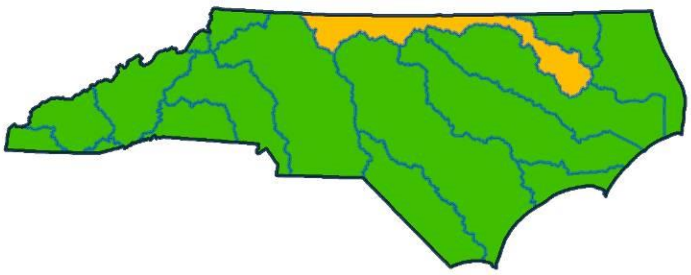
Roanoke River Basin Restoration Priorities

October 2009

Amended August 2018



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Cover Photo: Roanoke River near Halifax, NC.

Introduction

The Roanoke River Basin Restoration Priorities were set in 2001. This document was then updated in 2015. This 2018 interim amendment is intended to: provide current information regarding planning activities, supplement information regarding land cover within each 8-digit hydrologic unit, restore document links and maintain accurate contact information.

Since the creation of the original document agency, division and personnel changes have occurred. Session Law 2015-1 changed the name of the Ecosystem Enhancement Program (EEP) to the North Carolina Division of Mitigation Services (DMS), March 16, 2015. Furthermore, the Department of Environment and Natural Resources (DENR) was renamed the Department of Environmental Quality (DEQ) on September 18, 2015.

The Division of Mitigation Services is currently in the process of updating its watershed prioritization process. While DMS transitions to a new approach it will maintain the existing watershed priorities and update supporting data. If field observations or land cover analysis identify significant change within an 8-digit hydrologic unit further analysis will be conducted to re-examine the existing watershed priorities.

The 2001 plan selected 17 Hydrologic Units (14-digit HUs as denoted by the United States Geological Survey) to be targeted for stream, wetland, and riparian buffer restoration and protection and watershed planning efforts (i.e., Targeted Local Watersheds or TLWs). In the 2015 update, 12 TLWs have been added as targets for restoration and preservation efforts in the Roanoke River Basin along with two HUs identified as TLWs in 2001 that will have that status removed.

In addition to updating the *Watershed Restoration Plan for the Roanoke River Basin* (2001), this report complements information found in the *2006 Roanoke River Basinwide Water Quality Plan* (NC DWQ 2006[1]). These two reports provide much of the justification for selection of HUs by detailing water quality conditions, resource management activities, and restoration and preservation needs in North Carolina's portion of the Roanoke River Basin.

In past documents, North Carolina Division of Water Quality (DWQ) "subbasin" units were used to organize the document and discussion of the selected TLWs. This document, however, uses the five US Geological Survey's (USGS) 8-digit Cataloging Units in the river basin as the framework for organization and discussion of TLWs.

What is a River Basin Restoration Priority?

DMS develops River Basin Restoration Priorities (RBRPs) to guide its mitigation activities within each of North Carolina's 17 major river basins. The RBRPs delineate specific watersheds that exhibit a need for restoration and protection of wetlands, streams and riparian buffers. These priority watersheds, TLWs, are the USGS delineated 14-digit HUs which receive priority for DMSplanning and project funds. The designation may also benefit stakeholders writing watershed improvement grants (e.g., Section 319 or Clean Water Management Trust Fund) by giving added weight to their proposals.

North Carolina General Statute 143-214.10 charges DMS to pursue wetland and riparian restoration activities in the context of basin restoration plans, one for each of the 17 major river basins in the State, with the goal of protecting and enhancing water quality, fisheries, wildlife habitat, recreational opportunities and preventing floods.

Criteria for Selecting a Targeted Local Watershed

DMS evaluates a variety of GIS data and resource and planning documents on water quality and habitat conditions to select TLWs. Public comment and the professional judgment of local resource agency staff also play a critical role in targeting local watersheds. TLWs are chosen based on an evaluation of three factors—problems, assets, and opportunities. Problems reflect the need for restoration; assets reflect the ability for a watershed to recover from degradation and the need for land conservation; and opportunities indicate the potential for local partnerships in restoration and conservation work. Methods for evaluation of these three factors are outlined below:

Problems: DMS evaluates DWQ use support ratings, the presence of impaired /303(d)-listed streams, and DWQ Basinwide Plans to identify streams with known problems. DMS also assesses the potential for degradation by evaluating land cover data, riparian buffer condition, impervious cover, road density, and projected population change.

Assets: In order to gauge the natural resource value of each watershed, DMS considers the forest and wetland area, land in public or private conservation, riparian buffer condition, high quality resource waters, and NC Natural Heritage Program data.

Opportunity: DMS reviews restoration and protection projects that are already on the ground, such as Clean Water Management Trust Fund projects, US Clean Water Act Section 319 initiatives, mitigation banks[1], and land conservation efforts. DMS also considers the potential for partnership opportunities by consulting with local, state, and federal resource agencies and conservation organizations to assess the potential to partner in their priority areas.

In addition to these factors, local resource professional feedback is an important element in selecting TLWs. Comments and recommendations of local resource agency professionals, including staff with Soil & Water Conservation districts, the Natural Resources Conservation Service (NRCS), county planning staff, NC Department of Environmental Quality(DEQ) regional staff (e.g., Wildlife Resources Commission), local/regional land trusts and watershed organizations are considered heavily in the selection of TLWs. Local resource professionals often have specific and up-to-date information regarding the condition of local streams and wetlands. Furthermore, local resource professionals may be involved in water resource protection initiatives that provide good partnership opportunities for DMS restoration and preservation projects and DMS Local Watershed Planning initiatives.

[1] Army Corps of Engineer data from July 2009 show no mitigation banks present in the Roanoke Basin.

Finally, TLWs that were chosen for the last Watershed Restoration Plan or RBRP document are reevaluated. If new information reveals that a watershed is not a good TLW candidate, then it will be removed from the TLW list. An explanation of the reasons for its removal from the list is provided in the last section of this document, which provides descriptions of each TLW chosen and those whose TLW status has been removed.

Roanoke River Basin Overview

The Roanoke River Basin begins in the Blue Ridge Mountains of Virginia and ends in the Albemarle Sound of North Carolina. The Basin covers nearly 10,000 square miles with 3,500 falling within North Carolina making it the State's 6th largest of its 17 river basins. The basin encompasses126 HUs that range in size from less than 1 square mile to 113. There are five Catalog Units (8-digit watershed delineations) in Basin with the major rivers including the Dan, Smith, Mayo, and Roanoke. Large reservoirs in the Basin include the Hyco, Mayo, Kerr, and Lake Gaston.

Cities and towns inside or bordered by the Roanoke Basin include Eden, Reidsville, Walnut Cove, Mayodan, Wentworth, Yanceyville, Roxboro, Henderson, Roanoke Rapids, Williamston, Windsor, and Plymouth. The Basin includes all or portions of 19 counties and North Carolina's Office of State Budget and Management (OSBM) figures for these counties estimates 2007 population at 1.7 million people. The number is projected to grow to 1.9 million people by 2020 (NC OSBM 2009). Most of this growth is forecasted to occur in the western piedmont counties while several counties in the lower Roanoke Basin (e.g., Halifax and Martin) are expected to have declining populations.

Roanoke River Basin Restoration Goals

Based on an assessment of existing watershed characteristics and resource information, DMS has developed restoration and protection goals for the Basin's five Catalog Units (CUs). These goals are outlined below:

03010102

This CU is the lowermost CU of the Dan River, a tributary of the Roanoke River, and includes Kerr Reservoir, a large water body created to provide flood control and hydropower generation. In the CU, two streams, Little Island Creek and Nutbush Creek, have been rated as impaired for poor biological communities. Impacts from forest clearing and agricultural uses are the main sources of non-point source (NPS) in the CU. Protected areas around the reservoir have been identified by the NC Natural Heritage Program (NHP) as important Core Habitat Areas (NC NHP 2008). Restoration objectives for the CU center on limiting impacts from

forest harvesting and, to a lesser degree, protecting riparian vegetation from cattle grazing.

CU 03010102 2011 Land Use/Land Cover Data

Class	Percentage
Water	7.88
Developed	5.58
Barren	0.18
Forest	57.38
Shrubland	5.00
Herbaceous	7.31
Planted/Cultivated	14.77
Wetlands	1.92

03010103

This CU includes the Dan, Smith, and Mayo rivers and is the westernmost portion of the Roanoke in North Carolina. Hanging Rock State Park is a large State landholding in the CU. An additional State Park is being considered that includes areas along the Mayo River between Mayodan and the Virginia border. Large portions of the Dan (15 miles) and Smith Rivers (11 miles) are rated impaired by DWQ based on turbidity, fecal coliform levels, and low biological ratings. These waters are failing to meet both Class C uses (e.g., fishing, aquatic life propagation) and Class B (e.g., swimming, boating). It should be noted that some of these pollution sources start in the neighboring state of Virginia. Nevertheless, reductions in both NPS (agricultural, forestry) and point source pollution will be needed to meet the recreational usage. The Piedmont Land Conservancy (PLC) has completed the Dan River Watershed Protection Plan, a detailed report outlining conservation and restoration measures needed in the Dan River Basin (PLC 2006). This plan highlights a number of properties along the Dan, Smith, and Mayo rivers that received high priority conservation ratings from PLC.

In addition, the Piedmont Triad Regional Council (PTRC) has developed the Eden Area Local Watershed Plan (LWP) within this CU. This LWP comprises three 14-digit HUs and was completed in 2016. DMS has determined that this LWP meets programmatic criteria for a valid Local Watershed Plan (i.e., includes key elements such as watershed assessment, stressor identification, management strategy recommendations, and significant stakeholder participation). This LWP identified erosion/sedimentation, nutrients and fecal coliform bacteria as major stressors to water quality and habitat.

CU 03010103 2011 Land Use/Land Cover Data

Class	Percentage
Water	1.14
Developed	8.44
Barren	0.09
Forest	60.42
Shrubland	3.13
Herbaceous	7.30
Planted/Cultivated	18.87
Wetlands	0.62

03010104

The CU contains small portions of the Dan River and the Mayo and Hyco reservoirs. These two reservoirs provide waters for cooling Progress Energy coal fired power plants. Hyco Lake was included on DWQ's impaired waters list for mercury violations and North Hyco Creek was recommended to be put on the 2008 impaired waters list due to a Poor fish community assessment. Like the surrounding CUs, there is evidence of the once thriving tobacco farming in the area. Many of these farms have replaced tobacco with other crops or no longer farm these fields. Of the remaining land uses, forestry, cattle farming, and to a small degree, urban runoff from Yanceyville and Roxboro, are sources of NPS pollution that need improvement in the HU.

CU 03010104 2011 Land Use/Land Cover Data

Class	Percentage
Water	2.10
Developed	5.01
Barren	0.20
Forest	57.20
Shrubland	5.30
Herbaceous	9.70
Planted/Cultivated	19.17
Wetlands	1.33

03010106

This CU encompasses the portions of the Lake Gaston watershed in North Carolina. A significant population of recreational users occupies land surrounding the lake. Reducing inputs from the agricultural areas in the headwaters of Lake Gaston's tributaries remains a primary goal for this CU. Good lake water quality is essential to maintaining the economic benefit to the local communities who rely on boaters, fishers and other recreational users. Smith Creek is the only targeted HU in this comparatively small portion of the CU. It remains on North Carolina's list of impaired waters for impairment to aquatic communities, likely due to

low dissolved oxygen. It drains northward into the reservoir across the Virginia border.

CU 03010106 2011 Land Use/Land Cover Data

Class	Percentage
Water	10.95
Developed	6.89
Barren	0.13
Forest	55.23
Shrubland	5.66
Herbaceous	4.76
Planted/Cultivated	13.76
Wetlands	2.62

03010107

This CU consists of watersheds bound by Roanoke Rapids in the northwest and Williamston and Plymouth in the southeast. Major tributaries such as the Cashie River drain into the Roanoke near its confluence with Batchelor Bay. Much of this watershed is impaired due to standard violations of fish tissue samples, primarily for mercury but locally for dioxin in Welch Creek and Batchelor Bay. Land use tends to be predominantly agricultural outside of the small townships. A significant amount of land exists in conservation areas preserved by the Nature Conservancy, the NC Wildlife Resources Commission and the US Fish and Wildlife Service. The NC Natural Heritage Program has designated much of the lower Roanoke as Significant Natural Heritage Areas. As such, DMS recognizes a primary goal for this CU must be to develop preservation and restoration projects that augment existing conservation areas or connect them via corridors.

CU 03010107 2011 Land Use/Land Cover Data

Class	Percentage
Water	1.30
Developed	6.39
Barren	0.09
Forest	19.77
Shrubland	11.48
Herbaceous	4.06
Planted/Cultivated	24.46
Wetlands	32.45

Roanoke River Basin TLW Overview

Seventeen HUs were targeted in the 2001 Watershed Restoration Plan for the Roanoke River Basin. In the 2009 update, however, an additional 12 HUs were newly identified TLWs and two HUs had their TLW status removed. In total, 27 HUs were highlighted as TLWs by DMS in the 2009 RBRP. In the January 2015 amendment, two additional HUs were selected as TLWs because they are part of the Eden LWP in CU 03010103 (see above). [See amended Figure 1a on page 8.] This brings the total number of TLWs in the Roanoke Basin to 29 HUs.

Table 1 below provides a summary of information used to select TLWs and highlights in blue those that are newly added. Table 2 provides land use/land cover changes from 2001-2011 for selected TLWs. Additionally, Figures 1a and 1b are maps of the Roanoke River Basin showing current TLWs and those with removed TLW designation.

Table 1. Roanoke River Basin TLW Summary Table (HUs in blue indicate newly added TLWs, orange HUs are those with removed TLW designation).
[Updated January 2015.]

HUCODE	HU_Name	HU Area[1] (mi)	Stream Length[2] (mi)	Ag Area[3] (%)	Forest Area[4] (%)	Impervious Area[5] (%)	HQW or ORW Length[6] (%)	WSW Length (%)	SNHA Area[8] (%)	NHEO[9] (#)	Conserved Area[10] (%)	303(d) Length[11] (%)	Animal Operations[12] (#)	Non-forested Stream Buffer[13] (%)
Catalog Unit 03010102														
03010102161010	Grassy Creek	42.9	103.1	23	73	0.2%	0	0	3	3	4	0%	9	18%
Catalog Unit 03010103														
03010103170030	Big Creek	44.7	128.1	29	65	0.4%	0	0	3	2	0	0%	5	16%
03010103180010	Snow Creek	43.8	129.6	25	70	0.4%	0	0	3	18	0	0%	18	12%
03010103180040	Belews Creek-upper	37.6	97.0	30	53	2.4%	0	7.4	0	2	1	1%	10	21%
03010103190010	Town Fork Creek-upper	62.8	195.7	24	68	0.7%	0	0	2	11	2	6%	12	16%
03010103190020	Town Fork Creek-lower	71.4	195.9	26	65	1.1%	0	0	2	10	0	0%	18	17%
03010103220010	Big Beaver Island Creek	67.4	179.2	26	66	1.1%	0	29.6	1	3	1	0%	15	13%
03010103230020	Matrimony & Buffalo Creeks[14]	46.7	132.1	26	60	2.5%	0	98.5	0	2	0	4%	3	19%
03010103230040	Dan River-middle[14]	61.9	167.7	28	60	2.7%	0	0	1	26	0	0%	4	21%
03010103250030	Smith River-lower[14]	10.5	24.7	11	39	10.4%	0	64.1	1	4	0	33%	1	39%
Catalog Unit 03010104														
03010104021070	Rattlesnake Creek	34.0	86.9	32	62	0.9%	0	0	0	1	1	0%	7	16%
03010104032010	Country Line Creek-upper	55.3	141.7	22	72	0.6%	0	84.7	10	11	13	0%	18	8%
03010104032030	Country Line Creek-lower	38.4	110.2	24	72	0.4%	0	0	2	5	17	0%	4	8%
Catalog Unit 03010106														
03010106031010	Smith Creek	55.5	141.3	34	57	0.8%	0	0	0	0	0	6%	18	14%
Catalog Unit 03010107														
03010107070010	Chocoyette Creek	23.6	37.1	32	34	8.1%	0	0	0	5	0	6%	4	27%
03010107070020	Chocoyette Creek	19.4	31.7	40	50	1.2%	0	0	14	11	0	19%	0	19%
03010107070030	Quankey Creek	34.3	61.9	43	47	1.1%	0	0	0	0	0	4%	6	20%
03010107090010	Conoconnora Swamp	35.7	62.6	37	58	0.3%	0	0	0	4	16	0%	4	27%
03010107090020	Conoconnora Swamp	23.1	55.1	64	30	0.3%	0	0	5	3	49	7%	3	56%
03010107100020	Cypress Swamp	33.4	71.4	37	59	0.1%	0	0	25	20	12	10%	0	27%

HUCODE	HU_Name	HU Area[1] (mi)	Stream Length[2] (mi)	Ag Area[3] (%)	Forest Area[4] (%)	Impervious Area[5] (%)	HQW or ORW Length[6] (%)	WSW Length (%)	SNHA Area[8] (%)	NHEO[9] (#)	Conserved Area[10] (%)	303(d) Length[11] (%)	Animal Operations[12] (#)	Non-forested Stream Buffer[13] (%)
03010107110030	Blue Hole Swamp	38.1	73.9	22	75	0.1%	0	0	11	5	33	10%	0	12%
03010107120070	Conoho Creek	27.8	39.7	20	73	1.6%	0	0	57	9	49	10%	2	21%
03010107130020	Conniott Creek	32.4	77.5	23	75	0.0%	0	0	23	14	36	8%	6	20%
03010107130030	Conine Creek	17.3	33.2	27	71	0.1%	0	0	50	6	48	27%	1	19%
03010107160010	Cashie River headwaters	19.1	25.2	51	44	0.3%	0	0	0	0	0	15%	9	28%
03010107160090	Cashie River	20.2	19.0	27	64	1.3%	0	0	5	0	8	33%	2	14%
03010107160115	Cashie River-lower	19.3	25.5	31	64	0.1%	0	0	18	0	22	33%	3	18%
03010107160120	Bachelor Bay	25.4	44.2	5	76	0.0%	0	0	68	14	51	34%	1	9%
03010107170020	Conaby Creek	40.9	78.8	24	66	1.4%	0	0	15	9	4	6%	1	61%
03010107140010	Hardison Mill Creek	53.2	55.1	17	79	0.3%	0	0	0	1	0	0%	1	15%
03010107150010	Deep Run Swamp	42.2	45.9	26	69	0.5%	0	0	0	2	0	0%	6	16%

[1]Hydrologic Unit (HU) Area estimate based on USGS 14-digit HU boundaries (USDA NRCS 1998).
[2]Stream Length estimate derived from blue line streams on USGS 1:24,000 scale maps (NC CGIA 2008).
[3]Agricultural Area estimate based on 2001 National Land Cover Database (NLCD) (Homer et al., 2004).
[4]Forest Area estimate based on 2001 NLCD (Homer et al., 2004).
[5]Impervious Area Estimates based on 2001 NLCD (Homer et al., 2004).
[6]High Quality Waters (HQW) and Outstanding Resources Waters (ORW) (NC CGIA 2008).
[7]Water Supply Watershed (WSW) length (NC GIA 2008).
[8]Significant Natural Heritage Areas (SNHA) estimates (NC NHP 2007[1]).
[9]Natural Heritage Element Occurrences (NHEO) (NC NHP 2007[2]).
[10]Conserved Area estimate based on federal, state, and local land under protection (NC GIA 2008).
[11]303(d) List of impaired waters (NC DWQ 2006[2]).
[12]Animal Operations estimates based on NC estimates for pork, poultry, cattle and bovine operations in 2007 (NCDA, 2007).
[13]Non-forested Stream Buffer estimate based on 2001 NLCD and a 100 foot buffer distance from USGS blue line streams.
[14]These three HUs are part of the Eden Area Local Watershed Plan (LWP), as noted for CU 03010103 on page 4. Two of these three LWP HUs are newly identified TLWs; see Figure 1a below (Updated January 2015).

Table 2. 14-Digit TLWs Land Use/Land Cover Changes from 2001-2011				
	Increased Impervious Surface (acres)	**Forest Converted to Developed (acres)**	**Forest Converted to Agriculture (acres)**	**Loss of Wetland (acres)**
Catalog Unit 03010102				
03010102161010	0.00	0.67	253.98	0.00
Catalog Unit 03010103				
03010103170030	0.00	1.78	129.21	0.00
03010103180010	0.00	0.00	237.74	0.00
03010103180040	45.15	99.19	120.98	6.90
03010103190010	7.12	36.92	429.22	0.00
03010103190020	14.90	9.12	703.66	9.34
03010103220010	16.90	7.56	518.85	2.22
03010103230020	12.23	1.78	343.38	0.22
03010103230040	44.26	39.36	392.08	0.00
03010103250030	14.01	1.33	30.25	0.00
Catalog Unit 03010104				
03010104021070	7.56	3.78	283.78	0.00
03010104032010	0.45	5.11	478.37	0.00
03010104032030	0.22	0.00	421.66	0.00
Catalog Unit 03010106				
03010106031010	3.78	7.78	634.72	0.00
Catalog Unit 03010107				
03010107070010	124.32	74.50	197.26	19.57
03010107070020	17.12	1.11	56.71	2.67
03010107070030	24.91	6.89	524.63	4.67
03010107090010	1.11	0.00	273.10	0.89
03010107090020	3.11	0.00	13.34	0.00
03010107100020	0.00	0.00	20.46	0.00
03010107110030	0.22	0.00	5.56	6.89

	Increased Impervious Surface (acres)	Forest Converted to Developed (acres)	Forest Converted to Agriculture (acres)	Loss of Wetland (acres)
03010107120070	17.79	0.00	5.33	0.00
03010107130020	0.00	0.00	36.92	0.00
03010107130030	0.00	0.00	0.67	0.00
03010107160010	1.56	0.00	75.17	0.00
03010107160090	45.15	34.92	226.62	18.68
03010107160110	0.00	20.91	147.67	1.56
03010107160120	0.22	0.00	8.67	0.00
03010107170020	29.36	10.23	1532.97	1.56

Roanoke River Basin Targeted Local Watershed Maps

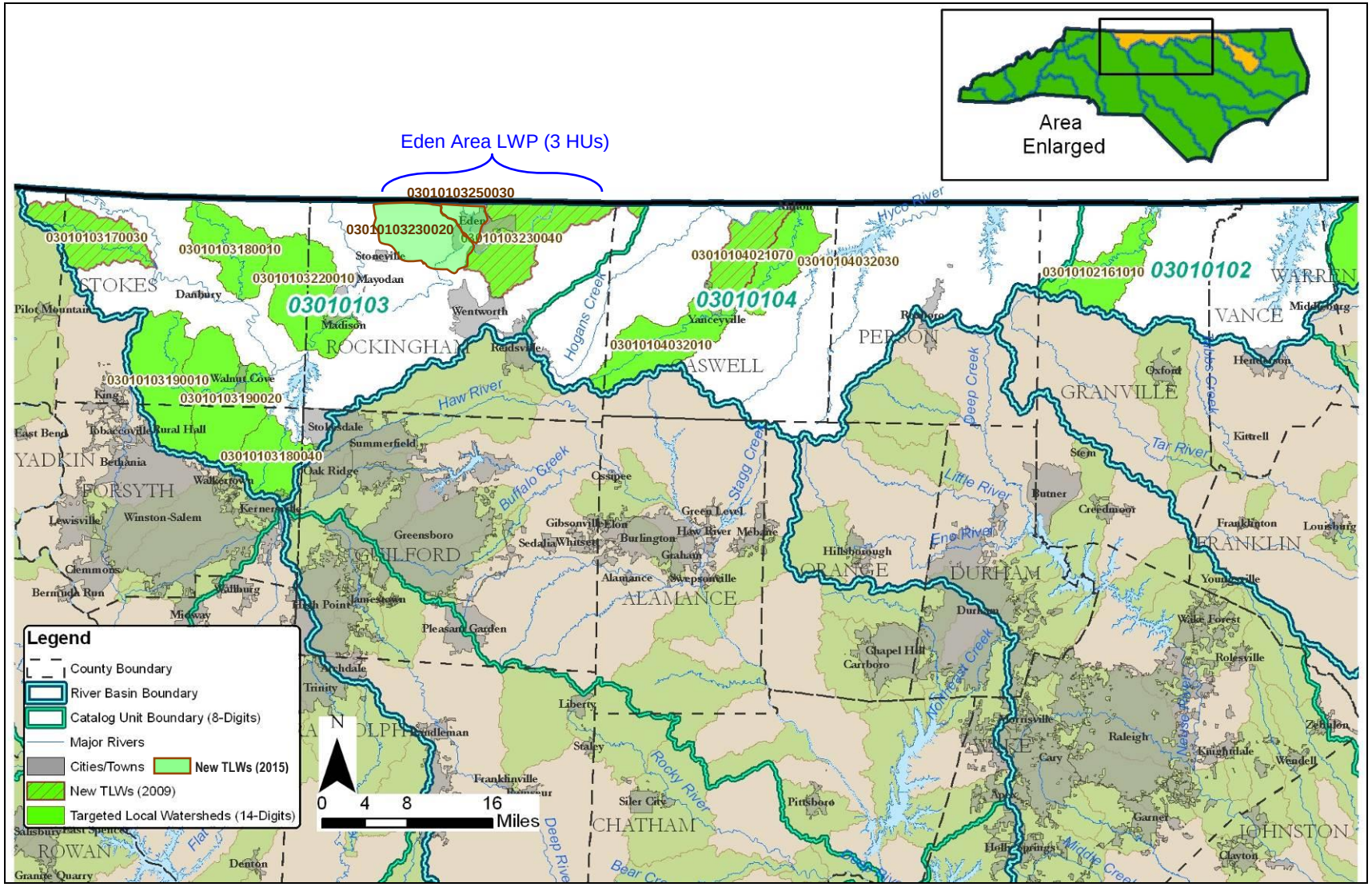


Figure 1a. TLWs, Upper Roanoke. [Map figure updated January 2015 to include two new TLWs that are part of the Eden Area LWP.]

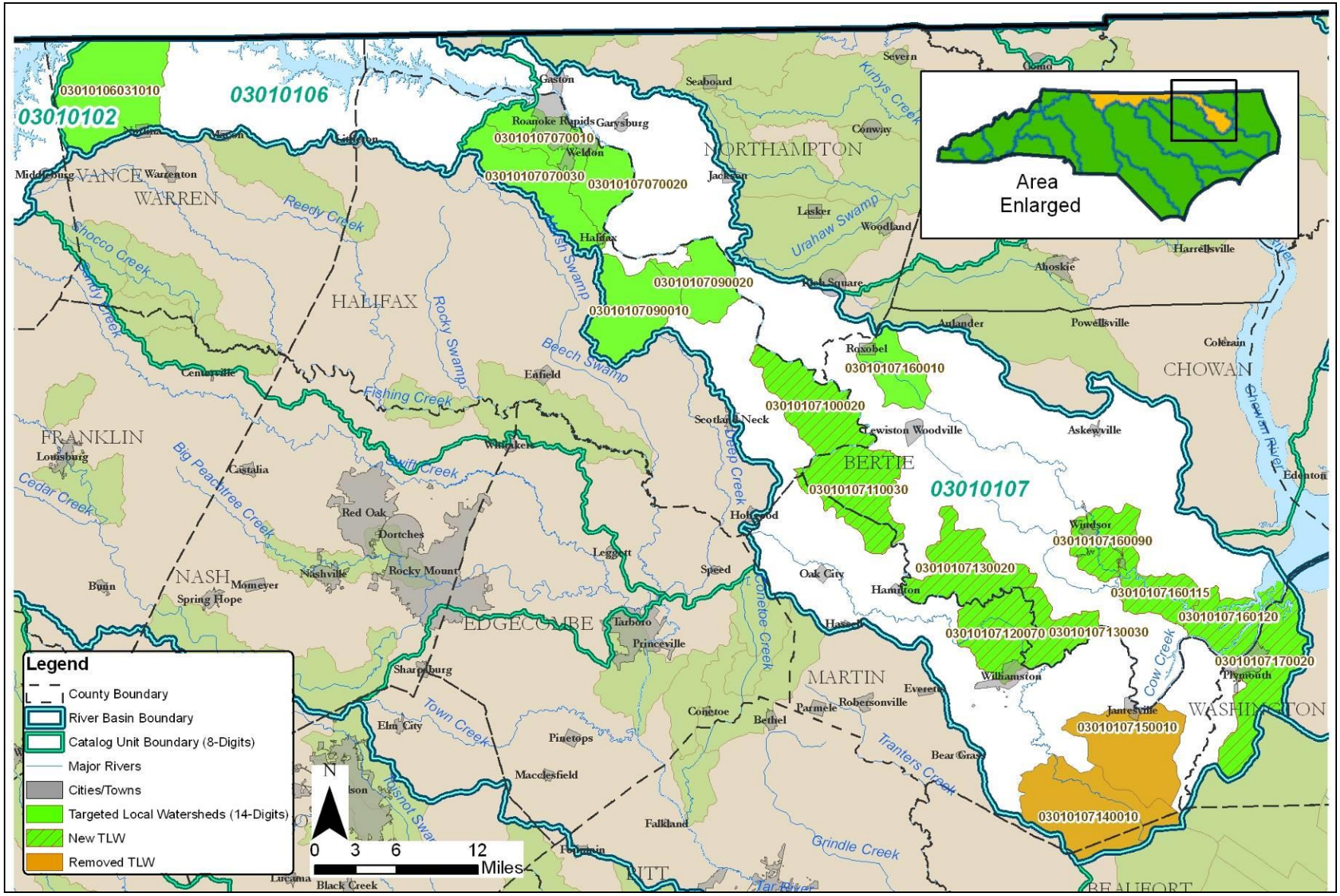


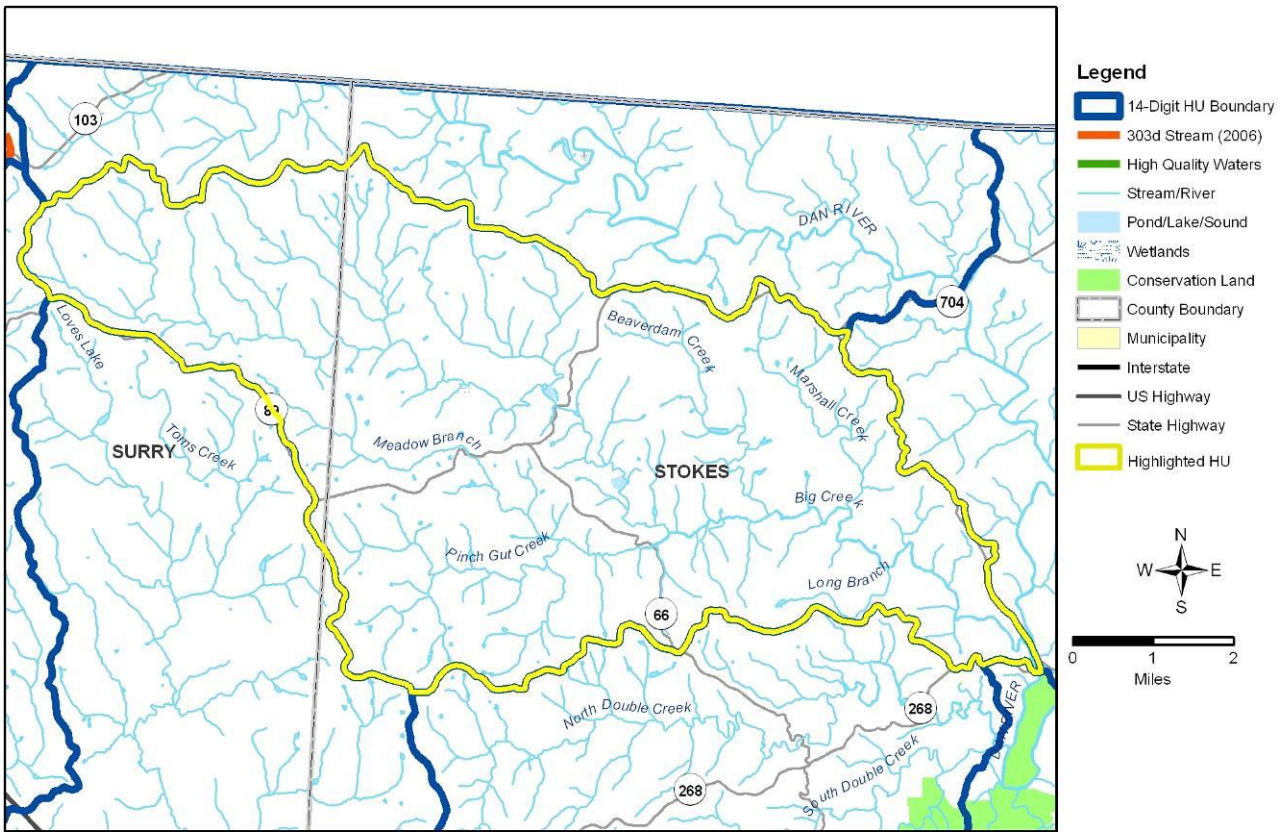
Figure 1b. TLWs, Lower Roanoke.

Discussion of Roanoke River Basin Targeted Local Watersheds

The following section provides maps and descriptions of TLWs and a discussion of the environmental conditions and activities that lead to their selection.

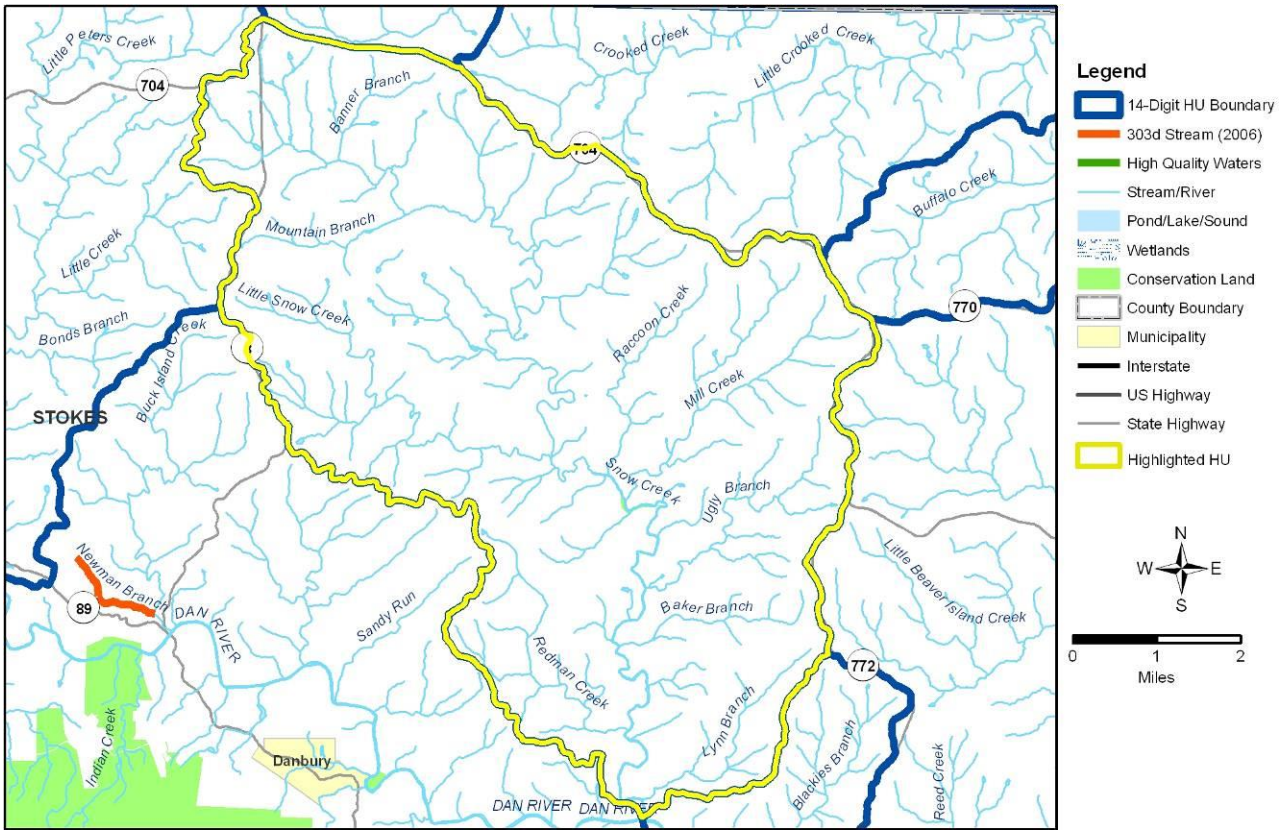
Big Creek: 03010103170030

Big Creek is at the western edge of the Roanoke Basin and flows to the Dan River. The HU is one of the three Roanoke HUs in North Carolina classified as a Trout Stream by the DWQ. Downstream, these waters empty into a section of the Dan River that is rated as impaired and hosts numerous rare and endangered aquatic species, including the federally endangered James River Spinymussel. As a result, the NC Wildlife Resources Commission (NC WRC) recommends this HU as a priority area for conservation measures (NC WRC 2005). While current fish populations rate as Good, several areas in the HU were noted to have land use practices that potentially impact local stream ecology (e.g., cattle accessing streams, deforested riparian buffers). Two stream projects have been completed in the HU; the first by DMS on Big Creek (10,000 ft.) and the second financed by CWMTF (8,000 ft.). Recommendations for the HU include improved riparian management and targeted restoration of impacted streams and riparian areas.



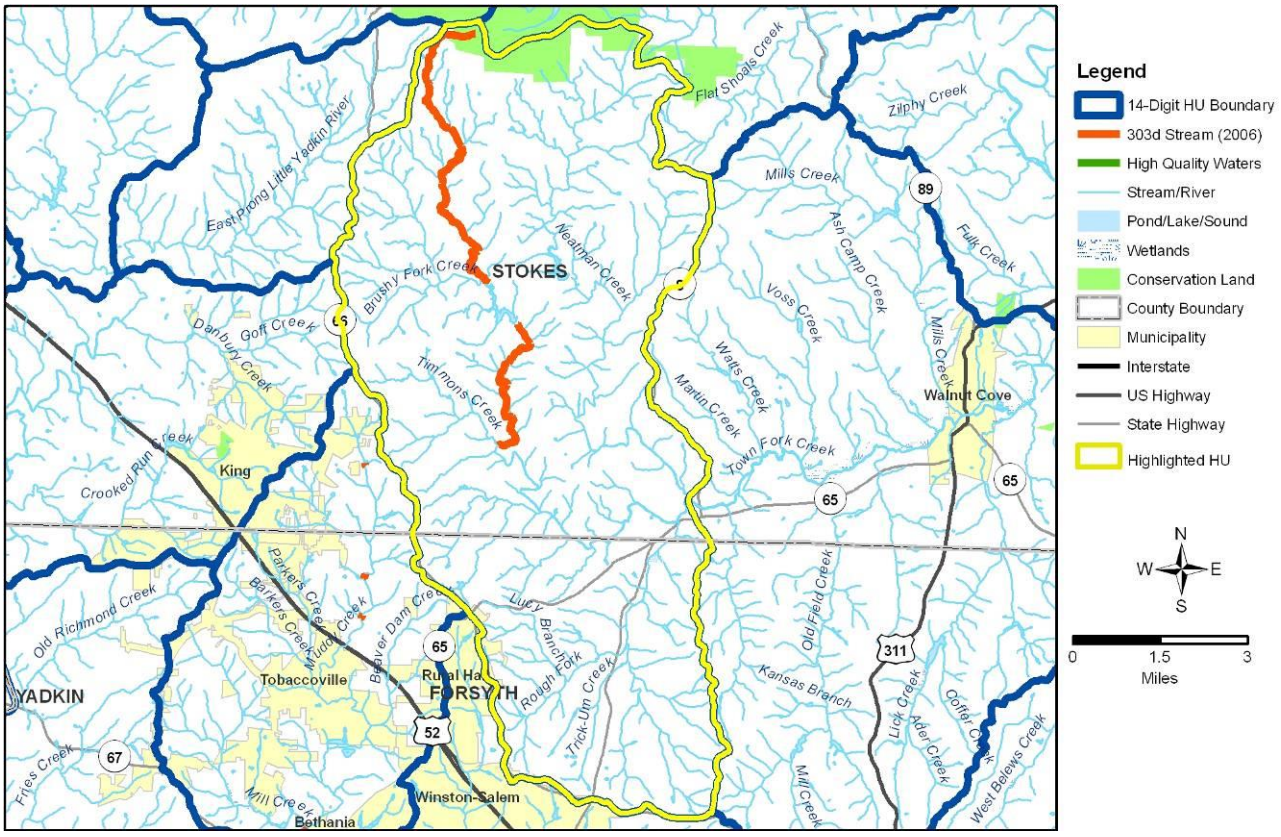
Snow Creek: 03010103180010

Snow Creek drains to the Dan River in Stokes County. Land use in the HU is mainly for forest (70%) and agriculture (25%). The NC Natural Heritage Program (NHP) identifies a number of Rare, Threatened, and Endangered (RTE) fish species in the creek (i.e., Riverweed Darter, Roanoke Hog Sucker, and Bigeye Jumprock). The NHP has also identified several unique habitats in the HU. In spite of improved fish and benthic ratings in the HU, DWQ continues to recommend that the Creek be observed for impacts from non-point source (NPS) pollution. Indeed, NC Department of Agriculture (NC DA) data shows the HU having the highest number of animal operations in the Dan River (18). To help improve aquatic conditions, DMS has completed a stream enhancement and restoration project (4,700 ft.) on Snow Creek. . Restoration and conservation actions in the HU should be aimed at minimizing impacts from agriculture and forestry.



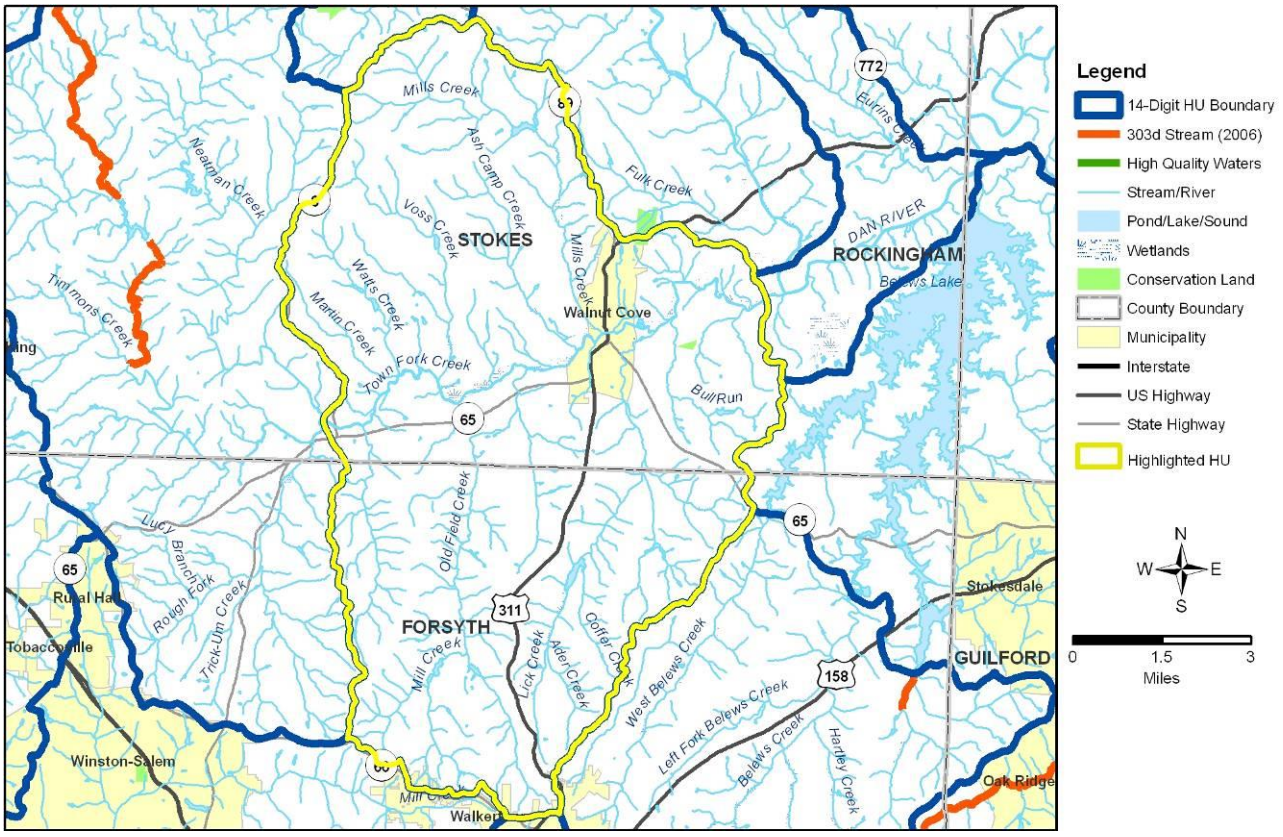
Town Fork Creek-Upper: 03010103190010

Town Fork Creek HU land use is largely forest (68%) and agriculture (24%). At its north end, the HU includes portions of Hanging Rock State Park. To the south, portions of Rural Hall and Winston Salem border the HU. Poor biological ratings in 1995 led to Town Fork Creek being classified as impaired for not meeting its aquatic life use support designation. As of 2006, this stream was still classified as impaired on the State's 303(d) list. NC DWQ, however, is recommending that Town Fork Creek be removed from the impaired waters list based on sampling at a number of sites in the HU that yielded Good-Fair and Good bioclassifications. NHP has identified a number of SNHAs in the HU and the Bigeye Jumprock fish, a Threatened species, has also been found in the HU. NC DA has identified 12 animal operations in the HU. While the Creek will likely be removed from the 303(d) list, the HU will continue to face stress from agricultural operations in the HU. Restoration and conservation actions in the HU should be aimed at minimizing impacts from agriculture and forestry.



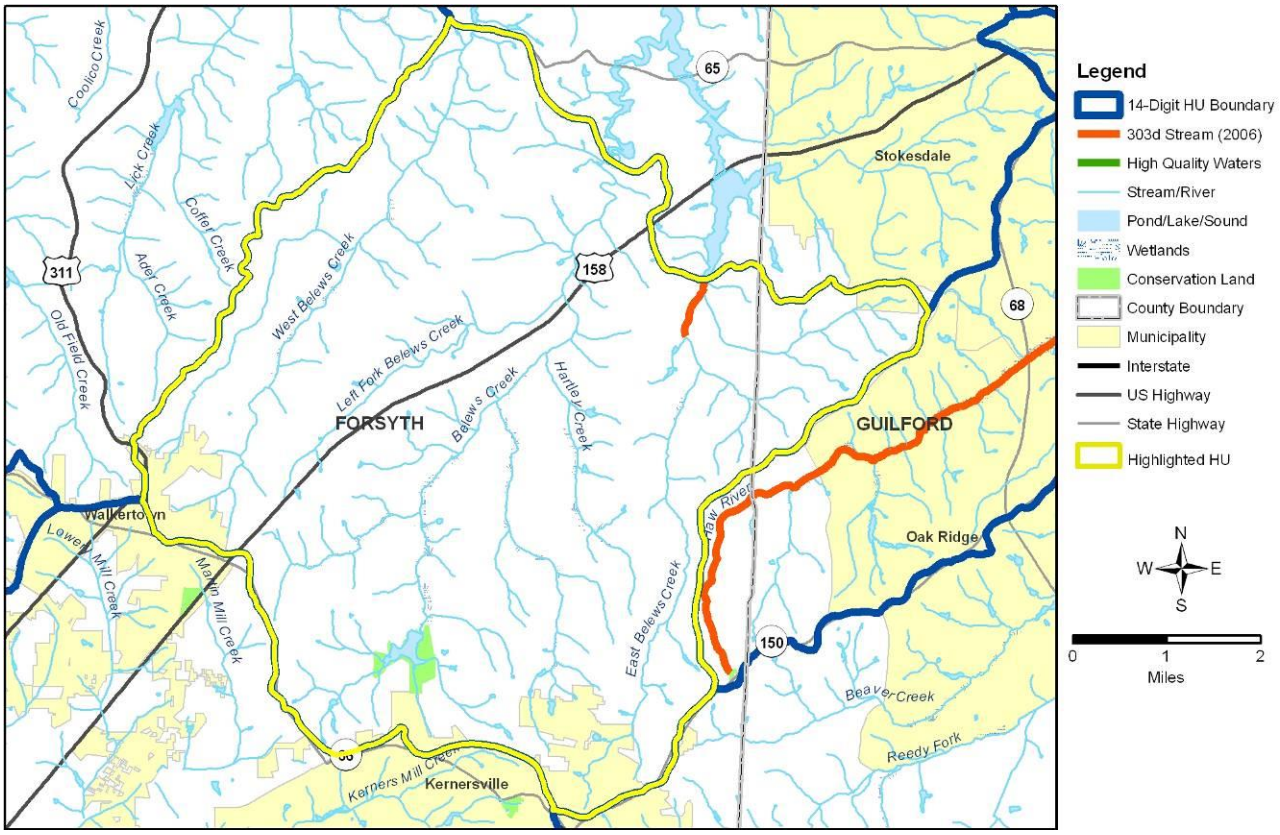
Town Fork Creek-Lower: 03010103190020

Town Fork Creek-Lower flows through this HU and the Town of Walnut Cove before emptying into the Dan River. Land use is weighted toward forest (65%) and Agriculture (26%). In touring the watershed, however, there were several noted impacts related to development. These include hydromodifcation (i.e., drained wetlands and channelized streams), poorly vegetated streamside buffers, and unstable streambanks. NC DWQ benthic ratings in the HU had improved from Good-Fair to Good suggesting that noted impacts are not critically affecting aquatic communities. Nevertheless, the high number of animal operations (18) and the noted impacts to streams and wetlands in this HU justify restoration to its riparian areas and floodplains to improve habitat and water quality.



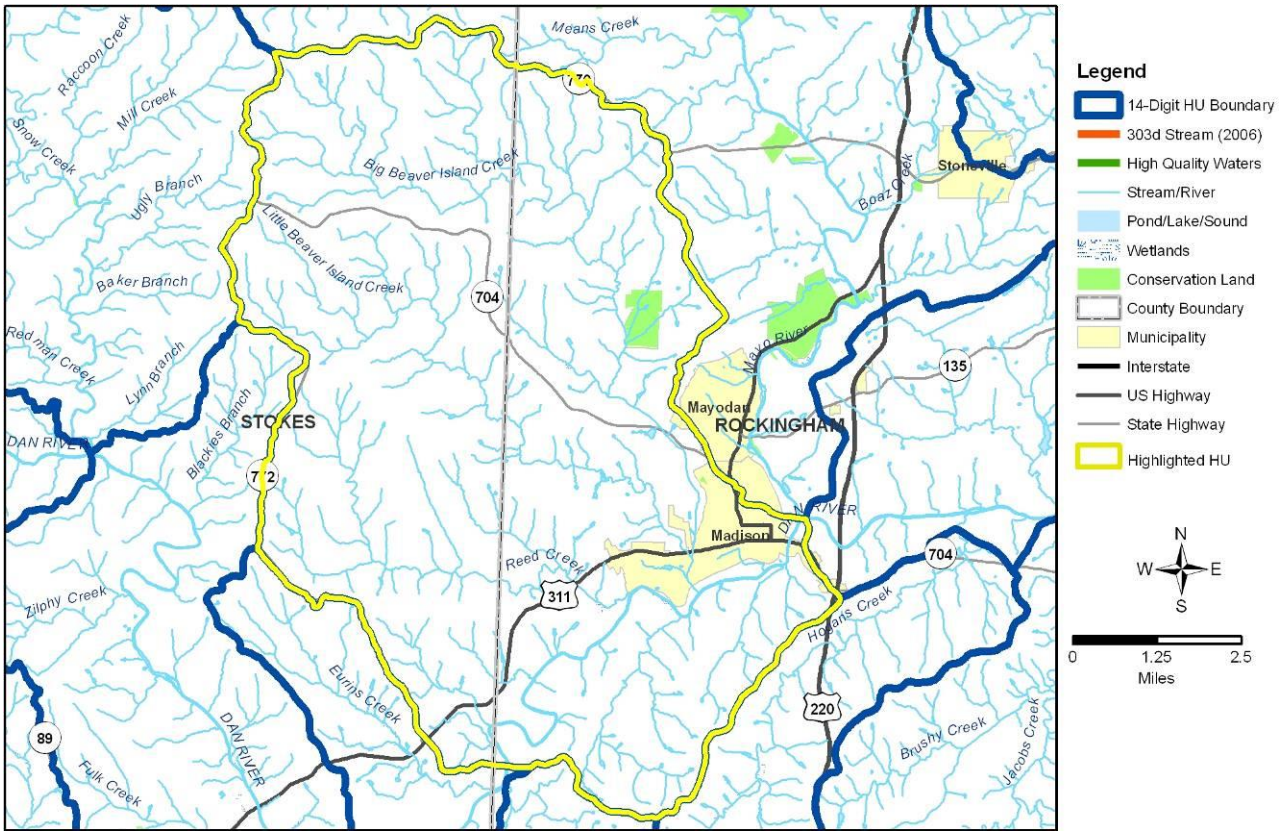
Belews Creek-Upper: 03010103180040

Belews Creek is the most developed HU in North Carolina's portion of the Dan River and includes portions of Kernersville, Stokesdale, Walkertown, and Oak Ridge. Still, forest (53%) and agriculture (30%) are more prevalent land covers than urban (16%). East Belews Creek is listed on the State's impaired waters list for high mercury levels. This Creek, along with West Belews Creek empty into Belews Lake in the downstream HU. According to DWQ, monitoring on Kernersville Lake, which falls along Belews Creek, has shown moderately high nutrient and chlorophyll *a* levels. The NC NHP has a number of identified SNHA along streams in the HU, however few of these are protected. Recommendations for the HU include improved control of stormwater and agricultural runoff to area streams and protection of the important habitat areas in the HU.



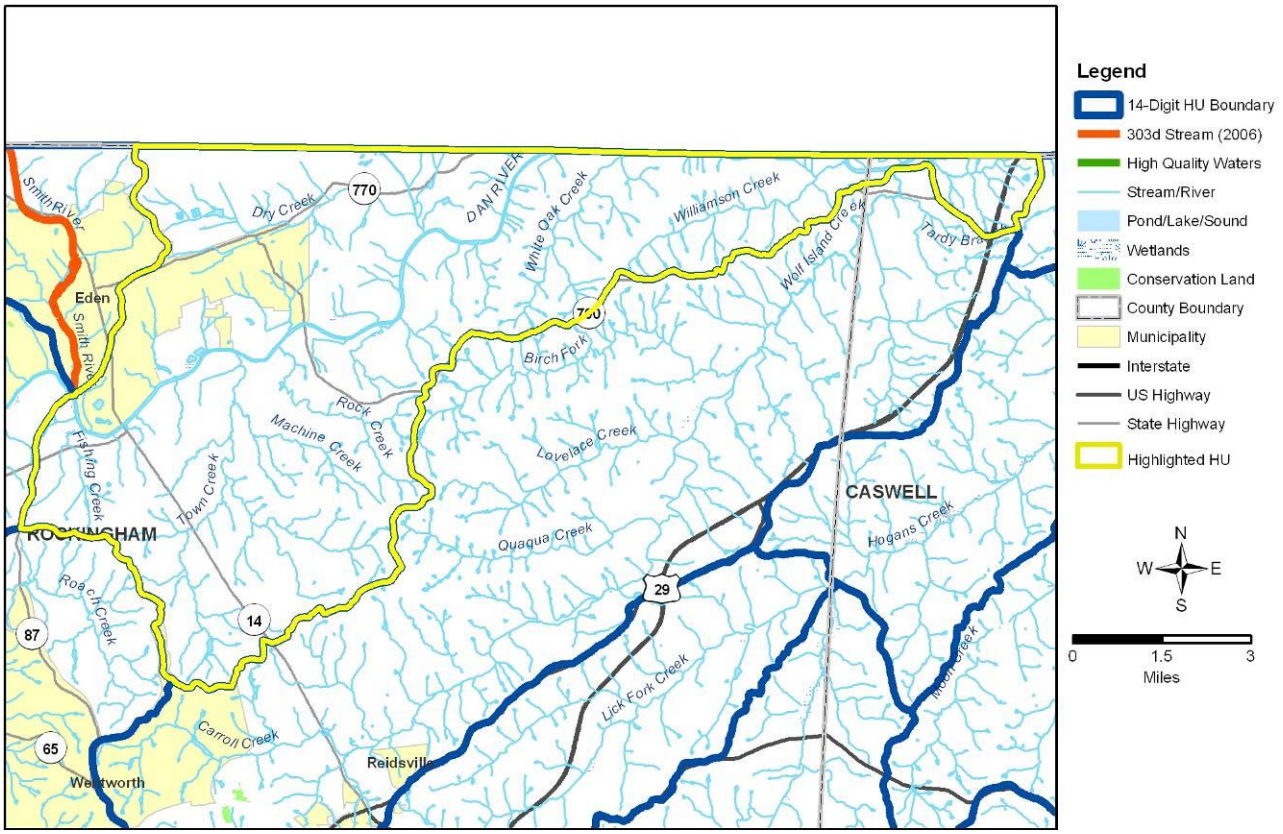
Big Beaver Island Creek: 03010103220010

Big Beaver Island Creek drains from west-to-east and into the Dan River. This HU contains mostly forest (66%) and agricultural (26%) land use but also includes portions of the Town of Madison where the Creek meets the Dan River. The Creek has received Good fish ratings from NC DWQ however a number of animal operations in the creek (15) have contributed to streambank instability. As a result, resource professionals in the area have recommended actions to improve this HU's riparian habitat and streambank conditions.



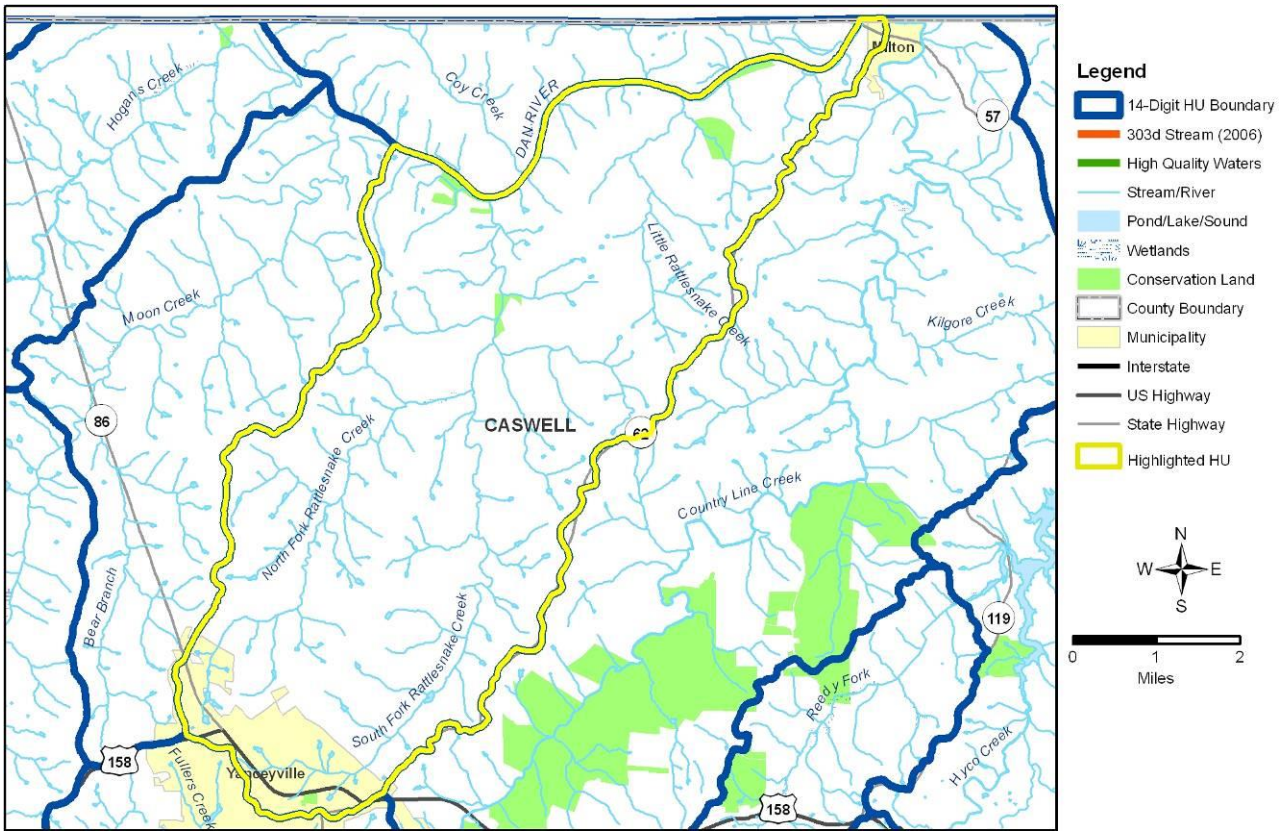
Dan River-Middle: 03010103230040

This HU begins downstream of the Dan and Smith River confluence in Eden, NC. The HU is mostly forest (60%) and agriculture (28%) but does have some urban development near Eden (11%). Some of the stream and riparian areas in the commercial and industrial areas of the HU near Eden were impacted and not providing habitat and water quality functions. Preliminary 2008 impaired waters ratings from DWQ had the Dan River in this HU is rated as impaired for high levels of turbidity levels and bacteria (fecal coliform). The HU hosts the federally-endangered Roanoke Logperch, making the HU a priority for the US Fish and Wildlife Service for recovery of the species. Additionally, sections of the Dan River in this HU are recognized as Significant Natural Heritage Area (SNHA). Aquatic habitat improvement in both urban and rural settings and habitat protection are recommended in this HU. This HU is one of three 14-digit hydrologic units that comprise the Eden Area Local Watershed Plan (LWP). [See *Watersheds Designated as TLWs (January 2015 Update)* section later in document.] It includes two priority subwatersheds, Dry Creek and Town Creek, in which stream and buffer restoration, agricultural BMPs and urban stormwater BMPs have been recommended to address water quality and habitat stressors.



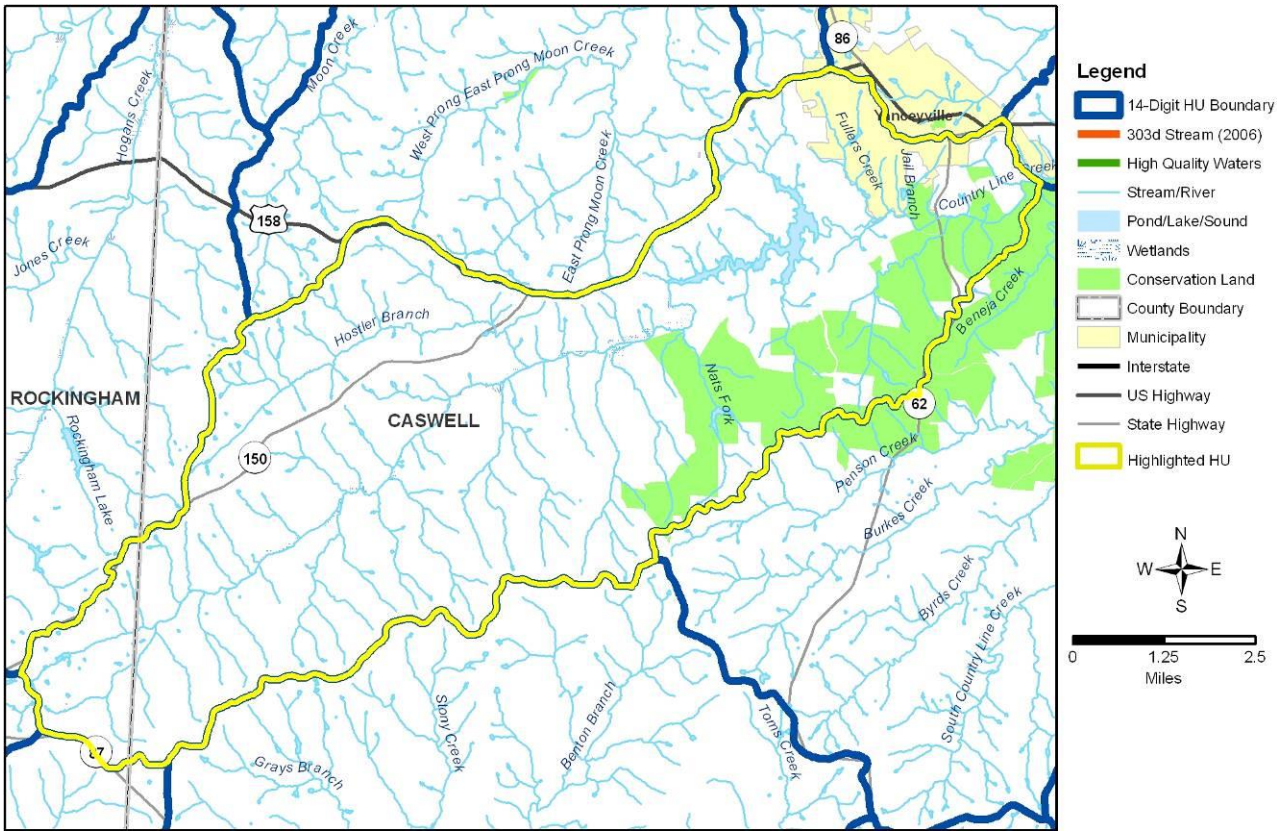
Rattlesnake Creek: 03010104021070

This HU has its headwaters in Yanceyville and its streams flow north into the Dan River. While the lower end of the Creek received Good fish ratings, a number of areas were observed where the streams were eroding large streambank sections. This scouring contributes heavy sediment loads to streams in the HU and impact benthic organisms. This fact was also noted by resource professionals in the area who recommended that this HU receive priority designation for restoration funds. The PLC has protected about 100 acres of land in the HU. Activities to improve aquatic habitat and reduce streambank erosion are recommended for this HU.

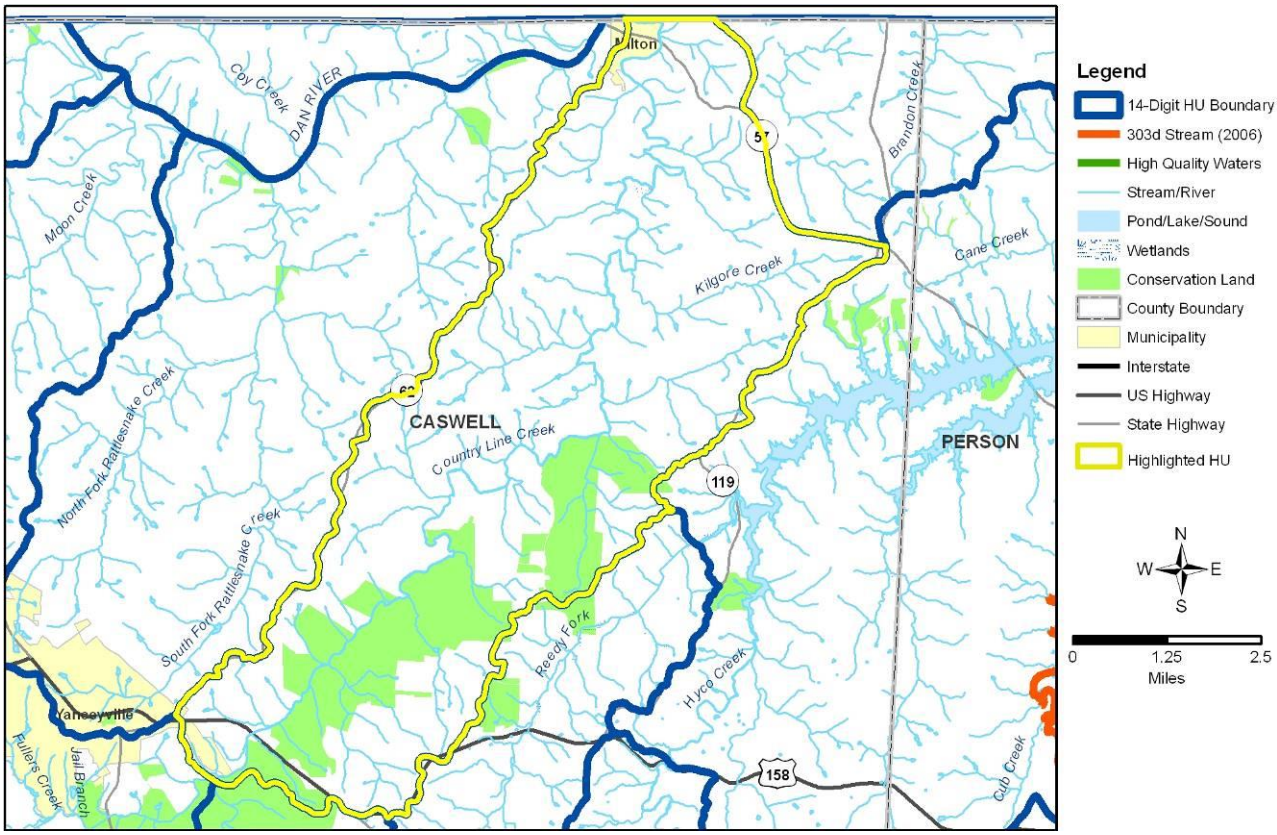


Country Line Creek: 03010104032010 (Upper), 03010104032030 (Lower)

These HUs flow northeast across much of Caswell County before emptying into the Dan River. Land use in the two HUs is dominated by forest (72%) and agriculture (24%). DWQ noted a number of areas along the Country Line Creek with marginal riparian habitat. Farmer Lake, which is south of Yanceyville, showed signs of eutrophic conditions and low clarity, but it was not rated as impaired. This Lake serves as a drinking water reservoir for the Town of Yanceyville. A number of threatened fish and mussel species have been identified in these HUs (Riverweed Darter, Creeper, Atlantic Pigtoe, and Triangle Floater) and, consequently, they are identified as priority areas for freshwater conservation in the NC Wildlife Action Plan (NC WRC 2005). DMS has completed one stream preservation project on Country Line Creek (2,300 ft.) Additionally, part of the Wildlife Resource Commission's large Caswell Gameland falls within these HUs. Continued investment in water quality improvement, particularly above Farmer Lake, and habitat protection are recommended for these HUs.



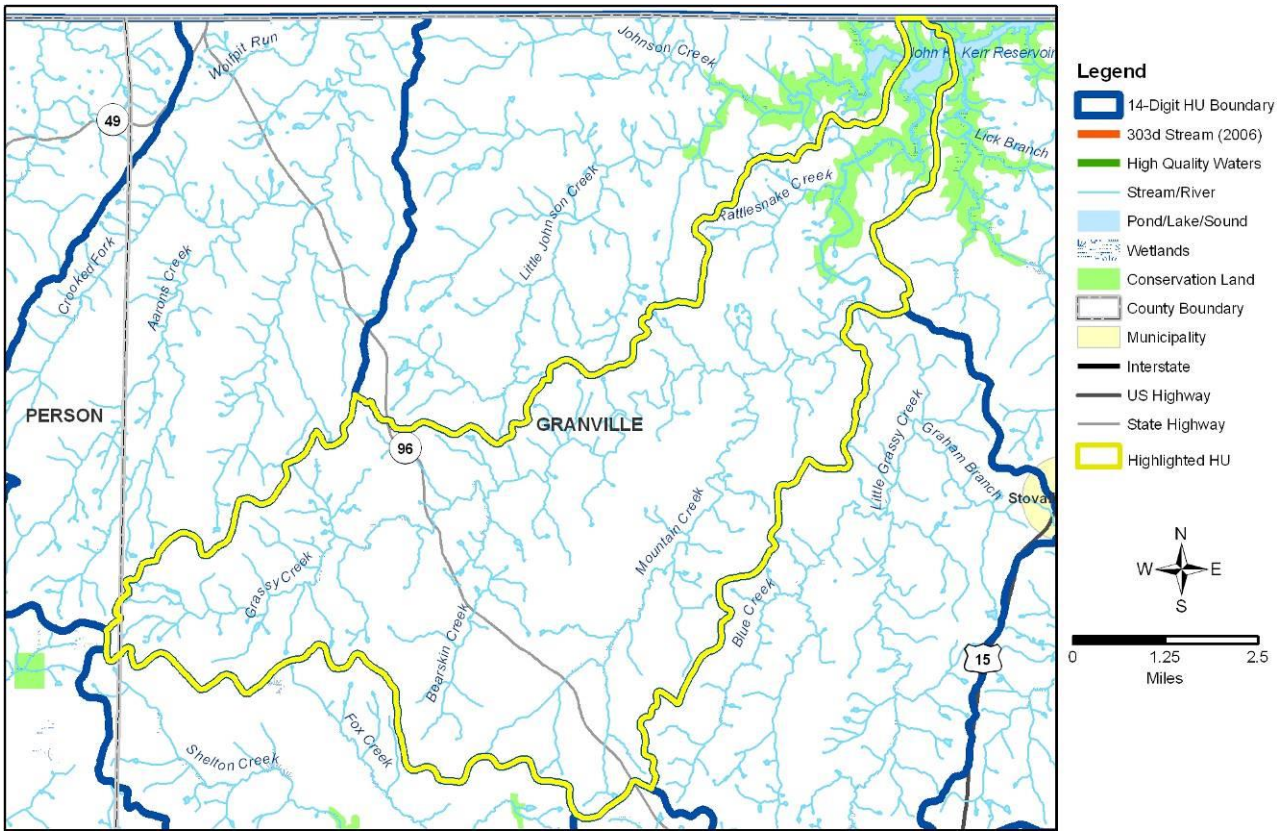
Country Line Creek: 03010104032010 (Upper)



Country Line Creek: 03010104032030 (Lower)

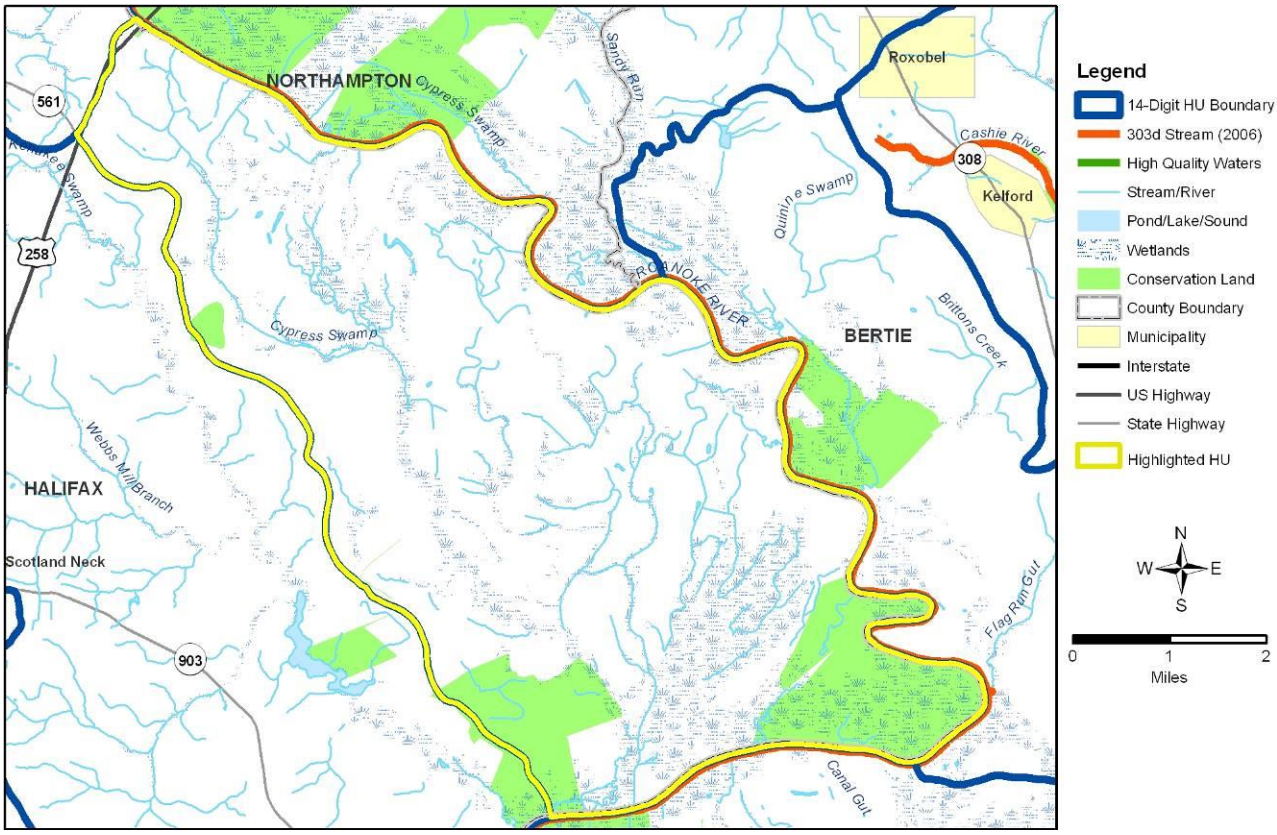
Grassy Creek: 03010102161010

Streams in the Grassy Creek HU, like the majority of those in the CU (03010102), are fully supporting their designated use. The State's Wildlife Resource Commission has identified the HU as a priority area for freshwater conservation in the NC Wildlife Action Plan (NC WRC 2005). Objectives in this HU, therefore, should focus on protecting the SNHA and rare, threatened, and endangered fish and mussel species including the Carolina Darter and Brook Floater. Grassy Creek discharges into a popular arm of the John H. Kerr Reservoir which is used for drinking water supply, hydroelectricity generation, and recreation.



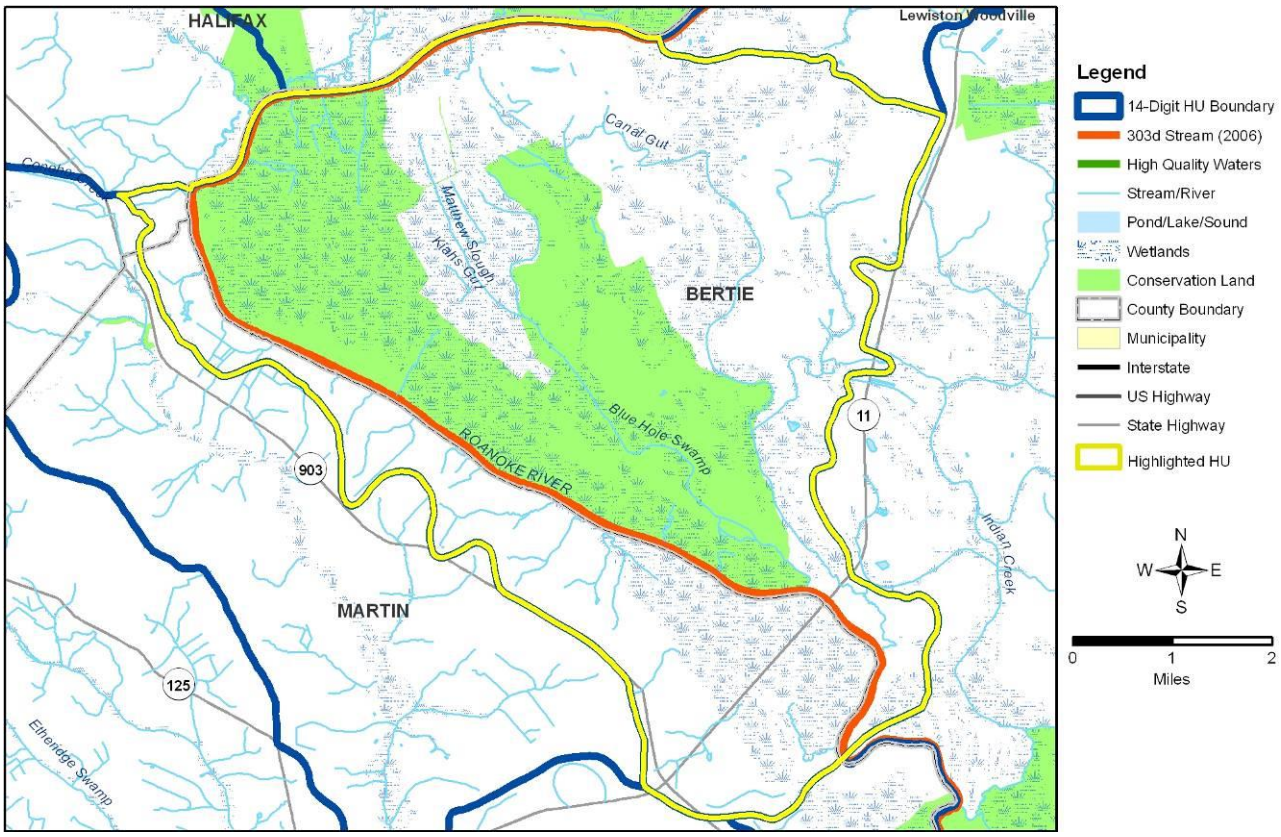
Cypress Swamp: 03010107100020

The Cypress Swamp HU has more Natural Heritage Element Occurrences than any other in the lower Roanoke River Basin. Twenty-one miles of stream are 303(d) listed by the Division of Water Quality for impairment due to mercury levels in fish tissue samples. It has a moderately high level of land disturbance due to human activities and a moderately high level of disturbed or absent riparian buffers. A significant portion of the Roanoke River proper is closed to shellfishing. The NC Wildlife Resources Commission maintains significant preservation areas in the downstream portion of the HU. This is the only area in the Lower Roanoke lying in the Southeastern Floodplains and Low Terraces ecoregion. This HU can benefit by increasing the amount of riparian buffer and increasing the number of agricultural BMPs to address runoff. As in most of the lower Roanoke, the region can benefit by additional preservation projects adjoining and connecting existing conservation lands.



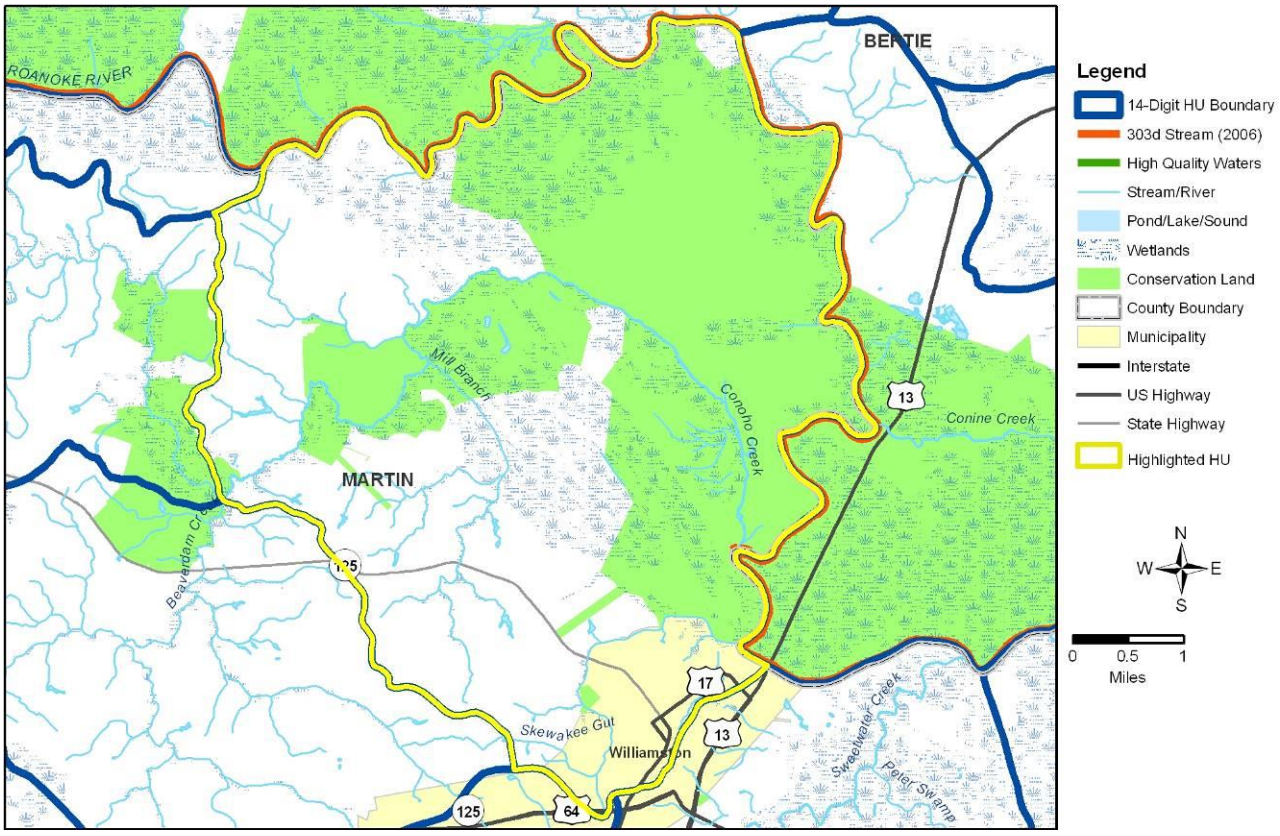
Blue Hole Swamp: 03010107110030

A large percentage of Blue Hole Swamp is dedicated as conservation lands. There are a moderately high number of rare species as well as a significant amount of land in dedicated natural areas. Twenty-six miles of stream are classified by DWQ as impaired waters due to mercury content in fish. A fish consumption advisory exists for the HU. There is a small amount of shellfish closure area on the mainstem of the river. Three-quarters of the land area in the HU are considered forested wetland. Additional preservation areas that contribute to the protection of rare species are a priority in this HU.



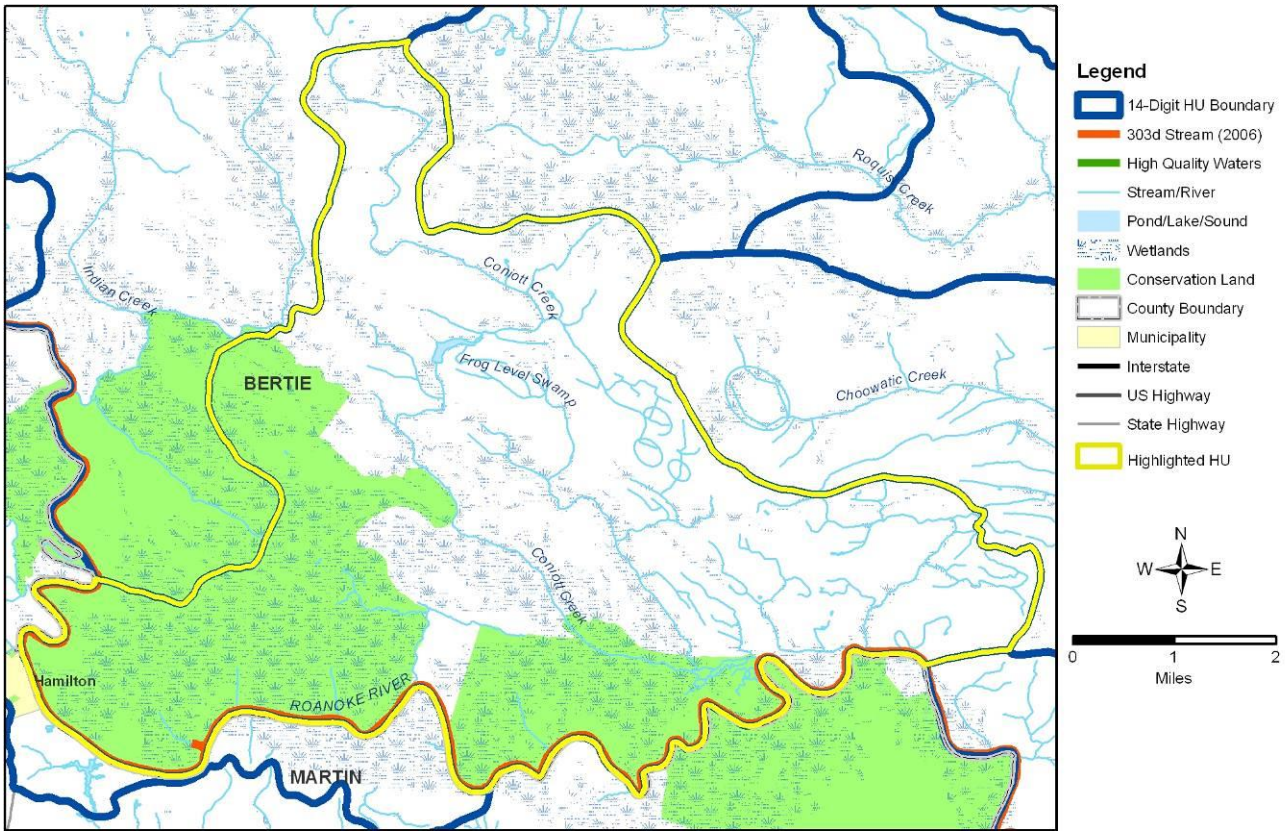
Conoho Creek: 03010107120070

About half of the Conoho Creek HU is dedicated conservation land and more than half is considered unfragmented forest, high even for an HU in the lower Roanoke. This HU has the second highest level of imperviousness in the lower Roanoke at 1.6%, attributable to development in the Williamston area. The HU has a moderately high level of unbuffered streams (21%). A small amount of the open water area on the mainstem of the river is closed to shellfishing. Most of the population is concentrated around Williamston though it has declined at a rate of nearly 6% over the past 10 year. Riparian buffers and agricultural BMPs that reduce impacts of runoff are important priorities for this HU. BMPs that address impacts of impervious surface runoff around Williamston are also important when considering restoration projects for this HU.



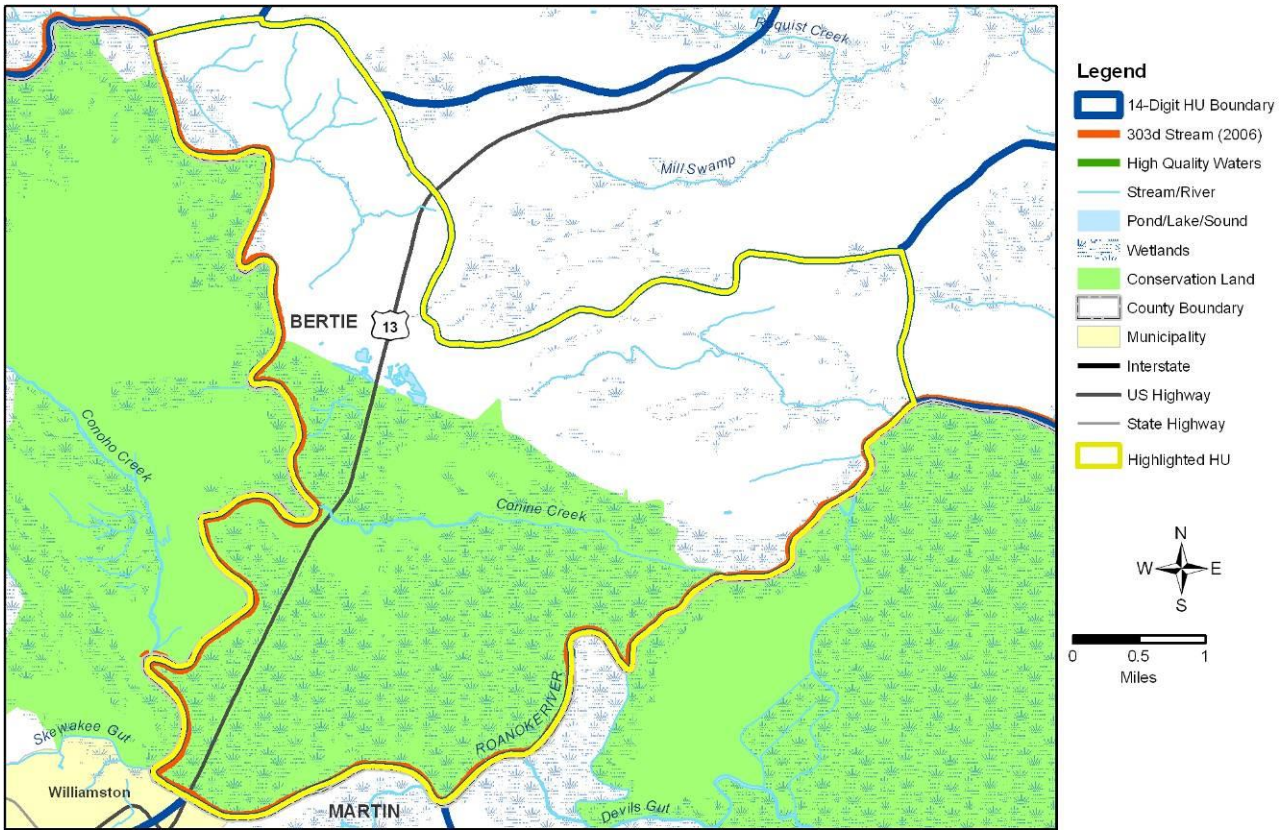
Conniott Creek: 03010107130020

One-third of the Conniott Creek HU is in preservation. There are a high number of Natural Heritage element occurrences in this area. Approximately half of the watershed exists as unfragmented forest area. Several significantly large Carolina Bays exist in the headwater areas north of the river. The NC Wildlife Resources Commission holds a significant amount of land as designated conservation land. One-fifth of the streams are not buffered. Nearly 75% of the soils here are considered hydric, the upper end of the range for the lower Roanoke River Basin. A small portion of open water here is closed to shellfishing. The HU is very sparsely populated. Preservation projects, especially of unique areas such as the Carolina Bays, should be a high priority in this HU.



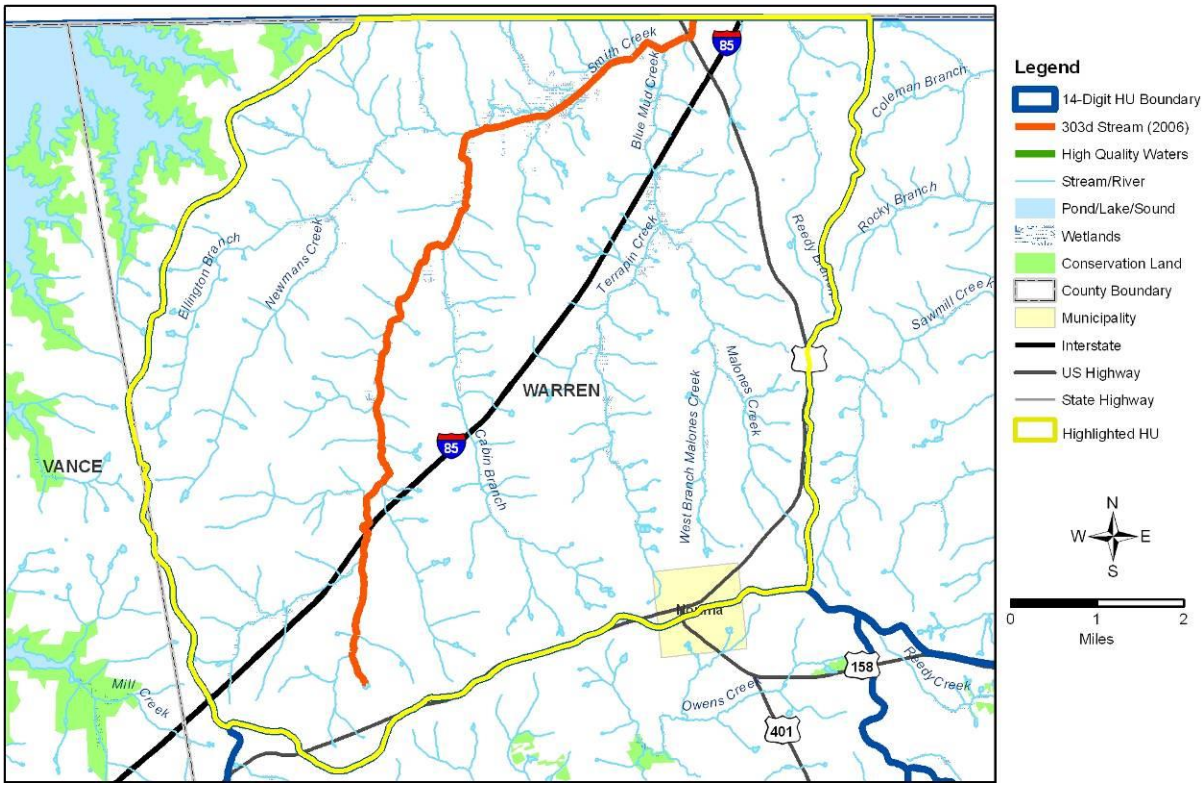
Conine Creek: 03010107130030

Fifty percent of the Conine Creek watershed exists as unfragmented forest area and half the entire watershed is dedicated conservation area. A moderately high number (7) of Natural Heritage element occurrences occur here. The watershed has a very sparse population. The entire length of the Roanoke River along the western and southern border of the HU is listed by DWQ as impaired due to mercury content in fish tissue samples. This HU can benefit primarily by projects contributing additional preservation lands.



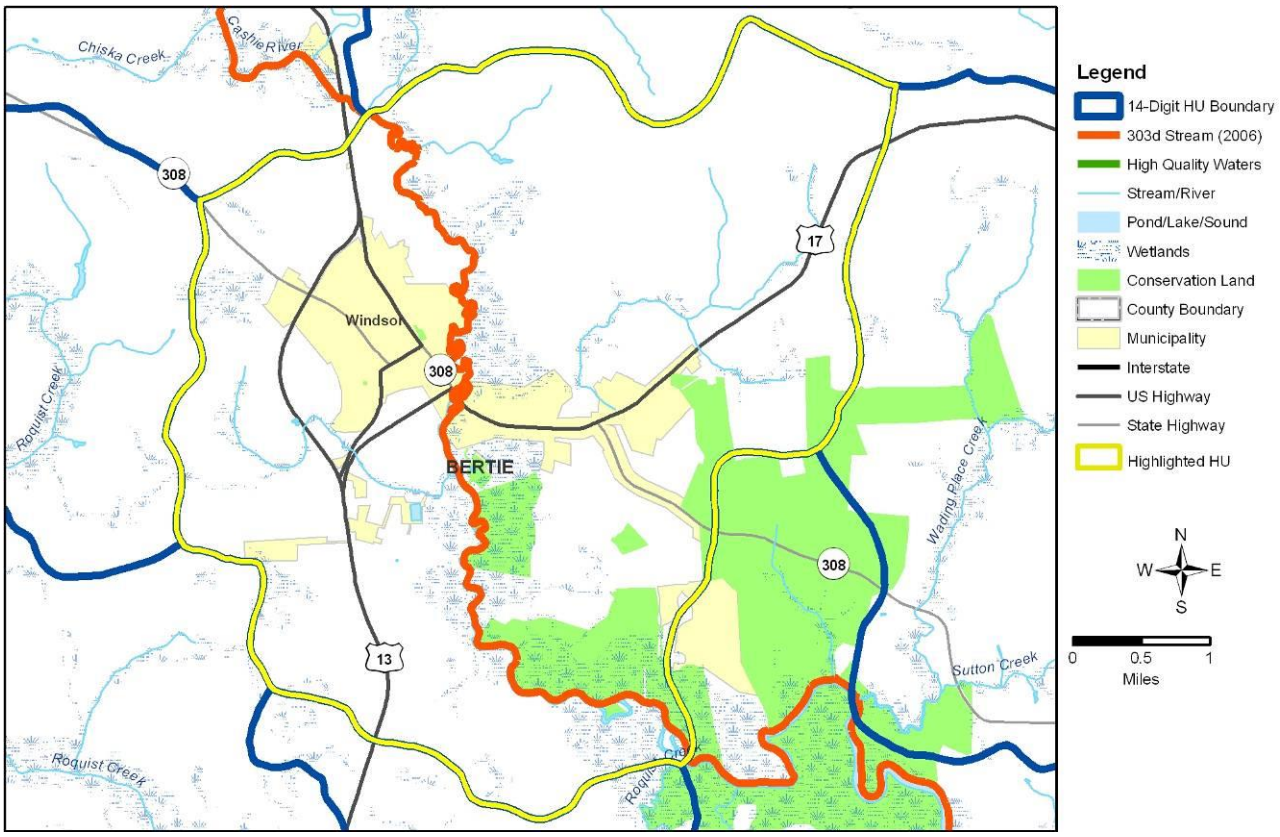
Smith Creek: 03010106031010

Smith Creek remains on the NC 303(d) list of impaired waters due to continued poor benthic macroinvertebrate communities. It is currently only partially supporting aquatic life. There is evidence of stream scouring during high flows and dissolved oxygen concentrations continue to be an issue. There was a gradual increase in conductivity in the stream during the last 15 years. Smith Creek is very turbid and its streambed is composed almost entirely of sand. There are no NPDES discharges to Smith Creek so pollution is attributed to nonpoint sources. The stream will benefit from agricultural BMPs and riparian buffer projects to reduce impacts of runoff.



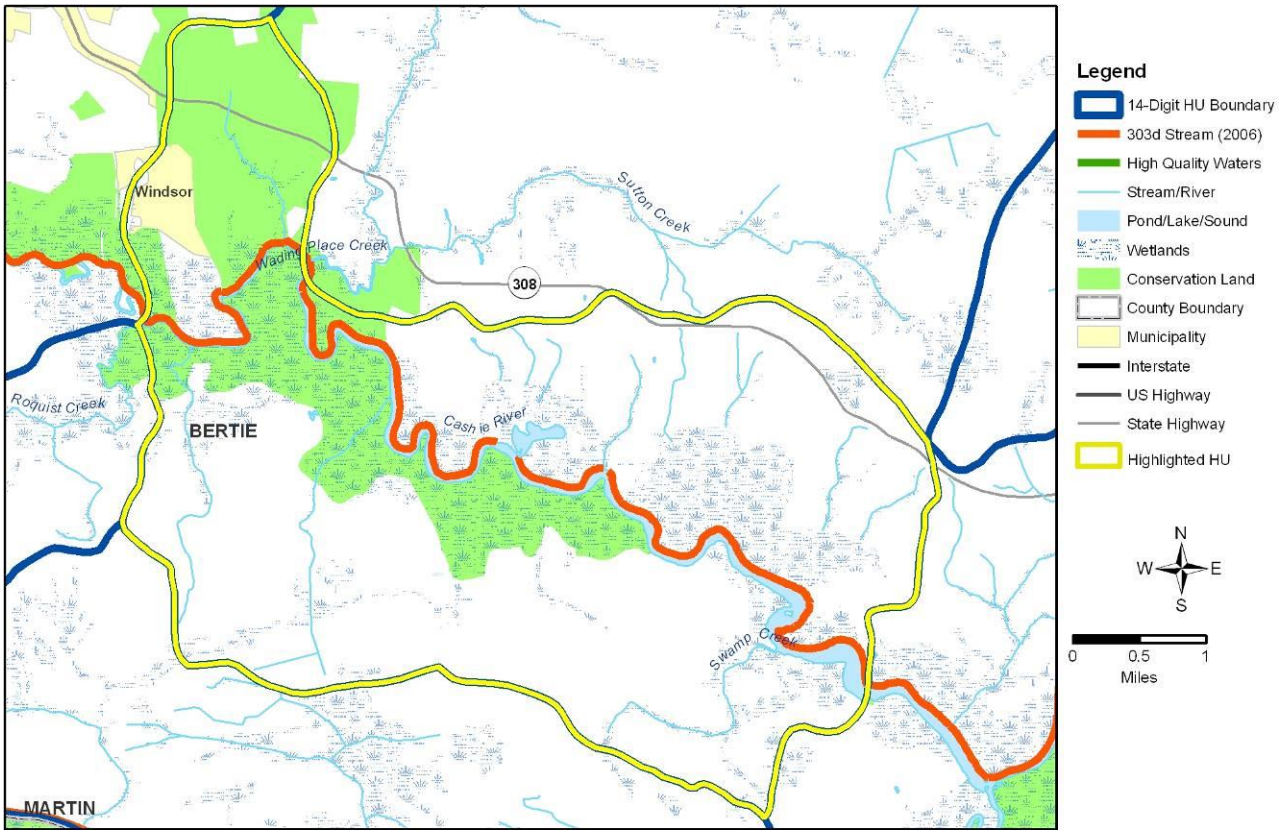
Cashie River (Windsor): 03010107160090

For the lower Roanoke River, this HU has relatively low unfragmented forest cover (29%) and a relatively high road density. NCDOT projects that an additional 6.2 miles of road projects will be built under its Transportation Improvement Program over the next seven years. Three Clean Water Management Trust Fund projects exist here and one Section 319 project was completed in the HU. The watershed encompasses the Town of Windsor, NC and has had a slowly declining population rate (2%) over the past 10 years. Priorities for the HU include BMPs that offset impacts of agricultural runoff as well as impervious surface runoff impacts around the highways and the Town of Windsor.



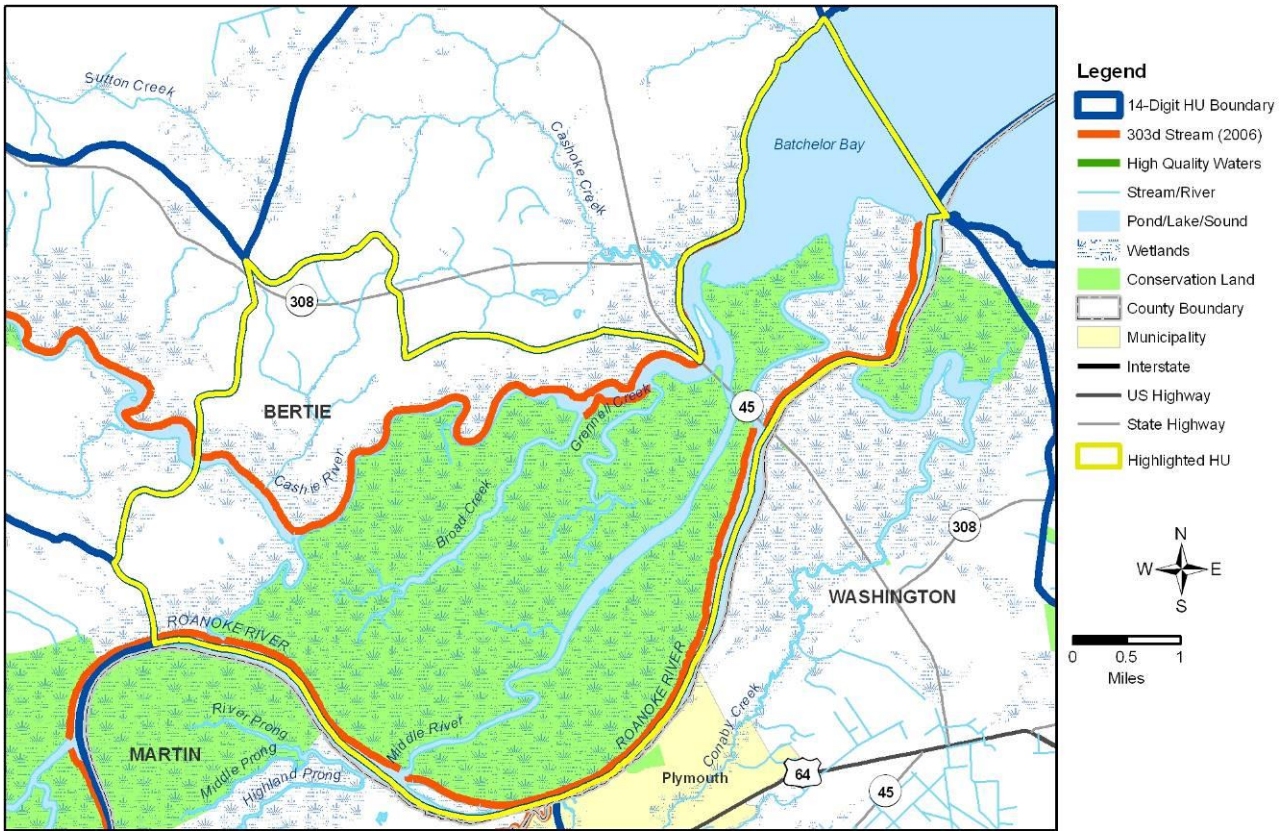
Lower Cashie River: 03010107160115

Twenty percent of the Lower Cashie River watershed exists as conservation land and nearly one-third of the total land area is unfragmented forest. Thirty-one percent of the area is agricultural land. A single Clean Water Management Trust Fund project has been completed in the HU. Similar to other lower Roanoke River HUs, the length of the mainstem is 303(d) listed due to mercury concentration in fish tissue with the associated fish consumption advisory. Agricultural BMPs and preservation projects are recommendations for this HU.



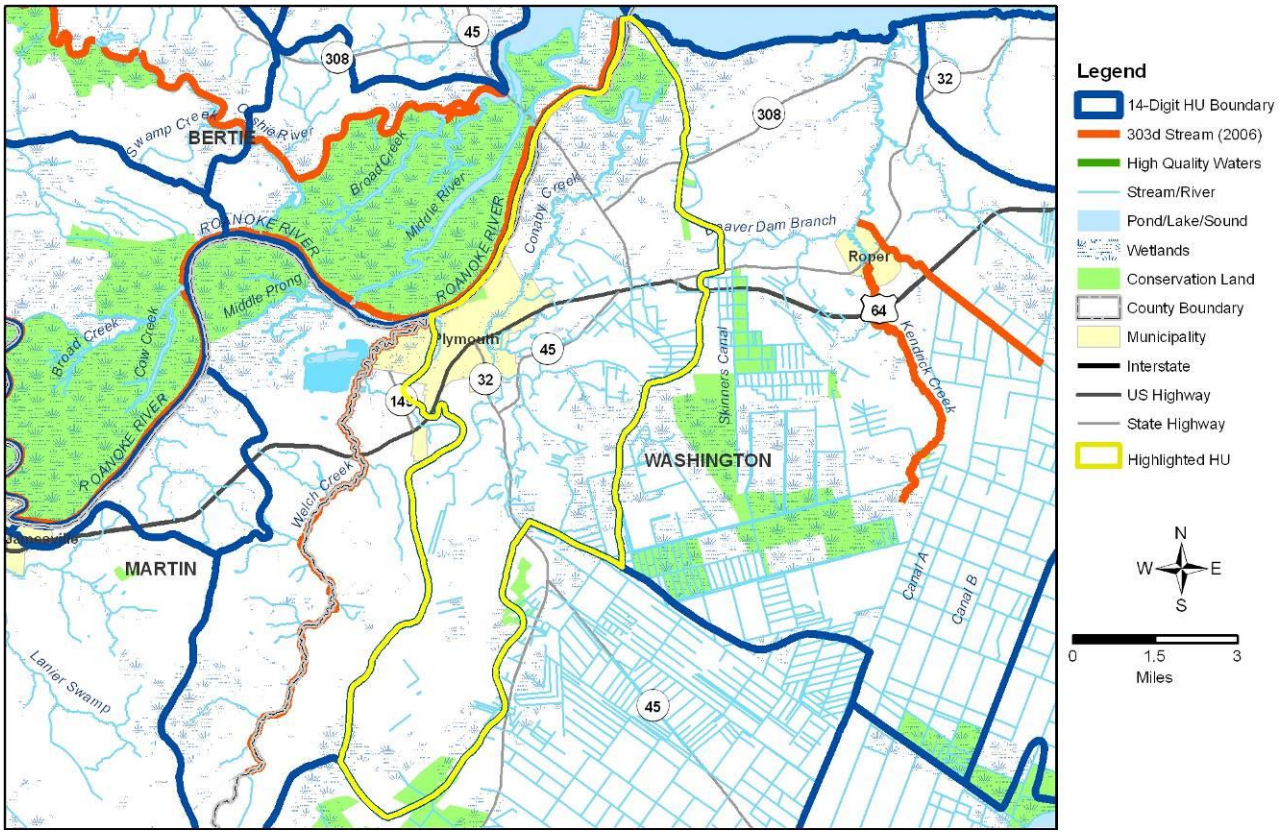
Batchelor Bay: 03010107160120

The Batchelor Bay watershed boasts streams and water bodies buffered at a rate over 90%. It also contains the largest open water area (5%) with a correspondingly large shellfish closure area (over 5 square miles). Large stretches of both the Cashie and Roanoke rivers are 303(d) listed by DWQ due to contamination of mercury *and* dioxin detected in fish tissue samples. Despite these issues, two-thirds of the watershed is designated as Significant Natural Heritage Area by the NC Natural Heritage Program. Because this watershed is largely wetland, it is very sparsely populated and it has the lowest agricultural area percentage (5%) in the lower Roanoke River basin. Projects that improve shellfish and fish nursery habitat are a priority for this HU (NCDMF, 2005).



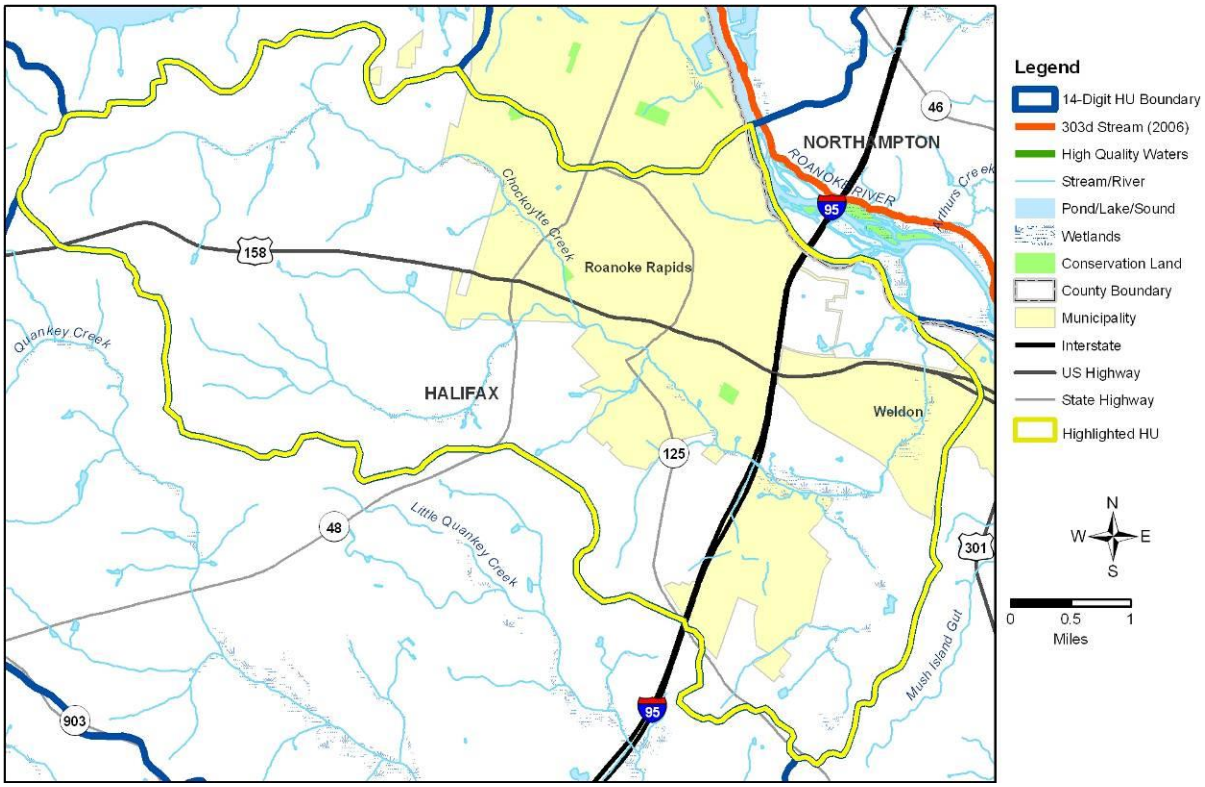
Conaby Creek: 03010107170020

The Conaby Creek watershed has more ditching than most other HUs in the lower Roanoke. It is also the farthest east, adjacent to Plymouth and Washington, NC. Half the area is unfragmented forest but only 15% exists as Significant Natural Heritage Area. Eighty-seven percent of the land area contains hydric soils. Three-fifths of the streams and other water bodies are unbuffered. Half a square mile of open water is currently designated as a shellfish closure area. There are currently four Clean Water Management Trust Fund projects in the watershed. The population here is expected to decline 14% between 2000 and 2030. Projects that improve protection of water quality in streams and downstream in Batchelor Bay are a priority. Stream restoration projects in the headwaters that reestablish natural geomorphology in ditched areas are also important.

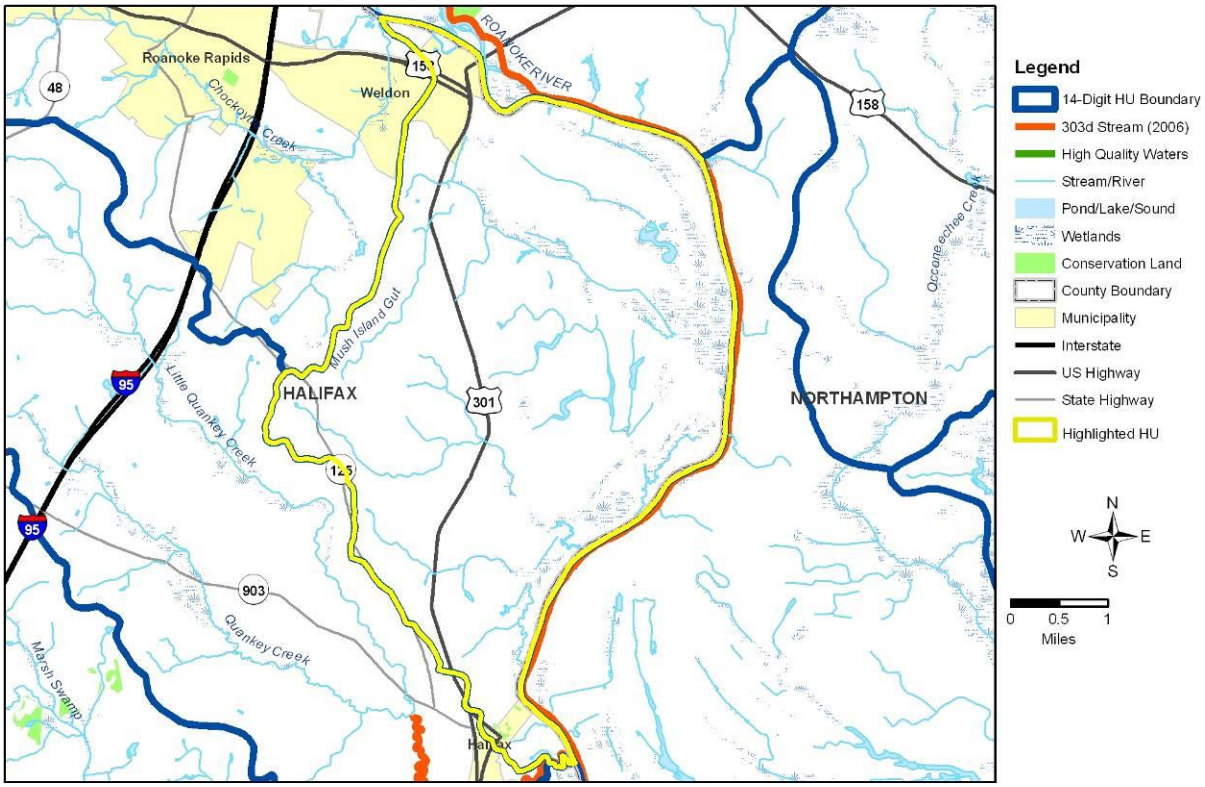


Chocoyette Creek: 03010107070010 (Upper) and 03010107070020 (Lower)

These watersheds contain Chocoyette Creek, which drains portions of Roanoke Rapids and Weldon. Roanoke Rapids is required to comply with EPA Phase II stormwater rules. Chocoyette Creek is impacted by sewer collection overflows in Roanoke Rapids as well as stormwater runoff from Roanoke Rapids and Weldon. Stormwater runoff continues to be an issue. Stormwater retrofits should be a priority for Roanoke Rapids in the Upper Chocoyette Creek watershed while agricultural BMPs, stream and buffer restoration projects are called for in Lower Chocoyette Creek.



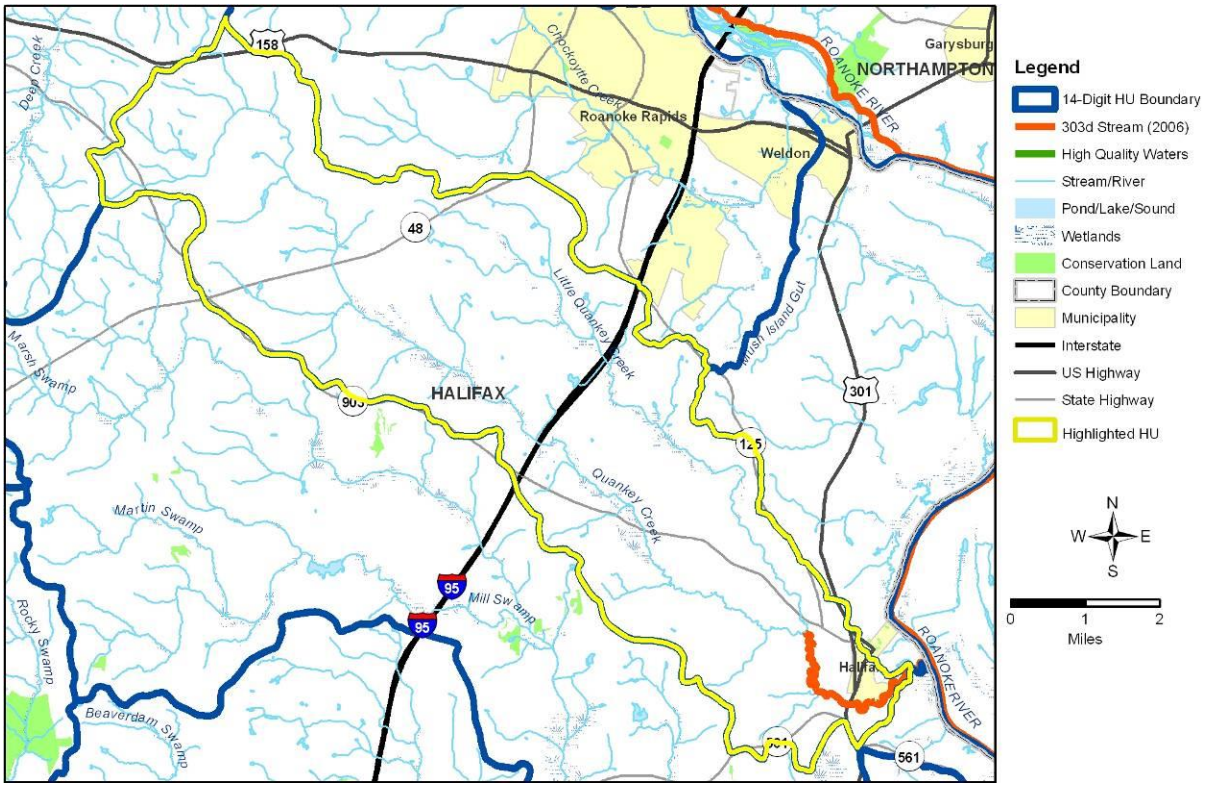
Upper Chocoyette Creek



Lower Chocoyette Creek

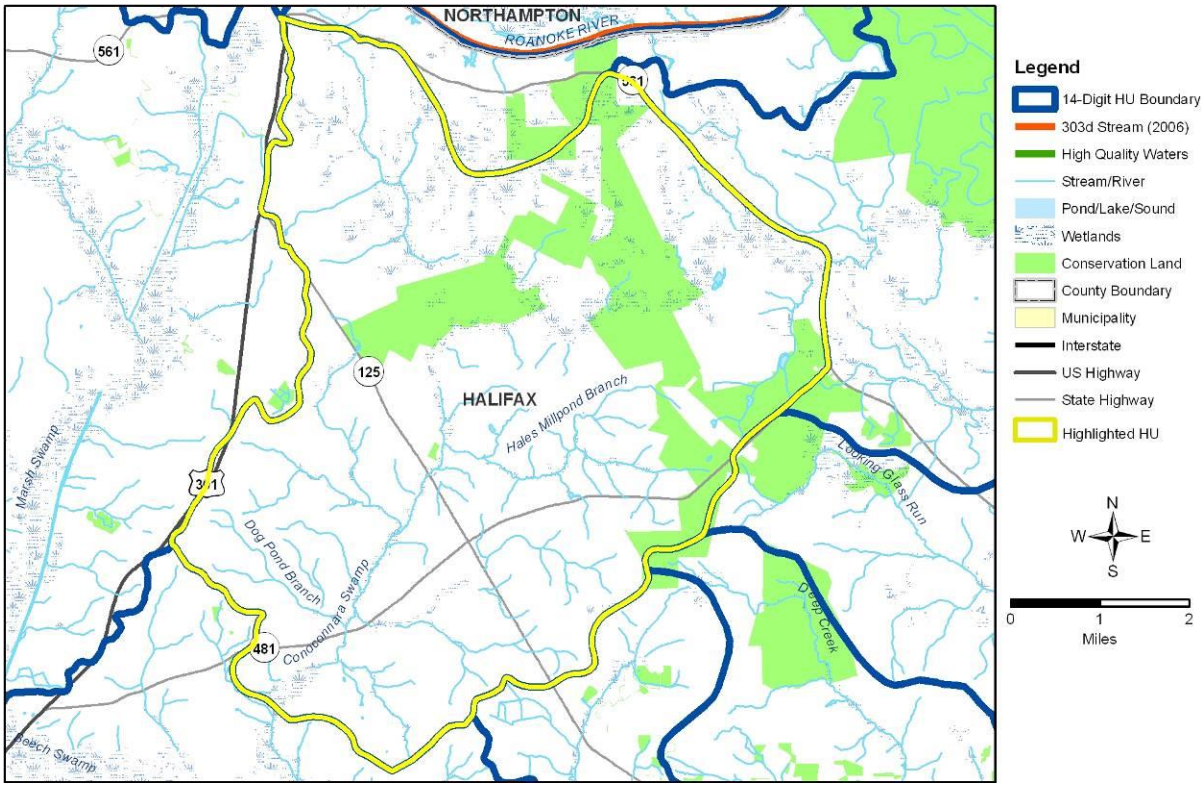
Quankey Creek: 03010107070030

Quankey Creek is a stream that is 303(d) listed and impaired. Some of this impairment is due to Halifax's Wastewater Treatment Plant as well as stormwater runoff from Halifax. These impacts influence the lower portion of the creek. The headwaters of Quankey Creek appear to be in much better shape than its downstream reaches. Upstream sampling sites showed healthy macroinvertebrate populations and there was little indication of water quality impacts (DWQ, 2001). Buffer and stream projects that reduce the cumulative impacts of runoff on the lower creek are a watershed priority.

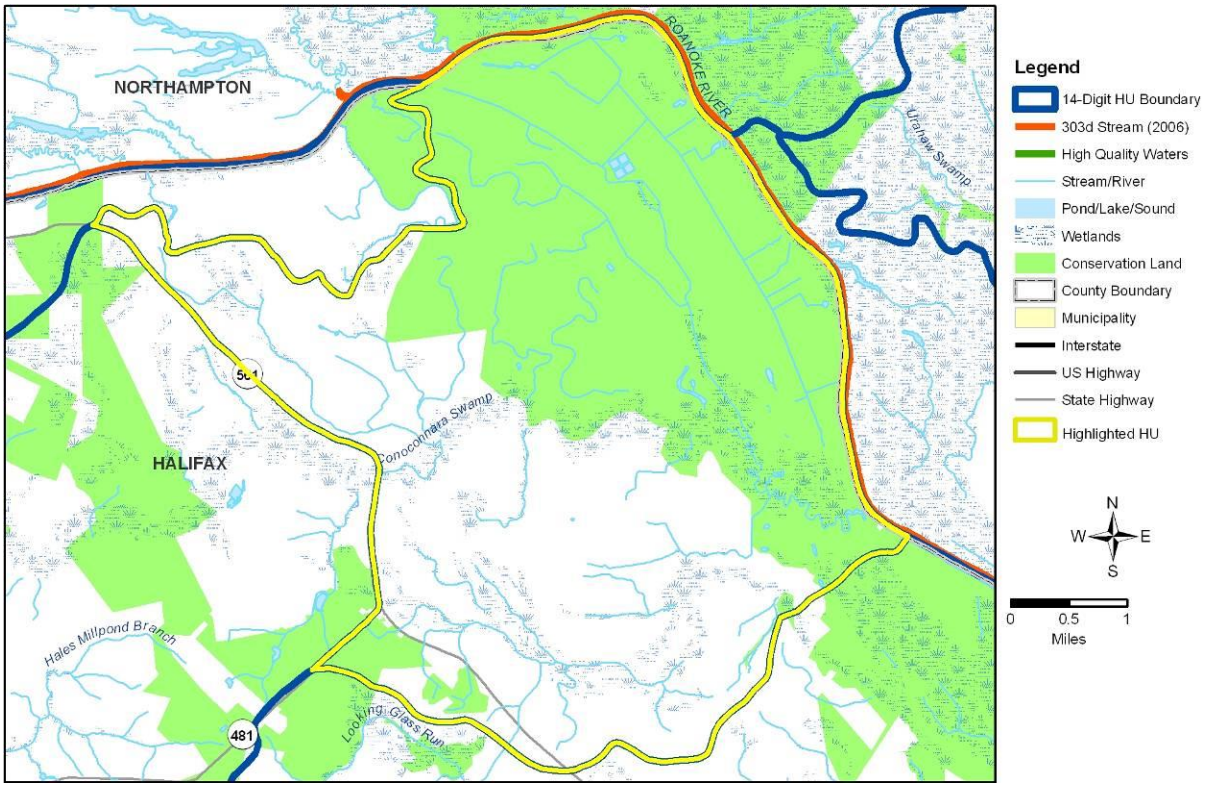


Conoconnora Swamp: 03010107090010 (Upper) and 03010107090020 (Lower)

This stream was rated as partially supporting in 2001 (DWQ, 2001) and has received more attention in the recent past. In 2000, the NC Wildlife Resources Commission received a $1.65 million grant from the Clean Water Management Trust Fund to acquire 2400 acres along the Roanoke River. This area is immediately downstream from the Department of Corrections Caledonia prison farm, where cattle have access to the riverbank for several hundred feet. The Division of Soil and Water Conservation has been working with the NC Department of Corrections to select and implement BMPs at this facility, including cattle exclusion and streambank stabilization (DWQ, 2001). Other projects that address agricultural runoff throughout the watershed are important to improve water quality for these HUs.



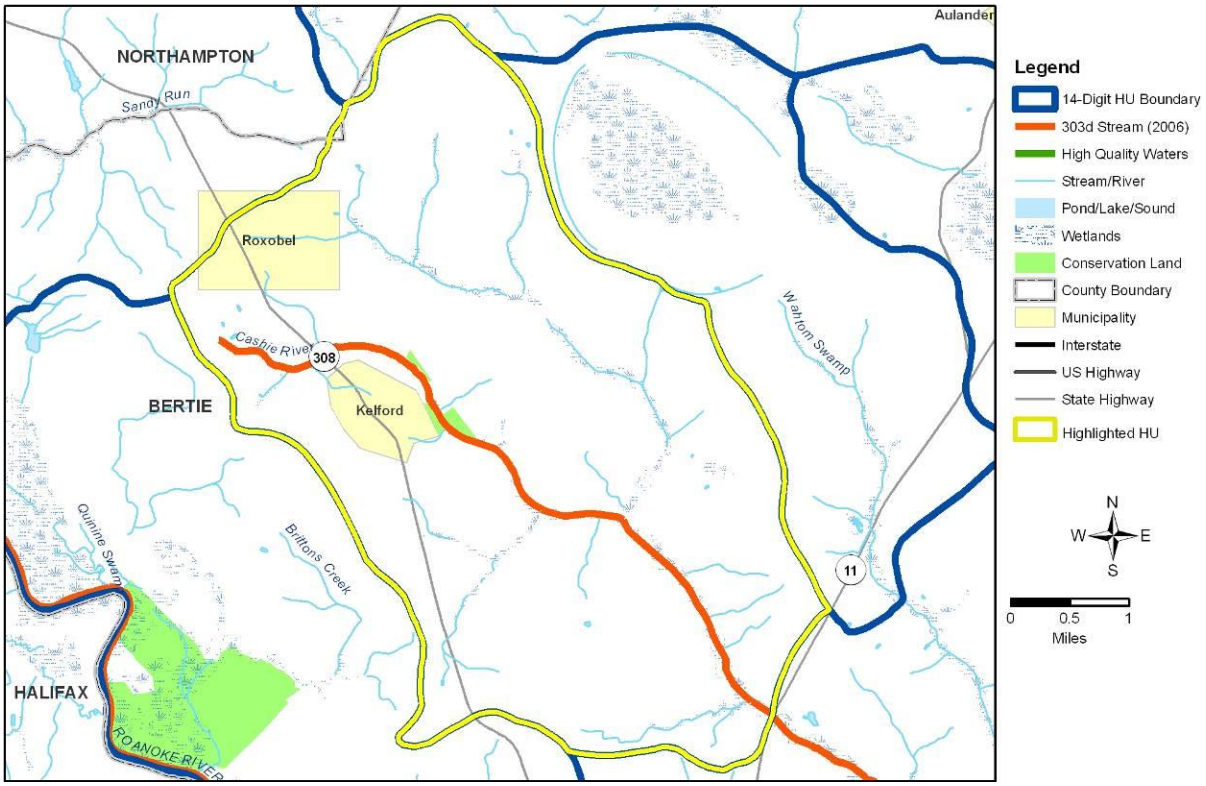
Upper Conoconnora Swamp



Lower Conoconnora Swamp

Cashie Headwaters: 03010107160010

The Cashie River is currently listed on NC's 303(d) list of impaired waters based on its poor benthic macroinvertebrate community (DWQ, 2006). In 2001, DWQ identified agricultural runoff in the upper portion of the watershed as the most likely source of downstream stressors and recommended BMPs as needed (DWQ, 2001). DMS is continuing to target the Cashie headwaters, recommending BMPs and stream/buffer projects that reduce inputs from agriculture and from impervious surfaces in the headwaters.

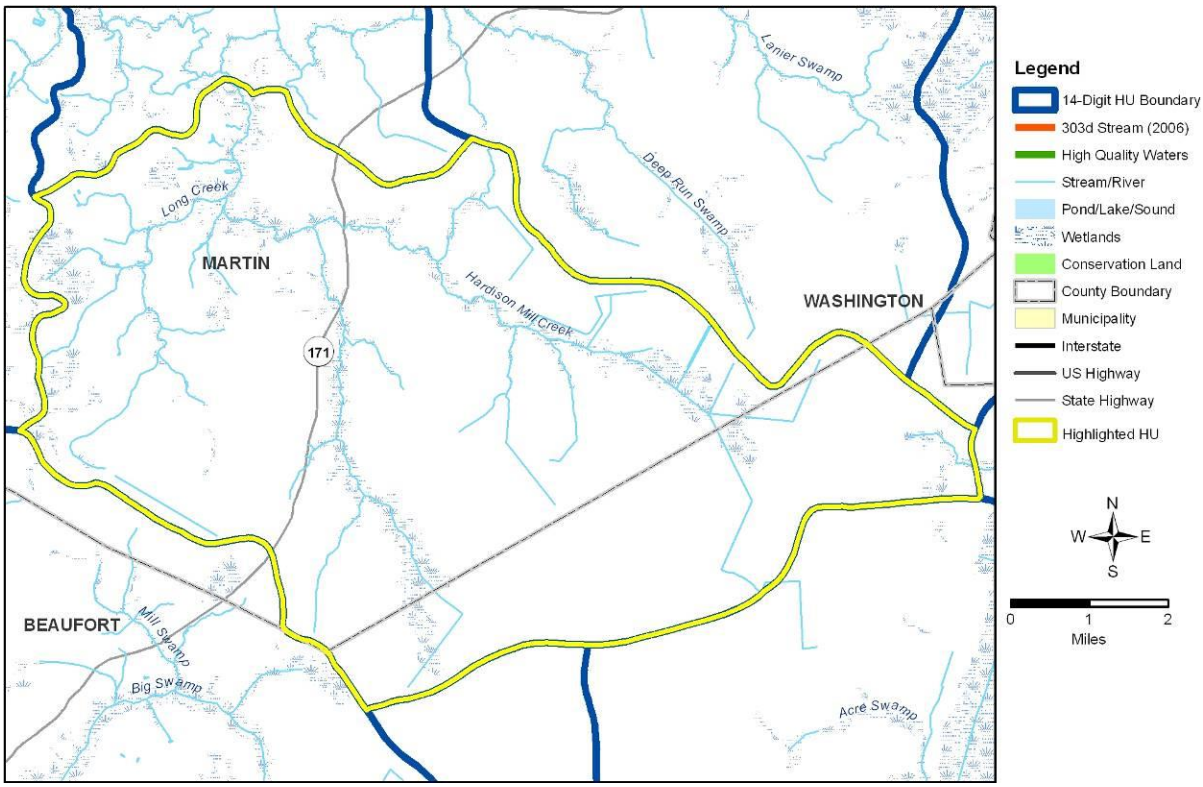


Information on Watersheds with removed TLW designation

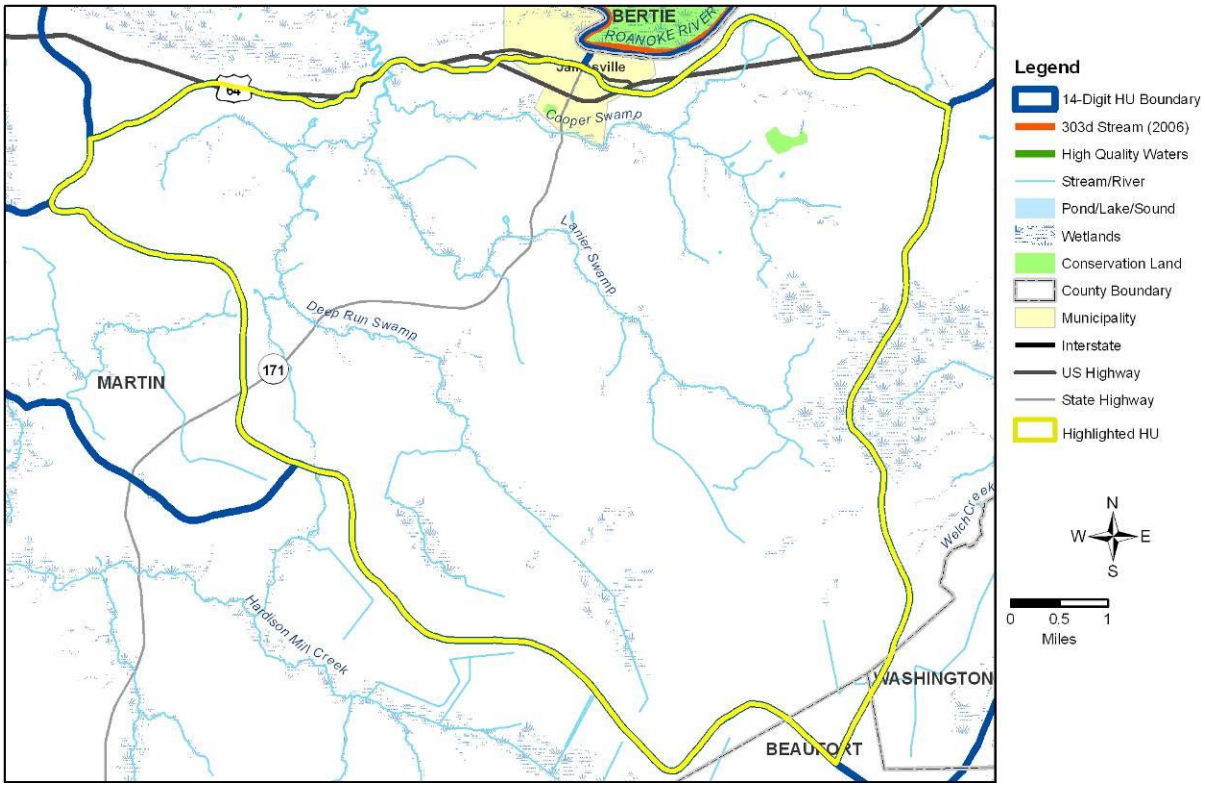
This section contains information on HUs that had their TLW designation removed. This change in designation affected two TLWs in the Roanoke.

Hardison Mill Creek and Deep Run Swamp: 03010107140010 and 03010107150010

Both of these watersheds have some issues related to agricultural impacts but compared to other HUs in the 8-digit Cataloging Unit in the current analysis, they do not exhibit as high a level of impact nor as great a quantity of assets such as existing conservation lands or Natural Heritage elements. Neither HU has any existing DMS projects. These two HUs are *proposed* for delisting.



Hardison Mill Creek

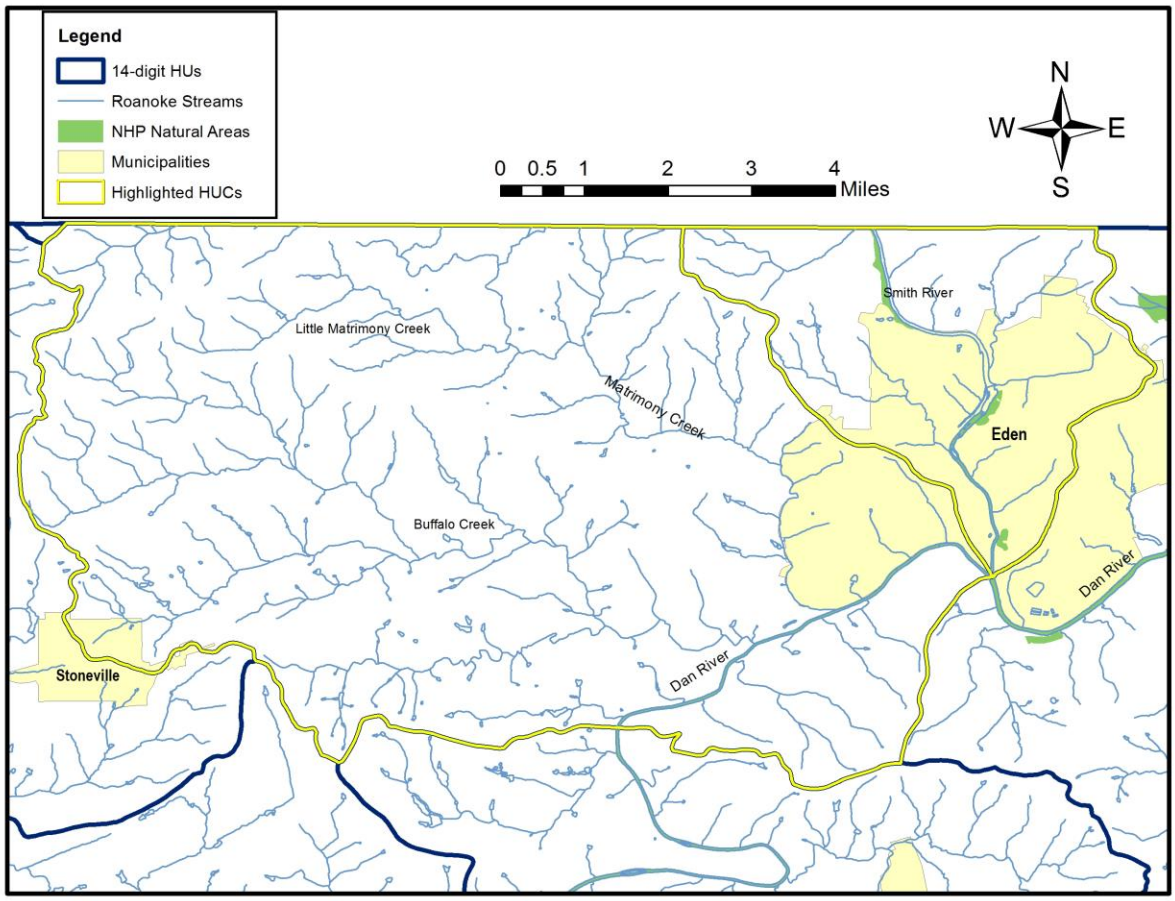


Deep Run Swamp

Watersheds Designated as TLWs *(January 2015 Update)*

Matrimony and Buffalo Creeks (03010103230020) and Lower Smith River (0301010325003)

These two 14-digit HUs are part of the Eden Area LWP discussed above in the *RBRP Goals* and *TLW Overview* sections. The Matrimony and Buffalo Creeks HU (47 square miles) comprises the westernmost area of the LWP and is characterized by 26% agricultural land use, 99% water supply (WS) waters, 19% non-forested buffers and 2.5% impervious cover (data from NCGIA, 2008). The LWP effort identified the Matrimony-Little Matrimony Creek subwatershed as a priority for stream bank stabilization, buffer restoration, wetland restoration, and agricultural BMPs to address sources of sediment, nutrients and fecal coliform bacteria. The Lower Smith River HU (11 square miles) is characterized by significant impervious cover (10%), 39% non-forested buffers and 64% WS waters. It includes a significant reach of impaired (303d listed) waters due to benthos impacts associated with stormwater pollutants (metals, sediment/turbidity). The *Eden Area Watershed Restoration Plan* has identified potential wetland restoration and urban BMP project sites within this HU to help address the sources of water quality impairment.



Matrimony-Buffalo Creeks and Lower Smith River HUs (new TLWs, January 2015)

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For More Information:

Visit the DMS Watershed Planning Contacts page located here:
https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Planning_Guidance_Docs/Watershed%20Planning%20Contacts.pdf

Definitions

8-digit Catalog Unit (CU) – The USGS developed a hydrologic coding system to delineate the country into uniquely identified watersheds that can be commonly referenced and mapped. North Carolina has 54 of these watersheds uniquely defined by an 8-digit number. DMS typically addresses watershed – based planning and restoration in the context of the 17 river basins (each has a unique 6-digit number), 54 catalog units and 1,601 14-digit hydrologic units.

14–digit Hydrologic Unit (HU) – In order to address watershed management issues at a smaller scale, the U.S. Natural Resources Conservation Service (NRCS) developed methodology to delineate and uniquely identify watersheds at a scale smaller than the 8-digit catalog unit. A hydrologic unit is a drainage area delineated to nest in a multilevel, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. North Carolina has 1,601 14-digit hydrologic units.

DMS– The North Carolina Division of Mitigation Services combines existing wetlands restoration initiatives (formerly the Ecosystem Enhancement Program and the Wetlands Restoration Program or NCWRP) of the N.C. Department of Environmental Quality with ongoing efforts by the N.C. Department of Transportation (NCDOT) to offset unavoidable environmental impacts from transportation-infrastructure improvements.

GIS - A geographic information system integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.

NCDWQ – North Carolina Division of Water Quality

NCWRP – The North Carolina Wetlands Restoration Program was a wetland restoration program under NC DENR and a predecessor of the NCEEP.

NPDES - National Pollutant Discharge Elimination System (NPDES) program was established by the federal government to control point-source discharges of water pollution. The NPDES Permitting and Compliance Program of North Carolina's Division of Water administers the program for the state. The Program aims to protect, maintain and enhance the State's waters by fostering compliance with North Carolina's environmental statutes, regulations and permits.

RBRP - The River Basin Restoration Priorities are documents that delineate specific watersheds (Targeted Local Watersheds) within a River Basin that exhibit both the need and opportunity for wetland, stream and riparian buffer restoration.

TLW - Targeted Local Watershed, are 14-digit hydrologic units which receive priority for DMS planning and restoration project funds.

USGS – United States Geological Survey

Watershed Restoration Plan – Previous namesake of the RBRP documents.