# French Broad River Basin Restoration Priorities 2009

Ecosystem Enhancement Program

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This document was updated by Andrea Leslie, western watershed planner.

Cover Photo: French Broad River, Henderson County during 2004 flood after Hurricanes Frances and Ivan

## Introduction

North Toe River and gardens, Mitchell County

This document, prepared by the North Carolina Ecosystem Enhancement Program (EEP), presents a description of Targeted Local Watersheds within the French Broad River Basin. This is an update of a document developed in 2005, the *French Broad River Basin Watershed Restoration Plan*.

The 2005 plan selected twenty-nine watersheds to be targeted for stream, wetland and riparian buffer restoration and protection and watershed planning efforts. This plan retains twenty-seven of these original watersheds, plus presents an additional two Targeted Local Watersheds (TLWs) for the French Broad River Basin. Two 2005 TLWs (East Fork French Broad River and North Toe River/Bear Creek/Grassy Creek) were not re-targeted in this document due to a re-evaluation of local priorities.

This document draws information from the detailed document, *French Broad River Basinwide Water Quality Plan—April 2005*, which was written by the NC Division of Water Quality (DWQ). It builds on EEP's 2005 *French Broad River Basin Watershed Restoration Plan* and the original *French Broad River Basin Watershed Restoration Plan*, written in 2001. Therefore, this document does not provide detailed information found in those documents but provides a quick overview of EEP and the criteria EEP uses to select new Targeted Local Watersheds and then describes the newly selected Targeted Local Watersheds.

In past documents, watersheds were delineated by the DWQ "subbasin" units and the smaller Targeted Local Watersheds were defined by US Geological Survey (USGS) 14-digit hydrologic unit (HU). In this document, the watersheds are defined by the USGS 8-digit cataloging units and the Targeted Local Watersheds continue to be defined by the USGS 14-digit hydrologic unit.

## What is a River Basin Restoration Priority?

EEP develops River Basin Restoration Priorities (RBRPs) to guide its mitigation activities within each of the major river basins. The RBRPs delineate specific watersheds that exhibit a need for restoration and protection of wetlands, streams and riparian buffers. These priority watersheds, or Targeted Local Watersheds (TLWs), are 14-digit hydrologic units which receive priority for EEP planning and project funds. The designation may also benefit stakeholders writing watershed improvement grants (e.g., Section 319 or Clean Water Management Trust Fund) by giving added weight to their proposals.

*North Carolina General Statute 143-214.10* charges EEP to pursue wetland and riparian restoration activities in the context of basin restoration plans, one for each of the 17 major river basins in the State,

with the goal of protecting and enhancing water quality, fisheries, wildlife habitat, recreational opportunities and preventing floods.

## Criteria for Selecting Targeted Local Watersheds

EEP evaluates a variety of GIS data and resource and planning documents on water quality and habitat conditions in each river basin to select TLWs. Public comment and the professional judgment of local resource agency staff also play a critical role in targeting local watersheds. TLWs are chosen based on an evaluation of three factors—*problems*, *assets*, and *opportunities*. *Problems* reflect the need for restoration, *assets* reflect the ability for a watershed to recover from degradation and the need for land conservation, and *opportunity* indicates the potential for local partnerships in restoration and conservation work.

Bat Fork, Henderson County

TLWs that were chosen for the last Watershed Restoration Plan or River Basin Restoration Priorities document are reevaluated. If new information reveals that a watershed is not a good TLW candidate, then it will be removed from the TLW list. An explanation of the reasons for its removal from the list is provided in the last section of this document, which provides descriptions of each TLW chosen and delisted.

**Problems:** EEP evaluates DWQ use support ratings, the presence of impaired /303(d)-listed streams, and DWQ Basinwide Assessment reports to identify streams with known problems. EEP also assesses the potential for degradation by evaluating land cover data, riparian buffer condition, road density, and projected population increase.

**Assets:** In order to gauge the natural resource value of each watershed, EEP considers the amount of forested land, land in public or private conservation, DWQ classified trout waters, high and outstanding quality resource waters, and natural heritage elements.

**Opportunity:** EEP reviews restoration and protection projects that are already on the ground, such as Clean Water Management Trust Fund projects, US Clean Water Act Section 319 projects, and land conservation projects. EEP also considers the potential for partnership opportunities by consulting with local, state, and federal resource agencies and conservation organizations, identifying their priority areas.

**Local Resource Professional Comments/Recommendations:** The comments and recommendations of local resource agency professionals, including staff with Soil & Water Conservation districts, the Natural Resources Conservation Service (NRCS), county planning staff, NCDENR regional staff (e.g., Wildlife Resources Commission), and local/regional land trusts and watershed organizations are considered heavily in the selection of Targeted Local Watersheds. Local resource

professionals often have specific and up-to-date information regarding the condition of local streams and wetlands. Furthermore, local resource professionals may be involved in local water resource protection initiatives that provide good partnership opportunities for EEP restoration and preservation projects and Local Watershed Planning initiatives.

## French Broad River Basin Overview


French Broad River valley, Transylvania County

The North Carolina portion of the French Broad River basin is 2,830 $mi^2$ and lies entirely in the Blue Ridge ecoregion. The French Broad River originates in Transylvania County and flows for 210 miles through western North Carolina northward into Tennessee, where it joins the Holston River near Knoxville, forming the Tennessee River.

The French Broad River basin has a varied landscape. Much of the basin is forested, with approximately a fourth of the land in the Pisgah National Forest, Dupont State Forest, and the Great Smoky Mountains National Park. Broad rich valleys of the river itself and tributaries such as Mills River, Jonathans Creek, and Mud Creek are important agricultural lands, kept in pasture and crops such as tomatoes, corn, and sod. The basin also has some of the largest urban areas in the mountains, including the municipalities of Asheville, Waynesville, Hendersonville, and Black Mountain, all of which are US Environmental Protection Agency Phase II stormwater communities.

The basin comprises most of Transylvania, Henderson, Buncombe, Madison, Haywood, Yancey, and Mitchell Counties; it also contains a small portion of Avery County. According to the 2000 census, the basin's population was about 395,000 (based on the percentage of the census blocks that fall in the basin). The basin's population is growing at a considerable rate, with counties growing at an estimated rate of between 10% (Mitchell County) and 30% (Henderson County) between 2000 and 2020 (NCDWQ, 2005).

According to the 2001 National Land Cover Dataset (dataset available at http://www.mrlc.gov/), a majority of the land in the French Broad River basin is forested (76%). Ten percent of the land area is developed, and 13% of the land is agricultural. Agricultural land is in decline and developed land is on the rise; from 1982 to 1997, cultivated cropland declined by 38% and pasture declined by 8%, but urban and built-up land increased by 85% (NCDWQ, 2005).

Outstanding Resource Waters include Cataloochee Creek, the upper South Toe River watershed, and the South Fork Mills River. Watersheds with significant reaches of High Quality Waters include Big Creek, East Fork and West Fork French Broad, Crab Creek, West Fork Pigeon River, and the upper Davidson River. The Wildlife Action Plan (NCWRC, 2005)

identifies four priority watersheds for freshwater conservation—the upper French Broad River, Little River, Mills River, and the upper Nolichucky/Cane/Toe Rivers.

The 2006 303(d) list names a number of stream reaches as impaired in the French Broad River basin, including the following:

- Morgan Mill Creek, Peter Weaver Creek, and the West Fork of the French Broad River in Transylvania County
- Bat Fork, Clear Creek, Devils Fork, Mud Creek, Brandy Branch, Mill Pond Creek, and Gash Creek in Henderson County
- Cane Creek and the French Broad River in Buncombe and Henderson Counties
- Hominy Creek, Ross Creek, Newfound Creek, and the Swannanoa River in Buncombe County
- Little Ivy Creek in Madison County
- Fines Creek, Hyatt Creek, Raccoon Creek, Richland Creek, and the Pigeon River in Haywood County
- Jacks Creek and the Cane River in Yancey County
- North Toe River in Mitchell County

Major stressors in the basin include excess fecal coliform bacteria, nutrient enrichment, habitat fragmentation from impoundments, and habitat degradation associated with sedimentation, streambed scour, and streambank erosion. Development, urbanization, and agriculture are sources of non-point source pollution and sedimentation (NCDWQ, 2005; NCWRC 2005). Toxic impacts from point and agricultural and transportation-related non-point sources have also significantly impacted biological communities, including federally threatened and endangered species.

The basin is divided into three watershed areas, called 8-digit catalog units—06010105, which contains 53 smaller watershed areas, or 14-digit hydrologic units (14-digit HUs), 06010106, which contains fifteen 14-digit HUs, and 06010108, which contains twenty-one 14-digit HUs.

EEP has three local watershed plans (LWPs) in the French Broad River basin, as summarized below.

The Mud Creek Local Watershed Plan was completed in 2003 and was developed by the Mud Creek Watershed Restoration Council. The Council evaluated causes and sources of water quality degradation in the 113 $mi^2$ watershed, which contains four 303(d) listed streams—Mud Creek, Bat Fork, Devils Fork, and Clear Creek. The plan sets forth a comprehensive set of strategies to address the problems identified. A restoration coordinator for the Mud Creek watershed works with the Council to implement restoration activities. See

http://www.nceep.net/services/lwps/Mud_Creek/mud_creek.pdf for more information on the planning effort.

The South Hominy Creek Local Watershed Plan effort began in 2003 and was completed in 2006. It had three phases—a preliminary watershed characterization, a detailed watershed assessment, and the development of prioritized management strategies to address watershed stressors for this 38 $mi^2$ watershed just west of Asheville. Functional limitations were identified for each of six subwatersheds with GIS and field assessment, and management strategies were named to address stream channelization, sedimentation, lack of adequate riparian vegetation, and nutrient and bacterial pollution. An atlas of prioritized stream restoration and preservation projects was developed in 2007. See http://www.nceep.net/services/lwps/South_Hominy_Creek/NEW_South_Hominy.pdf for more information on the planning effort.

The Bald Creek Local Watershed Plan was developed for an 18 $mi^2$ rural watershed in Yancey County between 2003 and 2006. Major stressors identified were fecal bacteria and nutrient pollution and habitat degradation due to excess sediment deposition, channelization, and lack of adequate riparian vegetation. Recommendations were made to address these issues, including stream restoration and preservation, straight-pipe elimination, livestock exclusion from streams, and development regulations. In 2007, an atlas of prioritized stream restoration and preservation projects was developed for an expanded area that includes Price, Indian, and Jacks Creeks. See http://www.nceep.net/services/lwps/Bald_Creek/NEW_baldcreek.pdf for more information on the planning effort.

## French Broad River Basin Restoration Goals

Based on an assessment of existing watershed characteristics and resource information, EEP has developed restoration goals for the French Broad River Basin. The goals reflect EEP's focus on restoring wetland and stream functions such as maintaining and enhancing water quality, restoring hydrology, and improving fish and wildlife habitat. Goals that apply to each of the three 8-digit catalog units include:

- Implement wetland and stream restoration projects that reduce sources of sediment and nutrients by restoring riparian buffer vegetation, stabilizing banks, excluding livestock, and restoring natural geomorphology, especially in headwater streams.
- Restore and protect habitat for priority fish, mussel, snail, and crayfish species in the basin [see Wildlife Resource Commission (2005) for a complete list].
- Cooperate with land trusts and resource agencies to help leverage federal and state grant funding for watershed restoration and conservation efforts.

- Protect high quality habitats, especially those prioritized by the Natural Heritage Program as Significant Natural Heritage Areas.

In addition, specific goals for individual 8-digit catalog units include:
French Broad River (06010105):

- Focus restoration efforts in the Mud Creek and South Hominy Creek LWP areas.
- Work with local partners to improve management of stormwater runoff, controlling both stormwater volume and pollutants, and promote low impact development techniques to lessen impacts of new development, especially in the expanding areas of Asheville, Black Mountain, Fletcher, and Hendersonville

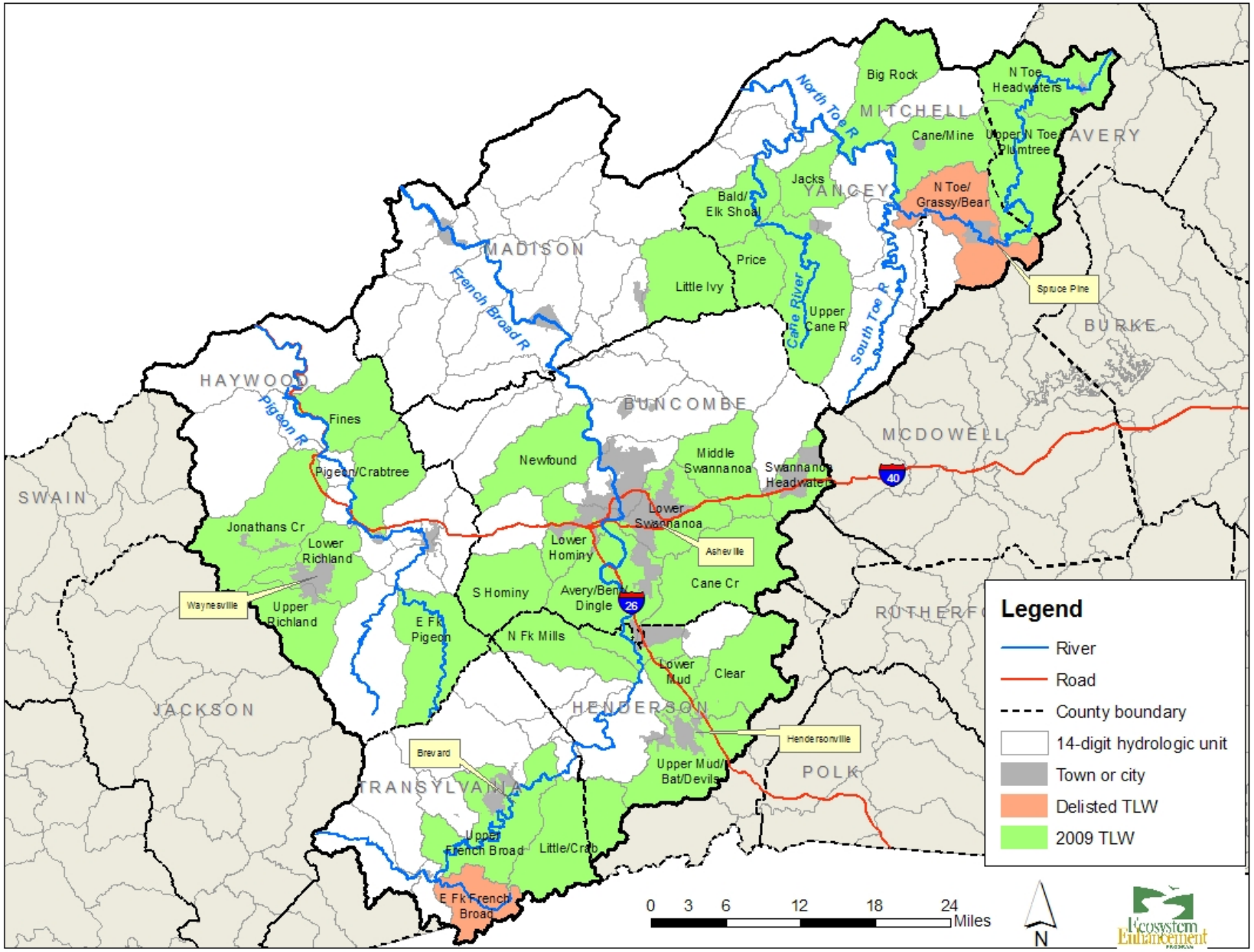
Pigeon River (06010106):

- Work with the Haywood Waterways Association to implement their restoration priorities, especially in the Richland Creek watershed.

Toe, Cane, and Nolichucky Rivers (06010108):

- Focus restoration efforts in the expanded Bald Creek LWP area.
- Work with partners to protect and restore habitat for the Appalachian elktoe in the Cane and Toe River watersheds.

# French Broad River Basin and Targeted Local Watershed Map




French Broad River Basin Restoration Priorities 2009

# Targeted Local Watershed Summary Table* (continued on following page)

| Major Streams | 14-digit Hydrologic Unit | Area (sq mi) | Land Cover: % Developed | Land Cover: % Agriculture | Land Cover: % Forest & Wetland | % of Streams w/ Forested Buffer | HQW & ORW Stream Miles | WSW Stream Miles | # of NHEOs | % of Land in Conser-vation | Impaired Streams | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper French Broad R | 06010105010050 | 64 | 17 | 18 | 65 | 58 | 17 | 0 | 24 | 11 | 0.2 mi Morgan Mill Cr; 0.8 mi Peter Weaver Cr | |
| Little R, Crab Cr | 06010105010080 | 60 | 5 | 8 | 85 | 82 | 40 | 0 | 183 | 28 | | New TLW in 2009 |
| N Fk Mills R | 06010105020020 | 33 | 5 | 15 | 80 | 75 | >80 | 89 | 57 | 63 | 2.1 mi Brandy Br | |
| Upper Mud Cr, Bat Fk, Devils Fk | 06010105030020 | 53 | 41 | 22 | 36 | 37 | 0 | 0 | 51 | 2 | 6.3 mi Bat Fk; 2.7 mi Devils Fk; 9.4 mi Mud Cr | Mud Creek LWP |
| Lower Mud Cr | 06010105030030 | 15 | 34 | 19 | 47 | 52 | 0 | 0 | 2 | 0 | 5.7 mi Mud Cr | Mud Creek LWP |
| Clear Cr | 06010105030040 | 45 | 13 | 35 | 53 | 52 | 0 | 0 | 11 | 1 | 11.3 mi Clear Cr | Mud Creek LWP |
| Cane Cr | 06010105040010 | 73 | 16 | 21 | 63 | 57 | 0 | 0 | 26 | 1 | 9.6 mi Cane Cr | |
| Avery Cr, Bent Cr, Dingle Cr | 06010105050010 | 63 | 23 | 18 | 57 | 57 | 0 | 0 | 25 | 22 | 8.2 mi French Broad R | |
| S Hominy Cr | 06010105060020 | 38 | 7 | 14 | 79 | 68 | 0 | 0 | 10 | 23 | | S Hominy LWP |
| Lower Hominy Cr | 06010105060030 | 25 | 42 | 15 | 42 | 40 | 0 | 0 | 0 | 9 | 7.8 mi Hominy Cr | |
| Swannanoa River Headwaters, Flat Cr | 06010105070020 | 22 | 28 | 4 | 68 | 58 | 10 | 1 | 41 | 18 | 7.0 mi Swannanoa R | |
| Middle Swannanoa R, Bull Cr, Beetree Cr | 06010105070030 | 39 | 15 | 7 | 78 | 65 | 0 | 10 | 60 | 31 | 2.6 mi Swannanoa R | |
| Lower Swannanoa R, Ross Cr, Sweeten Cr | 06010105070040 | 39 | 46 | 6 | 48 | 37 | 0 | 0 | 18 | 6 | 1.1 mi Ross Cr | |
| Newfound Cr | 06010105090020 | 45 | 10 | 42 | 47 | 39 | 0 | 0 | 2 | 0 | 11.9 mi Newfound Cr; 5.5 mi French Broad R | |
| Little Ivy R | 06010105110020 | 46 | 7 | 20 | 73 | 42 | 0 | 128 | 2 | 0 | 2.6 mi Little Ivy R | |
| East Fork Pigeon R | 06010106010010 | 53 | 5 | 5 | 91 | 81 | 25 | 128 | 50 | 49 | | |
| Pigeon R, Crabtree Cr | 06010106020010 | 35 | 6 | 30 | 64 | 44 | 0 | 0 | 4 | 0 | | |
| Jonathans Cr | 06010106020030 | 67 | 9 | 12 | 79 | 62 | 0 | 43 | 21 | 3 | | |
| Fines Cr | 06010106020040 | 35 | 4 | 15 | 80 | 60 | 0 | 0 | 12 | 7 | 9.7 mi Fines Cr | |
| Upper Richland Cr | 06010106030010 | 36 | 12 | 6 | 82 | 70 | 3 | 37 | 51 | 8 | 0.9 mi Hyatt Cr; 6.1 mi Richland Cr | |
| Lower Richland Cr | 06010106030020 | 33 | 32 | 18 | 49 | 29 | 0 | 0 | 16 | 1 | 4.7 mi Raccooon Cr; 6 mi Richland Cr; 200 ac L. Junaluska | |

*Table Notes:
TLW=targeted local watershed in 2003 plan; LWP=local watershed plan
HQW=DWQ High Quality Water; ORW=DWQ Outstanding Resource Water; NHEO=Natural Heritage Element Occurrence, as maintained by the NC Natural Heritage Program
Impaired Streams as noted in 2006 303(d) list

## Targeted Local Watershed Summary Table* (continued on from previous page)

| Major Streams | 14-digit Hydrologic Unit | Area (sq mi) | Land Cover: % Developed | Land Cover: % Agriculture | Land Cover: % Forest & Wetland | % of Streams w/ Forested Buffer | HQW & ORW Stream Miles | WSW Stream Miles | # of NHEOs | % of Land in Conser-vation | Impaired Streams | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N Toe R Headwaters | 06010108010010 | 46 | 8 | 10 | 82 | 68 | 0 | 0 | 89 | 16 | | |
| Upper N Toe R, Plumtree Cr | 06010108010020 | 59 | 6 | 13 | 81 | 74 | 0 | 32 | 26 | 1 | | |
| Cane Cr, Mine Cr | 06010108040010 | 37 | 6 | 12 | 82 | 58 | 0 | 0 | 18 | 0 | | |
| Jacks Cr | 06010108050010 | 22 | 5 | 19 | 76 | 54 | 0 | 0 | 0 | 0 | 8.5 mi Jacks Cr | Bald Creek LWP |
| Big Rock Cr | 06010108060010 | 46 | 3 | 11 | 85 | 72 | 0 | 0 | 64 | 20 | | |
| Price Cr | 06010108080010 | 22 | 4 | 12 | 84 | 52 | 0 | 0 | 10 | 0 | | Bald Creek LWP |
| Bald Cr, Elk Shoal Cr | 06010108080020 | 32 | 6 | 14 | 79 | 58 | 0 | 0 | 10 | 0 | | Bald Creek LWP |
| Cane R | 06010108070010 | 65 | 6 | 7 | 87 | 72 | 0 | 104 | 61 | 34 | | New TLW in 2009 |

*Table Notes:
TLW=targeted local watershed in 2003 plan; LWP=local watershed plan
HQW=DWQ High Quality Water; ORW=DWQ Outstanding Resource Water; NHEO=Natural Heritage Element Occurrence, as maintained by the NC Natural Heritage Program
Impaired Streams as noted in 2006 303(d) list

# Discussion of Targeted Local Watersheds in French Broad River Basin

This section provides a description and map of each watershed chosen as a Targeted Local Watershed (TLW) in 2009 and two watersheds named as TLWs in 2005 but not targeted in 2009. Information on impaired stream reaches, stressors, and biological community ratings were often drawn from the French Broad River Basinwide Plan (NCDWQ, 2005), the 2006 303(d) list (as of July 2009, the 2008 list was not approved), and the 2008 Basinwide Assessment Report for the French Broad Basin (NCDWQ, 2008). Where other documents are referenced, they are cited specifically.

Conservation priorities of Blue Ridge Forever (http://www.blueridgeforever.info/ ) are described if applicable. Blue Ridge Forever is a shared vision of thirteen land conservation organizations in western North Carolina that identified twenty-six focus areas across the Blue Ridge that would connect protected lands on a landscape scale. Significant Natural Heritage Areas noted in the NC Natural Heritage Program's county inventories (http://www.ncnhp.org/Pages/countysummaries1.htm) are often mentioned.

**2009 Targeted Local Watersheds**

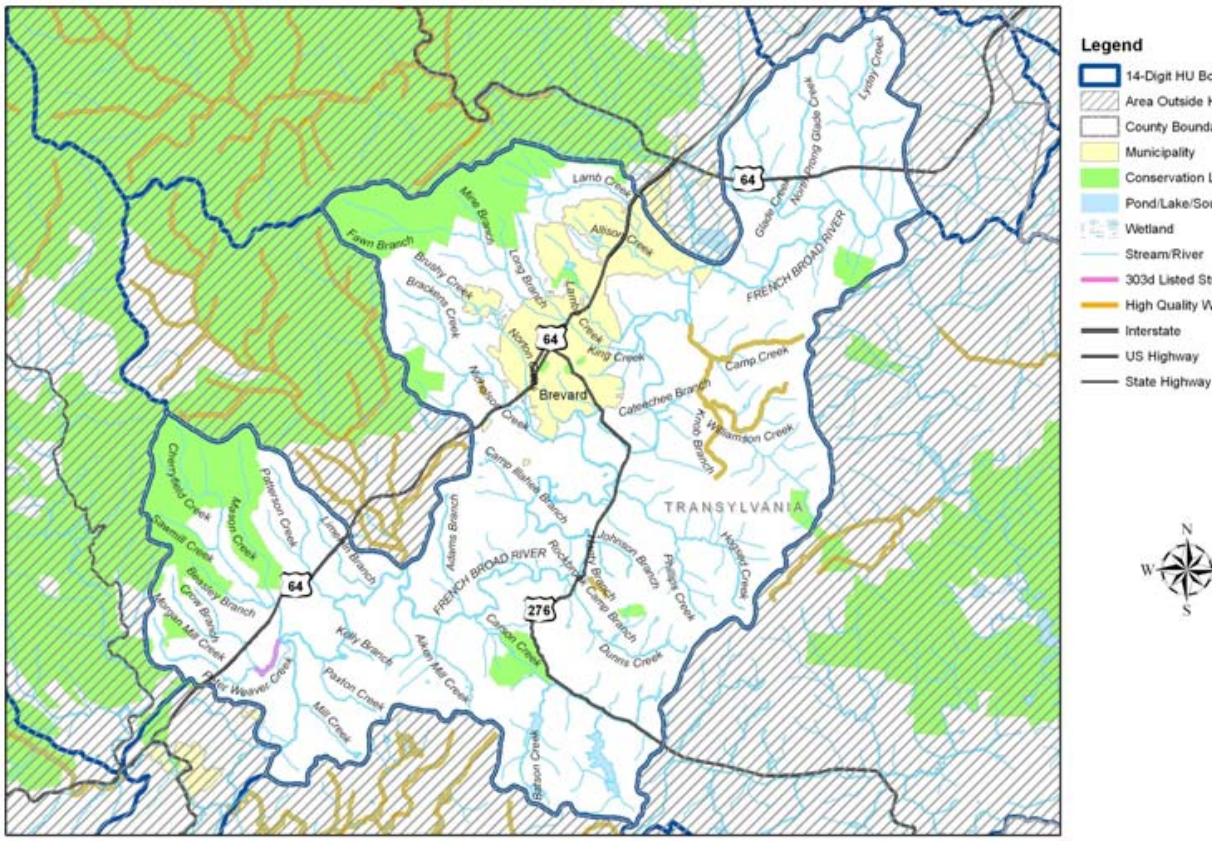
Upper French Broad River (06010105010050)

The upper French Broad River watershed is mainly forested but drains Brevard and prime agricultural land as well—65% of the land is forested, and the remainder is split evenly between developed and agricultural land. A relatively low proportion (58%) of streams in the watershed has an adequate forested buffer.

Morgan Mill Creek and Peter Weaver Creek are both on the 2006 303(d) list due to a severely degraded benthic macroinvertebrate community; impacts are due to organic loading from a trout farm, habitat degradation, and hydromodification. The Morgan Mill/Peter Weaver Creek watershed is a restoration priority of the Transylvania County Soil and Water Conservation District.

This watershed contains a long section of the upper French Broad River, which is a primary refuge for existing aquatic species (NCWRC, 2005). The Upper French Broad River is also a Blue Ridge Forever focus area, and the Carolina Mountain Land Conservancy has facilitated a number of conservation easements in the watershed. EEP has a stream restoration project on the campus of Brevard College on King Creek.

Upper French Broad River watershed

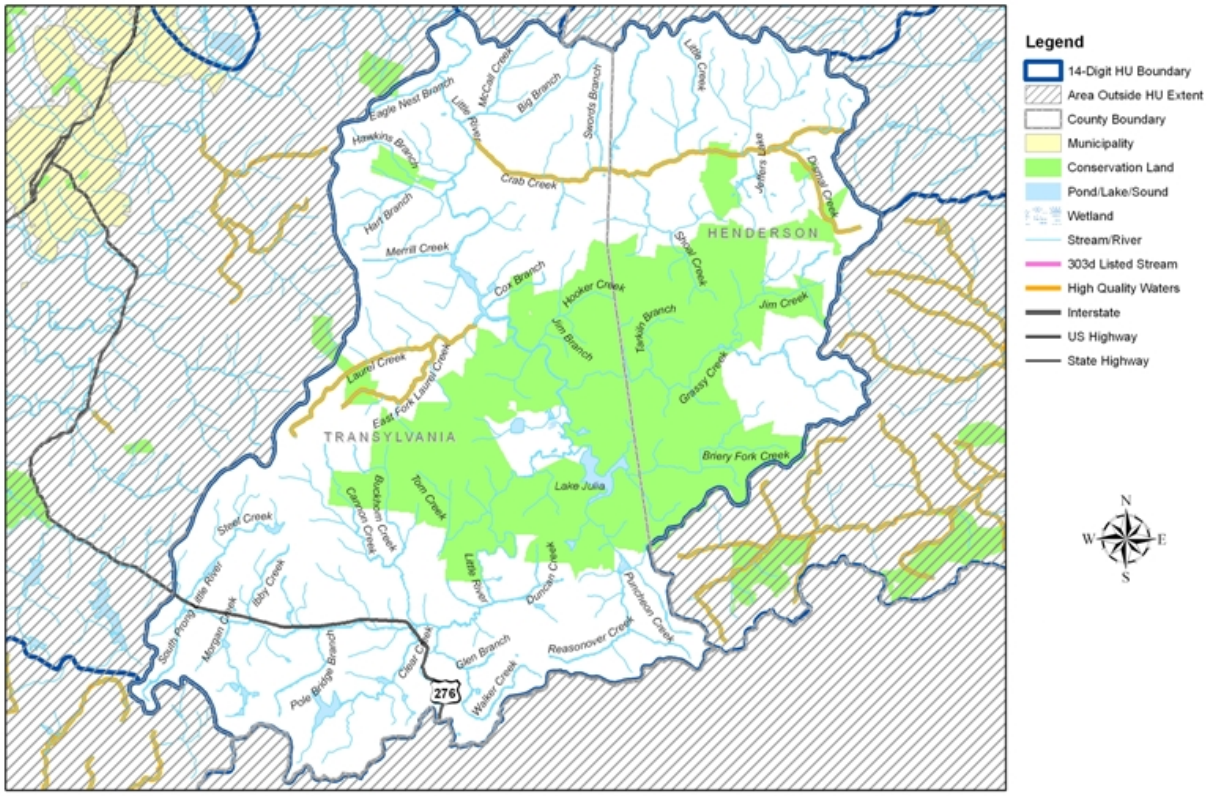


Little River, Crab Creek (06010105010080)

The 60 mi$^2$ Little River/Crab Creek watershed is a new TLW in 2009. Eighty-five percent of the land is forested and 82% of stream length is adequately buffered. The Dupont State Forest lies in the middle of the watershed, and the Little River serves as a primary refuge for most priority aquatic species still extant in the French Broad basin, including the federally listed Appalachian elktoe (NCWRC, 2005). Crab Creek and Laurel Creek and its tributaries are High Quality Waters, and the watershed includes a large number of Significant Natural Heritage Areas, including the Little River/Cedar Mountain natural area, the Little River wetland complex, Laurel Creek headwaters, and a number of areas along Reasonover Creek.

Both Crab Creek and the Little River suffer from excess sedimentation and have been foci of the Henderson and Transylvania County Soil and Water Conservation Districts. This area is also a focus area of Blue Ridge Forever, and the Carolina Mountain Land Conservancy has actively fostered conservation projects here.

Little River/Crab Creek watershed



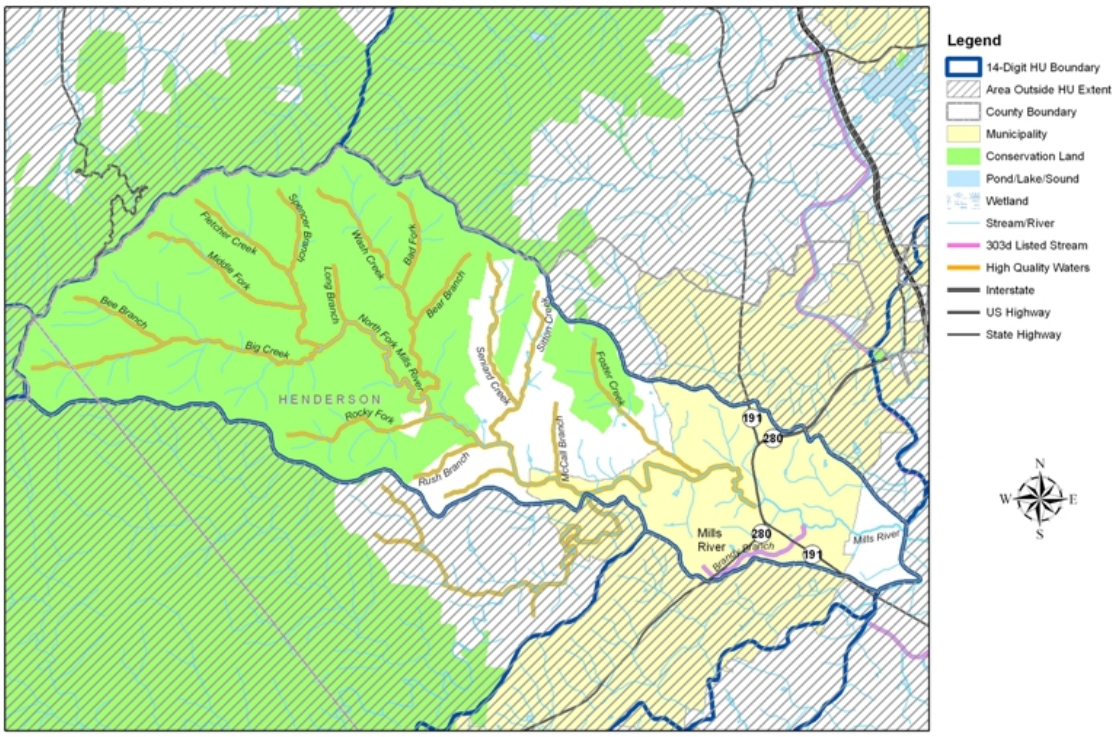
North Fork Mills River (06010105020020)

More than half of the North Fork Mills River watershed is in Pisgah National Forest. Most streams are High Quality Waters, and the watershed serves as a water supply for Asheville and Hendersonville. The lower section of the watershed flows through some of the richest bottomland in the region, and it has long been an important agricultural area. Now, tomatoes and sod are grown in the floodplain. In addition, residential development is on the increase in this scenic area; sediment impacts from these activities have been noted.

This watershed includes one 303(d) listed stream, Brandy Branch, which drains agricultural and residential lands. Periodic and severe impacts to fish and/or macroinvertebrate communities in the Mills River and the North and South Forks of the Mills River have been documented by NC Division of Water Quality and attributed to tomato pesticides. The Henderson County Soil and Water Conservation District has targeted the Mills River watershed for tomato pesticide management BMPs and stream restoration activities.

The Mills River is part of the Mills River/South Fork Mills River Significant Natural Heritage Area, notable for the presence of rare fish, aquatic salamanders, mussels, and other invertebrates. The entire Mills River watershed is a priority conservation area noted by the Wildlife Action Plan (NCWRC, 2005). It is also part of the upper French Broad River watershed focus area of Blue Ridge Forever.

North Fork Mills River watershed



**Mud Creek Watershed**

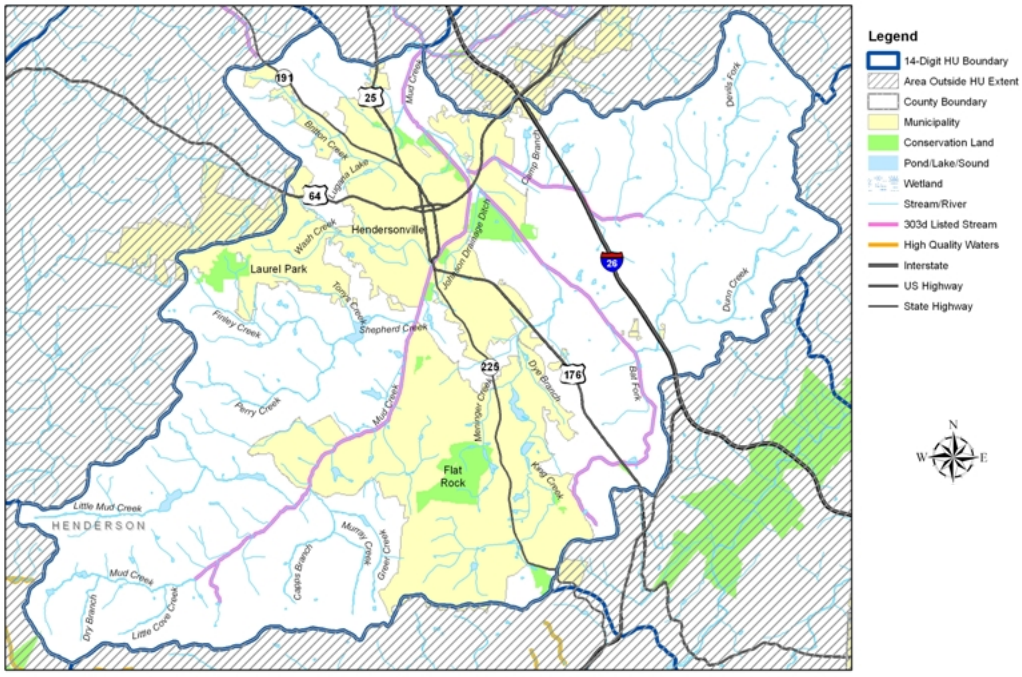
The *Upper Mud Creek/Bat Fork/Devils Fork, Lower Mud Creek, and Clear Creek watersheds* form the larger Mud Creek watershed, which has been the focus of a restoration effort for close to a decade. Portions of all four streams are impaired, and a 2003 study (NCDWQ, 2003) determined causes of impairment, described below. EEP worked with the Mud Creek Watershed Restoration Council to develop a local watershed plan that named strategies to address the causes of impairment. After the watershed plan was completed, a watershed coordinator was hired to carry out restoration and education activities.

The *Mud Creek/Bat Fork/Devils Fork watershed (06010105030020)* has a high (41%) proportion of developed land, including Hendersonville, Flat Rock, and Laurel Park. Twenty-two percent of the land is agricultural, with cattle pasture, hay, tomatoes, apples, and other row crops grown. Pesticides, nutrient enrichment, habitat degradation (sedimentation, lack of in-stream habitats), and urban stressors (toxicants, stormflow scour) are all implicated in impairment. Only 37% of the stream length has an adequate forested buffer. However, there are a number of mountain bogs in the watershed, and land conservation groups have been working to protect these special ecosystems.

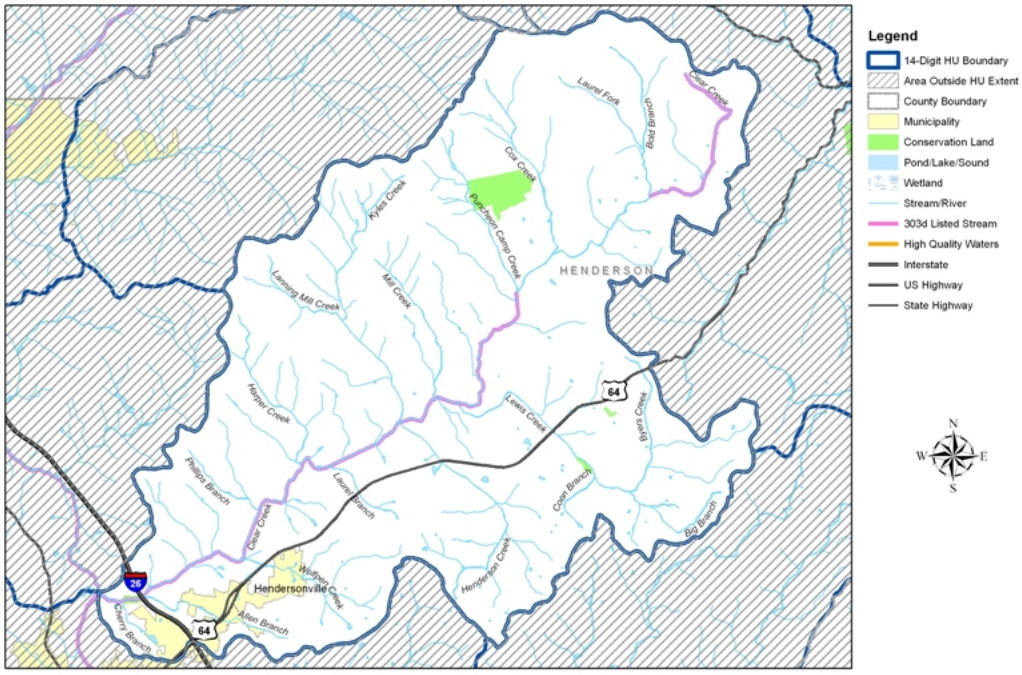
The *Clear Creek watershed (06010105030040)* has a higher proportion of land in agriculture (35%), with much of this land in apple orchard. Pesticides from apple and row crop operations have been named as the primary cause of impairment for Clear Creek, and the Mud Creek watershed coordinator and local NRCS and SWCD have been promoting BMPs to improve pesticide handling and use and decrease the amount of pesticides used. Sedimentation and nutrient enrichment were also identified as contributing stressors for Clear Creek. EEP has two stream restoration projects in the Clear Creek watershed, and other stream restoration activities have been implemented through the Mud Creek watershed coordinator.

Like the Upper Mud Creek watershed, the *Lower Mud Creek watershed (06010105030030)* has a majority of in developed (34%) and agricultural (19%) land uses. Lower Mud Creek suffers from the same mix of stressors as Upper Mud Creek.

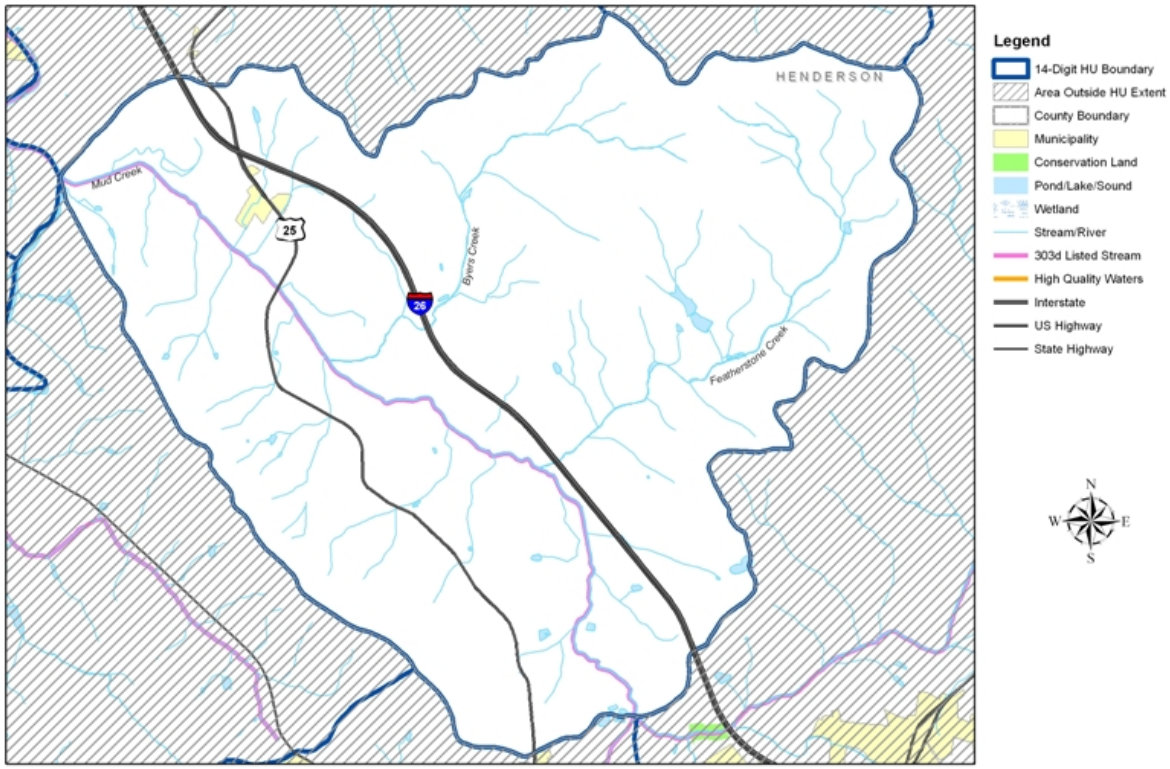
Upper Mud Creek watershed




Clear Creek watershed



Lower Mud Creek watershed

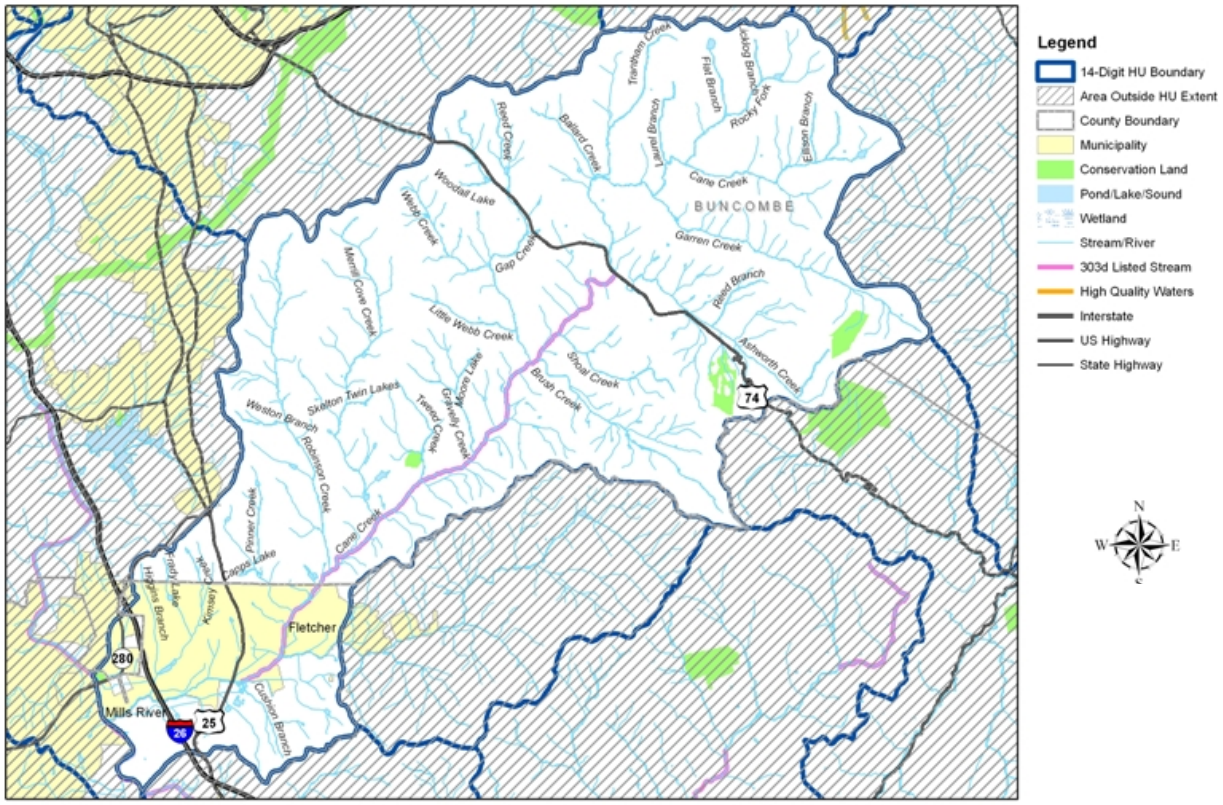


Cane Creek (06010105040010)

The Cane Creek watershed is the largest TLW in the French Broad River basin (73 $mi^2$). Its headwaters start at the continental divide and are primarily forested. As it courses southwest, it drains more developed and farm land and joins the French Broad River in Fletcher. The lower portion of Cane Creek is impaired due to a degraded biological community.

Although 63% of the land is forested or wetland, very little is permanently protected. The farming community of Fairview (in the upper and middle portions of the watershed) is a focus area of Blue Ridge Forever. EEP has a stream restoration project on an unnamed tributary to Cane Creek in Fletcher, a section of Cane Creek has been restored by NC State University along the Fletcher Park Greenway, and a riparian restoration project on Robinson Creek has also been implemented by RiverLink, a non-profit organization working with water quality issues in the French Broad River basin.

Cane Creek watershed

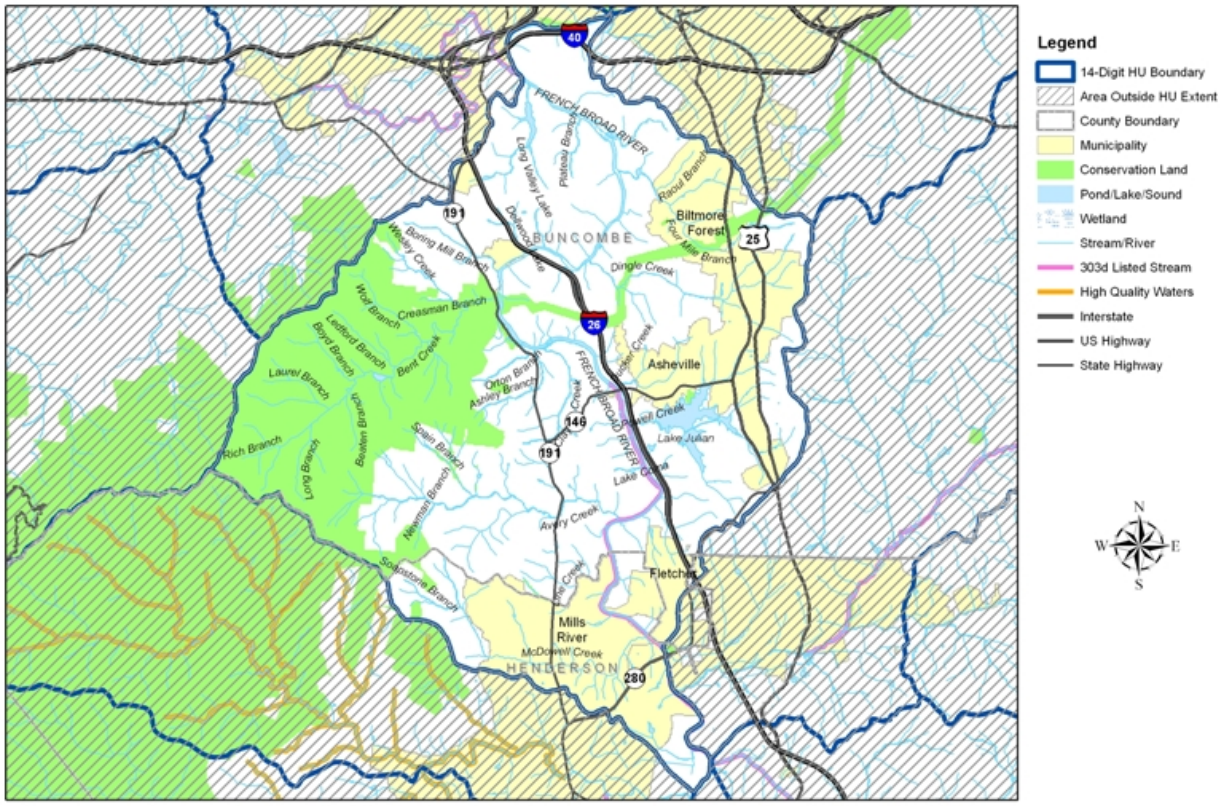


Avery Creek, Bent Creek, Dingle Creek (06010105050010)

The Avery Creek/Bent Creek/Dingle Creek watershed includes a portion of the French Broad River and a number of tributaries that drain the communities of south Asheville, Mills River, and Fletcher. The French Broad River is impaired due to high levels of fecal coliform bacteria, which are suspected to be due to agricultural sources.

The western portion of this watershed is conserved as part of the Bent Creek Experimental Forest (US Forest Service), and 57% of the total land area of the watershed is forested. However, this area is experiencing rapid development (a 29% increase in population is expected between 2005 and 2020), and stormwater-related issues are becoming more prevalent. A stream restoration project and stormwater wetland project in the Dingle Creek watershed were approved for funding in 2008 by the Clean Water Management Trust Fund (CWMTF) but are on hold due to lack of funding. EEP has a stream restoration project in the headwaters of County Line Creek, on the High Vista golf course.

Avery/Bent/Dingle Creek watershed

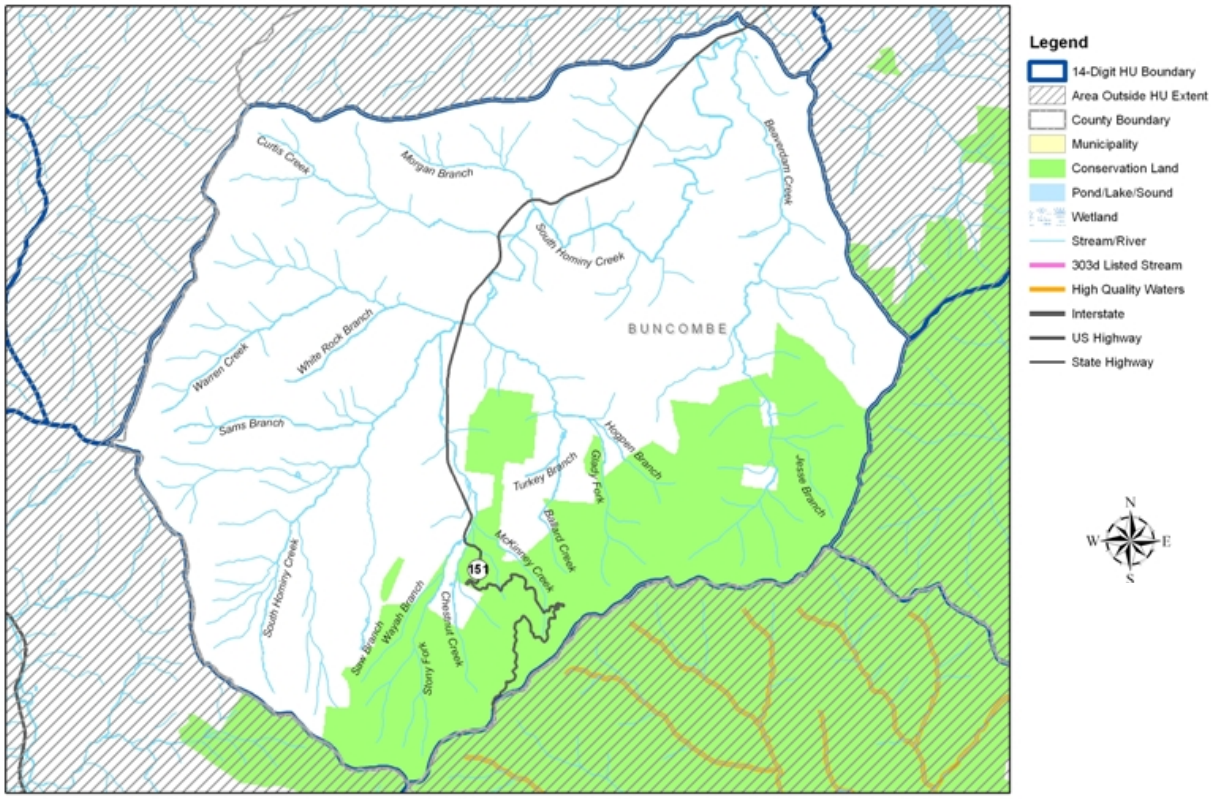


South Hominy Creek (06010105060020)

The South Hominy Creek watershed is just west of Asheville, with a majority (79%) of land in forested/wetland uses, with almost half of the land in the Pisgah National Forest or the Blue Ridge Parkway. Its broad valleys are a patchwork of agricultural (mostly hay and cattle pasture) and residential land, and the steeper slopes are mostly forested. Being so close to Asheville, this watershed is also seeing increased development in both the valleys and the steeper slopes.

The South Hominy Creek watershed was the subject of an EEP local watershed plan, which was completed in 2006. The plan developed a set of recommendations to address major stressors, which are stream channelization, sedimentation, lack of adequate riparian vegetation, and nutrient and bacterial pollution. EEP has a stream restoration project on South Hominy Creek.

South Hominy Creek watershed

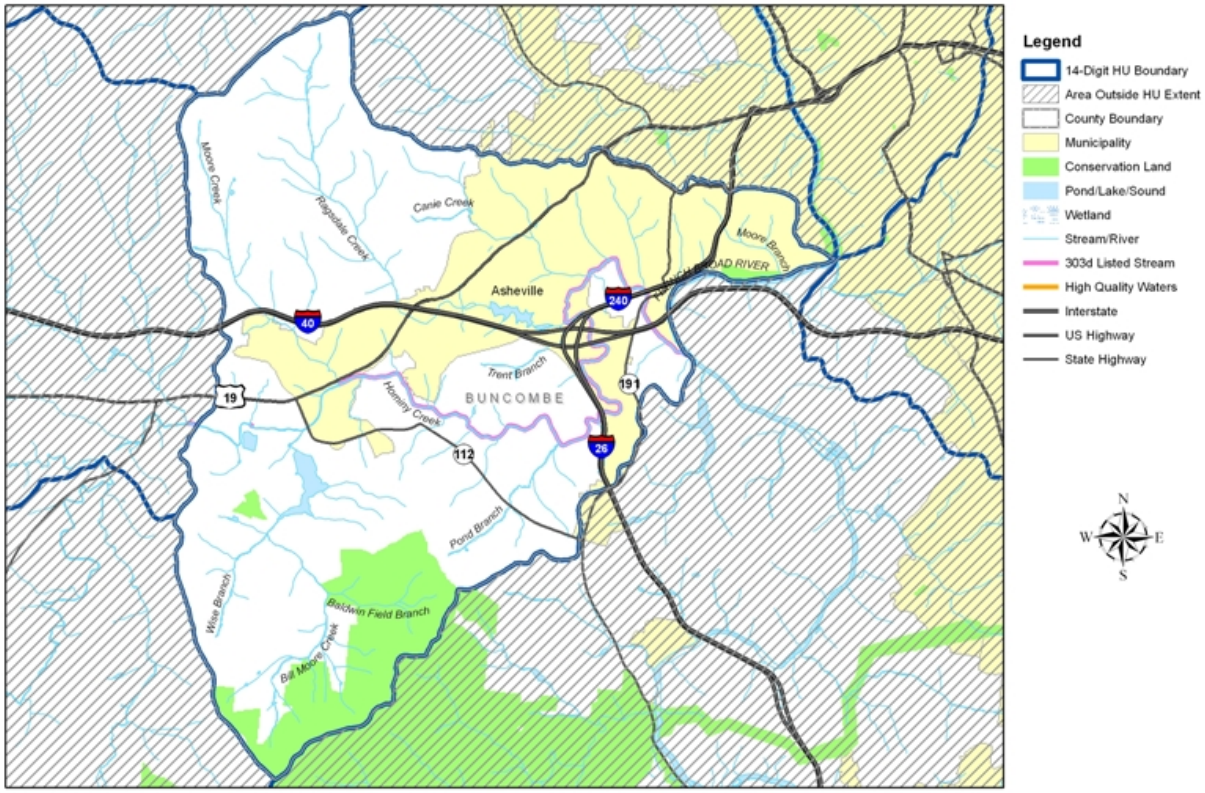


Lower Hominy Cr (06010105060030)

Lower Hominy Creek drains West Asheville and surrounding communities. It is a highly developed watershed (42% developed land), and only 40% of the stream length is adequately buffered. Most of the length of Hominy Creek in this watershed is impaired, impacted by severe habitat degradation (bank erosion and lack of riparian vegetation) and possible toxicity. NC Division of Water Quality recommends stream restoration and riparian buffer planting to restore habitat and careful sedimentation and erosion control during land-disturbing activities.

Stream restoration and stormwater BMPs are to be installed on two small tributaries to Hominy Creek (Buttermilk Creek and Rhododendron Creek) in West Asheville through RiverLink, a non-profit organization working with water quality issues in the French Broad River basin.

Lower Hominy Creek watershed



**Swannanoa River Watershed**

Three out of four 14-digit hydrologic units in the Swannanoa River watershed are TLWs (*Swannanoa River Headwaters, Middle Swannanoa River, Lower Swannanoa River*). Each of the TLWs have a portion of the Swannanoa River which is impaired or severely impacted. Stressors include habitat degradation, poor riparian buffers, nutrient enrichment, channelization, sedimentation, and toxicity; many of these stressors are attributed to urban and residential runoff and development. The NC Division of Water Quality recommends the use of stormwater BMPs and local planning efforts that address impacts from current and new development.

The watershed was the subject of a restoration project spearheaded by RiverLink, a local non-profit organization dedicated to economic and environmental improvement of the French Broad River and its tributaries. As a result of this effort, a number of stormwater and stream habitat improvement projects were established in the watershed.

The *Swannanoa River Headwaters/Flat Creek watershed's (06010105070020)* headwaters are at the continental divide, draining the protected Montreat Wilderness to the north and forested land to the east. Although 68% of the watershed is forested/wetland, 28% of it is developed, and there is continued development in the outskirts of Black Mountain and Swannanoa. The residential nature of this watershed is also indicated in the condition of its stream buffers; only 58% of the stream length is adequately buffered here.

A number of stormwater BMPs and a stream restoration project have been constructed or are planned in Black Mountain. The northern edge of this watershed is formed by the Black and Craggy Mountains, a focus area of Blue Ridge Forever.

The *Middle Swannanoa River/Bull Creek/Beetree Creek watershed (06010105070030)* is more forested (78% forest/wetland) and less developed (15%) than the Swannanoa River Headwaters watershed immediately upstream, and it still retains some land in agriculture (7%). Like the upstream watershed, a significant portion (31%) of it is protected in the Asheville Watershed and Pisgah National Forest. Development in this watershed is increasing, with the most notable development being a new and very large gated development and golf course on the southern slopes of the watershed.

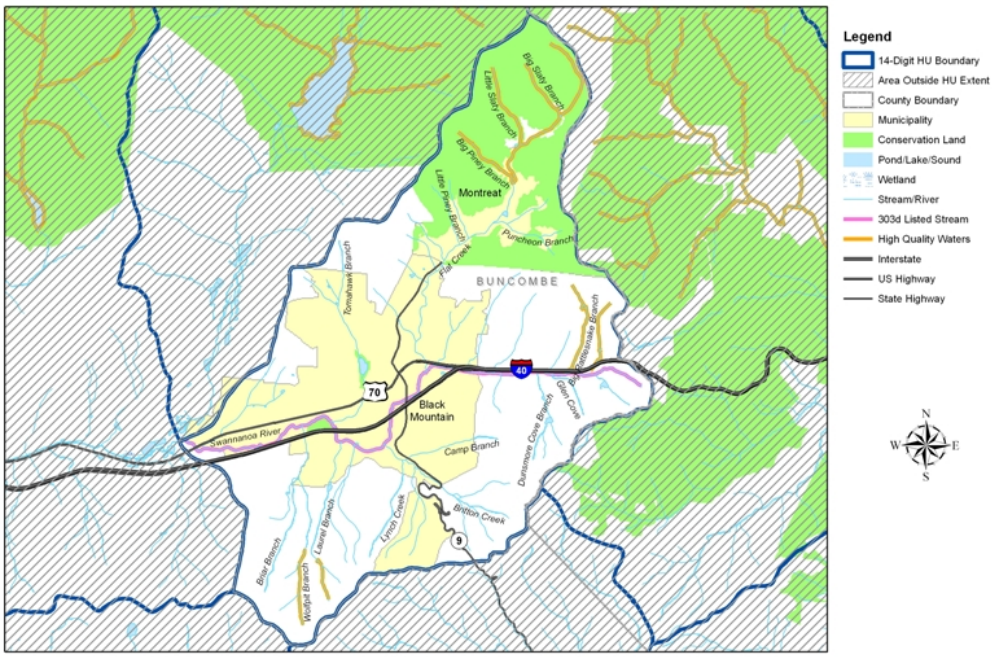
The northern edge of this watershed is formed by the Black and Craggy Mountains, a focus area of Blue Ridge Forever.

The *Lower Swannanoa River/Ross Creek/Sweeten Creek watershed (06010105070040)* is the most urban of all of the watersheds in the French Broad basin, with 46% of the land developed and only 37% of the stream length with an adequate buffer. This watershed drains a significant portion of Asheville and surrounding developed land.

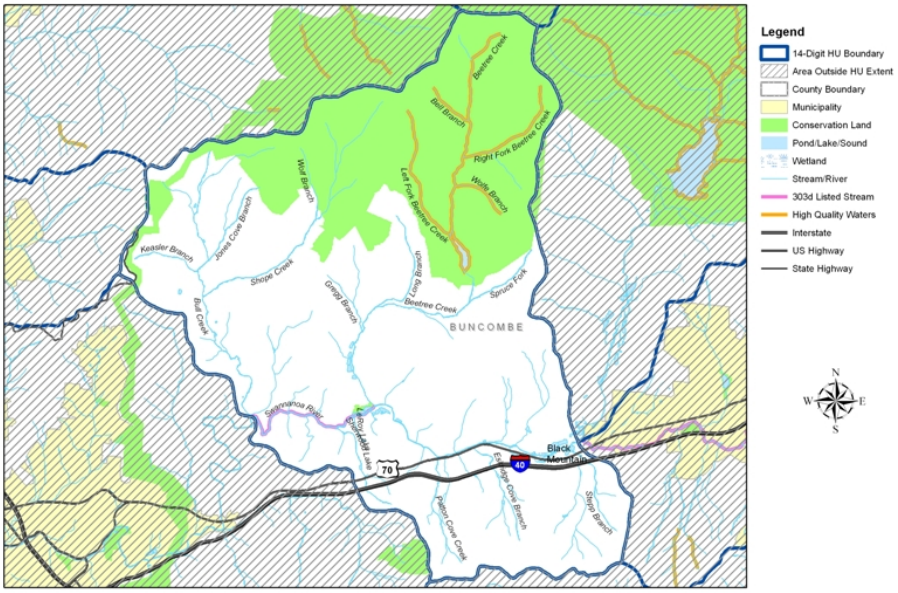
In addition to the impacted Swannanoa River, this watershed includes Ross Creek, a small urban stream that is on the 303(d) list. It suffers from urban runoff, habitat degradation (poor riparian zones, eroding stream banks, sedimentation), and nutrient enrichment. To address problems in Ross Creek, the NC Division of Water Quality recommends stormwater BMP retrofits, stream and riparian buffer restoration, and preservation. Several stormwater BMPs and stream

enhancement projects have been implemented in the Haw Creek and Ross Creek watersheds. A large stream restoration project was implemented on the Swannanoa River in the City of Asheville's Azaela Park.

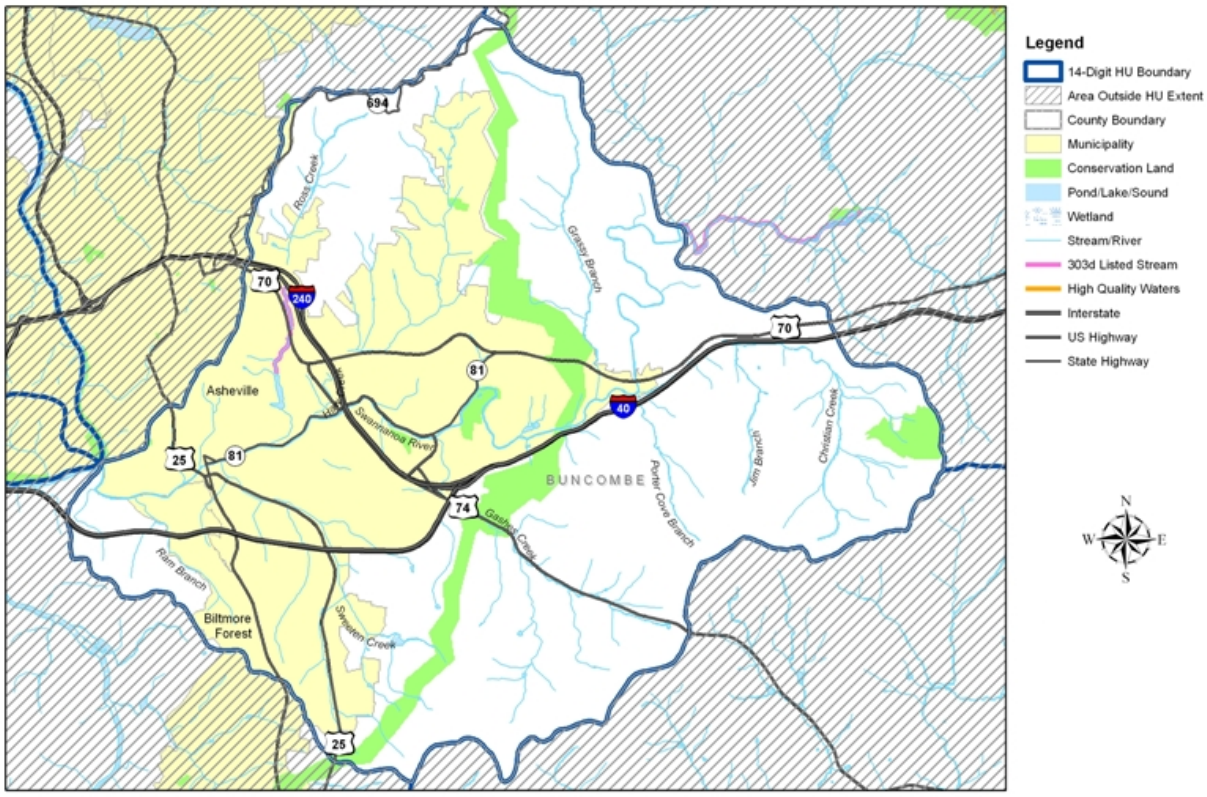
Swannanoa River Headwaters, Flat Creek watershed




Middle Swannanoa River, Bull Creek, Beetree Creek watershed



Lower Swannanoa River, Ross Creek, Sweeten Creek watershed

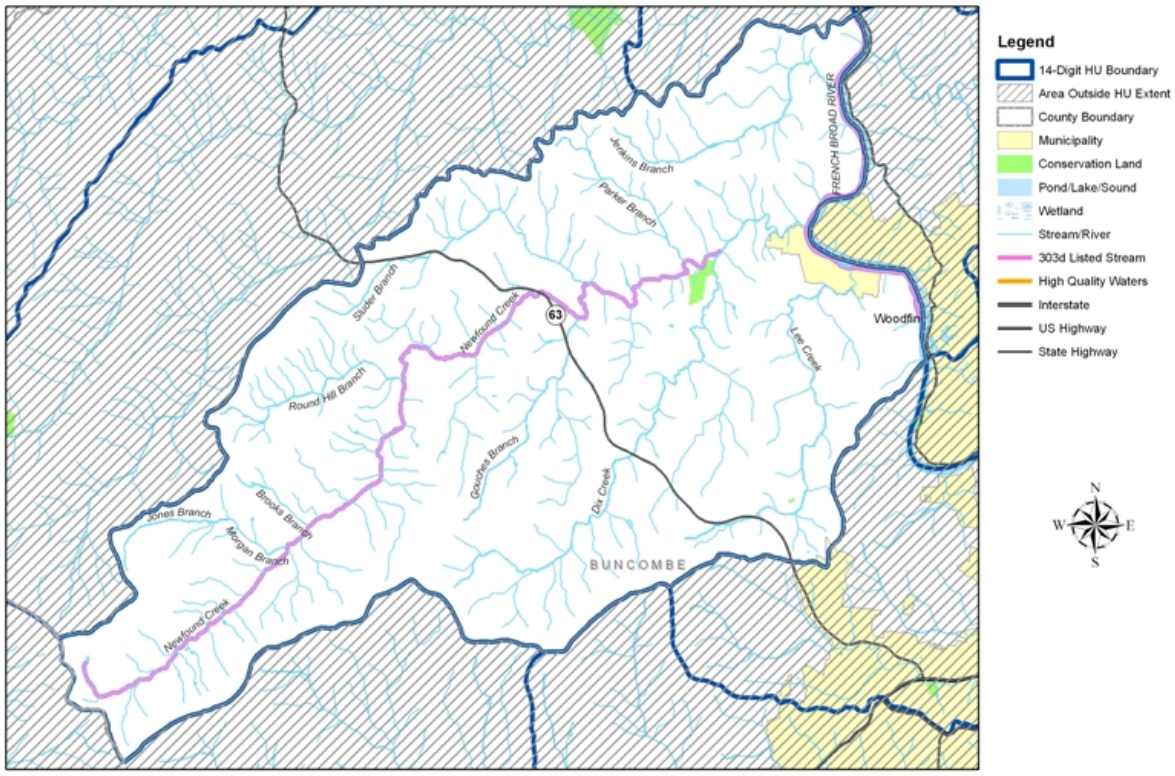


Newfound Creek (06010105090020)

The Newfound Creek watershed has the highest proportion (42%) of agricultural land in the French Broad basin, with most farmland in pasture and hay production, although some row crops (tomatoes, corn) are also grown. The watershed is also under development pressure, and impacts from urbanization as well as agriculture have been noted by NC Division of Water Quality. Only 39% of the stream length in the watershed is adequately buffered. Most of Newfound Creek is impaired, suffering from severe habitat degradation (including sedimentation), excess nutrients, and high fecal coliform bacteria. A total maximum daily load (TMDL) has been developed for fecal coliform bacteria, and it recommends BMPs for animal operations, riparian buffers, and the repair of problematic septic systems.

The watershed has been a restoration focus of the Buncombe County Soil and Water Conservation District for over ten years; it has a watershed program staffed with a full-time watershed coordinator. The program is working with landowners to install farm and residential BMPs and plant riparian buffers. EEP has a stream restoration project on Newfound Creek.

Newfound Creek watershed



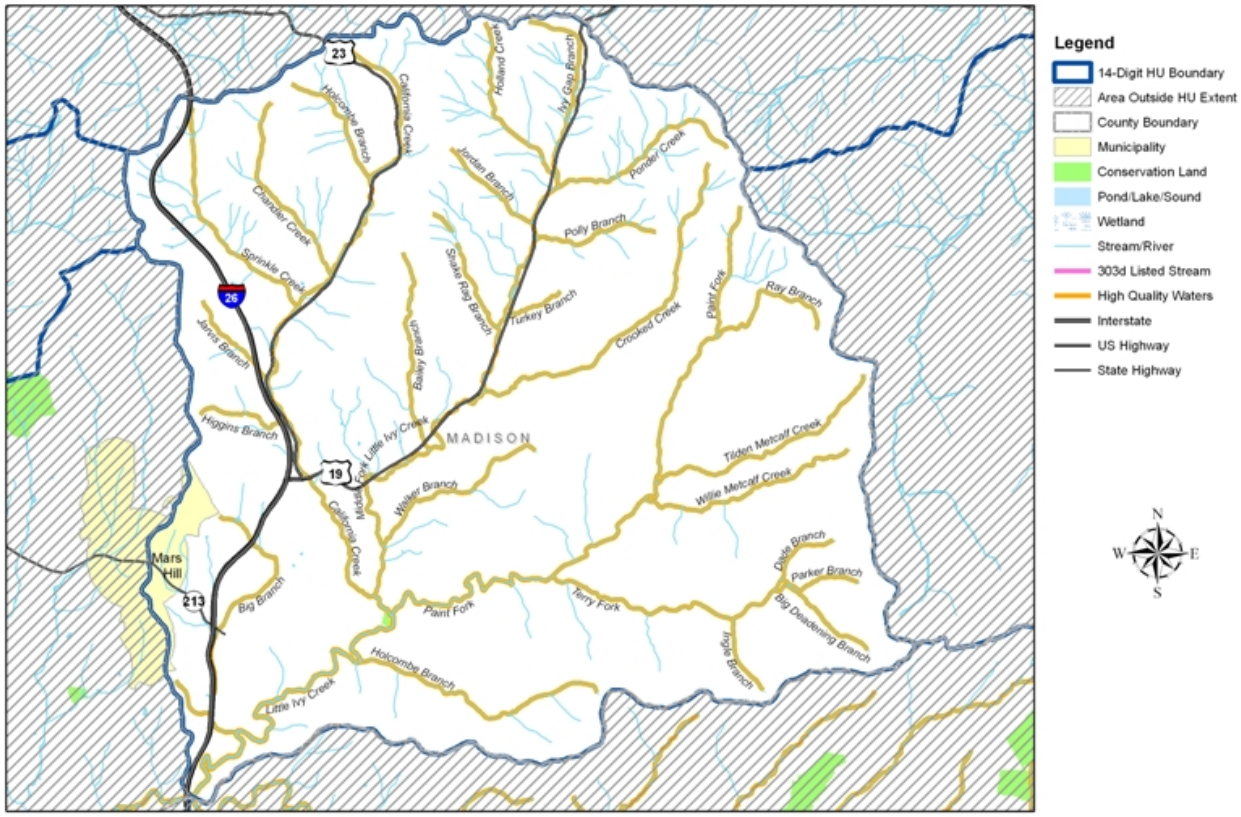
Little Ivy River (06010105110020)

Like the Newfound Creek watershed, the Little Ivy River watershed is an important agricultural area, and 20% of the land is farmed. Only 42% of the stream length in the watershed is adequately buffered. A portion of the Little Ivy River is impaired, and sedimentation, fecal coliform bacteria, and excess nutrients are concerns. NC Division of Water Quality recommends both urban and agricultural BMPs as well as adequate sedimentation and erosion control due to construction.

The Newfound Creek watershed is a priority area for the Madison County Soil and Water Conservation District, which is participating with other agencies to implement BMPs to control non-point source pollution in the watershed. Numerous agricultural BMPs, riparian buffers, and educational initiatives have been implemented.

The Little Ivy River watershed is a Water Supply Watershed and 73% of its area is forest/wetland. It empties into the Ivy River, which is a primary refuge for existing aquatic species in the French Broad River basin (NCWRC, 2005). The southeastern slopes of the watershed are in the Black & Craggy Mountains, a Blue Ridge Forever focus area.

Little Ivy River watershed

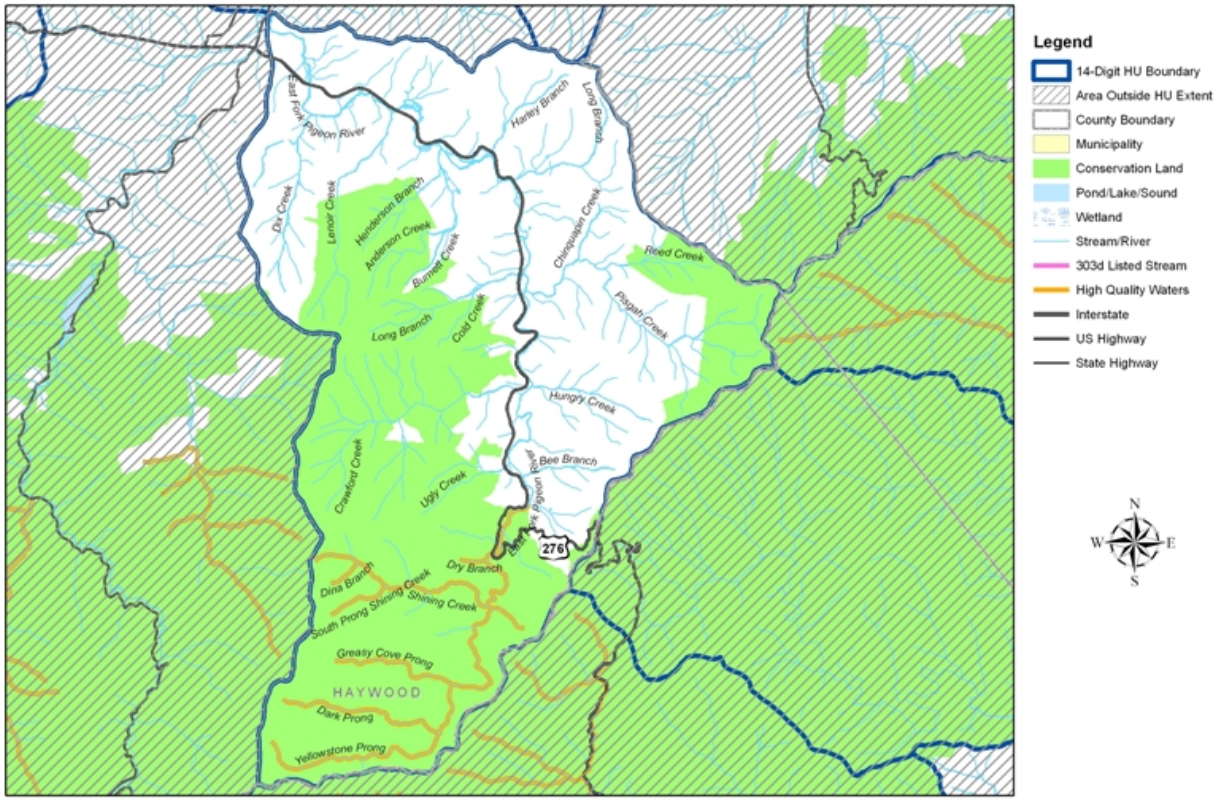


East Fork Pigeon River (06010106010010)

The East Fork of the Pigeon River watershed is the most forested of all TLWs in the French Broad, with 91% of the land in forest/wetland and 81% of the streams with an adequate buffer. About half of the land is in Pisgah National Forest, where the headwaters of the East Fork are High Quality Waters. All streams in the watershed are Water Supply Waters. The headwaters of the East Fork and Shining Creek are in the Shining Rock Wilderness Area, a Significant Natural Heritage Area.

Once the river leaves the Pisgah National Forest, it drops into a wide valley, which is farmed and settled as the Cruso community. Short reaches of the East Fork are relatively high quality cool-warm water habitat, serving as a refuge for high priority aquatic species (NCWRC, 2005). This lower area is part of a Blue Ridge Forever focus area, the Pisgah Ridge and Bethel Farming Community. It is a focus of environmental and cultural conservation efforts of the Bethel Rural Preservation Project, which has developed a plan to protect floodplain lands and is working with landowners to put conservation easements on the ground.

East Fork Pigeon River watershed

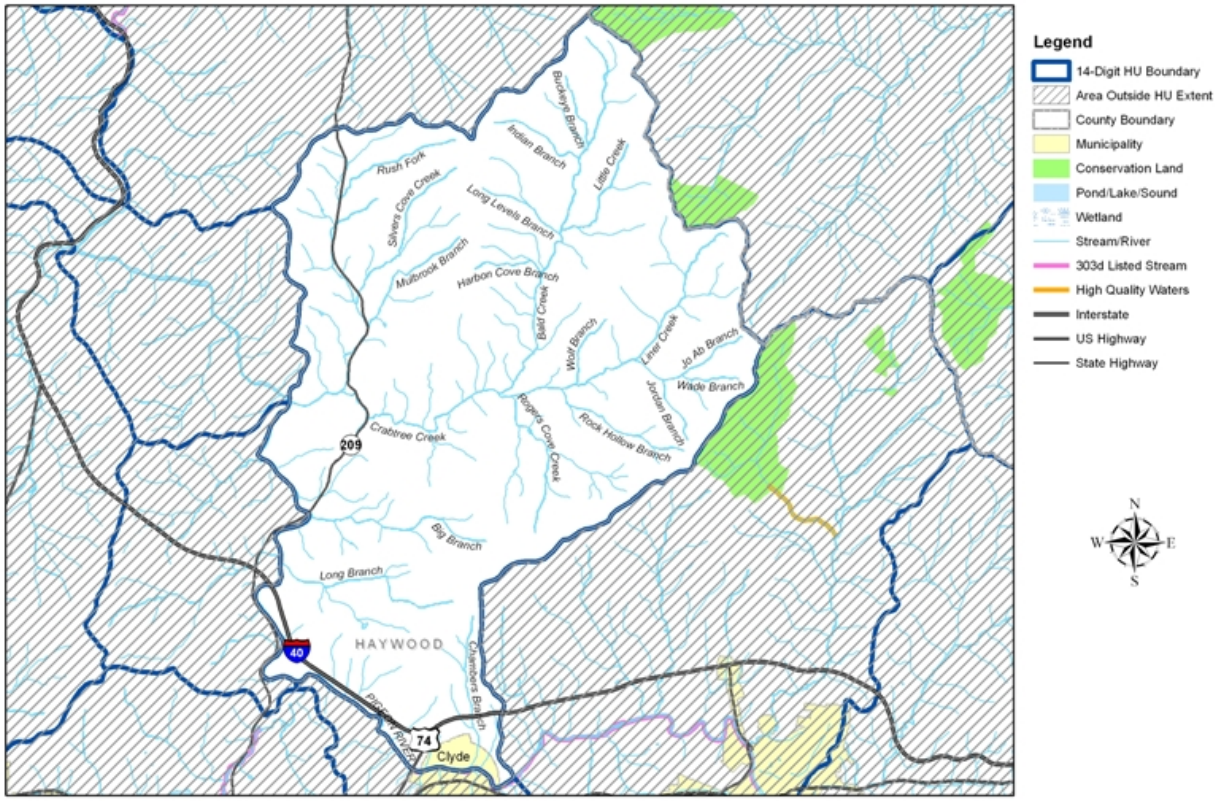


Pigeon River, Crabtree Creek (06010106020010)

The Pigeon River/Crabtree Creek watershed drains an area northeast of Waynesville. It has the highest proportion (30%) of agricultural land in the Pigeon River watershed, and only 44% of its stream length is adequately buffered. Fish community sampling in Crabtree Creek demonstrated a lack of sensitive species and impacts from high nutrient levels (NCDWQ, 2008).

Rush Fork, a tributary to Crabtree Creek, was named as a priority in Haywood Waterways Association's Watershed Action Plan (2002). This report identifies nutrient and sediment loading as problematic in Rush Fork. Pasture improvement and limiting cattle access to streams were recommended to address these issues.

Pigeon River, Crabtree Creek watershed

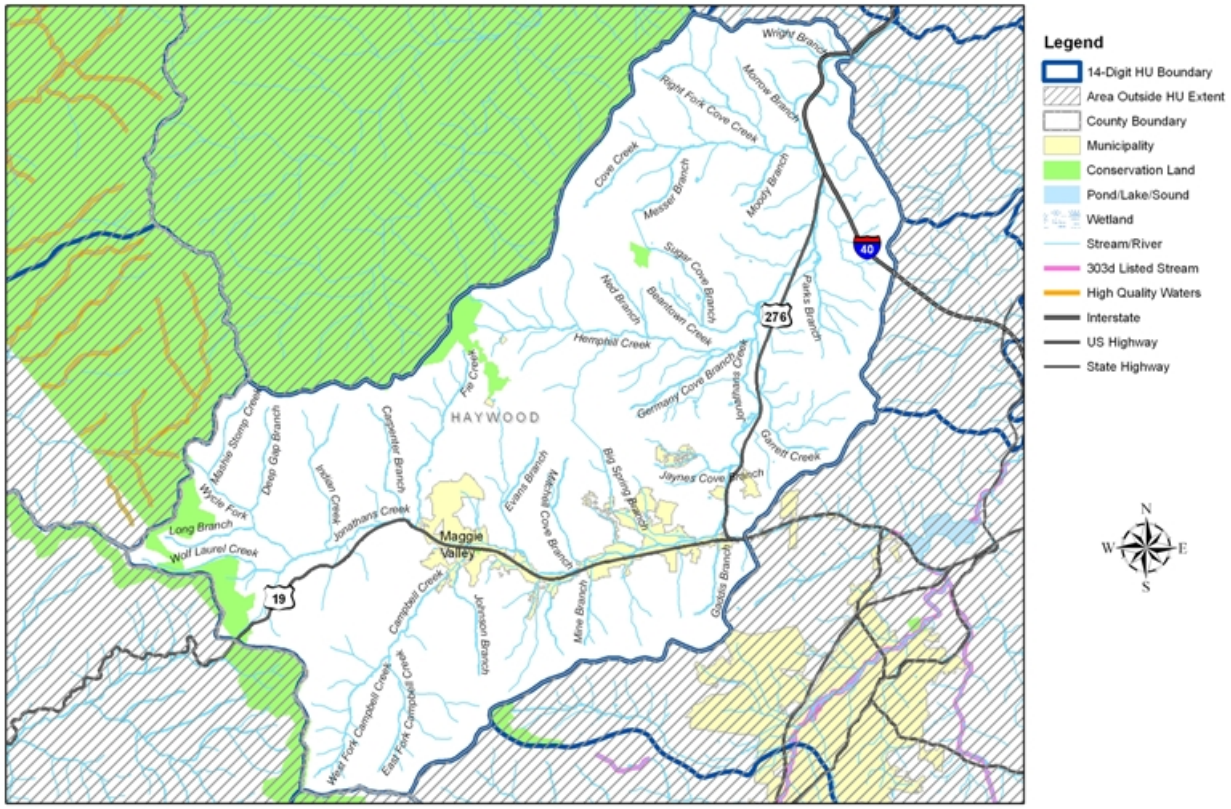


Jonathans Creek (06010106020030)

Jonathans Creek has consistently been rated Excellent by the NC Division of Water Quality. The watershed is 79% forest/wetland, 12% agriculture, and 9% developed. While much of its higher sloped land is in forest, Jonathans Creek itself flows through a wide floodplain, which is used for farmland and commercial/residential areas spreading from Maggie Valley and Waynesville. There is significant development pressure in both the floodplain and higher slopes, notably in the upper Jonathans Creek and Campbell Creek watersheds, which are both Water Supply Waters.

The Jonathans Creek watershed borders the Great Smoky Mountains National Park to its west. However, there is little protected land in the watershed. This area is included in Blue Ridge Forever's Great Smoky Mountains National Park focus area, which includes areas adjacent to the park. The Southern Appalachian Highlands Conservancy has prioritized a number of lands in the upper Jonathans Creek and upper Campbell Creek watersheds for preservation (SAHC, 2007).

Jonathans Creek watershed

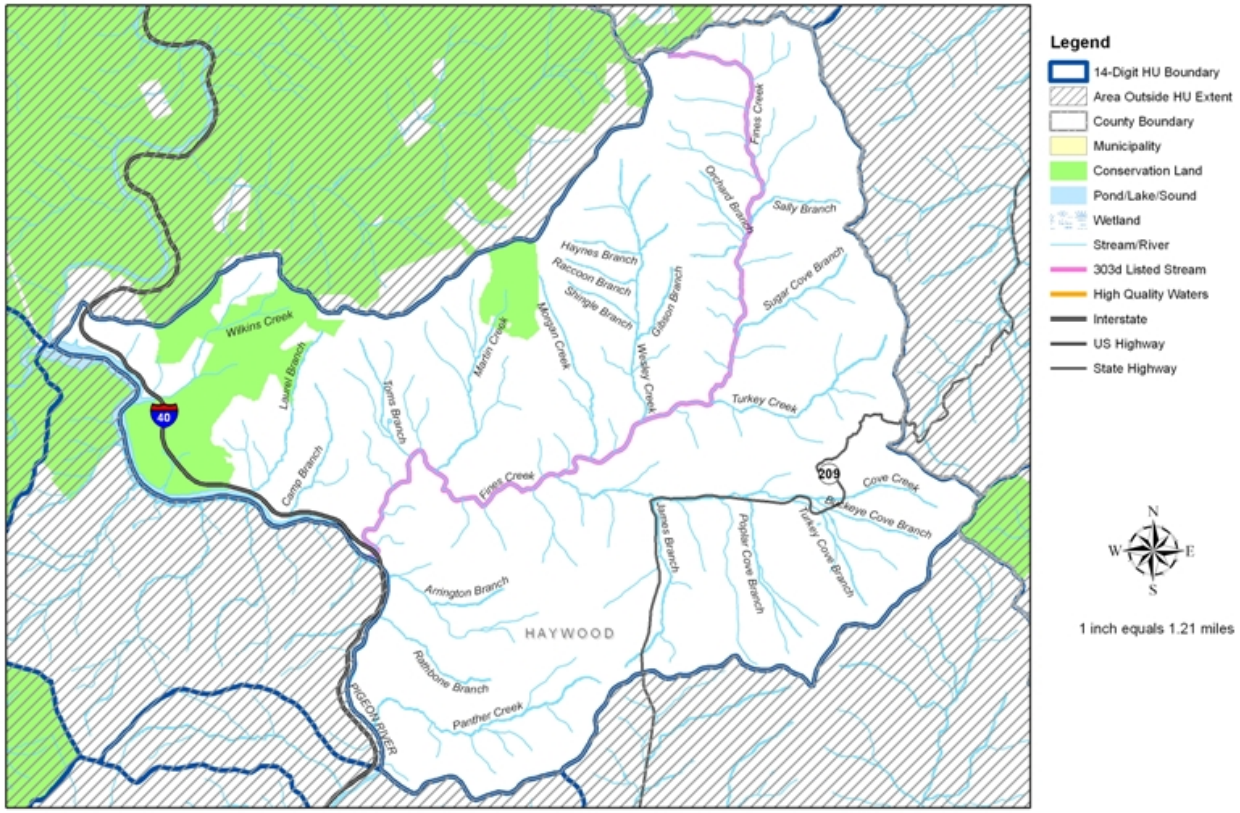


Fines Creek (06010106020040)

The Fines Creek watershed has a similar land use matrix to that of Jonathans Creek—80% forested, 15% agriculture, and 4% developed. Sixty percent of stream length has adequate buffer in the watershed. However, Fines Creek is impaired, and it suffers from high nutrient and sediment loads.

The Fines Creek watershed is a restoration priority of the Haywood Waterways Association (HWA, 2002). As much of the agricultural land is used for pasture, the Haywood Waterways Association recommends stream stabilization, better pasture management, and limiting livestock access to streams.

Fines Creek watershed



**Richland Creek Watershed**

Two 14-digit hydrologic units comprise the Richland Creek watershed (*Upper Richland Creek and Lower Richland Creek*), and both are 2009 TLWs. The entire length of Richland Creek is impaired, as well as two of its tributaries—Raccoon Creek and Hyatt Creek. Richland Creek is impaired due to high fecal coliform bacteria levels and degraded biological communities, impacted by sedimentation and water quality impacts due to urbanization. Lake Junaluska, which is an impounded section of Richland Creek, is impaired due to eutrophication (high algal growth due to elevated nutrient concentrations), and it is also frequently dredged due to rapid sediment build-up.

NC Division of Water Quality started a fecal coliform bacteria study in 2007, and numerous urban and non-urban sources have been identified. Shelton Branch (in Waynesville) and Hyatt Creek had some of the highest concentrations of bacteria. In Shelton Branch, sewer leaks were identified and fixed, and fecal coliform bacteria concentrations are now much lower. However, many tributaries to Richland Creek still have high bacteria levels, and the NC Division of Environmental Health is working to identify and address problematic septic systems and straight pipes.

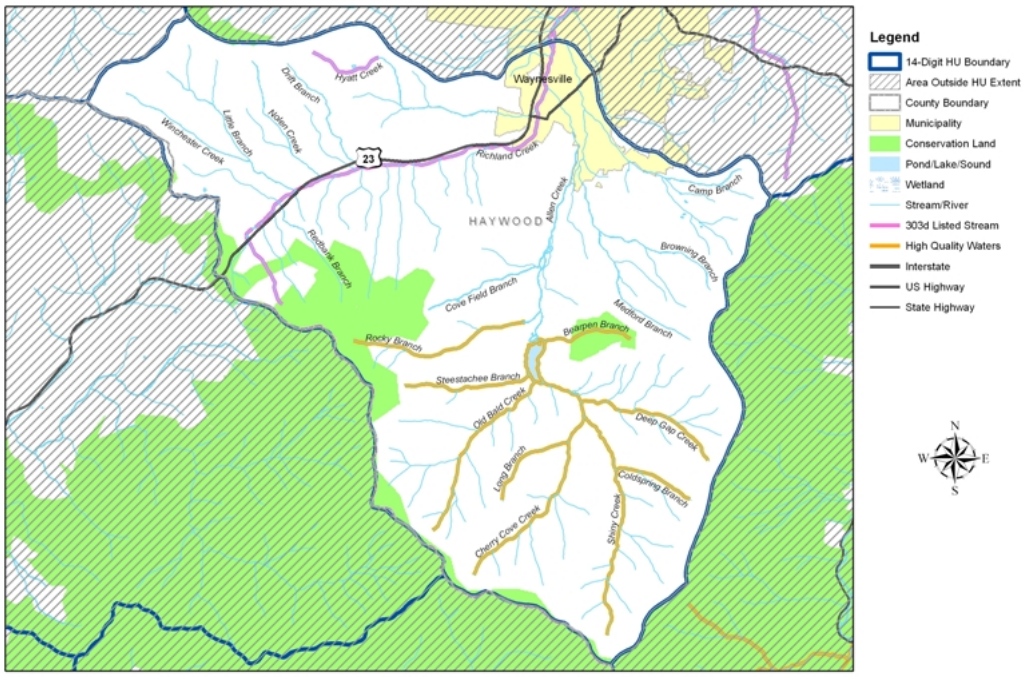
The Richland Creek watershed is a priority restoration area for the Haywood Waterways Association. They have led restoration and education initiatives and intend to develop a separate watershed action plan for the watershed,

The *Upper Richland Creek watershed (06010106030010)* is largely rural, with 82% of the land forested/wetland, 12% developed, and 6% agricultural. Seventy percent of the stream length has adequate forested buffers and much of the drainage area of a major tributary, Allen Creek, serves as the Water Supply Watershed of Waynesville. This watershed includes portions of the Great Balsam and Plott Balsam Mountains, Blue Ridge Forever focus areas.

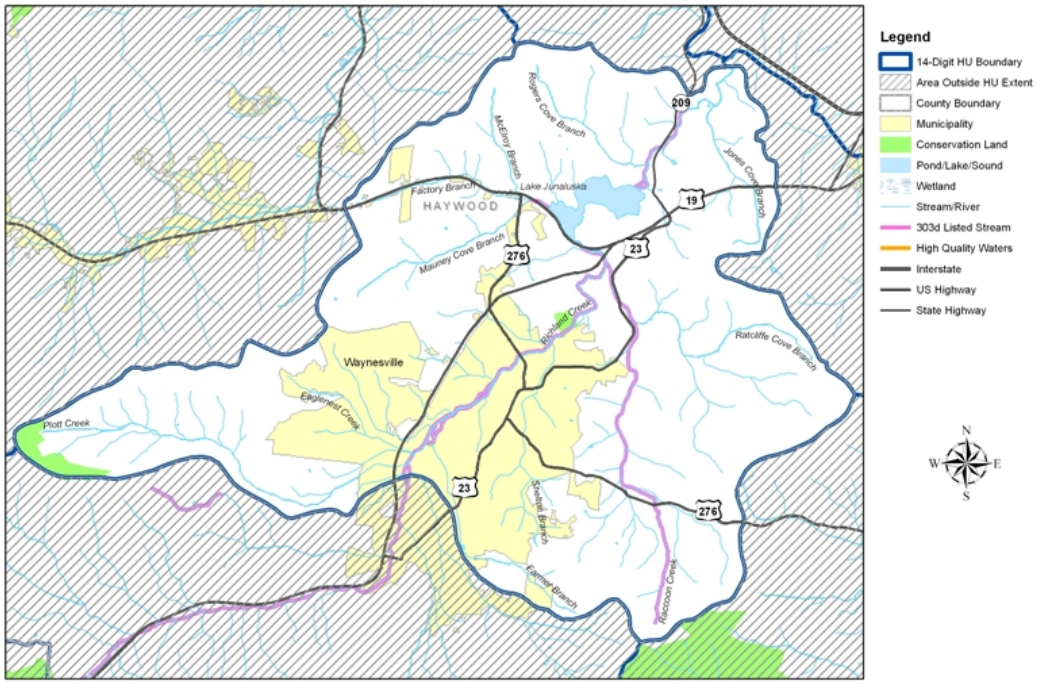
303(d) listed Hyatt Creek is a tributary in the Upper Richland Creek watershed, and it has been the focus of a restoration effort over the past several years. Hyatt Creek has high fecal coliform bacteria levels and severely degraded habitat in its lower reaches, impacted by channelization, sedimentation, and lack of riparian buffer. Straight pipes and problematic septic systems have been identified and some of these have been addressed.

The *Lower Richland Creek watershed (06010106030020)* is much more urban, with 49% of the land forested/wetland, 32% developed, and 18% agricultural. Only 29% of its stream length is adequately buffered. It drains most of Waynesville, including Raccoon Creek, which is impaired. Raccoon Creek drains both urban and agricultural lands, and it suffers from habitat degradation.

Upper Richland Creek watershed




Lower Richland Creek watershed

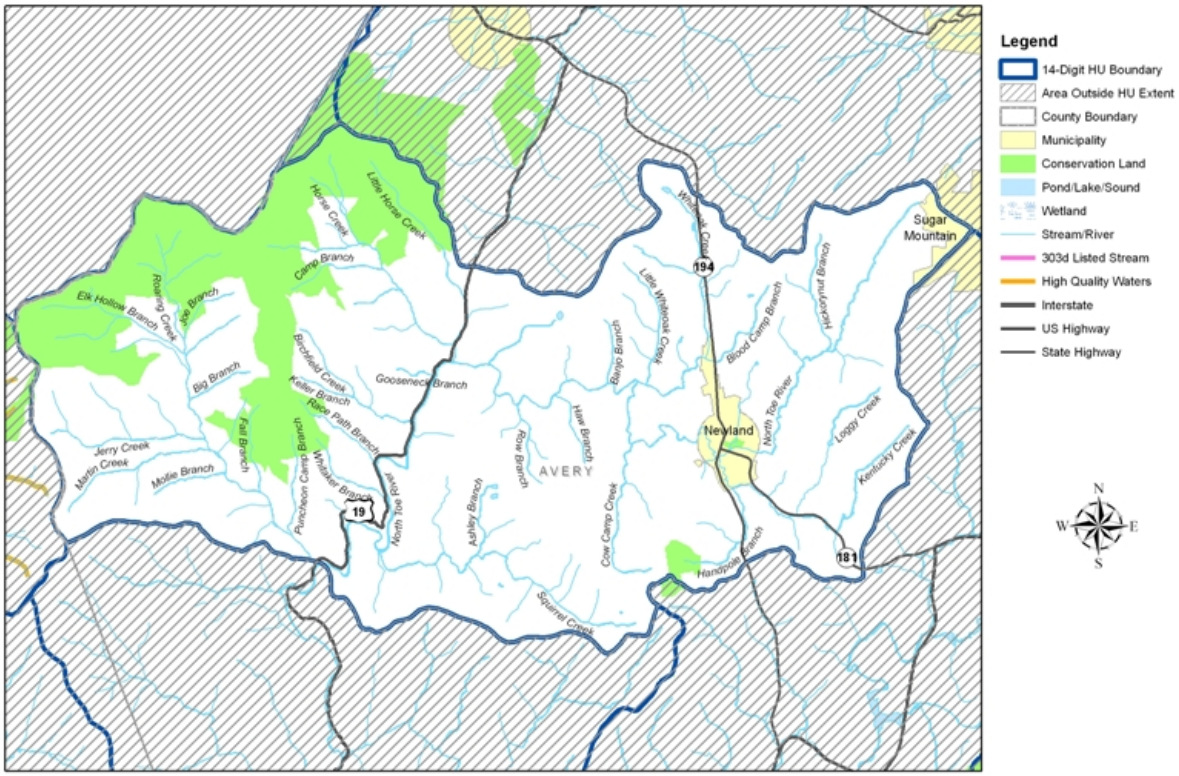


North Toe River Headwaters (06010108010010)

Land cover within the North Toe River Headwaters watershed is 82% forested/wetland, 10% agricultural, and 8% developed. Sixty-eight percent of the stream length is adequately buffered. The entire North Toe River watershed is a priority conservation area of the NC Wildlife Resources Commission.

The North Toe River valley in this headwaters area is a focus area of Blue Ridge Forever, and the High Country Conservancy has conserved a number of key lands here. A large part of the watershed is also part of the Highlands of Roan to Yellow Mountain focus area of Blue Ridge Forever. The watershed has a high number of Natural Heritage Element Occurrences, and its northern limits are part of the Roan Massif, as Significant Natural Heritage Area that hosts one of the most important concentrations of rare species and natural communities in the Southern Appalachians (NCNHP, 2006). A number of high priority lands have been protected around in the Roan Massif area.

North Toe River headwaters watershed

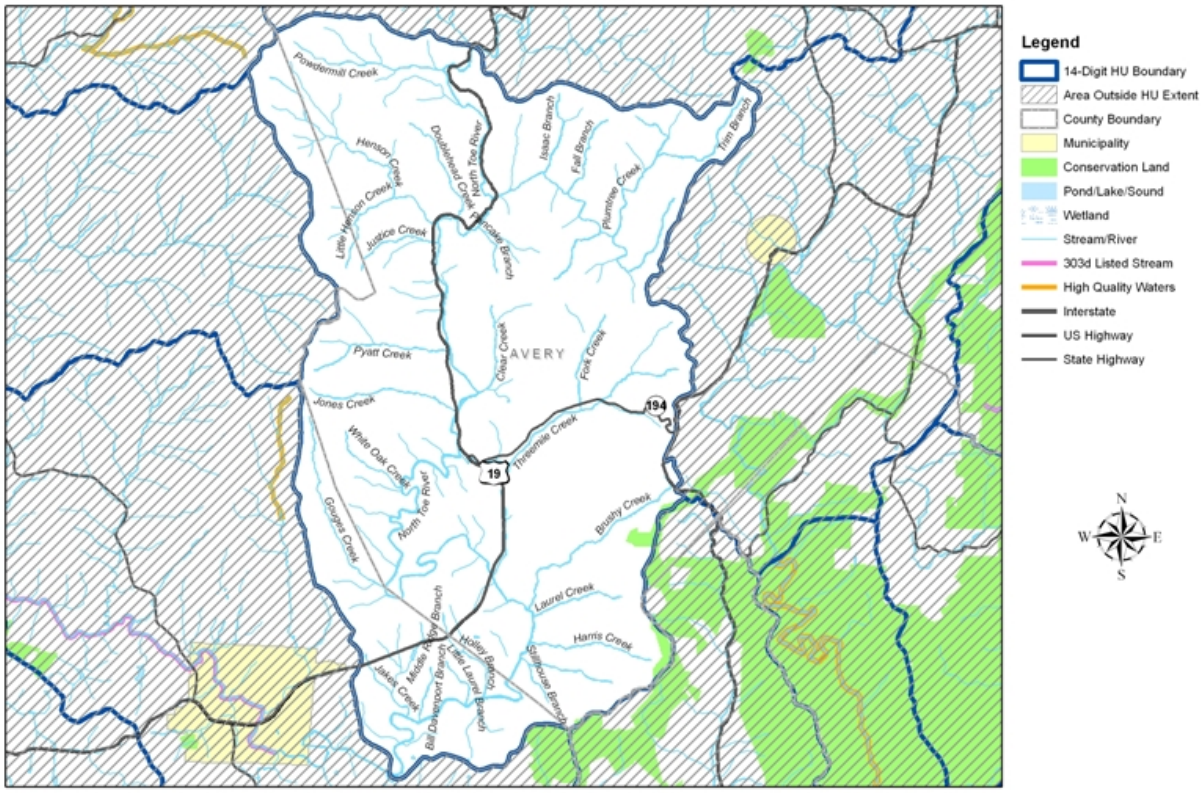


Upper North Toe River, Plumtree Creek (06010108010020)

The Upper North Toe River/Plumtree Creek watershed is just downstream of the North Toe Headwaters watershed. It has similar land use to its upstream neighbor, with 81% of the land in forest, 13% in developed, and 6% in agriculture. Seventy-four percent of the stream length is adequately buffered. The North Toe River and some of its tributaries in this watershed are Water Supply Waters.

The entire North Toe River watershed is a priority conservation area of the NC Wildlife Resources Commission. Part of the watershed is also in the Highlands of Roan to Yellow Mountain focus area of Blue Ridge Forever. EEP has a stream restoration project on Threemile Creek.

Upper North Toe River, Plumtree Creek watershed

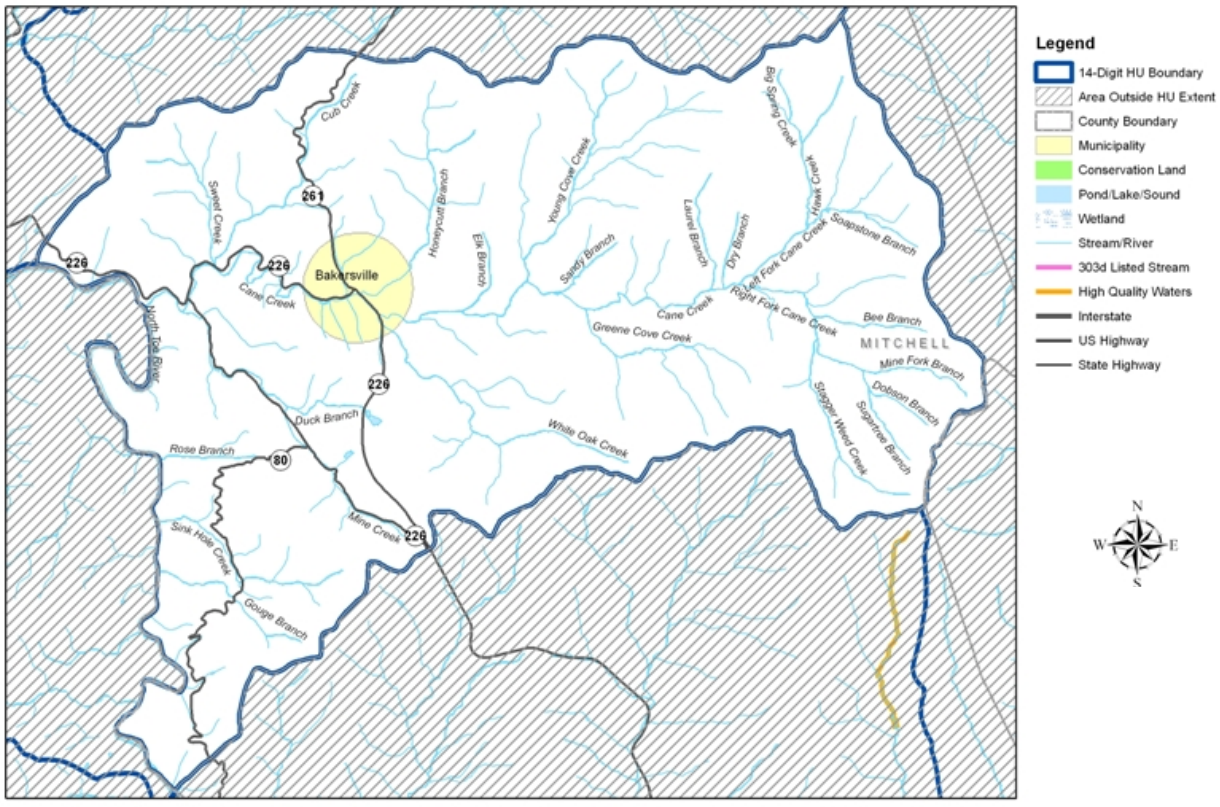


Cane Creek, Mine Creek (06010108040010)

The Cane Creek/Mine Creek watershed drains to the North Toe River. Its land use is like that of other North Toe watersheds, with 82% in forest, 12% in agriculture, and 6% in developed area. A lower proportion (58%) of the stream length is adequately buffered. Although not currently impaired, recent fish monitoring in Cane Creek by the NC Division of Water Quality revealed a degraded fish community, indicative of high nutrient concentrations likely from agricultural sources (NCDWQ, 2008).

This watershed is a priority area for stream restoration and agricultural BMP implementation for the Mitchell County Soil and Water Conservation District and the Blue Ridge Resource Conservation and Development Council. This watershed includes the Town of Barnardsville, which is the site of a greenway along Cane Creek, where a short stream and riparian restoration project has been implemented and may be extended in the future.

Cane Creek, Mine Creek watershed

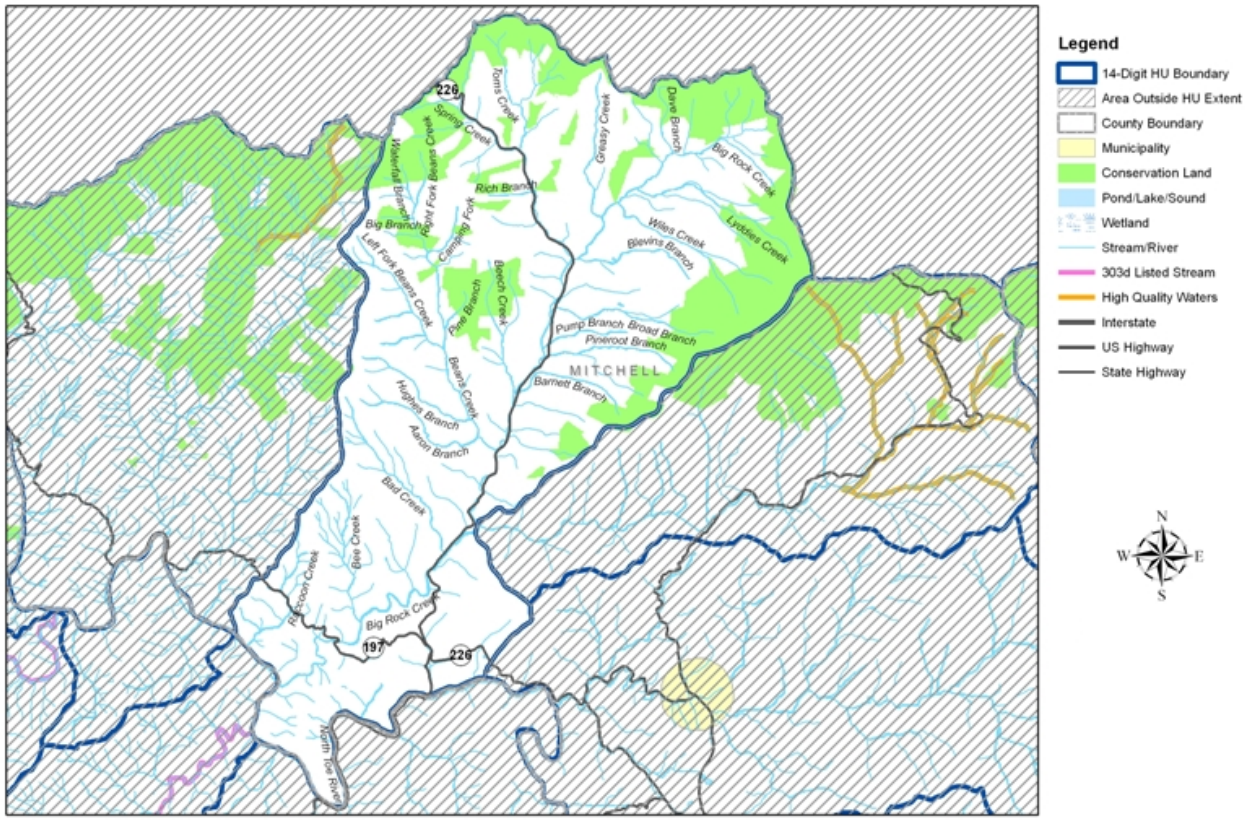


Big Rock Creek (06010108060010)

Much of the headwaters of the Big Rock Creek watershed are on protected land. It has 85% of its land in forest and another 11% in agriculture. It has a high number of Natural Heritage Element Occurrences. Recent fish monitoring by the NC Division of Water Quality reveals stable fish community, but excess nutrient loading from agriculture is suspected (NCDWQ, 2008).

The Big Rock Creek watershed is both a conservation and restoration priority area. There is need for agricultural BMPs in the watershed, and it is a priority area for the Mitchell County Soil and Water Conservation District and the Blue Ridge Resource and Conservation Development Council. It is also in the Highlands of Roan to Yellow Mountain focus area of Blue Ridge Forever.

Big Rock Creek watershed

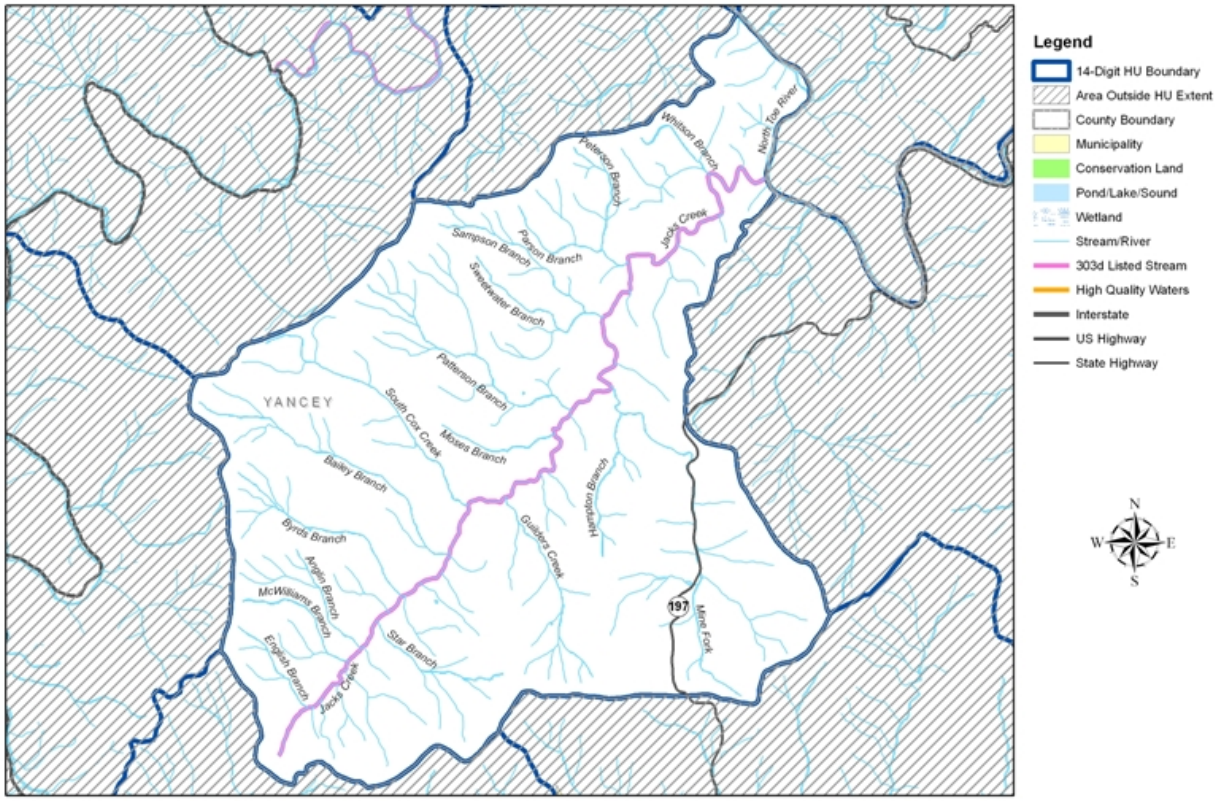


Jacks Creek (06010108050010)\

The Jacks Creek watershed drains to the North Toe River and has the most farmland of any watershed in the Cane/Toe/Nolichucky basin. Nineteen percent of the land area is in agricultural use, 76% is forested/wetland, and 5% is developed. Only 54% of the stream length in the watershed is adequately buffered. Jacks Creek is impaired, the fish community degraded by non-point sources.

This watershed is one of two watersheds that were incorporated into the Bald Creek Local Watershed Planning area after the initial plan was completed in 2006. A number of potential stream restoration projects were identified in this expanded study area.

Jacks Creek watershed

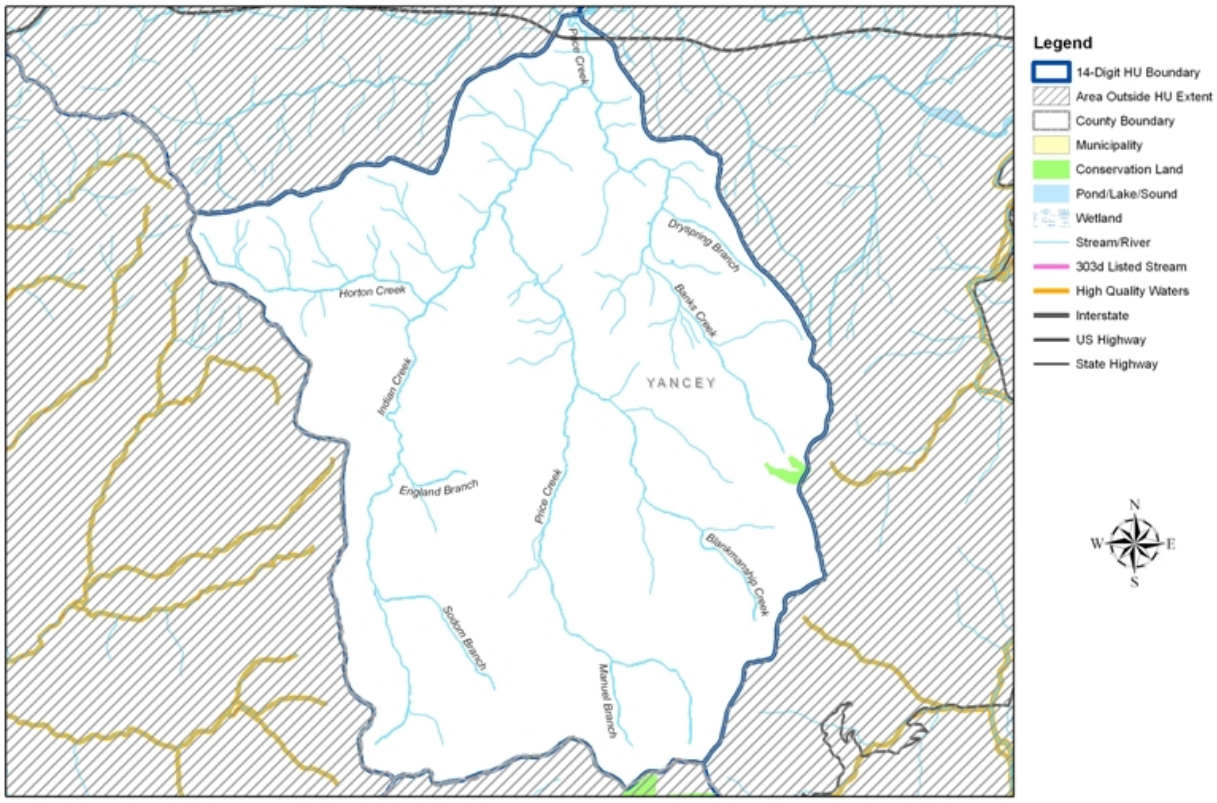


Price Creek (06010108080010)

The Price Creek watershed drains to the Cane River and is 84% forested/wetland, 12% agriculture, and 4% developed. Only 52% of its stream length is adequately buffered. A large gated golf course development was built in its headwaters; problems with sedimentation and erosion at that site were documented by NC Division of Water Quality.

The southern portion of this watershed is in the Black and Craggy Mountains Blue Ridge Forever focus area. This watershed is one of two watersheds that were incorporated into the Bald Creek Local Watershed Planning area after the initial plan was completed in 2006. A number of potential stream restoration projects were identified in this expanded study area.

Price Creek watershed

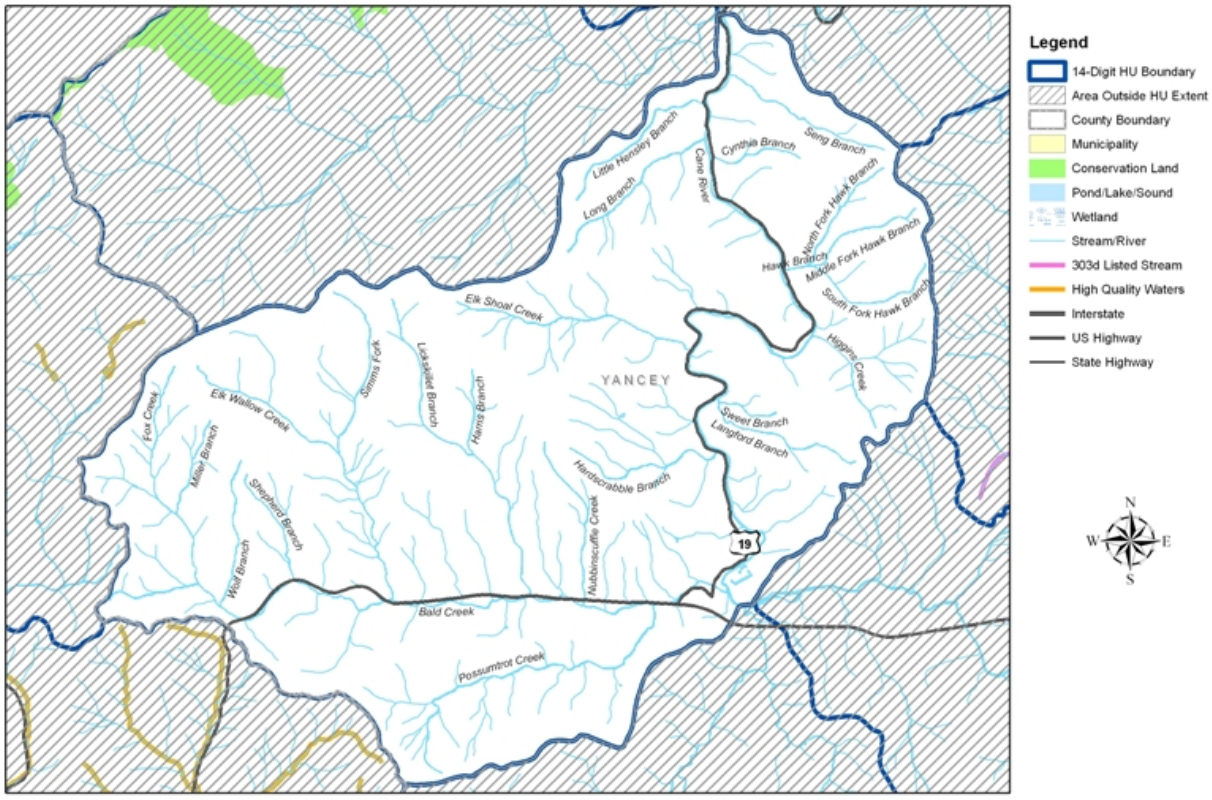


Bald Creek, Elk Shoal Creek (06010108080020)

The Bald Creek/Elk Shoal Creek watershed drains to the Cane River and is 79% forested, 14% agricultural, and 4% developed. Fifty-eight percent of its stream length is adequately buffered. The southern half of this watershed was the focus of the Bald Creek Local Watershed Plan, completed in 2006. Although no streams are impaired in the Bald Creek watershed, habitat degradation and high fecal coliform bacteria and nutrient concentrations were found throughout the watershed. Stream and riparian restoration, headwater preservation, straight pipe elimination, and livestock BMPs were key strategies recommended to address habitat and water quality issues.

The northern half of this watershed was incorporated into the Bald Creek Local Watershed Planning area after the initial plan was completed in 2006. A number of potential stream restoration projects were identified in this expanded study area. EEP has a stream restoration project on an unnamed tributary to Bald Creek.

Bald Creek, Elk Shoal Creek watershed

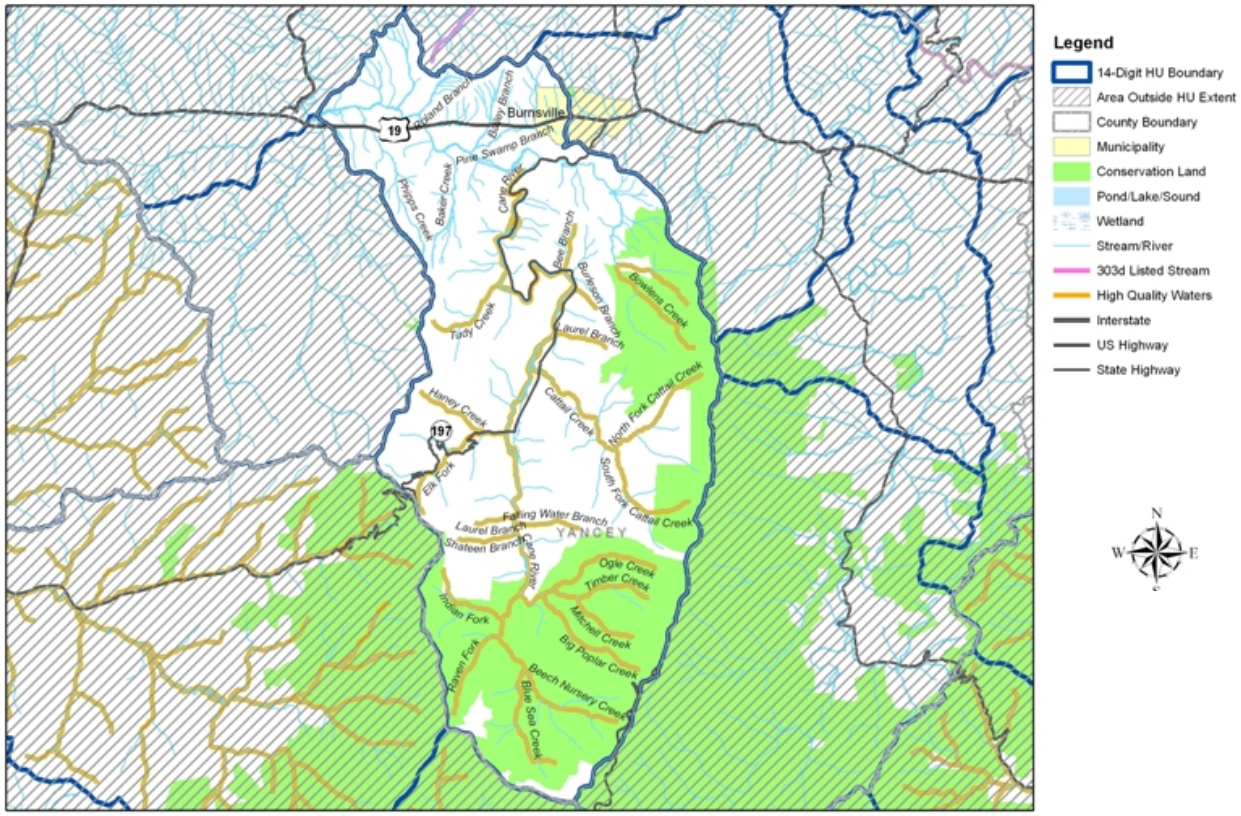


Upper Cane River (06010108070010)

The headwaters of the upper Cane River drain conserved land, and 87% of this watershed is forested. Much of the watershed serves as a Water Supply Watershed for the Town of Burnsville. The Cane River harbors a healthy population of the federally endangered mussel, the Appalachian elktoe, in its upper reaches. Recent problems with the Burnsville wastewater treatment plant, which discharges to the Cane River, has wiped out the elktoe and many other aquatic species downstream of it.

The Cane River above the Burnsville wastewater treatment plant is a conservation priority for US Fish and Wildlife Service and the Wildlife Resources Commission. It is also within the Black and Craggy Mountains focus area of Blue Ridge Forever, and the Southern Appalachian Highlands Conservancy has place a number of lands in conservation here. The Toe River Valley Watch, a non-profit organization founded to preserve the rural character of the Toe River Valley, is also focusing its efforts here in stream and riparian restoration and agricultural BMPs.

Upper Cane River watershed



**2005 Targeted Local Watersheds Delisted in 2009**

East Fork French Broad River (06010105010040)
This watershed is largely forested (92% forest/wetland cover), and 83% of is stream length is adequately buffered. It does have issues with eroding stream banks, notably on the mainstem of the East Fork of the French Broad River. However, this watershed was delisted in favor of listing the Little River/Crab Creek watershed, which is a higher conservation and restoration priority of land trusts, local Soil and Water Conservation Districts, and natural resource agencies.

North Toe River, Grassy Creek, Bear Creek (06010108010030)
Land cover in this watershed is like that of the two upstream watersheds in the North Toe River watershed (North Toe River Headwaters and the Upper North Toe River/Plumtree Creek watersheds)—11% agricultural, 12% developed, and 77% forested/wetland. Sixty-nine percent of its stream length is adequately buffered. This watershed does have restoration need; however, local resource agencies (e.g., Mitchell County Soil and Water Conservation District) have already worked with many of the problematic agricultural operations in the watershed. This watershed was delisted in favor of listing the Upper Cane River watershed, which is both a conservation and restoration priority of land trusts, local Soil and Water Conservation Districts, and natural resource agencies.

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## For More Information

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http://www.nceep.net/pages/lwplanning.htm

## Definitions

**303(d) List** – This refers to Section 303(d) of the federal Clean Water Act, under which the U.S. EPA requires states to submit biennially a list of all impaired water bodies. Impaired water bodies are streams and lakes not meeting state water quality standards linked to their designated uses (e.g., water supply, recreation/fishing, propagation of aquatic life). Best professional judgment (in interpreting water quality monitoring data and observations) along with numeric and narrative standards/criteria are considered when evaluating the ability of a water body to serve its uses.

**8-digit Catalog Unit (CU)** – The USGS developed a hydrologic coding system to delineate the country into uniquely identified watersheds that can be commonly referenced and mapped. North Carolina has 54 of these watersheds uniquely defined by an 8-digit number. EEP typically addresses watershed – based planning and restoration in the context of the 17 river basins (each has a unique 6-digit number), 54 catalog units and 1,601 14-digit hydrologic units.

**14–digit Hydrologic Unit (HU)** – In order to address watershed management issues at a smaller scale, the U.S. Natural Resources Conservation Service (NRCS) developed methodology to delineate and uniquely identify watersheds at a scale smaller than the 8-digit catalog unit. A hydrologic unit is a drainage area delineated to nest in a multilevel, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. North Carolina has 1,601 14-digit hydrologic units.

**Animal Operations –** Inventory of animal farms (bovine; swine; poultry) provided by NC Department of Agriculture (NCDA) in December 2007.

**Aquatic Habitat** – the wetlands, streams, lakes, ponds, estuaries, and streamside (riparian) environments where aquatic organisms (e.g., fish, benthic macroinvertebrates) live and reproduce; includes the water, soils, vegetation, and other physical substrate (rocks, sediment) upon and within which the organisms occur.

**Benthic Macroinvertebrates** – organisms living in or on the bottom substrate of aquatic habitats; include insect larvae, worms, snails, crayfish and mussels; can be used as indicators of stream water quality and stream habitat condition.

**BMPs (best management practices)** – any land or stormwater management practice or structure used to mitigate flooding, reduce erosion & sedimentation, or otherwise control water pollution from runoff; includes urban stormwater management BMPs and agriculture/forestry BMPs.

**EEP** – The North Carolina Ecosystem Enhancement combines existing wetlands restoration initiatives (formerly the Wetlands Restoration Program or NCWRP) of the N.C. Department of Environment and Natural Resources with ongoing efforts by the N.C. Department of Transportation (NCDOT) to offset unavoidable environmental impacts from transportation-infrastructure improvements.

**GIS** - A geographic information system integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.

**High Quality Waters (HQW)** - Supplemental NC DWQ classification intended to protect waters with quality higher than state water quality standards. In general, there are two means by which a water body may be classified as HQW. They may be HQW by definition, or they may qualify for HQW by supplemental designation and then be classified as HQW through the rule-making process.

1) The following are HQW by definition:

• (Water Supply) WS-I, WS-II,
• SA (shellfishing area),
• ORW (outstanding resource water),
• Waters designated as Primary Nursery Areas (PNA) or other functional nursery areas by the Marine Fisheries Commission, or
• Native and special native (wild) trout waters as designated by the Wildlife Resources Commission.

2) The following waters can qualify for supplemental HQW designation:

• Waters for which DWQ has received a petition for reclassification to either WS-I or WS-II, or
• Waters rated as Excellent by DWQ.

II. Classifications by Other State and Federal Agencies.

**NC DWQ** – North Carolina Division of Water Quality.

**NC WRP** – The North Carolina Wetlands Restoration Program was a wetland restoration program under NC DENR and a predecessor of the NCEEP.

**Natural Heritage Element Occurrences (NHEOs) –** NC Natural Heritage Program (NHP) documented locations of rare and endangered species (plant and animal) populations and occurrences of unique or exemplary natural ecosystems and special wildlife habitats (terrestrial and palustrine community types).

**Outstanding Resource Waters (ORW)** - Supplemental NC DWQ classification intended to protect unique and special waters having excellent water quality and being of exceptional state or national ecological or recreational significance. To qualify, waters must be rated Excellent by DWQ and have one of the following outstanding resource values:

- Outstanding fish habitat or fisheries,
- Unusually high level of water-based recreation,
- Some special designation such as NC or National Wild/Scenic/Natural/Recreational River, National Wildlife Refuge, etc.,
- Important component of state or national park or forest, or
- Special ecological or scientific significance (rare or endangered species habitat, research or educational areas).
- No new discharges or expansions of existing discharges shall be permitted.

There are associated development controls enforced by DWQ. ORW areas are HQW by definition.

**Preservation** – the long-term protection of an area with high habitat and/or water quality protection value (e.g., wetland, riparian buffer), generally effected through the purchase or donation of a conservation easement by/to a government agency or non-profit group (e.g., land trust); such areas are generally left in their natural state, with minimal human disturbance or land-management activities.

**RBRP** - The River Basin Restoration Priorities are documents that delineate specific watersheds (Targeted Local Watersheds) within a River Basin that exhibit both the need and opportunity for wetland, stream and riparian buffer restoration.

**Resource Professionals** – staff of state, federal, regional or local (city, county) natural resource agencies –including planners, water resources and storm water engineers, parks & recreation departments, water quality programs, regional councils of government, local/regional land trusts or other non-profit groups with knowledge/expertise and/or interest in local watershed issues and initiatives

**Restoration –** the re-establishment of wetlands or stream hydrology and wetlands vegetation into an area where wetland conditions (or stable streambank and stream channel conditions) have been lost; examples include: stream restoration using natural channel design methods coupled with re-vegetation of the riparian buffer; riparian wetlands restoration through the plugging of ditches, re-connection of adjacent stream channel to the floodplain, and planting of native wetland species; this type of compensatory mitigation project receives the greatest mitigation credit under the 401/404 regulatory framework.

**Riparian –**relating to the strip of land adjacent to streams and rivers, including streambanks and adjoining floodplain area; important streamside zones of natural vegetation that, when disturbed or removed, can have serious negative consequences for water quality and habitat in streams and rivers.

**Significant Natural Heritage Areas (SNHA) –** NC Natural Heritage Program identified areas containing ecologically significant natural communities or rare species. May be on private or public lands, and may or may not be in conserved status.

**TLW** - Targeted Local Watershed, are 14-digit hydrologic units which receive priority for EEP planning and restoration project funds.

**Use Support** –refers to the DWQ system for classifying surface waters based on their designated best use(s); at present, the DWQ primary stream classifications include the following: class C [fishing/boating & aquatic life propagation]; class B [primary recreation/direct contact]; SA [shellfish harvesting]; and WSW [water supply]. Supplemental classifications include High Quality Waters (HQW), Outstanding Resource Waters (ORW), Nutrient Sensitive Waters (NSW), Trout Waters (Tr), and Swamp Waters (Sw). All waters must at least meet the standards for class C waters.

**USGS** – United States Geological Survey.

**Watershed –**all the land area which contributes runoff to a particular point along a stream or river; also known as a "drainage basin", although the term *Basin* usually implies a very large drainage system, as of an entire river and its tributary streams.

**Watershed Restoration Plan** – Older versions of RBRP documents were called Watershed Restoration Plans. In essence, they are the same thing.