Chapter 1 -
Current Water Quality Initiatives

1.1 Workshop Summary

In November 2000, there was one workshop held by DWQ in the Watauga River basin at Boone. The workshop was sponsored by the Natural Resource Conservation Service, NC Cooperative Extension Service and Tennessee Valley Authority. There were 29 people in attendance representing a wide variety of interests. Figure C-1 gives an estimation of the groups/interests represented based on information recorded on attendance sheets.

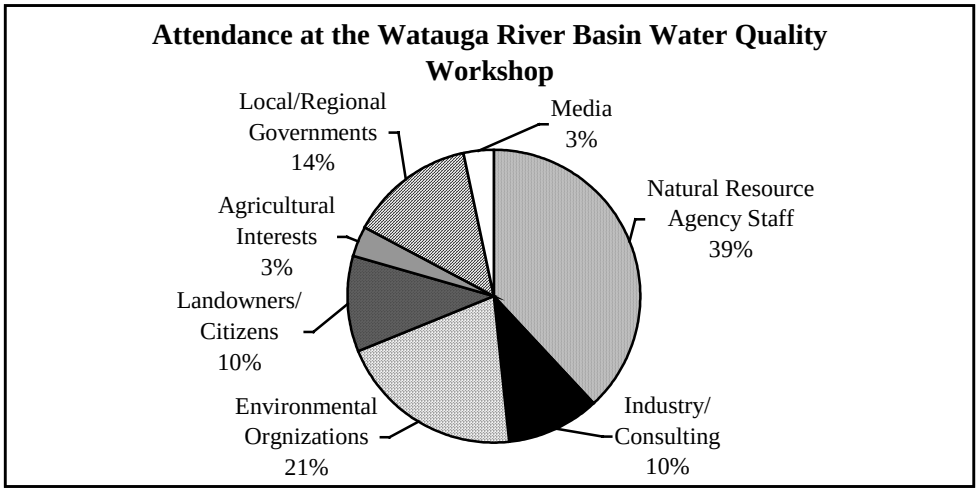

Figure C-1 Percent of Total Attendance by Various Interests at the DWQ Water Quality Workshop in the Watauga River Basin (2000)

DWQ staff gave presentations about general water quality in the Watauga River basin, basinwide planning and the Wetlands Restoration Program. Participants also presented information regarding the Riparian Corridor Conservation Design for the Watauga River and stream restoration projects going on in the basin. Workshop attendees were asked to discuss the following questions in small groups:

1) What are the main threats to water quality in the Watauga River basin?
2) Where are the problem areas or waters?
3) What recommendations do you have for addressing these problems/waters?
4) What local agencies or organizations should be involved in addressing these problems?

A detailed outline of each small group's discussion of these questions is provided in Appendix V. Good discussions were generated by each group, and all of the information was considered while drafting the revised Watauga River Basinwide Water Quality Plan and will be used to guide water quality activities in the Watauga River basin. A general summary providing common ideas and viewpoints by more than one group is presented below.

Important Issues Basinwide

The most frequently cited threats to water quality identified by workshop participants were:

- Sedimentation and erosion
- Nonpoint source pollution (agriculture, silviculture and urban runoff)
- Development
- Septic tanks
- Wastewater treatment plants

Please refer to Section A, Chapter 4 for discussion of some of these issues. All groups commented that nonpoint source pollution, primarily from excess sediment, is a major threat to water quality in the Watauga River basin.

Problem Areas

Nine of the streams mentioned were sampled by DWQ during 1999 basinwide sampling. Several streams were mentioned by more than one group:

- Headwaters of the Watauga River
- Mainstem of the Watauga River
- Cove Creek
- Laurel Fork

1.2 Summary of Watauga River Basin Water Quality Improvement Projects

This chapter summarizes some of the federal, state and localized programs and projects designed to improve and maintain water quality in the Watauga River basin. Table C-1 outlines these projects. Many projects have applicability basinwide; some are for specific streams. This chapter is organized according to program or organization, rather than project. Therefore, included in the table is a reference to the part of this chapter where details regarding each project are provided.

Table C-1 Summary of Water Quality Improvement Projects in the Watauga River Basin

Stream or Watershed	Project	Part of Section C	Project Lead	Funding Source
Cove Creek	Stream and Riparian Restoration	1.6.1	Watauga River Watershed Steering Committee	CWMTF, 319 and TVA
Worley Creek	Stream and Riparian Restoration	1.6.1	Watauga River Watershed Steering Committee	CWMTF, 319, NRCS and TVA
Shawneehaw Creek	Stream and Riparian Restoration	1.6.1	Watauga River Watershed Steering Committee and Blue Ridge RC&D	CWMTF and TVA
Dutch and Clark Creeks	Stream and Riparian Restoration and agricultural BMP implementation	1.6.1	Watauga River Watershed Steering Committee	CWMTF and NRCS-CRP
Laurel Creek	Stream and Riparian Restoration	1.6.1	Blue Ridge RC&D	CWMTF
Sharp Creek	Stream and Riparian Restoration	1.6.1	Blue Ridge RC&D	CWMTF
Crab Orchard Creek	Stream and Riparian Restoration	1.6.1	Blue Ridge RC&D	CWMTF
Shawneehaw Creek	Urban Stormwater Demonstration	1.6.5	Town of Banner Elk	CWMTF
Elk Creek and Shawneehaw Creek	Banner Elk Greenway	1.6.5	Town of Banner Elk	CWMTF
Foscoe Wetland	Acquisition and Construction of an Educational Boardwalk	1.6.1	Watauga River Watershed Steering Committee	CWMTF and TVA
Basinwide	Installation of Best Management Practices on Christmas Tree Farms	1.6.1	Watauga River Watershed Steering Committee	319
Basinwide	Riparian Corridor Conservation Design for the NC portion of the Watauga River	1.5.2	Blue Ridge Rural Land Trust	CTNC and CWMTF
Basinwide	Wetland and Riparian Restoration	1.4.2	NC Wetlands Restoration Program	State

Table C-1 does not represent a complete summary of the information in this chapter; rather it is a guide to information about projects in specific watersheds and the various organizations working in the Watauga River basin.

1.3 Federal Initiatives

1.3.1 Clean Water Act – Section 319 Program

Section 319 of the Clean Water Act provides grant money for nonpoint source demonstration projects. Approximately $1 million is available annually for demonstration and education projects across the state. Project proposals are reviewed and selected by the North Carolina Nonpoint Source Workgroup, made up of state and federal agencies involved in regulation or research associated with nonpoint source pollution. Information on the North Carolina Section

319 grant program, including application deadlines and requests for proposals, are available online at http://h2o.enr.state.nc.us/nps/bigpic.htm.

Three projects in the Watauga River basin have been partially funded (federal Section 319 money must be matched with nonfederal dollars) through the Section 319 base program between 1990 and 2000. Funding for the projects totals $100,000. Table C-1, in Part 2.1 of this section, outlines the projects and provides reference to the location of project descriptions in the plan.

1.3.2 USDA – NRCS Environmental Quality Improvement Program (EQIP)

Natural Resources Conservation Service (NRCS) districts are able to compete for EQIP incentive funding which is allocated to priority areas where current available funding is identified as inadequate. A team of state agencies reviews new applications and reevaluates the performance of existing priority areas on an annual basis.

The Northwest Blue Ridge USDA-NRCS EQIP Priority area for FY2000 includes the Watauga River basin. The overall priority area includes four counties (Ashe, Allegany, Avery and Watauga) and parts of two hydrologic units: Upper New (05050001) and Watauga (06010103). Primary resource concerns include soil erosion and sedimentation, pesticide runoff and habitat degradation. Since 1999, projects in the priority area have been allocated $176,404, and targeted practices include establishing an agro-chemical handling facility and access roads associated with Christmas tree farming.

NRCS district contacts for the Watauga River basin are included on the nonpoint source contact sheet found in Appendix VI or visit the website at http://nc.nrcs.usda.gov/Programs/eqip.htm.

1.3.3 Tennessee Valley Authority

Tennessee Valley Authority Clean Water Initiative

The goal of the Tennessee Valley Authority (TVA) is to protect and improve water resources, improve shoreline conditions, provide land and water-based recreation opportunities, and to plan and manage TVA land in the Tennessee River Watershed. A partnership approach is used to monitor, assess and report on water resource conditions. In North Carolina, the Watauga, French Broad, Little Tennessee and Hiwassee River basins make up portions of the Tennessee River basin watershed. TVA works with other agencies to identify pollution problems and implement solutions. TVA is looking for answers to key questions such as : Is the water safe for swimming? Are the fish safe to eat? What is the health of the reservoir? Answers to the questions can be found in the TVA website at www.tva.gov/environment/ecohealth.

TVA has developed a very comprehensive monitoring program that combines the professional expertise of water resource specialists with local citizens, interest groups, business and industry, and other governmental agencies. This is the baseline for the concept of the watershed teams. Water quality data collected from key locations on lakes and streams in the Tennessee River watershed are used to draw attention to pollution problems, set cleanup goals, and measure the effectiveness of water quality improvements over time. Measurements of water quality are based on physical, chemical and biological variables.

The strategy of the watershed teams is to build a coalition of information exchange with stakeholders in the watershed by seeking their support in developing and implementing protection and mitigation plans. To support these goals, TVA's Resource Stewardship group helps to maintain sustainable watersheds throughout the region by balancing uses of the valley's natural resources. The ecological resources must be protected with consideration given to the public use. TVA has twelve watershed teams in the Tennessee River Watershed. TVA's Upper Holston Watershed Team provides sponsorship of a volunteer monitoring program in the Watauga River basin.

TVA's Monitoring Team conducts fish community and benthic macroinvertebrate surveys throughout the 21-county area of the Holston River watershed. An intensive baseline survey was conducted during 1993 through 1997 at 172 sites. Currently, TVA is monitoring streams on a five-year cycle. These surveys are used to decide where to focus efforts to enhance and protect water quality, to document ecological recovery at sites where stream restoration management practices are implemented and to monitor trends in water quality over time.

For more information on the Upper Holston Watershed Team, contact them at (423) 239-2003 or contact Tandy Hobbs at tshobbs@tva.gov or Anne Patrick at awpatrick@tva.gov. The Tennessee Valley Authority website can also provide further information at www.tva.gov.

Watauga River Basin Volunteer Monitoring Program

The Volunteer Monitoring Program has been active in the Watauga River basin monitors since 1998. The number and location of sites as well as the volunteers have changed and fluctuated since the creation of the program. Since 1998, there has been a total of approximately 23 sampling sites; but as of December 2001, only ten sites are being monitored on a regular basis. Presently, the volunteers who monitor are very dependable, yet the need for additional vounteers is needed to insure the success of the program. There will be a "Stream Doctors" workshop in early spring of 2002 to train new volunteers in the community who are interested in "adopting a stream".

The volunteers monitor for both quantitative and qualitative data on a monthly basis. The volunteers are currently collecting samples to determine dissolved oxygen, pH, temperature, turbidity, water appearance, streambed coating, odor and weather conditions. The program would like to incorporate sampling for fecal coliform, nitrates and velocity. The Volunteer Monitoring Program also includes benthic macroinvertebrate sampling using TVA's sampling protocol. The protocol involves three kick samples in a run and subsampling until a minimum of 100 insects is found. Then volunteers are responsible for identifying and counting the EPT's, other taxa and tolerant taxa. In the spring of 2002, TVA would like to have a "Bug Sampling Day" where organized teams go out into the watershed and sample multiple sites. The sampling teams will collect the benthic macroinvertebrates by using the established protocol and rejoin the other groups. The volunteers will then be taught how to identify the insects and interpret what they have found with the help of professionals.

Kids in the Creek

The "Kids in the Creek" program, sponsored by TVA, North Carolina State University and the North Carolina Co-operative Extension, offers school age children a chance to get outdoors and become involved in stream conservation. The goal of this program is to educate students on the topics of watersheds, groundwater, riparian buffers, benthic macroinvertebrates and pollutants that may enter the stream through activities that take place in their watershed. Through this program, the students learn a hands-on approach to assessing the health of a stream. Students gain experience conducting DO, pH and temperature measurements along with macroinvertebrate counts. The program also includes the use of a groundwater flow model and an Enviroscape to illustrate the water cycle at work in the Watauga River basin.

For more information on or to join the Watauga River Volunteer Monitoring Program and Kids in the Creek, please contact Wendy Patoprsty at (828) 264-3061.

1.4 State Initiatives

1.4.1 NC Agriculture Cost Share Program

The North Carolina Agriculture Cost Share Program was established in 1984 to help reduce the sources of agricultural nonpoint source pollution to the state's waters. The program helps owners and renters of established agricultural operations improve their on-farm management by using Best Management Practices (BMPs). These BMPs include vegetative, structural or management systems that can improve the efficiency of farming operations while reducing the potential for surface and groundwater pollution. The Agriculture Cost Share Program is a voluntary program that reimburses farmers up to 75 percent of the cost of installing an approved BMP. The cost share funds are paid to the farmer once the planned control measures and technical specifications are completed. The annual statewide budget for BMP cost sharing is approximately $6.9 million.

Almost $15,000 were expended in the Watauga River basin from 1995 through 1999 on a variety of nonpoint source pollution reduction projects. Table C-2 presents Agriculture Cost Share Program dollars spent over the five-year period for each county in the North Carolina portion of the basin.

Table C-2 Agriculture Cost Share Program Dollars Spent Between 1995-1999 in Avery and Watauga Counties

Year	Watauga County	Avery County
1995	$2,980	$882
1996	$785	$8,164
1997	$1,595	Not Available
1998	$592	Not Available
1999	Not Available	Not Available

Soil and Water Conservation Districts contacts for the Watauga River basin are included in Appendix VI or visit the website at http://www.enr.state.nc.us/DSWC/files/acs.htm for more information.

1.4.2 NC Wetlands Restoration Program

The North Carolina Wetlands Restoration Program (NCWRP) is a nonregulatory program responsible for implementing wetland and stream restoration projects throughout the state. The focus of the program is to improve water quality, flood prevention, fisheries, wildlife habitat and recreational opportunities. The NCWRP is not a grant program. Instead the program funds wetlands, stream and riparian area projects directly through the Wetlands Restoration Fund.

The NCWRP develops and uses its Watershed Restoration Plans (formerly called Basinwide Wetland and Riparian Restoration Plans) to locate projects in watersheds with the greatest need and opportunity for restoration. Using information compiled in the DWQ's Basinwide Water Quality Plans and feedback from local stakeholders, the NCWRP selects local watersheds (14-digit hydrologic units) in each river basin where it may implement wetland and stream restoration projects. The Watershed Restoration Plans describe the local watersheds selected by the NCWRP as targeted areas for restoration. The NCWRP updates its Watershed Restoration Plans every five years on the same schedule as DWQ's Basinwide Water Quality Plans.

For the 2002 update of the Watershed Restoration Plan for the Watauga River Basin, the NCWRP has selected the Upper Watauga River Watershed (14-digit HU code *06010103010010)* as the targeted local watershed for restoration. This watershed is approximately 56 square miles and includes the Town of Seven Devils. The watershed encompasses the headwaters of the Watauga River, Boone Fork, Laurel Fork and other tributaries. The NCWRP has selected this watershed as a priority area for restoration based on data presented in the DWQ Basinwide Assessment Report for the Watauga River (2000) that indicates some impacts to water quality in this watershed. In addition, increased development activities through out the watershed pose a future threat to water quality. The Riparian Corridor Conservation Design for the Watauga River Basin, prepared for the Blue Ridge Rural Land Trust in 2000, indicates numerous restoration and preservation opportunities in this watershed.

The NCWRP is also working to develop comprehensive Local Watershed Plans for select watersheds across the state. These more locally-based plans will identify wetland areas, stream reaches and stream buffer areas that once restored will provide significant water quality and other environmental benefits to watershed. The NCWRP will coordinate with local community groups, local governments and others to develop and implement these plans.

The NCWRP can perform restoration projects cooperatively with other state or federal programs or environmental groups. For example, the NCWRP's efforts can complement projects funded through the Section 319 Program. Integrating wetland or riparian area restoration components with Section 319 funded or proposed projects will often improve the overall water quality benefits of the project.

For more information about the NCWRP, please contact Kristin Cozza at (919) 716-1922 or visit the website at http://h2o.enr.state.nc.us/wrp/index.htm.

1.4.3 Wildlife Resources Commission Fisheries Management Direction

A *Draft Fisheries Management Direction for the Watauga River Basin* was completed by the NC Wildlife Resources Commission (WRC) in July 1998. The document summarizes WRC's general direction for managing fisheries resources in the Watauga River basin. Specific habitat-related problems which impair a stream's ability to support quality fisheries are identified. The focus of the plan is on riparian and wetland areas with the intention of providing input to the Wetlands Restoration Program described above.

WRC fisheries management activities within the Watauga River basin include monitoring the abundance of fish populations, establishing harvest and size limit regulations, stocking fish, and protecting or enhancing habitat.

The *Draft Fisheries Management Direction for the Watauga River Basin* is cited in both Section A, Chapter 4 and in Section B. For additional information regarding local fisheries, contact Scott Loftis by calling (828) 452-0422 or visit the Wildlife Resources Commission website at http://www.state.nc.us/Wildlife/.

1.4.4 Clean Water Management Trust Fund

The Clean Water Management Trust Fund offers approximately $40 million annually in grants for projects within the broadly focused areas of restoring and protecting state surface waters and establishing a network of riparian buffers and greenways. CWMTF has awarded two grants totaling $1,274,103 in the Watauga River basin. Table C-1, in Part 2.1 of this section, outlines the projects and provides reference to the location of project descriptions in the plan.

For more information on the CWMTF or these grants, contact Beth McGee at (919) 363-8257 or by email beth.mcgee@ncmail.net. You can also visit their website at www.cwmtf.net.

1.4.5 Nature Conservancy

The Nature Conservancy works with members, contributors and partners to acquire endangered land. Some of this land, around 71,000 acres, is owned or managed by the North Carolina Chapter. Other sites are acquired on behalf of state and federal conservation agencies to be placed in public ownership.

The North Carolina Chapter works in conjunction with the NC Natural Heritage Program (a Division of the State Parks system) to identify and inventory unique natural areas and habitats. The chapter establishes protection priorities based on information gathered by the Heritage Program. Over the past decade, the Nature Conservancy has been working with numerous partners to protect over 2,600 acres of Grandfather Mountain. In 1991, Grandfather Mountain, Inc. began donating a series of conservation easements to the Nature Conservancy that will eventually protect over 1,700 acres of Grandfather Mountain's rocky summits and rugged backcountry. Through a management agreement, The Nature Conservancy currently assists Grandfather Mountain, Inc. with the management of this acreage. In 1993, thanks to a land donation from the Wilmor Corporation and a gift of $3,070,900 from Fred and Alice Stanback, Brad Stanback and Lawrence Stanback, the Conservancy acquired over 600 more acres on the

mountain. In September 1993, The Nature Conservancy purchased an additional 300 acres for inclusion in the preserve system.

For further information about The Nature Conservancy projects in the mountain region of North Carolina, contact Mountains District Coordinator, Beth Bockoven, by calling (828) 749-1700 or by email bbockoven@tnc.org.

1.5 Regional Initiatives

1.5.1 Blue Ridge RC&D

The Blue Ridge Resource Conservation and Development Council is a non-profit corporation which covers Ashe, Alleghany, Wilkes, Watauga, Avery, Mitchell and Yancey counties. The council is sponsored by the Soil and Water Conservation Districts and County Commissioners of those seven counties, in addition to the Region D Council of Governments. The council carries out a program of natural resource conservation and community development with the overall goal of achieving "communities in harmony with their environment". In addition to water quality and stream restoration projects, the council's current priorities include new income opportunities for the rural economy of the region, alternative energy with emphasis on landfill gas development, farmland and family farm preservation, and community recreation development. The Blue Ridge RC&D program is a USDA authorized program that is effective because of the unique public/private partnership under which it operates.

For more information on the Blue Ridge RC&D, contact Stan Steury at (828) 297-5805 or by email ssteury@boone.net.

1.5.2 Conservation Trust for North Carolina

The mission of the Conservation Trust of North Carolina (CTNC) is to conserve land resources through direct action and by helping communities, private land trusts and individual landowners protect lands most important to them for their natural, scenic, historic and recreational values.

CTNC helps government agencies allocate funds to local trusts or districts seeking funding for activities including land acquisition and water quality projects. The organization also acts as a service/resource center for local land trusts, as well as a mentor to help start new local trusts. A Land Trust Council has been established to distribute information to the various land trusts statewide and to represent them at the legislature. The Blue Ridge Rural Land Trust is one organization associated with CTNC that works in the Watauga River basin and surrounding watersheds.

The CTNC was awarded a grant from the Clean Water Management Trust Fund to prepare riparian corridor conservation designs across the state. CTNC awarded the Blue Ridge Rural Land Trust a portion of the grant to prepare a riparian corridor conservation design for the Watauga River basin. For more information on the Riparian Corridor Conservation Design for the Watauga River Basin, please see the section on the Blue Ridge Rural Land Trust below.

For more information about CTNC, contact Kathy Drew at (919) 828-4199 or visit the website at http://www.ctnc.org/.

Blue Ridge Rural Land Trust

Blue Ridge Rural Land Trust (BRRLT) was formed in late 1997 as a result of discussion groups started by the League of Women Voters and the Blue Ridge Resource Conservation and Development Council Inc., both of which were concerned about the rapid loss of farm and forestland in rural northwestern North Carolina. The BRRLT formed initially as an affiliate of the Southern Appalachian Highlands Conservancy. BRRLT became an independent, incorporated, not-for-profit, nongovermental organization in July 1999. Their mission is "Preserving rural communities and culture in Northwestern North Carolina through the protection of the land resource upon which they depend." They do this through the acquisition by purchase or gift of conservation easements on working farm and forest properties.

In 1999, BRRLT protected two tracts in Alleghany and Watauga counties totaling 310 acres. In 2000, five tracts were protected through easements in Ashe, Watauga and Alleghany counties totaling 365 acres. BRRTL also assisted in creating a new 220-acre state park, Bullhead Mountain State Natural Area. In 2001, the BRRLT anticipates protecting one tract in Wilkes County of 177 acres and approximately 10 additional tracts totaling 2500 acres by the end of 2001 in Alleghany, Ashe, Wilkes, Avery and Watauga counties.

Riparian Corridor Conservation Design for the North Carolina Portion of the Watauga River Basin

The Conservation Trust of North Carolina awarded the Blue Ridge Rural Land Trust a grant to prepare a riparian corridor conservation design for the Watauga River basin. The goal of the design project is to identify and prioritize areas throughout the North Carolina portion of the Watauga River basin where preservation or restoration projects would have the greatest positive effect on water quality.

To achieve the goal of the design project, a Geographical Information System (GIS) or computerized mapping system was developed which links watershed base maps to field data collected for approximately 200 linear miles of streams within the basin. The watershed base maps consist of the Watauga River and tributary network, a 400-foot wide buffer zone around all streams, and all tracts on land lying within or intersecting the buffer zone. Also, included on the base maps are road coverages, topography, land cover and political boundaries. Field data collected includes stream type, stream stability, land use, buffer type, development potential, wetlands and several other categories. This system allows the BRRLT to search the entire Watauga River basin to identify priority areas for water quality protection and restoration sites.

The design identifies eight stream segments as high priority. Three of these are preservation sites and the remaining five are restoration sites. A brief description of each of the highest priority preservation sites can be found in Section B, Chapter 1, Part 1.5.8, and descriptions of the highest priority restoration sites can be found in Section B, Chapter 1, Part 1.5.9.

For more information on the Blue Ridge Rural Land Trust or the Riparian Corridor Conservation Design for the Watauga River, please contact James Coman by calling (828) 263-8776 or by email hillshepard@skybest.com.

High Country Conservatory

The High Country Conservancy was formed in 1997 to help the people of the North Carolina High Country preserve, as well as develop their land, in such a manner that protects scenic vistas, important ecosystems, recreational opportunities and our cultural heritage. Their mission is "The High Country Conservancy provides for the permanent protection of land and its resources. We offer stewardship, education, and advice for the preservation and enhancement of agricultural, natural, scenic, and open space or recreational purposes, and that provides significant public benefit. The responsibilities, i.e. monitoring, management, and enforcement are associated with the given property."

Working with landowners, the High Country Conservancy protects land by utilizing flexible conservation easements, charitable donations, life estates, purchases and bargain sales. As of October 1, 2001, the HCC has protected 352 acres of land in the High Country. This includes 182 acres protected under conservation easements, 158 purchased and sold to the state as a biological studies area, and 12 acres purchased and retained.

For more information on the High Country Conservancy, please contact Marla Wilson by calling (828) 264-2511 or by email hcconservancy@boone.net.

1.6 Local Initiatives

1.6.1 Watauga River Watershed Steering Committee

The Watauga River Steering Committee was formed in 1995 to restore degraded stream corridors and wetlands, preserve high quality stream corridors, implement urban stormwater demonstrations and to establish riparian greenways. Another focus of the Watauga River Steering Committee is to educate landowners, local officials and the general public about water quality best management practices and watershed management. Current membership includes representatives from TVA, North Carolina Cooperative Extension, Natural Resources Conservation Service, the Blue Ridge Resource Conservation and Development Council, Blue Ridge Rural Land Trust, Division of Water Quality, Town of Banner Elk, Watauga County Planning Office and environmental consulting firms. As of December 2001, grant money and in-kind services raised by this steering committee have totaled over $1.5 million. Projects implemented include the restoration and educational projects described below.

For more information on the Watauga River Watershed Steering Committee or its restoration projects, please contact Stan Steury at (828) 297-5805 or by email ssteury@boone.net.

Cove Creek Restoration

In late September 1999, 1400 feet of Cove Creek and 3 acres of adjacent floodplain (near Highway 321) were restored to a more stable stream corridor. The project site is located behind the Cove Creek Community Center. Ten years ago, Hurricane Hugo destroyed the dam from an old mill resulting in channel incision and extreme streambank erosion. Over the past years, Cove Creek continued to erode the streambanks to the point that a new floodplain was forming at a lower elevation. There was no riparian vegetation and no pools. This stream restoration project completed the redevelopment of the new floodplain while stabilizing the streambanks. The aquatic habitat of the stream was also improved by reestablishing the riffle/pool sequence. Restoration best management practices (BMPs) used in the Cove Creek project include cross (across the channel) and J-hook (along the channel) rock vanes, root wads and several bioengineering techniques. After project construction, riparian vegetation was planted and the stream was stocked with fish.

Worley Creek Restoration

Design work was initiated during the winter of 1997 as a pilot project for the restoration of trout streams and alleviation of NPS pollution within the Watauga River. Permitting (both 401 and 404) and construction were completed in November 1998, with plans for additional work during the spring of 1999. This project included the restoration of 1600 linear feet of trout stream and the enhancement and creation of seven acres of adjacent wetlands that were isolated from their historical floodplain in 1978 when the channel was straightened to make room for an agricultural field. The design reestablished the natural meander pattern of Worley Creek throughout the project area, reuniting the streamflow with its floodplain, and allowing for the reconnection of a small Southern Appalachian bog to the hydrology of the stream system. Three ponds were created adjacent to the new channel as a means to balance cut and fill on the site. The old streambed was filled. The riparian area was replanted, and monitoring (fish and aquatic insect sampling, stream geometry measurements and water table elevation) have been set up (both pre- and post-construction).

Shawneehaw Creek Restoration

Shawneehaw Creek is a tributary to the Elk River. This project site is located behind the Banner Elk Town Hall in a town park. Constructed on May 30 and June 1, 2000, this project included the use of six cross vanes, 15 root wads, the relocation of 50 feet of channel, and 50 feet of logs for bank protection along 850 feet of the stream in order to stabilize the streambank, improve aquatic habitat and establish a riparian area. Also located at this site is an educational display on water quality issues in the basin developed by DWQ, CWMTF, NRCS, NCSU Co-operative Extension Service and others.

In 2001, the Shawneehaw Creek restoration project was extended an additional 3,000 feet immediately downstream of the 2000 project site. Rock cross vanes, root wads and vegetative transplants were used to reduce bank erosion and improve instream aquatic habitat. After construction, a riparian buffer will be established.

Dutch and Clark Creeks Restoration

The Dutch and Clark Creeks restoration project is located at Highway 194 and Clarks Creek Road. The project will restore Dutch Creek and Clark Creek to their natural channel design by remeandering Clark Creek and reestablishing a stable meander bend in Dutch Creek. Historically, both creeks have been straightened as they run through a pasture. Also included in this project will be livestock exclusion, alternative water systems, stream crossings, stream geometry modifications, streambank stabilization and riparian plantings. The project will restore over 3,300 feet of stream.

Laurel Creek Restoration

During the flood of 1940, Laurel Creek abandoned over 1.5 miles of its stream channel and formed a new channel. This channel change was facilitated by a millpond and milltrace, which existed at the site of the proposed restoration. The restoration project on Laurel Creek consisted of two phases. The first phase stabilized and planted approximately 1,500 feet of streambank. The second phase will restore approximately 1,800 feet of Laurel Creek just above the confluence with Worley Creek and immediately downstream of the Worley Creek reach restored in 1997-1998. Phase II reconnected Laurel Creek with its floodplain and created two acres of riparian wetlands. Additionally, four acres of wetlands at the confluence of Laurel and Worley Creeks were enhanced and preserved.

Sharp Creek Restoration

The restoration site on Sharp Creek is in the Cove Creek watershed. Prior to restoration, the stream had severe active bank erosion and severe entrenchment through a broad, flat hay field. However, at the upper end of the site the stream flowed through an active pasture. The restoration was completed in two phases, with Phase I stabilizing and planting 1,500 feet and Phase II stabilizing and planting 500 feet. An alternative water supply for the cattle was also incorporated into the project.

Crab Orchard Creek Restoration

The Crab Orchard Creek restoration is located in the Dutch Creek watershed above the Dutch Creek restoration project. This project restored three areas within a 5,000-foot long reach. Over 1,500 linear feet of Crab Orchard Creek was reconnected to its floodplain along with bank stabilization and the reestablishment of a well-vegetated buffer.

Foscoe Wetlands Acquisition

A ten-acre wetland connected to the Watauga River adjacent to Foscoe Park will be purchased and donated to Appalachian State University (ASU) for education and research. NCSU will work through the Watauga Soil and Water Conservation District to purchase the wetland and donate it to ASU. A conservation easement will require the wetland to remain undeveloped. An educational boardwalk will be constructed through the wetland to provide student and public access. Interpretative displays will accompany the boardwalk to educate the public about the

importance of wetlands and to identify wetland plants and wildlife. Currently five acres have been purchased and donated to ASU. Attempts are being made to purchase the other five acres.

Installation of Best Management Practices on Christmas Tree Farms

In spring 1999, several best management practices (BMPs) were installed on a Christmas tree farm in the basin to serve as a demonstration project. BMPs that were installed include improved road construction, stream crossings, nutrient management and integrated pest management. The site has been performing as designed, and the low cost bridge used in the stream crossing has been a valuable demonstration tool.

1.6.2 Watauga River Conservation Partners

The Watauga River Conservation Partners (WRCP) formed in 1999 in response to the growing pressures on the water quality of the Watauga River and its tributaries. WRCP identified three primary concerns: 1) lack of compliance with environmental regulations preserving water quality; 2) lack of public awareness about the impact of development on water quality; and 3) lack of awareness about how individuals and groups can protect the river and can influence government decision makers to make protection a priority.

Its chief fund-raising and public-awareness activity is Riverfest, which are both an educational event and a celebration of the Watauga River. Riverfest brings together community organizations, government agencies, local experts and businesses to educate and inspire the public. The goals of Riverfest are to increase public understanding of the condition of and risks facing the Watauga River and, equally important, to serve as a catalyst for community activism in protection of both water quality and quality of life in the High Country.

Members of WRCP have been influential in shaping local policy and improving local conditions through their work on planning boards, land use planning committees and community councils. WRCP has requested DWQ to reclassify the Watauga River from HQW to ORW and to reclassify specific tributaries to HQW. It has worked with local and state agencies to improve environmental enforcement and to improve performance of sewage treatment facilities. WRCP's environmental education activities are performed in partnership with the North Carolina Cooperative Extension Service, the Tennessee Valley Authority, the Western North Carolina Alliance and local media.

For more information on the WRCP, please contact Richard DeMott at (828) 963-8682.

1.6.3 Watauga County

Watauga County administers a local Sediment and Erosion Control Program. The requirements of the county's ordinance exceed those required by the NC Sedimentation Pollution Control Act by requiring a sediment and erosion control permit to be obtained on all projects that disturb more than one-half acre of land. The NC Sediment Pollution Control Act requires a permit to be obtained when one acre or more of land is disturbed.

In the Foscoe/Grandfather Mountain Community, Watauga County administers a zoning ordinance. A Riparian Buffer Protection provision is part of the zoning ordinance. The provision protects a 50-foot riparian buffer along the Watauga River mainstem and Boone Fork Creek and a 40-foot vegetated buffer along all perennial streams as denoted by solid blue lines on the USGS topography maps.

1.6.4 Town of Boone

The majority of the Town of Boone's jurisdiction drains into the South Fork of the New River. However, annexations into the Watauga River basin are occurring, and such action will significantly increase the influence of the town's policies on nonpoint source loading to the Watauga River. The Town of Boone has been and continues to work toward improving stormwater and floodplain management, including minimization of impervious surfaces and reduction of pollutants.

Stormwater and Floodplain Management

The Town of Boone, using primarily Hazard Mitigation Funds from FEMA, relocated 30 homes out of the 100-year floodplain in Boone between May 1997 and September 1998. The homes are being renovated for low and middle-income housing. Six to seven more homes are in various stages of this relocation/renovation process. Additionally, construction is beginning on a new nursing home to replace a current facility that is also in a 100-year floodplain. The new building should be completed in 2001; the old one will then be removed. Once the relocations are complete, the floodplain area will be used as greenway/open space for recreation. No structures will be built and impervious surfaces will be limited.

A draft stormwater management plan is currently before the town council. The study looked at impacts of new and existing development on stormwater and flooding through 2002. Many recommendations are outlined in the plan, including a requirement for stormwater detention for new development.

The Town of Boone's Unified Development Ordinance establishes goals for stormwater retention and detention best management practices. The competing goals for stormwater retention and discharge are accomplished by designing, constructing and maintaining all stormwater management installations to the extent practical and should avoid increases in surface water runoff volume and velocity by including measures which: 1) promote the infiltration of stormwater; 2) maximize the time of concentration of stormwater runoff; and 3) promote the filtration and precipitation of pollutants from the stormwater in order to protect the water quality of the receiving watercourse. These goals are achieved by using impervious surface criteria to determine the required volume of stormwater storage needed at new and redeveloped sites. It is the town's policy to evaluate the necessary stormwater BMPs on a project-by-project basis.

The Town of Boone also has adopted a Floodplain Ordinance. This ordinance prohibits most types of development within the mapped floodway. The ordinance requires a setback from streams with a drainage area greater than one square mile, extend 50 feet from the center of the channel, or 25 feet from top of bank, or to the limit of the mapped floodway as shown on the most recent FIRM map, whichever is greater. This ordinance also requires setbacks along

smaller unmapped streams; these setbacks are five times the width of the stream measured at the top of the bank. Streams that are culverted on or before September 23, 1986 are also required to have a floodway setback of 20 feet from the center of the culvert or to the limit of the mapped floodway as shown on the most recent FIRM map, whichever is greater. These floodway setbacks help control development and construction in the riparian areas and prevent habitat loss and erosion.

Erosion Control

The Town of Boone administers a local Sedimentation and Erosion Control Program. The town ordinance requires that measures be implemented on all projects (regardless of size) and which have the potential to result in either off-site sedimentation or sedimentation of any waterbody. The town has also adopted specific Grading Regulations which are intended to insure that graded steep slopes do not develop into significant erosion problems.

For more information regarding stormwater, floodplain management or stream restoration projects in the Town of Boone, contact Kevin Rothrock at (828) 265-4540 or by email tob-planning@boone.net.

1.6.5 Town of Banner Elk

The Town of Banner Elk administers a local Sediment and Erosion Control program. The requirements of the town's ordinance exceed those required by the NC Sedimentation Pollution Control Act by requiring a sediment and erosion control permit be obtained on all projects that disturb more than one-half acre of land. The NC Sediment Pollution Control Act requires a permit be obtained when one acre of land is disturbed.

Urban Stormwater Demonstration

In 2001, the Town of Banner Elk implemented a streetscape project which included the construction of sidewalks, curb and guttering, and planting areas for the downtown area. The streetscape project could have potentially greatly increased the amount of stormwater discharged into the Shawneehaw Creek. In order to help alleviate the stress of the additional stormwater, the town, in cooperation with the Blue Ridge RC&D and the CWMTF, constructed an urban stormwater demonstration project and a greenway.

The Stormwater Demonstration Project includes a stormwater collection system that drains a 65-acre area of downtown Banner Elk, a 150,000-gallon underground detention/storage vault, and treatment wetlands. The stormwater from the streetscape area is collected and transported, via the collection system, to the underground detention vault where it is stored and cooled. The detention vault also traps some sediment and debris. The stormwater is then released from the vault to the wetlands at a controlled rate to prevent flooding. The treatment wetlands are an efficient tool in preserving water quality as they can trap sediment and pollutants from the town's stormwater runoff. After flowing through the wetland, the stormwater is released into Shawneehaw Creek.

Banner Elk Greenway

In cooperation with the Blue Ridge RC&D and the CWMTF, the Town of Banner Elk is establishing a greenway along Elk Creek and Shawneehaw Creek and the Lees McRae Mill Pond. At the site, the town will establish conservation easements and water quality improvement practices such as the establishment of riparian vegetation and riparian wetlands. This 1.3-mile greenway is Phase I of a larger greenway project with future phases to be installed later.