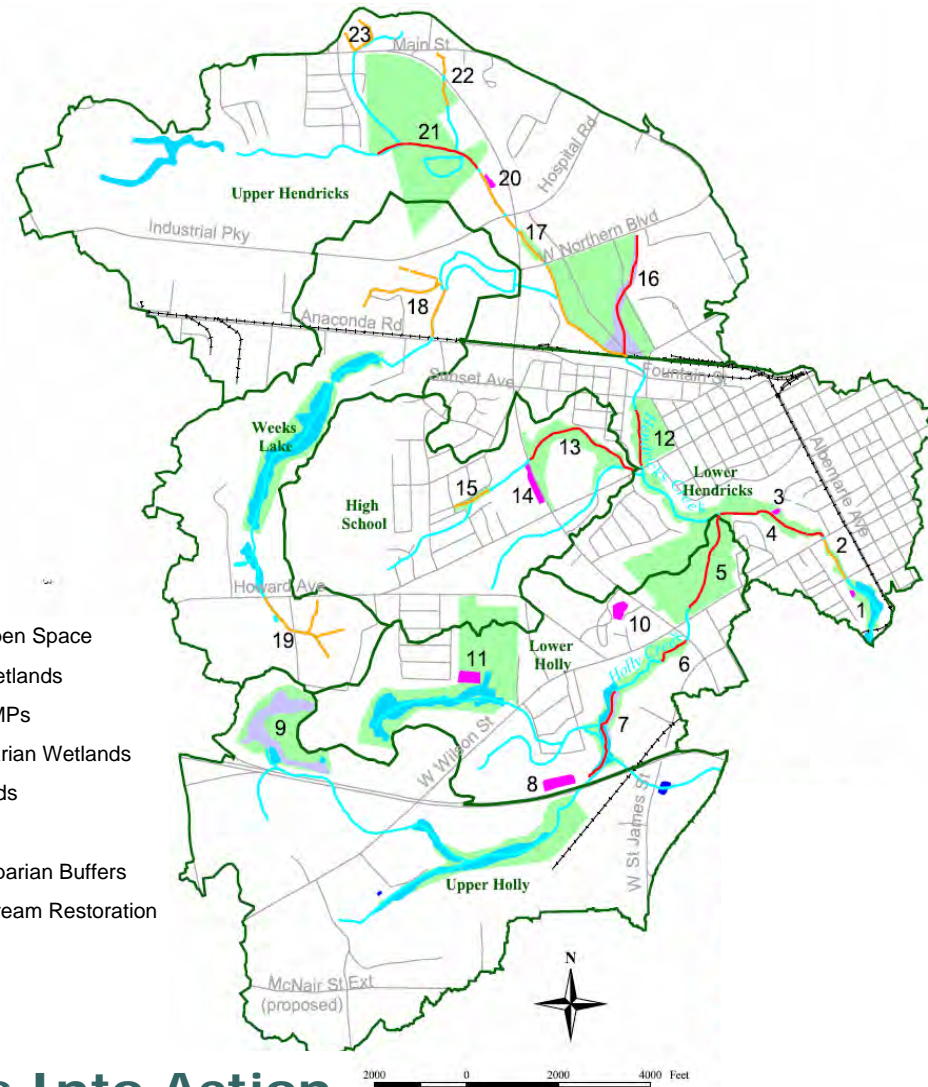


## The Site Atlas: A catalogue of potential restoration projects

The watershed assessment results were analyzed to determine potential projects that could help rehabilitate each catchment. The list of potential projects is not exhaustive, but represents the projects found with the techniques and resources available for the planning process. The projects identified are based on ideal conditions for meeting the watershed goals. They will be implemented if the landowners choose to participate.

The 23 projects identified include stream restoration, riparian buffer planting, wetland restoration, stormwater wetlands and bioretention. The projects are indicated by numbers on the map below. Full details of each project are available in the Hendrick's Creek Site Atlas.

- Proposed Open Space
- Proposed Wetlands
- Proposed BMPs
- Existing Riparian Wetlands
- Existing Ponds
- Catchments
- Proposed Riparian Buffers
- Proposed Stream Restoration
- Streams
- Roads
- Railroads



## Putting the Plans Into Action

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. Other possible projects that could help the watershed may still be identified. A staff member from EEP will work with watershed team members to meet 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](http://www.nceep.net)

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

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

- City of Greenville Public Works Dept.
- Edgecombe County Drainage District
- Edgecombe Soil & Water Conservation District, and 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

# Hendricks Creek Watershed Plan Summary

## 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 Hendricks Creek watershed.

## The Hendrick's Creek watershed is:

- a tributary to the Tar River.
- located in the Town of Tarboro, and Edgecombe County.
- 12.5 square miles (7,975 acres), with 83% within Tarboro, and 17% in the county.
- land cover in the subwatershed primarily cultivated and wooded. About 20% of the area is developed.
- developing, albeit slowly.
- characterized by 17% impervious cover, land that does not absorb rain water such as roofs and roads. Catchments range from 5-36% imperviousness. Imperviousness >10% in a watershed is associated with stream degradation.
- subject to environmental regulations, including the Tar-Pamlico Nutrient and Buffer Rules.



## Why Hendrick's Creek?

EEP is charged with finding stream and wetland restoration sites to mitigate for future NCDOT road impacts, as well as mitigating for Tar-Pamlico Riparian Buffer offset payments. 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.

**Hendricks Creek**  
straightened and unbuffered



## The Watershed Characterization

The first step of the watershed assessment was a characterization of the watershed using 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. Hendrick's Creek watershed was divided into 6 subcatchments for analysis.

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

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

The following stressors that impact the watershed were found:

- Deeply channelized/unbuffered streams
- Agriculture crops in the riparian zones
- Drained wetlands

- Untreated stormwater inputs to streams

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.

As the percent IS increases over 10% in a watershed, the level of stream quality decreases (although degradation can still occur with low IS). Geographic Information System (GIS) mapping using satellite imagery was used to conduct the trending analysis. Catchments in Hendricks Creek ranged from 5-39% impervious surface, with increases up to 40% expected in all catchments as development proceeds.

**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.**

## 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 the projects that would help rehabilitate each of the six catchments. These projects are summarized on page four.

**Land Use Trending:** Land use / land cover (LULC) has a major influence on watershed function. Areas of land use change can cause watershed function degradation. Goals were to establish a growth pattern to predict future growth areas so that steps can be taken now to alleviate future growth-related impacts to watershed health, and to quantify the amount of impervious surface (IS) in the watershed.

## Gathering Information for the Rehabilitation Plan

**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. The condition of the riparian zone and the stream channel were evaluated using 8-9 indicators of riparian condition for each reach.

Each stream reach was provided a score, higher scores indicating better condition. The possible conditions, with the percentage of each type found in Hendricks creek watershed include:

- relatively unaltered (85-100):* 4%
- somewhat altered (55-84):* 44%
- altered (25-54):* 48%
- severely altered (0-24):* 4%

Overall the watershed scored an average of 62 out of 100.

**Habitat analysis:** Habitat was analyzed using NCCREWS (North Carolina Coastal Region Evaluation of Wetland Significance) and comparing to the LULC data. The majority of the land area in Hendricks has been developed or is used for agriculture. The natural communities and habitats in these areas have been destroyed or are degraded. The forests provide a less altered habitat, although only 33% of the watershed is forest and these areas are subject to harvesting.

The best habitat is likely found in wetlands, particularly those not altered. A maximum of 115 acres is estimated as potentially high quality habitat (1.4% of watershed). Drained wetlands and pine plantations may provide shelter and some food but are not considered high quality habitat.

**Watershed modeling:** The "MUSIC" model (Model for Urban Stormwater Improvement Conceptualization) provided a mathematical representation of land uses and impacts on water quality in the watershed. The goal was to assess the relative pollutant removal performance of proposed structural stormwater Best Management Practices (BMPs) and restoration projects. Inputs into the model include local water quality data, percentages of impervious surface, properties of soil, infiltration, and other parameters.

BLWI calculated pollutant removal for two scenarios, to estimate the impacts of targeting different projects:

1. Implement all projects with 3 or fewer landowners
2. Implement all projects.

Scenario (2) produced the most substantial water quality improvement while the other scenario showed a much lesser degree of improvement.

Table 1: Pollution Removal for proposed projects

	% Total Suspended	% Total nitrogen	% Total phosphorus
All Projects	85%	73%	55%
Projects with ≤ 3 owners	13%	28%	19%
Projects on public property	0%	4%	3%

The estimated pollutant removal rates are significantly reduced in the "3 or less property owners" and "only public property" simulation scenarios. Thus, projects must be implemented on multiple private properties with multiple landowners for significant pollutant removal rates to be realized. This is generally the case in most areas of the watershed.

## Rehabilitation Plan Conclusions

In Hendricks Creek, the low order (headwater) streams are currently in relatively good shape and should be preserved as open space wherever possible. The higher order (downstream) streams scored lower and recommendations are being made for stream restoration on a large portion of those streams. It appears that stormwater runoff from US 64 has had a major impact on channel degradation in Holly Creek. However, the watershed is not urbanizing quickly and there is still room for restoration projects.

The slow, but steady growth in the Tarboro area provides an opportunity to prevent additional watershed degradation by preserving open space, and requiring stormwater treatment of new development.

