

### 3.6 Elk River HUC 0601010302

Elk River is a tributary to the Watauga River and begins on the northwestern slope of Peak Mountain in Avery County. It flows west/northwest through the Towns of Banner Elk and Elk Park, and just before the river crosses into Tennessee, it drops 40-feet over Big Falls (also known as Elk Falls). Once in Tennessee, it runs through a narrow, relatively steep valley, over Twisting Falls (30-foot drop) and into an embayment of Watauga Lake.



Covering 52.1 square miles in North Carolina, the watershed consists of high peaks, forests, rural residential properties, and scattered agricultural land. Because of its natural beauty, portions of the Elk River watershed have become popular destinations for nature and recreational enthusiasts. Banner Elk, Sugar Mountain and a small portion of Seven Devils are all located in the watershed along with several natural areas identified by the North Carolina Natural Heritage Program (NHP) including Hemlock Hill, Lutherock Natural Area, Belview Mountain Slopes, Cranberry Iron Mine Bat Habitat, and portions of Roan Mountain Massif.

HUC 12	HUC Name
060101030201	Elk River
060101030202	Lower Elk River

Table 3.38: Land Use and Estimated Population HUC 0601010302

Land Use Type	Acres	Square Miles	Percent
Open Water	7.7	0.0	0%
Developed	2,916.2	4.6	9%
Bare Earth	149.7	0.2	0%
Forest	27,434.0	42.9	82%
Grassland	1,074.8	1.7	3%
Agriculture	1,741.1	2.7	5%
Wetland	20.4	0.0	0%
<b>Total Area</b>	<b>33,343.9</b>	<b>52.1</b>	<b>100%</b>

Calendar Year	Population and Projections*
2000	4,821
2010	5,130
2020	-
2030	-

\* Methodology has not been developed to predict population projections on the HUC 10 scale.

(OSBM, 2014)

(NCLD, 2011)

Overall, water quality remains good in the watershed and several streams may be eligible for the Trout (Tr) classification based on a special study requested by the North Carolina Chapter of the American Fisheries Society (NCAFS). Additional information related to land use changes in the watershed may be necessary to pursue the supplemental classification for these streams. Five benthic sites and three fish sites were sampled during cycle 4 (2004-2009). Five benthic sites and two fish sites were sampled during cycle 5 (2009-2014). All sites were meeting criteria for aquatic life.

Residents throughout the watershed rely on groundwater through either a community well or private wells for drinking water. Two public water supply (PWS) systems and four recreational facilities are registered with the Water Withdrawal & Transfer Registration (WWATR) Program (Table 3.48). The recreational facilities rely on a combination of groundwater and private ponds for irrigating golf courses or making snow during the winter months. The PWS systems rely solely on groundwater for providing drinking water to their customers. Five NPDES wastewater discharge permits are in the watershed (Table

3.39). Two non-discharge facilities are also in the watershed (Table 3.40). No stormwater permits have been issued. No special management strategies are in place in the Elk River watershed.

Table 3.39: NPDES Wastewater Permits HUC 0601010302

Permit Number	Facility Name	Receiving Stream	Permitted Flow (MGD)
NC0022900	Sugar Mountain WWTP	Flattop Creek	1.000
NC0032115	Banner Elk WWTP	Elk River (Mill Pond)	0.600
NC0058378	Elk River WWTP	Elk River (Mill Pond)	0.080
NC0079561	Elk Park WWTP	Little Elk Creek	0.100
NC0088439	Cranberry Creek Development WWTP	Blevins Creek	0.072

Table 3.40: Non-Discharge Permits HUC 0601010302

Permit Number	Facility Name	Permit Type
WQ0012210	Town of Banner Elk	Distribution of Residual Solids (503)
WQCSD0557	Town of Elk Park	Deemed permitted collection system management and operation

### 3.6.1 Stream Assessments

#### 3.6.1.1 Elk River AU 8-22-(3)

Located just upstream of the Town of Banner Elk, the benthic community received a Good bioclassification in 2008, a substantial improvement when compared to the previous basinwide sampling cycle. Comparing flow data from the USGS gage on the Watauga River and historical biological data, biologists believe that higher flows likely delivered more nonpoint source runoff to the station during the 2004 monitoring cycle resulting in the Good-Fair bioclassification. Low-flow conditions due to drought conditions in 2008 reduced the amount of nonpoint source runoff which allowed the biological community to increase in number. No permitted dischargers are located upstream of the sampling station and land use is a mix of commercial and residential properties.

Sampling Year	Benthic Rating (LB7)
2004	Good-Fair
2008	Good
2013	Good

In 2013, the benthic community received a Good bioclassification for the second consecutive year. Many pollution tolerant and facultative species were found, however, with midges being extremely high. Midges are typically more tolerant of upstream anthropogenic activities (i.e., stormwater runoff from surrounding residential and impervious land cover).

In 2013, the benthic community received a Good bioclassification for the second consecutive year. Many pollution tolerant and facultative species were found, however, with midges being extremely high. Midges are typically more tolerant of upstream anthropogenic activities (i.e., stormwater runoff from surrounding residential and impervious land cover).

#### 3.6.1.2 Cranberry Creek AU 8-22-16

Located approximately 0.5 miles above the confluence with Elk River, the fish community (LF2) was Not Rated. Land use in the watershed is a mix of forest, agriculture and residential. Very little change was observed between basinwide monitoring cycles and the same six species were collected including both Rainbow and Brown trout. Habitat consisted of riffle runs with side snag pools and moderate to high substrate embeddedness. Good riparian cover was observed on the left streambank, but the right bank was mowed to the stream's edge. In 2008, BAB noted that there were no benthic macroinvertebrates in the stream segment. Cranberry Creek was not sampled in 2013.

Sampling Year	Fish Rating (LF2)
2004	Not Rated
2008	Not Rated
2013	-

### 3.6.1.3 Little Elk Creek AU 8-22-17

Fish (LF13) were sampled for the first time in Little Elk Creek in 2008. This small, high gradient trout stream was supporting a moderately diverse fish community. Habitats consisted of riffles, plunge pools and short runs. The lower half of the reach has an open canopy, but the upper half had a dense canopy.

Sampling Year	Fish Rating (LF13)
2008	Not Rated
2013	-

Good riparian zones and stable streambanks were observed along the entire sampling reach. Because criteria and metrics have not been developed for small, Southern Appalachian Trout stream, fish community ratings were not applied and the stream is Not Rated. Little Elk Creek was not sampled in 2013.

### 3.6.1.4 Elk River AU 8-22-(14.5)

Located less than one mile from the state line, the benthic community (LB6) improved in 2008 and received an Excellent bioclassification. BAB moved the station 0.75 miles downstream from the previous location (near the confluence of Mill Creek) for easier access. Several intolerant species were

Sampling Year	Benthic Rating (LB6)	Fish Rating (LF3)
2004	Good	Not Rated
2008	Excellent	Not Rated
2013	Excellent	-

collected and the abundance was the highest ever measured for this section of the Elk River. Two NPDES facilities are located 10 river miles upstream. In 2007 and 2008, effluent from these facilities was more concentrated due to drought and low-flow conditions, but based on the sampling data, biologists conclude that nonpoint source runoff exerts the strongest overall influence on the benthic community and the improvement in richness and abundance is likely due to reduced nonpoint source runoff entering the river.

In 2008, the fish community (LF3) was also sampled and was Not Rated. The station is located just downstream of the Town of Banner Elk and two permitted NPDES wastewater facilities are located upstream. A moderately diverse mix of cold and cool water species were identified and included one pollution intolerant trout species. Conductivity was high for a mountain stream but not unexpected because of low-flow conditions. Good riparian widths, stable banks and good instream habitat was noted. The fish community was not sampled in 2013.

In 2013, the benthic community was rated Excellent for the second consecutive year. However, many of the species collected during the previous basinwide monitoring cycle were not collected during the most recent monitoring cycle. The continued Excellent bioclassification indicates that the two upstream NPDES facilities are having minimal effect on the macroinvertebrates, but the decrease in richness could be the result of increased precipitation leading to more nonpoint source runoff and increased drift of some species.

### 3.6.1.5 Special Studies

Three special studies were conducted in the Elk River watershed. One stream – Shawneehaw Creek – was sampled as part of a special study to assess potential degradation from new construction activities in the catchment. Three streams – Leroy Creek, Clear Branch and Ramp Branch – were sampled as part of a special study requested by the North Carolina Chapter of the American Fisheries Society (AFS), and one stream – Greenbrier Creek – was sampled at the request of the regional office to assess potential degradation from land clearing and new construction activities in the catchment. No historic data is available for Greenbrier Creek (AU 8-22-16-2-1) and the benthic macroinvertebrates were sampled in July 2008 and again in July 2009. Site LB54 received a Good bioclassification in July 2008 and an Excellent bioclassification in July 2009. No formal data sheet or memo is available for this site.

### Impacts to Stream – Shawneehaw Creek AU 8-22-7

Shawneehaw Creek was sampled for the first time as part of a special study to assess potential degradation due to cumulative effects of sediment and erosion from rapid development in and around Banner Elk. The sampling site was within the town limits (NC 194), and habitat

Sampling Year	Benthic Rating (LB44)
2008*	Excellent
*Special Study (DWR, 2008)	

was generally good with the exception of poor streambank and riparian conditions on one side of the stream. Despite streambank conditions, however, the benthic community was rated Excellent and included pollution intolerant species. No historic data was available for the site and conclusions regarding degradation over time could not be made.

### Classification Study – Leroy Creek AU 8-22-9

#### Clear Branch AU 8-22-11

#### Ramp Branch AU 8-22-12

In 2012, a report was published on the special study requested by the AFS to determine if several streams throughout the Watauga River basin are 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. For streams that did not carry the supplemental classification of High Quality Waters (HQW), benthic macroinvertebrates were also sampled in 2011.

Fish communities were evaluated in Leroy Creek and Clear Branch but ratings were not applied to the sites because criteria and metrics have not been developed by BAB for Southern Appalachian trout streams. Benthic samples were on all three streams, and all received an Excellent bioclassification.

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 in Leroy Creek and Clear Branch, all three streams as well as all named and unnamed tributaries are eligible for the supplemental classification of Tr. Additional information related to land use changes in the watershed may be necessary to pursue the supplemental classification for these streams.

### Leroy Creek AU 8-22-9

Benthic and fish communities were sampled approximately 0.1 miles upstream of the stream's confluence with the Elk River. Habitat consisted of high gradient plunge pools, stair-step cobble, boulder and bedrock riffles and excellent riparian buffers. The benthic

Sampling Year	Benthic Rating (LB58)	Fish Rating (LF17)
2009*	-	Not Rated
2011*	Excellent	-
*Special Study (DWR, 2012)		

community received an Excellent bioclassification, and all three trout species – Brown, Rainbow and Brook – were collected. Brown trout were represented by multiple sizes and at least two age groups.

### Clear Branch AU 8-22-11

Clear Branch was mistakenly sampled as part of a special study requested by the NCAFS. The samples were collected approximately 0.3 miles upstream of the stream's confluence with the Elk River and is in the Elk Park Development. The site received an Excellent benthic

Sampling Year	Benthic Rating (LB60)	Fish Rating (LF22)
2009*	-	Not Rated
2011*	Excellent	*
*Special Study (DWR, 2012)		

bioclassification (LB60). Visible land use consisted of forest and a golf course, but the majority of the 0.4 square mile watershed is forested with little development. Habitat consisted of lower gradient cobble, boulder and bedrock plunges, riffles and runs with a good riparian zone on the right bank and the golf

course lawn on the left. Brook trout was the only species collected and was represented by multiple sizes and at least three age classes.

#### Ramp Branch AU 8-22-12

The benthic sample (LB56) was collected off NC 194 and is in the Elk Park Development. The site received an Excellent benthic bioclassification (LB56). Visible land use was dominated by a golf course (80%), but the majority of the 0.4 square mile watershed is forested. Habitat consisted of lower gradient cobble and boulder riffles and runs with sandy margins and a good riparian zone on the right and the golf course lawn on the left. Clear Branch (AU 8-22-11) was mistakenly sampled for fish instead of Ramp Branch, but BAB reviewed data submitted by NCWRC. NCWRC sampled Ramp Branch in February 2004. Twenty Brook trout were collected representing multiple size and age classes and habitat was good.

Sampling Year	Benthic Rating (LB56)
2011*	Excellent
*Special Study (DWR, 2012)	

### 3.6.2 Water Use

There are 18 Public Water Supply (PWS) Systems located in the Elk River watershed. Six are community systems and serve an estimated population of 5,880 people (Table 3.41). North Carolina General Statute requires all units of local government that provide or plan to provide public water service prepare a local water supply plan (LWSP). Based on statute, three of the six PWS systems are required to submit Local Water Supply Plans (LWSPs). Residents not served by a PWS rely on private groundwater wells for drinking water.

Table 3.41: Public Water Supply Systems in HUC 0601010302

PWS Name	PWS ID	PWS Type	Population Served
SUGAR MOUNTAIN UTILITY	01-06-107	Community	3,000
TOWN OF BANNER ELK	01-06-015	Community	1,407
TOWN OF ELK PARK	01-06-025	Community	495
ELK RIVER CLUB DEVELOPMENT*	01-06-118	Community	732
GRANDFATHER HOME FOR CHILDREN	01-06-422	Community	99
SKI COUNTRY	01-06-119	Community	150
ARBOR DALE PRESBYTERIAN CHURCH	01-06-406	Transient Non-Community	50
BEST WESTERN-MOUNTAIN LODGE	01-06-427	Transient Non-Community	100
DIAMOND CREEK CLUBHOUSE	01-06-002	Transient Non-Community	75
ELK VALLEY BAPTIST CHURCH	01-06-418	Transient Non-Community	50
ENNIS DENTAL BUILDING	01-06-522	Transient Non-Community	25
HEATON CHRISTIAN CHURCH	01-06-465	Transient Non-Community	150
HOLSTON PRESBYTERIAN CAMP	01-06-495	Transient Non-Community	50
JACKALOPE`S VIEW	01-06-520	Transient Non-Community	40
SEVENTH DAY ADVENTIST CHURCH	01-06-455	Transient Non-Community	25

PWS Name	PWS ID	PWS Type	Population Served
SUGAR MOUNTAIN LODGING INC	01-06-518	Transient Non-Community	25
THE ARTISANAL RESTAURANT	01-06-012	Transient Non-Community	100
THE OLD COUNTRY STORE AT HEADWATERS	01-06-425	Transient Non-Community	50

\*Elk River Club Development is listed as Elk River in the Water Withdrawal and Transfer Registration (WWATR) database. A PWSS that withdraws 100,000 gallons per day or more but does not meet the requirements for the LWSP are required to register with the state through WWATR Program.

### 3.6.2.1 Local Water Supply Plans (LWSP)

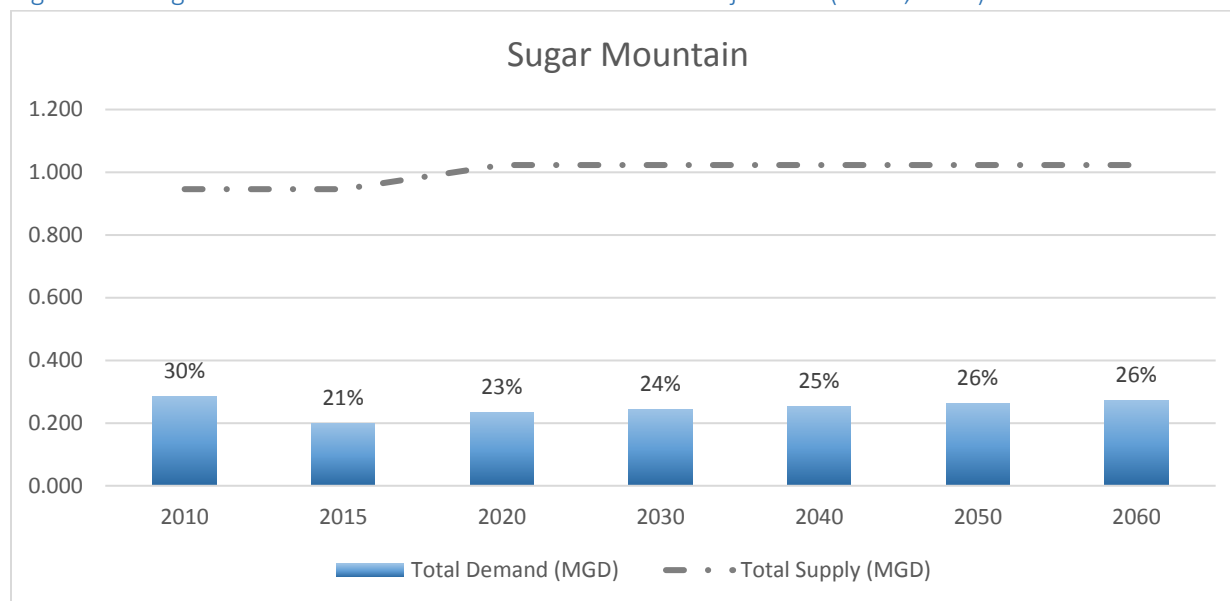
#### Sugar Mountain PWS ID 01-06-107

Sugar Mountain is a winter ski resort with approximately 20% of the residents living there year-round. In 2015, the utility reported that it had 1,277 connections and served an estimated population of 2,953. Because all customers are charged a base charge each month of the year, it is difficult to calculate a seasonal population. Based on winter usage, however, the highest influx of customers occurs between January and April. Sugar Mountain Utility does not participate in regional water supply or water use planning, but based on future projections, available amount and the construction of one new well, the PWS expects to meet their water use demands through 2060 (Table 3.42; Figure 3.6).

Table 3.42: Sugar Mountain PWS ID 01-06-107 Water Use Projections (LWSP, 2015)

	2010	2015	2020	2030	2040	2050	2060
Total Demand (MGD)	0.284	0.200	0.233	0.242	0.252	0.262	0.271
Total Supply (MGD)	0.946	0.946	1.023	1.023	1.023	1.023	1.023
Demand as Percent of Supply	30%	21%	23%	24%	25%	26%	26%
*Total demand includes the amount of water used for system processes (backwash water, water used in the treatment process but not distributed and water needed to maintain water quality in the distribution lines) and unaccounted-for water. In 2015, the PWS reported an unaccounted-for amount of 0.068 MGD.							
**The Sugar Mountain PWS relies on 23 groundwater wells to supply water to its customers. All 23 wells are used on a regular basis. Two of the wells are located in HUC 060101030301.							

Figure 3.6: Sugar Mountain PWS ID 01-06-107 Water Use Projections (LWSP, 2015)



Wastewater is handled by a combination of on-site septic systems and wastewater treatment (Table 3.43).

Table 3.43: Sugar Mountain PWS ID 01-06-107 Wastewater Management (LWSP, 2015)

Wastewater Management	Number
Sewer Connections Sugar Mountain WWTP* (NC0022900)	1,091
Septic Systems	270

\*Receiving stream Flattop Creek AU 8-22-2

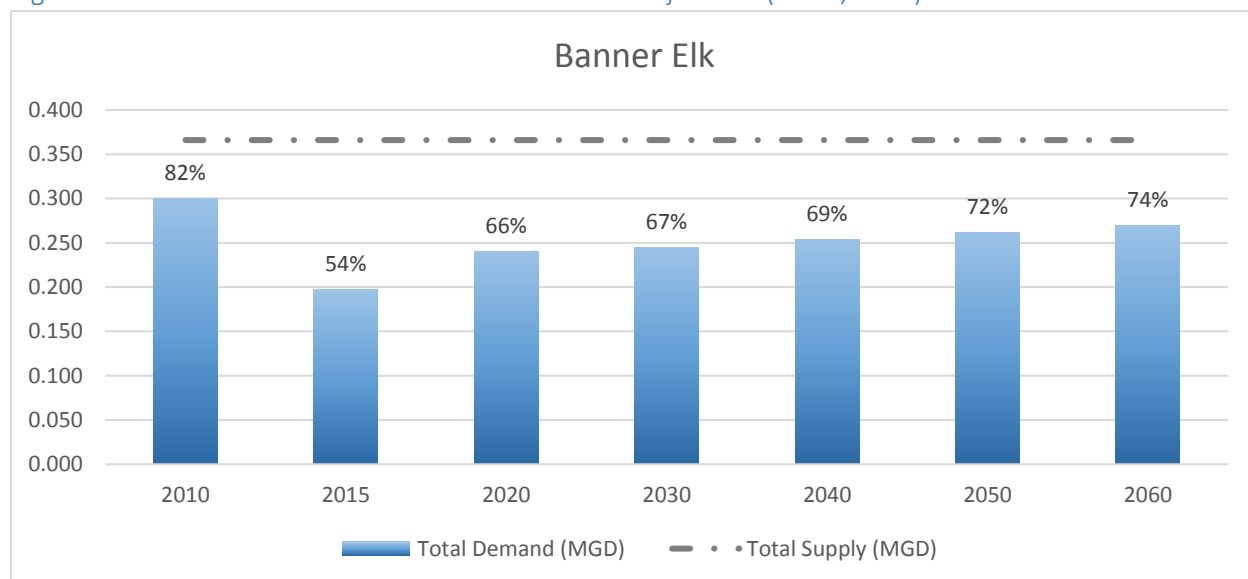
#### Banner Elk PWS ID 01-06-015

Shawneehaw Creek runs through the heart of Banner Elk and is home to several year-round activities including skiing, golfing, hiking, horseback riding, rafting and fishing. The town is also home to Lees-McRae College which receives water from the local PWS. Current year-round population is reported as 1,075 residents with an additional 1,500 reported as “seasonal” population. The Town of Banner Elk does not participate in regional water supply or water use planning, but based on future projections and available amount, the PWS expects to meet their water use demands through 2060 (Table 3.44; Figure 3.7).

Table 3.44: Banner Elk PWS ID 01-06-015 Water Use Projections (LWSP, 2015)

	2010	2015	2020	2030	2040	2050	2060
Total Demand (MGD)*	0.300	0.197	0.24	0.245	0.254	0.262	0.27
Total Supply (MGD)**	0.366	0.366	0.366	0.366	0.366	0.366	0.366
Demand as Percent of Supply	82%	54%	66%	67%	69%	72%	74%
*Total demand includes the amount of water used for system processes (backwash water, water used in the treatment process but not distributed and water needed to maintain water quality in the distribution lines) and unaccounted-for water. In 2015, the PWS reported an unaccounted-for amount of 0.101 MGD.							
**The Banner Elk PWS relies on five groundwater wells to supply water to its customers. Four wells are used on a regular basis. The fifth is used reserved for emergency purposes.							

Figure 3.7: Banner Elk PWS ID 01-06-015 Water Use Projections (LWSP, 2015)



Wastewater is handled by a combination of on-site septic systems and wastewater treatment (Table 3.45).

Table 3.45: Banner Elk PWS ID 01-06-015 Wastewater Management (LWSP, 2015)

Wastewater Management	Number
Sewer Connections Banner Elk WWTP (NC0032115)*	660
Septic Systems	32

\*Receiving Stream Elk River AU 8-22-(3)

#### Elk Park PWS ID 01-06-025

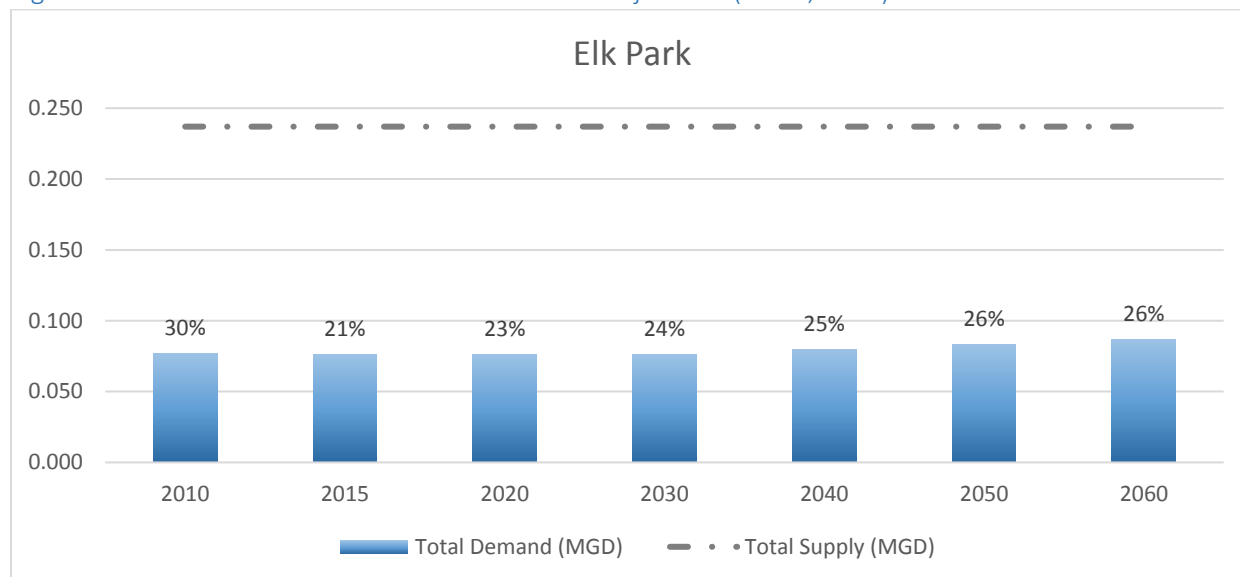
The Town of Elk Park encompasses a total of 0.7 square miles and is located near the confluence of Cranberry Creek and Elk River. Year-round population is reported at 495. The PWS does not participate in regional water supply or water use planning and notes in the 2015 LWSP that the town plans to purchase back-up generators for their two wells because there are no opportunities for interconnections due to location and terrain. Based on future projections and available amount, the PWS expects to meet their water use demands through 2060 (Table 3.46; Figure 3.8).



Table 3.46: Elk Park PWS ID 01-06-025 Water Use Projections (LWSP, 2015)

	2010	2015	2020	2030	2040	2050	2060
Total Demand (MGD)*	0.077	0.076	0.076	0.076	0.080	0.083	0.087
Total Supply (MGD)**	0.237	0.237	0.237	0.237	0.237	0.237	0.237
Demand as Percent of Supply	32%	32%	32%	32%	34%	35%	37%
*Total demand includes the amount of water used for system processes (backwash water, water used in the treatment process but not distributed and water needed to maintain water quality in the distribution lines) and unaccounted-for water. In 2015, the PWS reported an unaccounted-for amount of 0.019 MGD.							
**The Elk Park PWS relies on two groundwater wells to supply water to its customers. Both are used on a regular basis.							

Figure 3.8: Elk Park PWS ID 01-06-025 Water Use Projections (LWSP, 2015)



Wastewater is handled by a combination of on-site septic systems and wastewater treatment (Table 3.47).

Table 3.47: Banner Elk PWS ID 01-06-015 Wastewater Management (LWSP, 2015)

Wastewater Management	Number
Sewer Connections	227
Elk Park WWTP (NC0079561)*	
Septic Systems	75

\*Receiving Stream Little Elk Creek AU 8-22-17

### 3.6.2.1.2 Water Withdrawal and Transfer Registration (WWATR) Program

In the Elk River watershed, six facilities are registered with the state as withdrawing more than 100,000 gallons per day. Four are for recreational purposes – golf course irrigation or snow making for winter activities – and two are PWS’s. Table 3.48 includes the facility name, source water (well or on-site pond) and the annual average use (MGD) reported in 2015.

Table 3.48: Water Withdrawal Registration HUC 0601010302 (WWATR, 2015)

Facility Name	Facility ID	Use Type	Source Water	Annual Average Use (MGD)
Elk River (Elk River Utilities, Inc.)	0378-0011	Public Water Supply PWS ID 01-06-118	Wells	0.078
Diamond Creek Golf Club	0767-0001	Recreation - Golf Course	Wells	0.012
			Pond	0.063
Elk River Club	0724-0001	Recreation - Golf Course	Pond	0.021
Mountain Glen Golf Course	0723-0001	Recreation - Golf Course	Well	0.004
			Pond	0.172
Sugar Mountain Ski Area	0415-0001	Recreation - Snow Making	Pond	0.027
Ski Country	0378-0017	Public Water Supply PWS ID 01-06-119	Well	0.004

### 3.6.3 Classifications and Management Strategies

Because Elk River and several of its tributaries have the supplement classification of Trout (Tr), special management strategies are in place to protect water quality. The most downstream portion of the river in North Carolina is classified as B, and Wildcat Lake is also classified as B. 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. Ordinances are in place for controlling erosion and sedimentation in Avery County. The county also has a Land Use Plan. Both are available online.

Table 3.49: Stream Names and Classifications

AU Number	Stream Name	Description	Classification
8-22-(14.5)	Elk River	From Peavine Branch to North Carolina-Tennessee State Line	B;Tr
8-22-(3)	Elk River (Mill Pond)	From Sugar Creek to Peavine Creek	C;Tr
8-22-10	Whitehead Creek	From source to Elk River	C;Tr
8-10-13	Horney Branch (Whitehead Creek)	From source to Elk River	C;Tr
8-10-14	Peavine Branch	From source to Elk River	C;Tr
8-10-15	Curtis Creek	From source to Elk River	C;Tr
8-22-16	Cranberry Creek	From source to Elk River	C;Tr
8-22-16-2	Blevins Creek	From source to Cranberry Creek	C;Tr
8-22-16-2-1	Greenbrier Creek	From source to Blevins Creek	C;Tr
8-22-17	Little Elk Creek	From source to Elk River	C;Tr
8-22-18	Skalley Branch	From source to Elk River	C;Tr

AU Number	Stream Name	Description	Classification
8-22-19	Mill Creek	From North Carolina-Tennessee State Line to Elk River	C;Tr
8-22-20	Fall Creek	From source to Elk River	C;Tr
8-22-4	Sugar Creek	From source to Elk River	C;Tr
8-22-5	Hanging Rock Creek (Elk Creek)	From source to Elk River	C;Tr
8-22-5-1	Horse Bottom Creek	From source to Hanging Rock Creek	C;Tr
8-22-7	Shawneehaw Creek	From source to Mill Pond, Elk River	C;Tr
8-22-8-(1)	Wildcat Creek (Wildcat Lake)	From source to Dam at Wildcat Lake	B

### 3.6.4 Protecting Water Resources in the Elk River 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 Elk River watershed are included here.

#### 3.6.4.1 Innovative Stormwater Protection

The 2007 Watauga River Basinwide Water Quality Plan highlighted the Town of Banner Elk and the innovative stormwater collection and treatment system that was installed along Shawneehaw Creek. Constructed in 2001 and funded by the Blue Ridge Resource Conservation & Development (BRRC&D) Council, the Clean Water Management Trust Fund (CWMTF) and the Town of Banner Elk, stormwater from the 65-acre downtown area is collected and transported via curb and gutters to a 150,000-gallon underground detention vault. Sediment and debris settle out in the vault before it is released to wetlands at a controlled rate to prevent flooding. The wetlands trap additional sediment and pollutants before flowing into Shawneehaw Creek and eventually to the Elk River.

In 2015, Banner Elk received \$95,000 from the [Water Resources Development Grant Program](#) (WRDGP). WRDGP is administered by DWR. The program provides cost-share grants and technical assistance to local governments throughout the state to protect water quality. The 2015 grant provides financial assistance to the Town of Banner Elk to retrofit the existing bioretention wetland area that treats stormwater runoff flowing through Shawneehaw Creek. The town is funding \$55,000 of the total project cost which includes replacing the underground stormwater vault. More information about the project can be found in an article written in the [High Country Press](#).

#### 3.6.4.2 Stream Restoration Project

Hanging Rock Creek (AU 8-22-5) is a 2.6-mile tributary to the Elk River just outside the Town of Banner Elk. It was featured in the 2007 Watauga River Basinwide Water Quality Plan. At that time, the stream restoration project was in its third year of post-construction monitoring.

In May 2009, the North Carolina Ecosystems Enhancement Program (EEP) issued a report with the results from the fifth consecutive year of post-construction monitoring. The actual restored length for Hanging Rock Creek was 2,499 linear feet. Two hundred and forty feet of an unnamed tributary were also restored. Based on the available data, stream dimension and profile remained relative stable between years in Hanging Rock Creek. In the unnamed tributary, stream dimension and profile varied between years and is

likely the result of annual changes in sediment deposition and transport capacities. Any variability that was seen was likely due to beaver activity in the catchment with two beaver dams identified in Hanging Rock Creek and one in the unnamed tributary. More information about the restoration project can be found on [the Division of Mitigation Services \(DMS\) website](#) under [DMS Projects](#).

#### 3.6.4.3 NCD&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 in streams and exclude livestock. 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.

#### 3.6.5 References

North Carolina Department of Agriculture & Consumer Services (NCD&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) Ecosystems Enhancement Program (EEP). May 2009. Hanging Rock Creek and Tributary Stream Restoration. NCEEP Project Number: 165. Monitoring Year 5.

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