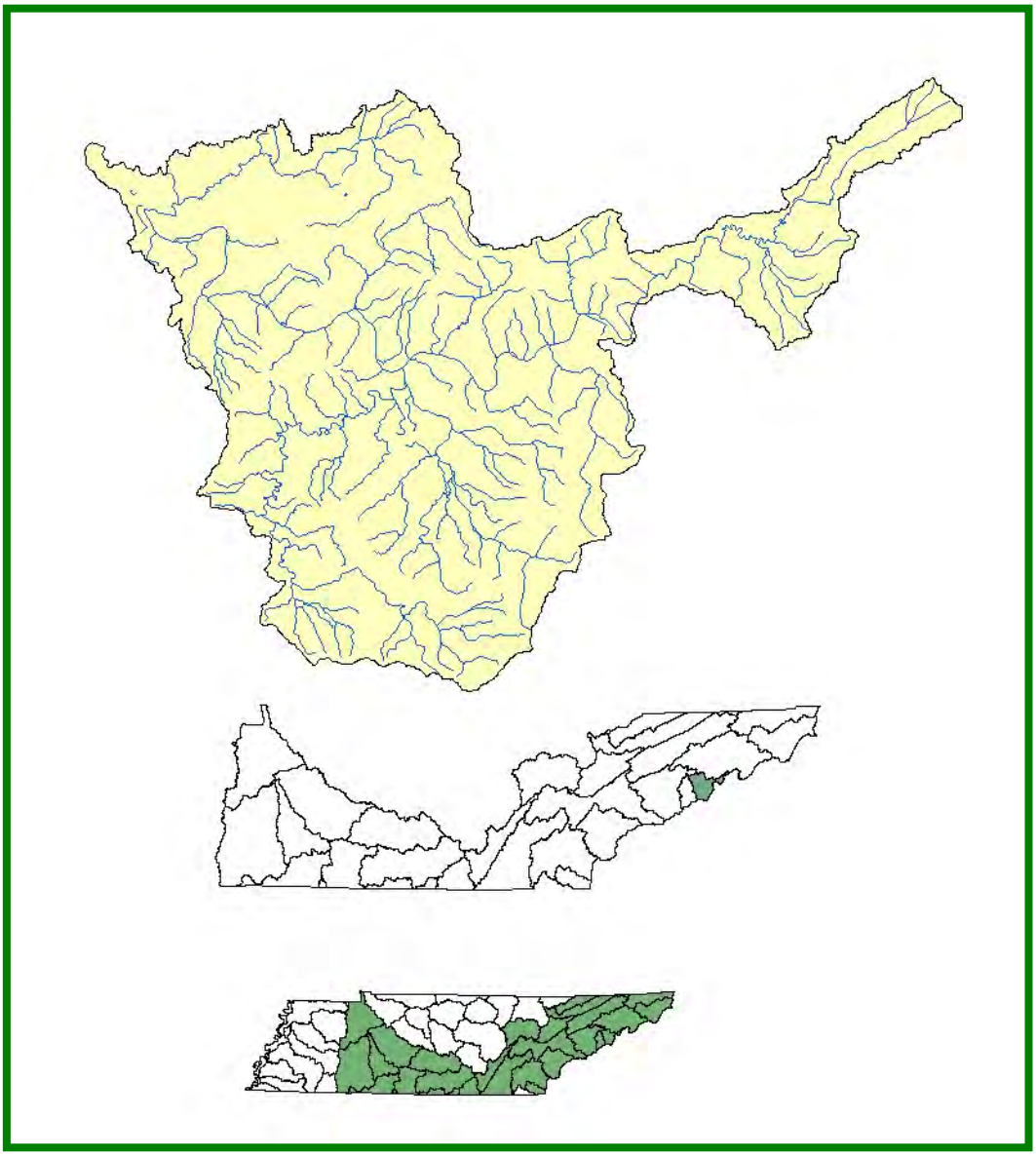
UPPER FRENCH BROAD RIVER WATERSHED (06010105) OF THE TENNESSEE RIVER BASIN

WATERSHED WATER QUALITY MANAGEMENT PLAN



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

UPPER FRENCH BROAD RIVER WATERSHED
WATER QUALITY MANAGEMENT PLAN

TABLE OF CONTENTS

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

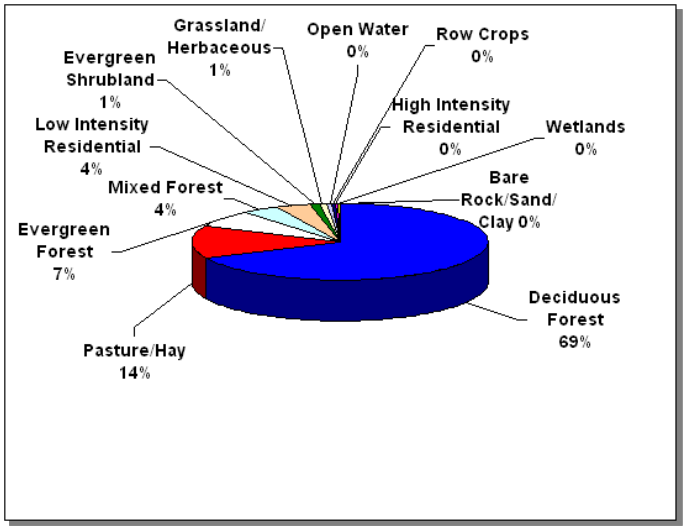
Summary – Upper French Broad River Watershed (06010105)

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 French Broad 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.

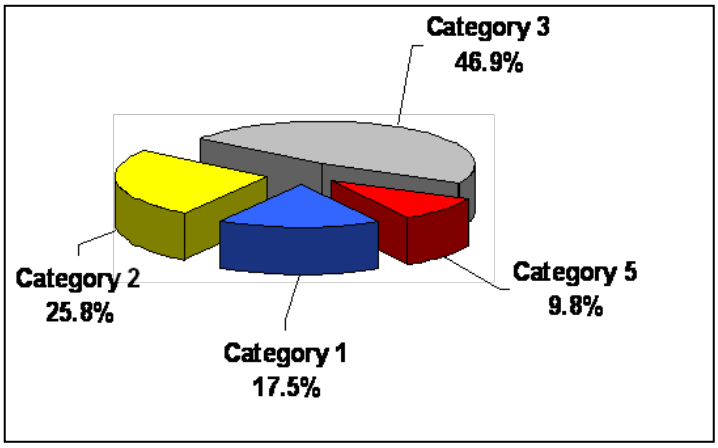
A detailed description of the watershed can be found in Chapter 2. The Upper French Broad River Watershed is approximately 1,859 square miles (215 mi^2 in Tennessee) and is located in three counties. A part of the Tennessee River drainage basin, the watershed has 380.0 stream miles.



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

The French Broad River is listed as a State Scenic River and is listed in the National Rivers Inventory. Forty-six rare plant and animal species have been documented in the watershed, including two rare fish species.

A review of water quality sampling and assessment is presented in Chapter 3. Using the Watershed Approach to Water Quality, 144 sampling events occurred in the Upper French Broad River Watershed in 2000-2005. These were conducted at ambient, ecoregion or watershed monitoring sites. Monitoring results support the conclusion that 81.5% 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 French Broad River Watershed. Assessment data are based on the 2006 Water Quality Assessment of 380.0 stream miles in the Tennessee portion of the Upper French Broad River Watershed.

Also in Chapter 3, a series of maps illustrates 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. An additional map illustrates streams that are listed for impairment by specific causes (E. coli).

Point and Nonpoint Sources are addressed in Chapter 4 which 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-8	HUC-10	HUC-12
06010105	0601010507	060101050701 (French Broad River)
		060101050702 (Paint Creek)
		060101050703 (French Broad River)
	0601001508	060101050801 (Trail Fork of Big Creek)
		060101050802 (Gulf Creek of Big Creek)

The Upper French Broad River Watershed is Composed of five USGS-Delineated Subwatersheds (12-Digit Subwatersheds).

Point source contributions to the Upper French Broad River Watershed consist of 2 individual NPDES-permitted facilities. Other permits in the watershed (as of October 13, 2008) are Aquatic Resource Alteration Permits (23), Tennessee Multi-Sector Permits (7), and Construction General Permits (11). Agricultural operations include cattle, chicken, 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 French Broad River Watershed* and highlights partnerships between agencies and between agencies and landowners that are essential to success. Programs of federal agencies (Natural Resources Conservation Service, U.S. Fish and Wildlife Service, U.S. Geological Survey, Tennessee Valley Authority, U.S. Army Corps of Engineers, and National Park Service), and state agencies (TDEC/State Revolving Fund, TDEC Division of Water Supply, Tennessee Department of Agriculture, and Tennessee Wildlife Resources Agency as well as North Carolina Division of Water Quality and North Carolina Water Management Trust Fund). Local initiatives of organizations active in the watershed (Smoky Mountain RC&D Council, Appalachian Resource Conservation and Development Council) are also described.

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

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

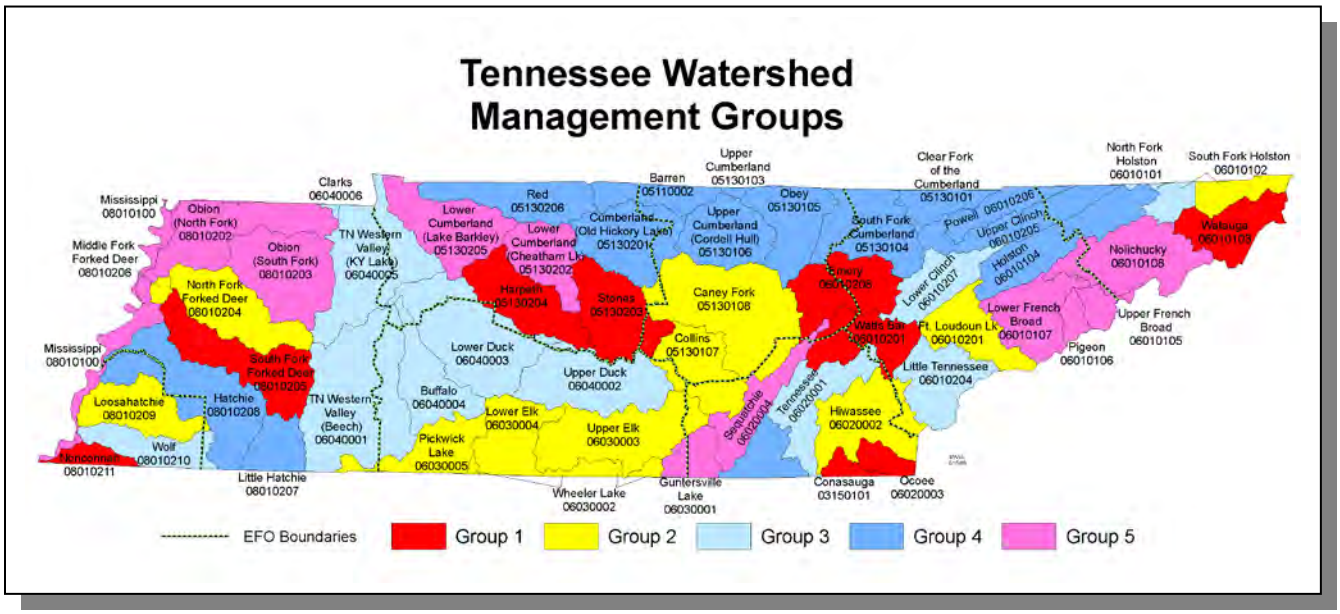


Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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

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

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

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

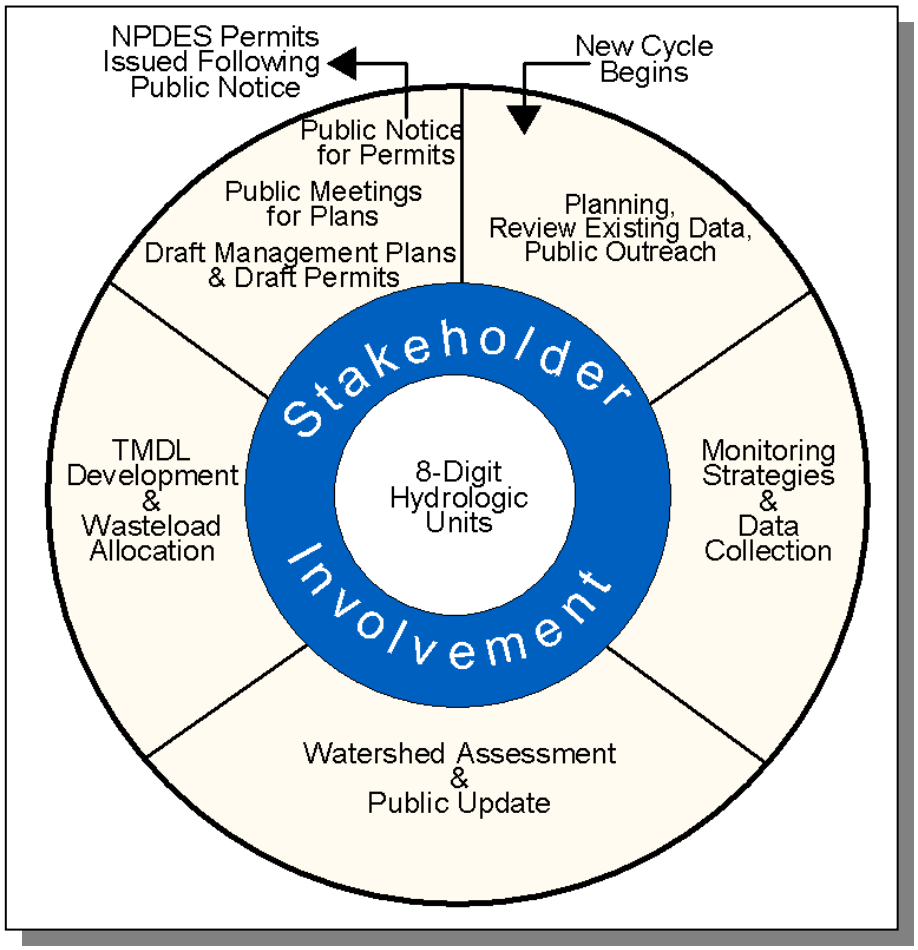


Figure 1-2. The Watershed Approach Cycle.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE UPPER FRENCH BROAD RIVER WATERSHED

4.1. BACKGROUND. This chapter is organized by HUC-12 subwatershed, and the description of each subwatershed is divided into four parts:

i. General description of the subwatershed
ii. Location of USGS (United States Geological Survey) and STORET sites.
iii. Location of Permitted Activities
iv. Description of nonpoint source contributions

The HUC can range from 2 to 16 digits long, more digits indicating a smaller and smaller portion of the watershed is represented. The Tennessee Portion of the Upper French Broad River Watershed (HUC 06010105) has been delineated into five 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 2001 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.

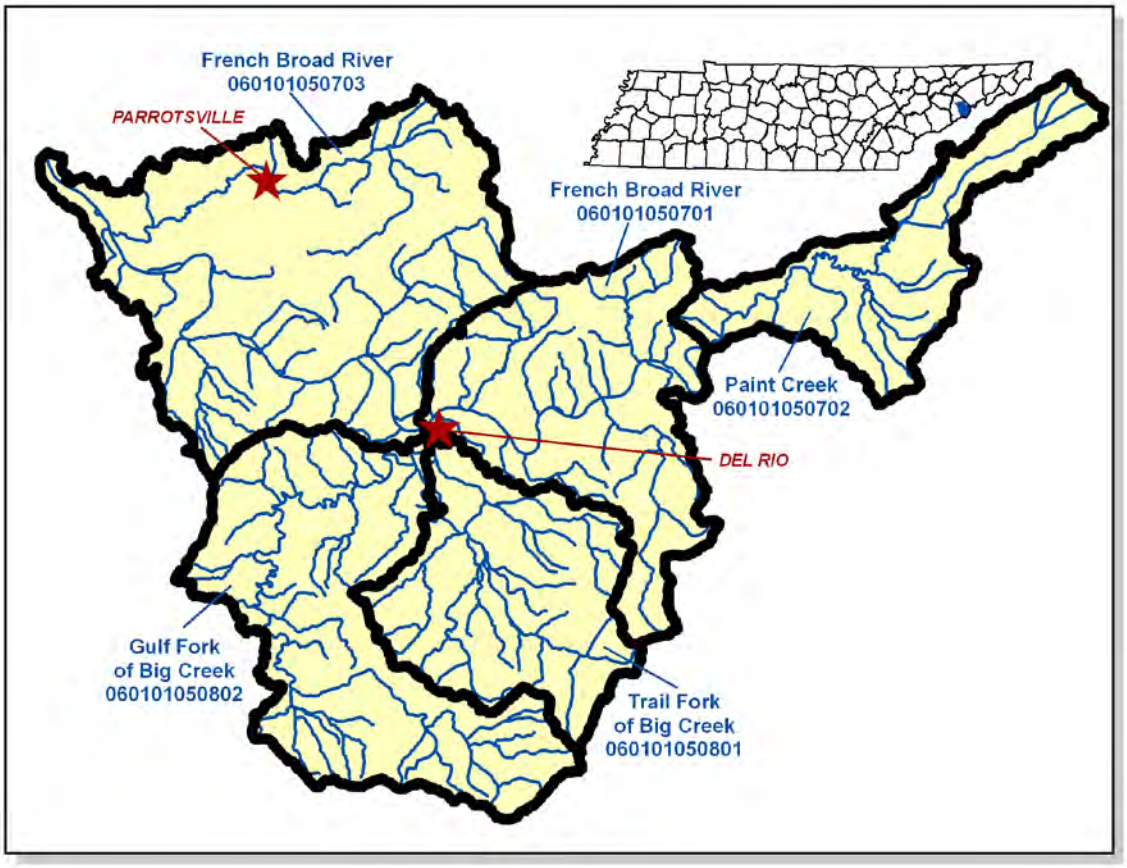


Figure 4-1. The Tennessee Portion of the Upper French Broad River Watershed is Composed of Five USGS-Delineated Subwatersheds (12-Digit Subwatersheds).

4.2. CHARACTERIZATION OF HUC-12 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 French Broad River Watershed.

HUC-8	HUC-10	HUC-12
06010105	0601010507	060101050701 (French Broad River)
		060101050702 (Paint Creek)
		060101050703 (French Broad River)
	0601001508	060101050801 (Trail Fork of Big Creek)
		060101050802 (Gulf Creek of Big 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. 060101050701 (French Broad River).

4.2.A.i. General Description.

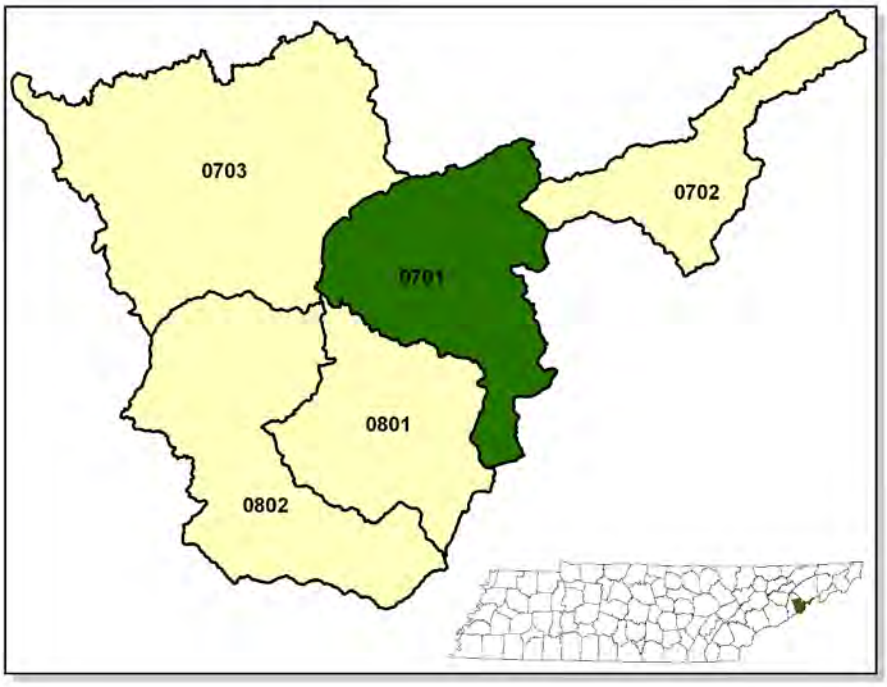


Figure 4-2. Location of Subwatershed 060101050701. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

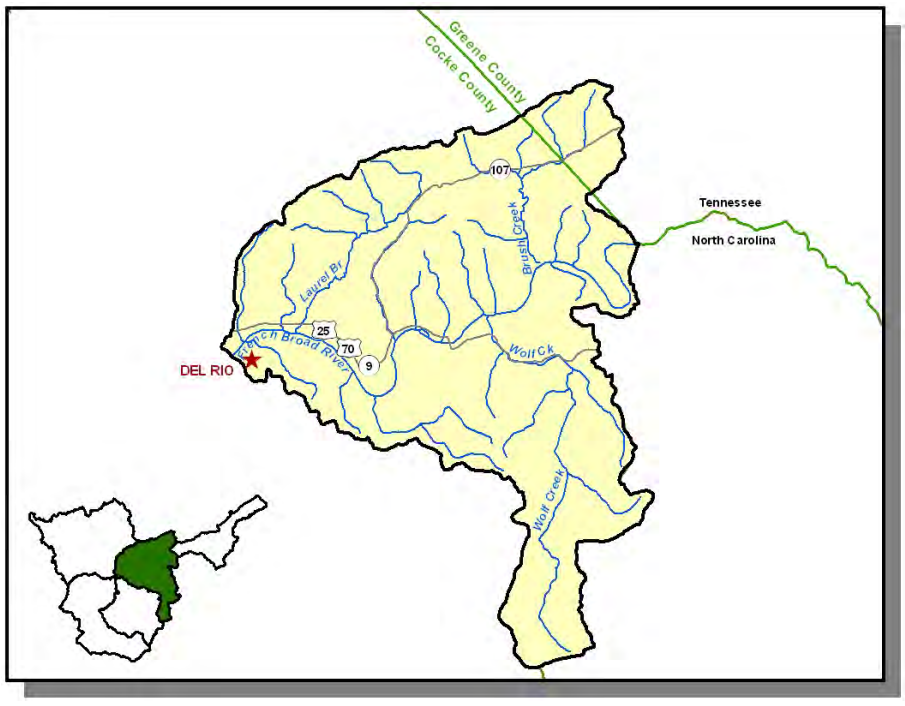


Figure 4-3. Locational Details of Subwatershed 060101050701.

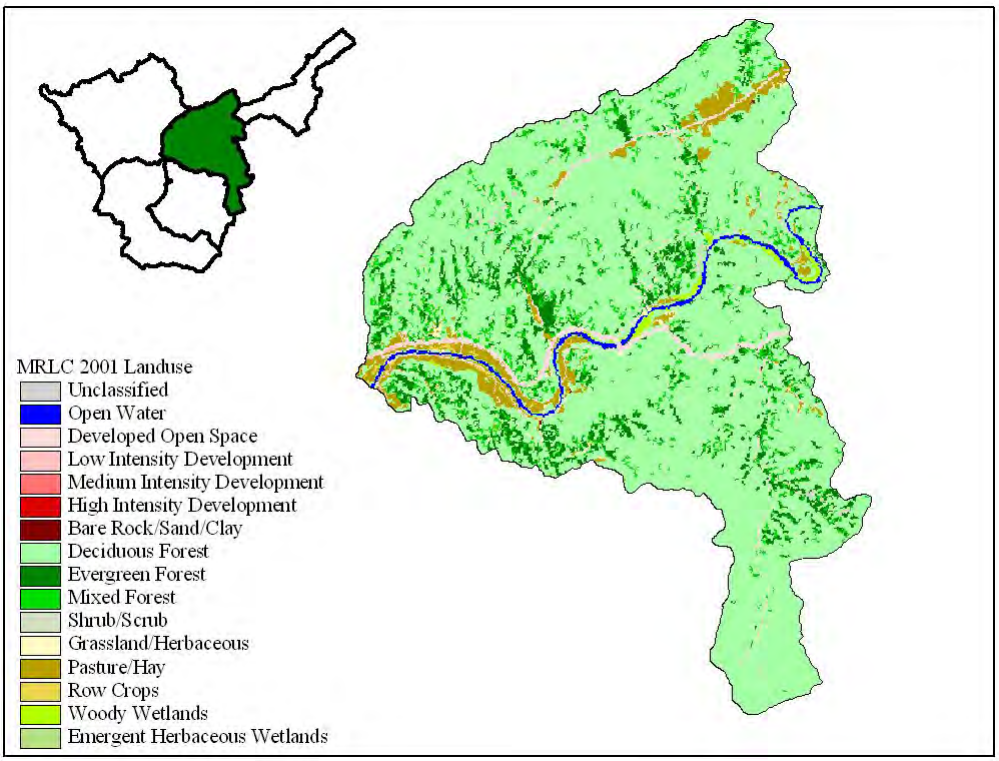


Figure 4-4. Illustration of Land Use Distribution in Subwatershed 060101050701.

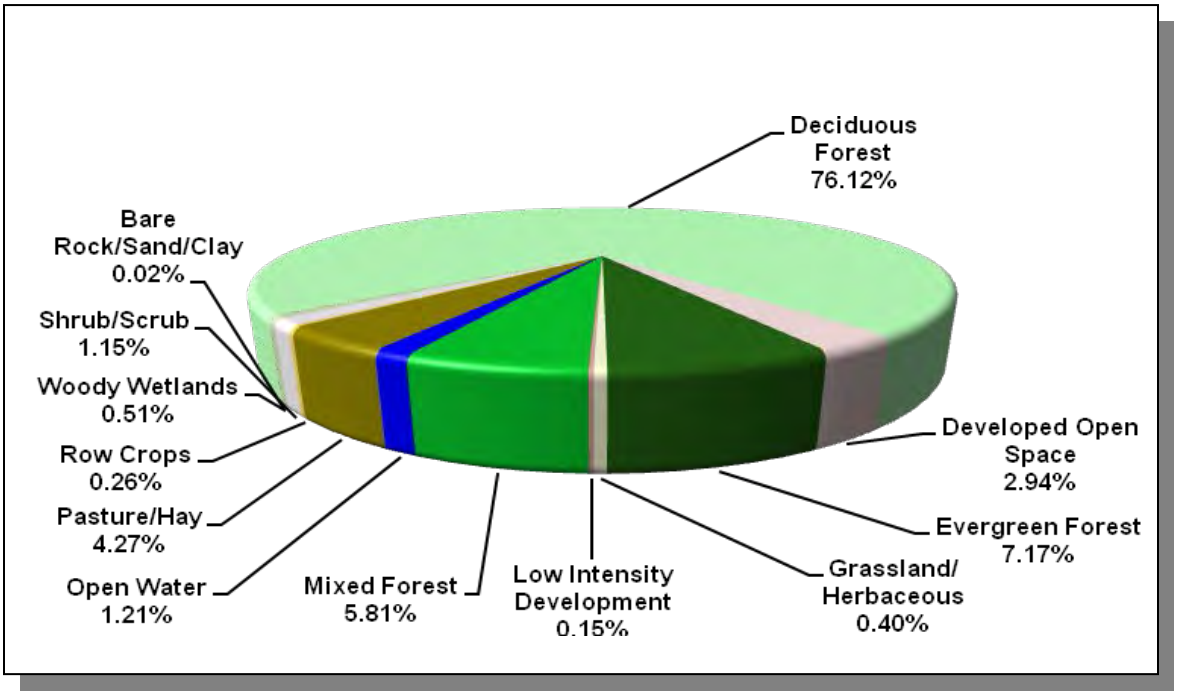


Figure 4-5. Land Use Distribution in Subwatershed 060101050701. *More information is provided in Appendix IV.*

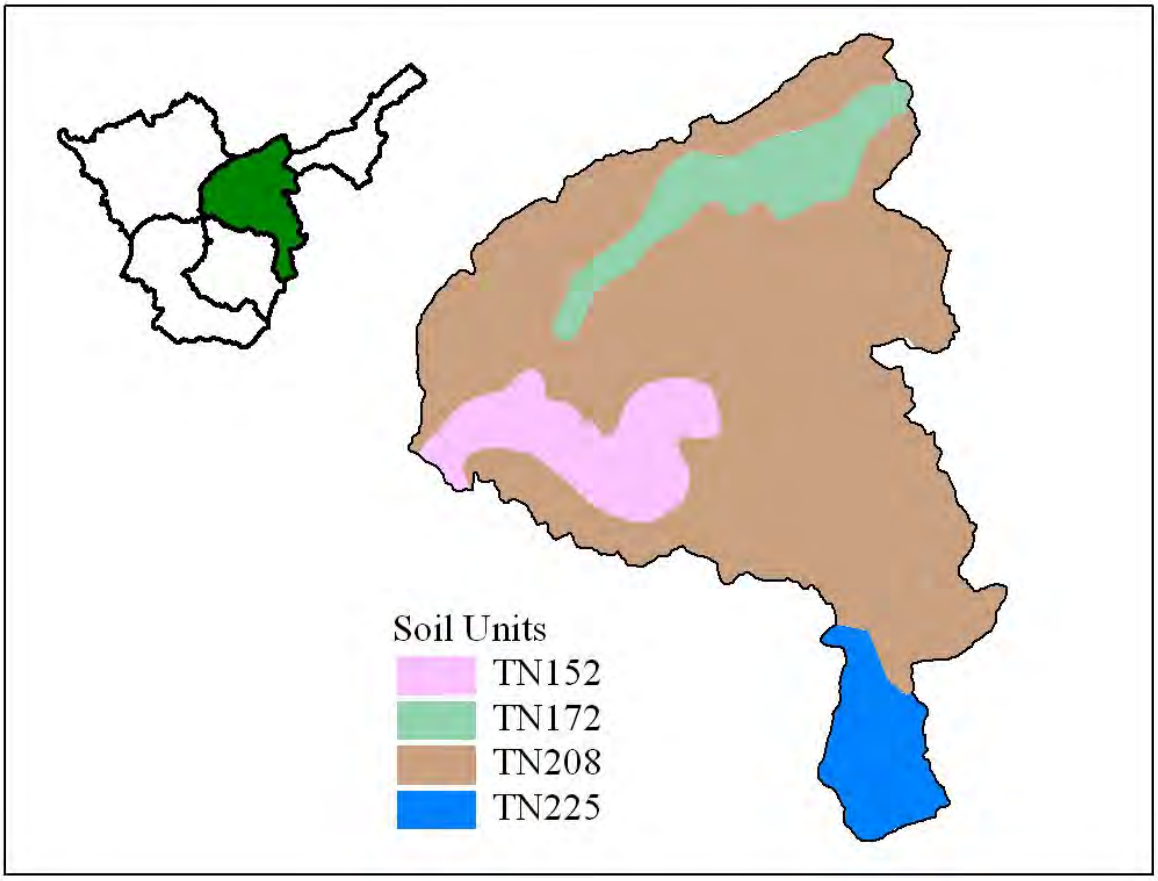


Figure 4-6. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050701.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN152	0	B	2.11	5.26	Loam	0.31
TN172	0	B	3.87	5.13	Loam	0.26
TN208	0	C	4.02	4.84	Loam	0.25
TN225	0	B	3.90	5.03	Sandy Loam	0.22

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050701. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	8.3	2,419	2,628	2,786	15.2
Greene	55,853	59,369	62,909	0.2	110	117	124	12.7

Table 4-3. Population Estimates in Subwatershed 060101050701.

4.2.A.ii. USGS Gaging Stations and STORET Sites.

There are no USGS continuous record gaging stations located in subwatershed 060101050701.

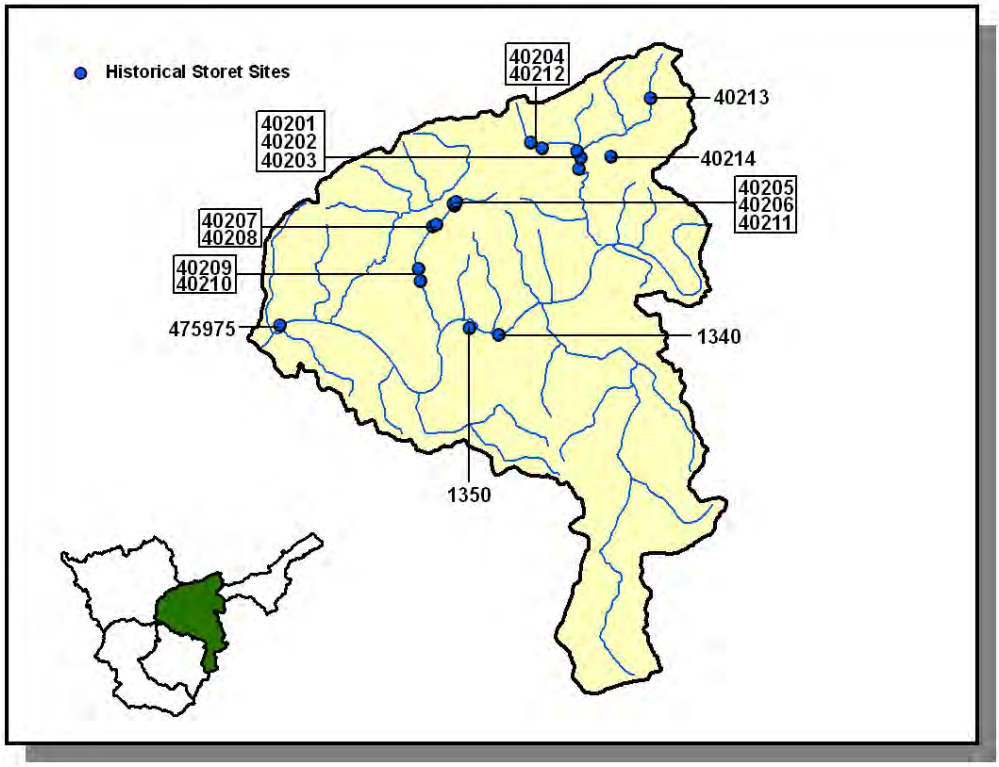


Figure 4-7. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101050701. *More information, including site names and locations, is provided in Appendix IV.*

4.2.A.iii. Permitted Activities.

Figure 4-8. Location of Permits Issued in Subwatershed 060101050701. *More information, including the names of Facilities, is provided in Appendix IV.*

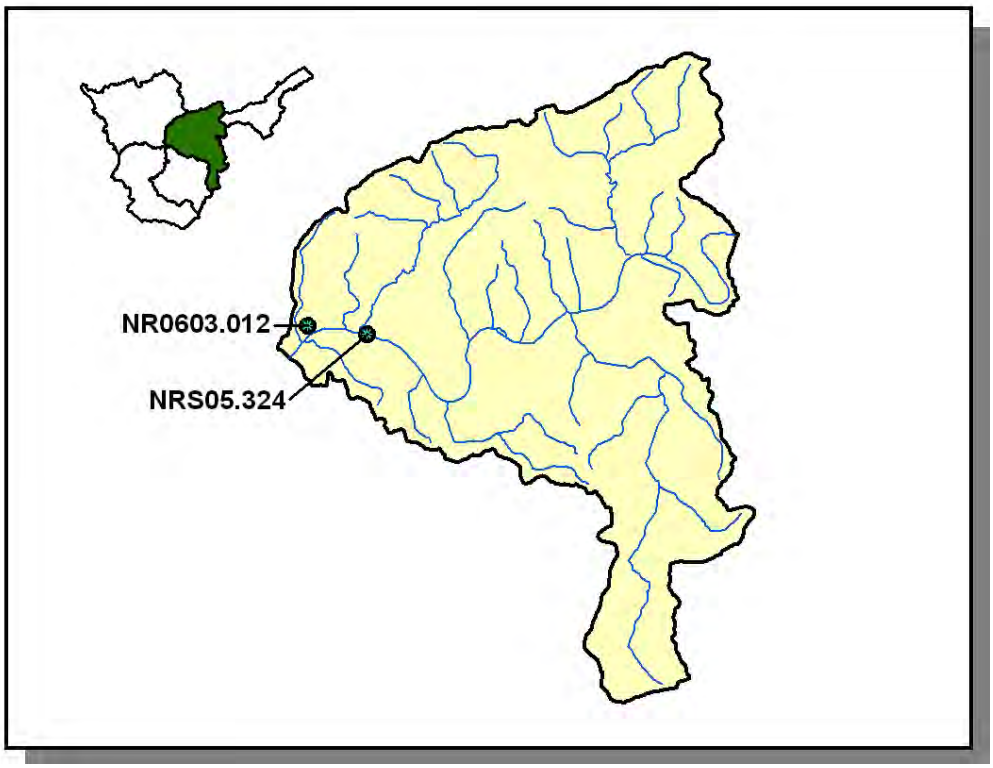


Figure 4-9. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101050701. *More information is provided in Appendix IV.*

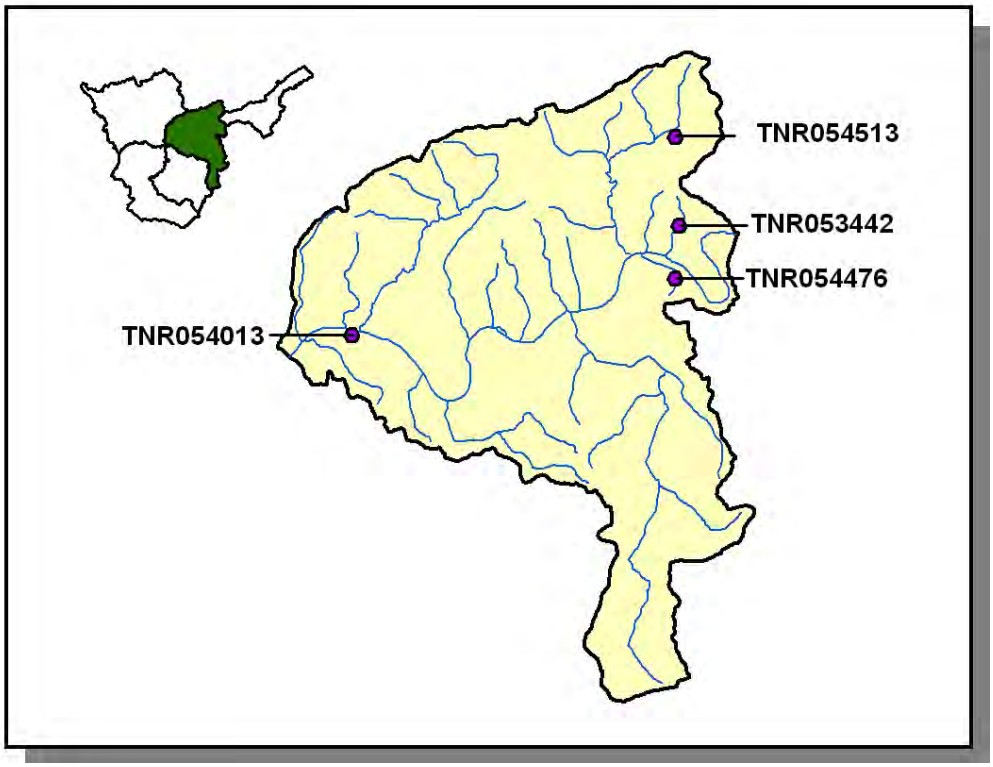


Figure 4-10. Location of TMSP (Tennessee Multi Sector Permit) Sites in Subwatershed 060101050701. *More information is provided in Appendix IV.*

4.2.A.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90
Greene	33,962	72,582	7,282	1,190	495	226

Table 4-4. Summary of Livestock Count Estimates by 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)
Cocke	182.0	163.4	3.7	17.4
Greene	180.0	171.8	2.0	10.5

Table 4-5. Forest Acreage and Annual Removal Rates (1987-1994) by County.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.38
Corn (Row Crops)	6.97
Wheat (Close Grown Cropland)	5.30
Other Vegetable and Truck Crop	3.80
Grass Forbs Legumes Mixed (Pastureland)	1.00
Grass (Pastureland)	0.58
Farmsteads and Ranch Headquarters	0.53
Grass (Hayland)	0.47
Legume (Hayland)	0.26
Legume Grass (Hayland)	0.09

Table 4-6. Annual Estimated Total Soil Loss in Subwatershed 0601010500701.

4.2.B. 060101050702 (Paint Creek).

4.2.B.i. General Description.

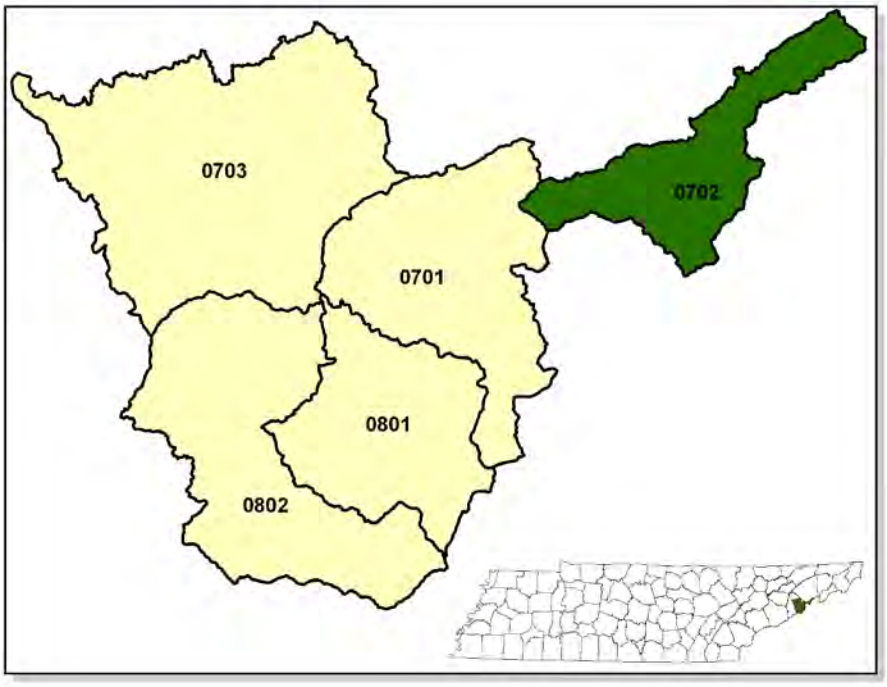


Figure 4-11. Location of Subwatershed 060101050702. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

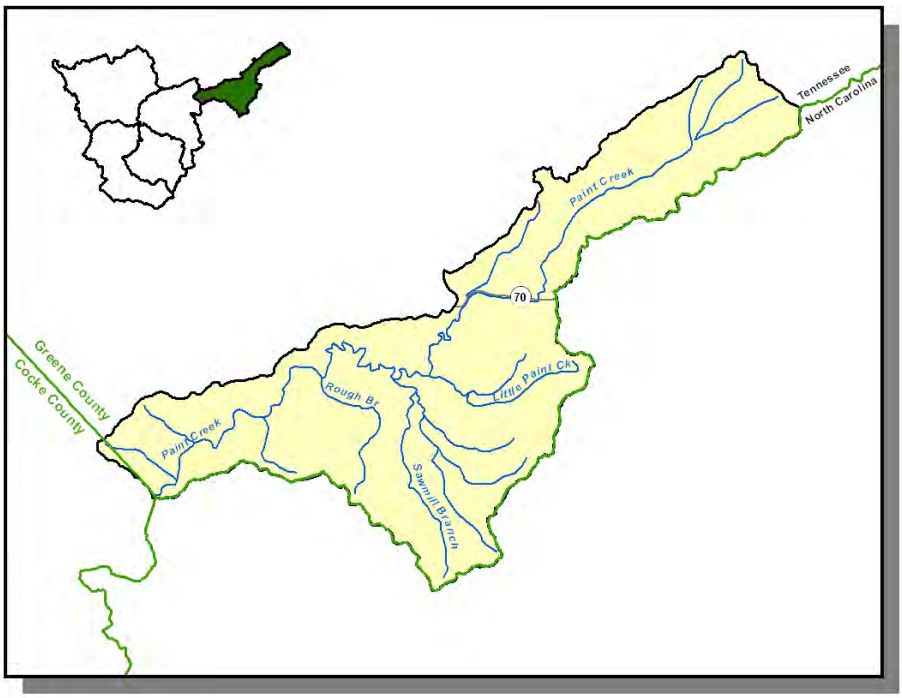


Figure 4-12. Locational Details of Subwatershed 060101050702.

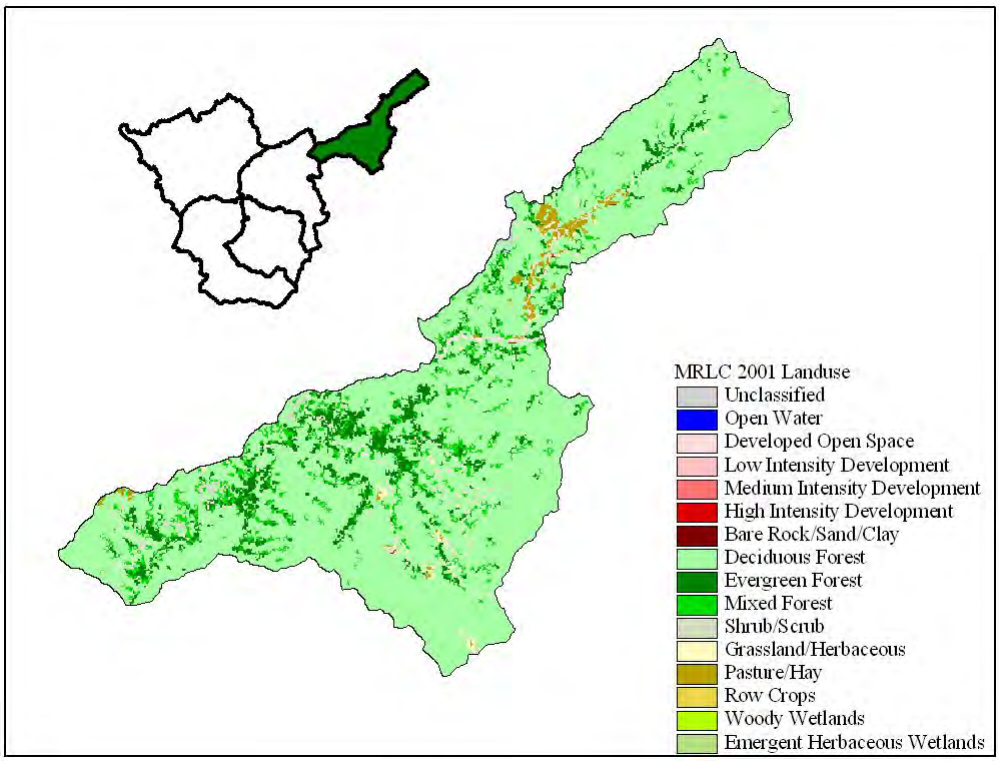


Figure 4-13. Illustration of Land Use Distribution in Subwatershed 060101050702.

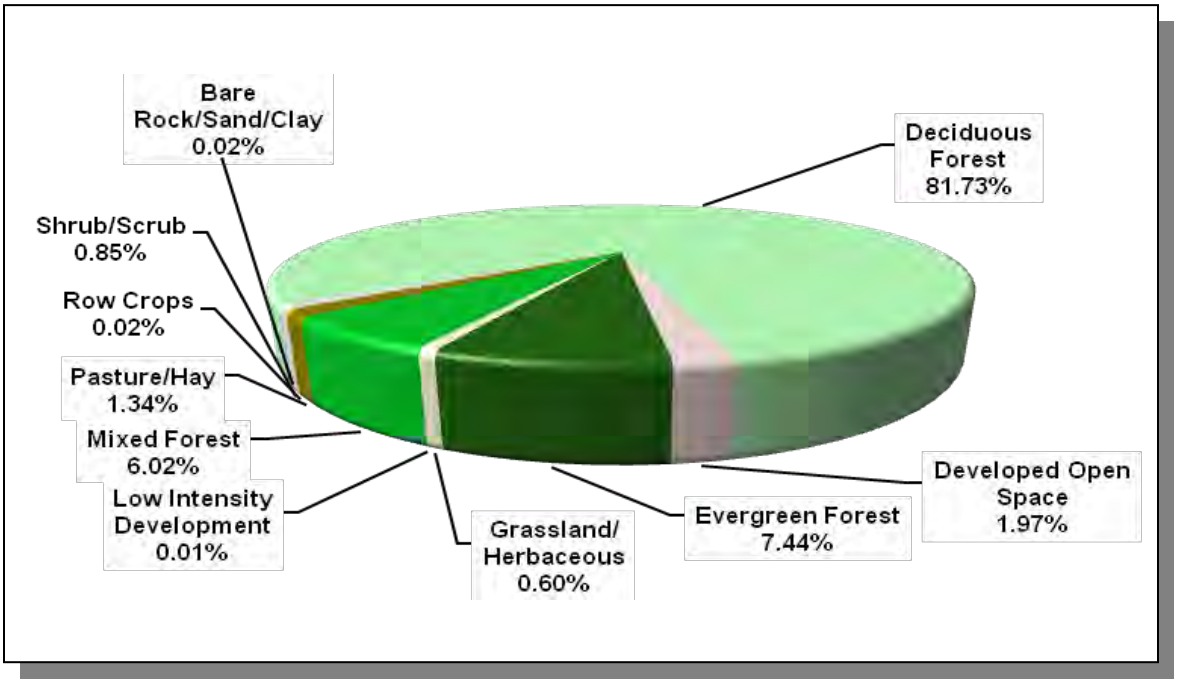


Figure 4-14. Land Use Distribution in Subwatershed 060101050702. *More information is provided in Appendix IV.*

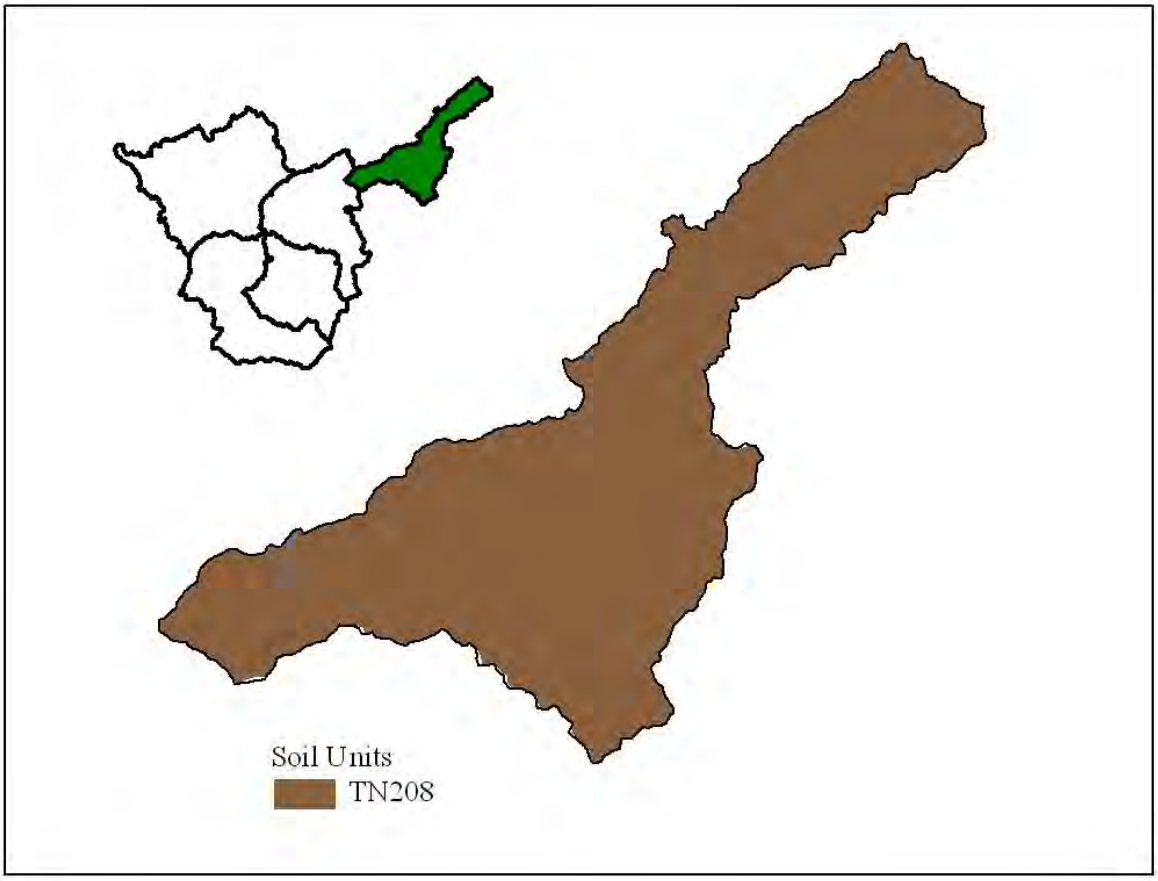


Figure 4-15. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050702.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-7. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050702. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	0.15	43	47	49	14.00
Greene	55,853	59,369	62,909	3.91	2,186	2,323	2,462	12.60

Table 4-8. Population Estimates in Subwatershed 060101050702.

4.2.B.ii. USGS Gaging Stations and STORET Sites.

There are no USGS continuous record gaging stations or STORET sites in subwatershed 060101050702.

4.2.B.iii. Permitted Activities.

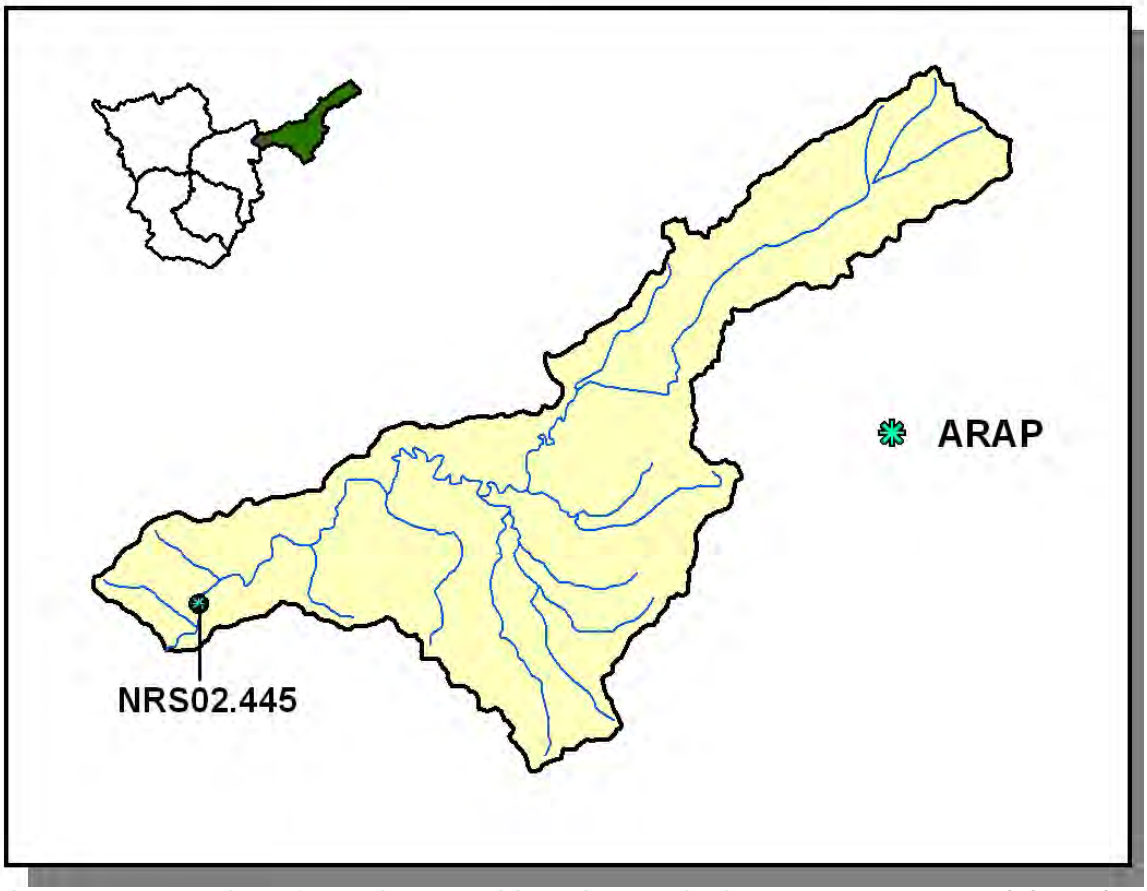


Figure 4-16. Location of Permits Issued in Subwatershed 060101050702. *More information, including the names of Facilities, is provided in Appendix IV.*

4.2.B.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90
Greene	33,962	72,582	7,282	1,190	495	226

Table 4-9. Summary of Livestock Count Estimates by 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)
Cocke	182.0	163.4	3.7	17.4
Greene	180.0	171.8	2.0	10.5

Table 4-10. Forest Acreage and Annual Removal Rates (1987-1994) by County.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	16.43
Tobacco (Row Crops)	15.31
Wheat (Close Grown Cropland)	5.30
Other Vegetable and Truck Crop	3.80
Farmsteads and Ranch Headquarters	1.63
Grass Forbs Legumes Mixed (Pastureland)	0.44
Grass (Pastureland)	0.39
Legume Grass (Hayland)	0.33
Legume (Hayland)	0.26
Grass (Hayland)	0.15

Table 4-11. Annual Estimated Total Soil Loss in Subwatershed 060101050702.

4.2.C. 060101050703 (French Broad River).

4.2.C.i. General Description.

Figure 4-17. Location of Subwatershed 060101050703. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

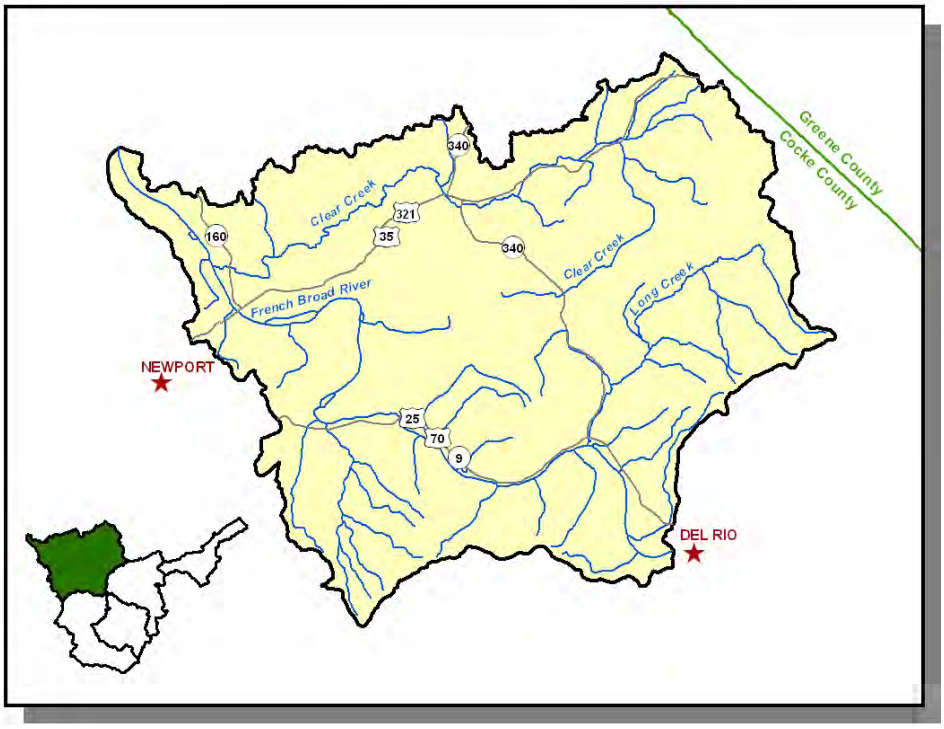


Figure 4-18. Locational Details of Subwatershed 060101050703.

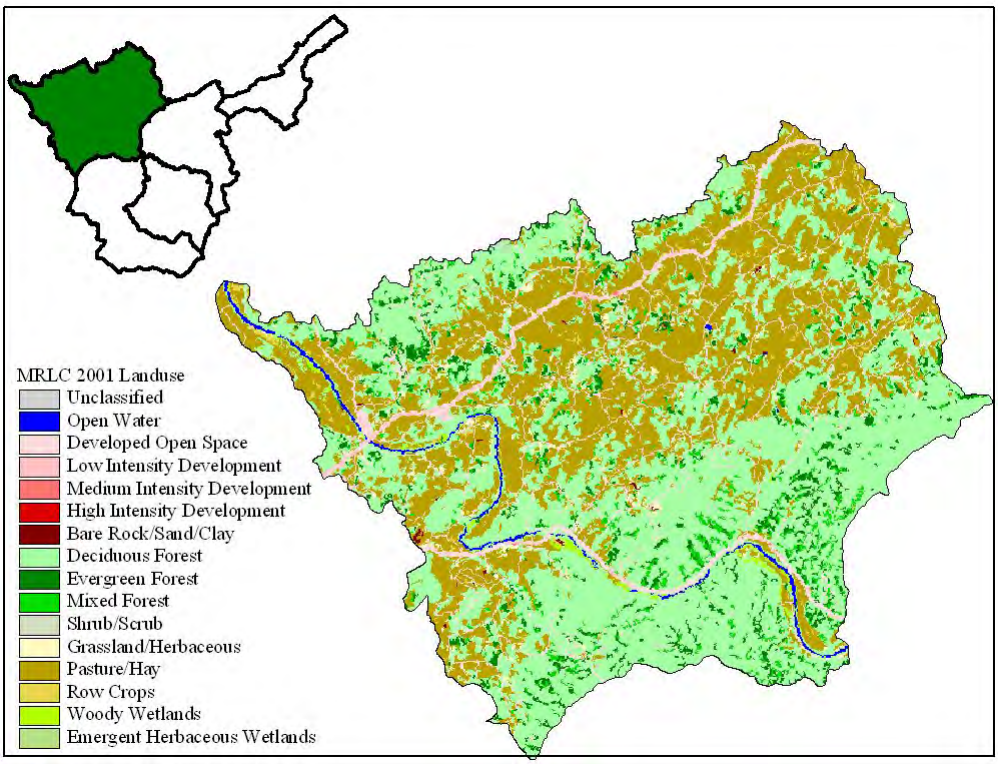


Figure 4-19. Illustration of Land Use Distribution in Subwatershed 060101050703.

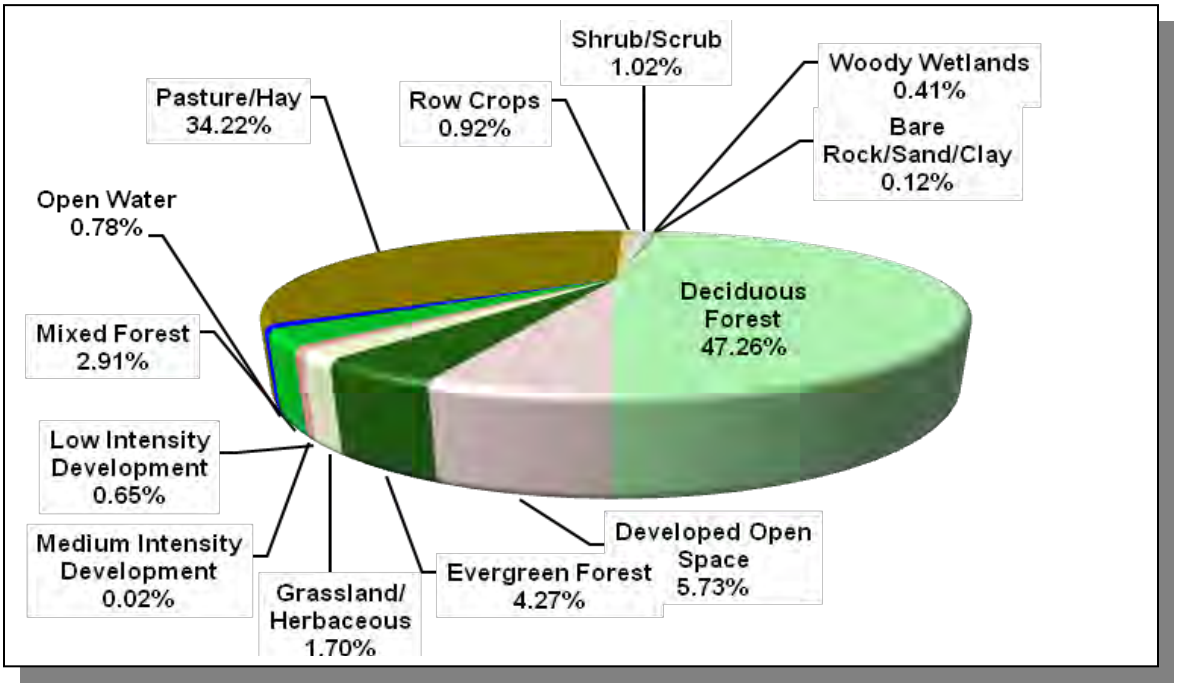


Figure 4-20. Land Use Distribution in Subwatershed 060101050703. *More information is provided in Appendix IV.*

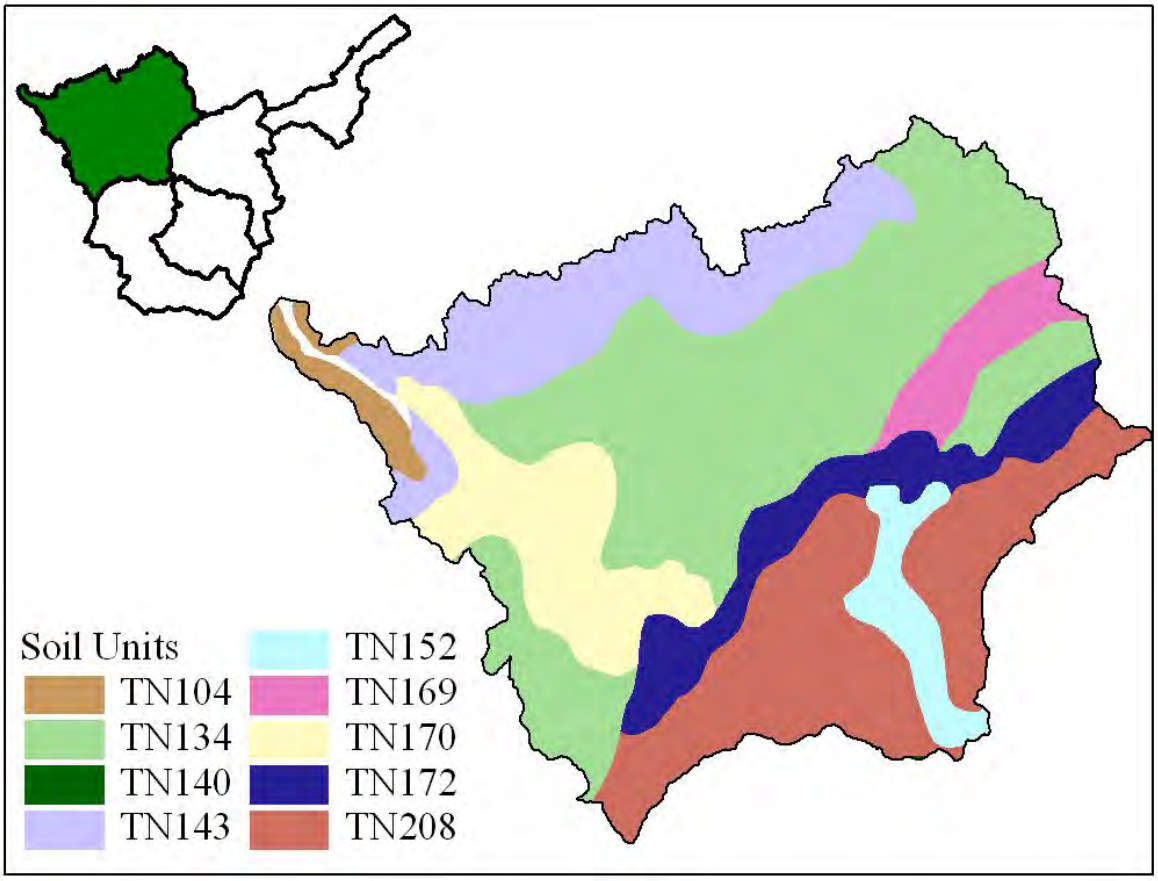


Figure 4-21. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050703.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN104	1	C	1.20	5.23	Silty Loam	0.38
TN134	0	B	1.38	5.18	Loam	0.31
TN140	0	B	3.85	4.85	Sandy Loam	0.21
TN143	0	C	1.22	6.44	Loam	0.32
TN152	0	B	2.11	5.26	Loam	0.31
TN169	0	C	3.29	4.75	Loam	0.40
TN170	0	B	1.14	4.37	Loam	0.25
TN172	0	B	3.87	5.13	Loam	0.26
TN208	0	C	4.02	4.84	Loam	0.25

Table 4-12. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050703. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	15.22	4,435	4,818	5,108	15.20

Table 4-13. Population Estimates in Subwatershed 060101050703.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Parrottsville	Cocke	117	42	4	38	0

Table 4-14. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 060101050703.

4.2.C.ii. USGS Gaging Stations and STORET Sites.

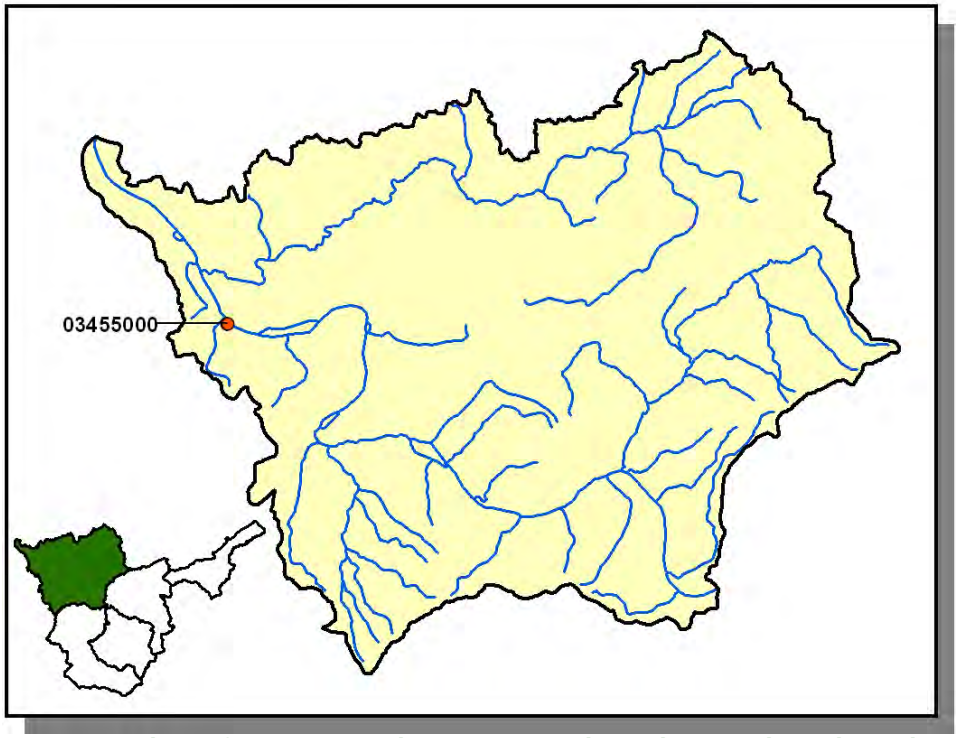


Figure 4-22. Location of USGS Continuous Record Gaging Stations in Subwatershed 060101050703. *More information is provided in Appendix IV.*

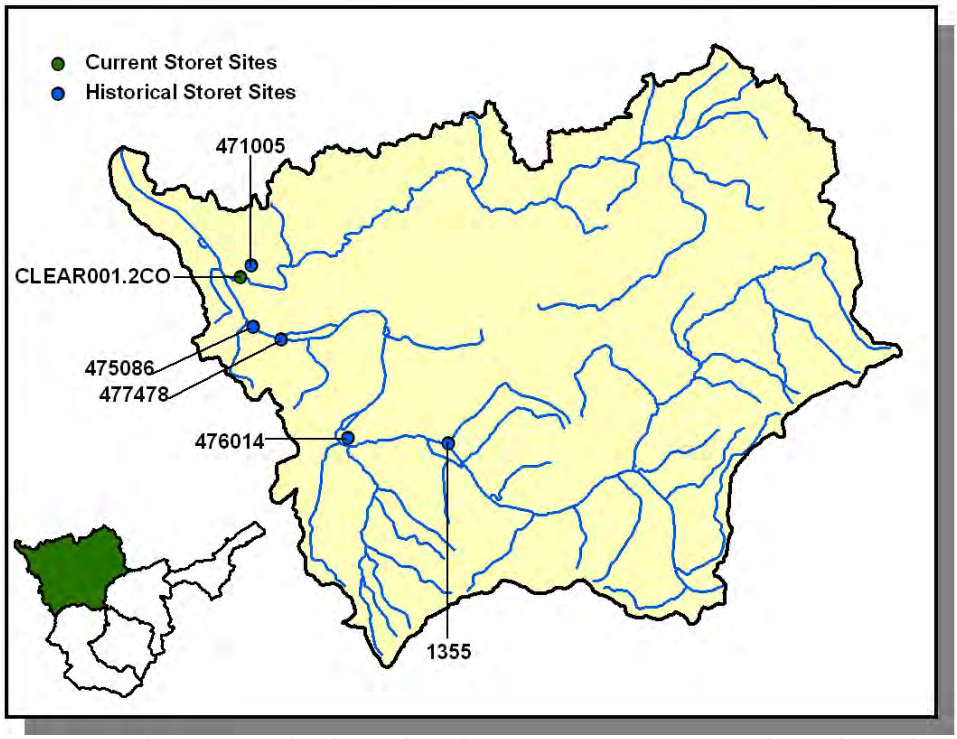


Figure 4-23. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101050703. *More information, including site names and locations, is provided in Appendix IV.*

4.2.C.iii. Permitted Activities.

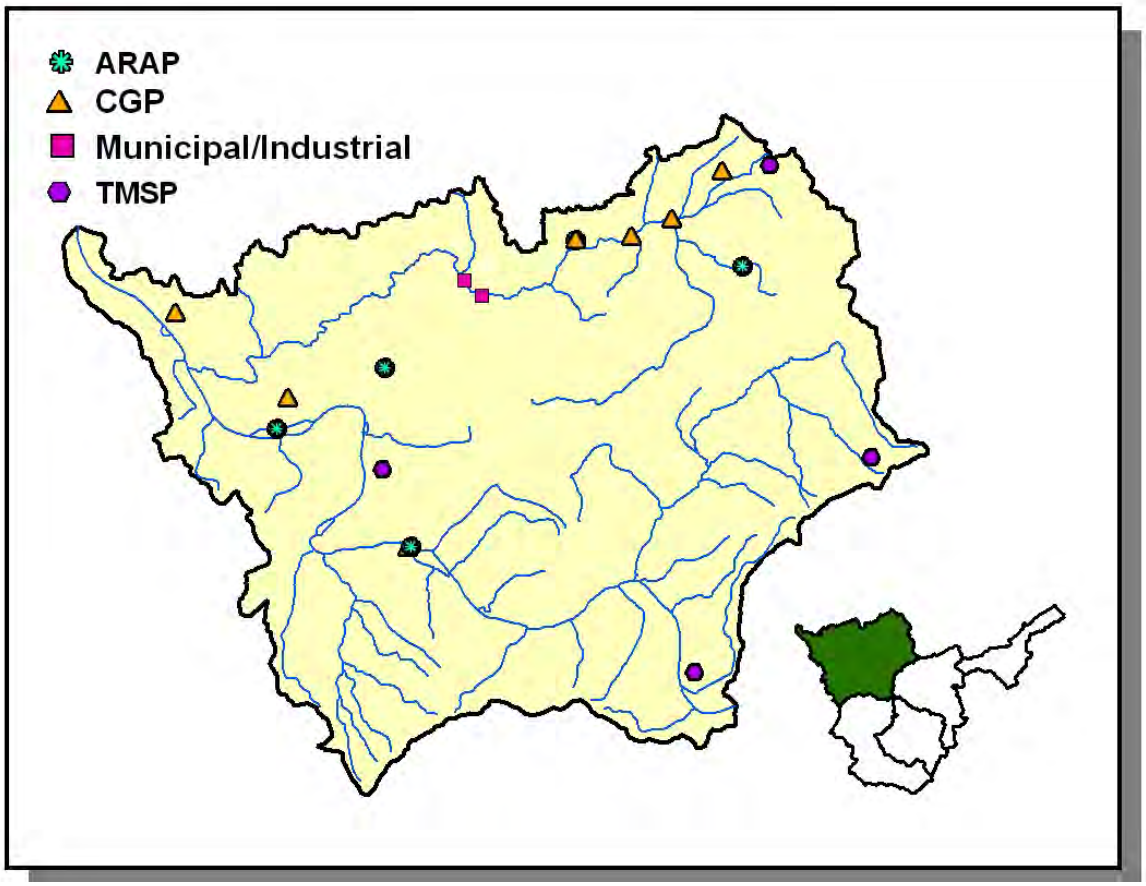


Figure 4-24. Location of Permits Issued in Subwatershed 060101050703. *More information, including the names of Facilities, is provided in Appendix IV.*

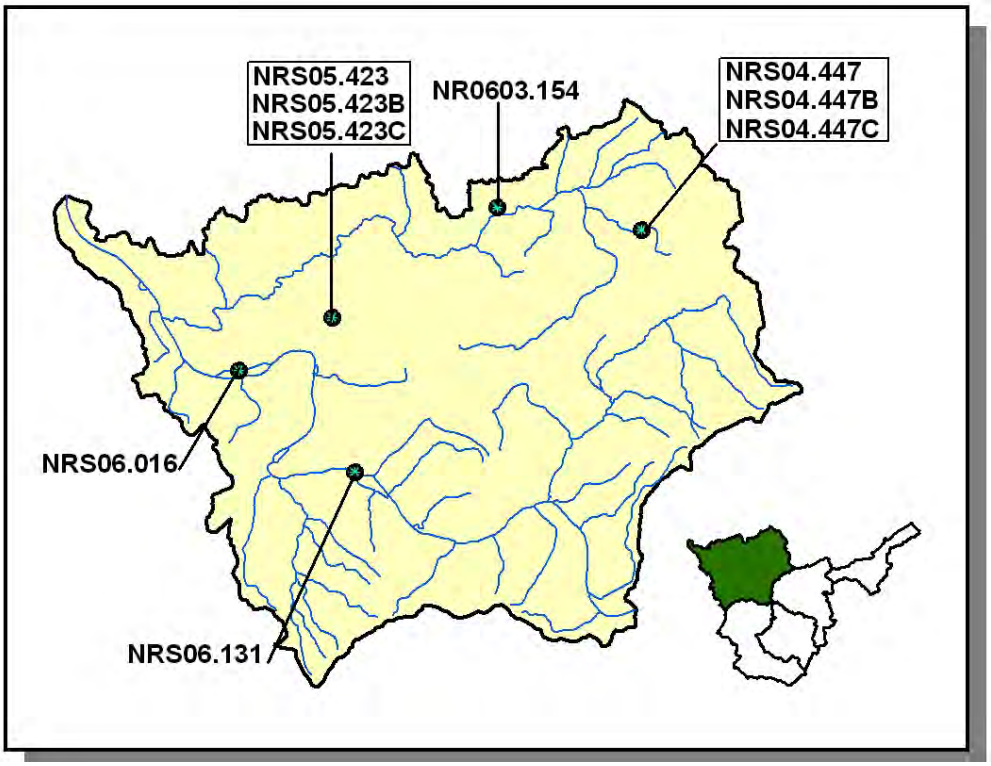


Figure 4-25. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101050703. *More information is provided in Appendix IV.*

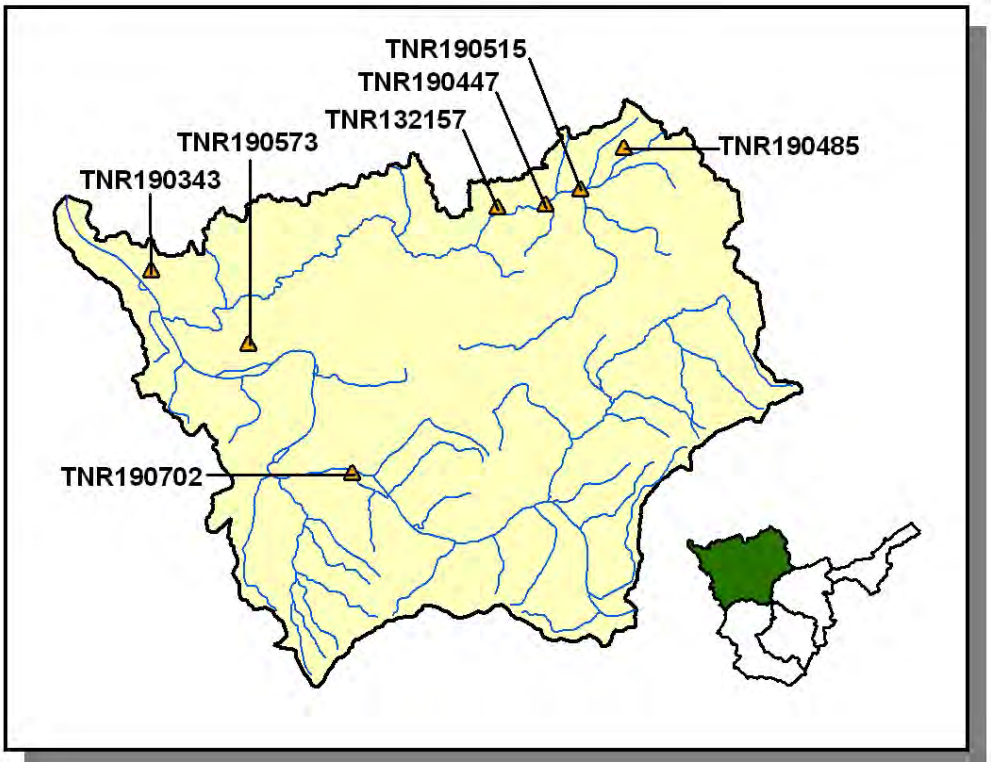


Figure 4-26. Location of CGP (Construction General Permit) Sites in Subwatershed 060101050703. *More information is provided in Appendix IV.*

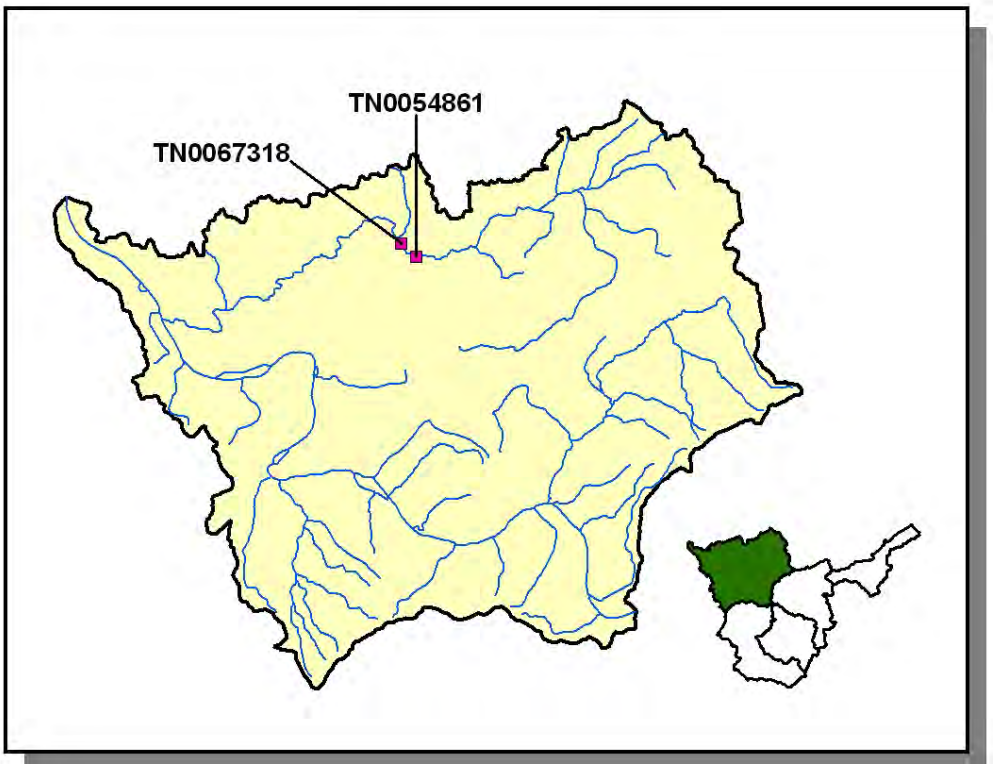


Figure 4-27. Location of Permitted Municipal and Industrial Facilities in Subwatershed 060101050703. *More information, including the name of the facility is provided in Appendix IV.*

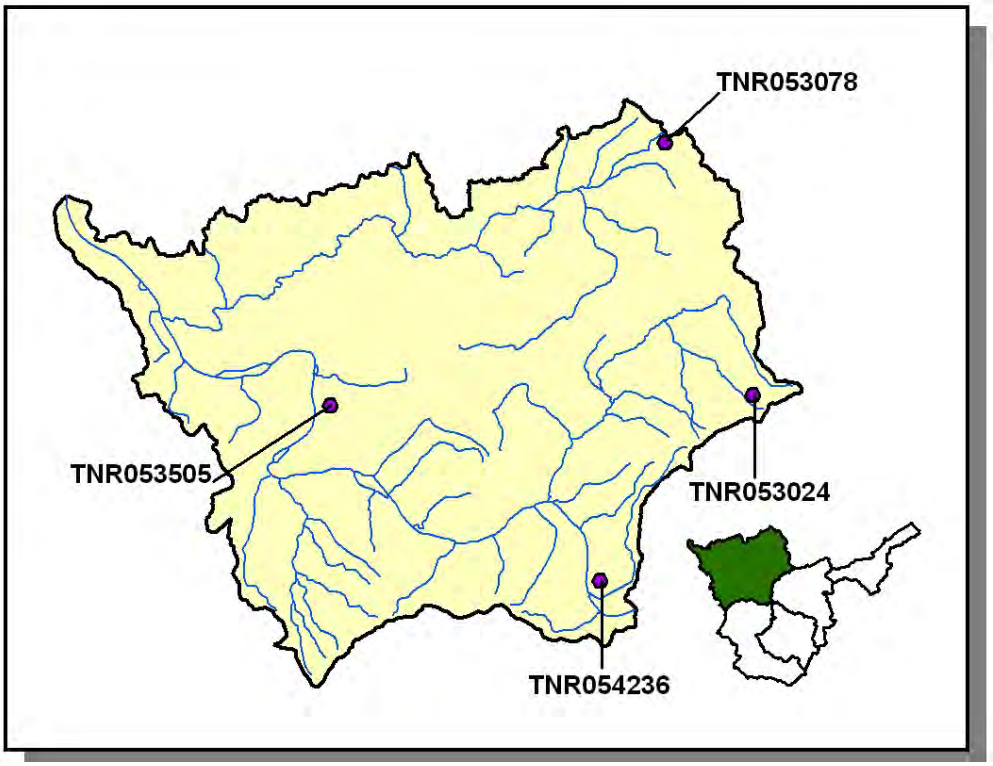


Figure 4-28. Location of Active TMSP (Tennessee Multi Sector Permit) Sites in Subwatershed 060101050703. *More information is provided in Appendix IV.*

4.2.C.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90

Table 4-15. Summary of Livestock Count Estimates by 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)
Cocke	182.0	163.4	3.7	17.4

Table 4-16. Forest Acreage and Annual Removal Rates (1987-1994) by County.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.78
Corn (Row Crops)	6.60
Wheat (Close Grown Cropland)	5.30
Grass Forbs Legumes Mixed (Pastureland)	0.85
Farmsteads and Ranch Headquarters	0.51
Grass (Hayland)	0.48
Grass (Pastureland)	0.35
Legume Grass (Hayland)	0.08

Table 4-17. Annual Estimated Total Soil Loss in Subwatershed 060101050703.

4.2.D. 060101050801 (Trail Fork of Big Creek).

4.2.D.i. General Description.

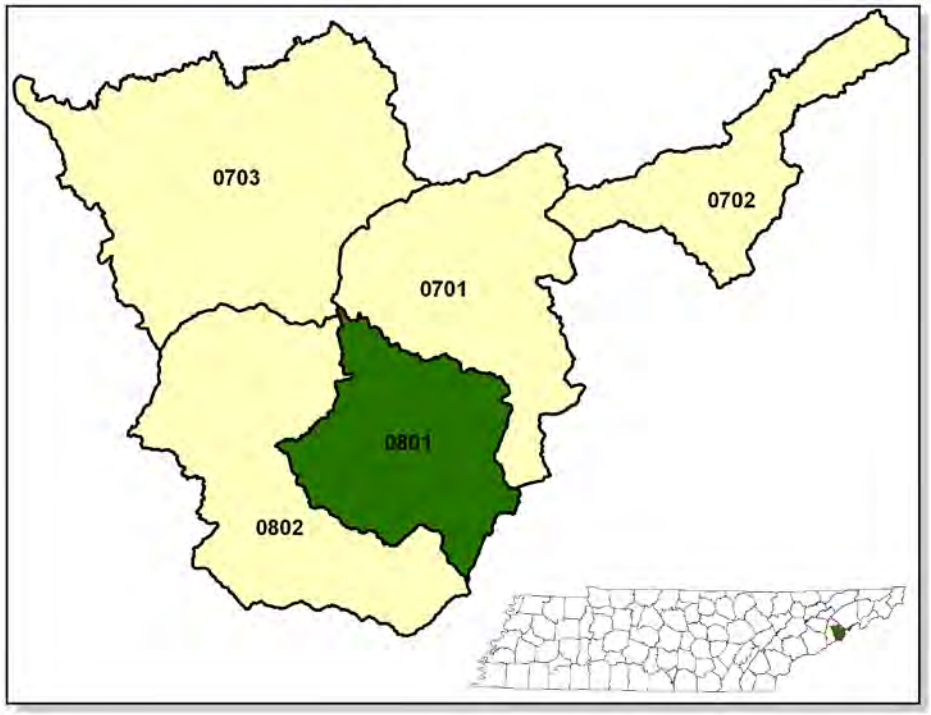


Figure 4-29. Location of Subwatershed 060101050801. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

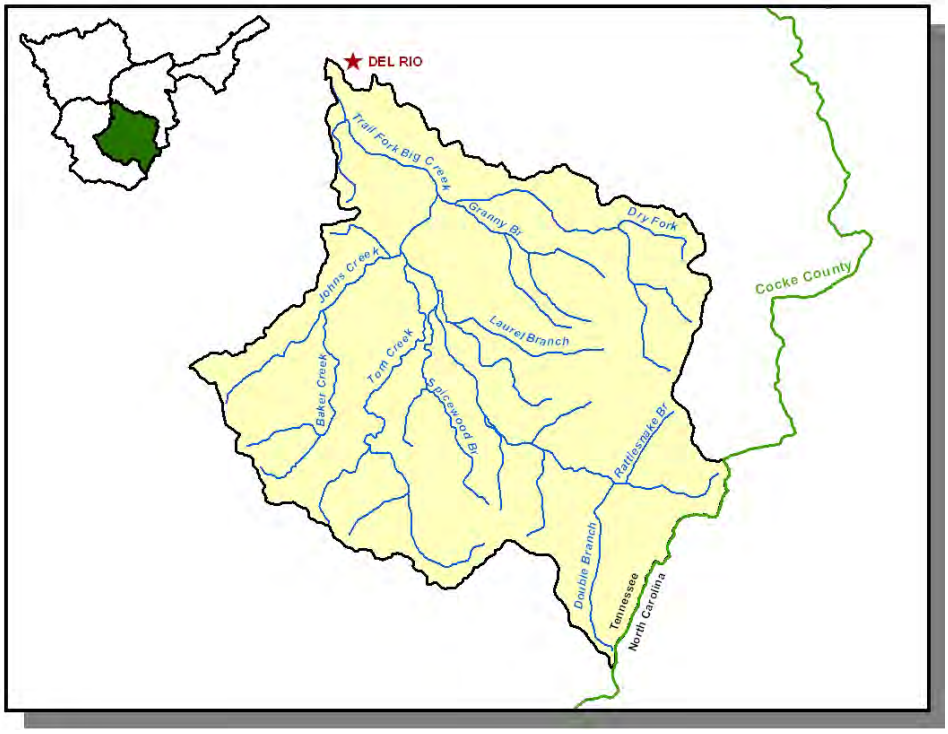


Figure 4-30. Locational Details of Subwatershed 060101050801.

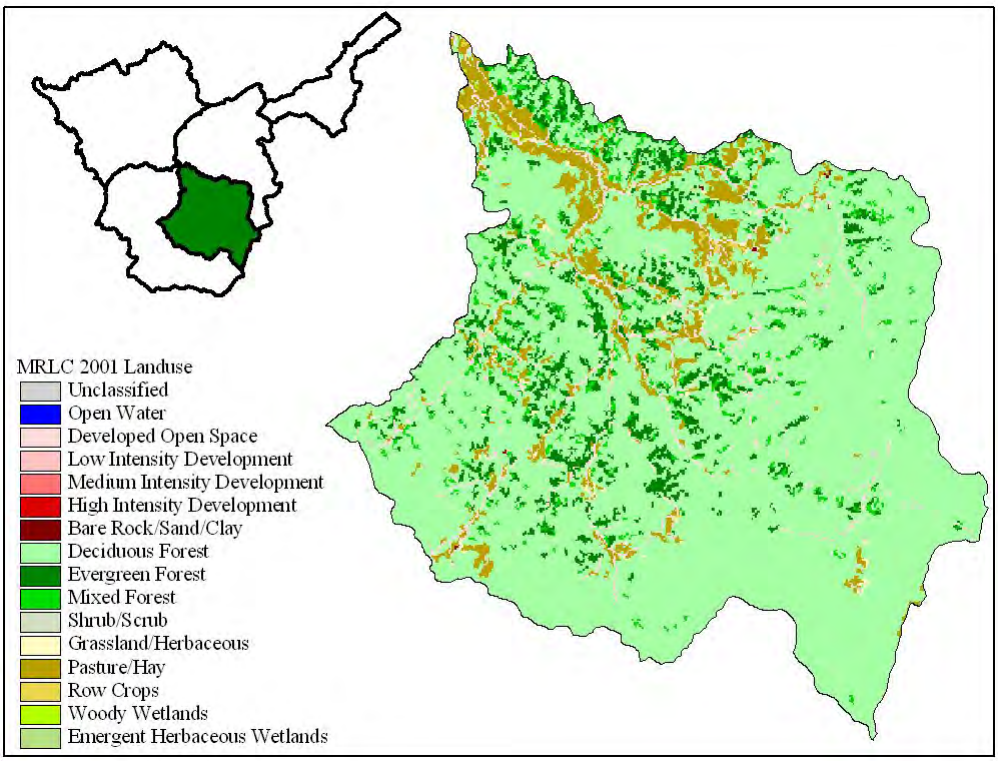


Figure 4-31. Illustration of Land Use Distribution in Subwatershed 060101050801.

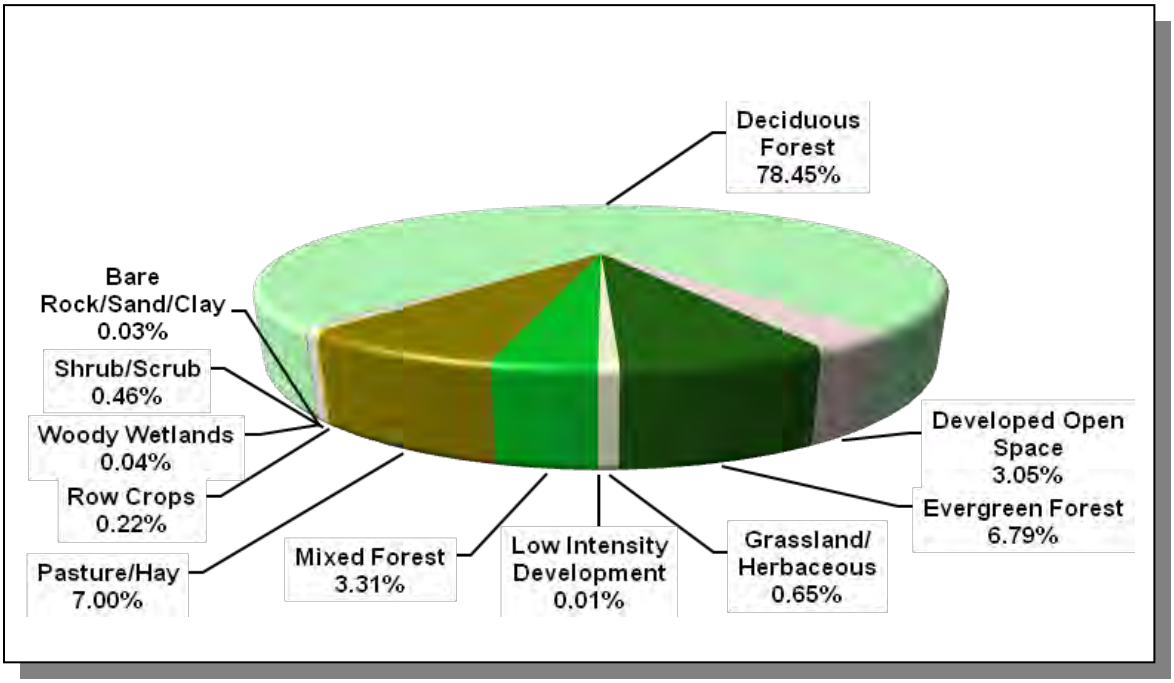


Figure 4-32. Land Use Distribution in Subwatershed 060101050801. *More information is provided in Appendix IV.*

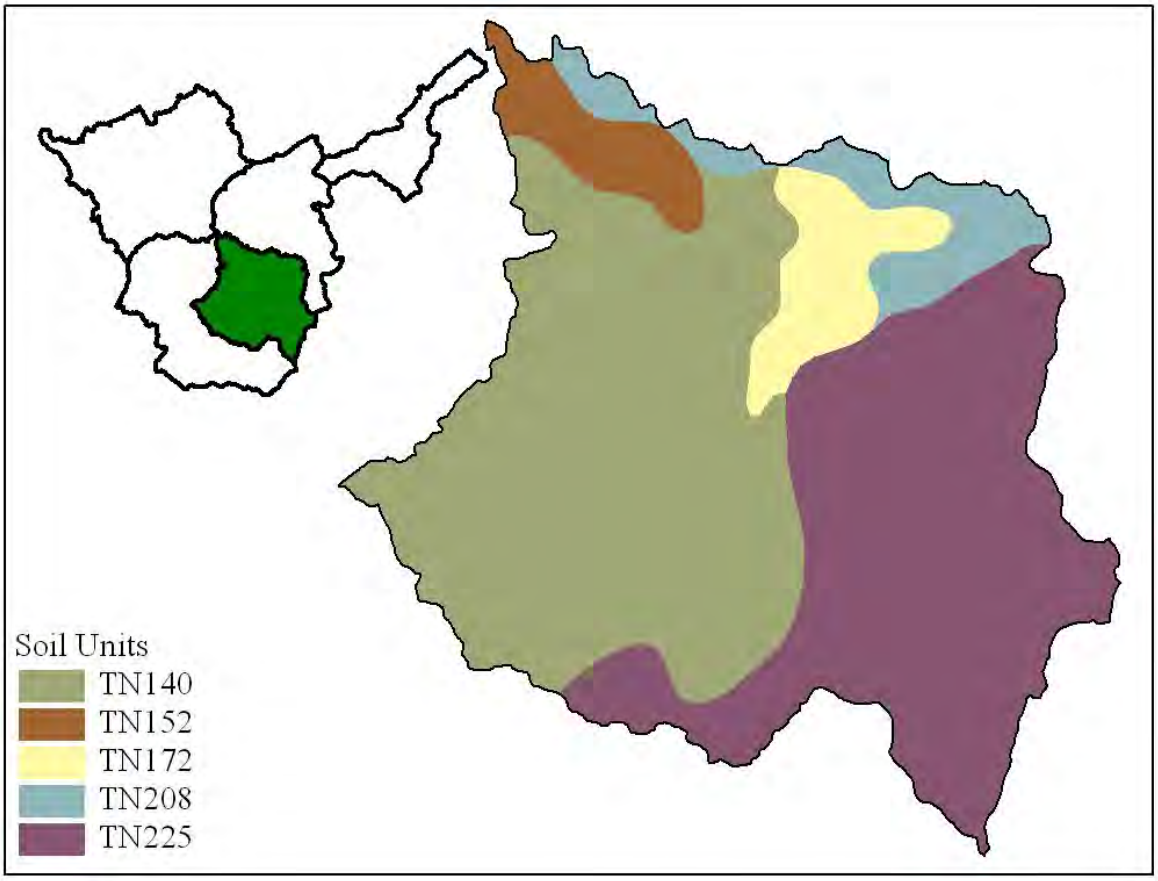


Figure 4-33. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050801.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN140	0	B	3.85	4.85	Sandy Loam	0.21
TN152	0	B	2.11	5.26	Loam	0.31
TN172	0	B	3.87	5.13	Loam	0.26
TN208	0	C	4.02	4.84	Loam	0.25
TN225	0	B	3.90	5.03	Sandy Loam	0.22

Table 4-18. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050801. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	7.15	2,085	2,265	2,401	15.20

Table 4-19. Population Estimates in Subwatershed 060101050801.

4.2.D.ii. USGS Gaging Stations and STORET Sites.

There are no USGS continuous record gaging stations located in subwatershed 060101050801.

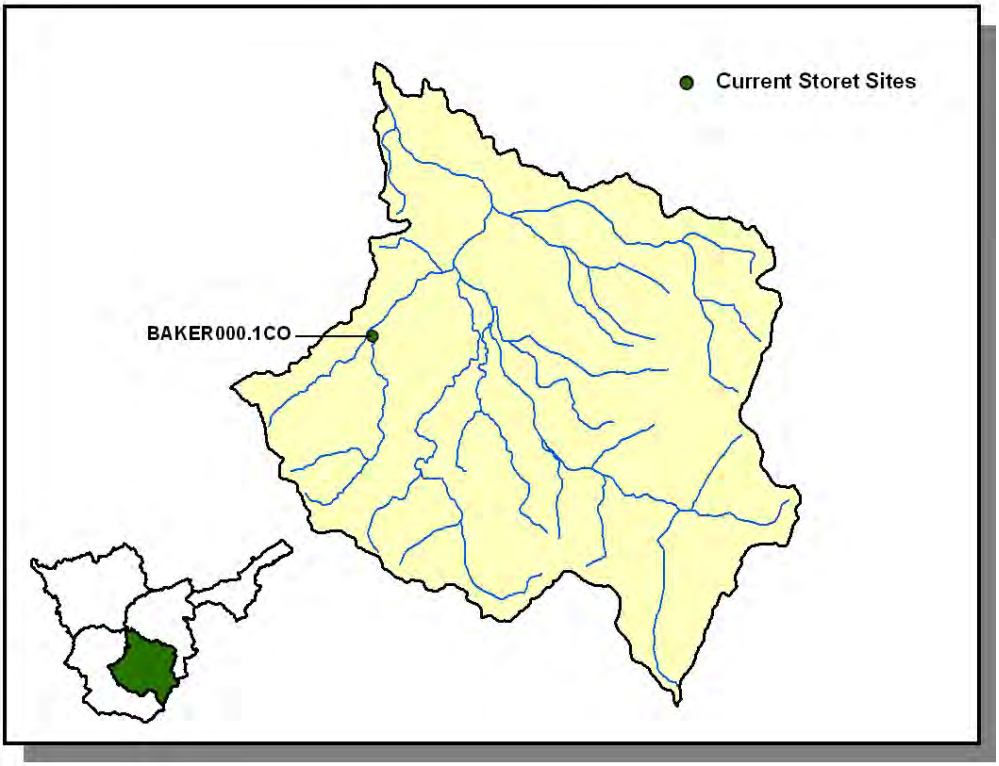


Figure 4-34. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101050801. *More information, including site names and locations, is provided in Appendix IV.*

4.2.D.iii. Permitted Activities.

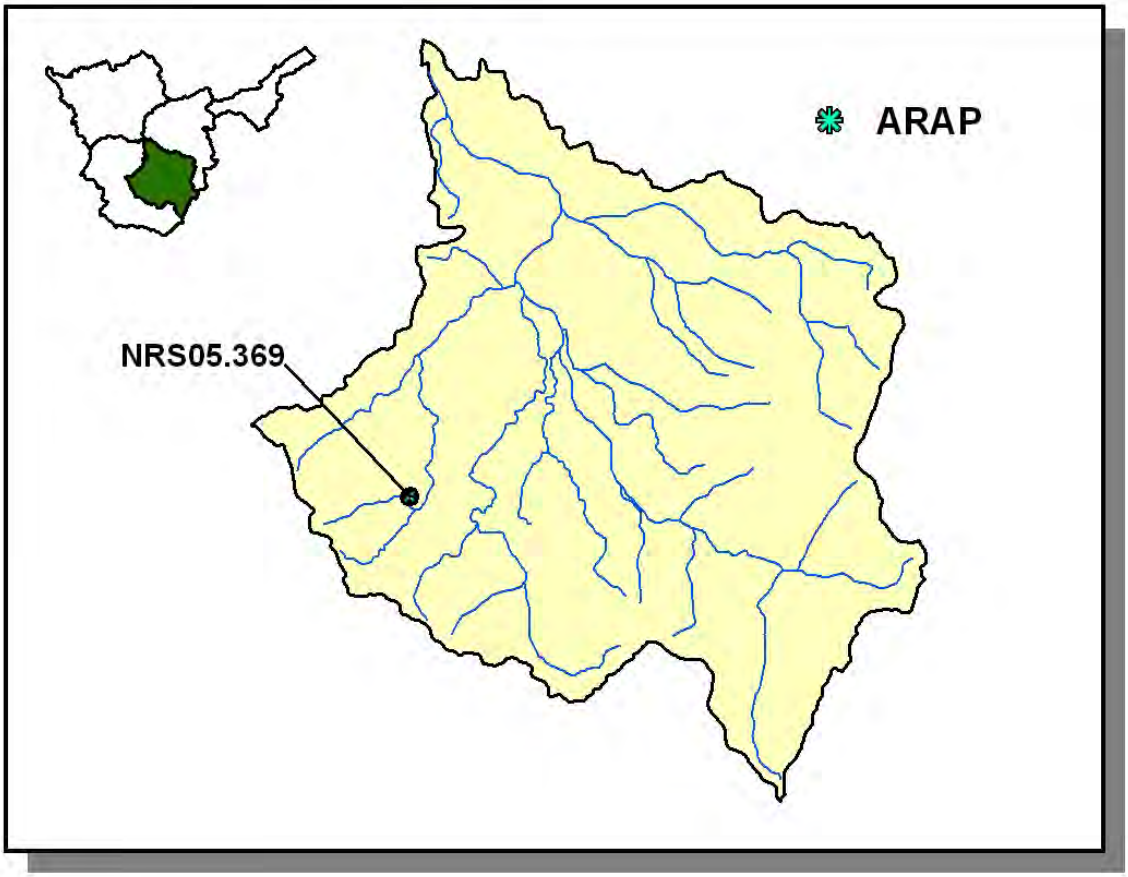


Figure 4-35. Location of Permits Issued in Subwatershed 060101050801. *More information, including the names of Facilities, is provided in Appendix IV.*

4.2.D.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90

Table 4-20. Summary of Livestock Count Estimates by 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)
Cocke	182.0	163.4	3.7	17.4

Table 4-21. Forest Acreage and Annual Removal Rates (1987-1994) in Smith County.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.77
Corn (Row Crops)	6.60
Wheat (Close Grown Cropland)	5.30
Grass Forbs Legumes Mixed (Pastureland)	0.85
Farmsteads and Ranch Headquarters	0.51
Grass (Hayland)	0.48
Grass (Pastureland)	0.36
Legume Grass (Hayland)	0.08

Table 4-22. Annual Estimated Total Soil Loss in Subwatershed 060101050801.

4.2.E. 060101050802 (Gulf Fork of Big Creek).

4.2.E.i. General Description.

Figure 4-36. Location of Subwatershed 060101050802. *All Upper French Broad River HUC-12 subwatershed boundaries in Tennessee are shown for reference.*

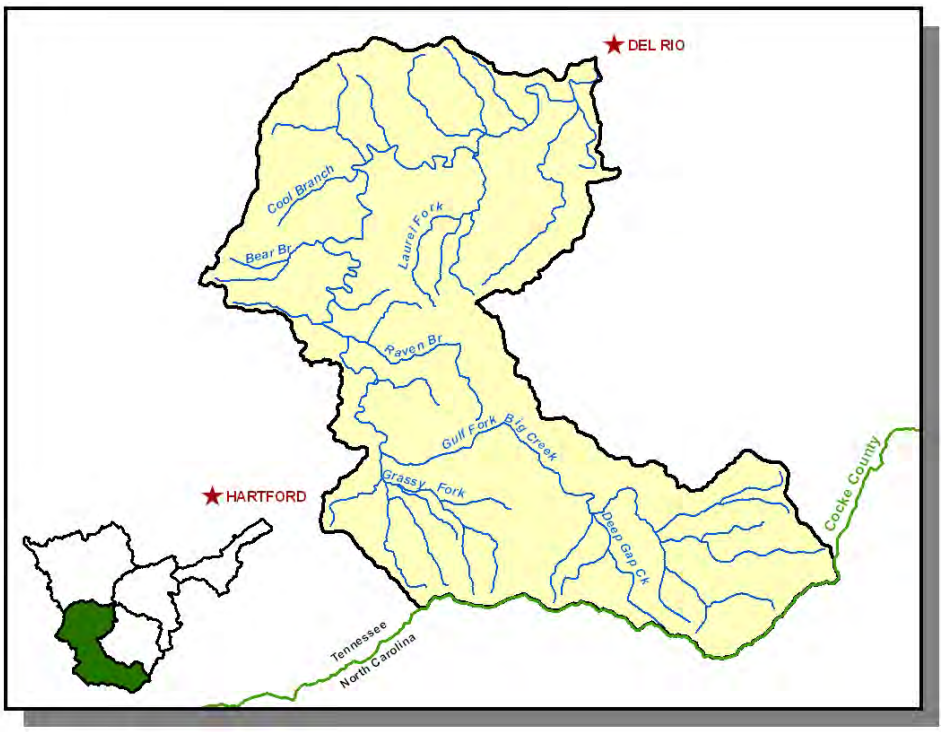


Figure 4-37. Locational Details of Subwatershed 060101050802.

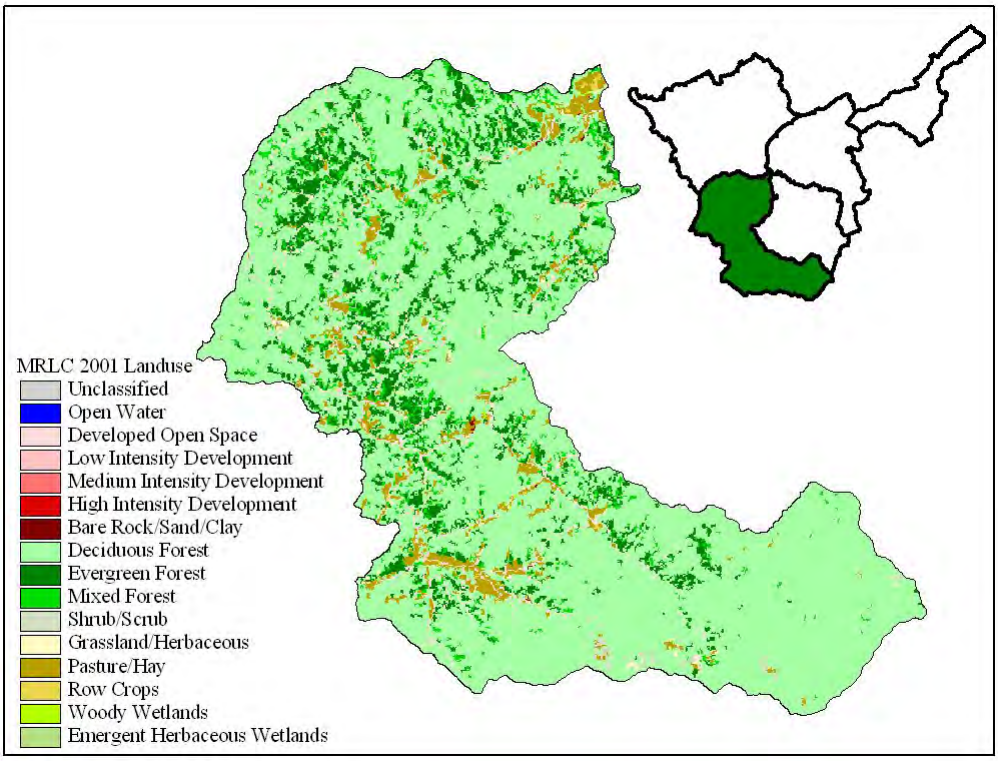


Figure 4-38. Illustration of Land Use Distribution in Subwatershed 060101050802.

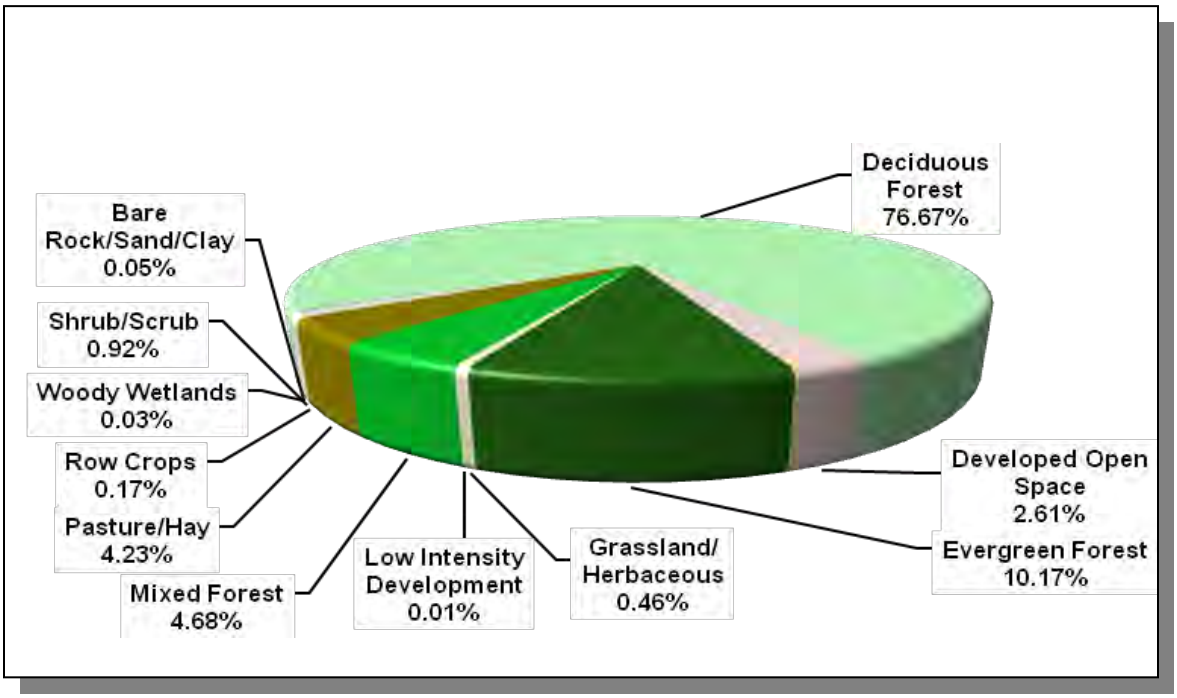


Figure 4-39. Land Use Distribution in Subwatershed 060101050802. *More information is provided in Appendix IV.*

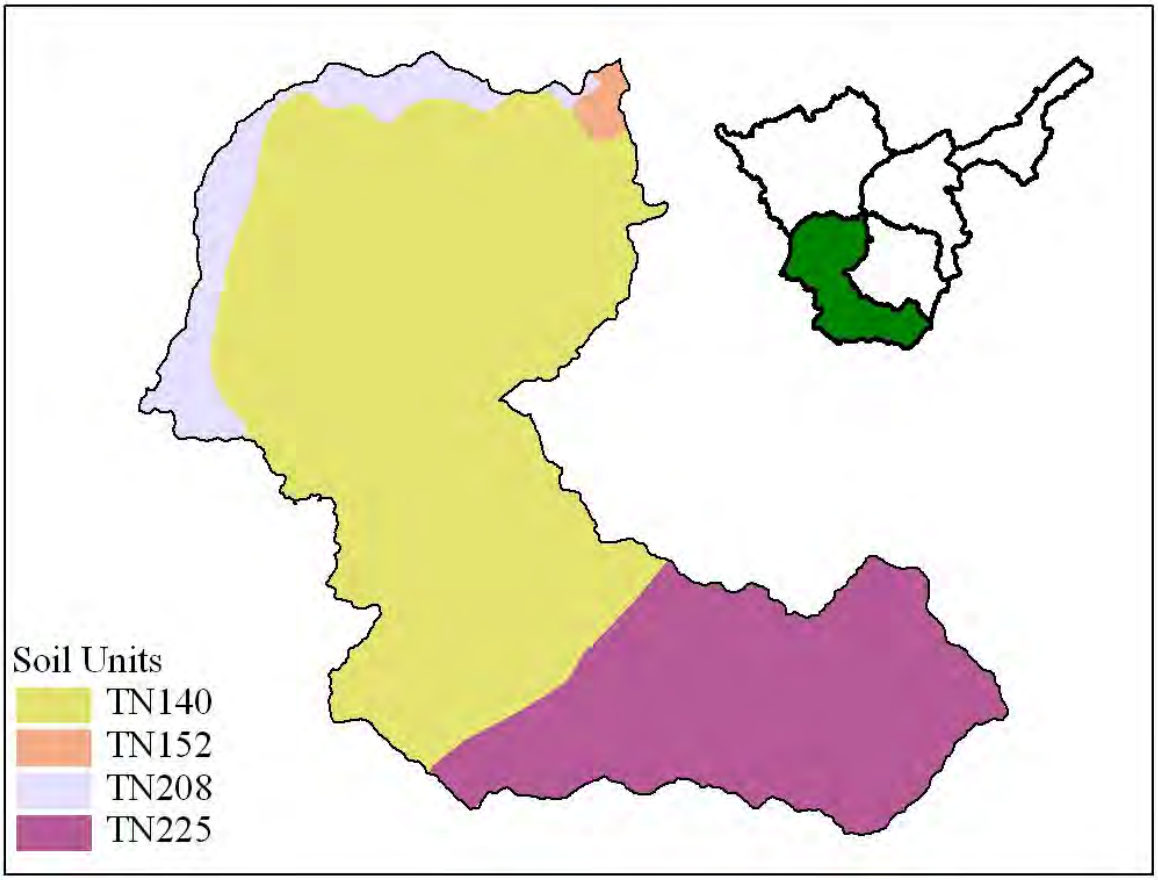


Figure 4-40. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050802.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN140	0	B	3.85	4.85	Sandy Loam	0.21
TN152	0	B	2.11	5.26	Loam	0.31
TN172	0	B	3.87	5.13	Loam	0.26
TN208	0	C	4.02	4.84	Loam	0.25
TN225	0	B	3.90	5.03	Sandy Loam	0.22

Table 4-23. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 060101050802. *The definition of "Hydrologic Group" is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	% of County in Watershed	1990	1997	2000	% Change (1990-2000)
Cocke	29,141	31,657	33,565	10.6	3,088	3,355	3,557	15.2

Table 4-24. Population Estimates in Subwatershed 060101050802.

4.2.E.ii. USGS Gaging Stations and STORET Sites.

There are no USGS continuous record gaging stations in subwatershed 060101050802.

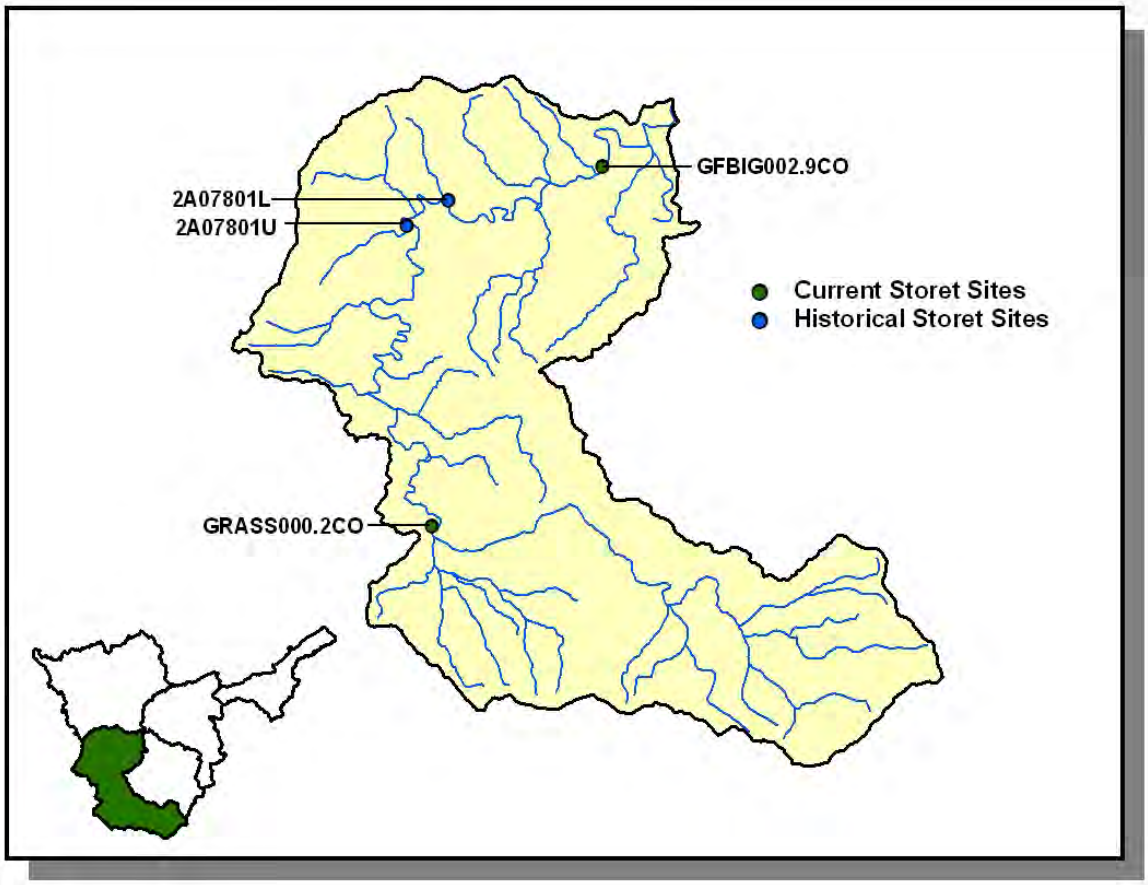


Figure 4-41. Location of Monitoring Sites in EPA's STORET Database in Subwatershed 060101050802. *More information, including site names and locations, is provided in Appendix IV.*

4.2.E.iii. Permitted Activities.

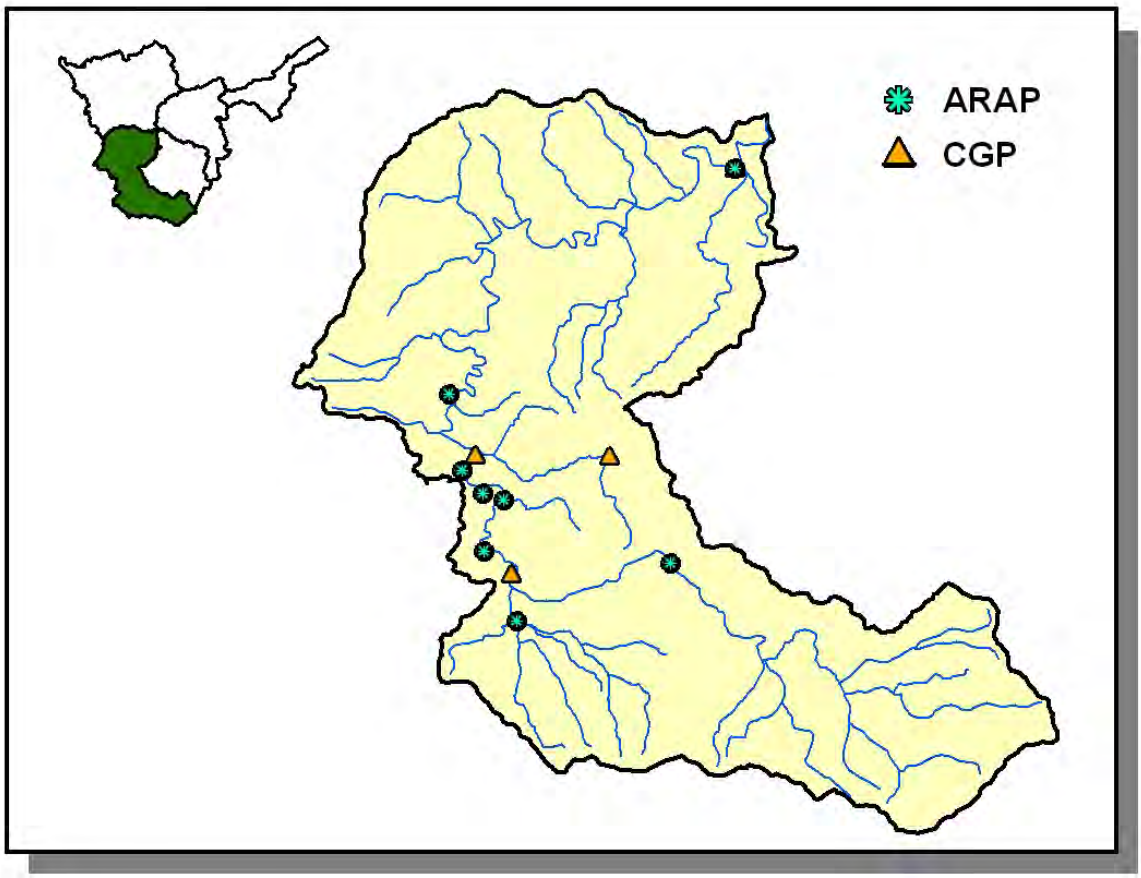


Figure 4-42. Location of Permits Issued in Subwatershed 060101050802. *Information, including the names of Facilities, is provided in Appendix IV.*

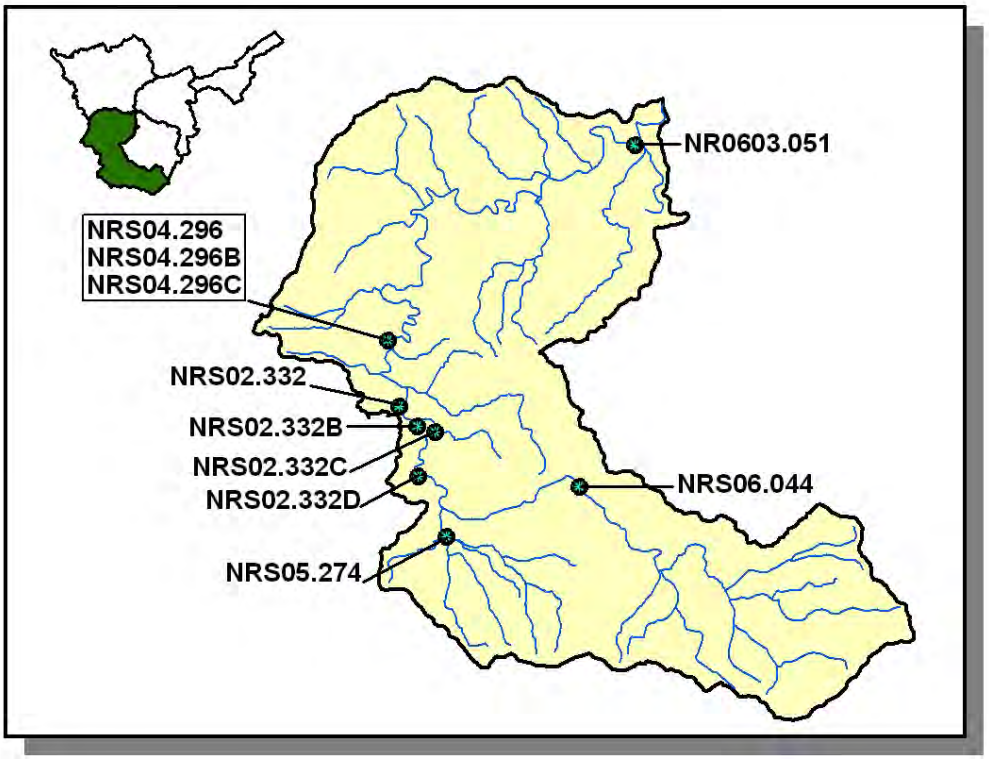


Figure 4-43. Location of ARAP (Aquatic Resource Alteration Permit) Sites in Subwatershed 060101050802. *More information is provided in Appendix IV.*

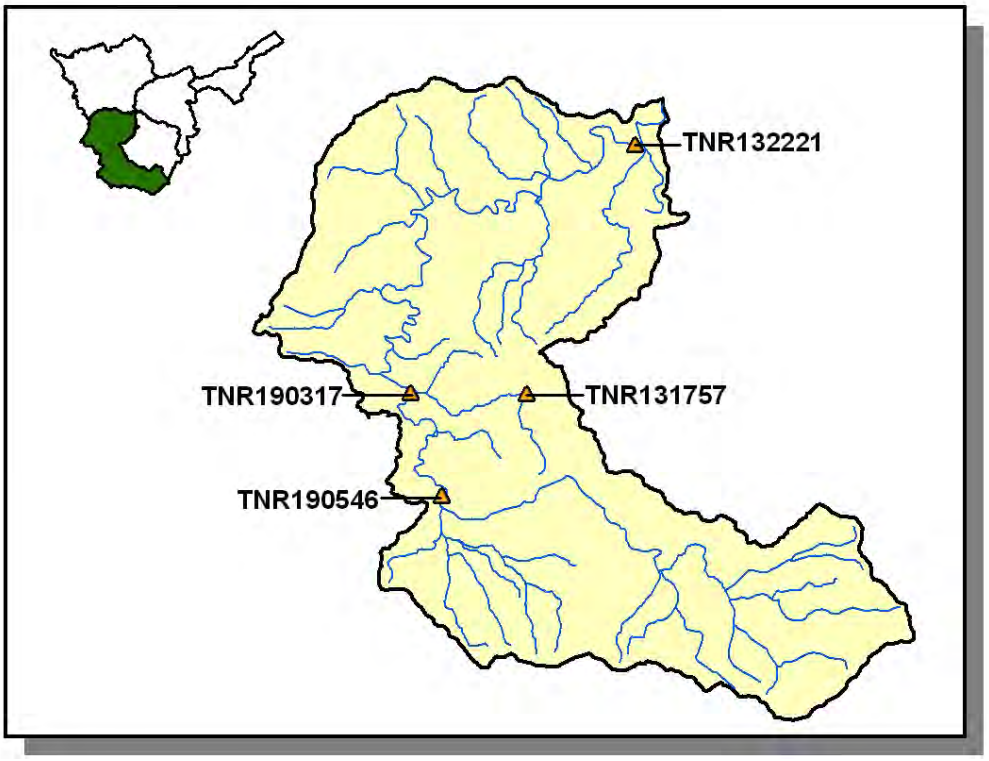


Figure 4-44. Location of CGP (Construction General Permit) Sites in Subwatershed 060101050802. *More information is provided in Appendix IV.*

4.2.E.iv. Nonpoint Source Contributions.

LIVESTOCK COUNTS						
County	Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Hogs	Sheep
Cocke	8,169	16,971	1,224	361	269	90

Table 4-25. Summary of Livestock Count Estimates by 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)
Cocke	182.0	163.4	3.7	17.4

Table 4-26. Forest Acreage and Annual Removal Rates (1987-1994) by County.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	15.78
Corn (Row Crops)	6.60
Wheat (Close Grown Cropland)	5.30
Grass Forbs Legumes Mixed (Pastureland)	0.85
Farmsteads and Ranch Headquarters	0.51
Grass (Hayland)	0.48
Grass (Pastureland)	0.36
Legume Grass (Hayland)	0.08

Table 4-27. Annual Estimated Total Soil Loss in Subwatershed 060101050802.

APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-12 SUBWATERSHEDS (ACRES)				
	0701	0702	0703	0801	0802
Bare Rock/Sand/Clay	4	4	52	7	15
Deciduous Forest	19,656	13,098	20,936	16,349	23,667
Developed Open Space	758	316	2,539	635	806
Emergent Herbaceous Wetlands					
Evergreen Forest	1,852	1,192	1,892	1,414	3,138
Grassland/Herbaceous	103	96	751	135	141
High Intensity Development					
Low Intensity Development	38	1	286	2	4
Medium Intensity Development			9		
Mixed Forest	1,501	964	1,290	689	1,445
Open Water	312		344	0	
Pasture/Hay	1,102	214	15,158	1,459	1,306
Row Crops	67	4	408	46	53
Shrub/Scrub	298	136	453	95	285
Woody Wetlands	131		180	8	10
Total	25,822	16,025	44,298	20,839	30,870

Table A4-1. Land Use Distribution in the Upper French Broad River Watershed by HUC-12. *Data are from 2001 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	LOCATION	HUC 12	Area	1Q10	7Q10	3Q20
03455000	French Broad River	060101050703	1,858.00	476.3140	532.7300	427.5850

Table A4-3. United States Geological Survey Continuous Record Gaging Stations in the Upper French Broad River Watershed. *Additional information may be found at:* http://water.usgs.gov/osw/streamstats/

AGENCY	STATION	LOCATION	HUC 12
TDEC	1340	French Broad River	060101050701
TDEC	1350	French Broad River	060101050701
USFS	40201	Brushy Creek	060101050701
USFS	40202	Brushy Creek	060101050701
USFS	40203	Brushy Creek	060101050701
USFS	40204	Brushy Creek	060101050701
USFS	40205	Moneyham Creek	060101050701
USFS	40206	Moneyham Creek	060101050701
USFS	40207	Moneyham Creek	060101050701
USFS	40208	Moneyham Creek	060101050701
USFS	40209	Moneyham Creek	060101050701
USFS	40210	Moneyham Creek	060101050701
USFS	40211	Moneyham Creek	060101050701
USFS	40212	Brushy Creek	060101050701
USFS	40213	Brushy Creek	060101050701
USFS	40214	Brushy Creek	060101050701
TVA	475975	French Broad River	060101050701
TDEC	1355	French Broad River @ RM 84.0	060101050703
USEPA	471005	French Broad River	060101050703
TVA	475086	French Broad River @ RM 77.5	060101050703
TVA	476014	French Broad River @ RM 82.1	060101050703
TVA	477478	French Broad River @ RM 78.0	060101050703
TDEC	CLEAR001.2CO	Clear Creek	060101050703
TDEC	BAKER000.1CO	Baker Branch @ RM 0.1	060101050801
EPA Environmental Resource Lab	2A07801L	Gulf Fork Big Creek	060101050802
EPA Environmental Resource Lab	2A07801U	Gulf Fork Big Creek	060101050802
TDEC	GFBIG002.9CO	Gulf Fork of Big Creek @ RM .02	060101050802
TDEC	GRASS000.2CO	Grassy Fork @ RM 0.2	060101050802

Table A4-4. STORET Water Quality Monitoring Stations in the Upper French Broad River Watershed*. EPA, Environmental Protection Angency; TDEC, Tennessee Department of Environment and Conservation; TVA, Tennessee Valley Authority; USFS, United States Forest Service.*

PERMIT NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-12
NR0603.012	Cocke	Utility Line Crossings	Long Creek and UT to French Broad River	060101050701
NRS05.324	Cocke	Surveying and Geotechnical Exploration	French Broad River	060101050701
NRS02.445	Greene	Road Repair	Paint Creek	060101050702
NR0603.154	Cocke	Construction and Removal of Minor Road Crossings	Not Identified	060101050703
NRS04.447	Cocke	Small Structure Replacement	Clear Creek South Fork	060101050703
NRS04.447B	Cocke	Small Structure Replacement	Clear Creek North Fork	060101050703
NRS04.447C	Cocke	Small Structure Replacement	Oven Creek	060101050703
NRS05.423	Cocke	Minor Alterations to Wetlands	French Broad River, Clear Creek, and Ground Water	060101050703
NRS05.423B	Cocke	Construction and Removal of Minor Road Crossings	Clear Creek	060101050703
NRS05.423C	Cocke	Minor Alterations to Wetlands	Ground Water	060101050703
NRS06.016	Cocke	Construction of Outfall Structures	French Broad River	060101050703
NRS06.131	Cocke	Construction and Removal of Minor Road Crossings	French Broad River	060101050703
NRS05.369	Cocke	Bank Stabilization	Not Identified	060101060801
NR0603.051	Cocke	Construction and Removal of Minor Road Crossings	Gulf Fork Big Creek	060101060802
NRS02.332	Cocke	Bridges and Approaches	Gulf Fork Big Creek	060101060802
NRS02.332B	Cocke	Bridges and Approaches	Gulf Fork Big Creek	060101060802
NRS02.332C	Cocke	Bridges and Approaches	Gulf Fork Big Creek	060101060802
NRS02.332D	Cocke	Bridges and Approaches	Gulf Fork Big Creek	060101060802
NRS04.296	Cocke	Construction and Removal of Minor Road Crossings	Gulf Fork Creek	060101060802
NRS04.296B	Cocke	Construction and Removal of Minor Road Crossings	Gulf Fork Creek	060101060802
NRS04.296C	Cocke	Construction and Removal of Minor Road Crossings	Gulf Fork Creek	060101060802
NRS05.274	Cocke	Construction and Removal of Minor Road Crossings	Gulf Fork Big Creek	060101060802
NRS06.044	Cocke	Construction and Removal of Minor Road Crossings	Gulf Fork Big Creek	060101060802

Table 4-5. ARAPs (Aquatic Resource Alteration Permit) issued June 2002 through June 2007 in the Tennessee Portion of the Upper French Broad River Watershed.
UT, Unnamed Tributaries.

PERMIT NUMBER	COUNTY	PERMITEE: DISCRIPTION	AREA	WATERDODY	HUC-12
TNR132157	Cocke	Cooke County Hwy Dept: Widening of County Road	0.40	Clear Creek & Oven Creek	060101050703
TNR190343	Cocke	TDOT: SR 160 Road Maintenance and Replace Small Structures	1.44	UT to French Broad River @ RM 76	060101050703
TNR190447	Cocke	TDOT: Trenton Hollow Road	2.00	Clear Creek	060101050703
TNR190485	Cocke	TDOT: Hwy 35	155.70	Clear Creek	060101050703
TNR190515	Cocke	TDOT: SR-35/SR-340, Replace Drainage Structures	4.91	North Fork of Clear Creek & South Fork of Clear Creek	060101050703
TNR190573	Cocke	TDOT: SR-35 New Alignment	262.00	Clear Creek & French Broad River	060101050703
TNR190702	Cocke	TDOT: Replace Bridge	15.00	French Broad River	060101050703
TNR131757	Cocke	Landstar Development, LLC: Cherokee Falls	181.00	Raven's Branch and UT to Raven's Branch	060101050802
TNR132221	Cocke	John B. Holloway & Don Norwood: Big Creek Bend	5.00	Gulf Fork Big Creek	060101050802
TNR190317	Cocke	TDOT: Bridge and Approaches over Gulf Fork Big Creek	5.86	Gulf Fork Big Creek, Trail Branch Big Creek, French Broad River	060101050802
TNR190546	Cocke	TDOT: Replace Bridge over Gulf Fork Big Creek	1.20	Gulf Fork Big Creek	060101050802

Table4-6. CGPs (Construction General Permit) issued May 2002 through June 2007 in the Tennessee Portion of the Upper French Broad River Watershed. Area, acres of property associated with construction activity; UT, Unnamed Tributaries.

PERMIT NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	HUC-12
TN0054861	Parrottsville Elementary School	4952	Sewerage Systems	Minor	Clear Creek @ RM 6.4	060101050703
TN0067318	Parrottsville STP	4952	Sewerage Systems	Minor	Clear Creek @ RM 6.0	060101050703

Table 4-7. Municipal and Industrial Permittees in the Tennessee Portion of the Upper French Broad River Watershed. SIC, Standard Industrial Classification; MADI, Major Discharge Indicator.

PERMIT NUMBER	FACILITY NAME	SECTOR	AREA	WATERBODY	HUC-12
TNR053442	TRANSFLO Terminal Services, Inc. (Knoxville)	P	3.00	Tennessee River	060101050701
TNR054013	Del Rio Wood Yard	A	1.00	French Broad River	060101050701
TNR054476	Morris Coupling Company, Inc.	AA	21.46	French Broad River	060101050701
TNR054513	Fleming Machine & Welding, Inc	AB	1.00	Metropolitan Storm Sewer	060101050701
TNR053078	Smurfit Stone Container Enterprises	B	2.60	Unnamed Stream	060101050703
TNR053505	Flura Corporation	C,L,P,K	30.00	French Broad River	060101050703
TNR054236	Hearthstone, Inc.	A	10.00	UT to French Broad River	060101050703

Table 4-8. Permitted TMSP (Tennessee Multi-Sector Permit) facilities in the Tennessee Portion of the Upper French Broad River Watershed. Area, acres of property associated with industrial activity; UT, Unnamed Tributaries. Sector details found in Table 4-9.

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 A4-9. TMSP Sectors and Descriptions.

CHAPTER 2

DESCRIPTION OF THE UPPER FRENCH BROAD RIVER WATERSHED

2.1. BACKGROUND. The French Broad River is 210 miles long and flows north and northwest to Knoxville, where it joins with the Holston River to form the Tennessee River. The French Broad River was an important settlers' route from the southeast coastal states into Tennessee during the colonial period and was named for being one of two broad rivers in western North Carolina and Eastern Tennessee. The one which flowed into formerly French territory was named the French Broad, and the other which stayed in English territory (the American colonies) was named the English Broad, now just the Broad River. On the river is Douglas Dam, part of the Tennessee Valley Authority (TVA), forming Douglas Lake, which is used for flood control.

This Chapter describes the location and characteristics of the Tennessee Portion of the Upper French Broad River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Upper French Broad River Watershed is located in East Tennessee and includes parts of Cocke and Greene Counties.

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

COUNTY	% OF WATERSHED IN EACH COUNTY
Cocke	87.56
Greene	12.32
Unicoi	0.12

Table 2-1. The Tennessee Portion of the Upper French Broad River Watershed Includes Parts of Three East Tennessee Counties.

2.2.B. Population Density Centers. Seven highways serve the major communities in the Upper French Broad River Watershed.

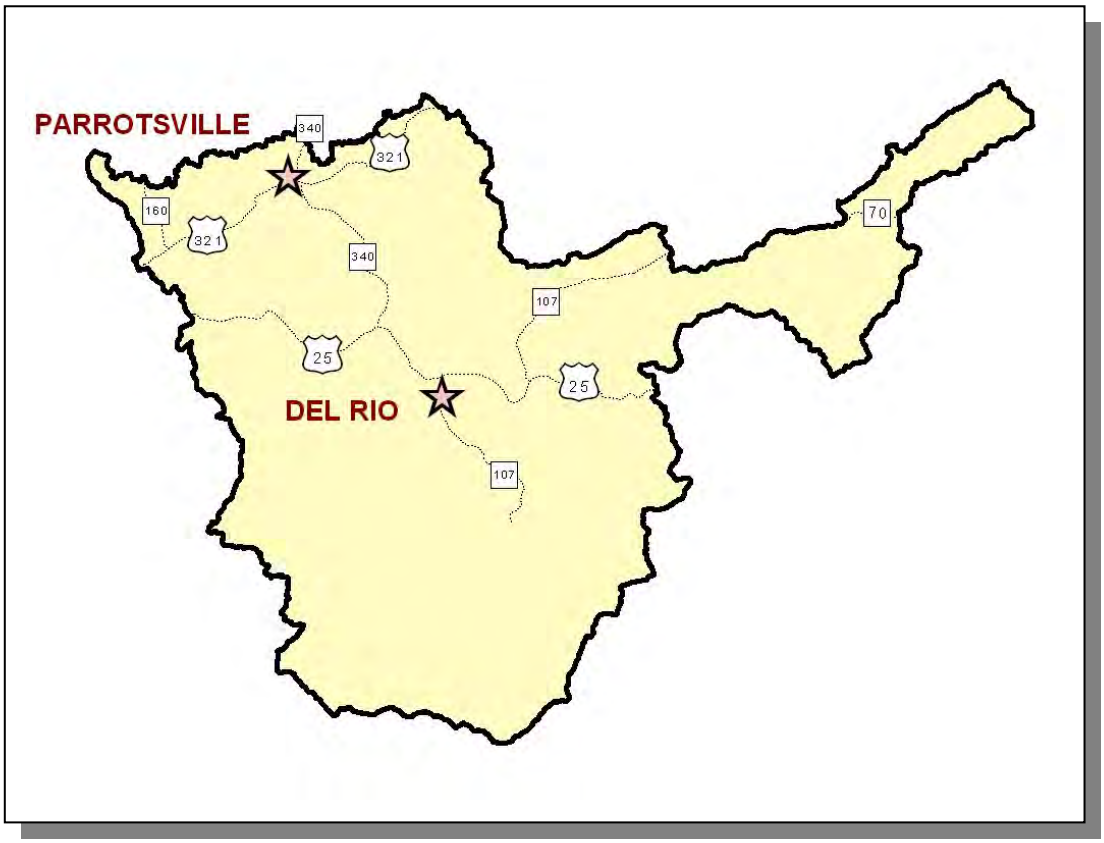


Figure 2-2. Communities and Roads in the Tennessee Portion of the Upper French Broad River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Del Rio	1,758	Cocke
Parrotsville	207	Cocke

Table 2-2. Municipalities in the Tennessee Portion of the Upper French Broad 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 Tennessee Portion of the Upper French Broad River Watershed, designated 06010105 by the USGS, is approximately 1,859 square miles (215 square miles in Tennessee) and drains to the French Broad River.

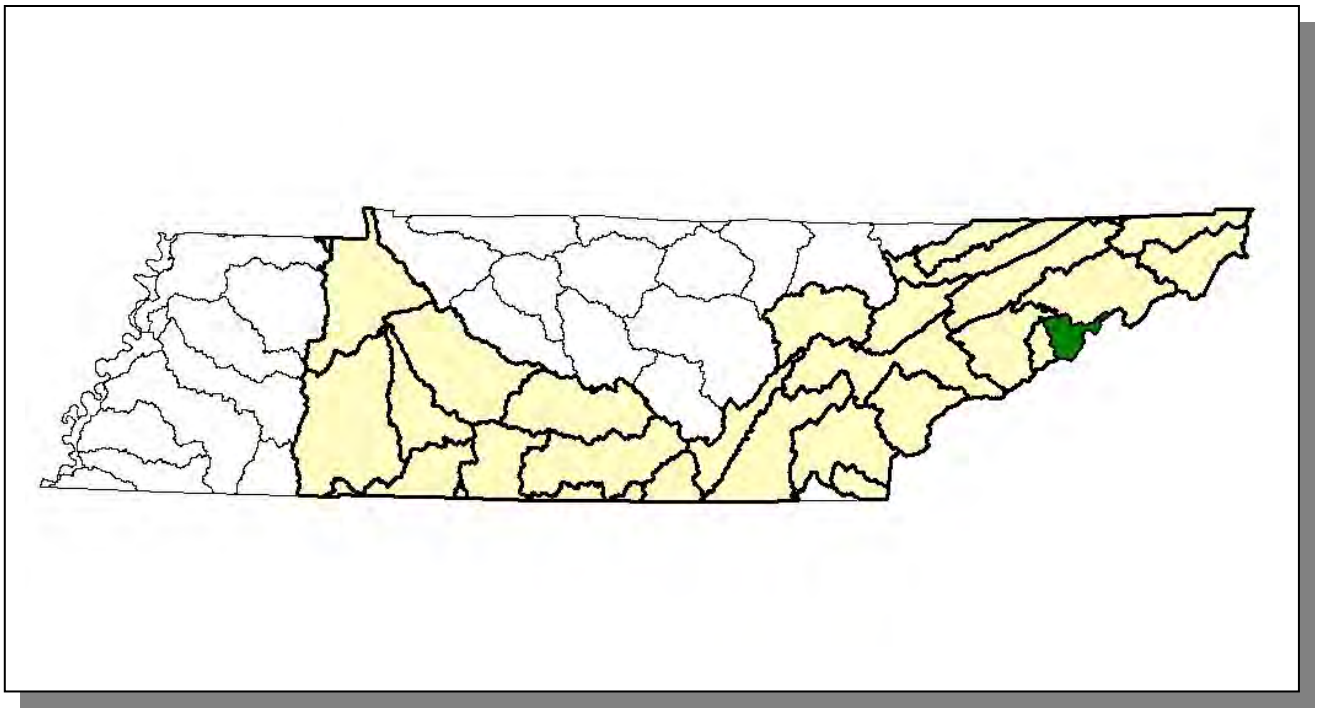


Figure 2-3. The Tennessee Portion of the Upper French Broad River Watershed is Part of the Tennessee River Basin.

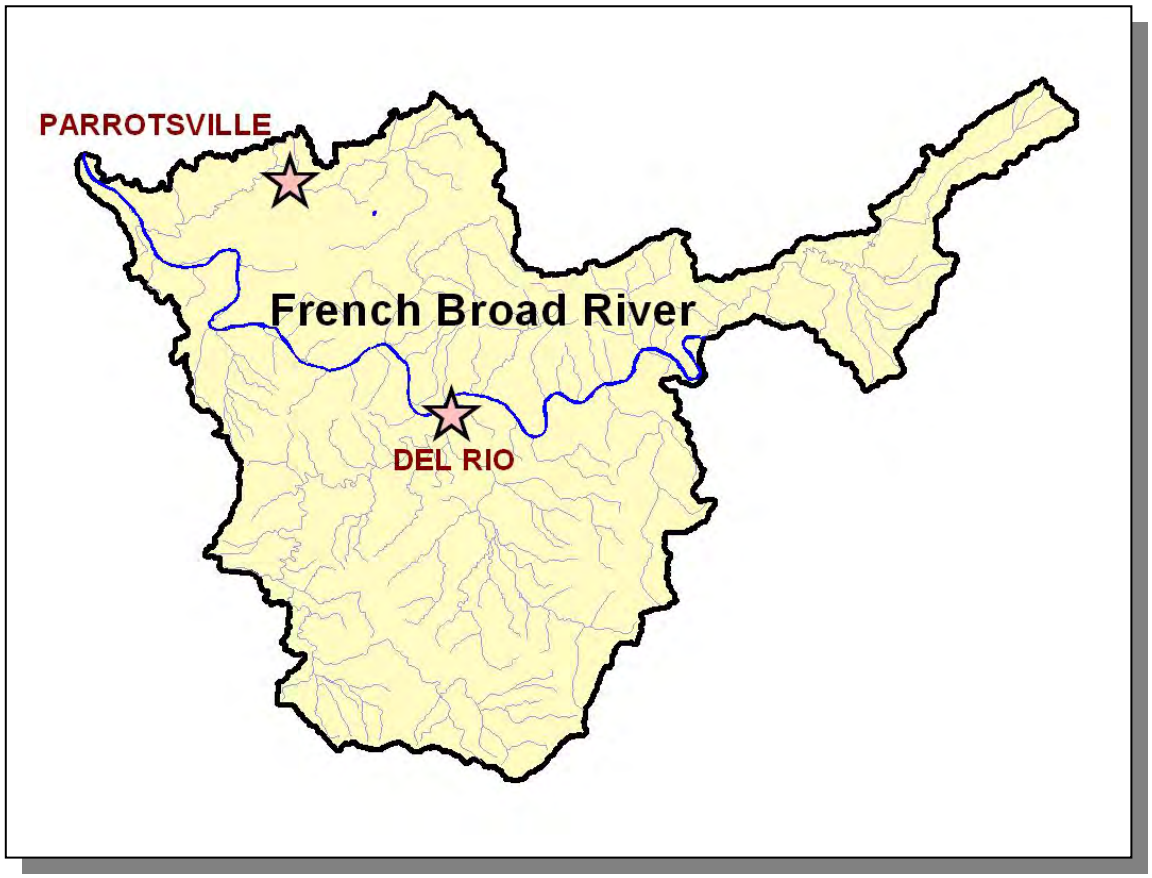


Figure 2-4. Hydrology in the Tennessee Portion of the Upper French Broad River Watershed. *There are 378 stream miles recorded in River Reach File 3 in the Tennessee Portion of the Upper French Broad River Watershed (2,958 total miles in the watershed). Location of the French Broad River, and the cities of Del Rio and Parrotsville are shown for reference.*

2.3.B. Dams. There are no dams inventoried by TDEC Division of Water Supply in the Upper French Broad River Watershed.

2.4. LAND USE. Land Use/Land Cover information was provided by EPA Region 4 and was interpreted from 2001 Multi-Resolution Land Cover (MRLC) satellite imagery.

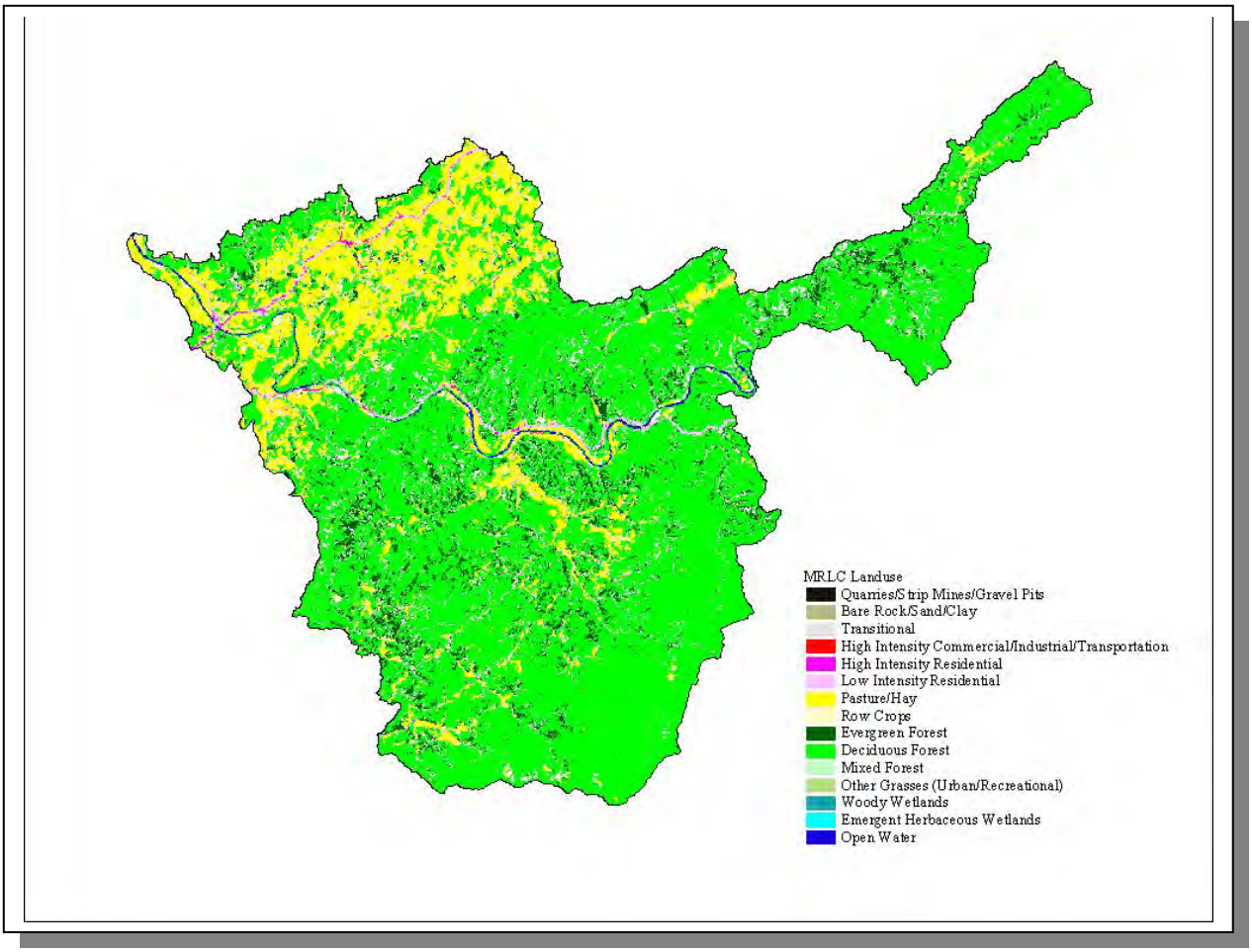


Figure 2-5. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

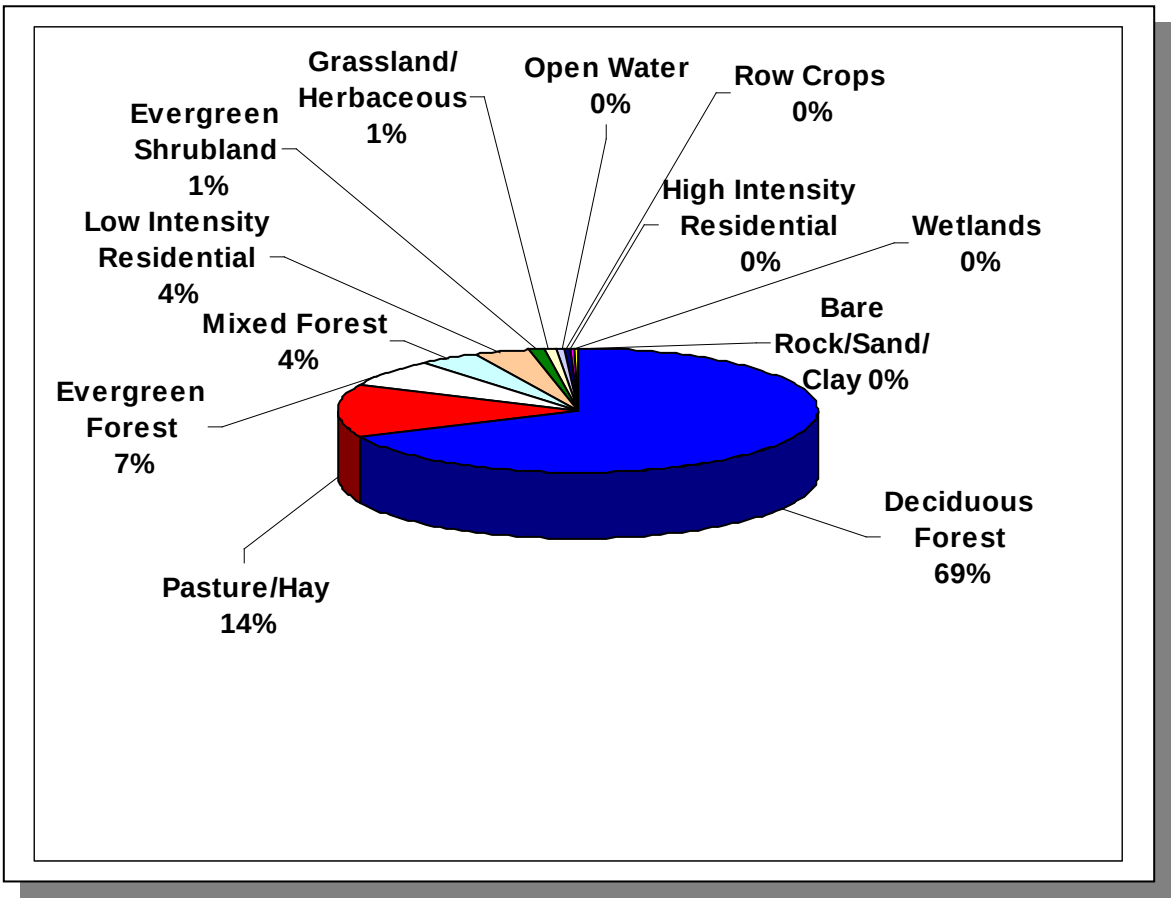


Figure 2-6. Land Use Distribution in the Tennessee Portion of the Upper French Broad River Watershed. *More information is provided in Appendix II.*

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.

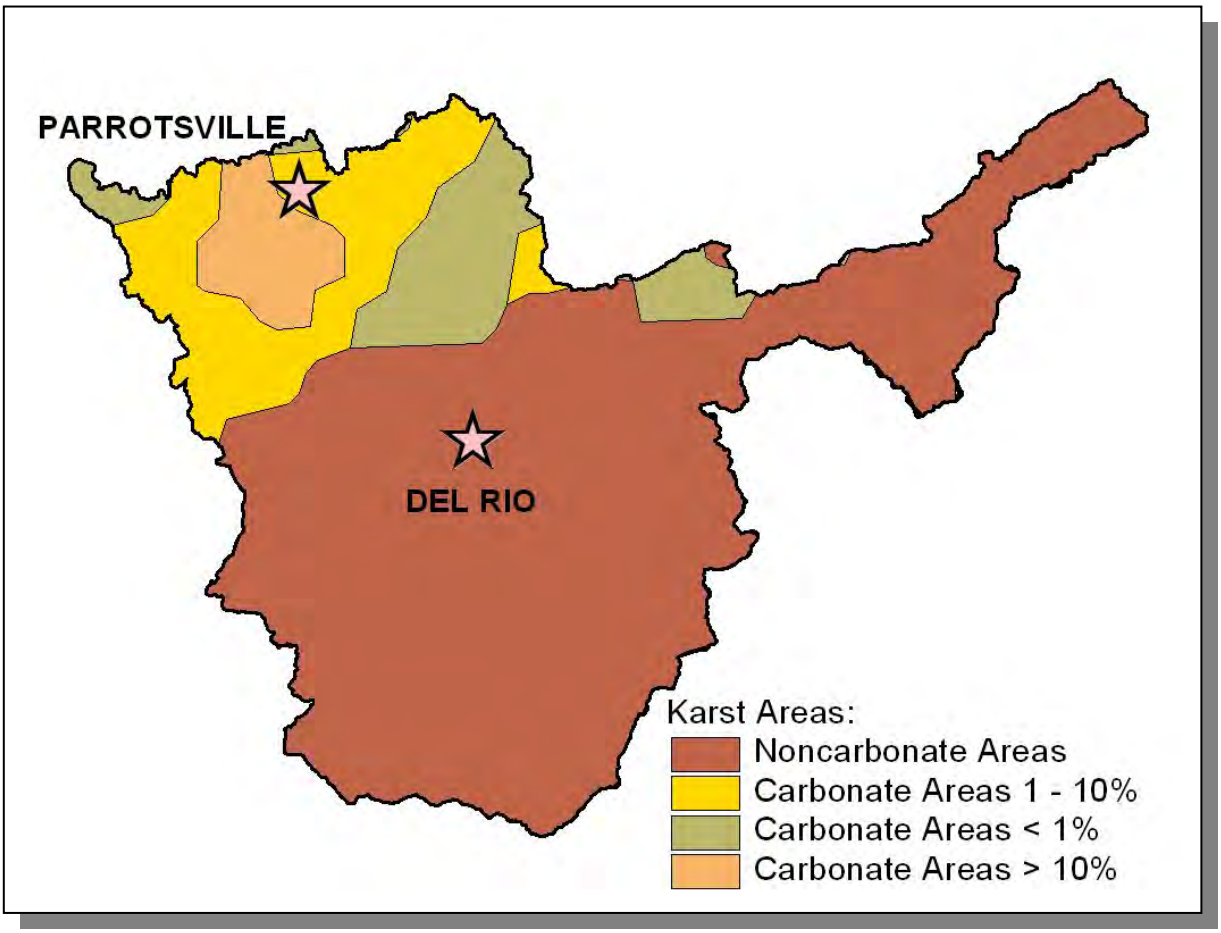


Figure 2-7. Illustration of Karst Areas in Tennessee Portion of the Upper French Broad River Watershed. *Locations of communities in the watershed are shown for reference.*

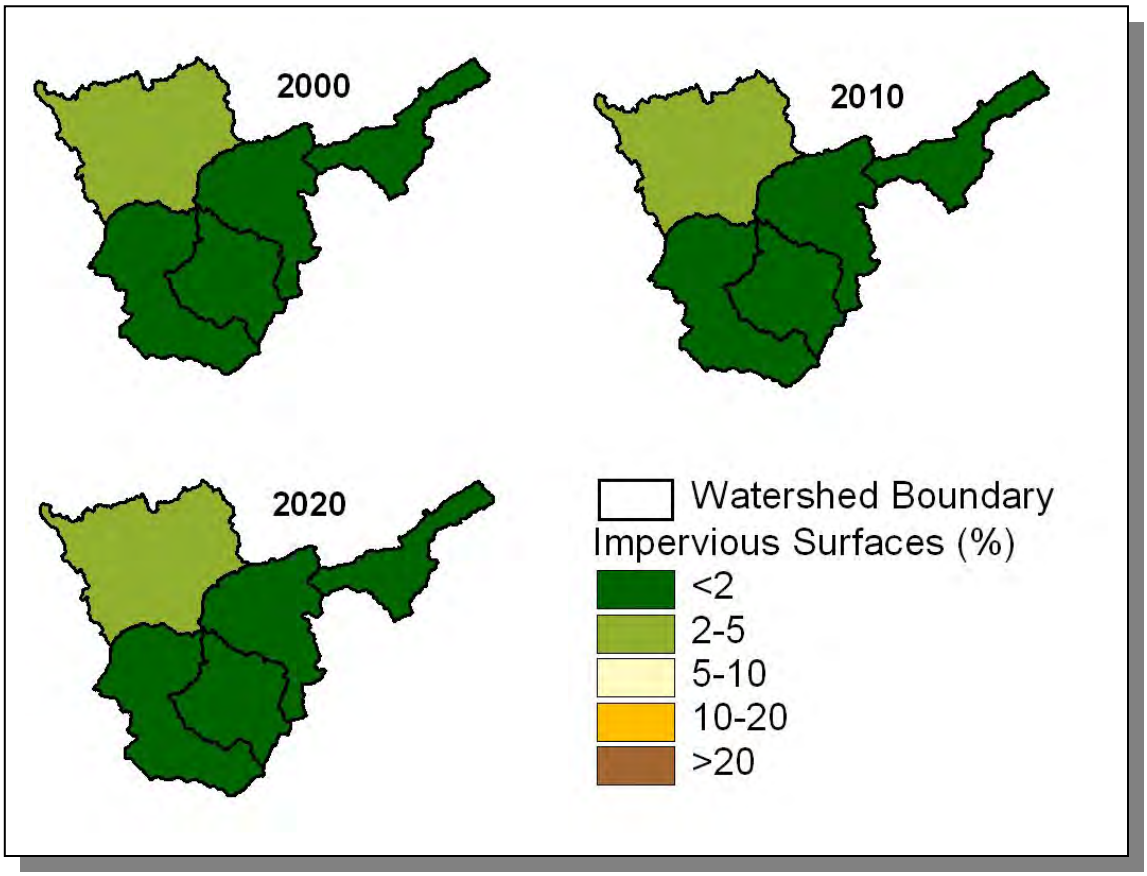


Figure 2-8. Illustration of Total Impervious Area in the Tennessee Portion of the Upper French Broad River Watershed. *All HUC-12 subwatersheds are shown. Current estimates and projected total impervious cover calculated by HUC-12 are provided by EPA Region 4. More information can be found at: http://www.epa.gov/ATHENS/research/impervious/.*

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 Upper French Broad River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains and Ridge and Valley) and contains 5 Level IV subecoregions:

- **Southern Igneous Ridges and Mountains (66d)** occur in Tennessee's northeastern Blue Ridge near the North Carolina border, primarily on Precambrian-age igneous and high-grade metamorphic rocks. The typical crystalline rock types include granite, gneiss, schist, and metavolcanics, covered by well-drained, acidic brown loamy soils. Elevations of this rough, dissected region range from 2000-6200 feet, with Roan Mountain reaching 6286 feet. Although there are a few small areas of pasture and apple orchards, the region is mostly forested; Appalachian oak and northern hardwood forests predominate.

- **Southern Sedimentary Ridges (66e)** include some of the westernmost foothill areas of the Blue Ridge Mountains ecoregion, such as the Bean, Starr, Chilhowee, English, Stone, Bald, and Iron Mountain areas. Slopes are steep, and elevations are generally 1000-4500 feet. The rocks are primarily Cambrian-age sedimentary (shale, sandstone, siltstone, quartzite, conglomerate), although some lower stream reaches occur on limestone. Soils are predominantly friable loams and fine sandy loams with variable amounts of sandstone rock fragments, and support mostly mixed oak and oak-pine forests.

- **Southern Metasedimentary Mountains (66g)** are steep, dissected, biologically-diverse mountains that include Clingmans Dome (6643 feet), the highest point in Tennessee. The Precambrian-age metamorphic and sedimentary geologic materials are generally older and more metamorphosed than the Southern Sedimentary Ridges (66e) to the west and north. The Appalachian oak forests and, at higher elevation, the northern hardwoods include a variety of oaks and pines, as well as silverbell, hemlock, yellow poplar, basswood, buckeye, yellow birch, and beech. The native spruce-fir forest, found generally above 5500 feet, has been affected greatly over the past twenty-five years by the great woolly aphid. The Copper Basin, in the southeast corner of Tennessee, was the site of copper mining and smelting from the 1850's to 1987, and once left more than fifty square miles of eroded bare earth.

- **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 soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forest, and sycamore-ash-elm riparian forest are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

- **Southern Shale Valleys (67g)** consist of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. The northern areas are associated with Ordovician-age calcareous shale, and the well-drained soils are often slightly acid to neutral. In the south, the shale valleys are associated with Cambrian-age shales that contain some narrow bands of limestone, but the soils tend to be strongly acid. Small farms and rural residences subdivide the land. The steeper slopes are used for pasture or have reverted to brush and forested land, while small fields of hay, corn, tobacco, and garden crops are grown on the foot slopes and bottom land.

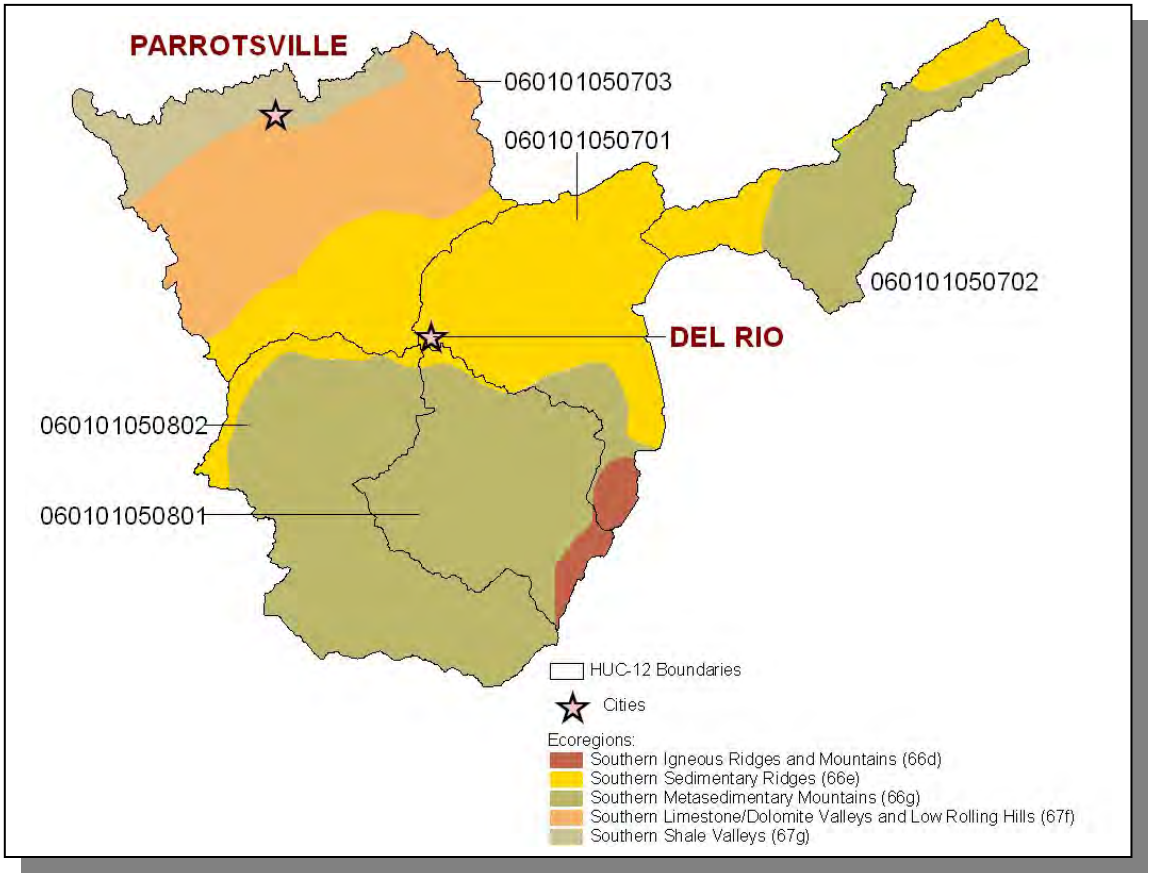


Figure 2-9. Level IV Ecoregions in the Tennessee Portion of the Upper French Broad River Watershed. *HUC-12 subwatershed boundaries and locations of Del Rio and Parrotsville are shown for reference.*

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

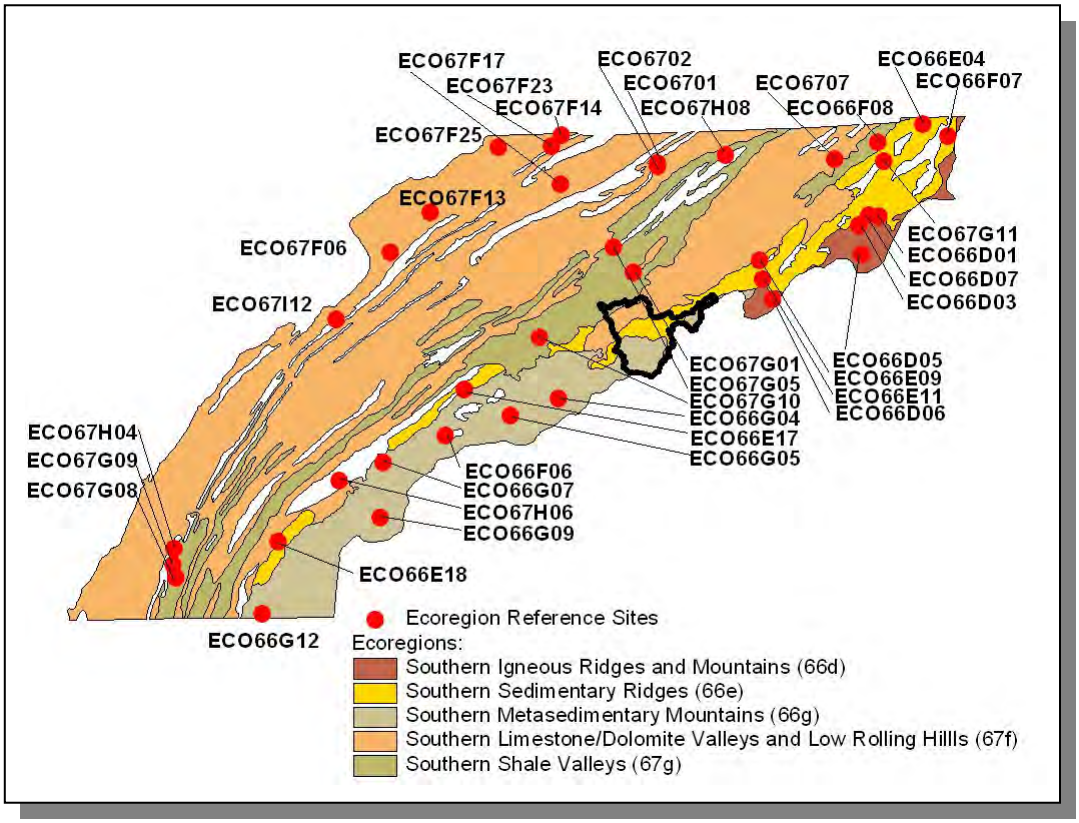


Figure 2-10. Ecoregion Monitoring Sites in Level IV Ecoregions 66d, 66e, 66g, 67f, and 67g. *The Tennessee Portion of the Upper French Broad River Watershed is shown for reference. More information, including which ecoregion reference sites were inactive or dropped prior to 06/01/2006, is provided in Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Rare Plants and Animals. The Heritage Program in the TDEC Division of Natural Areas 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	1
Snails	3
Birds	1
Fish	2
Mammals	4
Plants	35
Total	**46**

Table 2-3. There are 46 Known Rare Plant and Animal Species in the Tennessee Portion of the Upper French Broad River Watershed.

In the Upper French Broad River Watershed, there are two known rare fish species and three known rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Carpiodes velifer	Highfin Carpsucker		D
Percina aurantiaca	Tangerine Darter		D
Stenotrema altispira	Highland Slitmouth		
Paravitrea lamellidens	Lamellate Supercoil		
Mesodon wheatleyi	Cinnamon Covert		

Table 2-4. Rare Aquatic Species in the Tennessee Portion of the Upper French Broad River Watershed. *State Status: 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/

There are not any named wetland sites in the Upper French Broad River Watershed.

2.7. CULTURAL RESOURCES.

2.7.A. State Scenic River. Portions of the French Broad River are designated as a State Scenic River.

French Broad River is designated as a Class III Developed River Area (That segment from the North Carolina state line to its confluence with Douglas Lake).

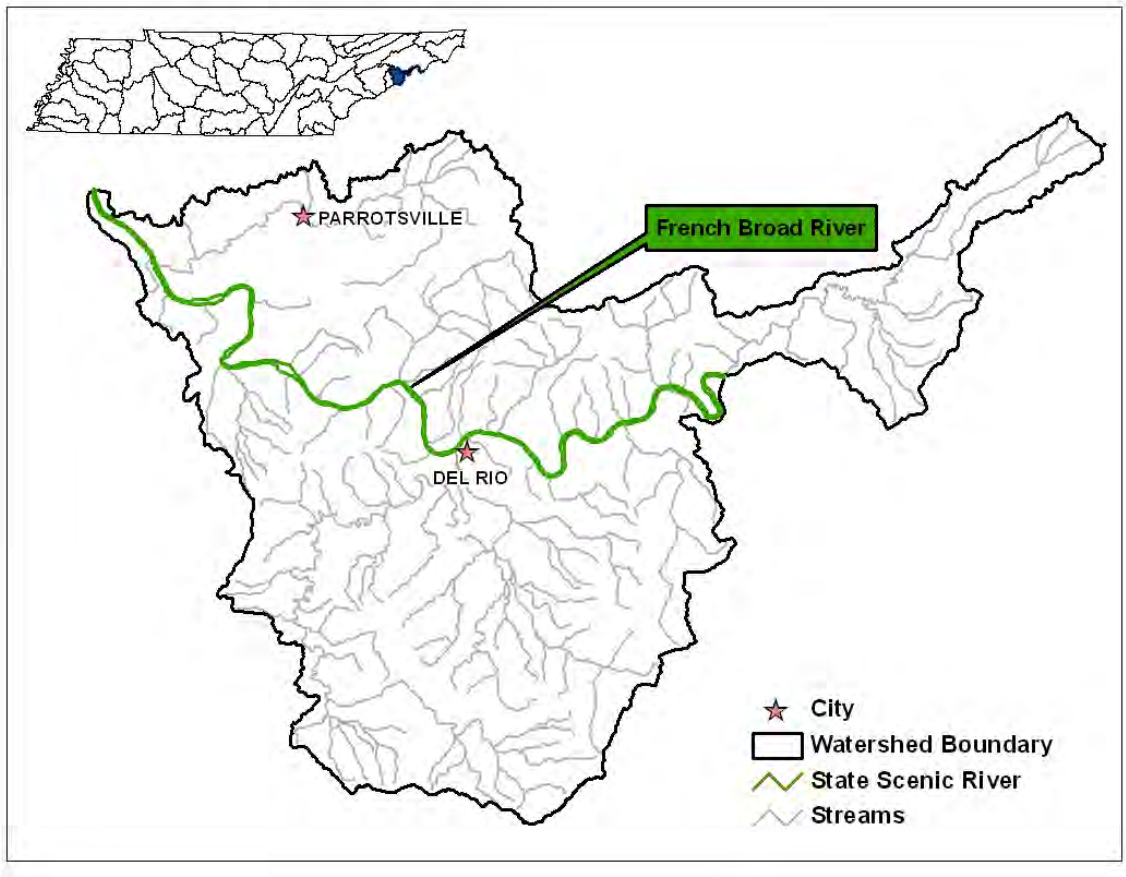


Figure 2-11. A Portion of the French Broad River (From the TN/NC State Line to the Confluence with Douglas Lake) is Designated as a State Scenic River*. Locations of Del Rio, and Parrotsville are shown for reference. More information can be found at: http://www.state.tn.us/environment/na/scenicrivers/.*

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

The most recent version of the Nationwide Rivers Inventory lists a portion of one river in the Upper French Broad Watershed:

> French Broad River (RM 0 to North Carolina State Line) is a mountainous stream with good whitewater and scenic gorge areas, numerous rock gardens, boulder beds, rapids, islands, and ledges. It has a diversity of flora and fauna and significant archaeological sites border the river.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE	HISTORIC	CULTURAL
French Broad	X	X	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.C. Public Lands. Some sites representative of the cultural heritage in the Upper French Broad River Watershed are under state or federal protection:

Cherokee National Forest is a 664,000-acre forest managed by the U.S. Department of Agriculture, Forest Service. More information may be found at: http://www.fs.fed.us/r8/cherokee/

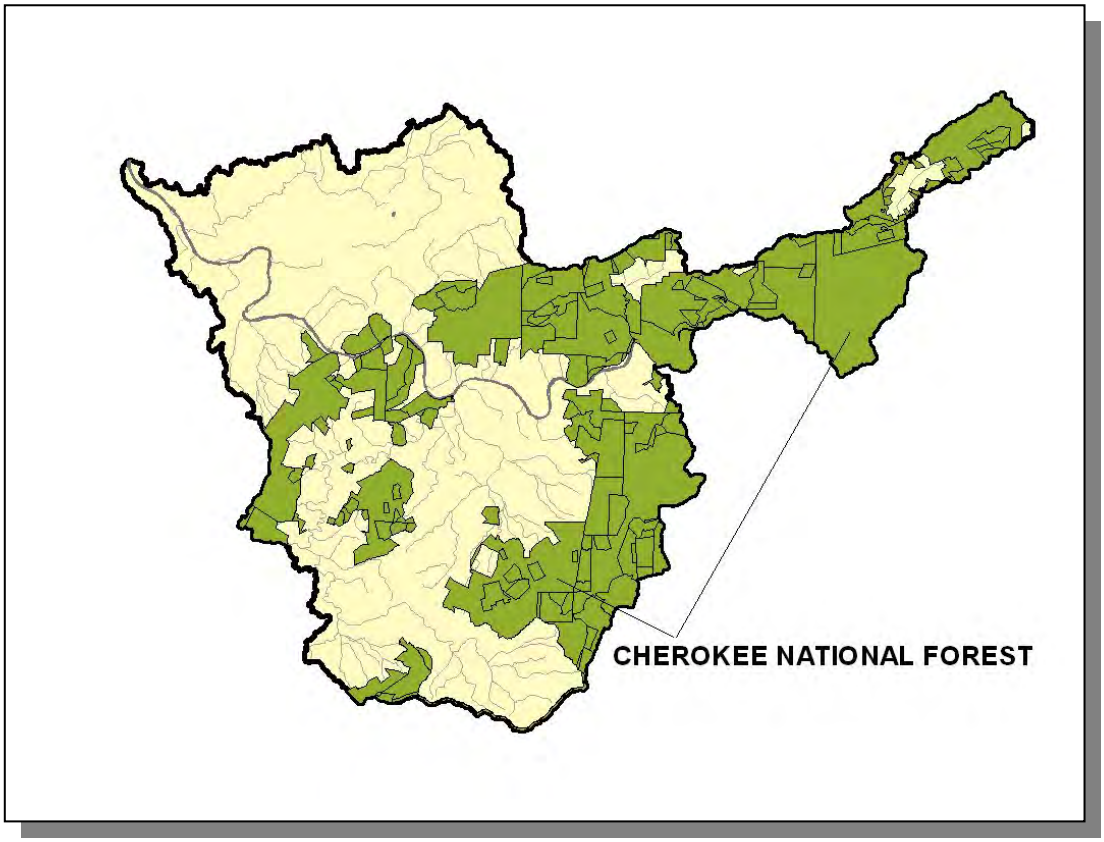


Figure 2-12. Public Lands in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Tennessee Wildlife Resources Agency.*

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
Big Creek	3			Long Creek	3		
Clear Creek	4			Paint Creek	2		1
Dry Fork Branch Big Creek			1	Trail Fork Big Creek			
French Broad River	1,2	1	2	Wolf Fork French Broad River	1		1
Gulf Fork Big Creek	2		1				

Table 2-6. Tennessee Rivers Assessment Project Stream Scoring in the Upper French Broad 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 FRENCH BROAD RIVER WATERSHED.

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

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

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

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

Tennessee uses the 305(b) Report to meet four goals (from 2008 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 eminent 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 non-point 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/303d2008.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 French Broad 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.

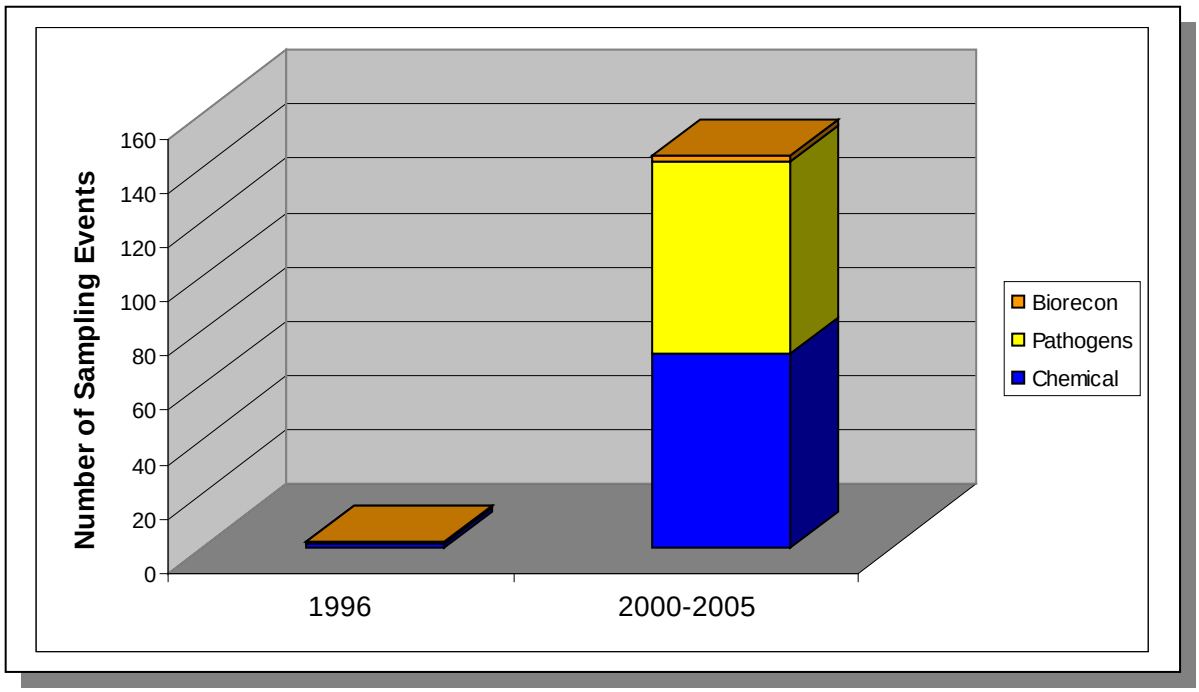


Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (July 1, 2000 through June 30, 2005) in the Tennessee Portion of the Upper French Broad River Watershed.

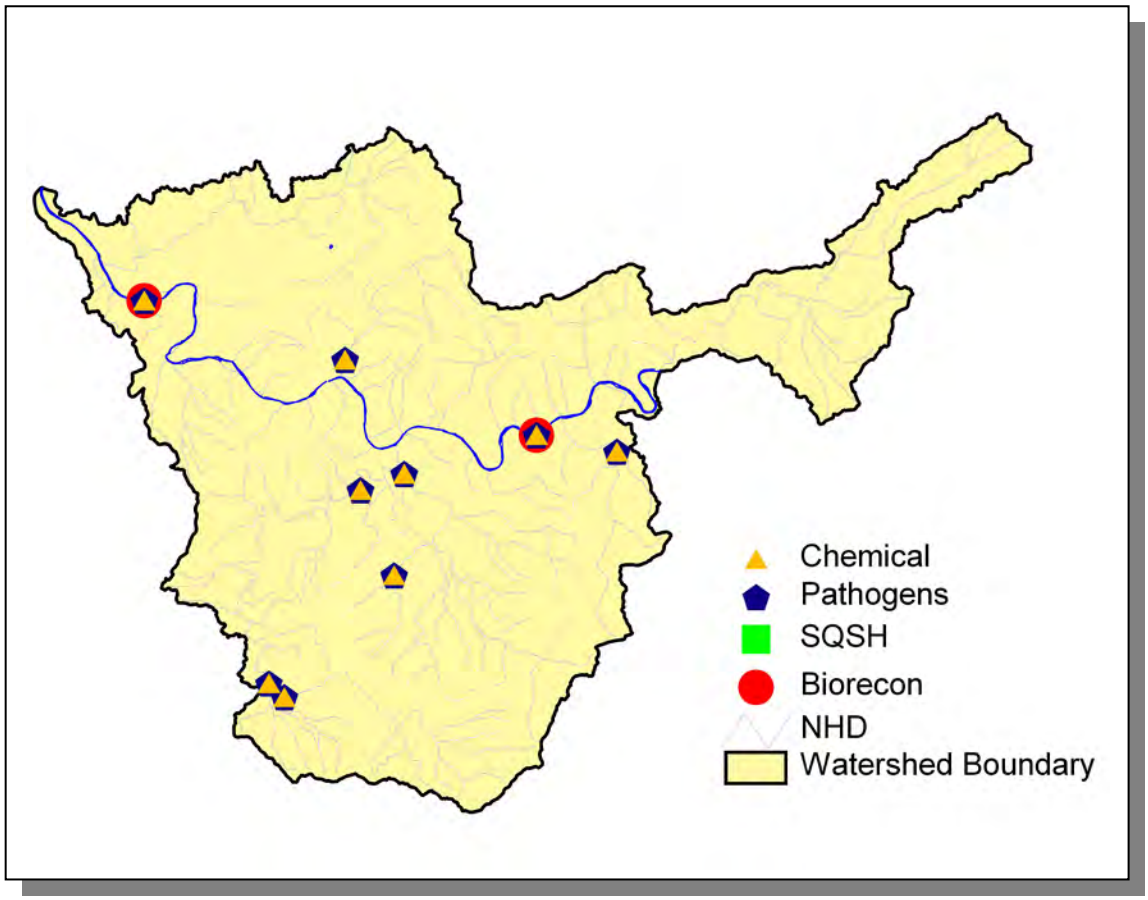


Figure 3-2. Location of Monitoring Sites in the Tennessee Portion of the Upper French Broad River Watershed (July 1, 2000 through June 30, 2005). *Pathogens include E. coli and fecal coliform; NHD, National Hydrography Dataset of Streams; SQSH, Semi-Quantitative Single Habitat Assessment.*

	1996	2000-2005
Chemical	1	71
Pathogens	1	71
SQSH	0	0
Biorecon	0	2
Total	**2**	**144**

Table 3-1. Number of Sampling Events in the Tennessee Portion of the Upper French Broad 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 and Environmental Field Office-Johnson City staff (this is in addition to samples collected by water and wastewater treatment plant operators and MS4 permittees). 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 French Broad 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 French Broad River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains and Ridge and Valley) and contains 5 subecoregions (Level IV):

- Southern Igneous Ridges and Mountains (66d)
- Southern Sedimentary Ridges (66e**)**
- Southern Metasedimentary Mountains (66g)
- Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)
- Southern Shale Valleys (67g)

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

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

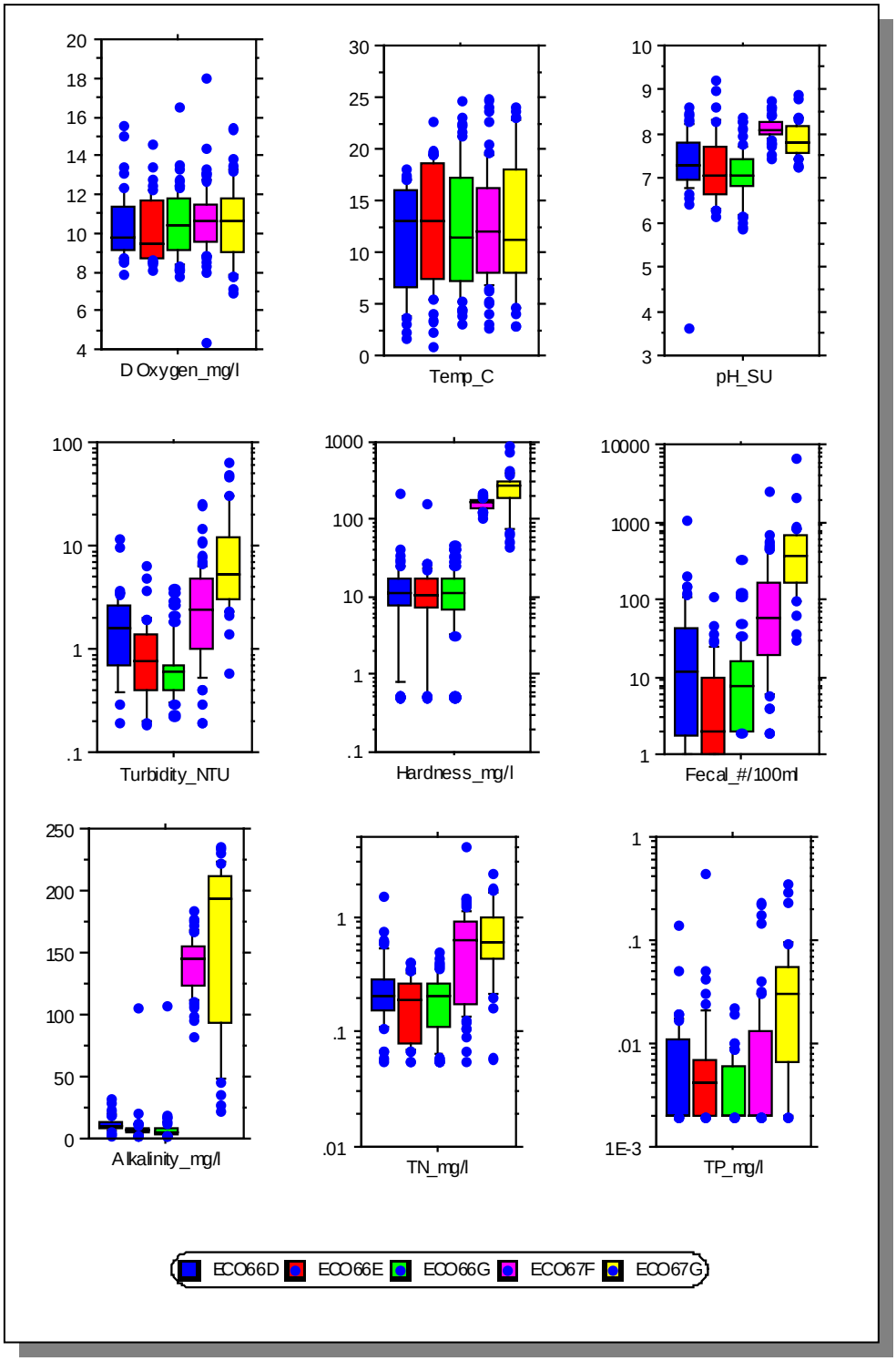


Figure 3-3. Select Chemical Data Collected in the Tennessee Portion of the Upper French Broad River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. Fecal, fecal coliform bacteria; TN, Total Nitrogen; TP, Total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

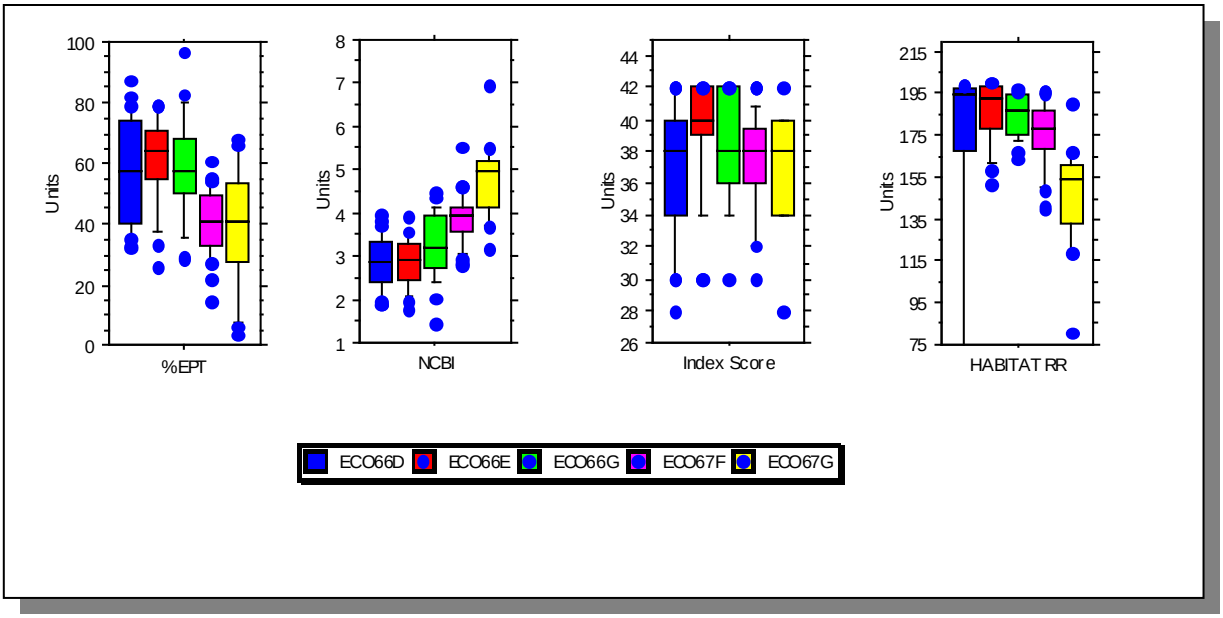


Figure 3-4. Benthic Macroinvertebrate and Habitat Scores for the Tennessee Portion of the Upper French Broad River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. NCBI, North Carolina Biotic Index. Index Score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

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

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

- The current 303(d) list,
- HUC-12 maps (every HUC-12 is considered for a BioRecon)
- Land Use/Land Cover maps
- Topographic maps
- Locations of NPDES facilities
- Sites of recent ARAP activities.

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

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

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

3.3. STATUS OF WATER QUALITY. Use support determinations, which can be classified as monitored or evaluated, are based on:

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

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

Waterbodies are assessed by comparing monitored water conditions to water quality standards for the stream, river, or reservoir's designated uses. Data that meet quality control standards and collection techniques are used to generate assessments. After use support is determined, waterbodies are placed in one of the following five categories recommended by EPA.

Category Assessment	Stream Miles	Reservoir Acres
Total	380.0	0
Assessed	202.0	0
Category 1	66.6	0
Category 2	97.9	0
Category 3	178.1	0
Category 4	0.0	0
Category 5	37.4	0

Table 3.2. Use Support Categories (Stream miles and/or Reservoir Acres) in the Tennessee Portion of the Guntersville Lake Watershed.

Use Support Categories: (from 2008 305(b) Report)

Category 1 waters are **fully supporting** of all designated uses. These streams, rivers, and reservoirs have been monitored and meet the most stringent water quality criteria for all designated uses for which they are classified. The biological integrity of Category 1 waters is comparable with reference streams in the same subecoregion and pathogen concentrations are at acceptable levels.

Category 2 waters are **fully supporting** of some designated uses, but have not been assessed for all uses. In many cases, these waterbodies have been monitored and are fully supporting of fish and aquatic life, but have not been assessed for recreational use.

Category 3 waters are **not assessed** due to insufficient or outdated data.

Category 4 waters are **impaired**, but a TMDL is not required. Category 4 has been further subdivided into three subcategories.

Category 4a impaired waters that have already had all necessary TMDLs approved by EPA.

Category 4b impaired waters do not require TMDL development since "other pollution control requirements required by local, State or Federal authority are expected to address all water-quality pollutants" (EPA, 2003). An example of a 4b stream might be where a discharge point will be moved in the near future to another waterbody with more assimilative capacity.

Category 4c impaired waters in which the impacts are not caused by a pollutant (e.g., certain habitat or flow alterations).

Category 5 waters have been monitored and found to not meet one or more water quality standards. These waters have been identified as **not supporting** their designated uses. Category 5 waterbodies are moderately to highly impaired by pollution and need to have TMDLs developed for the known impairments. These waters are included in the 303(d) List of impaired waters in Tennessee.

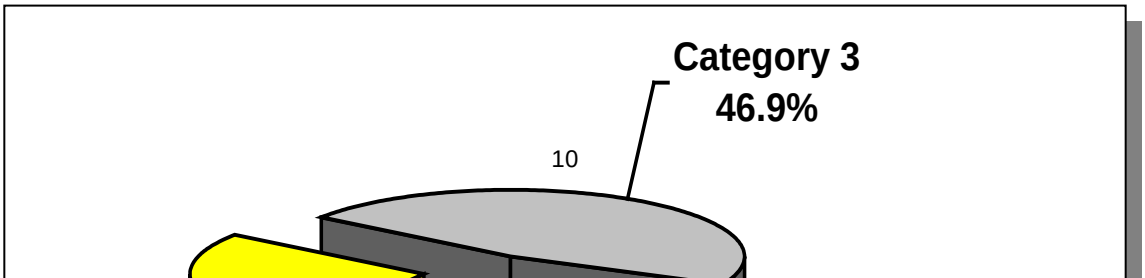


Figure 3-5. Water Quality Assessment of Streams in the Tennessee Portion of the Upper French Broad River Watershed. *Assessment data are based on the 2006 Water Quality Assessment of 380.0 stream miles in the watershed.*

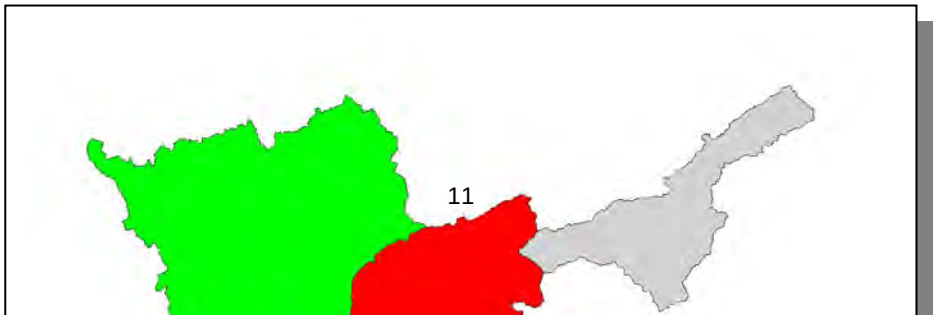


Figure 3-6. Percentage of Stream Miles Assessed for Support of Fish and Aquatic Life Designated Use in HUC-12 Subwatersheds.

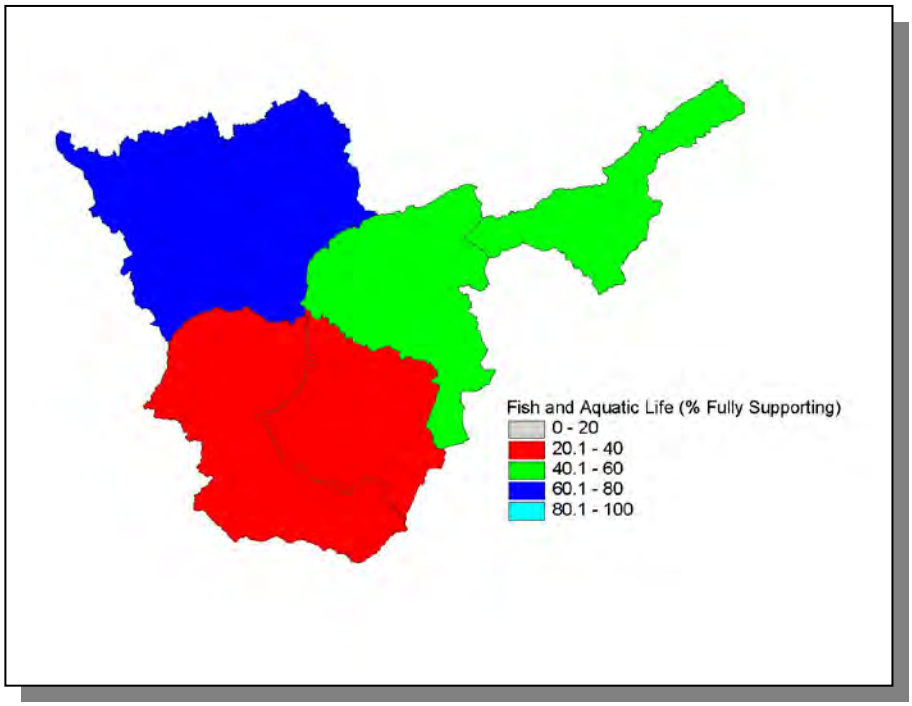


Figure 3-7. Percentage of Stream Miles Fully Supporting for Fish and Aquatic Life Designated Use in HUC-12 Subwatersheds.

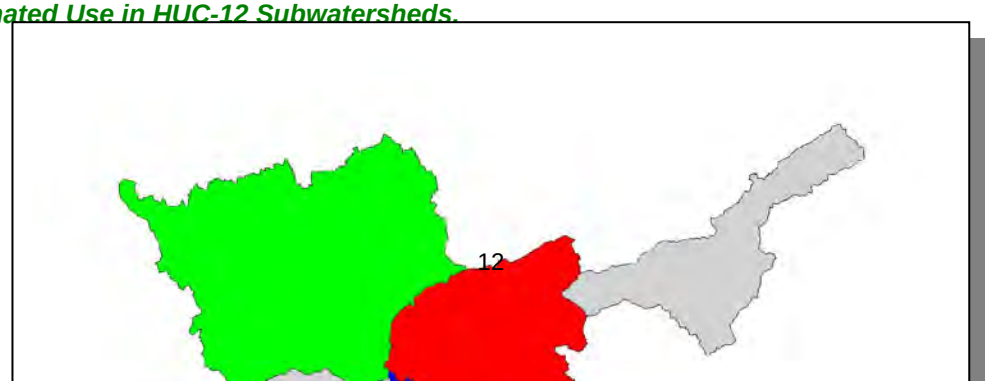


Figure 3-8. Percentage of Stream Miles Assessed for Support of Recreation Designated Use in HUC-12 Subwatersheds.

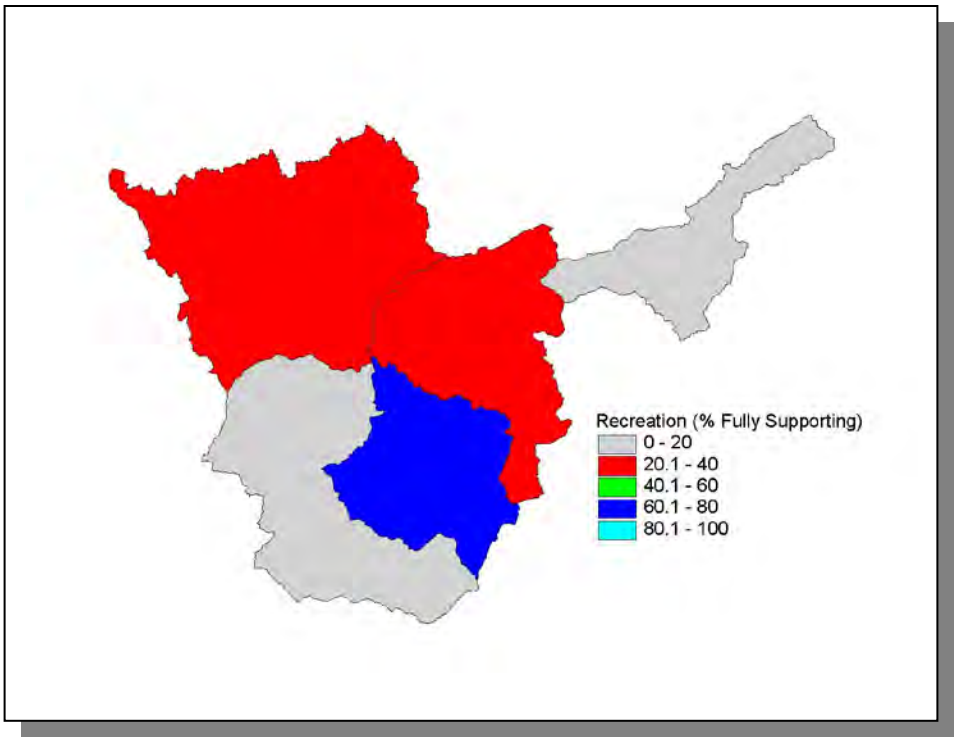


Figure 3-9. Percentage of Stream Miles Fully Supporting for Recreation Designated Use in HUC-12 Subwatersheds.

3.3.A. Assessment Summary.

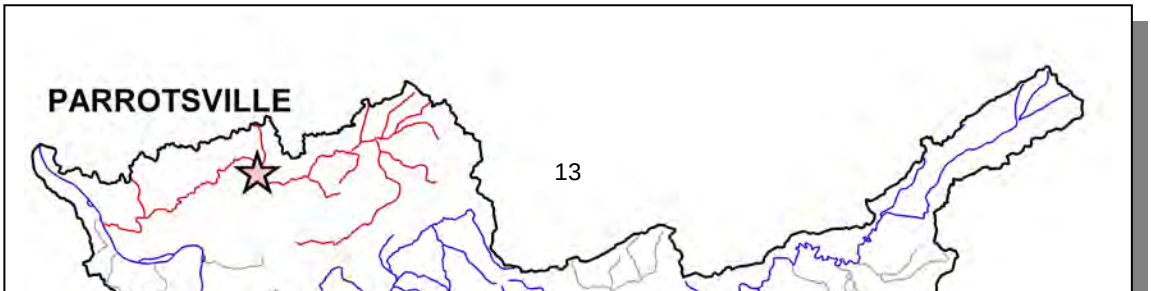


Figure 3-10. Overall Use Support Attainment in the Tennessee Portion of the Upper French Broad River Watershed. *Assessment data are based on the 2006 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Del Rio and Parrotsville are shown for reference. More information is provided in Appendix III.*

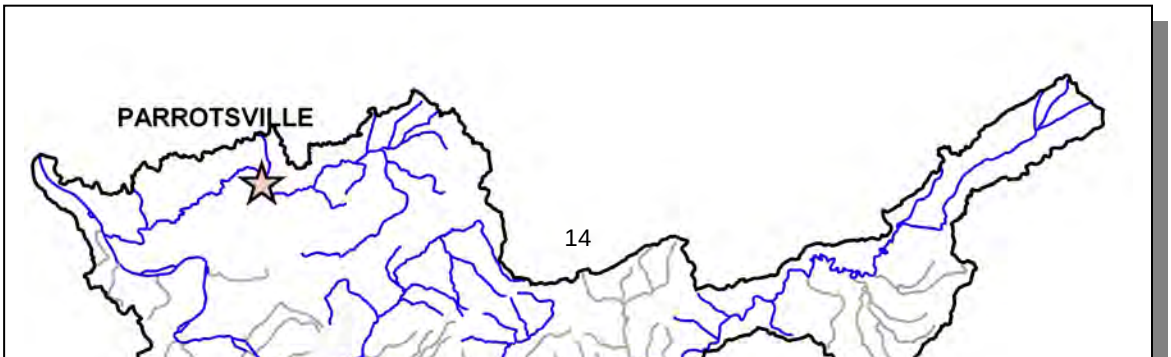


Figure 3-11. Fish and Aquatic Life Use Support Attainment in the Tennessee Portion of the Upper French Broad River Watershed. *Assessment data are based on the 2006 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Del Rio and Parrotsville are shown for reference. More information is provided in Appendix III.*

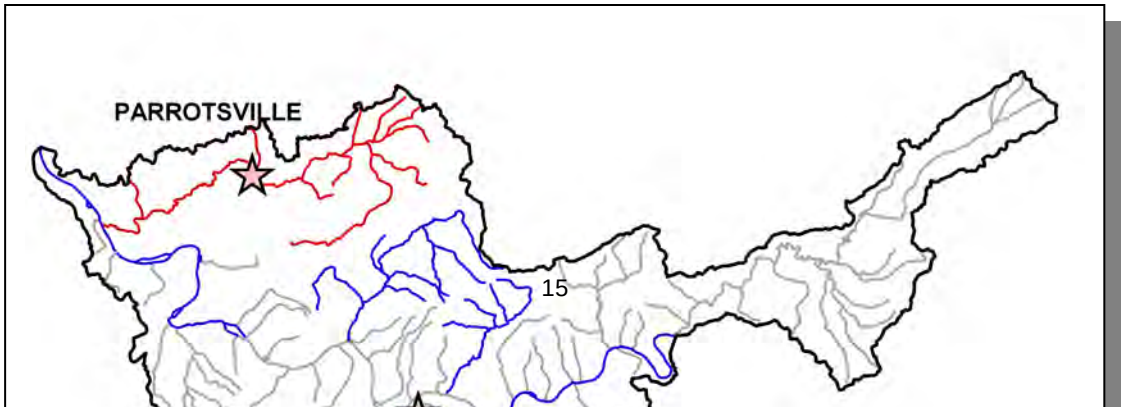


Figure 3-12. Recreation Use Support Attainment in the Tennessee Portion of the Upper French Broad River Watershed. *Assessment data are based on the 2006 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Del Rio and Parrotsville are shown for reference. More information is provided in Appendix III.*

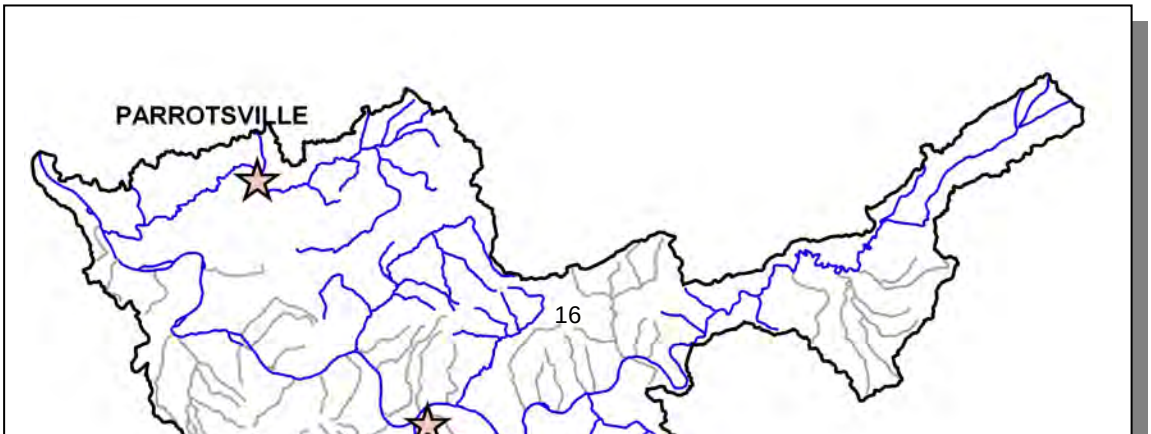


Figure 3-13. Irrigation Use Support Attainment in the Tennessee Portion of the Upper French Broad River Watershed. *Assessment data are based on the 2006 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Del Rio and Parrotsville are shown for reference. More information is provided in Appendix III.*

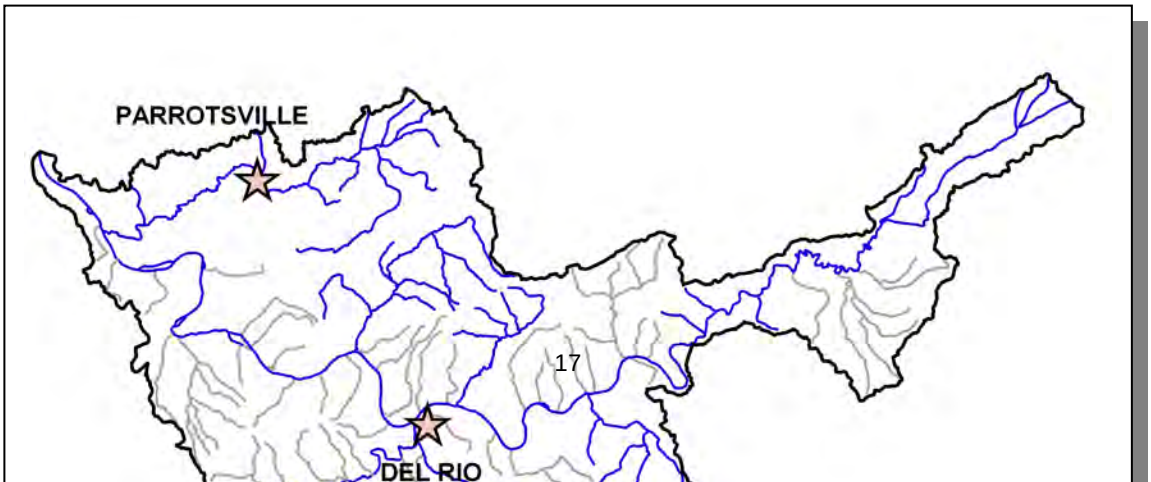


Figure 3-14. Livestock Watering and Wildlife Use Support Attainment in the Tennessee Portion of the Upper French Broad River Watershed. *Assessment data are based on the 2006 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Del Rio and Parrotsville are shown for reference. More information is provided in Appendix III.*

3.3.B. Use Impairment Summary.

Figure 3-15. Impaired Streams Due to Escherichia coli in the Tennessee Portion of the Upper French Broad River Watershed. *Assessment data are based on the 2006 Water Quality Assessment. Locations of Del Rio and Parrotsville 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 is compiled by using EPA's ADB (Assessment Database) software developed by RTI (Research Triangle Institute). The ADB allows for a more detailed segmentation of waterbodies. While this results in a more accurate description of the status of water quality, it makes it difficult when comparing water quality assessments with and without using this tool. A more meaningful comparison will be between assessments 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://gis3.memphis.edu/wpc/.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE UPPER FRENCH BROAD RIVER WATERSHED

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

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the Upper French Broad 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 the 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	12,576	5	
Erosion Control		133	
Nutrient Management		1,507	
Pest Management		1,682	
Grazing / Forages	805	7	
Tree and Shrub Practices		353	
Tillage and Cropping		781	
Wetlands		3	
Wildlife Habitat Management		1,402	
Water Supply	7,190		26

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Tennesseee Portion of the Upper French Broad River Watershed. *Data are from PRMS for October 1, 2002 through September 30, 2006 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.

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,
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 partners 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.

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

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

In a partnership with The Nature Conservancy (TNC), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) Division of Natural Areas, 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.

The federally endangered gray bat (*Myotis grisescens*) occurs in this reach of the French Broad River. For a complete listing of endangered and threatened species in the Upper French Broad River Watershed, please visit the Service's website at:
http://www.fws.gov/cookeville/

Partners for Fish and Wildlife Program

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

Participation is voluntary and various types of projects are available. Projects include livestock exclusion fencing, alternate water supply construction, streambank

stabilization, restoration of native vegetation, wetland restoration/enhancement, riparian zone reforestation, and restoration of in-stream aquatic habitats.

HOW TO PARTICIPATE...

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

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

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 7 multidisciplinary Watershed Teams located throughout the Valley. These Watershed Teams help communities develop and implement protection and restoration activities in their local watersheds. In addition to water quality efforts, Watershed Teams carry out varied resource stewardship functions including management of TVA lands and shorelines, recreation, and resource management. These teams work in partnership with business, industry, government agencies, and community groups to manage, protect, and improve the quality of the Tennessee River and its tributaries. TVA also operates a comprehensive monitoring program to provide real-time information to the Watershed Teams and other entities

about the conditions of these resources. TVA is also involved in outreach efforts in many watersheds in Tennessee, including the Upper French Broad River Watershed:

Transylvania County, NC- Tennessee Growth Readiness Workshop Series
The Tennessee Growth Readiness Initiative (TGRI) is an educational program that focuses on teaching local officials, and other decision makers about the sources and impacts of nonpoint source pollution, how different land uses affect water quality, and what communities can do to protect water quality.

Kids In the Creek
This annual event is done in conjunction with NC State Extension and the Mud Creek Restoration Council, for Henderson County Middle School students. The Kids in the Creek program provides students with a glimpse of how Aquatic Biologists monitor the health of a stream. The students spend time at four stations: aquatic insects, fish community, water quality, and watershed education. Each station focuses on the importance of a healthy stream both for the ecosystem and human health.

Details about Outreach Activities an be obtained by writing the Holston-Cherokee-Douglas Watershed Team, 3726 E. Morristown Blvd., Morristown, TN, 37813 or calling Ms. Dana Ball at 423-585-2128, or E-mail her at **dmball@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 are 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.

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.lrn.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

5.2.F. USDA – Forest Service. The USDA Forest Service manages approximately 645,000-acres in Tennessee (Cherokee National Forest (CNF)). This ownership includes about 59,000 acres within the Upper French Broad River watershed in Tennessee. The general mission of the Forest Service is to achieve an ecological and sustainable, multiple use approach to land management that meets the diverse needs of people. In order to achieve this mission, a watershed-based approach to ecosystem management has been adopted.

A variety of management activities occur within the Upper French Broad River watershed on national forest lands. Some of these include:

Ecosystem Management and Restoration. Prescribed burning and vegetation treatments are used to meet a variety of ecosystem-based management objectives. Periodically, prescribed fire is used to reduce hazardous fuel loads and improve wildlife habitat conditions within the watershed on CNF lands. Thinning and regeneration cuts are also used on selected areas where timber harvest is necessary to achieve restoration or wildlife habitat objectives. The southern pine beetle has impacted pine forest types within this watershed in the recent past. The Hemlock Wooly Adelgid is currently infesting hemlock trees in this watershed and other areas in Tennessee. Efforts are currently underway to provide for the conservation of the hemlock through a variety of means to suppress the Hemlock Wooly Adelgid on a local basis.

Recreation Management. A variety of recreation uses occur on National Forest lands within this watershed. Hiking, whitewater boating, fishing, camping, horse use, scenic viewing and hunting are some of the many uses. Developed and dispersed recreation opportunities are provided. The French Broad River and Paint Creek corridors are key areas for recreation activity. The Appalachian Trail is located on national forest and other lands within this watershed.

Inventory and Monitoring. There are 55 perennial streams capable of supporting fish and approximately double that number of perennial and intermittent streams that support other aquatic organisms in the Upper French Broad River Watershed on National Forest system lands. Three-pass electro-fishing and instream habitat surveys are conducted on some of these streams. Since 1997, thirty-six surveys have been conducted in the Upper French Broad River Watershed. A total of 22 species of fish have been documented in these streams. No federally listed species are documented on National Forest lands in this watershed.

The instream habitat surveys document physical characteristics in the stream. Degraded conditions are identified and corrected as needed. The most frequently documented degradation is a lack of large wood in the stream channel. Log structures have been installed to alleviate a portion of this problem.

Other Management Activities. A variety of additional management activities occur within the French Broad River watershed on national forest lands. These include:

• Collaborative planning with a variety of other Federal, State and local agencies and private individuals to identify and prioritize watershed improvement needs on public and private lands
• Watershed improvements including road and trail decommissioning to reduce soil loss and sediment yield

• Environmental education programs with school, scouting and other groups

Further information about the Cherokee National Forest can be found on its homepage at http://www.fs.fed.us/r8/cherokee/.

5.2.G. National Park Service. Great Smoky Mountains National Park (GSMNP) is rich with nearly 3,400 kilometers (2,100 miles) of cool and cold-water stream habitats. Of this total, 1,280 km (800 miles) support a diverse fish community. Large stream systems (4^{th}-5^{th} order) support the greatest diversity of fishes in GSMNP, including 12 families and over 60 species. Many of the fish species found in these large stream systems are excellent indicators of natural and anthropogenic environmental impacts. Large stream systems in GSMNP are sampled each fall in an attempt to provide a snapshot of the diversity of habitat and fish species found in the Park's larger stream systems. Backpack electrofishing gear and three-pass depletion estimates are used to evaluate year-class strength, reproductive success, density (# fish/100m^2), biomass (kg/ha), and other trend information.

For more information on biological monitoring, contact the Great Smoky Mountains National Park at grsm_smokies_information@nps.gov.

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 springs), 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.

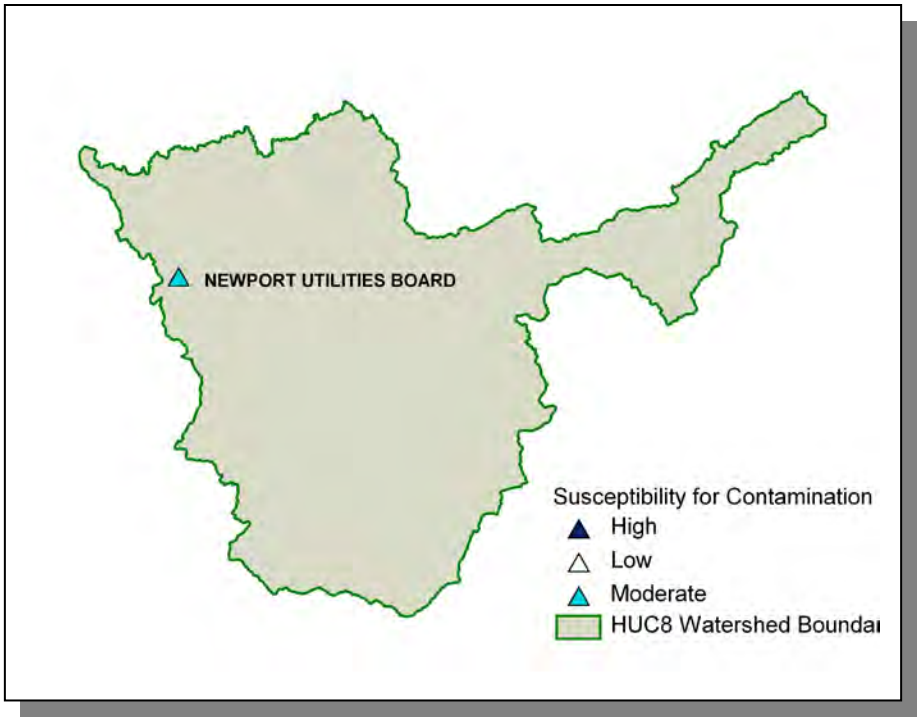


Figure 5-1. Public Water Systems Susceptible to Contamination in the Tennessee Portion of the Upper French Broad River Watershed.

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://state.tn.us/environment/dws/pdf/2006gw305b.pdf

5.3.B. TDEC Clean Water State Revolving Fund Program. The Division of Water Pollution Control and the Division of Water Supply jointly administer 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 over $675 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.

The SRF Program 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, contact the Clean Water SRF Loan Program by telephone at (615) 532-0445 or visit their Web site at http://tennessee.gov/environment/srf.

5.3.C. Tennessee Department of Agriculture. The Tennessee Department of Agriculture's Water Resources Section administers 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 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 French Broad 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 and C99944674-05-0).

- 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

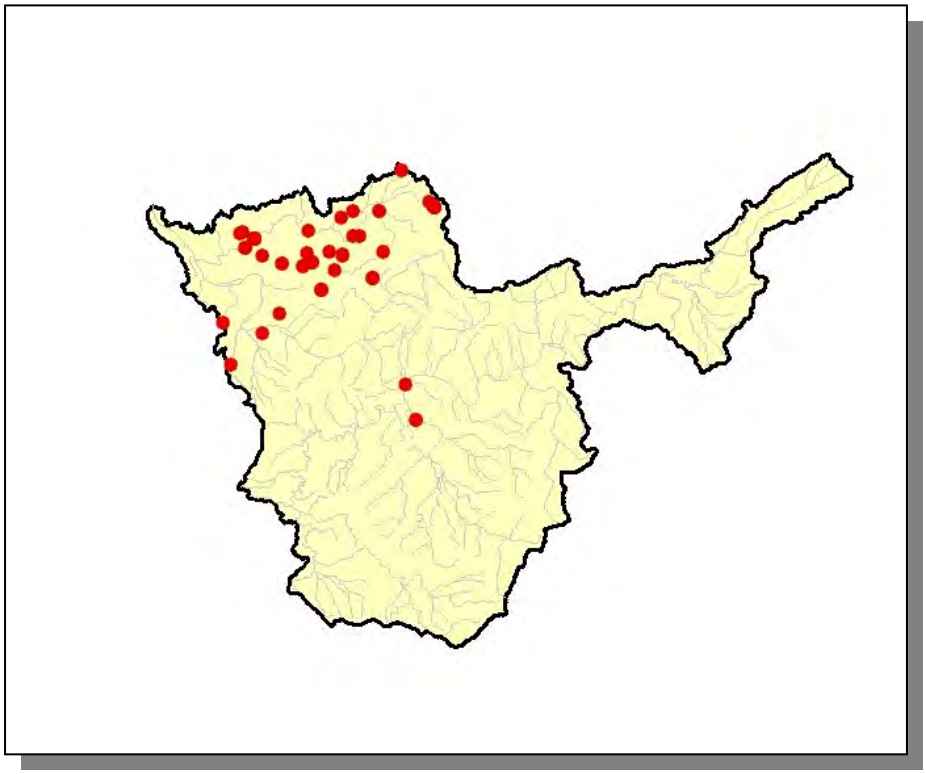


Figure 5-2. Location of BMPs installed from 2002 through 2006 in the Tennessee Portion of the Upper French Broad River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. *More information is provided in Appendix V.*

5.3.D. Tennessee Wildlife Resources Agency. The Tennessee Wildlife Resources Agency (TWRA) conducts a variety of activities related to watershed conservation and management. Fish management activities include documentation of fish and aquatic life through stream sampling and stocking of both warm water and coldwater sportfish. Fish data are managed in the Geographic Information System (GIS) project called Tennessee Aquatic Database System (TADS). TWRA nongame and endangered species projects include restoration of special status fish, aquatic life, and riparian wildlife. The Agency conducts a variety of freshwater mussel management, conservation, and restoration projects including the propagation and reintroduction of species once common in Tennessee streams. TWRA has been involved in riparian conservation projects since 1991 in partnership with state and federal agencies and conservation groups.

The Tennessee Aquatic Database System (TADS)

The Tennessee Aquatic Database System (TADS) originated in the mid-1980's as a geographically referenced fisheries database maintained with ESRI's GIS Arc/Info software. It consists of mapping coverages of streams, rivers and reservoirs along with relatable fisheries data files. These database files include stream and river fish distributions, sample site data, and Index of Biotic Integrity (IBI) data. The fish inventory data file contains over 15,000 records of fish occurrences from over 3,600 sample sites across the state. Fish data is referenced by river reach and a point coverage generated by latitude and longitude. Physical and chemical data and habitat evaluations from most of the sample sites have been entered into a database.

TWRA Fisheries stream survey data were consolidated, updated and entered into a Microsoft Access database to create the Tennessee Aquatic Database System 07 (TADS07), an updated version of the TADS. TADS07 contains fisheries stream survey data from 1987 to 2005.

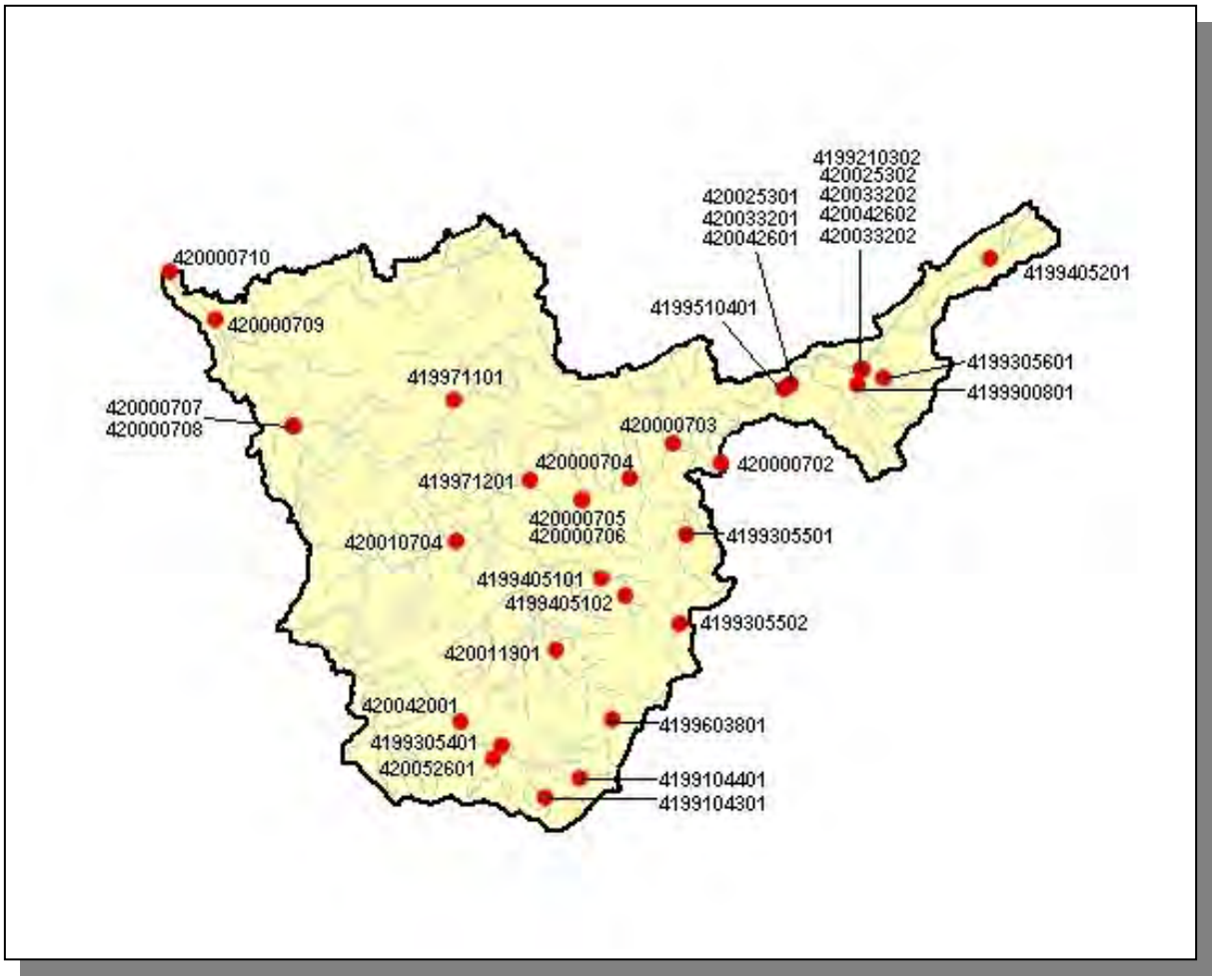


Figure 5-3. Location of TWRA TADS Sampling Sites in the Tennessee Portion of the Upper French Broad River Watershed from 1987-2005. *More information is provided in Appendix V.*

Tennessee State Wildlife Action Plan (SWAP)

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

GIS model based upon relative differences in species rarity, population viability, and potential mobility of species across habitat units.

Priority problems affecting species and needed conservation actions are detailed across each region of the state. For complete information about the Tennessee SWAP, please visit: http://www.state.tn.us/twra/cwcs/cwcsindex.html to read or download the full report.

For information on these and other water resources related activities, please contact your Regional TWRA office at the following phone numbers:

West Tennessee (Region I)	1-800-372-3928
Middle Tennessee (Region II)	1-800-624-7406
Cumberland Plateau (Region III)	1-800-262-6704
East Tennessee (Region IV)	1-800-332-0900

TDD services are available at 615-781-6691.
TWRA's website is http://www.state.tn.us/twra.

5.3.E. North Carolina Division of Water Quality

Basinwide Planning in North Carolina

The North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality's (DWQ) Planning Section prepare the basinwide water quality plans for each of the seventeen major river basins across the state. Basinwide planning is a watershed-based approach to restoring and protecting North Carolina's surface waters. Preparation of a basinwide plan is a five-year process and includes:

Phase I: Data collection and identification of goals
Phase II: Data analysis and coordination of stakeholders to identify and prioritize water quality issues in that river basin
Phase III: Preparation of the basinwide water quality plan (includes public review and comments), issuance of NPDES permits, and implementation of recommendations

While these plans are prepared by DWQ, their implementation and the protection of water quality entail the coordinated efforts of many agencies, local governments, and stakeholder groups across the state. The first cycle of plans was completed in 1998.

The goals of basinwide planning are to:

- Identify water quality problems and restore full use to impaired waters.
- Identify and protect high value resource waters.
- Protect unimpaired waters while allowing reasonable economic growth.

DWQ accomplishes these goals through the following objectives:

- Collaborate with other agencies to develop appropriate management strategies.
- Assure equitable distribution of waste assimilative capacity.
- Evaluate cumulative effects of pollution.
- Improve public awareness and involvement.
- Regulate point and nonpoint sources of pollution where other approaches are unsuccessful.

French Broad River Basin in North Carolina

The basin is composed of three major drainage areas: the **French Broad River (HUC 06010105)**, the Pigeon River (HUC 06010106), and the Nolichucky River (HUC 06010108). All three rivers individually flow northwest into Tennessee.

Specific watershed information can be found in the French Broad River Basinwide Water Quality Plan (April 2005). The plan is available on the DWQ Web site (www.ncwaterquality.org/basinwide/index.htm).

Water Quality Stressors and Sources in the French Broad River Basin

Many of the stressors related to water quality impairment in the basin include habitat degradation, fecal coliform bacteria, and altered watershed hydrology (i.e., impervious surfaces, stormwater runoff). Water quality stressors are identified when impacts have been noted to biological (fish and benthic) communities or water quality standards have been violated. In many cases, identifying stressors is challenging because direct measurements of the stressor may be difficult or prohibitively expensive. DWQ staff use field observations from sample sites, special studies, and data from ambient monitoring stations to identify stressors. It is important to identify stressors and potential sources of stressors so that water quality programs can target limited resources to address these issues.

Sources of stressors are most often associated with land use in a watershed, as well as the quality and quantity of any treated wastewater that may be entering a stream. Sources of stressors most often come from a watershed where the hydrology is altered enough to allow the stressor to be easily delivered to a stream during a rain event along with unnaturally large amounts of water. DWQ identifies the source of a stressor as specifically as possible depending on the amount of information available in a watershed. Most often, the source is based on the predominant land use in a watershed. Stressors sources identified in the French Broad River basin during this assessment period include urban or impervious surface areas, construction sites, road building, agriculture, and forestry. Point source discharges are also considered a water quality stressor source. More information about water quality stressors and sources can be found in the French Broad River Basinwide Water Quality Plan. The plan is available on the DWQ Web site (www.ncwaterquality.org/basinwide/index.htm).

Contact Information:

Michelle Raquet
Environmental Specialist
NCDENR DWQ
Planning Section – Basinwide Planning Unit
1617 Mail Service Center
Raleigh, NC 27699
Phone: 919-733-5083 ext. 367
Email: michelle.raquet@ncmail.net

5.3.F. North Carolina Clean Water Management Trust Fund. The 1996 General Assembly of North Carolina established the Clean Water Management Trust Fund to help local governments, state agencies and conservation non-profit groups finance projects to protect and restore surface water quality. Since 1996, thanks to appropriations from the General Assembly, the CWMTF has awarded 943 grants for a total of $711.5 million. CWMTF grants have contributed towards the protection of more than 391,805 acres and 4,277 miles of riparian buffers.

The 21-member, independent CWMTF Board of Trustees has full responsibility over the allocation of moneys from the Fund. CWMTF will fund projects that (1) enhance or restore degraded waters, (2) protect unpolluted waters, and/or (3) contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits.

For more information, contact Lisa Schell at (919) 716-0057 or visit:
http://www.cwmtf.net/.

5.4. LOCAL INITIATIVES.

5.4.A. The Smoky Mountain Resource Conservation and Development Council.

COUNCIL OVERVIEW

The Smoky Mountain Resource Conservation and Development (RC&D) Area encompasses both the Smoky Mountains of East Tennessee, as well as parts of the French Broad, Nolichucky, Little Tennessee, and Upper French Broad River basins. The counties included in this RC&D area are as follows: Blount, Cocke, Hamblen, Jefferson, Knox, and Sevier. The area includes approximately 1,629,440 acres – including parts of the Great Smoky Mountains National Park and the Cherokee National Forest. The area is bordered by the mountains of North Carolina along the southeast, by Greene County (TN) on the northeast, by the Upper French Broad River to the north, and by Anderson, Roane, and Loudon counties to the west. The area has a very diverse lane use and geology. This is a rugged, rural landscape that is dominated by the Appalachian Mountains. The severely dissected ridges and narrow valleys that formed the western frontier of early America continue to influence transportation, commerce, agriculture, and land use.

The population of the six county region is approximately 712,171 according to an estimated figure obtained by the US Census Bureau in 2002. Farming enterprises include beef cattle, tobacco, dairy, poultry, and specialty crops. The vast majority of farmers are part-time within this region. Most jobs are in a variety of service trades (16.7%) and manufacturing facilities (21.3%). The average per capita income for the area in 1999 was $17,970, with the median household income calculated to be $33,460 per year. Unemployment across the area was calculated at a rate of 5.7%.

The Smoky Mountain RC&D Area received its charter in June 1997, as well as successfully obtained its 501(c)3 tax status with the Internal Revenue Service. At this point, the Council consisted of only five counties (Blount, Cocke, Hamblen, Jefferson, and Sevier). The Council's borders were expanded to include Knox County in late 2004.

In addition, the Smoky Mountain RC&D Council has received grants from the USDA Forest Service, Tennessee Department of Agriculture, Tennessee Valley Authority, US Fish & Wildlife Service, Tennessee Arts Commission, and the USDA – Rural Development. The funds generated from these grantors have been (and will be) used to initiate and complete projects that will help to meet the goals and objectives of our council.

MISSION STATEMENT

The mission of the Smoky Mountain RC&D Council and its programs is to empower residents to improve their quality of life through economic and community development while sustaining the natural resources of the area.

COUNCIL GOALS

Goal A: Expand sustainable economic development while conserving the area's natural resources.

Goal B: Promote new and innovative entrepreneurial opportunities to individuals within the RC&D Area.

Goal C: Educate individuals within the area on the importance of clean drinking water, as well as on the value of teaching water quality – in general terms.

Goal D: Reach 25% of the RC&D Area population with educational programs by 2010, which will empower them with the knowledge and desire to improve their quality of life.

RECENT PROJECTS in the Upper French Broad River Watershed:

- In the process of installing a alternative water system, fencing, and heavy use area on Todd Bunch farm in order to increase water quality. This is located in the upper French Broad.

Contact:
Eston Williams
Smoky Mountain RC&D Council
1715 Garden Village Drive
White Pine, Tennessee 37890-3148
Phone: 865-674-8890
Email: eston.williams@tn.usda.gov

5.4.B. The Appalachian Resource Conservation and Development Council. The mission of the Appalachian RC&D Council is to conserve natural resources and improve rural economies through community leadership and enhanced educational opportunities.

The Appalachian RC&D Council assists in administering the USDA Resource Conservation and Development Program, which is a unique combination of private enterprise and federal assistance that encourages economic growth through development, conservation, and planned utilization of natural resources across the council area and Tennessee. Just a few services the RC&D Program is providing in our community are Conservation Education, Farmland Protection, providing Technical Assistance, ensuring Community Services, establishing Sustainable Development, encouraging Natural Resource Protection, and Communicating Local Issues.

The Appalachian RC&D Council is quite active with numerous watershed area groups in our six county region. Along with TVA, the Appalachian RC&D Council started the Upper and Middle Nolichucky and Upper Holston Watershed Alliances and have provided considerable support to them as well as to the Boone Watershed Partnership.

For more information on the Appalachian RC&D Council and its programs, contact Roy Settle, NRCS-RC&D Coordinator at 423-753-4441 ext. 4 or roy@appalachianrcd.org or visit the web site www.appalachianrcd.org.

CHAPTER 6

RESTORATION STRATEGIES
IN THE UPPER FRENCH BROAD RIVER WATERSHED

6.1. BACKGROUND.

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

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

6.2. COMMENTS FROM PUBLIC MEETINGS. Watershed meetings are open to the public, and most meetings were represented by citizens who live in the watershed, NPDES permitees, business people, farmers, and local river conservation interests. Locations for meetings were 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 Upper French Broad River Watershed public meeting was held jointly with the Pigeon River Watershed on December 5, 2007, at the Cocke County High School in Newport, Tennessee. 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. Eight people attended the meeting.

Major Concerns/Comments Voiced at Public Meeting

- Newspaper article about 4 houses with straight pipes
- Is the Pigeon River as good as it's going to get?
- Why are so many agricultural sources listed on the 303(d) list?
- Many people did not hear about this meeting

6.2.B. Year 3 Public Meeting. Not scheduled.

6.2.C. Year 5 Public Meeting. Not scheduled.

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.

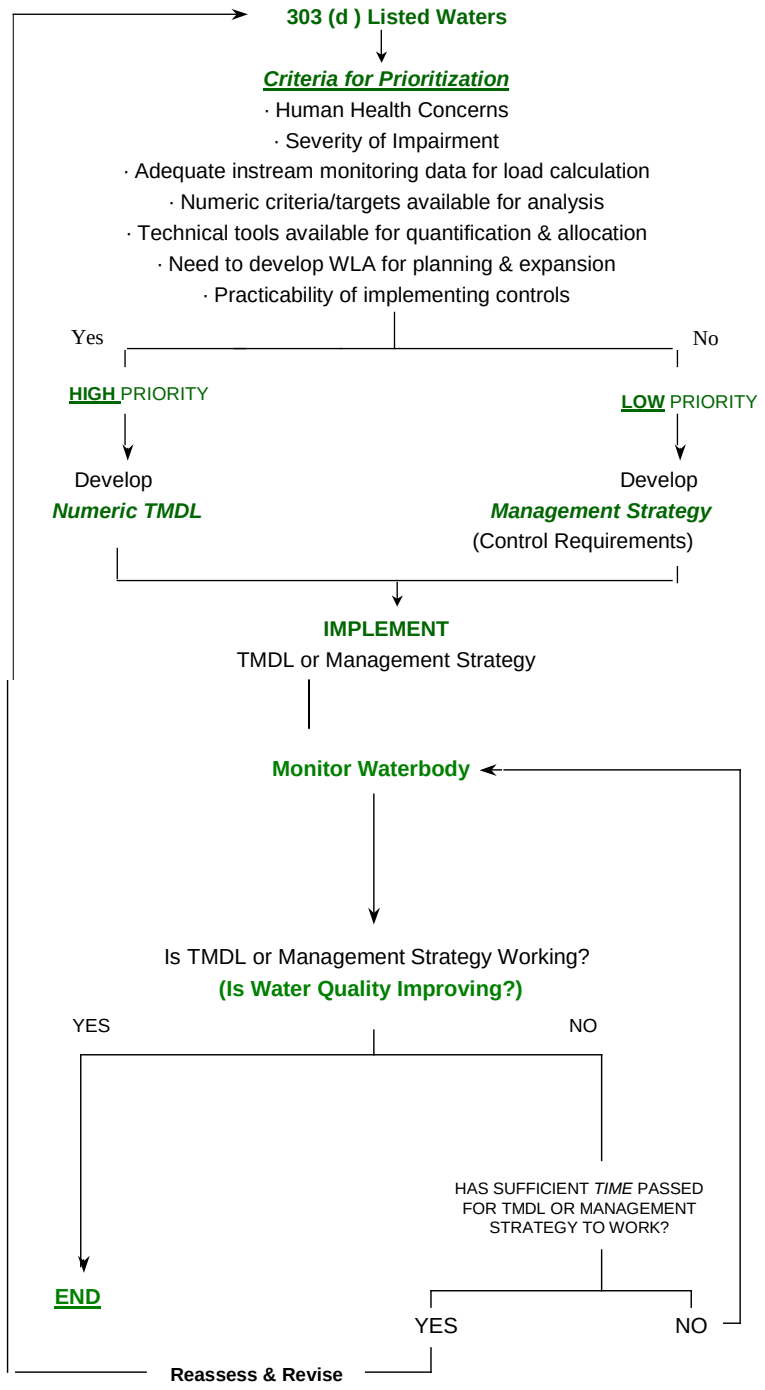


Figure 6-1. Prioritization Scheme for TMDL Development.

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

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

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

6.3.B.i. Sedimentation.

6.3.B.i.a. From Construction Sites. Construction activities have historically been considered "nonpoint sources." In the late 1980's, EPA designated them as being subject to NPDES regulation if more than 5 acres were being disturbed. In the spring of 2003, that threshold became 1 acre or less than 1 acre if it's part of a larger development. 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 and sediment control measures on sites in the watershed of streams that are already impaired due to siltation or are considered high quality. Regardless of the size, no construction site is allowed to cause a condition of pollution.

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

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

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

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

Voluntary activities

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

Regulatory Strategies

- Increase efforts in the Master Logger program to recognize impaired streams and require more effective management practices.
- Require post-construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion.
- Implement additional restrictions on logging in streamside management zones.
- 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.
- Limit clearing of stream and roadside ditch banks or other alterations. *Note: Permits may be required for any work along streams.*
- Encourage or require strong local buffer ordinances.
- Restrict rock harvesting and sand removal to permitted sites.

Additional strategies

- Better community planning and MS4 oversight for the impacts of development on small streams.

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 buffer along stream corridors is sometimes a problem in the Tennessee Portion of the Upper French Broad River Watershed. Impacted streams that could benefit from the establishment of riparian buffer zones include Clear Creek and its tributaries.

6.3.B.ii. Pathogen Contamination.

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

Currently, only 3 stream systems in the Tennessee Portion of the Upper French Broad River Watershed are known to have excessive pathogen contamination. Baker Creek and Johns Creek in the Trail Fork system are impacted by bacterial contamination coming from septic drainfields. In agricultural watersheds, Clear Creek shows elevated bacterial levels from pasture grazing and cattle access to streams.

Other measures that may be necessary to control pathogens are:

Voluntary activities

- 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 feeding operations.

Enforcement strategies

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

Additional strategies

- Develop intensive planning in areas where sewer is not available and treatment by subsurface disposal is not an option due to poor soils, floodplains, or high water tables.
- Develop and enforce leash laws and controls on pet fecal material.
- 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.

Other sources of nutrients can be addressed by:

Voluntary activities

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

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

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

Regulatory strategies.

- Strengthen enforcement of regulations governing on-site wastewater treatment.
- Impose more stringent permit limits for nutrients discharged from sewage treatment plants.
- Impose timely and appropriate enforcement for noncomplying sewage treatment plants, large and small, and their collection system.
- Identify Concentrated Animal Feeding Operations not currently permitted.
- Support and train local MS4 programs within municipalities to deal with storm water pollution issues.

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. No streams are currently listed as impaired from these kinds of sources in the Tennessee Portion of the Upper French Broad River Watershed. More stringent inspection and regulation of permitted industrial facilities, and local storm water quality initiatives and regulations, could help reduce the amount of contaminated runoff reaching state waters.

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

Some of these problems can be addressed by:

Voluntary activities

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

Enforcement strategies

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

6.3.B.v. Habitat Alteration.

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

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

Voluntary activities

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

- Encourage developers to avoid extensive use of culverts in streams.

Current regulations

- Restrict modification of streams by such means as culverting, lining, or impounding. Clay Creek, for example, has had a number of small impoundments built on its upper reaches.
- Require mitigation for impacts to streams and wetlands when modifications are allowed.

Additional Enforcement

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

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 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 section provides specific information on the municipal permit holders in the Tennessee Portion of the Upper French Broad River Watershed. Compliance information was obtained from EPA's Permit Compliance System (PCS). All data was queried for a five-year period between May 1, 2002, and May 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 Tennessee Portion of the Upper French Broad River Watershed.*

6.4.A. Municipal Permits

TN0054861 Parrottsville Elementary School

Discharger rating: Minor
City: Newport
County: Cocke
EFO Name: Knoxville
Issuance Date: 8/01/05
Expiration Date: 6/30/10
Receiving Stream(s): Clear Creek at mile 6.4
HUC-12: 060101050703
Effluent Summary: Treated domestic wastewater from Outfall 001
Treatment system: Activated sludge

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	Summer	1.8	mg/L	DMax Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Summer	1.2	mg/L	MAvg Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	7.5	mg/L	DMax Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	5	mg/L	MAvg Conc	2/Month	Grab	Effluent
CBOD5	Summer	15	mg/L	DMax Conc	2/Month	Grab	Effluent
CBOD5	Summer	10	mg/L	MAvg Conc	2/Month	Grab	Effluent
CBOD5	Winter	37.5	mg/L	DMax Conc	2/Month	Grab	Effluent
CBOD5	Winter	25	mg/L	MAvg Conc	2/Month	Grab	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	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	0.02	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	40	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 6-1. Stream Segment Information for Parrotsville Elementary School.

Comments:
None

TN0067318 Parrottsville STP

Discharger rating: Minor
City: Parrotsville
County: Cocke
EFO Name: Knoxville
Issuance Date: 1/01/06
Expiration Date: 6/30/10
Receiving Stream(s): Clear Creek at mile 6.0
HUC-12: 060101050703
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: Septic tank and recirculating sand filter

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	Summer	1.8	mg/L	DMax Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Summer	1.2	mg/L	MAvg Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	7.5	mg/L	DMax Conc	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	5	mg/L	MAvg Conc	2/Month	Grab	Effluent
CBOD5	Summer	15	mg/L	DMax Conc	2/Month	Grab	Effluent
CBOD5	Summer	10	mg/L	MAvg Conc	2/Month	Grab	Effluent
CBOD5	Winter	37.5	mg/L	DMax Conc	2/Month	Grab	Effluent
CBOD5	Winter	25	mg/L	MAvg Conc	2/Month	Grab	Effluent
D.O.	All Year	6	mg/L	DMin Conc	Weekdays	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	0.02	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	40	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 6-2. Stream Segment Information for Parrotsville STP.

Comments:
None

APPENDIX II

LAND COVER/LAND USE	ACRES	% OF WATERSHED
Deciduous Forest	93,707	68%
Pasture/Hay	19,239	14%
Evergreen Forest	9,489	6.90%
Mixed Forest	5,888	4.30%
Low Intensity Residential	5,054	3.70%
Evergreen Shrubland	1,267	0.90%
Grassland/Herbaceous	1,226	0.90%
Open Water	656	0.50%
Row Crops	578	0.40%
High Intensity Residential	331	0.20%
Wetlands	329	0.20%
Bare Rock/Sand/Clay	82	0.10%
Total	**13,7855**	**100**

Table A2-1. Land Use Distribution in the Tennessee Portion of the Upper French Broad 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 Igneous Ridges and Mountains (66d)	Black Branch (66d01)	Watauga River	06010103
	Laurel Fork Creek (66d03)	Watauga River	06010103
	Doe River (66d05)	Watauga River	06010103
	Tumbling Creek (66d06)	Nolichucky River	06010108
	Little Stony Creek (66d07)	Watauga River	06010103
Southern Sedimentary Ridges (66e)	Gentry Creek (66E04)	SF Holston River	06010102
	Clark Creek (66E09)	Nolichucky River	06010108
	Lower Higgins Creek (66E11)	Nolichucky River	06010108
	Double Branch (66E17)	Watts Bar/Fort Loudoun Lake	06010201
	Gee Creek (66E18)	Hiwassee	06020002
Southern Metasedimentary Mountains (66g)	Middle Prong Little River (66g04)	Lower French Broad	06010107
	Little River (66g05)	Watts Bar/Fort Loudoun Lake	06010201
	Citico Creek (66g07)	Little Tennessee River	06010204
	North River (66g09)	Little Tennessee River	06010204
	Sheeds Creek (66g12)	Conasauga River	03150101
Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)	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
	Big Creek (67F01)	Holston River	06010104
	Fisher Creek (67F02)	Holston River	06010104
	Possum Creek (67F07)	South Fork Holston	06010102
	Powell River (67F25)	Powell River	06010206
Southern Shale Valleys (67g)	Little Chuckey Creek (67g01)	Nolichucky River	06010108
	Bent Creek (67g05)	Nolichucky River	06010108
	Brymer Creek (67g08)	Hiwassee River	06020002
	Harris Creek (67g09)	Hiwassee River	06020002
	Flat Creek (67g10)	Lower French Broad	06010107
	North Prong Fishdam Creek (67g11)	South Fork Holston	06010102

Table A2-2. Ecoregion Monitoring Sites in Ecoregions 66d, 66e, 66g, 67f, and 67g,

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Bear Branch	TN06010105003_0200	2.1
Black Creek	TN06010105003_1120	1.1
Dry Fork	TN06010105003_0100	7.6
French Broad River	TN06010105001_3000	8.9
French Broad River	TN06010105001_1000	11.6
Granny Branch	TN06010105003_0110	5.6
Gulf Fork Big Creek	TN06010105003_1300	4.3
Johns Creek	TN06010105003_1150	2.0
Laurel Branch	TN06010105001_0300	9.0
Long Creek	TN06010105001_0200	19.6
Tom Creek	TN06010105003_0900	9.1
Trail Fork Big Creek	TN06010105003_1000	0.9
Trail Fork Big Creek	TN06010105003_2000	3.0
Trail Fork Big Creek	TN06010105003_3000	9.3

Table A3-1. Streams Fully Supporting the Designated Use of Recreation in the Upper French Broad River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Baker Creek	TN06010105003_1110	4.4
Clear Creek	TN06010105001_0100	28.0
Johns Creek	TN06010105003_1100	1.5

Table A3-2. Streams Not Supporting the Designated Use of Recreation in the Upper French Broad River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Allen Branch	TN06010105001_0600	11.5
Brush Creek	TN06010105001_0400	9.5
Bug Creek	TN06010105003_1200	1.4
Double Branch	TN06010105003_0700	2.6
French Broad River	TN06010105001_2000	8.7
Gulf Branch	TN06010105003_0500	1.0
Gulf Fork Big Creek	TN06010105003_1305	21.5
Hurricane Branch	TN06010105003_0400	3.0
Laurel Branch	TN06010105003_0300	5.1
Laurel Fork	TN06010105003_1320	6.8
Middle Fork Gulf Fork Big Creek	TN06010105003_1310	5.9
Misc tribs to French Broad River	TN06010105001_0999	54.1
Rattlesnake Branch	TN06010105003_0600	1.2

Table A3-3a.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Raven Branch	TN06010105003_1330	5.0
Spicewood Branch	TN06010105003_0800	4.6
Wolf Creek	TN06010105001_0500	15.3
Bear Branch	TN06010105003_1370	3.7
Carney Branch	TN06010105003_1390	3.2
Cool Branch	TN06010105003_1380	1.8
Deep Gap Creek	TN06010105003_1350	3.8
Grassy Fork	TN06010105003_1360	13.1
Little Paint Creek	TN06010105071_0100	4.2
Middle Prong Gulf Creek	TN06010105003_1340	4.3
Misc tribs to Gulf Fork Big Creek	TN06010105003_1399	19.1
Paint Creek	TN06010105071_1000	24.9
Rough Branch	TN06010105071_0300	2.7
Sawmill Branch	TN06010105071_0200	10.5

Table A3-3b.

Table A3-3a-b. Streams Not Assessed for the Designated Use of Recreation in the Upper French Broad River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Clear Creek	TN06010105001_0100	28.0
French Broad River	TN06010105001_2000	8.7
French Broad River	TN06010105001_3000	8.9
French Broad River	TN06010105001_1000	11.6
Gulf Fork Big Creek	TN06010105003_1300	4.3
Gulf Fork Big Creek	TN06010105003_1305	21.5
Laurel Branch	TN06010105001_0300	9.0
Long Creek	TN06010105001_0200	19.6
Paint Creek	TN06010105071_1000	24.9
Trail Fork Big Creek	TN06010105003_1000	0.9
Trail Fork Big Creek	TN06010105003_2000	3.0
Trail Fork Big Creek	TN06010105003_3000	9.3
Wolf Creek	TN06010105001_0500	15.3

Table A3-4. Streams Fully Supporting the Designated Use of Fish & Aquatic life in the Upper French Broad River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Allen Branch	TN06010105001_0600	11.5
Baker Creek	TN06010105003_1110	4.4
Bear Branch	TN06010105003_0200	2.1
Bear Branch	TN06010105003_1370	3.7
Black Creek	TN06010105003_1120	1.1
Brush Creek	TN06010105001_0400	9.5
Bug Creek	TN06010105003_1200	1.4
Carney Branch	TN06010105003_1390	3.2
Cool Branch	TN06010105003_1380	1.8
Deep Gap Creek	TN06010105003_1350	3.8
Double Branch	TN06010105003_0700	2.6
Dry Fork	TN06010105003_0100	7.6
Granny Branch	TN06010105003_0110	5.6
Grassy Fork	TN06010105003_1360	13.1
Gulf Branch	TN06010105003_0500	1.0
Hurricane Branch	TN06010105003_0400	3.0
Johns Creek	TN06010105003_1100	1.5
Johns Creek	TN06010105003_1150	2.0
Laurel Branch	TN06010105003_0300	5.1
Laurel Fork	TN06010105003_1320	6.8
Little Paint Creek	TN06010105071_0100	4.2
Middle Fork Gulf Fork Big Creek	TN06010105003_1310	5.9
Middle Prong Gulf Creek	TN06010105003_1340	4.3
Misc tribs to French Broad River	TN06010105001_0999	54.1
Misc tribs to Gulf Fork Big Creek	TN06010105003_1399	19.1
Rattlesnake Branch	TN06010105003_0600	1.2
Raven Branch	TN06010105003_1330	5.0
Rough Branch	TN06010105071_0300	2.7
Sawmill Branch	TN06010105071_0200	10.5
Spicewood Branch	TN06010105003_0800	4.6
Tom Creek	TN06010105003_0900	9.1

Table A3-5. Streams Not Assessed for the Designated Use of Fish & Aquatic Life in the Upper French Broad River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Bear Creek	TN06010207026_0600	5.5
Beaver Creek	TN06010207011_1000	22.5
Beaver Creek	TN06010207011_2000	13.7
Beaver Creek	TN06010207011_3000	7.5
Bullrun Creek	TN06010207014_1000	11.8
East Fork Poplar Creek	TN06010207026_2000	11.3
Grable Branch	TN06010207004_0100	1.3
Hines Branch	TN06010207011_0500	3.2
Knob Fork	TN06010207011_0600	8.1

Table A3-7. Stream Impairment Due to Escherichia coli in the Upper French Broad River Watershed.

APPENDIX V

LAND TREATMENT – CONSERVATION BUFFERS			
	Filter Strip (feet)	Streambank / Shoreline Protection (feet)	Riparian Forest Buffer (acres)
FY 2002	4	5320	2
FY 2003	2	3900	1
FY 2004			2
FY 2006		350	
FY 2006		3000	

Table A5-1a. Land Treatment Conservation Practices (Conservation Buffers), in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

EROSION CONTROL		
	Est. soil saved (tons/year)	Land Treated with erosion control measures (acres)
FY 2002	190	5
FY 2003	5545	128

Table A5-1b. Erosion Control Conservation Practices, in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

NUTRIENT MANAGEMENT				
	Waste Utilization (acres)	AFO Nutrient Mgmt Applied (acres)	Non-AFO Nutrient Mgmt. Applied (acres)	Total Applied (acres)
FY 2004		222		222
FY 2005	249	749		998
FY 2006	68	219		287

Table A5-c. Nutrient Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

PEST MANAGEMENT	
	Pest Mgmt. Systems (acres)
FY 2003	514
FY 2004	226
FY 2005	694
FY 2006	248

Table A5-1d. Pest Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

GRAZING/FORAGES				
	Prescribed Grazing (acres)	Fencing (feet)	Heavy Use Area Protection (acres)	Pasture and Hay Planting (acres)
FY 2002	20			
FY 2003	88			
FY 2004	174	2200		13
FY 2005	290	5517	2	61
FY 2006		8636	5	

Table A5-1e. Grazing/Forages Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

TREE AND SHRUB PRACTICES					
	Land Prepared for revegetation of Forest (acres)	Land Improved through Forest Stand improvement (acres)	Total Tree & Shrub Estab. (acres)	Forestland Re-established or improved (acres)	Use Exclusion (acres)
FY 2002		9			
FY 2004		136	13	148	2
FY 2005		67		67	105
FY 2006					22

Table A5-1f. Tree and Shrub Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

LAND TREATMENT – TILLAGE AND CROPPING					
	Residue Mgmt, No-till, Strip till (acres)	Tillage & Residue Mgmt Systems (acres)	Conservation Crop Rotation (acres)	Contour Farming (acres)	Cover Crop (acres)
FY 2002	98	98			
FY 2003	23	23			
FY 2004	136	136	52	8	8
FY 2005	148	148	31		88
FY 2006	107	107	49		33

Table A5-1g. Land Treatment Conservation Practices (Tillage and Cropping), in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

WETLANDS	
	Wetlands Created or Restored (acres)
FY 2003	3

Table A5-1h. Wetland Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

WILDLIFE HABITAT MANAGEMENT			
	Upland Habitat Mgmt (acres)	Wetland Habitat Mgmt (acres)	Total Wildlife Habitat Mgmt Applied (acres)
FY 2003	302	2	304
FY 2004	10		10
FY 2005	701	3	704
FY 2006	384		384

Table A5-1i. Wildlife Habitat Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

WATER SUPPLY			
	Pipeline (ft)	Pond (number)	Watering Facility (number)
FY 2004	600		2
FY 2005	819	3	3
FY 2006	5771		18

Table A5-1j. Water Supply Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Performance & Results Measurement System (PRMS) for each fiscal year reporting period (October 1 through September 30) from 2002 to 2006.*

PRACTICE	NRCS CODE	NUMBER OF BMPs
Pond for Rotational Grazing System	378	2
Fence	382	7
Heavy Use Area	561	3
Stream Crossing	576	1
Streambank/Shoreline Protection	580	1
Stream Channel Stability	584	1
Watering Facility	614	4
Total BMPs		**19**

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

SITE ID	WATER BODY	YEAR
420000702	French Broad River	2000
420000703	French Broad River	2000
420000704	French Broad River	2000
420000705	French Broad River	2000
420000706	French Broad River	2000
420000707	French Broad River	2000
420000708	French Broad River	2000
420000709	French Broad River	2000
420000710	French Broad River	2000
419971101	Long Creek	1997
419971201	Laurel Branch	1997
420010704	Gulf Fork Big Creek	2001
4199104301	Brown Gap Creek	1991
4199104401	Middle Prong Gulf Creek	1991
4199210302	Paint Creek	1992
4199305401	Gulf Fork Big Creek	1993
4199305501	Wolf Creek	1993
4199305502	Wolf Creek	1993
4199305601	Little Paint Creek	1993
4199405101	Dry Fork	1994
4199405102	Dry Fork	1994
4199405201	Paint Creek	1994
4199510401	Paint Creek	1995
4199603801	Trail Fork Big Creek	1996
4199900801	Sawmill Branch	1999
420011901	Trail Fork Big Creek	2001
420025301	Paint Creek	2002
420025302	Paint Creek	2002
420033201	Paint Creek	2003
420033202	Paint Creek	2003
420042001	Gulf Fork Big Creek	2004
420042601	Paint Creek	2004
420042602	Paint Creek	2004
420052601	Deep Gap Creek	2005

Table A5-3. TWRA TADS Sampling Sites in the Tennessee Portion of the Upper French Broad River Watershed.