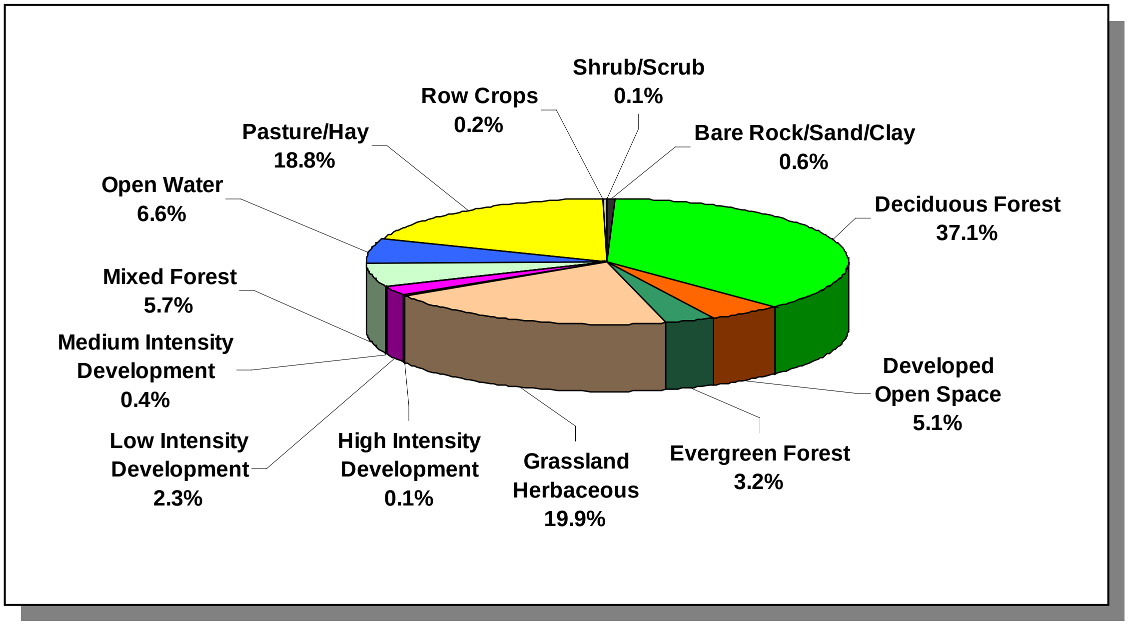


Figure 4-12. Land Use Distribution in Subwatershed 060102050102. *More information is provided in Appendix IV.*

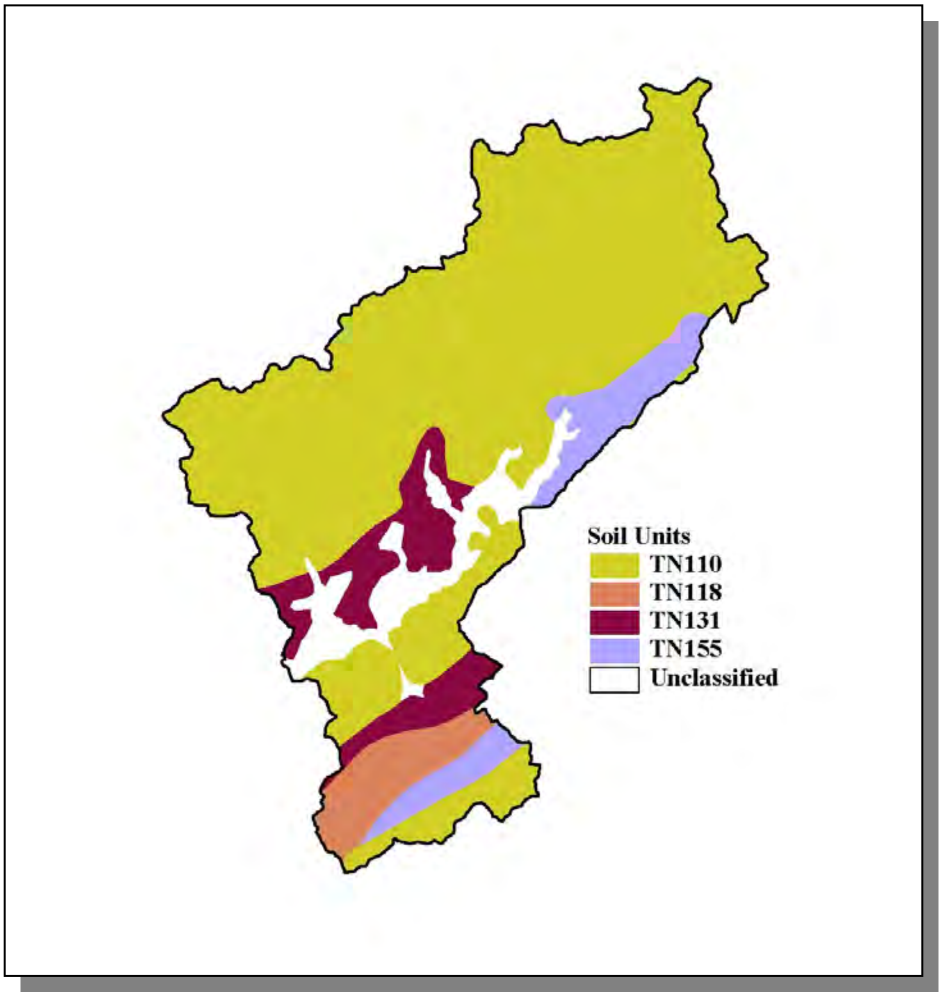


Figure 4-13. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050102.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN155	0.00	C	1.71	5.31	Loam	0.32

Table 4-8. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050102. *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)
Claiborne	26,137	28,963	29,862	7.82	2,045	2,266	2,336	14.2
Union	13,694	15,956	17,808	7.78	1,066	1,242	1,386	30.0
Total	**39,831**	**44,919**	**47,670**		**3,111**	**3,508**	**3,722**	**19.6**

Table 4-9. Population Estimates in Subwatershed 060102050102.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
New Tazewell	Claiborne	1,864	785	543	236	6

Table 4-10. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060102050102.

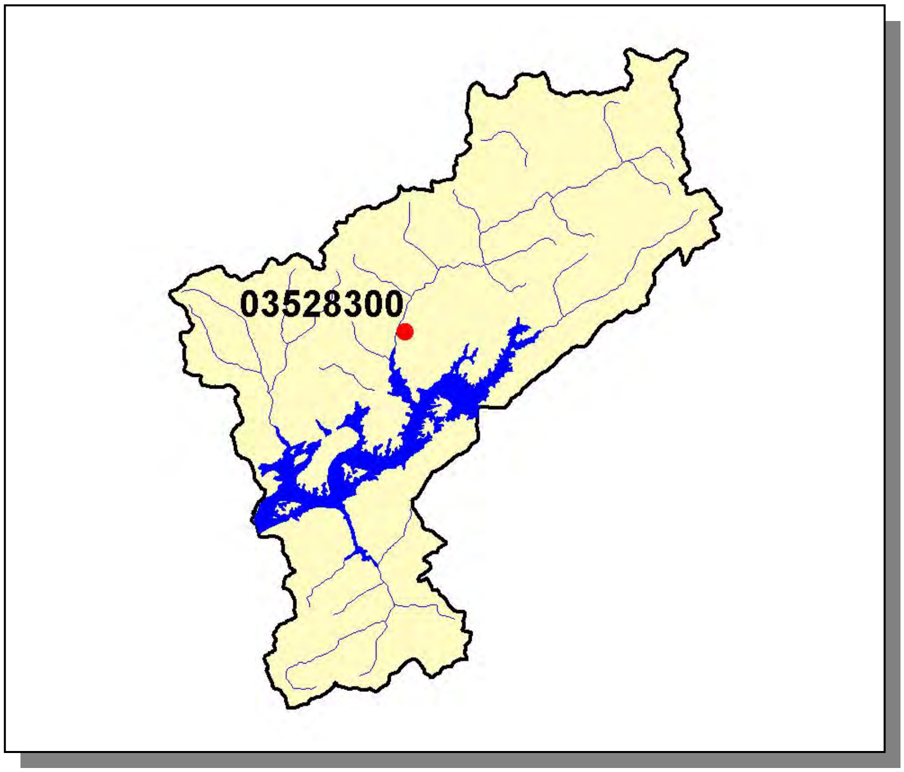


Figure 4-14. Location of Historical Streamflow Data Collection Sites in Subwatershed 060102050102. *More information is provided in Appendix IV.*

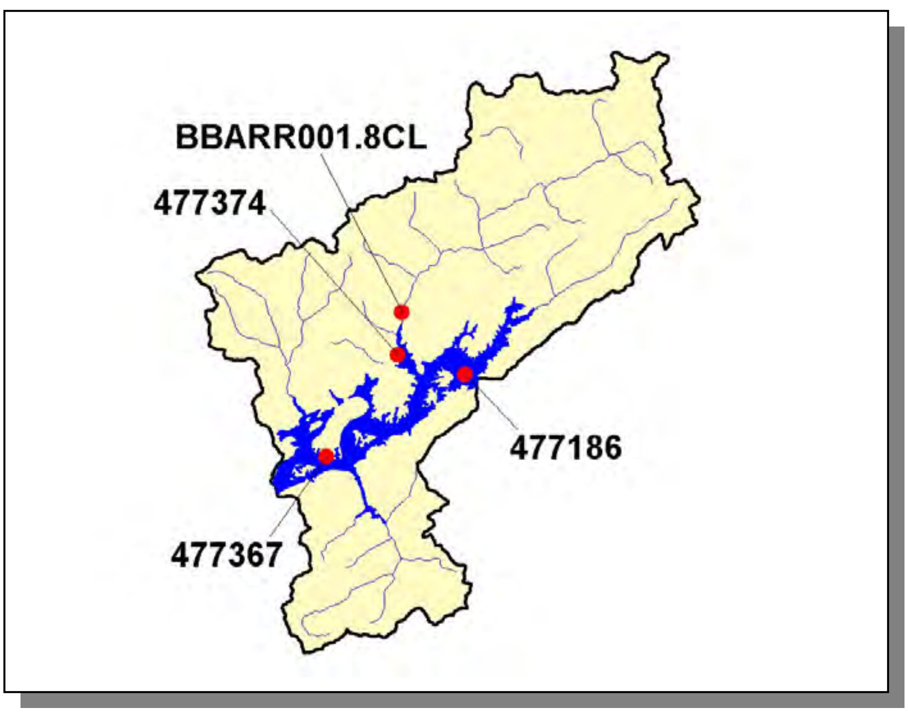


Figure 4-15. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050102. *More information, including site names and locations, is provided in Appendix IV.*

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

There are no point source contributions in this subwatershed.

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

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
2,940	5,728	152	6	8	30

Table 4-11. Summary of Livestock Count Estimates in Subwatershed 060102050102. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Claiborne	18,697	36,566	1,082	420	0	165
Union	5,540	10,575	105	981	93	96

Table 4-12. Summary of Livestock Count Estimates in Claiborne, Grainger, and Union Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Claiborne	167.6	167.6	2.6	12.1
Union	102.5	102.5	0.1	0.0

Table 4-13. Forest Acreage and Annual Removal Rates (1987-1994) in Claiborne and Union Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.41
Grass (Hayland)	1.91
Grass, Forbs, Legumes (Mixed Pasture)	0.65
Farmsteads and Ranch Headquarters	0.36

Table 4-14. Annual Estimated Total Soil Loss in Subwatershed 060102050102.

4.2.A.iii. 060102050103 (Norris Lake).

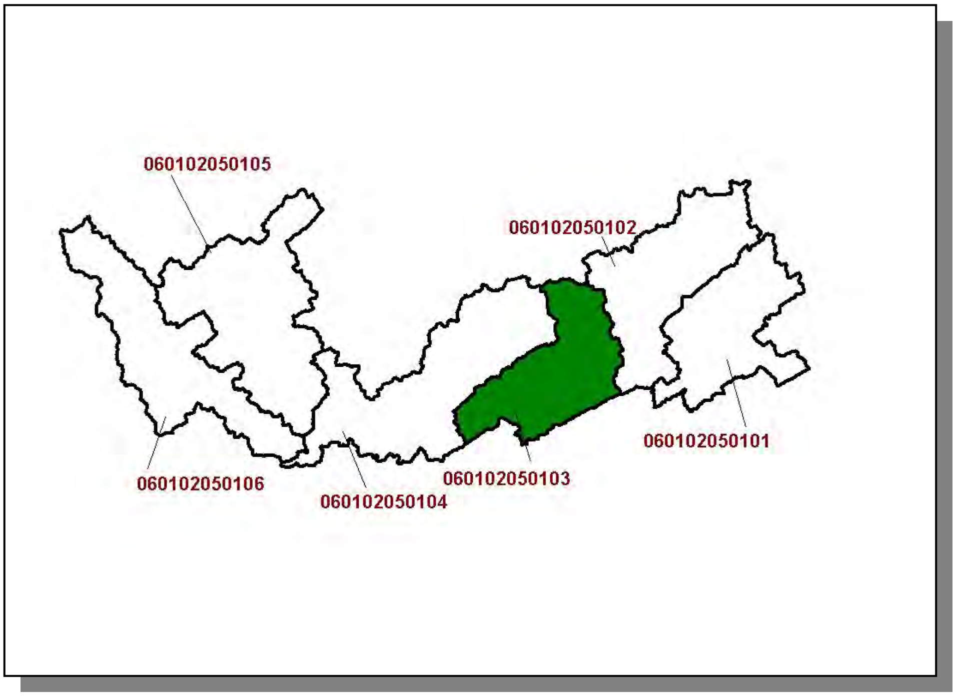


Figure 4-16. Location of Subwatershed 060102050103. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

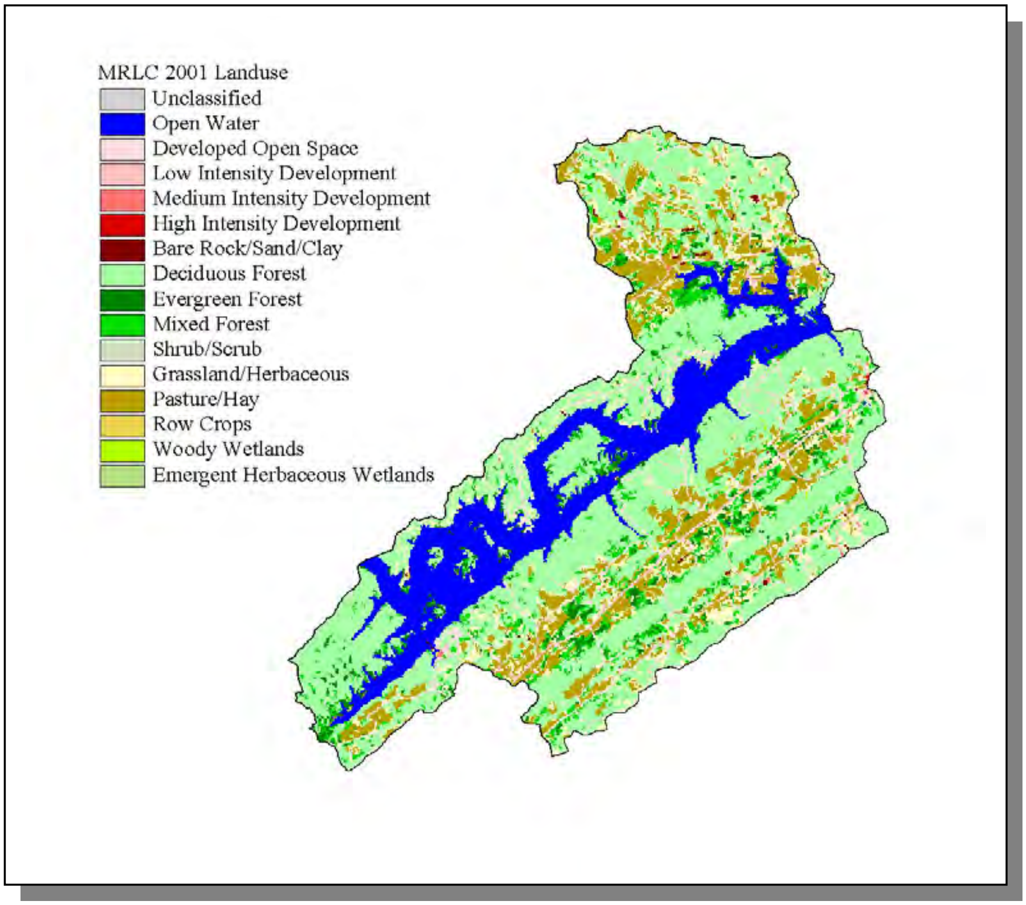


Figure 4-17. Illustration of Land Use Distribution in Subwatershed 060102050103.

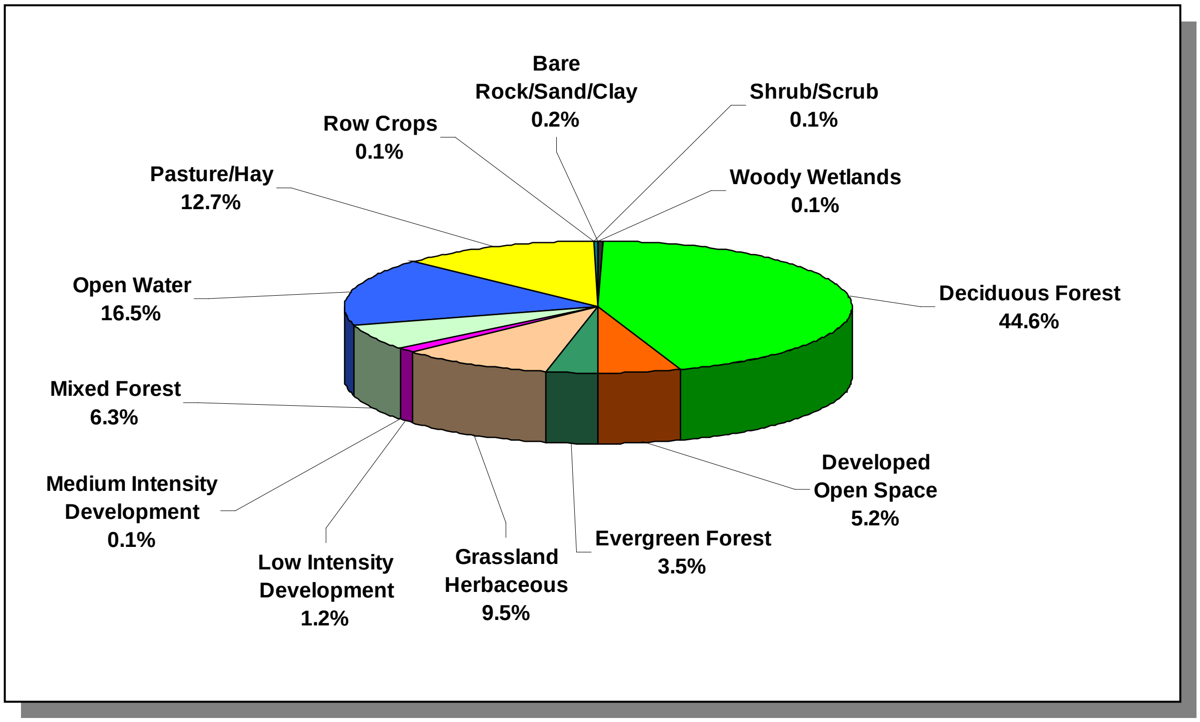


Figure 4-18. Land Use Distribution in Subwatershed 060102050103. *More information is provided in Appendix IV.*

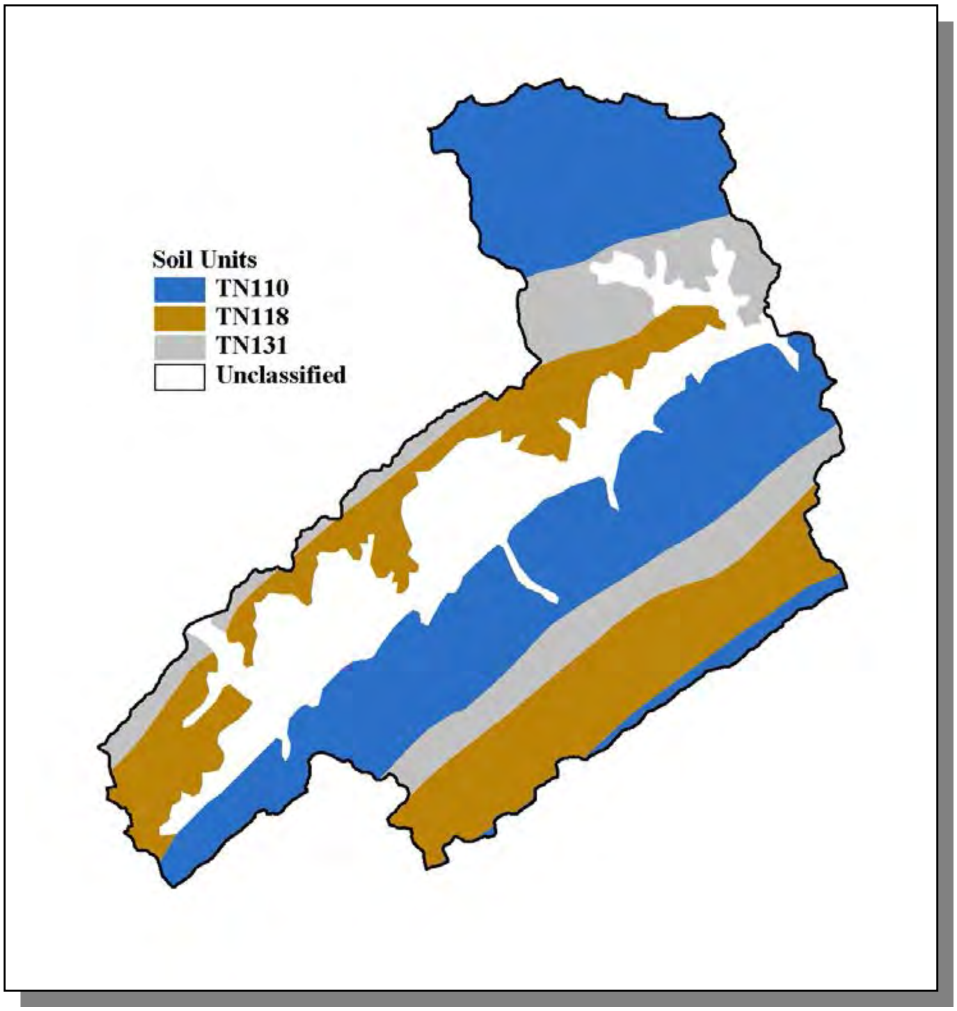


Figure 4-19. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050103.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33

Table 4-15. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050103. *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)
Union	13,694	15,956	17,808	19.12	2,618	3,051	3,405	30.1

Table 4-16. Population Estimates in Subwatershed 060102050103.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Maynardville	Union	1,298	544	366	173	5

Table 4-17. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060102050103.

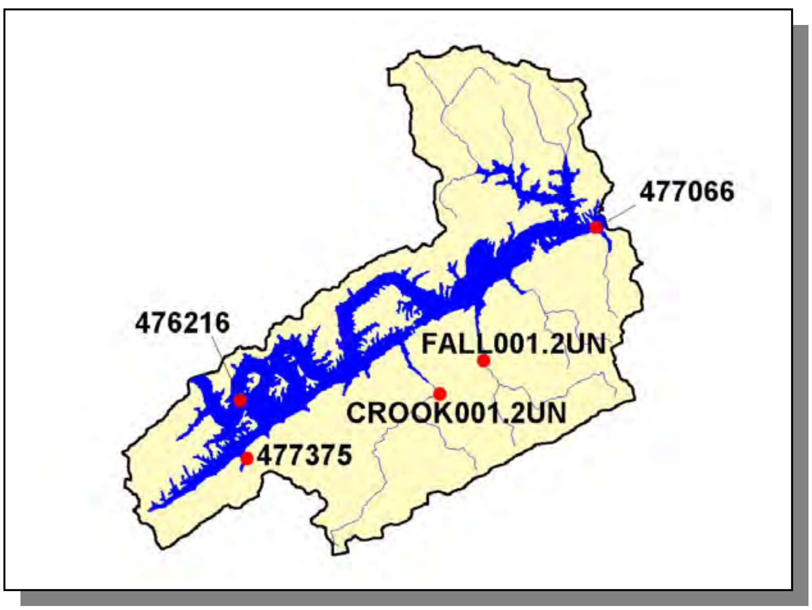


Figure 4-20. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050103. *More information, including site names and locations,, is provided in Appendix IV.*

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

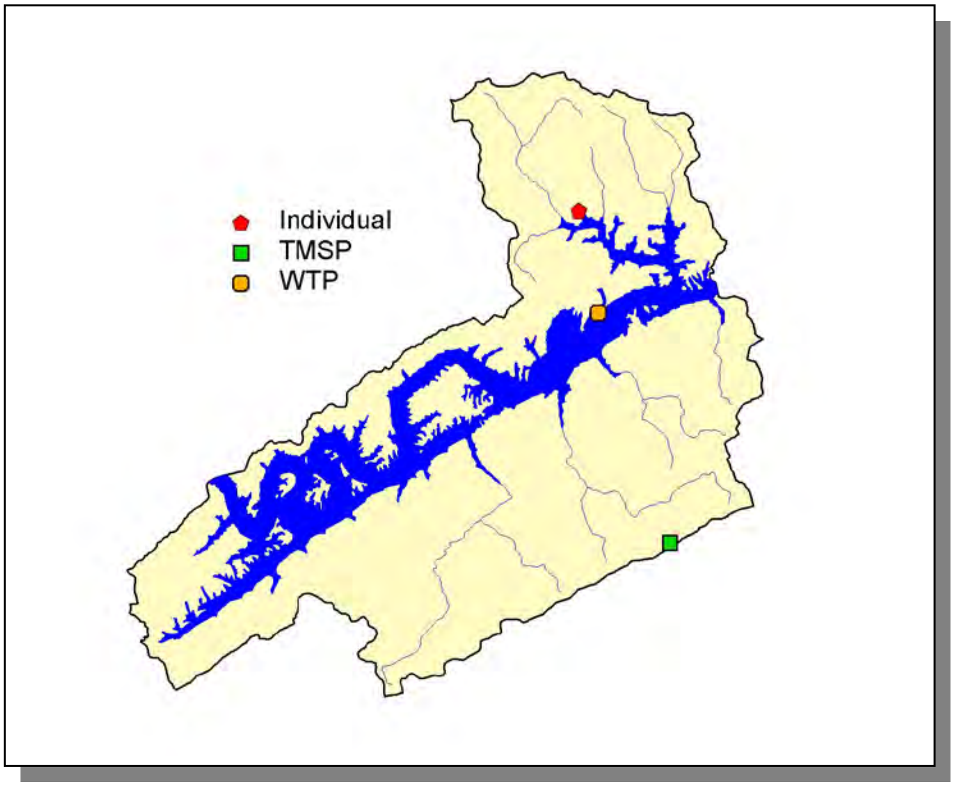


Figure 4-21. Location of Permits Issued in Subwatershed 060102050103. *More information, including the names of facilities, is provided in Appendix IV.*

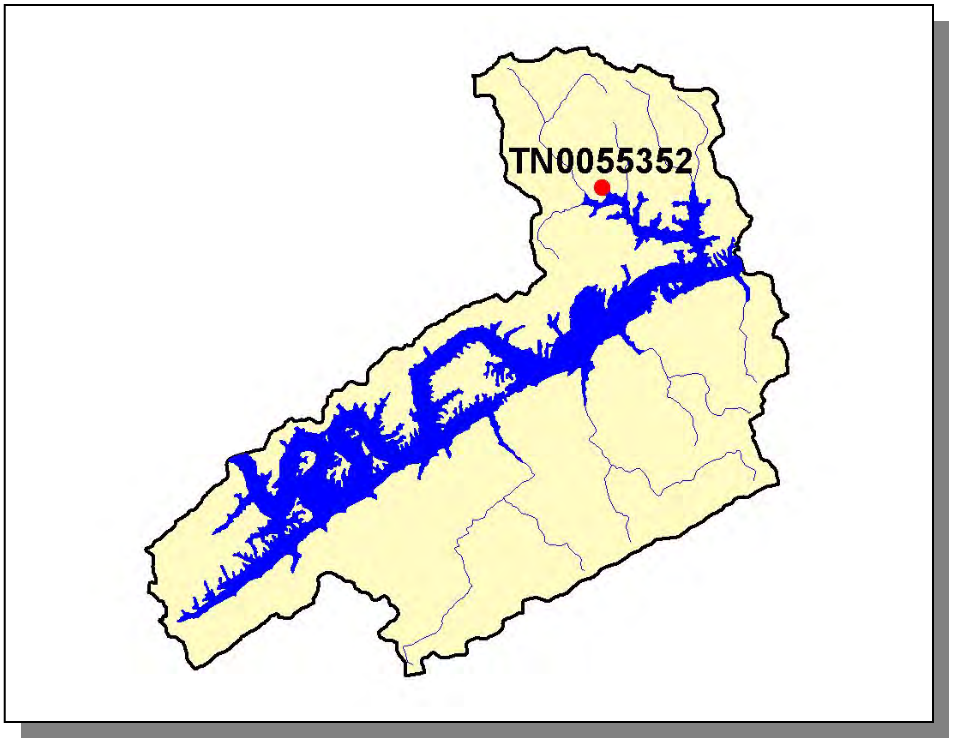


Figure 4-22. Location of Active NPDES Sites in Subwatershed 060102050103. *More information, including the names of facilities, is provided in Appendix IV.*

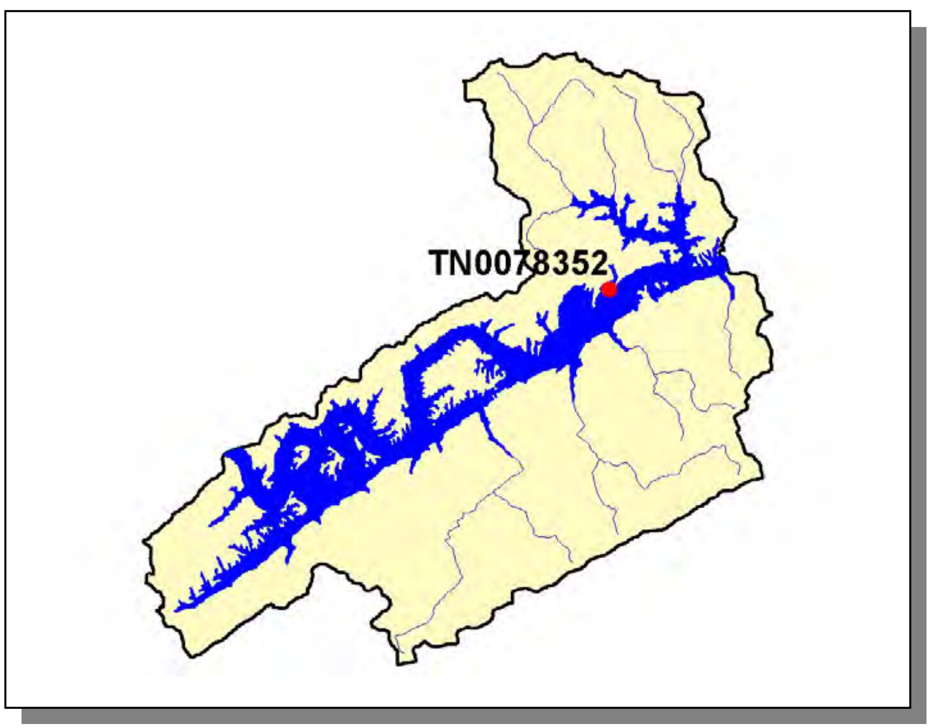


Figure 4-23. Location of Water Treatment Plants in Subwatershed 060102050103. *More information, including the names of facilities, is provided in Appendix IV.*

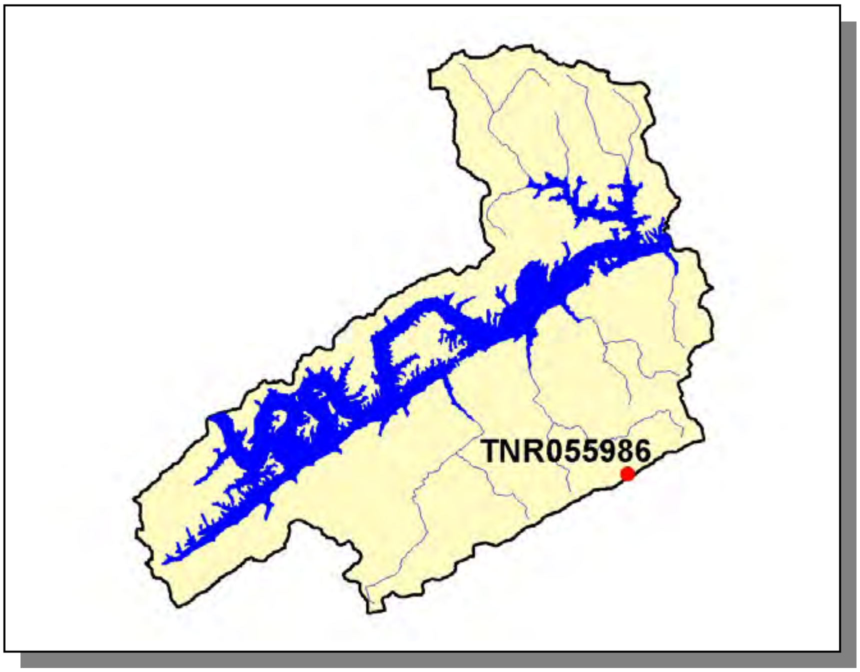


Figure 4-24. Location of TMSP Sites in Subwatershed 060102050103. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.iii.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 060102050103:

- TN0078352 (Hallsdale-Powell-Norris WTP) discharges to the Clinch River @ RM 116

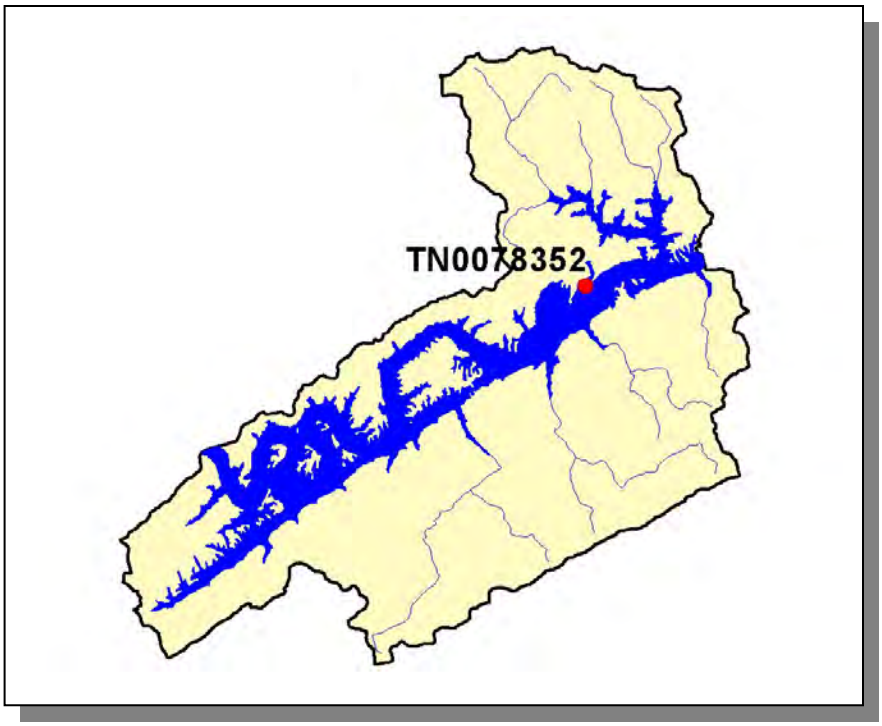


Figure 4-25. Location of NPDES Dischargers to Water Bodies Listed on the 2004 303(d) List in Subwatershed 060102050103. *More information, including the names of facilities, is provided in Appendix IV.*

PERMIT #	FLOW	Al
TN0078352	X	X

Table 4-18. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050103.

PERMIT #	TRC	TSS	SETTLEABLE SOLIDS	pH
TN0078352	X	X	X	X

Table 4-19. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050103. *TRC, Total Residual Chlorine; TSS, Total Suspended Solids.*

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

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,024	1,955	19	<5	17	18

Table 4-20. Summary of Livestock Count Estimates in Subwatershed 060102050103. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Union	5,540	10,575	105	981	93	96

Table 4-21. Summary of Livestock Count Estimates in Union County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Union	102.5	102.5	0.1	0.0

Table 4-22. Forest Acreage and Annual Removal Rates (1987-1994) in Union County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.46
Grass (Hayland)	1.91
Grass, Forbs, Legumes (Mixed Pasture)	1.66
Farmsteads and Ranch Headquarters	0.22

Table 4-23. Annual Estimated Total Soil Loss in Subwatershed 060102050103.

4.2.A.iv. 060102050104 (Norris Lake).

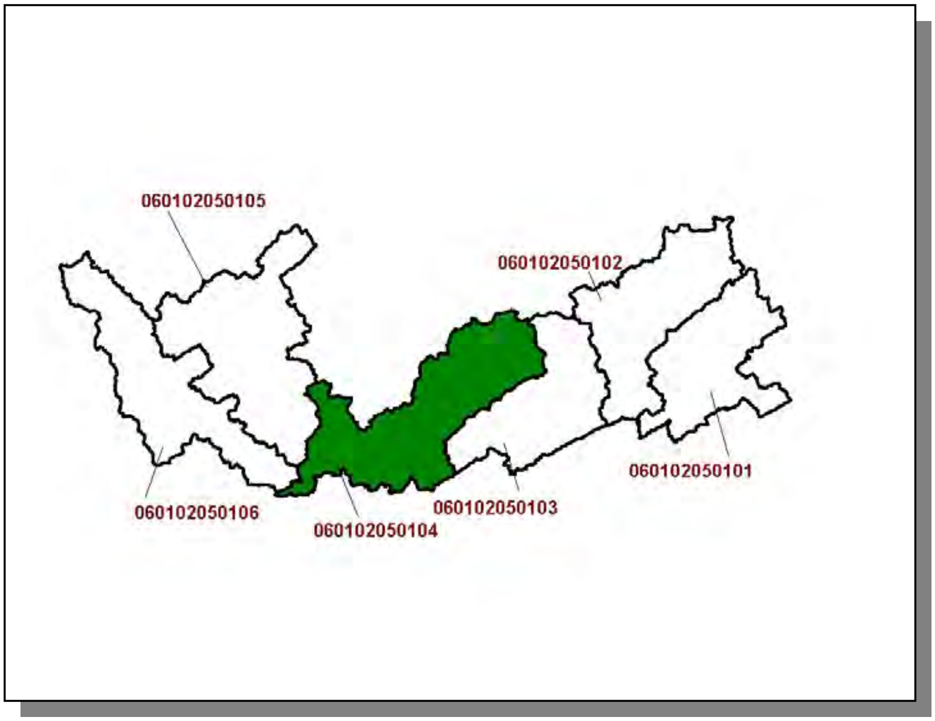


Figure 4-26. Location of Subwatershed 060102050104. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

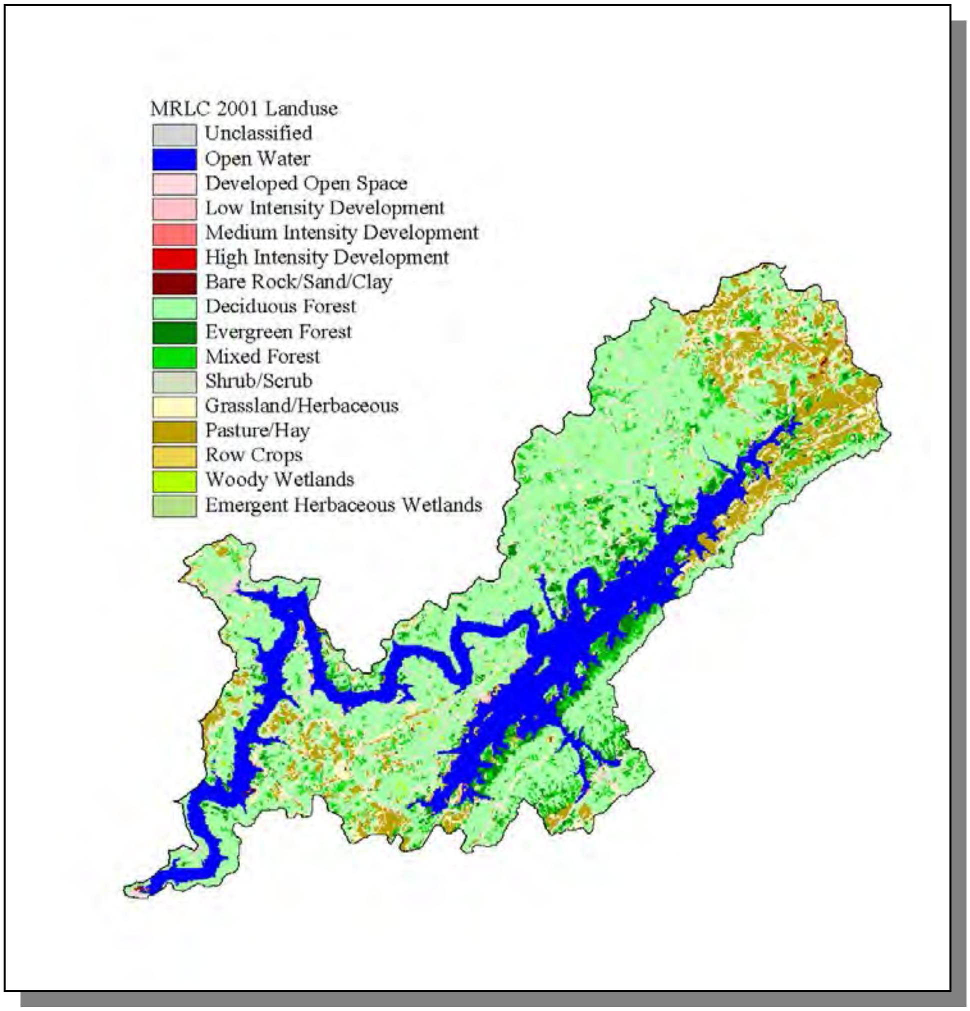


Figure 4-27. Illustration of Land Use Distribution in Subwatershed 060102050104.

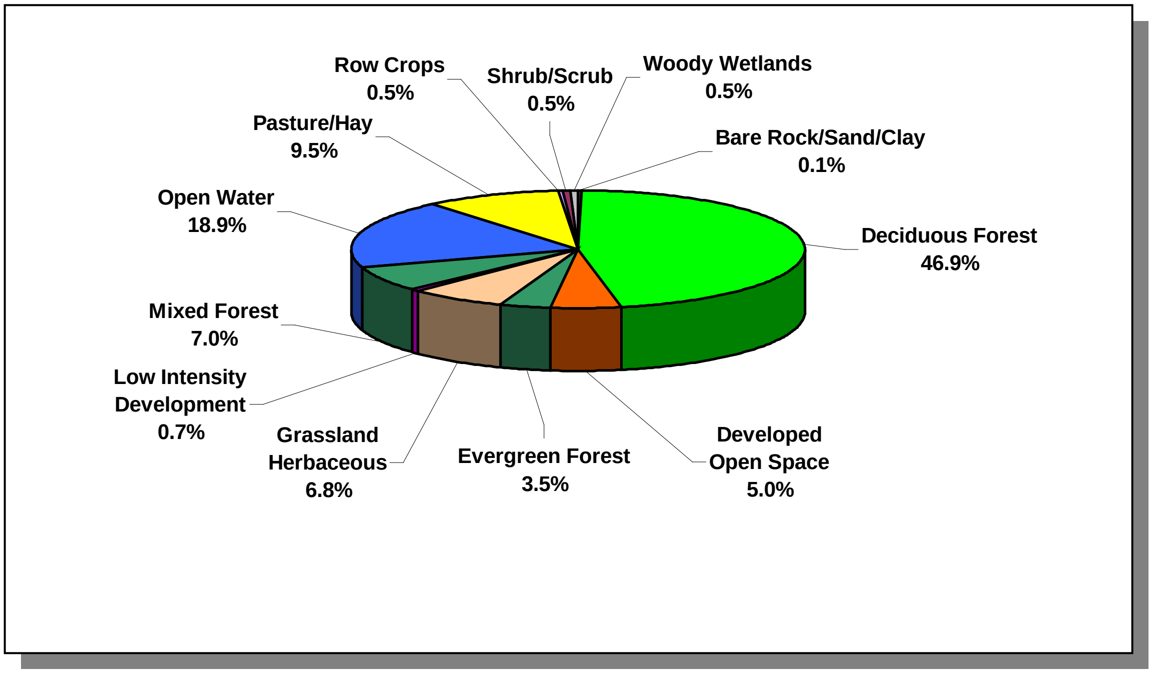


Figure 4-28. Land Use Distribution in Subwatershed 060102050104. *More information is provided in Appendix IV.*

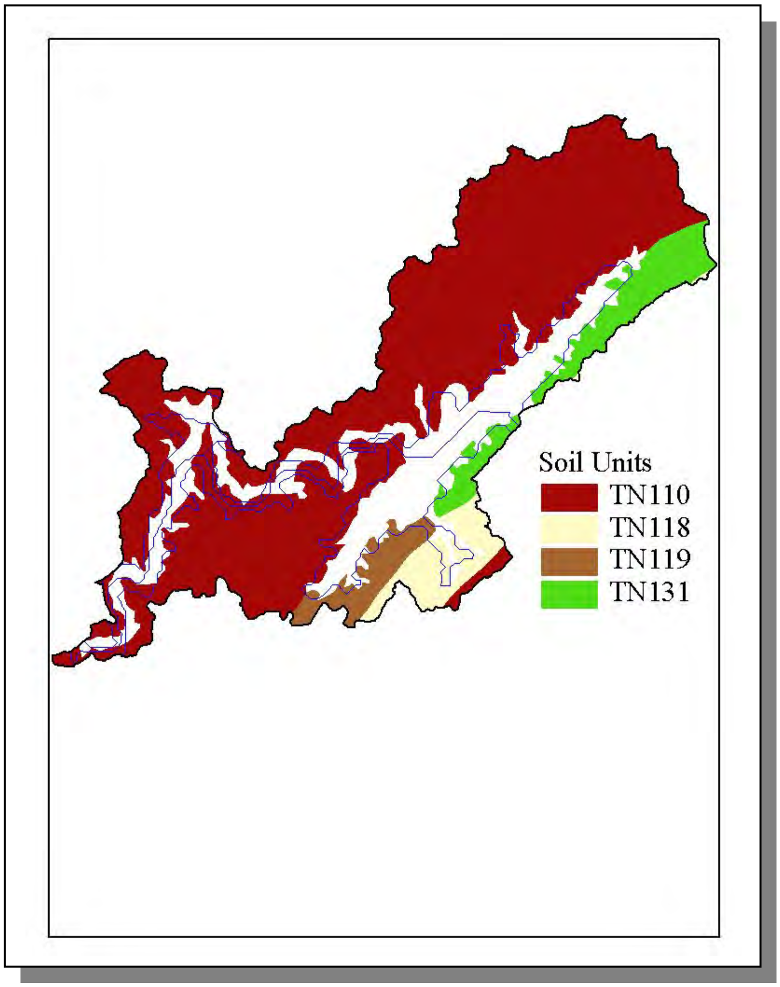


Figure 4-29. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050104.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN118	0.00	C	6.52	5.12	Loam	0.29
TN119	2.00	C	1.08	5.15	Loam	0.33
TN131	0.00	C	1.17	4.95	Silty Loam	0.33

Table 4-24. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050104. *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)
Anderson	68,250	71,498	71,330	2.52	1,719	1,801	1,797	4.5
Campbell	35,079	37,878	39,854	2.33	818	883	929	13.6
Union	13,694	15,956	17,808	20.82	2,851	3,322	3,707	30.0
Total	**117,023**	**125,332**	**128,992**		**5,388**	**6,006**	**6,433**	**19.4**

Table 4-25. Population Estimates in Subwatershed 060102050104.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Norris	Anderson	1,303	622	505	117	0

Table 4-26. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060102050104.

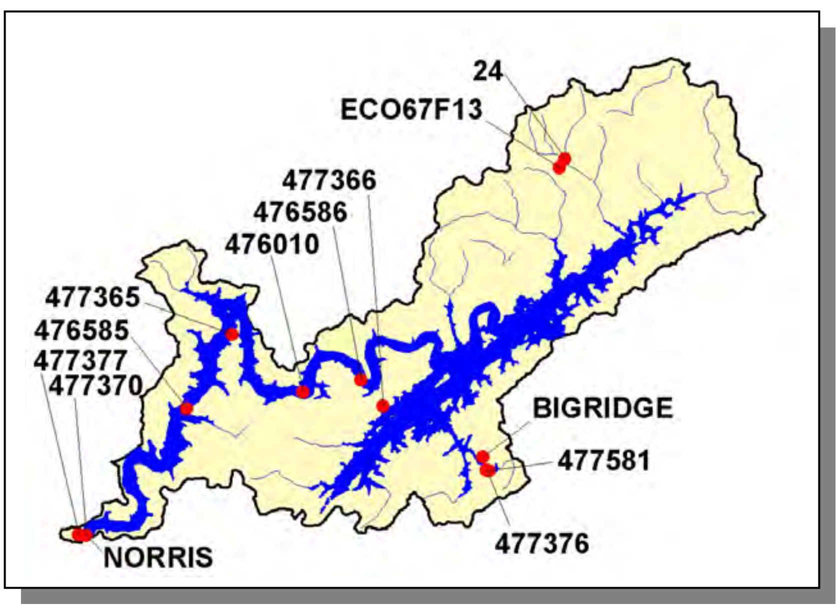


Figure 4-30. Location of Historical Streamflow Data Collection Sites in Subwatershed 060102050104. *More information is provided in Appendix IV.*

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

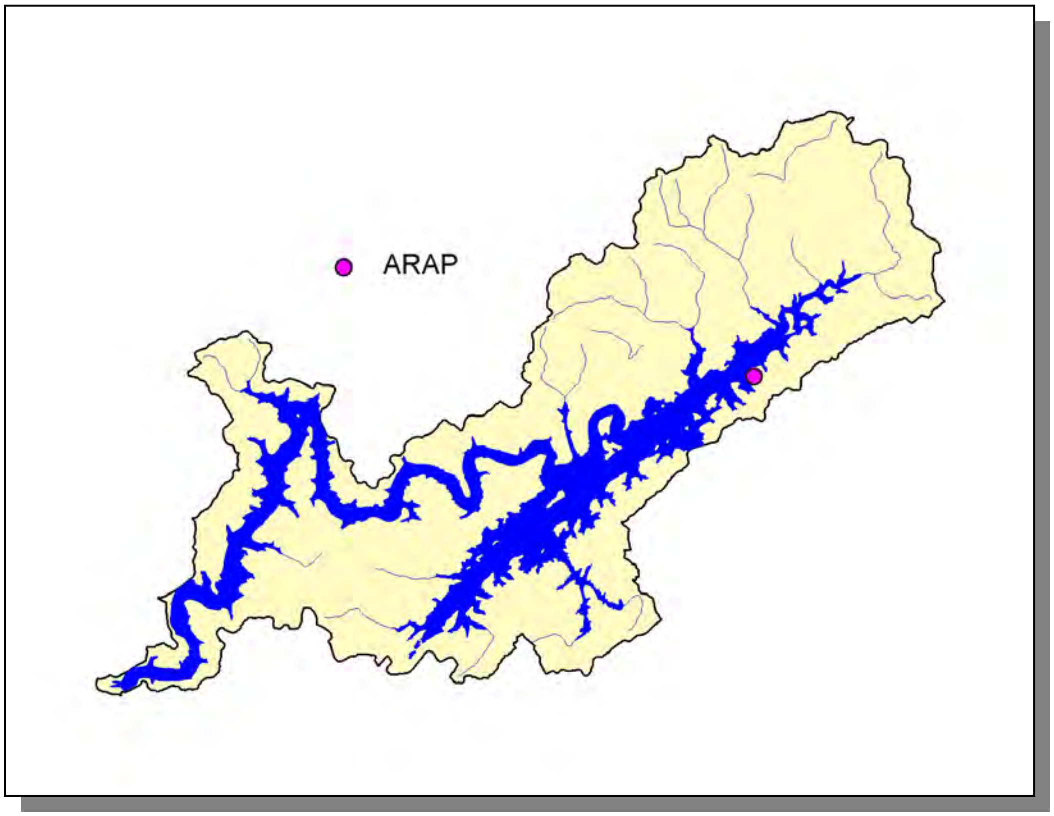


Figure 4-31. Location of Permits Issued in Subwatershed 060102050104. *More information, including the names of facilities, is provided in Appendix IV.*

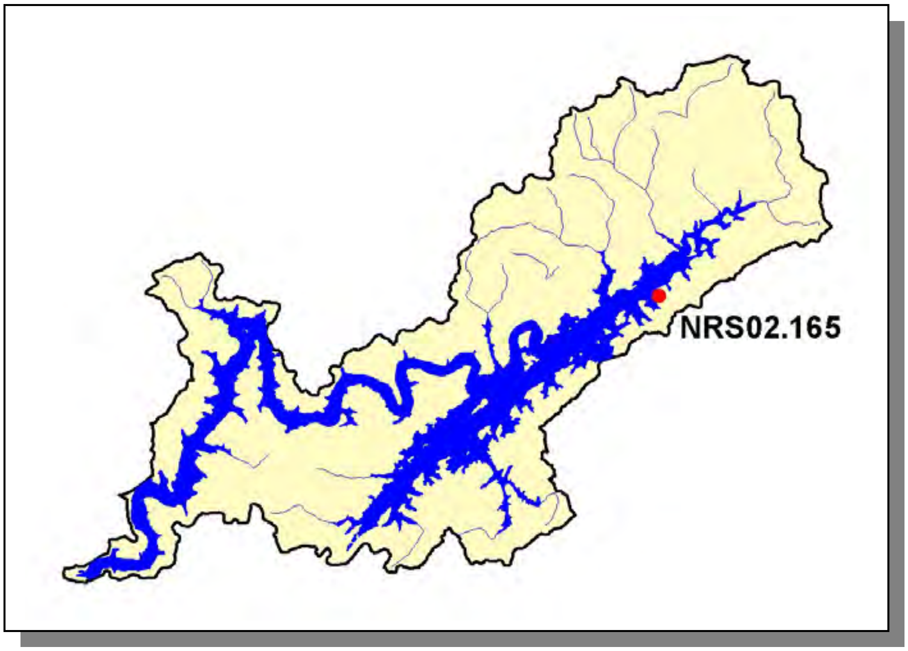


Figure 4-32. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 060102050104. *More information is provided in Appendix IV.*

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

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,495	2,978	61	8	15	32

Table 4-27. Summary of Livestock Count Estimates in Subwatershed 060102050104. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Anderson	4,449	9,458	335	769	0	135
Campbell	4,083	7,684	66	8	14	0
Union	5,540	10,575	105	981	93	96

Table 4-28. Summary of Livestock Count Estimates in Anderson, Campbell, and Union Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Anderson	124.0	124.0	2.6	6.2
Campbell	250.3	250.2	2.6	10.6
Union	102.5	102.5	0.1	0.0

Table 4-29. Forest Acreage and Annual Removal Rates (1987-1994) in Anderson, Campbell, and Union Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.79
Grass (Hayland)	1.75
Legumes, Grass (Hayland)	1.68
Legumes (Hayland)	1.07
Grass, Forbs, Legumes (Mixed Pasture)	1.84
Tobacco (Row Crops)	9.37
Other Vegetable and Truck Crops	7.05
Other Land in Farms	0.23
Farmsteads and Ranch Headquarters	0.29

Table 4-30. Annual Estimated Total Soil Loss in Subwatershed 060102050104.

4.2.A.v. 060102050105 (Big Creek).

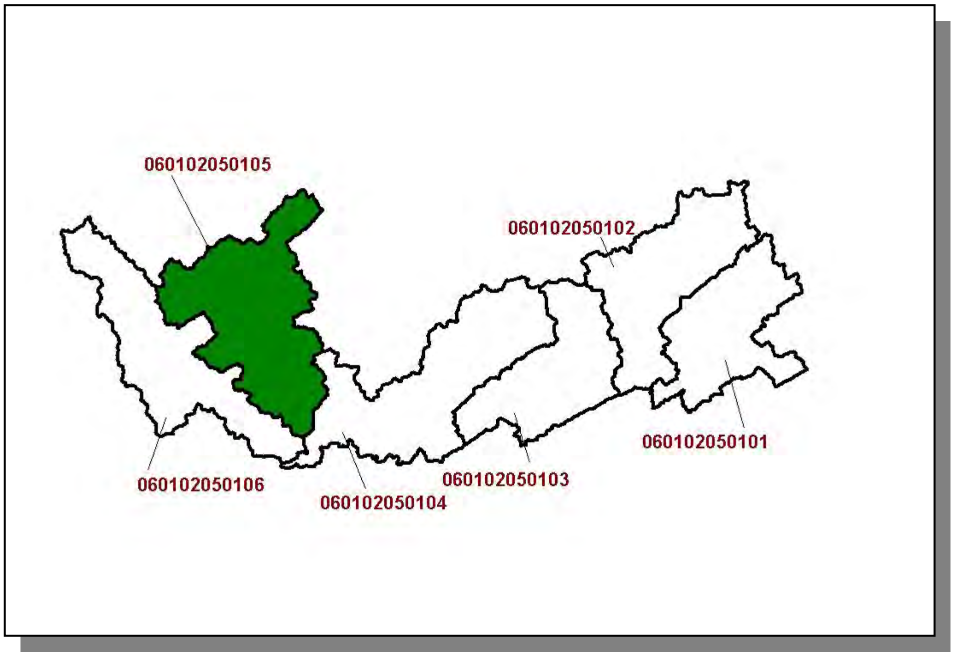


Figure 4-33. Location of Subwatershed 060102050105. HUC-12 subwatershed boundaries in Tennessee are shown for reference.

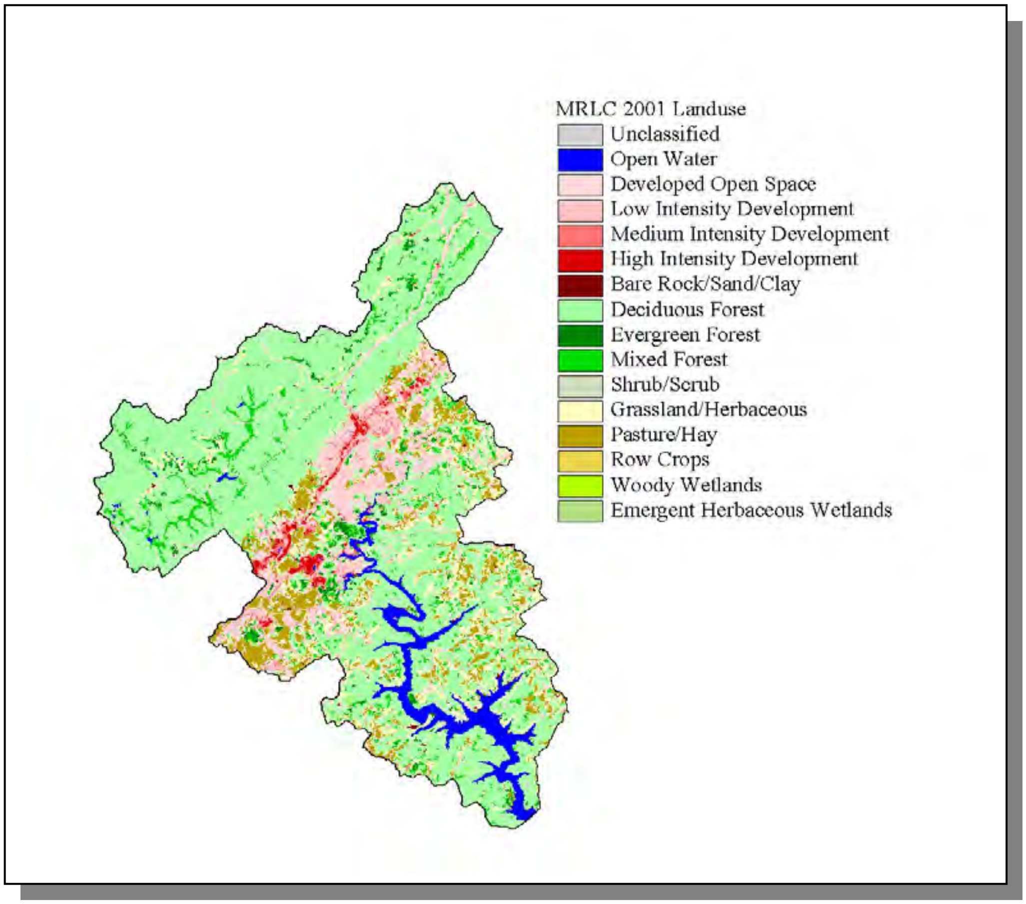


Figure 4-34. Illustration of Land Use Distribution in Subwatershed 060102050105.

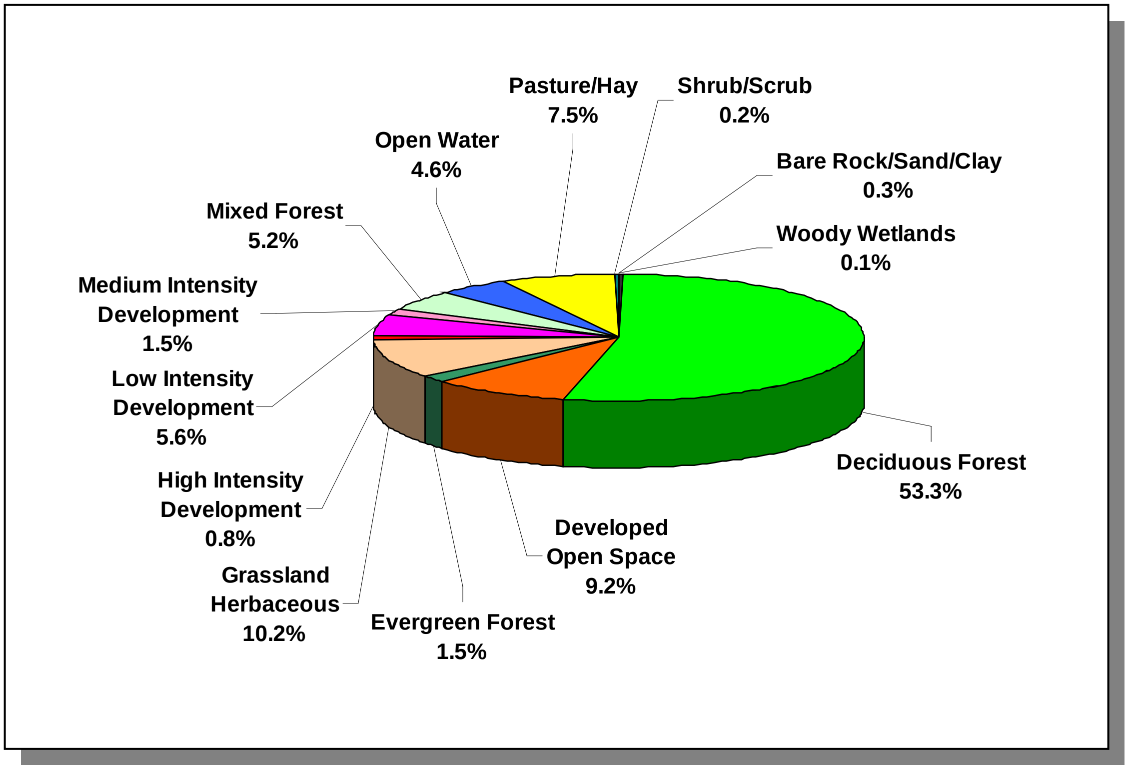


Figure 4-35. Land Use Distribution in Subwatershed 060102050105. *More information is provided in Appendix IV.*

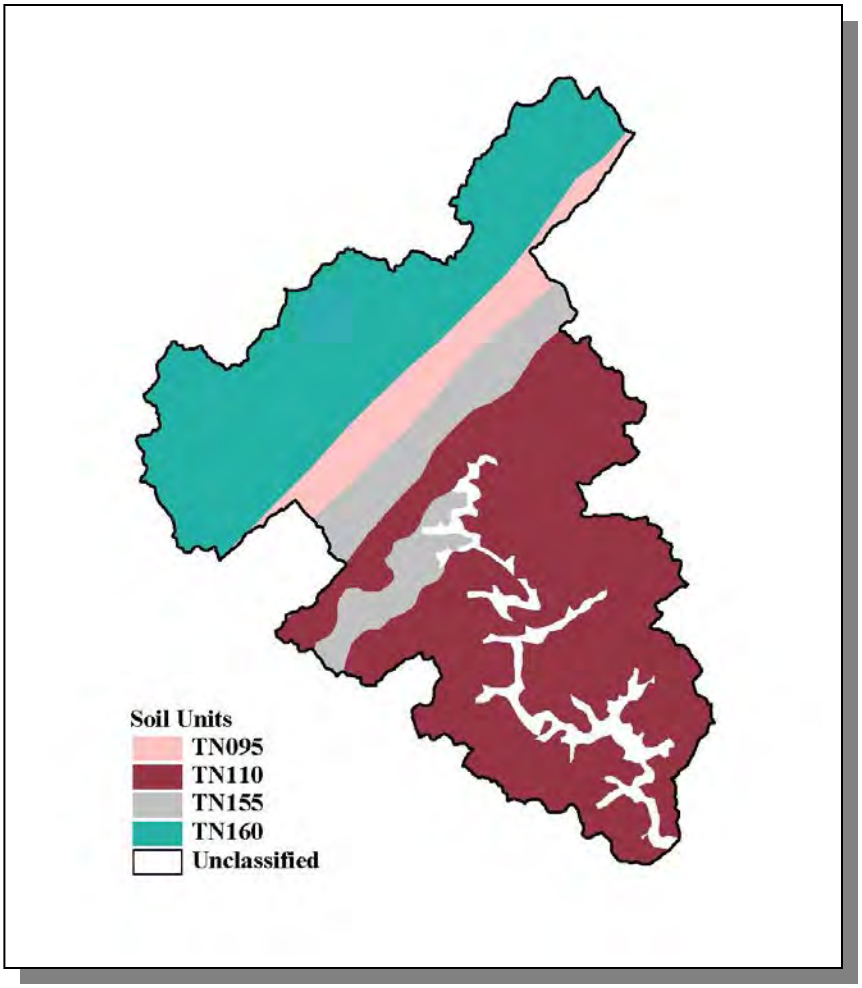


Figure 4-36. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050105.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN095	0.00	B	2.35	5.12	Loam	0.31
TN110	0.00	B	2.22	4.96	Loam	0.31
TN155	0.00	C	1.71	5.31	Loam	0.32
TN160	0.00	B	2.69	5.36	Loam	0.25

Table 4-31. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050105. *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)
Campbell	35,079	37,878	39,854	14.12	4,954	5,350	5,629	13.6

Table 4-32. Population Estimates in Subwatershed 060102050105.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Caryville	Campbell	1,750	736	439	281	16
Jacksboro	Campbell	1,568	650	519	127	4
LaFollette	Campbell	7,192	3,116	2,745	366	5
Total		**10.510**	**4,502**	**3,703**	**774**	**25**

Table 4-33. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060102050105.

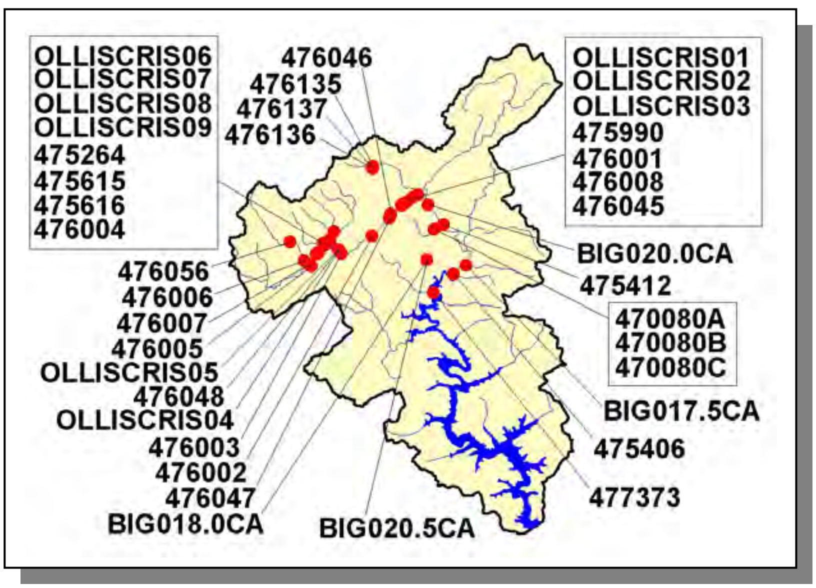


Figure 4-37. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050105. *More information, including site names and locations, is provided in Appendix IV.*

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

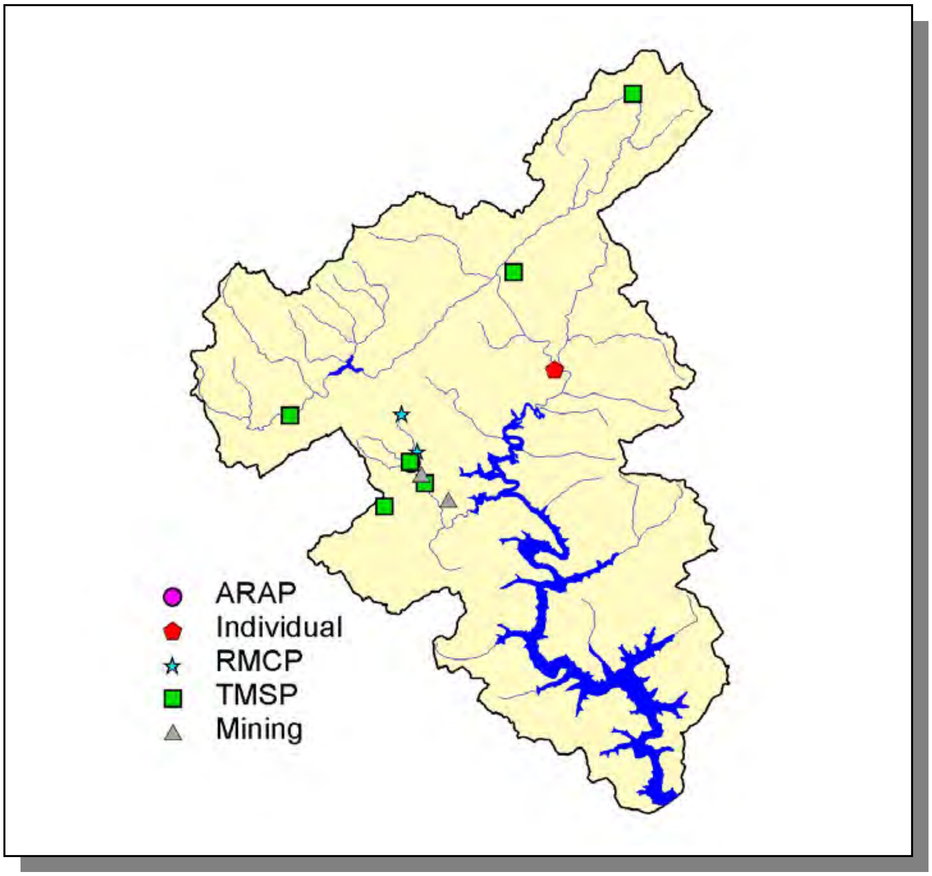


Figure 4-38. Location of Permits Issued in Subwatershed 060102050105. *More information, including the names of facilities, is provided in Appendix IV.*

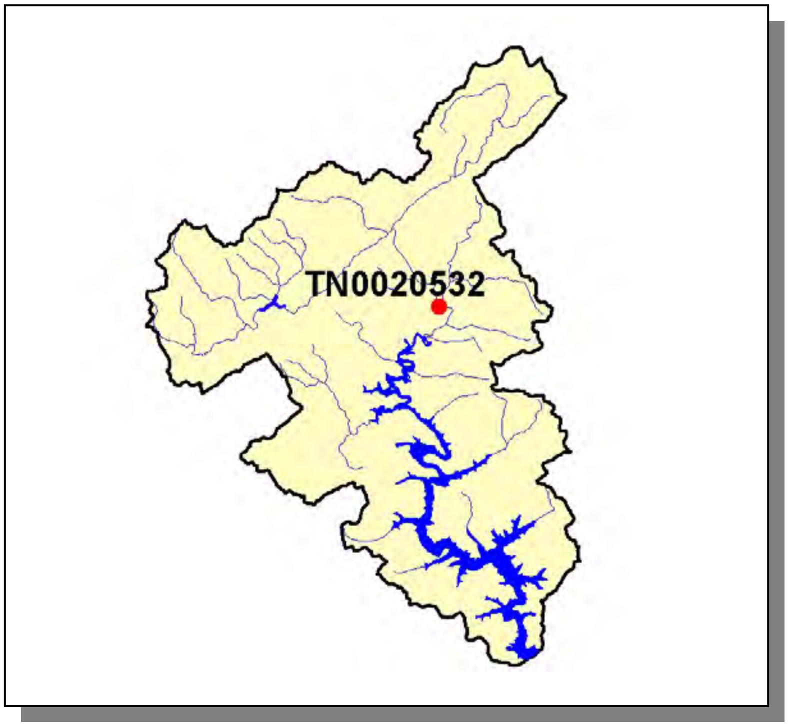


Figure 4-39. Location of Active NPDES Sites in Subwatershed 060102050105. *More information, including the names of facilities, is provided in Appendix IV.*

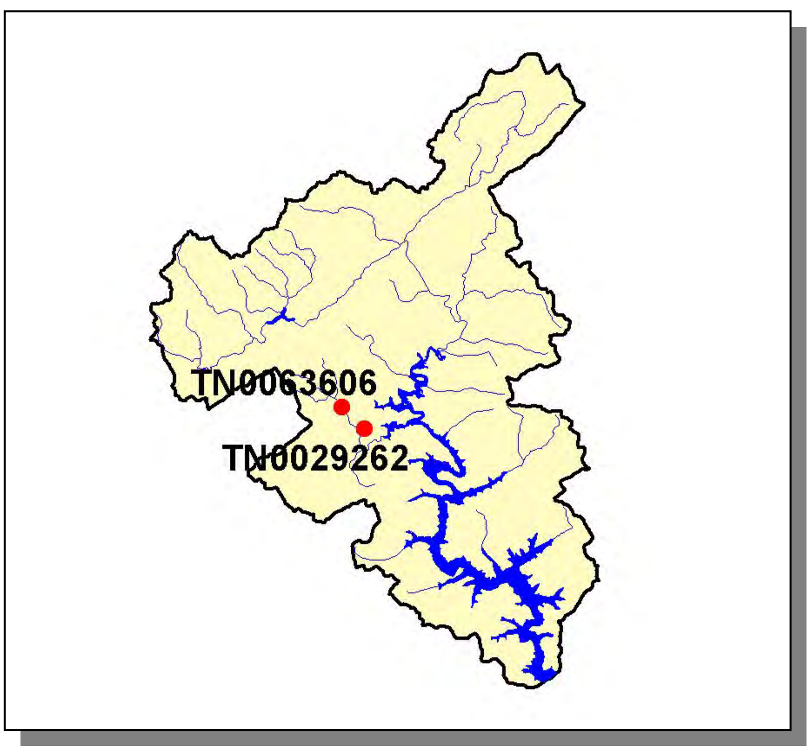


Figure 4-40. Location of Active Mining Sites in Subwatershed 060102050105. *More information, including the names of mining operations, is provided in Appendix IV.*

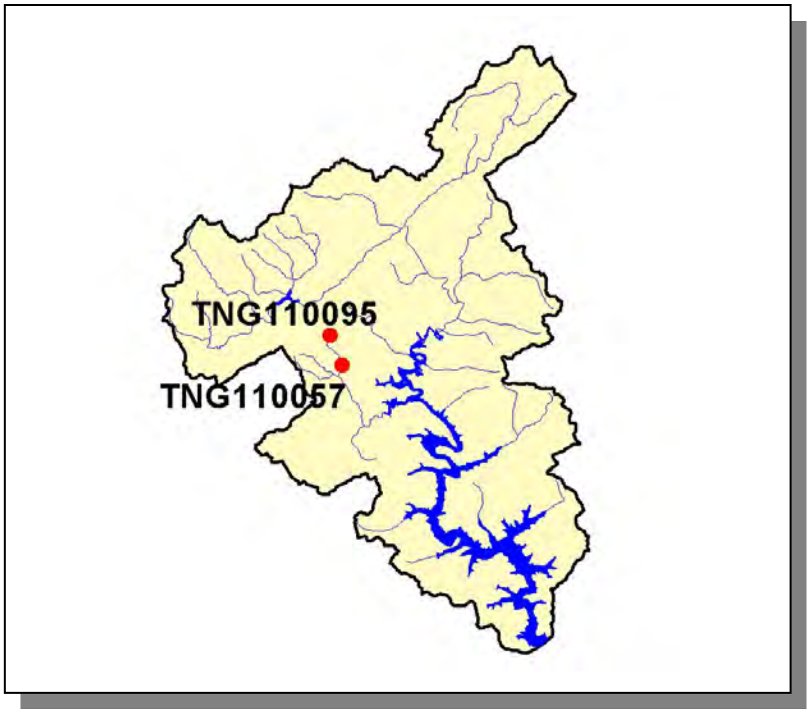


Figure 4-41. Location of Ready Mix Concrete Plants (RMCP) in Subwatershed 060102050105. *More information is provided in Appendix IV.*

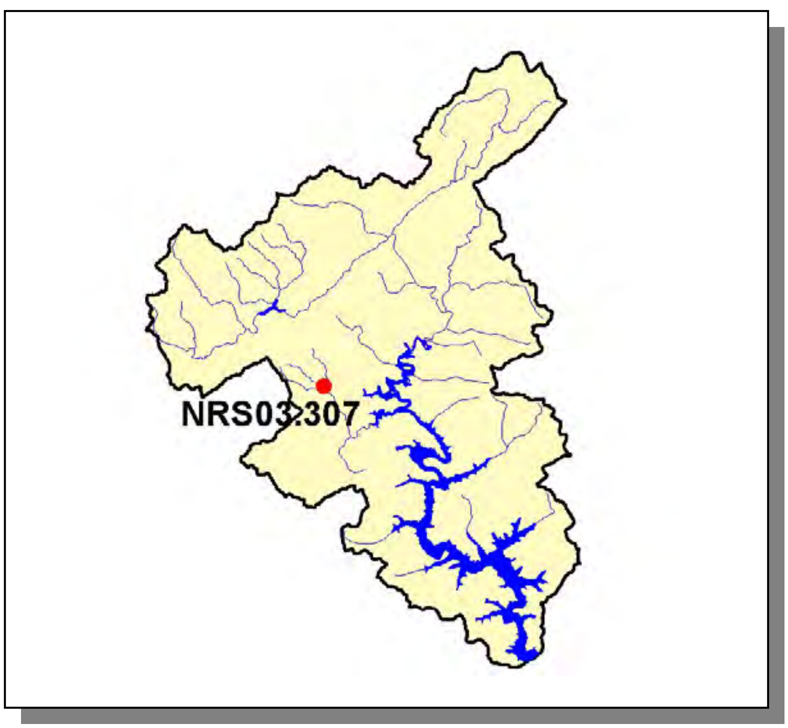


Figure 4-42. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 060102050105. *More information is provided in Appendix IV.*

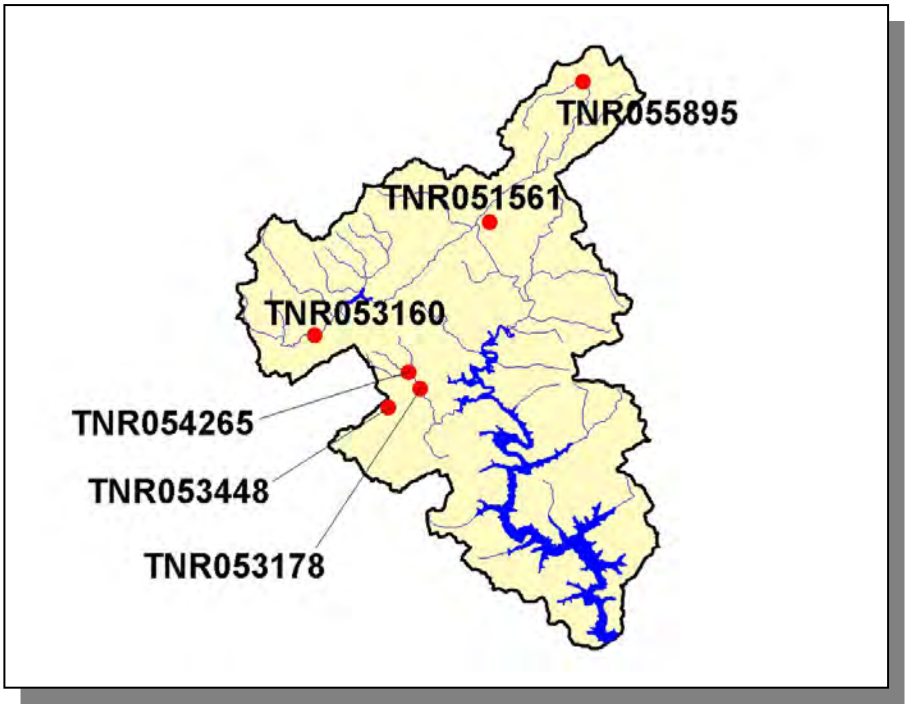


Figure 4-43. Location of TMSP Sites in Subwatershed 060102050105. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.v.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 060102050105:

- TN0020532 (LaFollette STP) discharges to Big Creek @ RM 17.1

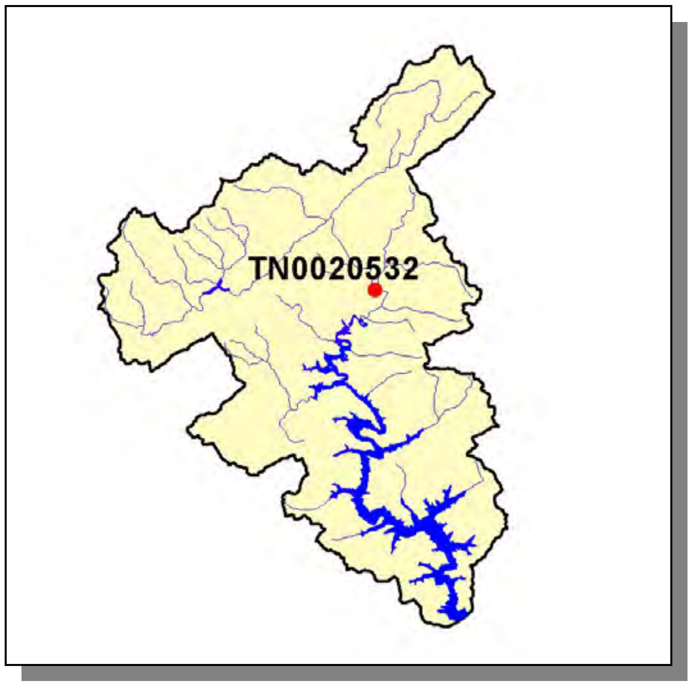


Figure 4-44. Location of NPDES Dischargers to Water Bodies Listed on the 2004 303(d) List in Subwatershed 060102050105. *More information, including the names of facilities, is provided in Appendix IV.*

Permit #	3Q2	1Q10	3Q10	3Q20	7Q10
TN0020532	0.55	na	0.19	0.13	0.22

Table 4-34. Receiving Stream Low Flow Information for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050105. *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 #	P	N	FLOW
TN0020532	X	X	X

Table 4-35. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050105.

PERMIT #	WET	$CBOD_5$	*E. coli*	NH_3	TRC	TSS	SETTLEABLE SOLIDS	DO	pH
TN0020532	X	X	X	X	X	X	X	X	X

Table 4-36. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050105. *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.A.v.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS				
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs
847	1,593	14	<5	<5

Table 4-37. Summary of Livestock Count Estimates in Subwatershed 060102050105. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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
Campbell	4,083	7,684	66	8	14

Table 4-38. Summary of Livestock Count Estimates in Campbell County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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)
Campbell	250.3	250.2	2.6	10.6

Table 4-39. Forest Acreage and Annual Removal Rates (1987-1994) in Campbell County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.73
Grass (Hayland)	1.78
Legumes, Grass (Hayland)	0.44
Grass, Forbs, Legumes (Mixed Pasture)	2.74
Tobacco (Row Crops)	15.11
Other Vegetable and Truck Crops	3.33
Farmsteads and Ranch Headquarters	0.07

Table 4-40. Annual Estimated Total Soil Loss in Subwatershed 051302050105.

4.2.A.vi. 060102050106 (Cove Creek).

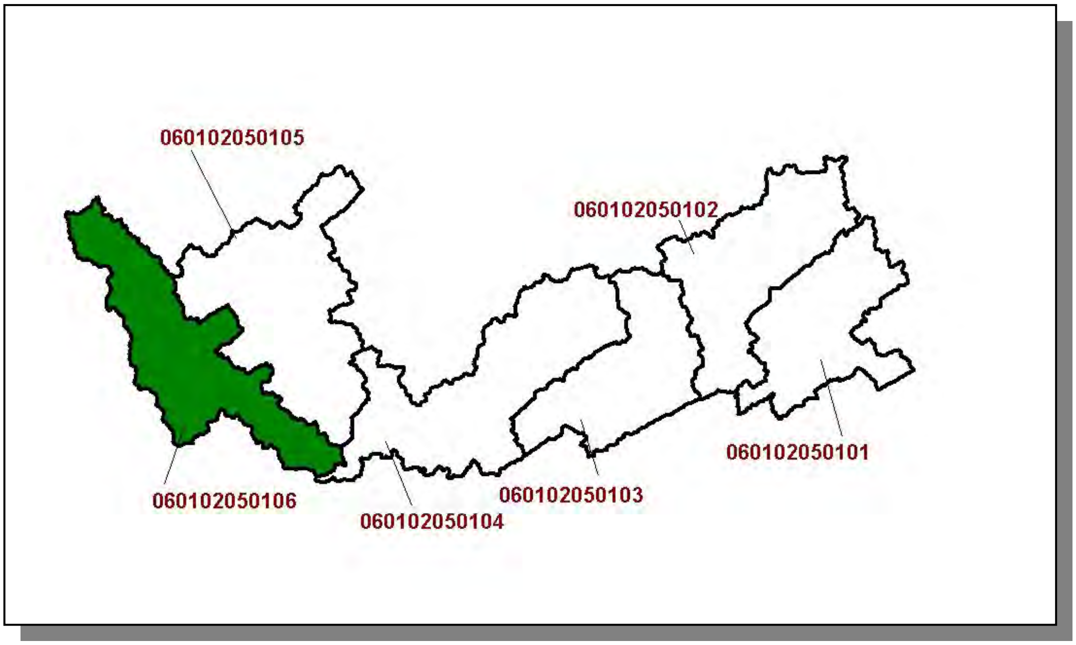


Figure 4-45. Location of Subwatershed 060102050106. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

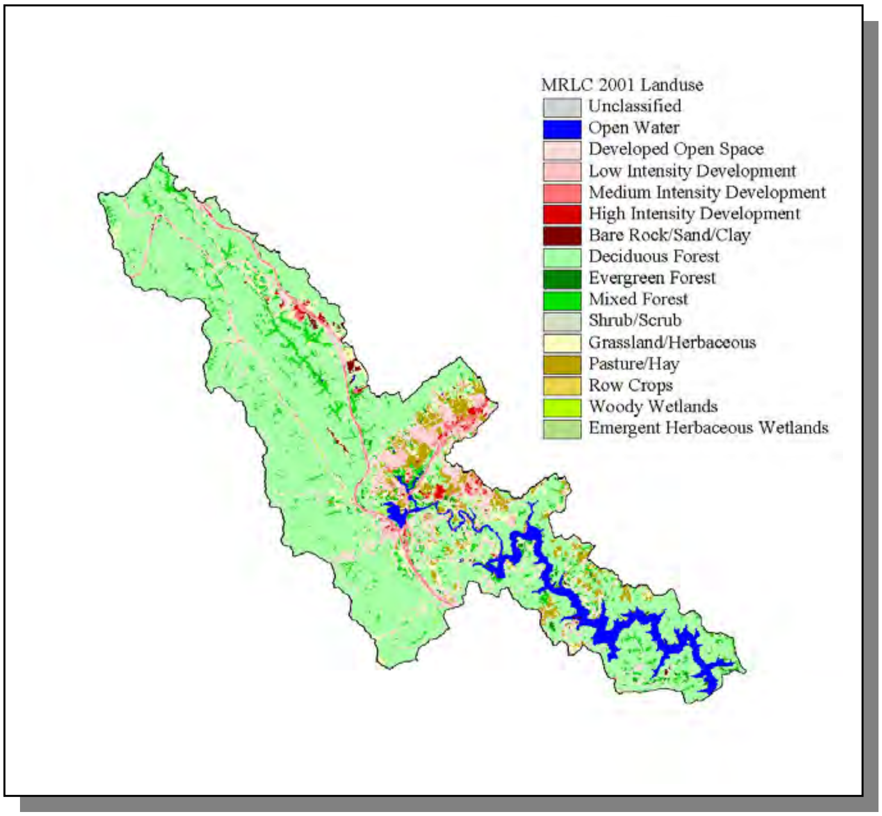


Figure 4-46. Illustration of Land Use Distribution in Subwatershed 060102050106.

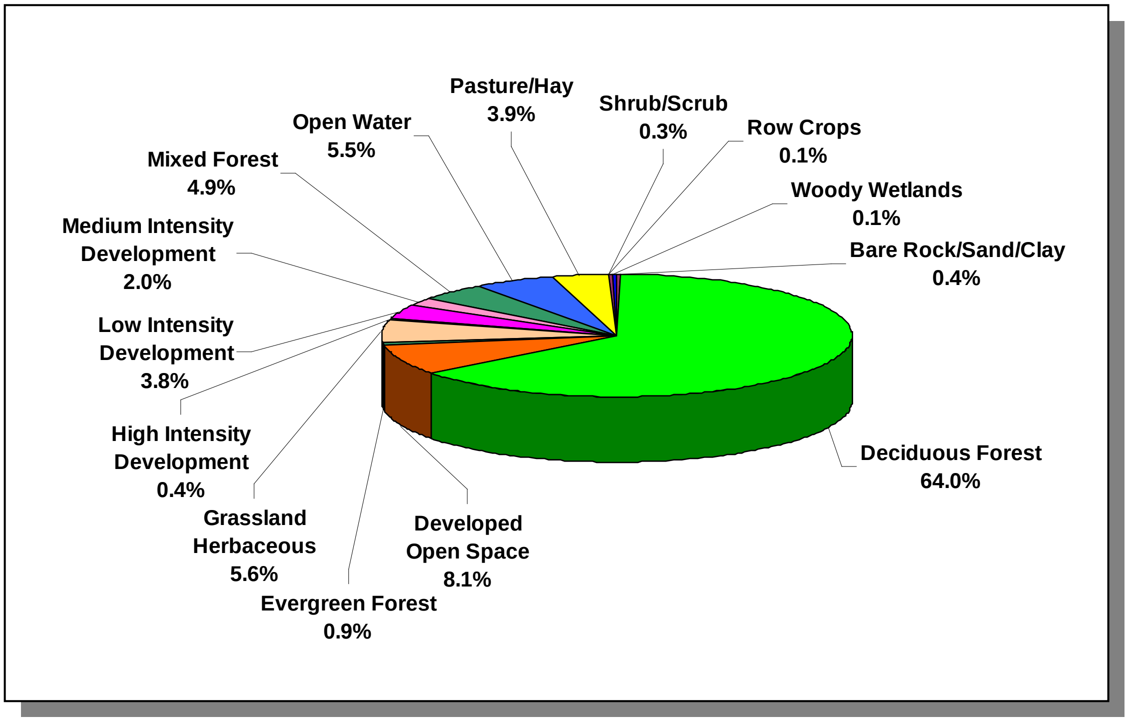


Figure 4-47. Land Use Distribution in Subwatershed 060102050106. *More information is provided in Appendix IV.*

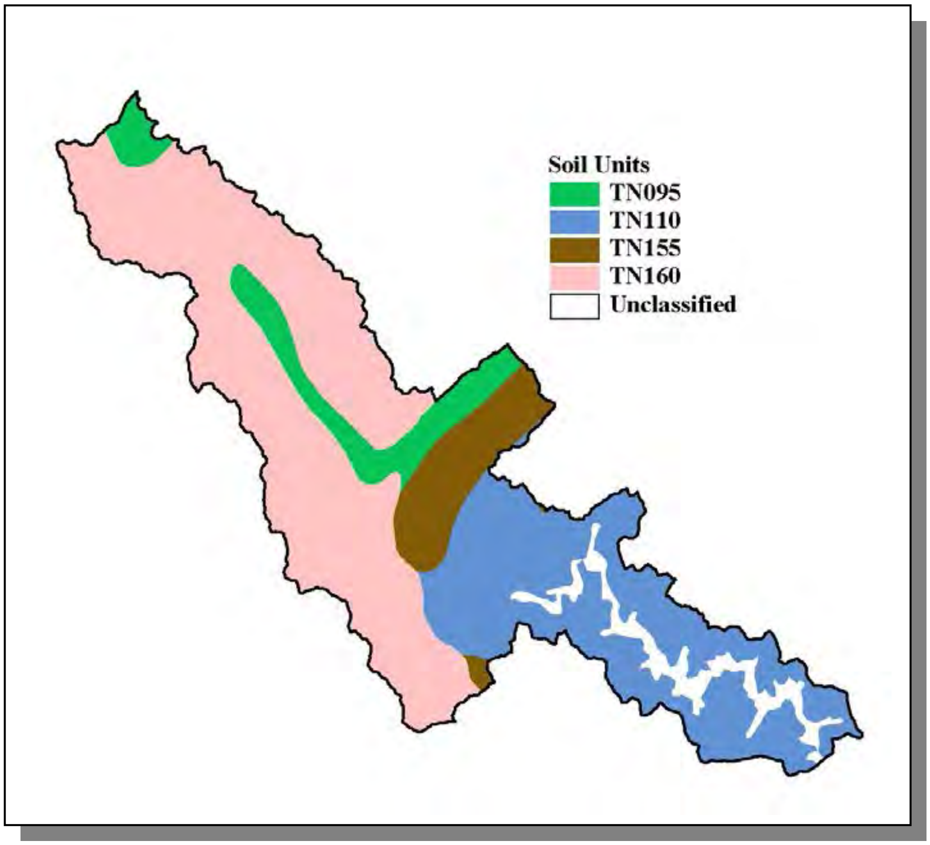


Figure 4-48. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050106.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN095	0.00	B	2.35	5.12	Loam	0.31
TN110	0.00	B	2.22	4.96	Loam	0.31
TN155	0.00	C	1.71	5.31	Loam	0.32
TN160	0.00	B	2.69	5.36	Loam	0.25

Table 4-41. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050106. *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)
Anderson	68,250	71,498	71,330	0.13	89	93	93	4.5
Campbell	35,079	37,878	39,854	11.63	4,079	4,405	4,634	13.6
Total	**103,329**	**109,376**	**111,184**		**4,168**	**4,498**	**4,727**	**13.4**

Table 4-42. Population Estimates in Subwatershed 060102050106.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Caryville	Campbell	1,750	736	439	281	16
Jacksboro	Campbell	1,568	650	519	127	4
LaFollette	Campbell	7,192	3,116	2,745	366	5
Total		**10.510**	**4,502**	**3,703**	**774**	**25**

Table 4-43. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060102050106.

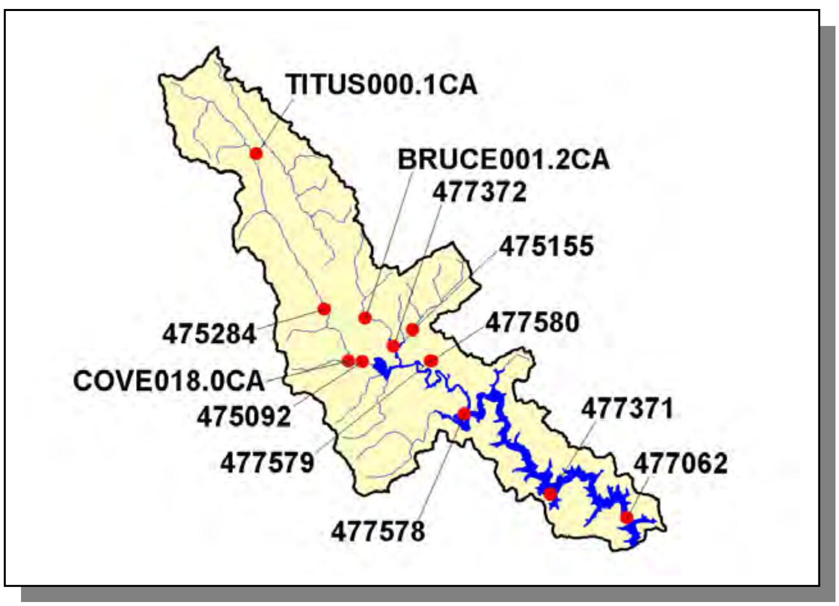


Figure 4-49. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050106. *More information, including site names and locations, is provided in Appendix IV.*

4.2.A.vi.a. Point Source Contributions.

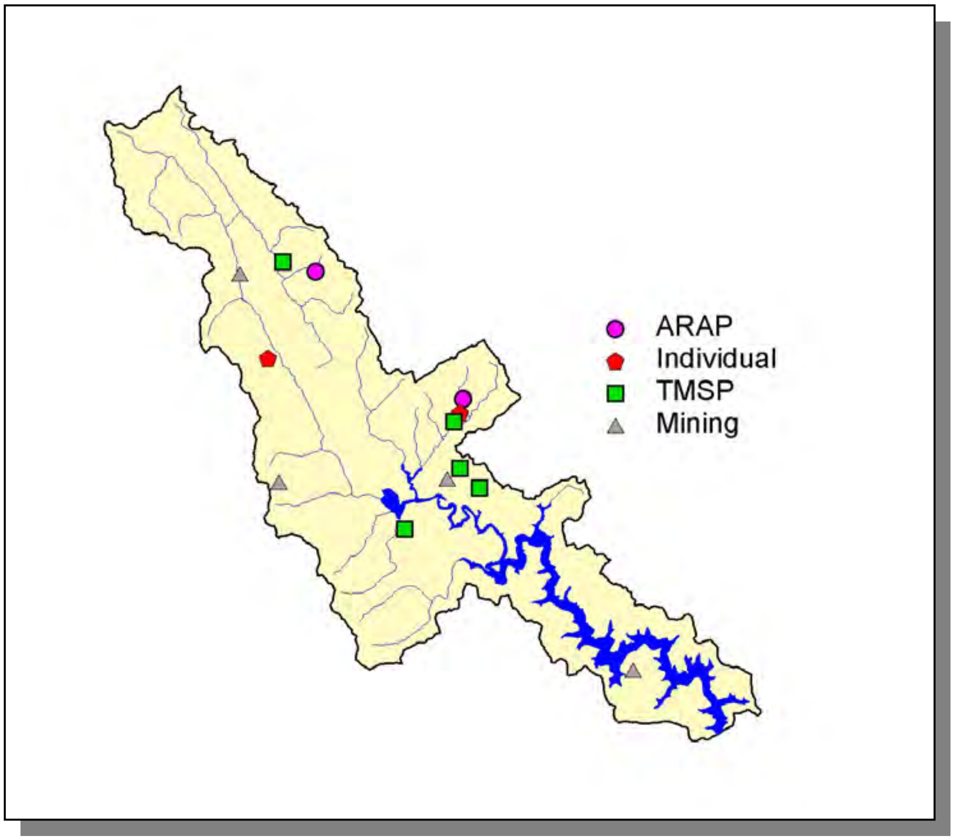


Figure 4-50. Location of Permits Issued in Subwatershed 060102050106. *More information, including the names of facilities, is provided in Appendix IV.*

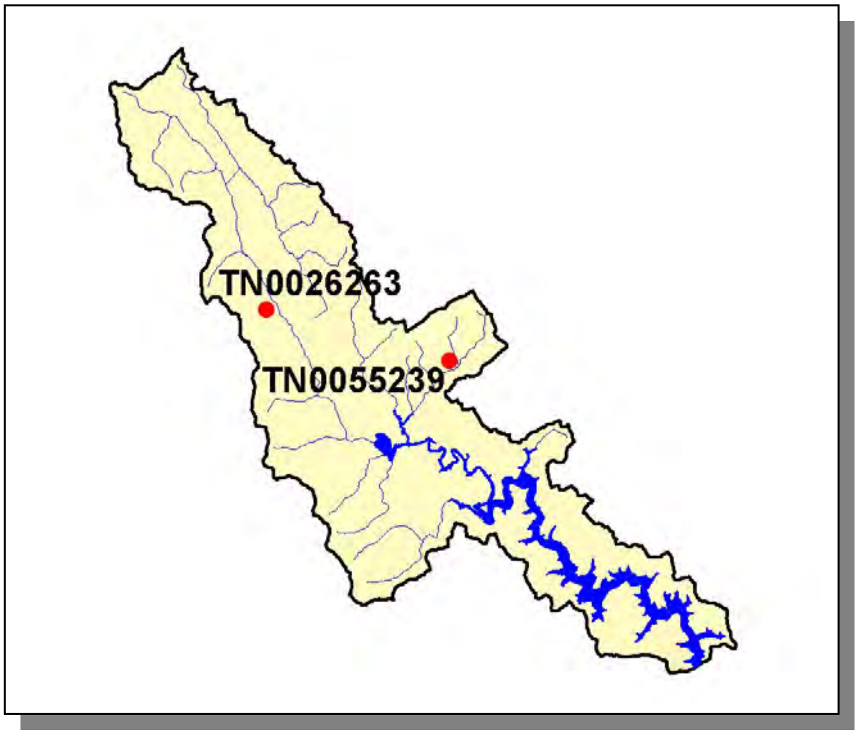


Figure 4-51. Location of Active NPDES Sites in Subwatershed 060102050106. More information, including the names of facilities, is provided in Appendix IV.

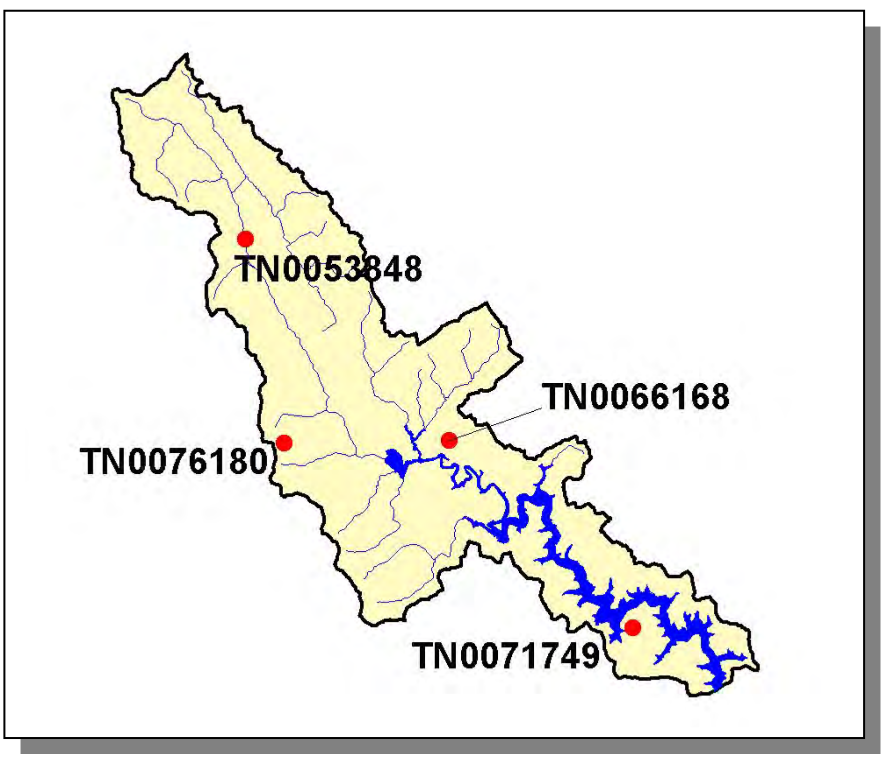


Figure 4-52. Location of Active Mining Sites in Subwatershed 060102050106. More nformation, including the names of mining operations, is provided in Appendix IV.

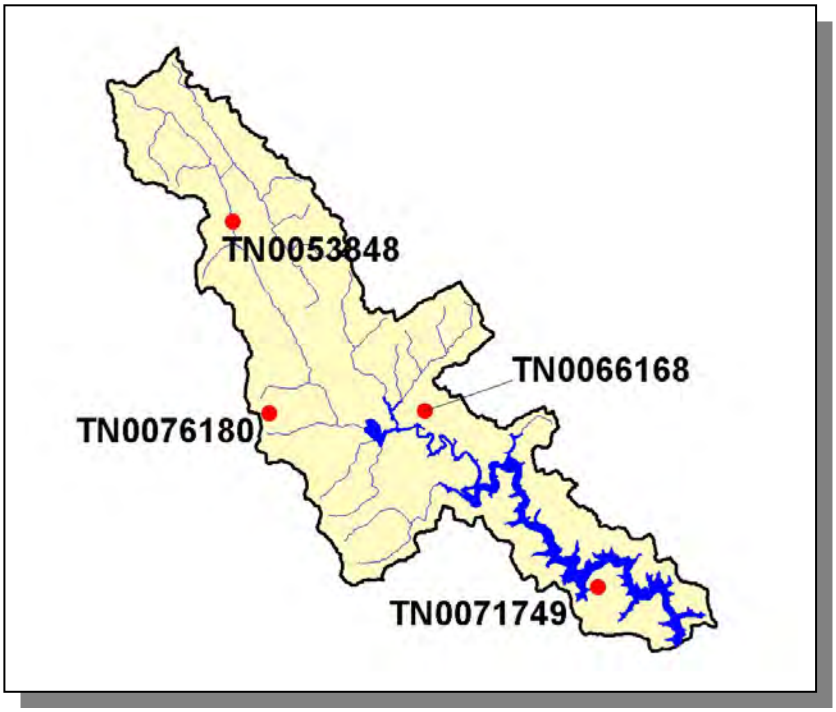


Figure 4-53. Location of Permitted Herbicide Application Sites in Subwatershed 060102050106. *More information is provided in Appendix IV.*

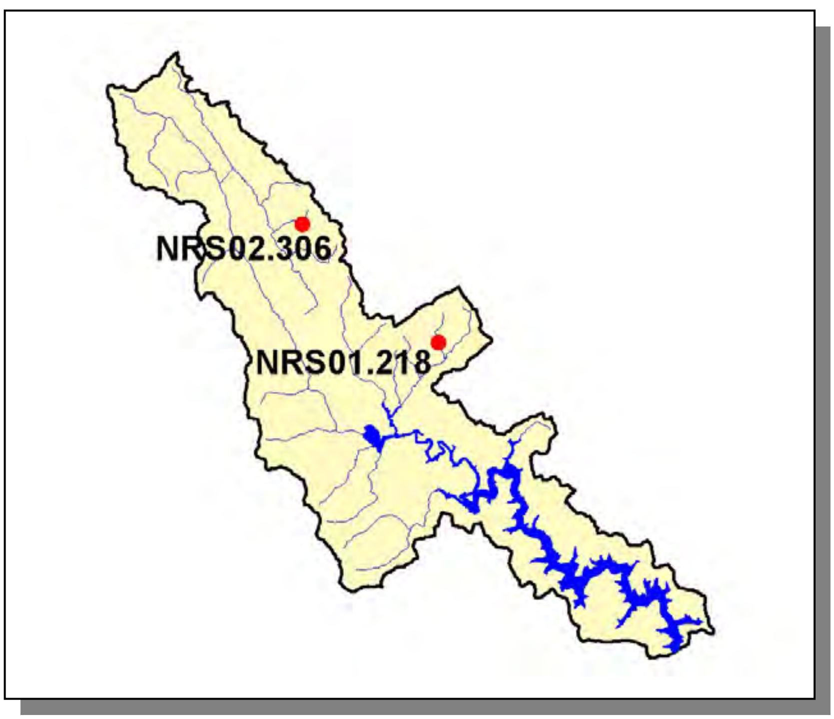


Figure 4-54. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 060102050106. *More information is provided in Appendix IV.*

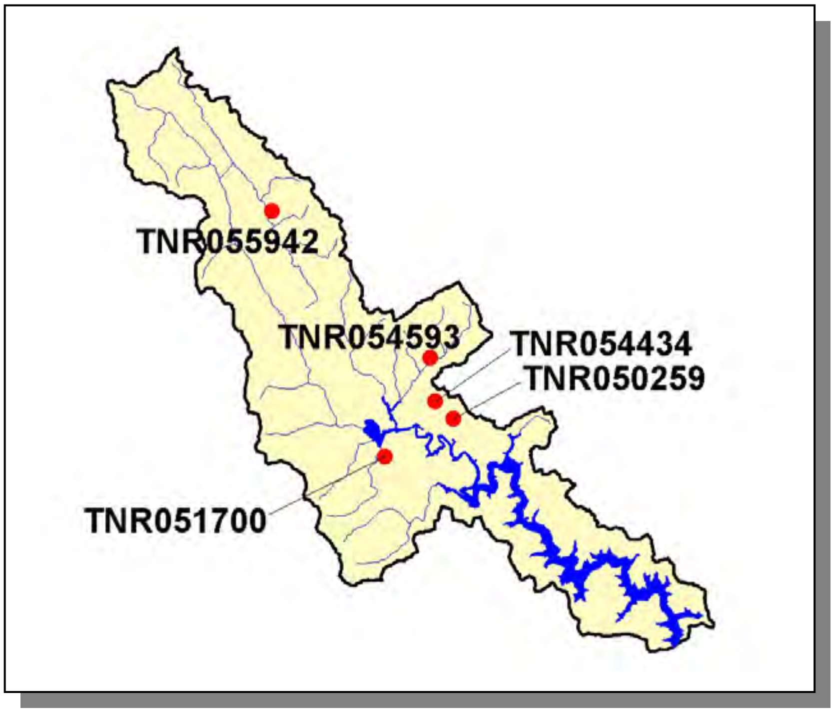


Figure 4-55. Location of TMSP Sites in Subwatershed 060102050106. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.vi.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS				
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs
304	573	5	<5	<5

Table 4-44. Summary of Livestock Count Estimates in Subwatershed 060102050106. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Anderson	4,449	9,458	335	769	0	135
Campbell	4,083	7,684	66	8	14	0

Table 4-45. Summary of Livestock Count Estimates in Anderson and Campbell Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Anderson	124.0	124.0	2.6	6.2
Campbell	250.3	250.2	2.6	10.6

Table 4-46. Forest Acreage and Annual Removal Rates (1987-1994) in Anderson and Campbell Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.73
Grass (Hayland)	1.77
Legumes, Grass (Hayland)	0.46
Legumes (Hayland)	1.07
Grass, Forbs, Legumes (Mixed Pasture)	2.73
Tobacco (Row Crops)	15.01
Other Vegetable and Truck Crops	3.40
Other Land in Farms	0.23
Farmsteads and Ranch Headquarters	0.08

Table 4-47. Annual Estimated Total Soil Loss in Subwatershed 060102050106.

4.2.B. 0601020505.

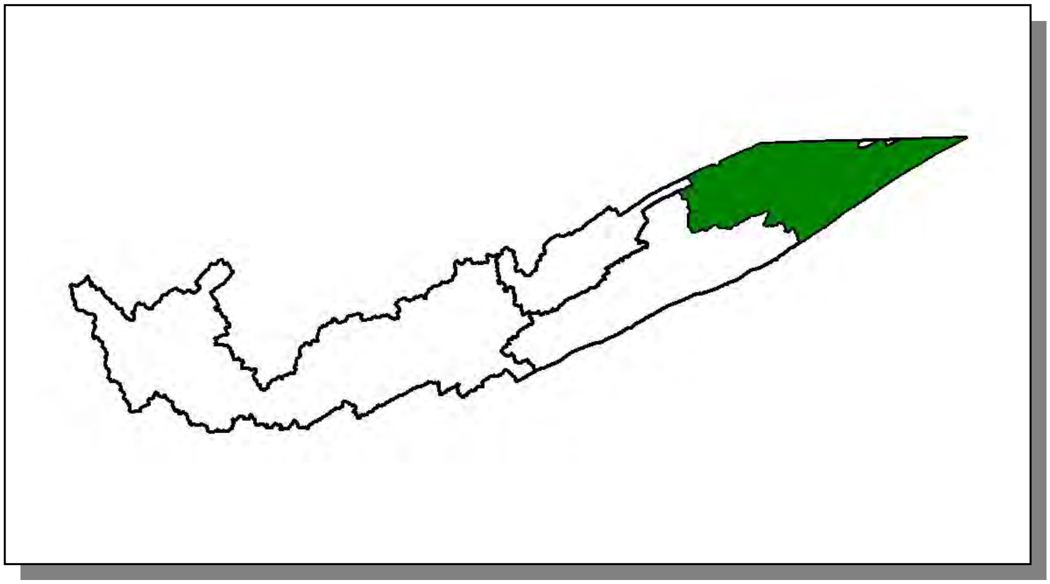


Figure 4-56. Location of Subwatershed 0601020505. *All Upper Clinch River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.B.i. 060102050502 (Clinch River).

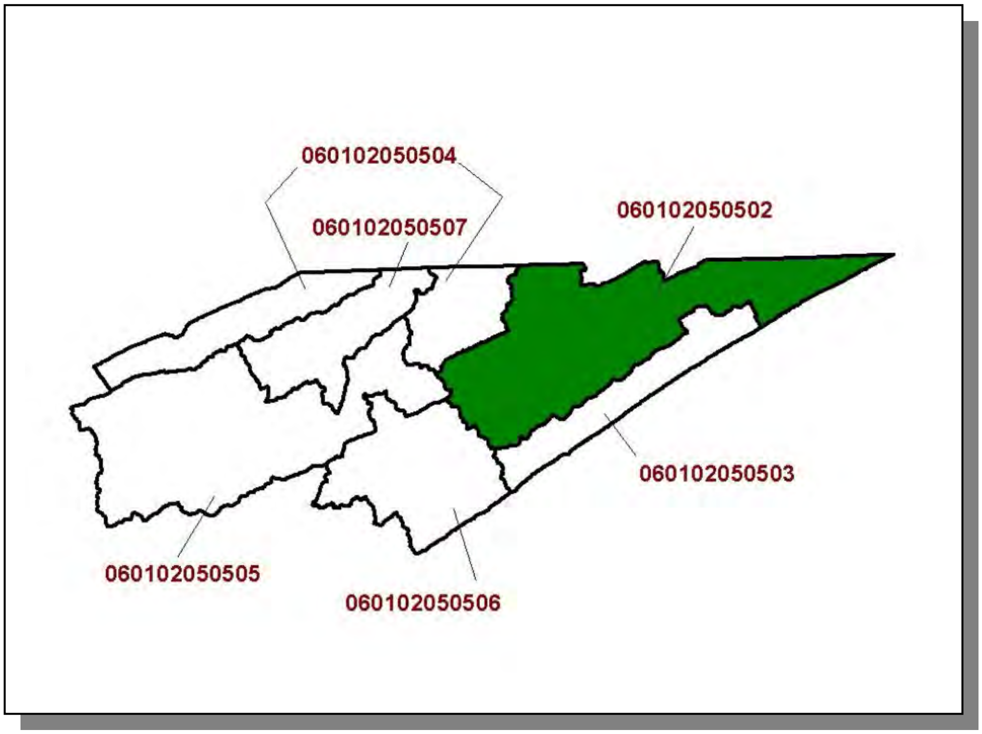


Figure 4-57. Location of Subwatershed 060102050502. *All HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

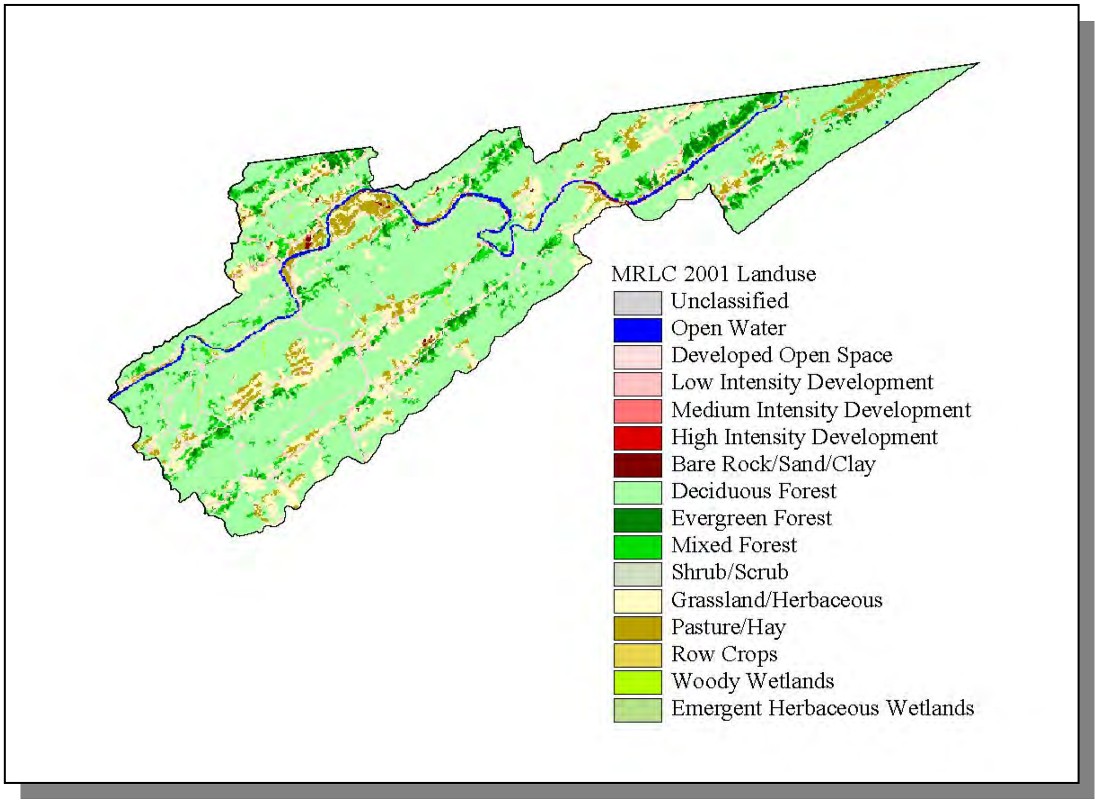


Figure 4-58. Illustration of Land Use Distribution in Subwatershed 060102050502.

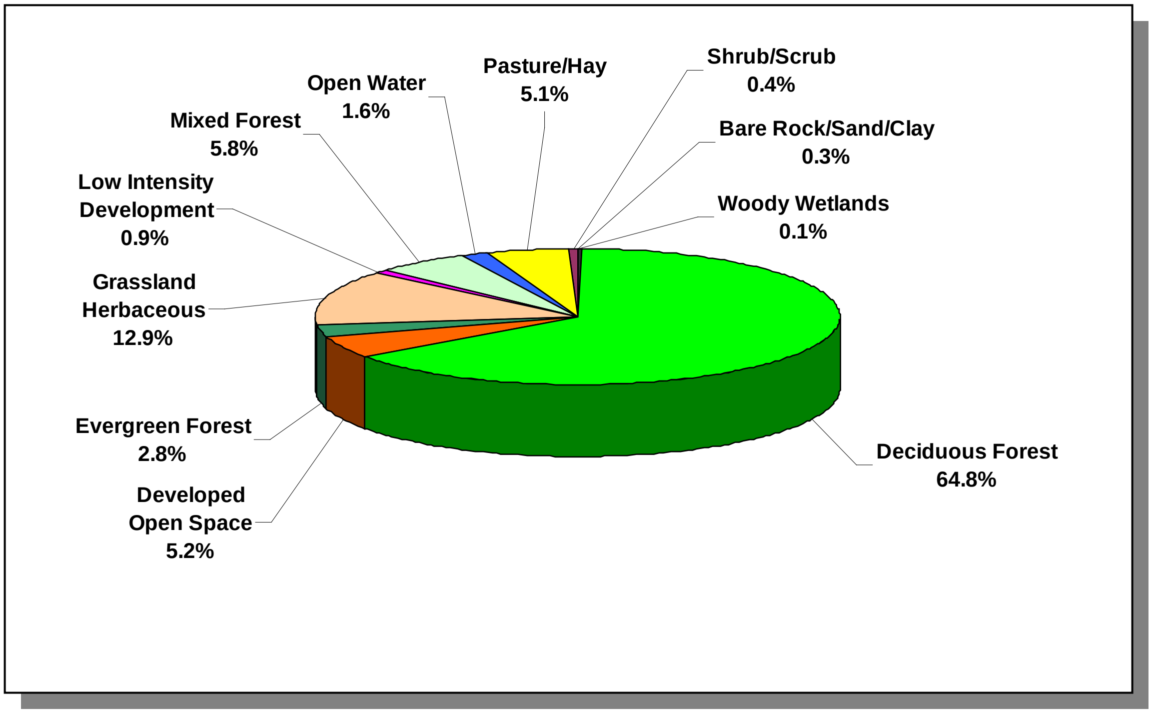


Figure 4-59. Land Use Distribution in Subwatershed 060102050502. *More information is provided in Appendix IV.*

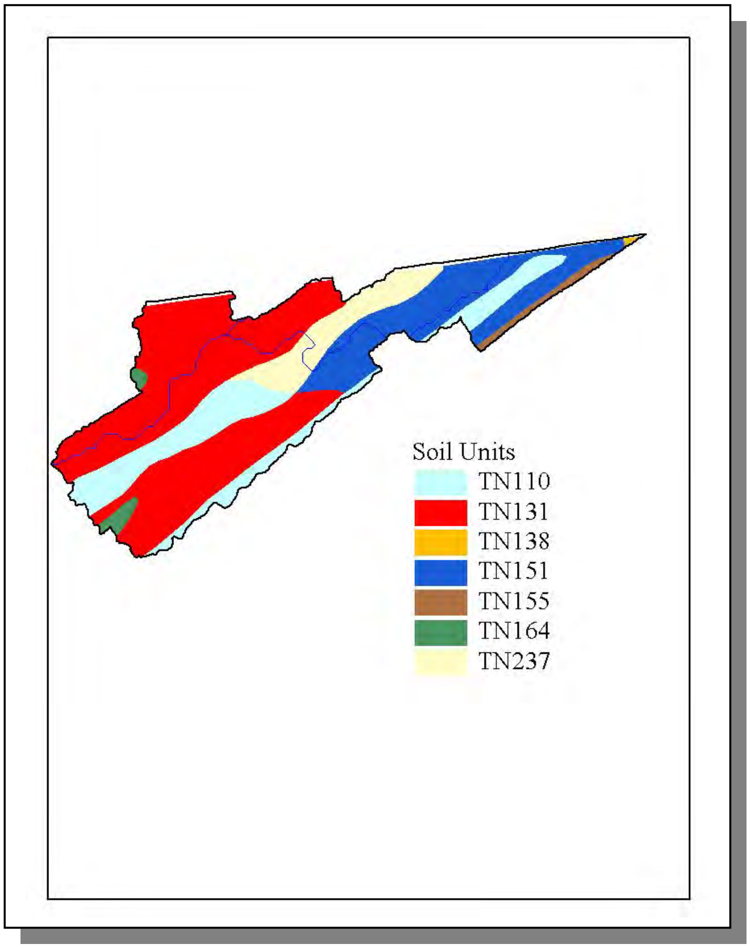


Figure 4-60. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050502.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN151	0.00	C	2.88	4.75	Loam	0.40
TN155	0.00	C	1.71	5.31	Loam	0.32
TN164	0.00	C	4.84	5.15	Loam	0.25
TN237	0.00	B	3.36	5.40	Silty Loam	0.32

Table 4-48. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050502. *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)
Hancock	6,739	6,801	6,786	10.8	728	734	733	0.7
Hawkins	44,565	48,821	53,563	2.27	1,010	1,107	1,214	20.2
Total	**51,304**	**55,622**	**60,349**		**1,738**	**1,841**	**1,947**	**12.0**

Table 4-49. Population Estimates in Subwatershed 060102050502.

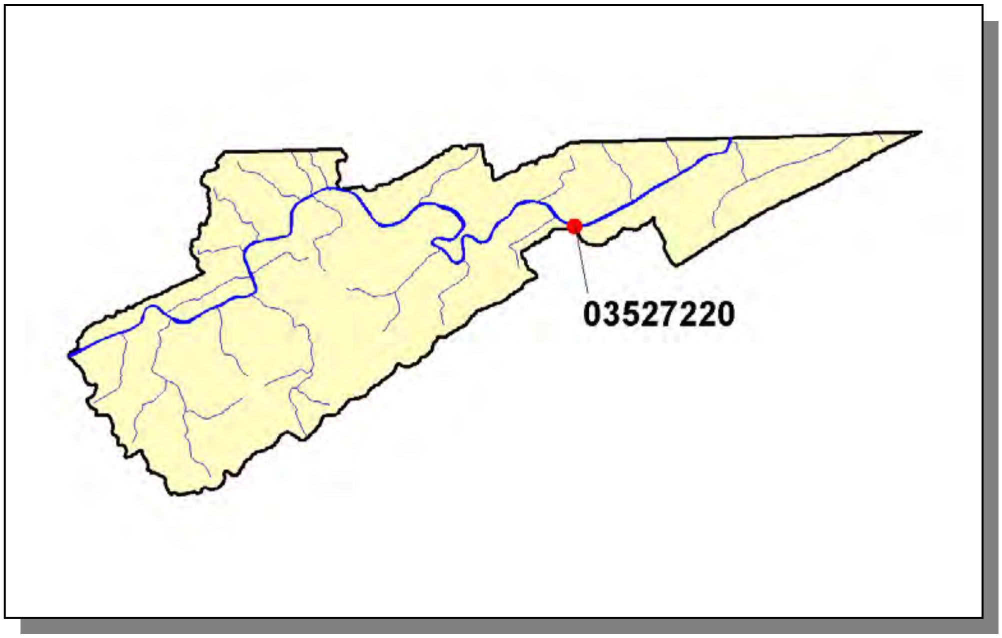


Figure 4-61. Location of Historical Streamflow Data Collection Sites in Subwatershed 060102050502. *More information is provided in Appendix IV.*

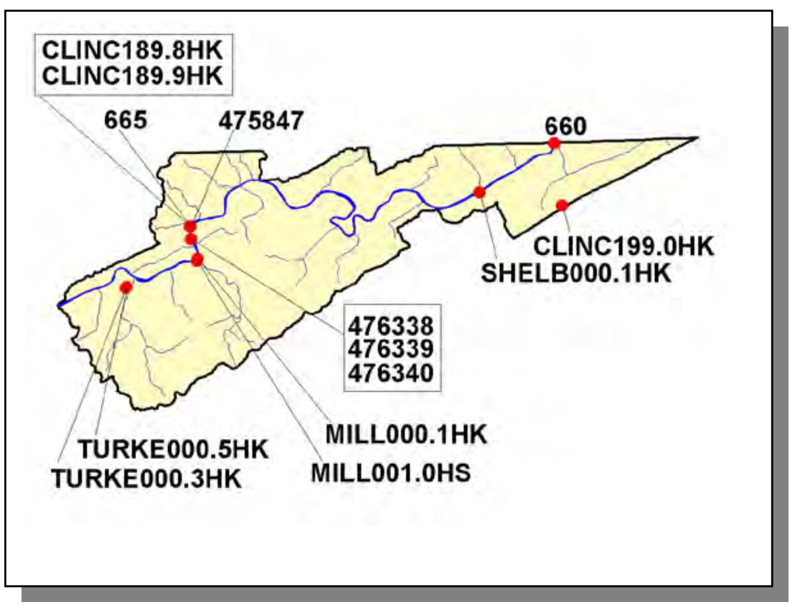


Figure 4-62. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050502. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

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

There are no point source contributions in this subwatershed.

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

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
557	1,113	13	<5	<5	6

Table 4-50. Summary of Livestock Count Estimates in Subwatershed 060102050502. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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
Hancock	7,079	14,311	89	364	0	67
Hawkins	18,796	36,429	903	1,079	442	243

Table 4-51. Summary of Livestock Count Estimates in Hancock and Hawkins Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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)
Hancock	92.9	92.9	2.7	14.2
Hawkins	177.4	177.4	0.4	2.1

Table 4-52. Forest Acreage and Annual Removal Rates (1987-1994) in Hancock and Hawkins Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.81
Grass (Hayland)	0.62
Legumes, Grass (Hayland)	0.40
Legumes (Hayland)	0.16
Grass, Forbs, Legumes (Mixed Pasture)	0.71
Corn (Row Crops)	2.42
Tobacco (Row Crops)	20.90
Other Vegetable and Truck Crops	33.50
Farmsteads and Ranch Headquarters	0.15

Table 4-53. Annual Estimated Total Soil Loss in Subwatershed 060102050502.

4.2.B.ii. 060102050503 (War Creek).

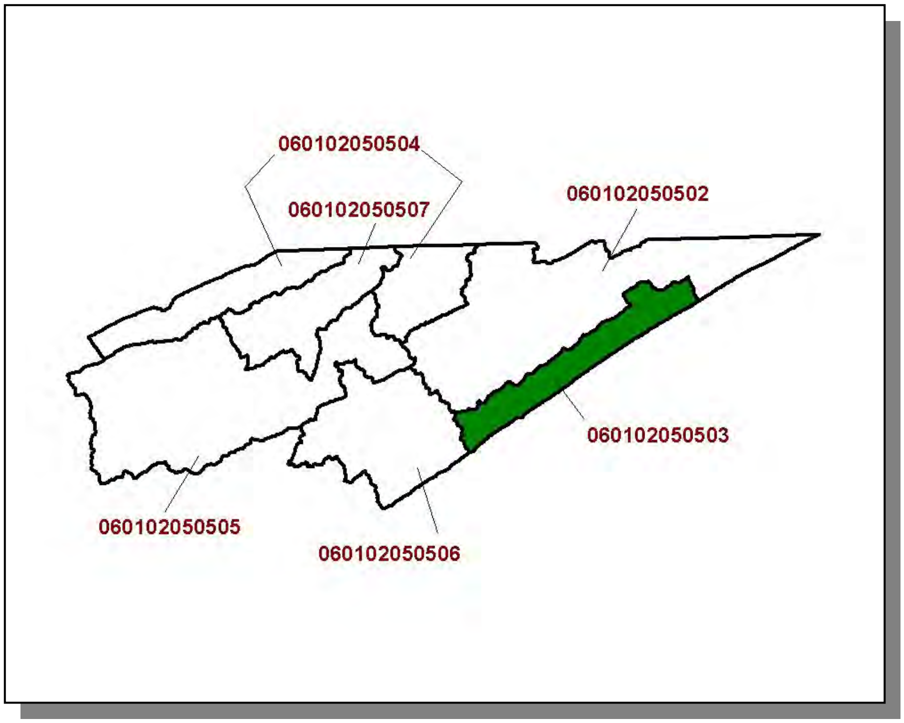


Figure 4-63. Location of Subwatershed 060102050503. *All Upper Clinch River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

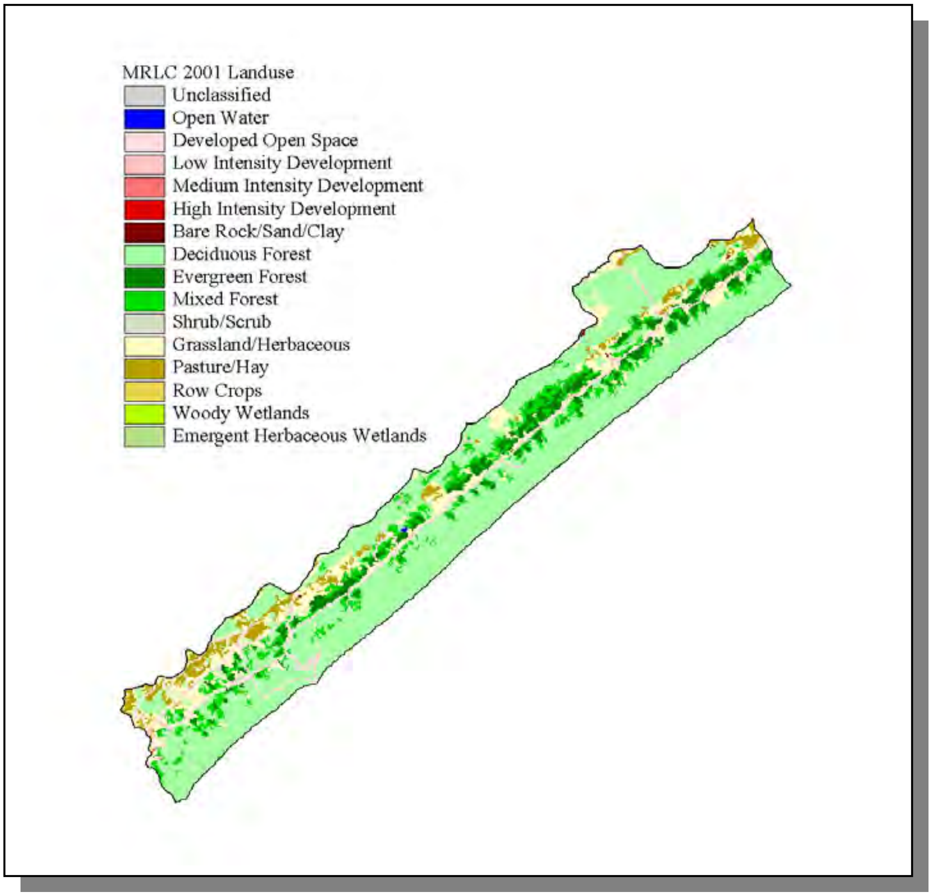


Figure 4-64. Illustration of Land Use Distribution in Subwatershed 060102050503.

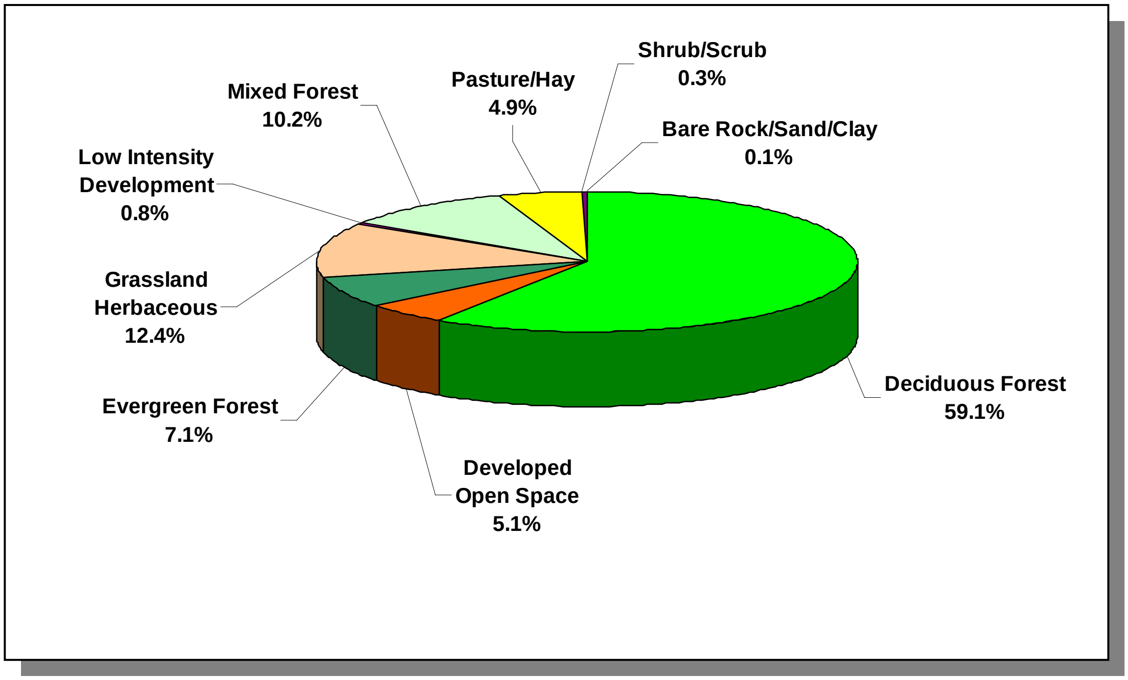


Figure 4-65. Land Use Distribution in Subwatershed 060102050503. *More information is provided in Appendix IV.*

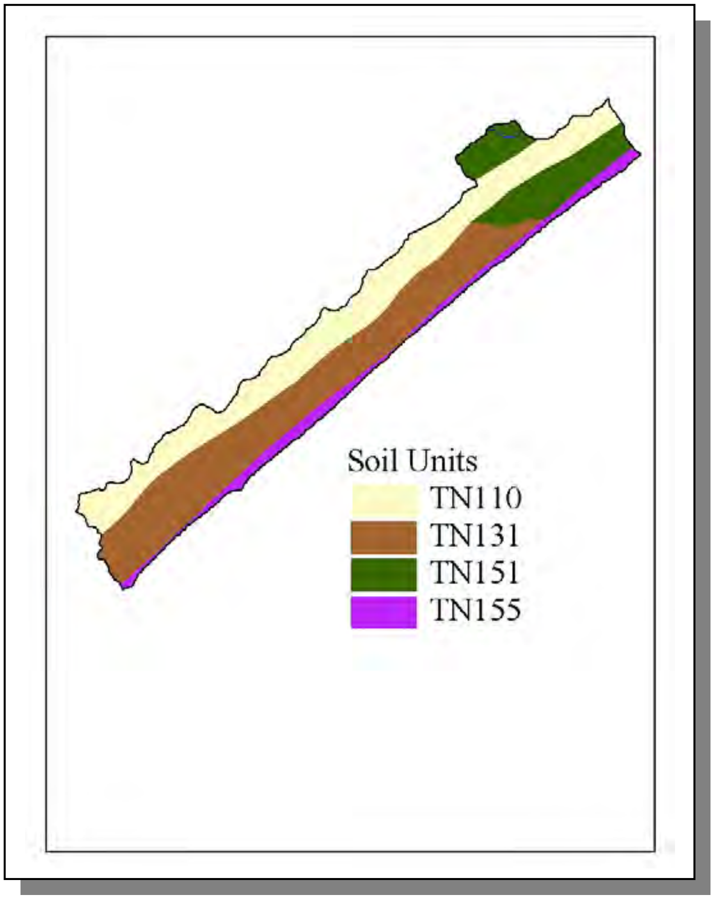


Figure 4-66. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050503.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN151	0.00	C	2.88	4.75	Loam	0.40
TN155	0.00	C	1.71	5.31	Loam	0.32

Table 4-54. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050503. *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)
Hancock	6,739	6,801	6,786	1.55	105	106	105	0.0
Hawkins	44,565	48,821	53,563	1.55	691	757	830	20.1
Total	**51,304**	**55,622**	**60,349**		**796**	**863**	**935**	**17.5**

Table 4-55. Population Estimates in Subwatershed 060102050503.

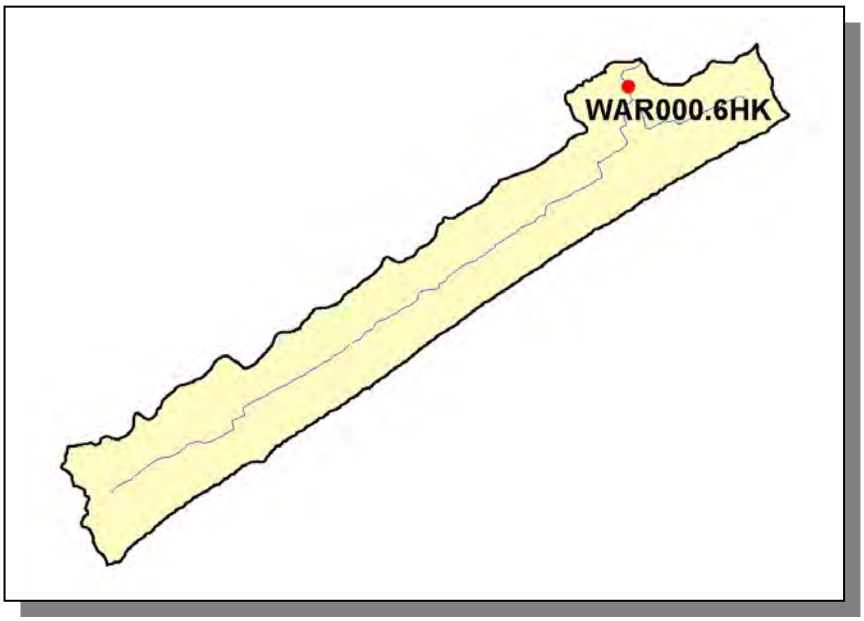


Figure 4-67. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050503. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

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

There are no point source contributions in this subwatershed.

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

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
167	326	7	<5	<5	<5

Table 4-56. Summary of Livestock Count Estimates in Subwatershed 060102050503. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Hancock	7,079	14,311	89	364	0	67
Hawkins	18,796	36,429	903	1,079	442	243

Table 4-57. Summary of Livestock Count Estimates in Hancock and Hawkins Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Hancock	92.9	92.9	2.7	14.2
Hawkins	177.4	177.4	0.4	2.1

Table 4-58. Forest Acreage and Annual Removal Rates (1987-1994) in Hancock and Hawkins Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.96
Grass (Hayland)	0.59
Legumes, Grass (Hayland)	0.40
Legumes (Hayland)	0.16
Grass, Forbs, Legumes (Mixed Pasture)	0.62
Corn (Row Crops)	2.42
Tobacco (Row Crops)	18.44
Other Vegetable and Truck Crops	33.50
Farmsteads and Ranch Headquarters	0.29

Table 4-59. Annual Estimated Total Soil Loss in Subwatershed 060102050503.

4.2.B.iii. 060102050504 (Blackwater Creek).

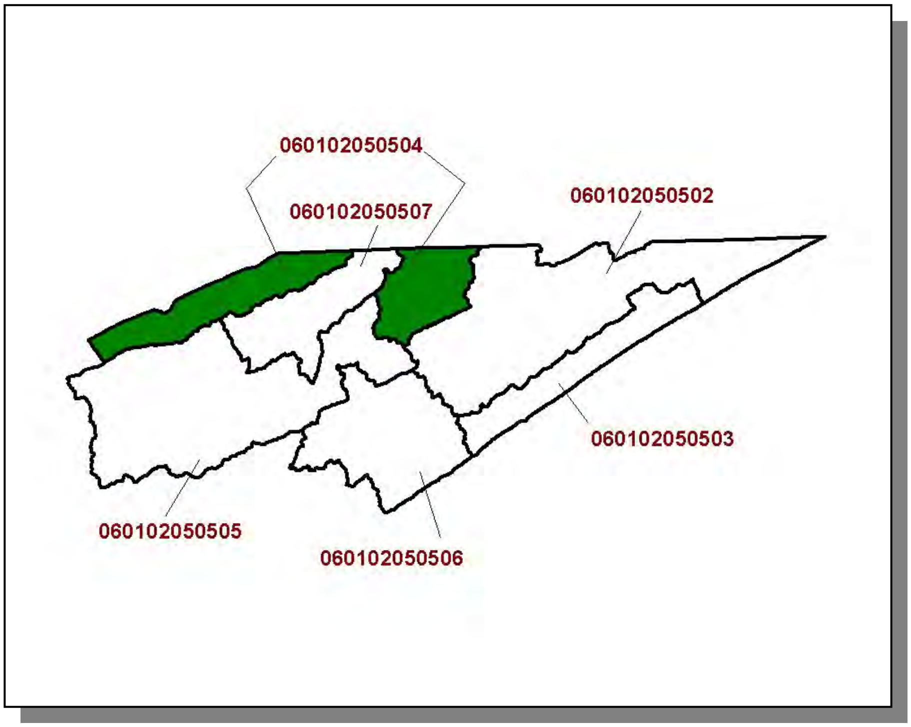


Figure 4-68. Location of the Tennessee Portion of Subwatershed 060102050504. *All Upper Clinch River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

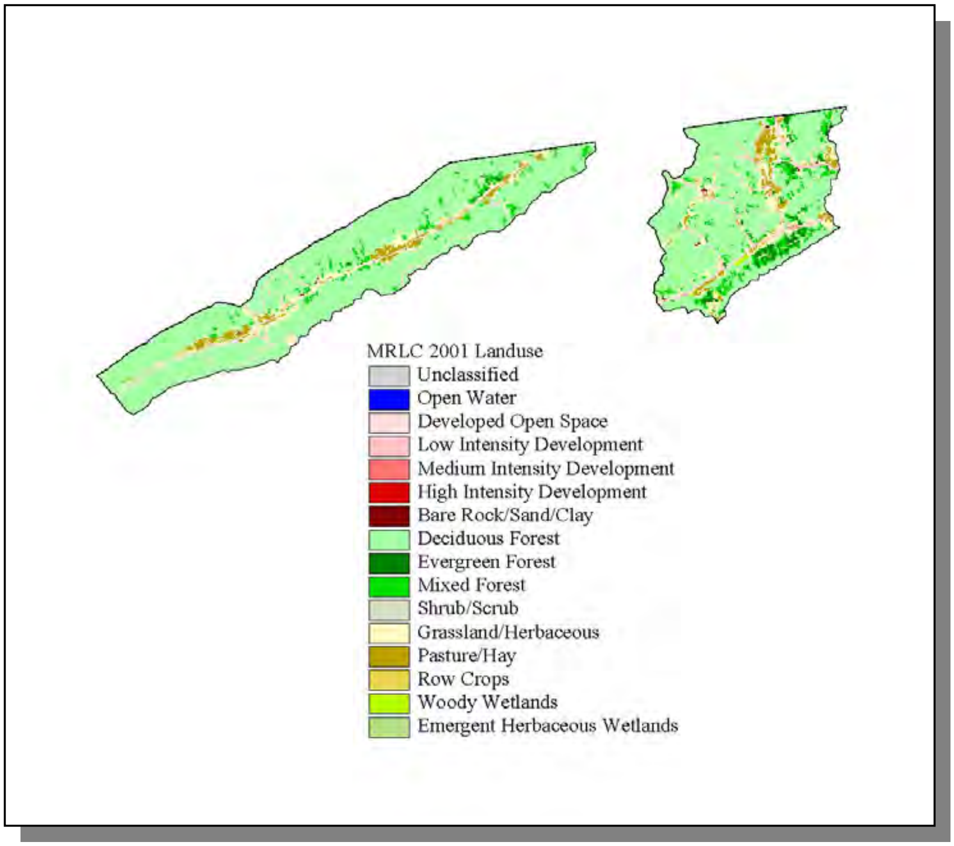


Figure 4-69. Illustration of Land Use Distribution in the Tennessee Portion of Subwatershed 060102050504.

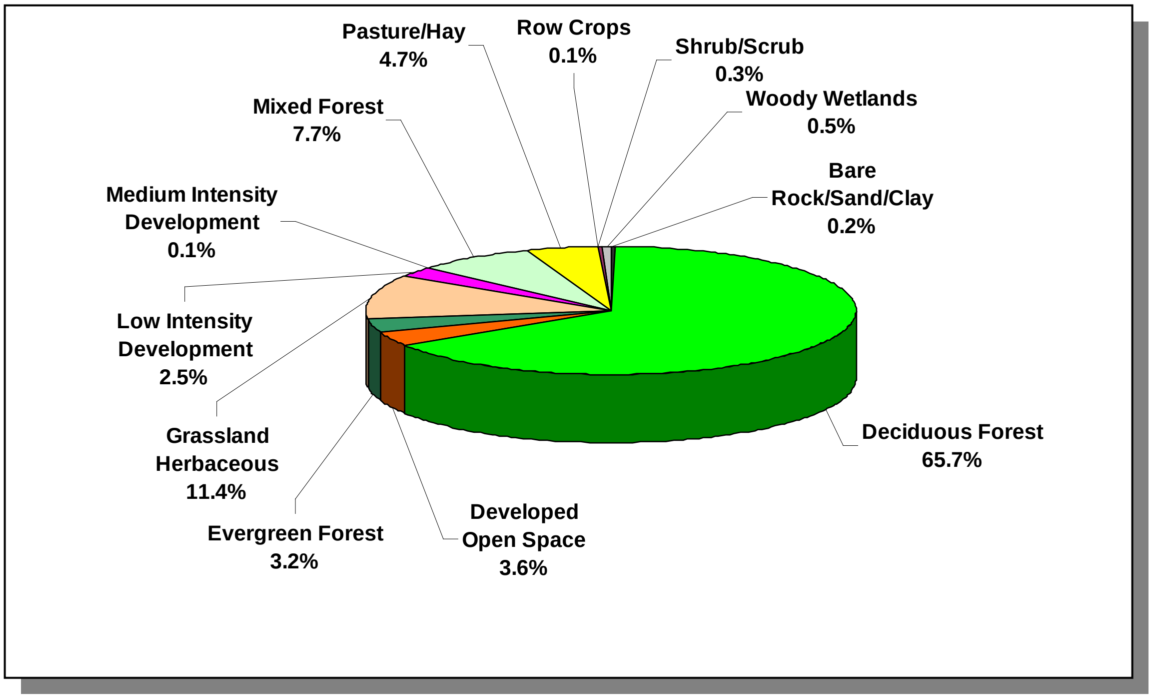


Figure 4-70. Land Use Distribution in the Tennessee Portion of Subwatershed 060102050504. *More information is provided in Appendix IV.*

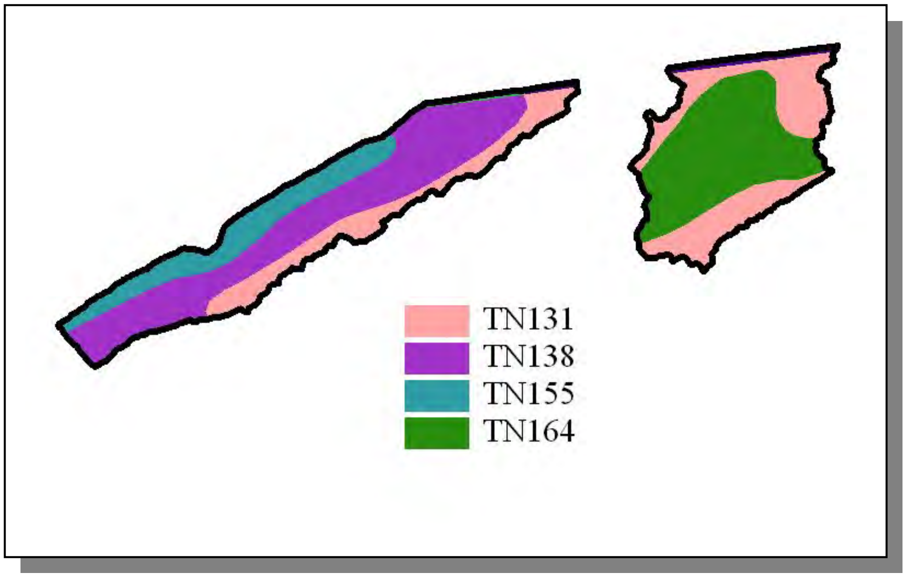


Figure 4-71. STATSGO (State Soil Geographic Database) Soil Map Units in the Tennessee Portion of Subwatershed 060102050504.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN155	0.00	C	1.71	5.31	Loam	0.32
TN164	0.00	C	4.48	5.15	Loam	0.25

Table 4-60. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in the Tennessee Portion of Subwatershed 060102050504. *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)
Hancock	6,739	6,801	6,786	4.5	303	306	305	0.7

Table 4-61. Population Estimates in Subwatershed 060102050504.

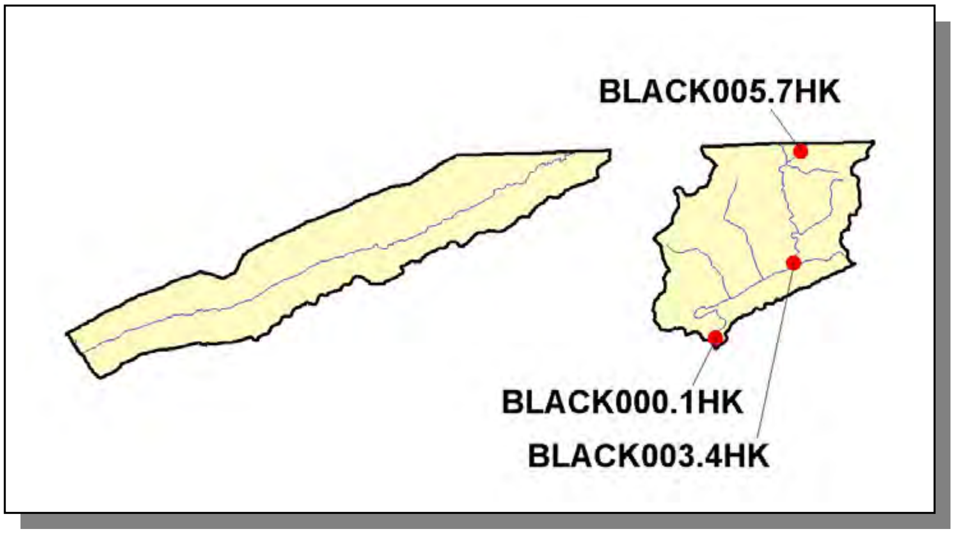


Figure 4-72. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050504. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

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

There are no point source contributions in this subwatershed.

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

LIVESTOCK COUNTS			
Beef Cow	Cattle	Milk Cow	Sheep
78	158	<5	<5

Table 4-62. Summary of Livestock Count Estimates in Subwatershed 060102050504. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/),* **“***Cattle” includes heifers, heifer calves, steers, bulls and bull calves.*

LIVESTOCK COUNTS					
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Sheep
Hancock	7,079	14,311	89	364	67

Table 4-63. Summary of Livestock Count Estimates in Hancock County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/),* **“***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)
Hancock	92.9	92.9	2.7	14.2

Table 4-64. Forest Acreage and Annual Removal Rates (1987-1994) in Hancock County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	2.54
Grass (Hayland)	0.65
Grass, Forbs, Legumes (Mixed Pasture)	0.79
Corn (Row Crops)	2.42
Tobacco (Row Crops)	23.03
Farmsteads and Ranch Headquarters	0.03

Table 4-65. Annual Estimated Total Soil Loss in Subwatershed 060102050504.

4.2.B.iv. 060102050505 (Clinch River).

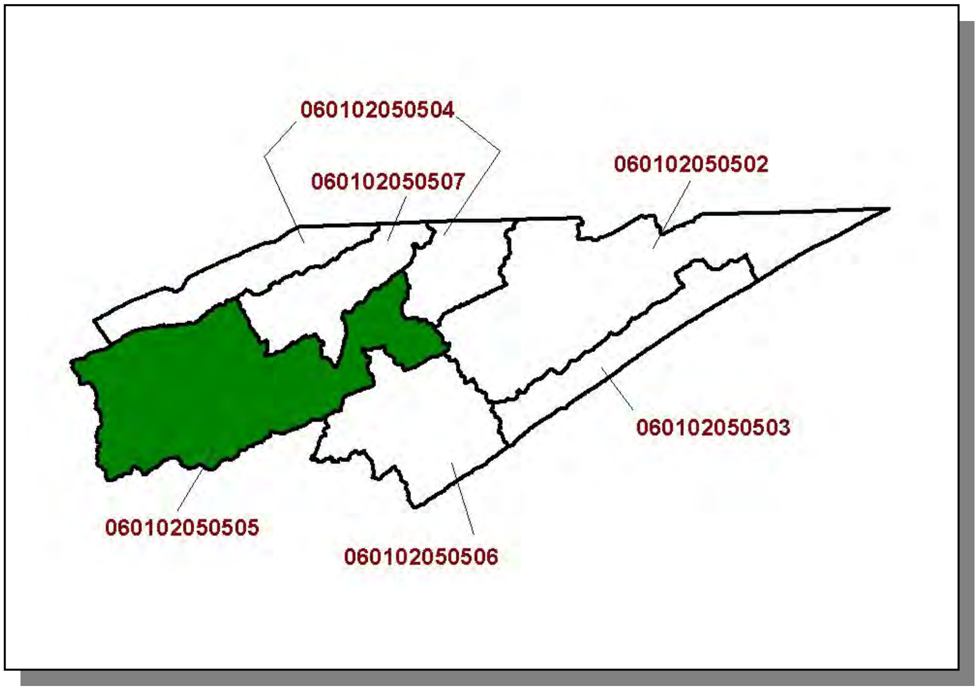


Figure 4-73. Location of Subwatershed 060102050505. *All Upper Clinch River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

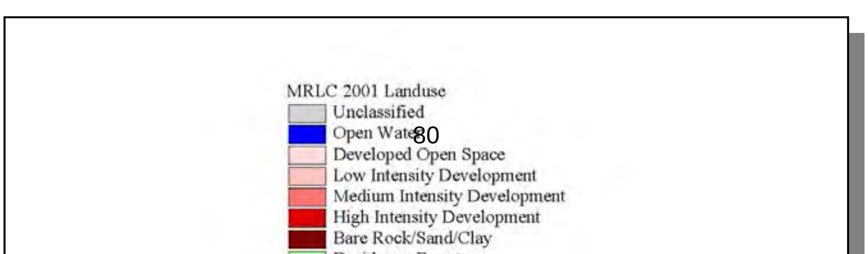


Figure 4-74. Illustration of Land Use Distribution in Subwatershed 060102050505.

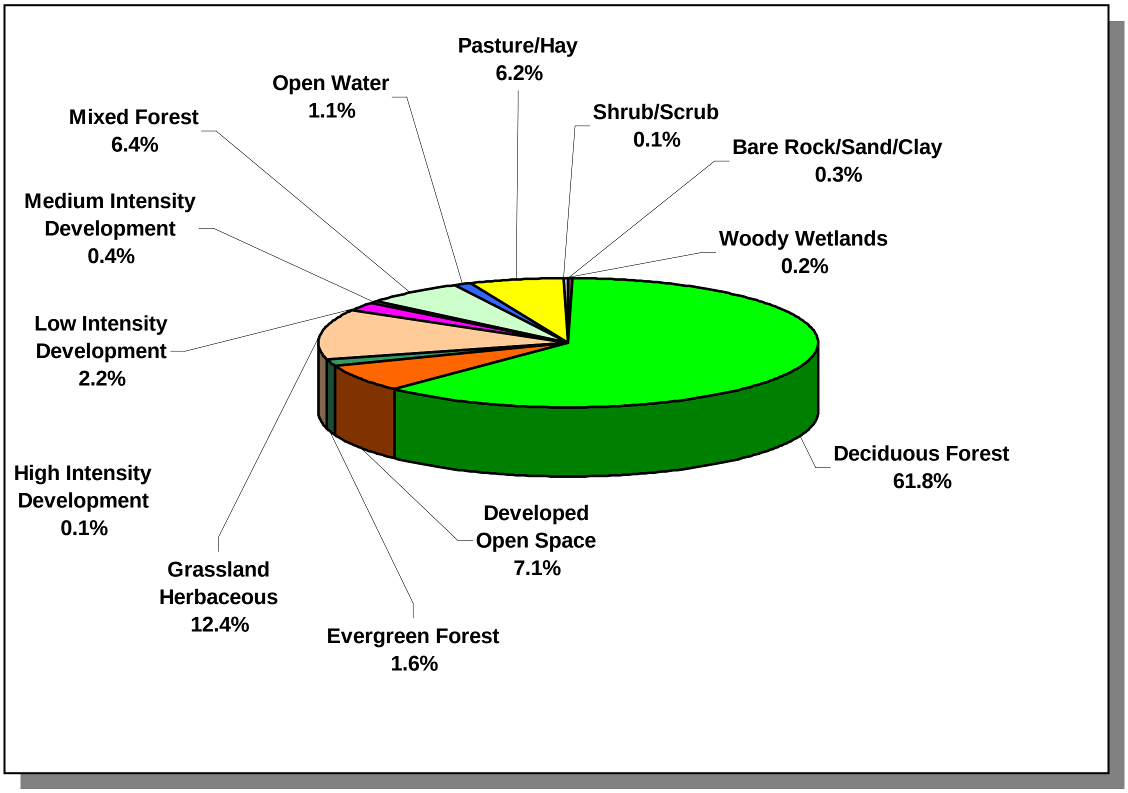


Figure 4-75. Land Use Distribution in Subwatershed 060102050505. *More information is provided in Appendix IV.*

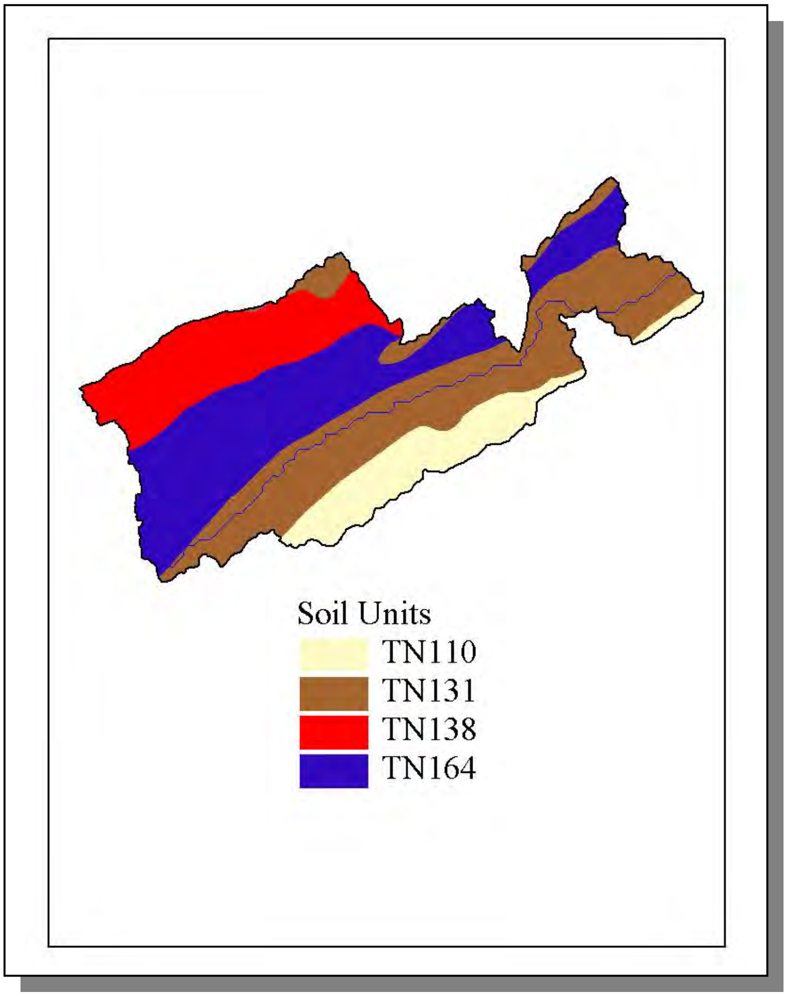


Figure 4-76. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050505.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN164	0.00	C	4.48	5.15	Loam	0.25

Table 4-66. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050505. *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)
Hancock	6,739	6,801	6,786	17.44	1,176	1,186	1,184	0.7

Table 4-67. Population Estimates in Subwatershed 060102050505.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Sneedville	Hancock	1,446	551	451	90	10

Table 4-68. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060102050505.

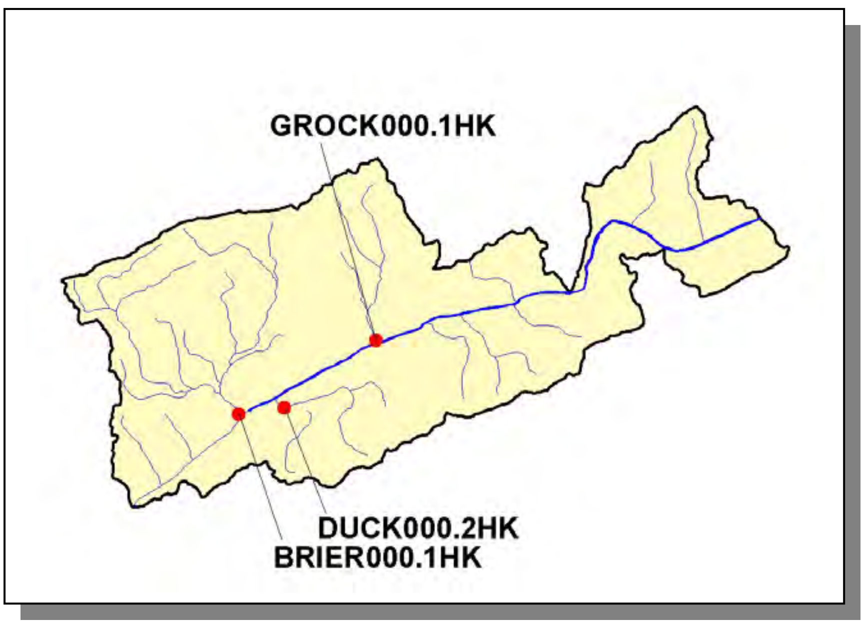


Figure 4-77. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050505. *More information, including site names and locations, is provided in Appendix IV.*

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

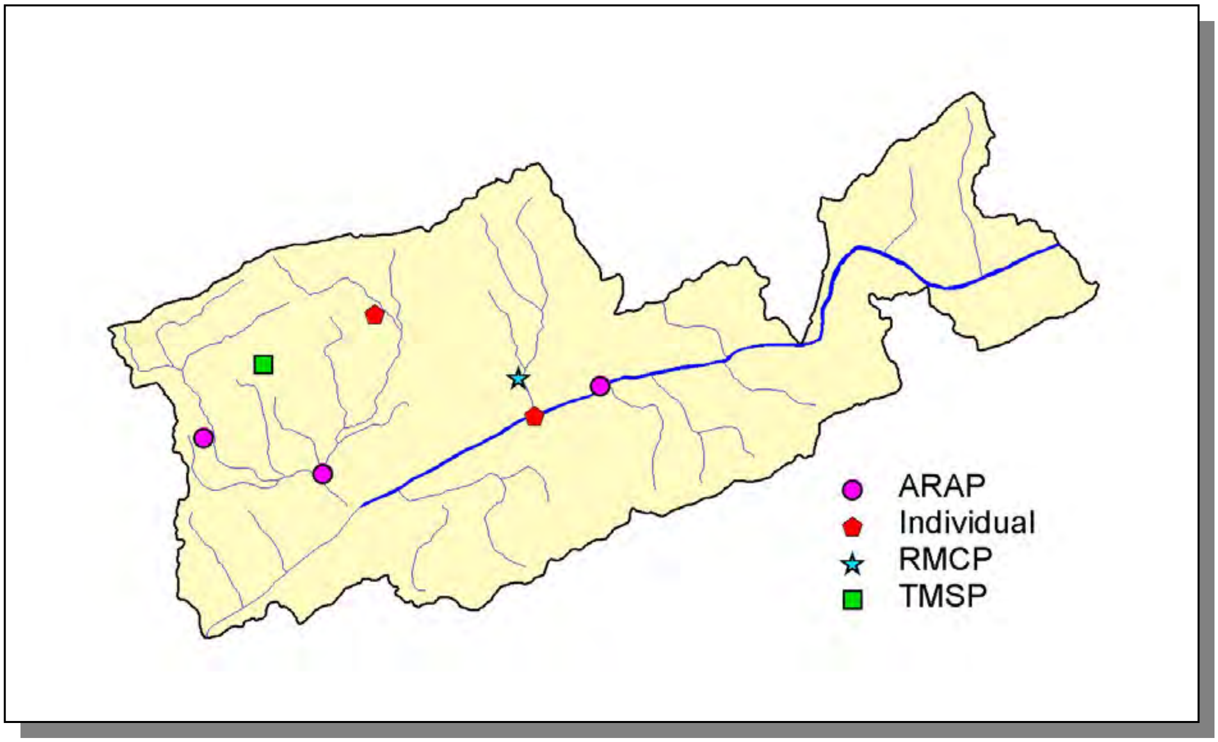


Figure 4-78. Location of Permits Issued in Subwatershed 060102050505. *More information, including the names of facilities, is provided in Appendix IV.*

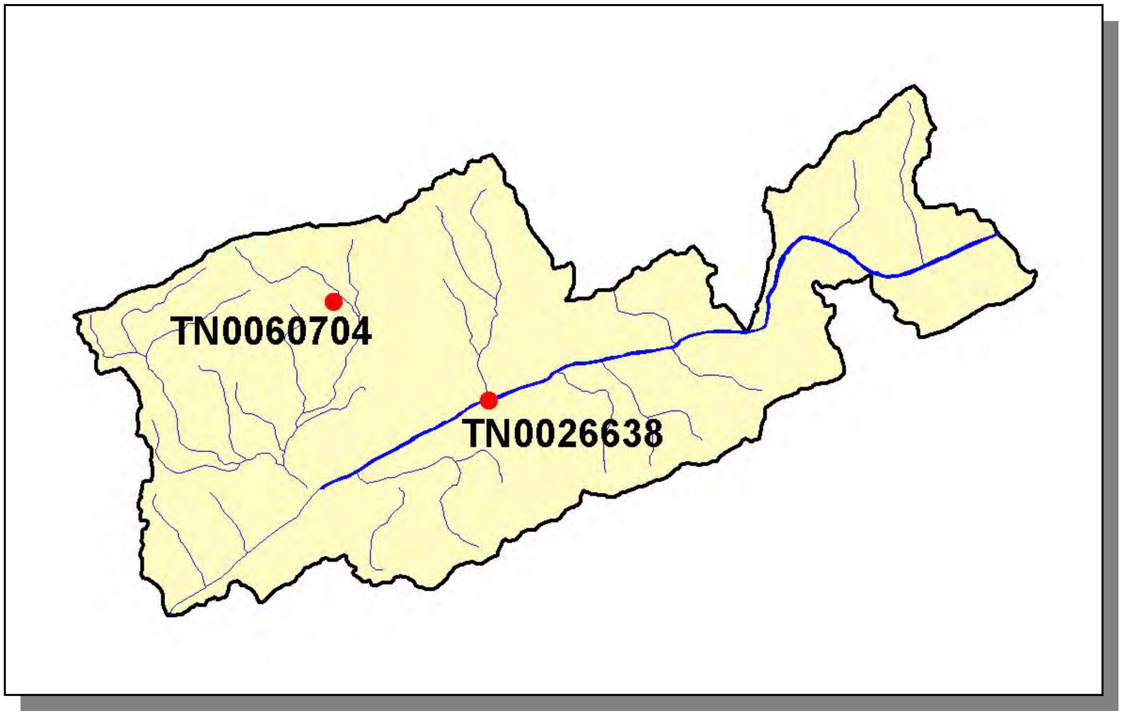


Figure 4-79. Location of Active NPDES Sites in Subwatershed 060102050505. *More information, including the names of facilities, is provided in Appendix IV.*

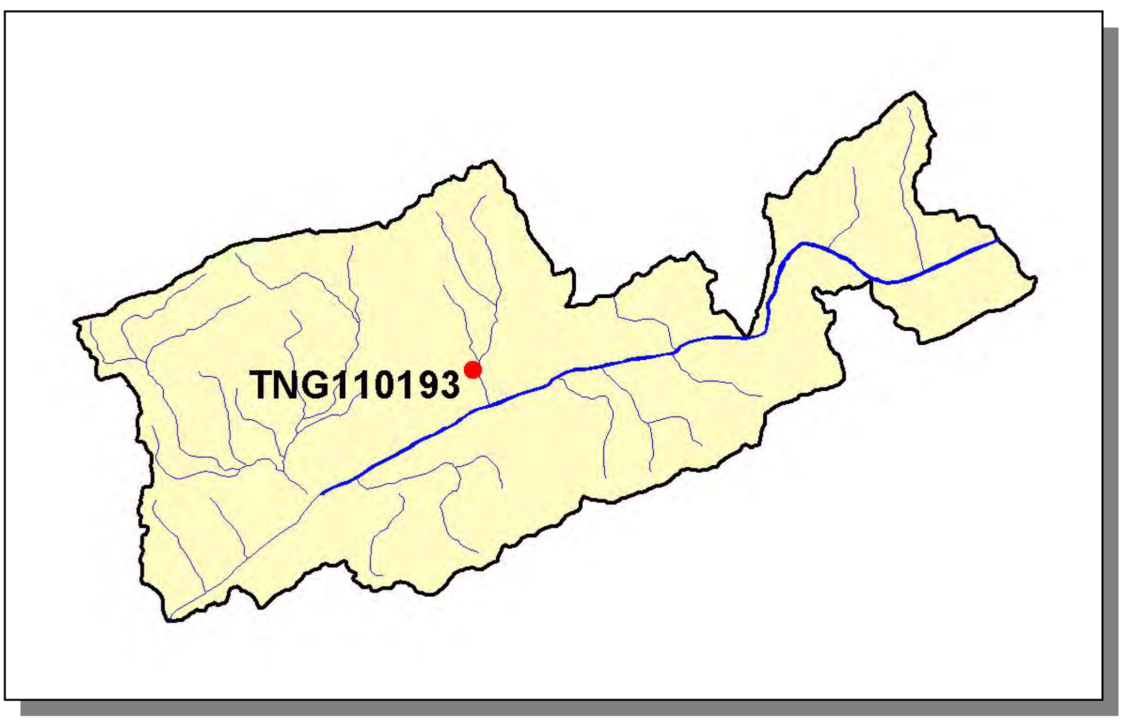


Figure 4-80. Location of Ready Mix Concrete Plants (RMCP) in Subwatershed 060102050505. *More information is provided in Appendix IV.*

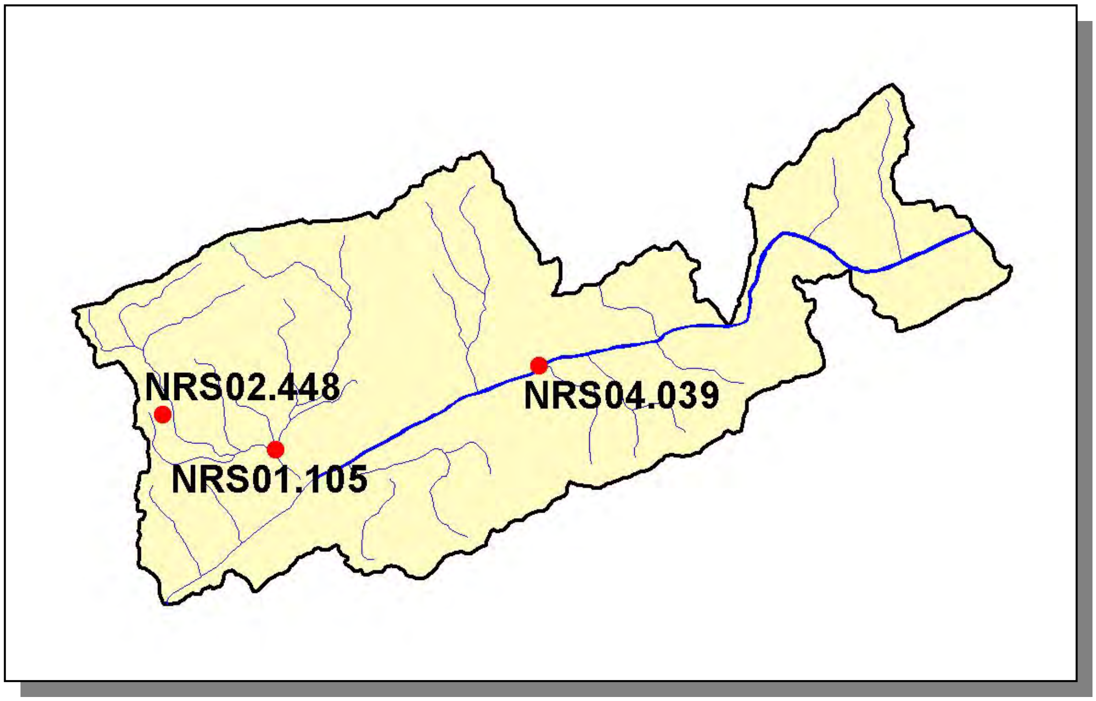


Figure 4-81. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 060102050505. *More information is provided in Appendix IV.*

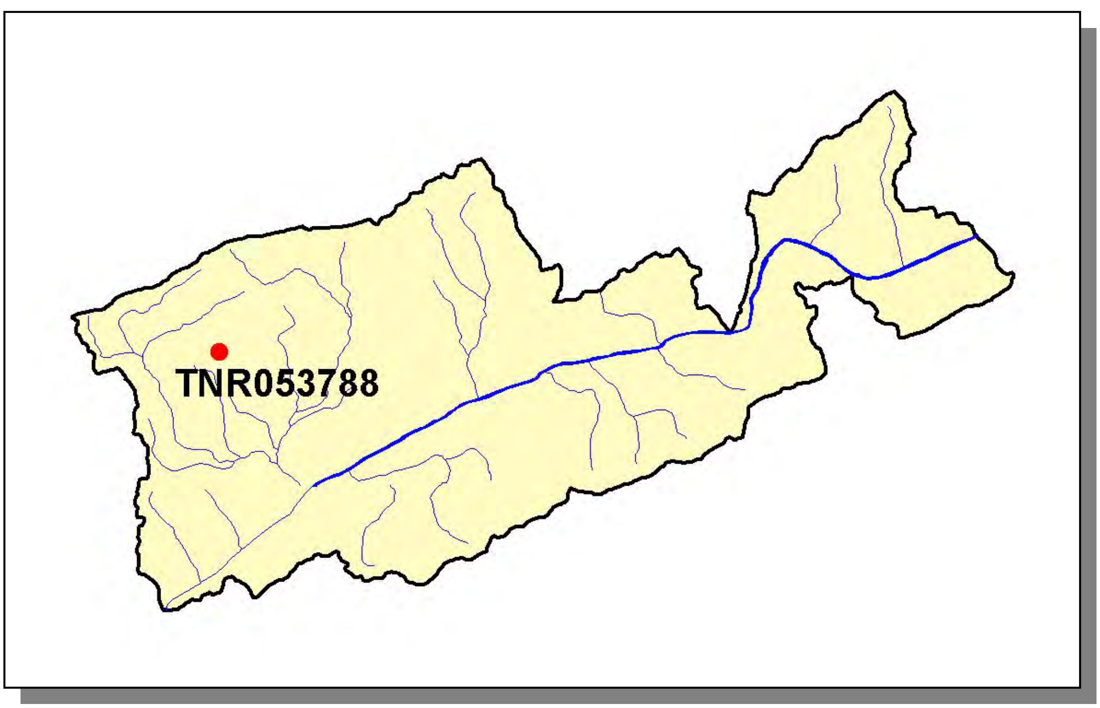


Figure 4-82. Location of TMSP Sites in Subwatershed 060102050505. *More information, including the names of facilities, is provided in Appendix IV.*

4.2.B.iv.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 060102050505:

- TN0026638 (Sneedville STP) discharges to the Clinch River @ RM 177.4

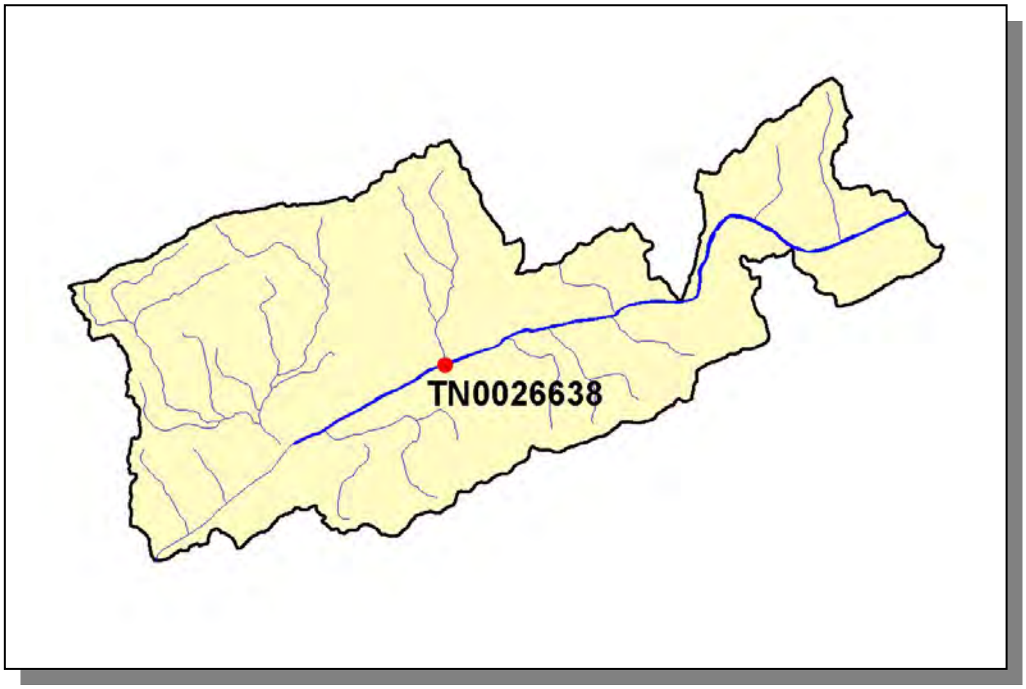


Figure 4-83. Location of NPDES Dischargers to Water Bodies Listed on the 2004 303(d) List in Subwatershed 060102050505. *More information, including the names of facilities, is provided in Appendix IV.*

Permit #	3Q2	1Q10	3Q10	3Q20	7Q10
TN0026638	145.30	94.20	95.90	86.40	99.00

Table 4-69. Receiving Stream Low Flow Information for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050505. *Data are in cubic feet per second (CFS). Data were obtained from the USGS web application StreamStats at http://water.usgs.gov/osw/streamstats/.*

PERMIT #	FLOW	$N0_2$+NO_3	N	Zn	Cu	Pb	Ni	Cd	Hg	Mo	As	Se
TN0026638	X	X	X	X	X	X	X	X	X	X	X	X

Table 4-70. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050505.

PERMIT #	$CBOD_5$	TRC	TSS	SETTLEABLE SOLIDS	DO	pH
TN0026638	X	X	X	X	X	X

Table 4-71. Inorganic Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050505. *$CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids; DO, Dissolved Oxygen.*

PERMIT #	*E. coli*	FECAL COLIFORM
TN0026638	X	X

Table 4-72. Bacteria Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050505.

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

LIVESTOCK COUNTS				
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Sheep
813	1,644	10	<5	8

Table 4-73. Summary of Livestock Count Estimates in Subwatershed 051302050505. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/),* ***"****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)	Sheep
Hancock	7,079	14,311	89	364	67

Table 4-74. Summary of Livestock Count Estimates in Hancock County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/),* ***"****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)
Hancock	92.9	92.9	2.7	14.2

Table 4-75. Forest Acreage and Annual Removal Rates (1987-1994) in Hancock County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	2.54
Grass (Hayland)	0.66
Grass, Forbs, Legumes (Mixed Pasture)	0.79
Corn (Row Crops)	2.42
Tobacco (Row Crops)	23.03
Farmsteads and Ranch Headquarters	0.03

Table 4-76. Annual Estimated Total Soil Loss in Subwatershed 060102050505.

4.2.B.v. 060102050506 (Richardson Creek).

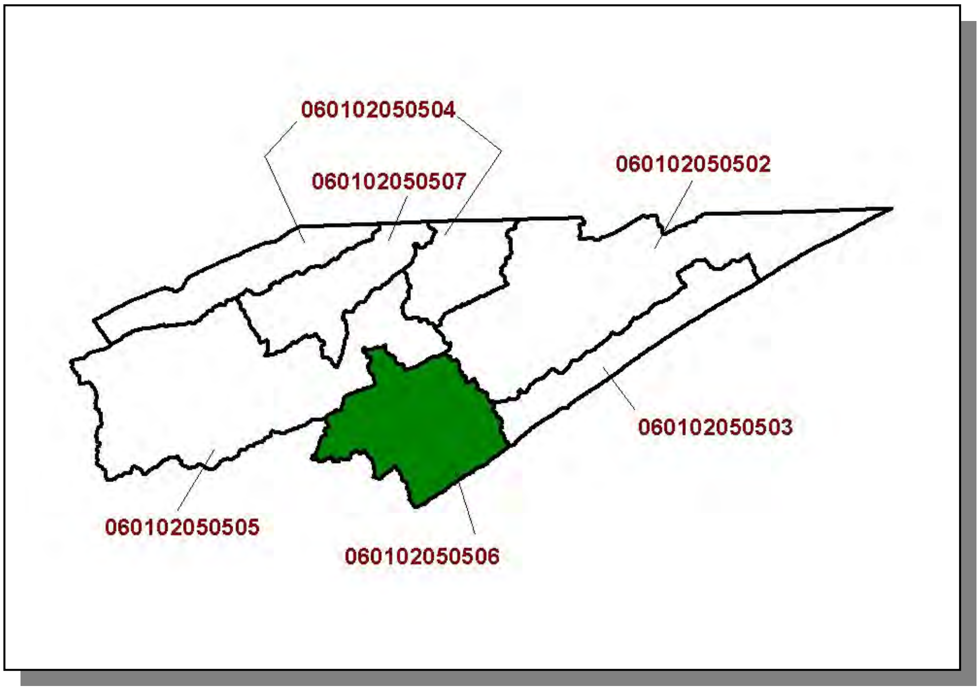


Figure 4-84. Location of Subwatershed 060102050506. *All Upper Clinch River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

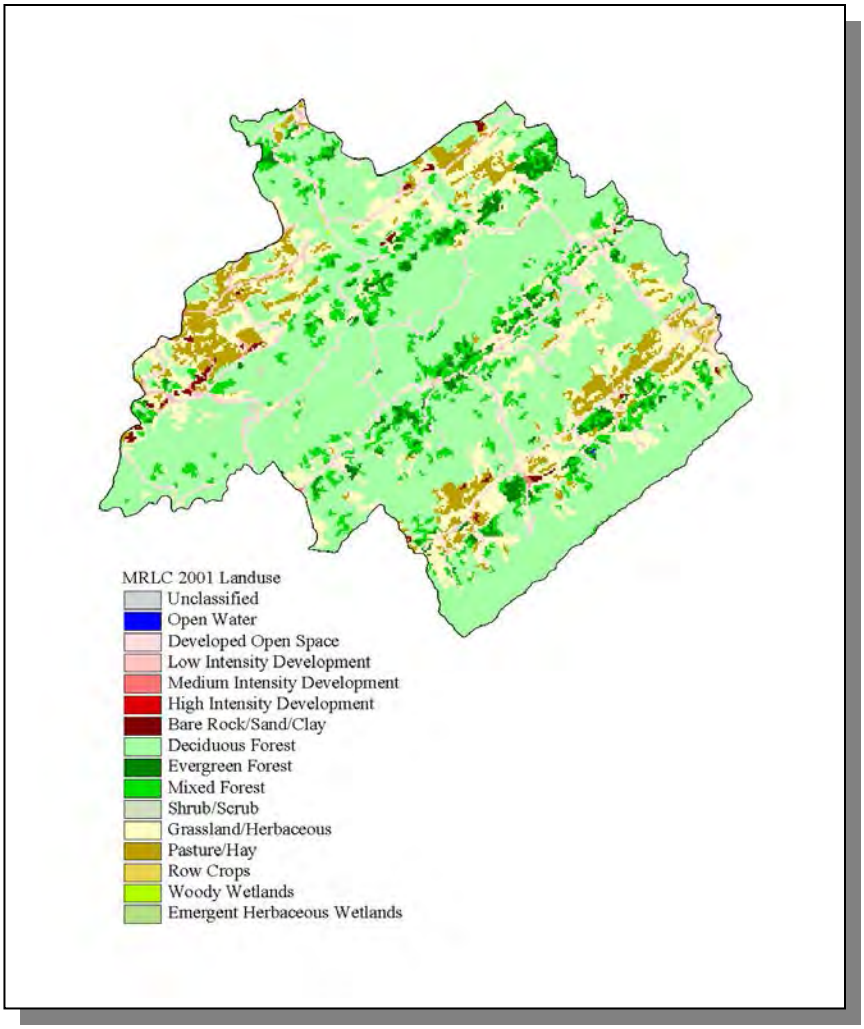


Figure 4-85. Illustration of Land Use Distribution in Subwatershed 060102050506.

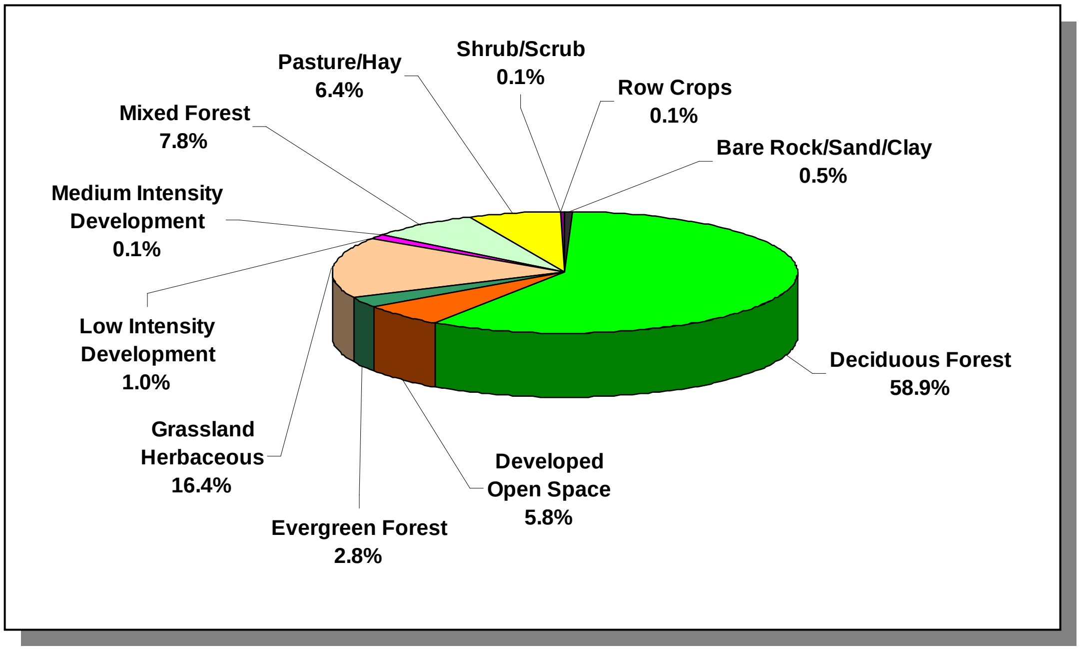


Figure 4-86. Land Use Distribution in Subwatershed 060102050506. *More information is provided in Appendix IV.*

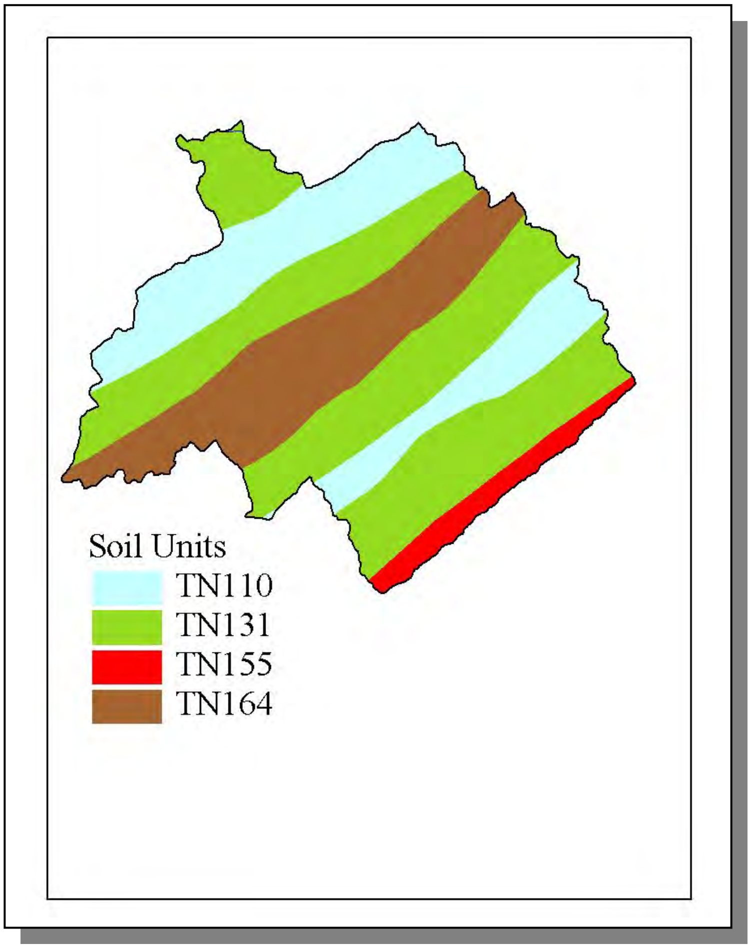


Figure 4-87. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050506.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN155	0.00	C	1.71	5.31	Loam	0.32
TN164	0.00	C	4.48	5.15	Loam	0.25

Table 4-77. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050506. *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)
Hancock	6,739	6,801	6,786	2.73	184	186	185	0.5
Hawkins	44,565	48,821	53,563	2.49	1,110	1,216	1,335	20.3
Total	**51,304**	**55,622**	**60,349**		**1,294**	**1,402**	**1,520**	**17.5**

Table 4-78. Population Estimates in Subwatershed 060102050506.

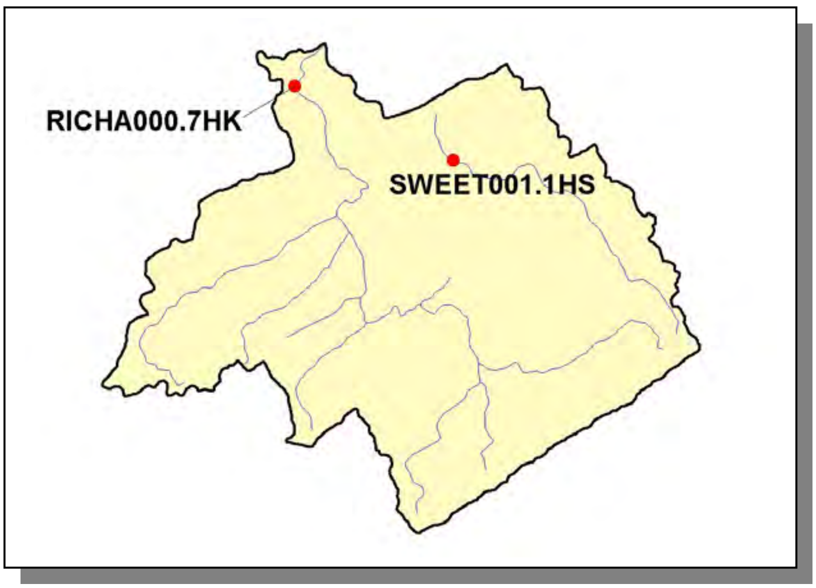


Figure 4-88. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050506. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

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

There are no point source contributions in this subwatershed.

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

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
443	881	12	<5	4	5

Table 4-79. Summary of Livestock Count Estimates in Subwatershed 060102050506. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/),* ***"****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
Hancock	7,079	14,311	89	364	0	67
Hawkins	18,796	36,429	903	1,079	442	243

Table 4-80. Summary of Livestock Count Estimates in Hancock and Hawkins Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/),* ***"****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)
Hancock	92.9	92.9	2.7	14.2
Hawkins	177.4	177.4	0.4	2.1

Table 4-81. Forest Acreage and Annual Removal Rates (1987-1994) in Hancock and Hawkins Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.01
Grass (Hayland)	0.59
Legumes, Grass (Hayland)	0.40
Legumes (Hayland)	0.16
Grass, Forbs, Legumes (Mixed Pasture)	0.62
Corn (Row Crops)	2.42
Tobacco (Close-Grown Cropland)	18.57
Other Vegetable and Truck Crops	33.50
Farmsteads and Ranch Headquarters	0.28

Table 4-82. Annual Estimated Total Soil Loss in Subwatershed 060102050506.

4.2.B.vi. 060102050507 (Panther Creek).

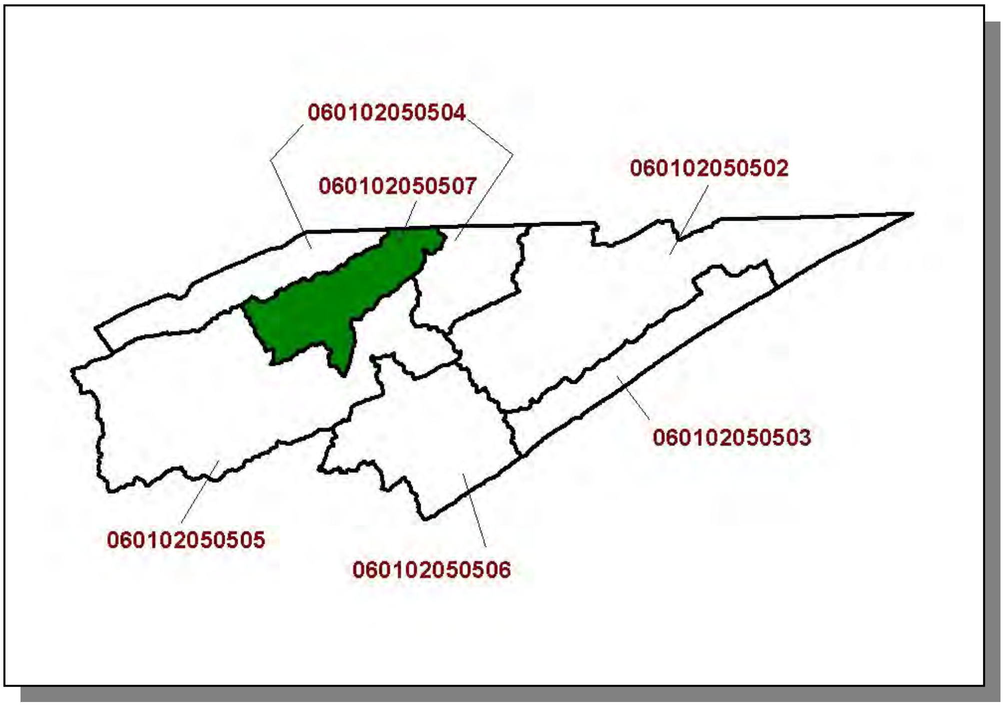


Figure 4-89. Location of the Tennessee Portion of Subwatershed 060102050507. *All Upper Clinch River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

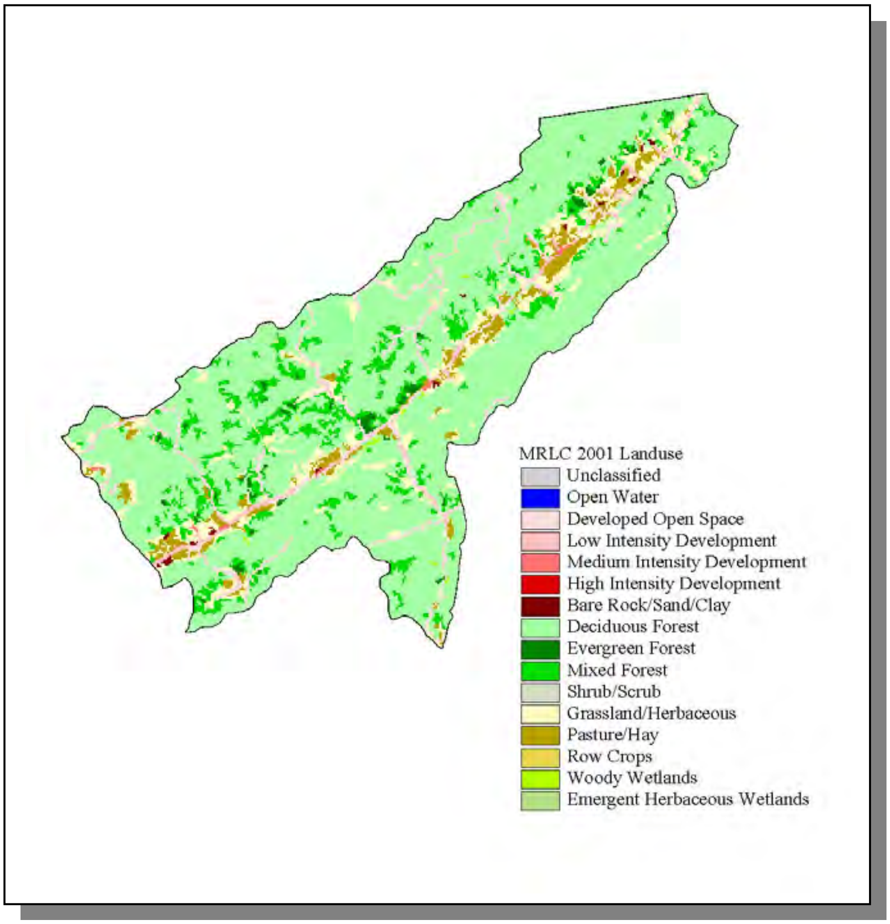


Figure 4-90. Illustration of Land Use Distribution in Subwatershed 060102050507.

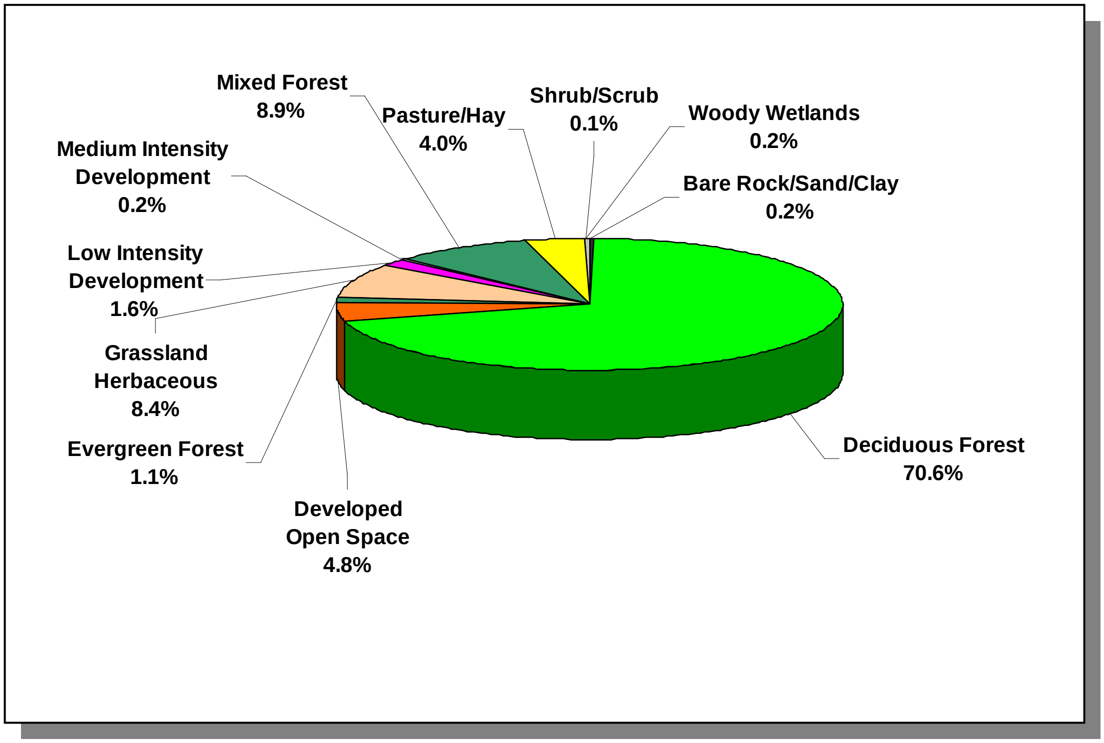


Figure 4-91. Land Use Distribution in Subwatershed 060102050507. *More information is provided in Appendix IV.*

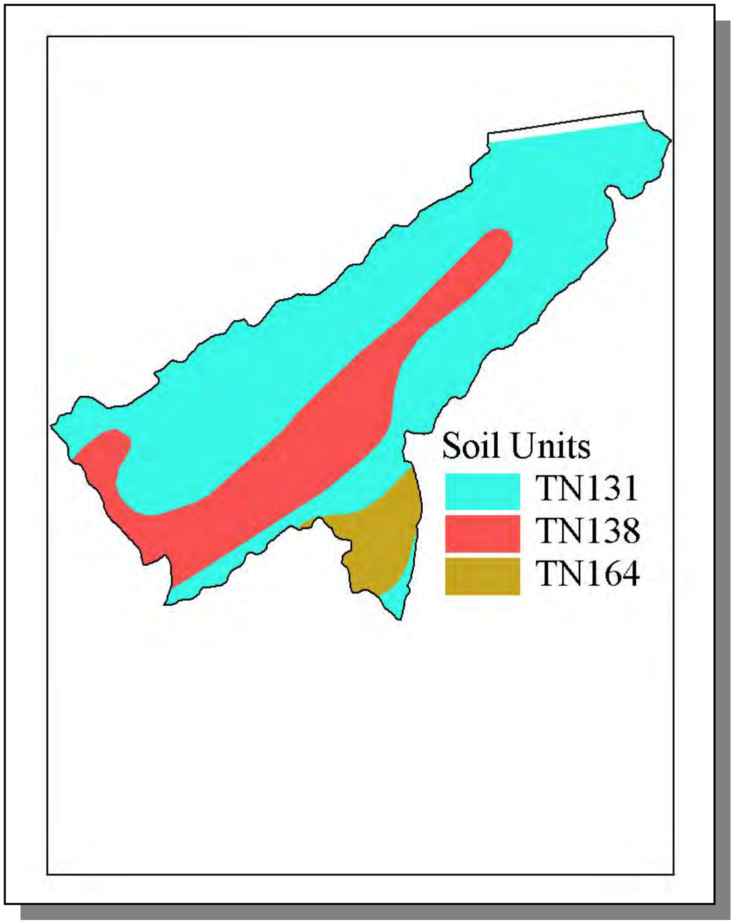


Figure 4-92. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050507.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN164	0.00	C	4.48	5.15	Loam	0.25

Table 4-83. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050507. *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)
Hancock	6,739	6,801	6,786	5.19	350	353	352	0.6

Table 4-84. Population Estimates in Subwatershed 060102050507.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Sneedville	Hancock	1,446	551	451	90	10

Table 4-85. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060102050507.

Figure 4-93. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050507. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

4.2.B.vi.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.B.vi.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS			
Beef Cow	Cattle	Milk Cow	Sheep
139	280	<5	<5

Table 4-86. Summary of Livestock Count Estimates in Subwatershed 060102050507. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Hancock	7,079	14,311	89	364	0	67

Table 4-87. Summary of Livestock Count Estimates in Hancock County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Hancock	92.9	92.9	2.7	14.2

Table 4-88. Forest Acreage and Annual Removal Rates (1987-1994) in Hancock County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	2.54
Grass (Hayland)	0.66
Grass, Forbs, Legumes (Mixed Pasture)	0.79
Corn (Row Crops)	2.42
Tobacco (Row Crops)	23.03
Farmsteads and Ranch Headquarters	0.03

Table 4-89. Annual Estimated Total Soil Loss in Subwatershed 060102050507.

4.2.C. 0601020507.

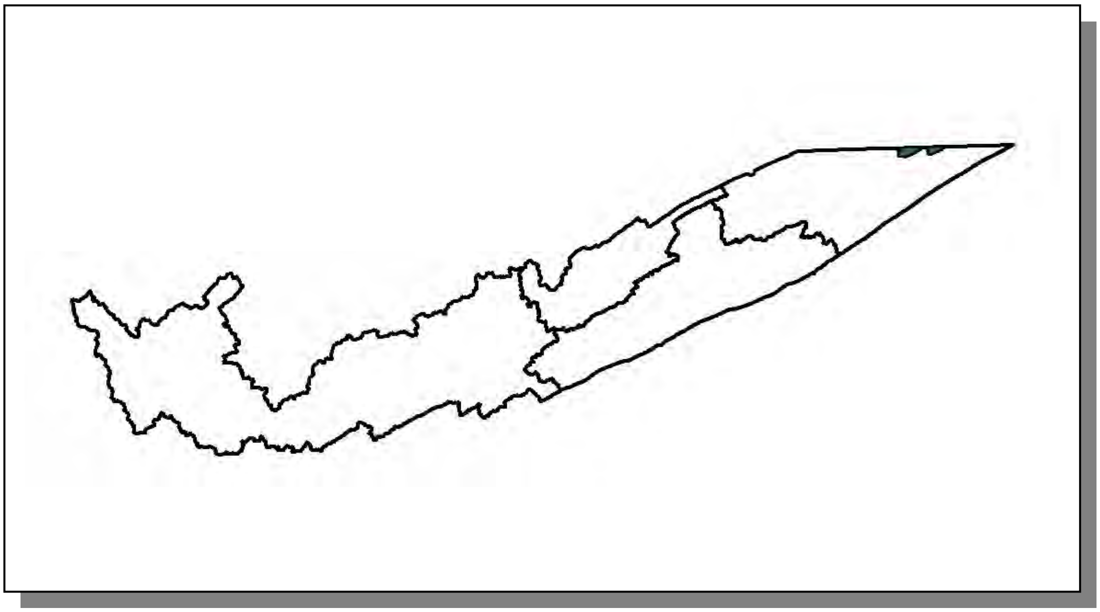


Figure 4-94. Location of Subwatershed 0601020507. *All Upper Clinch River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.C.i. 060102050702 (North Fork Clinch River).

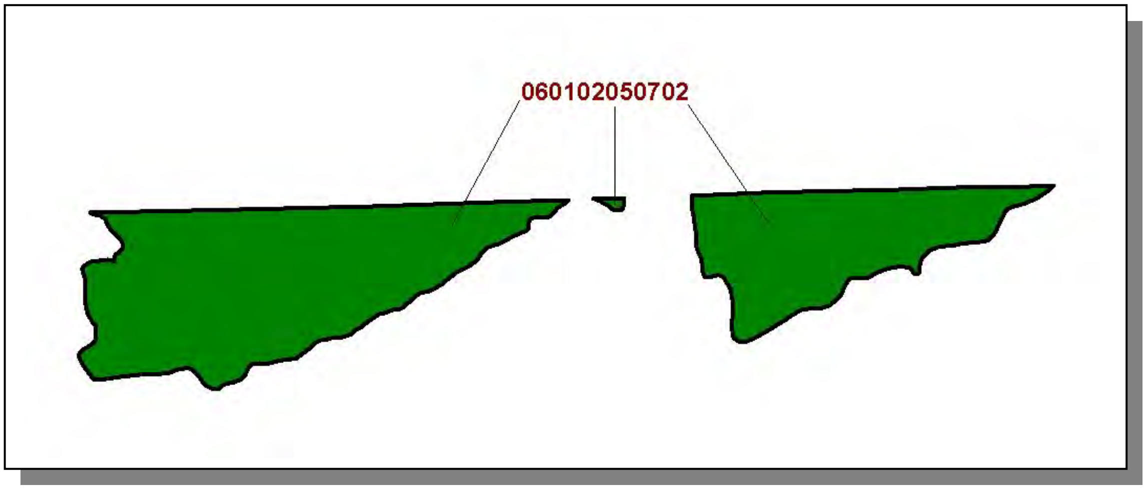


Figure 4-95. Location of Subwatershed 060102050702. All Upper Clinch River HUC-12 subwatershed boundaries in Tennessee are shown for reference.

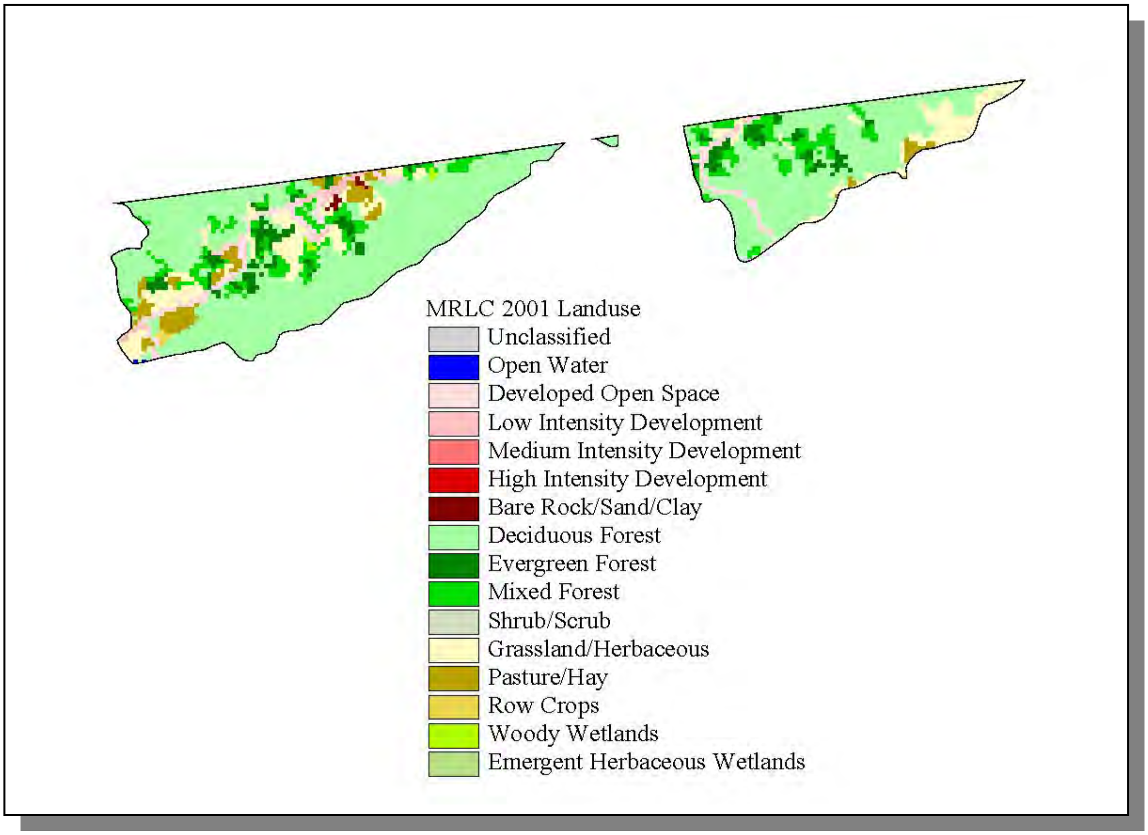


Figure 4-96. Illustration of Land Use Distribution in the Tennessee Portion of Subwatershed 060102050702.

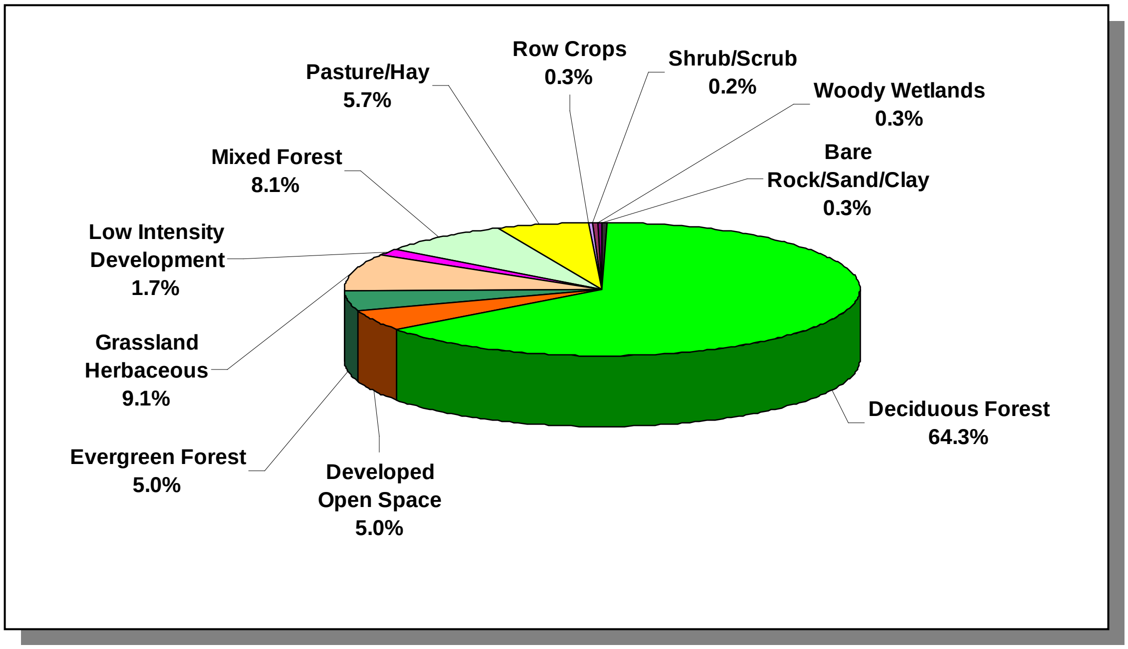


Figure 4-97. Land Use Distribution in Subwatershed 060102050702. *More information is provided in Appendix IV.*

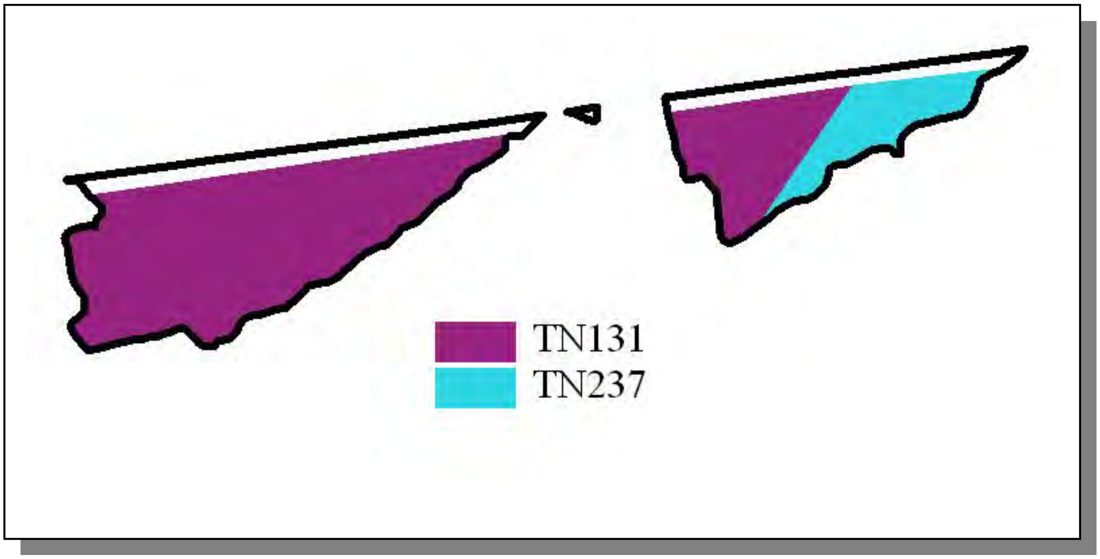


Figure 4-98. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050702.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN237	0.00	B	3.36	5.40	Silty Loam	0.32

Table 4-90. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050702. *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)
Hancock	6,739	6,801	6,786	0.29	19	19	19	0.0

Table 4-91. Population Estimates in Subwatershed 060102050702.

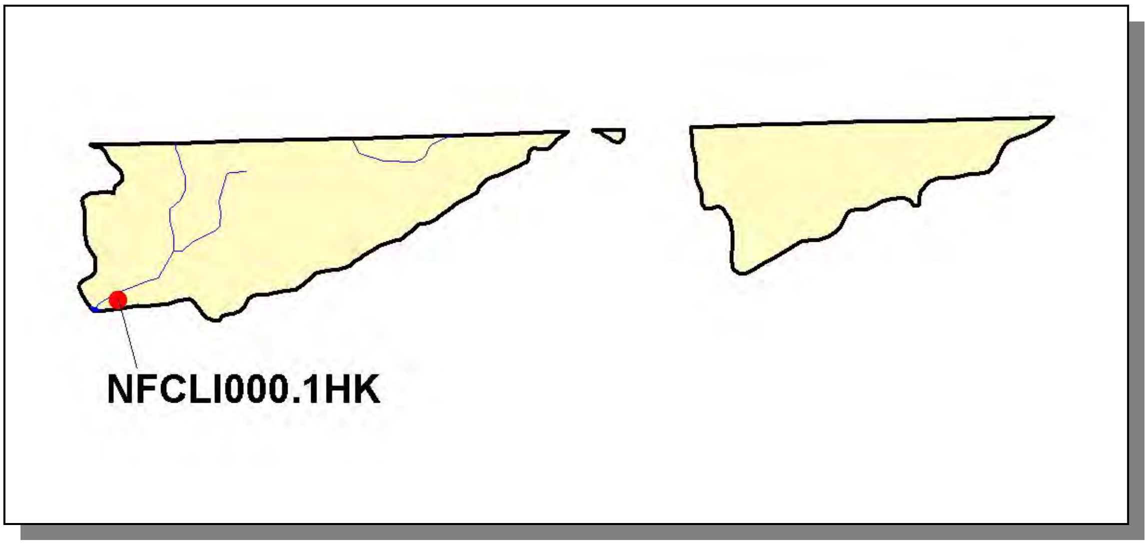


Figure 4-99. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050702. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

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

There are no point source contributions in this subwatershed.

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

LIVESTOCK COUNTS	
Beef Cow	Cattle
13	26

Table 4-92. Summary of Livestock Count Estimates in Subwatershed 060102050702. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Hancock	7,079	14,311	89	364	0	67

Table 4-93. Summary of Livestock Count Estimates in Hancock County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Hancock	92.9	92.9	2.7	14.2

Table 4-94. Forest Acreage and Annual Removal Rates (1987-1994) in Hancock County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	2.54
Grass (Hayland)	0.66
Grass, Forbs, Legumes (Mixed Pasture)	0.79
Corn (Row Crops)	2.42
Tobacco (Row Crops)	23.03
Farmsteads and Ranch Headquarters	0.03

Table 4-95. Annual Estimated Total Soil Loss in Subwatershed 060102050702.

4.2.D. 0601020508.

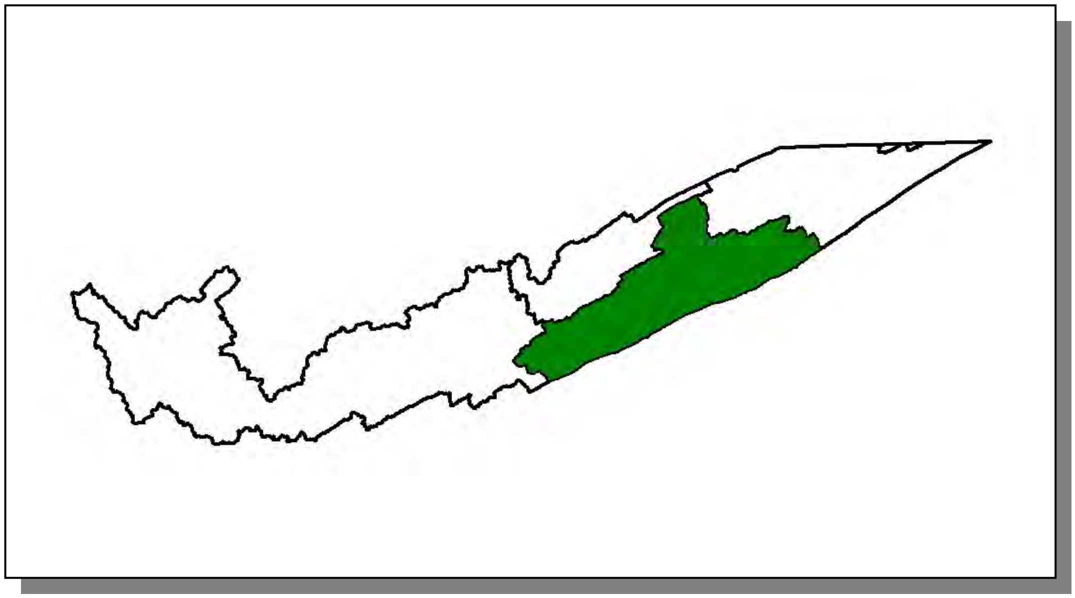


Figure 4-100. Location of Subwatershed 0601020508. *All Upper Clinch River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.D.i. 060102050801 (Clinch River).

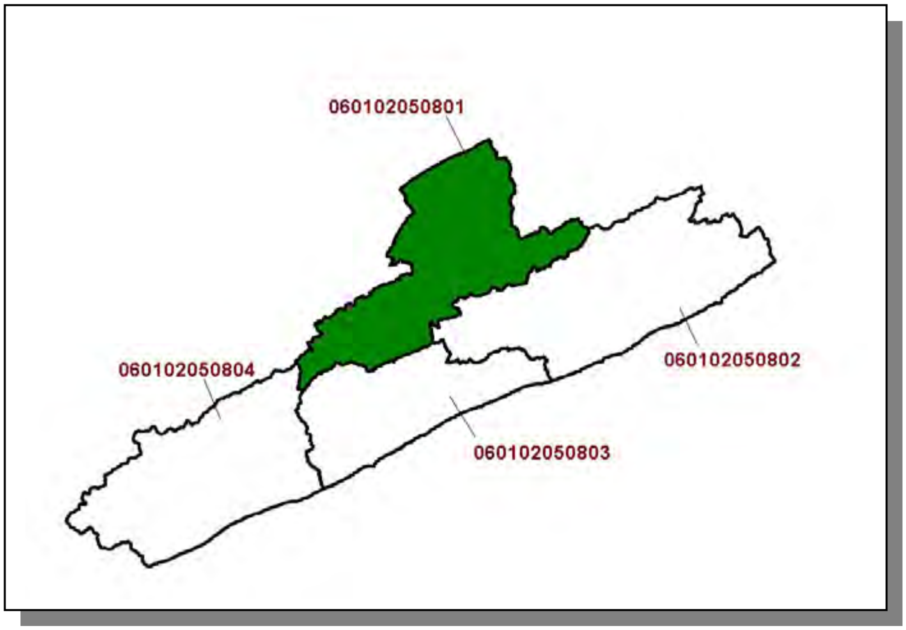


Figure 4-101. Location of Subwatershed 060102050801. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

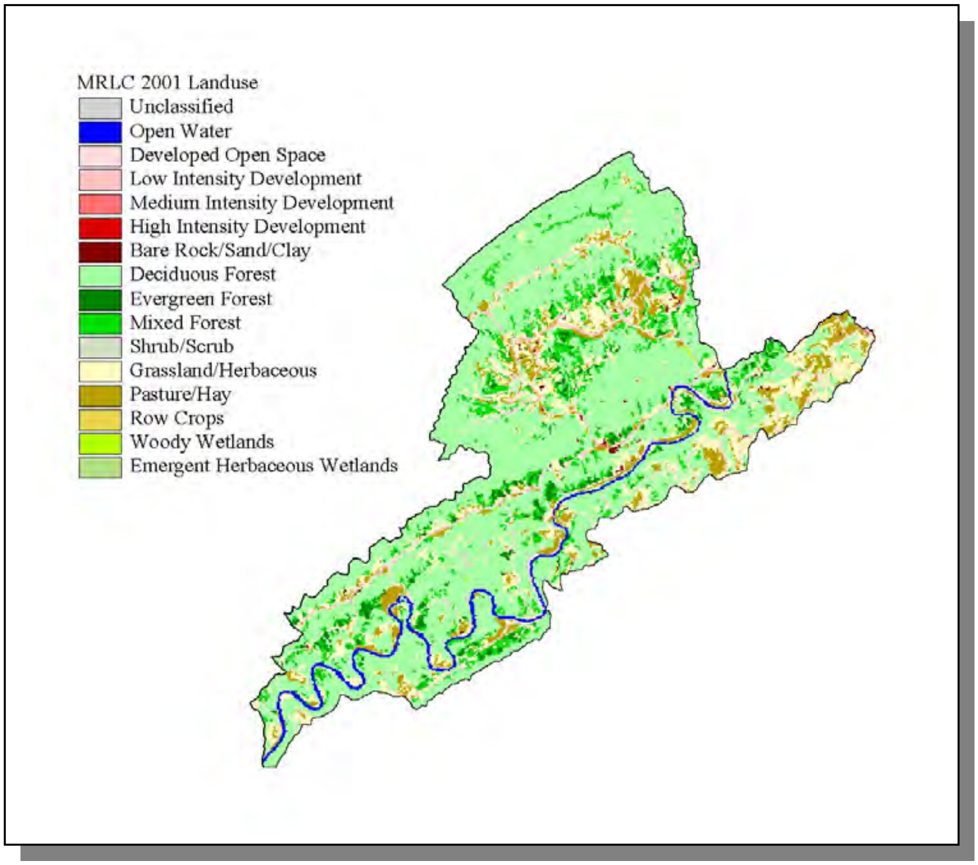


Figure 4-102. Illustration of Land Use Distribution in Subwatershed 060102050801.

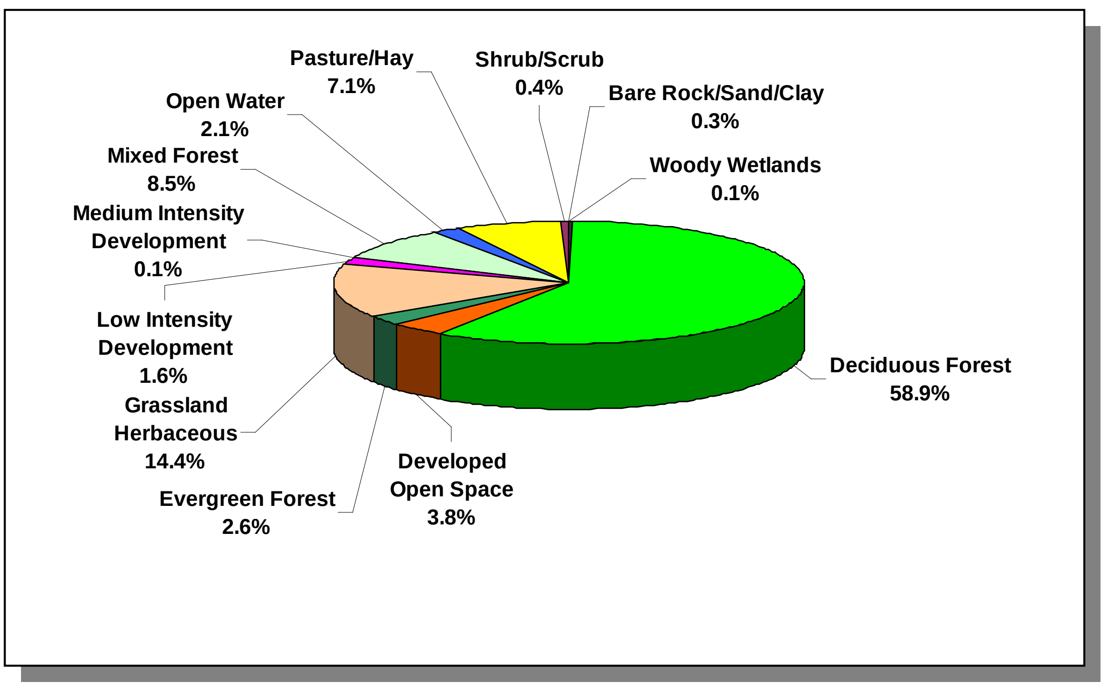


Figure 4-103. Land Use Distribution in Subwatershed 060102050801. *More information is provided in Appendix IV.*

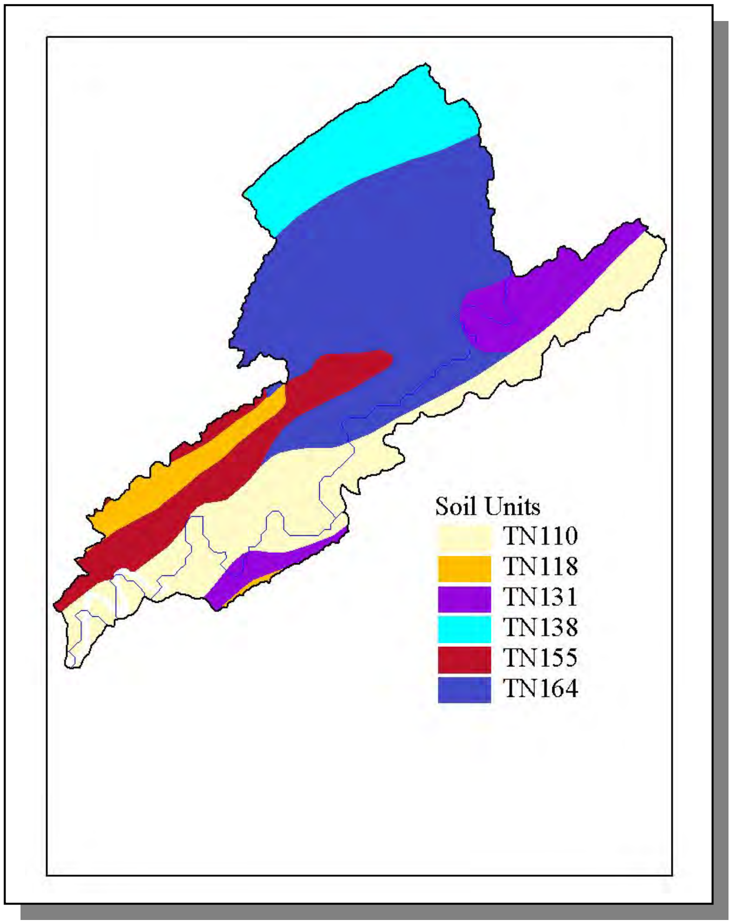


Figure 4-104. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050801.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN155	0.00	C	1.71	5.31	Loam	0.32
TN164	0.00	C	4.48	5.15	Loam	0.25

Table 4-96. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050801. *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)
Claiborne	26,137	28,963	29,862	2.03	532	589	607	14.1
Grainger	17,095	19,456	20,659	0.57	97	110	117	20.6
Hancock	6,739	6,801	6,786	13.1	883	891	889	0.7
Total	**49,971**	**55,220**	**57,307**		**1,512**	**1,590**	**1,613**	**6.7**

Table 4-97. Population Estimates in Subwatershed 060102050801.

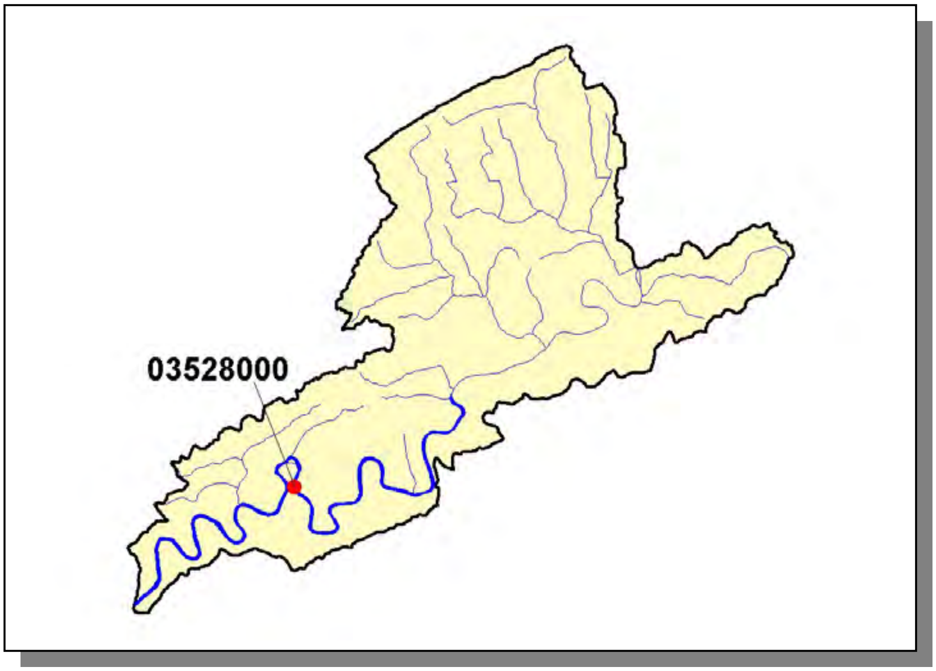


Figure 4-105. Location of Historical Streamflow Data Collection Sites in Subwatershed 060102050801. *More information is provided in Appendix IV.*

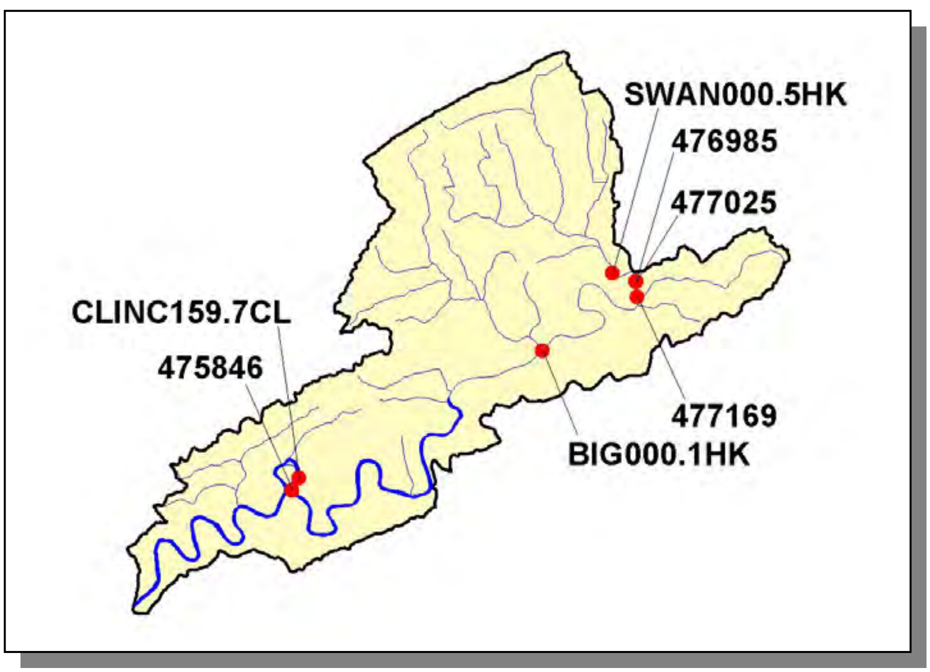


Figure 4-106. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050801. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

4.2.D.i.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.D.i.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
922	1,855	18	<5	<5	9

Table 4-98. Summary of Livestock Count Estimates in Subwatershed 060102050801. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Claiborne	18,697	36,566	1,082	420	0	165
Grainger	12,115	23,927	942	1,184	510	195
Hancock	7,079	14,311	89	364	0	67

Table 4-99. Summary of Livestock Count Estimates in Claiborne, Grainger, and Hancock Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Claiborne	167.6	167.6	2.6	12.1
Grainger	102.6	102.6	0.3	1.8
Hancock	92.9	92.9	2.7	14.2

Table 4-100. Forest Acreage and Annual Removal Rates (1987-1994) in Claiborne, Grainger, and Hancock Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.97
Grass (Hayland)	0.64
Legumes, Grass (Hayland)	0.60
Grass, Forbs, Legumes (Mixed Pasture)	0.64
Corn (Row Crops)	2.61
Tobacco (Row Crops)	22.13
Farmsteads and Ranch Headquarters	0.15

Table 4-101. Annual Estimated Total Soil Loss in Subwatershed 060102050801.

4.2.D.ii. 060102050802 (Big War Creek).

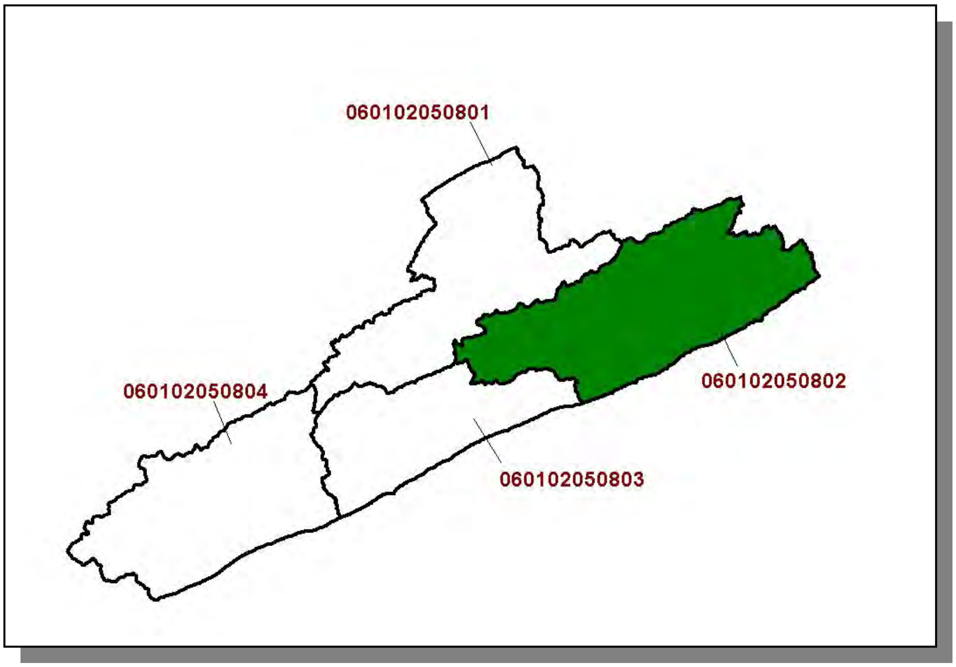


Figure 4-107. Location of Subwatershed 060102050802. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

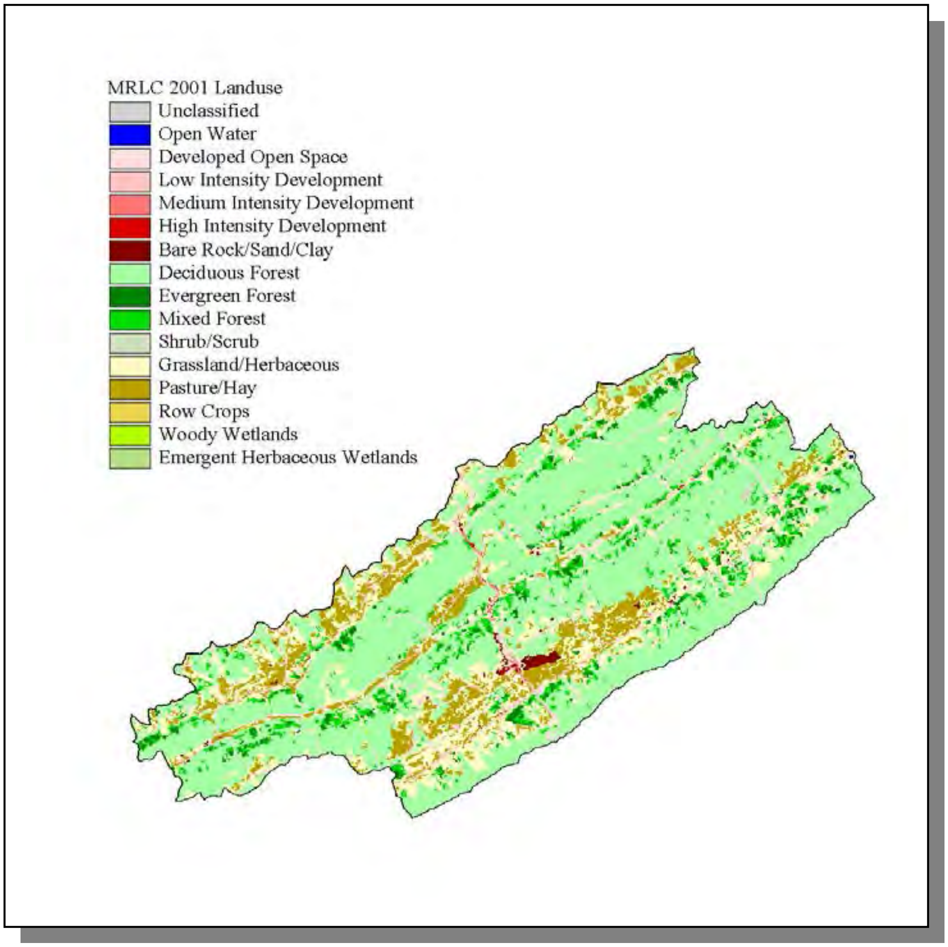


Figure 4-108. Illustration of Land Use Distribution in Subwatershed 060102050802.

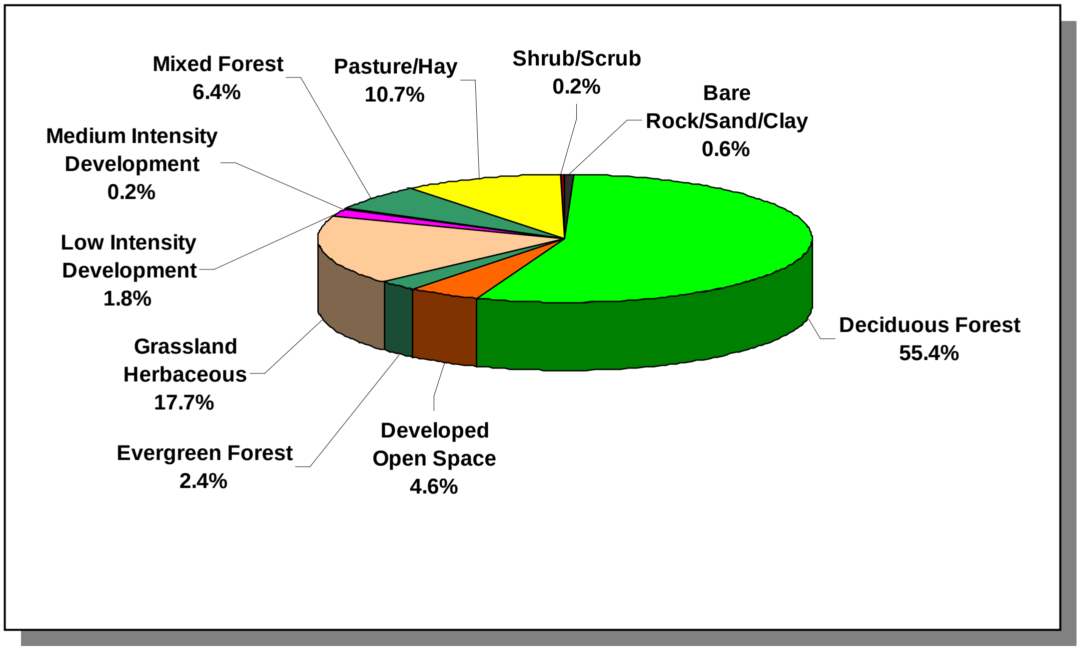


Figure 4-109. Land Use Distribution in Subwatershed 060102050802. *More information is provided in Appendix IV.*

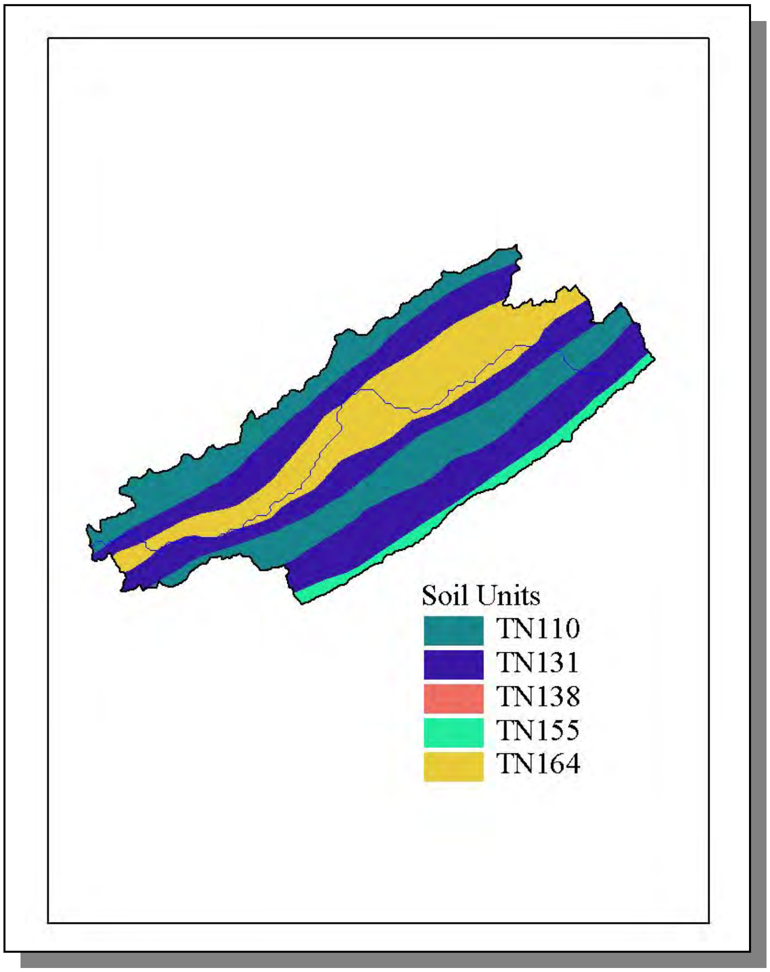


Figure 4-110. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050802.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN155	0.00	C	1.71	5.31	Loam	0.32
TN164	0.00	C	4.48	5.15	Loam	0.25

Table 4-102. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050802. *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)
Grainger	17,095	19,456	20,659	0.09	16	18	19	18.8
Hancock	6,739	6,801	6,786	17.32	1,167	1,178	1,175	0.7
Hawkins	44,565	48,821	53,563	1.91	852	934	1,025	20.3
Total	**68,399**	**75,078**	**81,008**		**2,035**	**2,130**	**2,219**	**9.0**

Table 4-103. Population Estimates in Subwatershed 060102050802.

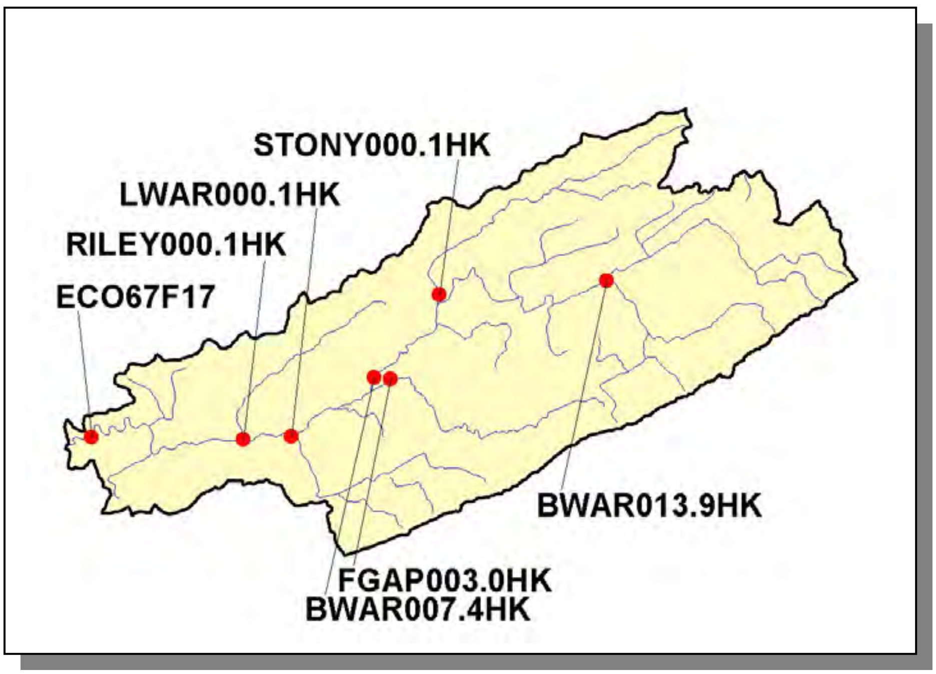


Figure 4-111. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050802. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

4.2.D.ii.a. Point Source Contributions.

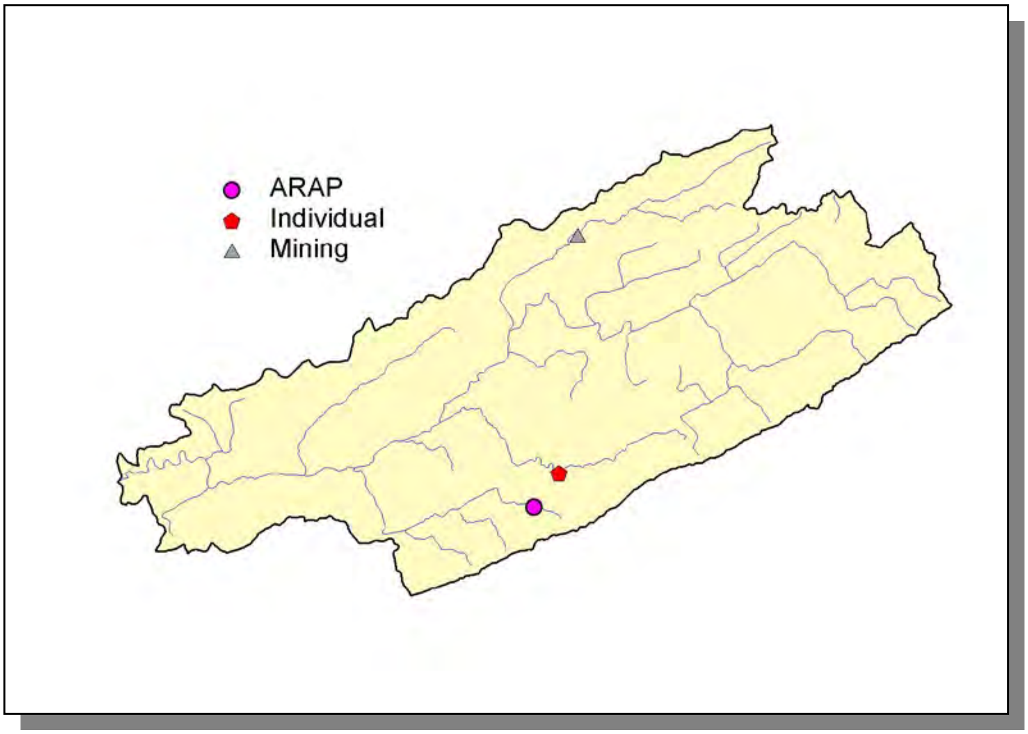


Figure 4-112. Location of Permits Issued in Subwatershed 060102050802. *More information, including the names of facilities, is provided in Appendix IV.*

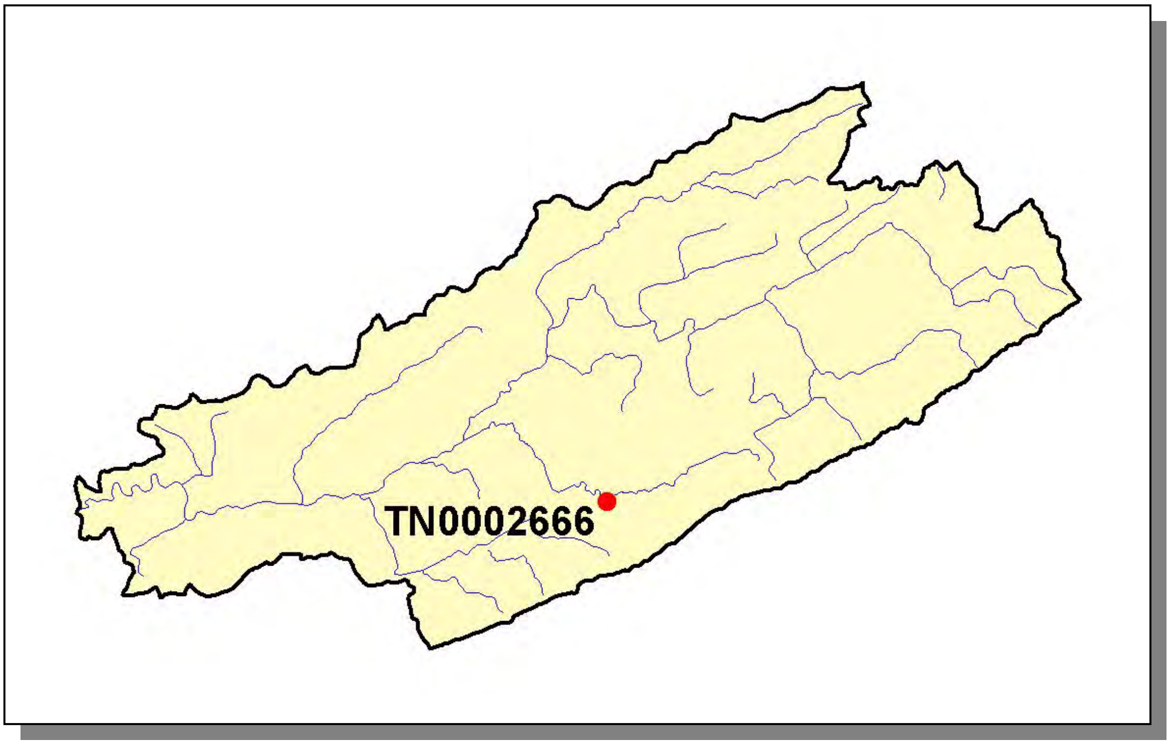


Figure 4-113. Location of Active NPDES Sites in Subwatershed 060102050802. *More information, including the names of facilities, is provided in Appendix IV.*

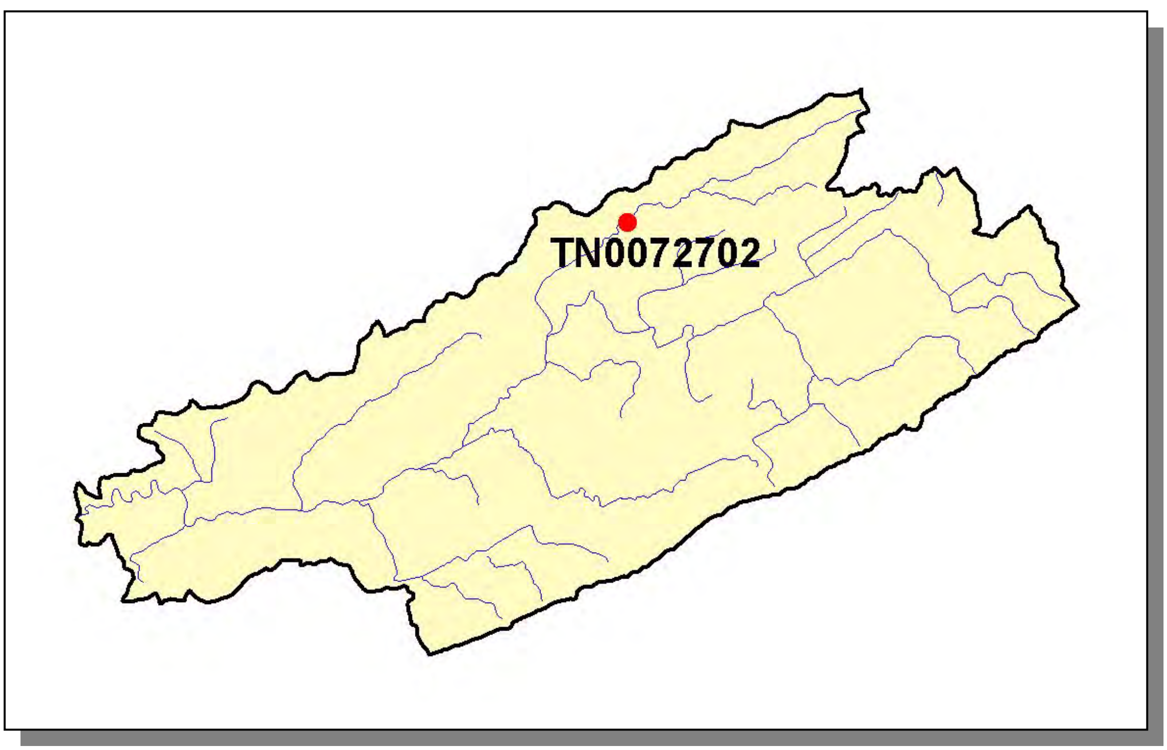


Figure 4-114. Location of Active Mining Sites in Subwatershed 060102050802. *More information, including the names of mining operations, is provided in Appendix IV.*

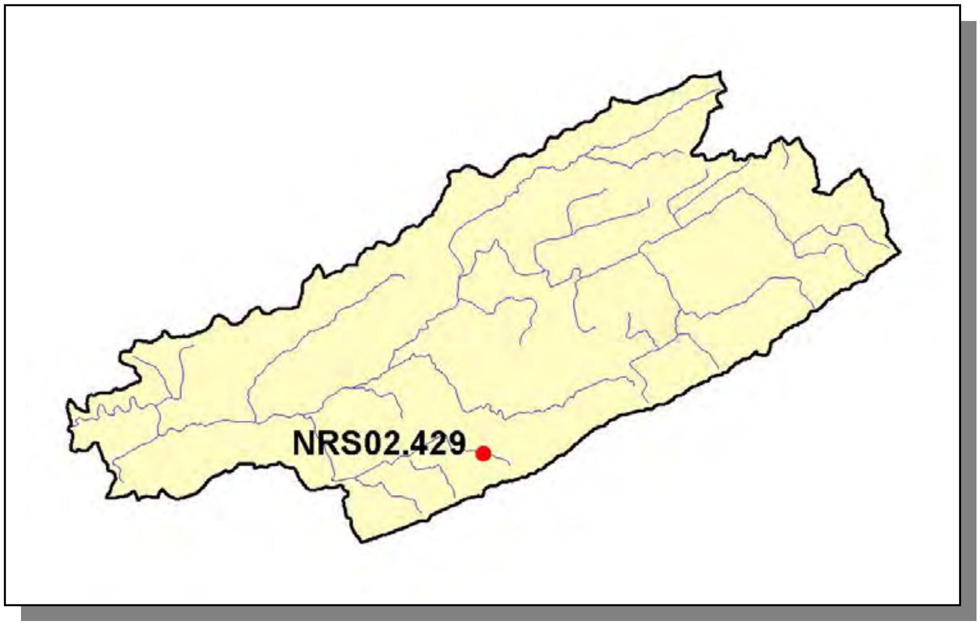


Figure 4-115. Location of Aquatic Resource Alteration Permit (ARAP) Sites (Individual Permits) in Subwatershed 060102050802. *More information is provided in Appendix IV.*

4.2.D.ii.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 060102050802:

- TN0002666 (Treadway Water and Sewer STP) discharges to Flat Gap Creek @ RM 3.0 and Big War Creek @ RM 7.0

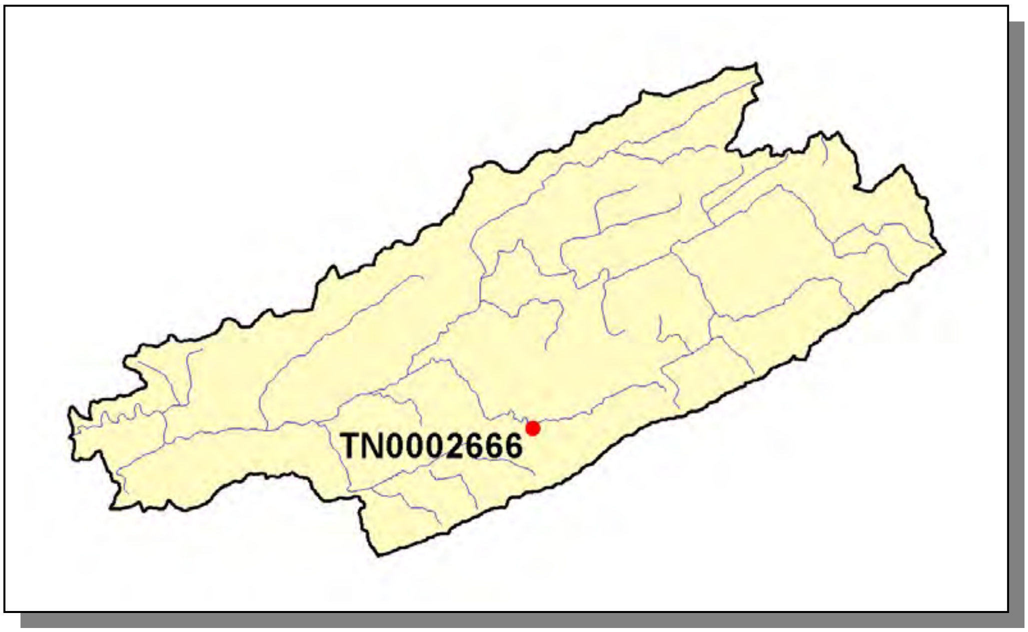


Figure 4-116. Location of NPDES Dischargers to Water Bodies Listed on the 2004 303(d) List in Subwatershed 060102050802. *More information, including the names of facilities, is provided in Appendix IV.*

Permit #	3Q2	1Q10	3Q10	3Q20	7Q10
TN0002666	0.21	na	0.10	0.08	0.12

Table 4-104. Receiving Stream Low Flow Information for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050802. *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 #	FLOW
TN0002666	X

Table 4-105. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050802.

PERMIT #	$CBOD_5$	FECAL COLIFORM	NH_3	TRC	TSS	SETTLEABLE SOLIDS	DO	pH
TN0002666	X	X	X	X	X	X	X	X

Table 4-106. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2004 303(d) List in Subwatershed 060102050802. *$CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids; Dissolved Oxygen.*

4.2.D.ii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,857	3,734	31	5	5	18

Table 4-107. Summary of Livestock Count Estimates in Subwatershed 060102050802. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Grainger	12,115	23,927	942	1,184	510	195
Hancock	7,079	14,311	89	364	0	67
Hawkins	18,796	36,429	903	1,079	442	243

Table 4-108. Summary of Livestock Count Estimates in Grainger, Hancock and Hawkins Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Grainger	102.6	102.6	0.3	1.8
Hancock	92.9	92.9	2.7	14.2
Hawkins	177.4	177.4	0.4	2.1

Table 4-109. Forest Acreage and Annual Removal Rates (1987-1994) in Grainger, Hancock, and Hawkins Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	2.08
Grass (Hayland)	0.63
Legumes, Grass (Hayland)	0.41
Legumes (Haylands)	0.16
Grass, Forbs, Legumes (Mixed Pasture)	0.74
Corn (Row Crops)	2.44
Tobacco (Row Crops)	21.62
Other Vegetable and Truck Crops	33.50
Farmsteads and Ranch Headquarters	0.11

Table 4-110. Annual Estimated Total Soil Loss in Subwatershed 060102050802.

4.2.D.iii. 060102050803 (Indian Creek).

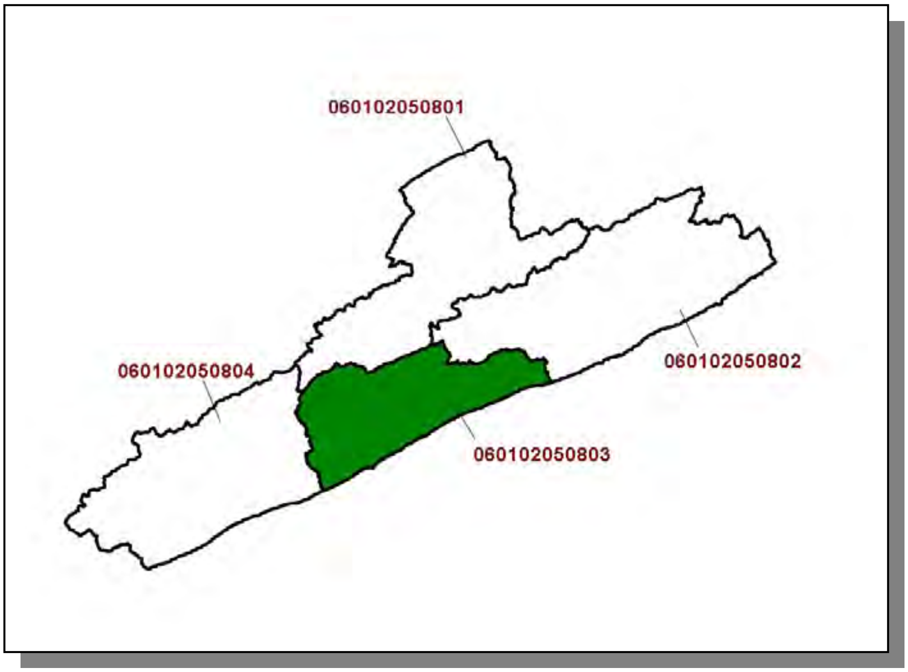


Figure 4-117. Location of Subwatershed 060102050803. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

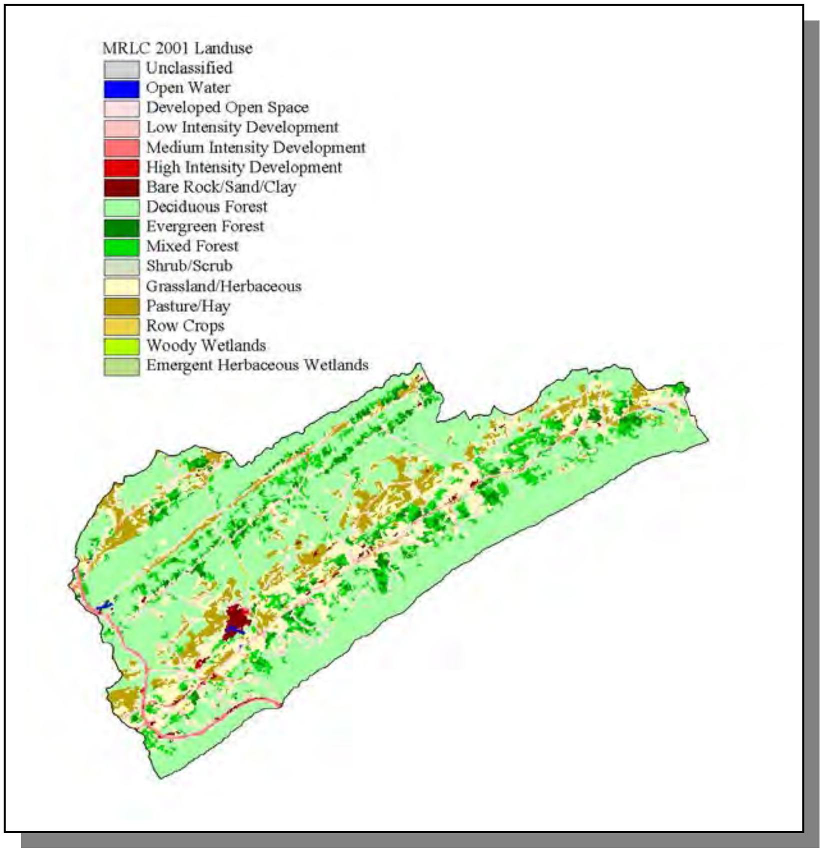


Figure 4-118. Illustration of Land Use Distribution in Subwatershed 060102050803.

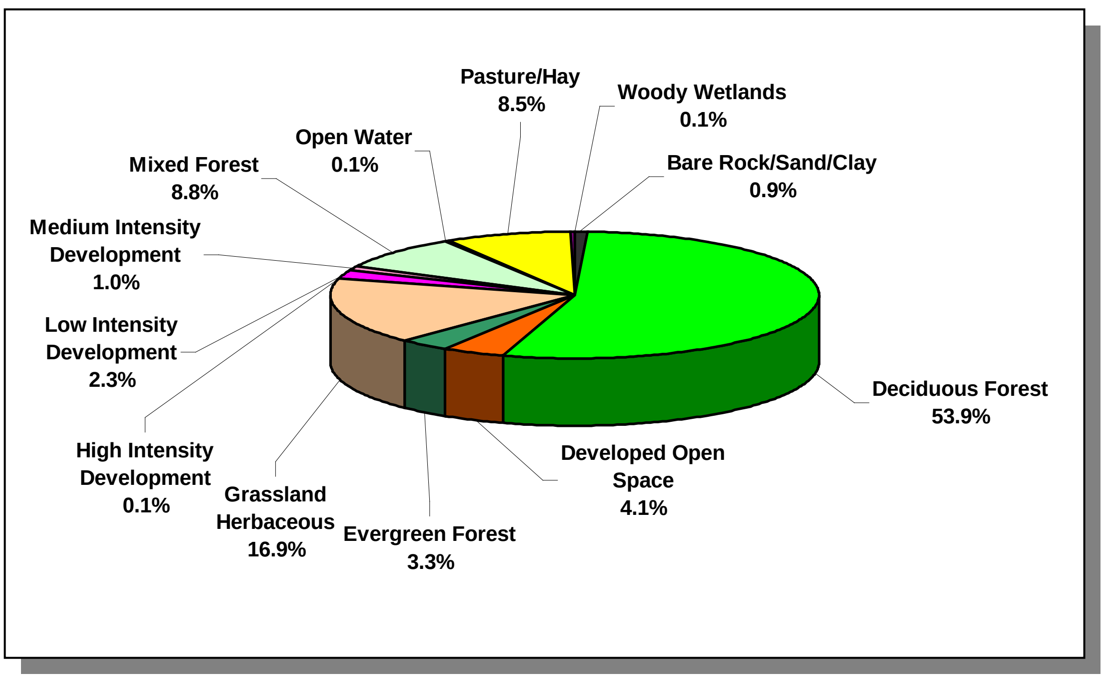


Figure 4-119. Land Use Distribution in Subwatershed 060102050803. *More information is provided in Appendix IV.*

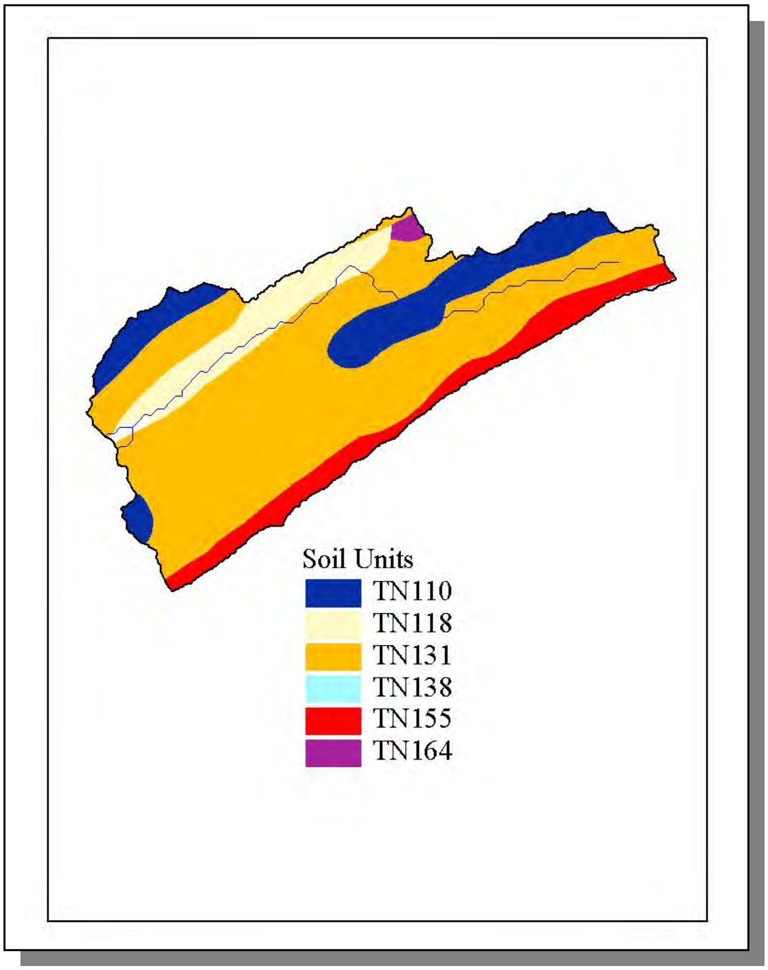


Figure 4-120. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050803.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN155	0.00	C	1.71	5.31	Loam	0.32
TN164	0.00	C	4.48	5.15	Loam	0.25

Table 4-111. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050803. *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)
Grainger	17,095	19,456	20,659	7.98	1,364	1,552	1,648	20.8
Hancock	6,739	6,801	6,786	1.55	104	105	105	1.0
Total	**23,834**	**16,257**	**27,445**		**1,468**	**1,657**	**1,753**	**19.4**

Table 4-112. Population Estimates in Subwatershed 060102050803.

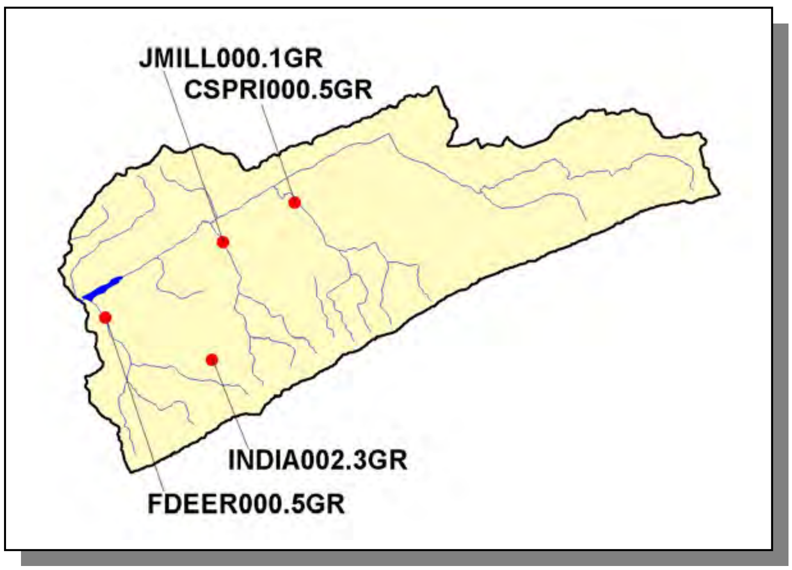


Figure 4-121. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050803. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

4.2.D.iii.a. Point Source Contributions.

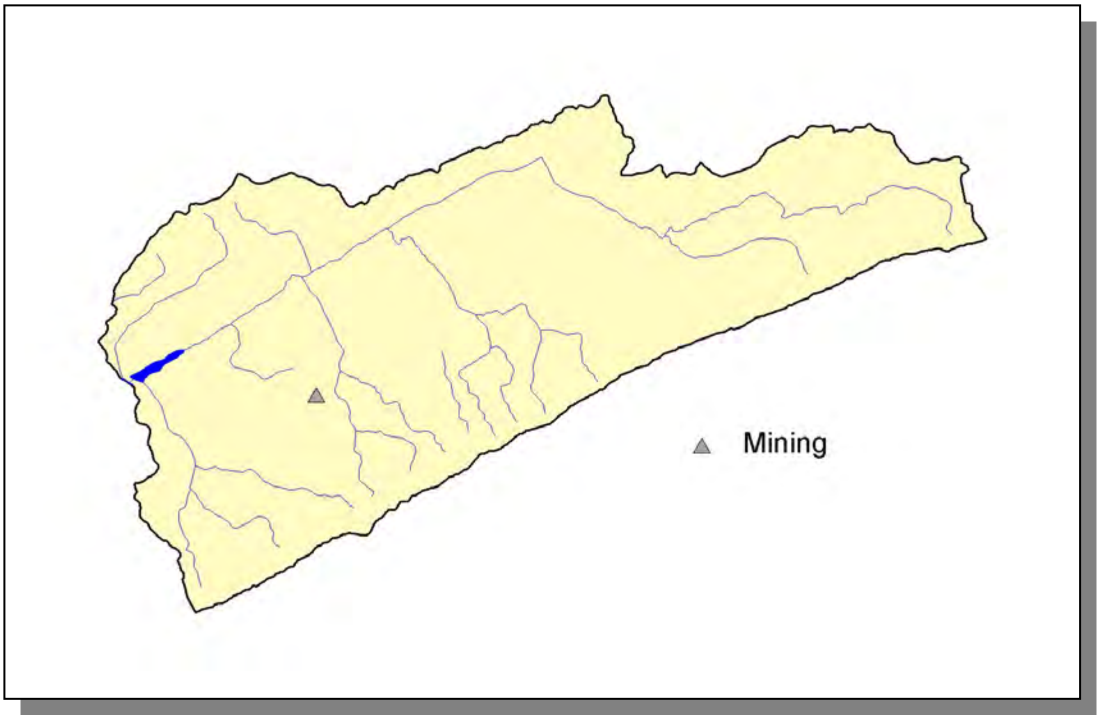


Figure 4-122. Location of Permits Issued in Subwatershed 060102050803. *More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-123. Location of Active Mining Sites in Subwatershed 060102050803. *More information, including the names of mining operations, is provided in Appendix IV.*

4.2.D.iii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
738	1,464	48	<5	25	11

Table 4-113. Summary of Livestock Count Estimates in Subwatershed 060102050803. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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
Claiborne	18,697	36,566	1,082	420	0	165
Grainger	12,115	23,927	942	1,184	510	195
Hancock	7,079	14,311	89	364	0	67

Table 4-114. Summary of Livestock Count Estimates in Claiborne, Grainger, and Hancock Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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)
Claiborne	167.6	167.6	2.6	12.1
Grainger	102.6	102.6	0.3	1.8
Hancock	02.9	92.9	2.7	14.2

Table 4-115. Forest Acreage and Annual Removal Rates (1987-1994) in Claiborne, Grainger, and Hancock Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.19
Grass (Hayland)	0.36
Legumes, Grass (Hayland)	0.60
Grass, Forbs, Legumes (Mixed Pasture)	0.84
Corn (Row Crops)	5.29
Tobacco (Row Crops)	9.14
Farmsteads and Ranch Headquarters	0.46

Table 4-116. Annual Estimated Total Soil Loss in Subwatershed 060102050803.

4.2.D.iv. 060102050804 (Clinch River).

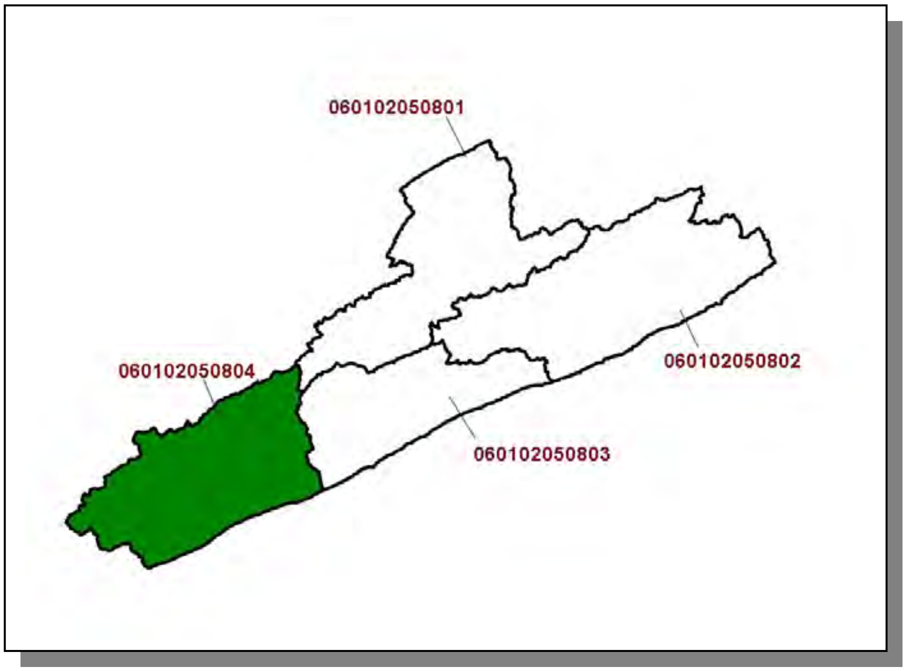


Figure 4-124. Location of Subwatershed 060102050804. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

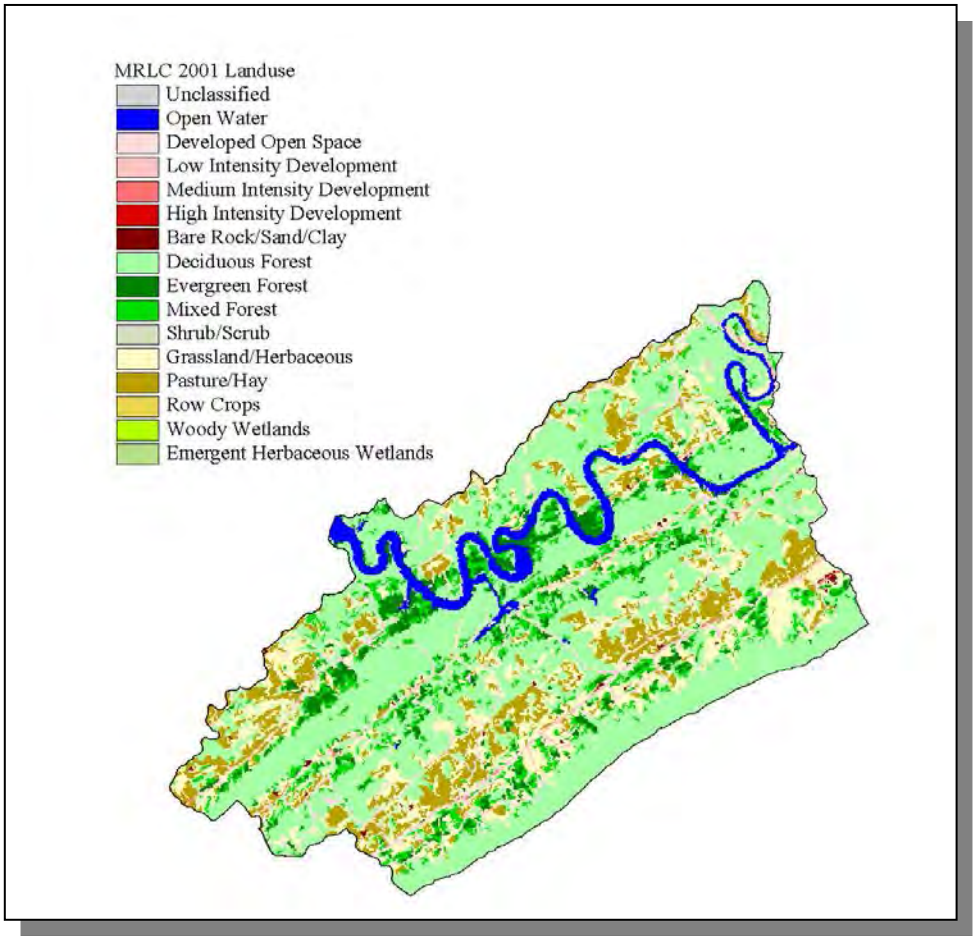


Figure 4-125. Illustration of Land Use Distribution in Subwatershed 060102050804.

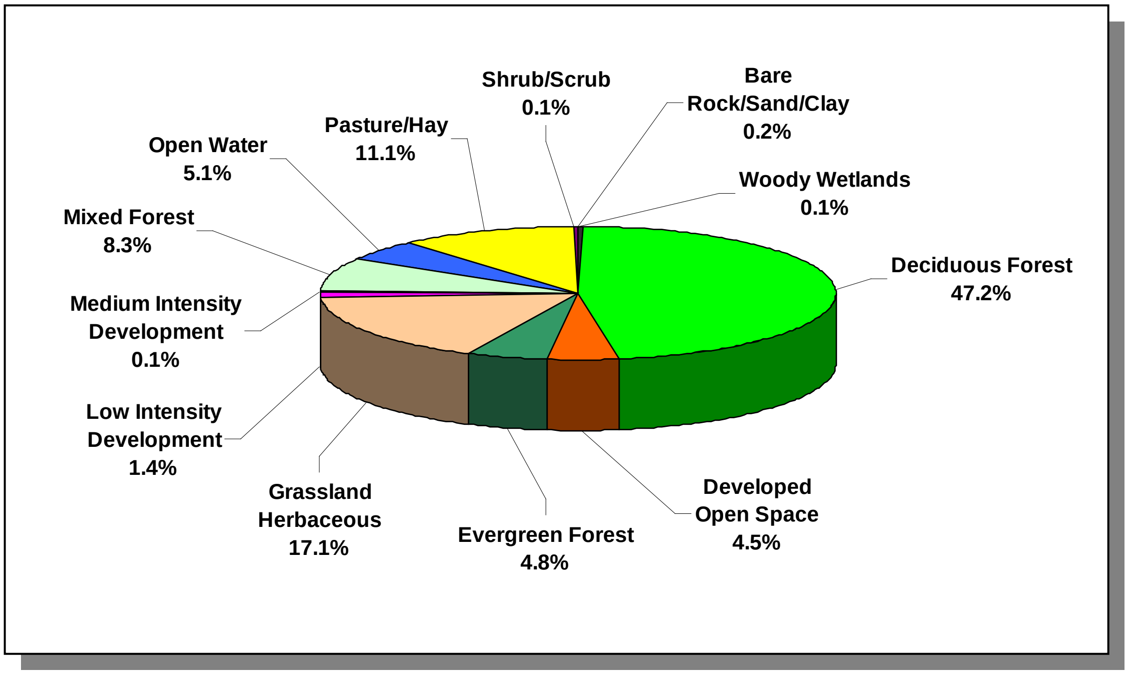


Figure 4-126. Land Use Distribution in Subwatershed 060102050804. *More information is provided in Appendix IV.*

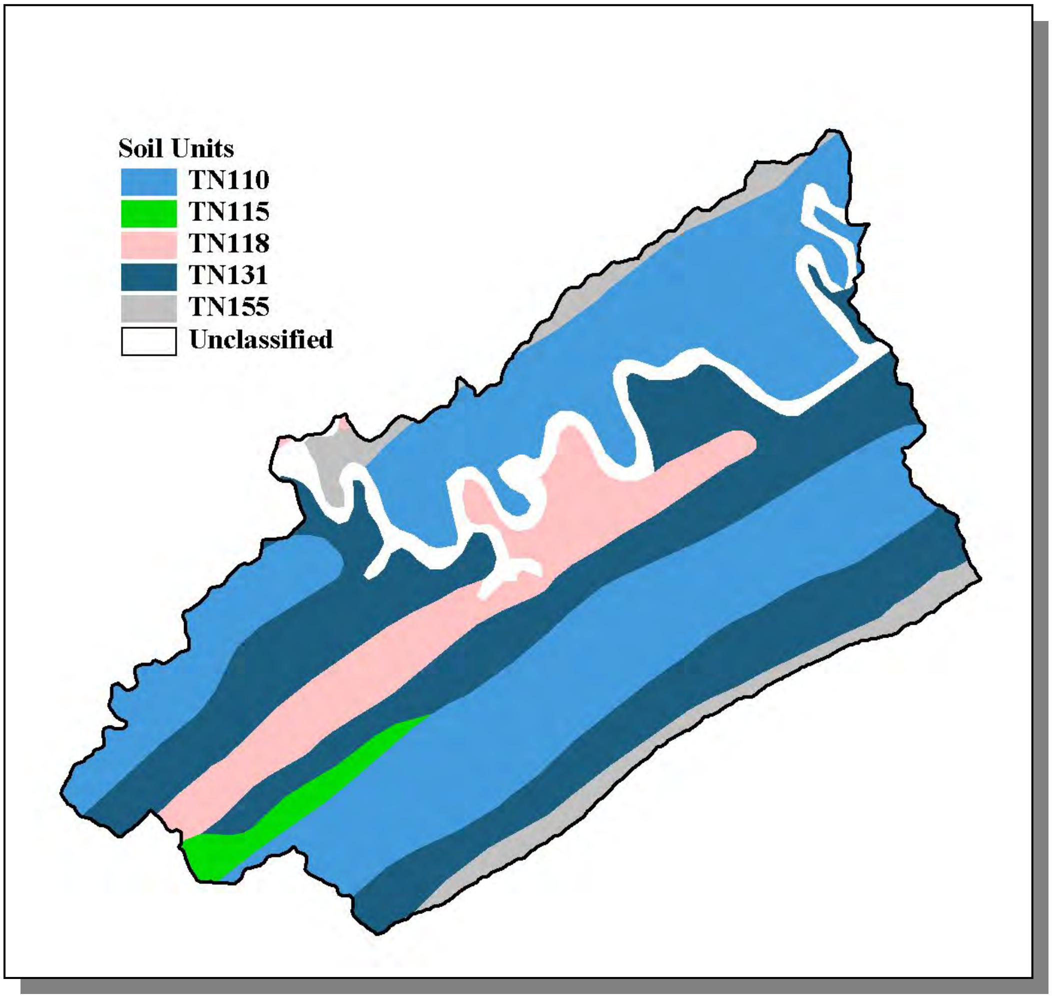


Figure 4-127. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050804.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN115	0.00	C	1.41	5.15	Silty Loam	0.36
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN155	0.00	C	1.71	5.31	Loam	0.32

Table 4-117. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050804. *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)
Claiborne	26,137	28,963	29,862	2.32	606	671	692	14.2
Grainger	17,095	19,456	20,659	9.64	1,648	1,875	1,991	20.8
Total	**43,232**	**48,419**	**50,521**		**2,254**	**2,546**	**2,683**	**19.0**

Table 4-118. Population Estimates in Subwatershed 060102050804.

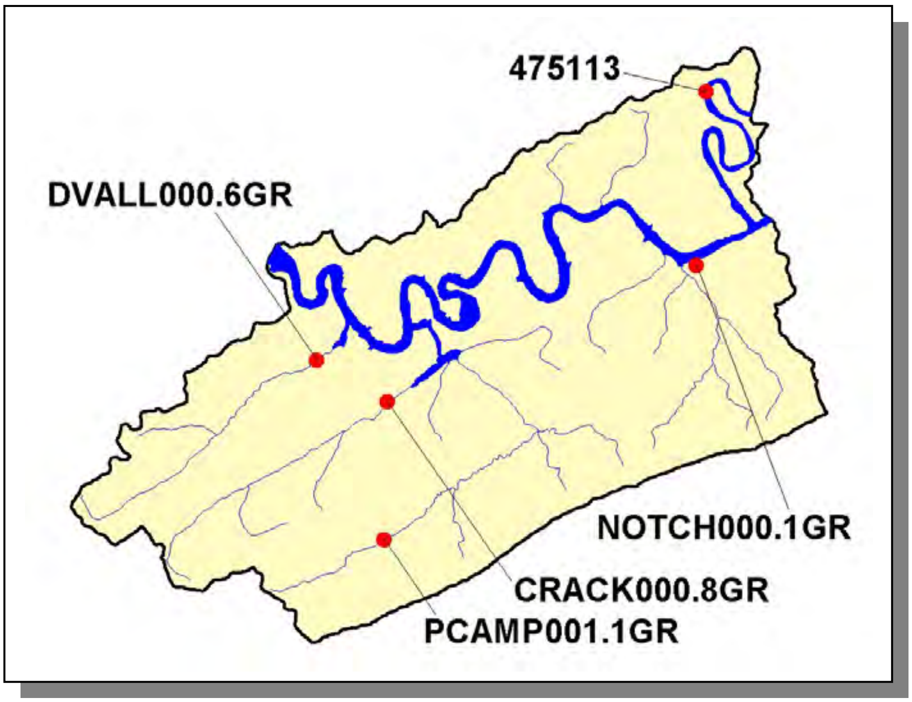


Figure 4-128. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050804. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

4.2.D.iv.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.D.iv.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS					
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
1,081	2,130	79	<5	34	15

Table 4-119. Summary of Livestock Count Estimates in Subwatershed 060102050804. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Claiborne	18,697	36,566	1,082	420	0	165
Grainger	12,115	23,927	942	1,184	510	195

Table 4-120. Summary of Livestock Count Estimates in Claiborne and Grainger Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Claiborne	167.60	167.60	2.6	12.1
Grainger	102.6	102.6	0.3	1.8

Table 4-121. Forest Acreage and Annual Removal Rates (1987-1994) in Claiborne and Grainger Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.83
Grass (Hayland)	0.32
Legumes, Grass (Hayland)	0.60
Grass, Forbs, Legumes (Mixed Pasture)	0.65
Corn (Row Crops)	5.69
Tobacco (Row Crops)	7.21
Farmsteads and Ranch Headquarters	0.50

Table 4-122. Annual Estimated Total Soil Loss in Subwatershed 060102050804.

4.2.E. 0601020509.

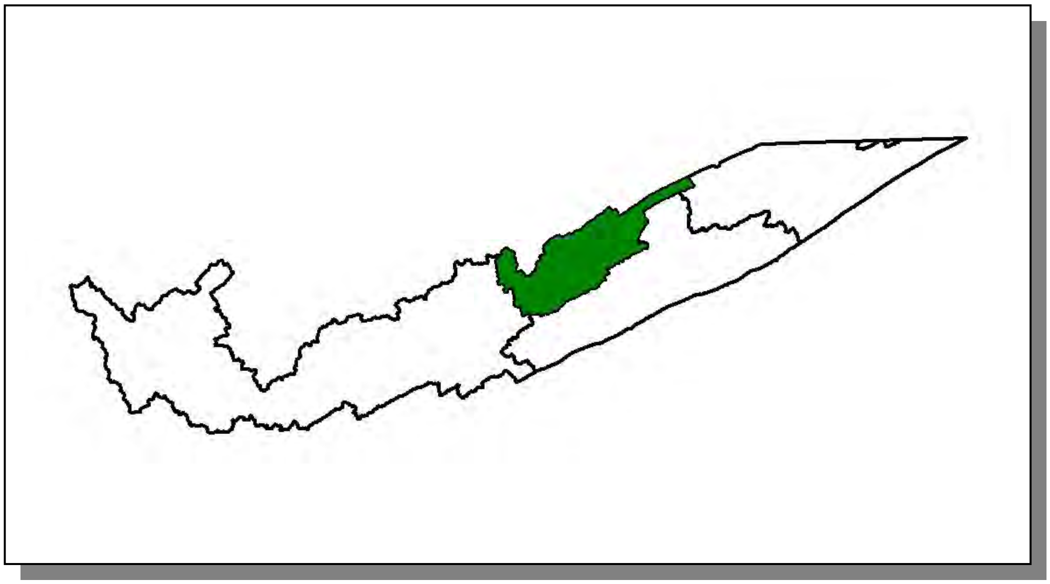


Figure 4-129. Location of Subwatershed 0601020509. *All Upper Clinch River HUC-10 subwatershed boundaries are shown for reference.*

4.2.E.i. 060102050901 (Big Sycamore Creek).

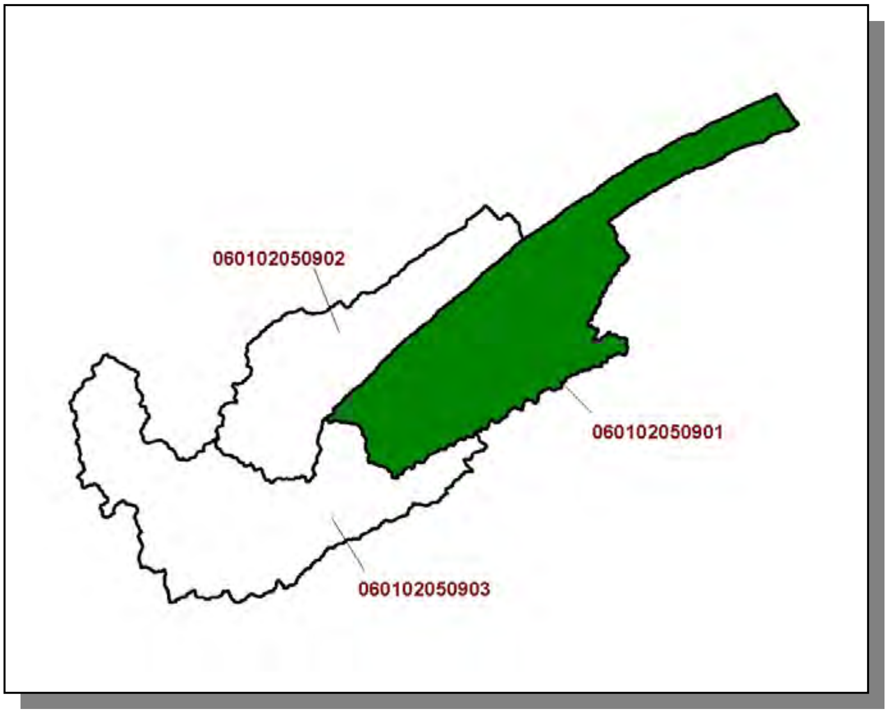


Figure 4-130. Location of Subwatershed 060102050901. *HUC-12 subwatershed are shown for reference.*

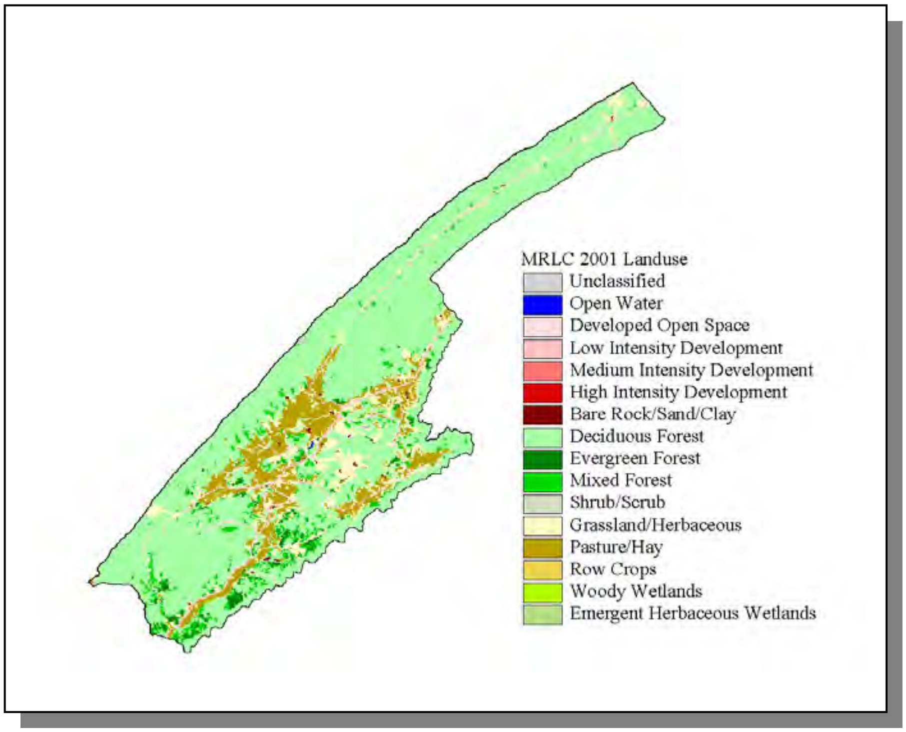


Figure 4-131. Illustration of Land Use Distribution in Subwatershed 060102050901.

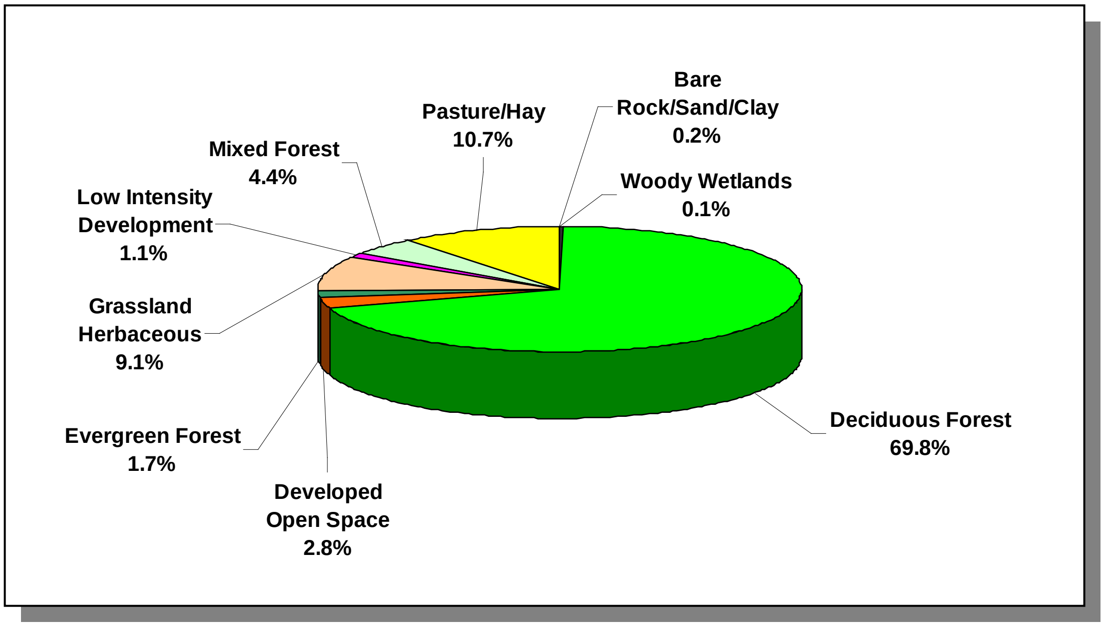


Figure 4-132. Land Use Distribution in Subwatershed 060102050901. *More information is provided in Appendix IV.*

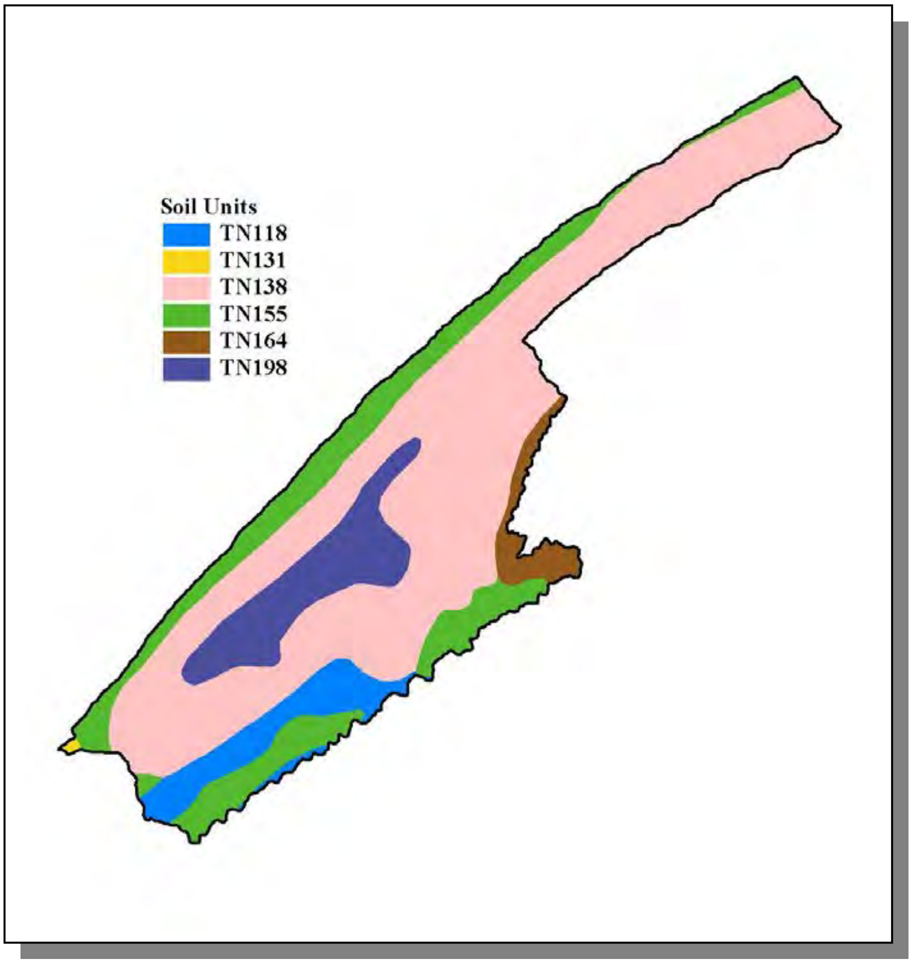


Figure 4-133. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050901.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN155	0.00	C	1.71	5.31	Loam	0.32
TN164	0.00	C	4.84	5.15	Loam	0.25
TN198	2.00	C	1.78	5.07	Silty Loam	0.39

Table 4-123. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050901. *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)
Claiborne	26,137	28,963	29,862	4.98	1,301	1,441	1,486	14.2
Hancock	6,739	6,801	6,786	2.52	170	171	171	0.6
Total	**32,876**	**35,764**	**36,648**		**1,471**	**1,612**	**1,657**	**12.6**

Table 4-124. Population Estimates in Subwatershed 060102050901.

Figure 4-134. Location of Historical Streamflow Data Collection Sites in Subwatershed 060102050901. *More information is provided in Appendix IV.*

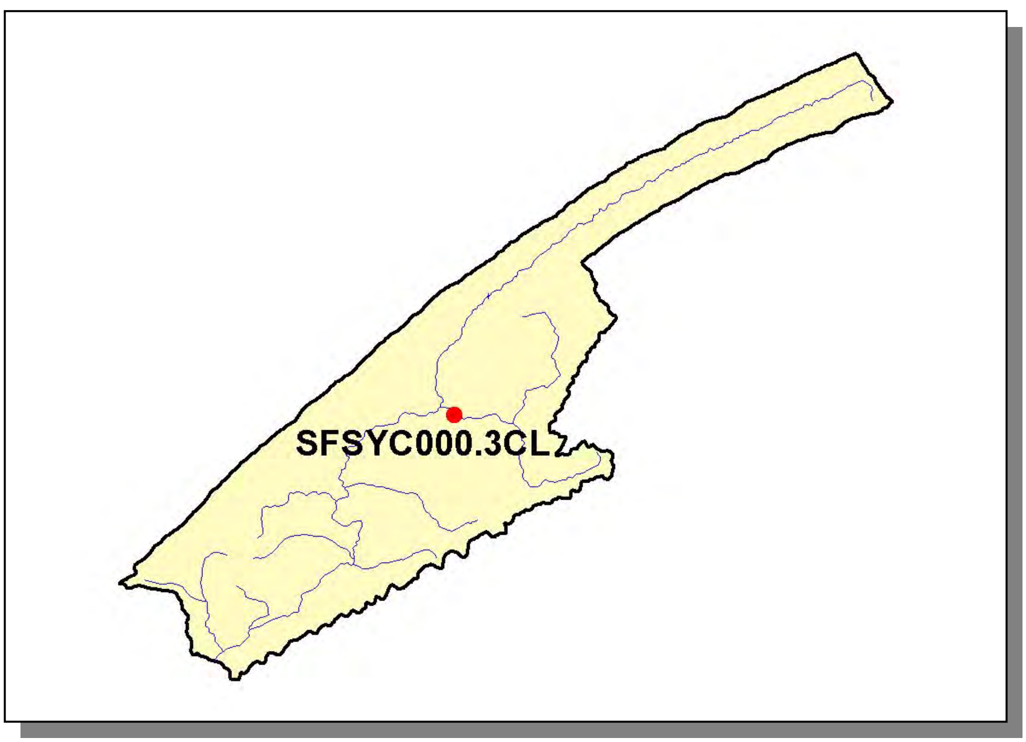


Figure 4-135. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050901. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

4.2.E.i.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.E.i.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS				
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Sheep
792	1,549	45	<5	7

Table 4-125. Summary of Livestock Count Estimates in Subwatershed 060102050901. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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
Claiborne	18,697	36,566	1,082	420	0	165
Hancock	7,079	14,311	89	364	0	67

Table 4-126. Summary of Livestock Count Estimates in Claiborne and Hancock Counties. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Claiborne	167.6	167.6	2.6	12.1
Hancock	92.9	92.9	2.7	14.2

Table 4-127. Forest Acreage and Annual Removal Rates (1987-1994) in Claiborne and Hancock Counties.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.80
Grass (Hayland)	0.66
Grass, Forbs, Legumes (Mixed Pasture)	0.26
Corn (Row Crops)	2.42
Tobacco (Row Crops)	23.03
Farmsteads and Ranch Headquarters	0.35

Table 4-128. Annual Estimated Total Soil Loss in Subwatershed 060102050901.

4.2.E.ii. 060102050902 (Little Sycamore Creek).

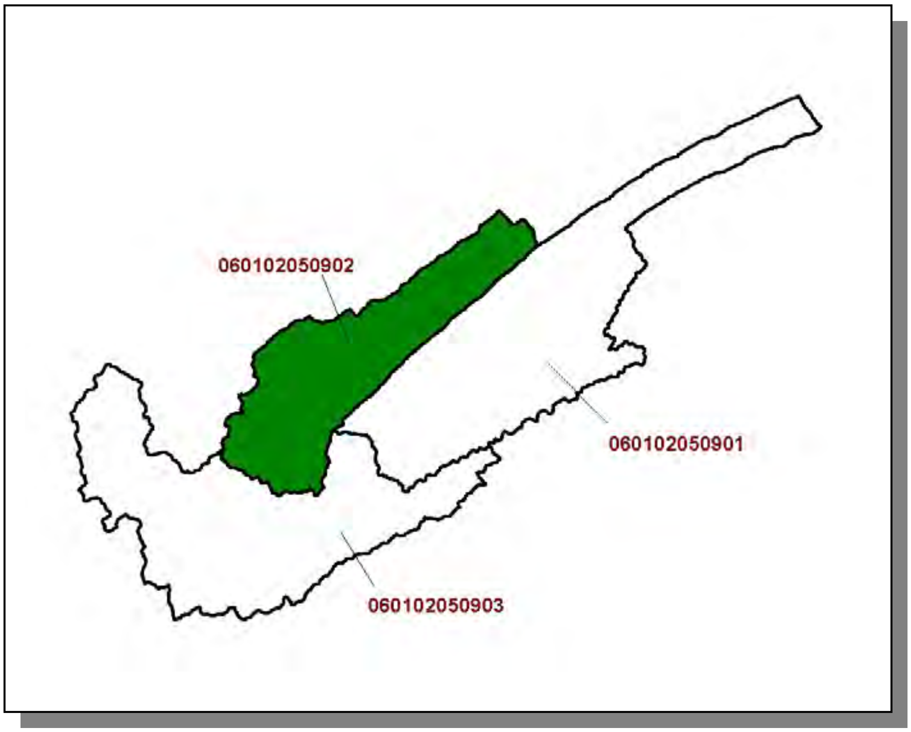


Figure 4-136. Location of Subwatershed 060102050902. *HUC-12 subwatershed are shown for reference.*

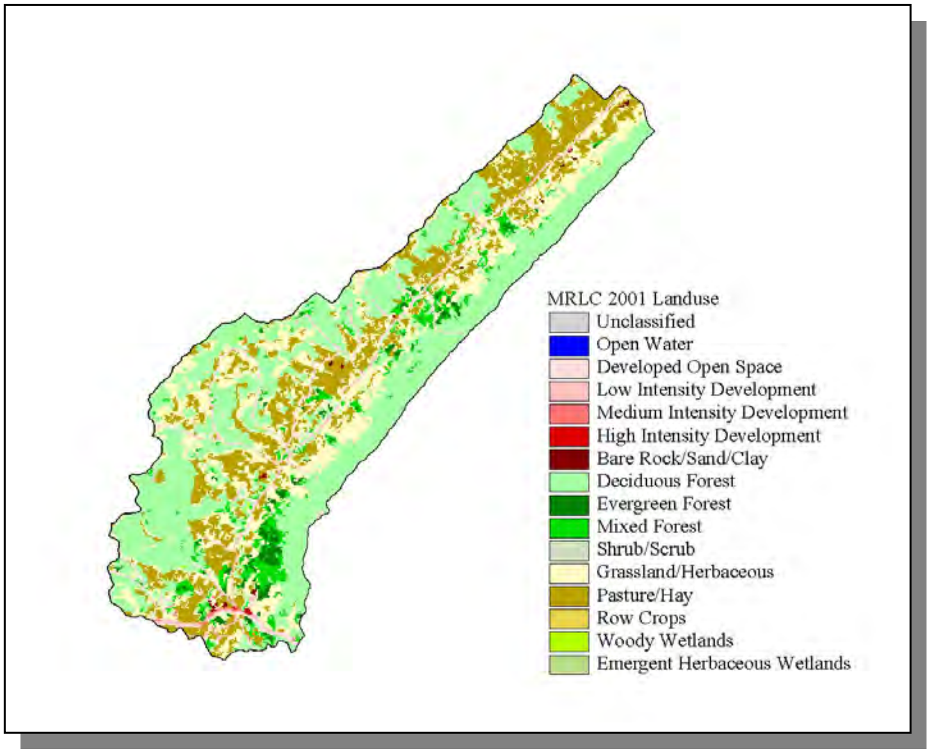


Figure 4-137. Illustration of Land Use Distribution in Subwatershed 060102050902.

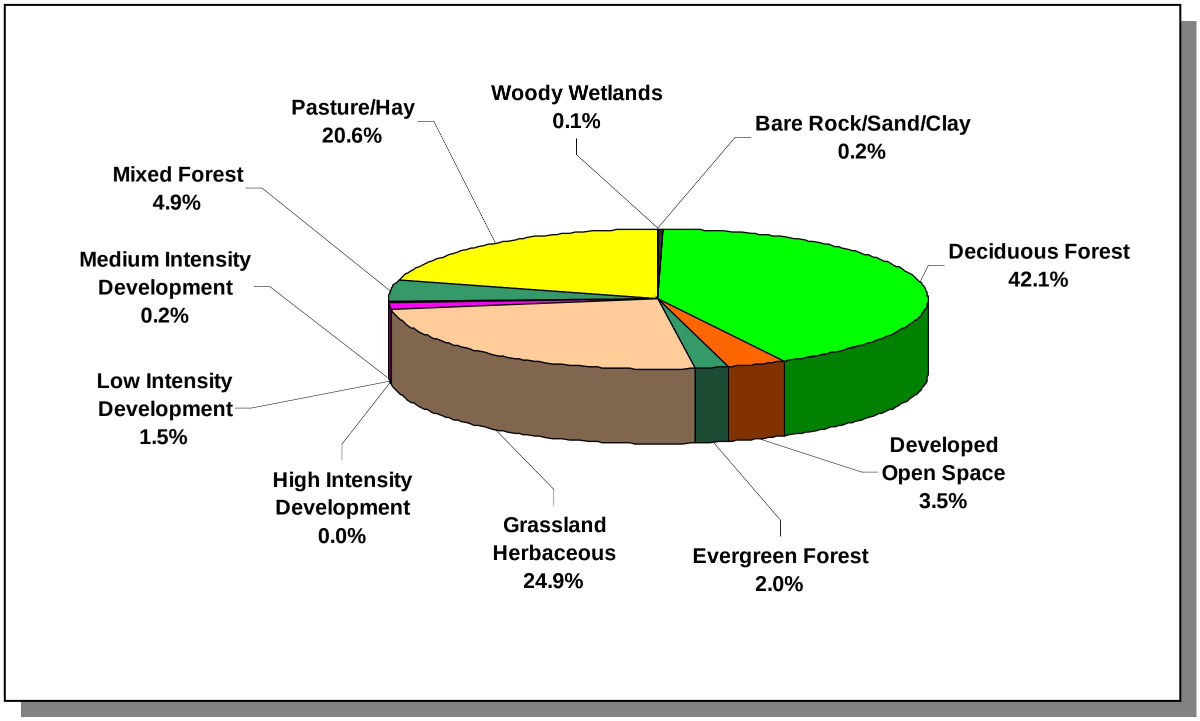


Figure 4-138. Land Use Distribution in Subwatershed 060102050902. *More information is provided in Appendix IV.*

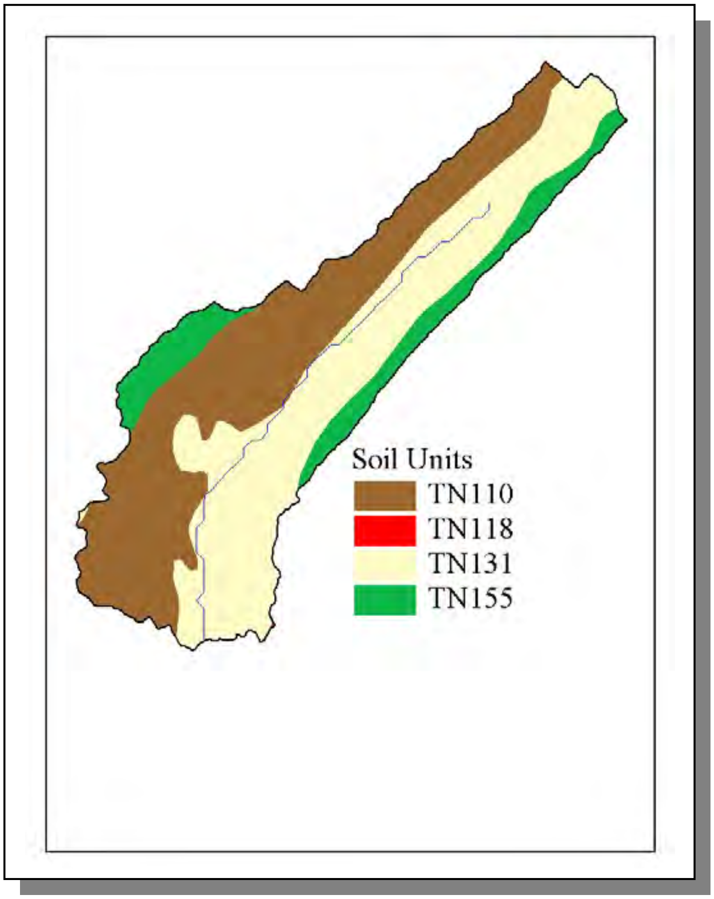


Figure 4-139. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050902.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN155	0.00	C	1.71	5.31	Loam	0.32

Table 4-129. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050902. *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)
Claiborne	26,137	28,963	29,862	3.79	989	1,096	1,130	14.3

Table 4-130. Population Estimates in Subwatershed 060102050902.

Figure 4-140. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050902. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

4.2.E.ii.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.E.ii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS				
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Sheep
1,118	2,187	65	<5	10

Table 4-131. Summary of Livestock Count Estimates in Subwatershed 060102050902. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)	Sheep
Claiborne	18,697	36,566	1,082	420	165

Table 4-132. Summary of Livestock Count Estimates in Claiborne County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), "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)
Claiborne	167.6	167.6	2.6	12.1

Table 4-133. Forest Acreage and Annual Removal Rates (1987-1994) in Claiborne County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.38
Grass, Forbs, Legumes (Mixed Pasture)	1.13
Farmsteads and Ranch Headquarters	0.43

Table 4-134. Annual Estimated Total Soil Loss in Subwatershed 060102050902.

4.2.E.iii. 060102050903 (Sycamore Creek).

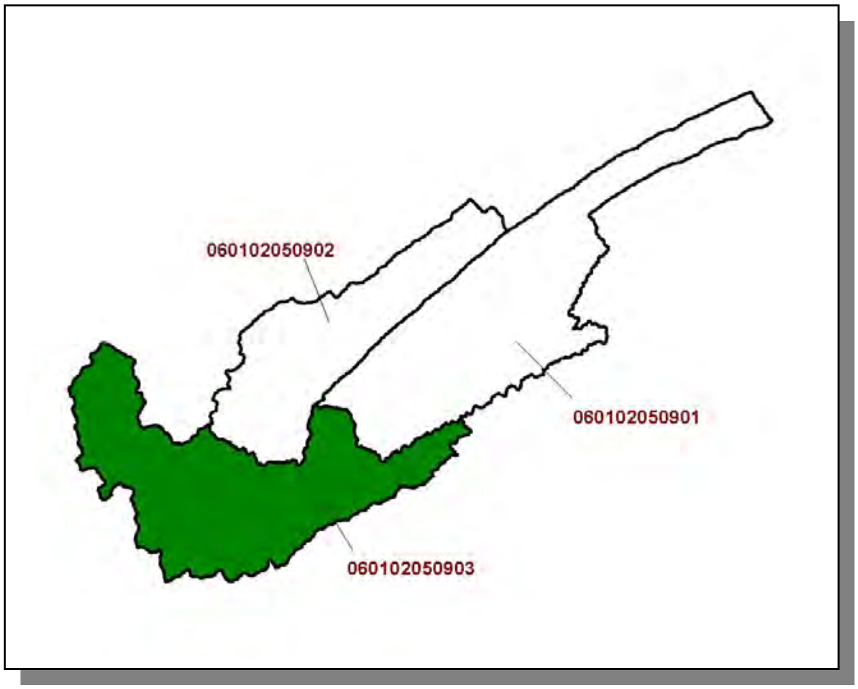


Figure 4-141. Location of Subwatershed 060102050903. *HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

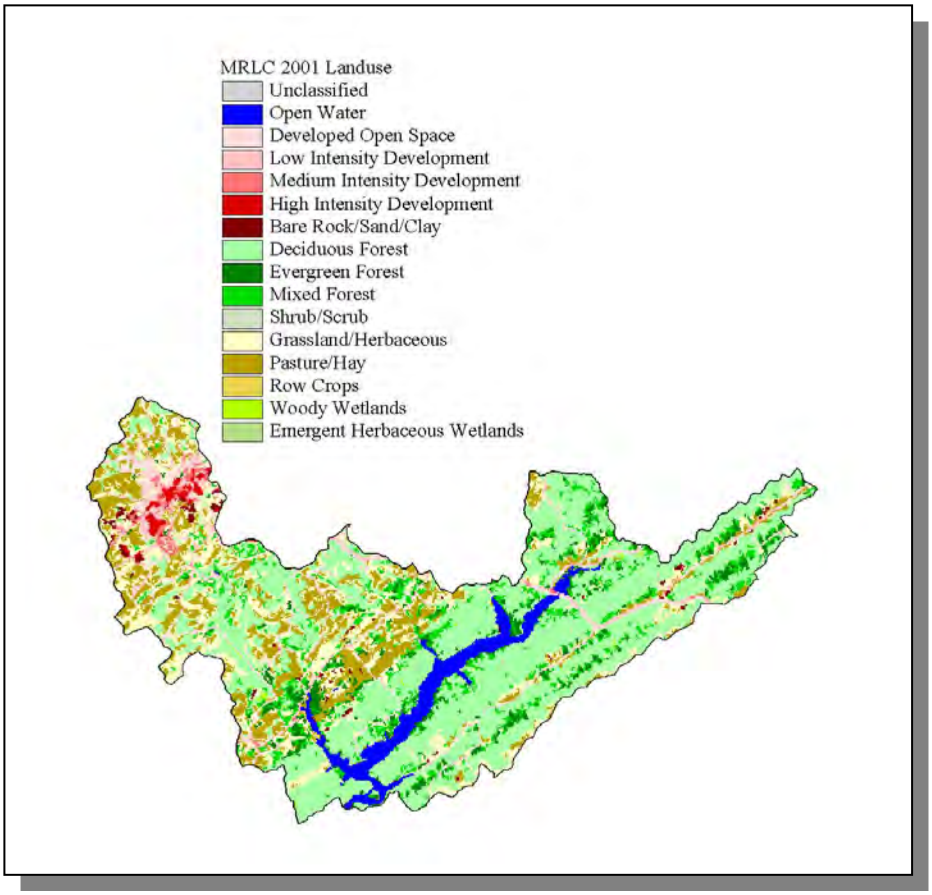


Figure 4-142. Illustration of Land Use Distribution in Subwatershed 060102050903.

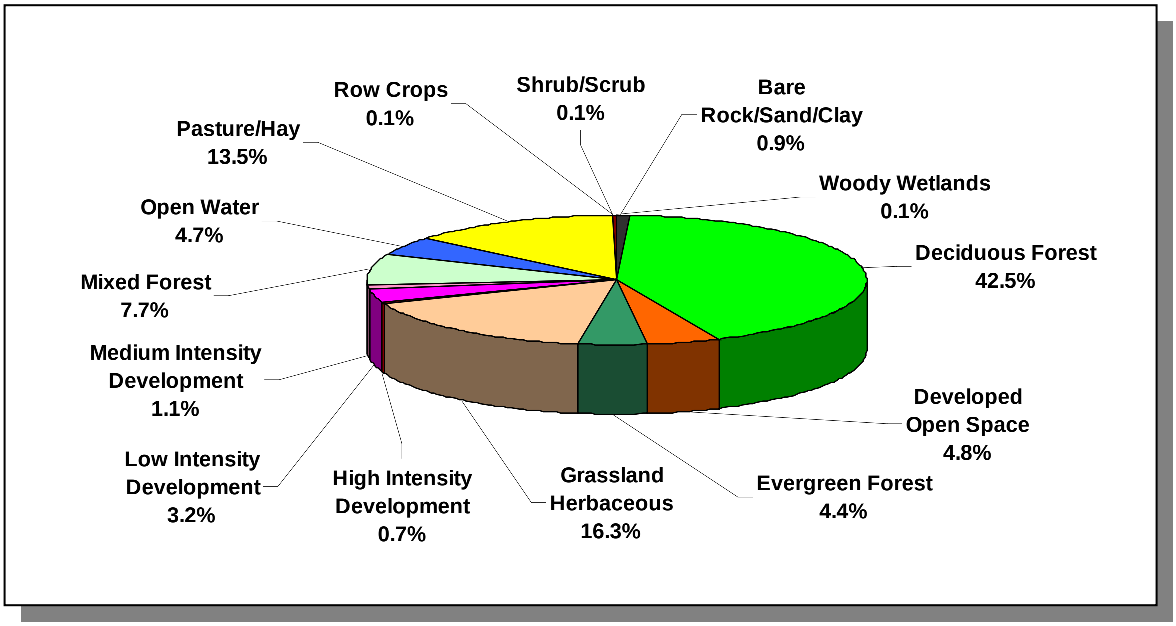


Figure 4-143. Land Use Distribution in Subwatershed 060102050903. *More information is provided in Appendix IV.*

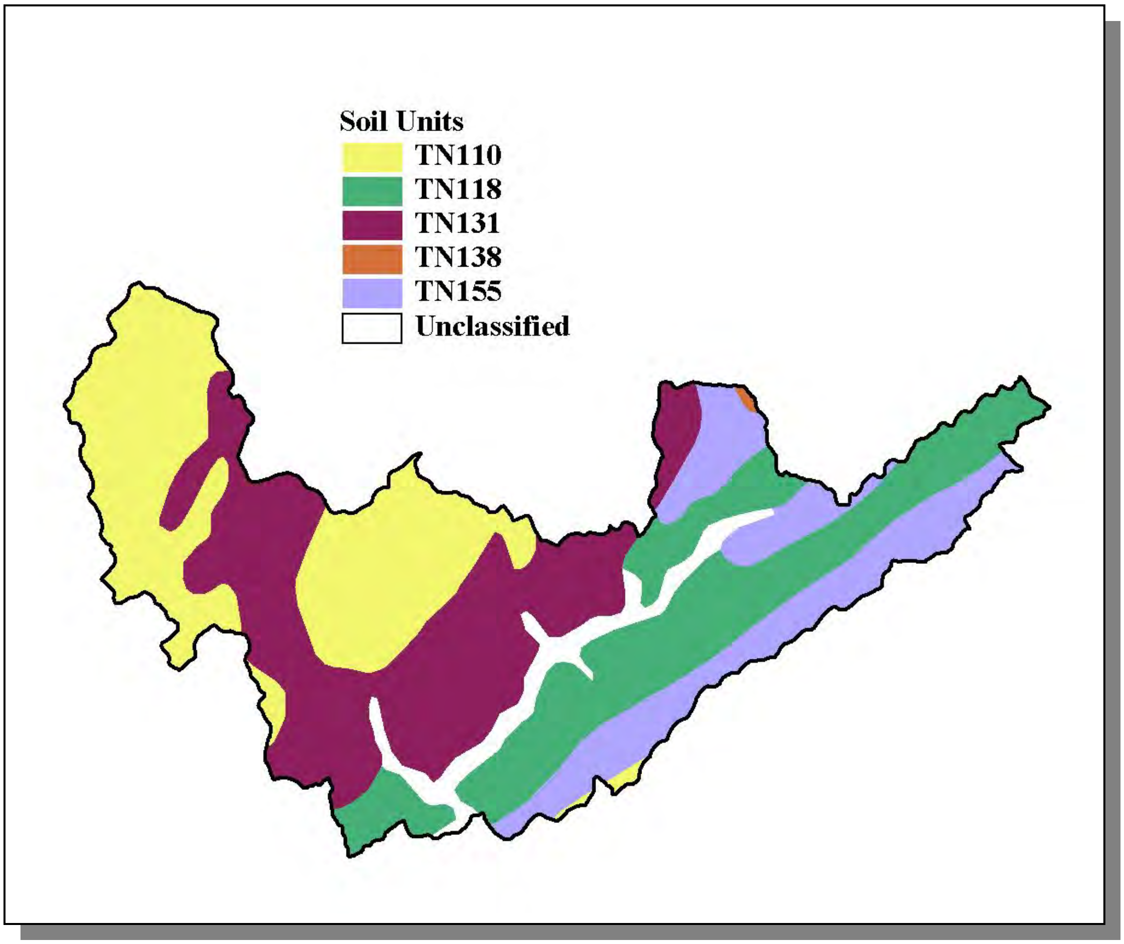


Figure 4-144. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050903.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN118	0.00	C	6.52	5.12	Loam	0.29
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN155	0.00	C	1.71	5.31	Loam	0.32

Table 4-135. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060102050903. *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)
Claiborne	26,137	28,963	29,862	5.78	1,512	1,675	1,727	14.2

Table 4-136. Population Estimates in Subwatershed 060102050903.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
New Tazewell	Claiborne	1,864	785	543	236	6
Tazewell	Claiborne	2,150	919	602	304	13
Total		**4,014**	**1,704**	**1,145**	**540**	**19**

Table 4-137. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060102050903.

Figure 4-145. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060102050903. *More information, including site names and locations, and station numbers for sites located in the watershed outside of Tennessee, is provided in Appendix IV.*

4.2.E.iii.a. Point Source Contributions.

There are no point source contributions in this subwatershed.

4.2.E.iii.b. Nonpoint Source Contributions.

LIVESTOCK COUNTS				
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Sheep
1,128	2,207	65	<5	10

Table 4-138. Summary of Livestock Count Estimates in Subwatershed 060102050903. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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)	Sheep
Claiborne	18,697	36,566	1,082	420	165

Table 4-139. Summary of Livestock Count Estimates in Claiborne County. *According to the 1997 Census of Agriculture (http://www.agcensus.usda.gov/), **"**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)
Claiborne	167.6	167.6	2.6	12.1

Table 4-140. Forest Acreage and Annual Removal Rates (1987-1994) in Claiborne County.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.38
Grass, Forbs, Legumes (Mixed Pasture)	0.13
Farmsteads and Ranch Headquarters	0.43

Table 4-141. Annual Estimated Total Soil Loss in Subwatershed 060102050903.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE UPPER CLINCH RIVER WATERSHED

5.1 Background

5.2 Federal Partnerships
- 5.2.A. Natural Resources Conservation Service
- 5.2.B. United States Geological Survey
- 5.2.C. United States Fish and Wildlife Service
- 5.2.D. Tennessee Valley Authority
- 5.2.E. United States Army Corps of Engineers

5.3 State Partnerships
- 5.3.A. TDEC Division of Water Supply
- 5.3.B. State Revolving Fund
- 5.3.C. Tennessee Department of Agriculture
- 5.3.D. Virginia Department of Environmental Quality
- 5.3.E. Tennessee Stream Mitigation Program

5.4 Local Initiatives
- 5.4.A. The Nature Conservancy
- 5.4.B. Clinch-Powell RC&D Council
- 5.4.C. Cumberland Mountain RC&D Council

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 Upper Clinch River Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS.

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

Performance Results System (PRS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRS may be viewed at http://prms.nrcs.usda.gov/prs. From the opening menu, select "Reports" in the top tool bar. 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	24,599	54	
Erosion Control		6,267	
Nutrient Management		10,489	
Pest Management		11,037	
Grazing / Forages	5,700	6,214	
Tree and Shrub Practices		4,879	
Tillage and Cropping		858	
Waste Management Systems			1
Wildlife Habitat Management		5,357	
Water Supply	13,151		29

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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 pygmy madtom (*Noturus stanauli*), as well as numerous federally endangered mussel species, occur in the Clinch River watershed.

On August 31, 2004, the Service designated critical habitat (Federal Register Volume 69, No. 168) in the upper Clinch River for the federally endangered Cumberland elktoe (*Alasmidonta atropurpurea*), Cumberlandian combshell (*Epioblasma brevidens*), purple bean (*Villosa perpurpurea*), rough rabbitsfoot (*Quadrula cylindrical strigillata*), and oyster mussel (*Epioblasma capsaeformis*) in Hancock County. The federally designated critical habitat begins at river mile 159, just below Grissom Island, and extends upstream to the Virginia state line. For a complete listing of endangered and threatened species in Tennessee, please visit the Service's website at http://*cookeville.fws.gov*.

Federally designated critical habitat also exists in the Clinch River for the federally threatened slender chub (*Erimystax cahni*) and yellowfin madtom (*Noturus flavipinnis*). The federally designated critical habitat extends from the backwaters of Norris Lake upstream to the Virginia state line. 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.

Utilizing funding provided through the Service's Landowner Incentives Program (LIP), the Tennessee Wildlife Resources Agency (TWRA), the Tennessee Nature Conservancy (TNC), and private landowners are implementing habitat restoration activities in the Clinch River watershed. The LIP is a new effort of the Service's endangered species recovery program focusing on the enhancement of in-stream aquatic habitats and the protection and restoration of riparian habitats for the numerous federally listed species which occur in the watershed. The Service also provided a Land Acquisition Grant to TWRA which was utilized to purchase properties adjacent to the Clinch River at Kyles Ford.

In a partnership with the TNC, 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.

The Service is actively involved with the TNC and private landowners in the upper reaches of the Clinch River watershed to protect riparian habitats and enhance water quality for a number of federally listed mussel and fish species. Current projects include the construction of bank stabilization practices, installation of livestock exclusion fencing, construction of heavy-use feeding pads and travel corridors, and the installation of alternate water supply sources.

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. Tennessee Valley Authority (TVA). Tennessee Valley Authority's (TVA) goals for the 21st century are to generate prosperity for the Tennessee Valley by promoting economic development, supplying low-cost, reliable power, and supporting a thriving river system. TVA is committed to the sustainable development of the region and is engaged in a wide range of watershed protection activities to improve or protect water quality conditions.

TVA's watershed activities are conducted by Watershed Teams located throughout the Valley. Watershed Teams help communities develop and implement protection and restoration activities in their local watersheds. In addition to water quality efforts, Watershed Teams carryout varied resource stewardship functions including management of TVA lands and shorelines, recreation, and resource management. TVA also operates a comprehensive monitoring program to provide water quality and aquatic information.

The following is a summary of TVA's resource stewardship and monitoring activities in the Upper Clinch watershed.

Water Quality Improvement Efforts

Watershed Initiatives: Watershed initiatives are major efforts to improve or protect water quality on a watershed scale. These long-term efforts represent a considerable commitment of resources. TVA participation is strategically targeted based on resource condition, partnership opportunity, and a need for TVA involvement. Watershed initiatives are cooperative efforts in which TVA's role varies depending on the needs and the capabilities of other participants.

While each watershed initiative is unique in many respects, TVA applies a conceptual model that provides a consistent framework and structure. This provides a basis for monitoring progress and ensures that each effort is of a sufficient quality to compete successfully for grant funds. Each initiative is viewed as proceeding through four stages of development: Explore, Build/Prepare, Implement, and Transition from an active initiative to a maintenance status. Within these phases, there a key elements that are deemed essential for a successful watershed initiative. These are cause/source identification, development of local capability, communication and marketing, funding strategy, and action plan development.

For more information on TVA's overall approach to watershed water quality, contact Donald Anderson at dwanderson@tva.gov or 423-876-6711.

Big Creek Initiative 06010205-210

Big Creek watershed is located in Campbell County, Tennessee with a drainage area of 67 square miles. The headwaters of Big Creek and its tributary, Ollis Creek travel through land that is impacted by historic coal mining. Big Creek runs through Lafollette and into Norris Reservoir. In 2003, the Big Creek Watershed Partnership formed to protect and improve water quality throughout the watershed. Key partners include Cumberland Mountain Resource Conservation and Development Council, Natural Resources Conservation Service (NRCS), Office of Surface Mining (OSM), Tennessee Department of Environment and Conservation (TDEC), Tennessee Division of Forestry, Tennessee Wildlife Resource Agency (TWRA) and Tennessee Valley Authority.

Efforts to-date include assessment, implementation and outreach. The partnership performed biological and chemical water quality monitoring and windshield surveys to assess watershed conditions and identify priority areas. In 2005, the partnership was awarded an Appalachian Clean Streams Programs grant to support a multi-year project to remediate acid mine drainage in the upper reaches of the watershed affected by historic mining. Future plans include acid mine drainage remediation, demonstration of stormwater/urban management practices, community meetings, and stakeholder planning sessions to encourage participation in the development and implementation of the Big Creek Watershed Restoration Action Plan.

For more information, contact Tiffany Foster, TVA Watts Bar Clinch Watershed Team at tlfoster@tva.gov or 865-632-1330.

Tennessee Valley Clean Marina Initiative: The Tennessee Valley Clean Marina Initiative is an effort to promote environmentally responsible marina practices. This voluntary program helps marina operators protect the resource that provides them with their livelihood. It addresses sewage management, oil and gas control, marina siting, and erosion prevention. The program certifies marinas that comply with pollution-control standards and allows them to use the Clean Marina logo and flag. As of October 3, 2005, 53 marinas were flying the Clean Marina flag and going the extra mile to protect the waters of the Tennessee Valley.

Norris Reservoir was the pilot for Clean Marina Initiative (CMI) in 2001. Participation and interest in the CMI is extensive. Norris Reservoir has 24 marinas with nine certified as Clean Marinas. Of the nine marinas certified (Norris Dam, Mountain Lake, Indian River, Shanghai, Stardust, Andersonville, Deerfield, Sugar Hollow, and Flat Hollow), three were certified last fiscal year. Currently two marinas are actively working towards CMI certification. Events such as National Clean Boating Day, County Leadership Council tours, and marina employees and customer appreciation celebrations have helped introduce the program to a wide variety of stakeholders. Additionally, monthly meetings held by the Norris Lake Marina Owners Association provide constant support and encouragement for continued CMI success.

For more information contact: David Harrell, TVA Watts Bar-Clinch Watershed Team at dbharrell@tva.gov or 865-632-1327.

Growth Readiness: The Tennessee Growth Readiness program helps communities learn how land use decisions affect water quality, and then make informed choices about managing growth. It helps them comply with regulatory requirements. Planners and public works officials are the program's target audience. They are intimately involved in the nuts-and-bolts of their community's land use and water quality decisions. Since the program began in the fall of 2003, representatives from 280 Tennessee communities have participated. Nearly 200 of these communities have evaluated their existing development rules against a set of model development principles. Development following these principles is economically viable and protects the environment. Statewide 40 communities have changed their development rules to adopt these principles.

Other partnership efforts:
Blackwater Creek (06010205-170A) and Kyles Ford (06010205-140)
Hancock Community Partners and The Nature Conservancy have a strong presence and partnership within the community of Sneedville, located in the watershed. TVA has partnered with these groups and Office of Surface Mining, The Nature Conservancy (TNC), US Fish and Wildlife Service, Volunteer In Service to America (VISTA) program to aid ongoing efforts in community outreach, water quality monitoring, demonstrational agricultural best management practices projects, and septic installation projects.

For more information, contact Tiffany Foster, TVA Watts Bar Clinch Watershed Team at tlfoster@tva.gov or 865-632-1330.

Sycamore Creek (06010205-210)
TVA partnered with the Claiborne Soil Conservation District, Natural Resource Conservation Service, Tennessee Department of Agricultural, and Tennessee Division of Forestry to address water quality impairments throughout the watershed. Federal and state programs along with TVA funds have enabled local landowners to install agricultural best management practices on their farms that improve water quality and farm productivity. Local participation in these programs has steadily increased as more landowners recognize the benefits.

For more information, contact Todd Reed, Claiborne County NRCS
2178 Highway 25 E
Tazewell, TN 37879-3823
423-626-3811

Water Quality Monitoring

TVA's monitoring efforts fall generally in three components: monitoring the ecological health and water quality of TVA reservoirs; assessing the ecological condition of selected stream sites; and monitoring of conditions directly related to human use of aquatic resources.

Reservoir Ecological Health: TVA's Reservoir Ecological Health Monitoring program evaluates current conditions, provides data for trend analysis, and provides assessments of current and future operations. TVA monitors ecological conditions at 69 sites on 31 reservoirs. Each site is monitored every other year unless a substantial change in the ecological health score occurs during a two-year cycle. The overall health ratings of TVA reservoirs include five ecological indicators: dissolved oxygen, chlorophyll, fish, bottom life, and sediment quality. Results from each of the five indicators are evaluated based on TVA's reservoir evaluation system and assigned a rating ranging from 1 (poor) to 5 (excellent).

The ecological health of Norris Reservoir was rated fair in 2003. Individual scores for each sampling site and component are presented in the table below.

Table 1: Ratings for Individual Ecological Health Indicators for Norris Reservoir, 2003

Monitoring Location	Dissolved Oxygen	Chlorophyll	Fish	Bottom Life	Sediment Quality
Forebay	Poor	Good	Fair	Poor	Fair
Mid-Reservoir (Clinch)	Poor	Good	Good	Good	Good
Mid-Reservoir (Clinch)	Poor	Fair	Good	Fair	Good

The most significant ecological health issue on Norris is low dissolved oxygen levels. Dissolved oxygen rated poor at all three monitoring locations because the lower half of the water column contained little oxygen (less than two milligrams per liter) from late summer through early autumn.

This chronic problem is mostly the result of the reservoir's basic characteristics. Norris is a deep tributary storage reservoir with a long summer retention time; that is, it can take more than 200 days for water to move through the reservoir. As the days lengthen in the spring, a warmer layer of water forms on top of a cooler layer. The layers do not mix, so the bottom layer becomes devoid of oxygen as it is used up by decaying plants and other materials that settle to the bottom.

In conjunction with the Reservoir Ecological Health monitoring, TVA collects additional water samples to be analyzed for parameters of interest to public and industrial water supplies.

More information about Reservoir Ecological Health Monitoring and related monitoring can be obtained by contacting Tyler Baker at 423-876-6733 or tfbaker@tva.gov or http://www.tva.gov .

Stream Monitoring

The condition of water resources in the streams is measured using three independent methods: Index of Biotic Integrity (IBI), number of mayfly, stonefly, and caddisfly taxa (EPT), and Habitat Assessment. EPT sampling and fish community assessment (IBI) are conducted at the same sites. Site selection is governed by study objectives, stream physical features, and stream access. TVA's objective is to characterize the quality of water resources within a sub-watershed (11-digit hydrologic unit). Sites are typically located in the lower end of sub-watersheds and at intervals on the mainstem to integrate the effects of land use.

IBI: The index of biotic integrity (IBI) assesses the water quality in flowing water by examining a stream's fish assemblage. Twelve metrics address species richness and composition, trophic structure (structure of the food chain), fish abundance, and fish health. Each metric reflects the condition of one aspect of the fish assemblage and is scored against high quality reference streams in the region... Potential scores for each of the twelve metrics are 1-poor, 3-intermediate, or 5-the best to be expected. Scores for the 12 metrics are summed to produce the IBI for the site.

EPT: The number and types of aquatic insects, like fish, are indicative of the general quality of the environment in which they live. The method TVA uses involves only qualitative sampling and field identification of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) to the family taxonomic level (EPT). The score for each site is simply the number of EPT families. The higher EPT scores are indicative of high quality streams because these insect larvae are intolerant of poor water quality.

Habitat Assessment: The quality and quantity of habitat (physical structure) directly affects aquatic communities. Habitat assessments are done at most stream sampling sites to help interpret IBI and EPT results. If habitat quality at a site is similar to that found at a good reference site, any impacts identified by IBI and EPT scores can reasonably be attributed to water quality problems. However, if habitat at the sample site differs considerably from that at a reference site, lower than expected IBI and EPT scores might be due to degraded habitat rather than water quality impacts.

The habitat assessment method used by TVA (modified EPA protocol) compares observed in-stream, channel, and bank characteristics at a sample site to those expected at a similar high-quality stream in the region. Individual attributes are scored from 1 (poorest condition) to 4 (best condition). The habitat score for the sample site is the sum of these attributes. Scores can range from a low of 10 to a high of 40.

EPT sampling and fish community assessment (IBI) are conducted at the same sites. Site selection is based on study objectives, stream physical features, and stream access. TVA's objective is to characterize the quality of water resources within a sub-watershed (11-digit hydrologic unit). Sites are typically located in the lower end of sub-watersheds and at intervals on the mainstem to integrate the effects of land use. Thirteen sites in the Upper Clinch have been sampled since 2000 and are being sampled routinely. These sites are typically sampled every five years.

Details about stream sampling sites and scores can be obtained by contacting Charlie Saylor at (865)632-6406 or cfsaylor@tva.gov or http://www.tva.gov.

Human Use

Bacteriological Monitoring at Recreational Areas: Each summer TVA evaluates about 250 swimming areas and informal water contact recreational sites for *Escherichia coli* (*E. coli*) bacteria. These sites include those operated by TVA and many operated by other agencies. Indicator organisms such as *E. coli* are used to help protect bathers from illnesses that may be contracted from recreational activities in waters contaminated by fecal pollution. Although these tests are not proof of human health threats, they may indicate the presence of more harmful pathogens in waterbodies.

Bacteriological water sampling is conducted between Memorial Day and Labor Day when people are most likely to be recreating. Typically, swimming areas and heavily used canoe sites are monitored every year, while boat ramps and other canoe sites are monitored every other year.

E. coli bacteria levels in samples collected on Norris Reservoir in 2005 were within the state of Tennessee's guidelines for water contact with one exception. The single-sample maximum concentration was exceeded in at least one of the ten samples at Loyston Point Recreation Area beach. The other sampling locations in 2005 were Cove Creek public boat ramp on Oak Grove Road, Mountain Lake Marina boat ramp, and Big Ridge State Park beach.

Fish Flesh Monitoring: TVA conducts fish tissue monitoring by collecting fish from its reservoirs and checking the tissue for metals, pesticides, PCBs, and other chemicals that could affect human health. This data is shared with state agencies, which are responsible for advising the public of health risks from eating contaminated fish.

TVA collected channel catfish and largemouth bass from Norris Reservoir for tissue analysis in fall 2001. All contaminant levels were either below detectable levels or below the levels used by the state of Tennessee to issue fish consumption advisories. These species were collected for analysis again in fall 2005.

More information about Bacteriological Monitoring at Recreational Areas and Fish Flesh Monitoring can be obtained by contacting Rebecca Hallman at (423)-876-6736 or rlhallman@tva.gov or http://www.tva.gov .

Spring Sport Fish Monitoring: TVA conducts an annual spring sportfish survey to determine the number, age, and general health of black bass and crappie populations in its reservoirs. Results are used by state agencies to protect and improve sport fisheries.

More information about Spring Sport Fish Monitoring can be obtained by contacting Kurt Lakin at (423)-876-6737 or kmlakin@tva.gov or http://www.tva.gov .

Sport Fishing Index: TVA and state fisheries agencies have created a Sport Fishing Index (SFI) to help anglers decide where they have the best chance of catching their favorite types of fish. SFI scores for different species are based both on population measures (the size and health of the individual fish, along with the number of fish present) and angler use and success information (the number of anglers looking for a particular type of fish, and the number of that type that they actually catch). The SFI score ranges from a high of 60 (excellent) to a low of 20 (very poor).

The spring sportfish surveys are conducted from March through early June and include twelve 30-minute electrofishing runs covering the various habitat types present. Fish are weighed, measured, checked for anomalies, and released. This approach to determining fish abundance is used by state game and fish agencies and academia. The survey predominantly targets three species of black bass — largemouth, smallmouth, and spotted bass — and black and white crappie.

Information about the Sport Fishing Index can be obtained by contacting Greg Shaffer at 865-632-6365 or gshaffer@tva.gov or http://www.tva.gov.

5.2.E. 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, 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.

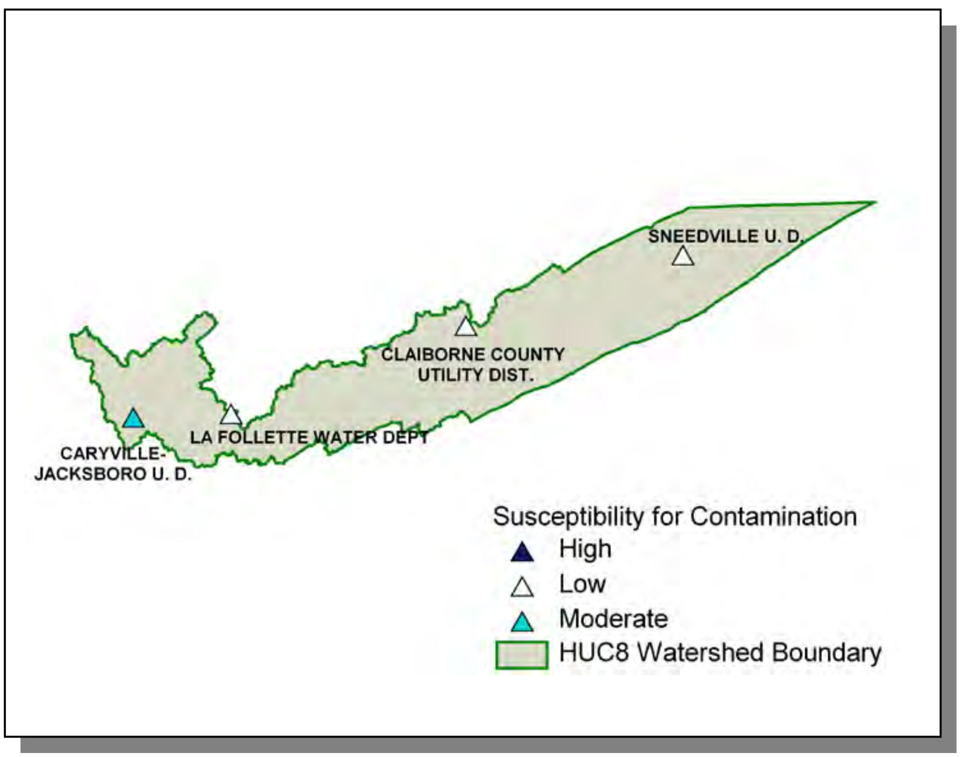


Figure 5-1. Susceptibility for Contamination in the Upper Clinch River Watershed.

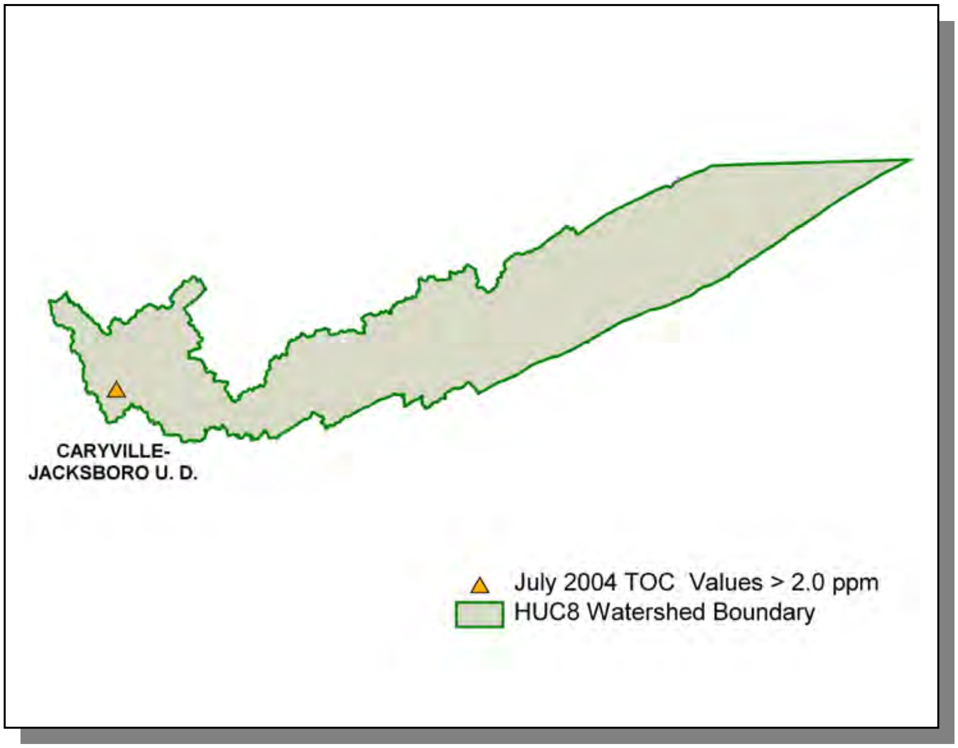


Figure 5-2. July 2004 Raw Water Total Organic Carbon (TOC) Analysis in the Upper Clinch River Watershed.

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

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

SRF loans are available for planning, design, and construction of wastewater facilities, or any combination thereof. Eligible projects include new construction or upgrading/expansion of existing facilities, including wastewater treatment plants, pump stations, force mains, collector sewers, interceptors, elimination of combined sewer overflows, and nonpoint source pollution remedies.
SRF loan applicants must pledge security for loan repayment, agree to adjust user rates as needed to cover debt service and fund depreciation, and maintain financial records

that follow governmental accounting standards. SRF loan interest rates range from zero percent to market rate, depending on the community's per-capita income, taxable sales, and taxable property values. Most SRF loan recipients qualify for interest rates between 2 and 4 percent. Interest rates are fixed for the life of the term of the loan. The maximum loan term is 20 years or the design life of the proposed wastewater facility, whichever is shorter.

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

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

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

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

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

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

- Monitoring Projects. Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Upper Clinch River 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

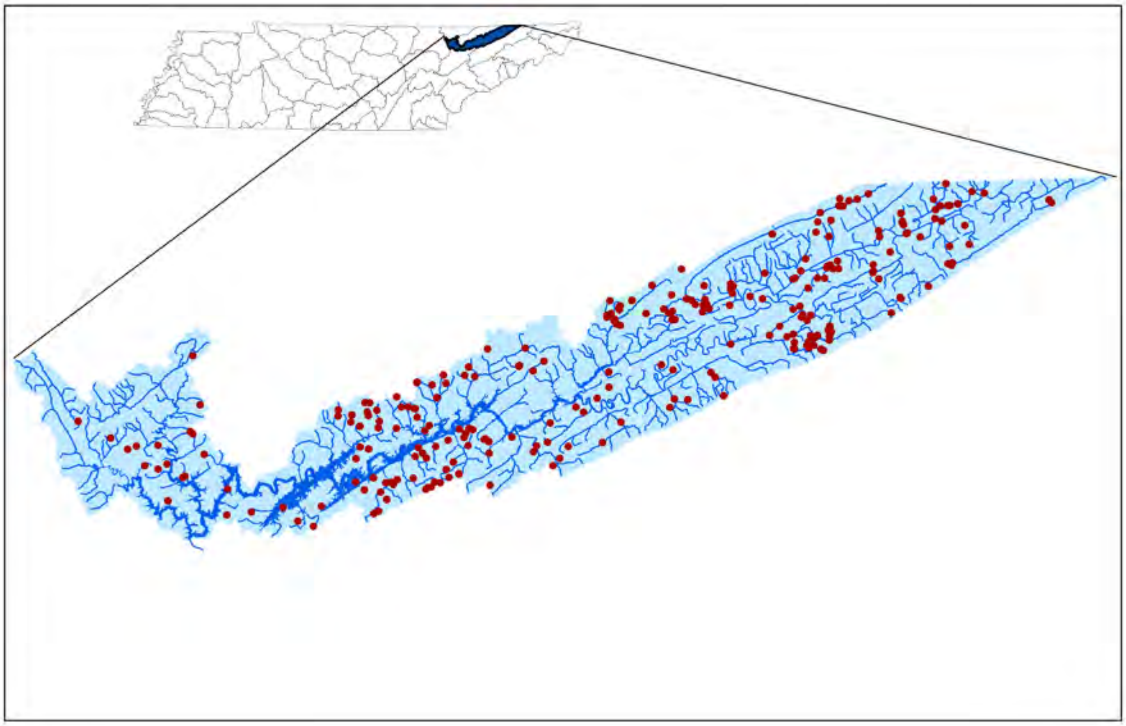


Figure 5-3. Location of BMPs installed from 1999 through 2005 in the Tennessee Portion of the Upper Clinch River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. *More information is provided in Appendix V.*

5.3.D. Virginia Department of Environmental Quality. Water quality management planning in Virginia began in 1972, with the passage of the Clean Water Act. Section 303(e) of the law required development of water quality management plans that focused on pollution control and set strategies for its prevention and control on a basin-wide basis. Section 208 of PL 92-500 required area-wide waste treatment management planning for areas having industrial concentrations or having other factors.

The State Water Control Board (SWCB) originally adopted the Tennessee–Big Sandy Water Quality Management Plan (WQMP) in 1977 as a regulatory document. The plan was later amended in 1980. In 2003, the Tennessee-Big Sandy WQMP was deregulated. A Water Quality Management Plan Regulation was put in place after all basin plans were de-regulated. Serving as a repository for EPA approved TMDL Reports for each impaired segment, the WQMP regulation also includes wasteload allocations for permitted dischargers within the Commonwealth. It is the intention of the Virginia Department of Environmental Quality to update and amend the Water Quality Management Plan Regulation as more TMDL's are approved by EPA or as new wastewater treatment plants are constructed and permitted in the Commonwealth.

Authority for Water Quality Management Planning.
State Law; Section 62.1-44.15(13) of the Code of Virginia authorizes the SWCB to establish policies and programs for effective area wide and basin wide water quality control and management. Section 62.1-44.19:7 of the Code of Virginia authorizes the SWCB to develop and implement a plan to achieve fully supporting status for impaired waters of the state. Federal Law: Water quality management plans are required by Section 303(e) of the Clean Water Act (CWA) as implemented by 40 CFR 130. In 2002, EPA emphasized the Continuous Planning Process and watershed planning.

Purpose of the Plan.
Plans are intended to provide a management tool for assisting the Commonwealth, local governments, industries and agricultural interests in anticipating, achieving and maintaining applicable water quality goals in the river basins. Plans need to meet all applicable requirements of 40 CFR 130 for water quality management plans and meet the requirements of the Virginia Water Quality Monitoring, Information and Restoration Act, Section 62.1-44.19-4 et seq. of the Code of Virginia.

Clinch/Powell River Basin Total Maximum Daily Load Reports.
There are seven completed and approved TMDL reports in this river basin. Of these seven studies, five watersheds are in the Clinch River drainage and 2 are in the Powell River drainage. These TMDL streams, the location by county and pollutant addressed in the TMDL study are listed in the Table below. Wasteload allocations for permitted discharges within the impaired segment were adopted as part of the Water Quality Management Plan Regulation by the Virginia State Water Control Board. The dates of state adoption are in the fifth column of the Table. Black Creek and Dumps Creek were the first TMDL studies with a resource extraction land use component. These studies included interagency collaboration between the Virginia Department of Mines, Minerals and Energy, Virginia Department of Environmental Quality, and the Virginia Department of Conservation and Recreation. More information about the Virginia TMDL program may be found at:

http://www.deq.virginia.gov/tmdl/develop.html.

Approved TMDL Reports

TMDL Project	County	Pollutant	EPA Approval Date	State Water Control Board Adoption Date
Guest River	Wise	Sediment	5/04/2003	3/23/2004
Upper Clinch River	Tazewell	Sediment	4/26/2004	8/31/2004
Guest River Tributaries: Crab Orchard, Sepulcher, Toms Creek and Little Toms Creek	Wise	Bacteria	5/04/2004	8/31/2004
Lewis Creek	Russell	Sediment	5/26/2004	6/28/2005
Black Creek and Tributaries	Wise	Alkalinity, Manganese	6/03/2004	8/31/2004
Dumps Creek	Russell	Total Dissolved and Total Suspended Solids	6/03/2004	8/31/2004
Stock Creek	Scott	Sediment	5/15/2006	

Additionally, DEQ submitted 2 TMDL studies to EPA in April 2006 that have yet to be approved. Those studies include TMDLs for bacteria, total dissolved solids and total suspended solids for Straight Creek and for Callahan Creek.

Implementation Plans.

In 1998, implementation plans for approved TMDL studies were mandated in the Water Quality Monitoring, Improvement and Restoration Act. The Department of Conservation and Recreation, through a memorandum of understanding with the Department of Environmental Quality, has taken the lead role in instances where the sources of impairment are due to nonpoint influences.

Development of an implementation plan for Guest River that includes both the sediment TMDL and the bacteria TMDLs on Crab Orchard Creek, Sepulcher Creek, Toms Creek and Little Toms Creek began in 2004 and was approved by the State Water Control Board June 28, 2005. This implementation plan was written by a local stakeholder group consisting of members of the Guest River Group. Members include land owners, business owners as well as local, state and federal agency staff. The implementation plan for Guest River can be viewed at the DEQ website: http://www.deq.virginia.gov/tmdl/iprpts.html.

Black Creek, located west of Norton, Virginia has implementation activities ongoing through re-mining and restoring abandoned mine lands in the watershed. The aquatic life use in this watershed is improving as acid mine drainage and sedimentation are corrected.

In 2006, DEQ contracted with a consulting firm to develop an implementation plan for Dumps Creek. It is anticipated that this study will be completed by years end.

Beyond developing watershed implementation plans for specific impaired watersheds, in June 2000, the Department of Conservation and Recreation held meetings with grassroot public participation to develop an Upper Tennessee River Watershed Strategic Plan. The purpose of this document was to assess the quality of waters and to identify ways to make them comply with water quality standards. An umbrella group, Upper Tennessee River Roundtable, is using this document as a spring-board for writing grant applications to implement some of the recommended strategies. In 2004, this group, in cooperation with Tennessee and North Carolina, successfully wrote a million dollar grant to undertake demonstration projects and provide educational opportunities in the Tennessee River Basin which includes both the Clinch River and Powell River watersheds.

Future TMDL Studies for the Clinch/Powell River Watershed.
There are still stream segments in the Clinch/Powell River Basin that are scheduled for TMDL studies. In 2008, DEQ anticipates completion of reports for North Fork Powell River, Powell River in Big Stone Gap, and Lick Creek in Russell County. To find out about other impaired segments, visit the DEQ website, http://www.deq.virginia.gov and search on TMDLs. For questions about impaired segments in the Upper Tennessee River Basin located in Virginia, you may contact Shelly D. Williams at (276)-676-4845 or by email at sdwilliams@deq.virginia.gov.

5.3.E. Tennessee Stream Mitigation Program. The Tennessee Stream Mitigation Program was established as Tennessee's first in-lieu-fee program under the TN Wildlife Resources Foundation in 2003. Since its inception the program has made great strides to provide compensatory mitigation to offset stream impacts associated with §404/401 water quality permits. The TSMP is committed to providing meaningful mitigation on degraded streams to improve in-stream and riparian habitat and overall water quality. Employing principles of natural channel design and process-based methodologies, the TSMP continues to identify and develop restoration and enhancement projects across the state. In accordance with the *Tennessee Stream Mitigation Guidelines* and the TWRF MOA, the TSMP develops large-scale projects based on a watershed approach, giving priority to 303(d) streams listed for physical habitat impairments.

Strategic partnerships with state and federal agencies, municipalities, and non-profit environmental organizations, allows the TSMP to provide funding for on-going watershed initiatives through stream restoration. The TSMP can fund 100% of the costs associated with the design and implementation of restoration projects on private or public lands. For more information on the program visit the TSMP website at http://www.tsmp.us.

Tennessee Stream Mitigation Program Restoration Project
Kyles Ford Stream, Hancock County, Tennessee

Watershed: Upper Clinch River
Ecoregion: Ridge and Valley
Project Length: 19,350 linear feet
Mitigation Treatment: Restoration, Enhancement I, Enhancement II
Est. Credits Produced: 5,960
Est. Completion Date: March 2007

Project Description:
The Clinch River System provides habitat for 48 imperiled and vulnerable species, including 29 species of rare mussels and 19 species of fish. All told, the river and surrounding valley are home to 27 species that are federally listed as threatened or endangered, and the Kyle's Ford Stream Restoration Project area contains 10 of these species. The health of the Clinch River in general is threatened by the erosion of river banks, the loss of riparian vegetation, and declining water quality due to contamination from industrial and agricultural activities. The ultimate goals of this project are to restore stability to the stream systems on the property and re-establish in-stream and near-stream habitat through channel and riparian restoration. These activities will reduce sediment entering the Clinch River System by establishing stable stream dimensions, patterns, and profiles to help maintain the sensitive ecosystem.

Key Elements of Project:
- Stream Restoration
- Stream Enhancement
- Bankfull bench, flood-prone area excavation
- In-stream habitat enhancement
- Native riparian buffer establishment
- Permanent Land Preservation Agreement

5.4. LOCAL INITIATIVES.

5.4.A. The Nature Conservancy (TNC). The Clinch and Powell Rivers are formed in the Appalachian Mountains of southwest Virginia, and are considered the only ecologically intact (undammed) headwaters of the Tennessee River system. The Clinch River watershed is the number one hotspot in the U.S. for imperiled aquatic species, sustaining 31 varieties of rare mussels (a collection unmatched anywhere else in the world) and 17 rare fish species. Combined with the rare plants, mammals, birds, and insects that live in the watershed, the Clinch Valley hosts 30 species federally listed as threatened or endangered.

What are the threats?
Of utmost consideration is the fact that the Clinch Valley's land, water, and natural resources sustain the human community and its economy. The socioeconomic conditions of the area are stressed by high unemployment and economic disparity. So the challenge in protecting this area is to encourage to practice of sustainable growth that protects both the environment and the local way of life. Declining water quality, a legacy of coal mining and unwise agricultural practices, is the primary threat to these rivers today.

What is the Conservancy doing to make a difference?
Beginning in 1990, The Nature Conservancy targeted the watersheds of the Clinch and Powell rivers as part of the "Last Great Places" ecosystem conservation program. A joint project of the Virginia and Tennessee chapters, the Clinch Valley Program has seven staff members working from field offices in Abingdon, VA and Hancock County, TN. The Conservancy owns seven preserves in the valley. We plan to acquire critical tracts of land in this area over the next five years.

Actions taken by the Conservancy include:

- Helping in the creation of citizens' initiatives for sustainable growth, including the Russell County Vision Forum and another similar program in St. Paul, VA.
- Joining hands with the residents of Hancock County, TN to purchase and renovate the century-old Vardy Church to serve as a community meeting place, historical archive, and natural resource information source.
- Forming the Clinch Valley Forest Bank - accepts voluntary "deposits" from private landowners of the right to grow, manage, and harvest trees on their land. In return, landowners will receive annual dividends on the value of their forest, which TNC will manage for ecologically sustainable harvests that benefit the local economy.
- Cooperative Management Agreements - helps local farmers to adopt agricultural best management practices to safeguard the rivers, creeks, and caves on their property from water pollution. TNC has made 65 such agreements with tobacco and cattle farm owners in Hancock County, TN and Virginia.

Coal re-mining initiative - partnering with the coal industry and public agencies, TNC's goal is to reclaim 5,000 acres of abandoned mine lands, with runoff from re-mining sites meeting current water quality standards.

For more information please visit:

http://www.nature.org/wherewework/northamerica/states/virginia/preserves/art15030.html

Or Contact:
Clinch Valley Program
146 East Main Street
Abingdon, VA 24210
Phone: (276) 676-2209

Additionally, in 2005, TNC assisted the Tennessee Wildlife Resources Agency in developing the Tennessee State Wildlife Action Plan (SWAP), formerly known as the Comprehensive Wildlife Conservation Strategy (CWCS). 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.B. Clinch Powell Resource Conservation and Development (RC&D) Council.

Clinch River Community Project

The Clinch River Community Project is a groundbreaking partnership between the Clinch-Powell Resource Conservation & Development Council and The Nature Conservancy. These two not-for-profit entities have worked hand in hand for more than a dozen years in the free flowing sections of the Clinch and Powell rivers in Tennessee.

The mission of the Clinch-Powell RC&D Council is to demonstrate regional leadership, secure resources and deliver programs and services that build strong vibrant communities where conservation and development are in balance with the needs of people. The formation of the Clinch-Powell RC&D Council in 1989 was an outgrowth of a bi-state effort to protect these world class rivers and to improve the life and livelihood of the people who live in their watersheds. The mission of The Nature Conservancy is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. The Clinch and Powell rivers have been designated as on the Last Great Places on Earth by TNC.

Our joint purpose is to provide financial assistance to farmers in the area wishing to make improvements that protect the waters of the Clinch and Powell rivers systems. We are not a regulatory agency, we are simply offering assistance to those who request it. For more information please contact the Clinch River Community Project office at (423) 733-2100 or visit us at the main office of the old Hancock County High School.

Being the only undammed and ecologically intact headwaters of the Tennessee River system has resulted in the Clinch River being the most ecologically rich river in the nation. The Clinch River has 48 imperiled and vulnerable fish and mussel species, including 21 that are federally listed as endangered or threatened. The Clinch and Powell Rivers in Hancock County alone boasts a collection of freshwater mussel species unmatched anywhere in the world. In addition to the aquatic biodiversity, the limestone soil and vast expanses of underground caves and waterways add other rare species to the list such as flowers, bats, and salamanders. The Clinch River Community Project is striving to educate the public of their great environmental resources and assist them in their protection.

The Clinch River is the most
ecologically diverse river in the nation.

Best Management Practices

Through our Voluntary program, we install Best Management Practices "BMP's", which are agricultural practices designed to increase farm productivity while minimizing impacts on the environment. They provide cost effective management of soil erosion issues including streambank and topsoil losses. BMP's may include graveled farm roads, graveled feed areas, streambank stabilization, graveled stream crossings and grassed waterways. We also construct streambank fencing to protect the streamside vegetation along with providing safe, reliable watering system for livestock including ponds, spring developments, pumping systems and/or water tanks.

Once assistance is requested by a landowner, it is the responsibility of the Clinch River Community Project staff to meet with the landowner and discuss the problems and possible solutions. We then assist the landowner in design and placement of the BMP's, as well as obtaining any permits need for the work. The staff is then present during most phases of the construction, assisting in any last minute decision, which need to be made. We feel that being involved with every aspect of the project makes the process simpler and easier on the landowner. Upon completion these BMP's are used as demonstrations for other landowners in the area, allowing local landowners to learning from each other about the ups and downs of these Best Management Practices.

5.4.C. Cumberland Mountain Resource Conservation and Development (RC&D) Council. The RC&D program is a United States Department of Agriculture (USDA) program administered by the Natural Resources Conservation Service. This program helps people on a local level, with the assistance of a Federal Coordinator, to work together with many local organizations, county and city governments and conservation districts to implement natural resource protection and community development. Once a specific area has been authorized by the Secretary of Agriculture, that area is eligible for assistance through its RC&D council.

RC&D council projects involving water are designed to help improve surface and groundwater quality and quantity. Projects may include watershed management; construction or rehabilitation of irrigation, flood control and water drainage systems; construction or rehabilitation of aquaculture, wastewater treatment and purification systems; installation of buffer strips; and efficient use of aquifers.

The Cumberland Mountain RC&D council area includes five Tennessee counties: Anderson, Campbell, Morgan, Roane and Scott.

For more information please contact Alan Neal, coordinator, at alan.neal@tn.usda.gov.

CHAPTER 6

RESTORATION STRATEGIES IN THE UPPER CLINCH RIVER WATERSHED

6.1. Background

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

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

6.4. Permit Reissuance Planning
6.4.A. Municipal Permits
6.4.B. Industrial Permits
6.4.C. Water Treatment Plant Permits

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 Tennessee portion of the Upper Clinch River Watershed.

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

6.2.A. Year 1 Public Meeting. The first Upper Clinch River Watershed public meeting was held jointly with the Powell River Watershed on November 16, 1999 at the Sneedville Courthouse. 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

- Sediment from soil erosion
- Agricultural practices (cattle in stream, agricultural runoff)
- Poor or no forestry BMPs
- Trash in sinkholes
- Development along river, especially from Sneedville to Kyle's Ford
- No required setback from river for development
- Pollution from Virginia
- Decline in mussel and game fish diversity and abundance

6.2.B. Year 3 Public Meeting. The second Upper Clinch River Watershed public meeting was held jointly with the Powell River Watershed November 13, 2001 at the Hancock County courthouse. 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

- Straight pipes to the Clinch and Powell Rivers
- TDOT spraying too close to streams

6.2.C. Year 5 Public Meeting. The third scheduled Upper Clinch River Watershed public meeting was held October 30, 2007 at the City Hall in New Tazewell. The meeting was held jointly with the Powell River Watershed and featured eight educational components:

- Overview of watershed approach flash video
- Live fish 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
- Water supply and ground water protection educational display
- Tennessee Valley Authority educational 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.

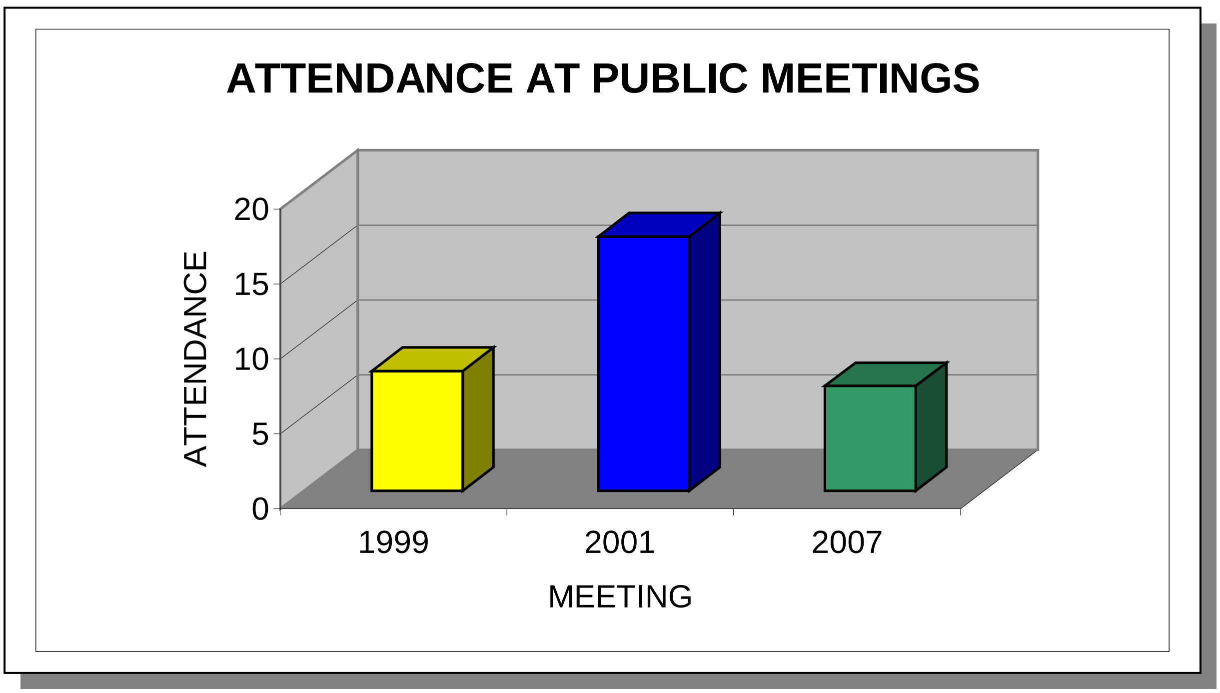


Figure 6-1. Attendance at the Upper Clinch River and Powell River Watershed Joint Public Meetings. *Attendance numbers do not include TDEC personnel.*

Figure 6-2. Environmental Specialist Jonathon Burr Helps Citizens Learn About the Relationship Between Fish Communities and Water Quality at the Lower Clinch River Watershed Public Meeting.

Figure 6-3. Watershed Meetings are a Good Chance to Talk with Staff Counterparts in Neighboring States. *Here Jonathon Burr confers with a staff member from the Virginia Department of Environmental Quality.*

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

Figure 6-5. The SmartBoard™ is an Effective Interactive Tool to Teach Citizens About the Power of GIS.

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.

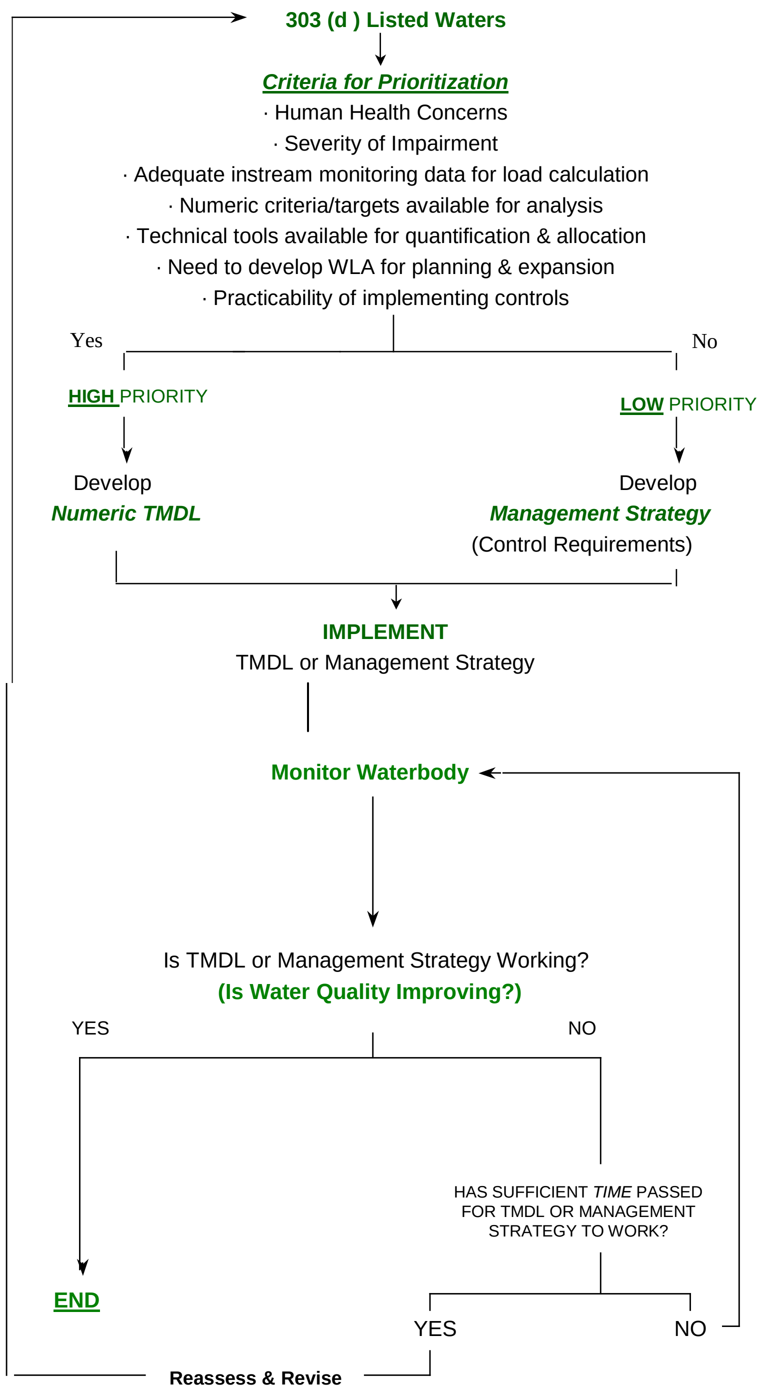


Figure 6-6. Prioritization Scheme for TMDL Development.

6.3.B. Nonpoint Sources

Common nonpoint sources of pollution in the Upper Clinch River 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 Upper Clinch River 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. An example of a stream impaired by sediment and land development in the Upper Clinch River Watershed is Greasy Rock Creek.

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.

Construction sites within a sediment-impaired watershed may also have higher priority for inspections by WPC and MS4 personnel, and are likely to have enforcement actions for failure to control erosion.

6.3.B.i.b. From Channel and/or Bank Erosion. Many streams within the Upper Clinch River 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 in the Upper Clinch River Watershed, like Greasy Rock Creek, could 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 (Greasy Rock Creek).
- 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 (Greasy Rock Creek, East Fork Panther Creek).
- Limit cattle access to streams and bank vegetation (Greasy Rock Creek and East Fork Panther Creek).

Regulatory Strategies

- Require post-construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion (all MS4 areas should establish these ordinances).
- Encourage or require strong local buffer ordinances.
- Implement additional restrictions on logging in streamside management zones.
- Limit clearing of stream and ditch banks or other alterations (Greasy Rock Creek). *Note: Permits may be required for any work along streams.*
- Limit road and utility crossings of streams through better site design.
- Restrict the use of off-highway vehicles on stream banks and in stream channels.

Additional Strategies

- Better community planning and MS4 oversight for the impacts of development on small streams, especially development in growing areas (Big Creek in LaFollette, West Fork Panther Creek in Sneedville).
- Increase efforts in the Master Logger program to recognize impaired streams and require more effective management practices.

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 any type of vegetated buffers along stream corridors is a significant problem in some areas of the Upper Clinch River Watershed, due both to agricultural and residential/commercial land uses. Many streams, like Greasy Rock Creek and Big Creek, could benefit from the establishment of more extensive riparian buffer zones.

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 Knoxville and Johnson City Environmental Field Offices 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, 7 stream systems in the Tennessee portion of the Upper Clinch River Watershed are known to have excessive pathogen contamination. The Clinch River (in Sneedville), Big Creek, and Greasy Rock Creek are impacted by urban areas, with contributions of bacterial contamination coming from storm water runoff, sewage collection system leaks, and treatment plant operation failures. Many streams in agricultural watersheds show elevated bacterial levels, including Brier Creek, Mill Creek, East Fork Panther Creek, and Robertson Creek.

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.
- Develop and enforce leash laws and controls on pet fecal material.
- 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.
- 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. Examples of streams that could benefit are Clinch River, North Fork Clinch River, Big War Creek, Greasy Rock Creek, and East Fork Panther Creek.
- Use grassed drainage ways that can remove fertilizer before it enters streams.
- Use native plants for landscaping since they don't require as much fertilizer and water.
- 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 (Clinch River).
- Impose timely and appropriate enforcement for noncomplying sewage treatment plants, large and small, and their collection systems (Clinch River).
- 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.
- Support and train local MS4 programs within municipalities to deal with storm water pollution issues and require additional storm runoff quality control measures.
- 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 Upper Clinch River Watershed, Flat Gap Creek exceeds water quality criteria for zinc due to runoff from a quarry. 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. An example of a stream that could benefit from these measures is Big Creek in LaFollette.

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.

Regulatory Strategies

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

Regulatory Strategies

- 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.
- 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 Upper Clinch River 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 Upper Clinch River Watershed.*

6.4.A. Municipal Permits

TN0026638 Sneedville STP

Discharger rating: Minor
City: Sneedville
County: Hancock
EFO Name: Johnson City
Issuance Date: 3/1/07
Expiration Date: 8/31/09
Receiving Stream(s): Clinch River at mile 177.4
HUC-12: 060102050505
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: AER-O-MOD activated sludge

Segment	TN06010207019_2000
Name	Clinch River
Size	7.4
Unit	Miles
First Year on 303(d) List	1990
Designated Uses	Domestic Water Supply (Supporting), Livestock Watering and Wildlife (Supporting), Irrigation (Supporting), Recreation (Supporting), Industrial Water Supply (Supporting), Fish and Aquatic Life (Non-Supporting)
Causes	Low flow alterations, Temperature, water
Sources	Upstream Impoundments (e.g., Pl-566 NRCS Structures)

Table 6-1. Stream Segment Information for Sneedville 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	30	mg/L	MAvg Conc	3/Week	Composite	Effluent
BOD5	All Year	39	lb/day	MAvg Load	3/Week	Composite	Effluent
BOD5	All Year	52	lb/day	WAvg Load	3/Week	Composite	Effluent
BOD5	All Year	40	mg/L	WAvg Conc	3/Week	Composite	Effluent
D.O.	All Year	1	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	3/Week	Grab	Effluent
E. coli	All Year	487	#/100mL	DMax Conc	3/Week	Grab	Effluent
Flow	All Year		MGD	DMax Load	Weekly	Continuous	Effluent
Flow	All Year		MGD	MAvg Load	Weekly	Continuous	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	3/Week	Composite	Effluent
TRC	All Year	0.5	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	3/Week	Composite	Effluent
TSS	All Year	52	lb/day	WAvg Load	3/Week	Composite	Effluent
TSS	All Year	30	mg/L	MAvg Conc	3/Week	Composite	Effluent
TSS	All Year	39	lb/day	MAvg Load	3/Week	Composite	Effluent
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	9	SU	DMax Conc	Weekdays	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekdays	Grab	Effluent

Table 6-2. Permit Limits for Sneedville STP.

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

5 Biological Oxygen Demand
10 Total Suspended Solids
3 Total Chlorine
2 Settleable Solids

Enforcement:
7/17/07 Notice of Violation for failure to submit reports

Comments:
Sneedville STP has substantial infiltration & inflow problems, and frequently has bypasses of treatment via the surge basin that is installed at the plant.

TN0002666 Treadway Circle Water & Sewer

Discharger rating:	Minor
City:	Treadway
County:	Hancock
EFO Name:	Johnson City
Issuance Date:	12/1/05
Expiration Date:	10/30/09
Receiving Stream(s):	Flat Gap Creek
HUC-12:	060102050802
Effluent Summary:	Treated municipal wastewater from Outfall 001
Treatment system:	Extended aeration

Segment	TN06010205014_0400
Name	Flat Gap Creek
Size	5.5
Unit	Miles
First Year on 303(d) List	2002
Designated Uses	Fish and Aquatic Life (Non-Supporting), Recreation (Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Impairment Unknown
Sources	Source Unknown

Table 6-3. Stream Segment Information for Treadway Circle Water & Sewer.

No Limits.

Comments:
Aging plant.

TN0026263 Caryville-Jacksboro Utilities Commission STP

Discharger rating:	Minor
City:	Caryville
County:	Campbell
EFO Name:	Knoxville
Issuance Date:	6/1/07
Expiration Date:	6/30/09
Receiving Stream(s):	Cove Creek Embayment of Norris Lake at mile 15.9
HUC-12:	060102050106
Effluent Summary:	Treated municipal wastewater from Outfall 001
Treatment system:	Waste Activated Sludge to anaerobic dig to drybeds to landfill

Segment	TN06010205001_1000
Name	Norris Reservoir
Size	34187
Unit	Acres
First Year on 303(d) List	-
Designated Uses	Industrial Water Supply (Supporting), Livestock Watering and Wildlife (Supporting), Domestic Water Supply (Supporting), Recreation (Supporting), Fish and Aquatic Life (Supporting), Irrigation (Supporting)
Causes	N/A
Sources	N/A

Table 6-4. Stream Segment Information for Caryville-Jacksboro Utilities Commission 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	16.5	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	11	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	21.5	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	32.3	lb/day	WAvg Load	3/Week	Composite	Effluent
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	108	lb/day	WAvg Load	3/Week	Composite	Effluent
CBOD5	All Year	15	mg/L	WAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	72	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	All Year	10	mg/L	MAvg Conc	3/Week	Composite	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	487	#/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	Influent (Raw Sewage)
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Effluent
Flow	All Year		MGD	DMax Load	Daily	Continuous	Effluent
IC25 7day Ceriodaphnia dubia	All Year	100	Percent	DMin Conc	Quarterly	Composite	Effluent
IC25 7day Fathead Minnows	All Year	100	Percent	DMin Conc	Quarterly	Composite	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	Weekdays	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	287	lb/day	WAvg Load	3/Week	Composite	Effluent
TSS	All Year	40	mg/L	WAvg Conc	3/Week	Composite	Effluent
TSS	All Year	215	lb/day	MAvg Load	3/Week	Composite	Effluent
TSS	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year	30	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 6-5. Permit Limits for Caryville-Jacksboro Utilities Commission STP.

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

4 Overflows
2 Ammonia
1 Total Suspended Solids
1 Total Chlorine
1 Carbonaceous Oxygen Demand

Enforcement:
None

Comments:
6/25/07 Compliance Evaluation Inspection – In Compliance

11/15/06 Earl G. Wilson, former chief operator of the Caryville-Jacksboro Wastewater Treatment Plant in Campbell County, Tennessee, was sentenced to two years of supervised probation for falsifying reports submitted to the United States Environmental Protection Agency. In sentencing Mr. Wilson, the Honorable Leon Jordan, Senior United States District Court Judge, emphasized the importance of protecting our nation's waterways from pollution. Among other things, while on probation Mr. Wilson is prohibited from performing any wastewater sampling or analysis for the purpose of complying with the federal Clean Water Act or the Tennessee Water Quality Control Act. Judge Jordan also imposed a $500 fine upon Mr. Wilson.

TN0060933 Washburn School

Discharger rating:	Minor
City:	Washburn
County:	Grainger
EFO Name:	Knoxville
Issuance Date:	4/2/07
Expiration Date:	5/28/09
Receiving Stream(s):	Williams Creek at mile 5.8
HUC-12:	060102050101
Effluent Summary:	Treated domestic wastewater from Outfall 001
Treatment system:	Activated Sludge

Segment	TN06010205001T_1100
Name	Williams Creek
Size	9.7
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Recreation (Not Assessed), Irrigation (Not Assessed), Livestock Watering and Wildlife (Not Assessed), Fish and Aquatic Life (Not Assessed)
Causes	N/A
Sources	N/A

Table 6-6. Stream Segment Information for Washburn School.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	Summer	4	mg/L	DMax Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Summer	2	mg/L	MAvg Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	10	mg/L	DMax Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	5	mg/L	MAvg Conc	2/Month	Grab	Effluent
CBOD5	All Year	20	mg/L	DMax Conc	2/Month	Grab	Effluent
CBOD5	All Year	10	mg/L	MAvg Conc	2/Month	Grab	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	2/Month	Grab	Effluent
E. coli	All Year	941	#/100mL	MAvg Ari Mean	2/Month	Grab	Effluent
Flow	All Year		MGD	DMax Load	Weekly	Instantaneous	Effluent
Flow	All Year		MGD	MAvg Load	Weekly	Instantaneous	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	2/Week	Grab	Effluent
TRC	All Year	0.5	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	2/Month	Grab	Effluent
TSS	All Year	30	mg/L	MAvg Conc	2/Month	Grab	Effluent
pH	All Year	8.5	SU	DMax Conc	2/Week	Grab	Effluent
pH	All Year	9	SU	DMin Conc	2/Week	Grab	Effluent

Table 6-7. Permit Limits for Washburn School.

Comments:
None

TN0080021 LaFollette Wastewater Treatment Facility

Discharger rating:	Major
City:	LaFollette
County:	Campbell
EFO Name:	Knoxville
Issuance Date:	8/31/07
Expiration Date:	8/31/12
Receiving Stream(s):	Big Creek at mile 17.7
HUC-12:	060102050105
Effluent Summary:	Treated municipal wastewater from Outfall 001
Treatment system:	Treatment from activated sludge with chlorination to oxidation ditch and tertiary treatment with UV disinfection

Segment	TN06010205064_2000
Name	Big Creek
Size	1.9
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Fish and Aquatic Life (Non-Supporting), Livestock Watering and Wildlife (Supporting), Recreation (Supporting), Industrial Water Supply (Supporting), Domestic Water Supply (Supporting), Irrigation (Supporting)
Causes	Nitrates
Sources	Discharges from Municipal Separate Storm Sewer Systems (MS4)

Table 6-8. Stream Segment Information for LaFollette Wastewater Treatment facility.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	Summer	1.5	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	2	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	1	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	24	lb/day	WAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	16	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	1.9	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	30	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	46	lb/day	WAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	3.8	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	2.9	mg/L	WAvg Conc	3/Week	Composite	Effluent
Bypass of Treatment (occurrences)	All Year		Occurences/ Month	MAvg Load	Continuous	Visual	Wet Weather
CBOD % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
CBOD5	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	13.4	mg/L	DMax Conc	3/Week	Composite	Effluent
CBOD5	All Year	6.7	mg/L	MAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year	104	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	All Year	156	lb/day	WAvg Load	3/Week	Composite	Effluent
CBOD5	All Year	40	Percent	DMin % Removal	3/Week	Composite	Effluent
CBOD5	All Year	10	mg/L	WAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
D.O.	All Year	6	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	MAvg Load	Daily	Continuous	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)
IC25 7day Ceriodaphnia Dubia	All Year	86	Percent	DMin Conc	Quarterly	Composite	Effluent
IC25 7day Fathead Minnows	All Year	86	Percent	DMin Conc	Quarterly	Composite	Effluent
Nitrogen Total (as N)	All Year	8	mg/L	MAvg Conc	2/Month	Composite	Effluent
Nitrogen Total (as N)	All Year		mg/L	MAvg Conc	2/Month	Composite	Influent (Raw Sewage)
Nitrogen Total (as N)	All Year		mg/L	DMax Conc	2/Month	Composite	Effluent
Nitrogen Total (as N)	All Year		mg/L	DMax Conc	2/Month	Composite	Influent (Raw Sewage)
Nitrogen Total (as N)	All Year	125	lb/day	MAvg Load	2/Month	Composite	Effluent

Table 6-9a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Overflow Use Occurences	All Year		Occurences/ Month	MAvg Load	Continuous	Visual	Wet Weather
Overflow Use Occurences	All Year		Occurences/ Month	MAvg Load	Continuous	Visual	Non Wet Weather
Phosphorus Total	All Year		mg/L	DMax Conc	2/Month	Composite	Effluent
Phosphorus Total	All Year	2	mg/L	MAvg Conc	2/Month	Composite	Effluent
Phosphorus Total	All Year		mg/L	MAvg Conc	2/Month	Composite	Influent (Raw Sewage)
Phosphorus Total	All Year		mg/L	DMax Conc	2/Month	Composite	Influent (Raw Sewage)
Phosphorus Total	All Year	31	lb/day	MAvg Load	2/Month	Composite	Effluent
Settleable Solids	All Year	1	mL/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	30	mg/L	MAvg Conc	3/Week	Composite	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	625	lb/day	WAvg Load	3/Week	Composite	Effluent
TSS	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year	469	lb/day	MAvg Load	3/Week	Composite	Effluent
TSS	All Year	40	mg/L	WAvg Conc	3/Week	Composite	Effluent
TSS % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
pH	All Year	9	SU	DMax Conc	Weekdays	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekdays	Grab	Effluent

Table 6-9b.

Tables 6-9a-b. Permit Limits for LaFollette Wastewater Treatment facility.

Comments:
Upgrade and expansion of the existing facility permitted as TN0020532 to process inflow/infiltration and serve future growth. Plant expansion from 1.25 to 1.875 MGD. This new plant, TN0080021, will be operational approximately winter of 2008.

TN0020532 LaFollette Wastewater Treatment Facility

Discharger rating:	Major
City:	LaFollette
County:	Campbell
EFO Name:	Knoxville
Issuance Date:	2/1/04
Expiration Date:	12/31/09
Receiving Stream(s):	Big Creek at mile 17.7
HUC-12:	060102050105
Effluent Summary:	Treated municipal wastewater from Outfall 001
Treatment system:	Treatment from activated sludge with chlorination to oxidation ditch and tertiary treatment with UV disinfection

Segment	TN06010205064_2000
Name	Big Creek
Size	1.9
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Fish and Aquatic Life (Non-Supporting), Livestock Watering and Wildlife (Supporting), Recreation (Supporting), Industrial Water Supply (Supporting), Domestic Water Supply (Supporting), Irrigation (Supporting)
Causes	Nitrates
Sources	Discharges from Municipal Separate Storm Sewer Systems (MS4)

Table 6-10. Stream Segment Information for LaFollette Wastewater Treatment facility.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	Summer	18	lb/day	MAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	3.4	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	27	lb/day	DMax Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	1.7	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Summer	2.6	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	8.6	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	4.3	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	68	lb/day	DMax Load	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	6.5	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	Winter	45	lb/day	MAvg Load	3/Week	Composite	Effluent
Bypass of Treatment (occurrences)	All Year		Occurrences/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	156	lb/day	DMax Load	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	10	mg/L	DMin Conc	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	104	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	All Year	15	mg/L	MAvg Conc	3/Week	Composite	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	Grab	Effluent
Fecal Coliform	All Year	1000	#/100mL	DMax Conc	3/Week	Grab	Effluent
Fecal Coliform	All Year	200	#/100mL	MAvg Geo Mean	3/Week	Grab	Effluent
Flow	All Year		MGD	DMax Load	Daily	Continuous	Effluent
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MGD	DMax Load	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Effluent
IC25 7day Ceriodaphnia dubia	All Year	81	Percent	DMin Conc	Continuous	Composite	Effluent
IC25 7day Fathead Minnows	All Year	81	Percent	DMin Conc	Continuous	Composite	Effluent
Overflow Use Occurrences	All Year		Occurrences/Month	MAvg Load	Continuous	Visual	Wet Weather
Overflow Use Occurrences	All Year		Occurrences/Month	MAvg Load	Continuous	Visual	Non Wet Weather
Settleable Solids	All Year	1	mL/L	DMax Conc	Weekdays	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	418	lb/day	DMax Load	3/Week	Composite	Effluent
TSS	All Year	40	mg/L	MAvg Conc	3/Week	Composite	Effluent
TSS	All Year	313	lb/day	MAvg Load	3/Week	Composite	Effluent

Table 6-11a.

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	30	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	9	SU	DMax Conc	Weekdays	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekdays	Grab	Effluent

Table 6-11b.

Tables 6-11a-b. Permit Limits for LaFollette Wastewater Treatment facility.

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

61 Overflows
57 Bypasses
7 Ammonia
5 Escherichia coli
4 Total Chlorine
1 Carbonaceous Biological Oxygen Demand
1 Total Suspended Solids
1 Suspended Solids % Removal

Enforcement:
10/1/2004 Director's Order for overflows between May 2002 and April 2004. This facility was on the EPA Watch List.

Comments:
Upgrade and expansion of the existing facility permitted as TN0020532 to process inflow/infiltration and serve future growth. Plant expansion from 1.25 to 1.875 MGD. The new plant, TN0080021, will be operational approximately winter of 2008.

1/19/07 Technical Assistance Visit and file review: In compliance.

TN0055352 Sharp's Chapel Elementary School

Discharger rating:	Minor
City:	Sharps Chapel
County:	Union
EFO Name:	Knoxville
Issuance Date:	6/1/04
Expiration Date:	4/30/09
Receiving Stream(s):	Mile 0.3 of an unnamed tributary to Hunting Creek at mile 2.0
HUC-12:	060102050103
Effluent Summary:	Treated domestic wastewater from Outfall 001
Treatment system:	Extended aeration

Segment	TN06010205001T_0999
Name	Misc Tribs to Norris Reservoir
Size	140.5
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Fish and Aquatic Life (Not Assessed), Recreation (Not Assessed), Irrigation (Not Assessed), Livestock Watering and Wildlife (Not Assessed)
Causes	N/A
Sources	N/A

Table 6-12. Stream Segment Information for Sharps Chapel Elementary School.

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	2/Week	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
Settleable Solids	All Year	1	mL/L	DMax Conc	2/Week	Grab	Effluent
TRC	All Year	0.5	mg/L	DMax Conc	2/Week	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 6-13. Permit Limits for Sharps Chapel Elementary School.

Comments:
None

TN0029106 TDEC Norris Dam State Park

Discharger rating:	Minor
City:	Lake City
County:	Anderson
EFO Name:	Knoxville
Issuance Date:	10/1/04
Expiration Date:	8/31/09
Receiving Stream(s):	Norris Lake (Cove Creek) at mile 0.65
HUC-12:	060102050106
Effluent Summary:	Treated domestic wastewater from Outfall 001
Treatment system:	Extended aeration

Segment	TN06010205001_1000
Name	Norris Reservoir
Size	34187
Unit	Acres
First Year on 303(d) List	-
Designated Uses	Industrial Water Supply (Supporting), Livestock Watering and Wildlife (Supporting), Domestic Water Supply (Supporting), Recreation (Supporting), Fish and Aquatic Life (Supporting), Irrigation (Supporting)
Causes	N/A
Sources	N/A

Table 6-14. Stream Segment Information for TDEC Norris Dam 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
BOD5	All Year	20	mg/L	DMax Conc	2/Month	Grab	Effluent
BOD5	All Year	10	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	0.5	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	2/Month	Grab	Effluent
TSS	All Year	30	mg/L	MAvg Conc	2/Month	Grab	Effluent
pH	All Year	9	SU	DMax Conc	2/Week	Grab	Effluent
pH	All Year	6	SU	DMin Conc	2/Week	Grab	Effluent

Table 6-15. Permit Limits for TDEC Norris Dam State Park.

Comments:
None

6.4.B. Industrial Permits:

TN0027481 TVA Norris Hydro Plant

Discharger rating: Minor
City: Norris
County: Anderson
EFO Name: Knoxville
Issuance Date: 7/1/04
Expiration Date: 5/30/09
Receiving Stream(s): Clinch River Mile 79.8
HUC-12: 060102050104
Effluent Summary: Cooling water from Outfall 001
Treatment system: -

Segment	TN06010207019_2000
Name	Clinch River
Size	7.4
Unit	Miles
First Year on 303(d) List	1990
Designated Uses	Domestic Water Supply (Supporting), Livestock Watering and Wildlife (Supporting), Irrigation (Supporting), Recreation (Supporting), Industrial Water Supply (Supporting), Fish and Aquatic Life (Non-Supporting)
Causes	Low flow alterations, Temperature, water
Sources	Upstream Impoundments (e.g., Pl-566 NRCS Structures)

Table 6-16. Stream Segment Information for TVA Norris Hydro Plant.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Flow	All Year		MGD	DMax Load	Daily	Estimate	Effluent
Flow	All Year		MGD	MAvg Load	Daily	Estimate	Effluent
Polychlorinated Biphenyls (PCBs)	All Year	0.01	mL/L	DMax Conc	Annually	Grab	Effluent
Settleable Solids	All Year	0.5	mL/L	DMax Load	Daily	Grab	Effluent
Settleable Solids	All Year		mL/L	MAvg Conc	Daily	Grab	Effluent

Table 6-17. Permit Limits for TVA Norris Hydro Plant.

Comments:
Electric Services

6.4.C. Water Treatment Plants

TN0060704 Sneedville U.D. WTP

Discharger rating: Minor
City: Sneedville
County: Hancock
EFO Name: Johnson City
Issuance Date: 2/1/05
Expiration Date: 12/30/10
Receiving Stream(s): Briar Creek at mile 1.3 to Clinch River at mile 174.8
HUC-12: 060102050505
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: Filter backwash, untreated raw water from lagoon, and wash water and treated water from flocculation and sedimentation basins through Outfall 001.

Segment	TN06010205013_0400
Name	Brier Creek
Size	21
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Recreation (Not Assessed), Irrigation (Supporting), Fish and Aquatic Life (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

Table 6-18. Stream Segment Information for Sneedville U.D. WTP.

Parameter	Season	Limit	Units	Designator	Frequency	Sample	Monitoring
Al (T)	All Year	1.47	mg/L	DMax Conc	Monthly	Grab	Effluent
Al (T)	All Year	0.6	lb/day	DMax Load	Monthly	Grab	Effluent
Flow	All Year		MGD	DMax Load	Monthly	Instantaneous	Effluent
Flow	All Year		MGD	MAvg Load	Monthly	Instantaneous	Effluent
Settleable Solids	All Year	0.5	mL/L	DMax Conc	Monthly	Grab	Effluent
TRC	All Year	0.04	mg/L	DMax Conc	Weekly	Grab	Effluent
TRC	All Year	0.016	lb/day	DMax Load	Monthly	Grab	Effluent
TSS	All Year	40	mg/L	DMax Conc	Monthly	Grab	Effluent
TSS	All Year	16.35	lb/day	DMax Load	Monthly	Grab	Effluent
pH	All Year	9	SU	DMax Conc	Monthly	Grab	Effluent
pH	All Year	6.5	SU	DMin Conc	Monthly	Grab	Effluent

Table 6-19. Permit Limits for Sneedville U.D. WTP

Comments:
Turbidity removal WTP. This WTP has an individual permit because it discharges to Tier 2 Waters.

APPENDIX II

ID	NAME	HAZARD
077002	Eblen-Powell #1	1
377003	Kirkstone	1
077003	Lanier Lake	2
347001	BASF Reservoir	L
077004	Spring Lake	N
297010	Patriot Lake	2
297009	Clinch Valley "C"	2

Table A2-1. Inventoried Dams in the Tennessee Portion of the Upper Clinch River Watershed. *Hazard Codes: 1, High; 2, Significant; L, Low; N, Not yet built. TDEC only regulates dams indicated by a numeric hazard score.*

LAND COVER/LAND USE	ACRES	% OF WATERSHED
Bare Rock/Sand/Clay	1,728	0.4
Deciduous Forest	243,882	53.9
Developed Open Space	24,690	5.5
Emergent Herbaceous Wetlands	21	0.0
Evergreen Forest	12,297	2.7
Grassland/Herbaceous	57,941	12.8
High Intensity Development	702	0.2
Low Intensity Development	9,557	2.1
Medium Intensity Development	2,250	0.5
Mixed Forest	29,274	6.5
Open Water	24,737	5.5
Pasture/Hay	43,329	9.6
Row Crops	373	0.1
Shrub/Scrub	946	0.2
Woody Wetlands	610	0.1
Total	**452,336**	**100.0**

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

ECOREGION	REFERENCE STREAM	WATERSHED (HUC)	
Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)	Big Creek (6701)	Holston River	06010104
	Fisher Creek (6702)	Holston River	06010104
	Possum Creek (6707)	SF Holston River	06010102
	Clear Creek (67F06)	Lower Clinch River	06010207
	White Creek (67F13)	Upper Clinch River	06010205
	Powell River (67F14)	Powell River	06010206
	Big War Creek (67F17)	Upper Clinch River	06010205
	Martin Creek (67F23)	Powell River	06010206
	Powell River (67F25)	Powell River	06010206
Southern Sandstone Ridges (67h)	Blackburn Creek (67H04)	Hiwassee River	06020002
	Laurel Creek (67H06)	Little Tennessee River	06010204
Southern Dissected Ridges and Knobs (67i)	Mill Branch (67I2)	Lower Clinch River	06010207
Cumberland Mountains (69d)	No Business Branch (69D01)	Clear Fork Cumberland	05130101
	Stinking Creek (69D04)	Clear Fork Cumberland	05130101
	New River (69D05)	South Fork Cumberland	05130104
	Round Rock Creek (69D06)	South Fork Cumberland	05130104

Table A2-3. Ecoregion Monitoring Sites in Ecoregions 67f, 67h, 67i, and 69d.

CODE	NAME	AGENCY
308	TDOT SR 70 Mitigation/Permit Site	TDOT
446	TDEC/WPC Lafollette Reservoir Permit/Mitigation	TDEC/WPC

Table A2-4. Wetland Sites in the Upper Clinch River Watershed in TDEC Database. *TDEC, Tennessee Department of Environment and Conservation; WPC, Water Pollution Control; TDOT, Tennessee Department of Transportation.* ***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)
Big Barren Creek	TN06010205069_1000	18.6
Big Creek	TN06010205013_0200	14.3
Big Creek	TN06010205064_3000	8.2
Big War Creek	TN06010205014_1000	18.7
Blackwater Creek	TN06010205057_1000	13.8
Brier Creek	TN06010205013_0400	21.0
Bruce Creek	TN06010205001T_0100	4.8
Clinch River	TN06010205013_1000	37.0
Clinch River	TN06010205016_1000	17.0
Cove Creek	TN06010205305_1000	11.7
Crooked Creek	TN06010205001T_1400	6.6
East Fork Panther Creek	TN06010205013_0620	5.5
Hogskin Creek	TN06010205001T_1200	13.1
Indian Creek	TN06010205011_1000	15.4
Little War Creek	TN06010205014_0500	7.3
Mill Creek	TN06010205016_0400	5.1
North Fork Clinch River	TN06010205016_0100	1.7
Ollis Creek	TN06010205064_0100	22.3
Panther Creek	TN06010205013_0600	2.2
Puncheon Camp Creek	TN06010205001T_0700	9.8
Richardson Creek	TN06010205013_0700	20.5
Richardson Creek	TN06010205014_0300	8.4
Riley Creek	TN06010205014_0100	3.9
Stony Fork	TN06010205014_0200	7.9
Swan Creek	TN06010205013_0300	19.9
Sweet Creek	TN06010205013_0710	4.3
Titus Creek	TN06010205305_0100	12.3
Turkey Creek	TN06010205016_0500	5.9
War Creek	TN06010205016_0300	10.9
West Fork Panther Creek	TN06010205013_0610	5.8
White Creek	TN06010205001T_0200	7.8

Table A3-1. Streams Fully Supporting Fish and Aquatic Life Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Norris Reservoir	TN06010205001_1000	34,187

Table A3-2. Lakes Fully Supporting Fish and Aquatic Life Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Big Creek	TN06010205064_1000	1.2
Big Creek	TN06010205064_2000	1.9
Flat Gap Creek	TN06010205014_0400	5.5
Greasy Rock Creek	TN06010205013_0500	5.7

Table A3-3. Streams Not Supporting Fish and Aquatic Life Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Ball Creek	TN06010205001T_0400	6.2
Big Sycamore Creek	TN06010205059_1000	17.3
Cedar Springs Creek	TN06010205011_0100	8.7
Cracker Creek	TN06010205001T_0800	7.1
Duck Creek	TN06010205013_0800	3.8
Dutch Valley Creek	TN06010205001T_0900	5.7
Fall Creek	TN06010205001T_1300	5.6
Forked Deer Creek	TN06010205001T_0500	6.1
Joe Mill Creek	TN06010205011_0200	5.6
Little Barren Creek	TN06010205001T_0300	10.2
Little Sycamore Creek	TN06010205061_1000	18.7
Misc Tribs to Big Creek	TN06010205064_0999	16.0
Misc Tribs to Big Sycamore Creek	TN06010205059_0999	11.9
Misc Tribs to Big War Creek	TN06010205014_0999	17.3
Misc Tribs to Clinch River	TN06010205013_0999	24.9
Misc Tribs to Clinch River	TN06010205016_0999	24.2
Misc Tribs to Cove Creek	TN06010205305_0999	7.2
Misc Tribs to Norris Reservoir	TN06010205001T_0999	140.5
Notchy Creek	TN06010205001T_0600	7.4
Patterson Branch	TN06010205013_0100	5.4
Shelby Creek	TN06010205016_0200	4.6
Unnamed Trib to Big Sycamore Creek	TN06010205059_0100	6.5
Williams Creek	TN06010205001T_1100	9.7

Table A3-4. Streams Not Assessed for Fish and Aquatic Life Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Cove Lake	TN06010205COVELAKE_1000	494

Table A3-5. Lakes Not Assessed for Fish and Aquatic Life Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Big Barren Creek	TN06010205069_1000	18.6
Big Creek	TN06010205064_1000	1.2
Big Creek	TN06010205064_2000	1.9
Big Creek	TN06010205064_3000	8.2
Big Sycamore Creek	TN06010205059_1000	17.3
Big War Creek	TN06010205014_1000	18.7
Blackwater Creek	TN06010205057_1000	13.8
Clinch River	TN06010205013_1000	37.0
Clinch River	TN06010205016_1000	17.0
Cove Creek	TN06010205305_1000	11.7
Flat Gap Creek	TN06010205014_0400	5.5
Indian Creek	TN06010205011_1000	15.4
Little War Creek	TN06010205014_0500	7.3
Ollis Creek	TN06010205064_0100	22.3
Panther Creek	TN06010205013_0600	2.2
Richardson Creek	TN06010205013_0700	20.5
Richardson Creek	TN06010205014_0300	8.4
Riley Creek	TN06010205014_0100	3.9
Stony Fork	TN06010205014_0200	7.9
Turkey Creek	TN06010205016_0500	5.9
War Creek	TN06010205016_0300	10.9
White Creek	TN06010205001T_0200	7.8

Table A3-6. Streams Fully Supporting Recreation Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Norris Reservoir	TN06010205001_1000	34,187

Table A3-7. Lakes Fully Supporting Recreation Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
East Fork Panther Creek	TN06010205013_0620	5.5
Greasy Rock Creek	TN06010205013_0500	5.7
Mill Creek	TN06010205016_0400	5.1
North Fork Clinch River	TN06010205016_0100	1.7
Sweet Creek	TN06010205013_0710	4.3

Table A3-8. Streams Not Supporting Recreation Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Ball Creek	TN06010205001T_0400	6.2
Big Creek	TN06010205013_0200	14.3
Blackwater Creek	TN06010205057_2000	10.5
Brier Creek	TN06010205013_0400	21.0
Bruce Creek	TN06010205001T_0100	4.8
Cedar Springs Creek	TN06010205011_0100	8.7
Cracker Creek	TN06010205001T_0800	7.1
Crooked Creek	TN06010205001T_1400	6.6
Duck Creek	TN06010205013_0800	3.8
Dutch Valley Creek	TN06010205001T_0900	5.7
Fall Creek	TN06010205001T_1300	5.6
Forked Deer Creek	TN06010205001T_0500	6.1
Hogskin Creek	TN06010205001T_1200	13.1
Joe Mill Creek	TN06010205011_0200	5.6
Little Barren Creek	TN06010205001T_0300	10.2
Little Sycamore Creek	TN06010205061_1000	18.7
Misc Tribs to Big Creek	TN06010205064_0999	16.0
Misc Tribs to Big Sycamore Creek	TN06010205059_0999	11.9
Misc Tribs to Big War Creek	TN06010205014_0999	17.3
Misc Tribs to Clinch River	TN06010205013_0999	24.9
Misc Tribs to Cove Creek	TN06010205305_0999	7.2
Misc Tribs to Norris Reservoir	TN06010205001T_0999	140.5
Notchy Creek	TN06010205001T_0600	7.4
Patterson Branch	TN06010205013_0100	5.4
Puncheon Camp Creek	TN06010205001T_0700	9.8
Shelby Creek	TN06010205016_0200	4.6
Swan Creek	TN06010205013_0300	19.9
Titus Creek	TN06010205305_0100	12.3
Unnamed Trib to Big Sycamore Creek	TN06010205059_0100	6.5
West Fork Painther Creek	TN06010205013_0610	5.8
Williams Creek	TN06010205001T_1100	9.7

Table A3-9. Streams Not Assessed for Recreation Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Cove Lake	TN06010205COVELAKE_1000	494

Table A3-10. Lakes Not Assessed for Recreation Designated Use in the Tennessee Portion of the Upper Clinch River Watershed.

APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)				
	0101	0102	0103	0104	0105
Bare Rock/Sand/Clay	199	213	70	64	113
Deciduous Forest	15,240	12,967	13,072	21,012	23,901
Developed Open Space	1,160	1,797	1,517	2,261	4,141
Emergent Herbaceous Wetlands		1	6	6	4
Evergreen Forest	904	1,110	1,012	1,585	685
Grassland/Herbaceous	4,425	6,955	2,795	3,037	4,553
High Intensity Development	1	32	2	6	340
Low Intensity Development	302	803	342	295	2,530
Medium Intensity Development	31	126	32	12	692
Mixed Forest	1,821	1,974	1,857	3,157	2,323
Open Water	1,733	2,294	4,828	8,458	2,076
Pasture/Hay	3,432	6,567	3,726	4,265	3,343
Row Crops	8	60	27	203	9
Shrub/Scrub	81	24	19	224	96
Woody Wetlands	31	8	28	241	32
Total	**29,369**	**34,931**	**29,334**	**44,827**	**44,838**

Table A4-1a.

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)				
	0106	0502	0503	0504	0505
Bare Rock/Sand/Clay	149	61	6	12	80
Deciduous Forest	23,819	15,012	4,150	3,551	15,006
Developed Open Space	3,019	1,203	358	197	1,720
Emergent Herbaceous Wetlands	4				
Evergreen Forest	332	651	500	172	387
Grassland/Herbaceous	2,098	2,988	871	616	3,006
High Intensity Development	162				29
Low Intensity Development	1,398	213	53	135	546
Medium Intensity Development	730	7	2	6	108
Mixed Forest	1,825	1,334	714	416	1,552
Open Water	2,043	379	2		261
Pasture/Hay	1,443	1,191	344	253	1,510
Row Crops	23	1	1	4	
Shrub/Scrub	108	93	23	18	29
Woody Wetlands	53	22		28	37
Total	**37,205**	**23,156**	**7,025**	**5,408**	**24,268**

Table A4-1b.

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)				
	0506	0507	0702	0801	0802
Bare Rock/Sand/Clay	56	18	2	82	172
Deciduous Forest	6,842	5,328	383	14,916	16,775
Developed Open Space	671	361	30	957	1,401
Evergreen Forest	330	82	30	646	729
Grassland/Herbaceous	1,903	632	54	3,636	5,345
High Intensity Development					5
Low Intensity Development	121	124	10	411	556
Medium Intensity Development	7	14		18	58
Mixed Forest	903	670	48	2,164	1,931
Open Water	1			544	4
Pasture/Hay	749	303	34	1,804	3,242
Row Crops	10		2	3	1
Shrub/Scrub	17	6	1	112	54
Woody Wetlands	3	12	2	20	5
Total	**11,615**	**7,552**	**595**	**25,314**	**30,280**

Table A4-1c.

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)				
	0803	0804	0901	0902	0903
Bare Rock/Sand/Clay	153	62	39	24	145
Deciduous Forest	9,524	12,055	12,653	4,676	7,216
Developed Open Space	729	1,160	502	394	816
Evergreen Forest	581	1,229	315	218	756
Grassland/Herbaceous	2,984	4,360	1,648	2,773	2,773
High Intensity Development	11			5	111
Low Intensity Development	398	367	202	169	548
Medium Intensity Development	175	26	8	17	179
Mixed Forest	1,548	2,107	799	543	1,310
Open Water	20	1,290	5		798
Pasture/Hay	1,509	2,834	1,933	2,290	2,302
Row Crops	5	6			10
Shrub/Scrub	2	21		4	9
Woody Wetlands	19	17	23	6	23
Total	**17,656**	**25,535**	**18,127**	**11,121**	**16,995**

Table A4-1d.

Tables A4-1a-d. Land Use Distribution in the Upper Clinch River 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 AVG	DAILY FLOW MAX	DAILY FLOW MIN	3Q2	1Q10	3Q10	7Q10	3Q20
3528300	0601020501	Sweetwater Ck	13.25	13.9	295.0	1.8	2.6	1.9	1.9	2.1	1.8
3528400	0601020501	Indian Ck	2.68	na	na	na	na	na	na	na	na
3528000	0601020508	Willow Fork	1,474.00	2059.6	83,300.0	108.0	208.3	132.8	135.7	139.6	120.9
3528100	0601020509	Little Baker Ck	5.49	na	na	na	na	na	na	na	na

Table A4-3. Stream Flow Data from USGS Gaging Stations in the Upper Clinch River 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	WILLI000.4GR	Williams Creek @ RM 0.4	060102050101
TDECWPC	HOGSK000.5GR	Hogskin Creek @ RM 0.5	060102050101
TDECWPC	BBARR001.8CL	Big Barren Creek @ RM 1.8	060102050102
TDECWPC	CROOK001.2UN	Crooked Creek @ RM 1.2	060102050103
TDECWPC	FALL001.2UN	Fall Creek @ RM 1.2	060102050103
TDECWPC	ECO67F13	White Creek @ RM 2.0	060102050104
TDECDOE	24	White Creek	060102050104
TDECWPC	BIG018.0CA	Big Creek @ RM 18.0	060102050105
TDECWPC	BIG020.0CA	Big Creek @ RM 20.0	060102050105
TDECWPC	BIG017.5CA	Big Creek @ RM 17.5	060102050105
TDECWPC	BIG020.5CA	Big Creek @ RM 20.5	060102050105
TDECWPC	COVE018.0CA	Cove Creek @ RM 18.0	060102050106
TDECWPC	TITUS000.1CA	Titus Creek @ RM 0.1	060102050106
TDECWPC	BRUCE001.2CA	Bruce Creek @ RM 1.2	060102050106
TDECWPC	WAR000.6HK	War Creek @ RM 0.6	060102050503
TDECWPC	BLACK000.1HK	Blackwater Creek @ RM 0.1	060102050504
TDECWPC	BLACK003.4HK	Blackwater Creek @ RM 3.4	060102050504
TDECWPC	BLACK005.7HK	Blackwater Creek @ RM 5.7	060102050504
TDECWPC	CLINC199.0HK	Clinch River @ RM 199.0	060102050505
TDECWPC	MILL001.0HS	Mill Creek @ RM 1.0	060102050505
TDECWPC	BRIER000.1HK	Brier Creek @ RM 0.1	060102050505
TDECWPC	GROCK000.1HK	Greasy Rock Creek @ RM 0.1	060102050505
TDECWPC	MILL000.1HK	Mill Creek @ RM 0.1	060102050505
TDECWPC	SHELB000.1HK	Shelby Creek @ RM 0.1	060102050505
TDECWPC	DUCK000.2HK	Duck Creek @ RM 0.2	060102050505
TDECWPC	TURKE000.3HK	Turkey Creek @ RM 0.3	060102050505
TDECWPC	TURKE000.5HK	Turkey Creek @ RM 0.5	060102050505
TDECWPC	CLINC189.8HK	Clinch River @ RM 189.8	060102050505
TDECWPC	CLINC189.9HK	Clinch River @ RM 189.9	060102050505
TDECWPC	SWEET001.1HS	Sweet Creek @ RM 1.1	060102050506
TDECWPC	RICHA000.7HK	Richardson Creek @ RM 0.7	060102050506
TDECWPC	EFPAN000.1HK	East Fork Panther Creek @ RM 0.1	060102050507
TDECWPC	WFPAN000.1HK	West Fork Panther Creek @ RM 0.1	060102050507
TDECWPC	NFCLI000.1HK	North Fork Clinch River @ RM 0.1	060102050702
TDECWPC	BIG000.1HK	Big Creek @ RM 0.1	060102050801
TDECWPC	SWAN000.5HK	Swan Creek @ RM 0.5	060102050801
TDECWPC	CLINC159.7CL	Clinch River @ RM 159.7	060102050801
TDECWPC	ECO67F17	Big War Creek @ RM 0.6	060102050802
TDECWPC	FGAP003.0HK	Flat Gap Creek @ RM 3.0	060102050802
TDECWPC	LWAR000.1HK	Little War Creek @ RM 0.1	060102050802
TDECWPC	RILEY000.1HK	Riley Creek @ RM 0.1	060102050802

Table A4-4a.

AGENCY	STATION	LOCATION	HUC-12
TDECWPC	STONY000.1HK	Stony Fork @ RM 0.1	060102050802
TDECWPC	BWAR007.4HK	Big War Creek @ RM 7.4	060102050802
TDECWPC	BWAR013.9HK	Big War Creek @ RM 13.9	060102050802
TDECWPC	JMILL000.1GR	Joe Mill Creek @RM 0.1	060102050803
TDECWPC	INDIA002.3GR	Indian Creek @ RM 2.3	060102050803
TDECWPC	CSPRI000.5GR	Cedar Springs Creek @ RM 0.5	060102050803
TDECWPC	FDEER000.5GR	Forked Deer Creek @ RM 0.5	060102050803
TDECWPC	NOTCH000.1GR	Notchy Creek @ RM 0.1	060102050804
TDECWPC	PCAMP001.1GR	Puncheon Camp Creek @ RM 1.1	060102050804
TDECWPC	DVALL000.6GR	Dutch Valley Creek @ RM 0.6	060102050804
TDECWPC	CRACK000.8GR	Cracker Creek @ RM 0.8	060102050804
TDECWPC	SFSYC000.3CL	South Fork Sycamore Creek @ RM 0.3	060102050901
TDECWPC	LSYCA001.8CL	Little Sycamore Creek @ RM 1.8	060102050902
TDECWPC	BALL000.2CL	Ball Creek @ RM 0.2	060102050903
TDECWPC	BSYCA007.6CL	Big Sycamore Creek @ RM 7.6	060102050903
TDECWPC	NFCLI004.0_VA	North Fork Clinch River @ RM 4.0	Virginia

Table A4-4b.

Tables A4-4a-b. STORET Water Quality Monitoring Stations in the Upper Clinch River 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
TN0055352	Sharp's Chapel Elementary School	4952	Sewerage System	Minor	Hunting Creek @ RM 2.0	060102050101
TN0060933	Washburn School	4952	Sewerage System	Minor	Williams Creek @ rm 5.8	060102050101
TN0020532	LaFollette STP	4952	Sewerage System	Major	Big Creek @ RM 17.1	060102050105
TN0026263	Caryville-Jacksboro Utility District	4952	Sewerage System	Minor	Norris lake @ RM 15.9	060102050106
TN0055239	Wynn Habersham School	4952	Sewerage System	Minor	Davis Creek @ RM 0.1	060102050106
TN0026638	Sneedville STP	4952	Sewerage System	Minor	Clinch River @ RM 177.4	060102050505
TN0060704	Sneedville Utility District WTP	4941	Water Supply	Minor	Brier Creek @ RM 1.3 and Clinch River	060102050505
TN0002666	Treadway Water and Sewer STP	4952	Sewerage System	Minor	Flat Gap Creek @ RM 3.0 and Big War Creek @ RM 7.0	060102050802

Table A4-5. NPDES Permittees in the Upper Clinch River Watershed. *SIC, Standard Industrial Classification; MADI, Major Discharge Indicator.*

FACILITY NUMBER	PERMITEE	WATERBODY	HUC-12
TN0078352	Hallsdale-Powell Norris WTP	Clinch River @ RM 116	060102050103

Table A4-6. Water Treatment Plants in the Upper Clinch River Watershed.

FACILITY NUMBER	PERMITEE	SIC	SIC NAME	WATERBODY	HUC-12
TN0029262	Tennessee Aggregate Co. (Key Limestone Quarry)	1422	Crushed and Broken Limestone	Cuckle Creek, Big Creek, and Norris Lake	060102050105
TN0063606	Campbell Co. Highway Dept. (Area #1)	1422	Crushed and Broken Limestone	Cuckle Creek	060102050105
TN0053848	New River Processing, Inc. (Tipple #2)	1221	Bituminous Coal and Lignite Surface Mining	Cove Creek	060102050106
TN0066168	Caryville Stone, LLC (Quarry/Processing Facility)	1422	Crushed and Broken Limestone	UT to Cove Creek	060102050106
TN0071749	Tennessee Valley Authority (Flatwoods Mine Area)	1221	Bituminous Coal and Lignite Surface Mining	Bruce Creek	060102050106
TN0076180	U.S. Coal, Incorporated (Deep Mine 10)	1222	Coal Mining, Bituminous, Underground	UT to Adkins Branch	060102050106
TN0072702	G and M Enterprises, Inc. (Sand Quarry #1)	1442	Construction Sand and Gravel	Owens Branch, Reynolds Church House Hollow	060102050802
TN0060127	Mossy Creek Mining, LLC (Clinch Valley Mine)	1031	Lead and Zinc Ore	Joe Mill Creek	060102050803

Table A4-7. Active Permitted Mining Sites in the Upper Clinch River Watershed. *SIC, Standard Industrial Classification; UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	WATERBODY	HUC-12
TNG110057	C & C Concrete Products	Big Creek @ RM 13	060102050105
TNG110095	Dixie Concrete Company	Hunter and Norris Dam	060102050105
TNG110193	Tri-Cities Concrete Co.	Greasy Rock Creek	060102050505

Table A4-8. Ready Mix Concrete Plants in the Upper Clinch River Watershed.

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-12
NRS02.165	Union	Boat Ramp and Road Crossing	Lost Creek	060102050104
NRS03.307	Campbell	Culvert Replacement	Cuckle Creek	060102050105
NRS01.218	Campbell	Bank Stabilization	Eagle Bluff Springs	060102050106
NRS02.306	Campbell	Wetland Alteration	UT to Titus Creek	060102050106
NRS01.105	Hancock	Bridge replacement	Briar Creek	060102050505
NRS02.448	Hancock	Livestock Watering Pond	UT to Flea Creek	060102050505
NRS04.039	Hancock	Install Ductile Iron Pipe	Clinch River	060102050505
NRS02.429	Hancock	Livestock Watering Pond	UT to Little War Creek	060102050802

Table A4-9. Individual ARAP Permits Issued January 2000 Through June 2004 in the Upper Clinch River Watershed. *UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	SECTOR	RECEIVING STREAM	AREA*	HUC-12
TNR055986	TNT Auto Parts	M	UT to Dotson Creek	7	060102050103
TNR051561	Continental Camper Company	AB	Ollis Creek and Big Creek	1.3	060102050105
TNR053160	Caryville	D	Unnamed Tributary	4.5	060102050105
TNR053178	LaFollette	D	Ditch	1.6	060102050105
TNR053448	Campbell County Airport	S	Not Reported	0	060102050105
TNR053788	Volunteer Fabricators, Inc.	W	Brier Creek	4	060102050505
TNR054265	BSH Home Appliances Corp.	AA	Cockle Creek	5	060102050105
TNR055895	Austin Powder Company	C, P	UT to Big Creek	115	060102050105
TNR050259	Clinch River Casting, Inc.	F	Cove Creek	6	060102050106
TNR051700	Advance Foods, Incorporated	U	Cove Lake	13	060102050106
TNR054434	Profile Solutions Industries	Y	Norris Reservoir	4.64	060102050106
TNR054593	Creative Tubes	F	Big Creek	0.7	060102050106
TNR055942	International Paper Corporation	A	UT to Titus Creek	103.5	060102050106

Table A4-10. Active Permitted TMSP Facilities in the Upper Clinch River Watershed. *Area, acres of property associated with industrial activity; UT, Unnamed Tributary. 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)	Streambank / Shoreline Protection (feet)	Riparian Forest Buffer (acres)
FY 2001	13	2200	2730	1
FY 2002	5		5780	4
FY 2003	5	10639	2950	25
FY 2004			300	1
FY 2005				

Table A5-1a. Land Treatment Conservation Practices (Conservation Buffers), in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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	16009	1881
FY 2002	37653	2438
FY 2003	36560	1948
FY 2004		
FY 2005		

Table A5-1b. Erosion Control Conservation Practices, in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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			2271	2271
FY 2002		207	1758	1965
FY 2003		30	1719	1749
FY 2004		141		141
FY 2005	31	4332		4363

Table A5-1c. Nutrient Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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	1617
FY 2002		2059
FY 2003		2197
FY 2004		205
FY 2005		4959

Table A5-1d. Pest Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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	801			
FY 2002	903			
FY 2003	1261			
FY 2004	245	2800		
FY 2005	2364	2900	108	532

Table A5-1e. Grazing/Forages Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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)
FY 2001	1449		1449
FY 2002	953		953
FY 2003	661	15	676
FY 2004	451		451
FY 2005	1350		1350

Table A5-1f. Tree and Shrub Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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 - Mulch Till (acres)	Tillage & Residue Mgmt Systems (acres)	Conservation Crop Rotation (acres)	Contour Farming (acres)	Cover Crop (acres)
FY 2001					
FY 2002					
FY 2003					
FY 2004			28	9	9
FY 2005	11	11	291	242	268

Table A5-1g. Land Treatment Conservation Practices (Tillage and Cropping), in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2001 to 2005.*

Waste Management Facilities		
	Waste Storage Facility (number)	Total Facilities (number)
FY 2001		
FY 2002	1	1
FY 2003		
FY 2004		
FY 2005		

Table A5-1h. Waste Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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	1428	1428
FY 2002	1113	1113
FY 2003	1428	1428
FY 2004	1	1
FY 2005	1387	1387

Table A5-1i. Wildlife Habitat Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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			1
FY 2005	13151	4	24

Table A5-1j. Water Supply Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper Clinch River 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
CARYVILLE/JACKSBORO	03/15/91	$ 110,900
LAFOLLETTE	06/23/03	$ 1,060,000

Table A5-2. Communities in the Tennessee Portion of the Upper Clinch River Watershed that have received Clean or 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
Waste Storage Facility	313	1
Clearing and Snagging	326	1
Critical Area Planting	342	21
Pond	378	58
Fence	382	39
Filter Strip	393	1
Use Exclusion	472	13
Pasture/Hay Planting	512	91
Pipeline	516	16
Livestock Watering pumping plant	533	4
Roof Runoff Management	558	3
Access Road	560	2
Heavy Use Area	561	51
Spring Development	574	3
Stream Crossing -1	576	1
Stream Crossing	578	9
Streambank Protection	580	20
Subsurface Drain	606	1
Watering Facility	614	32
Waste Utilization	633	1
TOTAL BMPs	**-**	**369**

Table A5-3. Best Management Practices Installed by Tennessee Department of Agriculture and Partners in the Tennessee Portion of the Upper Clinch River Watershed.