Chapter 5 -
French Broad River Subbasin 04-03-05
Includes Pigeon River, East and West Fork Pigeon River and Richland, Jonathans, Crabtree and Cataloochee Creeks

5.1 Water Quality Overview

Subbasin 04-03-05 at a Glance

Land and Water Area (sq. mi.)

Total area:	532
Land area:	531
Water area:	1

Population Statistics

1990 Est. Pop.:	43,746 people
Pop. Density:	82 person/mi^2

Land Cover (%)

Forest/Wetland:	84%
Surface Water:	<1%
Urban:	1%
Cultivated Crop:	<1%
Pasture/ Managed Herbaceous:	14%

Use Support Ratings

Freshwater Streams:

Fully Supporting:	612.1 miles
Partially Supporting:	9.4 miles
Not Supporting:	0.0 miles
Not Rated:	155.6 miles

Lakes:

Allen Creek Reservoir – Fully Supporting
Lake Junaluska – Fully Supporting
Walters Lake – Fully Supporting

This subbasin includes undeveloped land within the Great Smoky Mountains National Park, Pisgah National Forest, Pisgah Game Lands and the Shining Rock Wilderness area. The largest urban areas are Waynesville, Lake Junaluska, Clyde and Canton. A map of this subbasin, including water quality sampling locations, is presented in Figure B-5. Overall biological ratings are presented in Table B-5.

The Pigeon River near Canton has been intensively sampled since the 1960s, when very poor water quality was found below Champion Paper's (now Blue Ridge Paper Products) discharge to the Pigeon River near Canton. Studies by DWQ in 1978-1980 showed water quality improvements, but the river was still impaired. Consultants to Champion Paper conducted extensive studies of the Pigeon River and tributaries, most recently in 1995 (EA, 1996). CP&L biologists have studied the Pigeon River near Walters Lake. These investigations generally agree that water quality has improved in the river.

Water chemistry data collected at four ambient sites on the Pigeon River by DWQ show substantial improvements as evidenced by large declines over time in conductivity, fecal coliform bacteria and nutrient values for all sites downstream of the Blue Ridge Paper Products discharge. Some improvements can be seen even within the last 5 years, with conductivity dropping by about 50% at Clyde (the first site downstream of the discharge). Further discussion on the Pigeon River can be found in Part 5.2 and 5.3 below.

Benthic macroinvertebrates were collected from 38 sites in this subbasin, including 16 samples collected during 1997. These data indicated Good to Excellent water quality in many tributary streams. Cataloochee Creek and its tributaries have been designated as Outstanding Resource Waters, while the Middle Prong West Fork Pigeon River and its tributaries have been designated

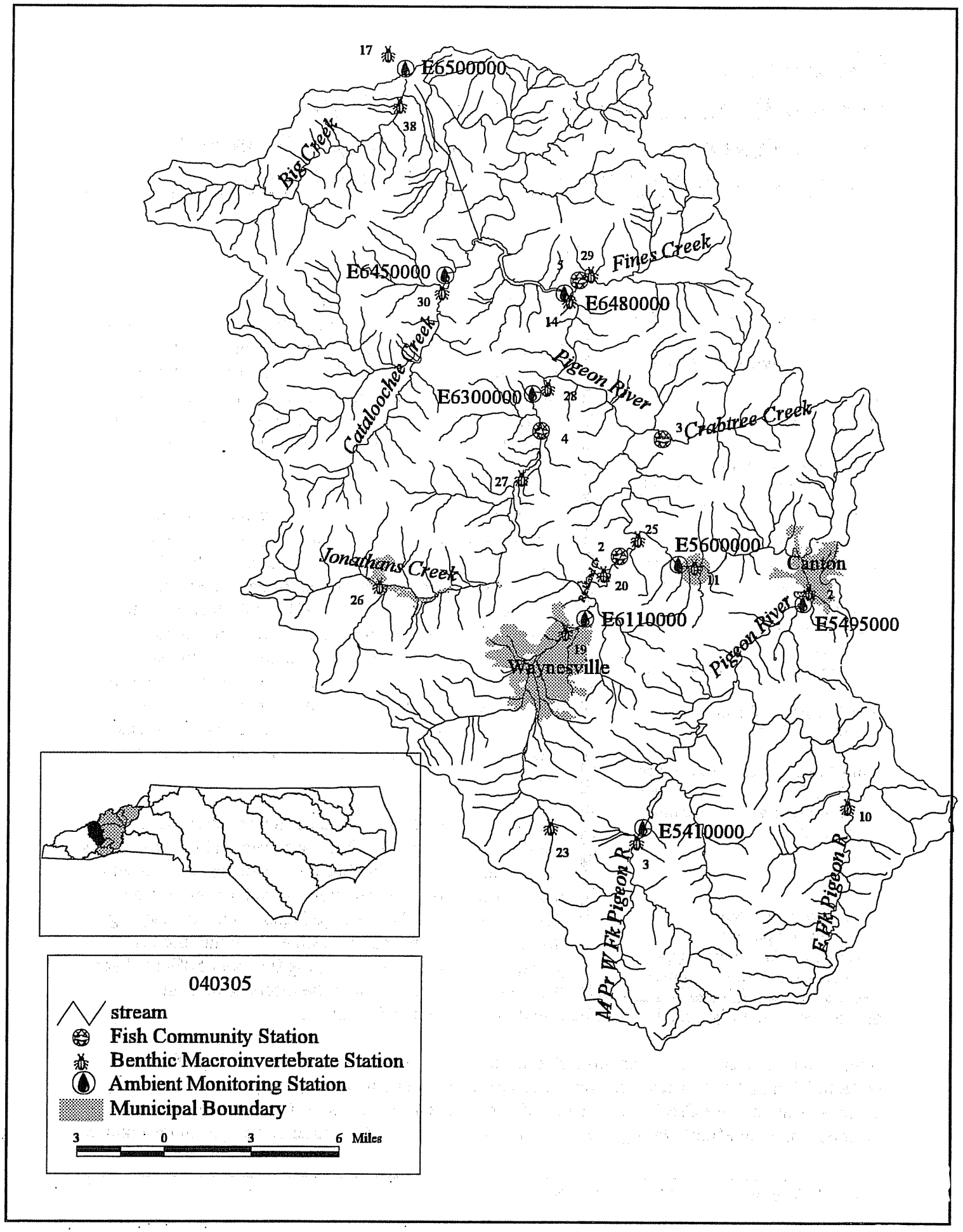


Figure B-5 Sampling Locations within Subbasin 04-03-05

Table B-5 Basinwide Biological Sites in French Broad River Subbasin 04-03-05 (1997)°

Site #	Stream	County	Road	Rating
Benthic Macroinvertebrates				
B-2	Pigeon River	Haywood	NC 215	Excellent
B-3	West Fork Pigeon River	Haywood	SR 1216	Excellent
B-10	East Fork Pigeon River	Haywood	US 276	Excellent
B-11	Pigeon River	Haywood	SR 1642, Clyde	Fair**
B-14	Pigeon River	Haywood	SR 1338, Hepco	Good-Fair
B-17	Pigeon River	Haywood	I-40, Waterville	Good
B-19	Richland Creek	Haywood	US 23 Business	Good-Fair
B-20	Richland Creek	Haywood	SR 1184	Good-Fair
B-23	Shiny Creek	Haywood	ab Allen Reservoir	Excellent
B-25	Richland Creek	Haywood	SR 1519	Fair
B-26	Jonathans Creek	Haywood	SR 1306	Excellent
B-27	Jonathans Creek	Haywood	SR 1322	Excellent
B-28	Jonathans Creek	Haywood	SR 1349	Excellent
B-29	Fines Creek	Haywood	SR 1355	Good-Fair
B-30	Cataloochee Creek	Haywood	SR 1395	Excellent
B-38	Big Creek	Haywood	in GSMNP	Excellent
Fish Community				
F-3	Richland Creek	Haywood	Walnut Trail	Not Rated*
F-4	Crabtree Creek	Haywood	NC 209	Not Rated*
F-5	Jonathans Creek	Haywood	US 276	Not Rated*
F-6	Fines Creek	Haywood	SR 1355	Not Rated*

* Refer to Section A, Chapter 3 for more information on fish community ratings
° Locations of ambient monitoring stations can be found in Section A, Table A-25
** Based on December 1999 sampling data

High Quality Waters. Other waters designated Native and Special Native Trout Waters (and thus also HQW) include the upper portion of the Little East Fork Pigeon River and tributaries, the upper portion of East Fork Pigeon River and tributaries, and portions of Rough Creek and Rocky Branch. The Excellent rating given to Jonathans Creek could make it eligible for reclassification to HQW.

Richland Creek near Waynesville has shown signs of improving water quality in recent years. Degradation from nonpoint sources has been found in some of the smaller tributaries (Jonathans Creek and Fines Creek), although all Jonathans Creek sites received an Excellent rating in 1997. Jonathans Creek drains the Maggie Valley area, while Fines Creek flows through an agricultural area.

Fish sampling by both DWQ and TVA biologists produced low ratings for 8 of 10 sites in this subbasin. Some of these low ratings reflect the naturally low diversity of trout streams (Big Creek, East Fork Pigeon River) and were not rated. Highest scores were assigned to the West

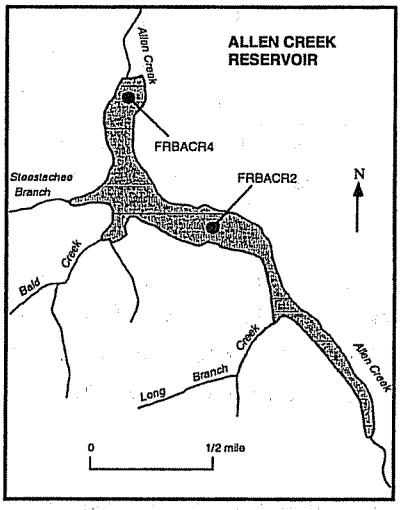
Fork Pigeon River and the Pigeon River above Canton. Streams draining agricultural watersheds (Crabtree Creek and Fines Creek) had low ratings. These sites suggested enrichment and Volunteer Water Information Network data have confirmed high nutrient levels in Fines Creek, as well as in nearby Rush Fork. Streams draining developed areas (Jonathans Creek and Richland Creek) also had low ratings, with Richland Creek more severely impacted.

There are over 20 dischargers in this subbasin, but only three facilities have a permitted flow greater than 0.5 MGD: Waynesville WWTP, Maggie Valley WWTP and Blue Ridge Paper Products. Four dischargers in this subbasin currently monitor effluent toxicity under conditions of the NPDES permits. Most facilities are passing toxicity tests, with occasional failures recorded for Blue Ridge Paper Products (single tests in 1995 and 1997) and Maggie Valley WWTP (2 tests in 1996).

Allen Creek Reservoir Assessment

COUNTY:	Haywood	**CLASSIFICATION:**	WS-I
SURFACE AREA:	49 hectares (120 acres)	**MEAN DEPTH:**	46 feet (14 meters)
VOLUME:	3.3 x$10^6 m^3$	**WATERSHED:**	13 mi^2 (34 km^2)

Allen Creek Reservoir is a small water supply reservoir with over 98 percent of its watershed owned by the Town of Waynesville. Most of the watershed is forested and undeveloped. Access to the lake is restricted to water treatment plant personnel.

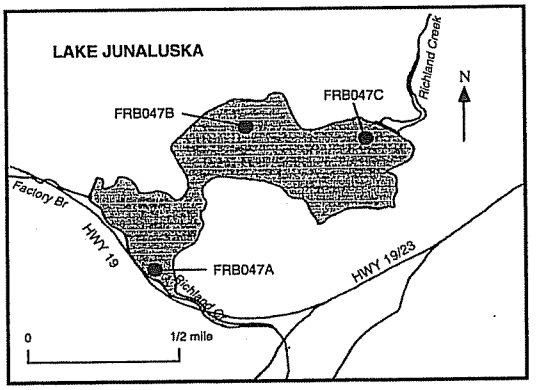


In 1991, Allen Creek was selected as one of 16 regional reference lakes. The purpose of this evaluation is to use this information in comparative evaluations of other lakes within the same general region. As part of that process, the lake was monitored three times each summer from 1991 to 1993. Allen Creek Reservoir was most recently sampled in 1993 and was found to be oligotrophic.

Lake Junaluska Assessment

COUNTY:	Haywood	**CLASSIFICATION:**	B
SURFACE AREA:	81 hectares (200 acres)	**MEAN DEPTH:**	20 feet (6 meters)
VOLUME:	4.50 x$10^6 m^3$	**WATERSHED:**	63 mi^2 (162 km^2)

The Lake Junaluska Assembly built Lake Junaluska in 1914. Mean hydraulic retention time of the lake is 13 days. The watershed is primarily forested with a few urban areas.

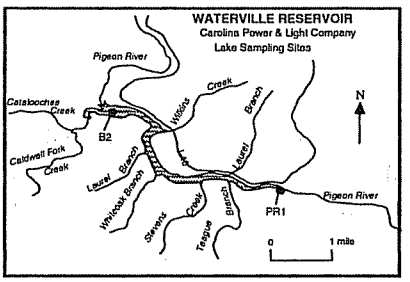


Lake Junaluska was most recently monitored by DWQ in June, August and September 1997 and was found to be oligotrophic in June and July and mesotrophic in August. DWQ has sampled this lake since 1981. Between 1981 to 1992, Lake Junaluska fluctuated between eutrophic and mesotrophic conditions. Lake Junaluska has had problems with sedimentation and eutrophication. An algae bloom was noted during July 1997, and a fish kill was reported a week prior to the sample date. Sedimentation has increased primarily because of residential and commercial growth in the watershed.

Waterville Lake (also known as Walters Lake) Assessment

COUNTY:	Haywood	**CLASSIFICATION:**	C
SURFACE AREA:	138 hectares (340 acres)	**MEAN DEPTH:**	76 feet (23 meters)
VOLUME:	31.60 x$10^6 m^3$	**WATERSHED:**	455 mi^2 (1178 km^2)

Waterville Lake, an impoundment of the Pigeon River, was built in the 1920s by Carolina Power and Light Company (CP&L) to produce hydroelectric power for Asheville and the surrounding area. The drainage area includes forest, agriculture and small urban/residential areas. Blue Ridge Paper Products (BRPP) is a major discharger into the headwaters of the lake.



Waterville Lake was most recently monitored by CP&L in 1995. Comparison of water quality data collected by CP&L indicates that most chemistry characteristics of the lake have improved since 1988, when monitoring of this reservoir was conducted in support of relicensure of the Walters Hydroelectric Plant. Waterville Lake was most recently monitored by DWQ in 1992, at which time the lake was determined to be eutrophic. Elevated total phosphorus and total organic nitrogen values contributed to the eutrophic conditions in the lake at that time.

For more detailed information on water quality in this subbasin, refer to the *Basinwide Assessment Report – French Broad River Basin – November 1998,* available from the DWQ Environmental Sciences Branch at (919) 733-9960.

5.2 Prior Basinwide Plan Recommendations (1995) and Achievements

5.2.1 Impaired Waters

Portions of two streams were identified as impaired in this subbasin in the 1995 French Broad River Basinwide Plan: Pigeon River at Clyde to Waterville and Richland Creek. Each of these waters is discussed below.

Pigeon River (38.6 miles from Clyde to Waterville)

This length of the Pigeon River was listed as partially supporting due to dioxin contamination from the Champion Paper Mill (now called Blue Ridge Paper Products). Some portions were also listed due to elevated fecal coliform bacteria. After the 1992 biological sampling was conducted, many facility improvements were made to eliminate dioxin levels to the river. A field-calibrated model was recommended for the future once a long-term improvement to the paper mill effluent was observed.

Status of Progress

A mistake was made in the listing of an eight-mile stretch of the river from Hurricane Creek to the NC/TN state line. Champion's effluent by-passed this section of the river via a tunnel and these miles should not have been included in the total number of impaired stream miles. The Pigeon River has shown significant improvements due to process changes at the Blue Ridge Paper Products facility. There have been no detectable levels of dioxin in the mill's effluent since June 1989.

The majority of the river is no longer considered to be impaired. Therefore, field-calibrated modeling of the river is no longer a priority for DWQ. However, a seven-mile section of the river, just below the Canton water supply intake to Clyde, is still considered to be impaired and is discussed further in Part 5.3 below.

Richland Creek (2.4 miles from Bus US 23 to Lake Junaluska Dam to the Pigeon River)

Impacts from the wastewater effluent and stormwater runoff from the Dayco facility were noted, resulting in a partially supporting rating for the creek. Connection to municipal sewerage was recommended for new and expanding discharges to Factory Branch, a major tributary of Richland Creek.

Status of Progress

The Dayco facility has closed and is no longer having a significant impact on the creek. There is substantial urban and nonurban development in the watershed. This section of the creek is still considered to be impaired and is discussed further in Part 5.3 below.

Waterville (Walters) Lake (320 acres)

Waterville Lake (Walters Lake) was impaired due to organics and nutrients from the Champion Paper Mill (now Blue Ridge Paper Products) discharge 20.7 miles upstream. The lake also receives nonpoint source runoff from agricultural and urban areas. Lake water quality problems included algal blooms, chlorophyll *a* and dissolved oxygen violations. A nutrient budget was recommended to examine point and nonpoint sources of nutrients to the lake.

Status of Progress

A nutrient budget for the lake was not developed and will not be developed in the near future given current DWQ priorities. Use support methodology has changed since the last basinwide plan was completed. Based on current methods, the lake is considered to be supporting its uses. Monitoring by both DWQ and CP&L suggests recent improvements in water quality. However, there are still concerns about nutrients in the lake and dioxin levels in fish tissue. Dioxin concentrations in all species of fish collected from the lake have decreased since the early 1990s. However, dioxin levels in common carp remain above the North Carolina limit. A no-consumption advisory for catfish and carp remains in effect for the lake. Waterville Lake is on the state's 303(d) list due to the fish consumption advisory. DWQ is developing a TMDL (see Part 5.3.2) for dioxin in Waterville Lake.

5.2.2 Other Recommendations

Lake Junaluska has had chronic problems with sediment inputs from the surrounding watershed. As a result of these inputs, significant funds have been spent on periodically dredging the lake. DWQ assessed an enforcement action against the Lake Junaluska Assembly in November 1998 after the lake was mistakenly drained lower than was intended. A plume of sediment from the lake bottom flowed down the entire length of lower Richland Creek to the Pigeon River, burying

fish and habitat. These actions will likely have a long-term impact on the water quality of lower Richland Creek and the Pigeon River.

A progressive program to implement nonpoint source pollution controls was recommended to reduce the nutrient and sediment loading and the need for future dredging. Such a program will need to be developed and implemented at the local level. An initiative by the Haywood Waterways Association is underway to inventory nonpoint sources of pollution (see Section C, Chapter 1). The local support of recommendations produced by this study is critical to correcting the water quality of Lake Junaluska.

5.3 Current Priority Issues and Recommendations

One segment of both the Pigeon River and Richland Creek is listed as impaired based on recent DWQ monitoring data. Both of these waters are presented and discussed below in Part 5.3.1. These waters are also on the state's year 2000 (not yet EPA approved) 303(d) list (see Part 5.3.2).

5.3.1 Monitored Impaired Waters

Pigeon River (7.0 miles from Canton water supply intake to Clyde at SR 1642)

This section of the Pigeon River is listed as impaired (PS) due to both point source impacts from the Champion International facility (now Blue Ridge Paper Products) and nonpoint sources.

2000 Recommendation(s)

Water quality conditions in the Pigeon River have improved tremendously since the early 1990s. The 1995 basinwide plan reported the length of the Pigeon River from Clyde to Waterville (38.6 miles) as impaired. A Good rating for benthic samples at the state line was found in 1994 and 1997. The most recent benthic sampling provides evidence that the 7.0-mile stretch of the Pigeon River from the Town of Canton water supply intake to the Town of Clyde is still impaired.

The Pigeon River near Clyde at SR 1642 has been sampled ten times since 1984. There have been eight summer collections and two winter collections. This site consistently received Poor ratings from 1984 to 1989, but improved to Fair in 1992. The 1997 summer macroinvertebrate collection resulted in a Good-Fair rating; however, the benthic community was still dominated by pollution tolerant organisms. The benthic community makeup also indicated some toxic effects at this site. The 1997 summer sampling was very borderline between Good-Fair and Fair, so DWQ biologists conducted another sampling at this site in December 1999 to see if the sample results were stable. This winter sampling resulted in a Fair rating. The benthic community at this site was dominated by tolerant species, and no intolerant species were found. Fish sampling by TVA biologists in the Pigeon River in 1990, 1995 and 1997 has shown some limited recovery over time below BRPP discharge. However, the fish community below the plant was assigned Fair or Poor ratings in 1995-1997. Given the history of this sample site for benthic community, and considering TVA fish community data, DWQ will rate this stream segment as impaired and commit to conducting additional sampling during the summer months

to further assess recovery. The river has improved dramatically over the last 15 years, but clearly there are still impacts from Blue Ridge Paper Products (BRPP).

DWQ analyzed mercury concentrations in fish tissue at five Pigeon River sites during 1996, but none of these samples had levels over FDA or EPA criteria. Annual fish tissue monitoring for dioxin in the Pigeon River is also performed by BRPP and Carolina Power and Light. This monitoring is required as part of the BRRP discharge permit issued by DWQ and as a condition of the FERC license for Carolina Power and Light.

The BRPP facility has made several improvements to manufacturing processes. BRPP has spent more than $330 million upgrading its manufacturing process since 1990. Another $30 million dollars was spent to implement BFR™, a proprietary technology that has also improved the quality of the mill's effluent. Additional process improvements have been ongoing. These improvements in wastewater treatment at the BRPP facility are associated with a gradual improvement in macroinvertebrate bioclassifications over the years.

By 1994, a modernization program was completed at the BRPP facility that included replacing chlorine as a bleaching agent to ensure dioxin would no longer be a by-product within the effluent. Therefore, the source of dioxin in the river has been eliminated by BRPP. Dioxin concentrations in fish collected from the Pigeon River and Walters Lake have generally declined since the early 1990s, although levels for certain species have fluctuated depending on sample season, station and the size of the fish collected. Dioxin concentrations in sportfishes (redbreast sunfish, rock bass, crappie, largemouth and smallmouth bass) have remained non-detectable or well below the North Carolina limit for issuing a consumption advisory (3.0 ppt). Dioxin levels in carp have decreased as much as 80% downstream of the BRPP facility, but remain above the North Carolina limit in Walters Lake (see Figures B-6 and B-7).

Currently, there is a limited-consumption advisory for common carp and catfish species (bullhead species, channel catfish and flathead catfish) in effect for the Pigeon River between Canton and the North Carolina-Tennessee state line, including Walters Lake. Due to declining dioxin levels, this advisory was revised by the State Health Director from a no-consumption to a limited-consumption advisory in September 1994. Additionally, there is a limited-consumption advisory for common carp, catfish species and redbreast sunfish in effect for the Pigeon River within the State of Tennessee from the North Carolina-Tennessee state line downstream to the confluence with the French Broad River. DWQ is developing a TMDL (see Part 5.3.2) for dioxins in Waterville Lake and the Pigeon River.

Figure B-6 Dioxin (TCDD) Concentrations in Carp Fillets from the Pigeon River (1990-1997)

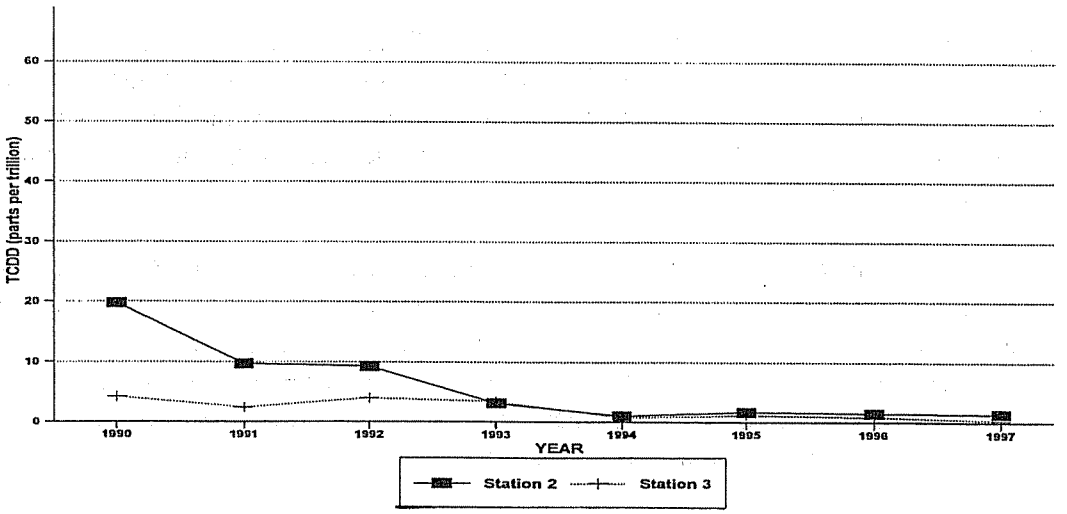
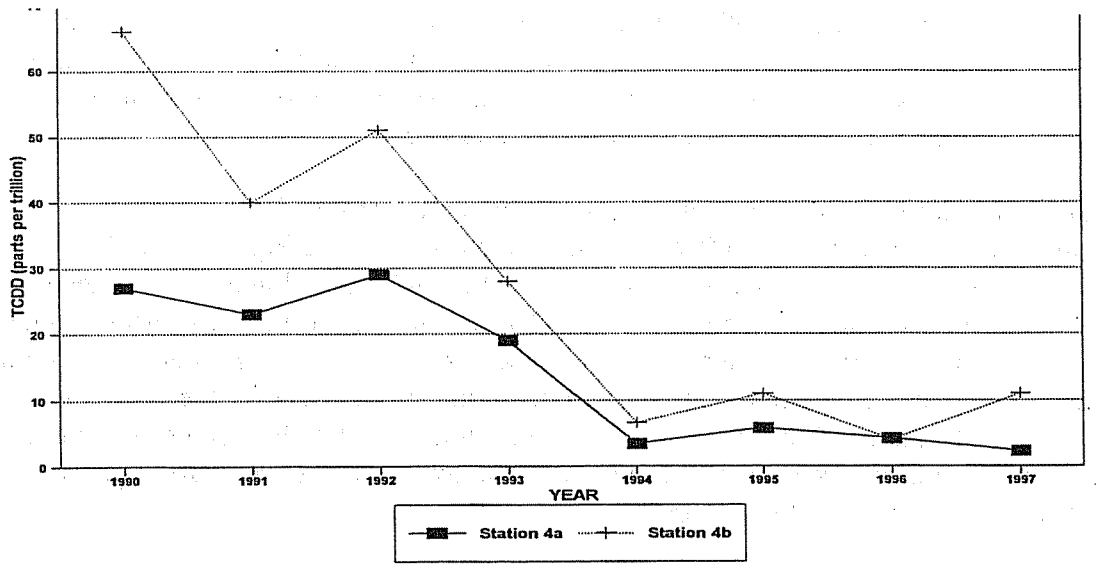


Figure B-7 Dioxin (TCDD) Concentrations in Carp Fillets Collected from Walters Lake (1990-1997)



A Settlement Agreement was reached in 1997 on a modified color variance and NPDES permit between EPA; the states of North Carolina and Tennessee; Cocke County and the City of Newport, TN; Tennessee Environmental Council; American Canoe Association and BRPP. The intent of the Agreement was to address the Pigeon River color issue without litigation. The parties involved in the ensuing discussions agreed to many measures to achieve color reduction over the life of the NPDES permit. In accordance with this agreement, BRPP began installing a full-scale Bleach Filtrate Recycle (BFR™) technology on the mill's pine line. Facility personnel also began to evaluate the potential for additional minimization of color and are reporting these

achieve a true color loading not to exceed an annual average load of 60,000 lbs/day, a monthly average true color of 69,000 lbs/day, and a maximum monthly color average of 50 true color units at the NC-TN state line (it was further agreed that the 50 color units should be met at Hepco). Further agreement was reached to target annual average color loading of 48,000-52,000 lbs/day by May 1, 2001.

A Technology Review Workgroup was formed to monitor BRPP's achievements. To date, this Workgroup has received reports on the following progress:

- The (BFR™) demonstration on the softwood fiber line has been installed with no problems.
- All of the BMP projects as required in the agreement were completed and are operational.
- Additional color reduction measures were completed and others are ongoing.
- Contingency plans for low flow periods were in place and operational.

As reported to the Workgroup in January 1999, monitoring confirms the daily average of color discharge is well below the limits set forth in the Agreement. The mill's end-of-pipe true color report shows the facility was discharging approximately 10,000 lbs/day of color below the limit required in the Agreement. The facility has reached the 2001 target for color loading. The color in the Pigeon River was below the limit at Hepco for the reporting period in 1998. The Workgroup, therefore, believes that BRPP is making substantial and continuous progress in reducing the amount of color generated and discharged to the Pigeon River and has met the conditions of the Agreement. Additional technologies are yet to be installed and further operational progress is anticipated. Figure B-8 illustrates BRPP's success in reducing color discharges to the Pigeon River since 1988, including monthly average performance for 1998.

Pursuant to the Agreement, North Carolina and Tennessee are required to establish a Joint Watershed Advisory Group to foster joint planning and public input on decisions affecting the Pigeon River. Each state will appoint three or four members to the committee and be co-chaired by each state. The Joint Watershed Advisory Group is expected to begin meeting in early 2000. DWQ will participate in the Watershed Advisory Group and will continue to monitor the river as additional improvements are made. In addition to the Joint Advisory Group, the mill has established a Community Advisory Committee composed of community leaders in Haywood County, Cocke County in Tennessee and the state of North Carolina.

Local initiatives are needed to address the nonpoint source impacts to the river from the towns of Canton and Clyde and outlying nonurban areas.

Richland Creek (2.4 miles from Lake Junaluska Dam to Pigeon River)

While the upper 15 miles of Richland Creek show impacts from agriculture and nonurban development, only the section below the Lake Junaluska Dam is currently rated impaired (PS). Agriculture and nonurban development is also affecting this section of the creek, resulting in biological impairment and habitat degradation. Erosion and the resulting sedimentation is problematic for the entire length of the creek and is heavily impacting water quality in Lake Junaluska.

2000 Recommendation(s)

The Pigeon River Fund has awarded a grant to the Haywood Waterways Association to conduct a nonpoint source inventory in the Pigeon River watershed (including the entire length of Richland Creek and Lake Junaluska) using infrared photography. The TVA is assisting with the interpretation of this information. A technical committee has formed to assist in the development of a Water Action Plan to address the pollution sources. For more information on this project, refer to Section C. DWQ will continue to monitor the creek and work with local initiatives to restore water quality.

5.3.2 303(d) Listed Waters

Segments of several streams and Waterville Lake are on the state's year 2000 (not yet EPA approved) 303(d) list for this subbasin. Refer to Appendix IV for more information on the state's 303(d) list and listing requirements. Both the Pigeon River and Richland Creek are currently rated impaired and are therefore addressed above in Part 5.3.1. Hyatt Creek and Hurricane Creek were previously rated based on evaluated information. Use support methodology has been improved, and only monitored data are now used in use support determinations (see Appendix III). However, these streams are required to remain on the 303(d) list until sampling is conducted to assess current water quality conditions. DWQ will be developing a dioxin TMDL for Waterville Lake.

The Wetlands Restoration Program has prioritized watersheds within this subbasin for the development of local watershed restoration activities. For further information on this program, refer to Section C, Chapter 1, Part 1.3.

5.3.3 Other Issues and Recommendations

The following surface water segments are rated as fully supporting using recent DWQ monitoring data. However, these data revealed some impacts to water quality. Although no action is required for these surface waters, continued monitoring is recommended. Enforcement of sediment and erosion control laws will help to reduce impacts on these streams. DWQ encourages the use of voluntary measures to prevent water quality degradation. Education on local water quality issues is always a useful tool to prevent water quality problems and to promote restoration efforts. For information on water quality education programs and nonpoint source agency contacts, see Appendix VI.

Fines Creek (10.4 miles from source to Pigeon River) is experiencing some notable impacts from agricultural activities as well as nonurban development. Siltation and nutrients have also been noted by the VWIN program (Maas et al., 1999). This watershed could benefit from implementation of BMPs directed towards these inputs. DWQ will notify local agencies of water quality concerns for this creek and work with these various agencies to conduct further monitoring and assist agency personnel with locating sources of water quality protection funding.

Rough Creek was approved by the Environmental Management Commission for a reclassification from WS-I to a WS-I Trout Outstanding Resource Water (see Section A, Chapter 3, Part 3.2 for more information).

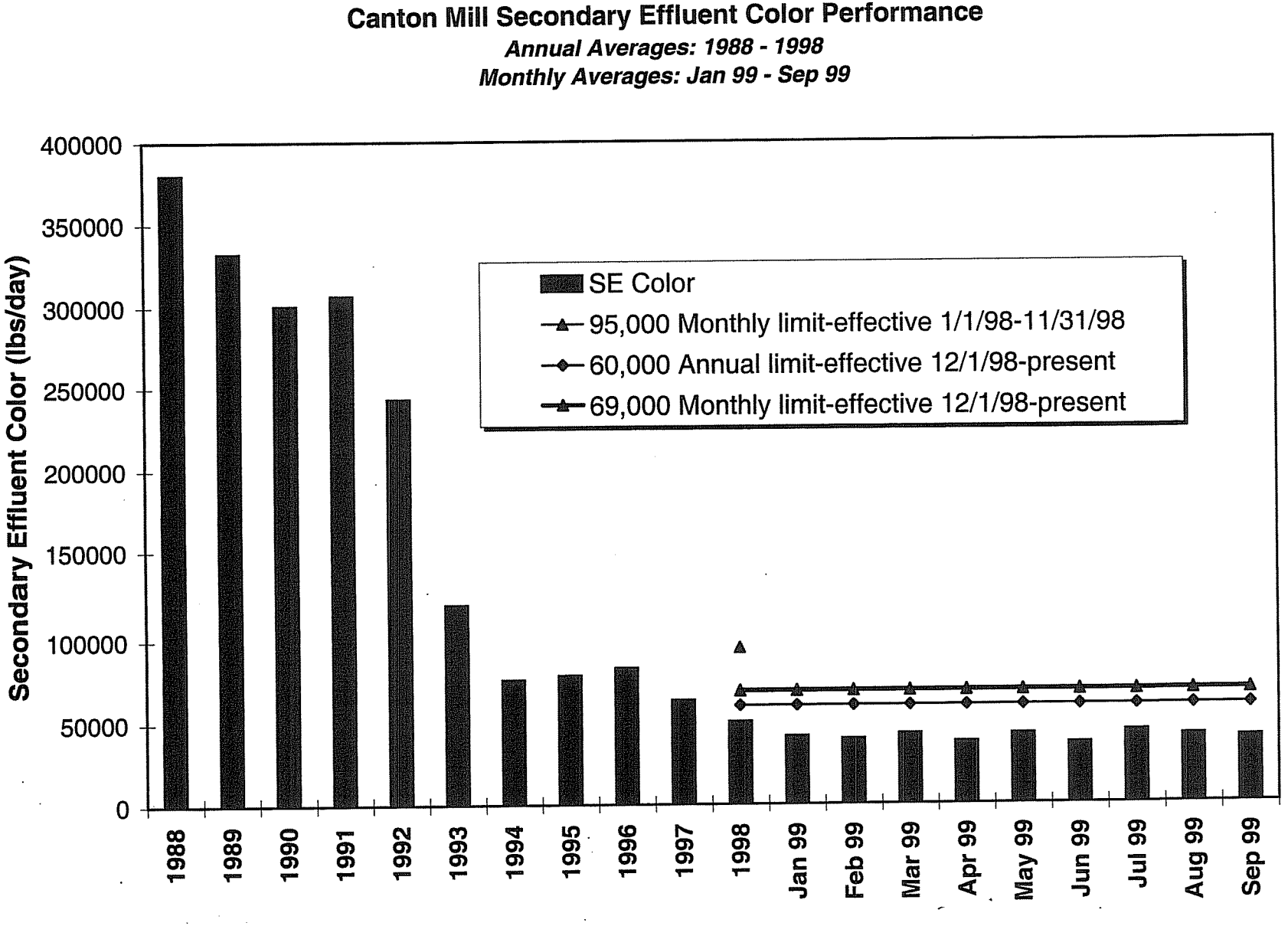


Figure B-8 Canton Mill Secondary Effluent Color Performance Source: Blue Ridge Paper Products