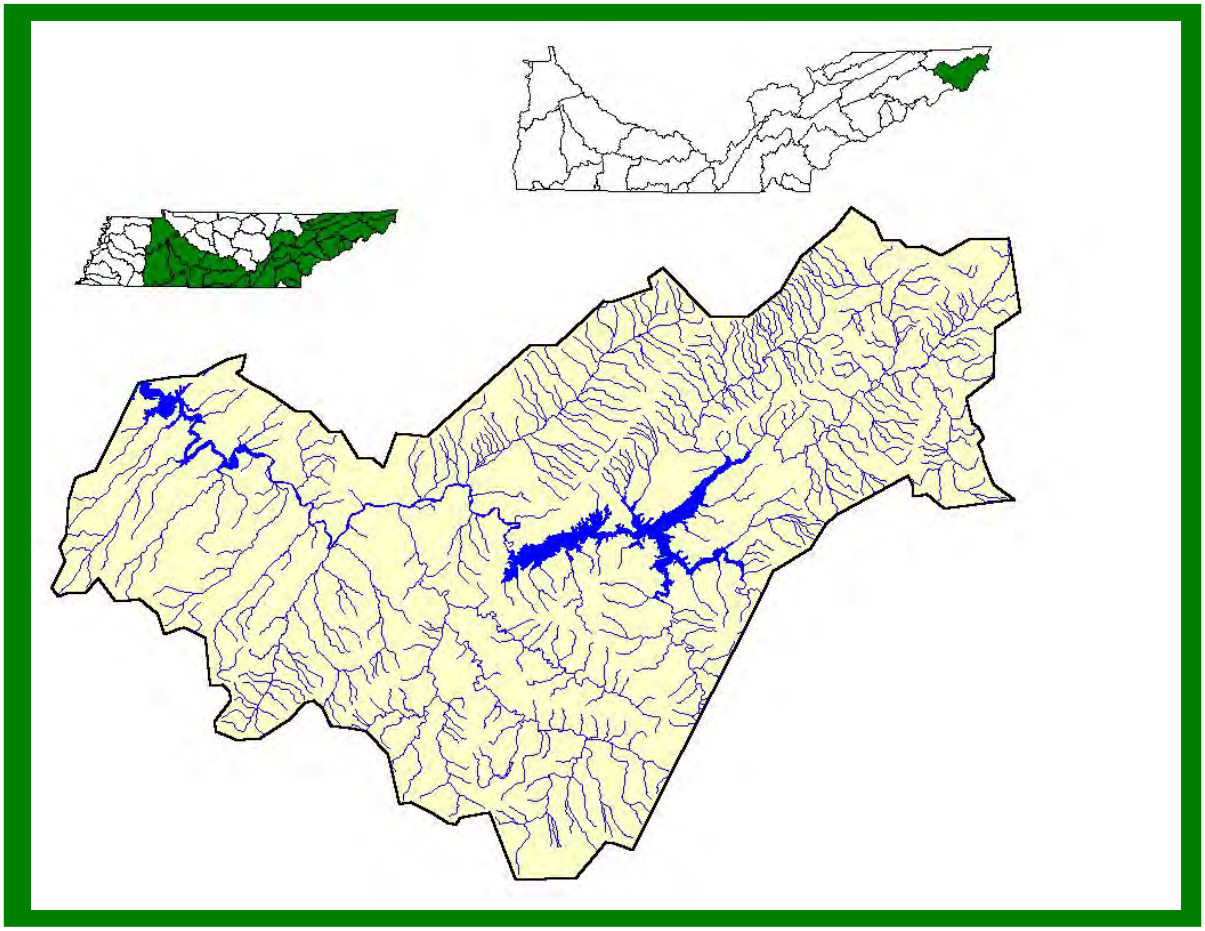
WATAUGA RIVER WATERSHED (06010103) OF THE TENNESSEE RIVER BASIN

WATER QUALITY MANAGEMENT PLAN



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

August 13, 2002

WATAUGA RIVER WATERSHED
WATER QUALITY MANAGEMENT PLAN

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GLOSSARY

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

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

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

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

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

AFO. Animal Feeding Operation.

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

ARAP. Aquatic Resource Alteration Permit.

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

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

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

Benthic. Bottom dwelling.

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

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

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

CAFO. Concentrated Animal Feeding Operation.

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

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

DO. Dissolved oxygen.

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

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

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

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

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

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

MRLC. Multi-Resolution Land Classification.

MS4. Municipal Separate Storm Sewer System.

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

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

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

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

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

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

SBR. Sequential Batch Reactor.

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

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

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

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

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

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

TMSP. Tennessee Multi-Sector Permit.

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

WAS. Waste Activated Sludge.

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

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

WET. Whole Effluent Toxicity.

WWTP. Waste Water Treatment Plant

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

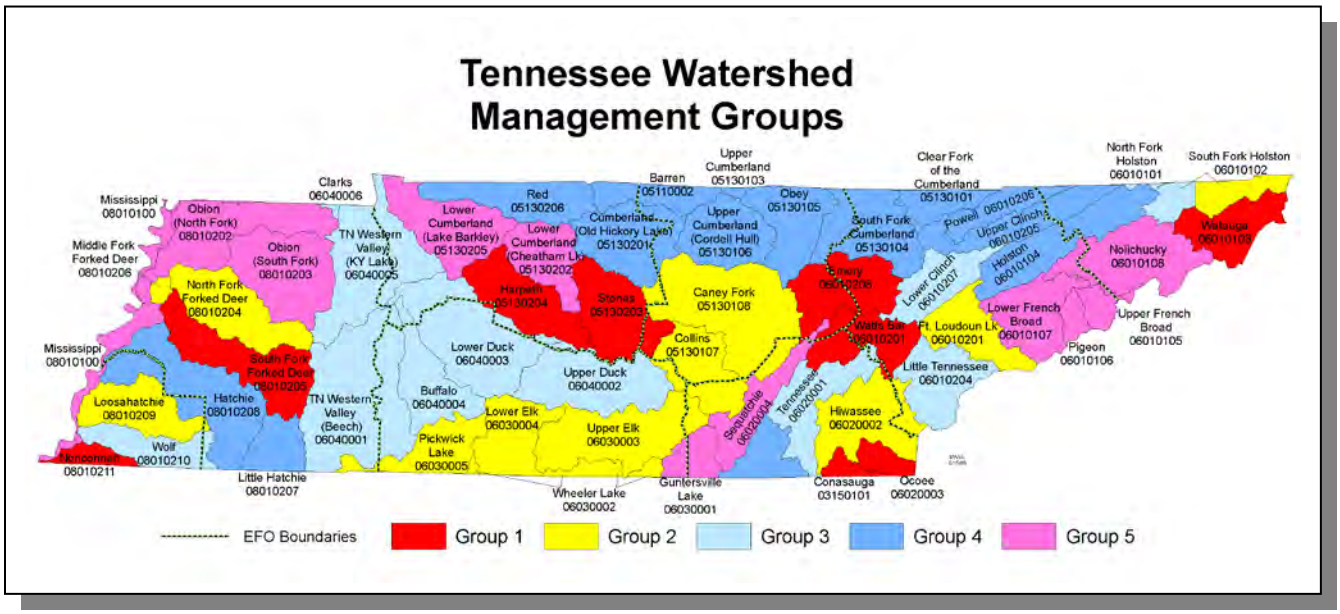

Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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

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

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

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

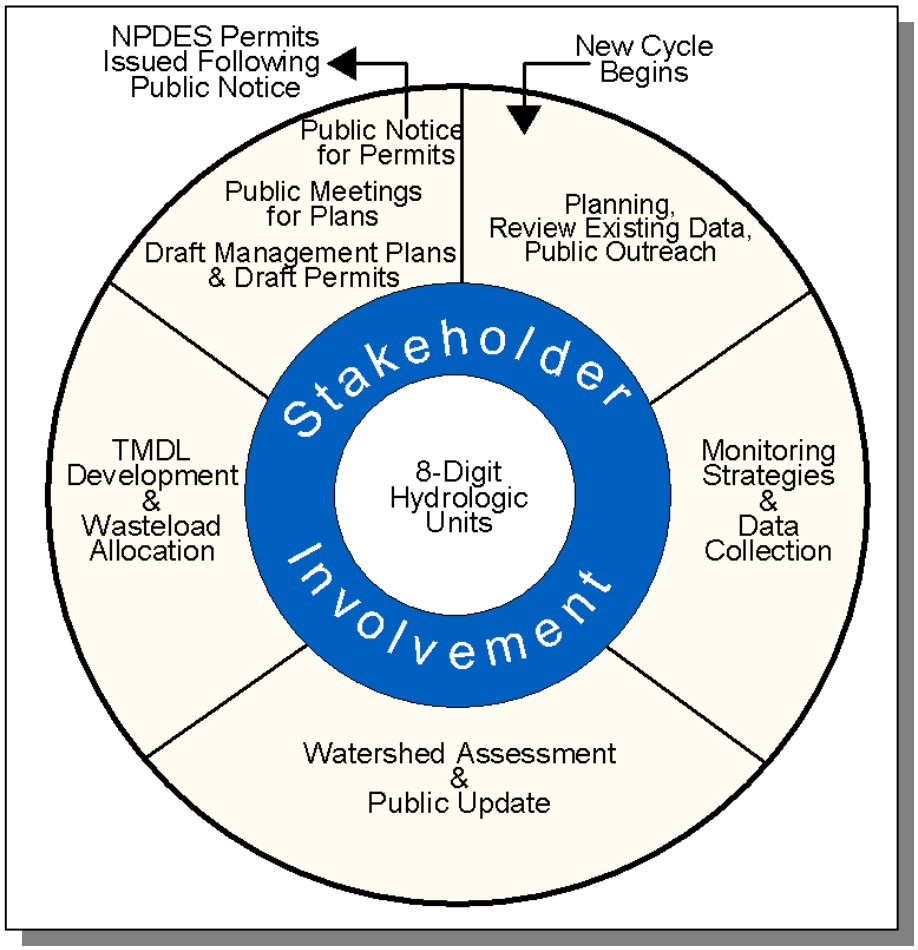

Figure 1-2. The Watershed Approach Cycle.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAPTER 2

DESCRIPTION OF THE WATAUGA RIVER WATERSHED

2.1 BACKGROUND. The name “Watauga” means “beautiful river” in the Cherokee language. Cattle and tobacco farming, timber logging operations, and urban areas all occur within the watershed. Part of the Cherokee National Forest, several state parks and wildlife management areas and TVA lakes provide the backdrop for recreation in the watershed.

The Watauga River Watershed includes cool, clear streams with high gradient and rugged terrain. It contains one of the richest centers of biodiversity in the eastern U.S. Springs and caves are relatively numerous in the Southern Limestone/Dolomite Valleys and Low Rolling Hills. The watershed has great aquatic habitat diversity and supports a diverse fish fauna.

This Chapter describes the location and characteristics of the Watauga River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Tennessee portion of Watauga River Watershed is located in East Tennessee and includes parts of Carter, Johnson, Sullivan, Unicoi, and Washington Counties.

Figure 2-1. General Location of the Watauga River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Carter	54.3
Johnson	25.7
Washington	14.2
Sullivan	2.9
Unicoi	2.9

Table 2-1. The Watauga River Watershed Includes Parts of Five East Tennessee Counties.

2.2.B. Population Density Centers. Six state highways serve the major communities in the Watauga River Watershed.

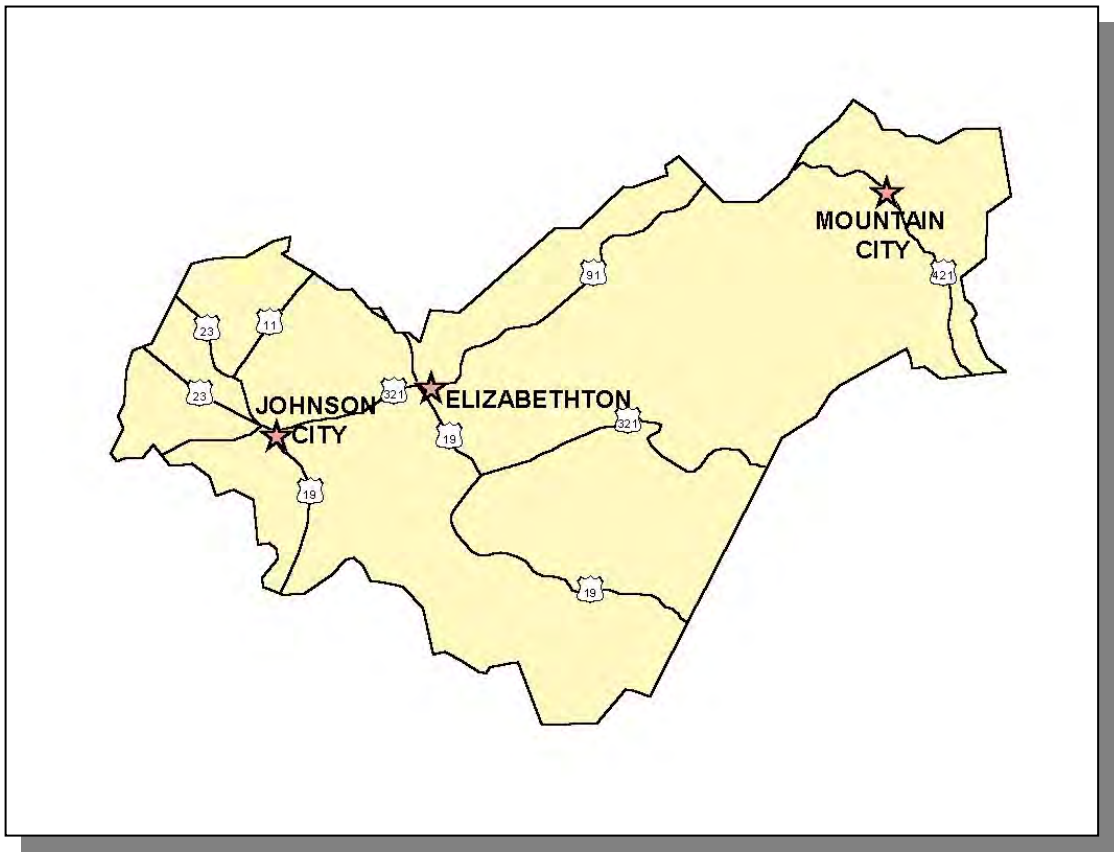

Figure 2-2. Municipalities and Roads in the Watauga River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Johnson City	49,381	Washington
Elizabethton*	11,931	Carter
Mountain City*	2,169	Johnson
Watauga	389	Carter

Table 2-2. Municipalities in the Watauga River Watershed. *Population based on 1990 census (Tennessee Blue Book). Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Watauga River Watershed, designated the Hydrologic Unit Code (HUC) 06010103 by the USGS, drains approximately 614 square miles in Tennessee and drains to Boone Reservoir. The entire watershed drains approximately 816 square miles.

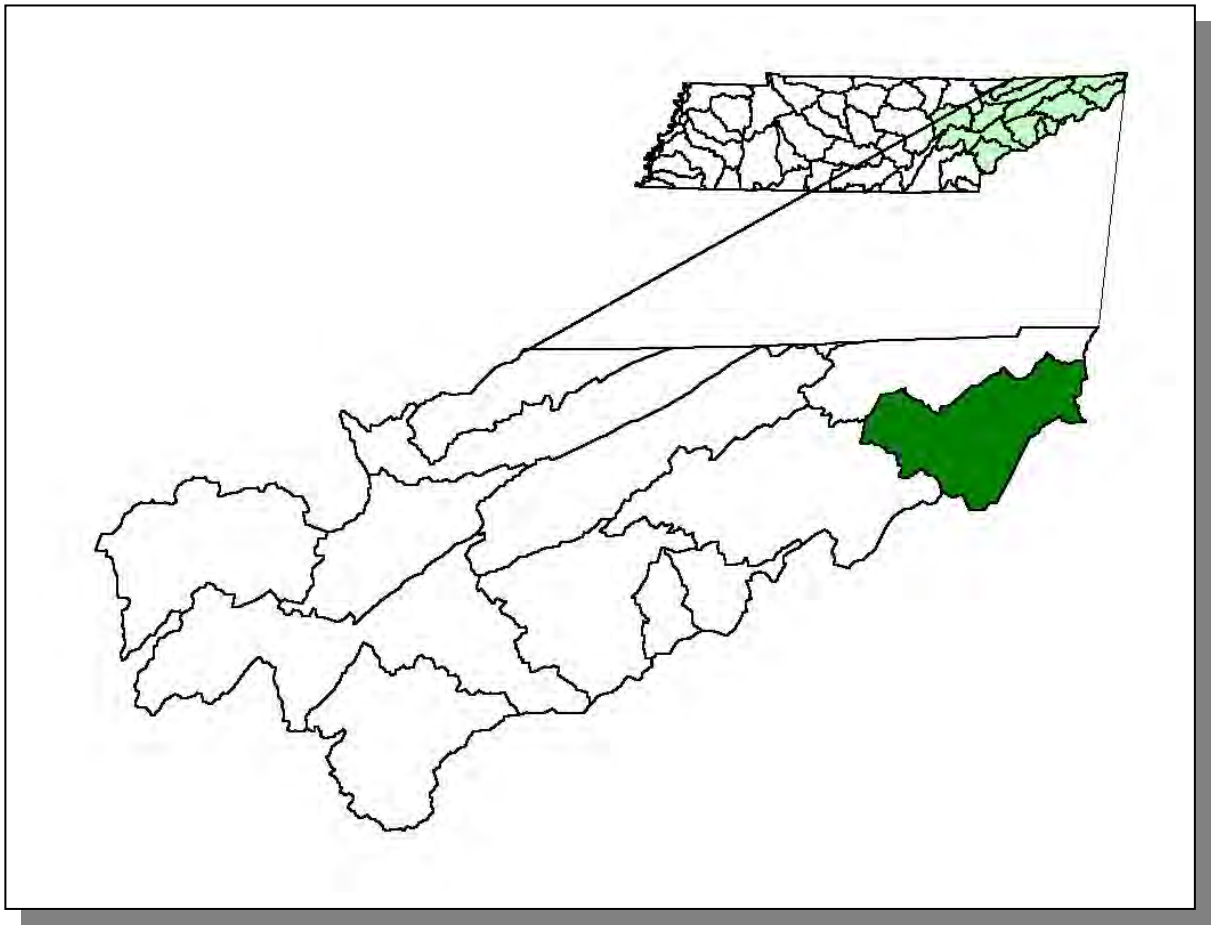

Figure 2-3. The Watauga River Watershed is Part of the Upper Tennessee River Basin.

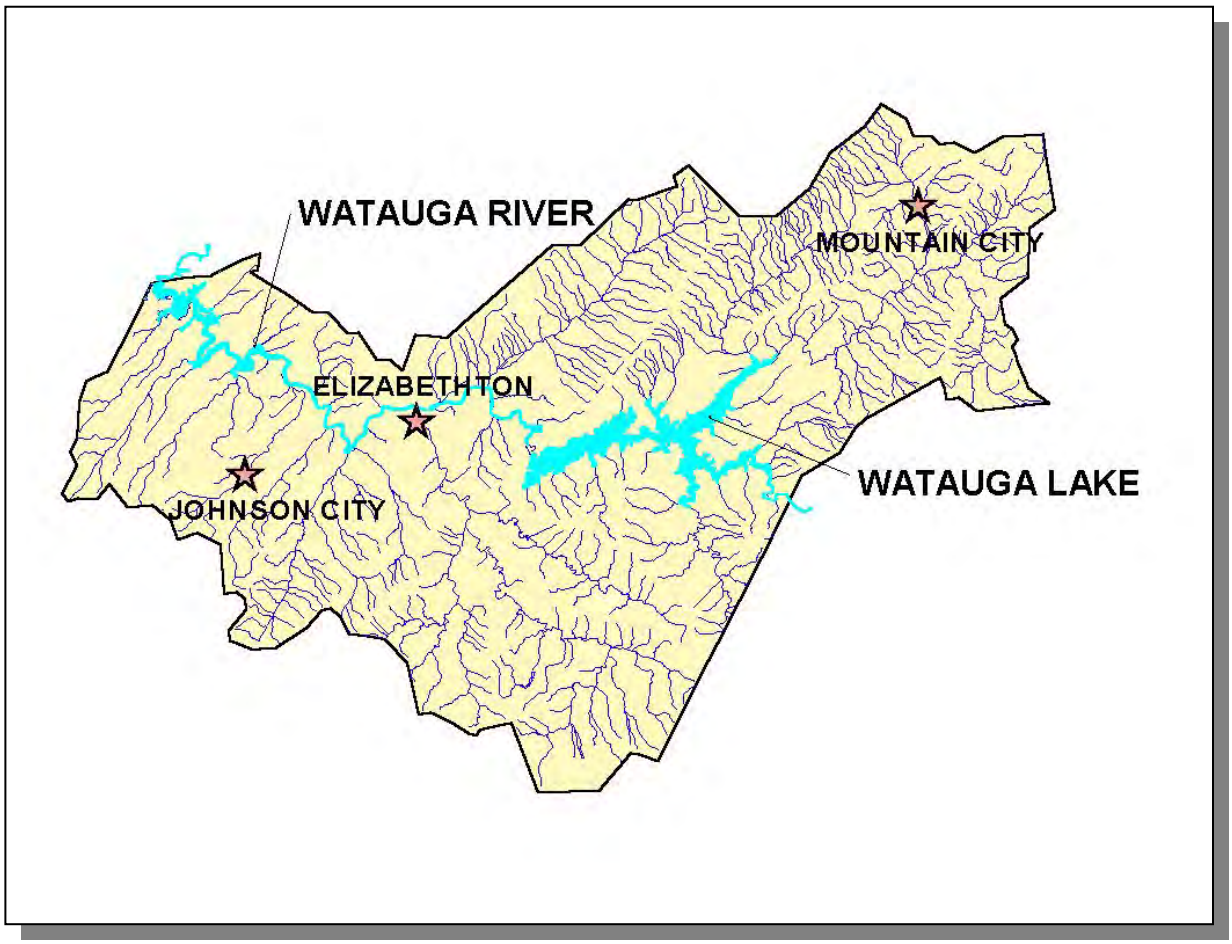

Figure 2-4. Hydrology in the Watauga River Watershed. *There are 1,039 stream miles and 6,499 lake acres recorded in River Reach File 3 in the Tennessee portion of the Watauga River Watershed. There are 1553 stream miles in the entire watershed. Locations of Elizabethton, Johnson City, and Mountain City are shown for reference.*

2.3.B. Dams. There are 6 dams inventoried by TDEC Division of Water Supply in the Watauga River Watershed. These dams either retain at least 30 acre-feet of water or have structures at least 20 feet high. Additional dams may be found in the watershed.

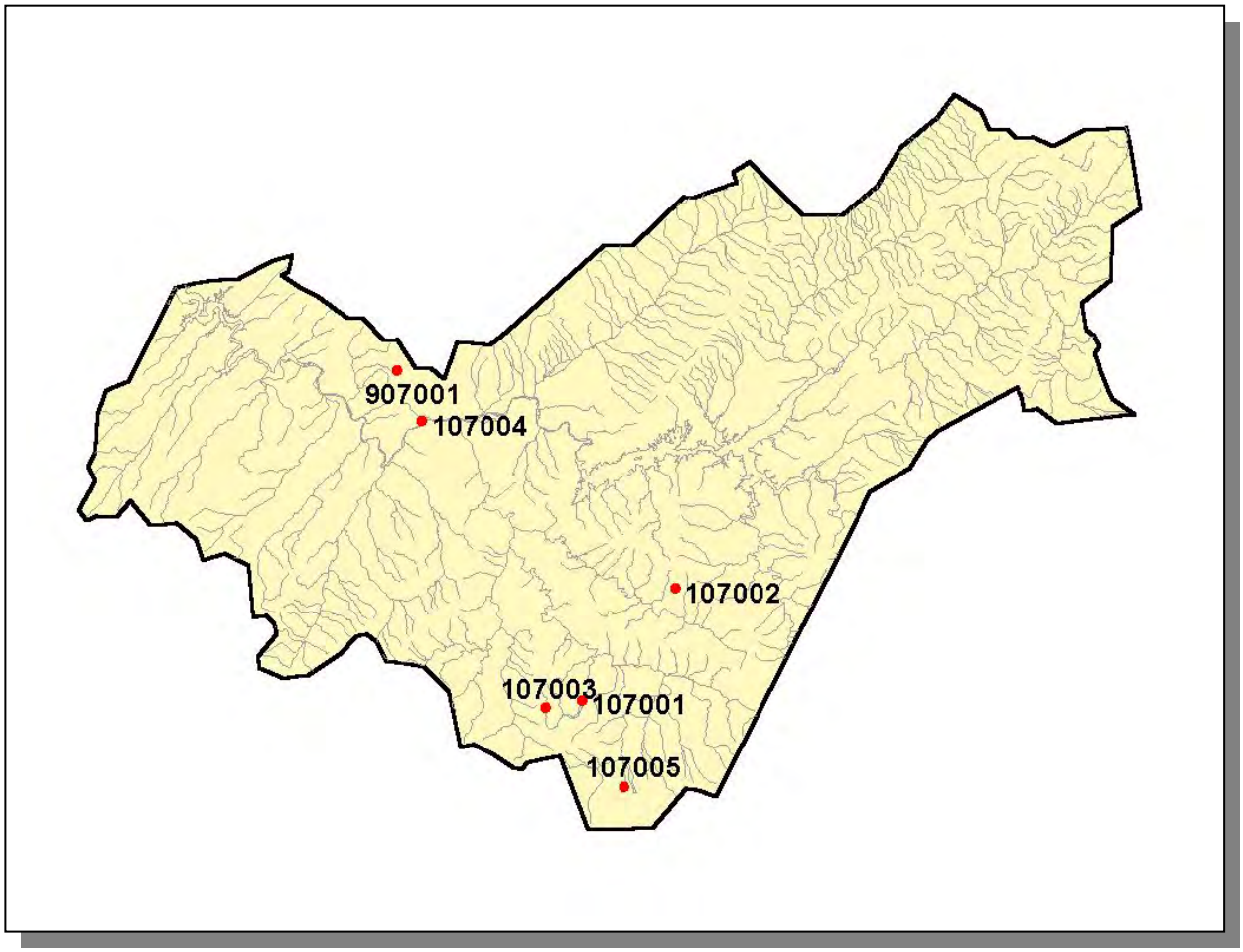

Figure 2-5. Location of Inventoried Dams in the Watauga River Watershed. *More information is provided in Watauga-Appendix II.*

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.

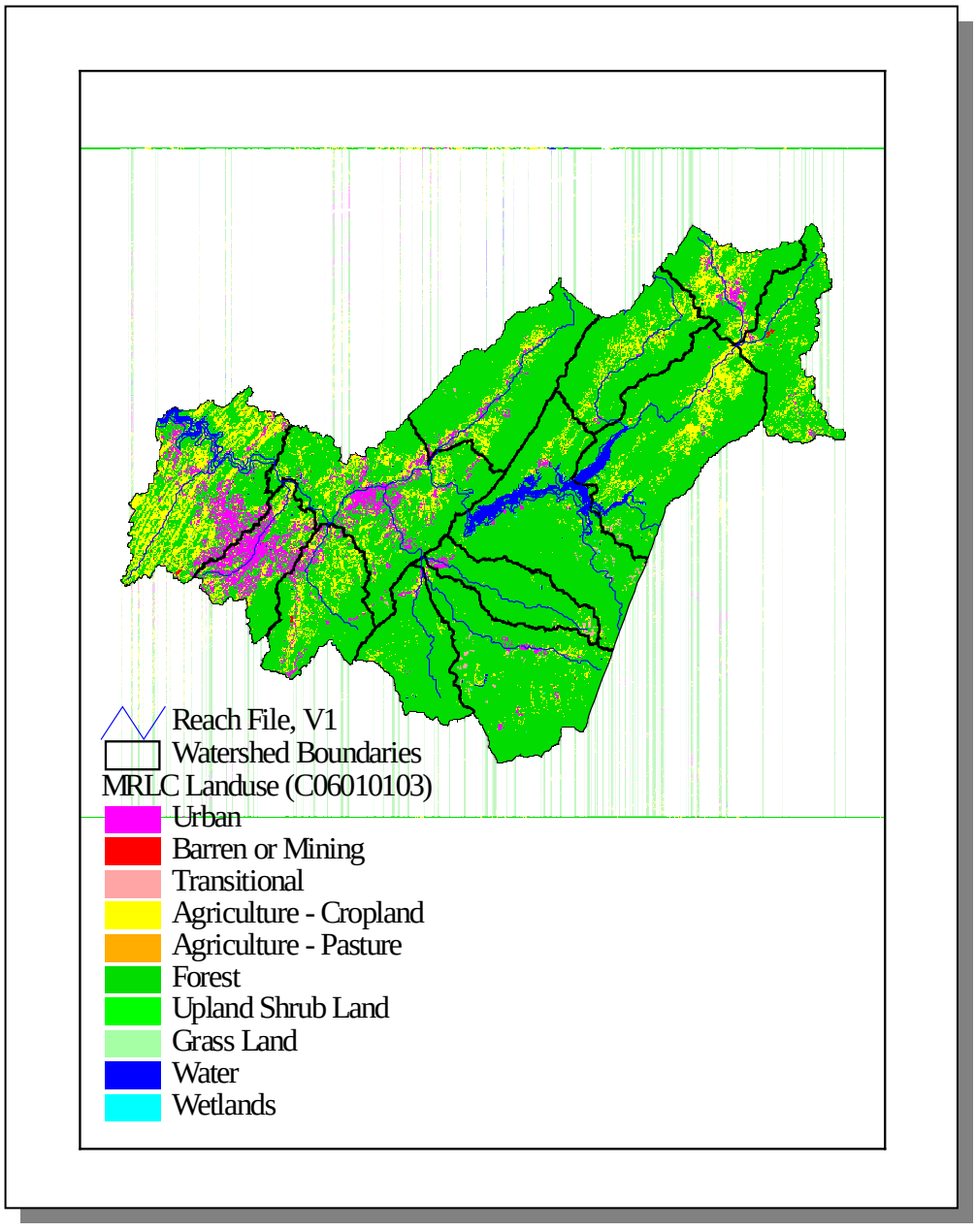

Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

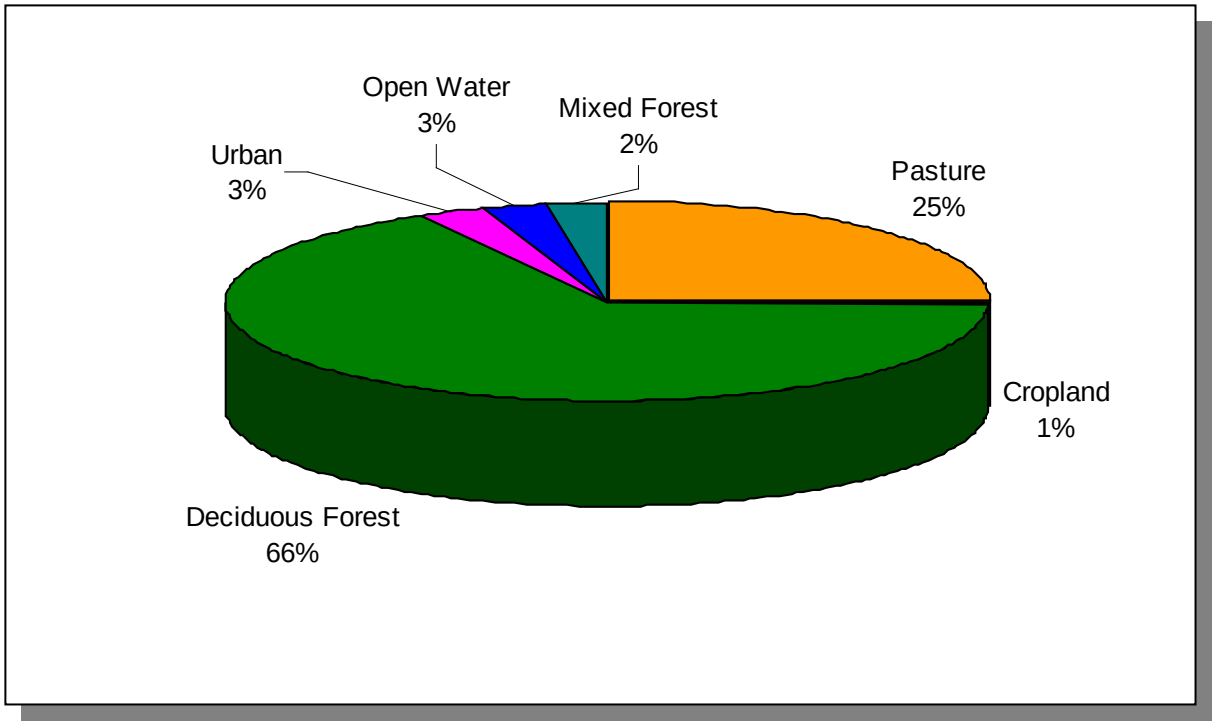

Figure 2-7. Land Use Distribution in the Watauga River Watershed. *More information is provided in Watauga-Appendix II.*

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 Watauga River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains and Ridge and Valley) and contains 5 Level IV subecoregions (Griffen, Omernik, Azavedo, 1997):

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

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

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

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

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

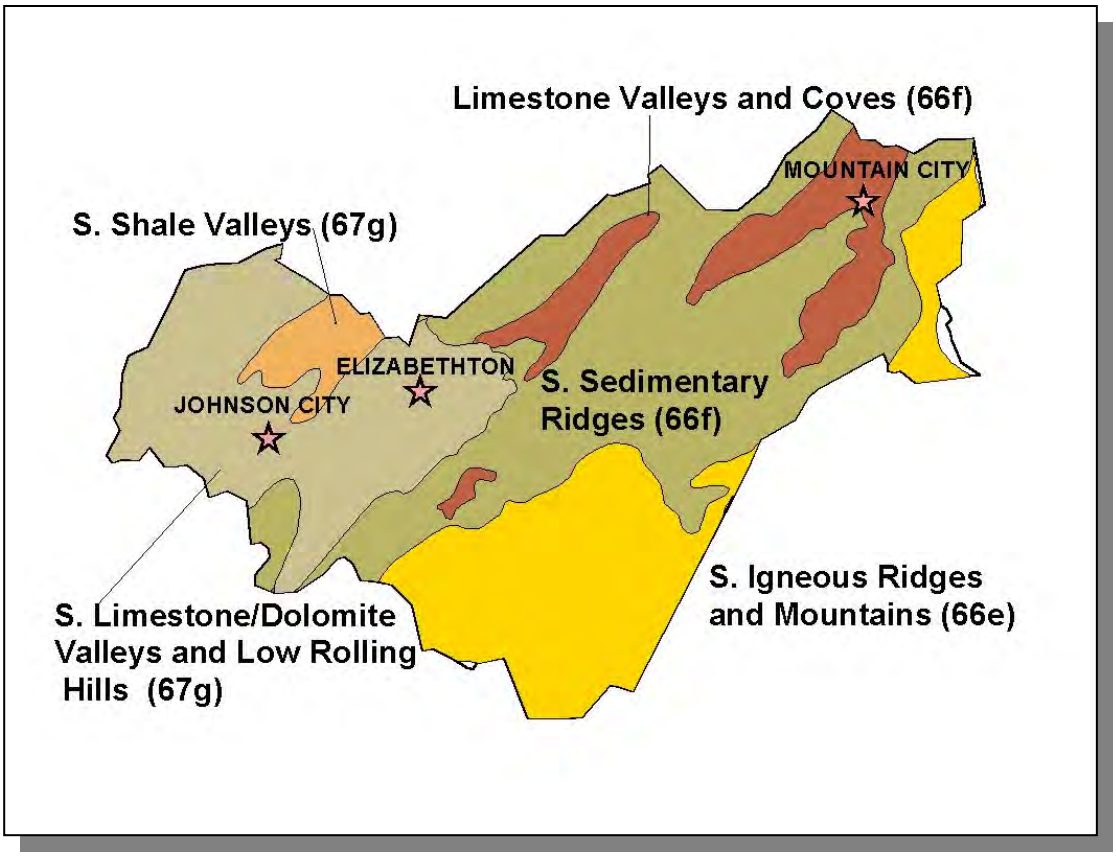

Figure 2-8. Level IV Ecoregions in the Watauga River Watershed. *Elizabethton, Johnson City and Mountain City are shown for reference.*

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.

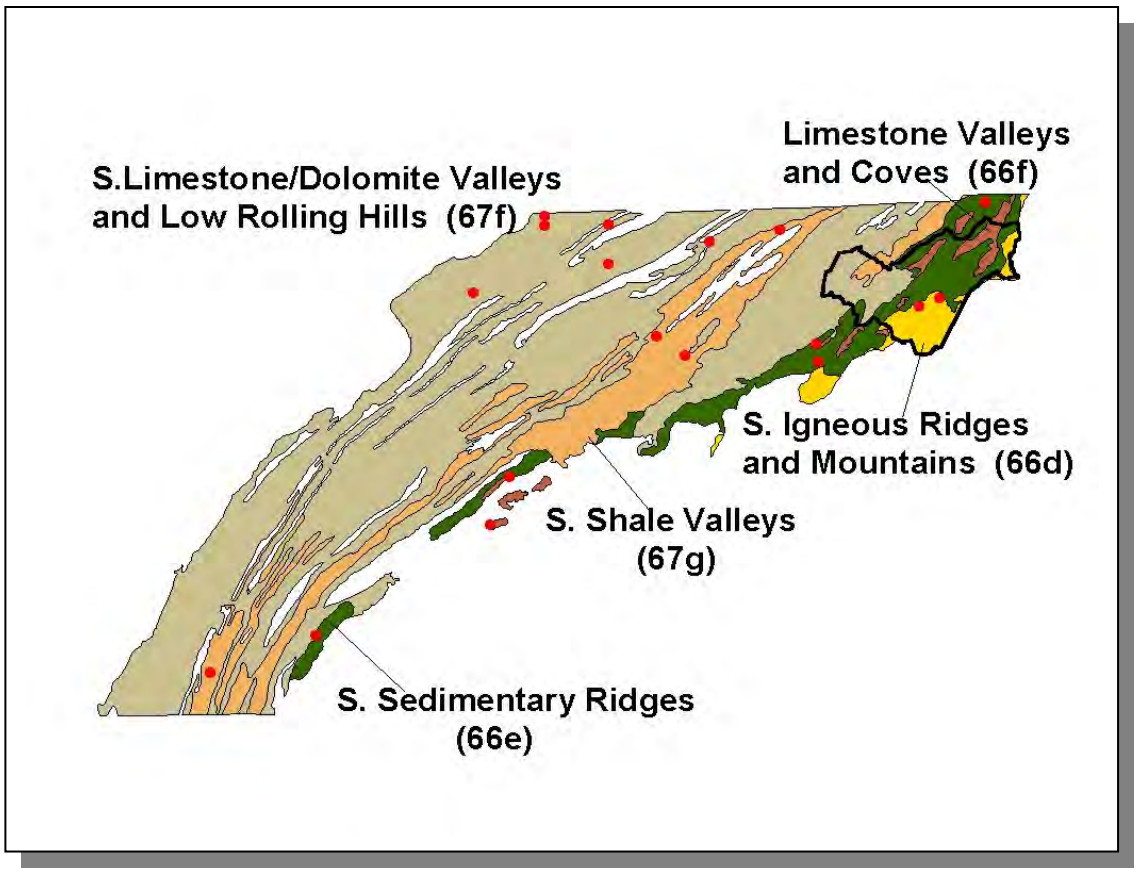

Figure 2-9. Ecoregion Monitoring Sites in Level IV Ecoregions 66d, 66e, 66f, 67f, and 67g. *The Watauga River Watershed is shown for reference. More information is provided in Watauga-Appendix II.*

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 Watauga River Watershed has two Designated Natural Areas:

Watauga River Bluffs Designated State Natural Area is a 50-acre site located along the Watauga River in Carter County.

Hampton Creek Cove Designated State Natural Area is a 693-acre site that supports several rare plants and animals in the headwaters of Hampton Creek.

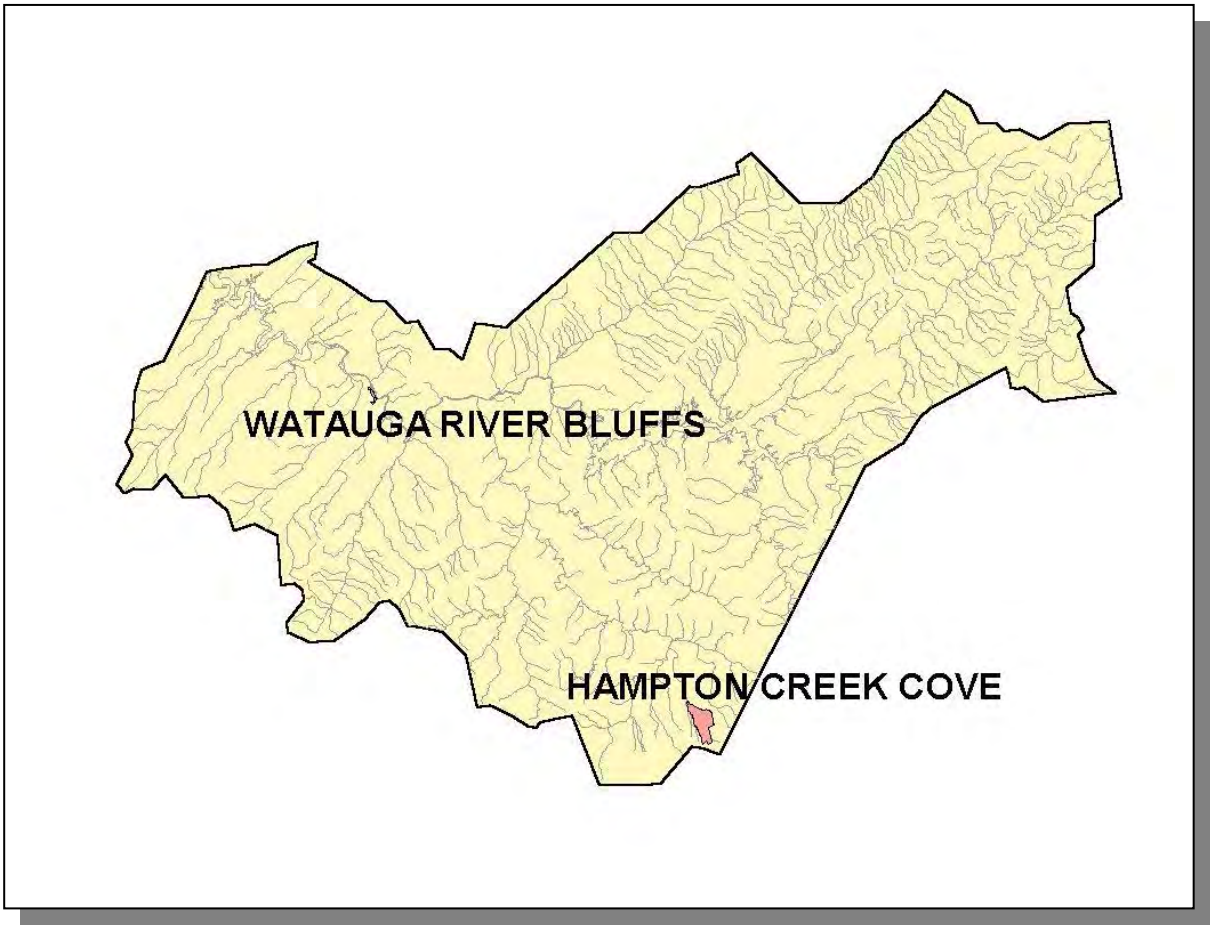

Figure 2-10. There are Two Designated State Natural Areas in the Watauga River Watershed.

2.6.B. National Forest. Covering 630,000 acres (187 square miles in the Tennessee portion of the Watauga River Watershed), the Cherokee National Forest is the largest tract of public land in the state. It is managed for multiple uses by the U.S. Department of Agriculture—Forest Service.

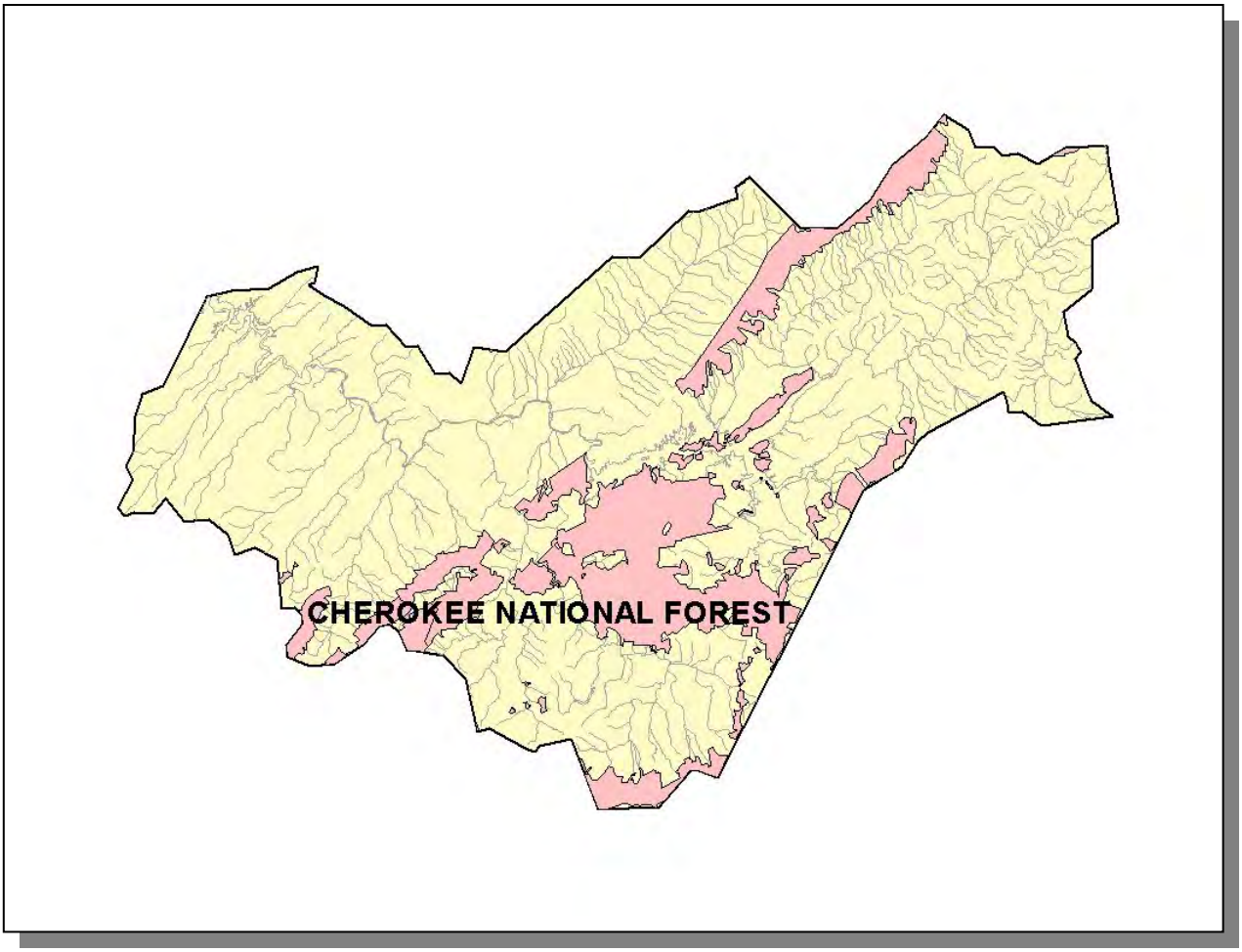

Figure 2-11. Location of Cherokee National Forest in Watauga River Watershed.

2.6.C. 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	4
Mussels	0
Snails	0
Amphibians	3
Birds	12
Fish	2
Mammals	11
Reptiles	0
Plants	91
Total	**123**

Table 2-3. There are 123 Documented Rare Plant and Animal Species in the Watauga River Watershed. Additional rare plant and animal species may be present.

Additionally, in the Watauga River Watershed, there are two rare fish species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Percina aurantiaca	Tangerine darter		D
Percina macrocephala	Longhead darter		T

Table 2-4. Rare Aquatic Species in the Watauga River Watershed. *State Status: T, Listed Threatened by the Tennessee Wildlife Resources Agency; D, Deemed in Need of Management by the Tennessee Wildlife Resources Agency.*

2.6.D. 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.

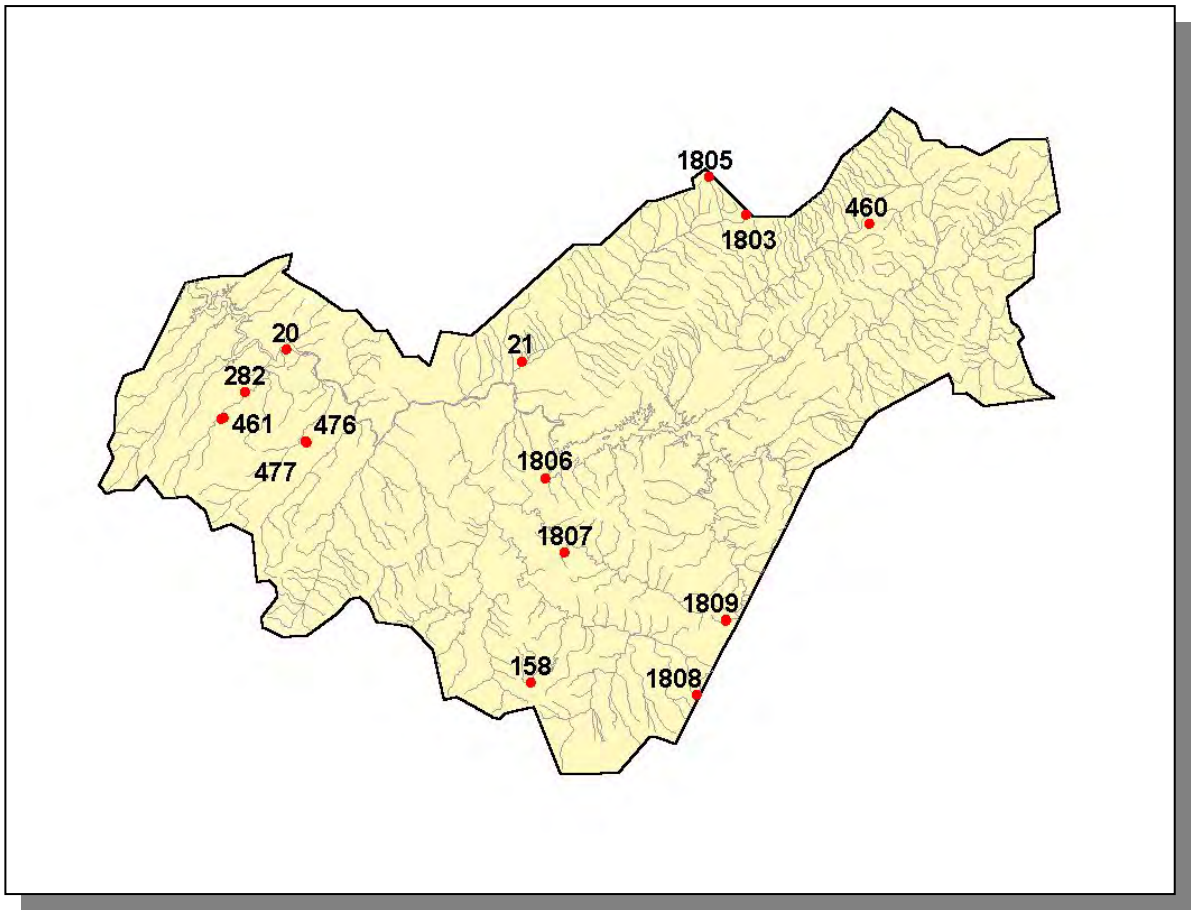

Figure 2-12. Location of Wetland Sites in TDEC Division of Natural Heritage Database in Watauga River Watershed. There may be additional wetland sites in the watershed. *More information is provided in Watauga-Appendix II.*

2.7. CULTURAL RESOURCES.

2.7.A. Nationwide Rivers Inventory. The Nationwide Rivers Inventory, required under the Federal Wild and Scenic Rivers Act of 1968, is a listing of free-flowing rivers that are believed to possess one or more outstanding natural or cultural values. Exceptional scenery, fishing or boating, unusual geologic formations, rare plant and animal life, cultural or historic artifacts that are judged to be of more than local or regional

significance are the values that qualify a river segment for listing. The Tennessee Department of Environment and Conservation and the Rivers and Trails Conservation Assistance branch of the National Park Service jointly compile the Nationwide Rivers Inventory from time to time (most recently in 1997). Under a 1980 directive from the President's Council on Environmental Quality, all Federal agencies must seek to avoid or mitigate actions that would have an adverse effect on Nationwide Rivers Inventory segments.

The most recent version of the Nationwide Rivers Inventory lists portions of three streams in the Watauga River Watershed:

> Doe River. One of the most majestic, deep gorge areas in eastern U.S., in a remote area, with 1000 foot walls.
>
> Watauga Creek. Scenic gorge area with several waterfalls and large boulders; recreational opportunities throughout.
>
> Watauga River. Scenic gorge area with several waterfalls and large boulders.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE	HISTORIC	CULTURAL
Doe River	X						
Watauga Creek	X	X	X	X	X	X	X
Watauga River	X						

Table 2-5. Attributes of Streams Listed in the Nationwide Rivers Inventory.

Additional information may be found online at http://www.ncrc.nps.gov/rtca/nri/tn.htm

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

- Sycamore Shoals State Historic Area, the site of a frontier settlement, the reconstruction of Fort Watauga, and a hiking/fitness trail
- Tipton-Haynes Historic Site, location of the Battle of the Lost State of Franklin and a museum

In addition, many local interpretive areas are common, most notably the Doe River Covered Bridge, a white clapboard bridge built in 1882 across the Doe River.

2.7.C. Wildlife Management Area. The Tennessee Wildlife Resources Agency manages the Doe Mountain Wildlife Management Area near Mountain City, Tennessee.

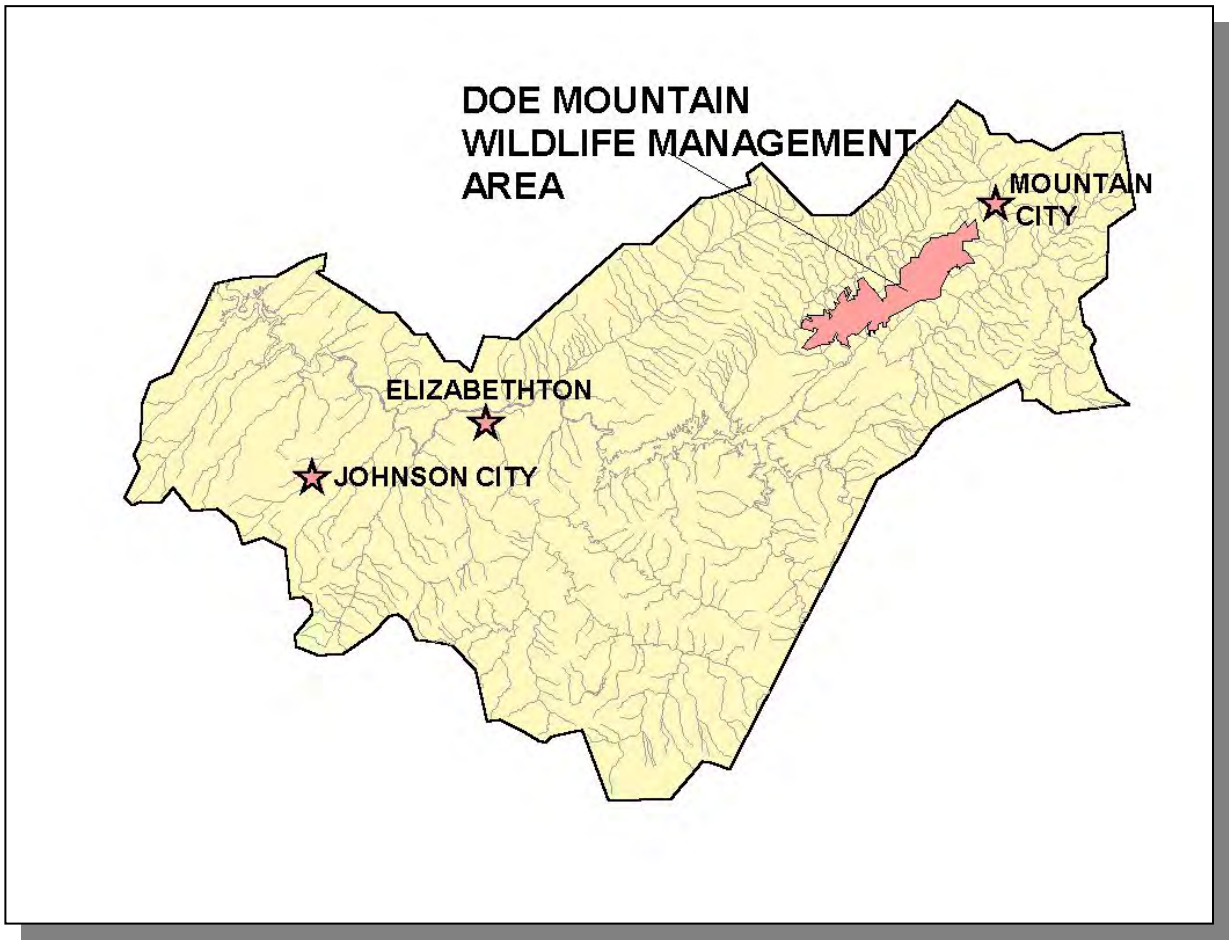

Figure 2-13. TWRA Manages the Doe Mountain Wildlife Management Area in the Watauga River Watershed.

2.8. TENNESSEE RIVERS ASSESSMENT PROJECT. The Tennessee Rivers Assessment is part of a national program operating under the guidance of the National Park Service's Rivers and Trails Conservation Assistance Program. The Assessment is an inventory of river resources, and should not be confused with "Assessment" as defined by the Environmental Protection Agency. A more complete description can be found in the Tennessee Rivers Assessment Summary Report, which is available from the Department of Environment and Conservation and on the web at:

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

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Boones Creek	3			Laurel Fork Creek	1		1
Buffalo Creek	3			Reedy Creek	3		
Cobb Creek	3			Roan Creek	3		1
Doe Creek	2		1	Roaring Creek	2		
Doe River	1,2,3	1		Roaring Forge Creek	3		
Dry Creek	2			Shell Creek	2		
Elk River	2		1	Sinking Creek	3		
Furnace Creek	2			South Brush Creek	4		
Gap Creek	2			Stony Creek	3		
Goose Creek	2,3			Tiger Creek	2		
Knob Creek	4			Watauga River	1,3	1,2	1

Table 2-6. 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 as a fishery

CHAPTER 3

WATER QUALITY ASSESSMENT OF THE WATAUGA RIVER WATERSHED

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

In 1996, Tennessee began the watershed approach to water quality protection. In the Watershed Approach, resources—both human and fiscal—are better used by assessing water quality more intensively on a watershed-by-watershed basis. In this approach, water quality is assessed in year three, following one to two years of data collection. More information about the Watershed Approach may be found at http://www.state.tn.us/environment/wpc/wshed1.htm.

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 2000 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/OW/resources/9698/tn.html

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

This chapter provides a summary of water quality in the Watauga River Watershed, and summarizes data collection, assessment results and a description of impaired waters.

3.2 DATA COLLECTION. Comprehensive water quality monitoring in the Watauga River Watershed was conducted in 1998. Data were collected from 32 sites and were from one of four types of site: 1)Ambient, 2)Ecoregion, 3)Watershed or 4)Aquatic Resources Alteration Permit (ARAP) inspection.

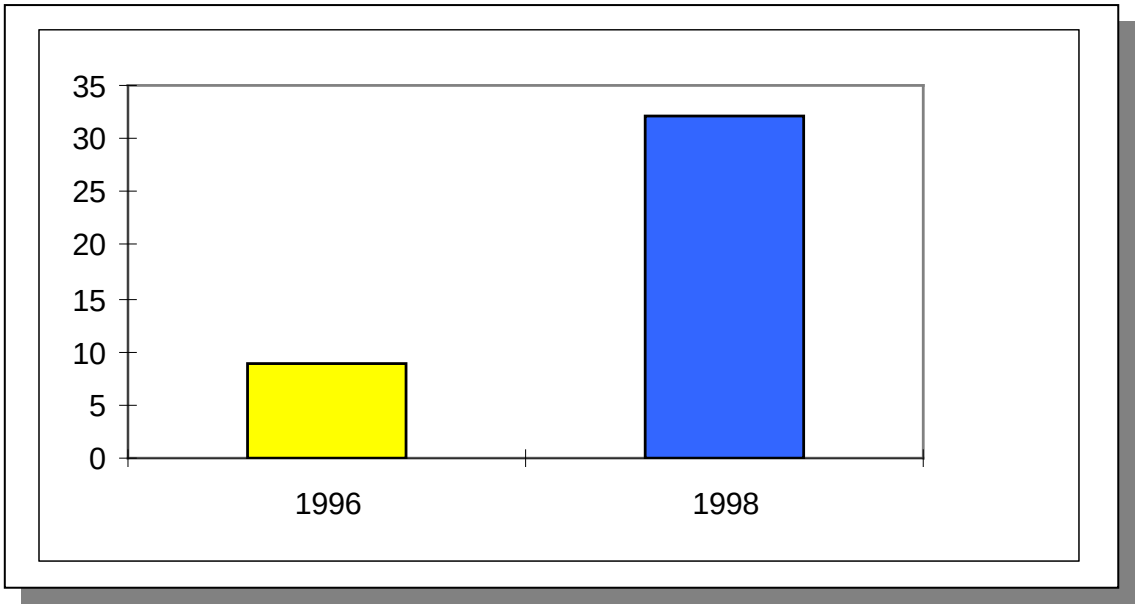

Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (1998) in the Watauga River Watershed.

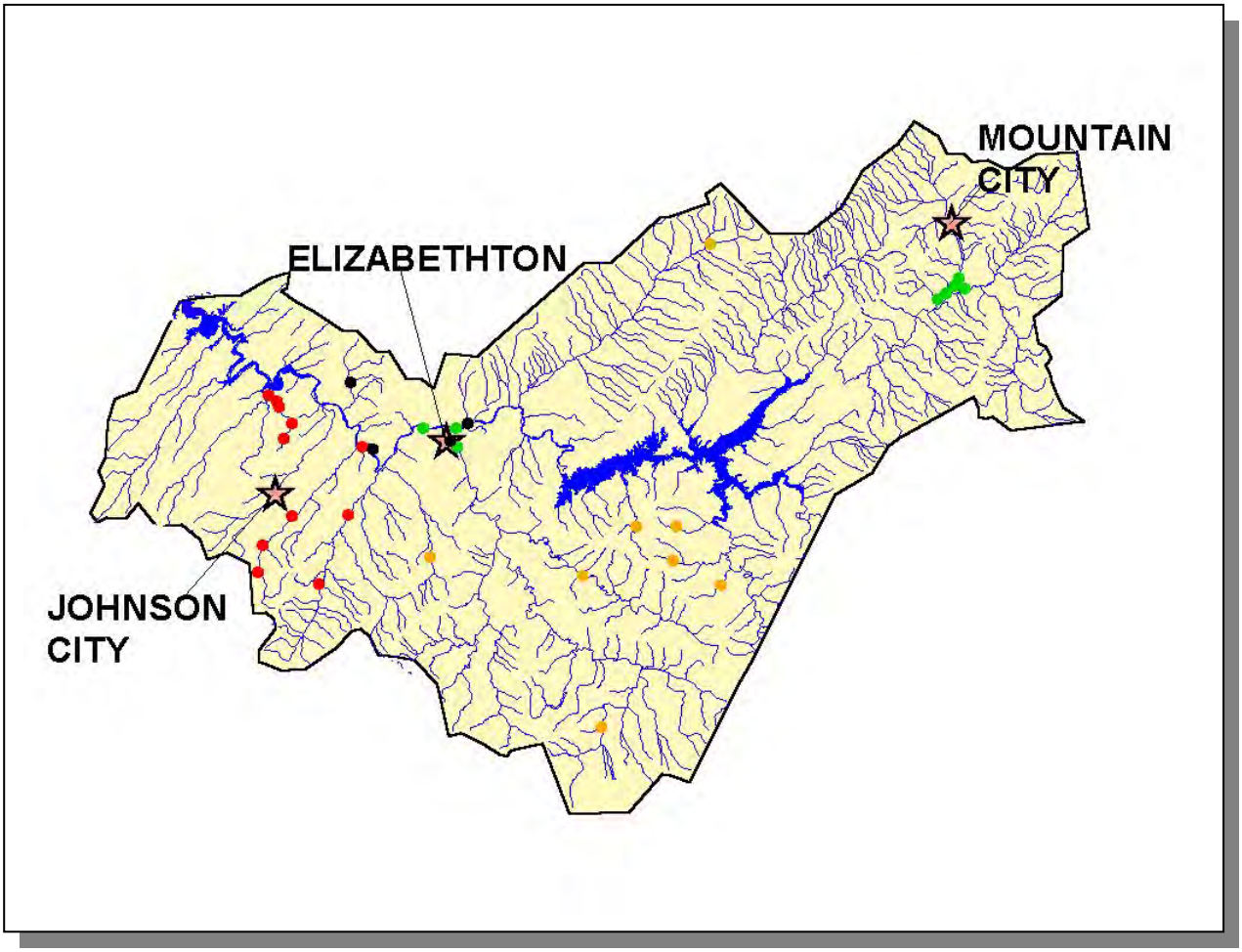

Figure 3-2. Location of Monitoring Sites in the Watauga River Watershed. *Red, Watershed Monitoring Sites; Black, Observational Data Sites; Orange, Rapid Bioassessment Sites; Green, Ambient Monitoring Sites. Locations of Elizabethton, Johnson City, and Mountain City are shown for reference.*

TYPE	NUMBER	TOTAL NUMBER OF SAMPLING EVENTS		
		CHEMICAL ONLY	BIOLOGICAL ONLY	BIOLOGICAL PLUS CHEMICAL (FIELD PARAMETERS)
Ambient	7	56		8
Ecoregion	7	24		18
Watershed	14	336		
ARAP Site Inspections	4	2		2
Totals	**32**	**418**		**28**

Table 3-1. Monitoring Sites in the Watauga River Watershed During the Data Collection Phase of the Watershed Approach.

In addition to the 446 sampling events, over 46 citizen complaints, 1 occurrence involving dead fish (fish kill) and 3 responses to toxic spills were investigated.

3.2.A. Ambient Monitoring Sites. These fixed-station chemical monitoring sites are sampled quarterly or monthly by the Environmental Assistance Center-Johnson City Water Pollution Control 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 measured in the Watauga River Watershed are provided in Watauga-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 Watauga River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains, Ridge and Valley) and contains 5 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 Valleys (67g)

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

Ecoregion stations are scheduled to be monitored as Watershed sampling sites.

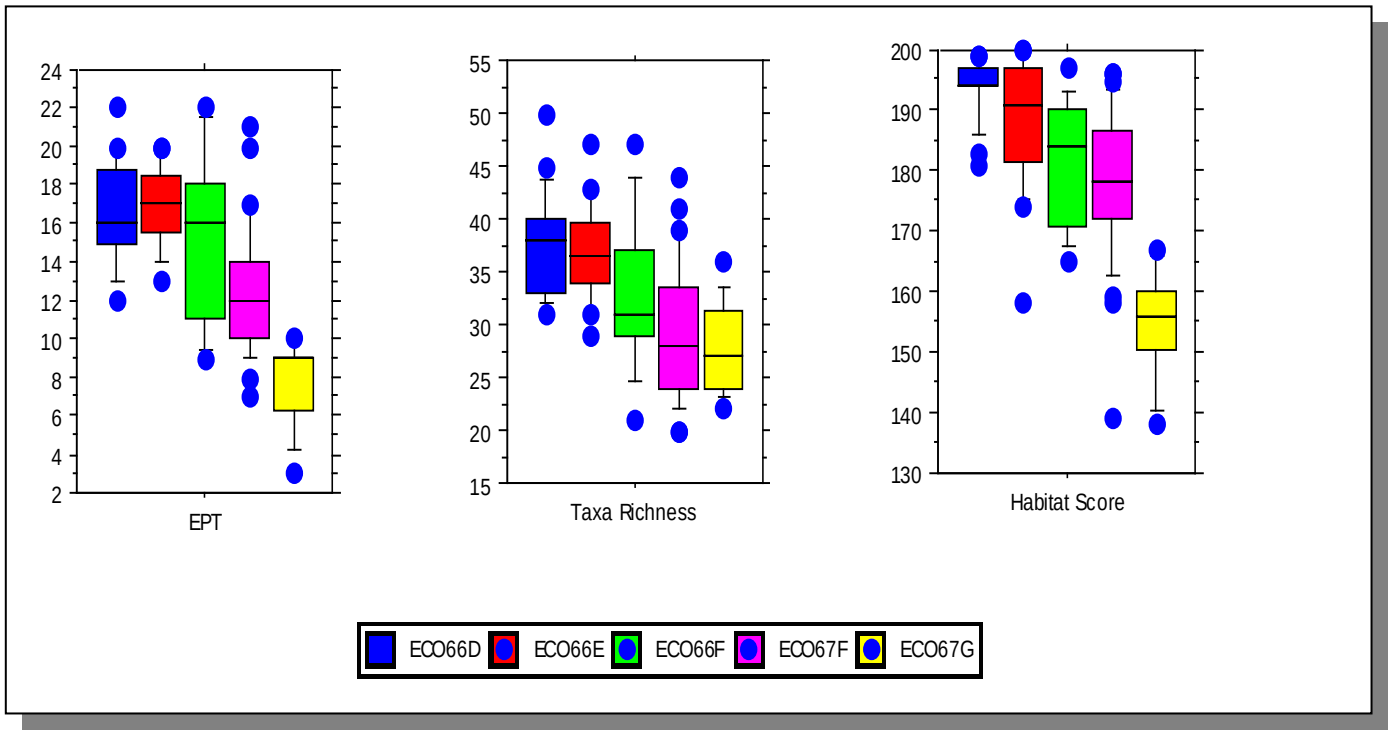

Figure 3-3. Benthic Macroinvertebrate and Habitat Scores for Watauga River Ecoregion RBP III Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as points. EPT and Taxa scores are number of genus observed; habitat score is calculated as described in EPA 841-D-97-002*

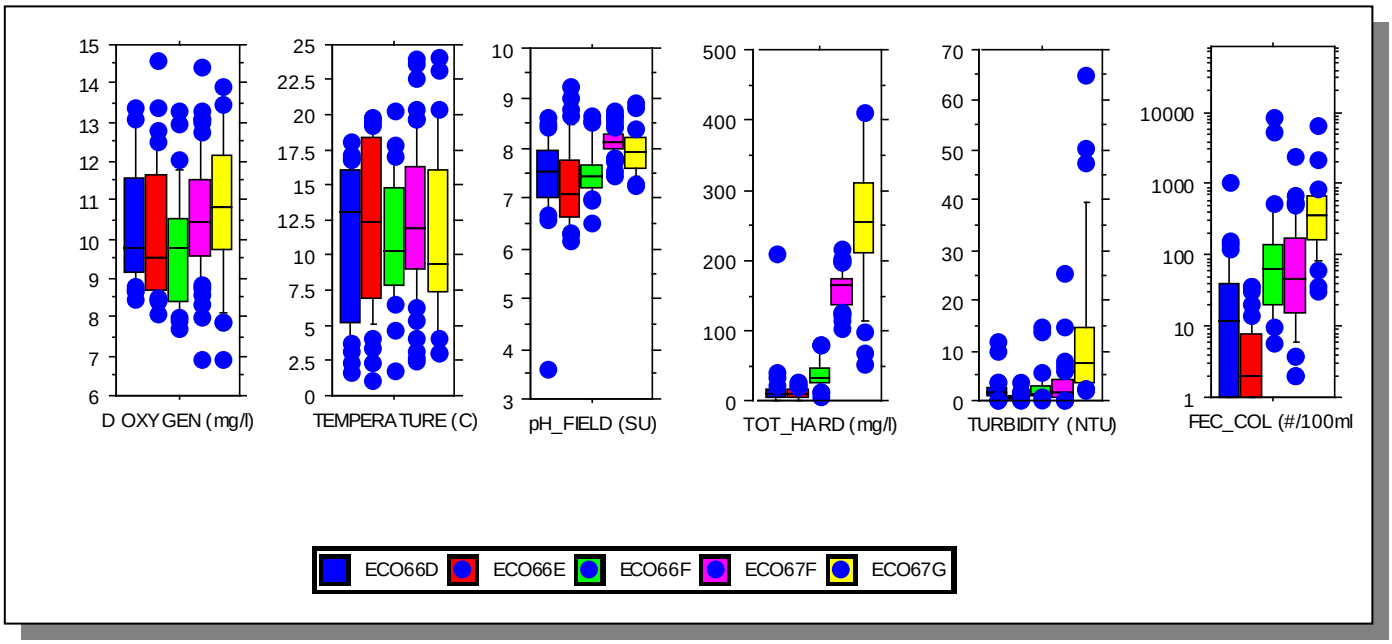

Figure 3-4. Select Chemical Data Collected in Watauga River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as points.*

3.2.C. Watershed Sites. Activities that take place at watershed sites are benthic macroinvertebrate biological 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 to describe the condition of water quality, in general, by determining the absence or presence of clean water indicator organisms, such as EPT (Ephemeroptera [mayflies], Plecoptera [stoneflies], Trichoptera [caddisflies]). Factors and resources used for selecting BioRecon sites are:

- The current 303(d) list,
- HUC-11 maps (every HUC-11 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 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 include:

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

These special surveys are performed when needed.

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.

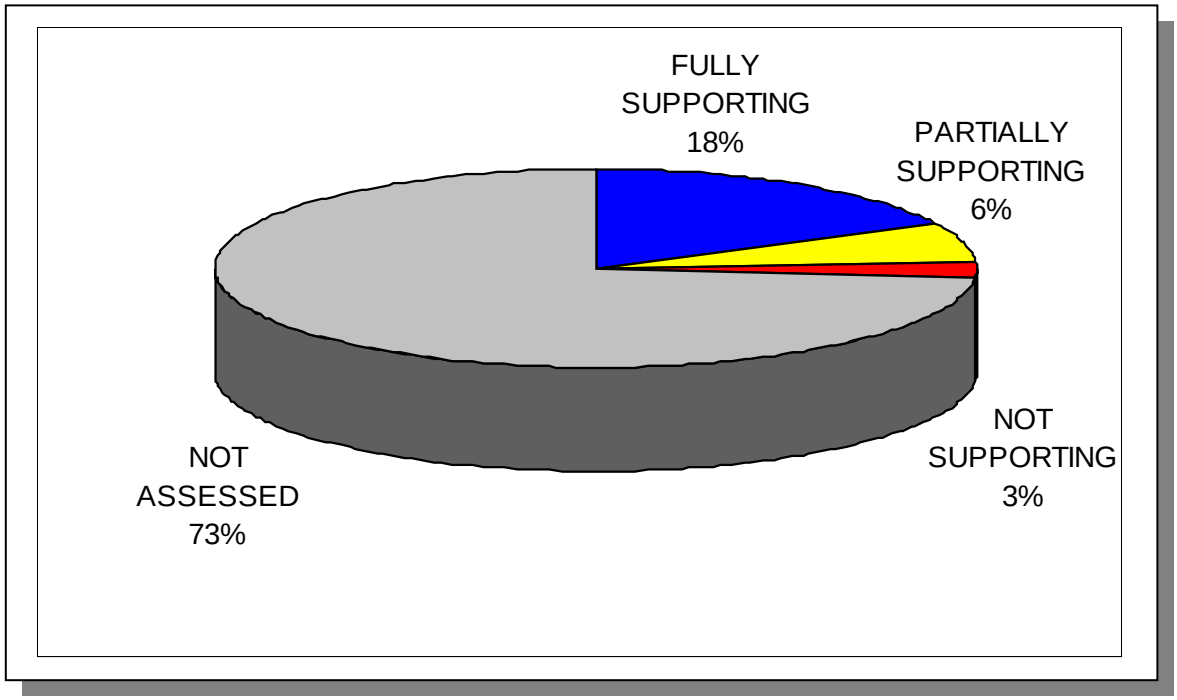

Figure 3-5. Water Quality Assessment for Rivers and Streams in the Watauga River Watershed. *Assessment data (stream miles) are based on the 2000 Water Quality Assessment.*

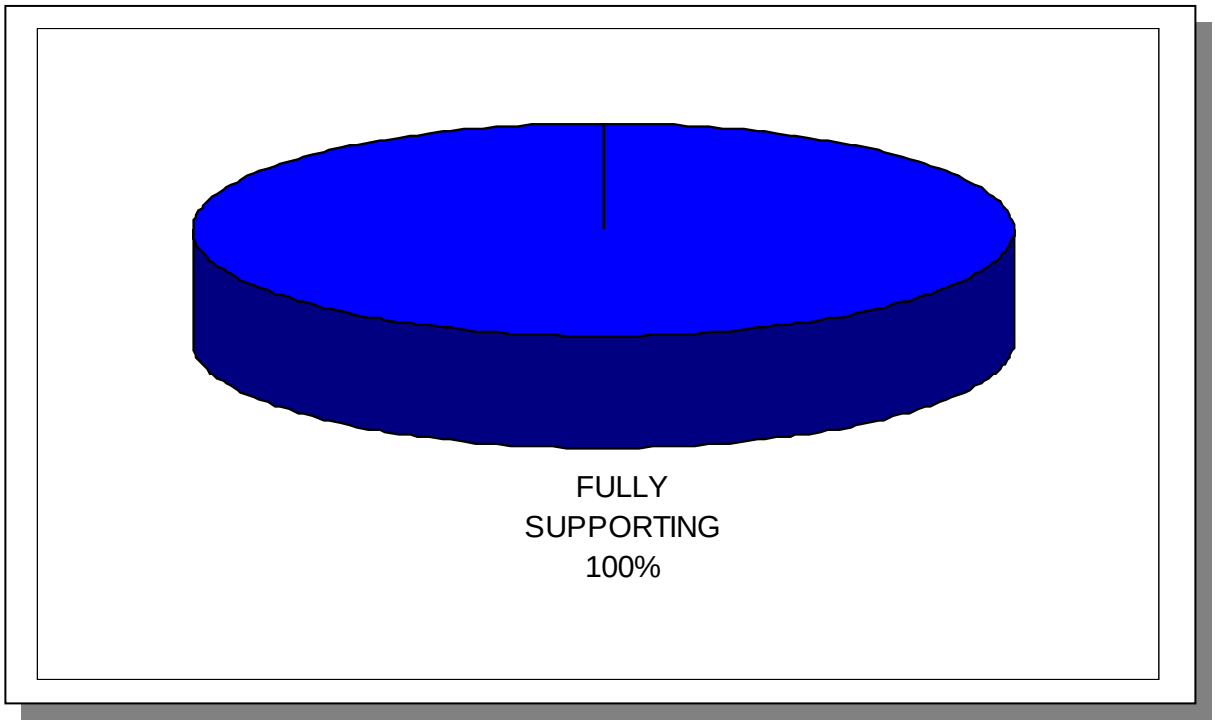

Figure 3-6. Water Quality Assessment for Lakes in the Watauga River Watershed. *Assessment data (stream miles) are based on the 2000 Water Quality Assessment. More information is provided in Watauga-Appendix III.*

3.3.A. Assessment Summary.

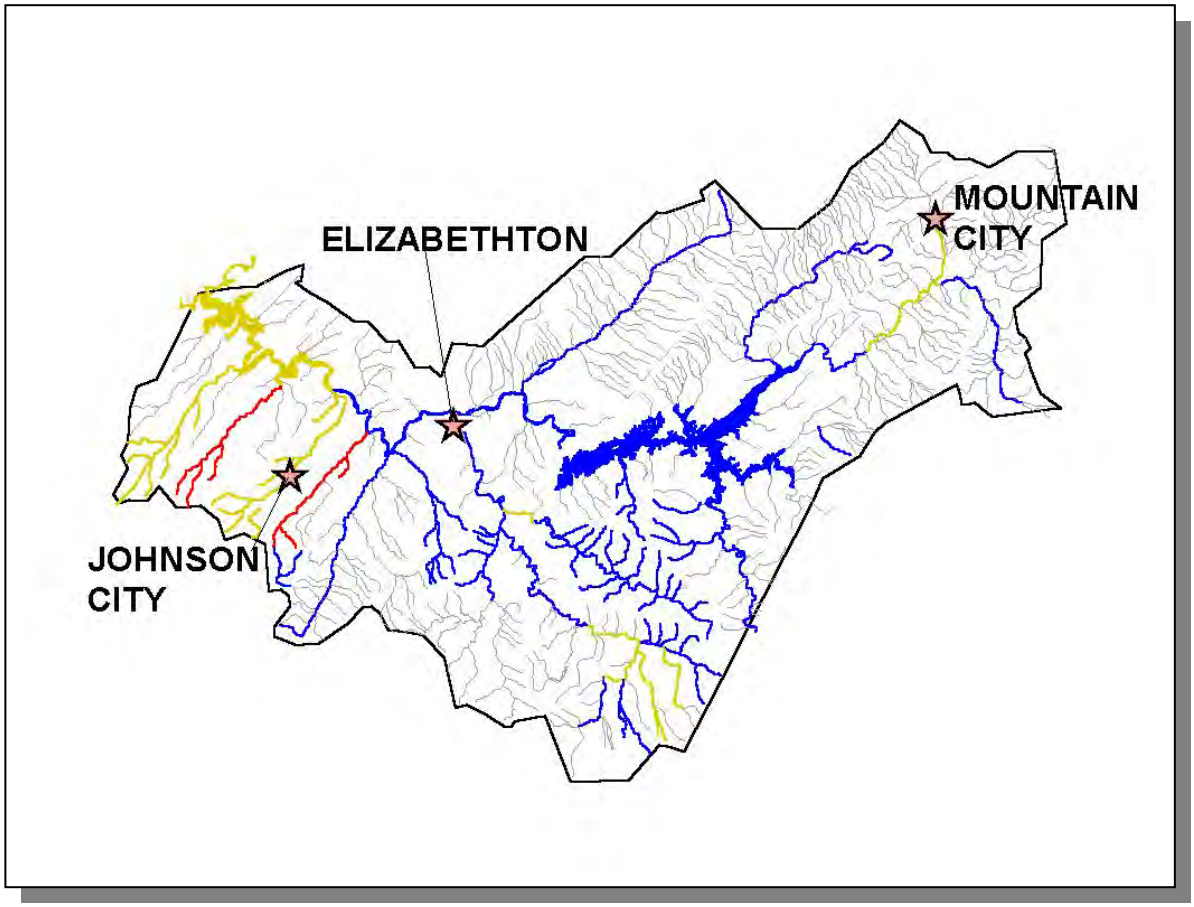

Figure 3-7a. Overall Use Support Attainment in the Watauga River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Elizabethton, Johnson City, and Mountain City are shown for reference. More information is provided in Watauga-Appendix III.*

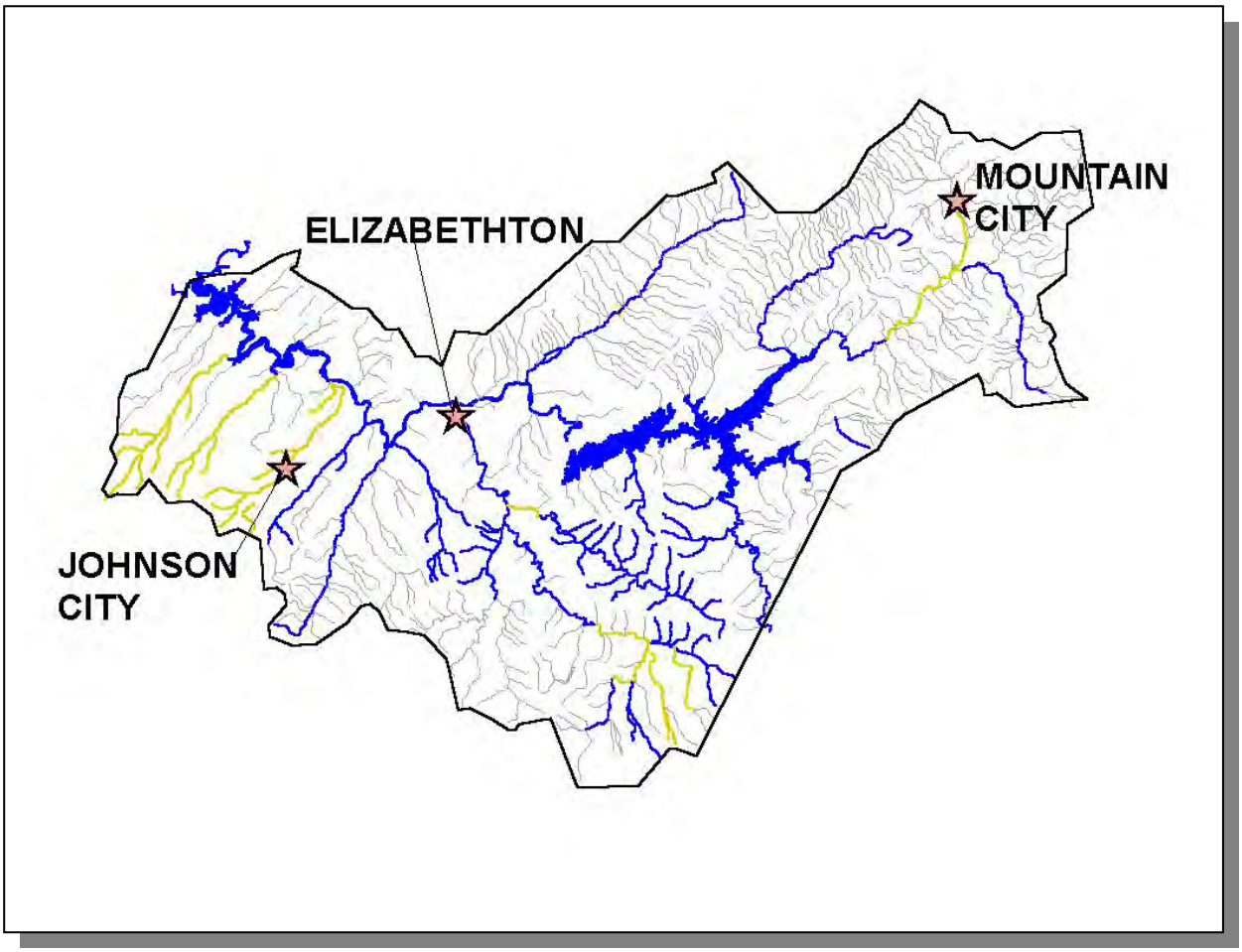

Figure 3-7b. Fish and Aquatic Life Use Support Attainment in the Watauga River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Elizabethton, Johnson City, and Mountain City are shown for reference.*

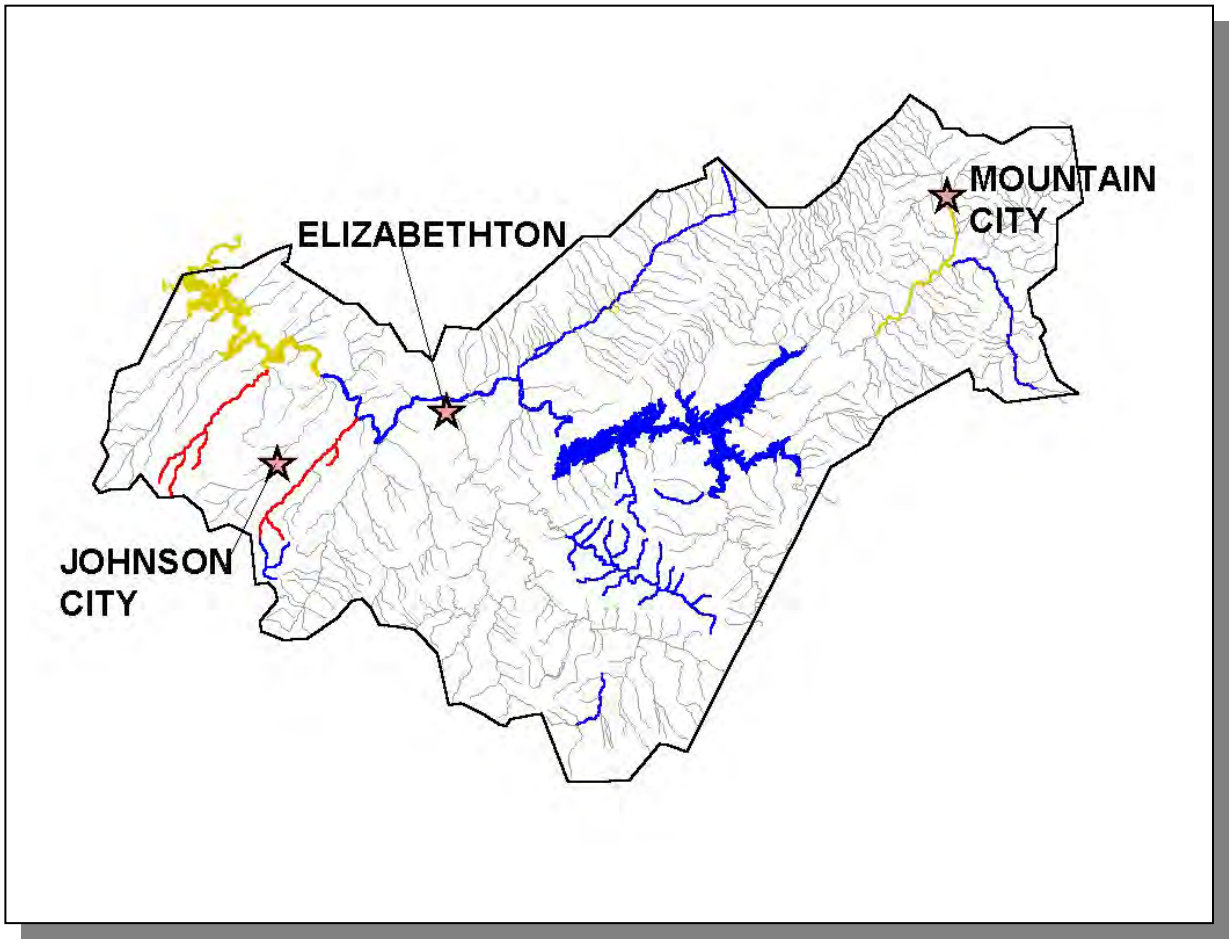

Figure 3-7c. Recreation Use Support Attainment in the Watauga River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Elizabethton, Johnson City, and Mountain City are shown for reference.*

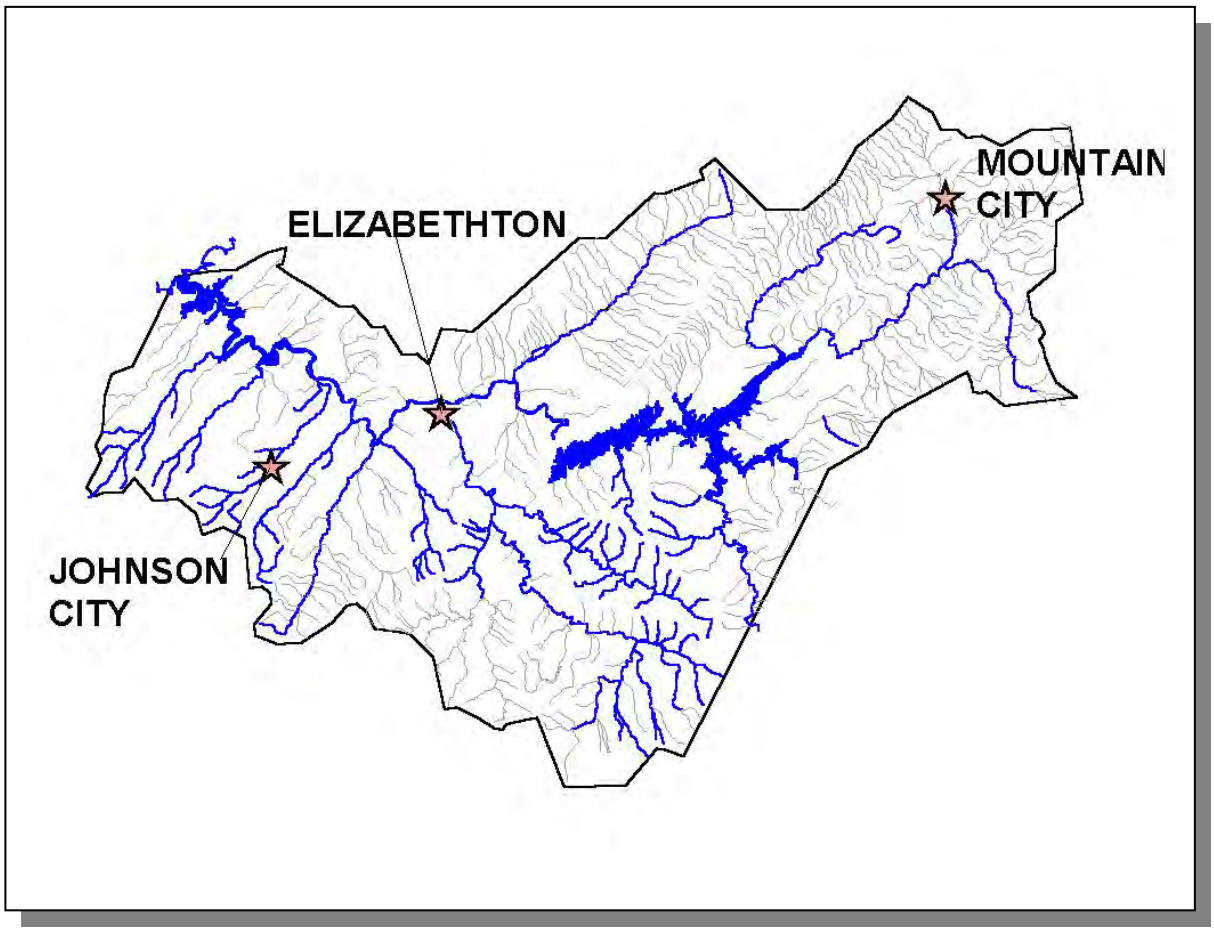

Figure 3-7d. Irrigation Use Support Attainment in the Watauga River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Elizabethton, Johnson City, and Mountain City are shown for reference.*

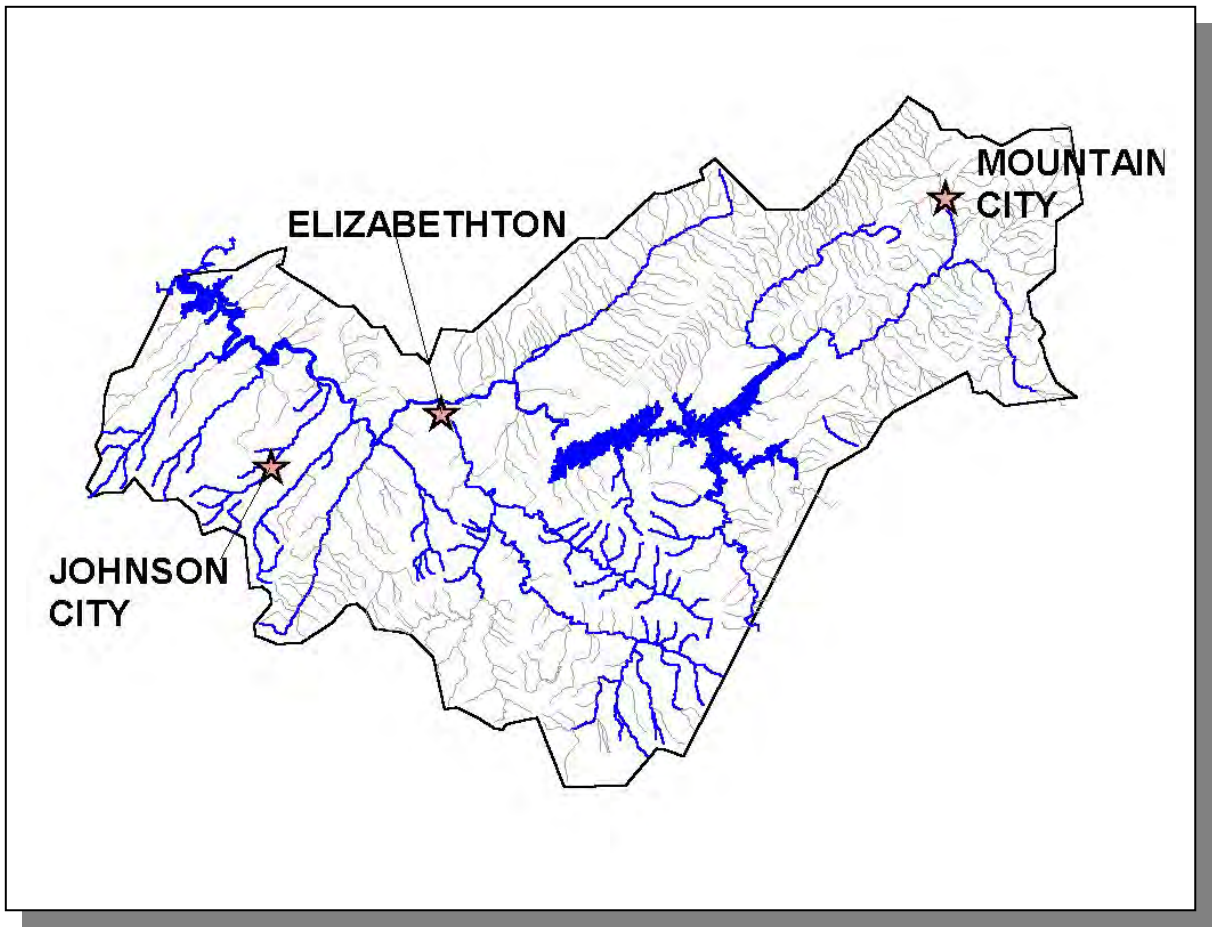

Figure 3-7e. Livestock Watering and Wildlife Use Support Attainment in the Watauga River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Elizabethton, Johnson City, and Mountain City are shown for reference.*

3.3.B. Use Impairment Summary.

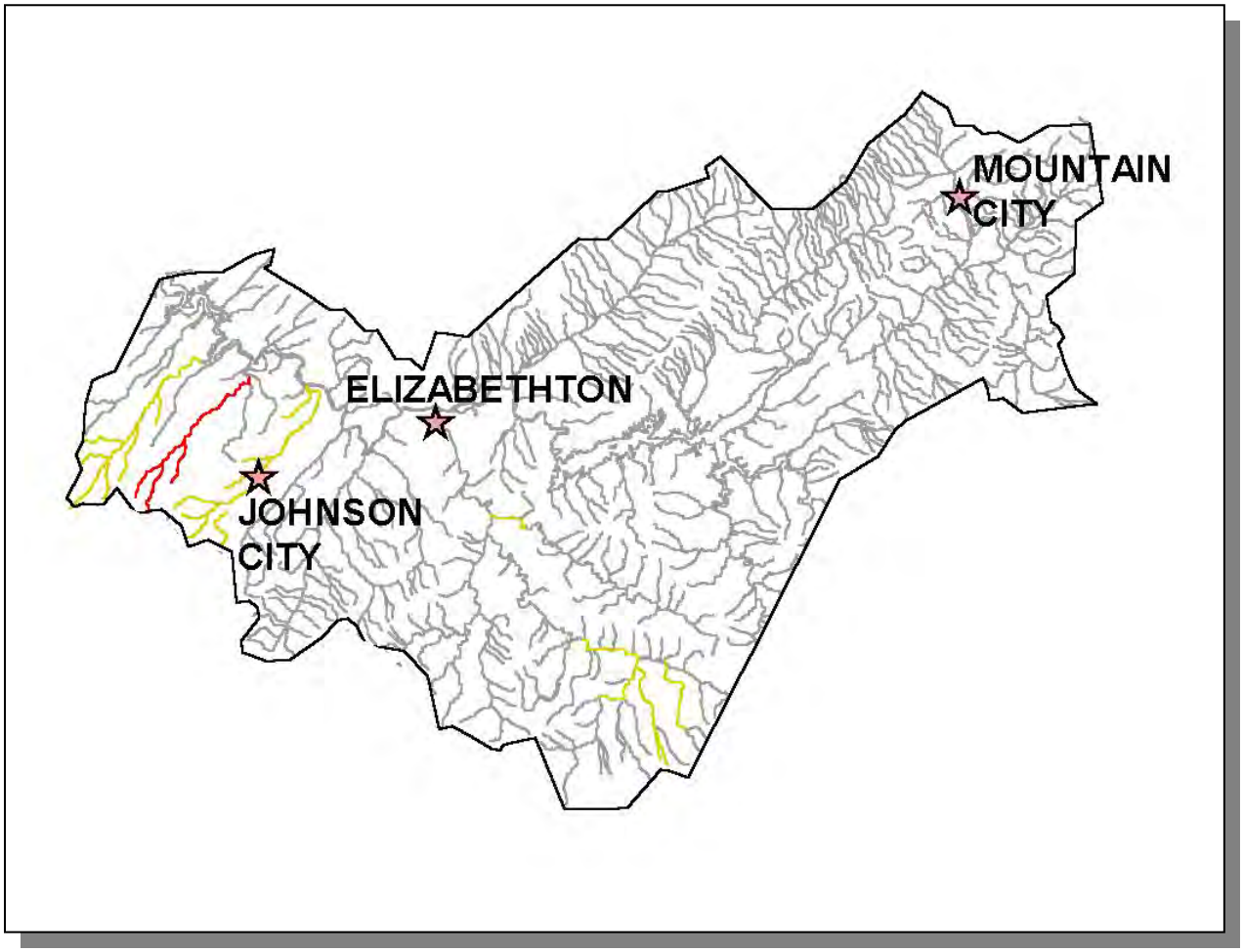

Figure 3-8a. Impaired Streams Due to Habitat Alteration in the Watauga River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Elizabethton, Johnson City, and Mountain City are shown for reference. More information is provided in Watauga-Appendix III.*

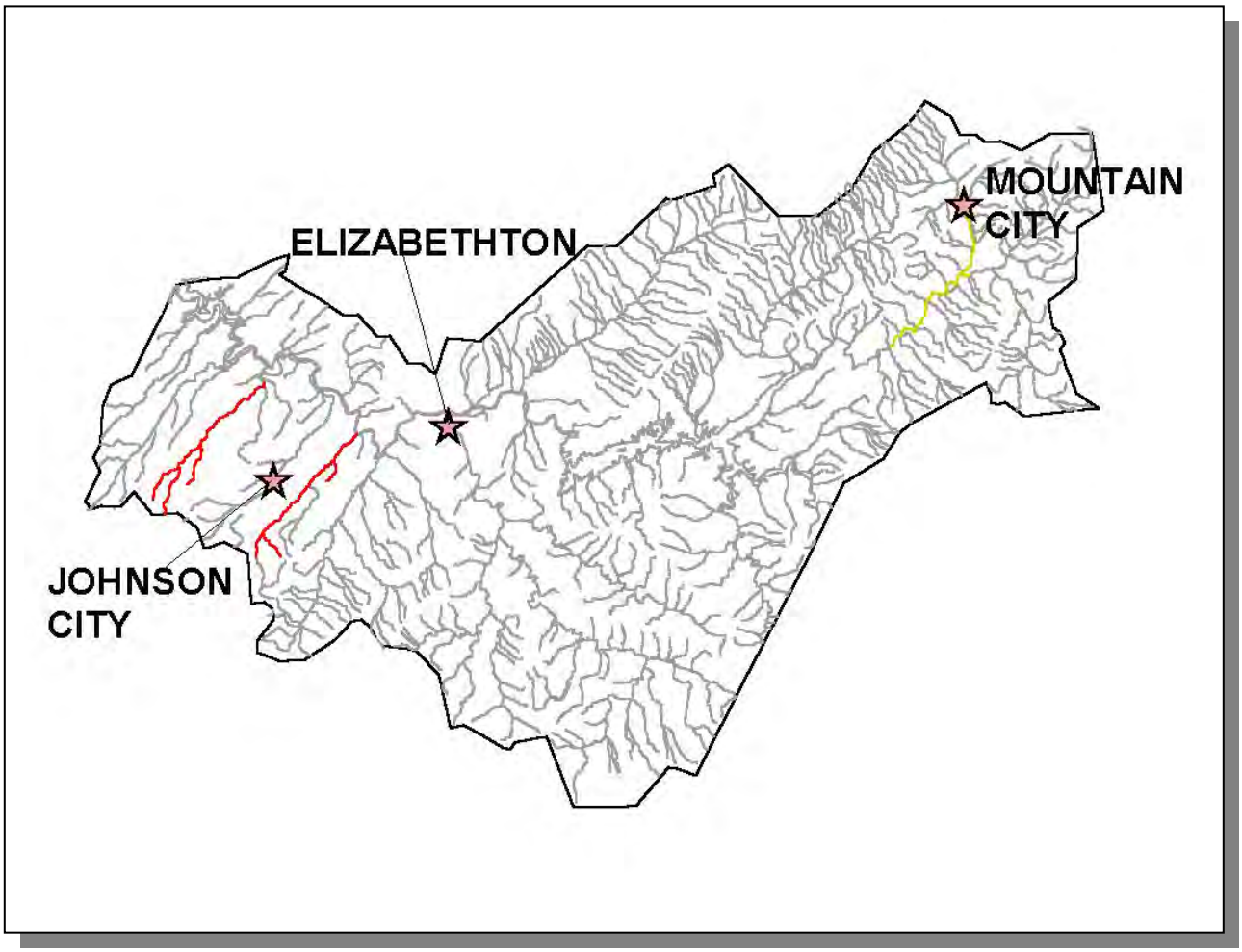

Figure 3-8b. Impaired Streams Due to Pathogens in the Watauga River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Elizabethton, Johnson City, and Mountain City are shown for reference. More information is provided in Watauga-Appendix III.*

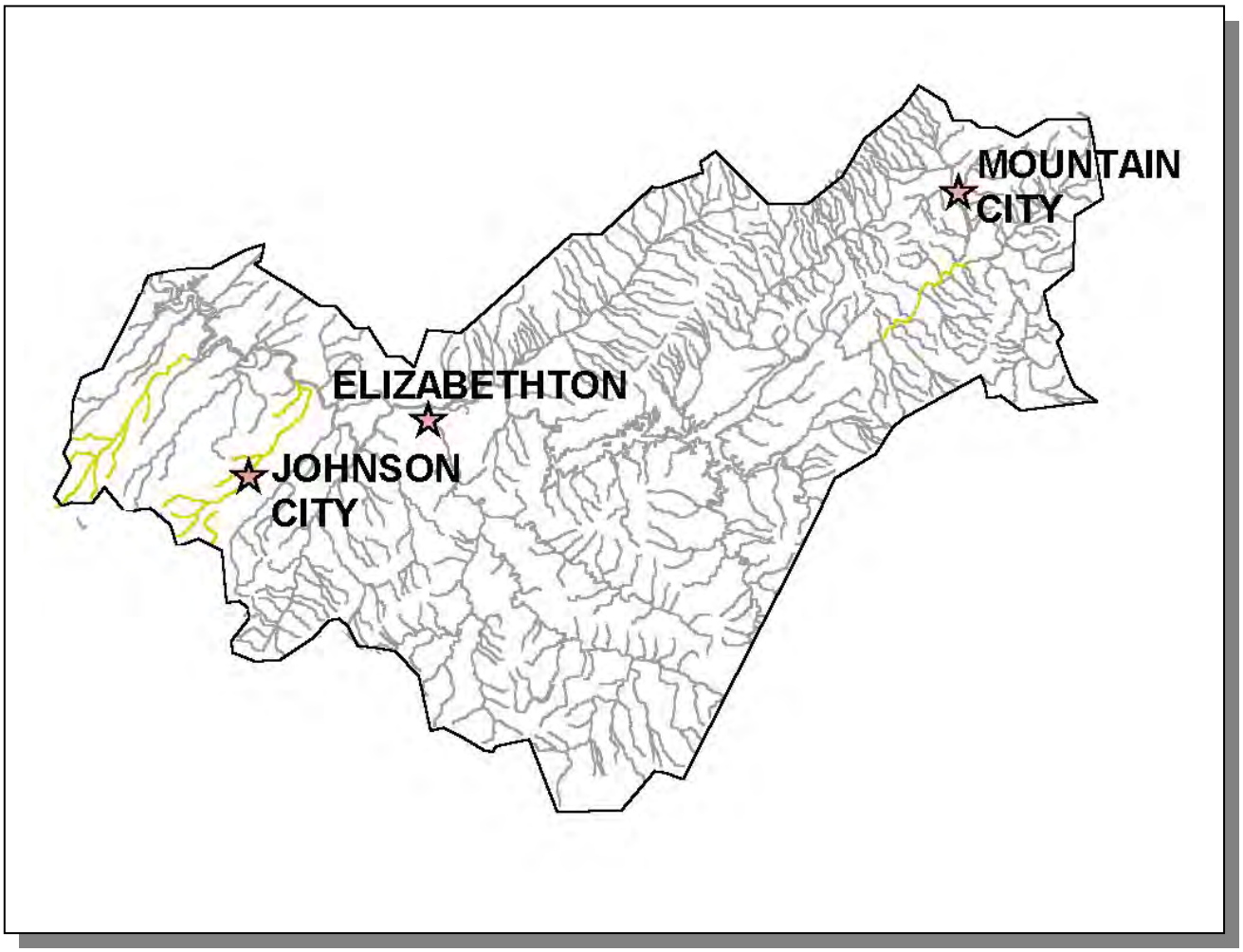

Figure 3-8c. Impaired Streams Due to Siltation in the Watauga River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Elizabethton, Johnson City, and Mountain City are shown for reference. More information is provided in Watauga-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.

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE WATAUGA RIVER WATERSHED.

4.1 BACKGROUND. This chapter is organized by HUC-11 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

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® v3.1 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.

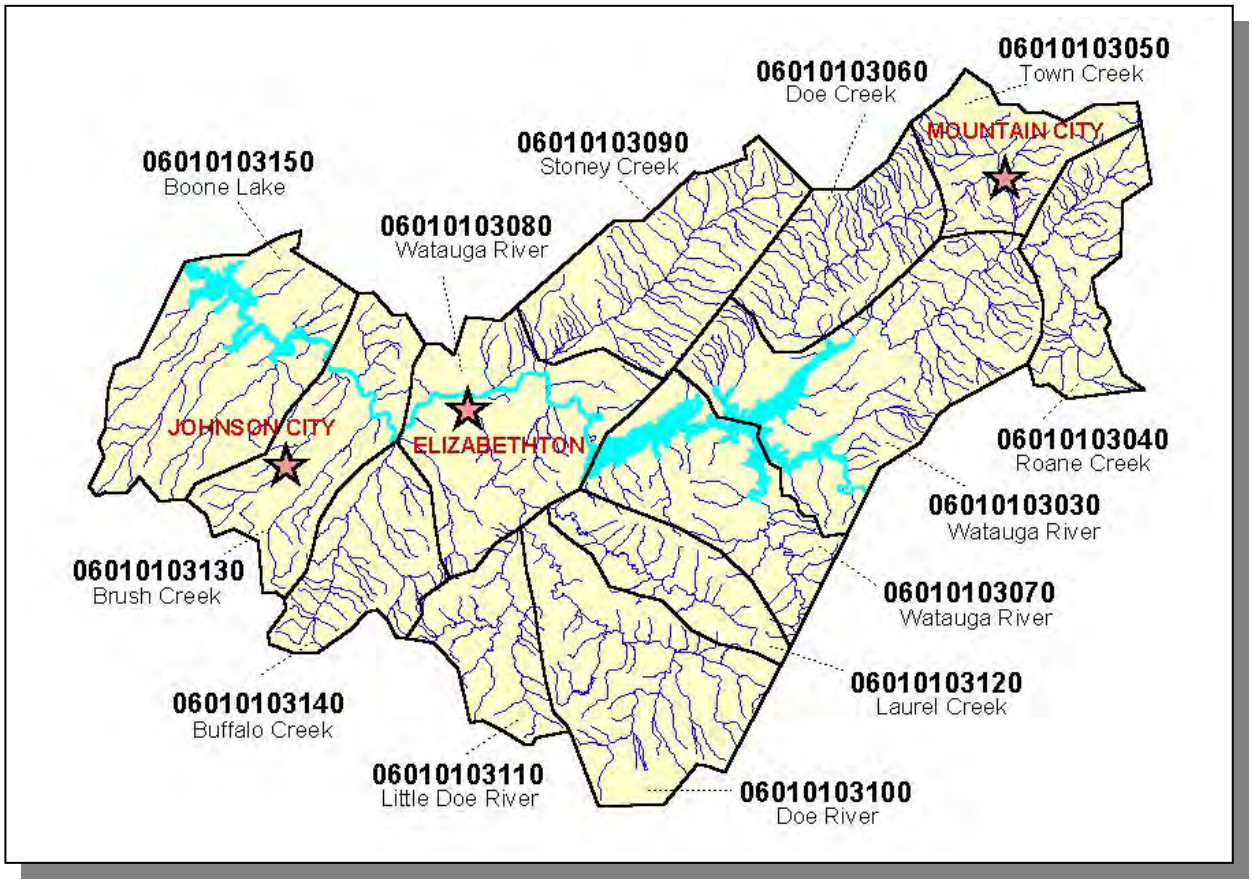

Figure 4-1. The Watauga River Watershed is Composed of Thirteen USGS-Delineated Subwatersheds (11-Digit Subwatersheds). *Locations of Watauga River, Elizabethton, Johnson City, and Mountain City are shown for reference.*

4.2. CHARACTERIZATION OF HUC-11 SUBWATERSHEDS. The Watershed Characterization System (WCS) software and data sets provided by EPA Region 4 were used to characterize each subwatershed in the Watauga River Watershed. HUC-14 polygons were aggregated to form the HUC-11 boundaries for data analysis.

HUC-11	HUC-14
06010103030	06010103010040 (Roane Creek) 06010103020050 (Watauga River)
06010103040	06010103010010 (Roane Creek)
06010103050	06010103010020 (Town Creek)
06010103060	06010103010030 (Doe Creek)
06010103070	06010103020060 (Watauga River) 06010103030020 (Elk River)
06010103080	06010103040060 (Doe River) 06010103050010 (Watauga River)
06010103090	06010103050020 (Stoney Creek)
06010103100	06010103040010 (Buck Creek) 06010103040020 (Doe River) 06010103040030 (Doe River)
06010103110	06010103040040 (Little Doe River)
06010103120	06010103040050 (Laurel Creek)
06010103130	06010103050040 (Sinking Creek) 06010103050050 (Brush Creek)
06010103140	06010103050030 (Buffalo Creek)
06010103150	06010103050060 (Boone Lake) 06010103050070 (Knob Creek) 06010103050080 (Boones Creek)

Table 4-1. HUC-14 Drainage Areas are Nested Within HUC-11 Drainages. *USGS delineated the HUC-11 drainage areas. NRCS inventories and manages the physical database for HUC-14 drainage areas.*

4.2.A. 06010103030.

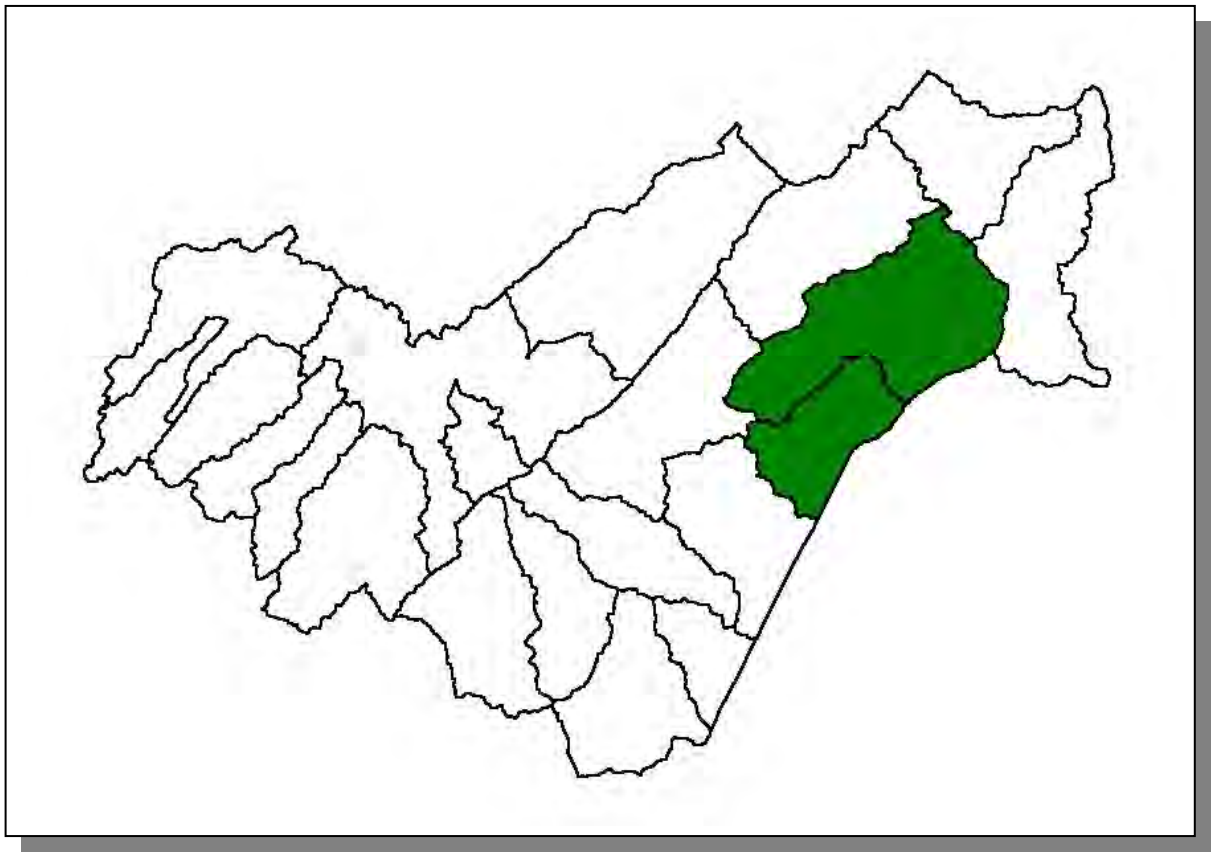

Figure 4-2. Location of Subwatershed 06010103030. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.A.i. General Description.

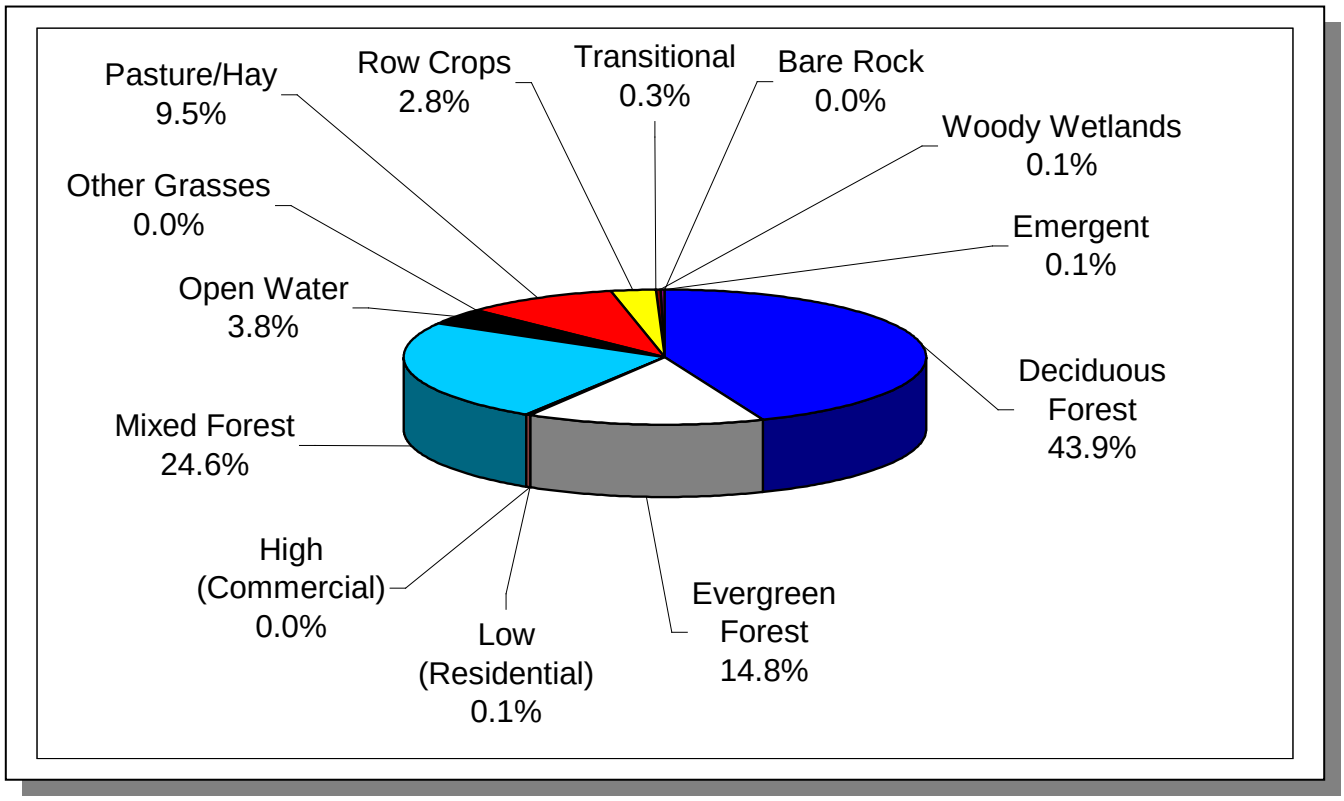

Figure 4-3. Land Use Distribution in Subwatershed 06010103030. *More information is provided in Watauga-Appendix IV.*

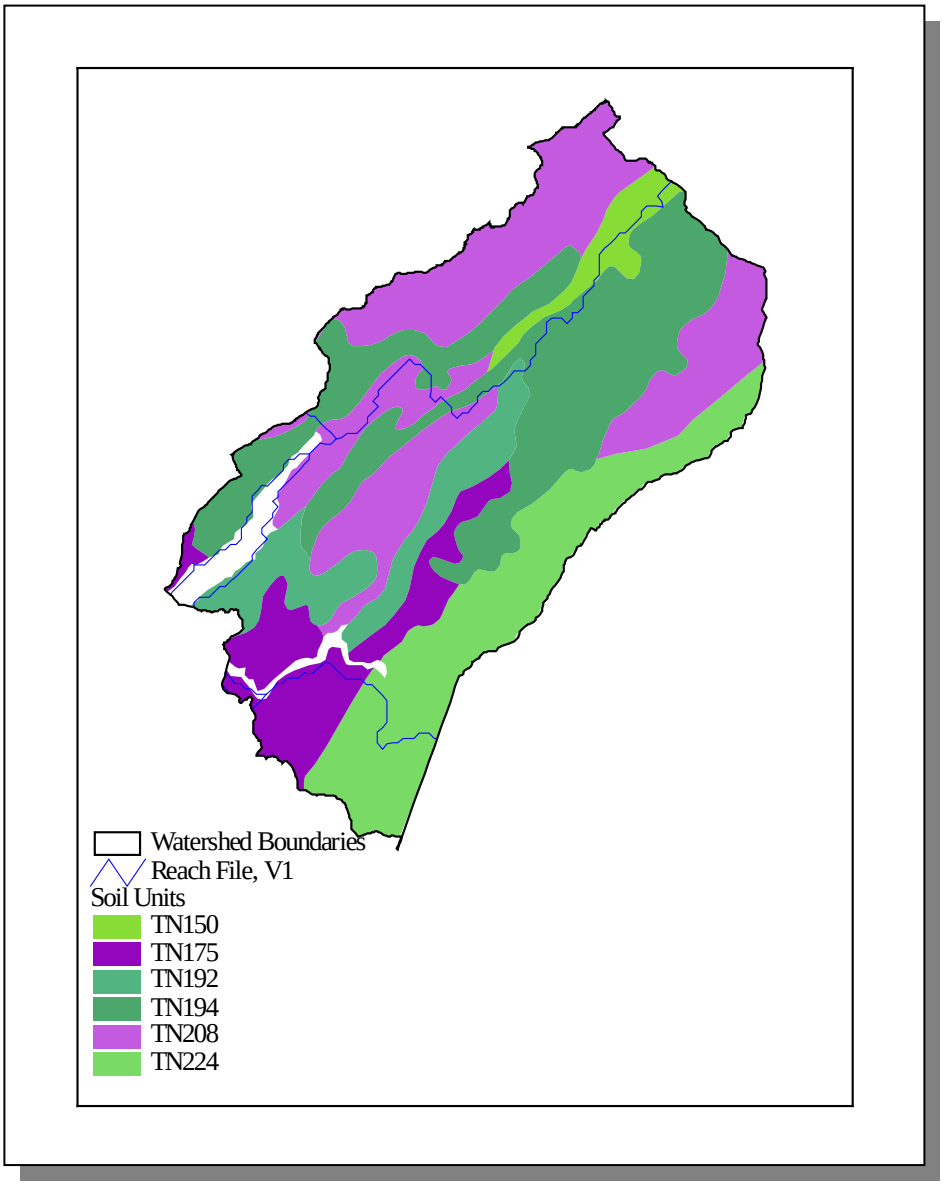

Figure 4-4. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103030.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN150	6.00	C	1.68	5.63	Silty Loam	0.32
TN175	0.00	B	1.49	5.23	Loam	0.30
TN192	0.00	B	2.72	4.41	Sandy Loam	0.27
TN194	0.00	B	3.75	5.44	Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25
TN224	1.00	B	3.97	5.27	Loam	0.24

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103030. *More details are provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Carter	51,505	53,132	0.21	106	109	2.8
Johnson	13,766	16,572	25.59	3,522	4,240	20.4
Totals	**65,271**	**69,704**		**3,628**	**4,349**	**19.9**

Table 4-3. Population Estimates in Subwatershed 06010103030.

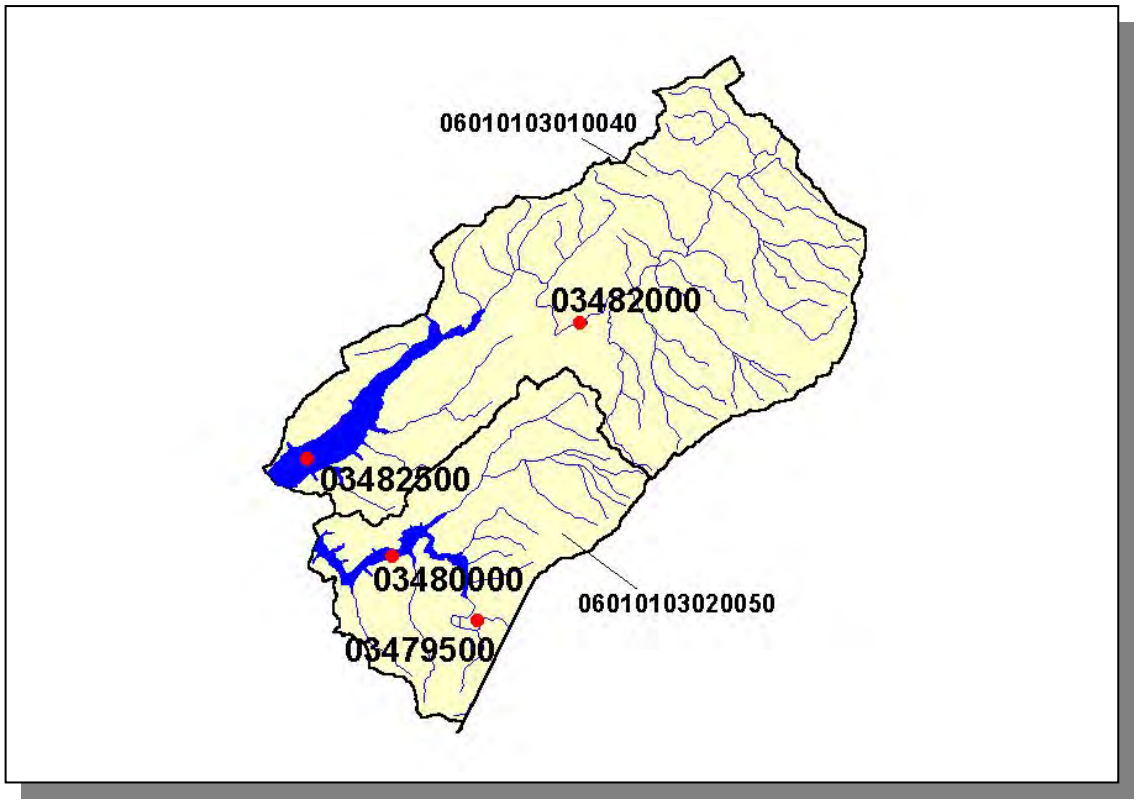

Figure 4-5. Location of Historical Streamflow Data Collection Sites In Subwatershed 06010103030*. Subwatershed 06010103010040 and 06010103020050 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

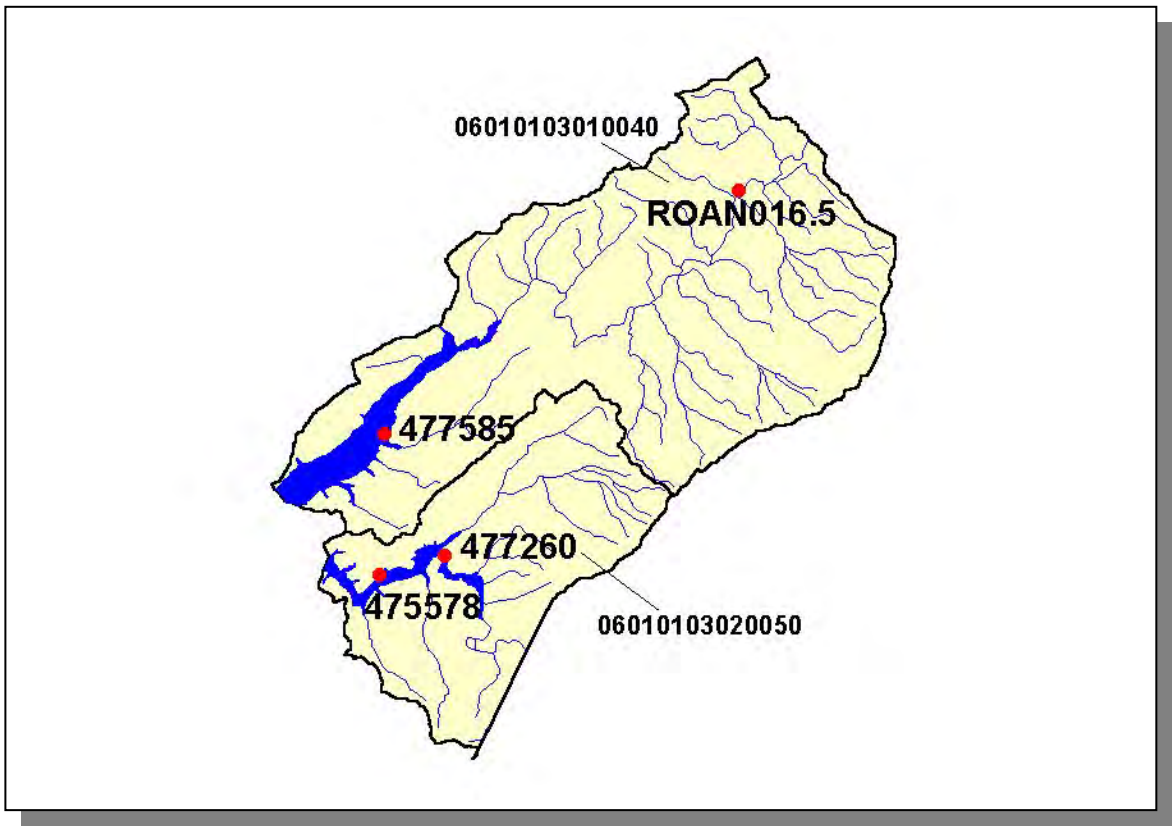

Figure 4-6. Location of STORET Monitoring Sites in Subwatershed 06010103030. *Subwatershed 06010103010040 and 06010103020050 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

4.2.A.ii Point Source Contributions.

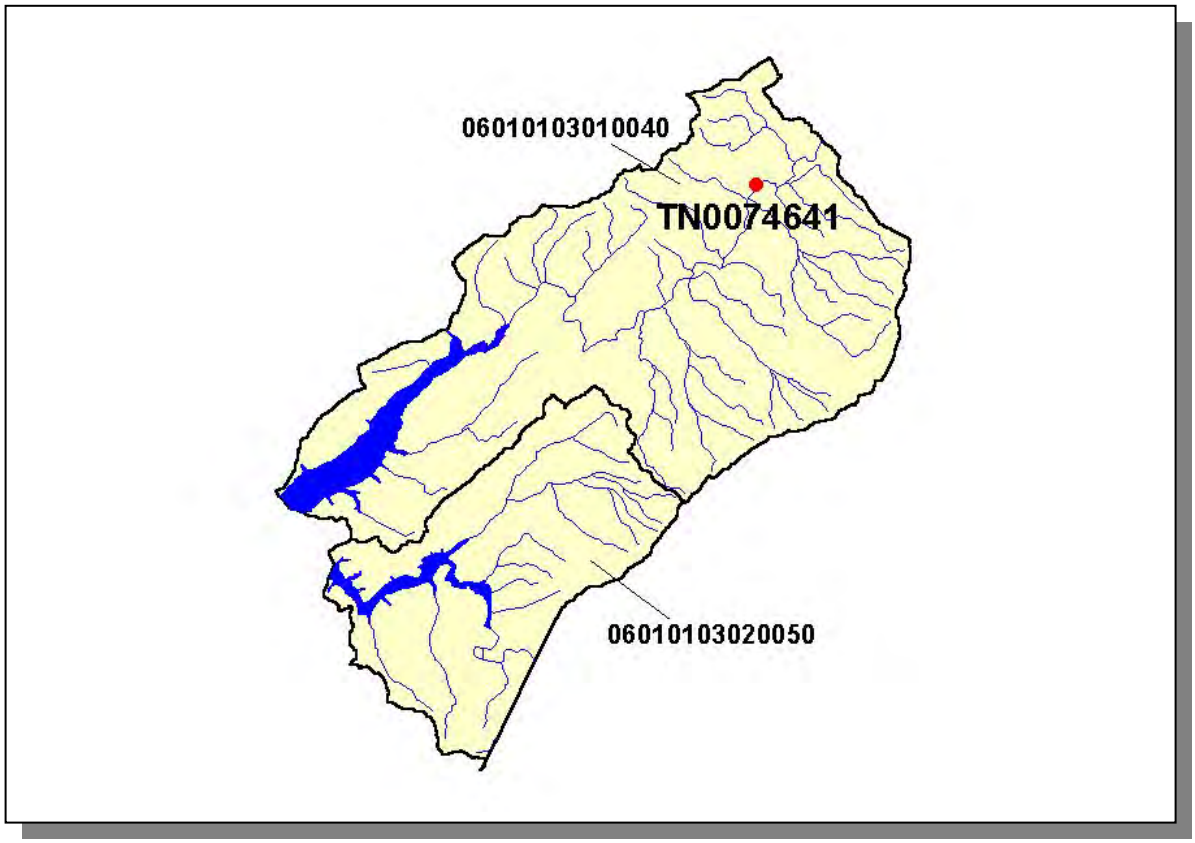

Figure 4-7. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06010103030. *Subwatershed 06010103010040 and 06010103020050 boundaries are shown for reference. More information, including the names of facilities, is provided in Watauga-Appendix IV.*

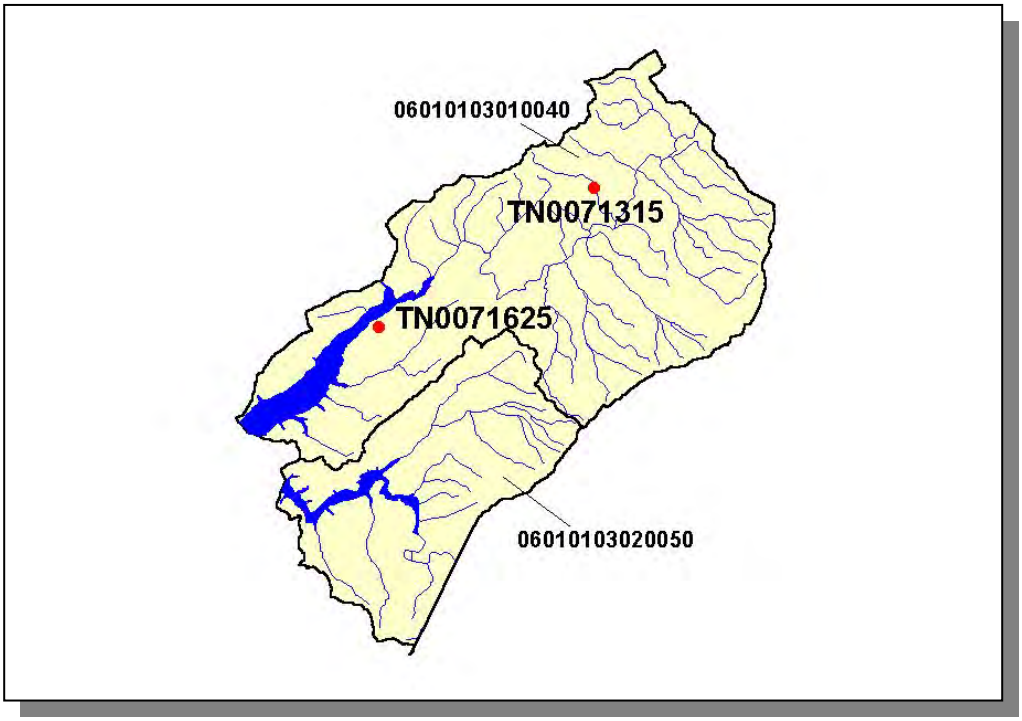

Figure 4-8. Location of Active Mining Sites in Subwatershed 06010103030. *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Hogs**	**Sheep**
1,095	2,618	127	<5	19	41

Table 4-4. Summary of Livestock Count Estimates in Subwatershed 06010103030. *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
Total	**305.7**	**299.9**	**4.0**	**14.6**

Table 4-5. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 06010103030.

CROP	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Grass (Hayland)	0.40
Grass (Pastureland)	0.58
Grass, Forbs, Legumes (Mixed Pasture)	0.26
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.21
Corn (Row Crops)	4.76
Tobacco (Row Crops)	3.33
Legume Grass (Hayland)	0.03
Other Cropland Not Planted	0.12

Table 4-6. Annual Estimated Total Soil Loss in Subwatershed 06010103030.

4.2.B. 06010103040.

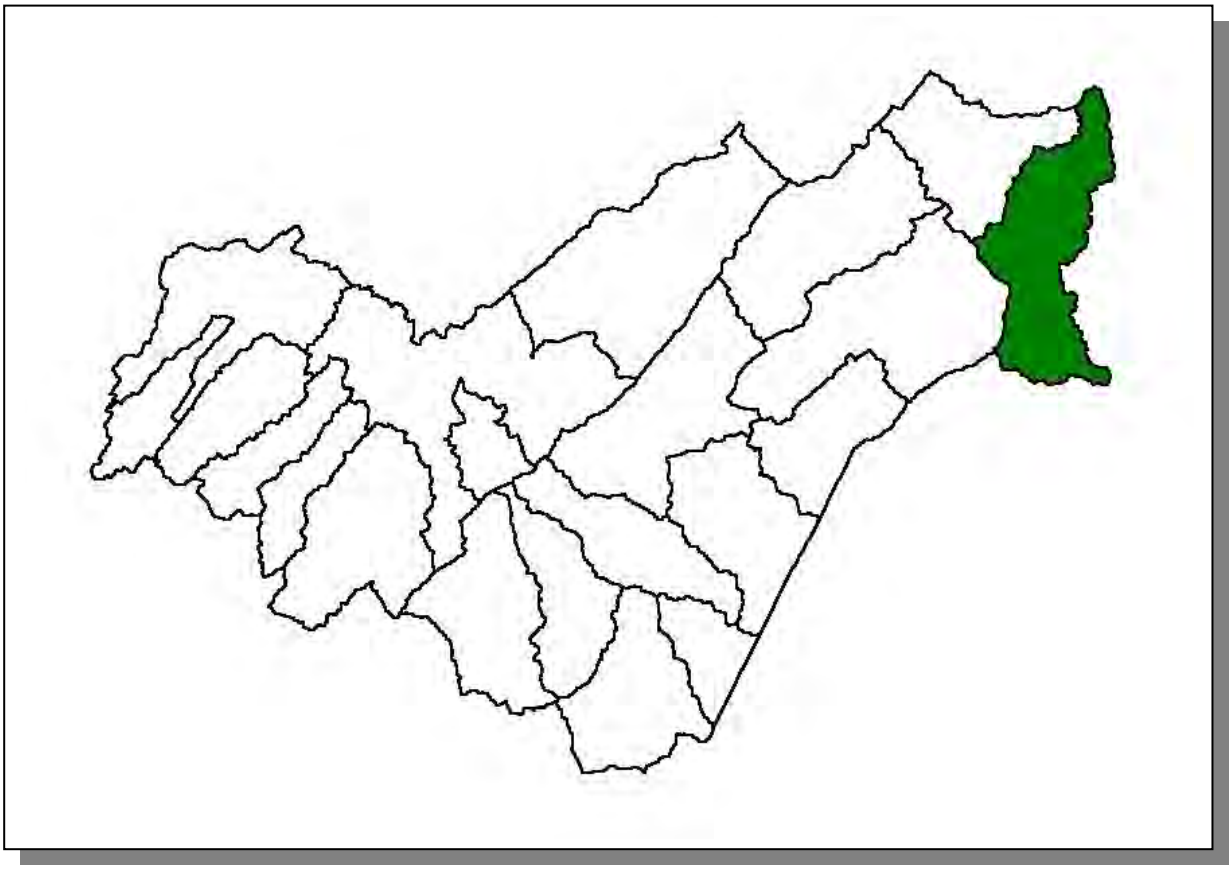

Figure 4-9. Location of Subwatershed 06010103040. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.B.i. General Description.

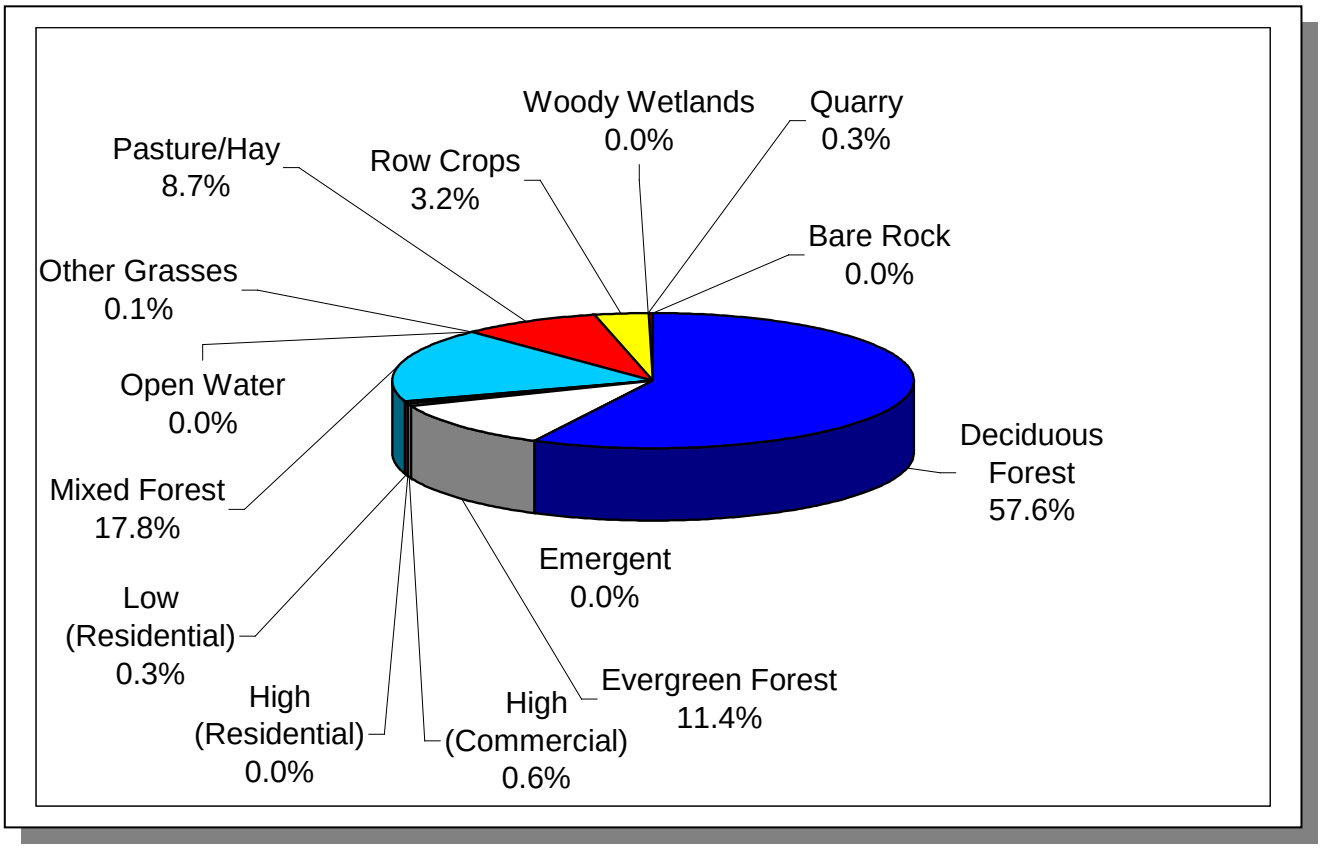

Figure 4-10. Land Use Distribution in Subwatershed 06010103040. *More information is provided in Watauga-Appendix IV.*

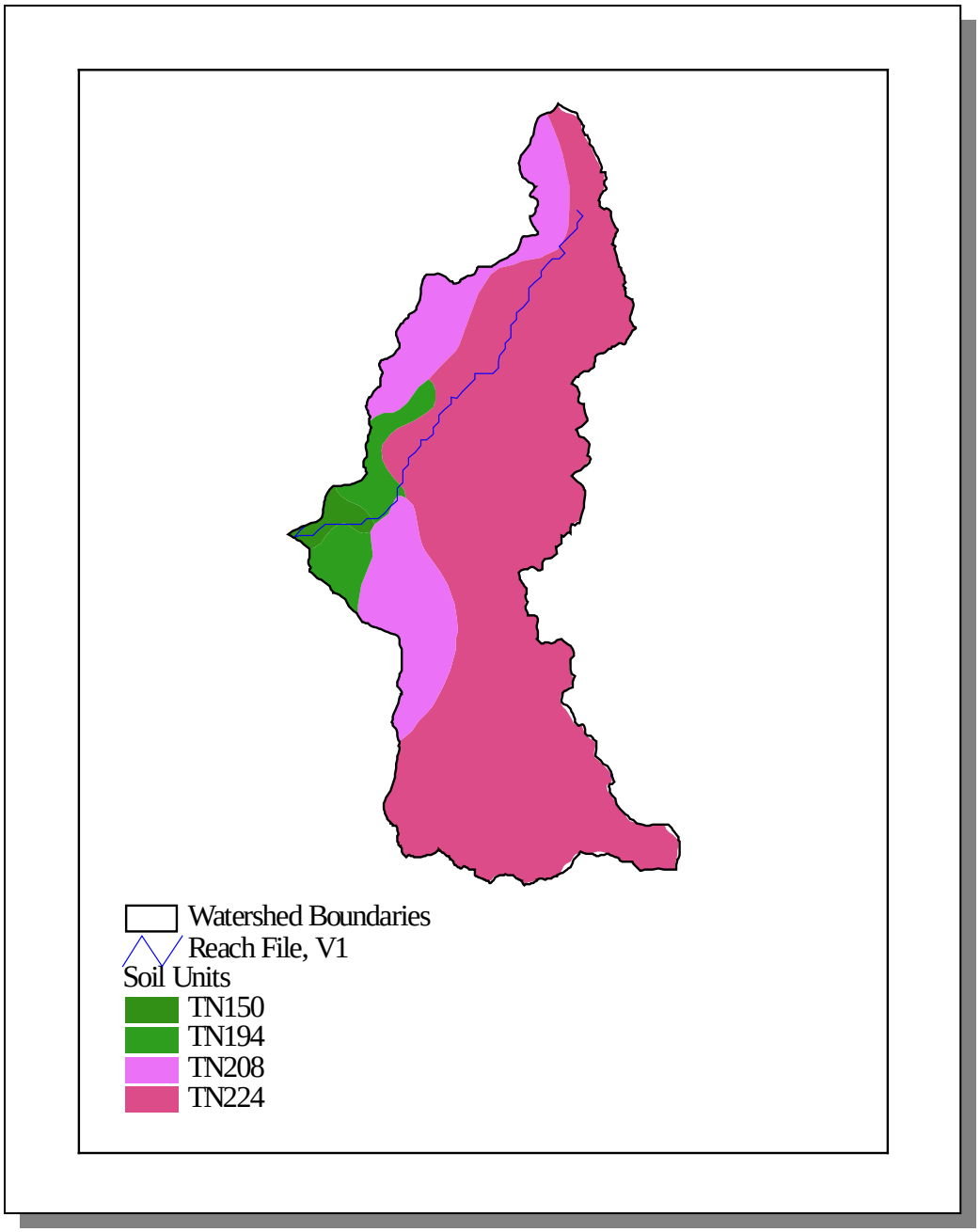

Figure 4-11. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103040.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN150	6.00	C	1.68	5.63	Silty Loam	0.32
TN194	0.00	B	3.75	5.44	Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25
TN224	1.00	B	3.97	5.27	Loam	0.24

Table 4-7. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103040. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Johnson	13,766	16,572	12.15	1,673	2,104	20.4

Table 4-8. Population Estimates in Subwatershed 06010103040.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Mountain City	Johnson	2,169	1,050	873	174	3

Table 4-9. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06010103040.

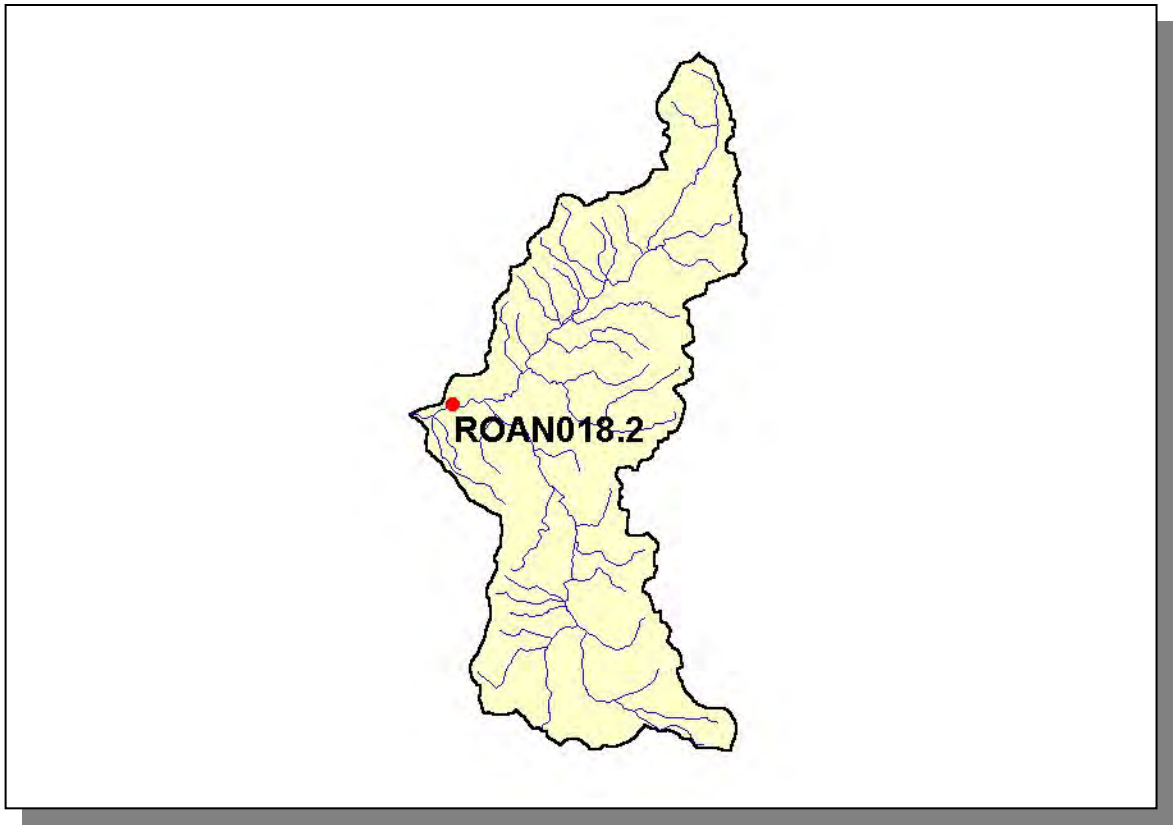

Figure 4-12. Location of STORET Monitoring Sites in Subwatershed 06010103040. More information is provided in Watauga-Appendix IV.

4.2.B.ii. Point Source Contributions.

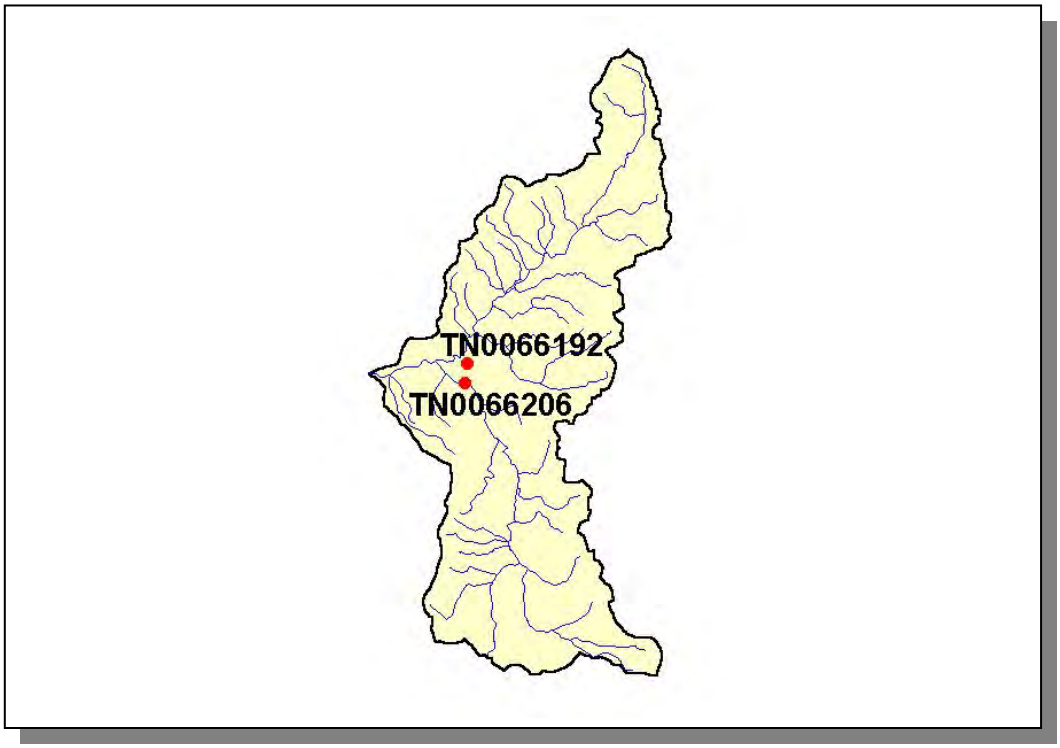

Figure 4-13. Location of Active Mining Sites in Subwatershed 06010103040 *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Hogs**	**Sheep**
604	1,454	58	<5	11	30

Table 4-10. Summary of Livestock Count Estimates in Subwatershed 06010103040. *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)**
Johnson	144.4	144.4	0.6	2.2

Table 4-11. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103040.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Grass (Hayland)	0.41
Grass (Pastureland)	0.58
Grass, Forbs, Legumes (Mixed Pasture)	0.26
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.21
Corn (Row Crops)	4.76
Tobacco (Row Crops)	3.25
Legume Grass (Hayland)	0.03
Other Cropland not Planted	0.12

Table 4-12. Annual Estimated Total Soil Loss in Subwatershed 06010103040.

4.2.C. 06010103050.

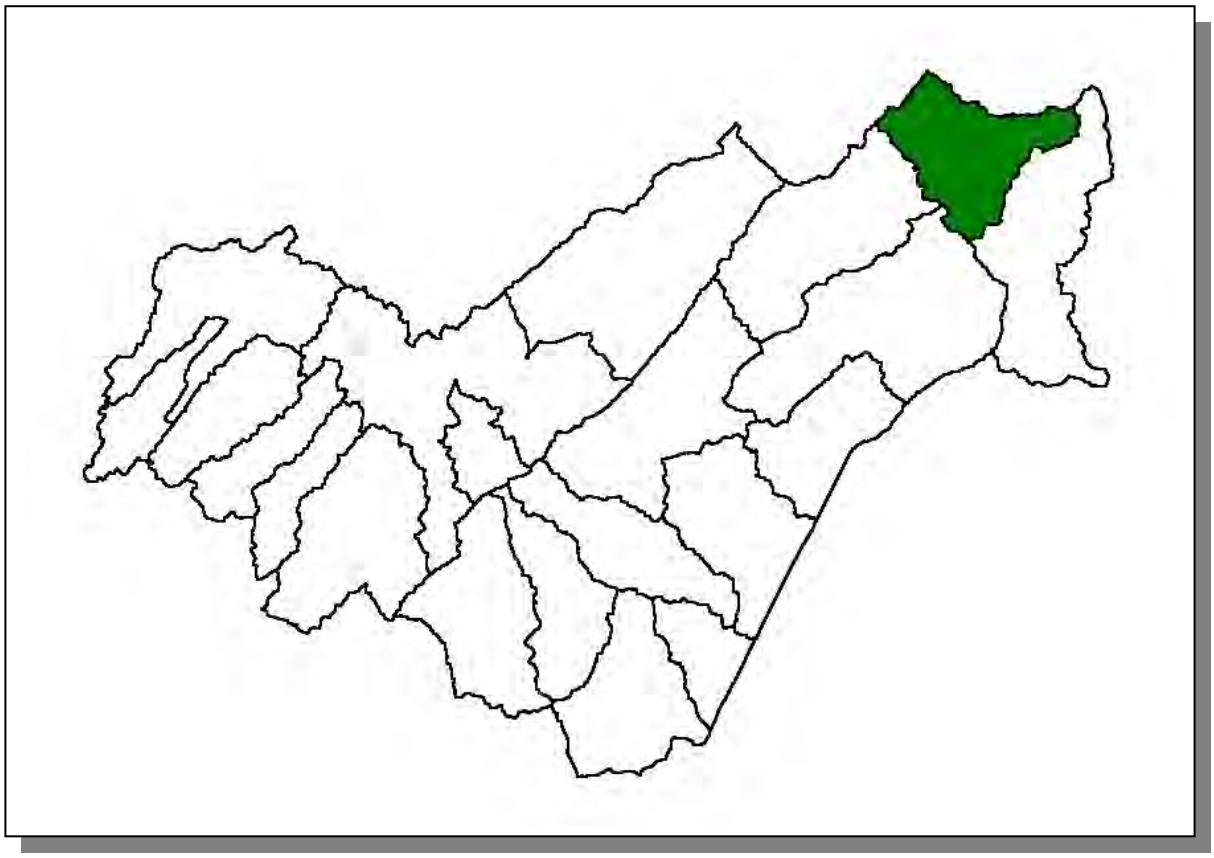

Figure 4-14. Location of Subwatershed 06010103050. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.C.i. General Description.

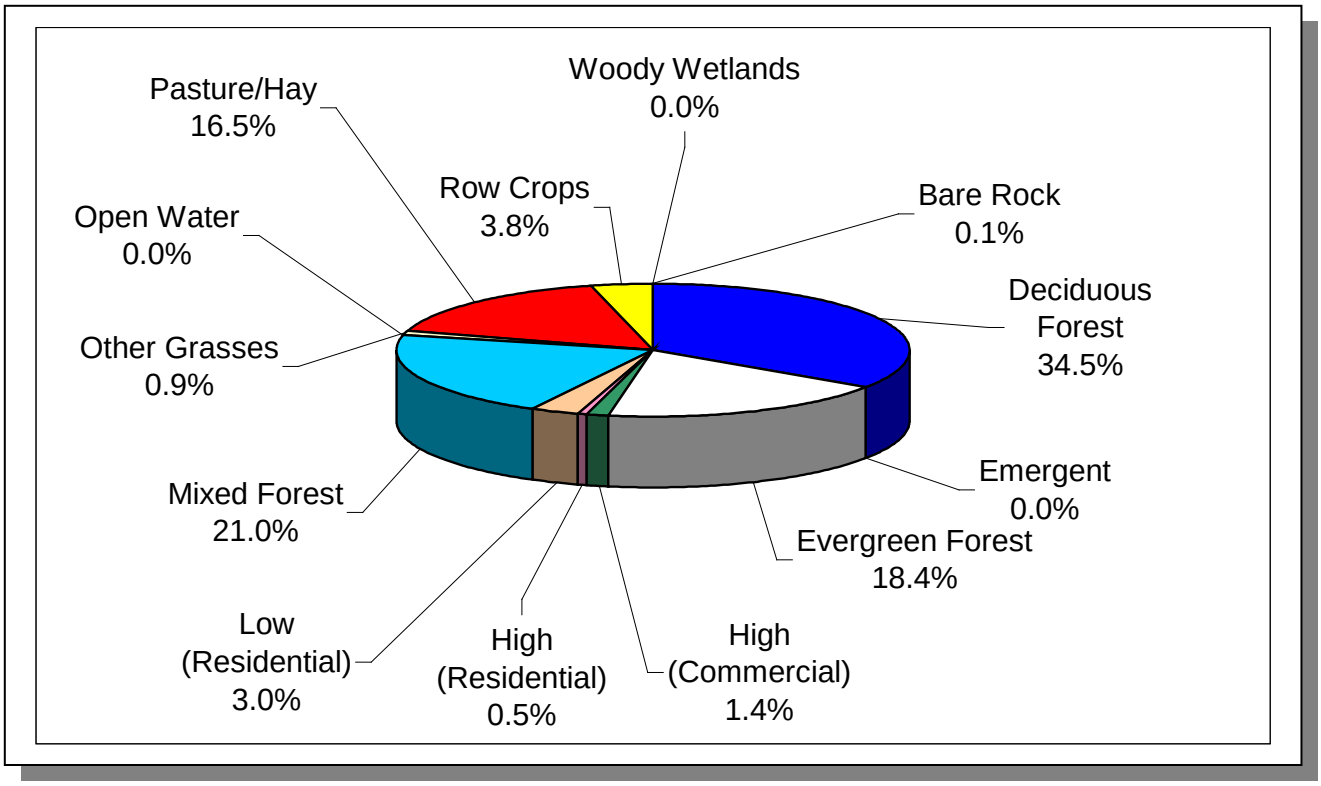

Figure 4-15. Land Use Distribution in Subwatershed 06010103050. *More information is provided in Watauga-Appendix IV.*

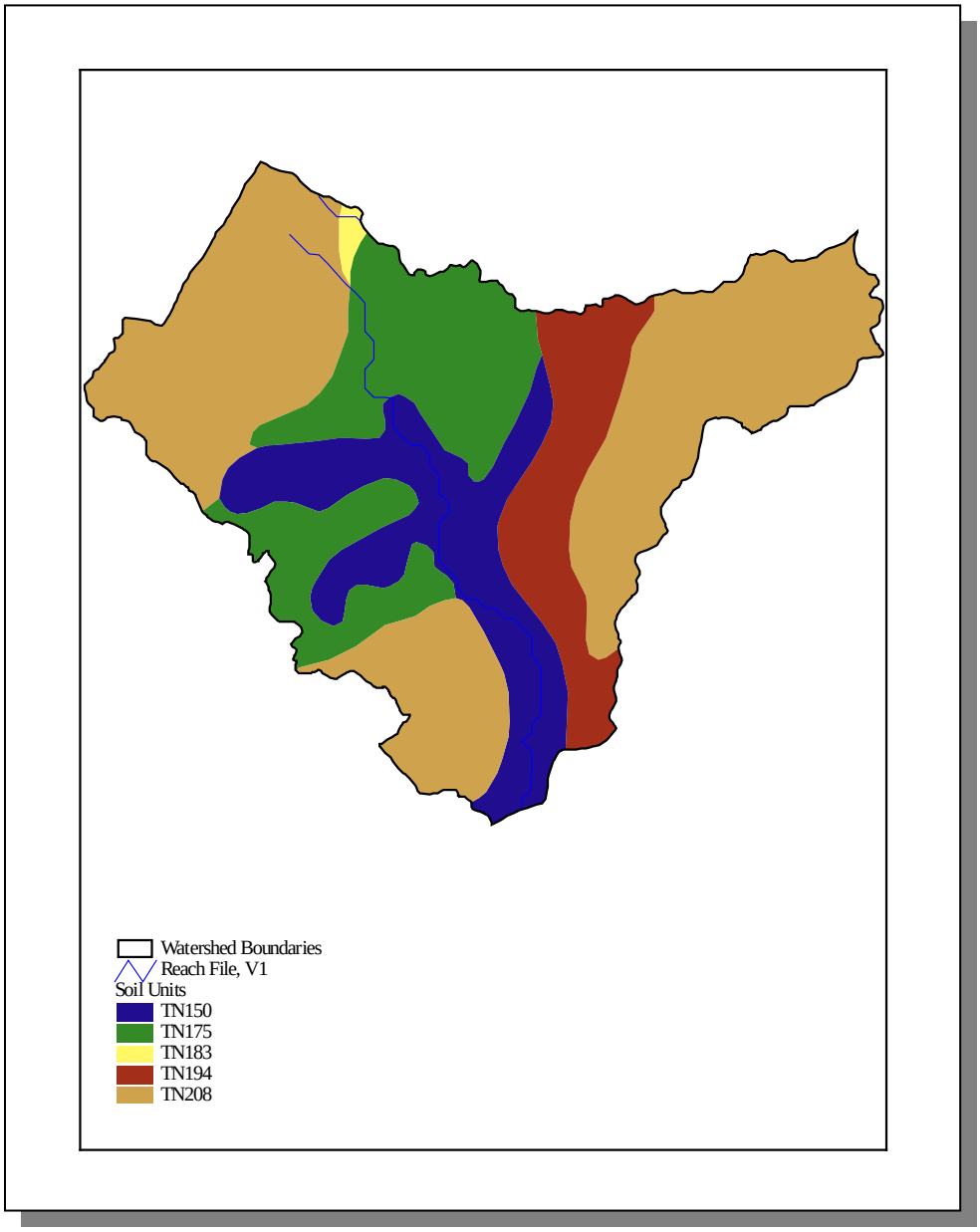

Figure 4-16. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103050.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN150	6.00	C	1.68	5.63	Silty 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
TN194	0.00	B	3.75	5.44	Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-13. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103050. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Johnson	47,091	13,766	9.7	1,336	1,608	20.4

Table 4-14. Population Estimates in Subwatershed 06010103050.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Mountain City	Johnson	2,169	1,050	873	174	3

Table 4-15. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06010103050.

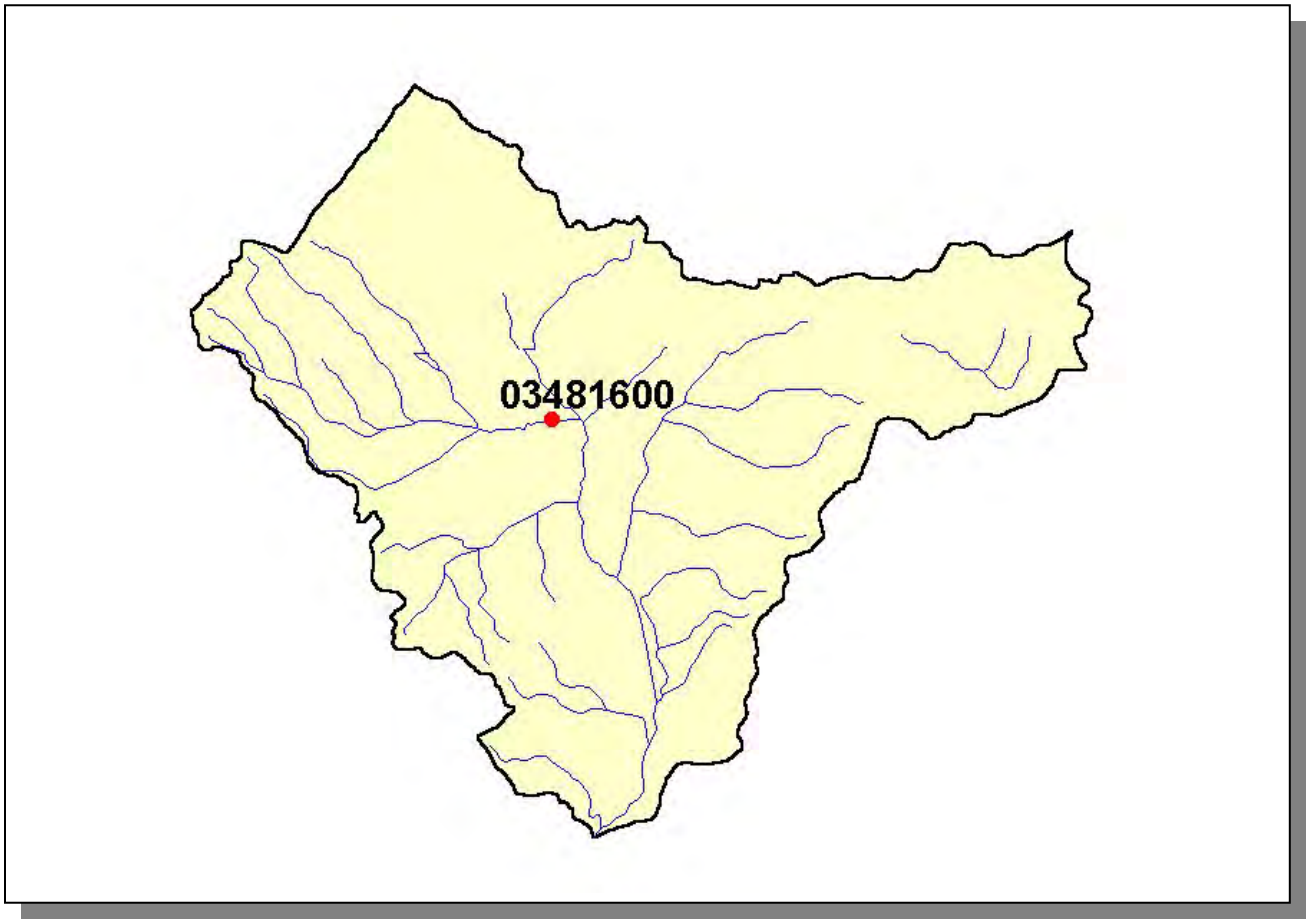

Figure 4-17. Location of Historical Streamflow Data Collection Sites In Subwatershed 06010103050. More information is provided in Watauga-Appendix IV.

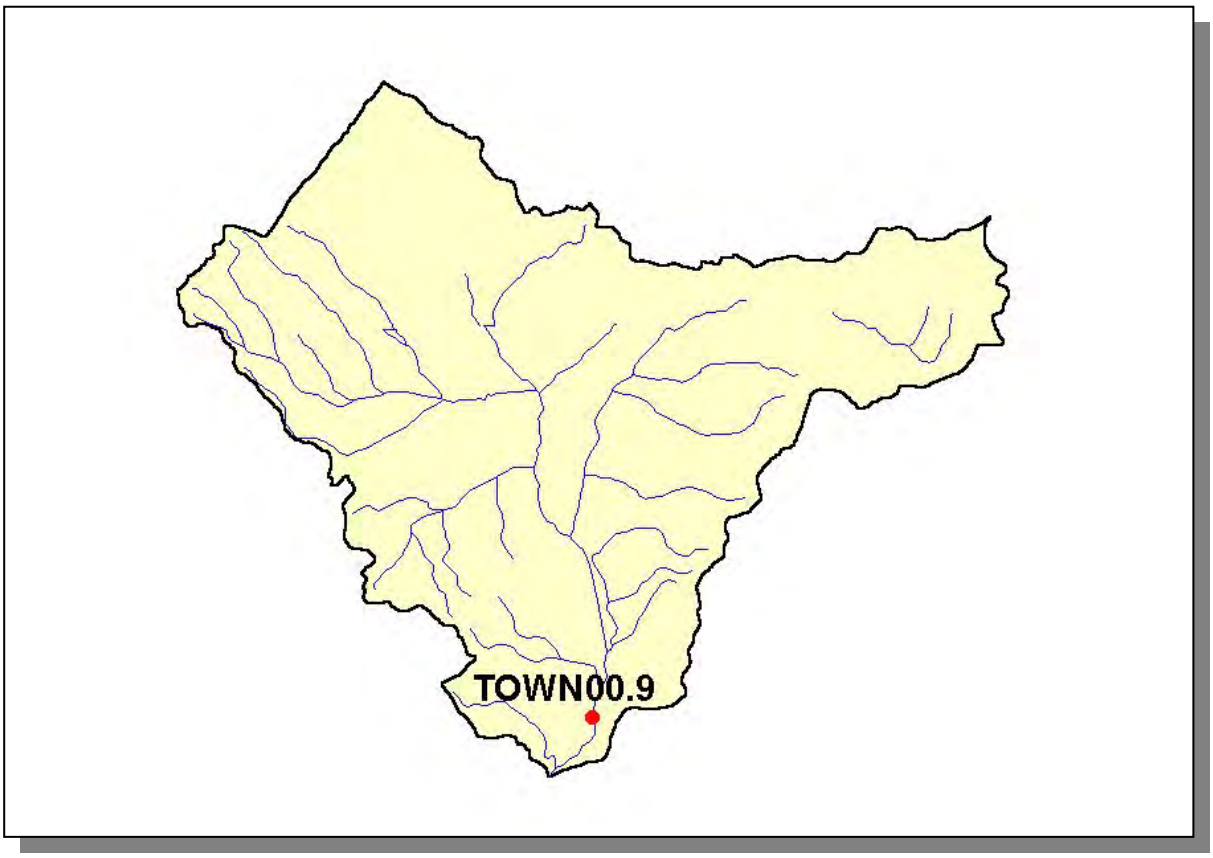

Figure 4-18. Location of STORET Monitoring Sites in Subwatershed 06010103050. *More information is provided in Watauga-Appendix IV.*

4.2.C.ii. Point Source Contributions.

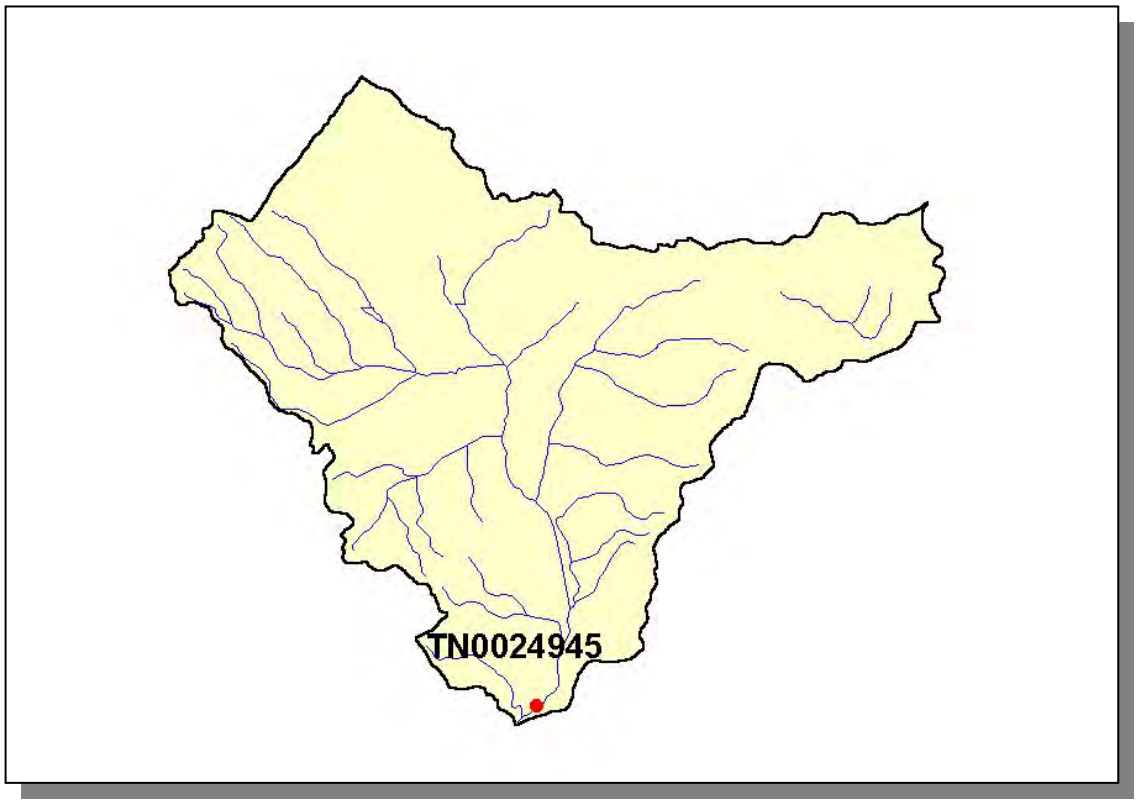

Figure 4-19. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06010103050. *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

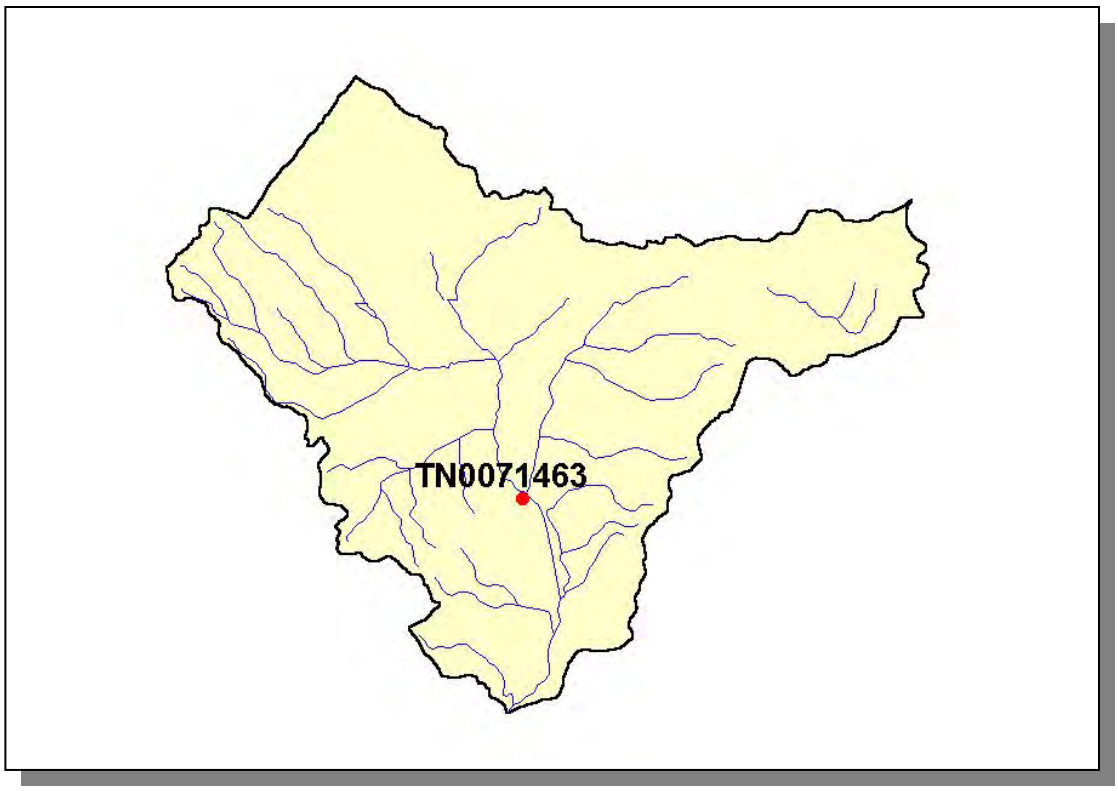

Figure 4-20. Location of Active Mining Sites in Subwatershed 06010103050. *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Hogs**	**Sheep**
713	1,705	83	<5	12	27

Table 4-16. Summary of Livestock Count Estimates in Subwatershed 06010103050. *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)**
Johnson	144.4	144.4	0.6	2.2

Table 4-17. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103050.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Grass (Hayland)	0.41
Grass (Pastureland)	0.58
Grass, Forbs, Legumes (Mixed Pasture)	0.26
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.21
Corn (Row Crops)	4.76
Tobacco (Row Crops)	3.25
Legume Grass (Hayland)	0.03
Other Cropland not Planted	0.12

Table 4-18. Annual Estimated Total Soil Loss in Subwatershed 06010103050.

4.2.D. 06010103060.

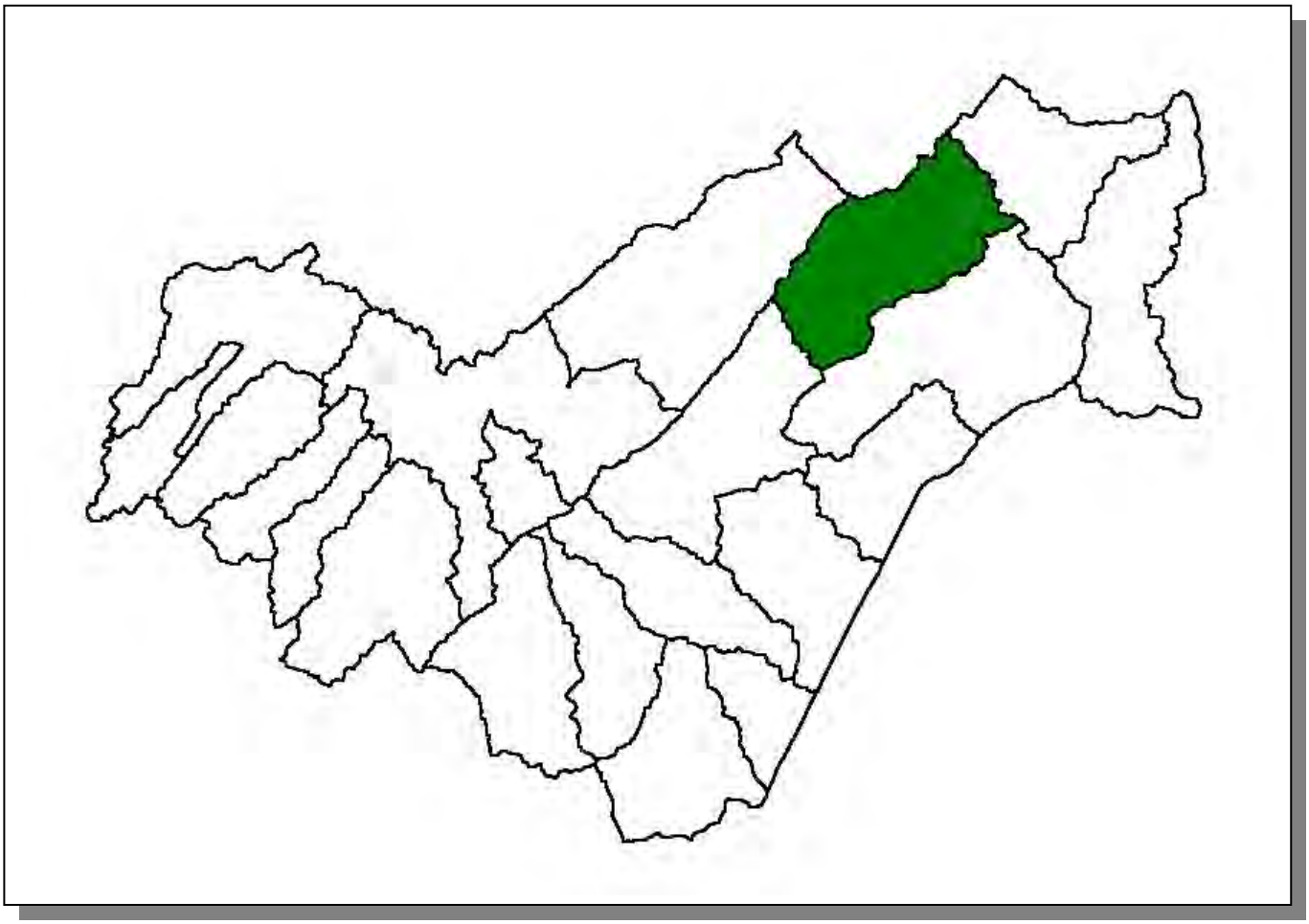

Figure 4-21. Location of Subwatershed 06010103060. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.D.i. General Description.

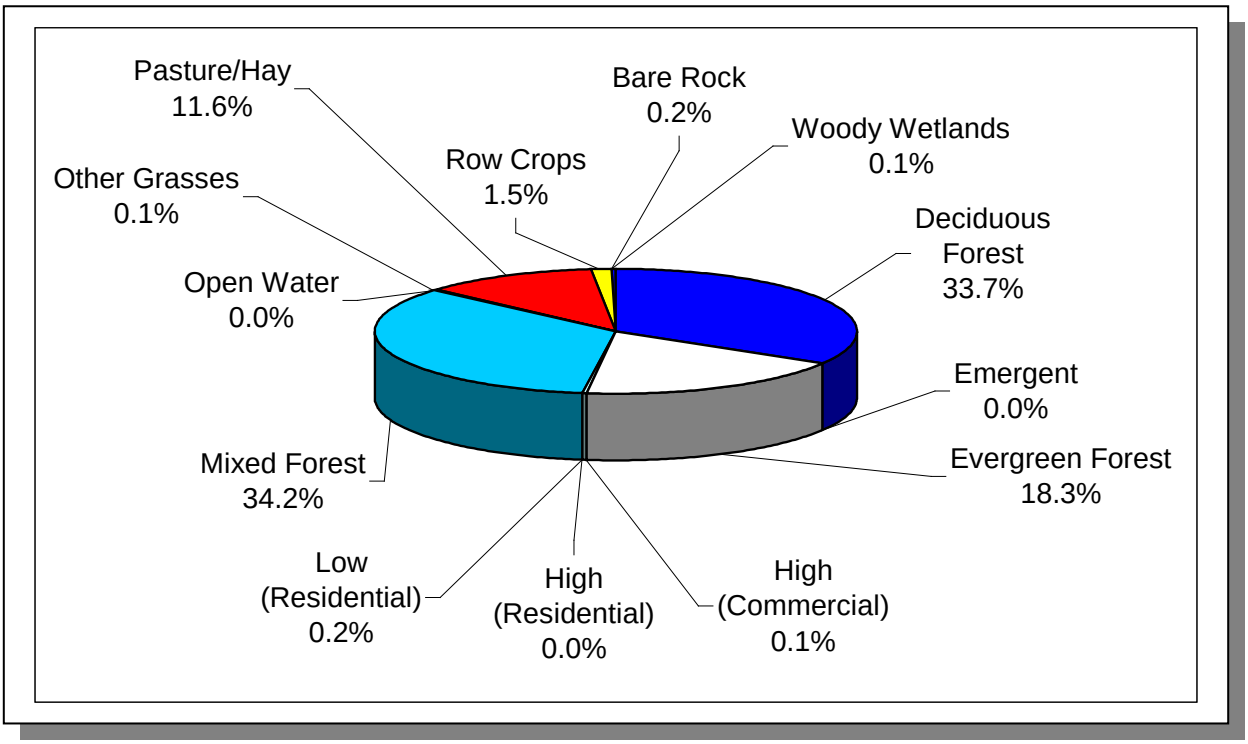

Figure 4-22. Land Use Distribution in Subwatershed 06010103060. *More information is provided in Watauga-Appendix IV.*

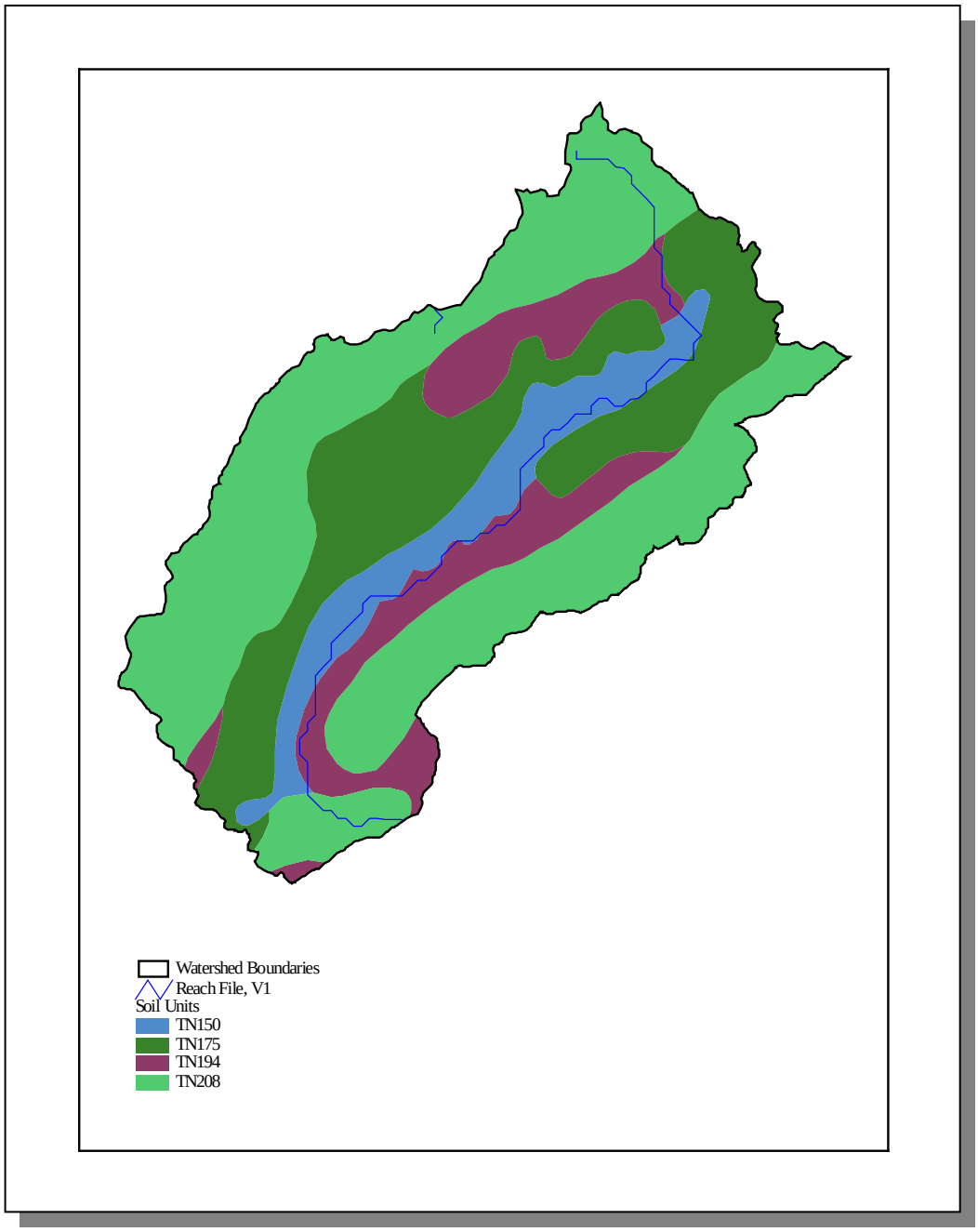

Figure 4-23. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103060.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN150	6.00	C	1.68	5.63	Silty Loam	0.32
TN175	0.00	B	1.49	5.23	Loam	0.30
TN194	0.00	B	3.75	5.44	Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-19. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103060. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Carter	51,505	53,132	0.26	134	139	3.7
Johnson	13,766	16,572	13.58	1,869	2,250	20.4
Totals	**65,271**	**69,704**		**2,003**	**2,389**	**19.3**

Table 4-20. Population estimates in Subwatershed 06010103060.

4.2.D.ii. Point Source Contributions.

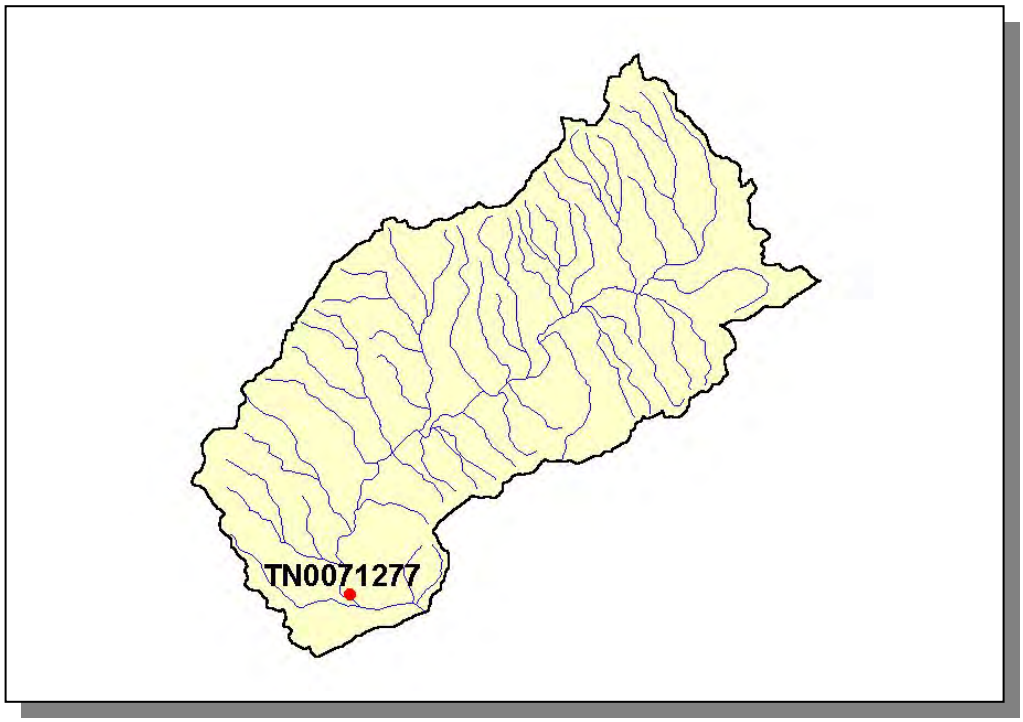

Figure 4-24. Location of Active Mining Sites in Subwatershed 06010103060. *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

4.2.D.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Milk Cow**	**Cattle**	**Chickens**	**Hogs**	**Sheep**
720	84	1,721	<5	12	27

Table 4-21. Summary of Livestock Count Estimates in Subwatershed 06010103060. *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
Totals	**305.7**	**299.9**	**4.0**	**14.6**

Table 4-22. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103060.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Grass (Hayland)	0.40
Grass (Pastureland)	0.58
Grass, Forbs, Legumes (Mixed Pasture)	0.26
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.21
Corn (Row Crops)	4.77
Tobacco (Row Crops)	3.45
Legume Grass (Hayland)	0.04
Other Cropland not Planted	0.12

Table 4-23. Annual Soil Loss in Subwatershed 06010103060.

4.2.E. 06010103070.

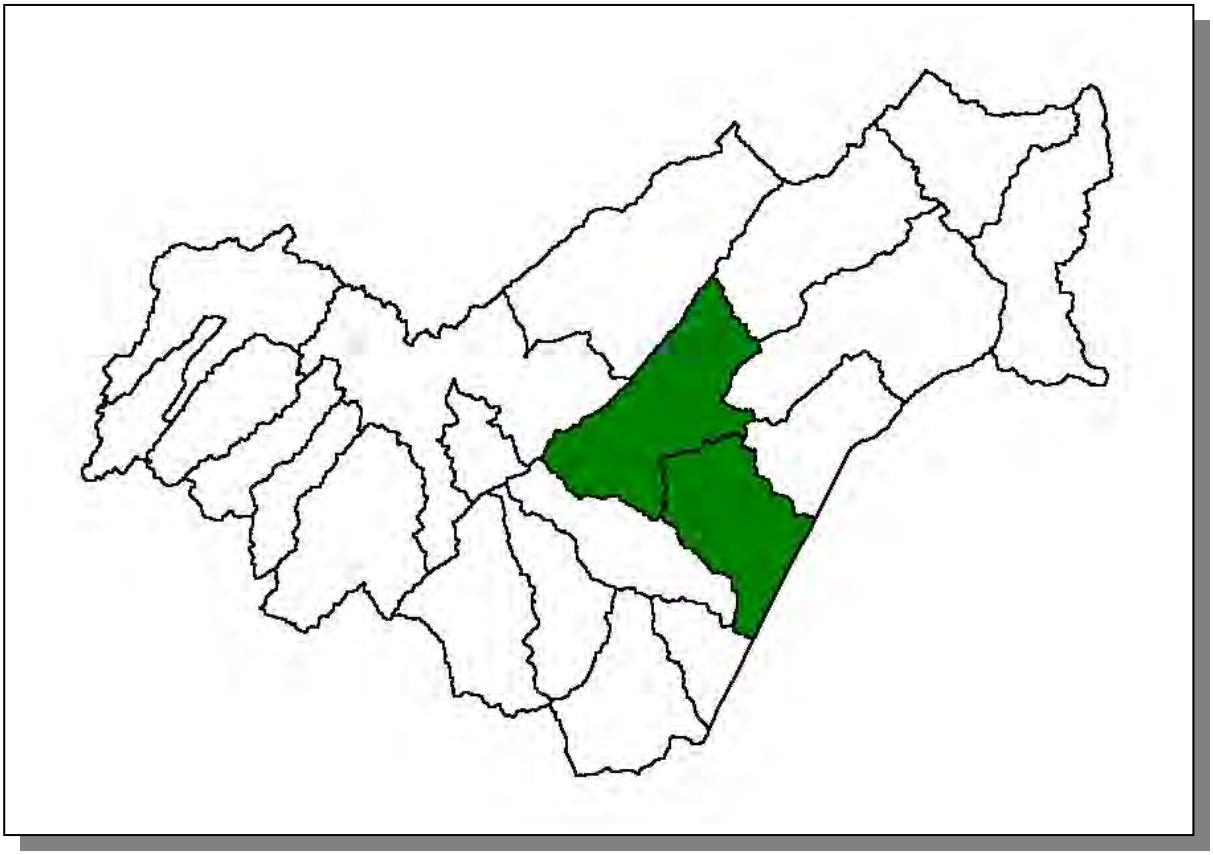

Figure 4-25. Location of Subwatershed 06010103070. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.E.i. General Description.

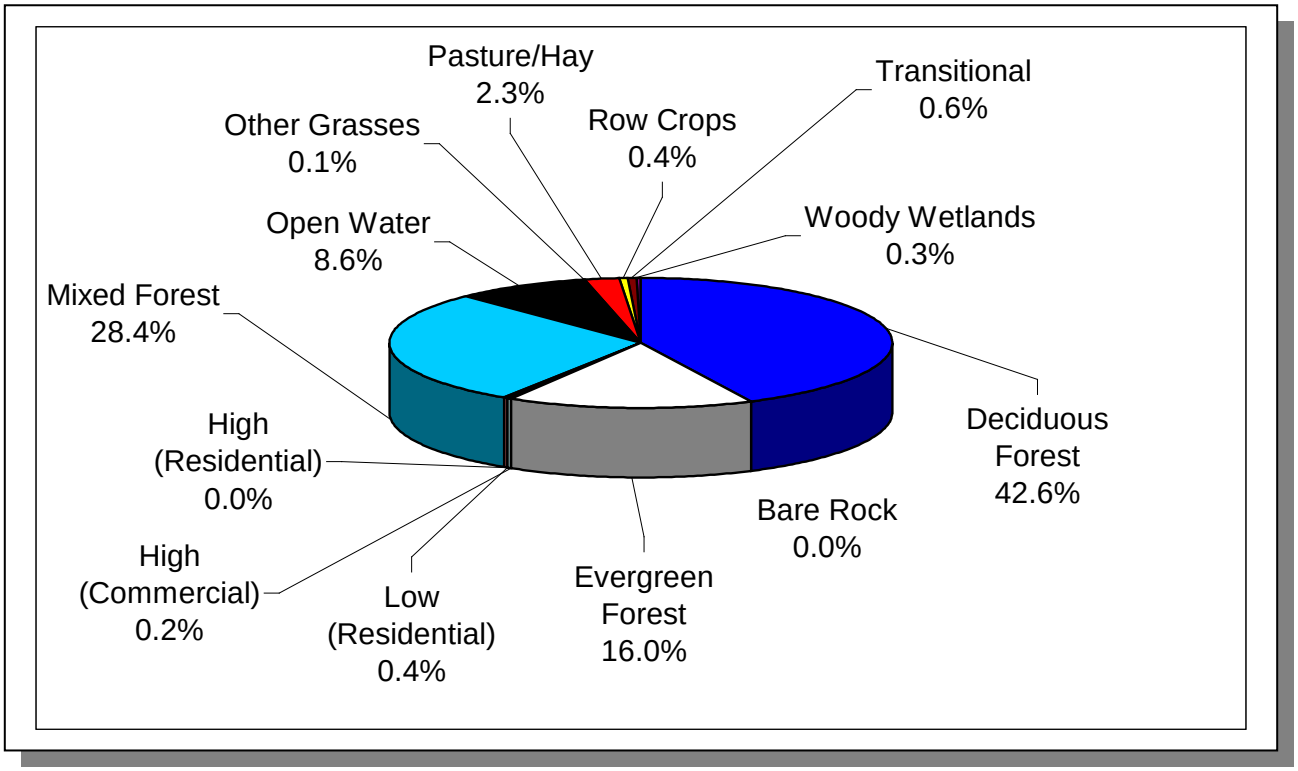

Figure 4-26. Land Use Distribution in Subwatershed 06010103070. *More information is provided in Watauga-Appendix IV.*

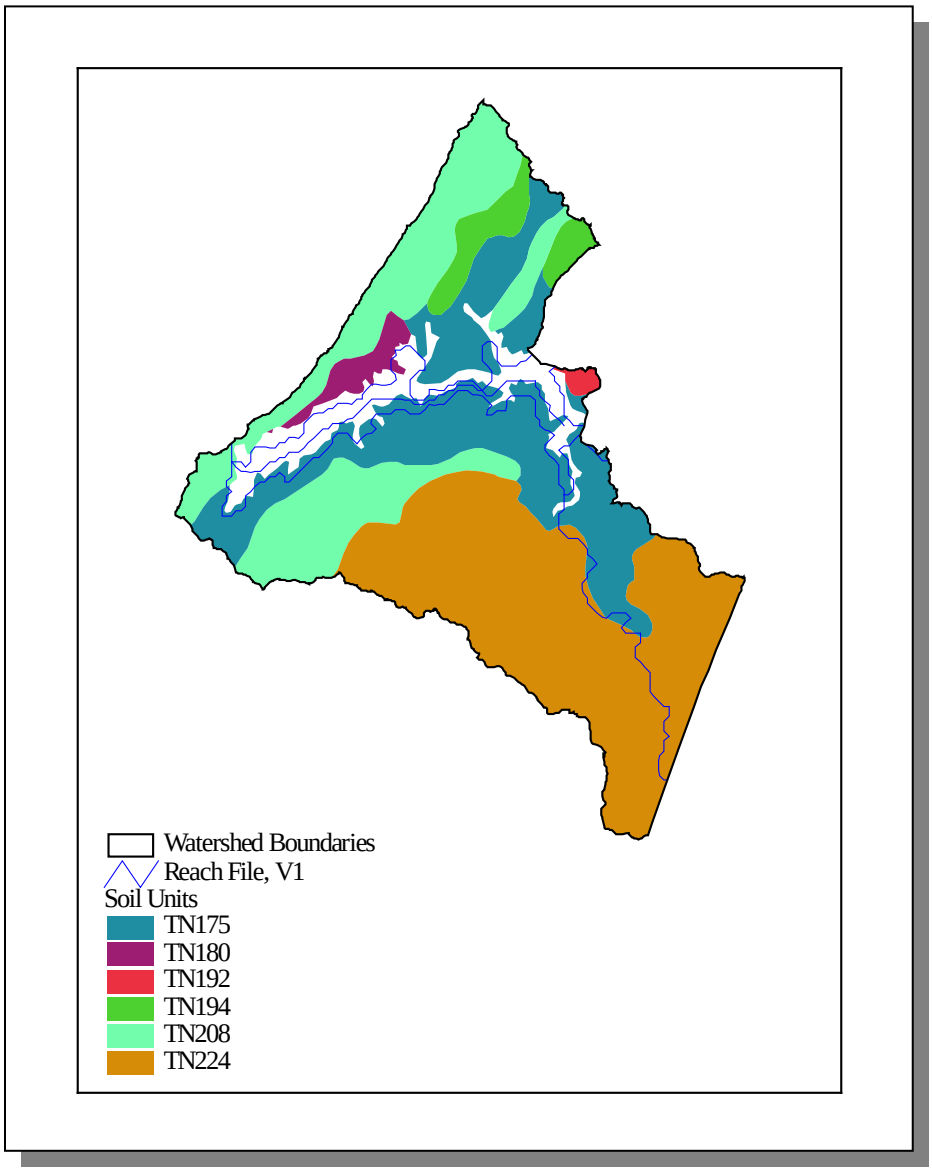

Figure 4-27. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103070.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hr)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN175	0.00	B	1.49	5.23	Loam	0.30
TN180	0.00	B	1.71	4.97	Loam	0.28
TN192	0.00	B	2.72	4.41	Sandy Loam	0.27
TN194	0.00	B	3.75	5.44	Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25
TN224	1.00	B	3.97	5.27	Loam	0.24

Table 4-24. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103070. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County Name	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Carter	51,505	53,132	16.87	8,690	8,964	3.2
Johnson	13,766	16,572	4.09	564	6,79	20.4
Totals	**65,271**	**69,704**		**9,254**	**9,643**	**4.2**

Table 4-25. Population Estimates in Subwatershed 06010103070.

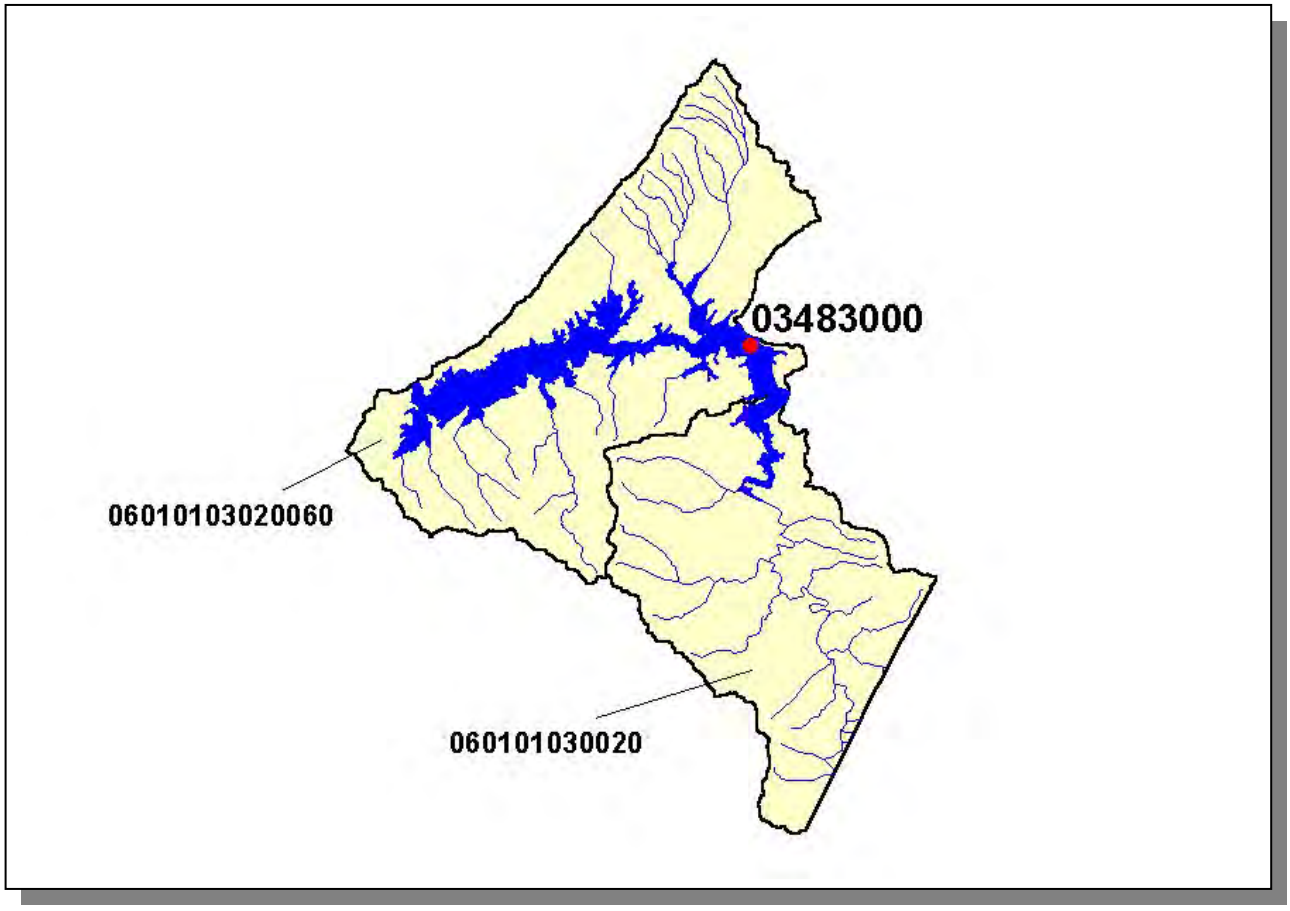

Figure 4-28. Location of Historical Streamflow Data Collection Sites In Subwatershed 06010103070*. Subwatershed 06010103020060 and 06010103030020 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

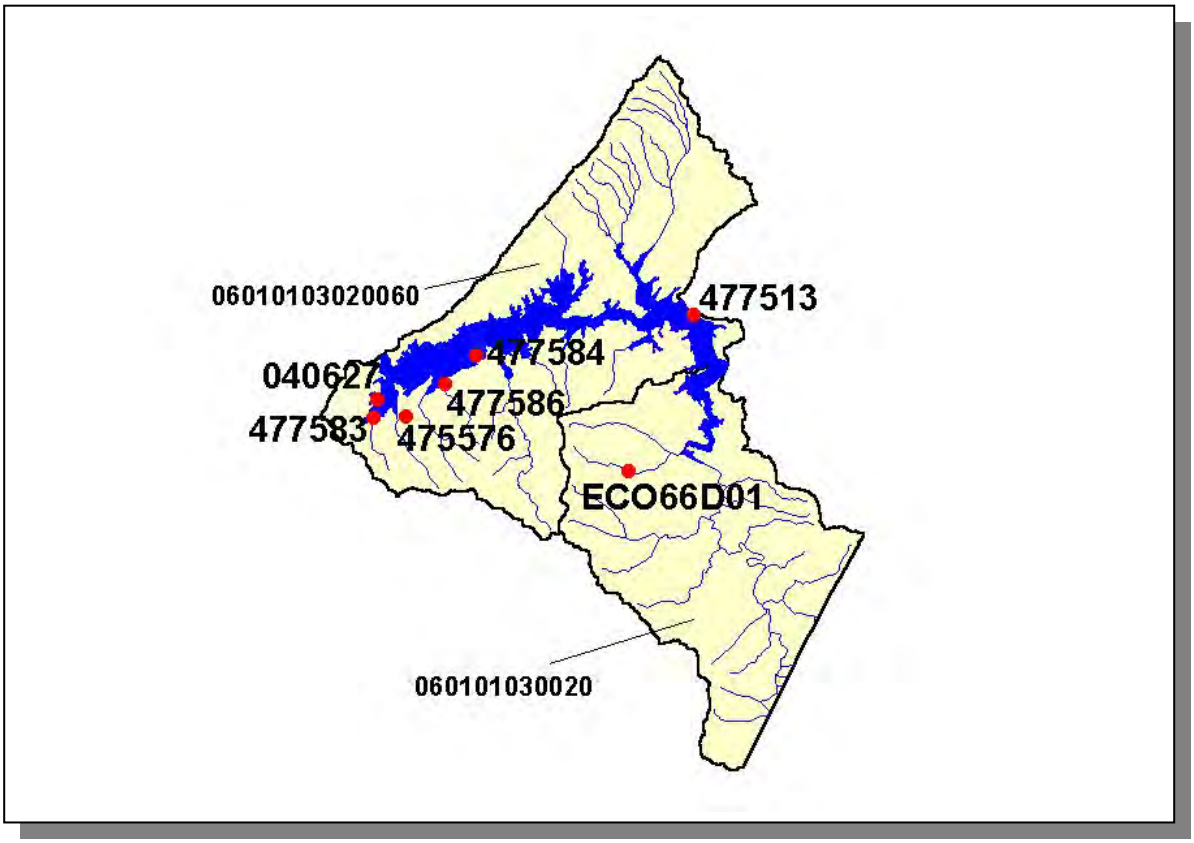

Figure 4-29. Location of STORET Monitoring Sites in Subwatershed 06010103070. *Subwatershed 06010103020060 and 06010103030020 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

4.2.E.ii. Point Source Contributions.

No Contributions.

4.2.E.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Milk Cow**	**Cattle**	**Chickens**	**Hogs**	**Sheep**
287	43	729	<5	<5	8

Table 4-26. Summary of Livestock Count Estimates in Subwatershed 06010103070. *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
Totals	**305.7**	**299.9**	**4.0**	**14.6**

Table 4-27. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 06010103070.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Grass (Hayland)	0.30
Grass (Pastureland)	0.42
Grass, Forbs, Legumes (Mixed Pasture)	0.31
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.33
Corn (Row Crops)	4.98
Tobacco (Row Crops)	10.63
Legume Grass (Hayland)	0.34
Other Cropland not Planted	0.12

Table 4-28. Annual Estimated Soil Loss in Subwatershed 06010103070.

4.2.F. 06010103080

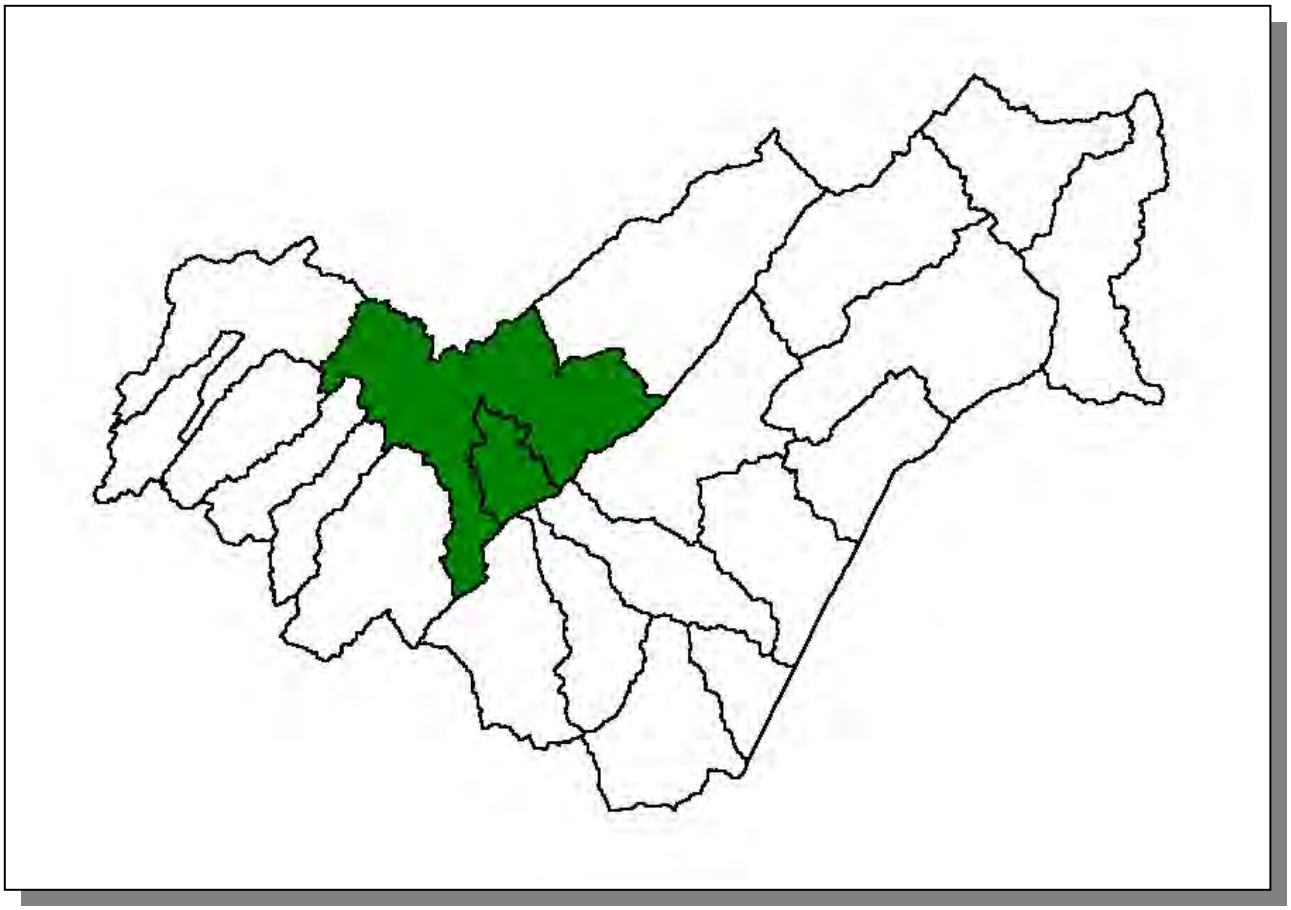

Figure 4-30. Location of Subwatershed 06010103080. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.F.i. General Description.

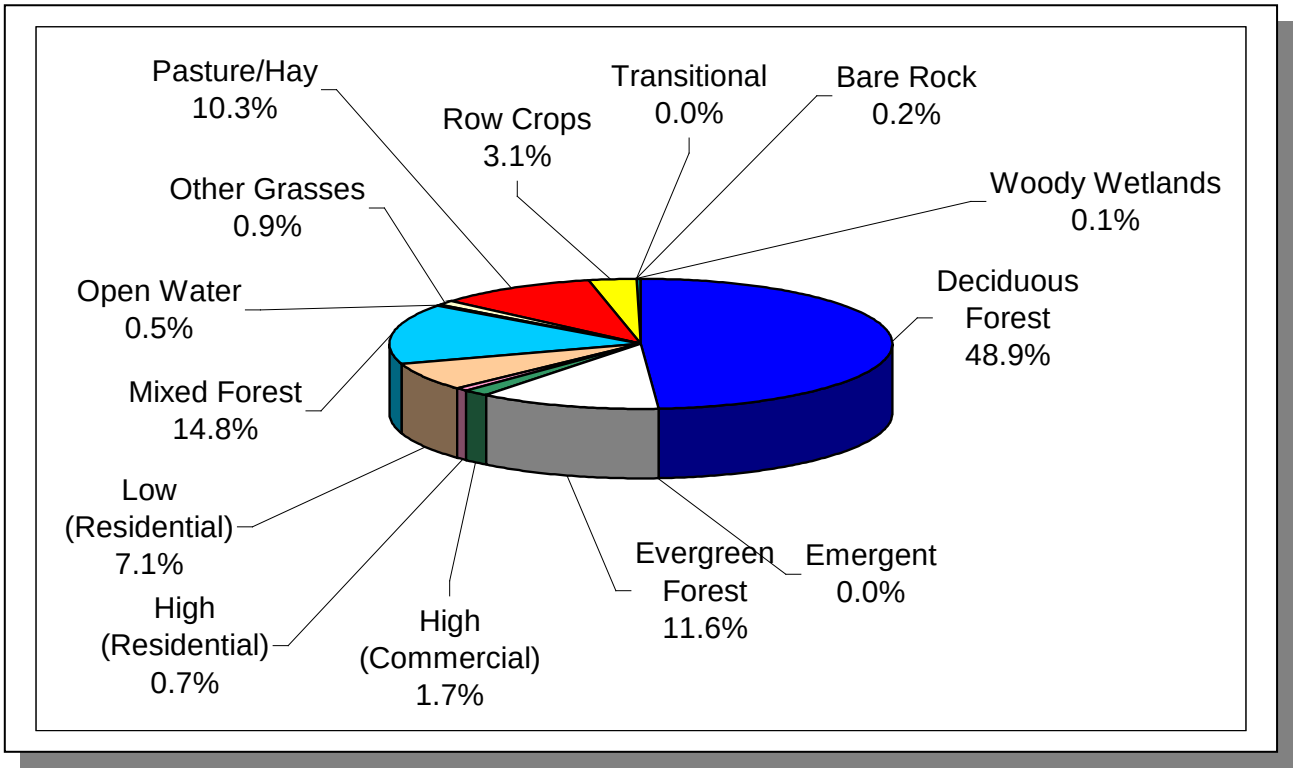

Figure 4-31. Land Use Distribution in Subwatershed 06010103080. *More information is provided in Watauga-Appendix IV.*

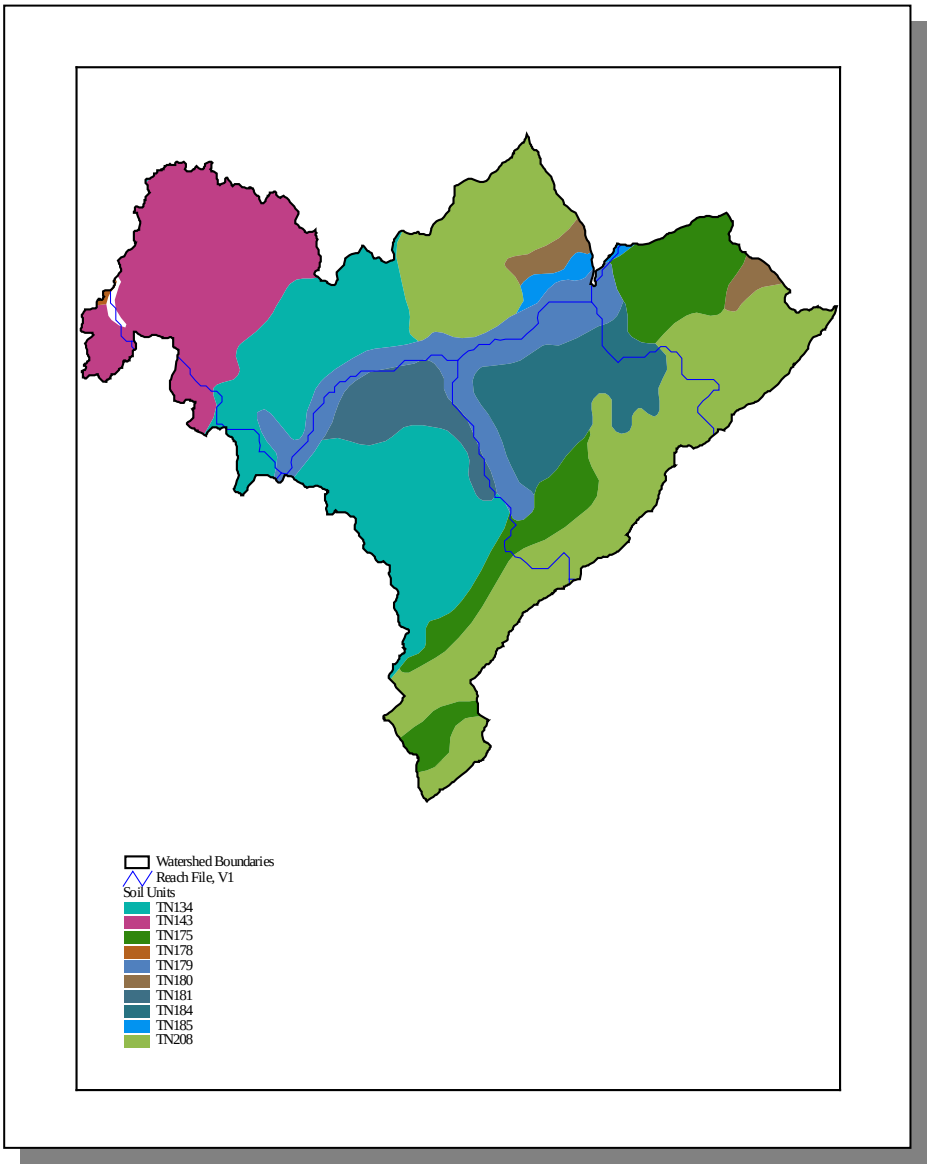

Figure 4-32. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103080.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hr)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN134	0.00	B	1.38	5.18	Loam	0.31
TN143	0.00	C	1.22	6.44	Loam	0.32
TN175	0.00	B	1.49	5.23	Loam	0.30
TN178	8.00	C	1.46	5.45	Loam	0.28
TN179	0.00	B	3.90	5.62	Sandy Loam	0.25
TN180	0.00	B	1.71	4.97	Loam	0.28
TN181	14.00	C	3.79	4.99	Loam	0.30
TN184	0.00	C	1.45	4.74	Loam	0.29
TN185	0.00	B	2.81	5.10	Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-29. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103080. *More information is provided in Watauga-Appendix IV.*

	TOTAL COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		PERCENT CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Carter	51,505	53,132	19.62	10,107	10,426	3.2
Sullivan	143,596	150,371	0.54	776	813	4.8
Washington	92,315	101,368	0.91	838	920	9.8
Totals	**287,416**	**304,871**		**11,721**	**12,159**	**3.7**

Table 4-30. Population Estimates in Subwatershed 06010103080.

			NUMBER OF HOUSING UNITS			
Populated Place	**County**	**Population**	**Total**	**Public Sewer**	**Septic Tank**	**Other**
Johnson City	Washington	49,178	21,214	19,213	2,001	0
Elizabethton	Carter	11,931	5,191	4,991	200	0
Watauga	Carter	334	153	4	133	16
Totals		**61,443**	**26,558**	**24,208**	**2,334**	**16**

Table 4-31. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06010103080.

Figure 4-33. Location of Historical Streamflow Data Collection Sites In Subwatershed 06010103080*. Subwatershed 06010103040060 and 06010103050010 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

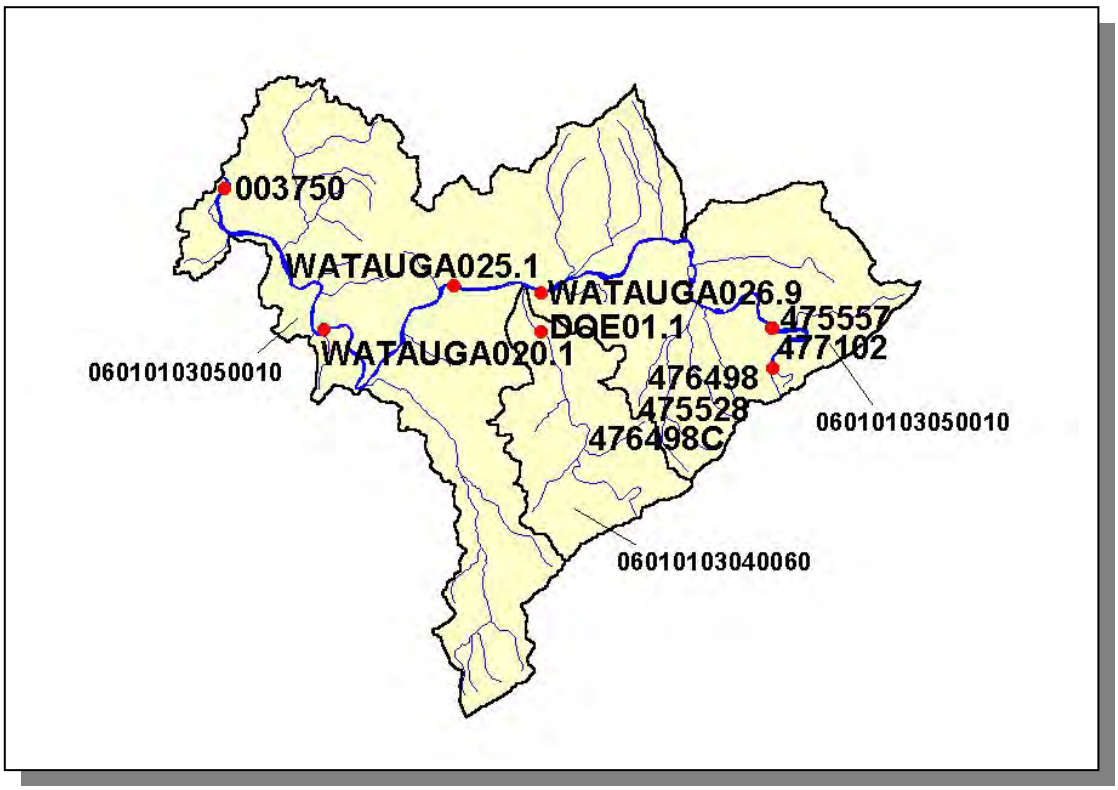

Figure 4-34. Location of STORET Monitoring Sites in Subwatershed 06010103080. *Subwatershed 06010103040060 and 06010103050010 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

4.2.F.ii. Point Source Contributions.

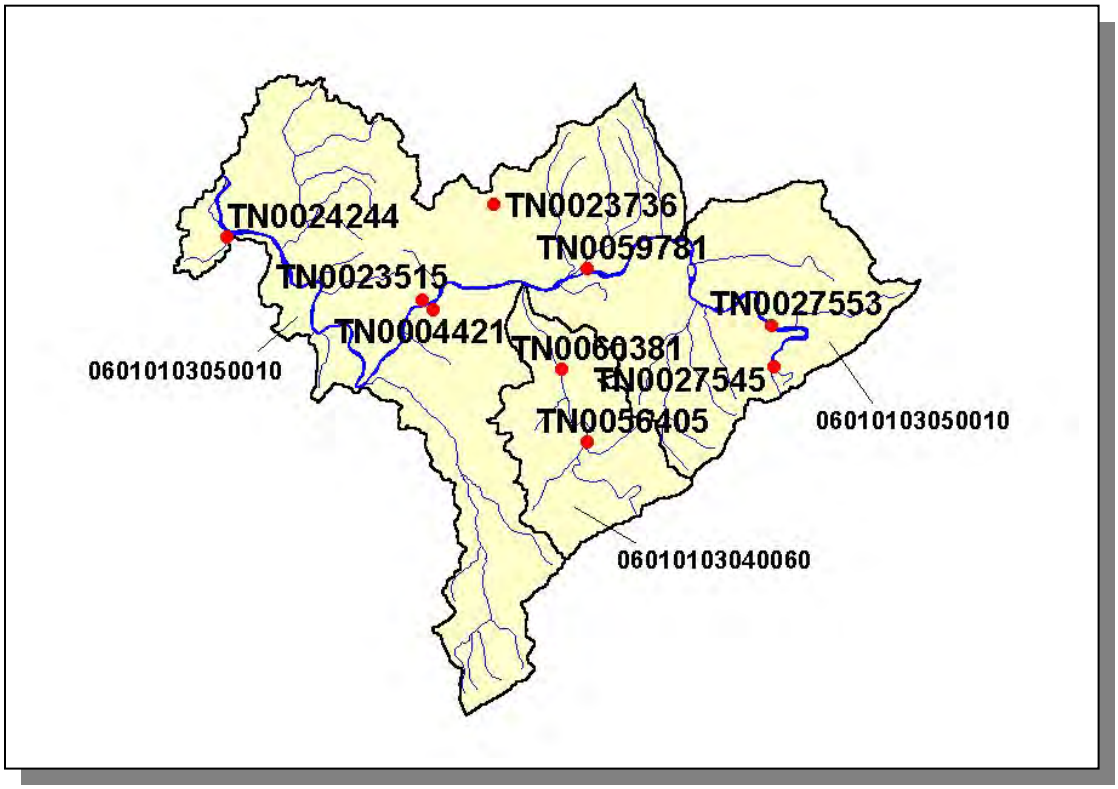

Figure 4-35. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06010103080. *Subwatershed 06010103040060 and 06010103050010 boundaries are shown for reference. More information, including the names of facilities, is provided in Watauga-Appendix IV.*

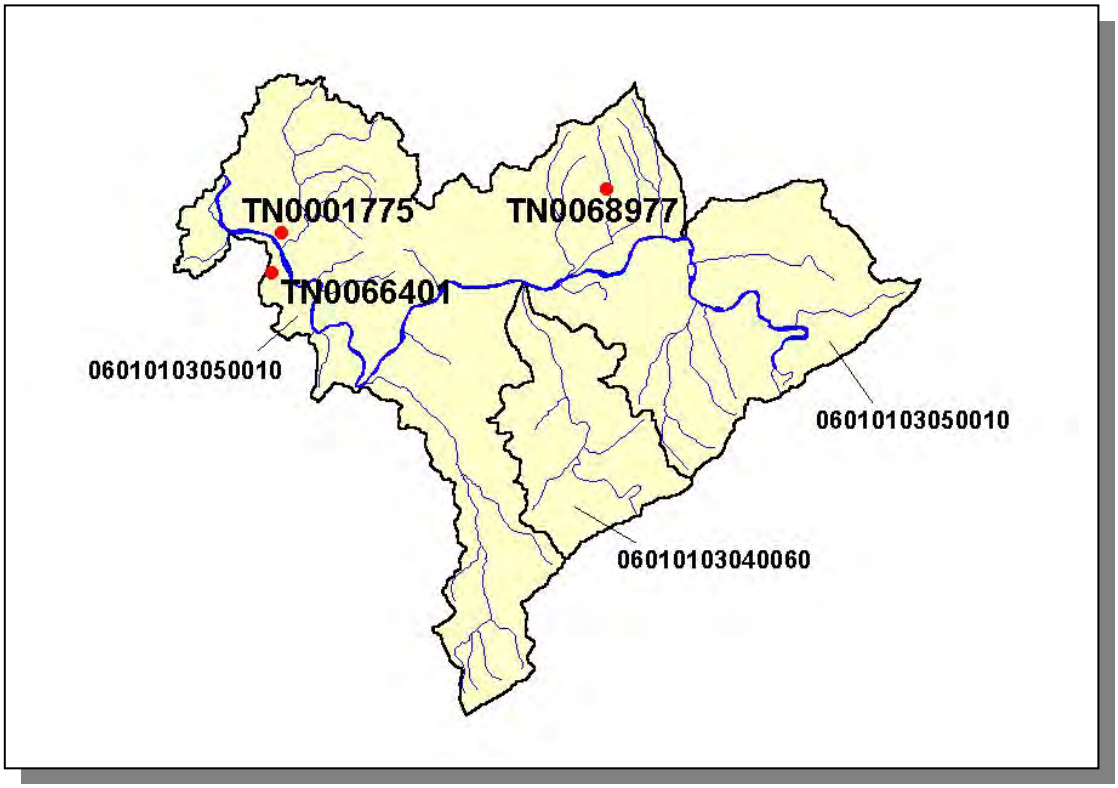

Figure 4-36. Location of Active Mining Sites in Subwatershed 06010103080. *Subwatershed 06010103040060 and 06010103050010 boundaries are shown for reference. More information, including the names of facilities, is provided in Watauga-Appendix IV.*

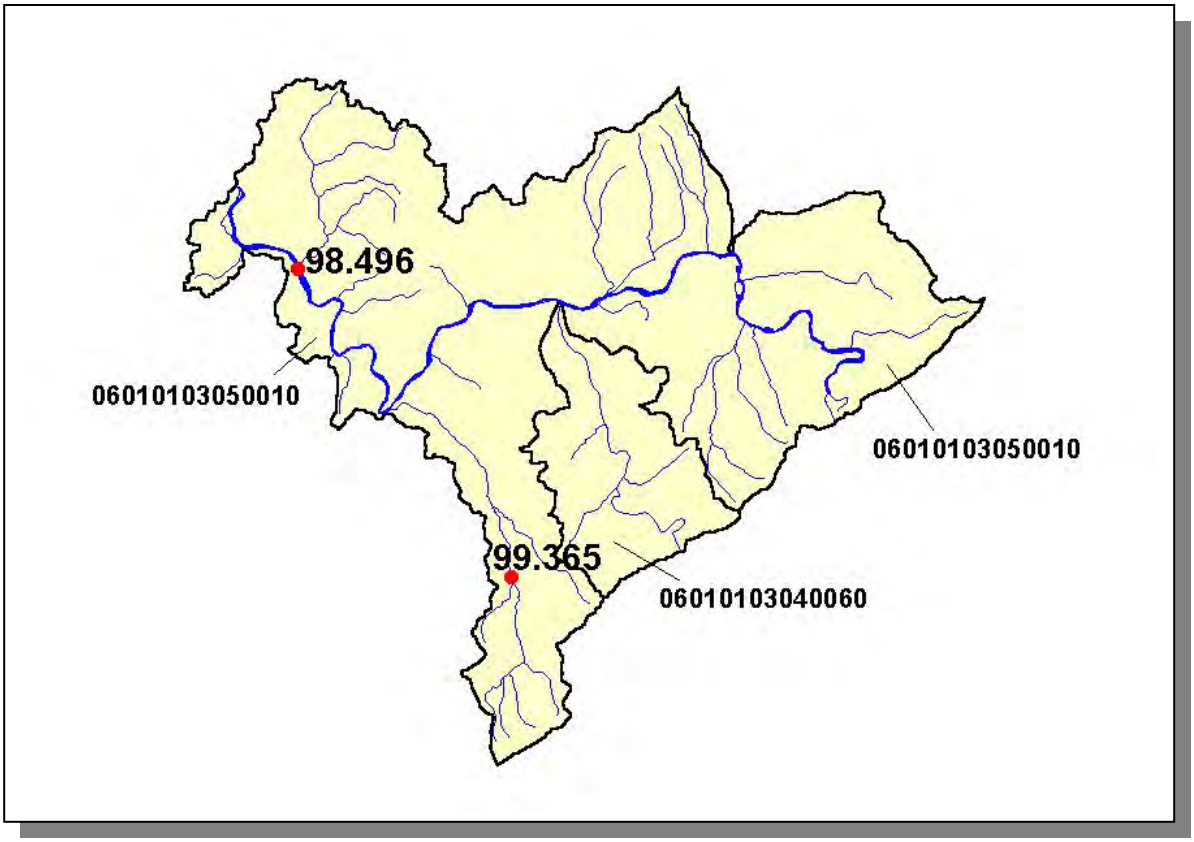

Figure 4-37. Location of ARAP Sites (Individual Permits) in Subwatershed 06010103080. *Subwatershed 06010103040060 and 06010103050010 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

4.2.F.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Milk Cow**	**Cattle**	**Chickens**	**Hogs**	**Sheep**
1,676	307	4,422	5	8	28

Table 4-32. Summary of Livestock Count Estimates in Subwatershed 06010103080. *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
Sullivan	123.7	123.7	0.1	0.3
Washington	54.8	50.3	0.3	0.2
Total	**339.8**	**329.5**	**3.8**	**12.9**

Table 4-33. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103080.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Corn (Row Crops)	5.45
Tobacco (Row Crops)	11.66
Grass (Hayland)	0.30
Legume Grass (Hayland)	0.38
Grass (Pastureland)	0.42
Grass, Forbs, Legumes (Mixed Pasture)	0.37
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.34
Other Land in Farms	0.02

Table 4-34. Annual Estimated Total Soil Loss in Subwatershed 06010103080.

4.2.G. 06010103090.

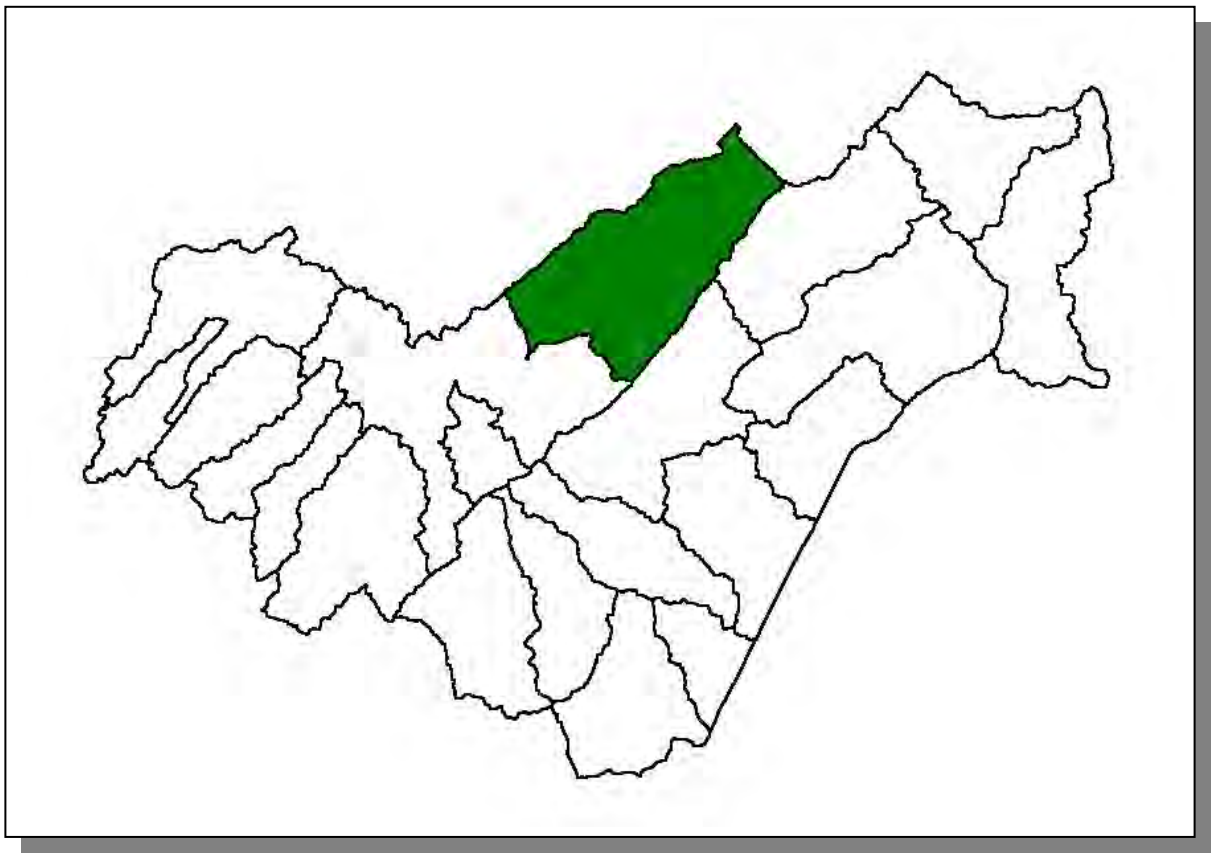

Figure 4-38. Location of Subwatershed 06010103090. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.G.i. General Description.

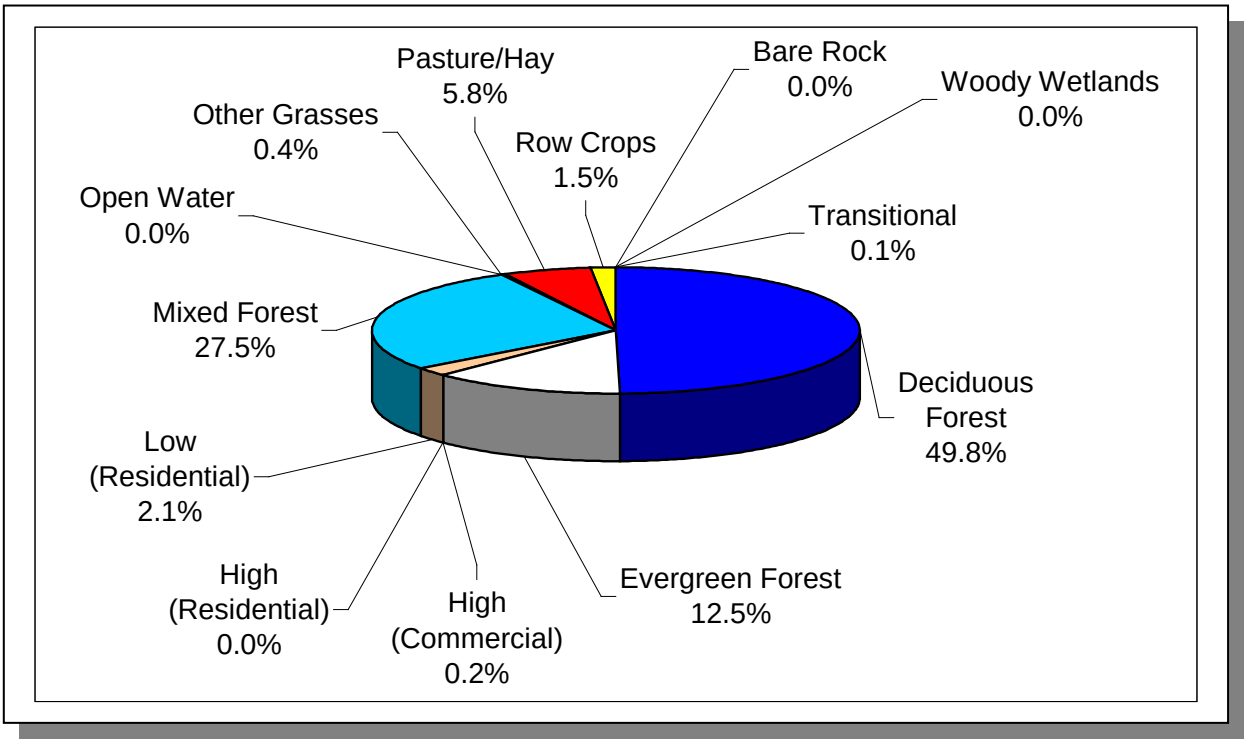

Figure 4-39. Land Use Distribution in Subwatershed 06010103090. *More information is provided in Watauga-Appendix IV.*

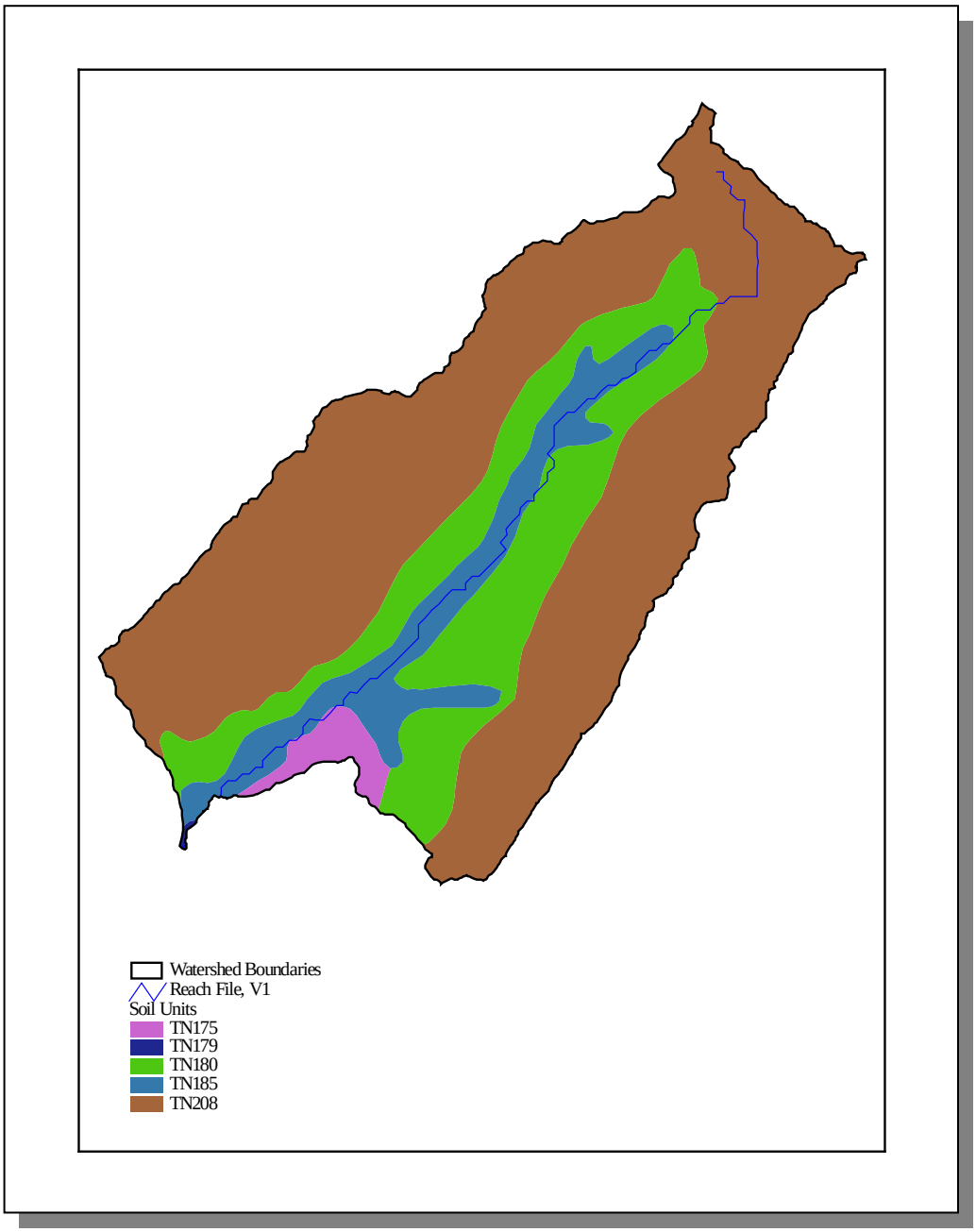

Figure 4-40. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103090.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hr)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN175	0.00	B	1.49	5.23	Loam	0.30
TN179	0.00	B	3.90	5.62	Sandy Loam	0.25
TN180	0.00	B	1.71	4.97	Loam	0.28
TN185	0.00	B	2.81	5.10	Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-35. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103090. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Carter	51,505	53,132	16.04	8,259	8,520	3.2
Johnson	13,766	16,572	0.02	2	3	50.0
Sullivan	14,3596	150,371	0.26	371	389	4.9
Totals	**208,867**	**220,075**		**8,632**	**8,912**	**3.2**

Table 4-36. Population Estimates in Subwatershed 06010103090.

4.2.G.ii. Point Source Contributions.

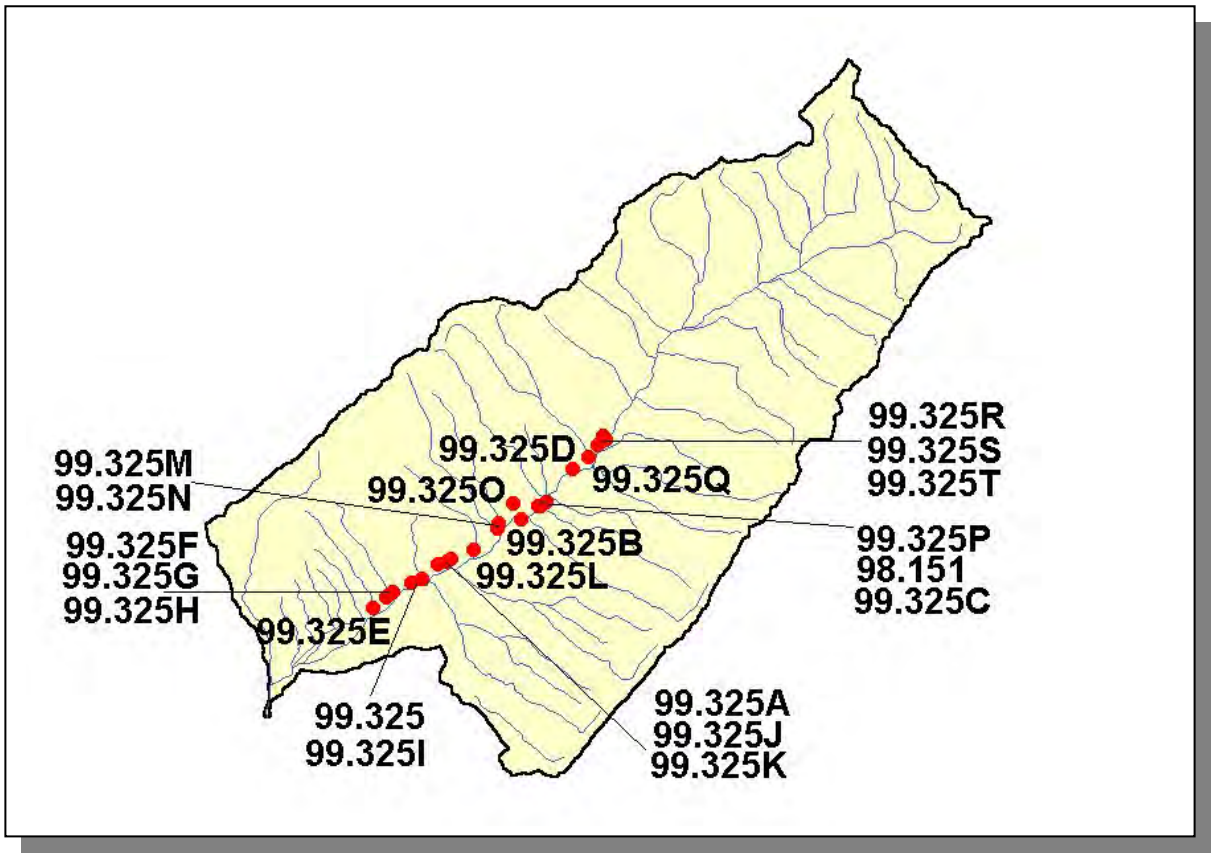

Figure 4-41. Location of ARAP Sites (Individual Permits) in Subwatershed 06010103090.
More information is provided in Watauga-Appendix IV.

4.2.G.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Milk Cow**	**Cattle**	**Chickens**	**Hogs**	**Sheep**
713	130	1,909	<5	<5	12

Table 4-37. Summary of Livestock Count Estimates in Subwatershed 06010103090. *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
Totals	**429.4**	**423.6**	**4.1**	**14.9**

Table 4-38. Forest Acreage and Average Removal Rates (1987-1994) in Subwatershed 06010103090.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Corn (Row Crops)	5.08
Tobacco (Row Crops)	11.97
Grass (Hayland)	0.28
Legume Grass (Hayland)	0.40
Grass (Pastureland)	0.40
Grass, Forbs, Legumes (Mixed Pasture)	0.35
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.35
Other Land in Farms	0.02
Other Cropland not Planted	0.12

Table 4-39. Annual Estimated Total Soil Loss in Subwatershed 06010103090.

4.2.H. 06010103100.

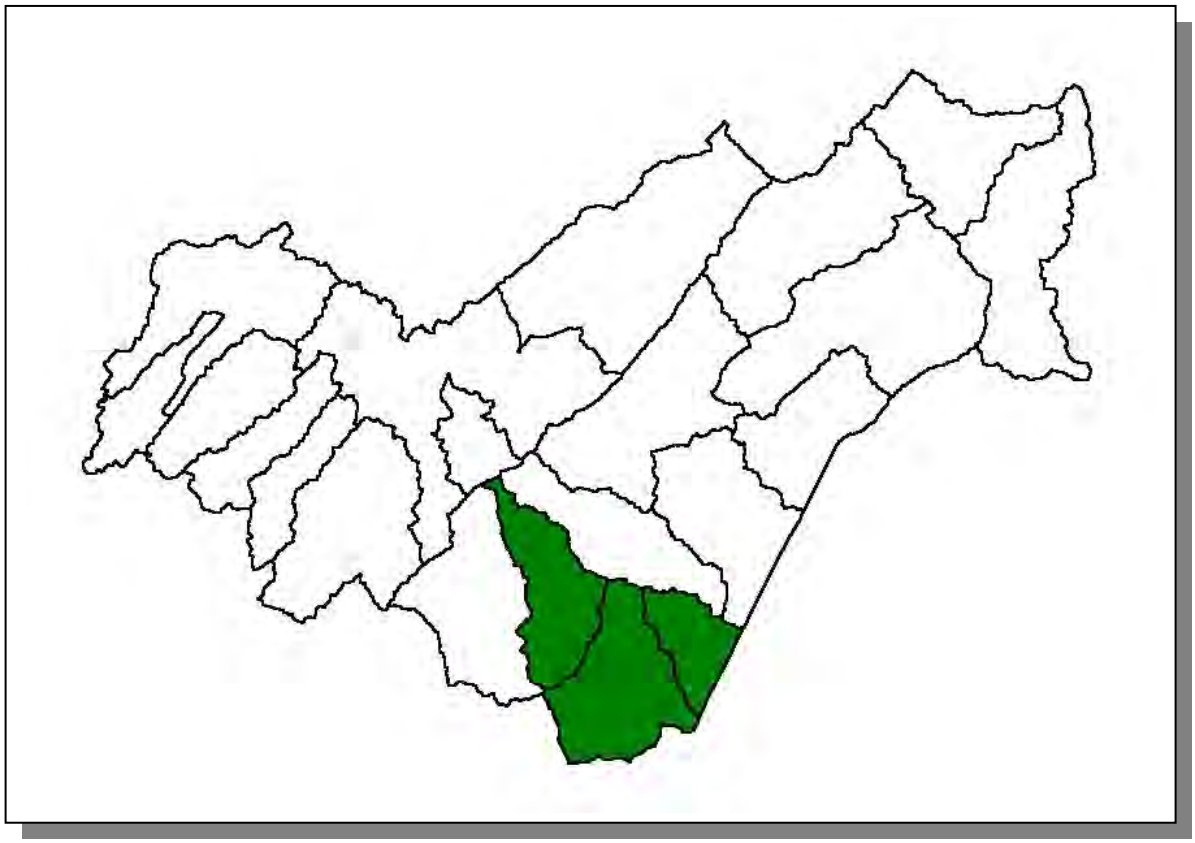

Figure 4-42. Location of Subwatershed 06010103100. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.H.i. General Description.

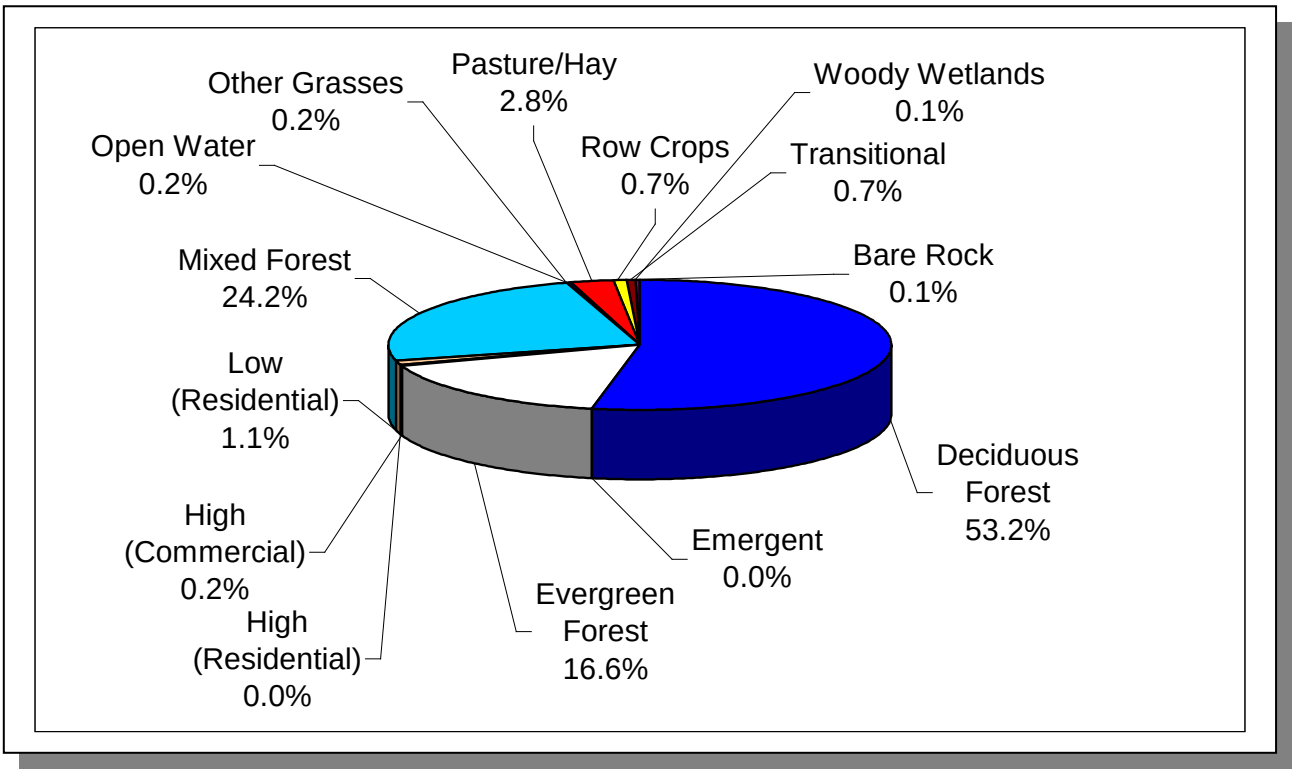

Figure 4-43. Land Use Distribution in Subwatershed 06010103100. More information is provided in Watauga-Appendix IV.

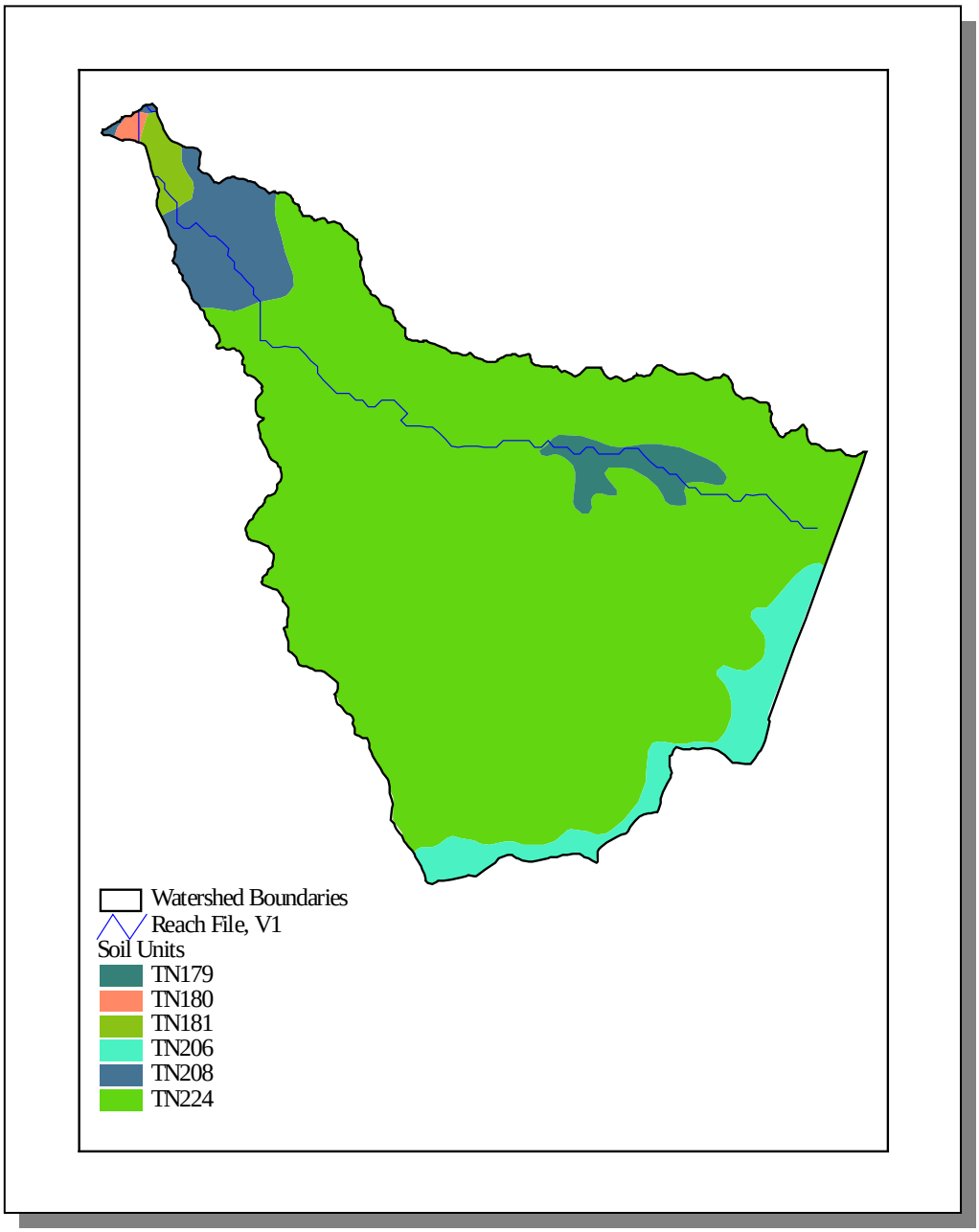

Figure 4-44. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103100.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN179	0.00	B	3.90	5.62	Sandy Loam	0.25
TN180	0.00	B	1.71	4.97	Loam	0.28
TN181	14.00	C	3.79	4.99	Loam	0.30
TN206	0.00	B	3.99	4.76	Sandy Loam	0.20
TN208	0.00	C	4.02	4.84	Loam	0.25
TN224	1.00	B	3.97	5.27	Loam	0.24

Table 4-40. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103100. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Carter	51,505	53,132	18.37	9,464	9,763	3.2

Table 4-41. Population Estimates in Subwatershed 06010103100.

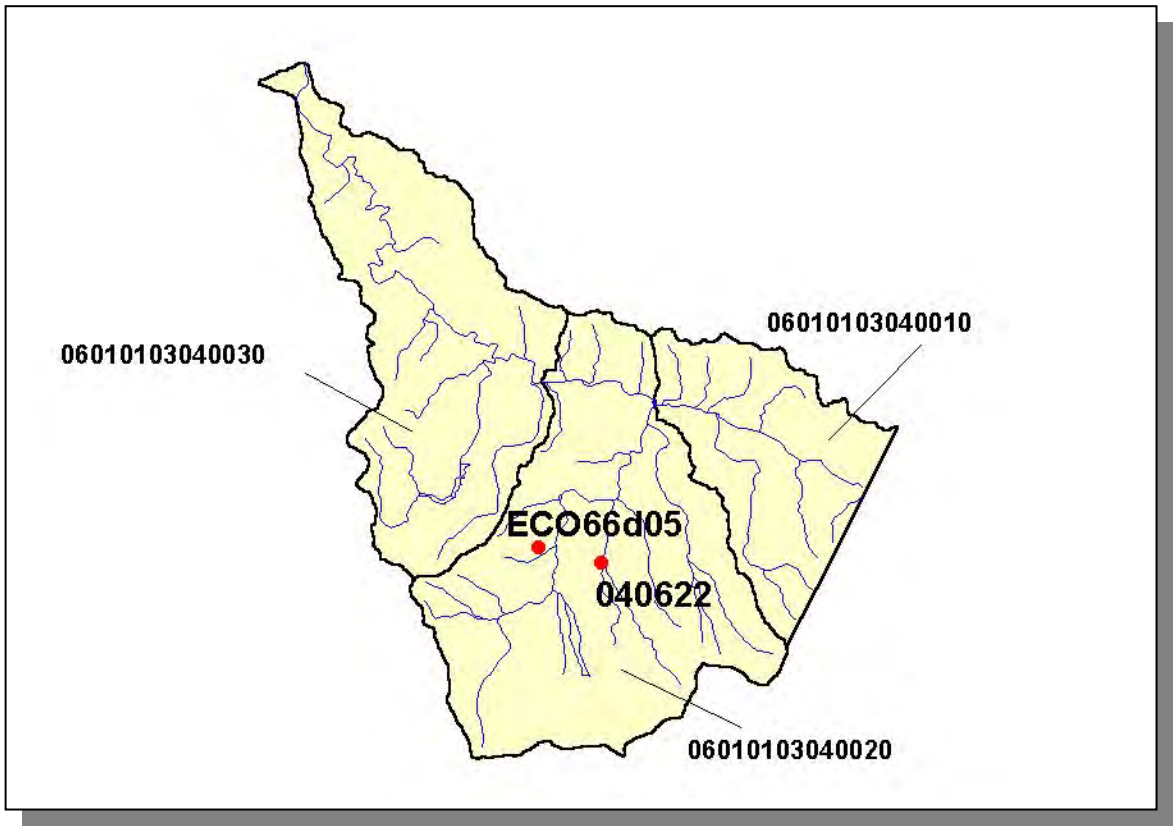

Figure 4-45. Location of STORET Monitoring Sites in Subwatershed 06010103100. *Subwatershed 06010103040010, 06010103040020 and 06010103040030 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

4.2.H.ii. Point Source Contributions.

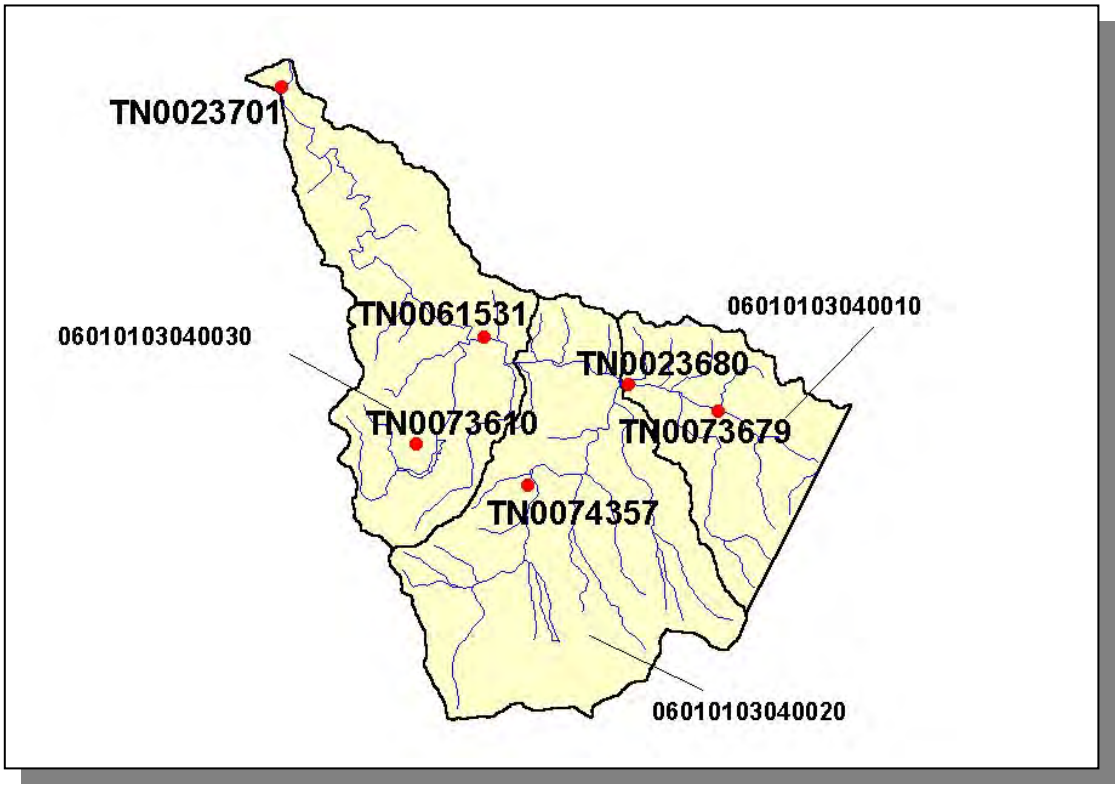

Figure 4-46. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06010103100. *Subwatershed 06010103040010, 06010103040020 and 06010103040030 boundaries are shown for reference. More information, including the names of facilities, is provided in Watauga-Appendix IV.*

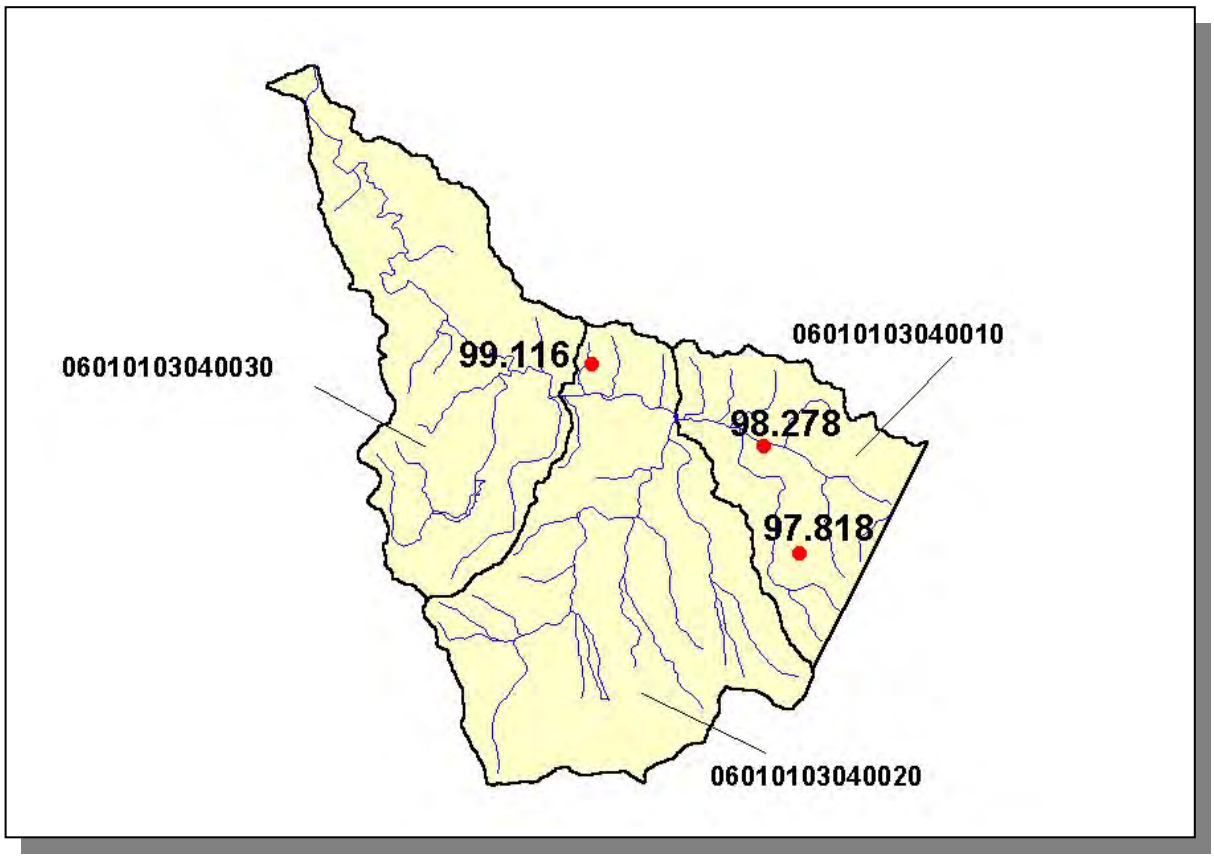

Figure 4-47. Location of ARAP Sites (Individual Permits) in Subwatershed 06010103100. *Subwatershed 06010103040010, 06010103040020 and 06010103040040 boundaries are shown for reference. Additional information may be found in Watauga-Appendix IV.*

4.2.H.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Hogs**	**Sheep**
387	1,035	71	<5	<5	7

Table 4-42. Summary of Livestock Count Estimates in Subwatershed 06010103100. *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

Table 4-43. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103100.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	12.14
Grass (Pastureland)	0.39
Grass, Forbs, Legumes (Mixed Pasture)	0.33
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.35
Non Agricultural Land Use	0.00
Corn (Row Crops)	5.02
Grass (Hayland)	0.28
Legume Grass (Hayland)	0.40

Table 4-44. Annual Estimated Total Soil Loss in Subwatershed 06010103100.

4.2.I. 06010103110.

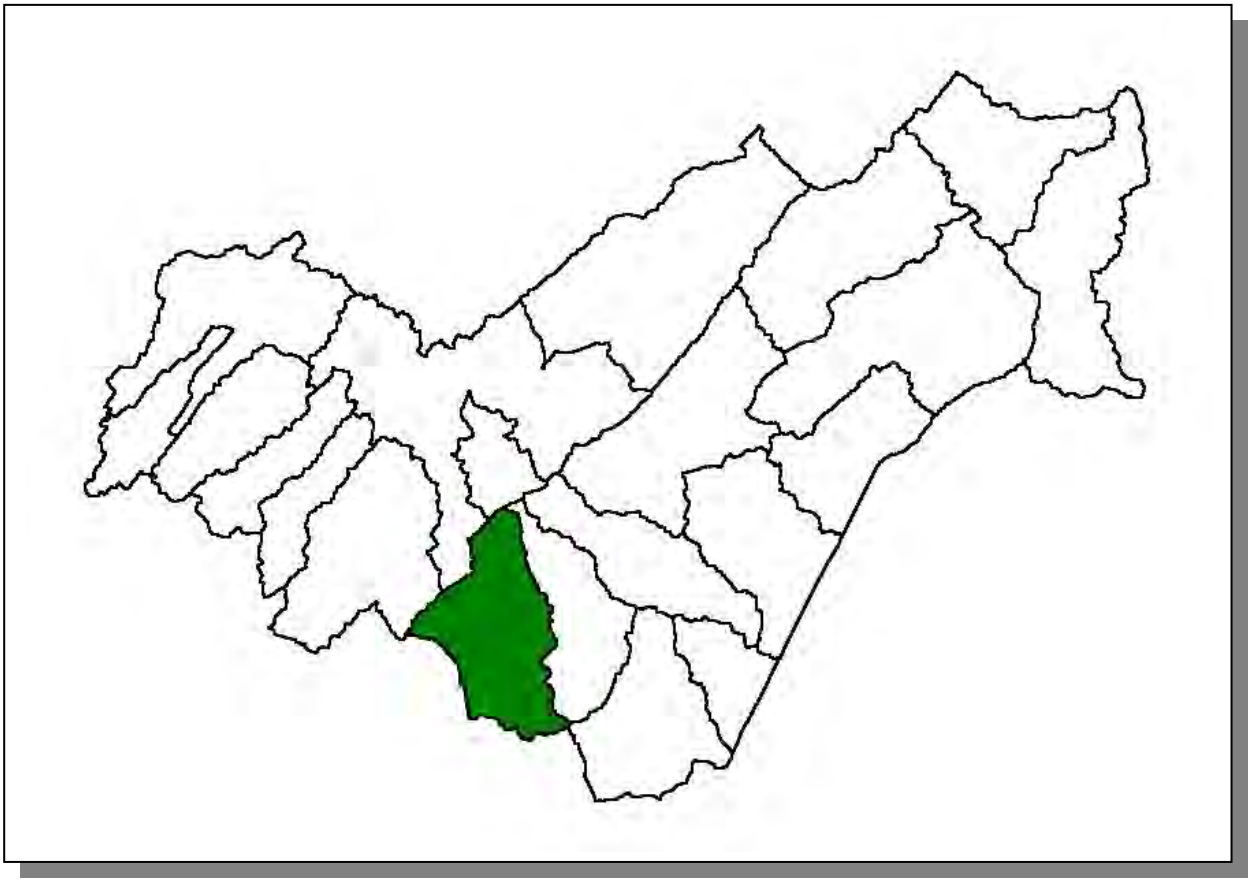

Figure 4-48. Location of Subwatershed 06010103110. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.I.i. General Description.

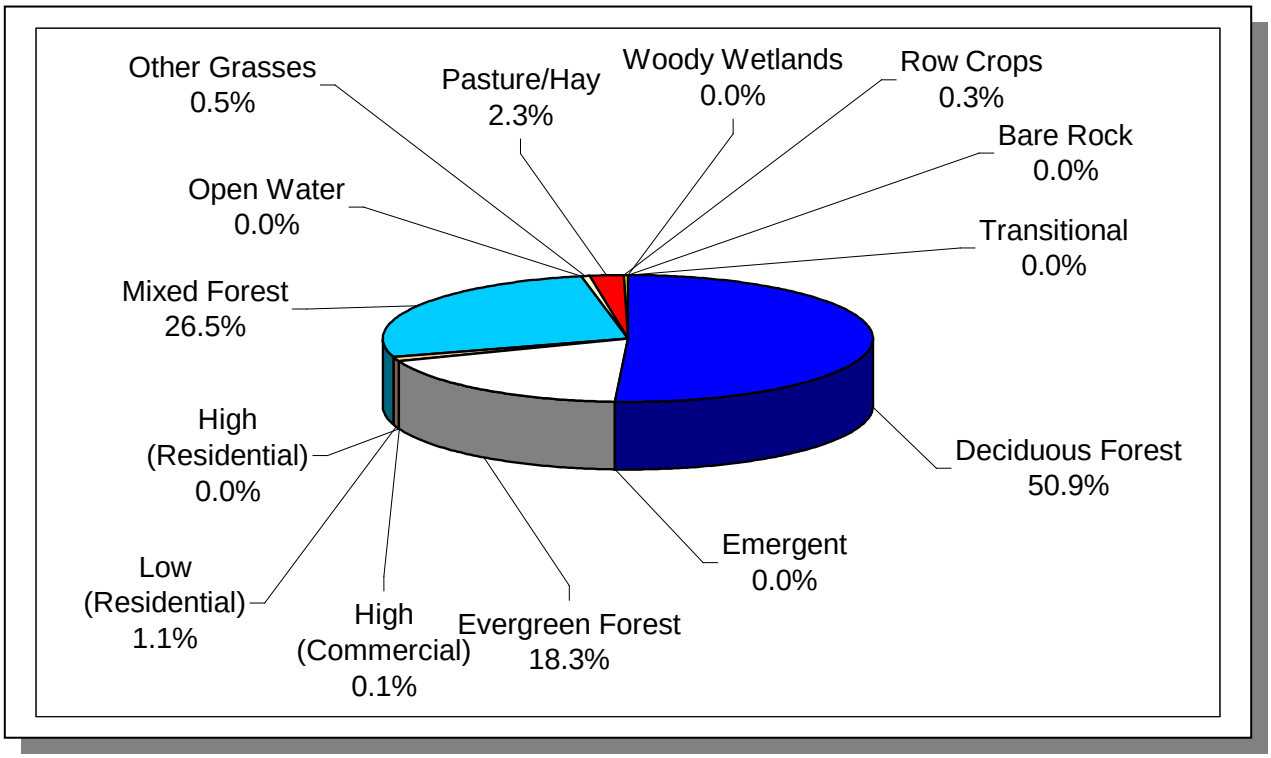

Figure 4-49. Land Use Distribution in Subwatershed 06010103110. *More information is provided in Watauga-Appendix IV.*

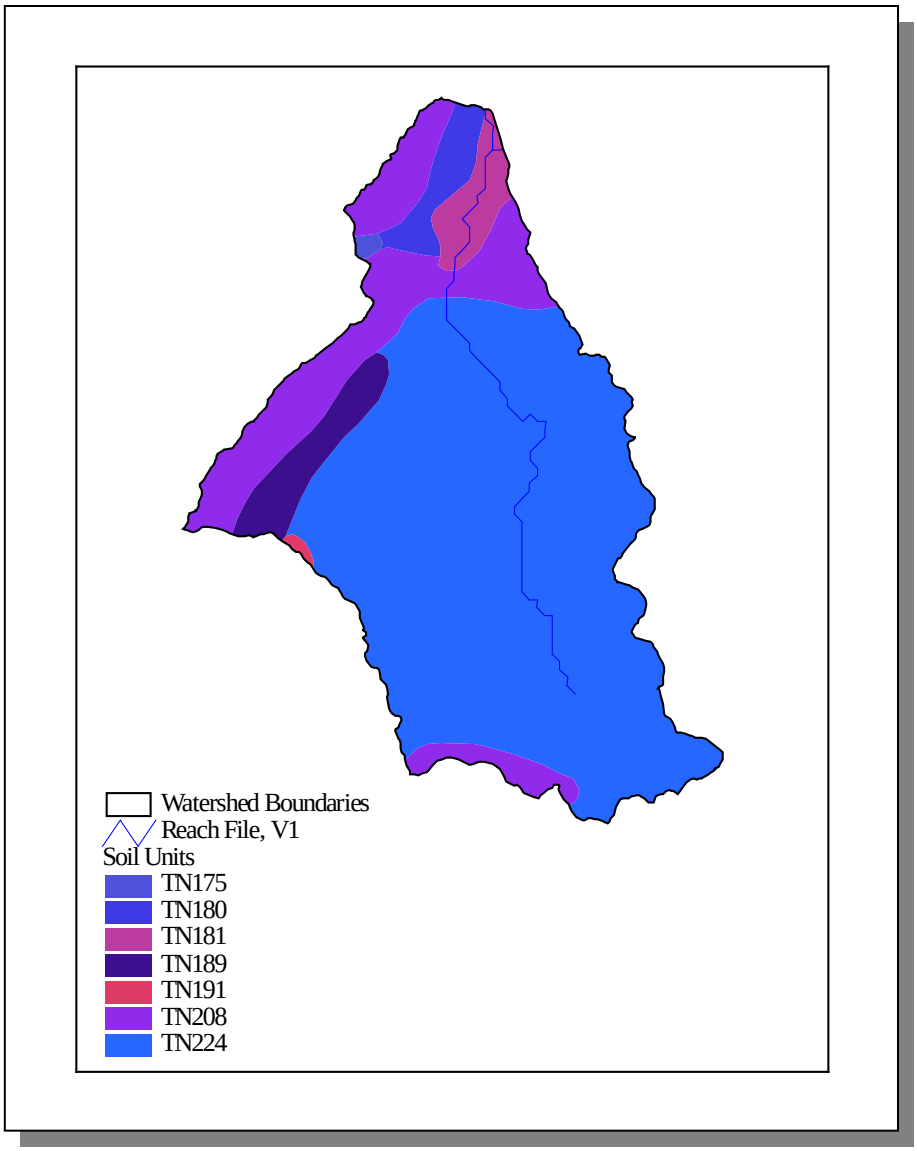

Figure 4-50. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103110.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN175	0.00	B	1.49	5.23	Loam	0.30
TN180	0.00	B	1.71	4.97	Loam	0.28
TN181	14.00	C	3.79	4.99	Loam	0.30
TN189	0.00	B	3.99	5.05	Loam	0.24
TN191	0.00	B	3.03	5.36	Loam	0.27
TN208	0.00	C	4.02	4.84	Loam	0.25
TN224	1.00	B	3.97	5.27	Loam	0.24

Table 4-45. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103110. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Carter	51,505	53,132	8.72	4,493	4,635	3.2
Unicoi	16,549	17,221	0.65	108	112	3.7
Totals	**68,054**	**70,353**		**4,601**	**4,747**	**3.2**

Table 4-46. Population Estimates in Subwatershed 06010103110.

4.2.I.ii. Point Source Contributions.

No Contributions.

4.2.I.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Hogs**	**Sheep**
155	407	26	<5	<5	<5

Table 4-47. Summary of Livestock Count Estimates in Subwatershed 06010103110. *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
Unicoi	99.3	89.4	3.1	8.5
Total	**260.6**	**244.9**	**6.5**	**20.9**

Table 4-48. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103110.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	12.14
Grass (Pastureland)	0.38
Grass, Forbs, Legumes (Mixed Pasture)	0.33
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.34
Non Agricultural Land Use	0.00
Corn (Row Crops)	5.02
Grass (Hayland)	0.28
Legume Grass (Hayland)	0.40
Other Vegetable and Truck Crop	6.10
Legume (Hayland)	0.06
Forest Land (Grazed)	0.00

Table 4-49. Annual Estimated Total Soil Loss in Subwatershed 06010103110.

4.2.J. 06010103120.

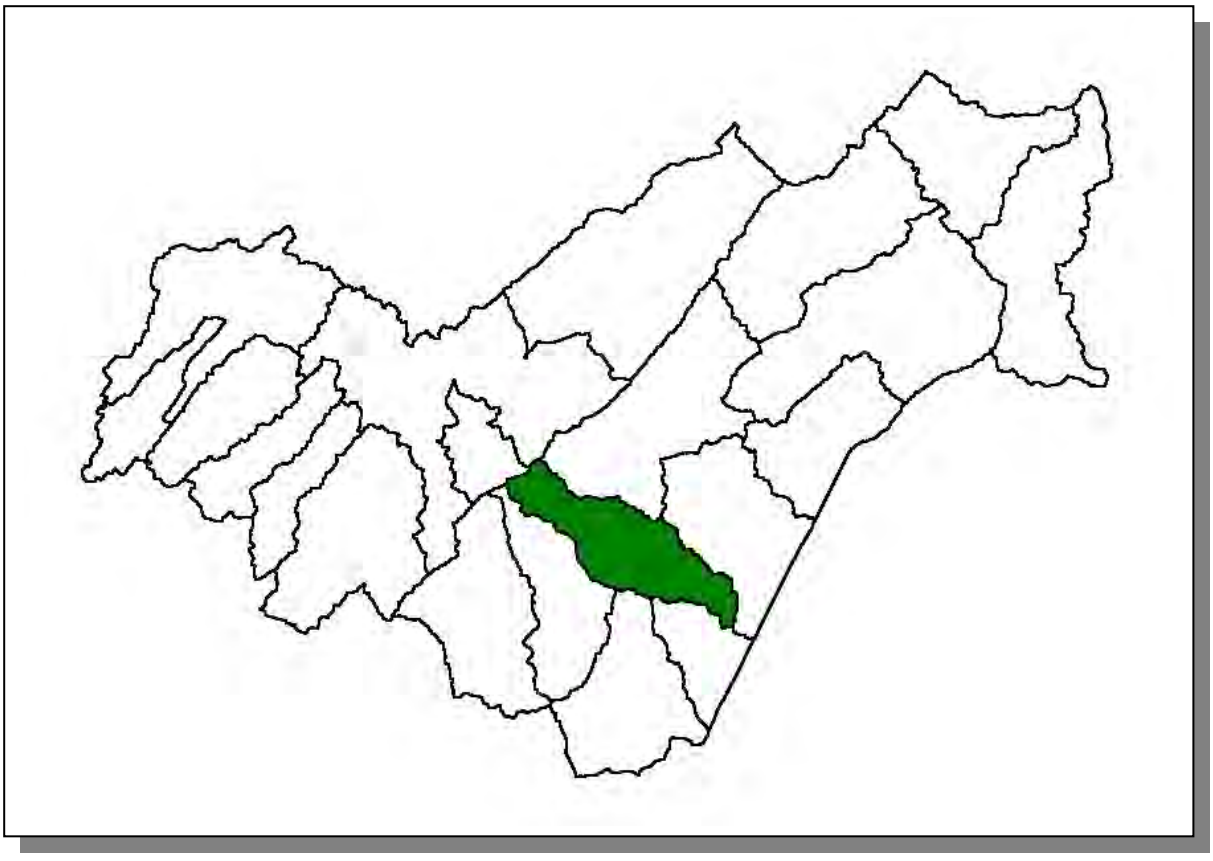

Figure 4-51. Location of Subwatershed 06010103120. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.J.i. General Description.

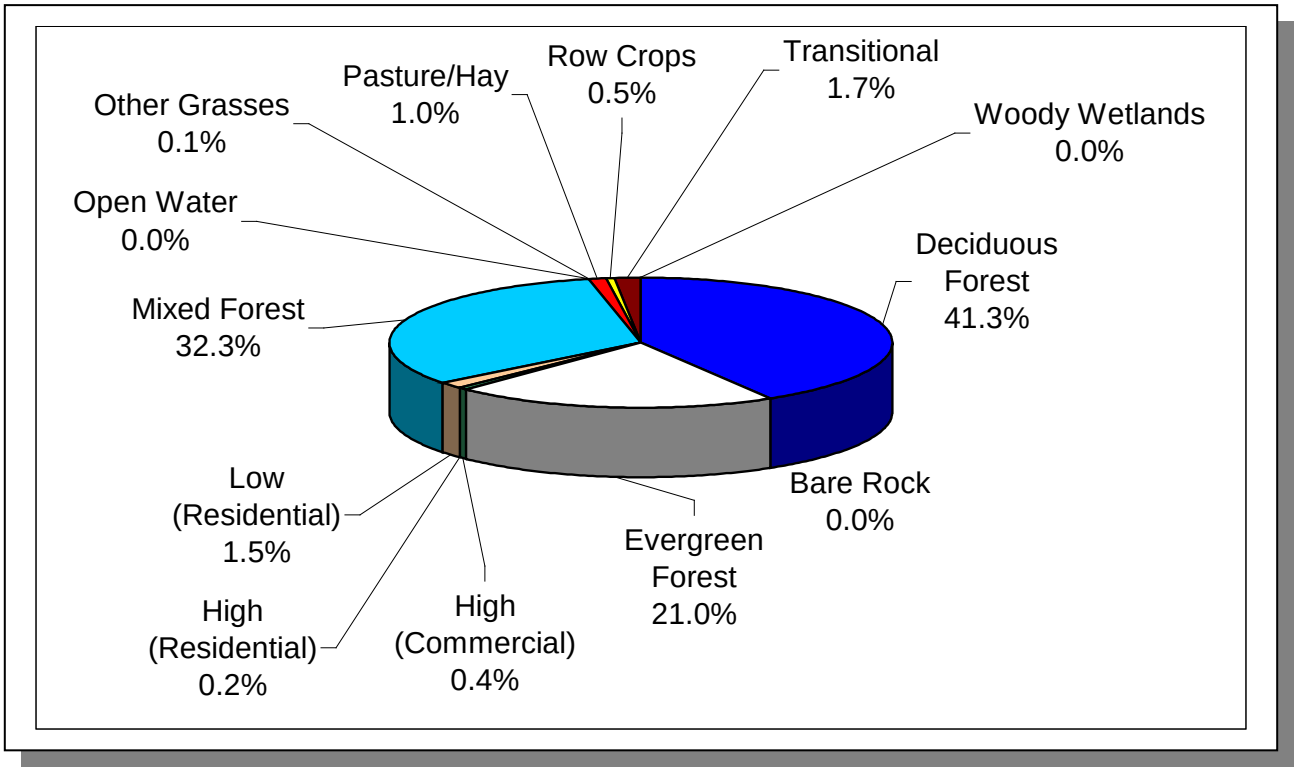

Figure 4-52. Land Use Distribution in Subwatershed 06010103120. *More information is provided in Watauga-Appendix IV.*

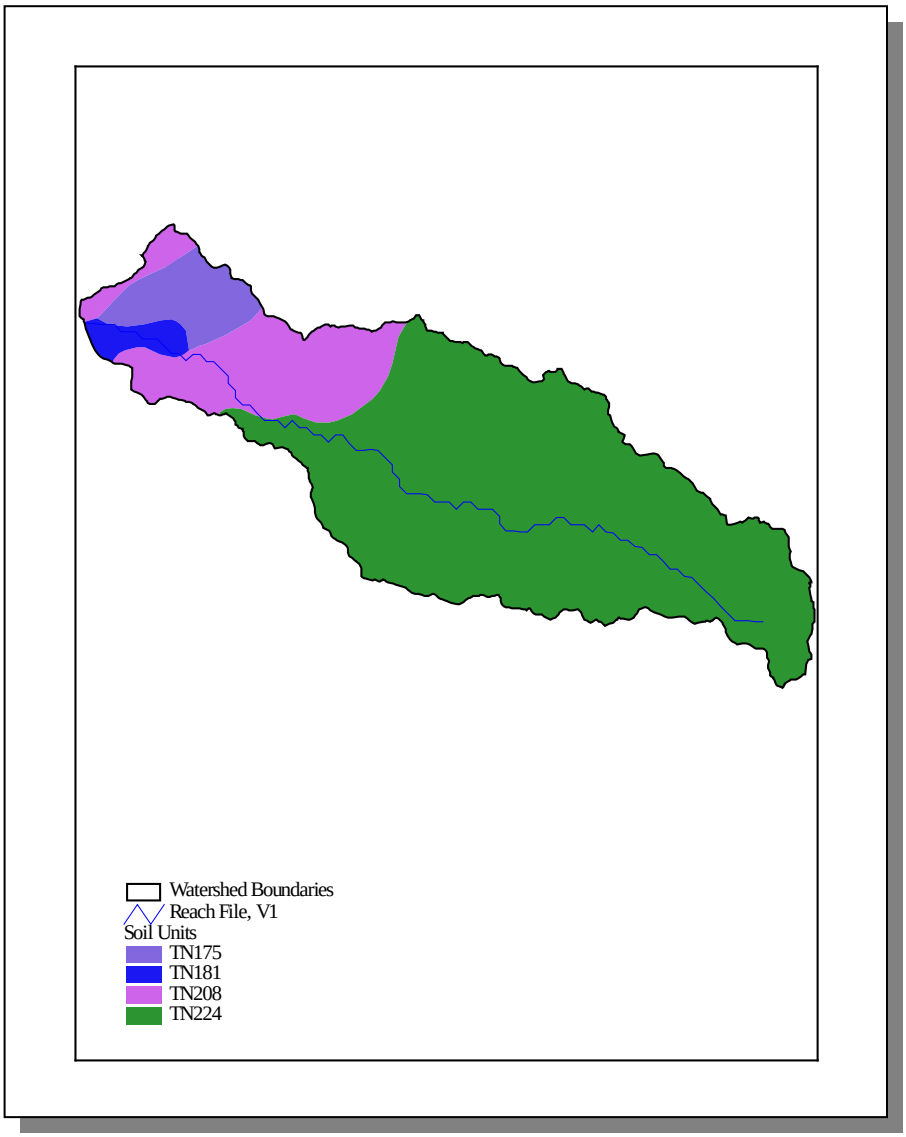

Figure 4-53. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103120.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN175	0.00	B	1.49	5.23	Loam	0.30
TN181	14.00	C	3.79	4.99	Loam	0.30
TN208	0.00	C	4.02	4.84	Loam	0.25
TN224	1.00	B	3.97	5.27	Loam	0.24

Table 4-50. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103120. *More details are provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Carter	51,505	53,132	7.3	3,759	3,878	3.2

Table 4-51. Population Estimates in Subwatershed 06010103120.

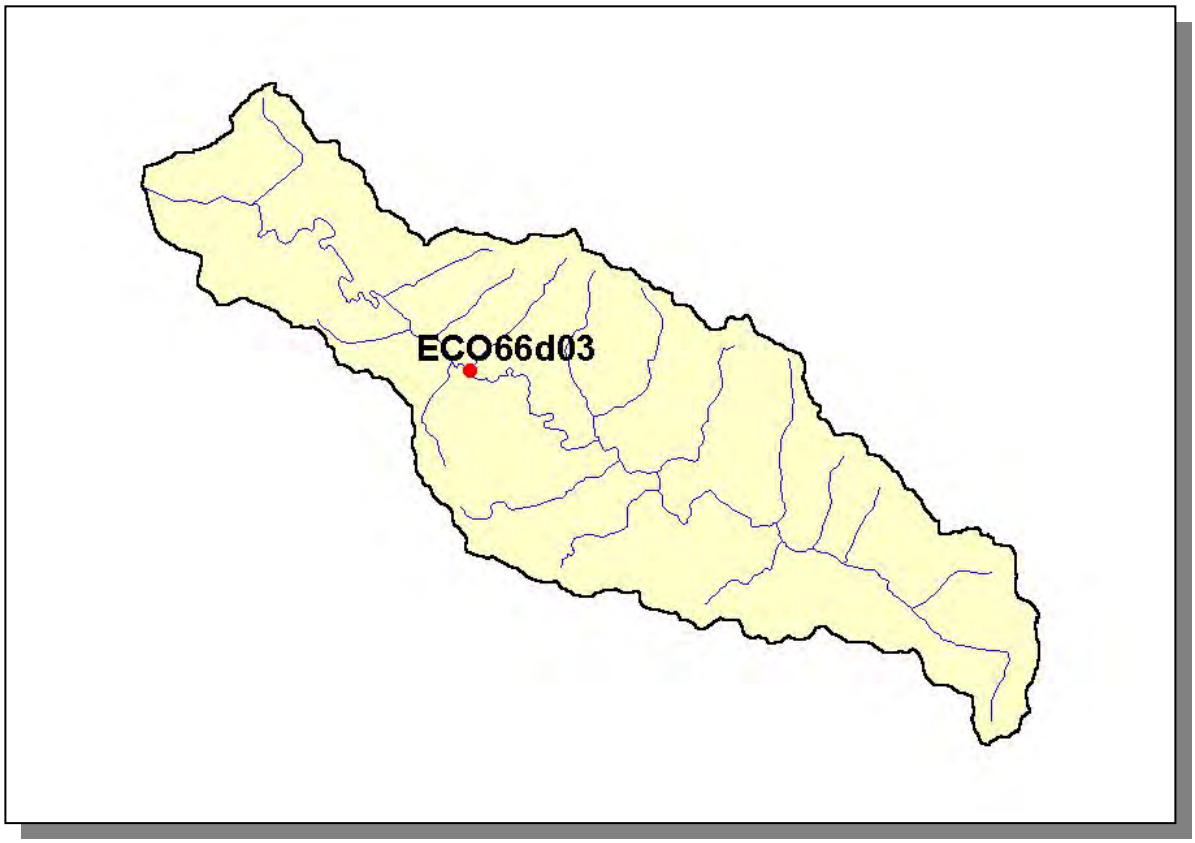

Figure 4-54. Location of STORET Monitoring Sites in Subwatershed 06010103120. *More information is provided in Watauga-Appendix IV.*

4.2.J.ii Point Source Contributions.

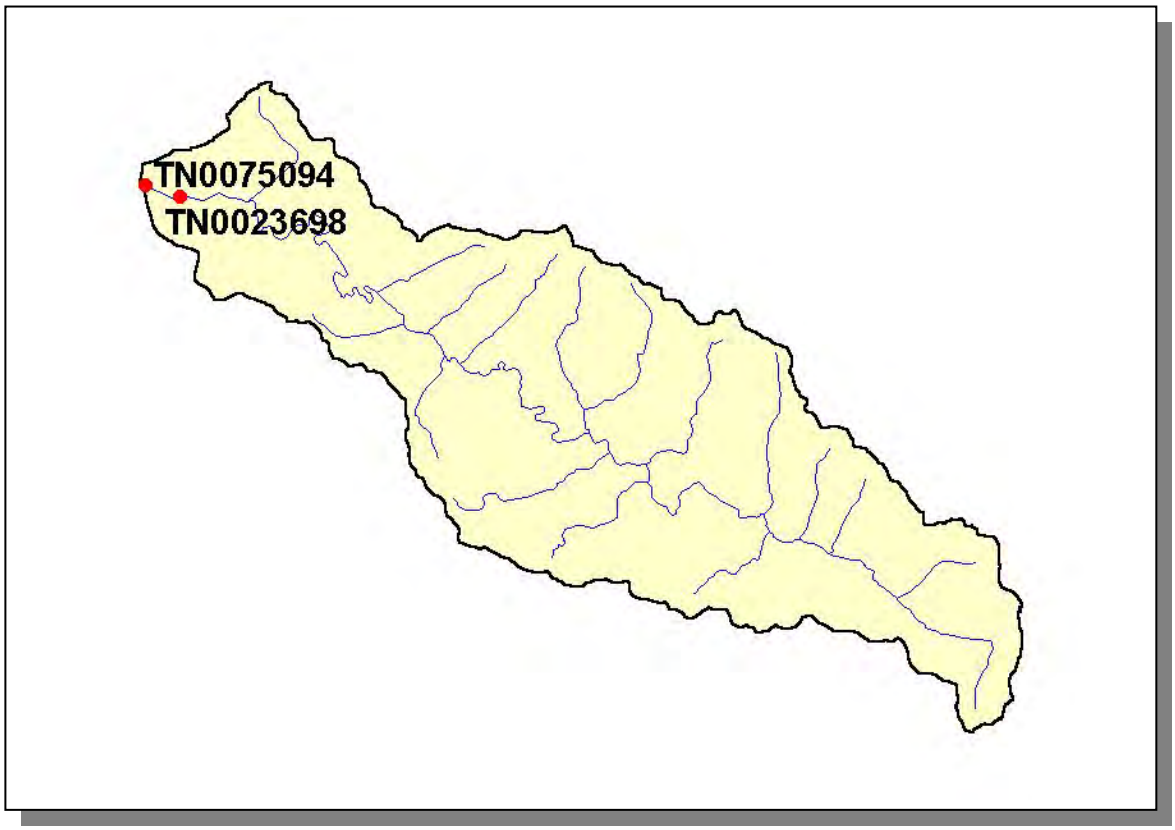

Figure 4-55. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06010103120. *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

4.2.J.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)			
Beef Cow	**Cattle**	**Milk Cow**	**Sheep**
53	141	10	1

Table 4-52. Summary of Livestock Count Estimates in Subwatershed 06010103120. *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

Table 4-53. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 06010103120.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	12.14
Grass (Pastureland)	0.39
Grass, Forbs, Legumes (Mixed Pasture)	0.33
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.35
Non Agricultural Land Use	0.00
Corn (Row Crops)	5.02
Grass (Hayland)	0.28
Legume Grass (Hayland)	0.40

Table 4-54. Annual Estimated Total Soil Loss in Subwatershed 06010103120.

4.2.K. 06010103130.

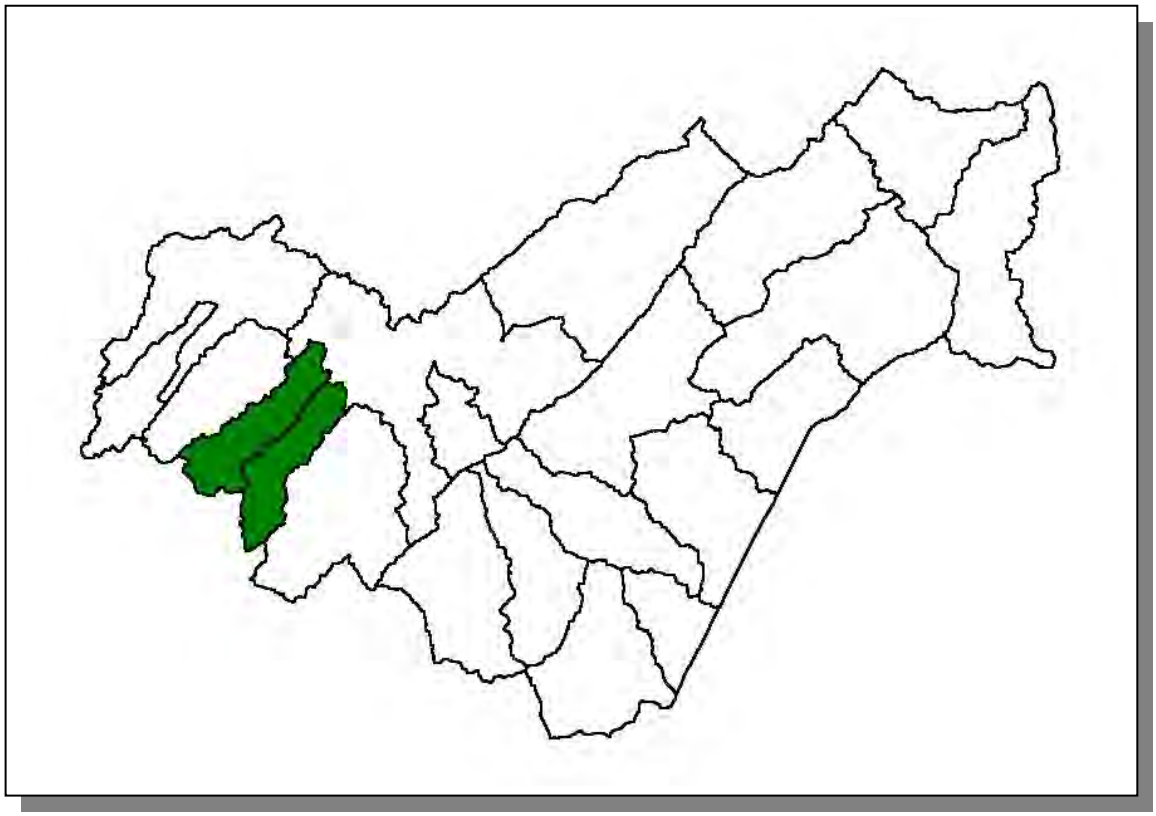

Figure 4-56. Location of Subwatershed 06010103130. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.B.i. General Description.

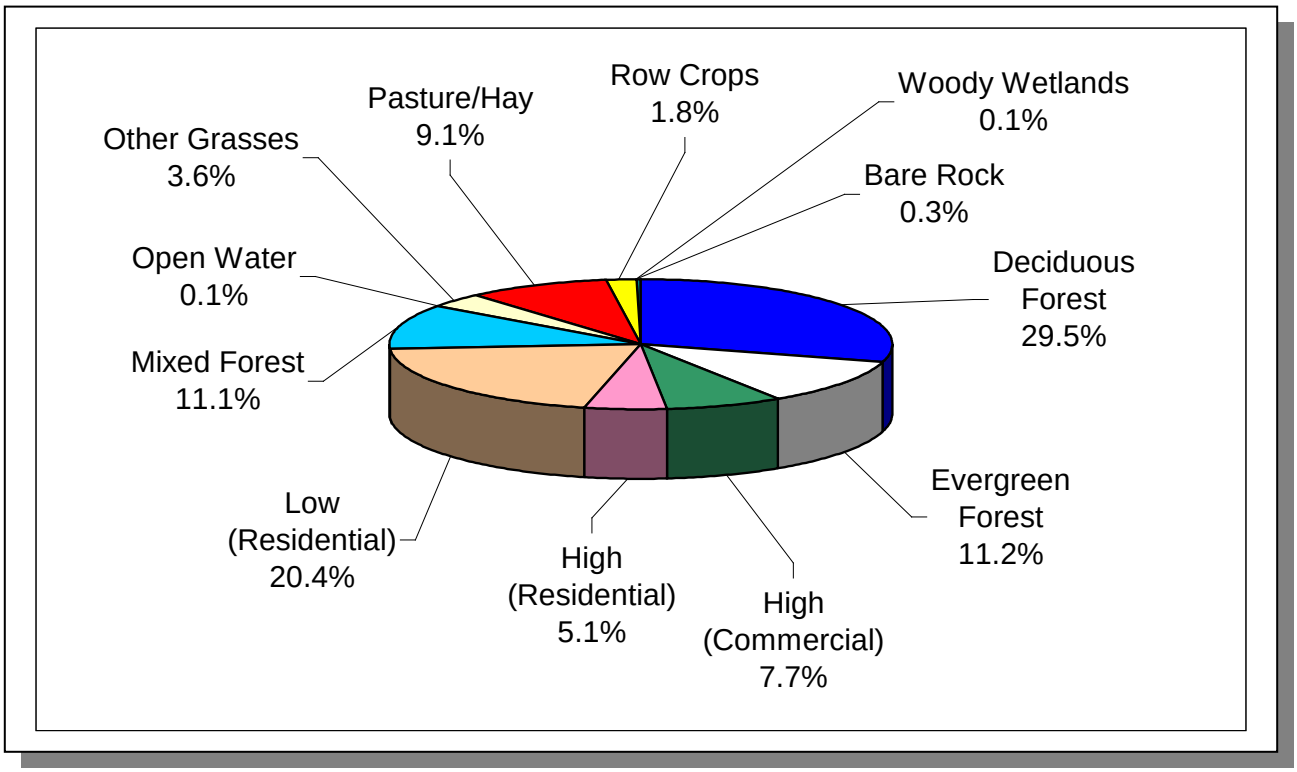

Figure 4-57. Land Use Distribution in Subwatershed 06010103130. *More information is provided in Watauga-Appendix IV.*

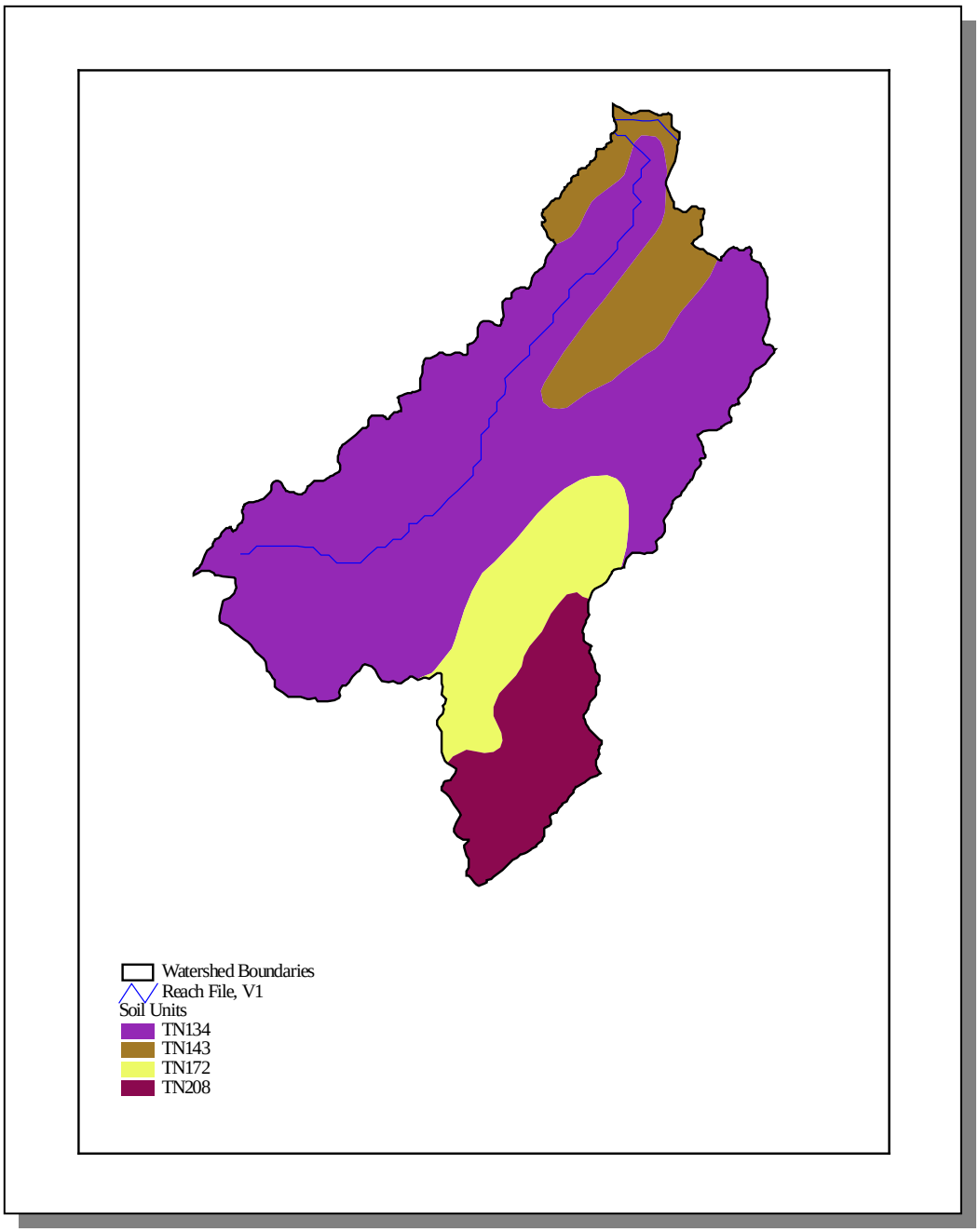

Figure 4-58. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103130.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN134	0.00	B	1.38	5.18	Loam	0.31
TN143	0.00	C	1.22	6.44	Loam	0.32
TN172	0.00	B	3.87	5.13	Loam	0.26
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-55. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103130. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Carter	51,505	53,132	1.39	715	738	3.2
Unicoi	16,549	17,221	0.06	11	11	0.0
Washington	92,315	101,368	7.7	7,106	7,803	9.8
Totals	**160,369**	**171,721**		**7,832**	**8,552**	**9.2**

Table 4-56. Population Estimates in Subwatershed 06010103130.

			NUMBER OF HOUSING UNITS			
Populated Place	**County**	**Population**	**Total**	**Public Sewer**	**Septic Tank**	**Other**
Johnson City	Washington	49,178	21,214	19,213	2,001	0
Elizabethton	Carter	11,931	5,191	4,991	200	0
Totals		**61,109**	**26,405**	**24,,204**	**2,201**	**0**

Table 4-57. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06010103130.

4.2.K.ii. Point Source Contributions.

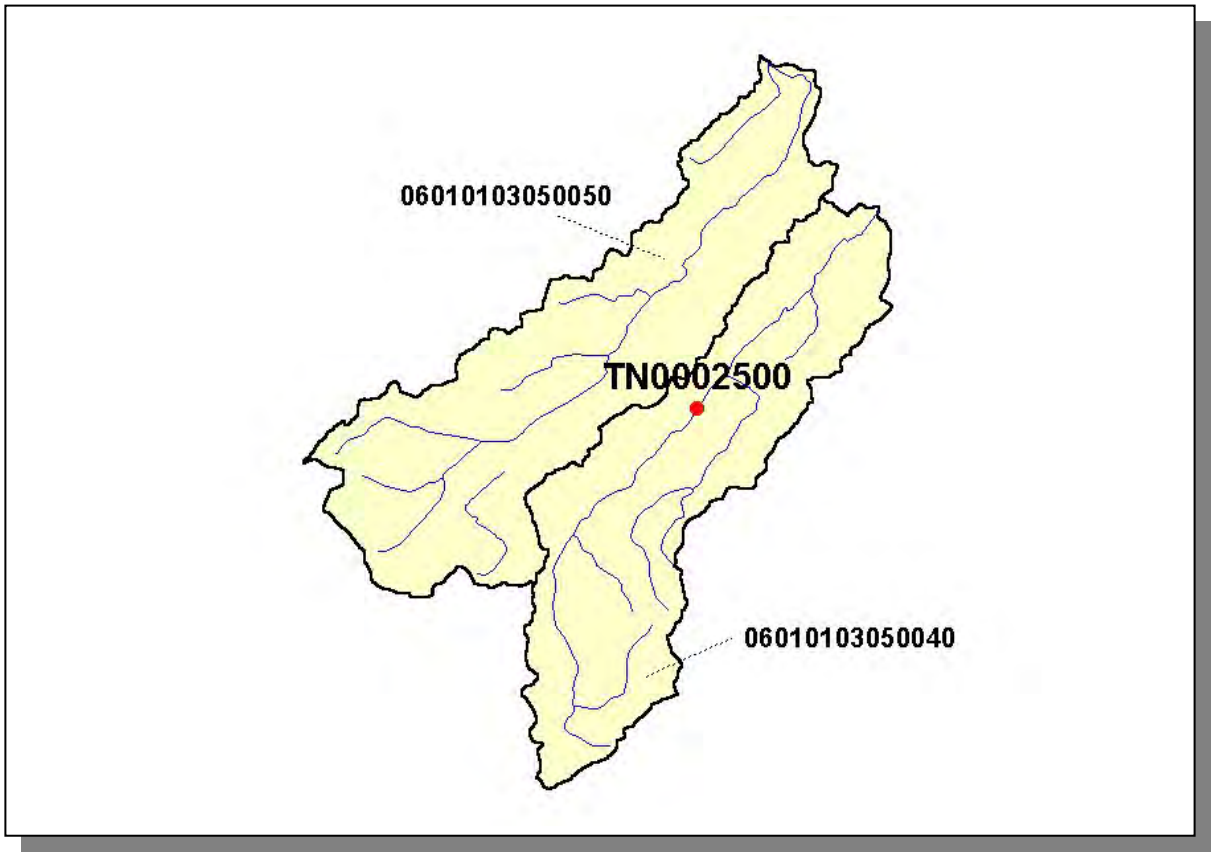

Figure 4-59. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06010103130. *Subwatershed 06010103050040, and 06010103050050 boundaries are shown for reference. More information, including the names of facilities, is provided in Watauga-Appendix IV.*

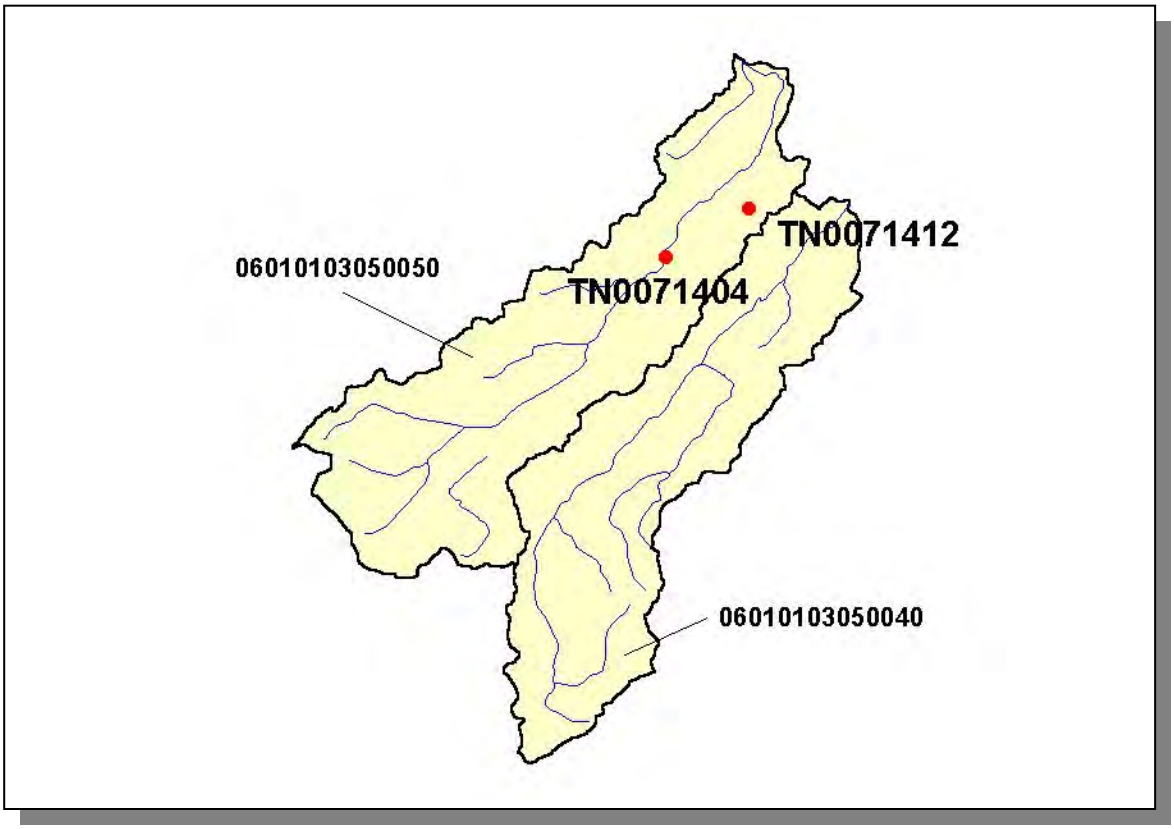

Figure 4-60. Location of Active Mining Sites in Subwatershed 06010103130. *Subwatershed 06010103050040 and 06010103050050 boundaries are shown for reference. More information, including the names of facilities, is provided in Watauga-Appendix IV.*

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

There is one NPDES facility discharging to water bodies listed on the 1998 303(d) list in Subwatershed 06010103130:

- TN0002500 discharges to Sinking Creek @ RM 3.6

Figure 4-61. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 06010103130. *Subwatershed 06010103050040, and 06010103050050 boundaries are shown for reference. The names of facilities are provided in Watauga-Appendix IV.*

PERMIT #	7Q10	1Q20	30Q2	QLTA
TN0002500	0	0	0	0.0828

Table 4-58. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06010103130. *Data are in million gallons per day (MGD). 30Q2 data were calculated using the correlation method (TN0001384) or using data in Flow Duration and Low Flows of Tennessee Streams Through 1992 (TN0057789).*

PERMIT #	$CBOD_5$
TN0002500	X

Table 4-59. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06010103130.

4.2.K.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Hogs**	**Sheep**
774	1,846	167	<5	8	12

Table 4-60. Summary of Livestock Count Estimates in Subwatershed 06010103130. *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
Unicoi	99.3	89.4	3.1	8.5
Washington	54.8	50.3	0.3	0.2
Total	**315.4**	**295.2**	**6.8**	**21.1**

Table 4-61. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103130.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	7.59
Grass (Pastureland)	0.52
Grass, Forbs, Legumes (Mixed Pasture)	0.40
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.24
Non Agricultural Land Use	0.00
Corn (Row Crops)	12.15
Grass (Hayland)	0.56
Legume Grass (Hayland)	0.23
Forest Land (Grazed)	0.00
Other Vegetable and Truck Crop	6.10
Legume (Hayland)	0.06

Table 4-62. Annual Estimated Total Soil Loss in Subwatershed 06010103130.

4.2.L. 06010103140.

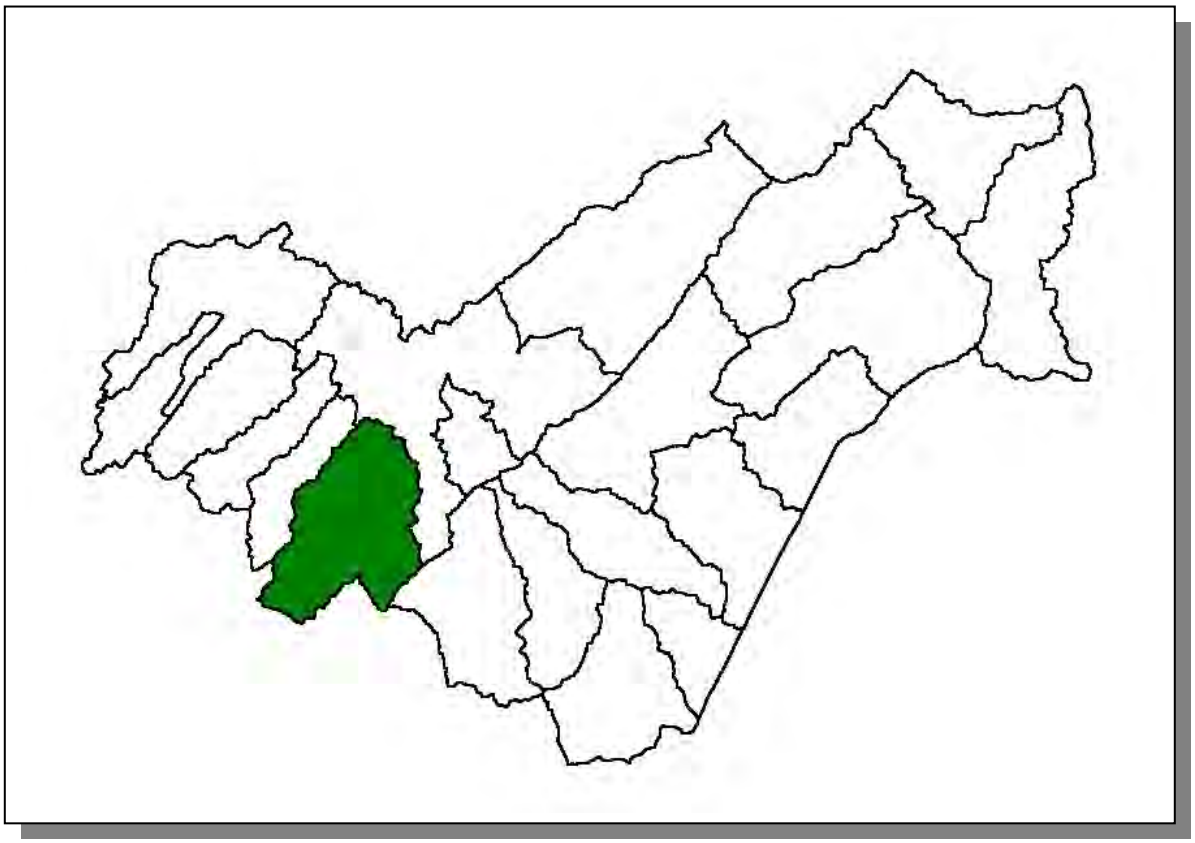

Figure 4-62. Location of Subwatershed 06010103140. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.L.i. General Description.

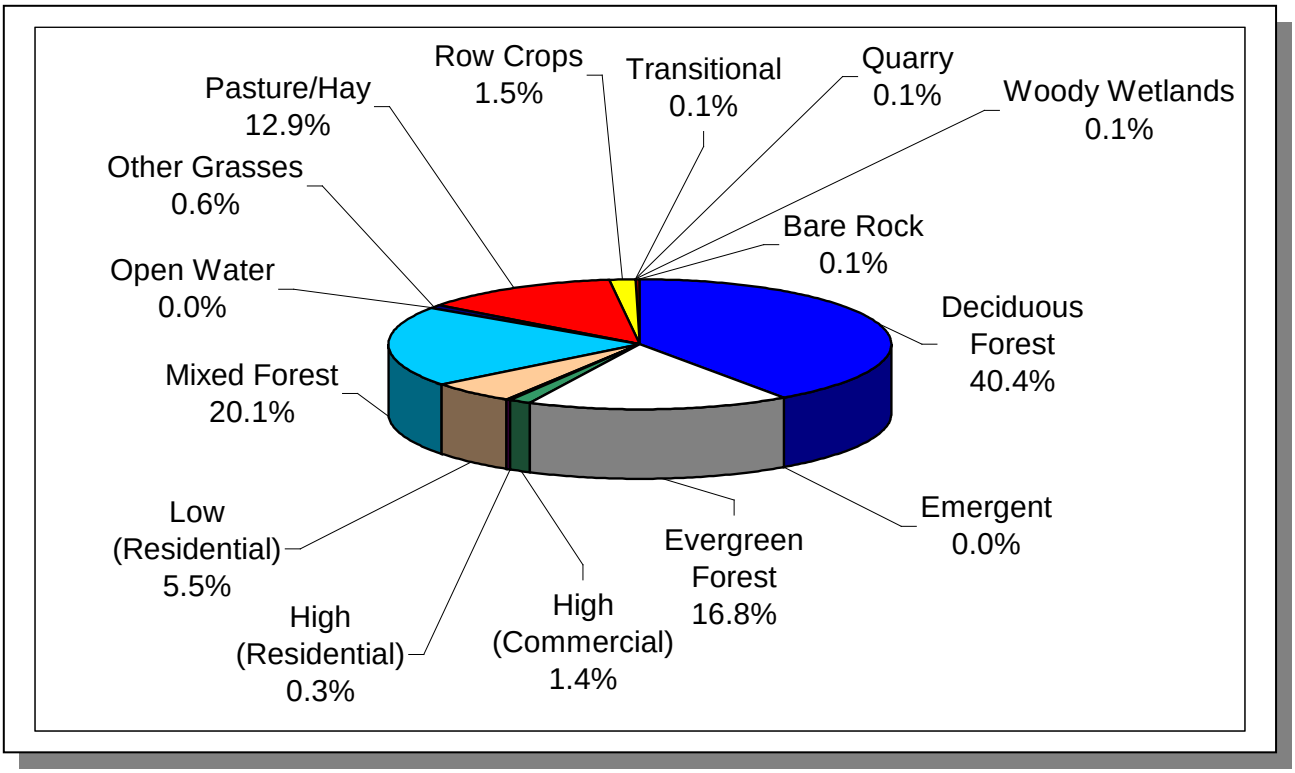

Figure 4-63. Land Use Distribution in Subwatershed 06010103140. *More information is provided in Watauga-Appendix IV.*

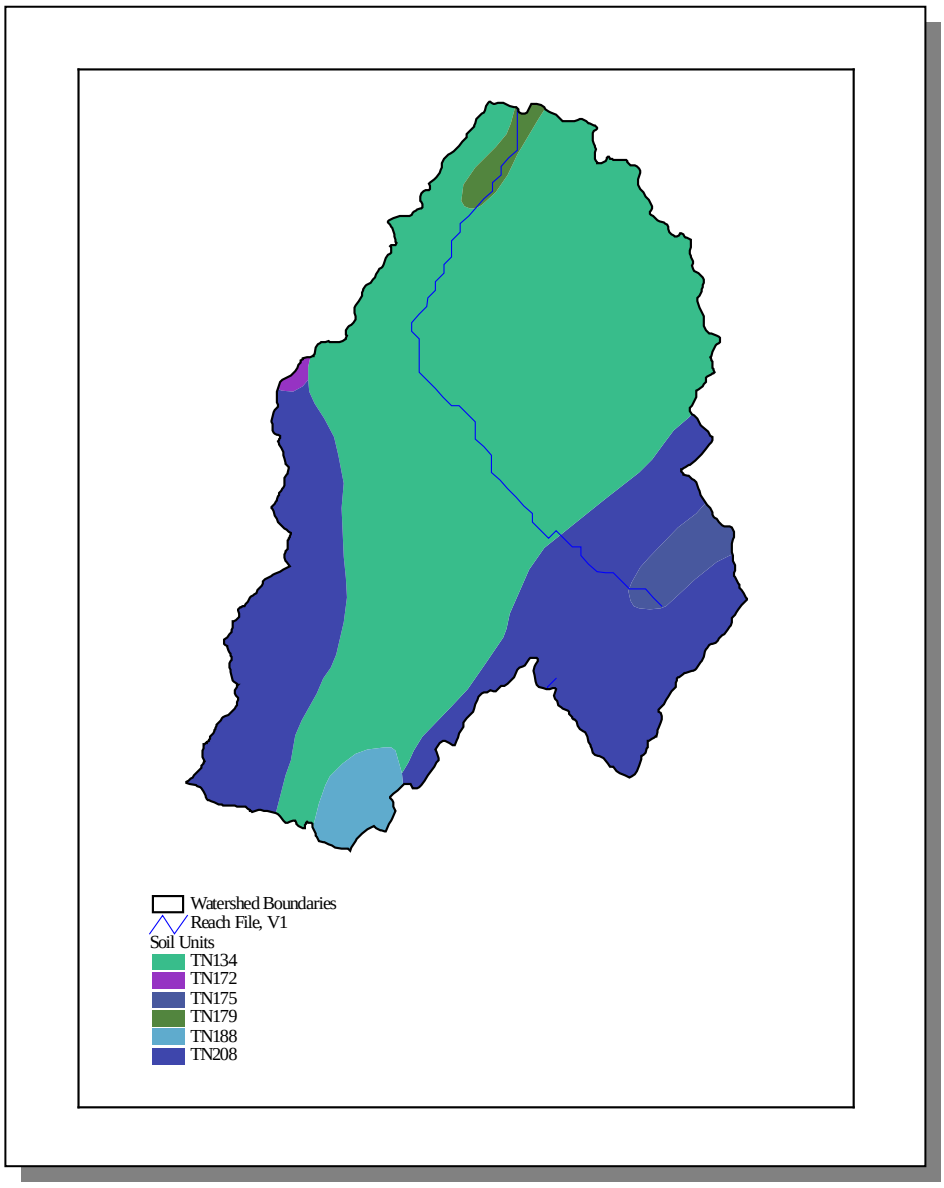

Figure 4-64. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103140.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN134	0.00	B	1.38	5.18	Loam	0.31
TN172	0.00	B	3.87	5.13	Loam	0.26
TN175	0.00	B	1.49	5.23	Loam	0.30
TN179	0.00	B	3.90	5.62	Sandy Loam	0.25
TN188	0.00	B	2.65	5.40	Silty Loam	0.28
TN208	0.00	C	4.02	4.84	Loam	0.25

Table 4-63. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103140. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Carter	51,505	53,132	6.38	3,288	3,392	3.2
Unicoi	16,549	17,221	7.92	1,311	1,364	4.0
Washington	92,315	101,368	0.03	25	28	12.0
Totals	**160,369**	**171,721**		**4,624**	**4,784**	**3.5**

Table 4-64. Population Estimates in Subwatershed 06010103140.

			NUMBER OF HOUSING UNITS			
Populated Place	**County**	**Population**	**Total**	**Public Sewer**	**Septic Tank**	**Other**
Johnson City	Washington	49,178	21,214	19,213	2,001	0
Elizabethton	Carter	11,931	5,191	4,991	200	0
Totals		**49,178**	**2,,1214**	**19,213**	**2,001**	**0**

Table 4-65. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06010103140.

Figure 4-65. Location of Historical Streamflow Data Collection Sites In Subwatershed 06010103140*. More information is provided in Watauga-Appendix IV.*

4.2.L.ii. Point Source Contributions.

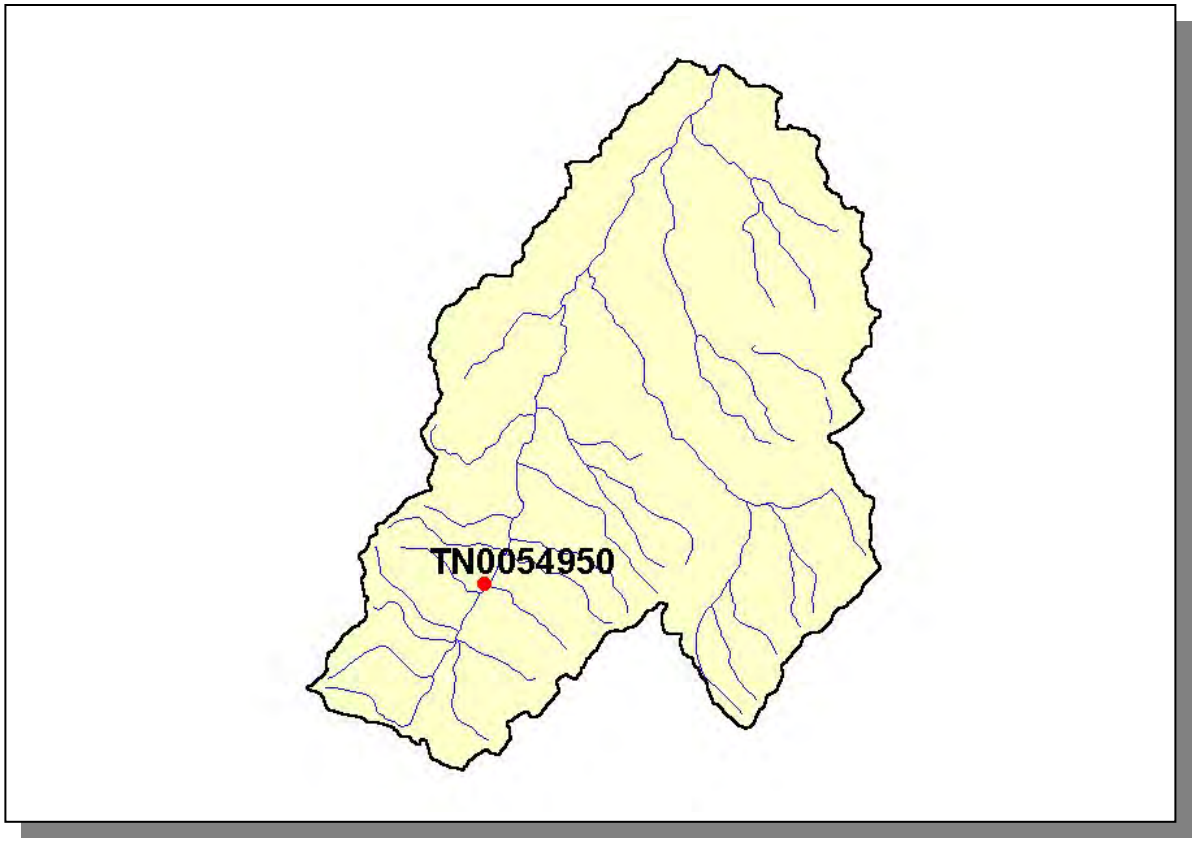

Figure 4-66. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06010103140. *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

Figure 4-67. Location of Active Mining Sites in Subwatershed 06010103140. *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

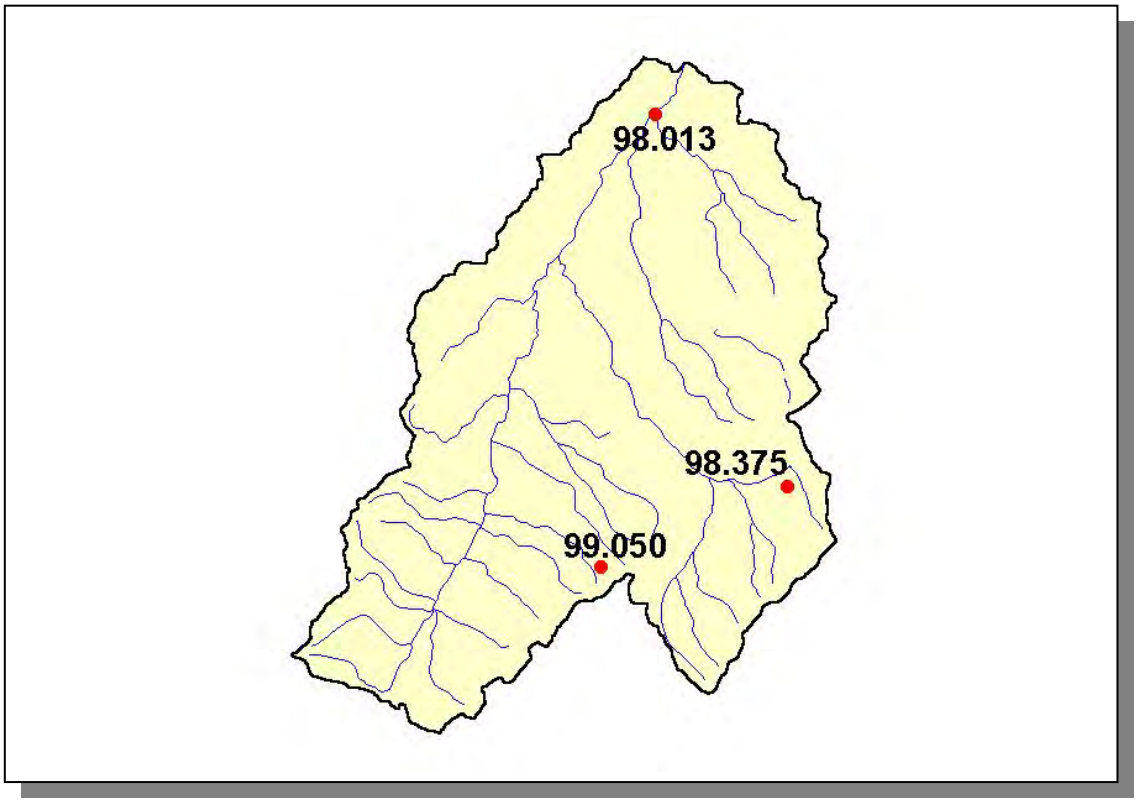

Figure 4-68. Location of ARAP Sites (Individual Permits) in Subwatershed 06010103140. *More information is provided in Watauga-Appendix IV.*

4.2.L.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Hogs**	**Sheep**
998	2,546	142	<5	27	13

Table 4-66. Summary of Livestock Count Estimates in Subwatershed 06010103140. *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
Unicoi	99.3	89.4	3.1	8.5
Washington	54.8	50.3	0.3	0.2
Totals	**315.4**	**295.2**	**6.8**	**21.1**

Table 4-67. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103140.

CROPS	TONS/ACRE/YEAR
Tobacco (Row Crops)	12.11
Grass (Pastureland)	0.37
Grass, Forbs, Legumes (Mixed Pasture)	0.34
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.22
Non Agricultural Land Use	0.00
Corn (Row Crops)	5.05
Grass (Hayland)	0.28
Legume Grass (Hayland)	0.40
Forest Land (Grazed)	0.00
Other Vegetable and Truck Crop	6.10
Legume (Hayland)	0.06

Table 4-68. Annual Estimated Total Soil Loss in Subwatershed 06010103140.

4.2.M. 06010103150.

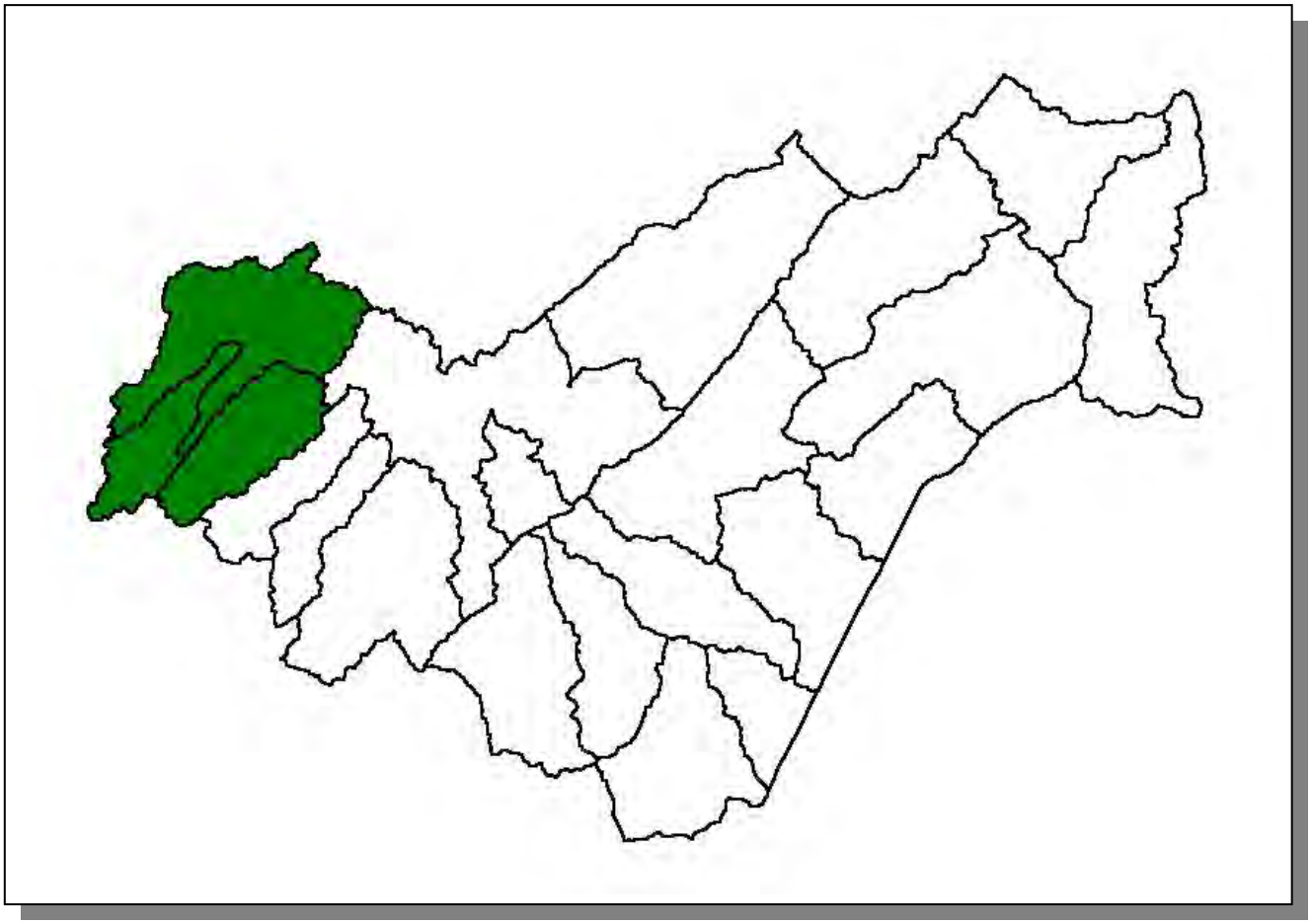

Figure 4-69. Location of Subwatershed 06010103150. *All Watauga HUC-14 subwatershed boundaries are shown for reference.*

4.2.M.i. General Description.

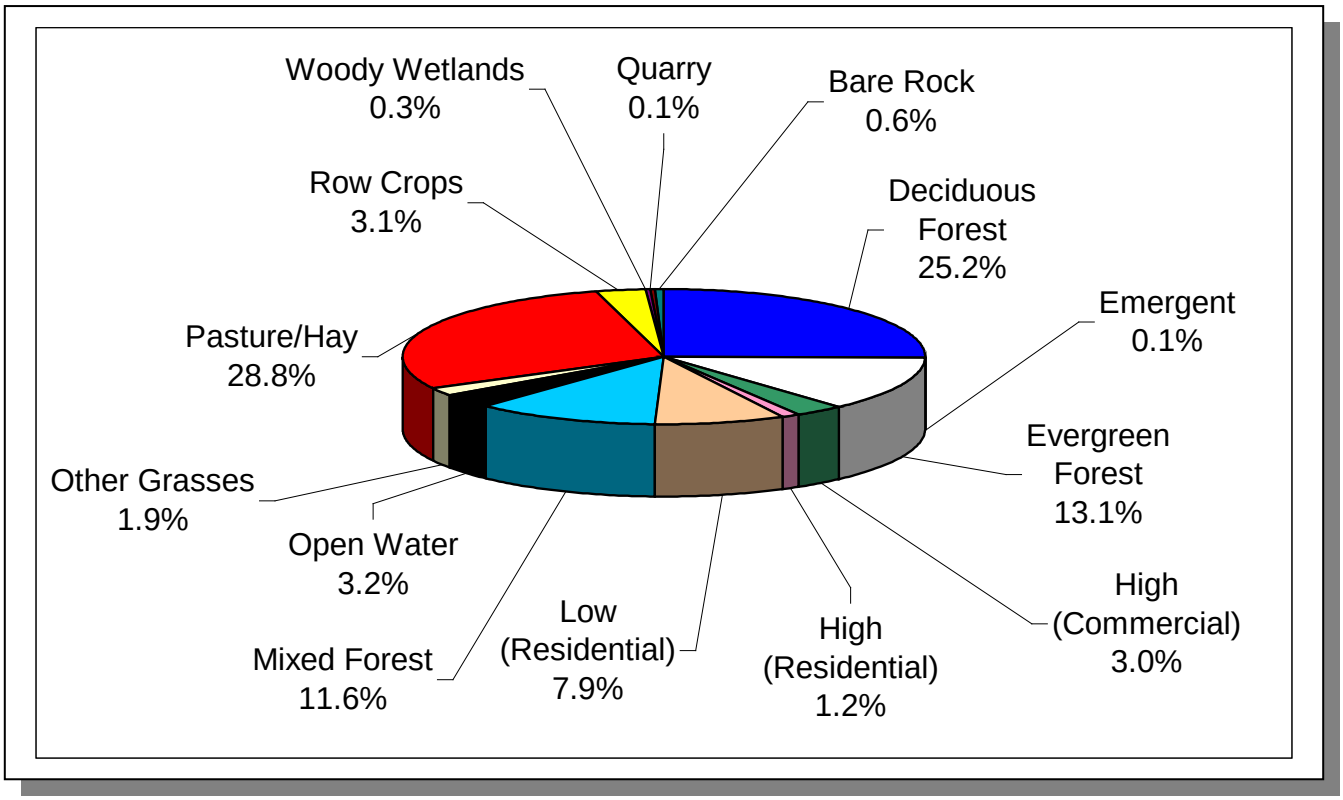

Figure 4-70. Land Use Distribution in Subwatershed 06010103150. *More information is provided in Watauga-Appendix IV.*

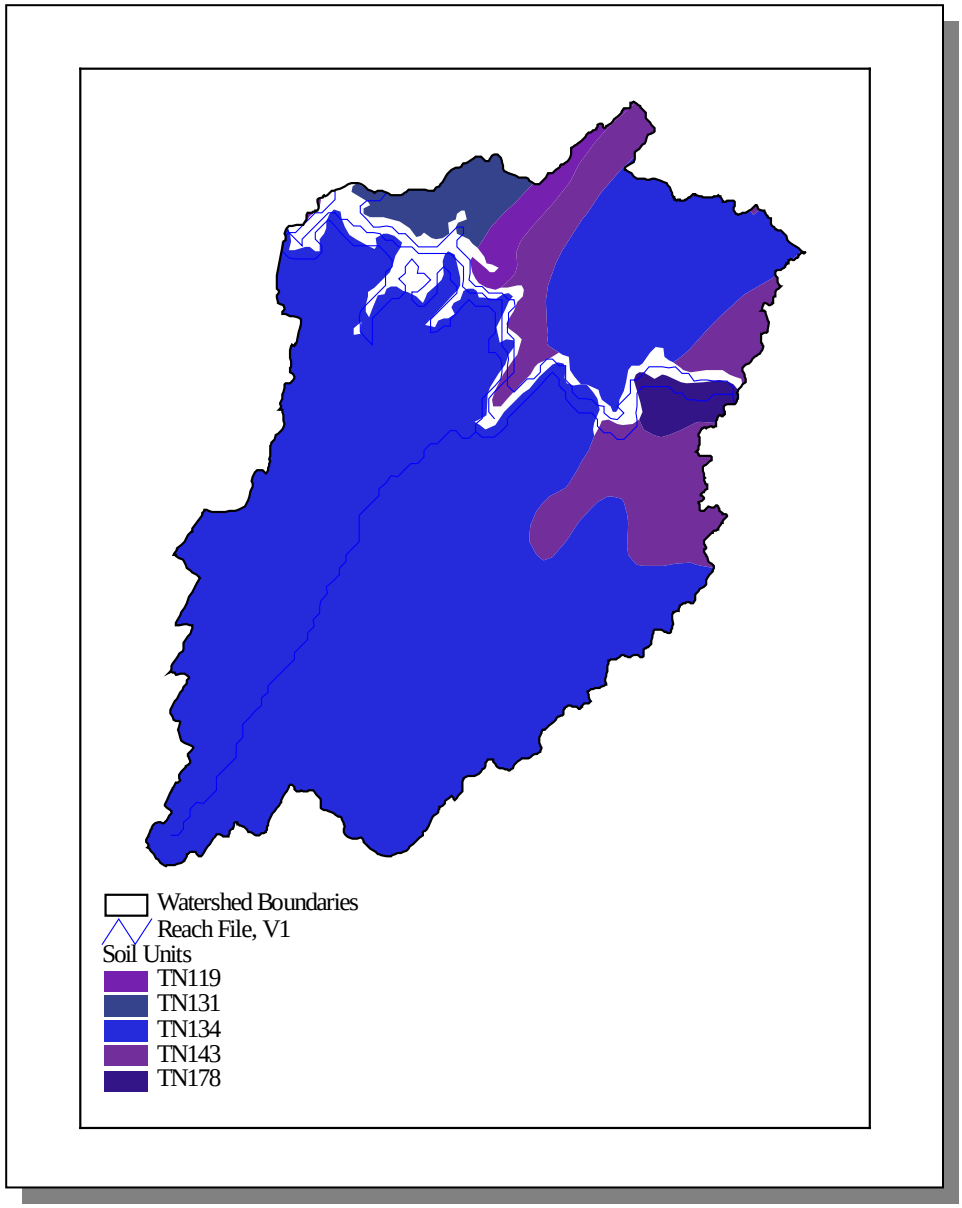

Figure 4-71. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103150.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN119	0.00	0.00	C	5.15	Loam	0.33
TN131	0.00	0.00	C	4.95	Silty Loam	0.33
TN134	0.00	0.00	B	5.18	Loam	0.31
TN143	0.00	0.00	C	6.44	Loam	0.32
TN178	8.00	8.00	C	5.45	Loam	0.28

Table 4-69. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06010103150. *More information is provided in Watauga-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Sullivan	143,596	150,371	3.89	5,588	5,852	4.7
Washington	92,315	101,368	17.05	15,744	17,288	9.8
Totals	**235,911**	**251,739**		**21,332**	**23,140**	**8.5**

Table 4-70. Population Estimates in Subwatershed 06010103150.

			NUMBER OF HOUSING UNITS			
Populated Place	**County**	**Population**	**Total**	**Public Sewer**	**Septic Tank**	**Other**
Johnson City	Washington	49,178	21,214	19,213	2,001	0
Jonesborough	Washington	3,196	1,232	1,098	134	0
Bristol	Sullivan	23,421	10,403	9,751	637	15
Totals		**75,795**	**32,849**	**30,062**	**2,772**	**15**

Table 4-71. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06010103150.

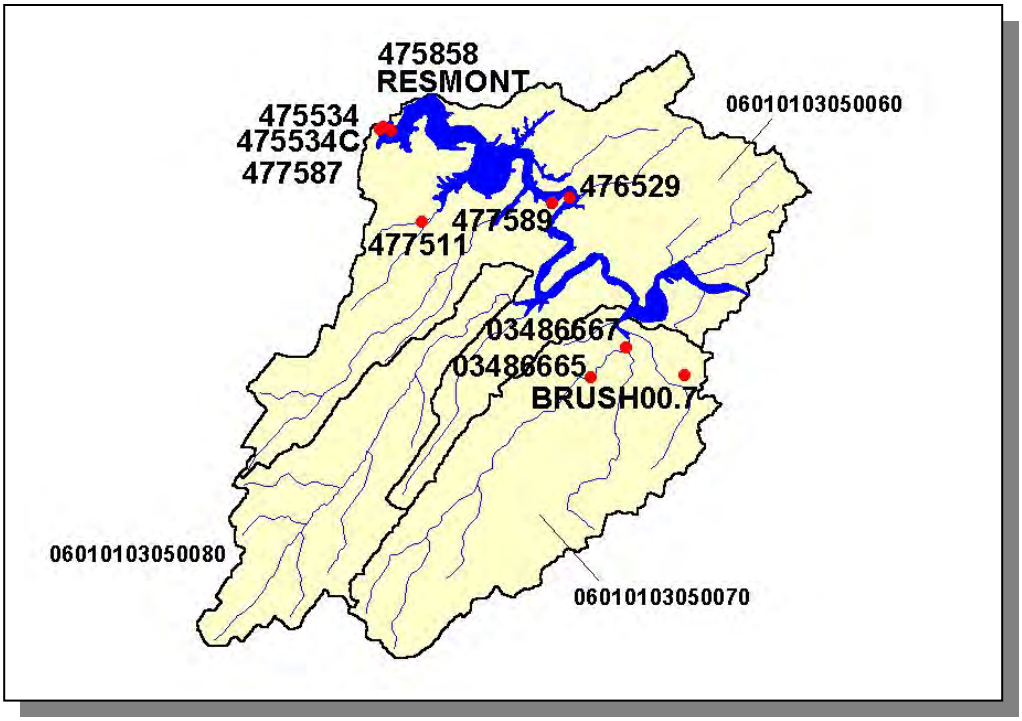

Figure 4-72. Location of STORET Monitoring Sites in Subwatershed 06010103150*. Subwatershed 06010103050060, 06010103050070, and 06010103050080 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

4.2.M.ii. Point Source Contributions.

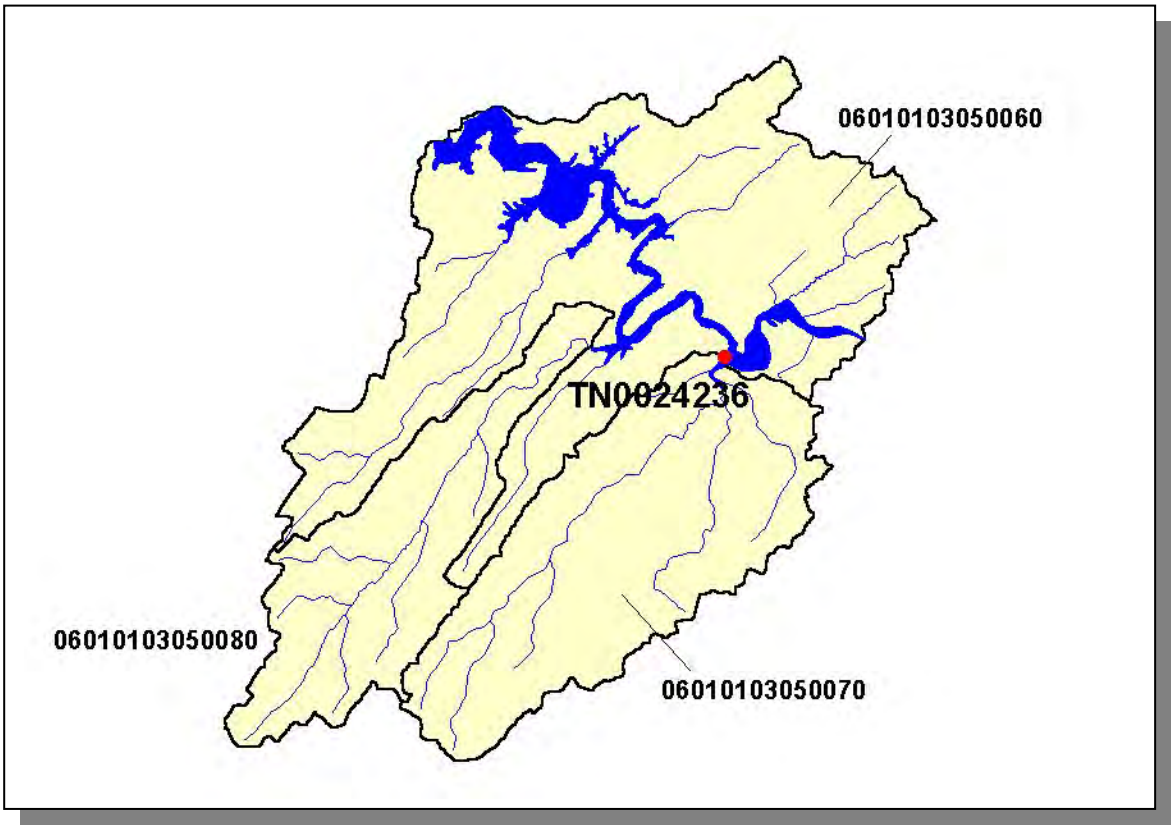

Figure 4-73. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06010103150. *More information, including the names of facilities, is provided in Watauga-Appendix IV.*

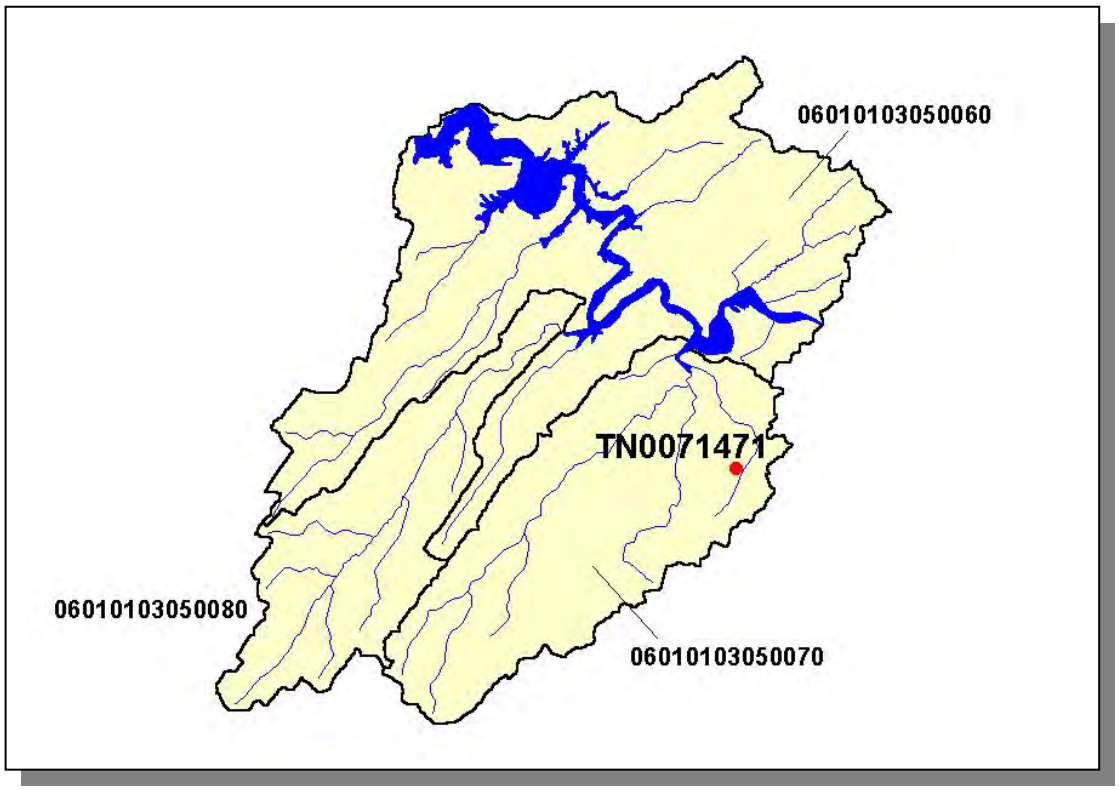

Figure 4-74. Location of Active Mining Sites in Subwatershed 06010103150. *Subwatershed 06010103050060, 05130103 050070 and 06010103050080 boundaries are shown for reference. More information, including the names of facilities, is provided in Watauga-Appendix IV.*

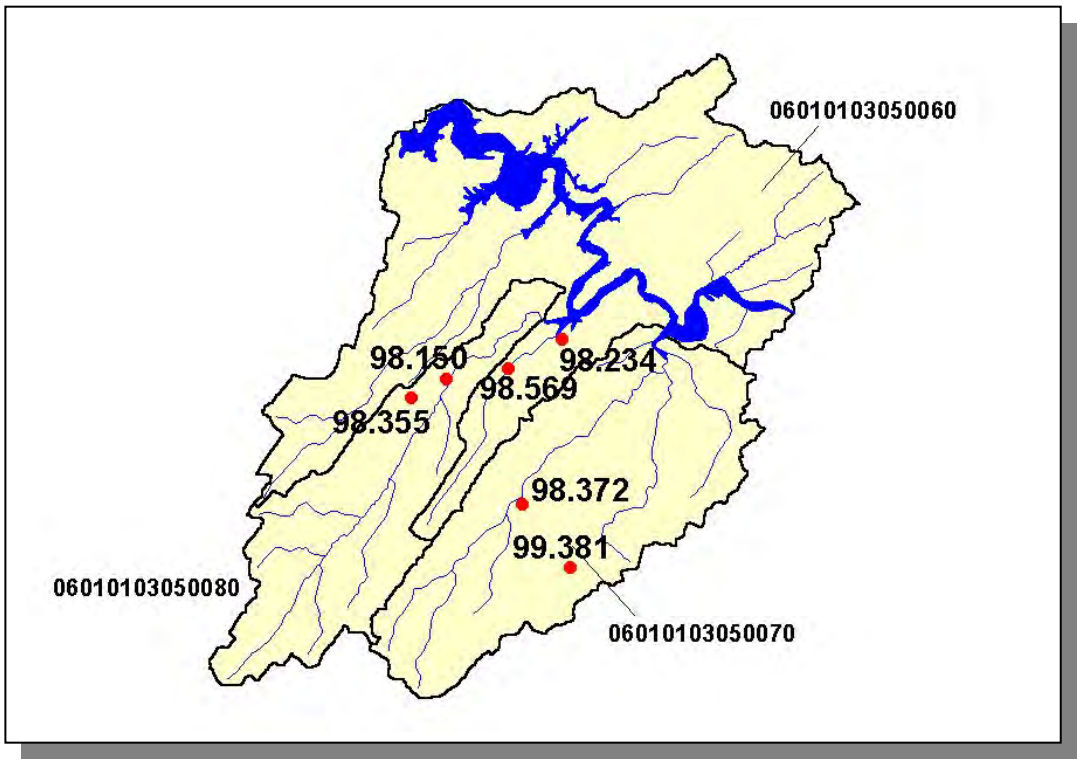

Figure 4-75. Location of ARAP Sites (Individual Permits) in Subwatershed 06010103150. *Subwatershed 06010103050060, 06010103050070, and 06010103050080 boundaries are shown for reference. More information is provided in Watauga-Appendix IV.*

4.2.M.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)					
Beef Cow	**Milk Cow**	**Cattle**	**Chickens**	**Hogs**	**Sheep**
6,026	1,209	13,791	11	65	82

Table 4-72. Summary of Livestock Count Estimates in Subwatershed 06010103150. *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)**
Sullivan	123.7	123.7	0.1	0.3
Washington	54.8	50.3	0.3	0.2
Total	**178.5**	**174.0**	**0.4**	**0.5**

Table 4-73. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06010103150.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Corn (Row Crops)	12.33
Tobacco (Row Crops)	5.98
Grass (Hayland)	0.57
Legume Grass (Hayland)	0.19
Grass (Pastureland)	0.74
Grass, Forbs, Legumes (Mixed Pasture)	0.69
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.25
Other Land in Farms	0.02

Table 4-74. Annual Soil Loss in Subwatershed 06010103150.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE WATAUGA RIVER WATERSHED

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

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the Watauga 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://sugarberry.itc.nrcs.usda.gov/netdynamics/deeds/index.html. From the PRMS Products Menu, select "Products," then select "Conservation Treatments." Select the desired program and parameters and choose "Generate Report."

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	ACRES
Conservation Buffer	0
Erosion Control	392
Irrigation Management	0
Nutrient Management Applied	1,550
Pest Management	1,237
Prescribed Grazing	471
Salinity and Alkalinity Control	0
Tree and Shrub Practices	0
Tillage and Residue Management	265
Wildlife Habitat Management	22
Wetlands Created, Restored, and Enhanced	0
Total	**3,935**

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in Tennessee Portion of Watauga River Watershed. *Data are from PRMS for October 1, 1999 through September 30, 2000 reporting period. More information is provided in Watauga-Appendix V.*

5.2.B. Tennessee Valley Authority (TVA). TVA's vision for the 21st century is 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 Watauga watershed.

MONITORING

Vital Signs Monitoring

Reservoir Monitoring: TVA has monitored the quality of water resources of Watauga and Boone Reservoir 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 reservoir. These parameters are sampled on Boone Reservoir at mid-reservoir (WRM 6.5), and near Boone Dam (SFHRM 19.00). Sampling on Watauga Reservoir is done at mid-reservoir (WRM 45.5), and near Watauga Dam (WRM 37.4).

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. Ecological conditions in Boone Reservoir have been in the poor range for the duration of this monitoring program. Results for 1999 provided the lowest reservoir ecological heath score found to date and are likely resulting from low rainfall conditions resulting in decreased reservoir flows. Sampling will be done again in 2001.

Watauga Reservoir was fair to good for the duration of this monitoring program. Reservoir Vital Signs samples were also collected in 2000 on Watauga Reservoir; results will be made available when analyses are complete

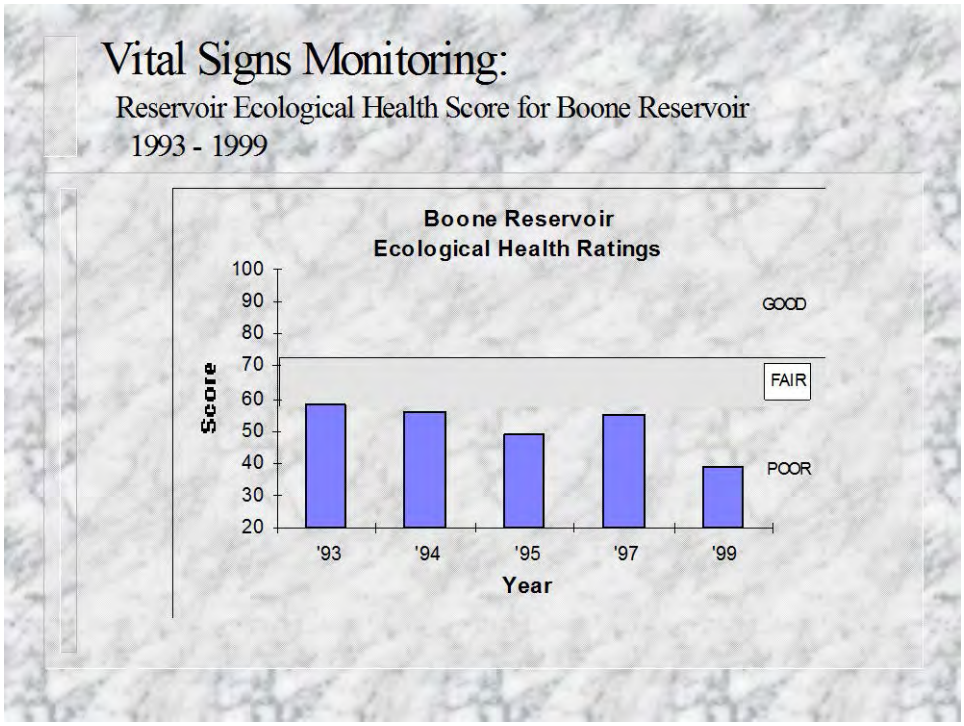

Figure 5-1. Vital Signs Monitoring for Boone Reservoir (1993-1999).

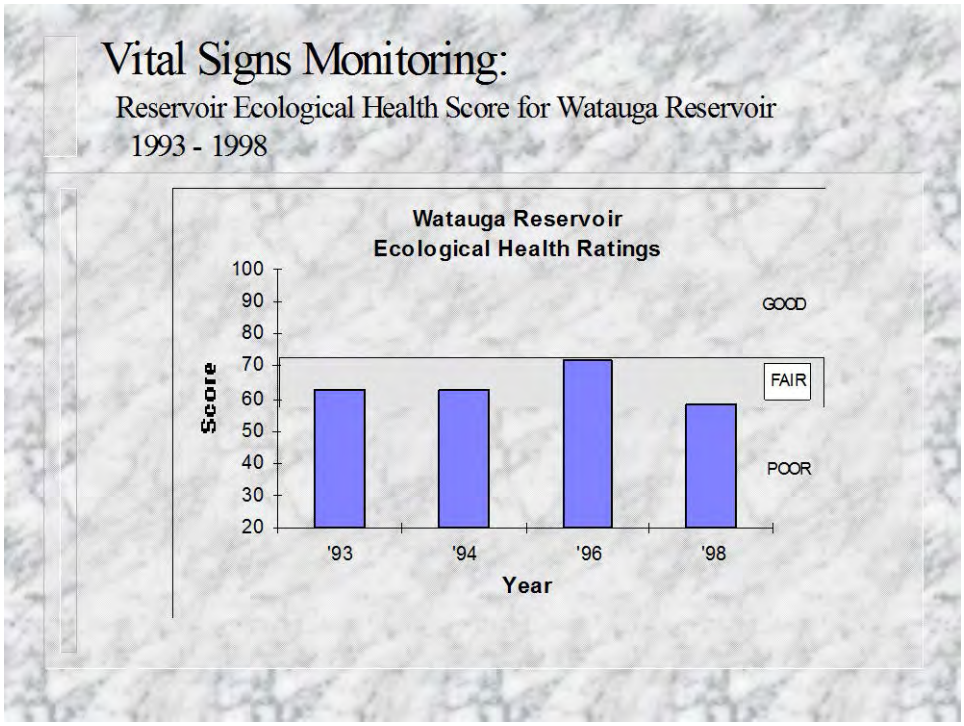

Figure 5-2. Vital Signs Monitoring for Watauga Resrvoir (1993-1998).

Bacteriological sampling: One site on Watauga Reservoir and three sites on Boone Reservoir were sampled ten times each for fecal coliform bacteria in 2000. 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. However, there are no State of Tennessee swimming advisories on Boone or Watauga Reservoir.

Samples were collected at the following locations:

Site Name	Site Location	Type of Site
Boone Dam TVA Beach	SHRM 18.7	Swim
Jay's Dock Boat Ramp	WRM 5.5L	Boat ramp
Pickens Bridge Boat Ramp	WRM 5.9L	Boat ramp
Watauga Dam TVA Visitor Overlook Area	WRM 37.0R	Swim

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. The USDA Forest Service monitors the swimming areas of Shook Branch and Watauga Point on Watauga Reservoir in accordance with Forest Service regulations.

Fish Flesh Toxic Contaminants:

The State of Tennessee has issued a precautionary advisory for catfish and carp from Boone Reservoir because of PCB 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 Watauga Lake. The last time TVA sampled channel catfish and largemouth bass from Watauga Lake was in autumn 1996. All contaminant levels were either below detection levels or below the levels used by the state to issue fish consumption advisories. Watauga was sampled in autumn 2000, but results are not available.

Further information on Vital Signs Monitoring can be obtained by writing to Donald Dycus at: Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee, 37402 or calling him at 423/751-7322. Email address: dldycus@tva.gov

Stream Bioassessment

Condition of water resources in Watauga 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. Scores for the 12 metrics are summed to produce the IBI for the site.

EPT - The number and types of aquatic insects, like fish, are indicative of the general quality of the environment in which they live. 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 53 sites are sampled in the Watauga drainage. These sites are typically sampled every five years to keep a current picture of watershed condition. The next round of sampling in the Watauga watershed will be coordinated with the monitoring phase of TDEC's Watershed Cycle which calls for data collection to begin again in 2002.

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 37818 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 Watauga Reservoir in 2000.

Materials were distributed at local marinas that expressed an interest in the program and at public access area. TVA plans to continue this partnership in upcoming years by working with the marinas and the Boone Watershed Partnership and Boone Lake Association.

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, will help marina operators protect the resource that provides them with their livelihood. Plans are to implement this program on Watauga Reservoir in 2001 and continue as long as it brings about positive change.

The Boone Watershed Partnership (BWP) was established in August 1999 by TVA. BWP sponsors water monitoring on Buffalo Creek and Doe River with the Elizabethton High School Adopt-A-Watershed class. The Partnership has conducted a public Watershed meeting in the Buffalo Creek Watershed at Milligan College. TVA supported the 12th Annual Watauga River Cleanup and the 5th Annual Doe River Cleanup in Roan Mountain with Trout Unlimited. TVA through the BWP partnered with NRCS and Milligan College and a private landowner to implement two stream bank stabilization projects on Buffalo Creek in 2000. The BWP and TVA, NRCS, Roan Mountain State Park and Appalachian Resource Conservation and Development Council completed demonstration projects on Doe River in Roan Mountain State Park area to showcase various stream bank and habitat improvement projects.

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.

Protection and restoration activities

TVA provides funding and technical assistance for protection and restoration activities to various organizations in the five counties in the Tennessee portion of the Watauga 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 first time in 2000. BLA provides year-long cleanup with volunteers and paid staff employees. TVA supports the Johnson City-Washington County-Jonesboro Clean Team in all of its Keep America Beautiful endeavors. The Carter County Clean Stream, Trout Unlimited (TU), TVA and others have sponsored for 13 years a clean-up effort on Watauga River. TU sponsors several cleanups on small tributary streams using TVA bags and gloves. Boat Watauga sponsors a cleanup on Watauga Reservoir utilizing inmates from correctional centers and bags and gloves from TVA.

5.2.C. U.S. Forest Service. The USDA Forest Service manages approximately 635,000 acres in Tennessee (Cherokee National Forest). This ownership includes about 106,000 acres within the Watauga River watershed and about 71,000 acres within the Ocoee River watershed in Tennessee. The general mission of the Forest Service is to achieve

an ecological and sustainable multiple use approach to land management that meets the diverse needs of people. In order to achieve this mission a watershed-based approach to ecosystem management has been adopted.

A variety of common management activities occur within these watersheds on national forest lands. These include:

- Completion of a general watershed analysis of all 5th level watersheds that encompass Forest Service ownership in Tennessee, including the Ocoee and Watauga Rivers
- Collaborative planning with a variety of other Federal, State and local agencies and private individuals to identify and prioritize watershed improvement needs on public and private lands
- Watershed improvements including road decommissioning to reduce soil loss and sediment yield
- Fisheries habitat improvements in selected streams
- A program of prescribed burning and timber harvest to improve forest health and wildlife habitat conditions
- Providing a variety of land and water based recreation opportunities

In addition to these common management activities, specific activities occurring in the Watauga River Watershed include:

- Shoreline restoration along Watauga Lake to reduce erosion
- Reference stream monitoring by TDEC at three sites on national forest ownership in the Watauga River watershed

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

STATE PARTNERSHIPS.

5.3.A. TDEC Division of Water Supply. Congress, the Environmental Protection Agency, and the states are increasing their emphasis on the prevention of pollution, particularly in the protection of the raw water sources for public water systems. The initial step toward prevention of contamination of public water supplies came with the Federal Safe Drinking Water Act Amendments of 1986. At that time, each state was required to develop a wellhead protection program to protect the water source of public water systems relying on groundwater (wells or springs). The new Source Water Assessment provisions of the Federal Safe Drinking Water Act of 1996 Amendments expanded the scope of protection beyond groundwater systems to include protection of the waters supplying surface water systems.

More information may be found at: www.state.tn.us/environment/dws .

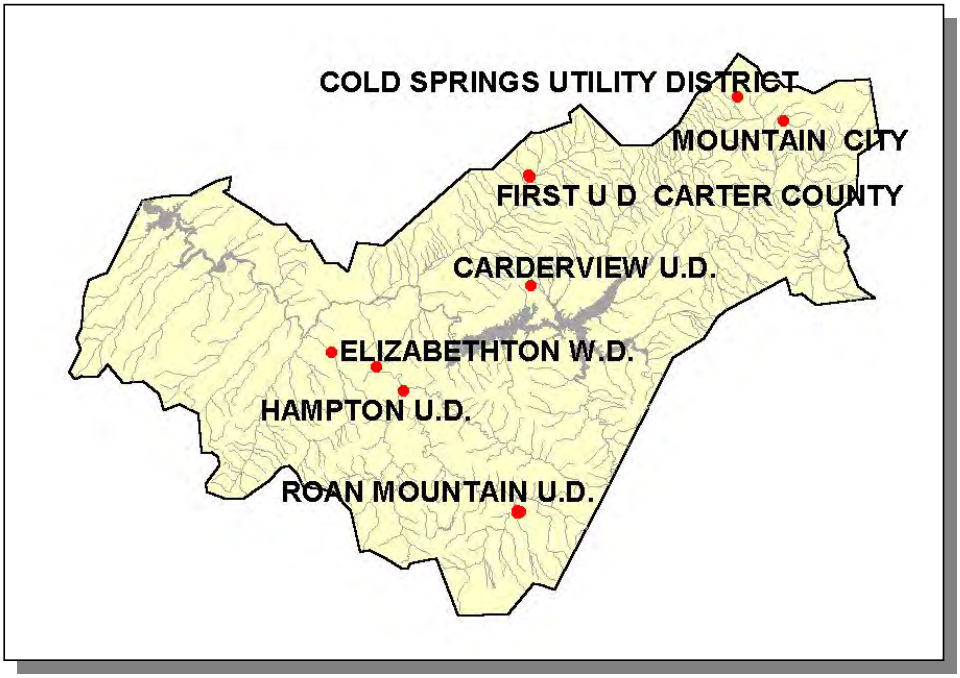

Figure 5-3. Location of Communities Using Groundwater for Water Supply in Watauga River Watershed.

A "wellhead" is the source area for the water, which is withdrawn through a well or spring, similar to the concept of the head of a river. To protect the water supply, it is important to know from where the water flowing to that well or spring is coming. Source water/wellhead protection areas for public water systems using groundwater are generally based on hydrologic considerations and/or modeling. Source water protection

areas for public water systems using surface water are based on the portion of the watershed area upstream of the water intake.

There are three basic steps involved in a wellhead protection program: 1) defining the wellhead protection area, 2) inventorying the potential contaminant sources within that area, and 3) developing a wellhead protection plan. The official designation of wellhead protection areas provides valuable input and emphasis to government agencies in the siting of facilities and the prioritization and cleanup of contaminated sites.

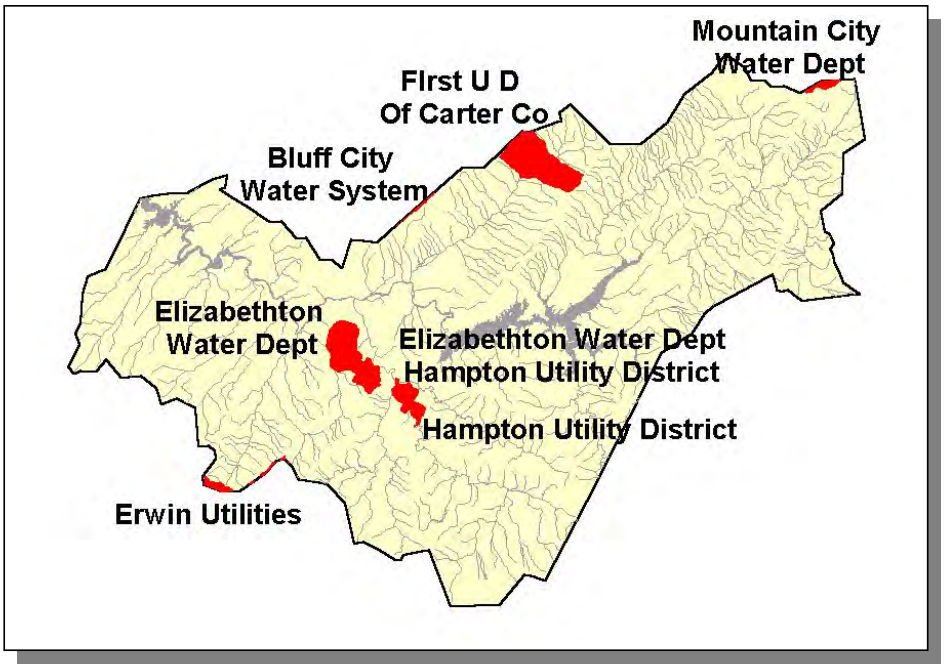

Figure 5-4. Location of Communities in the Wellhead Protection Program in Watauga River Watershed.

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Figure 5-5. Location of Communities with Surface Water Intakes for Water Supply in Watauga River Watershed.

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.

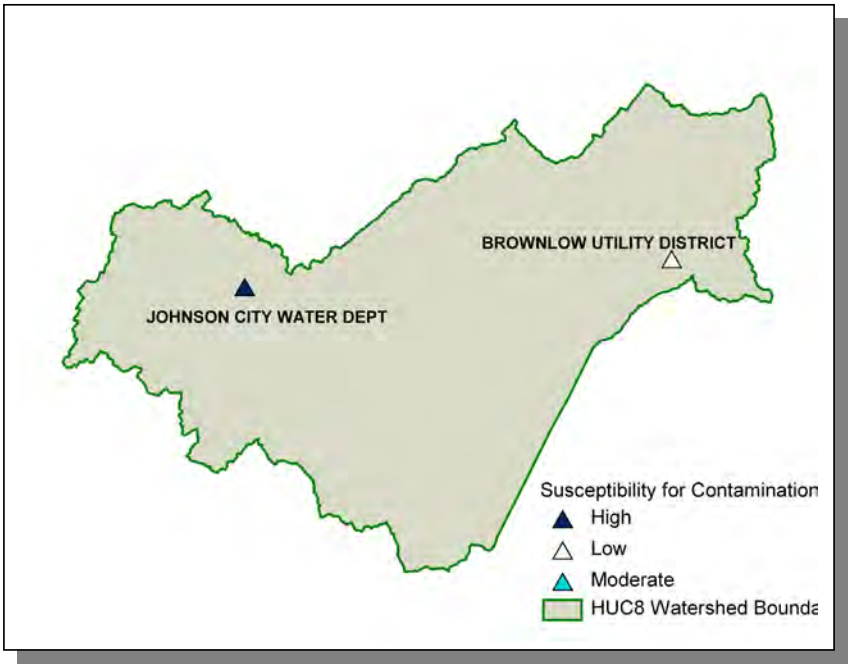

Figure 5-6. Susceptibility for Contamination in the Watauga River Watershed.

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 $500 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 5-7. Location of Communities Receiving SRF Loans or Grants in the Watauga River Watershed. *More information is provided in Watauga-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.

- 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.

The Tennessee Department of Agriculture has spent $47,951 for Agriculture BMPs in the Watauga Watershed since 1998. In the FY-2000 Unified Watershed Assessment, Section 319 money plus match will equal $178,583 in the Watauga River Watershed:

- Johnson County Soil Conservation District contracted a study entitled: Watauga River Water Quality Restoration Project: Roan & Roaring Forge Creeks.

- Boone Watershed Partnership. The partnership has help fund monitoring and various environmental projects in the watershed.

Additional information is provided in Watauga-Appendix V.

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.

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

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

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

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

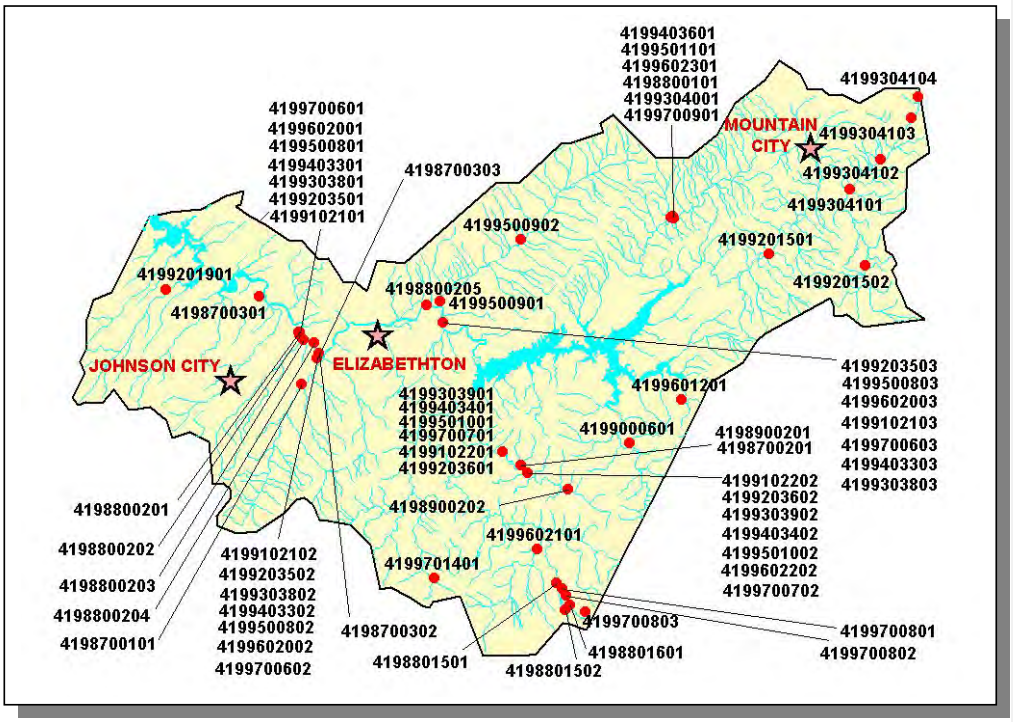

Figure 5-8. Location of TWRA TADS Sampling Sites in Watauga River Watershed. *Locations of Johnson City, Elizabethton,, and Mountain City are shown for reference. Additional Information is presented in Watauga-Appendix V.*

5.3.E. North Carolina's Basinwide Planning Program and Water Quality in the Watauga River Watershed. Basinwide planning is a non-regulatory watershed-based approach to restoring and protecting the quality of North Carolina's surface waters. In an approach similar to that employed in the State of Tennessee, the North Carolina Division of Water Quality (DWQ) prepares water quality plans for each of 17 major river basins in the state according to a defined schedule. The plans are prepared in order to communicate to policymakers, the regulated community and the general public the state's rationale, approaches and long-term management strategies for each river basin. Each plan is circulated for public review and presented at public meetings in the basin. After implementation, the plans are re-evaluated, based on follow-up water quality monitoring, and updated at five-year intervals.

DWQ initiated basinwide planning activities in 1990, when it began conducting water quality monitoring for the first basinwide plan, published in 1993. Since then, DWQ has produced plans for all 17 river basins and has begun to update those plans for each basin. The new plans emphasize changes in water quality and give the status of recommendations made in the previous plan. The *Watauga River Basinwide Water Quality Management Plan,* published in 1997, contains information about water quality in

the North Carolina portion of the basin. DWQ is currently in the process of updating this basin plan. A public workshop was held in November of 2000 where results of recent water quality monitoring data was presented. A draft plan for public review will be available in fall of 2001 and a public meeting to obtain comments on the draft will also be held at that time.

For more information concerning water quality in the Watauga River basin in North Carolina, visit the Basinwide Planning Program website or contact the Watauga River Basin Planner:

http://h2o.enr.state.nc.us/basinwide/

Deanna Doohaluk
NC Division of Water Quality
Planning Branch
1617 Mail Service Center
Raleigh, North Carolina, 27699-1617
Phone (919) 733-5083 ext. 577
FAX (919) 715-5637
deanna.doohaluk@ncmail.net

5.4 LOCAL INITIATIVES.

5.4.A. Boone Watershed Partnership (BWP). The mission of the BWP is: To partner with local users, regional, state, and Federal entities, educators, and others to identify and address water resource issues in the Boone Watershed. The Boone Watershed Partnership is an organization dedicated to improving the water quality and habitat of South Fork Holston and Watauga Tailwaters and Boone Lake.

The goals of the partnership are to: 1) share information on water conditions and issues among resource agencies, water users and the public; 2) develop consensus on priorities and actions needed to address regional issues; 3) marshal resources to carry out needed actions and 4) promote awareness of the importance of water resources to the regional economy and to the quality of life.

Projects include:

- Stream bank restoration
- Stream litter/trash cleanups
- Annual Recognition event to highlight water quality accomplishments among educators, land owners, organizations and municipalities.
- Sponsors an Adopt-A-Watershed program for high schools.

Recent activities in Watauga River Watershed include:

- Water Quality monitoring on Buffalo Creek and Doe River with the Elizabethton High School Adopt-A-Watershed class.
- Conducting a public watershed meeting in the Buffalo Creek Watershed at Milligan College.
- Conducted 12th Annual Watauga River Cleanup with Trout Unlimited.
- Conducted 5th Annual Doe River Cleanup in Roan Mountain with Trout Unlimited.
- Partnered with TVA, NRCS and Milligan College to complete a stream bank stabilization project on Buffalo Creek.
- Partnered with TVA, NRCS and a landowner on Buffalo Creek in order to complete a stream bank stabilization project.
- Partnered with TVA, NRCS, Roan Mountain State Park and Appalachian Resource Conservation and Development Council to complete demonstration projects on Doe River in Roan Mountain State Park area, showcasing various stream bank and habitat improvement projects.

The Boone Watershed Partnership is the recipient of Tennessee Department of Environment and Conservation's "Aquatic Resource Preservation" Award in 1998 and 1999.

For more information, contact:

Ken Chase
Chairman, Boone Watershed Partnership
804 Forest Avenue
Johnson City, TN 37601-3320
423-975-0357
email: chasekr@xtn.net

5.4.B. The Nature Conservancy. The mission of The Nature Conservancy is “to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive."

The Nature Conservancy's Tennessee Chapter owns two wetland restoration sites in the Watauga River watershed's Shady Valley, just 20 miles south of Bristol. Rare and endangered reptiles, migratory birds, and wetland plants like cranberries distinguish Shady Valley from other Southern Appalachian agricultural communities. By restoring the hydrology on over 100 acres of ditched and drained marginal farmland, the Conservancy is expanding wetland habitat that both rare species and Shady Valley's human residents may enjoy. The wetland properties combined with two other Conservancy nature preserves total over 600 acres of protected land within a five-square-mile area.

For more information, contact Charles McQueen, Shady Valley Preserves Manager, cmcqueen@tnc.org

CHAPTER 6

FUTURE DIRECTIONS IN THE WATAUGA RIVER WATERSHED

6.1 BACKGROUND.

The Watershed 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 Watauga River Watershed.

6.2. COMMENTS FROM PUBLIC MEETINGS. Watershed meetings are open to the public, and most meetings were represented by citizens who live in the watershed, NPDES permitees, business people, farmers, and local river conservation interests. Locations for meetings were 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 Watauga River Watershed public meeting was held September 10, 1996 at Sycamore Shoals State Historic Park. 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 plans, and 4)solicit input from the public.

Major Concerns/Comments

- Litter
- Inadequate public education program
- Insufficient land protection
- Inadequate or nonexistent buffers along river
- Siltation
- Mountain City STP effluent
- NPS is biggest problem but TDEC has no authority to address it

6.2.B. Year 3 Public Meeting. The second Watauga River public meeting was held May 19, 1998 at Sycamore Shoals State Historic Park. 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

- Clean water goals should never conflict with property rights
- Litter
- NPS is biggest problem but TDEC has no authority to address it

6.2.C. Year 5 Public Meeting. The third Watauga River Watershed public meeting was held August 13, 2002 at Sycamore Shoals State Historic Park (Elizabethton). The meeting featured eight educational stations:

- Draft Watershed Water Quality Management Plan
- Benthic macroinvertebrate samples and interpretation
- Smart Board with interactive GIS maps
- "Watershed Approach" (self-guided slide show)
- "How We Monitor Streams" (self-guided slide show)
- "Why We Do Biological Sampling" (self-guided slide show)
- Landowner Assistance Programs (NRCS and TDA)
- Local Citizen Group Displays (Boone Lake Partnership, Elizabethton High School)

In addition, citizens had the opportunity to make formal comments on the Draft Year 2002 303(d) List.

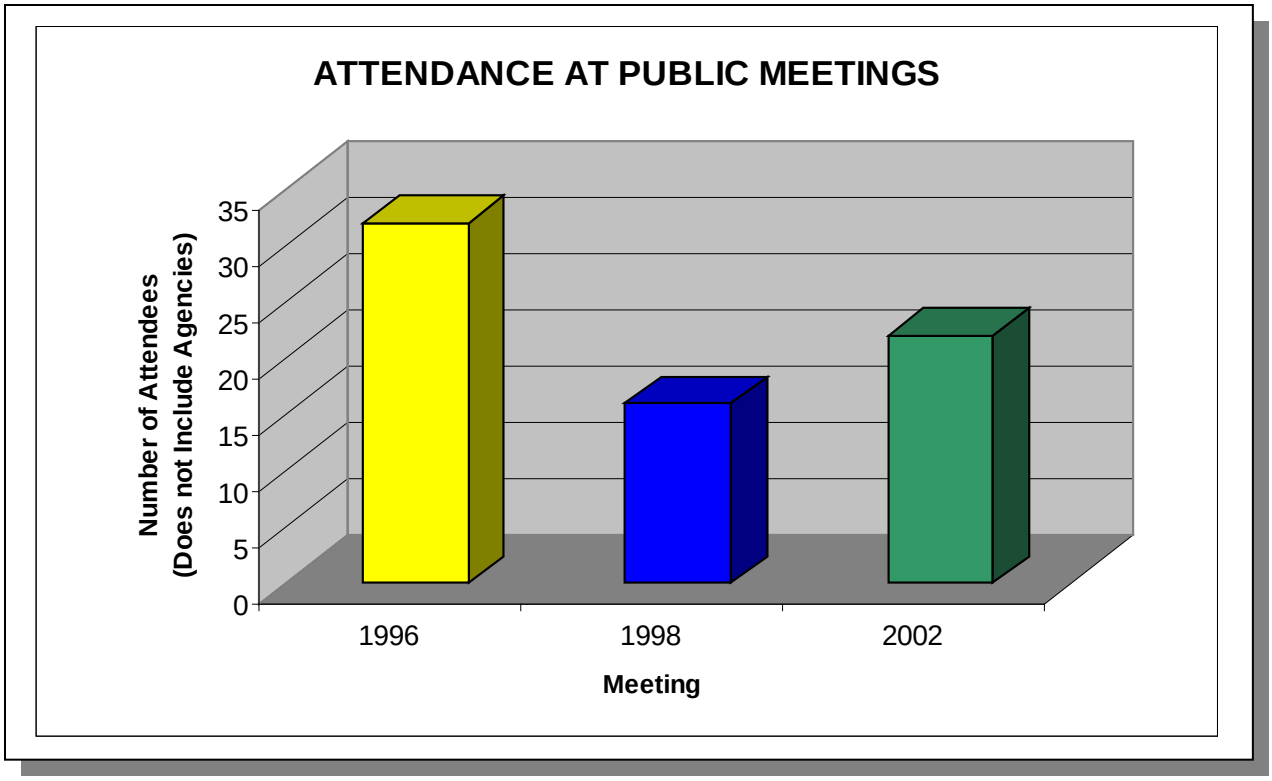

Figure 6-1. Attendance at Public Meetings in the Watauga River Watershed. *Attendance numbers do not include agency personnel.*

Figure 6-2. Biologist Tina Robinson Answers Questions from Participants at the Biological Education Station at the Watauga River Watershed Public Meeting.

6.3. ASSESSMENT OF NEEDS.

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/index.html. 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.htm

Roan Creek TMDL- Approved June 1, 2001. A total maximum daily load (TMDL) for fecal coliform in Roan Creek from mile 16.5 to Forge Creek (approximately 19.2), including Forge Creek and Town Creek, in Johnson County.
http://www.state.tn.us/environment/wpc/RoanCrF2.pdf

Cash Hollow TMDL- Approved March 27, 2001. A total maximum daily load (TMDL) for fecal coliform in Cash Hollow Creek from the headwaters to the confluence with the Watauga River in Washington County.
http://www.state.tn.us/environment/wpc/CsHwCrF1.pdf

Sinking Creek TMDL- Approved December 12, 2000. A total maximum daily load (TMDL) for fecal coliform in Sinking Creek from the headwaters to the confluence with the Watauga River in Carter County.
http://www.state.tn.us/environment/wpc/sinkgcreek.pdf

TMDLs are prioritized for development based on many factors.

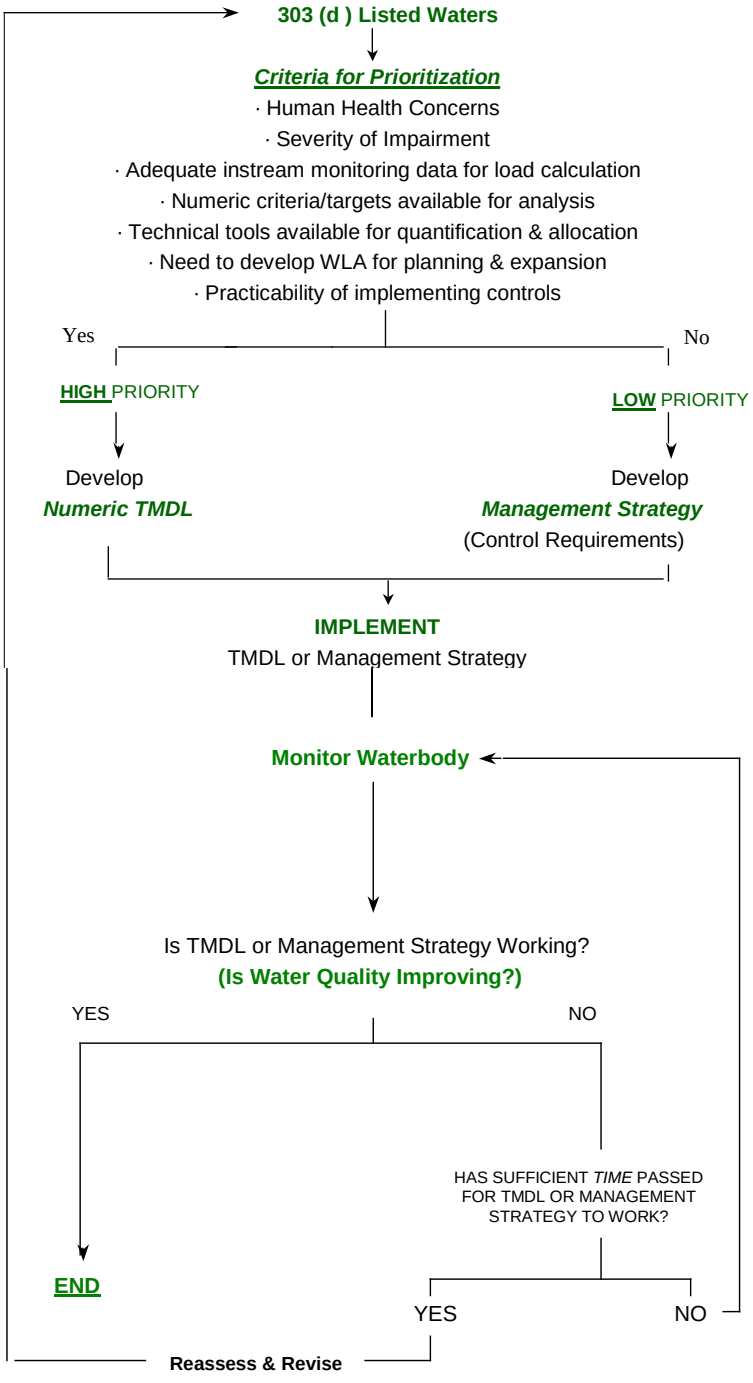

Figure 6.3. Prioritization scheme for TMDL Development.

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 can address some of the contaminants impacting the Watauga 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. The general permit issued for such construction sites establishes conditions for maintenance of the sites to minimize pollution from stormwater, including requirements for inspection of the controls. Also, the general permit imposes more stringent inspection and self-monitoring requirements for streams in the watershed, which are impaired due to sedimentation (i.e., Roan, Boones and Brush Creeks).

The same requirements apply to sites in the drainage of high quality waters. Laurel Fork, Doe River, and Stony Creek are examples of high quality streams in the Watauga River watershed.

The same measures, which are currently required of all sites of 5 acres or more, can also be required on a site-by-site basis for smaller sites. New federal requirements will reduce the size of the sites subject to construction stormwater permitting to one acre. Local regulations may already address smaller sites. Regardless of the size, no construction site is allowed to cause a condition of pollution.

6.3.B.i.b. From Channel and/or Bank Erosion. Due to the past channelization of Laurel Fork, Doe River, Town and Roan creeks and other Watauga River tributaries, the

channels are unstable. Several agencies are working to stabilize portions of stream banks. These include NRCS, TDOT and the Tennessee Valley Authority, and Watershed Citizen Groups. Other methods or controls necessary to address common problems are:

Voluntary activities

- Re-establishment of bank vegetation (examples: Laurel Fork, Town, Doe, Brush and Shell Creeks).
- Establish off-channel watering areas for livestock by moving watering troughs and feeders back from stream banks (example: Sinking, Cash Hollow, Roan, Brush, Knob and Boones Creeks).
- Limit livestock access to streams and bank vegetation (examples: Sinking and Knob Creeks, Roan, Brush and Boones Creeks).

Additional strategies

- Increase efforts in the Master Logger program to recognize impaired streams and require more effective management practices.
- Better community planning of development impacts on small streams, especially development in rapidly growing areas (examples: Brush, Knob, Town, Laurel Fork, Boones Creeks, and Doe River).
- Restrictions requiring post construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion (example: Town, Laurel Fork, Knob and Boones creeks).
- Additional restrictions on logging in stream side management zones.
- Prohibition on clearing of stream and ditch banks (example: Laurel Fork, Doe, Brush and Boones Creeks). *Note: Permits are now 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.ii. Pathogen Contamination.

Possible sources of pathogens are inadequate (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 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: Roan, Town Brush, Boones, Sinking and Knob Creeks).
- Limiting livestock access to streams (examples: Roan, Town, Brush, Knob, Sinking and Boones creeks).
- 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 sub-surface disposal is not an option due to poor soils, flood plains or high water tables.
- Discourage the creation of "duck holes" that attract waterfowl.
- Develop and enforce leash laws and controls on pet fecal material, (example: Brush Creek).
- Elimination of point-source discharges found after employing an underground camera in encapsulated stream areas.
- Greater efforts by sewer utilities to identify leaking lines or overflowing manholes, (examples: Town, Knob, Sinking and Boones Creeks) .

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

- Encourage no-till farming, (examples that could benefit Roan , Knob, and Boones Creeks).
- Encourage farmers to use the proper rate of fertilizer for the soil and crop, (Roan, Knob, Brush, Boones Creeks).
- Educate homeowners and lawn care companies in the proper application of fertilizers.
- Encourage landowners, developers, and builders to leave stream buffer zones (examples of a stream that could benefit is Brush Creek, as well as, all 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 area stream channels suffer from some canopy removal.
- Discourage impoundments. Ponds and lakes do not aerate water. *Note: Permits are 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, painting equipment washed out near 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 Brush, and Town Creeks).
- Sponsoring community clean-up days. (This has already benefited Cash Hollow Creek).
- 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 had such cleanup efforts in recent years.
- Organizing stream cleanups, removing trash, limbs and debris before they cause blockage.
- Avoiding use of heavy equipment to "clean out" streams. Town, Laurel Fork, Hampton creeks and Doe River have suffered from such activities.
- Planting vegetation along streams to stabilize banks and provide habitat. Doe River, in the Roan Mountain area, had a segment "bio-engineered" using matting and willow post to re-vegetate, following the 1998 flood.
- 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.

APPENDIX II

ID	NAME	HAZARD
107001	Ripshin Lake	2
107002	Odom Trout Lake	3
107003	Miller Lake	3
107004	Bromburg	B
107005	Lakeview	O
907001	Sampson-Wood Lake	S

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

LAND COVER/LAND USE	SQUARE MILES	% OF WATERSHED
Open Water	16.2	2.5
Forested Wet	0.2	0.0
Nonforested	0.1	0.0
Pasture	151.0	23.8
Crop Land	4.3	0.7
Scrub Shrub	0.0	0.0
Deciduous Forest	410.5	63.5
Mixed Forest	15.0	6.8
Coniferous Forest	0.9	0.1
Urban	15.9	2.5
Barren Land	0.0	0.0
Strip Mines	0.0	0.0
Cloud/Shadow	0.0	0.0
Forested Dead Wetland	0.0	0.0
Total	**614.1**	**100.0**

Figure A2-2. Land Use Distribution in the Watauga Watershed. *Data is 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	(06010103)
	Laurel Fork Creek	Watauga	(06010103)
Southern Sedimentary Ridges (66e)	Clark Creek	Nolichucky	(06010108)
	Lower Higgins Creek	Nolichucky	(06010108)
	Double Branch	Watts Bar	(06010201)
	Gee Creek	Hiwassee	(06020002)
Limestone Valleys and Coves (66f)	Abrams Creek	Holston	(06010204)
	Beaverdam Creek	South Fork Holston	(06010102)
Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)	Fisher Creek	Holston	(06010104)
	White Creek	Upper Clinch	(06010205)
	Powell River	Powell	(06010206)
	Big War Creek	Upper Clinch	(06010205)
	Powell River	Powell	(06010206)
	Indian Creek	Powell	(06010206)
		Powell	(06010206)
Southern Shale Valleys (67g)	Little Chucky Creek	Nolichucky	(06010108)
	Bent Creek	Nolichucky	(06010108)
	Brymer Creek	Hiwassee	(06020002)

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

CODE	NAME	AGENCY	AGENCY ID
20	TDEC/DNH AUSTIN SPRINGS SITE	TDEC/DNH	S.USTNFO 3
21	TDEC/DNH HUNTER MARSH SITE	TDEC/DNH	S.USTNHP 310
158	TDEC/DNH RIPSHIN BOG SITE	TDEC/DNH	S.USSERO1 184
282	TDOT KNOB CREEK MITIGATION SITE	TDOT	
460	TDOT SMITH BRANCH MITIGATION SITE	TDOT	
461	TDOT KNOB CREEK PERMIT SITE	TDOT	
476	TDEC/WPC TRIBUTARY OF BRUSH CRK MITIGATION SITE	TDEC/WPC	
477	TDEC/WPC TRIBUTARY OF BRUSH CREEK WPC PERMIT SITE	TDEC/WPC	
1803	TDEC/DNH LINDY CAMP BOG (SITE 44) SITE	TDEC/DNH	APPALACHIAN TRAIL REPORT
1805	TDEC/DNH STONY CREEK BOG	TDEC/DNH	APPALACHIAN TRAIL REPORT
1806	TDEC/DNH SOUTH SHORE (SITE 31) SITE	TDEC/DNH	APPALACHIAN TRAIL REPORT
1807	TDEC/DNH COON DEN FALLS TRAIL (SITE 18) SITE	TDEC/DNH	APPALACHIAN TRAIL REPORT
1808	TDEC/DNH DOLL FLATS SPRING (SITE 2) SITE	TDEC/DNH	APPALACHIAN TRAIL REPORT
1809	TDEC/DNH LITTLE PINE MOUNTAIN BOG (SITE 6) SITE	TDEC/DNH	APPALACHIAN TRAIL REPORT
2610	TDOT SR 381, SUNSET DR TO I-181 SITE	TDOT	
2781	TDEC/DNH JONES BRANCH BOG	TDEC/DNH	

Table A2-4. Wetland Sites in Watauga Watershed in TDEC Database. *TDEC, Tennessee Department of Environment and Conservation; WPC, Water Pollution Control; DNH, Division of Natural Heritage; TDOT, Tennessee Department of Transportation..*

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Black Branch	TN06010103020T_0110	2.6
Buck Creek	TN06010103013_0200	12.2
Buffalo Creek	TN06010103011_1000	11.5
Doe Creek	TN06010103037_1000	11.5
Doe River	TN06010103013_1000	17.8
Doe River	TN06010103013_3000	3.1
Elk River	TN06010103027_1000	10.4
Gap Creek	TN06010103008_0700	10.0
Harbin Branch	TN06010103037_0900	2.9
Heaton Branch	TN06010103027_0300	7.2
Heaton Creek	TN06010103013_0400	5.9
Laurel Fork	TN06010103013_0110	6.4
Laurel Fork	TN06010103013_0120	5.0
Little Doe River	TN06010103013_0700	10.3
Little Stoney Creek	TN06010103020T_0200	6.4
Morgan Branch	TN06010103338_0200	2.2
Roan Creek	TN06010103034_1000	6.8
Roan Creek	TN06010103034_3000	9.1
Sinking Creek	TN06010103046_2000	4.1
Stoney Creek	TN06010103038_1000	17.1
Watauga River	TN06010103008_1000	15.0
Watauga River	TN06010103008_2000	4.4

Table A3-1a. Streams Fully Supporting Designated Uses in Watauga River Watershed. *Data are based on Year 2000 Water Quality Assessment*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Boones Creek	TN06010103006_1000	18.6
Brush Creek	TN06010103009_1000	20.3
Doe River	TN06010103013_2000	6.4
Hampton Creek	TN06010103013_0300	6.2
Laurel Fork	TN06010103013_0100	1.9
Roan Creek	TN06010103034_2000	6.0
Shell Creek	TN06010103013_0210	3.8
Town Creek	TN06010103034_0300	3.0

Table A3-1b. Streams Partially Supporting Designated Uses in Watauga River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Knob Creek (Cash Hollow)	TN06010103635_1000	12.3
Sinking Creek	TN06010103046_1000	10.0

Table A3-1c. Streams Not Supporting Designated Uses in Watauga River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Avery Branch	TN06010103034_1300	7.7
Baker Branch	TN06010103338_0100	4.5
Bearwallow Creek	TN06010103027_0200	2.8
Big Dry Run	TN06010103338_1000	5.2
Big Laurel Branch	TN06010103174_1000	2.6
Blue Spring Branch	TN06010103008_0500	3.2
Boone Reservoir Tribs (Watauga)	TN06010103001T_0999	24.6
Bulldog Creek	TN06010103034_0500	5.5
Cabbage Creek	TN06010103034_0800	4.9
Campbell Creek	TN06010103037_0400	10.8
Carrol Creek	TN06010103639_1000	4.3
Catbird Creek	TN06010103046_0100	5.7
Clover Branch	TN06010103008_0600	9.1
Cobb Creek	TN06010103052_1000	12.3
Cobb Creek	TN06010103635_0100	4.5
Corn Creek	TN06010103034_0312	17.5
Crooked Branch	TN06010103034_0311	6.6
Davis Branch	TN06010103008_0300	5.9
Dry Creek	TN06010103011_0300	8.9
Dugger Branch	TN06010103037_0200	5.4
Fall Branch	TN06010103034_0200	5.7
Fall Branch	TN06010103034_0600	2.2
Forge Creek	TN06010103034_0400	33.7
Furnace Creek	TN06010103034_0320	9.4
George Creek	TN06010103013_0500	4.6
Goose Creek	TN06010103034_0310	15.4
Honeycomb Creek	TN06010103011_0310	5.8
Hopper Creek	TN06010103034_0100	4.7
Left Prong Hampton Creek	TN06010103013_0310	2.5
Lick Creek	TN06010103008_0100	11.0
Little Stoney Creek	TN06010103038_0100	4.5
Lumpkin Branch	TN06010103034_0700	3.6
Mill Creek	TN06010103034_1200	8.9
Misc tribs to Buffalo Creek	TN06010103011_0999	23.1
Misc Tribs to Doe Creek	TN06010103037_0999	45.0
Misc tribs to Doe River	TN06010103013_0999	32.8
Misc Tribs to Roan Creek	TN06010103034_1999	8.0
Misc tribs to Roan Creek	TN06010103034_2999	11.9
Misc tribs to Roan Creek	TN06010103034_3999	16.7
Misc tribs to Watauga River	TN06010103008_0999	9.6
Misc. tribs to Elk River	TN06010103027_0999	14.1
Misc. tribs to Stoney Creek	TN06010103038_0999	99.7
Misc. tribs to Town Creek	TN06010103034_0399	9.3
Morton Branch	TN06010103013_0130	1.7
Nowwhere Branch	TN06010103027_0100	4.6
Powder Branch	TN06010103011_0100	6.2
Powder Creek	TN06010103011_0400	5.9
Reedy Creek	TN06010103061_1000	10.7
Richardson Branch	TN06010103008_0400	4.7
Roaring Creek	TN06010103013_0600	11.9
Roaring Creek	TN06010103034_0410	7.7
Rocky Branch	TN06010103008_0200	6.6
Row Branch	TN06010103020T_0100	2.7

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Sally Cove Creek	TN06010103013_0721	7.5
Sensabaugh Branch	TN06010101001_0100	5.0
Shell Creek	TN06010103013_0211	2.3
Simmerly Creek	TN06010103013_0720	14.9
Slabtown Branch	TN06010103037_0600	8.0
Spear Branch	TN06010103037_0500	5.3
Spruce Branch	TN06010103037_0700	7.3
Stalcup Branch	TN06010103037_0100	2.7
Stout Branch	TN06010103034_1100	7.5
Stout Branch	TN06010103037_0800	5.8
Tiger Creek	TN06010103013_0710	18.7
Timothy Branch	TN06010103037_0300	5.5
Toll Branch	TN06010103011_0200	6.5
Tribs to North Fork Holston River	TN06010101001_0999	5.0
Vaught Creek	TN06010103034_0900	13.4
Watauga Reservoir Misc. Tribs	TN06010103020T_0999	44.1
Watauga River	TN06010103029_1000	5.6

Table A3-1d. Streams Not Assessed in Watauga River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Watauga Lake	TN06010103020_1000	6,427
Wilbur Reservoir	TN06010103019_1000	72

Table A3-1e. Lakes Fully Supporting Designated Uses in Watauga River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
Boones Creek	TN06010103006_1000	18.6	Partial
Brush Creek	TN06010103009_1000	20.3	Partial
Doe River	TN06010103013_2000	6.4	Partial
Hampton Creek	TN06010103013_0300	6.2	Partial
Knob Creek (Cash Hollow)	TN06010103635_1000	12.3	Not supporting
Laurel Fork	TN06010103013_0100	1.9	Partial
Shell Creek	TN06010103013_0210	3.8	Partial

Table A3-2a. Stream Impairment Due to Habitat Alterations in Watauga River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
Knob Creek (Cash Hollow)	TN06010103635_1000	12.3	Not supporting
Roan Creek	TN06010103034_2000	6.0	Partial
Sinking Creek	TN06010103046_1000	10.0	Not supporting
Town Creek	TN06010103034_0300	3.0	Partial

Table A3-2b. Stream Impairment Due to Pathogens in Watauga River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
Boones Creek	TN06010103006_1000	18.6	Partial
Brush Creek	TN06010103009_1000	20.3	Partial
Roan Creek	TN06010103034_2000	6.0	Partial

Table A3-2c. Stream Impairment Due to Siltation in Watauga River Watershed. *Data are based on Year 2000 Water Quality Assessment*

APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-11 SUBWATERSHEDS (ACRES)						
	030	**040**	**050**	**060**	**070**	**080**	**090**
Deciduous Forest	22,033	14,854	6,501	9,115	19,970	23,760	18,777
Emergent Herbaceous Wetlands	33	4	2	0	23	4	
Evergreen Forest	7,404	2,937	3,465	4,928	7,472	5,636	4,713
High Intensity:							
Commercial/Industrial	7	155	266	22	92	842	60
High Intensity: Residential		2	90	1	4	337	7
Low Intensity: Residential	43	69	562	42	188	3,458	782
Mixed Forest	12,336	4,597	3,966	9,248	13,314	7,203	10,369
Open Water	1,906	7	3	1	4,008	224	3
Other Grasses: Urban/Recreational	3	26	166	20	46	419	155
Pasture/Hay	4,756	2,243	3,101	3,129	1,061	4,995	2,178
Row Crops	1,426	828	710	406	207	1,552	573
Transitional	165				283	24	44
Quaries/Strip Mines		65					
Woody Wetlands	36	4	8	19	129	60	9
Bare Rock, Sand, Clay	24	11	15	50	20	90	10
Total	**50,172**	**25,803**	**18,856**	**26,983**	**46,816**	**48,575**	**37,680**

LAND USE/LAND COVER	AREAS IN HUC-11 SUBWATERSHEDS (ACRES)					
	100	**110**	**120**	**130**	**140**	**150**
Deciduous Forest	22,558	10,709	6,937	5,713	10,051	11,664
Emergent Herbaceous Wetlands	6	1			2	62
Evergreen Forest	7,017	3,850	3,538	2,170	4,192	6,038
High Intensity:						
Commercial/Industrial	68	11	65	1,486	346	1,410
High Intensity: Residential	19	3	26	977	66	543
Low Intensity: Residential	456	234	260	3,954	1,382	3,634
Mixed Forest	10,225	5,578	5,436	2,144	5,015	5,339
Open Water	69	8	8	12	7	1,477
Other Grasses: Urban/Recreational	77	97	16	705	150	876
Pasture/Hay	1,181	480	161	1,752	3,214	13,307
Row Crops	286	69	80	348	379	1,441
Transitional	314	1	283		13	
Woody Wetlands	25	7	4	26	28	128
Bare Rock, Sand, Clay	21	5	2	57	34	258
Total	**42,324**	**21,052**	**16,816**	**19,343**	**24,915**	**46,219**

Table A4-1. Land Use Distribution in Watauga River Watershed by HUC-11. *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-11	NAME	AREA (SQ. MILES)	PERIOD OF OBSERVATIONS	FLOW (CFS)		
					Min	Max	Mean
03482500	06010103030	Roan Creek at Butler	166.0	06/01/34-09/30/48	23.0	3,390.0	165.0
03482000	06010103030	Roan Creek Near Neva	102.0	06/01/42-06/30/55	6.0	2,410.0	104.0
03480000	06010103030	Watauga River	171.0	11/01/27-09/30/45	28.0	14,800.0	290.0
03479500	06010103030	Watauga River at TN-NC State Line	152.0	10/01/42-06/30/55	12.0	5,580.0	256.0
03481600	06010103050	Corn Creek at Mountain City	5.34		0.11		
03483000	06010103070	Watauga River	427.0	08/31/00-09/30/48	85.0	31,400.0	692.0
03485500	06010103080	Doe River at Elizabethton	137.0	10/01/11-03/31/82	17.0	5,340.0	223.0
03486000	06010103080	Watauga River at Elizabethton	692.0	03/01/26-02/28/82	85.0	28,400.0	1,085.0
03484000	06010103080		471.0	05/11/03-02/28/82	2.0	10,100.0	741.0
03486200	06010103140		28.1	10/09/64-09/30/70	3.0	921.0	26.0

Table A4-3. Historical USGS Streamflow Data Summary Based on Mean Daily Flows in Watauga River Watershed. *Min, absolute minimum flow for period of record.*

PARAMETER ID	PARAMETER NAME
00010	Water Temperature (Degrees Centigrade)
00060	Flow, Stream, Mean Daily (cfs)
00061	Flow, Stream, Instantaneous (cfs)
00065	Stream Stage (Feet)
00078	Transparency, Secchi Disc (Meters)
00080	Color (Platinum-Cobalt Units)
00094	Specific Conductance, Field (μmhos/cm @ 25° C)
00095	Specific Conductance, Field (μmhos/cm @ 25° C)
00299	Oxygen, Dissolved, Analysis by Probe (mg/L)
00300	Oxygen, Dissolved (mg/L)
00310	BOD 5 Day @ 20° C (mg/L)
00335	COD (Low Level) in .025 N $K_2Cr_2O_7$ (mg/L)
00340	COD (High Level) in .025 N $K_2Cr_2O_7$ (mg/L)
00400	pH (Standard Units)
00410	Alkalinity, Total (mg/L as $CaCO_3$)
00431	Alkalinity, Total Field (mg/L as $CaCO_3$)
00515	Residue, Total Filtrable (mg/L)
00530	Residue, Total Nonfiltrable (mg/L)
00605	Nitrogen, Organic, Total (mg/L as N)
00608	Nitrogen Ammonia , Dissolved (mg/L as N)
00610	Nitrogen Ammonia , Total (mg/L as N)
00613	Nitrite Nitrogen, Dissolved (mg/L as N)
00619	Ammonia, Unionized (Calculated From Temp-pH-NH_4; mg/L)
00620	Nitrate Nitrogen, Total (mg/L as N)
00623	Nitrogen, Kjeldahl, Dissolved (mg/L as N)
00625	Nitrogen, Kjeldahl, Total (mg/L as N)
00630	Nitrite Plus Nitrate, Total (1 Determination mg/L as N)
00631	Nitrite Plus Nitrate, Dissolved (1 Determination mg/L as N)
00665	Phosphorus, Total (mg/L as P)
00666	Phosphorus, Dissolved (mg/L as P)
00671	Phosphorus, Dissolved Orthophosphate (mg/L as P)
00680	Carbon, Total Organic (mg/L as C)
00900	Hardness, Total (mg/L as $CaCO_3$)
00915	Calcium, Dissolved (mg/L as Ca)
00916	Calcium, Total (mg/L as Ca)
00925	Magnesium, Dissolved (mg/L as Mg)
00927	Magnesium, Total (mg/L as Mg)
00929	Sodium, Total (mg/L as Na)
00930	Sodium, Dissolved (mg/L as Na)
00935	Potassium, Dissolved (mg/L as K)
00937	Potassium, Total (mg/L as K)
00940	Chloride, Total In Water (mg/L)
00941	Chloride, Dissolved in Water (mg/L)
00945	Sulfate, Total (mg/L as SO_4)
00946	Sulfate, Dissolved (mg/L as SO_4)
00950	Fluoride, Dissolved (mg/L as F)
00955	Silica, Dissolved (mg/L as SiO_2)
01002	Arsenic, Total (μg/L as As)
01007	Barium, Total (μg/L as Ba)
01025	Cadmium, Dissolved (μg/L as Cd)
01027	Cadmium, Total (μg/L as Cd)
01034	Chromium, Total (μg/L as Cr)
01040	Copper, Dissolved (μg/L as Cu)

01042	Copper, Total (μg/L as Cu)
01045	Iron, Total (μg/L as Fe)
01046	Iron, Dissolved (μg/L as Fe)
01049	Lead, Dissolved (μg/L as Pb)
01051	Lead, Total (μg/L as Pb)
01065	Nickel, Dissolved (μg/L as Ni)
01067	Nickel, Total (μg/L as Ni)
01075	Silver Dissolved (μg/L as Ag)
01077	Silver Total (μg/L as Ag)
01090	Zinc, Dissolved (μg/L as Zn)
01092	Zinc, Total (μg/L as Zn)
01105	Aluminum, Total (μl as Al)
01106	Aluminum, Dissolved (μl as Al)
01147	Selenium, Total (μl as Se)
31613	Fecal Coliform (Membrane Filter, M-FC Agar at 44.5^{o} C, 24 h)
31616	Fecal Coliform (Membrane Filter, M-FC Broth at 44.5^{o} C)
31625	Fecal Coliform (Membrane Filter, M-FC, 0.7 UM)
31673	Fecal Streptococci, (Membrane Filter, KF Agar, at 35^{o}C, 48h)
32211	Chlorophyll-A, Spectrophotometric, Acid, Corrected (μg/L)
39086	Alkalinity, Water, Dissolved, Field Titration (mg/l as $CaCO_3$)
70300	Residue, Total Filtable (Dried at 180^{o}C, as mg/L)
70507	Phosphorus, in Total Orthophosphate (mg/L as P)
71845	Nitrogen, Ammonia, Total (mg/L as NH_4)
71890	Mercury, Dissolved (μg/L as Hg)
71900	Mercury, Total (μg/L as Hg)
80154	Suspended Sediment (Evaporation at 110^{o}C, as mg/L)
82078	Turbitity, Field (as Nephelometric Turbidity Units, NTU)
82079	Turbitity, Lab (as Nephelometric Turbidity Units, NTU)

Table A4-4a. Water Quality Parameters and Codes.

PARAMETER ID	SUBWATERSHED							
	030	**040**	**050**	**070**	**080**	**100**	**120**	**150**
00010	b,d	e	f	g,h,k	n,o,p,q,r,s,t,u,v,w	y	z	%,@,&
00060				k				
00061	d				o,p,r,s,t			%
00078				g,k				@
00080	b			h		y	z	
00094		e	f	g,h,k	n,p,q,u,v,w	y	z	@,&
00095								%,&
00300	b,d	e	f	g,h,k	n,o,p,q,r,s,t,u,v,w	y	z	%,@,&
00310								&
00335	b	e	f		n,q,v,w			&
00400	b	e	f	g,h,k,m	n,p,q,u,v,w	x,y	z	%,@
00410				h	u	y	z	&
00515	b	e	f	h	n,q,v,w	y	z	&
00530	b	e	f	h	n,q,u,v,w	y	z	&
00605				g,k				@,&
00608								%
00610	b	e	f	g,h,k	n,q,u,v,w	y	z	@,&
00613								%
00619	b	e	f	g,h,k	n,q,u,v,w	y	z	%,@
00623								%
00625								%
00630	b	e	f	g,h,k	n,q,u,v,w	y	z	@,&
00631								%
00665	b	e	f	g,h,k	n,v,u,w	y	z	%,@,&
00666								%
00671				g,k				%,@
00680				g,k				@
00900	b	e	f	h	n,q,u,v,w	y	z	&
00927								&
00940				h			z	&
00945				h			z	&
01002	b	e	f	h	n,q,u,v,w	y	z	&
01027	b	e	f	h	n,q,u,v,w	y	z	&
01034	b	e	f	h	n,q,u,v,w	y	z	&
01042	b	e	f	h	n,q,u,v,w	y	z	&
01045				h		y	z	&
01051	b	e	f	h	n,q,u,v,w	y	z	&
01067	b	e	f	h	n,q,u,v,w		z	&
01092	b	e	f	h	n,q,u,v,w	y	z	&
01105								&
01147								&
31616	a,b,c	e	f	h,i,j,l,m	n,q,u,v,w	x,y	z	$,+,&
32211				g,k				@
39086								%
71900	b	e	f	h	n,q,u,v,w		z	&
80154								%
82078				g	o,r,s,t			@

Table A4-4b. Water Quality Parameters Monitored in Watauga River Watershed.

CODE	STATION	ALIAS	AGENCY	LOCATION
a	477260		TVA	Watauga Reservoir
b	ROAN016.5	ROAN016.4JO	TDEC	Roane Creek at Maymead Farm
c	477585		TVA	Watauga Reservoir
d	475578		TVA	Watauga Reservoir
e	ROAN018.2	ROAN017.9JO	TDEC	Roane Creek at Bridge
f	TOWN00.9		TDEC	Town Creek at Bridge
g	477513		TVA	Watauga Reservoir
h	ECO66d01		TDEC	Black Branch @ RM 2.0
i	477583		TVA	Watauga Reservoir @ Shook Branch
j	477584		TVA	Watauga Reservoir @ Watauga Point
K	475576		TVA	Watauga Reservoir
L	477586		TVA	Watauga Reservoir @ Lakeshore Dock
m	040627		USFS	Shook Branch Swimming Area
N	WATAUGA026.9	WATAU026.9CT	TDEC	Watauga River @ RM 26.9
O	475528		TVA	Watauga Powerhouse
P	476498C		TVA	Watauga Tailrace
Q	DOE01.1	DOE001.1CT	TDEC	Doe River @ Hwy 19E Bridge (Elizabethton)
R	477102		TVA	Wilbur Dam Tailrace
S	476498		TVA	Watauga Tailrace
T	475557		TVA	Wilbur Dam
U	003750	WATAU015.3WN	TDEC	Watauga River
V	WATAUGA020.1	WATAU020.1CT	TDEC	Watauga River @ RM 20.1
W	WATAUGA025.1	WATAU025.1CT	TDEC	Watauga River @ RM 25.1
X	040622		USFS	Watauga Point Number 2
y	ECO66d05		TDEC	Doe River @ RM 26.0
z	ECO66d03		TDEC	Laurel Fork Creek @ RM 6.5
#	03486665		USGS	Knob Creek @ Wayfield Drive
%	03486667		USGS	Knob Creek @ Austin Springs
&	BRUSH00.7	BRUSH000.8WN	TDEC	Watauga Road Bridge (Johnson City)
$	476529		TVA	Boone Reservoir at Pickens Bridge
+	477589		TVA	Boone Reservoir @ Jay's Boat Dock
@	477511		TVA	Boone Reservoir Above Pickens Bend

Table A4-4c. Water Quality Monitoring Stations in Watauga River Watershed*. TDEC, Tennessee Department of Environment and Conservation; TVA, Tennessee Valley Authority; USFS, United States Forest Service; USGS, United States Geological Survey.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	SUBWATERSHED
TN0074641	Maymead Shop	2951	Asphalt Paving Mixtures	Minor	Roan Creek @ RM 15.6	06010103030
TN0024945	Mountain City STP	4952	Sewerage Systems	Minor	Town Creek @ RM 0.4	06010103050
TN0060381	Alumax Extrusions	3354	Aluminum Extruded Poroducts	Minor	Doe River @ RM 2.6	06010103080
TN0023515	Elizabethton STP	4952	Sewereage Systems	Major	Watauga River @ RM 24.3	06010103080
TN0059781	ColorWorks, Inc.	2262	Broadwoven Fabric Finisher	Minor	Watauga River @ RM 28.2	06010103080
TN0004421	North American Rayon	2823	Cellulosic Manmade Fibers	Major	Watauga River @ RM 24.0-25.0 (Various Points)	06010103080
TN0023736	Keenburg ES	4952	Sewerage Systems	Minor	0.24 Mi of Trib to Campbell Creek @ RM 1.7	06010103080
TN0024244	Brush Creek STP	4952	Sewerage Systems	Major	Watauga River @ RM 16.4	06010103080
TN0027553	TVA Wilbur Hydro Plant	4911	Electric Services	Minor	Watauga River @ RM 34.0	06010103080
TN0027545	TVA Watauga Hydro Plant	4911	Electric Services	Minor	Watauga River @ RM 35.8	06010103080
TN0056405	Valley Forge ES	4952	Sewerage Systems	Minor	Doe River @ RM 3.9	06010103080
TN0056405	Valley Forge ES	4952	Sewerage Systems	Minor	Doe River @ RM 3.9	06010103080
TN0073610	Bill Morgan Farm Groundwater Remediation			Minor	Trib to Ripshin Lake	06010103100
TN0023680	Cloudland School	4952	Sewerage Systems	Minor	Buck Creek @ RM 0.2	06010103100
TN0073679	Roan Highlands Nursing Center	4952	Sewerage Systems	Minor	Buck Creek @ RM 2.3	06010103100
TN0074357	Roan Mountain State Park	4952	Sewerage Systems	Minor	Doe River @ RM 24.5	06010103100
TN0061531	Carter County Work Camp	4952	Sewerage Systems	Minor	Doe River @ RM 18.0	06010103100
TN0023701	Hampton HS	4952	Sewerage Systems	Minor	Doe River @ RM 7.6	06010103100

TN0023698	Hampton ES	4952	Sewerage Systems	Minor	Laurel Fork @ RM 0.5	06010103120
TN0075094	Hampton Carter Commercial Center	4952	Sewerage Systems	Minor	Laurel Fork Creek @ RM 0.1	06010103120
TN0002500	Bosch Braking Systems	3714	Motor Vehicle Parts and Accessories	Minor	Sinking Creek @ RM 3.1	06010103130
TN0054950	Buffalo Mtn Resort	4952	Sewerage Systems	Minor	Buffalo Creek @ RM 7.9	06010103140
TN0024236	Knob Creek STP	4952	Sewerage Systems	Major	Watauga River @ RM 11.0	06010103150

Table A4-5. Active Permitted Point Source Facilities in the Watauga River Watershed. *SIC, Standard Industrial Classification; MADI, Major Discharge Indicator.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	WATERBODY	HUC-11
TN0071625	Butler Stone & Gravel: Cook Hollow Quarry	1429	Crushed and Broken Stone, NEC	Tributary to Doe Creek	06010103030
TN0071315	S & S Paving: Site # 1	1422	Crushed and Broken Limestone	Unnamed Drainway to Roan Creek	06010103030
TN0066206	Maymead, Inc.: Potter Quarry	1423	Crushed and Broken Granite	Roaring Creek Forge Creek	06010103040
TN0066192	Maymead, Inc.: 421 Plant	1423	Crushed and Broken Granite	Roan Creek	06010103040
TN0071463	Mountain City Stone	1423	Crushed and Broken Granite	Goose Creek	06010103050
TN0071277	Doe Creek Quarry	1429	Crushed and Broken Stone, NEC	Doe Creek	06010103060
TN0068977	American Limestone Co.: Elizabethton Quarry	1442	Construction Sand and Gravel	Davis Branch	06010103080
TN0066401	General Shale Products: Mine #18-Bowery	1459	Clay, Ceramics, and Refractory Minerals, NEC	Watauga River	06010103080
TN0001775	Watauga Quarry	1422	Crushed and Broken Limestone	Watauga River	06010103080
TN0071412	General Shale Products: Mine #17-Sluder Hollow	1459	Clay, Ceramics, and refractory Minerals, NEC	Trib to Brush Creek	06010103130
TN0071404	General Shale Products: Mine #2-Tannery Knob	1459	Clay, Ceramics, and refractory Minerals, NEC	Brush Creek	06010103130
TN0061069	American Limestone Co.: Unicoi Quarry	1422	Crushed and Broken Limestone	Unnamed Drainway to Buffalo Creek	06010103140
TN0071471	General Shale Products: Mine #19-Cash Hollow	1459	Clay, Ceramics, and Refractory Minerals, NEC	Trib to Knob Creek	06010103150

Table A4-6. Active Mining Sites in the Watauga River Watershed. *SIC, Standard Industrial Classification.*

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-11
98.496	Carter	Water Intake Construction	Watauga River	06010103080
99.365	Carter	Stream Relocation	Gap Creek	06010103080
98.151	Carter	Stream Relocation	Liberty Branch	06010103090
99.325	Carter	Box Culvert	Weaver Branch Wetland	06010103090
99.325A	Carter	Box Culvert and Channel Relocation	Stoney Creek Tributary	06010103090
99.325B	Carter	Channel Relocation	Stoney Creek Tributary	06010103090
99.325C	Carter	Slab Culvert and Channel Relocation	Laurel Branch	06010103090
99.325D	Carter	Box Culvert and Channel Relocation	Stoney Creek Tributary	06010103090
99.325E	Carter	Box Culvert		06010103090
99.325F	Carter	Spring Drain		06010103090
99.325G	Carter	Box Culvert		06010103090
99.325H	Carter	Box Culvert		06010103090
99.325I	Carter	Slab Culvert		06010103090
99.325J	Carter	Spring-Drain		06010103090
99.325K	Carter	Concrete Pipe		06010103090
99.325L	Carter	Box Culvert		06010103090
99.325M	Carter	Slab Culvert		06010103090
99.325N	Carter	Box Culvert		06010103090
99.325O	Carter	Box Culvert		06010103090
99.325P	Carter	Box Culvert		06010103090
99.325Q	Carter	Slab Culvert		06010103090
99.325R	Carter	Concrete Pipe		06010103090
99.325S	Carter	Box Culvert		06010103090
99.325T	Carter	Gabion Wall		06010103090
97.818	Carter	Slide Repair and Stream Relocation	Blue Creek	06010103100
98.278	Carter	Removal of Point Bars	Buck Creek	06010103100
99.116	Carter	Bridge Replacement	Watauga River @ RM 1.72	06010103100
98.013	Carter	Box Culvert repair	Powder Branch	06010103140
98.375	MultiCounty			06010103140
99.050	Washington	Box Culvert	Ford Creek	06010103140
98.150	Washington	Rip Rap	Boones Creek	06010103150
98.234	Washington	Stream Relocation	Carroll Creek	06010103150
98.355	Washington	Stream Impoundment	Boones Creek Tributaries	06010103150
98.372	Washington	Stream Relocation	Knob Creek Tributary	06010103150
98.569	Washington	Wetland Alteration	Carroll Creek Tributary	06010103150
99.381	Washington	Wetland Alteration	Wetland Fill in Subdivision	06010103150

Table A4-7. Individual ARAP Permits Issued January 1994 Through June 2000 in Watauga River Watershed.

APPENDIX V

CONSERVATION PRACTICE	UNITS	AMOUNT
Alley Cropping	Acres	0
Contour Buffer Strips	Acres	0
Crosswind Trap Strips	Acres	0
Grassed Waterways	Acres	0
Filter Strips	Acres	0
Riparian Forest Buffers	Acres	0
Streambank and Shoreline Protection	Feet	2,716
Windbreaks and Shelterbelts	Feet	0
Hedgerow Plantings	Feet	0
Herbaceous Wind Barriers	Feet	0
Field Borders	Feet	0

Table A5-1a. Conservation Buffers Conservation Practices in Partnership with NRCS in Tennessee Portion of Watauga River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 1999 through September 30, 2000 reporting period.*

PARAMETER	TOTAL
Highly Erodible Land With Erosion Control Practices	335
Estimated Annual Soil Saved By Erosion Control Measures (Tons/Year)	1,309
Total Acres Treated With Erosion Control Measures	392

Table A5-1b. Erosion Control Conservation Practices in Partnership with NRCS Tennessee Portion of Watauga River Watershed. *Data are from PRMS for October 1, 1999 through September 30, 2000 reporting period.*

PARAMETER	TOTAL
Acres of AFO Nutrient Management Applied	19
Acres of Non-AFO Nutrient Management Applied	1,531
Total Acres Applied	1,550

Table A5-1c. Nutrient Management Conservation Practices in Partnership with NRCS in Tennessee Portion of Watauga River Watershed. *Data are from PRMS for October 1, 1999 through September 30, 2000 reporting period.*

PARAMETER	TOTAL
Number of Pest Management Systems	28
Acres of Pest Management Systems	1,237

Table A5-1d. Pest Management Conservation Practices in Partnership with NRCS in Tennessee Portion of Watauga River Watershed. *Data are from PRMS for October 1, 1999 through September 30, 2000 reporting period.*

CONSERVATION PRACTICE	ACRES
Acres of Coniferous Tree and Shrub Establishment	0
Acres Prepared for Revegetation of Forestland	0
Acres Improved Through Forest Stand Improvement	643
Acres of Tree and Shrub Establishment	0

Table A5-1e. Tree and Shrub Conservation Practices in Partnership with NRCS in Tennessee Portion of Watauga River Watershed. *Data are from PRMS for October 1, 1999 through September 30, 2000 reporting period.*

CONSERVATION PRACTICE	ACRES
Acres of Upland Habitat Management	22
Acres of Wetland Habitat Management	0
Total Acres Wildlife Habitat Management	22

Table A5-1f. Wildlife Habitat Management Conservation Practices in Partnership with NRCS in Tennessee Portion of Watauga River Watershed. *Data are from PRMS for October 1, 1999 through September 30, 2000 reporting period.*

COMMUNITY	TYPE OF LOAN	PROJECT DESCRIPTION	AWARD DATE
Elizabethton	Plan, Design, Construction	Renovate WTP	6/28/99
Elizabethton	Construction	Inflow/Infiltration Correction STP Upgrade	1/30/89
Elizabethton	Plan, Design, Construction	Interceptor, Collectors WWTP Pump Station Renovation	6/24/1997

Table A5-2. Communities in Watauga River Watershed Receiving SRF Grants or Loans.

PRACTICE	COUNTY	NUMBER OF BMPs
Fencing	Carter	1
Fencing	Sullivan	1
Hayland Planting	Carter	1
Hayland Planting	Johnson	1
Hayland Planting	Unicoi	1
Heavy Use Area	Carter	4
Heavy Use Area	Johnson	3
Heavy Use Area	Sullivan	3
Pasture & Hayland Planting	Carter	7
Pasture & Hayland Planting	Johnson	1
Pasture Planting	Carter	11
Pasture Planting	Johnson	7
Pipeline	Carter	1
Pond	Carter	3
Pond	Washington	1
Tank	Carter	2

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

SITE ID	WATER BODY
4198700101	Buffalo Creek
4198700201	Laurel Fork Creek
4198700301	Watauga River
4198700302	Watauga River
4198700303	Watauga River
4198800101	Doe Creek
4198800201	Watauga River
4198800202	Watauga River
4198800203	Watauga River
4198800204	Watauga River
4198800205	Watauga River
4198801501	Hampton Creek
4198801502	Hampton Creek
4198801601	Left Prong Hampton Creek
4198900201	Laurel Fork Creek
4198900202	Laurel Fork Creek
4199000601	Elk River
4199102101	Watauga River
4199102102	Watauga River
4199102103	Watauga River
4199102201	Laurel Fork Creek
4199102202	Laurel Fork Creek
4199201501	Roan Creek
4199201502	Roan Creek
4199201901	Boone Creek
4199203501	Watauga River
4199203502	Watauga River
4199203503	Watauga River
4199203601	Laurel Fork
4199203602	Laurel Fork
4199303801	Watauga River
4199303802	Watauga River
4199303803	Watauga River
4199303901	Laurel Fork Creek
4199303902	Laurel Fork Creek
4199304001	Doe Creek
4199304101	Forge Creek
4199304102	Forge Creek
4199304103	Forge Creek
4199304104	Forge Creek
4199403301	Watauga River
4199403302	Watauga River
4199403303	Watauga River
4199403401	Laurel Fork Creek
4199403402	Laurel Fork Creek

4199403601	Doe Creek
4199500801	Watauga River
4199500802	Watauga River
4199500803	Watauga River
4199500901	Stony Creek
4199500902	Stony Creek
4199501001	Laurel Fork Creek
4199501002	Laurel Fork Creek
4199501101	Doe Creek
4199601201	Watauga River
4199602001	Watauga River
4199602002	Watauga River
4199602003	Watauga River
4199602101	Doe River
4199602201	Laurel Fork
4199602202	Laurel Fork
4199602301	Doe Creek
4199700601	Watauga River
4199700602	Watauga River
4199700603	Watauga River
4199700701	Laurel Fork
4199700702	Laurel Fork
4199700801	Left Prong
4199700802	Left Prong
4199700803	Left Prong
4199700901	Doe Creek
4199701401	Bill Creek

Table A5-4. TWRA TADS Sampling Sites in Watauga River Watershed.