CHAPTER 2

DESCRIPTION OF THE UPPER FRENCH BROAD RIVER WATERSHED

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2.1. BACKGROUND. The French Broad River is 210 miles long and flows north and northwest to Knoxville, where it joins with the Holston River to form the Tennessee River. The French Broad River was an important settlers' route from the southeast coastal states into Tennessee during the colonial period and was named for being one of two broad rivers in western North Carolina and Eastern Tennessee. The one which flowed into formerly French territory was named the French Broad, and the other which stayed in English territory (the American colonies) was named the English Broad, now just the Broad River. On the river is Douglas Dam, part of the Tennessee Valley Authority (TVA), forming Douglas Lake, which is used for flood control.

This Chapter describes the location and characteristics of the Tennessee Portion of the Upper French Broad River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Upper French Broad River Watershed is located in East Tennessee and includes parts of Cocke and Greene Counties.

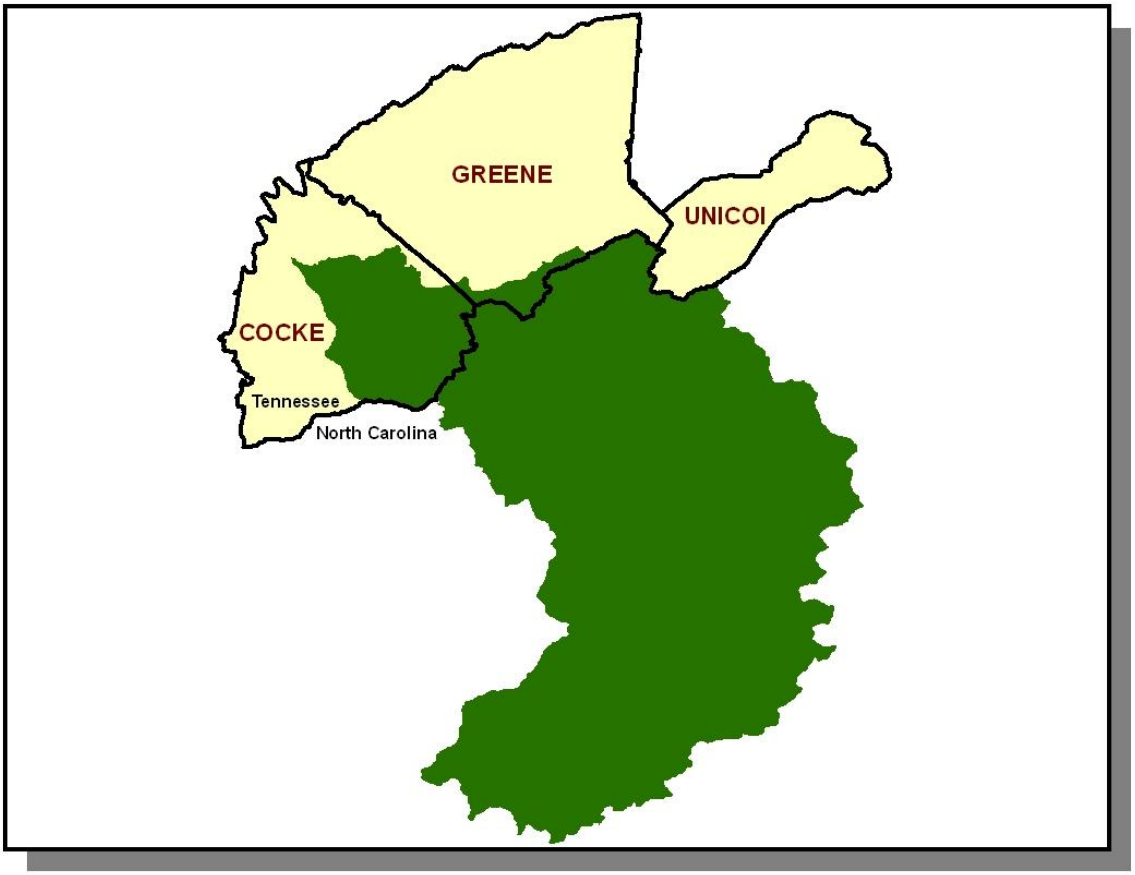

Figure 2-1. General Location of the Upper French Broad River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Cocke	87.56
Greene	12.32
Unicoi	0.12

Table 2-1. The Tennessee Portion of the Upper French Broad River Watershed Includes Parts of Three East Tennessee Counties.

2.2.B. Population Density Centers. Seven highways serve the major communities in the Upper French Broad River Watershed.

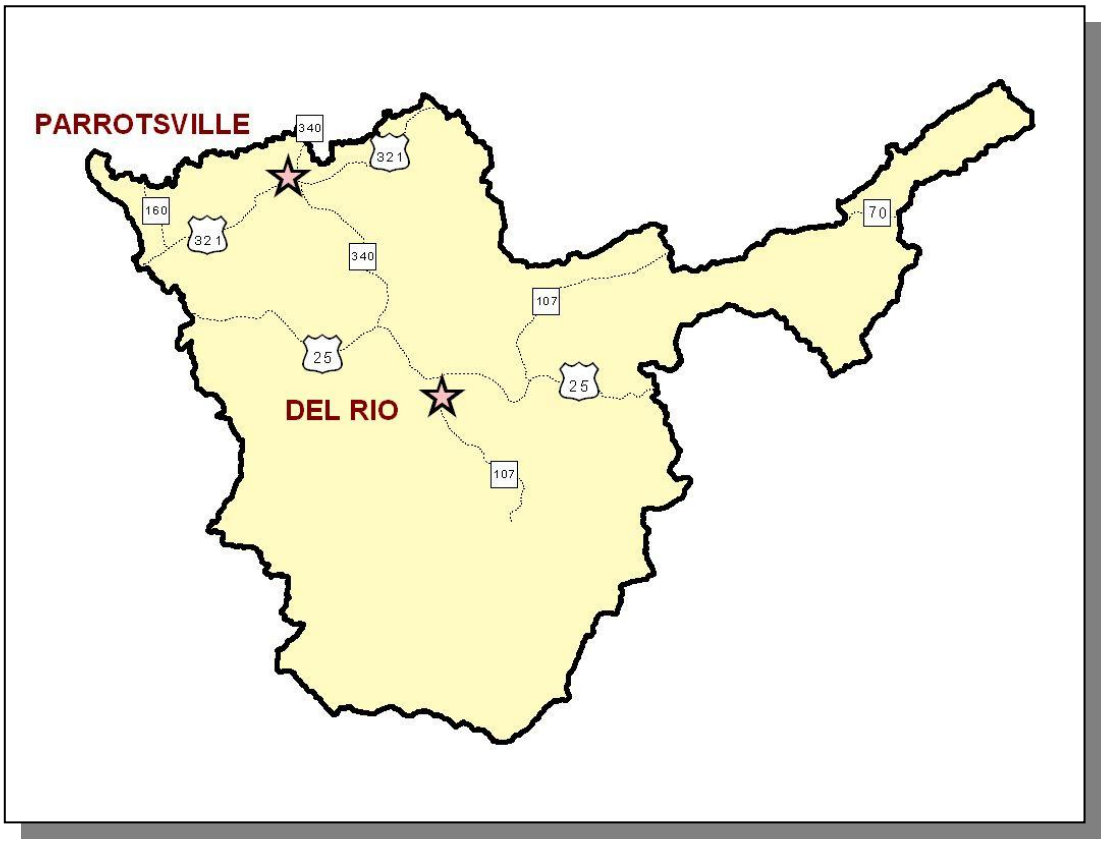

Figure 2-2. Communities and Roads in the Tennessee Portion of the Upper French Broad River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Del Rio	1,758	Cocke
Parrotsville	207	Cocke

Table 2-2. Municipalities in the Tennessee Portion of the Upper French Broad River Watershed. *Population based on 2000 census (Tennessee Blue Book) or http://www.hometownlocator.com. Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The Tennessee Portion of the Upper French Broad River Watershed, designated 06010105 by the USGS, is approximately 1,859 square miles (215 square miles in Tennessee) and drains to the French Broad River.

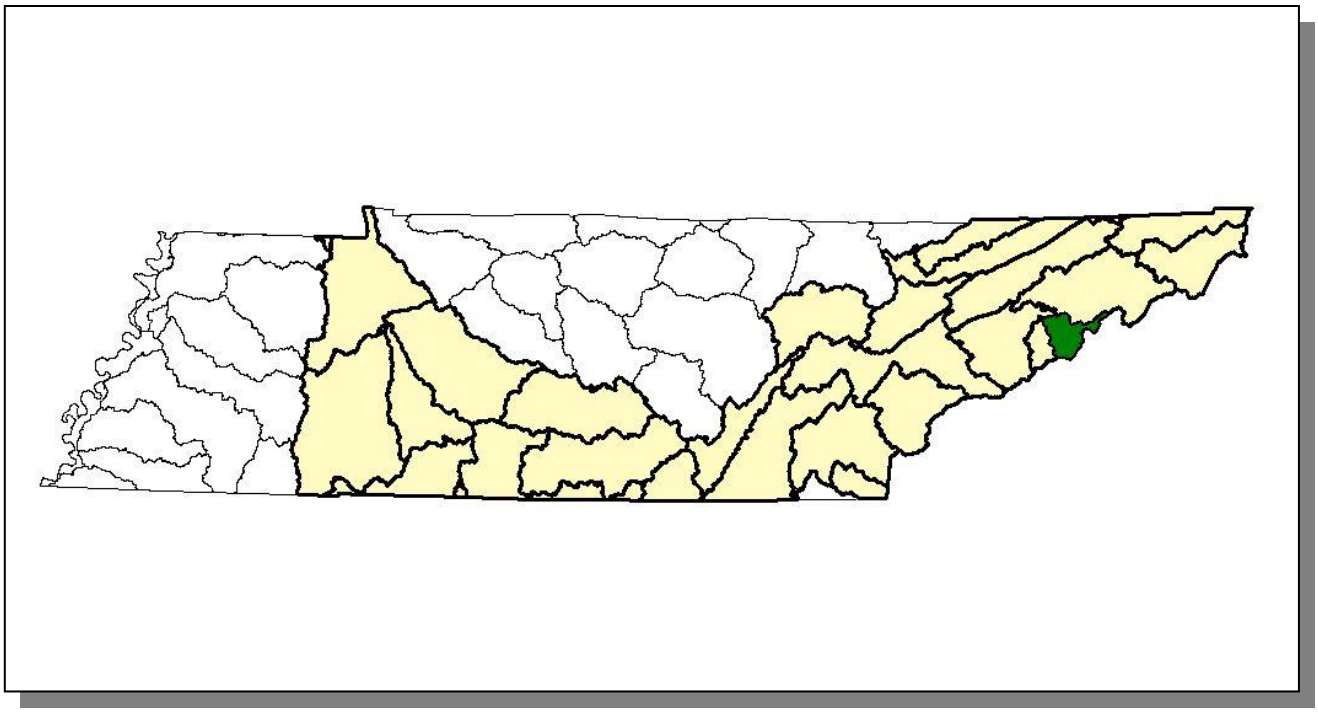

Figure 2-3. The Tennessee Portion of the Upper French Broad River Watershed is Part of the Tennessee River Basin.

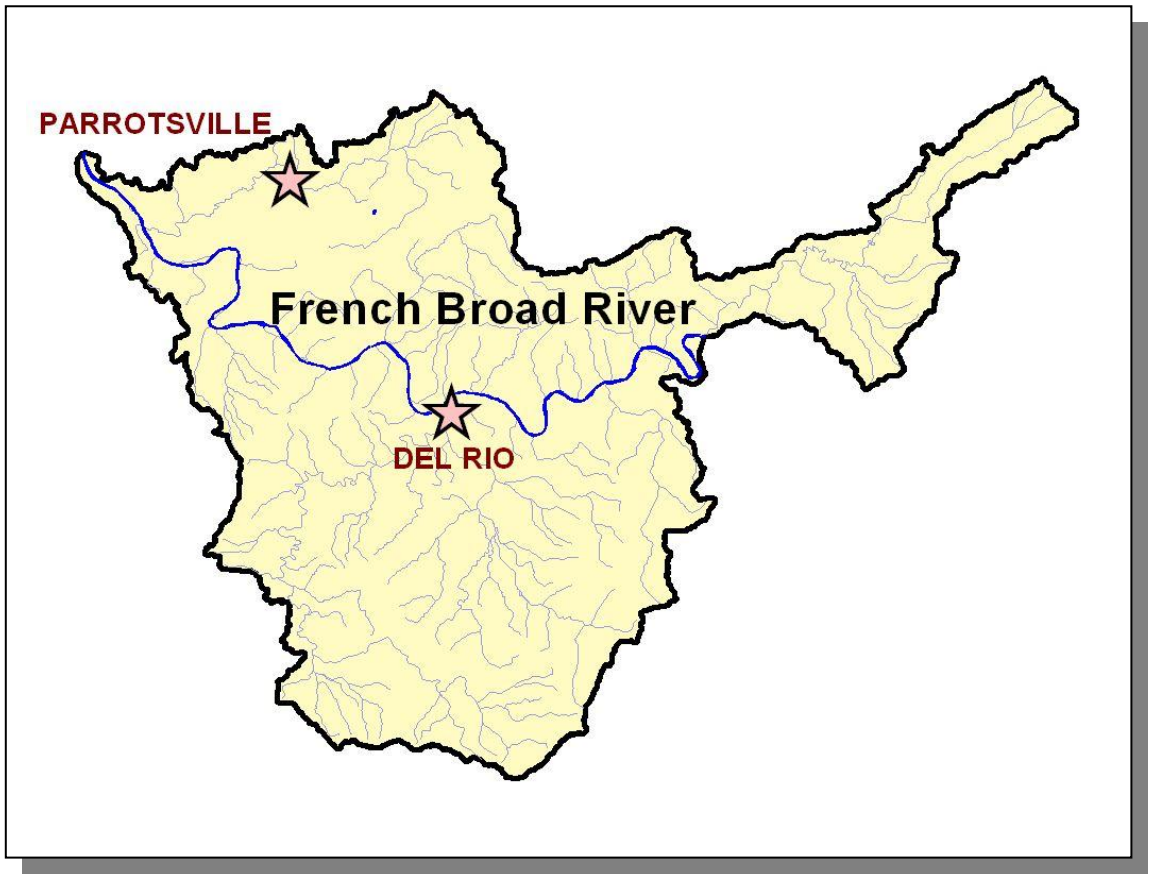

Figure 2-4. Hydrology in the Tennessee Portion of the Upper French Broad River Watershed. *There are 378 stream miles recorded in River Reach File 3 in the Tennessee Portion of the Upper French Broad River Watershed (2,958 total miles in the watershed). Location of the French Broad River, and the cities of Del Rio and Parrotsville are shown for reference.*

2.3.B. Dams. There are no dams inventoried by TDEC Division of Water Supply in the Upper French Broad River Watershed.

2.4. LAND USE. Land Use/Land Cover information was provided by EPA Region 4 and was interpreted from 2001 Multi-Resolution Land Cover (MRLC) satellite imagery.

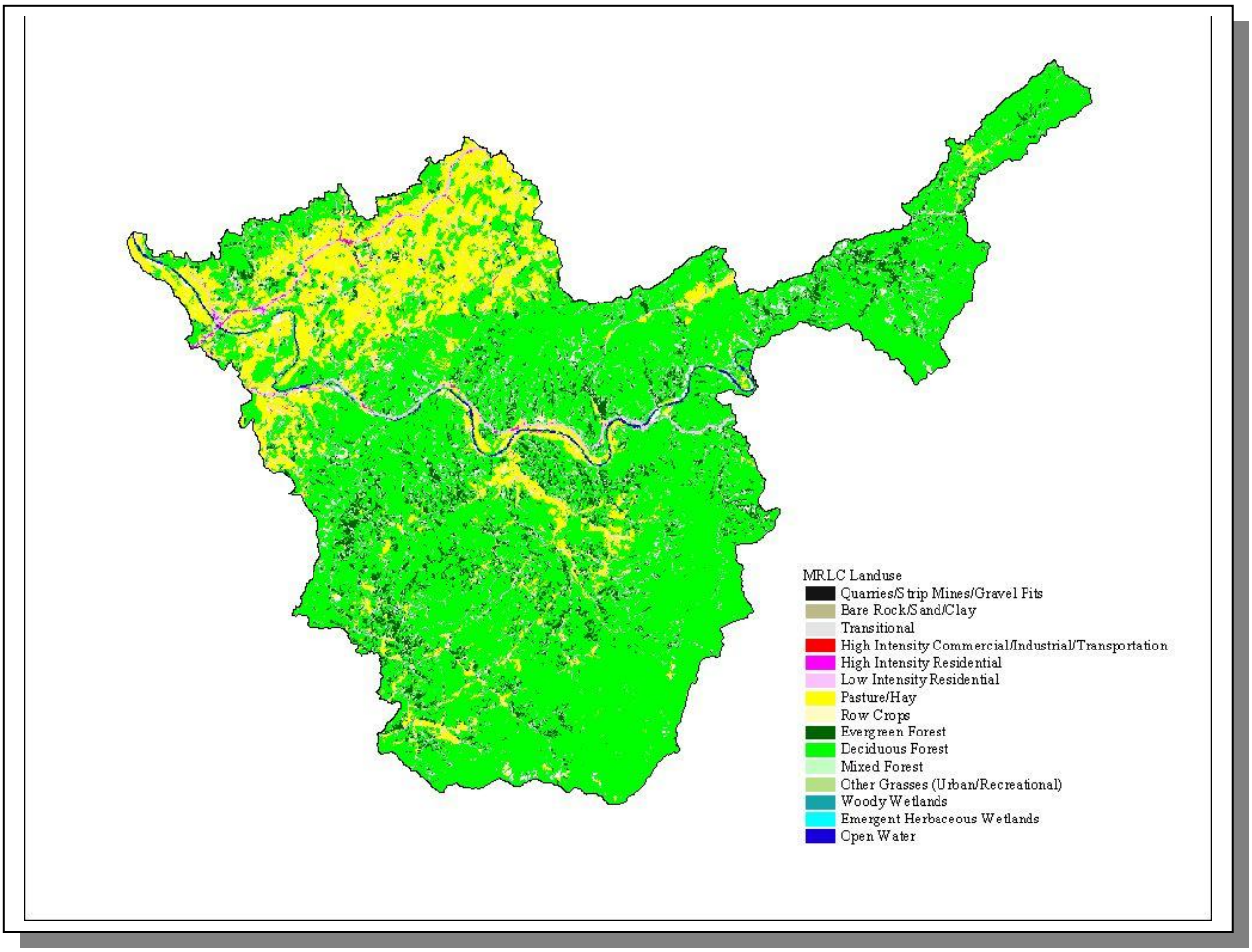

Figure 2-5. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

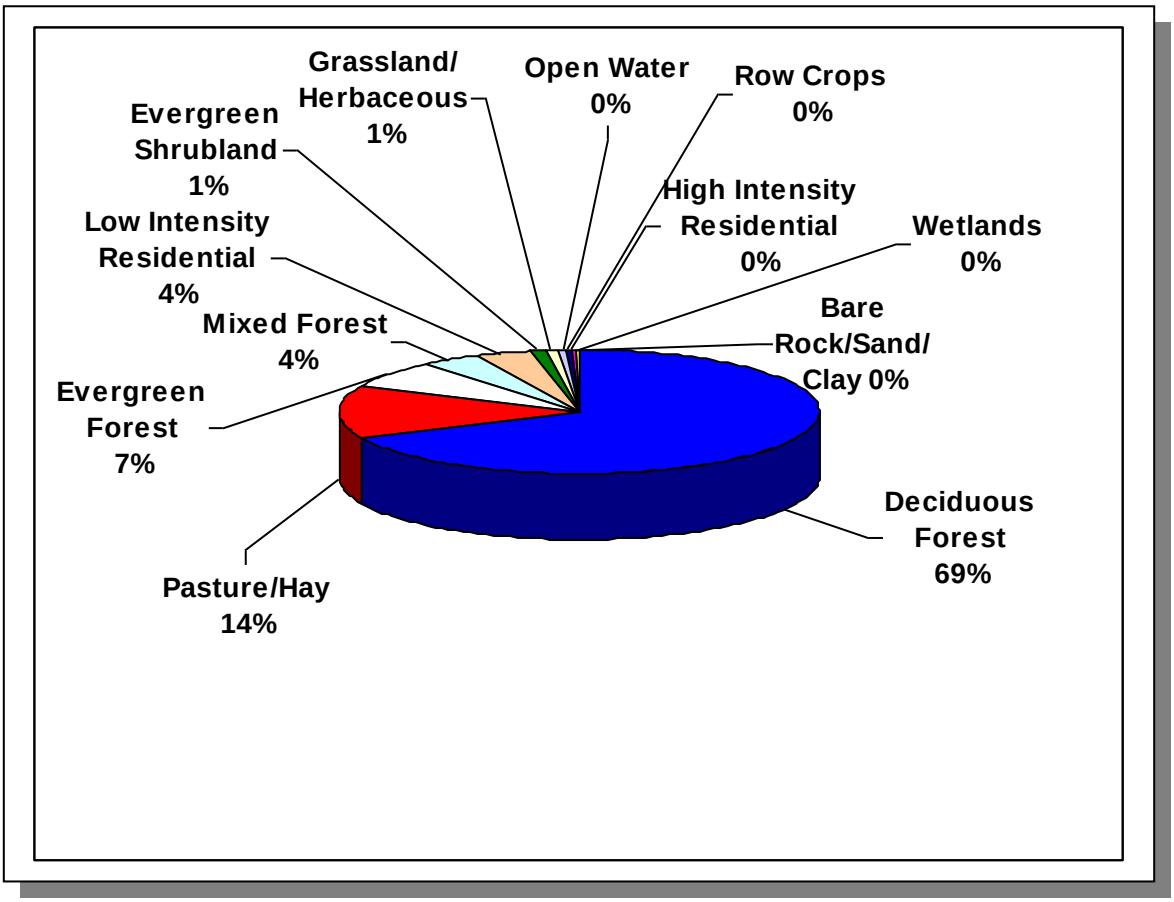

Figure 2-6. Land Use Distribution in the Tennessee Portion of the Upper French Broad River Watershed. *More information is provided in Appendix II.*

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

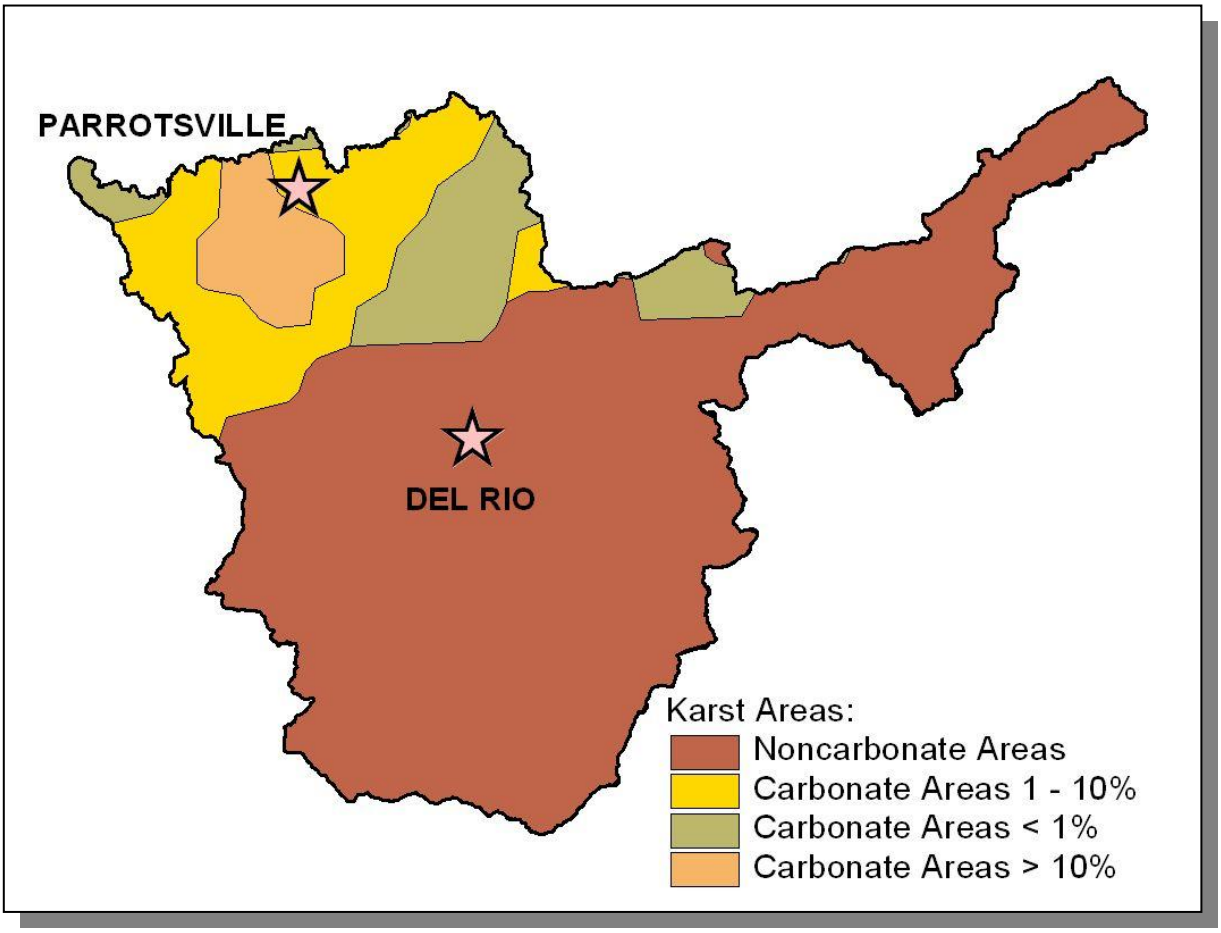

Figure 2-7. Illustration of Karst Areas in Tennessee Portion of the Upper French Broad River Watershed. *Locations of communities in the watershed are shown for reference.*

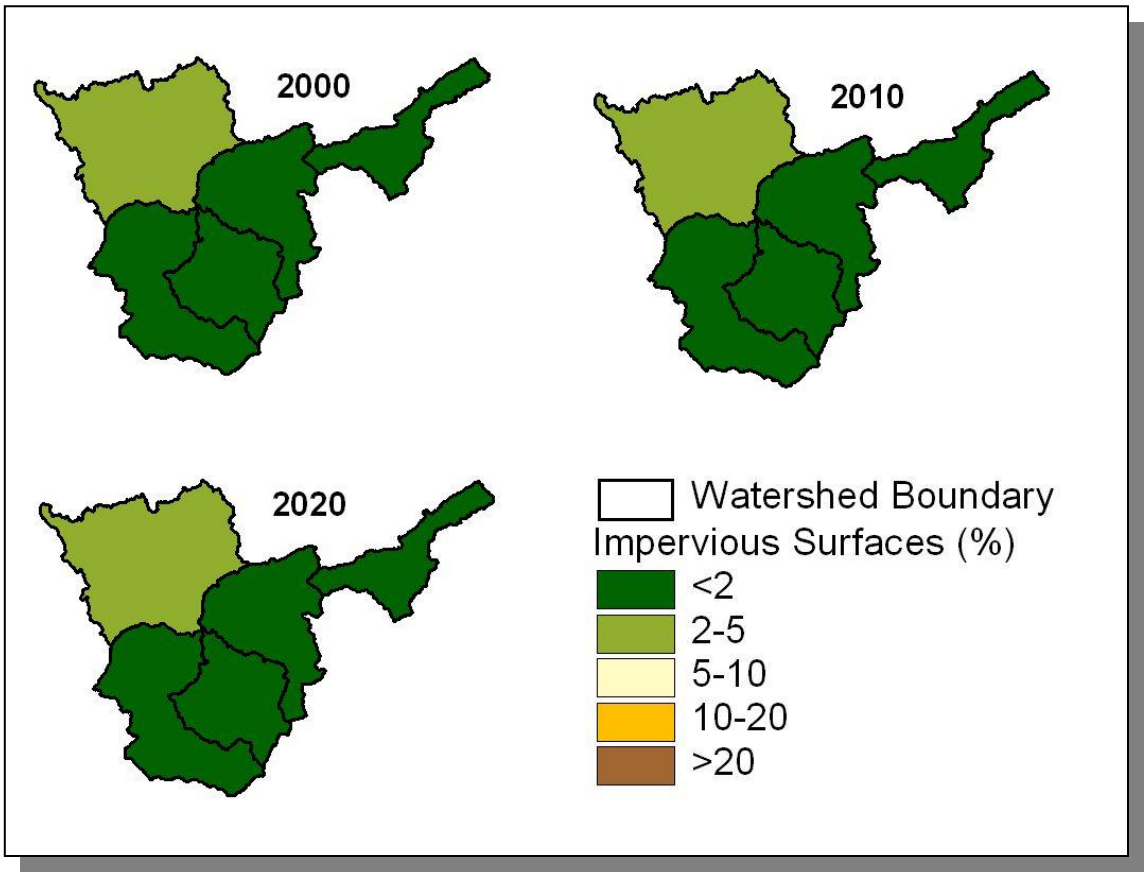

Figure 2-8. Illustration of Total Impervious Area in the Tennessee Portion of the Upper French Broad River Watershed. *All HUC-12 subwatersheds are shown. Current estimates and projected total impervious cover calculated by HUC-12 are provided by EPA Region 4. More information can be found at: http://www.epa.gov/ATHENS/research/impervious/.*

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

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Upper French Broad River Watershed lies within 2 Level III ecoregions (Blue Ridge Mountains and Ridge and Valley) and contains 5 Level IV subecoregions:

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

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

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

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

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

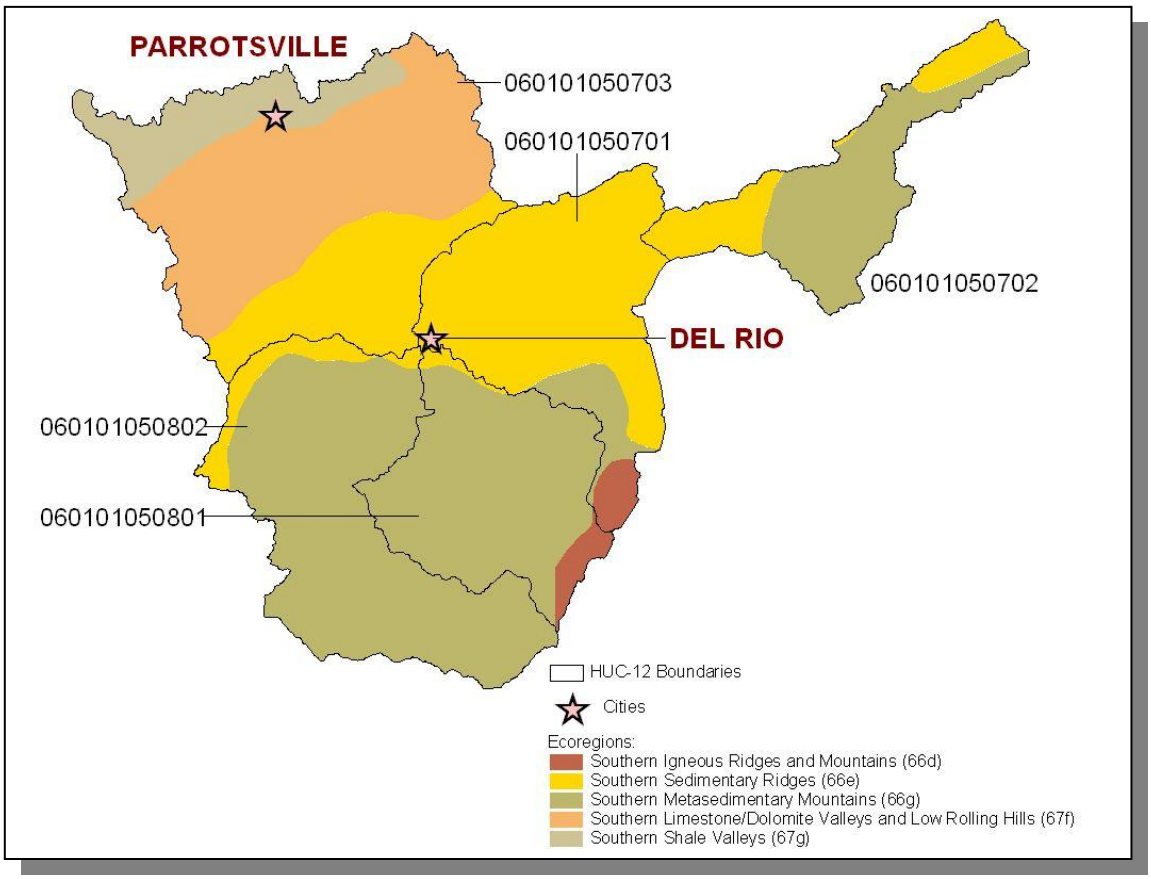

Figure 2-9. Level IV Ecoregions in the Tennessee Portion of the Upper French Broad River Watershed. *HUC-12 subwatershed boundaries and locations of Del Rio and Parrotsville are shown for reference.*

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

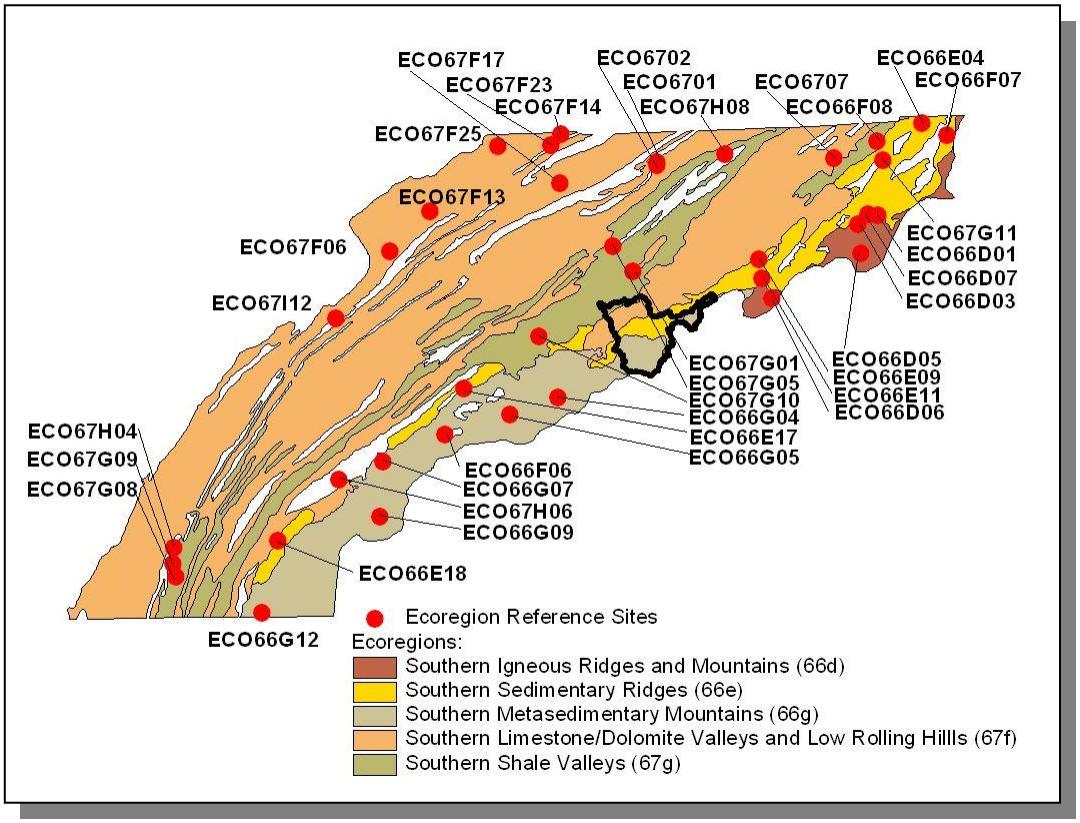

Figure 2-10. Ecoregion Monitoring Sites in Level IV Ecoregions 66d, 66e, 66g, 67f, and 67g. *The Tennessee Portion of the Upper French Broad River Watershed is shown for reference. More information, including which ecoregion reference sites were inactive or dropped prior to 06/01/2006, is provided in Appendix II.*

2.6. NATURAL RESOURCES.

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

GROUPING	NUMBER OF RARE SPECIES
Insects	1
Snails	3
Birds	1
Fish	2
Mammals	4
Plants	35
Total	**46**

Table 2-3. There are 46 Known Rare Plant and Animal Species in the Tennessee Portion of the Upper French Broad River Watershed.

In the Upper French Broad River Watershed, there are two known rare fish species and three known rare snail species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Carpiodes velifer	Highfin Carpsucker		D
Percina aurantiaca	Tangerine Darter		D
Stenotrema altispira	Highland Slitmouth		
Paravitrea lamellidens	Lamellate Supercoil		
Mesodon wheatleyi	Cinnamon Covert		

Table 2-4. Rare Aquatic Species in the Tennessee Portion of the Upper French Broad River Watershed. *State Status: D, Deemed in Need of Management by the Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/na/.*

2.6.B. Wetlands. The Division of Natural Areas 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/na/wetlands/

There are not any named wetland sites in the Upper French Broad River Watershed.

2.7. CULTURAL RESOURCES.

2.7.A. State Scenic River. Portions of the French Broad River are designated as a State Scenic River.

> **French Broad River** is designated as a Class III Developed River Area (That segment from the North Carolina state line to its confluence with Douglas Lake).

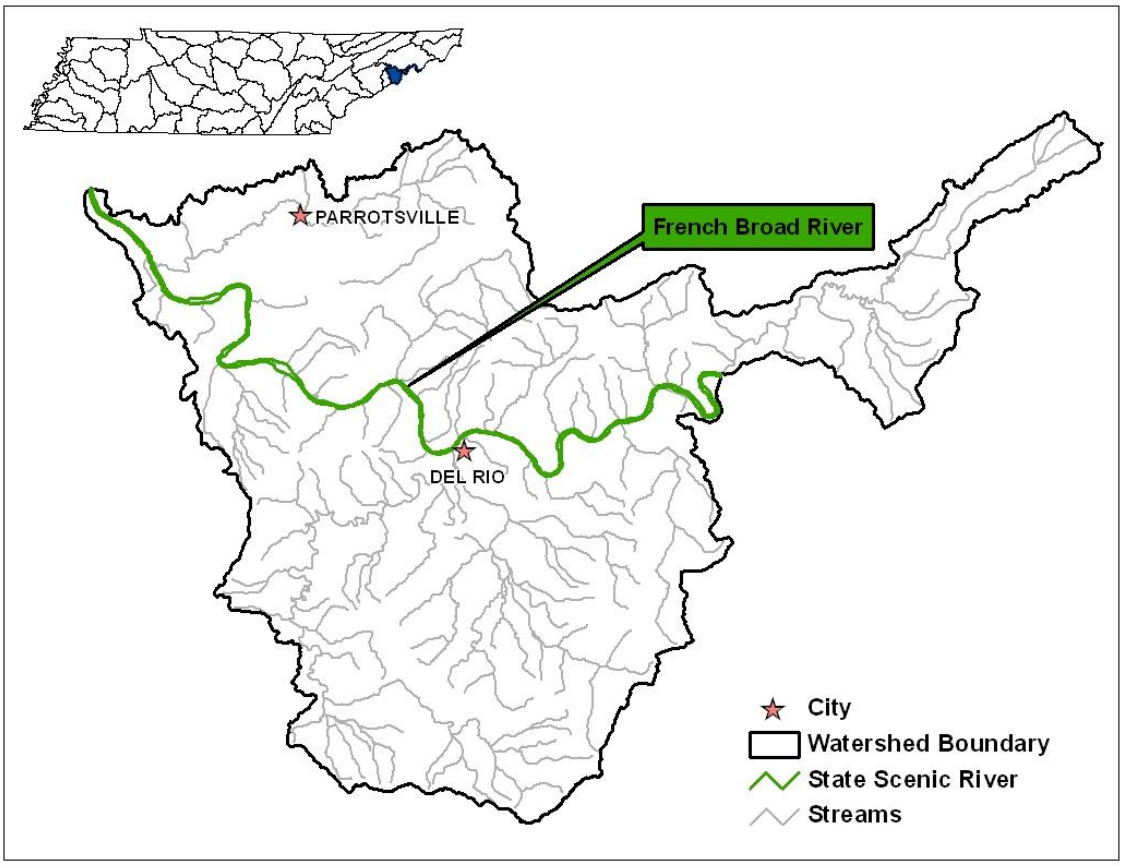

Figure 2-11. A Portion of the French Broad River (From the TN/NC State Line to the Confluence with Douglas Lake) is Designated as a State Scenic River*. Locations of Del Rio, and Parrotsville are shown for reference. More information can be found at: http://www.state.tn.us/environment/na/scenicrivers/.*

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

The most recent version of the Nationwide Rivers Inventory lists a portion of one river in the Upper French Broad Watershed:

> French Broad River (RM 0 to North Carolina State Line) is a mountainous stream with good whitewater and scenic gorge areas, numerous rock gardens, boulder beds, rapids, islands, and ledges. It has a diversity of flora and fauna and significant archaeological sites border the river.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE	HISTORIC	CULTURAL
French Broad	X	X	X	X	X	X	X

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

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

2.7.C. Public Lands. Some sites representative of the cultural heritage in the Upper French Broad River Watershed are under state or federal protection:

Cherokee National Forest is a 664,000-acre forest managed by the U.S. Department of Agriculture, Forest Service. More information may be found at: http://www.fs.fed.us/r8/cherokee/

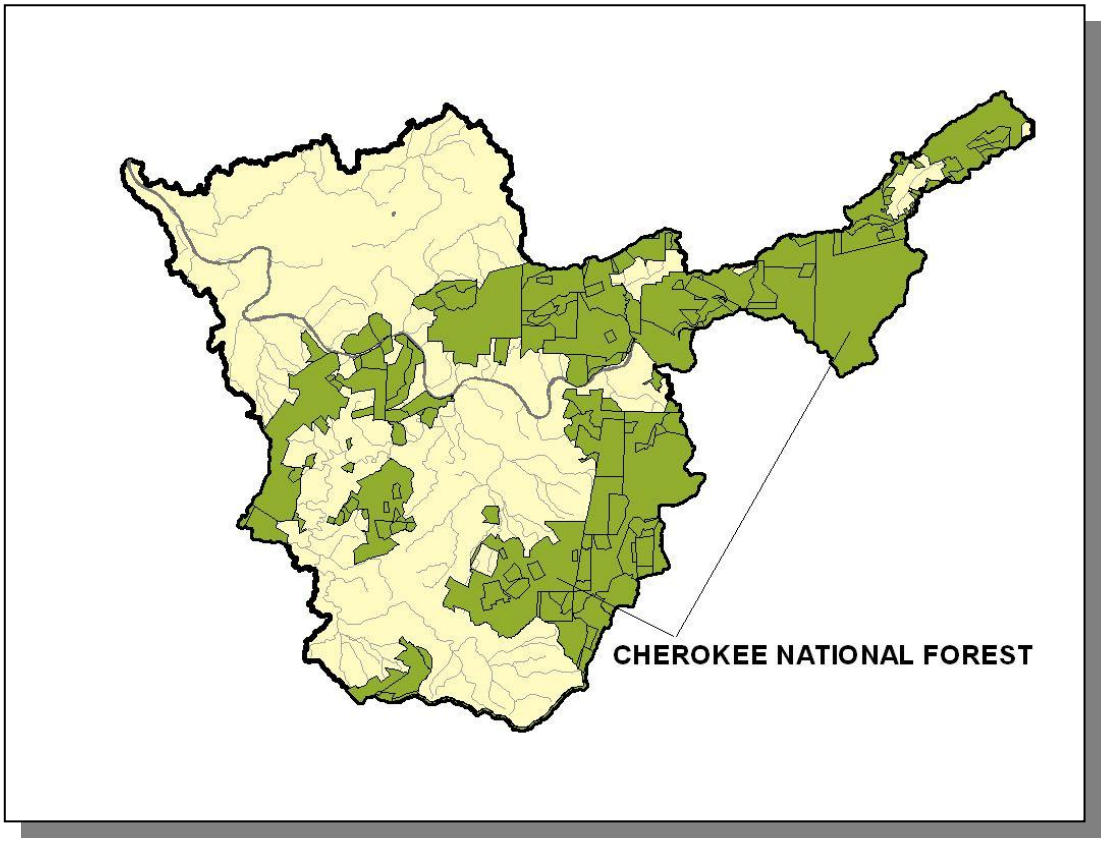

Figure 2-12. Public Lands in the Tennessee Portion of the Upper French Broad River Watershed. *Data are from Tennessee Wildlife Resources Agency.*

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

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

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Big Creek	3			Long Creek	3		
Clear Creek	4			Paint Creek	2		1
Dry Fork Branch Big Creek			1	Trail Fork Big Creek			
French Broad River	1,2	1	2	Wolf Fork French Broad River	1		1
Gulf Fork Big Creek	2		1				

Table 2-6. Tennessee Rivers Assessment Project Stream Scoring in the Upper French Broad River Watershed.

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

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