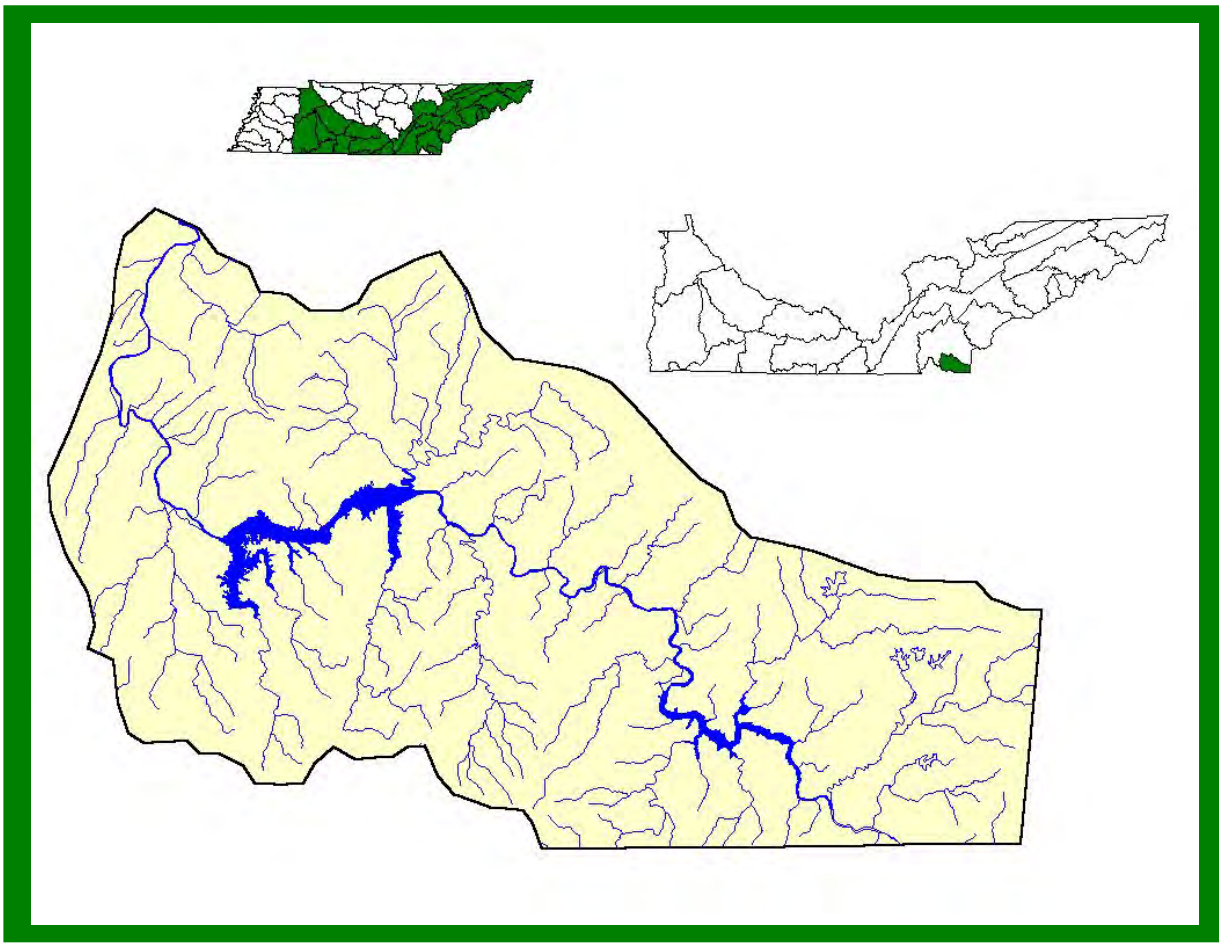
OCOEE RIVER WATERSHED (06020003) OF THE TENNESSEE RIVER BASIN

WATER QUALITY MANAGEMENT PLAN



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

August 5, 2002

OCOEE RIVER WATERSHED
WATER QUALITY MANAGEMENT PLAN

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GLOSSARY

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

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

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

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

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

AFO. Animal Feeding Operation.

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

ARAP. Aquatic Resource Alteration Permit.

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

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

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

Benthic. Bottom dwelling.

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

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

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

CAFO. Concentrated Animal Feeding Operation.

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

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

DO. Dissolved oxygen.

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

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

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

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

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

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

MRLC. Multi-Resolution Land Classification.

MS4. Municipal Separate Storm Sewer System.

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

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

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

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

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

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

SBR. Sequential Batch Reactor.

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

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

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

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

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

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

TMSP. Tennessee Multi-Sector Permit.

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

WAS. Waste Activated Sludge.

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

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

WET. Whole Effluent Toxicity.

WWTP. Waste Water Treatment Plant

CHAPTER 1

WATERSHED APPROACH TO WATER QUALITY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

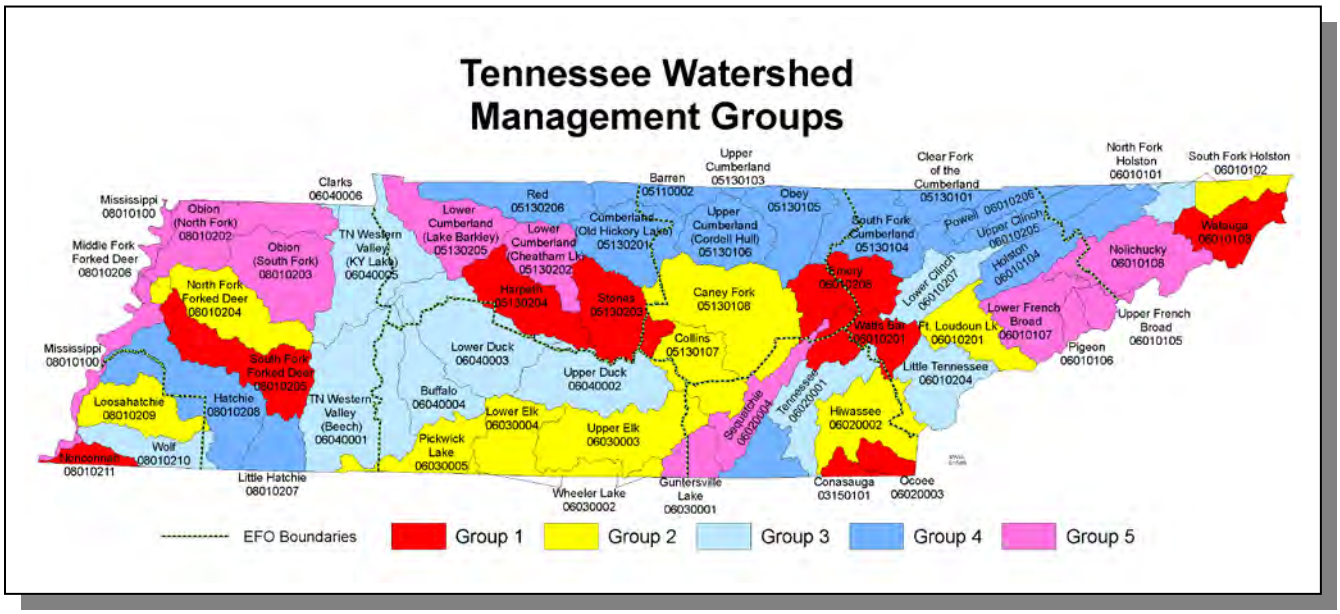

Figure 1-1. Watershed Groups in Tennessee's Watershed Approach to Water Quality.

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

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

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

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

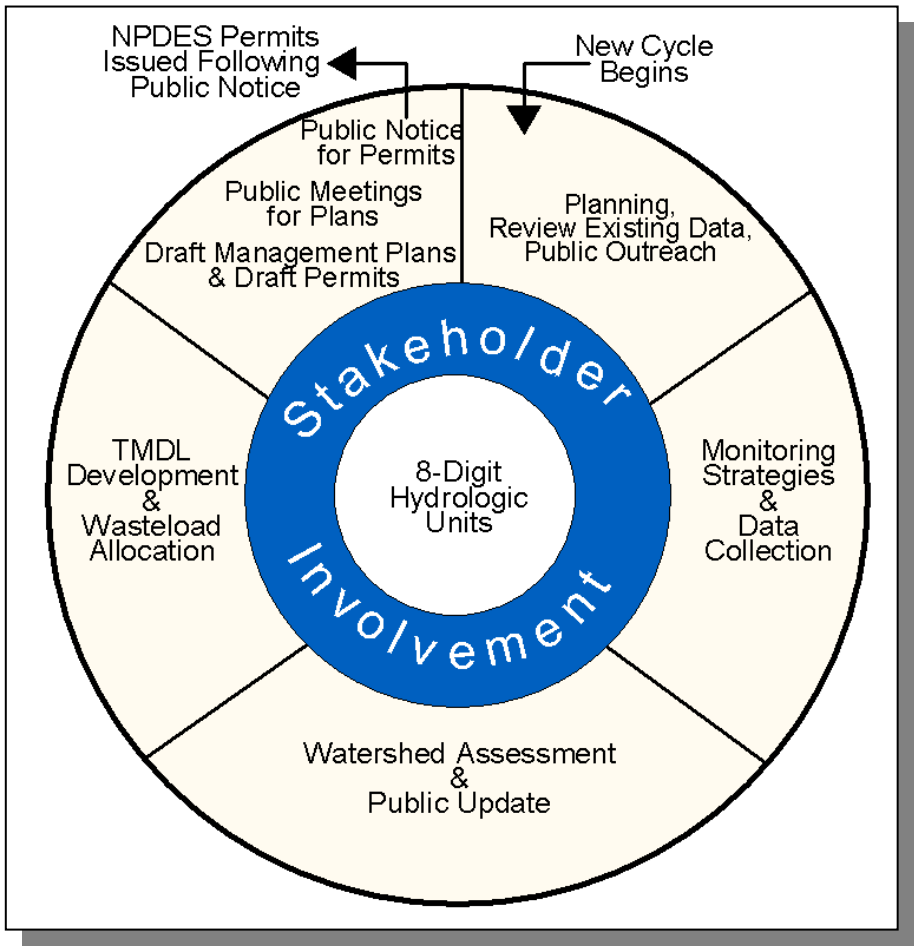

Figure 1-2. The Watershed Approach Cycle.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAPTER 2

DESCRIPTION OF THE OCOEE RIVER WATERSHED

2.1 BACKGROUND. Because of its worldwide reputation, the Ocoee River was selected as the site for the 1996 Olympic whitewater boating event. Thousands of people travel to this region every year to challenge the river's mighty rapids, swim in countless "dry river" pools, or simply to view the lush beauty of the Ocoee River Gorge along the Ocoee Scenic Byway.

The Ocoee River Watershed includes cool, clear streams with high gradient in the Blue Ridge Mountains, and great aquatic habitat diversity in the Ridge and Valley region.

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

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Tennessee portion of the Ocoee River Watershed is wholly contained within Polk County in East Tennessee.

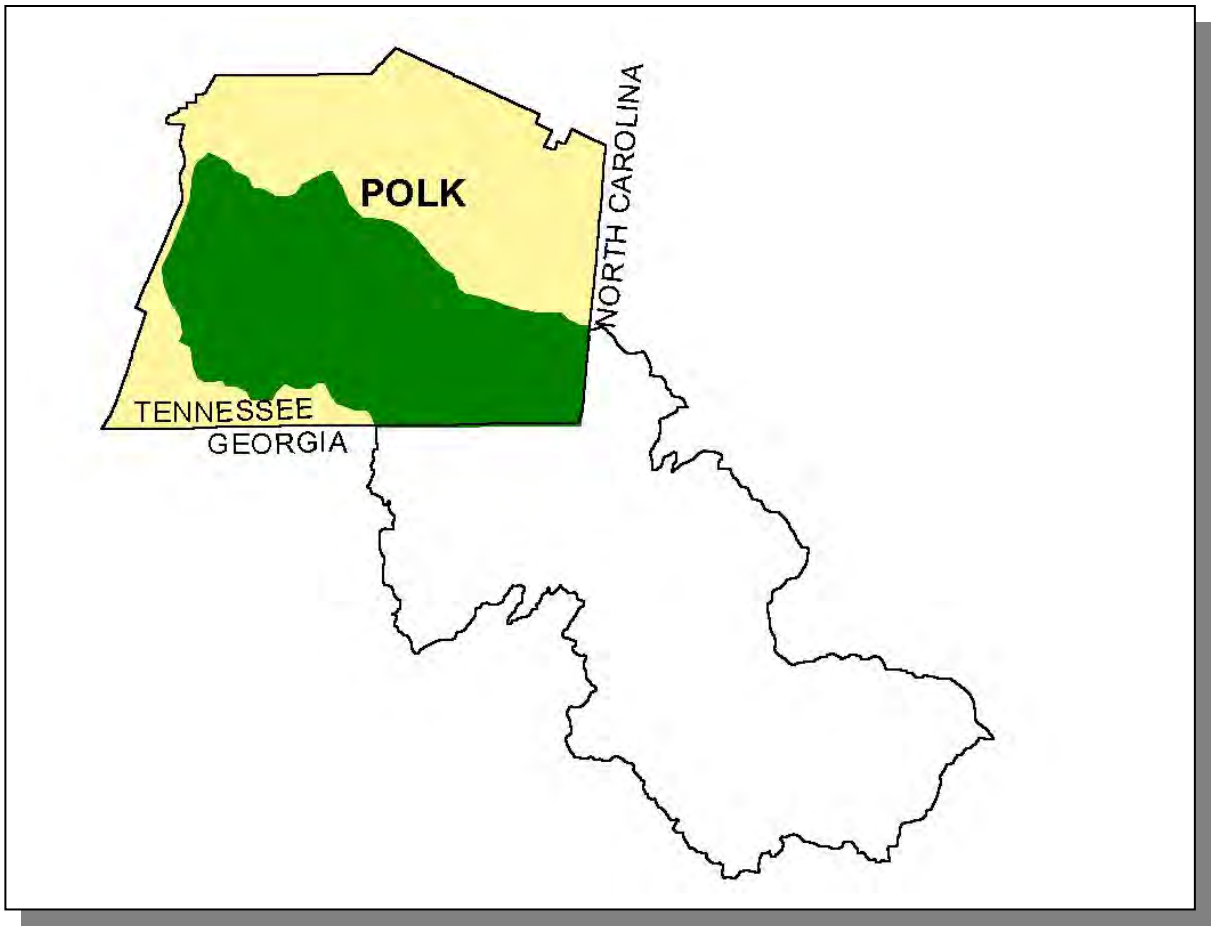

Figure 2-1. General Location of the Ocoee River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Polk	100

Table 2-1. The Ocoee River Watershed Is Contained Entirely Within Polk County.

2.2.B. Population Density Centers. Four state highways serve the major communities in the Ocoee River Watershed.

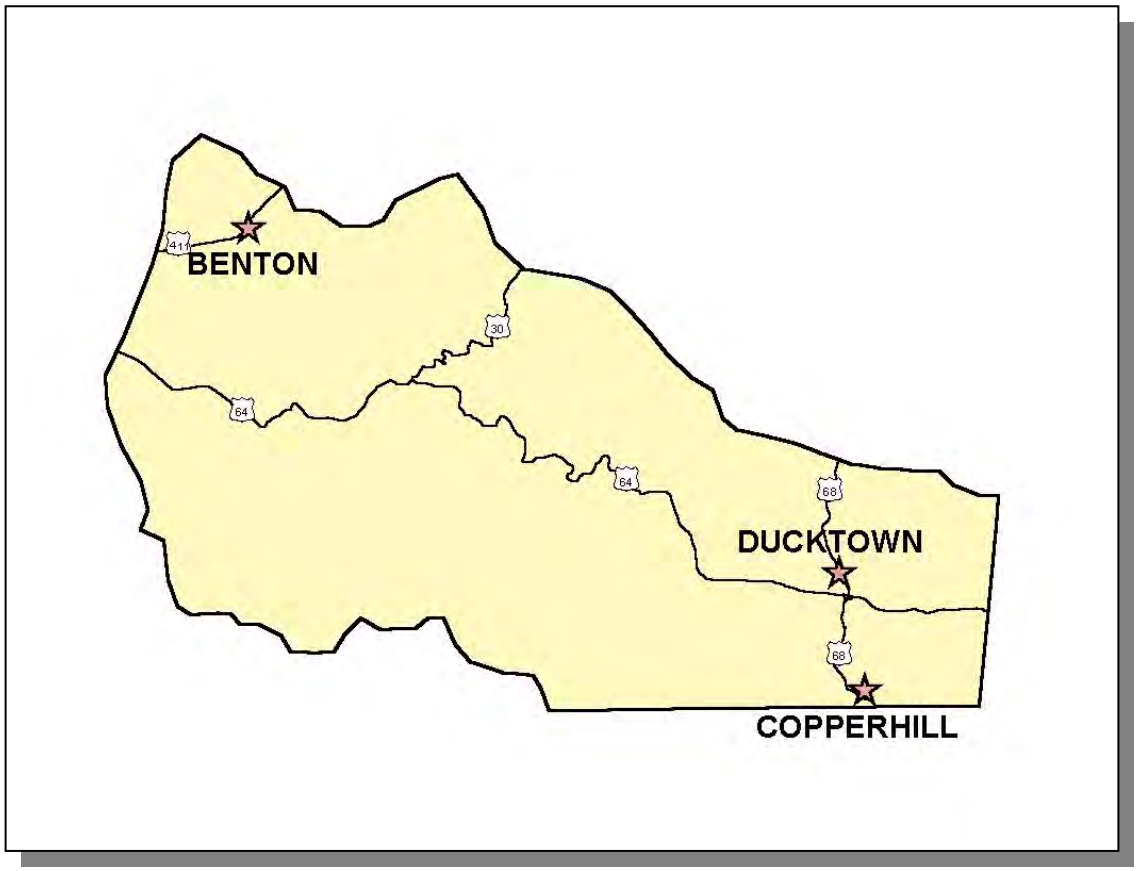

Figure 2-2. Municipalities and Roads in the Ocoee River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Benton*	992	Polk
Ducktown	421	Polk
Copperhill	362	Polk

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

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Ocoee River Watershed, designated the Hydrologic Unit Code (HUC) 06020003 by the USGS, is approximately 665 square miles (207 of which are in Tennessee) and drains to the Hiwassee River.

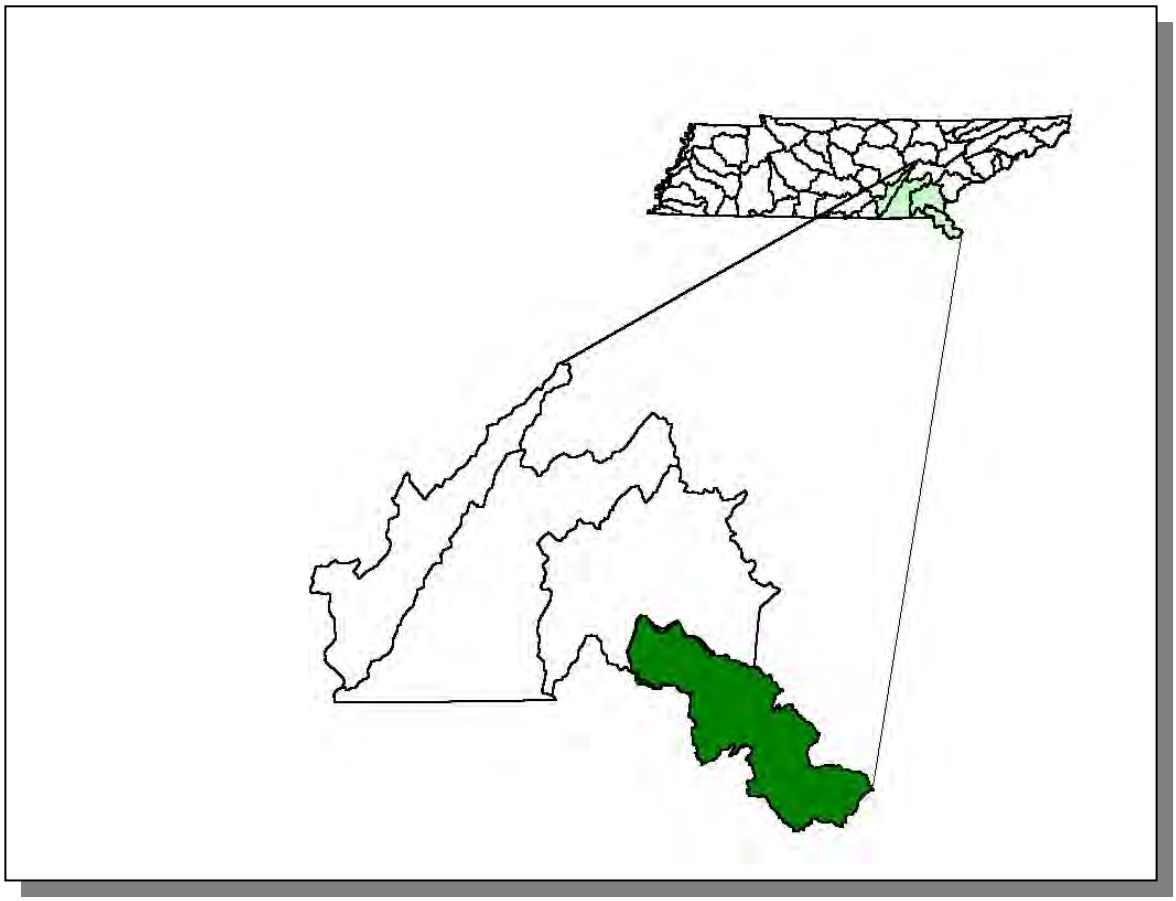

Figure 2-3. The Ocoee River Watershed is Part of the Lower Tennessee River Basin.

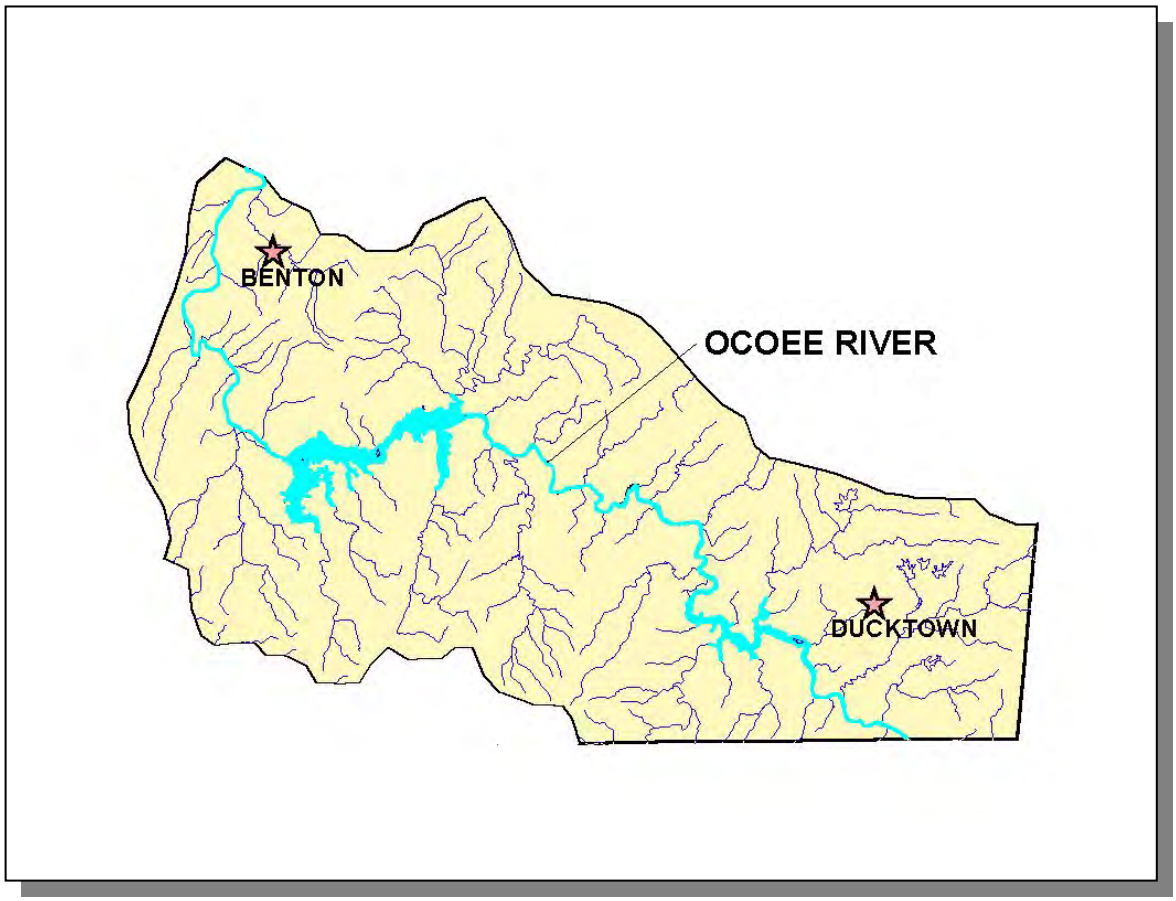

Figure 2-4. Hydrology in the Ocoee River Watershed. *There are 314 stream miles and 2,881 lake acres recorded in River Reach File 3 in the Tennessee Portion of the Ocoee River Watershed. Locations of Ocoee River and the cities of Benton and Ducktown are shown for reference.*

2.3.B. Dams. There are 8 dams inventoried by TDEC Division of Water Supply in the Ocoee River Watershed. These dams either retain at least 30 acre-feet of water or have structures at least 20 feet high. Additional dams may be found in the watershed.

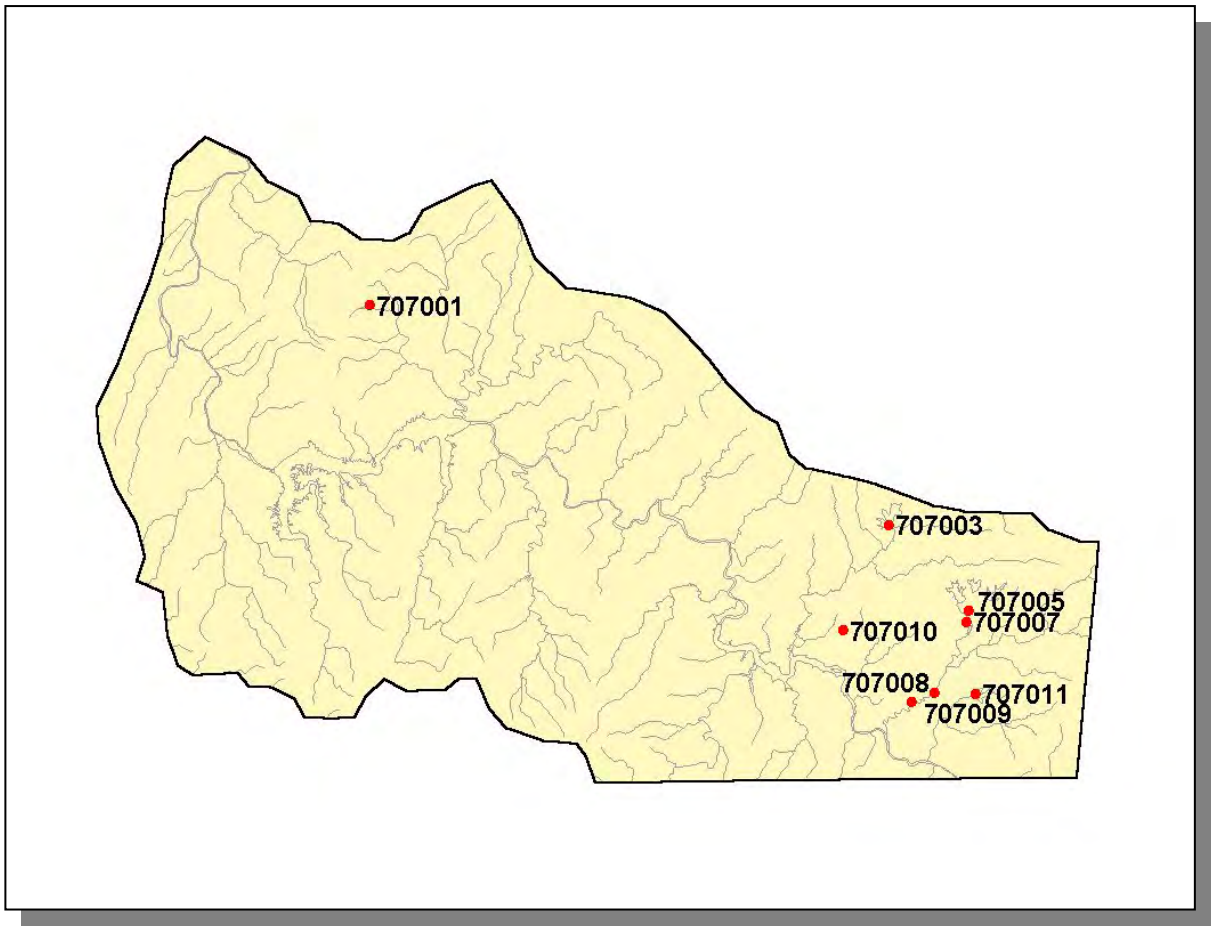

Figure 2-5. Location of Inventoried Dams in the Ocoee River Watershed. *Additional information is provided in Ocoee-Appendix II.*

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

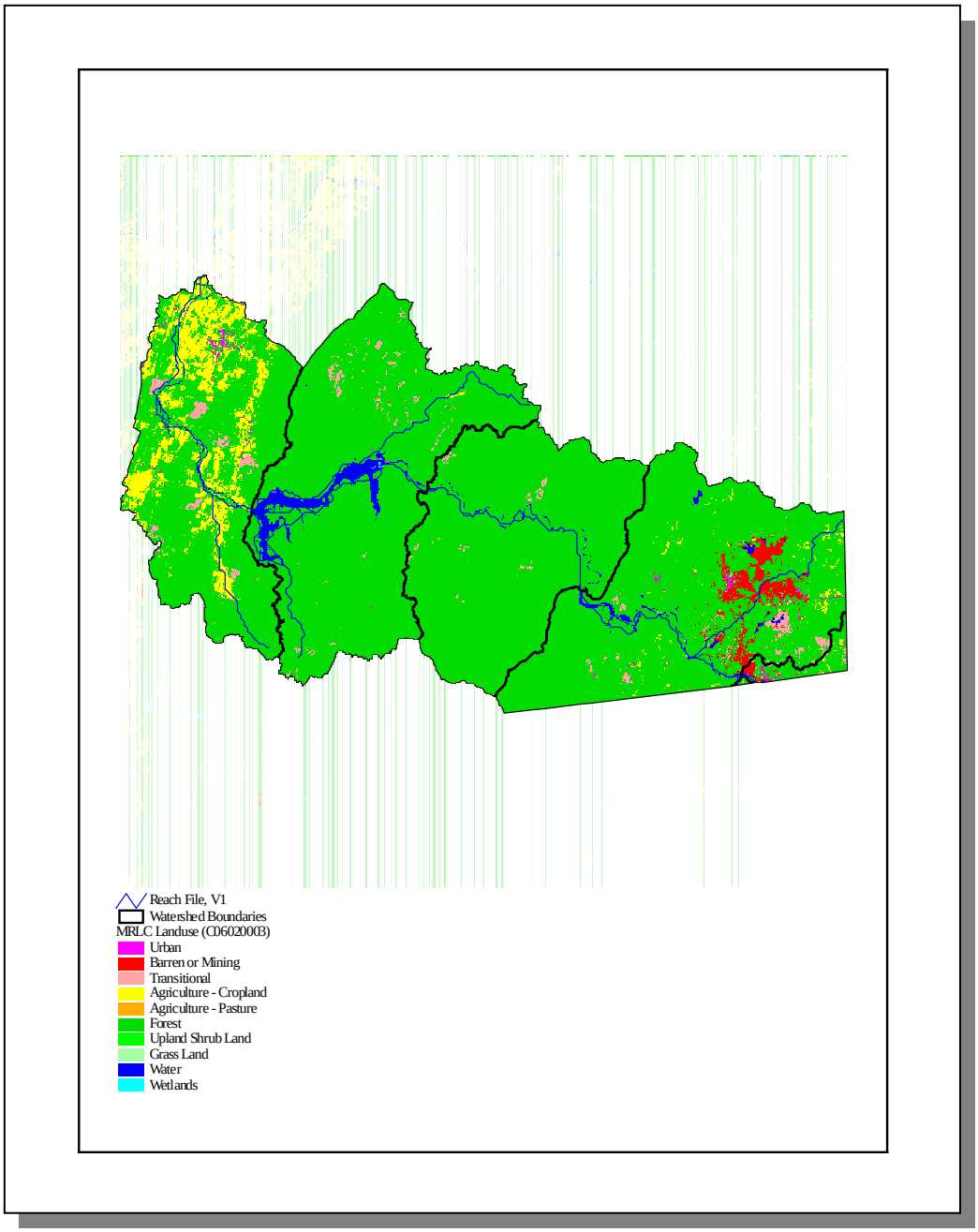

Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

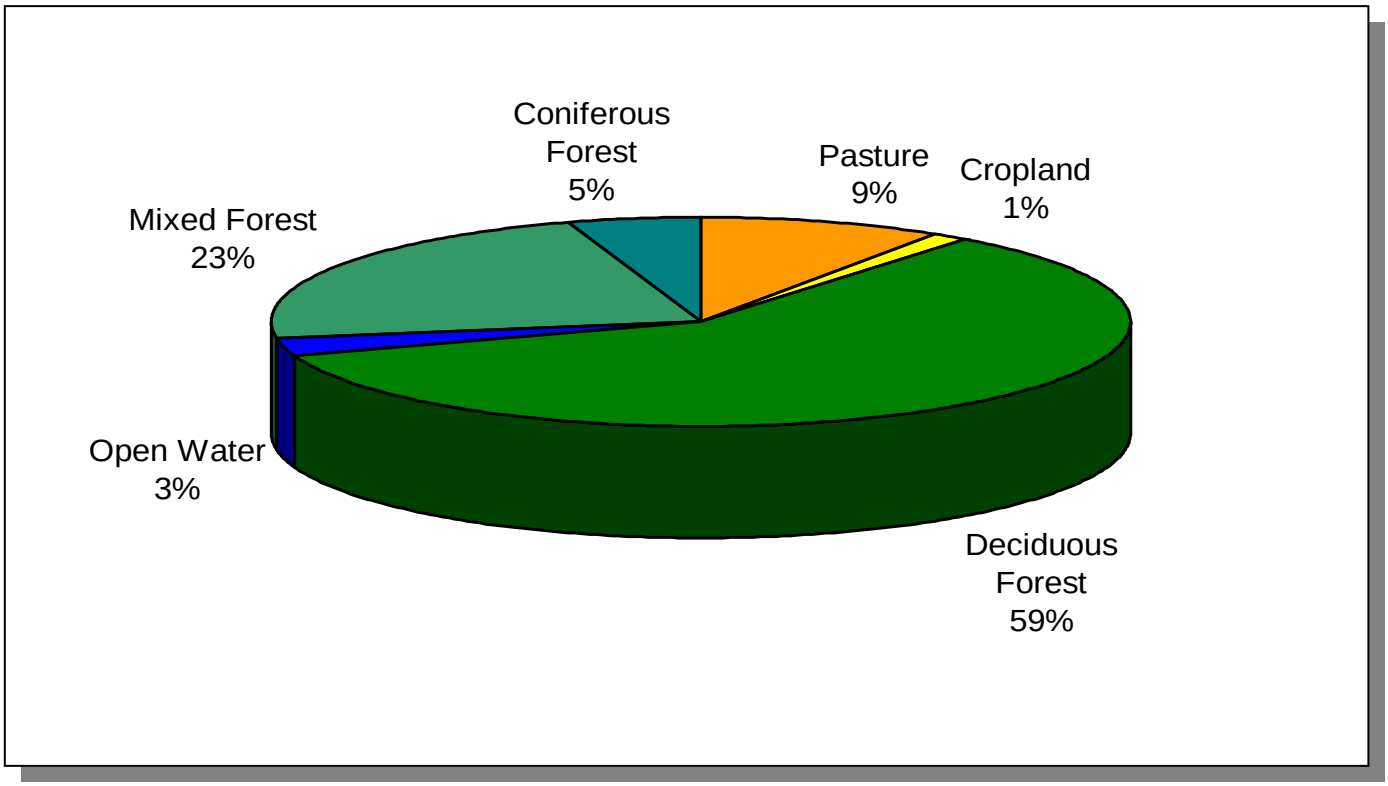

Figure 2-7. Land Use Distribution in the Ocoee River Watershed. *More information is provided in Ocoee-Appendix II.*

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

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Ocoee River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains, Ridge and Valley) and contains 5 Level IV subecoregions (Griffen, Omernik, Azavedo, 1997):

- The Southern Sedimentary Ridges (66e) in Tennessee include some of the westernmost foothill areas of the Blue Ridge Mountains ecoregion, such as the Bean, Starr, Chilhowee, English, Stone, Bald, and Iron Mountain areas. Slopes are steep, and elevations are generally 1000-4500 feet. The rocks are primarily Cambrian-age sedimentary (shale, sandstone, siltstone,

quartzite, conglomerate), although some lower stream reaches occur on limestone. Soils are predominantly friable loams and fine sandy loams with variable amounts of sandstone rock fragments, and support mostly mixed oak and oak-pine forests.

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

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

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

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

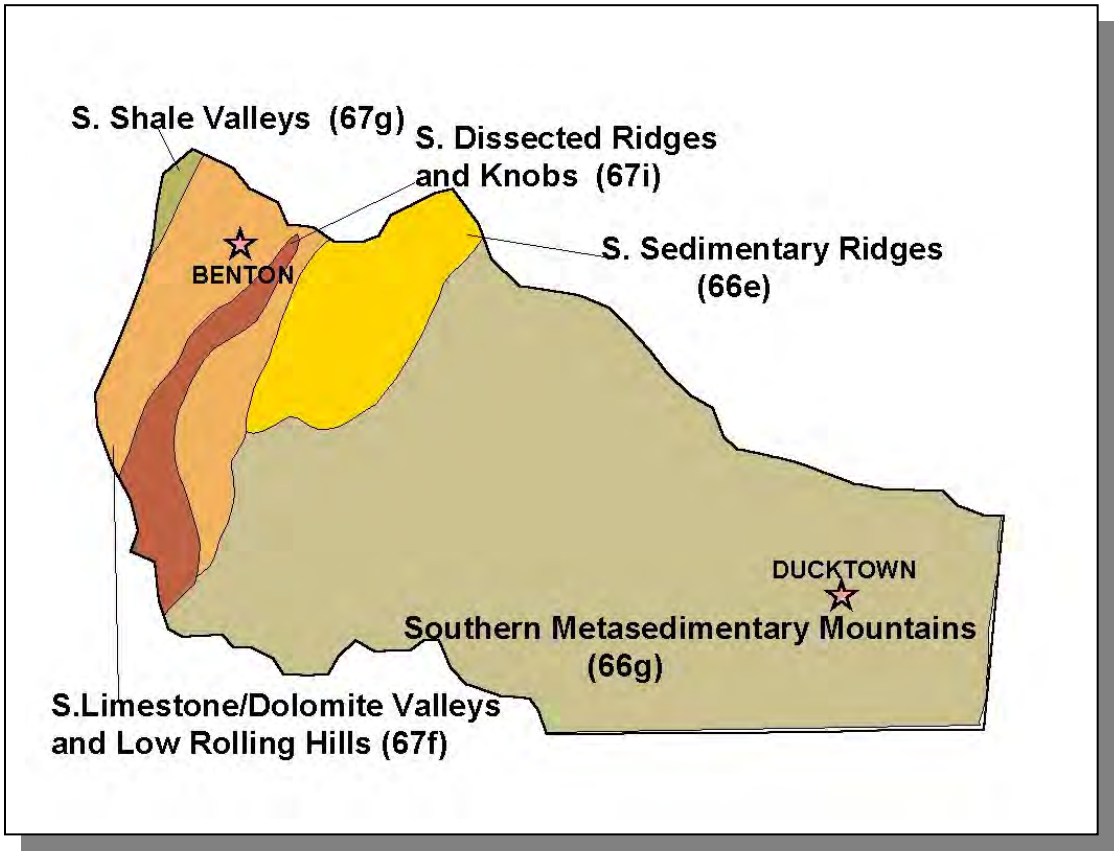

Figure 2-8. Level IV Ecoregions in the Ocoee River Watershed. *Locations of Benton and Ducktown are shown for reference.*

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.

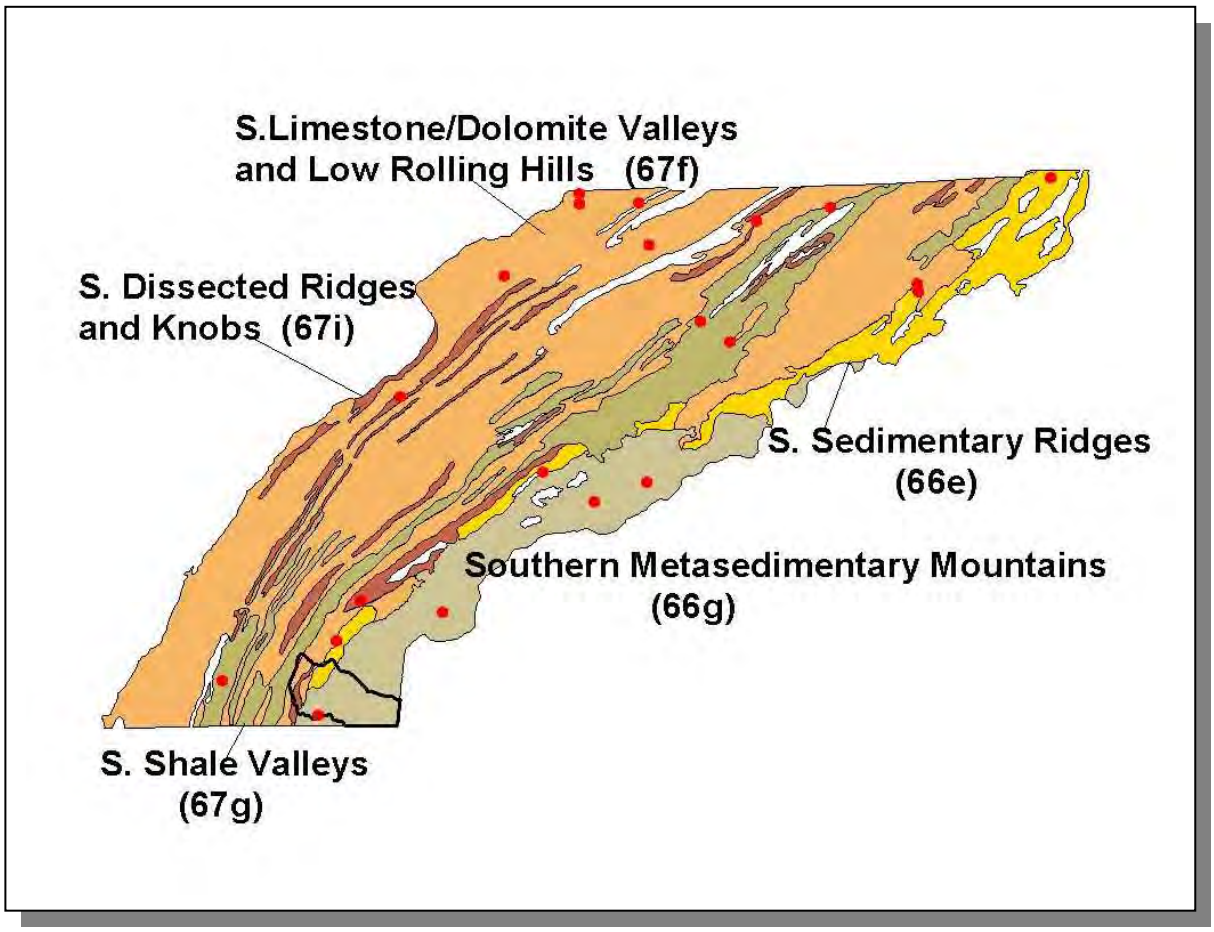

Figure 2-9. Ecoregion Monitoring Sites in Level IV Ecoregions 66e, 66g, 67f, 67g, and 67i. *The Ocoee River Watershed is shown for reference. Additional information is provided in Ocoee-Appendix II.*

2.6. NATURAL RESOURCES.

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

> Davenport Refuge Designated State Natural Area is 120 acres and includes a globally rare southern Appalachian bog community.

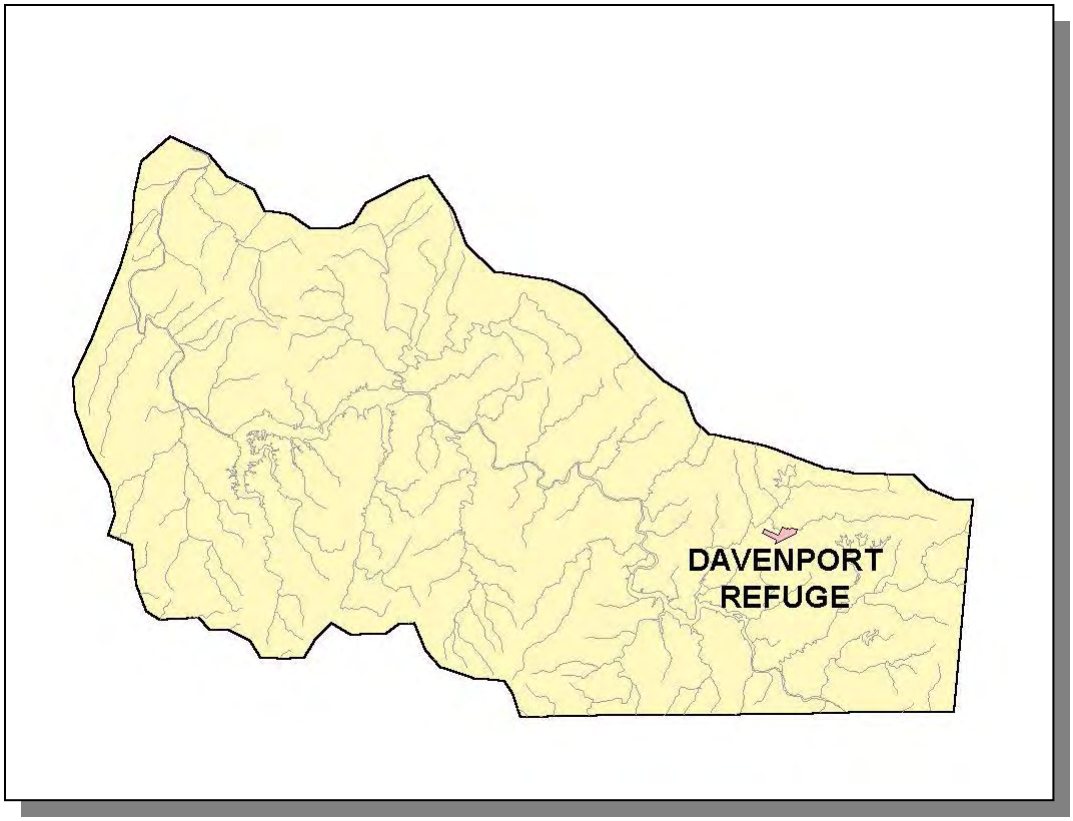

Figure 2-10. The Davenport Refuge Designated State Natural Area is in the Ocoee River Watershed.

2.6.B. National Forest. Covering 630,000 acres (120 square miles in the Tennessee portion of the Ocoee River Watershed), the Cherokee National Forest is the largest tract of public land in the state. It is managed for multiple uses by the U.S. Department of Agriculture—Forest Service.

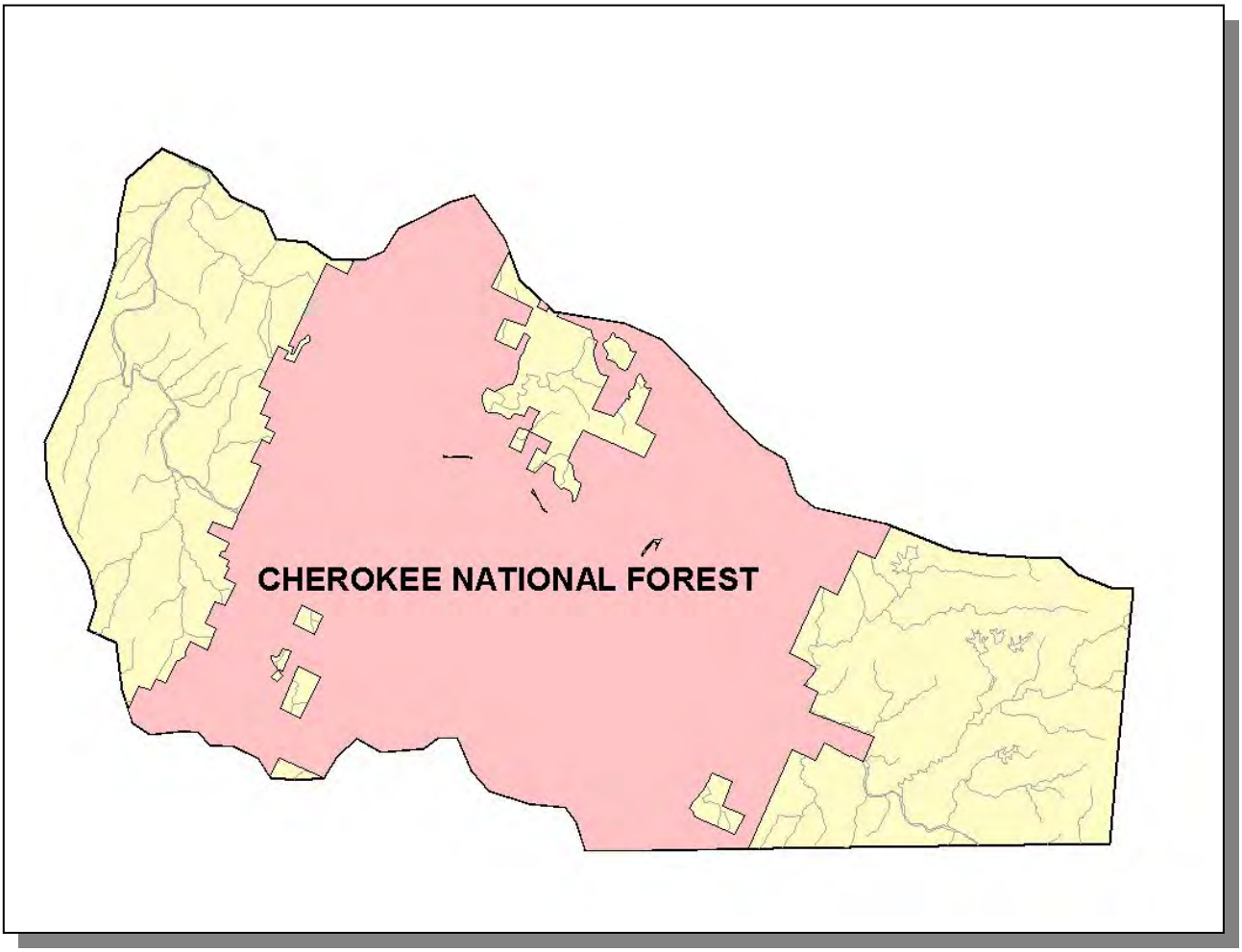

Figure 2-11. Location of Cherokee National Forest in Ocoee River Watershed.

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

GROUPING	NUMBER OF RARE SPECIES
Crustaceans	0
Insects	0
Mussels	0
Snails	1
Amphibians	2
Birds	1
Fish	2
Mammals	0
Reptiles	2
Plants	28
Total	**36**

Table 2-3. There are 36 Documented Rare Plant and Animal Species in the Ocoee River Watershed. Additional rare plant and animal species may be present.

Additionally, in the Ocoee River Watershed, there are two rare fish species and one rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Hybopsis lineapunctata	Lined chub		D
Phoxinus tennesseensis	Tennessee dace		D
Mesodon archeri	Ocoee covert		

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

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

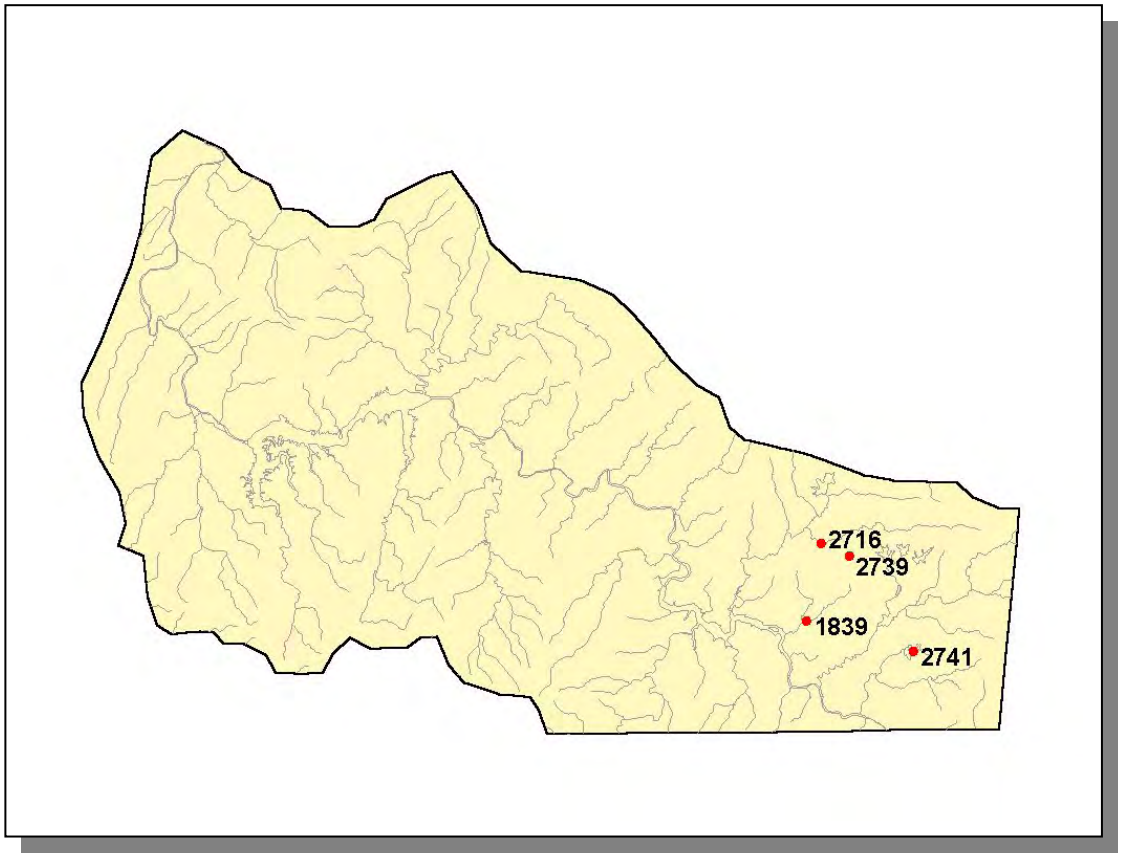

Figure 2-12. Location of Wetland Sites in TDEC Division of Natural Heritage Database in Ocoee River Watershed. ***There may be additional wetland sites in the watershed.*** *Additional information is provided in Ocoee-Appendix II.*

2.7. CULTURAL RESOURCES.

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

The most recent version of the Nationwide Rivers Inventory lists two portions of the Ocoee River in the Ocoee River Watershed:

> Ocoee River. (River mile 19, Parksville Reservoir, to river mile 29, Ocoee No. 3 Dam). High quality whitewater stream with spectacular mountain scenery.
>
> Ocoee River. (River mile 14, Parksville Reservoir, to river mile 28, below Ocoee No. 3 Dam). High quality whitewater stream with spectacular mountain scenery.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE
Ocoee River	X	X			
Ocoee River (Below Ocoee Dam)	X	X	X	X	X

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

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

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

- Old Copper Road Historic Trail, which is designated as a historic site on the National Register of Historic Places, is a road built in 1878 for the transportation of copper ore.

- The Burra Burra Mine site consists of 10 buildings located on 17 acres and is listed in the National Register of Historic Places. Buildings on the site include the mine office, shop building, change house, hoist house, and powder house. The museum interprets the basin's history through audio-visual and artifact exhibits and examples of the kinds of equipment used in the mines. The history of the Cherokee Nation, including its removal from the basin, is also presented.

2.7.C. Wildlife Management Area. The U.S. Forest Service manages the Cherokee National Forest, where 620,000 acres provide stable communities for over 1000 species of plants and animals. The area has outdoor recreation and forest products.

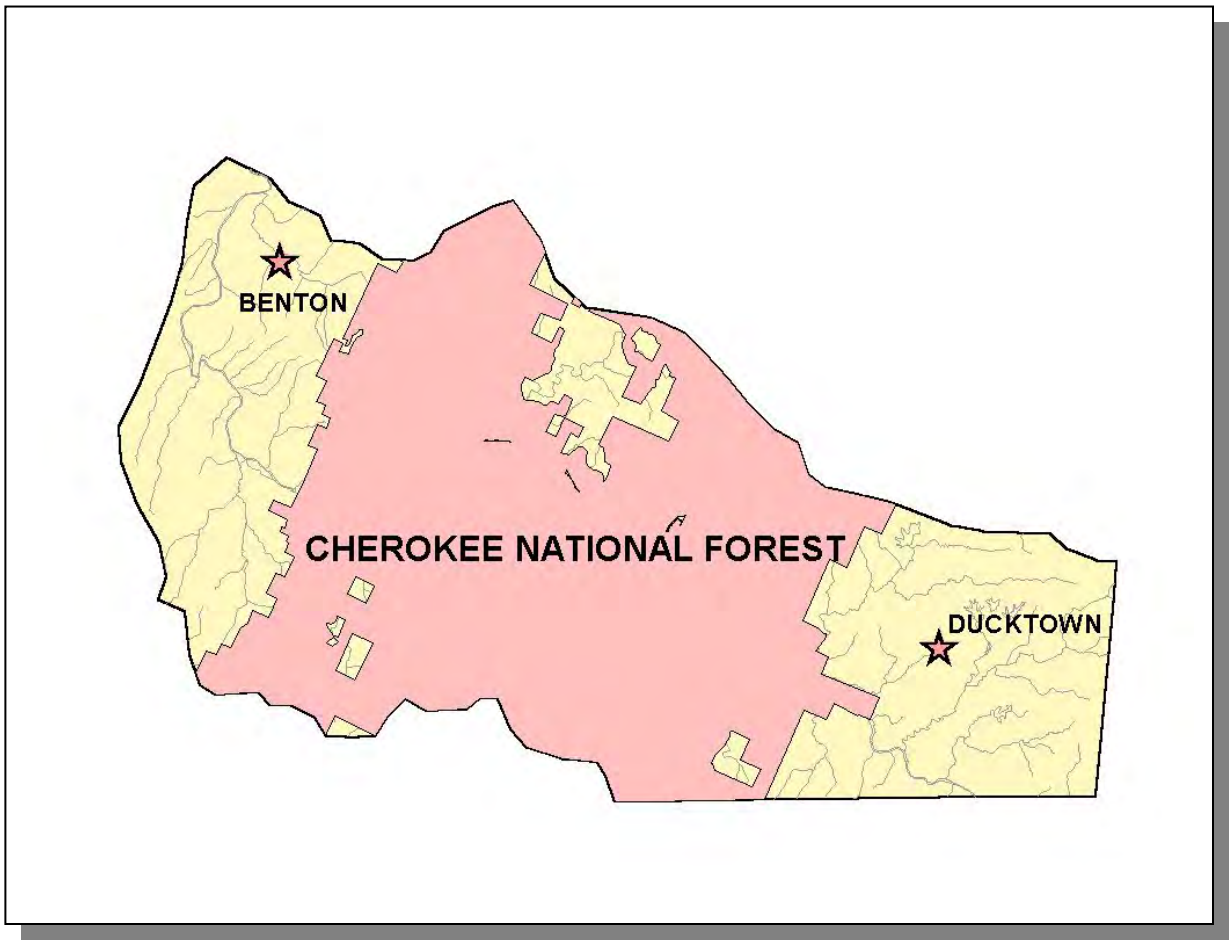

Figure 2-13. The U.S. Forest Service Manages the Cherokee National Forest in the Ocoee River Watershed.

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

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

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Big Creek	1	2	1	Ocoee River	3,4	1,2	
East Fork Rough Creek		1		Sylco Creek	2	2	1
Greasey Creek	2		3,4	Tumbling Creek		1	
North Potato Creek			3				

Table 2-6. Stream Scoring from the Tennessee Rivers Assessment Project.

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

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

CHAPTER 3

WATER QUALITY ASSESSMENT OF THE OCOEE RIVER WATERSHED

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

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

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

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

Tennessee uses the 305(b) Report to meet four goals (from 2000 305(b) Report):

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

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

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

4. Highlight areas of improved water quality

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

http://www.epa.gov/OW/resources/9698/tn.html

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

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

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

The current 303(d) List is available on the TDEC homepage at http://www.state.tn.us/environment/water.htm and information about Tennessee's TMDL program may be found at http://www.state.tn.us/environment/wpc/tmdl.htm.

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

3.2 DATA COLLECTION. Comprehensive water quality monitoring in the Ocoee River Watershed was conducted in 1998. Data were collected from 53 sites. One site was an ambient monitoring station and the remainder were watershed sites.

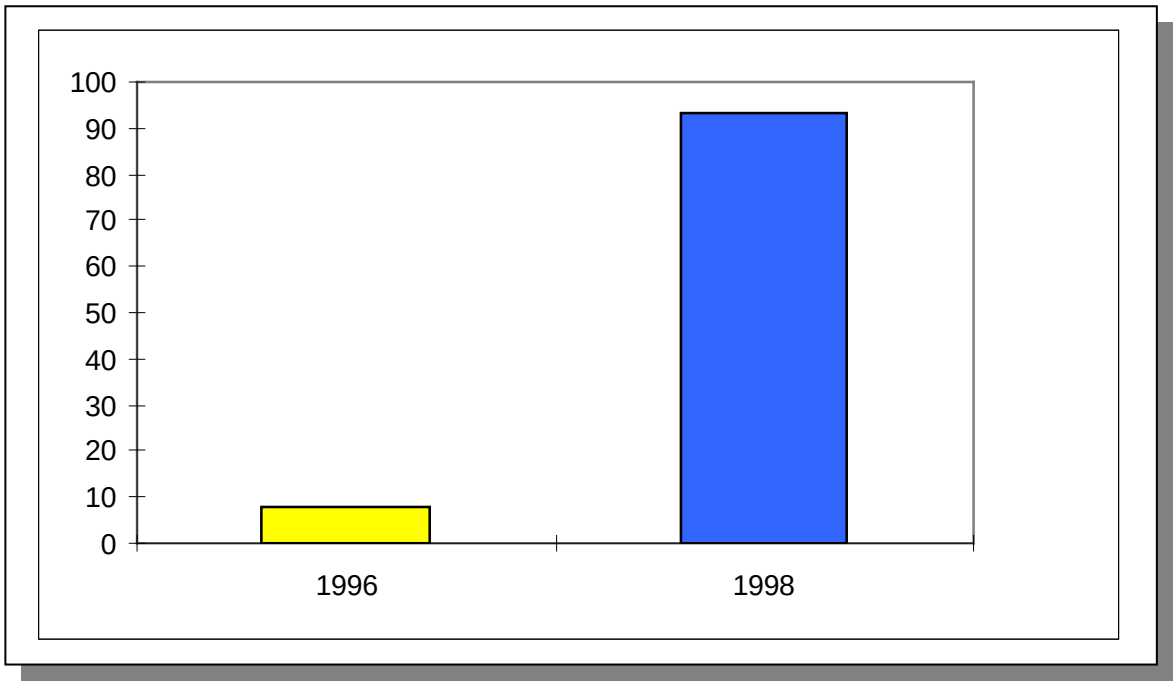

Figure 3-1. Number of Sampling Events Using the Traditional Approach (1996) and Watershed Approach (1998) in the Ocoee River Watershed.

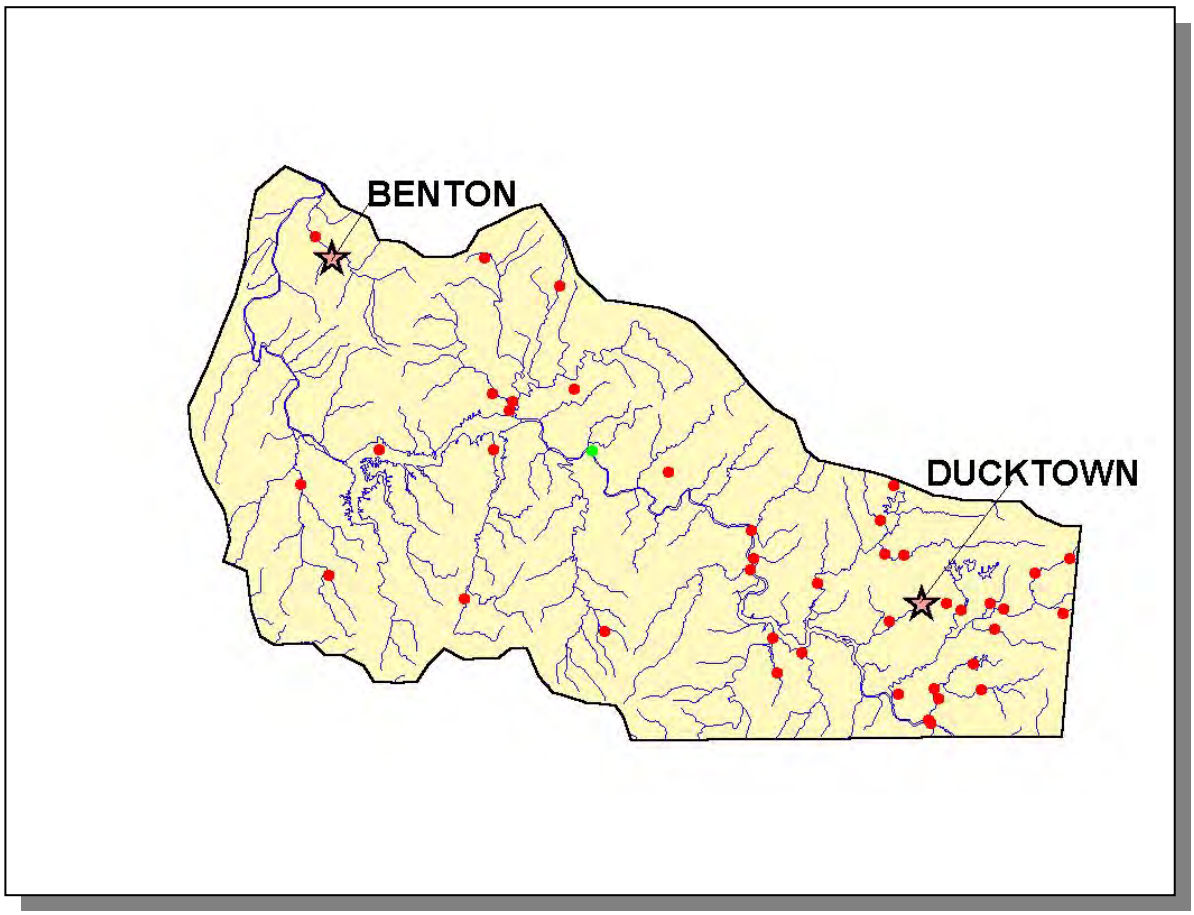

Figure 3-2. Location of Monitoring Sites in the Ocoee River Watershed. *Red, Watershed Monitoring Sites; Green, Ambient Monitoring Sites. Locations of Benton and Ducktown are shown for reference.*

TYPE	NUMBER	TOTAL NUMBER OF SAMPLING EVENTS		
		CHEMICAL ONLY	BIOLOGICAL ONLY	BIOLOGICAL PLUS CHEMICAL (FIELD PARAMETERS)
Ambient	1	8		
Watershed	52	54	14	16
Totals	**53**	**62**	**14**	**16**

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

In addition to the 92 sampling events, over 20 citizen complaints and 5 responses to toxic spills were investigated.

3.2.A. Ambient Monitoring Sites. These fixed-station chemical monitoring sites are sampled quarterly or monthly by the Environmental Assistance Center-Chattanooga Water Pollution Control staff (this is in addition to samples collected by water and wastewater treatment plant operators). Samples are analyzed by the Tennessee Department of Health, Division of Environmental Laboratory Services. Ambient monitoring data are used to assess water quality in major bodies of water where there are NPDES facilities and to identify trends in water quality. Water quality parameters measured in the Ocoee River Watershed are provided in Ocoee-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 Ocoee River watershed lies within 2 Level III ecoregions (Blue Ridge Mountains, Ridge and Valley) and contains 5 subecoregions (Level IV):

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

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

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

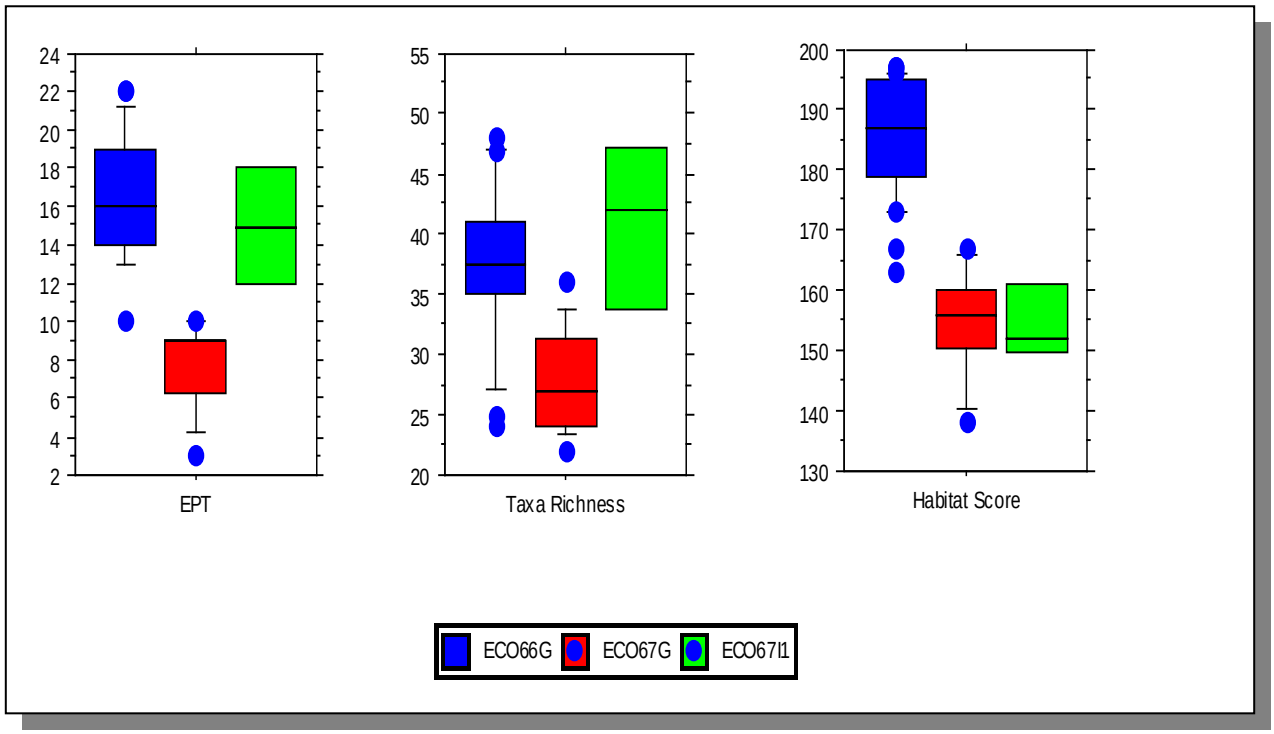

Figure 3-3. Benthic Macroinvertebrate and Habitat Scores for Ocoee River Ecoregion RBP III Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as points. EPT and Taxa scores are number of genus observed; habitat score is calculated as described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

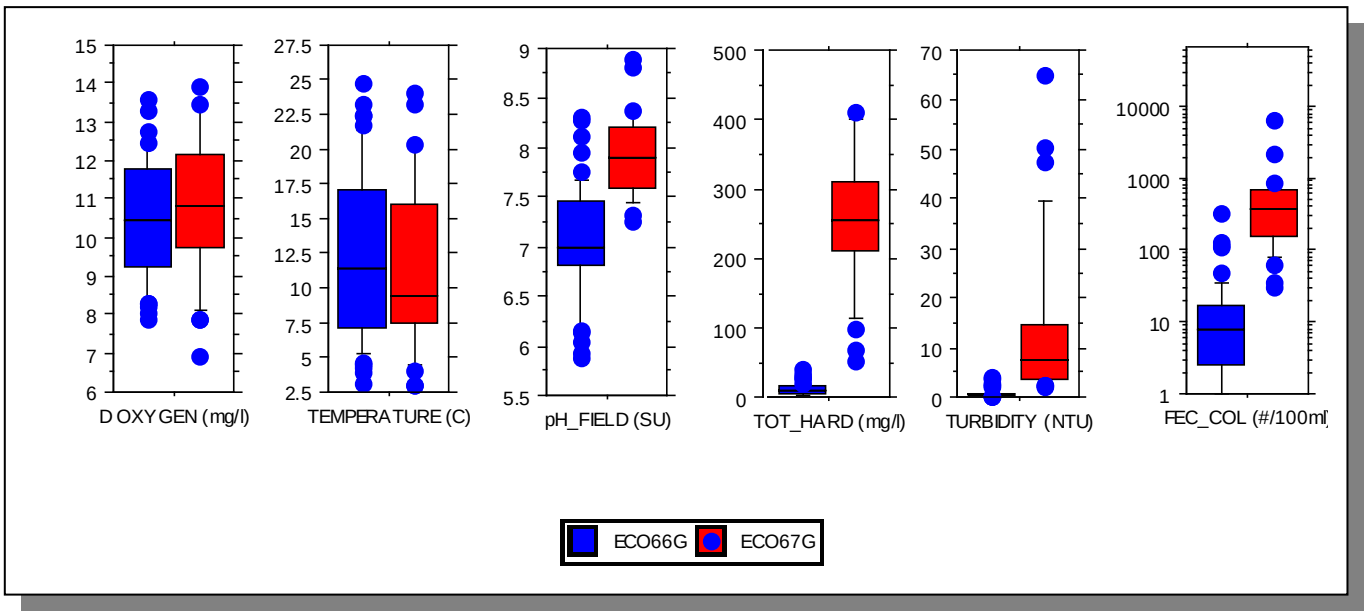

Figure 3-4. Select Chemical Data Collected in Ocoee River Watershed Ecoregion Sites. *Boxes and bars illustrate 10th, 25th, median, 75th, and 90th percentiles. Extreme values are also shown as points.*

3.2.C. Watershed Sites. Activities that take place at watershed sites are benthic macroinvertebrate biological stream surveys, physical habitat determinations and/or chemical monitoring. Following review of existing data, watershed sites are selected in Year 1 of the watershed approach when 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 [mayflies], Plecoptera [stoneflies], Trichoptera [caddisflies]). Factors and resources used for selecting BioRecon sites are:

- The current 303(d) list,
- HUC-11 maps (every HUC-11 is scheduled for a BioRecon)
- Land Use/Land Cover maps
- Topographic maps
- Locations of NPDES facilities
- Sites of recent ARAP activities

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

3.2.D. Special Surveys. These investigations include:

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

These special surveys are performed when needed.

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

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

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

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

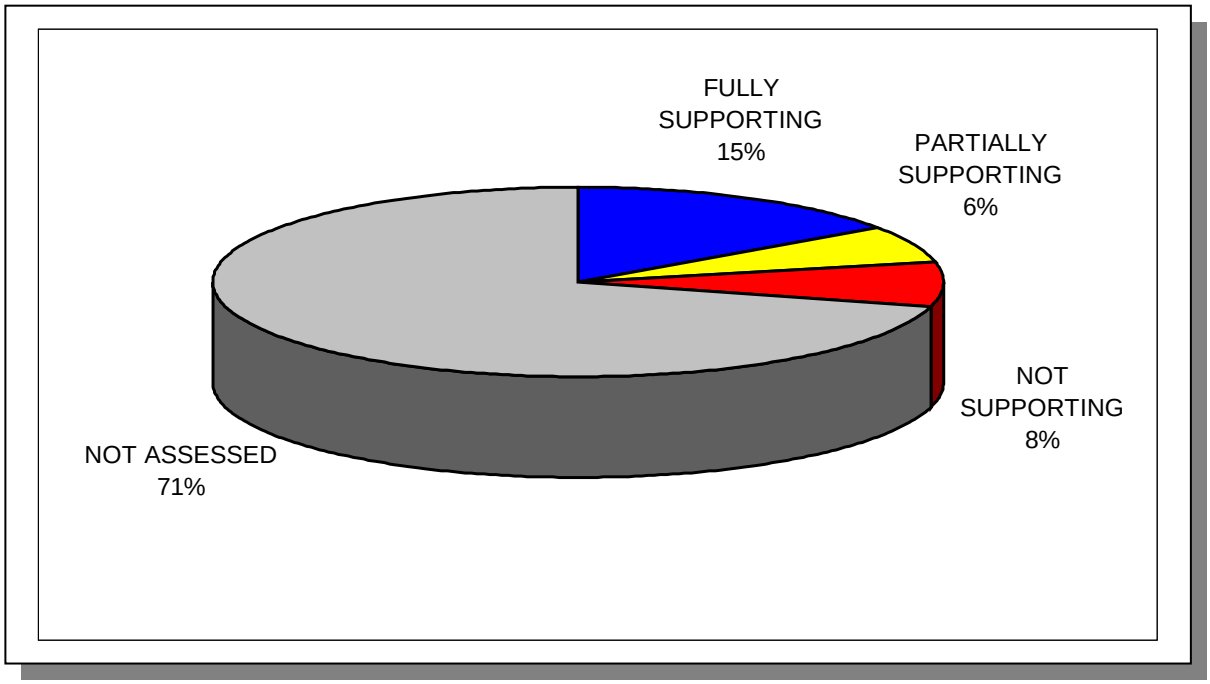

Figure 3-5. Water Quality Assessment for Rivers and Streams in the Ocoee River Watershed. *Assessment data (stream miles) are based on the 2000 Water Quality Assessment.*

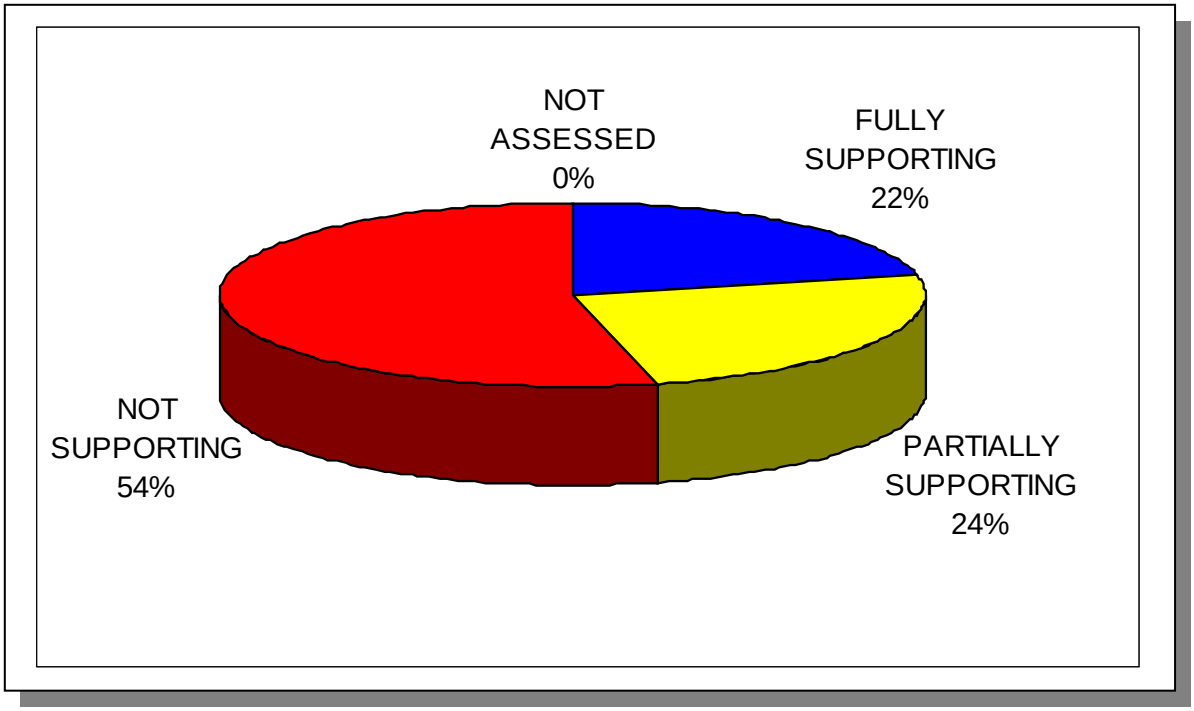

Figure 3-6. Water Quality Assessment for Lakes in the Ocoee River Watershed. *Assessment data (stream miles) are based on the 2000 Water Quality Assessment. More information is provided in Ocoee-Appendix III.*

3.3.A. Assessment Summary.

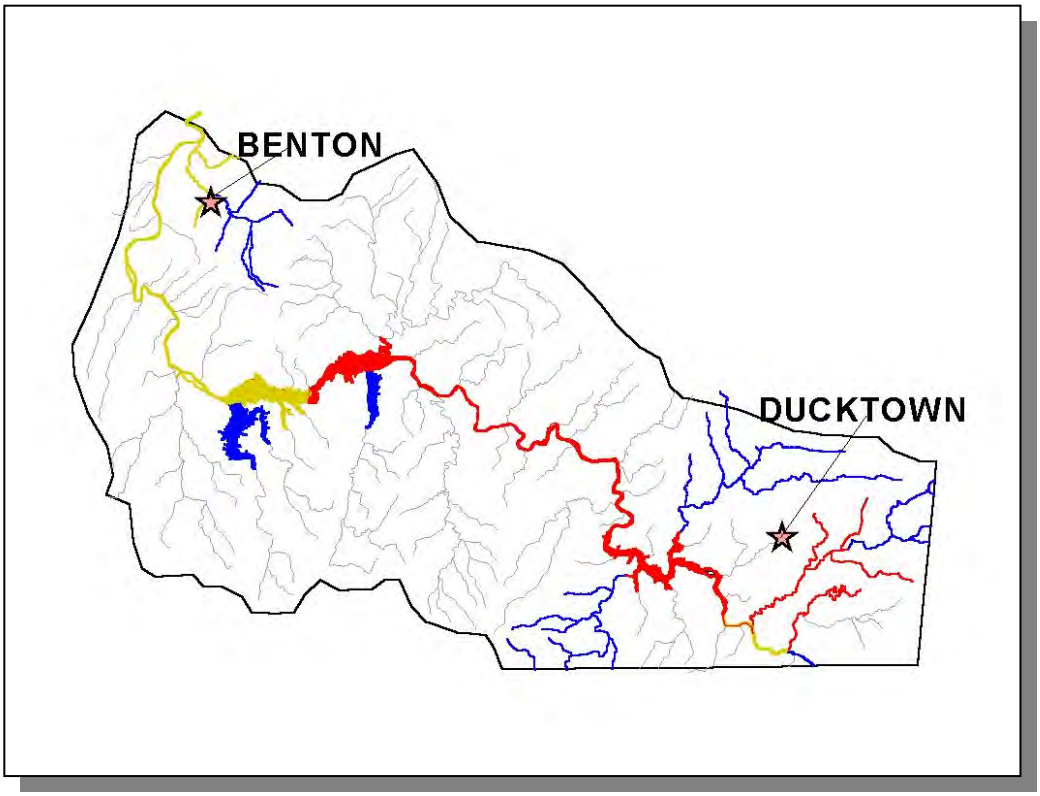

Figure 3-7a. Overall Use Support Attainment in the Ocoee River Watershed. *Assessment data is based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards are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

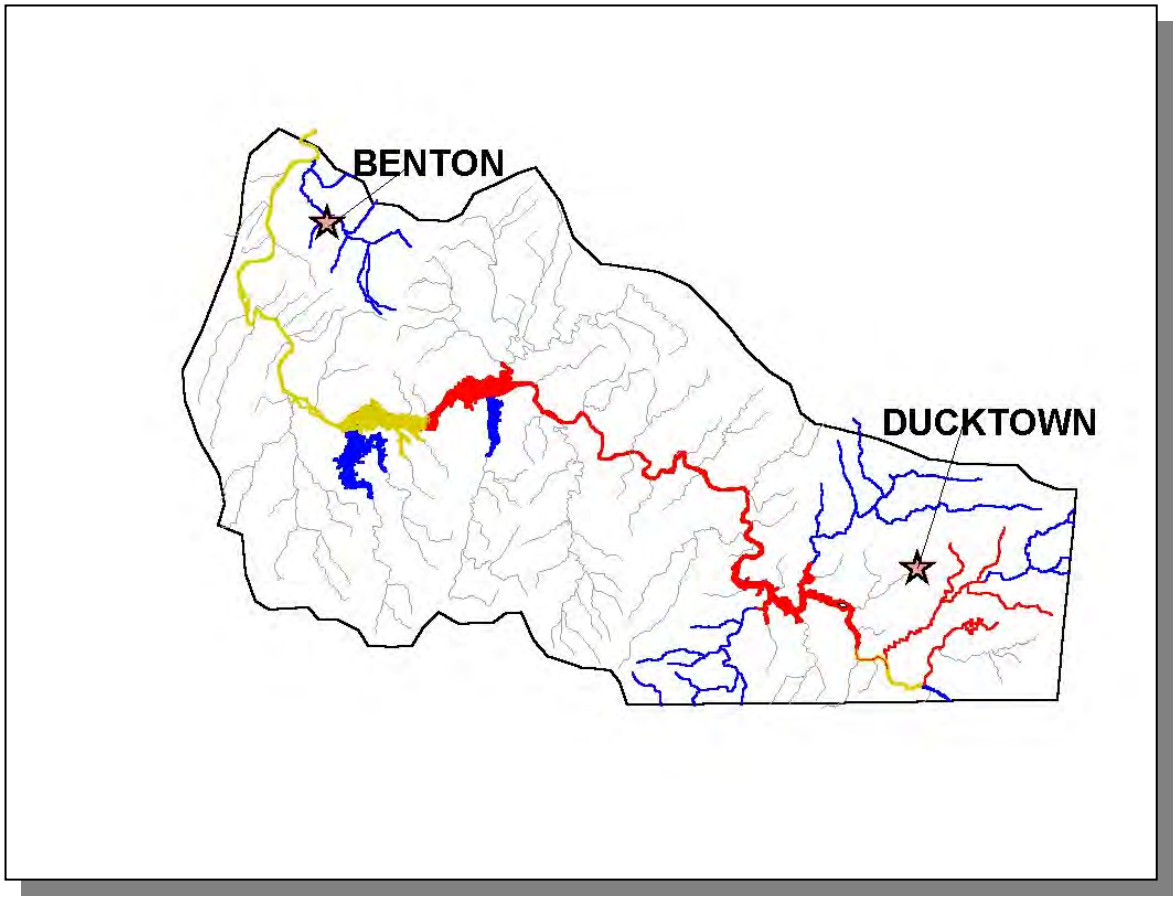

Figure 3-7b. Fish and Aquatic Life Use Support Attainment in the Ocoee River Watershed. *Assessment data is based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality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

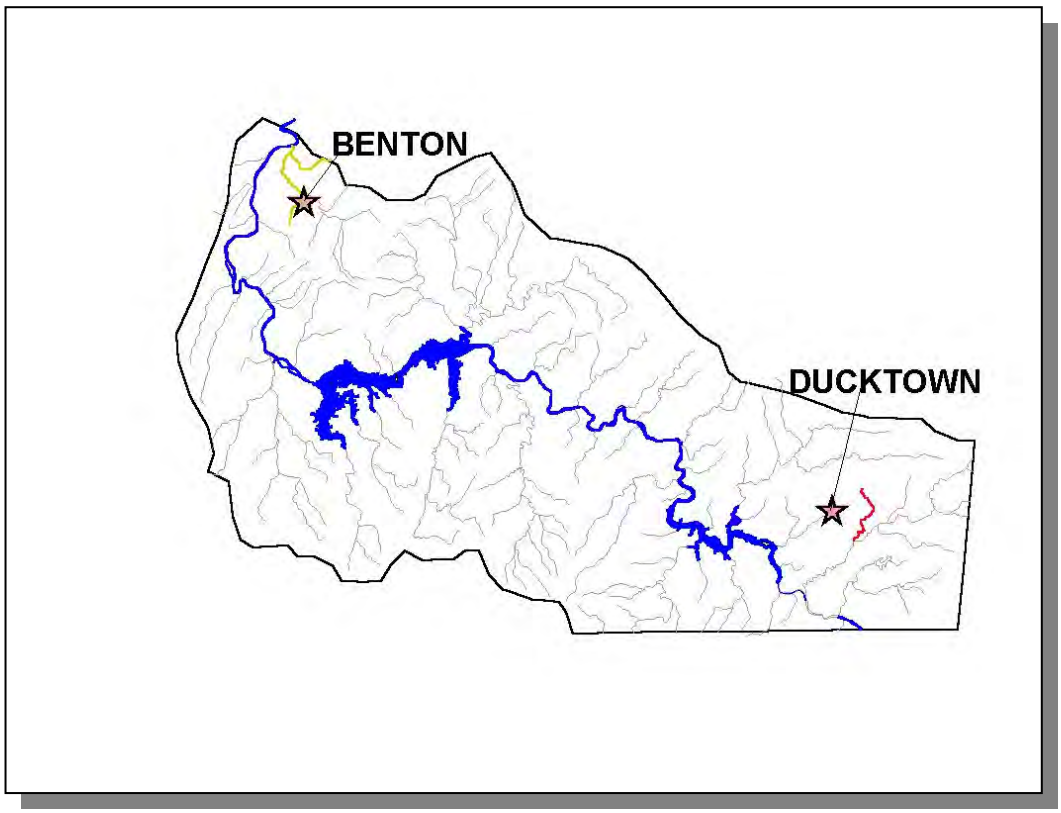

Figure 3-7c. Recreation Use Support Attainment in the Ocoee River Watershed. *Assessment data is based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Gray, Not Assessed. Water Quality Standards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

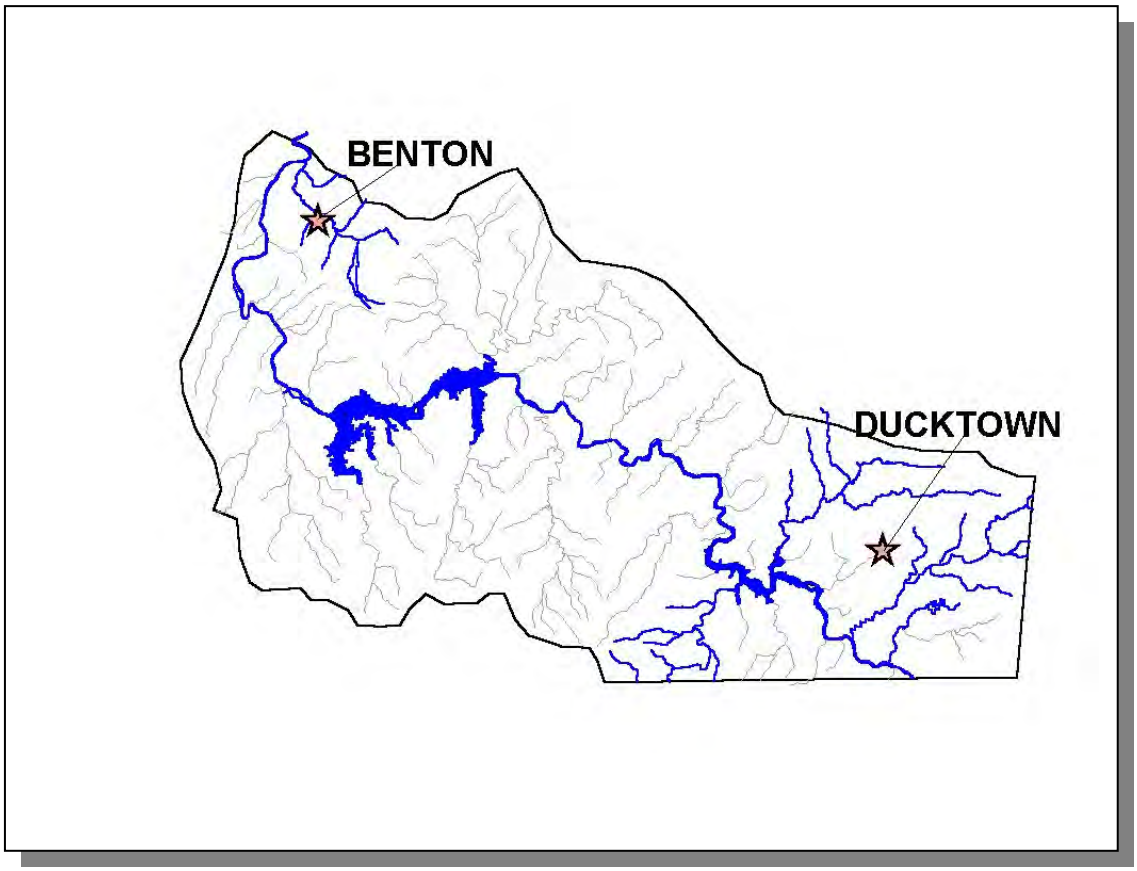

Figure 3-7d. Irrigation Use Support Attainment in the Ocoee River Watershed. *Assessment data is based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm. Benton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

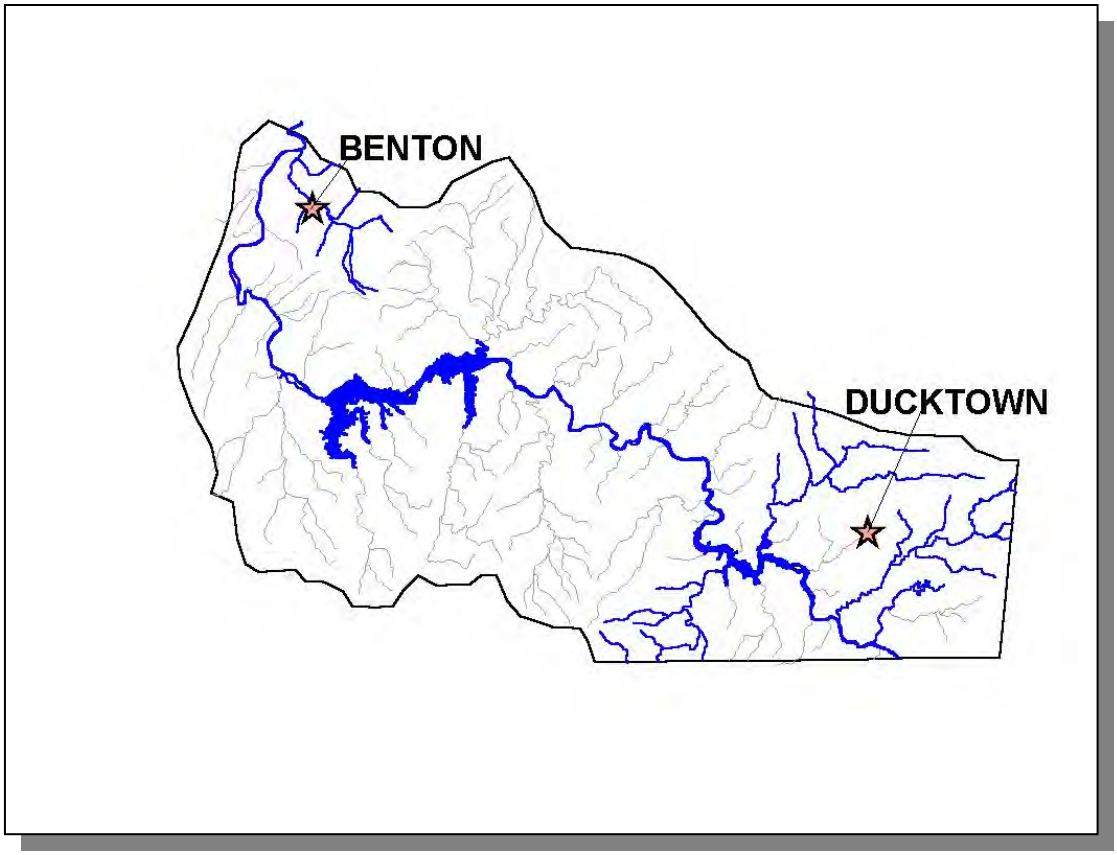

Figure 3-7e. Livestock Watering and Wildlife Use Support Attainment in the Ocoee River Watershed. *Assessment data is based on the 2000 Water Quality Assessment. Blue, Fully Supports Designated Use; Gray, Not Assessed. Water Quality Standards are described at http://www.state.tn.us/sos/rules/1200/1200-04/1200-04.htm.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

3.3.B. Use Impairment Summary.

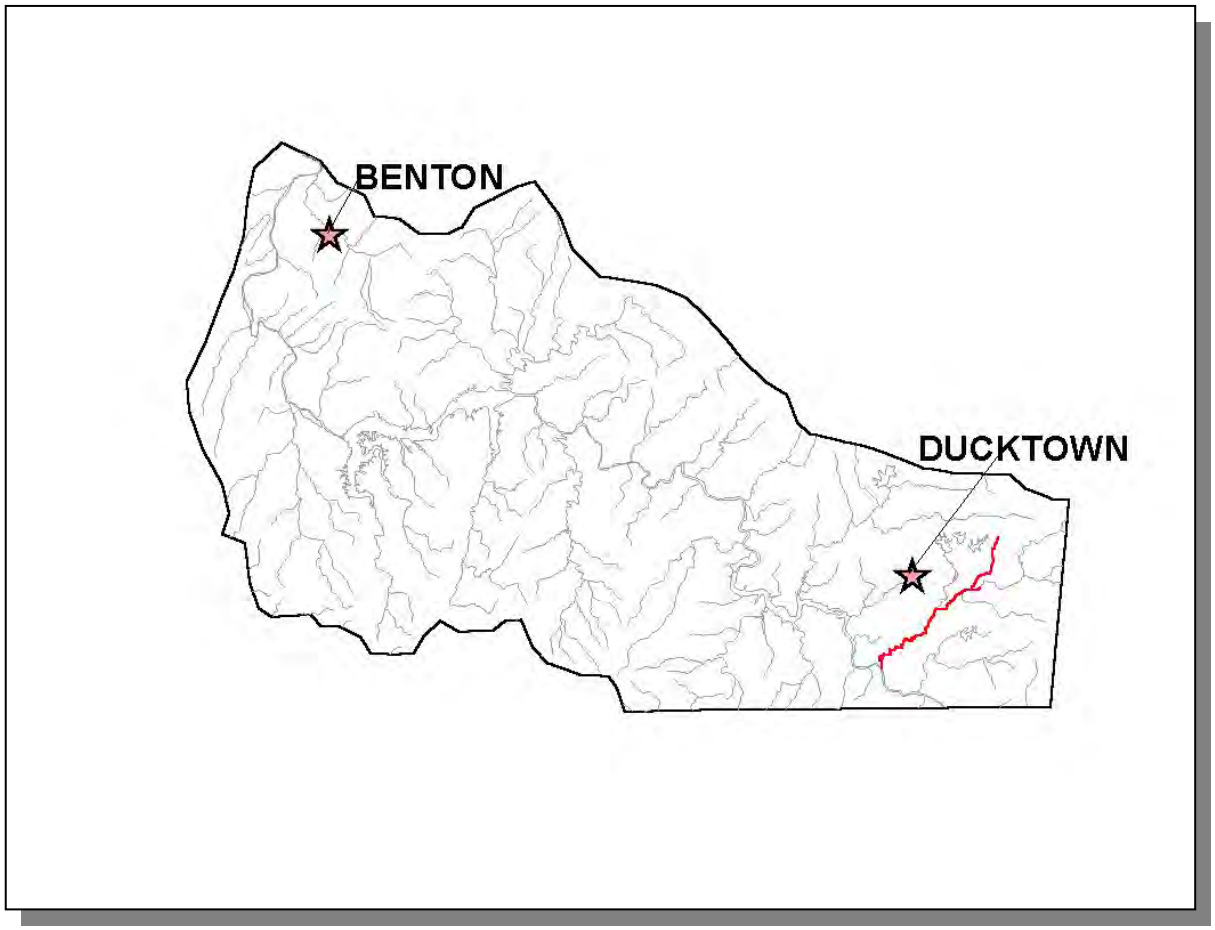

Figure 3-8a. Impaired Streams Due to Habitat Alteration in the Ocoee River Watershed. *Assessment data is based on the 2000 Water Quality Assessment.; Red, Does Not Support Designated Use; Benton and Ducktown are shown for reference*

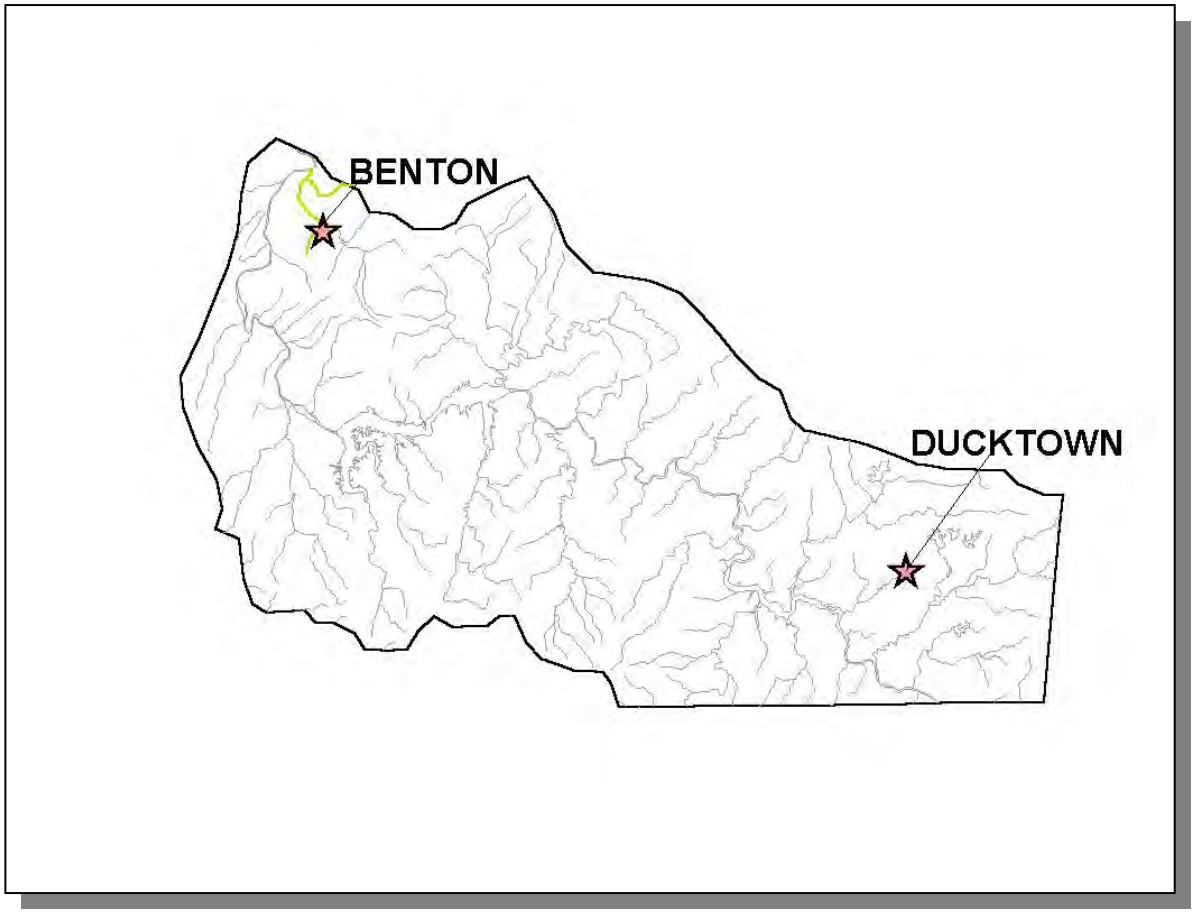

Figure 3-8b. Impaired Streams Due to Pathogens in the Ocoee River Watershed. *Assessment data is based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Benton and Ducktown are shown for reference. More information is provided in Ocoee-Appendix III.*

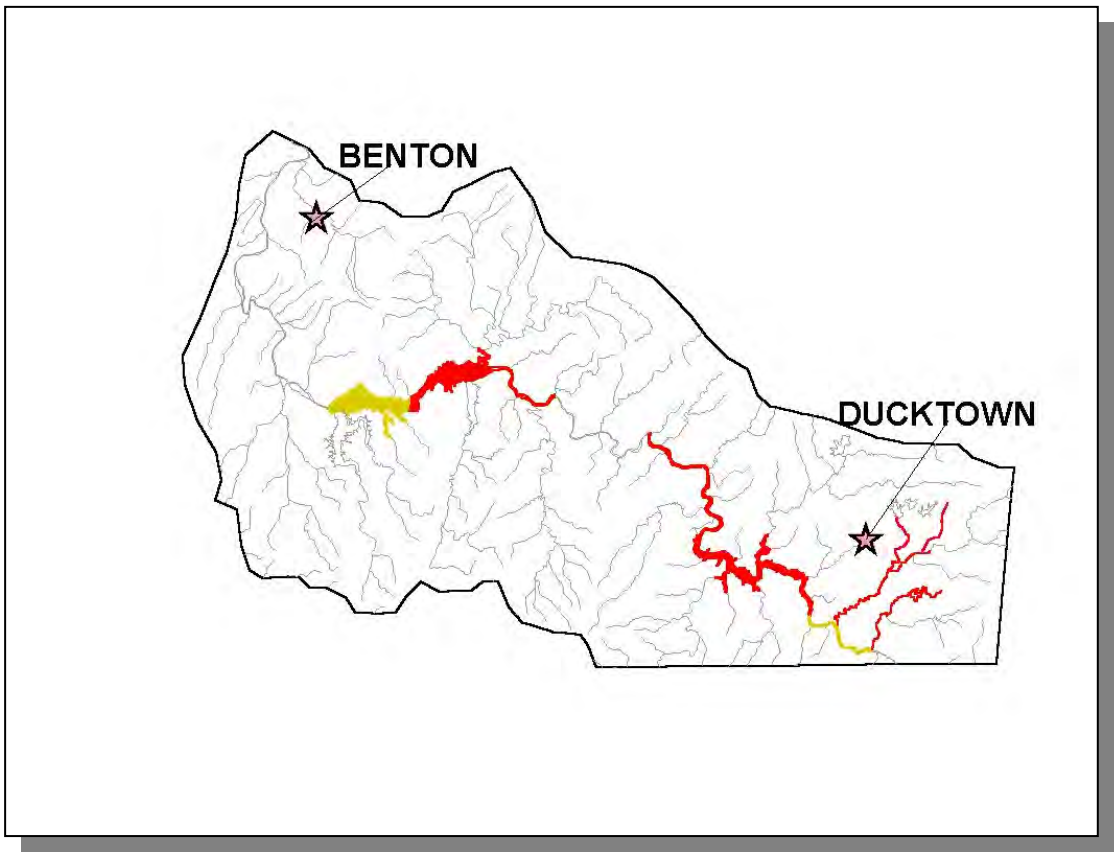

Figure 3-8c. Impaired Streams Due to Siltation in the Ocoee River Watershed. *Assessment data is based on the 2000 Water Quality Assessment. Yellow, Partially Supports Designated Use; Red, Does Not Support Designated Use; Benton and Ducktown are shown for reference. More information is provided in Ocoee-Appendix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

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

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

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE OCOEE RIVER WATERSHED

4.1 BACKGROUND. This chapter is organized by HUC-11 subwatershed, and the description of each subwatershed is divided into four parts:

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

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

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

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

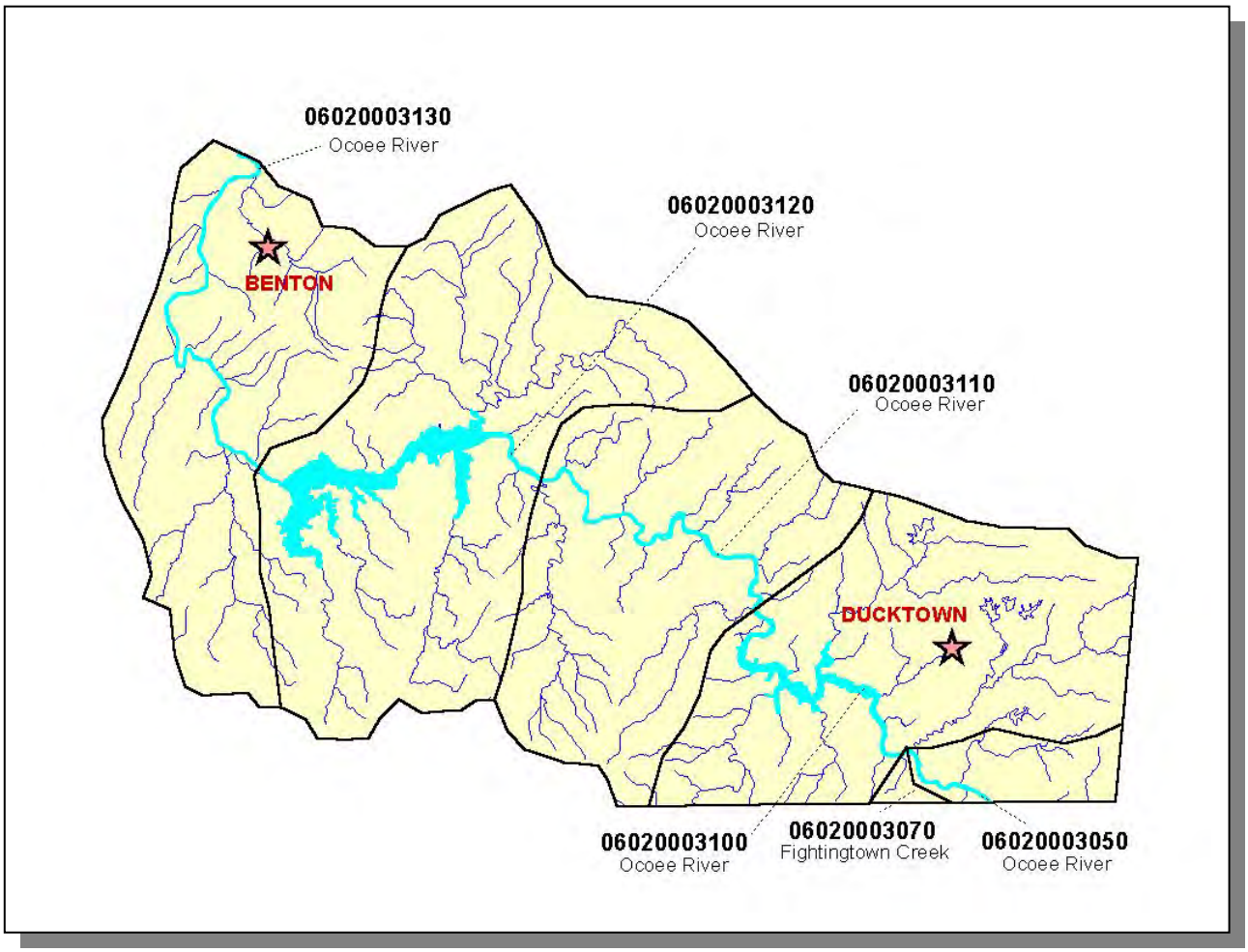

Figure 4-1. The Ocoee River Watershed is Composed of Six USGS-Delineated Subwatersheds (11-Digit Subwatersheds). *Locations of Ocoee River, Benton, and Ducktown are shown for reference.*

HUC-11	HUC-14
06020003050	06020003020020 (Tacoa River)
06020003070	06020003020030 (Fightingtown Creek)
06020003100	06020003020040 (Belltown Creek) 06020003020050 (North Potato Creek) 06020003020060 (Ocoee River)
06020003110	06020003020070 Ocoee River)
06020003120	06020003020080 Ocoee River)
06020003130	06020003020090 (Fightingtown Creek)

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

4.2.A. 06020003050.

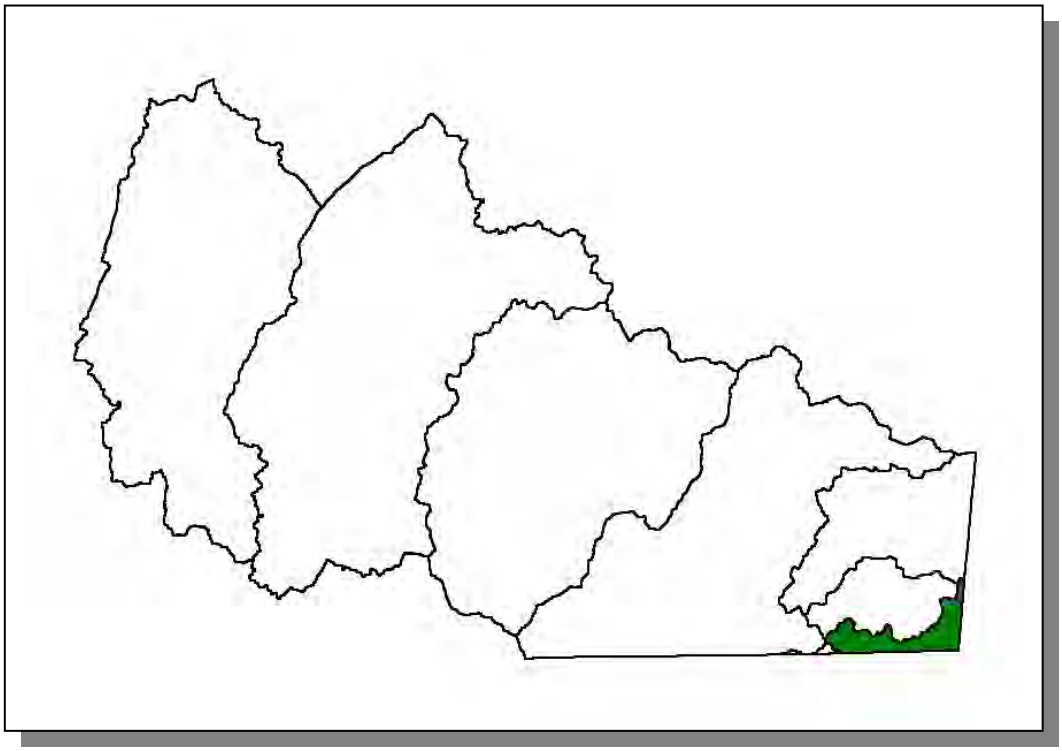

Figure 4-2. Location of Subwatershed 06020003050. *All Ocoee HUC-14 subwatershed boundaries are shown for reference.*

4.2.A.i. General Description.

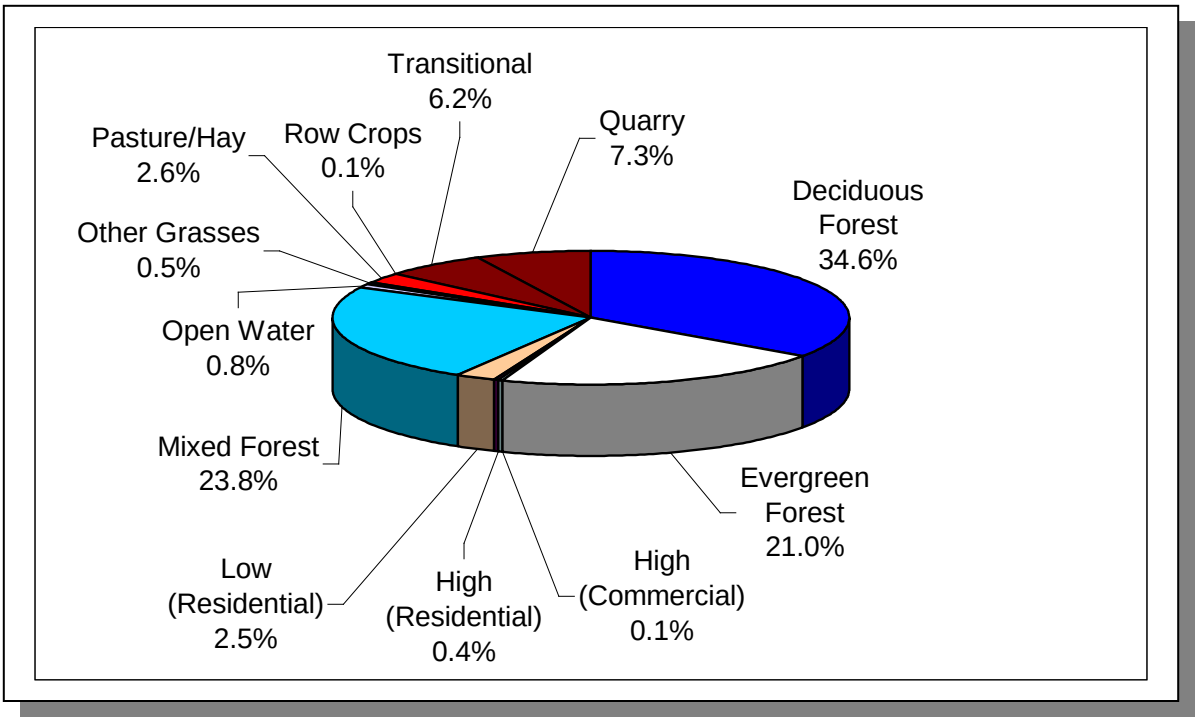

Figure 4-3. Land Use Distribution in Subwatershed 06020003050. *More information is provided in Ocoee-Appendix IV.*

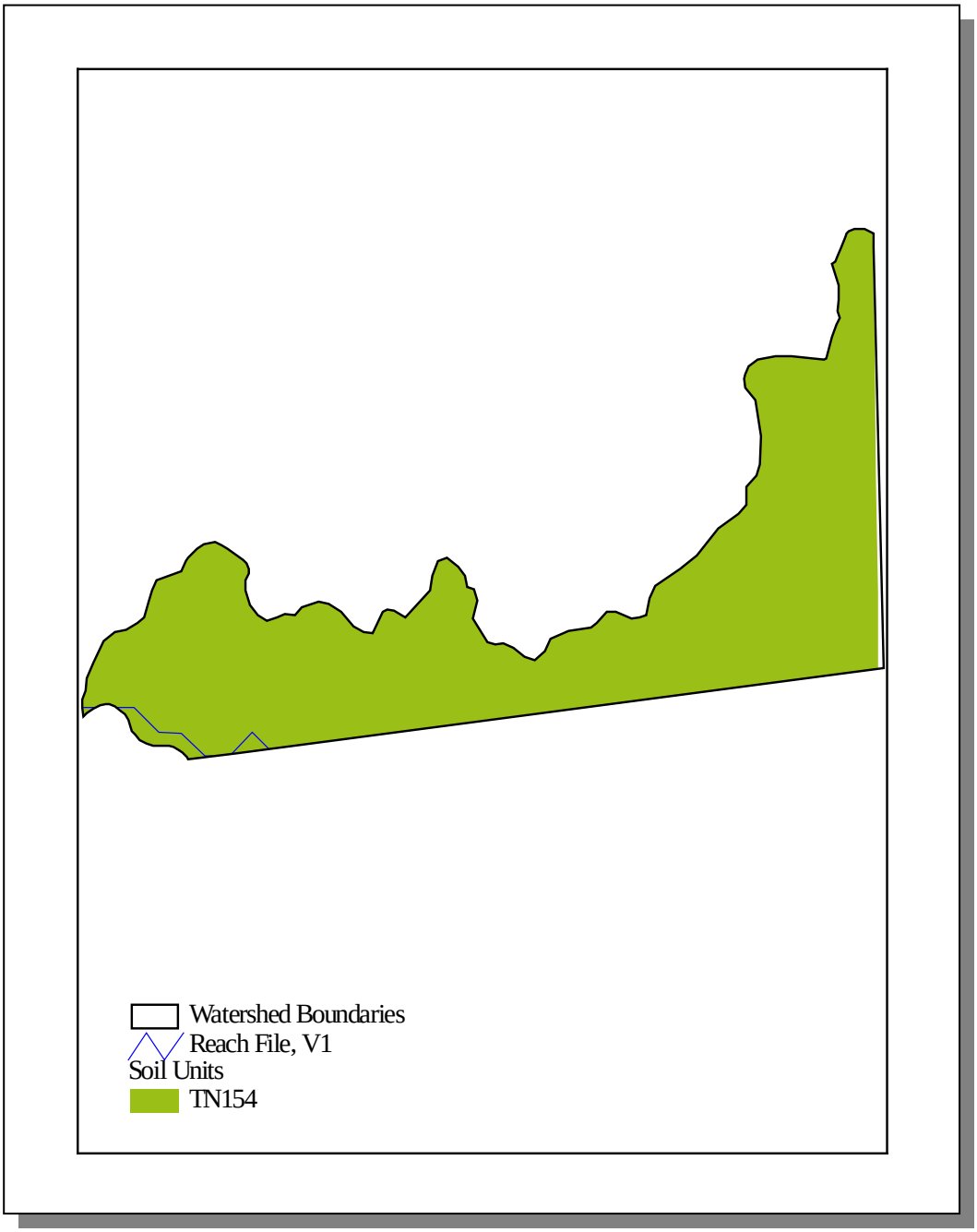

Figure 4-4. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003050.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN154	9.00	B	2.64	4.68	Loam	0.23

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003050. *More details are provided in Ocoee-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Polk	13,643	14,666	0.47	64	69	7.8

Table 4-3. Population Estimates in Subwatershed 06020003050.

NUMBER OF HOUSING UNITS					
Populated Place	County	Population	Total	Public Sewer	Septic Tank
Copperhill	Polk	355	227	198	29

Table 4-4. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06020003050.

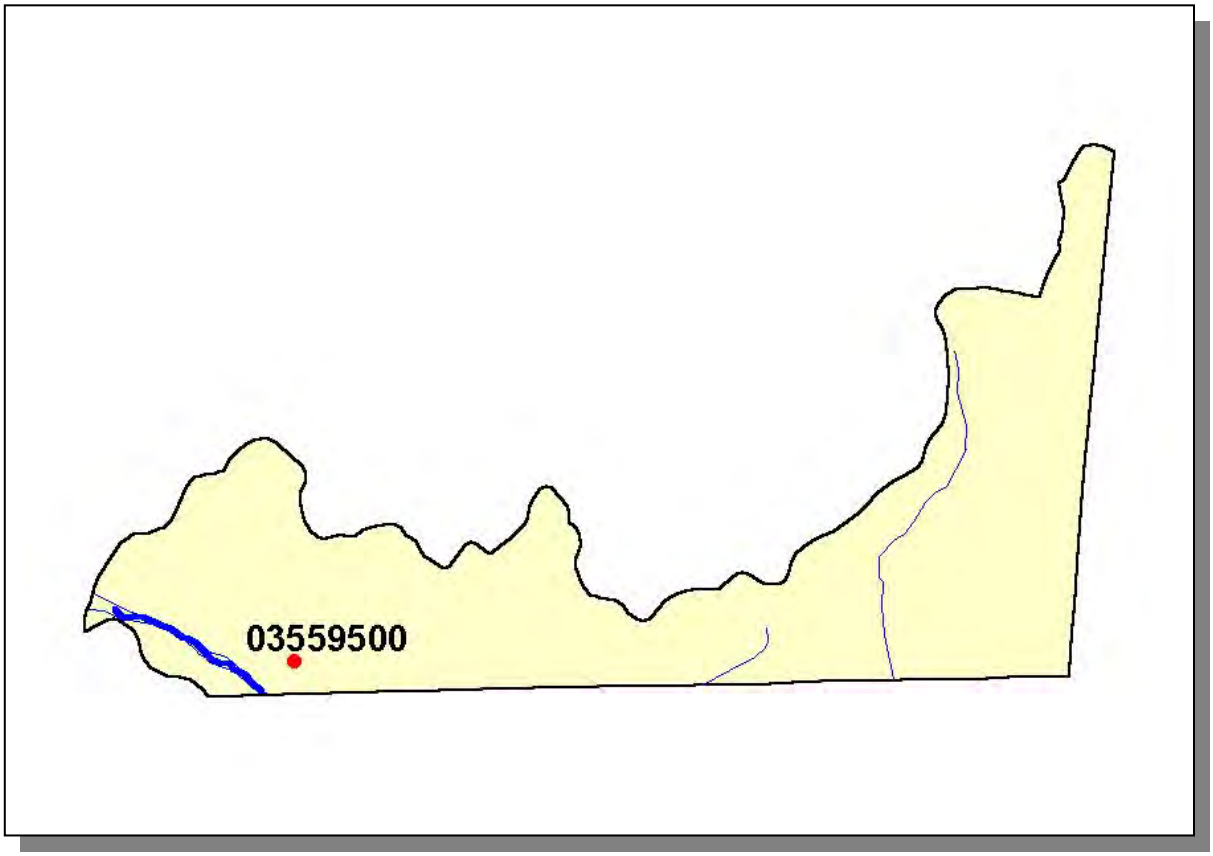

Figure 4-5. Location of Historical Streamflow Data Collection Sites in Subwatershed 06020003050. *More information is provided in Ocoee-Appendix IV.*

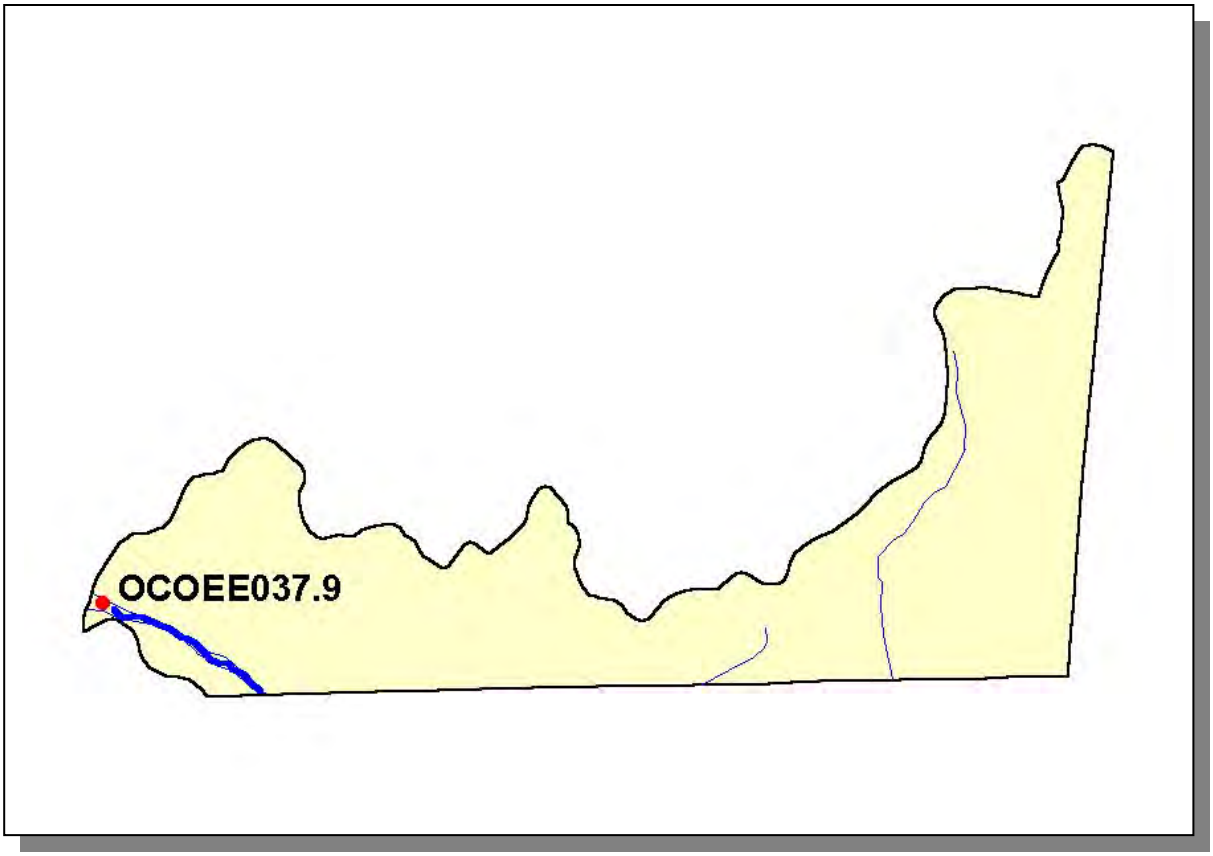

Figure 4-6. Location of STORET Monitoring Sites in Subwatershed 06020003050. *More information is provided in Ocoee-Appendix IV.*

4.2.A.ii Point Source Contributions.

No Contributions.

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)				
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Chickens Sold**
5	17	5	169	19,166

Table 4-5. Summary of Livestock Count Estimates in Subwatershed 06020003050. *According to the 1997 Census of Agriculture, "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

	INVENTORY		REMOVAL RATE	
County	**Forest Land (thousand acres)**	**Timber Land (thousand acres)**	**Growing Stock (million cubic feet)**	**Sawtimber (million board feet)**
Polk	224.7	214.1	6.2	21.1

Table 4-6. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 06020003050.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Soybeans (Row Crops)	2.33
Grass (Pastureland)	1.15
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.61
Grass, Forbs, Legumes (Mixed Pasture)	1.34
Forest Land (Grazed)	0.00
Fruit (Horticultural)	0.19
Corn (Row Crops)	6.43
Grass (Hayland)	0.22
Legume Grass (Hayland)	0.05
Other Cropland not Planted	2.93

Table 4-7. Annual Estimated Total Soil Loss in Subwatershed 06020003050.

4.2.B. 06020003070.

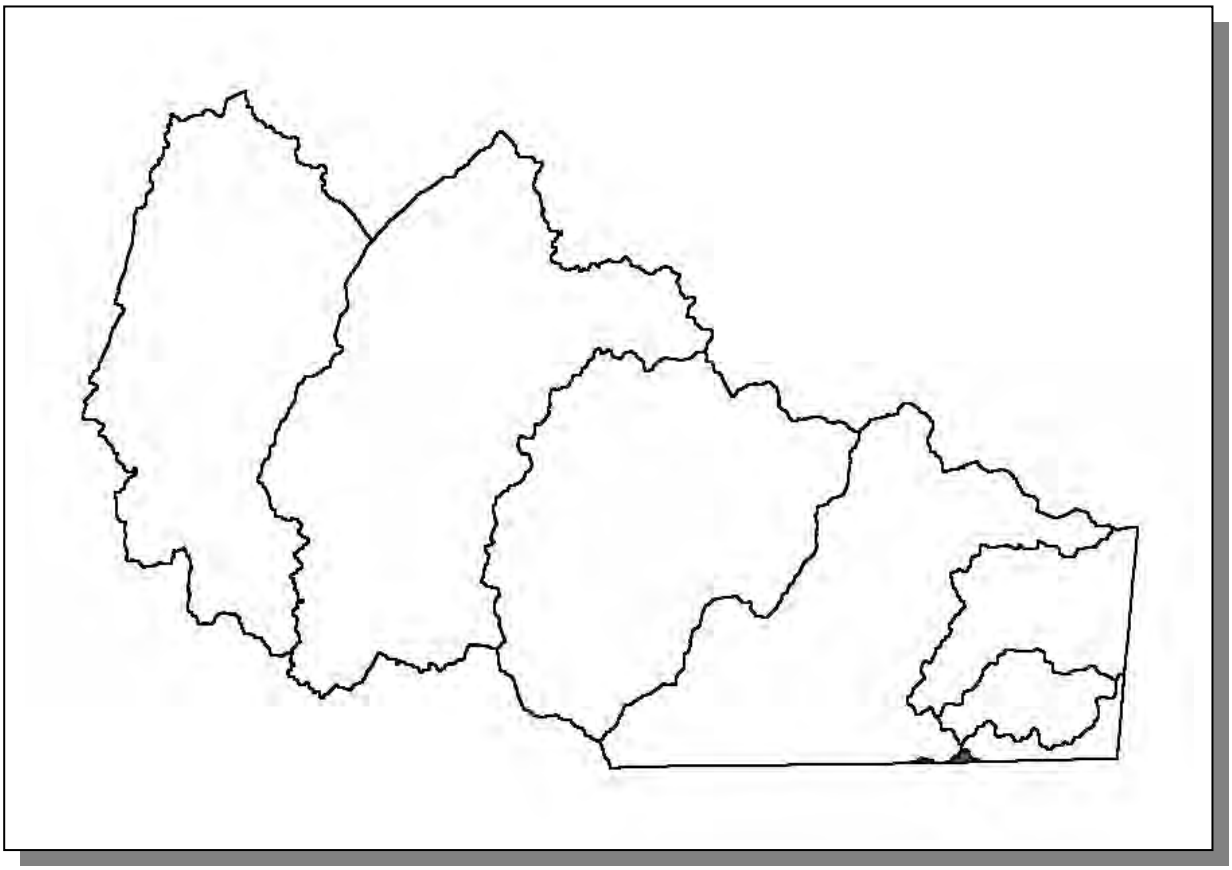

Figure 4-7. Location of Subwatershed 06020003070. *All Ocoee HUC-14 subwatershed boundaries are shown for reference.*

4.2.B.i. General Description.

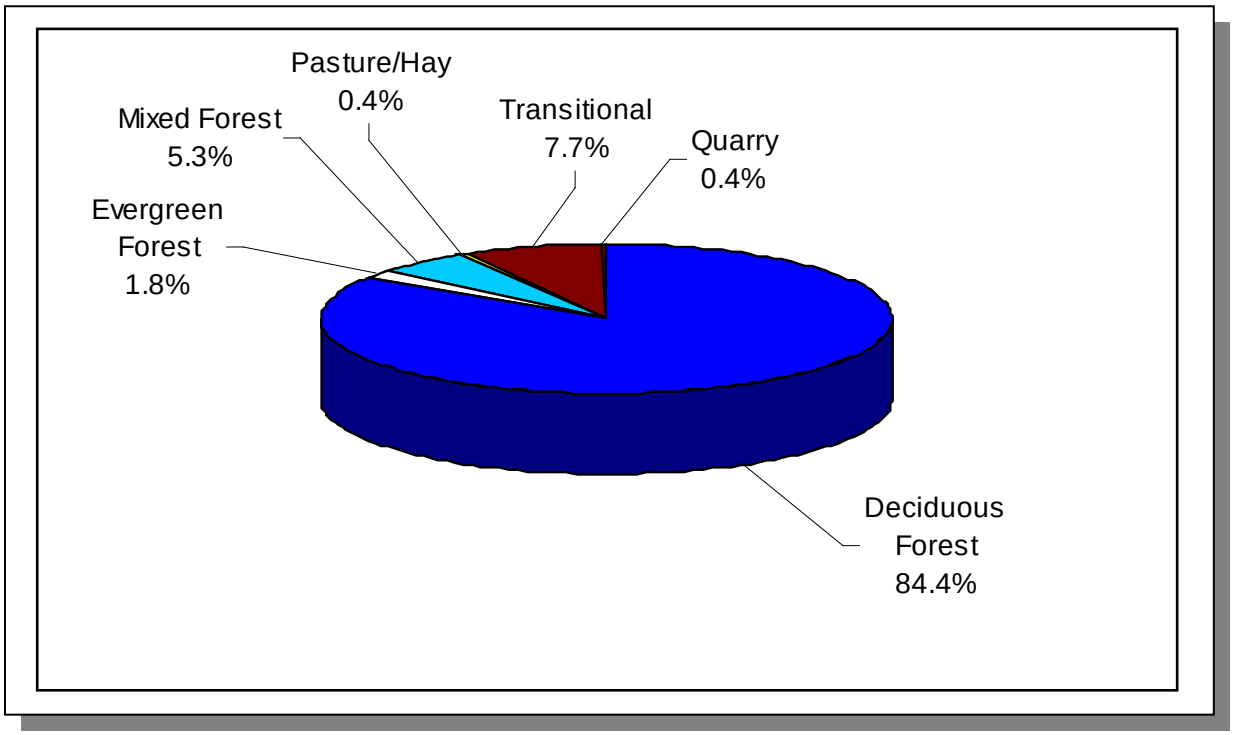

Figure 4-8. Land Use Distribution in Subwatershed 06020003070. *More information is provided in Ocoee-Appendix IV.*

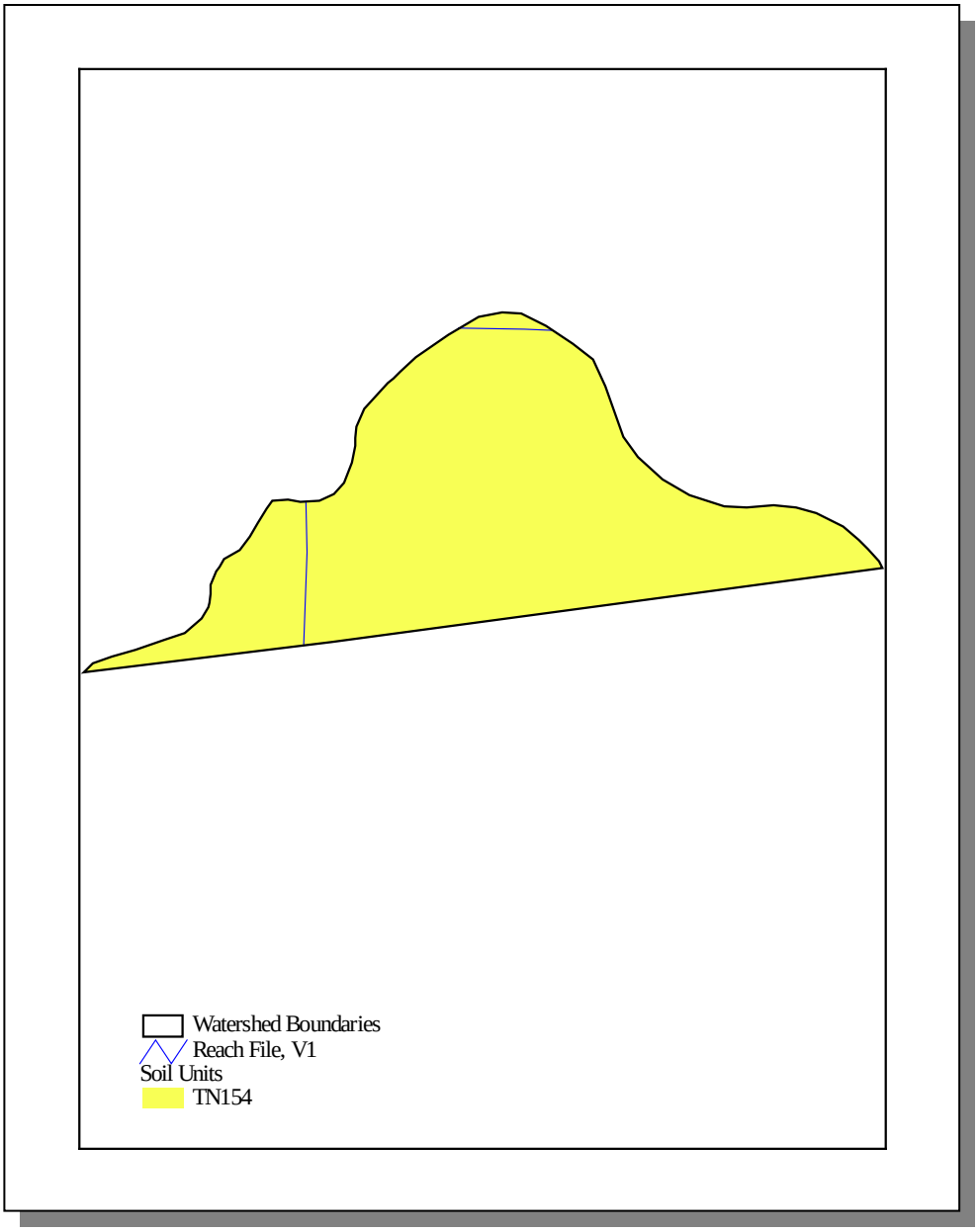

Figure 4-9. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003070.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN154	9.00	B	2.64	4.66	Loam	0.23

Table 4-8. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003070. *More information is provided in Ocoee-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Polk	13,643	14,666	0.01	2	2	0.0

Table 4-9. Population Estimates in Subwatershed 06020003070.

4.2.B.ii. Point Source Contributions.

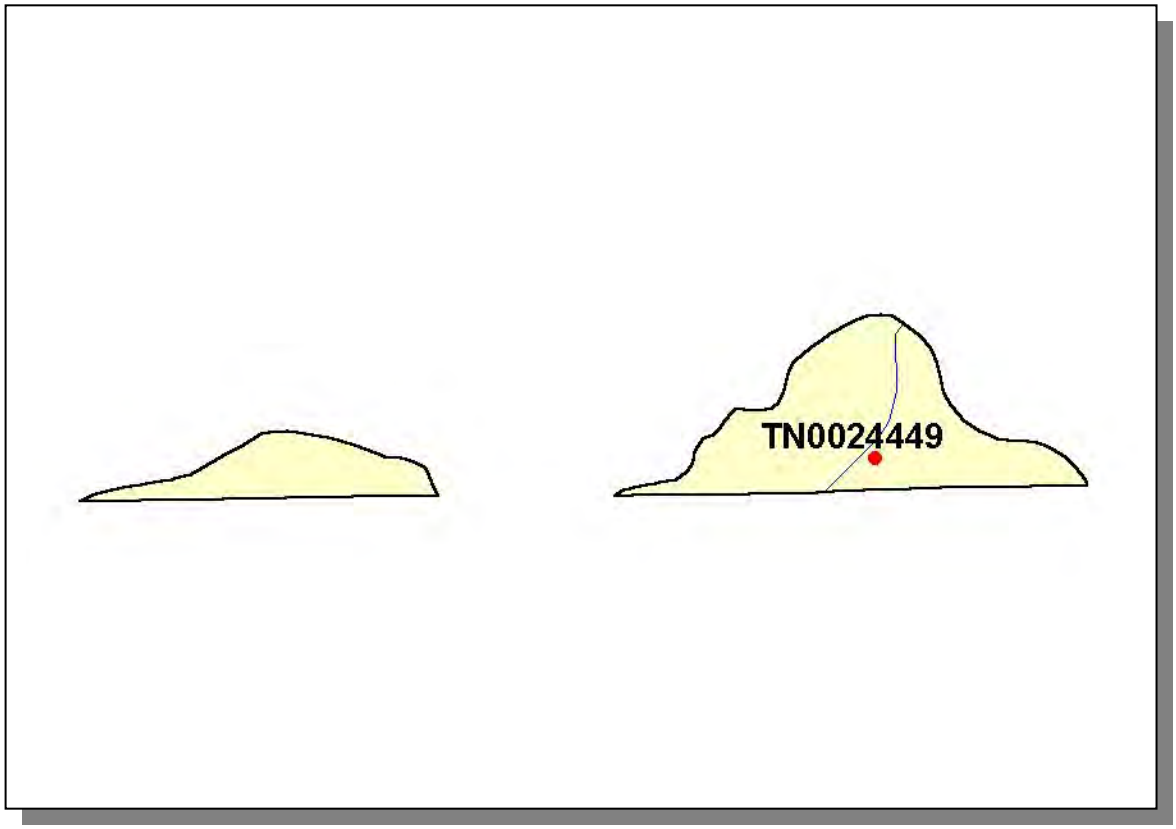

Figure 4-10. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06020003070. *More information, including the names of facilities, is provided in Ocoee-Appendix IV.*

4.2.B.ii.a. Dischargers to Waterbodies Listed on the 1998 303(d) List.

There is one NPDES facility discharging to water bodies listed on the 1998 303(d) list in Subwatershed 06020003070:

- TN0024449 discharges to Ocoee River @ RM 37.0

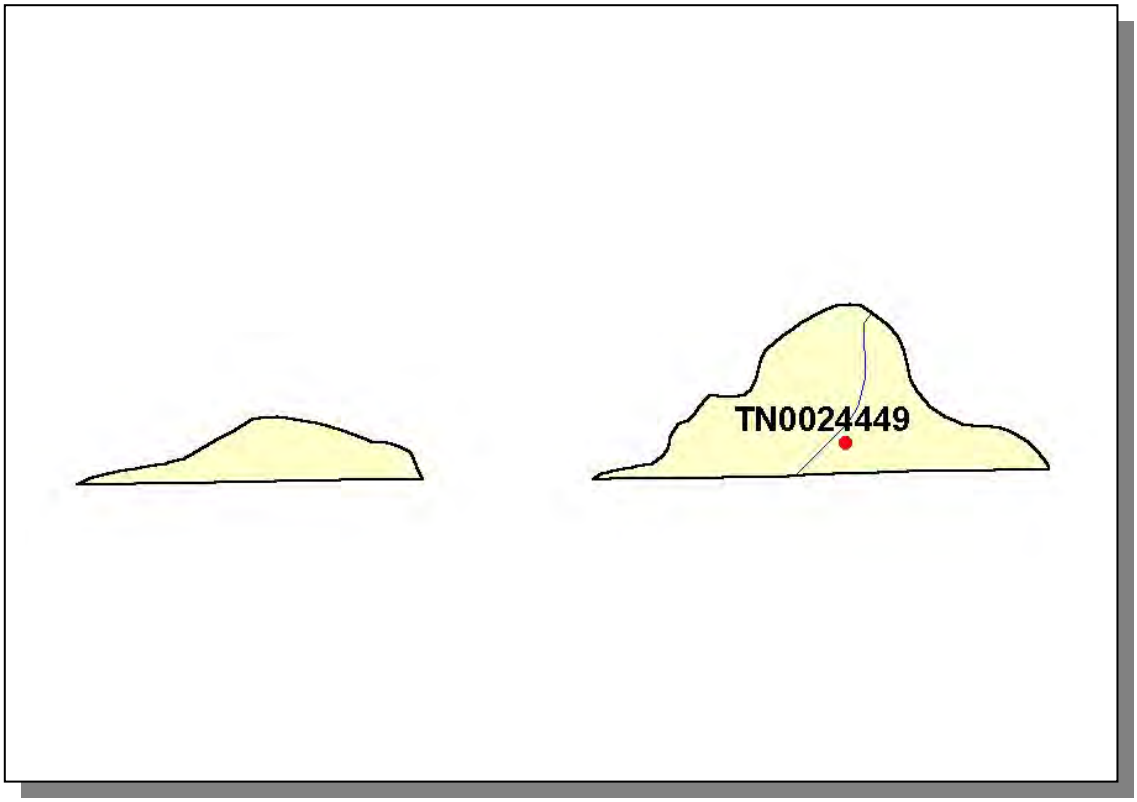

Figure 4-11. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 06020003070. *The names of facilities are provided in Ocoee-Appendix IV.*

PERMIT #	7Q10	1Q20	30Q2	QDESIGN	QLTA
TN0024449	110	77.6	447.0	0.7	0.308

Table 4-10. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003070. *Data are in million gallons per day (MGD). 30Q2 data were calculated using data in Flow Duration and Low Flows of Tennessee Streams Through 1992 .*

PERMIT #	$CBOD_5$	FECAL
TN0024449	X	X

Table 4-11. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003070.

PERMIT #	TSS	BOD	BYPASS
TN0024449	32	3	12

Table 4-12. Number of Permit Violations Based on DMR Data (01/1997-06/2000) for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003070.

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)
Chickens Sold
115

Table 4-13. Summary of Livestock Count Estimates in Subwatershed 06020003070.

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Polk	224.7	214.1	6.2	21.1

Table 4-14. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06020003070.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Soybeans (Row Crops)	2.33
Grass (Pastureland)	1.15
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.61
Grass, Forbs, Legumes (Mixed Pasture)	1.34
Forest Land (Grazed)	0.00
Fruit (Horticultural)	0.19
Corn (Row Crops)	6.43
Grass (Hayland)	0.22
Legume Grass (Hayland)	0.05
Other Cropland not Planted	2.93

Table 4-15. Annual Estimated Total Soil Loss in Subwatershed 06020003070.

4.2.C. 06020003100.

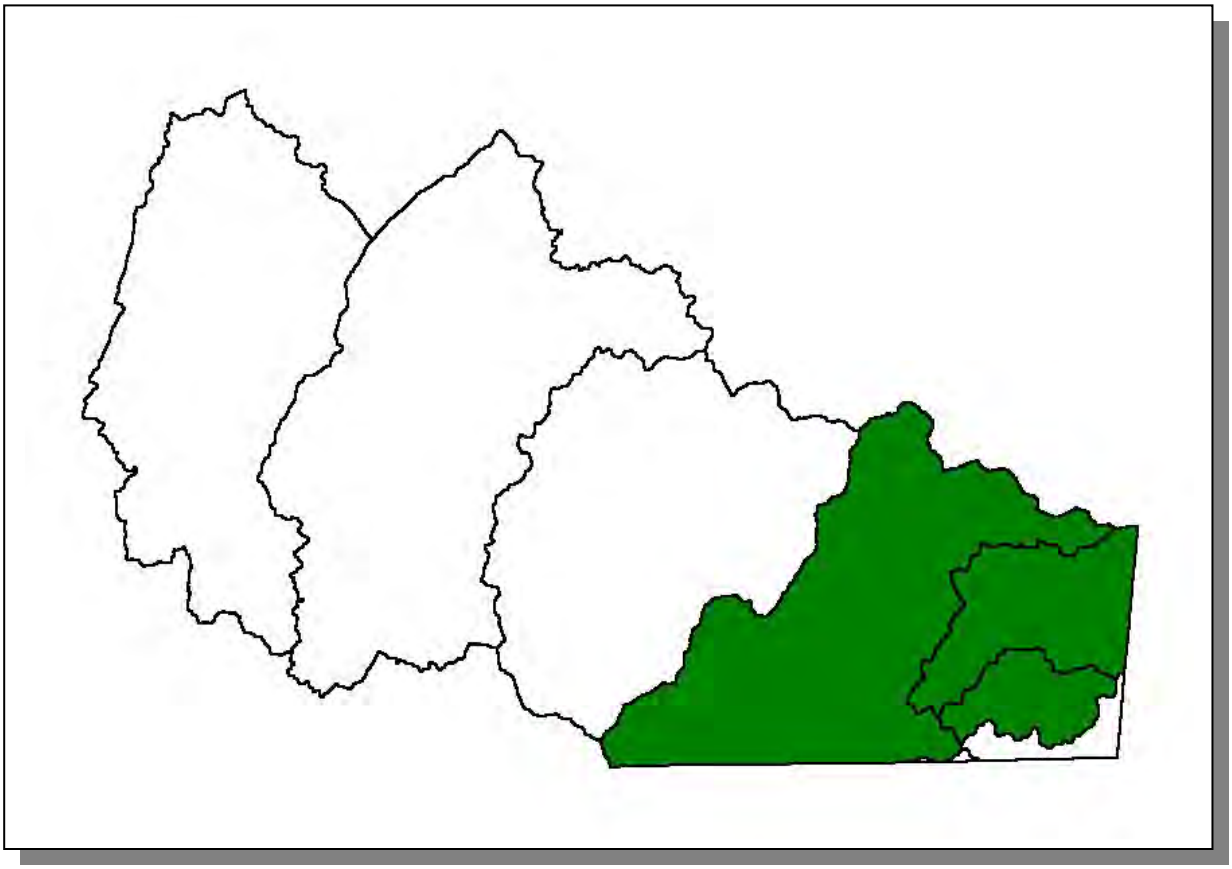

Figure 4-12. Location of Subwatershed 06020003100. *All Ocoee HUC-14 subwatershed boundaries are shown for reference.*

4.2.C.i. General Description.

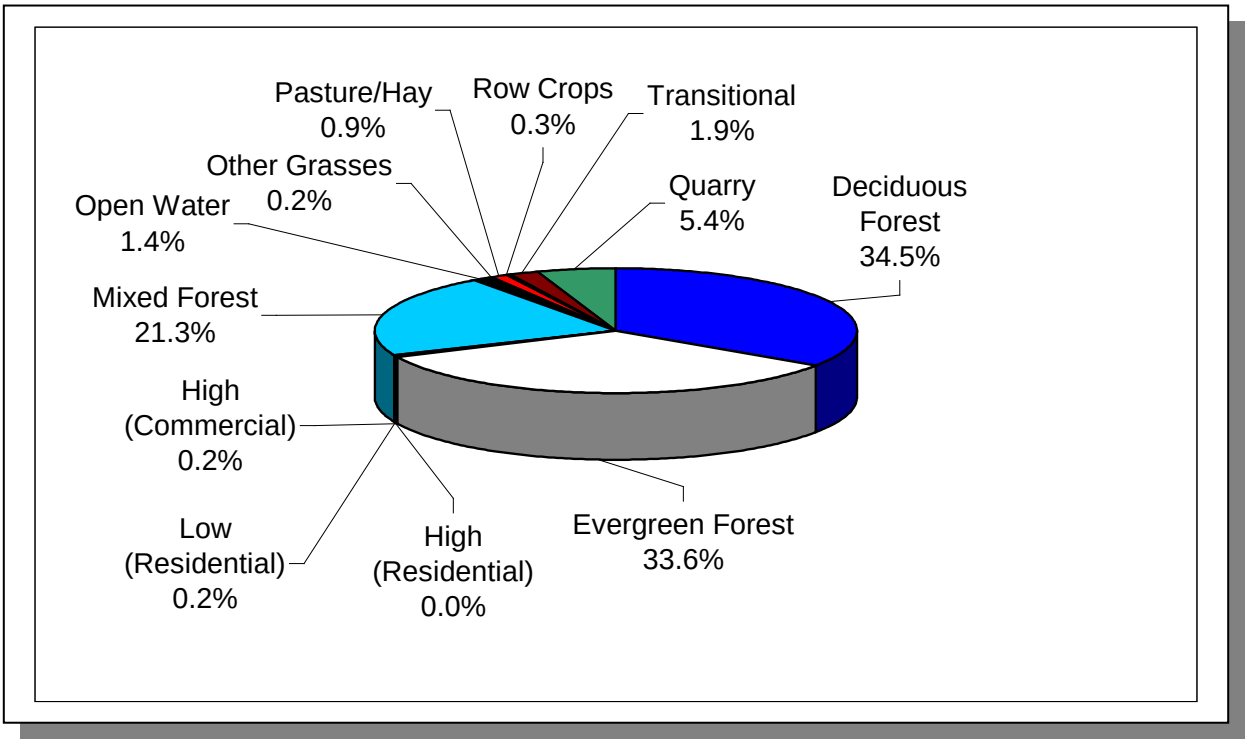

Figure 4-13. Land Use Distribution in Subwatershed 06020003100. *More information is provided in Ocoee-Appendix IV.*

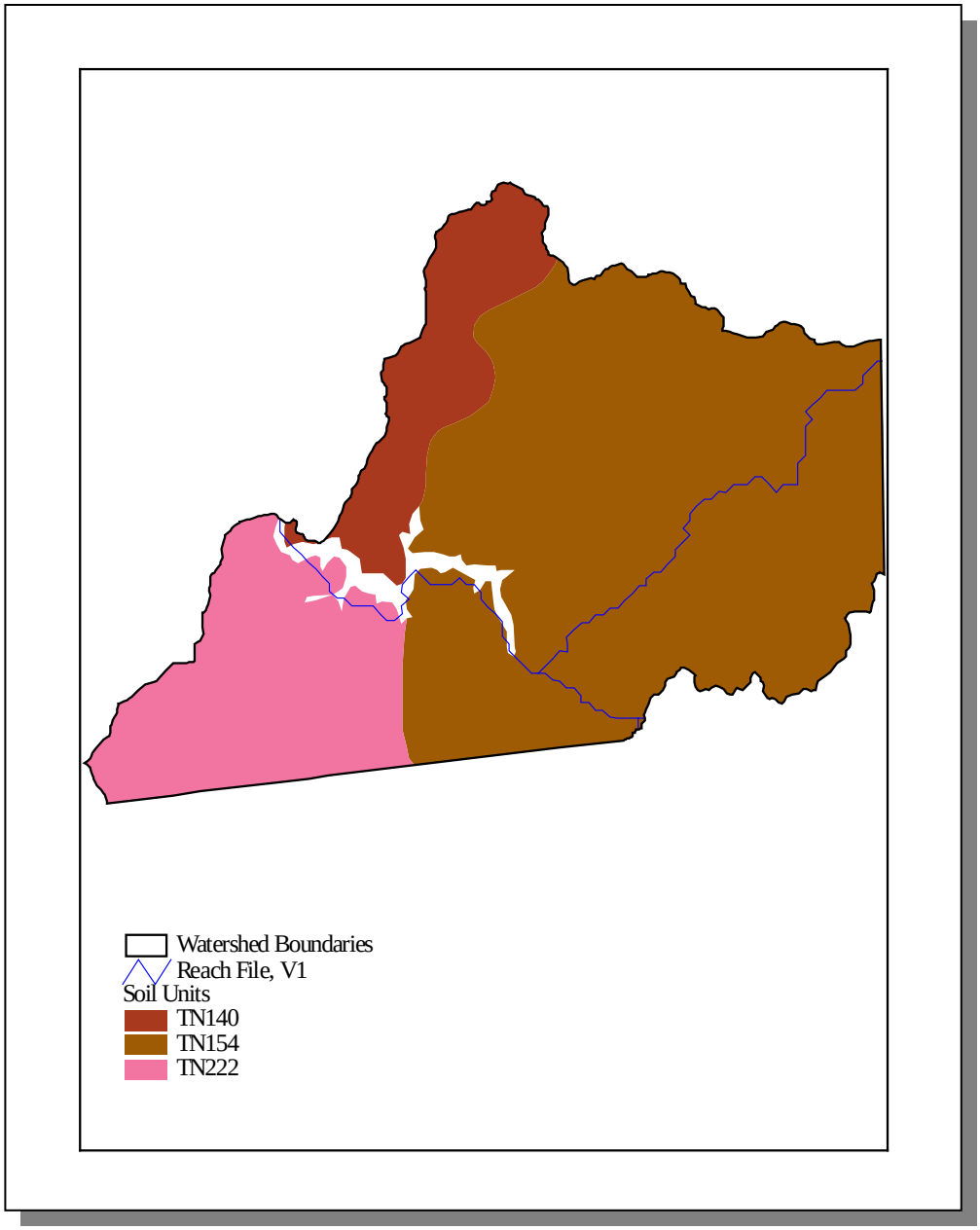

Figure 4-14. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003100.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN140	0.00	B	3.85	4.85	Sandy Loam	0.21
TN154	9.00	B	2.64	4.66	Loam	0.23
TN222	0.00	B	3.96	5.32	Sandy Loam	0.23

Table 4-16. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003100. *More information is provided in Ocoee-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Polk	13,643	14,666	12.18	1,662	1,787	7.5

Table 4-17. Population Estimates in Subwatershed 06020003100.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Copperhill	Polk	355	227	198	29	0
Ducktown	Polk	412	215	115	91	9
Totals		**767**	**442**	**313**	**120**	**9**

Table 4-18. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06020003100.

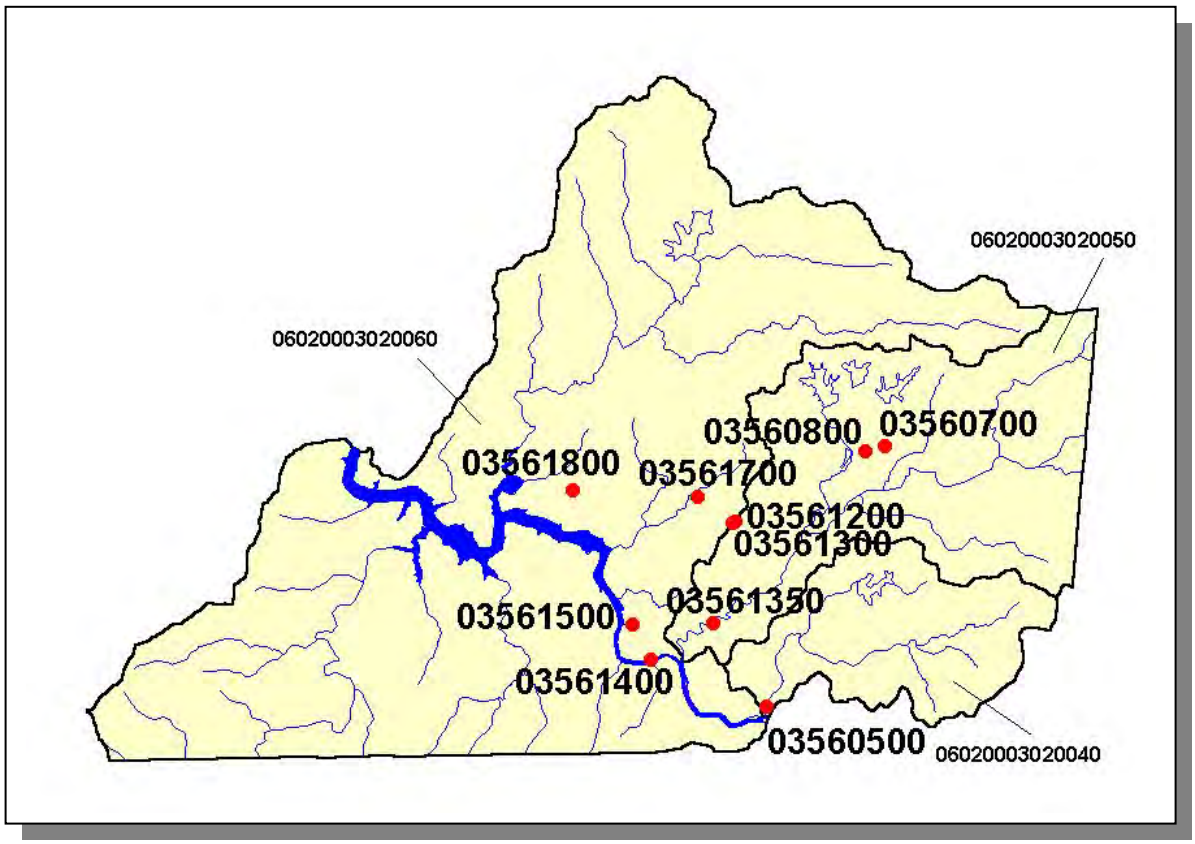

Figure 4-15. Location of Historical Streamflow Data Collection Sites in Subwatershed 06020003100. *Subwatershed 06020003020040, 06020003020050, and 06020003020060 boundaries are shown for reference. More information is provided in Ocoee-Appendix IV.*

4.2.C.ii. Point Source Contributions.

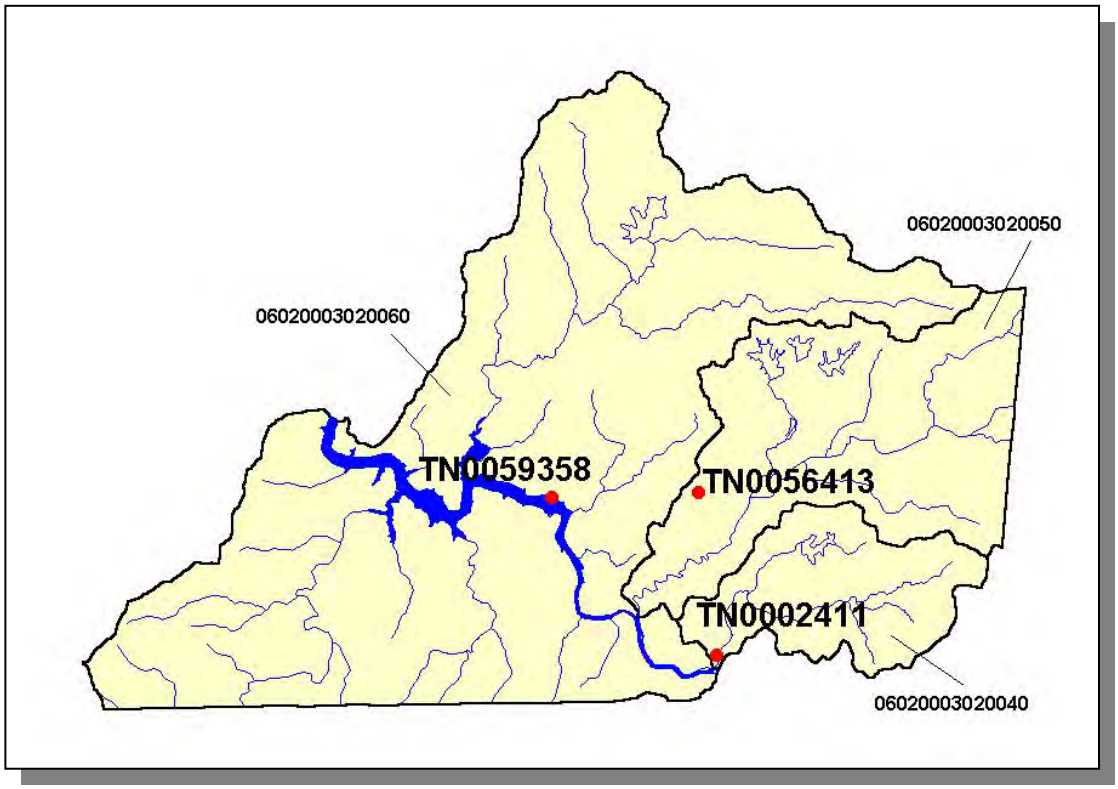

Figure 4-16. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06020003100. *Subwatershed 06020003020040, 06020003020050, and 06020003020060* boundaries are shown for reference. *More information, including the names of facilities, is provided in Ocoee-Appendix IV.*

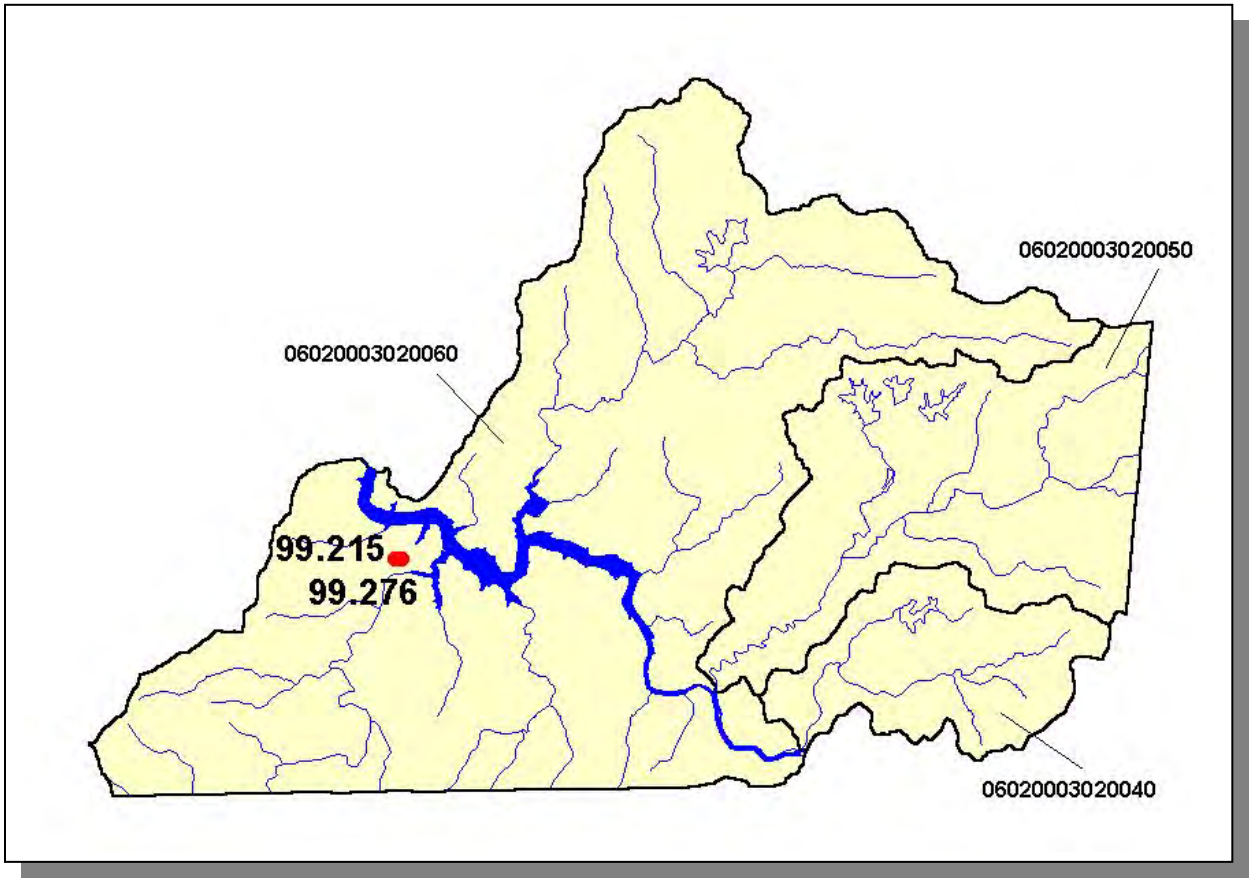

Figure 4-17. Location of ARAP Sites (Individual Permits) in Subwatershed 06020003100. *Subwatershed 06020003020040, 06020003020050, and 06020003020060 boundaries are shown for reference. More information is provided in Ocoee-Appendix IV.*

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

There are two NPDES facilities discharging to water bodies listed on the 1998 303(d) list in Subwatershed 06020003100:

- TN0056413 discharges to Mile 0.5 of a Wet Weather Conveyance to Central Mine Branch @ RM 0.5
- TN0002411 discharges to Ocoee River @ RM 37.1 and to Davis Mill Creek

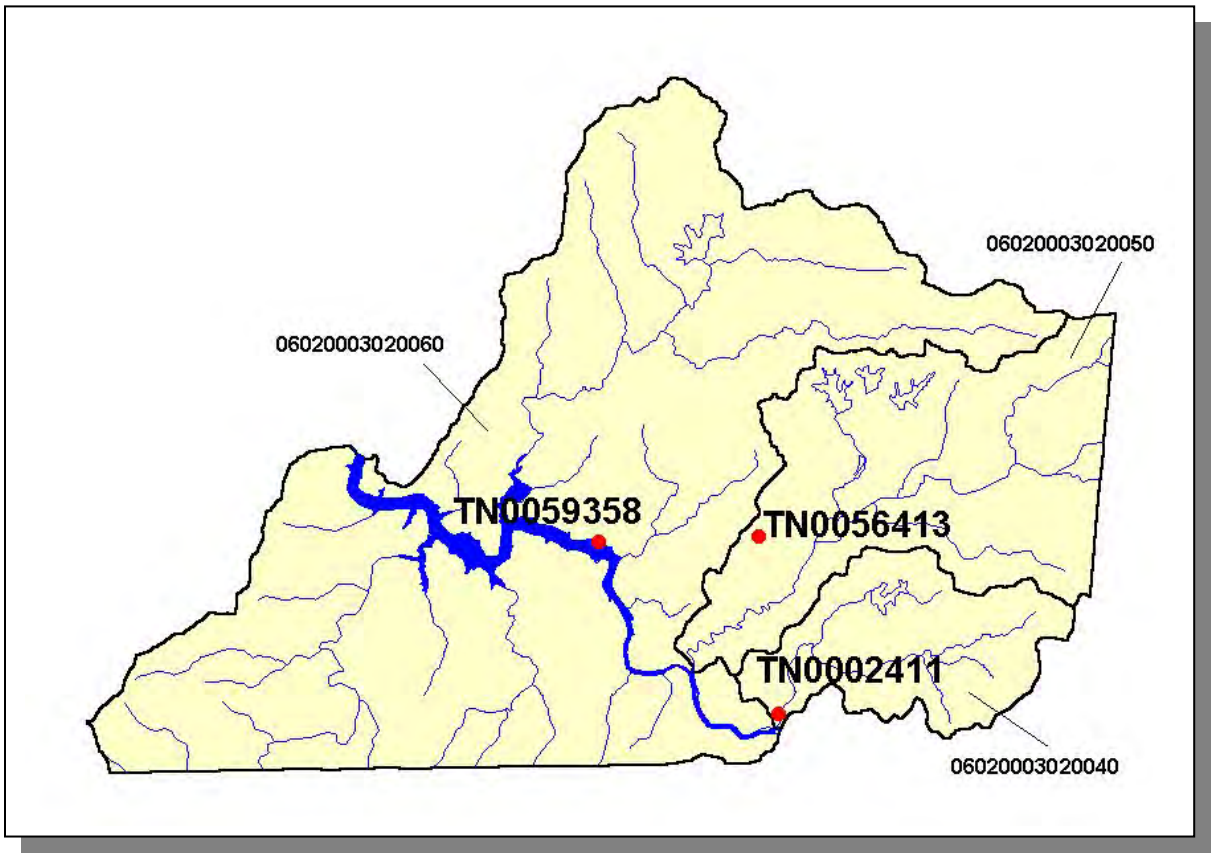

Figure 4-18. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 06020003100. *Subwatershed 06020003020040, 06020003020050, and 06020003020060 boundaries are shown for reference. The names of facilities are provided in Ocoee-Appendix IV.*

PERMIT #	7Q10	1Q20	30Q2	QDESIGN	QLTA
TN0002411	0	0	0		31.05
TN0056413	0	0	0	0.02	0.0052
TN0059358	71.0	0	0	0.14	

Table 4-19. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003100. *Data are in million gallons per day (MGD). 30Q2 data were calculated using data in Flow Duration and Low Flows of Tennessee Streams Through 1992 .*

PERMIT #	$CBOD_5$	FECAL	NH_3	PH	TSS	COD
TN0002411				X	X	X
TN0056413	X	X	X	X	X	
TN0059358	X	X				

Table 4-20a. Inorganic Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003100.

PERMIT #	DIMETHYLANALINE	SURFACTANTS	OIL and GREASE
TN0002411	X	X	X

Table 4-20b. Organic Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003100.

PERMIT #	Cu	Zn	Cr	Pb	Fe	Ni
TN0002411	X	X	X	X	X	X

Table 4-21. Parameters Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003100.

PERMIT #	Cu	Zn	Fe	pH	SS	SETTLEABLE SOLIDS	Fecal	CBOD
TN0002411	34	6	1	80				
TN0059358				24	16	1	16	1

Table 4-22. Number of Permit Violations Based on DMR Data (04/1993-12/1999) for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003100.

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)				
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Chickens Sold**
43	163	43	38	151,032

Table 4-23. Summary of Livestock Count Estimates in Subwatershed 06020003100. *According to the 1997 Census of Agriculture, "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

	INVENTORY		REMOVAL RATE	
County	**Forest Land (thousand acres)**	**Timber Land (thousand acres)**	**Growing Stock (million cubic feet)**	**Sawtimber (million board feet)**
Polk	224.7	214.1	6.2	21.1

Table 4-24. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06020003100.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Soybeans (Row Crops)	2.33
Grass (Pastureland)	1.15
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.61
Grass, Forbs, Legumes (Mixed Pasture)	1.34
Forest Land (Grazed)	0.00
Fruit (Horticultural)	0.19
Corn (Row Crops)	6.43
Grass (Hayland)	0.22
Legume Grass (Hayland)	0.05
Other Cropland not Planted	2.93

Table 4-25. Annual Estimated Total Soil Loss in Subwatershed 06020003100.

4.2.D. 06020003110.

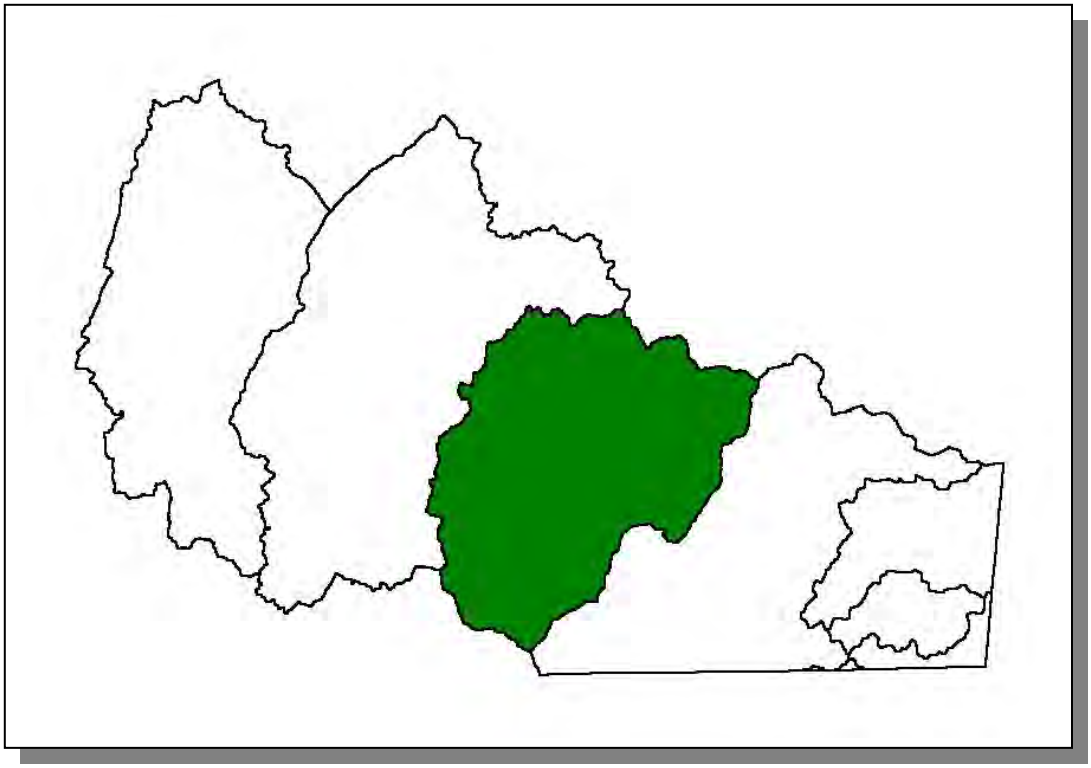

Figure 4-19. Location of Subwatershed 06020003110. *All Ocoee HUC-14 subwatershed boundaries are shown for reference.*

4.2.D.i. General Description.

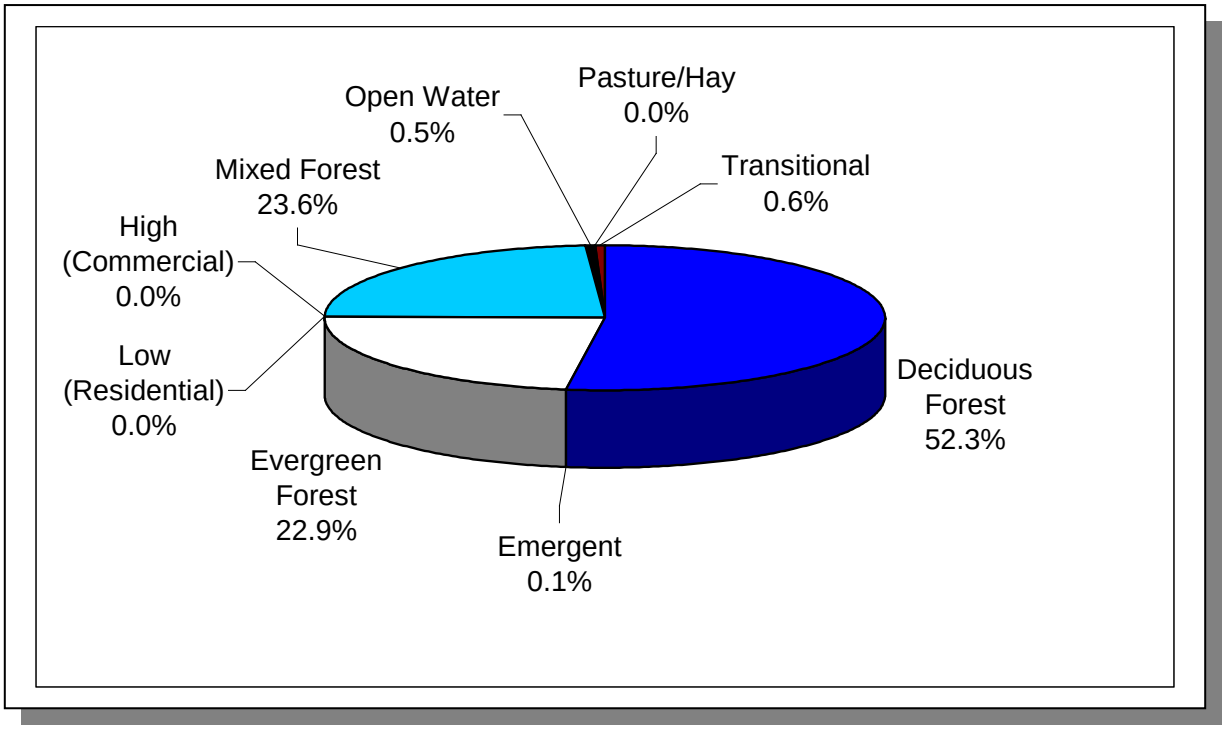

Figure 4-20. Land Use Distribution in Subwatershed 06020003110. *More information is provided in Ocoee-Appendix IV.*

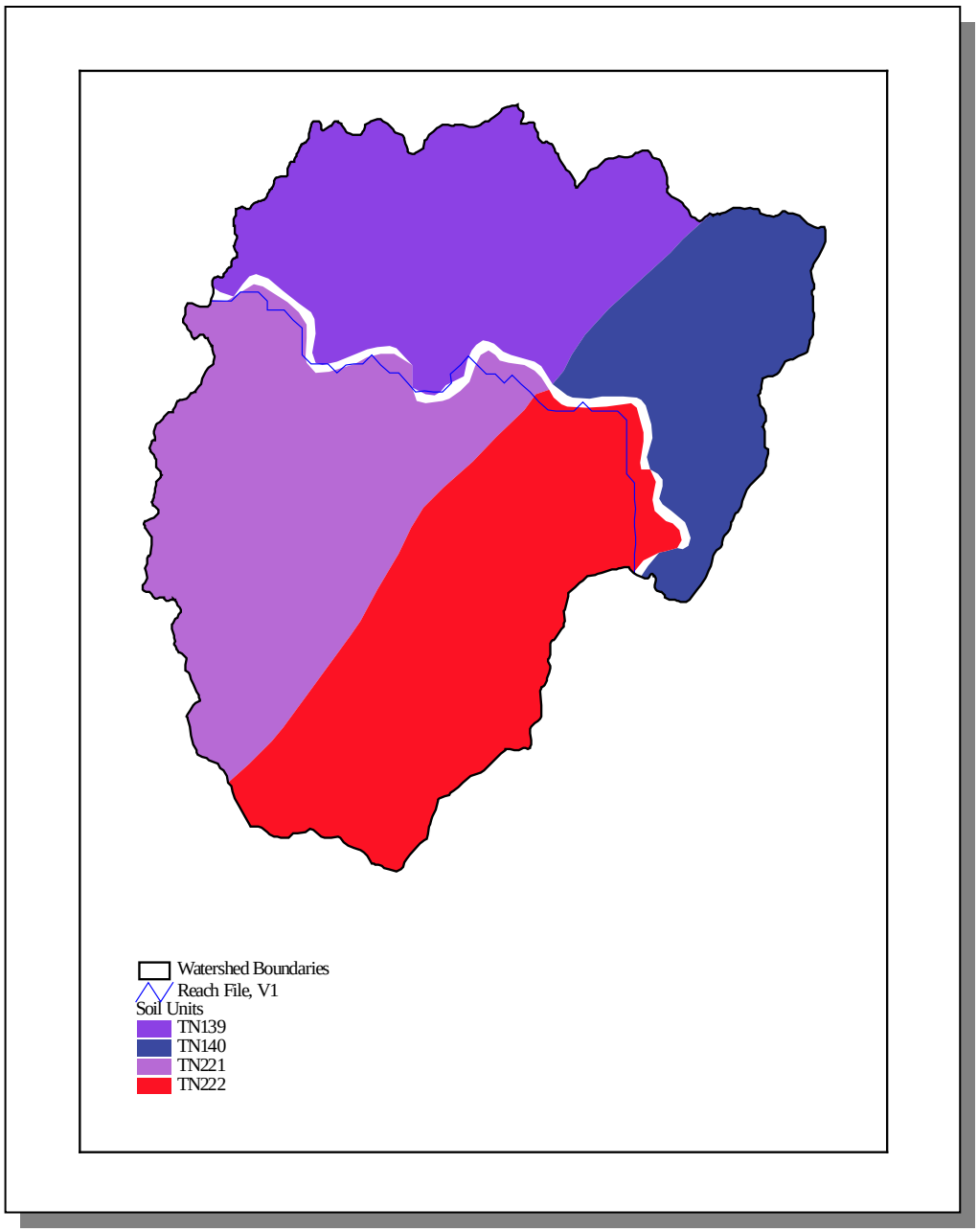

Figure 4-21. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003110.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN139	0.00	C	11.84	4.82	Loam	0.20
TN140	0.00	B	3.85	4.85	Sandy Loam	0.21
TN221	0.00	B	3.60	5.33	Sandy Loam	0.24
TN222	0.00	B	3.96	5.32	Sandy Loam	0.23

Table 4-26. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003110. *More information is provided in Ocoee-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Polk	13,643	14,666	10.0	1,365	1,467	7.5

Table 4-27. Population estimates in Subwatershed 06020003110.

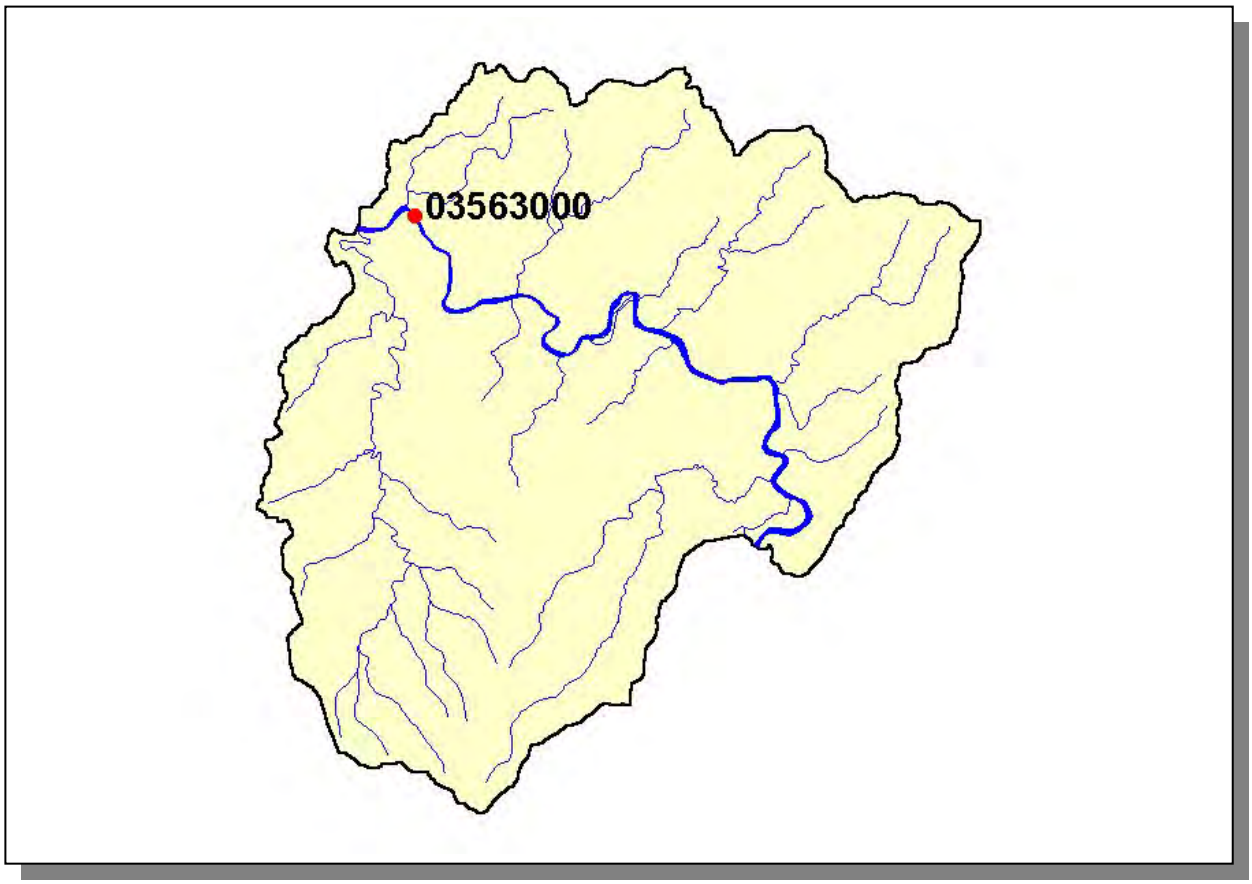

Figure 4-22. Location of Historical Streamflow Data Collection Sites in Subwatershed 06020003110. *More information is provided in Ocoee-Appendix IV.*

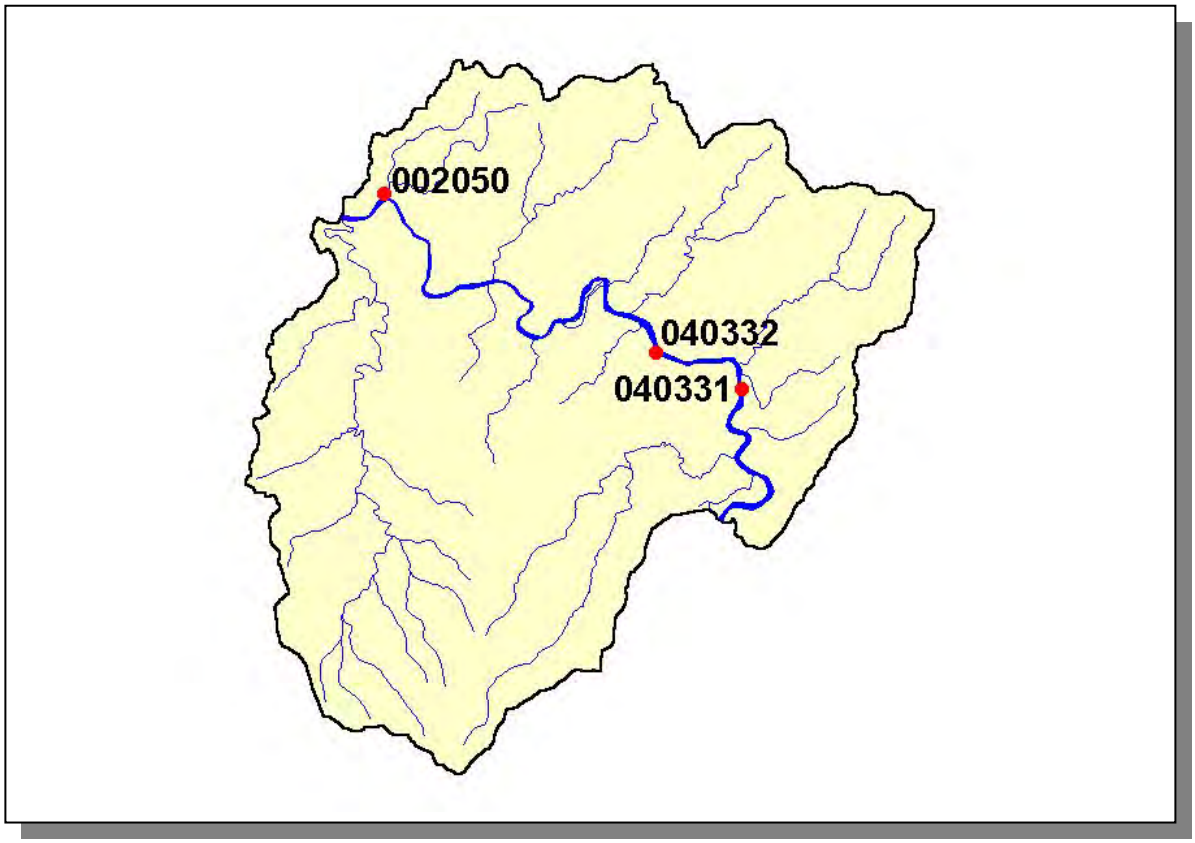

Figure 4-23. Location of STORET Monitoring Sites in Subwatershed 06020003110. *More information is provided in Ocoee-Appendix IV.*

4.2.D.ii. Point Source Contributions.

Figure 4-24. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06020003110. *More information, including the names of facilities, is provided in Ocoee-Appendix IV.*

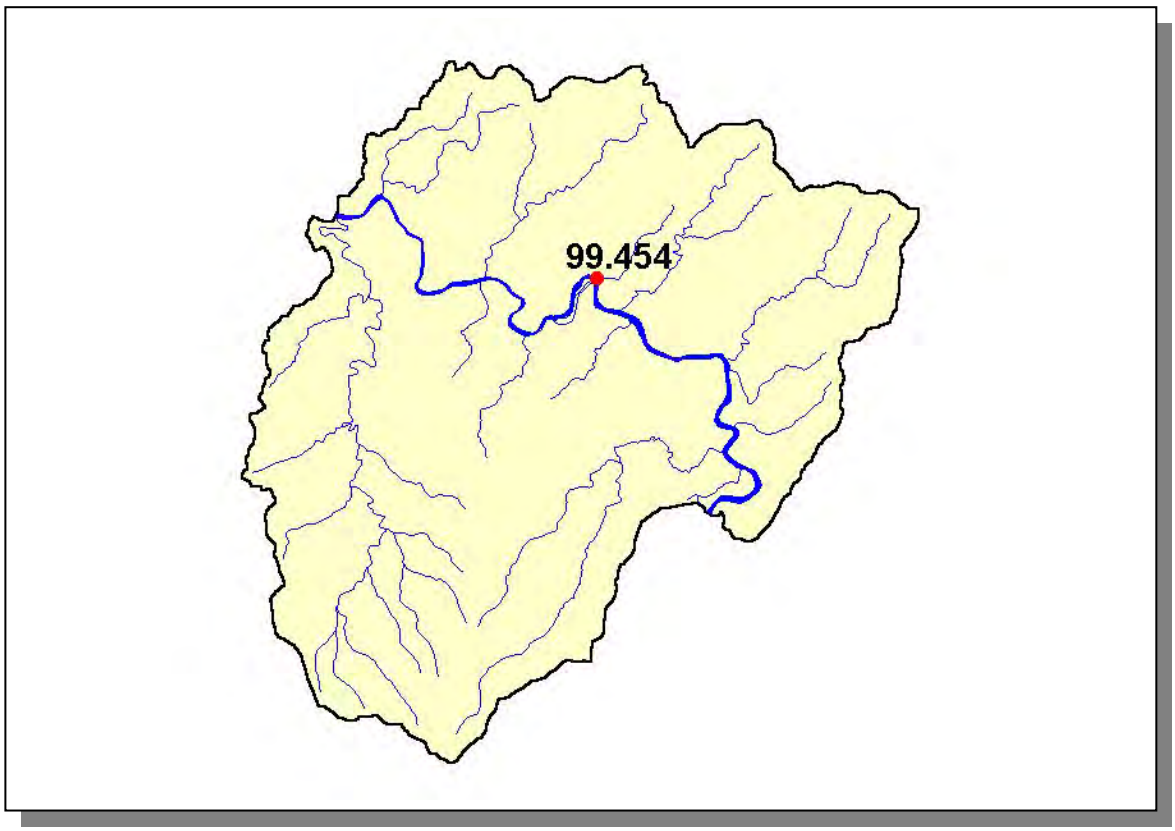

Figure 4-25. Location of ARAP Sites (Individual Permits) in Subwatershed 06020003110. *More information is provided in Ocoee-Appendix IV.*

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

There are two NPDES facilities discharging to water bodies listed on the 1998 303(d) list in Subwatershed 06020003110:

- TN0027502 discharges to Ocoee River @ RM 19.7
- TN0005479 discharges to Ocoee River @ RM 25.1

Figure 4-26. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 06020003110. *The names of facilities are provided in Ocoee-Appendix IV.*

PERMIT #	7Q10	1Q20	30Q2	QLTA
TN0005479	0	0	0	0.766
TN0027502	0	0	0	0.15

Table 4-28. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003110. *Data are in million gallons per day (MGD). 30Q2 data were calculated using data in Flow Duration and Low Flows of Tennessee Streams Through 1992 .*

PERMIT #	METAL
TN0005479	X
TN0027502	X

Table 4-29. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003110.

PERMIT #	PCB
TN0005479	X

Table 4-30. Parameters Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003110.

4.2.D.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)
Chickens Sold
229

Table 4-31. Summary of Livestock Count Estimates in Subwatershed 06020003110.

	INVENTORY		REMOVAL RATE	
County	**Forest Land (thousand acres)**	**Timber Land (thousand acres)**	**Growing Stock (million cubic feet)**	**Sawtimber (million board feet)**
Polk	224.7	214.1	6.2	21.1

Table 4-32. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06020003110.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Soybeans (Row Crops)	2.33
Grass (Pastureland)	1.15
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.61
Grass, Forbs, Legumes (Mixed Pasture)	1.34
Forest Land (Grazed)	0.00
Fruit (Horticultural)	0.19
Corn (Row Crops)	6.43
Grass (Hayland)	0.22
Legume Grass (Hayland)	0.05
Other Cropland not Planted	2.93

Table 4-33. Annual Soil Loss in Subwatershed 06020003110.

4.2.E. 06020003120.

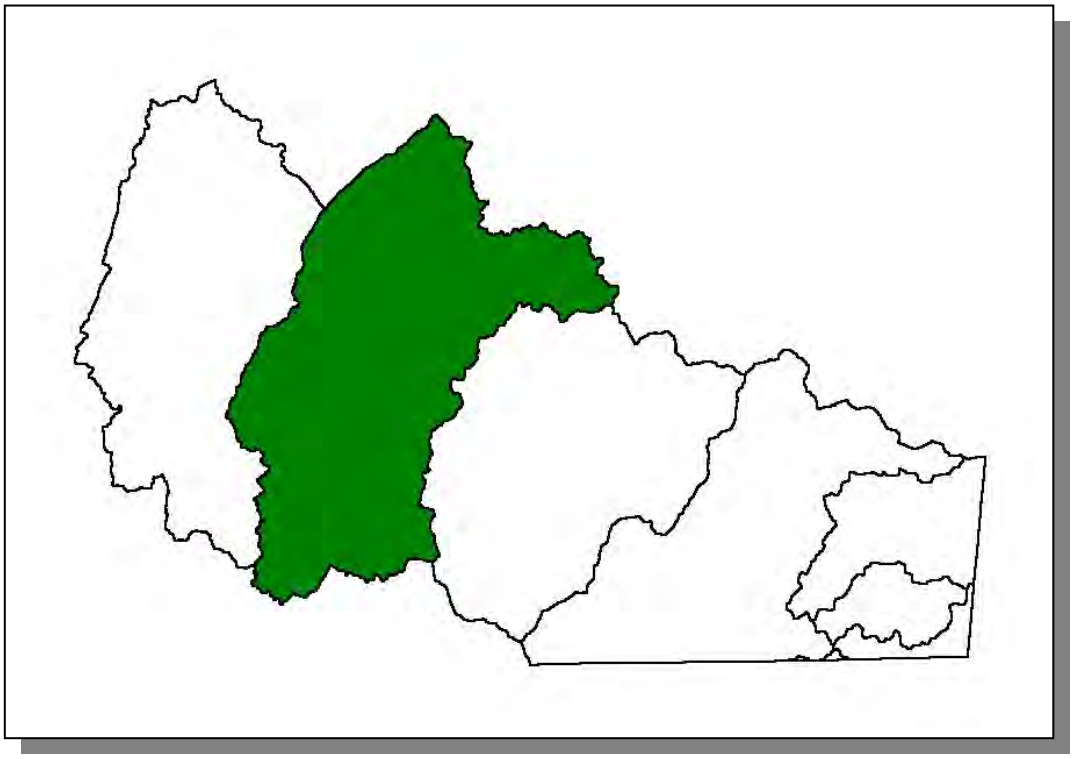

Figure 4-27. Location of Subwatershed 06020003120. *All Ocoee HUC-14 subwatershed boundaries are shown for reference.*

4.2.E.i. General Description.

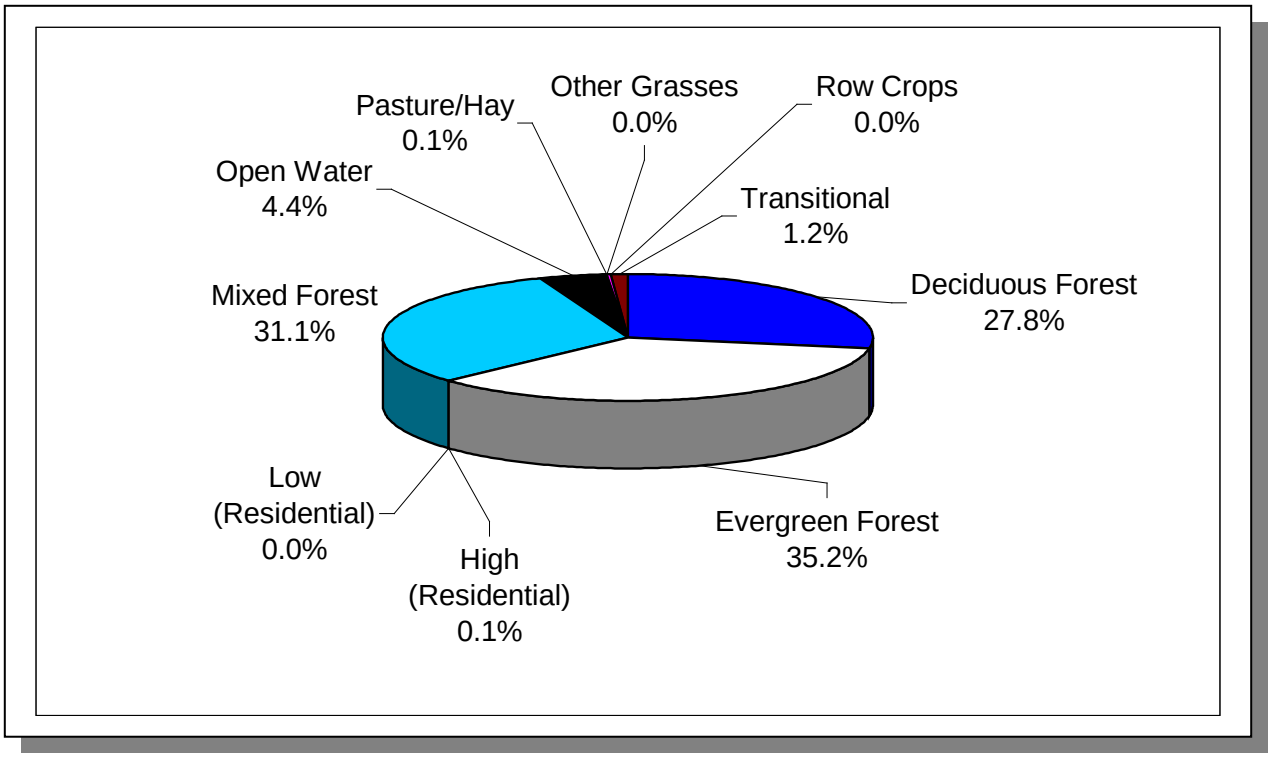

Figure 4-28. Land Use Distribution in Subwatershed 06020003120. *More information is provided in Ocoee-Appendix IV.*

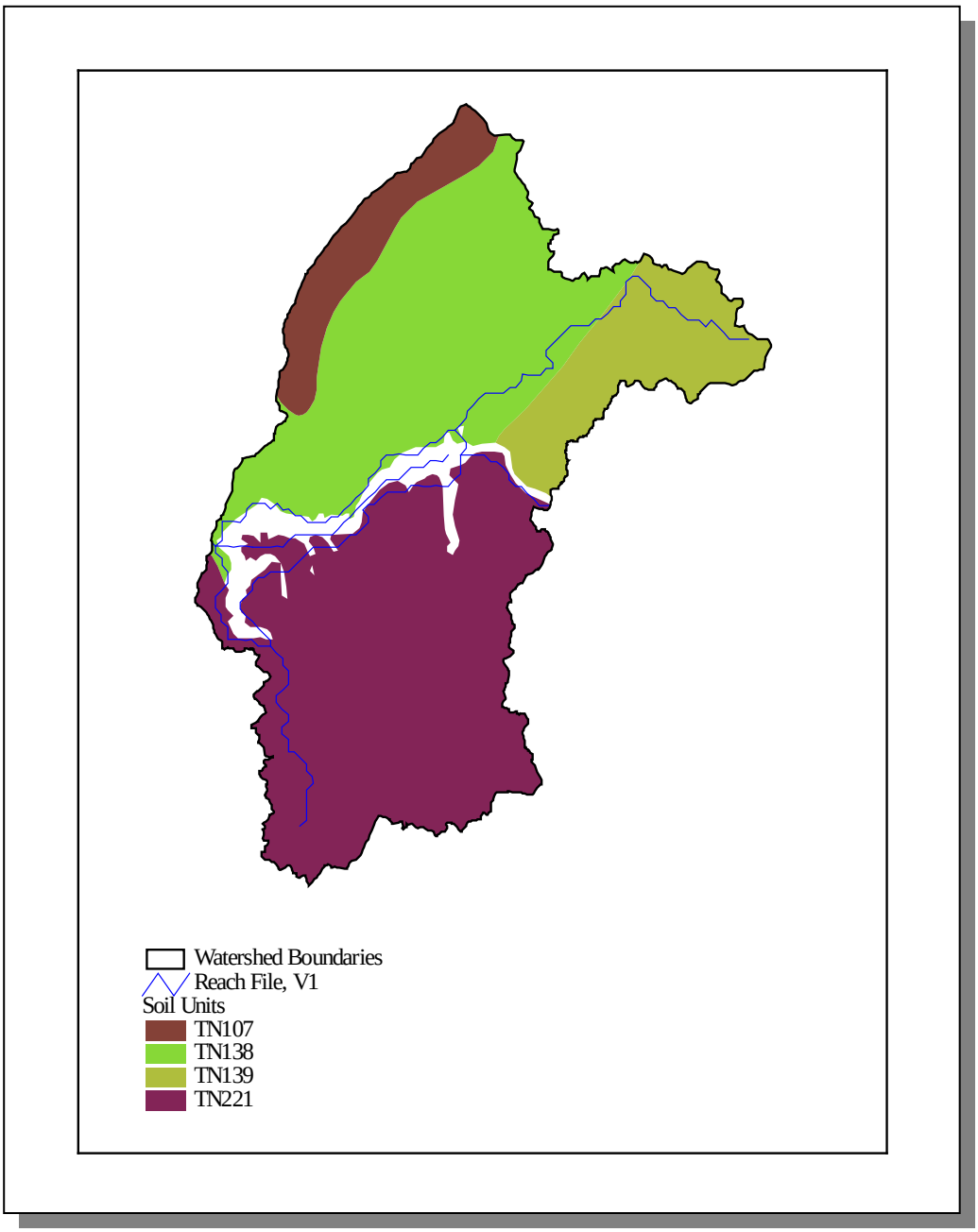

Figure 4-29. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003120.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hr)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN107	1.00	C	6.34	4.84	Loam	0.28
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN139	0.00	C	11.84	4.82	Loam	0.20
TN221	0.00	B	3.60	5.33	Sandy Loam	0.0.24

Table 4-34. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003120. *More information is provided in Ocoee-Appendix IV.*

	COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		% CHANGE
County	1990	1997 Est.	Portion of Watershed (%)	1990	1997	
Polk	13,643	14,666	13.07	1,783	1,917	7.5

Table 4-35. Population Estimates in Subwatershed 06020003120.

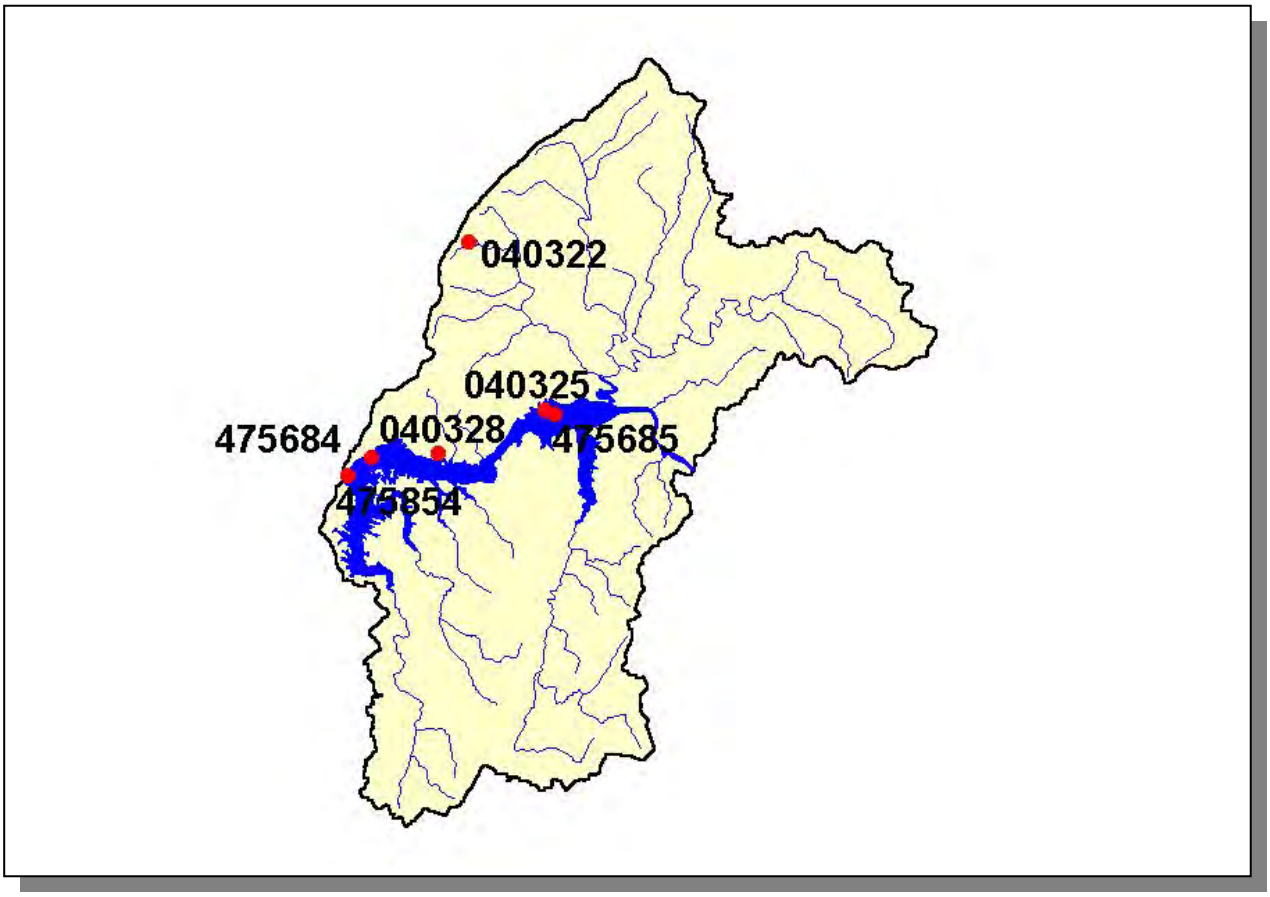

Figure 4-30. Location of STORET Monitoring Sites in Subwatershed 06020003120. *More information is provided in Ocoee-Appendix IV.*

4.2.E.ii. Point Source Contributions.

No Contributions.

4.2.E.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)			
Beef Cow	**Cattle**	**Milk Cow**	**Chickens Sold**
<5	17	<5	15,806

Table 4-36. Summary of Livestock Count Estimates in Subwatershed 06020003120. *According to the 1997 Census of Agriculture, "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

	INVENTORY		REMOVAL RATE	
County	**Forest Land (thousand acres)**	**Timber Land (thousand acres)**	**Growing Stock (million cubic feet)**	**Sawtimber (million board feet)**
Polk	224.7	214.1	6.2	21.1

Table 4-37. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 06020003120.

CROPS	TONS/ACRE/YEAR
Non Agricultural Land Use	0.00
Soybeans (Row Crops)	2.33
Grass (Pastureland)	1.15
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.61
Grass, Forbs, Legumes (Mixed Pasture)	1.34
Forest Land (Grazed)	0.00
Fruit (Horticultural)	0.19
Corn (Row Crops)	6.43
Grass (Hayland)	0.22
Legume Grass (Hayland)	0.05
Other Cropland not Planted	2.93

Table 4-38. Annual Estimated Soil Loss in Subwatershed 06020003120.

4.2.F. 06020003130

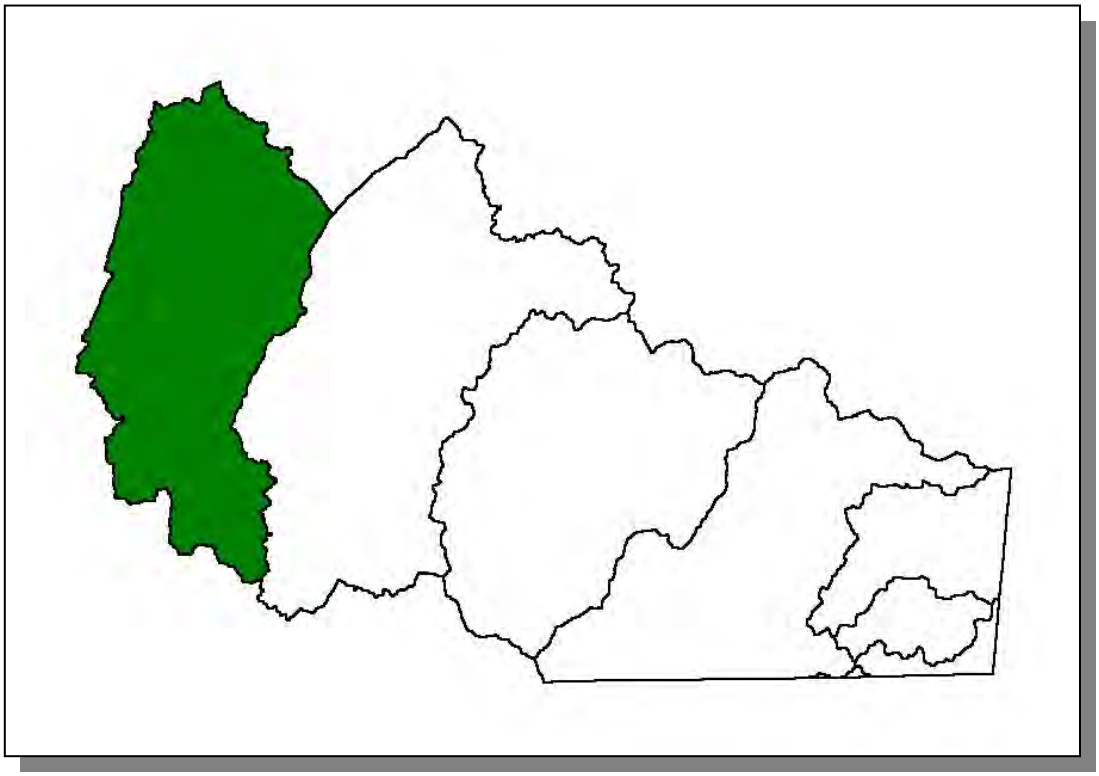

Figure 4-31. Location of Subwatershed 06020003130. *All Ocoee HUC-14 subwatershed boundaries are shown for reference.*

4.2.F.i. General Description.

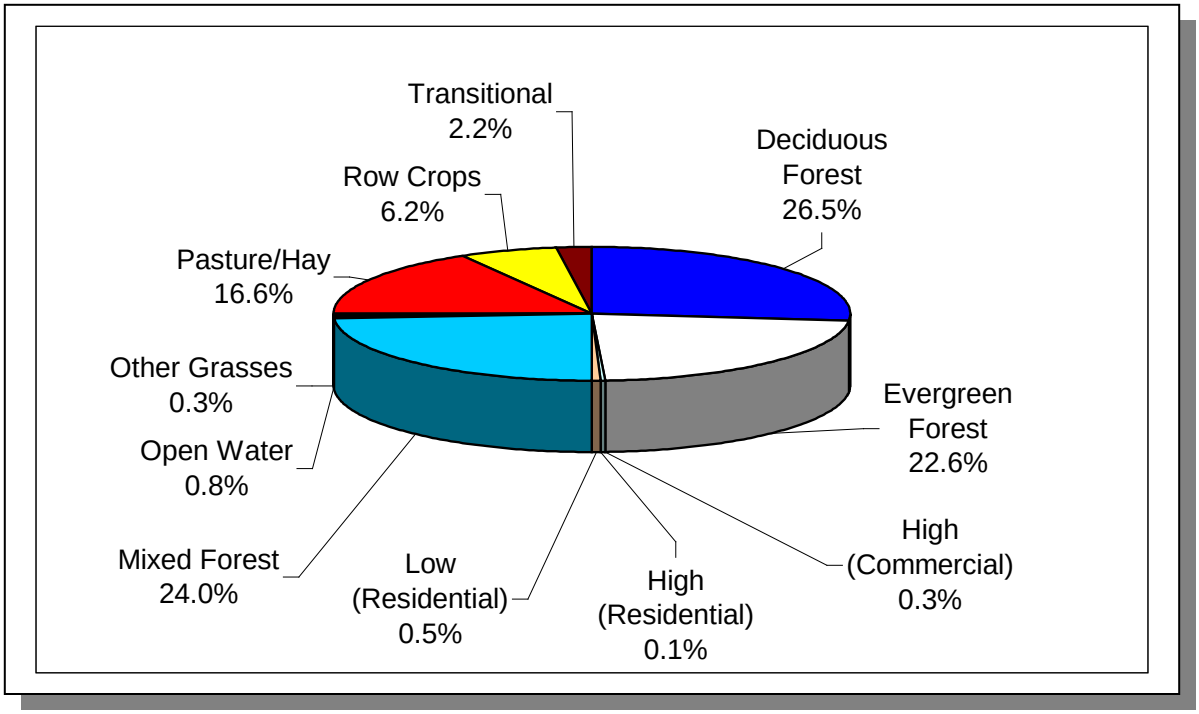

Figure 4-32. Land Use Distribution in Subwatershed 06020003130. *More information is provided in Ocoee-Appendix IV.*

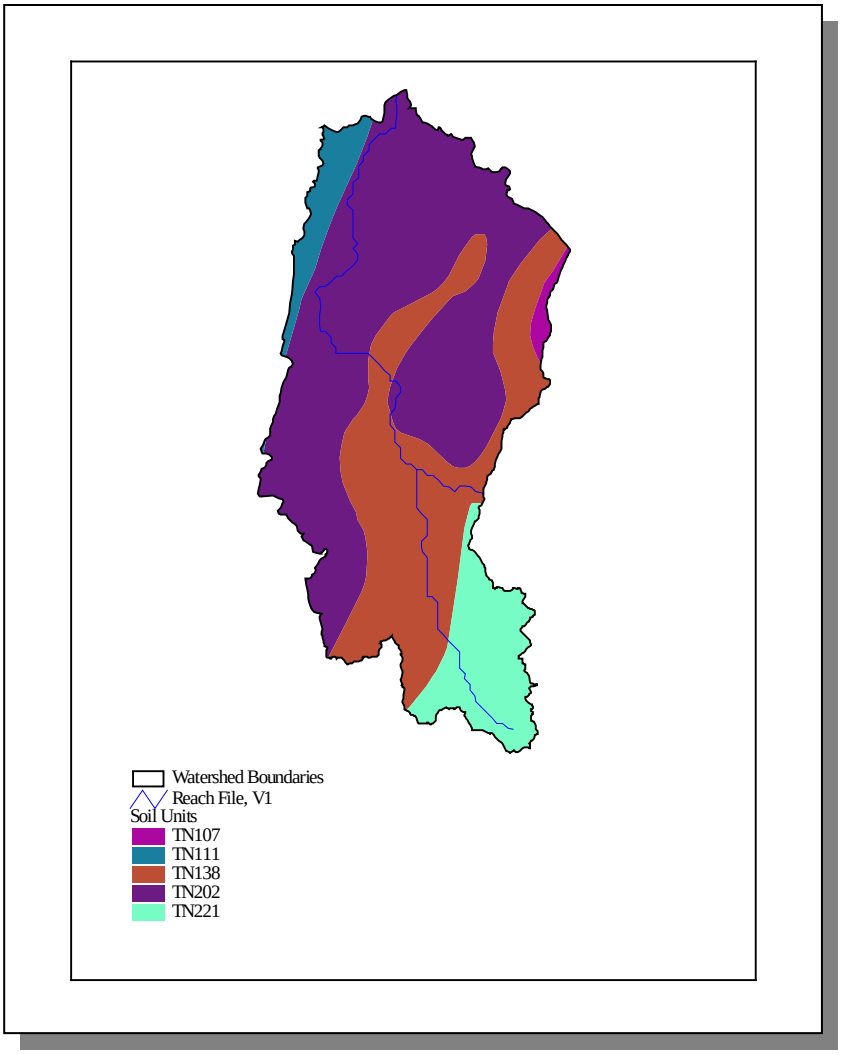

Figure 4-33. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003130.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hr)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN107	1.00	C	6.34	4.84	Loam	0.28
TN111	0.00	C	1.41	5.10	Loam	0.34
TN138	0.00	C	2.48	4.26	Sandy Loam	0.22
TN202	0.00	B	1.30	5.00	Loam	0.33
TN221	0.00	B	3.60	5.33	Sandy Loam	0.24

Table 4-39. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 06020003130. *More information is provided in Ocoee-Appendix IV.*

	TOTAL COUNTY POPULATION			ESTIMATED POPULATION IN WATERSHED		PERCENT CHANGE
County	**1990**	**1997 Est.**	**Portion of Watershed (%)**	**1990**	**1997**	
Bradley	73,712	80,800	0.09	69	76	10.1
Polk	13,643	14,666	10.07	1,374	1,477	7.5
Totals	**87,355**	**95,466**		**1,443**	**1,553**	**7.6**

Table 4-40. Population Estimates in Subwatershed 06020003130.

			NUMBER OF HOUSING UNITS			
Populated Place	**County**	**Population**	**Total**	**Public Sewer**	**Septic Tank**	**Other**
Benton	Polk	992	397	21	372	4

Table 4-41. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 06020003130.

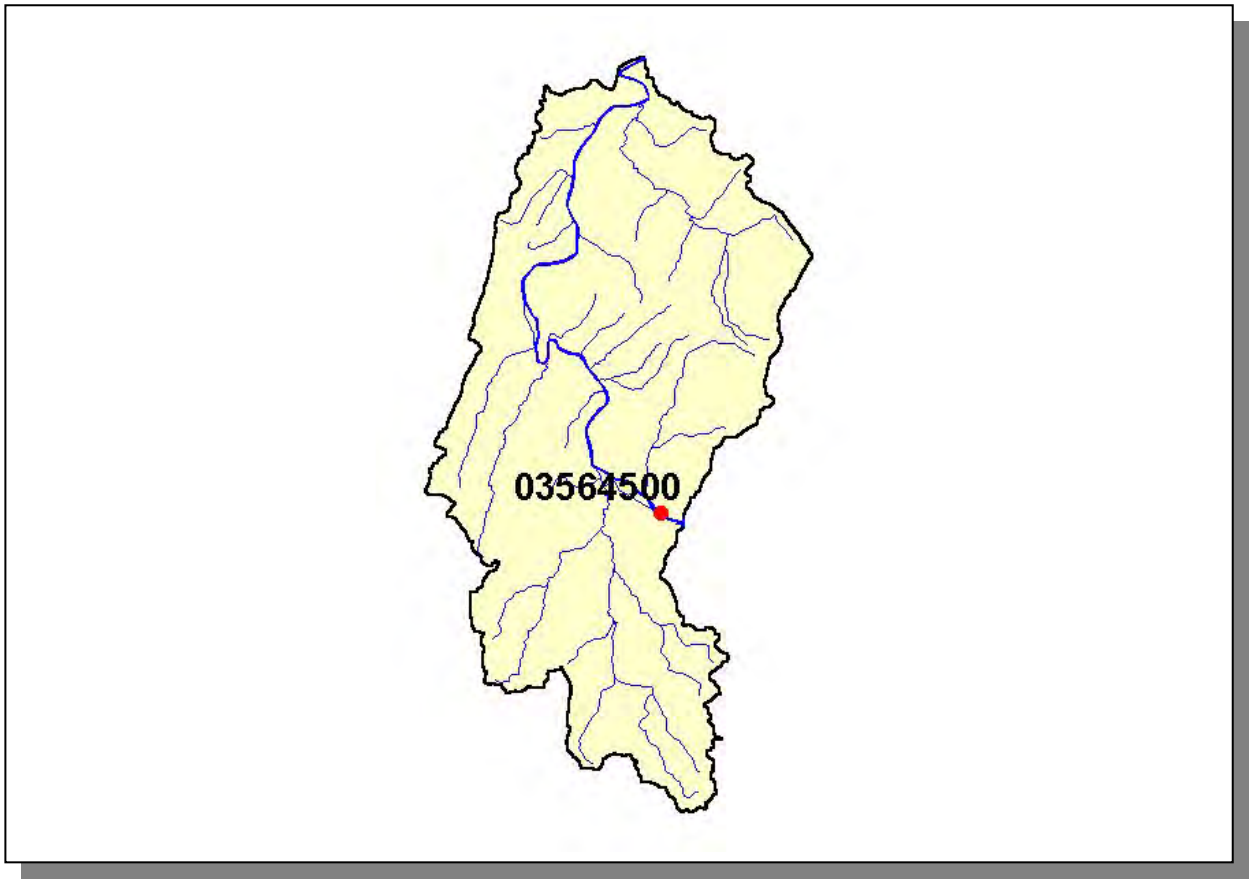

Figure 4-34. Location of Historical Streamflow Data Collection Sites in Subwatershed 06020003130. *More information is provided in Ocoee-Appendix IV.*

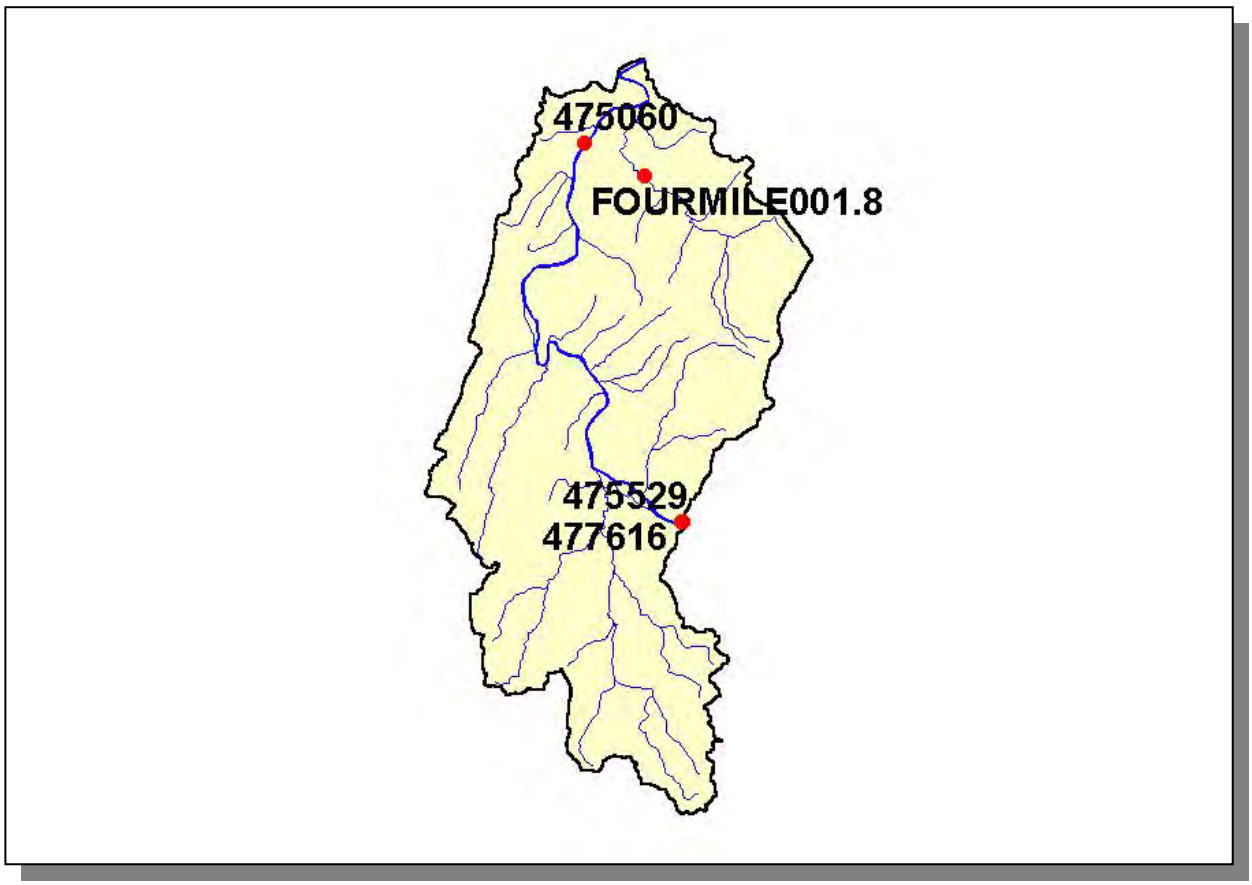

Figure 4-35. Location of STORET Monitoring Sites in Subwatershed 06020003130. *More information is provided in Ocoee-Appendix IV.*

4.2.F.ii. Point Source Contributions.

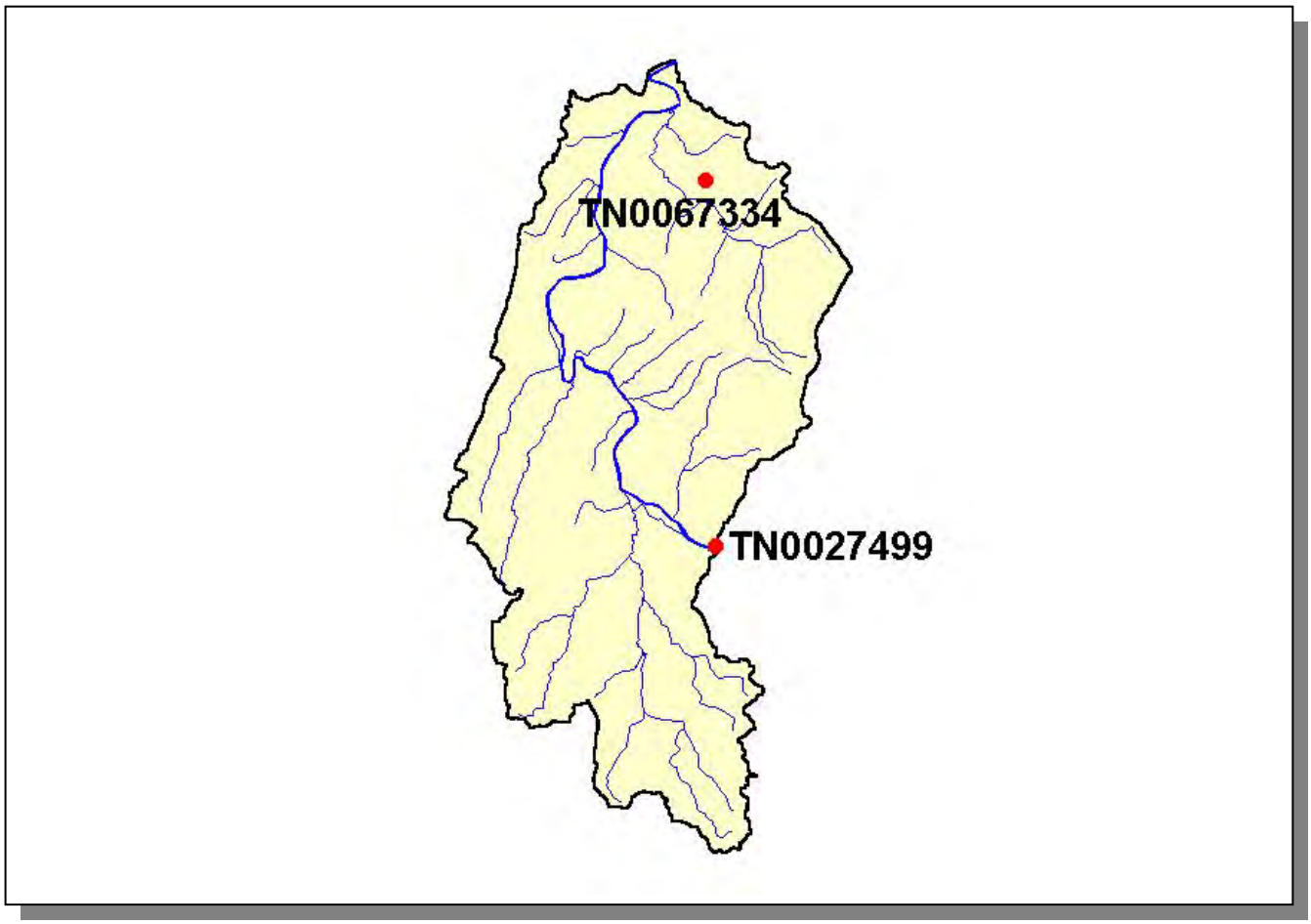

Figure 4-36. Location of Active Point Source Facilities (Individual Permits) in Subwatershed 06020003130. *More information, including the names of facilities, is provided in Ocoee-Appendix IV.*

4.2.F.ii.a. Dischargers to Waterbodies Listed on the 1998 303(d) List.

There is one NPDES facility discharging to water bodies listed on the 1998 303(d) list in Subwatershed 06020003130:

- TN0027499 discharges to Ocoee River @ RM 12.0

Figure 4-37. Location of NPDES Dischargers to Water Bodies Listed on the 1998 303(d) List in Subwatershed 06020003130. *The names of facilities are provided in Ocoee-Appendix IV.*

PERMIT #	7Q10	1Q20	30Q2	QLTA
TN0027499	0	0	0	0.3

Table 4-42. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003130. *Data are in million gallons per day (MGD). 30Q2 data were calculated using data in Flow Duration and Low Flows of Tennessee Streams Through 1992 .*

PERMIT #	METAL
TN0027499	X

Table 4-43. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003130.

PERMIT #	PCB
TN0027499	X

Table 4-44. Parameters Monitored for Daily Maximum (mg/L) Limits for NPDES Dischargers to Waterbodies Listed on the 1998 303(d) List in Subwatershed 06020003130.

4.2.F.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	**Cattle**	**Milk Cow**	**Chickens**	**Chickens Sold**	**Hogs**	**Sheep**
841	3,052	736	6	2,743,898	<5	<5

Table 4-45. Summary of Livestock Count Estimates in Subwatershed 06020003130. *According to the 1997 Census of Agriculture, "Cattle" includes heifers, heifer calves, steers, bulls and bull calves.*

	INVENTORY		REMOVAL RATE	
County	**Forest Land (thousand acres)**	**Timber Land (thousand acres)**	**Growing Stock (million cubic feet)**	**Sawtimber (million board feet)**
Polk	224.7	214.1	6.2	21.1

Table 4-46. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 06020003130

.

CROPS	TONS/ACRE/YEAR
Corn (Row Crops)	6.42
Legume Grass (Hayland)	0.05
Grass (Pastureland)	1.14
Grass, Forbs Legumes (Mixed Pasture)	1.33
Forest Land (Not Grazed)	0.00
Farmsteads and Ranch Headquarters	0.62
Conservation Reserve Program Land	0.27
Grass (Hayland)	0.22
Forest Land (Grazed)	0.00
Non Agricultural Land Use	0.00
Soybeans (Row Crops)	2.33
Fruit (Horticultural)	0.19
Other Cropland not Planted	2.93

Table 4-47. Annual Estimated Total Soil Loss in Subwatershed 06020003130.

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE OCOEE RIVER WATERSHED

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

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the Ocoee River Watershed. The information presented is provided by the agencies and organizations described.

5.2 FEDERAL PARTNERSHIPS.

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

Performance & Results Measurement System (PRMS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRMS may be viewed at http://sugarberry.itc.nrcs.usda.gov/netdynamics/deeds/index.html. From the PRMS Products Menu, select "Products," then select "Conservation Treatments." Select the desired program and parameters and choose "Generate Report."

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

CONSERVATION PRACTICE	ACRES
Conservation Buffer	9
Erosion Control	387
Irrigation Management	0
Nutrient Management Applied	439
Pest Management	439
Prescribed Grazing	104
Salinity and Alkalinity Control	0
Tree and Shrub Practices	0
Tillage and Residue Management	309
Wildlife Habitat Management	0
Wetlands Created, Restored, and Enhanced	0
Total	**1,686**

Table A5-1. Landowner Conservation Practices in Partnership with NRCS in Tennessee Portion of Ocoee River Watershed. *Data are from PRMS for October 1, 1999 through September 30, 2000 reporting period. More information is provided in Ocoee-Appendix V.*

5.2.B. United States Forest Service. The USDA Forest Service manages approximately 635,000 acres in Tennessee (Cherokee National Forest). This ownership includes about 106,000 acres within the Watauga River watershed and about 71,000 acres within the Ocoee River watershed in Tennessee. The general mission of the Forest Service is to achieve an ecological and sustainable multiple use approach to land management that meets the diverse needs of people. In order to achieve this mission a watershed-based approach to ecosystem management has been adopted.

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

- Completion of a general watershed analysis of all 5th level watersheds that encompass Forest Service ownership in Tennessee, including the Ocoee and Watauga Rivers

- Collaborative planning with a variety of other Federal, State and local agencies and private individuals to identify and prioritize watershed improvement needs on public and private lands

- Watershed improvements including road decommissioning to reduce soil loss and sediment yield

- Fisheries habitat improvements in selected streams

- A program of prescribed burning and timber harvest to improve forest health and wildlife habitat conditions

- Providing a variety of land and water based recreation opportunities

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

- Environmental education programs conducted by the Ocoee Whitewater Center located on the Ocoee River and at schools located within the watershed

- Collaborative management of entire Hiwassee River Basin including Ocoee River watershed is taking place through the efforts of an interagency team

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

5.2.C. Tennessee Valley Authority (TVA). TVA's vision for the 21st century is to generate prosperity for the Tennessee Valley by promoting economic development, supplying low-cost, reliable power, and supporting a thriving river system. TVA is committed to the sustainable development of the region and is engaged in a wide range of watershed protection activities. To assist communities across the Tennessee Valley actively develop and implement protection and restoration activities in their local watersheds, TVA formed 12 multidisciplinary Watershed Teams. These teams work in partnership with business, industry, government agencies, and community groups to manage, protect, and improve the quality of the Tennessee River and its tributaries for fishing, swimming, drinking, and recreational uses. TVA also operates a comprehensive monitoring program to provide real time information to the Watershed Teams and other entities about the conditions of these resources. The following is a summary of TVA's resource stewardship activities in the Ocoee River watershed.

MONITORING

Vital Signs Monitoring

Reservoir Monitoring: TVA has regularly monitored the quality of water resources of the Ocoee River watershed as part of its Vital Signs Monitoring effort since 1991. Physical, chemical, and biological indicators (dissolved oxygen, chlorophyll, sediment chemistry, benthos, and fish) provide information from various habitats on the ecological health of the reservoir. Sampling is done in the forebay area at Parksville (Ocoee #1) reservoir (Ocoee River Mile 12.5).

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

The following chart presents Reservoir Vital Signs scores for all years for which data are available. Reservoir Vital Signs samples will be collected again in 2001. Results will be made available when analyses are complete. As can be seen in the chart below, the ecological health score has declined. The indicators primarily responsible for this decline are fish community, bottom life and sediment quality. Because of this, the Parksville Reservoir score in 1999, was the lowest to date.

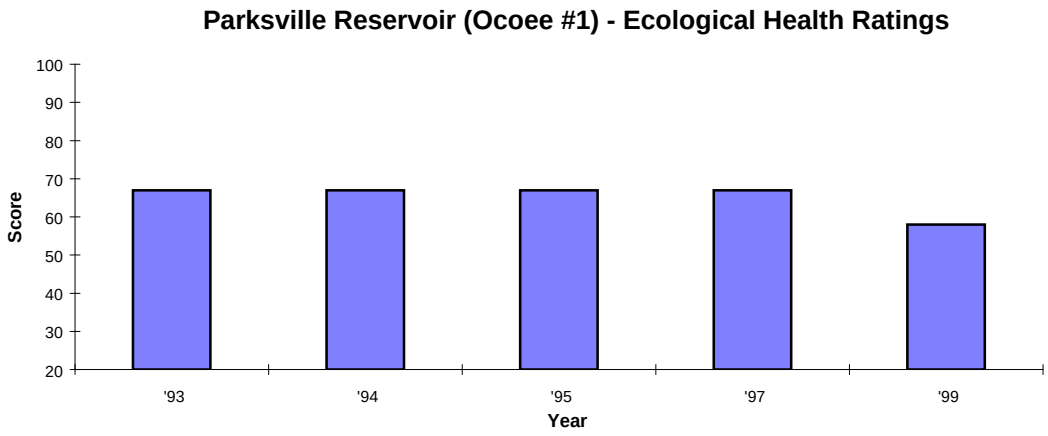

Figure A5-1. Ecological Health Ratings for Parksville Reservoir.

Vital Signs Monitoring Indicators - 1999

Dissolved oxygen: As in past years, dissolved oxygen (DO) concentrations remained relatively high throughout the year.

Chlorophyll: Chlorophyll concentrations were quite low (as expected given the nutrient-poor soils in the surrounding watershed), resulting in a good rating for this indicator.

Fish: The fish community diversity and overall density were lower than expected, indicating adverse environmental conditions.

Bottom life: The number and variety of animals found in samples taken from the reservoir bottom was relatively low, indicating poor environmental conditions for these organisms.

Sediment quality: Sediment quality remains the most important ecological health issue for Parksville Reservoir. Past mining practices in the Copper Basin left a legacy of very high concentrations of several metals—arsenic, cadmium, copper, iron, lead, and zinc. In addition, elevated amounts of PCBs have been found historically in the sediment.

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

Bacteriological sampling

There are no advisories against swimming in Parksville Reservoir or in the Ocoee River flowing into the reservoir. TVA checked fecal coliform bacteria levels in samples from five stream canoe access sites and two Parksville Reservoir swimming beach sites in 2000. Four of the canoe access sites were on the floatway upstream of the reservoir and one site was downstream of Ocoee #1 Dam. All canoe access sites met the State of Tennessee bacteriological water quality criteria for water contact recreation [Tennessee's criteria for water contact recreation requires the collection of at least 10 fecal coliform samples within a 30 day period, with a geometric mean less than 200 fecal coliform colonies per 100 milliliters of water. Also, no single sample should exceed 1,000 colonies per 100 milliliters.].

Mac Point and Parksville Beach swimming areas were sampled by the U.S. Forest Service from May through August, with three samples being taken from each area once each week for the whole period (a total of 51 samples from each area). None of the samples exceeded 47 fecal coliform colonies per 100 milliliters of water.

Bacteriological sampling locations and results for canoe access areas are:

Sampling Locations		Geometric Means			Max.
		All	Rain	Base	
Ocoee River Canoe Access Site	Ocoee RM 11.7	10	10	10	10
Ocoee River Canoe Access Site	Ocoee RM 19.6	24	20	25	270
Ocoee River Canoe Access Site	Ocoee RM 19.7	27	10	34	410
Caney Creek Canoe Access Site	Caney CM 0.1	18	20	17	170
Ocoee River Canoe Access Site	Ocoee RM 24.2	21	14	23	180

Table A5-2. TVA Sampling Locations in Ocoee River watershed.

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

Fish Flesh Toxic Contaminants

There are no fish consumption advisories for Parksville Reservoir. TVA collected channel catfish and largemouth bass from Parksville for tissue analysis in autumn 1999. All contaminant levels were either below detectable levels or below the levels used by the states to issue fish consumption advisories.

Stream Bioassessment

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

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

EPT - As with fish, the number and types of aquatic insects are indicative of the general quality of the environment in which they live. Unlike fish, aquatic insects are useful in determining short-term and localized impacts because they are short-lived and have limited mobility. The assessment method TVA uses involves only qualitative sampling and field identification of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) to the family taxonomic level (EPT). The score for each site is simply the number of EPT families. The higher EPT scores are indicative of high quality streams because these insect larvae are intolerant of poor water quality.

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

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

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

Stream Bioassessment Results - Between 1993 and 1999, TVA conducted 40 bioassessments on the Ocoee River and its tributaries. The lowermost site sampled on the Ocoee River, ORM 2.5, is monitored every two years. The remaining sites are monitored on a five year rotational schedule. Several additional sites in the Ocoee have been assessed for special project level activities.

The fish community at the lowermost site on the mainstem Ocoee River, ORM 2.5, appears to have shown some improvement over the last few years. From 1994 until 1997, the IBI scores ranged from 34 to 38. The score improved to 46 in 1999. During the same time period, the benthic community has also shown improvement, though not as much as the fish community. Ocoee River mile 2.5 will be monitored again in 2001.

Over the past 8 years several other sites on the Ocoee and its tributaries have been sampled, but not with the frequency of the lower most site (ORM 2.5). Most of these sites have been sampled only once, with a few exceptions for certain streams with historically poor water quality. Most streams draining into the Ocoee River, especially those in the Parksville Reservoir and Ocoee No. 2 impoundment segments, support fairly healthy benthic communities. The ecological health of the fish communities in these same streams is a bit harder to interpret, as there are naturally fewer species of fish in the Blue Ridge ecoregion than in lower elevation streams. Most fish communities in streams draining to Parksville Reservoir and Ocoee No, 2 have low diversity. One notable exception is Greasy Creek, with a score 50. Fourteen native fish species were recorded, as well as the non-native, angler-prized rainbow trout. On the other end of the spectrum, Fourmile Creek, in Benton TN, had scores of 26 at River Mile 1 and 36 at River Mile 2 in 1997.

Ecological conditions deteriorate both in the mainstem and tributaries of the Ocoee River upstream towards the Copper Basin, with the greatest impacts being to the fish communities. Monitoring sites on Brush Creek, North Potato Creek, and Walkerton Branch have repeatedly produced low scores ranging from 18 to 36. Conditions do not appear to have improved for any of these sites over time. Fish communities, widely accepted as long-term indicators ecological health, have thus far been unable to recover in these streams. However, benthic communities in these creeks are faring somewhat better than the fish. Although several families of insects have been reported, densities are extremely low.

Six additional bioassessment sites on the mainstem of the Ocoee River, between the Ocoee No. 2 Powerhouse and the state line have been monitored, The score near the Ocoee No. 2 Powerhouse was 28 while upstream about 3 miles, near Goforth Creek, no fish were collected despite aggressive sampling efforts. Moving farther upstream about 12 miles, near the mouth of North Potato Creek, scores were still very low, 26 in 1995 and 30 in 1997. The uppermost sampling site, located just below the McCaysville Sewage Treatment Plant discharge, had an IBI score of 36, an improvement compared to sites downstream. Benthic communities at the aforementioned sites had average diversity and well below average density of pollution sensitive organisms with scores ranging from 11 to 21.

Details about stream bioassessment sampling sites and scores can be obtained by writing Charles Saylor at Tennessee Valley Authority, PO Box 920, Ridge Way Road, Norris, TN 37818 or calling him at 865/632 -1779.

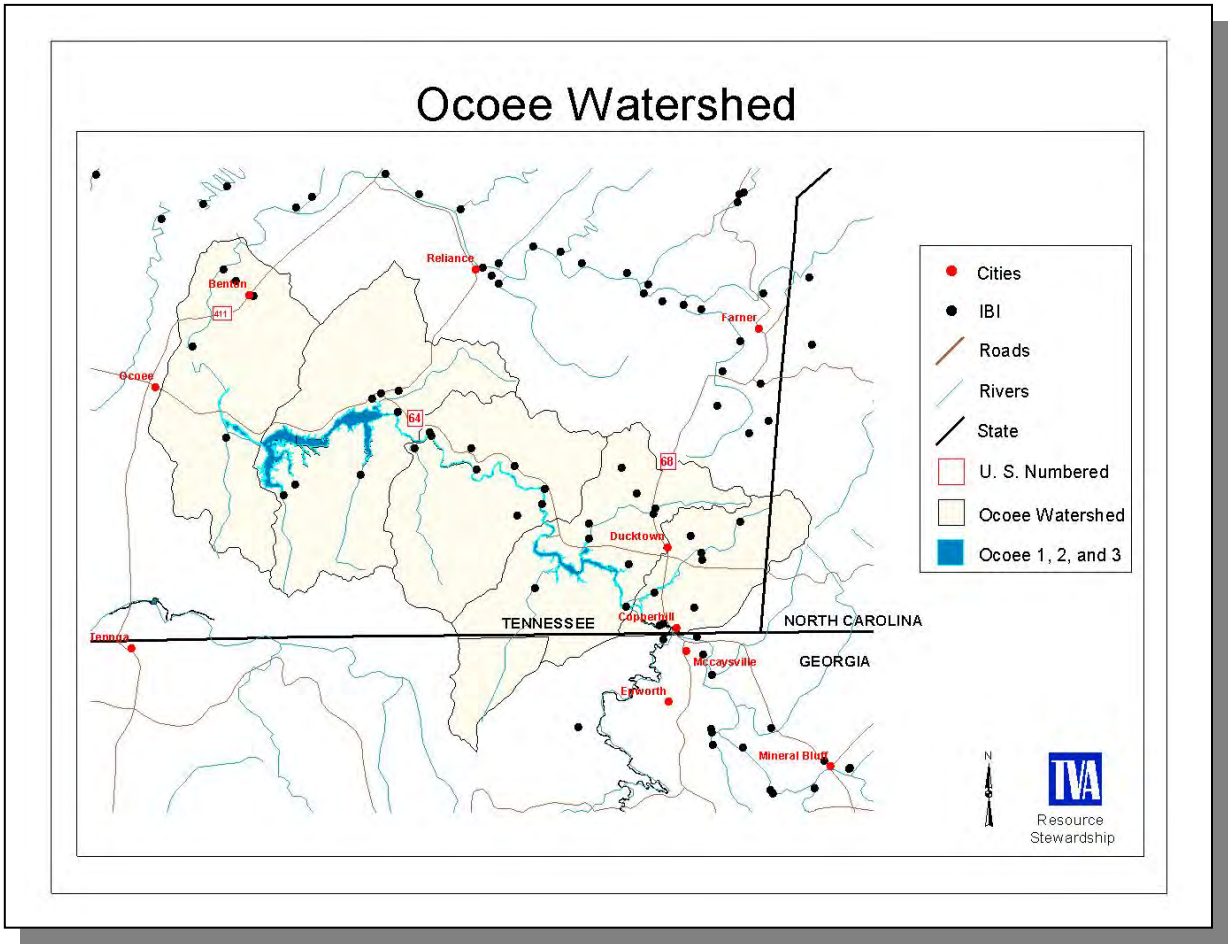

Figure A5-2. TVA Sampling Sites in Ocoee River Watershed and Vicinity.

WATERSHED ASSISTANCE

Outreach

The National Clean Boating Campaign is a partnership program which highlights the importance of clean water so boating will continue to be fun for future generations. The program demonstrates how boaters can be good stewards of their water environment through best boating and marina practices. The Clean Boating Campaign on the Ocoee Reservoirs consisted of distributing materials to local marinas that expressed an interest in the program. TVA plans to continue this partnership in upcoming years by working with the marinas and other concerned individuals.

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

on the Ocoee River reservoirs in 2001 and continue as long as it brings about positive change.

There are many special interest groups in the Ocoee River watershed that are striving to protect the valuable land and water-based resources in the watershed through grassroot efforts. TVA is supporting these groups by providing speakers for their meetings, detailed technical support, and limited financial support for resource improvement activities. TVA is also helping the watershed groups expand their programs with other projects like the Clean Boating Campaign and seedling give-aways for shoreline stabilization demonstrations.

Protection and restoration activities

TVA is continuing support for the Cooperative Copper Basin Land Reclamation Project that addresses soil erosion control on the lands denuded by crude copper smelting and other land use practices that occurred between the 1850s-1930s. Severe soil erosion of topsoil and subsoil occurred on 23,000 acres. In 1984, the remaining problem acreage was identified at 12,612. Since 1984, cooperators have reclaimed 10,517 acres with vegetative treatments and installed two major surface water sediment control structures (one of which has not been used to date). This work has made major improvements in controlling offsite sedimentation into the Ocoee River and three downstream Ocoee Reservoirs and abrasive damage to hydro-electric facilities. This leaves only 2,095 acres of partially vegetated lands in need of work to help restore watershed protection benefits. The remaining 2,095 acres in need of reclamation is about 10 percent of the 23,000 acres originally completely denuded.

TVA is also providing detailed technical assistance to cooperative efforts involving resource improvements throughout other areas in the Ocoee River watershed. These efforts include improving public use benefits, reducing sediment runoff, improving riparian zone conditions, and stabilizing critical shoreline and streambank sites.

Further information on Watershed Assistance can be obtained by writing to Gary Springston at: Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee, 37402 or calling him at 423/751-7336.

5.3 STATE PARTNERSHIPS.

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

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

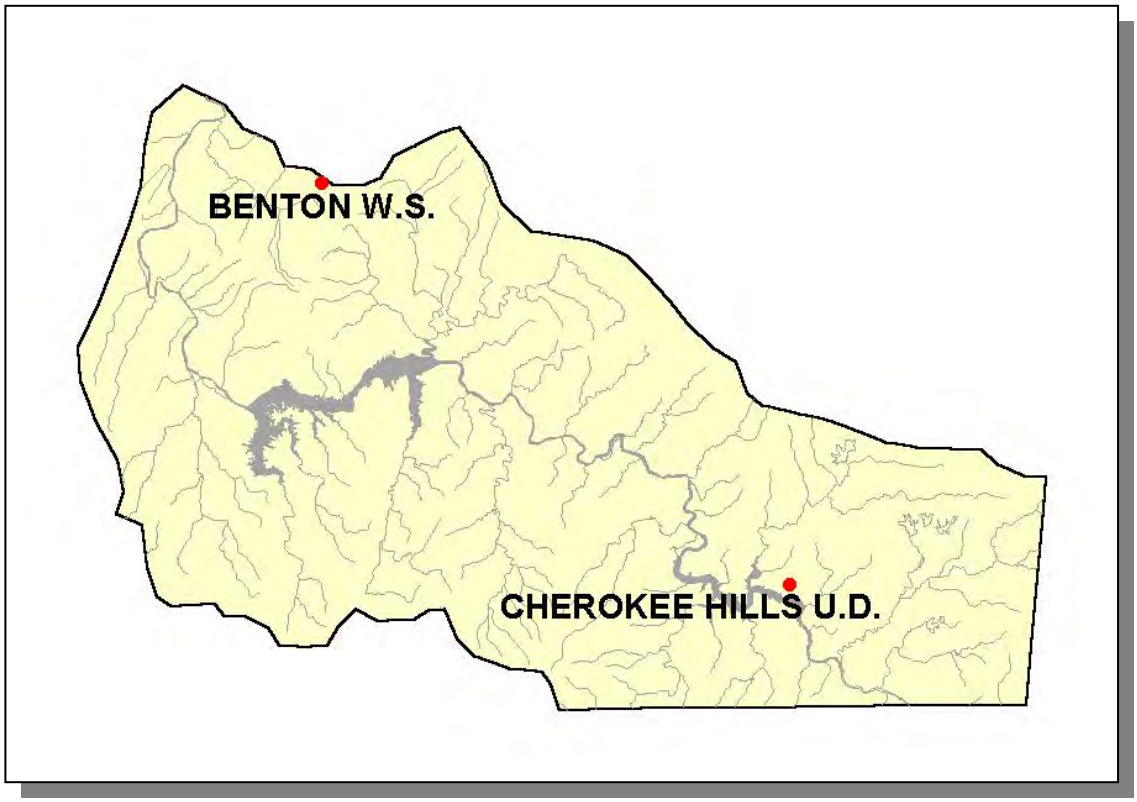

Figure A5-2. Location of Communities Using Groundwater for Water Supply in Ocoee River Watershed. *More Information is presented in Ocoee-Appendix V.*

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

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

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

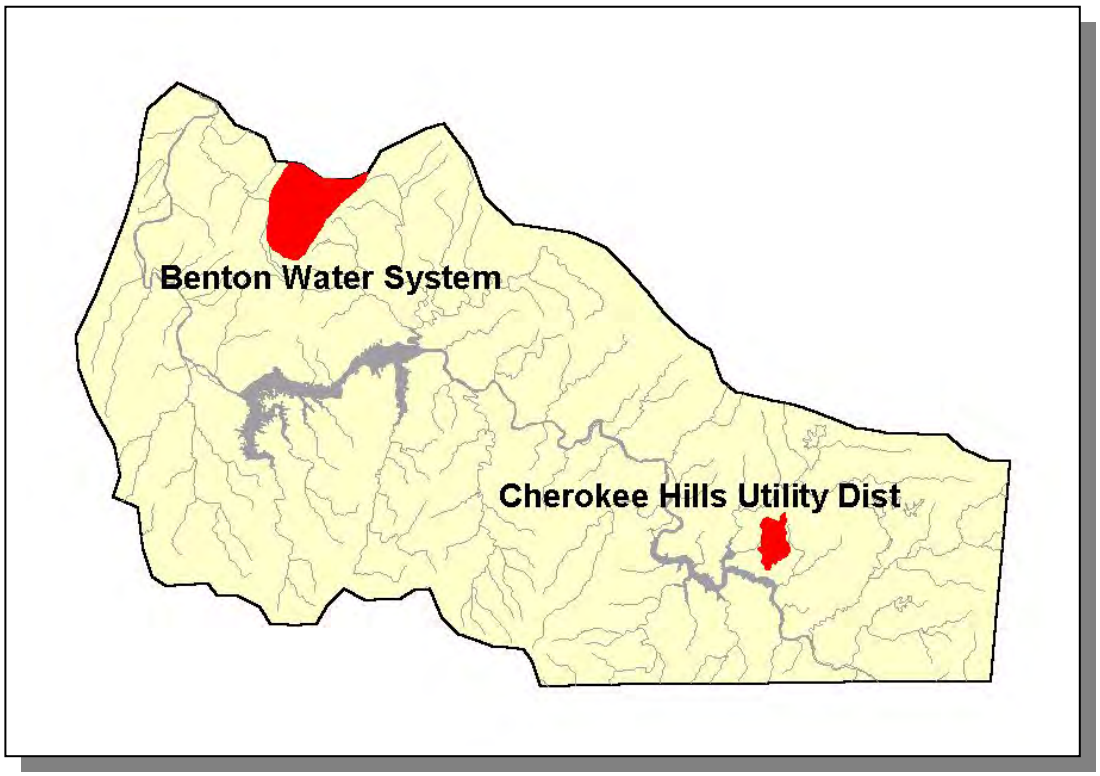

Figure A5-3. Location of Communities in the Wellhead Protection Program in Ocoee River Watershed. *More Information is presented in Ocoee-Appendix V.*

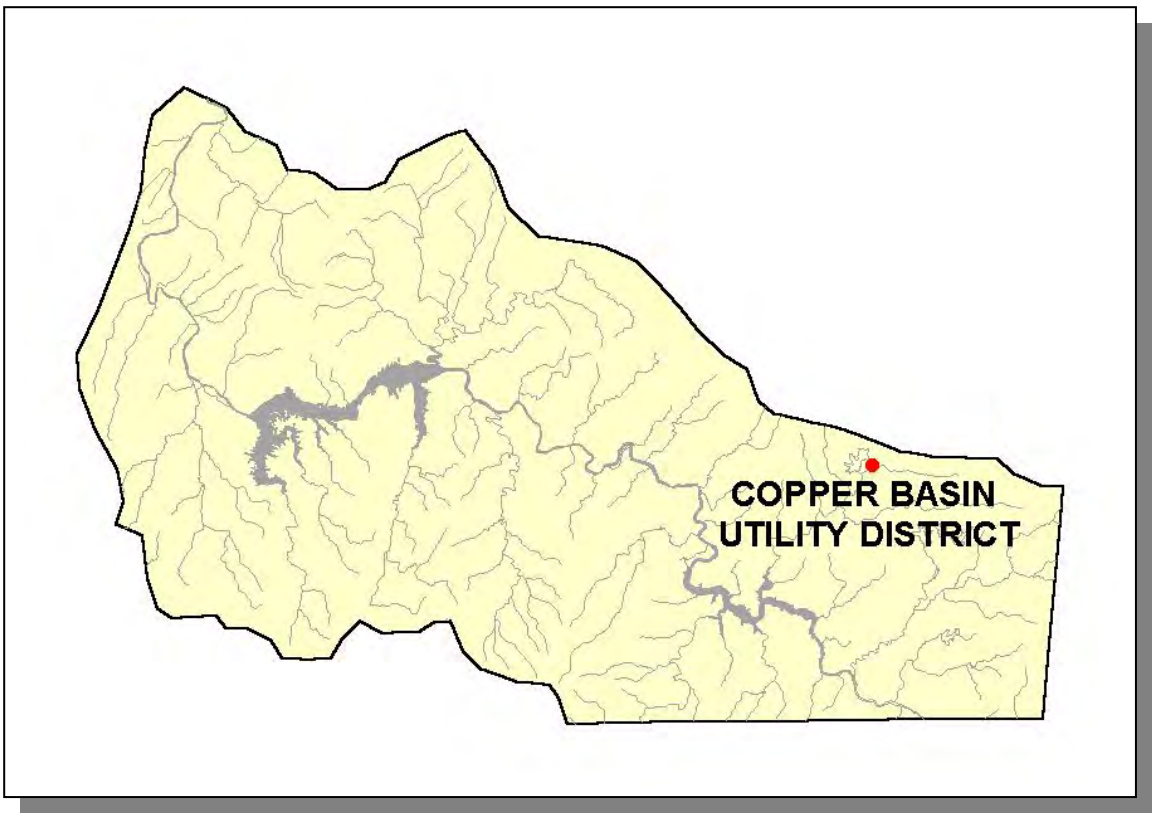

Figure A5-4. Location of Communities with Surface Water Intakes for Water Supply in Ocoee River Watershed. *More Information is presented in Ocoee-Appendix V.*

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.

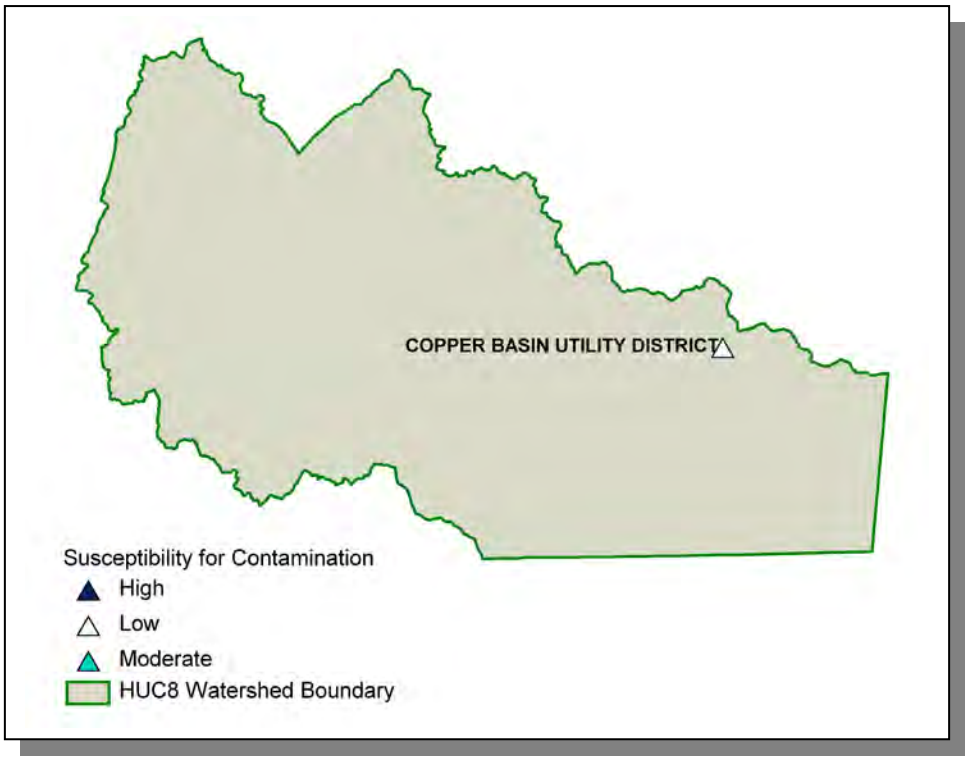

Figure A5-5. Susceptibility for Contamination in the Ocoee River Watershed.

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

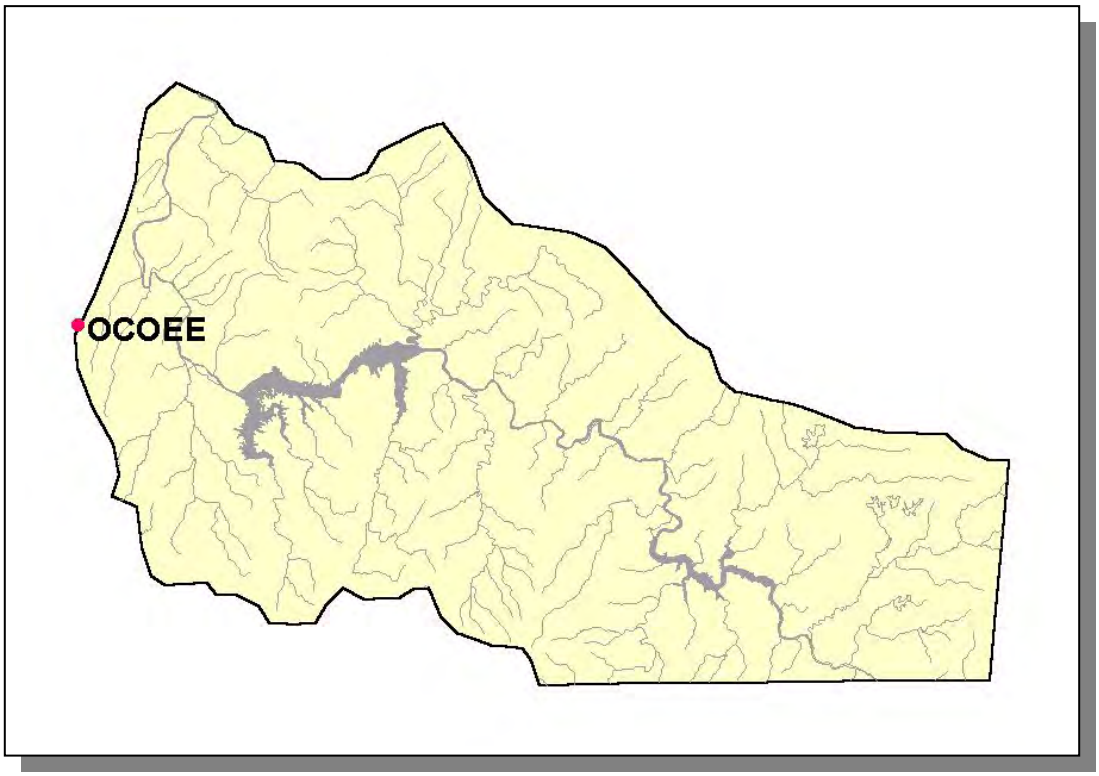

Figure A5-6. Location of Communities Receiving SRF Loans or Grants in the Ocoee River Watershed. *More information is provided in Ocoee-Appendix V.*

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

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

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

- Monitoring Projects. Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified.

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

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

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

The Tennessee Department of Agriculture has spent $13,187 for Agriculture BMPs in the Ocoee River Watershed since 1998. Additional information is provided in Ocoee Ocoee-Appendix V.

Since January of 1999, the Department of Agriculture and the Department of Environment and Conservation have had a Memorandum of Agreement whereby complaints received by TDEC concerning agriculture or silviculture projects would be forwarded to TDA for investigation and possible correction. Should TDA be unable to obtain correction, they would assist TDEC in the enforcement against the violator.

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

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

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

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

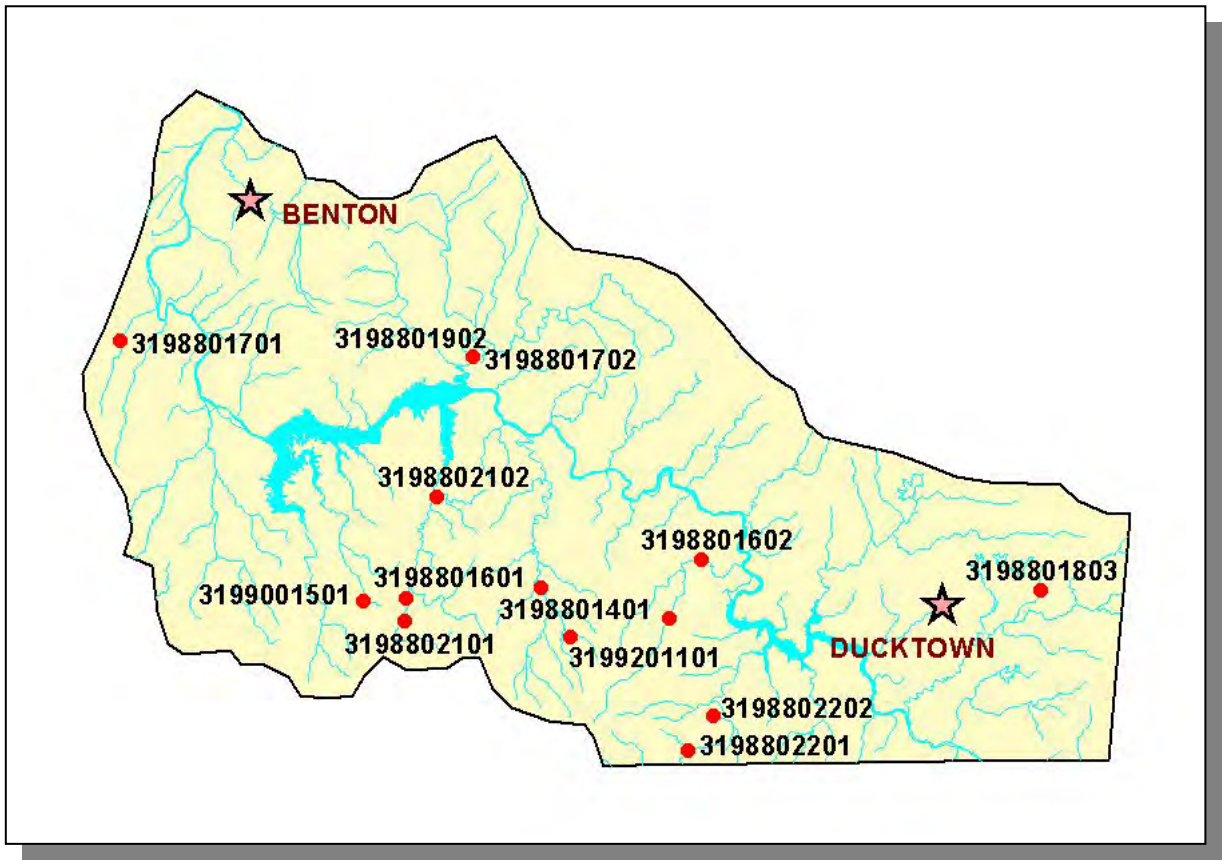

Figure A5-7. Location of TWRA TADS Sampling Sites in Ocoee River Watershed. *Locations of Benton and Ducktown are shown for reference. More Information is presented in Ocoee-Appendix V.*

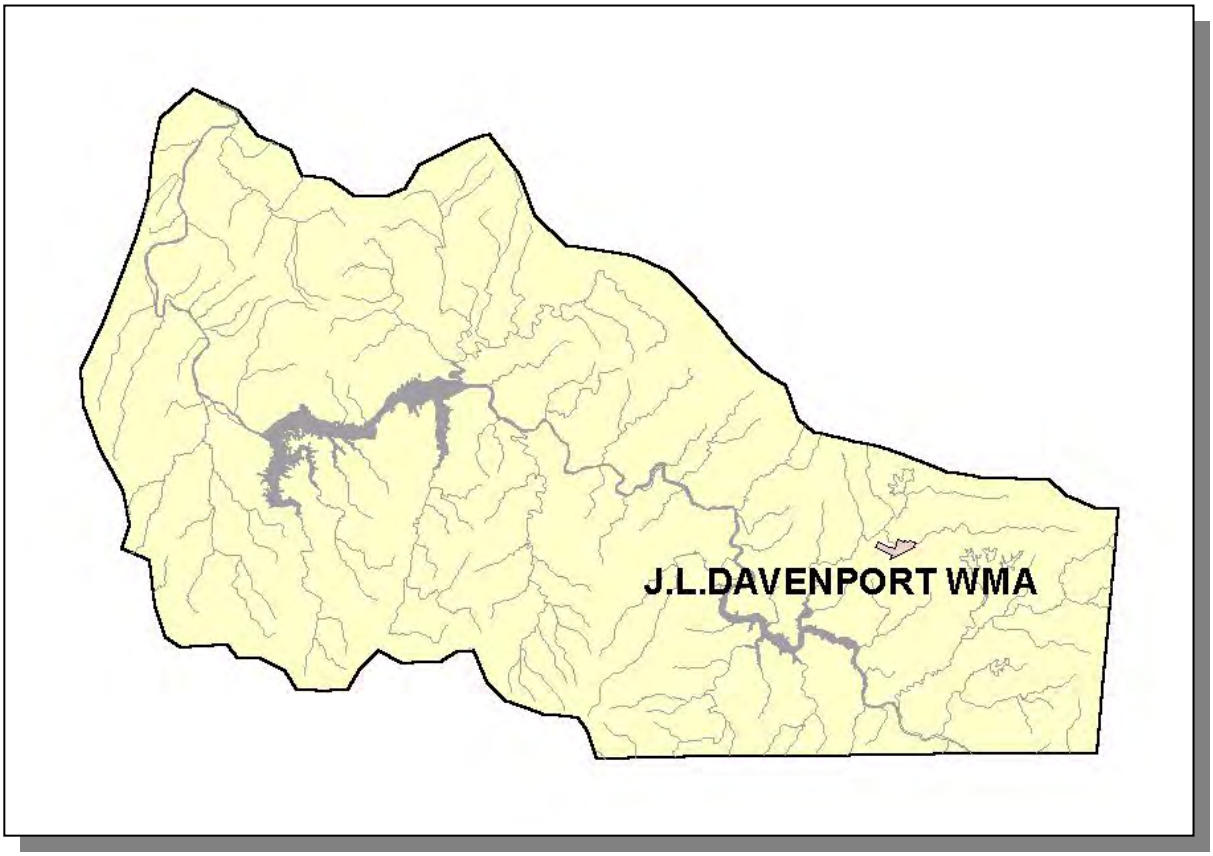

Figure A5-8. Location of TWRA Wetland Sites in Ocoee River Watershed Purchased with Wetland Mitigation Funds.

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

DWQ initiated basinwide planning activities in 1990, when it began conducting water quality monitoring for the first basinwide plan, published in 1993. Since then, DWQ has produced plans for all 17 river basins and has begun to update those plans for each basin. The new plans emphasize changes in water quality and give the status of recommendations made in the previous plan. Information about water quality in the Ocoee River watershed in North Carolina is included in the *Hiwassee River Basinwide Water Quality Management Plan*, published in 1997. DWQ is currently in the process of updating this basin plan. A public workshop was held in October of 2000 where results of recent water quality monitoring data was presented. A draft plan for public review will be available in fall of 2001 and public meetings to obtain comments on the draft will also be held at that time.

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

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

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NC Division of Water Quality
Planning Branch
1617 Mail Service Center
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CHAPTER 6

FUTURE DIRECTIONS IN THE OCOEE RIVER WATERSHED

6.1 BACKGROUND.

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

In addition to the NPDES program, some state and federal regulations, such as the TMDL and ARAP programs, address point and nonpoint issues. Construction and MS4 stormwater rules (implemented under the NPDES program) are transitioning from Phase 1 to Phase 2. More information on stormwater 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 Ocoee River Watershed.

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

6.2.A. Year 1 Public Meeting. The first Ocoee River Watershed public meeting was held October 3, 1996 at the Ducktown Elementary School. The goals of the meeting were to 1) present, and review the objectives of, the Watershed Approach, 2) introduce local, state, and federal agency and nongovernmental organization partners, 3) review water quality monitoring strategies, and 4) solicit input from the public.

Major Concerns/Comments

- Voluntary NPS improvements
- Loss of fish diversity due to road projects
- Loss of use of Upper Ocoee River for recreation
- Loss of recreational dollars if water quality declines
- Siltation

6.2.B. Year 3 Public Meeting. The second Ocoee River Watershed public meeting was held May 5, 1998 at Ducktown Elementary School. The goals of the meeting were to 1)review the watershed approach, 2)summarize the monitoring strategy, 3)review the most recent water quality assessment, 4)discuss the TMDL schedule and citizens' role in commenting on draft TMDLs, and 5)review BMPs and other nonpoint source tools available through the Tennessee Department of Agriculture 319 Program and NRCS conservation assistance programs.

Major Concerns/Comments

- Effectiveness of BMPs for forestry
- Sediment behind Ocoee Dam #1
- Effectiveness of constructed wetlands in the watershed
- Highway 64 expansion
- Poor advertisement for meeting
- Legality and necessity of holding watershed meetings

6.2.C. Year 5 Public Meeting. The third Ocoee River Watershed public meeting was held August 5, 2002 at the Polk County Courthouse (Benton). The meeting featured three educational stations:

- Draft Watershed Water Quality Management Plan
- Benthic macroinvertebrate samples and interpretation
- Landowner Assistance Programs (NRCS and TDA)

An additional six educational stations could not be viewed due to a power outage.

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

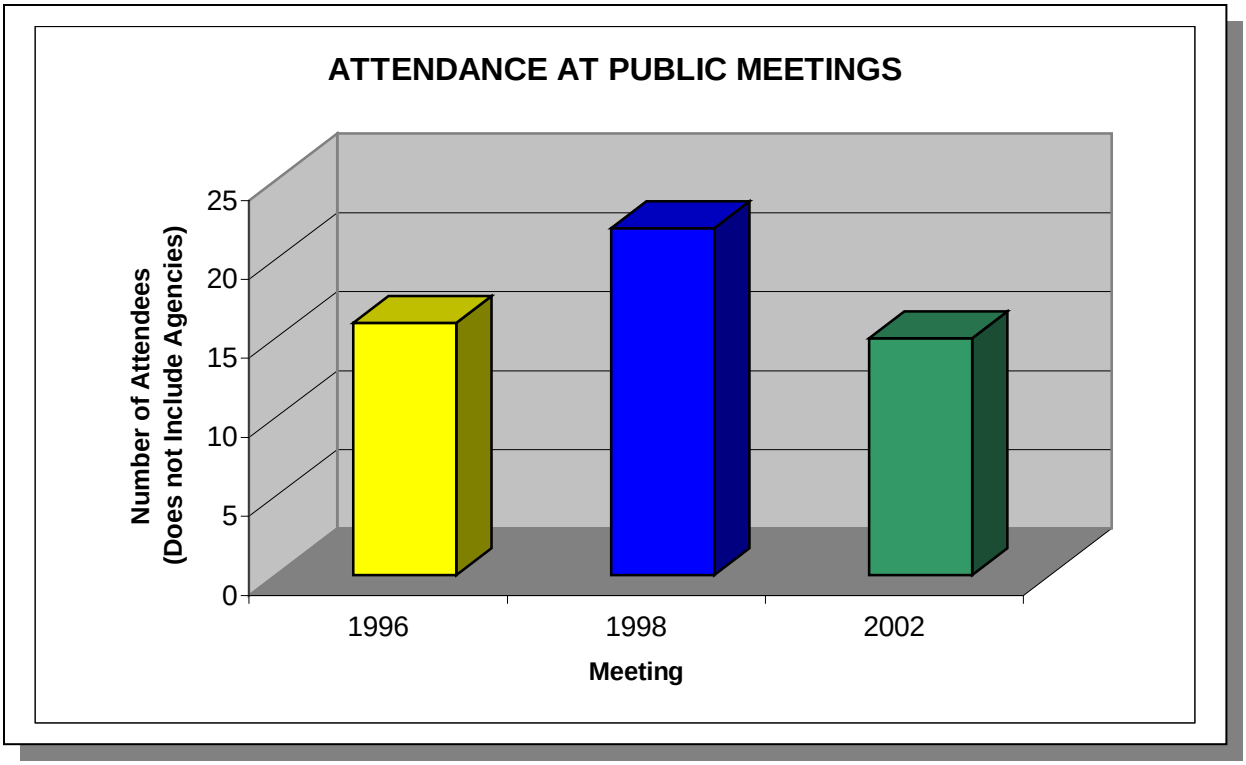

Figure 6-1. Attendance at Public Meetings in the Ocoee River Watershed. *Attendance numbers do not include agency personnel.*

6.3. ASSESSMENT OF NEEDS.

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

The watershed approach applies to point sources in the watershed by placing all individual wastewater discharge permits within the same year of a 5-year cycle for issuance and renewal. Increased consideration will be given to cumulative effects of multiple dischargers into receiving waters since all of the permits in a watershed will be on the same yearly cycle. Future TMDLs will also factor into permit issuance.

NPDES permits are also required for storm water point source discharges from construction sites (disturbing at least 5 acres, or smaller sites of disturbance on a cause basis) and from industrial sites categorized by federal regulation. These storm water discharges are covered by general NPDES permits which are not issued on a watershed specific basis in most cases. Construction sites that disturb greater than 1 acre will require permits in 2003. Regardless of the size, no construction site is allowed to cause a condition of pollution. Urban runoff from cities with populations under 100,000 are currently exempt from NPDES storm water regulations. Metropolitan areas and cities with populations greater than 10,000 and appropriate densities will be required to obtain NPDES storm water permits in 2003. The Ocoee watershed does not contain any urban areas subject to these storm water permits for cities.

The purpose of the TMDL program is to identify sources of pollution—both point and nonpoint—accurately and to 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 and/or wasteload reductions necessary for impaired streams to return to compliance with water quality standards.

TMDL development is a federal Clean Water Act requirement. So is the techincal assessment process which requires states to develop specific documents for reporting on the status of water quality and for reporting on waters that do not fully meet their designated uses (see Chapter 3 regarding the 305b report and 303d list). Waters that are impaired may be candidates for TMDL development, although not all waters and/or sources of impairment are best suited for such development as other corrective actions may be more appropriate.

Since the Ocoee River and its main tributary watersheds within the Copper Basin do not meet some of Tennessee's classified use criteria, TMDL development in the Ocoee watershed will be focused on this non-attainment region. Due to the magnitude and complexity of adverse water quality impacts, EPA will be the lead agency for TMDL development for the Ocoee River and its impaired tributaries in the Copper Basin. More information about Tennessee's TMDL program may be found at:
http://www.state.tn.us/environment/wpc/tmdl.htm

TMDLs are prioritized for development based on many factors.

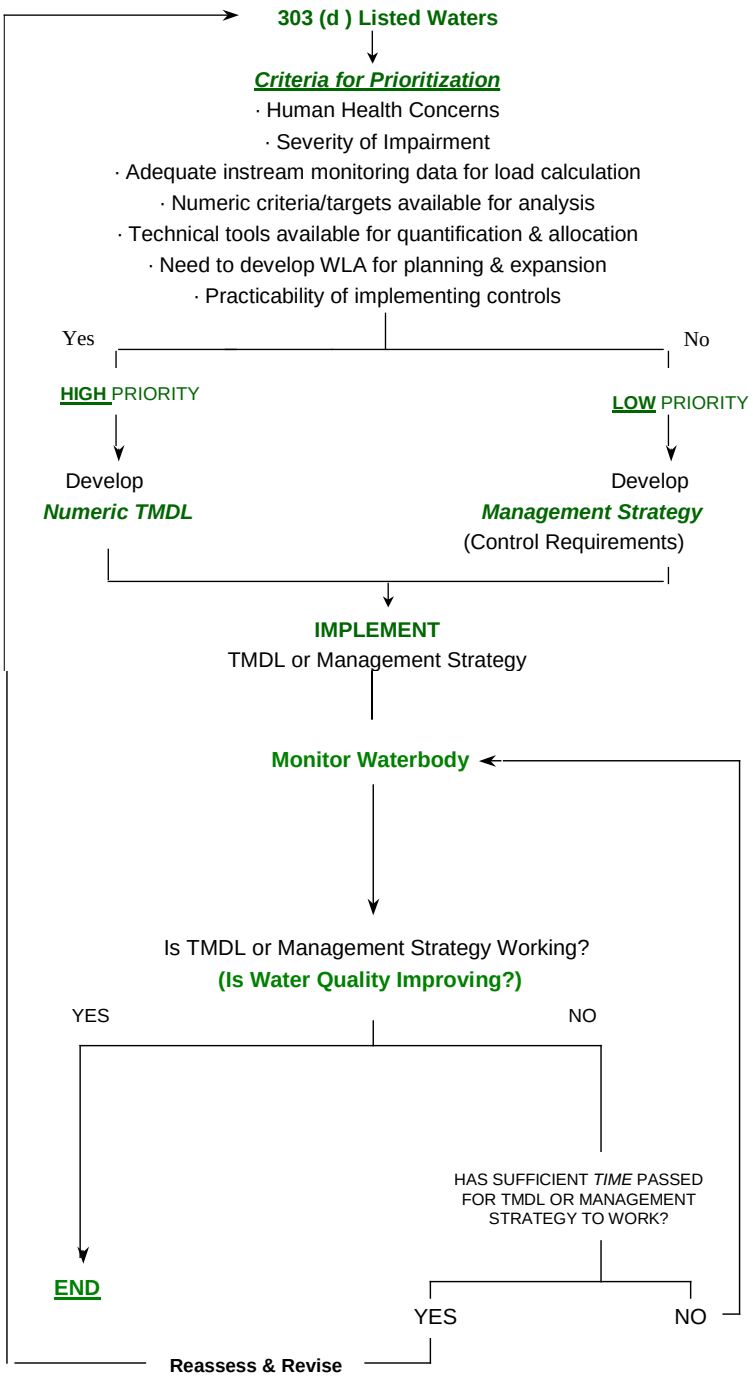

Figure 6.2. Prioritization scheme for TMDL Development.

The Tennessee Department of Environment and Conservation, the U.S. Environmental Protection Agency, and Glenn Springs Holdings, Inc. are cooperatively working on the Copper Basin Project.

Mining and related activities have resulted in the environmental degradation of portions of the Copper Basin, including the North Potato Creek Watershed, the Davis Mill Creek Watershed, and parts of the Ocoee River. Acidic conditions and leaching metals have impaired water quality and deforestation has resulted in severe erosion. PCB containing oils have been released to the environment from abandoned transformers. Abandoned and collapsing mine works and other deteriorating facilities and waste piles also pose significant physical hazards. In addition, the lack of a healthy soil structure and the poor quality of riparian and upland ecosystems contribute to poor surface water quality.

Presently the site is being investigated and cleaned up through a collaborative three party effort that was formalized on January 11, 2001, in a Memorandum of Understanding (MOU), and several related legal agreements, between EPA, the Tennessee Department of Environment and Conservation (TDEC), and OXY USA, Inc. (Glen Springs Holdings). The MOU provides an overall framework and establishes roles and responsibilities amongst the three parties for this investigation and cleanup work. It also provides assurance on the part of the federal government not to list, or propose to list, the site on the Superfund National Priorities List as long as other terms of the MOU are met.

Extensive data gathering activity has occurred in the past and additional sampling is planned for the Copper Basin in the near future. EPA and their contractors will conduct an RI/FS (remedial investigation/feasability study) under their superfund program for the Ocoee River; data will be generated that may be used for TMDL development. Administrative orders from EPA and commissioner's orders from TDEC will guide Glenn Springs Holdings toward cleanup of the North Potato Creek watershed and the study and improvement of the Davis Mill Creek watershed, both in the Copper Basin. Revegetation, reforestation, stabilization, water diversion and water treatment are all being considered, planned or implemented at present. Also, Glen Springs Holdings has voluntarily initiated or sponsored many cooperative projects and educational opportunities in the Copper Basin.

More information may be found at:
http://www.epa.gov/region4/waste/copper/index.htm
and at http://www.glennsprings-copperbasinproject.com

6.3.B. Nonpoint Sources. Many types of storm water discharges are considered nonpoint, and are not subject to NPDES permits mandated by federal regulations (see 6.3.A). Additionally, agricultural and silvicultural operations are generally exempt from water quality permitting in Tennessee except for large-scale animal farming or certain lumber industry activities that are defined by standard industrial classification codes. Nonpoint causes of adverse impacts in the Ocoee watershed such as siltation, pathogens, habitat alteration, pH, and metals may have many past and present sources

like logging, historical mining, waste storage, small-city urban runoff, livestock, agriculture, channelization, impoundments and contaminated sediments. The Tennessee Department of Agriculture (TDA), Division of Forestry, has implemented a "Master Logger" program for education and implementation of forestry best management practices (BMPs). TDEC and TDA along with federal agencies such as NRCS and the National Forest Service help agricultural and silvicultural operators with management tools and guidance that are designed to prevent erosion and other adverse impacts such as nutrient or pesticide pollution.

6.4. CURRENT AND FUTURE ISSUES

The Ocoee River watershed is one of the most unique in Tennessee. World class whitewater recreational waters and abundant natural scenic values are resources that invoke appreciation, protection and restoration. The restoration of the Copper Basin is a daunting challenge that finally has the hope of being achieved. Reforestation efforts over the past 25 years have changed the landscape dramatically along the highways and off into the previously barren lands. Much more can be done.

The restoration of water quality in impaired waters in the Copper Basin to a point where fish and aquatic life can survive and propagate is a goal that can be reached through cooperative efforts like those already underway and additional improvements from stakeholders and others in the watershed. Native fish are being introduced in the Ocoee watershed and many kinds of aquatic organisms have already begun their return to parts of the Copper Basin after a long absence.

Highway 64 relocation or improvement in the Ocoee watershed is being planned; this project presents a tremendous challenge for preserving and protecting the natural resources that exist or are being restored.

The massive amounts of sediment in the three TVA reservoirs on the Ocoee River present another challenge, due to the toxic metals that are present and the maintenance that is required to remove or flush sediments so that hydroelectric generation can continue. Flows, reservoir management and water quality are among the issues that will be part of TVA's comprehensive 2-year reservoir operations study that is already underway.

Watershed impacts from outside the Ocoee boundaries may play a significant part in water quality improvement planning. Stakeholders from these adjacent and upstream waters can help the restoration and preservation efforts in the Ocoee watershed.

APPENDIX II

ID	NAME	HAZARD
707001	McCAMEY LAKE	F
707003	CAMPBELL COVE	1
707005	LONDON MILLS TAILINGS PD	2
707007	RETENTION POND--NOT BUILT	N
707008	N POTATO CK DIVERSION	1
707009	F-11	N
707010	LAKE MARCELLA	L
707011	GYPSUM POND	1

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

LAND COVER/LAND USE	SQUARE MILES	% OF WATERSHED
Open Water	10.6	2.9
Forested Wetlands	0.1	0.0
Nonforested	0.0	0.0
Pasture	199.0	9.1
Cropland	13.2	1.5
Scrub Shrub	0.0	0.0
Deciduous Forest	549.3	59.6
Mixed Forest	69.9	22.3
Coniferous Forest	19.5	4.5
Urban	5.7	0.1
Barren Land	0.0	0.0
Strip Mines	0.0	0.0
Cloud/Shadow	0.0	0.0
Forested Dead Wetlands	0.0	0.0
Total	**867.4**	**100**

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

ECOREGION	REFERENCE STREAM	WATERSHED (HUC)
Southern Sedimentary Ridges (66e)	Clark Creek	(06010108)
	Lower Higgins Creek	(06010108)
	Double Branch	(06010201)
	Gee Creek	(06020002)
Southern Metasedimentary Mountains (66g)	Little Pigeon River	(06010107)
	Little River	(06010201)
	North River	(08010204)
	Sheeds Creek	(03150101)
Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f)	Fisher Creek	(06010104)
	White Creek	(06010205)
	Powell River	(06010205)
	Big War Creek	(06010205)
	Indian Creek	(06010206)
Southern Shale Valleys (67g)	Little Chucky Creek	(06010108)
	Bent Creek	(06010108)
	Brymer Creek	(06020002)
Southern Dissected Ridges and Knobs (67i)	Thompson Branch	(06020002)
	Mill Creek	(06010207)

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

CODE	NAME	AGENCY	AGENCY ID
1839	TDEC/DNH WALKERTOWN BRANCH BOG SITE	TDEC/DNH	M.USTNHP 2661
2716	TWRA J.L. DAVENPORT WILDLIFE MANAGEMENT AREA SITE	TWRA	
2739	TDEC/DNH DUCKTOWN SCHOOL CONSERVANCY SITE	TDEC/DNH	S.USTNHP 544
2741	TDEC/DNH CALLOWAY MINE TAILINGS POND	TDEC/DNH	

Table A2-4. Wetland Sites in Ocoee River Watershed in TDEC Database. *TDEC, Tennessee Department of Environment and Conservation; TWRA, Tennessee Wildlife Resources Agency; DNH, Division of Natural Heritage.*

APPENDIX III

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Brush Creek	TN06020003013.7T_0100	18.4
Fourmile Creek	TN06020003001_0150	9.5
North Potato Creek	TN06020003014_0150	6.2
Ocoee River	TN06020003014_2000	0.8
Tumbling Creek	TN06020003013.7T_0400	12.9

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Fourmile Creek	TN06020003001_0100	4.8
Ocoee River	TN06020003001_1000	13.0
Ocoee River	TN06020003014_1000	2.5

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (MILES)
Burra Burra Creek	TN06020003014_0110	2.2
Davis Mill Creek	TN06020003014_0200	3.8
Ellis Branch	TN06020003014_0120	2.8
North Potato Creek	TN06020003014_0100	6.3
Ocoee River	TN06020003013.55_1000	3.9
Ocoee River	TN06020003013_1000	4.7

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE
Baker Creek	TN06020003010_1000	6.9
Barker Mill Creek	TN06020003014_0400	1.9
Belltown Creek	TN06020003014_0210	5.1
Big Creek	TN06020003045_1000	25.0
Clear Creek	TN06020003035_0100	12.3
Cloud Branch	TN06020003001_0200	5.2
Cookson Creek	TN06020003001_0300	22.4
Coon Creek	TN06020003035_0200	6.1
Fightingtown Creek	TN06020003014_0300	0.4
Fry Branch	TN06020003001_0400	3.8
Goforth Creek	TN06020003013_0100	5.0
Grassy Creek	TN06020003013.7T_0300	5.4
Greasy Creek	TN06020003035_1000	13.3
Long Branch	TN06020003035_0300	3.1
Misc tribs to Ocoee River	TN06020003001_0999	18.2
Misc Tribs to Ocoee River	TN06020003013.55_0999	4.4
Misc Tribs to Ocoee River	TN06020003013_0999	3.5
Misc Tribs to Ocoee River	TN06020003014_0999	1.1
Ocoee Number 2 Misc. Tribs	TN06020003013.5T_1000	8.0
Ocoee Reservoir Number 3 Tribs.	TN06020003013.7T_0999	5.4
Parksville Reservoir Misc Tribs	TN06020003004T_1000	21.1
Rock Creek	TN06020003013.55_0100	4.6
Rock Creek	TN06020003092_1000	10.3
Rough Creek	TN06020003013.55_0200	9.8
Sylco Creek	TN06020003376_1000	15.4
Walkertown Branch	TN06020003013.7T_0200	4.0

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Baker Creek Embayment Parksville Reservoir	TN06020003004_0200	300
Slyco Embayment Parksville Reservoir	TN06020003004_0100	327

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

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Parksville Reservoir	TN06020003004_1000	704

Table A3-1f. Lakes Partially Supporting Designated Uses in Ocoee River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SEGMENT SIZE (ACRES)
Ocoee Number 2	TN06020003013.5_1000	494
Ocoee Reservoir Number 3	TN06020003013.7_1000	480
Parksville Reservoir	TN06020003004_2000	576

Table A3-1g. Lakes Not Supporting Designated Uses in Ocoee River Watershed. *Data are based on Year 2000 Water Quality Assessment.*

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
North Potato Creek	TN06020003014_0100	6.3	Not supporting

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

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
Fourmile Creek	TN06020003001_0100	4.8	Partial

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

SEGMENT NAME	WATERBODY SEGMENT ID	SIZE (MILES)	SUPPORT DESCRIPTION
Burra Burra Creek	TN06020003014_0110	2.2	Not supporting
Davis Mill Creek	TN06020003014_0200	3.8	Not supporting
Fourmile Creek	TN06020003001_0100	4.8	Partial
North Potato Creek	TN06020003014_0100	6.3	Not supporting
Ocoee Number 2	TN06020003013.5_1000	494	Not supporting
Ocoee Reservoir Number 3	TN06020003013.7_1000	480	Not supporting
Ocoee River	TN06020003014_1000	2.5	Partially supporting
Parksville Reservoir	TN06020003004_2000	576	Not supporting

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

APPENDIX IV

LAND USE/LAND COVER	AREA IN HUC-11 SUBWATERSHED (ACRES)					
	050	**070**	**100**	**110**	**120**	**130**
Deciduous Forest	518	53	12,030	14,769	10,243	7,612
Emergent Herbaceous Wetlands				17		
Evergreen Forest	315	1	11,715	6,467	12,990	6,458
High Intensity: Commercial/Industrial	1.		73	5	2	75
High Intensity: Residential	6		3			17
Low Intensity: Residential	38		79	0	12	149
Mixed Forest	355	3	7,434	6,673	11,472	6,873
Open Water	12		486	129	1,608	217
Other Grasses: Urban/Recreational	8		59		5	77
Pasture/Hay	40	0	299	0	31	4,746
Row Crops	2		102		2	1,769
Transitional	93	5	665	181	465	617
Quaries/Strip Mines	108	0	1,879			
Woody Wetlands					1	
Total	**1495**	**63**	**34,823**	**28,224**	**36,831**	**28,610.0**

Table A4-1. Land Use Distribution in Ocoee River Watershed by HUC-11. *Data are from 1992 Multi-Resolution Land Characterization (MRLC) derived by applying a generalized Anderson Level II system to mosaics of Landsat thematic mapper images collected every five years.*

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

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

STATION	HUC-11	NAME	AREA (SQ. MILES)	PERIOD OF OBSERVATIONS	FLOW (CFS)		
					Min	Max	Mean
03559500	06020003050	Ocoee River @ Copperhill	352.0	03/01/03-01/15/71	76.0	26,200.0	849.0
03560500	06020003100	Davis Mill Creek	5.2	08/01/40-10/10/94	4.0	950.0	54.0
03560700	06020003100	Copper Basin Area 6	0.01	07/16/41-10/06/49			
03560800	06020003100	Copper Basin Area 5	0.24	07/02/41-05/01/51			
03561200	06020003100	Copper Basin Area 1	0.01	08/17/44-08/07/51			
03561300	06020003100	Copper Basin Area 1	0.01	06/12/44-05/01/51			
03561350	06020003100	North Potato Creek	14.2				
03561400	06020003100	Ocoee River	446.0	08/02/66-09/14/73			
03561500	06020003100	Ocoee River	447.0	05/01/17-10/10/94	120.0	15,200.0	1,057.0
03561700	06020003100	Copper Basin Area 4	0.01	08/08/40-02/17/45			
03561800	06020003100	Copper Basin Area 3	0.01	08/10/36-10/06/49			
03563000	06020003110						

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

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

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

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

PARAMETER ID				
	050	**110**	**120**	**130**
00010	a	b,c,d	j	l,m,n
00060			j	
00061			j	l,m
00065				n
00078			j	
00080				
00094	a	b,c,d	j	n
00095		b,c,d		
00300	a	b,c,d	j	
00310	a			
00335	a	c		
00400	a	b,c,d	g,i,j	
00431				n
00515		c		
00530	a	c		m,n
00605			j	
00610	a	c	j	m,n
00619	a	c	j	m,n
00630	a	c	j	n
00665	a	c	j	n
00671			j	n
00680			j	n
00900	a	c		m
00915			j	n
00916			j	n
00925			j	n
00927			j	n
00941				n
00946				n
01002	a	c		
01025			j	n
01027	a	c	j	
01034	a	c	j	
01040			j	n
01042	a	c	j	n
01045	a		j	n
01046			j	n
01049			j	n
01051	a	c	j	
01065				n
01067	a	c		
01077	a			
01090			j	n
01092	a	c	j	n
01105			j	n
01106			j	n
01147	a			
31616	a	b,c,d	g,h,i	m
32211			j	
70300				n
71890			j	
71900	a	c	j	

82078 82079			j j	l,n n

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

CODE	STATION	ALIAS	AGENCY	LOCATION
a	OCOEE37.9	OCOEE037.9PO	TDEC	Ocoee River @ RM 37.9
b	040332		USFS	Ocoee River Below Olympic Site
c	002050	OCOEE019.6PO	TDEC	Ocoee River @ RM 19.6
d	040331		USFS	Ocoee River Upstream from Olympic Site
e	475685		TVA	Parksville Lake
f	475854		TVA	Ocoee #1 Reservoir
g	040328		USFS	Parksville #2
h	040322		USFS	Chilhowee #2
i	040325		USFS	MAC Point #2
j	475684		TVA	Parksville Lake
k	475060		TVA	0.4 Mi ESE of Benton Station
l	475529		TVA	Ocoee Dam #1 Scroll Case
m	FOURMILE001.8	FOURM001.8PO	TDEC	Fourmile Creek @ RM 1.8 (u/s of STP)
n	47616		TVA	Below Ocoee Dam #1

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

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	SUBWATERSHED
TN0024449	Copperhill STP	4952	Sewerage Systems	Minor	Ocoee River @ RM 37.0	06020003070
TN0002411	Interstate Holdings	2819	Industrial Inorganic Chemicals	Minor	Ocoee River @ RM 37.1 and Davis Mill Creek	06020003100
TN0056413	Copper Basin Medical Center	4952	Sewerage Systems	Minor	Mile 0.5 of a Wet Weather Conveyance to Central Mine Branch @ RM 0.5	06020003100
TN0059358	Copper Basin UB STP	4952	Sewerage Systems	Minor	Ocoee River @ RM 33.1	06020003100
TN0005479	Ocoee #3 Hydro Plant	4911	Electric Services	Minor	Ocoee River @ RM 25.1	06020003110
TN0027502	TVA #2 Hydro Plant	4911	Electric Services	Minor	Ocoee River @ RM 19.7	06020003110
TN0067334	Benton STP	4952	Sewerage Systems	Minor	Four Mile Creek @ RM 1.7	06020003130
TN0027449	TVA #1 Hydro Plant	4911	Electric Services	Minor	Ocoee River @ RM 12.0	06020003130

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

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-11
99.215	Polk	Culvert	Wetland	06020003100
99.276	Polk	Culvert and Wetland Fill	Sweetwater Creek and Tributaries	06020003100
99.454	Polk	Dam Repair	Ocoee River	06020003110

Table A4-6. Individual ARAP Permits Issued January 1994 Through June 2000 in Ocoee River Watershed.

APPENDIX V

CONSERVATION PRACTICE	UNITS	AMOUNT
Alley Cropping	Acres	0
Contour Buffer Strips	Acres	0
Crosswind Trap Strips	Acres	0
Grassed Waterways	Acres	0
Filter Strips	Acres	9
Riparian Forest Buffers	Acres	0
Streambank and Shoreline Protection	Feet	4,300
Windbreaks and Shelterbelts	Feet	0
Hedgerow Plantings	Feet	0
Herbaceous Wind Barriers	Feet	0
Field Borders	Feet	0

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

PARAMETER	TOTAL
Highly Erodible Land With Erosion Control Practices	387
Estimated Annual Soil Saved By Erosion Control Measures (Tons/Year)	1,344
Total Acres Treated With Erosion Control Measures	387

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

PARAMETER	TOTAL
Acres of AFO Nutrient Management Applied	335
Acres of Non-AFO Nutrient Management Applied	104
Total Acres Applied	439

Table A5-1c. Nutrient Management Conservation Practices in Partnership with NRCS in Tennessee Portion of Ocoee River Watershed. *Data are from PRMS and represent total of Watts Bar and Fort Loudoun Lake Subwatersheds for October 1, 1999 through September 30, 2000 reporting period.*

PARAMETER	TOTAL
Number of Pest Management Systems	2
Acres of Pest Management Systems	439

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

COMMUNITY	TYPE OF LOAN	PROJECT DESCRIPTION	AWARD DATE
Ocoee	Construction	New Storage Tank and Supply Line	3/30/2000

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

PRACTICE	COUNTY	NUMBER OF BMPs
Streambank Stabilization	Polk	1
Pasture & Hayland Planting	Polk	2
Stream crossing	Polk	1
Fencing	Polk	3

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

SITE ID	WATER BODY
3198801401	Big Creek
3198801601	East Fork Rough Creek
3198801602	East Fork Rough Creek
3198801701	Greasy Creek
3198801702	Greasy Creek
3198801803	North Potato Creek
3198801902	Greasy Creek
3198802101	Sylco Creek
3198802102	Sylco Creek
3198802201	Tumbling Creek
3198802202	Tumbling Creek
3199001501	Indian Creek
3199201101	Big Creek
3199600601	Sylco Creek

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