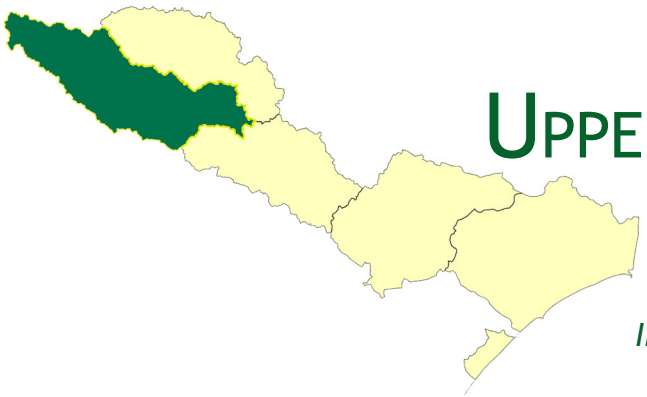


Upper Tar River Subbasin

Subbasin/HUC 03020101

Includes the Tar River and Tributaries

Water Quality Overview:

Modest water quality improvements have been made in this subbasin. Water quality is generally good with a few stressors (e.g., fecal coliform bacteria, turbidity) indicating additional protection is needed. Drought conditions in 2007-2008 resulted in low dissolved oxygen levels in several streams. Nutrient data indicates organic nitrogen has increased over the last several years in this subbasin. Additional efforts are needed to reduce total nitrogen and total phosphorous contributions from this subbasin. Collecting nutrient data from ambient stations representing all watersheds should be a priority. This subbasin has endangered aquatic mussel species requiring additional protection. The lower end of Fishing Creek remains the waterbody with the most stressors (turbidity, copper, zinc, fecal coliform bacteria) in this subbasin. However, substantial restoration and protection activities have been implemented in Fishing Creek watershed and should result in improved conditions in the future.

Watershed at a Glance

Counties: Person, Granville, Vance, Warren, Franklin, Nash, Edgecombe

Municipalities: Oxford, Kittrell, Henderson, Franklinton, Youngsville, Louisburg, Centerville, Bunn, Castalia, Spring Hope, Momeyer, Nashville, Red Oak, Dortches, Rocky Mount, Whitakers

Permitted Facilities:

NPDES WWTP:.....21
Major:.....4
Minor:.....17
NonDischarge:.....17
Stormwater:
General:.....55
Individual:.....9
Animal Operations:.....43

2000 Population: 181,036

Area: 1,305 sq mi.

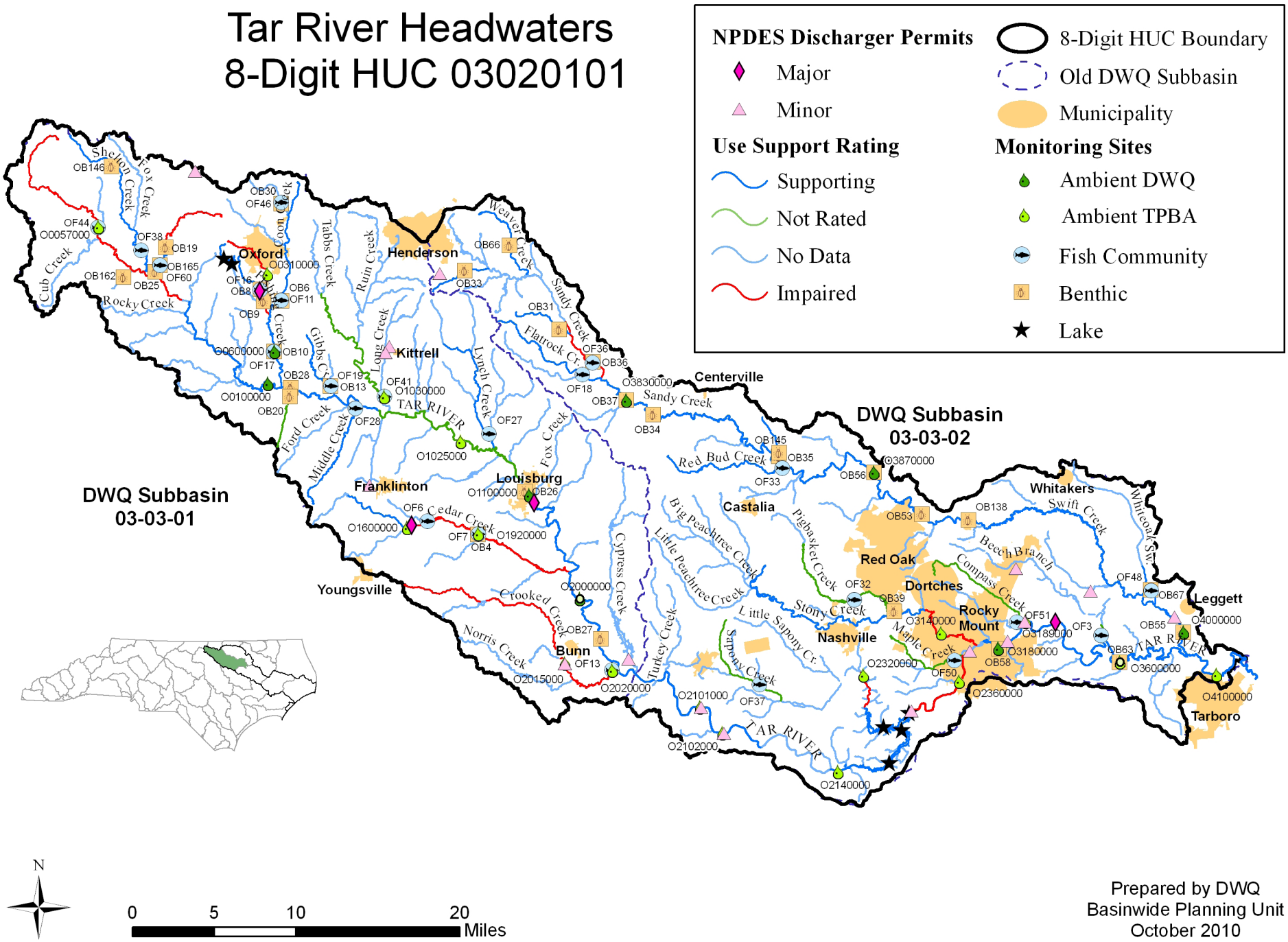
Impervious Surface Estimate: 21 sq mi.

General Description

This subbasin, hydrologic unit code (HUC) 03020101, contains the Tar River headwaters and its tributaries down to Tarboro, covering ~1,305 square miles (Figure 1-1). It was previously delineated as DWQ subbasins 03-03-01 and 03-03-02.

The headwaters of the Tar River originate in eastern Person County, with the majority of the upper portion of this subbasin in Granville, Nash, and Franklin counties. Most of the land use in the upper subbasin consists of a mixture of active and inactive agriculture, rural residences, and remnant patches of forest. The subbasin is represented by several ecoregions, including Northern Outer Piedmont, small portions of the Triassic Basin and Carolina Slate Belt, Rolling Coastal Plain, and small patches of Southeastern Floodplains and Low Terraces. Streams in or near Carolina Slate Belt ecoregion are vulnerable to drying during periods of drought because of poor groundwater recharge. With the exception of the Triassic Basin and Carolina Slate Belt, the infiltration capacity of soils in the less disturbed areas of this subbasin are high and stream flow is maintained during drier periods by base flows via groundwater inputs. However, in more developed areas where impervious surfaces dominate the landscape, overland flow during

FIGURE 1-1. HUC 03020101 MAP



Prepared by DWQ
Basinwide Planning Unit
October 2010

heavy precipitation events can lead to flashier stream flows. Land use in the lower portion of this subbasin is divided relatively evenly between agriculture, undisturbed forest, rural residences, and urbanized areas.

This subbasin provides habitat for several threatened and endangered aquatic species (e.g., tar spinymussel, dwarf wedgemussel). Shelton Creek, Fox Creek, North Fork Tar River, and Cub Creek provide good habitat conditions, supporting a stable dwarf wedgemussel population considered to be some of the best in North Carolina. Swift Creek supports populations of the tar spinymussel. However, increased urbanization and other disturbances could increase pollutant delivery to these areas and potentially threaten these species. Therefore, protection of the upper Tar River and Swift Creek watersheds are crucial for the continuation of the species.

There are several major and minor NPDES dischargers to the Tar River in this subbasin. Major dischargers include the Oxford WWTP (3.5 million gallons/day (MGD)) which discharges into Fishing Creek, the Franklin County WWTP (3 MGD) discharging to Cedar Creek, and Louisburg WWTP (1.37 MGD) and the Tar River Regional WWTP (21 MGD) which discharge to the Tar River.

Current Status and Significant Issues

Use Support Assessment Summary

All surface waters in the state are assigned a classification reflecting the best-intended use of that water. Chemical, physical, and biological parameters are regularly assessed by DWQ to determine how well waterbodies are meeting their best-intended use. These data are used to develop use support ratings every two years and reported to EPA. The collected list of all monitored waterbodies and their water quality rating is called the Integrated Report (IR). Water not meeting surface water standards are rated as Impaired and reported on the 303(d) list. Water quality evaluation levels and how a waterbody earns a rating of Supporting or Impaired is explained in detail in the IR methodology. The 2010 IR is based on data collected between 2004 and 2008; the IR and methodology are available on the DWQ Modeling/TMDL website: http://portal.ncdenr.org/web/wq/ps/mtu/assessment. The most current use support ratings for this subbasin are found in Appendix 1A.

In this subbasin, use support ratings were assigned for aquatic life, recreation, fish consumption, and water supply categories. Waters are either Supporting, Impaired, Not Rated, or No Data in the aquatic life and recreation categories on a monitored or evaluated basis. All waters are Impaired in the fish consumption category on an evaluated basis, based on statewide fish consumption advice issued by the Department of Health and Human Services. All waters are Supporting in the water supply category. This evaluation is based reports from Division of Environmental Health regional water treatment plant consultants.

Primary Classifications found in HUC 03020101:

Freshwater	Miles	Freshwater	Acres*
Total	995	Total	821

Supplemental Classifications:

B;NSW	35	WS-II;HQW,NSW,CA	99
B;NSW+:	36	WS-IV,B;NSW,CA	619
C;NSW	497	WS-IV;NSW,CA	103
C;NSW+:	92		
C;ORW,NSW	14		
WS-II;HQW,NSW	4		
WS-II;HQW,NSW,CA	1		
WS-IV;B,NSW,CA	3		
WS-IV;NSW	241		
WS-IV;NSW,CA	18		
WS-V;NSW	54		

* Reservoirs and impoundments

Classification descriptions are found at:
http://portal.ncdenr.org/web/wq/ps/csu/classifications

General Biological Health

Biological samples were collected during the spring and summer months of 2007 as part of the basinwide sampling five year cycle, with the exception of a few special studies. Twelve benthic macroinvertebrate sites and 15 fish community sites were sampled as part of the basinwide sampling cycle. Tables 1-1 and 1-2 provide summaries of site results and a description of the stream location corresponding to Figure 1-1. Site specific information is available in Appendix 1B and the entire Biological Assessment Report can be found at: http://www.esb.enr.state.nc.us/documents/2008TARbasinwiderptfinal.pdf.

Benthos Community Sampling Summary

Sites that retained the same rating as previous 2002 samples include the Tar River-OB58 (Good-Fair), Sandy Creek-OB35 (Good), Swift Creek-OB55 (Good), White Oak Swamp-OB67 (Moderate Stress), Fishing Creek-OB10 (Good-Fair), and Tar River-OB27 (Good). Bioclassifications from two sites increased from Good-Fair to Good (Cedar Creek-OB4 and Tar River-OB63). The Tar River-OB25 received a Good-Fair bioclassification, the same as it did the last time it was sampled in 1997. The bioclassification of Swift Creek-OB56 decreased from Excellent in 2003 to Good in 2007. The North Fork Tar River-OB19 received a 2007 bioclassification of Fair, this decreased from the last 1997 Good-Fair sample. Due this decrease, 8.8 miles of North Fork Tar River (Assessment Unit # 28-5) is listed on the 2010 303(d) list of Impaired waters for not meeting benthos community narrative standards for biological integrity.

Table 1-1. Benthos Biological Sample Results in HUC 03020101

Station ID*	Waterbody	Assessment Unit #	Description	County	Site Location	Date	Sample Result
Benthos Community Sites							
OB33	Martin Cr	28-78-1-3	From source to Sandy Creek	Vance	SR 1519	4/23/03	Good-Fair
OB66	Weaver Cr	28-78-1-7	From source to Southerlands Pond	Vance	SR 1533	4/23/03	Good-Fair
OB25	Tar R	28-(1)	From source to a point 0.6 mile upstream of Oxford Water Supply	Granville	SR 1150	7/3/07	Good-Fair
OB28	Tar R	28-(5.7)	From Oxford Water Supply Intake to 0.6 mile upstream of Taylors Creek	Granville	SR 1622	7/22/02	Good
OB156	Shelton Cr	28-4	From source to Tar River	Granville	SR 1309	4/20/06	Not Impaired
OB19	N Fk Tar R	28-5a	From source to 0.2 miles south of US 158	Granville	US 158	6/25/07	Fair
OB165	N Fk Tar R	28-5b	From 0.2 miles south of US 158 to the Tar River	Granville	SR 1151	5/22/07	Good
OB13	Gibbs Cr	28-13	From source to Tar River	Granville	SR 1620	3/24/06	Good
OB20	Sand Cr	28-12	From source to Tar River	Granville	SR 1623	3/22/06	Not Rated
OB6	Coon Cr	28-11-5	From source to Fishing Creek	Granville	SR 1609	3/22/06	Good
OB30	UT Coon Cr	28-11-5	From source to Coon Cr	Granville	SR 1515	3/22/06	Excellent
OB162	UT Tar R	28-(1)ut37	From source to Tar River	Granville	SR 1126	4/20/06	Not Rated
Special Study	Hatcher's Run	28-11-3-(2)	From dam at Devin Lake to Fishing Creek	Granville	SR 15	8/25/06	Fair
OB8	Fishing Cr	28-11b	From SR 1649 to #1 outfall	Granville	SR 1607	3/22/06	Not Impaired
OB9	Fishing Cr	28-11c & 28-11d	From #1 outfall to SR 1608 to Coon Creek	Granville	SR 1608	3/2/06	Fair
OB10	Fishing Cr	28-11e	From Coon Creek to Tar River	Granville	SR 1643	6/25/07	Good-Fair
OB26	Tar R	28-(24.7)a	In Louisburg	Franklin	SR 1229	7/22/02	Good-Fair

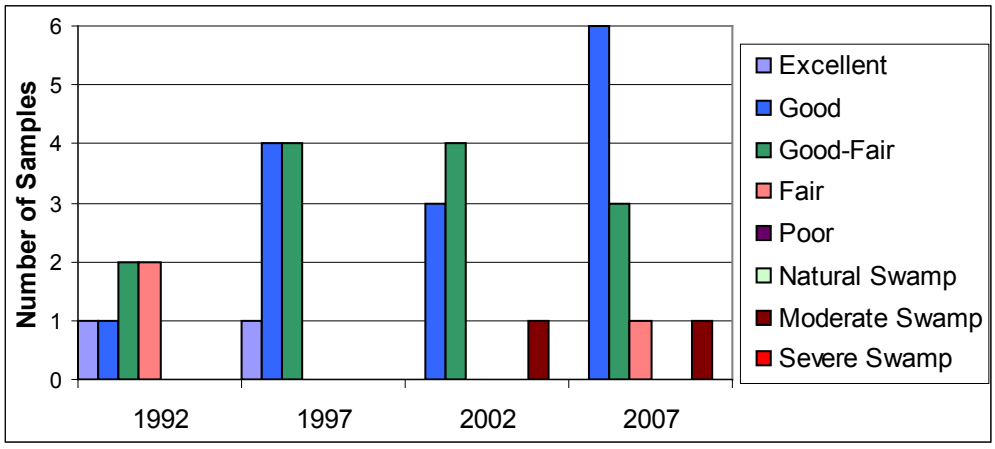
Station ID*	Waterbody	Assessment Unit #	Description	County	Site Location	Date	Sample Result
OB27	Tar R	28-(24.7)a	From Louisburg Water Supply Intake to Cypress Creek	Franklin	SR 1609	6/27/07	Good
OB4	Cedar Cr	28-29-(2)b	From Franklinton Branch to Tar R.	Franklin	SR 1109	6/26/07	Good
OB31	Buffalo Cr	28-78-1-10	From source to Sandy Creek	Franklin	US 401	4/21/03	Not Impaired
OB37	Sandy Cr	28-78-1-(8)b	From Flat Rock Creek to NC 561	Franklin	SR 1436	6/27/07	Good-Fair
OB34	Sandy Cr	28-78-1-(8)b2	From N.C. Hwy. 561 to Nash Co. 1004	Franklin	NC 561	4/24/03	Excellent
OB36	Sandy Cr	28-78-1-(8)b1	From NC 401 to Flat Rock Cr	Franklin	SR 1412	4/21/03	Fair
OB145	Shelly Br	28-78-1-16	From source to Sandy Creek	Nash	SR 1180	7/18/07	Not Impaired
OB35	Sandy Cr	28-78-1-(14)	From N.C. Hwy. 561 to Nash Co. 1004	Nash	SR 1405	6/26/07	Good
OB56	Swift Cr	28-78-(0.5)	From source to Nash Co. SR 1003	Nash	SR 1310	6/26/07	Good
OB53	Swift Cr	28-78-(0.5)	From source to Nash Co. SR 1003	Nash	SR 1003	6/25/04	Excellent
OB138	Swift Cr	28-78-(2.5)	From Nash SR 1003 to 1.4 miles upstream of Edgecombe SR 1409	Nash	I-95	6/25/04	Good
OB39	Stoney Cr	28-68a	From source to Lassiters Creek	Nash	SR 1603	7/24/02	Good-Fair
-	Stoney Cr. Boddies Millpond	28-68b	From Lassiters Cr to Tar R.	Nash	-	1992	Impaired
OB58	Tar R	28-(69)	From dam at Rocky Mount Mills to 0.9 mile downstream of Buck Swamp	Edgecombe	NC 97	6/27/07	Good-Fair
OB63	Tar R	28-(74)a	From a point 0.9 mile downstream of Buck Swamp to Subbasin boundary	Edgecombe	SR 1252	6/27/07	Good
OB55	Swift Cr	28-78-(6.5)	From 1.4 miles upstream of Edgecombe Co. SR 1409 to Tar R.	Edgecombe	SR 1253	6/27/07	Good
OB67	White Oak Swp	28-78-7-(2)	From 1.8 miles upstream of Edgecombe Co. SR 1428 to Swift Cr.	Edgecombe	SR 1428	2/5/07	Moderate Stress

Bioclassification of Excellent, Good, Natural, Good-Fair, Not Impaired or Moderate Stress = Supporting
Fair, Severe Stress or Poor = Impaired
* Corresponds to Station IDs on Figure 1

Biological Trends

Figure 1-2 shows the bioclassification trends for all basinwide benthos sites in this subbasin (results from special studies are not included). Several sites improved in bioclassification from the 2002 sample period, with the number of Good bioclassifications doubling. However, despite these improvements, there has been no summer Excellent bioclassifications at the long-term monitoring stations since 1997. Bioclassifications from swamp waters have remained unchanged.

Figure 1-2. HUC 03020101: Bioclassification Trends



Fish Community Sampling Summary

Eleven fish locations were sampled in 2007 (Table 1-2). Of these, two improved from Good at the previous sampling to a current bioclassification of Excellent (North Fork Tar River-OF60 and Middle Creek-OF28); six retained the same rating of Good (Tabs Creek-OF41, Lynch Creek-OF27, and Red Bud Creek-OF33) or Not Rated (Pig Basket Creek-OF32, Beech Branch-OF3, and White Oak Swamp-OF48); one dropped from Excellent to Good (Tar River-OF44); and two that had not been previously sampled were rated as Not Rated (Maple Creek-OF50 and Compass Creek-OF51).

Four other fish study locations in this subbasin were also compared using data collected in 2006 (BAU Memo F-20060728) with historic data. Cedar Creek-OF6 was rated Excellent in 2002 and 2004. Fishing Creek-OF17 improved from Good to Excellent, Coon Creek-OF11 retained the same bioclassification of Good, and Shelton Creek-OF38 decreased from Excellent to Good.

Table 1-2. Fish Community Sample Results in HUC 03020101

Station ID*	Waterbody	Assessment Unit #	Description	County	Site Location	Date	Sample Result
Fish Community Sites							
OF41	Tabbs Cr	28-17-(0.5)b	From Poplar Creek to Vance County SR 1100	Vance	SR 1100	4/10/07	Good
OF44	Tar R	28-(1)	From source to a point 0.6 mile upstream of Oxford Water Supply	Granville	US 158	4/9/07	Good
OF38	Shelton Cr	28-4	From source to Tar River	Granville	US 158	5/17/06	Good
OF60	N Fk Tar R	28-5	From source to Tar River	Granville	SR 1151	4/9/07	Excellent
OF17	Fishing Cr	28-11e	From Coon Creek to Tar River	Granville	SR 1643	5/18/06	Excellent
OF16 Special Study	Fishing Cr	28-11b	From SR 1649 to #1 outfall	Granville	SR1607	5/17/06	Good-Fair
OF11	Coon Cr	28-11-5	From source to Fishing Creek	Granville	SR 1609	5/18/06	Good
OF46 Special Study	UT Coon Cr	28-11-5ut10	From source to Coon Creek	Granville	SR 1515	5/17/06	Good
OF19 Special Study	Gibbs Cr	28-13	From source to Tar River	Granville	SR 1620	5/18/06	Excellent
OF28	Middle Cr	28-15	From source to Tar River	Franklin	SR 1203	4/9/07	Excellent

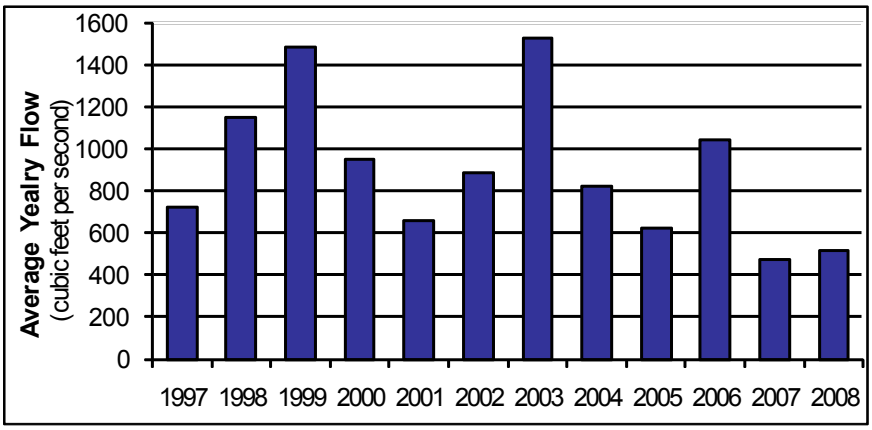
Station ID*	Waterbody	Assessment Unit #	Description	County	Site Location	Date	Sample Result
OF27	Lynch Cr	28-21-(0.7)	From Vance County SR 1547 to Tar River	Franklin	SR 1235	4/10/07	Good
OF6	Cedar Cr	28-29-(2)b	From Franklinton Branch to Tar River	Franklin	SR 1105	6/10/04	Excellent
OF7	Cedar Cr	28-29-(2)b	From Franklinton Branch to Tar River	Franklin	SR 1109	4/10/02	Excellent
OF13	Crooked Cr	28-30b	From NC 98 to Tar River	Franklin	NC 98	4/10/02	Good-Fair
OF37	Sapony Cr	28-55-(1)	From source to mouth of Gabe Branch	Nash	SR 1145	4/18/02	Not Rated
OF32	Pig Basket Cr	28-68-3-(2)	From Nash County SR 1425 to Stony Creek	Nash	SR 1433	4/10/07	Not Rated
OF50	Maple Cr	28-66	From source to Tar River	Nash	SR 1713	5/8/07	Not Rated
OF18	Flatrock Cr	28-78-1-12	From source to Sandy Creek	Franklin	SR 1412	4/9/02	Good
OF36	Sandy Cr	28-78-1-(8)b1	From NC 401to Flatrock Creek	Franklin	SR 1412	4/9/02	Good-Fair
OF33	Red Bud Cr	28-78-1-17	From source to Sandy Creek	Nash	SR 1407	4/11/07	Good
OF51	Compass Cr	28-72	From source to Tar River	Edgecombe	NC 97	5/8/07	Not Rated
OF3	Beech Br	28-75-(4)	From Falling Run to Tar River	Edgecombe	NC 97	5/8/07	Not Rated
OF48	White Oak Swp	28-78-7-(2)	From 1.8 miles upstream of Edgecombe C SR 1428 to Swift Cr.	Edgecombe	SR 1428	5/9/07	Not Rated

Not Rated = Fish community metrics and criteria have yet to be developed for Coastal Plain streams
Excellent, Good or Good-Fair = Supporting
Fair or Poor = Impaired
* Corresponds to Station ID on Figure 1-1

Stream Flow

Stream flow is monitored at US Geological Survey gaging stations. Flow, often abbreviated as "Q", is measured in terms of volume of water per unit of time, usually cubic feet per second (cfs). There are 11 gaging stations in this subbasin. Figure 1-3 provides an example of average stream flow over a 12 year period and gives an idea of which years received heavier precipitation. For more information about instream flow see DWR website: http://www.ncwater.org/About_DWR/Water_Projects_Section/Instream_Flow/welcome.html.

Figure 1-3. Stream flow at USGS 02082585 Tar River in Rocky Mount (Yearly Average based on Daily Means)



Ambient Data

Subbasinwide, monthly chemical and physical samples are taken by DWQ (9 stations) and by the Tar Pamlico Basin Association (18 stations), starting in 2007. A majority of the ambient stations are associated with waterbody locations where potential pollution could occur from known land use activities. There are also portions of the subbasin where no water quality data are collected; therefore, we cannot evaluate the condition of the water quality in those areas. Parameters collected depend on the waterbody classification, but typically include conductivity, dissolved oxygen, pH, temperature, turbidity, nutrient measurements, metals, and fecal coliform. Each classification has an associated set of standards the parameters must meet in order to be considered supporting the waterbody's designated uses. Ten sample results are required within the five year data collection window in order to evaluate the water quality parameter and

compare it to the water quality standards. Stressors are either chemical parameters or physical conditions that at certain levels prevent waterbodies from meeting the standards for their designated use. Ambient stations are listed in Table 1-3, and their locations are found in Figure 1-1 and on watershed maps provided in Appendix 1D.

Table 1-3. Ambient Stations in HUC 03020101

Station ID	Agency	Active Since	Waterbody	AU#	Station Location	Stressors
O0057000	TPBA	3/1/07	Tar River	28-(1)	US 158 near Berea	Low DO
O0100000	NCAMBNT	6/11/68	Tar River	28-(5.7)	NC 96 near Tar River	Fecal Coliform Bacteria
O0310000	TPBA	3/1/07	Foundry Br	28-11-2	SR 1649 New Commerce Dr at Oxford	Low DO, Turbidity
O0600000	NCAMBNT	6/11/68	Fishing Cr	28-11e	SR 1643 near Clay	Turbidity, Fecal Coliform Bacteria, Copper, Zinc
O1025000	TPBA	3/1/07	Tar River	28-(15.5)	SR 1003 Sims Bridge Rd near Louisburg	Turbidity, Fecal Coliform Bacteria
O1030000	TPBA	3/1/07	Tabbs Cr	28-17-(0.5)b	SR 1100 Egypt Mountain Rd near Kittrell	Fecal Coliform Bacteria
O1100000	NCAMBNT	11/20/80	Tar River	28-(24.7)a	US 401 at Louisburg	Fecal Coliform Bacteria, Copper, Zinc
O1600000	TPBA	3/1/07	Cedar Cr	28-29-(2)a	SR 1116 Cedar Creek Rd near Franklinton	-
O1920000	TPBA	3/1/07	Cedar Cr	28-29-(2)b	SR 1109 Timberlake Rd near Louisburg	Turbidity, Fecal Coliform Bacteria
O2000000	Both	6/17/68	Tar River	28-(24.7)a	SR 1001 near Bunn	Fecal Coliform Bacteria
O2015000	TPBA	3/1/07	Crooked Cr	28-30a	SR 1719 Bunn Elementary School Rd near Bunn	Low DO
O2020000	TPBA	3/1/07	Crooked Cr	28-30b	NC 98 near Bunn	Low DO
O2101000	TPBA	3/1/07	Tar River	28-(24.7)b	SR 1145 Old Spring Hope Rd near Spring Hope	-
O2102000	TPBA	3/1/07	Tar River	28-(24.7)b	NC 581 near Stanhope	-
O2140000	TPBA	3/1/07	Tar River	28-(35.5)	SR 1981 Tar River Church Rd near Cliftonville	Fecal Coliform Bacteria
O2320000	TPBA	3/1/07	Sapony Cr Tar River	28-55-(5.5) 28-(36)b	SR 1704 Batchelor Dr near Nashville to Tar R.	Low DO
O2360000	TPBA	3/1/07	Tar River	28-(64.5)	US 301 Byp at Rocky Mount	Low DO
O3140000	TPBA	3/1/07	Stony Cr (Boddies Millpond)	28-68b	Winstead Ave near Little Easonburg	Low DO, Fecal Coliform Bacteria
O3180000	NCAMBNT	11/20/80	Tar River	28-(69)	NC 97 at Rocky Mount	Fecal Coliform Bacteria
O3189000	TPBA	3/1/07	Tar River	28-(69)	SR 1250 Springfield Rd at Rocky Mount	Fecal Coliform Bacteria
O3600000	Both	7/5/68	Tar River	28-(74)a	SR 1252 near Hartsease	Fecal Coliform Bacteria
O3830000	NCAMBNT	4/9/75	Sandy Cr	28-78-1-(8) b2	SR 1432 near Gupton	-
O3870000	NCAMBNT	7/1/02	Swift Cr	28-78-(0.5)	SR 1310 at Hilliardston	Fecal Coliform Bacteria
O4000000	NCAMBNT	3/14/74	Swift Cr	28-78-(6.5)	SR 1253 near Leggett	Fecal Coliform Bacteria
O4100000	TPBA	3/1/07	Tar River	28-(74)b	NC 33 near Tarboro	-
O0065000	RAMS	2007-2008	North Fork Tar River	28-5	at SR 1151 near Berea	-

Station ID	Agency	Active Since	Waterbody	AU#	Station Location	Stressors
O1190000	RAMS	2009-2010	Cedar Creek	28-29-(1)	at SR 1127 near Pocomoke	?
TPBA=Tar Pamlico Basin Association, NCAMBNT= DWQ, RAMS= Random Ambient Monitoring System, sampled by DWQ "-" indicates no stressors identified. "?" stressors to be determined						

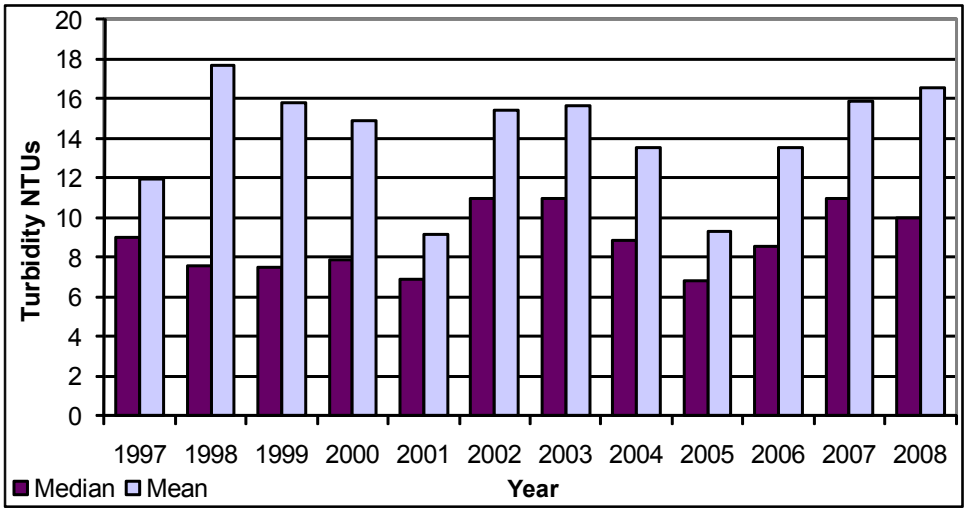
The following discussion of ambient monitoring parameters includes graphs showing the median and mean concentration values for all ambient stations (n=26) in this subbasin for a specific parameter over each year (note: sample size increased with the addition of Tar Pamlico Basin Association sampling in 2007). These graphs are not intended to provide statistically significant trend information or loading numbers, but rather provide an idea of how changes in land use conditions, natural fluctuations, or climate changes effect parameter readings over the long term. The difference between median and mean results indicate the presence of outliers in the dataset. Box and whisker plots of individual ambient stations were completed by parameter for data between 2002-2007 and can be found in the Ambient Monitoring report: http://portal.ncdenr.org/c/document_library/get_file?uuid=994c08a8-a98d-4ff5-9425-656cadf8cfa4&groupId=38364. Summary sheets for ambient stations are available in Appendix 1C.

Turbidity

The turbidity standard for freshwater (Class C) streams is 50 NTUs. Data from Cedar Creek and Foundry Branch indicate turbidity as a stressor and are therefore listed as Impaired on the 2010 303(d) list. 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 treatment systems, and fill reservoirs. It is important to note that the turbidity standard does not capture incident duration or the amount of sedimentation, both of which can impact aquatic species.

Figure 1-4 shows turbidity results from 1,481 samples collected over the 12 year period of which 41 (3%) of those samples exceeded 50 NTUs. Review of individual station data over a 12 year period indicate stations with the most number of samples over 50 NTUs include the lower end of Fishing Creek and two stations on the Tar River, one at Louisburg and one near Bunn.

Figure 1-4. Summarized Turbidity values for all data collected at Ambient Stations in HUC 03020101



Fecal Coliform Bacteria

The fecal coliform bacteria standard for freshwater streams is not to exceed the geometric mean of 200 colonies/100ml, or 400 colonies/100ml in 20% of the samples where five samples have been taken in a span of 30 days (5-in-30). Only results from a 5-in-30 study are to be used to indicate whether the stream is Impaired or Supporting. Waters with a classification of B (primary recreation water) will receive priority for 5-in-30 studies. Other waterbodies will be studied as resources permit. Data through 2007 indicate several streams where bacteria colony numbers exceeded 400 colonies/100ml. These streams currently impacted by fecal coliform bacteria include:

-Fishing Creek (C, NSW) at SR 1643 near Clay (AU# 28-11),
-Tar River (WS-IV, NSW) at SR 1003 Sims Bridge Rd near Louisburg (AU# 28-(15.5))
-Tabbs Creek (C, NSW) at SR 1100 Egypt Mountain Rd near Kittrell (AU# 28-17-(0.5))
-Cedar Creek (C, NSW) at SR 1109 Timberlake Rd near Louisburg (AU# 28-29-(2))
-Stony Creek (C, NSW) at Winstead Ave near Little Easonburg (AU# 28-69)

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. 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 1-5. Summarized Fecal Coliform Bacteria numbers for all data collected at Ambient Stations in HUC 03020101

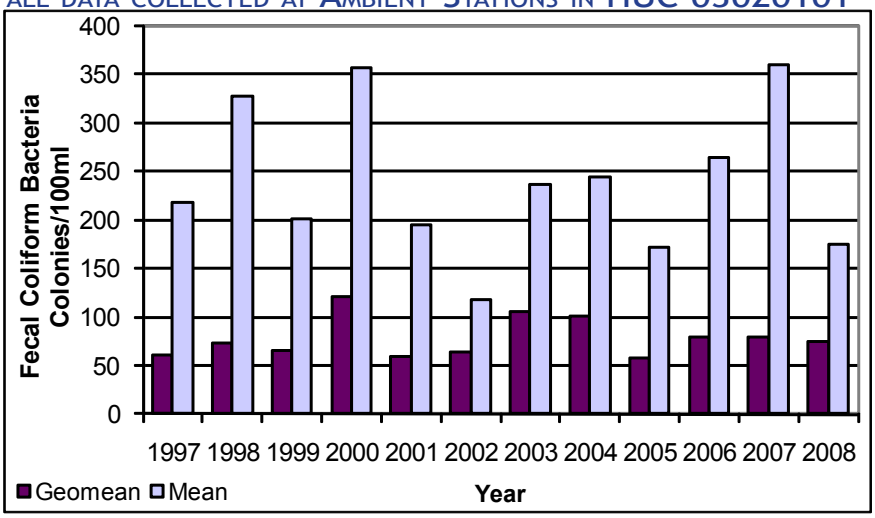
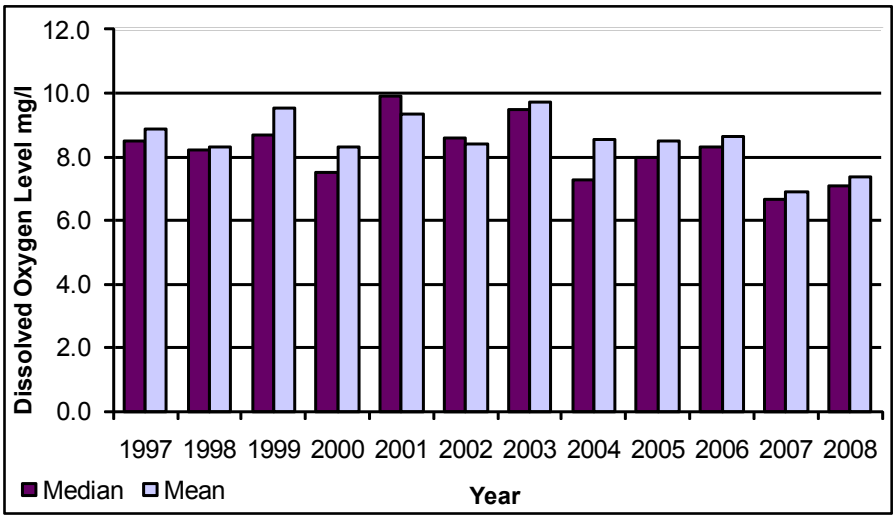


Figure 1-5 shows results from 1,473 samples collected over a 12 year period, 166 of these samples have more than 400 fecal coliform bacteria colonies /100 ml. Review of individual station data over the 12 year period indicate individual stations with the most samples over 400 colonies/100ml were at the lower end of Fishing Creek and in the Tar River in Rocky Mount.

Dissolved Oxygen

The dissolved oxygen (DO) water quality standard for Class C waters is not less than a daily average of 5.0 mg/L with a minimum instantaneous value of not less than 4 mg/L, the latter standard being the most commonly used. Swamp waters may have lower values if the low DO level is caused by natural conditions. Dissolved oxygen can be produced by wind or wave action that mix air into the water or through aquatic plant photosynthesis. During the day, DO levels are higher when photosynthesis occurs and they drop at night when respiration occurs by aquatic organisms. High levels are found mostly in cool, swift moving waters and low levels are found in warm, slow moving waters. In slow moving waters, such as reservoirs or estuaries, depth is also a factor. Wind action and plants can cause these waters to have a higher dissolved oxygen concentration near the surface, while biochemical reactions lower in the water column may result in concentration as low as zero at the bottom.

Figure 1-6. Summarized Dissolved Oxygen Levels for all data collected at Ambient Stations in HUC 03020101



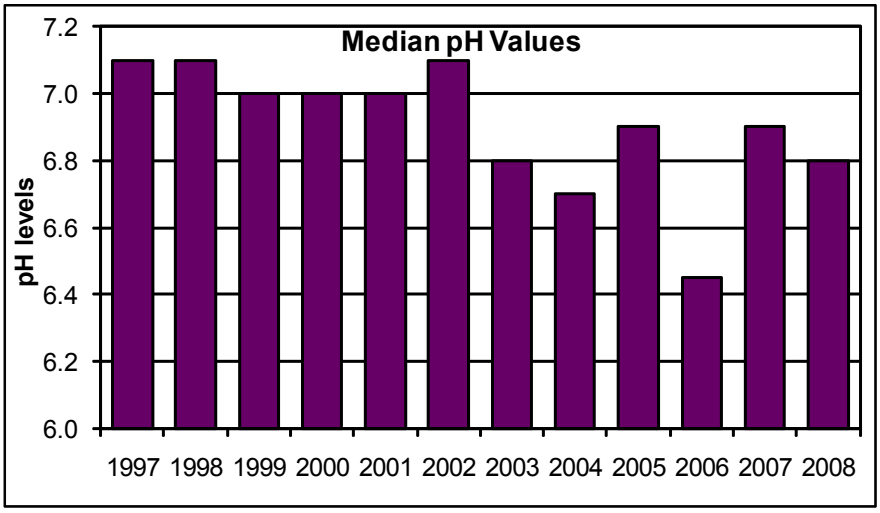
From 1997-2008, 1,623 samples were collected, 82 DO samples (5%) had instantaneous readings below 4 mg/L.; however median and mean values by year were above 6 mg/L. (Figure 1-6.). Review of individual station data over the 12 year period did not indicate significant issues at any particular station.

pH

The water quality standard for pH in surface freshwater is 6.0 to 9.0 standard units. Swamp water (supplemental Class Sw) may have a pH as low as 4.3 if it is the result of natural conditions. pH is a measure of hydrogen ion concentration that is used to express whether a solution is acidic or alkaline (basic). Values outside the 6.0-9.0 standard unit range can have chronic effects on the community structure of macroinvertebrates, fish and phytoplankton.

Figure 1-7 shows data from 1,640 pH samples over a 12 year period, 17 samples had low pH readings below 6 su. Review of individual station data over the 12 year period did not indicate significant issues at any particular station. Data indicate slightly more acidic waters in recent years; however, 99% of the samples meet standards.

Figure 1-7. Summarized pH values for all data collected at Ambient Stations in HUC 03020101



Nutrient Enrichment

Compounds of nitrogen and phosphorus are major components of living organisms and thus are essential to maintain life. These compounds are collectively referred to as "nutrients". Nitrogen compounds include ammonia as nitrogen (NH_3), Total Kjeldahl Nitrogen (TKN) and nitrite+nitrate nitrogen (NO_2+NO_3). Total nitrogen (TN) is the sum of TKN and NO_2+NO_3. Phosphorus is measured as total phosphorus (TP) by DWQ. When nutrients are introduced to an aquatic ecosystem from municipal and industrial treatment processes or runoff from urban or agricultural land, the growth of algae and other plants may be accelerated. In addition to the possibility of causing algal blooms, ammonia-nitrogen may combine with high pH water to form ammonium hydroxide (NH_4OH), a form toxic to fish and other aquatic organisms.

Due to excessive levels of nutrients resulting in massive algal blooms and fish kills, the entire Tar-Pamlico River Basin was designated as Nutrient Sensitive Water (NSW) in 1989. This designation resulted in the development and implementation of a nutrient management strategy to achieve a decrease in TN by 30% and no increase in TP loads compared to 1991 conditions. Even though implementation of the strategy has occurred by wastewater treatment plant dischargers, municipal stormwater programs, and agriculture, nutrient enrichment continues to be cumulatively impacting the Pamlico Estuary. A review of the NSW strategy, including implementation activities, progress towards meeting the loading goals, and additional actions are discussed in Chapter 6.

Basin trend analyses were completed for nutrient concentration and daily loads to evaluate progress towards meeting TMDL reduction goals, as discussed in detail in the NSW Chapter 6. These analyses detected a statistically significant increase in TKN concentration and a decrease in NH_3 and NO_2+NO_3. There were no basinwide detected trends for TN or TP concentrations. TKN is defined as total organic nitrogen and NH_3. An increase in organic nitrogen is the likely source for the increase in TKN concentrations since NH_3 concentrations have decreased basinwide. Further analysis of these parameters were completed on a subbasin scale to determine concentrations changes over an 11 year time period. Currently, NC does not have nutrient standards; however, NC normal nutrient levels in class C piedmont waters are typically:

TP = < 0.05 mg/L
TN= < 0.8 mg/L
TKN= <0.5 mg/L
NH_3= < 0.05 mg/L

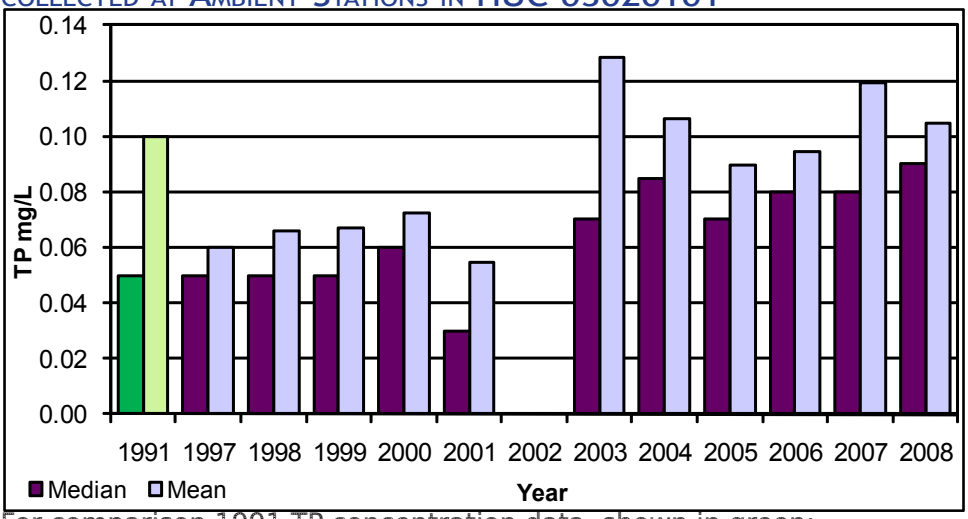
In early 2001, the DWQ Laboratory Section reviewed its internal Quality Assurance/Quality Control (QA/QC) programs and analytical methods. This effort resulted in a marked increase in reporting levels for certain parameters. New analytical equipment and methods were subsequently acquired to establish new lower reporting levels and more scientifically supportable quality assurance. As a result, the reporting levels quickly dropped back down to at or near the previous reporting levels. Nutrients were especially affected by these changes, as shown below:

	Reporting Level by Date (mg/L)			
Parameter	Pre-2001	3/13/2001 to 3/29/2001	3/30/2001 to 7/24/2001	7/25/2001 to present
NH_3	0.01	0.05	0.2	0.01
TKN	0.1	1.0	0.6	0.2
NO_2+NO_3	0.01	0.5	0.15	0.01
TP	0.01	0.5	0.1	0.02
Note: Do not let increased reporting levels be interpreted as a sudden upward trend. The Laboratory Section cautions that the establishment of minimum reporting levels may have been inconsistent and undocumented prior to those established in July 2001.				

Also, from July 2001 to May 2003, insufficient staffing resulted in suspension of nutrient sampling at most stations, resulting in a smaller sample size for 2001-2003.

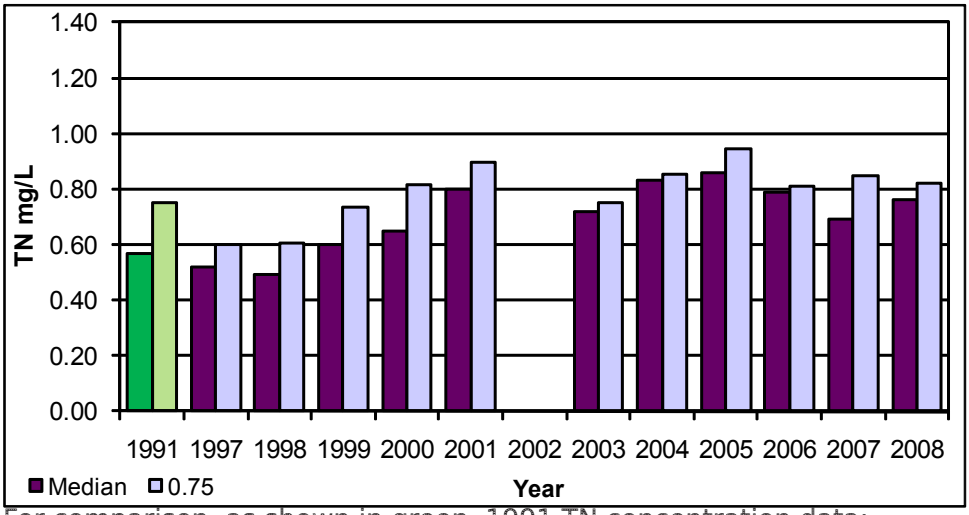
Figure 1-8 shows 943 samples collected over 11 years; 621 samples had TP levels above 0.05 mg/L. A review of individual station data indicates that two stations had the majority of incidences with TP levels above 0.05 mg/L. These include ambient stations below Rocky Mount on the Tar River at SR 1252 and on the lower end of Fishing Creek. However, TP levels above 0.05 mg/L were also detected at other sample locations on corresponding days indicating weather and flow conditions as a factor.

Figure 1-8. Summarized Total Phosphorus values for all data collected at Ambient Stations in HUC 03020101



For comparison 1991 TP concentration data, shown in green: Median= 0.05 Mean = 0.10

Figure 1-9. Summarized Total Nitrogen values for all data collected at Ambient Stations in HUC 03020101

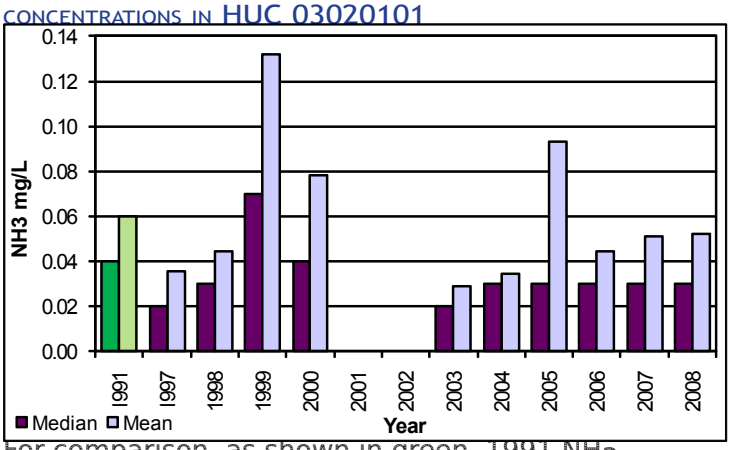


For comparison, as shown in green, 1991 TN concentration data: Median= 0.57 Mean = 0.75

Over 11 years, 942 nitrogen samples were collected; 357 (38%) had TN levels above 0.8 mg/L. (Figure 1-9). Figure 1-10 indicates stable ammonia concentrations, while Figure 1-11 shows a slight increase in TKN. Therefore, increases in organic nitrogen in this subbasin are likely contributing to TN loads. Identifying and reducing organic nitrogen contributions is needed to help meet required TMDL reductions.

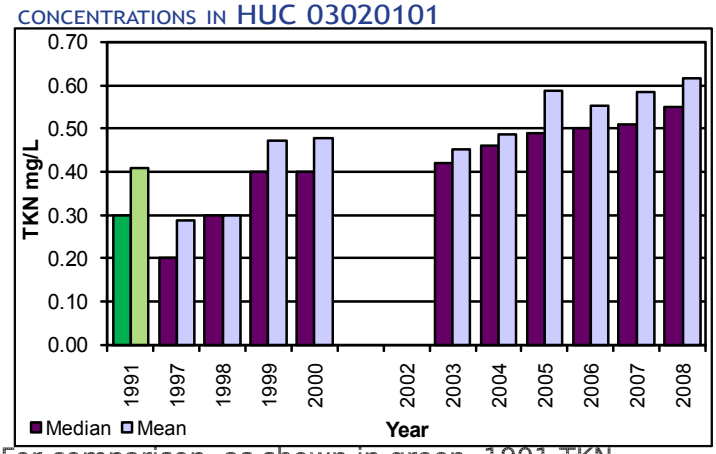
The limited ammonia data in 2001 contained outliers that skewed the data and therefore were eliminated from the ammonia and TKN graphs but were included in the TN graph.

Figure 1-10. Summarized Ammonia concentrations in HUC 03020101



For comparison, as shown in green, 1991 NH_3 concentration data: Median= 0.04 Mean = 0.06

Figure 1-11. Summarized TKN concentrations in HUC 03020101



For comparison, as shown in green, 1991 TKN concentration data: Median= 0.30 Mean = 0.41

Restoration and Protection Opportunities

The following section provides more detail about specific streams where special studies have occurred or stressor sources information is available. Specific stream information regarding basinwide biological samples sites are available in Appendix 1B. Use support information on all monitored streams can be found in Appendix 1A. Detailed maps of each of the watersheds are found in Appendix 1D or by clicking on the following small maps. Interactive elements have been incorporated within all 10-digit HUC watershed maps. To use the new features click on the Layers tab on the left side of the Adobe Reader window. Expand the folder tree by clicking on the (+) sign to the left of the map name. Each item in the subsequent folder tree is a layer on the map. These layers can be turned on or off by clicking the symbol to the left of the layer name. To return to your previous place within the text click the smaller map in the upper left corner of the 10-digit watershed map.

To assist in identifying potential water quality issues, we are requesting information be gathered by citizens, watershed groups and resource agencies through our Impaired and Impacted Stream/Watershed Survey found here: **http://portal.ncdenr.org/web/wq/ps/bpu/about/impactedstreamssurvey**.

Aycock Creek Watershed (0302010101)

This watershed is a priority area for protection of threatened and endangered species due to the presence of the dwarf wedgemussel in Shelton Creek (AU# 28-4, 13.9 miles), Fox Creek (AU# 28-4-1, 7.2 miles), Cub Creek (AU# 28-3, 8 miles), Tar River (AU# 28-(1), 20.1 miles) and the North Fork Tar River (AU# 28-5, 8.8 miles). This watershed is a priority for implementation of nonpoint source BMPs, including agricultural BMPs, stormwater control BMPs, buffer enhancement, and sediment and erosion control BMPs.

North Fork Tar River (HUC 030201010104) received both Fair and Good benthos bioclassification ratings during the 2007 sampling period. Site OB19 (Fair) is upstream of site OB144 (Good). The stream segment (AU# 28-5a, 5.9 mi) with site OB19 is Impaired on the 2010 303(d) list. The 2007 biological sample indicated beaver dam activity may have severely interrupted flows. This stream was impaired in the 1990's; however, water quality conditions improved during lower flow conditions, suggesting nonpoint source pollution as a major contributor to the stream's biological impairment during wetter years. Continued efforts to reduce agricultural runoff are needed. A landfill was also indicated as a potential cause contributing to low DO levels as a result of iron oxidation process.

Heritage Meadows WWTP (NC0047279) a minor discharge into an unnamed tributary to the North Fork Tar River but is not perceived to be causing the decline in biological communities. The NPDES permitted flow is 0.01 MGD, but the median daily annual flow is much less at 0.004 MGD (April 2008 to March 2009). Parameters that have exceeded permit limits include: fecal coliform bacteria, ammonia, BOD, and DO. The current operator fixed a piping and pumping problem in 2006, improving operational conditions of the facility. Although there have been several BOD violations, no significant exceedances have been identified since 2007 that warranted a civil penalty assessment. Evaluation of the facility's discharge impact to endangered mussel species found in this segment of the river may be required.

Tabbs Creek Watershed (0302010102)

Tabbs Creek (HUC 030201010203) AU # 28-17-(0.5)b, has been monitored by the Tar Pamlico Basin Association at station O1030000 since 2007, which is below the confluence of Long Creek. Tabs Creek is currently Not Rated because of several incidences of high fecal

coliform bacteria samples (note: five samples collected within 30 days that exceed the standard are needed to rate the creek as Impaired).

Kittrell Job Corps Center (NC0029131) and Long Creek Court WWTP (NC0048631) discharge into Long Creek (AU# 28-17-3). Parameters that have exceeded their permit limits include total suspended solids, fecal coliform bacteria, ammonia, BOD, and flow. Kittrell Job Corps Center's permitted flow is 0.025 MGD with a median annual daily flow 0.013 MGD (April 2008 to March 2009). The facility had been struggling to handle peak flows and slugs from improper use of the garbage disposal at the cafeteria. As of June 2010, the facility completed an upgrade that includes a new secondary clarifier, return activated sludge pump station, tertiary filtration system, post aeration, and UV disinfection. Long Creek Court WWTP's permitted flow is 0.007 MGD with a median daily annual flow 0.0043 MGD (April 2008 to March 2009). The plant's hydraulic problems (piping and pumping) have been repaired and has operated with no major noncompliance issues since 2007.

Lake Devin (HUC 030201010201) is a small lake located in the City of Oxford. Primarily used for public fishing, this lake originally served as the water supply source for the City. DWQ staff sampled Lake Devin from May through September 2007. Nutrient levels were found to support excessive algal growth. Based on the calculated North Carolina Trophic State Index (NCTSI) scores, Lake Devin was determined to be eutrophic (exhibiting elevated biological productivity) in May and August and hypereutrophic (exhibiting excessive biologically productivity) in June and July. This is the first time that NCTSI scores for this lake have indicated hypereutrophic conditions. The 2007 drought may have contributed to increased concentration of nutrients within the lake as the water level decreased through the summer. Lake water circulation and flushing from storm events were significantly reduced in 2007. These processes normally reduce the build up of algae and subsequent elevated chlorophyll *a* concentrations. Further monitoring during more normal rainfall years may help to determine if a change in trophic status is occurring.

Hatcher's Run (HUC 030201010201), AU# 28-11-3-(2), from dam at Devin Lake to Fishing Creek, covering 3.9 miles, received a Fair bioclassification during a special study assessment in 2006. However, DWQ Biologists noted the Fair bioclassification was primarily due to a lack of flow and resulting low DO. Upstream of the sample site, the stream flows through a cattail marsh that, along with the low release of water from Lake Devin, contributes to the low oxygen levels. Flow and low DO will continue to be naturally recurring issues here. Nutrient impacts were also noted. Additional surveys of this stream noted the stream banks as being highly eroded and undercut; sedimentation was observed, causing habitat degradation.

Foundry Branch (HUC 030201010201), AU# 28-11-2, from source to Fishing Creek, covering 5.5 miles, is listed as Impaired on the 2010 303(d) list because of turbidity and low DO standard violations. Foundry Branch runs through the City of Oxford and was sampled as a Tar Pamlico Basin Association coalition station (O0310000) that has now been relocated to Fishing Creek between the mouth of Foundry Branch and the Oxford WWTP discharge. This stream will remain Impaired until new water quality samples are taken showing improvement. DWQ does not plan on taking water quality sampling until evidence suggests activities have occurred in the watershed that have the potential to improve current stream conditions.

Fishing Creek (HUC 030201010201), AU#s 28-11c and 28-11d, from #1 outfall to Coon Creek, covering a total of 1.9 miles, is Impaired for Aquatic Life based on a Fair bioclassification in 2006. These segments have been Impaired since the 1990s because of the poor ecological and biological integrity.

Fishing Creek Impairment Timeline

- 1999 - The entire length (11 miles) of Fishing Creek was Impaired. Above the WWTP, Fishing Creek and Foundry Branch are impacted by urban runoff from the City of Oxford. Oxford WWTP was placed under a moratorium after the Poor bioclassification in 1999. It was recommended that no new or expanding

wastewater dischargers be connected to the Oxford wastewater treatment plant.

- 2004 - 10.4 miles of Fishing Creek were on the 303(d) list of impaired waters. DWQ continued to monitor water quality in the Fishing Creek watershed. DWQ Raleigh Regional Office staff continued to work with the Oxford WWTP to remedy plant problems that were adversely impacting water quality in Fishing Creek, including influent overflows and infiltration and inflow in the Foundry Branch watershed. Oxford was required to address nutrients in stormwater as part of the Tar-Pamlico NSW strategy and were advised to address the more acute impacts to Fishing Creek when developing their stormwater program.
- 2005 - The Fishing Creek subwatershed was chosen by the NC Ecosystem Enhancement Program (EEP) as a Local Watershed Planning Project area; as a result, extensive water quality assessments were completed in 2006-2007. This plan focused on projects that address sedimentation and nutrient issues related to agriculture and forestry, stormwater runoff from Oxford and from highways, and degraded mussel habitat. Information from this study included: freshwater mussel surveys, special study summaries, and a water quality summary. These documents can be found at: http://www.nceep.net/services/lwps/Fishing/Fishing_Creek.pdf.
- 2006 - Fishing Creek remained Impaired, covering 4.8 miles (from source to Coon Creek). Oxford completed its WWTP upgrades expanding the facility from 2.17 MGD to 3.5 MGD and received permit limits of 5 mg/L BOD5 and 1 mg/L NH_3-N, down from 15 mg/L BOD5 and 4 mg/L NH3-N. The new limits as well as those improvements implemented by Oxford were expected to further reduce impacts to Fishing Creek. A description of additional improvements are detailed at: http://cleanwateroxford.org/
- 2007 - EPA completed a special study on Fishing Creek to help assess conditions. This study found that the flow was strongly dominated by effluent from Oxford's WWTP. A detailed report of these results can be found In Appendix 1E. The Albemarle-Pamlico National Estuary Program (APNEP) also chose Fishing Creek for restoration activities.
- 2008 - Benthos data collected in 2006 resulted in a Fair rating leaving 1.9 miles Impaired on the 2008 & 2010 303(d) list. Although the benthic sample in the southern reach of Fishing Creek resulted in a Good-Fair bioclassification in 2007, ambient station indicated high turbidity, copper, zinc and fecal coliform bacteria levels, verifying the waterbody is still impacted.
- 2010 - The Tar Pamlico Basin Association began monitoring at station O0320000 (Knotts Grove Rd near Oxford) in January 2010. This station replaced station O0310000 (Foundry Branch at SR 1649 at Oxford). The new station is located on Fishing Creek upstream of the Oxford WWTP discharge and downstream of the mouth of Foundry Branch.

Water quality is expected to improve in Fishing Creek as long as Oxford WWTP is in compliance with its permit limits and stormwater BMPs are used. Potential water quality improvement results may be reflected in the future.

Lynch Creek-Tar River (0302010103)

Two ambient stations (O1025000 & O1100000) indicated increased levels of turbidity and fecal coliform bacteria. The fish sample resulted in a Good bioclassification in 2007, while the benthic samples resulted in a Good-Fair bioclassification in 2002. Additional information is needed about restoration and protection opportunities in this watershed.

Crooked Creek-Tar River (0302010104)

Crooked Creek (HUC 030201010404), AU#s 28-30a & 28-30b, habitat conditions are described as transitional between Piedmont and Coastal Plain. This creek has not had a biological sample taken since 2002; therefore, it is recommended that a biological sample be taken during the next basinwide sample period. Ambient data through 2008 indicate the stream is impacted by low DO and is Impaired on the 2010 303(d) list.

Bunn WWTP (NC0042269) discharges into Crooked Creek. The wastewater plant's permitted flow is 0.150 MGD and the current median annual daily flow is 0.085 MGD. This facility is in the process of an upgrade and currently benefits from three series-type tertiary lagoons. The plant has experienced problems with fats, oils, and grease discharges that are likely from the Division of Prisons Franklin Correctional Facility. Occasional excursions of the permit limits include the following parameters: high pH, total suspended solids, fecal coliform bacteria, BOD, and flow.

Two of the six ambient stations in this watershed indicated increased levels of turbidity and all had samples with high fecal coliform bacteria levels. Cedar Creek, (HUCs 030201010401 & 030201010402), AU# 28-29-(2)b, is listed as Impaired on the 2010 303(d) list based on exceedance of the turbidity standard.

Stony Creek Watershed (0302010105)

Stony Creek (Boddies Millpond) (HUC 030201010504), AU# 28-68b, from Lassiters Creek to Tar River covering 5.9 miles is Impaired for Aquatic Life based on a historical listing for sediment from benthos samples taken in 1992. This stream segment runs through urban areas in southwest Rocky Mount. This segment is likely a good candidate for an urban stream restoration and education project. A new ambient station was established in 2007; data from this site will help identify additional water quality stressors. This segment should be reassessed for biological integrity during the next basinwide biological assessment in 2012 to determine whether continued Impairment of the segment is warranted. The upper portion of this creek (AU# 28-68a) was removed from the 303(d) list because of a Good-Fair bioclassification in 2002.

Tar River Reservoir-Tar River (0302010106)

Tar River Reservoir is the primary water supply source for the City of Rocky Mount. Located on the confluence of the Tar River and Sapony Creek, the reservoir is open to the public for boating and fishing. Overall, nutrient concentrations in Tar River Reservoir were at levels capable of sustaining nuisance algal blooms. Based on the calculated North Carolina Trophic State Index (NCTSI) scores for 2007, the Reservoir was determined to be eutrophic (exhibiting elevated biological productivity). This reservoir has been eutrophic since 1989 when it was first monitored by DWQ. The dam is required to provide a continuous downstream release of 80 cfs.

Old Webb's Mill Hydro Project is proposed for just south of Lake Royale. This proposed hydropower project is non-jurisdictional to Federal Energy Regulatory Commission regulation and is therefore under the authority of the N.C. Utilities Commission. Conditions of the Certificate of Public Convenience and Necessity include the following: the project will only operate in a run-of-river mode (i.e. project outflow equals project inflow) and the operator will coordinate with the Division of Water Resources and the Wildlife Resources Commission to determine a flow requirement during generation, if needed.

Cypress Creek (HUC 030201010601), AU# 28-31-(3), from dam at Lake Sagamore/Royale down 1.6 miles to the confluence with the Tar River, receives effluent from Lake Royale WWTP. There are currently no monitoring stations in Cypress Creek but ambient monitoring in the Tar River downstream of this confluence began in 2007 by the Tar Pamlico Basin Association, while the last biological sample was taken in 1992. Lake Royale WWTP (NC0042510) is a small, package-type treatment facility and receives the majority of flow on seasonal basis (summer months).

Parameters that have exceeded the permit limits include fecal coliform bacteria and ammonia. The NPDES permitted flow is 0.080 MGD and the median annual flow is 0.0014 MGD. This discharge occurs downstream of the Lake Royale dam. Based on a 08/21/72 letter, under the Dam Safety Law, the dam is required to release a minimum flow of at least 0.3 cfs at all times. The letter also states that a minimum release requirement of at least 1.0 cfs from the dam will be a condition within the wastewater discharge permit when the plant is in "full capacity operation," unless the permittee chooses to discharge to the Tar River. A **Cypress Creek Watershed Plan** was recently completed with funds secured by Franklin County through CWMTF. The plan is to provide guidance for other watersheds and identifies actions to reduce existing impacts and prevent future impacts within the Cypress Creek Watershed.

Tar River (HUC 030201010603), AU# 28-(24.7)b, from Cypress Creek to a point 3.2 miles downstream of N.C. Hwy. 581 receives effluent from two minor WWTPs. Spring Hope WWTP facility (NC0020061) had problems with inflow and infiltration and was under a Special Order by Consent (expired 7/31/2010). Since 2007, inflow and infiltration into the wastewater collection system have decreased by ~80% through compliance efforts by DWQ's Raleigh Regional Office. The facility plans to upgrade in the next year. Flow permitted at 0.400 MGD and the median daily annual flow is 0.084 MGD. Southern Nash Middle School facility (NC0037885) is a septic tank-sand filter operation with a permitted flow of 0.015 MGD; while their median annual flow has been 0.0033 MGD. Proper operations were interrupted during 2006 and 2007 due to the unauthorized deconstruction of the majority of the treatment unit process. This problem has since been repaired and DWQ's Raleigh Regional Office staff recently conducted a Compliance Evaluation Inspection and found facility to be in compliance.

There were no data available to determine water quality conditions in this reach of the Tar River during the 2002-2006 assessment period. Ambient monitoring began in 2007 by the Tar Pamlico Basin Association and the last biological sample was taken in 1992. It is recommended that biological samples be collected during the next basinwide sample period or a special study conducted for the proposed Old Webb's Mill Hydro project.

Sandy Creek Watershed (0302010107)

Sandy Creek (HUC 030201010703) AU# 28-78-1-(8)b1, from NC 401 to Flat Rock Creek, covering 5.3 miles, is Impaired for Aquatic Life based on a Fair bioclassification result in 2003. Problems with High Roost Poultry Farm's lagoon were previously indicated as a source of pollution with reports of wastewater travelling via groundwater to the creek. In 2008, the lagoon was closed and the land put in a conservation easement. Several conservation easements have been established along Sandy/ Swift Creek with the assistance and facilitation by Tar River Land Conservancy and NC Ecosystem Enhancement Program. Restoration of this segment is especially important to protect the ORW status of this watershed. This site needs to be resampled to assess biological conditions post lagoon removal.

Sandy/Swift Creek ORW Reclassification

The request for reclassification of ~14 miles of Swift Creek and Sandy Creek was submitted by the Pamlico-Tar River Foundation in 1995. Water quality studies indicated that ~14-mile segment of water, from SR 1003 to SR 1004 in Nash County, had excellent water quality. This entire watershed is also recognized for its exceptional State and national ecological significance. As a result of this reclassification request, rule amendments were proposed to reclassify the ~14-mile segment with excellent water quality to C ORW NSW, and to extend the ORW management strategy to the remainder of the Swift Creek watershed. This ORW classification became effective on October 7, 2003 with nearly 142 miles of named waters being affected. As an ORW

watershed, regulations that affect new development activities, wastewater discharges, landfills, and DOT activities apply on a permanent basis. No new discharges or expansions of existing discharges are permitted, and stormwater controls for all new development activities requiring an Erosion and Sedimentation Control Plan in accordance with rules established by the NC Sedimentation Control Commission or an appropriate local erosion and sedimentation control program are required to follow the stormwater provisions as specified in 15A NCAC 02H .1000. Specific stormwater requirements for ORW areas are described in 15A NCAC 02H .1007.

Swift Creek 0302010108

This watershed is a threatened and endangered species protection priority area, which supported the upper reach of Swift Creek receiving ORW status in 2003(AU# 28-78-(0.5), 9.6 miles). Thirty-eight miles of Swift Creek (AU#s 28-78-(2.5) & 28-78-(6.5)) downstream of the designated ORW area are in need of additional protection. The downstream portion of Swift Creek did not meet excellent water quality standards at the time of ORW designation, but the importance of protection in this watershed led to the request for a site-specific strategy to be developed by DWQ and advising agencies (in development). The mainstem of Swift Creek is denoted as a Natural Heritage Area of national significance as recorded by the North Carolina Natural Heritage Program. In addition, the lower portion of Swift Creek contains the Swift Creek Swamp Forest, an approximately 2,000 acre natural area of regional significance, and a wading bird rookery.

There are several wastewater residual application fields in the drainage area; the impacts from potential runoff from fields is unknown. Further research may be needed to identify if any runoff from these fields may be impacting the aquatic species in Swift Creek.

This watershed is a priority for implementation of nonpoint source BMPs, including agricultural BMPs, stormwater control BMPs, buffer enhancement and sediment and erosion control BMPs.

Currently no nutrient data are collected in the Sandy/Swift Creek watersheds. It is recommended that nutrient data be collected at ambient station O4000000 to be able to help identify which watersheds are significantly contributing to the accumulation of nutrients in the estuary.

Beech Branch-Tar River (0302010109)

Rocky Mount Mills Dam, found along the Tar River, is a hydropower facility required to provide, under the Dam Safety Law, a continuous instantaneous minimum flow of 60 cfs in the natural channel directly below the dam. No data are available to describe water quality conditions in the upstream portion (AU# 28-(67)), while downstream of the dam (AU# 28-(69)) is considered Supporting.

Additional Studies

Lake and Reservoir Assessment

Two lakes, Lake Devin and Tar River Reservoir, were sampled by DWQ in 2007. However, not enough samples were collected to determine use support status. The samples that were taken indicated impacts due to 2007 drought conditions. Data collected included chlorophyll *a*, pH, dissolved oxygen, water temperature, turbidity, and chloride. Other parameters include nutrient concentrations, Secchi depth and percent dissolved oxygen saturation. The detailed report can be found on DWQ's website: http://www.esb.enr.state.nc.us/documents/TARPAMLICORIVERBASIN2007_000.pdf.

Volunteer Water Information Network

The Volunteer Water Information Network (VWIN) is a partnership of groups and individuals dedicated to preserving water quality in North Carolina. In August 2005, the Pamlico-Tar River Foundation initiated a monitoring program in tributaries to the Tar River. The UNC-Asheville Environmental Quality Institute (EQI) provided technical assistance through laboratory analyses of water samples, statistical analyses of water quality results, and written interpretation of the data. Volunteers collected water samples once a month from selected streams in Edgecombe, Nash and Pitt counties. The results of this data collection are similar to DWQ's sampling results, but VWIN also collected data on streams that DWQ does not monitor. The VWIN report (available in Appendix 1E) provides statistical analyses and interpretation of data from samples gathered from Beech Swamp, Compass Creek, Hornbeam Branch, Little Saponey Creek, Maple Creek, Penders Mill Run, Pig Basket Creek, Red Bud Creek, Saponey Creek, Stoney Creek, Swift Creek, and Turkey Creek.

Aquatic Species Protection

Within this subbasin, two specific management areas are the focus of aquatic species protection, these include: the Upper Tar River headwaters (North Fork Tar River, Fox Creek, Shelton Creek, Cub Creek, and Tar River) and Lower Swift Creek.

The Upper Tar River headwaters (Aycock Creek watershed) and its riparian habitat support rare fish, mussels, and plants, in addition to the federally-listed as endangered dwarf wedgemussel. Based on this diversity, several drainages within the management area have been identified as state (North Fork Tar River and Fox Creek) and nationally (Shelton Creek, Cub Creek, and Tar River) significant. The federal species of concern and state endangered Atlantic pigtoe (*Fusconaia masoni*), green floater (*Lasmigona subviridis*), and yellow lampmussel (*Lampsilis cariosa*) are known to occur in the upper Tar. Other mussels known from this area include the state-listed as threatened triangle floater (*Alasmidonta undulat*a), creeper (*Strophitus undulatus*), and eastern lampmussel (*Lampsilis radiata*), as well as the notched rainbow (*Villosa constricta*), which is a State species of concern.

The Upper Tar River headwaters provide habitat for: the federal species of concern and state significantly rare pinewoods shiner (*Lythrurus matutinus*), the state special concern North Carolina spiny crayfish (*Orconectes carolinensis*), the state special concern Neuse River waterdog (*Necturus lewisi*), the state rare and federal species of concern Roanoke bass (*Ambloplites cavifrons*), and the state and federally endangered plant Harperella (*Ptilimnium nodosum*) .

Lower Swift Creek and its riparian habitat support rare fish, mussels, and plants in addition to the federally-listed endangered Tar spinymussel. The federal species of concern and State endangered Atlantic pigtoe (*Fusconaia masoni*), yellow lance (*Elliptio lanceolata*), and yellow lampmussel (*Lampsilis cariosa*) are known to occur in the lower reaches of Swift Creek. Other mussels known from this reach include the state-listed threatened triangle floater (*Alasmidonta undulata*), creeper (*Strophitus undulatus*), Roanoke slabshell (*Elliptio roanokensis*) and eastern lampmussel (*Lampsilis radiata*), as well as the notched rainbow (*Villosa constricta*), a state species of concern. Two rare fish, the Carolina madtom (*Noturus furiosus*) and pinewoods shiner (*Lythrurus matutinus*), the Neuse River waterdog (*Necturus lewisi*), the state special concern North Carolina spiny crayfish (*Orconectes carolinensis*), two significantly rare plants and two significantly rare insects have also been documented in this portion of the subbasin. While the development of site-specific water quality management strategies are specifically aimed at the Tar spinymussel, they will also benefit other rare species in this watershed.

In 2005, wildlife resource agencies (US Fish & Wildlife, NC Natural Heritage Program and NC Wildlife Resources Commission) wrote a technical support document providing management recommendations for the threatened and endangered aquatic species in the Upper Tar River headwaters. Many of the recommendations include activities that are currently in place or are not

resources that DWQ has regulatory authority over. Therefore, DWQ will identify efforts that can be regulated by DWQ to protect water quality for the propagation of threatened and endangered aquatic life (e.g., tar spinymussel & dwarf wedgemussel). DWQ is currently considering the development of a statewide mussel species management plan to avoid the lengthy process of individual site specific plans and rulemaking.

Permit Programs

Wastewater Dischargers

The National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States, as authorized by the Clean Water Act. Non-compliance with permit limits on wastewater flow and constituents can lead to discharge of pollutants that degrade surface waters making them unsafe for drinking, fishing, swimming, and other activities. The NPDES Permitting and Compliance Programs of DWQ are responsible for administering the program for the state. These permits are reviewed and are potentially renewed every five years. A list of NPDES permits is found in Table 1-4 and locations shown on Figure 1-1.

The Federal and State Pretreatment Program gives regulatory authority for EPA, States, and Municipal Governments to control the discharge of industrial wastewater into municipal Wastewater Treatment Plants (WWTPs) or Publicly Owned Treatment Works (POTWs). The objectives of the Pretreatment Program are to prevent pass-through, interference, or other adverse impacts to the POTW, its workers and the environment; to promote the beneficial reuse of biosolids; and to assure all categorical pretreatment standards are met. There are currently around 700 Significant Industrial Users (SIUs) who discharge industrial wastewater to over 120 POTWs throughout the state of North Carolina. The WWTPs covered by POTW Pretreatment Programs in this subbasin are Oxford, Rocky Mount, and Franklin County

All NPDES permitted facilities use 7Q10s (the lowest stream flow for seven consecutive days that would be expected to occur once in ten years) as critical flow in determining permit limits for non-carcinogen toxicants. If a toxicant is a known carcinogen, then the QA (the mean annual stream flow) is used in determining permit limits. In cases where an aesthetic standard is applicable to a pollutant then the permit limit is based on 30Q2 (the minimum average flow for 30 consecutive days that would be expected to occur once in 2 years). These critical flow values used to determine permit limits for all NPDES facilities may need to be reviewed as the permits come up for renewal. Currently, a 7Q10 is only evaluated in the initial application of the permit and upon expansion. Low flow conditions impact a stream's ability to assimilate both point and nonpoint source pollutants. Droughts as well as the demand for water resources, are very likely to increase; therefore, the reevaluation of stream flow will become more critical to water quality within the next decade or so. DWQ will work with Division of Water Resources and other agencies to discuss the need and resource availability to update 7Q10 values.

Table 1-4. NPDES Discharge Permits

Permit #	Facility Name	Owner Type	Permit Type	Class	Receiving Stream	Permit Flow MGD
NC0002852	Franklinton WTP	Government - Municipal	Water Plants and Water Conditioning	Minor	Taylors Creek	0
NC0020061*	Spring Hope WWTP	Government - Municipal	Municipal Wastewater Discharge, < 1MGD	Minor	Tar River	0.4
NC0020231*	Louisburg WWTP	Government - Municipal	Municipal Wastewater Discharge, Large	Major	Tar River	1.37
NC0025054*	Oxford WWTP	Government - Municipal	Municipal Wastewater Discharge, Large	Major	Fishing Creek	3.5

Permit #	Facility Name	Owner Type	Permit Type	Class	Receiving Stream	Permit Flow MGD
NC0029131	Kittrell Job Corps Center	Non-Government	Discharging 100% Domestic < 1MGD	Minor	Long Creek	0.025
NC0030317*	Tar River Regional WWTP	Government - Municipal	Municipal Wastewater Discharge, Large	Major	Tar River	21
NC0037885	Southern Nash Middle School	Government - County	Discharging 100% Domestic < 1MGD	Minor	Tar River	0.015
NC0042269*	Bunn WWTP	Government - Municipal	Municipal Wastewater Discharge, < 1MGD	Minor	Crooked Creek	0.15
NC0042510	Lake Royale WWTP	Non-Government	Discharging 100% Domestic < 1MGD	Minor	Cypress Creek	0.08
NC0047279	Heritage Meadows WWTP	Non-Government	Discharging 100% Domestic < 1MGD	Minor	N. Fork Tar River	0.01
NC0048631	Long Creek Court WWTP	Non-Government	Discharging 100% Domestic < 1MGD	Minor	Long Creek	0.007
NC0050415	Phillips Middle School	Government - County	Discharging 100% Domestic < 1MGD	Minor	Moccasin Creek	0.01
NC0050431	North Edgecombe High School	Government - County	Discharging 100% Domestic < 1MGD	Minor	Swift Creek	0.02
NC0069311*	Franklin County WWTP	Government - County	Municipal Wastewater Discharge, Large	Major	Cedar Creek	3
NC0072125*	Tar River WTP	Government - Municipal	Water Plants and Water Conditioning	Minor	Tar River	0
NC0072133*	Sunset Avenue WTP	Government - Municipal	Water Plants and Water Conditioning	Minor	Tar River	0
NC0077437	Battleboro plant	Non-Government	Industrial Process & Commercial	Minor	Tar River	0.904
NC0083038	Saint-Gobain Containers	Non-Government	Industrial Process & Commercial	Minor	Martin Creek	
NC0001589	Hospira, Inc. -RM1	Industrial Process & Commercial		Minor		
NC0084697	Amoco Fabrics & Fibers	Groundwater Remediation		Minor		
NC0079227	Nash remediation site	Groundwater Remediation		Minor		

* Indicates Tar-Pamlico Basin Association Permittee Member
+ Indicates pretreatment

Non-Discharge

Non-discharge systems have been the preferred alternative to discharge to surface waters for NSW waterbodies and DWQ requires all new and expanding NPDES permit applicants to provide documentation that considers all alternatives to surface water discharges. Non-discharge wastewater disposal options include spray irrigation, rapid infiltration basins, and drip irrigation systems (Table 1-5). Although these systems are operated without a discharge to surface waters, they still require a DWQ permit. The permit insures that treated wastewater is land applied at a rate that is protective of groundwater and does not produce ponding or runoff into a waterbody. More information about land application and non-discharge requirements can be found on the DWQ Aquifer Protection Section – Land Application Unit website: http://portal.ncdenr.org/web/wq/aps/lau.

Run-off and spills are not common at non-discharge facilities. In general, maintaining compliance with permit conditions largely falls back to having a properly managed facility. Aging collection systems may lead to increased flows from inflow and infiltration or a facility may not be properly

prepared to expand as flows increase and the upper limits of a plant's capacity are reached. Non-discharge facilities, just like any other, must properly plan for any elevated flows and take action to ensure that the facility is capable of managing the wastewater.

Groundwater moving into surface water is a mechanism to introduce nutrients into the surface water system in the absence of direct discharges and in NSW systems it is important to be able to better quantify these potential nutrient loads. Some facilities have a groundwater monitoring program to measure compliance with groundwater quality standards. However, it should be noted that a facility can be compliant with groundwater quality requirements while still contributing to the overall nutrient loading of a surface water system. A better understanding of the groundwater/surface water interaction process at non-discharge facilities may help to identify and quantify nutrient loading from these locations .

Novozymes (WQ0002806) is permitted to apply wastewater on an ~900 acre sprayfield. Their wastewater is currently low in nitrogen; however, past applications (>10 yrs ago) were not. Novozymes has groundwater standard violations associated with nitrates in the groundwater; the nitrate groundwater standard is 10 mg/L whereas expected total nitrogen level, in surface waters are around 0.8 mg/L N. The excess nitrates may be discharging off-site into local surface waters, but the amount of nitrogen contributions from groundwater to surface waters has not been quantified. In September 2009, Novozymes initiated a partial groundwater treatment system to address contaminated groundwater. Additional remediation of groundwater will likely be required.

Table 1-5. Non-Discharge Permits

Facility Name	Permit Type	Permit #	Size
Saint Gobain Containers Incorporated	Wastewater Recycling	WQ0000221	Minor
Novozymes North America Inc - Franklin County	Surface Irrigation	WQ0002806	Major
Ball's Laundromat	Surface Irrigation	WQ0002848	Major
Eastern Minerals Incorporated-Henderson	Surface Irrigation	WQ0003075	Minor
Granville Family Park Incorporated	Surface Irrigation	WQ0004410	Major
Single Family Residence	Surface Irrigation	WQ0007524	Minor
Pretty Good Sand Co Incorporated-Arm	Wastewater Recycling	WQ0007574	Minor
McCracken Enterprises Incorporated	Groundwater Remediation	WQ0012614	Minor
Green Hill Country Club (golf course)	Reuse	WQ0020302	Minor
Curtis Insulation	Wastewater Recycling	WQ0001122	Minor
Bass Farms Inc.	Surface Irrigation	WQ0002004	Minor
Town of Tarboro Residuals Land Application	Land Application of Residual Solids	WQ0002047	Major
NZNA Franklinton, NC Manufacturing Facility	Distribution of Residual Solids	WQ0003487	Major
Town of Louisburg Residuals Land Application	Land Application of Residual Solids	WQ0005981	Minor
Wilton Elementary School WWTP	Gravity Sewer Extension, Pump Stations, & Pressure Sewer	WQ0020807	Minor
Single Family Residence	Surface Irrigation	WQ0022963	Minor
Eastern Compost	Wastewater Recycling	WQ0033492	Minor

Major = Wastewater irrigation, high-rate infiltration, other non-discharge wastewater and reclaimed water facilities with an average daily flow >or= to 10,000 gallons per day (GPD); Class A residual management systems distributing > or = to 3,000 dry tons; Class B residual management systems containing > or = to 300 acres. Minor= < than above amounts.

Wastewater Residuals (Biosolids)

Residuals, biosolids or treated sludge, are by-products of the wastewater treatment process. After pathogen reduction, vector attraction reductions, and metal limits are met, these residuals are disposed in a manner to protect public health and the environment. Disposal sites include land fills, dedicated and non-dedicated residual disposal sites, agricultural land for crops not for human consumption, and distribution to the public for home use. When applied to the land, steps must be taken to assure that residuals are applied at or below agronomic rates based on the soil and crop types present at the disposal site. If these criteria cannot be met, permitted disposal must take place at a dedicated residual disposal site or landfill.

In this subbasin, four facilities that produce wastewater residuals (Class B) apply their treated sludge on 165 available fields covering 2,776 acres (not all fields are used every year). A rough estimate of 194,320 lbs/yr of nitrogen and 249,840 lbs/yr of phosphorous are applied to these fields. This estimate does not include Class A residuals which are not monitored by DWQ but can also contribute nitrogen and phosphorus loading (which is not accounted for) within the basin. Additional research would be necessary to determine if organic nitrogen from biosolids is contributing to the basinwide increase in organic nitrogen. For more information about residuals please see DWQ's Aquifer Protection Section: **http://portal.ncdenr.org/web/wq/aps/lau**.

On-Site Wastewater Treatment Systems (Septic Systems)

Wastewater from many households is treated on-site through the use of permitted septic systems instead of being sent to a wastewater treatment facility. Poorly planned and/or maintained systems can fail and contribute to nonpoint source pollution. Wastewater from failing septic systems can contaminate groundwater and surface water. Failing septic systems are health hazards and are considered illegal discharges of wastewater if surface waters are impacted. Local health departments are responsible for ensuring that new systems are sited and constructed properly and an adequate repair area is available. Municipal planners need to understand the economic and human health ramifications caused by failing septic systems and plan for long-term septic system sustainability. Information about the proper installation and maintenance of septic tanks can be obtained by contacting the Department of Environmental Health and local county health departments.

In 2007, North Carolina Agricultural Research Service completed a report concerning nitrogen contributions from on-site wastewater systems for each river basin. The results for this subbasin based on 1990 census data indicate a population of 73,318 people using 29,169 septic systems resulting in a nitrogen loading of 733,179 lbs/yr and nitrogen loading rate of 564 lbs/mi^2/yr. These numbers reflect the TN discharged to the soil from the septic system and does not account for nitrogen used because of soil processes and plant uptake. (Pradhan et al. 2007).

Wetland Or Surface Water Disturbance (401 Certification)

The "401" refers to Section 401 of the Clean Water Act. The North Carolina DWQ is the state agency responsible for issuing 401 water quality certifications (WQC). When the state issues a 401 certification, this certifies that a given project will not degrade waters of the state or violate state water quality standards. A 401 WQC is required for any federally permitted or licensed activity that may result in a discharge to waters of the U.S. Typically, if the United States Army Corps of Engineers determines that a 404 Permit or Section 10 Permit is required because a proposed project involves impacts to wetlands or surface waters, then a 401 WQC is also required. Locations of 401 WQCs are included on each watershed map. Examples of activities that may require WQCs include:

- Any disturbance to the stream bed or banks,
- Any disturbance to a wetland,
- The damming of a stream channel to create a pond or lake,
- Placement of any material within a stream, wetland or open water, including material that is

necessary for construction, culvert installation, causeways, road fills, dams, dikes or artificial islands, property protection, reclamation devices and fill for pipes or utility lines and

• Temporary impacts including dewatering of dredged material prior to final disposal and temporary fill for access roads, cofferdams, storage and work areas.

Riparian Buffers

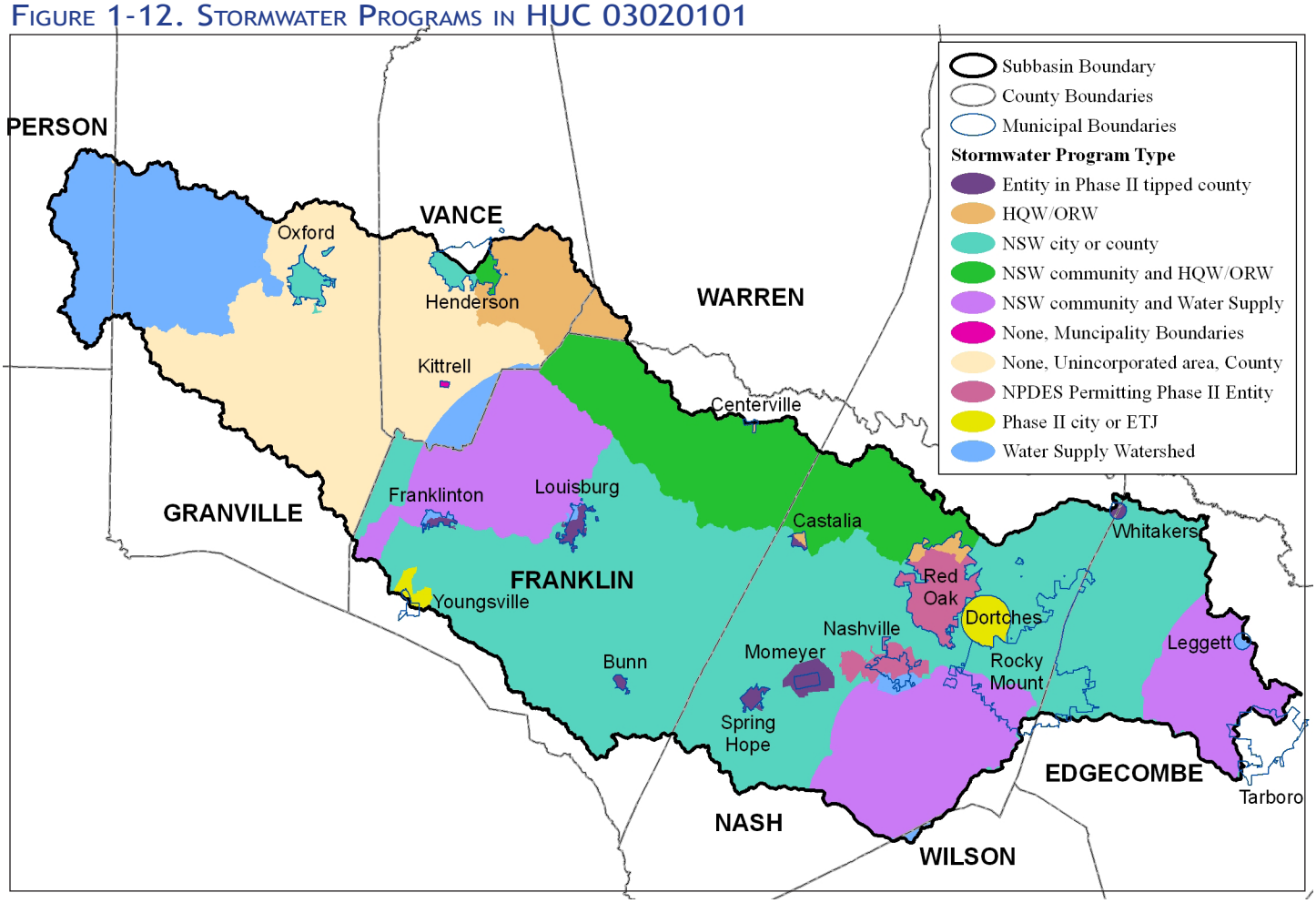
Riparian buffers in the basin are to be protected and maintained on both sides of intermittent and perennial streams, lakes, ponds, and estuarine waters. Tar-Pamlico River Basin Buffer Rules **(15A NCAC 2B.0259)** do not establish new buffers unless the existing use in the buffer area changes. The footprints of existing uses such as agriculture, buildings, commercial, and other facilities, maintained lawns, utility lines, and on-site wastewater systems are exempt. A total of 50 feet of riparian area is required on each side of waterbodies; within this 50 feet, the first 30 feet is to remain undisturbed and the outer 20 feet must be vegetated. Activities that disturb this buffer require a buffer authorization from DWQ or may require a major variance approval from the Environmental Management Commission. More information about the buffer rules are available at: **http://portal.ncdenr.org/web/wq/swp/ws/401/riparianbuffers**.

Stormwater

There are several different stormwater programs administered by DWQ. One or more of these programs affects many communities in the Tar-Pamlico River Basin. The goal of the DWQ stormwater discharge permitting regulations and programs is to prevent pollution from entering the waters of the state through the use of stormwater runoff controls. Active stormwater control programs include Phase II NPDES and State post-construction, coastal stormwater, HQW/ORW stormwater, Tar-Pamlico River Basin NSW stormwater, and Water Supply Watershed Program requirements. Figure 1-12 shows that the different stormwater programs in this subbasin cover over two-thirds of the subbasin.

Henderson, Oxford, and Rocky Mount and Franklin, Nash, and Edgecombe counties are required to implement actions to prevent and treat stormwater runoff under the Tar-Pamlico NSW stormwater rules. These local programs include new development controls to reduce nitrogen runoff by 30 percent compared to pre-development levels and to keep phosphorus inputs from increasing over pre-development levels. Local programs must also identify and remove illicit discharges; educate developers, businesses, and homeowners; and make efforts toward treating runoff from existing developed areas. As of July 2009, there are 55 general stormwater permits and nine individual stormwater permits issued in this subbasin.

Figure 1-12. Stormwater Programs in HUC 03020101



Interbasin Transfers

In 1993, the North Carolina Legislature adopted the Regulation of Surface Water Transfers Act (G.S. §143-215.22L) which was subsequently modified in 2007. This law regulates large surface water transfers between river basins by requiring a certificate from the Environmental Management Commission (EMC). A transfer certificate is required for a new transfer of 2 million gallons per day (MGD) or more and for an increase in an existing transfer by 25 percent or more (if the total including the increase is more than 2 MGD). Certificates are not required for facilities that existed or were under construction prior to July 1, 1993 up to the full capacity of that facility to transfer water, regardless of the transfer amount.

The Kerr Lake Regional Water System (KLRWS) is a regional provider of potable water service for portions of Vance, Granville, Franklin, and Warren counties. KLRWS has an existing grandfathered surface water transfer capacity of 10 MGD that allows the system to move water from the Roanoke River Basin (Kerr Lake) to the Upper Tar and Fishing Creek subbasins. On February 18, 2009, KLRWS submitted a Notice of Intent to Request an Interbasin Transfer (IBT) Certificate to the Environmental Management Commission. The request is to increase the authorized transfer from 10 MGD to 24 MGD, based on water use projections to the year 2040. More information about this project is available from The Division of Water Resources: http://www.ncwater.org/Permits_and_Registration/Interbasin_Transfer/.

Agriculture

Agriculture is NC's leading industry and is especially strong in the Tar-Pamlico River Basin. Nonpoint source pollution from agriculture is a significant source of stream degradation in the Tar-Pamlico River Basin. 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 and is supported by financial incentives, technical and educational assistance, research, and regulatory programs.

The conversion of agricultural lands to developed lands with impervious surfaces is another potential nonpoint source of pollution. A report by the American Farmland Trust organization identifies this subbasin as having high quality farmland with large areas threatened by development. A map of these areas is available at: http://www.farmland.org/. Some farmers are protecting their land from developement through the Conservation Reserve Enhancement Program (CREP). CREP is a voluntary program utilizing federal and state resources to achieve long-term protection of environmentally sensitive cropland and marginal pastureland. These voluntary protection measures are accomplished through 10-, 15-, 30-year and permanent conservation easements. In this subbasin, there are approximately 3,442 acres in easements, of which 44% are in 30 year or permanent easements.

North Carolina Agriculture Cost Share Program

Financial incentives are provided through North Carolina's Agriculture Cost Share Program, administered by DENR's Division of Soil and Water Conservation to protect water quality by installing BMPs on agricultural lands. In the Upper Tar River Subbasin, $1,441,667 was spent between 2003-2008 on BMPs to reduce nonpoint source pollution from agriculture. Approximately 16,248 acres were affected by BMPs that prevented an estimated 136,150 tons of soil, 233,067 lbs of nitrogen and 43,979 lbs of phosphorous from running off into surface waters. Animal waste BMPs also accounted better management of an estimated 83,689 lbs of nitrogen and 111,338 lbs of phosphorous.

DWQ's Animal Feeding Operations Unit

The Animal Feeding Operations Unit is responsible for the permitting and compliance monitoring of animal feeding operations across the state. Poultry farms with dry litter waste are not regulated or monitored by DWQ. Table 1-6 summarizes the number of registered livestock operations, total number of animals, number of facilities, and total steady state live weight (SSLW) in this subbasin. These numbers reflect only operations required by law to be registered and, therefore, do not represent the total number of animals in the subbasin.

Table 6. Animal Operations in HUC 03020101

Type	# of Facilities	# of Animals	SSLW
Animal Individual	10	9,600	1,296,000
Cattle	4	1,400	1,365,000
Wet Poultry	6	731,600	2,822,400
Swine	24	94,897	14,153,090

*Steady State Live Weight (SSLW) is in pounds, after a conversion factor has been applied to the number of swine, cattle or poultry on a farm. Conversion factors come from the US Department of Agriculture, Natural Resource Conservation Service (NRCS) guidelines. Since the amount of waste produced varies by hog size, this is the best way to compare the sizes of the farms.

Animal waste is often stored in lagoons before it is applied to fields. Therefore there is concern that several animal operations in the basin may be abandoned without proper closeout of the lagoons. Numerous environmental hazards exist from these lagoons including: ammonia emissions, overflows into surface waters, and groundwater contamination.

A better understanding of groundwater quality in relation to animal feeding operation locations is needed. Often animal operations are located immediately adjacent to surface water bodies. Groundwater that is moving from beneath a facility into the surface water system may transport significant levels of nutrients. However, lack of groundwater quality data at animal operations hampers quantifying their impacts.

Restoration, Protection & Conservation Planning

Population

The 2000 census estimated population for this subbasin is 181,038 and this is expected to increase with the results of the 2010 census. As population increases so does our demand for clean water from aquifer and surface water sources and for the land and water to assimilate wastes. Population estimates for each of the watersheds in this subbasin are listed in Table 1-7.

Table 1-7 Watershed Population Estimates* for HUC 03020101

10-Digit HUC	2000 Population	2000 Population Density (per sq mi)	2010 Estimated Population	2020 Estimated Population	2030 Estimated Population
0302010101	8,405	50	9,866	11,181	12,443
0302010102	26,412	155	29,916	33,198	36,406
0302010103	14,262	103	17,373	20,686	24,103
0302010104	16,259	120	20,563	25,133	29,851
0302010105	18,944	161	20,786	22,618	24,342
0302010106	31,249	156	34,530	37,819	40,952
0302010107	20,389	127	21,973	23,703	25,462
0302010108	5,764	52	5,797	5,836	5,858
0302010109	39,350	375	39,143	38,995	38,739
03020101	181,038	139	199,949	219,172	238,158

*NC Office of State Budget and Management: http://www.osbm.state.nc.us/

Land Use

Land use in this subbasin shows increasing urbanizing areas and a strong agriculture use, both of which continue to place increasing demands on water quality and quantity. Table 1-8 lists the percentage of predominant land cover types within this subbasin (based on 2001 land cover data). A map showing these land types can be found in Appendix 1D.

Table 1-8. Land Cover Percentages in HUC 03020101

Land Cover Type	Percent
Developed Open Space	6.53
Developed Low Intensity	1.76
Developed Medium Intensity	0.61
Developed High Intensity	0.22
Total Developed	9.12
Bare Earth Transition	0.19
Deciduous Forest	24.74
Evergreen Forest	16.04
Mixed Forest	5.64
Total non-Wetland Forest	46.42
Scrub Shrub	1.75
Grassland Herbaceous	7.03
Pasture Hay	16.52
Cultivated Crops	12.15
Total Agriculture	28.68
Woody Wetlands	6.55
Emergent Herbaceous Wetland	0.26
Total Wetlands	6.81

Local Initiatives & Conservation Planning

Resources & Guides

NCDENR's One North Carolina Naturally initiative promotes and coordinates the long-term conservation of North Carolina's threatened land and water resources. Each DENR division specializes in management of a specific natural resource, while a collaborative coordination and planning process results in cost-effective implementation and management of multiple resources. Natural resource planning and conservation provides the science and incentives to inform and support conservation actions of North Carolina's conservation agencies and organizations. The Conservation Planning Tool was developed to assist in building partnerships through the exchange of conservation information and opportunities, support stewardship of working farms and forests, inform conservation actions of agencies and organizations, and guide compatible land use planning. A link to the interactive map view is found here: http://www.onencnaturally.org/pages/ConservationPlanningTool.html.

Conservation planning is important on a local level to protect natural resources that provide recreational, aesthetic, and economic assets important to community growth and sustainability. The NC Wildlife Resource Commission has developed a Green Growth Toolbox: http://www.ncwildlife.org/greengrowth/, to assist municipalities to grow in nature-friendly ways. The tools provide assistance with using conservation data, green planning, green ordinances and green development and site design. Also, a guide to help local governments protect aquatic ecosystems while streamlining environmental review is available here: http://www.ncwildlife.org/planningforgrowth/swimming_with_the_current.pdf.

Land conservation, accompanied with stream restoration projects can be very successful at protecting water quality. Prevention and protection activities are known to be more cost effective than retrofits and restoration. DWQ strongly encourages conservation in this watershed. Local land trusts can help landowners explore conservation options and identify potential funding sources. For more information about land trusts in North Carolina see the Conservation Trust for North Carolina at: http://www.ctnc.org/site/PageServer. With the assistance of the Tar-River Land Conservancy and several state and federal agencies ~9,837 acres are protected within this subbasin, much of which are riparian buffers.

Local Initiatives

DWQ has authority to enforce the Clean Water Act and to develop state regulations to protect water quality. However, local governments can also regulate and promote activities that protect water quality. Several local governments provided information on local activities, ordinances, and concerns about protecting their natural resources and water quality. The following information reflects projects and practices on a local level that protect water quality:

Bunn Middle School Stream Restoration Project

This project was funded through the EPA Section 319 Program in the amount of $46,600. The primary objective of this project was to address the severe sedimentation problems that existed on the Bunn Middle School campus and negatively impacted water quality in an unnamed tributary of Crooked Creek. The project's goal was to restore degraded waters by implementing best management practices (BMPs) to directly reduce sediment delivery to the tributary. Additional benefits are anticipated as many of the implemented BMPs also prevent off-site movement of pesticides, phosphorus, nitrogen, and fecal coliform. Since implementation, stream bank stability and habitat conditions have shown improvements. This site also provides an excellent learning opportunity for students and the community about nonpoint source pollution, water quality, and conservation practices. A detailed final report is available from DWQ's 319 website: http://h2o.enr.state.nc.us/nps/2004Projects.htm.

Tar River Riparian Corridor Conservation Design Implementation

This project was funded through the EPA Section 319 Program in the amount of $702,900. Tar River Land Conservancy (TRLC) was chartered in 2000 as a regional land trust in an eight county region of the Upper Tar River Basin. Working voluntarily with private landowners to protect working farms and riparian corridors through perpetual conservation easements is critically important in the Upper Tar River Basin due to its nationally significant aquatic biodiversity. Project implementation has targeted land owners along the Upper Tar River, Fishing Creek, Sandy Creek, Swift Creek, and Stony Creek, resulting in 49 conservation easements. Five conservation easement projects are considered ongoing with the anticipation that additional acres and stream frontage will be protected through perpetual conservation easements. Conservation easements were signed protecting 3,441 acres and an additional 39.6 miles of streams are protected with permanent forested riparian buffers.

City of Rocky Mount

While the City of Rocky Mount does not have any LID or Green Growth specific ordinances, the application of the Tar-Pamlico NSW and NPDES Phase II rules necessitate that developers

and builders utilize such practices. Specifically, many developers choose to provide permanent conservation easements in order to meet nutrient reduction requirements under the Tar-Pamlico rules. Additionally, the City of Rocky Mount requires detention of the 10 year/24-hour and 25- year/24-hour storms.

In reference to stormwater controls, the City applies a holistic approach to overseeing development activities. Prior to construction, the City's Stormwater Engineer reviews Sediment and Erosion Control Plans (S&EC) and overall site plans for adherence to S&EC ordinances, as well as stormwater management requirements. During construction, inspectors monitor sites for compliance with approved S&EC plans, issue inspection reports, and, if needed, the Stormwater Engineer issues NOVs to non-complying property owners. Upon completion, the city requires as-built drawings for all stormwater BMPs and infrastructure to ensure that improvements installed are consistent with those designed. Finally, after construction is complete, the City assumes responsibility for BMPs located within residential subdivisions. For commercial BMPs, the property owners are required to submit an annual inspection report. The owners of BMPs are required to enter into an Operation and Maintenance Agreement with the City, thus ensuring long term maintenance for the BMP is provided. However, maintenance of these documents (i.e., ensuring that new agreements are entered into when property changes hands) continues to be a challenge. Post construction operation and maintenance is and will continue to be the most challenging aspect of administration of the NPDES and Tar-Pamlico rules. Continued education about implementing the NSW strategy and Phase II from DWQ is necessary.

Franklin County

The County's adopted Unified Development Ordinance states: "The purpose of flexible development is to preserve agricultural and forestry lands, natural and cultural features, and rural community character that might be lost through conventional development approaches. To accomplish this goal, greater flexibility and creativity in the design of such developments is encouraged and allowed."

Franklin County has adopted stormwater ordinances and enforces the Tar-Pamlico NSW regulations, but does not enforce erosion and sedimentation control plans. In 2008, the County contracted with NC State Watershed Education for Communities and Officials program (WECO) to initiate a stakeholder process to ascertain ways to better improve water quality within the County. The main recommendation from the stakeholder process was for the County to initiate its own erosion and sedimentation control program in accordance with current state regulations. However, due to current economic trends, funding for the implementation of a County erosion and sedimentation program has been delayed.

Franklin County does not conduct water quality sampling. The County has identified certain streams as candidates for stream restoration and is working with the Franklin County Conservation District as well as the Tar River Land Conservancy to identify areas for restoration and protection. Additionally, a watershed plan was recently completed for Cypress Creek that identified multiple sites for restoration and or protection.

Erosion and Sedimentation Control

The Sedimentation Control Commission was created to administer the Sedimentation Control Program pursuant to the **N.C. Sedimentation Pollution Control Act of 1973**. It is charged with adopting rules, setting standards, and providing guidance for implementation of the Act. The Division of Land Resources (DLR) is the primary agency responsible for managing land disturbing activities that have the potential to violate the Sedimentation Pollution Control Act. For those land disturbing activities, an Erosion and Sedimentation Control Plan must be approved by DLR prior to land disturbing activities. Due to the large number of land disturbing activities and the limited number of DLR staff available to do inspections, cities and counties have been encouraged to adopt a local erosion and sediment control ordinance in compliance with State

requirements. The Sedimentation Control Commission can then delegate the local government authority to administer the erosion and sedimentation control program within its jurisdiction. The local programs' staff then performs plan reviews and enforces compliance with plans within their jurisdictions. Within this subbasin the Cities of Henderson and Rocky Mount have local erosion and sediment control ordinances and Franklin County is considering developing a local program.

Construction Grants and Loans

The NC Construction Grants and Loans (CG&L) Section of DWQ provides grants and loans to local government agencies for construction, upgrades, and expansion of wastewater collection and treatment systems. As a financial resource, the Section administers five major programs that assist local governments. Of these, two are federally funded programs administered by the State, Clean Water State Revolving Fund (SRF) Program and the State and Tribal Assistance Grants (STAG). The STAG is a direct congressional appropriation for a specific "special needs" projects within NC. The High Unit Cost Grant Program, the State Emergency Loan (SEL) Program, and the State Revolving Loan (SRL) Program are state funded programs, with the later two being below market revolving loan money. The Section also received an additional $70,729,100 Capitalization Grant authorized by the American Recovery and Reinvestment Act of 2009. These funds are administered according to existing SRF procedures. All projects must be eligible under Title VI of the Clean Water Act. For more information please see the CG&L webpage at: **http://portal.ncdenr.org/web/wq/cgls/news**. Projects currently underway in this subbasin are listed in Table 1- 9.

Table 1-9. CG&L Projects in HUC 03020101

Location	Project Description	Date	~Amount
Youngsville	Cripple Creek sewer replacement	5/18/2009	$919,280
Oxford	Install 24" effluent outfall parallel to existing 21" effluent outfall for WWTP improvement; Expansion to 3.5 MGD from 2.17 MGD.	3/10/2005	$1,823,148
Rocky Mount	Tar River Regional Wastewater Treatment Plant digester mixing and aeration improvements	9/15/2005	$3,595,500
Rocky Mount	Headworks improvements	8/6/2004	$1,177,000
Oxford	WWTP upgrade and expansion to 3.5 MGD	12/15/2003	$7,934,580
Henderson	Upgrade to Red Bud pump station	Not yet made	$112,780
Granville County	Sewer Service to Wilton School	3/6/2002	$952,000
Louisburg	Rehab & Reuse	7/29/2002	$2,295,500
Nash County	New interceptor and collection lines	4/24/2001	$2,870,000
Franklinton	New collection lines	1/4/2000	$1,280,000

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 several investments in the Upper Tar River Subbasin. Table 1-10 includes a list of recent projects and their cost. These projects include several land acquisitions.

Table 1-10. Clean Water Management Trust Fund Projects in HUC 03020101

Application ID	Proposed Project Description	Amount Funded	County
2003D-005 Tar River Land Conservancy - Donation Minigrant, Brittain Tract/ Lynch Creek	Minigrant to pay for transactional costs for a donated easement on 39 acres along Lynch Creek.	$12,400	Franklin

Application ID	Proposed Project Description	Amount Funded	County
2004A-407 Franklin Soil & Water Conservation District - Rest./ Hog Lagoon Closeout, Sandy Creek	Fund the close out of a failing abandoned egg layer waste lagoon and eliminate its input of fecal coliform bacteria and nutrient inputs into Deer Branch and Sandy Creek. Protect 33 acres through a permanent conservation easement.	$335,000	Franklin
2004B-602 Edgecombe Water & Sewer District #5 - Septic/ Leggett Septic Tanks, Swift Creek	Reduce fecal coliform and nitrogen loading to Swift Creek by hooking up 72 septic tank systems (includes 66 failing), removing 2 school package WWTPs, and 1 school septic system. Reroute wastewater to the Rocky Mount WWTP for treatment.	$2,945,000	Edgecombe
2004D-011 Tar River Land Conservancy - Donated Minigrant, Taylor Tract	Minigrant to pay for transactional costs for a donated permanent conservation easement on 140 acres along the Tar River.	$19,675	Franklin
2005B-048 Tar River Land Conservancy - Acq/ Blackley Farm Tract, Tar River	Protect through a permanent conservation easement 266 riparian ac along the Tar River & tribs, a Nationally Significant Aquatic Habitat. Conservation easement will conform to CWMTF's Working Forest easement and be partially funded by USDA Farm & Ranchland Preservation Program.	$471,000	Granville
2005B-050 Tar River Land Conservancy - Acq/ Perry Tract, Sandy Creek	Protect through purchase of a permanent conservation easement 70 riparian ac along Sandy Creek. Landowner to donate working farm and forestry easement on upland 128 acres. Tract is within the Nationally Significant Swift Creek Aquatic Habitat.	$219,000	Franklin
2005B-051 Tar River Land Conservancy - Acq/ Thorp Tract, Fox Creek	Protect through purchase of a permanent conservation easement 75 riparian ac along Fox Creek, a State Significant Aquatic Habitat. Landowner donated conservation easement on upland 400 acres. Compliments nearby EEP projects.	$306,000	Granville
2005B-052 Tar River Land Conservancy - Acq/ Wood Farm Tract, FRPP, Sandy Creek	Protect through purchase of a permanent CWMTF Working Forest CE 314 riparian ac along Sandy Ck. CWMTF to purchase CE on 114 ac. Funding from USDA Farm & Ranch Land Protection Program and landowner donation to protect additional 200 acres.	$345,000	Franklin
2005M-009 Conservation Fund - Minigrant/ Gateway Wetland, Rock Spring	Minigrant to pay for acquisition and transactional costs associated with the fee simple purchase of a one-acre wetland in the headwaters of Rock Spring.	$18,000	Vance
2006A-008 Conservation Trust for North Carolina - Acq./ Averette Tracts 1-9, Tar River	Protect 513 ac along the Tar River through purchase of a working forest conservation easement on the riparian 201 ac (CWMTF funds) & a Farm and Ranchland Preservation Program easement on the remaining 312 ac. Protects a Nationally Significant Aquatic Habitat.	$716,000	Granville
2006A-009 Conservation Trust for North Carolina - Acq./ Averette Tracts 10&12, Tar River	Protect through purchase of a permanent conservation easement 108 ac along the Tar River & Fishing Creek. CWMTF funds to purchase CE on 21 riparian ac & landowner to donate an easement on 87 upland ac. Protects a Nationally Significant Aquatic Habitat.	$117,000	Granville
2006A-022 Nature Conservancy, The - Acq /IP Timber Tracts, Upper Tar River; 19 Tracts (Transferred to NC WRC)	Protect through fee simple purchase 9,165 acre along Shocco & Fishing Creeks. Tracts to become part of Shocco Creek Game Land. Project aids in the protection of rare aquatic species & a Nationally Significant Aquatic Habitat.	$9,136,313	Nash

Application ID	Proposed Project Description	Amount Funded	County
2006A-044 Tar River Land Conservancy- Acq./ Jones Farm, Flatrock Creek	Protect a total of 73 ac, including 16 riparian acres, along Flatrock Creek through permanent conservation easements (16 ac purchased and 57 ac donated). Tract aids protection of rare aquatic species & a Significant Aquatic Habitat.	$62,000	Franklin
2006A-803 Bunn, Town of - Plan/ WW/ Engineering Report on I&I Evaluation, Crooked Creek	Produce Preliminary Engineering Report on WWTP upgrade needs to reduce infiltration and inflow into the Town's sanitary sewer system. Complete sanitary sewer video inspection and smoke testing of the remainder of the sewer system.	$24,000	Franklin
2006B-608 Rocky Mount, City of - Septic/ Legget Park, Tar River	Design, permit & construct approx 3,960 lf of gravity sewer collection lines & pumping station to transport waste from 82 homes (with 74 failing septic systems) to the City's WWTP. Will reduce untreated wastewater discharges to Tar River by 37,500 gpd.	$512,000	Edgecombe
2006D-002 Tar River Land Conservancy- Donated Mini/ Martha Morton Tract, Tar River	Minigrant to pay for transactional costs for a donated easement on 181 acres along Fox Creek, a tributary of Shelton Creek. Fox Creek is a state significant aquatic natural area.	$25,000	Granville
2006D-003 Tar River Land Conservancy- Donated Mini/ Goodfred Tract, Tar River	Minigrant to pay for transactional costs for a donated easement on 147 acres along the Tar River.	$25,000	Edgecombe
2006D-004 Tar River Land Conservancy- Donated Mini/ Jane Morton Tract, Tar River	Minigrant to pay for transactional costs for a donated easement on 320 acres along the Tar River.	$25,000	Granville
2006D-007 Tar River Land Conservancy- Donated Mini/ Wilde Tract, Tar River	Minigrant to pay for transactional costs for a donated easement on 10.5 acres along the Tar River Reservoir.	$21,725	Nash
2006D-008 Tar River Land Conservancy- Donated Mini/ Perry,Bagwell,Powell Tracts; Tar River	Minigrant to pay for transactional costs for a donated easement on 67 acres along the Tar River.	$25,000	Granville
2006D-026 Tar River Land Conservancy- Donated Mini/ Lynch Creek Farm, Lynch Creek	Minigrant to pay for transactional costs for a donated easement on a 54-acre tract on Lynch Creek.	$20,800	Franklin
2006D-034 Tar River Land Conservancy- Donated Mini/ Jenkins Farm, Sand Creek	Minigrant to pay for transactional costs for a donated easement on a 116-acre tract on Sand Creek and tributaries.	$25,000	Granville
2006M-003 Tar River Land Conservancy- Minigrant; Daniels Tract, Big Peachtree Creek	Minigrant to pay for pre-acquisition costs associated with acquisition of a conservation easement on the 26 acre Daniels tract on Big Peach Creek	$2,575	Franklin
2006M-004 Tar River Land Conservancy- Minigrant; Foster Tract, Sandy Creek	Minigrant to pay for pre-acquisition costs associated with the future purchase of an approximately 20 acre conservation easement on the Martin Foster tract on Sandy Creek.	$3,100	Vance
2007-053 Tar River Land Conservancy - Acq/ Barnes - Goode Tract, Knaps of Reeds Creek	Protect through conservation easements 105 acres along Knap of Reeds Cr. The property borders Butner Military Training Camp.	$263,000	Granville
2007-054 Tar River Land Conservancy - Acq/ Daniels Farm Tract, Big Peachtree Creek	Protect through conservation easement 49 acres, including 26 riparian acres along Big Peachtree Cr. The project would protect rare aquatic species and was identified as a priority in a Riparian Corridor Plan.	$135,000	Franklin

Application ID	Proposed Project Description	Amount Funded	County
2007-512 Franklinton, Town of - WW/ I&I and Collection Rehabilitation, Cedar Creek	Design, permit and replace or rehabilitate portion of sewer system. The project will reduce I/I and overloading and overflows at pump stations with will improve water quality in Cedar Cr	$1,030,000	Franklin
2007-540 Spring Hope, Town of - WW/ Collection System Rehabilitation, Sapony Creek	Design, permit and repair 5 pump station, rehabilitate portion of sewer system, and repair the WWTP to improve performance and compliance with NPDES permit	$840,000	Nash
2007-617 Red Oak, Town of - Septic/ Red Oak Schools Septic Tank Elimination, Stony and Swift Creeks	Design and permit the construction of pump station and force main to eliminate septic systems at 2 schools and connect to Rocky Mount	$74,000	Nash
2007-810 Franklin County - Plan/ Storm/ Cypress Creek Watershed Assessment		$45,000	Franklin
2007D-010 Tar River Land Conservancy - Donated/Mini/ Knoop-Pfister Tract, Aycock Creek	Minigrant to pay for transactional costs for a donated easement on a 67-acre tract on Aycock Creek.	$25,000	Granville
2008-070 Tar River Land Conservancy - Acq/ Morton Tract, Tar River	Protect through conservation easement 106 acres, including 42 riparian acres along Tar R and unnamed tributaries. The project will protect Nationally Significant Aquatic Habitat and rare aquatic species.	$228,000	Vance
2008-071 Tar River Land Conservancy - Acq/ Whitfield Farm, Cedar Creek	Protect through conservation easement 325 acres, including 40 riparian acres along Cedar Cr. Upland acres will be protected by easement held by land trust.	$283,000	Franklin
2008-543 Youngsville, Town of - WW/ Sewer Rehabilitation, Hattles Branch	Design, permit and rehabilitate a portion of a sewer system to mitigate overflows, and improve water quality in Hattles Br.	$734,000	Franklin
2008D-001 Butner, Town of - Mini (pre-acquisition)/ Lake Holt Tract, Knap of Reeds Creek	Minigrant to pay for transactional costs for a donated easement on a 1,656 acre tract along Knapp of Reeds Cr and Lake Holt.	$25,000	Granville

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

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 EPA 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 3 million dollars to address NPS pollution through its 319 Grant Program. Thirty percent of the funding supports ongoing state nonpoint source programs. The remaining 70% is made available through a competitive grant process. Table 1-11 list the most current 319 contracts in this Subbasin, more information can be found about these contracts and the 319 Grant Program: http://portal.ncdenr.org/web/wq/ps/nps/319program.

Table 1-11. 319 Grant Contracts

Fiscal Year	Contract Number	Name	Description	Agency	Funding
2004	EW05021	Upper Tar Riparian Corridor Conservation Design	Conservation Easement & Protection Project	Tar River Land Conservancy	$702,900

Fiscal Year	Contract Number	Name	Description	Agency	Funding
2004	EW07037	Bunn Middle School Stream Restoration Project	BMP Implementation	Franklin SWCD	$46,600
2006	EW07042	Tar Pamlico Coordinator	Agricultural Staffing	DSWC	$89,182
See Local Initiatives for more information on the Bunn Middle School and Upper Tar Riparian Corridor Projects					

Recommendations

- More research is needed to understand the amount nutrients entering the Tar River and its tributaries through baseflow and how this contribution can be managed. The NSW strategy targets point and some nonpoint source nutrient contributions to surface waters; however, some nonpoint sources are not specifically addressed in the strategy. Nutrients from non-discharge spray field systems, wastewater residual applications, septic systems, animal feeding operations, dry litter poultry farms, and tiled agriculture may all be contributing to nutrient loads in surface waters via groundwater. DWQ's Aquifer Protection Planning Unit is currently compiling a few select watershed-scale estimates of total nutrient loads from permitted land application facilities which will help determine the potential nutrient loading magnitude.

- Identify sources of organic nitrogen that could be contributing to the increase in basinwide TKN concentrations. Basinwide, the ammonia component of TKN shows a decrease in concentration since 1991; however, in this subbasin ammonia concentrations have remained fairly constant. Also TKN has steadily risen since 1997, indicating an increase in organic nitrogen.

- Total phosphorus concentrations have increased over an 11 year time period, this may be related to an increase in development, soil erosion, and general increase in population. The Tar-Pamlico NSW strategy requires no increase in phosphorus loads from the 1991 conditions. To achieve this reduction, older laws should be examined to identify where new technology alternatives may be able to assist in meeting nutrient goals (e.g., G.S 143-214.4. prohibits certain cleaning agents from containing phosphorus, household dishwashing machine detergent is exempt.) Several states have recently **banned phosphorous** in dishwasher detergent and lawn fertilizers.

- Explore development of a more comprehensive basinwide stormwater management to prevent uncontrolled development in areas currently exempt from stormwater regulations and to protect watersheds with threatened and endangered species.

- Continue to work with advising agencies on developing a site-specific management plan, a statewide mussel protection plan or ORW/HQW protection for the threatened and endangerd mussel species in this subbasin.

References

American Farmland Trust. Farming on the Edge: North Carolina State Map. http://www.farmland.org/resources/fote/states/map_northcarolina.asp.

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