

# Riparian Corridor Conservation Plans For Fishing and Swift Creeks

Edgecombe, Franklin, Halifax, Nash, Vance and Warren Counties  
North Carolina



**Prepared by:**



**As A Final Report To:**

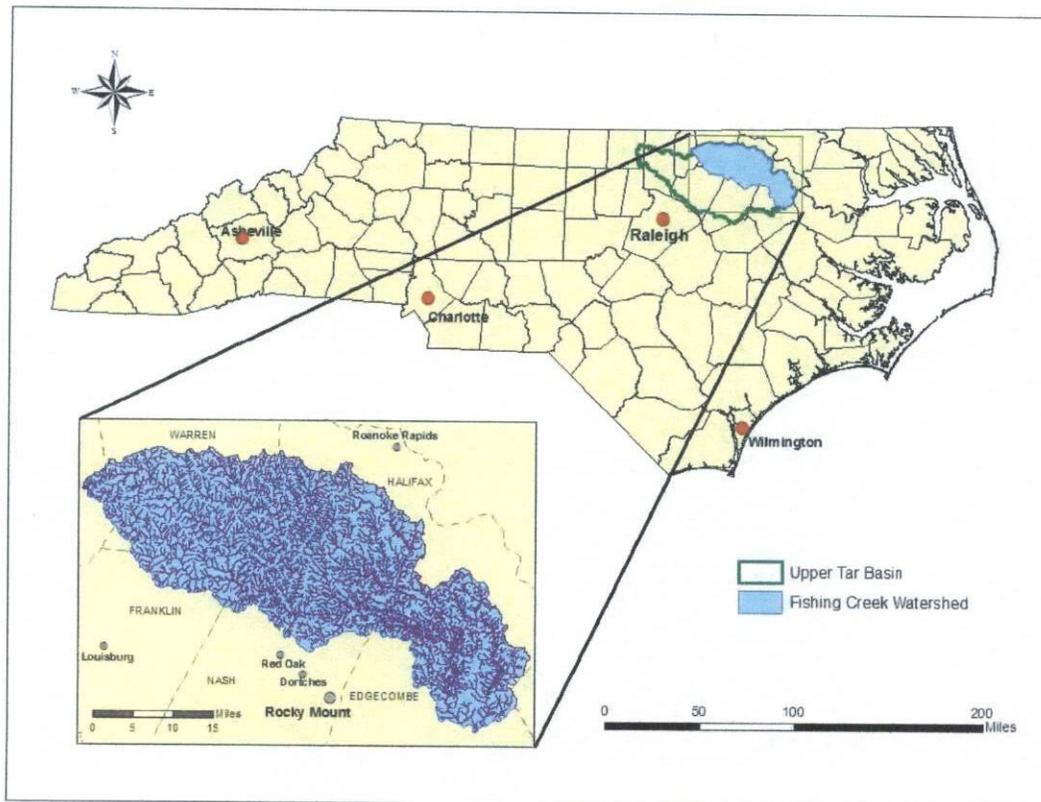
*State of North Carolina  
Department of Justice  
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**Introduction:**

Fishing Creek is located within subbasin 03-03-04 of the Tar River Basin. With its headwaters beginning in Vance County, Fishing Creek and its tributaries meander through Nash, Warren, Franklin, Halifax and Edgecombe Counties before joining the Tar River near Tarboro (Figure 1).

Fishing Creek begins in Vance County and has its confluence with the Tar River near the Town of Tarboro. The watershed is primarily in the Northern Outer Piedmont and Rolling Coastal Plain ecoregions; a smaller southeastern portion is in the Southeastern Floodplains and Low Terraces ecoregion. This watershed has a high potential for nonpoint source pollution, especially from croplands and animal operations (USDA, 1995.) The Towns of Warrenton and Enfield are the only urban areas. Approximately three fourths of the watershed is still forested; the remainder is cultivated crops and pastureland.



**Figure 1: Fishing Creek Watershed Location Map**



### **Purpose and Outline:**

This report is intended to act as an update to the existing Riparian Corridor Conservation Design Plan for the Fishing Creek sub-basin area in Franklin, Vance, Halifax, Edgecombe, Nash and Warren counties. The goal of the Fishing Creek Conservation Design Plan is to identify priority parcels of land on which to focus land protection and restoration efforts. This Plan enables TRLC to proceed towards subsequent conservation objectives of coordinating landowner visits and facilitating the protection of land.

Geographic information system (GIS) analysis was used as the primary tool in characterizing the land use and restoration and conservation potential within the Fishing Creek watershed. In addition, field visits were conducted to familiarize staff with the area and to verify the results of the GIS analysis. The ultimate product from the plan will be a targeted list of properties from which the Tar River Land Conservancy and cooperating organizations can focus their future conservation efforts within the Fishing Creek watershed.

### **Methodology:**

**Base Data Gathering:** Evaluation of the landscape along Fishing Creek and its tributaries was conducted using a combination of GIS and field verification. GIS analysis was conducted at the tax parcel scale and utilized several different data sources including county tax parcel data, hydrology, Natural Heritage Program data, Wildlife Resources Commission data, State Historic Resource data, soils, existing conservation lands in the watershed and aerial photography. A field verification exercise using GPS and a digital camera was performed to verify results from the GIS analysis and provide documentation of existing land cover types and land use taking place within the watershed.

**Conservation Zones:** The initial step in the GIS analysis was the creation of two conservation zones. Each conservation zone contains only parcels that are 35 acres or greater in area, and are adjacent to or contain portions of named streams within the watershed. Prior to selecting parcels greater than 35 acres, a dissolve function was performed on the parcel layer using the Name, Address, Zip Code, and Parcel Identification Number (PIN) fields as criteria. Using the dissolve function allowed parcels that may have been split by a road or that were less than 35 acres to be combined if the attributes between one parcel were exactly the same as the attributes of another parcel. In some cases, two parcels less than 35 acres were combined to form one parcel greater than 35 acres. Parcels meeting the  $\geq 35$  acre criteria were then analyzed based on whether or not they were adjacent to or contained part of Fishing Creek or a named stream. Parcels not adjacent to a stream were removed from the database.

Parcels meeting both the acreage and stream frontage criteria were placed into two zones based upon their location within the watershed. Zone A includes parcels adjacent to or containing a portion of Fishing Creek. Zone B includes parcels adjacent to or containing portions of a named stream (Bear Swamp, Beaverdam Swamp, Beech Swamp, Bens Creek, Big Branch, Black Branch, Black Swamp, Bobbitts Branch, Bobs Creek, Breeches Swamp, Bridle Creek, Buffalo Branch, Buffalo Creek, Burnt Coat Swamp, Butterwood

Creek, Buzzard Branch, Cabin Branch, Canal Creek, Cow Haul Swamp, Crooked Swamp, Deep Creek, Dog Pond Branch, Downtins Creek, Enon Branch, Fishing Creek, Gum Pond Branch, Gunters Creek, Hogpen Creek, Horse Creek, Horsepen Branch, Indian Branch, Ingram Branch, Isinglass Creek, Jack Horse Swamp, Jacket Swamp, Lees Branch, Little Fishing Creek, Little Shocco Creek, Long Branch, Maple Branch, Maple Swamp, Marsh Swamp, Martins Swamp, Matthews Creek, Mill Branch, Mill Swamp, Moore Swamp, Owens Creek, Phoebes Creek, Pope Branch, Porter Creek, Possumquarter Creek, Powells Creek, Race Prong, Reedy Branch, Reedy Creek, Richneck Creek, Rocky Creek, Rocky Swamp, Savage Mill Run, Shocco Creek, Turkey Branch, Walker's Creek, Whiteoak Swamp, and Wolfpit Branch). However, parcels adjacent to or containing a named stream that were already assigned to Zone A, were not assigned to Zone B. Figure 3 illustrates how parcels were placed in a Zone.

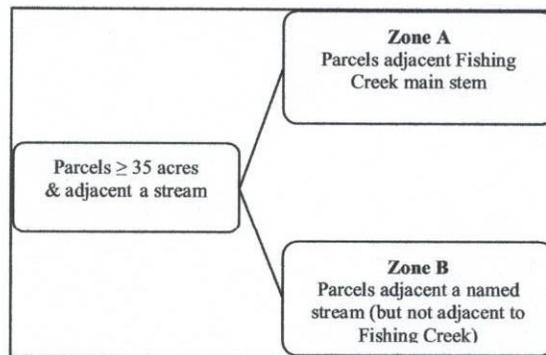


Figure 3. Flowchart Describing Parcel Zones

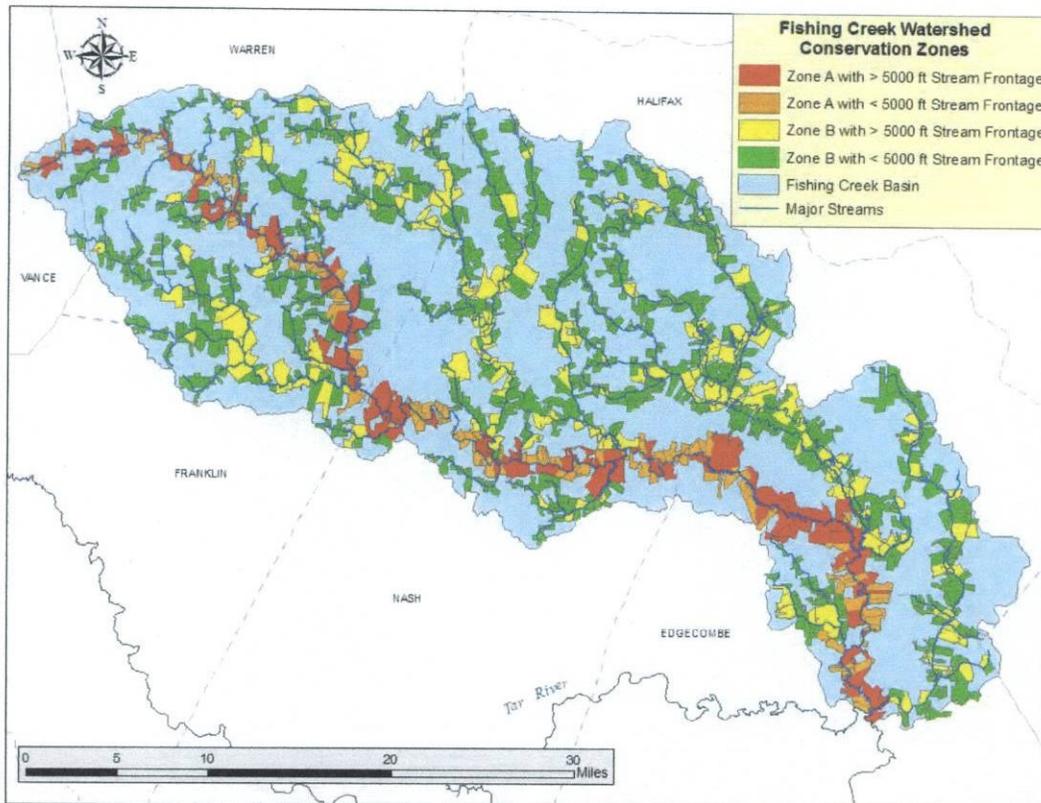


Figure 4. Parcels Classified by Zone and Stream Frontage in the Fishing Creek Watershed

**Stream Frontage:** Stream frontage was calculated for each conservation zone parcel. Many parcels have a portion of their boundary that follows the centerline of a stream, but due to discrepancies between datasets, parcel boundaries and streams did not always match up exactly. To account for the potential differences between the streams and parcel boundaries, the parcels were buffered by 100-ft. Streams were clipped by the buffered parcel layer and the stream length within each parcel was calculated. Parcels with less than 1,000 stream feet were removed from the database.

**Rare Species:** Several rare and endangered species are found within the Fishing Creek watershed. To account for an occurrence within a particular conservation zone parcel a spatial join was performed using the NC Natural Heritage Program Element Occurrence (NHEO) database and the NC Wildlife Resources Commission (WRC) databases of sampling results for mussels, fish and crayfish. Occurrences with an uncertainty distance between 0 – 500 meters were selected. Occurrences with a uncertainty distance greater than 500 meters were determined to be too inaccurate and were not included in the analysis. The NHEO database was buffered by the uncertainty distance (UNCRT\_DIS) field within the NHEO attribute table. The WRC database was queried to select records of rare or endangered species and new shapefiles of the selected results were created. The rare and endangered WRC shapefiles were buffered by 500-m to account for any potential uncertainties in the data collection. Performing the spatial join added a count field to the conservation zone parcel attribute table. Another field was added with a

YES/NO value inserted depending upon whether or not the parcel contained an occurrence.

**Cultural Resources:** Three cultural resources databases were examined to determine whether or not such resources were located within any of the conservation zones. Databases of national and state listed historic features and a database of potentially significant historic sites which are not yet on any register, but are to be considered for future historic site listings were evaluated. These resources were evaluated using the same methodology as that used for identifying rare species within each conservation zone parcel. A YES/NO indicator was inserted for each feature within a column in the conservation zones attribute table.

**Prime and Statewide Important Soils:** Soils data were evaluated to determine the percentage of prime or statewide important soils within each conservation zone parcel. Soils types were classified as prime, statewide important or other based on a list of prime and statewide important soils provided by the North Carolina Natural Resources Conservation Service (NRCS). Digital soils data were not available for Vance or Warren Counties at the time of this analysis.

A field was added to the soils database attribute table to input the prime or statewide important classification. The soils database was queried for prime and statewide important soils and a new shapefile of prime and important soils was created. Polygon-in-polygon analysis was conducted using Hawthorne's Analysis Tool inputting the prime and statewide important soils database and the parcel database. Area of prime and important soils was calculated for each parcel and a new field was added to the conservation zones attribute table to calculate acreage. Percentage of prime and important soils was calculated by dividing the prime and important soils acreage by the total parcel acreage.

**Wetlands:** Conservation zone parcels containing wetlands were identified by using the National Wetlands Inventory (NWI) database. The same methodology used for evaluating the occurrence of rare species and cultural resources within a parcel was used to determine whether a parcel contained wetlands. A column was added to the conservation zones database with a YES/NO indicator inserted for each record.

**Existing Conservation Easements:** Several state and federal programs have existing conservation easements on properties within the Upper Tar River Basin including the Fishing Creek watershed. Building upon the conservation work of other agencies is valuable in order to maximize limited funding available for conservation efforts and in order to create a network of protected lands that will conserve and enhance water quality, wildlife habitat and other natural resources. Currently the US Fish and Wildlife Service (USFWS), The Nature Conservancy and the Pamlico Tar River Foundation each own at least one conservation easement in the Fishing Creek Watershed. In addition, Tar River Land Conservancy has 19 existing conservation easement within the Fishing Creek Watershed.

Parcels were evaluated based upon their proximity to existing conservation easements and whether or not conservation easements already existed within the parcel. Due to discrepancies between the boundaries of existing conservation easements and the parcels within the conservation zones database, a visual analysis was conducted to determine which parcels were adjacent to or already contained a conservation easement within their boundary. Two columns were added to the conservation zones database, one for parcels with existing conservation easements and one for parcels adjacent to existing conservation easements. A YES/NO indicator was added to each record to identify the presence or absence of an existing conservation easement.

**Land Cover Classification:** Parcels were classified by land cover type(s) using a nine category land cover classification system (Tables 3 & 4; Figures 5 – 12). Land cover analysis was performed using visual observation of aerial photography and by performing a “ground truth” exercise in the field using GPS and digital photography. Many parcels did not contain just one land cover type and it was necessary to classify some parcels by primary, secondary and/or tertiary land cover types based on approximate coverage area. Three columns were added to the conservation zones attribute table for primary, secondary and tertiary land cover classification. Small structures, like houses and garages, were given the same land cover characterization as the land which they sat upon because the structures were too small to characterize the land. However, noticeably larger structures, like industrial buildings or schools, were accounted for because their structural footprint was large enough to impact land use more significantly than individual houses.

Table 3: Land Cover Categories Used in Analysis

Land Cover Type	Description
Mature Forest (Hardwood)	Tall stands of trees with a thick canopy
Mature Forest (Pine)	Tall stands of trees with a thick canopy
Wetland (Forested)	Wetlands that maintain significant canopy cover
Wetland (Open)	Wetland with few trees or standing dead trees
Immature Forest (Hardwood)	Shorter stands of trees without a developed canopy
Immature Forest (Pine)	Shorter stands of trees without a developed canopy
Open land	Grazing fields, open grassy fields and cropland
Developed or Clearcut	Parcels possessing large industrial facilities with a footprint significantly larger than homes and normal farm structures. Recent (<10 yr) clearcuts

A numeric ranking was given to each land cover type to populate the conservation zones database. Some of the land cover categories were combined for a total of nine categories used to classify parcels.

**Table 4: Land Cover Characterization Number**

Land Cover	Numerical Class
Mature Forest (Hardwood)	1
Mature Forest (Pine)	2
Wetland (Forested)	3
Wetland (Open)	4
Immature Forest (Hardwood)	5
Immature Forest (Pine)	6
Agricultural/Open land	7
Developed or Clearcut	8
Water	9

**Photo Documentation of Land Cover within the Watershed:**



**Figure 5. Crop Land**



**Figure 6. Mature Forest**



**Figure 7. Wetland**



**Figure 8. Recent Clearcut**

**Buffer Land Cover Classification:** In addition to evaluating land cover at the parcel scale, land cover within the 50 and 300 ft buffer region along all streams was evaluated. By analyzing land cover within the buffer, potential candidates for restoration and reforestation were identified. The same land cover classifications used for the parcel level analysis were used for the buffer analysis (Table 4).

**Photo Documentation of Riparian Buffers within the Watershed:**



**Figure 9. Mature Hardwood Buffer**



**Figure 10. Buffer with Encroaching Development**



**Figure 11. Buffer with Wetland Floodplain**



**Figure 12. Buffer in Pasture**

## **Results:**

GIS analysis resulted in a conservation zones database containing 1327 parcels that met the 35 acre and 1,000 stream feet criteria. Total area covered by all 1327 parcels is approximately 227,110 acres (355 square miles), with approximately 893 miles of stream frontage.

Analysis of the remote sensing land cover classification revealed that the primary land cover type for approximately 18% of the parcels within the conservation zones database is mature hardwood forest or forested wetland, 18% mature pine forest, 2% open wetland, 24% immature forest (pine or hardwood), 29% agriculture/open fields and 9% clear-cut/developed. Analysis of the primary land cover within the buffers within each parcel revealed that approximately 44% of buffers were in mature hardwood forest or forested wetland, 8% mature pine, 15% immature forest (pine or hardwood), 22% open wetland, 4% agriculture/open fields and 7% clear-cut/developed.

Land cover classifications assigned using remote sensing were verified in the field. Approximately 25% of the parcels were observed in the field. Parcel and buffer field verification was mainly limited to parcels with road access and stream crossings. Of the field verified parcels, 95% had the same land cover classification as that assigned during the remote sensing analysis. Approximately 5% of the field verified parcels were either incorrectly interpreted during the remote sensing analysis or changes in land use had altered the land cover.

The stream frontage calculation provided a rough estimate of the total stream lengths contained within each parcel. Out of 1327 parcels evaluated, 245 have over 5,000 feet of stream frontage, while 1082 have between 1,000 and 5,000 feet of frontage.

The presence of NWI wetlands, significant natural and cultural resources, prime and statewide important soils and proximity to existing conservation easements does not weigh as heavily as parcel size, location and stream frontage in the process of parcel evaluation, but were noted because of their relative importance to land conservation and riparian protection. In addition, these pieces of information may be useful for future evaluation when determining which parcels may be eligible for certain funding sources.

Locations where NWI wetlands are found mostly overlap stream corridors, which are already being focused on for this study. The presence of significant cultural resources is minimal within the watershed. No National or State listed sites are located within the conservation zones parcels. However, several sites with the potential to become registered as historically significant in the future are located within a few of the parcels. Several rare, threatened and/or endangered plants, animals and natural communities have been documented within a number of the conservation zones parcels. Since these records were buffered by an uncertainty distance, the actual location of these resources may fall outside of the parcel boundaries. Evaluation of the soils within each parcel reveals that approximately 51% of the parcels contain more than 50% prime or statewide important soils, thus potentially making them eligible for certain conservation funding sources.

Assessment of existing conservation easements within the watershed revealed that 17 parcels are already encumbered by a conservation easement. In addition, several conservation zone parcels were found to be adjacent to existing conservation easements, which may provide a foundation upon which to build a network of conservation lands.

The database can be used to rank parcels according to conservation demands. For example, in evaluating parcels with forested buffers that benefit water quality and/or endangered aquatic species the following ranking scheme might be applied. The criteria shown in Table 5 were used to rank parcels and generate the map shown in Figure 13. In this scenario a parcel with a rank of 1 has greater than 2500 ft of stream frontage, is primarily forested with hardwoods within the 300 ft buffer, is near at least one Natural Heritage Element Occurrence, and is in Conservation Zone A (has stream frontage along the main stem of Fishing Creek). Only 48 of the 1327 parcels fulfill these criteria, but these 48 parcels have a disproportionately greater importance for protection of water quality and/or endangered aquatic species than an equal number of randomly selected parcels.

Rank	Primary Buffer Cover	Natural Heritage Element Occurrence	Zone	Stream frontage	# of parcels
1	1 or 3	Yes	A	> 2500 ft	48
2	2	Yes	A	> 2500 ft	7
3	1 or 3	Yes	B	> 2500 ft	59
4	2	Yes	B	> 2500 ft	7
5	1 or 3	No	A	> 2500 ft	29
6	2	No	A	> 2500 ft	4
7	1 or 3	No	B	> 2500 ft	148
8	2	No	B	> 2500 ft	20

**Table 5: Ranking Criteria Used in Preservation Analysis**

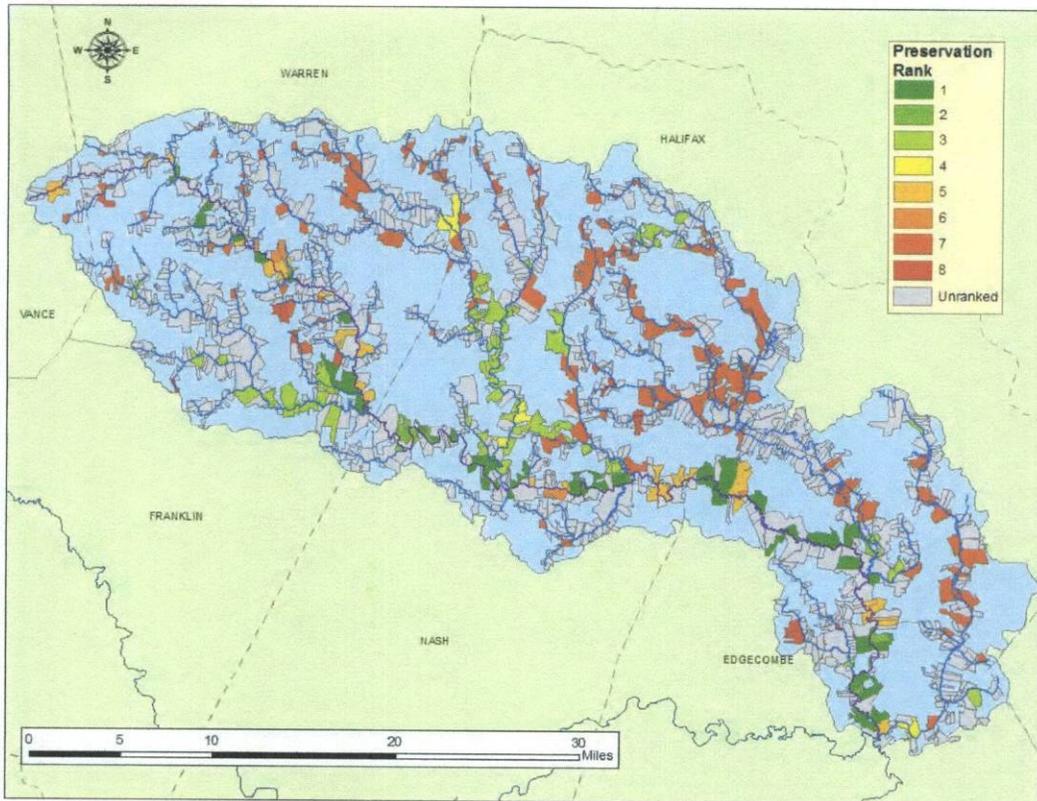


Figure 13. Parcels Priority Ranked for Preservation in the Fishing Creek Watershed

Alternatively, we may wish to focus on parcels that have a high potential for Enhancement or Restoration. In the following scenario a parcel with a rank of 1 has greater than 1500 ft of stream frontage, is mostly open land (generally agriculture or pasture), is near at least one Natural Heritage Element Occurrence, and is in Conservation Zone A (has stream frontage along the main stem of Fishing Creek). Very few parcels meet the standard set, but restoration or enhancement on these parcels would have a greater benefit than elsewhere

Rank	Primary Buffer Cover	Natural Heritage Element Occurrence	Stream Frontage	Zone	# of Parcels
1	7	Yes	>1500	A	4
2	7	Yes	>1500	B	6
3	7	No	>1500	A	4
4	7	No	>1500	B	30

Table 6: Ranking Criteria Used in Enhancement/Restoration Analysis

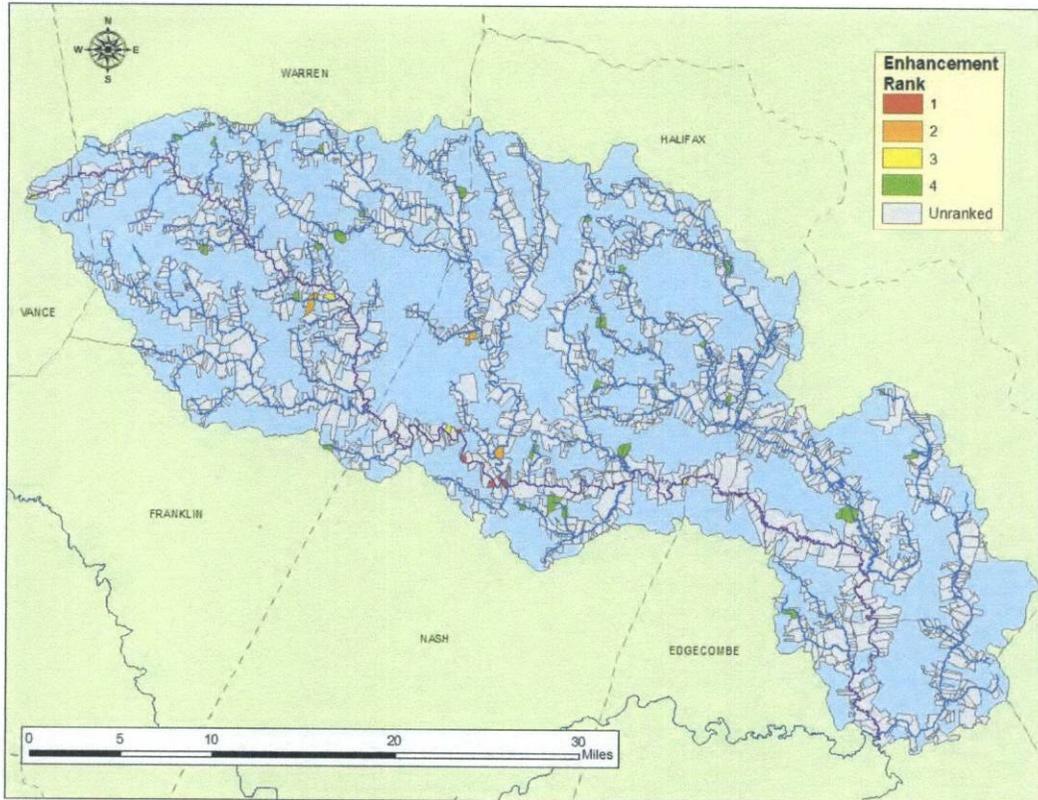


Figure 13. Parcels Priority Ranked for Enhancement/Restoration in the Fishing Creek Watershed

### Conclusions:

GIS analysis and field verification results reveal many conservation opportunities within the Fishing Creek Watershed. The majority of conservation opportunities within the Fishing Creek Watershed are in preservation of existing mature and immature forested buffers. Few parcels within the conservation zones parcel database appear to be good candidates for restoration. However, some parcels contain narrow buffers (less than 300-foot wide) which may benefit from enhancement.

Information for some parcels has been summarized in Appendix A. This database may be queried and refined in order to systematically focus on conservation opportunities within the Fishing Creek Watershed. In addition, the information within the database may be useful in determining which parcels are potentially eligible for certain federal or state funding programs. The Clean Water Management Trust Fund (CWMTF), Conservation Reserve Enhancement Program (CREP), Federal Farm and Ranch Land Protection Program (FFRPP) and the Environmental Quality Incentives Program (EQIP) are all grant sources that could be pursued to fund conservation efforts on the properties outlined by this plan.

**Appendix B: Abbreviations for Landowner Spreadsheet (Appendix A)**

Abbreviation	Description
ZONE	Conservation Zone
NHP	Natural Heritage Element Occurrences
P & I SOILS	Prime and Statewide Important Soils (Acres)
PERC P & I	Percentage of Prime and Statewide Important Soils
EXIST EASE	Existing easement within parcel
ADJ EASE	Existing easement adjacent to parcel
PRIM LC	Primary Land Cover
SEC LC	Secondary Land Cover
TERT LC	Tertiary Land Cover
PRIM BC	Primary Buffer Cover
SEC BC	Secondary Buffer Cover
TERT BC	Tertiary Buffer Cover

**Appendix C: GIS Base Files**

File Name	Shapefile	Description
Franklin County Tax Parcel Boundaries	franklin_parcel_200503.shp	Tax parcel boundaries and landowner information for Franklin County
Nash County Tax Parcel Boundaries	Nash_parcel.20050616shp	Tax parcel boundaries and landowner information for Nash County
Edgecombe County Tax Parcel Boundaries	edgeparcel_0105.shp	Tax parcel boundaries and landowner information for Edgecombe County
Warren County Tax Parcel Boundaries	warren_parcel_20050228.shp	Tax parcel boundaries and landowner information for Warren County
Halifax County Tax Parcel Boundaries	Halifax_parcel_200505.shp	Tax parcel boundaries and landowner information for Halifax County
Vance County Tax Parcel Boundaries	Vance_parcel.shp	Tax parcel boundaries and landowner information for Vance County (partial)
Streams – Fishing Creek Watershed	Fishing_strms_lin.shp	Streams and rivers within the Fishing Creek Watershed; created from Detailed Hydrology layer from CGIA BasinPro data.
Natural Heritage Element Occurrences	nheo_ut_2005.shp	Point shapefile showing recorded occurrences of rare and endangered species and natural communities
WRC Mussels	utar_wrcmussels2.shp	Point shapefile showing recorded occurrences of mussels from surveys conducted in the Tar River Basin
WRC Crayfish	utar_wrccrayfish.shp	Point shapefile showing recorded occurrences of crayfish from surveys conducted in the Tar River Basin

WRC Fish	utar_wrcfish.shp	Point shapefile showing recorded occurrences of fish from surveys conducted in the Tar River Basin
National Register Historic Sites	hsdnrpt_2.shp	National register sites, updated 1998-2000
State Listed Historic Sites	hdsldpt_2.shp	State sites listed as - Study List (SL), Determined Eligible (DOE), and Locally Designated (LD)
Franklin County Historic Architecture	franklin_har.shp	Database of Franklin County sites that are being considered for future addition to the National or State lists of historic sites.
Nash County Historic Architecture	Nash_har.shp	Database of Nash County sites that are being considered for future addition to the National or State lists of historic sites.
Warren County Historic Architecture	Warren_har.shp	Database of Warren County sites that are being considered for future addition to the National or State lists of historic sites.
Halifax County Historic Architecture	Halifax_har.shp	Database of Halifax County sites that are being considered for future addition to the National or State lists of historic sites.
Edgecombe County Historic Architecture	Edgecombe_har.shp	Database of Edgecombe County sites that are being considered for future addition to the National or State lists of historic sites.
Franklin County Soils	franklin_soils.shp	Soils data digitized from Franklin County Soil Survey
Nash County Soils	Nash_soils.shp	Soils data digitized from Nash County Soil Survey
Halifax County Soils	Halifax_soils.shp	Soils data digitized from Halifax County Soil Survey
Edgecombe County Soils	Edgecombe soils.shp	Soils data digitized from Edgecombe County Soil Survey
National Wetland Inventory	nwi_ut.shp	National Wetland Inventory wetlands within the Upper Tar Basin; created from the National Wetlands Inventory statewide database.
Tar River Land Conservancy (TRLC) Protected Lands	TRLC_protected_lands.shp	Database of conservation easements held by TRLC.
Various State Program Conservation Easements	conservationcase0703.shp	Conservation easements held by various state programs including WRP, CWMTE, State Parks, etc.
US Fish and Wildlife Conservation Easements	ceusfws_trlc.shp	Conservation easements held by the USFWS in the Upper Tar Basin; created from USFWS easements database for the state.
Managed Areas	marea_ut_200508.shp	Database of Federal, State and Privately managed lands within the Upper Tar Basin; created from managed areas database for the state provided by NHP.

### Appendix D: Rare Species Listing Criteria

Abbreviation	Description
<b>E</b>	Endangered (those species in danger of becoming extinct)
<b>T</b>	Threatened (considered likely to become endangered within the foreseeable future)
<b>SR</b>	Significantly Rare (those whose numbers are small and whose populations need monitoring)
<b>SC</b>	Species of Special Concern
<b>FSC</b>	Federal Species of Concern (those under consideration for listing under the Federal Endangered Species Act)
<b>-P</b>	The species is at the <b>periphery</b> of its range in NC. These species are generally more common somewhere else in their ranges, occurring in North Carolina peripherally to their main ranges, mostly in habitats which are unusual in North Carolina.
<b>-T</b>	These species are <b>rare throughout</b> their ranges (fewer than 100 populations total)
<b>G1</b>	Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction.
<b>G2</b>	Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction.
<b>G3</b>	Vulnerable globally because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction.
<b>G4</b>	Apparently Secure Uncommon but not rare (although it may be rare in parts of its range, particularly on the periphery), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern.
<b>G5</b>	Secure Common, widespread, and abundant (although it may be rare in parts of its range, particularly on the periphery). Not vulnerable in most of its range.
<b>G#G#</b>	Range Rank A numeric range rank (e.g., G2G3) is used to indicate uncertainty about the exact status of the element.
<b>S1</b>	Critically imperiled in North Carolina because of extreme rarity or otherwise very vulnerable to extirpation in the state.
<b>S2</b>	Imperiled in North Carolina because of rarity or because of some factor(s) making it very vulnerable to extirpation.
<b>S3</b>	Vulnerable in North Carolina because rare or uncommon, or found in only a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation.
<b>S4</b>	Apparently Secure Uncommon, but not rare in North Carolina, and usually widespread. Possibly of long-term concern.
<b>S5</b>	Secure Common, widespread, and abundant in North Carolina. Essentially ineradicable under present conditions
<b>S#S#</b>	Range Rank A numeric range rank (e.g., S2S3) is used to indicate uncertainty about the exact status of the element.

## **References**

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