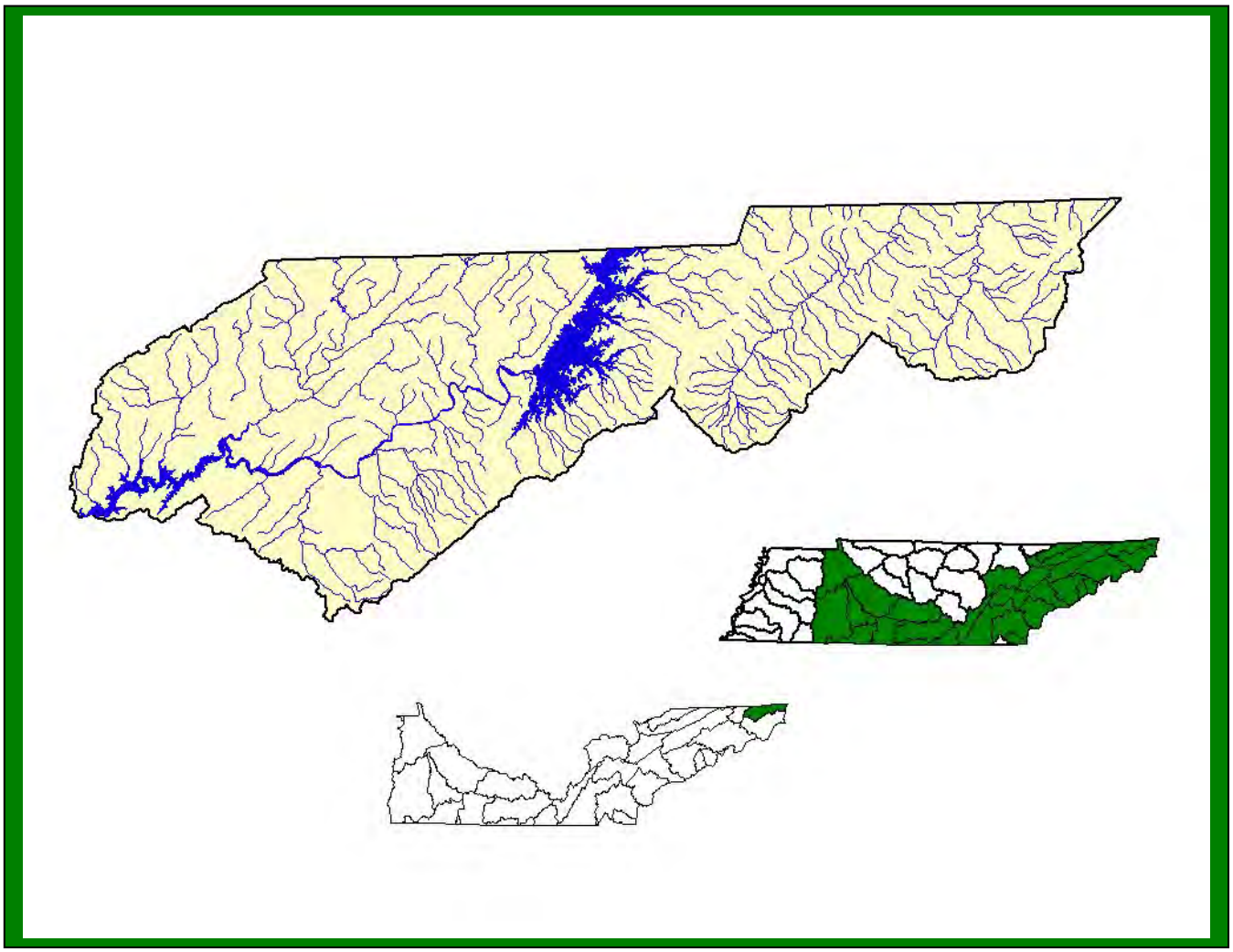
SOUTH FORK HOLSTON RIVER WATERSHED (06010102) OF THE TENNESSEE RIVER BASIN

WATERSHED WATER QUALITY MANAGEMENT PLAN



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

2003

GLOSSARY

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

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

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

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

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

AFO. Animal Feeding Operation.

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

ARAP. Aquatic Resource Alteration Permit.

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

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

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

Benthic. Bottom dwelling.

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

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

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

CAFO. Concentrated Animal Feeding Operation.

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

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

DO. Dissolved oxygen.

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

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

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

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

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

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

MRLC. Multi-Resolution Land Classification.

MS4. Municipal Separate Storm Sewer System.

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

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

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

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

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

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

SBR. Sequential Batch Reactor.

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

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

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

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

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

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

TMSP. Tennessee Multi-Sector Permit.

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

WAS. Waste Activated Sludge.

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

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

WET. Whole Effluent Toxicity.

WWTP. Waste Water Treatment Plant

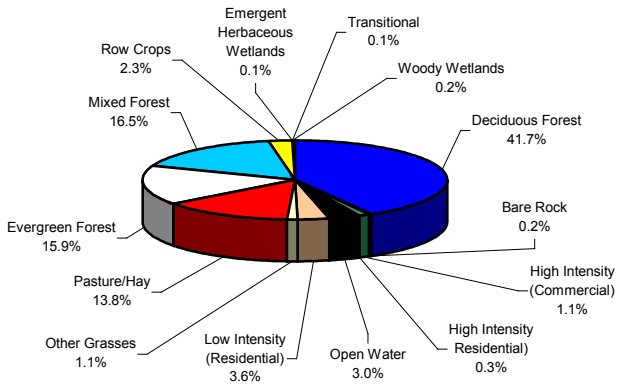
Summary – South Fork Holston River

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

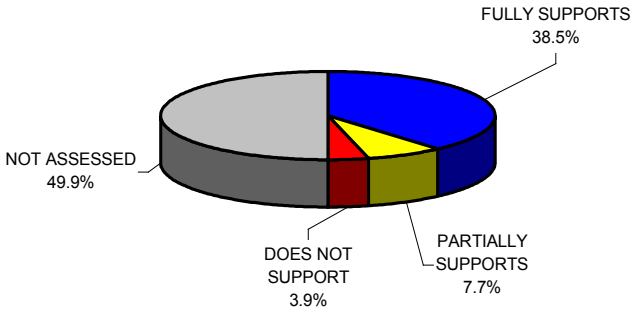
A detailed description of the watershed can be found in Chapter 2. The Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed is approximately 551 square miles and includes parts of three East Tennessee counties. A part of the Tennessee River drainage basin, the watershed has 542 stream miles and 11,977 lake acres.



Land Use in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed is based on MRLC Satellite Imagery.

One Designated State Natural Areas, four interpretive areas, and one wildlife management area are located in the watershed. Eighty rare plant and animal species have been documented in the watershed, including four rare fish species, three rare mussel species and two rare snail species.

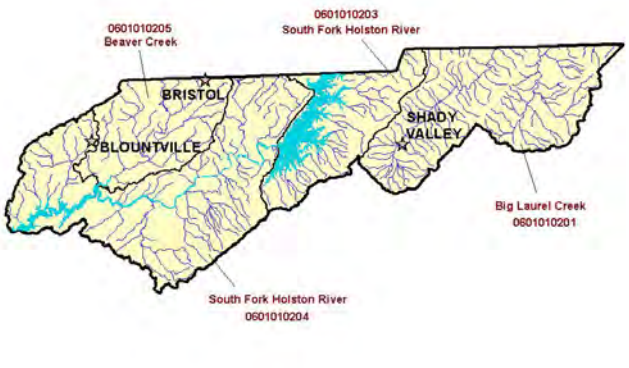
A review of water quality sampling and assessment is presented in Chapter 3. Using the Watershed Approach to Water Quality, 58 sampling sites were utilized in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. These were ambient, ecoregion or watershed monitoring sites. Monitoring results support the conclusion that 38.5% of total stream miles (based on RF3) fully support designated uses.



Water Quality Assessment in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed is Based on the 1998 303(d) List.

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

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



HUC-10 Subwatersheds in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed.

Point source contributions to the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed consist of four individual NPDES-permitted facilities, three 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 (3), Tennessee Multi-Sector Permits (24) and Mining Permits (1). Agricultural operations include cattle, chicken, hog, and sheep farming. Maps illustrating the locations of NPDES and ARAP permit sites are presented in each subwatershed.

Chapter 5 is entitled *Water Quality Partnerships in the South Fork Holston River Watershed* and highlights partnerships between agencies and between agencies and landowners that are essential to success. Programs of federal agencies (Natural Resources Conservation Service, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. Geological Survey, Tennessee Valley Authority), and state agencies (TDEC Division of Community Assistance, TDEC Division of Water Supply, Tennessee Department of Agriculture, and Virginia Department of Environmental Quality) are summarized. Local initiatives of active watershed organizations (Friends of Fort Patrick Henry, Kingsport Citizens for a Cleaner Environment and the Holston River Alliance) are also described.

Point and Nonpoint source approaches to water quality problems in the Group 2 Portion of the Tennessee Portion of the South Fork Holston 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 Group 2 Portion of the South Fork Holston River Watershed Water Quality Management Plan can be found at:

http://www.state.tn.us/environment/wpc/watershed/wsmplans/.

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

1.1 Background

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

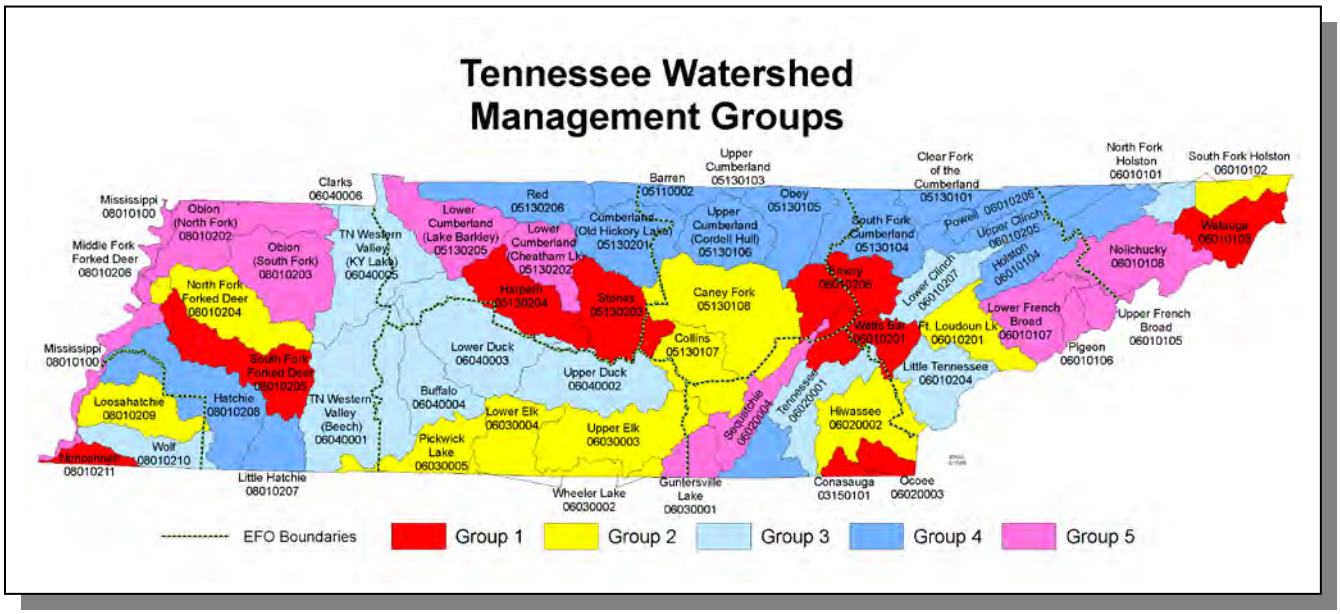


Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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

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

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

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

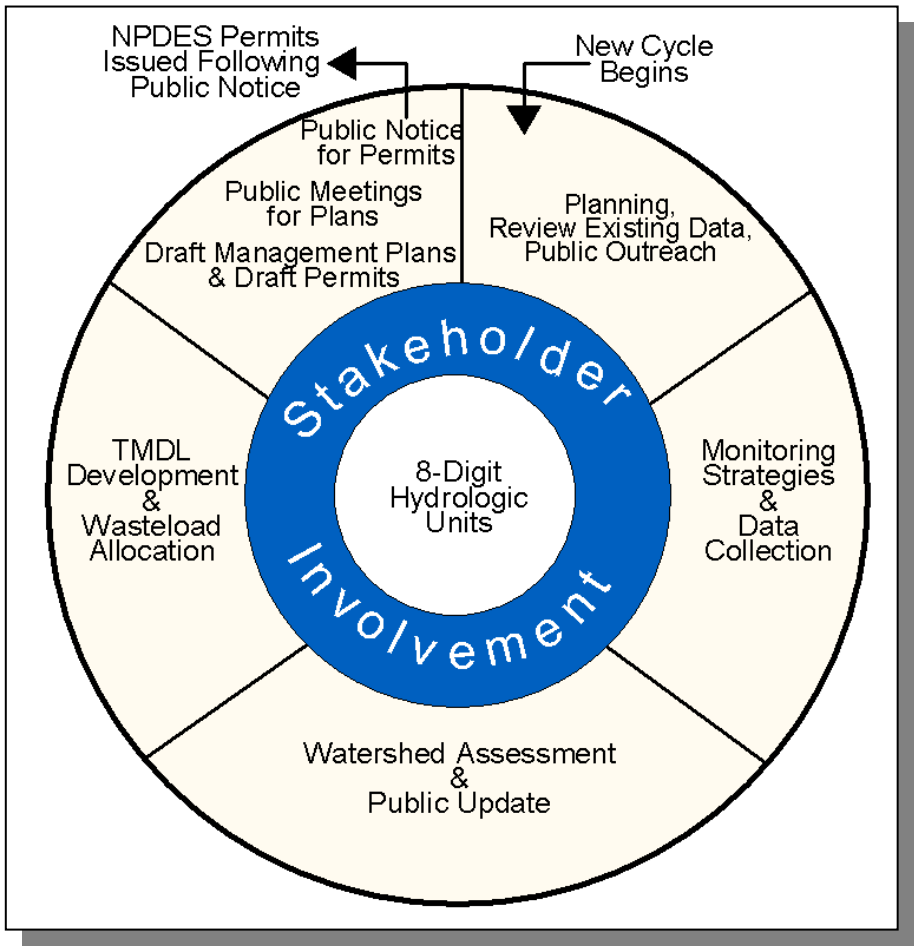


Figure 1-2. The Watershed Approach Cycle.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAPTER 2

DESCRIPTION OF THE SOUTH FORK HOLSTON RIVER WATERSHED

2.1. Background.

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

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

2.4. Land Use.

2.5. Ecoregions and Reference Streams

2.6. Natural Resources
2.6.A. Designated State Natural Areas
2.6.B. Rare Plants and Animals
2.6.C. Wetlands

2.7. Cultural Resources
2.7.A. Interpretive Areas
2.7.B. Wildlife Management Area

2.8. Tennessee Rivers Assessment Project

2.1. BACKGROUND. The Holston River and Watershed are named in honor of Stephen Holston. Holston, an early explorer and surveyor with The Expedition of 1748, was the first settler to explore the Holston River system, including South Fork of the Holston River.

The South Fork Holston River watershed consists of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. The well-drained soilds of the watershed are often slightly acid to neutral. The low-lying region contains roughly parallel ridges and valleys in a variety of geologic materials. Springs and caves are relatively numerous.

This Chapter describes the location and characteristics of the South Fork Holston River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. Located in East Tennessee, the Tennessee portion of South Fork Holston River Watershed includes parts of Carter, Greene, Hawkins, Johnson, Sullivan, and Washington Counties. The Group 2 portion of the watershed just includes parts of Carter, Johnson, and Sullivan Counties.

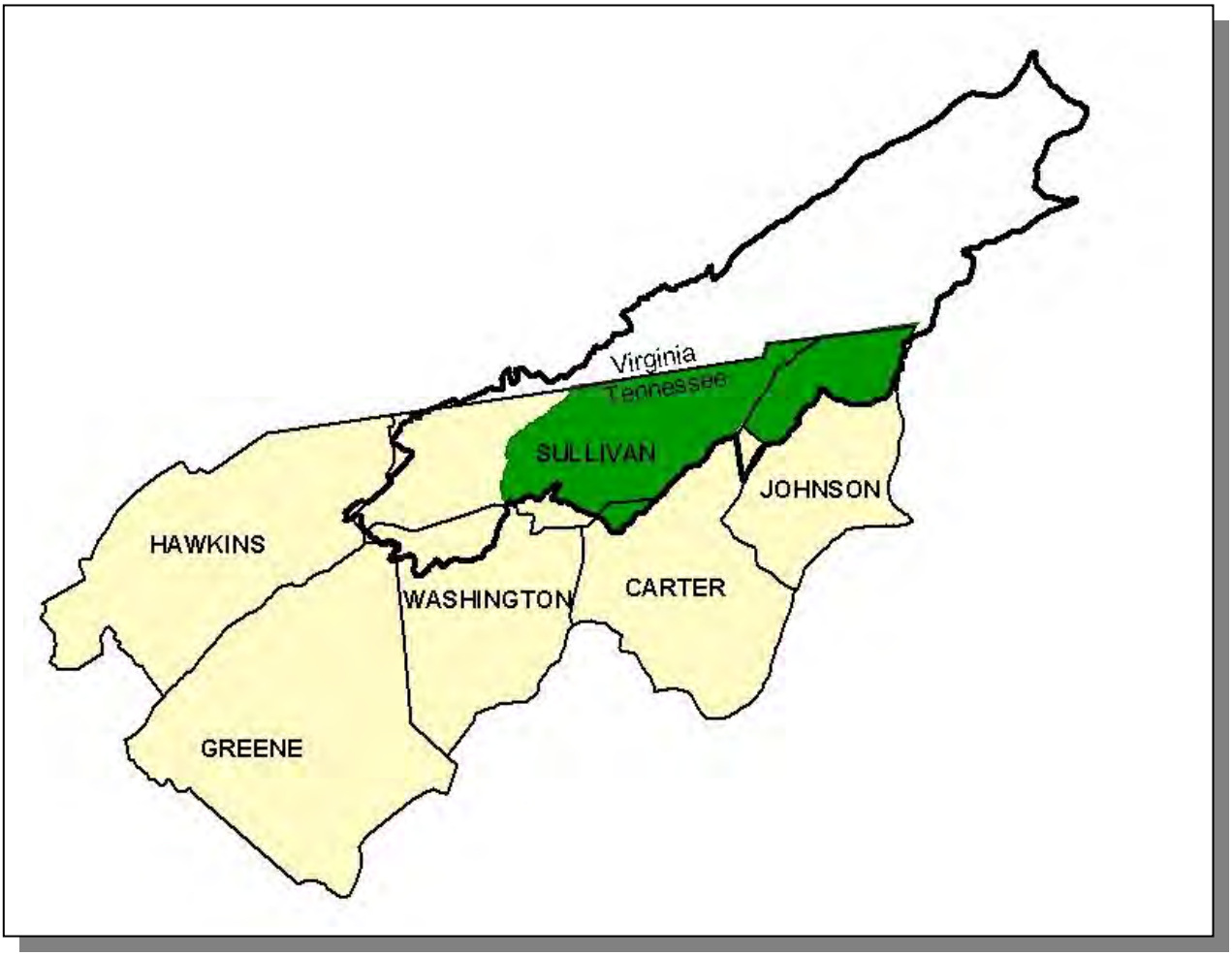


Figure 2-1. General Location of the South Fork Holston River Watershed. *The green portion represents the Group 2 portion of the watershed.*

COUNTY	% OF WATERSHED IN EACH COUNTY
Sullivan	70.9
Johnson	26.6
Carter	2.5

Table 2-1. The Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed Includes Parts of Three East Tennessee Counties.

2.2.B. Population Density Centers. One interstate and four state highways serve the major communities in the Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed.

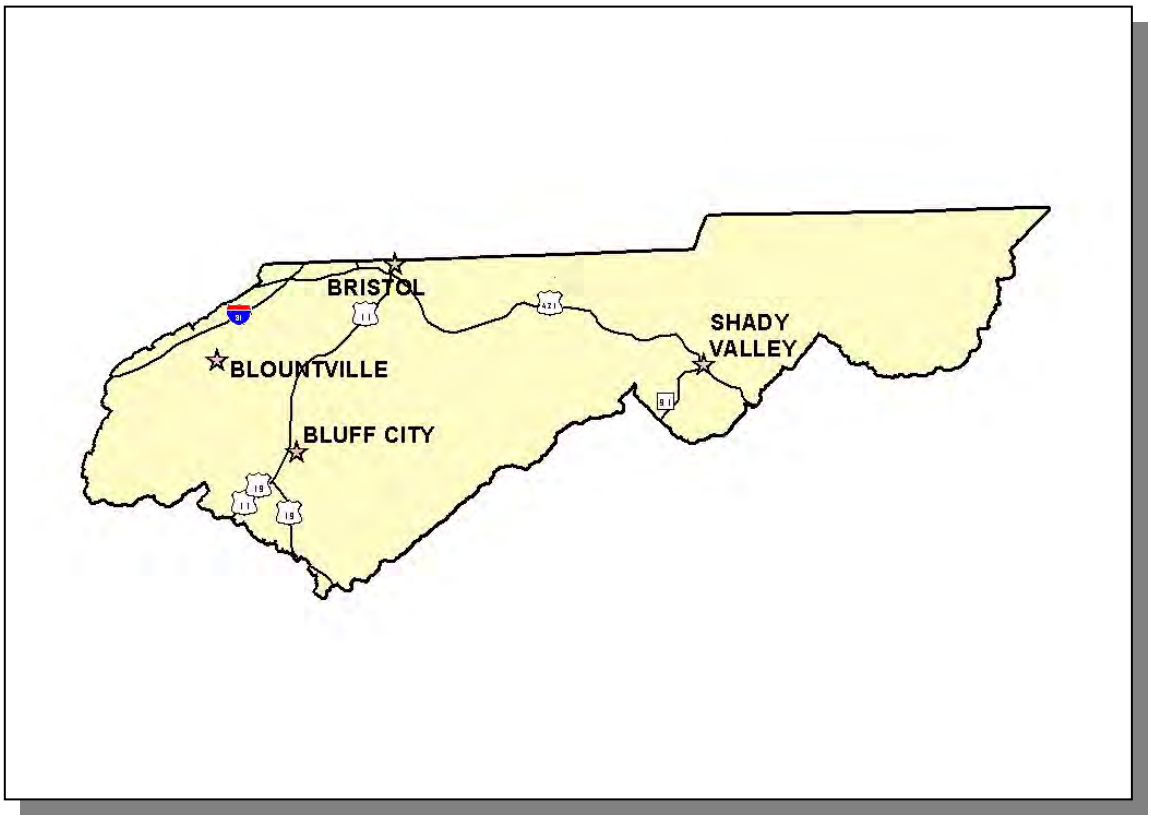


Figure 2-2. Municipalities and Roads in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Bluff City	1,403	Sullivan
Bristol	24,564	Sullivan

Table 2-2. Municipalities in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Population based on 2000 census (Tennessee Blue Book).*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The South Fork Holston River Watershed, designated 06010102 by the USGS, drains 551 square miles in Tennessee and empties to the Holston River.

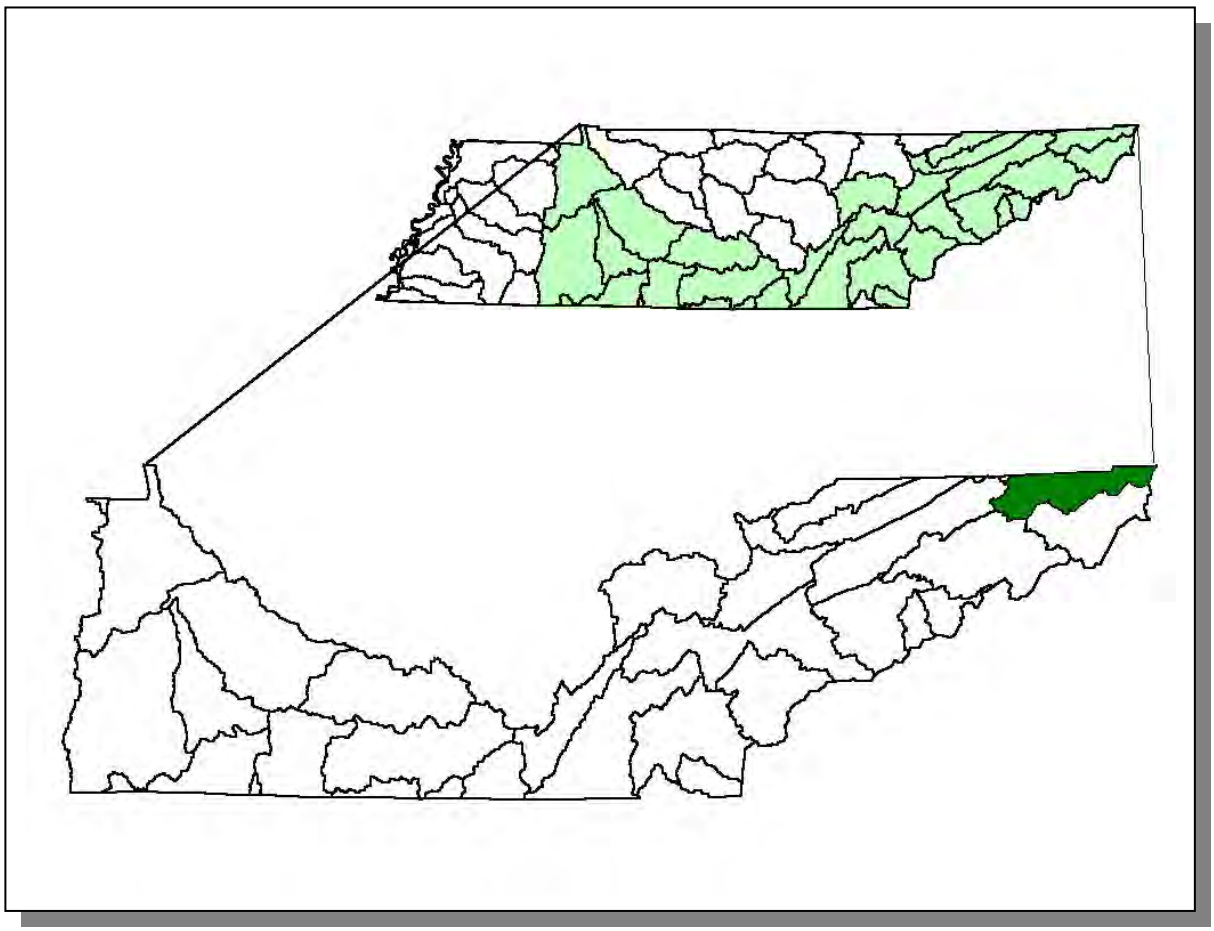


Figure 2-3. The South Fork Holston River Watershed is Part of the Tennessee River Basin.

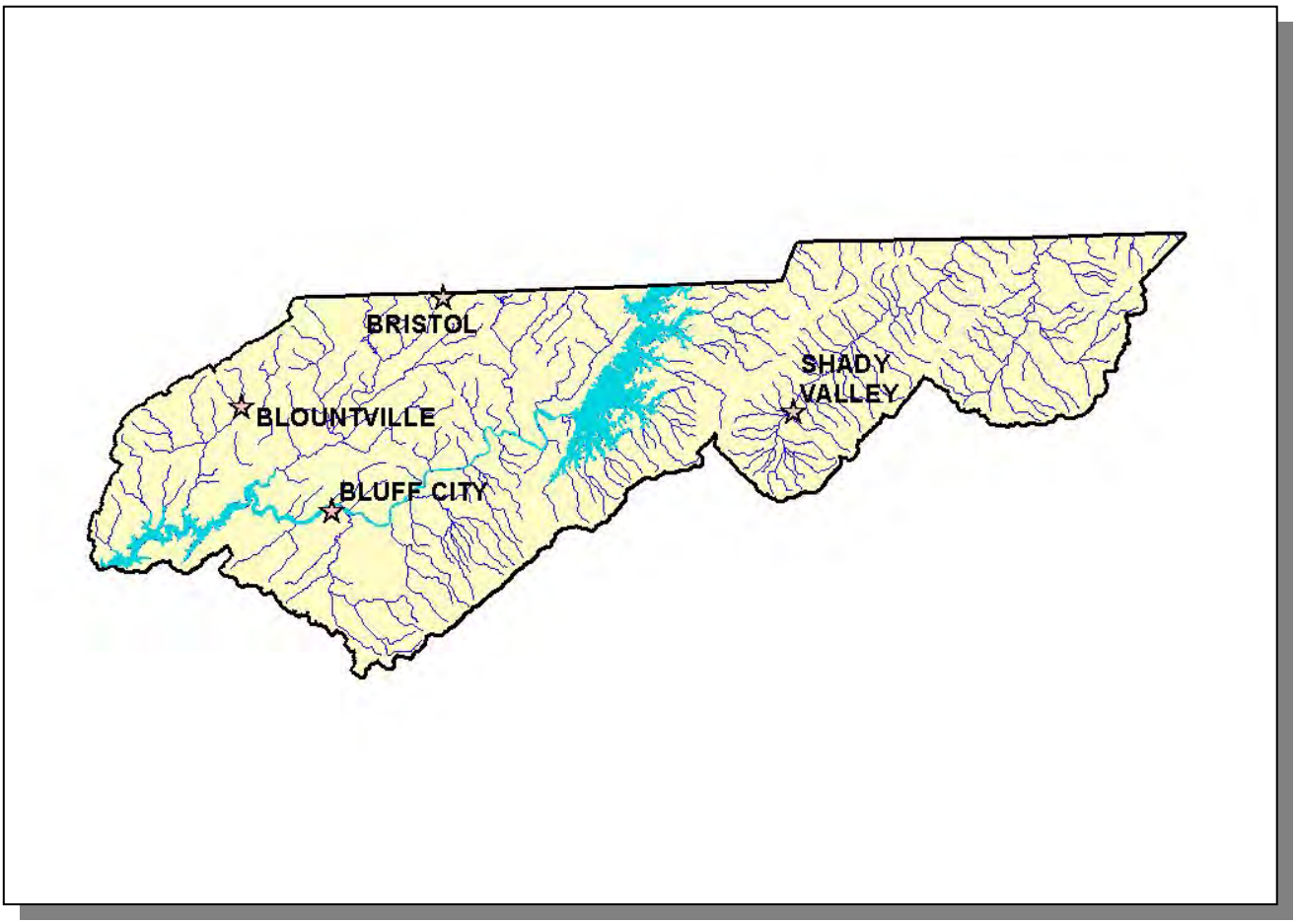


Figure 2-4. Hydrology in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *There are 1,880 stream miles recorded in River Reach File 3 in the South Fork Holston River Watershed (838 miles in the Tennessee portion and 542 in the Group 2 portion of the Tennessee portion), and 12,884 lake acres in the Tennessee portion of the South Fork Holston River Watershed (11,977 lake acres in the Group 2 portion). Location of the South Fork Holston River and impoundments, and the locations of Blountville, Bluff City, Bristol, and Shady Valley are shown for reference.*

2.3.B. Dams. There are 4 dams inventoried by TDEC Division of Water Supply in the Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

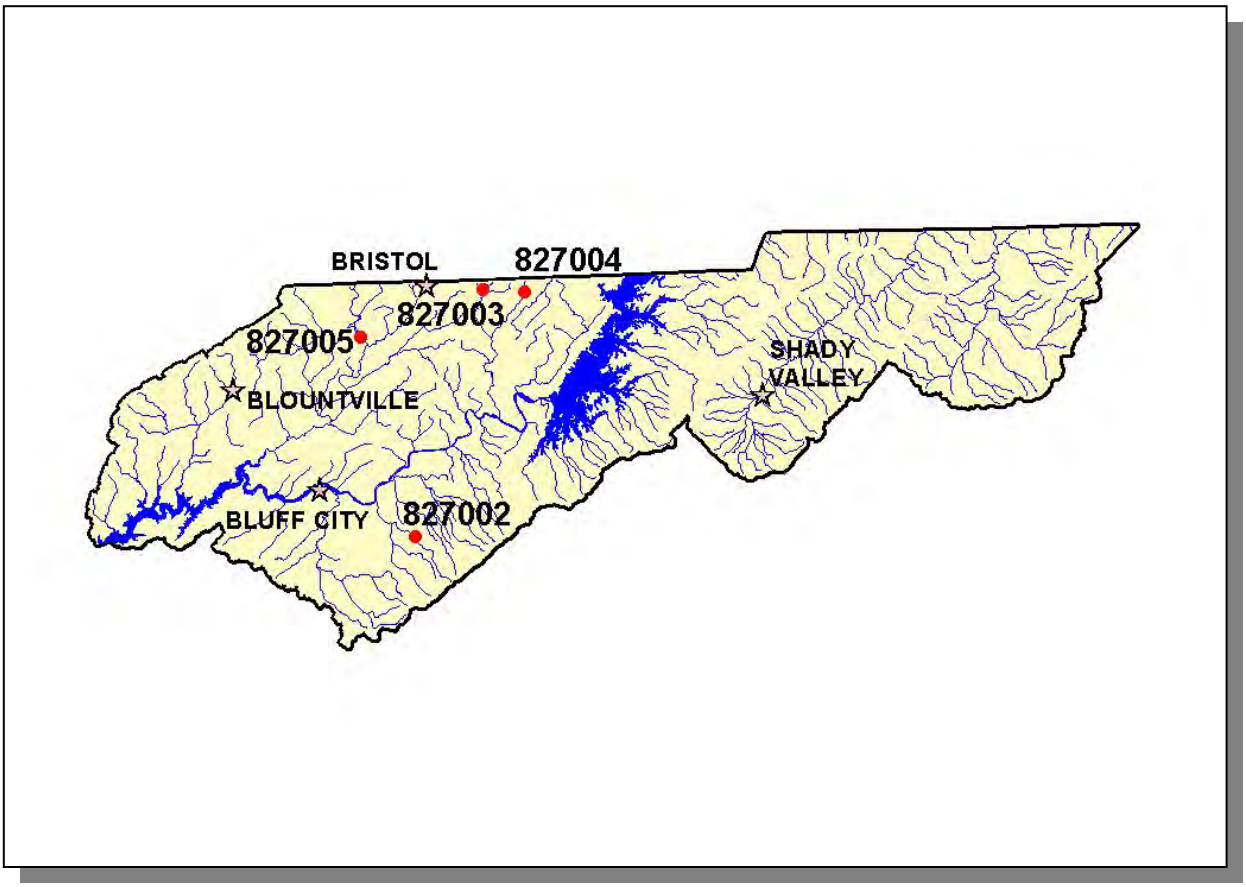


Figure 2-5. Location of Inventoried Dams in the Group 2 portion of the Tennessee Portion of the South Fork Holston River Watershed. *Locations of Blountville, Bluff City, Bristol, and Shady Valley are shown for reference. More information is provided in SF Holston-Appendix II and on the TDEC homepage at: http://gwidc.gwi.memphis.edu/website/dams/viewer.htm*

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

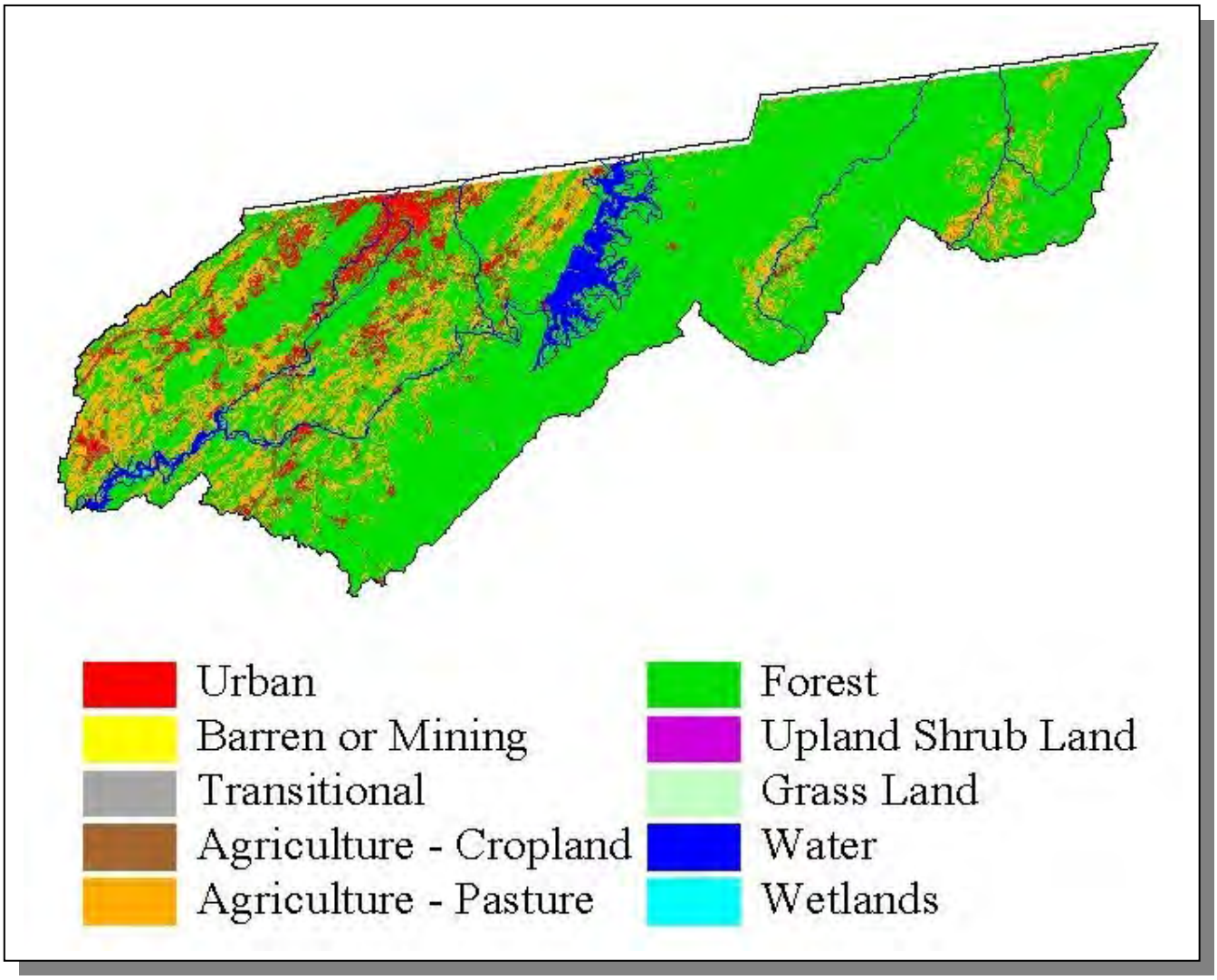


Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

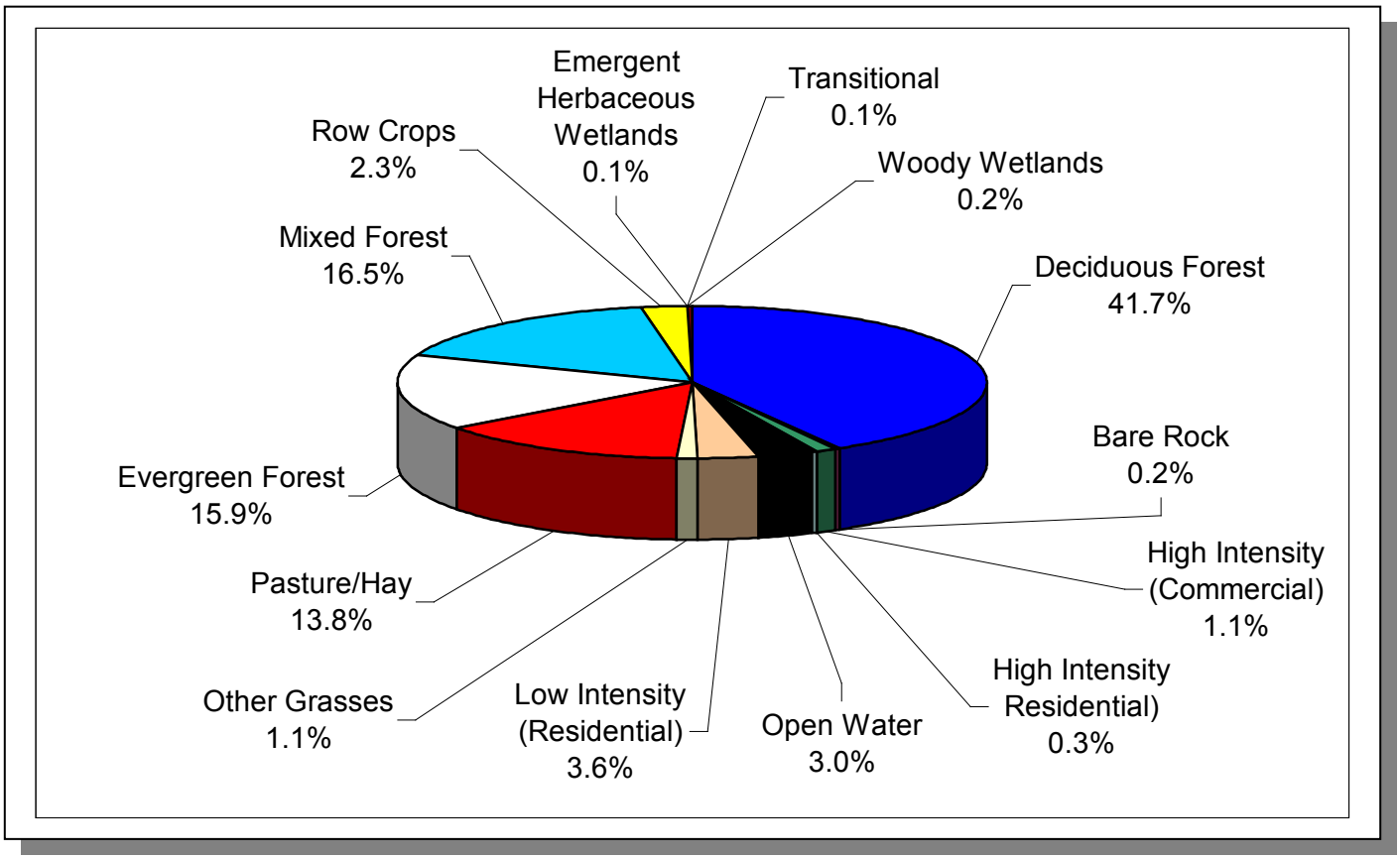


Figure 2-7. Land Use Distribution in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *More information is provided in SF Holston-Appendix II.*

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

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains and Ridge and Valley) and contains 6 Level IV subecoregions (Griffen, Omernik, Azavedo):

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

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

- The Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f) form a heterogeneous region composed predominantly of limestone and cherty dolomite. Landforms are mostly low rolling ridges and valleys, and the soils vary in their productivity. Landcover includes intensive agriculture, urban and industrial, or areas of thick forest. White oak forests, bottomland oak forests,

and sycamore-ash-elm riparian forests are the common forest types, and grassland barrens intermixed with cedar-pine glades also occur here.

- The Southern Shale Valleys (67g) consist of lowlands, rolling valleys, and slopes and hilly areas that are dominated by shale materials. The northern areas are associated with Ordovician-age calcareous shale, and the well-drained soils are often slightly acid to neutral. In the south, the shale valleys are associated with Cambrian-age shales that contain some narrow bands of limestone, but the soiils tend to be strongly acid. Small farms and rural residences subdivide the land. The steeper slopes are used for pasture of 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.

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

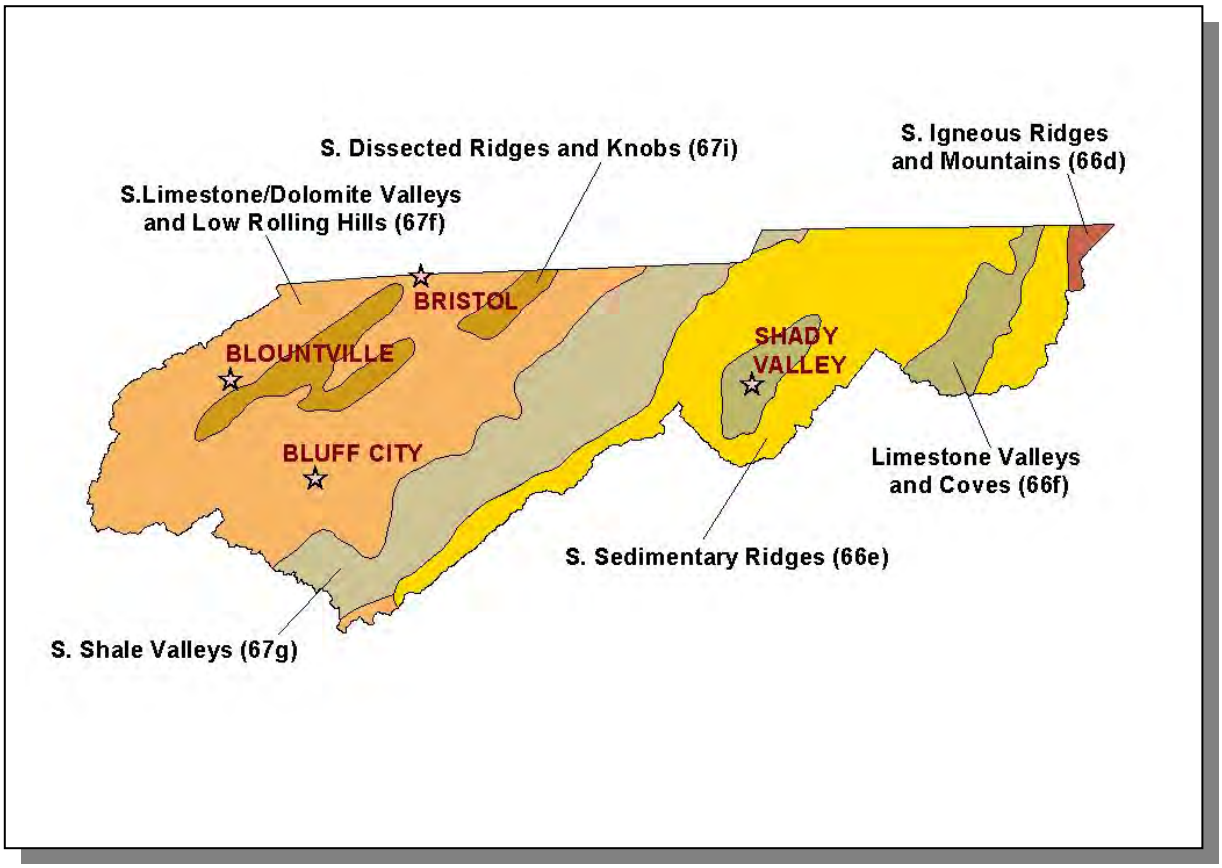


Figure 2-8. Level IV Ecoregions in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Locations of Blountville, Bluff City, Bristol, and Shady Valley are shown for reference.*

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

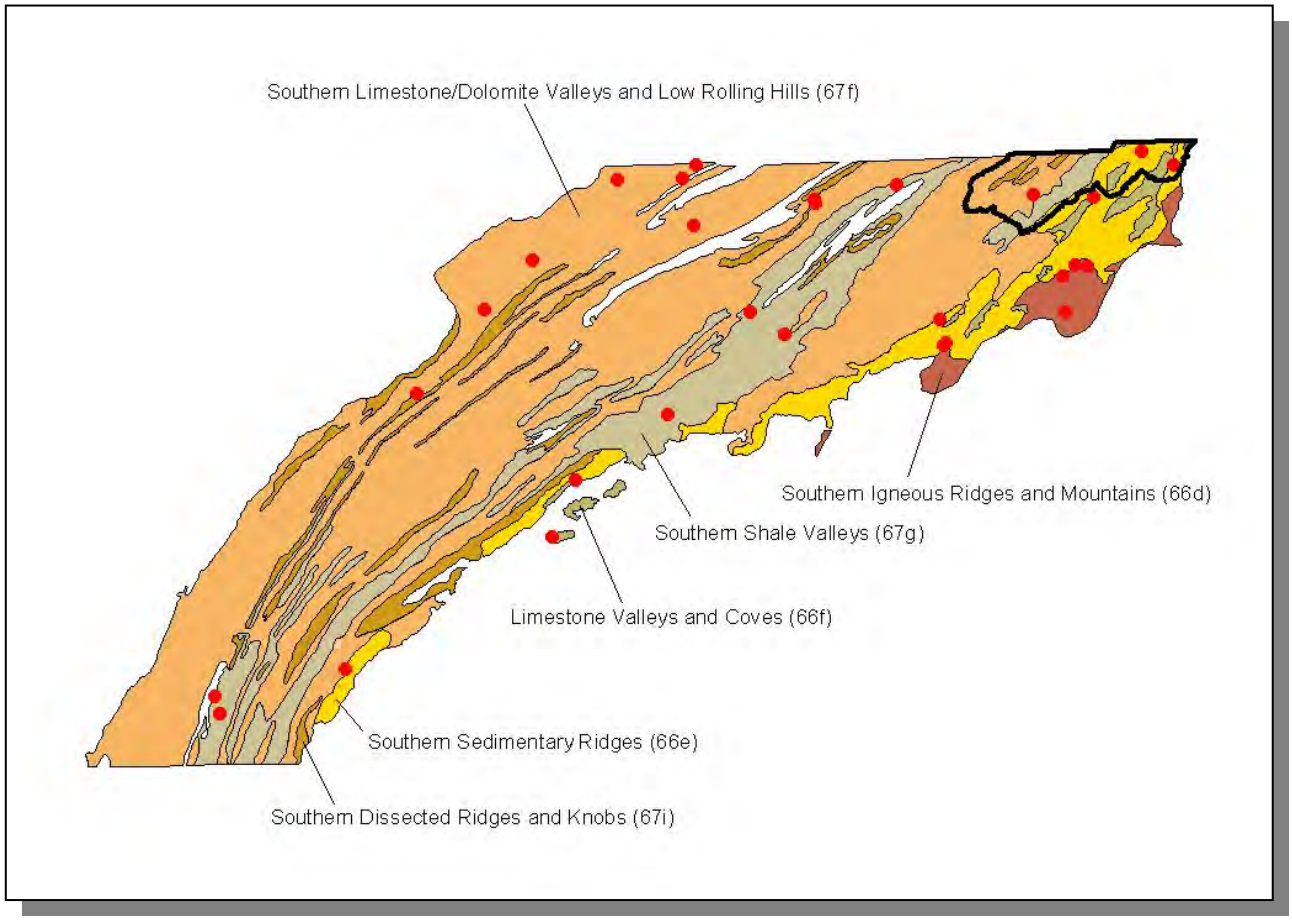


Figure 2-9. Ecoregion Monitoring Sites in the Blue Ridge Mountains (66) and Ridge and Valley (67) Ecoregions. *More information is provided in SF Holston-Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Designated State Natural Areas. The Natural Areas Program was established in 1971 with the passage of the Natural Areas Preservation Act. The Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed has one Designated State Natural Area:

Morril's Cave, 30 acres of land that includes an undisturbed cave with formations and 8-10 miles of passages.

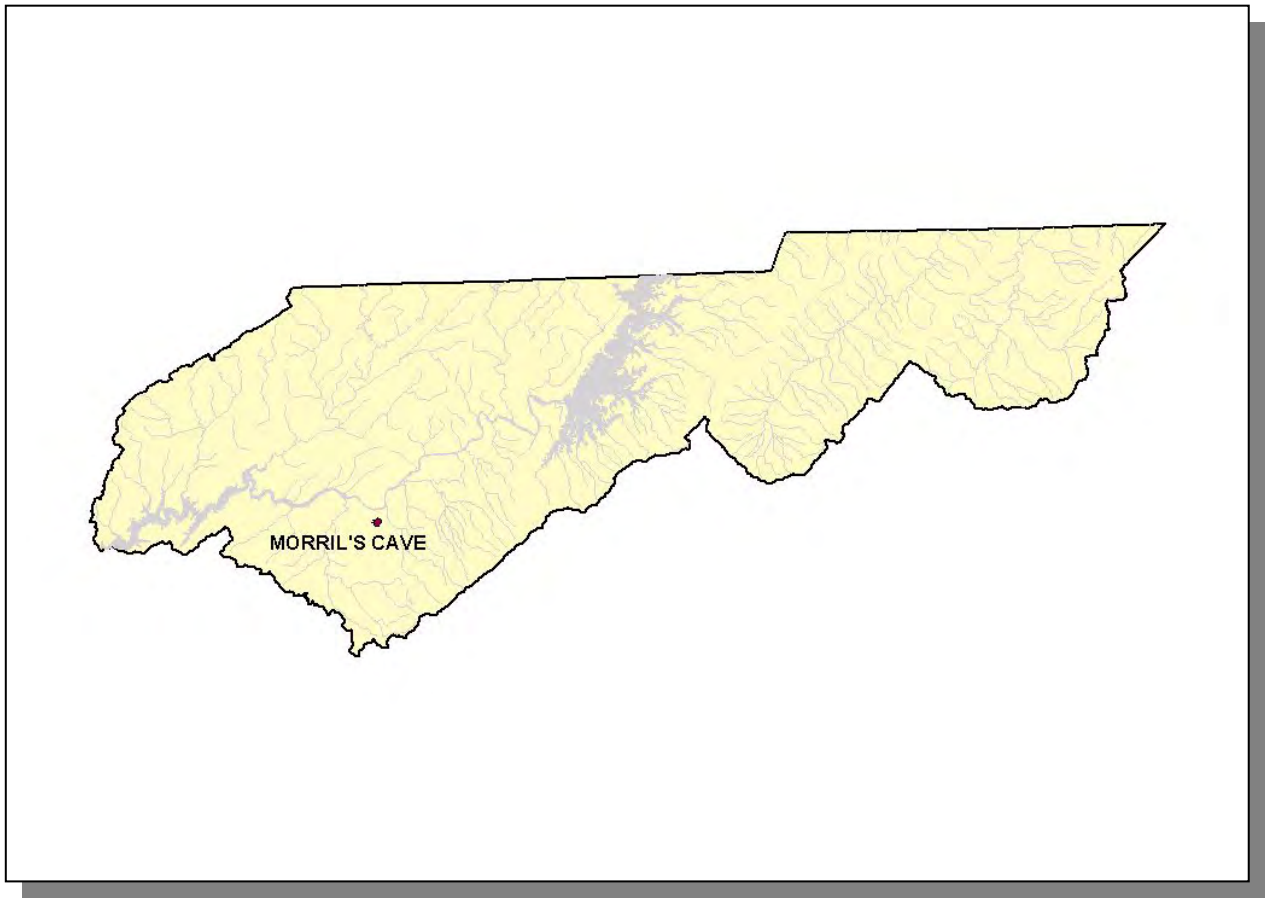


Figure 2-10. There is One Designated State Natural Area in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed.

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

GROUPING	NUMBER OF RARE SPECIES
Crustaceans	0
Insects	1
Mussels	3
Snails	2
Amphibians	0
Birds	6
Fish	4
Mammals	4
Reptiles	1
Plants	59
Total	**80**

Table 2-3. There are 80 Rare Plant and Animal Species in the Tennessee Portion of the South Fork Holston River Watershed.

In the Tennessee Portion of the South Fork Holston River Watershed, there are four rare fish species, three rare mussel species, and two rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Cyprinella monacha	Spotfin chub	LT	T
Etheostoma percnurum	Duskytail darter	LE	E
Percina burtoni	Blotchside darter	MC	D
Percina macrocephala	Longhead darter		T
Epioblasma florentina walkeri	Tan riffleshell	LE	E
Pegias fabula	Little-wing pearlymussel	LE	E
Quadrula intermedia	Cumberland monkeyface	LE	E
Helicodiscus notius specus	A Landsnail		
Io fluvialis	Spiny riversnail		

Table 2-4. Rare Aquatic Species in the Tennessee Portion of the South Fork Holston 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 the U.S. Fish and Wildlife Service. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; D, Deemed in Need of Management by the Tennessee Wildlife Resources Agency, T, Listed Threatened by the Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/nh/tnanimal.html.*

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

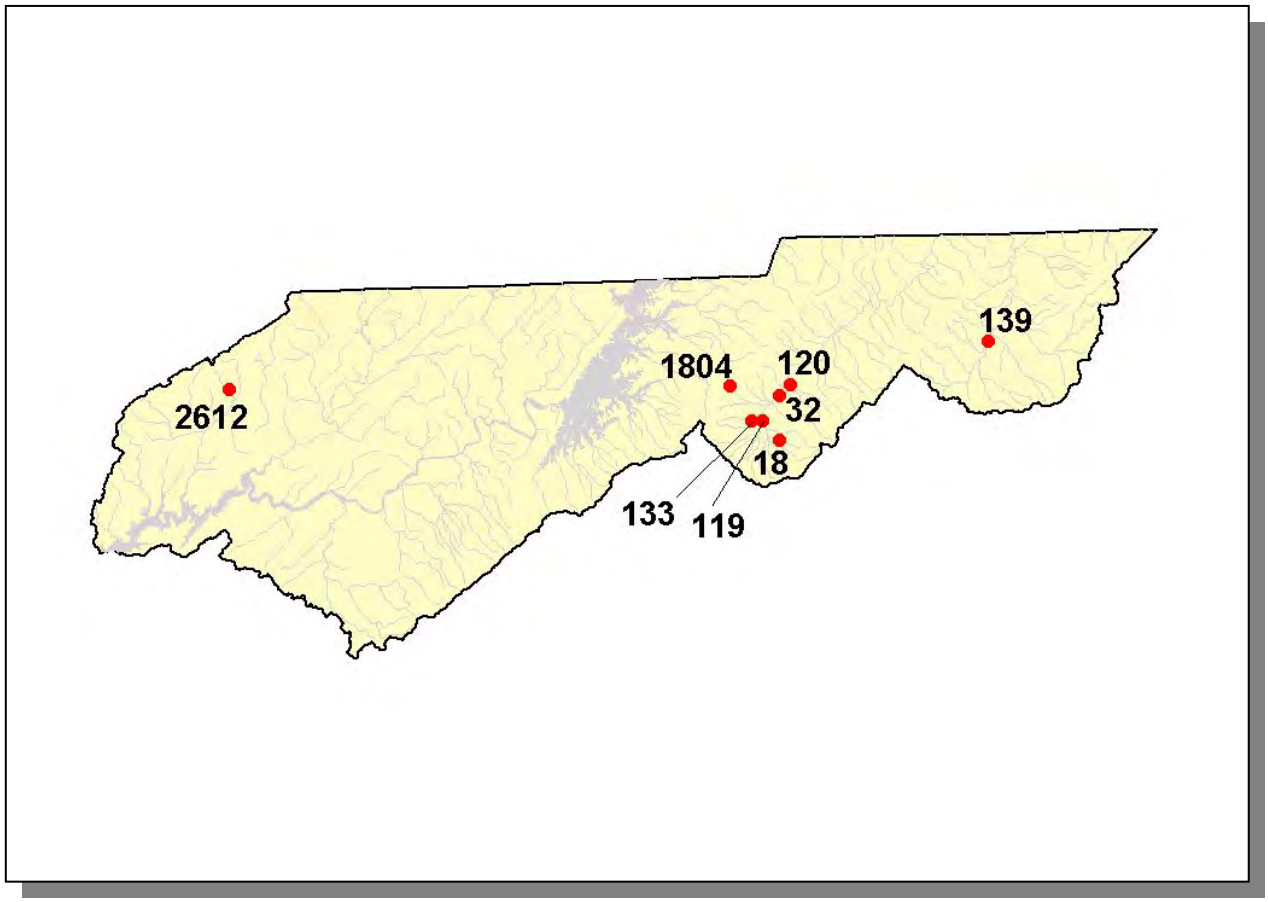


Figure 2-11. Location of Wetland Sites in TDEC Division of Natural Heritage Database in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands in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

2.7. CULTURAL RESOURCES.

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

- Appalachian Caverns, giant chambers and formations in Blountville
- America's First Frontier Heritage Tourism Area, a historic district that includes the home of President Andrew Johnson
- Little Oak Recreation Area, part of Cherokee National Forests, with trails near South Holston Lake.
- Warrior's Path State Park, located on Patrick Henry Reservoir

In addition, many local interpretive areas are common, most notably, Steele Creek Park and Nature Center in Bristol.

2.7.B. Wildlife Management Area. The Cherokee National Forest is jointly managed by the Tennessee Wildlife Resources Agency and the U.S. Forest Service. At 630,000 acres, it is the largest tract of public land in the state.

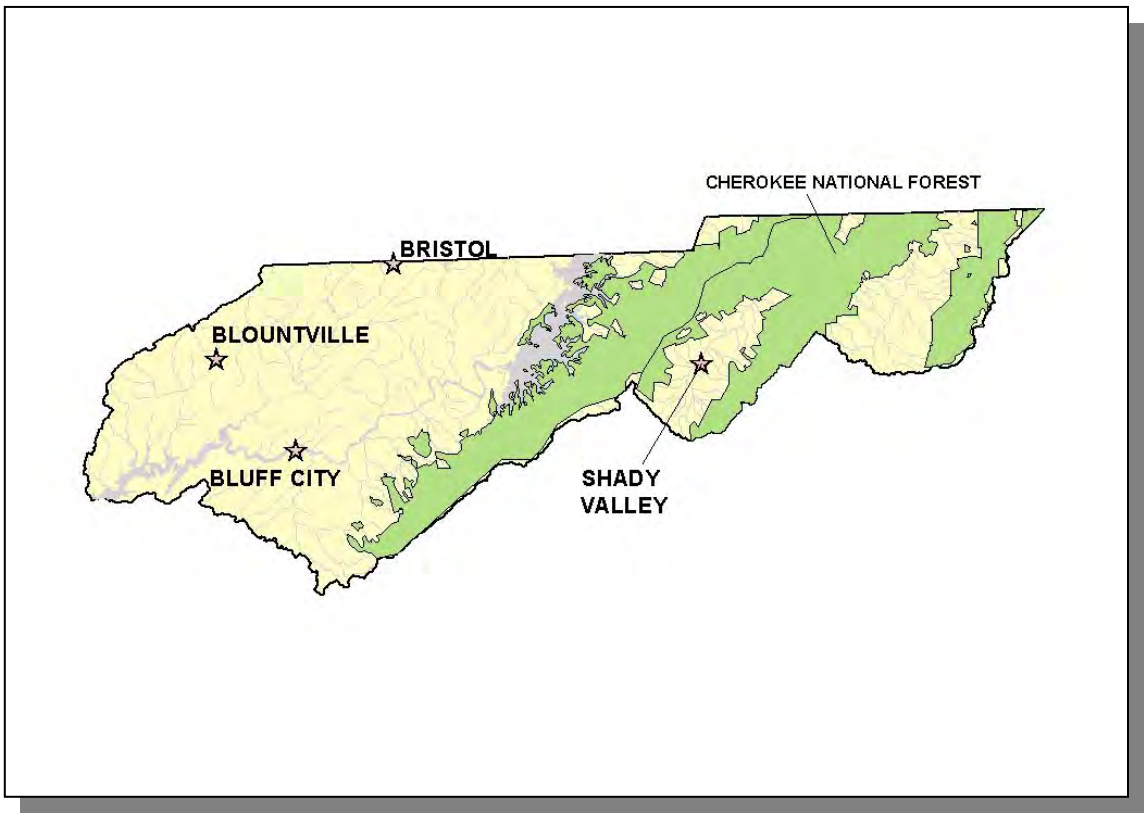


Figure 2-12. TWRA Manages Cherokee National Forest in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Locations of Blountville, Bluff City, Bristol, and Shady Valley are shown for reference.*

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
Baker Creek	4				Morrell Creek	3		
Beaver Creek	3				Muddy Creek	3		
Beaverdam Creek	1		1		Nicely Branch SF Holston River			1
Indian Creek	3				South Fork Holston River	3,4	2	
Laural Creek	2		1		Steele Creek	4		

Table 2-5. Stream Scoring from the Tennessee Rivers Assessment Project.

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

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

CHAPTER 3

WATER QUALITY ASSESSMENT OF THE SOUTH FORK HOLSTON RIVER WATERSHED.

3.1 Background

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

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

3.4 Fluvial Geomorphology

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, following one to two years of data collection. More information about the Watershed Approach may be found in Chapter 1 and at http://www.state.tn.us/environment/wpc/watershed/.

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

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

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

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

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

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

4. Highlight areas of improved water quality

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

The 303(d) list is a compilation of the waters of Tennessee that are water quality limited and fail to support some or all of their classified uses. Water quality limited streams are those that have one or more properties that violate water quality standards. Therefore, the water body is considered to be impacted by pollution and is not fully meeting its designated uses. The 303(d) list does not include streams determined to be fully supporting designated uses as well as streams the Division of Water Pollution Control cannot assess due to lack of water quality information. Also absent are streams where a control strategy is already in the process of being implemented.

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

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

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

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

This chapter provides a summary of water quality in the Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed, summarizes data collection and assessment results, and describes impaired waters.

3.2. DATA COLLECTION. Comprehensive water quality monitoring in the Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed was conducted in 1999. Data were collected from 69 siites and are from one of four types of sites: 1)Ambient sites, 2)Ecoregion sites or 3)Watershed sites.

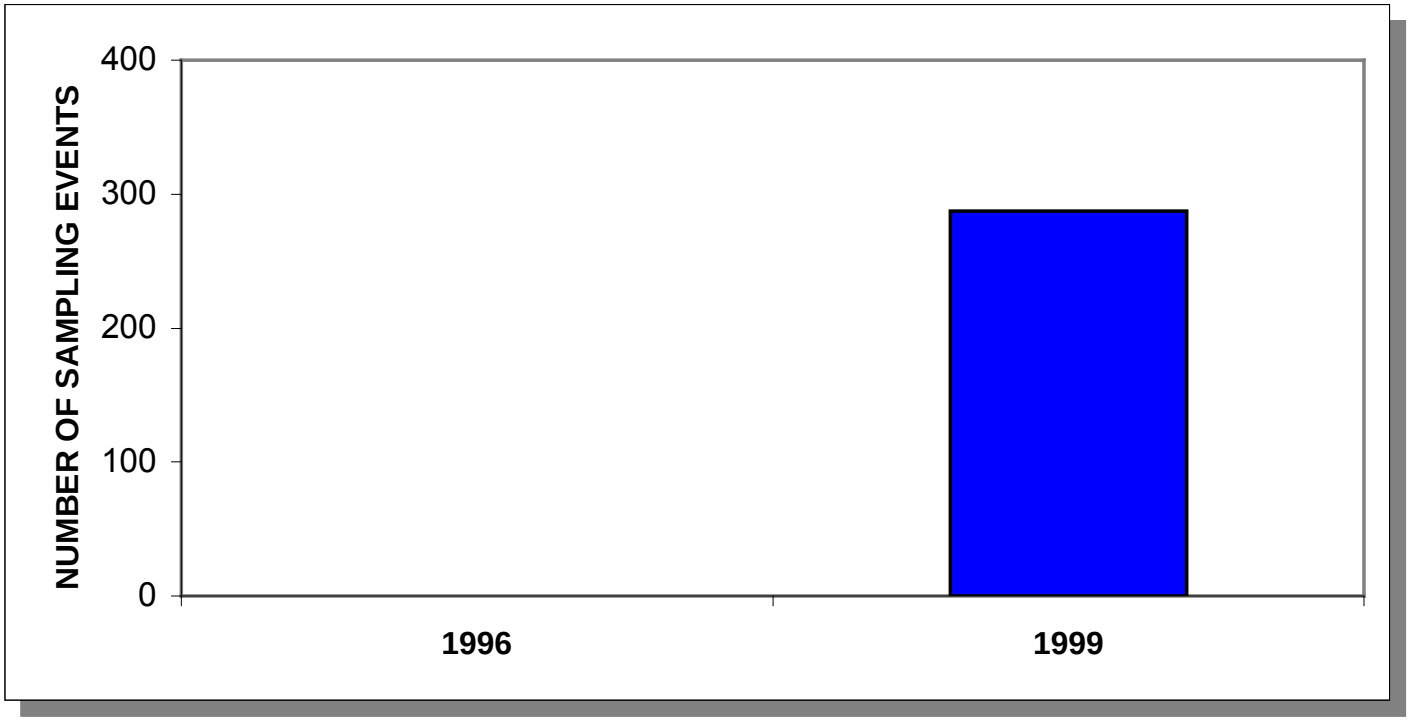


Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (1999) in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed.

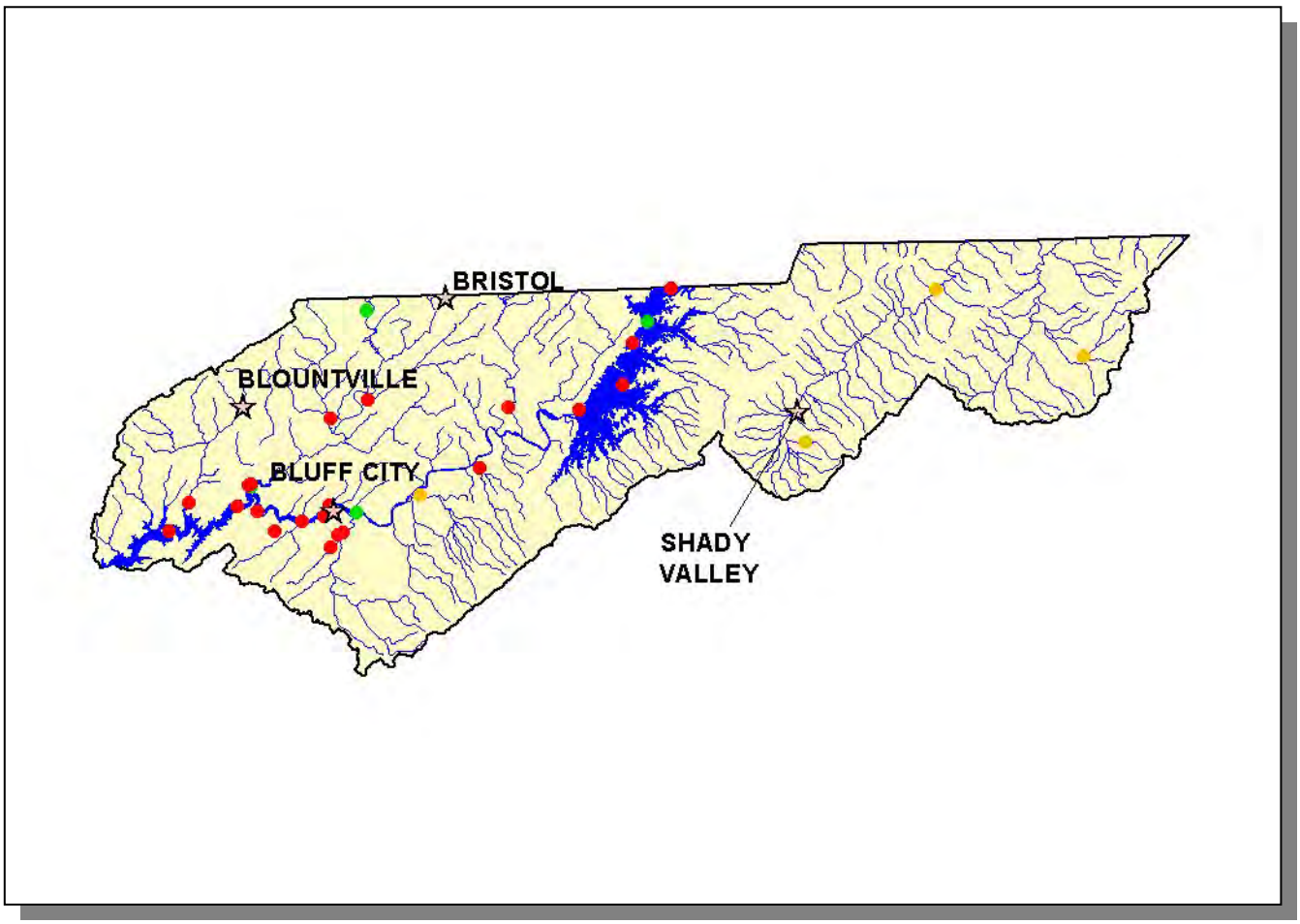


Figure 3-2. Location of Monitoring Sites in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Red, Watershed Monitoring Sites; Green, Ambient Monitoring Sites, Orange, Ecoregion Monitoring Sites. Locations of Blountville, Bluff City, Bristol, and Shady Valley are shown for reference.*

TYPE	NUMBER	TOTAL NUMBER OF SAMPLING EVENTS		
		CHEMICAL ONLY	BIOLOGICAL ONLY	BIOLOGICAL PLUS CHEMICAL (FIELD PARAMETERS)
Ambient	8	32		12
Ecoregion	8	6		19
Watershed	42	218		
Totals	**58**	**256**		**31**

Table 3-1. Monitoring Sites in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed During the Data Collection Phase of the Watershed Approach.

In addition to the 287 sampling events, there were 127 citizen complaints investigated since 1997.

3.2.A. Ambient Monitoring Sites. These fixed-station chemical monitoring sites are sampled quarterly or monthly by the Environmental Assistance Center-Johnson City 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 South Fork Holston River Watershed are provided in SF Holston-Appendix IV.

Data from ambient monitoring stations are entered into the STORET (Storage and Retrieval) system administered by EPA. Some ambient monitoring stations are scheduled to be monitored as watershed sampling sites.

3.2.B. Ecoregion Sites. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plants and animals. The delineation phase of the Tennessee Ecoregion Project was completed in 1997 when the ecoregions and subecoregions were mapped and summarized (EPA/600/R-97/022). There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee (see Chapter 2 for more details). The Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains and Ridge and Valley) and contains 6 subecoregions (Level IV):

- Southern Igneous Ridges and Mountains (66d)
- Southern Sedimentary Ridges (66e)
- Limestone Valleys and Coves (66f)
- Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)
- Southern Shale Valeys (67g)
- 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 as Watershed sampling sites.

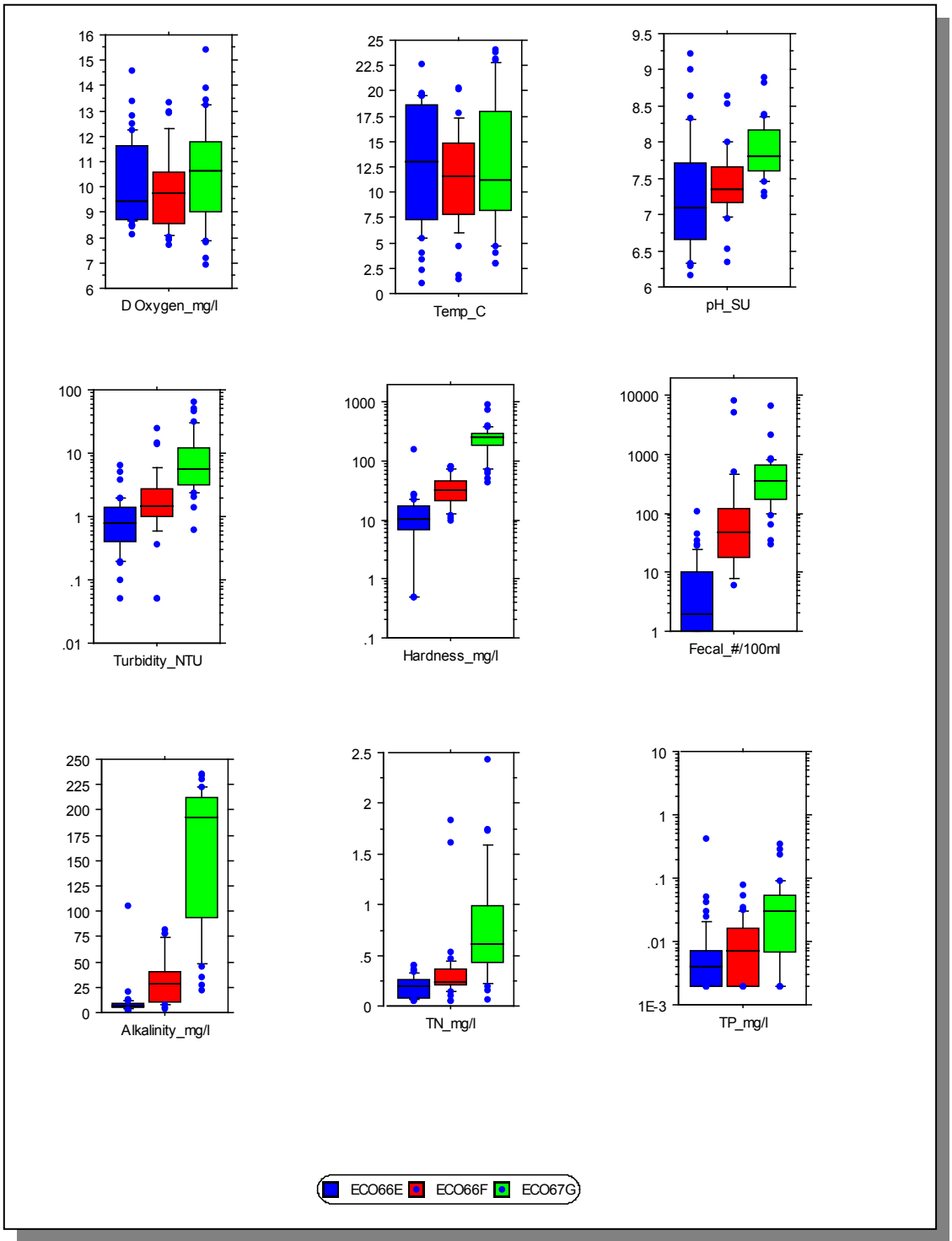


Figure 3-3. Select Chemical Data Collected in Group 2 Portion of Tennessee Portion of South Fork Holston River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots.* Fecal, fecal coliform bacteria; TN, Total Nitrogen; TP, Total Phosphorus.

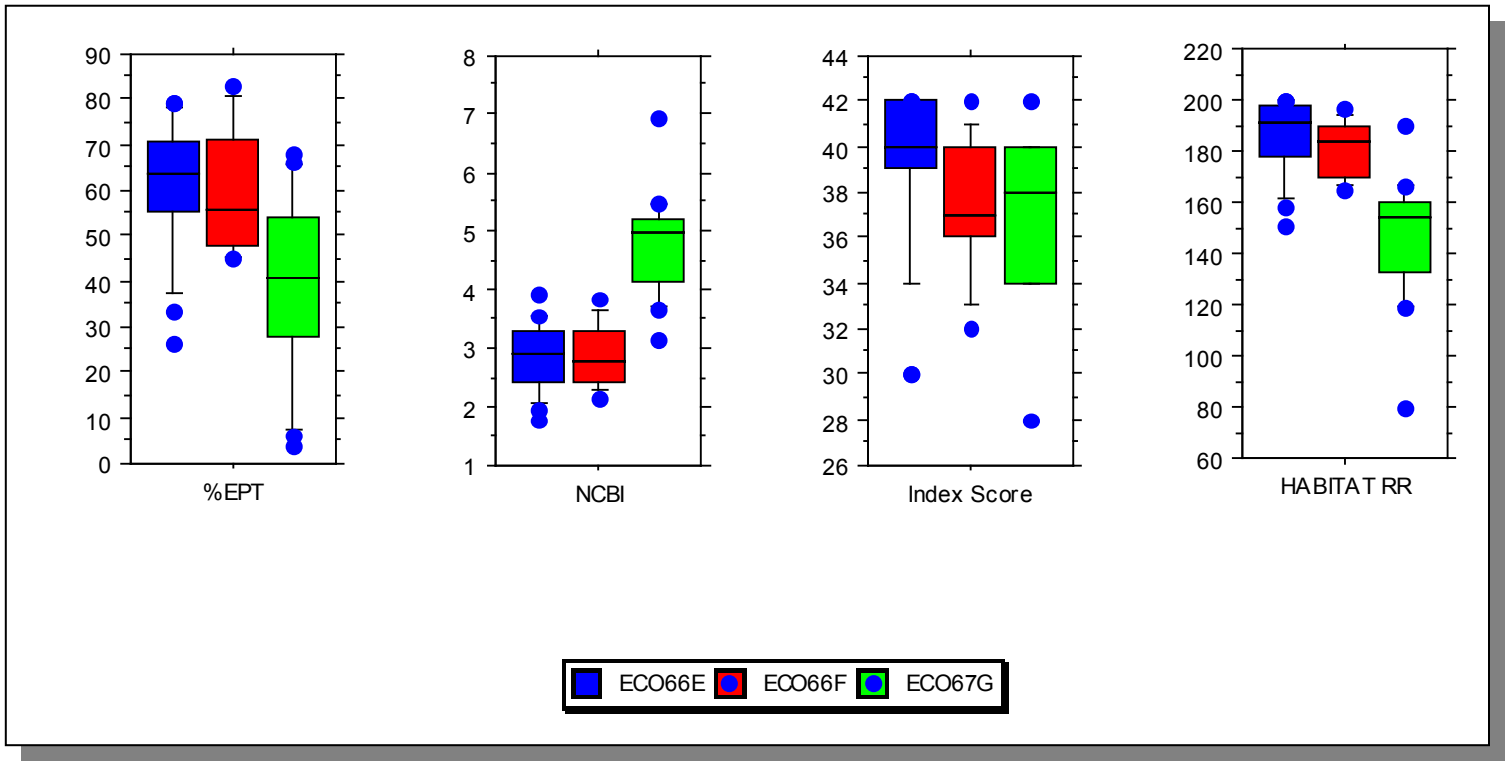


Figure 3-4. Benthic Macroinvertebrate and Habitat Scores for Group 2 Portion of Tennessee Portion of South Fork Holston River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. NCBI, North Carolina Biotic Index. Index Score, Habitat Riffle/Run, and Habitat Glide/Pool scoring system are described in TDEC's Quality System Standard Operating Procedure for Macroinvertebrate Surveys (2002).*

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

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

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

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

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

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

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

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

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

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

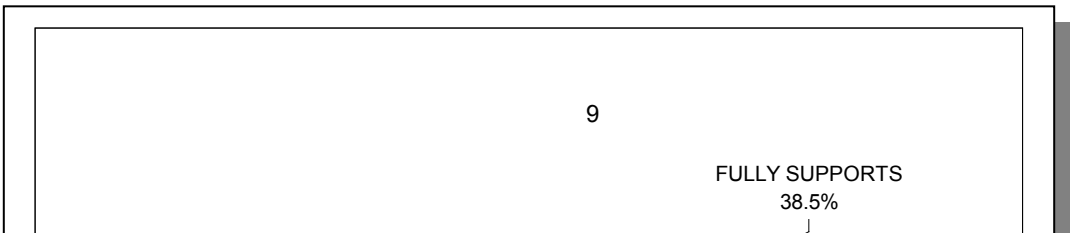


Figure 3-5a. Water Quality Assessment for Streams and Rivers in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. More information is provided in SF Holston-Appendix III.*

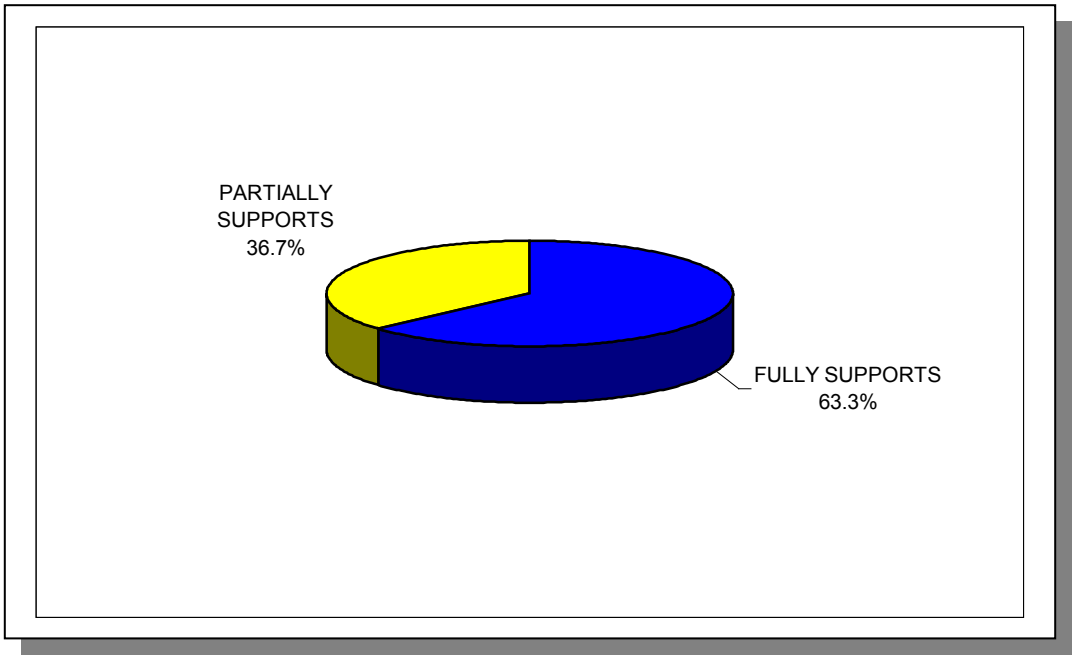


Figure 3-5b. Water Quality Assessment for Lakes in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. More information is provided in SF Holston-Appendix III.*

3.3.A. Assessment Summary.

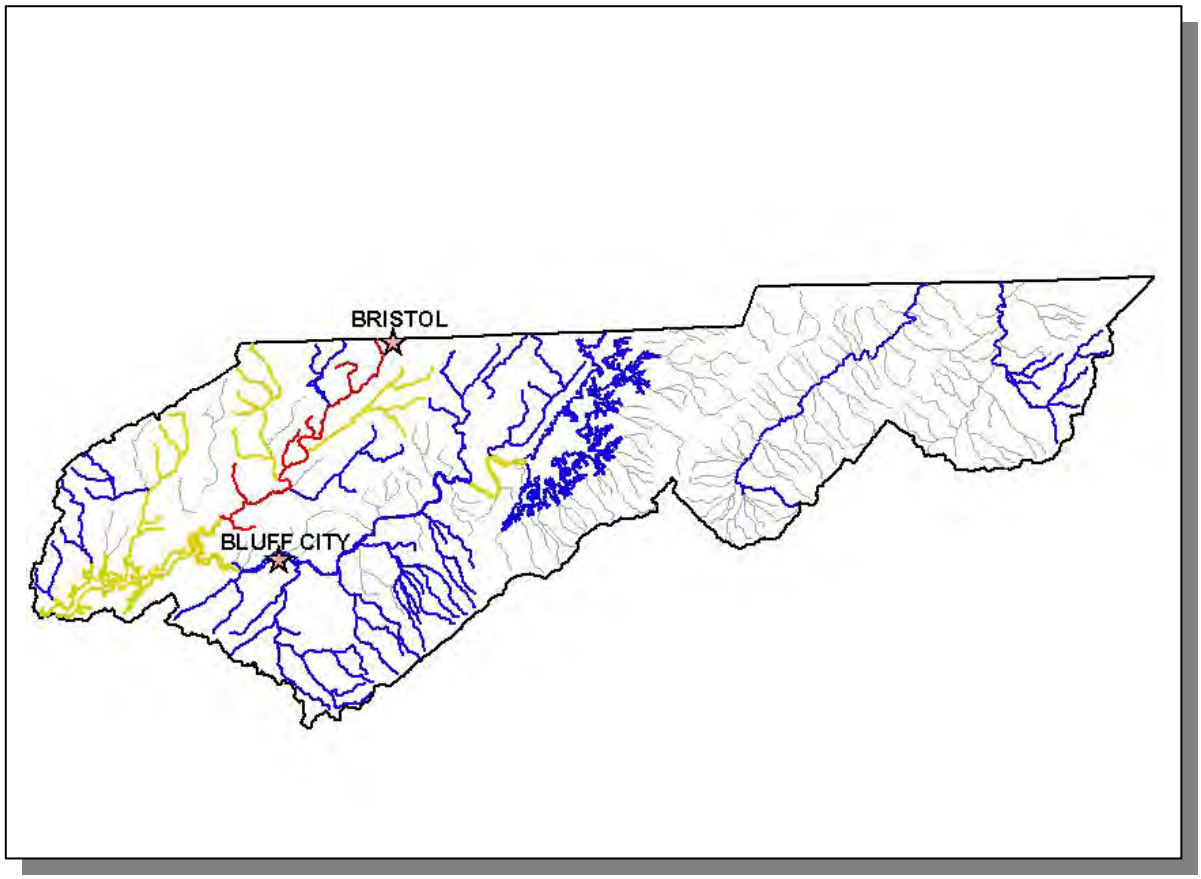


Figure 3-6a. Overall Use Support Attainment in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

Figure 3-6b. Fish and Aquatic Life Use Support Attainment in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

Figure 3-6c. Recreation Use Support Attainment in the Tennessee Potion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

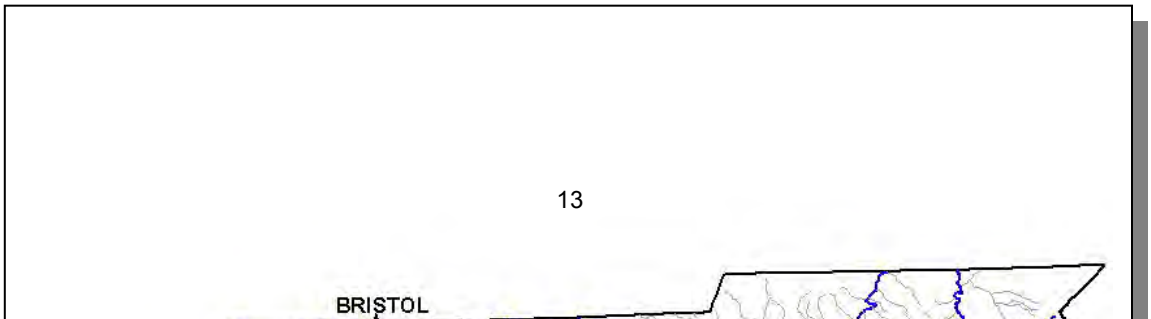


Figure 3-6d. Irrigation Use Support Attainment in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

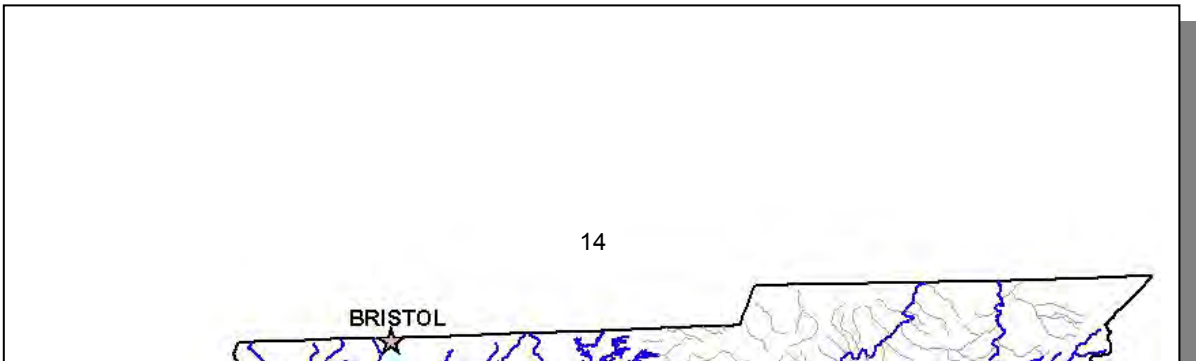


Figure 3-6e. Livestock Watering and Wildlife Use Support Attainment in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

3.3.B. Use Impairment Summary.

Figure 3-7a. Impaired Streams Due to Habitat Alteration in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment.; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

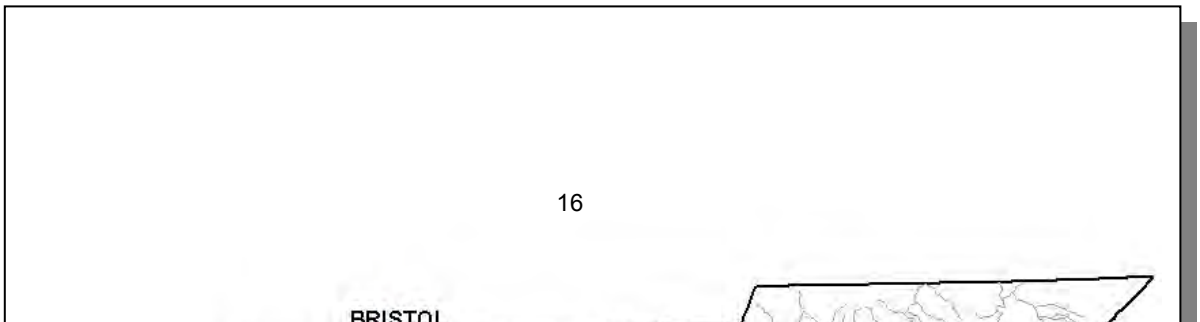


Figure 3-7b. Impaired Streams Due to Nutrients in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

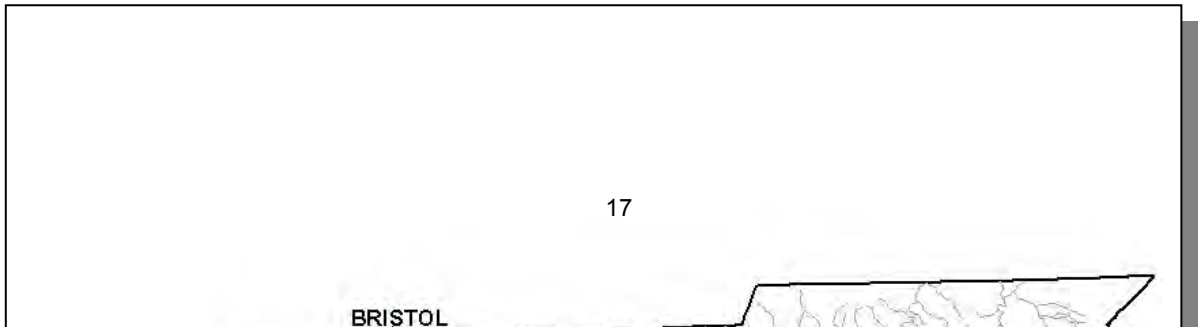


Figure 3-7c. Impaired Streams Due to Pathogens in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

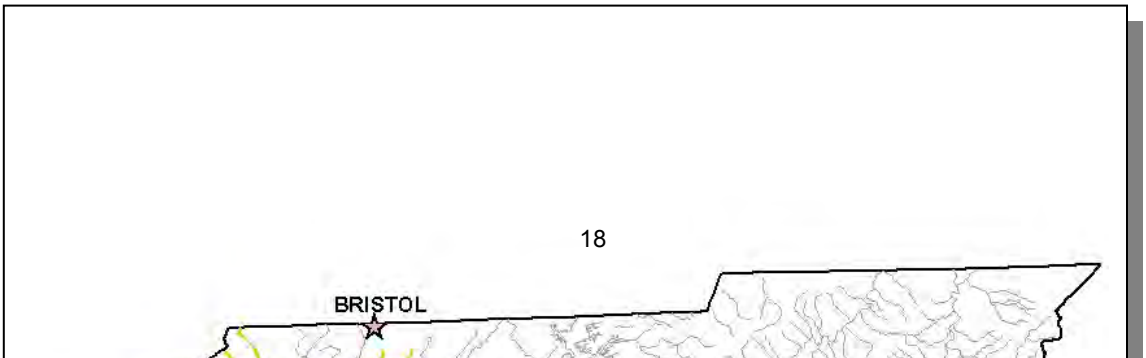


Figure 3-7d. Impaired Streams Due to Siltation in the Group 2 portion of the Tennessee Portion of the South Fork Holston River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use. Bluff City and Bristol are shown for reference. More information is provided in SF Holston-Appendix III.*

The listing of impaired waters that do not support designated uses (the 303(d) list) is traditionally submitted to EPA every two years. A copy of the most recent 303(d) list may be downloaded from: http://www.state.tn.us/environment/water.htm

In the year 2002 and beyond, the 303(d) list will be compiled by using EPA's ADB (Assessment Database) software developed by RTI (Research Triangle Institute). The ADB allows for a more detailed segmentation of waterbodies. While this results in a more accurate description of the status of water quality, it makes it difficult when comparing water quality assessments with and without using this tool. A more meaningful comparison will be between assessments conducted in Year 3 of each succeeding five-year cycle.

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

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

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

There are several benefits to using regional curves:

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

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

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE SOUTH FORK HOLSTON RIVER WATERSHED

4.1. Background.

4.2. Characterization of HUC-10 Subwatersheds
4.2.A. 0601010201 (Big Laurel Creek)
4.2.B. 0601010203 (South Fork Holston River)
4.2.C. 0601010204 (South Fork Holston River)
4.2.D. 0601010205 (Beaver Creek)

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

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

The South Fork Holston River Watershed (HUC 06010102) has been delineated into four HUC 10-digit subwatersheds.

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

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

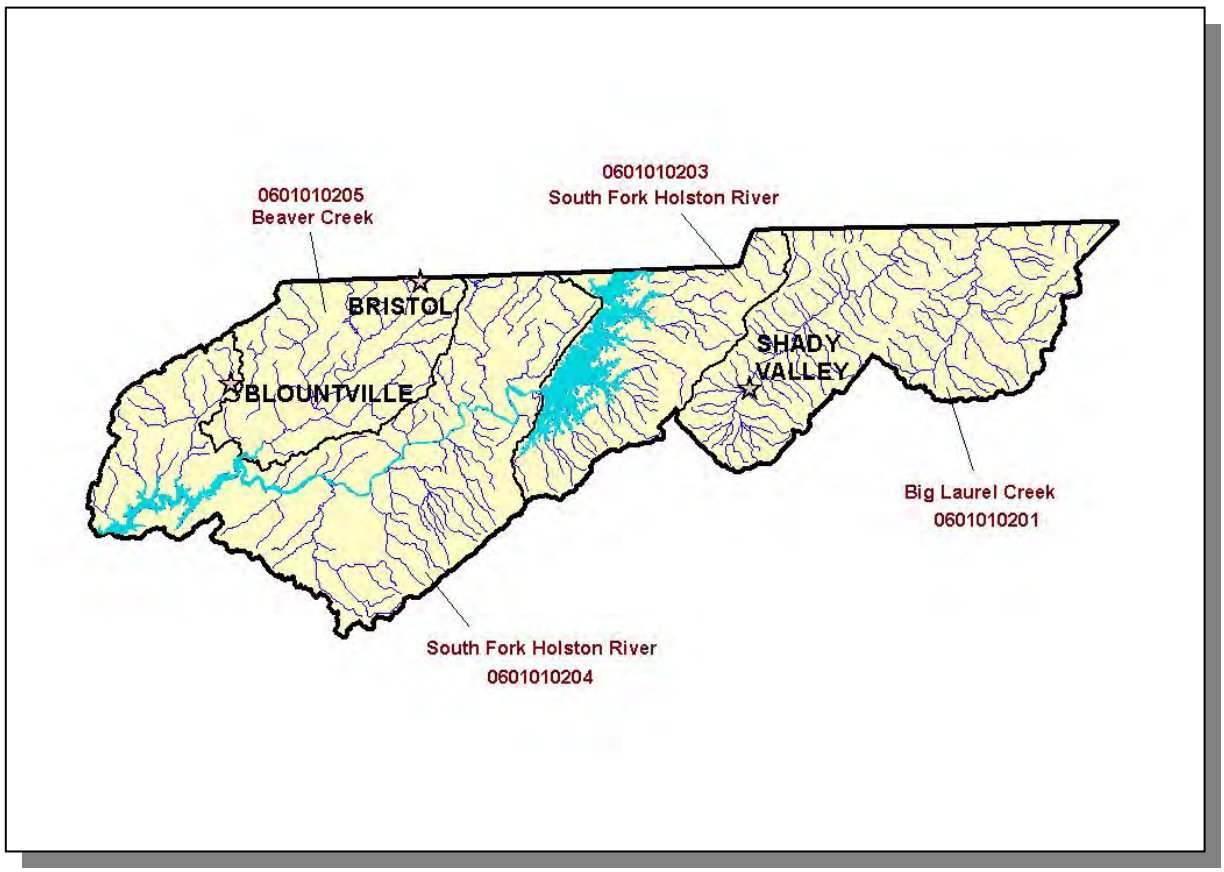


Figure 4-1. The Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed is Composed of Four USGS-Delineated Subwatersheds (10-Digit Subwatersheds). *Locations of Blountville, Bristol, and Shady Valley are shown for reference.*

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 Group 2 portion of the Tennessee portion of the South Fork Holston River Watershed.

HUC-10	HUC-12
0601010201	060101020103 (Upper Big Laurel Creek)
	060101020104 (Laurel Creek)
	060101020105 (Beaverdam Creek)
	060101020106 (Lower Big Laurel Creek)
0601010203	060101020302 (South Holston lake)
	060101020303 (South Fork Holston River)
0601010204	060101020401 (South Fork Holston River)
	060101020402 (South Fork Holson River)
	060101020403 (Boone Lake)
0601010205	060101020501 (Upper Beaver Creek)
	060101020502 (Lower Beaver 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. 0601010201.

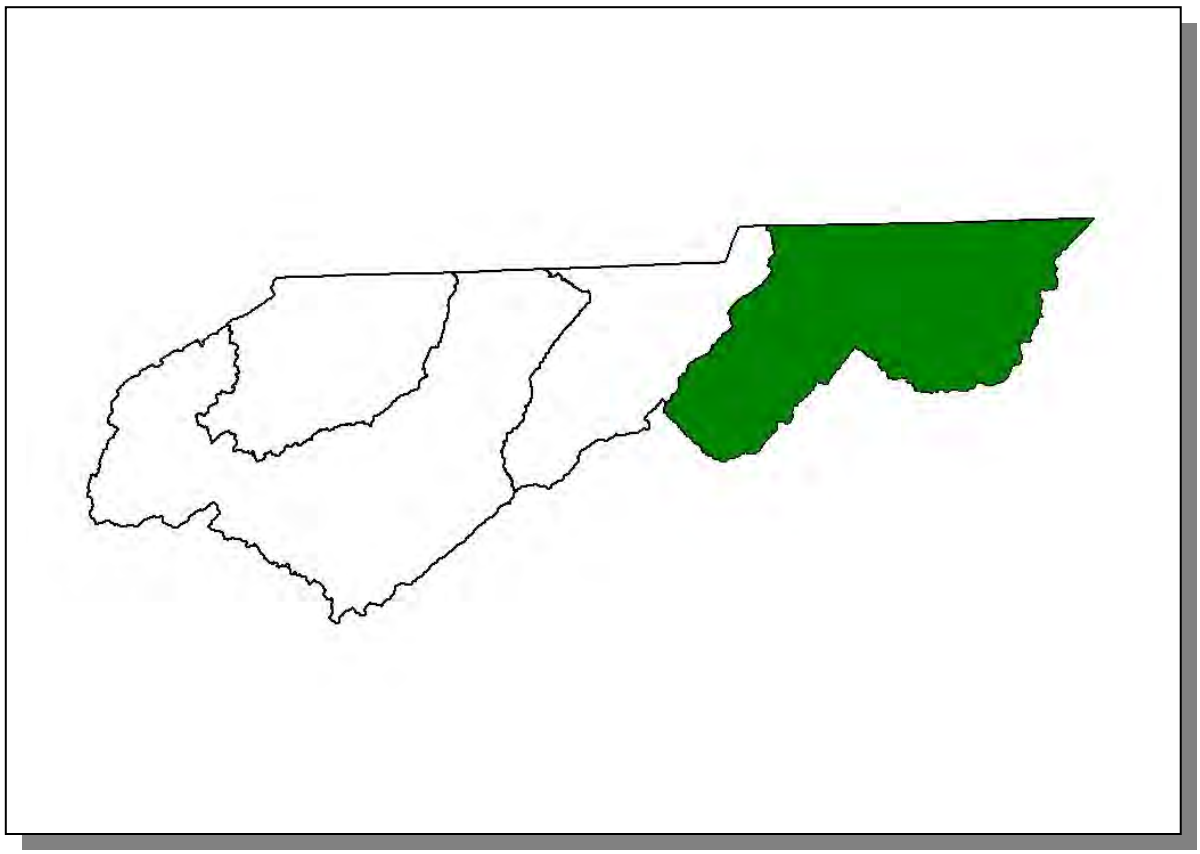


Figure 4-2. Location of Subwatershed 0601010201. *The Group 2 portion of the Tennessee portion of the South Fork Holston HUC-10 subwatershed boundaries are shown for reference.*

4.2.A.i. General Description.

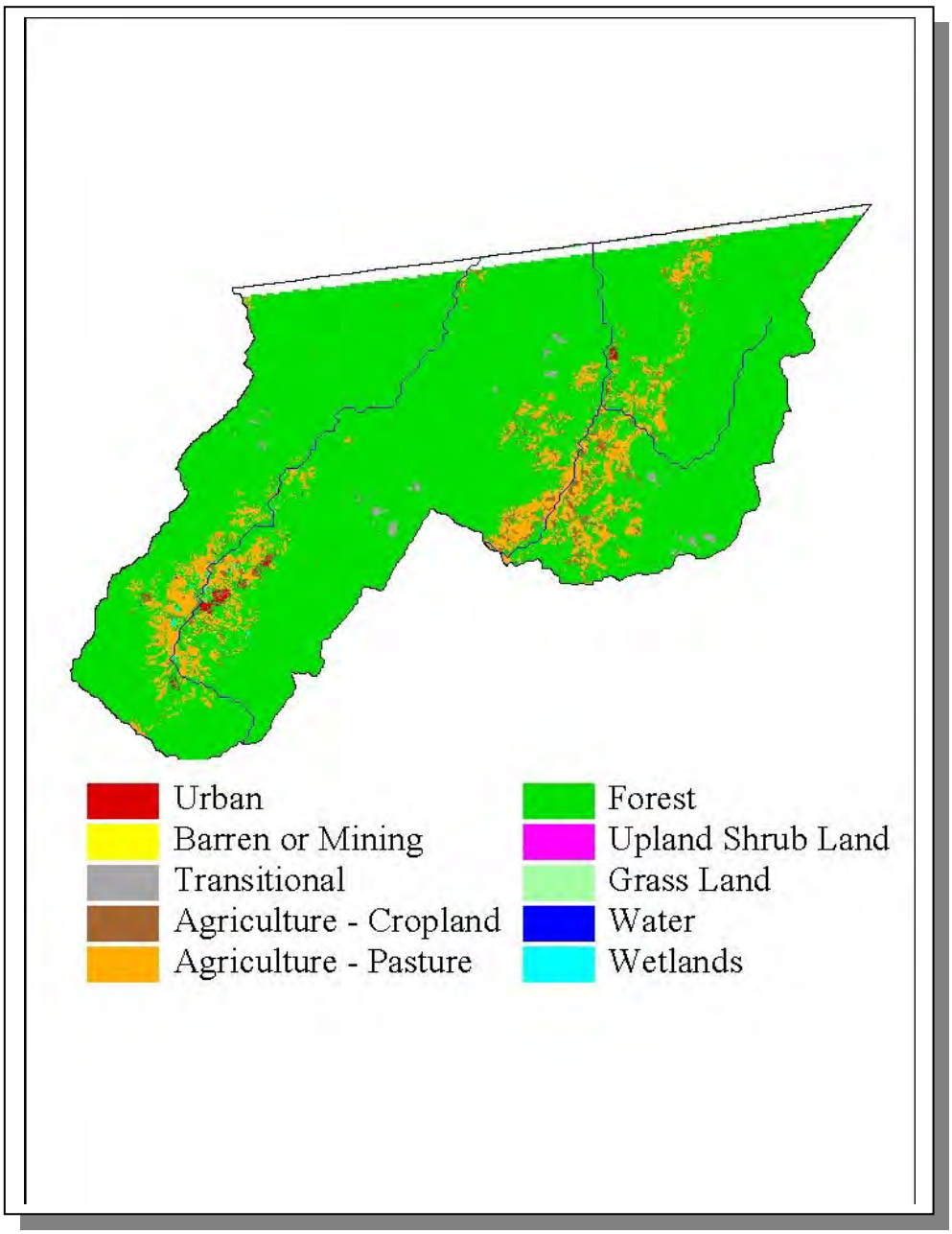


Figure 4-3. Illustration of Land Use Distribution in the Tennessee Portion of Subwatershed 0601010201.

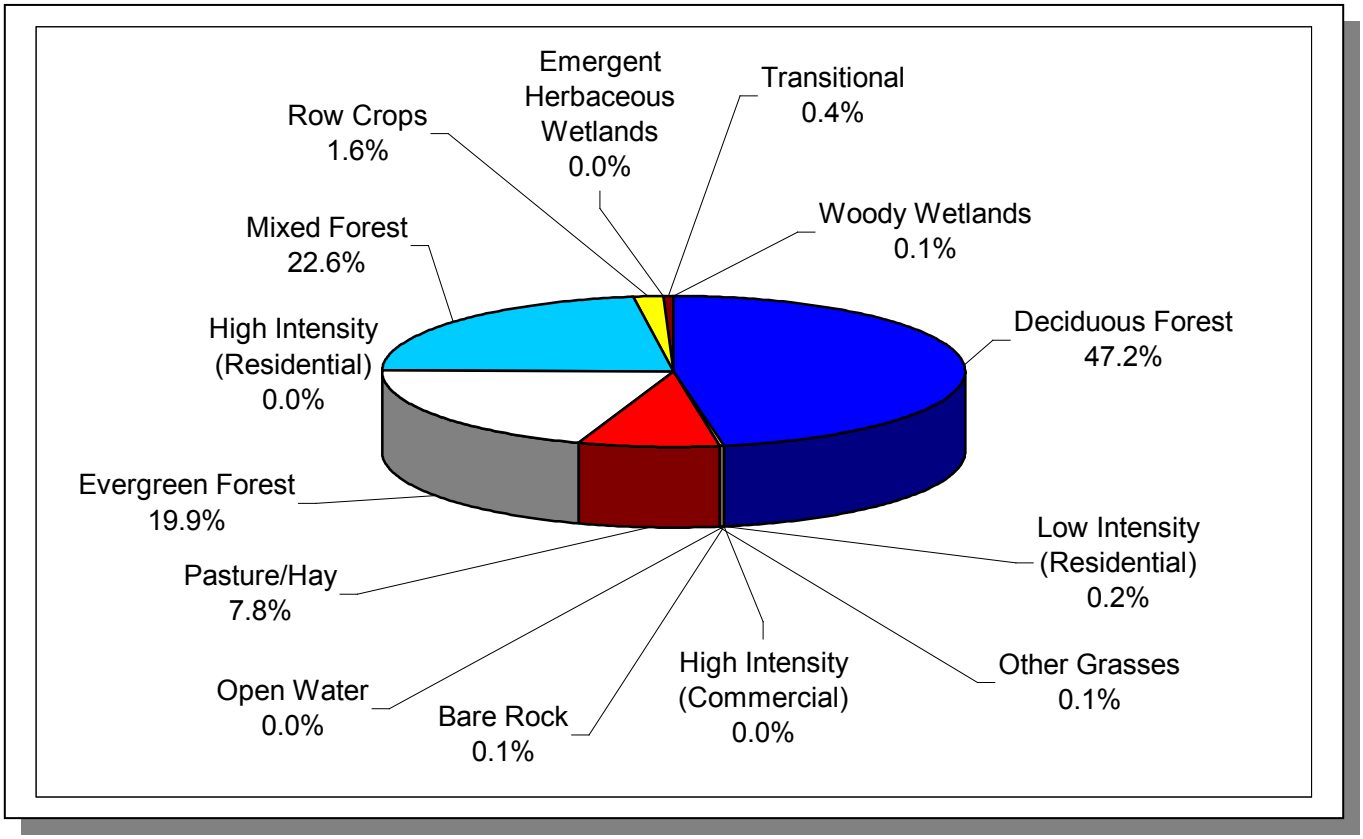


Figure 4-4. Land Use Distribution in Subwatershed 0601010201. *More information is provided in SF Holston-Appendix IV.*

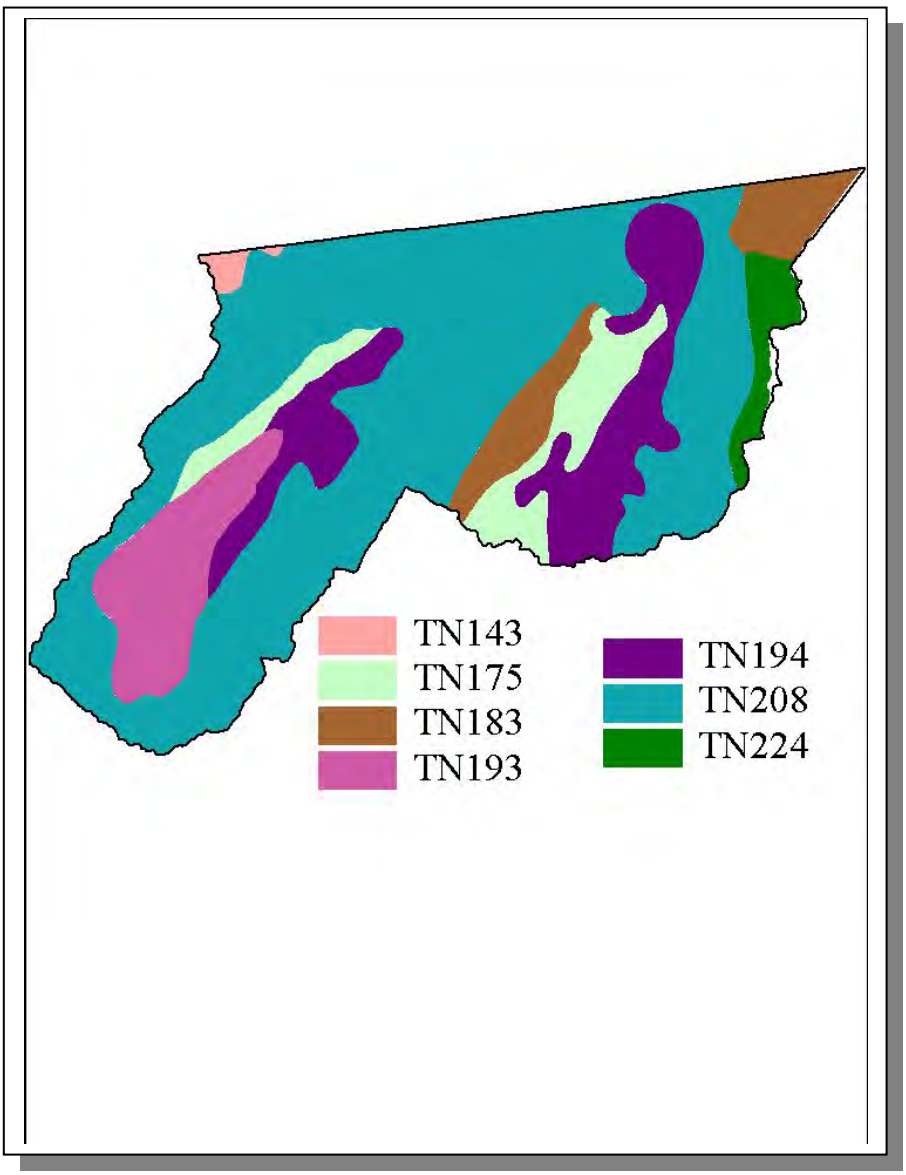


Figure 4-5. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601010201.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN143	0.00	B	1.22	6.44	Loam	0.32
TN175	0.00	B	1.49	5.23	Loam	0.30
TN183	0.00	B	4.45	5.04	Sandy Loam	0.21
TN193	0.00	B	4.15	5.73	Loam	0.28
TN194	0.00	B	3.75	5.44	Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25
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 0601010201. *More details are provided in SF Holston-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Carter	51,505	53,132	0.04	22	22	0.0
Johnson	13,766	16,572	31.11	4,282	5,155	20.4
Sullivan	143,596	150,371	1.33	1,910	2,001	4.8
Total	**208,867**	**220,075**		**6,214**	**7,178**	**15.5**

Table 4-3. Population Estimates in Subwatershed 0601010201.

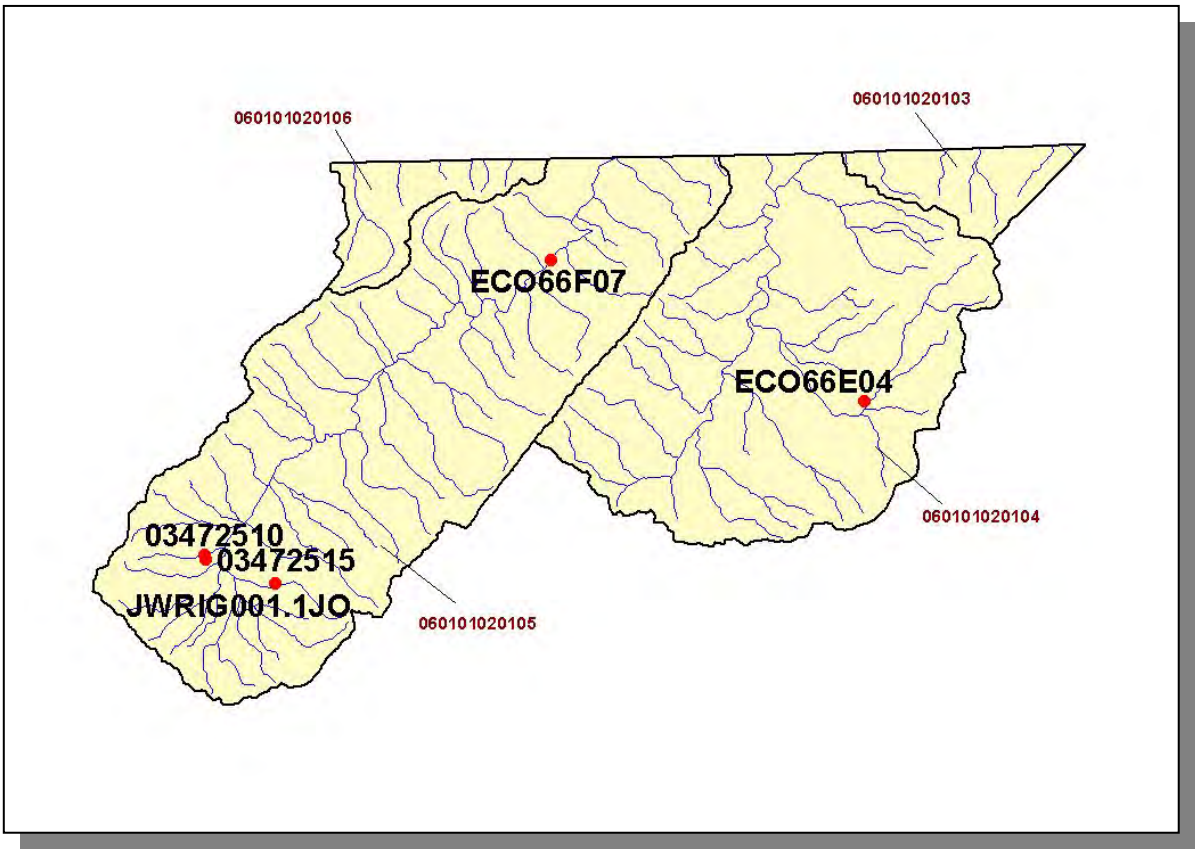


Figure 4-6. Location of Storet Monitoring Sites in Subwatershed 0601010201. *Subwatershed 060101020103, 060101020104, 060101020105, and 060101020306 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

4.2.A.ii. Point Source Contributions.

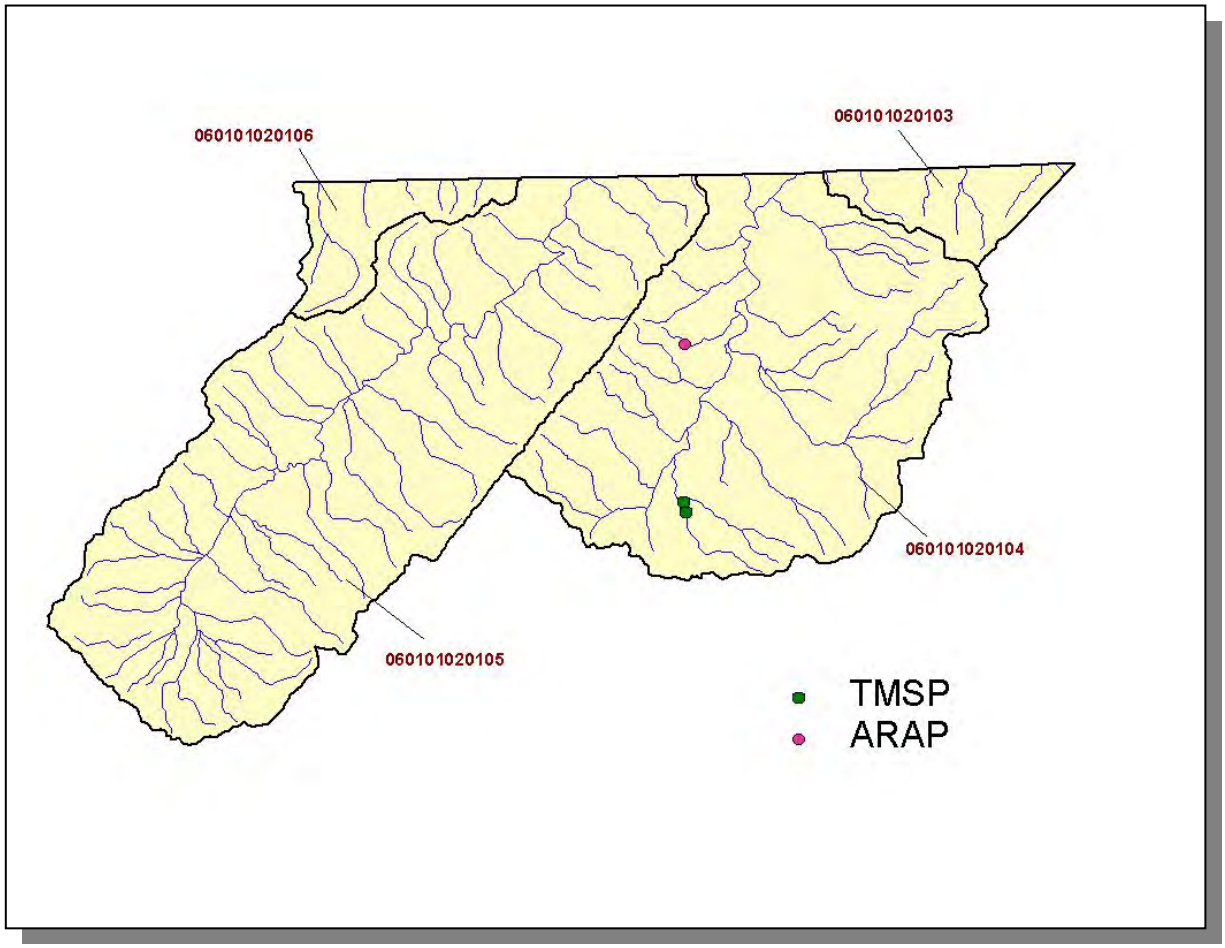


Figure 4-7. Location of Active Point Source Facilities in Subwatershed 0601010201. *Subwatershed 060101020103, 060101020104, 060101020105, and 060101020106 boundaries are shown for reference. More information is provided in the following figures.*

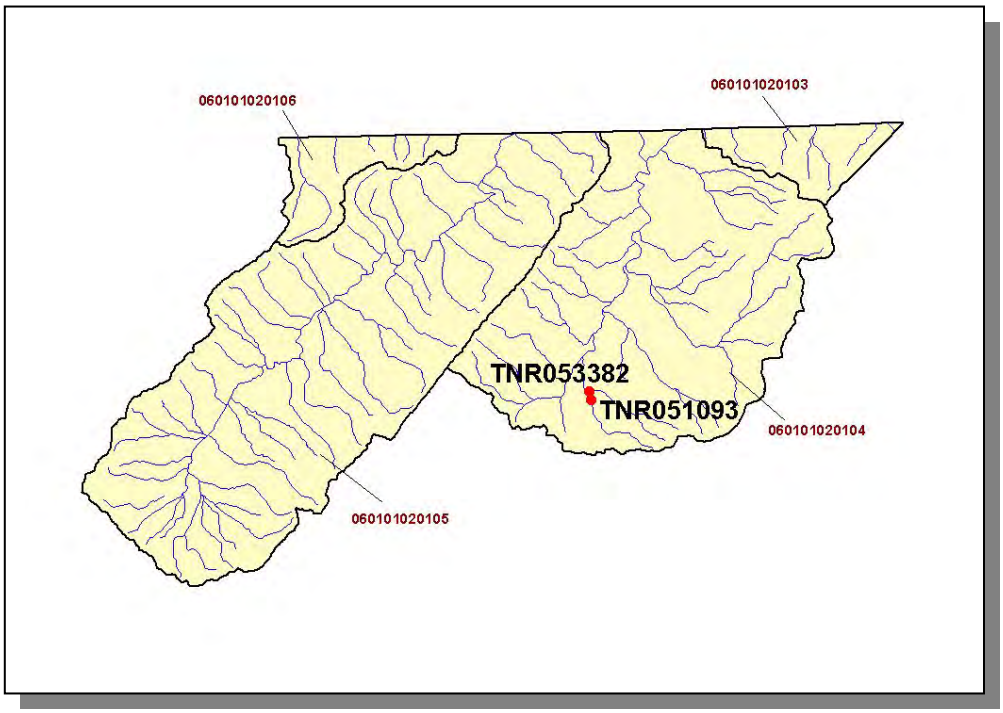


Figure 4-8. Location of TMSP Facilities in Subwatershed 0601010201. *Subwatershed 060101020103, 060101020104, 060101020105, and 060101020106 boundaries are shown for reference. More information, including the names of facilities, is provided in SF Holston-Appendix IV.*

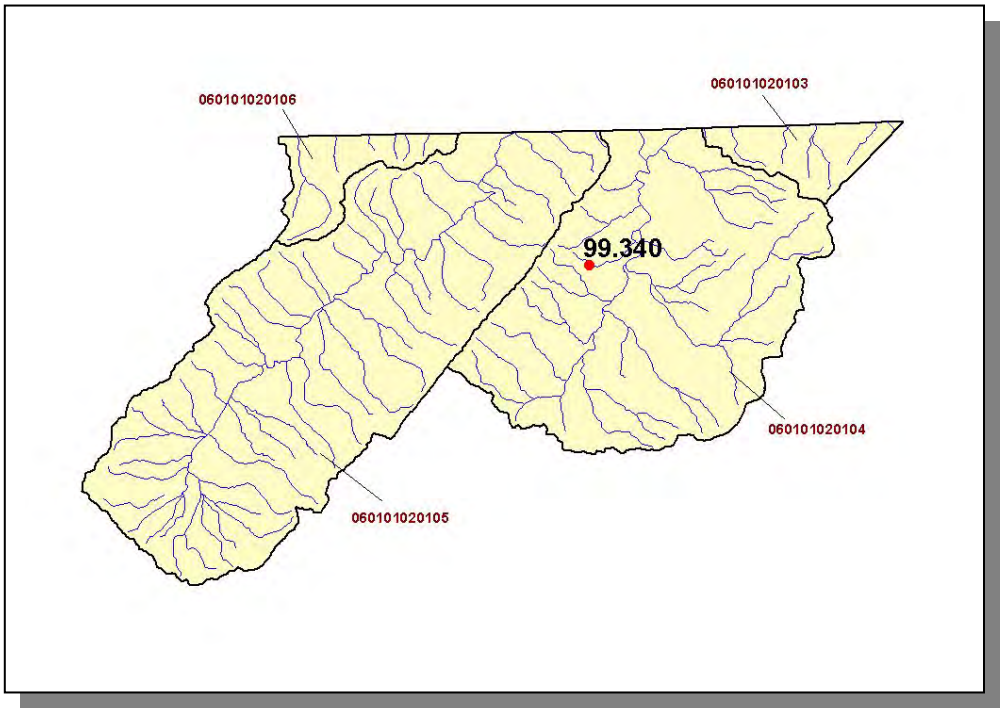


Figure 4-9. Location of ARAP Sites (Individual Permits) in Subwatershed 0601010201. *Subwatershed 060101020103, 060101020104, 060101020105, and 060101020106 boundaries are shown for reference. More information, including the names of facilities, is provided in SF Holston-Appendix IV.*

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	Cattle	Milk Cow	Chickens	Hogs	Sheep
1,118	2,674	130	4	19	42

Table 4-4. Summary of Livestock Count Estimates in Subwatershed 0601010201. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Carter	161.3	155.5	3.4	12.4
Johnson	144.4	144.4	0.6	2.2
Sullivan	123.7	123.7	0.1	0.3
Total	**429.4**	**423.6**	**4.1**	**14.9**

Table 4-5. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 0601010201.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	8.20
Grass (Hayland)	0.52
Legume/Grass (Hayland)	0.16
Grass (Pastureland)	0.74
Grass,Forbs, Legumes (Mixed Pasture)	0.18
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.23
Tobacco (Row Crops)	3.91
Other Farmlands	0.02

Table 4-6. Annual Estimated Total Soil Loss in Subwatershed 0601010201.

4.2.B. 0601010203.

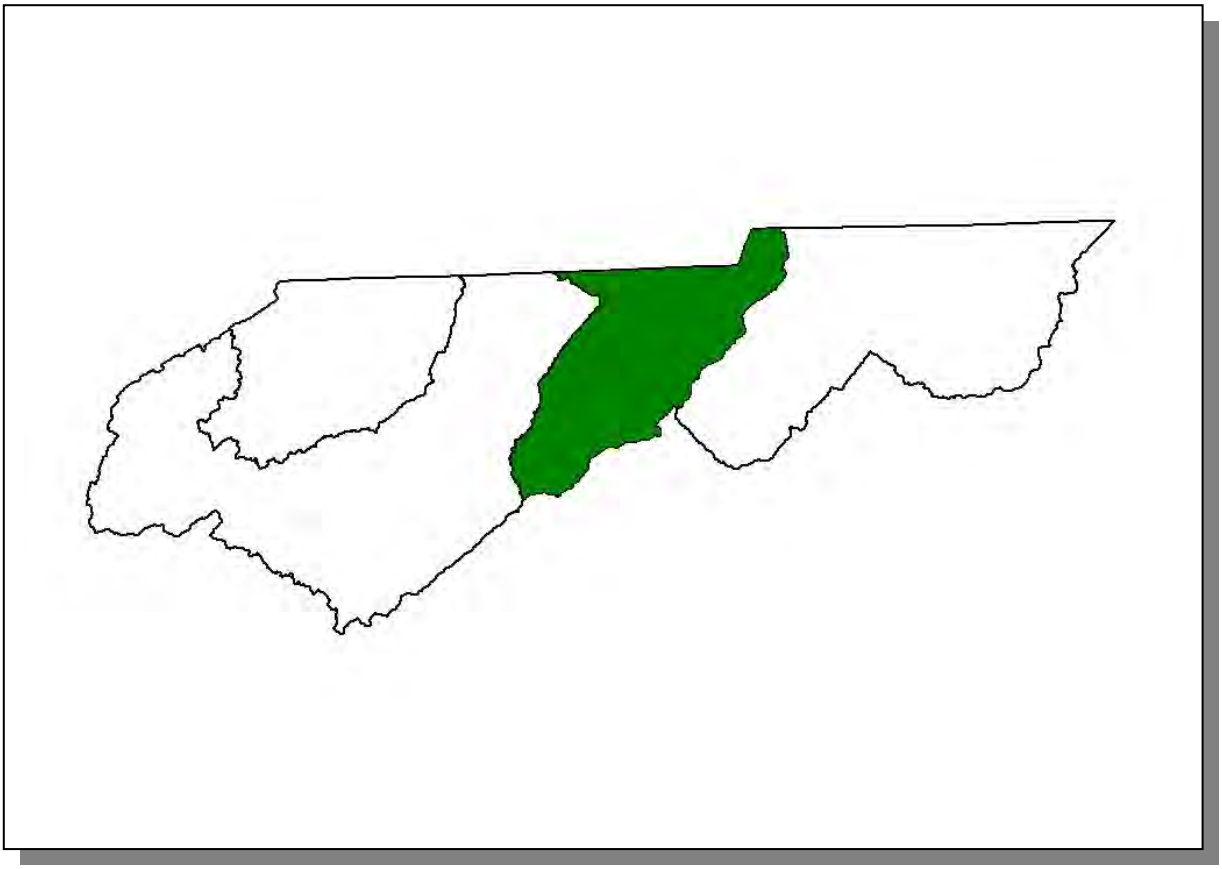


Figure 4-10. Location of Subwatershed 0601010203. *The Group 2 portion of the Tennessee portion of the South Fork Holston HUC-10 subwatershed boundaries are shown for reference.*

4.2.B.i. General Description.

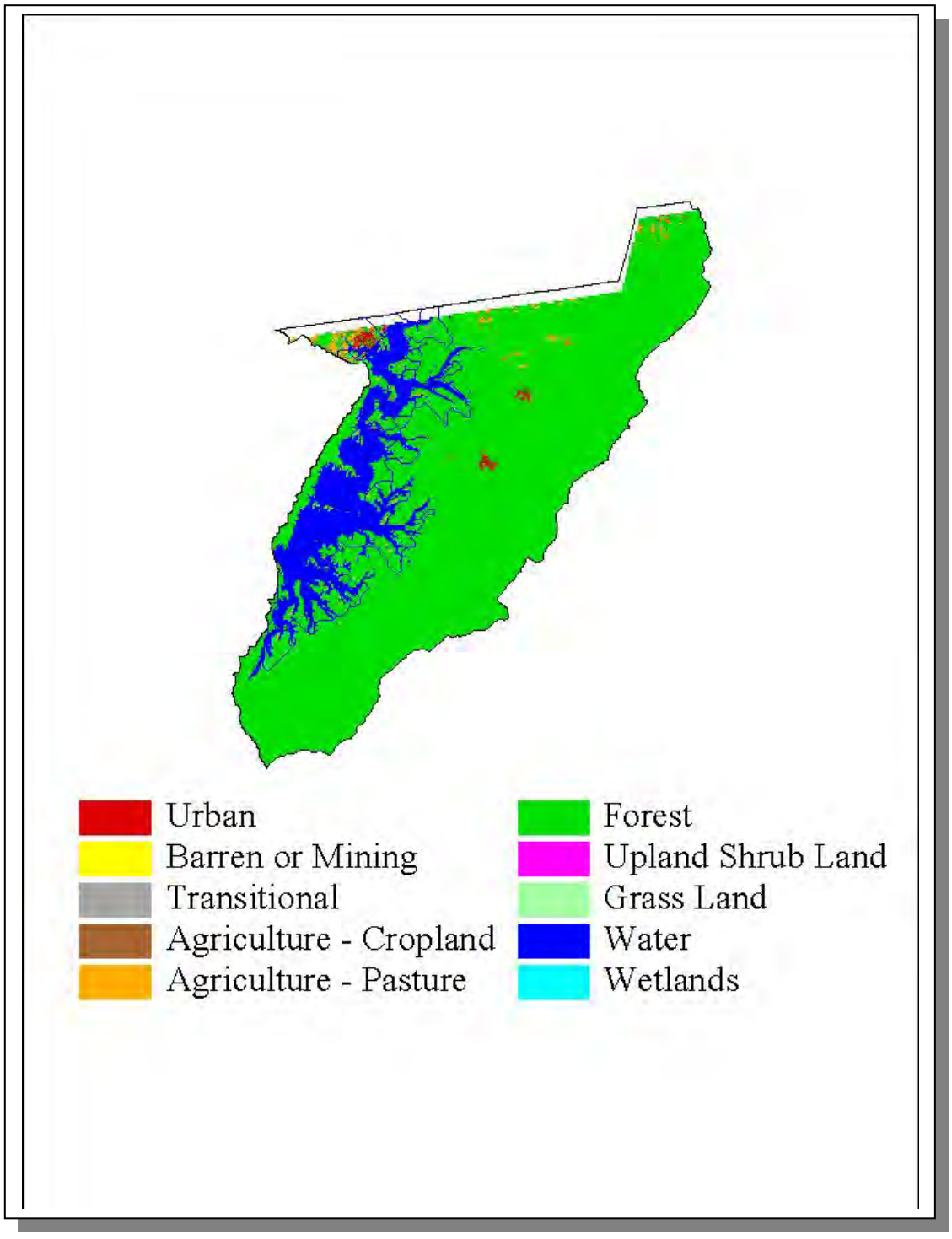


Figure 4-11. Illustration of Land Use Distribution in Subwatershed 0601010203.

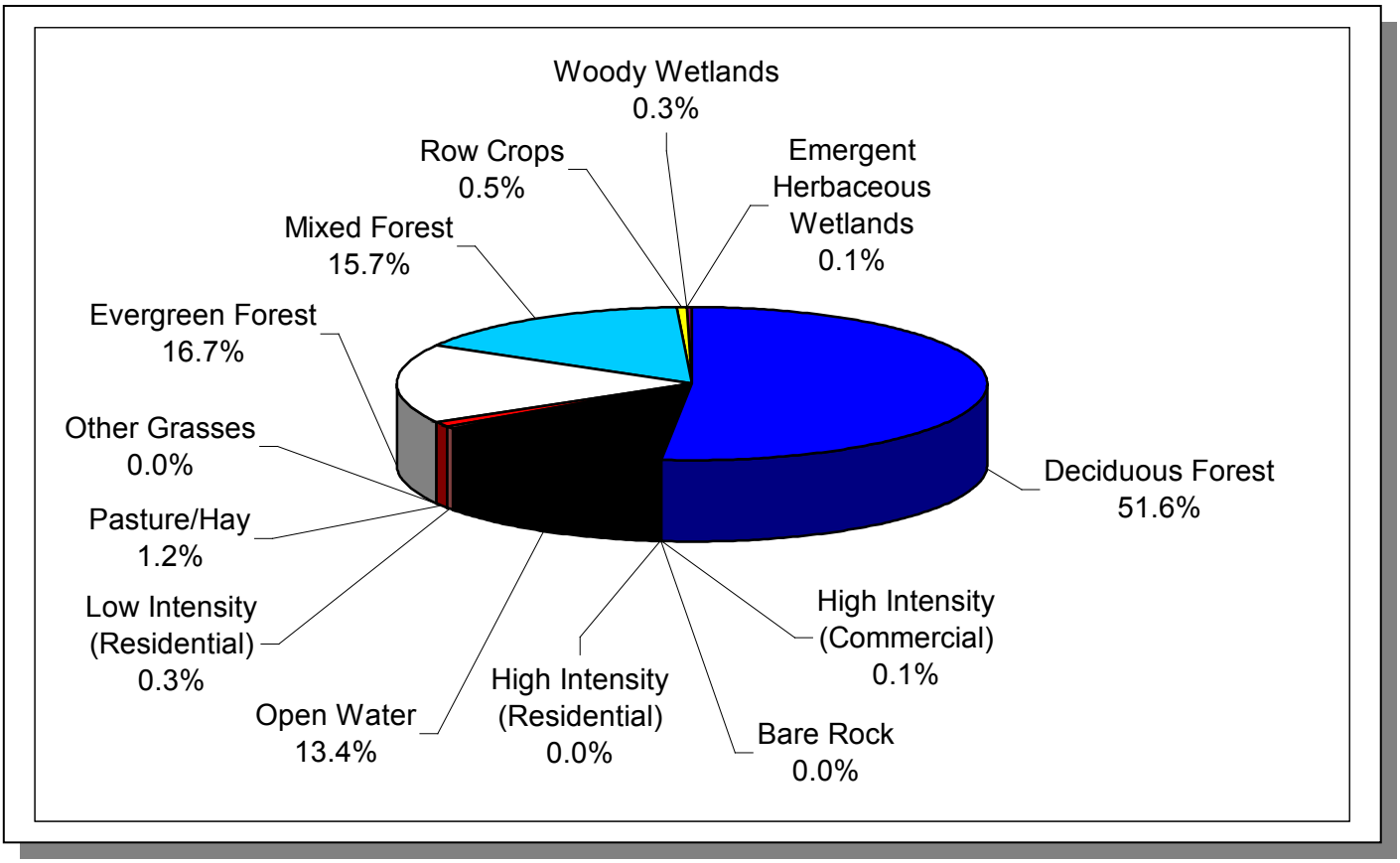


Figure 4-12. Land Use Distribution in Subwatershed 0601010203. *More information is provided in SF Holston-Appendix IV.*

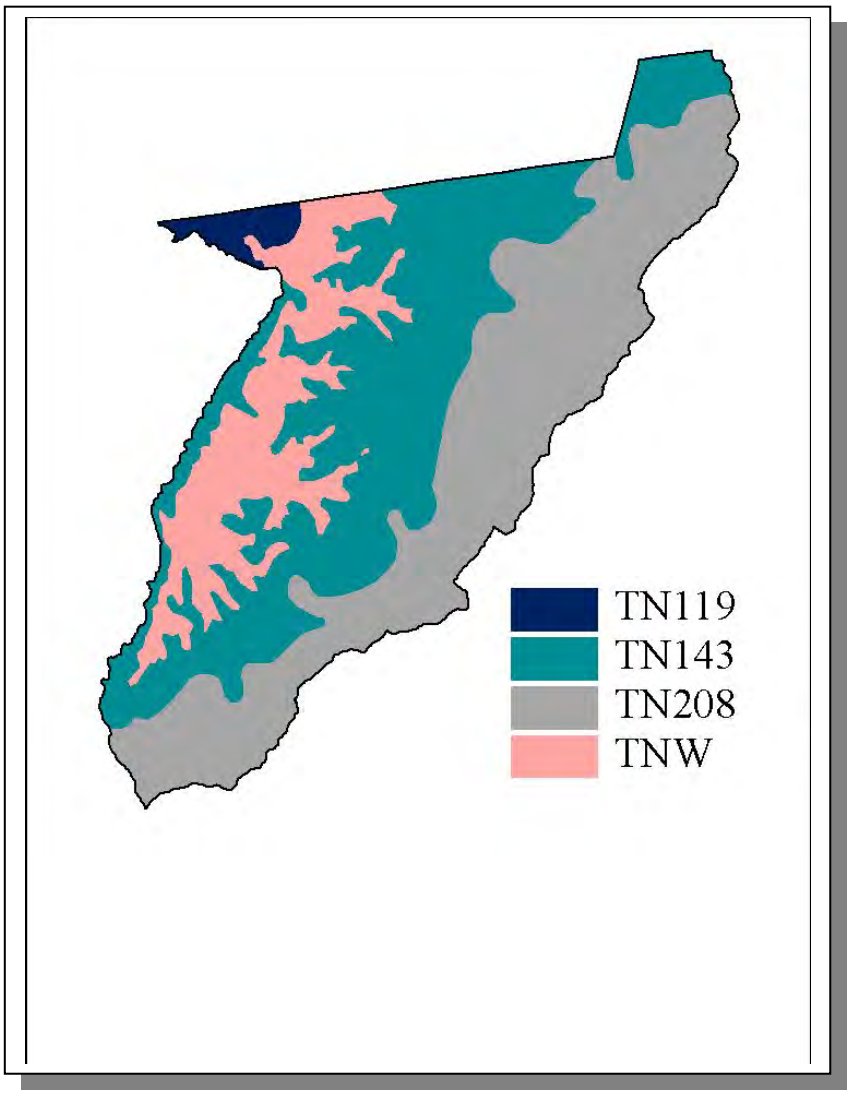


Figure 4-13. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601010203. *TNW, lake area.*

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN119	0.00	C	1.08	5.15	Loam	0.33
TN143	0.00	C	1.22	6.44	Loam	0.32
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-7. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601010203. *More information is provided in SF Holston-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Carter	51,505	53,132	0.07	37	38	2.7
Sullivan	143,596	150,371	13.63	19,566	20,489	4.7
Total	**195,101**	**203,503**		**19,603**	**20,527**	**4.7**

Table 4-8. Population Estimates in Subwatershed 0601010203.

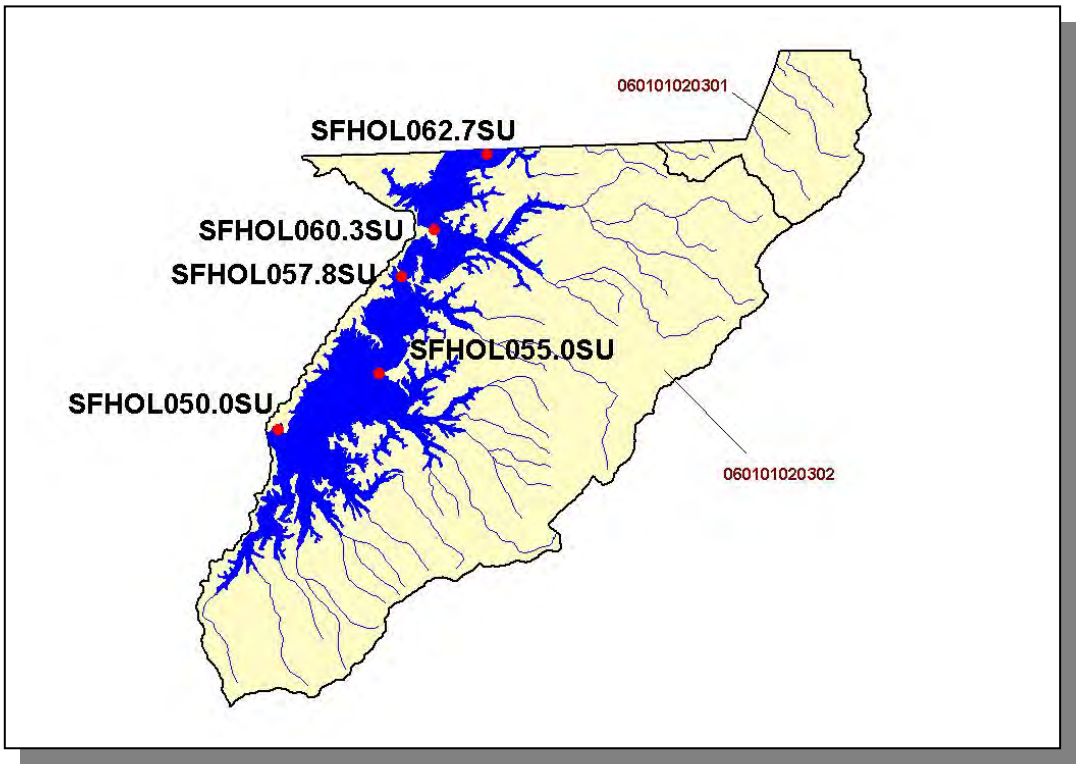


Figure 4-14. Location of Storet Monitoring Sites in Subwatershed 0601010203. *Subwatershed 060101020301 and 060101020302 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

4.2.B.ii. Point Source Contributions.

There are no point source contributions in this watershed.

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)				
Beef Cow	Cattle	Milk Cow	Hogs	Sheep
158	348	13	<5	<5

Table 4-9. Summary of Livestock Count Estimates in Subwatershed 0601010203. *According to the 1997 Census of Agriculture, "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Carter	161.3	155.5	3.4	12.4
Johnson	144.4	144.4	0.6	2.2
Sullivan	123.7	123.7	0.1	0.3
Total	**429.4**	**423.6**	**4.1**	**14.9**

Table 4-10. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0601010203.

CROPS	TONS/ACRE/YEAR
Legume/Grass (Hayland)	0.16
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.35
Non Agricultural Land Use	0.00
Corn (Row Crops)	8.20
Tobacco (Row Crops)	3.67
Grass (Hayland)	0.42
Grass (Pastureland)	1.38
Grass, Forbs, Legumes (Mixed Pasture)	1.60
Other Land in Farms (Other Farmland)	0.02

Table 4-11. Annual Estimated Total Soil Loss in Subwatershed 0601010203.

4.2.C. 0601010204.

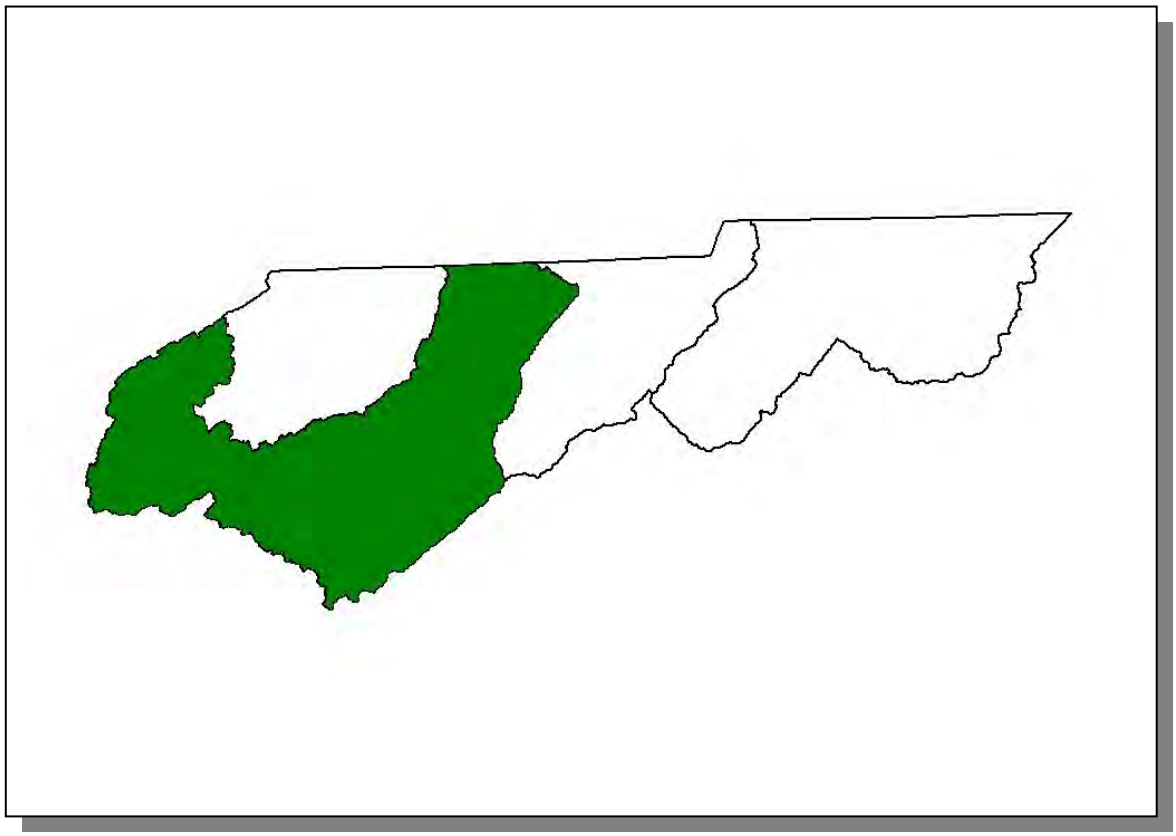


Figure 4-15. Location of Subwatershed 0601010204. *The Group 2 portion of the Tennesseee portion of the SF Holston HUC-10 subwatershed boundaries are shown for reference.*

4.2.C.i. General Description.

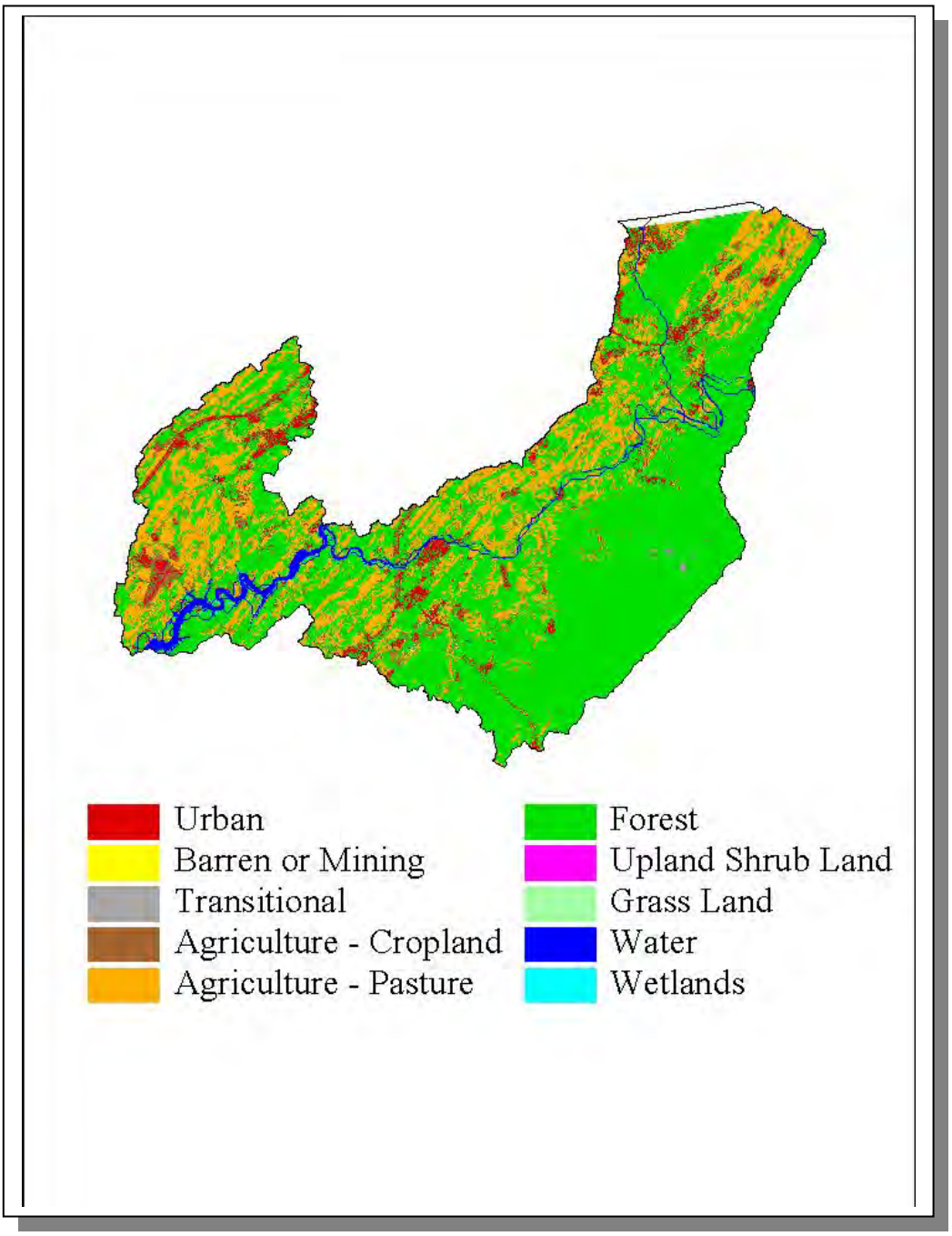


Figure 4-16. Illustration of Land Use Distribution in Subwatershed 0601010204.

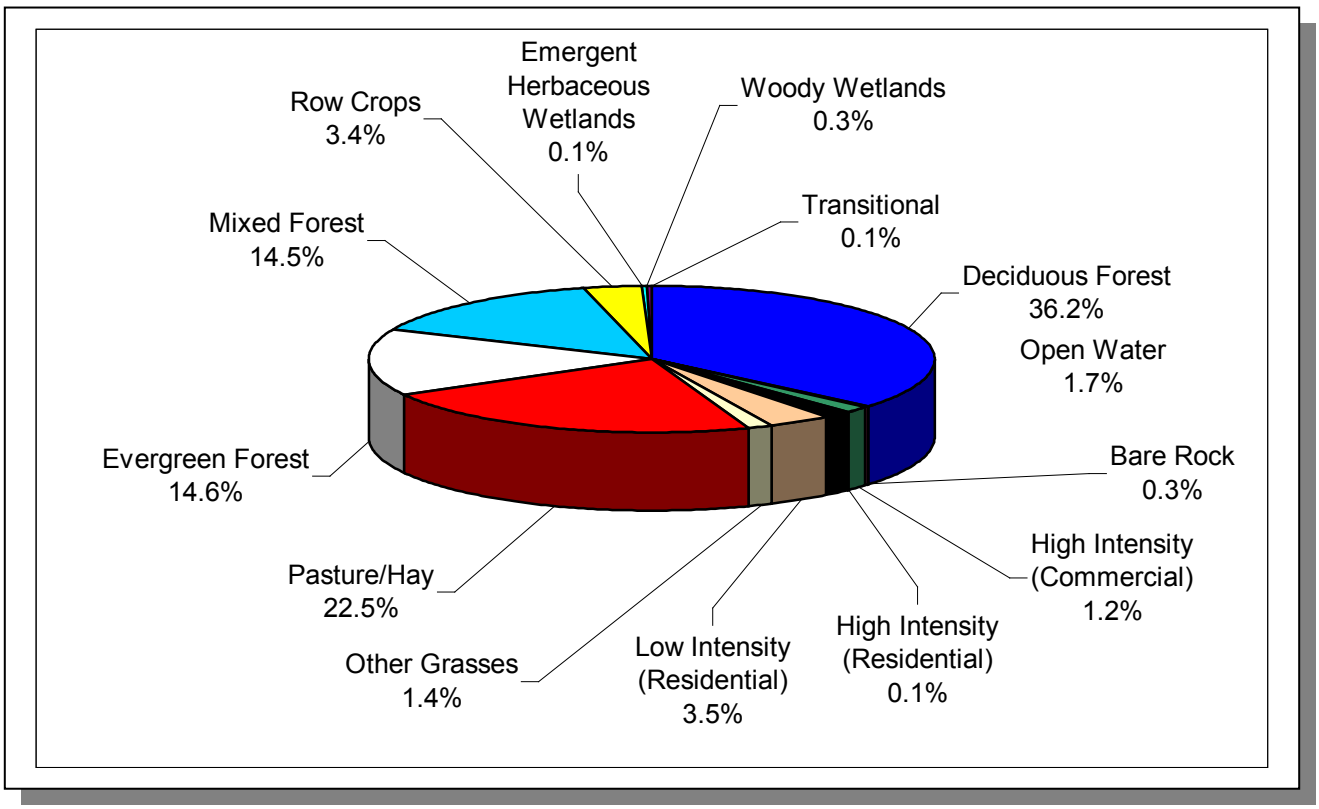


Figure 4-17. Land Use Distribution in Subwatershed 0601010204. *More information is provided in SF Holston-Appendix IV.*

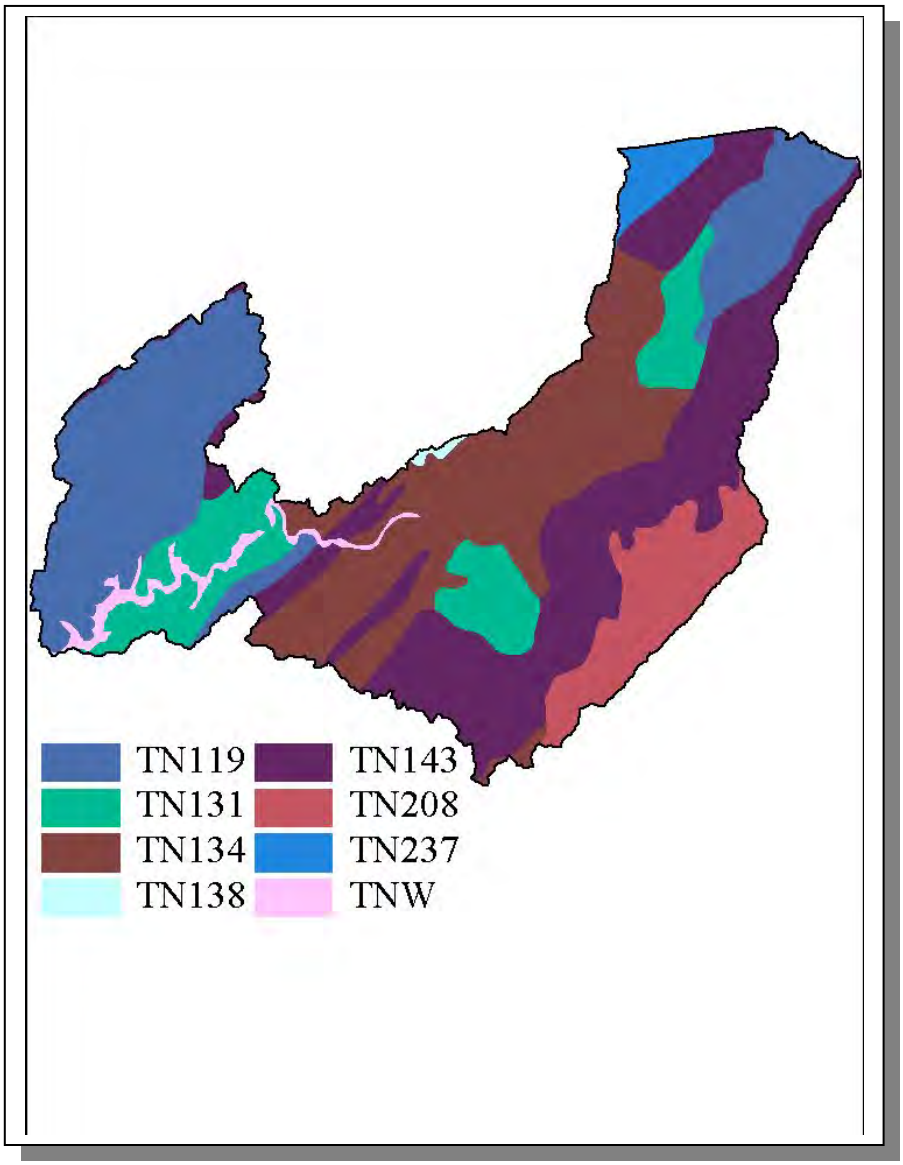


Figure 4-18. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601010204. *TNW, lake area.*

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN119	0.00	C	1.08	5.15	Loam	0.33
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN134	0.00	B	1.38	5.18	Loam	0.31
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN143	0.00	C	1.22	6.44	Loam	0.32
TN208	0.00	C	4.02	4.84	Loam	0.25
TN237	0.00	B	3.36	5.40	Silty Loam	0.32

Table 4-12. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601010204. *More information is provided in SF Holston-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Carter	51,505	53,132	2.63	1,353	1,395	3.1
Sullivan	143,596	150,371	31.31	44,963	47,085	4.7
Total	**195,101**	**203,503**		**46,316**	**48,480**	**4.7**

Table 4-13. Population Estimates in Subwatershed 0601010204.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Bluff City	Sullivan	1,394	608	447	155	6
Bristol	Sullivan	23,421	10,403	9,751	637	15
Total		**24,815**	**11,011**	**10,198**	**792**	**21**

Table 4-14. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0601010204.

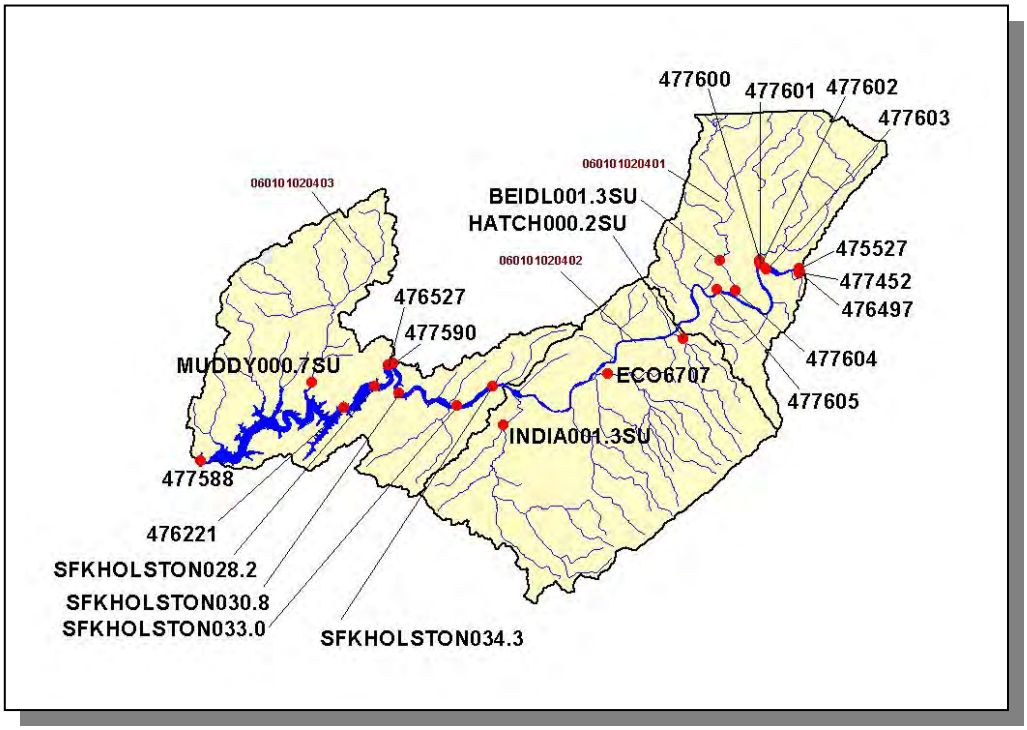


Figure 4-19. Location of Storet Monitoring Sites in Subwatershed 0601010204. *Subwatershed 060101020401, 060101020402, and 060101020403 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

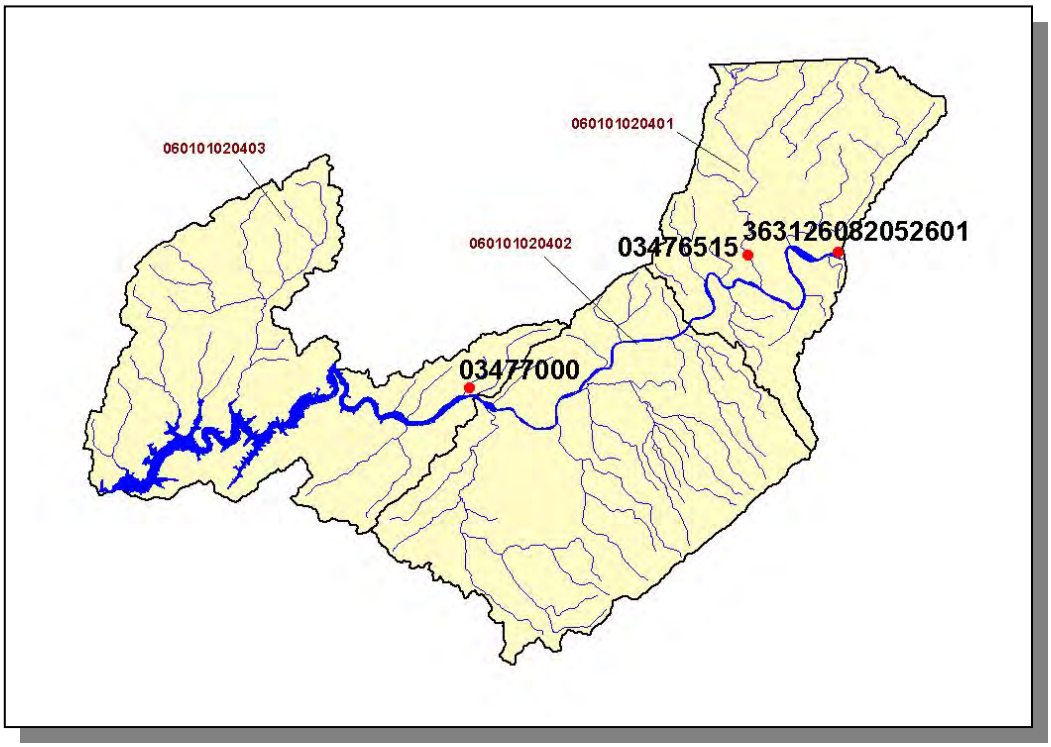


Figure 4-20. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601010204. *Subwatershed 060101020401, 060101020402, and 060101020403 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

4.2.C.ii. Point Source Contributions.

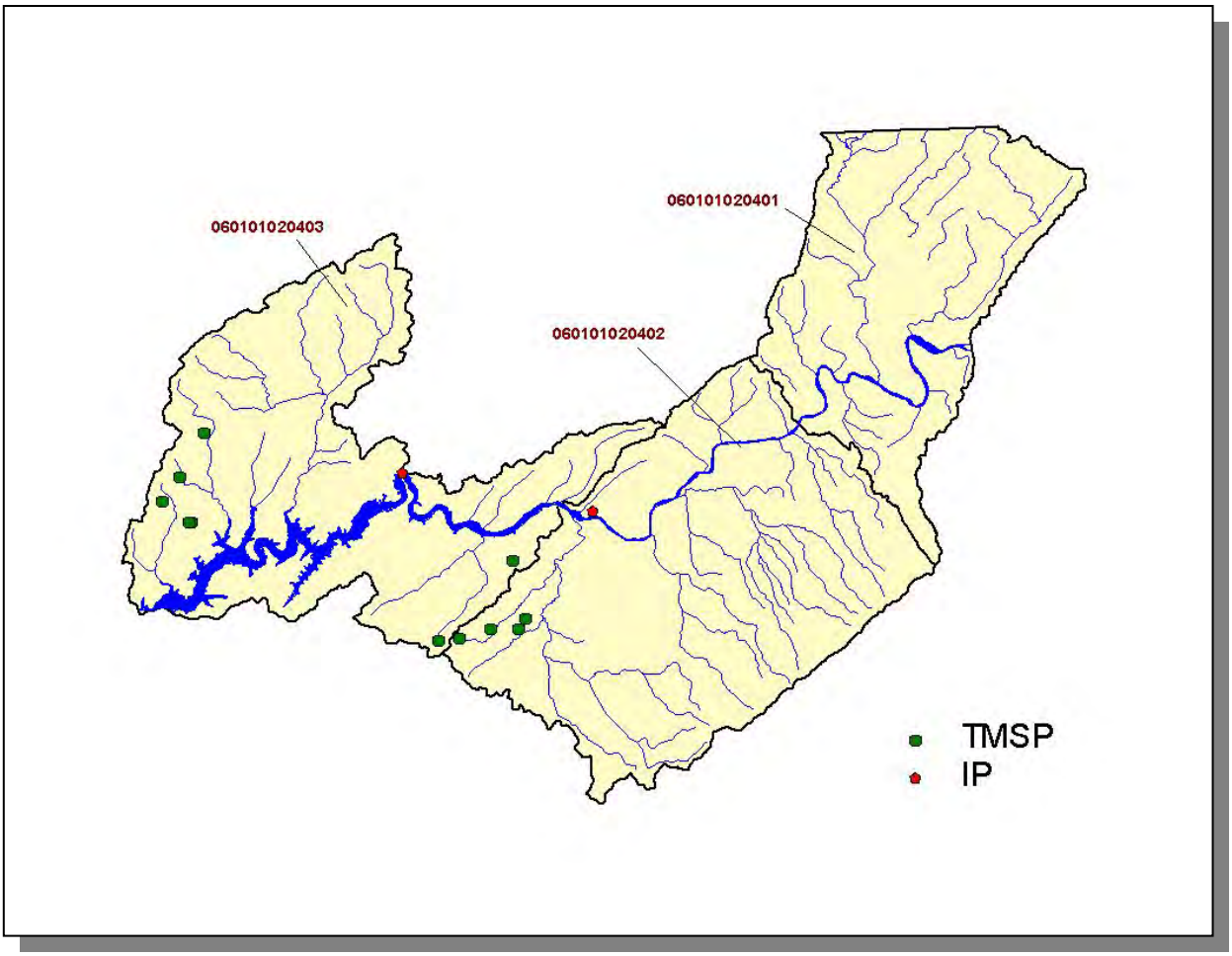


Figure 4-21. Location of Active Point Source Facilities in Subwatershed 0601010204. *Subwatershed 060101020401, 060101020402, and 060101020403 boundaries are shown for reference. More information is provided in the following figures.*

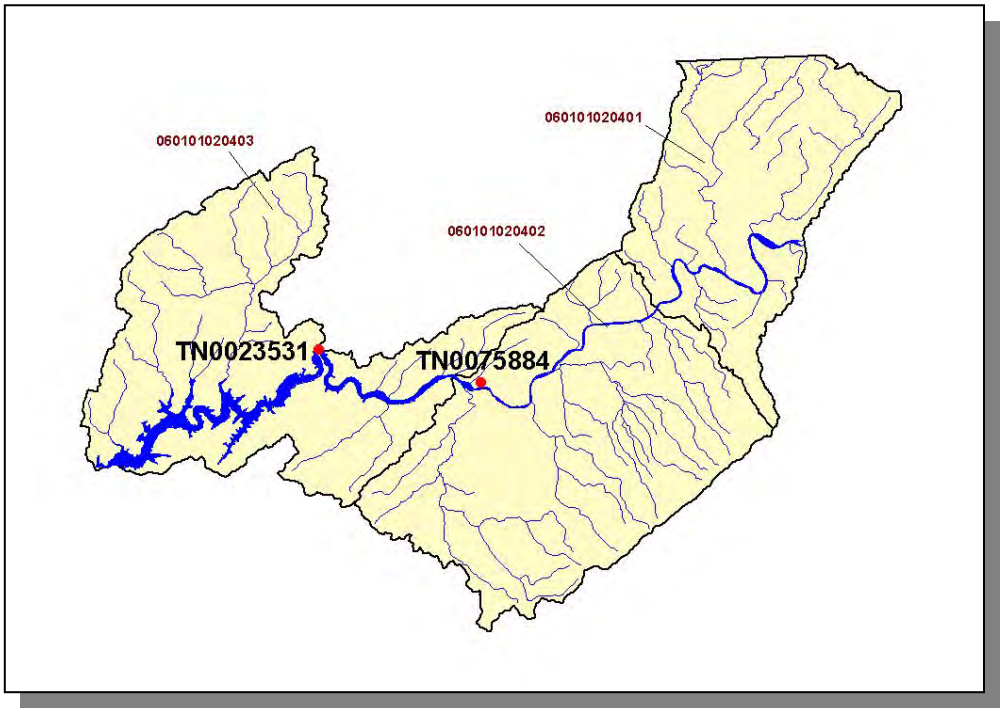


Figure 4-22. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 0601010204. *Subwatershed 060101020401, 060101020402, and 060101020403 boundaries are shown for reference. More information, including the names of facilities, is provided in SF Holston-Appendix IV.*

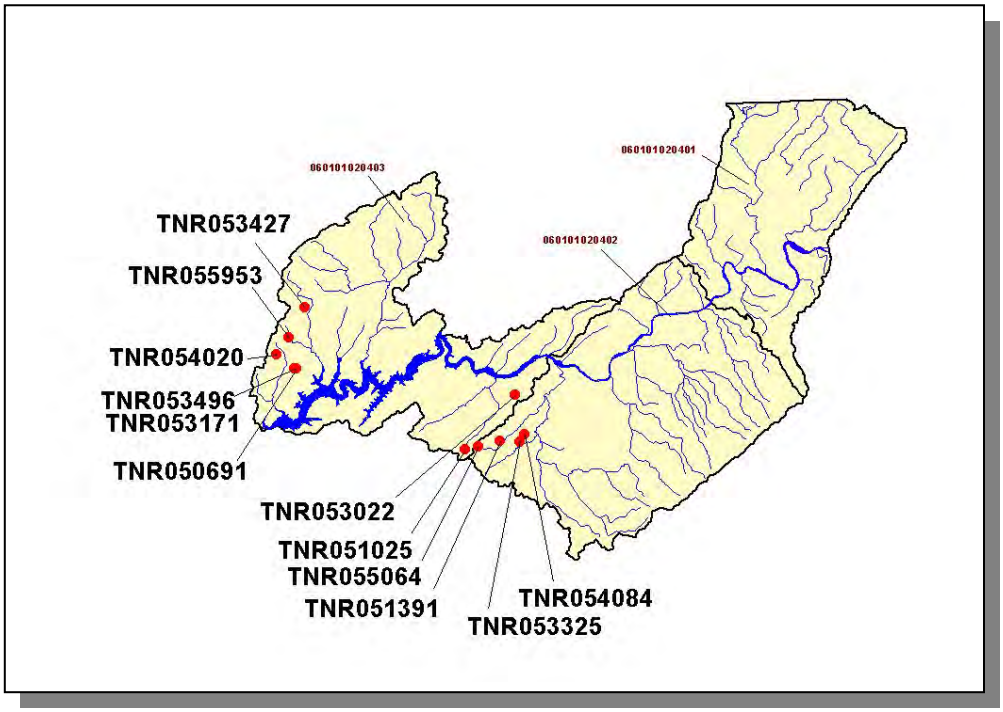


Figure 4-23. Location of TMSP Facilities in Subwatershed 0601010204. *Subwatershed 060101020401, 060101020402, and 060101020403 boundaries are shown for reference. More information, including the names of facilities, is provided in SF Holston-Appendix IV.*

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

There is one NPDES facility discharging to a water body listed on the 1998 303(d) list in Subwatershed 0601010204:

- TN0023531 (Bristol STP #2) discharges to Boone Reservoir (South Fork Holston River @ RM 29.6).

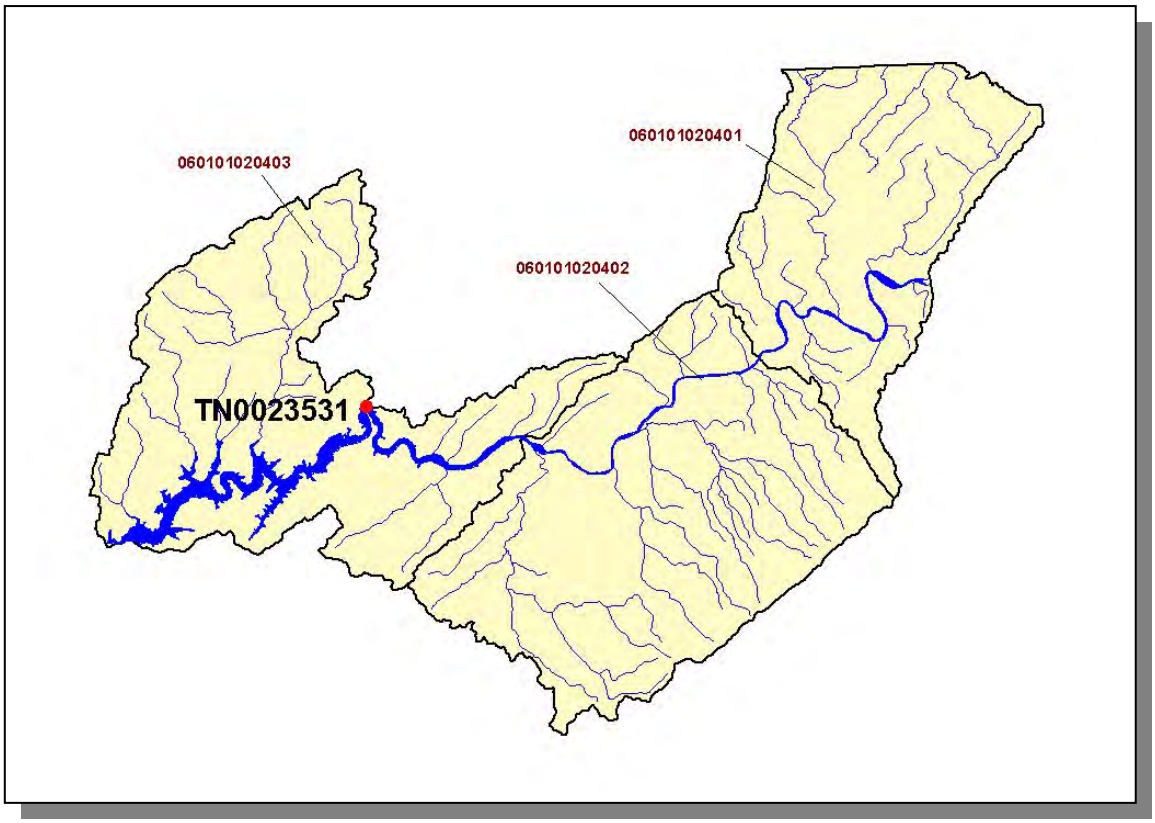


Figure 4-24. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 0601010204. *Subwatershed 060101020401, 060101020402, and 060101020403 boundaries are shown for reference. The names of facilities are provided in SF Holston-Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0023531	77.56	84.67	89.84	71.42	15.00000

Table 4-15. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0601010204. *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 #	TDS	P	NH_3
TN0023531	X	X	X

Table 4-16. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0601010204. *TDS, Total Dissolved Solids.*

PERMIT #	WET	FECAL	TRC	TSS	SETTLEABLE SOLIDS	BOD	CN^-	DO	pH
TN0023531	X	X	X	X	X	X	X	X	X

Table 4-17. Parameters Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0601010204. *Wet, Whole Effluent Toxicity; trc, total residual Chlorine; TSS, Total Suspended Solids, BOD, Biochemical Oxygen Demand.*

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	Cattle	Milk Cow	Chickens	Hogs	Sheep
5,986	13,235	490	16	46	32

Table 4-18. Summary of Livestock Count Estimates in Subwatershed 0601010204. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Carter	161.3	155.5	3.4	12.4
Sullivan	123.7	123.7	0.1	0.3
Totals	**285.0**	**279.2**	**3.5**	**12.7**

Table 4-19. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0601010204.

CROPS	TONS/ACRE/YEAR
Nonagricultural Land Use	0.00
Grass (Hayland)	0.42
Legume/Grass (Hayland)	0.16
Grass (Pastureland)	1.30
Grass, Forbs, Legumes (Mixed Pasture)	1.51
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.36
Corn (Row Crops)	8.20
Tobacco (Row Crops)	4.35
Other Land in Farms	0.02

Table 4-20. Annual Estimated Total Soil Loss in Subwatershed 0601010204.

4.2.D. 0601010205.

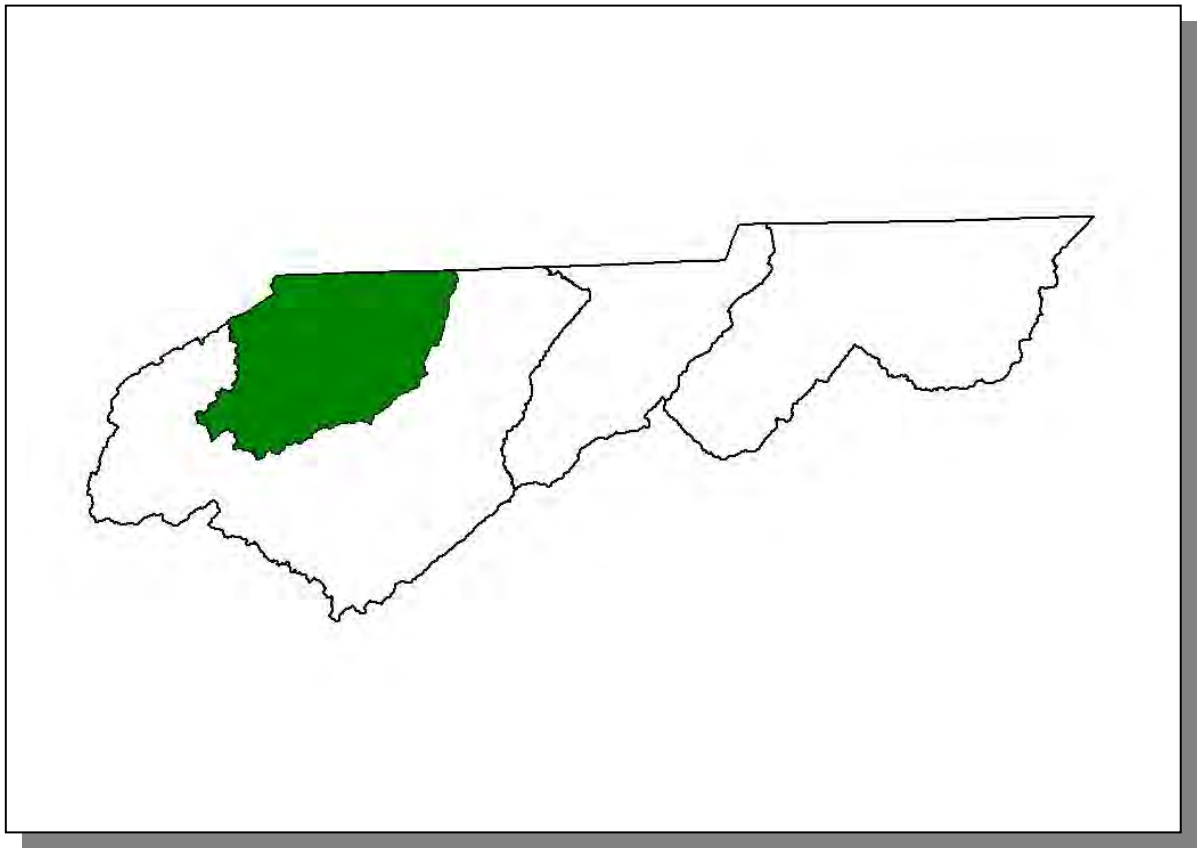


Figure 4-25. Location of Subwatershed 0601010205. *The Group 2 portion of the Tennessee portion of the SF Holston HUC-10 subwatershed boundaries are shown for reference.*

4.2.D.i. General Description.

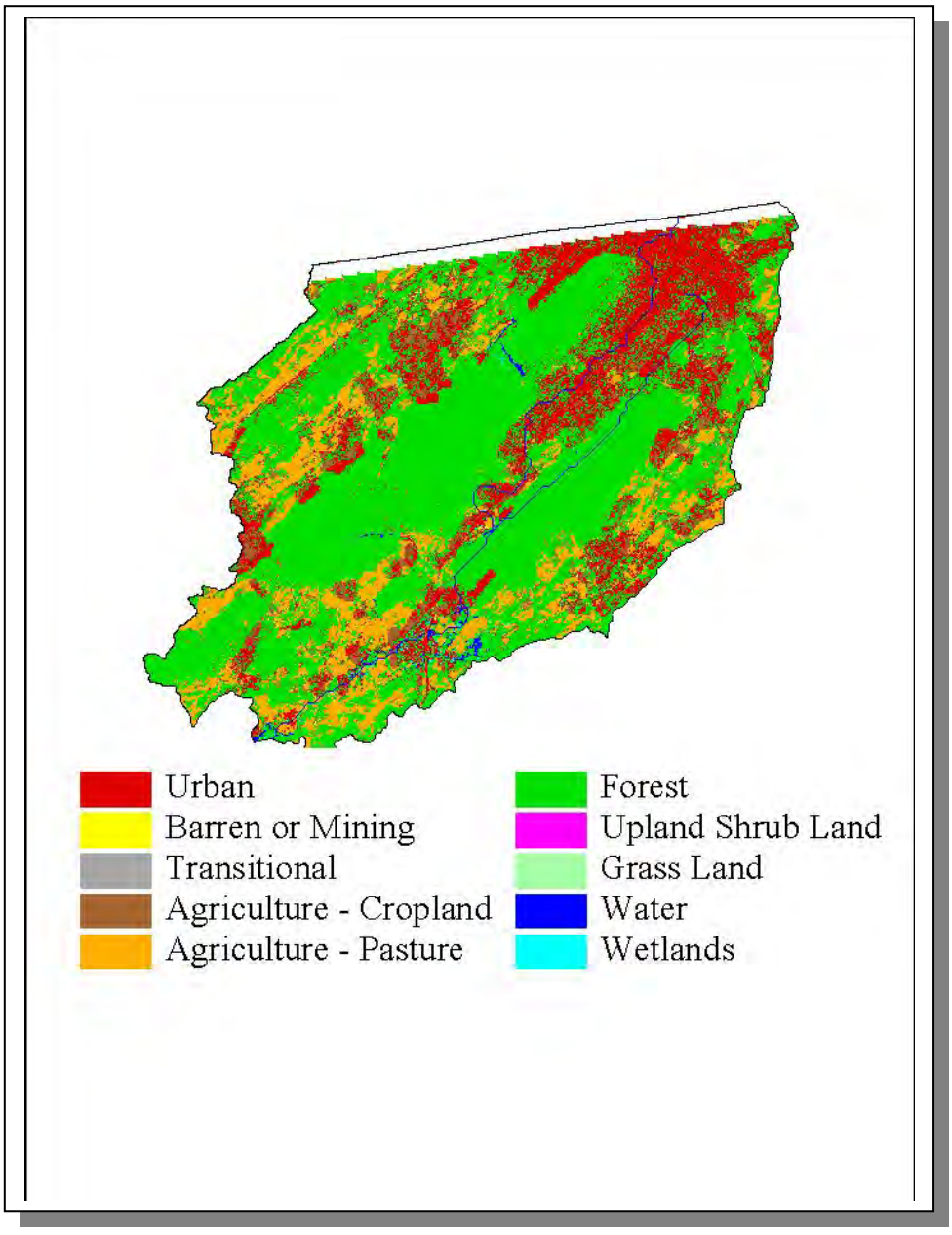


Figure 4-26. Illustration of Land Use Distribution in Subwatershed 0601010205.

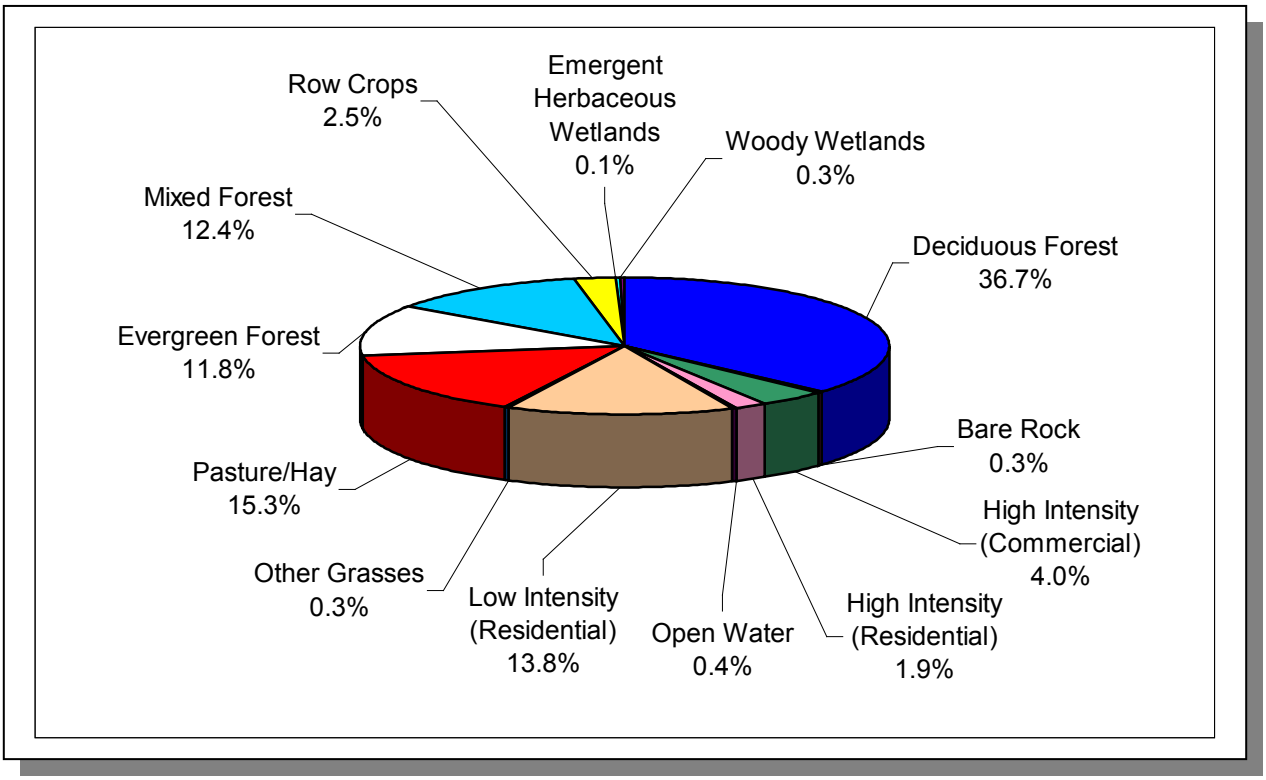


Figure 4-27. Land Use Distribution in Subwatershed 0601010205. *More information is provided in SF Holston-Appendix IV.*

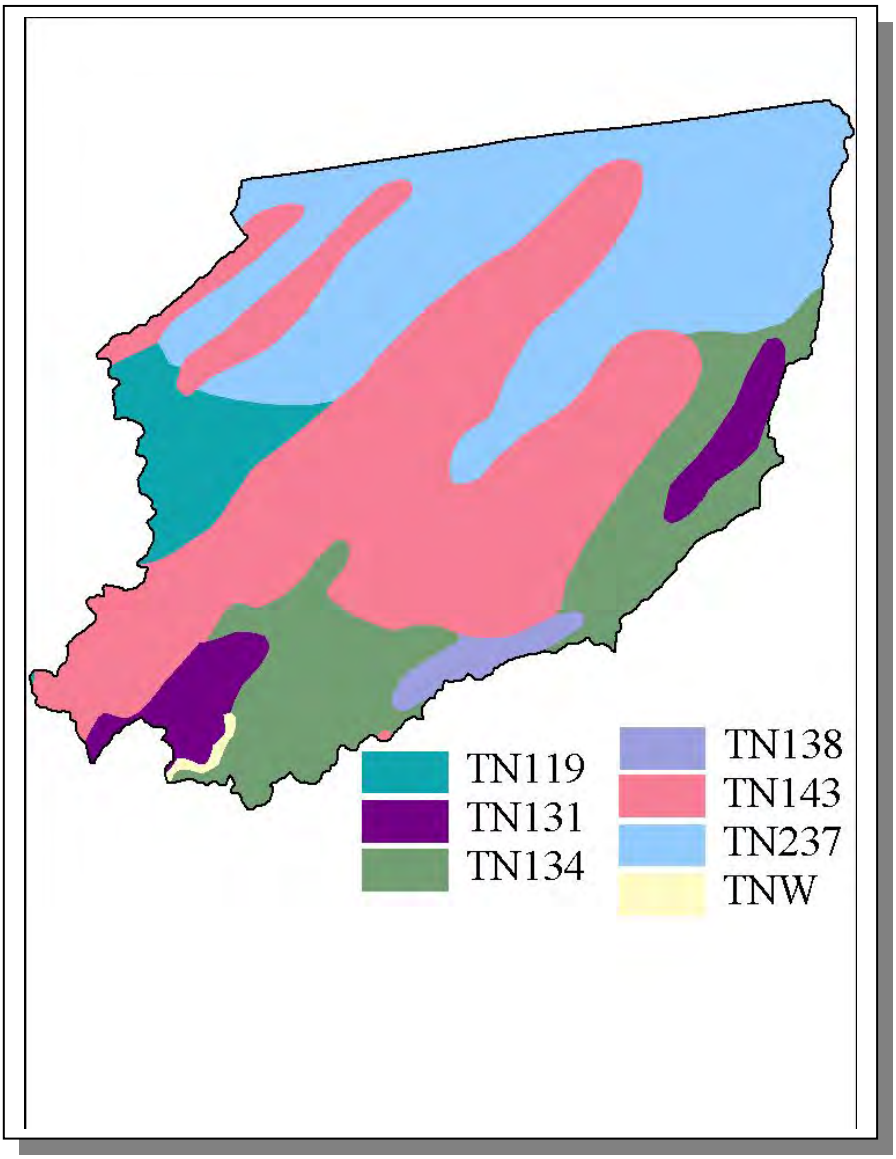


Figure 4-28. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601010205. *TNW, lake area.*

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN119	0.00	C	1.08	5.15	Loam	0.33
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN134	0.00	B	1.38	5.18	Loam	0.31
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN143	0.00	C	1.22	6.44	Loam	0.32
TN237	0.00	B	3.36	5.40	Silty Loam	0.32

Table 4-21. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020205. *More information is provided in SF Holston-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Sullivan	143,596	150,371	13.25	19,028	19,925	4.7

Table 4-22. Population Estimates in Subwatershed 0601010205.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Bristol	Sullivan	23,421	10,403	9,751	637	15

Table 4-23. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0601010205.

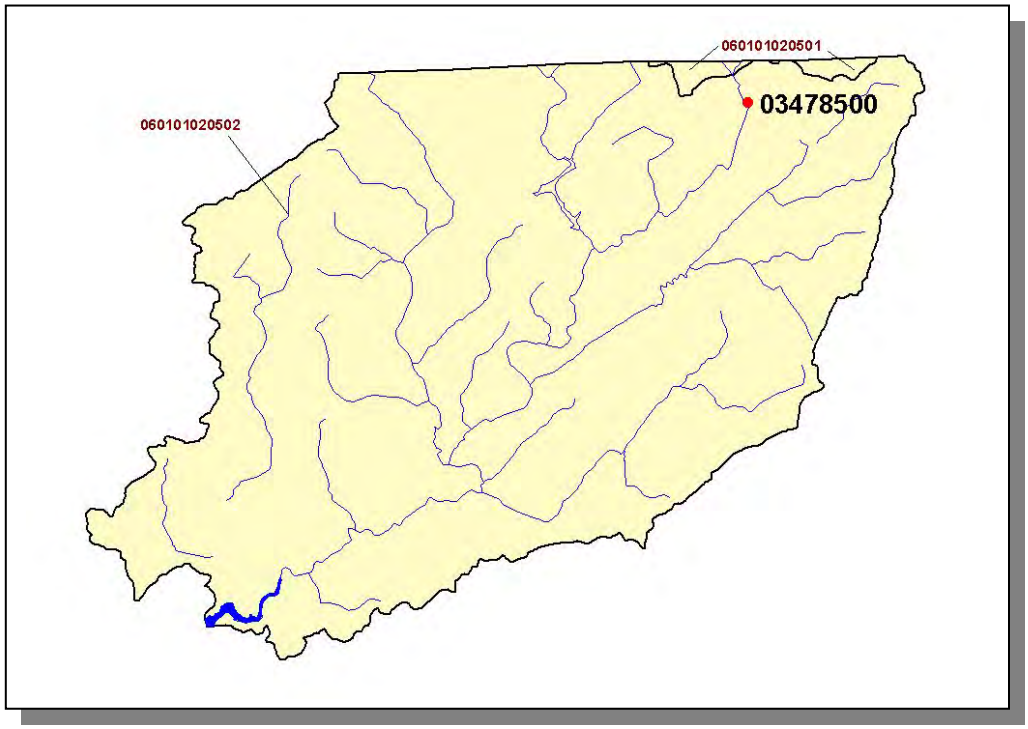


Figure 4-29. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601010205. *Subwatershed 060101020501 and 060101020502 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

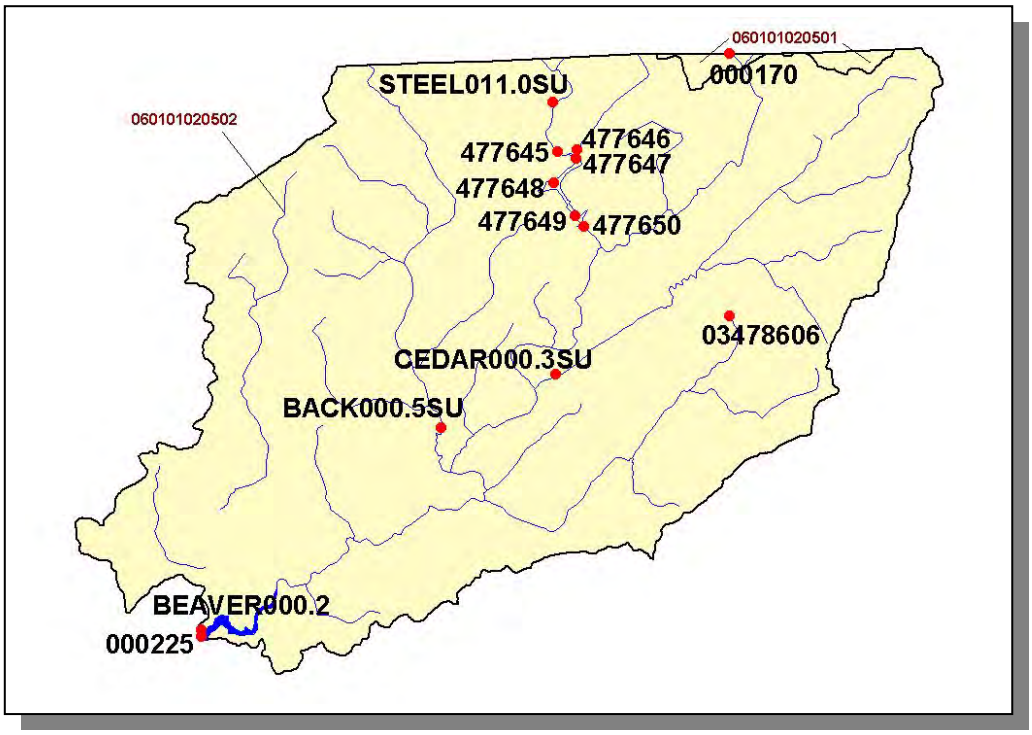


Figure 4-30. Location of STORET Monitoring Sites in Subwatershed 0601010205. *Subwatershed 060101020501 and 060101020502 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

4.2.D.ii. Point Source Contributions.

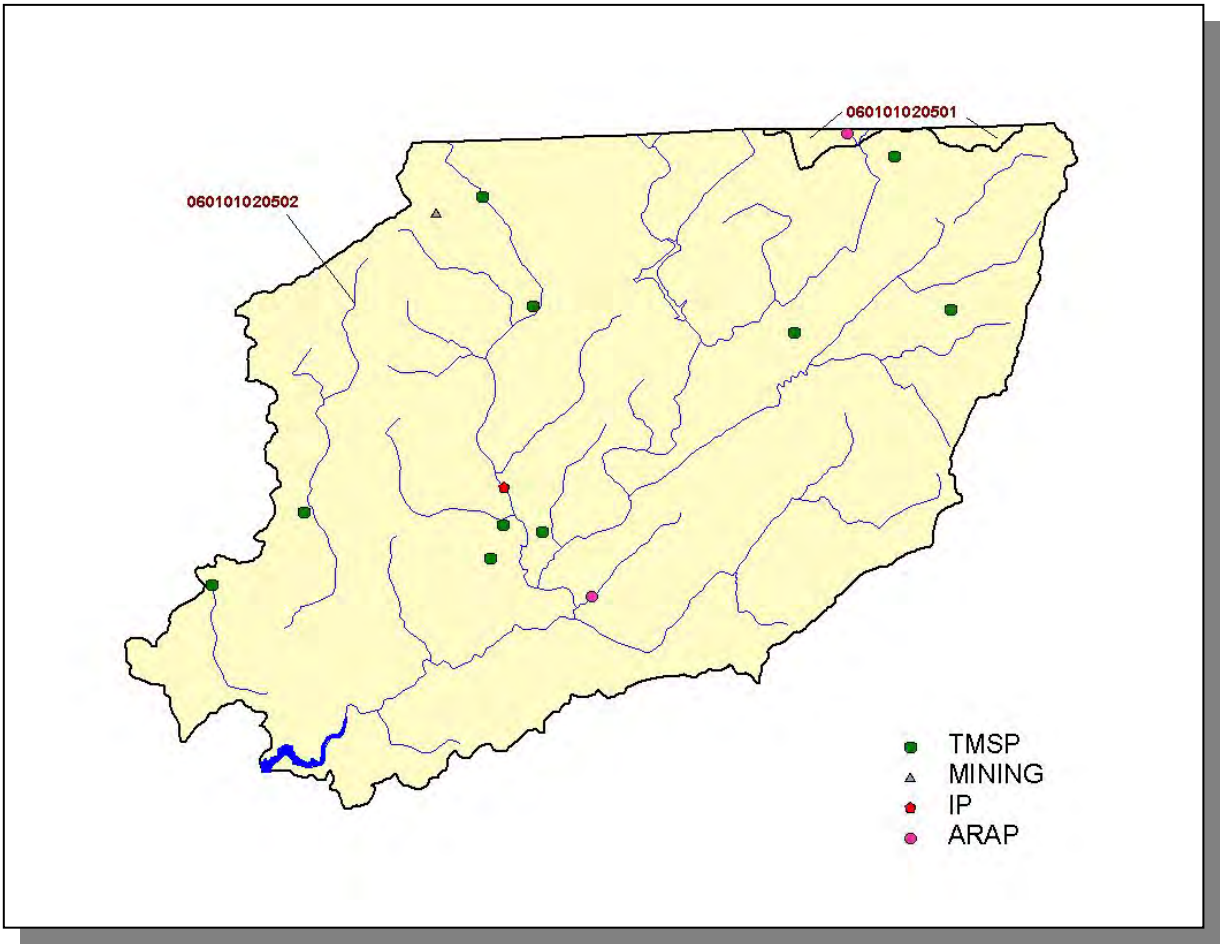


Figure 4-31. Location of Active Point Source Facilities in Subwatershed 0601010205. *Subwatershed 060101020501 and 060101020502 boundaries are shown for reference. More information is provided in the following figures.*

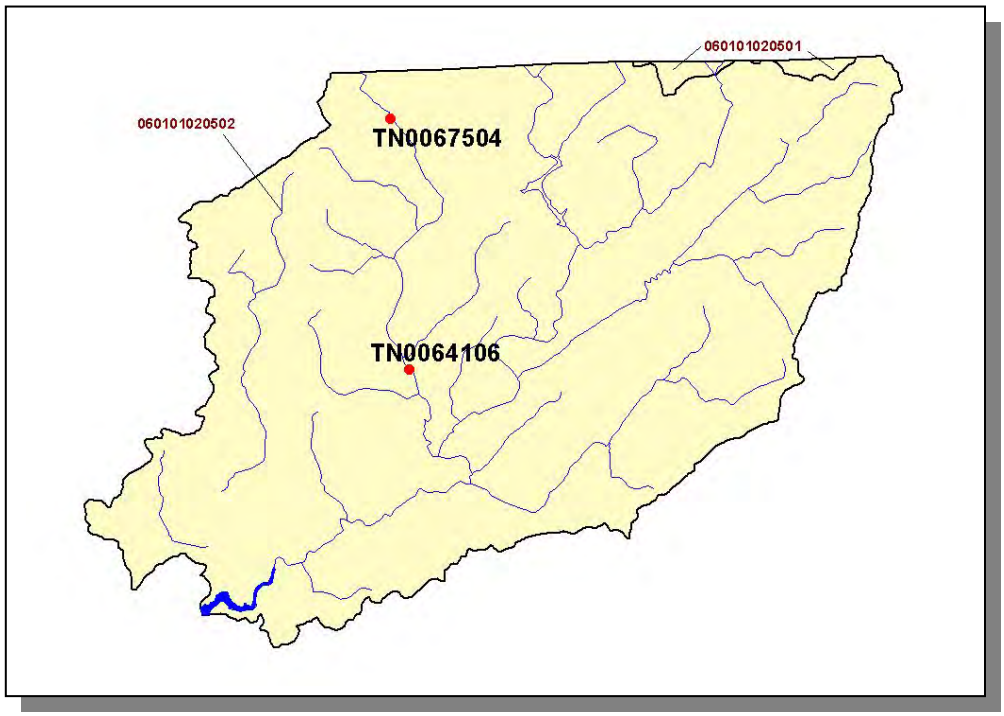


Figure 4-32. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 0601010205. *Subwatershed 060101020501 and 060101020502 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

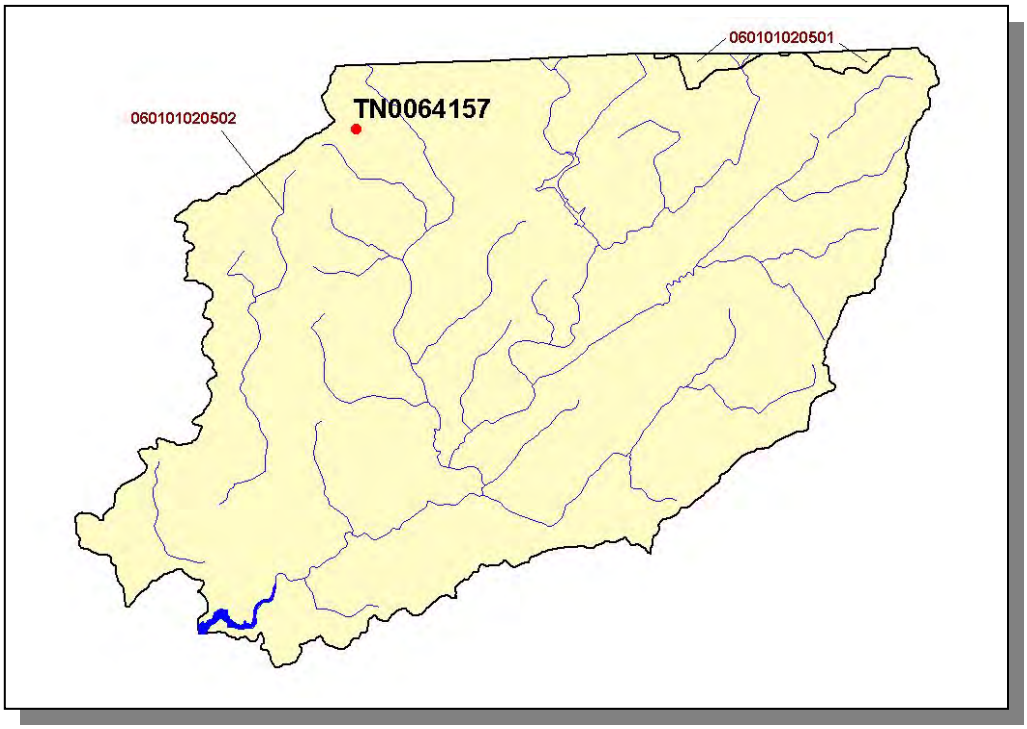


Figure 4-33. Location of Active Mining Sites in Subwatershed 0601010205. *Subwatershed 060101020501 and 060101020502 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

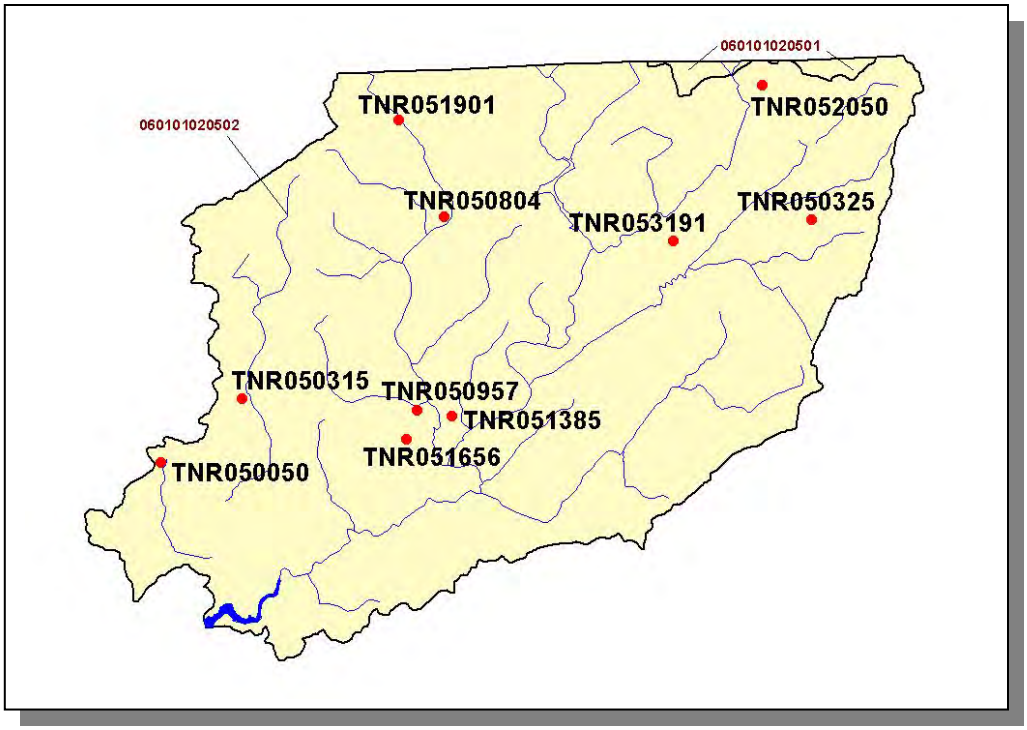


Figure 4-34. Location of TMSP Facilities in Subwatershed 0601010205. *Subwatershed 060101020501 and 060101020502 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

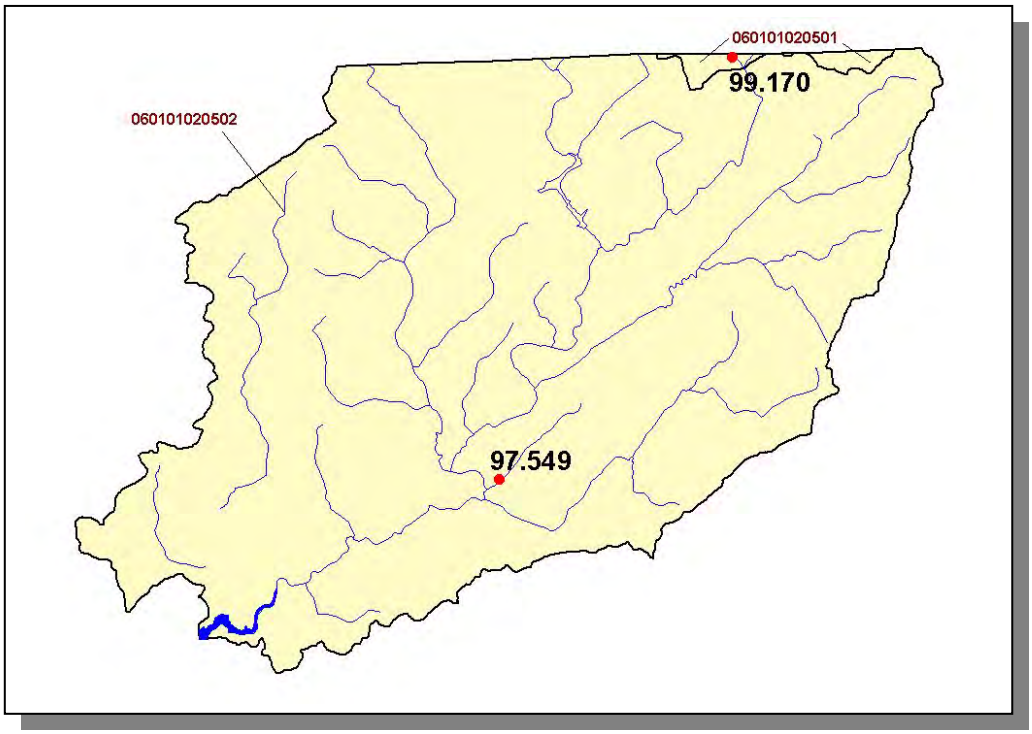


Figure 4-35. Location of ARAP Sites (Individual Permits) in Subwatershed 0601010205. *Subwatershed 060101020501 and 060101020502 boundaries are shown for reference. More information is provided in SF Holston-Appendix IV.*

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

There are two NPDES facilities discharging to water bodies listed on the 1998 303(d) list in Subwatershed 0601010205:

- TN0064106 (Unisys Corp.-Earhart Site) discharges to an unnamed trib of Back Creek @ RM 1.4
- TN0067504 (Maymead Materials) discharges to an unnamed trib of back Creek @ RM 5.5

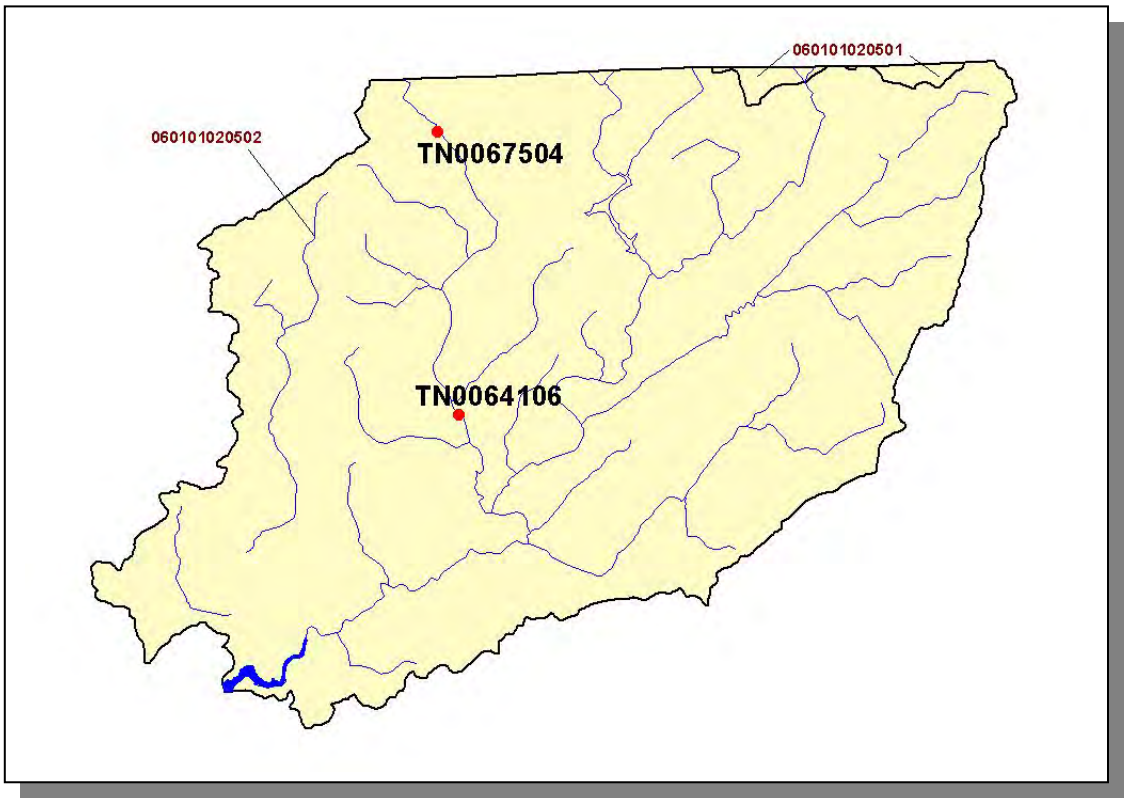


Figure 4-36. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 0601010205. *Subwatershed 060101020501, and 060101020502 boundaries are shown for reference. The names of facilities are provided in SF Holston-Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0064106					0.10100
TN0065504					0.03500

Table 4-24. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0601010205. *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	TSS	pH
TN0064106	X	X	X
TN0067504			X

Table 4-25. Inorganic Parameters Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0601010205. *Wet, Whole Effluent Toxicity; TSS, Total Suspended Solids.*

PERMIT #	OIL and GREASE	1,2-DICHLOROBENZENE	TOLUENE
TN0064106		X	X
TN0067504	X		

Table 4-26. Organic Parameters Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0601010205.

PERMIT #	75-34-3	75-35-4	156-60-5	79-34-5	71-55-6	79-01-6	127-18-4
TN0064106	X	X	X	X	X	X	X

Table 4-27. Chlorinated Ethanes Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 0601010205. *CAS (Chemical Abstract System) Codes: 75-34-3, 1,1-Dichloroethane; 75-35-4, 1,1-Dichloroethene; 156-60-5, 1,2-trans-Dichloroethene; 79-34-5, Tetrachloroethane; 71-55-6, 1,1,1-Trichloroethane; 79-01-6, Trichloroethene; 127-18-4, Tetrachloroethene.*

4.2.D.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	Milk Cow	Cattle	Chickens	Hogs	Sheep
1,563	126	3,447	<5	12	8

Table 4-28. Summary of Livestock Count Estimates in Subwatershed 0601010205. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Sullivan	123.7	123.7	0.1	0.3

Table 4-29. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0601010205.

CROPS	TONS/ACRE/YEAR
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.35
Non Agricultural Land Use	0.00
Corn (Row Crops)	8.20
Tobacco (Row Crops)	3.62
Grass (Hayland)	0.42
Legume/Grass (Hayland)	0.16
Grass (Pastureland)	1.39
Grass, Forbs, Legumes (Mixed Pasture)	1.61
Other Land in Farms	0.02

Table 4-30. Annual Soil Loss in Subwatershed 0601010205.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE SOUTH FORK HOLSTON RIVER WATERSHED

5.1 Background

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

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

5.1. 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 South Fork Holston River Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS.

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

Performance & Results Measurement System (PRMS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRMS may be viewed at http://prms.nrcs.usda.gov/prms. From the opening menu, select "Reports," then select the Conservation Treatment of interest on the page that comes up. Select the desired location and time period from the drop down menus and choose "Refresh." Choose "by HUC" in the "Location" option and choose "Refresh" again.

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

CONSERVATION PRACTICE	TOTAL
Comprehensive Nutrient Management Plans (Number)	0
Conservation Buffers (Acres)	41
Erosion Reduction (Tons/Year)	3,073
Inventory and Evaluations (Number)	25
Irrigation Management (Acres)	0
Nutrient Management (Acres)	1,381
Pest Management (Acres)	1,500
Prescribed Grazing (Acres)	74
Residue Management (Acres)	1
Tree and Shrub Practices (Acres)	16
Waste Management (Number)	0
Wetlands Created, Restored, or Enhanced (Acres)	9
Wildlife Habitat (Acres)	737

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

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

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

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

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

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

Endangered Species Program. Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available under the ESA, including prohibitions on killing, harming or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program. For a complete listing of endangered and threatened species in the South Fork Holston River watershed, please visit the Service's website at http://www.cookeville.fws.gov.

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

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

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

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

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

How To Participate:

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

- Project installation begins.
- When the project is completed, the Service reimburses the landowner after receipts and other documentation are submitted according to the Wildlife Extension Agreement.

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

5.2.D. Tennessee Valley Authority (TVA). Tennessee Valley Authority (TVA). TVA's 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 12 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 South Fork Holston watershed.

VITAL SIGNS MONITORING

Reservoir Monitoring. TVA has monitored the quality of water resources of South Holston, Boone and Fort Patrick Henry Reservoirs regularly as part of its Vital Signs Monitoring effort since 1991. Physical, chemical, and biological indicators (dissolved oxygen, chlorophyll, sediment chemistry, benthos, and fish) provide information from various habitats on the ecological health of the reservoirs. These parameters are sampled on Boone Reservoir at mid-reservoir (WRM 6.5), and near Boone Dam (SFHRM 19.00). Sampling on South Holston Reservoir is done at mid-reservoir (SFHRM 60.00) and near South Holston Dam (SFHRM 50.0). Sampling on Fort Patrick Henry Reservoir is done at Fort Patrick Henry Dam (SFHRM 8.2).

Numeric ratings are given to all of the indicators sampled at each station. The lowest possible rating for any indicator is 1 (poorest condition) while the highest rating is 5 (best condition). Sediment chemistry is an exception; 0.5 is the lowest rating, 2.5 the highest. This information is used to evaluate conditions at each location as well as to develop an ecological health score for the reservoir. To obtain this score, ratings from all locations are summed and divided by total possible points for the reservoir. The result is then multiplied by 100. The lowest possible score is 20, the highest is 100.

The following charts present Reservoir Vital Signs scores for each year for which data are comparable. Boone rated poor in 2001—continuing a trend of poor to fair ratings since TVA began monitoring it in 1991. Conditions in 2001 were much better, however, than when the reservoir was last monitored in 1999. The 1999 score was the lowest ever observed in TVA monitoring—primarily because dissolved oxygen, chlorophyll, and

bottom life rated poor at more monitoring sites. Meteorological conditions and related changes in reservoir flows appear to a significant factor in the differences among years.

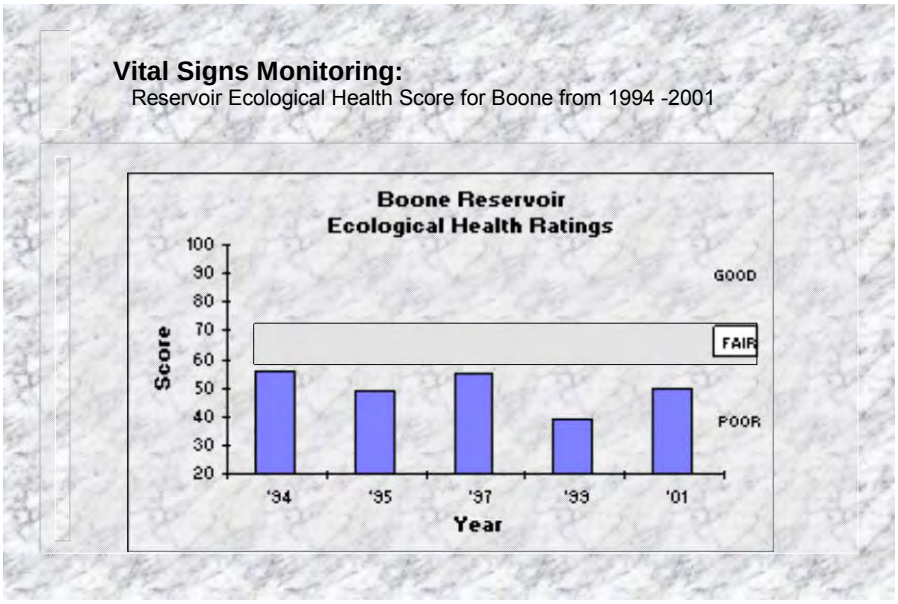


Figure 5-1. Vital Signs Monitoring for Boone Reservoir (1994-2001)

TVA monitored South Holston Reservoir annually from 1991 through 1994 to establish baseline data on the reservoir's ecological health under a range of weather and flow conditions. South Holston is now evaluated every other year.

South Holston Reservoir rated poor in 2000. Conditions were similar to those observed in 1996 and 1998. South Holston rated fair in previous years primarily because of improved ratings for chlorophyll and bottom life.

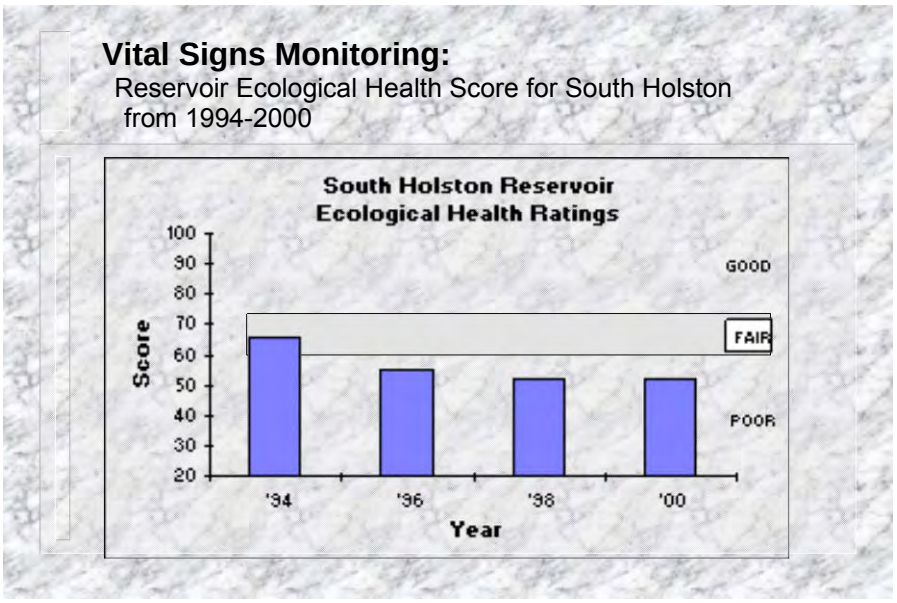


Figure 5-2. Vital Signs Monitoring for South Holston Reservoir (1994-2000)

TVA monitored Fort Patrick Henry Reservoir annually from 1993 to 1997 to establish baseline data on the reservoir's ecological health under a range of weather and flow conditions. Fort Patrick Henry is now monitored every other year. The fair rating in 2001 was a slight improvement over previous years, but not appreciably different. The main issues in Fort Patrick Henry are consistent from year to year—generally high chlorophyll concentrations and fair to poor ratings for fish, bottom life and sediment.

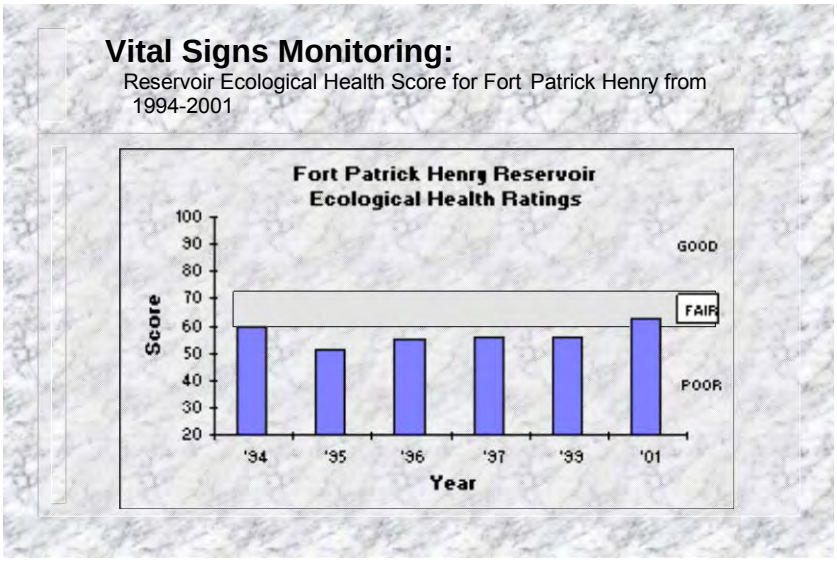


Figure 5-3. Vital Signs Monitoring for Fort Patrick Henry Reservoir (1994-2001)

Bacteriological Sampling. Five sites on Boone Reservoir were sampled ten times each for fecal coliform bacteria in 2002. All sites except Pickens Bridge boat ramp on Boone Reservoir met the State of Tennessee bacteriological water quality criteria for water contact recreation [Tennessee's criteria for water contact recreation requires the collection of at least 10 fecal coliform samples within a 30 day period, with a geometric mean less than 200 fecal coliform colonies per 100 milliliters of water. Also, no single sample should exceed 1,000 colonies per 100 milliliters.]. At Pickens Bridge boat ramp one sample exceeded 1000 colonies per 100 milliliters. Five sites on South Holston Reservoir were sampled ten times for fecal coliform in 2000. A likely source of contamination is the large numbers of Canadian geese present at this site. The following sites met state guidelines for water contact: Laurel Yacht Club Marina, Painter Creek Dock swimming area, and Observation Knob Park swimming area. Two sites on Fort Patrick Henry Reservoir were sampled for fecal coliform bacteria in 2001. Elevated bacteria levels were found in several samples collected at Warriors' Path State Park where large numbers of Canada geese are present and are a likely source of contamination. However, there are no State of Tennessee swimming advisories on Boone, South Holston or Fort Patrick Henry Reservoirs. Samples were collected at the following locations:

Reservoir/River	Site Name	Location	Type of Site
Boone	Boone Dam TVA Beach	SHRM 18.7	swim
Boone	Jays Dock Boat Ramp	WRM 5.5L	boat ramp
Boone	Pickens Bridge Boat Ramp	WRM 5.9L	boat ramp
Boone	Wing Deer Park	WRM 10.7	swim
Boone	Bluff City Park	SFHRM 34.5	swim
Fort Patrick Henry	Warrior Path State Park Beach	SHRM 11.8	swim
Fort Patrick Henry	Warrior Path State Park Swim Area	SHRM 11.8	swim
South Holston	Laurel Yacht Club Marina	SHRM 57.6R	boat ramp
South Holston	Painter Creek Dock Swim Area	SHRM 60.0R	swim
South Holston	Observation Knob Park (formerly Sullivan County Park)	SHRM 60.5R	swim
South Holston	Washington County Park	SFHRM 62.2	swim
South Holston	TVA Access Area 6 (Whitaker Hollow)	SFHRM 70.8	canoe

Swimming beaches are scheduled for sampling every year and boat ramps every other year. Data from this sampling effort is shared in a timely manner with TDEC's Division of Water Pollution Control.

Fish Flesh Toxic Contaminants. The State of Tennessee has issued a precautionary advisory for catfish and carp from Boone Reservoir because of PCB and chlordane contamination. The last time TVA sampled Boone was in autumn 1997. Channel catfish fillets were analyzed for pesticides, PCBs, and metals and largemouth bass for mercury. The results, which were provided to state agencies for appropriate action, were similar to previous years. There are no fish consumption advisories on South Holston and Fort Patrick Henry Reservoirs. The last time TVA sampled channel catfish and largemouth bass from South Holston Reservoir was in autumn 2000. All contaminant levels were either below detectable levels or below the levels used by the state to issue fish consumption advisories. TVA will analyze fish from South Holston again in the autumn of 2004. The last time TVA sampled channel catfish and largemouth bass from Fort Patrick Henry Reservoir was in autumn 1997. All contaminant levels were either below detectable levels or below the levels used by the state to issue fish consumption advisories.

Further information on Vital Signs Monitoring can be obtained by writing to Tyler Baker at: Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee, 37402 or calling him at 423-876-6733. Email address: tfbaker@tva.gov

STREAM BIOASSESSMENT

The condition of water resources in South Fork Holston 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 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 27 sites are sampled in the South Holston drainage. 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 is cfsaylor@tva.gov

WATERSHED ASSISTANCE

Outreach. 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. The Clean Boating Campaign on Boone Reservoir began in 1999 and on South Holston and Fort Patrick Henry Reservoirs in 2000. Materials were distributed at local marinas that expressed an interest in the program and at public access areas. TVA plans to continue this partnership in upcoming years by working with the marinas, Boone Watershed Partnership, Boone Lake Association, and Friends of Fort Patrick Henry.

The Tennessee Valley Clean Marina Initiative is an effort by TVA to promote environmentally-responsible marina practices. A voluntary program, established in support of the National Clean Boating Campaign, helps marina operators protect the resource that provides them with their livelihood. Laurel Marina on South Holston Reservoir received the Clean Marina award in 2002.

The Boone Watershed Partnership (BWP) was established in August 1995 by TVA. The Boone Watershed Partnership is an organization dedicated to improving water quality and aquatic habitat. It includes agencies, citizens, local governments and others interested in working together to identify pollution problems and solutions within the Boone Watershed. Visit their website at http://www.geocities.com/boonewatershed or call Ken Chase (Chairman) at 423-975-0357 or email: chasekr@xtn.net for more information.

The Boone Lake Association's purpose is to "unite all friends, businesses, organizations, politicians, and corporations who would further and assist in the common cause of keeping Boone Lake clean and pure, not only for now but for generations to come." TVA has supported the association by providing financial support for their litter cleanups. We are helping them expand their program with other projects like the Clean Boating Campaign and riparian buffers and shoreline stabilization demonstrations.

Friends of Fort Patrick Henry is an organization dedicated to improving water quality in Fort Patrick Henry Reservoir. The group is made up of property owners, citizens, and local government agencies. Cleanups are held several times a year. For further information, contact Harry Miles at 423-239-8242, or hmiles@charter.net

The Holston River Watershed Alliance was established in February 2000 by TVA and is developing a shared vision for improved water quality for the greater Kingsport area. For information on how to become involved in this partnership effort, contact Sam Jones (Chairman) 423-239-8225 or Liesa Jenkins 423-246-2017.

Protection and Restoration Activities. TVA provides funding and technical assistance for protection and restoration activities to various organizations in the two counties in the Tennessee portion of the South Fork Holston River Watershed. The Boone Lake Association (BLA) is actively cleaning up Boone Reservoir. TVA provides funding for a winter drift and debris removal as well as regular clean-ups for about 25 high priority camping areas along the reservoir. The association along with other organizations and TVA sponsored a Boone Reservoir cleanup day for the third time in 2002. BLA provides

year-long cleanup with volunteers and paid staff employees. TVA supports the Keep Kingsport Beautiful and Keep Bristol Beautiful Teams in all of its Keep America Beautiful endeavors. TVA supported the 2nd Annual Fort Patrick Henry Lake Cleanup, 3rd Annual Boone Lake Cleanup, 3rd Annual Beaver Creek Cleanup, and 10th Annual South Holston Lake/River Cleanup during 2002. Additional cleanups were conducted on Tranbarger Banch, Madd Branch, and Reedy Creek. TVA, through the Boone Watershed Partnership, partnered with Steele Creek Park in Bristol to complete the second year of a six-year project to stabilize shoreline on Steele Creek Park Lake. TVA continually partners with Sullivan County Park to improve critical shoreline stabilization projects on South Holston Reservoir. A shoreline stabilization project was also completed at Warriors' Path State Park on Fort Patrick Henry Reservoir.

5.2.E. United States Army Corps of Engineers-Nashville District. The geographic boundaries of the Nashville District Corps of Engineers consist of the Cumberland and Tennessee River basins, a combined area of approximately 59,000 square miles. This includes portions of seven states: Tennessee, Kentucky, Alabama, Virginia, Mississippi, Georgia, and North Carolina.

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

Beaver Creek (South Fork Holston River). The Nashville District is performing a Flood Damage Reduction Study to evaluate flood problems occurring in the twin cities of Bristol, Tennessee and Bristol, Virginia. Various construction activities along Beaver Creek have been evaluated to determine the preferred means to alleviate flooding in the Bristol area. These measures include channel widening, bridge removal/replacement, building removal, construction of a diversion tunnel, and modification to an existing dry basin. Bridge removals and/or removals with replacements would reduce flooding by taking out piers and culverts that currently act as impediments to water flow and trap trash and debris. Channel widening would include the construction of a high flow bench approximately one foot above the existing streambed to aid in transport of high waters. In areas where channel widening is considered, in-stream structures would be added to provide variation in water flows and add additional aquatic habitat.

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

5.3. STATE PARTNERSHIPS.

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

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

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

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

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

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

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

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

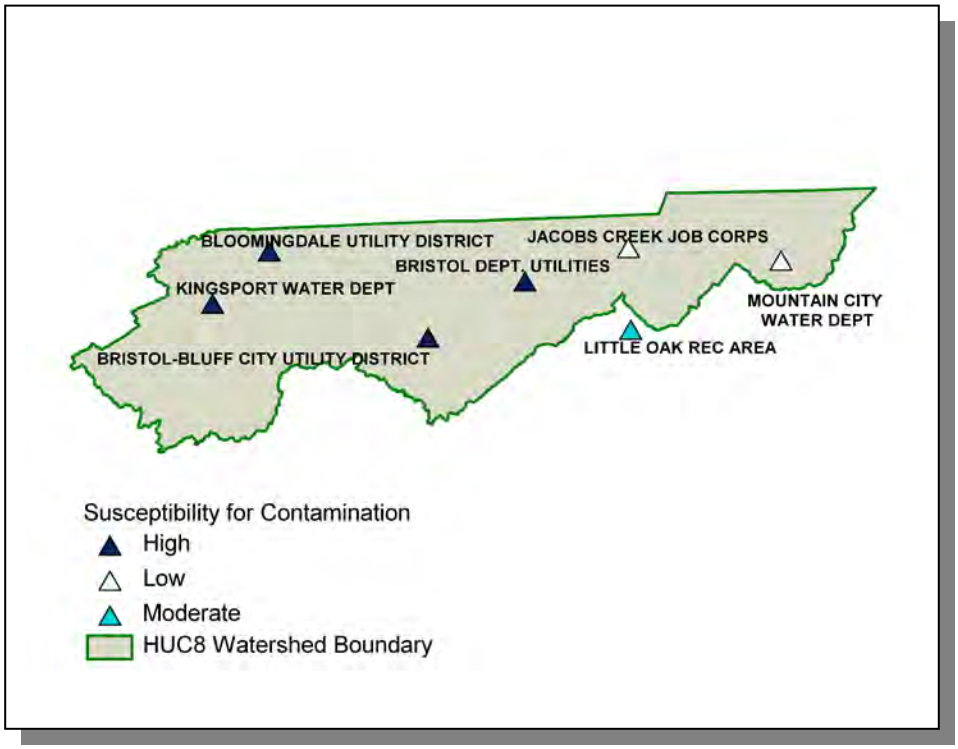


Figure 5-1. Susceptibility for Contamination in the South Fork Holston River Watershed.

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

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

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

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

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

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

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

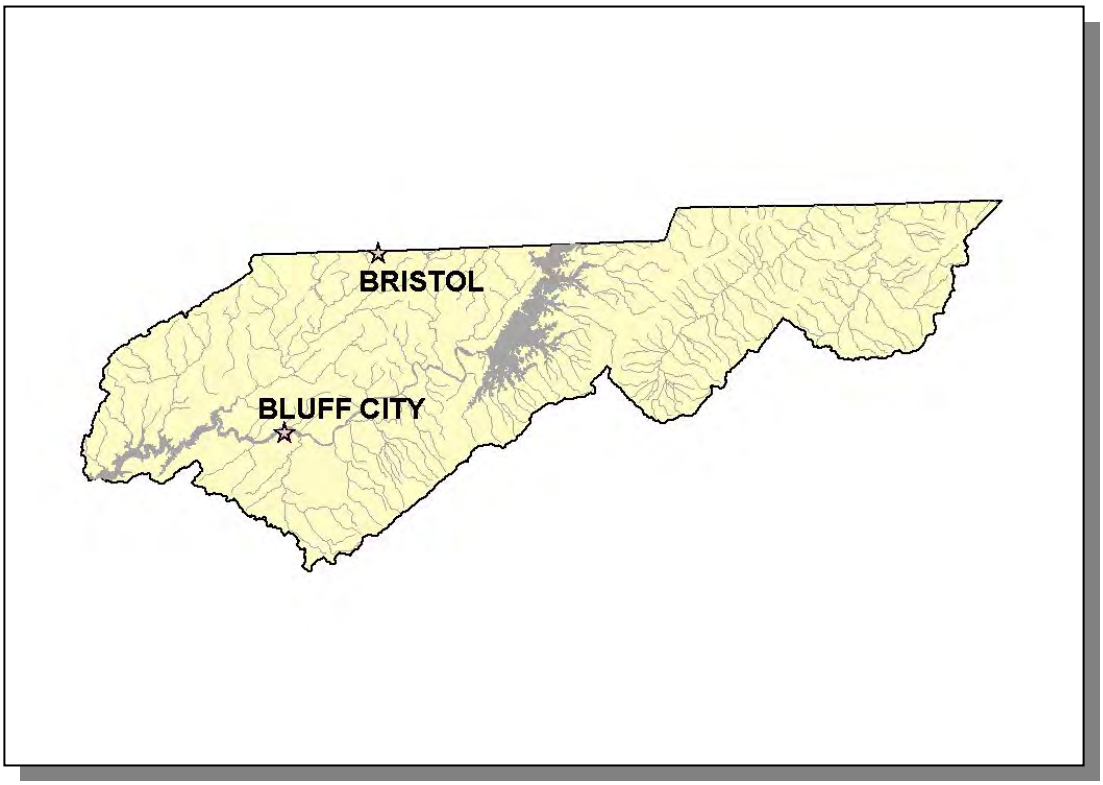


Figure 5-2. Location of Communities Receiving SRF Loans or Grants in the Group 2 Portion of the Tennessee Portion of South Fork Holston River Watershed. *More information is provided in SF Holston-Appendix V.*

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 South Fork Holston River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program, and the U.S. Environmental Protection Agency Assistance Agreements C9994674-99-0, C9994674-00-0, and C9994674-01-0.

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

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

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

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

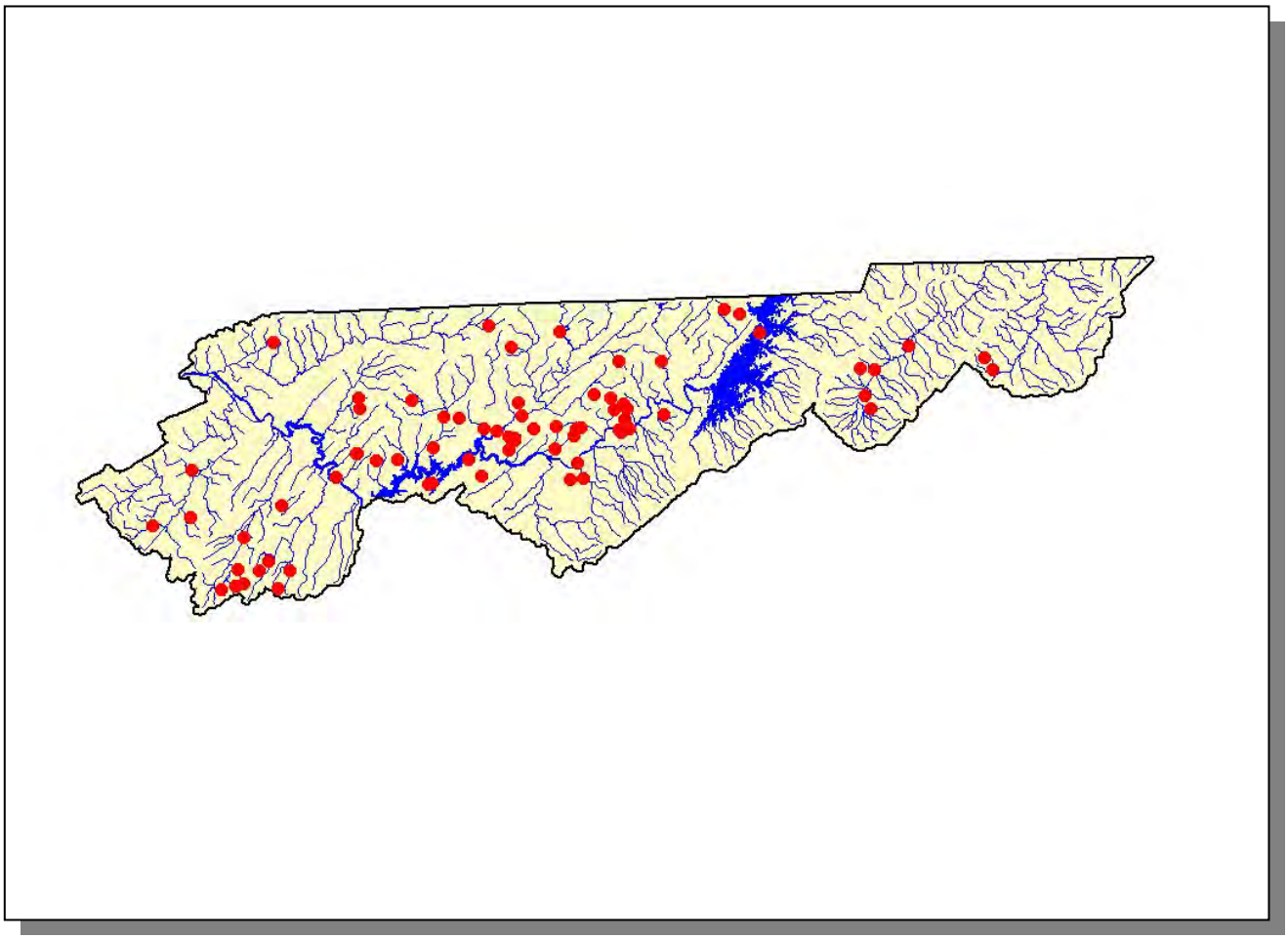


Figure 5-3. Location of BMPs installed from 1999 through 2002 in the South Fork Holston River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. *More information is provided in SF Holston-Appendix V.*

5.3.D. Virginia Department of Environmental Quality.

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

The State Water Control Board (SWCB) originally adopted the Tennessee-Big Sandy Water Quality Management Plan (WQMP) in 1977 as a regulatory document. The plan was later amended in 1980. In 1998, a draft plan, aimed at updating and replacing the existing Tennessee-Big Sandy WQMP, was developed. Although the 1998 draft went

through a public participation process, as of December 1, 2002, the 1998 draft plan has not been adopted by the State Water Control Board. Water Quality Management Plans in Virginia are in review for deregulation with the exceptions of Total Maximum Daily Load Limits and Permit effluent limits.

Authority for Water Quality Management Planning.

State Law: Section 62.1-44.15(13) of the Code of Virginia authorizes the SWCB to establish policies and programs for effective area wide and basin wide water quality control and management. Section 62.1-44.19:7 of the Code of Virginia authorizes the SWCB to develop and implement a plan to achieve fully supporting status for impaired waters of the state.

Federal Law: Water quality management plans are required by Section 303(e) of the Clean Water Act (CWA) as implemented by 40 CFR 130. In 2002 rules, EPA emphasis is on the Continuous Planning Process and watershed planning.

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

In order to meet these legislative needs, the Tennessee Big Sandy Water Quality Management Plan needs to be revised so that it complements the Section 305(b) Virginia Water Quality Assessment Report and the Section 303(d) Total Maximum Daily Load (TMDL) Priority List Report. Serving as a repository for EPA approved TMDL Reports and Implementation Plans for each impaired segment, the Plan would propose control measures and management strategies to address the priority point and nonpoint source water quality problems identified in these two reports.

It is the intention of DEQ staff to periodically update and amend the 1980 version of the Tennessee Big Sandy Water Quality Management Plan with a non-regulatory plan. The draft version developed in 1998 would be the springboard for a new document. Since the 1998 prototype was written, changes to the Clean Water Act, and U.S. Environmental Protection Agency (EPA) guidance specify additional elements that need to be included in water quality management plans. With this in mind, Virginia DEQ staff must make modifications so that not only the Tennessee Big Sandy Water Quality Management Plan is updated, but all Basin Plans reflect current data and scientific studies, new or revised legislation, procedures, policies and regulations, and changes in area growth and development.

Holston River Basin Total Maximum Daily Load Reports. There have been two Fecal Coliform Bacteria Total Maximum Daily Load Reports completed and approved in the Holston River Watershed to date. Four of these are grouped in one report. The report, Fecal Coliform TMDL Development for Cedar, Hall, Byers and Hutton Creeks, is available at the DEQ web site address http://www.deq.state.va.us/tmdl/tmdlrpts.html. These streams are tributaries to Middle Fork Holston River and are located around Meadowview, Emory and Glade Spring in Washington County, Virginia. The other study

that has been approved is Little Creek, a tributary to Beaver Creek, which flows through Bristol, Virginia/Tennessee.

Implementation Plans. In 1998 state legislation, plans to implement approved total maximum daily loads for impaired streams were mandated. The Department of Conservation and Recreation, through a memorandum of understanding with Department of Environmental Quality, have taken a lead role in instances where the sources of impairment are due to non point influences. One such plan has been completed in the Holston River Watershed. That implementation plan is for the Cedar, Hall, Byers and Hutton Creek bacteria TMDL report.

Beginning in June 2000, the Department of Conservation and Recreation (DCR) held meetings with grassroots public participation to develop an Upper Tennessee River Watershed Strategic Plan. The purpose of this document is to assess the quality of waters and to identify ways to make them healthy. Strategies were recommended for the broad categories of land uses that were identified as impacting water quality. An umbrella group, Upper Tennessee River Roundtable, is using this document as a spring-board for writing grant applications to implement some of the recommended strategies.

Future TMDL Studies for the Holston River Watershed. Three TMDL studies are targeted to be completed by April 2004 in the basin. Hutton, Cedar, Hall and Byers Creeks have a benthic TMDL study underway now. Beaver Creek, in Bristol and Washington County, Virginia is scheduled for a TMDL for both bacteria and benthic impairments. North Fork Holston River in Smyth County is on the schedule for a benthic TMDL by April 2004.

DEQ maintains a web site for Total Maximum Daily Load Reports that can be referred to periodically for the latest studies. Current water quality data and assessments are available at the DEQ web site, http://www.deq.state.va.us, as well.

For questions about impaired segments of the Tennessee River Basin headwaters in Virginia, you may contact Nancy T. Norton, P.E. at (276)676-4807 or by e-mail at ntnorton@deq.state.va.us.

CHAPTER 6

FUTURE DIRECTIONS IN THE SOUTH FORK HOLSTON RIVER WATERSHED

6.1. Background

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

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

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

6.1. BACKGROUND.

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

In addition to the NPDES program, some state and federal regulations, such as the TMDL and ARAP programs, address point and nonpoint issues. Construction and MS4 stormwater rules (implemented under the NPDES program) are transitioning from Phase 1 to Phase 2. More information on stormwatrer rules may be found at: http://www.state.tn.us/environment/wpc/stormh2o/MS4.htm.

This Chapter addresses point and nonpoint source approaches to water quality problems in the South Fork Holston River Watershed as well as specific NPDES permit tee information.

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

6.2.A. Year 1 Public Meeting. The first South Fork Holston River Watershed public meeting was held April 9, 1997 in Bristol. 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

- Need to work with all agencies to control Nonpoint sources of pollution
- EPA or TVA needs to reduce pollution from neighboring states (Virginia)
- Need better water quality standards for lakes
- Effect of lawsuits on Tennessee
- Effect of Watershed Approach on permit limits
- Business growth opportunities in watershed plans

6.2.B. Year 3 Public Meeting. The second South Fork Holston River Watershed public meeting was held July 29, 1999 at the Bristol Municipal Building. The goals of the meeting were to 1)provide an overview of the watershed approach, 2)review the monitoring strategy, 3)summarize the most recent water quality assessment, 4)discuss the TMDL schedule and citizens' role in commenting on draft TMDLs, and 5)discuss BMPs and other nonpoint source tools available through the Tennessee Department of Agriculture 319 Program and NRCS conservation assistance programs.

Major Concerns/Comments

- Pollution from Virginia (Beaver Creek) affects Tennessee waters
- Attendance at meetings and advertising meeting dates needs improvement
- 303(d)-listed streams need TMDLs now

6.2.C. Year 5 Public Meeting. The third scheduled South Fork Holston River Watershed public meeting was held October 28, 2003 at the Sullivan County Regional Health Center. The meeting featured eight educational components:

- Overview of draft Watershed Water Quality Management Plan slide show
- Benthic macroinvertebrate samples and interpretation
- SmartBoard™ with interactive GIS maps
- "How We Monitor Streams" self-guided slide show
- "Why We Do Biological Sampling" self-guided slide show
- Citizen Group Displays (Boone Lake Association, Kingsport Tomorrow, Beaver Creek Watereshed Alliance, Holston River Alliance, Friends of Fort Patrick Henry Lake)
- Tennessee Valley Authority display
- University display (East Tennessee State University)

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

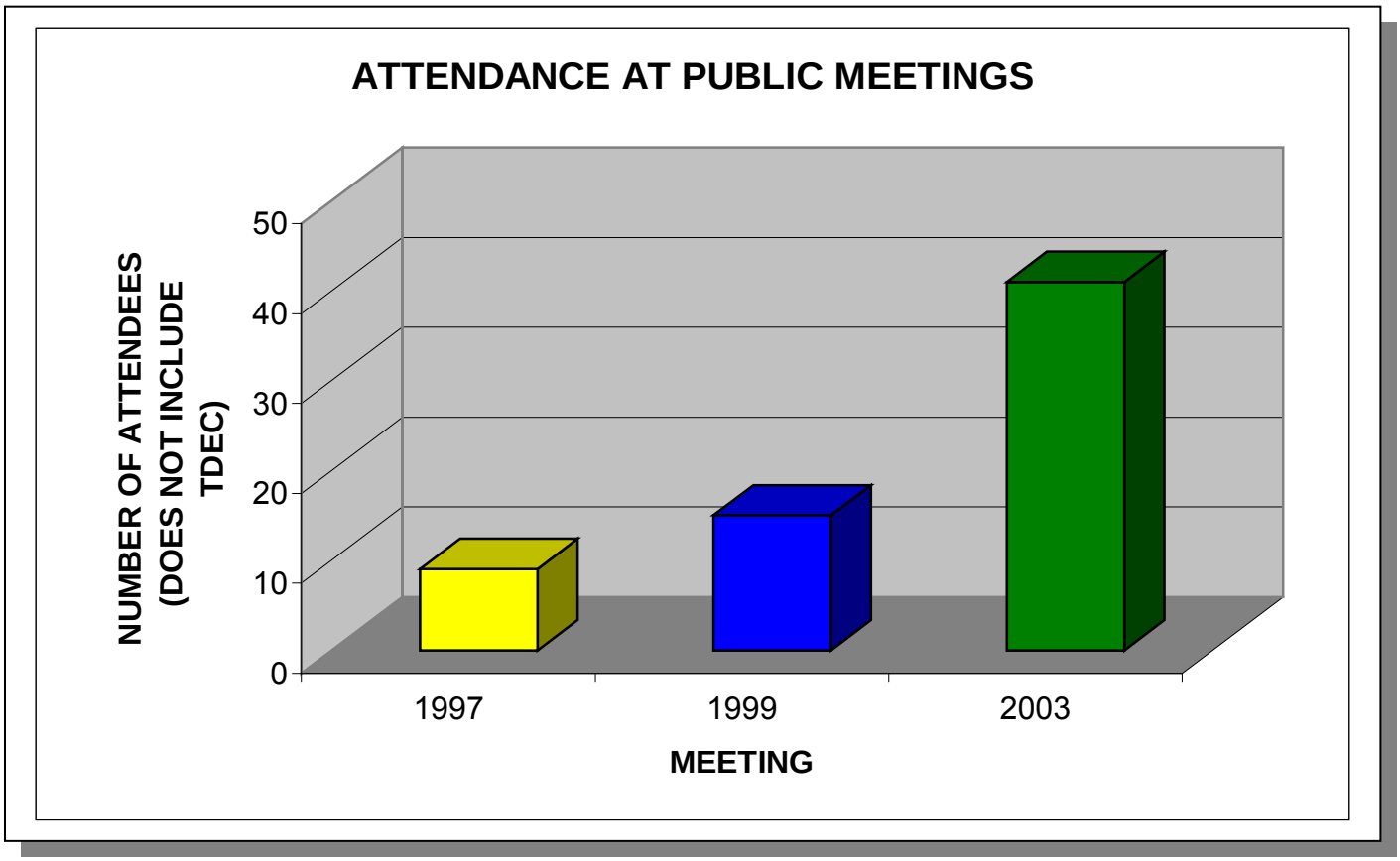


Figure 6-1. Attendance at Public Meetings in the South Fork Holston River Watershed.

Figure 6-2. Informal discussions are important in meeting citizens' interest in understanding Water Pollution Control's activities in the watershed, and in communicating to the Department any concerns they might have.

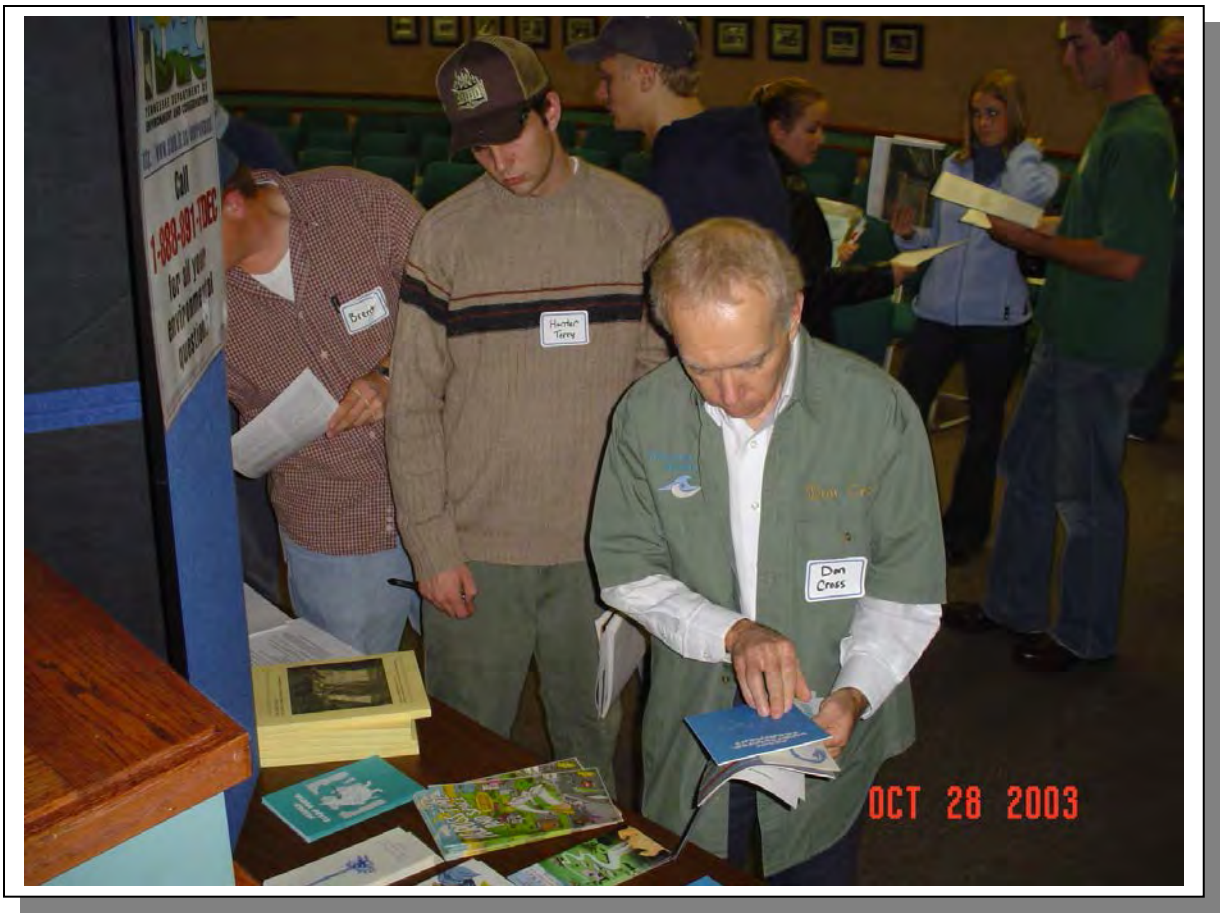


Figure 6-3. Free literature taken by public meeting attendees help communicate TDEC's activities to meeting participants.

Figure 6-4. Students learn about the relationship between aquatic insects and water quality at the watershed public 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.php

TMDLs are prioritized for development based on many factors.

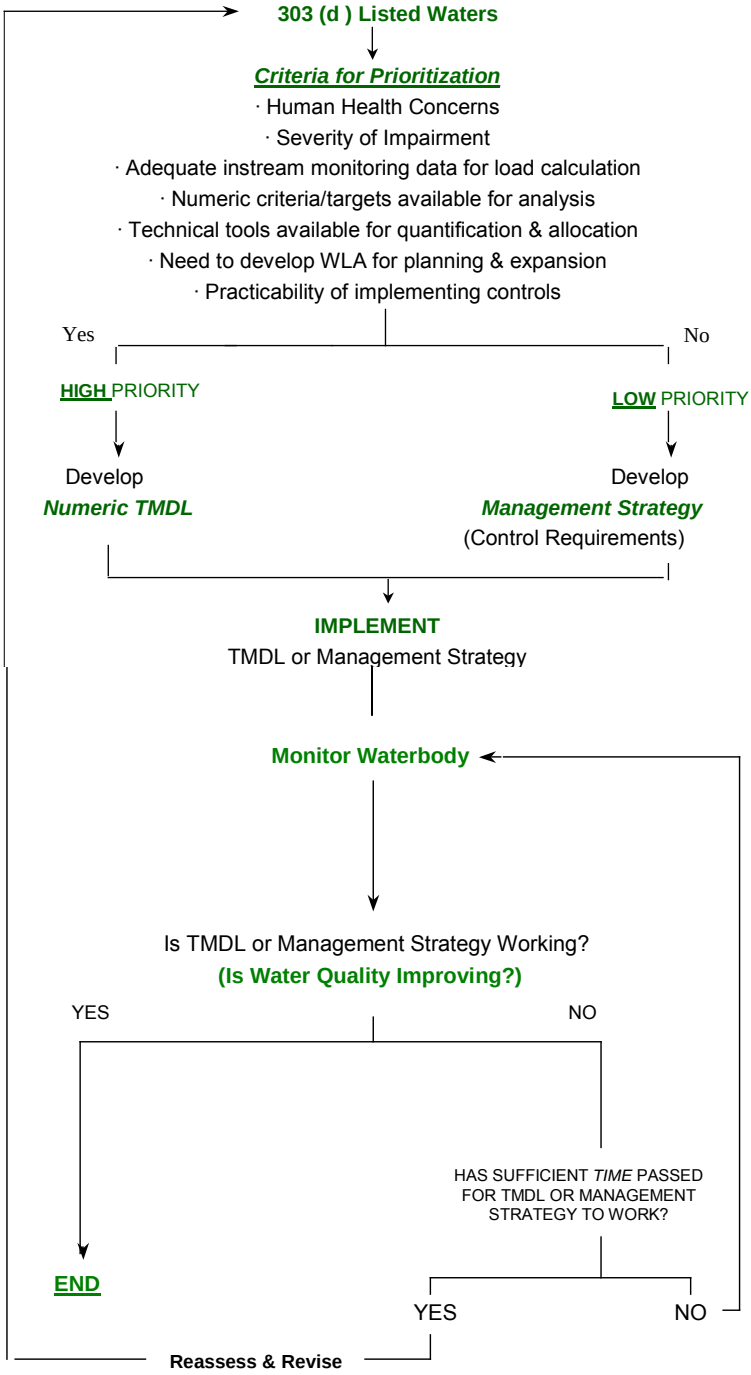


Figure 6-5. Prioritization scheme for TMDL Development.

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 and drains to a stream, existing point source regulations can have only a limited effect, so other measures are necessary.

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

The following text describes certain types of impairments, causes, suggested improvement measures, and control strategies. The suggested measures and streams are only examples and efforts should not be limited to only those streams and measures mentioned.

6.3.B.i. Sedimentation.

6.3.B.i.a. From Construction Sites. Construction activities have historically been considered “nonpoint sources.” In the late 1980’s, EPA designated them as being subject to NPDES regulation if more than 5 acres are disturbed. In the spring of 2003, that threshold became 1 acre. The general permit issued for such construction sites sets out conditions for maintenance of the sites to minimize pollution from stormwater runoff, including requirements for installation and inspection of erosion controls. Also, the general permit imposes more stringent inspection and self-monitoring requirements on sites in the watershed of streams that are already impaired due to sedimentation. Examples in the Group 2 portion of the South Fork Holston River Watershed are Back Creek and Muddy Creek. 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 in the drainage of high quality waters. Beaver Dam Creek and Gentry Creek are examples of high quality streams in the Group 2 portion of the South Fork Holston River Watershed.

6.3.B.i.b. From Channel and/or Bank Erosion. Due to the past channelization of Back Creek and Beaver Creek, and other South Fork Holston River tributaries, the channels are unstable. Several agencies are working to stabilize portions of stream banks. These include NRCS and the Tennessee Valley Authority, as well as watershed citizen groups. Other methods or controls that might be necessary to address common problems are:

Voluntary activities

- Re-establishment of bank vegetation (example: Back Creek).
- Establish off channel watering areas for livestock by moving watering troughs and feeders back from stream banks (examples: tributaries of Back Creek, Beaver Creek, and Boone Lake).
- Limit cattle access to streams and bank vegetation (example: Beaver 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: Muddy Creek, Beaver Creek, Cedar Creek, Paperville Creek, and Whitetop Creek).
- Limit livestock access to streams and bank vegetation (example: Beaver Creek).
- Restrictions requiring post construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion (examples: Muddy Creek, Beaver Creek, Cedar Creek, Paperville Creek, and Whitetop Creek).
- Additional restrictions on logging in streamside management zones.
- Prohibition on clearing of stream and ditch banks (examples: Paperville Creek, Beaver Creek, and Whitetop Creek). *Note: Permits may be required for any work along streams.*
- Additional restriction to road and utilities crossings of streams.
- Restrictions on the use of off-highway vehicles on stream banks and in stream channels.

6.3.B.i.c. From Agriculture and Silviculture. Even though there is an exemption in the Water Quality Control Act stating that normal agricultural and silvicultural practices that do not result in a point source discharge do not have to obtain a permit, efforts are being made to address impacts due to these practices.

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

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. Buck Creek had already had several BMPs installed to address the sediment lost from fields in this watershed.

6.3.B.ii. Pathogen Contamination.

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

Other measures that may be necessary to control pathogens are:

Voluntary activities

- Off-channel watering of livestock (examples: tributaries of Back Creek, Beaver Creek and Boone Lake).
- Limiting livestock access to streams (examples: Back Creek and Steele Creek).
- Proper management of animal waste from feeding operations.

Enforcement strategies

- Greater enforcement of regulations governing on-site wastewater treatment.
- Timely and appropriate enforcement for non-complying sewage treatment plants, large and small, and their collection systems.
- Identification of Concentrated Animal Feeding Operations not currently permitted, and enforcement of current regulations.

Additional strategies

- Restrict development in areas where sewer is not available and treatment by subsurface disposal is not an option due to poor soils, floodplains, or high water tables.
- Discourage the creation of “duck ponding” that attracts waterfowl.
- Develop and enforce leash laws and controls on pet fecal material (example: Beaver Creek).
- Greater efforts by sewer utilities to identify leaking lines or overflowing manholes (example: Beaver 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 and from fertilized lawns and croplands.

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 (examples of streams that could benefit are Beaver Creek, Cedar Creek, Muddy Creek, and areas along stream channels). Streamside vegetation can filter out many nutrients and other pollutants before they reach the stream. These riparian buffers are also vital along livestock pastures.
- 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.
- Discourage impoundments. Ponds and lakes do not aerate water. *Note: Permits may be required for any work on a stream, including impoundments.*

6.3.B.iv. Toxins and Other Materials.

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

Voluntary activities

- Providing public education.
- Painting warnings on storm drains that connect to a stream. (This would benefit Beaver Creek, Little Creek, and Cedar Creek).
- Sponsoring community clean-up days (This has already benefited Beaver Creek, Paperville Creek, Boone Lake, and South Holston Lake).
- Landscaping of public areas.
- Encouraging public surveillance of their streams and reporting of dumping activities to their local authorities.

Needing regulation

- Prohibition of illicit discharges to storm drains.
- Litter laws and strong enforcement at the local level.

6.3.B.v. Habitat Alteration.

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

Measures that can help address this problem are:

Voluntary activities

- Sponsoring litter pickup days to remove litter that might enter streams (Brush and Sinking Creeks have benefited from such cleanup efforts).
- Organizing stream cleanups removing trash, limbs and debris before they cause blockage.
- Avoiding use of heavy equipment to "clean out" streams (Back Creek and Beaver Creek have suffered from such activities).
- Planting vegetation along streams to stabilize banks and provide habitat (Steele Creek Park Lake, in the Bristol area, had three 1000-foot segments bio-engineered using matting and willow posts to revegetate).
- Encouraging developers to avoid extensive culverts in streams.

Current regulations

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

Additional Enforcement

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

6.4. PERMIT REISSUANCE PLANNING

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

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

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

Stream Segment information, including designated uses and impairments, are described in detail in Chapter 3, *Water Quality Assessment of South Fork Holston River Watershed.*

6.4.A. Municipal Permits

TN0031640 USDA - Forest Service-Little Oak Recreation Area

Discharger rating: Minor
City: Bristol
County: Sullivan
EFO Name: Johnson City
Issuance Date: 8/31/07
Expiration Date: 9/30/07
Receiving Stream(s): South Holston Reservoir at the South Fork Holston River at mile 50.8
HUC-12: 060101020302
Effluent Summary: Treated domestic wastewater from Outfall 001
Treatment system: Septic tank sand filter system

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
BOD5	All Year	45	DMax Conc	mg/L	Monthly	Grab	Effluent
BOD5	All Year	30	MAvg Conc	mg/L	Monthly	Grab	Effluent
D.O.	All Year	1	DMin Conc	mg/L	Monthly	Grab	Effluent
E. coli	All Year	487	DMax Conc	#/100mL	Monthly	Grab	Effluent
E. coli	All Year	126	MAvg Geo Mean	#/100mL	Monthly	Grab	Effluent
Flow	All Year		MAvg Load	MGD	3/Week	Instantaneous	Effluent
Flow	All Year		DMax Load	MGD	3/Week	Instantaneous	Effluent
Settleable Solids	All Year	1	DMax Conc	mL/L	Monthly	Grab	Effluent
TRC	All Year	2	DMax Conc	mg/L	Monthly	Grab	Effluent
TSS	All Year	45	DMax Conc	mg/L	Monthly	Grab	Effluent
TSS	All Year	30	MAvg Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6.5	DMin Conc	SU	Monthly	Grab	Effluent

Table 6-1. Permit Limits for USDA - Forest Service-Little Oak Recreation Area.

EFO Comments:
One (of two) loops has been closed all season this year because of an electrical outage. This should be repaired for next season, and discharge at both outfalls should be comparable to historical performance. EFO is unaware of any expansion plans.

TN0020745 USDA - Jacobs Creek Civilian Conservation Center

Discharger rating: Minor
City: Bristol
County: Sullivan
EFO Name: Johnson City
Issuance Date: 8/31/07
Expiration Date: 4/30/07
Receiving Stream(s): Little Jacob Creek at mile 2.0
HUC-12: 060101020302
Effluent Summary: Treated domestic wastewater from Outfall 001
Treatment system: Extended aeration

Segment	TN060101020540_0400
Name	Little Jacob Creek
Size	6.9
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Domestic Water Supply (Supporting), Fish and Aquatic Life (Supporting), Recreation (Not Assessed), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

Table 6-2. Stream Segment Information for USDA - Jacobs Creek Civilian Conservation Center

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Ammonia as N (Total)	Summer	1.5	DMax Conc	mg/L	2/Month	Grab	Effluent
Ammonia as N (Total)	Summer	0.75	MAvg Conc	mg/L	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	5.5	DMax Conc	mg/L	2/Month	Grab	Effluent
Ammonia as N (Total)	Winter	2.75	MAvg Conc	mg/L	2/Month	Grab	Effluent
CBOD5	Summer	20	DMax Conc	mg/L	2/Month	Grab	Effluent
CBOD5	Summer	10	MAvg Conc	mg/L	2/Month	Grab	Effluent
CBOD5	Winter	40	DMax Conc	mg/L	2/Month	Grab	Effluent
CBOD5	Winter	25	MAvg Conc	mg/L	2/Month	Grab	Effluent
D.O.	All Year	6	DMin Conc	mg/L	Weekdays	Grab	Effluent
E. coli	All Year	487	DMax Conc	#/100mL	2/Month	Grab	Effluent
E. coli	All Year	126	MAvg Geo Mean	#/100mL	2/Month	Grab	Effluent
Flow	All Year		MAvg Load	MGD	Weekdays	Instantaneous	Effluent
Flow	All Year		DMax Load	MGD	Weekdays	Instantaneous	Effluent
Settleable Solids	All Year	1	DMax Conc	mL/L	2/Week	Grab	Effluent
TRC	All Year	0.02	DMax Conc	mg/L	Weekdays	Grab	Effluent
TSS	All Year	45	DMax Conc	mg/L	2/Month	Grab	Effluent
TSS	All Year	30	MAvg Conc	mg/L	2/Month	Grab	Effluent
pH	All Year	9	DMax Conc	SU	2/Week	Grab	Effluent
pH	All Year	6.5	DMin Conc	SU	2/Week	Grab	Effluent

Table 6-3. Permit Limits for USDA - Jacobs Creek Civilian Conservation Center.

Enforcement:
Director's Order #05-046D
Order issued for effluent violations, in-plant bypasses and overflows. New WWTP (trickle filter) will be the likely solution.

EFO Comments:
This facility is currently under Director's Order #05-046D. They are finishing up an I/I study and collection system repair/rehabilitation/replacement should follow. Wastewater treatment plant replacement is planned to follow in turn. The latest proposal for WWTP replacement was use of AdvanTex recirculating filters in place of the current extended aeration treatment technology. They were not planning an increase in flow, but that may have changed.

TN0027529 TVA South Holston Hydro-Electric Plant

Discharger rating: Minor
City: Bristol
County: Sullivan
EFO Name: Johnson City
Issuance Date: 6/30/02
Expiration Date: 6/30/07
Receiving Stream(s): South Fork Holston River at mile 49.8
HUC-12: 060101020401
Effluent Summary: Cooling water from Outfall 001
Treatment system: -

Permit Limits:
No limits

EFO Comments:
An oil/water separator was installed at the TVA South Holston Hydroelectric Plant for the switchyard and transformer yard stormwater runoff.

TN0023531 Bristol Sewage Treatment Plant #2

Discharger rating: Major
City: Bristol
County: Sullivan
EFO Name: Johnson City
Issuance Date: 4/26/04
Expiration Date: 4/30/09
Receiving Stream(s): Boone Lake
HUC-12: 060101020403
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: WAS to blend tank to fpress to invessel composting Class A.

Segment	TN06010102006_1000
Name	Boone Reservoir
Size	4400
Unit	Acres
First Year on 303(d) List	1990
Designated Uses	Domestic Water Supply (Supporting), Fish and Aquatic Life (Supporting), Recreation (Non-Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Chlordane, Polychlorinated biphenyls
Sources	Contaminated Sediments

Table 6-4. Stream Segment Information for Bristol STP #2

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Ammonia as N (Total)	Summer		MAvg Conc	mg/L	Bi-monthly	Composite	Effluent
Ammonia as N (Total)	Winter		MAvg Conc	mg/L	Monthly	Composite	Effluent
BOD % removal	All Year	40	DMin % Removal	Percent	Daily	Calculated	% Removal
BOD % removal	All Year	85	MAvg % Removal	Percent	Daily	Calculated	% Removal
BOD5	All Year	45	DMax Conc	mg/L	Daily	Composite	Effluent
BOD5	All Year	30	MAvg Conc	mg/L	Daily	Composite	Effluent
BOD5	All Year	40	WAvg Conc	mg/L	Daily	Composite	Effluent
BOD5	All Year	3753	MAvg Load	lb/day	Daily	Composite	Effluent
BOD5	All Year	5004	WAvg Load	lb/day	Daily	Composite	Effluent
D.O.	All Year	1.5	DMin Conc	mg/L	Daily	Grab	Effluent
Dissolved Solids, Total (TDS)	All Year		MAvg Conc	mg/L	Annually	Continuous	Effluent
E. coli	All Year	126	MAvg Geo Mean	#/100mL	Daily	Grab	Effluent
Fecal Coliform	All Year	1000	DMax Conc	#/100mL	Daily	Grab	Effluent
Fecal Coliform	All Year	200	MAvg Geo Mean	#/100mL	Daily	Grab	Effluent
Flow	All Year		DMax Load	MGD	Daily	Continuous	Effluent
Flow	All Year		MAvg Load	MGD	Daily	Continuous	Influent (Raw Sewage)

Table 6-5a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Flow	All Year		DMax Load	MGD	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MAvg Load	MGD	Daily	Continuous	Effluent
IC25 7day Ceriodaphnia Dubia	All Year	14.2	DMin Conc	Percent	Annually	Composite	Effluent
IC25 7day Fathead Minnows	All Year	14.2	DMin Conc	Percent	Annually	Composite	Effluent
Nitrite + Nitrate Total (as N)	Summer		MAvg Conc	mg/L	Bi-monthly	Composite	Effluent
Nitrite + Nitrate Total (as N)	Winter		MAvg Conc	mg/L	Monthly	Composite	Effluent
Nitrogen Organic Total (as N)	All Year		MAvg Conc	mg/L	Annually	Continuous	Effluent
Nitrogen Total (as N)	All Year		MAvg Conc	mg/L	Annually	Continuous	Effluent
Phosphate Ortho (as PO4)	Summer		MAvg Conc	mg/L	Bi-monthly	Composite	Effluent
Phosphate Ortho (as PO4)	Winter		MAvg Conc	mg/L	Monthly	Composite	Effluent
Phosphorus, Total	Summer		MAvg Conc	mg/L	Bi-monthly	Composite	Effluent
Phosphorus, Total	Winter		MAvg Conc	mg/L	Monthly	Composite	Effluent
Settleable Solids	All Year	1	DMax Conc	mL/L	Weekly	Composite	Effluent
TKN - Total Kjeldahl Nitrogen	Summer		MAvg Conc	mg/L	Bi-monthly	Composite	Effluent
TKN - Total Kjeldahl Nitrogen	Winter		MAvg Conc	mg/L	Monthly	Composite	Effluent
TOC	Summer		MAvg Conc	mg/L	Bi-monthly	Composite	Effluent
TOC	Winter		MAvg Conc	mg/L	Monthly	Composite	Effluent
TRC	All Year	0.31	DMax Conc	mg/L	Daily	Grab	Effluent
TSS	All Year	45	DMax Conc	mg/L	3/Week	Composite	Effluent
TSS	All Year	30	MAvg Conc	mg/L	3/Week	Composite	Effluent
TSS	All Year	40	WAvg Conc	mg/L	3/Week	Composite	Effluent
TSS	All Year	3753	MAvg Load	lb/day	3/Week	Composite	Effluent
TSS	All Year	5004	WAvg Load	lb/day	3/Week	Composite	Effluent
TSS % Removal	All Year	40	DMin % Removal	Percent	3/Week	Calculated	% Removal
TSS % Removal	All Year	85	MAvg % Removal	Percent	3/Week	Calculated	% Removal
pH	All Year	9	DMax Conc	SU	Daily	Grab	Effluent
pH	All Year	6	DMin Conc	SU	Daily	Grab	Effluent

Table 6-5b.

***Tables 6-5a-b. Permit Limits for Bristol STP #2*.**

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

- 3 BOD
- 5 TSS
- 1 Chlorine
- 1 Fecal coliform

EFO Comments:
No issues.

TN0025135 East High School

Discharger rating: Minor
City: Bluff City
County: Sullivan
EFO Name: Johnson City
Issuance Date: 4/26/04
Expiration Date: 4/30/09
Receiving Stream(s): Unnamed tributary at mile 1.7 to South Fork Holston River at mile 39.1
HUC-12: 060101020402
Effluent Summary: Treated domestic wastewater from Outfall 001
Treatment system: Extended aeration

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Ammonia as N (Total)	All Year	10	DMax Conc	mg/L	2/Month	Grab	Effluent
Ammonia as N (Total)	All Year	5	MAvg Conc	mg/L	2/Month	Grab	Effluent
CBOD5	All Year	40	DMax Conc	mg/L	2/Month	Grab	Effluent
CBOD5	All Year	25	MAvg Conc	mg/L	2/Month	Grab	Effluent
D.O.	All Year	6	DMin Conc	mg/L	Weekdays	Grab	Effluent
Fecal Coliform	All Year	1000	DMax Conc	#/100mL	2/Month	Grab	Effluent
Fecal Coliform	All Year	200	MAvg Geo Mean	#/100mL	2/Month	Grab	Effluent
Settleable Solids	All Year	1	DMax Conc	mL/L	2/Week	Grab	Effluent
TRC	All Year	0.5	DMax Conc	mg/L	Weekdays	Grab	Effluent
TSS	All Year	45	DMax Conc	mg/L	2/Month	Grab	Effluent
TSS	All Year	30	MAvg Conc	mg/L	2/Month	Grab	Effluent
pH	All Year	8.5	DMax Conc	SU	2/Week	Grab	Effluent
pH	All Year	6.5	DMin Conc	SU	2/Week	Grab	Effluent

Tables 6-6. Permit Limits for East High School

EFO Comments:
None

TN0025178 Akard Elementary School

Discharger rating: Minor
City: Bristol
County: Sullivan
EFO Name: Johnson City
Issuance Date: 11/26/02
Expiration Date: 11/30/07
Receiving Stream(s): Unnamed tributary at mile 0.1 to Back Creek at mile 4.0
HUC-12: 060101020502
Effluent Summary: Treated domestic wastewater from Outfall 001
Treatment system: Extended aeration

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
BOD5	All Year	45	DMax Conc	mg/L	Monthly	Grab	Effluent
BOD5	All Year	30	MAvg Conc	mg/L	Monthly	Grab	Effluent
D.O.	All Year	1	DMin Conc	mg/L	Weekdays	Grab	Effluent
Fecal Coliform	All Year	1000	DMax Conc	#/100mL	Monthly	Grab	Effluent
Fecal Coliform	All Year	200	MAvg Geo Mean	#/100mL	Monthly	Grab	Effluent
Settleable Solids	All Year	1	DMax Conc	mL/L	2/Week	Grab	Effluent
TRC	All Year	0.5	DMax Conc	mg/L	Weekdays	Grab	Effluent
TSS	All Year	45	DMax Conc	mg/L	Monthly	Grab	Effluent
TSS	All Year	30	MAvg Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	2/Week	Grab	Effluent
pH	All Year	6	DMin Conc	SU	2/Week	Grab	Effluent

Tables 6-7. Permit Limits for East High School

EFO Comments:
No issues.

TN0056669 Misty Waters Homeowners Association

Discharger rating:	Minor
City:	Blountville
County:	Sullivan
EFO Name:	Johnson City
Issuance Date:	10/31/02
Expiration Date:	10/31/07
Receiving Stream(s):	Mile 0.2 of an unnamed tributary which enters 0.4 of Wagner Creek which is a tributary of the South Fork of the Holston River (Boone Lake) at mile 22.6
HUC-12:	060101020403
Effluent Summary:	Treated domestic wastewater from Outfall 001
Treatment system:	Activated sludge

Permit Limits:
No Limits

EFO Comments:
Misty Waters Homeowners Assn. is in the process of hooking up to Johnson City POTW.

6.4.B. Industrial Permits

TN0067504 Maymead Materials, Inc.

Discharger rating: Minor
City: Bristol
County: Sullivan
EFO Name: Johnson City
Issuance Date: 10/31/02
Expiration Date: 10/31/07
Receiving Stream(s): Unnamed tributary at mile 1.5 to Whitetop Creek at mile 3.8
HUC-12: 060101020502
Effluent Summary: Treated groundwater from Outfall 001
Treatment system: -

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Flow	All Year		DMax Load	MGD	Monthly	Instantaneous	Effluent
Flow	All Year		MAvg Load	MGD	Monthly	Instantaneous	Effluent
Oil and Grease (Freon EM)	All Year	15	DMax Conc	mg/L	Monthly	Grab	Effluent
Oil and Grease (Freon EM)	All Year	10	MAvg Conc	mg/L	Monthly	Grab	Effluent
Oil and Grease Visual	All Year		DMax Load	YES=1 NO=0	2/Week	Visual	Effluent
TPH DRO	All Year		DMax Conc	mg/L	Quarterly	Grab	Effluent
TPH DRO	All Year		MAvg Conc	mg/L	Quarterly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6.5	DMin Conc	SU	Monthly	Grab	Effluent

Tables 6-8. Permit Limits for Maymead Materials, Inc.

EFO Comments:
Asphalt Paving Mixtures and Blocks. The plant has an oil/water separator for treatment. During my September 24, 2004, Compliance Evaluation Inspection, the facility inquired about the NPDES permit being terminated. The response to their inquiry was, "Since the December 2003 and January 2004 oil and grease sample results of 24 mg/l and 8 mg/l revealed that an oil and grease residue is still in the discharge, treatment and monitoring for the discharge must be maintained. Also, the Total Petroleum Hydrocarbons-Diesel Range Organics June 2004 result was 0.1 mg/l. Therefore, the NPDES permit cannot be terminated at this time."

TN0056898 Magic Wand Car Wash

Discharger rating: Minor
City: Kingsport
County: Sullivan
EFO Name: Johnson City
Issuance Date: 12/31/02
Expiration Date: 12/31/07
Receiving Stream(s): Horse Creek at mile 9.8
HUC-12: 060101020603
Effluent Summary: Treated process wastewater from Outfall 001
Treatment system: -

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
BOD5	All Year	45	DMax Conc	mg/L	Quarterly	Grab	Effluent
Oil and Grease (Freon EM)	All Year	30	DMax Conc	mg/L	Monthly	Grab	Effluent
Settleable Solids	All Year	0.5	DMax Conc	mL/L	Monthly	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6	DMin Conc	SU	Monthly	Grab	Effluent

Tables 6-9. Permit Limits for Magic Wand Car Wash.

EFO Comments:
No issues.

TN0064106 Unisys Corp. - Earhart Site

Discharger rating: Minor
City: Bristol
County: Sullivan
EFO Name: Johnson City
Issuance Date: 6/30/05
Expiration Date: 6/30/07
Receiving Stream(s): Unnamed tributary to Back Creek at mile 1.4 to Beaver Creek
HUC-12: 060101020502
Effluent Summary: Treated groundwater from Outfall 001
Treatment system: -

Segment	TN06010102042_0200
Name	Back Creek
Size	14.1
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Recreation (Non-Supporting), Irrigation (Supporting), Fish and Aquatic Life (Non-Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Escherichia coli, Sedimentation/Siltation, Physical substrate habitat alterations, Nitrates
Sources	Grazing in Riparian or Shoreline Zones, Channelization, Discharges from Municipal Separate Storm Sewer Systems (MS4), Unrestricted Cattle Access

Tables 6-10. Stream Segment Information for Unisys Corp. – Earhart Site.

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
BOD5	All Year	45	DMax Conc	mg/L	Quarterly	Grab	Effluent
Oil and Grease (Freon EM)	All Year	30	DMax Conc	mg/L	Monthly	Grab	Effluent
Settleable Solids	All Year	0.5	DMax Conc	mL/L	Monthly	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6	DMin Conc	SU	Monthly	Grab	Effluent

Tables 6-11. Permit Limits for Unisys Corp. - Earhart Site.

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

- 2 Toluene

EFO Comments:
No issues.

6.4.B. Water Treatment Plant Permits

TN0073709 Chinquapin Grove Utility District Water Treatment Plant

Discharger rating: Minor
City: Bluff City
County: Sullivan
EFO Name: Johnson City
Issuance Date: 9/30/02
Expiration Date: 9/29/07
Receiving Stream(s): Webb Spring Branch to Dry Creek at mile 0.5
HUC-12: 060101020402
Effluent Summary: Filter backwash and/or sedimentation basin washdown from Outfall 001
Treatment system: Alum, polymer, chlorine

Segment	TN06010102012_0300
Name	Unnamed Trib to South Fork Holston River
Size	3.89
Unit	Miles
First Year on 303(d) List	2004
Designated Uses	Fish and Aquatic Life (Non-Supporting), Recreation (Non-Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	Alteration in stream-side or littoral vegetative covers, Sedimentation/Siltation, Escherichia coli
Sources	Grazing in Riparian or Shoreline Zones

Tables 6-12. Stream Segment Information for Chinquapin Grove Utility District WTP.

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Al (T)	All Year	0.75	DMax Conc	mg/L	Monthly	Grab	Effluent
Flow	All Year		DMax Load	MGD	Monthly	Instantaneous	Effluent
Settleable Solids	All Year	0.5	DMax Conc	mL/L	Monthly	Grab	Effluent
TRC	All Year	0.019	DMax Conc	mg/L	Monthly	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6.5	DMin Conc	SU	Monthly	Grab	Effluent

Table 6-13. Permit Limits for Chinquapin Grove Utility District WTP.

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

- 5 Settleable Solids
- 1 Aluminum

EFO Comments:
No issues.

TN0074292 Bristol Water Treatment Plant

Discharger rating: Minor
City: Bristol
County: Sullivan
EFO Name: Johnson City
Issuance Date: 9/30/02
Expiration Date: 9/29/07
Receiving Stream(s): South Fork Holston River at mile 35.6 (Boone Reservoir)
HUC-12: 060101020401
Effluent Summary: Filter backwash and sedimentation basin washdown water through Outfall 001
Treatment system: -

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Al (T)	All Year	0.75	DMax Conc	mg/L	Monthly	Grab	Effluent
Fe (T)	All Year	2	DMax Conc	mg/L	Monthly	Grab	Effluent
Flow	All Year		DMax Load	MGD	Monthly	Instantaneous	Effluent
Settleable Solids	All Year	0.5	DMax Conc	mL/L	Monthly	Grab	Effluent
TRC	All Year	0.019	DMax Conc	mg/L	Monthly	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6.5	DMin Conc	SU	Monthly	Grab	Effluent

Table 6-14. Permit Limits for Bristol WTP.

EFO Comments:
None

TN0075884 Bristol/Bluff City Utility District Water Treatment Plant

Discharger rating: Minor
City: Bluff City
County: Sullivan
EFO Name: Johnson City
Issuance Date: 1/31/06
Expiration Date: 10/31/07
Receiving Stream(s): Thomas Creek at mile 0.4 to South Fork Holston River
HUC-12: 060101020402
Effluent Summary: Filter backwash and/or sedimentation basin washdown from Outfall 001
Treatment system: Polyaluminum chloride (GPAC 2800), Sodium hypochlorite (Aqua Guard) hydrofluosilicic acid (H2SiF6), sodium ortho/polyphosphate (F-35)

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Al (T)	All Year	1	DMax Conc	mg/L	Weekly	Grab	Effluent
Al (T)	All Year	0.29	MAvg Conc	mg/L	Weekly	Grab	Effluent
Settleable Solids	All Year	0.5	DMax Conc	mL/L	Weekly	Grab	Effluent
TRC	All Year	0.019	DMax Conc	mg/L	Weekly	Grab	Effluent
TRC	All Year	0.011	MAvg Conc	mg/L	Weekly	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	Weekly	Grab	Effluent
TSS	All Year	7	MAvg Conc	mg/L	Weekly	Grab	Effluent
pH	All Year	8.5	DMax Conc	SU	Weekly	Grab	Effluent
pH	All Year	6	DMin Conc	SU	Weekly	Grab	Effluent

Table 6-15. Permit Limits for Bristol/Bluff City Utility District WTP.

Compliance History:

The following numbers of exceedences were noted in PCS:

- 2 pH
- 2 Settleable Solids
- 25 Chlorine
- 4 TSS
- 10 Aluminum

EFO Comments:

None

APPENDIX II

ID	NAME	HAZARD
827002	Underwood Park	H
827003	Middlebrook	2
827004	Taylor Lake	3
827005	Steele Creek	1

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

LAND COVER/LAND USE	SQUARE MILES	% OF WATERSHED
Bare Rock/Sand/Clay	476	0.2
Deciduous Forest	94,663	40.8
Emergent Herbaceous Wetland	167	0.1
Evergreen Forest	36,153	15.6
High Intensity:Commercial/Industrial	2,565	1.1
High Intensity: Residential	775	0.3
Low Intensity: Residential	8,185	3.5
Mixed Forest	37,641	16.2
Open Water	6,628	2.9
Other Grasses	2,576	1.1
Pasture/Hay	31,264	13.5
Row Crops	5,256	2.3
Transitional	338	0.1
Woody Wetlands	534	0.2
Total	**227,221**	**97.9**

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

ECOREGION	REFERENCE STREAM	WATERSHED (HUC)	
Southern Igneous Ridges and Mountains (66d)	Black Branch	Watauga River	06010103
	Laurel Fork Creek	Watauga River	06010103
	Doe River	Watauga River	06010103
	Tumbling Creek	Nolichucky River	06010108
	Little Stony Creek	Watauga River	06010103
Southern Sedimentary Ridges (66e)	Gentry Creek	SF Holston River	06010102
	Clark Creek	Nolichucky River	06010108
	Lower Higgins Creek	Nolichucky River	06010108
	Double Branch	Watts Bar/Fort Loudoun Lake	06010201
	Gee Creek	Hiwassee River	06020002
Limestone Valleys and Coves (66f)	Abrams Creek	Little Tennessee	06010204
	Beaverdam Creek	SF Holston River	06010102
	Stony Fork	Watauga River	06010103
Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)	Clear Creek	Lower Clinch River	06010207
	White Creek	Upper Clinch River	06010205
	Powell River	Powell River	06010206
	Hardy Creek	Powell River	06010206
	Big War Creek	Upper Clinch River	06010205
	Martin Creek	Powell River	06010206
	Powell River	Powell River	06010206
Southern Shale Valleys (67g)	Little Chuckey Creek	Nolichucky River	06010108
	Bent Creek	Nolichucky River	06010108
	Brymer Creek	Hiwassee River	06020002
	Harris Creek	Hiwassee River	06020002
	Flat Creek	Lower French Broad	06010107
Southern Dissected Ridges and Knobs (67i)	Mill Creek	Lower Clinch River	06010207

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

.

CODE	NAME	AGENCY	AGENCY ID
18	TDEC/DNH CROSS MOUNTAIN BOG SITE	TDEC/DNH	S.USTNHP 1442
32	TDEC/DNH SHADY VALLEY BOG SITE	TDEC/DNH	S.USTNHP 196
119	TDEC/DNH ORCHARD ROAD BOG SITE	TDEC/DNH	
120	TDEC/DNH QUARRY BOG SITE	TDEC/DNH	
133	TDEC/DNH JENKINS CRANBERRY BOG TNC PRESERVE SITE	TDEC/DNH	M.USTNHP 241
139	TDEC/DNH LAUREL CREEK SITE	TDEC/DNH	S.USTNHP 92
159	TDEC/DNH REEDY CREEK COVE SITE	TDEC/DNH	S.USTNHP 318
254	USACOE-NASHVILLE CLIENT SITE	USACOE-N	
531	TDOT SR 75 PERMIT SITE	TDOT	
1804	TDEC/DNH JOHN'S CRANBERRY BOG (SITE 49) SITE	TDEC/DNH	APPALACHIAN TRAIL REPORT
2612	TDOT SR 37 SITE	TDOT	
2731	USACOE REEDY CREEK 3.2 R SITE	USACOE-N	960047955

Table A2-4. Wetland Sites in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed in TDEC Database. *TDEC, Tennessee Department of Environment and Conservation; USACOE-N, United States Army Corps of Engineers-Nashville District; WPC, Water Pollution Control; TDOT, Tennessee Department of Transportation' USFWS, United States Fish and Wildlife Service; TWRA, Tennessee Wildlife Resources Agency; DNH, Division of Natural Heritage.* ***This table represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands in the watershed.***

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Beaverdam Creek	TN060101020231.0_1000	8.3
Beaverdam Creek	TN060101020231.0_2000	6.5
Beidleman Creek	TN06010102041_1000	5.0
Booher Creek	TN06010102237_0100	7.2
Dry Creek	TN06010102012_0300	12.2
Gammon Creek	TN06010102006T_0100	3.8
Gentry Branch	TN060101020250_0200	18.3
Hatcher Creek	TN06010102012_0100	10.8
Indian Creek	TN06010102012_0400	22.2
Jim Wright Branch	TN060101020231.0_0100	2.5
Laurel Creek	TN060101020250_1000	4.4
Little Sinking Creek	TN06010102041_0200	3.9
Nicely Branch	TN06010102041_0110	2.7
Paperville (Sinking) Creek	TN06010102041_0100	3.9
Possum Creek	TN06010102012_0200	22.8
South Fork Holston River	TN06010102012_1000	12.9
Steele Creek	TN06010102042_0300	0.3
Steele Creek	TN06010102042_0310	3.8
Thomas Creek	TN06010102014_0100	13.5
Wagner Creek	TN06010102006T_0200	5.5
Weaver Branch	TN06010102012_0500	5.9
Whitetop Creek	TN06010102042_0700	8.5

Table A3-1a. Streams Fully Supporting Designated Uses in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Back Creek	TN06010102042_0200	14.1
Cedar Creek	TN06010102042_0500	11.8
Muddy Creek	TN06010102237_1000	12.3
South Fork Holston River	TN06010102014_1000	4.4

Table A3-1b. Streams Partially Supporting Designated Uses in Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Beaver Creek	TN06010102042_1000	11.1
Beaver Creek	TN06010102042_2000	10.5

Table A3-1c. Streams Not Supporting Designated Uses in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Big Jacob Creek	TN060101020540_0300	6.8
Candy Creek	TN06010102006T_0300	3.2
Cox Mill Creek	TN060101020540_0200	5.0
Evans Creek	TN06010102042_0110	6.4
Harpers Creek	TN060101020540_0310	4.8
Laurel Creek	TN060101020250_2000	3.8
Linville Branch	TN06010102042_0100	1.8
Little Jacob Creek	TN060101020540_0400	6.9
Misc. tribs to Laurel Creek	TN060101020250_0999	38.4
Misc. tribs to South Fork Holston	TN06010102012_0999	34.6
Owens Branch	TN060101020250_0100	10.8
Robinson Creek	TN06010102237_0110	3.3
Rockhouse Run	TN060101020540_0100	4.0
Sharps Creek	TN060101020540_0500	5.4
South Holston Reservoir Misc. Tribs.	TN060101020540_0999	37.3
Tributaries to Beaverdam Creek	TN060101020231.0_0999	96.2
Unnamed trib to Back Creek	TN06010102042_0210	2.7
Unnamed trib. To Beaver Creek	TN06010102042_0600	1.7

Table A3-1d. Streams Not Assessed in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
South Holston Reservoir	TN06010102015_1000	7577.0
Steele Creek Lake	TN06010102STLCKLAKE_1000	35.0

Table A3-1e. Lakes Fully Supporting Designated Uses in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Boone Reservoir	TN06010102006_1000	4400.0

Table A3-1f. Lakes Partially Supporting Designated Uses in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Back Creek	TN06010102042_0200	14.1
Cedar Creek	TN06010102042_0500	11.8
Muddy Creek	TN06010102237_1000	12.3

Table A3-2a. Stream Impairment Due to Habitat Alterations in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Beaver Creek	TN06010102042_1000	11.10000
Beaver Creek	TN06010102042_2000	10.50000

Table A3-2b. Stream Impairment Due to Nutrients in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Beaver Creek	TN06010102042_1000	11.10000
Beaver Creek	TN06010102042_2000	10.50000

Table A3-2c. Stream Impairment Due to Pathogens in the Tennessee Portion of the Group 2 Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Back Creek	TN06010102042_0200	14.1
Cedar Creek	TN06010102042_0500	11.8
Muddy Creek	TN06010102237_1000	12.3

Table A3-2d. Stream Impairment Due to Siltation in the Group 2 Poprtion of the Tennessee Portion of the South Fork Holston River Watershed. *Data are based on Year 2000 Water Quality Assessment*

APPENDIX IV

LAND USE/LAND COVER	AREA IN HUC-10 SUBWATERSHEDS (ACRES)			
	01	03	04	05
Bare Rock/Sand/Clay	40	10	310	116
Deciduous Forest	30.260	18,753	32,962	12,688
Emergent Herbaceous Wetlands	16	54	67	29
Evergreen Forest	12,715	6,083	13,267	4,086
High Intensity: Commercial/Industrial/Transportation	32	35	1,107	1,391
High Intensity: Residential	2	5	106	663
Low Intensity: Residential	121	114	3,186	4,764
Mixed Forest	14,448	5,693	13,214	4,287
Open Water	6	4,877	1,590	155
Other Grasses: Urban/Recreational	87	14	1,260	1,215
Pasture/Hay	5,041	436	20,483	5,304
Row Crops	1,051	200	3.120	886
Transitional	267		72	
Woody Wetlands	49	109	273	104
Total	**64,134**	**36,382**	**91,087**	**35687**

Table A4-1. Land Use Distribution in Group 2 Portion of Tennessee Portion of the South Fork Holston River Watershed by HUC-10. *Data are from 1992 Multi-Resolution Land Characterization (MRLC) derived by applying a generalized Anderson Level II system to mosaics of Landsat thematic mapper images collected every five years.*

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

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

STATION	HUC-10	AGENCY	NAME	AREA (SQ MILES)	LOW FLOW (CFS)		
					1Q10	7Q10	3Q20
363115082051101	0601010203	TVA					
0347700	0601010204	USGS	South Fork Holston River	813.0	120.0	139.0	101.0
03476515	0601010204	USGS	Beidleman Creek	27.4	3.75	4.10	3.00
363126082052601	0601010204	TVA					
03478500	0601010205	USGS					

Table A4-3. Historical Streamflow Data Summary Based on Mean Daily Flows in South Fork Holston River Watershed. *USGS, United States Geological Survey; TVA, Tennessee Valley Authority.*

PARAMETER	SUBWATERSHED			
	01	03	04	05
E. coli	A, E		$, α, β, γ, δ	%, @, ■, ▲
Enterococcus	A, E		$, α, β, γ, δ	%, @, ■, ▲
Fecal Coliform	A, E		$, α, β, γ, δ	%, @, ■, ▲
Fecal Streptococcus				%, @, ■
Total Coliform				
Acidity				
Alkalinity (Total)	A, E		$	%, @
BOD_5				%, @
BOD-C	A, E		$	%, @, ■
Color (Apparent)	A, E		$	
Color (True)	A, E		$	
Conductivity (Field)	A, E		$, α, β, γ, δ	%, @, ■, ▲
COD (Low)			α, β, γ, δ	%, @, ■, ▲
Depth				
DO	A, E		$, α, β, γ, δ	%, @, ■, ▲
Flow				%, @
Hardness (Total)	A, E		$, α, β, γ, δ	%, @, ■, ▲
pH (Field)	A, E		$, α, β, γ, δ	%, @, ■, ▲
pH (Lab)				
Residue (Dissolved)	A, E		$, α, β, γ, δ	%, @, ■, ▲
Residue (Settlable)				%, @
Residue (Suspended)	A, E		$, α, β, γ, δ	%, @, ■, ▲
Residue (Total)				%, @
Temperature	A, E		$, α, β, γ, δ	%, @, ■, ▲
Turbidity	A, E		$	
Biorecon			L, N	%, @
RBP III	A, B, E		L, N, $	%, @
Ag				
Al				%, @
Ammonia N	A, E		$, α, β, γ, δ	%, @, ■, ▲
As	A, E		$, α, β, γ, δ	%, @, ■, ▲
Ca				
Cd	A, E		$, α, β, γ, δ	%, @, ■, ▲
Cl^-	A, E			
CN^-	A, E			%, @
Cr (Hexavalent)				
Cr (Total)	A, E		$, α, β, γ, δ	%, @, ■, ▲
Cu	A, E		$, α, β, γ, δ	%, @, ■, ▲
Fe	A, E		$	%, @
Hg	A, E		A, β, γ, δ	%, @, ■, ▲
Mn	A, E		$	%, @
N (Total Kjeldahl)	A, E		$, α, β, γ, δ	%, @, ■, ▲
Ni	A, E		α, β, γ, δ	%, @, ■, ▲
NO_2+NO_3	A, E		$, α, β, γ, δ	%, @, ■, ▲
P (Total)	A, E		$, α, β, γ, δ	%, @, ■, ▲

Pb	A, E		$, α, β, γ, δ	%, @, ■, ▲
Se				%, @
SO_4	E			
TOC	A, E		$	%, @, ■
Zn	A, E		$, α, β, γ, δ	%, @, ■, ▲

Table A4-4a. Water Quality Parameters Monitored in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. Codes are described in Table A4-4b.

CODE	STATION	ALIAS	AGENCY	LOCATION
A	ECO66E04		TDEC	Gentry Creek @ RM 3.2
B	JWRIG001.1JO	ECO66F02	TDEC	Jim Wright Branch @ RM 1.2
C	03472510		USGS	Locust Knob Branch
D	03472515		USGS	UT to Locust Knob Branch
E	ECO66F07		TDEC	Beaverdam Creek
F	SFHOL050.0SU	SFHOLSTON050.0	TDEC	South Fork Holston River @ RM 50.0
G	SFHOL055.0SU	SFHOLSTON055.0	TDEC	South Fork Holston River @ RM 55.0
H	SFHOL057.8SU	SFHOLSTON057.8	TDEC	South Fork Holston River @ RM 57.8
I	SFHOL060.3SU	002540	TDEC	South Fork Holston River @ RM 60.3
J	SFHOL062.7SU	SFKHOLSTON62.7	TDEC	South Fork Holston River @ RM 62.7
K	BEIDL001.3SU		TDEC	Beidleman Creek @ RM 1.3
L	HATCH000.2SU		TDEC	Hatcher Creek @ RM 0.2
M	INDIA001.3SU		TDEC	Indian Creek @ RM 1.3
N	MUDDY000.7SU		TDEC	Muddy Creek @ RM 0.7
O	475527		TVA	South Fork Holston Dam Scroll Case
P	476221		TVA	Boone Reservoir
Q	476494		TVA	South Fork Holston Dam Tail Race
R	476527		TVA	Davis Boat Dock
S	477452		TVA	South Fork Holston Dam Sluice
T	477588		TVA	Boone Reservoir Boat Ramp
U	477590		TVA	Boone Reservoir Private Beach
V	477600		TVA	Below Bristol WTP
W	477601		TVA	South Fork Holston River @Thomas Creek
X	477602		TVA	South Fork Holston River
Y	477603		TVA	South Fork Holston River
Z	477604		TVA	
#	477605		TVA	
$	ECO6707		TDEC	Possum Creek
α	SFHOL028.2SU	SFKHOLSTON028.2	TDEC	South Fork Holston River @ RM 28.2
β	SFHOL030.8SU	SFKHOLSTON030.8	TDEC	South Fork Holston River @ RM 30.8
γ	SFHOL033.0SU	SFKHOLSTON033.0	TDEC	South Fork Holston River @ RM 33.0
δ	SFHOL034.3SU	SFKHOLSTON034.3	TDEC	South Fork Holston River @ RM 34.3
&	STEEL011.0SU	002790	TDEC	Steele Creek @ RM 11.0
%	BACK000.5SU		TDEC	Back Creek @ RM 0.5
@	CEDAR000.3SU		TDEC	Cedar Creek @ RM 0.3
?	03478606		USGS	Unnamed Trib to White Top Creek
£	477645		TVA	Steele Creek @ Steele Creek Lake
♠	477646		TVA	Mill Creek @ Steele Creek lake
♣	477647		TVA	Steele Creek Lake (Upper Station)
♥	477648		TVA	Steele Creek lake (Middle Station)
♦	477649		TVA	Steele Creek Lake (Forebay Section)
♪	477650		TVA	Steele Creek Lake Discharge
■	BEAVE001.0SU	000225	TDEC	Beaver Creek @ RM 1.0
▲	BEAVE000.2SU		TDEC	Beaver Creek @ RM 0.2

Table A4-4b. Water Quality Monitoring Stations in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed*. TDEC, Tennessee Department of Environment and Conservation; USGS, United States Geologic Survey; TVA, Tennessee Valley Authority.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	HUC-10
TN0023531	Bristol STP #2	4952	Sewerage Systems	Major	Boone Reservoir	0601010204
TN0075884	Bristol/Bluff City UD	4941	Water Supply	Minor	Boone Reservoir	0601010204
TN0064106	Unisys Corp.-Earhart Site	9999	Nonclassifiable Establishments	Minor	UT to Back Creek @ RM 1.4	0601010205
TN0067504	Maymead Materials, Inc.	2951	Asphalt Paving Mixtures/Blocks	Minor	UT to Back Creek @ RM 5.5	0601010205

Table A4-5. Active Permitted Point Source Facilities in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *SIC, Standard Industrial Classification; MADI, Major Discharge Indicator.*

FACILITY NUMBER	PERMITEE	SIC	SIC NAME	WATERBODY	HUC-10
TN0064157	Bristol Quarry	1422	Crushed and Broken Limestone	Unnamed Trib to Back Creek	0601010205

Table A4-6. Active Permitted Mining Sites in the Group 2 Portion of the Tennessee portion of the South Fork Holston River Watershed. *SIC, Standard Industrial Classification.*

FACILITY NUMBER	FACILITY NAME	SECTOR	RECEIVING STREAM	AREA*	HUC-10
TNR051093	Mountain City Lumber	A	Drystone Branch	13.0	0601010201
TNR053382	Mountain City Hardwoods	A	Laurel Creek	13.0	0601010201
TNR050691	Eastman Aviation	S	Gannon Creek	8.5	0601010204
TNR051025	Specialty Chemical Co.	AD	UT to Woods Branch	3.0	0601010204
TNR051391	Microporous Products	Y	Booher Creek	4.0	0601010204
TNR053022	Bluff City Used Cars	M	UT to South Fork Holston	6.0	0601010204
TNR053171	Modern Forge Company	AA	UT to Booher Creek	7.0	0601010204
TNR053325	Thompson Metal Services	N	Booher Creek	6.0	0601010204
TNR053427	Federal Express	S	Ten Mile Creek	1.2	0601010204
TNR053496	Tri-Cities Regional Airport	S	Wagner Creek	1100.0	0601010204
TNR054020	Magneti Marelli	AB	UT to Gammon Creek	21.6	0601010204
TNR054084	General Shale Products	E	East Woods Branch, Booher Creek	37.0	0601010204
TNR055064	Kysor Panel Systems	AB	UT to Woods Branch	4.0	0601010204
TNR055953	Harris Trucking Company	P		2.7	0601010204
TNR050050	Blountville Auto Salvage	M	South Fork Holston River	29.0	0601010205
TNR050315	Davis Pipe	F	Evans Creek	64.0	0601010205
TNR050325	Seaman Corporation #1	V	Cedar Creek	9.0	0601010205
TNR050804	Tenn Investment Casting	F	Back Creek	3.0	0601010205
TNR050957	Hot Rod Auto Salvage	M	Back Creek	4.5	0601010205
TNR051385	Tri-City Auto Parts	M	Wet Weather Conveyance to Beaver Creek	50.0	0601010205
TNR051656	Exide Technologies Battery Plant	AC	Univac Branch	150.6	0601010205
TNR051901	Maymead Materials	D	Back Creek	5.0	0601010205
TNR052050	Overnight Transportation	P	Reedy Creek	12.5	0601010205
TNR053191	Simerly Concrete Products	Y	Cedar Creek	2.3	0601010205

Table A4-7. Active Permitted TMSP Facilities in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed. *Area, acres of property associated with industrial activity; WWC, Wet Weather Conveyance. Sector details may be found in Table A4-8.*

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

Table A4-8. TMSP Sectors and Descriptions.

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-10
99.340	Johnson	Earthen Dam	UT to Waters Branch	0601010201
97.549	Sullivan	Culvert, Stream Relocation	Burr Branch	0601010205
99.170	Sullivan	Box Culvert	Little Creek	0601010205

Table A4-9. Individual ARAP Permits Issued January 1994 Through June 2002 in the Group 2 Portion of the Tennessee Portion of the South Fork Holston River Watershed.

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APPENDIX V

CONSERVATION PRACTICE	UNITS	AMOUNT
Alley Cropping	Acres	0
Contour Buffer Strips	Acres	32
Crosswind Trap Strips	Acres	0
Field Borders	Feet	1,500
Filter Strips	Acres	0
Grassed Waterways	Acres	0
Riparian Forest Buffers	Acres	8
Streambank and Shoreline Protection	Feet	0
Windbreaks and Shelterbelts	Feet	0
Hedgerow Plantings	Feet	0
Herbaceous Wind Barriers	Feet	0
Total Conservation Buffers	Acres	41

Table A5-1a. Conservation Buffers Conservation Practices in Partnership with NRCS in the Tennessee Portion of South Fork Holston River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period. Data represent practices in both the Group 2 and Group 3 portions of the watershed.*

PARAMETER	TOTAL
Erosion Reduction Applied (Acres)	387
Highly Erodible Land With Erosion Control Practices (Acres)	353
Estimated Annual Soil Saved By Erosion Control Measures (Tons/Year)	3,073
Total Estimated Soil Saved (Tons/Year)	3,073

Table A5-1b. Erosion Control Conservation Practices in Partnership with NRCS in the Tennessee Portion of the South Fork Holston River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period. Data represent practices in both the Group 2 and Group 3 portions of the watershed.*

PARAMETER	TOTAL
Acres of AFO Nutrient Management Applied	222
Acres of Non-AFO Nutrient Management Applied	1,159
Total Acres Applied	1,381

Table A5-1c. Nutrient Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of South Fork Holston River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period. Data represent practices in both the Group 2 and Group 3 portions of the watershed.*

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PARAMETER	TOTAL
Acres of Pest Management Systems Applied	1,500

Table A5-1d. Pest Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of South Fork Holston River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period. Data represent practices in both the Group 2 and Group 3 portions of the watershed.*

CONSERVATION PRACTICE	ACRES
Acres Prepared for Revegetation of Forestland	0
Acres Improved Through Forest Stand Improvement	82
Acres of Tree and Shrub Establishment	16

Table A5-1e. Tree and Shrub Conservation Practices in Partnership with NRCS in the Tennessee Portion of the South Fork Holston River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period. Data represent practices in both the Group 2 and Group 3 portions of the watershed.*

CONSERVATION PRACTICE	ACRES
Acres of Wetlands Created or Restored	9
Acres of Wetlands Enhanced	0
Total Acres Created, Restored, or Enhanced	9

Table A5-1f. Wetland Conservation Practices in Partnership with NRCS in the Tennessee Portion of South Fork Holston River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period. Data represent practices in both the Group 2 and Group 3 portions of the watershed.*

CONSERVATION PRACTICE	ACRES
Acres of Upland Habitat Management	550
Acres of Wetland Habitat Management	187
Total Acres Wildlife Habitat Management	737

Table A5-1g. Wildlife Habitat Management Conservation Practices in Partnership with NRCS in the Tennessee Portion of South Fork Holston River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period. Data represent practices in both the Group 2 and Group 3 portions of the watershed.*

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COMMUNITY	PROJECT DESCRIPTION	AWARD DATE	AWARD AMOUNT
Bluff City	Wastewater Collection System Rehabilitation	04/26/00	$67,800
Bristol	Wastewater Interceptor and Pump Station	05/12/97	$2,320,000

Table A5-2. Communities in the Group 2 Portion of the Tennessee Portion of South Folk Holston River Watershed Receiving SRF Grants or Loans.