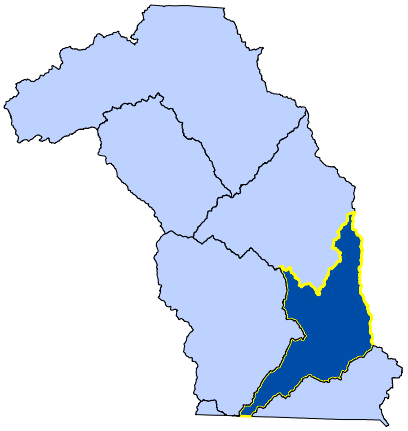
Lake Tillery/Pee Dee River

Subbasin HUC: 03040104



Water Quality Overview

Of the monitored streams in the Lake Tillery / Pee Dee River subbasin 74 percent are supporting aquatic life and 22 percent do not meet the standards required to support aquatic life. Water quality is generally good compared to other subbasins within the greater Yadkin- Pee Dee River Basin. Issues to be noted include the inability of low flow streams to assimilate waste, impoundments resulting in low dissolved oxygen levels, runoff from agriculture operations and areas of excellent water quality that have the potential to be reclassified as High Quality Water (HQW) to facilitate protecting the water quality in the future.

Watershed at a Glance

Counties

Randolph, Montgomery, Stanly, Anson, Richmond

Municipalities

Arlington, Bethania, Blowing Badin, Albemarle, Norwood, Mt. Gilead, Star, Troy, Biscoe, Candor, Ansonville, Polkton, Wadesboro

Permitted Facilities

NPDES WWTP:	
Major	0
Minor	10
NPDES Nondischarge:	4
NPDES Stormwater:	
General	40
Individual	2
Phase II	0
Animal Operations:	20

Waterbody Summary

Total Streams:.....782.1 mi
.....2,177.3 ac
Total Monitored:.....243 mi
Total Supporting:....179.9 mi
Total Impaired:.....52.3 mi
Total Not Rated:.....10.7 mi
Total No Data:.....539.2 mi
.....2,177.3 ac

General Description

The boundaries of this subbasin are oddly defined. The northeast portion of the subbasin includes the Little River watershed. The western portion includes the Mountain and Brown Creek watersheds. The central portion includes the Pee Dee River from the confluence of the Yadkin and Uwharrie Rivers to the dam at Blewett Falls Reservoir. The Rocky and Uwharrie Rivers are large tributaries, and constitute major 8-digit hydrologic units (HUC) in their own right and are discussed in separate documents.

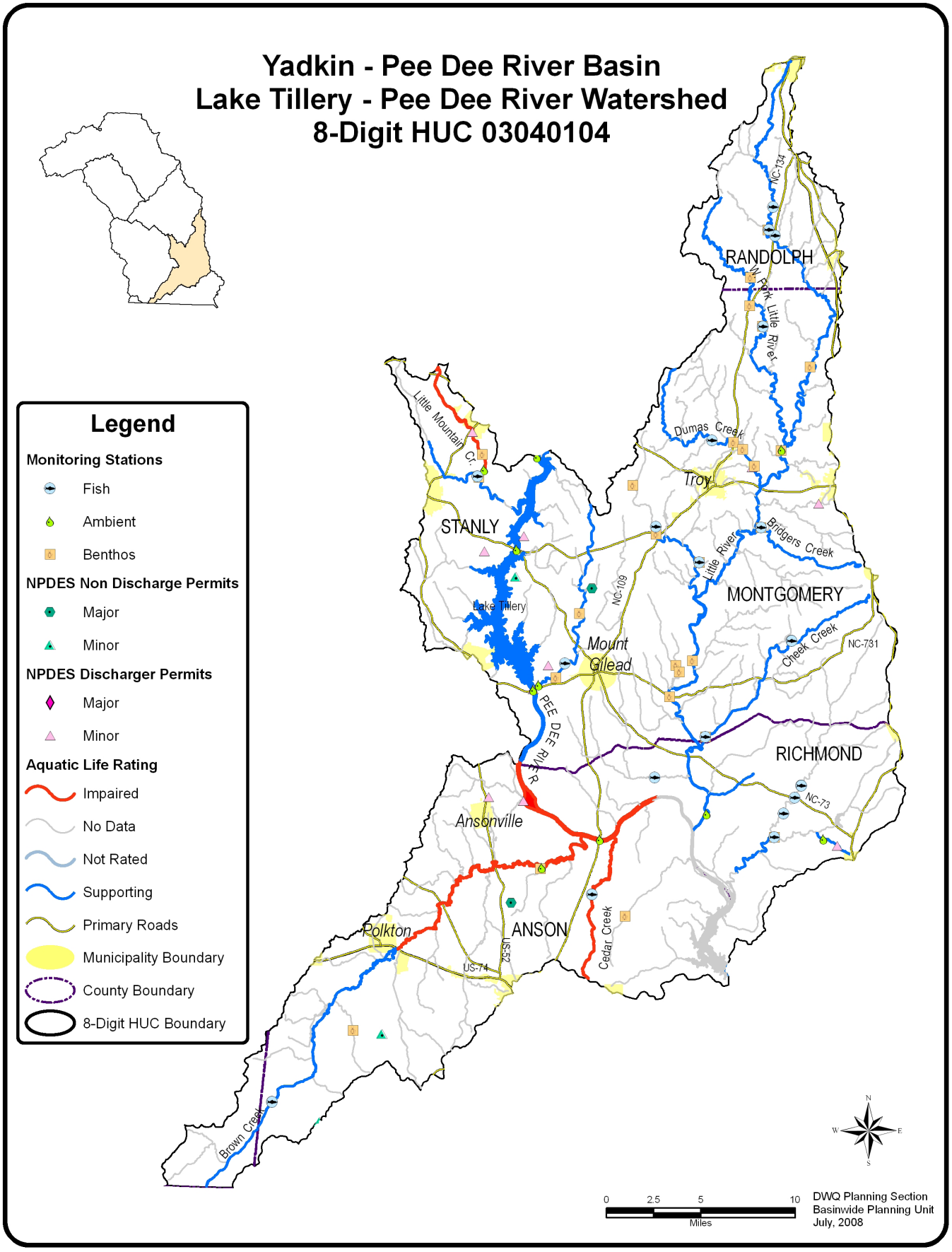
The Mountain Creek watershed flows south of Morrow Mountain and enters the Pee Dee River from the west. This area includes portions of Albemarle and Norwood. A large portion of the Little River is located within the Uwharrie National Forest. The land is mostly forested, but with some areas utilized for agriculture and silviculture. Streams throughout this area have low base flows and tend to stop flowing in summer months.

Troy is the largest urban areas in the northeastern part of this subbasin. Polkton, Ansonville, Mt. Gilead, and portions of Wadesboro are larger communities in the southwestern and central portions of the subbasin.

The Pee Dee River has several minor dischargers. Many of these are located within watersheds where biological samples were collected for this report. These include Greater Badin WWTP (NC 0074756), discharging up to 0.55 MGD to Little Mountain Creek; Mount Gilead Town WWTP (NC 0021105), 0.85 MGD to Clarks Creek; and Montgomery County WTP (0080322), 0.47 MGD to UT Clarks Creek. Three facilities are located within the Little River Watershed. These are Biscoe Town WWTP (NC 0021504) discharging up to 0.6 MGD to Hickory Branch; Carolina Trace Utilities Inc. (NC 0038831), 0.325 MGD to the Upper Little River; and Troy Town WWTP (NC 0028916), 0.84 MGD to Densons Creek.

One discharger, Ansonville Town WWTP (NC 008125), discharges up to 0.12 MGD directly to the Pee Dee River. Another facility, Stony Gap Fish House (NC 0040801) has ceased discharging up to 0.004 MGD to UT Jacobs Creek prior to January 2007.

Figure 4-1. Pee Dee River HUC 03040104



Current Status and Significant Issues

Impaired streams are those streams not meeting their associated water quality standards in more than 10 percent of the samples taken within the assessment period (January 1, 2002 through December 31, 2006) and impacted streams are those not meeting water quality standards in 7 to 9 percent of the samples. The ***Use Support*** report provides information on how and why water quality ratings are determined and DWQ's "***Redbook***" describes in detail water quality standards for each waterbody ***classification***. For a general discussion of water quality parameters, potential issues, and rules please see "***Supplemental Guide to North Carolina's Basinwide Planning***: Support Document for Basinwide Water Quality Plans"

Figure 4-1. shows monitoring station locations and impaired streams for the Lake Tillery/ Pee Dee River subbasin.
Appendix A. provides descriptions of all monitored waterbodies in the subbasin.
Appendix B. provides a summary of each ambient data monitoring station.
Appendix C. provides summaries of biological and fish assessment monitoring sites.

General Biological Health

A total of 18 biological monitoring sites were sampled within HUC 03040104 for basinwide assessment of water quality. Of those sites, nine rated Excellent, five Good and two Good-Fair. Two sites were Fair. No sites rated Poor in either 2004 or 2006. The two Fair streams, Little Mountain Creek and Cedar Creek are both affected by naturally low flows typically seen in the area. Flows in Little Mountain Creek appear unable to dilute effluent from the upstream Badin WWTP. No anthropogenic influences could be detected that contributed to the naturally low flows at Cedar Creek to cause it to be in a biologically degraded condition.

Of the six benthic sites sampled in 2006, three improved in bioclassification (Little River at NC 731, Mountain Creek at SR 1150 and Clarks Creek at SR 1110); one site declined (West Fork Little River at SR 1311); and two sites remained the same (Little River at SR 1340 and Little Mountain Creek at SR 1720). Mountain Creek (at SR 1720) and Cheek Creek (at SR 1541), benthic sites that were sampled in 2001, were not sampled in 2006. Both streams lacked sufficient flows to enable sampling. In 2001, Mountain Creek rated Good-Fair and Cheek Creek rated Fair.

There were 12 fish sites sampled in 2006 (or in 2004 as special studies). Compared with the 2001 basinwide sampling effort: four improved in bioclassification (Little River at SR 1127, Bridges Creek at SR 1519, Mountain Creek at SR 1720 and Mountain Creek at SR 1150); three declined (Brown Creek at SR 1230, Cedar Creek at SR 1709 and Cheek Creek at SR 1541); and four remained the same (West Fork Little River at SR 1311, Rocky Creek at SR 1549, Clarks Creek at SR 1110 and Cheek Creek at SR 1563). One site, Densons Creek at SR 1323 was only sampled once (in 2004). Fish sites that were not sampled in 2006 (or 2004) that were sampled in 2001 included Dumas Creek (at SR 1310) and Hamer Creek (SR 1159). Hamer Creek is within an area of Triassic geology and was not flowing during spring 2006. This site has since been discontinued as a basin sampling location. Time restrictions did not permit the sampling of Dumas Creek in 2006.

The Yadkin River basin was experiencing moderate to severe drought conditions in 2001, which had the potential to reduce the impacts from nonpoint sources and magnify the impacts from point source discharges. This below average flow regime in the basin should be considered when looking at changes in the 2006 monitoring cycle.

SPECIAL STUDIES

Mountain Creek, Little Mountain Creek and Jacobs Creek, Ecosystem Enhancement Program Study

Three sites were sampled for benthic macroinvertebrates in January 2004 as part of the Memorandum of Agreement between the Division of Water Quality and the North Carolina Ecosystem Enhancement Program in the creation of a Local Watershed Plan for the Mountain Creek planning area. Bioclassifications ranged from Poor to Good-Fair. The benthic communities at all three sites indicate the low flow conditions naturally present in the Slate Belt ecoregion. See ***memorandum B-040831*** for more information.

Lick Creek TMDL

Two benthic sites were sampled in 2003 because Lick Creek was considered impaired from its source to a point one mile upstream of Davidson County SR 2501, not far above the confluence with the Yadkin River. Both sites received a Good-Fair rating.

Small Streams Study

One benthic site, Wood Run at SR 1150, was sampled twice in 2005 as part of the Small Streams Study. It rated Not Impaired on both occasions. No memorandum is available for this site.

Fish Community Ecosystem Enhancement Program Study

The instream and riparian habitats, physical and chemical characteristics, and fish communities of Mountain, Little Mountain, and Jacobs Creeks in Stanly County were evaluated by DWQ in 2004. These streams are downstream from the Towns of Badin and Albemarle and near Morrow Mountain State Park. Nonpoint nutrient runoff from pastures and livestock which have access to the streams contributed to slightly elevated conductivities, abundant periphyton, and an abundance of nutrient indicator species and tolerant fish.

Fish Community Urbanization Study

Clarks Creek at SR 1110 and Densons Creek at SR 1323 in Montgomery County were sampled by DWQ in 2004 as part of a North Carolina State University fish community urbanization study (unpublished data). The fish communities were rated Excellent and Good-Fair, respectively.

Habitat Degradation

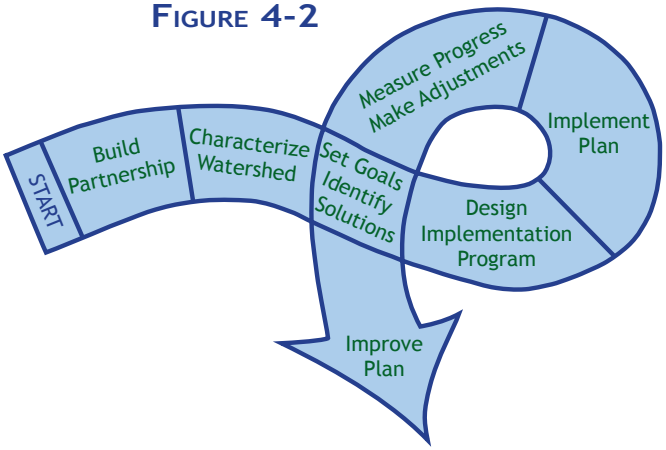
Many streams in this hydrologic unit are impaired or impacted by habitat degradation. In most cases habitat is degraded by the cumulative effect of several stressors acting in concert. These stressors often originate in the upland portions of the watershed and may include impervious surfaces, sedimentation and erosion from construction, general agriculture, and other land disturbing activities. Naturally erodible soils in the area make streams highly vulnerable to these stressors.

Table 4-1. Stream Impaired and Impacted by Habitat Degradation in HUC 03040104

Assessment Unit	Name	Source	Subbasin	Class.	Impaired	Impacted	Miles
13-20a	Brown Creek	General Agriculture/Pasture	03-07-10	C		X	16.5
		Natural Conditions				X	
13-20b	Brown Creek	General Agriculture/Pasture	03-07-10	C	X		28.5
		Impervious Surface					
13-21	Cedar Creek	Natural Conditions	03-07-10	C	X		10.7
		Stormwater Runoff					
13-25-20-(9)	Densons Creek	Impoundment	03-07-15	C		X	2.8
		Natural Conditions					
						Total	58.5

Many tools are available to address habitat degradation including; ***urban stormwater BMPs, agricultural BMPs***, ordinance/rule changes at the local, state, and federal levels, volunteer activism, and education programs. In this watershed, agricultural BMP's are needed most. Figure 4-2 illustrates a general process for developing ***watershed restoration plans***. This process can and should be applied to streams suffering from habitat degradation. Efforts on all streams listed in Table 4-1 are necessary. Interested parties should contact the ***Basinwide Planning Program*** to discuss opportunities to begin the planning and restoration process in their chosen watershed.

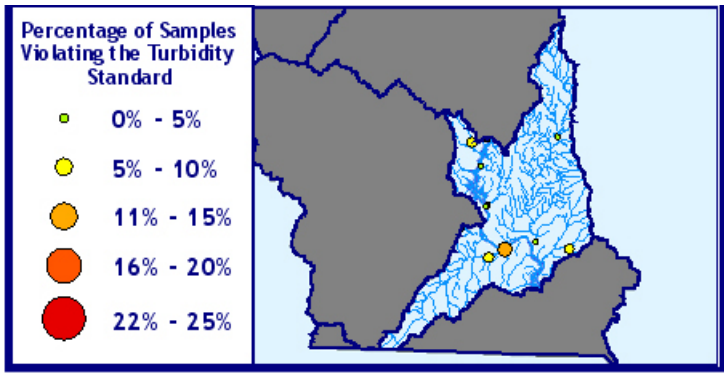
Figure 4-2



Turbidity

There were several ambient sites with turbidity violations in this subbasin (Figure 4-3). Turbidity is a measure of cloudiness in water and is often accompanied with excessive sediment deposits in the streambed. Excessive sediments deposited on stream and lake bottoms can choke spawning beds (reducing fish survival and growth rates), harm fish food sources, fill in pools (reducing cover from prey and high temperature refuges), and reduce habitat complexity in stream channels. Excessive suspended sediments can make it more difficult for fish to find prey and at high levels can cause direct physical harm, such as clogged gills. Sediments can cause taste and odor problems, block water supply intakes, foul water treatment systems, and fill reservoirs. (USEPA, 1999 and Waters, 1995). Sand and silt were noted in the stream substrate at many of the biological sample sites.

Figure 4-3. Turbidity Violations



Soil erosion is the most common source of turbidity and sedimentation and while some erosion is a natural phenomenon, human land use practices accelerate the process to unhealthy levels. Construction sites, mining operations, agricultural operations, logging operations, excessive stormwater flow off impervious surfaces are all potential sources. It appears violations are highest in the agricultural areas in the Brown Creek watershed. Violations are lowest where land use is predominantly forest. This trend demonstrates the importance of ***protecting and conserving stream buffers and natural areas.***

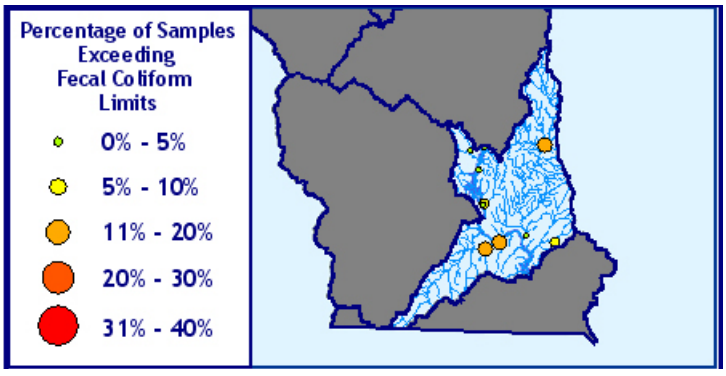
Table 4-2. Streams Impaired by Turbidity Violation in Hydrologic Unit 03040104

Assessment Unit	Name	Source	Subbasin	Class.	Impaired	Miles
13-(15.5)b	Pee Dee River	Stormwater Runoff	03-07-10	WS-V;B	X	10.4
		General Agriculture/Pasture				
		Natural Conditions				

Fecal Coliform Bacteria

Fecal coliform bacteria concentrations did exceed 400 colonies/100ml. in this subbasin (Figure 4-4). The presence of fecal coliform bacteria in aquatic environments indicates that the water has been contaminated with the fecal material of humans or other warm-blooded animals. At the time this occurred, the source water might have been contaminated by pathogens or disease producing bacteria or viruses that can also exist in fecal material. Some waterborne pathogenic diseases include typhoid fever, viral and bacterial gastroenteritis and hepatitis A. The presence of fecal contamination is an indicator that a potential health risk exists for individuals exposed to this water. Fecal coliform bacteria may occur in ambient water as a result of the overflow of domestic sewage or nonpoint sources of human and animal waste.

Figure 4-4. Fecal Violations



An analysis of all ambient water quality stations in the Lake Tillery – Pee Dee River subbasin shows a downward trend in fecal coliform bacteria concentrations from 2002-2006. Rainfall, which influences bacteria concentrations, did not appear to be driving this trend. Therefore, the decrease is likely due to implementation of agricultural BMPs and sewer infrastructure improvements. However, concentrations remain elevated and further work remains to be done. Additional funds will be necessary to continue implementing these improvements.

Table 4-3. Streams Impacted and Impaired by Fecal Coliform Bacteria Concentrations

Assessment Unit	Name	Source	Subbasin	Class.	Impacted	Miles
13-(15.5)b	Pee Dee River	Stormwater Runoff	03-07-10	WS-V; B	X	10.4
		General Agriculture/Pasture				
		Natural Conditions				
13-20b	Brown Creek	General Agriculture/Pasture	03-07-10	C	X	28.5
					Total	38.9

Other Stressors

Low dissolved oxygen is a problem throughout this subbasin. In many cases, naturally low flow in the summer depresses oxygen levels. In the case of Little Mountain Creek, the low flows are not able to dilute the Badin WWTP discharge, further degrading the stream. A CWMTF grant, used to rehabilitate the sewer system feeding the Badin WWTP, may also help improve conditions by reducing raw sewage overflows. New discharges with significant biological oxygen demands should not be permitted in low flow streams. These and existing discharges should be directed to the Pee Dee main stem or streams with consistent flows, suitable for waste assimilation. Water reuse options, such as the one *i*mplemented by Troy should be explored.

The Lake Tillery dam causes the low dissolved oxygen impact on the Pee Dee River. Water with low dissolved oxygen is drawn from the bottom of Lake Tillery to produce electricity and the discharged into the river. This dam was part of a major FERC Relicensing effort for all the dams owned by Progress Energy and the Aluminum Company of America (ALCOA). Physical upgrades and operational changes negotiated as part of this effort are expected to improve dissolved oxygen conditions in the river.

Table 4-4. Other Stressors Impacting Streams In Hydrologic Unit 03040104

Assessment Unit	Name	Stressor	Source	Subbasin	Class.	Impaired	Impacted	Length Miles
13-(15.5)a	Pee Dee River	Low Dissolved Oxygen	Impoundment	03-07-10	WS-V; B		X	4.9
13-(15.5)b	Pee Dee River	Low Dissolved Oxygen	Natural Conditions	03-07-10	WS-V; B		X	10.4
			Stormwater Runoff					
13-20b	Brown Creek	Low Dissolved Oxygen	Natural Conditions	03-07-10	C	X		28.5
13-5-1-(2)	Little Mountain Creek	Low Dissolved Oxygen	Natural Conditions	03-07-08	C		X	5.7
			WWTP NPDES					
			Impoundment					
		Nutrient Impacts	WWTP NPDES					
13-9-(2)	Jacobs Creek	Nutrient Impacts	Stormwater Runoff	03-07-08	WS-IV; CA		X	0.5
		Low Dissolved Oxygen	Stormwater Runoff					
							Total	50.1

See *Yadkin Ambient Monitoring System Report* and *Yadkin Basinwide Assessments* for more information regarding specific monitoring sites.

Population and Land Use

This is a rural area with a few small towns. A large part of the northeast portion of HUC is located within the Uwharrie National Forest. The land is mostly forested, but with some areas utilized for agriculture and silviculture. The town of Troy is the largest urban area. Land use in the southwestern part of the watershed is primarily a combination of forest and agriculture with smaller towns like Polkton and Ansonville. The town of Wadesboro is partially contained within this area.

DWQ biological and ambient data suggest the urban areas are having a minimal impact on water quality. Most impacts are coming from agricultural impacts in the southwestern part of the watershed, around Brown and Cedar Creeks. ***Agricultural BMPs*** are needed in these watersheds. The remainder of the watershed offers many opportunities for ***protecting and conserving stream buffers and natural areas*** that will prevent stream degradation in the long term. Many of the streams in this area are rated Excellent. Residents and local governments should consider requesting a ***stream reclassification to High Quality Waters*** to help preserve excellent water quality.

Figure 4-5. 2000 Population Density

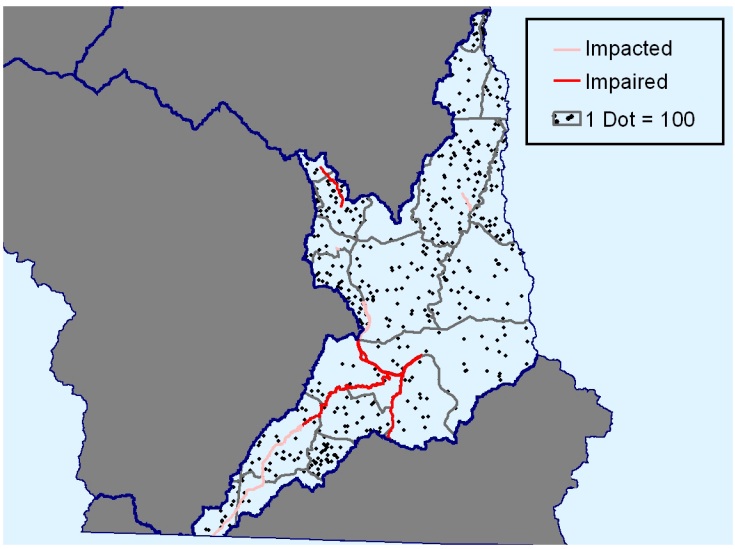
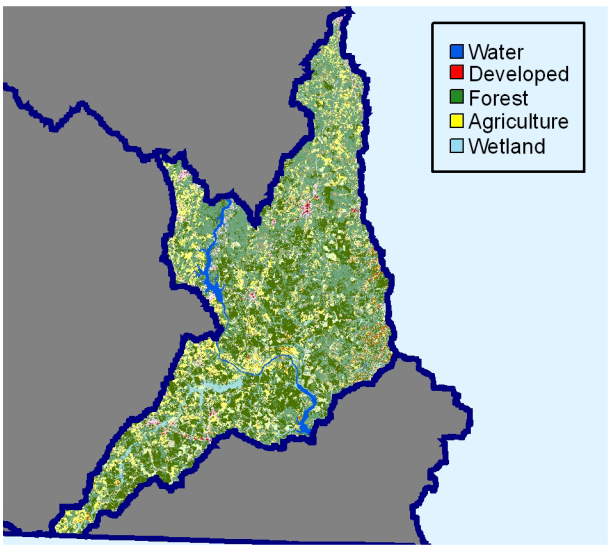


Figure 4-6. Land Cover



Local Initiatives

Section 319-Grant Program

The ***Section 319 Grant Program*** was established to provide funding for efforts to reduce nonpoint source (NPS) pollution, including that which occurs though stormwater runoff. The U.S. Environmental Protection Agency provides funds to state and tribal agencies, which are then allocated via a competitive grant process to organizations to address current or potential NPS concerns. Each fiscal year North Carolina is awarded nearly 5 million dollars to address nonpoint source pollution through its 319 Grant Program. Thirty percent of the funding supports ongoing state nonpoint source programs. The remaining seventy percent is made available through a competitive grants process.

319 projects have not been awarded in this watershed. Any of the impaired streams listed above are candidates for 319 funding. Interested parties should contact the ***Basinwide Planning Program*** to discuss potential projects.

Clean Water Management Trust Fund

Created in 1996, the ***Clean Water Management Trust Fund*** (CWMTF) makes grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address water pollution problems. The fund has made significant investment in this hydrologic unit. Figure 4-7 shows the distribution of projects to date in the watershed and Table 4-5, at the end of this document, includes a list of projects and their cost. These projects include land acquisitions, capital improvements to wastewater and stormwater infrastructure, and creative water reuse systems.

Figure 4-7. CWMTF Projects

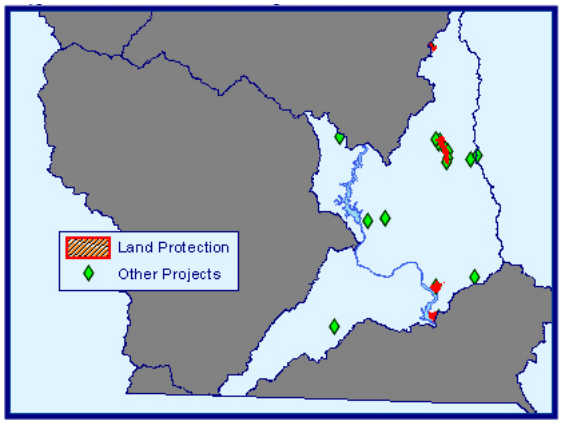


Table 4-5. CWMTF Funded Projects In 03040104 (9/1/2001 - 8/31/2006)

Project Number	Application Name	Proposed Project Description	Amount Funded
2001B-049	Troy, Town of - Acquisition/ Densons Creek & Little River (Phase III)	Protect 58 acres through fee simple purchase and conservation easements along Densons Creek and Little River.	$372,000
2002B-021	Troy, Town of - Acq./ Denson's Cr. Phase IV	Protect through permanent conservation easements 37 riparian acres along Densons Creek and Little River.	$236,800
2002B-501	Greater Badin Water & Sewer District - Sewer System Rehabilitation/Little Mt. Cr.	Rehabilitate sewer collection system by replacing 18,400 LF of sewer collection lines and 83 manholes, and installing 208 service connections. Reduce overflow of raw sewage to Little Mountain Creek.	$1,677,000
2003A-041	Troy, Town of - Acq./ Densons Creek, Phase IV	Acquire through fee simple purchase 5.9 acres and purchase a permanent conservation easement on 64 acres along the Little River and Smitherman Creek. This tract adds to the south end of an existing protected corridor of 640 acres along 6 miles of stream.	$287,000
2003A-513	Troy, Town of - Wastewater/ Densons Creek Reuse	Design and permit a wastewater system to seasonally divert 87% of Troy's average daily discharge from Denson's Creek to a nearby golf course for irrigation.	$55,000
2003A-801	Biscoe, Town of- Plan./ Regional Wastewater Feasability, Cedar Cr.	Evaluate possible wastewater treatment and disposal alternatives, including the feasibility of wastewater regionalization, in the Hickory Branch and Cotton Creek drainages. Wastewater treatment for the towns of Biscoe and Star will be a focus.	$36,000
2004B-506	Ellerbe, Town of - WW/ UV Disinfection, Toms Creek	Design, permit and construct a sand filtration and UV disinfection system as an additional treatment step to the Town's existing lagoon treatment process. Project will reduce fecal coliform and chlorine contamination of Toms Creek.	$365,000
2005A-502	Biscoe, Town of - WW/ Treatment Plant Upgrade, Cedar Creek	Reduce fecal coliform and chlorine delivery to Cedar Creek by repairing the Town's WWTP. Includes closing an unused lagoon, replacing a pump station, and installing dechlorination equipment at the WWTP and telemetry equipment at 9 pump stations.	$480,000
2006A-034	NC Wildlife Resources Commission - Acq./ Mountain Creek Tracts	Protect through fee simple purchase 373 ac along Mountain Creek. CWMTF funds to purchase 157 riparian ac. Tract aids protection of rare aq spp & will be part of NC Game Lands Program and is adjacent to existing WRC public boat ramp on Blewett Falls Lake.	$277,000
2006A-521	Mount Gilead, Town of- WW/ I&I Rehabilitation, Pee Dee River	Conduct a feasibility study to investigate the cost-effectiveness and advantages of a low pressure system to minimize future upgrade and operation and maintenance costs. The sewer system runs along Clarks Creek, a 303(d)-listed stream.	$55,000
2006A-533	Troy, Town of- WW/Acq/ Land Application Site and Greenway, Dumas Creek	Purchase 151 acres in fee for land application of wastewater. Reestablish buffers where needed and a greenway trail. Compliments Town's extensive efforts to improve water quality in the Denson's Creek watershed.	$1,455,000
2006A-813	Mount Gilead, Town of- Plan/WW/Storm/ GIS Mapping, Harner Creek	Fund GIS mapping of the Town's stormwater and sewer systems by locating lines, manholes and catch basins. The Town will use this information to develop programs to eliminate sources of pollution to both surface and groundwaters.	$29,000

This list does not include: regional or statewide projects that were in multiple river basins or projects that were funded and subsequently withdrawn.

North Carolina Agriculture Cost Share Program

Nonpoint source pollution is a significant source of stream degradation in the Pee Dee River watershed. The approach taken in North Carolina for addressing agriculture's contribution to the nonpoint source water pollution problem is to primarily encourage voluntary participation by the agricultural community. This approach is supported by financial incentives, technical and educational assistance, research, and regulatory programs.

Financial incentives are provided through ***North Carolina's Agriculture Cost Share Program***. The ***Division of Soil and Water Conservation*** in the Department of Environment and Natural Resources administers this program. It has been applauded by the U.S. Environmental Protection Agency and has received wide support from the general public as well as the state's agricultural community. Table 4-6 shows the number of projects implemented and in this watershed and the dollar amount invested. Table 4-7 shows the water quality benefits realized from that investment.

Table 4-6. ACSP Project Expenditures In the Yadkin Hydrologic Unit

	Erosion Reduction/Nutrient Loss Reduction in Fields		Sediment/Nutrient Delivery Reduction from Fields		Stream Protection from Animals			Proper Animal Waste Management		
12-digit HU	Total Implemented	Cost	Total Implemented	Cost	Total Implemented		Cost	Total Implemented		Cost
030401040100	38.82 ac.	$4,407			2 units	710 LF	$5,163	1 unit		$22,194
030401040200	109.1 ac.	$19,105						6 units		$89,381
030401040300	0.2 ac.	$3,469						5 units		$82,837
030401040400	0.1 ac.	$292	1 unit	$306	1 unit		$4,985	6 units		$89,166
030401040500								1 unit		$6,607
030401040600								4 units		$23,478
030401040700	0.8 ac.	$766						1 unit		$1,901
030401040800	86.8 ac.	$8,587						9 units	1 ton	$137,552
Total		$36,626		$306			$10,148			$453,116

Table 4-7. NC ASCP Water Quality Benefits

	Water Quality Benefits				
	Soil Saved (tons)	Nitrogen Saved (lbs)	Phosphorus Saved (lbs)	Waste-N Managed (lbs)	Waste-P Managed (lbs)
030401040100	274	742	22	36,720	56,160
030401040200	639	26,428	37,318	77,073	120,735
030401040300		23,328	35,910	113,253	178,249
030401040400	26	33,722	40,028	96,856	144,030
030401040500				10,920	17,976
030401040600				145,189	158,554
030401040700	8	8	1		
030401040800	488	2,409	325	133,986	170,948
Total	1,435	86,637	113,604	613,997	846,652

References

U.S. Environmental Protection Agency (USEPA) 1999. Protocol for Developing Sediment TMDLs. First Edition. EPA 841-B-99-044. U.S. EPA, Office of Water, Washington D.C.

Waters, T.F. 1995. Sediment in streams—Sources, biological effects, and control. American Fisheries Society Monograph 7. American Fisheries Society, Bethesda, MD.