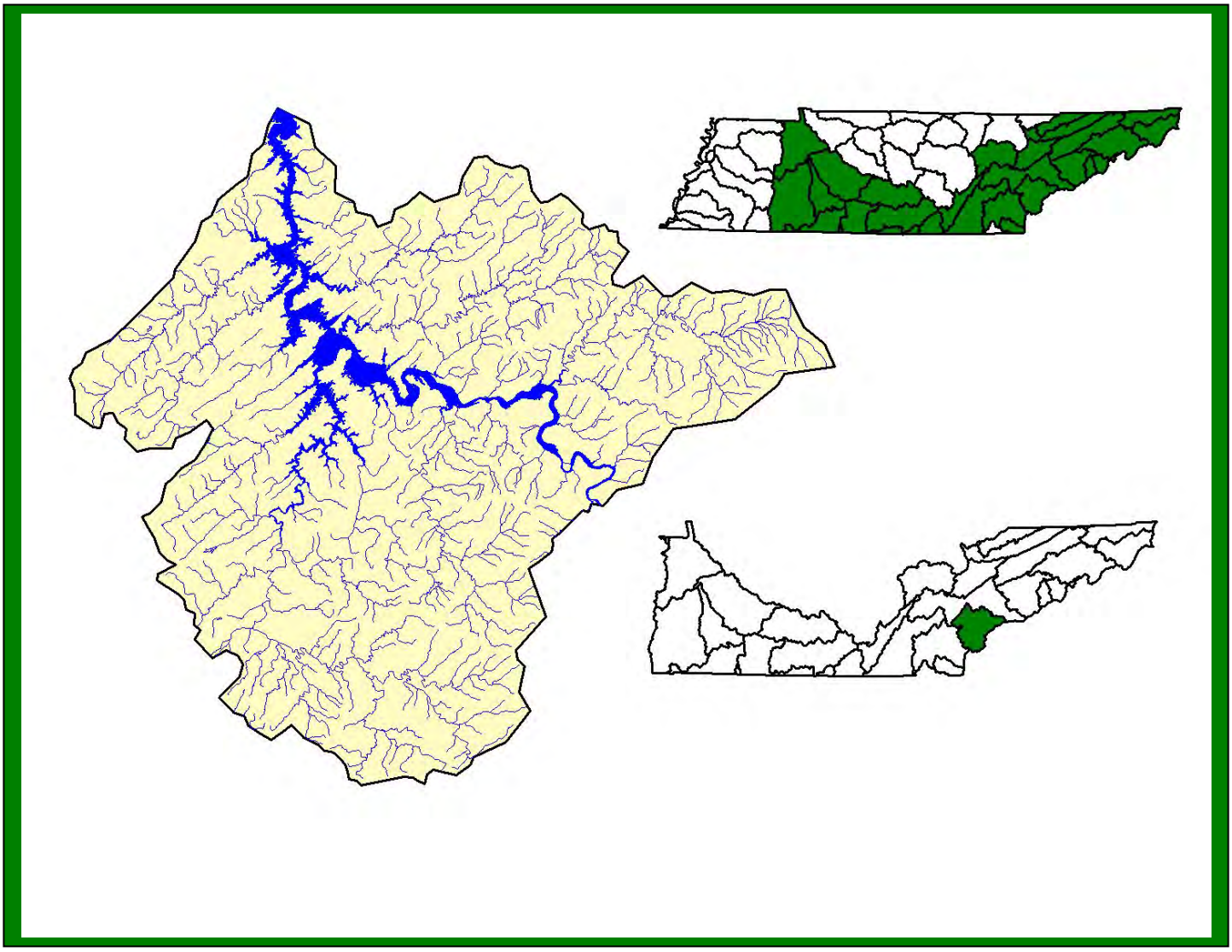
LITTLE TENNESSEE RIVER WATERSHED (06010204) OF THE TENNESSEE RIVER BASIN

WATERSHED WATER QUALITY MANAGEMENT PLAN



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

LITTLE TENNESSEE 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

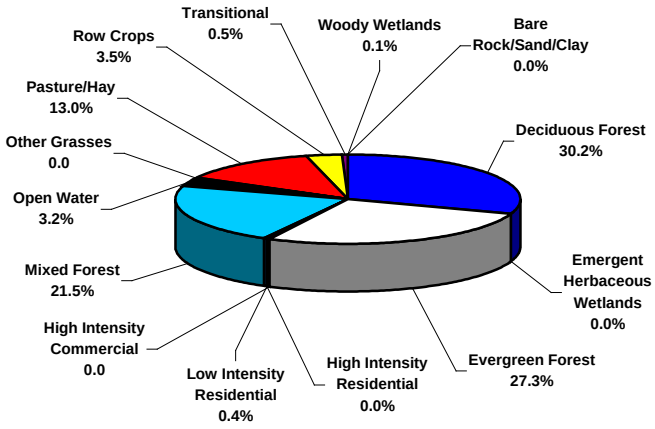
Summary – Little Tennessee River

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

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

Chapter 1 of the Little Tennessee 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.

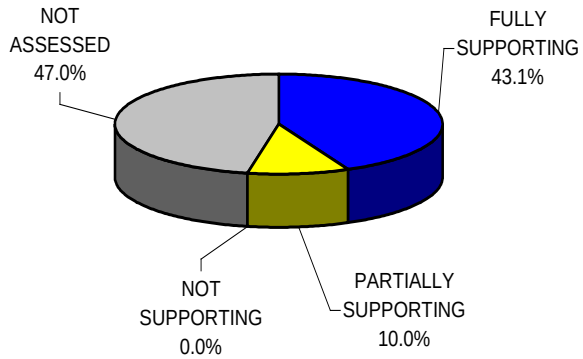
A detailed description of the watershed can be found in Chapter 2, to include information on location, population, hydrology, land use and natural and cultural resources. The Tennessee portion of the Little Tennessee River Watershed is approximately 783 square miles and includes parts of 3 Tennessee counties. A part of the Tennessee River drainage basin, the watershed has 1,082 stream miles and 18,878 lake acres in Tennessee.



Land Use Distribution in the Tennessee Portion of the Little Tennessee River Watershed.

There are three greenways, eleven interpretive areas, and three wildlife management areas located in the watershed. One hundred thirty rare plant and animal species have been documented in the watershed, including twelve rare fish species, two rare mussel species, and nine rare snail species.

A review of water quality sampling and assessment is presented in Chapter 3. Using the Watershed Approach to Water Quality, 68 sampling events occurred in the Tennessee portion of the Little Tennessee River Watershed in 1999-2000. These were conducted at ambient, ecoregion or watershed monitoring sites. Monitoring results support the conclusion that 43.1% of total stream miles fully support designated uses.



Water Quality Assessment for Streams and Rivers in the Tennessee Portion of the Little Tennessee River Watershed. Assessment data are based on the 2002 Water Quality Assessment of 1,081.5 miles in the watershed.

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

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

The Tennessee Portion of the Little Tennessee River Watershed is Composed of Four USGS-Delineated Subwatersheds (10-Digit Subwatersheds).

Point source contributions to the Tennessee portion of the Little Tennessee River Watershed consist of eight individual NPDES-permitted facilities, five of which discharge into streams that have been listed on the 1998 303(d) list. Other point source permits in the watershed are Aquatic Resource Alteration Permits (4), Tennessee Multi-Sector Permits (19), Mining Permits (3), Ready-Mix Concrete Plant Permits (3) and Concentrated Animal Feeding Operation Permits (1). Agricultural operations include cattle, chicken, hog, and sheep farming. Maps illustrating the locations of NPDES and ARAP permit sites are presented in each subwatershed.

Chapter 5 is entitled *Water Quality Partnerships in the Little Tennessee 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, Tennessee Valley Authority, U.S. Fish and Wildlife Service, U.S. Geological Survey, USDA Forest Service and National Park Service), and state agencies (TDEC Division of Community Assistance, TDEC Division of Water Supply, Tennessee Department of Agriculture and North Carolina Department of Environment and Natural Resources) are summarized. Local initiatives of active watershed organizations (Watershed Association of Tellico Reservoir) are also described.

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

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

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

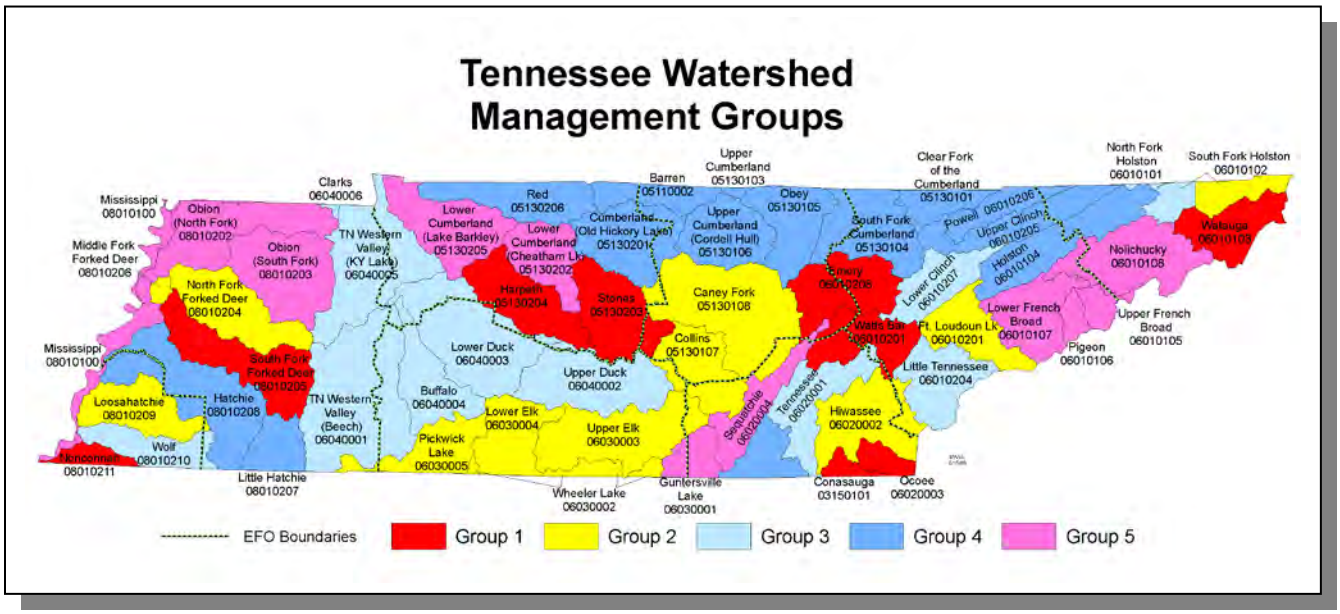


Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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

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

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

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

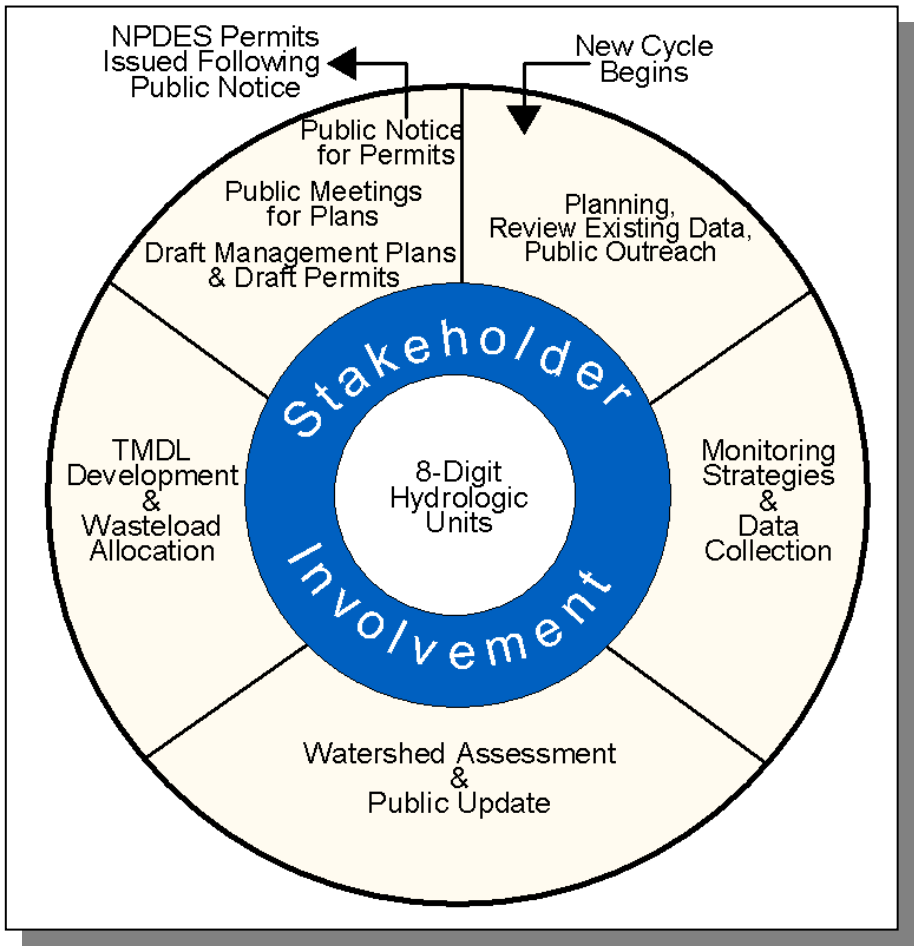


Figure 1-2. The Watershed Approach Cycle.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAPTER 2

DESCRIPTION OF THE LITTLE TENNESSEE RIVER WATERSHED

2.1. BACKGROUND. The Little Tennessee River is part of the TVA system of rivers and lakes. In Tennessee, the waterway is now called Tellico and Chilhowee Reservoirs. The watershed was home to the village of Itsa' sa, or Echota (also spelled Chota), which was regarded as the capital of the Cherokee nation. Headwaters are in both Tennessee and North Carolina, and public lands in Tennessee include the Great Smoky Mountains National Park and Cherokee National Forest.

This Chapter describes the location and characteristics of the Tennessee portion of the Little Tennessee River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Little Tennessee River Watershed is located in Tennessee and North Carolina. The Tennessee portion (74.5% of the watershed) includes parts of Blount, Loudon, and Monroe Counties.

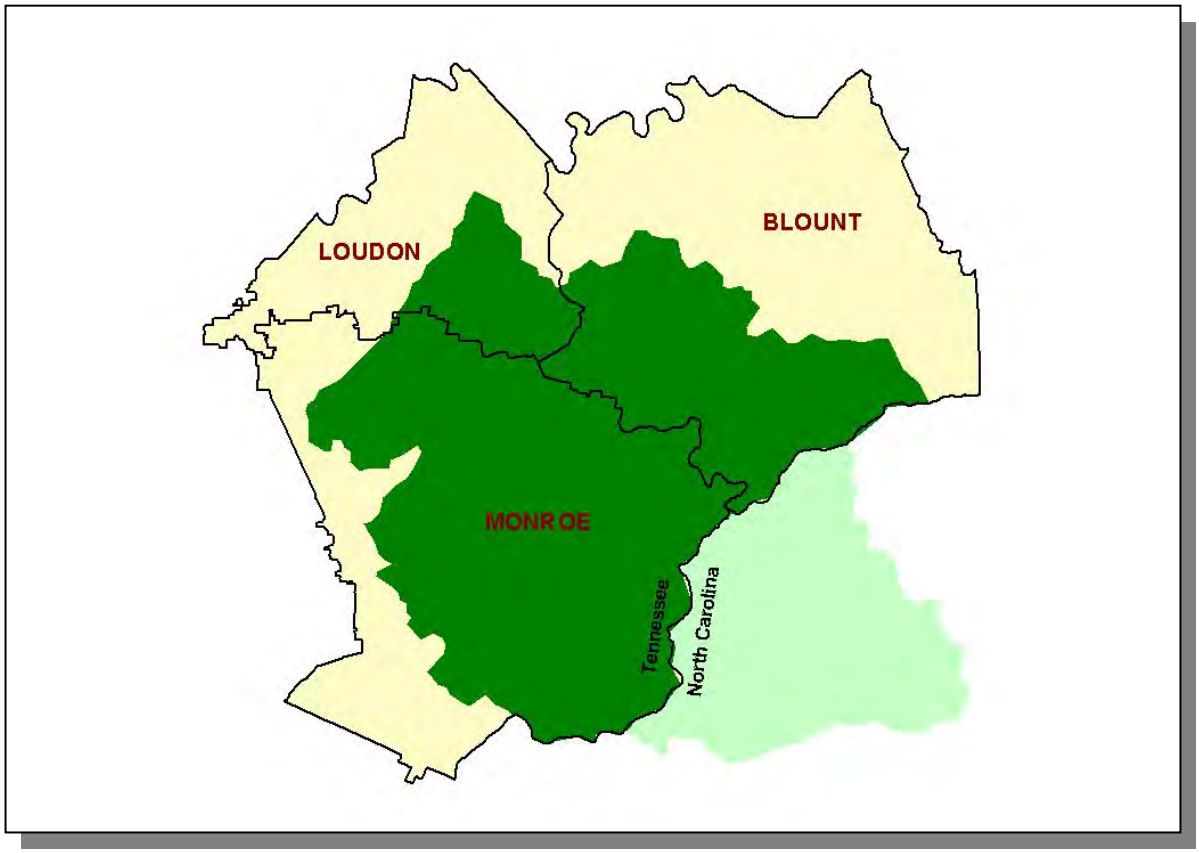


Figure 2-1. General Location of the Little Tennessee River Watershed. *Dark green, Tennessee portion (783 square miles); light green, North Carolina portion (267 square miles).*

COUNTY	% OF WATERSHED IN EACH COUNTY
Monroe	62.8
Blount	28.2
Loudon	8.9

Table 2-1. The Little Tennessee River Watershed Includes Parts of Three East Tennessee Counties. *Percentages are calculated for Tennessee portion of watershed.*

2.2.B. Population Density Centers. Four state highways serve the major communities in the Tennessee portion of the Little Tennessee River Watershed.

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

MUNICIPALITY	POPULATION	COUNTY
Madisonville*	3,635	Monroe
Vonore	938	Monroe
Tellico Plains	758	Monroe
Greenback	684	Loudon

Table 2-2. Communities and Populations in the Tennessee Portion of the Little Tennessee River Watershed. *Population based on 1999 census (Tennessee 2001/2002 Blue Book). Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Little Tennessee River Watershed, designated 06010204 by the USGS, drains approximately 1,050 square miles, 783 square miles of which are in Tennessee, and empties to the Fort Loudoun Lake Watershed (06010201).

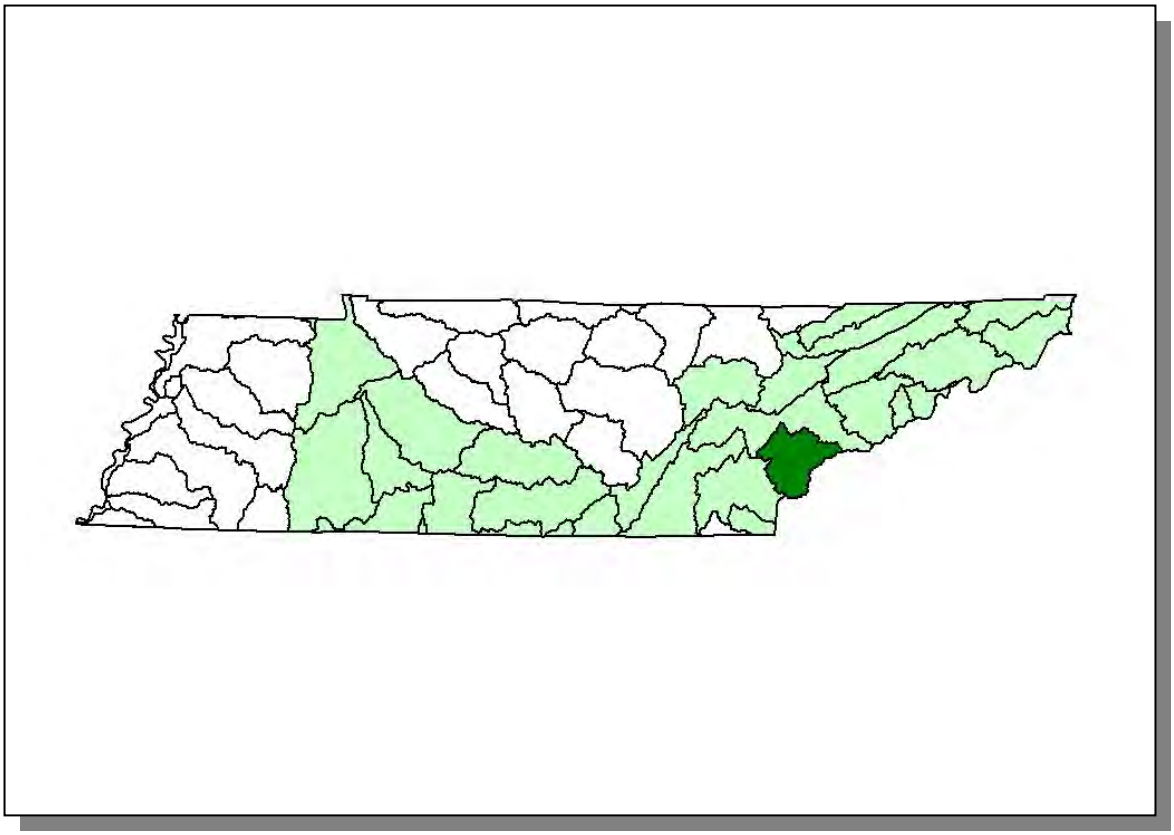


Figure 2-3. The Little Tennessee River Watershed is Part of the Tennessee River Basin.

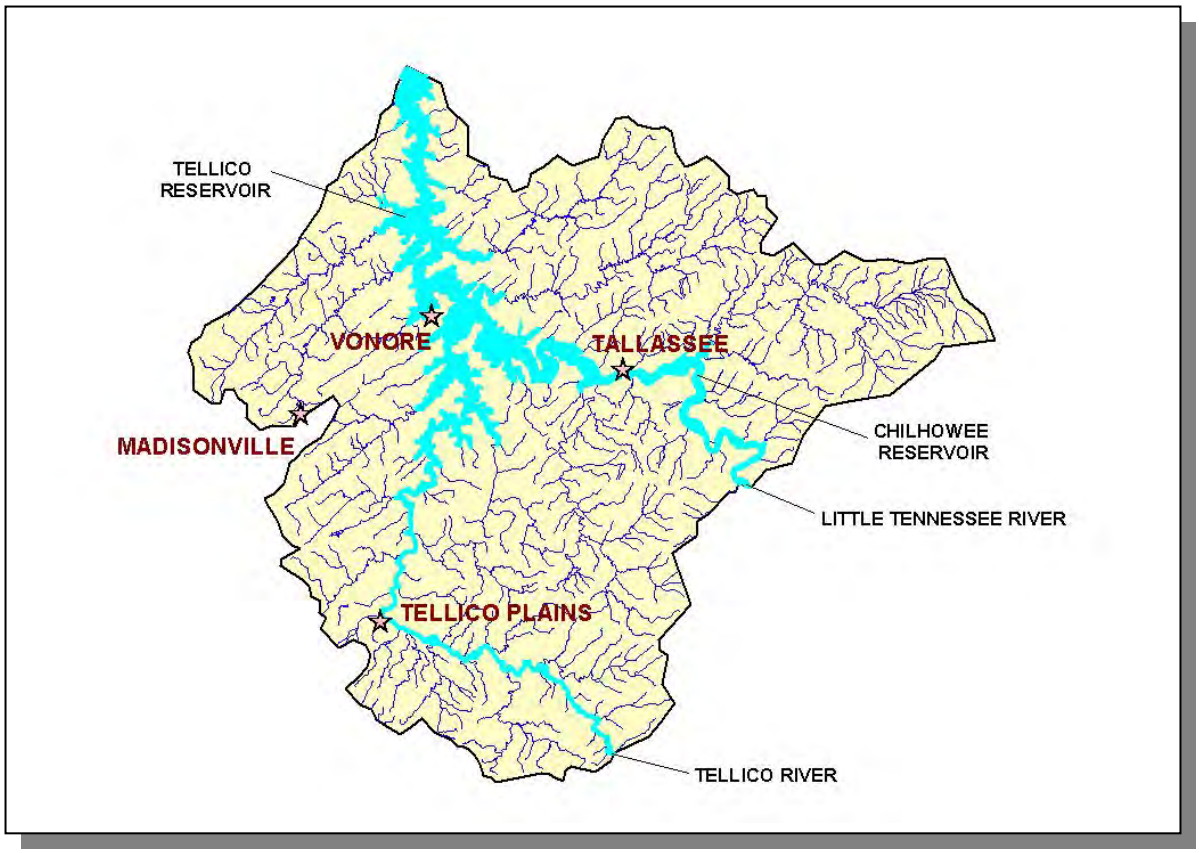


Figure 2-4. Hydrology in the Tennessee Portion of the Little Tennessee River Watershed. *There are 1,082 stream miles and 18,878 lake acres in the Tennessee portion of the Little Tennessee River Watershed as catalogued in the assessment database. An additional 415 stream miles are located in the North Carolina portion of the watershed as catalogued in the River Reach File 3 database. Location of the Little Tennessee River, Tellico River, and the cities of Madisonville, Tallassee, Tellico Plains, and Vonore are shown for reference.*

2.3.B. Dams. There are 10 dams inventoried by TDEC Division of Water Supply in the Tennessee portion of the Little Tennessee River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

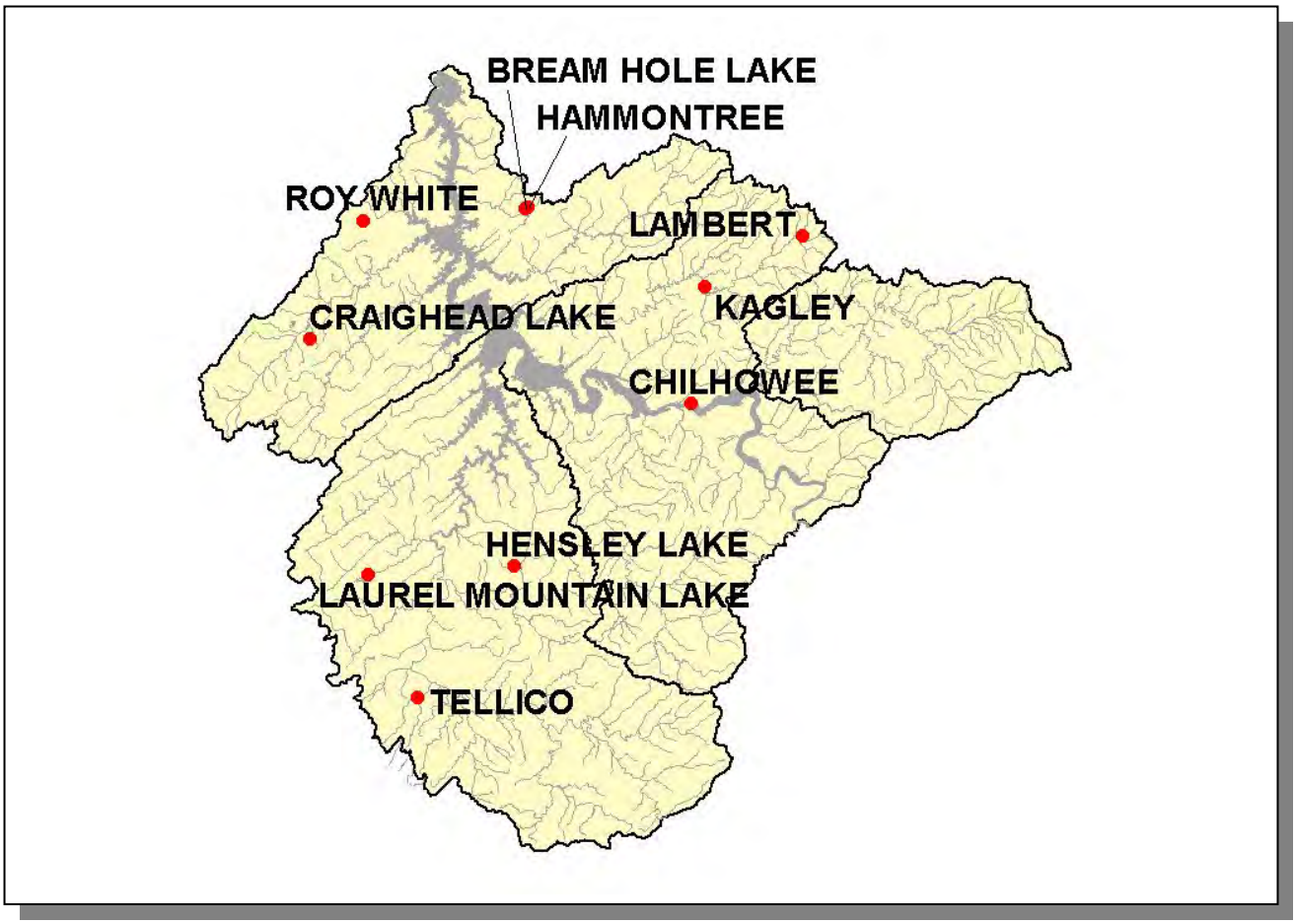


Figure 2-5. Location of Inventoried Dams in the Tennessee Portion of the Little Tennessee River Watershed. *More information is provided in Appendix II and on the TDEC homepage at http://gwidc.memphis.edu/website/dws/.*

2.4. LAND USE. Land Use/Land Cover information was provided by EPA Region 4 and was interpreted from 1992 Multi-Resolution Land Cover (MRLC) satellite imagery.

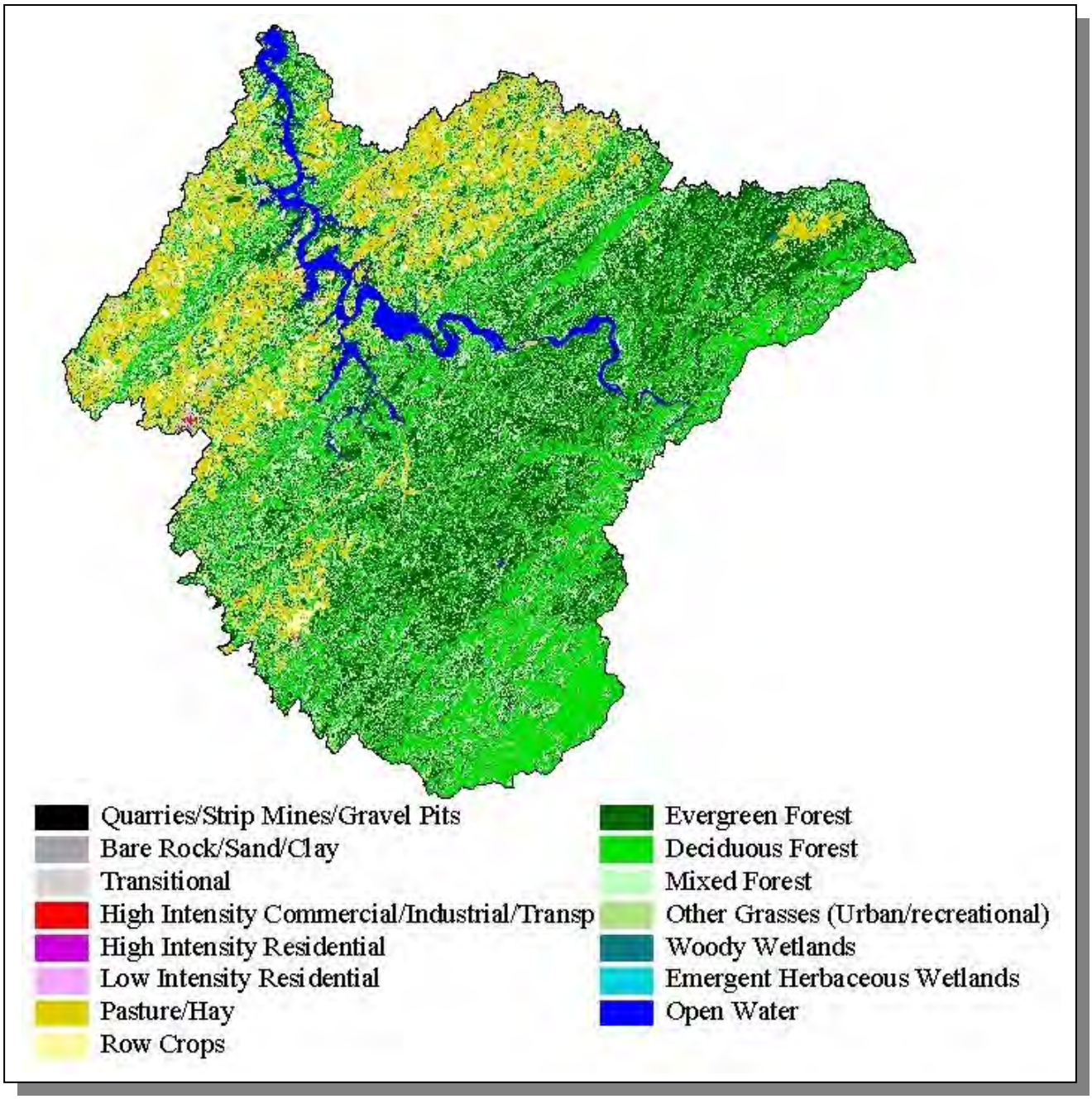


Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery in the Tennessee Portion of the Little Tennessee River Watershed.

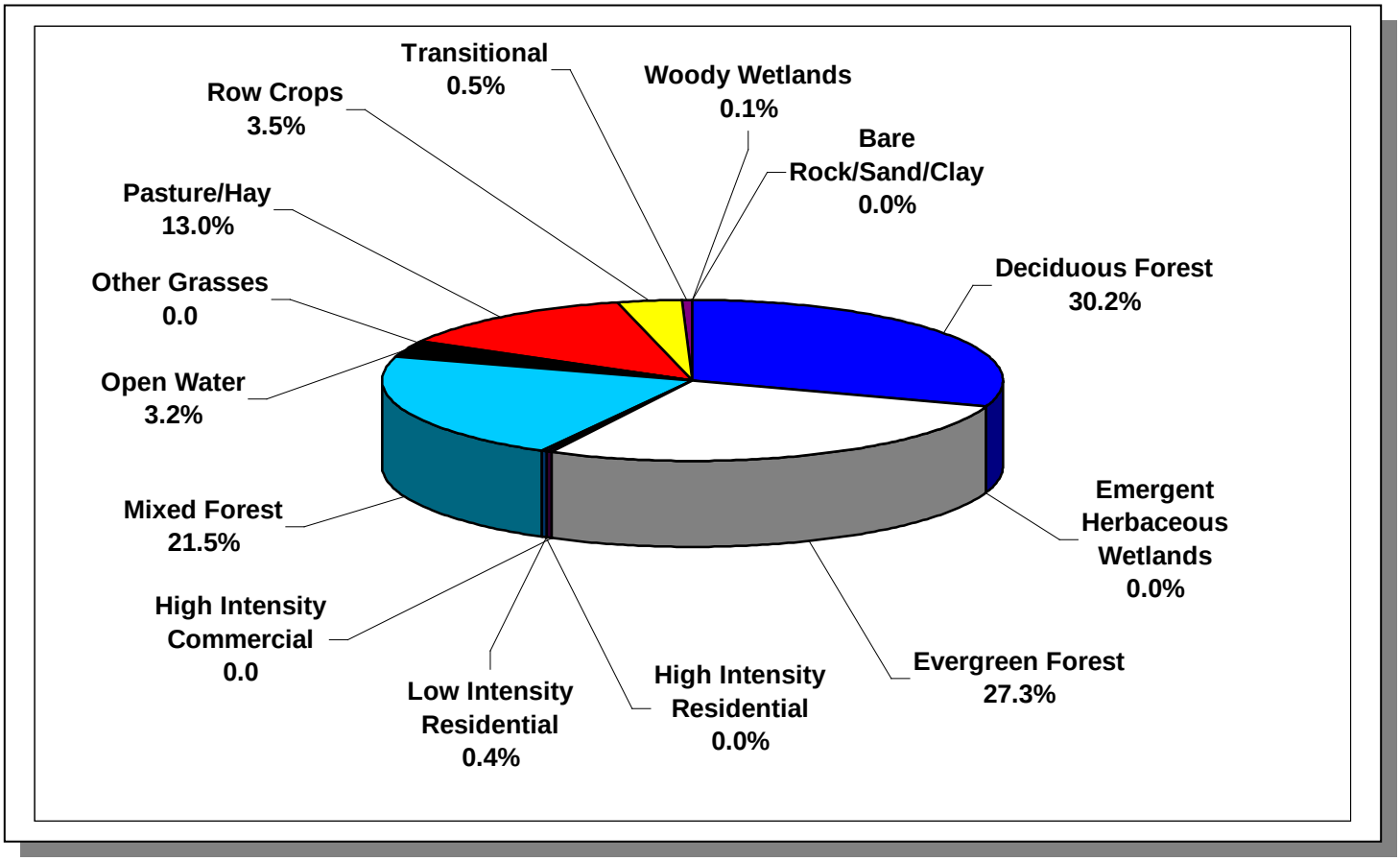


Figure 2-7. Land Use Distribution in the Tennessee Portion of the Little Tennessee River Watershed. *More information is provided in Appendix II.*

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

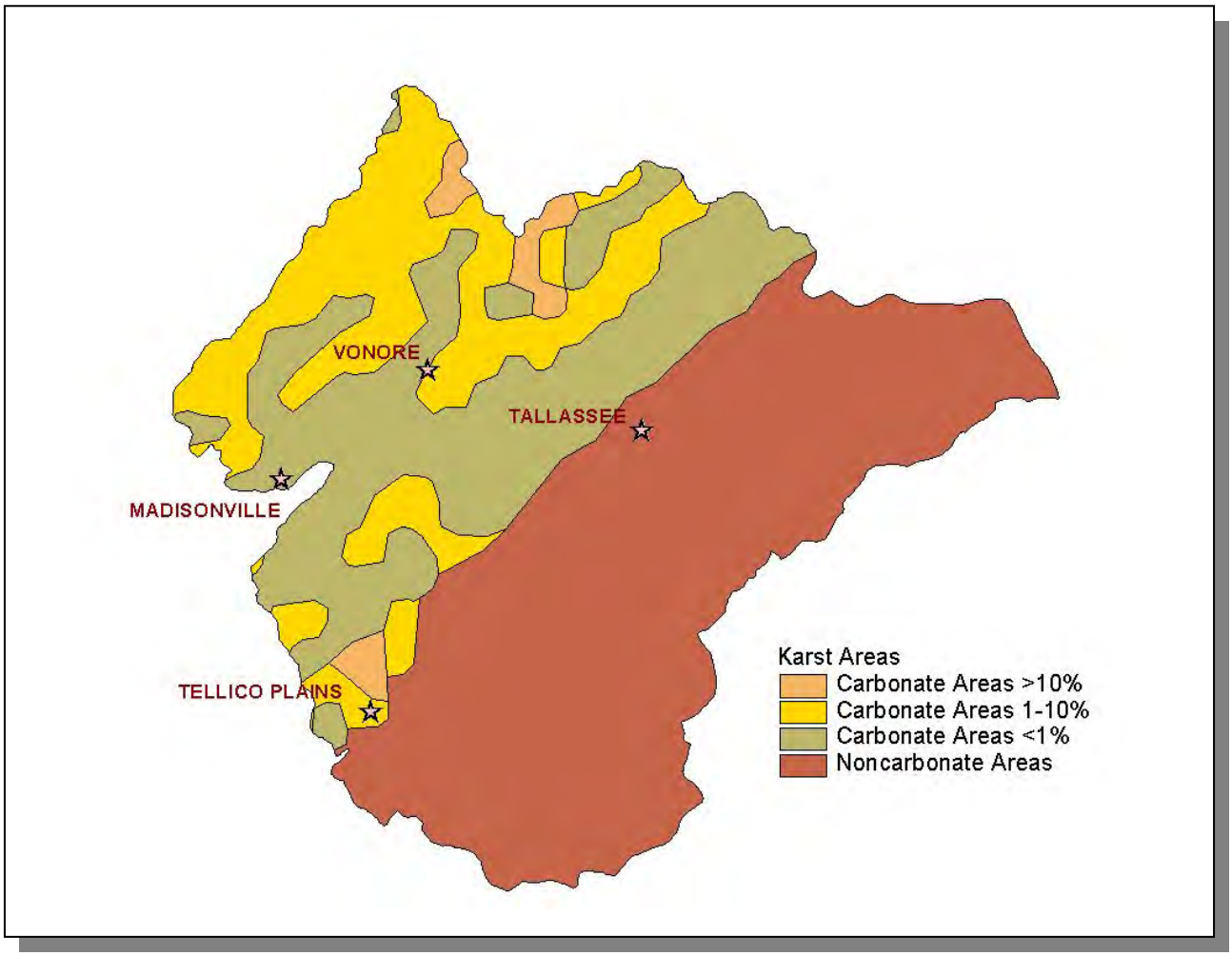


Figure 2-8. Illustration of Karst Areas in Tennessee Portion of Little Tennessee River Watershed. *Locations of Madisonville, Tallassee, Tellico Plains, and Vonore are shown for reference.*

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

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Tennessee portion of the Little Tennessee River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains and Ridge and Valley) and contains 7 Level IV subecoregions:

- **Southern Sedimentary Ridges (66e)** include some of the westernmost foothill areas of the Blue Ridge Mountains ecoregion, such as Bean, Starr, Chilhowee, English, Stone, Bald, and Iron Mountains. Slopes are steep with elevations of 1000-4500 feet. 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. Natural vegetation is mostly mixed oak and oak-pine forests.

- **Limestone Valleys and Coves (66f)** are small but distinct lowland areas of the Blue Ridge, with elevations mostly between 1500 and 2500 feet. About 450 million years ago, older Blue Ridge rocks to the east were forced up and over younger rocks to the west. In places, the Precambrian rocks have eroded through to Cambrian or Ordovician-age limestones, as seen especially in isolated, deep cove areas that are surrounded by steep mountains. The main areas of limestone include the Mountain City lowland area and Shady Valley in the north; and Wear Cove, Tuckaleechee Cove, and Cades Cove of the Great Smoky Mountains in the south. Hay and pasture, with some tobacco patches on small farms, are typical land uses.

- **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 uses, as well as areas of thick forest. White oak forest, bottomland oak forest, and sycamore-ash-elm riparian forests are the common forest types. Grassland barrens intermixed with cedar-pine glades also occur here.

- **Southern Shale Valleys (67g)** consist of lowlands, rolling valleys, 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.

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

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

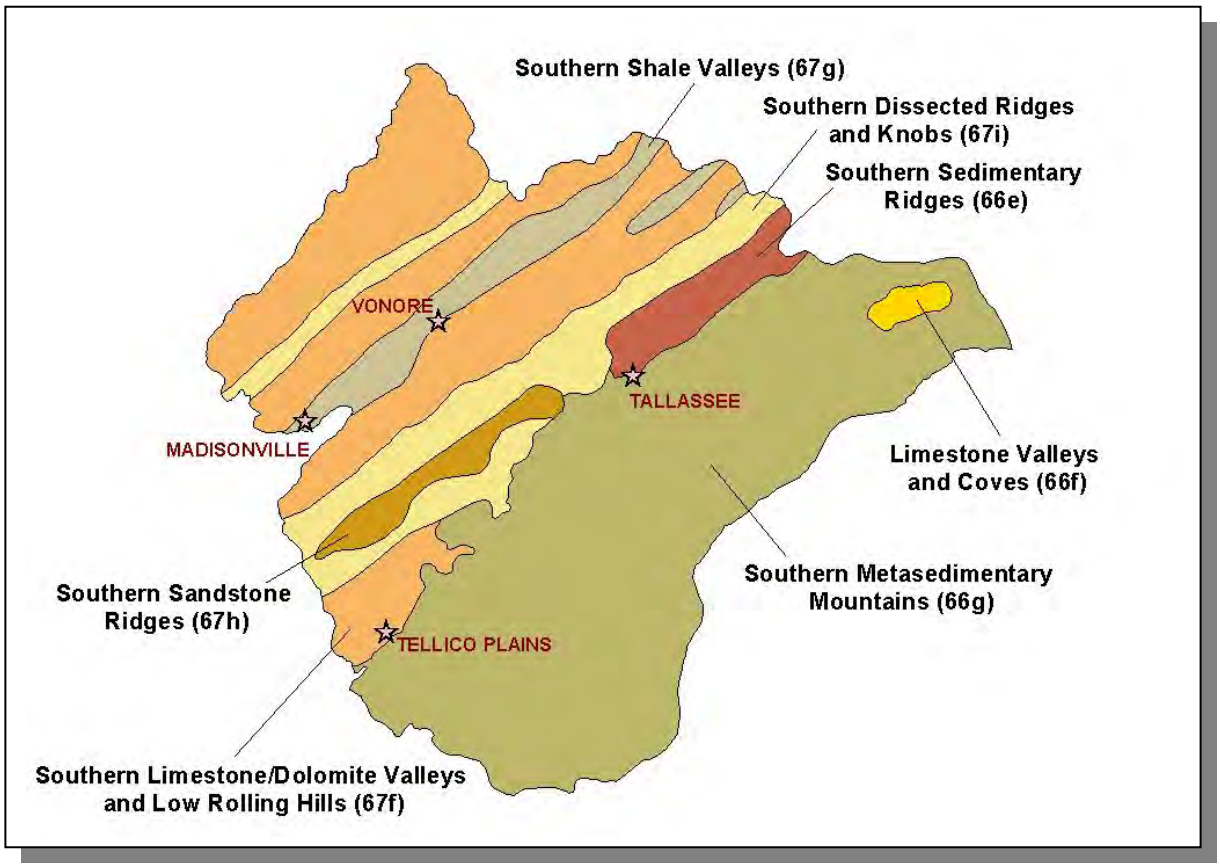


Figure 2-9. Level IV Ecoregions in the Tennessee Portion of the Little Tennessee River Watershed. *Locations of Madisonville, Tallassee, Tellico Plains, and Vonore are shown for reference.*

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

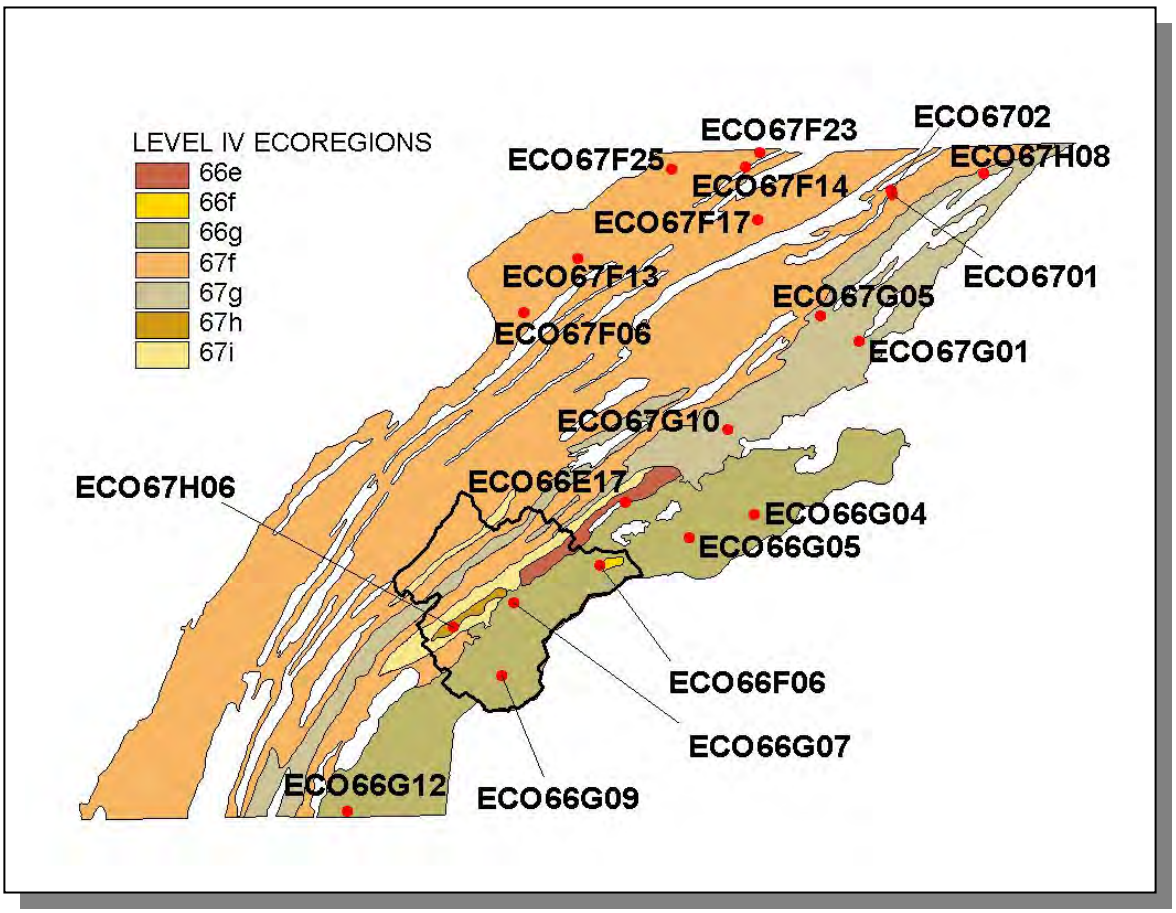


Figure 2-10. Ecoregion Monitoring Sites in Level IV Ecoregions 66e, 66f, 66g, 67f, 67g, 67h, and 67i in Tennessee. *The Tennessee portion of the Little Tennessee River Watershed boundary is shown for reference. More information is provided in Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Rare Plants and Animals. The Heritage Program in the TDEC Division of Natural Heritage maintains a database of rare species that is shared by partners at The Nature Conservancy, Tennessee Wildlife Resources Agency, the US Fish and Wildlife Service, and the Tennessee Valley Authority. The information is used to: 1) track the occurrence of rare species in order to accomplish the goals of site conservation planning and protection of biological diversity, 2) identify the need for, and status of, recovery plans, and 3) conduct environmental reviews in compliance with the federal Endangered Species Act.

GROUPING	NUMBER OF RARE SPECIES
Insects and Spiders	3
Mussels	2
Snails	9
Other Invertebrates	3
Amphibians	4
Birds	8
Fish	12
Mammals	13
Reptiles	3
Plants	73
Total	**130**

Table 2-3. There are 130 Known Rare Plant and Animal Species in the Tennessee Portion of the Little Tennessee River Watershed.

In the Tennessee Portion of the Little Tennessee River Watershed, there are 13 rare fish species, 3 rare mussel species, and 11 rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Clinostomus funduloises ssp 1	Smoky Dace		D
Cycleptus elongates	Blue Sucker	MC	T
Cyprinella monacha	Spotfin Chub	LT	T
Etheostoma blennioides gutselli	Tuckasegee Darter		E
Etheostoma percnurum	Duskytail Darter	LE	E
Hemitrema flammea	Flame Chub	MC	D
Noturus baileyi	Smoky Madtom	LE	E
Noturus flavipinnis	Yellowfin Madtom	LT, XN	E
Percina aurantica	Tangerine Darter	LE	E
Percina burtoni	Blotchside Darter	MC	D
Percina tanasi	Snail Darter	LT	T
Phoxinus tennesseensis	Tennessee Dace		D
Quadrula intermedia	Cumberland Monkeyface	LE	E
Quadrula sparsa	Appalachia Monkeyface	LE	E
Athearnia anthonyi	Anthony's Riversnail	LE	E
Glyphyalina pentadelphia	Pink Glyph		
Helicodiscus fimbriatus	Fringed Coil		
Mesodon christyi	Glossy Covert		
Mesodon wheatleyi	Cinnamon Covert		
Paravitrea lamellidens	Lamellate Supercoil		
Stenotrema fraternum montanum	A Pillsnail		
Striatura exigua	Ribbed Striate		
Vertigo clappi	Cupped Vertigo		

Table 2-4. Rare Aquatic Species in the Tennessee Portion of the Little Tennessee River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service: LT, Listed Threatened by the U.S. Fish and Wildlife Service; MC, Management Concern for U.S. Fish and Wildlife Service; XN, Non-Essential Experimental Population. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; T, Listed Threatened by the Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/nh/data.php.*

2.6.B. Wetlands. The Division of Natural Heritage maintains a database of wetland records in Tennessee. These records are a compilation of field data from wetland sites inventoried by various state and federal agencies. Maintaining this database is part of Tennessee's Wetland Strategy, which is described at:
http://www.state.tn.us/environment/nh/wetlands/

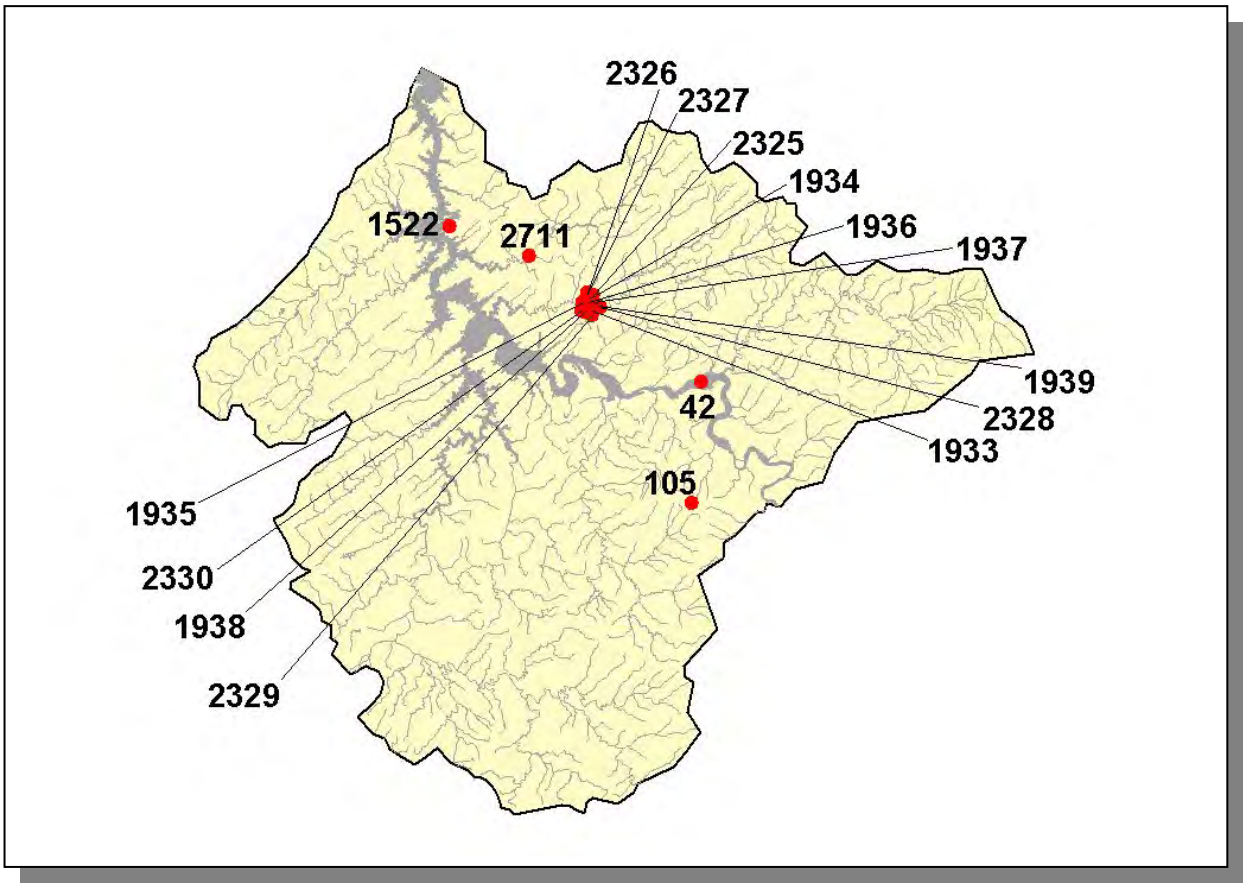


Figure 2-11. Location of Wetland Sites in TDEC Division of Natural Heritage Database in the Tennessee Portion of the Little Tennessee River Watershed. ***This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands****. More information is provided in Appendix II.*

2.7. CULTURAL RESOURCES.

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

The most recent version of the Nationwide Rivers Inventory lists portions of six streams in the Tennessee portion of the Little Tennessee River Watershed:

> Abrams Creek, a small scenic stream, entirely within the Great Smoky Mountains National Park. Deer and fur-bearers common. Near the National Park Service campground.
>
> Anthony Creek, a small scenic stream, entirely within the Great Smoky Mountains National Park. Deer and fur-bearers common. Near the National Park Service campground.
>
> Little Pigeon River, a scenic, sparkling, excellent whitewater stream with waterfalls. Trout habitat.
>
> Little Tennessee River (Segment 1), an excellent fishing and float stream. Critical habitat for snail darter. Historical significance, with 180 recorded archaeological sites. Unique scenery.
>
> Little Tennessee River (Segment 2), an excellent fishing and float stream. Critical habitat for snail darter.
>
> Middle Prong Little Pigeon River, a scenic, sparkling, excellent whitewater stream with waterfalls. Trout habitat.
>
> Tellico River (Segment 1), a wild whitewater mountain stream with spectacular waterfalls and numerous recreational opportunities.
>
> Tellico River (Segment 2), a whitewater mountain river with spectacular waterfalls and numerous recreational opportunities.
>
> West Prong Little Pigeon River, a scenic, clear mountain stream with considerable recreation potential.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE	HISTORIC	CULTURAL
Abrams Creek	X	X	X		X		
Anthony Creek	X	X	X		X		
Little Pigeon River	X	X	X	X	X	X	X
Little Tennessee River (Segment 1)	X	X	X	X	X	X	X
Little Tennessee River (Segment 2)		X			X		
Middle Prong Little Pigeon River	X	X	X	X	X	X	X
Tellico River (Segment 1)	X	X	X	X	X	X	X
Tellico River (Segment 2)	X	X					
West Prong Little Pigeon River	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.nps.gov/ncrc/programs/rtca/nri/index.html

2.7.B. Greenways. The Little Tennessee River Watershed has at least three greenways/trails:

- Kefauver Walking Trail in Madisonville
- Tellico Walking Trail in Tellico Plains
- Bobby Brewer Memorial Trail in Fort Loudoun State Historic Area

More information about greenways and trails in the watershed may be found at:

http://www2.state.tn.us/tdec/GREENWAYS/tnmap.htm

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

- Cherokee National Forest, a 640,000-acre forest, is the largest tract of public land in Tennessee. The Forest is managed by the U.S. Forest Service and by the Tennessee Wildlife Resources Agency.
- Foothills Parkway, a scenic parkway authorized by Congress in 1944, was built along the western and northern perimeters to provide scenic views of the Great Smoky Mountains National Park. The Parkway is managed by the National Park Service.
- Fort Loudoun Dam Reservation is located by the canal connecting Tellico Lake with Fort Loudoun Lake. Boat launching facilities are an example of the recreational benefits of TVA lakes. The Reservation is managed by TVA.
- Fort Loudoun State Historic Area is a 1,200-acre interpretive site that is the location of one of the earliest British fortifications on the Western frontier (built 1756). The Historic Area is managed by the state of Tennessee.
- Great Smoky Mountains National Park is located in Tennessee and North Carolina. Its 800 square miles are 95% forested. The area was designated as national park in 1934, as an International Biosphere Reserve in 1976, and as a World Heritage Site in 1983. The park is managed by the National Park Service.
- Harrison Branch Recreation Area is located on Tellico Lake and features a boat ramp. The Recreation area is managed by TVA.
- Lotterdale Cove Recreation Area is a campground on Tellico Lake with a sand beach, boat ramp, and camping amenities. The recreation area is managed by TVA.
- Notchy Creek Recreation Area is a swimming area located on Tellico Lake. The Recreation Area is managed by TVA.
- Tallassee Recreation Area is located on Tellico lake and features a boat ramp. The Recreation Area is managed by TVA.
- Tellico Blockhouse, located at the confluence of Ninemile Creek and Little Tennessee River, was built in 1794 as a military fort to protect the Cherokee from continued advances in the valley by settlers. The site is managed by the state of Tennessee.
- Toqua Recreation Area is a camping and day use area on Tellico Lake with a fishing pier and boat ramp. The recreation area is managed by TVA.

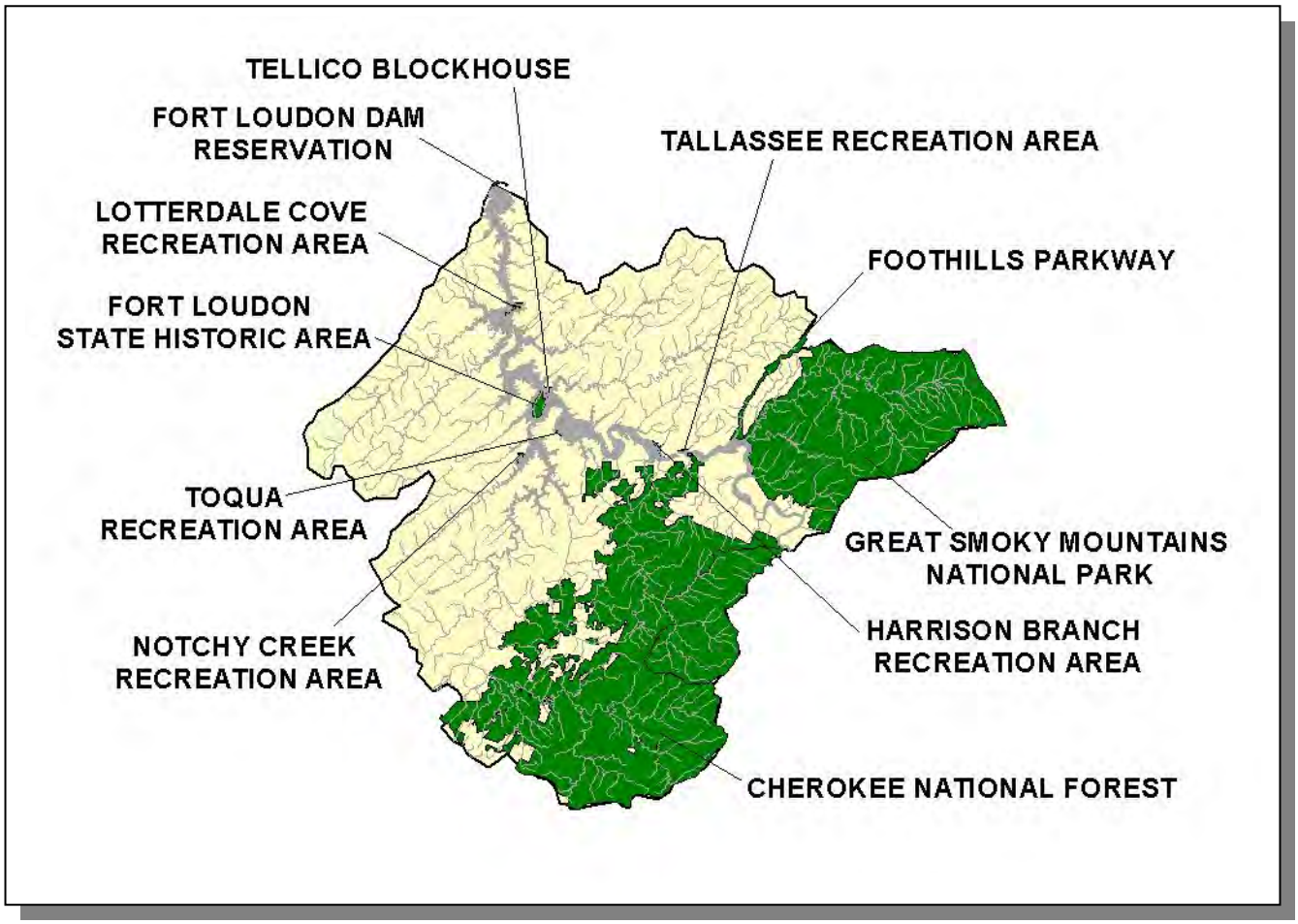


Figure 2-12. Locations of State- and Federally-Managed Lands in the Tennessee Portion of the Little Tennessee River Watershed.

2.7.D. Wildlife Management Area. The Tennessee Wildlife Resources Agency manages three wildlife management areas in the Tennessee Portion of the Little Tennessee River Watershed.

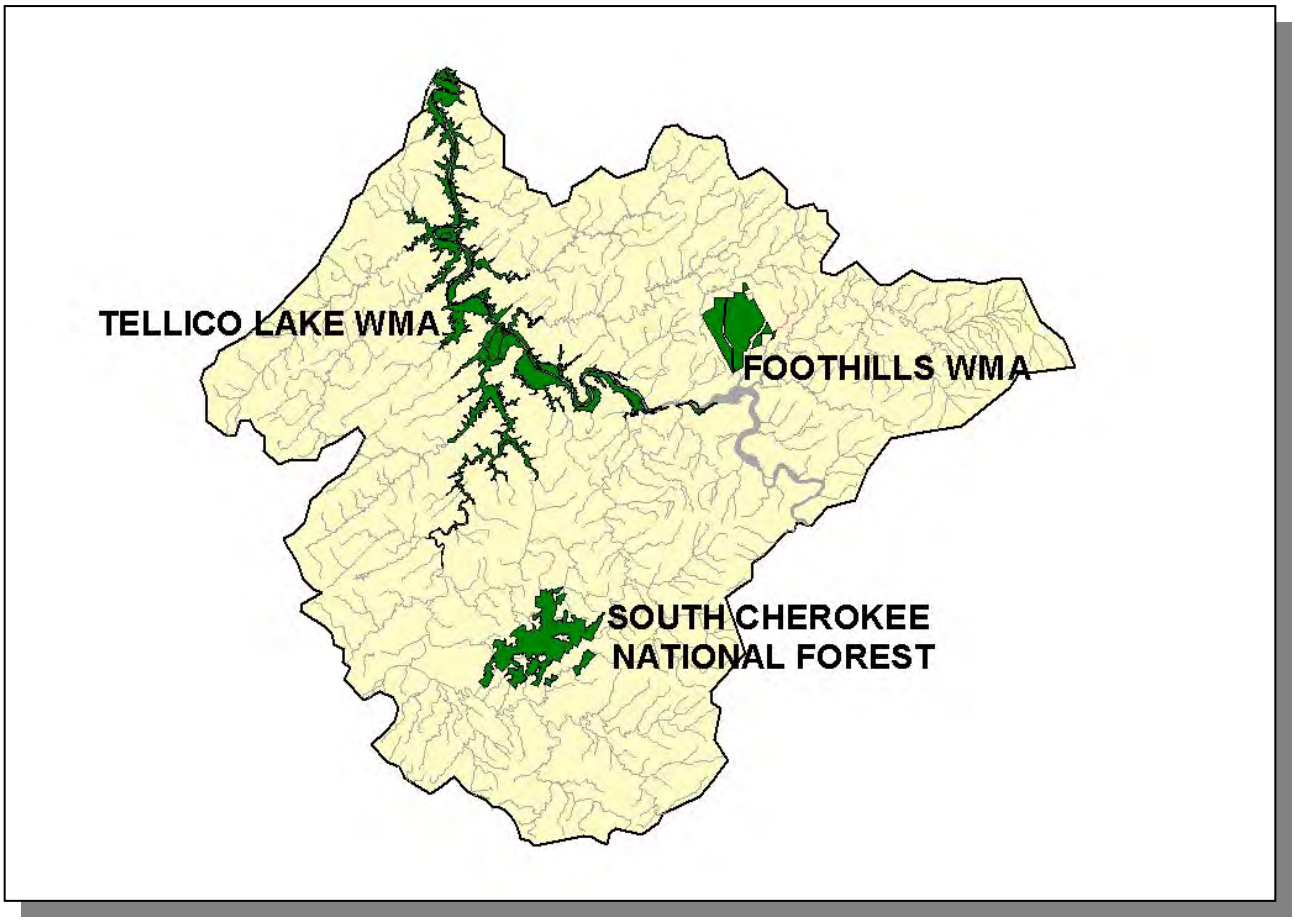


Figure 2-13. TWRA Manages Wildlife Management Areas in the Tennessee Portion of the Little Tennessee River Watershed.

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
Abrams Creek	1				Little Ninemile Creek	3		
Baker Creek	3				Mill Creek	1		
Bald River	1	2	1		Mulberry Creek	1	2	
Ballplay Creek	3				Nickles Branch Cane Creek	3		
Bat Creek	3				Ninemile Creek	4		2
Big Creek	2				North Fork Citico Creek	1		
Cane Creek	3		2		North Fork Notchy Creek	3		
Centencry Creek	4				North River Meadow Branch Tellico Creek	1	2	1
Citico Creek	1	2	1		Notchy Creek	3		
Craighead Creek	2				Panther Creek	1		
Double Camp Creek	2				Rabbit Creek	1		
Flats Creek	2				Sinkhole Creek	3		
Forge Creek	1				Sixmile Creek (Wildcat Creek)	2		
Fork Creek	3	3			Sixmile Creek (Ninemile Creek)	3		
Fourmile Creek	4				South Fork Citico Creek	1		
Island Creek	4				Tellico River	1	1,2	1
Laurel Creek	3				Wildcat Creek	1,3		2

Table 2-6. Stream Scoring from the Tennessee Rivers Assessment Project in the Little Tennessee 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 LITTLE TENNESSEE RIVER WATERSHED

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

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

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

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

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

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

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

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

4. Highlight areas of improved water quality

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

The 303(d) list is a compilation of the waters of Tennessee that 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 as well as streams the Division of Water Pollution Control cannot assess due to lack of water quality information. Also absent are streams where a control strategy is already in the process of being implemented.

Once a stream is placed on the 303(d) list, it is considered a priority for water quality improvement efforts. These efforts not only include traditional regulatory approaches such as permit issuance, but also include efforts to control pollution sources that have historically been exempted from regulations, such as certain agricultural and forestry activities. If a stream is on the 303(d) list, the Division of Water Pollution Control cannot use its regulatory authority to allow additional sources of the same pollutant(s) for which it is listed.

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

The current 303(d) List is available on the TDEC homepage at:
http://www.state.tn.us/environment/wpc/publications/2004_303dlist.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 Little Tennessee River Watershed, summarizes data collection and assessment results, and describes impaired waters.

3.2. DATA COLLECTION. Comprehensive water quality monitoring in the Little Tennessee Watershed was conducted in 1999-2000. Data are from one of four site types: (1) Ambient sites, (2) Ecoregion sites, (3) Watershed sites, or (4) Tier Evaluation sites.

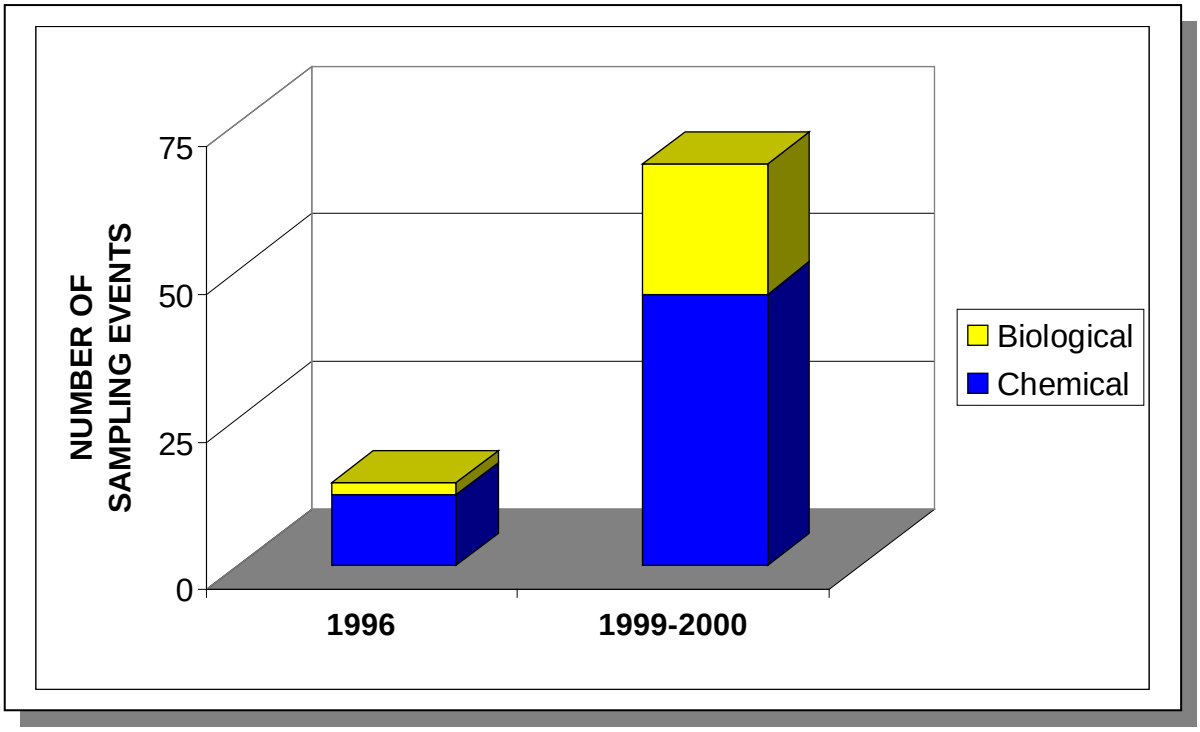


Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (1999-2000) in the Tennessee Portion of the Little Tennessee River Watershed.

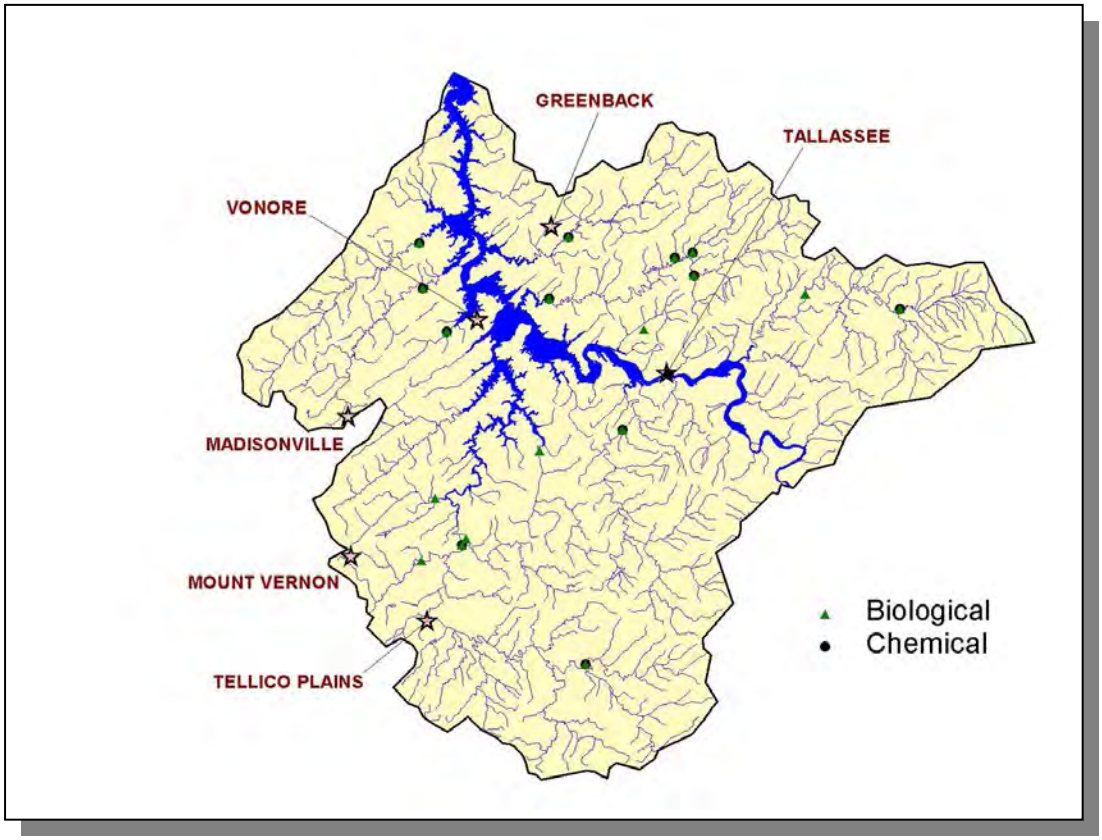


Figure 3-2. Location of Monitoring Sites in the Tennessee Portion of the Little Tennessee River Watershed. *Locations of Greenback, Madisonville, Mount Vernon, Tallassee, Tellico Plains, and Vonore are shown for reference.*

	1996	1999-2000
Biological	2	22
Chemical	12	46
Total	**14**	**68**

Table 3-1. Number of Sampling Events in the Tennessee Portion of the Little Tennessee River Watershed During the Data Collection Phase of the Watershed Approach.

3.2.A. Ambient Monitoring Sites. These fixed-station chemical monitoring sites are sampled quarterly or monthly by the Environmental Field Office-Knoxville staff (this is in addition to samples collected by water and wastewater treatment plant operators). Samples are analyzed by the Tennessee Department of Health, Division of Environmental Laboratory Services. Ambient monitoring data are used to assess water quality in major bodies of water where there are NPDES facilities and to identify trends in water quality. Water quality parameters traditionally measured at ambient sites in the Tennessee portion of the Little Tennessee 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 Little Tennessee River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains and Ridge and Valley) and contains 7 subecoregions (Level IV):

- Southern Sedimentary Ridges (66e)
- Limestone Valleys and Coves (66f)
- Southern Metasedimentary Mountains (66g)
- Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)
- Southern Shale Valleys (67g)
- Southern Sandstone Ridges (67h)
- Southern Dissected Ridges and Knobs (67i)

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

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

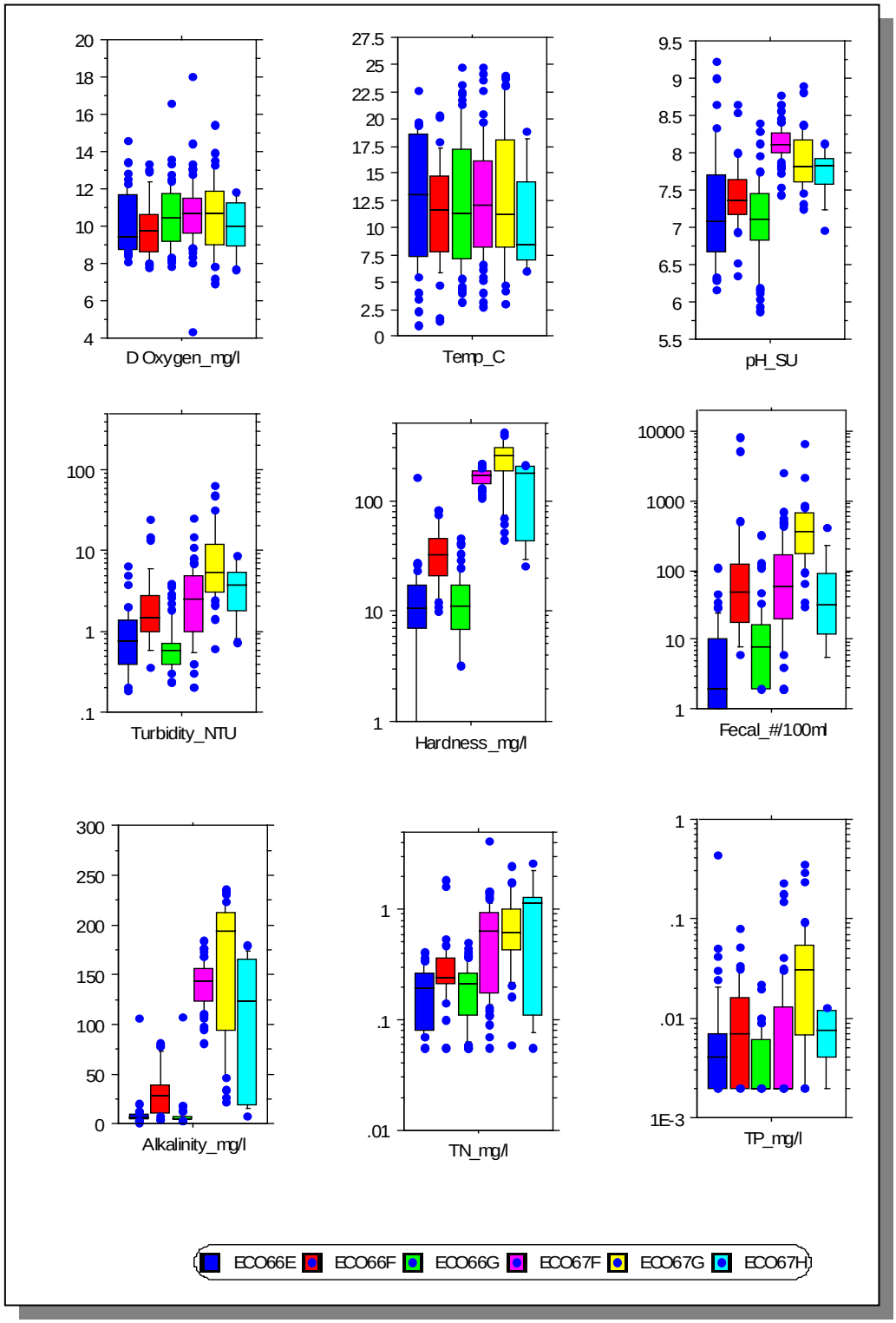

D Oxygen_mg/l
Temp_C
pH_SU
Turbidity_NTU
Hardness_mg/l
Fecal_#/100ml
Alkalinity_mg/l
TN_mg/l
TP_mg/l
ECO66E
ECO66F
ECO66G
ECO67F
ECO67G
ECO67H

Figure 3-3. Select Chemical Data Collected in the Tennessee Portion of the Little Tennessee 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.*

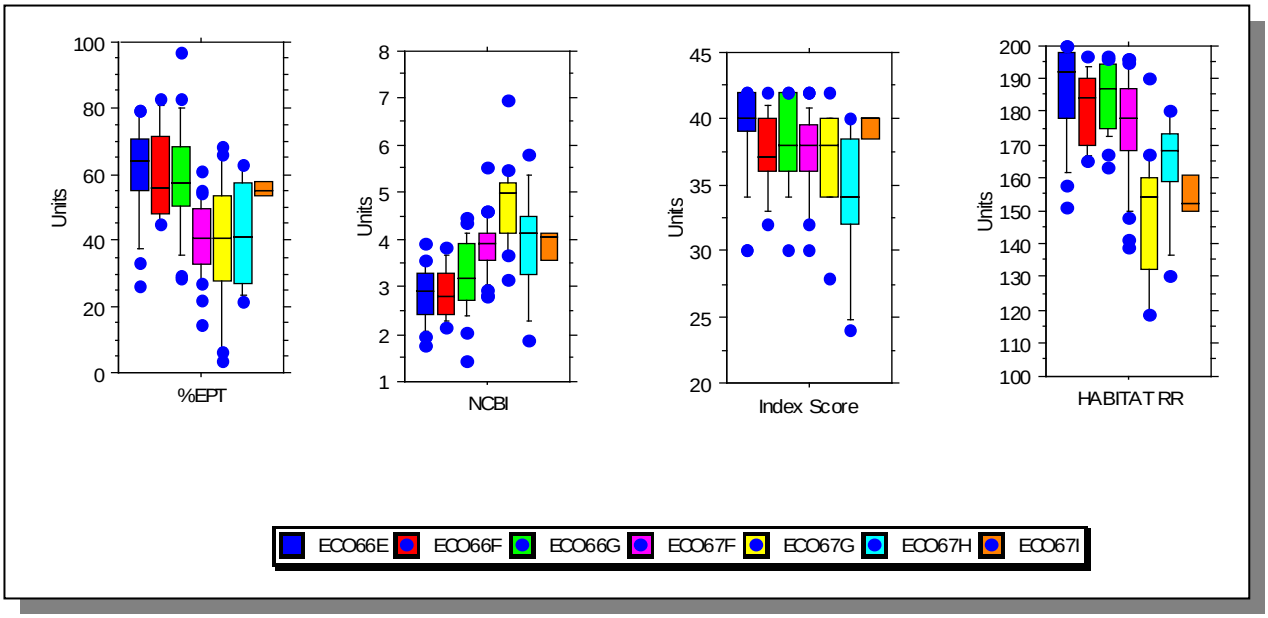


Figure 3-4. Benthic Macroinvertebrate and Habitat Scores for the Tennessee Portion of the Little Tennessee River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. NCBI, North Carolina Biotic Index. Index Score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

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

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

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

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

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

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

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

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

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

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

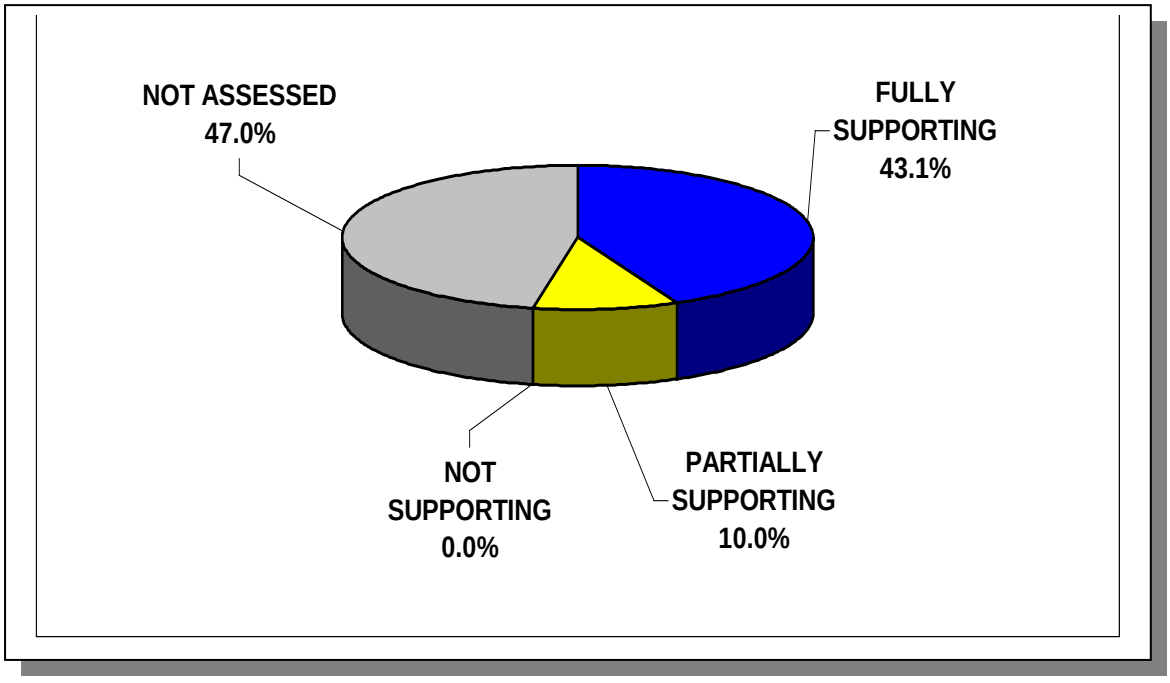


Figure 3-5a. Water Quality Assessment for Streams and Rivers in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment of 1,081.5 miles in the watershed. More information is provided in Appendix III.*

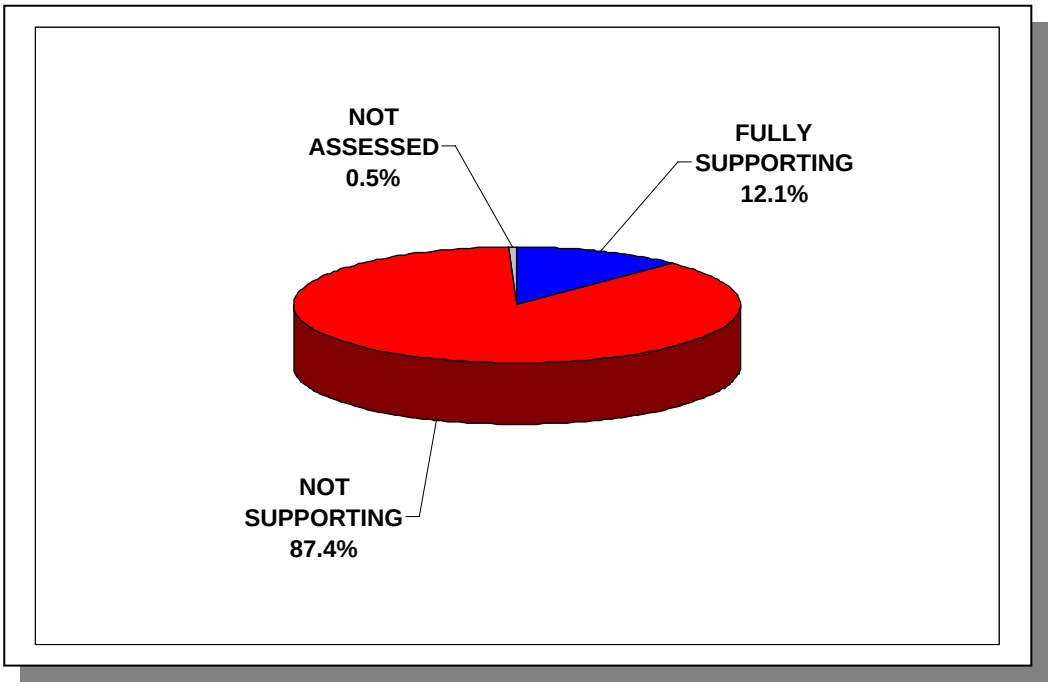


Figure 3-5b. Water Quality Assessment of Lakes in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment of 18,878 lake acres in the watershed. More information is provided in Appendix III.*

3.3.A. Assessment Summary.

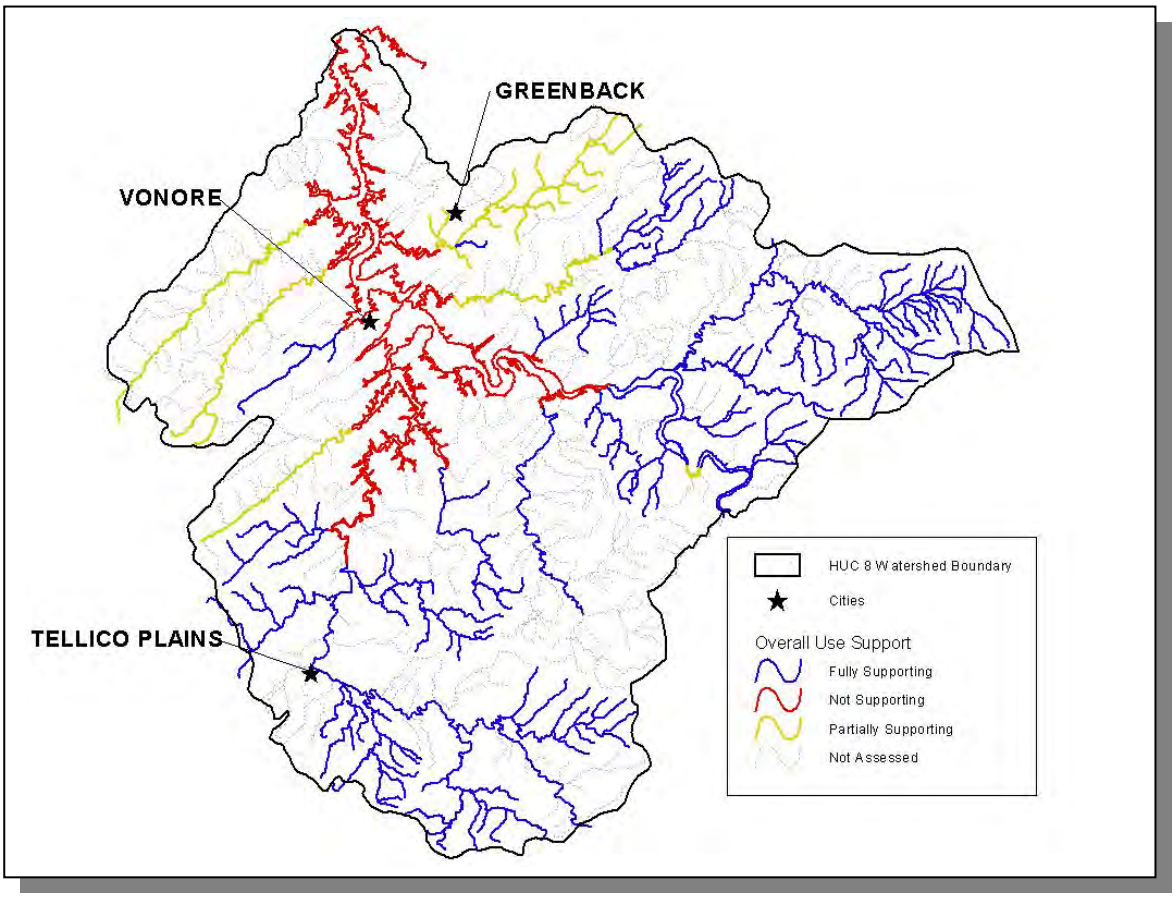


Figure 3-6a. Overall Use Support Attainment in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Greenback, Tellico Plains, and Vonore are shown for reference. More information is provided in Appendix III.*

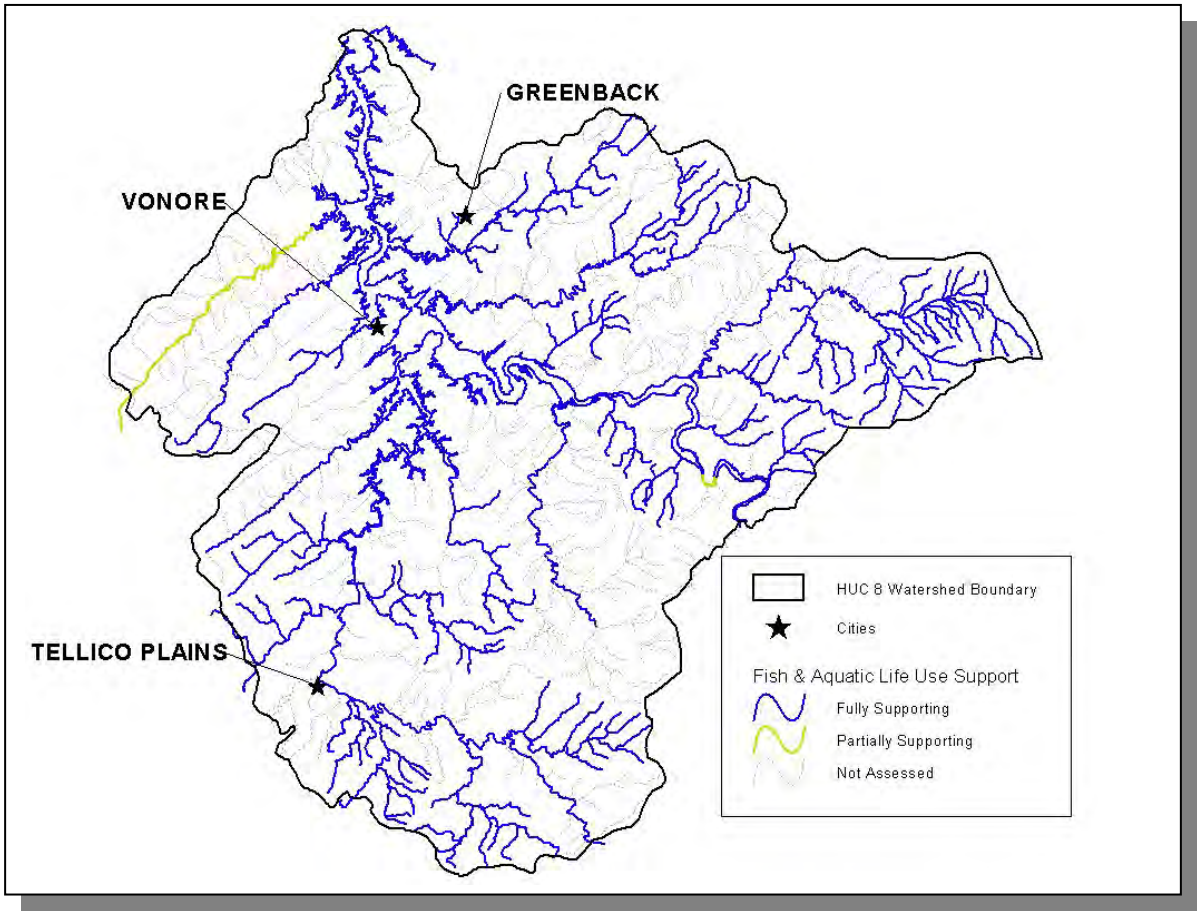


Figure 3-6b. Fish and Aquatic Life Use Support Attainment in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Greenback, Tellico Plains, and Vonore are shown for reference. More information is provided in Appendix III.*

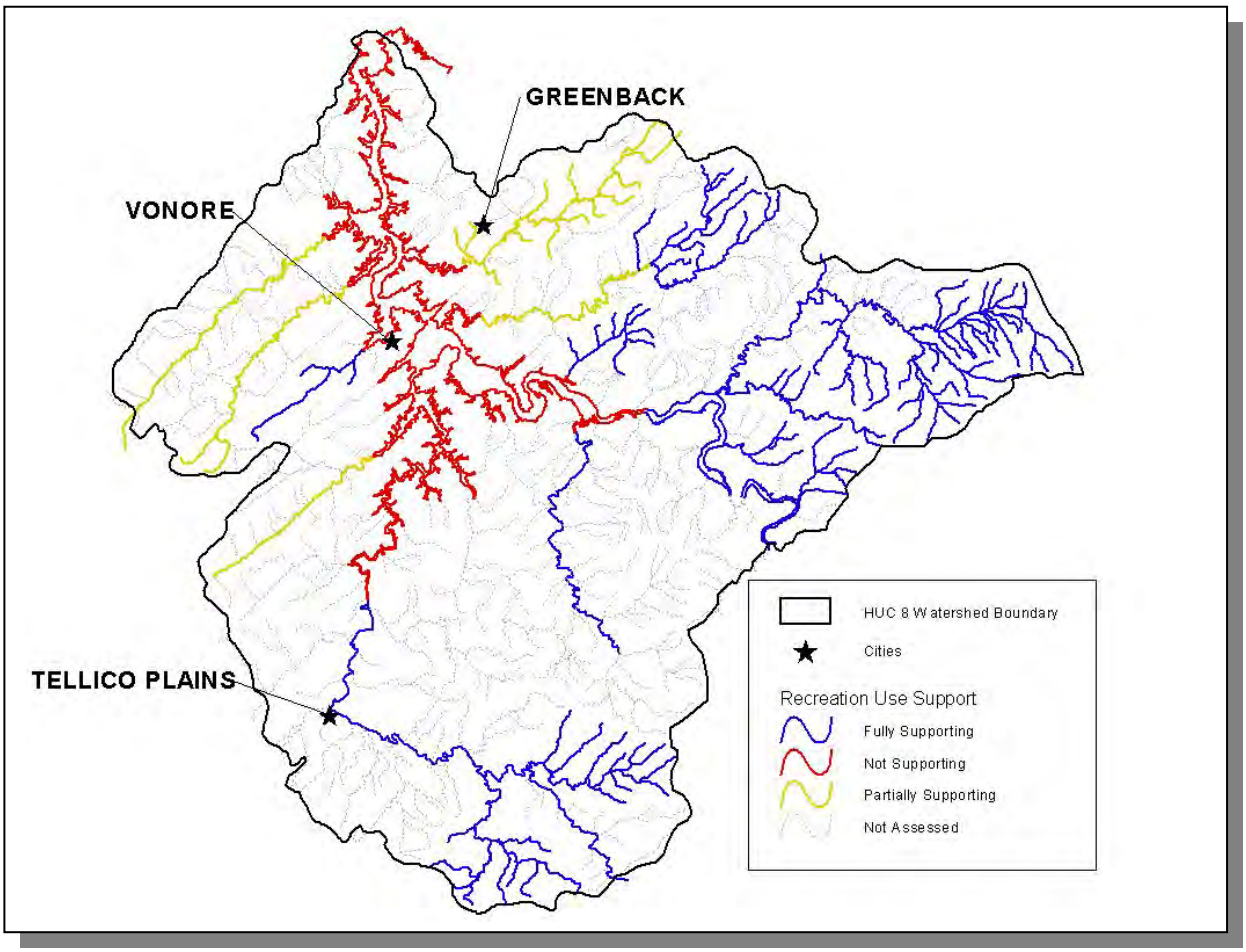


Figure 3-6c. Recreation Use Support Attainment in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Greenback, Tellico Plains, and Vonore are shown for reference. More information is provided in Appendix III.*

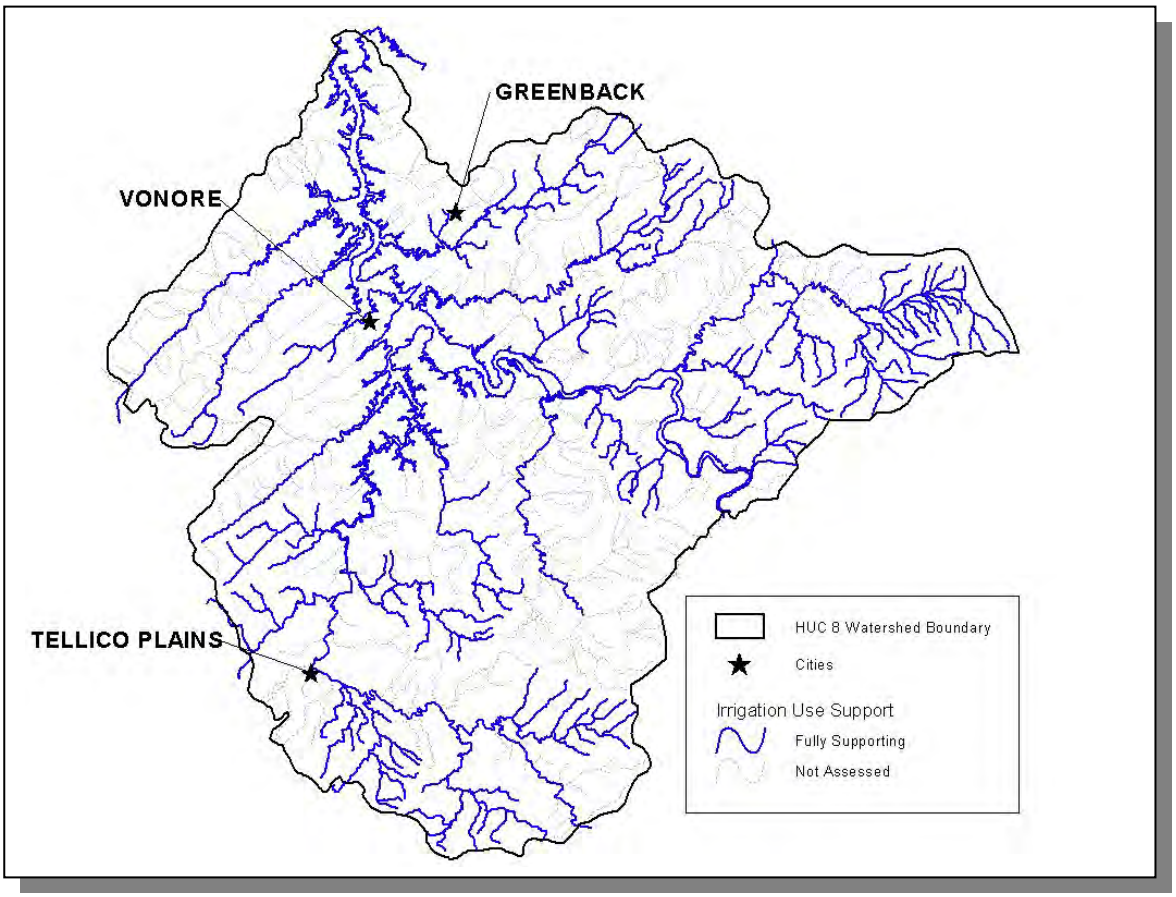


Figure 3-6d. Irrigation Use Support Attainment in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Greenback, Tellico Plains, and Vonore are shown for reference. More information is provided in Appendix III.*

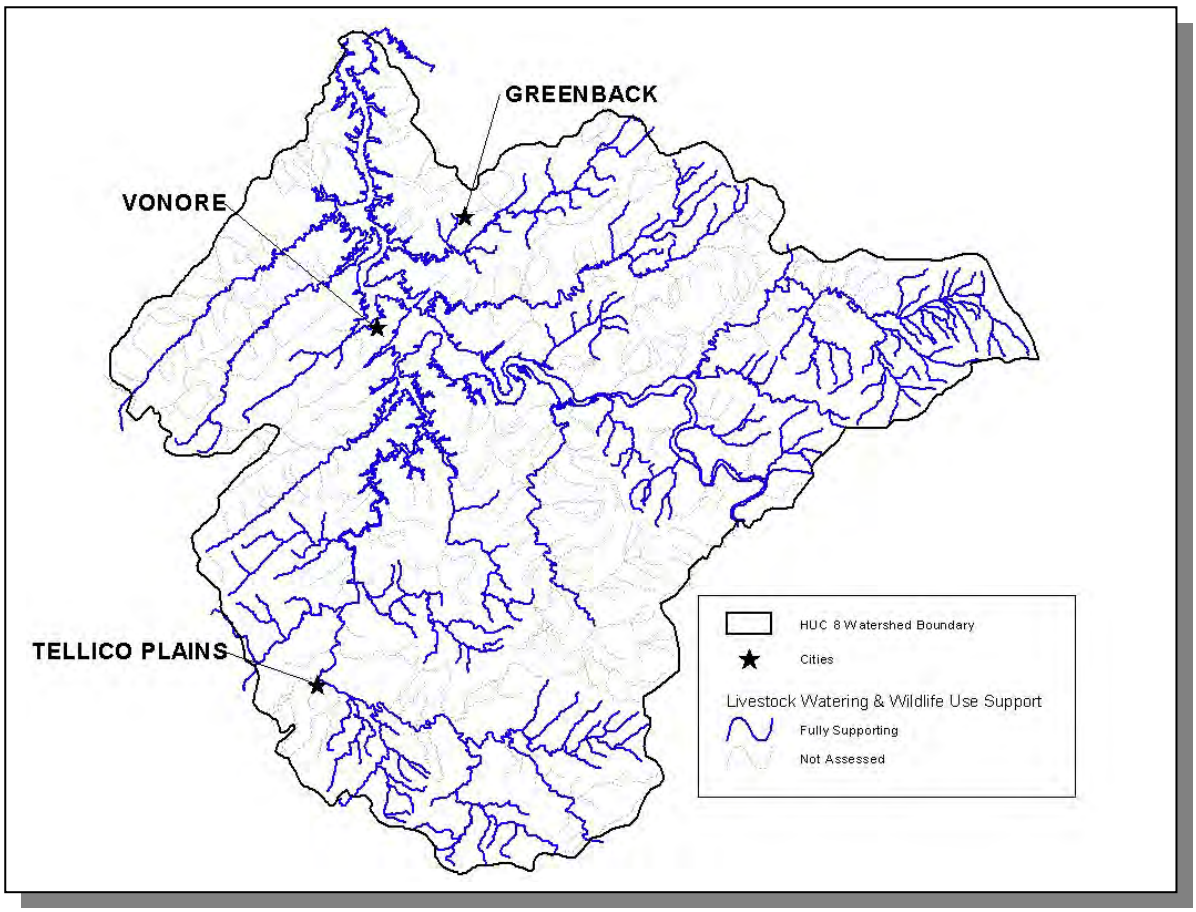


Figure 3-6e. Livestock Watering and Wildlife Use Support Attainment in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Locations of Greenback, Tellico Plains, and Vonore are shown for reference. More information is provided in Appendix III.*

3.3.B. Use Impairment Summary.

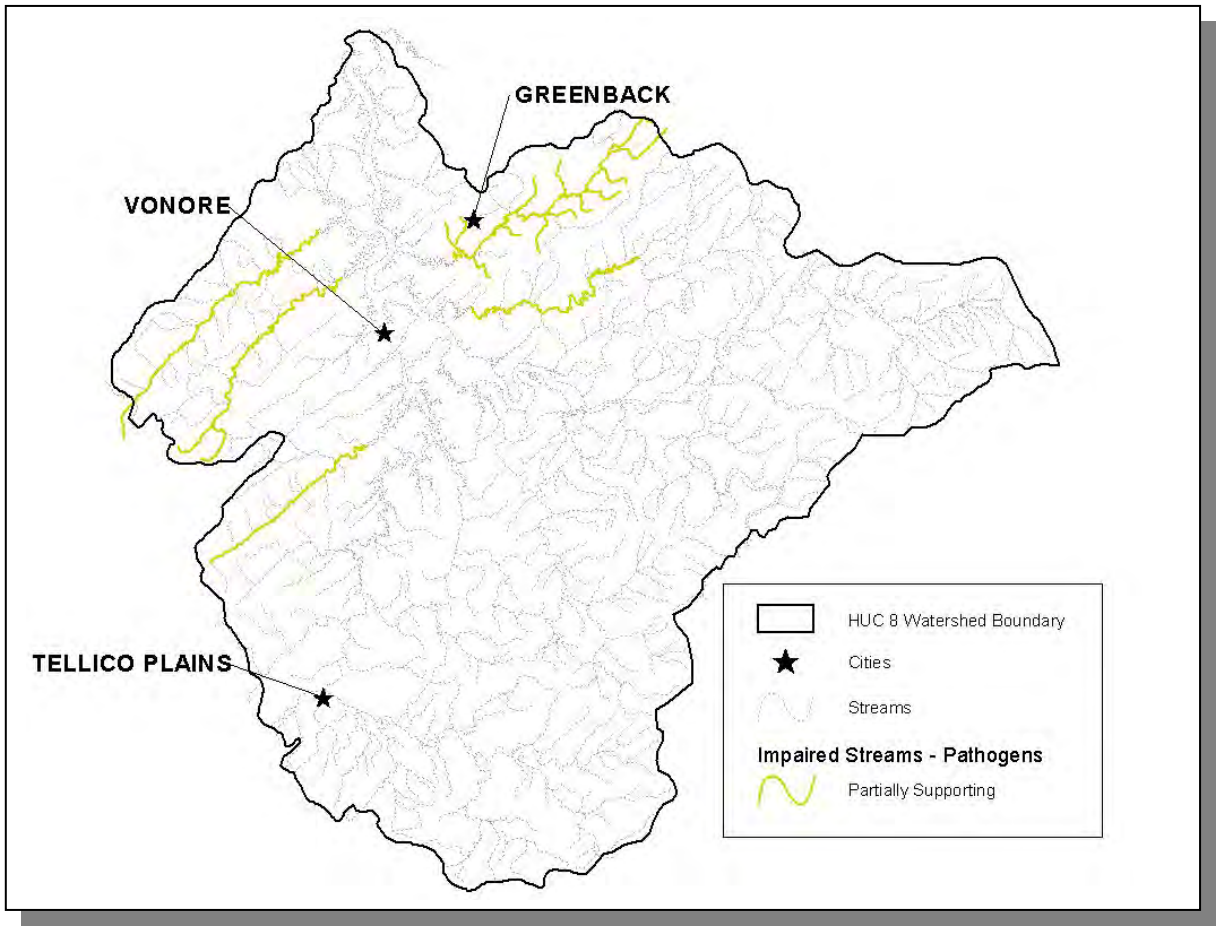


Figure 3-7a. Impaired Streams Due to Pathogens in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Locations of Greenback, Tellico Plains, and Vonore are shown for reference. More information is provided in Appendix III.*

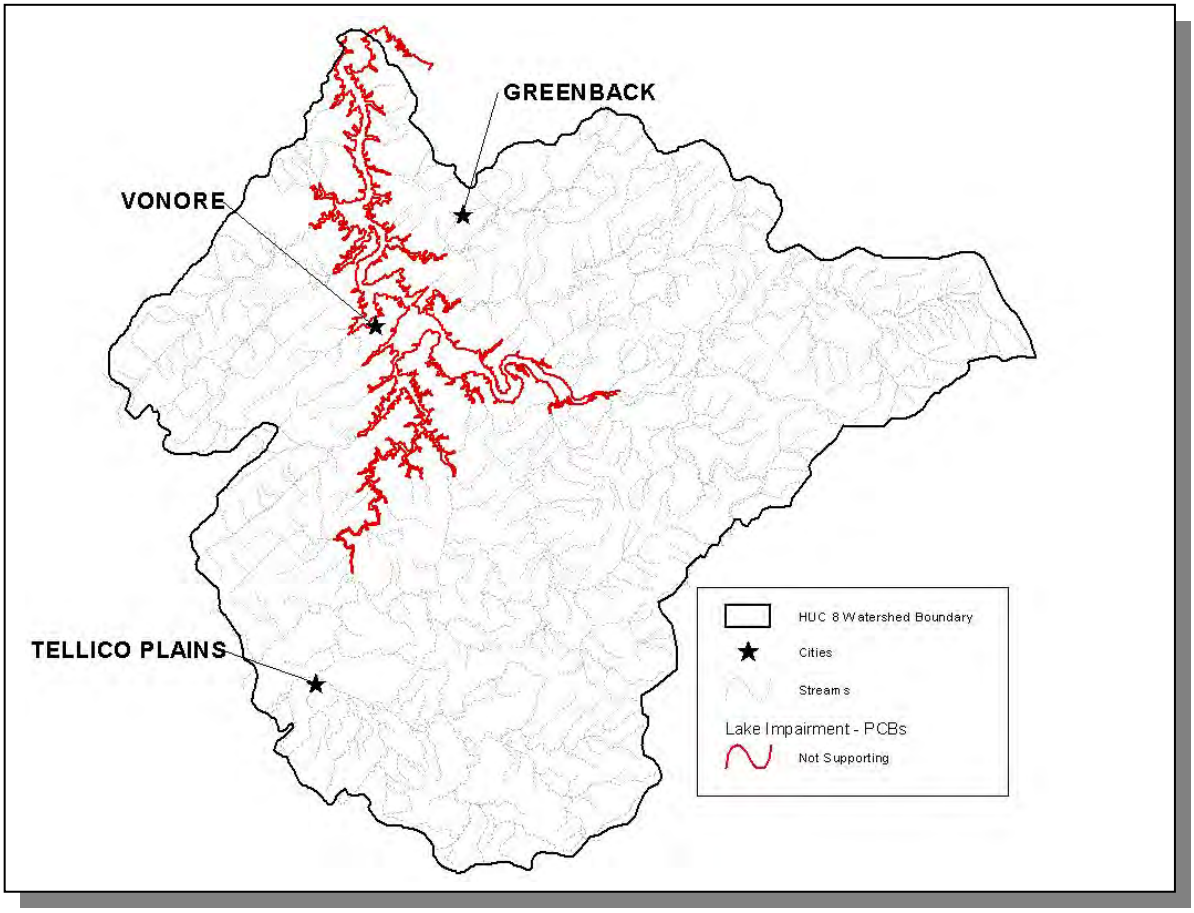


Figure 3-7b. Impaired Lakes Due to Polychlorinated Biphenyls (PCBs) in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Locations of Greenback, Tellico Plains, and Vonore are shown for reference. More information is provided in Appendix III.*

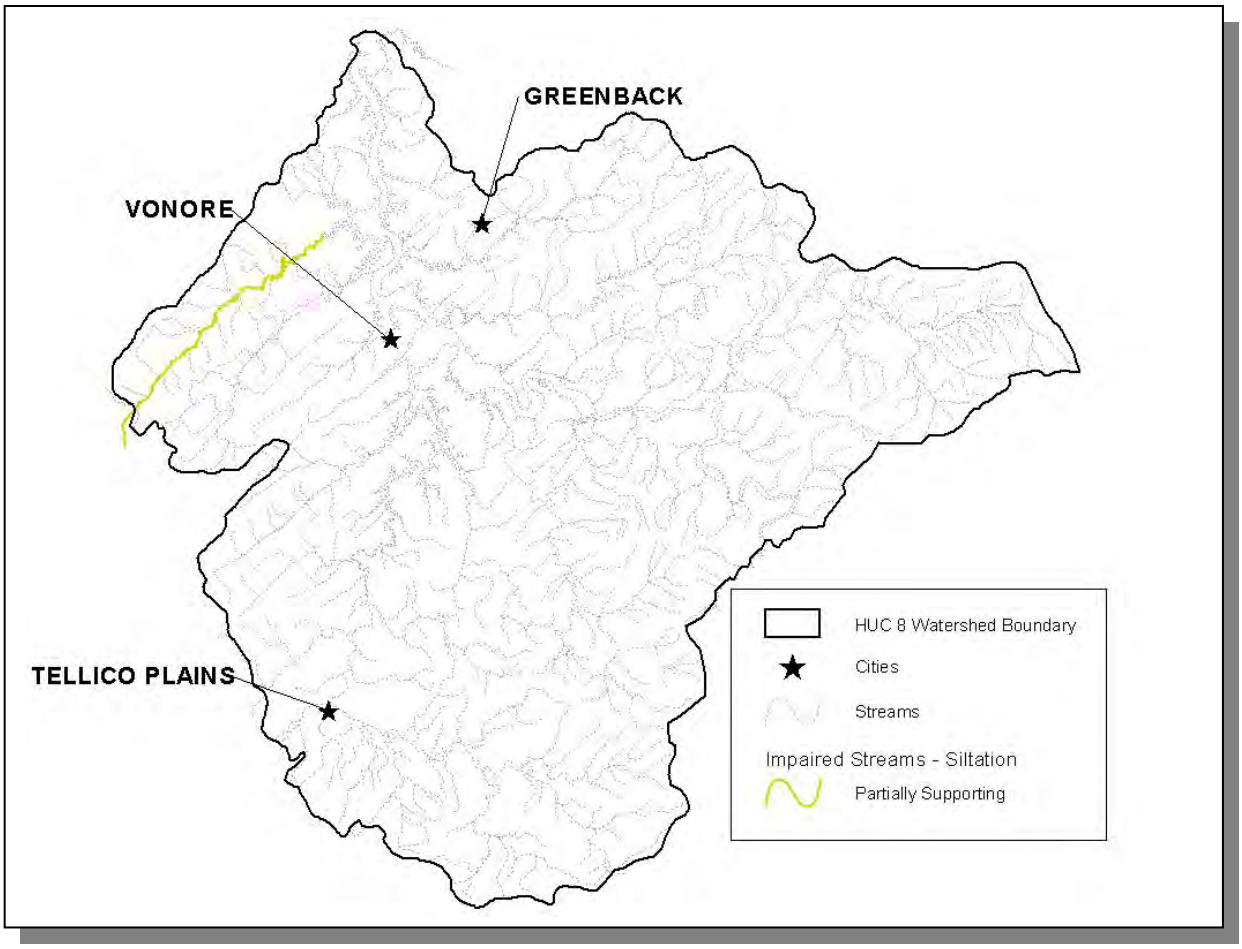


Figure 3-7c. Impaired Streams Due to Siltation in the Tennessee Portion of the Little Tennessee River Watershed. *Assessment data are based on the 2002 Water Quality Assessment. Locations of Greenback, Tellico Plains, and Vonore are shown for reference. More information is provided in Appendix III.*

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://www.state.tn.us/environment/water.htm.

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 conducted in Year 3 of each succeeding five-year cycle.

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

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE LITTLE TENNESSEE RIVER WATERSHED

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

i. General description of the subwatershed
ii. Description of point source contributions
ii.a. Description of facilities discharging to water bodies listed on the 2002 303(d) list
iii. Description of nonpoint source contributions

The Tennessee portion of the Little Tennessee River Watershed (HUC 06010204) has been delineated into four HUC 10-digit subwatersheds.

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

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

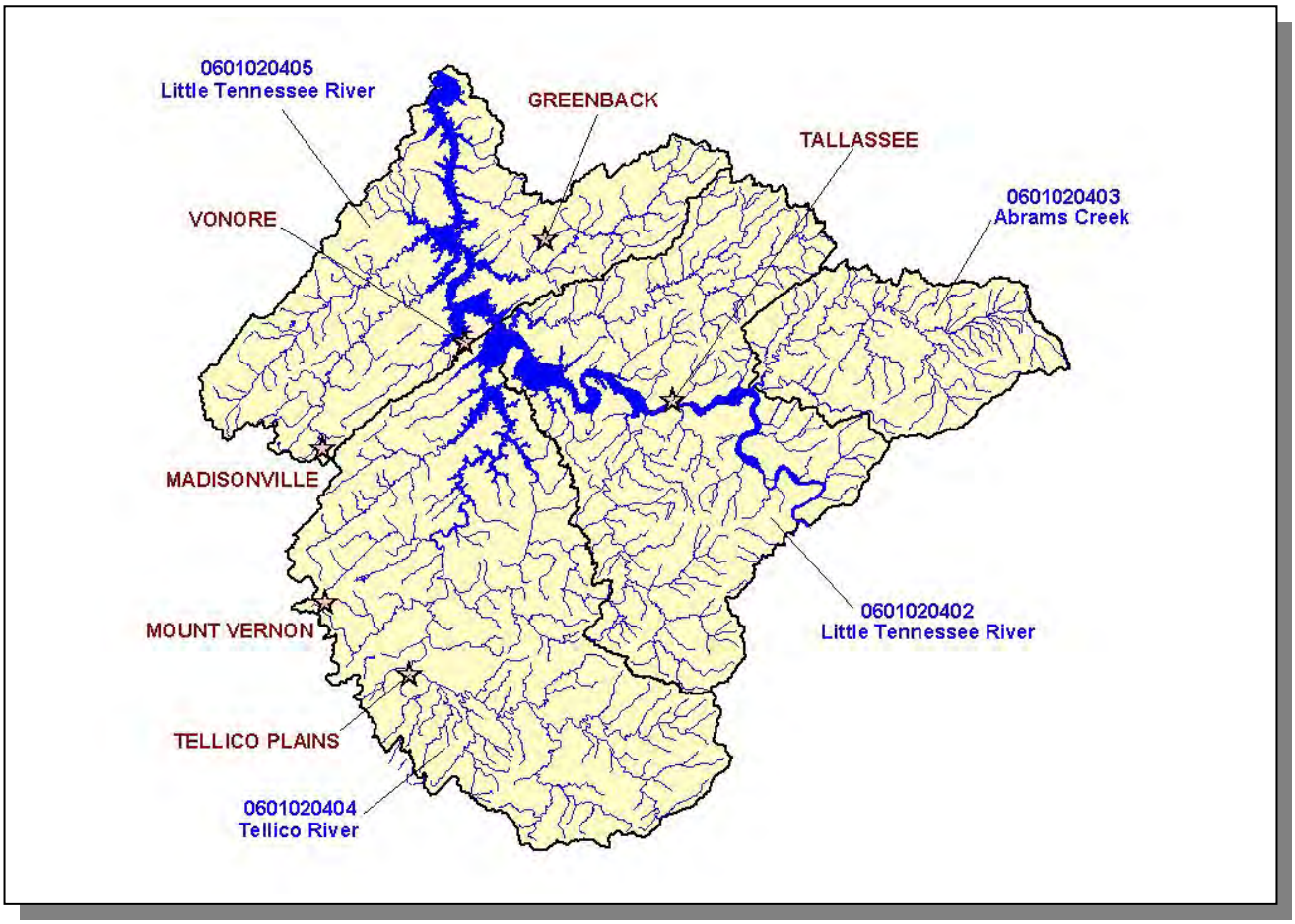


Figure 4-1. The Tennessee Portion of the Little Tennessee River Watershed is Composed of Four USGS-Delineated Subwatersheds (10-Digit Subwatersheds). *Locations of Greenback, Madisonville, Mount Vernon, Tallassee, Tellico Plains, and Vonore are shown for reference.*

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

HUC-10	HUC-12
0601020402	060102040201 (Chilhowee Lake)
	060102040202 (Slick Rock Creek)
	060102040203 (Tellico Lake)
	060102040204 (Citico Creek)
	060102040205 (Ninemile Creek)
0601020403	060102040301 (Upper Abrams Creek)
	060102040302 (Lower Abrams Creek)
0601020404	060102040401 (Tellico River)
	060102040402 (North River)
	060102040403 (Bald River)
	060102040404 (Tellico River)
	060102040405 (Sinkhole Creek)
	060102040406 (Tellico River)
	060102040407 (Ballplay Creek)
	060102040408 (Tellico Creek)
	060102040409 (Notchy Creek)
0601020405	060102040501 (Tellico Lake)
	060102040502 (Baker Creek)
	060102040503 (Tellico Lake)
	060102040504 (Bat 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. 0601020402 (Little Tennessee River).

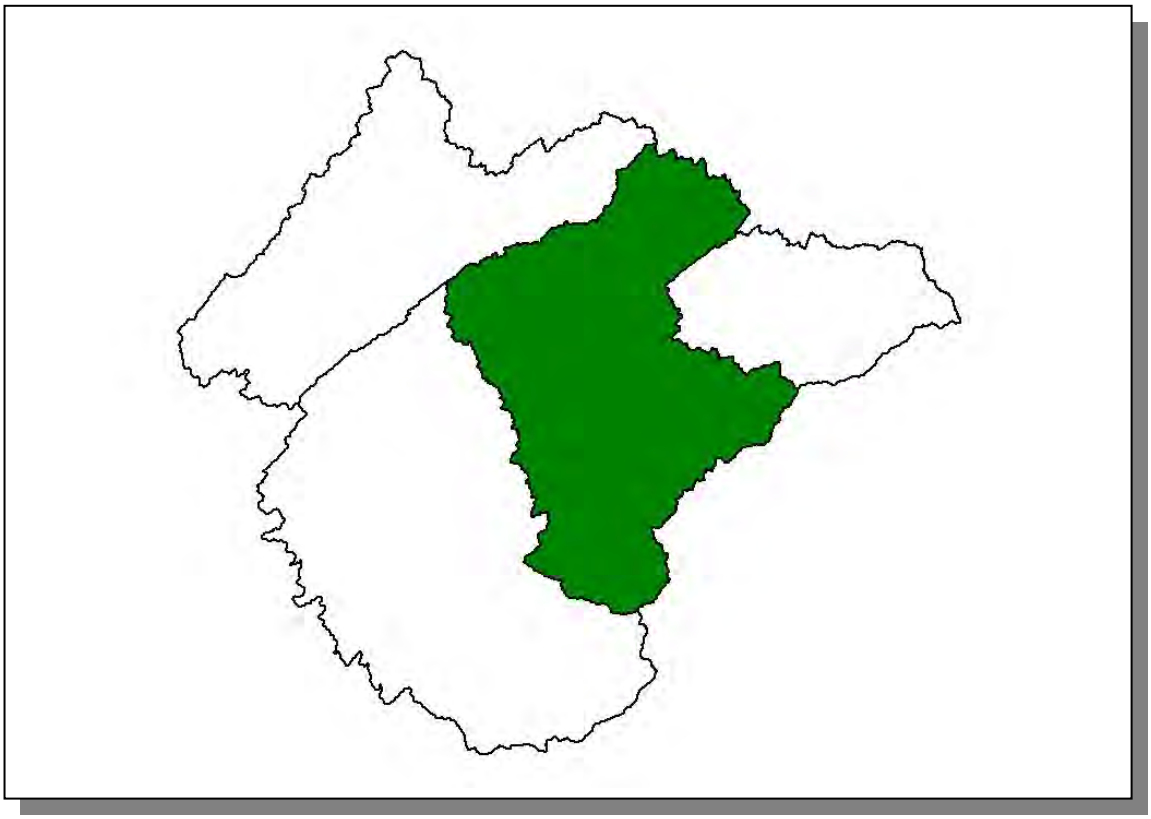


Figure 4-2. Location of Subwatershed 0601020402. *All Little Tennessee HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.A.i. General Description.

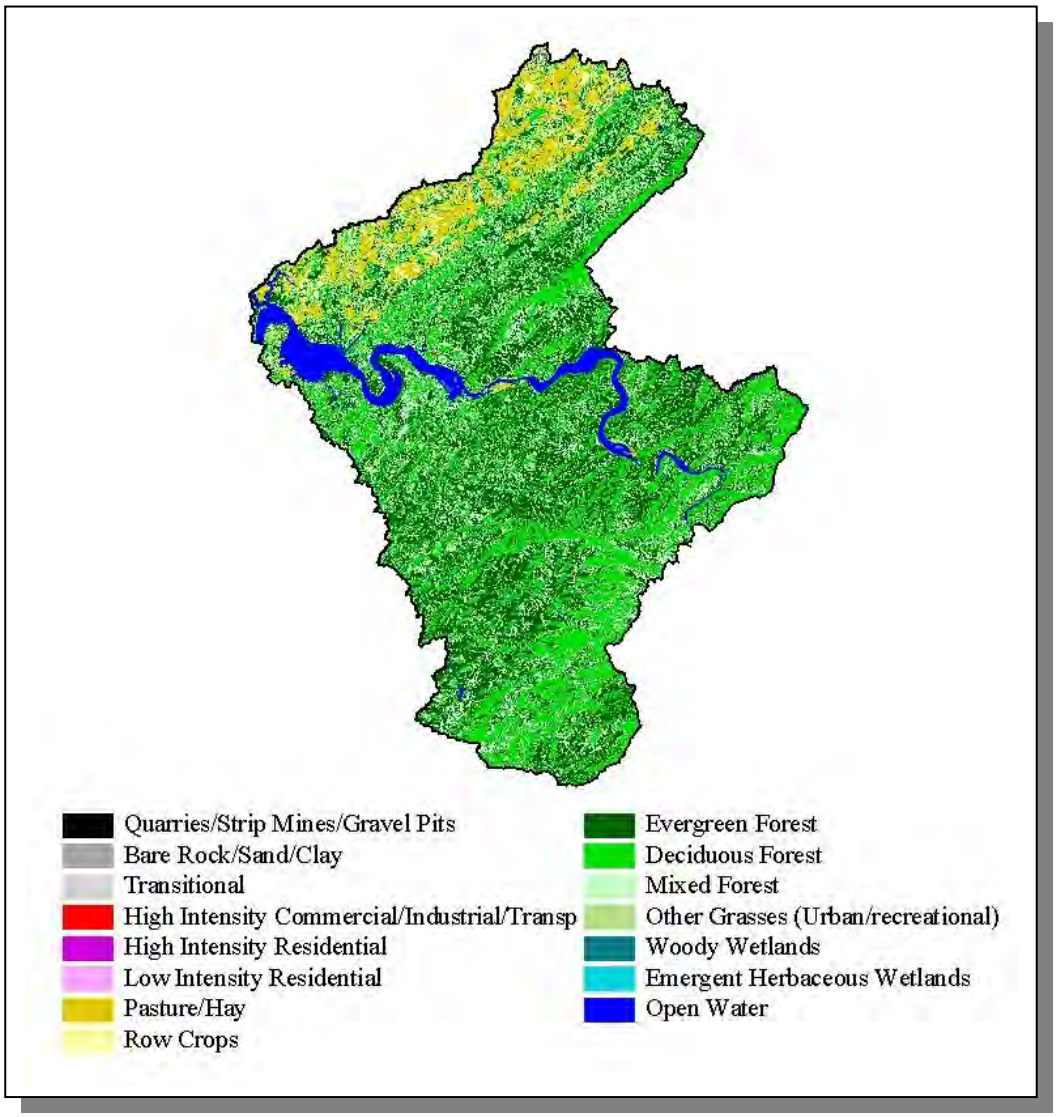


Figure 4-3. Illustration of Land Use Distribution in Subwatershed 0601020402.

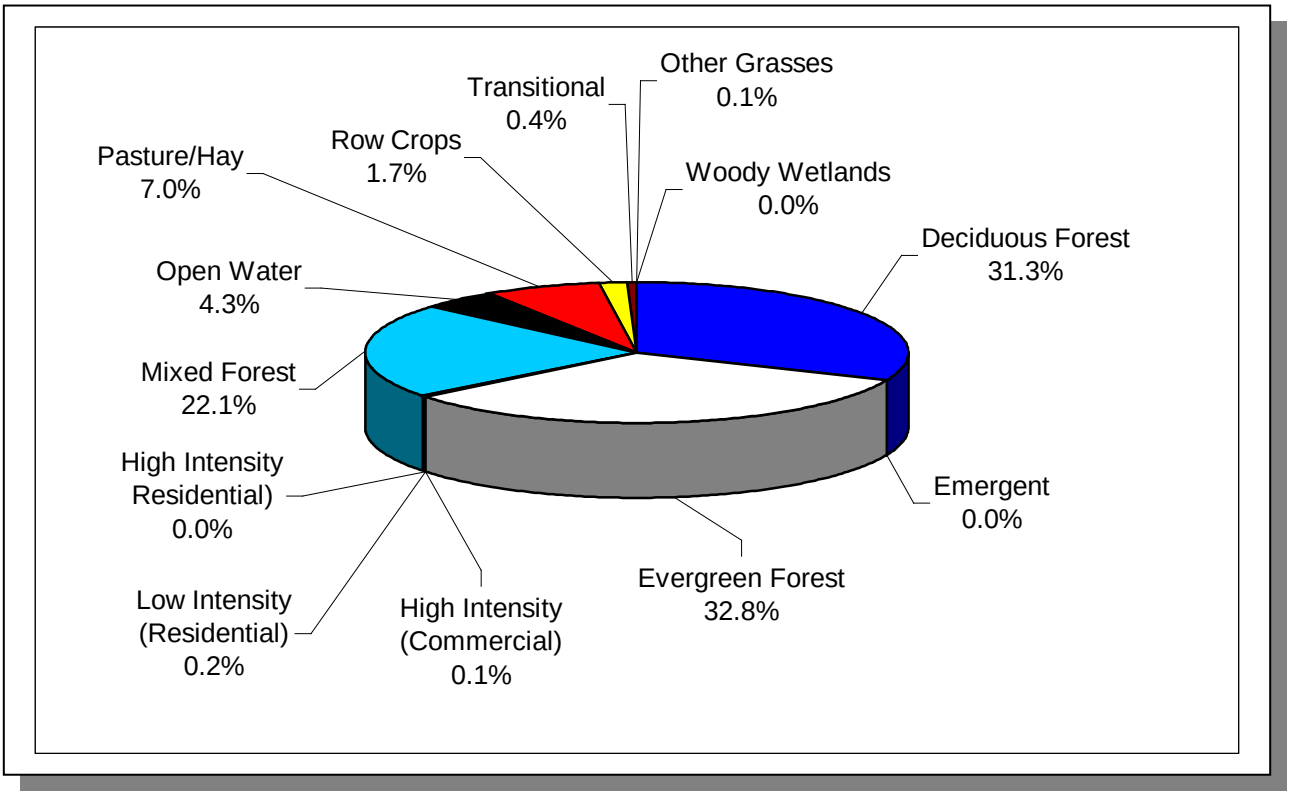


Figure 4-4. Land Use Distribution in Subwatershed 0601020402. *More information is provided in Appendix IV.*

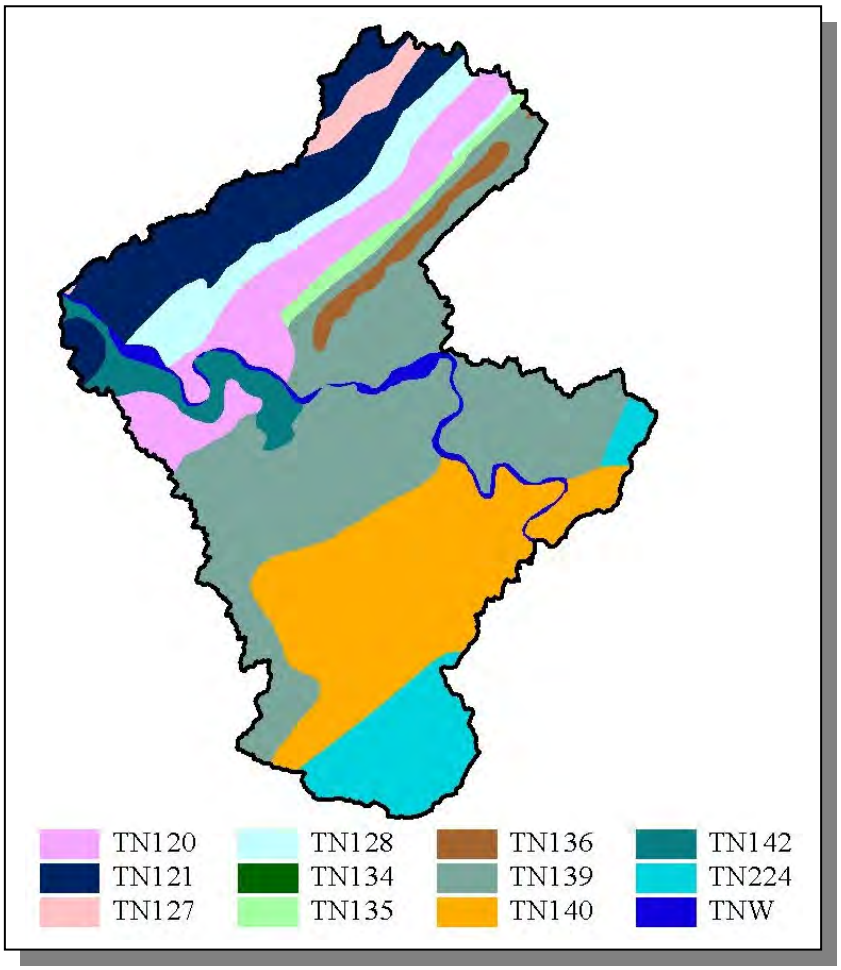


Figure 4-5. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020402.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN120	0.00	B	1.68	5.11	Loam	0.27
TN121	0.00	B	1.30	5.21	Loam	0.33
TN127	6.00	C	1.31	5.20	Loam	0.35
TN128	0.00	C	1.30	6.53	Clayey Loam	0.26
TN134	0.00	B	1.38	5.18	Loam	0.31
TN135	0.00	C	1.30	5.84	Loam	0.33
TN136	0.00	B	3.16	5.11	Loam	0.27
TN139	0.00	C	11.84	4.82	Loam	0.20
TN140	0.00	B	3.85	4.85	Sansy Loam	0.21
TN142	0.00	B	2.20	5.78	Loam	0.31
TN224	3.00	B	3.97	5.27	Loam	0.24

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601010202. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Blount	85,969	100,218	105,823	17.56	15,100	17,602	18,587	23.1
Loudoun	31,255	38,245	39,086	0.38	118	145	148	25.4
Monroe	30,541	33,953	38,961	20.48	6,255	6,954	7,980	27.6
Totals	**147,765**	**172,416**	**183,870**		**21,473**	**24,701**	**26,715**	**24.4**

Table 4-3. Population Estimates in Subwatershed 0601020402.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Vonore	Monroe	601	281	8	271	2

Table 4-4. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0601020402.

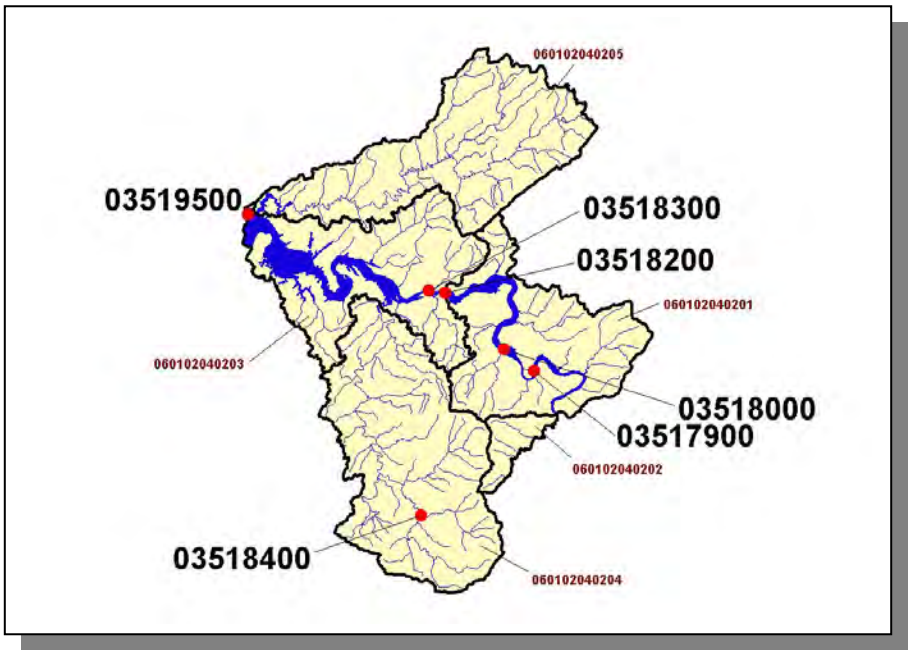


Figure 4-6. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601020402. *Subwatershed 060102040201, 060102040202, 060102040203, 060102040204, and 060102040205 boundaries are shown for reference. More information is provided in Appendix IV.*

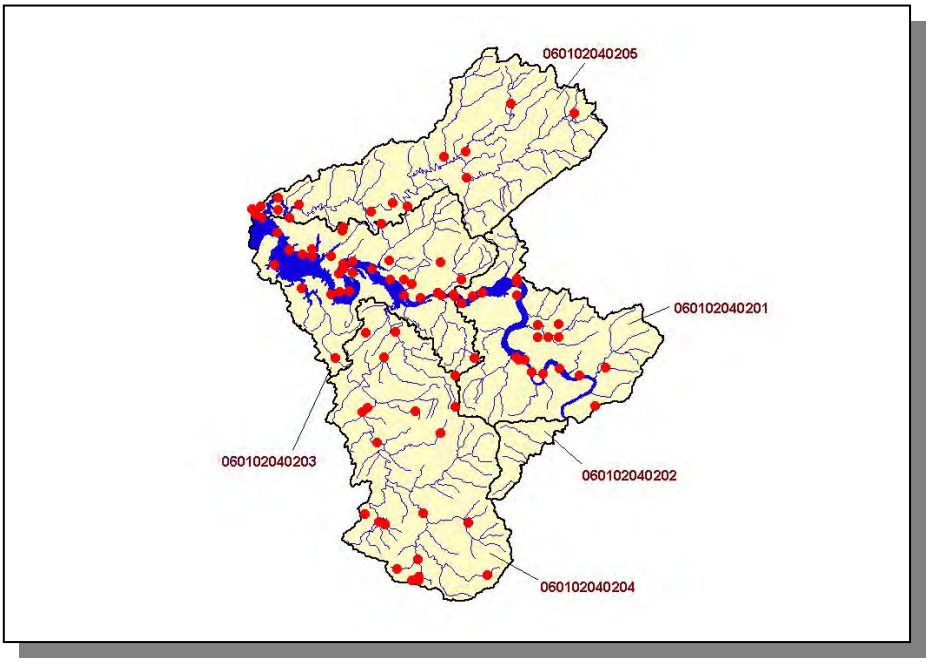


Figure 4-7. Location of STORET Monitoring Sites in Subwatershed 0601020402. *Subwatershed 060102040201, 060102040202, 060102040203, 060102040204, and 060102040205 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.A.ii. Point Source Contributions.

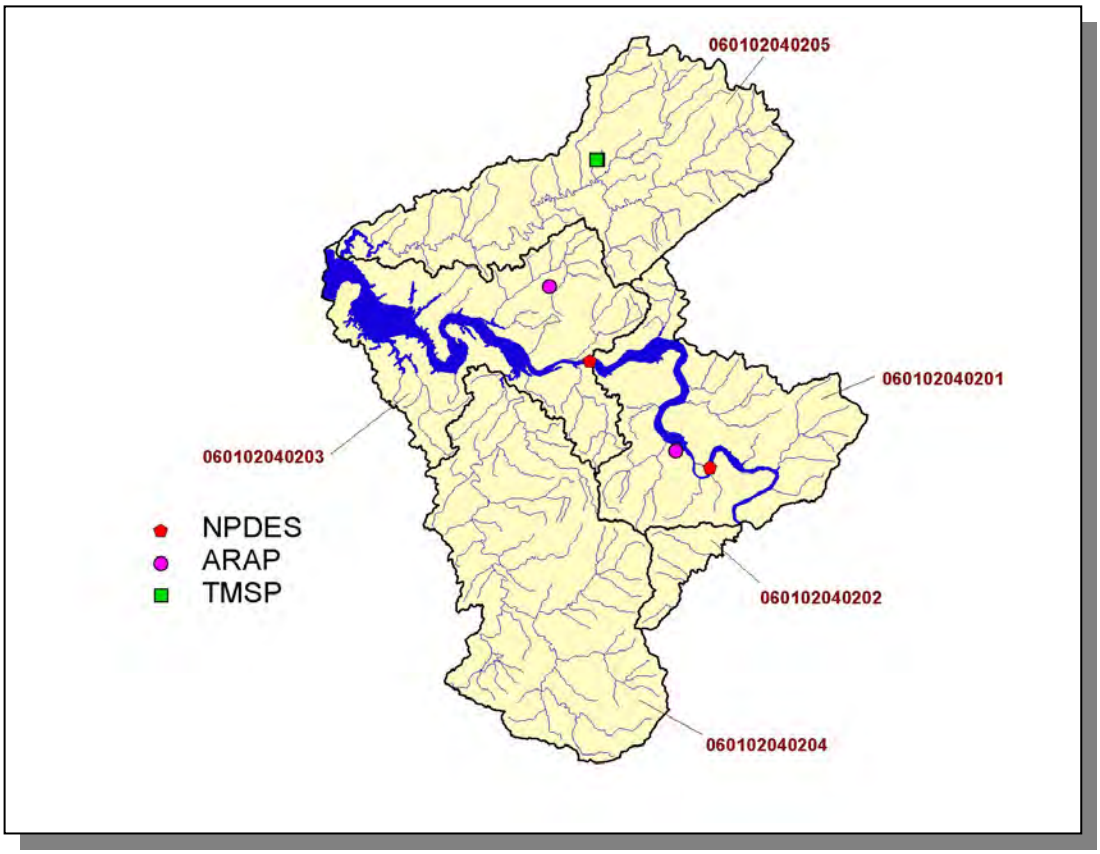


Figure 4-8. Location of Active Point Source Facilities in Subwatershed 0601020402. *Subwatershed 060102040201, 060102040202, 060102040203, 0601020404, and 060102040205 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

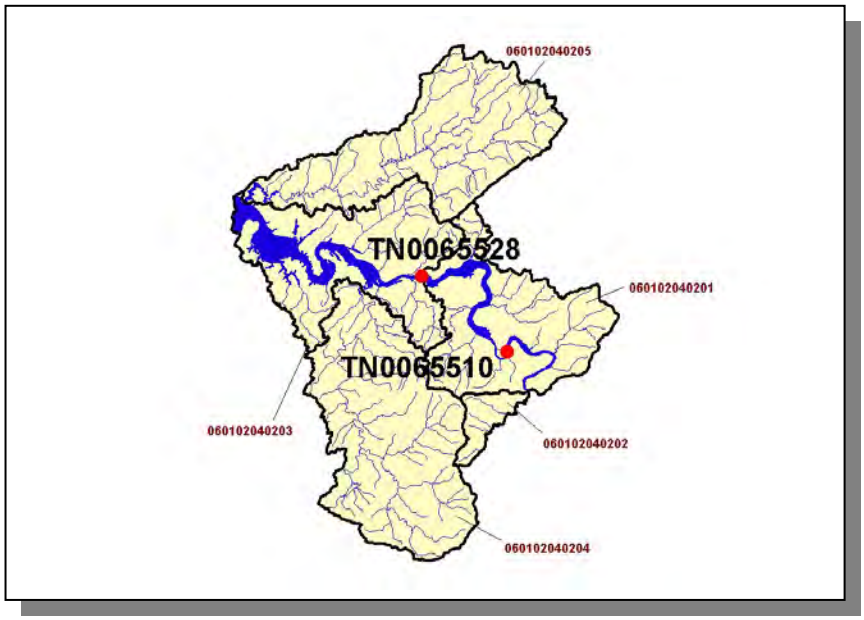


Figure 4-9. Location of NPDES Facilities in Subwatershed 0601020402. *Subwatershed 060102040201, 060102040202, 060102040203, 0601020404, and 060102040205 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

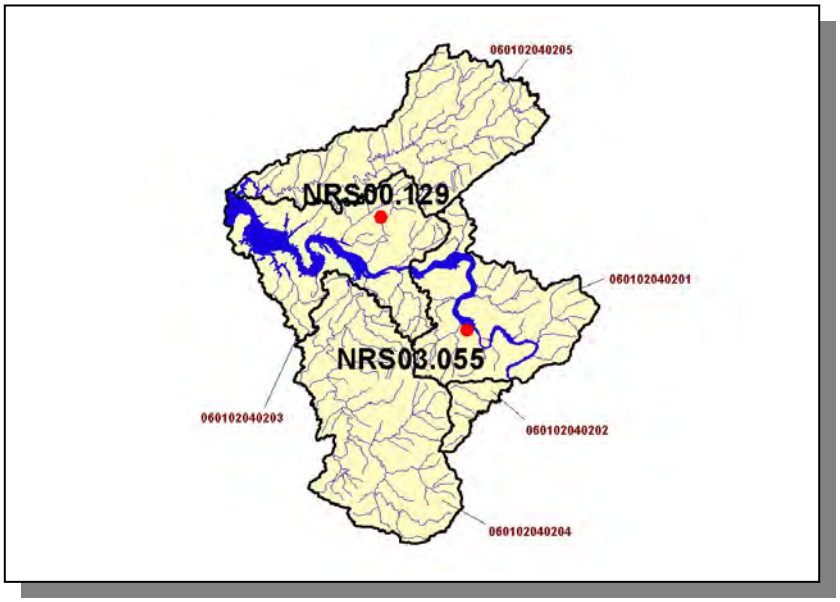


Figure 4-10. Location of ARAP Sites (Individual Permits) in Subwatershed 0601020402. *Subwatershed 060102040201, 060102040202, 060102040203, 0601020404, and 060102040205 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

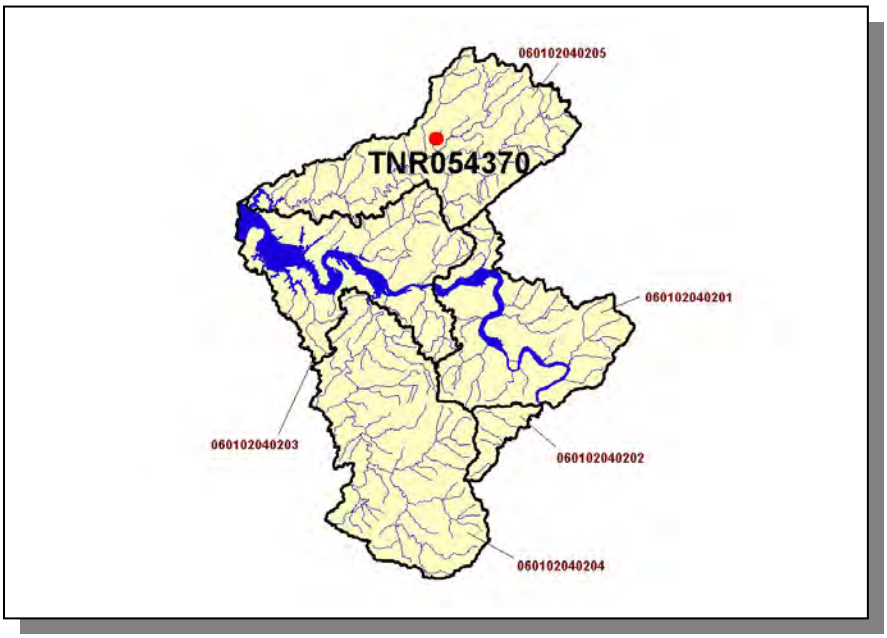


Figure 4-11. Location of TMSP Facilities in Subwatershed 0601020402. *Subwatershed 060102040201, 060102040202, 060102040203, 0601020404, and 060102040205 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There is one NPDES facility discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0601020402:

- TN0065510 (ALCOA-Calderwood Power House Hydro Plant) discharges to Little Tennessee River @ RM 43.6

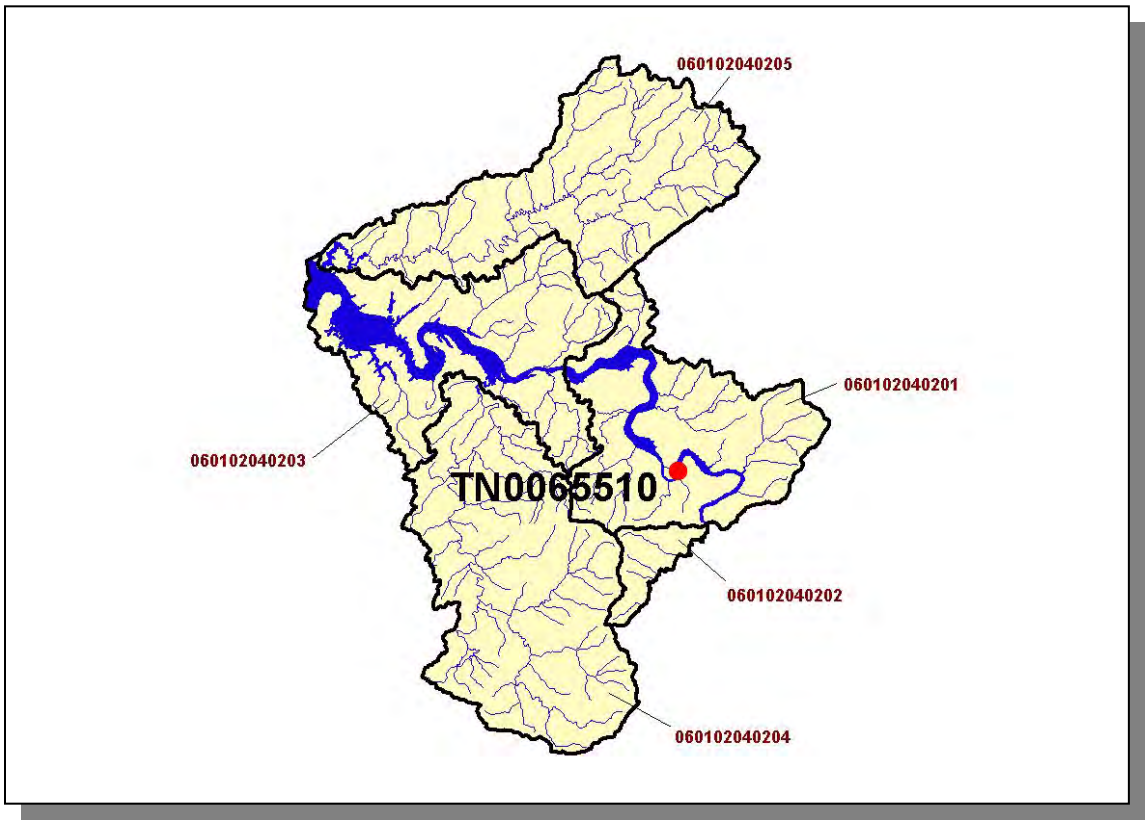


Figure 4-12. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0601020402. *Subwatershed 060102040201, 060102040202, 060102040203, 0601020404, and 060102040205 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0065510	1,200	1,252	1,350	1,200	

Table 4-5. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020402. *Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.*

PCB	SETTLEABLE SOLIDS
X	X

Table 4-6. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020402. *PCB, Polychlorinated Biphenyl.*

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens Sold	Hogs	Sheep
2,899	6,162	425	8	<5	115	79

Table 4-7. Summary of Livestock Count Estimates in Subwatershed 0601020402. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Blount	165.5	69.9	1.8	9.3
Loudon	62.3	62.3	1.1	3.5
Monroe	301.5	279.1	7.4	21.4
Total	**529.3**	**411.3**	**10.3**	**34.2**

Table 4-8. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0601020402.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.42
Legumes (Hayland)	0.77
Grass (Hayland)	0.30
Legumes, Grass (Hayland)	0.38
Grass, Forbs, Legumes (Mixed Pasture)	0.32
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	16.41
Soybeans (Row Crops)	12.82
Tobacco (Row Crops)	4.69
Wheat (Close-Grown Cropland)	5.87
Oats (Close-Grown Cropland)	0.32
Non-Agricultural Land Use	0.00
Other Land in Farms	0.14
Farmsteads and Ranch Headquarters	0.29

Table 4-9. Annual Estimated Total Soil Loss in Subwatershed 0601020402.

4.2.B. 0601020403 (Abrams Creek).

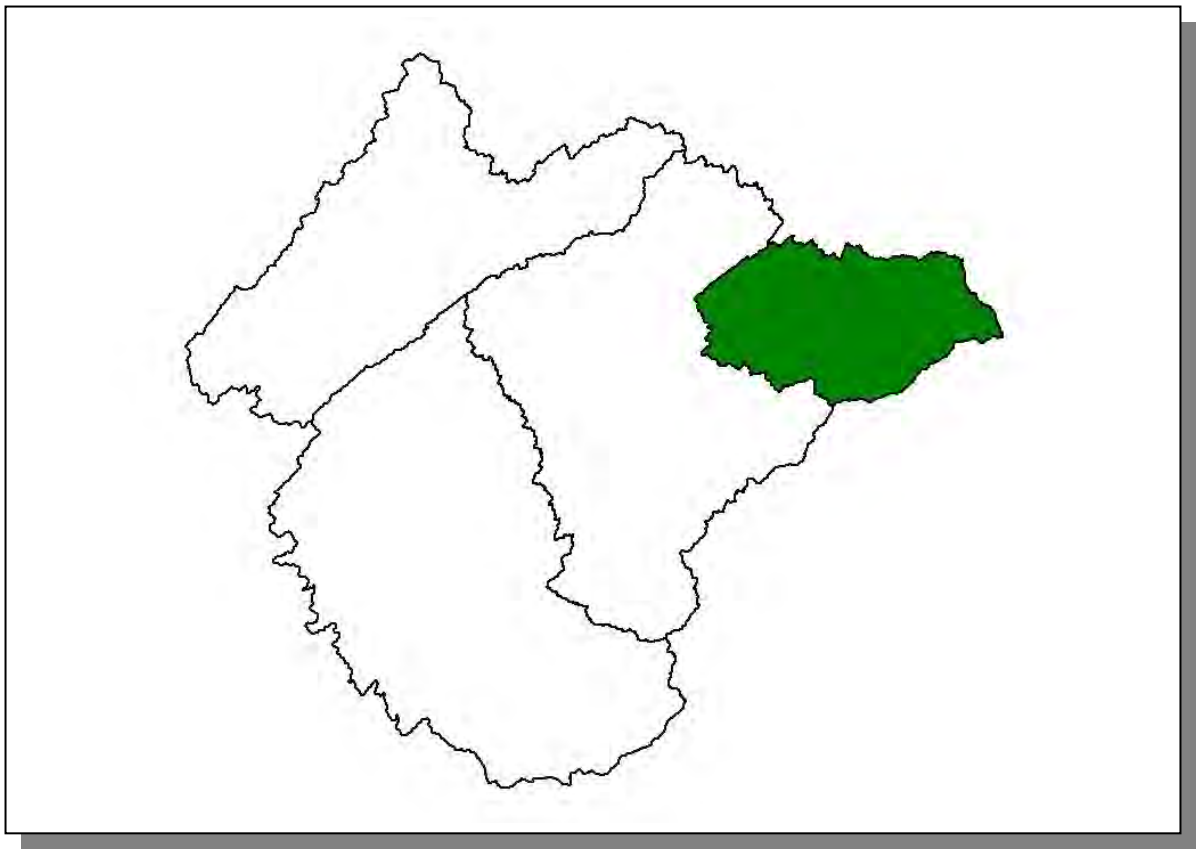


Figure 4-13. Location of Subwatershed 0601020403. *All Little Tennessee River Watershed HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.B.i. General Description.

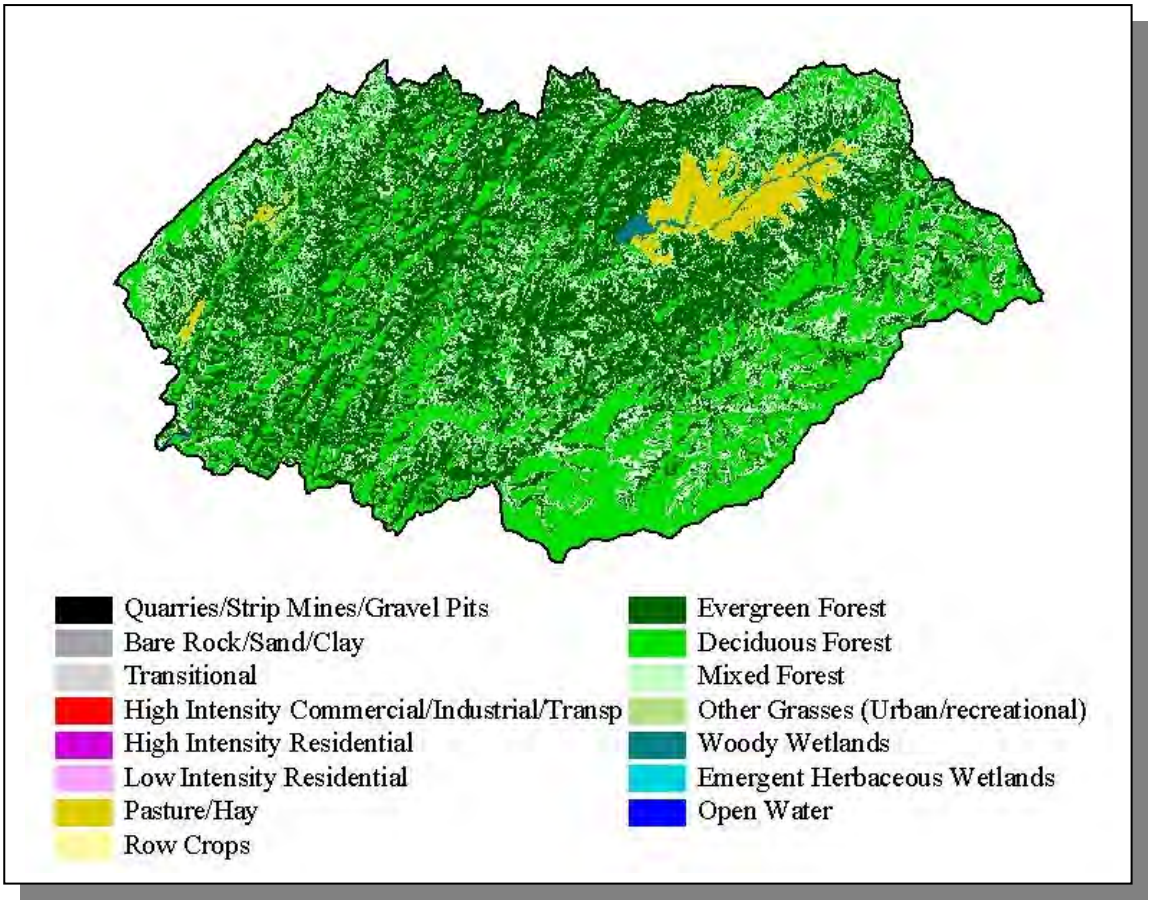


Figure 4-14. Illustration of Land Use Distribution in Subwatershed 0601020403.

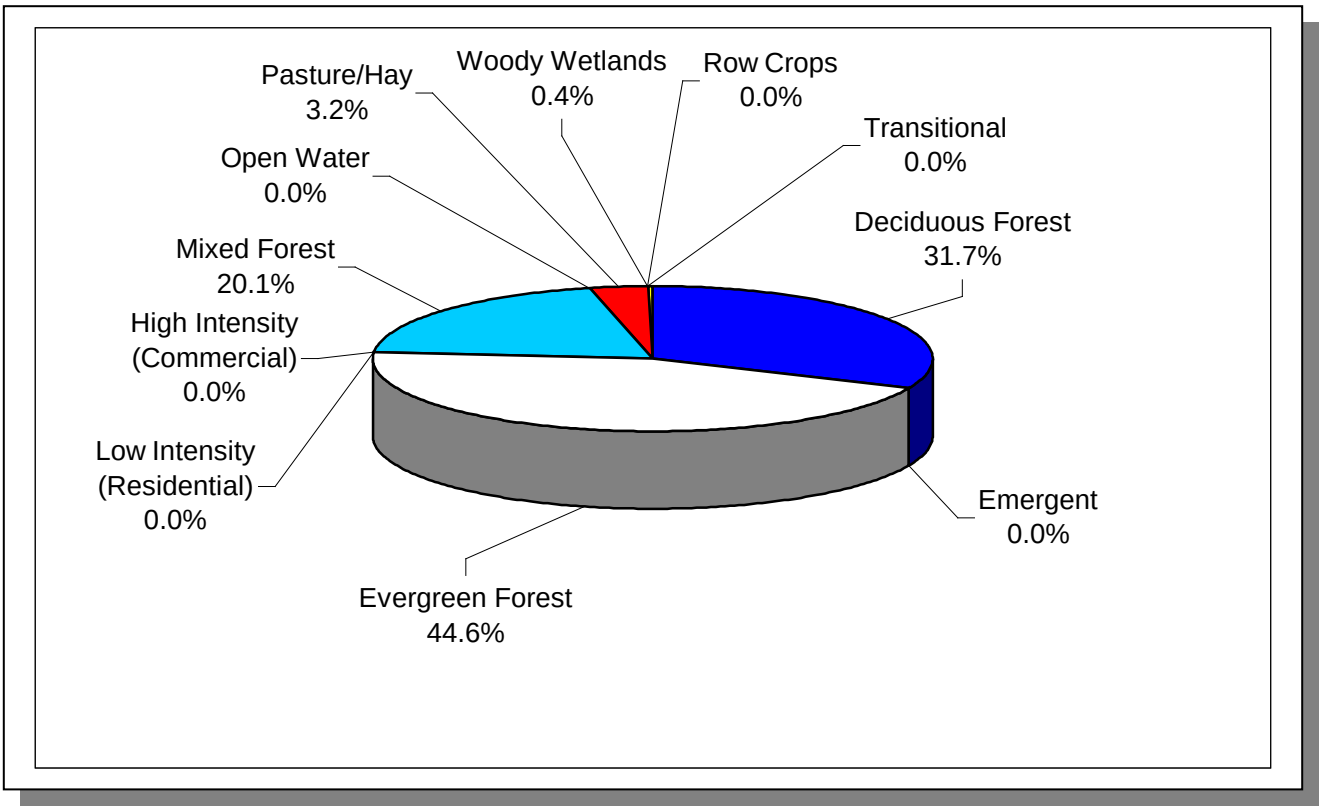


Figure 4-15. Land Use Distribution in Subwatershed 0601020403. *More information is provided in Appendix IV.*

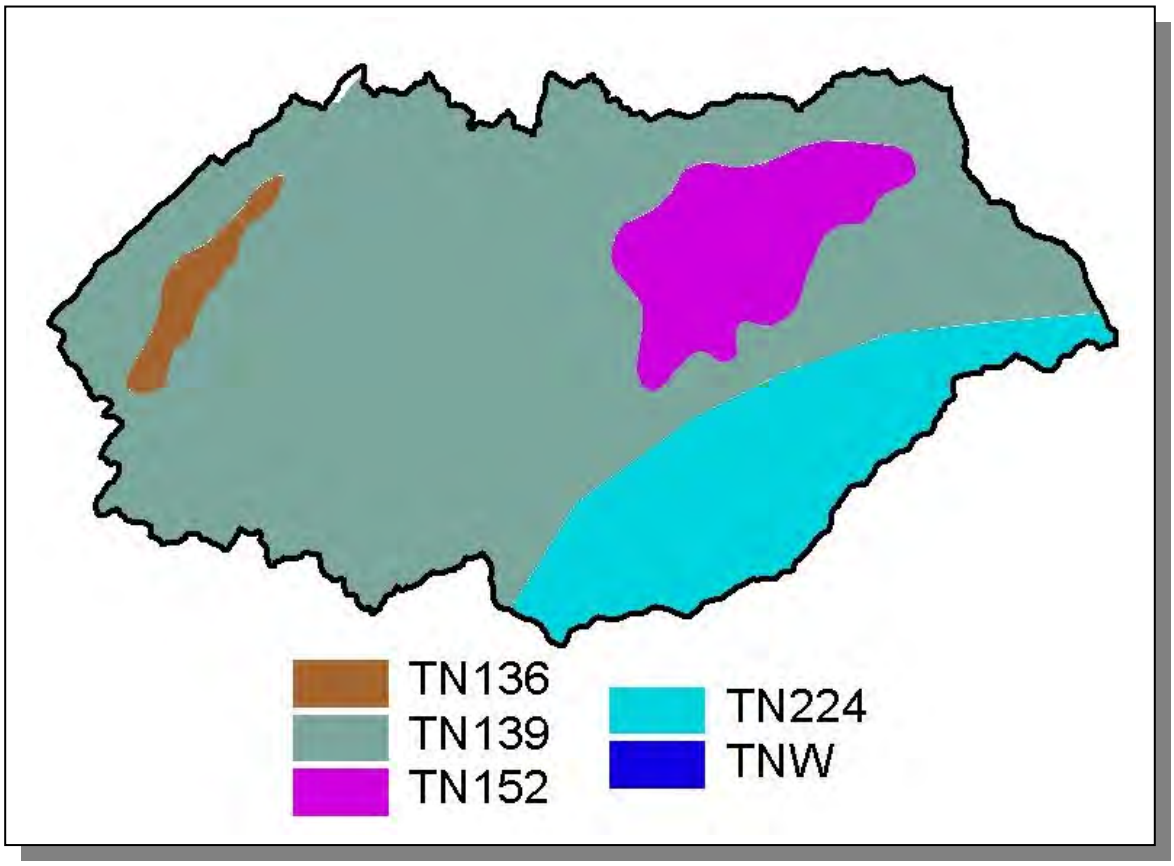


Figure 4-16. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020403.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN136	0.00	B	3.16	5.11	Loam	0.27
TN139	0.00	C	11.84	4.82	Loam	0.20
TN152	0.00	B	2.11	5.26	Loam	0.31
TN224	3.00	B	3.97	5.27	Loam	0.24

Table 4-10. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020403. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Blount	85,969	100,218	105,823	15.32	13,171	15,354	16,213	23.1

Table 4-11. Population Estimates in Subwatershed 0601020403.

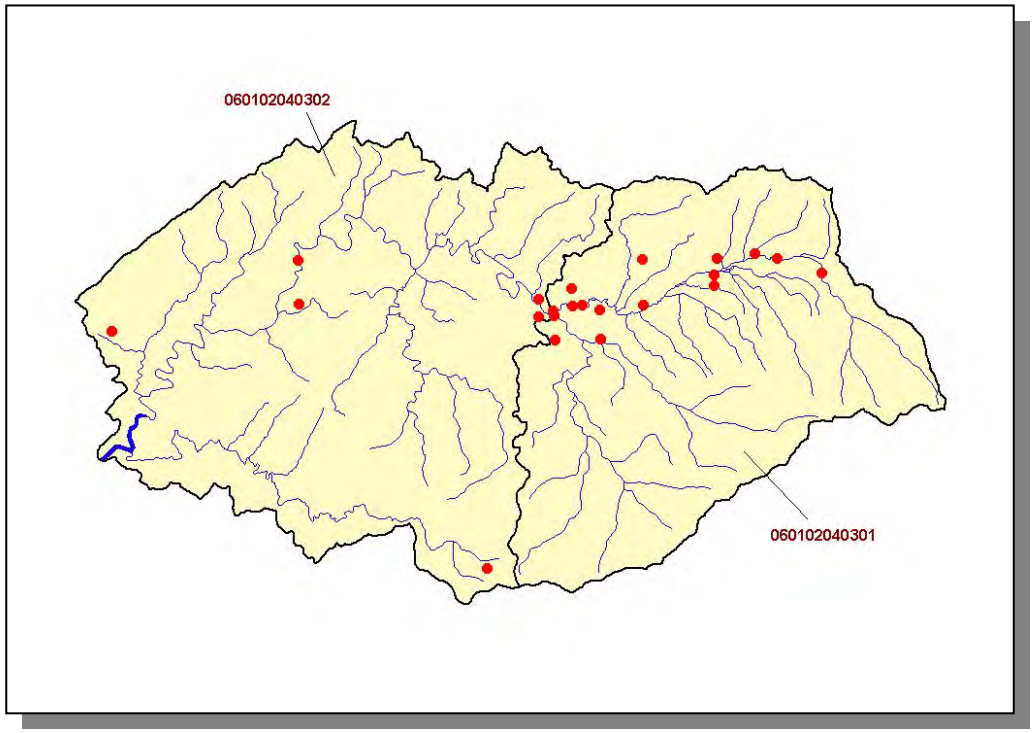


Figure 4-17. Location of STORET Monitoring Sites in Subwatershed 0601020403. *Subwatershed 060102040301 and 060102040302 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.B.ii. Point Source Contributions.

No point source contributions in this subwatershed.

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens Sold	Hogs	Sheep
506	1,048	58	<5	<5	22	15

Table 4-12. Summary of Livestock Count Estimates in Subwatershed 0601020403. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Blount	165.5	69.9	1.8	9.3

Table 4-13. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0601020403.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.22
Legumes (Hayland)	0.19
Legumes, Grass (Hayland)	0.06
Grass, Forbs, Legumes (Mixed Pasture)	0.20
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	15.48
Tobacco (Row Crops)	
Wheat (Close-Grown Cropland)	5.44
Oats (Close-Grown Cropland)	0.32
Non-Agricultural Land Use	0.00
Other Land in Farms	0.14
Farmsteads and Ranch Headquarters	0.29

Table 4-14. Annual Estimated Total Soil Loss in Subwatershed 0601020403.

4.2.C. 0601020404 (Tellico River).

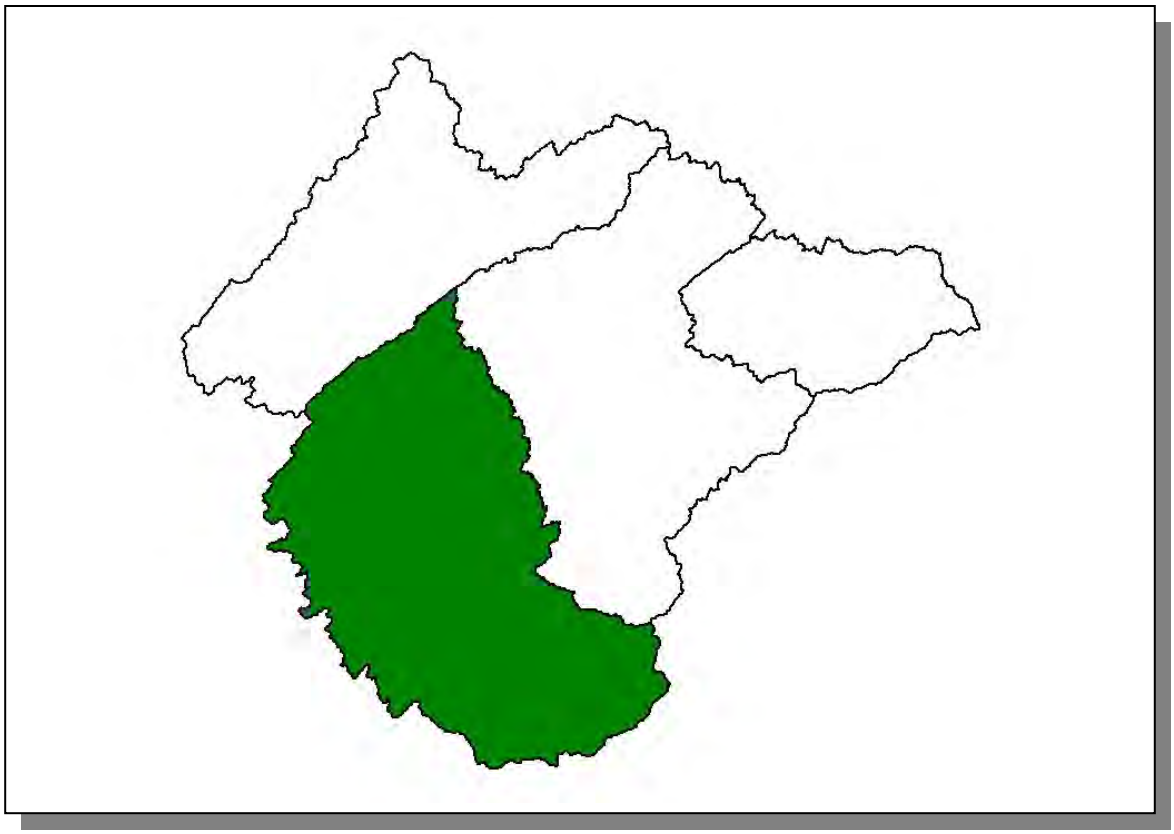


Figure 4-18. Location of Subwatershed 0601020404. *All Little Tennessee River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.C.i. General Description.

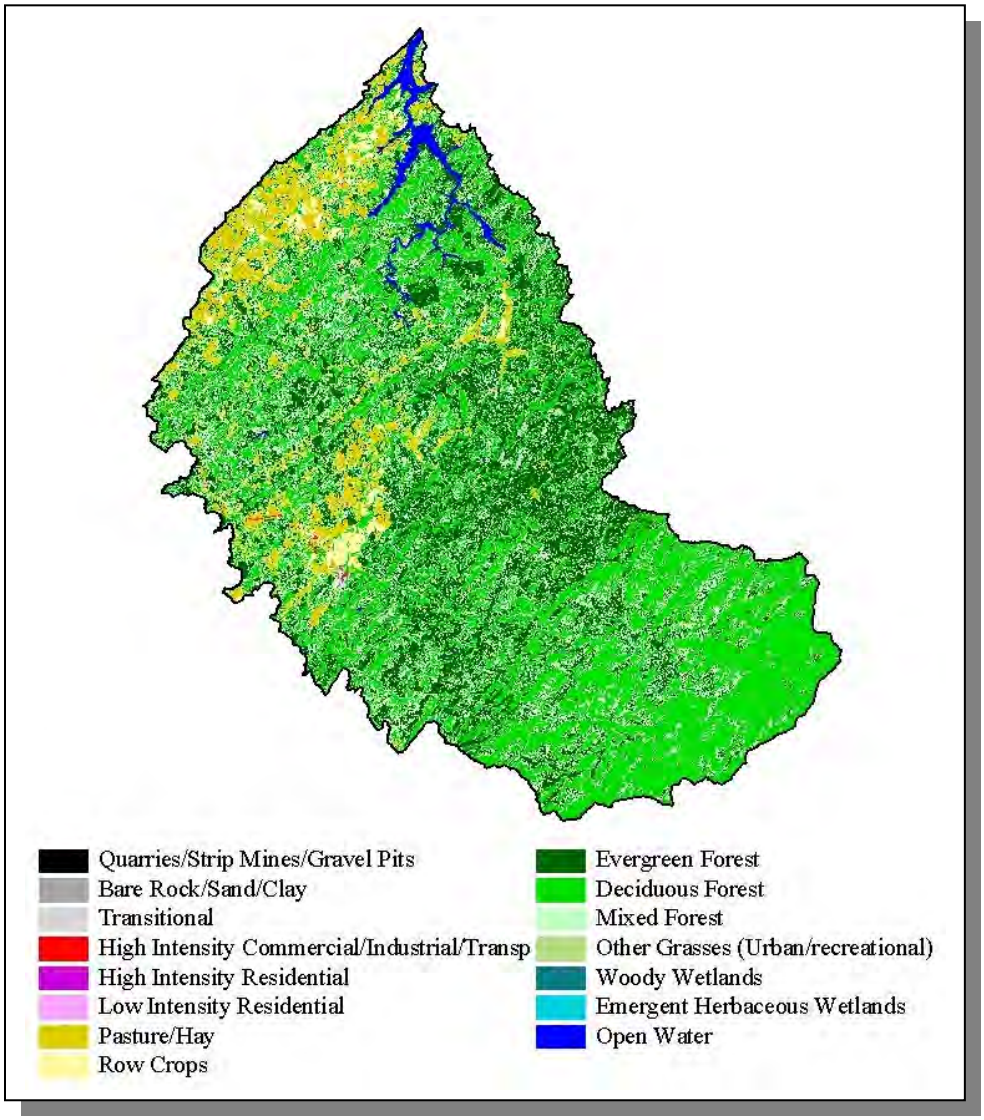


Figure 4-19. Illustration of Land Use Distribution in Subwatershed 0601020404.

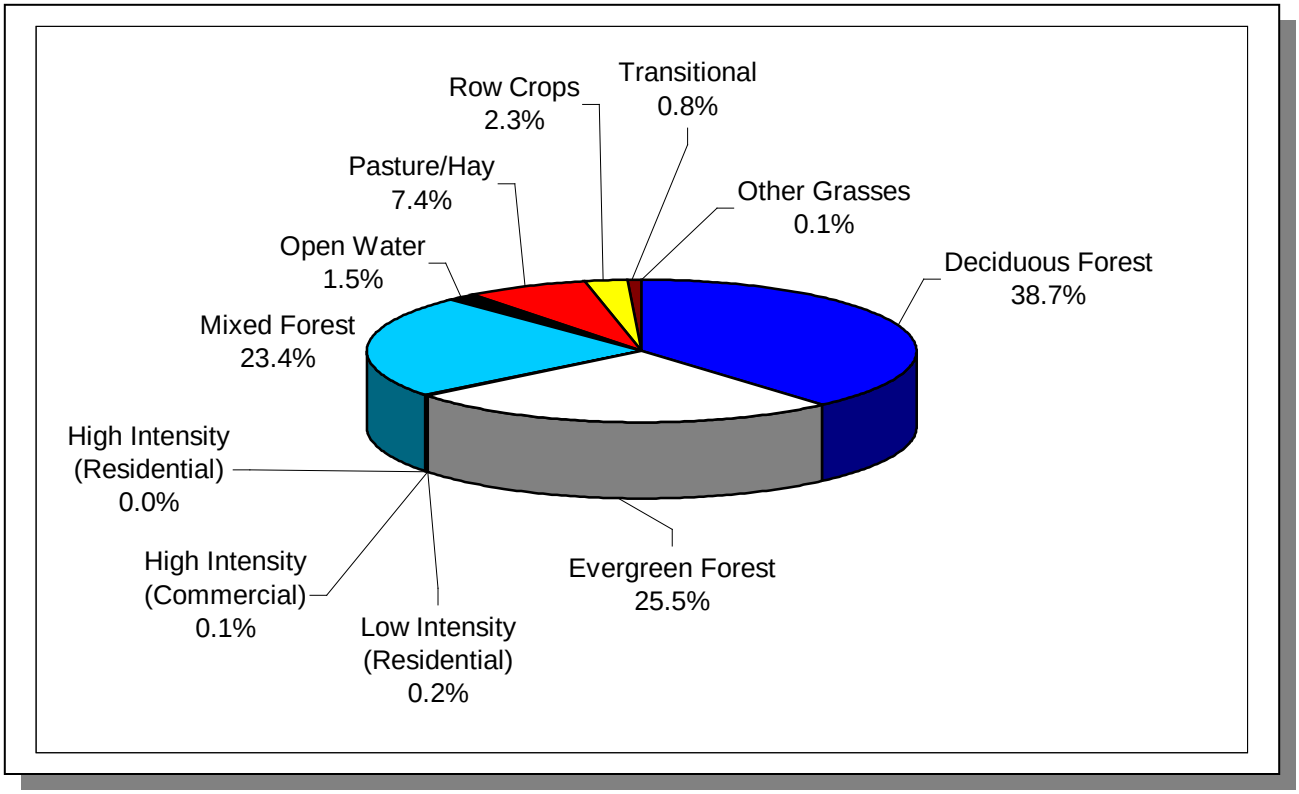


Figure 4-20. Land Use Distribution in Subwatershed 0601020404. *More information is provided in Appendix IV.*

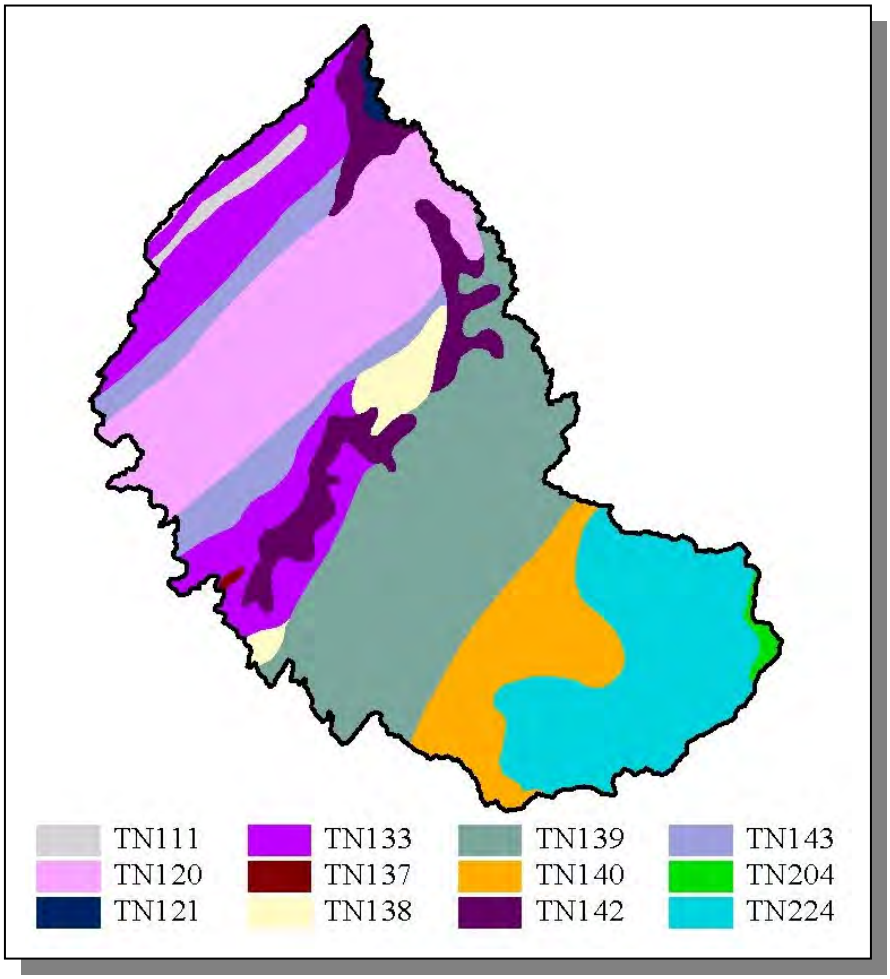


Figure 4-21. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020404.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN111	0.00	C	1.41	5.10	Loam	0.34
TN120	0.00	B	1.68	5.11	Loam	0.27
TN121	0.00	B	1.30	5.21	Loam	0.33
TN133	0.00	C	1.35	6.04	Clayey Loam	0.27
TN137	0.00	C	3.41	5.34	Silty Loam	0.26
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN139	0.00	C	11.84	4.82	Loam	0.20
TN140	0.00	B	3.85	4.85	Sandy Loam	0.21
TN142	0.00	B	2.20	5.78	Loam	0.31
TN143	0.00	C	1.22	6.44	Loam	0.32
TN204	0.00	B	3.95	4.80	Sandy Loam	0.19
TN224	3.00	B	3.97	5.27	Loam	0.24

Table 4-15. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020404. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Monroe	30,541	33,953	38,961	41.30	12,612	14,021	16,090	27.6

Table 4-16. Population Estimates in Subwatershed 0601020404.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Madisonville	Monroe	3,137	1,360	893	467	0
Tellico Plains	Monroe	710	370	284	83	3
Vonore	Monroe	601	281	8	271	2
Totals		**4,448**	**2,011**	**1,185**	**821**	**5**

Table 4-17. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0513010804.

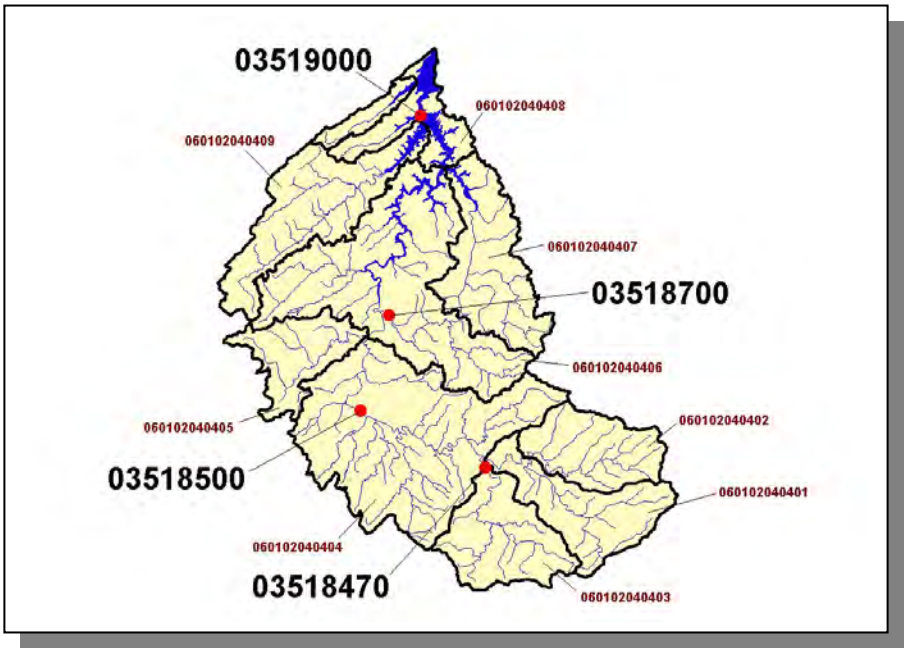


Figure 4-22. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601020404. *Subwatershed 060102040401, 060102040402, 060102040403, 060102040404, 060102040405, 060102040406, 060102040407, 060102040408, and 060102040409 boundaries are shown for reference. More information is provided in Appendix IV.*

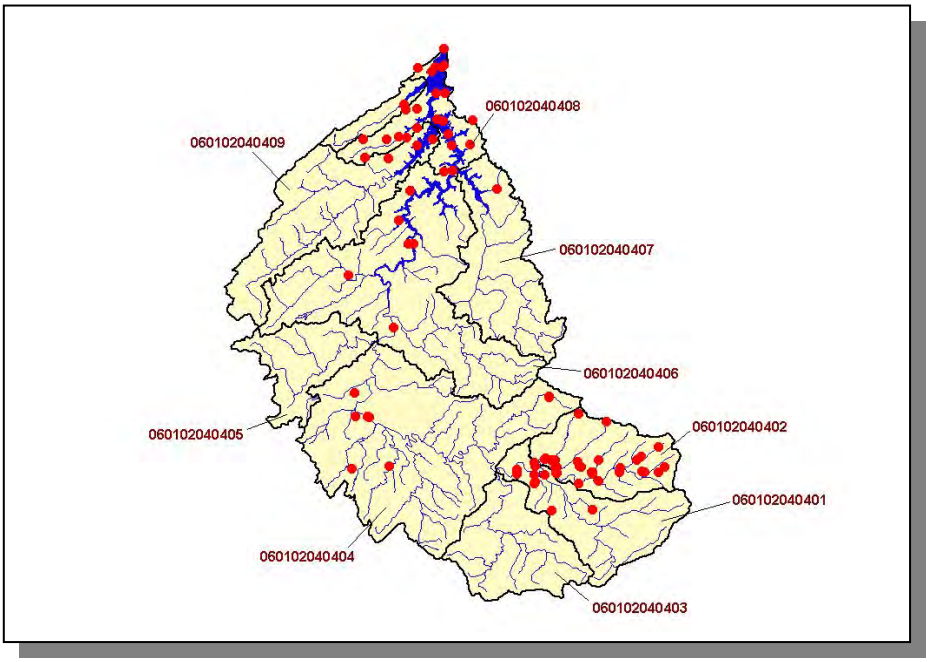


Figure 4-23. Location of STORET Monitoring Sites in Subwatershed 0601020404. *Subwatershed 060102040401, 060102040402, 060102040403, 060102040404, 060102040405, 060102040406, 060102040407, 060102040408, and 060102040409 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.C.ii. Point Source Contributions.

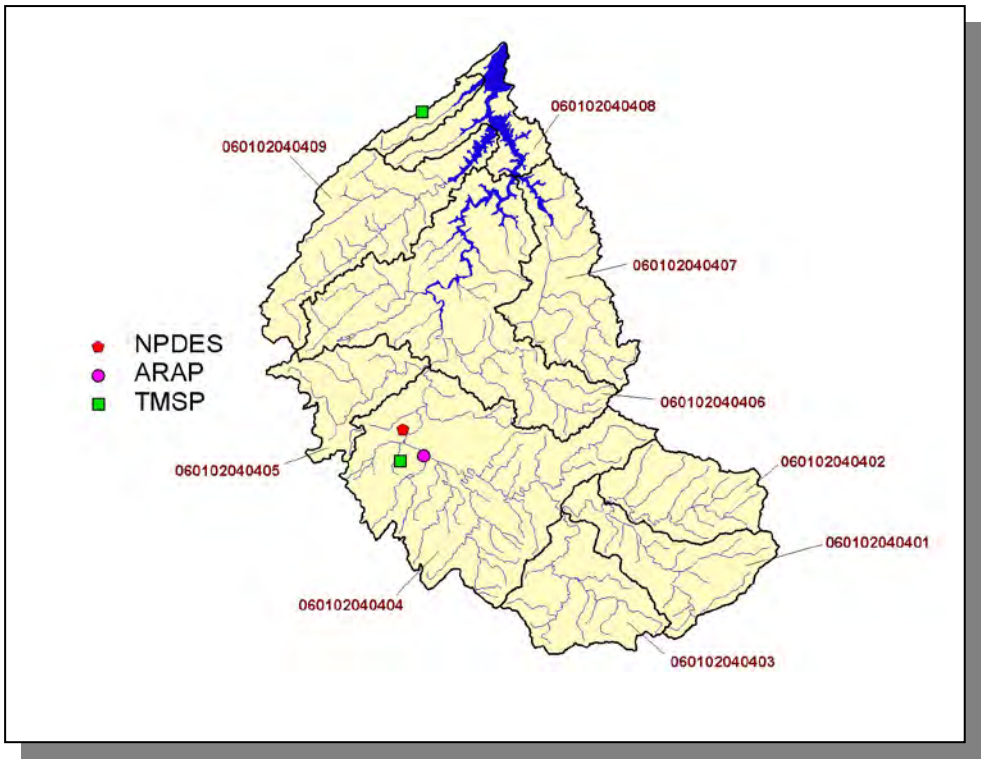


Figure 4-24. Location of Active Point Source Facilities in Subwatershed 0601020404. *Subwatershed 060102040401, 060102040402, 060102040403, 060102040404, 060102040405, 060102040406, 060102040407, 060102040408, and 060102040409 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

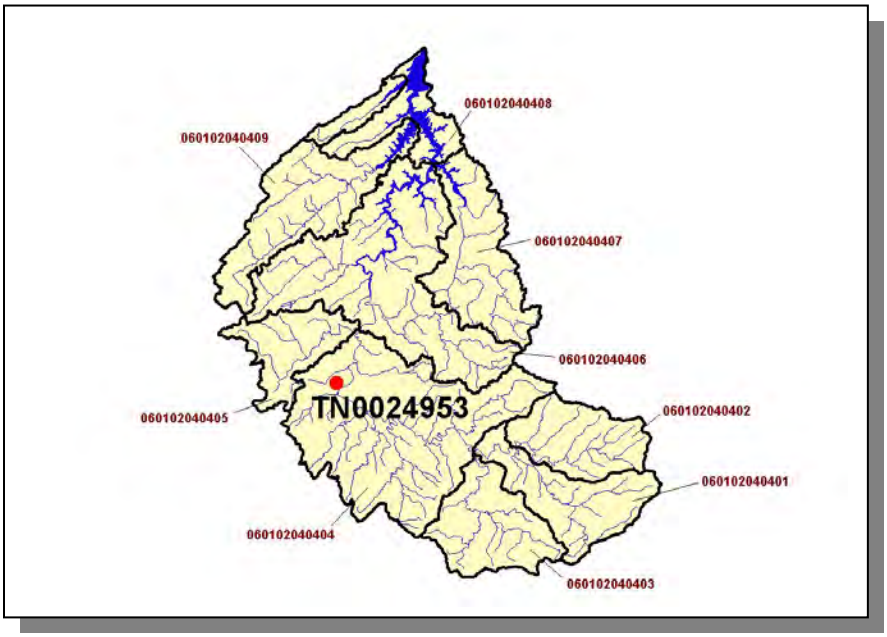


Figure 4-25. Location of NPDES Facilities in Subwatershed 0601020404. *Subwatershed 060102040401, 060102040402, 060102040403, 060102040404, 060102040405, 060102040406, 060102040407, 060102040408, and 060102040409 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

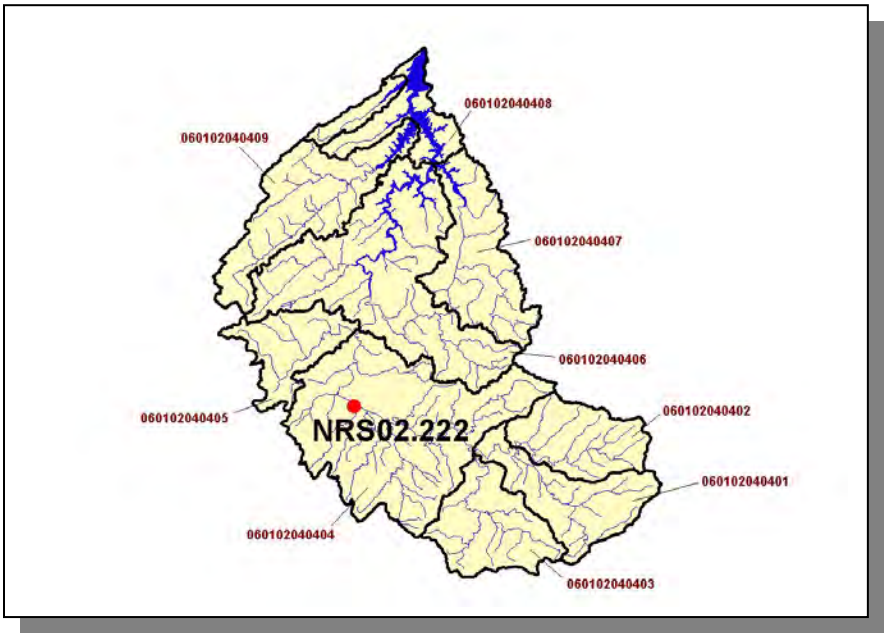


Figure 4-26. Location of ARAP Sites (Individual Permits) in Subwatershed 0601020404. *Subwatershed 060102040401, 060102040402, 060102040403, 060102040404, 060102040405, 060102040406, 060102040407, 060102040408, and 060102040409 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

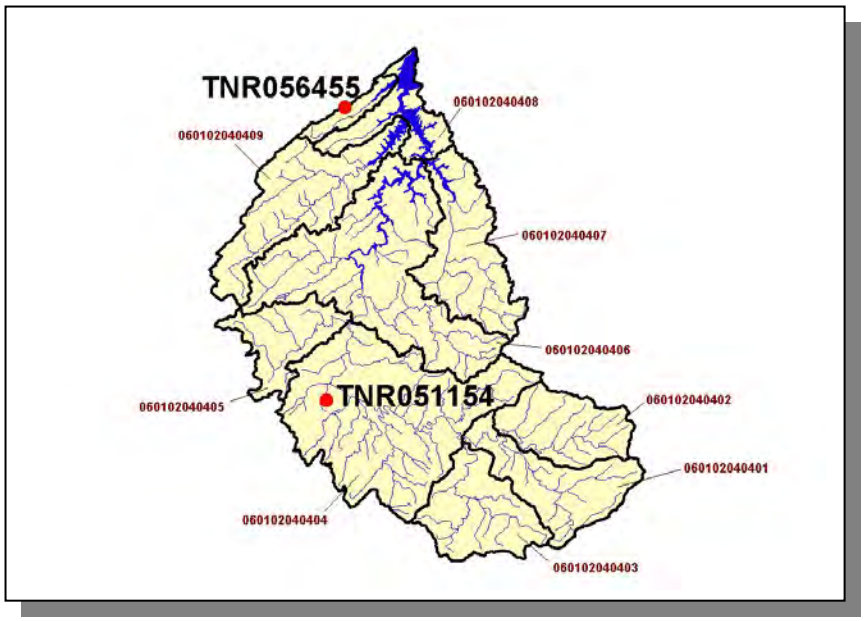


Figure 4-27. Location of TMSP Facilities in Subwatershed 0601020404. *Subwatershed 060102040401, 060102040402, 060102040403, 060102040404, 060102040405, 060102040406, 060102040407, 060102040408, and 060102040409 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Milk Cow	Cattle	Chickens (Layers)	Chickens Sold	Hogs	Sheep
2,957	1,231	7,619	6	<5	55	23

Table 4-18. Summary of Livestock Count Estimates in Subwatershed 0601020404*. According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Monroe	301.5	279.1	7.4	21.4

Table 4-19. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0601020404.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.56
Grass (Hayland)	0.38
Legumes, Grass (Hayland)	0.60
Grass, Forbs, Legumes (Mixed Pasture)	0.41
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	17.20
Soybeans (Row Crops)	12.82
Tobacco (Row Crops)	30.54
Wheat (Close-Grown Cropland)	6.20
Non-Agricultural Land Use	0.00
Farmsteads and Ranch Headquarters	0.28

Table 4-20. Annual Soil Loss in Subwatershed 0601020404.

4.2.D. 0601020405 (Little Tennessee River).

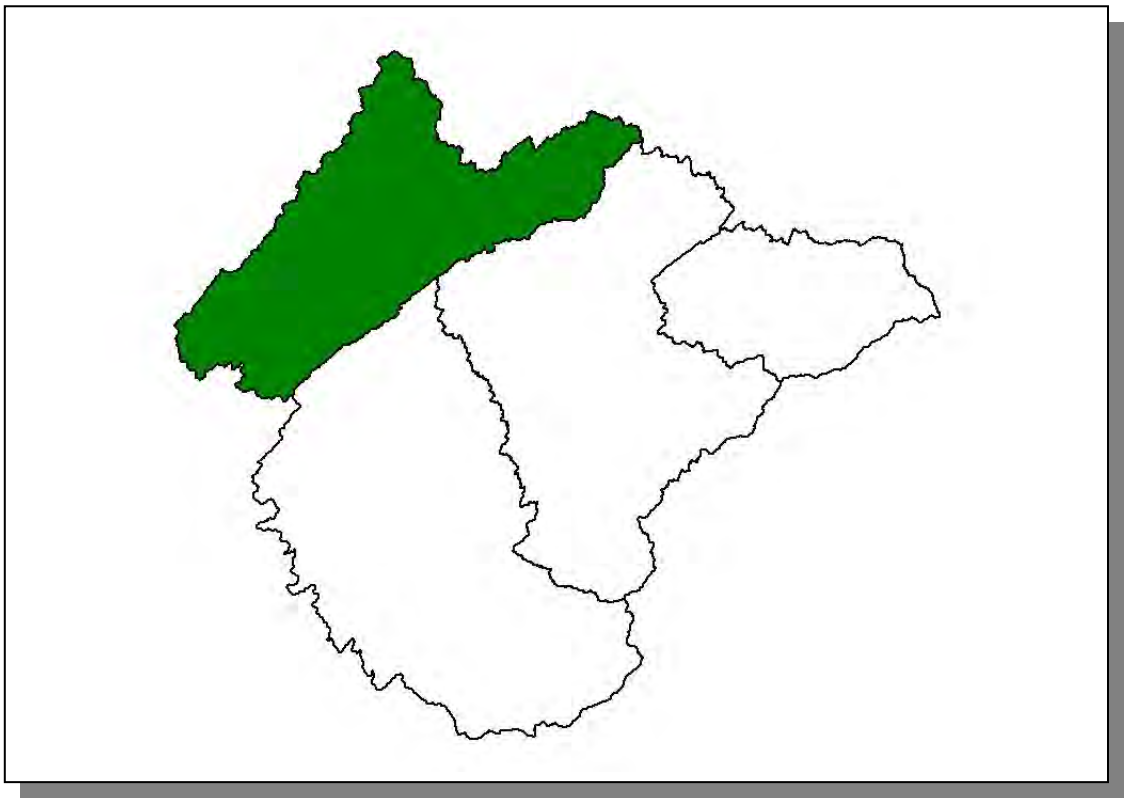


Figure 4-28. Location of Subwatershed 0601020405. *All Little Tennessee River HUC-10 subwatershed boundaries in Tennessee are shown for reference.*

4.2.D.i. General Description.

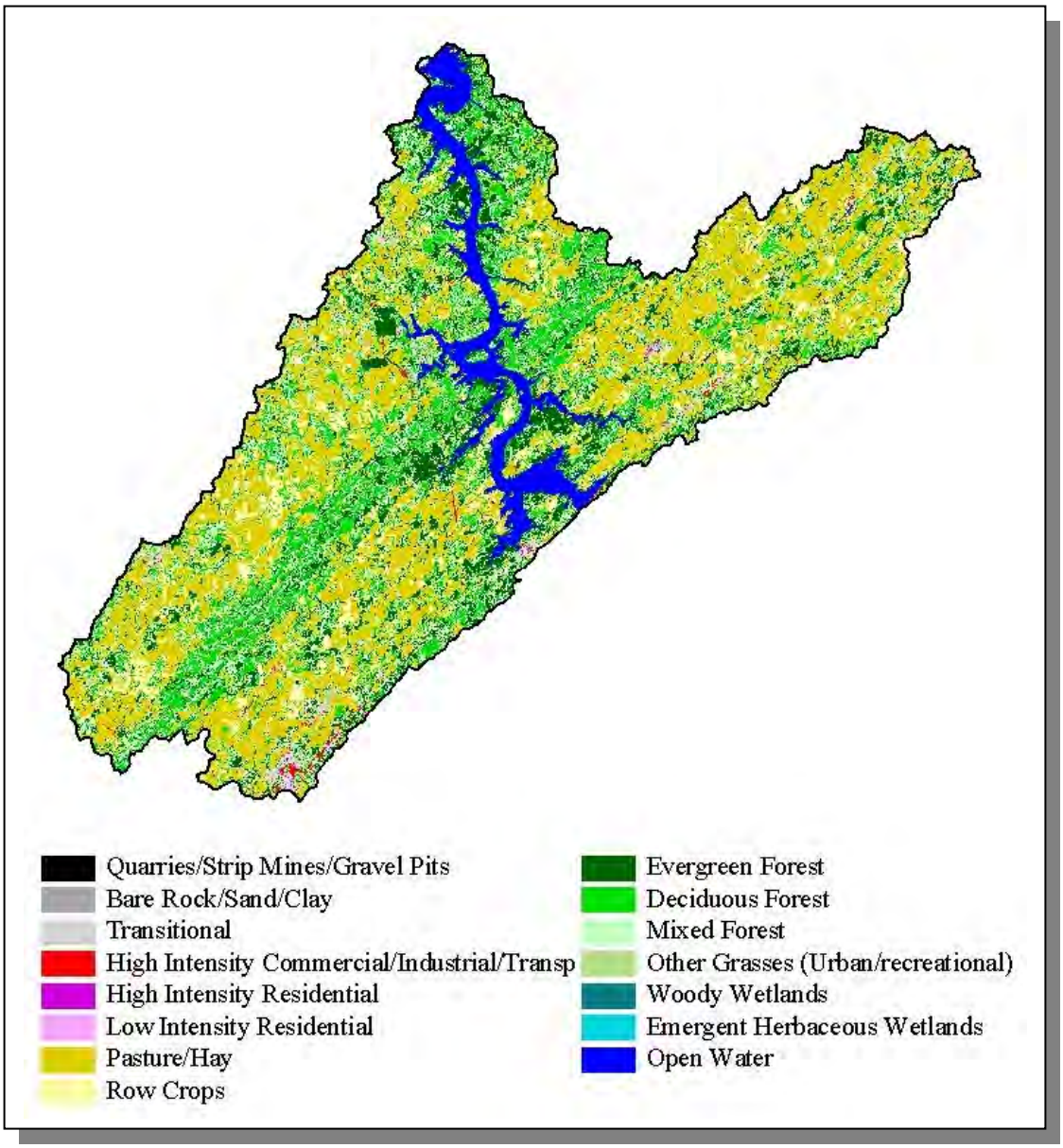


Figure 4-29. Illustration of Land Use Distribution in Subwatershed 0601020405.

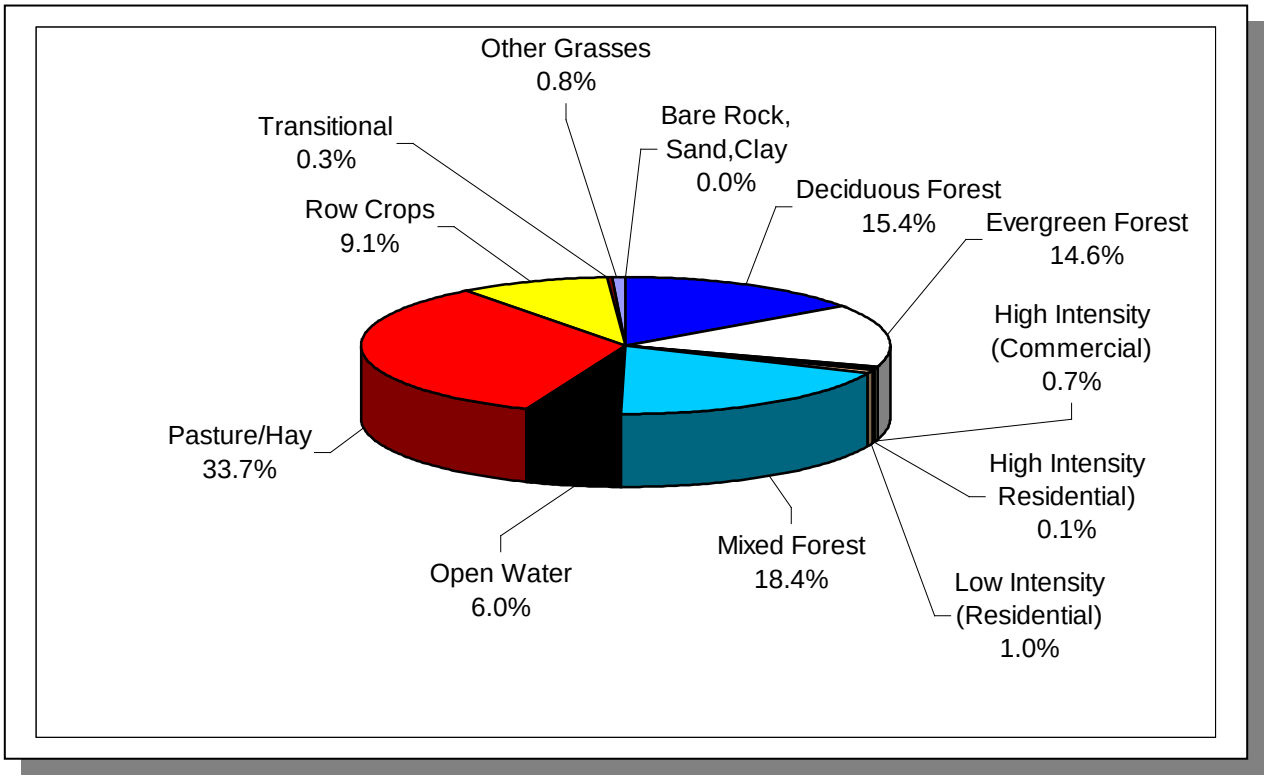


Figure 4-30. Land Use Distribution in Subwatershed 0601020405. *More information is provided in Appendix IV.*

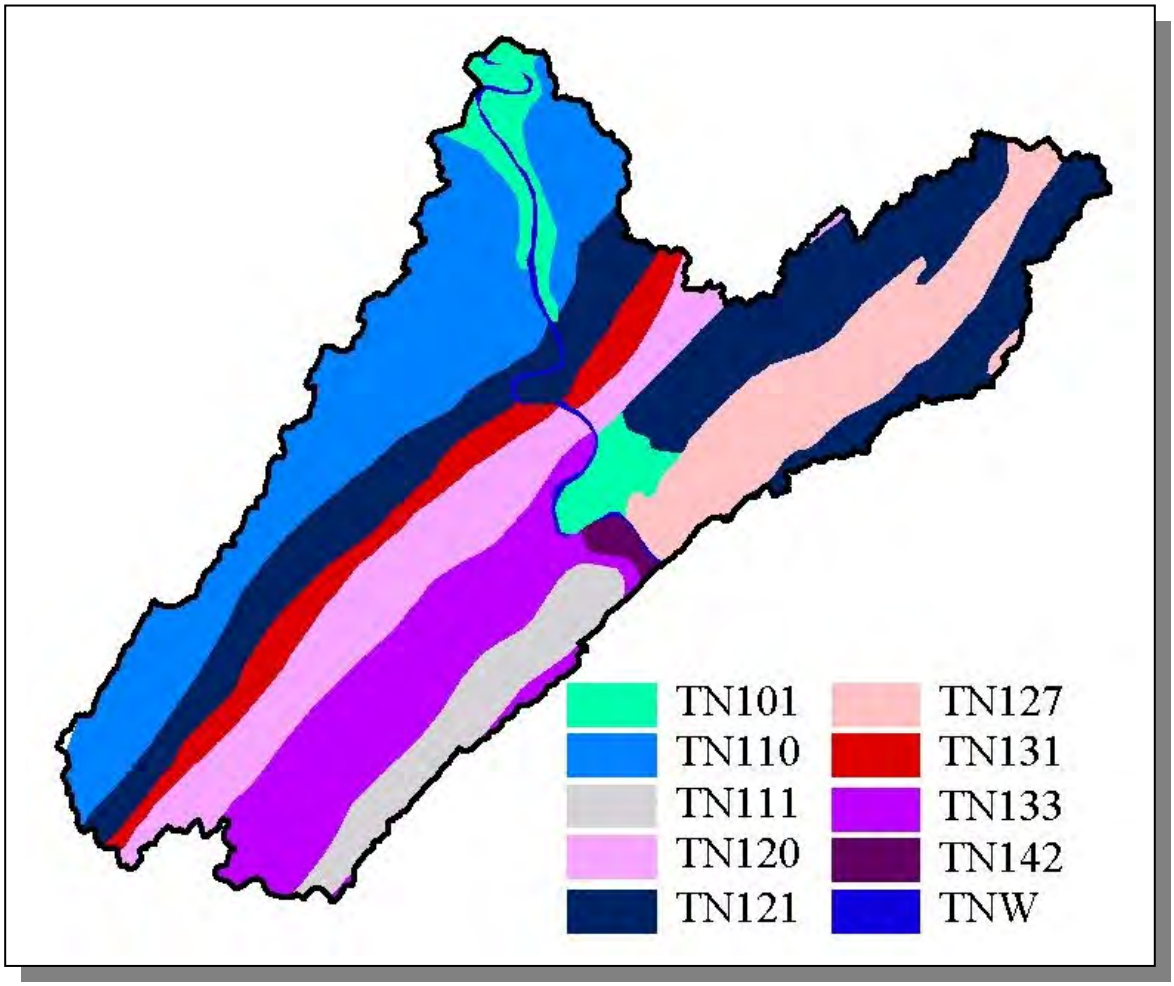


Figure 4-31. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020405.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hr)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN101	0.00	B	1.71	5.39	Loam	0.35
TN110	0.00	B	2.22	4.96	Loam	0.31
TN111	0.00	C	1.41	5.10	Loam	0.34
TN120	0.00	B	1.68	5.11	Loam	0.27
TN121	0.00	B	1.30	5.21	Loam	0.33
TN127	6.00	C	1.31	5.20	Loam	0.35
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN133	0.00	C	1.35	6.04	Clayey Loam	0.27
TN142	0.00	B	2.20	5.78	Loam	0.31

Table 4-21. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020405. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Blount	85,969	100,218	105,823	4.96	4,268	4,975	5,253	23.1
Loudoun	31,255	38,245	39,086	27.75	8,673	10,613	10,846	25.1
Monroe	30,541	33,953	38,961	12.89	3,938	4,378	5,023	27.6
Totals	**147,765**	**172,416**	**183,870**		**16,879**	**19,966**	**21,122**	**25.1**

Table 4-22. Population Estimates in Subwatershed 0601020405.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Madisonville	Monroe	3,137	1,360	893	467	0
Sweetwater	Monroe	5,054	2,164	1,598	560	6
Vonore	Monroe	601	281	8	271	2
Greenback	Loudon	600	243	0	243	0
Totals		**9,392**	**4,048**	**2,499**	**1,541**	**8**

Table 4-23. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0601020405.

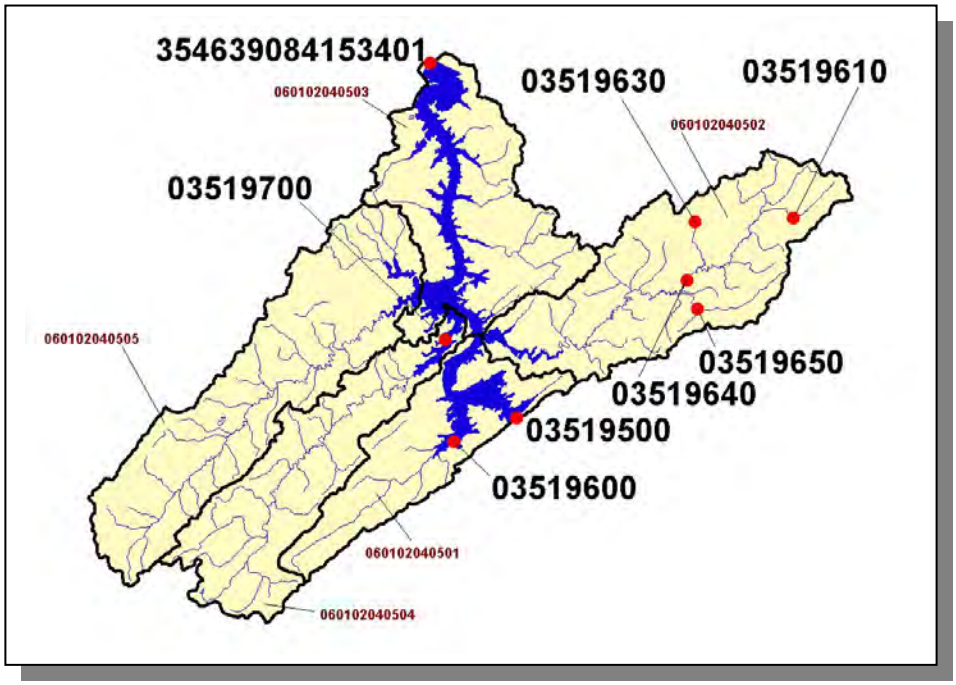


Figure 4-32. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601020405. *Subwatershed 060102040501, 060102040502, 060102040503, 060102040504, and 060102040505 boundaries are shown for reference. More information is provided in Appendix IV.*

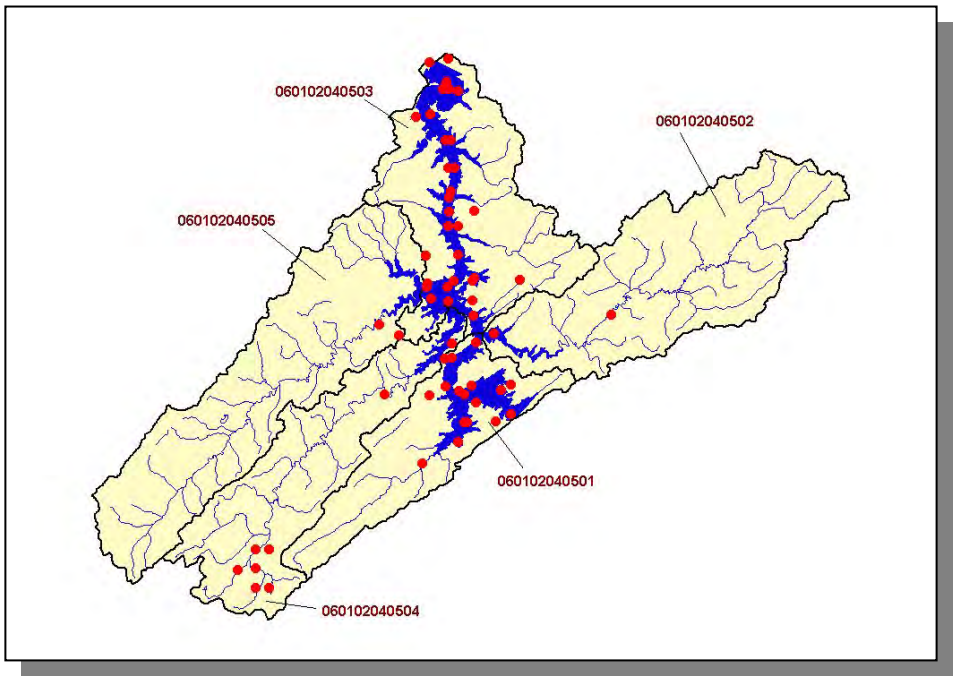


Figure 4-33. Location of STORET Monitoring Sites in Subwatershed 0601020405. *Subwatershed 060102040501, 060102040502, 060102040503, 060102040504, and 060102040505 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.D.ii. Point Source Contributions.

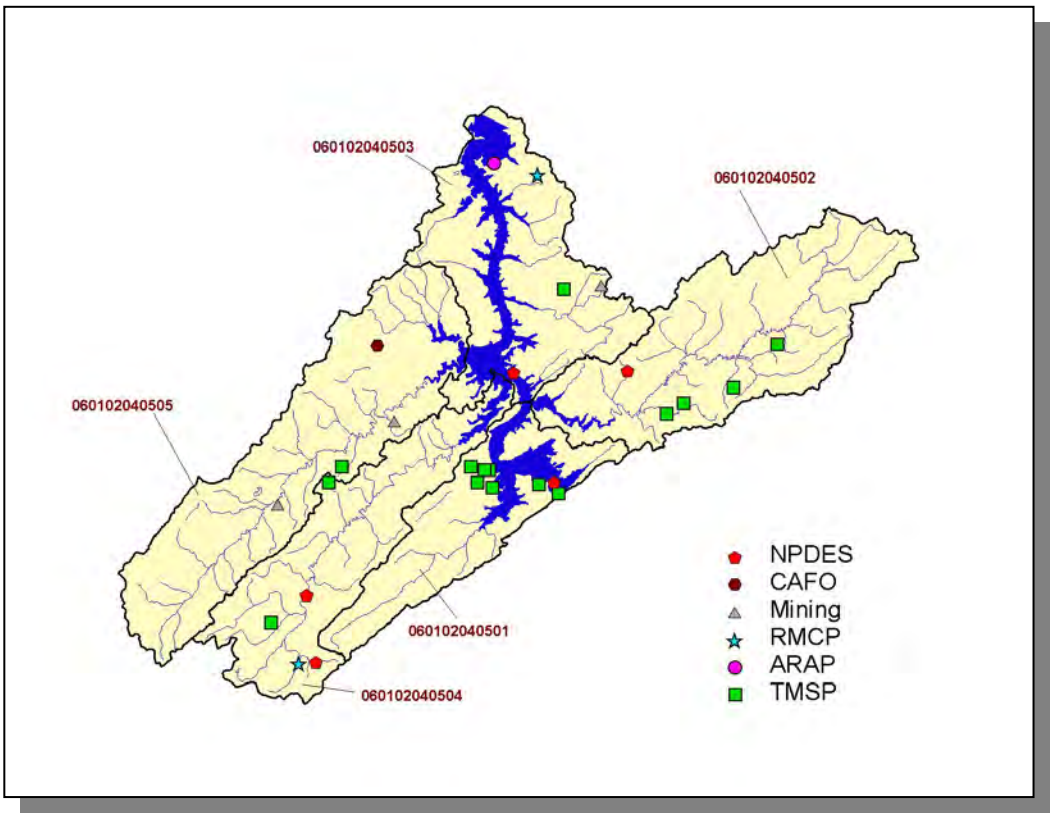


Figure 4-34. Location of Active Point Source Facilities in Subwatershed 0601020405. *Subwatershed 060102040501, 060102040502, 060102040503, 060102040504, and 060102040505 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

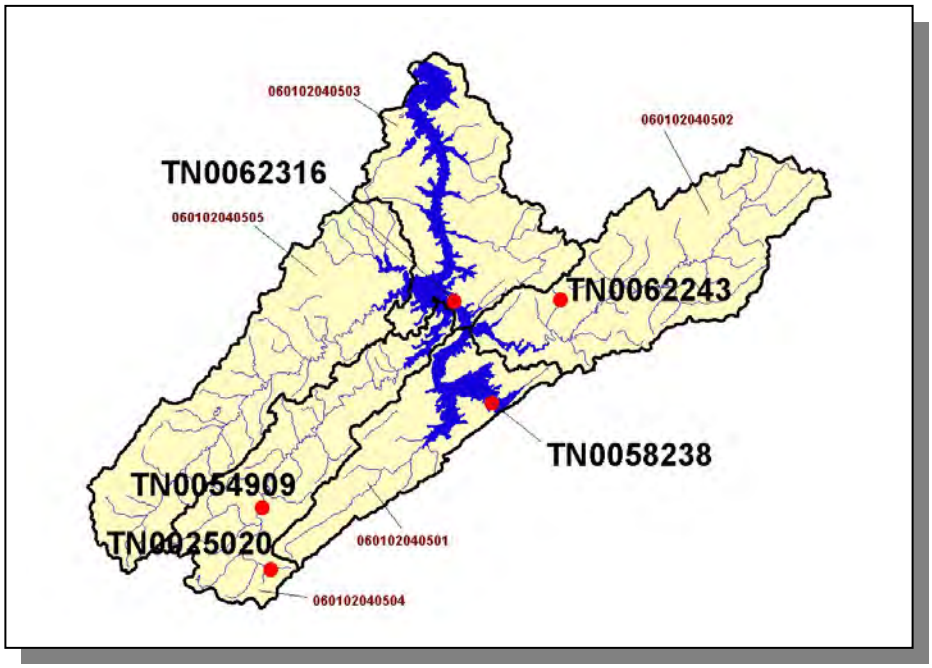


Figure 4-35. Location of NPDES Facilities in Subwatershed 0601020405. *Subwatershed 060102040501, 060102040502, 060102040503, 060102040504, and 060102040505 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

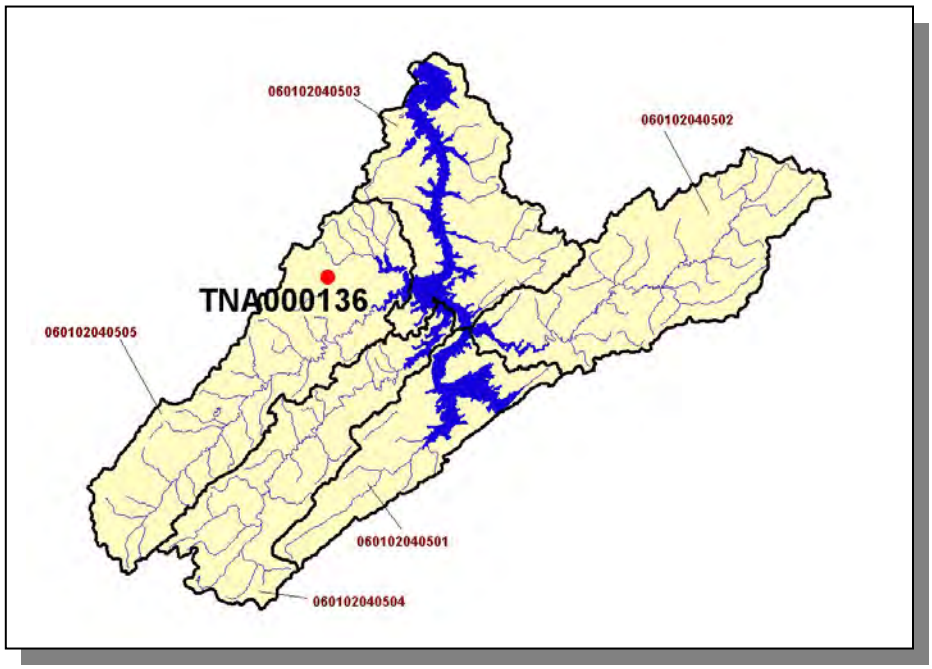


Figure 4-36. Location of Concentrated Animal Feeding Operations (CAFO) in Subwatershed 0601020405. *Subwatershed 0601020405, 0601020405, 0601020405, 0601020405, and 0601020405 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

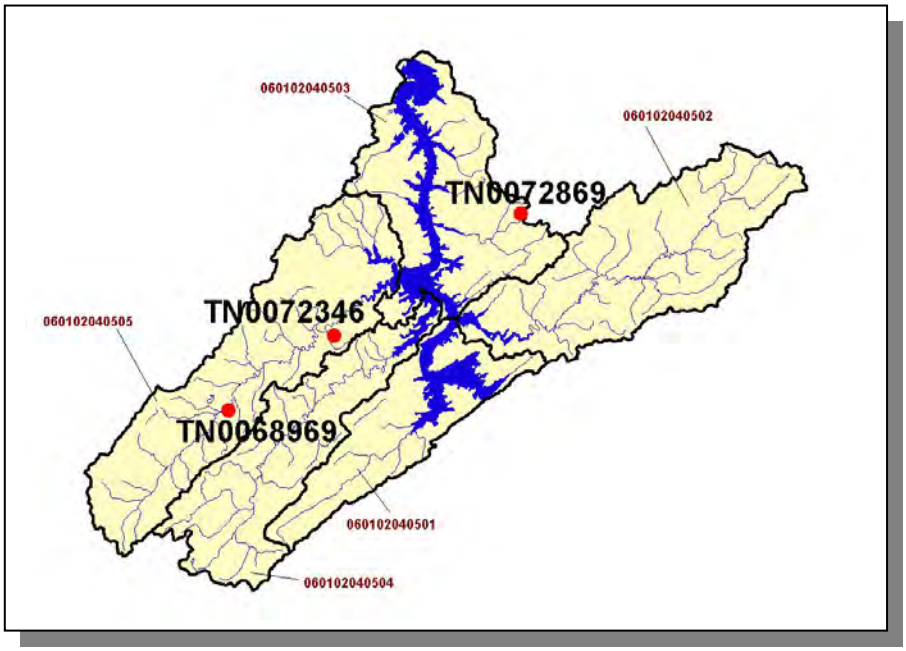


Figure 4-37. Location of Active Mining Facilities in Subwatershed 0601020405. *Subwatershed 060102040501, 060102040502, 060102040503, 060102040504, and 060102040505 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

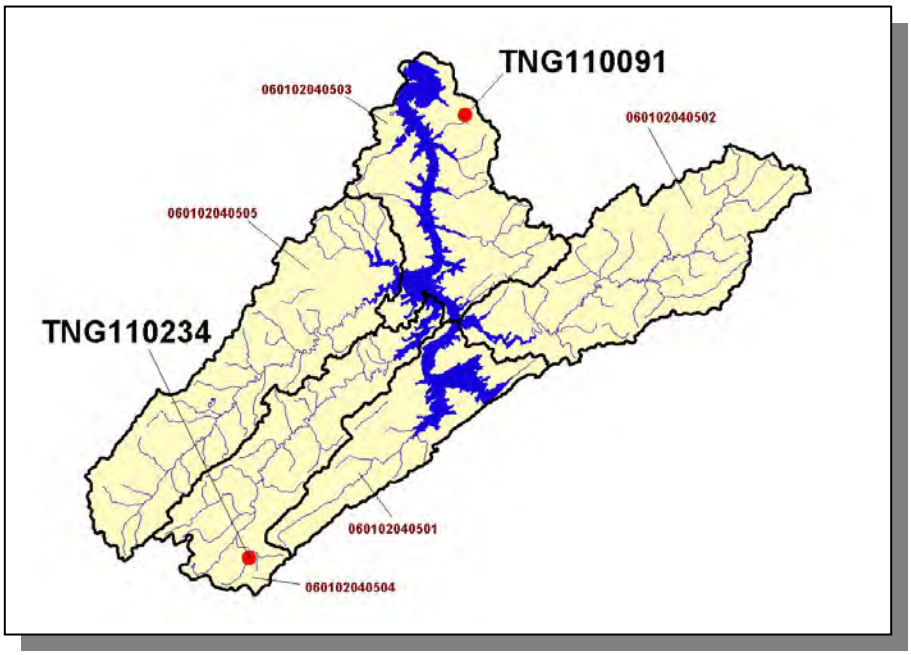


Figure 4-38. Location of Ready Mix Concrete Plants in Subwatershed 0601020405. *Subwatershed 060102040501, 060102040502, 060102040503, 060102040504, and 060102040505 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

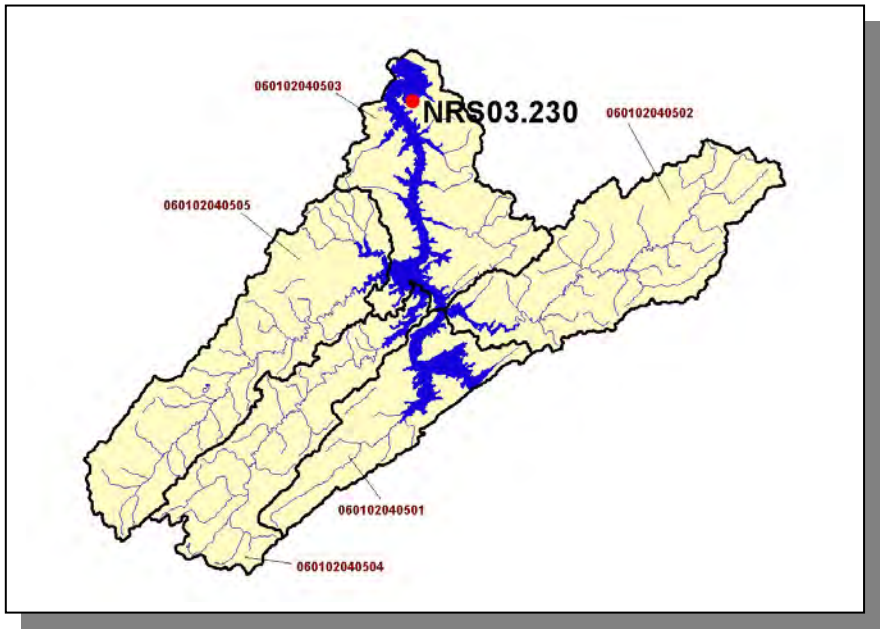


Figure 4-39. Location of ARAP Sites (Individual Permits) in Subwatershed 0601020405. *Subwatershed 0601020405, 0601020405, 0601020405, 0601020405, and 0601020405 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

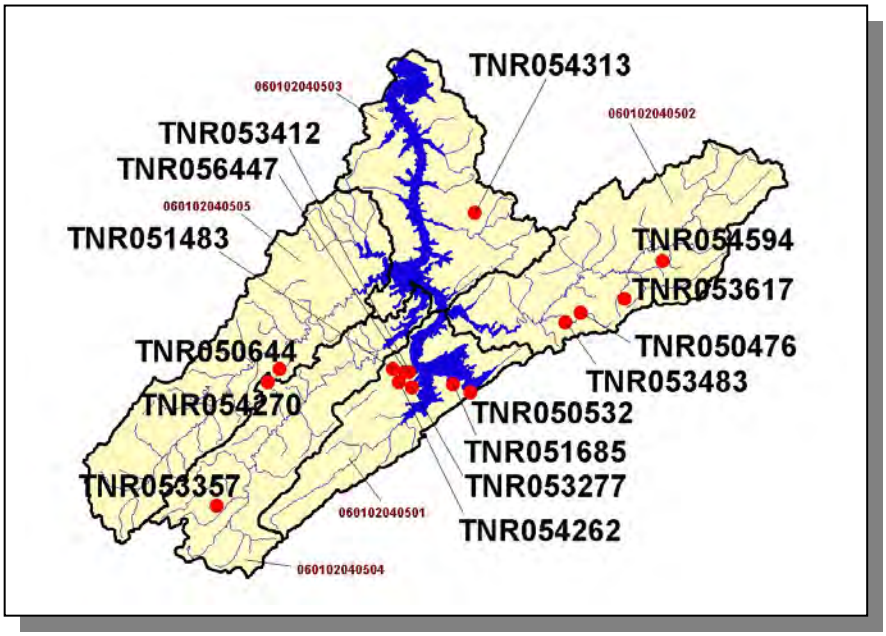


Figure 4-40. Location of TMSP Facilities in Subwatershed 0601020405. *Subwatershed 060102040501, 060102040502, 060102040503, 060102040504, and 060102040505 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.D.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There are four NPDES facilities discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0601020405:

- TN0058238 (Niles ferry Wastewater Treatment Facility) discharges to Little Tennessee River @ RM 18.6
- TN0062316 (Foothills Pointe Owners Association) discharges to Tellico reservoir (Little Tennessee River) @ RM 13.4
- TN0025020 (Madisonville STP) Discharges to Bat Creek @ RM 19.3
- TN0054909 (Hiwasee College STP) discharges to Bat Creek @ RM 16.4

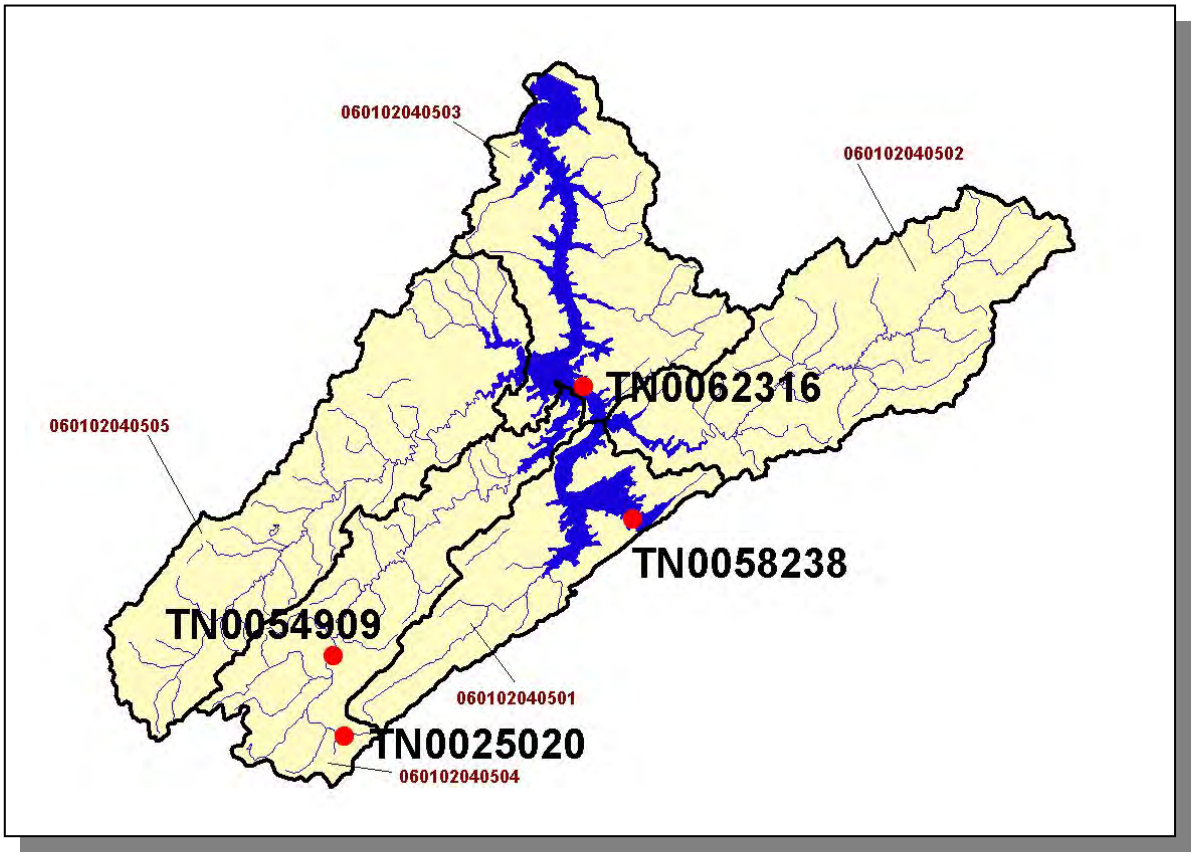


Figure 4-41. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0601020405. *Subwatershed 060102040501, 060102040502, 060102040503, 060102040504, and 060102040505 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0058238	1,100	1,200	1,500	970	0.3
TN0062316	990	1,000	1,200	890	
TN0025020	1.20	1.28	1.33	1.13	0.8
TN0054909	1.20	1.28	1.33	1.13	0.06

Table 4-24. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020405. *Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.*

PERMIT #	WET	$CBOD_5$	FECAL COLIFORM	*E.COLI*	NH_3	TRC	TSS	SETTLEABLE SOLIDS	DO	pH
TN0058238		X	X	X		X	X	X	X	X
TN0062316		X	X	X		X	X	X	X	X
TN0025020		X	X	X	X	X	X	X	X	X
TN0054909	X	X	X	X	X		X	X	X	

Table 4-25. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020405. *WET, Whole Effluent Toxicity; $CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids.*

4.2.D.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Milk Cow	Cattle	Chickens (Layers)	Chickens Sold	Hogs	Sheep
10,068	3,175	24,149	24	<5	214	192

Table 4-26. Summary of Livestock Count Estimates in Subwatershed 0601020405. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Blount	165.5	69.9	1.8	9.3
Loudon	62.3	62.3	1.1	3.5
Monroe	301.5	279.1	7.4	21.4
Totals	**529.3**	**411.3**	**10.3**	**34.2**

Table 4-27. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 0601020405.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.69
Legumes (Hayland)	0.77
Grass (Hayland)	0.53
Legumes, Grass (Hayland)	0.64
Grass, Forbs, Legumes (Mixed Pasture)	0.44
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	11.58
Soybeans (Row Crops)	12.82
Tobacco (Row Crops)	2.98
Wheat (Close-Grown Cropland)	4.79
Oats (Close-Grown Cropland)	0.32
Non-Agricultural Land Use	0.00
Other Land in Farms	0.14
Farmsteads and Ranch Headquarters	0.22

Table 4-28. Annual Estimated Soil Loss in Subwatershed 0601020405.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE LITTLE TENNESSEE 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 Tennessee portion of the Little Tennessee 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. Next, select "2004 Reports" if it's active, and "2003 PRMS Reports" if it's not. Pick the conservation treatment of interest on the page that comes up and reset the date to 2004 Reports if it is not set there. Pick the conservation practice of interest. In the location drop box of the page that comes up, select "Tennessee" and click on the "Refresh" button. In the "By" drop box that comes up, select "Hydrologic Unit" and click on the "Refresh" button. The report of interest can now be viewed.

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

CONSERVATION PRACTICE	TOTAL	
	FEET	ACRES
Comprehensive Nutrient Management Plans		3,110
Pest Management		2,779
Grazing/Forages Practices		3,122

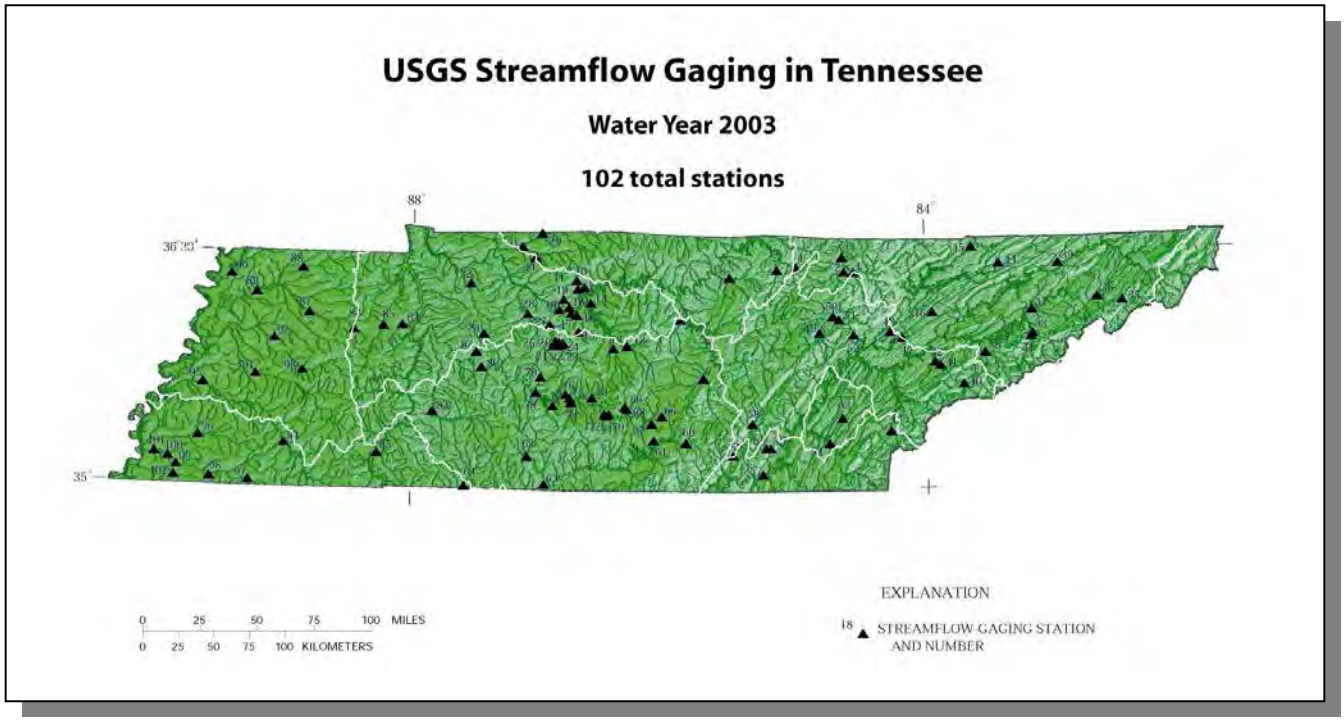
Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Little Tennessee River Watershed. *Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period. More information is provided in Appendix V.*

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

The USGS collects hydrologic data to document current conditions and provide a basis for understanding hydrologic systems and solving hydrologic problems. In Tennessee, the USGS records streamflow continuously at more than 102 gaging stations equipped with recorders and makes instantaneous measurements of streamflow at many other locations. Ground-water levels are monitored Statewide, and the physical, chemical, and biologic characteristics of surface and ground waters are analyzed. USGS activities also

include the annual compilation of water-use records and collection of data for National baseline and water-quality networks. National programs conducted by the USGS include the National Atmospheric Deposition Program (http://bqs.usgs.gov/acidrain/), National Stream Quality Accounting Network (http://water.usgs.gov/nasqan/), and the National Water-Quality Assessment Program (http://water.usgs.gov/nawqa/). For specific information on the Upper and Lower Tennessee NAWQA studies, please visit http://tn.water.usgs.gov/lten/tenn.html

USGS Water Resources Information on the Internet. Real-time and historical streamflow, water levels, and water-quality data at sites operated by the Tennessee District can be accessed at http://waterdata.usgs.gov/tn/nwis/nwis. Data can be retrieved by county, hydrologic unit code, or major river basin using drop-down menus. Contact Donna Flohr at (615) 837-4730 or dfflohr@usgs.gov for specific information about streamflow data. Recent publications by the USGS staff in Tennessee can be accessed by visiting http://tn.water.usgs.gov/pubpg.html. This web page provides searchable bibliographic information to locate reports and other products about specific areas.



5.2.C. U.S. Fish and Wildlife Service. The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. The U.S. Fish and Wildlife Service (Service) works with State and Federal agencies and Tribal governments, helps corporate and private landowners conserve habitat, and cooperates with other nations to

halt illegal wildlife trade. The Service also administers a Federal Aid program that distributes funds annually to States for fish and wildlife restoration, boating access, hunter education, and related projects across America. The funds come from Federal excise taxes on fishing, hunting, and boating equipment.

Endangered Species Program

Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available under the ESA, including prohibitions on killing, harming or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program. Federally endangered and threatened species in the Little Tennessee River Watershed include the Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*), spotfin chub (*Cyprinella* (=*Hybopsis*) *monacha*), smoky madtom (*Noturus baileyi*), yellowfin madtom (*Noturus flavipinnis*), duskytail darter (*Etheostoma percnurum*), Anthony's riversnail (*Athearnia anthonyi*), and Virginia spiraea (*Spiraea virginiana*). Federally designated critical habitat for the endangered smoky madtom exists in Citico Creek, from the Cherokee National Forest boundary at upper Citico bridge on Mountain Settlement Road (milepoint 4.3) upstream to the confluence of Citico Creek with Barkcamp Branch (milepoint 10.8), in Monroe County. For a complete listing of endangered and threatened species in Tennessee, please visit the Service's website at http://www.fws.gov/cookeville/.

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

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

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

Partners for Fish and Wildlife Program

The U.S. Fish and Wildlife Service established the Partners for Fish and Wildlife Program to restore historic habitat types that 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 Tennessee 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. TVA formed 7 multidisciplinary Watershed Teams to help communities across the Tennessee Valley actively develop and implement protection and restoration activities in their local watersheds. 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. The following is a summary of TVA's resource stewardship activities in the Little Tennessee River watershed.

Reservoir Monitoring

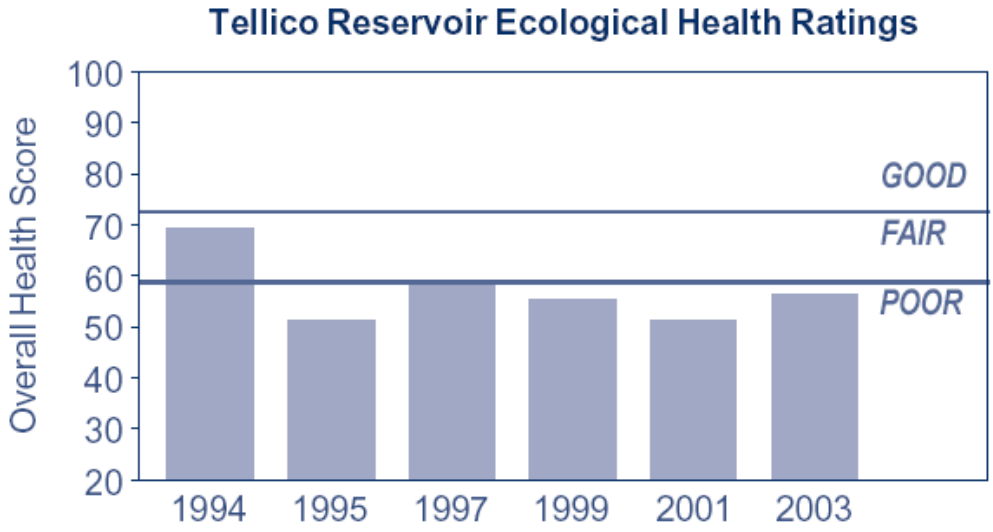
Reservoir Ecological Health: TVA's Reservoir Ecological Health Monitoring program is designed to provide the necessary information from five key ecological indicators (dissolved oxygen, chlorophyll, fish community, benthic macroinvertebrates, and sediment contaminants [PCBs, Pesticides, and Metals]) to evaluate current conditions, provide data for comparing future water quality conditions, and provide for assessments as needed for current and future operations and development.

A part of this monitoring program has been to communicate the data in an easily understandable format. TVA's approach has been to use a Reservoir Ecological Health Score. The ecological health scoring process is designed such that results from each of the five indicators are evaluated based on TVA's reservoir evaluation system and assigned a rating ranging from 1 (poor) to 5 (excellent). To arrive at an overall health evaluation for a reservoir, the sum of the ratings from all sites are totaled, divided by the maximum possible rating for that reservoir, and expressed as a percentage.

TVA monitors ecological conditions at 69 sites on 31 reservoirs. TVA monitored the quality of water resources in Tellico Reservoir annually from 1991 through 1995 to establish baseline data on ecological health under a range of weather and flow conditions. Tellico Reservoir is now monitored every other year. Monitoring is conducted at the forebay, or deep still water near the dam, (LTRM 1.0) and at a mid-reservoir site (LTRM 15.0).

The following chart present Reservoir Ecological Health scores for each year for which data are comparable.

Reservoir Ecological Health Ratings for Tellico Reservoir (1994-2003):



Tellico Reservoir rated poor in monitoring by TVA in 2003. The ecological health score for Tellico has varied over the years from poor to fair. The results from each of the five indicators in 2003 follow:

Dissolved oxygen rated fair near Tellico Dam due to low concentrations near the bottom and good at the mid-reservoir monitoring location. Dissolved oxygen ratings near the dam have shown the most variation through time: good in 1994, poor in 1995, fair in 1997, good in 1999, and poor in 2001.

Chlorophyll rated poor at both monitoring locations. Concentrations were higher than expected given the nutrient-poor soils in the upstream watershed. Higher chlorophyll levels are expected at the forebay monitoring location because of the exchange of water from the highly productive forebay of Fort Loudoun Reservoir via the canal connecting the two reservoirs. However, that does not explain the high chlorophyll levels observed at the mid-reservoir site. The average summer chlorophyll levels at this site have increased substantially from 1991 to 2003.

The fish community rated fair at both monitoring locations. The diversity of species collected was in line with what was expected for Tellico, but the number of fish collected was relatively low.

As in previous years, bottom life rated poor at both monitoring locations because few animals were found and most were able to tolerate poor conditions. Sporadic low dissolved oxygen levels and cold bottom water are likely contributing factors.

Sediment quality rated good at both locations. No pesticides or PCBs were detected, and concentrations of metals were within the expected background levels.

Public and Industrial Water Supplies: Adequate water of good quality is essential for sustained population growth and economic development. In conjunction with routine water quality monitoring efforts conducted as part of Reservoir Ecological Health Monitoring, TVA collects additional water samples to be analyzed for parameters of interest to public and industrial water supplies. The purpose of these additional collections is to provide data for use in siting new water supply facilities and determining appropriate treatment design. Also, data are available to domestic water suppliers to assist in water treatment operations and diagnosis of abnormal conditions.

More information about Reservoir Ecological Health Monitoring in the Little Tennessee River watershed can be obtained by contacting Tyler Baker at (423)-876-6733 or tfbaker@tva.gov or by visiting TVA's internet site (http://www.tva.gov).

Bacteriological sampling: Recreation is an important objective of TVA's integrated river resource management system. TVA develops, maintains, and promotes public use of several recreational sites. Increased public knowledge about bacterial contamination has heightened the interest in bacteriological levels in recreational waters by both TVA and our stakeholders. Each summer, about 250 swimming areas and informal water contact recreational sites throughout the Tennessee Valley are tested for fecal coliform and/or Escherichia coli (E. coli) bacteria by TVA's Resource Stewardship. These sites include those operated by TVA and many operated by other agencies. The site list is

reexamined annually by the appropriate watershed teams and other TVA organizations to ensure the most heavily used sites are monitored.

TVA monitored thirteen sites on or around Tellico Reservoir for *E. coli* in 2004. Bacteriological water sampling is conducted between Memorial Day and Labor Day when people are most likely to be recreating. Resource Stewardship conducts ten tests within a 30-day period at each site to establish a geometric mean for the indicator bacteria. The 2004 sampling locations were:

Site Name	**Location**	**Type of Site**
Lotterdale Cove Recreation Area Beach	LTRM 9.6R	swim
Vonore City Recreation Area Beach	Island Creek M 2.6; LTRM 16.5L	swim
Toqua Recreation Area Beach	Harrison Branch M 1.4; LTRM 22.2L	swim
Notchy Creek Recreation Area Beach	Notchy Creek M 2.2: Tellico RM4.6L	swim
Notchy Creek Boat Ramp at Monroe County Day Use Area	Notchy Creek M 2.0	boat ramp
Fort Loudoun State Park Boat Ramp	LTRM 19.8L	boat ramp
Ball Play Bridge (Informal Recreation Site) Swim Area	Ball Creek Mile 1.3 at bridge; Tellico RM 7.5	swim
Harrison Recreation Area Swim Area	LTRM 30.8R	swim
Slough opposite Lotterdale Cove (informal)	LTRM 9.6R	swim
Nine Mile Bridge (informal)	LTRM 20.R Nine Mile Creek-Mile 2	swim
TWRA Big Creek River Access Site	Tellico RM 18.1L	boat ramp
Tellico Day Use Area	LTRM 0.4L	swim
Tellico Dam Reservation Boat Ramp	LTRM 0.4L	boat ramp

All the sites were within the state of Tennessee guidelines for water contact with three exceptions. Elevated bacteria levels were observer on one occasion at Big Creek River access site, Tellico Dam Reservation boat ramp, and Toqua Recreation Area beach.

Fish Flesh Toxic Contaminants: State agencies are responsible for advising the public of health risks from eating contaminated fish. TVA assists the states by collecting and analyzing fish from TVA reservoirs. TVA collected channel catfish and largemouth bass from the reservoir for tissue analysis in the autumn of 2003. Catfish were analyzed for an array of contaminants (including pesticides and PCBs). Largemouth bass were analyzed for mercury. The results have been provided to state agencies in Tennessee.

More information on bacteriological and fish tissue monitoring on Tellico Reservoir can be obtained by contacting Rebecca Hallman at (423)-876-6736 or rlhallman@tva.gov by visiting TVA's internet site (http://www.tva.gov).

Stream Bioassessment.

The condition of water resources in Fort Loudoun watershed streams is measured using three independent methods; Index of Biotic Integrity (IBI), number of mayfly, stonefly, and caddisfly taxa (EPT), and Habitat Assessment. Not all of these tools were used at each stream sample site.

IBI: The index of biotic integrity (IBI) assesses the quality of water resources in flowing water by examining a stream's fish assemblage. Fish are useful in determining long-term (several years) effects and broad habitat conditions because they are relatively long-lived and mobile. Twelve metrics address species richness and composition, trophic structure (structure of the food chain), fish abundance, and fish health. Each metric reflects the condition of one aspect of the fish assemblage and is scored against reference streams in the region known to be of very high quality. Potential scores for each of the twelve metrics are 1-poor, 3-intermediate, or 5-the best to be expected. Scores for the 12 metrics are summed to produce the IBI for the site. The following table associates IBI ranges with attributes of fish assemblages.

Attributes	IBI Range
Comparable to the best situations without influence of man; all regionally expected species for the habitat and stream size, including the most intolerant forms, are present with full array of age and sex classes; balanced trophic structure.	58-60
Species richness somewhat below expectation, especially due to loss of most intolerant forms; some species with less than optimal abundance or size distribution; trophic structure shows some signs of stress.	48-52
Signs of additional deterioration include fewer intolerant forms, more skewed trophic structure (e.g., increasing frequency of omnivores); older age classes of top predators may be rare.	40-44
Dominated by omnivores, pollution-tolerant forms, and habitat generalists; few top carnivores; growth rates and condition factors commonly depressed; hybrids and diseased fish often present.	28-34
Few fish present, mostly introduced or tolerant forms; hybrids common; disease, parasites, fin damage, and other anomalies regular.	12-22

EPT: The number and types of aquatic insects, like fish, are indicative of the general quality of the environment in which they live. Unlike fish, aquatic insects are useful in determining short-term and localized impacts because they are short-lived and have limited mobility. The method TVA uses involves only qualitative sampling and field identification of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) to the family taxonomic level (EPT). The score for each site is simply the

number of EPT families. The higher EPT scores are indicative of high quality streams because these insect larvae are intolerant of poor water quality.

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

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

1. Instream cover (fish)
2. Epifaunal substrate
3. Embeddedness
4. Channel Alteration
5. Sediment Deposition
6. Frequency of Riffle
7. Channel Flow Status
8. Bank vegetation protection - Left bank and right bank, separately
9. Bank stability - Left bank and right bank, separately
10. Riparian vegetation zone width - Left bank and right bank, separately

Sample Site Selection: EPT sampling and fish community assessment (IBI) are conducted at the same sites. Site selection is governed primarily by study objectives, stream physical features, and stream access. TVA's objective is to characterize the quality of water resources within a sub-watershed (11-digit hydrologic unit). Sites are typically located in the lower end of sub-watersheds and at intervals on the mainstem to integrate the effects of land use. A total of 24 sites have been sampled in the Little Tennessee watershed since 1995. These sites are typically sampled every five years to keep a current picture of watershed condition.

Details about stream bioassessment sampling sites and scores can be obtained by writing Charles Saylor at Tennessee Valley Authority, PO Box 920, Ridge Way Road, Norris, TN 37828 or calling him at (865)-632-1779. Email address: cfsaylor@tva.gov

Coalition Support.

Citizen Based Organizations: Citizen based watershed organizations can play a critical role in watershed protection. TVA's watershed teams work to strengthen these organizations by providing assistance in the areas of understanding the local watershed, its conditions, impacts, and threats; developing and implementing strategies to protect or improve resource quality; fundraising; river issues; and organizational development. In

1999, TVA initiated a series of workshops for watershed organizations. Past workshops have covered state and federal water quality protection programs, grant writing, fund raising, communication/outreach, and strategic planning.

The Watershed Association of the Tellico Reservoir (WATeR) is a citizen based organization formed to protect and improve the lower Little Tennessee River from Tellico Dam upstream to Chilhowee Dam, incorporating a major portion of the Tellico River. TVA supports the WATeR by providing financial and technical assistance. For information about WATeR contact Bill Waldrop at (865)-458-0506.

Inter-agency Partnerships: The benefits of watershed partnerships are well documented. No one unit of government, agency, group or individual has all the knowledge, expertise or resources to address all watershed issues. Partnerships can tap a diversity of energy, talent, and ideas. Watershed partnerships can also promote a more efficient use of limited financial and human resources and can identify innovative and efficient means of improving or protecting water quality. The Little Tennessee Watershed Team partners with various local, state, and federal partners including Blount County Soil and Water Conservation District, Loudon County Soil and Water Conservation District, Tennessee Department of Agriculture, Tennessee Department of Environment and Conservation, US Forest Service, and the UT Agricultural Extension Service with efforts to improve and protect water resources in the Little Tennessee watershed.

Outreach.

National Clean Boating Campaign: The National Clean Boating Campaign is a partnership program which highlights the importance of clean water so boating will continue to be fun and safe for future generations. The program demonstrates how boaters can be good stewards of their water environment through best boating and marina practices.

Clean Marina Initiative: The Tennessee Valley Clean Marina Initiative is an effort by TVA to promote environmentally-responsible marina practices. This voluntary program, established in support of the National Clean Boating Campaign, helps marina operators protect the resource that provides them with their livelihood.

Protection and Restoration Activities.

Promote Best Management Practices: TVA provides funding and technical expertise to assist with installation of best management practices (BMPs) that will reduce non-point pollution. TVA also works with partners to promote use of BMPs. For example, TVA provided assistance to develop “model farms” in the Baker Creek watershed and has plans to expand the program into the Ninemile Creek watershed. These “model farms” demonstrate a variety of BMPs.

Support Clean Up Efforts: TVA supports several group litter clean up efforts on Tellico Reservoir. TVA, in conjunction with the US Forest Service, also supports clean up

efforts on the Upper Tellico River. Volunteers have removed several hundred tons of trash from the Little Tennessee watershed in the last five years.

Shoreline stabilization: Between 2000 and 2004, the Little Tennessee Watershed Team successfully stabilized over 15,350 feet of critically eroding reservoir shoreline. Working closely with cooperators and partners, the team has implemented innovative and cost effective methods for minimizing the erosion from these public lands. In addition, the team provides technical assistance to stakeholders through individual landowner meetings and public workshops for those interested in stabilization on private shoreline areas. Additional stabilization is scheduled for 2005.

Promote Riparian Buffers: An effective line of water quality protection is maintaining the vegetative plant cover along waterbodies. TVA encourages waterfront property owners to maintain or establish vegetated riparian buffers by providing information and materials to the riparian property owners. TVA has also developed a series of 11 fact sheets that will enable riparian property owners to restore, manage, and be better stewards of riparian land. The fact sheets are available on the TVA internet site http://www.tva.com/river/landandshore/index.htm.

Further information on TVA's Watershed Assistance activities in the Little Tennessee Watershed can be obtained by writing the Little Tennessee Watershed Team at: Tennessee Valley Authority, 804 Highway 321 North (HWY 1A-LCT), Lenoir City, TN 37771-6440 or calling them at (865)-988-2420.

5.2.E. USDA – Forest Service. The USDA Forest Service manages approximately 640,000 acres in Tennessee (Cherokee National Forest (CNF)). This ownership includes about 121,000 acres within the Little Tennessee 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 Little Tennessee River watershed on national forest lands. Some of these include:

Ecosystem Management and Restoration. Prescribe burning and vegetation treatments are used to meet a variety of ecosystem-based management objectives. Each year, 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 Little Tennessee River Watershed has been severely impacted by the southern pine beetle in the past three years. In the foreseeable future, restoration efforts will focus on needs associated with stands damaged by the southern pine beetle.

Recreation Management. A variety of recreation uses occur on National Forest lands within this watershed. Hiking, whitewater boating, fishing, camping, horse use, camping, scenic viewing and hunting are some of the many uses. In the upper Tellico River watershed in North Carolina, a nationally known off-highway vehicle (OHV) area

provides opportunity for this form of recreation. There are currently about 24,000 acres of designated wilderness in the Little Tennessee River watershed in Tennessee and another 10,500 acres have been recommended to Congress for wilderness designation. The Tellico River has been found to be eligible for designation by Congress for recreational status as part of the National Wild and Scenic River system.

Inventory and Monitoring. There are 146 perennial streams capable of supporting fish and approximately double that number of perennial and intermittent streams that support other aquatic organisms in the Little Tennessee River Watershed on National Forest system lands. Three-pass electrofishing, seining, snorkeling, and instream habitat surveys are conducted within each stream approximately once every ten years. Since 1999, fifty-nine surveys have been conducted in the Little Tennessee River Watershed. A total of 62 species of fish have been documented in these streams including three federally listed species: smoky madtom, yellowfin madtom, and duskytail darter. These rare species are monitored every year through snorkel surveys. These same species, along with the spotfin chub have been identified as extirpated from the Tellico River. Re-introduction began in 2001 and continues today.

The aquatic 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.

The Forest Service works with TWRA, TVA and Trout Unlimited to restore and monitor brook trout populations in eleven streams.

Suspended sediment is monitored at several locations in the upper Tellico River watershed. Much of this monitoring is conducted in headwater streams in North Carolina that are within the OHV area. Some of the monitoring is done downstream in Tennessee (Citico Creek, Bald River).

Other Management Activities. A variety of additional management activities occur within the Little Tennessee 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.southernregion.fs.fed.us/cherokee.

5.2.F. National Park Service. Approximately 3,400 kilometers (2,100 miles) of cold and cool water streams are found within the Great Smoky Mountains National Park (GRSM). A diverse fish community is found in about 1,280 kilometers (800 miles) of the total and the greatest diversity of species is found in the larger streams adjacent to the Park boundary. Park staff, assisted by personnel from TWRA and volunteers from UT and

Trout Unlimited, sample a small number of large streams annually. Backpack electrofishing techniques are used to collect data on species composition, year class strength, density and biomass.

Data were collected from 12 sites in the Little River/Little Tennessee Watershed in 2003. These data indicate that fish species diversity increases from the headwaters to the boundary. The density and biomass values for each species were within the normal range of annual variation observed from 1990 – 2002. Life history information for rainbow trout indicates that the maximum life span for this species is about four years. Brown trout typically live 5 – 8 years and can reach 8 – 10 pounds in weight. Based on the data for 2003, Little River/Little Tennessee contained approximately 2,000 trout per mile of stream.

The aquatic macroinvertebrate component of the Inventory and Monitoring program has been operating in the Park since 1992. This aspect of the program is designed to provide data on the health of streams and aquatic biodiversity, and to determine relationships among macroinvertebrates, fishes, and water quality.

In 2003, park stream samples that fall within the Little Tennessee watershed included Abrams, Silers, Sams, and Starkey Creeks, and Little River. Analysis of this monitoring data reveals a continuing increase in the number of new taxa encountered each year. Over the years, a total of over 600 taxa has been documented in streams and the species accumulation curve is still climbing, indicating that there are more taxa yet to be encountered. The Rapid Bioassessment scores for each site, based on a Biotic Index and EPT values, have generally been in the “good” to “excellent” categories. This type of long-term trend information is critical for detecting any biotic effects of pollution in the park’s aquatic ecosystems.

These sites were not sampled in 2004, due to budget restrictions.

5.3. STATE PARTNERSHIPS.

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

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

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

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

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

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

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

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

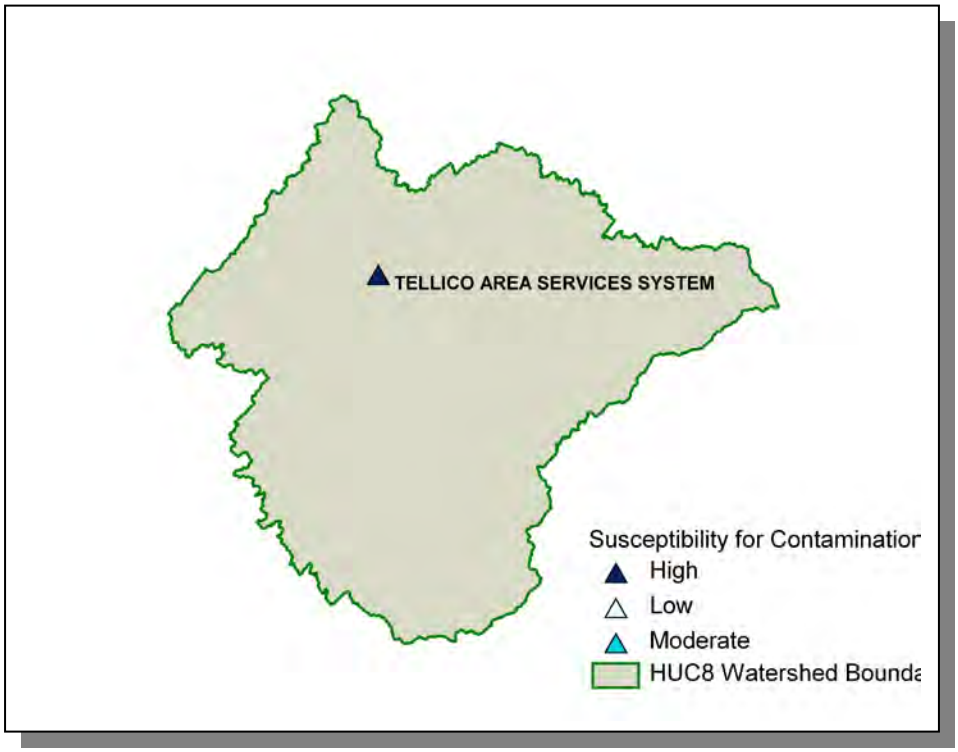


Figure 5-1. Susceptibility for Contamination in the Little Tennessee River Watershed.

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

Figure 5-2. Locations of Community and Non-Community Public Water Supply Intakes in the Tennessee Portion of the Little Tennessee River Watershed.

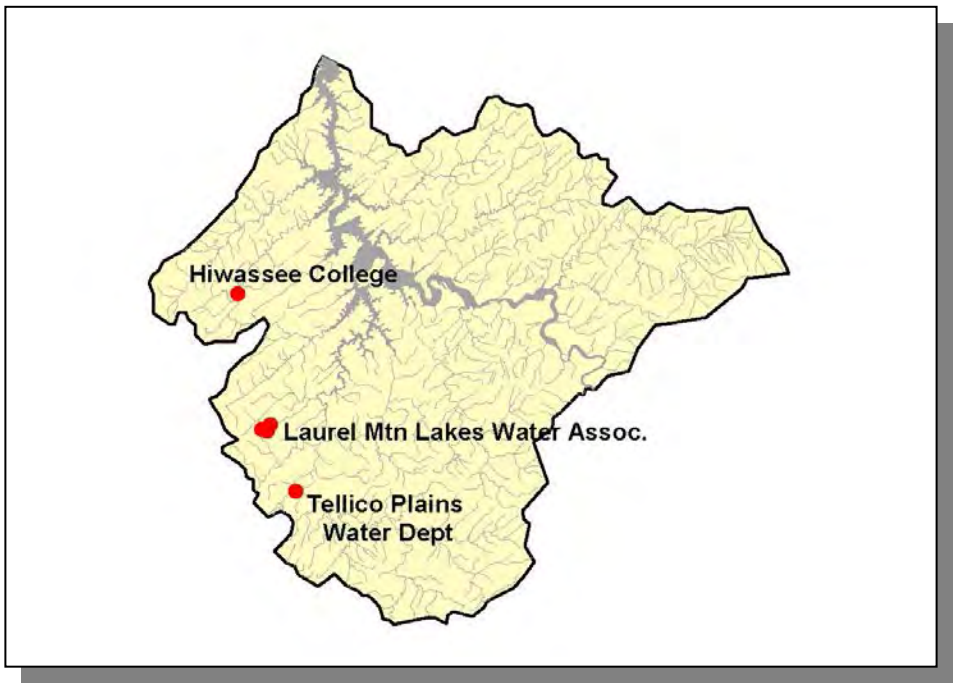


Figure 5-3. Locations of Community and Public Groundwater Supply Intakes in the Tennessee Portion of the Little Tennessee River Watershed.

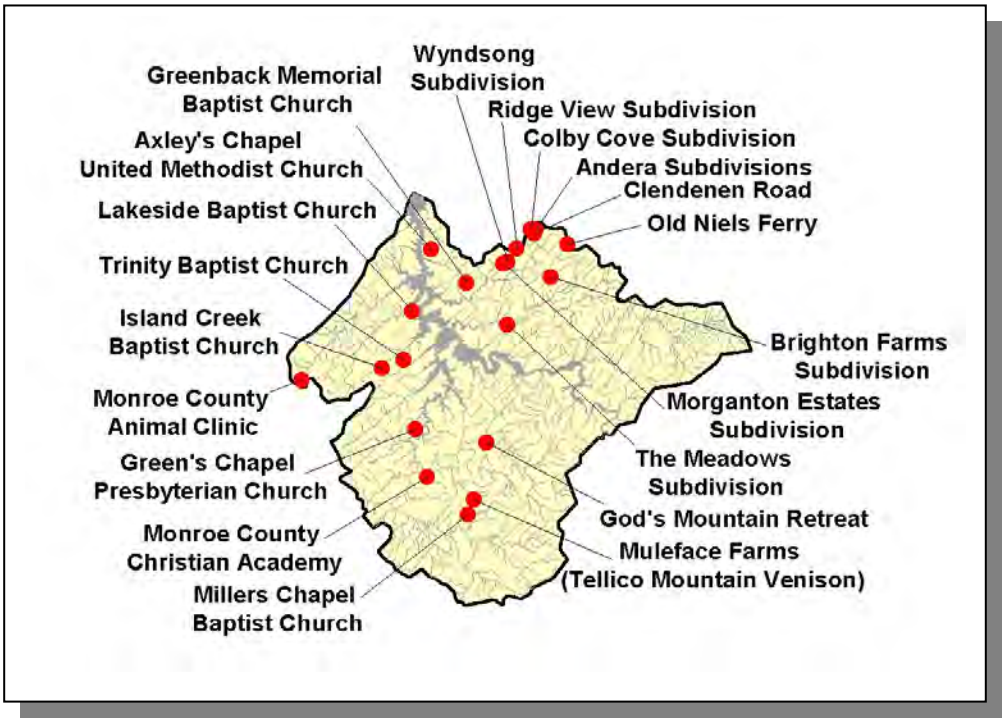


Figure 5-4. Locations of UIC (Underground Injection Control) Sites in the Tennessee Portion of the Little Tennessee River Watershed. *Injection wells include stormwater sinkholes modified for drainage, commercial/industrial septic tanks, and large capacity septic tanks.*

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

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

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

maximum loan term is 20 years or the design life of the proposed wastewater facility, whichever is shorter.

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

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

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

Figure 5-5. Location of Communities Receiving SRF Loans or Grants in the Tennessee Portion of the Little Tennessee River Watershed. *More information is provided in Appendix V.*

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

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

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

- Monitoring Projects. Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Little Tennessee River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program (U.S. Environmental Protection Agency Assistance Agreements C9994674-00-0, C9994674-01-0, and C9994674-02-0).

- 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://tennessee.gov/agriculture/forestry/BMPs.pdf, and the complaint form is available at: http://tennessee.gov/environment/wpc/logform.php.

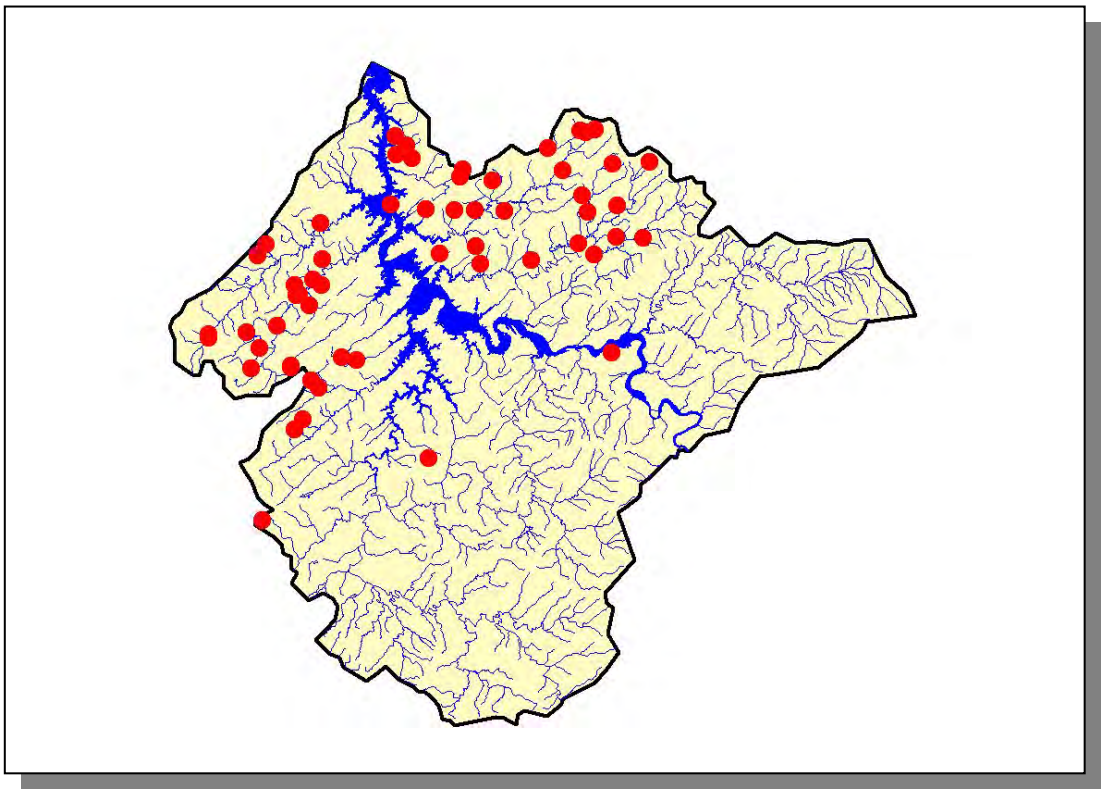


Figure 5-6. Location of BMPs installed from 1999 through 2003 in the Tennessee Portion of the Little Tennessee River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. *More information is provided in Appendix V.*

5.3.D. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Basinwide planning is a non-regulatory watershed-based approach to restoring and protecting the quality of North Carolina's surface waters. In an approach similar to that employed in the State of Tennessee, the North Carolina Division of Water Quality (DWQ) prepares water quality plans for each of 17 major river basins in the state according to a defined schedule. The plans are prepared in order to communicate to

policymakers, the regulated community and the general public the state's rationale, approaches and long-term management strategies for each river basin. Each plan is circulated for public review and presented at public meetings in the basin. After implementation, the plans are re-evaluated, based on follow-up water quality monitoring, and updated at five-year intervals.

DWQ initiated basinwide planning activities in 1990, when it began conducting water quality monitoring for the first basinwide plan, published in 1993. Since then, DWQ has produced plans for all 17 river basins and has begun to update those plans for each basin. The new plans emphasize changes in water quality and give the status of recommendations made in the previous plan. The first *Little Tennessee River Basinwide Water Quality Management Plan* was published in 1997; DWQ updated this plan in 2002, and will do so again in 2007.

Overview of the North Carolina Portion of the Little Tennessee River Basin. In the North Carolina portion of the basin, the Little Tennessee River and its major tributaries, the Nantahala and Tuckasegee Rivers, drain almost 1,800 square miles of the southwestern portion of the state. The Tennessee Valley Authority (TVA) and Duke Energy regulate water flow for flood control and the production of hydroelectric power via three major impoundments: Nantahala Lake, Fontana Lake, and Santeetlah Lake.

The Little Tennessee River in North Carolina is thought to contain its full assemblage of native aquatic life. Even though the watershed above Fontana Lake represents only one percent of the entire Tennessee River basin, it contains 25 percent of all fish species found in the much larger river system. Water quality in the basin is generally excellent. Trout waters are abundant, and many streams are classified High Quality or Outstanding Resource Waters.

The land comprising the Little Tennessee River basin in North Carolina is mountainous and primarily rural. Nearly 89 percent of the land is forested, and less than 5 percent falls into the urban/built-up category. More than half of the land in the basin is publicly owned and lies within the Great Smoky Mountains National Park or the Nantahala National Forest. Land use comparisons between 1982 and 1997 show a significant decrease in private forested land (-23,300 acres) and substantial increases in the urban/developed (+30,200 acres) and federal (+11,000 acres) land use categories. Since most of the federal land in the basin is forested, it is likely that the amount of forested land actually increased over the fifteen-year period (+6,900 acres). The estimated population of the basin in 2000 was 79,493, and the population is projected to increase 31 percent by 2020. While the resident population may be fairly low, the basin experiences significant seasonal population fluctuations from recreation and tourist travel.

The North Carolina Natural Heritage Program identifies areas that have outstanding conservation value, either because they contain rare or endangered species, or because an area provides an excellent, intact example of an ecological community that naturally occurs in the state. The Little Tennessee River basin has 54 aquatic and terrestrial natural areas, 20 of which are considered nationally significant and 34 state significant. Four reaches of river are considered Significant Aquatic Habitats, and there are 37 federally listed Rare, Threatened, or Endangered aquatic dwelling species.

Assessment of Water Quality. In a manner similar to that employed by TDEC, surface waters in North Carolina are classified according to their best uses. Determining how well a waterbody supports its uses (*use support* status) is an important method of interpreting water quality data and assessing water quality. Surface waters are rated *fully supporting* (FS), *partially supporting* (PS) or *not supporting* (NS). The ratings refer to whether the classified uses of the water (i.e., aquatic life protection, primary recreation and water supply) are being met. For example, waters classified for fish consumption, aquatic life protection and secondary recreation (Class C for freshwater) are rated FS if data used to determine use support meet certain criteria. However, if these criteria were not met, then the waters would be rated as PS or NS, depending on the degree of degradation. Waters rated PS or NS are considered to be impaired. Waters lacking data, having inconclusive data, or for which criteria have not been developed, are listed as not rated (NR).

DWQ also assesses ecosystem health and human health risk through the development of use support ratings for six categories: aquatic life and secondary recreation, fish consumption, shellfish harvesting, primary recreation, water supply, and "other" uses. These categories are tied to the uses associated with the primary classifications applied to NC rivers and streams. A single water could have more than one use support rating corresponding to one or more of the six use support categories. For many waters, a use support category will not be applicable (N/A) to the use classification of that water (e.g., drinking water supply is only applied to Class WS waters). Currently, 12.9 miles and 280 lake acres are partially supporting in the Little Tennessee River Basin.

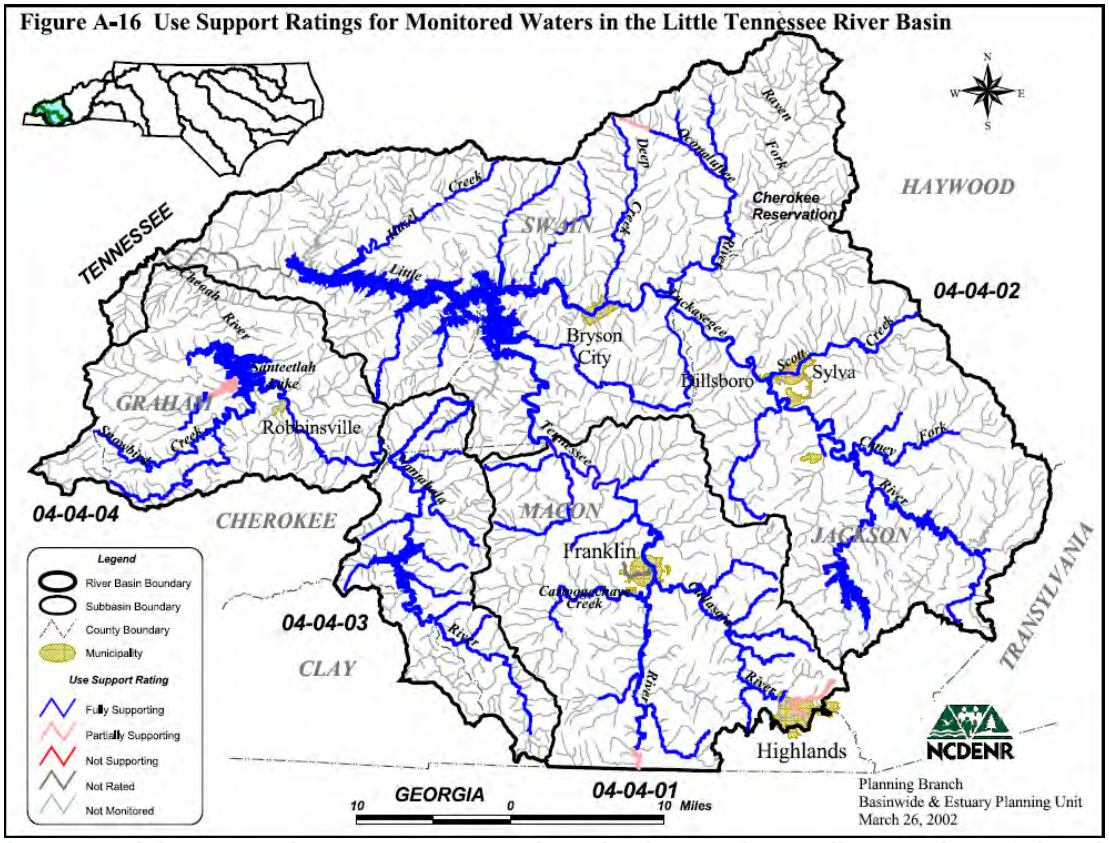


Figure 5-7 (Figure A-16). Use Support Ratings in the North Carolina Portion of the Little Tennessee River Basin.

Aquatic Life/Secondary Recreation. The aquatic life/secondary recreation use support category is applied to all waters in North Carolina. Therefore, this category is applied to the total number of stream miles (2,564.6) and lake acres (21,158.4) in the North Carolina portion of the Little Tennessee River basin. Approximately 20 percent of stream miles (524.7) and 33 percent of lake acres (6,881) were monitored for the protection of aquatic life and secondary recreation by DWQ during this basinwide planning cycle. Impaired waters account for 2.4 percent of monitored stream miles and 4.1 percent of monitored lake acres. A basinwide summary of current aquatic life/secondary recreation use support ratings is presented in Figure 5-7 and Figure 5-8.

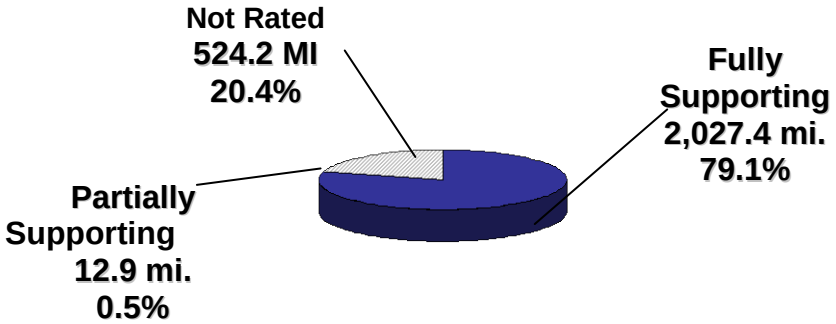


Figure 5-8. Aquatic Life/Secondary Recreation Use Support Ratings for Streams in the North Carolina portion of the Little Tennessee River Basin (1999).

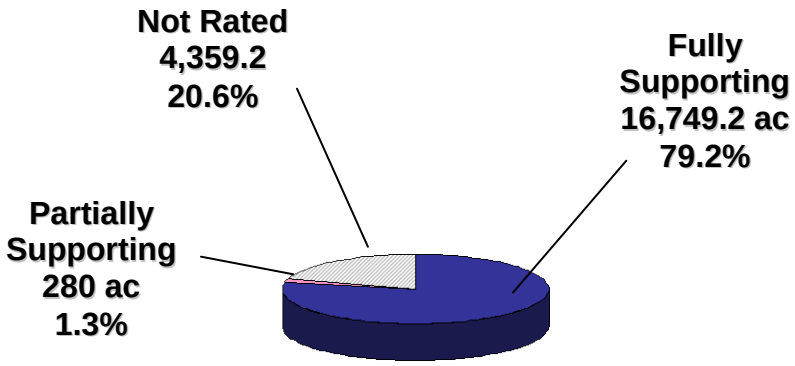


Figure 5-9. Aquatic Life/Secondary Recreation Use Support Ratings for Lakes in the North Carolina portion of the Little Tennessee River Basin (1999)

Primary Recreation. There are 237.3 stream miles and 16,879.2 lake acres currently classified for primary recreation in the Little Tennessee River basin. Approximately 58 percent of stream miles (136.8) and 40 percent of lake acres (6,731) were monitored for the protection of primary recreation by DWQ over the past five years. Impaired waters account for 4.2 percent of monitored lake acres. Primary recreation use support ratings are based on swimming advisories issued by the NC Department of Health and Human Services (DHHS).

Fish Consumption. Like the aquatic life/secondary recreation use support category, fish consumption is also applied to all waters in the state. Fish consumption use support ratings are based on fish consumption advisories issued by the NC Department of Health and Human Services. Currently, there are no fish consumption advisories specific to the NC portion of the basin. Therefore, all waters are considered to be fully supporting the fish consumption category. No waters were monitored for fish consumption during this basinwide cycle because of the lack of any significant contaminant concerns in the Little Tennessee River basin.

Water Supply. There are 530.6 stream miles and 2,426 lake acres currently classified for water supply in the Little Tennessee River basin. All were evaluated within the past five years; all are fully supporting.

Strategies for Addressing Notable Water Quality Impacts in Unimpaired Waters. Often during DWQ's use support assessment, water quality concerns are documented for waters that are fully supporting designated uses. While these waters are not considered impaired, attention and resources should be focused on these waters over the next basinwide planning cycle to prevent additional degradation or facilitate water quality improvement.

Water quality problems in the Little Tennessee River basin are varied and complex. Inevitably, many of the water quality impacts noted are associated with human activities within the watershed. Solving these problems and protecting the surface water quality of the basin in the face of continued growth and development will be a major challenge. Voluntary implementation of BMPs is encouraged and continued monitoring is recommended. DWQ will notify local agencies and others of water quality concerns for these waters and work with them to conduct further monitoring and to locate sources of water quality protection funding.

The most pressing water quality concern for these streams and throughout the Little Tennessee River basin is habitat degradation. Habitat degradation includes sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour. It is attributed to nonpoint source pollution. The primary sources of nonpoint source pollution in the Little Tennessee River basin are runoff from construction sites, pasturelands, roads and developed areas. The task of quantifying nonpoint sources of pollution and developing management strategies for these waters is resource intensive. DWQ plans to notify local agencies and others of water quality concerns for these waters and work with them to conduct further monitoring and to locate sources of water quality protection funding for these unimpaired waters.

Local Water Quality Improvement Initiatives. There are several initiatives in the Little Tennessee River basin dedicated to improving and protecting water quality. The Little Tennessee Watershed Association (LTWA), Inc. is organized to work with public agencies, conservation interests, community groups, and public and private landowners to develop and implement a strategy for the conservation and improvement of the water quality and habitat of the Little Tennessee River and its tributaries above the Fontana Reservoir. The LTWA presently operates four major projects: stream restoration; stream monitoring; education; and stream stewardship. Long-term data collection allows LTWA to measure the effect of restoration efforts. Through the stewardship program, LTWA rewards landowners for their own efforts to protect the watershed. The educational program builds public support for conservation efforts.

The Watershed Association for the Tuckasegee River (WATR) is a fairly new group of grassroots-organized citizens who wish to see their community keep its peaceful character amidst booming growth. One of the primary objectives of WATR is to increase citizen involvement and activity on behalf of the river. In 2004, WATR began a locally based restoration on Savannah Creek, with support from EPA.

Formed in 1999 as a local, citizen-based watershed organization for the upper Cullasaja River watershed on the Highlands Plateau, the Upper Cullasaja Watershed Association (UCWA) has successfully initiated a wide range of water resource quantity and quality projects. UCWA worked with the NC Division of Water Resources and the US Geological Survey (USGS) to obtain joint funding and installation of a USGS flow gauging station on the Cullasaja River in July 2001, after a 30-year hiatus in long-term streamflow measurement on this river. Additional work with DWQ and USGS groundwater specialists resulted in the restoration of regular groundwater elevation measurements in two Town of Highlands' water supply wells. Work began in 2004 on a major groundwater research project to be centered in the upper Cullasaja River watershed.

In 1995, the Little Tennessee Nonpoint Source (NPS) Team was organized by local stakeholders, with guidance from DWQ, to address water quality problems in the Little Tennessee River basin caused by nonpoint source pollution. Current members include the above non-profits, Western Carolina University, Soil and Water Conservation Districts, the Natural Resource Conservation Service, NC DWQ, EPA, and the Eastern Band of Cherokee Indians. The NPS Team serves as a mechanism to enhance communication and cooperation between groups and agencies at work in the basin, and has a long-term goal to develop a regional support center for water quality stewards.

For more information concerning water quality in the Little Tennessee River basin in North Carolina, visit the Basinwide Planning Program website:
http://h2o.enr.state.nc.us/basinwide/

Or contact the Little Tennessee River Basin Planner:

Little Tennessee River Basin Planner
NC Division of Water Quality
Planning Branch
1617 Mail Service Center
Raleigh, North Carolina, 27699-1617
Phone: (919)-733-5083
FAX: (919)-715-5637

5.4. LOCAL INITIATIVES.

5.4.A. The Watershed Association of the Tellico Reservoir. The Watershed Association of the Tellico Reservoir (WATeR) is an all-volunteer organization dedicated to protecting and improving the environment in and around Tellico Reservoir. WATeR is non-profit and non-partisan. The focus is on issues, policies, and practices that promote clean water, air, and natural habitat so that humans can live, work, and play in harmony with native plants and animals as well as with each other. The association strives to work cooperatively with governmental agencies and private organizations with similar goals and responsibilities for environmental protection and appropriate quality economic growth. Public education and demonstration projects are emphasized to make people aware of environmentally friendly practices that affect the watershed. WATeR strives to involve all stakeholders and to represent everyone interested in preserving and enhancing the environmental quality of the Tellico Reservoir Watershed.

WATeR has four program committees: Water Quality Improvements, Nature and Hiking Trails, Environmental Education, and Shoreline Trash Collection. WATeR's accomplishments during the first three years include:

- Maintaining a dialog with TVA and TDEC to reflect membership opinion on environmental issues;
- Water quality sampling to answer questions not addressed by TVA or TDEC;
- Public meetings with expert speakers on water quality or environmental protection;
- Demonstration projects to reduce soil erosion and prevent stream sedimentation;
- Collecting tons of trash along the shoreline using hundreds of volunteers;
- Constructing a hiking trail along the eastern shore of Tellico Lake that includes bridges over ravines, trailhead parking facilities, a kiosk with maps and directions, and restrooms; and
- Demonstrating new methods for stabilizing shorelines to prevent wave erosion, intercepting runoff from lawns, and preventing ingress of Canada Geese.

Other information concerning activities of WATeR including how to contact officers of the association is available on the web at http://www.TellicoWATeR.org.

CHAPTER 6

RESTORATION PRIORITIES IN THE LITTLE TENNESSEE 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/MS4.htm.

This Chapter addresses point and nonpoint source approaches to water quality problems in the Tennessee portion of the Little Tennessee River Watershed.

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

6.2.A. Year 1 Public Meeting. The first Little Tennessee River Watershed public meeting was held November 17, 1998 at Cleveland State Community College (Vonore Campus). The goals of the meeting were to: (1) present, and review the objectives of, the Watershed Approach, (2) introduce local, state, and federal agency and nongovernment organization partners, (3) review water quality monitoring strategies, and (4) solicit input from the public.

Major Concerns/Comments

- Tellico lake has too much trash along shoreline
- There is no way to clean up Tellico Lake's PCB contamination
- Nonpoint Source Pollution is is increasing due to growth
- Too much impervious surface near Tellico Lake that leads to runoff pollution
- Unplanned development along Tellico lake and its impact on water quality
- Runoff from golf courses

6.2.B. Year 3 Public Meeting. The second Little Tennessee River Watershed public meeting was held April 26, 2001 at Cleveland State Community College (Vonore Campus). The goals of the meeting were to: (1) provide an overview of the watershed approach, (2) review the monitoring strategy, (3) summarize the most recent water quality assessment, (4) discuss the TMDL schedule and citizens' role in commenting on draft TMDLs, and (5) discuss BMPs and other nonpoint source tools available through the Tennessee Department of Agriculture 319 Program and NRCS conservation assistance programs.

Major Concerns/Comments

- Listing Tellico Lake for PCB contaminantion is an unfair characterization
- The public should be notified when bacteria levels for some streams are high and it effects recreation
- Uncontrolled development in Monroe County
- Industrial plant dischargers
- Boats not using pump-out facilities at marinas
- Siltation and its effect on biology in Fork Creek

6.2.C. Year 5 Public Meeting. The third scheduled Little Tennessee River Watershed public meeting was held January 24, 2006 at the Community Church in Tellico Village. The meeting featured seven educational components:

- Overview of draft Watershed Water Quality Management Plan slide show
- SmartBoard™ with interactive GIS maps
- "How We Monitor Streams" self-guided slide show
- "Why We Do Biological Sampling" self-guided slide show
- TVA display
- Sequoyah High School slide show
- WATeR (Watershed Association of Tellico River) Display

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

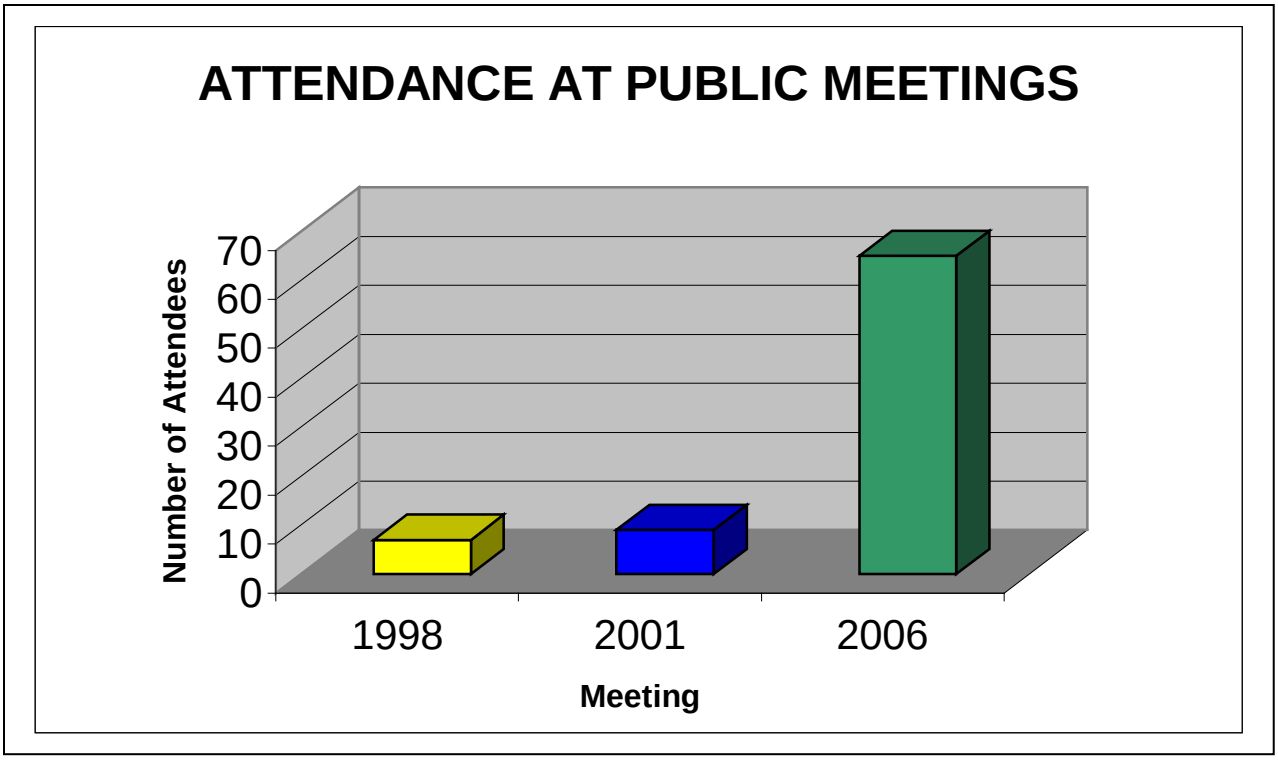


Figure 6-1. Attendance at Public Meetings in the Little Tennessee River Watershed. *Attendance numbers do not include TDEC personnel.*

Figure 6-2. Watershed Attendees Got to See a PowerPoint Presentation by Madisonville's Sequoyah High School About Their School's Environmental Program Called P.L.A.N.E.T.

Figure 6-3. Maps Illustrating Water Quality-Related Information are Always Available to the Public at Watershed Meetings.

Figure 6-4. Informal Discussions Among Residents of the Watershed are an Important Part of TDEC's Watershed Meetings.

6.3. APPROACHES USED.

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

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

TMDLs are prioritized for development based on many factors.

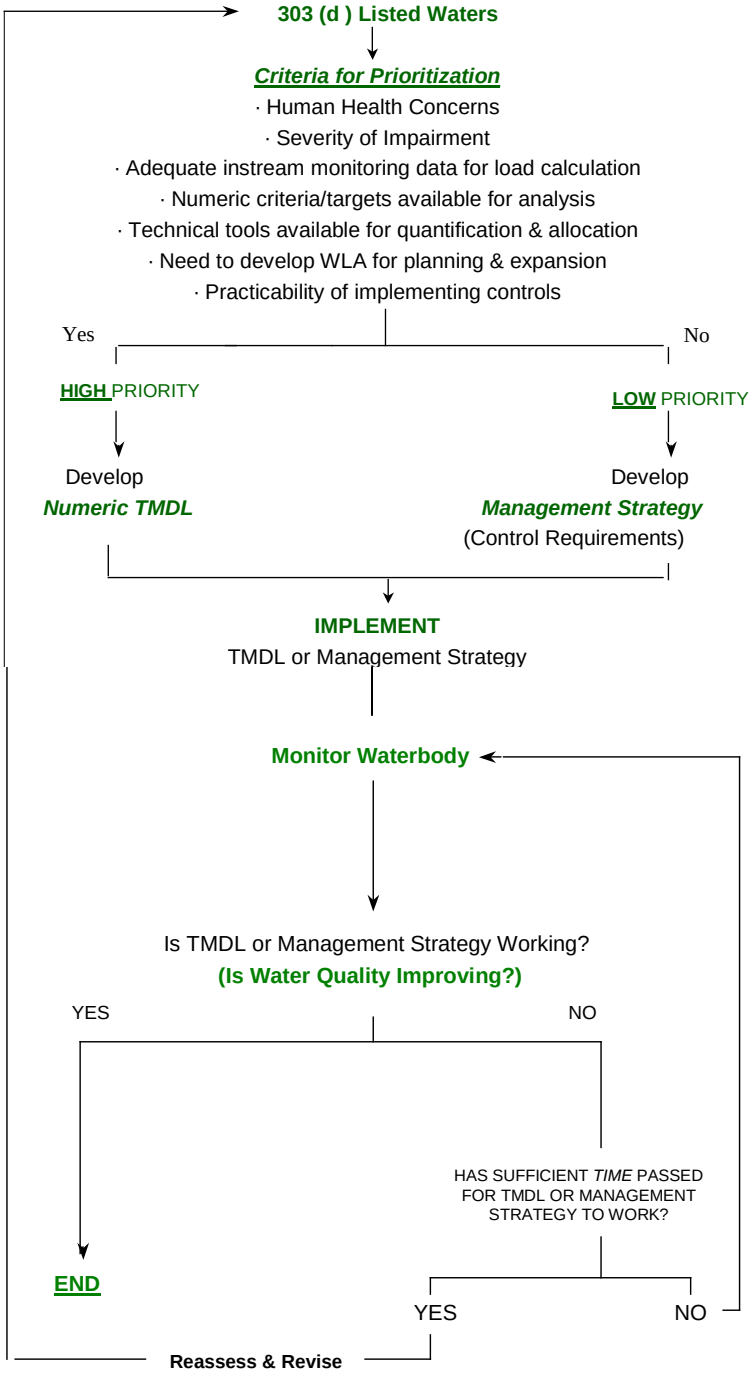


Figure 6.5. Prioritization Scheme for TMDL Development.

6.3.B. Nonpoint Sources

Common nonpoint sources of pollution 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 Little Tennessee 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. 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 controls. Also, the general permit imposes more stringent inspection and self-monitoring requirements on sites in the watershed of streams that are already impaired due to sedimentation. Regardless of the size, no construction site is allowed to cause a condition of pollution.

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

The same requirements apply to sites that drain into high quality waters. Tellico River and Abrams Creek are examples of high quality streams in the Little Tennessee River Watershed.

6.3.B.i.b. From Channel and/or Bank Erosion. Many streams within the Little Tennessee River Watershed suffer from varying degrees of streambank erosion. When steam 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. Destabilized banks contribute sediment load and lose riparian vegetation. 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. Many of the affected streams, like Baker 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 (example: Baker Creek).
- Establish off-channel watering areas for livestock by moving watering troughs and feeders back from stream banks (examples: Baker Creek, Bat Creek, and Fork Creek).
- Limit cattle access to streams and bank vegetation (example: Baker Creek).

Additional strategies

- Increase efforts in the Master Logger program to recognize impaired streams and require more effective management practices.
- Better community planning for the impacts of development on small streams, especially development in growing areas (examples: Tellico River and its tributaries in the Tellico Plains area).
- Limit livestock access to streams and bank vegetation (example: Fork Creek).
- 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 clearing of stream and ditch banks (example: Hunt Creek). *Note: Permits may be required for any work along streams.*
- Limit road and utilities crossings of streams.
- Restrict the use of off-highway vehicles on stream banks and in stream channels.

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 were enacted which established that these BMPs must be used or the Commissioners of the Departments of Environment and Conservation and of Agriculture would be permitted to stop the logging operation that, upon failing to install these BMPs, was causing impacts to streams.

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

Many sediment problems traceable to agricultural practices also involve riparian loss due to close row cropping or pasture clearing for grazing. Agriculturally impacted streams which could benefit from the establishment of riparian buffer zones include Baker Creek, Fork Creek, Bat Creek, and Notchy Creek.

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 five stream systems in the Tennessee portion of the Little Tennessee River Watershed are known to have excessive pathogen contamination. They are Baker Creek, Notchy Creek, Bat Creek, Fork Creek, and Nine Mile Creek.

Other measures that may be necessary to control pathogens are:

Voluntary activities

- Off-channel watering of livestock (examples: Baker Creek and Fork Creek).
- Limit livestock access to streams (examples: Bat Creek and Fork Creek).
- 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 (example: Bat Creek).

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 Hunt Creek and all areas along stream channels.
- 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.
- Timely and appropriate enforcement for noncomplying sewage treatment plants, large and small, and their collection system.
- Identify Concentrated Animal Feeding Operations not currently permitted.

6.3.B.iv. Toxins and Other Materials.

Although some toxic substances are discharged directly into waters of the state from a point source, much of these materials are washed in during rainfalls from an upland location, or via improper waste disposal that contaminates groundwater. In the Little Tennessee River Watershed, damage from storm water runoff from industrial facilities or urban areas is relatively minor. More stringent inspection and regulation of permitted industrial facilities, and local strormawter quality initiatives and regulations, could help reduce the amount of contaminated runoff reaching state waters. Examples of streams that could benefit from these measures include Bat Creek, Hunt Creek, and Tellico River.

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. (This would benefit Tellico River and Bat Creek).
- 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 (This would benefit Bat Creek and Baker Creek).
- Encourage developers to avoid extensive use of culverts in streams.

Current regulations

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

Additional Enforcement

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

APPENDIX II

ID	NAME	HAZARD		ID	NAME	HAZARD
057001	Lambert	H		537004	Bream Hole Lake	S
057008	Kagley	H		627001	Tellico	1
057010	Chilhowee	F		627004	Craighead Lake	S
537001	Roy White	H		627006	Laurel Mountain Lake	2
537002	Hammontree	S		627019	Hensley Lake	H

Table A2-1. Inventoried Dams in the Tennessee Portion of the Little Tennessee River Watershed. *Hazard Codes: F, Federal; (H, 1), High; (S, 2). TDEC only regulates dams indicated by a numeric hazard score.*

LAND COVER/LAND USE	ACRES	% OF WATERSHED
Open Water	16,047	3.21
Other Grasses	1,134	0.23
Pasture/Hay	64,772	12.97
Row Crops	17,366	3.48
Woody Wetlands	270	0.05
Emergent Herbaceous Wetlands	26	0.01
Deciduous Forest	150,805	30.19
Mixed Forest	107,254	21.47
Evergreen Forest	136,228	27.27
High Intensity: Commercial/Industrial	1,235	0.25
High Intensity: Residential	107	0.02
Low Intensity: Residential	1,914	0.38
Quarries/Strip Mines/Gravel Pits	0	0.00
Bare Rock/Sand/Clay	4	0.00
Transitional	2,383	0.48
Total	**499,545**	**100.00**

Table A2-2. Land Use Distribution in the Tennessee Portion of the Little Tennessee 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)	
Ridge and Valley (6701)	Big Creek	Holston River	06010104
Ridge and Valley (6702)	Fisher Creek	Holston River	06010104
Southern Sedimentary Ridges (66e)	Double Branch (66E17)	Fort Loudoun/Watts Bar	06010201
Limestone Valleys and Coves (66f)	Abrams Creek (66F06)	Little Tennessee River	06010204
Southern Metasedimentary Mountains (66g)	Middle Prong Little Pigeon River (66G04)	Lower French Broad River	06010107
	Little River (66G05)	Fort Loudoun/Watts Bar	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 Creek (67F14)	Powell River	06010206
	Big War Creek (67F17)	Upper Clinch River	06010205
	Martin Creek (67F23)	Powell River	06010206
	Powell River (67F25)	Powell River	06010206
Southern Shale Valleys (67g)	Little Chucky Creek (67G01)	Nolichucky River	06010108
	Bent Creek (67G05)	Nolichucky River	06010108
	Flat Creek (67G10)	Lower French Broad River	06010107
Southern Sandstone Ridges (67h)	Laurel Creek (67H06)	Little Tennessee River	06010204
	Parker Branch (67H08)	Little Tennessee River	06010104

Table A2-3. Ecoregion Monitoring Sites in Ecoregions 67, 66e, 66f, 66g, 67f, 67g, and 67h.

CODE	NAME	AGENCY	AGENCY ID
42	TDEC/DNH Chilhowee Reservoir Reservation Site	TDEC/DNH	M.USTNHP 13
105	TDEC/DNH Citico Creek Site	TDEC/DNH	S.USTNHP 1431
1522	NRCS Site	USFWS	
1933	TWRA Kyker Bottoms Site	TWRA	
1934	TWRA Kyker Bottoms Site	TWRA	
1935	TWRA Kyker Bottoms Site	TWRA	
1936	TWRA Kyker Bottoms Site	TWRA	
1937	TWRA Kyker Bottoms Site	TWRA	
1938	TWRA Kyker Bottoms Site	TWRA	
1939	TWRA Kyker Bottoms Site	TWRA	
2325	TWRA Kyker Bottoms Site	TWRA	
2326	TWRA Kyker Bottoms Site	TWRA	
2327	TWRA Kyker Bottoms Site	TWRA	
2328	TWRA Kyker Bottoms Site	TWRA	
2329	TWRA Kyker Bottoms Site	TWRA	
2330	TWRA Kyker Bottoms Site	TWRA	
2711	TWRA Baker Creek Site	TWRA	

Table A2-4. Wetland Sites in the Tennessee Portion of the Little River Watershed in TDEC Database. *TDEC, Tennessee Department of Environment and Conservation; USFWS, United States Fish and Wildlife Service; TWRA, Tennessee Wildlife Resources Agency; DNH, Division of Natural Heritage.* ***This table represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands in the watershed.***

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Abrams Creek	TN06010204039_1000	17.1
Abrams Creek	TN06010204039_2000	5.9
Abrams Creek	TN06010204039_3000	3.3
Bald River	TN06010204044_0700	28.5
Ballplay Creek	TN06010204015_1000	6.5
Ballplay Creek	TN06010204015_2000	12.7
Big Creek	TN06010204056_1000	18.1
Cane Creek	TN06010204044_0100	29.3
Centenary Creek	TN06010204042_0100	5.0
Citico Creek	TN06010204018_1000	16.5
Forge Creek	TN06010204039_0410	17.5
Fourmile Creek	TN06010204062_1000	9.5
Fourmile Creek	TN06010204062_2000	5.1
Indian Creek	TN06010207020_0400	6.8
Island Creek	TN06010204065_1000	10.0
Kingfisher Creek	TN06010204039_0300	2.3
Little Ninemile Creek	TN06010204042_0200	19.0
Lyons Creek	TN06010204044_0900	13.4
Mill Creek	TN06010204039_0400	10.5
Misc tribs to Abrams Creek	TN06010204039_2999	28.6
Misc tribs to Abrams Creek	TN06010204039_3999	5.2
Mulberry Creek	TN06010204498_1000	10.7
North River	TN06010204044_0500	28.4
Panther Creek	TN06010204038_1000	16.9
Parson Branch	TN06010204348_1000	11.1
Rabbit Creek	TN06010204039_0500	16.8
Sinkhole Creek	TN06010204044_1300	18.3
Sixmile Creek	TN06010204042_0300	16.4
Tabcat Creek	TN06010204344_1000	8.6
Tallassee Creek	TN06010204053_1000	11.5
Tellico River	TN06010204044_1000	10.0
Tellico River	TN06010204044_2000	22.1
UT to Baker Creek	TN06010204043_0400	2.1
Wildcat Creek	TN06010204044_0800	22.0

Table A3-1a. Streams Fully Supporting Designated Uses in the Tennessee Portion of the Little Tennessee River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Baker Creek	TN06010204043_1000	39.9
Bat Creek	TN06010204004_1000	19.1
Fork Creek	TN06010204002_1000	19.3
Little Tennessee River	TN06010204020_1000	1.1
Ninemile Creek	TN06010204042_1000	17.1
Notchy Creek	TN06010204045_1000	11.2

Table A3-1b. Streams Partially Supporting Designated Uses in the Tennessee Portion of the Little Tennessee River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Bell Branch	TN06010204039_0200	5.8
Calderwood Reservoir misc tribs	TN06010204CLDRWOODT_1000	5.1
Centenary Creek	TN06010204042_0110	4.7
Chilhowee Reservoir misc. tribs	TN06010204CHILHOWEET_1000	16.0
Cochran Creek	TN06010204058_1000	5.4
Craighead Creek	TN06010204004_0200	8.5
Doublecamp Creek	TN06010204018_0300	17.7
Flats Creek	TN06010204018_0600	5.3
Flats Creek	TN06010204018_0610	6.4
Fortner Branch	TN06010204058_0100	3.5
Hunt Branch	TN06010204044_1200	9.9
Jakes Creek	TN06010204018_0100	9.6
Little Baker Creek	TN06010204043_0300	6.1
Little Citico Creek	TN06010204018_0200	8.4
Mill Creek	TN06010204039_0100	7.0
Misc tribs Notchy Creek (North Bank)	TN06010204045_0998	9.1
Misc tribs Notchy Creek (South Bank)	TN06010204045_0999	5.1
Misc tribs to Citico Creek	TN06010204018_0999	27.7
Misc tribs to Fork Creek	TN06010204002_0999	33.9
Misc tribs to Sixmile Creek	TN06010204042_0399	25.2
Misc tribs to Tellico River	TN06010204044_0999	29.2
Misc. tribs to Abrams Creek	TN06010204039_1999	19.7
Misc. tribs to Bat Creek (North Bank)	TN06010204004_0998	11.8
Misc. tribs to Bat Creek (South Bank)	TN06010204004_0999	6.3
Misc. Tribs to Little Tennessee River	TN06010204020_0999	3.9
Misc. tribs to Ninemile Creek	TN06010204042_0999	17.8
North Fork Citico Creek	TN06010204018_0400	10.7
North Fork Notchy Creek	TN06010204045_0100	12.8
Ostermeck Creek	TN06010204044_0300	5.0
Quarry Creek	TN06010204044_1100	7.1
Sinking Creek	TN06010204050_2000	4.2
Slickrock Creek	TN06010204046_1000	11.7
Smoky Run	TN06010204044_0200	6.2
South Fork Citico Creek	TN06010204018_0500	16.3

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Sycamore Creek	TN06010204044_0600	6.5
Tellico Reservoir Misc. tribs	TN06010204001T_1000	84.4
Turkey Creek	TN06010204044_0400	10.9
Unnamed trib to Baker Creek	TN06010204043_0100	5.6
Unnamed trib to Baker Creek	TN06010204043_0200	3.9
Unnamed trib to Ballplay Creek	TN06010204015_0100	8.3
Unnamed trib to Bat Creek	TN06010204004_0100	2.5
Unnamed trib to Centenary Creek	TN06010204042_0120	2.9

Table A3-1c. Streams Not Assessed in the Tennessee Portion of the Little Tennessee River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Calderwood Reservoir	TN06010204CLDRWOOD_1000	533
Chilhowee Reservoir	TN06010204CHILHOWEE_1000	1,749

Table A3-1d. Lakes Fully Supporting Designated Uses in the Tennessee Portion of the Little Tennessee River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Tellico Reservoir	TN06010204001_1000	16,500

Table A3-1e. Lakes Not Supporting Designated Uses in the Tennessee Portion of the Little Tennessee River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Indian Boundary Lake	TN06010204INDIANBND_1000	96

Table A3-1f. Lakes Not Assessed in the Tennessee Portion of the Little Tennessee River Watershed

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Baker Creek	TN06010204043_1000	39.9	Partial
Bat Creek	TN06010204004_1000	19.1	Partial
Fork Creek	TN06010204002_1000	19.3	Partial
Ninemile Creek	TN06010204042_1000	17.1	Partial
Notchy Creek	TN06010204045_1000	11.2	Partial

Table A3-2a. Stream Impairment Due to Pathogens in the Tennessee Portion of the Little Tennessee River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Fork Creek	TN06010204002_1000	19.3	Partial

Table A3-2b. Stream Impairment due to Siltation in the Tennessee Portion of the Little Tennessee River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Fork Creek	TN06010204002_1000	19.3	Partial

Table A3-2c. Stream Impairment Due to Nutrients in the Tennessee Portion of the Little Tennessee River Watershed.

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Fork Creek	TN06010204002_1000	19.3	Partial

Table A3-2d. Stream Impairment due to Nitrate in the Tennessee Portion of the Little Tennessee River Watershed.

APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-10 SUBWATERSHEDS (ACRES)			
	02	03	04	05
Bare Rock/Sand/Clay	0			3
Deciduous Forest	47,245	17,622	67,892	18,046
Emergent Herbaceous Wetlands	25	1		17,146
Evergreen Forest	49,509	24,826	44,746	
High Intensity: Commercial/Industrial/Transportation	222	5	239	769
High Intensity: Residential	7		19	81
Low Intensity: Residential	377	2	372	1,164
Mixed Forest	33,491	11,197	40,965	21,601
Open Water	6,456	24	2,574	6,993
Other Grasses: Urban/Recreational	86		103	946
Pasture/Hay	10,582	1,809	12,943	39,439
Row Crops	2,590	1	4,092	10,683
Transitional	679	24	1,382	298
Woody Wetlands	40	230		
Total	**151,308**	**55,741**	**175327**	**117,169**

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

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

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

STATION	HUC-10	AGENCY	STREAM NAME	AREA (SQ MILES)	LOW FLOW (CFS)		
					1Q10	7Q10	3Q20
03517900	0601020402	USGS	Calderwood Lake				
03518000	0601020402	USGS	Little Tennessee River	1,862	200	1,200	750
03518200	0601020402	USGS	Chilhowee Lake				
03518300	0601020402	USGS	Little Tennessee River	1,987	1,200	1,350	1,200
03518400	0601020402	USGS	North Fork Citico Creek				
03519500	0601020402	USGS	Little Tennessee River	2,443	1,400	1,700	1,600
03518470	0601020404	USGS	Bald River	21.7	7.8	8.3	7.1
03518500	0601020404	USGS	Tellico River	118	29.2	31.4	26.6
03518700	0601020404	USGS	Cane Creek	18.2	1.16	1.26	1.02
03519000	0601020404	USGS	Tellico River	271	47.5	51.2	43.0
03519500	0601020405	USGS	Little Tennessee River	2,443	1,400	1,700	1,600
03519600	0601020405	USGS	Island Creek	11.2	1.21	1.30	1.12
03519610	0601020405	USGS	Baker Creek				
03519630	0601020405	USGS	Griffiths Branch				
03519640	0601020405	USGS	Baker Creek	16.0	1.7	1.9	1.4
03519650	0601020405	USGS	Little Baker Creek				
03519700	0601020405	USGS	Bat Creek	30.7	5.62	5.81	5.18
354639084153401	0601020405	TVA	Little Tennessee River				

Table A4-3. Historical Streamflow Data Summary Based on Mean Daily Flows in the Tennessee Portion of the Little Tennessee River Watershed*. USGS, United States Geological Survey; TVA, Tennessee Valley Authority. Additional information may be found at:* http://nwis.waterdata.usgs.gov/tn/nwis/discharge

AGENCY	STATION	ALIAS	LOCATION	HUC-10
TDEC			Abrams Creek	0601020401
TDEC	CENTE000.3BT		Centenary Creek @ RM 0.3	0601020401
TDEC	CHILHOWEE02		Chilhowee Reservoir at Abrams Creek	0601020401
TDEC	CHILHOWEE01		Chilhowee Reservoir at Dam	0601020401
TDEC	CITCI000.0HM	00650	Citico Creek @ RM0.0	0601020401
TDEC	GRASS000.0MO	GRASSYCREEKIS01	Grassy Creek at RM 0.0	0601020401
TDEC	LNINE000.5BT		Little Ninemile Creek @ RM 0.5	0601020401
TDEC	LTENN019.2MO	1735	Little Tennessee River @ RM 19.2	0601020401
TDEC	LTENN032.8BT	1730	Little Tennessee River @ RM 32.8	0601020401
TDEC	NINEM004.8BT		Ninemile Creek @ RM 4.8	0601020401
TDEC	SIXMI001.3BT		Sixmile Creek @ RM 1.3	0601020401
TVA	477631		Abrams Creek @ RM 8.57	0601020401
TVA	477632		Citico Creek @ RM 3.79	0601020401
TVA	477633		Citico Creek @ RM 9.80	0601020401
TVA	476979		Clear Creek @ RM 0.02	0601020401
TVA	477410		Harrison Branch @ RM 1.4	0601020401
TVA	477024		Little Tennessee River @ RM 11.5	0601020401
TVA	476307		Little Tennessee River @ RM 18.0	0601020401
TVA	476459		Little Tennessee River @ RM 19.0	0601020401
TVA	477412		Little Tennessee River @ RM 19.2	0601020401
TVA	476263		Little Tennessee River @ RM 19.5	0601020401
TVA	476460		Little Tennessee River @ RM 20.0	0601020401
TVA	476295		Little Tennessee River @ RM 21.0	0601020401
TVA	476461		Little Tennessee River @ RM 22.0	0601020401
TVA	476976		Little Tennessee River @ RM 22.55	0601020401
TVA	476462		Little Tennessee River @ RM 23.0	0601020401
TVA	476308		Little Tennessee River @ RM 24.0	0601020401
TVA	476463		Little Tennessee River @ RM 25.0	0601020401
TVA	476464		Little Tennessee River @ RM 26.0	0601020401
TVA	476465		Little Tennessee River @ RM 27.0	0601020401
TVA	476296		Little Tennessee River @ RM 27.5	0601020401
TVA	476466		Little Tennessee River @ RM 28.0	0601020401
TVA	476264		Little Tennessee River @ RM 29.0	0601020401
TVA	476467		Little Tennessee River @ RM 30.0	0601020401
TVA	476468		Little Tennessee River @ RM 31.0	0601020401
TVA	476469		Little Tennessee River @ RM 32.0	0601020401
TVA	476297		Little Tennessee River @ RM 33.0	0601020401
TVA	475388		Little Tennessee River @ RM 33.6	0601020401
TVA	476234		Little Tennessee River @ RM 33.61	0601020401
TVA	476972		Little Tennessee River @ RM 34.0	0601020401
TVA	477022		Little Tennessee River @ RM 34.5	0601020401
TVA	475856		Little Tennessee River @ RM 35.0	0601020401
TVA	476971		Little Tennessee River @ RM 37.0	0601020401
TVA	477021		Little Tennessee River @ RM 41.5	0601020401

AGENCY	STATION	ALIAS	LOCATION	HUC-10
TVA	476970		Little Tennessee River @ RM 41.9	0601020401
TVA	475526		Little Tennessee River @ RM 42.4	0601020401
TVA	476233		Little Tennessee River @ RM 43.61	0601020401
TVA	477096		Little Tennessee River @ RM 46.0	0601020401
TVA	477413		Ninemile Creek @ RM 2.3	0601020401
TVA	475848		Tellico River @ RM 28.2	0601020401
TVA	476309		Tellico River @ RM 3.0	0601020401
USEPA			Calderwood Lake	0601020401
USEPA			Indian Boundary Lake	0601020401
USEPA			Twenty Mile Creek	0601020401
USFS	40429		Citico Creek	0601020401
USFS	40428		Citico Creek Above Warden Field	0601020401
USFS	40421		Indian Boundary Lake #1	0601020401
USFS	40422		Indian Boundary Lake #2	0601020401
USFS	40423		Indian Boundary Lake #3	0601020401
USFS	180001		North River	0601020401
USFS	180004		North River	0601020401
USFS	180005		North River	0601020401
TDEC			Abrams Creek	0601020403
TVA	477630		Abrams Creek @ RM 15.43	0601020403
TVA	477627		Abrams Creek @ RM 15.87	0601020403
TVA	477626		Abrams Creek @ RM 16.58	0601020403
TVA	477625		Abrams Creek @ RM 18.34	0601020403
TVA	477624		Abrams Creek @ RM 19.95	0601020403
TVA	477623		Abrams Creek @ RM 20.82	0601020403
TVA	477622		Abrams Creek @ RM 21.28	0601020403
TVA	477634		Abrams Creek @ RM 22.34	0601020403
TVA	477631		Abrams Creek @ RM 8.57	0601020403
TVA	477637		Maple Creek @ RM 0.84	0601020403
TVA	477638		Maple Creek @ RM 0.84	0601020403
TVA	477629		Mill Creek @ RM 0.09	0601020403
TVA	477628		Mill Creek @ RM 2.15	0601020403
TVA	476470		Tellico River @ RM 1.25	0601020403
TDEC	LAURE000.0MO		Laurel Creek @ RM0.0	0601020404
TDEC	HEMLO000.0MO	HEMLOCKBRIS01	Hemlock Branch @ RM 0.0	0601020404
TDEC	LAURE000.0MO	LAURELBRIS01	Laurel Branch RM 0.0	0601020404
TDEC	MCNAB000.0MO	MCNABBCREEKIS01	McNabb Creek @ RM 0.0	0601020404
TDEC			North River	0601020404
TDEC	TELLI022.0MO		Tellico River @ RM 22.0	0601020404
TVA	475472		Bat Creek @ RM 19.95	0601020404
TVA	477410		Harrison Branch @ RM 1.4	0601020404
TVA	477411		Island Creek @ RM 2.6	0601020404
TVA	476307		Little Tennessee River @ RM 18.0	0601020404
TVA	477412		Little Tennessee River @ RM 19.2	0601020404

AGENCY	STATION	ALIAS	LOCATION	HUC-10
TVA	477412		Little Tennessee River @ RM 19.2	0601020404
TVA	476976		Little Tennessee River @ RM 22.55	0601020404
TVA	476308		Little Tennessee River @ RM 24.0	0601020404
TVA	476264		Little Tennessee River @ RM 29.0	0601020404
TVA	476469		Little Tennessee River @ RM 32.0	0601020404
TVA	476297		Little Tennessee River @ RM 33.0	0601020404
TVA	475388		Little Tennessee River @ RM 33.6	0601020404
TVA	476234		Little Tennessee River @ RM 33.61	0601020404
TVA	476972		Little Tennessee River @ RM 34.0	0601020404
TVA	477022		Little Tennessee River @ RM 34.5	0601020404
TVA	477096		Little Tennessee River @ RM 46.0	0601020404
TVA	477409		Notchy Creek @ RM 2.2	0601020404
TVA	476293		Tellico River @ RM 1.0	0601020404
TVA	476470		Tellico River @ RM 1.25	0601020404
TVA	476298		Tellico River @ RM 15.0	0601020404
TVA	476975		Tellico River @ RM 2.9	0601020404
TVA	475458		Tellico River @ RM 27.2	0601020404
TVA	475454		Tellico River @ RM 28.13	0601020404
TVA	475848		Tellico River @ RM 28.2	0601020404
TVA	476309		Tellico River @ RM 3.0	0601020404
TVA	476974		Tellico River @ RM 4.9	0601020404
TVA	476294		Tellico River @ RM 5.0	0601020404
TVA	476310		Tellico River @ RM 7.0	0601020404
TVA	476973		Tellico River @ RM 7.8	0601020404
TVA	475544		UT To Bat Creek @ RM 0.52	0601020404
USFS	40402		Big Cove Station	0601020404
USFS	40407		Long Branch Station	0601020404
USFS	180006		McNabb Creek @ RM 0.0	0601020404
USFS	180001		North River at Grassy Branch Mouth	0601020404
USFS	180002		North River at Hemlock Creek Mouth	0601020404
USFS	180004		North River at Hemlock Creek Mouth	0601020404
USFS	180003		North River at McNabb Creek Mouth	0601020404
USFS	40403		North River Station	0601020404
USFS	40408		North River Station	0601020404
USFS	40409		North River Station	0601020404
USFS	40410		North River Station	0601020404
USFS	40411		North River Station	0601020404
USFS	40404		Queens Cove Station	0601020404
USFS	40401		Sugar Cove Station	0601020404
USFS	40424		Tellico River Station	0601020404
USFS	40425		Tellico River Station	0601020404
USFS	40406		Unnamed Tributary	0601020404
USFS	40405		Upper Tellico Station	0601020404
TDEC	BAKER008.9LO		Baker Creek @ RM 8.9	0601020405

AGENCY	STATION	ALIAS	LOCATION	HUC-10
TDEC	BAKER008.9LO		Baker Creek @ RM 8.9	0601020405
TDEC	BAT008.1MO		Bat Creek @ RM 8.1	0601020405
TDEC	FORK004.6MO		Fork Creek @ RM 4.6	0601020405
TDEC	ISLAN003.2MO		Island Creek @ RM 3.2	0601020405
TVA	476300		Baker Creek @ RM 2.0	0601020405
TVA	475530		Bat Creek @ RM 18.95	0601020405
TVA	475472		Bat Creek @ RM 19.95	0601020405
TVA	476979		Clear Creek @ RM 0.02	0601020405
TVA	477408		Clear Creek @ RM 0.5	0601020405
TVA	476978		Island Creek @ RM 0.15	0601020405
TVA	476299		Island Creek @ RM 1.4	0601020405
TVA	477411		Island Creek @ RM 2.6	0601020405
TVA	477406		Little Tennessee River @ RM 0.6	0601020405
TVA	476262		Little Tennessee River @ RM 10.0	0601020405
TVA	476452		Little Tennessee River @ RM 11.0	0601020405
TVA	477024		Little Tennessee River @ RM 11.5	0601020405
TVA	476453		Little Tennessee River @ RM 12.0	0601020405
TVA	476454		Little Tennessee River @ RM 13.0	0601020405
TVA	476455		Little Tennessee River @ RM 14.0	0601020405
TVA	476456		Little Tennessee River @ RM 15.0	0601020405
TVA	476457		Little Tennessee River @ RM 16.0	0601020405
TVA	476283		Little Tennessee River @ RM 16.55	0601020405
TVA	476458		Little Tennessee River @ RM 17.0	0601020405
TVA	476459		Little Tennessee River @ RM 19.0	0601020405
TVA	476447		Little Tennessee River @ RM 2.0	0601020405
TVA	477382		Little Tennessee River @ RM 2.5	0601020405
TVA	476304		Little Tennessee River @ RM 3.0	0601020405
TVA	475503		Little Tennessee River @ RM 4.0	0601020405
TVA	476261		Little Tennessee River @ RM 5.0	0601020405
TVA	476448		Little Tennessee River @ RM 6.0	0601020405
TVA	476062		Little Tennessee River @ RM 6.78	0601020405
TVA	476449		Little Tennessee River @ RM 7.0	0601020405
TVA	476305		Little Tennessee River @ RM 7.5	0601020405
TVA	476450		Little Tennessee River @ RM 8.0	0601020405
TVA	476451		Little Tennessee River @ RM 9.0	0601020405
TVA	477413		Ninemile Creek @ RM 2.3	0601020405
TVA	476977		Tellico River @ RM 0.12	0601020405
TVA	477407		Unnamed Tributary @ RM 0.45	0601020405
TVA	477414		Unnamed Tributary @ RM 0.8	0601020405
TVA	475544		UT to Bat Creek @ RM 0.52	0601020405
TVA	475535		UT to Bat Creek @ RM 1.56	0601020405

Table A4-4. STORET Water Quality Monitoring Stations in the Tennessee Portion of the Little Tennessee River Watershed*. TDEC, Tennessee Department of Environment and Conservation; RM, River Mile; USFS, United States Forest Service; TVA, Tennessee Valley Authority. UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	HUC-10
TN0065510	ALCOA-Calderwood Power House Hydro Plant	4911	Electric Service	Minor	Little Tennessee River @ RM 43.6	0601020402
TN0065528	Alcoa-Chilhowee Power House Hydro Plant	4911	Electric Service	Minor	Little Tennessee River @ RM 33.6	0601020402
TN0024953	Tellico Plains STP	4952	Sewerage System	Minor	Tellico River @ RM 27.5	0601020404
TN0062243	Greenback School	4952	Sewerage System	Minor	UT @mile 1.3 to Baker Creek @ RM 5.9	0601020405
TN0058238	Niles Ferry Wastewater Treatment Facility	4952	Sewerage System	Minor	Little Tennessee River @ RM 18.6	0601020405
TN0062316	Foothills Pointe Owners Association, Incorporated	4952	Sewerage System	Minor	Tellico Reservoir (Little Tennessee River) @ RM 13.4	0601020405
TN0025020	Madisonville STP	4952	Sewerage System	Minor	Bat Creek @ RM 19.3	0601020405
TN0054909	Hiwassee College STP	4952	Sewerage System	Minor	Bat Creek @ RM 16.4	0601020405

Table A4-5. NPDES Permittees in the Tennessee Portion of the Little Tennessee River Watershed. *RM, River Mile; SIC, Standard Industrial Classification; MADI, Major Discharge Indicator; UT, Unnamed Tributary.*

FACILITY NUMBER	PERMITEE	COUNTY	LIVESTOCK	WATERBODY	HUC-10
TNA000136	Harrison Dairy	Loudon	Dairy Cow	Fork Creek	0601020405

Table A4-6. CAFO Sites in the Tennessee Portion of the Little Tennessee River Watershed.

FACILITY NUMBER	PERMITEE	SIC	SIC NAME	WATERBODY	HUC-10
TN0068969	Craighead Limestone Co. (Craighead Limestone Quarry)	1422	Limestone-Crushed and Broken	Fork Creek	0601020403
TN0072869	TVM/TSW (Andies Quarry)	1411	Marble Quarrying	UT to Sinking Creek	0601020403
TN0072346	Vulcan Construction Materials (Madisonville Quarry)	1422	Limestone-Crushed and Broken	UT to Fork Creek	0601020403

Table A4-7. Active Permitted Mining Sites in the Tennessee Portion of the Little Tennessee River Watershed. *SIC, Standard Industrial Classification; UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	WATERBODY	HUC-10
TNG110091	Harrison Ready Mix	UT to Craighead Creek	0601020405
TNG110234	R&S Concrete	Tennessee River @ RM 601	0601020405

Table A4-8. Ready Mix Concrete Plants in the Tennessee Portion of the Little Tennessee River Watershed. *RM, River Mile; UT, Unnamed Tributary.*

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-10
NRS00.129	Blount	Impoundment of Intermittent Stream	UT to Four Mile Creek	0601020402
NRS03.055	Blount	TAPOCO Hydropower	Little Tennessee River	0601020402
NRS02.222	Monroe	Covered Pedestrian Bridge	Tellico River	0601020404
NRS03.230	Loudon	Dredging and Bank Stabilization	Little Tennessee River	0601020405

Table A4-9. Individual ARAP Permits Issued January 2000 Through June 2004 in the Tennessee Portion of the Little Tennessee River Watershed. *UT, Unnamed Tributary.*

FACILITY NUMBER	FACILITY NAME	SECTOR	RECEIVING STREAM	AREA*	HUC-10
TNR054370	Griffitts Drilling and Seals	Y	Little Nine Mile Creek	0.5	0601020402
TNR054371	Southern Precision Tooling	AB	Little Nine Mile Creek	0.5	0601020402
TNR056455	Amburns Auto Salvage	M	WWC to Fourmile Creek	21	0601020404
TNR051154	Tellico Mountain Motors	M	UT to Tellico Reservoir	3	0601020404
TNR054594	Gilded Motors	E	Baker Creek	4.75	0601020405
TNR053617	Skiers Choice, Inc.	R	Culton Creek	8	0601020405
TNR050476	Wyko, Inc.	AB	Baker Creek	5.5	0601020405
TNR053483	AcuPowder Tennessee	F	UT to Baker Creek	18	0601020405
TNR054313	Proffitts Machining, Inc.	AB	Unknown	1	0601020405
TNR050532	PolyOne Corporation	Y	Little Tennessee River	10	0601020405
TNR051685	Havco Wood Products	J	Tellico lake	69	0601020405
TNR053277	Tennessee Watercraft	R	Tellico Lake	11.8	0601020405
TNR053412	Sea Ray Boats	R	Little Tennessee River (Tellico Lake Embayment)	39	0601020405
TNR056447	Tellico Resources Development Agency STP	T	Little Tennessee River	3.5	0601020405
TNR054262	Carlex Glass Company	E	Tellico lake	9.18	0601020405
TNR051483	Master Craft Boat Co.	R	Tellico lake	27	0601020405
TNR050644	Donald Lankford salvage	M	Burton Branch	3	0601020405
TNR054270	R&K Enterprises	A	Bat Creek	1	0601020405
TNR053357	Monroe County Airport	S, P	Bat Creek	0.2	0601020405

Table A4-10. Active Permitted TMSP Facilities in the Tennessee Portion of the Little Tennessee River Watershed. *Area, acres of property associated with industrial activity; UT, Unnamed Tributary; WWC, Wet Weather Conveyance. Sector details may be found in Table A4-11.*

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

Table A4-11. TMSP Sectors and Descriptions.

APPENDIX V

NUTRIENT MANAGEMENT PLANS APPLIED	ACRES
Feed Management	0
Irrigation Management	0
Water Management	0
Nutrient Management	2,779
Waste Utilization	331
Total	**3,010**

Table A5-1a. Nutrient Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Little Tennessee River Watershed. *Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period.*

PARAMETER	ACRES
Acres of Pest Management Systems Applied	2,799

Table A5-1b. Pest Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Little Tennessee River Watershed. *Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period.*

CONSERVATION PRACTICE	AMOUNT	
	Feet	**Acres**
Fence		
Firebreak		
Forest Harvest Management		921
Heavy Use Area Protection		
Pasture and Hay Planting		29
Prescribed Grazing		2,172
Range Planting		
Use Exclusion		
Pipeline		
Prescribed Burning		
Total	**0**	**3,122**

Table A5-1c. Grazing/Forages Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Little Tennessee River Watershed. *Data are from PRMS for October 1, 2003 through September 30, 2004 reporting period.*

COMMUNITY	PROJECT DESCRIPTION	AWARD DATE	AWARD AMOUNT
Madisonville	Sewer Line Rehabilitation	08/11/1989	$500,000

Table A5-2. Communities in the Tennessee Portion of the Little Tennessee River Watershed Receiving SRF Grants or Loans.

PRACTICE	NRCS CODE	NUMBER OF BMPs
Critical Area Planting	342	3
Diversion	362	1
Fence	382	3
Heavy Use Area	561	40
Pasture/Hay Planting	512	21
Pipeline	516	12
Pond	378	1
Stream Crossing	578	3
Waste Management System	312	1
Watering Facility	614	12

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