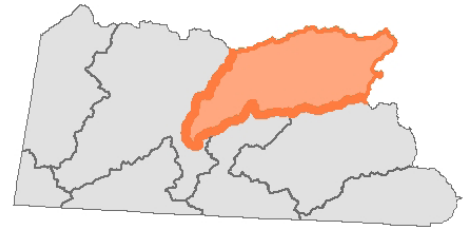


# VALLEY RIVER WATERSHED



HUC 0602000204

*Includes: Major Streams Junaluska Creek, Tatham Creek, Gipp Creek, Morris Creek, Welch Mill Creek, Hyatt Creek, Vengeance Creek, Colvard Creek & Valley River*

## WATERSHED AT A GLANCE

<u>COUNTY:</u>	<u>AREA</u>	<u>2006 LAND COVER:</u>	<u>PERMITTED FACILITIES:</u>
Cherokee	117 sq mi.	Agriculture.....6%	NPDES
<u>MUNICIPALITIES:</u>	<u>POPULATION:</u>	Developed.....8%	Wastewater Discharge.....4
Andrews, Murphy	2000.....9,210	Forested.....86%	Wastewater Nondischarge....0
<u>EPA LEVEL IV ECOREGIONS:</u>	2010.....9,713		Stormwater.....10
Broad Basins, Southern Metasedimentary Mtns.			Animal Operations.....0

The Valley River originates in the Snowbird Mountains near the Cherokee/Graham County line and flows generally southwest into the Hiwassee River near Murphy. The entire 117 square miles watershed lies within Cherokee County and the county boundaries follow the watershed boundary for much of its length. The Valley River is one of the largest tributaries of the Hiwassee River.

The Valley River watershed is predominantly forested, but the valley contains significant pastureland and row crops, see Figure 1-1. A major highway, US 74/19/129, crosses the river several times as it follows the valley from Andrews to Murphy. Residential development is currently low density and generally not located directly on the banks of the river. Development is increasing, but the pace is relatively slow when compared to other parts of Cherokee and Clay counties.

Major impacts to water quality and instream habitat include a lack of riparian vegetation, stream bank erosion, livestock access, stream channel alterations, and runoff from the highway, airport and urbanized areas. As a result, turbidity, sedimentation, high temperatures and fecal coliform bacteria continue to stress the river.

FIGURE 1-1: 2006 LAND COVER

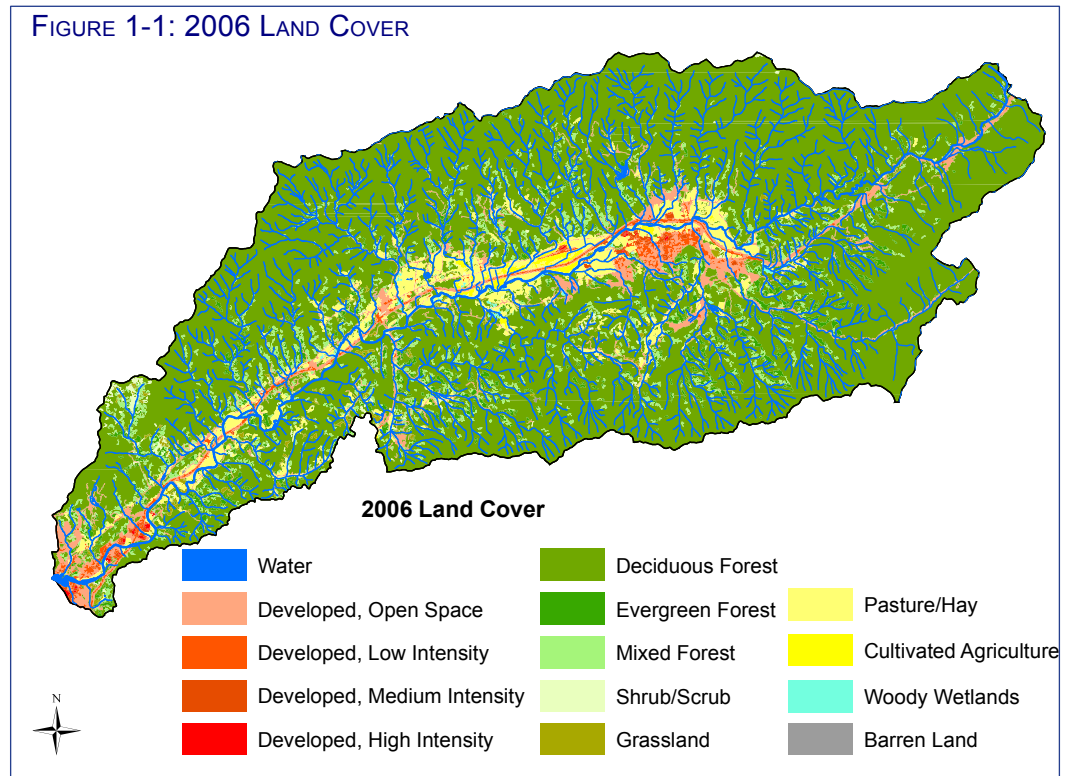
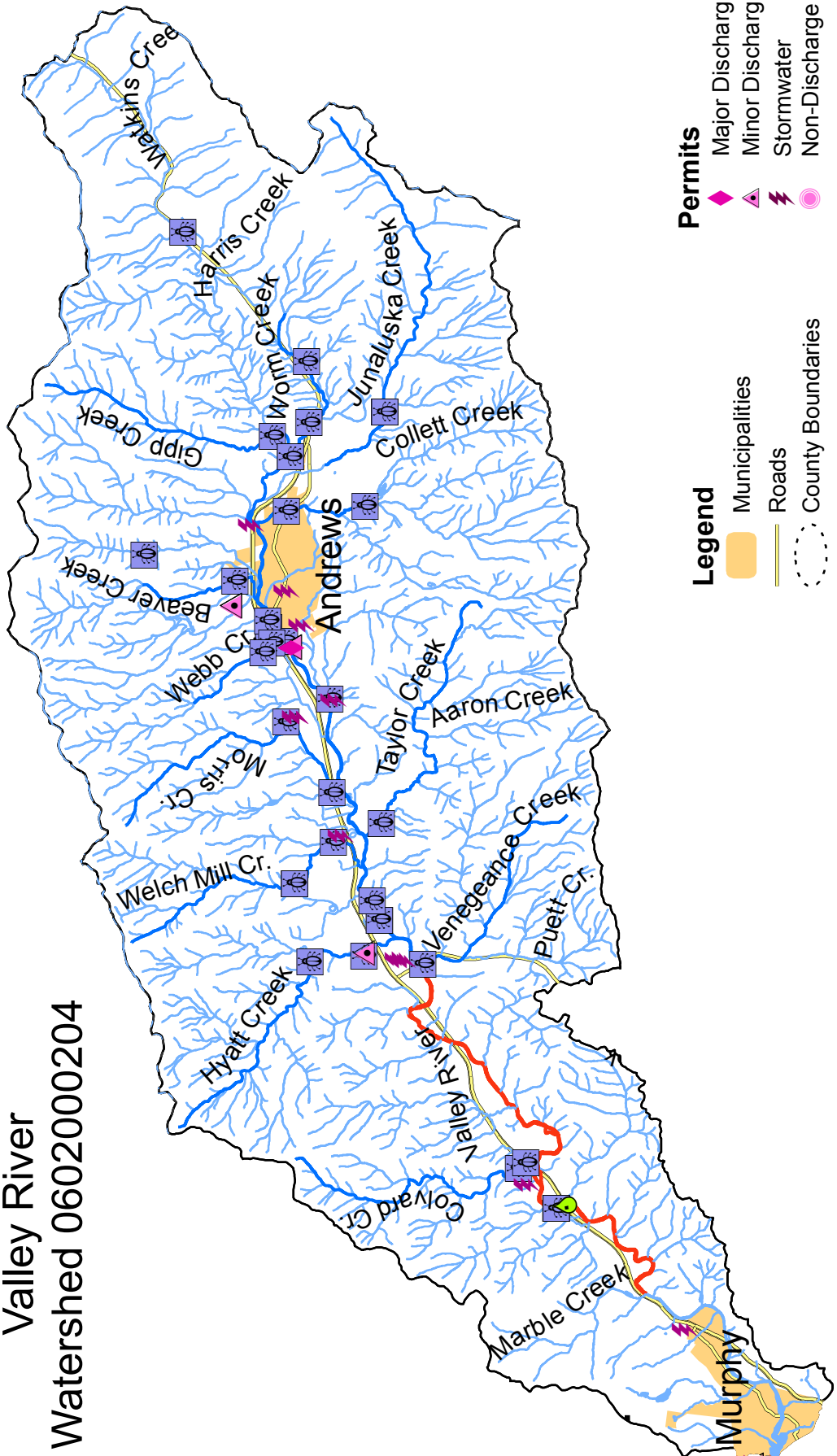


FIGURE 1-2: VALLEY RIVER WATERSHED MAP

Valley River  
Watershed 0602000204



**Permits**

- Major Discharge
- Minor Discharge
- Stormwater
- Non-Discharge

**Legend**

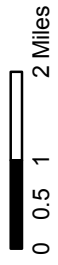
- Municipalities
- Roads
- County Boundaries

**Monitoring Sites**

- Benthic Macroinvertebrate
- Fish
- Ambient
- Lake

**2010 Use Support**

- Supporting
- No Data
- Not Rated
- Impaired

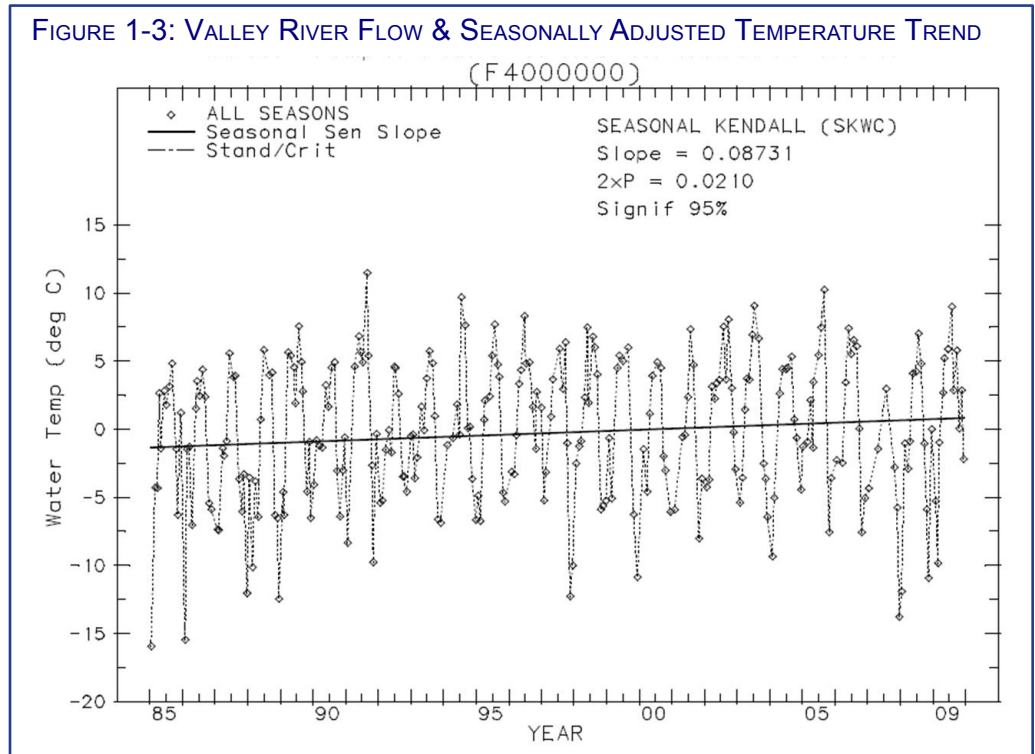


NC Division of Water Quality  
Basinwide Planning Unit  
Sept. 2011

## WATER QUALITY MONITORING

There is one ambient station in this watershed (F4000000). Water quality data from this station does show high levels of turbidity and fecal coliform. Data from this site were evaluated for the presence of trends for parameters including: water temperature, specific conductance, pH, dissolved oxygen, turbidity, fecal coliform bacteria, ammonia, nitrates/nitrites, kjeldahl nitrogen, and phosphorus. Trends were explored for this station from station inception (1973) through 2009 and there were no strong linear trends found, except for temperature.

The Flow and Seasonally Adjusted Temperature Trend in the Valley River reported in the 2007 Basin Plan was updated using the 1985-2009 time period (Figure 1-3). The trend through 2009 is statistically significant at the 95% confidence level with a slope of 0.09 degrees Celsius/year. The slope for the 1985-2003 analysis was 0.16 degrees Celsius/ year. The results indicate there has been some improvement in that the temperature is not increasing as much as previously indicated, but it is still increasing.

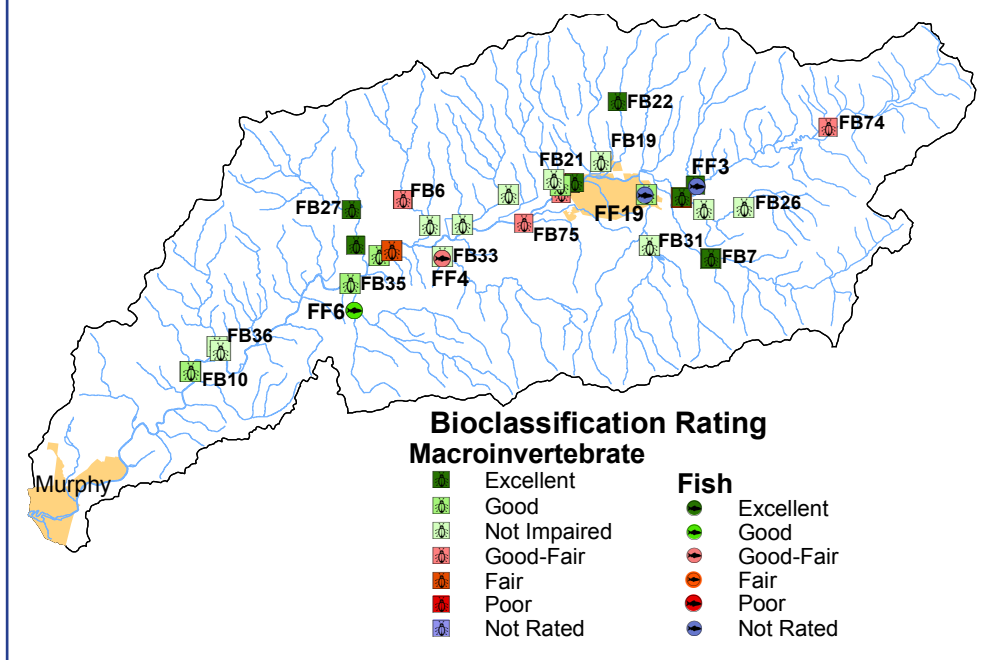


## Biological Monitoring

Biocriteria have been developed using the diversity, abundance, and pollution sensitivity of the organisms that inhabit flowing waterbodies in NC. One of five bioclassifications are typically assigned to each water body sampled: Excellent, Good, Good-Fair, Fair and Poor. Not Impaired and Not Rated designations are reserved for samples that were not eligible to be assigned one of the five typical bioclassification categories. Typically, a "Not Impaired" rating is equivalent to a Good-Fair or better bioclassification and a "Not Rated" designation is equivalent to a Fair or worse bioclassification. The reasons for not being able to assign one of these five typical bioclassifications may be a lack of appropriate bio-criteria or atypical sampling conditions (e.g., drought). These bioclassifications are used to assess the various impacts of both point source discharges and nonpoint source runoff. The resulting information is used to document both spatial and temporal changes in water quality, and to complement water chemistry analyses, ambient toxicity data, and habitat evaluations. In addition to assessing the effects of water pollution, biological information is also used to define High Quality or Outstanding Resource Waters, support enforcement of stream standards, and measure improvements associated with management actions. The results of biological investigations have been an integral part in North Carolina's basinwide monitoring program.

Biological samples have been taken throughout the watershed since the 1980's. Basinwide sites were first sampled in 1994 and the three most recent basinwide benthic macroinvertebrate samples were taken in 2009. Site specific information is available in Appendix and the Biological Assessment Report is available here: <http://portal.ncdenr.org/web/wq/ess/reports>. Figure 1-4 shows the most recent benthic site rating in this watershed at sites sampled since 1994.

FIGURE 1-4: BIOLOGICAL SAMPLE SITES & RATINGS

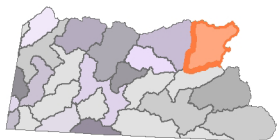


## PROTECTION AND RESTORATION OPPORTUNITIES

The following section provides more detail about specific streams where special studies have occurred or stressor sources information is available. Within this document biological sample site IDs ending in an “F” denote fish community and a “B” denote macroinvertebrate community. Specific stream information regarding basinwide biological samples sites are available in Appendix 1B. Use support information on all monitored streams can be found in Appendix 1A. Detailed maps of each of the watersheds are found in Appendix 1C or by clicking on the following small maps.

To assist in identifying potential water quality issues citizens, watershed groups and resource agencies can gather and report information through our Impaired and Impacted Stream/ Watershed survey found here: <http://portal.ncdenr.org/web/wq/ps/bpu/about/impactedstreamssurvey>.

## HEADWATERS VALLEY RIVER (HUC 060200020401)



The headwaters of the Valley River drain 42 square miles, with a majority of the tributaries starting in the mountains of Nantahala National Forest. The Valley River and most of the tributaries are classified as Trout (Tr) waters. Gipp Creek and its tributaries, Brokeleg Branch and Ash Cove Creek are classified as ORWs. This drainage is a National Heritage Significant Area.

Gipp Creek [AU# 1-52-23] was last sampled for macroinvertebrates in 2002 and rated Excellent (FB20).

Junaluska Creek [AU# 1-52-25a] maintains its Excellent Bioclassification rating at site FB7 in 2009 and water quality conditions are noted as stable.

Valley River [AU# 1-52b] is hatchery supported trout waters, was sampled in 2009 (FF3) noting a moderately rich and abundant assemblage of primarily cool water fish and the presence of Hellbender salamanders indicating high water quality despite the Not Rated status.

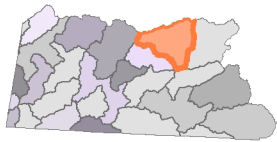
Tatham Creek [AU# 1-52-28] site FF19, was sampled in 2009 resulting in a Not Rated status due to absence of criteria for rating high gradient mountain trout streams. Two benthic sites (FB24 and FB31) were



sampled on Tatham Creek during the 2002 Valley River Watershed Assessment. Much of the watershed is in residential land use. Instream habitat was generally good at both sites, but the riparian vegetation had been cleared for residential purposes. Periphyton growth was prolific and the creek bed was slightly embedded with silt and sand. These problems are likely due to a combination of leaky/failing septic systems, straight pipes, and runoff from lawns through the poor riparian habitat.

Worm Creek [AU# 1-52-24] was sampled at benthic sites FB26 and FB38 as part of the Valley River Watershed Assessment in 2002. The habitat at the upstream site (FB26) was good, but the conductivity was elevated. This suggests runoff from residential or agricultural land use. The downstream site (FB38) was plagued by several habitat and water quality problems. The stream was full of silt and muck due to severe erosion. Heavy equipment had been used to push trees and other woody debris into the creek, disrupting flow. The site was very productive with long filamentous algae, suggesting nutrient enrichment. Conductivity was also very high for a mountain stream. Field staff determined the source of this high conductivity was Rail Cove Creek, a very small tributary to Worm Creek. Rail Cove Creek runs along SR 1503 through a number of residences.

## UPPER VALLEY RIVER (HUC 060200020402)



The Upper Valley River subwatershed drains 41 square miles, with the tributaries beginning in the mountains of Nantahala National Forest. The upstream reach of this subwatershed begins in the Town of Andrews. North of Andrews, the headwaters of Beaver Creek and Dan Holland Creek are WSW-II/ HQW areas. Along Dan Holland Creek, the Town of Andrews WTP holds a discharge permit (NC0069892) for release of its backwash water. Downstream on the Valley River the town has a major WWTP

discharge (NC0020800), which needs to improve its operation and maintenance regime to avoid future violations. There are also two active stormwater permits within the vicinity of Andrews; one for transportation and vehicle maintenance (NCG080754) and other for concrete mixing operation (NCG140154).

Britton Creek [AU# 1-52-29-(2)] was evaluated by Tennessee Valley Authority in 1993 and 2002. The stream was rated Good based on fish community data, but habitat was degraded. Habitat problems included: lack of well-developed riffle/run complexes, embedded substrate, heavy deposits of sediment, unstable banks, bank erosion, and a narrow riparian zone. Much of the bank damage, erosion, and sediment deposition are likely due to livestock access. The impacts from cattle access should be corrected through use of agricultural best management practices.

Beaver Creek [AU# 1-52-30-(3)] was sampled at Site FB19 as part of the 2002 Valley River Watershed Assessment, resulting in a Not Impaired status. Riparian vegetation is absent from many of the banks and much of the stream has been channelized and hardened with riprap. Channel restoration is advised where feasible, but identifying restoration sites may be difficult due to the proximity of the road that parallels the creek for its entire length. Residential landowners along the creek are encouraged to contact the Hiwassee River Watershed Coalition to help in reducing pollution caused by runoff from their property.

Morris Creek [AU# 1-52-36] was sampled above (site FB25) and below (site FB29) the Andrews Airport during the 2002 Valley River Watershed Assessment. Both sites were rated Not Impaired based on the stream's small size. There were several pollution intolerant species collected at the upstream site, but green algae and abundant aquatic worms indicated nutrient enrichment. The stream is channelized through the airport property and the downstream benthic community was more pollution tolerant. The stream banks are unstable due to the lack of riparian vegetation and channelization. Stream restoration and bank stabilization options should be evaluated. The Andrews Airport contributes significant runoff to several Valley River tributaries.

Taylor Creek [AU# 1-52-39] maintained its Good-Fair Bioclassification from a fish sample (FF4) taken in 2009. The creek's headwaters are primarily forested although downstream the creek is impacted by animal agriculture with evidence of breaks in riparian vegetation, bank instability and sedimentation.

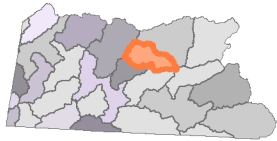
Welch Mill Creek [AU# 1-52-40] declined in Bioclassification from Excellent in 2004 to Good-Fair in 2009.

Biologists noted excellent habitat conditions but a decrease in flow conditions. In 2006, a trout farm began diverting an estimated 70-80% of the creeks water resulting in the absence of taxa that require heavier stream flows. The extremely sharp reduction in taxa here greatly exceeds anything observed elsewhere in the Hiwassee basin and warrants further investigation. Resampling this site, as well as sampling below the trout farm is recommended.

Hyatt Creek [AU# 1-52-43] was last sampled in 2002 (FB34 & FB27) which resulted in an Excellent macroinvertebrate rating. Hyatt Creek is one of the larger tributary streams to the Valley River. The lower end passes through residential areas and follows SR 1379. Livestock and land disturbing activities along the stream have likely contributed to sedimentation within the stream.

Hiwassee River Watershed Coalition helped facilitate the development of an outdoor environmental education area on property adjacent to the Marble Elementary School in Cherokee County. The property, which was donated by NC Rep. Roger West, contains the original Marble Springs, Hyatt Creek (which is a designated trout stream), a wetland area, and an area of native pine forest.

## MIDDLE VALLEY RIVER (HUC 060200020403)

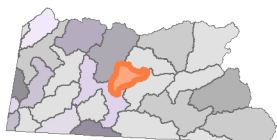


The impairment on Valley River starts just below the mouth of Vengeance Creek. The Valley River [AU# 1-52c] is Impaired because of turbidity standard violations from ambient data collected at site F4000000. The Valley River also has a history of high fecal coliform bacteria levels with several occurrences happening within the last several years. This rise may indicate a change in land use, land cover, intensity of use, or possibly a deterioration of vegetative buffers in the drainage area. Addressing the causes of the turbidity impairment in this reach may also help reduce fecal coliform bacteria levels. A 5-in-30 day sample study is needed to assess whether this portion of the river could be Impaired for fecal coliform bacteria.

The fish community in Vengeance Creek [AU# 1-52-45] was sampled at site FF6 and resulted in a Good Bioclassification in 2009. Nutrients were indicated as a possible concern in this drainage but overall water quality remains good.

Colvard Creek [AU# 1-52-58] was sampled at sites FB36 and FB37 as part of the 2002 Valley River Watershed Assessment. Habitat was severely degraded primarily due to poor cattle management practices. At the time the stream was sampled, livestock had direct access to the stream. During periods of high water, parts of a feedlot could be submerged. The impacts from cattle access should be corrected through use of agricultural best management practices.

## LOWER VALLEY RIVER (HUC 060200020404)



The basinwide macroinvertebrate site FB10 on the Valley River received a Good rating in 2009 as it did in 2004, although water quality improvements were noted. However, this reach [AU# 1-52c] of the river is Impaired because of high turbidity levels. The reach designated as Impaired by DWQ extends to the mouth of Marble Creek just above Murphy. Fecal coliform bacteria samples were collected in the Valley River near the KOA Campground and near Konehete Park in September 2011 and the data indicates bacteria levels that exceed our current water quality standards assessment criteria. The remaining 3.2mi. reach of Valley River [AU# 1-52d] that flows through Murphy before it empties into the Hiwassee River is Not Rated because of there is no data collected to represent this portion, although it may be Impaired on the 2014 303(d) list based on the 2011 fecal coliform bacteria data. North of Murphy there are two drainages that are protected for water supplies, Marble Creek and Brittian Branch/Fain Mtn. Reservoir are WSW-I areas. There is also one stormwater discharge permit for a concrete business with an outfall into Valley River.

Marble Creek [AU# 1-52-66-(3)] was evaluated by Tennessee Valley Authority as part of the 2002 Valley River Watershed Assessment. Severe habitat degradation affects the biological communities in this stream. The substrate was partially embedded, with cobble and boulders (25-50 percent) surrounded by fine sediment. The banks were moderately stable, but there were small areas of erosion. The channel of this stream was altered (channelized) in the past. Stream restoration and bank stabilization options should be evaluated.

## ***Water Quality Initiatives***

### Hiwassee River Watershed Coalition

Between 2003 and 2008, the Hiwassee River Watershed Coalition (HRWC) was awarded approximately \$1.5 million by the NC Clean Water Management Trust Fund for restoration work in the Valley River watershed. Using these funds, HRWC, in partnership with the Natural Resources Conservation Service, the Cherokee County Soil & Water Conservation District, and 22 local landowners, conducted restoration activities along nearly 15,000 linear feet (2.8 miles) of the river and its tributaries. In addition, more than 25 acres of wooded riparian buffer were created and placed under a protective easement and 150 acres of pastureland were improved. Additional accomplishments of the Valley River Watershed Restoration Project include \$600,000 dollars spent locally (materials and grading/clearing contractors); updated biological data for 24 sites in the watershed; a detailed nonpoint source pollution inventory to help guide restoration efforts; and a community educated about the value of riparian buffers for controlling erosion. Specific information, including before and after pictures, about the projects can be found at the HRWC website: <http://www.hrwc.net/valley.htm>

In 2008 HRWC received a grant from the NC Section 319 program to draft a watershed action plan for the Valley River watershed. The action plan establishes the reduction in Total Suspended Solids needed for the river to meet the turbidity standard, violations of which cause it to be Impaired. The grant also allowed for a bank stabilization project at Murphy High School which was conducted in partnership with Cherokee County Schools. HRWC is currently conducting restoration work in the upper third of the watershed under a second 319 grant, in partnership with Cherokee County, the Town of Andrews, and a number of private landowners.

HRWC has also been working to reduce sedimentation and improve aquatic habitat at several locations in the Valley River watershed using a \$45,000 grant from the Southeast Aquatic Resources Partnership (SARP) administered by the US Fish & Wildlife Service. This work involves eradication of nonnative invasive plants and supplemental plantings of native trees and shrubs within the riparian buffer areas, as well as instream habitat improvements.

### Land Trust for the Little Tennessee

Over the past five years, the Land Trust for the Little Tennessee's Hiwassee-Valley Land Trust project assisted in the conservation, or pending conservation, of 1,773 acres of open land, 4,462 feet of river frontage, and tens of thousands of feet of tributaries in the Valley River watershed.

In 2008, the land trust facilitated conservation of the 713-acre Marble Creek water supply watershed owned by the Town of Murphy. The land trust acted as a liaison between the Town and the State to help bring Clean Water Management Trust Fund dollars to the table, resulting in a permanent conservation easement for the land. Land trust staff have continued to monitor the easement annually and worked with the Town to improve drainage and vegetative cover on old logging roads and skid trails on the watershed property. In 2011, the Town was proactive in investing considerable resources in road and trail improvements, with all investments going to local contractors and materials suppliers. As a result, erosion has been sharply reduced on over two miles of steep roads and trails in the Marble Creek watershed.

In 2009, the land trust "bridged" a funding gap to allow the addition of 28 acres in the Vengeance Creek watershed to the Nantahala National Forest. The land trust purchased the vulnerable privately-owned tract, which includes over a half-mile of trout streams and a waterfall, and held it until the US Forest Service was able to purchase the land approximately one year later.

The land trust conserved its first major riverfront property in 2011, with the purchase of a conservation easement on a 101-acre historic farm on Valley River immediately upstream of the mouth of Welch Mill Creek. The rare property includes 4,462 feet of frontage on the river, as well as the most extensive and intact oxbow wetlands in the watershed. Farming will continue on most of the property, with stream buffers and many wetland areas protected and eventually enhanced or restored with the assistance of Hiwassee River Watershed Coalition and other partners.

The land trust is also working with the Town of Andrews and the NC Clean Water Management Trust Fund to facilitate the conservation of the Town's 930-acre Beaver Creek water supply watershed. Similar to the work of the Murphy project in 2008, this project would conserve nearly ten additional miles of streams, and would connect two disjunct tracts of Nantahala National Forest. With a written corridor conservation strategy in hand, the land trust will continue to work with interested landowners in the Valley River watershed to move forward with conserving waters, farms, forests, and heritage in this amazing valley.

### Recommendations

This watershed was intensively monitored in 1992 and 2002 and would benefit from being monitored again in 2012 to keep the 10-year cycle going. This would allow for a more thorough assessment of the local restoration efforts and adapting future restoration projects.

While HRWC has made significant progress towards reducing erosion and sediment inputs to the Valley River, much work remains to be done. HRWC has identified thirteen restoration projects that will address erosion and sedimentation problems in the Valley River watershed. These include approximately 18,050 feet of restoration on the Valley River mainstem and 19,000 feet on its tributaries. Projects to protect and restore riparian vegetation along the Valley River and its tributaries can slow the rate of water temperature increase and greatly reduce turbidity. The high gradient/high flow of headwater streams, coupled with the rocky nature of mountain streams have likely kept the tributaries from becoming impaired despite poor land use practices; but their biological integrity will decline if land disturbing activities continue without appropriate best management practices and riparian buffer protection. HRWC has demonstrated its ability to coordinate restoration efforts in the Valley River watershed to significantly reduce sedimentation. It uses sound scientific methods and has created effective partnerships at the federal, state, and local level. DWQ strongly supports their ongoing restoration goals.

## **NOTABLE WATERS**

Table 1-1 lists waterbodies identified as needing additional protection and potential restoration actions. The fourth and fifth columns of this table list potential stressors and sources that may be impacting a stream based on in-field observations, monitoring data, historical evidence, permit or other violations, and other staff and public input. In many cases, additional study is needed to determine exact source(s) of the impact. The last column includes a list of recommended actions.



TABLE 1-1: NOTABLE WATERBODIES

STREAM NAME	AU#	CLASS.	STRESSOR	SOURCE	STATUS	ACTIONS NEEDED
Britton Creek	1-52-29-(2)	C;Tr	habitat degradation, sedimentation	agriculture, limited riparian cover, development, stormwater	Impacted	R, BMPs
Brown Creek	1-52-34	C	habitat degradation, sedimentation	agriculture, livestock access	Impacted	R, Ag
Colvard Creek	1-52-39-1-1	C	habitat degradation, sedimentation	agriculture, livestock access	Impacted	R, Ag, BMPs
Marble Creek	1-52-66-(3)	C	sedimentation	unpaved roads (ATVs), stormwater	Impacted	R, BMPs
McCull Branch	1-51	C	habitat degradation, sedimentation, nutrients	urban stormwater, failing septic systems	Impacted	M, SC, LO, R
Rodgers Creek	1-52-60	C; Tr	habitat degradations, sedimentation	agriculture, residential stormwater	Impacted	R, M, Ag, BMPs
Taylor Creek	1-52-39	C;Tr	habitat degradation, nutrients	agriculture	Supporting	R, Ag, BMPs
Valley River	1-52c	C;Tr	turbidity, nutrients, fecal coliform bacteria, increasing temperature	agriculture, livestock access, development, failing septic systems, stormwater	Impaired	S&E, R, LO, M, Ag, BMPs
Welch Mill Creek	1-52-40	C;Tr	flow	trout farm	Supporting	M, Ag, R
Whitaker Creek	1-52-33	C	habitat degradation, sedimentation	agriculture, livestock access, residential runoff	Impacted	R, Ag, BMPs
Worm Creek	1-52-24	C;Tr	habitat degradation, sedimentation, nutrients	agriculture, residential stowmater	Supporting	R, Ag, BMPs

AU # = Assessment Unit # or stream segment/reach

Class. = Classification (e.g., C, S, B, WS-I, WS-II, WS-III, WS-IV, WS-V, Tr, HQW, ORW, SW, UWL)

Stressor = chemical parameters or physical conditions that at certain levels prevent waterbodies from meeting the standards for their designated use.(e.g., low/high DO, nutrients, toxicity, habitat degradation, etc.)

Source = development, agriculture, WWTP, NPS,

Status = Impaired, Impacted, Supporting, Improving

Actions Needed = BMPs, R= restoration, P= conservation protection, SC= stormwater controls, SS= stressor study, E= education, LO= local ordinance, SSP= species protection plan, F= forestry BMPs, Ag= Agriculture BMPs, NMC= nutrient mgnt controls, S&E soil and erosion control, M= monitoring

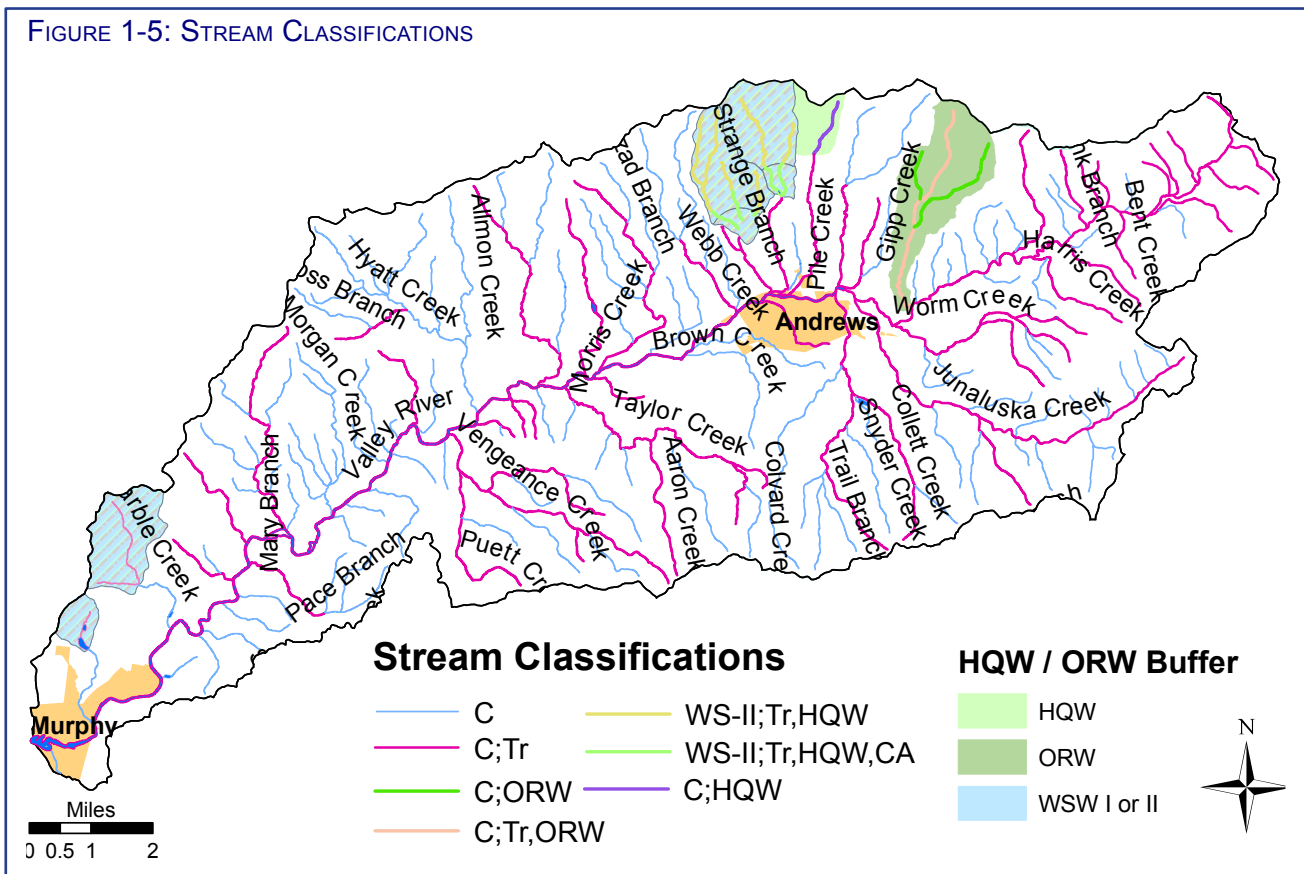
## MANAGEMENT STRATEGIES FOR WATER QUALITY PROTECTION

Trout (Tr), High Quality Water (HQW) and Outstanding Resource Water (ORW) are supplemental classifications to the primary freshwater classification(s) placed on a waterbody. As show in Figure 1-5, Gipp Creek is classified as an ORW Trout stream. Management strategies are associated with the supplemental HQW and ORW classifications and are intended to protect water quality. Below is a brief summary of these strategies and the administrative code under which the strategies are found. More detailed information can be found in the document entitled Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina(NCDENR-DWQ, 2004). This document is available on-line at <http://portal.ncdenr.org/web/wq/ps/csu/rules>.

### Trout (Tr) Waters

Trout (Tr) waters are protected for natural trout propagation and maintenance of stocked trout. There are no watershed development restrictions associated with the trout classification; however, the NC Division of Land Resources (DLR), under the NC Sedimentation and Pollution Control Act (SPCA), has requirements to protect trout streams from land disturbing activities. Under G.S. 113A-57(1), "waters that have been classified as trout waters by the Environmental Management Commission (EMC) shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the twenty-five percent of the buffer zone nearest the land-disturbing activity, whichever is greater." The Sedimentation Control Commission, however, can approve land-disturbing activities along trout waters when the duration of the disturbance is temporary and the extent of the disturbance is minimal. This rule applies to unnamed tributaries flowing to the affected trout water stream. Further clarification on classifications of unnamed tributaries can be found under Administration Code 15A NCAC 02B .0301(i)(1) or the following link: [http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=f4f0b765-7892-4681-885b-95f4ef26f806&groupId=38364](http://portal.ncdenr.org/c/document_library/get_file?uuid=f4f0b765-7892-4681-885b-95f4ef26f806&groupId=38364).

FIGURE 1-5: STREAM CLASSIFICATIONS



## HQW & ORWs

HQW classification is intended to protect waters with water quality higher than the state's water quality standards. In the Hiwassee River basin, waters classified as Water Supply I and II (WS-I and WS-II), ORW, and waters designated by the NC Wildlife Resources Commission (WRC) as native (wild) trout waters are subject to HQW rules. Streams petitioned for WS-I or WS-II or which are considered Excellent based on biological and physical/chemical water quality parameters may qualify for the HQW supplemental designation.

New discharges and expansions of existing discharges may, in general, be permitted in waters classified as HQW provided that the effluent limits are met for dissolved oxygen (DO), ammonia/nitrogen levels (NH<sub>3</sub>-N), and the biochemical oxygen demand (BOD<sub>5</sub>). More stringent limitations may be necessary to ensure that the cumulative effects from more than one discharge of oxygen-consuming wastes will not cause the dissolved oxygen concentration in the receiving water to drop more than 0.5 milligrams per liter (mg/l) below background levels. Discharges from single-family residential structures into surface waters are prohibited. When a discharge from an existing single-family home fails, a septic tank, dual or recirculation sand filters, disinfection, and step aeration should be installed (Administrative Code 15A NCAC 2B .0224).

In addition to the above, development activities which require an Erosion and Sedimentation Control Plan under the NC Sedimentation Control Commission or an approved local erosion and sedimentation control program are required to follow stormwater management rules as specified in Administrative Code 15A NCAC 2H .1000 (NCDENR-DWQ, 1995). Under these rules, stormwater management strategies must be implemented if development activities are within one mile of and draining to waters designated as HQW. There are two development options outlined in the rule:

- The low-density option requires a 30-foot wide vegetative buffer between development activities and the stream. This option can be used when the built upon area is less than 12 percent of the total land area or the proposed development is for a single-family residential home on one acre or greater. Vegetated areas may be used to transport stormwater in the low-density option, but it must not lead to a discrete stormwater collection system (e.g., constructed).
- The high-density option is for all land disturbing activities on greater than one acre. For high-density projects, structural stormwater controls must be constructed (e.g., wet detention ponds, stormwater infiltration systems, innovative systems) and must be designed to control runoff from all surfaces affected by one inch or more of rainfall. More stringent stormwater management measures may be required on a case-by-case basis where it is determined additional measures are needed to protect and maintain existing and anticipated uses of the water (Administrative Code 15A NCAC 2H .1006).

ORWs are unique and special surface waters that have some outstanding resource value (e.g., outstanding fish habitat and fisheries, unusually high levels of water-based recreation, special ecological or scientific significance). No new discharge or expansions on existing discharges are permitted. Rules related to the development activities are similar to those for HQW, and stormwater controls for all new development activities requiring an Erosion and Sedimentation Control Plan under the NC Sedimentation Control Commission or an approved local erosion and sedimentation control program are required to follow stormwater management rules as specified in Administrative Code 15A NCAC 2H .1000 (NCDENR-DWQ, 1995). In addition, site specific stormwater management strategies may be developed to protect the resource values of these waters.