

Mechumps Creek Corridor Restoration Project

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WILLIAMSBURG
ENVIRONMENTAL
GROUP, INC.



Randolph-Macon
College
Ashland, Virginia

Town of Ashland



EQR
ENVIRONMENTAL QUALITY RESOURCES, LLC



Chesapeake Bay 2000 Agreement

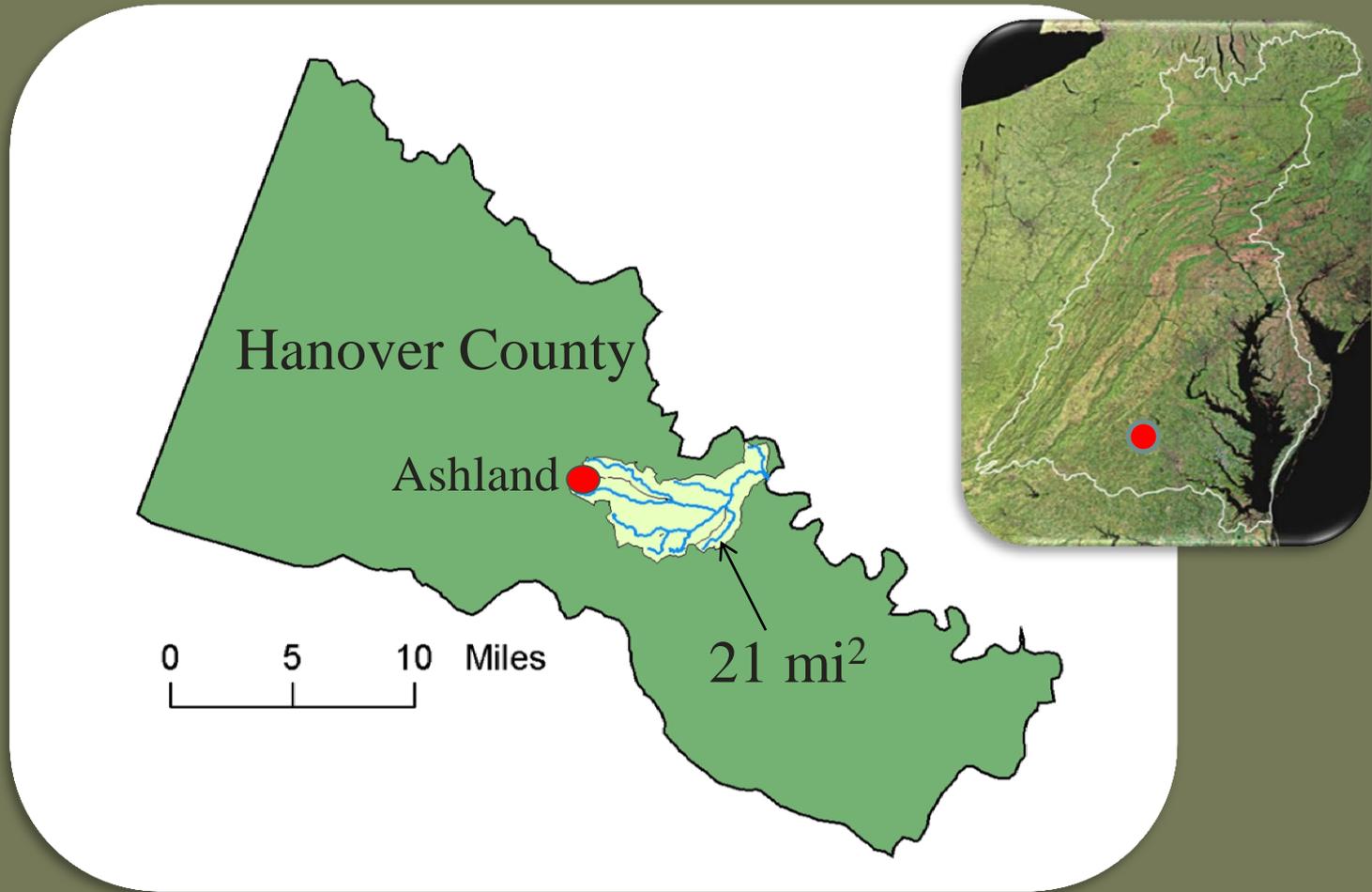
“...develop locally-supported watershed management plans [to] address the protection, conservation and restoration of stream corridors...”



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Mechumps Creek Watershed



Make it a Course in 2004...

A Watershed Management Plan for Mechumps Creek,
Hanover County, Virginia

Goal 1:

*"Reduce the harmful effects of commercial,
residential and agricultural development..."*

Prepared by

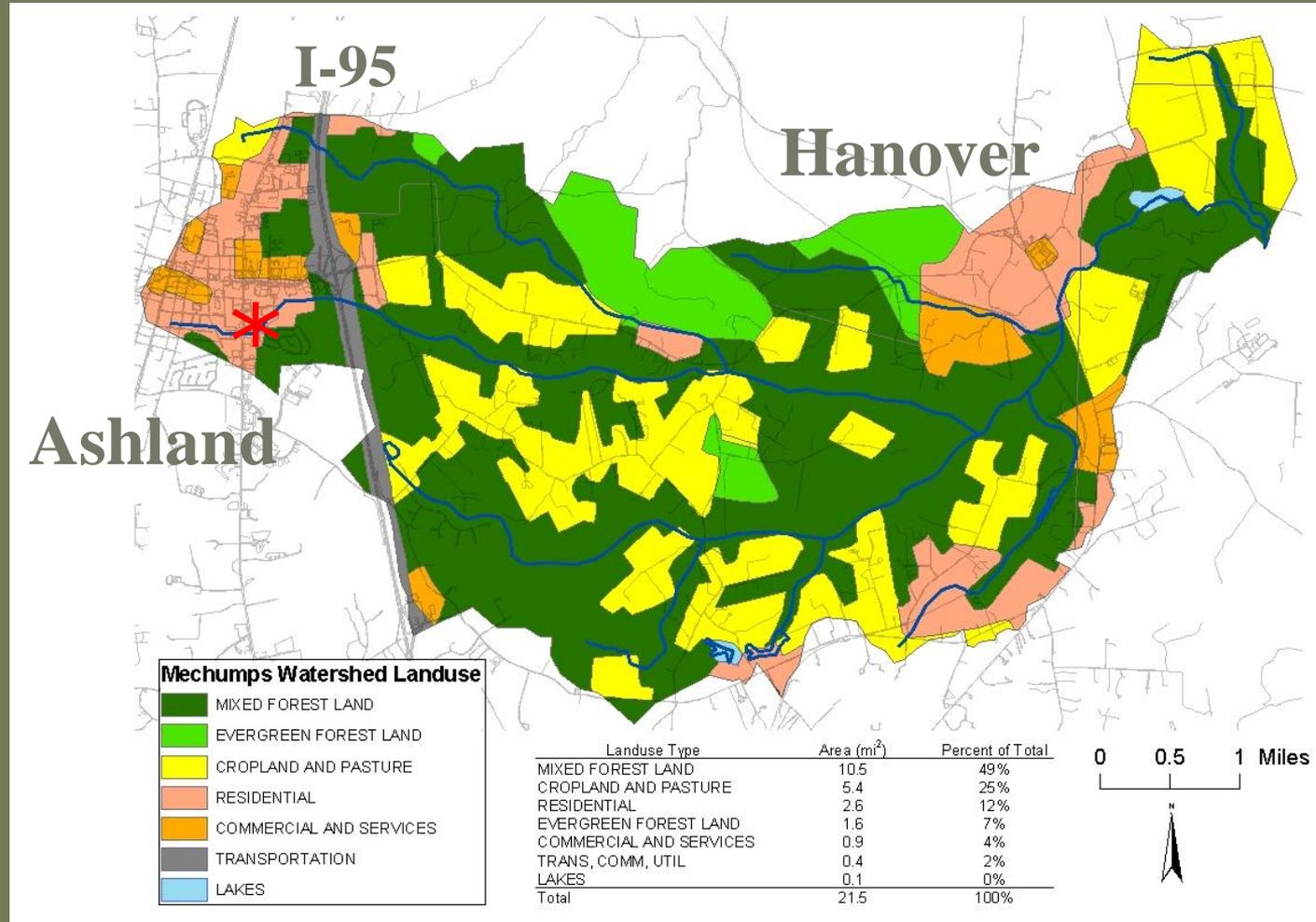
Students and faculty at Randolph-Macon College
in collaboration with government, citizen and business stakeholders



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Landuse in the Watershed



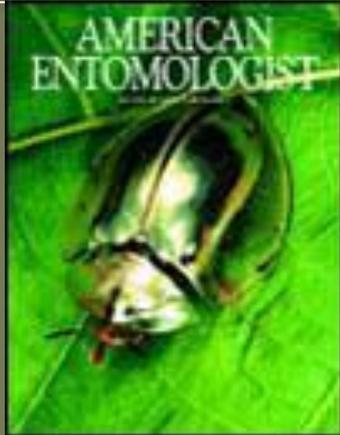
Mechumps Creek in Ashland



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Pre-Project Monitoring: Insects



RESEARCH

Stream Monitoring Methods Suitable for Citizen Volunteers Working in the Coastal Plain and Lower Piedmont Regions of Virginia

Charles Gowan, Mindy Ruby,
Ryan Knisley, and Lauren Grimmer

Abstract: Citizen volunteers can play an important role in stream monitoring programs, but reliable methods to evaluate ecological condition are often lacking for specific ecoregions of the United States. We developed and validated a stream monitoring method suitable for the coastal plains and lower piedmont regions of Virginia. The Coastal Save Our Streams (SOS) method is based on four metrics (%Ephemeroptera, Plecoptera, and Trichoptera excluding Hydropsychidae; %Coleoptera; %Tolerant; and %Gomphidae) that are each ranked on a scale of 1–6 based on metric values obtained in field samples. This method produces a total SOS score ranging from 0 to 24, with higher values indicating that the stream is increasingly similar to undisturbed streams in the region. Scores from the Coastal SOS method were highly correlated with scores from professional assessments in 13 streams used to develop the method ($r = 0.93$), and an additional 13 used to validate it ($r = 0.91$). We confirmed that trained citizens could successfully use the method in the field, obtaining an unbiased sample of the benthic community and accurately classifying organisms into 21 taxonomic categories needed to use the method. Seasonal and annual variation in scores was relatively high, and so we recommend that citizens collect at least three seasons of data over two years before drawing conclusions about the ecological condition of any particular stream.

In 1987, Virginia, Maryland, New York, Pennsylvania, and the U.S. Environmental Protection Agency (EPA) signed the original Chesapeake Bay Agreement to protect the bay's natural resources

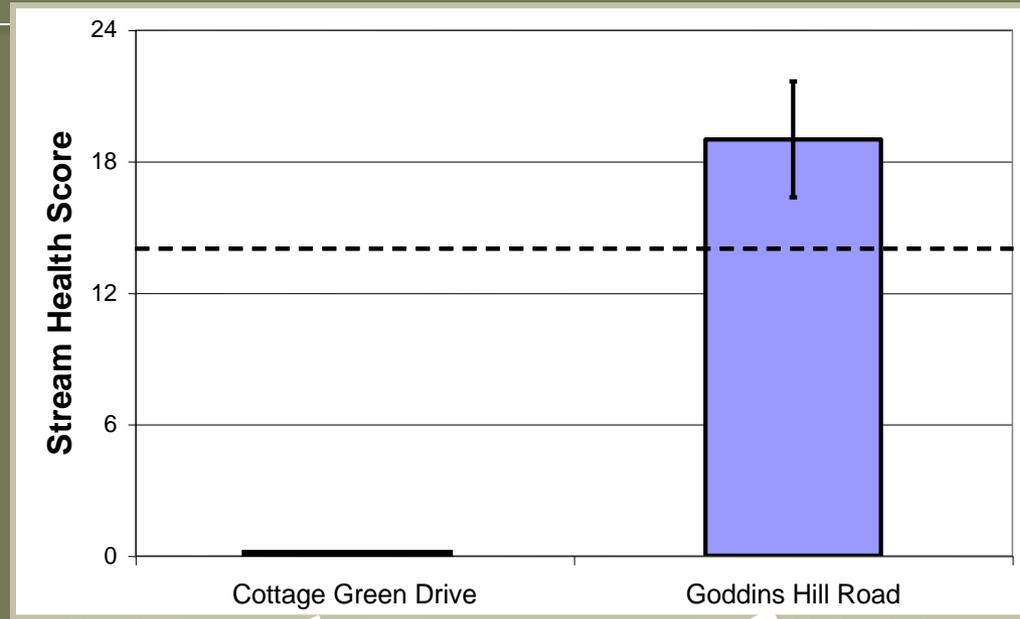
protection and to develop cost-effective monitoring techniques for citizens. The Virginia SOS program was formed in 1988 (Firehock and West 1995) and today, about 220 volunteers monitor ~125 sites on 80 streams (Engel 2000). These volunteers must meet rigorous training requirements, including periodic testing and review of data by a trained biologist to ensure that data are valid and potentially usable by water resource agencies. The Virginia SOS citizen monitoring program was the first to be approved by the U.S. EPA and is a model for methods in many other states (Firehock and West 1995).

Much effort has gone into developing methods that are suitable for use by citizen volunteers working in the Virginia SOS program. Most recently, Engel and Voshell (2002) developed and validated monitoring protocols based on macroinvertebrates. The "SOS method" ranks ecological condition on a scale of 0–12 using six metrics calculated from a sample of invertebrates collected in riffles with a kicknet. Such multimetric indices are widely accepted for monitoring ecological condition in streams and are used by citizens and professionals throughout the United States (Barbour et al. 1992).

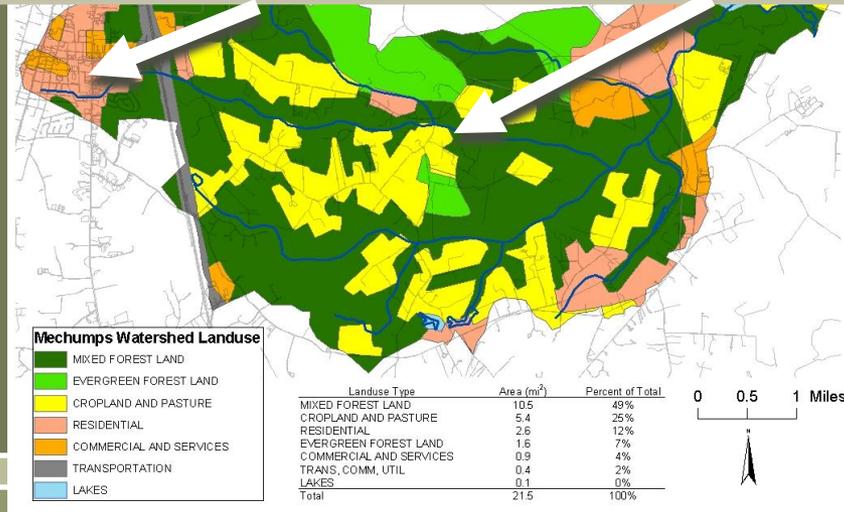
Multimetric indices must be region-specific because the metrics are based on quantitative aspects of the macroinvertebrate community, and these change in different geographical regions (Usseglio-Polatera et al. 2000). EPA has divided the United States into 76 ecoregions according to factors including land use, geology, vegetation, and soils (Omernik and Bailey 1997). Engel and Voshell (2002) developed the Virginia SOS method based primarily on data taken from ecoregions 66 (Blue Ridge) and 67 (Ridge and Valley). Streams in both areas tend to be high-gradient (>2%) with well-developed riffles containing gravel and cobble substrates. But about 3/4 of Virginia



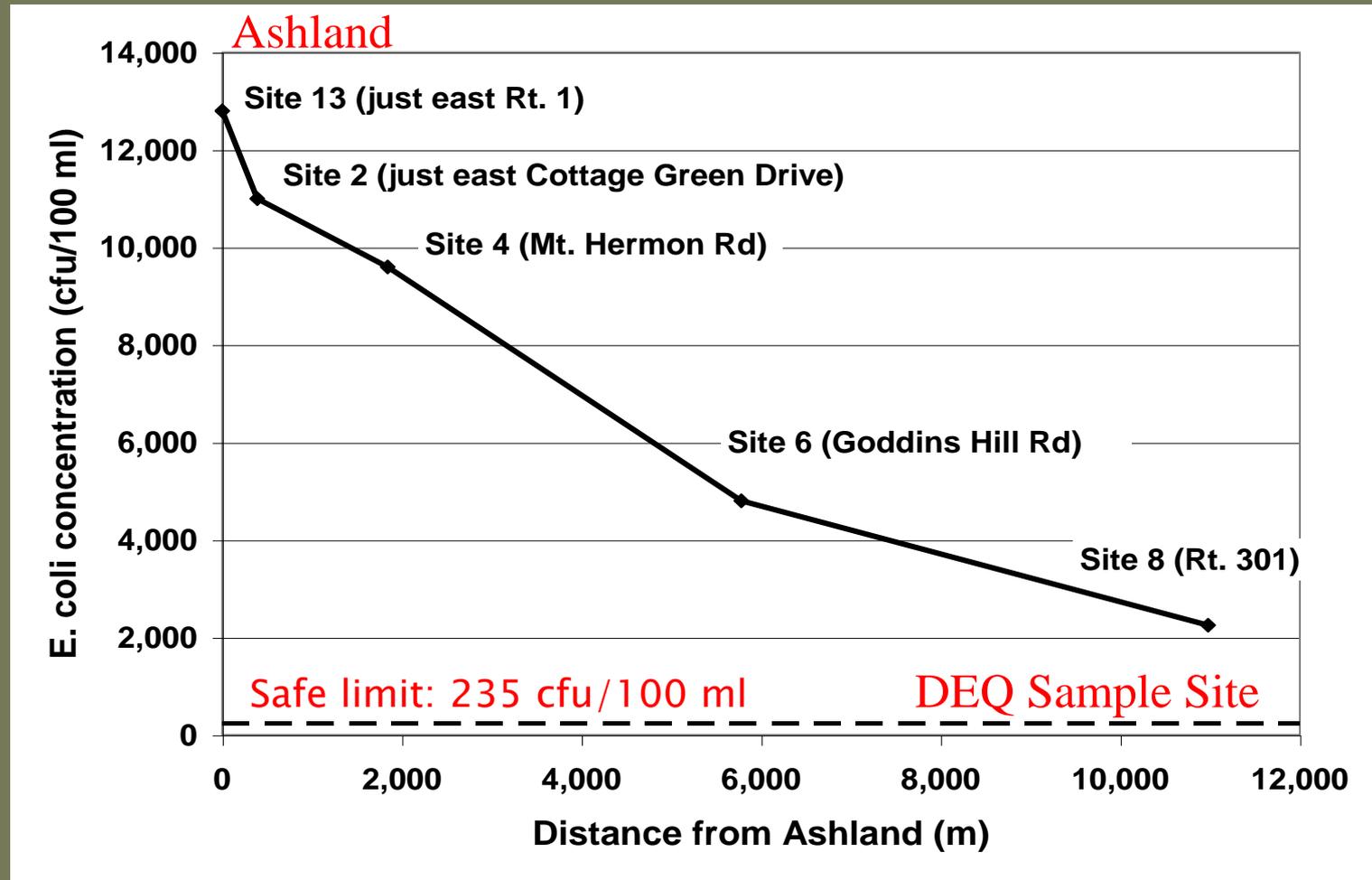
Pre-Project Monitoring: Insects



Ashland



Pre-Project Monitoring: Bacteria



Town Council OKs R-MC pitch to study Mechumps Creek

By **DANA A. FITZWATER**
H-P Staff Writer

Nearly every seat at Town Hall was filled during the Ashland Town Council meeting Tuesday night. The attendees included many young faces, among them Randolph-Macon College freshmen and Patrick Henry High School students. The meeting lasted two and a half hours, 30 minutes of which was devoted to a presentation by R-MC students.

"It's always a delight to have this many people present," said Mayor Faye O. Prichard.

The meeting began with a 25-minute academic presentation from R-MC students enrolled in a First Year Experience course that combines sociology and environmental science.

In a presentation they called *Repairing Nature*, the students proposed to study Mechumps Creek from its natural state to its current condition. They said they would also suggest better methods to maintain the creek.

Freshmen Ashlee McDearmon and Shannon White represented the class and addressed the council members during the presentation as if they were consultants.

Mechumps Creek is an important drainage basin for the town. It drains all the way into the Pamunkey River and into the Chesapeake Bay.

The students said that development and industrialization are

detrimental to the creek. Development alters the hydrology (the cycle of precipitation and evaporation and water flow) of the area. Development has caused the need for more storm drains surrounding the creek because of increased water run-off. In turn, increased sediment is washed into the creek, causing an increase in pollutants entering the water.

Goals of the program are to document existing conditions and evaluate ecosystem health, conduct social mapping of demographic characteristics, and incorporate public policy and the town's comprehensive plan into the program.

The freshmen are working in conjunction with The Williamsburg Environmental Group on this project and there are no funds budgeted. They will complete their research in May 2007 at which time they will leave Ashland Town Council with a comprehensive study of how the creek got to its current condition and what forces will continue to negatively impact the watershed.

The students will supply the town with a list of recommendations of what they can do to restore the creek, including policies they can instigate and what types of funding should be made available for the restoration project.

Town Council approved this proposal to study Mechumps Creek.

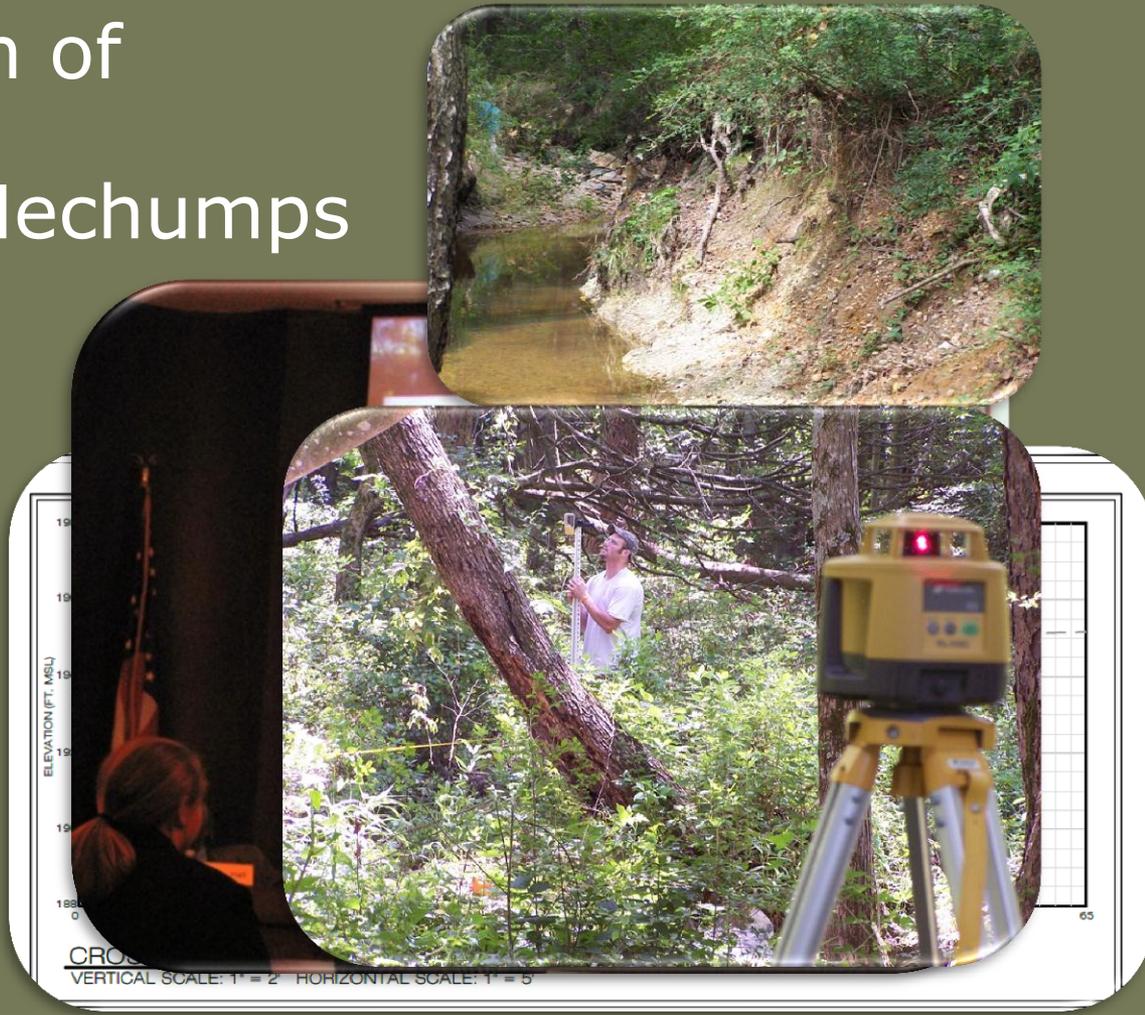
The next phase...

Another course (2006) Repairing Nature



Repairing Nature

- Work with Town of Ashland to plan restoration of Mechumps Creek
- Partner with WEG
- Present plans to Town: \$100K grant
- NFWF grants for \$145K

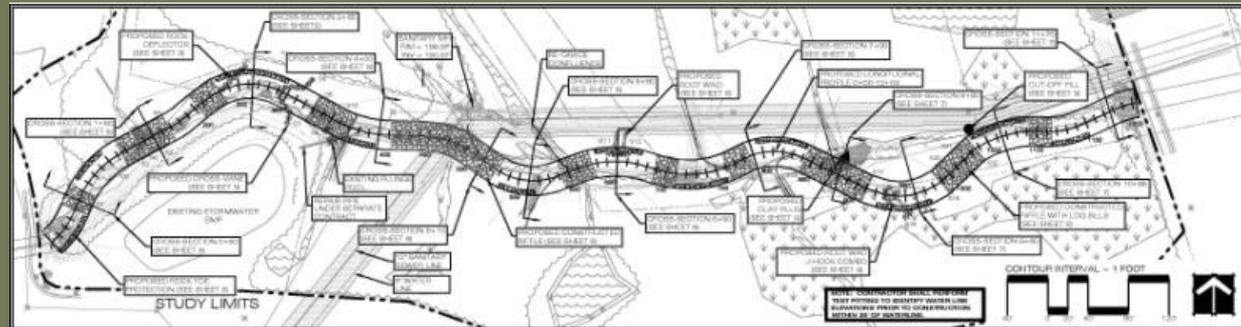
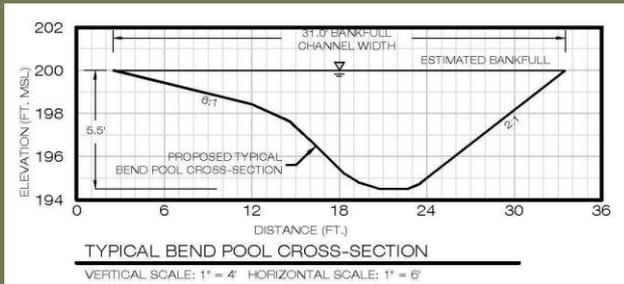
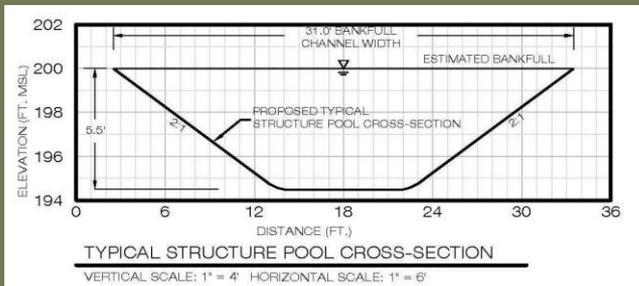
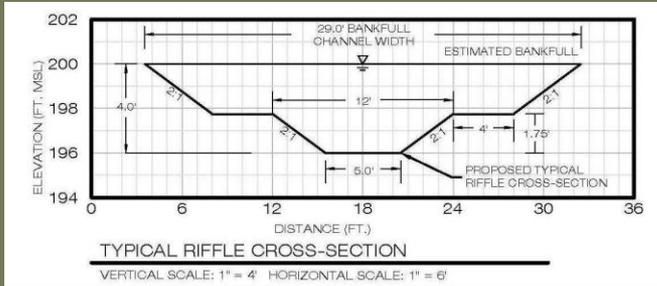


Pre-Construction Goals

- Restore stream form and function that has been degraded due to past land use practices and urbanization.
- Create a stable dimension, pattern and profile
- Increase floodplain connectivity
- Improve sediment transport
- Increase availability of instream habitat
- Enhance existing riparian buffer (Removal of Invasives)
- Improve Water Quality (Nutrient/Bacteria Reduction)



Restoration Design



- Cross-sectional area
 - DA 1.17 Square miles
 - BF = +/- 350 CFS
 - BF Velocity 4.5 +/- F.S.
 - Slope= 0.4%
 - 70 sq.ft. in Riffles
 - 80 - 100 sq.ft. pools
- Rosgen Design
 - B4c (Tight Belt Width, Slope < 2%)
- Constraints:
 - Sewer Easement
 - Adjacent Development
 - Stormwater Infrastructure

Construction

- Const. performed by EQR
- Additional Features:
 - Inner Berm
 - Log Roller Riffles
 - Rootwads
 - Rock Toe Protection
- Cost:
 - Construction: \$135,000 (\$113/ft)
 - Plants: \$6,500 (planted by RMC)



Post Construction (Log Roller Riffles)



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Pre/Post Restoration Stations



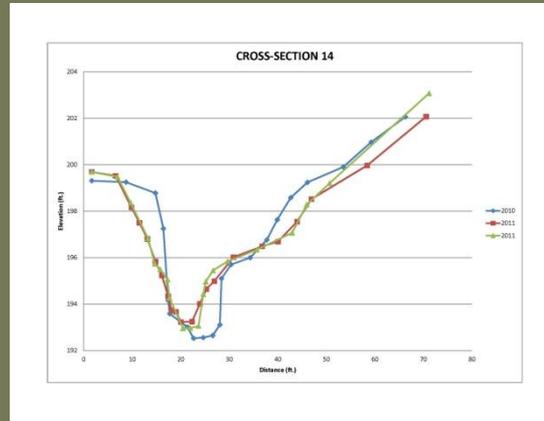
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Post Restoration Monitoring



RMC Students complete Monitoring



- 16 Cross Sections
- Bugs, Fish and WQ
- 10 year program/ class work



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Ashland, Virginia



Storm Events-Ashland, VA



- 30 Year Average: 44"±
- Current 2011 Rainfall (to date): 42"±



- Major Storms in 2011:
 - March 10 – 1.75"
 - July 23 – 2.05"
 - August 28-29 – 3.30"
 - September 6-9 – 4.52"



Monitoring in 2011

3 Areas Totaling 120' (Outerbend Erosion)

- All following toe protection rock (value engineering)
- Contingency money used to repair
- Floodplain soils, vegetation and cohesiveness issues (Rocky/gravel material)

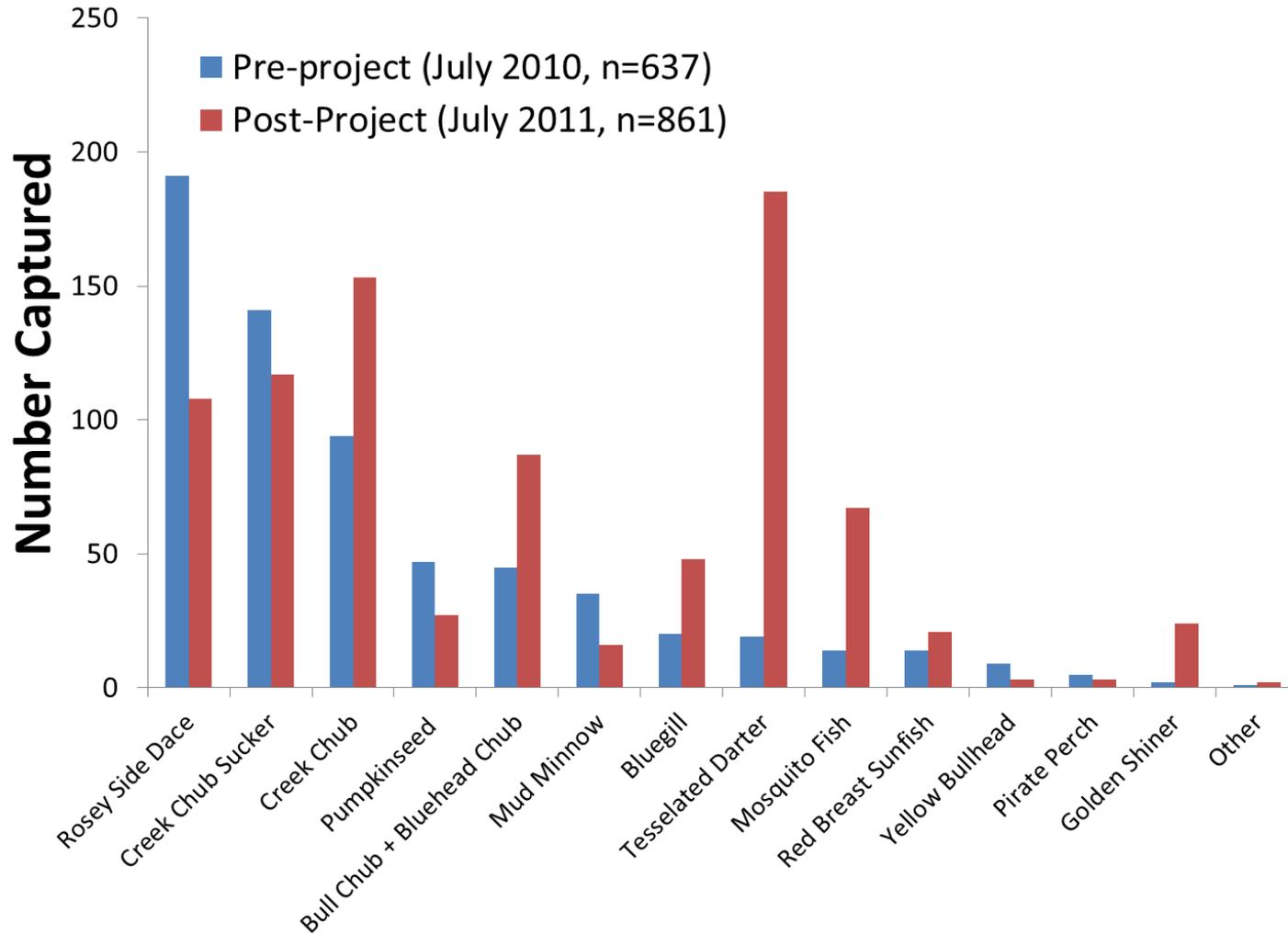


Successful Restoration

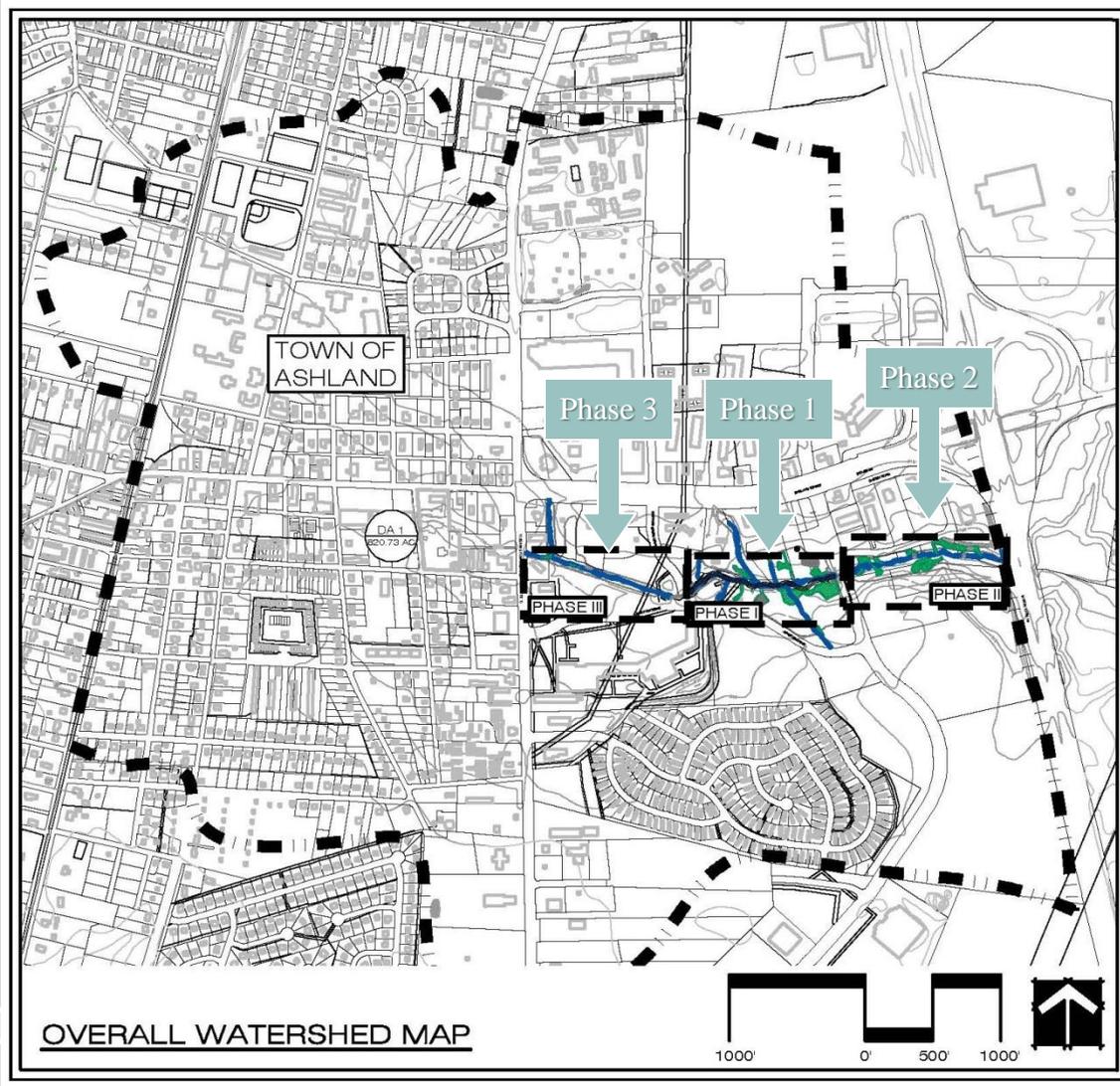
- Live Stake Growth Based on Species (Dogwoods struggled)
- Inner Berm Deposition
- Pool Depth Providing Fish Habitat
- Low Flow Channel Providing Macro Habitat
- Majority of Site Doing Well



Immediate Fish Response



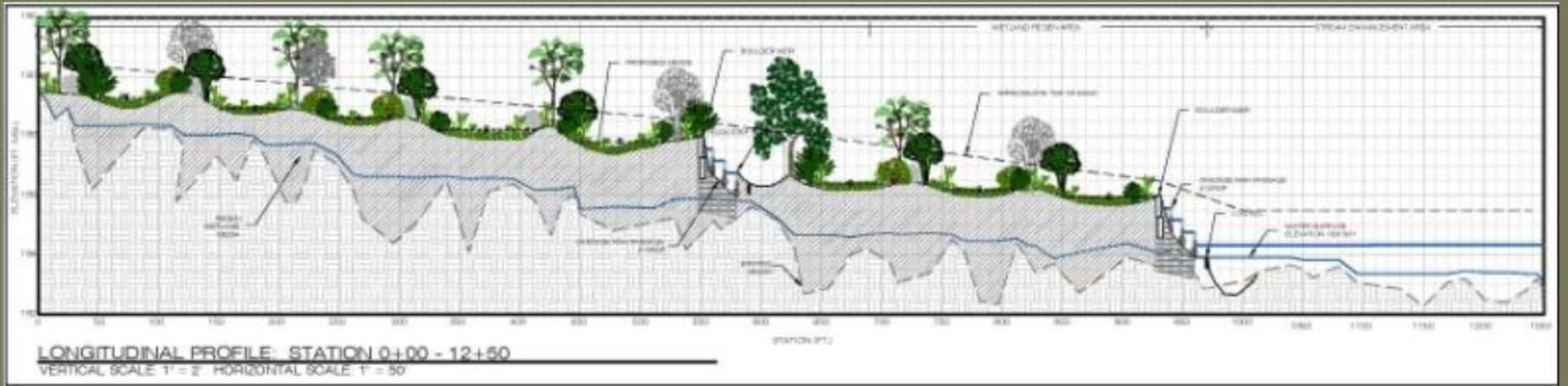
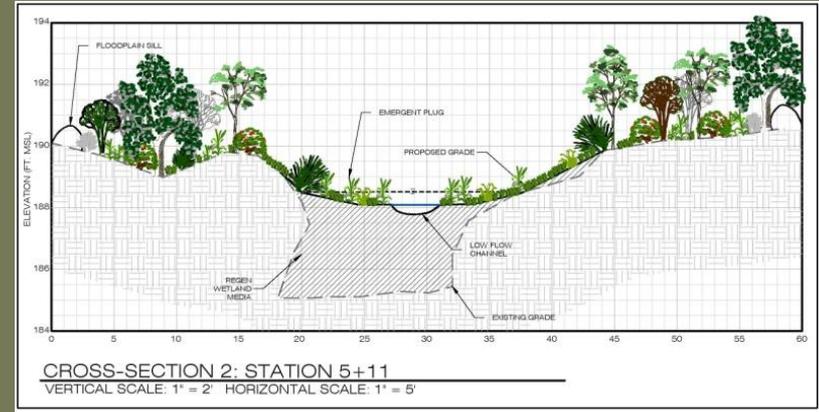
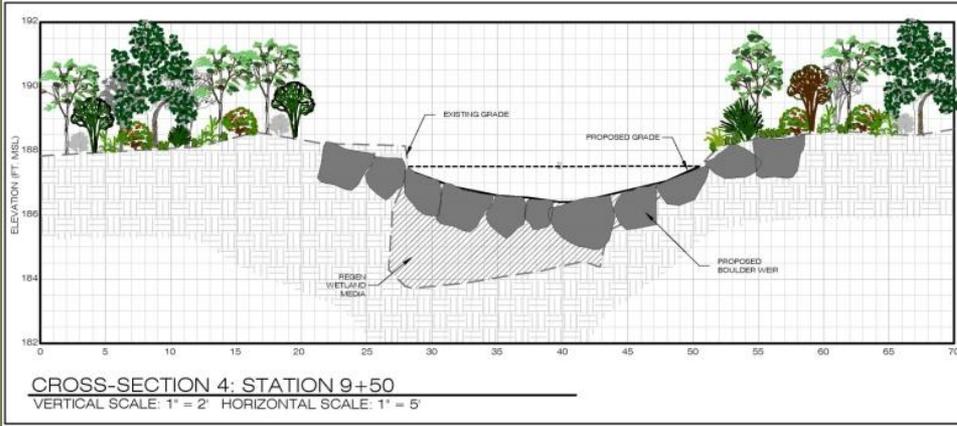
Future Site Plans



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Future Site Plans – Regenerative Stormwater System



Future of Mechumps/Questions

- Future of Phase II
 - Beginning Design of Phase II with limited funding
 - Exploring Grant Opportunities for Completion
- Continued Educational Opportunities
- Public Outreach for Town of Ashland

