Chapter 1 -
Watauga River Subbasin 04-02-01
Includes the Entire Watauga River Watershed

1.1 Water Quality Overview

Subbasin 04-02-01 at a Glance

Land and Water

Land Area:	205 mi^2
% of Basin Land Area:	100
Stream Miles:	270

Population Statistics

1990 Est. Pop.:	16,083 people
Pop. Density:	78 persons / mi^2

Land Cover (%)

Forest / Wetland:	87
Surface Water:	>1
Urban:	>1
Cultivated Crop:	>1
Pasture / Managed Herbaceous:	13

The Watauga River is located within the Blue Ridge Province of the Appalachian Mountains of western North Carolina. The entire North Carolina portion of the Watauga River basin is contained within this subbasin (04-02-01). A map of this subbasin including water quality sampling locations is presented as Figure B-1.

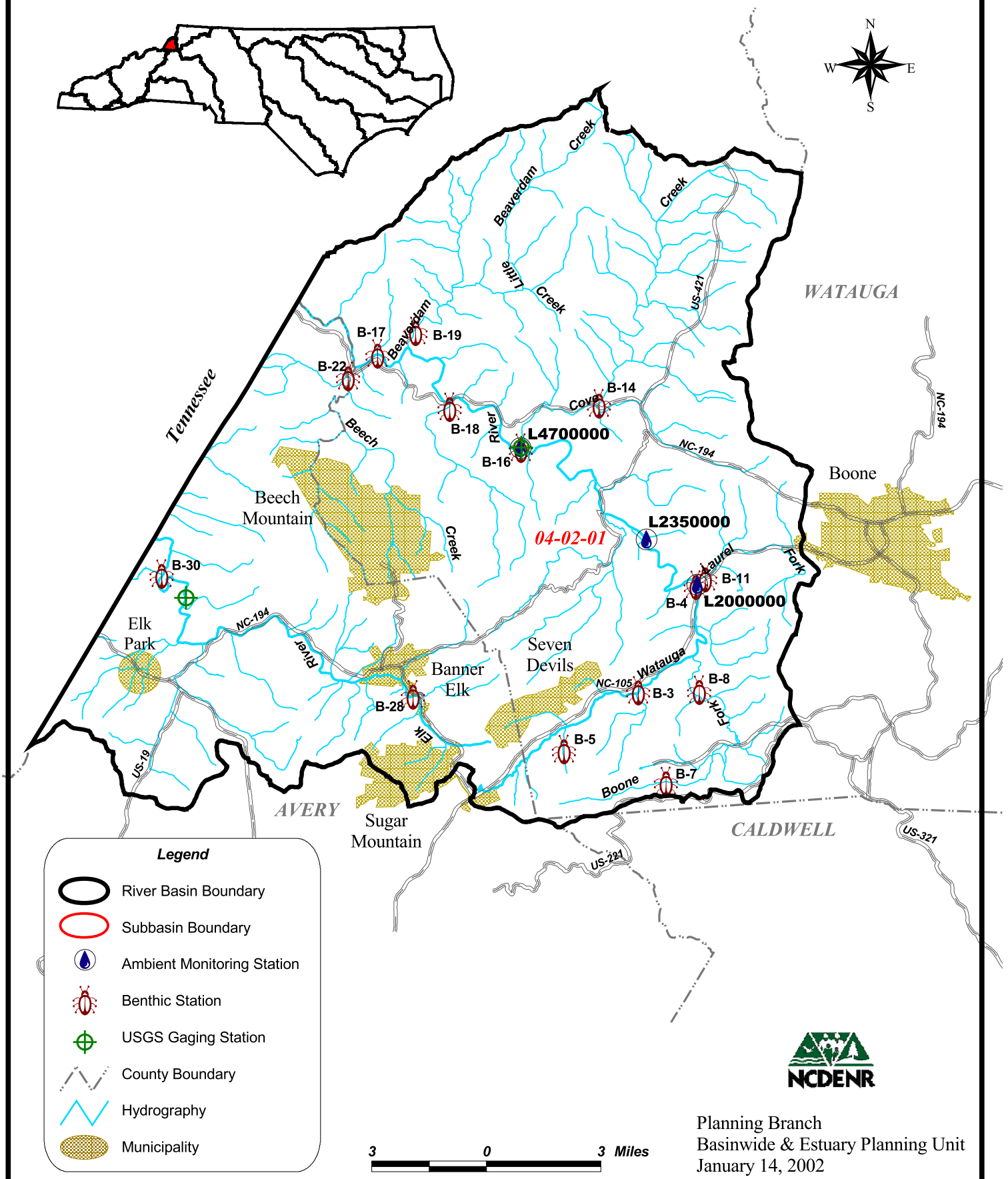
Biological ratings for these sample locations are presented in Table B-1. The current sampling did not result in any impaired waters. Refer to Appendix III for a complete listing of monitored waters and use support ratings.

Overall water quality in this subbasin is good as most of the streams drain undeveloped and protected mountain areas. The Watauga River basin has a large number of trout streams and some waterfalls that attract tourists to the area. The entire Boone Fork watershed has been designated Outstanding Resource Waters, and the entire mainstem of the Watauga River is classified High Quality Waters.

The land comprising the Watauga River basin is mountainous. Elevations in the basin range from 2,100 feet at the Tennessee state line to over 5,900 feet at Calloway Peak on Grandfather Mountain. Most of the land is forested (87%) with another 13 percent in pastureland. While most of the watershed is forested, portions of the basin are being rapidly developed for second homes and recreational activities, such as golf courses. Most agriculture and development activities occur in river valleys and near streams due to the more level ground found in valleys. Development in or near stream corridors potentially affects water quality through nonpoint source runoff and numerous small point source dischargers.

There are 28 permitted dischargers in the subbasin. The largest facilities are the Banner Elk (0.6 MGD to the Elk River), Sugar Mountain (0.5 MGD to Flattop Creek) and Beech Mountain-Pond Creek (0.4 MGD to Pond Creek) wastewater treatment plants. Other facilities include the Town of Elk Park, Beech Mountain-Grassy Gap, Smoketree Lodge and Woodland Hills WWTPs. Three facilities experienced significant problems meeting permitted limits during this review cycle: Beech Mountain-Grassy Gap, Smoketree Lodge and Woodland Hills. Both the Sugar Mountain and the Beech Mountain-Pond Creek facilities are required to perform toxicity tests on the discharge. In the two-year review period, toxicity problems were observed at the Beech Mountain-Ponds facility.

Figure B-1 Watauga River Subbasin 04-02-01



Planning Branch
Basinwide & Estuary Planning Unit
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Table B-1 Biological Assessment Bioclassifications (1999) for Watauga River Subbasin 04-02-01 Sites

Site(s)*	Stream	County	Location	Bioclassification
Benthic Macroinvertebrates				
B-3*	Watauga River	Watauga	SR 1580	Good-Fair
B-4*	Watauga River	Watauga	NC 105	Excellent
B-5*	Valley Creek	Watauga	NC 105	Not Impaired
B-7*	Boone Fork	Watauga	SR 1561	Excellent
B-8*	Boone Fork	Watauga	Off SR 1558	Good
B-11*	Laurel Fork	Watauga	SR 1111	Good-Fair
B-14*	Cove Creek	Watauga	US 321	Good
B-16*	Watauga River	Watauga	SR 1121	Good
B-17*	Watauga River	Watauga	SR 1200	Excellent
B-18*	Laurel Creek	Watauga	Off SR 1123	Good
B-19*	Beaverdam Creek	Watauga	Old SR 1201	Good
B-22*	Beech Creek	Watauga	US 321	Excellent
B-28*	Elk River	Avery	Off NC 184	Good
B-30*	Elk River	Avery	SR 1305	Excellent
Ambient Monitoring				**Parameters in Excess of State Standard**
L2000000	Watauga River	Watauga	NC Hwy 105 near Shulls Mill, NC	None
L2350000	Watauga River	Watauga	SR 1114 near Valle Crucis, NC	None
L4700000	Watauga River	Watauga	SR 1121 near Sugar Grove, NC	None

* Historical data are available for all sampling sites; refer to Appendix II.

** Assessment period from 09/01/94 to 08/31/99.

Overall, water quality in this basin is very good, with the majority of sites having a bioclassification of Good or Excellent based on macroinvertebrate data. The entire Watauga River was classified as High Quality Waters in 1990, although the most recent macroinvertebrate collections indicate only Good-Fair water quality in the headwater segment near Foscoe. The Foscoe site declined from Excellent in 1994. Although EPT taxa richness values also have been declining for the Watauga River at Shulls Mill and at Sugar Grove, the decreases were not large enough to result in changes in bioclassifications. Sampling at these sites resulted in a bioclassification of Good for the middle portion of the Watauga River near Sugar Grove and Excellent at Shulls Mill. An Excellent bioclassification was assigned to the site at Peoria.

No between year changes in bioclassification were noted at seven other tributaries to the Watauga River (Valley Creek, Boone Fork, Boone Fork below Price Lake, Laurel Fork, Cove Creek, Laurel Creek and Beech Creek) nor the two sites on the Elk River. Excellent or Good

bioclassifcations were found during both basinwide surveys in 1994 and 1999 at Boone Fork, Boone Fork below Price Lake, Cove Creek, Laurel Creek, Beech Creek and both sites on the Elk River. A Good-Fair bioclassification was found during both sampling surveys at Laurel Fork.

Several rare or unusual benthic macroinvertebrate were collected in the Watauga River basin during the 1999 basinwide surveys. In particular, Beech Creek is the only stream in North Carolina where the intolerant caddisfly (*Ceratopsyche (=Symphitopsyche) walkeri)* is found. Several other unusual and intolerant macroinvertebrate species were also found in the Watauga River from Shulls Mill to Peoria, Cove Creek and Beaverdam Creek. Biotic Index values indicate that upper Boone Fork Creek has the most intolerant macroinvertebrate community in the basin.

The primary water quality problem in this basin is nonpoint source runoff, including inputs of sediment. Many of the catchments in the Watauga River basin are farmed, especially the Cove Creek, Beaverdam Creek and Laurel Creek watersheds. Heavy sediment loads may affect the quality of the fisheries, but such impacts may not be adequately evaluated by macroinvertebrate sampling.

Based on benthic macroinvertebrate data, nonpoint source runoff appeared to have some impacts (Good or Good-Fair bioclassification) on some segments of the Watauga River, a part of the Elk River, Spice Bottom Creek, Cove Creek, Lance Creek, Laurel Fork, Laurel Creek, Beaverdam Creek and Buckeye Creek.

Habitat degradation was also noted on the Watauga River, Laurel Fork, Cove Creek, Laurel Creek, Beaverdam Creek and some segments of the Elk River and included embedded substrate, lack of pool and riffle habitat, narrow riparian zones and frequent breaks in the riparian zone.

Water chemistry samples are collected monthly from three locations on the Watauga River at Shulls Mill (NC 105), Valle Crucis (SR 114) and Sugar Grove (SR 1121). Turbidity measurements were in excess of the state standard for trout waters (10 NTU) four times (6.9%) over the five-year review period at the Sugar Grove station. Three of these excesses occurred during periods of higher than normal flows resulting from recent precipitation. Please refer to Section A, Chapter 3.3.5 for a more detailed discussion of ambient monitoring data.

For more detailed information on sampling and assessment of streams in this subbasin, refer to the *Basinwide Assessment Report for the Watauga River Basin* (NCDENR-DWQ, April 2000), available from DWQ Environmental Sciences Branch at (919) 733-9960 or on their website at http://www.esb.enr.state.nc.us/bar.html.

Table B-2 Use Support Rating Summary (1999) for Monitored and Evaluated Streams in Watauga River Subbasin 04-02-01

Use Support Category	FS	PS	NS	NR	Total [1]
Aquatic Life/ Secondary Recreation	224.2	0	0	45.9	270.1
Fish Consumption	270.1	0	0	0	0
Primary Recreation	19.5	0	0	24.5	44.0
Water Supply	8.1	0	0	0	8.1

[1] Total stream miles/acres assigned to each use support category in this subbasin. Column is not additive because some stream miles are assigned to more than one category.

1.2 Status and Recommendations for Previously Impaired Waters

There were no streams identified as impaired in this subbasin in the 1997 Watauga River Basinwide Plan.

1.3 Status and Recommendations for Newly Impaired Waters

Although no stream segments in this subbasin are rated as impaired based on recent DWQ monitoring (1994-1999), impacts to many streams from narrow riparian buffer zones, sedimentation and moderate to severe bank erosion were observed. Part 1.5 below discusses specific streams where these impacts were observed.

1.4 303(d) Listed Waters

There are no stream segments in this subbasin that are impaired and on the state's year 2000 303(d) list. Refer to Appendix IV for more information on the state's 303(d) list and listing requirements.

1.5 Other Water Quality Concerns and Recommendations

The surface waters discussed in this section are fully supporting designated uses based on DWQ's use support assessment and are not considered to be impaired. However, notable water quality problems and concerns have been documented for some waters based on this assessment. While these waters are not considered impaired, attention and resources should be focused on these waters over the next basinwide planning cycle to prevent additional degradation or facilitate water quality improvement. A discussion of how impairment is determined can be found in Section A, Part 3.5.

Water quality problems in the Watauga River basin are varied and complex. Inevitably, many of the water quality impacts noted are associated with human activities within the watershed. Solving these problems and protecting the surface water quality of the basin in the face of continued growth and development will be a major challenge. Voluntary implementation of

BMPs is encouraged and continued monitoring is recommended. DWQ will notify local agencies and others of water quality concerns for the waters discussed below and work with them to conduct further monitoring and to locate sources of water quality protection funding. Additionally, education on local water quality issues is always a useful tool to prevent water quality problems and to promote restoration efforts. Nonpoint source program agency contacts are listed in Appendix VI.

1.5.1 Upper Watauga River

The benthic macroinvertebrate community of the upper Watauga River was sampled at Foscoe near SR 1580 in 1999. This upper portion of the river received a bioclassification of Good-Fair, a decrease from the Excellent bioclassification the river received in 1994 and 1988. This decline in bioclassification indicates that some impacts to water quality are present, but the biological community was not considered impaired.

Habitat problems that were noted at this site include sedimentation, loss of pool habitat, narrow riparian zones and frequent breaks in the riparian zone. Several areas of bank erosion, channel migration and channel filling were also seen along the mainstem of the upper Watauga River (E'nV, 2000). Abundant algae growths were also observed at this site, suggesting some enrichment from nutrients.

Many new homes and commercial developments are being built throughout the upper portion of the Watauga River watershed. In addition, US Highway 105 parallels this segment of the Watauga River. However, there is still a substantial amount of agricultural activity in the watershed as well. Nonpoint source runoff associated with these land uses is most likely the cause of the water quality impacts noted in this portion of the watershed. BMPs should be carefully installed and maintained in this area during construction because of the steep slopes and high erosion potential of soils in this area. Agricultural BMPs should also be installed to protect aquatic life in the Watauga River watershed. Section A, Chapter 4 discusses habitat degradation, including sedimentation, and provides general recommendations.

The Foscoe/Grandfather Mountain Community and the Town of Seven Devils are also located within this watershed. As growth and development continue to occur, stormwater issues need to be addressed by the two communities. These developing areas are not automatically covered by the EPA's Phase II stormwater rules, based on total population and density. However, the Foscoe/Grandfather Mountain Community and Seven Devils could begin to develop a stormwater program that addresses stormwater runoff. Section A, Chapter 2.7.2 provides a description of North Carolina's stormwater program.

1.5.2 Valley Creek

Valley Creek is a very small stream (average width of 10 feet) that drains the Seven Devils area and receives discharges from two minor wastewater treatment plants. The benthic macroinvertebrate community of Valley Creek at NC 105 was sampled in 1990 and 1999. In 1990, the stream received a bioclassification of Good-Fair. The stream was resampled again in 1999. Current methods do not accurately assess the benthic community of mountain streams of this size unless the stream is in an undisturbed watershed. However, the fauna was dominated by

pollution intolerant taxa indicating no water quality problems and the stream received a designation of Not Impaired. Valley Creek is currently fully supporting its designated uses.

Land use in the watershed is predominately residential and recreational. Habitat problems associated with development and stormwater runoff were noted in the watershed by participants at the public workshop and include sedimentation, narrow riparian zones and frequent breaks in the riparian zone. However, Valley Creek is a high gradient stream, and it is likely that sediment inputs to the stream are flushed through the system without being deposited in the streambed and degrading benthic habitat in Valley Creek. At the sampling site, good boulder/rubble habitat was found with little accumulation of sand and silt. While sediment is not accumulating in Valley Creek, sediment originating in the watershed could be impacting the water quality of the Watauga River downstream. DWQ will plan to sample this site again in the next sampling cycle if methods to sample small mountain streams have been finalized.

1.5.3 Lance Creek

The benthic macroinvertebrate community of Lance Creek was sampled twice in 1990: above and below the golf course. The site above the golf course received a Good bioclassification, and the site below the golf course received a Good-Fair. These sites were not sampled in 1999 and the stream is not rated.

Land use in the Lance Creek watershed is extremely varied. Residential development and open (not forested) areas are found at the headwaters and its confluence with the Watauga River while forested areas are found in between. The water quality impacts noted on Lance Creek are likely caused by nonpoint source pollution associated with construction activities and maintenance of the golf course. Development and construction in the Lance Creek watershed will likely continue because the terrain is not excessively steep, and there is an established road network allowing for workable access (E'nV, 2000). DWQ will plan to sample this stream again during the next basinwide cycle; however, BMPs to address any nonpoint source pollution problems should be put in place now to prevent further degradation to water quality.

1.5.4 Laurel Fork, Upper Laurel Fork and Hayes Branch

The benthic macroinvertebrate community of Laurel Fork was sampled in 1999. The site received a Good-Fair bioclassification, indicating some impacts to water quality were present but the biological community was not considered impaired.

The Laurel Fork watershed, which includes Laurel Fork, upper Laurel Fork and Hayes Branch, drains portions of Boone. Land use in the watershed is predominately residential and commercial. Development in this area has caused streamflows to dramatically increase in speed and magnitude during storm events. Habitat problems associated with development and stormwater runoff were noted in the watershed and include sedimentation, loss of pool habitat, narrow riparian zones and frequent breaks in the riparian zone. Areas of bank erosion, channel migration and channel filling were also seen in the watershed (E'nV, 2000).

Stormwater runoff associated with the residential and commercial land uses is most likely the cause of the water quality impacts noted in this watershed. BMPs should be carefully installed

and maintained in this area during construction because of the steep slopes and high erosion potential of soils in this area. Measures should be put in place now to reduce sediment inputs and to protect these streams and to prevent further water quality degradation. Bank stabilization and channel restoration projects should also be implemented in the watershed to help alleviate existing problems. Section A, Chapter 4 contains general recommendations for development, construction and stormwater best management practices.

1.6 Additional Issues within this Subbasin

The previous section discussed water quality concerns for specific stream segments. This section discusses water quality issues that relate to multiple watersheds in the Watauga River basin. Permitted wastewater dischargers, non-permitted wastewater dischargers, ski slopes, population growth, priority areas for conservation and priority areas for restoration were all identified by participants at the public workshop as significant issues in the Watauga River basin.

1.6.1 Permitted Wastewater Dischargers

There are 28 permitted discharges in the Watauga River basin. The majority of these facilities discharge directly to, or to tributaries of, the Watauga River below the Highway 321 bridge. These facilities are concentrated in the upper portion of the watershed. DWQ has issued each of these facilities a NPDES permit which sets permit limits on the concentration of conventional (BOD_5, dissolved oxygen, fecal coliform, ammonia and total suspended solids) and toxic pollutants the facility can discharge. These permit limits are designed to insure that water quality standards are met in the receiving stream. Each of the facilities is responsible for monitoring its discharge for specified pollutants and submitting the data to DWQ monthly.

DWQ uses the self-reported information to confirm that each facility is operating within its permit limits by comparing the reported monthly averages to the facility's permitted limits. If a facility is not operating within its permitted limits, DWQ can take one of two actions depending on the severity of the violation. One course of action is issuing the facility a Notice of Violation (NOV). A NOV is issued to a facility that exceeds the permit limitations, but is not found to be in "significant noncompliance". For reports submitted prior to May 31, 20001, DWQ had defined "significant noncompliance" as 40 percent in excess of conventional pollutant limitations or 20 percent in excess of toxic pollutants for two or more months during two consecutive quarter review periods or chronic violations of either conventional or toxic pollutant limitations for four or more months during two consecutive quarter review periods. For example, a NOV will be issued to a facility if its reported monthly average for total suspended solids had 32 mg/l and the permitted limit is 30 mg/l, and there has been no history of problems. The facility's monthly average was in excess of their permit limitations but only by 7 percent; and therefore, the facility is not in "significant noncompliance". However, when a facility is found to be in "significant noncompliance" then an assessment violation (civil penalties) is issued.

During this reporting cycle, there were only three facilities that were found to be in "significant noncompliance": Smoketree Lodge, Woodland Hills Apartments and Beech Mountain-Grassy Gap. These facilities have each made many improvements to their processes.

Smoketree Lodge, which discharges into an unnamed tributary to the Watauga River, has had significant noncompliance problems with total suspended solids. The plant at Smoketree Lodge has been replaced with a more modern facility which should alleviate these problems. The new facility has the same permit limits as the old facility, although the capacity is almost doubled.

Woodland Hills Apartments, which discharges into Brushy Fork Creek, has had significant noncompliance problems with ammonia. Problems at Woodland Hills Apartments started when the building that houses the plant was demolished by a snowplow. The plant had to be shut down completely while building materials were removed from the clarifier. After cleaning, the plant was then shut down, pumped completely out, and reseeded several times. However, the facility was still having compliance problems. The owner of the facility then removed several coin washers that were on the premises. The removal of the washers and the addition of sodium bicarbonate equalized the system, alleviated the compliance problems, and the facility is currently running properly.

Beech Mountain operates two WWTPs: Grassy Gap and Pond Creek. During this reporting cycle, both Beech Mountain facilities had noted problems; and as of December 13, 2000, both facilities were placed under a moratorium prohibiting new connections. In October of 2001, DWQ allocated 10,000 gallons of additional flow to the Beech Mountain-Pond Creek facility. This allocation was given with an understanding that when the allocation has been used up, DWQ will re-examine compliance at the Ponds facility and consider lifting the moratorium.

Beech Mountain-Grassy Gap, which discharges in to Grassy Gap Creek, had significant noncompliance problems with ammonia, while the Beech Mountain-Pond Creek facility has been experiencing toxicity problems over the last two years. Because of their consistent noncompliance, they were among the first private systems to require a collections system permit. Beech Mountain's problems are associated with inflow and infiltration (I and I). The sewer lines were laid poorly during initial construction, and the nature of the topography has caused serious breakage in the lines. During any significant rainstorm, stormwater percolates into the pipes in volumes the plants cannot handle. The breaks in the line are very difficult to track since a map of the collection system did not exist until the summer of 2001.

The Town of Beech Mountain is adamantly working on correcting their compliance problems. In FY 1998-99, $93,000 were budgeted to control the I and I problems. Approximately 50 percent of this amount has been spent on a TV inspection camera system. Since its purchase, 10-12 of the over 60-mile sewage collection line has been filmed. In this section, more than 37 leaks have been discovered and fixed. Also, all manholes are being uncovered for a visual inspection and any problems found are noted and mapped. During this time, both the Pond Creek WWTP and the Grassy Gap WWTP are being examined at by an operational consultant. The operational consultant is analyzing past and current operations data to determine if any improvements can be made in the day-to-day operations of the plants.

In February 2001, the Town of Beech Mountain appropriated $150,000 to begin a comprehensive wastewater system analysis. This analysis will consist of a thorough study of both the problems and future needs of the two plants as well as a collections systems study which will include manhole inspections of an estimated 1,500 manholes and flow measurements. The findings from the comprehensive wastewater systems analysis are expected in August 2001 and will contain

recommendations for upgrading and repairing both parts of the system along with cost estimates and expenditures.

Beech Mountain has also proposed a relocation of the Grassy Gap treatment plant outfall into Buckeye Creek to give the plant the ability to better meet its discharge limits. The facility has also made an application for speculative limits for ammonia. Based on the estimated streamflows of Buckeye Creek, the summer limits for ammonia at these approximate locations would be 11 or 13 mg/l, depending on exactly where the outfall is to be located on Buckeye Creek. No winter ammonia limits would be given, but instream monitoring would be required. Current summer ammonia limits are 2.0 mg/l and winter limits are 4.0 mg/l.

DWQ will continue to work with all of the above mentioned facilities to expedite the upgrades and construction in order to prevent further degradation of downstream waters.

1.6.2 Non-Permitted Wastewater Discharges

In the Watauga River basin, there are other sources of wastewater besides those with NPDES permits. These non-permitted discharges include septic systems and straight piping. Septic systems receive and treat wastewater from an individual household or business. The septic tank unit removes some wastes, but the soil drainfield associated with the septic tank provides further absorption and treatment of the pollutants found in wastewater. Pollutants that are commonly found in wastewater include bacteria, nutrients, toxic substances and oxygen-consuming wastes. Septic tanks can be a safe and effective method for treating wastewater if they are sized, sited and maintained properly. However, if the tank or drainfield are improperly placed, constructed or maintained, nearby wells and surface waters may become contaminated causing potential risks to human health. Septic tanks should be properly installed and maintained to insure they are functioning properly. Information about the installation and maintenance of septic tanks can be obtained by contacting the Watauga County Cooperative Extension Service Center at (828) 264-3061 or the Avery County Cooperative Extension Service Center at (828) 733-8270.

Sometimes pollutants associated with on-site wastewater disposal are also discharged directly to surface waters through straight pipes. Straight pipes are direct pipe connections between the septic system and surface waters, thus, bypassing the drainfield. In some cases, straight pipes can pipe wastewater directly from the home or business into a stream, bypassing any type of treatment. Not only is straight piping illegal, the discharge of untreated sewage is extremely harmful to humans and the aquatic environment. In all cases, straight pipes should be eliminated. Several straight pipe elimination projects, such as the Wastewater Discharge Elimination (WaDE) program, are helping to identify and remove straight pipes in the western portion of the North Carolina. These programs use door to door surveys to locate straight pipes, and then, offer low interest loans or grants to homeowners who wish to eliminate the straight pipe by installing a septic system. The program also offers low interest loans and grants to repair old, malfunctioning septic systems. However, no such program is in place in the Watauga River basin. The Watauga and Avery County Health Departments should request funding from the Clean Water Management Trust Fund and Section 319 Program to develop a straight pipe elimination program for the Watauga River basin. More information about the Clean Water Management Trust Fund can be found in Section C: Part 2.3.4, and information about the Section 319 Program can be found in Section C: Part 2.2.1.

For more information on the WaDE program, contact the DENR On-Site Wastewater Division at 1-800-973-9243 or visit their website at http://www.deh.enr.state.nc.us/oww/Wade/wade.htm.

1.6.3 Ski Slopes

Participants at the Watauga River basin workshop listed ski slopes as a potential impact to water quality. There are four ski resorts located in the basin: Appalachian Ski, Ski Beech, Hawksnest and Sugar Mountain Ski. While DWQ did not conduct benthic macroinvertebrate sampling in all the watersheds where these ski slopes are located, one watershed was sampled. Benthic macroinvertebrates were collected from Beech Creek, downstream of Ski Beech, in 1999. The stream received an excellent bioclassification. Additionally, several rare or unusual benthic macroinvertebrates were collected, including one caddisfly, which is found only in Beech Creek and nowhere else in North Carolina. At this time, DWQ has no reason to believe that the maintenance and operation of ski slopes present a significant threat to water quality in the Watauga River basin. However, if a specific problem should arise in the future, DWQ will conduct additional monitoring and work to prevent degradation of water quality from these areas.

1.6.4 Projected Population Growth

From 2000 to 2020, the estimated population growth for Watauga County is 17 percent and Avery County is 16 percent. The population of Beech Mountain has increased 27 percent, Seven Devils by 10 percent and Sugar Mountain by 71 percent over the past ten years and is expected to continue growing. Growth management within the next five years will be imperative, especially in and around urbanizing areas, in order to maintain good water quality in this subbasin. Growth management can be defined as the application of strategies and practices that help achieve sustainable development in harmony with the conservation of environmental qualities and features of an area. On a local level, growth management often involves planning and development review requirements that are designed to maintain or improve water quality. Refer to Section A, Chapter 4 for more information about urbanization and development and recommendations to minimize impacts to water quality.

1.6.5 Areas for Priority Conservation

The Riparian Corridor Conservation Design for the Watauga River Basin (The Design) identified three areas within the basin as areas for priority conservation (E'nV, 2000). In order to determine the areas of priority conservation, The Design identified large (greater than 1/3 acre), functional riparian wetlands of the highest quality, particularly in areas that would be considered bogs or possess similar characteristics. These areas are generally associated with the active floodplain and play a vital role in flood control by providing flood storage and energy dissipation. Wetlands also are highly competent in removing nutrients and other pollutants and provide habitat for a number of rare, threatened and endangered species. Priority areas that were identified in the plan include the Beech Creek Bog, Harrison Branch Bog and Worley Creek Wetland.

For more information on the Riparian Corridor Conservation Design for the Watauga River Basin, please see the project description in Section C, Chapter 2, Part 2.9.

Beech Creek Bog

The Beech Creek Bog is located in the headwaters of the main branch of Beech Creek. It consists of two significant areas separated by a pond. The upper bog is large (approximately 10+ acres) and contains extensive areas of sphagnum moss. The stream that flows through the site is very stable and has many beaver dams constructed on it. The surrounding riparian vegetation is rhododendron, laurel, birch and maple as well as a large variety of wetland species. The lower portion of the bog (below the pond) has in the past been impacted by sedimentation but is recovering. This area is smaller than the upper portion, and the vegetation is not as extensive. This area is a high quality, high elevation bog in an area of high development pressure.

Harrison Branch Bog

This site is located in the headwaters of Harrison Branch, which is a tributary to Laurel Fork. This site is densely vegetated, but surrounded by developing areas. Harrison Branch, which flows through the site, is very stable and meanders though a patchwork of wetlands. The vegetation at the site contains many sphagnum-dominated hummocks.

Worley Creek Wetland

The Worley Creek wetland is located at the headwaters of Worley Creek and is one of the least encroached areas in the basin. Worley Road separates the wetland into two segments. Above the road, Worley Creek is extremely stable and flows through rhododendron with high quality marsh and bog characteristics. Below, the channel flows through more of an open marsh wetland and is a bit more forested than the section above the road. The stream also flows through a series of waterfalls.

1.6.6 Areas for Priority Restoration

The Riparian Corridor Conservation Design for the Watauga River Basin (The Design) identifies three areas within the basin as areas for priority restoration (E'nV, 2000). In order to determine the areas of priority restoration, The Design identifies sites with the highest potential and purpose. "Potential" refers to the degree to which a restoration project could reasonably, given sufficient time, result in a stream that resembles the priority conservation sites. "Purpose" refers to a need to address an existing condition that negatively affects water quality. Sites that were documented as areas for priority restoration possess several of the following characteristics: 1) unstable stream type; 2) located in a broad flat valley; 3) severe erosion; 4) agricultural or undeveloped land use; 5) history of alteration (channelization, dredging); 6) loss of riparian vegetation; 7) loss of wetlands through filling or draining; and 8) minimal access to floodplain. The Design identifies five streams as sites for priority restoration: Baird Creek, Laurel Creek, Crab Orchard Creek, Lou Hallow Creek and Sharp Creek. Since The Design was published, Laurel Creek, Sharp Creek and Crab Orchard Creek have had restoration projects implemented through the use of funds from the Clean Water Management Trust Fund.

For more information on the Riparian Corridor Conservation Design for the Watauga River Basin, please see the project description in Section C, Chapter 2, Part 2.9. For more information

on the restoration projects for Laurel Creek, Sharp Creek and Crab Orchard Creek, please see the project descriptions in Section C, Chapter 2, Part 2.4.1.

Baird Creek

The Baird Creek site consists of two segments, each a third to a half-mile long and separated by a half-mile of more stable channel. The valley through which this section of Baird Creek flows is dominated by agriculture but is very close to several rapidly developing areas, and two subdivisions are in the early stages of development within this valley. Like many of the valleys that have been historically farmed in the basin, the landscape has been adjusted over time to accommodate fields, pastures, roads and homes. Consequently, the stream has been straightened and bermed or simply moved to the edge of the bottomland. The result is that Baird Creek is severely entrenched and there is severe bank erosion. In many areas, livestock have direct access to the stream and stabilization vegetation is sparse.

Lou Hallow Creek

This site is located at the confluence of Lou Hallow Creek and the Watauga River. This area is in the state of transition from Christmas tree farming to single family residential. Lou Hallow Creek is severely entrenched with eroding banks and little or no access to its floodplain. While Lou Hallow is a relatively small stream, there is excellent potential for channel stabilization and wetland creation in the floodplain of the Watauga River. The site also has the potential to serve as stormwater demonstration project to treat and store increased stormwater resulting from upstream development through the creation of floodplain wetlands.