Chapter 1 -
Little Tennessee River Subbasin 04-04-01
Includes the Little Tennessee and Cullasaja River Watersheds

1.1 Water Quality Overview

Subbasin 04-04-01 at a Glance

Land and Water

Land area:	370 mi^2
Stream miles:	533.7
Lake acres:	150

Population Statistics

1990 Est. pop.:	21,008 people
Pop. density:	57 persons / mi^2

Land Cover (%)

Forest / Wetland:	89.1
Surface Water:	0.3
Urban:	0.9
Cultivated Crop:	0.9
Pasture / Managed Herbaceous:	8.8

The Little Tennessee River flows into North Carolina from Georgia in this subbasin. After passing through Franklin and Lake Emory, the river flows through a steep gorge and eventually into Fontana Lake (Subbasin 04-04-02). Major tributaries to the Little Tennessee River in this 35-mile reach include Cartoogechaye Creek and the Cullasaja River. Other streams include Coweeta, Iotla, Burningtown and Tellico Creeks. A map of this subbasin including water quality sampling locations is presented as Figure B-1.

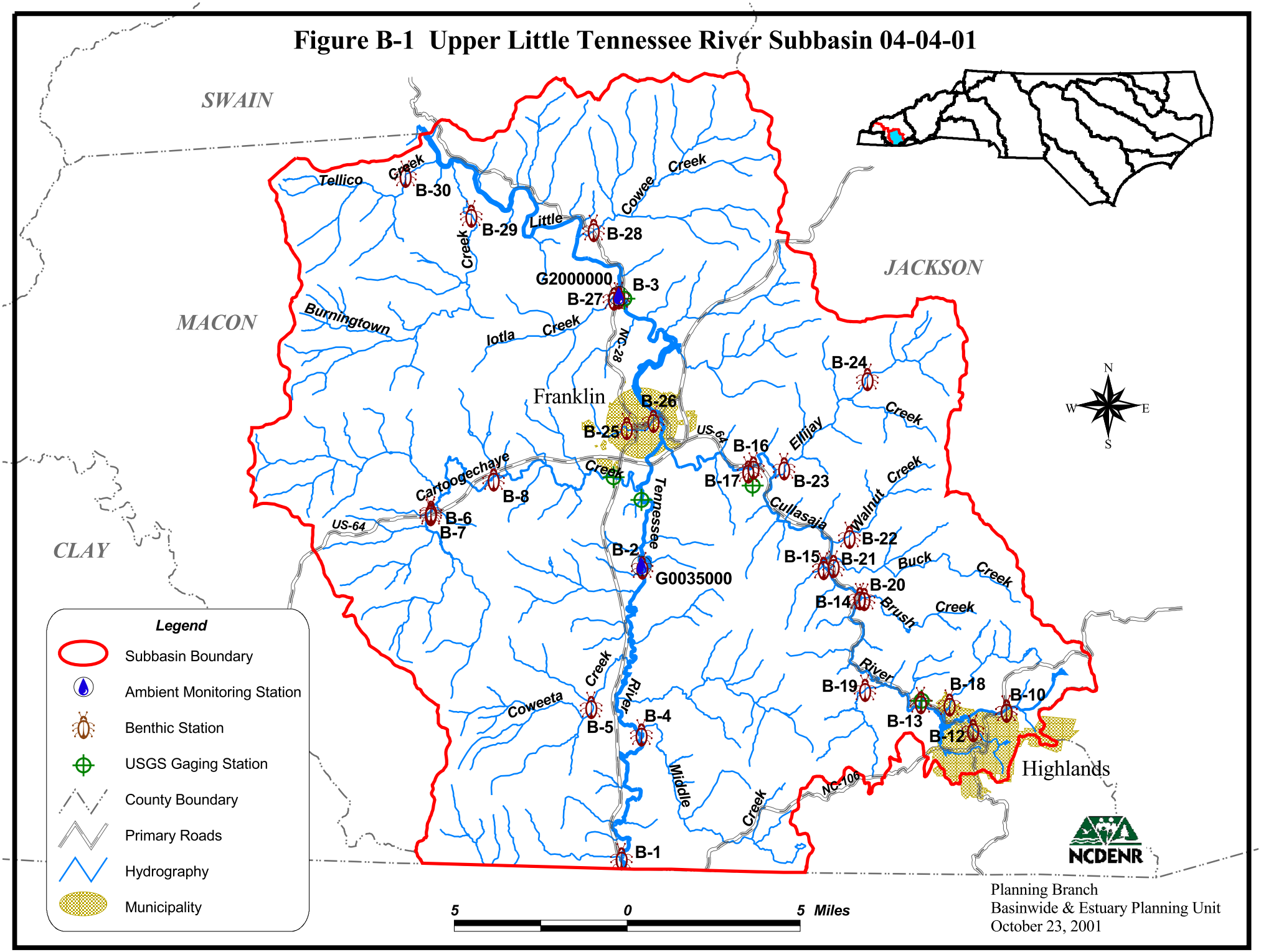
Bioclassifications for sample locations are presented in Table B-1. Use support ratings for each applicable category in this subbasin are summarized in Tables B-2 and B-3. Refer to Appendix III for a complete listing of monitored waters and further information about use support ratings.

Most of the land within this subbasin is forested (89 percent) and lies within the Nantahala National Forest. There are several major mountain ranges and most streams are high gradient and capable of supporting trout populations in the upper reaches. Lower reaches of many tributaries are in agriculture (primarily pastureland) or developed and are impacted to some extent by habitat degradation. The towns of Franklin and Highlands are the only large population centers in this subbasin.

Water quality in this subbasin is generally good and many streams are classified as trout waters. There are no High Quality Waters (HQW) or Outstanding Resources Waters (ORW). However, the Big Creek watershed and a portion of Rattlesnake Branch, both located near Highlands in the Cullasaja River watershed, are (respectively) WS-II and WS-I watersheds, which are, by definition, HQW. The Little Tennessee River, from Lake Emory dam to Fontana Lake, is one of four significant aquatic habitats in the basin, and the Cullasaja Gorge/Crow Creek Falls is a significant natural heritage area. Refer to Section A, Chapter 2 (page 43) for further information about these designations.

There are 14 permitted dischargers in this subbasin; the largest of which is the Franklin WWTP. Franklin WWTP is the only facility in this subbasin that is required to monitor the toxicity of its discharge. No significant compliance or toxicity problems were noted during the most recent review period.

Figure B-1 Upper Little Tennessee River Subbasin 04-04-01



Planning Branch
Basinwide & Estuary Planning Unit
October 23, 2001

Table B-1 DWQ Monitoring Locations and Benthic Macroinvertebrate Bioclassifications (1999) for Little Tennessee River Subbasin 04-04-01

Site(s)	Stream	County	Location	Bioclassification
Benthic Macroinvertebrates				
B-1*	Little Tennessee River	Macon	Off SR 1629	Fair
B-1*	Little Tennessee River (2000)	Macon	Off SR 1629	Fair
B-2*	Little Tennessee River	Macon	SR 1651	Good-Fair
B-3*	Little Tennessee River	Macon	NC 28	Good-Fair
B-4	Middle Creek	Macon	SR 1635	Good-Fair
B-5*	Coweeta Creek	Macon	SR 1115	Excellent
B-6	Cartoogechaye Creek (1996)	Macon	SR 1307	Excellent
B-7	Cartoogechaye Creek (1996)	Macon	SR 1307 – downstream	Good
B-8*	Cartoogechaye Creek	Macon	SR 1146	Excellent
B-10*	Cullasaja River	Macon	US 64 (above Mirror Lake)	Fair
B-13	Cullasaja River (1996)	Macon	Off US 64 (below Lake Sequoyah)	Good-Fair
B-14	Cullasaja River	Macon	Off US 64 (at Jackson Hole)	Excellent
B-15*	Cullasaja River	Macon	SR 1678	Excellent
B-16	Cullasaja River (1996)	Macon	US 64/SR 1524	Good
B-17	Cullasaja River	Macon	US 64/SR 1668	Excellent
B-12*	Mill Creek	Macon	Below old WWTP	Fair
B-18	Big Creek	Macon	Above Highlands WTP	Excellent
B-19	Turtle Pond Creek	Macon	SR 1620	Excellent
B-20	Brush Creek	Macon	Near mouth/US 64	Excellent
B-21	Buck Creek	Macon	NC 28	Excellent
B-22	Walnut Creek	Macon	SR 1533	Good
B-23	Ellijay Creek	Macon	SR 1524	Excellent
B-24	North Prong Ellijay Creek	Macon	SR 1001	Excellent
B-25	Crawford Branch	Macon	Franklin Memorial Park	Not Rated
B-26	Crawford Branch	Macon	E. Main Street	Not Rated
B-27*	Iotla Creek	Macon	SR 1372	Good
B-28*	Cowee Creek	Macon	NC 28	Good
B-29*	Burningtown Creek	Macon	SR 1371	Excellent
B-30*	Tellico Creek	Macon	SR 1367	Excellent
Ambient Monitoring				
G0130000	Cartoogechaye Creek	Macon		N/A
G2000000	Little Tennessee River	Macon	At Iotla	N/A

* Historical data are available; refer to Appendix II.

Benthic Macroinvertebrates

Water quality of rivers and streams in this subbasin is generally good; however, benthic macroinvertebrate monitoring did reveal impacts to aquatic life in some streams. Sixteen of the 24 sites (67 percent) sampled by DWQ in 1999 were assigned a Good or an Excellent benthic macroinvertebrate bioclassification. The Little Tennessee River near the Georgia state line received a Fair bioclassification, both in 1999 and during a resampling event in 2000. Special studies in 1999 also found Fair water quality in the Cullasaja River above Mirror Lake and Mill Creek in the Town of Highlands and water quality impacts in Crawford Branch in the Town of Franklin. Portions of the Little Tennessee River, Cullasaja River and Mill Creek are impaired and are discussed in greater detail below.

The Fair bioclassification for the Little Tennessee River near the NC/GA state line represents a decline from the Good-Fair found in 1994. The next site (downstream) at Prentiss was assigned a Good-Fair bioclassification in 1999. Benthic macroinvertebrates had not been sampled at this site by DWQ since 1987 (Good-Fair). The Little Tennessee River at Iotla is below Franklin and Lake Emory. This site was also assigned a Good-Fair bioclassification in 1999. This portion of the Little Tennessee River has consistently received a Good-Fair since 1983.

Of the six tributary streams sampled for benthic macroinvertebrates during this basin monitoring cycle, four showed considerable improvement from 1994 ratings. Cowee Creek and Iotla Creek improved from Good-Fair to Good, while Burningtown Creek and Cartoogechaye Creek improved from Good to Excellent. Extremely high flows in 1994 prior to sample collection, and the increased nonpoint source pollution that accompanies them, most likely caused the lower bioclassifications. Coweeta Creek and Tellico Creek were both Excellent in 1994 and 1999.

The Cullasaja River watershed was given special attention in 1999 at the request of DWQ Asheville Regional Office staff. Benthic macroinvertebrates were sampled at four mainstem river sites and seven tributaries. All Cullasaja River sites downstream of Highlands were Excellent, as were Big Creek, Brush Creek, Buck Creek, Ellijay and North Prong Ellijay Creeks, and Turtle Pond Creek. Walnut Creek received a Good bioclassification. These tributaries were all sampled by DWQ for the first time. Prior data have been collected from the Cullasaja River, and no substantial changes in water quality have been observed since the river was first sampled in 1990.

Ambient Monitoring

Water chemistry samples are collected monthly from three locations in this subbasin: the Little Tennessee River at Prentiss (near Middle Creek); the Little Tennessee River at Iotla; and Cartoogechaye Creek. Turbidity, fecal coliform, copper and iron occasionally exceeded reference levels. These data are primarily associated with large rainfall events and represent relatively minor water quality concerns.

Lakes Assessment

Lake Sequoyah, an impoundment of the upper Cullasaja River near the Town of Highlands, is the only lake sampled by DWQ in this subbasin between 1994 and 1999. Much of the lake's

watershed is developed; however, an upstream impoundment, Mirror Lake, traps some sediment (and associated pollutants) before it reaches Lake Sequoyah. Samples collected in 1999 reflected mesotrophic to eutrophic lake conditions. Seven algal species found in the samples are known to contribute to taste and odor problems in drinking water. There have been no recently reported problems with low dissolved oxygen, nuisance aquatic macrophytes or algal blooms in the lake.

For more detailed information on sampling and assessment of streams and lakes in this subbasin, refer to the *Basinwide Assessment Report – Little Tennessee River Basin* (NCDENR-DWQ, April 2000), available from DWQ Environmental Sciences Branch at http://www.esb.enr.state.nc.us/bar.html or by calling (919) 733-9960.

Table B-2 Use Support Ratings Summary (2000) for Monitored Lakes (acres) in Little Tennessee River Subbasin 04-04-01

Use Support Category	FS	PS	NS	Total[1]
Aquatic Life/Secondary Recreation	150	0	0	150
Fish Consumption	150	0	0	150
Primary Recreation	0	0	0	0
Water Supply	0	0	0	150

Table B-3 Use Support Ratings Summary (2000) for Monitored and Evaluated Freshwater Streams (miles) in Little Tennessee River Subbasin 04-04-01

Use Support Category	FS	PS	NS	NR	Total[1]
Aquatic Life/Secondary Recreation	406.0	6.7	0	121.0	533.7
Fish Consumption	533.7	0	0	0	533.7
Primary Recreation	24.0	0	0	41.3	65.3
Water Supply	85.5	0	0	0	85.5

[1] Total stream miles/acres assigned to each use support category in this subbasin. Column is not additive because some stream miles are assigned to more than one category.

1.2 Status and Recommendations for Previously Impaired Waters

This section reviews use support and recommendations detailed in the 1997 basin plan, reports status of progress, gives recommendations for the next five-year cycle, and outlines current projects aimed at improving water quality for each water. The 1997 Little Tennessee River Basin Plan identified two impaired waters in this subbasin: Cullasaja River and Mill Creek. These stream segments are discussed in further detail below.

1.2.1 **Cullasaja River** (4.8 miles from the source to SR 1545)
Mill Creek (1.4 miles from the source to Mirror Lake)

1997 Recommendations

Poor and Fair benthic macroinvertebrate bioclassifications were found in the Cullasaja River upstream of Lake Sequoyah and Mill Creek during the 1990s. The 1997 Little Tennessee River Basin Plan identified sedimentation from a combination of urban land uses in the Highlands area including roads, residences, golf courses, construction sites and commercial businesses, many of which are directly adjacent to the river as the primary cause of impairment. Recommendations were for local, long-term urban planning and installation of best management practices to control erosion and impacts from stormwater runoff. The Town of Highlands' Soil and Erosion Control Ordinance and Subdivision Regulations, passed in 1995, were applauded. Implementation and enforcement of these and other rules, including a local water supply watershed ordinance, designed to minimize the impacts of future growth were encouraged. The 1997 basin plan also recognized that restoration efforts may be needed to return full use to this segment of stream.

Status of Progress

The Cullasaja River watershed was given special attention by DWQ biologists in 1999. Benthic macroinvertebrates were sampled at four mainstem river sites and seven tributaries. All Cullasaja River sites downstream of Highlands were Excellent, as were Big Creek, Brush Creek, Buck Creek, Ellijay and North Prong Ellijay Creeks, and Turtle Pond Creek. Walnut Creek received a Good bioclassification. Both the Cullasaja River and Mill Creek upstream of Lake Sequoyah again received Fair benthic macroinvertebrate bioclassifications and are only partially supporting aquatic life. DWQ biologists concluded that no substantial changes in water quality have been observed since the river was first sampled in 1990.

In 1999, the Asheville Regional Water Quality Supervisor initiated an outreach effort in the Cullasaja River watershed as part of a project for the Natural Resource Leadership Institute. The objective of the effort was to assemble various stakeholders within the watershed to share water quality concerns and to develop recommendations that could be incorporated into the revised basinwide plan for the Little Tennessee River basin. Four workgroups formed as part of this process and recommendations from each group were presented to the Little Tennessee River basin planner in March 2001 prior to the initial drafting of this document (Appendix V).

Between 2000 and 2002, DWQ conducted, with financing from the Clean Water Management Trust Fund, a water quality assessment of the upper Cullasaja River watershed (includes Mill Creek). The goal of the assessment was to provide the foundation for future water quality restoration activities in the watershed by: identifying the most likely causes of biological impairment; identifying the major watershed activities and pollution sources contributing to those causes; and outlining a general watershed strategy that recommends restoration activities and BMPs to address the identified problems.

The assessment determined that prevention of downstream colonization of benthic macroinvertebrates and fish by dams on the Cullasaja River and its tributaries is the key component of impairment in the upper Cullasaja River. A secondary problem contributing to impairment is the lack of organic microhabitat in the form of leafpacks, sticks and large wood. Lower flow below dams during dry months and increased temperature and lower dissolved

oxygen of water flowing out of the impoundments are also impacting the aquatic communities during dry periods or for localized areas.

For Mill Creek, no primary or "key" contributor could be identified over the two-year period; however, toxicants from urban runoff, including metals, pesticides and other organic pollutants, are likely important. In addition, the lack of organic microhabitat (upstream of the Town of Highlands' center), scour from storm flows (downstream of the Town of Highlands' center), and the lack of colonization sources for benthic macroinvertebrates were also documented.

2002 Recommendations

For the upper Cullasaja River, a strategy to reduce the impacts of dams in the Wildcat Cliffs Country Club, the Cullasaja Club and the Highlands Falls Country Club should be developed, including a plan for access to unimpounded sources of benthic macroinvertebrate communities. If the latter half of the recommendation is not addressed, the recovery potential for the upper Cullasaja River is limited and other strategies discussed will have minimal impacts. Golf course communities (residential areas and golf courses) should plant wooded buffers along cleared streams where practical, and large woody debris and rock clusters should be placed in the stream channel where wooded buffers are not planted. Nutrient and pesticide management should be reexamined for the three golf course communities and a management plan that supports conservative use of these substances should be developed. Developers of roads and home sites should be encouraged to implement and strictly maintain BMPs that control erosion in steep areas, quickly stabilizing bare areas with vegetation and limiting development of steeper slopes. Refer to Section A, Chapter 4 for further information about mountain development, impacts of dams and impacts from golf courses.

For Mill Creek, further monitoring of toxicants and sources of toxicants should be conducted in the Mill Creek watershed. In addition, the source of high levels of semi-volatile organic contaminants in the main stormwater tributary to Mill Creek should be determined and remediated; the underground storage tank sites at the Town of Highlands' maintenance facility should be reevaluated to determine impacts on local tributaries and remediated as necessary; illicit connections to the stormwater system of Mill Creek should be pinpointed and eliminated; stormwater retrofits should be constructed to control the quantity and quality of stormwater delivered to Mill Creek; and DWQ should consider designating the Town of Highlands as a jurisdiction to which the Phase II stormwater rules apply. For details about these and other recommendations for the Mill Creek watershed, refer to *Assessment Report: Biological Impairment in the Upper Cullasaja River Watershed* (DWQ-WARP, 2002).

Current Water Quality Improvement Projects

Formed in 1999 as a local, citizen-based watershed organization for the upper Cullasaja River watershed on the Highlands Plateau, the Upper Cullasaja Watershed Association (UCWA) has successfully initiated a wide range of water resource quantity and quality projects. Refer to page 121 for more information. Additionally, the Town of Highlands adopted an erosion and sediment control ordinance in 1992 and a watershed buffer plan and ordinance in 1994. Section C (page 124) contains details.

1.3 Status and Recommendations for Newly Impaired Waters

One additional stream segment in this subbasin was rated as impaired based on recent DWQ monitoring (1994-1999): Little Tennessee River from the NC/GA state line to the confluence with Mulberry Creek. Impacts to many streams from narrow riparian buffer zones, sedimentation and moderate to severe bank erosion were observed. Part 1.5 below discusses specific streams where these impacts were observed.

1.3.1 Little Tennessee River (2.2 miles from the NC/GA state line to Mulberry Creek)

1997 Recommendations

The Little Tennessee River near the NC/GA state line was first sampled by DWQ in 1994. The stream received a Good-Fair benthic macroinvertebrate bioclassification and was rated support threatened. The watershed above this sample site in Georgia contains several NPDES permitted discharges; however, the land use is primarily agricultural. Many streams have been channelized historically and have little riparian vegetation. The 1997 basinwide plan recommended better communication between the NC Department of Environment and Natural Resources (NCDENR) and the Georgia Environmental Protection Division (EPD) to assure that appropriate NPDES limits are established and enforced in order to maintain water quality and improve water quality in this portion of the Little Tennessee River.

Current Status

In August 1999 and September 2000, samples from this site resulted in a Fair bioclassification. Specific conductivity values ranged from 350-427 umhos/cm suggesting impacts from point sources upstream. Biologists also reported eroding streambanks, heavily embedded substrate, few riffle areas and little mature riparian vegetation. Data indicated possible toxicity problems and low dissolved oxygen conditions, but not severe organic loading. DWQ suspects that the source of these problems is the Fruit of the Loom facility just over the state line in Georgia. Currently, this portion of the Little Tennessee River is only partially supporting aquatic life/secondary recreation.

2002 Recommendations

DWQ has been working to establish a better relationship with Georgia EPD. The Little Tennessee River from Dillard to the GA/NC state line is on the Georgia 303(d) list. The "action to alleviate" water quality problems in the stream in Georgia is for EPD to "address nonpoint sources (urban runoff) through a watershed protection strategy". In 1993, Georgia began a River Basin Management Planning approach. River Basin Watershed Protection Plans have been developed for five of Georgia's fourteen river basins (http://www.state.ga.us/dnr/environ/ scroll down and click on "Georgia's Environment"). However, the draft "Tennessee River Basin Management Plan" that would cover streams flowing into NC will not be available until mid-2004.

DWQ has recently requested information from the Georgia EPD regarding NPDES permit limits and compliance records for facilities in the Little Tennessee River basin upstream of this site (specifically Fruit of the Loom). DWQ will follow-up with GA EPD until this information is received and the facility is in compliance with its NPDES permit. However, local

implementation of nonpoint source pollution BMPs is also needed throughout the Little Tennessee River watershed, both in North Carolina and Georgia.

1.4 303(d) Listed Waters

There are two stream segments (6.2 stream miles) in this subbasin that are impaired and on the state's year 2000 303(d) list. Segments of the Cullasaja River and Mill Creek are discussed above. Refer to Appendix IV for more information on the state's 303(d) list and listing requirements.

1.5 Other Water Quality Concerns and Recommendations

Based on DWQ's most recent use support assessment, the surface waters discussed in this section are not impaired. However, notable water quality impacts were documented during this process. While these waters are not considered impaired, attention and resources should be focused on them over the next basinwide planning cycle to prevent additional degradation or facilitate water quality improvement. A discussion of how impairment is determined can be found on page 51.

Although no action is required for these streams, voluntary implementation of BMPs is encouraged and continued monitoring is recommended. DWQ will notify local agencies and others of water quality concerns discussed below and work with them to conduct further monitoring and to locate sources of water quality protection funding. Additionally, education on local water quality issues is always a useful tool to prevent water quality problems and to promote restoration efforts. Nonpoint source agency contacts are listed in Appendix VI.

1.5.1 Crawford Branch

Crawford Branch is a relatively small tributary of the Little Tennessee River that flows through downtown Franklin. Based on 1988-1989 aerial photography, urban residential land use comprised 41 percent of the watershed; 29 percent was forest; commercial/industrial uses made up 14 percent; and 10 percent was pastureland. Much growth has occurred in the more recent ten-year period, and additional forest and pasturelands have been converted to residential and commercial land uses. Approximately 55 percent of the watershed is within the corporate limits of Franklin, and 75 percent is under the jurisdiction of the town's zoning ordinance. Much of the remaining 25 percent, under Macon County's land use jurisdiction (not zoned), is already platted for mountain subdivision development (Land-of-Sky, January 2001).

DWQ biologists sampled benthic macroinvertebrates at two sites on Crawford Branch in 1999. The stream is too small to assign a bioclassification using current criteria; however, the community clearly indicated severe stress at the most downstream site on East Main Street (only seven of the pollution intolerant indicator species). The stream is in better condition upstream at Franklin Memorial Park (24 pollution intolerant indicator species). There are no permitted discharges to Crawford Branch. Nonpoint sources of pollution include underground storage tanks, urban runoff and sedimentation from construction sites.

Even though this stream is not rated by DWQ, there are obvious impacts to water quality in Crawford Branch. The Little Tennessee Nonpoint Source Team (refer to page 39 for further information) allocated $23,000 of a $100,000 grant toward the development of a watershed management plan to improve water quality in Crawford Branch. Eight potential sites for installation of nonpoint source pollution BMPs were identified as part of the management options outlined in the *Crawford Branch Watershed Management Plan* (Land-of-Sky, January 2001). The Little Tennessee Nonpoint Source Team, with cooperation from Macon County, is currently working to construct a stormwater demonstration project on one of the eight sites. DWQ encourages local governments, the Little Tennessee Watershed Association, local nonpoint source pollution agencies and citizens to implement the entire *Crawford Branch Watershed Management Plan* to improve water quality in Crawford Branch and the Little Tennessee River.

1.6 Additional Issues within this Subbasin

The previous part discussed water quality concerns for specific stream segments. This section discusses water quality issues related to multiple watersheds within subbasin 04-04-01.

1.6.1 Projected Population Growth

From 2000 to 2020, estimated population growth for Macon County is 37. Growth management within the next five years will be imperative in order to maintain good water quality in this subbasin. Growth management can be defined as the application of strategies and practices that help achieve sustainable development in harmony with the conservation of environmental qualities and features of an area. On a local level, growth management often involves planning and development review requirements that are designed to maintain or improve water quality.

Local Ordinances

The Town of Highlands adopted an erosion and sediment control ordinance in 1992 and a watershed buffer plan and ordinance in 1994. The erosion and sediment control ordinance applies to any land-disturbing activities of one acre or greater and sets rules to reduce site erosion, limits the slope of land that can be disturbed, and stipulates revegetation of exposed slopes. Highlands is a locally delegated program, and therefore, has the ability to enforce the ordinance on behalf of the state. Sediment control within riparian buffers are required for any land-disturbing activity adjacent to streams and lakes and a buffer width of 25 feet is established for disturbance adjacent to classified trout waters (Tr). The ordinances also provide requirements for stormwater outlet protection, borrow and waste areas, access and haul roads, operations in lakes or natural watercourses, existing uncovered areas, and design and performance standards for activities adjacent to classified high quality waters (HQW).

Macon County recently adopted an erosion and sediment control ordinance also, which builds on the current program administered by the State. An Erosion and Sediment Control Plan must be submitted if one half of an acre of land (or more) is disturbed, rather than the one acre minimum set by the state program. The Macon County ordinance also includes incentives for contractors that attend a Clear Water Contractor training course. The county has also proposed a general Land Use Ordinance.