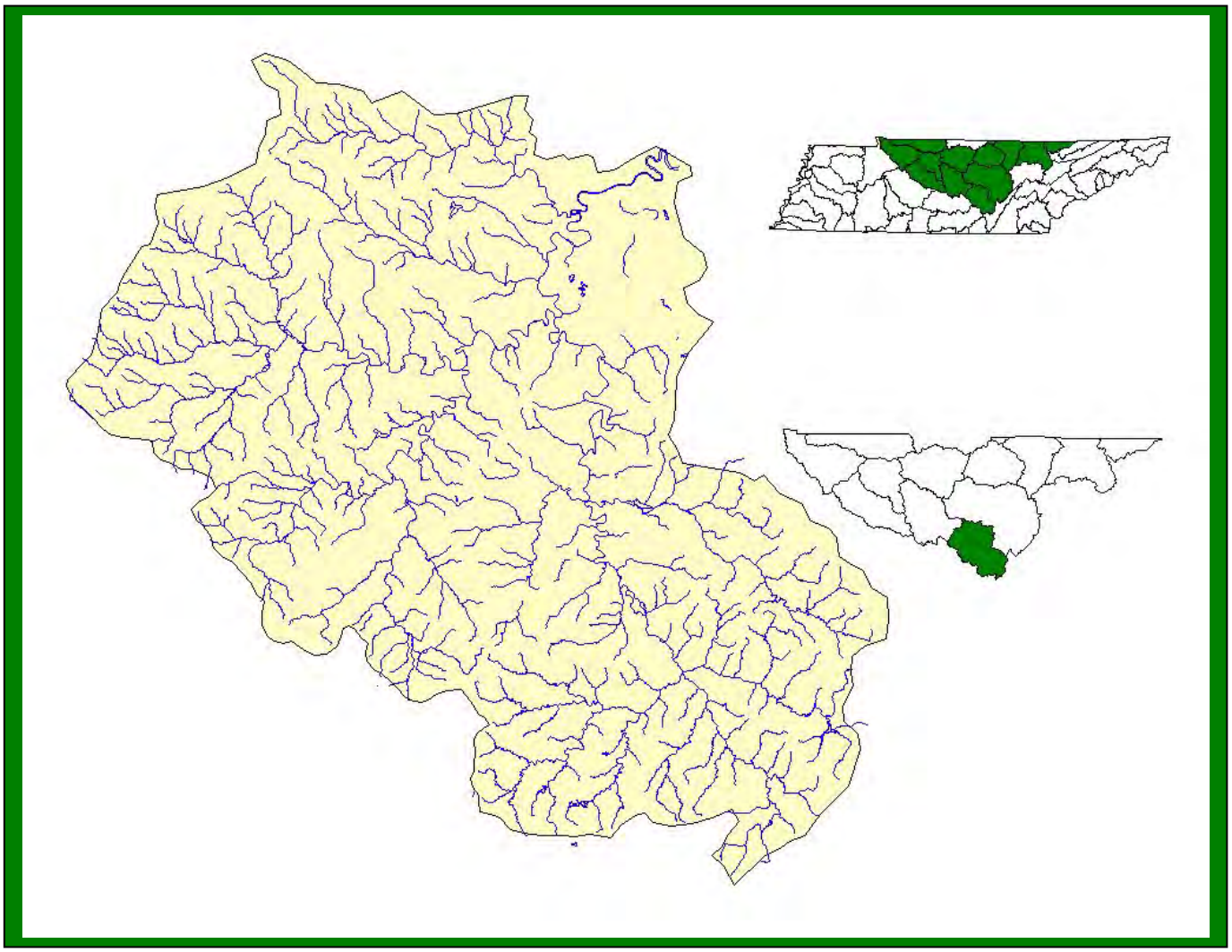
COLLINS RIVER WATERSHED (05130107) OF THE CUMBERLAND RIVER BASIN

WATERSHED WATER QUALITY MANAGEMENT PLAN



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER POLLUTION CONTROL
WATERSHED MANAGEMENT SECTION
2003

GLOSSARY

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

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

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

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

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

AFO. Animal Feeding Operation.

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

ARAP. Aquatic Resource Alteration Permit.

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

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

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

Benthic. Bottom dwelling.

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

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

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

CAFO. Concentrated Animal Feeding Operation.

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

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

DO. Dissolved oxygen.

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

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

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

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

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

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

MRLC. Multi-Resolution Land Classification.

MS4. Municipal Separate Storm Sewer System.

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

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

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

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

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

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

SBR. Sequential Batch Reactor.

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

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

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

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

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

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

TMSP. Tennessee Multi-Sector Permit.

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

WAS. Waste Activated Sludge.

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

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

WET. Whole Effluent Toxicity.

WWTP. Waste Water Treatment Plant

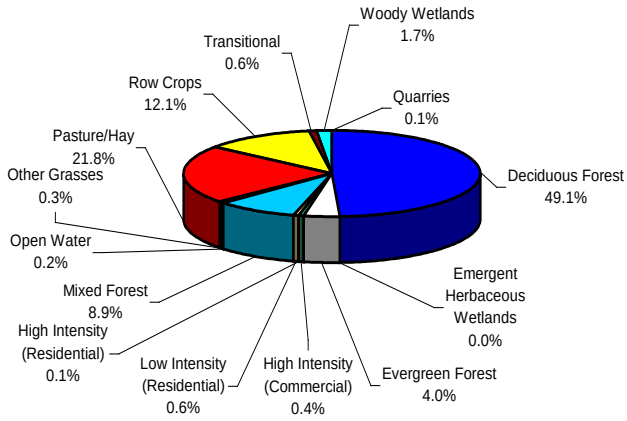
Summary – Collins River

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

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

Chapter 1 of the Collins River Watershed Water Quality Management Plan discusses the Watershed Approach and emphasizes that the Watershed Approach is not a regulatory program or an EPA mandate; rather it is a decision-making process that reflects a common strategy for information collection and analysis as well as a common understanding of the roles, priorities, and responsibilities of all stakeholders within a watershed. Traditional activities like permitting, planning and monitoring are also coordinated in the Watershed Approach.

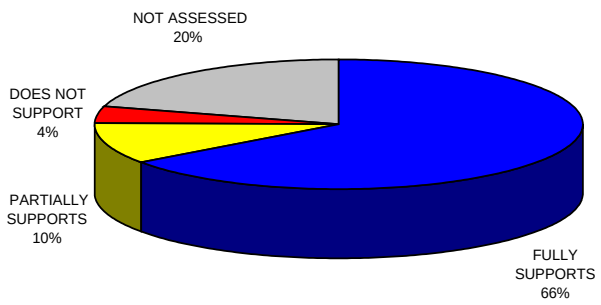
A detailed description of the watershed can be found in Chapter 2. The Collins River Watershed is approximately 811 square miles and includes parts of 6 Middle Tennessee counties. A part of the Cumberland River drainage basin, the watershed has 1,003 stream miles and 69 lake acres.



Land Use in the Collins River Watershed is based on MRLC Satellite Imagery.

There is one Designated State Natural Area and three Interpretive Areas located in the watershed. Seventy-eight rare plant and animal species have been documented in the watershed, including seven rare fish species, four rare mussel species, three rare snail species, and one rare crustacean species. A portion of the Collins River has been designated as a State Scenic River. Portions of four streams in the Collins River Watershed are listed in the National Rivers Inventory as having one or more outstanding natural or cultural values.

A review of water quality sampling and assessment is presented in Chapter 3. Using the Watershed Approach to Water Quality, 69 sampling sites were utilized in the Collins River Watershed. These were ambient or watershed monitoring sites. Monitoring results support the conclusion that 66% of total stream miles (based on RF3) fully support designated uses.



Water Quality Assessment in the Collins River Watershed is Based on the 1998 303(d) List.

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

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

HUC-10 Subwatersheds in the Collins River Watershed.

Point source contributions to the Collins River Watershed consist of three individual NPDES-permitted facilities. Other point source permits in the watershed are Aquatic Resource Alteration Permits (33), Tennessee Multi-Sector Permits (24), Mining Permits (5), and Water Treatment Plant Permits (2). Agricultural operations include cattle, chicken, hog, and sheep farming. Maps illustrating the locations of NPDES and ARAP permit sites are presented in each subwatershed.

Chapter 5 is entitled *Water Quality Partnerships in the Collins River Watershed* and highlights partnerships between agencies and between agencies and landowners that are essential to success. Programs of federal agencies (Natural Resources Conservation Service, U.S. Fish and Wildlife Service, U.S. Geological Survey), and state agencies (TDEC Division of Community Assistance, TDEC Division of Water Supply, and Tennessee Department of Agriculture) are summarized. Local initiatives of active watershed organizations (Cumberland River Compact) are also described.

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

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

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

1.1 Background

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

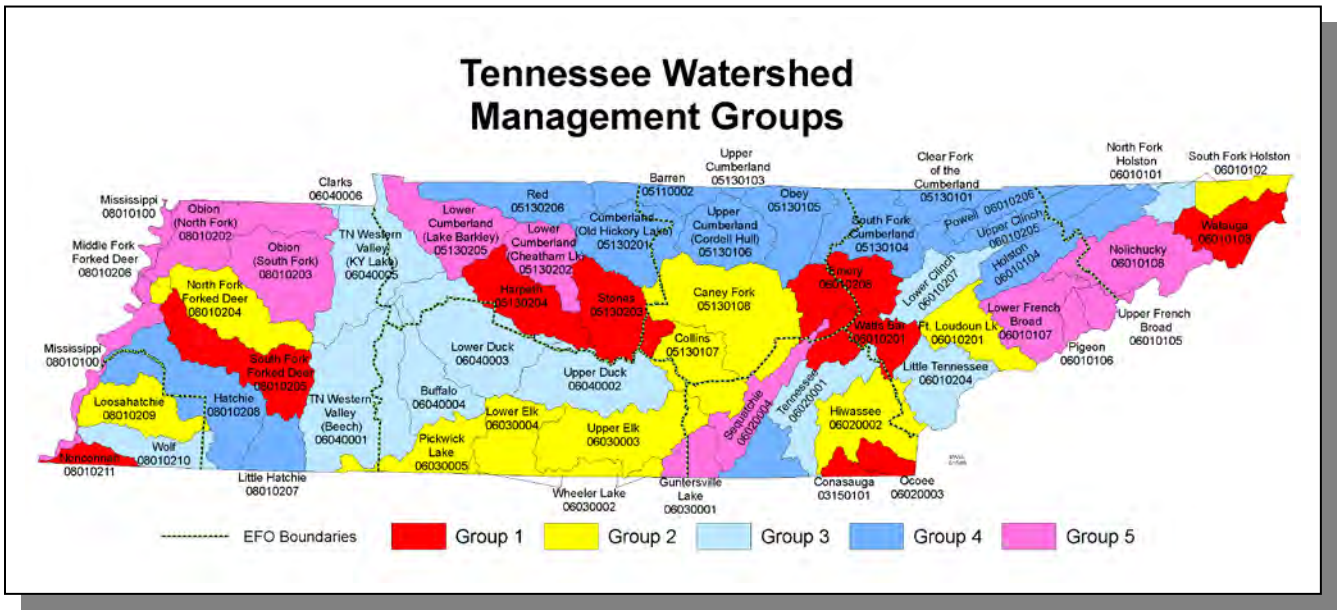


Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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

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

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

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

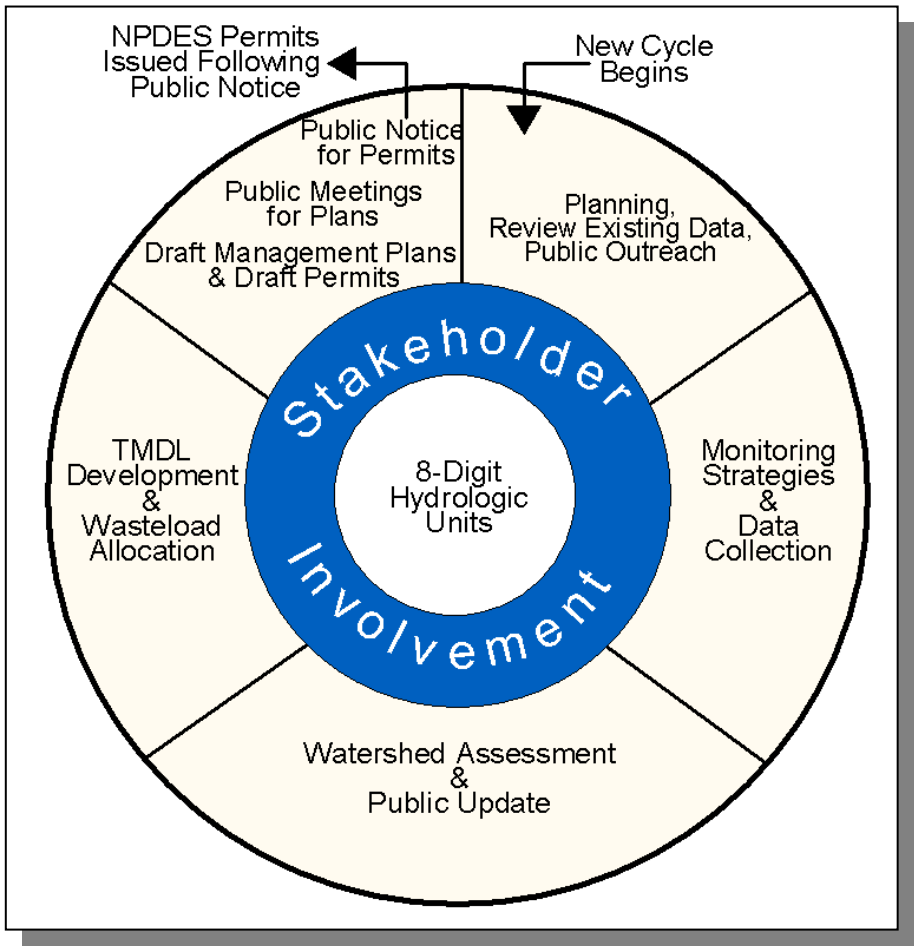


Figure 1-2. The Watershed Approach Cycle.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAPTER 2

DESCRIPTION OF THE COLLINS RIVER WATERSHED

2.1. Background

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

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

2.4. Land Use

2.5. Ecoregions and Reference Streams

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

2.7. Cultural Resources
2.7.A. State Scenic River
2.7.B. Nationwide Rivers Inventory
2.7.C. Interpretive Areas

2.8. Tennessee Rivers Assessment Project

2.1. BACKGROUND. The Collins River Watershed contains low to moderate gradient streams, with productive, nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. There are numerous springs and spring-associated fish fauna. Land in the Collins River Watershed is utilized by cattle, grain production, and tobacco farms as well as an abundance of plant nurseries.

Streams in the watershed have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Natural areas in this region are among the most scenic in the state.

Part of the Collins River is included in the State Scenic River System due to its scenic and pastoral nature.

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

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Collins River Watershed is located in Middle Tennessee and includes parts of Cannon, Coffee, De Kalb, Grundy, Marion, Sequatchie, Van Buren, and Warren Counties.

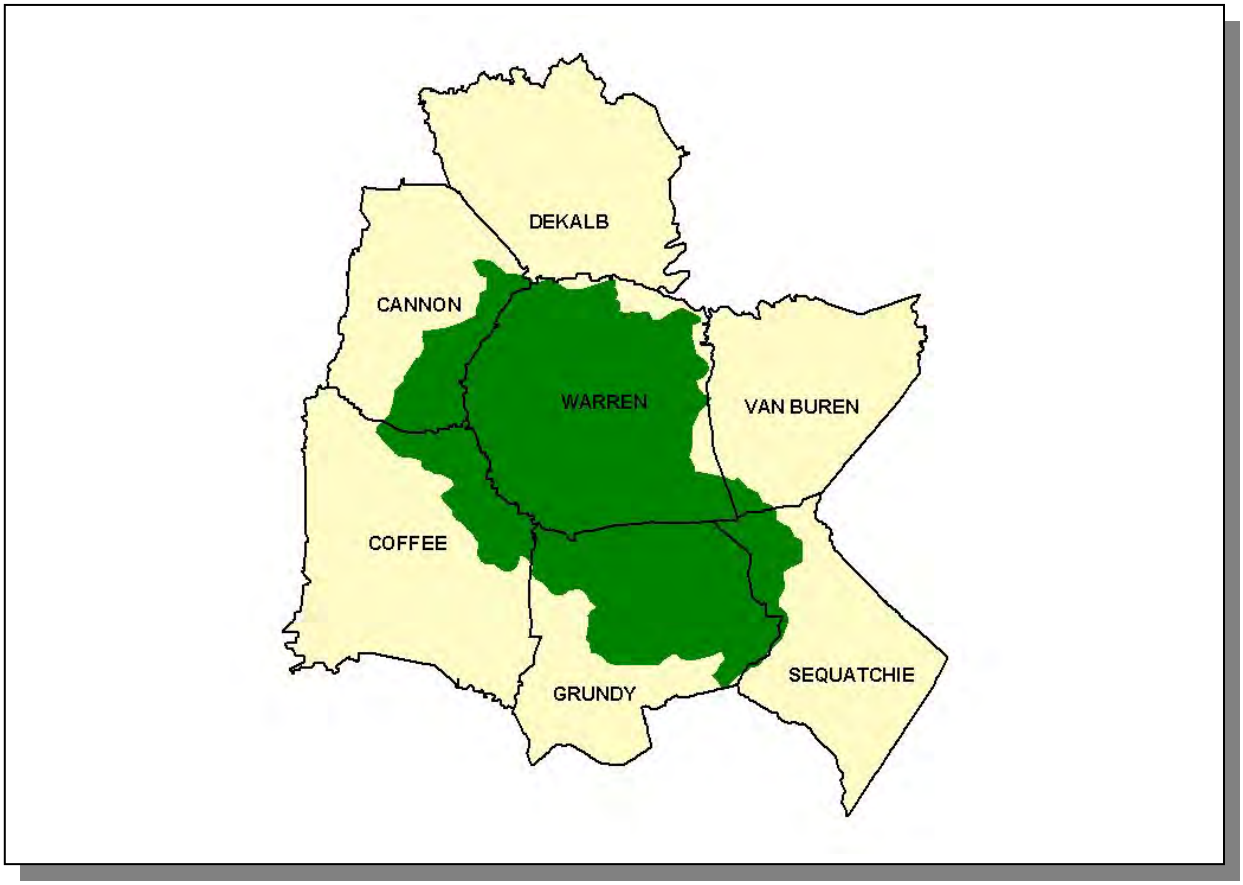


Figure 2-1. General Location of the Collins River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Warren	50.4
Grundy	26.8
Coffee	9.1
Cannon	8.9
Sequatchie	4.8

Table 2-1. The Collins River Watershed Includes Parts of Seven Middle Tennessee Counties. *238 acres (0.04662% of total acres) in DeKalb County and 11.0 acres (0.001327% of total acres) in Marion County are also in the watershed.*

2.2.B. Population Density Centers. Seven state highways serve the major communities in the Collins River Watershed.

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

MUNICIPALITY	POPULATION	COUNTY
McMinnville*	12,060	Warren
Gruetli-Laager	1,910	Grundy
Palmer	799	Grundy
Altamont*	719	Grundy
Beersheba Springs	607	Grundy
Morrison	594	Warren
Viola	128	Warren

Table 2-2. Municipalities in the Collins River Watershed. *Population based on 1996 census (Tennessee Blue Book). Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Collins River Watershed, designated 05130107 by the USGS, is approximately 811 square miles and empties to the Caney Fork River.

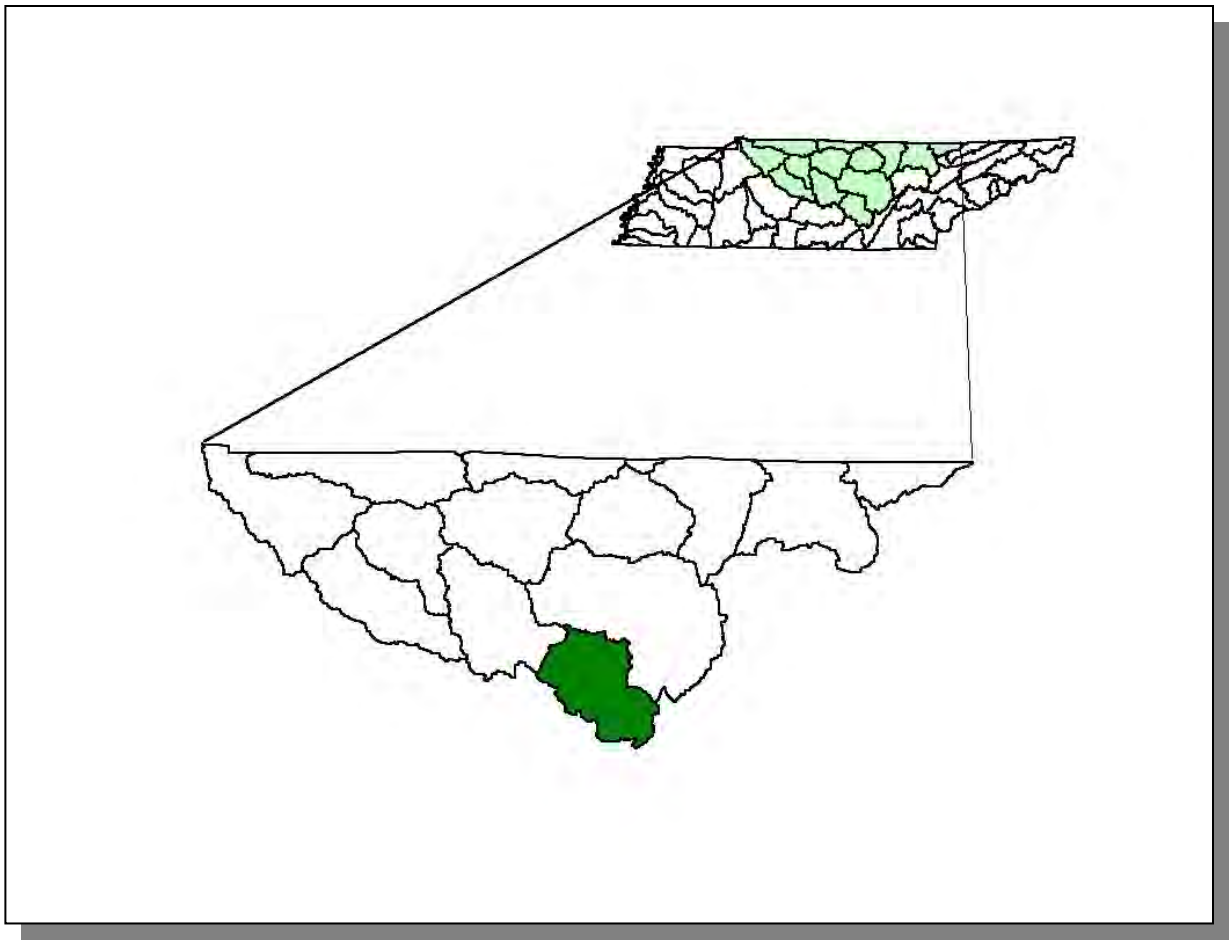


Figure 2-3. The Collins River Watershed is Part of the Cumberland River Basin.

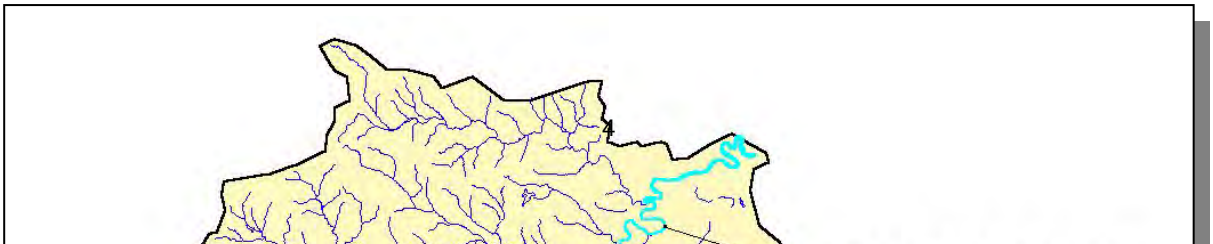


Figure 2-4. Hydrology in the Collins River Watershed. *There are 1,003 stream miles and 69 lake acres recorded in River Reach File 3 in the Collins River Watershed. Location of the Collins River and the cities of Gruetli-Laager, McMinnville, and Morrison are shown for reference.*

2.3.B. Dams. There are 13 dams inventoried by TDEC Division of Water Supply in the Collins River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

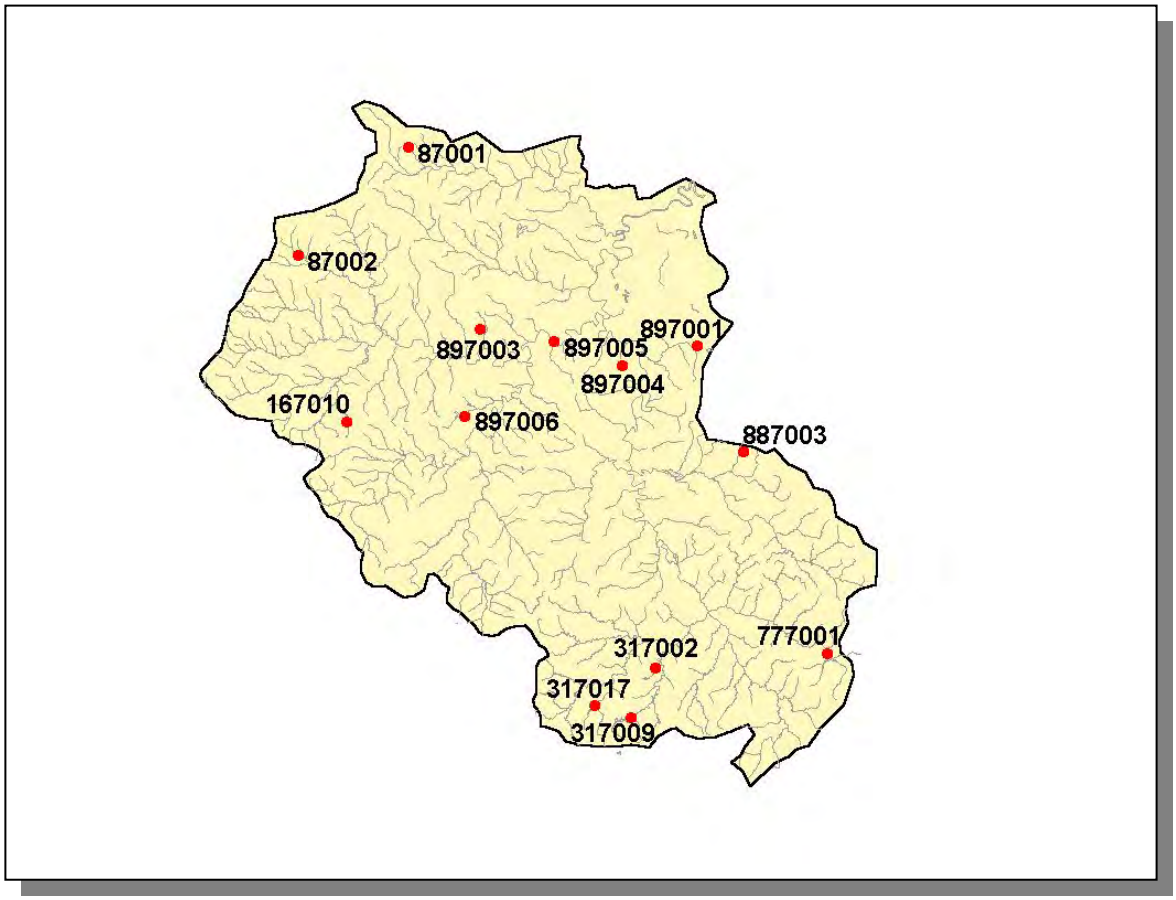


Figure 2-5. Location of Inventoried Dams in the Collins River Watershed. *More information is provided in Collins-Appendix II and on the TDEC homepage at:*
http://gwidc.gwi.memphis.edu/website/dams/viewer.htm

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

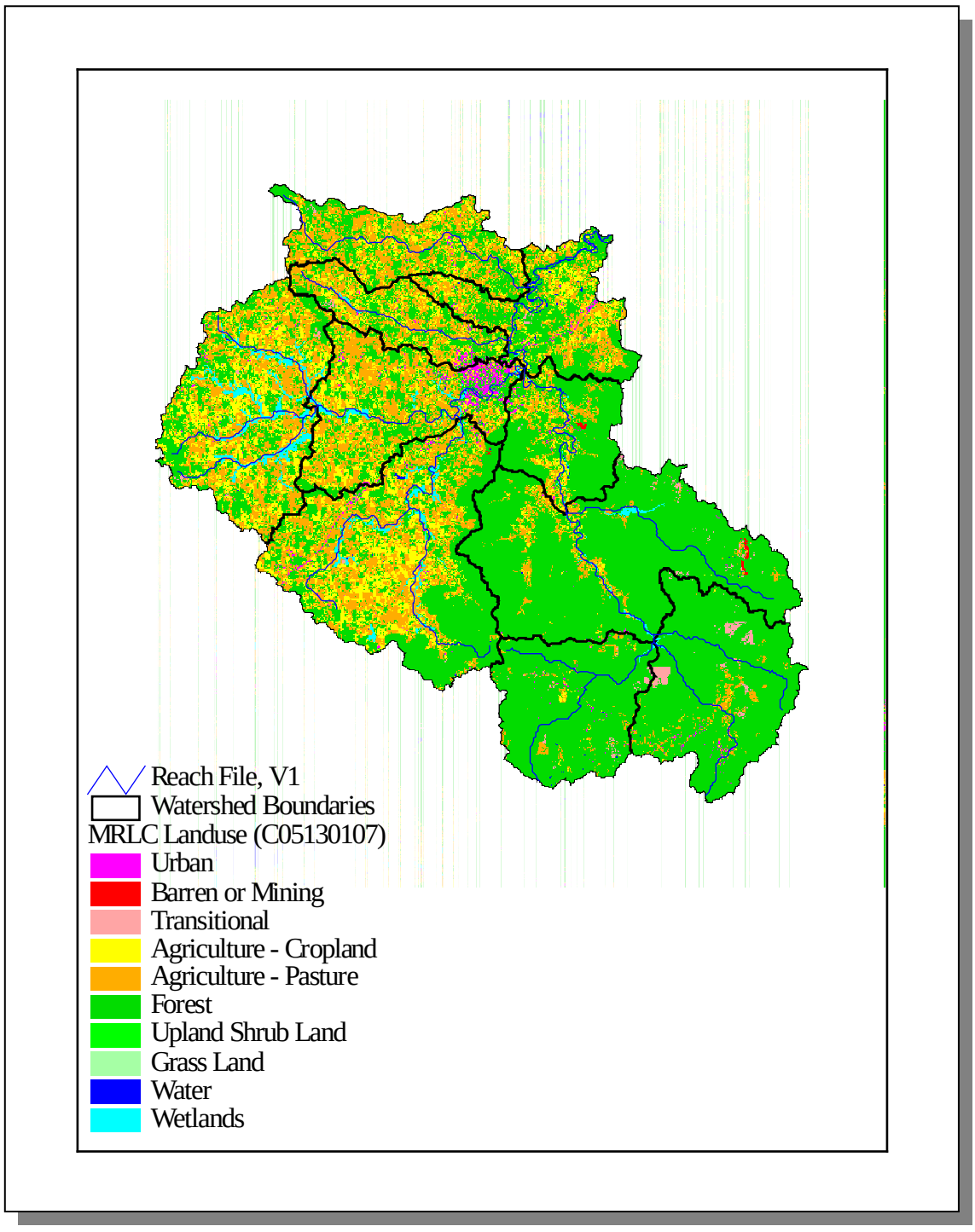


Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

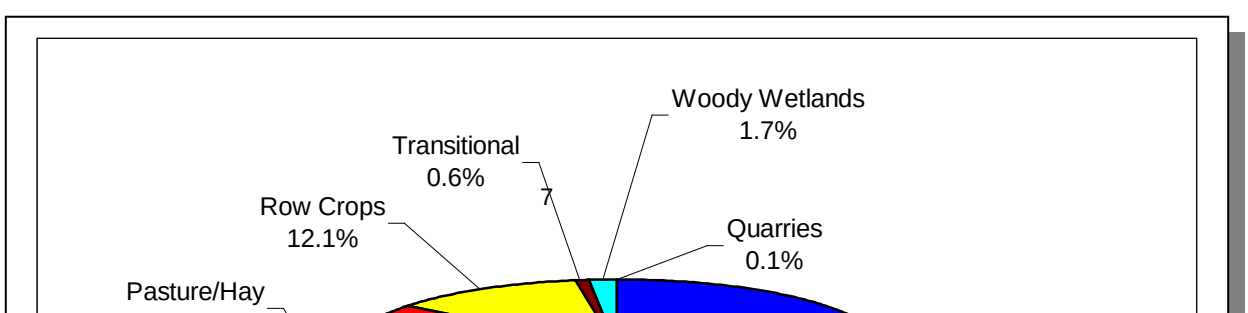


Figure 2-7. Land Use Distribution in the Collins River Watershed. *More information is provided in Collins-Appendix II.*

2.5. ECOREGIONS AND REFERENCE STREAMS. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plant and animal life. Ecoregions serve as a spatial framework for the

assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregion studies can aid the selection of regional stream reference sites, identifying high quality waters, and developing ecoregion-specific chemical and biological water quality criteria.

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Collins River Watershed lies within 2 Level III ecoregion (Interior Plateau and Southwestern Appalachians) and contains 4 Level IV subecoregions (Griffen, Omernik, Azavedo):

- The Cumberland Plateau's (68a) tablelands and open low mountains are about 1000 feet higher than to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains or the Plateau Escarpment (68c). Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvania-age conglomerate, sandstone, siltstone, and shale is covered by mostly well-drained, acidic soils of low fertility. The region is forested, with some agriculture and coal mining activities.

- The Plateau Escarpment (68c) is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvania-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

- The Eastern Highland Rim (71g) has level terrain, with landforms characterized as tablelands of moderate relief and irregular plains. Mississippian-age limestone, chert, shale, and dolomite predominate, and karst terrain sinkholes and depressions are especially noticeable between Sparta and McMinnville. Numerous springs and spring-associated fish fauna also typify the region. Natural vegetation for the region is transitional between the oak-hickory type to the west and the mixed mesophytic forests of the Appalachian ecoregions (68, 69) to the east. Bottomland hardwood forest has been inundated by several large impoundments. Barrens and former prairie areas are now mostly oak thickets or pasture and cropland.

- Outer Nashville Basin (71h) is a more heterogeneous region than the Inner Nashville Basin, with more rolling and hilly topography and slightly higher elevations. The region encompasses most all of the outer areas of the generally non-cherty Ordovician limestone bedrock. The higher hills and knobs are capped by the more cherty Mississippian-age formations, and some Devonian-age Chattanooga shale, remnants of the Highland Rim. The

region's limestone rocks and soils are high in phosphorus, and commercial phosphate is mined. Deciduous forests with pasture and cropland are the dominant land covers. Streams are low to moderate gradient, with productive nutrient-rich waters, resulting in algae, rooted vegetation, and occasionally high densities of fish. The Nashville Basin as a whole has a distinctive fish fauna, notable for fish that avoid the region, as well as those that are present.

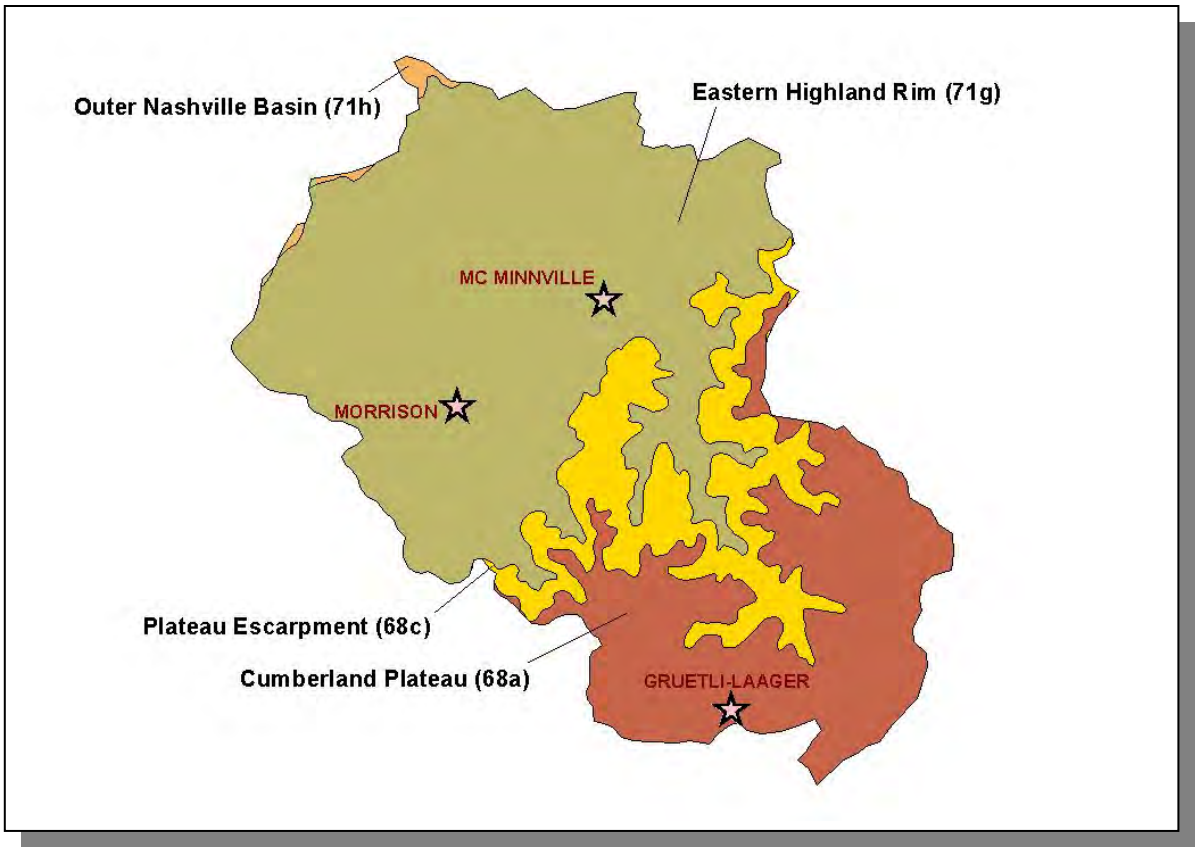


Figure 2-8. Level IV Ecoregions in the Collins River Watershed. *Locations of Gruetli-Laager, McMinnville, and Morrison are shown for reference.*

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.

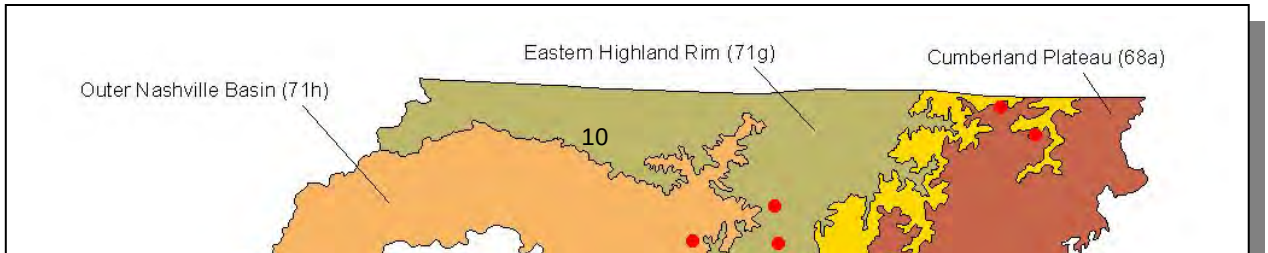


Figure 2-9. Ecoregion Monitoring Sites in Level IV Ecoregions 68a, 68c, 71g, and 71h. *The Collins River Watershed is shown for reference. More information is provided in Collins-Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Designated State Natural Area. The Natural Areas Program was established in 1971 with the passage of the Natural Areas Preservation Act. The Collins River Watershed has one Designated State Natural Area:

> Savage Gulf State Natural Area is a scenic area with an extensive trail system that includes a trail to Stone Door, used by native Indians as a passage for centuries.

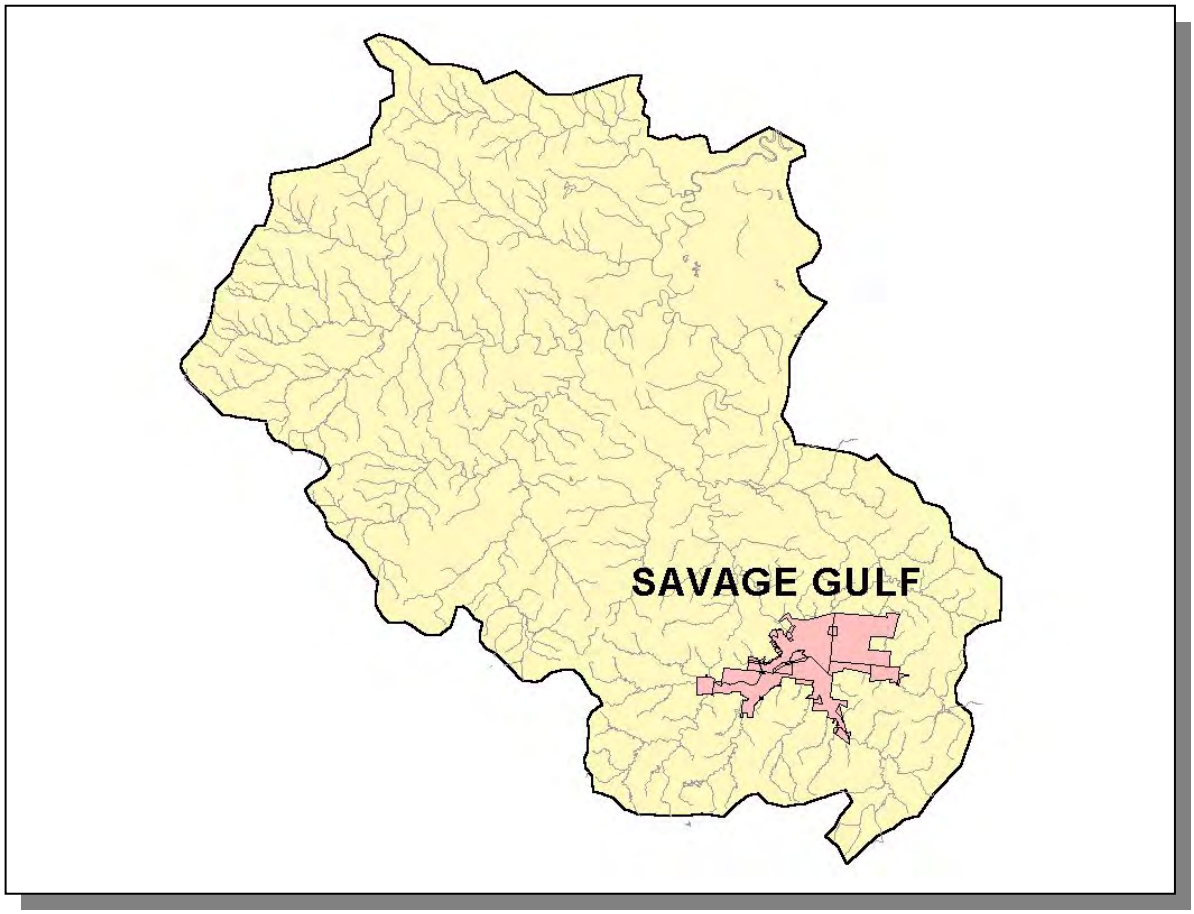


Figure 2-10. There is One Designated State Natural Area in the Collins River Watershed.

2.6.B. Rare Plants and Animals. The Heritage Program in the TDEC Division of Natural Heritage maintains a database of rare species that is shared by partners at The Nature Conservancy, Tennessee Wildlife Resources Agency, the US Fish and Wildlife Service,

and the Tennessee Valley Authority. The information is used to: 1) track the occurrence of rare species in order to accomplish the goals of site conservation planning and protection of biological diversity, 2) identify the need for, and status of, recovery plans, and 3) conduct environmental reviews in compliance with the federal Endangered Species Act.

GROUPING	NUMBER OF RARE SPECIES
Crustaceans	0
Insects	0
Mussels	5
Snails	3
Amphibians	3
Birds	3
Fish	8
Mammals	7
Reptiles	1
Plants	48
Total	**78**

Table 2-3. There are 78 Rare Plant and Animal Species in the Collins River Watershed.

In the Collins River Watershed, there are seven rare fish species, four rare mussel species, and three rare snail species.

SCIENTIFIC	COMMON	FEDERAL	STATE

NAME	NAME	STATUS	STATUS
Hemitremia flammea	Flame chub	MC	D
Notropis rupestris	Bedrock shiner		D
Typhlicthys subterraneus	Southern catfish	MC	D
Fundulus julisia	Barrens topminnow	MC	E
Etheostoma luteovinctum	Redband darter	MC	E
Etheostoma forbesi	Barrens darter	MC	E
Etheostoma sp d	Jewel darter (doration)	LE	E
Alasmidonta atropurpurea	Cumberland elktoe	LE	E
Medionidus conradicus	Cumberland pearlymussel	LE	E
Pegias fabula	Little-wing pearlymussel	LE	E
Pleurobema gibberum	Cumberland pigtoe	LE	E
Leptoxis subglobosa umbilicata	Umbilicate rocksnail		
Lithasia geniculata fuliginosa	Geniculate riversnail		
Lithasia geniculata pinguis	Small geniculate riversnail		

Table 2-4. Rare Aquatic Species in the Collins River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service, MC, Management Concern for U.S. Fish and Wildlife Service. State Status: E, Listed Endangered by the Tennessee Wildlife Resources Agency; D, Deemed in Need of Management by the Tennessee Wildlife Resources Agency. More information may be found at* http://www.state.tn.us/environment/nh/tnanimal.html

2.6.C. Wetlands. The Division of Natural Heritage maintains a database of wetland records in Tennessee. These records are a compilation of field data from wetland sites inventoried by various state and federal agencies. Maintaining this database is part of

Tennessee's Wetland Strategy, which is described at http://www.state.tn.us/environment/epo/wetlands/strategy.zip.

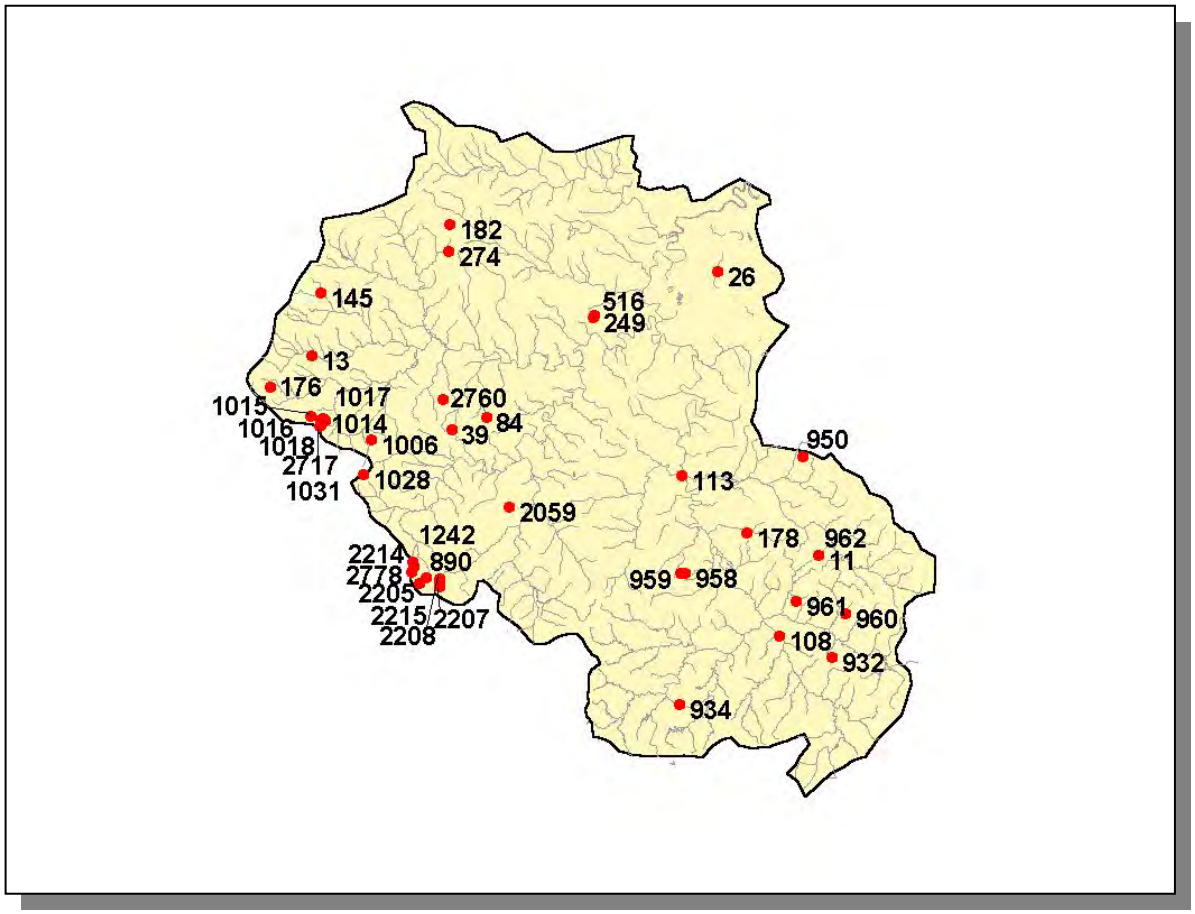


Figure 2-11. Location of Wetland Sites in TDEC Division of Natural Heritage Database in Collins River Watershed. ***This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands.*** *There may be additional wetland sites in the watershed.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

2.7. CULTURAL RESOURCES.

2.7.A. State Scenic River. A portion of the Collins River has been designated as a State Scenic River. Only the segment that lies within Grundy County is designated: The segment of the Collins River that lies within the Savage Gulf natural-scientific area is designated Class II. The Tennessee Scenic Rivers Act of 1968 defines Class II as pastoral river areas.

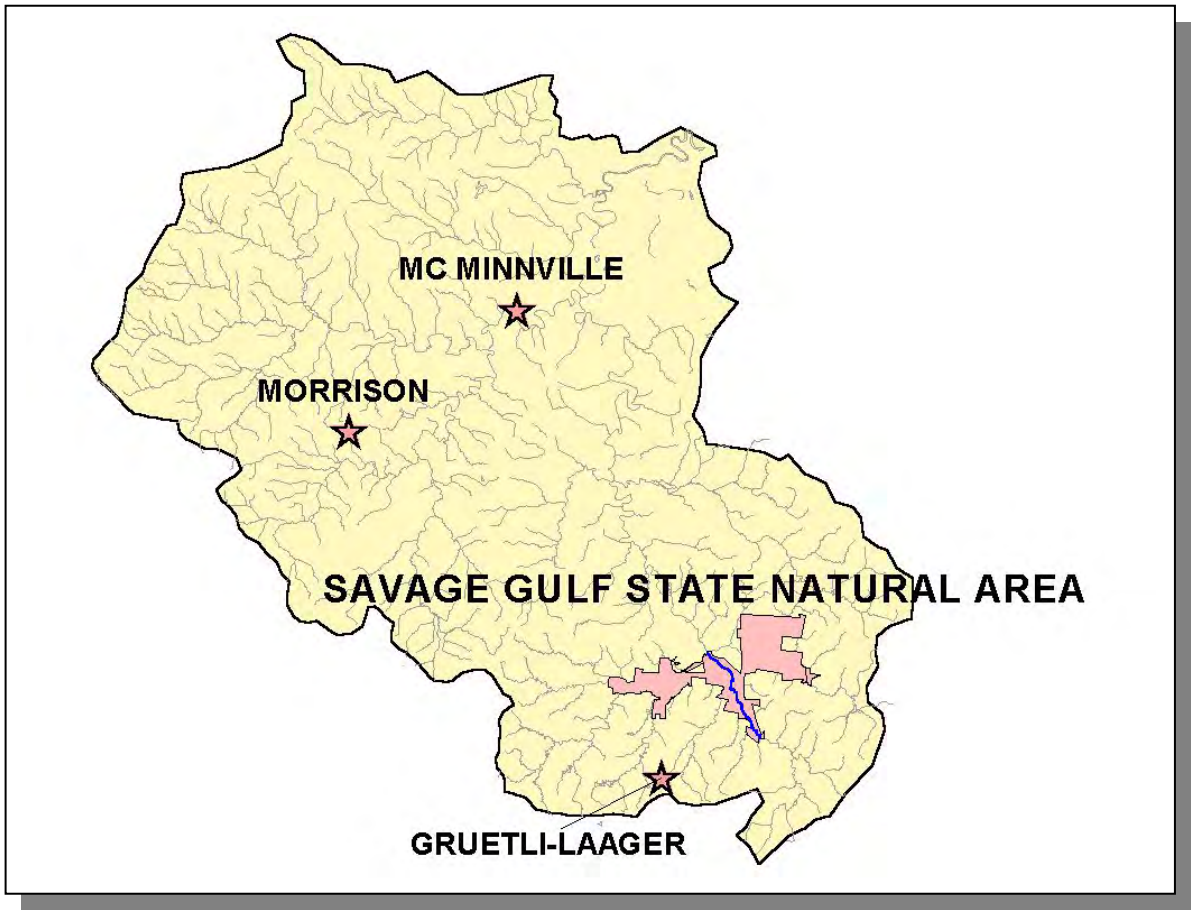


Figure 2-12. A Portion of the Collins River is Designated as a State Scenic River*. Locations of Gruetli-Laager, McMinnville, and Morrison are shown for reference.*

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

or mitigate actions that would have an adverse effect on Nationwide Rivers Inventory segments.

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

Big Creek. Scenic pastoral stream.

Charles Creek. Popular scenic fishing stream.

Collins River. Slow moving clear and cold pastoral stream with long pools and mild riffles; surrounded by high-forested hills and numerous bluffs.

Mountain Creek. Scenic stream that supports game fishery.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE
Big Creek	X			X	X
Charles Creek	X			X	X
Collins River	X	X	X	X	X
Mountain Creek	X	X		X	X

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

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

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

- South Cumberland State Park maintains an extensive trail system that enables the hiker to view Big Creek, Collins River, and Savage Creek as they tumble over 800 feet in elevation through narrow gorges and scenic rugged canyons.
- Rock Island State Park includes a 3 mile nature trail that winds along the riverbank of the Collins River and provides a glimpse of wildlife.
- Cumberland Caverns, a U.S. National Landmark containing great underground hallways and galleries of columns, stalactites and masses of formations.

There are also many local interpretive areas. McMinnville's Riverfront Park, a park for fishing, picnicking, and boating, is the most notable in the area.

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

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

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Barren Fork River	2	3	2	North Prong Barren Fork River	1		1
Big Creek	2			Piney Creek	3		1
Carvinger Creek	1			Ranger Creek	3		3
Charles Creek	3		1	Right Branch Dry Fork Creek			4
Collins River	1,2,3	2	1	Rusty Cup Creek	3		
Cone Hollow Creek	2			Sanville Branch Little Hickory Creek	2		
Fall Creek	3		3	Savage Creek	1		
Hickory Creek	2	3	2	South Prong Barren Fork River	3		
Hills Creek	3	3	1	Thicket Creek	3		
Meadow Creek	3			West Fork Hickory Creek	2		1
Mill Creek	2		1	Witty Creek			
Mountain Creek	1		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

CHAPTER 3

WATER QUALITY ASSESSMENT OF THE COLLINS RIVER WATERSHED

3.1 Background

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

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

3.4 Fluvial Geomorphology

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

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

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

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

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

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

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

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

4. Highlight areas of improved water quality

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

The 303(d) list is a compilation of the waters of Tennessee that 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) for which it is listed.

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

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

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

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

3.2. DATA COLLECTION. Comprehensive water quality monitoring in the Collins River Watershed was conducted in 1999. Data were collected from 57 sites and are from one of four types of sites: 1)Ambient sites, 2)Ecoregion sites, 3)Watershed sites or 4)Special survey sites.

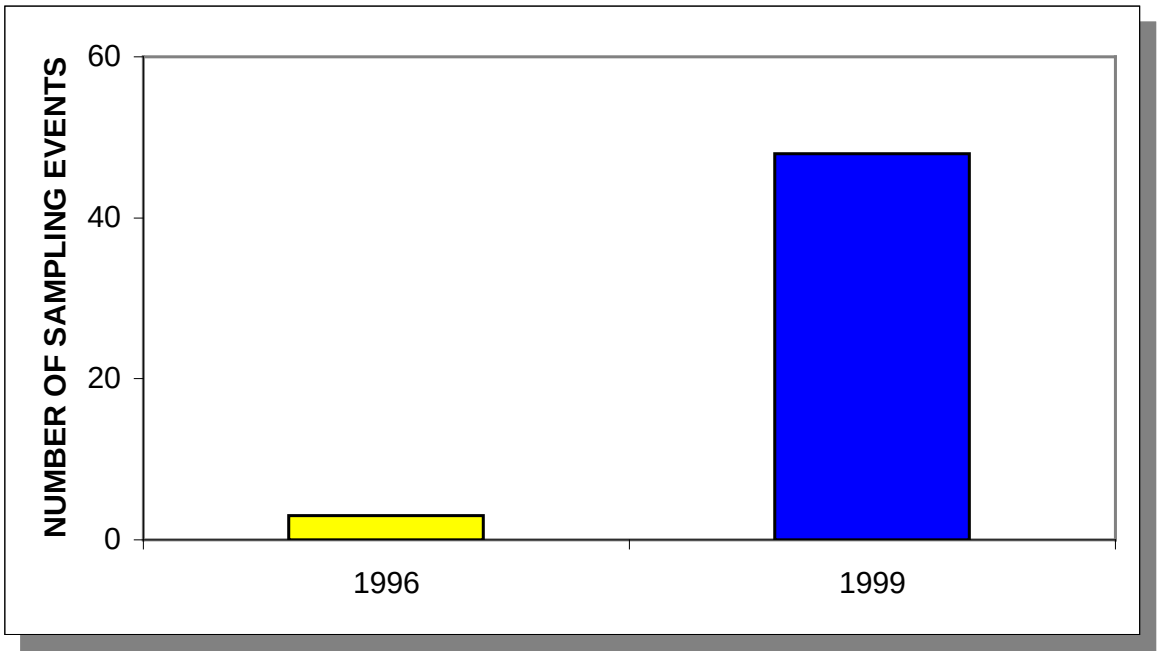


Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (1999) in the Collins River Watershed.

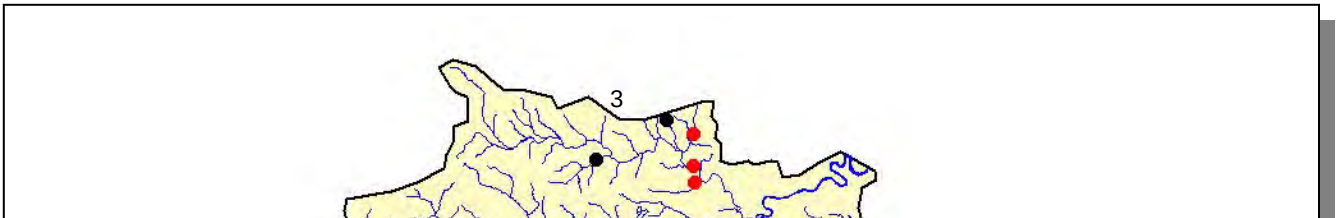


Figure 3-2. Location of Monitoring Sites in the Collins River Watershed. *Red, Biological Assessment Sites; Black, Observational Assessment Sites; Green, Chemical Sampling Sites. Locations of Gruetli-Laager, McMinnville, and Morrison are shown for reference.*

TYPE	NUMBER	TOTAL NUMBER OF SAMPLING EVENTS		
		CHEMICAL ONLY	BIOLOGICAL ONLY	BIOLOGICAL PLUS CHEMICAL (FIELD PARAMETERS)
Ambient	11	8	3	
Watershed	45	3	42	
Special Survey	13	12	1	1
Totals	**69**	**23**	**46**	**1**

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

In addition to the 69 sampling events, over 13 citizen complaints and 1 occurrence involving dead fish (fish kill) were investigated.

3.2.A. Ambient Monitoring Sites. These fixed-station chemical monitoring sites are sampled quarterly or monthly by the Environmental Assistance Center-Nashville and Environmental Assistance Center-Cookeville staff (this is in addition to samples collected by water and wastewater treatment plant operators). Samples are analyzed by the Tennessee Department of Health, Division of Environmental Laboratory Services. Ambient monitoring data are used to assess water quality in major bodies of water where there are NPDES facilities and to identify trends in water quality. Water quality parameters traditionally measured at ambient sites in the Collins River Watershed are provided in Collins-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 Collins River Watershed lies within 2 Level III ecoregions (Interior Plateau and Southwestern Appalachians) and contains 4 subecoregions (Level IV):

- Cumberland Plateau (68a)
- Plateau Escarpment (68c)
- Outer Nashville Basin (71h)
- Eastern Highland Rim (71g)

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

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

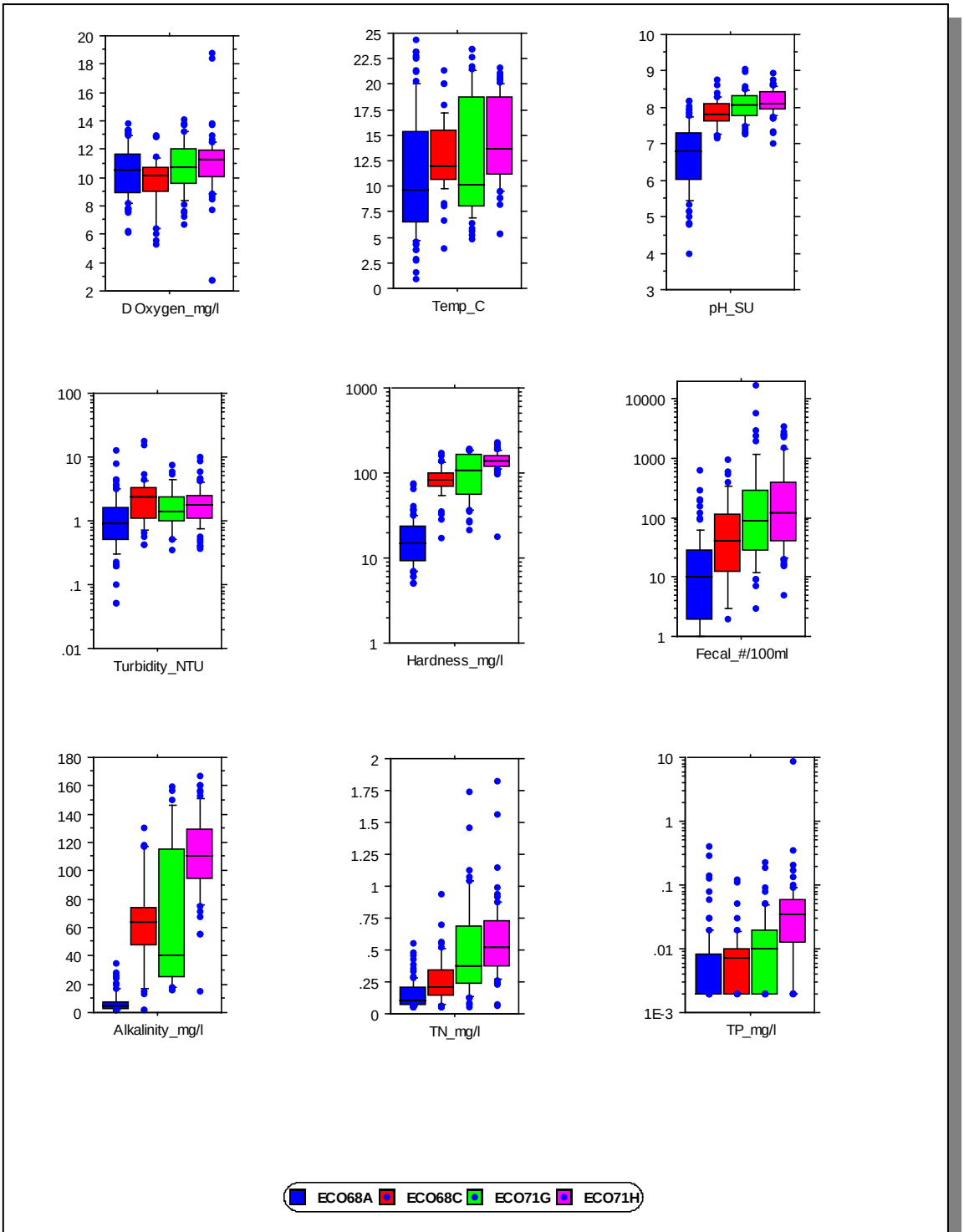


Figure 3-3. Select Chemical Data Collected in Collins River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots.* Fecal, fecal coliform bacteria; TN, Total Nitrogen; TP, Total Phosphorus.

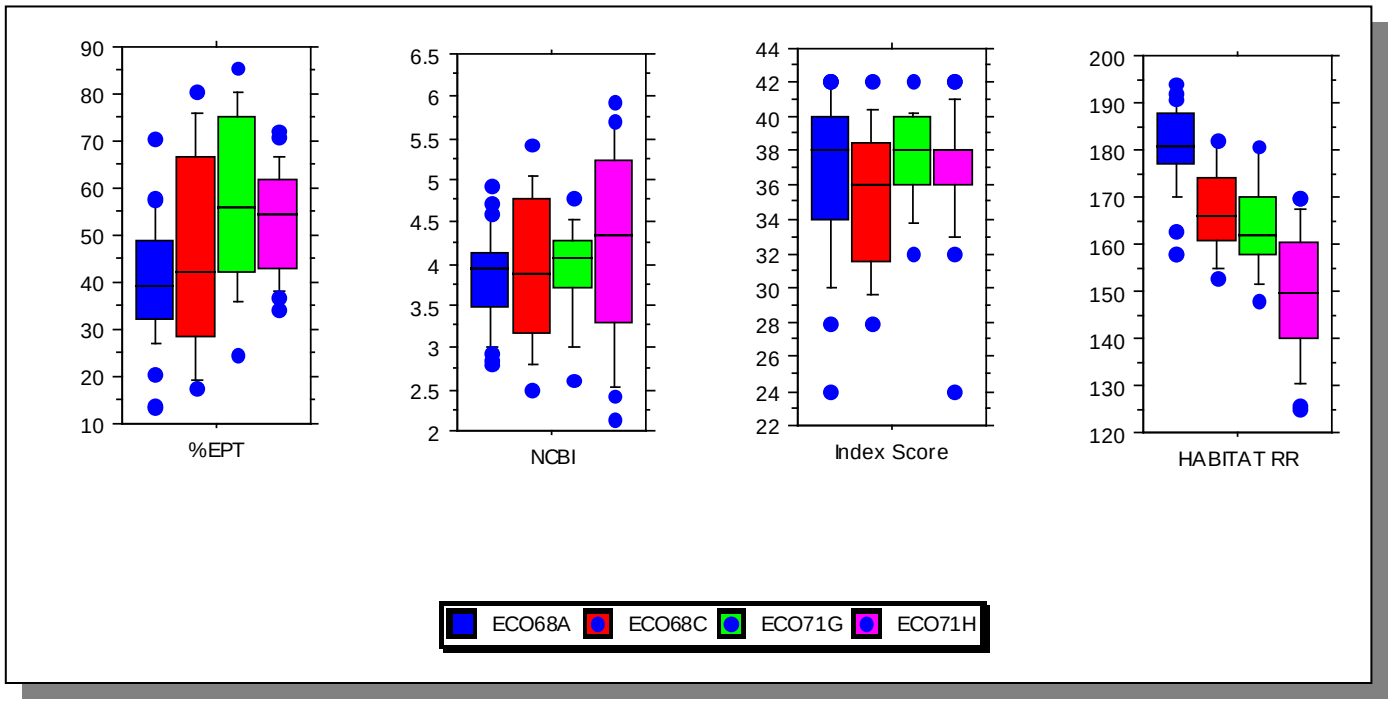


Figure 3-4. Benthic Macroinvertebrate and Habitat Scores for Collins River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as dots. NCBI, North Carolina Biotic Index. Index Score and Habitat Riffle/Run scoring system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

3.2.C. Watershed Screening Sites. Activities that take place at watershed sites are benthic macroinvertebrate stream surveys, physical habitat determinations and/or

chemical monitoring. Following review of existing data, watershed sites are selected in Year 1 of the watershed approach when preliminary monitoring strategies are developed. Additional sites may be added in Year 2 when additional monitoring strategies are implemented.

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

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

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

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

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

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

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

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

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

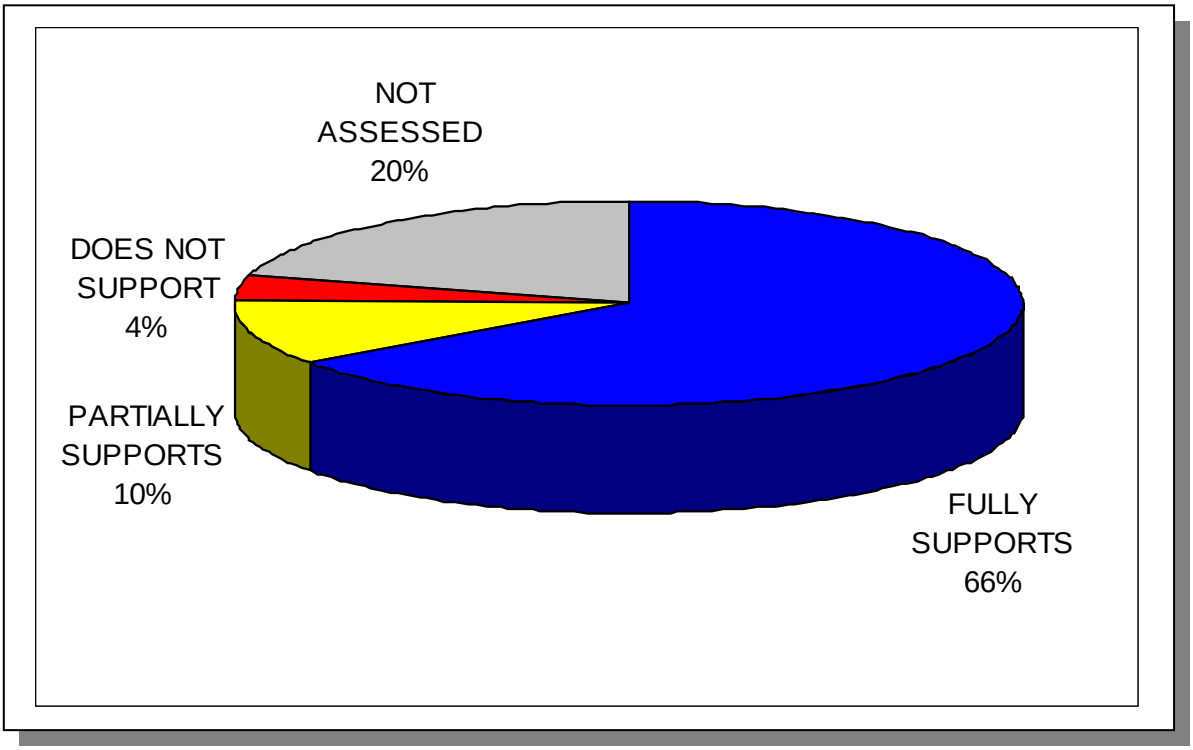


Figure 3-5a. Water Quality Assessment for Streams and Rivers in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. More information is provided in Collins-Appendix III.*

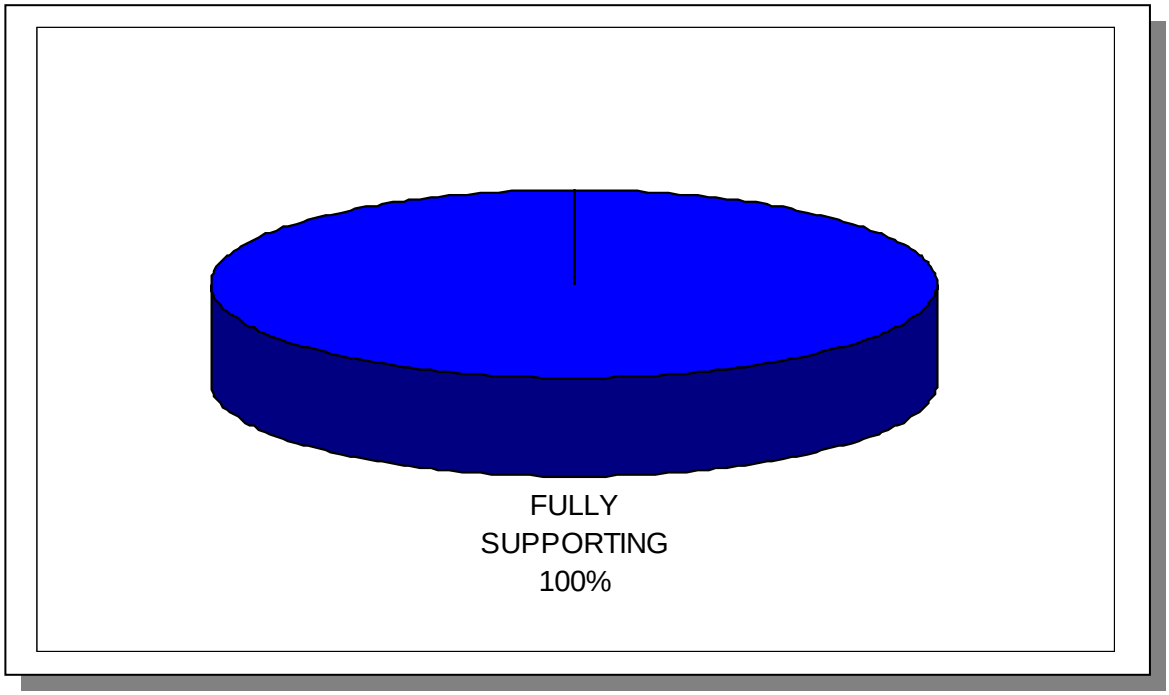


Figure 3-5b. Water Quality Assessment for Lakes in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. More information is provided in Collins-Appendix III.*

3.3.A. Assessment Summary.

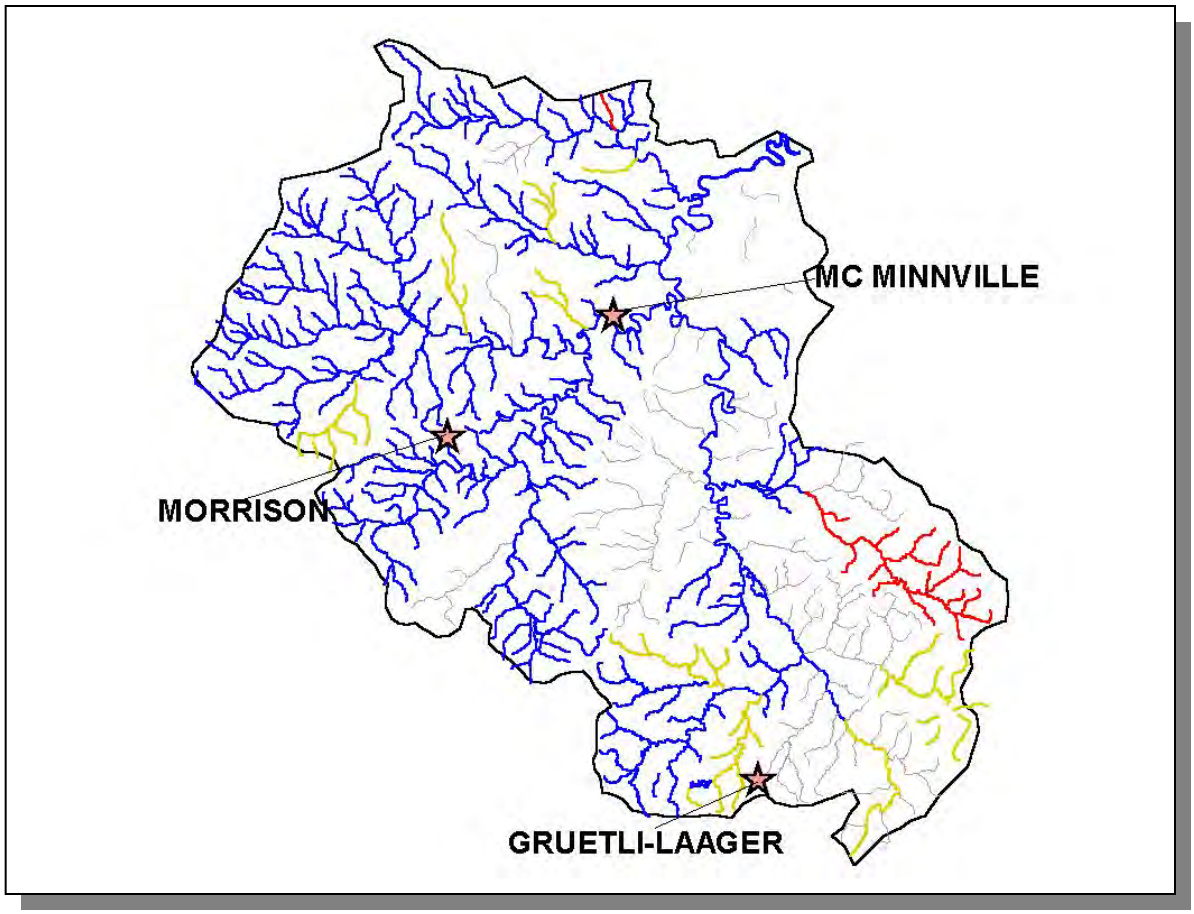


Figure 3-6a. Overall Use Support Attainment in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Gruetli-Laager, McMinnville, and Morrison are shown for reference. More information is provided in Collins-Appendix III.*

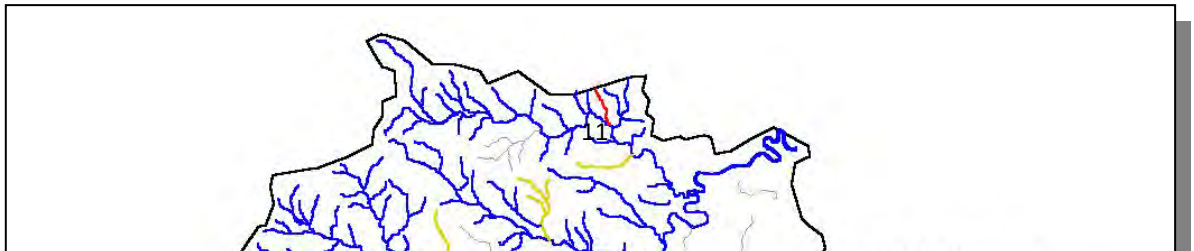


Figure 3-6b. Fish and Aquatic Life Use Support Attainment in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Gruetli-Laager, McMinnville, and Morrison are shown for reference. More information is provided in Collins-Appendix III.*

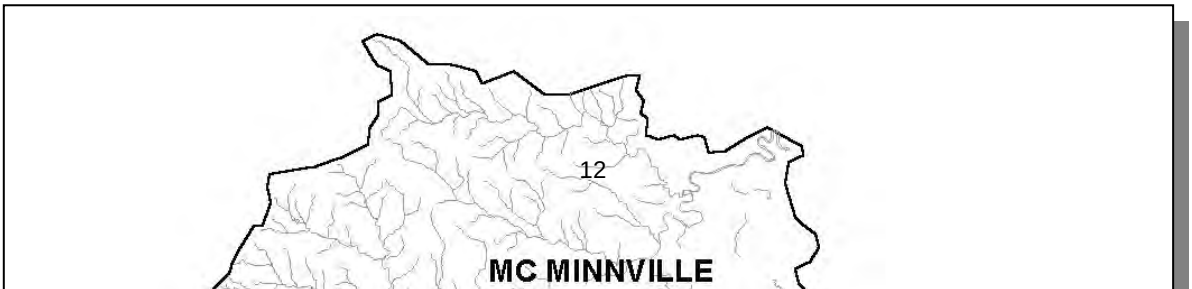


Figure 3-6c. Recreation Use Support Attainment in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Gruetli-Laager, McMinnville, and Morrison are shown for reference. More information is provided in Collins-Appendix III.*

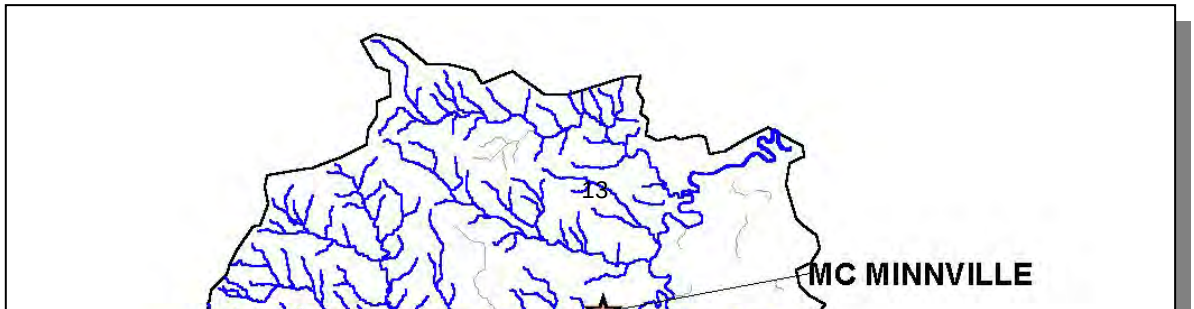


Figure 3-6d. Irrigation Use Support Attainment in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Gruetli-Laager, McMinnville, and Morrison are shown for reference. More information is provided in Collins-Appendix III.*

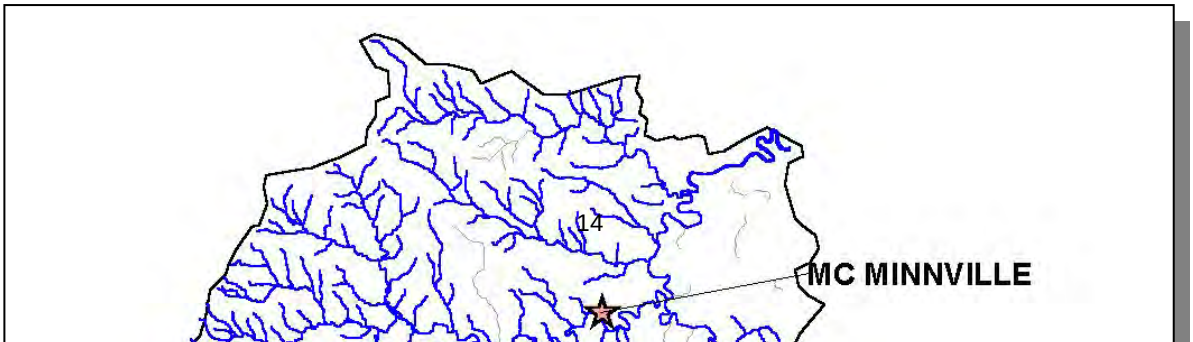


Figure 3-6e. Livestock Watering and Wildlife Use Support Attainment in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Gruetli-Laager, McMinnville, and Morrison are shown for reference. More information is provided in Collins-Appendix III.*

3.3.B. Use Impairment Summary.

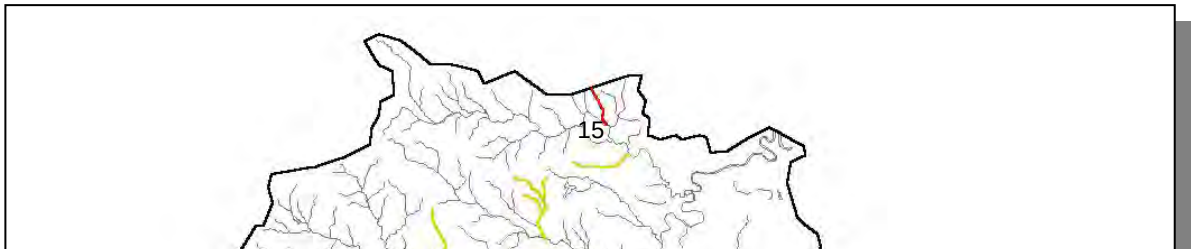


Figure 3-7a. Impaired Streams Due to Habitat Alteration in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment.; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gruetli-Laager, McMinnville, and Morrison are shown for reference. More information is provided in Collins-Appendix III.*

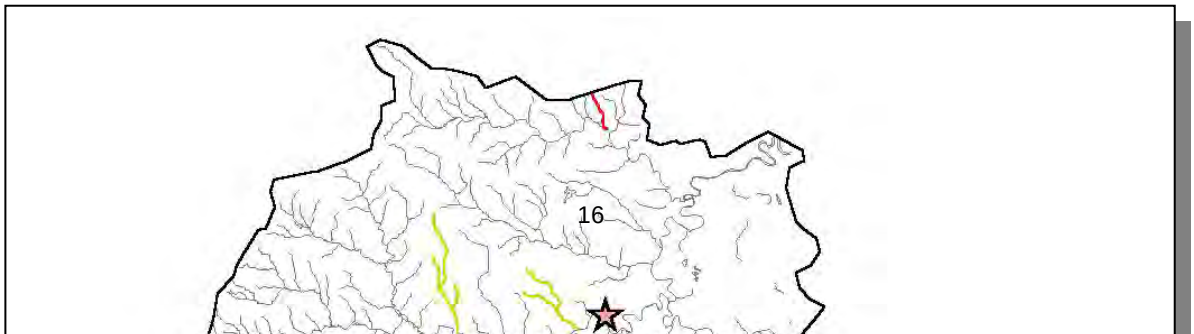


Figure 3-7b. Impaired Streams Due to Siltation in the Collins River Watershed. *Assessment data are based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gruetli-Laager, McMinnville, and Morrison are shown for reference. More information is provided in Collins-Appendix III.*

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

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

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

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

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

There are several benefits to using regional curves:

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

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

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE COLLINS RIVER WATERSHED

4.1 Background.

4.2. Characterization of HUC-10 Subwatersheds
4.2.A. 0513010701 (Collins River)
4.2.B. 0513010702 (Barren Fork River)
4.2.C. 0513010703 (Hickory Creek)
4.2.D. 0513010704 (Collins River)

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

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

The Collins River Watershed (HUC 05130107) has been delineated into four HUC 10-digit subwatersheds.

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

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

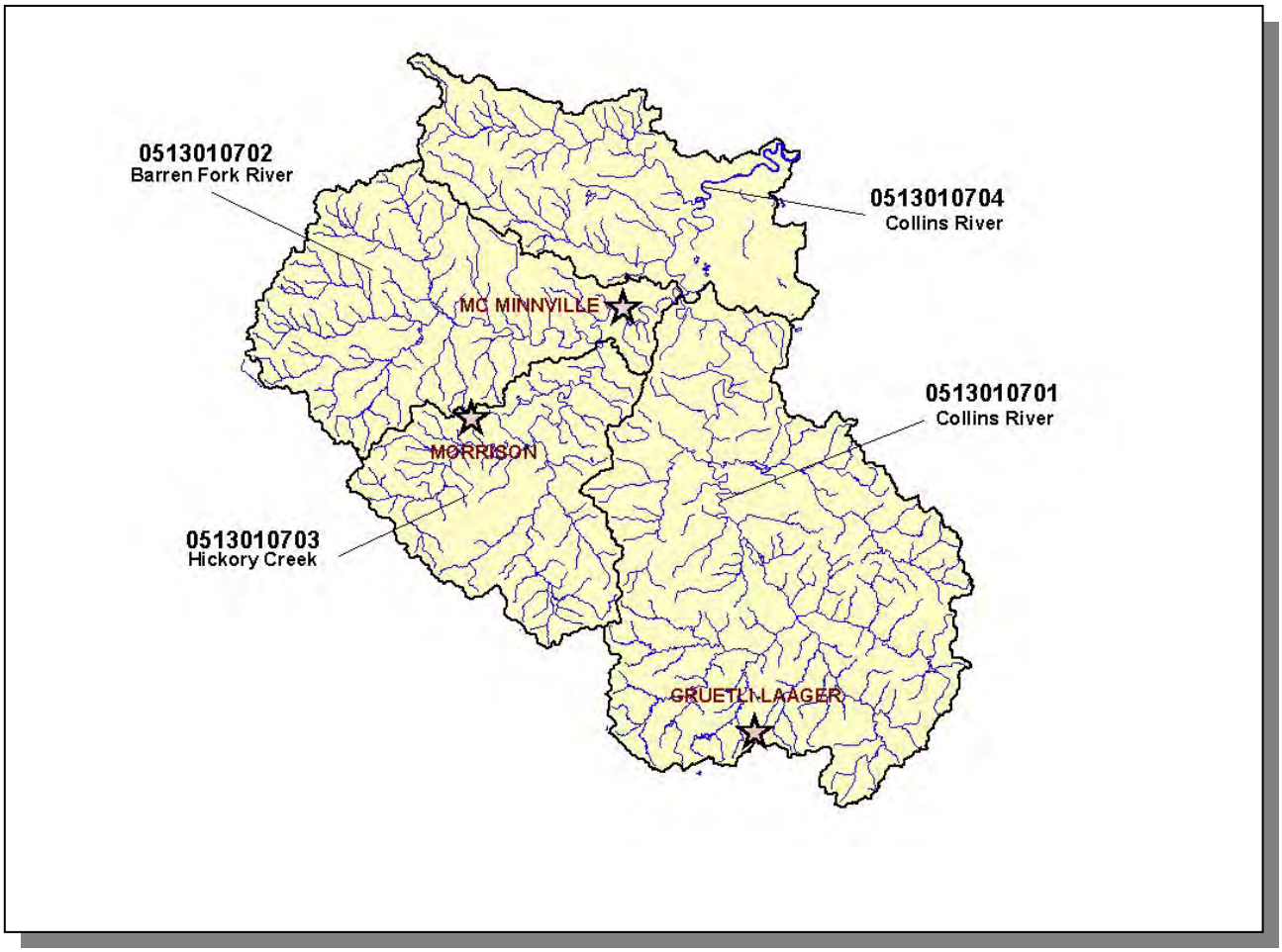


Figure 4-1. The Collins River Watershed is Composed of Four USGS-Delineated Subwatersheds (10-Digit Subwatersheds). *Locations of Gruetli-Laager, McMinnville, and Morrison are shown for reference.*

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

HUC-10	HUC-12
0513010701	051301070101 (Collins River)
	051301070102 (Big Creek)
	051301070103 (Savage Creek)
	051301070104 (Collins River)
	051301070105 (Scott Creek)
	051301070106 (Spring Creek)
	051301070107 (Collins River)
0513010702	051301070201 (Bullpen Creek)
	051301070202 (Duke Creek)
	051301070203 (Barren Fork River)
	051301070204 (Barren Fork River
0513010703	051301070301 (Little Hickory Creek)
	051301070302 (West Fork Hickory Creek)
	051301070303 (Hickory Creek)
0513010704	051301070401 (Collins River)
	051301070402 (Charles Creek)
	051301070403 (Mountain Creek)

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

4.2.A. 0513010701.

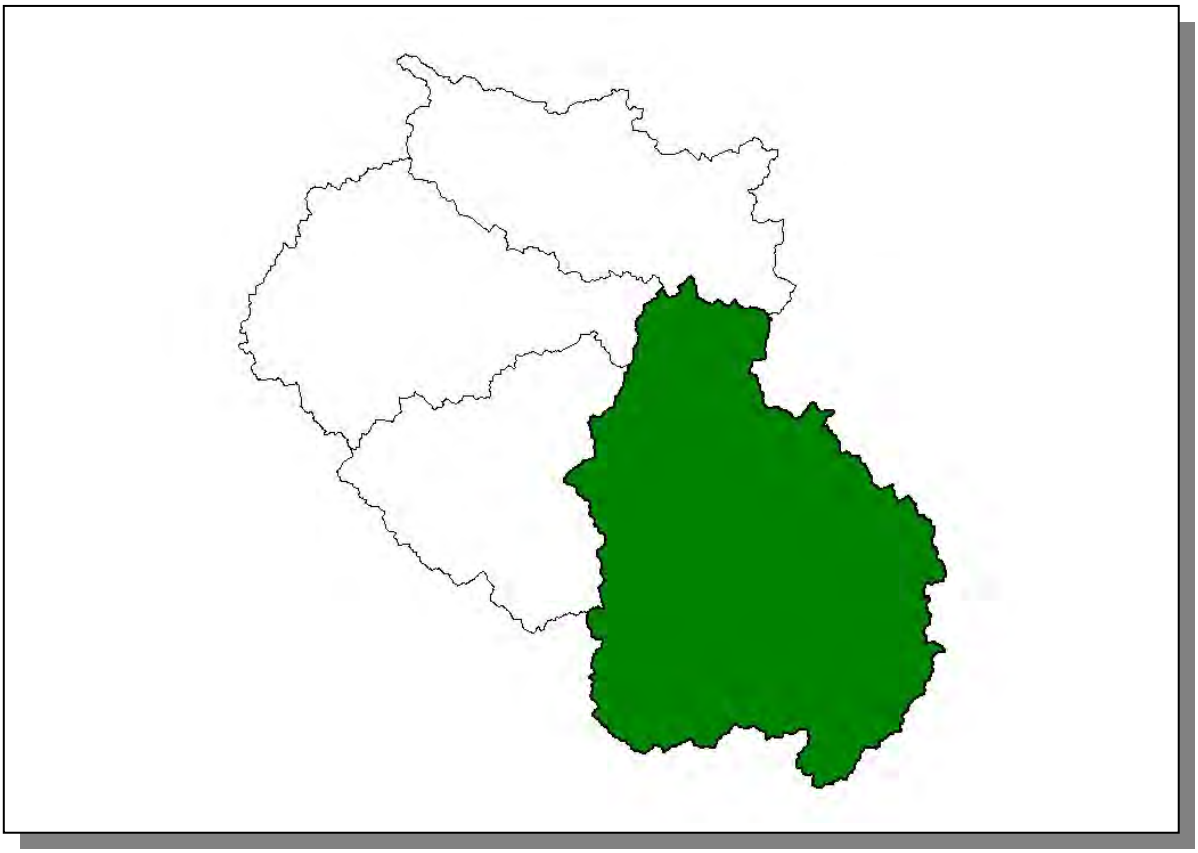


Figure 4-2. Location of Subwatershed 0513010701. *All Collins HUC-10 subwatershed boundaries are shown for reference.*

4.2.A.i. General Description.

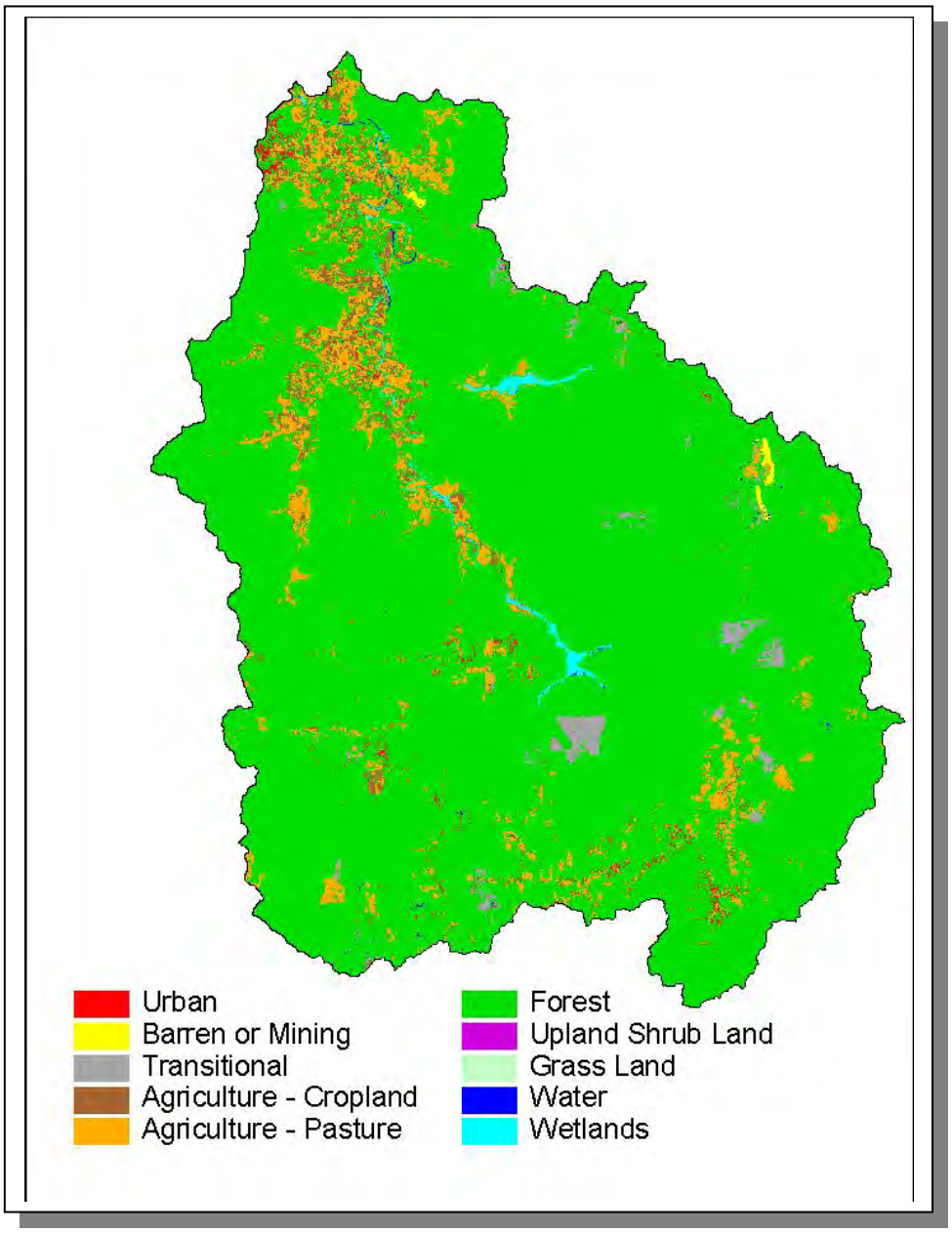


Figure 4-3. Illustration of Land Use Distribution in Subwatershed 0513010701.

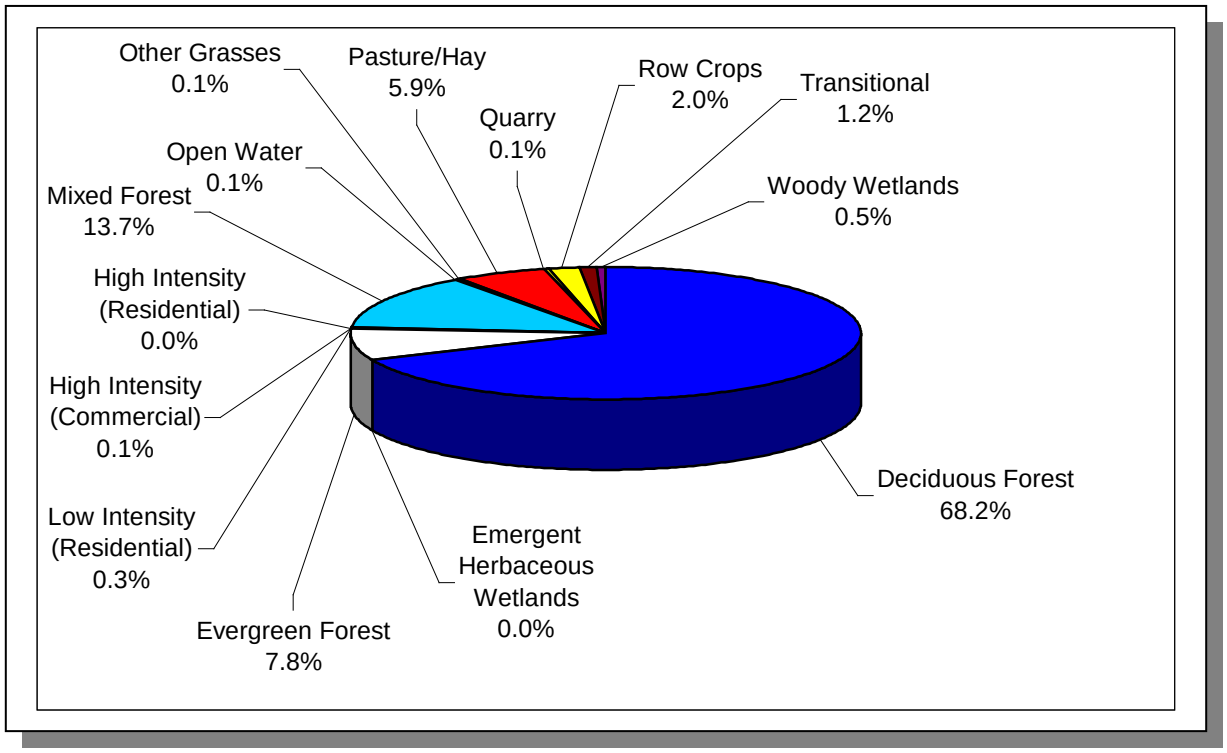


Figure 4-4. Land Use Distribution in Subwatershed 0513010701. *More information is provided in Collins-Appendix IV.*

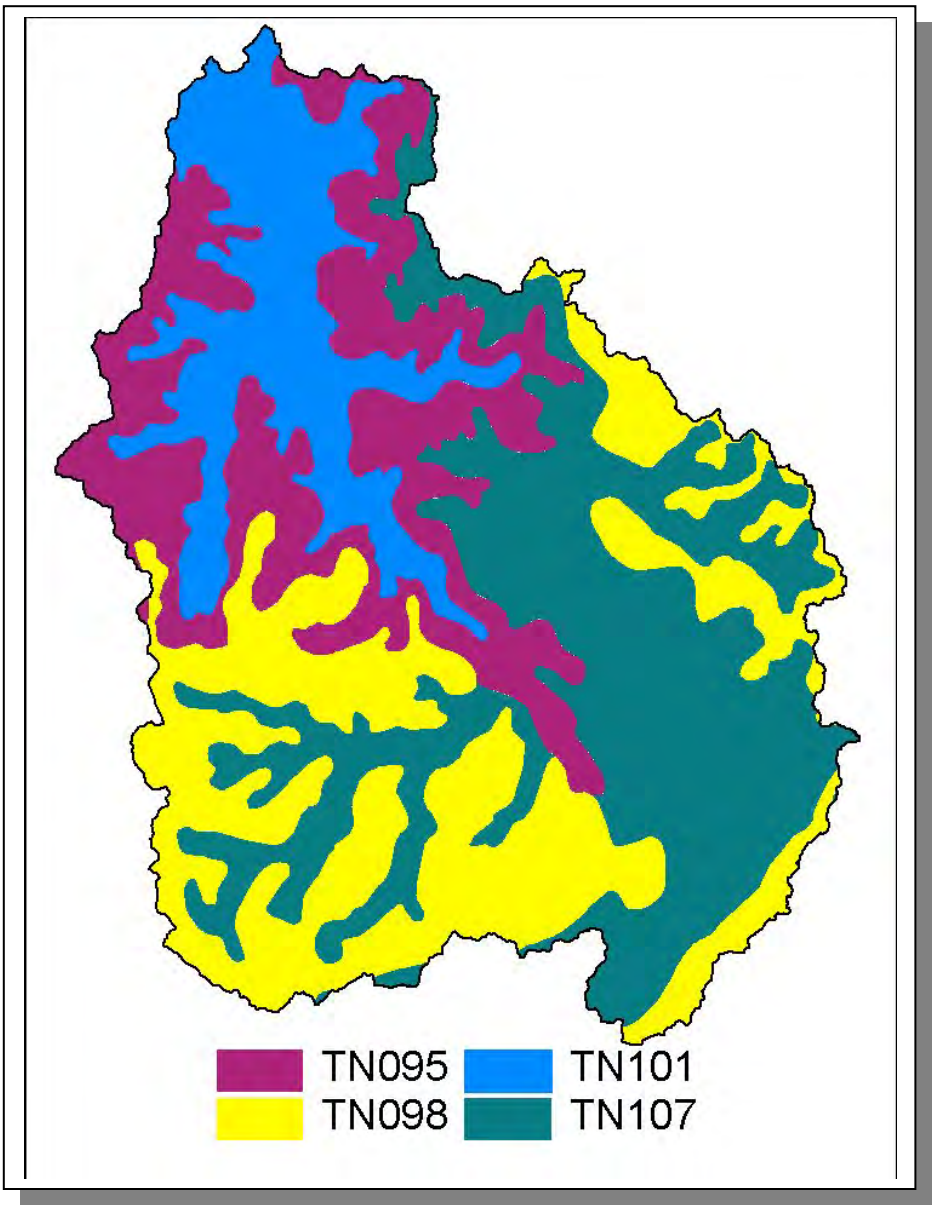


Figure 4-5. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0513010701.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN095	0.00	B	2.35	5.12	Loam	0.31
TN098	1.00	C	3.98	4.82	Loam	0.32
TN101	0.00	B	1.71	5.39	Loam	0.35
TN107	1.00	C	6.34	4.84	Loam	0.28

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0513010701. *More details are provided in Collins-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		PERCENT CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Grundy	13,362	14,012	53.24	7,113	7,459	4.9
Marion	24,860	26,674	0.17	42	45	7.1
Sequatchie	8,863	10,119	14.74	1,307	1,492	14.2
VanBuren	4,846	5,060	0.17	8	9	12.5
Warren	32,992	35,777	21.66	7,145	7,748	8.4
Totals	**84,923**	**91,642**		**15,615**	**16,753**	**7.3**

Table 4-3. Population Estimates in Subwatershed 0513010701.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
McMinnville	Warren	11,194	5,123	4,746	353	24
Altamont	Grundy	648	260	0	246	14
Beersheba Springs	Grundy	608	286	15	263	8
Coalmont	Grundy	857	300	4	268	28
Gruetli-Laager	Grundy	1,810	680	15	633	32
Palmer	Grundy	804	301	8	275	18
Total		**15,921**	**6,950**	**4,788**	**2,038**	**124**

Table 4-4. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0513010701.

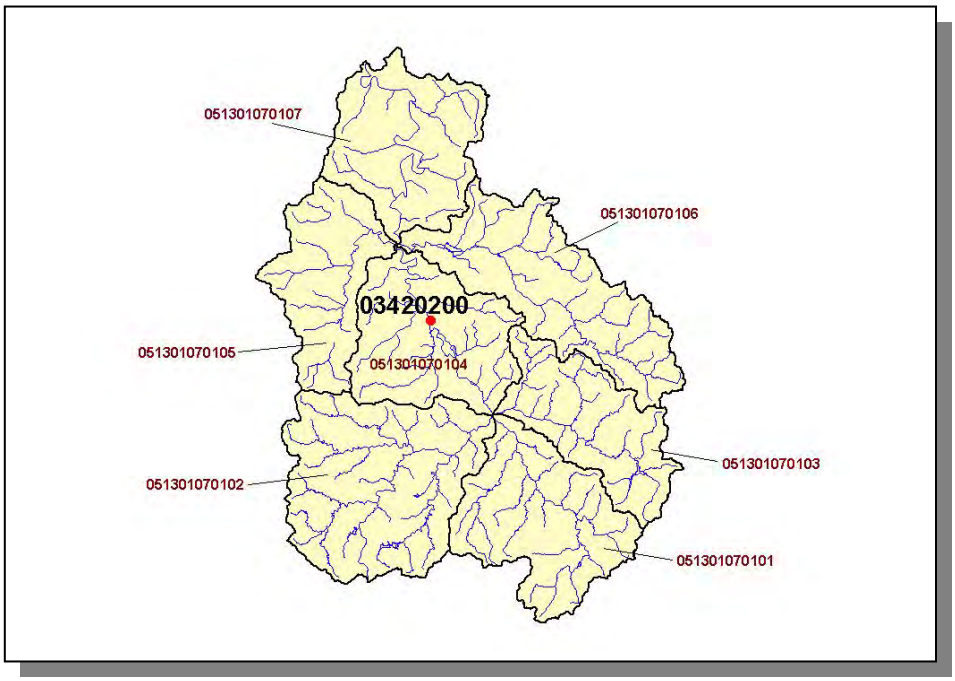


Figure 4-6. Location of Historical Streamflow Data Collection Sites in Subwatershed 0513010701. *Subwatershed 051301070101, 051301070102, 051301070103, 051301070104, 051301070105, 051301070106, and 051301070107 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

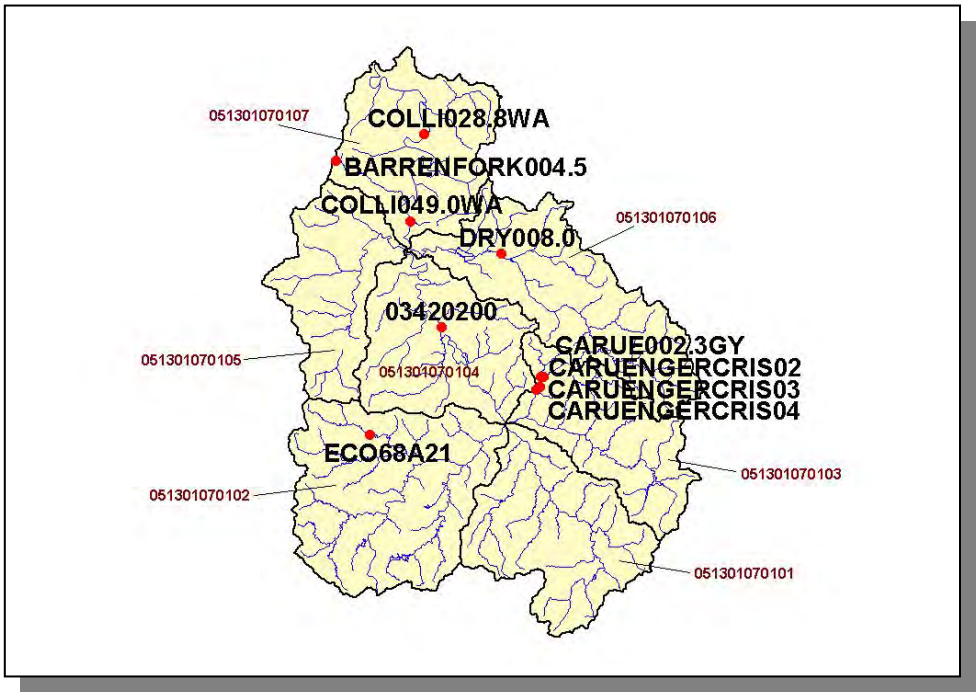


Figure 4-7. Location of STORET Monitoring Sites in Subwatershed 0513010701. *Subwatershed 051301070101, 051301070102, 051301070103, 051301070104, 051301070105, 051301070106, and 051301070107 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

4.2.A.ii. Point Source Contributions.

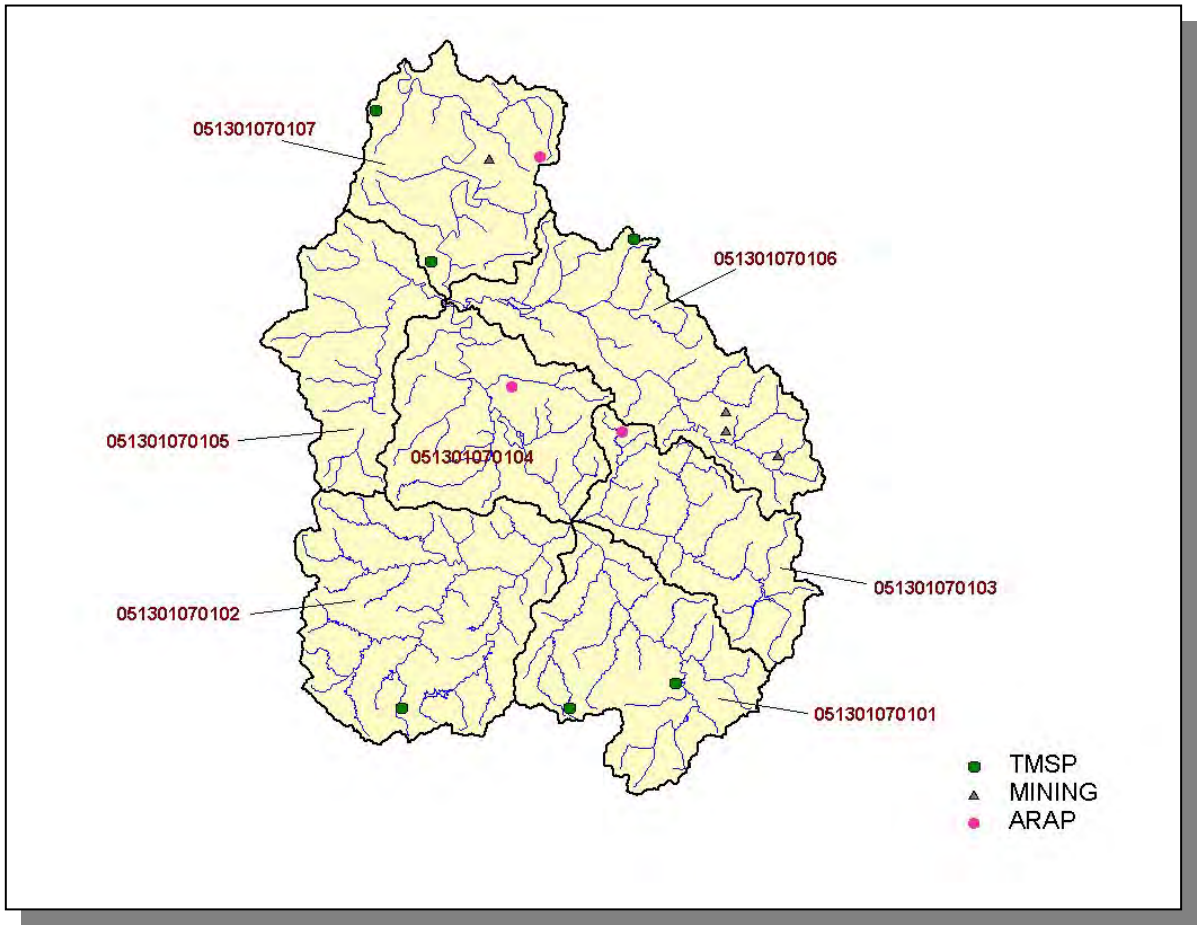


Figure 4-8. Location of Active Point Source Facilities in Subwatershed 0513010701. *Subwatershed 051301070101, 051301070102, 051301070103, 051301070104, 051301070105, 051301070106, and 051301070107 boundaries are shown for reference. More information is provided in the following figures.*

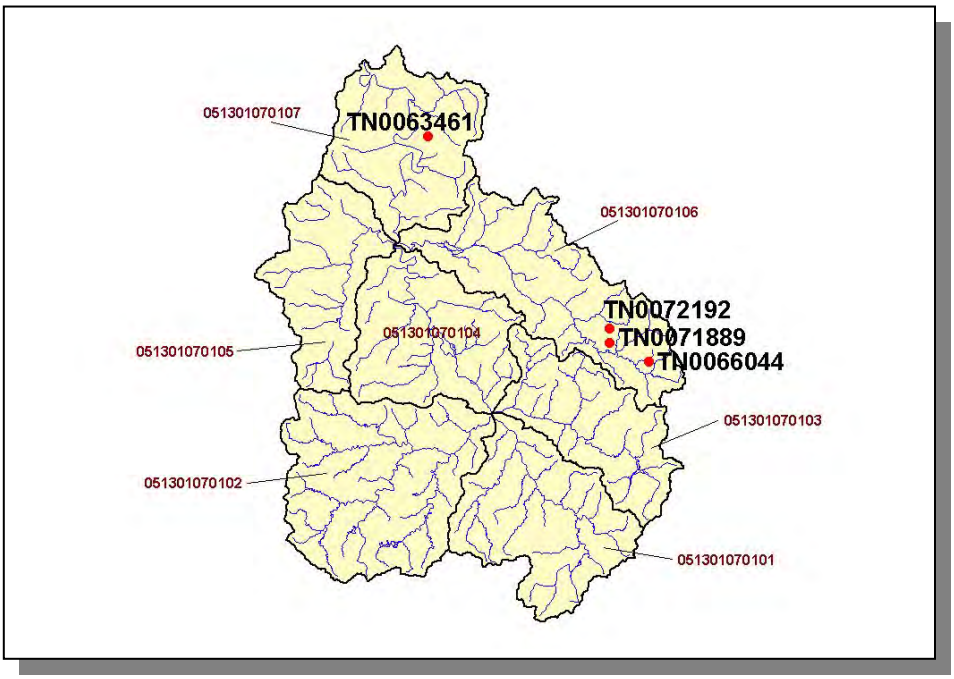


Figure 4-9. Location of Active Mining Sites in Subwatershed 0513010701. *Subwatershed 051301070101, 051301070102, 051301070103, 051301070104, 051301070105, 051301070106, and 051301070107 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

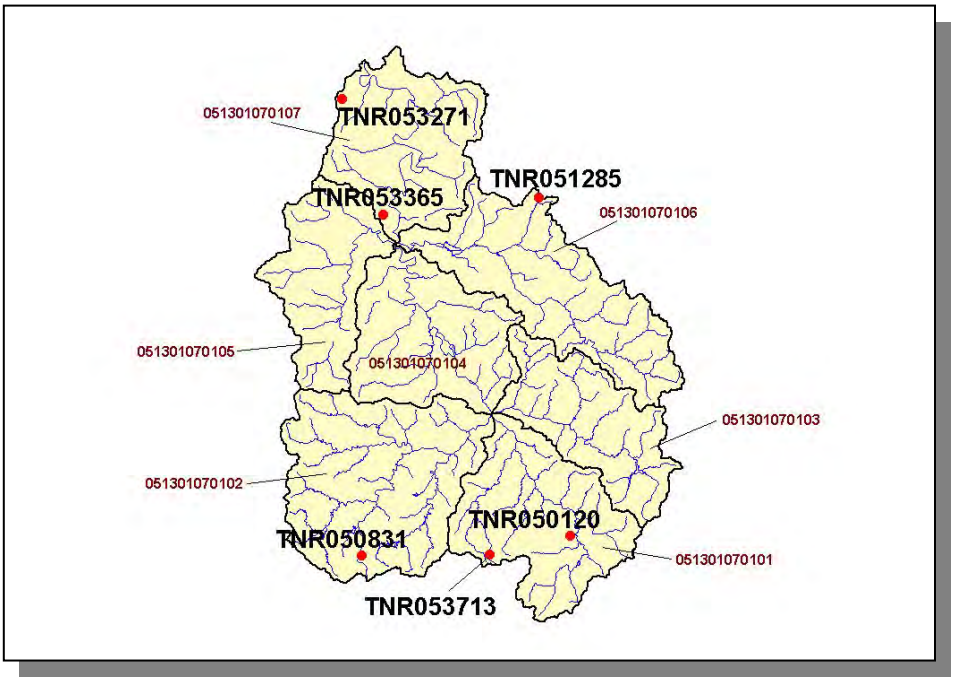


Figure 4-10. Location of TMSP Facilities in Subwatershed 0513010701. *Subwatershed 051301070101, 051301070102, 051301070103, 051301070104, 051301070105, 051301070106, and 051301070107 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

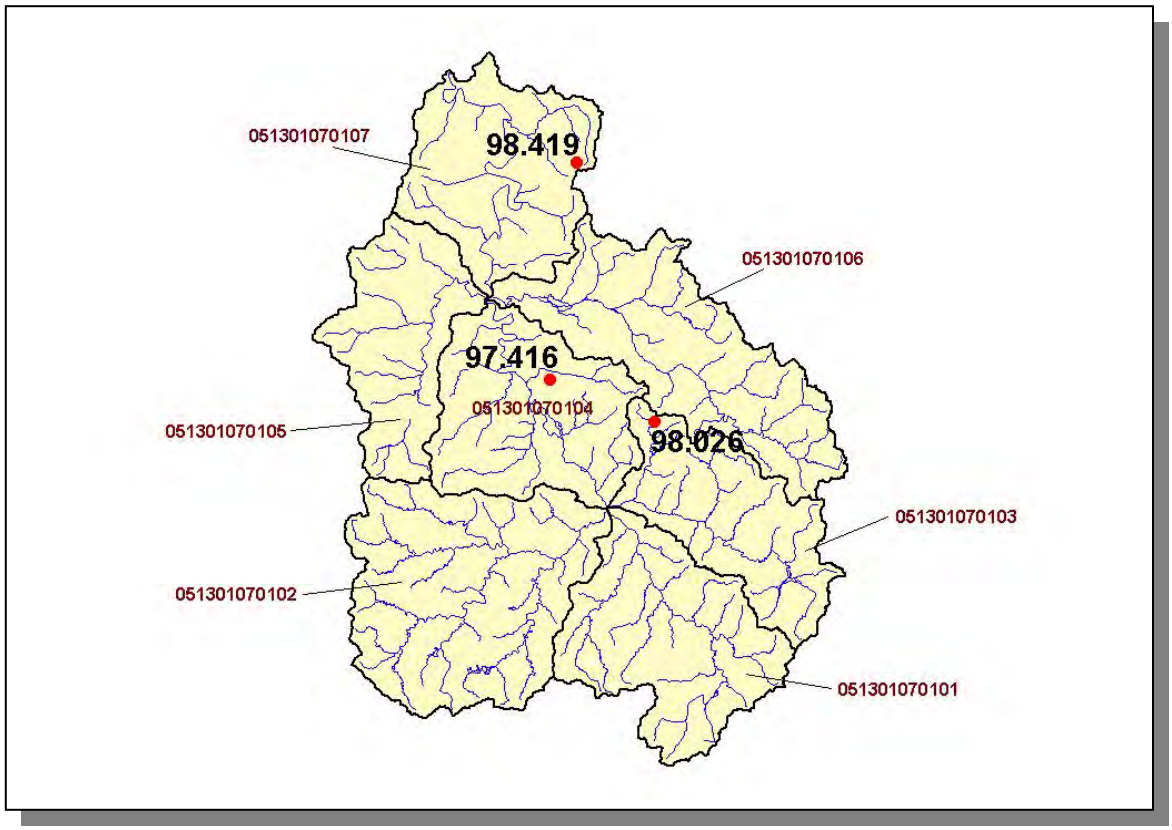


Figure 4-11. Location of ARAP Sites (Individual Permits) in Subwatershed 0513010701. *Subwatershed 051301070101, 051301070102, 051301070103, 051301070104, 051301070105, 051301070106, and 051301070107 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens	Chickens Sold	Hogs	Sheep
3,046	6,597	373	8	4,403,940	784	10

Table 4-5. Summary of Livestock Count Estimates in Subwatershed 0513010701. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Grundy	174.5	165.9	5.6	17.7
Sequatchie	137.3	137.3	0.6	1.2
Van Buren	145.0	135.4	2.3	9.5
Warren	93.6	93.6	2.4	10.1
Totals	**550.4**	**532.2**	**10.9**	**38.5**

Table 4-6. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 0513010701.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	5.89
Soybeans (Row Crops)	8.97
Grass (Hayland)	5.56
Legume/Grass (Hayland)	1.52
Grass (Pastureland)	0.53
Legume (Hayland)	0.10
Grass,Forbs, Legumes (Mixed Pasture)	0.51
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.22
Nonagricultural Land Use	0.00
Conservation Reserve Program Land	0.33
Wheat (Close Grown Cropland)	10.12
Other (Horticultural)	7.71
Other Vegetables and Truck Crop	7.28

Table 4-7. Annual Estimated Total Soil Loss in Subwatershed 0513010701.

4.2.B. 0513010702.

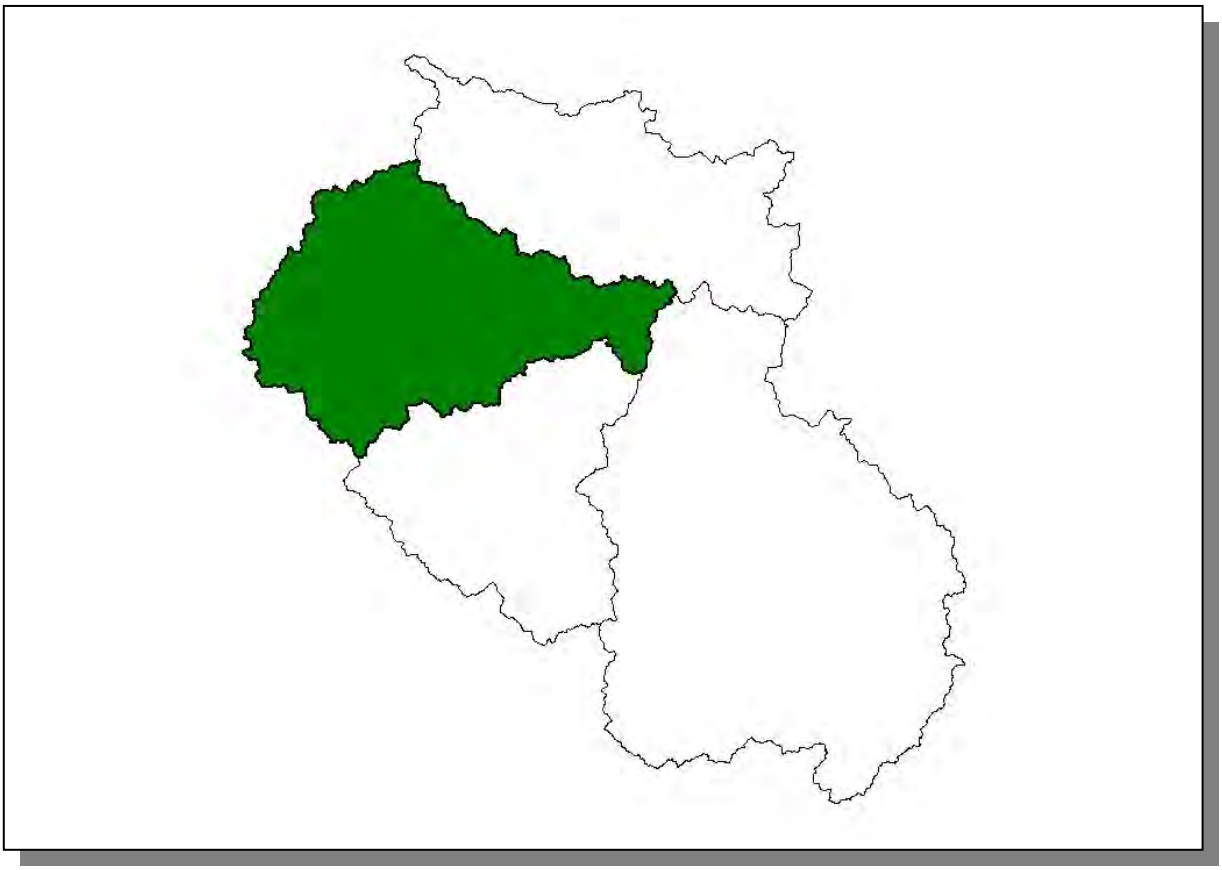


Figure 4-12. Location of Subwatershed 0513010702. *All Collins HUC-10 subwatershed boundaries are shown for reference.*

4.2.B.i. General Description.

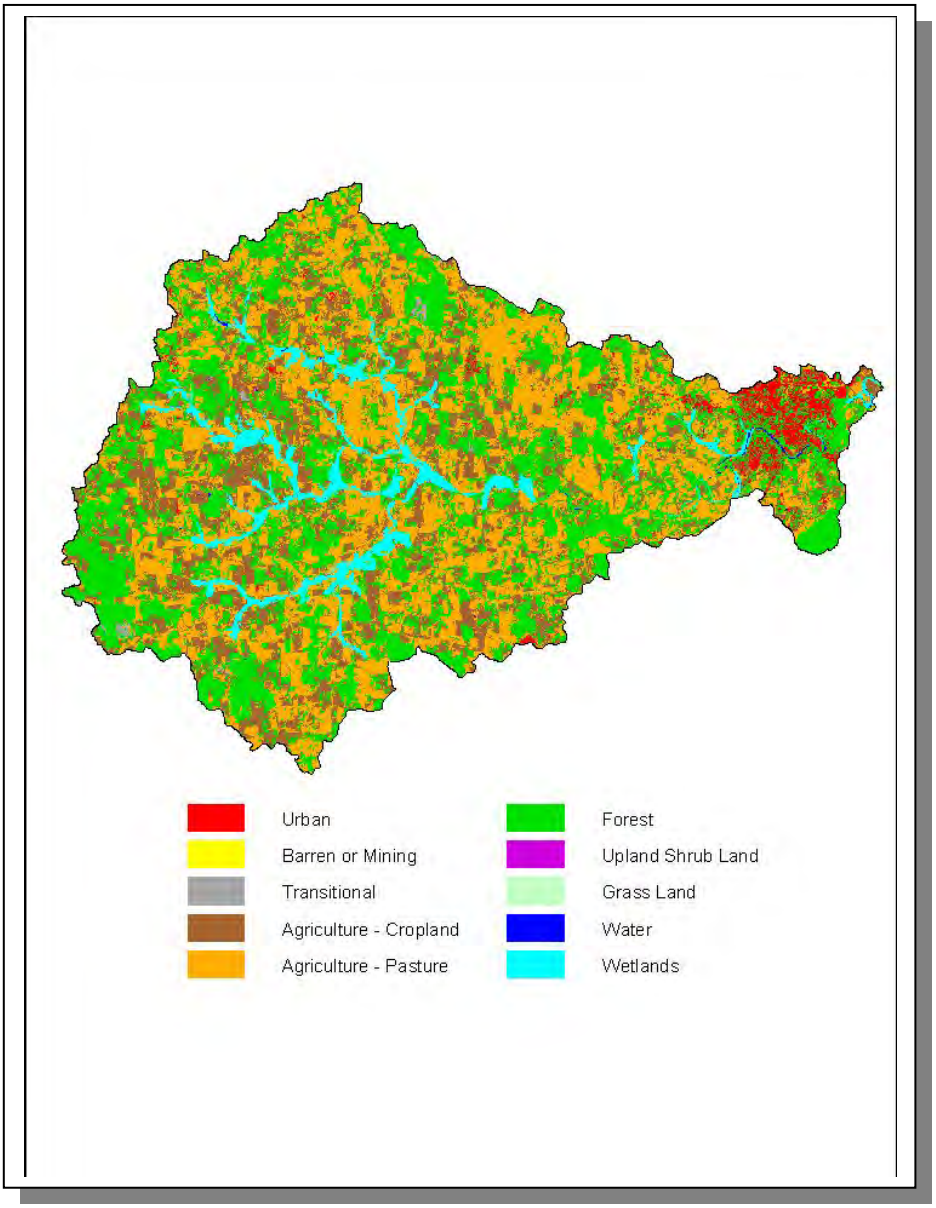


Figure 4-13. Illustration of Land Use Distribution in Subwatershed 0513010702.

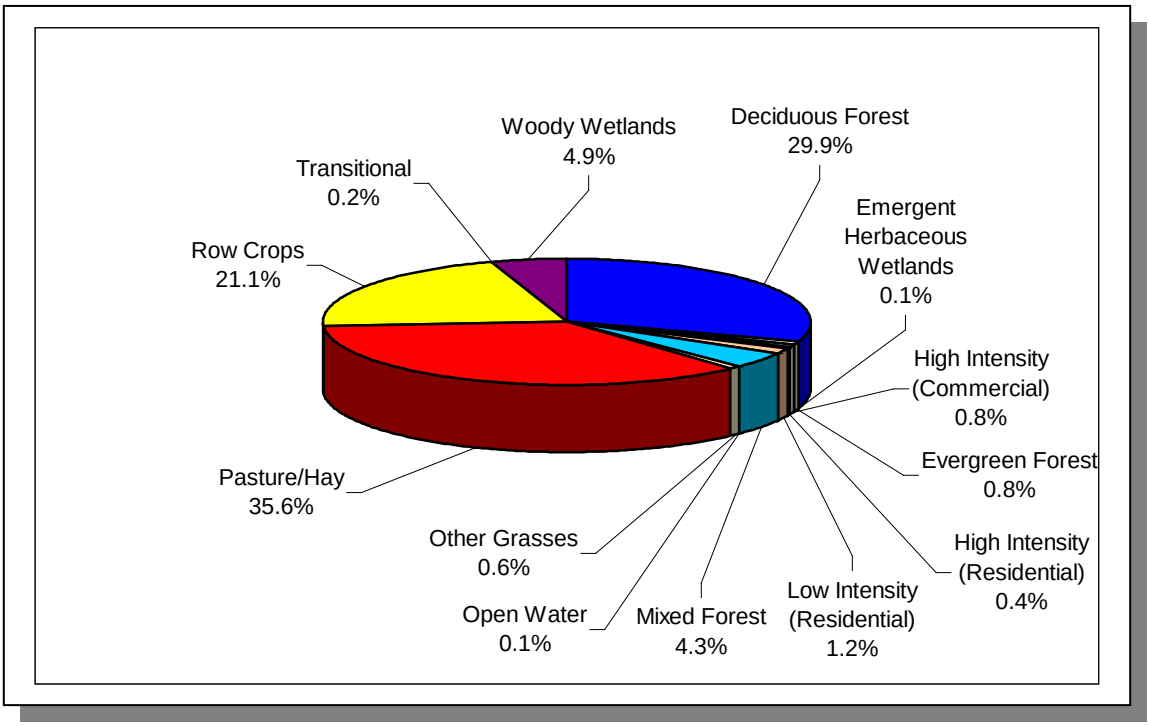


Figure 4-14. Land Use Distribution in Subwatershed 0513010702. *More information is provided in Collins-Appendix IV.*

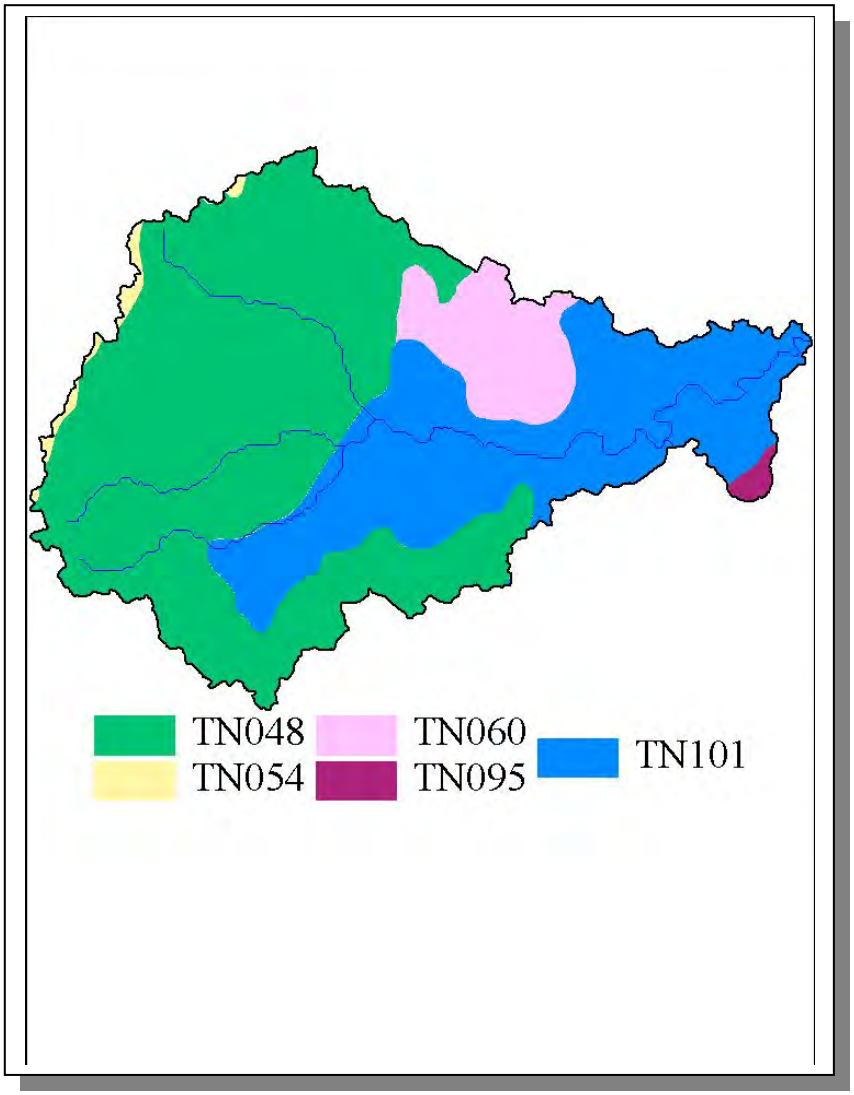


Figure 4-15. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0513010702.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN048	16.00	C	1.38	5.06	Silty Loam	0.42
TN054	0.00	C	3.04	4.84	Loam	0.32
TN060	20.00	B	1.30	5.32	Silty Loam	0.39
TN095	0.00	B	2.35	5.12	Loam	0.31
TN101	0.00	B	1.71	5.39	Loam	0.35

Table 4-8. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0513010702. *More information is provided in Collins-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Cannon	10,467	12,011	19.22	2,012	2,309	14.8
Coffee	40,339	45,347	7.90	3,146	3,537	12.4
Warren	32,992	35,777	20.79	6,858	7,437	8.4
Total	**83,798**	**93,135**		**12,016**	**13,283**	**10.5**

Table 4-9. Population Estimates in Subwatershed 0513010702.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Centertown	Warren	345	138	3	135	0
McMinnville	Warren	11,194	5,123	4,746	353	24
Morrison	Warren	557	235	195	37	3
Total		**12,096**	**5,496**	**4,944**	**525**	**27**

Table 4-10. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0513010702.

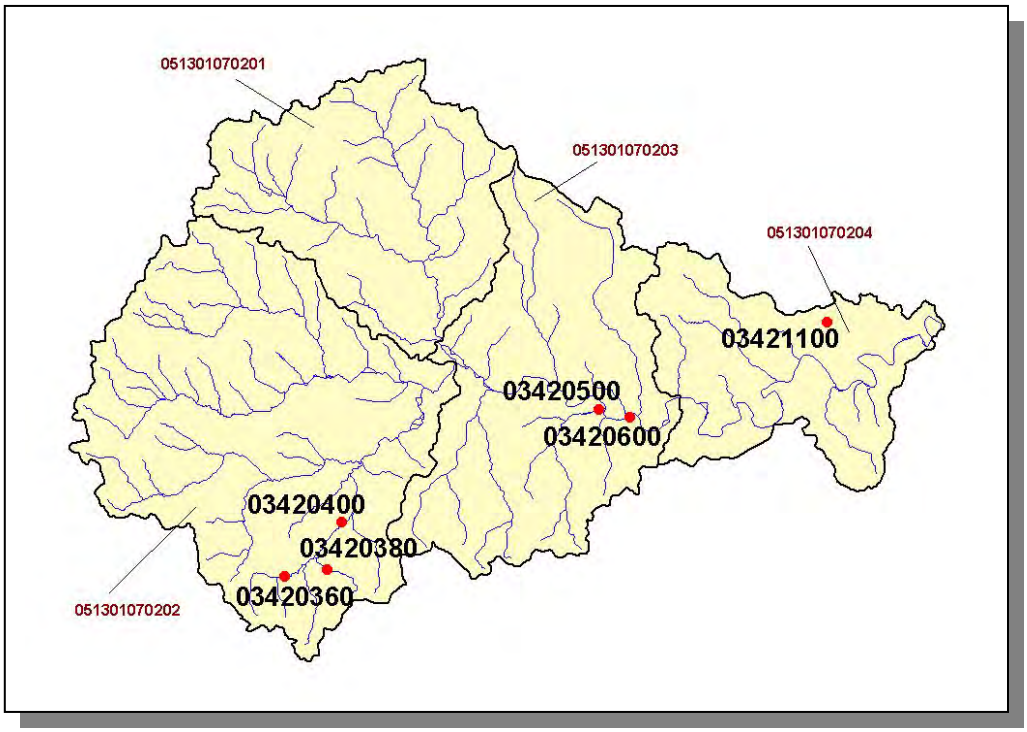


Figure 4-16. Location of Historical Streamflow Data Collection Sites in Subwatershed 0513010702. *Subwatershed 051301070201, 051301040202, 051301070203 and 051301070204 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

Figure 4-17. Location of STORET Monitoring Sites in Subwatershed 0513010702. *Subwatershed 051301070201, 051301040202, 051301070203 and 051301070204 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

4.2.B.ii. Point Source Contributions.

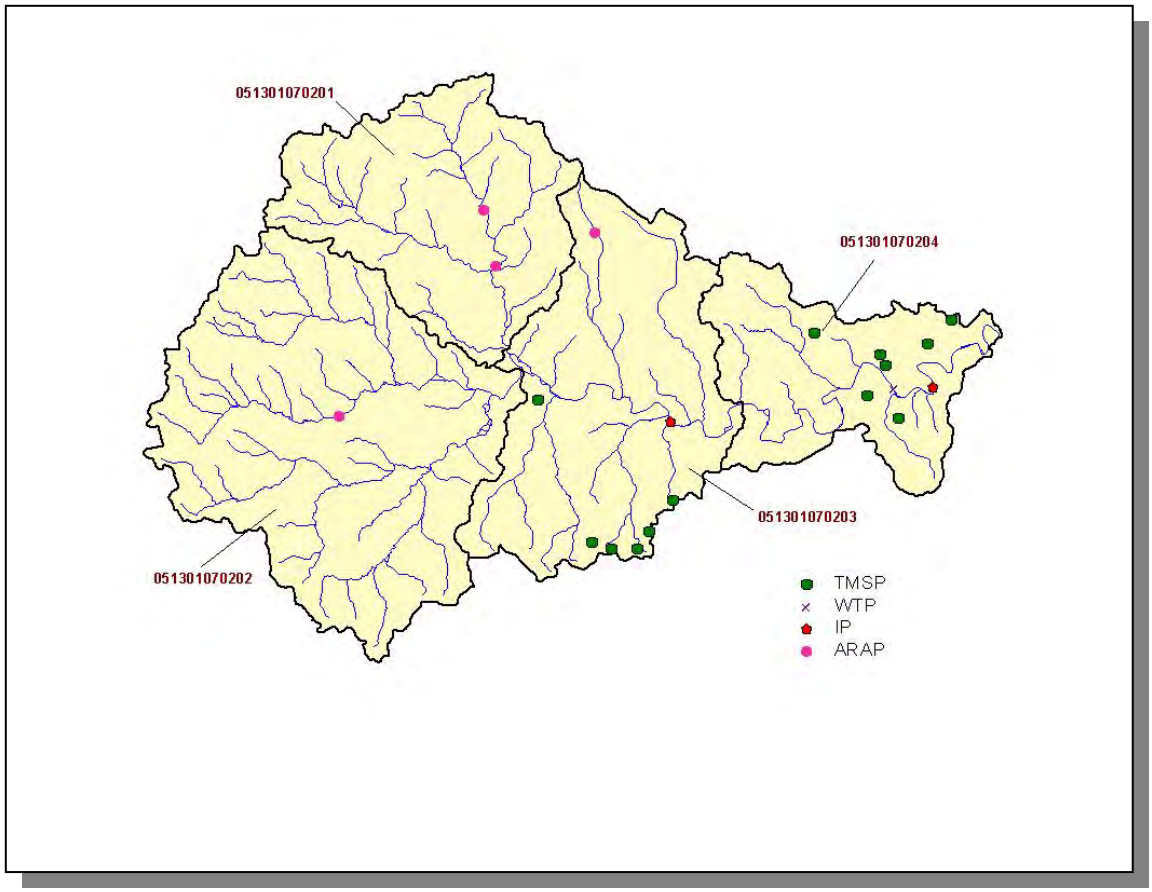


Figure 4-18. Location of Active Point Source Facilities in Subwatershed 0513010702. *Subwatershed 051301070201, 051301040202, 051301070203 and 051301070204 boundaries are shown for reference. More information is provided in the following figures.*

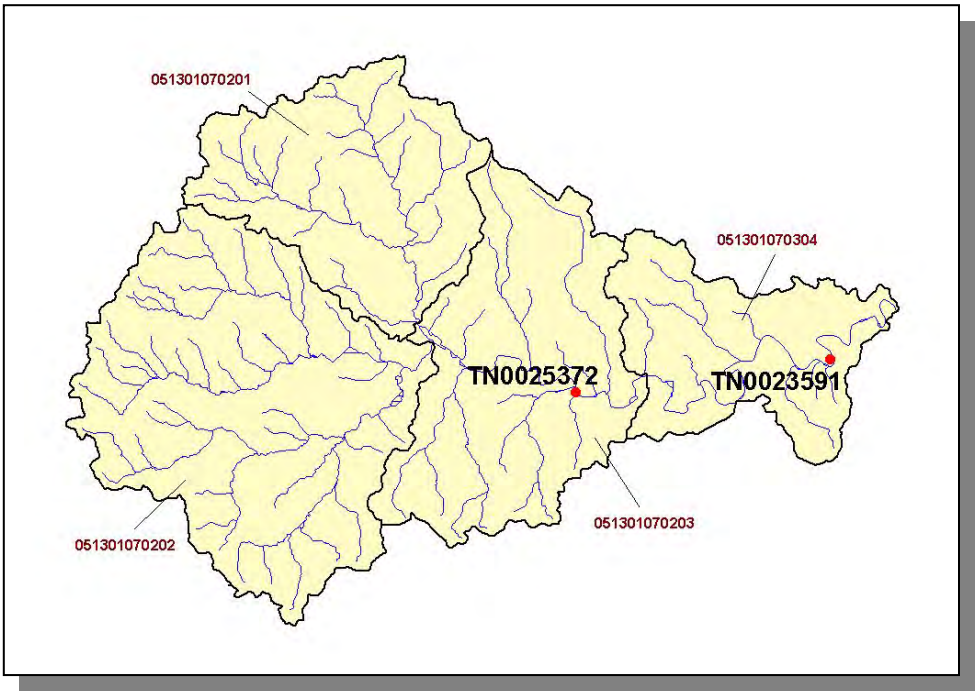


Figure 4-19. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 0513010702. *Subwatershed 051301070201, 051301040202, 051301070203 and 051301070204 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

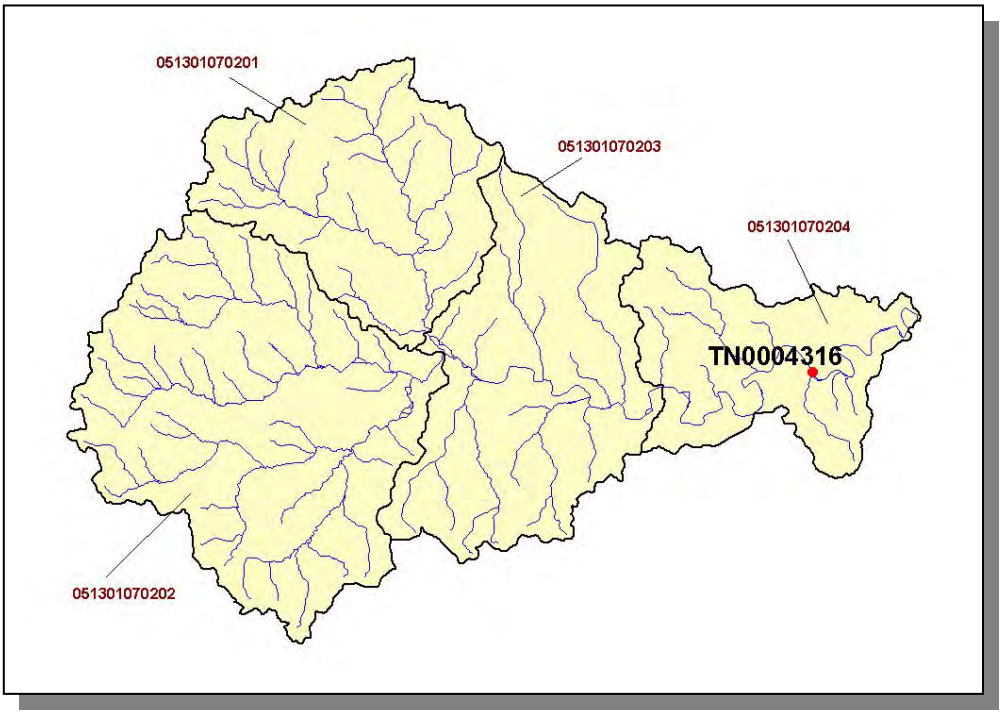


Figure 4-20. Location of Water Treatment Plant in Subwatershed 0513010702. *Subwatershed 051301070201, 051301040202, 051301070203 and 051301070204 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

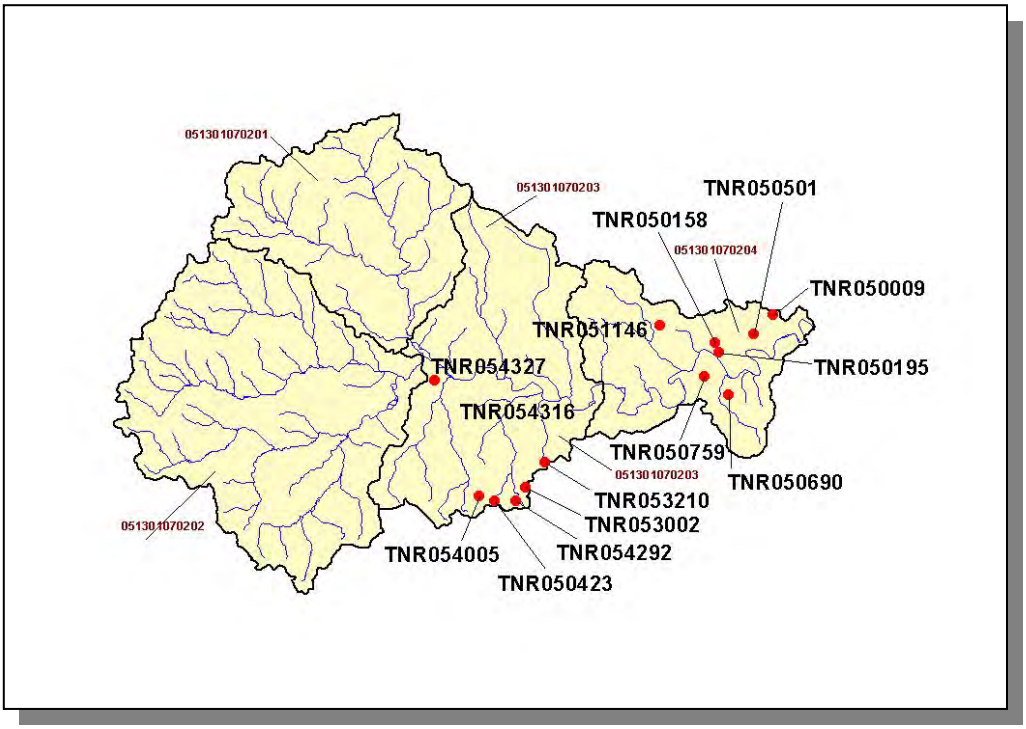


Figure 4-21. Location of TMSP Facilities in Subwatershed 0513010702. *Subwatershed 051301070201, 051301040202, 051301070203 and 051301070204 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

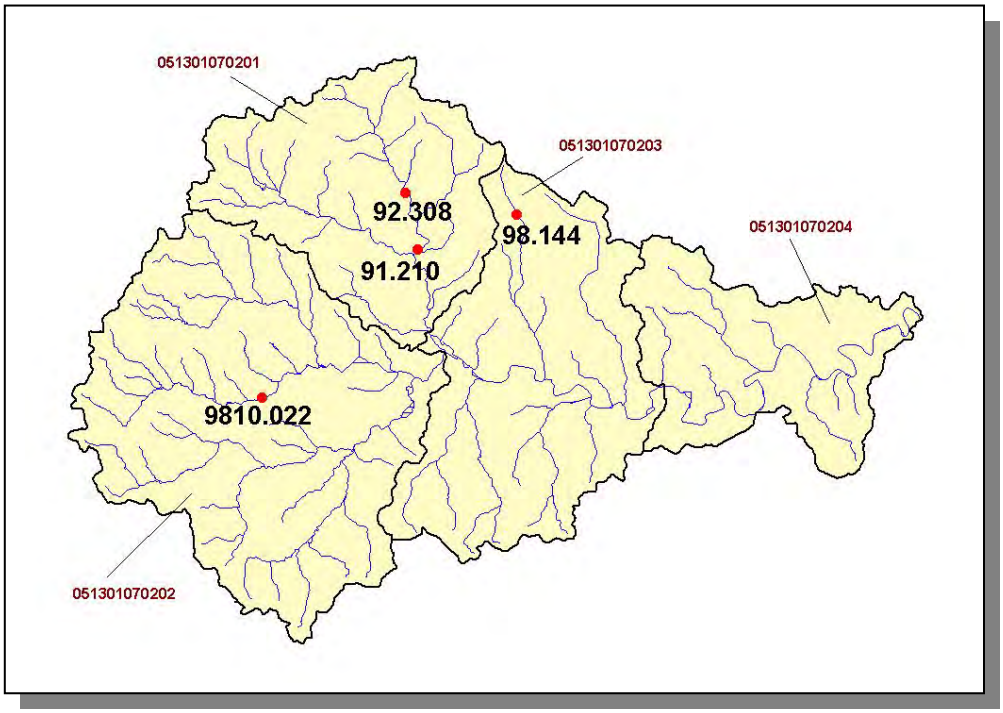


Figure 4-22. Location of ARAP Sites (Individual Permits) in Subwatershed 0513010702. *Subwatershed 051301070201, 051301040202, 051301070203 and 051301070204 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens	Chickens Sold	Hogs	Sheep
10,094	21,831	1,367	26	387,447	2,412	108

Table 4-11. Summary of Livestock Count Estimates in Subwatershed 0513010702. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cannon	88.5	88.5	1.7	7.1
Coffee	114.4	114.2	2.8	12.7
Warren	93.6	93.6	2.4	10.1
Total	**296.5**	**301.4**	**6.9**	**29.9**

Table 4-12. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0513010702.

CROPS	TONS/ACRE/YEAR
Legume/Grass (Hayland)	2.66
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.42
Non Agricultural Land Use	0.00
Corn (Row Crops)	8.92
Soybeans (Row Crops)	13.36
Cotton (Row Crops)	4.03
Wheat (Close Grown Cropland)	8.92
Grass (Hayland)	0.82
Legume (Hayland)	0.10
Legume (Pastureland)	0.37
Other (Horticulture)	13.98
Grass (Pastureland)	0.53
Grass, Forbs, Legumes (Mixed Pasture)	0.58
Conservation Reserve Lands	0.28
Other Vegetable and Truck Crop	0.37
Other Cropland not Planted	6.68

Table 4-13. Annual Estimated Total Soil Loss in Subwatershed 0513010702.

4.2.C. 0513010703.

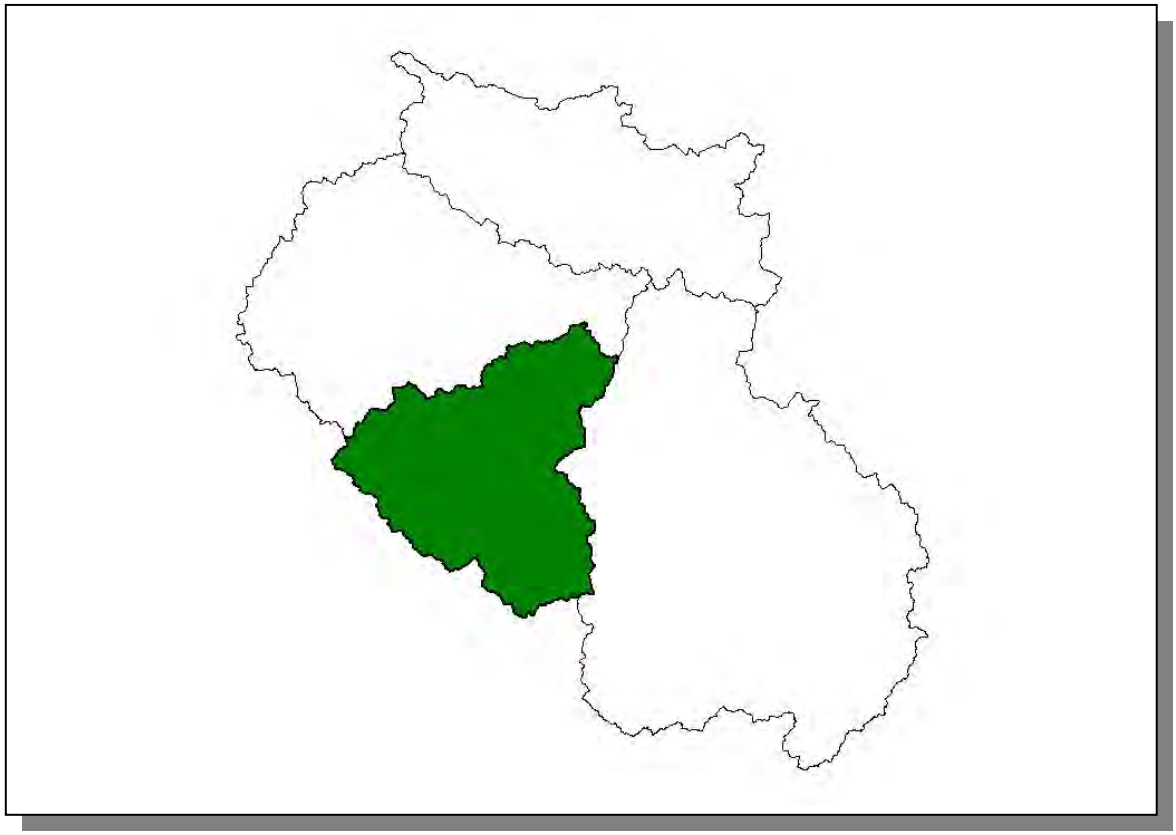


Figure 4-23. Location of Subwatershed 0513010703. *All Collins HUC-10 subwatershed boundaries are shown for reference.*

4.2.C.i. General Description.

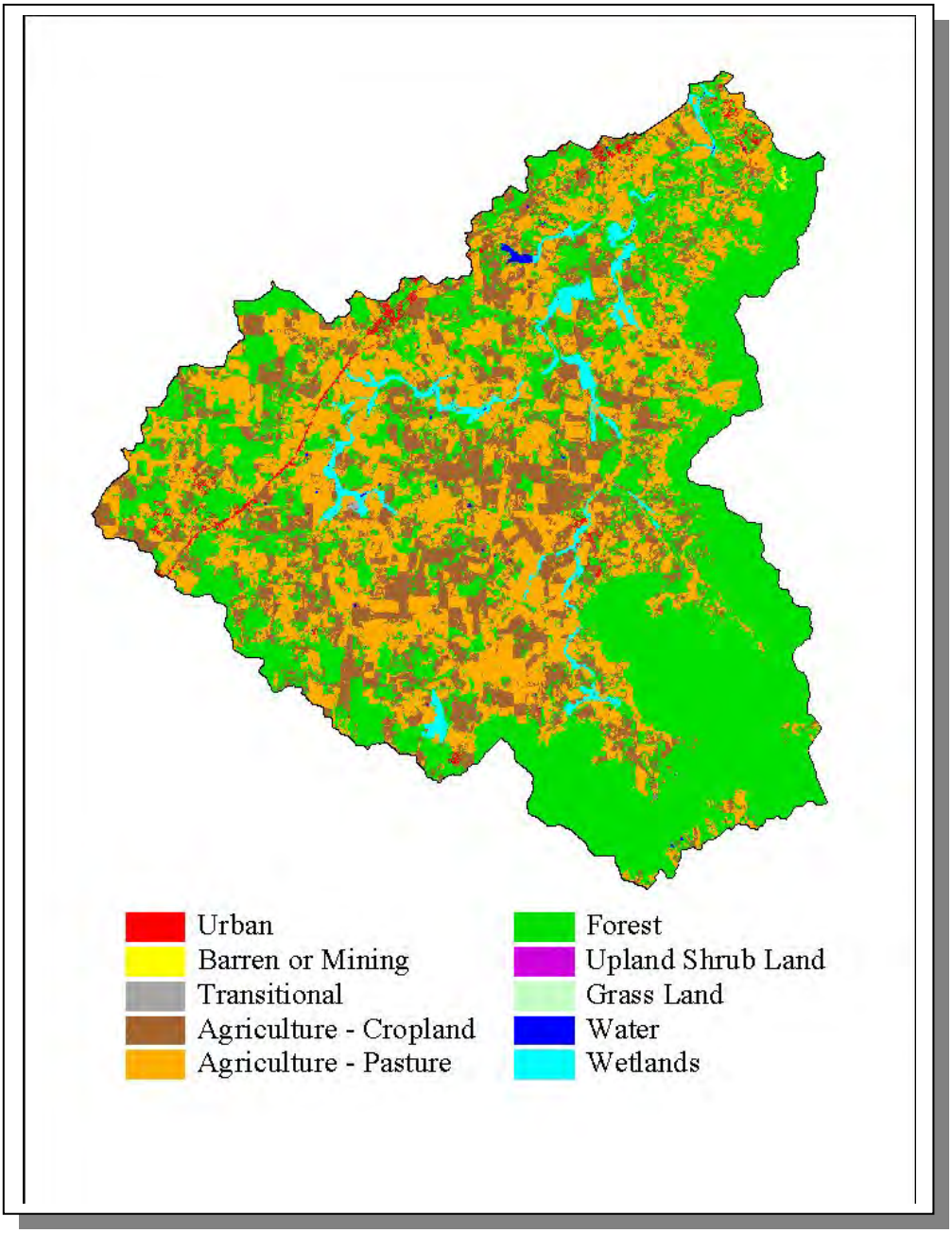


Figure 4-24. Illustration of Land Use Distribution in Subwatershed 0513010703.

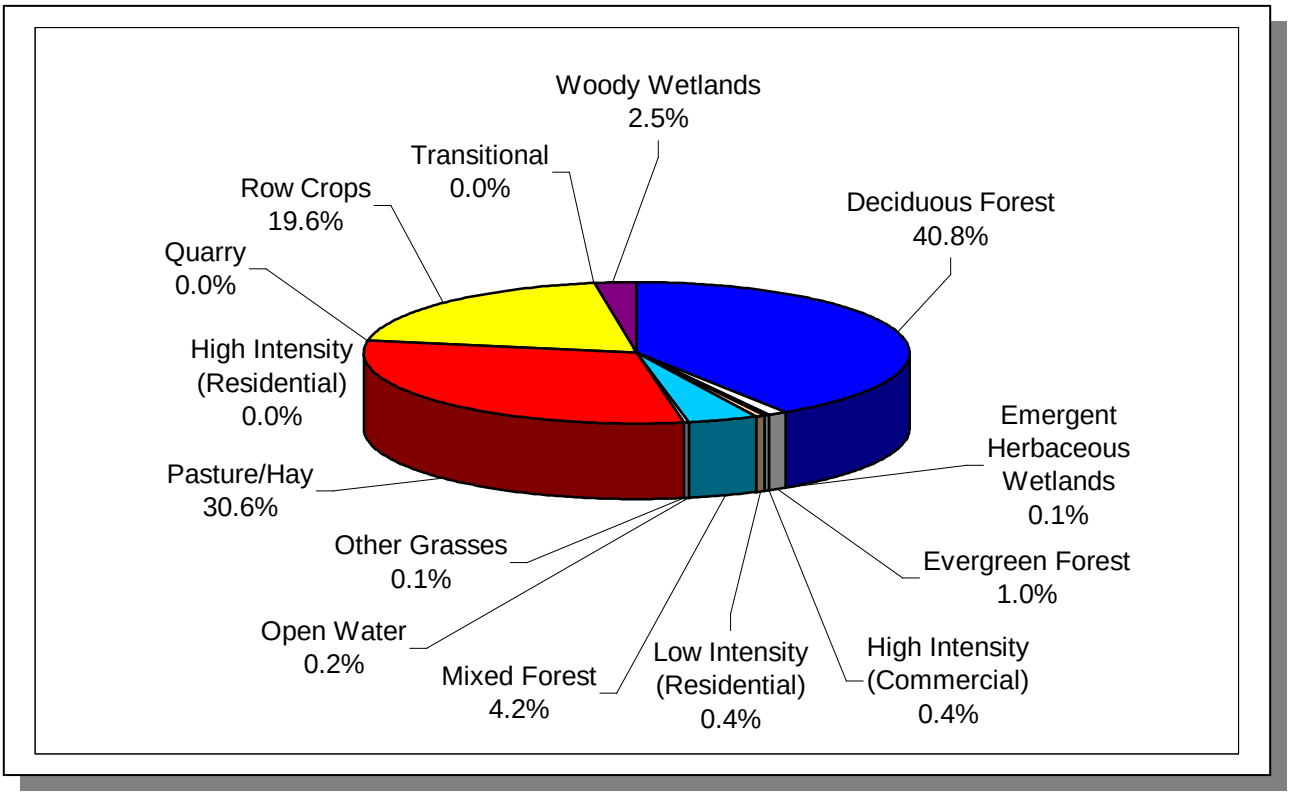


Figure 4-25. Land Use Distribution in Subwatershed 0513010703. *More information is provided in Collins-Appendix IV.*

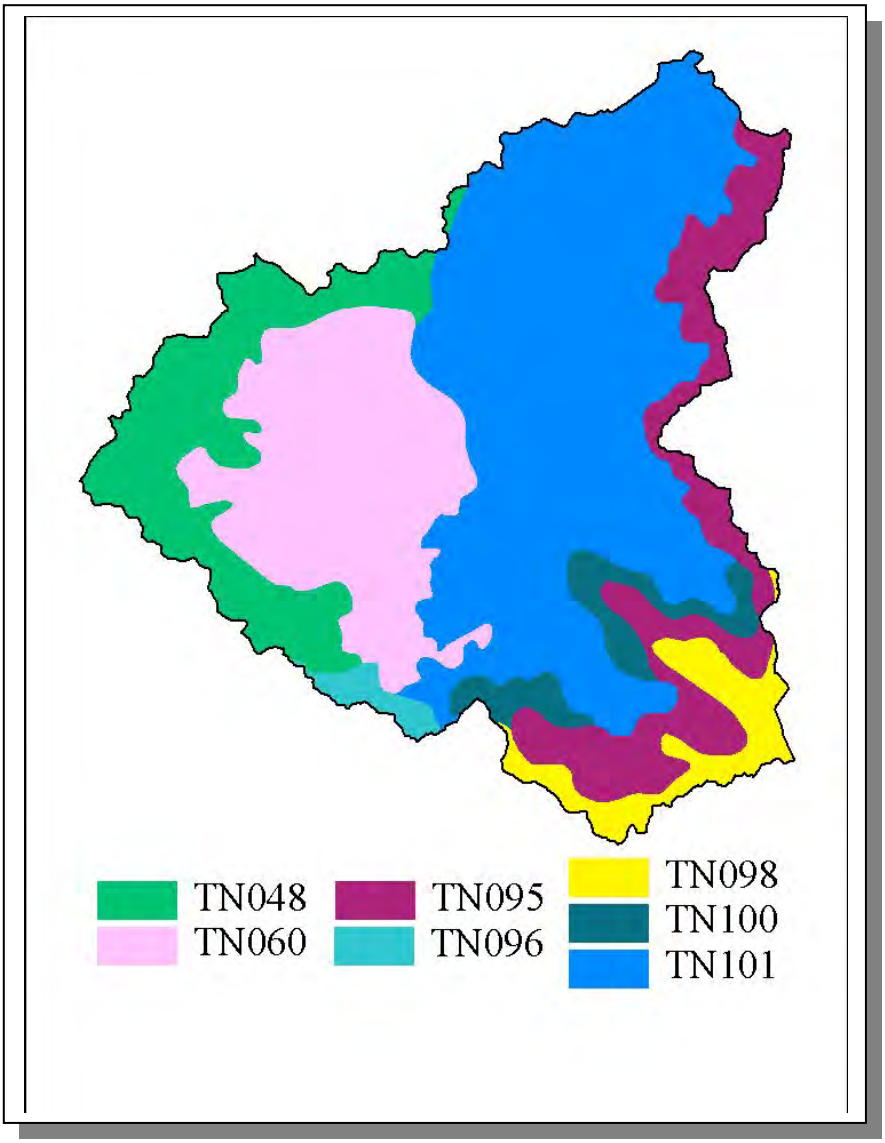


Figure 4-26. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0513010703.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN048	8.00	C	1.38	5.06	Silty Loam	0.42
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN095	0.00	B	2.35	5.12	Loam	0.31
TN096	1.00	C	1.22	5.16	Silty Loam	0.38
TN098	1.00	C	3.98	4.82	Loam	0.32
TN100	0.00	B	1.14	3.35	Silty Loam	0.21
TN101	0.00	B	1.71	5.39	Loam	0.35

Table 4-14. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0513010703. *More information is provided in Collins-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Coffee	40,339	45,347	10.72	4,324	4,861	12.4
Grundy	13,362	14,012	8.27	1,104	1,158	4.9
Warren	32,992	35,777	12.83	4,233	4,590	8.4
Total	**86, 693**	**95,136**		**9,661**	**10,609**	**9.8**

Table 4-15. Population Estimates in Subwatershed 0513010703.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
McMinnville	Warren	11,194	5,123	4,746	353	24
Morrison	Warren	557	235	195	37	3
Viola	Warren	123	53	2	48	3
Totals		**11,874**	**5,411**	**4,943**	**438**	**30**

Table 4-16. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0513010703.

Figure 4-27. Location of STORET Monitoring Sites in Subwatershed 0513010703. *Subwatershed 051301070301, 051301070302, and 051301070303 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

4.2.C.ii. Point Source Contributions.

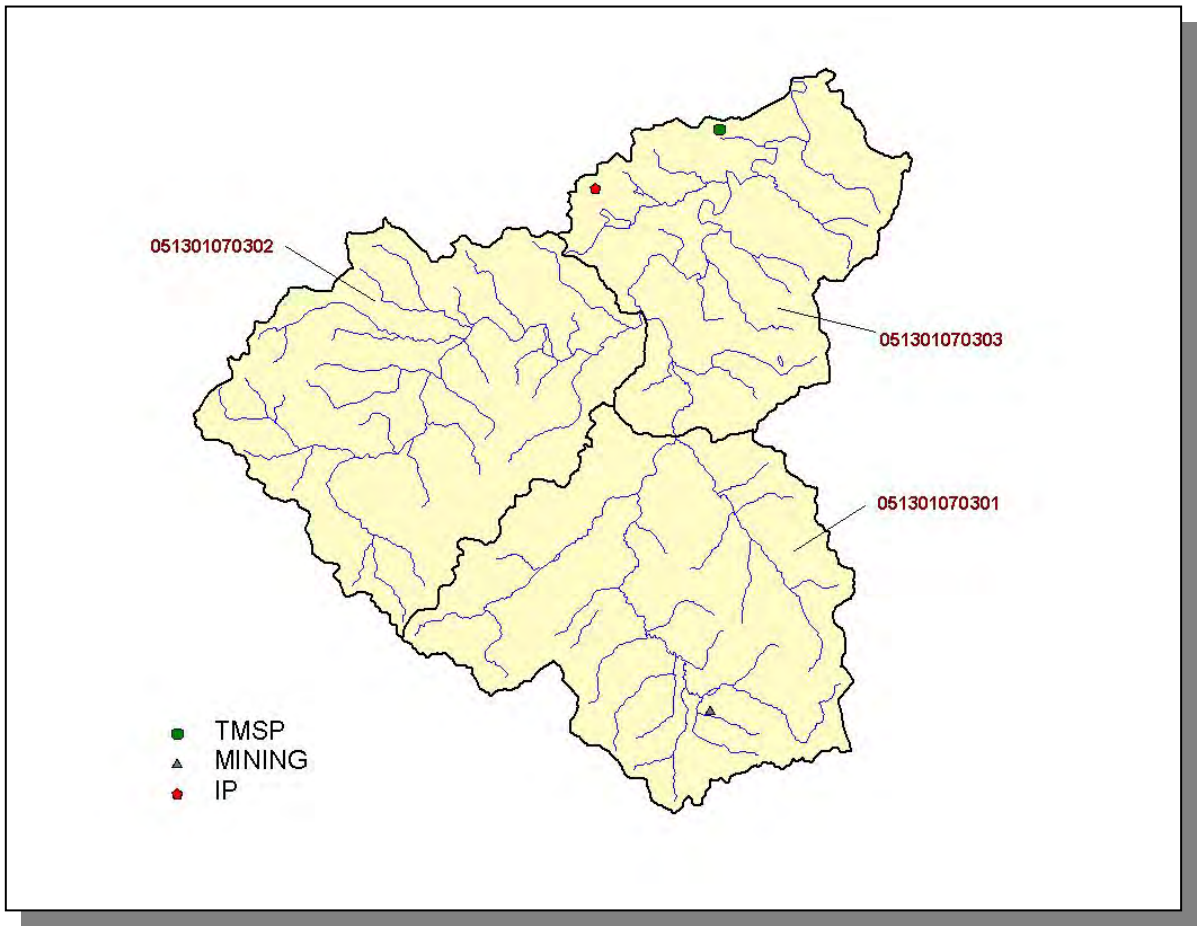


Figure 4-28. Location of Active Point Source Facilities in Subwatershed 0513010703. *Subwatershed 051301070301, 051301070302, and 051301070303 boundaries are shown for reference. More information is provided in the following figures.*

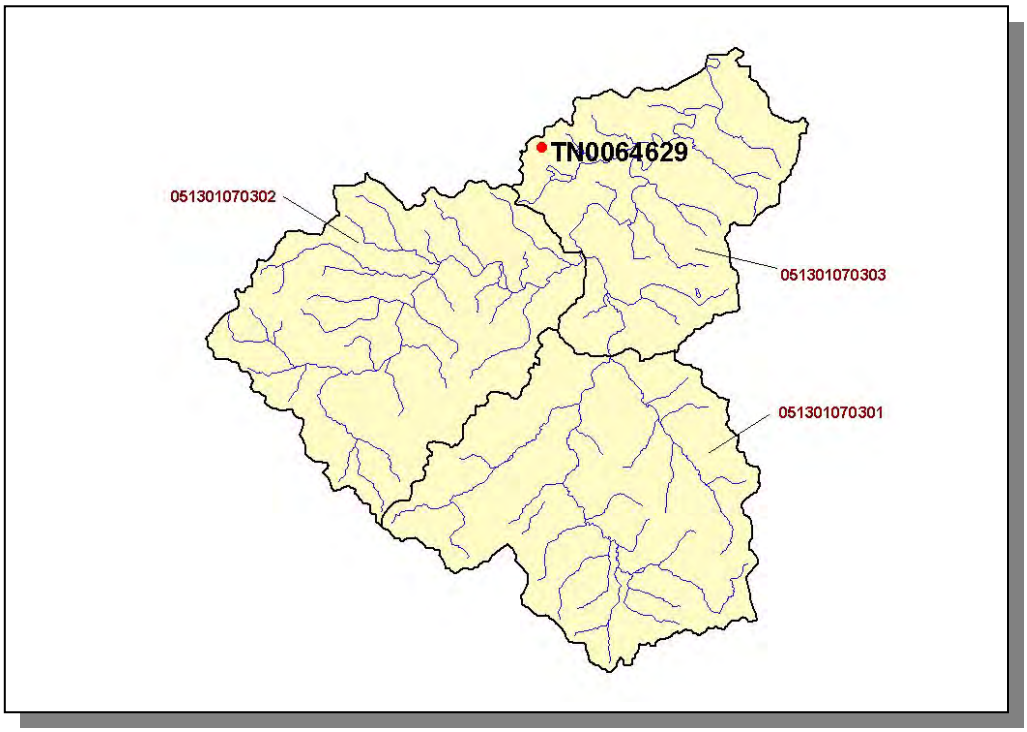


Figure 4-29. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 0513010703. *Subwatershed 051301070301, 051301070302, and 051301070303 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

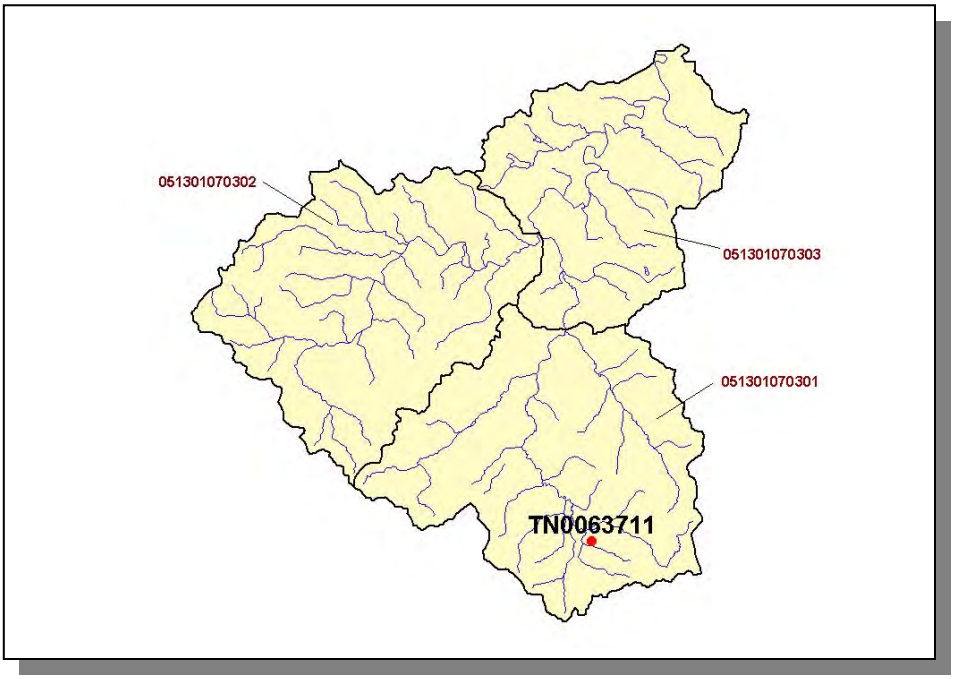


Figure 4-30. Location of Active Mining Sites in Subwatershed 0513010703. *Subwatershed 051301070301, 051301070302, and 051301070303 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

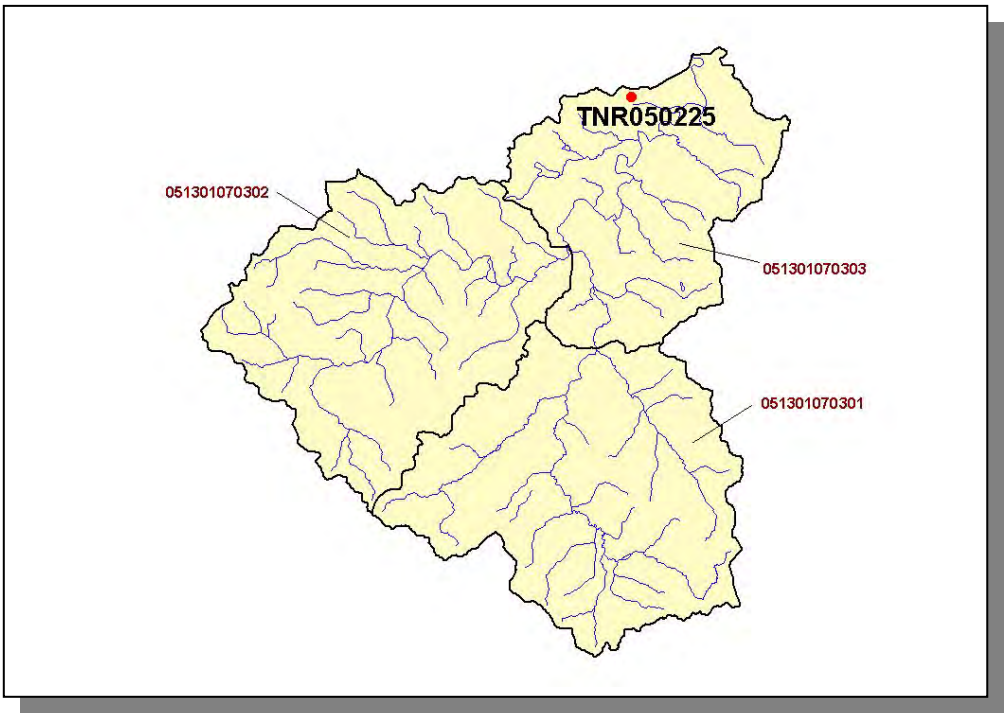


Figure 4-31. Location of TMSP Facilities in Subwatershed 0513010703. *Subwatershed 051301070301, 051301070302, and 051301070303 boundaries are shown for reference. More information, including the names of facilities, is provided in Collins-Appendix IV.*

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens	Chickens Sold	Hogs	Sheep
5,880	13,366	976	13	3,008,668	1,206	62

Table 4-17. Summary of Livestock Count Estimates in Subwatershed 0513010703. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Coffee	114.4	114.2	2.8	12.7
Grundy	174.5	165.9	5.6	17.7
Warren	93.6	93.6	2.4	10.1
Totals	**382.5**	**373.7**	**10.8**	**40.5**

Table 4-18. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0513010703.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	8.69
Soybeans (Row Crops)	14.24
Nonagricultural Land Use	0.00
Legume (Hayland)	0.10
Grass (Hayland)	0.75
Grass (Pastureland)	0.82
Grass, Forbs, Legumes (Mixed Pasture)	0.42
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.18
Cotton (Row Crops)	4.03
Other Vegetable and Truck Crop	4.37
Other Cropland not Planted	6.68
Wheat (Close Grown Cropland)	11.80
Conservation Reserve Program Land	0.24
Other (Horticultural)	10.75

Table 4-19. Annual Estimated Total Soil Loss in Subwatershed 0513010703.

4.2.D. 0513010704.

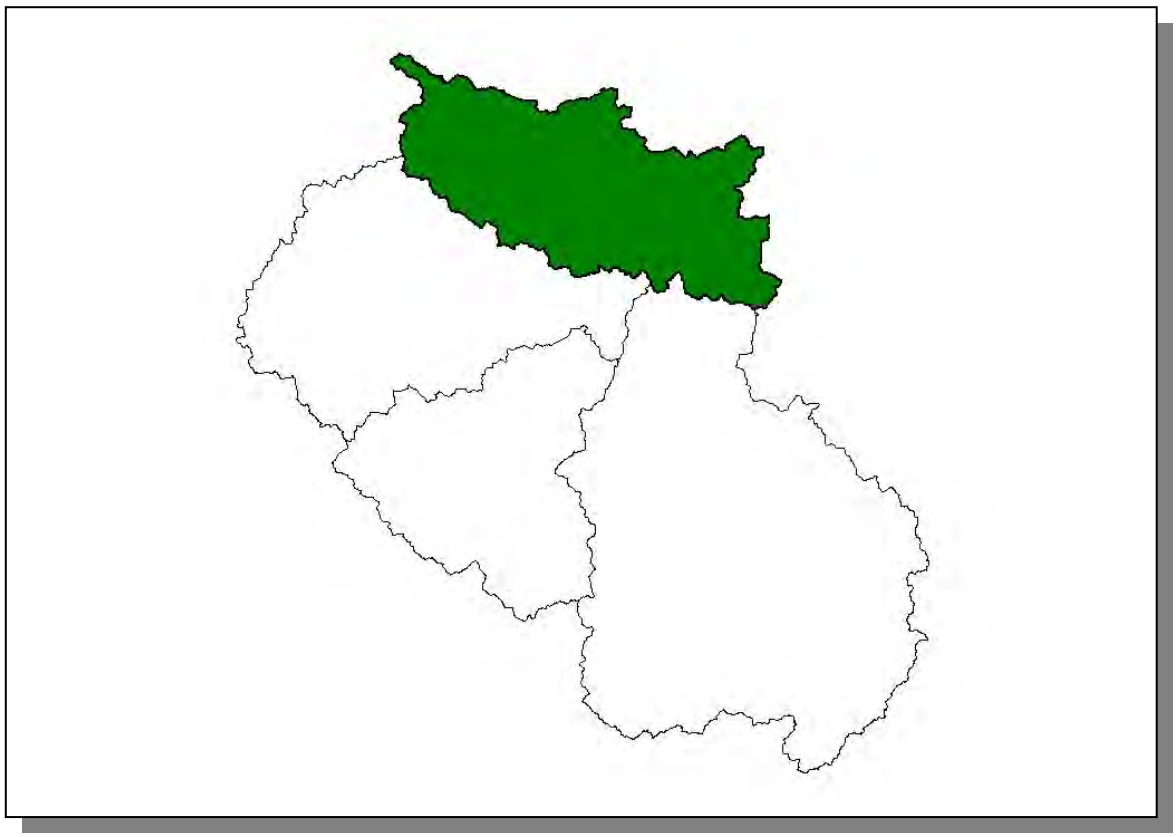


Figure 4-32. Location of Subwatershed 0513010704. *All Collins HUC-10 subwatershed boundaries are shown for reference.*

4.2.D.i. General Description.

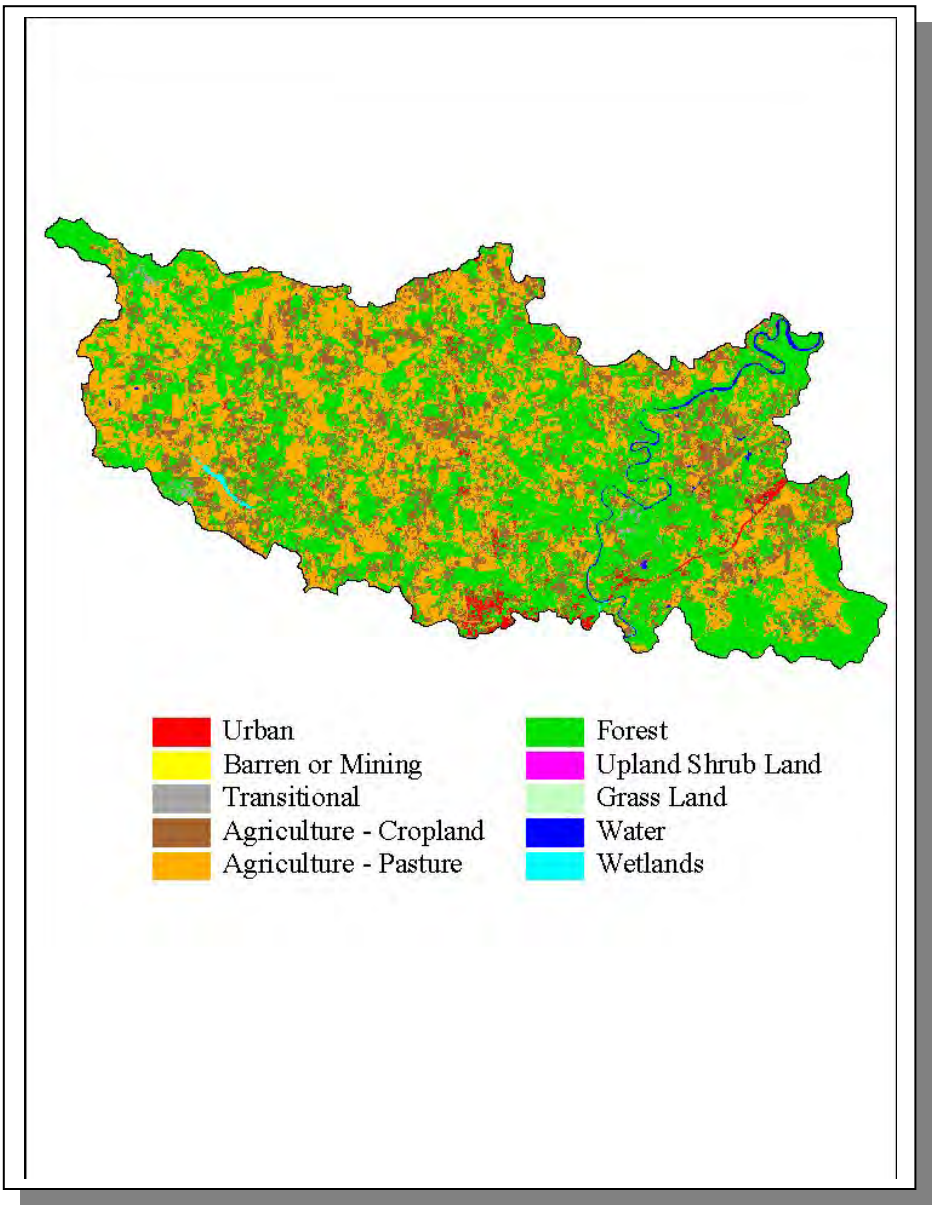


Figure 4-33. Illustration of Land Use Distribution in Subwatershed 0513010704.

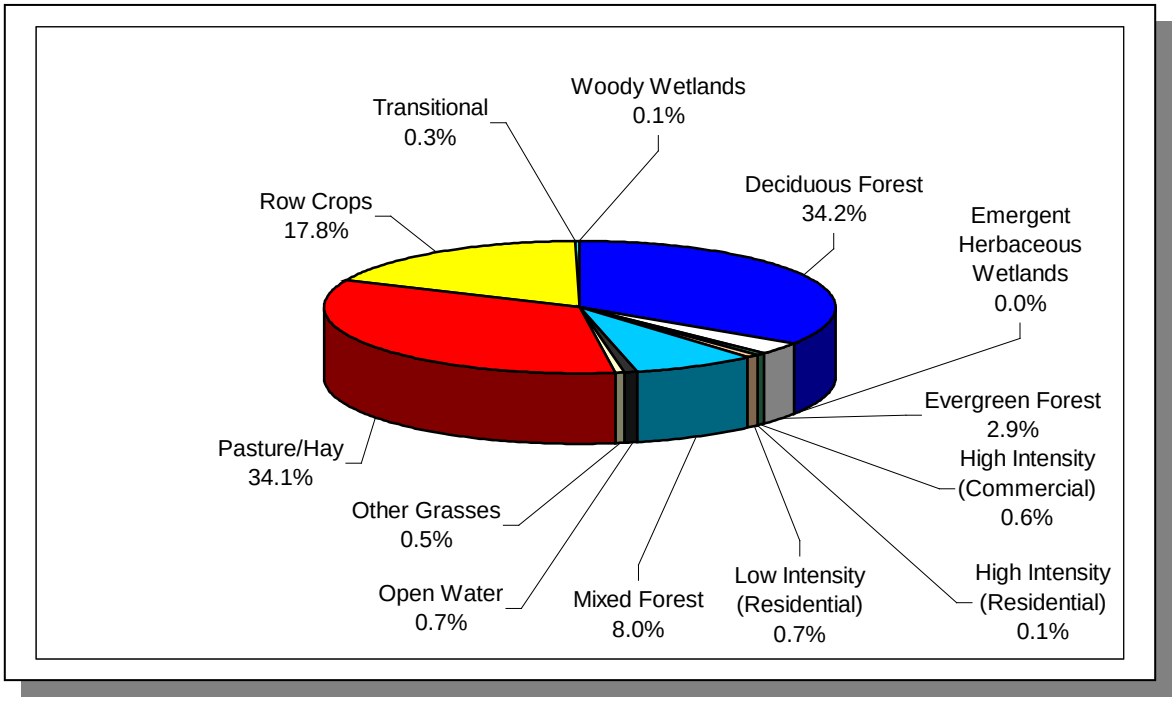


Figure 4-34. Land Use Distribution in Subwatershed 0513010704. *More information is provided in Collins-Appendix IV.*

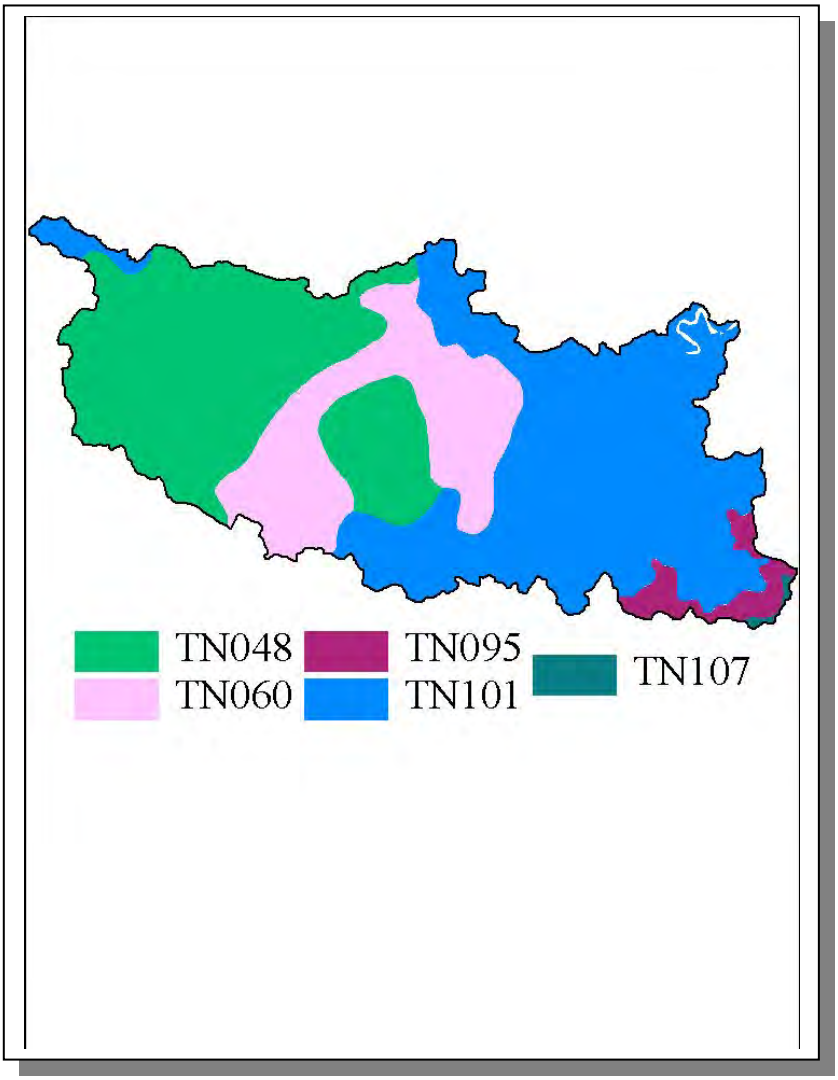


Figure 4-35. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0513010704.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN048	8.00	C	1.38	5.06	Silty Loam	0.42
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN095	0.00	B	2.35	5.12	Loam	0.31
TN101	0.00	B	1.71	5.39	Loam	0.35
TN107	1.00	C	6.34	4.84	Loam	0.28

Table 4-20. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0513010704. *More information is provided in Collins-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Cannon	10,467	12,011	4.95	519	595	14.6
Warren	32,992	35,777	30.47	10,053	10,901	8.4
Total	**43,459**	**47,788**		**10,572**	**11,496**	**8.7**

Table 4-21. Population Estimates in Subwatershed 0513010704.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
McMinnville	Warren	11,194	5,123	4,746	353	24

Table 4-22. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0513010704.

Figure 4-36. Location of Historical Streamflow Data Collection Sites in Subwatershed 0513010704. *Subwatershed 051301070401, 051301070402 and 051301070403 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

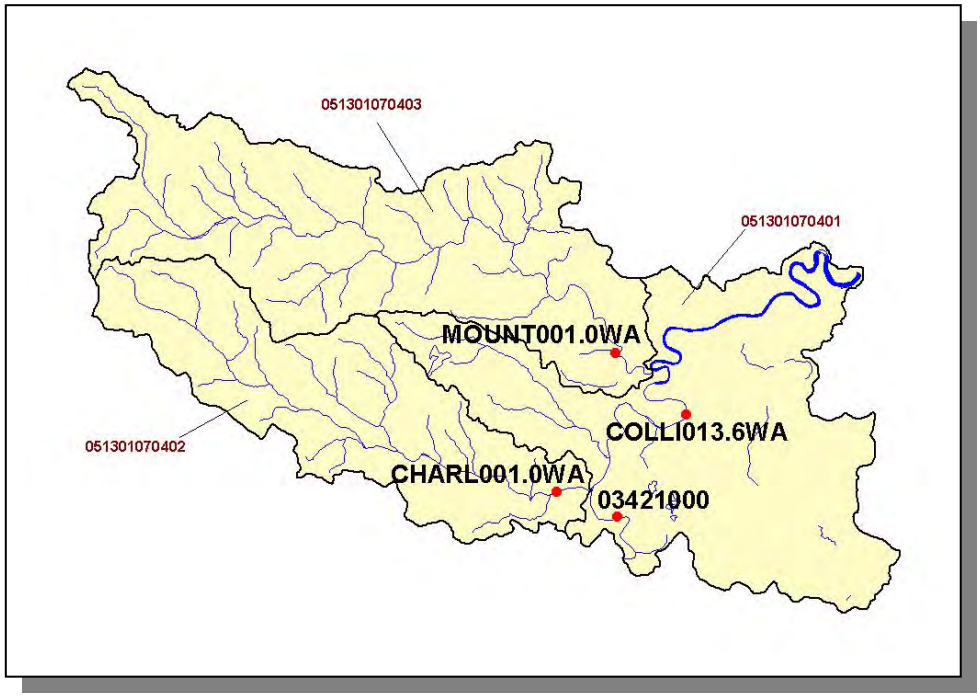


Figure 4-37. Location of STORET Monitoring Sites in Subwatershed 0513010704. *Subwatershed 051301070401, 051301070402 and 051301070403 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

4.2.D.ii. Point Source Contributions.

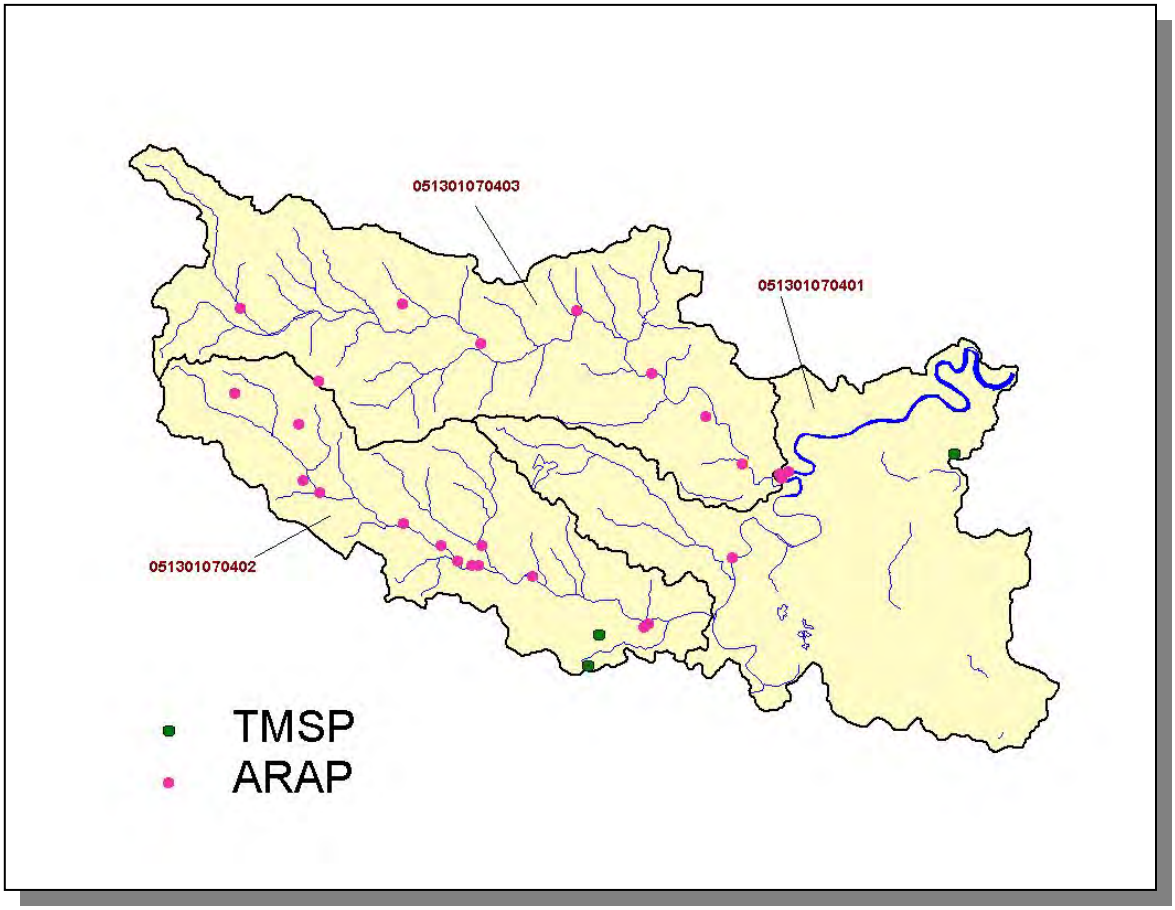


Figure 4-38. Location of Active Point Source Facilities in Subwatershed 0513010704. *Subwatershed 051301070401, 051301070402 and 051301070403 boundaries are shown for reference. More information is provided in the following figures.*

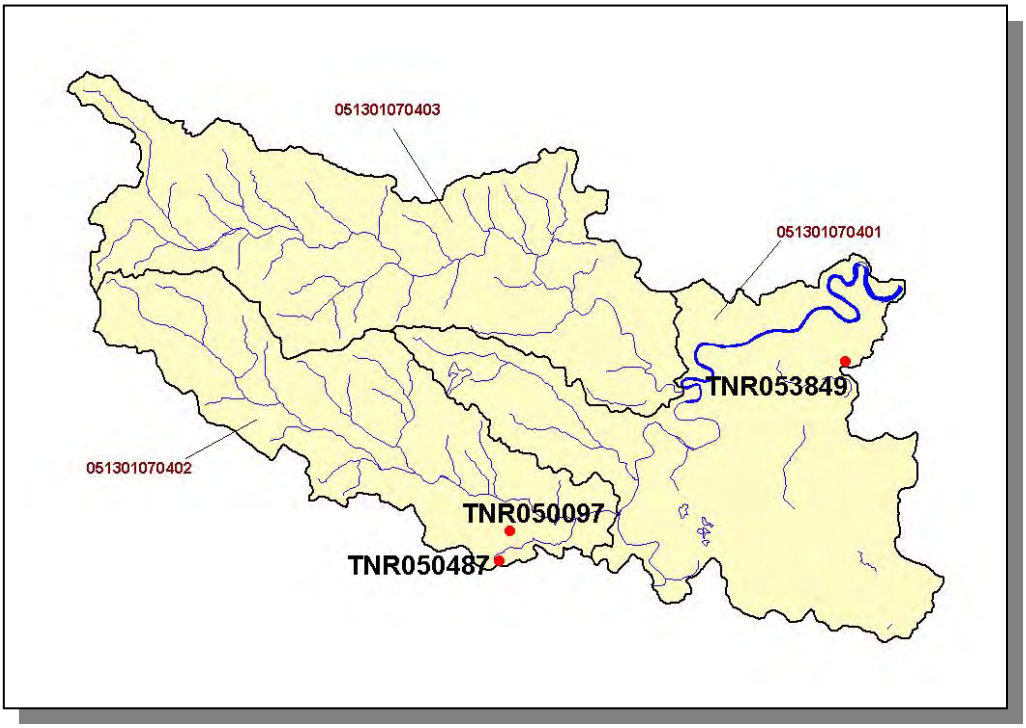


Figure 4-39. Location of TMSP Facilities in Subwatershed 0513010704. *Subwatershed 051301070401, 051301070402 and 051301070403 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

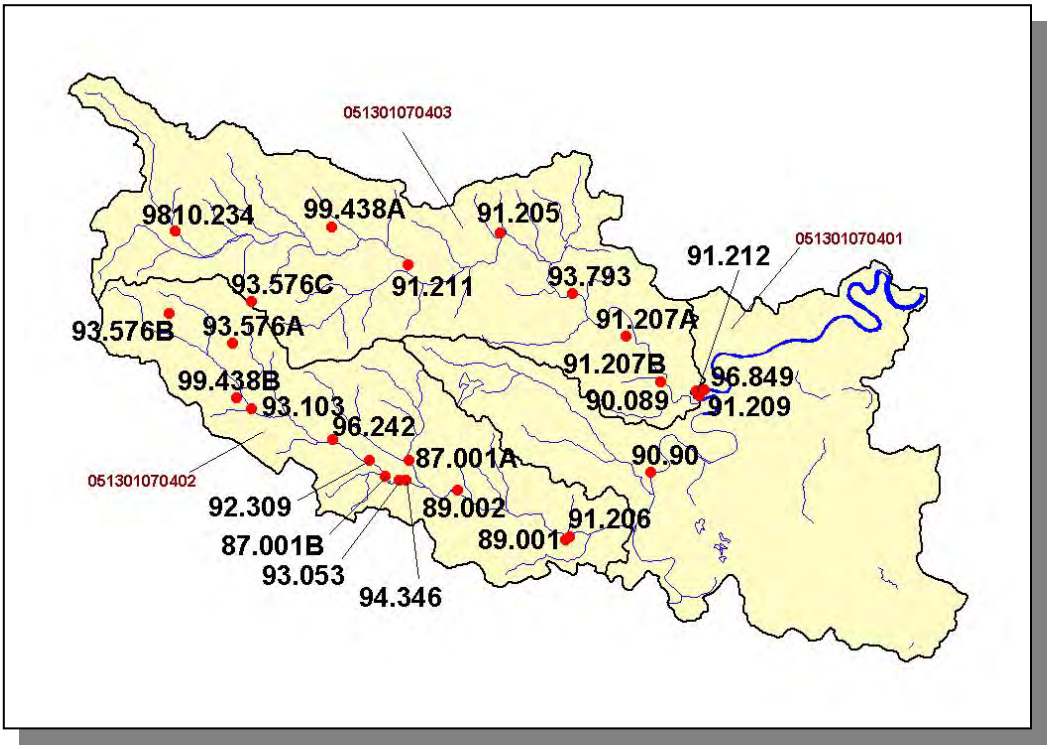


Figure 4-40. Location of ARAP Sites (Individual Permits) in Subwatershed 0513010704. *Subwatershed 051301070401, 051301070402 and 051301070403 boundaries are shown for reference. More information is provided in Collins-Appendix IV.*

4.2.D.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Milk Cow	Cattle	Chickens	Chickens Sold	Hogs	Sheep
8,178	956	16,692	16	0	1,294	58

Table 4-23. Summary of Livestock Count Estimates in Subwatershed 0513010704. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Cannon	88.5	88.5	1.7	7.1
Warren	93.6	93.6	2.4	10.1
Total	182.1	182.1	4.1	17.2

Table 4-24. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0513010704.

CROPS	TONS/ACRE/YEAR
Forest Land (Grazed)	0.00
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.22
Non Agricultural Land Use	0.00
Corn (Row Crops)	8.77
Soybeans (Row Crops)	16.50
Tobacco (Row Crops)	8.97
Wheat (Close Grown Cropland)	9.54
Legume/Grass (Hayland)	4.37
Grass (Hayland)	0.92
Legume (Hayland)	0.10
Other Cropland not Planted	1.86
Grass (Pastureland)	0.30
Grass, Forbs, Legumes (Mixed Pasture)	0.59
Conservation Reserve Program Land	0.33
Legume (Pastureland)	0.37
Other (Horticulture)	13.97

Table 4-25. Annual Soil Loss in Subwatershed 0513010704.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE COLLINS RIVER WATERSHED

5.1. Background.

5.2. Federal Partnerships
5.2.A. Natural Resources Conservation Service
5.2.B. United States Geological Survey
5.2.C. United States Fish and Wildlife Service

2.6. State Partnerships
5.3.A. TDEC Division of Water Supply
5.3.B. State Revolving Fund
5.3.C. Tennessee Department of Agriculture

2.7. Local Initiatives
5.4.A. Cumberland River Compact

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

5.2. FEDERAL PARTNERSHIPS.

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

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

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

CONSERVATION PRACTICE	TOTAL
Comprehensive Nutrient Management Plans (Number)	6
Conservation Buffers (Acres)	81
Erosion Reduction (Tons/Year)	13,376
Inventory and Evaluations (Number)	5
Irrigation Management (Acres)	169
Nutrient Management (Acres)	4,003
Pest Management (Acres)	2,511
Prescribed Grazing (Acres)	972
Residue Management (Acres)	1,486
Tree and Shrub Practices (Acres)	9
Waste Management (Number)	3
Wetlands Created, Restored, or Enhanced (Acres)	2
Wildlife Habitat (Acres)	284

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in Collins River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period. More information is provided in Collins-Appendix V.*

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

The USGS collects hydrologic data to document current conditions and provide a basis for understanding hydrologic systems and solving hydrologic problems. In Tennessee,

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

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

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

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

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

Recovery is the process by which the decline of an endangered or threatened species is stopped and reversed, and threats to the species' survival are eliminated, so that long-term survival in nature can be ensured. The goal of the recovery process is to restore listed species to a point where they are secure and self-sustaining in the wild and can be

removed from the endangered species list. Under the ESA, the Service and National Marine Fisheries Service were delegated the responsibility of carrying out the recovery program for all listed species.

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

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

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

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

The Service is actively involved with Tennessee Tech University and private landowners in the Rocky River and Collins River watersheds to protect habitat for the Federally endangered bluemask darter (*Etheostoma (doration) sp.*) and Cumberland pigtoe (*Pleurobema gibberum*). Specific projects have included the installation of livestock exclusion fencing and alternate water supply sources.

How To Participate.

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

- After funding is approved, the landowner and the Service co-sign a Wildlife Extension Agreement (minimum 10-year duration).
- Project installation begins.
- When the project is completed, the Service reimburses the landowner after receipts and other documentation are submitted according to the Wildlife Extension Agreement.

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

5.3 STATE PARTNERSHIPS.

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

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

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

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

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

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

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

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

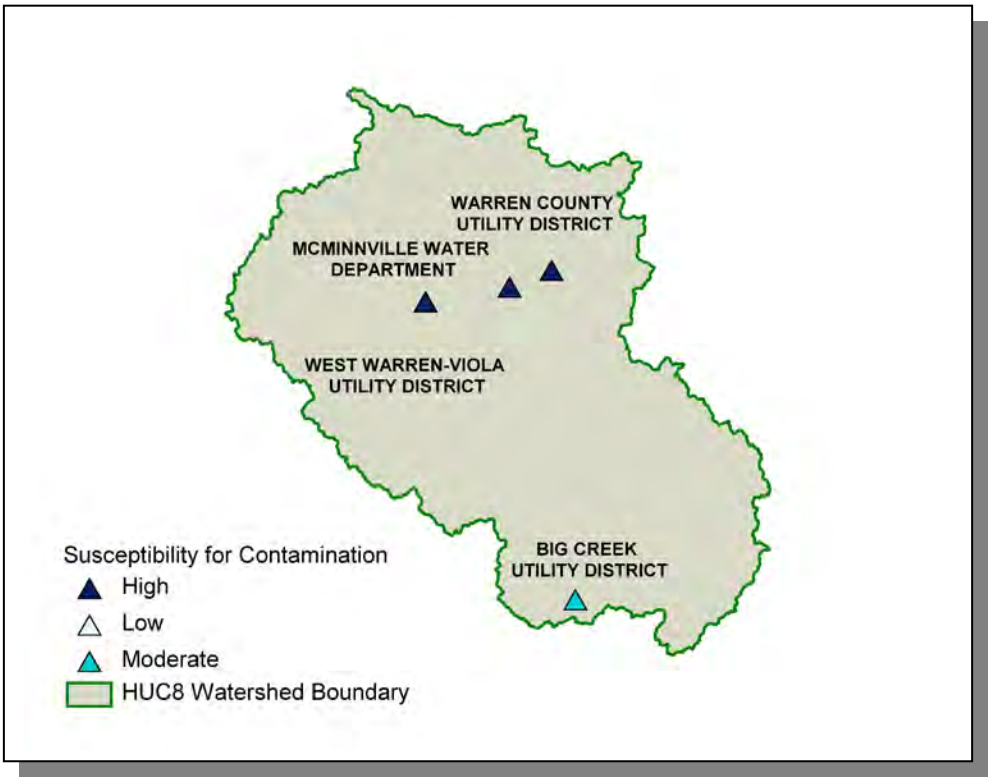


Figure 5-1. Susceptibility for Contamination in the Collins River Watershed.

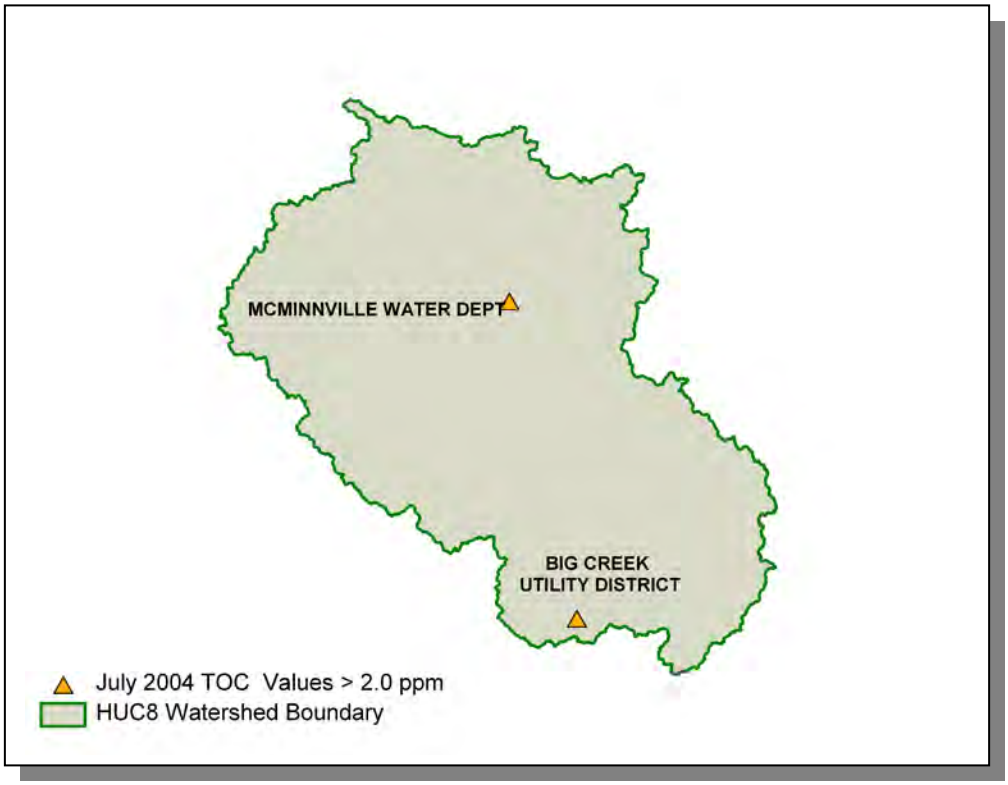


Figure 5-2. July 2004 Raw Water Total Organic Carbon (TOC) Analysis in the Collins River Watershed.

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

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

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

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

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

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

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

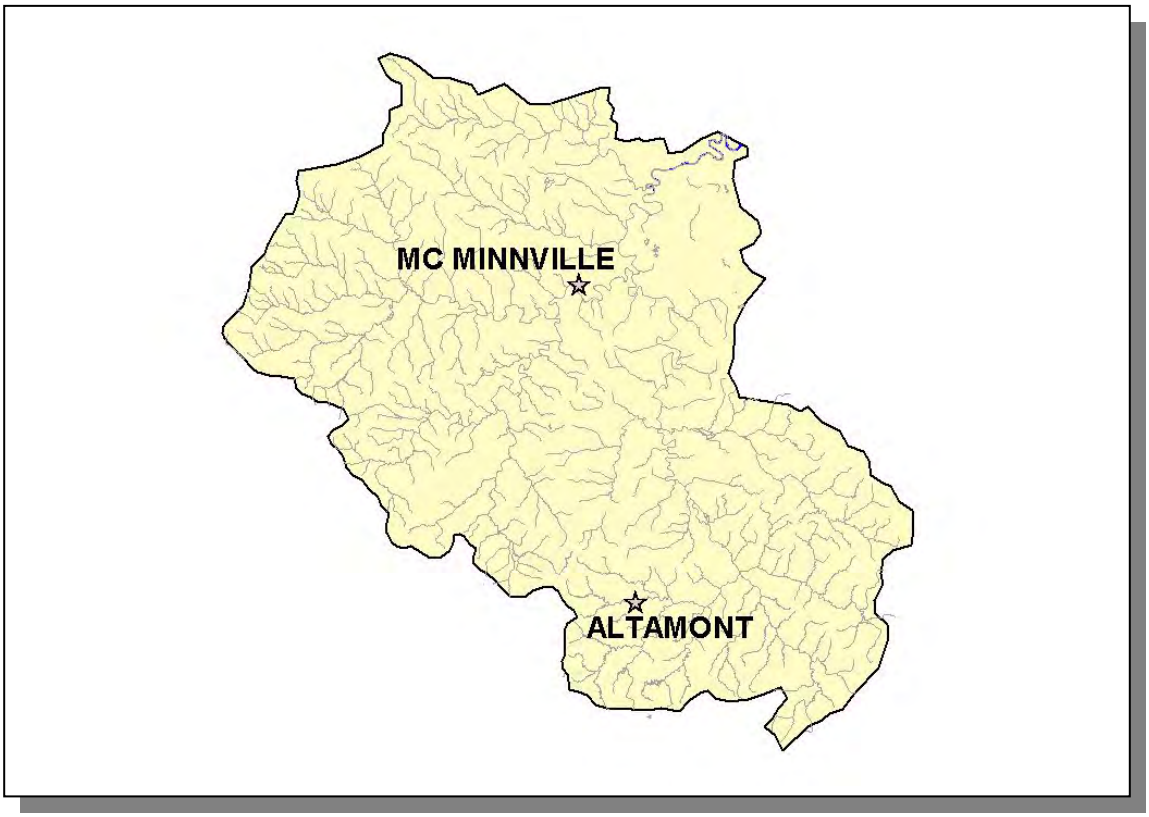


Figure 5-3. Location of Communities Receiving SRF Loans or Grants in the Collins River Watershed. *More information is provided in Collins-Appendix V.*

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

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

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

- Monitoring Projects. Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Collins River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program, and the U.S. Environmental Protection Agency Assistance Agreements C9994674-99-0, C9994674-00-0, and C9994674-01-0.

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

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

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

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

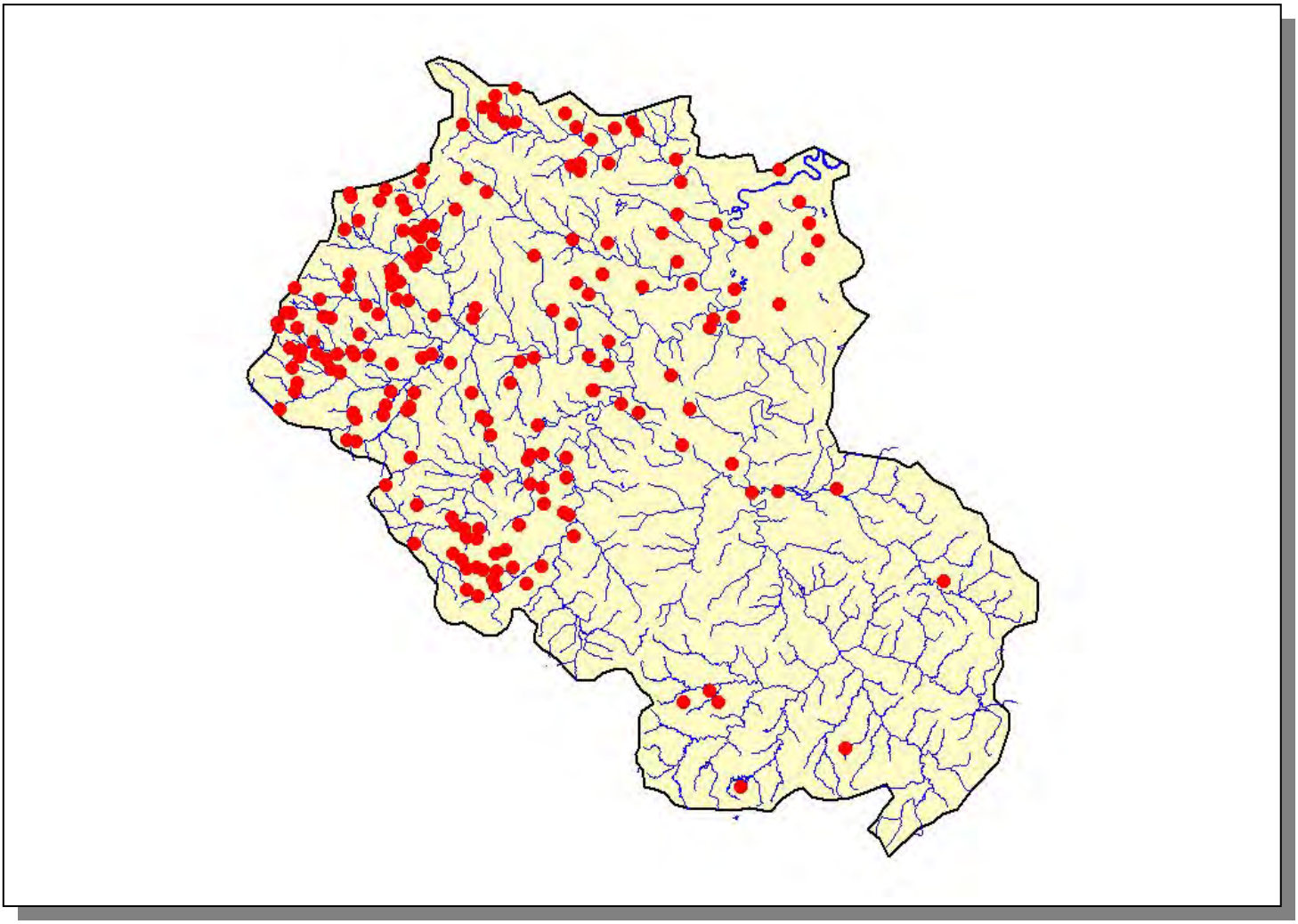


Figure 5-4. Location of BMPs installed from 1999 through 2002 in the Collins River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs.

5.4. LOCAL INITIATIVES.

5.4.A. Cumberland River Compact. The Cumberland River Compact is a not-for-profit educational organization with a mission to*: enhance the water quality of the Cumberland River and its tributaries through education and by promoting cooperation among citizens, businesses, and agencies in Kentucky and Tennesse*e.

The Cumberland River, 696 miles long, with a watershed that encompasses almost 18,000 square miles and a stakeholder population of nearly two million, has provided the challenge of setting specific goals and utilizing an organized approach to have an effect on the river. With grants from TDEC and the Tennessee Department of Agriculture 319 program, the Compact started reaching out to the 14 separate watersheds that make up the Cumberland Basin – one at a time in conjunction with Tennessee's five-year watershed management cycle. A series of stakeholder meetings have been completed in the Harpeth River and the Red River Watersheds. Stakeholders in both watersheds formed their own organization and continue to work with the Compact and on their own on neighborhood workshops, river clean-ups, water quality testing, and visual assessments, and have gotten involved with local planning and zoning. They also send a member to the Compact Board meetings and Water Quality Advisory Committees to insure ongoing communication and partnering. The Compact is currently working in the third watershed, the Middle Cumberland (a.k.a. Lower Cumberland), and these stakeholder meetings will continue until spring of 2003. Similar stakeholder meetings in the Caney Fork River and Collins River watersheds will occur in the next few years.

With the goal to educate and promote cooperation among citizens, businesses and agencies the following programs have been established:

Splash Bash Teacher Training and Festival. This is a combination teaching and celebration program for the river. The Compact brings professionals who work in the field of water quality to teach teachers, and therefore their students, how to perform simple chemical testing, macro-invertebrate identification and learn watershed mapping. Each class adopts a local creek for the purpose of analyzing its health. After each classroom collects their data they come together for a day of exhibiting their data and having fun.

Marina Education Program. This program targets marina owners and boarders to get them involved personally in the river's health. The first project completed was a series of signs reading: "You are in the Cumberland River Watershed – Don't Pollute the Boot." Each of the member marinas proudly display their signs at their pump docks and offices. Currently, this program is heading up the "Catfish Out of Water City Art Festival." Partnering with Greenways for Nashville and the Parthenon Patrons, the Compact hopes to raise awareness-through public art- about the value of the Cumberland River to our quality of life and the land management tools, such as greenways, which can protect and enhance this natural resource. Recognizing the value of the educational possibilities with Catfish Out of Water, a number of partners (Austin Peay State University, Metro Greenways, Metro Water, Middle Tennessee State University, the Parthenon and Warner Parks) have joined together to 1) work with Metro Water and water departments of surrounding communities to bring a storm drain labeling program to the watershed, 2) create and distribute "A Catfish Lives Here" booklet for grades 4-8 to teach children about non-point source pollution and the effect it has on catfish, 3) expand the Warner

Parks Junior Naturalist Program throughout local school systems featuring the Catfish Out of Water patch, and 4) provide activities about water quality through interactive placemats in local restaurants. Funding is made possible through a grant from the Department of Agriculture's Nonpoint Source Program.

Land Education Program. Educating "strange bedfellows" through annual programs, the first workshop put on by the Land Committee was a *Conservation Easement Conferenc*e. The Compact brought Stephen Small, the Boston attorney who wrote most of the IRS Codes on the subject of conservation easements, to speak with attorneys, CPA's, appraisers, as well as local landowners on the subject of protecting land through these means. The second conference in 2002 was *Conservation and Common Sense Development – A Workshop for Building Better Communitie*s, co-hosted by the Tennessee River Eastbank Group, The Tennessee Homebuilders, The Tennessee Farm Bureau, the Compact, and others. This conference started the conversation between developers, the government agencies who permit them, and the citizens who live in their communities on better site design approaches to show "the bottom line of green is black." The third conference is in the early planning stages; however, the topic will focus on new technologies to building ecologically-friendly homes, buildings, and neighborhoods.

Water Quality Advisory Committee. This committee is responsible for seeing that our technical information is beyond reproach. The committee has members who represent: the Kentucky Division of Water, the Natural Resource Conservation Service, Greater Nashville Regional Council, the Tennessee Department of Agriculture's Nonpoint Source Program, CTE Engineers, TDEC Division of Water Pollution Control, U.S. Army Corps Of Engineers, Nashville Public Works, Nashville Metropolitan Water Services, the United States Geologic Survey, and the Tennessee Wildlife Resource Agency. The two most outstanding products to come out of this Committee to date are the award-winning *Harpeth River Watershed Brochure* (a simple brochure/map of that watershed which answers two questions through the use of government data – Where can I swim? Where can I fish?) and the *Harpeth River Sediment Study Pla*n. The Sediment Study Plan follows the Splash Bash Teacher Training in our outreach to each watershed. This project uses local volunteers to measure the sediment being carried through the streams of a particular watershed. Since silt is one of the leading pollutants to all southeastern rivers but is seldom tested by government agencies, this work is important not only to local citizens, businesses, and wildlife but also to our governmental partners who have given this project their stamp of approval. The Cumberland River Compact was chosen by the Southeast Watershed Forum as *The Tennessee Success Story for the Year* – for the production of the *Harpeth River Watershed Map – An Overview of Our Water Quality*. A Red River Watershed Map is now in progress.

For additional information, contact:
Margo Farnsworth
Executive Director
Cumberland River Compact
P. O. Box 41721
Nashville, TN 37204
(615)837-1151 or email: screendoor@bigfoot.com
http://www.cumberlandrivercompact.org

CHAPTER 6

FUTURE DIRECTIONS IN THE COLLINS RIVER WATERSHED

6.1. Background

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

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

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

6.1. BACKGROUND.

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

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

This Chapter addresses point and nonpoint source approaches to water quality problems in the Collins River Watershed as well as specific NPDES permittee information.

6.2. COMMENTS FROM PUBLIC MEETINGS. Watershed meetings are open to the public, and most meetings were represented by citizens who live in the watershed, NPDES permitees, business people, farmers, and local river conservation interests. Locations for meetings were 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 Caney Fork River Watershed public meeting was held April 17, 1997 in Smithville. The goals of the meeting were to 1)present, and review the objectives of, the Watershed Approach, 2)introduce local, state, and federal agency and nongovernment organization partners, 3)review water quality monitoring strategies, and 4)solicit input from the public.

Major Concerns/Comments

- Wasteload allocations and their use in running models
- Lake management
- Communication with citizen groups
- The effect of naming the Caney Fork River an Outstanding National Resource Water (ONRW)
- Fish postings

6.2.B. Year 3 Public Meeting. The second Caney Fork River Watershed public meeting was held July 13, 1999 at the Smithville Courthouse. The goals of the meeting were to 1)provide an overview of the watershed approach, 2)review the monitoring strategy, 3)summarize the most recent water quality assessment, 4)discuss the TMDL schedule and citizens' role in commenting on draft TMDLs, and 5)discuss BMPs and other nonpoint source tools available through the Tennessee Department of Agriculture 319 Program and NRCS conservation assistance programs.

Major Concerns/Comments

- Cows in the creek adding to Nonpoint source pollution
- Increased discharges to 303(d)-listed streams from a planned industrial development
- Development by the City of Cookeville around Mine Lick Creek
- Inadequate protection of sinkholes

6.2.C. Year 5 Public Meeting. The third scheduled Collins River Watershed public meeting was held November 4, 2003 at the McMinnville Administrative Center. The meeting featured five educational components:

- Overview of draft Watershed Water Quality Management Plan slide show
- Benthic macroinvertebrate samples and interpretation
- SmartBoard™ with interactive GIS maps
- "How We Monitor Streams" self-guided slide show
- "Why We Do Biological Sampling" self-guided slide show

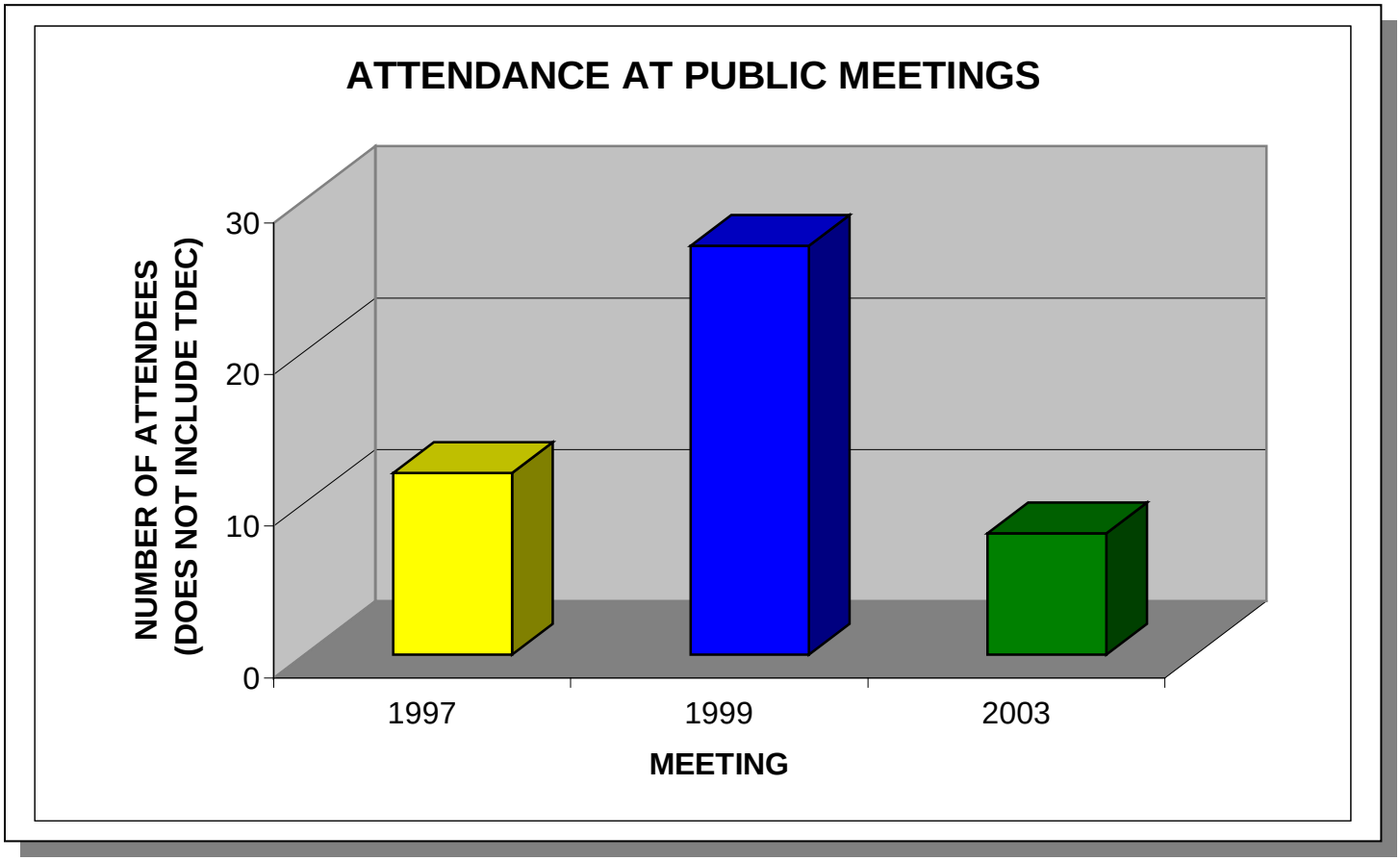


Figure 6-1. Attendance at Public Meetings in the Collins River Watershed. *The 1997 and 1999 watershed meeting numbers represent Collins River and Caney Fork River Watersheds joint meetings.*

Figure 6-2. Maps are a convenient way to illustrate water quality data in a way that the public can easily understand.

Figure 6-3. Displays, like this one on biological indicators of water quality, foster lots of questions and discussions among meeting participants.

6.3. APPROACHES USED.

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

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

Approved TMDL:

Dry Creek, Gath Branch, Unnamed Trib to Mountain Creek, Hickory Grove Branch, Mud Creek, Dog Branch, and Oakland Branch. TMDL for siltation and habitat alteration approved February 13, 2003:
http://www.state.tn.us/environment/wpc/CollinsSed03.pdf

TMDLs are prioritized for development based on many factors.

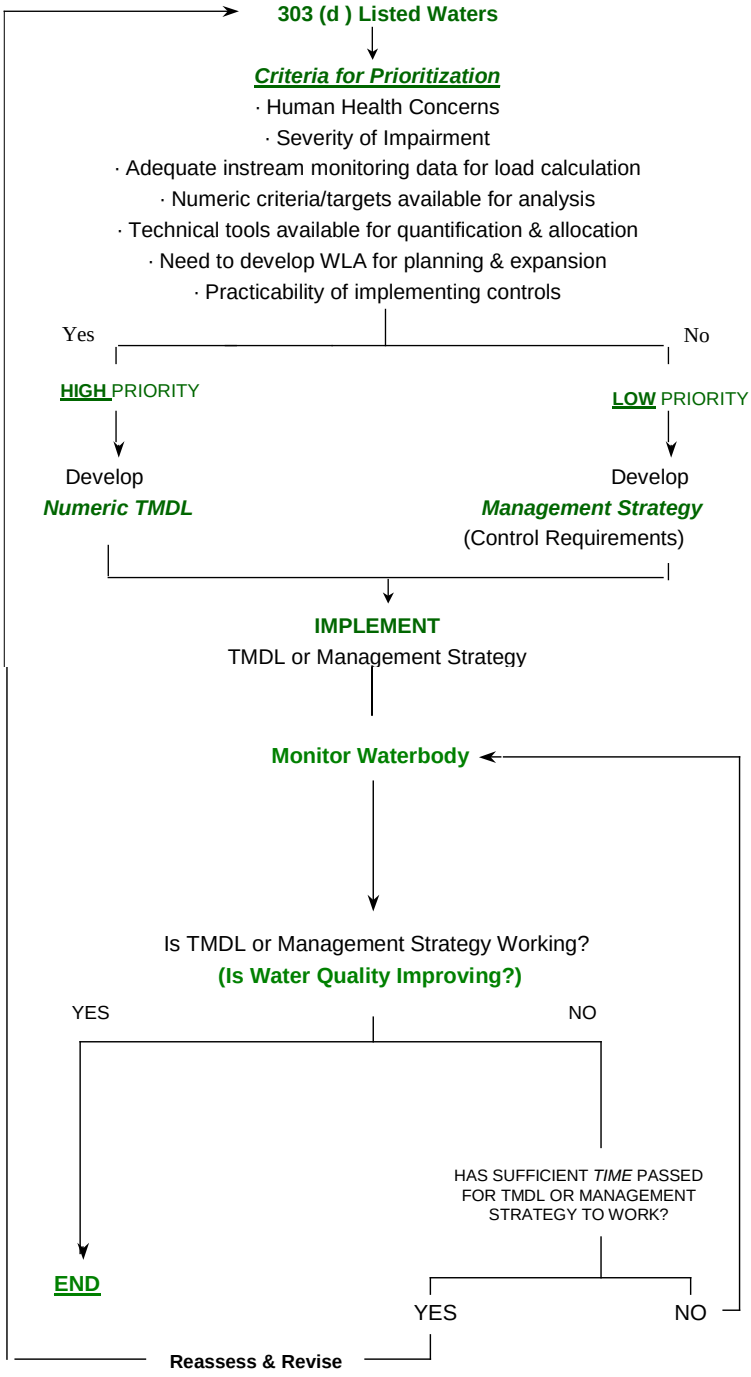


Figure 6-4. Prioritization scheme for TMDL Development.

6.3.B. Nonpoint Sources

Common nonpoint sources of pollution include urban runoff, riparian vegetation removal, and inappropriate land development, agricultural, and road construction practices. Since nonpoint pollution exists essentially everywhere rain falls and drains to a stream, existing point source regulations can have only a limited effect, so other measures are necessary.

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

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

6.3.B.i. Sedimentation.

6.3.B.i.a. From Construction Sites. Construction activities have historically been considered "nonpoint sources." In the late 1980's, EPA designated them as being subject to NPDES regulation if more than 5 acres are disturbed. In the spring of 2003, that threshold became 1 acre. The general permit issued for such construction sites sets out conditions for maintenance of the sites to minimize pollution from stormwater runoff, including requirements for installation and inspection of erosion controls. Also, the general permit imposes more stringent inspection and self-monitoring requirements on sites in the watershed of streams that are already impaired due to sedimentation. An example in the Collins River Watershed is Oakland Branch. Regardless of the size, no construction site is allowed to cause a condition of pollution.

Construction sites within a sediment-impaired watershed may also have higher priority for inspections by WPC personnel, and are likely to have enforcement actions for failure to control erosion. Historically, however, construction activities have not been a large source of sediment problems within the Collins River Watershed due to its rather sparsely populated characteristics.

6.3.B.i.b. From Channel and/or Bank Erosion. Many streams within the Collins River Watershed suffer from varying degrees of streambank erosion. When stream channels are altered, or when large tracts of land are cleared increasing storm runoff, banks can

become unstable and highly erodable. Destabilized banks contribute sediment load and lose their riparian vegetation. This cycle is especially problematic in certain areas of the Collins River Watershed where the very sandy plateau soils and shallow rooted trees are especially vulnerable. Most of the land and channel alterations are due to agricultural practices or mining operations.

Several agencies such as the Natural Resources Conservation Service and Tennessee Department of Agriculture, as well as citizen groups, are working to stabilize portions of streambanks. Other methods or controls that might be necessary to address common problems are:

Voluntary activities

- Re-establishment of bank vegetation (examples: Dry Branch and Mud Creek).
- Establish buffer zones around streams flowing through row crop fields or nurseries (examples: Dog Branch and Bluff Spring Branch).
- Establish off channel watering areas for cattle by moving watering troughs and feeders back from stream banks (examples: Gath Branch and Mountain Branch tributaries).
- Limit cattle access to streams and bank vegetation (example: Hickory Grove Branch).

Additional strategies

- Better community planning for the impacts of development on small streams, especially development in growing areas (examples: small streams in McMinnville and Grundy County resort towns).
- Restrictions requiring post construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion, (example: Oakland Branch).
- Additional restrictions on logging in streamside management zones.
- Prohibition on clearing of stream and ditch banks (example: various small tributaries to the Collins River). *Note: Permits may be required for any work along streams.*
- Additional restriction to road and utilities crossings of streams.
- Restrictions on the use of off-highway vehicles on stream banks and in stream channels.

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

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

Since the Dust Bowl era, the agriculture community has strived to protect the soil from wind and soil erosion. Agencies such as the Natural Resources Conservation Service (NRCS), the University of Tennessee Agricultural Extension Service, and the Tennessee department of Agriculture have worked to identify better ways of farming, to educate the farmers, and to install the methods that address the sources of some of the impacts due to agriculture. Cost sharing is available for many of these measures. Of particular concern in the Collins River Watershed is the burgeoning nursery industry centered around McMinnville.

More stringent controls and oversight of water withdrawals and Nonpoint fertilizer runoff from the many nursery operations are needed to improve the quality of many streams in the area, including Mountain Creek tributaries, Martin Creek, Bluff Springs Branch, Gath Branch, Hickory Grove Branch, and other small tributaries to the Collins River.

6.3.B.ii. Pathogen Contamination.

Possible sources of pathogens are inadequate or failing septic tank systems, overflows or breaks in public sewer collection systems, poorly disinfected discharges from sewage treatment plants, and fecal matter in streams and storm drains due to pets, livestock and wildlife. Permits issued by the Division of Water Pollution Control regulate discharges from point sources and require adequate control for these sources. Individual homes are required to have subsurface, on-site treatment (i.e., septic tank and field lines) if public sewers are not available. Septic tank and field lines are regulated by the Division of Ground Water Protection within Cookeville 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 (example: Hoover Branch).
- Limiting livestock access to streams (example: North Prong Barren River).
- Proper management of animal waste from feeding operations.

Enforcement strategies

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

Additional strategies

- Restrict development in areas where sewer is not available and treatment by subsurface disposal is not an option due to poor soils, floodplains, or high water tables. This is particularly important in the Collins River watershed given the geology of the Cumberland Plateau and escarpment.

- Develop and enforce leash laws and controls on pet fecal material in areas with higher population densities.
- Greater efforts by sewer utilities to identify leaking lines or overflowing manholes.

6.3.B.iii. Excessive Nutrients and/or Dissolved Oxygen Depletion.

These two impacts are usually listed together because high nutrients often contribute to low dissolved oxygen within a stream. Since nutrients often have the same source as pathogens, the measures previously listed can also address many of these problems. Elevated nutrient loadings are also often associated with urban runoff from impervious surfaces and from fertilized lawns and croplands.

Other sources of nutrients can be addressed by:

Voluntary activities

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

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

- Maintain shade over a stream. Cooler water can hold more oxygen and retard the growth of algae. As a general rule, all stream channels suffer from some canopy removal.
- Discourage impoundments. Ponds and lakes do not aerate water. Firescald Creek has suffered from an impoundment. *Note: Permits may be required for any work on a stream, including impoundments.*

6.3.B.iv. Toxins and Other Materials.

In the Collins River Watershed, a relatively small amount of toxic substances enter streams due to stormwater runoff from industrial facilities and urban areas. More stringent inspection and regulation of permitted industrial facilities, and local stormwater quality initiatives, could help reduce the amount of contaminated runoff reaching state waters. Examples of streams which would benefit from these measures include several small unnamed streams in the McMinnville urban area.

Many materials enter our streams due to apathy, or lack of civility or knowledge by the public. Litter in roadside ditches, garbage bags tossed over bridge railings, paint brushes washed off over storm drains, and oil drained into ditches are all 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 Oakland Branch).
- Sponsoring community clean-up days.
- 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

- Organizing stream cleanups removing trash, limbs and debris before they cause blockage.
- Avoiding use of heavy equipment to clean out streams. Several small tributaries to the Collins River, as well as Bluff Springs Branch, Gath Branch, and Hickory Grover Branch, have suffered from such activities.
- Planting vegetation along streams to stabilize banks and provide habitat (nearly all streams can benefit from this).
- Encouraging developers to avoid extensive culverts in streams.

Current regulations

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

Additional Enforcement

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

6.3.B.v. Acid Mine Runoff.

The Cumberland plateau has had a long history of coal mining, much of which was done prior to any type of environmental regulation. Unfortunately, the legacy of many of these old mining sites is severe impacts to the streams that drain them in the form of pollution from metals and low pH from sulfuric acid.

Streams that would benefit from remediation projects include the Upper Collins River, Ranger Creek and Dry Creek.

6.4. PERMIT REISSUANCE PLANNING

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

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

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

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

6.4.A. Municipal Permits

TN0066940 Dibrell School Waste Water Treatment Plant

Discharger rating: Minor
City: McMinnville
County: Warren
EFO Name: Cookeville
Issuance Date: 8/29/02
Expiration Date: 8/30/07
Receiving Stream(s): Mountain Creek mile 9.7
HUC-12: 051301070403
Effluent Summary: Treated domestic wastewater from Outfall 001
Treatment system: Septic tank and recirculating sand filter

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
CBOD5	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
CBOD5	All Year	30	MAvg Conc	mg/L	Monthly	Grab	Effluent
D.O.	All Year	1	DMin Conc	mg/L	Weekdays	Grab	Effluent
Fecal Coliform	All Year	1000	DMax Conc	#/100mL	Monthly	Grab	Effluent
Fecal Coliform	All Year	200	MAvg Geo Mean	#/100mL	Monthly	Grab	Effluent
Settleable Solids	All Year	1	DMax Conc	mL/L	2/Week	Grab	Effluent
TRC	All Year	2	DMax Conc	mg/L	Weekdays	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
TSS	All Year	30	MAvg Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	2/Week	Grab	Effluent
pH	All Year	6	DMin Conc	SU	2/Week	Grab	Effluent

Table 6-1. Permit Limits for Dibrell School Waste Water Treatment Plant.

EFO Comments:
The school WWTP (re-circulating sand filter) system seems to require more maintenance than similar systems. Recently a collection system pump was replaced. The discharge point is located less than a mile from the WWTP.

TN0023591 McMinnville Sewage Treatment Plant

Discharger rating: Major
City: McMinnville
County: Warren
EFO Name: Cookeville
Issuance Date: 1/31/02
Expiration Date: 1/31/07
Receiving Stream(s): Barren Fork River Mile 4.5
HUC-12: 051301070204
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: WAS to thickner to aerobic digestor to lap

Segment	TN05130107006_1000
Name	Barren Fork
Size	6.97
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Fish and Aquatic Life (Supporting), Livestock Watering and Wildlife (Supporting), Recreation (Not Assessed), Irrigation (Supporting)
Causes	N/A
Sources	N/A

Table 6-2. Stream Segment Information for McMinnville STP.

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
48hr LC50: Ceriodaphnia Dubia	All Year	38	DMin Conc	Percent	Quarterly	Grab	Effluent
48hr LC50: Fathead Minnows	All Year	38	DMin Conc	Percent	Quarterly	Grab	Effluent
Ammonia as N (Total)	All Year	10	DMax Conc	mg/L	Weekly	Composite	Effluent
Ammonia as N (Total)	All Year	5	WAvg Conc	mg/L	Weekly	Composite	Effluent
Ammonia as N (Total)	All Year	7.5	MAvg Conc	mg/L	Weekly	Composite	Effluent
Ammonia as N (Total)	All Year	250	DMax Load	lb/day	Weekly	Composite	Effluent
Ammonia as N (Total)	All Year	167	MAvg Load	lb/day	Weekly	Composite	Effluent
CBOD % Removal	All Year	40	DMin % Removal	Percent	Weekly	Calculated	% Removal
CBOD % Removal	All Year	85	MAvg % Removal	Percent	Weekly	Calculated	% Removal
CBOD5	All Year	40	DMax Conc	mg/L	Weekly	Composite	Effluent
CBOD5	All Year	25	DMin Conc	mg/L	Weekly	Composite	Effluent
CBOD5	All Year	35	MAvg Conc	mg/L	Weekly	Composite	Effluent
CBOD5	All Year	1168	DMax Load	lb/day	Weekly	Composite	Effluent
CBOD5	All Year	834	MAvg Load	lb/day	Weekly	Composite	Effluent
D.O.	All Year	3	DMin Conc	mg/L	Weekdays	Grab	Effluent
E. coli	All Year	126	MAvg Geo Mean	#/100mL	3/Week	Grab	Effluent
Fecal Coliform	All Year	1000	DMax Conc	#/100mL	3/Week	Grab	Effluent

Table 6-3a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Fecal Coliform	All Year	200	MAvg Geo Mean	#/100mL	3/Week	Grab	Effluent
Settleable Solids	All Year	1	DMax Conc	mL/L	Weekly	Composite	Effluent
TRC	All Year	0.18	DMax Conc	mg/L	Weekdays	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	Weekly	Composite	Effluent
TSS	All Year	35	MAvg Conc	mg/L	Weekly	Composite	Effluent
TSS	All Year	30	WAvg Conc	mg/L	Weekly	Composite	Effluent
TSS	All Year	1168	DMax Load	lb/day	Weekly	Composite	Effluent
TSS	All Year	1001	MAvg Load	lb/day	Weekly	Composite	Effluent
TSS % Removal	All Year	40	DMin % Removal	Percent	Weekly	Calculated	% Removal
TSS % Removal	All Year	85	MAvg % Removal	Percent	Weekly	Calculated	% Removal
pH	All Year	9	DMax Conc	SU	Weekdays	Grab	Effluent

Table 6-3b.

Tables 6-3a-b. Permit Limits for McMinnville Sewage Treatment Plant.

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

- 19 overflows
- 18 bypasses

EFO Comments:
McMinnville STP has an excellent performance track. Sludge is aerobically digested and land applied. The sludge generation and storage capacity for the wet season was compared. The storage routinely reaches full capacity during the winter affecting the solids removal from the plant during the winter months. The City is in process to bid out the engineering design for Class A processing facility.

McMinnville Pretreatment
Considerable assistance was provided in the identification of the root cause of the total phenol violations by two Industrial Users in McMinnville. Local limits were recalculated and changes to the limits were approved. Categorical limits were not applied correctly at the end of the categorical treatment process and combined waste formula was required. Changes to the Industrial User permit language were recommended. Changes in the appropriate limits were required to reflect the more stringent applicable values.

TN0025372 West Warren- Viola Utility District Sewage Treatment Plant

Discharger rating: Minor
City: Morrison
County: Warren
EFO Name: Cookeville
Issuance Date: 1/31/02
Expiration Date: 1/31/07
Receiving Stream(s): Barren Fork River at mile 18.1
HUC-12: 051301070203
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: SBR to thickener to aerobic digester to landfill

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
BOD % removal	All Year	40	DMin % Removal	Percent	3/Week	Calculated	Percent Removal
BOD % removal	All Year	85	MAvg % Removal	Percent	3/Week	Calculated	Percent Removal
BOD5	All Year	45	DMax Conc	mg/L	3/Week	Composite	Effluent
BOD5	All Year	30	WAvg Conc	mg/L	3/Week	Composite	Effluent
BOD5	All Year	40	MAvg Conc	mg/L	3/Week	Composite	Effluent
BOD5	All Year	300	DMax Load	lb/day	3/Week	Composite	Effluent
BOD5	All Year	226	MAvg Load	lb/day	3/Week	Composite	Effluent
D.O.	All Year	1	DMin Conc	mg/L	Weekdays	Grab	Effluent
E. coli	All Year	126	MAvg Geo Mean	#/100mL	3/Week	Grab	Effluent
Fecal Coliform	All Year	1000	DMax Conc	#/100mL	3/Week	Grab	Effluent
Fecal Coliform	All Year	200	MAvg Geo Mean	#/100mL	3/Week	Grab	Effluent
Settleable Solids	All Year	1	DMax Conc	mL/L	3/Week	Composite	Effluent
TRC	All Year	0.5	DMax Conc	mg/L	Weekdays	Grab	Effluent
TSS	All Year	45	DMax Conc	mg/L	3/Week	Composite	Effluent
TSS	All Year	30	WAvg Conc	mg/L	3/Week	Composite	Effluent
TSS	All Year	40	MAvg Conc	mg/L	3/Week	Composite	Effluent
TSS	All Year	300	DMax Load	lb/day	3/Week	Composite	Effluent
TSS	All Year	226	MAvg Load	lb/day	3/Week	Composite	Effluent
TSS % Removal	All Year	85	MAvg % Removal	Percent	3/Week	Calculated	Percent Removal
TSS % Removal	All Year	40	DMin % Removal	Percent	3/Week	Calculated	Percent Removal
pH	All Year	9	DMax Conc	SU	Weekdays	Grab	Effluent
pH	All Year	6	DMin Conc	SU	Weekdays	Grab	Effluent

Table 6-4. Permit Limits for West Warren- Viola Utility District STP

Compliance History:

The following numbers of exceedences were noted in PCS:

- 17 Overflows
- 1 Bypass

EFO Comments:

No issues.

6.4.B. Industrial Permits

TN0064629 Bridgestone/Firestone North American Tire, LLC

Discharger rating: Minor
City: Morrison
County: Warren
EFO Name: Cookeville
Issuance Date: 8/30/02
Expiration Date: 8/30/07
Receiving Stream(s): Unnamed tributary at mile 1.0 to Crowfoot Branch at mile 2.9
HUC-12: 051301070303
Effluent Summary: Continuous boiler blowdown, cooling tower blowdown, non-contact cooling water, hot well for curing blowdown, softener backwash, air dryer drains, ornamental fountain, seal water from vacuum pump, condensate from condensing heat exchanger, basement sumps.
Treatment system: Ponds

PARAMETER	*SEASON*	*LIMIT*	*UNITS*	*SAMPLE DESIGNATOR*	*MONITORING FREQUENCY*	*SAMPLE TYPE*	*MONITORING LOCATION*
Flow	All Year		DMax Load	MGD	Weekly	Instantaneous	Effluent
Flow	All Year		MAvg Load	MGD	Weekly	Instantaneous	Effluent
IC25 7day Ceriodaphnia Dubia	All Year	100	DMin Conc	Percent	Continuous	Composite	Effluent
IC25 7day Fathead Minnows	All Year	100	DMin Conc	Percent	Continuous	Composite	Effluent
Oil and Grease (Freon EM)	All Year	30	DMax Conc	mg/L	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	30	DMax Conc	mg/L	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	30	DMax Conc	mg/L	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	30	DMax Conc	mg/L	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	30	DMax Conc	mg/L	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	19.7	DMax Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	14.3	MAvg Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	16.7	MAvg Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	17.8	MAvg Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	15.5	MAvg Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	13.2	MAvg Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	23.2	DMax Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	25	DMax Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	26.7	DMax Load	lb/day	2/Month	Grab	Effluent
Oil and Grease (Freon EM)	All Year	21.5	DMax Load	lb/day	2/Month	Grab	Effluent
Raw Materials Processed	All Year		MAvg Load	lb/day	Monthly	Grab or Composite	Effluent
TSS	All Year	40	DMax Conc	mg/L	2/Month	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	2/Month	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	2/Month	Grab	Effluent
TSS	All Year	40	DMax Conc	mg/L	2/Month	Grab	Effluent

Table 6-5a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
TSS	All Year	40	DMax Conc	mg/L	2/Month	Grab	Effluent
TSS	All Year	78.9	DMax Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	106.9	DMax Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	57.3	MAvg Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	66.6	MAvg Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	71.2	MAvg Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	61.8	MAvg Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	52.6	MAvg Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	99.9	DMax Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	85.9	DMax Load	lb/day	2/Month	Grab	Effluent
TSS	All Year	92.8	DMax Load	lb/day	2/Month	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Weekly	Grab	Effluent
pH	All Year	6.5	DMin Conc	SU	Weekly	Grab	Effluent

Table 6-5b.

Tables 6-5a-b. Permit Limits for Bridgestone/Firestone North American Tire, LLC

Compliance History:
None noted in PCS.

EFO Comments:
An oil –water separator is an integral part of the wastewater treatment at this facility. The oil water separator is followed by two treatment ponds in series. Residual oil is captured in the first pond and a disposable floating absorbent sock is used for oil skimming and removal. The second pond is used to provide additional holding time and settling. Bridgestone/Firestone uses a commercial lab to analyze for all permit parameters except for pH and flow. The facility discharges in a batch mode. The discharge flow was reported as maximum pumping rate resulting in over - reporting the average TSS and O&G loadings. The facility now records the total flow for each month and calculates the average daily flow.

TN0004359 Burroughs Ross and Colville Co., LLC

Discharger rating: Minor
City: McMinnville
County: Warren
EFO Name: Cookeville
Issuance Date: 3/1/02
Expiration Date: 2/28/07
Receiving Stream(s): Barren Fork River at approximate mile 5.5 for Outfall 001, Town Creek at approximate mile 0.04 to Barren Fork River at approximate mile 5.4 for Outfall 002, and Barren Fork River at approximate mile 5.3 for Outfall 004
HUC-12: 051301070204
Effluent Summary: Log spraying water through Outfalls 001, 002 and 004
Treatment system: -

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
TSS	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6	DMin Conc	SU	Monthly	Grab	Effluent

Table 6-6. Permit Limits for Bridgestone/Firestone North American Tire, LLC Outfall 001.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
TSS	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6	DMin Conc	SU	Monthly	Grab	Effluent

Table 6-7. Permit Limits for Bridgestone/Firestone North American Tire, LLC Outfall 002.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
TSS	All Year	40	DMax Conc	mg/L	Monthly	Grab	Effluent
pH	All Year	9	DMax Conc	SU	Monthly	Grab	Effluent
pH	All Year	6	DMin Conc	SU	Monthly	Grab	Effluent

Table 6-8. Permit Limits for Bridgestone/Firestone North American Tire, LLC Outfall 004.

Compliance History:

The following numbers of exceedences were noted in PCS:

- 3 TSS

EFO Comments:

Company produces wood products, hardwood lumber, bark processing and sawmill. In April 2006, the discharge from the wet deck storage lumberyard carried a significant load of suspended solids. A possibility of primary settling sump near the lumberyard and a settling pond installation prior to discharge offsite was discussed. In September 2006, NOV was issued for discharge of excess solids from outfall 001 causing a visual contrast in the receiving body. Plans for sediment removal are being prepared and are due in EFO office in November 2006.

6.4.B. Water Treatment Plant Permits

TN0074462 Big Creek Water Treatment Plant

City: Tracy City
County: Grundy
EFO Name: Chattanooga
Issuance Date: 9/29/04
Expiration Date: 9/29/09
Receiving Stream: Ranger Creek at mile 7.6
HUC-12: 051301070102
Effluent Summary: Filter backwash from Outfall 001
Treatment system: KMnO4, alum, soda ash, chlorine

Segment	TN05130107016_0710
Name	Ranger Creek
Size	18.3
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Fish and Aquatic Life (Supporting), Recreation (Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

Table 6-9. Stream Segment Information for Big Creek Water Treatment Plant

Parameter	*Season*	*Limit*	*Units*	*Designator*	*Frequency*	*Sample Type*	*Monitoring Location*
Al (T)	All Year	0.75	mg/L	DMax Conc	Monthly	Grab	Effluent
Fe (T)	All Year	2	mg/L	DMax Conc	Monthly	Grab	Effluent
Flow	All Year		MGD	DMax Load	Monthly	Instantaneous	Effluent
Settleable Solids	All Year	0.5	mL/L	DMax Conc	Monthly	Grab	Effluent
TRC	All Year	0.019	mg/L	DMax Conc	Monthly	Grab	Effluent
TSS	All Year	40	mg/L	DMax Conc	Monthly	Grab	Effluent
pH	All Year	9	SU	DMax Conc	Monthly	Grab	Effluent
pH	All Year	6.5	SU	DMin Conc	Monthly	Grab	Effluent

Table 6-10. Permit Limits for Big Creek Water Treatment Plant

EFO Comments:
Turbidity removal WTP; treated water not meeting drinking water specifications from Outfall 001; Stream is impaired for iron. Facility cannot increase load.

APPENDIX II

ID	NAME	HAZARD
87001	Henegar	3
87002	Lake Anne	2
167010	Morgan's	L
317002	Carol	3
317009	Big Creek Utility District Lake	1
317017	Parker	3
777001	Johnson	3
887003	O'neal Lake	3
897001	Boyd Nursery Lake #2	3
897003	Airport Lake	3
897004	Clark	3
897005	Mcminnville Water Supply	2
897006	Harvest Farms Lake	2

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

LAND COVER/LAND USE	ACRES	% OF WATERSHED
Open Water	1,155	0.2
Other Grasses	1,564	0.3
Pasture/Hay	111,811	21.8
Row Crops	62,006	12.1
Woody Wetlands	8,911	1.7
Emergent Herbaceous Wetlands	214	0.0
Deciduous Forest	251,338	49.1
Mixed Forest	45,676	8.9
Evergreen Forest	20,493	4.0
High Intensity: Commercial/Industrial	2,099	0.4
High Intensity: Residential	558	0.1
Low Intensity: Residential	3,190	0.6
Quarries/Strip Mines/Gravel Pits	341	0.1
Transitional	3,035	0.6
Bare Rock/Sand/Clay	0	0.0
Total	**512,392**	**99.9**

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

ECOREGION	REFERENCE STREAM	WATERSHED (HUC)	
Cumberland Plateau (68a)	Rock Creek	South Fork Cumberland	05130104
	Laurel Creek	South Fork Cumberland	05130104
	Clear Creek	Emory River	06010208
	Piney Creek	Watts Bar/Fort Loudoun Lake	06010201
	Mullens Creek	Tennessee River	06020001
	Daddys Creek	Emory River	06010208
	Island Creek	Emory River	06010208
	Rock Creek	Emory River	06010208
Plateau Escarpment (68c)	Ellis Gap Branch	Tennessee River	06020001
	Mud Creek	Upper Elk River	06030003
	Crow Creek	Guntersville Lake	06030001
	Crow Creek	Guntersville Lake	06030001
Eastern Highland Rim (71g)	Flat Creek	Cordell Hull Lake	05130106
	Spring Creek	Cordell Hull lake	05130106
	Hurricane Creek	Upper Elk River	06030003
Outer Nashville Basin (71h)	Flynn Creek	Cordell Hull Lake	05130106
	Clear Fork	Caney Fork River	05130108
	Carson Fork	Stones River	05130203

Table A2-3. Ecoregion Monitoring Sites in Ecoregions 68a, 68c, 71g, and 71h.

CODE	NAME	AGENCY	AGENCY ID
11	TDEC/DNH PLANTATION POND SITE	TDEC/DNH	S.USTNHP 42
13	TDEC/DNH DUKE CREEK SITE	TDEC/DNH	S.USTNHP 902
26	TDEC/DNH MUD CREEK SWAMP SITE	TDEC/DNH	S.USTNHP 347
39	TDEC/DNH WEST MORRISON POND AND LOW WOODS SITE	TDEC/DNH	S.USTNHP 159
84	TDEC/DNH MORRISON BOG SITE	TDEC/DNH	S.USTNHP 102
108	TDEC/DNH SAVAGE GULF STATE NATURAL AREA SITE	TDEC/DNH	M.USTNHP 236
113	TDEC/DNH COLLINS STATE SCENIC RIVER SITE	TDEC/DNH	M.USTNHP 2023
145	TDEC/DNH MCMAHAN CREEK SITE	TDEC/DNH	S.USTNHP 38
176	TDEC/DNH ROUND POND SITE	TDEC/DNH	PATRICK REPORT
178	TDEC/DNH DYKES MOUNTAIN POND SITE	TDEC/DNH	PATRICK REPORT
182	TDEC/DNH CHERRY SPRING ROAD SWAMP SITE	TDEC/DNH	PATRICK REPORT
249	USACOE-NASHVILLE CLIENT SITE	USACOE-N	
274	TDEC/DNH BIG WOODS SITE	TDEC/DNH	S. USTNHP 348
516	TDEC/WPC HWY 70-S WALMART PERMIT SITE	TDEC/WPC	
890	USFWS WILLIAM SPEARS WRP SITE	USFWS	TRACT 8567, FARM 1221
932	TDEC/DNH REPORT: GRUNDY COUNTY SITE 12	TDEC/DNH	F88JON01TNUS
934	TDEC/DNH REPORT: GRUNDY COUNTY SITE 14	TDEC/DNH	F88JON01TNUS
950	TDEC/DNH REPORT: VAN BUREN CO SITE 39	TDEC/DNH	F88JON01TNUS
958	TDEC/DNH REPORT: GRUNDY CO SITE 50A	TDEC/DNH	F88JON01TNUS
959	TDEC/DNH REPORT: GRUNDY CO SITE 50B	TDEC/DNH	F88JON01TNUS
960	TDEC/DNH REPORT: GRUNDY CO SITE 51	TDEC/DNH	F88JON01TNUS
961	TDEC/DNH REPORT: GRUNDY CO SITE 52	TDEC/DNH	F88JON01TNUS
962	TDEC/DNH REPORT: GRUNDY CO SITE 53	TDEC/DNH	F88JON01TNUS
1006	BRAD BINGHAM THESIS: SITE 4 FREDONIA QUAD	USFWS	FREDONIA.4
1014	BRAD BINGHAM THESIS: SITE 12 FREDONIA QUAD	USFWS	FREDONIA.12
1015	BRAD BINGHAM THESIS: SITE 13 FREDONIA QUAD	USFWS	FREDONIA.13
1016	BRAD BINGHAM THESIS: SITE 14 FREDONIA QUAD	USFWS	FREDONIA.14
1017	BRAD BINGHAM THESIS: SITE 15 FREDONIA QUAD	USFWS	FREDONIA.15
1018	BRAD BINGHAM THESIS: SITE 16 FREDONIA QUAD	USFWS	FREDONIA.16
1028	BRAD BINGHAM THESIS: SITE 26 FREDONIA QUAD	USFWS	FREDONIA.26
1031	BRAD BINGHAM THESIS: SITE 29 FREDONIA QUAD	USFWS	FREDONIA.29
1242	TWRA SITE	TWRA	
2059	TWRA BONNER SWAMP SITE	TWRA	
2205	TWRA BARK CAMP BARRENS SITE	TWRA	
2207	TWRA BARK CAMP BARRENS SITE	TWRA	
2208	TWRA BARK CAMP BARRENS SITE	TWRA	
2214	TWRA BARK CAMP BARRENS SITE	TWRA	
2215	TWRA BARK CAMP BARRENS SITE	TWRA	
2717	TWRA MAPLE SPRINGS SITE	TWRA	
2760	TVA POND 22	TDEC/DNH	
2778	COFFEE CO. MITIGATION BANK	USFWS	

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

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Barren Fork	TN05130107006_1000	12.5
Barren Fork	TN05130107006_2000	30.9
Big Creek	TN05130107016_0200	14.4
Big Creek	TN05130107016_0240	29.3
Bluff Spring Branch	TN05130107002_0400	5.7
Caney Branch	TN05130107006_0200	13.7
Charles Creek	TN05130107004_1000	40.2
Collins River	Tn05130107001_1000	40.2
Collins River	TN05130107016_1000	19.2
Dry Branch	Tn05130107001_0100	11
Dry Creek (Hills Creek)	TN05130107023_1000	19.8
Fultz Creek	TN05130107012_0100	14.4
Garner Branch	TN05130107006_0100	9.5
Hickory Creek	TN05130107012_1000	86.7
Mountain Creek	TN05130107002_1000	55.2
North Prong Barren Fork	TN05130107006_0400	51.7
Piney Creek	TN05130107016_0220	14.2
Rams Creek	Tn05130107001_0200	11.2
Savage Cove Creek	TN05130107016_0400	6.6
South Prong Barren Fork	TN05130107006_0300	37.4
Taylor Creek	TN05130107016_0300	12.5
West Fork Hickory Creek	TN05130107012_0300	68.2
Witty Creek	TN05130107006_0320	52.4

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Collins River	TN05130107016_2000	11.1
Dog Branch	TN05130107006_0500	9.2
Firescald Creek	TN05130107016_0230	14.3
Gath Branch	TN05130107002_0100	2.9
Hickory Grove Branch	TN05130107004_0100	6.5
Mud Creek	TN05130107006_0310	14
Oakland Branch	TN05130107006_0700	6.3
Ranger Creek	TN05130107016_0210	18.3
Savage Creek	TN05130107016_0120	22.1

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Unnamed Tributary of Mountain Creek	TN05130107002_0300	1.9
Dry Creek	TN05130107023_2000	40.8

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Little Hickory Creek	TN05130107012_0200	10.2
Long Hollow Branch	TN05130107002_0200	7.3
Meadow Creek	TN05130107016_0110	9.5
Misc tribs to Collins River	TN05130107016_1999	47.2
Misc tribs to Collins River	TN05130107016_2999	28.3
Misc. tribs to Collins River	Tn05130107001_0999	29.7
Owen Branch	TN05130107006_0600	7.3
Savage Creek	TN05130107016_0100	18.3
Scott Creek	TN05130107016_0500	36.3
Spring Creek	TN05130107023_0100	13

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Big Creek Lake	TN05130107BIGCRLK_1000	69

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Gath Branch	TN05130107002_0100	2.9	Partial
Unnamed Tributary of Mountain Creek	TN05130107002_0300	1.9	Not supporting
Hickory Grove Branch	TN05130107004_0100	6.5	Partial
Mud Creek	TN05130107006_0310	14	Partial
Dog Branch	TN05130107006_0500	9.2	Partial
Oakland Branch	TN05130107006_0700	6.3	Partial

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)	SUPPORT DESCRIPTION
Unnamed Tributary of Mountain Creek	TN05130107002_0300	1.9	Not supporting
Mud Creek	TN05130107006_0310	14	Partial
Dog Branch	TN05130107006_0500	9.2	Partial
Oakland Branch	TN05130107006_0700	6.3	Partial

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

APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-10 SUBWATERSHEDS (ACRES)			
	01	02	03	04
Deciduous Forest	144,520	33,385	34,813	32,446
Emergent Herbaceous Wetlands	16	145	50	1
Evergreen Forest	16,527	869	874	2,703
High Intensity: Commercial/Industrial/Transportation	222	869	333	586
High Intensity: Residential	22	394	42	86
Low Intensity: Residential	671	1,394	355	679
Mixed Forest	29,054	4,836	3,581	7,588
Open Water	224	160	138	647
Other Grasses: Urban/Recreational	177	722	125	459
Pasture/Hay	12,445	39,762	26,059	32,361
Row Crops	4,310	23,549	16,739	16,868
Transitional	2,465	242	29	267
Woody Wetlands	1,096	5,464	2,112	131
Quarries/Strip Mines	306		35	
Total	**212,054**	**111,792**	**85,286**	**94,822**

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

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

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

STATION	HUC-10	AGENCY	NAME	AREA (SQ MILES)	LOW FLOW (CFS)		
					1Q10	7Q10	3Q20
03420200	0513010701	USGS	Collins River	174.0	0.60	1.00	0.50
03421100	0513020702	USGS	Sink Tributary				
03420500	0513020702	USGS	Barren Fork	126.0	36.1	37.1	34.4
03420600	0513020702	USGS	Owen Branch				
03420400	0513020702	USGS	Mud Creek				
03420380	0513020702	USGS	Mud Creek				
03420360	0513020702	USGS	Mud Creek				
02403155	0513020704	USGS	Cotaquilla Creek				
03421200	0513020704	USGS	Charles Creek	31.1	6.0	7.4	5.5
03421000	0513020704	USGS	Collins River	642.0	55.1	58.0	51.7

***Table A4-3. Historical Streamflow Data Summary Based on Mean Daily Flows in Collins River Watershed**. USGS, United States Geological Survey.*

PARAMETER	SUBWATERSHED			
	01	02	03	04
E. coli	A, B	K, L	N, O	Q, R, S
Fecal Coliform	A, B	K, L	N, O	Q, R, S
Fecal Streptococcus	B, I			
Enterococcus	A			S
Total Coliform	B	K, L	N, O	Q, R
Acidity	J			
Alkalinity (Total)	J			
BOD_5	A, I	M	P	S
Conductivity (Field)	A, B, I, J	K, L, M	N, O, P	Q, R, S
COD (Low)	B	K, L	N, O	Q, R
DO	A, B, I, J	K, L, M	N, O, P	Q, R, S
Flow	J		P	
Hardness (Total)	A, B, I, J	K, L, M	N, O, P	Q, R, S
pH (Field)	A, B, J, I	K, L, M	N, O, P	Q, R, S
Residue (Dissolved)	A, B	K, L	N, O	Q, R
Residue (Settlable)	J			
Residue (Suspended)	A, B, I, J	K, L, M	N, O, P	Q, R, S
Secchi		M		
Temperature	A, B, I, J	K, L, M	N, O, P	Q, R, S
Turbidity				R
Ag	I		P	R
Al	J			
Ammonia N	A, B, I	K, L, M	N, O, P	Q, R, S
As	A, B, J	K, L	N, O	Q, R, S
Ca				
Cd	A, B, I, J	K, L, M	N, O, P	Q, R, S
Cl^-				R
CN^-				R
Cr (Total)	A, B, I, J	K, L, M	N, O, P	Q, R, S
Cu	A, B, I, J	K, L, M	N, O, P	Q, R, S
Fe	A, B, J	K, L	N, O	Q, R, S
Hg	B, I	K, L, M	N, O, P	Q, R
Mn	A, B, J	K, L	N, O	Q, R, S
N (Total Kjeldahl)	A, B	K, L	N, O	Q, R, S
Ni	A, B, J, I	K, L, M	N, O, P	Q, R, S
NO_2+NO_3	A, B	K, L	N, O	Q, R, S
P (Total)	A, B	K, L	N, O	Q, R, S
Pb	A, B, I, J	K, L, M	N, O, P	Q, R, S
Se	B			
SO_4	J			S
TOC				R
Zn	A, B, I, J	K, L, M	N, O, P	Q, R, S

Table A4-4a. Water Quality Parameters Monitored in the Collins River Watershed. *Parameter codes are provided in Table A4-4b.*

CODE	STATION	ALIAS	AGENCY	LOCATION
A	COLLI028.8WA		TDEC	Collins River @ RM 28.8
B	COLLI049.0		TDEC	Collins River @RM 49.0
C	CARUE002.3GY	CARUENGERCRIS01	TDEC	Caruenger Creek @RM 2.3
D	CARUENGERCRIS02		TDEC	Unnamed Trib to Caruenger Creek
E	CARUENGERCRIS03		TDEC	Unnamed Trib to Caruenger Creek
F	CARUENGERCRIS04		TDEC	Caruenger Creek at RM 1.7
G	03420200		USGS	Collins River near Tarlton
H	ECO68A21		TDEC	Firescald Creek @ RM4.1
I	BARRENFORK004.5		TDEC	Barren Fork @ RM 4.5
J	DRY008.0		TDEC	Dry Creek @ RM 8.0
K	BFORK004.4WA		TDEC	Barren Fork River @ RM 4.4
L	BFORK019.0WA		TDEC	Barren Fork River @ RM 19.0
M	BARRENFORK16.5		TDEC	Barren Fork River @ RM 16.5
N	HICKO000.8WA		TDEC	Hickory Creek @ RM 0.8
O	WFHIC002.3WA		TDEC	West Fork Hickory Creek @ RM 2.3
P	KEEL003.1		TDEC	Keel Creek @ RM 3.1
Q	CHARL001.0WA		TDEC	Charles Creek @ RM 1.0
R	MOUNT001.0WA		TDEC	Mountain Creek @ RM 1.0
S	COLLI013.6WA	CANEYFK08	TDEC	Collins River @ RM 13.6
T	03421000		USGS	Collins River near McMinnville

Table A4-4b. Water Quality Monitoring Stations in the Collins River Watershed*. TDEC, Tennessee Department of Environment and Conservation; USGS, United States Geologic Survey; TVA, Tennessee Valley Authority; NPS, National Park Service.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	HUC-10
TN0023591	McMinnville STP	4952	Sewerage Systems	Major	Barren Fork @ RM 4.5	0513010702
TN0025372	Viola UD STP	4952	Sewerage Systems	Minor	Barren Fork @ RM 18.1	0513010702
TN0064629	Bridgestone/Firestone	3011	Tires and Inner Tubes	Minor	Unnamed Trib to Crowfoot Branch @ RM 2.9	0513010703

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

FACILITY NUMBER	PERMITEE	SIC	SIC NAME	WATERBODY	HUC-10
TN0071889	Sequatchie Valley Coal Corp.	1221	Bituminous Coal and Lignite	Dry Creek	0513010701
TN0072192	Sequatchie Valley Coal Corp.	1221	Bituminous Coal and Lignite	Dry Creek	0513010701
TN0066044	TN Consolidated Coal Co.	1221	Bituminous Coal and Lignite		0513010701
TN0063461	Rogers Group	1422	Crushed and Broken Limestone	Collins River	0513010701
TN0063711	Tri-County Stone Company	1422	Crushed and Broken Limestone	Cedar Hollow Cr	0513010703

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

FACILITY NUMBER	FACILITY NAME	SECTOR	RECEIVING STREAM	AREA	HUC-10
TNR050120	Meeks Auto Sales	M	Mill Creek	6.0	0513010701
TNR050831	Grundy County Landfill	L	Rusty Cup Creek Rocky Creek	38.0	0513010701
TNR051285	Sequatchie Handle Works	A	Owens Branch	10.5	0513010701
TNR053271	APAC McMinnville Plant	D	Barren Fork	10.0	0513010701
TNR053365	Byars Service Center	P	Town Creek	10.0	0513010701
TNR053713	Sequatchie Handle Works	A	Piney Creek	5.78	0513010701
TNR050009	Dezurik Corporation	AA	Barren Fork	16.9	0513010702
TNR050158	Metal Products Company	AA		6.0	0513010702
TNR050195	Burroughs-Ross-Colville	A	Barren Fork	44.7	0513010702
TNR050227	Cumberland Lumber	A	Barren Fork	81.5	0513010702
TNR050423	Carrier Corporation	AB	Unnamed Trib to Barren Fork	51.0	0513010702
TNR050501	A.O. Smith Electrical	AC	Collins River	15.0	0513010702
TNR050690	McMinnville Manufacturing	A	Barren Fork	39.0	0513010702
TNR050759	Powermatic Main Plant	AB	Unnamed Trib to Barren Fork	18.0	0513010702
TNR051146	Turner Auto Salvage	M, K	Wet Weather Conveyance to Willow Branch to Barren Fork	17.0	0513010702
TNR053002	Yorozu Automotive	AA	Garner Branch	23.5	0513010702
TNR053210	Bridgestone/Firestone	Y	Crowfoot Branch Henegar Branch	350.0	0513010702
TNR054005	Southern Manufacturing	AA	Harvest Farm Lake	5.6	0513010702
TNR054292	Helton Incorporated	C	Metro Storm Sewer	0.5	0513010702
TNR054327	Metal Products Group	AA	Pepper Creek Barren Fork	1.1	0513010702
TNR050225	S. Central Iron and Metal	N	Hickory Creek	14.0	0513010703
TNR050097	Plateau Express	N	Bybee Creek	3.0	0513010704
TNR050487	Sunbeam Products	Y, AB	Unnamed Trib to Collins River	5.0	0513010704
TNR053849	Ames True Temper	AA, AB	Collins River	9.0	0513010704

Table A4-7. Active Permitted TMSP Facilities in the Collins River Watershed. *Area, acres of property associated with industrial activity, Sector details may be found in Table A4-8.*

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

Table A4-8. TMSP Sectors and Descriptions.

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-10
97.416	Grundy	Bridge Construction	Pepper Hollow Branch	0513010701
98.026	Cannon	Bridge Replacement	Shanborne Branch	0513010701
98.419	Warren	Impoundment	Powder Mill Branch	0513010701
91.210	Warren	Gravel Dredging	North Fork Barren Fork	0513010702
92.308	Warren	Gravel Dredging	North Fork Barren Fork	0513010702
98.144	Warren	Debris Removal	Dog Branch	0513010702
9810.022	Cannon	Gravel Dredging	Dukes Creek	0513010702
87.001A	Warren	Gravel Dredging	Hickory Grove Branch	0513010704
87.001B	Warren	Gravel Dredging	Charles Creek	0513010704
89.001	Warren	Gravel Dredging	Charles Creek	0513010704
89.002	Warren	Gravel Dredging	Charles Creek	0513010704
90.089	Warren	Gravel Dredging	Mountain Creek	0513010704
90.90	Warren	Gravel Dredging	Collins River	0513010704
91.205	Warren	Gravel Dredging	Mountain Creek	0513010704
91.206	Warren	Gravel Dredging	Charles Creek	0513010704
91.207A	Warren	Gravel Dredging	Mountain Creek	0513010704
91.207B	Warren	Gravel Dredging	Mountain Creek	0513010704
91.209	Warren	Gravel Dredging	Collins River	0513010704
91.211	Warren	Gravel Dredging	Mountain Creek	0513010704
91.212	Warren	Gravel Dredging	Collins River	0513010704
92.309	Warren	Gravel Dredging	Charles Creek	0513010704
93.053	Warren	Gravel Dredging	Charles Creek	0513010704
93.103	Warren	Gravel Dredging	Charles Creek	0513010704
93.576A	Warren	Gravel Dredging	Charles Creek	0513010704
93.576B	Warren	Gravel Dredging	Charles Creek	0513010704
93.576C	Warren	Gravel Dredging	Charles Creek	0513010704
93.793	Warren	Gravel Dredging	Mountain Creek	0513010704
94.346	Warren	Gravel Dredging	Charles Creek	0513010704
96.242	Warren	Debris Removal	Charles Creek	0513010704
96.849	Warren	Gravel Dredging	Collins River	0513010704
9810.234	Cannon	Road Crossing	Mountain Creek	0513010704
99.438A	Warren	Gravel Dredging	Charles Creek	0513010704
99.438B	Warren	Gravel Dredging	Mountain Creek	0513010704

Table A4-9. Individual ARAP Permits Issued January 1994 Through June 2000 in Collins River Watershed.

APPENDIX V

CONSERVATION PRACTICE	UNITS	AMOUNT
Alley Cropping	Acres	0
Contour Buffer Strips	Acres	53
Crosswind Trap Strips	Acres	0
Field Borders	Feet	17,730
Filter Strips	Acres	5
Grassed Waterways	Acres	0
Riparian Forest Buffers	Acres	13
Streambank and Shoreline Protection	Feet	0
Windbreaks and Shelterbelts	Feet	0
Hedgerow Plantings	Feet	0
Herbaceous Wind Barriers	Feet	0
Total Conservation Buffers	Acres	81

Table A5-1a. Conservation Buffers Conservation Practices in Partnership with NRCS in Collins River Watershed. *Data are from Performance & Results Measurement System (PRMS) for October 1, 2001 through September 30, 2002 reporting period.*

PARAMETER	TOTAL
Erosion Reduction Applied (Acres)	2,513
Highly Erodible Land With Erosion Control Practices (Acres)	1,578
Estimated Annual Soil Saved By Erosion Control Measures (Tons/Year)	13,376
Total Estimated Soil Saved (Tons/Year)	13,376

Table A5-1b. Erosion Control Conservation Practices in Partnership with NRCS in Collins River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

PARAMETER	TOTAL
Acres of AFO Nutrient Management Applied	408
Acres of Non-AFO Nutrient Management Applied	3,596
Total Acres Applied	4,003

Table A5-1c. Nutrient Management Conservation Practices in Partnership with NRCS in Collins River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

PARAMETER	TOTAL
Acres of Pest Management Systems Applied	2,511

Table A5-1d. Pest Management Conservation Practices in Partnership with NRCS in Collins River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

CONSERVATION PRACTICE	ACRES
Acres Prepared for Revegetation of Forestland	0
Acres Improved Through Forest Stand Improvement	399
Acres of Tree and Shrub Establishment	9

Table A5-1e. Tree and Shrub Conservation Practices in Partnership with NRCS in Collins River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

CONSERVATION PRACTICE	ACRES
Acres of Wetlands Created or Restored	0
Acres of Wetlands Enhanced	2
Total Acres Created, Restored, or Enhanced	2

Table A5-1f. Wetland Conservation Practices in Partnership with NRCS in Collins River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

CONSERVATION PRACTICE	ACRES
Acres of Upland Habitat Management	284
Acres of Wetland Habitat Management	0
Total Acres Wildlife Habitat Management	284

Table A5-1g. Wildlife Habitat Management Conservation Practices in Partnership with NRCS in Collins River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period.*

COMMUNITY	PROJECT DESCRIPTION	AWARD DATE	AWARD AMOUNT
Altamont	Wastewater Treatment and Collection	03/14/94	$318,980
McMinnville	Wastewater Treatment and Collection	08/03/92	$2,905,806

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

NRCS CODE	PRACTICE	NUMBER OF BMPs
	Mine Reclamation	2
312	Waste Management Systems	14
340	Winter Cover Crop	15
342	Critical area Treatment	6
351	Well Decommissioning	2
362	Diversion	2
378	Pond	8
382	Fencing	12
382a	Fencing for Livestock Exclusion	2
382d	Rotational Grazing fencing	1
393	Filter Strip	1
412	Grassed Waterway	5
447	Irrigation System/Tailwater	3
472	Livestock Exclusion	3
512	Pasture or Hayland Renovation	89
512a	Cropland Conversion	6
516	Pipeline	8
528	Proper Grazing Use	1
528a	Prescribed Grazing	2
558	Roof Runoff Management	1
561	Heavy Use Area	6
576	Stream Crossing	2
590	Nutrient Management	1
600	Terraces	5
614	Trough or Tank	44
620	Underground Outlet	5
633	Waste Utilization	1
728	Stream Crossing	2
769	Small Animal Incinerator	1

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