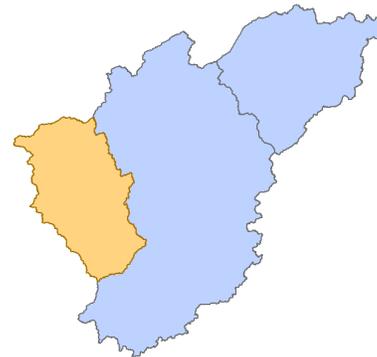


Chapter 2

Pigeon River

Part of Hydrologic Unit Code 06010106



Subbasin Overview

This approximately 535 square mile subbasin is the equivalent to the old DWQ subbasin number 04-03-05. The Pigeon River flows from southern Haywood County to the northwest where it empties into the French Broad River near Newport, Tennessee. The Pigeon River watershed includes portions of the Great Smoky Mountains National Park, Pisgah National Forest, Pisgah Game Lands, and the Shining Rock Wilderness Area. Major tributaries to the Pigeon River include: Cattaaloochee Creek, East Fork Pigeon River, Jonathans Creek, Richland Creek, and West Fork Pigeon River.

The West Fork Pigeon River and upper Pigeon River make up one of the few remaining areas that still support populations of the federally endangered Appalachian Elktoe. This mussel species, once found throughout the mountains of western North Carolina requires clean, well-oxygenated water that flows at a moderate to fast pace. They also require stable, relatively silt-free, gravelly or rocky stream bottoms (USFWS, 2008).

Population and Land Cover

Most of the population in the subbasin is concentrated around Waynesville and Canton. The subbasin has been experiencing only moderate growth with an increase of about 7.4 percent between 2000 and 2009. However, Maggie Valley is an exception because its population has increased by over 100 percent since 2000.

Permits

NPDES Wastewater Discharge

There are 15 NPDES individual wastewater discharge permits in this subbasin with a total permitted flow of 37.13 MGD. Three of those dischargers are permitted to discharge one million gallons a day or more of treated wastewater. They are the Canton Mill (29.9 MGD), Waynesville WWTP (6 MGD), and Maggie Valley WWTP (1 MGD). Figure 2-1 shows the location of all individual NPDES wastewater permits in this subbasin. For a complete list of all individual NPDES wastewater permits in the basin, see Appendix V.

WATERSHED AT A GLANCE

COUNTIES

Haywood

MUNICIPALITIES

Canton, Clyde, Maggie Valley, Waynesville

POPULATION

1990:

44,414 or 83 per mi²

2000:
51,212 or 96 per mi²

2001 LAND COVER

Developed: 7.7 %

Forest: 80.8 %

Agriculture: 10.0 %

Other: 1.5 %

EPA LEVEL IV ECOREGIONS

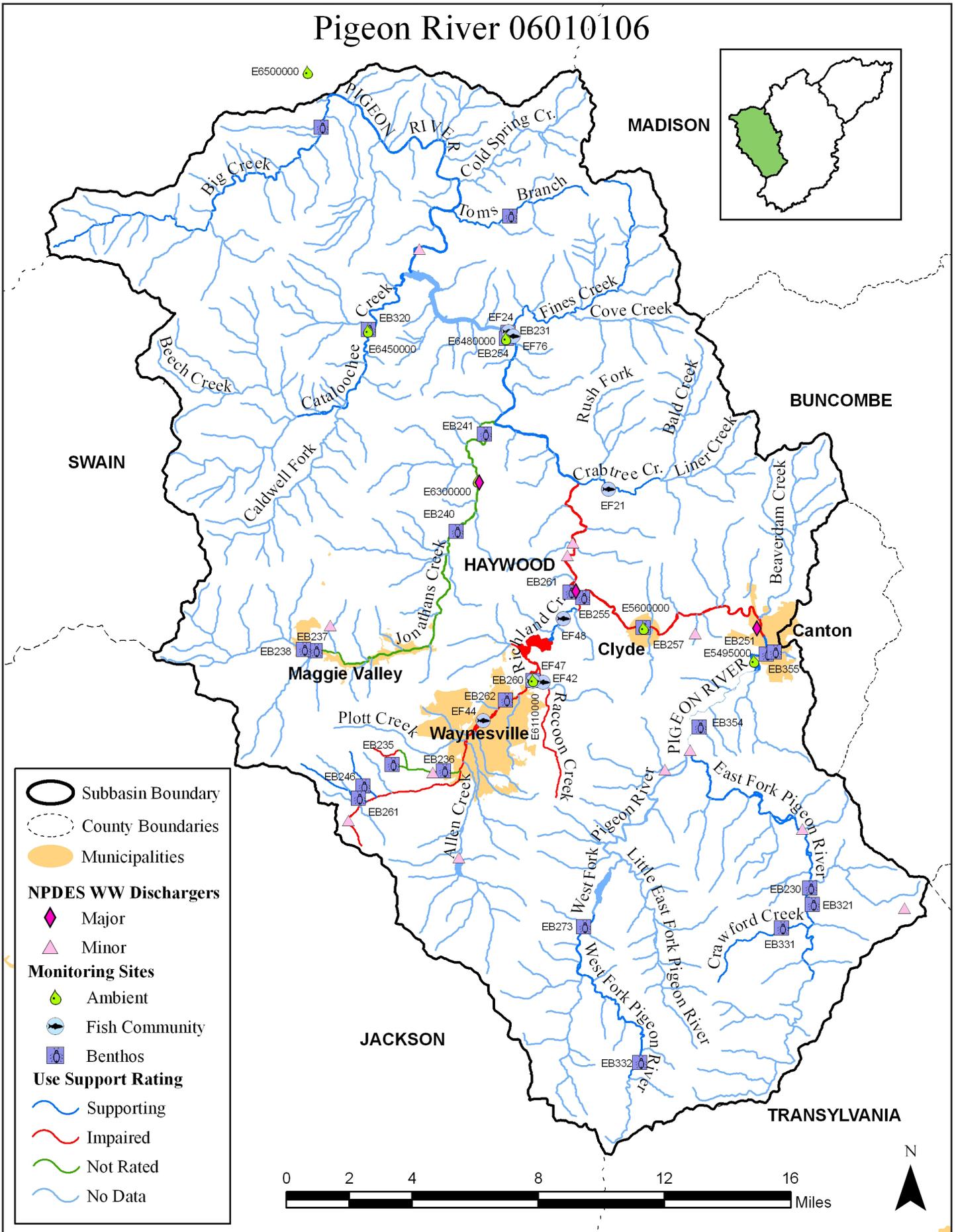
Southern Crystalline Ridges and Mountains

Southern Metasedimentary Mountains

High Mountains

Broad Basins

FIGURE 2-1: PIGEON RIVER SUBBASIN (06010106)



While compliance at WWTP has improved, many collection systems continue to report frequent sanitary sewer overflows (SSO). A state statute requires that wastewater collection system owners report all SSO incidents. The main causes of SSOs are broken or clogged sewer lines, equipment failures, and inadequate treatment capacity. The following are ways to prevent SSOs from occurring:

- Sewer system cleaning and maintenance;
- Reducing infiltration and inflow through system rehabilitation and repairing broken or leaking service lines;
- Enlarging or upgrading sewer, pump station, or sewage treatment plant capacity and/or reliability; and
- Construction wet weather storage and treatment facilities to treat excess flows.

There are 11 permitted trout farms in the basin. This number excludes farms not meeting permit coverage requirements related to annual fish production and feed usage. (See *NPDES General Permit NCG530000* for more information.) Macroinvertebrate and chemical sampling data collected in streams utilized by certain farms indicate negative impacts to water quality. Additional data need to be collected and analyzed. In an effort to support the industry in the region and improve and protect water quality, a collaborative approach has been undertaken, enlists trout farmers, NC Department of Agriculture and Consumer Services, NC Cooperative Extension and DWQ. The outcomes should be a better understanding of farm operations, best management practices, water resource protection, and regulatory needs. The NCG530000 permit will be renewed in July 2012. Any necessary permit modifications to fully protect surface waters utilized by trout farm operations will be considered and discussed by the DWQ and stakeholders during the renewal period.

During this process, DWQ should encourage trout farms to contact their local extension service and/or research institutions to use management measures such as those recommended/developed by DWQ in Collaborative Assessment for Watershed and Streams (CAWS) Project (funded by an EPA 104(b)(3) grant):

- Use hand feeding as much as possible to reduce the amount of food that enters the raceways and stream;
- Use high quality feed, which results in less manure production;
- Clean raceways regularly and land apply the manure as fertilizer; and
- Consider reducing the amount of fish being raised if the assimilative capacity has been exceeded.

Stormwater

The *Stormwater Permitting Unit* of the *Wetlands and Stormwater Branch* is responsible for the development, planning, and implementation of statewide stormwater control policies, strategies, and rules designed to protect the surface waters of North Carolina from impacts of stormwater pollutants and run-off volumes. The Unit handles permitting for industrial, municipal, and post-construction (for development projects) stormwater programs, as well as provides technical assistance to the regulated community, engineers, industry, citizens, and local governments. For a list of stormwater permits in the basin refer to Appendix V.

Animal Operations

DWQ and the Division of Soil and Water Conservation work in all areas of the state to ensure that animal operations are not having a negative impact on water quality. The local soil and water conservation districts, NRCS, RC&Ds, and other funding agencies should continue to work with farmers to install livestock exclusion from streambanks and to install alternate water supplies for livestock watering.

Ambient Water Quality

Samples were collected at five AMS sites. Three sampling locations in the subbasin exceeded the screening criteria for fecal coliform bacteria. Richland Creek was the only waterbody that exceeded the screening criteria and is currently Impaired for recreation due to bacteria levels.

Biological Health

Twenty-one benthic macroinvertebrate samples were taken in the Pigeon River subbasin from January 2004 through December 2008 at 20 different locations. Figure 2-2 shows the current site rating for all benthic macroinvertebrate sampling sites in which at least one sample was taken during the assessment period and figure 2-3 illustrates how those site ratings changed. Fish communities were sampled 5 times at 5 different locations in the Pigeon River subbasin from January 2004 through December 2008.

One fish kill was reported in the Pigeon River watershed between January 2004 and December 2008.

FIGURE 2-2: CURRENT BENTHOS SITE RATINGS

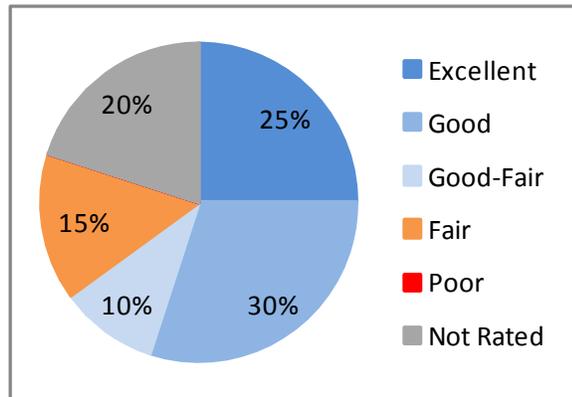
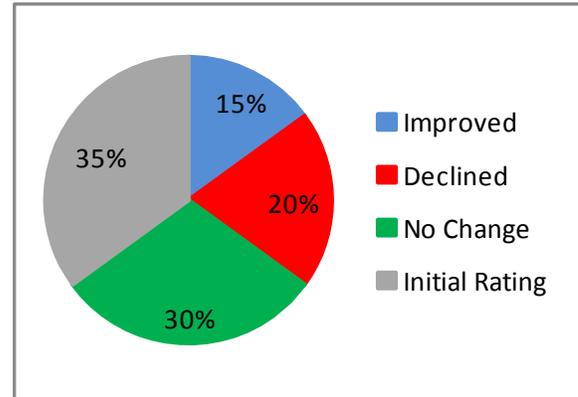


FIGURE 2-3: CHANGE IN BENTHOS RATINGS



Lake Sampling

Lake Junaluska [AU # 5-16-(11.5)d] was the only lake in the Pigeon River subbasin to be sampled by DWQ. The lake was monitored between April and September 2007. The lake was again found to have pH levels greater than the state standard of 9.0 s.u. and has been on the 303(d) list of Impaired waters since 2006. The high pH may be the result of eutrophication of the lake, which can produce algal blooms. When these algal blooms die off at night, it decreases the oxygen in the water and can lead to fish kills.

Local Water Quality

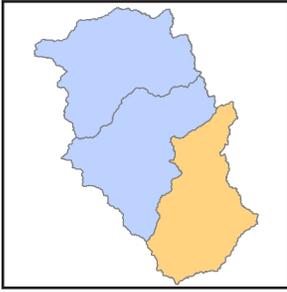
The North Carolina portion of the Pigeon River subbasin contains three 10-digit hydrologic units. Table 2-1 lists these watersheds with a summary of their sizes and the number of locations that were sampled between January 2004 and December 2008.

TABLE 2-1: 10-DIGIT HYDROLOGIC UNIT OR WATERSHEDS IN THE PIGEON RIVER SUBBASIN

10-DIGIT HUC	NAME	SQUARE MILES	BENTHIC SITES	FISH COM. SITES	AMBIENT SITES
0601010601	Headwaters Pigeon River	168.0	7	0	2
0601010602	Richland Creek - Pigeon River	181.7	8	4	2
0601010603	Cataloochee Creek - Pigeon River	186.1	3	1	2
0601010604	Pigeon River*	*0.0	0	0	1

*Hydrologic Unit is entirely in Tennessee.

Headwaters Pigeon River Watershed (0601010601)



Over half of this watershed is within the Pisgah National Forest and another approximately six percent is managed by the Wildlife Resource Commission as part of the Cold Mountain Game Land. This watershed contains the Town of Clyde and most of Canton. There are three minor and one major NPDES individual wastewater discharge permits in this watershed, with permitted flows totaling 29.95 MGD.

Blue Ridge Paper Product, Inc., operates a kraft pulp and paper mill in Canton that has been in operation since 1908. This facility has a permitted discharge of 29.9 MGD.

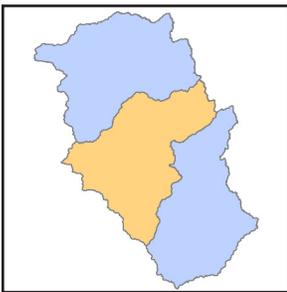
Historically, this discharger was a major polluter, but over time has greatly improved performance. The current permit, issued on May 26, 2010, contains variances for both color and temperature. The limits for both temperature and color were tightened. The permit also requires future reduction to the color limit, as well as increased monitoring for turbidity, hardness, and dioxins. Although this permit is being challenged in court by Cocke County, Tennessee and several environmental groups, it should be noted that the mill's improvements have led to the successful reintroduction of various native fish species to Pigeon River below the mill.

Beaverdam Creek - Pigeon River Subwatershed (060101060105)

Pigeon River [AU# 5-(7)b] is Impaired for biological integrity due to a Fair bioclassification rating at benthic macroinvertebrate sampling site EB257. This site has been sampled 13 times since 1984 and all have been either Poor or Fair, except for one sampling in 1997 that rated Good-Fair.

In September 2007, a fish kill of approximately 8,000 fish occurred on the Pigeon River below Canton. The fish kill event was attributed to low flow, low DO, and high water temperatures brought on by ongoing drought conditions. Investigators observed numerous live fish during the investigation.

Richland Creek - Pigeon River Watershed (0601010602)



This watershed contains the Towns of Waynesville and Maggie Valley. There are six minor and two major NPDES individual wastewater discharge permits in this watershed, with permitted flow totaling 7.08 MGD.

Staff from the DWQ Asheville Regional Office (ARO) and the ESS have partnered with the Wildlife Resource Commission, the University of Tennessee-Knoxville, and others to reintroduce several species of native fish to the upper reaches of Richland Creek. Thousands of rock bass, warpaint shiners, river chubs, tuckasegee and greenfin darters and mottled sculpins were released in April and September 2010 to waters upstream of the Lake Junaluska dam. This effort is being conducted to improve the fish population diversity and remove the stream from its Impaired status for fish community.

Upper Richland Creek Subwatershed (060101060201)

The Harrison Construction rock quarry, south of Waynesville, was issued a notice of violation in July 2010 for improperly controlling sediment in stormwater runoff coming from the site and entering Allen Creek [AU # 5-16-7-(8.5)]. The inspection that took place by DWQ was initiated by complaints from local citizens.

The DWQ Aquifer Protection Section staff in the ARO have partnered with the United States Geological Survey (USGS), N.C. Division of Environmental Health's Waste Discharge Elimination Program, and Haywood Waterways Association to conduct a septic-well survey to determine the potential impacts of on-site septic leachate on private drinking well water. The study is being conducted in the Hyatt Creek and Richland Creek watersheds in Haywood County as part of ongoing watershed restoration efforts in this area. For more information visit the [Richland Creek Watershed Use Restoration website](#).

The Southwestern North Carolina Resource Conservation and Development Council has been awarded three 319 Nonpoint Source Pollution Control Grants since 2005. The first project focused on the creation of a watershed plan for Hyatt Creek, repairing failing septic systems, and installation of agricultural best management practices. The second grant expanded this project to include Richland Creek watershed, from its headwaters to the confluence of Richland Creek and Raccoon Creek. This project is expected to be completed in December 2012. The third grant was awarded for a site specific project to purchase and demolish a hog and a dairy farm, purchase an easement, and restore 2,830 of Oxner Creek, which is a tributary of Hyatt Creek. This project is expected to be completed in March 2011.

Hyatt Creek [AU # 5-16-6a and 5-16-6b] is no longer impaired for biological integrity due to a Good-Fair rating at benthic macroinvertebrate sampling site EB236. An Unnamed Tributary to Hyatt Creek [AU # 5-16-6ut1] was sampled for benthic macroinvertebrates in August of 2009 using small stream sampling and received a rating of Good.

Richland Creek [AU # 5-16-(1)a] is Impaired for recreation due to levels of fecal coliform bacteria samples that exceeded water quality standards.

Lower Richland Creek Subwatershed (060101060202)

Raccoon Creek [AU # 5-16-14] is Impaired for biological integrity due to a Poor rating at fish community sampling site EF42. Land use in the Raccoon Creek watershed is a mix of urban and agricultural. Site EF42 is downstream of the Town of Waynesville and the North Carolina Department of Agriculture and Consumer Services Mountain Research Station. Ratcliffe Cove Branch a tributary of Raccoon Creek that enters just above EF42 and has insufficient to nonexistent buffers.

Richland Creek [AU # 5-16-(11.5)a and 5-16-(11.5)b] is Impaired for recreation due to levels of fecal coliform bacteria samples that exceeded water quality standards. As part of the ARO Watershed Initiative, staff are conducting an ongoing project to identify and remove fecal sources in the Richland Creek watershed upstream of Lake Junaluska through thorough sampling and characterization of the watershed, stream walking to visually identify sources, and remediation/repair of these sources. Sources have been found to be primarily leaking sewer infrastructure in the Town of Waynesville, failing septic systems, and livestock with access to the creek. Agriculture and failing septic system issues have been addressed through cooperation with the Haywood Waterways Association, the Haywood Soil and Water Conservation District, and DENR's WaDE Program. Through this project, measurable improvement has been documented in Shelton Branch [AU# 5-16-13], a tributary to Richland Creek. Shelton Branch is entirely in the jurisdiction of the Town of Waynesville and served by the Town's sanitary sewer collection system. Leaks in the collection system were identified and repaired resulting in the measured reduction in fecal coliform levels.

Lake Junaluska is a small reservoir located in the mountains of southwestern North Carolina. The lake is privately owned by the Methodist Church and was built by the Lake Junaluska Assembly as a meeting ground for southern Methodists. DWQ monitored this reservoir from April - September 2007.

Due to drought conditions during the spring and summer of 2007, nonpoint source runoff into Lake Junaluska was reduced. Subsequently, turbidity values were lower than those previously observed by DWQ and Secchi depths were slightly greater. Nonpoint source runoff was reduced during drought, but agricultural, residential and commercial development upstream of Lake Junaluska resulted in increasing sediment entering the lake from Richland Creek and Factory Branch. In addition, stormwater monitoring has indicated that the Raccoon Creek and Ratcliffe Cove watersheds are sediment sources into Lake Junaluska (HWA, 2002).

In the past, the solution to this problem has been to lower the level of the lake and dredge out the accumulated sediment. In 2004, as a condition of the NCDENR permit to dredge Lake Junaluska, a three-quarter acre wet-

land was created on the lake's northwest shore to improve the lake's water quality, enhance fish and wildlife habitat and increase citizen awareness of water quality protection by providing an educational element to the lake. A 12 foot wide littoral shelf was also constructed and planted with native plants and grasses by the DWQ Intensive Survey Unit. This structure also serves to improve fish and wildlife habitat while controlling runoff into the lake (Don Hendershot, May 7, 2003).

Haywood Waterways Association (HWA) is currently developing potential alternative solutions to dredging Lake Junaluska. They are developing a long term project focused on making substantial and permanent reductions in sediment discharged from the Raccoon Creek and Ratcliffe Cove watersheds. In addition, HWA is proposing a certification process for developers that incorporate recommendations of suitability analysis in their design, change some existing practices, and follow best management practices development will be certified as conservation based development.

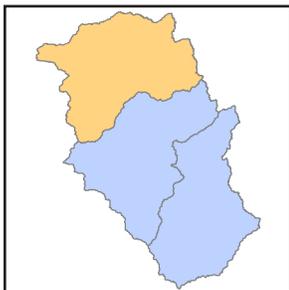
Lake productivity increased during this monitoring period, as suggested by pH values and percent DO concentrations. Lake-wide mean pH values exceeded state water quality standard of 9.0 s.u. on June 12 and July 17, 2007. Chlorophyll *a* values, an indicator of increased algae growth in the lake, were elevated on July 17 and August 14, 2007. Analysis of algae samples collected from Lake Junaluska indicated the presence of an algal bloom (based on cell densities) in July. This bloom was dominated by the diatom *Achnanthydium sp.* This algae is usually found attached to aquatic plant stems and leaves and is found in the water column only when it has been sheared away from the surfaces of these plants. Other algae found in water samples included green algae, cryptomonads, and chrysophytes, all of which are considered to be beneficial as the base of the aquatic food web.

Upper and Lower Jonathans Creek Subwatersheds (060101060203 and 060101060204)

Jonathans Creek [AU # 5-26-(7)] is currently Not Rated because ambient sampling system site E6300000 exceeded the fecal coliform screening criteria of 43 colonies/L in 23.5 percent of the samples taken and had a geometric mean of 218 colonies/L. To rate this stream for fecal coliform bacteria, five samples in a 30-day period are required. Dairy farms near the sampling site may be contributors to the bacteria levels in the creek. Jonathans Creek is no longer impaired for Turbidity, but is still considered as borderline with 9.8 percent of the samples exceeding the standard.

Crabtree Creek - Pigeon River Subwatershed (060101060205)

Pigeon River (Waterville Lake) [AU# 5-(7)c] is currently Impaired for biological integrity due to a Fair benthic macroinvertebrate sample rating at site EB255 in 2006. This same site also rated Fair in 1994. This site is immediately downstream of the Town of Waynesville WWTP discharge and is approximately 8.5 miles downstream of the Canton's Mill discharge.



Cataloochee Creek - Pigeon River Watershed (0601010603)

Almost 52 percent of this watershed is part of the Great Smoky National Park and is under the management of the National Park Service (NPS). Approximately another 23 percent is part of the Pisgah National Forest and is under the management of the United States Forest Service (USFS). The only NPDES individual wastewater discharge permit in this watershed belongs to the State and is for the Haywood County Rest Area. This permit has a maximum permitted flow of 0.026 MGD. All waterbodies in the watershed that have been assessed are Supporting for all designated uses.

Walters Lake - Pigeon River Subwatershed (060101060303)

A total of four fish community sites in the Fines Creek watershed were sampled for the presence of trout for purposes of determining whether or not it qualifies for reclassification to Trout (Tr) waters. All sites were found to be supporting a wild or naturalized and stocked trout population on a year-round basis (BAU Memorandum

F-20060906).

A contractor working for the EEP completed stream restoration on approximately 3,900 linear feet of Morgan Creek and three of its tributaries, as well as 9.8 acres of riparian buffers and 1.1 acres of wetlands in the Morgan Creek watershed in 2009. The project is now in the monitoring phase which will determine if the project was successful.

Recommendations

Pathogens remain a water quality concern throughout the Richland Creek-Pigeon River watershed. Continuation of work by the HWA and the North Carolina Wastewater Discharge Elimination program to find and repair straight pipes and failing septic systems is needed. In addition, Richland Creek would benefit from an inflow/infiltration study of the Waynesville wastewater collection system and the subsequent repair of any damaged lines and equipment found during such a study.

Buffers are needed along Raccoon Creek and Ratcliffe Cove Branch. The Department of Agriculture and Consumer Services Mountain Research Station along Raccoon Creek and a few small tributaries are in need of buffers to protect water quality and could serve as a demonstration area for agricultural best management practices in the mountain region.

FIGURE 2-4: HEADWATER PIGEON RIVER WATERSHED WITH 2010 USE SUPPORT

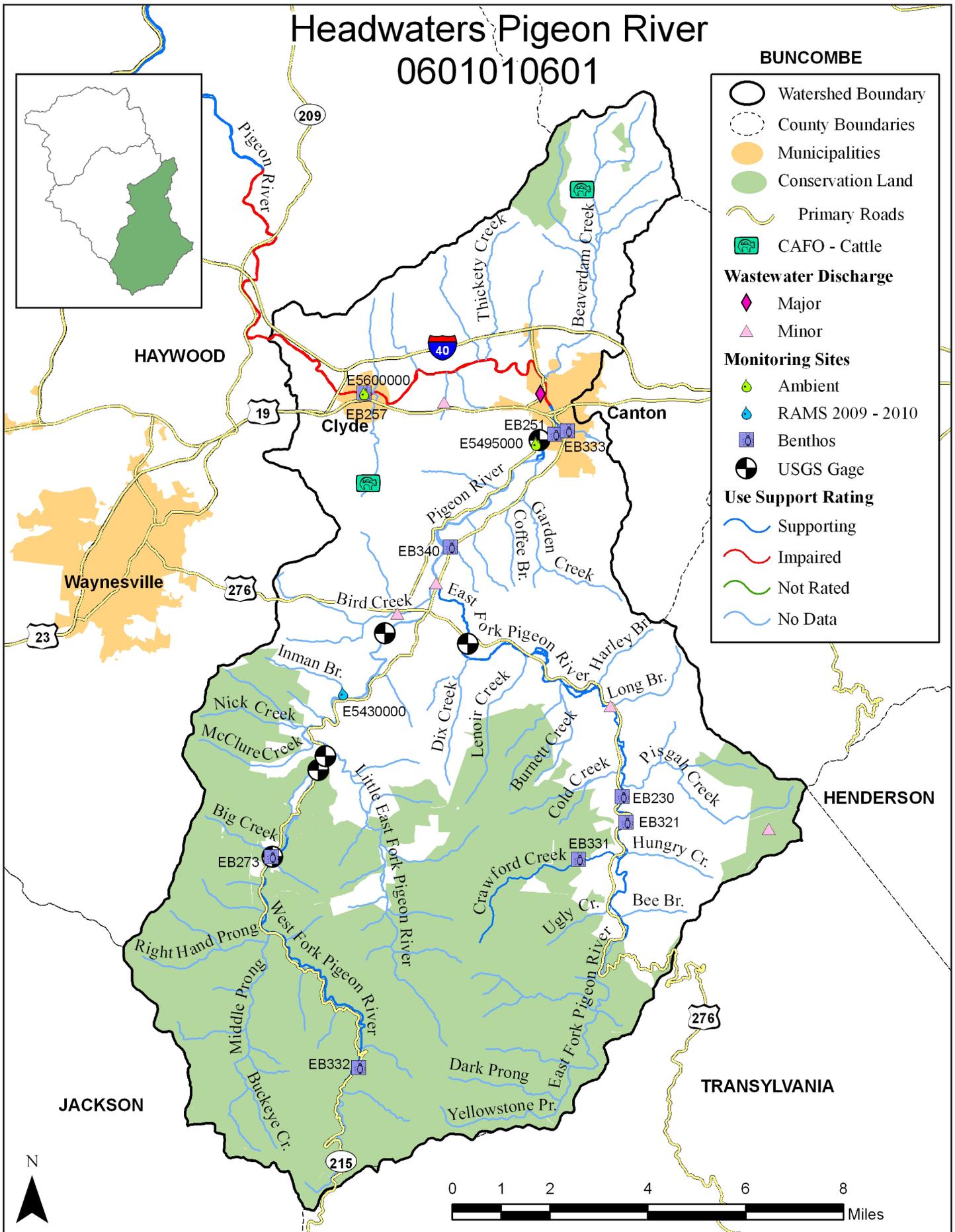


FIGURE 2-5: RICHLAND CREEK WATERSHED WITH 2010 USE SUPPORT

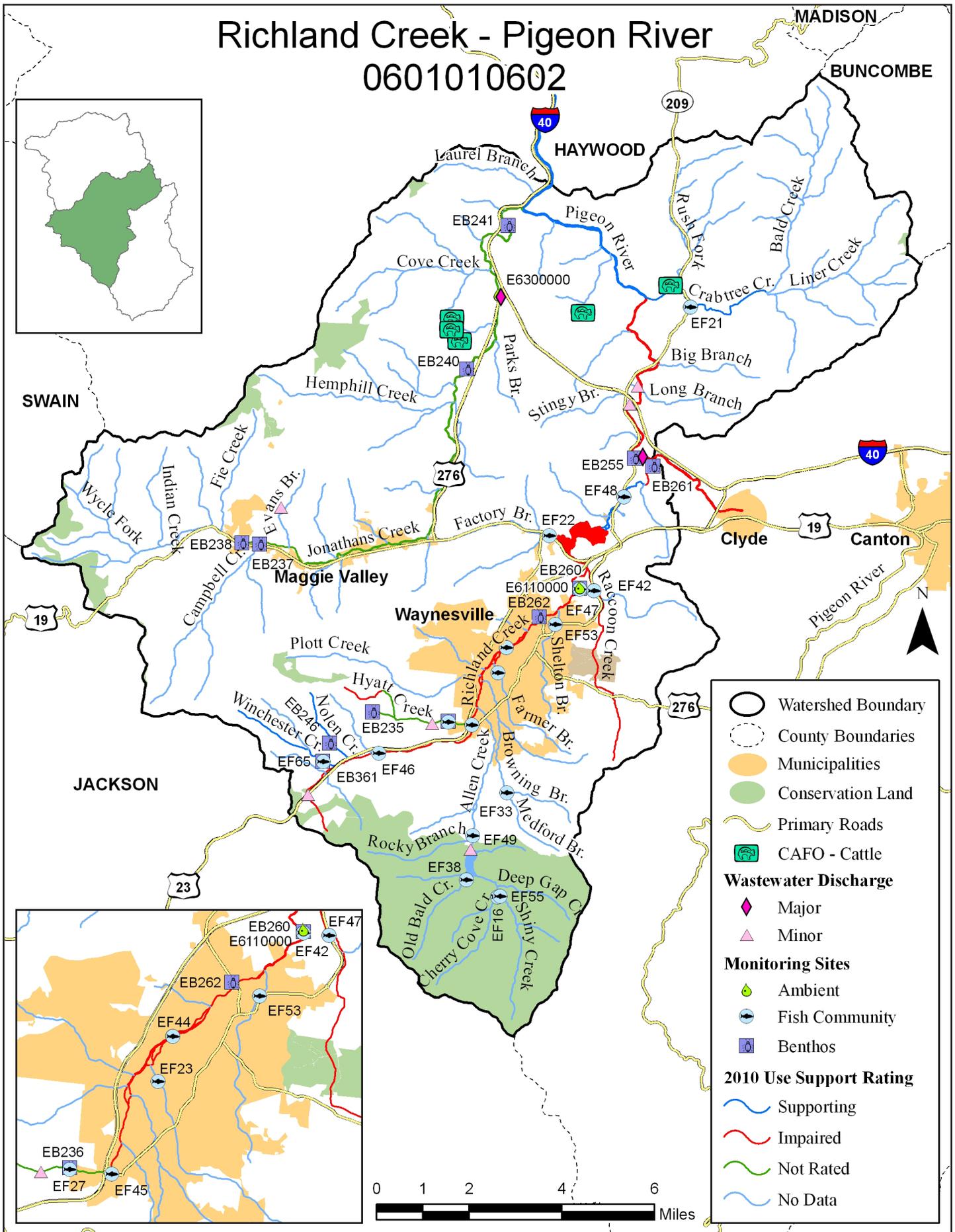


FIGURE 2-6: CATALOOCHEE CREEK WATERSHED WITH 2010 USE SUPPORT

