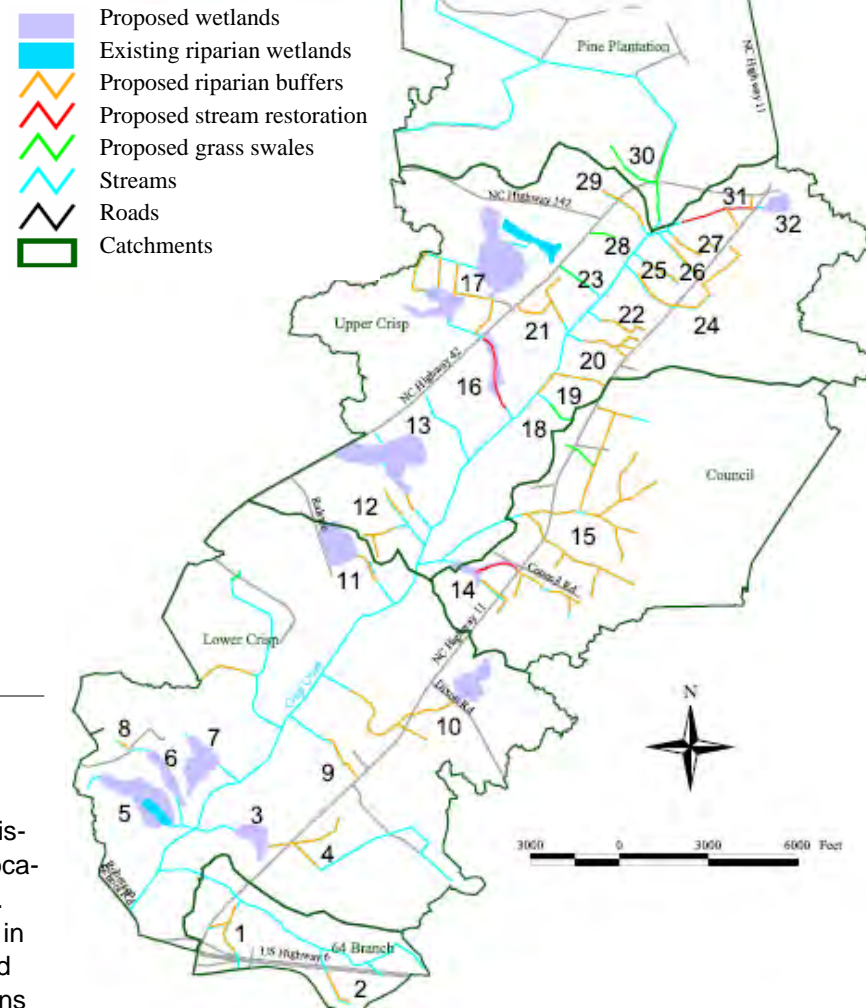


The Site Atlas: A catalogue of potential restoration projects

The watershed assessment results were analyzed to determine potential projects that could help rehabilitate the watershed. The list of potential projects represents the projects found with the techniques and resources available. Projects will only be undertaken if the landowners choose to participate. Some of the projects are located on channels that are under drainage district jurisdiction. These projects must be approved by all upstream landowners and the drainage district board of commissioners.

The 32 projects identified include stream restoration, riparian buffer planting, and wetland restoration. The projects are indicated by numbers on the map below. Full details of each project are available in the Crisp Creek Site Atlas.



Next Steps

NCSU and EEP will work with the Drainage District Commission and landowners to identify locations for one or more demonstrations projects. Project sites are not limited to those identified in the Site Atlas. These projects will be designed and constructed to improve watershed functions while addressing landowners concerns. Projects will be monitored by NCSU for effectiveness.

EEP can fund many of the projects identified in the Site Atlas, although some of the projects may not meet EEP's funding criteria and must be implemented by other parties using other funding sources. Staff from EEP will work with landowners and discuss possibilities for participating in projects.

A CD containing the complete set of watershed plan documents is available from the EEP. The following documents are included:

- Watershed Characterization Report (Jan 2004)
- Watershed Rehabilitation Plan (June 2005)
- Site Atlas (May 2005)

To contact the NC Ecosystem Enhancement Program, call (919) 715-0476 or visit www.nceep.net

For more information about the planning project, visit the Project Website: www.ces.ncsu.edu/WECO/Tar-Pamlico

The following organizations had representatives participate on the Tar-Pam Local Watersheds Group:

City of Greenville Public Works Dept.
 Edgecombe County Drainage District
 Edgecombe Soil & Water Conservation District, and
 Natural Resources Conservation Service (NRCS)
 Edgecombe Cooperative Extension Service
 Edgecombe County Planning Department
 Martin County Natural Resources Conservation Service
 NC Cooperative Extension Service (Edgecombe and Pitt County Centers)
 NC Division of Forest Resources
 NC Division of Water Quality
 NC Wildlife Resources Commission
 Pitt County Planning Dept.
 Southeastern Drainage Office
 Town of Tarboro (Planning, Parks & Recreation, Public Works Depts.)
 Upper Coastal Plain Council of Governments

Crisp Creek Watershed Plan Fact Sheet

About the Watershed Plan

The Ecosystem Enhancement Program (EEP), a non-regulatory program within the NC Department of Environment and Natural Resources, sponsored a local watershed planning project in four watersheds in the middle Tar-Pamlico River Basin. These watersheds drain to Green Mill Run, Cow Swamp, Crisp Creek, and Hendricks Creek. The Watershed plans were completed in 2005.

The watershed plans were developed through a collaborative effort with local governments, resource professionals, and other local stakeholders. This group, called the Tar-Pam Local Watersheds Advisory Group, reviewed the

technical work and provided suggestions and feedback throughout the planning process.

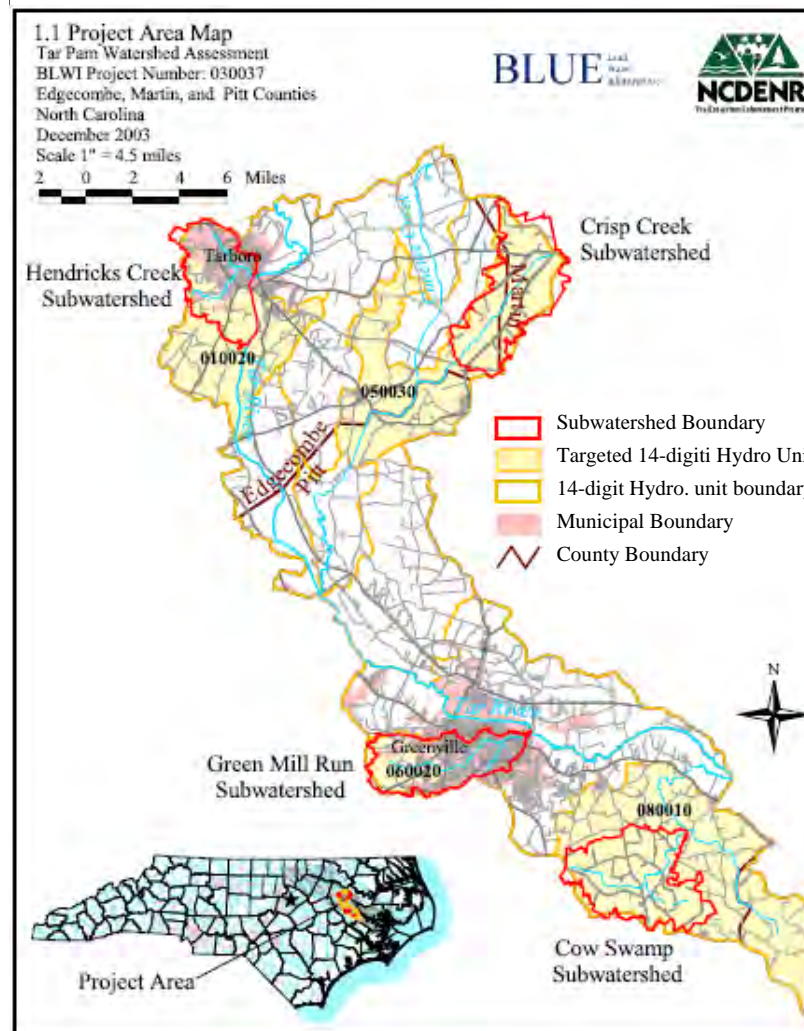
The purpose of the planning process was to assess the health of the watersheds, identify issues that can be addressed through a watershed plan, set priorities, identify watershed protection and restoration projects and eventually secure funding and implement projects in the communities. The recommendations are reflected in reports for each watershed titled **Rehabilitation Plans**, with potential projects identified in the **Site Atlases**. These 2 documents comprise the watershed plans.

BLUE: Land, Water, Infrastructure (BLWI) conducted the technical watershed assessments and developed the Rehabilitation Plans and Site Atlases. Watershed Education for Communities and Local Officials (WECO) at NC State University coordinated public involvement during the process.

This Fact Sheet summarizes the results of this work for the Crisp Creek watershed.

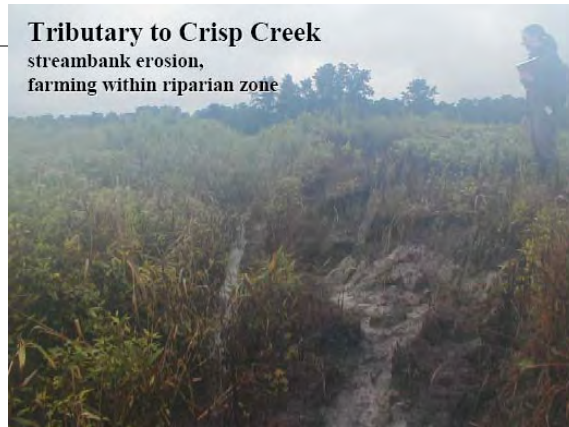
The Crisp Creek watershed is:

- a tributary to Conetoe Creek, which flows into the Tar River. Conetoe Creek is on the state's list of impaired waters (the 303-d list).
- located in Edgecombe and Martin Counties.
- 11,558 acres in size, with 63% in Martin County, and 37% in Edgecombe County.
- consists of land cover that is primarily cultivated and wooded. About 1.6% of the area is developed.
- within the Conetoe Creek legal drainage district.
- subject to environmental regulations, including the Tar-Pamlico Nutrient and Buffer Rules.



Why Crisp Creek?

EEP is charged with finding stream and wetland restoration sites to mitigate for future NCDOT road impacts. The EEP selects areas for local watershed planning that meet the following criteria: NCDOT projects will impact wetlands and streams in the river basin (here it is the Tar-Pamlico River Basin); water bodies in the watersheds are degraded; potential opportunities for improving watershed functions exist; opportunities for achieving mitigation credits through qualifying restoration projects exist; and local citizens express interest in participating. In addition, Crisp Creek provides a unique learning opportunity for working in an area under the jurisdiction of a Drainage District. The watershed plan could potentially serve as a model for improving other eastern NC watersheds.



Tributary to Crisp Creek
streambank erosion,
farming within riparian zone

The Watershed Characterization and Stakeholder Involvement

The watershed characterization compiled existing data and information, such as that found in land use plans, water quality reports, floodplain maps. Much of the work involved using Geographic Information System (GIS) mapping techniques.

The analysis looked at:

- Sediment and nutrient movement in the watersheds
- State of stream buffers
- Wetlands- existing and altered
- Land use/land cover
- Population
- Water quality and flooding
- Regulations

This report outlined general subwatershed statistics such as historical trends and watershed functions, as well as possible solutions to the problems identified by the analysis.

As BLWI completed the characterization, WECO interviewed local stakeholders to learn issues of concern and identify

who would want to participate on the Tar-Pamlico Local Watersheds Group. The Group's first task was to review the characterization, and then to review a map of the watershed to indicate areas of concern or interest. This information was used to determine where to further investigate watershed conditions and select project sites.

The Group also discussed how they wanted the watershed to function. Their concerns were considered in the goals and objectives of the watershed plan (goals are in table 1.1 in the Rehabilitation Plan). Overall, the goal is to improve the functions of the watershed while considering development and agriculture. The plan aims to protect and improve water quality, aquatic habitat, terrestrial habitat, and baseflow and flood prevention.

With this information in hand, BLWI conducted the next phase of the watershed assessment, gathering information, then analyzing this information to result in a Rehabilitation Plan.

Gathering Information for the Rehabilitation Plan

The following tasks were used to gather and analyze information for the Rehabilitation Plan. The results were analyzed to determine how to rehabilitate the Crisp Creek Watershed.

Land Use Trending: Used GIS computer mapping (geographic information systems) areas of land use change and potential future changes was investigated.

Coastal plain stream assessment: The condition of each stream reach was evaluated relative to unaltered reaches of the same type. Riparian (streamside) ecosystem functioning depends upon the condition of the stream itself, which incorporates onsite and upstream influences, and upon the condition of its adjacent riparian zone.

Habitat analysis: Habitat was analyzed using NCCREWS (North Carolina Coastal Region Evaluation of Wetland Significance) and comparing to the land use data.

Watershed Modeling: A mathematical representation of land uses and impacts on water quality in the watershed was created to assess the relative pollutant removal performance of proposed structural stormwater Best Management Practices (BMPs) and restoration projects.

A HEALTHY WATERSHED NATURALLY PROVIDES MANY FUNCTIONS, INCLUDING WILDLIFE HABITAT, MAINTAINING BASE WATER FLOWS IN STREAMS, FLOOD CONTROL, AND PROCESSING POTENTIAL POLLUTANTS TO PROVIDE CLEAN WATER.

Rehabilitation Plan Conclusions

Crisp Creek is an agricultural watershed with an immense network of unbuffered ditches and channels. Other than runoff from US Highway 64, development is not an issue in the Crisp Creek watershed due to a declining trend in population. Watershed functions have been severely impacted with the removal of native forest, the draining of wetlands, and the straightening of channels.

There is limited opportunity for traditional restoration projects on larger channels. The proposed projects will be difficult to implement unless an agreement is reached with the drainage district and landowners. Alternative ways to improve water quality and hydrology should be evaluated (NCSU will develop alternative demonstration projects.).

Streams were determined to be unbuffered using aerial im-

agery, the land cover analysis, and stream assessments in the field. Buffers have been recommended for all of the unbuffered streams. It is likely that grass buffers will be more beneficial in some of the reaches where woody buffers are suggested. Any stream reach should be analyzed before installing buffers to determine if a grass or woody buffer is more appropriate.

The drainage network in Crisp is very extensive and many ditches were not included in this assessment. To improve water quality, buffers and other BMPs should also be installed along these secondary ditches. Potentially, projects in the headwaters, where many of the secondary ditches are found, will treat the water before it gets to Crisp Creek and lessen the downstream inputs to the 303-d listed Conetoe Creek.

Special Considerations for Rehabilitating Agricultural Watersheds

Recognizing the unique circumstances facing rehabilitation of working agricultural watersheds in eastern NC, EEP has partnered with NC State University Cooperative Extension to help in the next step of the watershed plan. Faculty in the Department of Biological and Agricultural Engineering (BAE) will work with the Drainage Commission, county Cooperative Extension, Edgecombe & Martin Soil & Water Conservation Districts and other watershed residents to identify sites for demonstration projects, design, construct and monitor these demonstration projects.

According to Robert Evans, NCSU Dept. BAE, Conetoe Creek and its tributaries have been modified several times over the years to improve drainage and mosquito problems. Although water management is still an important aspect of managing the land for agriculture, we've

discovered that other functions besides draining water from the land are important for a healthy watershed.

The channelization of streams and tributaries in eastern NC has resulted in mixed consequences. Although it reduced the frequency and duration of flooding and increased agricultural productivity, it also altered adjacent wetlands and reduced the ability of the land to store flood waters, absorb pollutants, and provide habitat for fish and other wildlife.

NCSU researchers have found methods of altering channels to function more closely to how they would in a natural system. In this case, restoration of a stream is not intended to repair the stream and riparian floodplain to how it looked before human activity altered it, but to restore it to a stable system with natural functions.

EEP and NCSU believe that it is possible to improve floodplain storage, wildlife habitat, and nutrient removal while also managing the land for productive agricultural uses!

Opportunities to participate in demonstration projects in the Crisp Creek watershed will be available, with funding for conservation easements provided by EEP. The community will be provided with information as the projects proceed.

For more information, contact Christy Perrin, NCSU, at (919) 515-4542, Robert Evans, NCSU at (919) 515-6788, or Rob Breeding, EEP, at (919) 733-5311.

