Innovative Urban Stormwater Management in Banner Elk, NC

Mike Pitman

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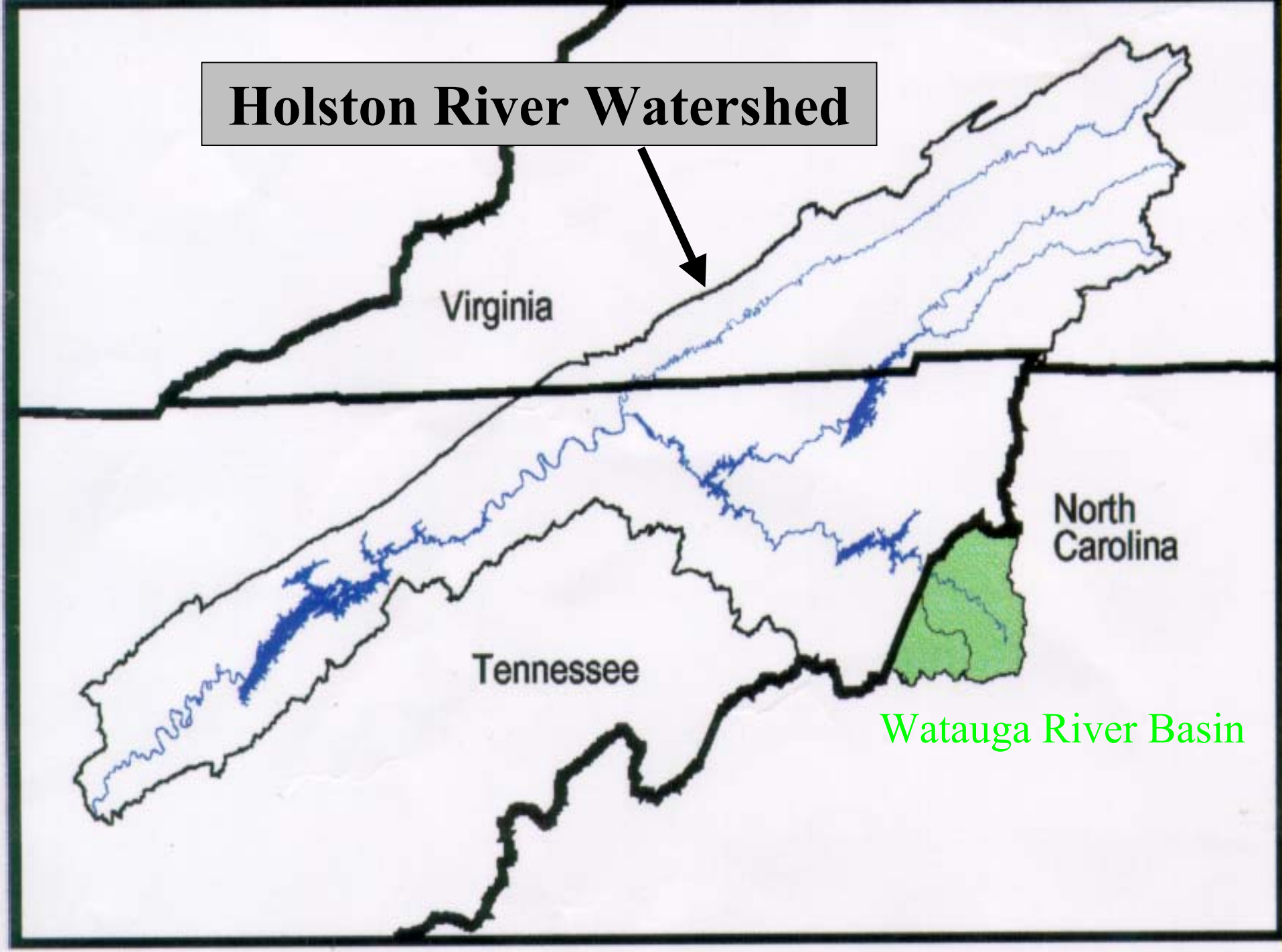

Holston River Watershed
Virginia
North Carolina
Tennessee
Watauga River Basin

Shawneehaw Creek in Banner Elk- May 2001


CAT

Shawneehaw Kiosk in Banner Elk Town Park

Funding Agencies

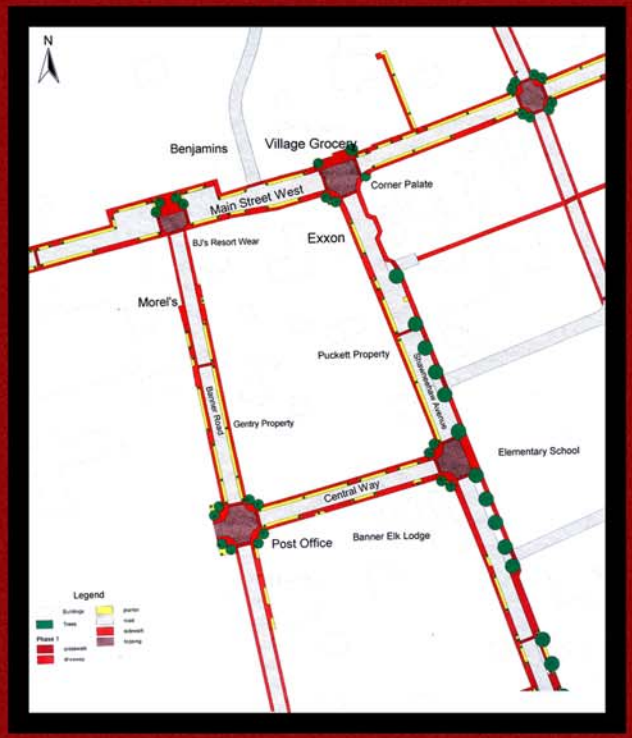
- North Carolina Clean Water Trust Fund
- EPA 319
- NRCS Cost Share
- Tennessee Valley Authority
- Department of Environmental & Natural Resources – Division of Water Quality

Watauga Basin
Non-point Source Team

- **NC State University**
  - **BAE** – Bio & Ag Engineering
  - **Water Quality Group**
  - **NCCE** – NC Cooperative Extension
- **NRCS** – Natural Resource Conservation Service
- **TVA** - Tennessee Valley Authority
- **DENR** – Dept. Environmental & Natural Resources
- **CWMTF** – Clean Water Management Trust Fund
- **WRCP-** Watauga River Conservation Partners

How it all got started

See the Difference!



Help Improve Banner Elk's Appearance

Purpose:

The Banner Elk Streetscape plan is a partnership between the Town of Banner Elk and a group of community volunteers who are dedicated to the improvement of Banner Elk's overall appearance.

Needs:

Your time, labor, and funds for the project.

Call:

Banner Elk Town Hall

828.898.5398

Master Streetscape Plan

Phase I

Do you know what's in your storm water?

Urban Stormwater Demonstration Project

- Underground Storage Vault

&

- Constructed Wetland

Banner Elk Project Site

Expected Maintenance

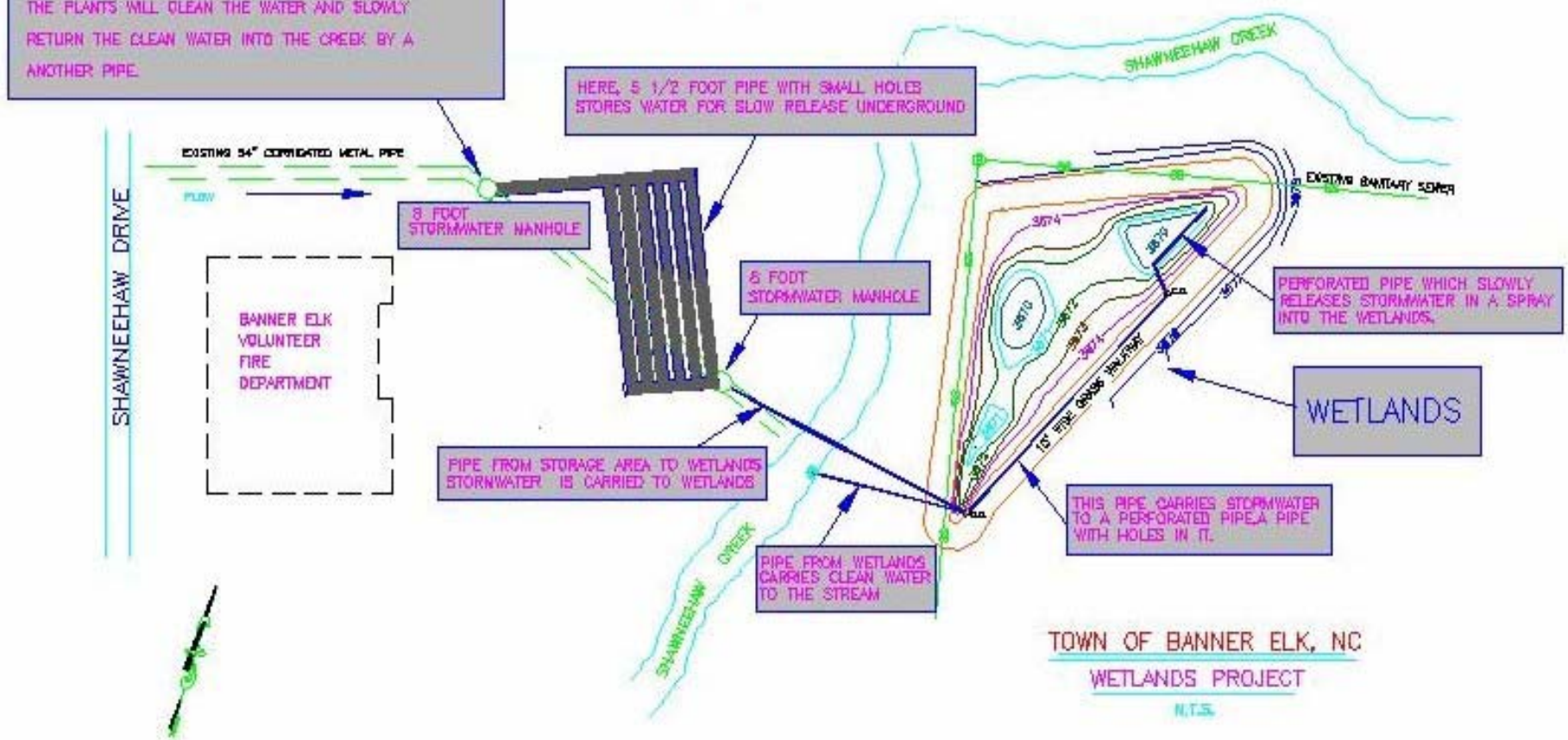
- Check the vault annually
- Clean out every 3 years

DESIGN AND CONSTRUCTION TEAM—VAUGHN & MELTON ENGINEERS

WE WOULD LIKE TO GRATEFULLY THANK AND ACKNOWLEDGE ALL THOSE WHO CONTRIBUTED AND SUPPORTED THIS WETLANDS PROJECT, SO THAT EVERYONE MIGHT ENJOY THE BEAUTY AND CONSERVATION OF THEIR ENVIRONMENT.

TOWN OFFICIALS OF BANNER ELK, NORTH CAROLINA
NORTH CAROLINA STATE UNIVERSITY
A & T STATE UNIVERSITY
COOPERATIVE EXTENSION SERVICES
AVERY COUNTY INSPECITON DEPARTMENT

HERE, A MANHOLE IS SET OVER AN EXISTING PIPE WHERE IT COLLECTS STORMWATER AND IS CARRIED TO AN UNDERGROUND STORAGE AREA , A SERIES OF PIPES THAT GRADUALLY RELEASE THE FLOW OF WATER INTO A PIPE THAT GOES TO THE WETLANDS. THIS IS WHERE THE PLANTS WILL CLEAN THE WATER AND SLOWLY RETURN THE CLEAN WATER INTO THE CREEK BY A ANOTHER PIPE.



TOWN OF BANNER ELK, NC
WETLANDS PROJECT
N.T.S.


PLANTING ZONES
ZONE 1–DEEP WATER (0–2' OF WATER)
ZONE 2–LITTORAL SHELF (0–2' OF WATER)
ZONE 3–SHORELINE (WET SOIL)
ZONE 4–UPLAND FRINGE (MOIST SOIL)
3674
3673
3671
3670
3675
3676
3677
3678
DRAW DOWN PIPE
PIPE USED TO DRAIN OFF EXCESS WATER–KEEPING THE WATER AT AN AVERAGE ELEVATION OF 3674. FILTERED WATER GOES BACK TO THE STREAM.
Looking Down From Above–Top View
Not To Scale

Native Plant Seed / Tuber Growing Operation

Dragonfly
Larvae

Native South Eastern Wetland Plants


Sagittaria latifolia

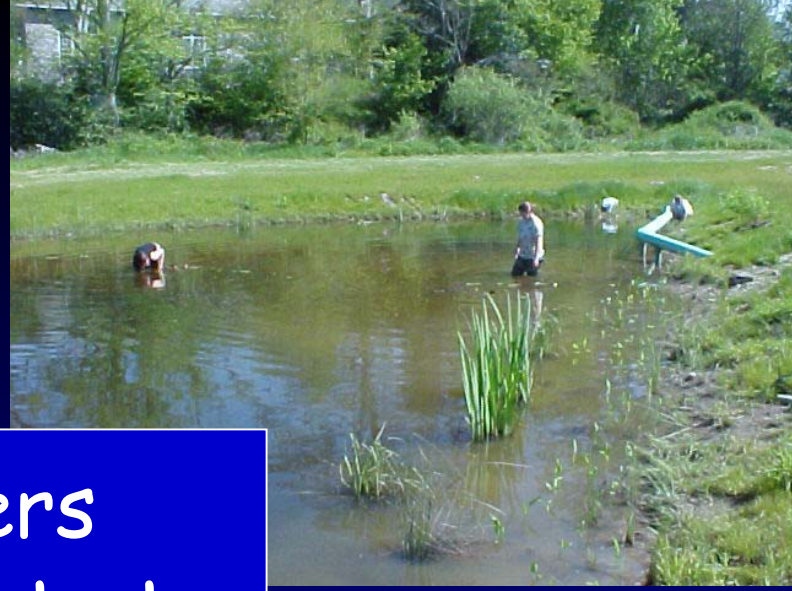

Peltandra virginica


Iris virginica

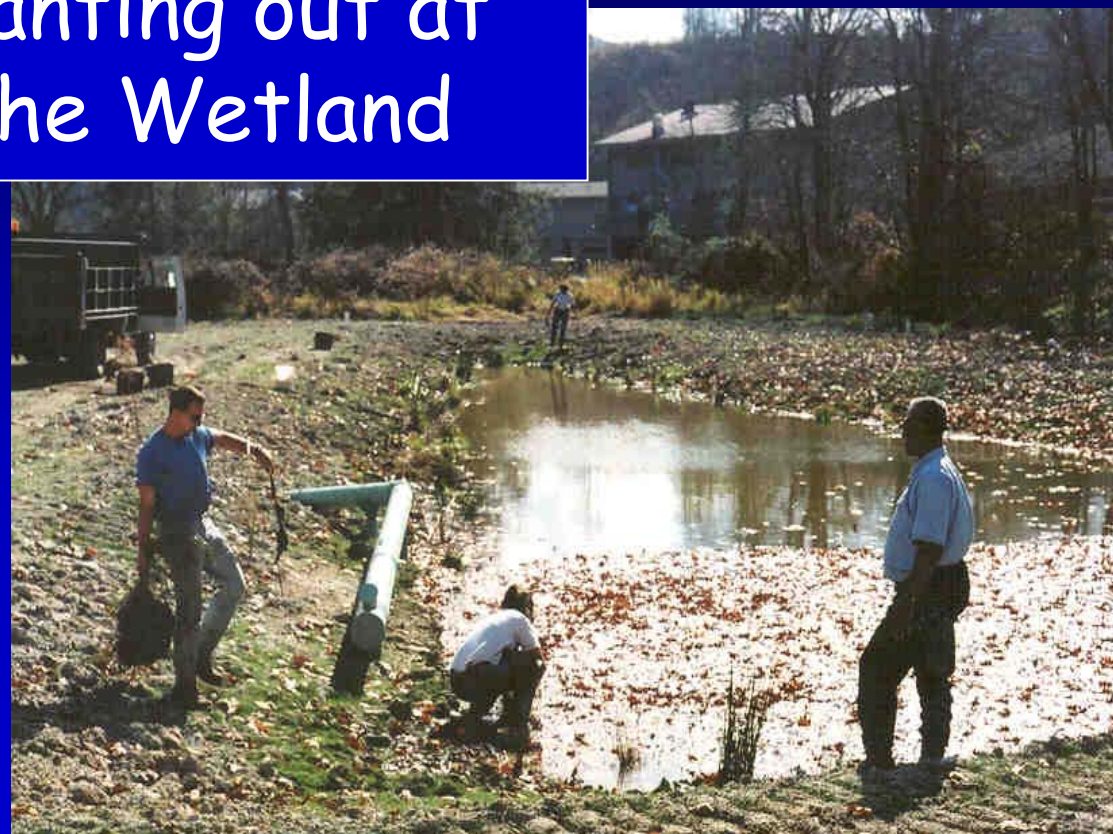

Pontederia cordata


Scirpus cyperinus


Juncus effusus



Volunteers Planting out at the Wetland



Getting students out into the field is priceless experience if they are interested in this type of work.

-Lees McRae

-ASU

Lessons Learned

-Maintenance issues

pipes get clogged

frequent cleaning

-Cost - $300,000

-Creek jumping bank during large storm events

-This was not an NCSU design

Stormwater Medallions

Environmental Education

The Groundwater Flow Model educates people of all ages

The Enviroscape teaches about watersheds and water quality

- Watershed Watch
- Kids in the Creek
- Water Screenings
- RIVERFEST
- BIGSWEEP

NC STATE UNIVERSITY

Watershed Watch

Volume 1, Issue 2 • July 1999 | Watauga River Watershed Project

Volunteer Monitoring Update

On February 1, 1999, Andy Edwards replaced Jocelyn Elliott as the coordinator for the volunteer monitoring program in the Watauga River watershed project. We would like to thank Jocelyn for her contribution to the project.

On February 10, 1999, Dave Tomljanovich, better known as TVA Dave, joined us in hosting the annual volunteer meeting with the current participants. Also in attendance was Dani Wise from NCSU. Dani is currently working on a guidebook for the Cooperative Extension Service volunteer monitoring programs. She is also processing the data we receive from the volunteers.

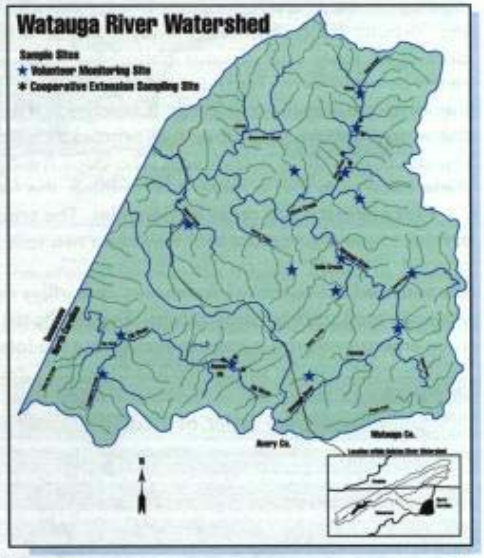
The main topic of discussion was the monitoring process. Volunteers are currently collecting samples to determine dissolved oxygen, pH, temperature and turbidity. We are working diligently to make sure that the tests performed are reliable and consistent.

Steve Fraley, an aquatic entomologist from TVA, was also at the meeting. He reviewed the protocol for macroinvertebrate sampling with the volunteers. After the meeting, several volunteers participated in a macroinvertebrate count.

Currently, we are working with new and old volunteers on an individual basis at their sites. Volunteers are observed performing their tests to maintain consistency in data collection. We are also visiting their sites to assist them in the quarterly macroinvertebrate count. This should help to keep volunteers motivated and properly equipped. We are also compiling a photographic record of each site.

A future goal is to work closely with or help form a coalition in the watershed. This coalition would include all members of the community that want to protect their watershed. Possible goals might include education and to create and implement a plan to maintain good water quality. From this group we also hope to gain more volunteers to assist in the monitoring program.

We are up to 25 volunteers and growing. If you would like to be a volunteer monitor, call Andy Edwards at 264-3061.



Cooperators:

- NC Cooperative Extension Service
- North Carolina State University
- Tennessee Valley Authority
- Natural Resources Conservation Service
- Blue Ridge Resource Conservation & Development
- Avery/Watauga Soil and Water Conservation District
- Lees-McRae College
- Appalachian State University
- NC Division of Water Quality
- NC Division of Water Resources
- NC Clean Water Management Trust Fund
- NC Wetland Restoration Program

In This Issue:

Volunteer Monitoring

"Kids in the Creek"

Goals of the Constructed Stormwater Wetland

- Education- elementary to university to community
- Final cleansing stage of the stormwater
- Serve as a model for other towns in Western NC that have similar needs for stormwater control
- Provide a diverse habitat for birds, plants, insects, and amphibians.
- Enhance the beauty of the town park

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