

3.2 Dutch Creek HUC 060101030303

Covering almost 35 square miles, the Dutch Creek watershed is a good mix of agriculture (pasture and crops), forests and developed land with portions of Western Boone located in the far eastern corner of the watershed and Valle Crucis near the center. During the past two decades, Valle Crucis has transformed from a little-known rural community to a popular destination for vacationers and new residents. One reason for its scenic beauty is that much of the town is located in a low-lying area that is flat when compared to the surrounding Blue Ridge Mountains. Because of its location, however, it is quick to flood and flood waters can often limit access to and from parts of town.



Several buildings in the community are registered on the National Register of Historic Places, and portions of the watershed have been identified as natural areas by the NC Natural Heritage Program (NHP). This includes Valle Mountain, Hanging Rock Mountain, the Watauga River and a portion of Dutch Creek itself. Several conservation easements are managed throughout the watershed by the Blue Ridge Conservancy (BRC), and in 2008, the NC Division of Parks and Recreation (DPR) was authorized to begin a land acquisition process that will protect the ecological value of Bear Paw State Natural Area. Bear Paw is located just north of Grandfather Mountain and is home to Hanging Rock Ridge. Many rare plant species and nine rare animals, including the Virginia big-eared bat, are also found here.

Table 3.9: Land Use and Estimated Population – Dutch Creek Watershed

Land Use Type	Acres	Square Miles	Percent
Open Water	0.0	0.0	0.0%
Developed	1,221.8	1.9	5.5%
Bare Earth	60.5	0.1	0.3%
Forest	18,888.7	29.5	84.7%
Grassland	305.7	0.5	1.4%
Agriculture	1,801.6	2.8	8.1%
Wetland	12.1	0.0	0.1%
Total Area	22,290.4	34.8	100.0%

(NCLD, 2011)

Calendar Year	Population and Projections*
2000	3,580
2010	4,960
2020	-
2030	-

*Methodology has not been developed to predict population projections on the HUC 12 scale.

(OSBM, 2014)

Overall, water quality in the Dutch Creek watershed is good, but historic and current agricultural land use has created extremely narrow riparian zones and unstable streambanks throughout the watershed. Personnel in the Winston-Salem Regional Office has worked with several of the stormwater permittees throughout the years to identify discharge locations and how to reduce the amount of stormwater leaving individual facilities. Three benthic and two fish sites were sampled during cycle 4 (2004-2009). Three benthic and two fish sites were also sampled during cycle 5 (2009-2014). The two fish sites were Not Rated because criteria and metrics have not been developed by the Biological Assessment Branch (BAB) for Southern Appalachian trout streams. The remaining sites were meeting criteria for aquatic life – benthic and fish.

Five NPDES wastewater discharge permits (Table 3.10), one non-discharge permit (Table 3.11) and six stormwater permits (Table 3.12) are found in the Dutch Creek watershed.

Table 3.10: NPDES Wastewater Permits in 060101030303

Permit Number	Facility Name	Receiving Stream	Permitted Flow (MGD)
NC0032166	Camp Broadstone WWTP	Watauga River	0.008
NC0038041	Laurel Seasons WWTP	Laurel Fork	0.020
NC0061425	Willow Valley Resort WWTP	Laurel Fork	0.030
NC0067024	Valle Crucis Elementary School	Dutch Creek	0.007
NC0072559	Valle Landing Shopping Center WWTP	Dutch Creek	0.004
Permit Type: Minor – Discharging 100% Domestic < 1MGD			

Table 3.11: Non-Discharge Permits in HUC 06010101030303

Permit Number	Facility Name	Permit Type
WQ0035784	Cottages of Boone	Wastewater Irrigation

Table 3.12: NPDES Stormwater Permits in HUC 060101030303

Permit Number	Facility Name	Permit Type
NCG020251	Vulcan Construction Materials-Boone Quarry	Mining Activities Stormwater Discharge COC
NCG080900	Boone Bin	Transportation w/Vehicle Maintenance/Petroleum Bulk/Oil Water Separator Stormwater Discharge COC
NCG140101	Chandler Concrete Co., Inc.	Ready Mix Concrete Stormwater/Wastewater Discharge COC
NCG140259	R H Loven Co Incorporated	Ready Mix Concrete Stormwater/Wastewater Discharge COC
NCG160039	Maymead Materials Inc - Brown	Asphalt Paving Mixture Stormwater Discharge COC
NCG160141	Maymead Materials Inc	Asphalt Paving Mixture Stormwater Discharge COC

3.2.1 Stream Assessments

3.2.1.1 Watauga River AU 8-(1)b

(from Laurel Fork to Cove Creek)

Near the confluence of the Watauga River and Cove Creek, the river is 17 meters wide, encompasses 92 square miles and receives nonpoint source runoff from several land uses and point sources. The velocity of the river is also slower in this downstream section. Consequently, fine sediments tend to settle out near the streambanks. To assess the biological impacts of the September 2004 hurricanes, DWR staff requested a post-hurricane special study. Two sites were selected for sampling and included the Watauga River (near Sugar Grove – LB12) and Cove Creek. Instream

Sampling Year	Benthic Rating (LB12)
2004	Excellent
2004*	Good
2008	Good
2013	Excellent
*Special Study (post-hurricane, December 2004)	

habitat in the Watauga River was still a good mix of boulders, rubble, sand, gravel and silt. However, post-hurricane sampling showed a substantial decline in species richness and diversity. Despite the decline, however, the benthic bioclassification only dropped from an Excellent (August 2004) to a Good (December 2004) at site LB12. Both DWR and local resource agency staff believe that the benthic population will rebound and return to pre-hurricane conditions.

Basinwide sampling in 2008 found an increase in species richness, but the increase is comprised mostly of facultative, or pollution tolerant, species. Samples were collected during extreme drought conditions which is likely exacerbating the impact of point sources on the benthic community causing the shift to a slightly more tolerant community. Despite the low-flow conditions, the benthic community remained Good.

Improved water quality conditions were observed during the 2013 sampling cycle, and the benthic community received an Excellent bioclassification. Based on historical observations and sampling data, it appears as if the upstream dischargers and fluctuations in flow are likely influencing the benthic community more than nonpoint source pollution within this sampling reach. The area saw the return of many intolerant species and increased flow due to increased precipitation.

3.2.1.2 Laurel Fork AU 8-10

The headwaters of Laurel Fork are forested with very little development, good riparian areas and natural landscapes. As it winds its way towards the Watauga River, it receives nonpoint source and stormwater runoff from heavily urbanized areas of western Boone. It also receives runoff from several permitted stormwater facilities. It has a history of running “milky white” or “cloudy” but the events are episodic and varied in duration. Several stormwater investigations have been conducted over the years with the regional office and NC Department of Transportation (NCDOT) working with the permitted stormwater facilities to ensure proper BMPs are in place.

Sampling Year	Benthic Rating (LB10)	Fish Rating (LF8)
2004	Good-Fair	Not Rated
2008	Good	Not Rated
2013	Good-Fair	-

The benthic sampling site (LB10) is located 0.5 miles upstream of the confluence with the Watauga River and continues to fluctuate between Good-Fair and Good. In 2008, benthic community received a Good bioclassification. It had the highest taxa richness and abundance recorded since the station was first sampled in 1990. Two NPDES dischargers (Laurel Seasons WWTP and Willow Valley Resort WWTP) are located upstream, but it appears that the stream is influenced by nonpoint source pollution associated with the City of Boone, roadways and a nearby quarry. Why? Because despite low-flow conditions

associated with drought conditions, the effluent from the upstream dischargers did not seem to be adversely affecting the benthic community. The reduction in nonpoint source runoff likely explains the improved community metrics.

The fish community (LF8) was Not Rated in 2008, but the biologists noted that there appeared to be no substantial water quality issues in the watershed. There was an even mix of cold and cool freshwater fish species and twice as many individuals were collected when compared to 2004 data. Biologists noted good riparian and instream habitats but elevated conductivity for a mountain stream.

In 2013, the benthic community received a Good-Fair bioclassification. Taxa richness and abundance had decreased when compared to the previous sampling cycle. Changes are likely attributed to differences in precipitation and flow conditions between the two cycles. The fish community was not sampled.

3.2.1.3 Dutch Creek AU 8-12-(1.5)

Located just over one mile upstream of the confluence with the Watauga River, the fish community (LF7) in Dutch Creek was given a Good-Fair bioclassification for the third consecutive year. Even though the number of fish collected in 2013 declined by almost half when compared to previous sampling cycles, the station still had the most

Sampling Year	Fish Rating (LF7)
2004	Good-Fair
2008	Good-Fair
2013	Good-Fair

number of fish and number of species collected relative to other sites in the basin. The dominant species was the herbivorous Central Stoneroller which is indicative of an open canopy, abundant periphyton growth and nutrient enrichment from nonpoint source runoff. A naturally reproducing population of Brown Trout has been documented in the stream during each assessment cycle, supporting the trout (Tr) supplemental classification. No municipalities or NPDES dischargers are located upstream of the sampling location. Since 1992, however, BAB noted that forested land has decreased from 94% to 86% and developed land has increased from < 1% to 5%. Eight percent of the land is cultivated. Changes in land use has the potential to impact habitat in Dutch Creek and change the current rating.

3.2.1.4 Special Studies

One stream – Harrison Branch – was sampled in 2009 and 2011 as part of a special study requested by the North Carolina Chapter of the American Fisheries Society (AFS). The special study was requested to determine if the stream is eligible for the supplemental classification of Trout (Tr). Supporting documentation was provided by the North Carolina Wildlife Resources Commission (WRC), and the fish communities were sampled by DWR in 2009. Where appropriate, benthic macroinvertebrates were also sampled in 2011 as part of the study to determine if the streams are eligible for the supplemental classification of High Quality Waters (HQW).

Harrison Branch AU 8-10-1

All three species of trout were collected in Harrison Branch in 2009, but fish community ratings were not applied to the data because criteria and metrics have not been developed by the Biological Assessment Branch (BAB) for Southern Appalachian trout streams. Rainbow trout were represented by multiple sizes and at least three age classes. Two intolerant species as well as two cold-cool water species were also collected.

Sampling Year	Benthic Rating (LB59)	Fish Rating (LF16)
2009*	-	Not Rated
2011*	Excellent	-
*Special Study (DWQ, 2012)		

The benthic community (LB59) was sampled in 2011. It is located 50 feet above the confluence with Laurel Fork, and it received an Excellent bioclassification. Habitat consisted of shallow cobble and gravel riffles

with a few shallow side and instream pools. The riparian zones are narrow but vegetated with shrubs and small maples. The watershed is approximately 0.5 mi² and is 90 percent forested with some rural residential properties, a church and a private campground in the immediate vicinity of the sampling site.

Based on data submitted by WRC and because data collected by the Biological Assessment Branch (BAB) showed evidence of multiple age classes and trout species, Harrison Branch, including all named and unnamed tributaries, is eligible for the supplemental classification of HQW and Trout (Tr). Additional information related to land use changes in the watershed may be necessary to pursue the supplemental classification for these streams.

3.2.2 Water Use

There are 30 Public Water Supply (PWS) Systems located in the Dutch Creek watershed. Three are community systems and collectively serve an estimated population of 610 people (Table 3.13). The vast majority of the residents living in this watershed rely on private groundwater wells for drinking water. None of these community systems are required to submit a Local Water Supply Plan (LWSP).

Table 3.13: Public Water Supply Systems in HUC 060101030303

PWS Name	PWS ID	PWS Type	Population Served
PEBBLE CREEK APARTMENTS	01-95-127	Community	32
MOUNTAIN CARE FACILITIES	01-95-440	Community	44
COTTAGES OF BOONE	30-95-030	Community	534
FLINTLOCK CAMPGROUND	01-95-132	Transient Non-Community	300
FRONTIER VILLAGE I (WELL 1)	01-95-145	Transient Non-Community	25
FRONTIER VILLAGE I (WELL 2)	01-95-146	Transient Non-Community	25
FRONTIER VILLAGE I (WELL 4)	01-95-148	Transient Non-Community	25
FRONTIER VILLAGE II (WELL 1)	01-95-149	Transient Non-Community	25
FRONTIER VILLAGE II (WELL 2)	01-95-150	Transient Non-Community	25
WILDFLOWER (WELL 1)	01-95-151	Transient Non-Community	25
WILDFLOWER (WELL 2)	01-95-152	Transient Non-Community	25
FRONTIER VILLAGE III	01-95-158	Transient Non-Community	25
HILL TOP DRIVE IN	01-95-413	Transient Non-Community	25
VALLE CRUCIS MISSION	01-95-427	Transient Non-Community	25
HONEYBEAR CAMPGROUND SECT A	01-95-448	Transient Non-Community	60
BIBLE WAY BAPTIST CHURCH	01-95-473	Transient Non-Community	25
CAMP BROADSTONE	01-95-481	Transient Non-Community	25
OAK GROVE BAPTIST CHURCH	01-95-496	Transient Non-Community	25
MAST GENERAL STORE ANNEX	01-95-504	Transient Non-Community	25
HONEYBEAR CAMPGROUND-SECT B/C	01-95-511	Transient Non-Community	62
MAST GENERAL STORE	01-95-512	Transient Non-Community	25
WESTVIEW BAPTIST CHURCH	01-95-513	Transient Non-Community	25
VALLE CRUCIS CONFERENCE CENTER	01-95-519	Transient Non-Community	25
VALLE LANDING SHOPS/RESTAURANT	01-95-535	Transient Non-Community	50
MAST FARM INN	01-95-544	Transient Non-Community	25
MARY'S KITCHEN	01-95-552	Transient Non-Community	25

PWS Name	PWS ID	PWS Type	Population Served
FRONTIER VILLAGE III-WELL 2	30-95-027	Transient Non-Community	25
THE 1861 FARM HOUSE	30-95-031	Transient Non-Community	25
MAST GENERAL STORE-WAREHOUSE	01-95-534	Non-Transient Non-Community	45
VALLE CRUCIS ELEM SCHOOL	0195422	Non-Transient Non-Community	410

3.2.2.1 Water Withdrawal & Transfer Registration (WWATR) Program

One facility is registered with the state as withdrawing more than 100,000 gallons per day. Table 3.14 includes the facility name, source water (well or on-site pond) and the annual average use (MGD) reported in 2015.

Table 3.14: Water Withdrawal Registration HUC 0601010303 (WWATR, 2015)

Facility Name	Facility ID	Use Type	Source Water	Annual Average Daily Use (MGD)
Vulcan Construction Materials, L. P.*	0199-0023	Mining - Mining Extraction	Quarry	0.279

*The facility discharges to surface water under stormwater permit number NCG020251. The facility reported that it discharged to surface water a total of 15 days over the months of August, October and November for an average daily discharge of 1.014 mgd.

3.2.3 Classifications and Management Strategies

Because the Watauga River, Laurel Fork, Lost Branch, Dutch Creek and two of its tributaries have the supplemental classification of Trout (Tr), special management strategies are in place to protect water quality. In addition, two sections of Dutch Creek are classified B and the entire length of the Watauga River is classified B with the supplemental classification of HQW. Waters with a B classification are managed for primary recreation, including frequent or organized swimming, and must meet water quality standards for fecal coliform bacteria. For HQW watersheds, a 30-foot vegetated setback is required, and there are restrictions on wastewater discharges, development, landfills and residual application sites to control the impacts of point and nonpoint sources of pollution to the high quality water. Ordinances are in place for erosion control at the county level and available online.

Table 3.15: Stream Names and Classifications

AU Number	Stream Name	Description	Classification
8-(1)	Watauga River	From Laurel Fork to Cove Creek	B;Tr,HQW
8-10	Laurel Fork	From source to Watauga River	C;Tr
8-11	Lost Branch	From source to Watauga River	C;Tr
8-12-(0.5)	Dutch Creek	From source to Clark Creek	B;Tr
8-12-(1.5)	Dutch Creek	From Clark Creek to Watauga County SR 1112	C;Tr
8-12-(3.5)	Dutch Creek	From Watauga County SR 1112 to Watauga River	B;Tr
8-12-1	Pigeonroost Creek	From source to Dutch Creek	B
8-12-3	Craborchard Creek	From source to Dutch Creek	C;Tr

3.2.4 Protecting Water Resources in the Dutch Creek Watershed

Several agencies and organizations are actively working throughout the basin to protect water resources. Agencies or organizations that have identified specific priorities, concerns or restoration projects in the Dutch Creek watershed are included here.

3.2.4.1 NCDEQ Division of Mitigation Services (DMS)

The Watauga River headwaters and Dutch Creek are combined in the [2009 River Basin Restoration Priority \(RBRP\) Plan](#) issued by the Division of Mitigation Services (DMS). The combined watershed is one of three targeted local watersheds (TLWs) identified for priority planning and restoration project funds, and even though the combined watershed is rich in natural assets, development, land clearing activities and increasing impervious surface cover are contributing to habitat degradation especially along the highway corridors (NC-105 and NC-194). DMS identifies preservation and restoration of riparian buffers and streams and land conservation as priorities in the combined watershed. DMS also recommends improved stormwater management and sediment and erosion control practices for steep slopes and new construction throughout the combined watershed.

3.2.4.2 NC Wildlife Resources Commission (WRC)

The Wildlife Resources Commission (WRC) identifies four species of greatest conservation need (SGCN) in the Watauga River basin. SGCN identified in the 2015 Wildlife Action Plan (WAP) include one crayfish species, two freshwater fish and one freshwater mussel. WRC identifies erosion and sedimentation from nonpoint sources as well as narrow riparian corridors or lack thereof as the primary problems impacting habitats and affecting aquatic species in the basin.

Table 3.16: SGNC Identified in the Watauga River Basin

Taxa Group	Scientific Name	Common Name	Federal/State Status*
Crayfish	<i>Cambarus eeseehensis</i>	Grandfather Mountain Crayfish	FSC / -
Fish	<i>Cottus carolinae</i>	Banded Sculpin	-
Fish	<i>Salvelinus fontinalis</i>	Brook Trout (native)	-
Mussel	<i>Lasmigona subviridis</i>	Green Floater	FSC / E

*FSC – Federal Species of Concern
E – Endangered (State)

The Dutch Creek watershed along with the Watauga River headwaters, Cove Creek and the Beech Creek watersheds have been identified as Tier 2 conservation priority areas by the WRC. Tier 1 are considered highest priority and Tier 2 are high priority areas. WRC recommends surveys to identify species distribution in the watersheds. Long-term monitoring is also needed to assess species and ecosystem health over time. Monitoring will also assist with understanding species resiliency to changing water quality conditions. WRC also recommends research to investigate aquatic community responses to restoration activities as well as water withdraws. Research is also needed to investigate the potential for species reintroduction of native mussels to the basin. Education and management measures are recommended to prevent the introduction or spread of invasive nonnative species, and WRC supports stream and riparian area conservation and restoration initiatives throughout the basin to protect, improve or enhance existing conditions. More information about can be found in Section 4.5.18 of the [2015 Wildlife Action Plan \(WAP\)](#).

3.2.4.3 NCDA&CS DSWC Agriculture Cost Share Program (ACSP)

Between 2004 and 2014, several BMPs were installed in the watershed. BMPs included measures to reduce sediment, nutrient and erosion and exclude livestock from streams. Additional information about the ACSP and the total number of BMPs installed, total cost as well as the benefits (soil saved and nutrient reduction) can be found in the chapter titled Nonpoint Source Pollution and Programs to Protect Water Resources.

3.2.5 References

North Carolina Department of Agriculture & Consumer Services (NCDA&CS) Division of Soil and Water Conservation (DSWC). March 2017. Agriculture Cost Share Program (ACSP) BMP Manual.

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North Carolina Department of Environment and Natural Resources (DENR) Division of Water Quality (DWQ) Environmental Sciences Section (ESS). May 2012. Supplemental Classification Study: Watauga River Basin in Avery and Watauga Counties HUC 06010103.

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