

Chapter 1

Chowan River Subbasin 03-01-01

Including: Chowan River (Upper), Wiccacon River, Ahoskie Creek and Bennetts Creek (Merchants Millpond)

1.1 Subbasin Overview

Subbasin 03-01-01 at a Glance

Land and Water Area

Total area:	579 mi ²
Land area:	569 mi ²
Water area:	10 mi ²

Land Cover (percent)

Forest/Wetland:	73%
Cultivated Crop:	24%
Surface Water:	2%
Urban:	<1%
Pasture/ Managed Herbaceous:	1%

Counties

Bertie, Gates and Hertford

Municipalities

Ahoskie, Aulander, Cofield,
Como, Gatesville and Winton

Monitored Waterbody Statistics

Aquatic Life:

Total:	137.7 mi
Total Supporting:	70.6 mi
Total Not Rated:	44.6 mi
Total Impaired:	22.5 mi

Recreation:

Total:	39.8 mi
Total Supporting:	39.8 mi

The upper Chowan River subbasin is located in the Middle Atlantic Coastal Plains ecoregion of North Carolina. The Chowan River is formed at the border of Virginia and North Carolina by the confluence of the Nottoway and Blackwater Rivers. It then flows southeastward toward Albemarle Sound. The Chowan River basin includes 1,315 square miles in North Carolina, but the largest part of the drainage basin (3,575 mi²) drains from Virginia. Major tributaries to the Chowan River in this subbasin include the Wiccacon River and Ahoskie Creek. A map of this subbasin including water quality sampling locations is presented as Figure 3.

Portions of Merchants Millpond State Park and Chowan Swamp State Natural Area are also located in this subbasin. The Chowan Swamp State Natural Area, administered by the Division of Parks and Recreation, protects more than 6,000 acres. Merchants Millpond supports a diverse assemblage of aquatic plants including several rare species.

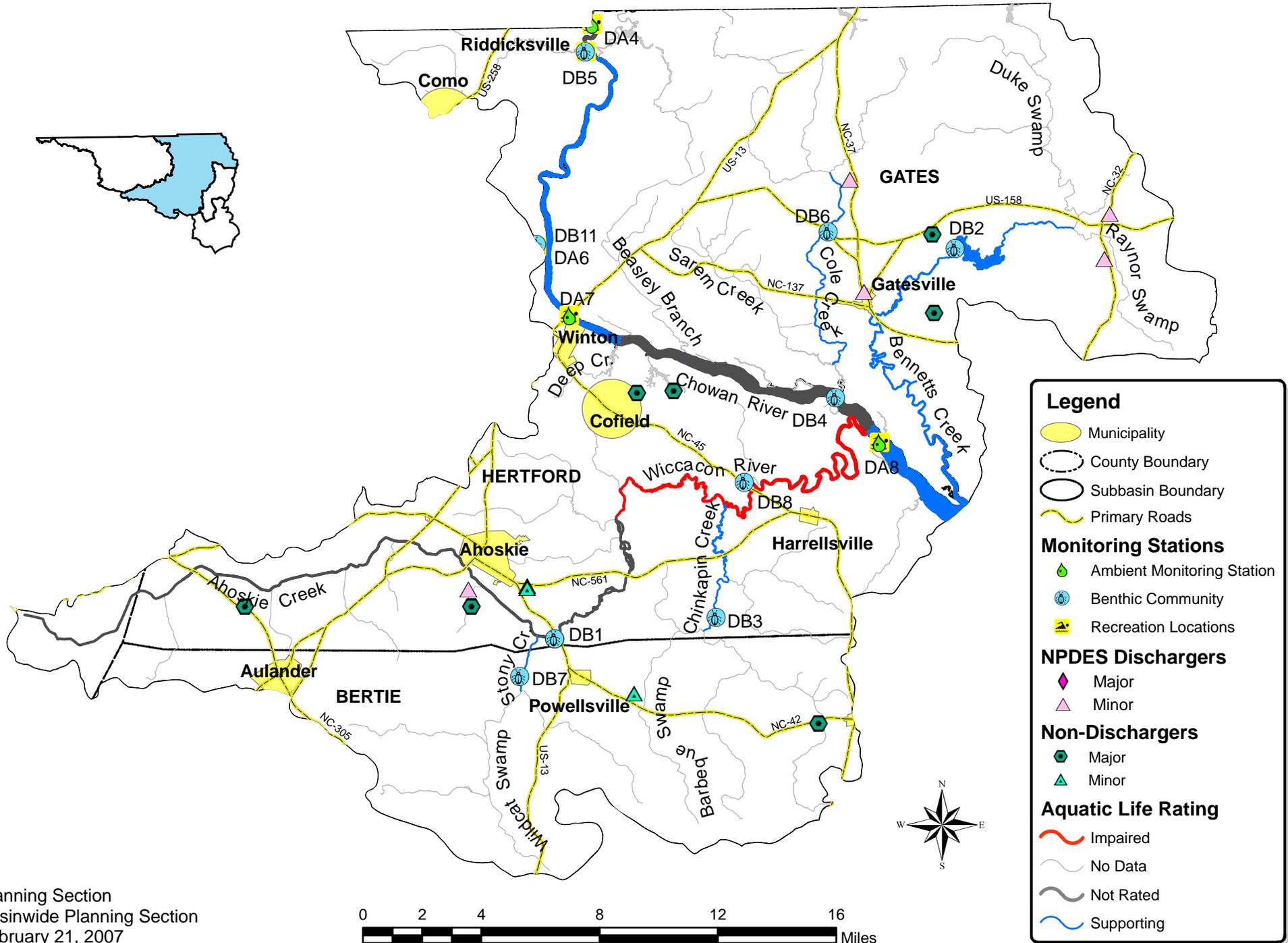
The largest municipalities in this subbasin include Ahoskie, Aulander, and Winton. Based on 2000 census data, Winton's population grew 20 percent since 1990, but the other municipalities' populations declined. Refer to Chapter 8 for more information about population growth and trends.

There are five minor National Pollutant Discharge Elimination System (NPDES) wastewater discharge permits in this subbasin with a total permitted flow of 0.04 MGD. The largest facility is Aluminum Casting Technology in Hertford County. Aluminum Casting Technology, permitted to discharge 0.024 MGD of industrial process and commercial waste into Ahoskie Creek (Section 1.4.3), has discontinued its operation and will likely apply to rescind its

NPDES permit. There are ten non-discharge permits and nine stormwater permits in this subbasin. Refer to Appendix III for the listing of NPDES permit holders.

A map including the locations of the NPDES facilities and water quality monitoring stations is presented in Figure 3. Table 3 contains a summary of monitored waterbodies with their associated assessment unit numbers (AU#) and lengths, monitoring data types, locations and results, along with use support ratings.

Figure 3 Chowan River Subbasin 03-01-01



Legend

- Municipality
- County Boundary
- Subbasin Boundary
- Primary Roads

Monitoring Stations

- Ambient Monitoring Station
- Benthic Community
- Recreation Locations

NPDES Dischargers

- Major
- Minor

Non-Dischargers

- Major
- Minor

Aquatic Life Rating

- Impaired
- No Data
- Not Rated
- Supporting

Table 3 CHO

Subbasin 03-01-01

AU Number	Classification	Length/Area		Aquatic Life Assessment				Recreation Assessment			
				AL Rating	Station	Result	Year/ Parameter % Exc	REC Rating	Station	Result	Stressors
Description											
Ahoskie Creek (Ahoskie Swamp, Bear Swamp)											
25-14-1	C;NSW	33.3	FW Miles	NR							
From source to Wiccacon River					DB1	NR	2005			Nutrient Impacts	WWTP NPDES
					DB1	NR	2005			Habitat Degradation	Agriculture
Bennetts Creek (Merchants Millpond)											
25-17	C;NSW	23.3	FW Miles	S							
From source to Chowan River					DB2	M	2005				
Chinkapin Creek (Cessons Millpond)											
25-14-3	C;NSW	7.1	FW Miles	S							
From source to Wiccacon River					DB3	N	2005				
CHOWAN RIVER											
25a1	B;NSW	1.8	FW Miles	NR+	DA1	NCE		S	DA1	NCE	Low Dissolved Oxygen Unknown
					DA2	NCE			DA2	NCE	
					DA3	CE	Low DO 15.1		DA3	NCE	
					DA4	NCE	Low DO 9.3		DA4	NCE	
From North Carolina-Virginia State Line to near Riddicksville					DB5	G	2005				
25a2a	B;NSW	24.4	FW Miles	S	DA7	NCE		S	DA7	NCE	
From near Riddicksville to Deep Creek											
25a2b	B;NSW	9.5	FW Miles	NR+				S			
From Deep Creek to Wiccacon River					DB4	F	2005				
25a2c	B;NSW	4.1	FW Miles	S	DA8	NCE		S	DA8	NCE	
From Wiccacon River to the subbasin 03-01-01/03-01-03 boundary											

Table 3 CHO

Subbasin 03-01-01

AU Number	Classification	Length/Area	Aquatic Life Assessment				Recreation Assessment					
			AL Rating	Station	Result	Year/ Parameter % Exc	REC Rating	Station	Result	Stressors	Sources	
Cole Creek (Lilleys Millpond)												
25-12-7	C;NSW	9.5 FW Miles	S					NR			Nutrient Impacts	Agriculture
	From source to Sarem Creek			DB6	M	2005					Low Dissolved Oxygen	Agriculture
											Total Suspended Solids	WWTP NPDES
											Fecal Coliform Bacteria	WWTP NPDES
Stony Creek												
25-14-1-6	C;NSW	2.2 FW Miles	S									
	From source to Ahoskie Creek			DB7	M	2005						
Wiccacon River (Hoggard Swamp)												
25-14	C;NSW	22.5 FW Miles	I								Habitat Degradation	Unknown
	From source to Chowan River			DB8	F	2005					Nutrient Impacts	Agriculture
											Low Dissolved Oxygen	Unknown

Table 3 CHO

Subbasin 03-01-01

AU Number	Classification	Length/Area	Aquatic Life Assessment				Recreation Assessment			
			AL Rating	Station	Result	Year/ Parameter % Exc	REC Rating	Station	Result	Stressors
Description										
Use Categories:		Monitoring data type:		Results:		Use Support Ratings 2005:				
AL - Aquatic Life		DF - Fish Community Survey		E - Excellent		S - Supporting, I - Impaired				
REC - Recreation		DB - Benthic Community Survey		G - Good		NR - Not Rated				
		DA - Ambient Monitoring Site		GF - Good-Fair		NR*- Not Rated for Recreation (screening criteria exceeded)				
		DL- Lake Monitoring		F - Fair		ND-No Data Collected to make assessment				
				P - Poor		NR+-Not Rated because draft criteria used for rating				
				NI - Not Impaired						
Miles/Acres		m- Monitored		N- Natural		Results				
FW- Fresh Water		e- Evaluated		M- Moderate		CE-Criteria Exceeded > 10% and more than 10 samples				
				S- Severe		NCE-No Criteria Exceeded				
						ID- Insufficeint Data Available				

Aquatic Life Rating Summary

S m 70.6 FW Miles
 NR m 11.3 FW Miles
 NR m 33.3 FW Miles
 I m 22.5 FW Miles
 278.5 FW Miles

Recreation Rating Summary

S m 39.8 FW Miles
 NR e 9.5 FW Miles
 367.0 FW Miles

Fish Consumption Rating Summary

I e 416.3 FW Miles

There were eight benthic macroinvertebrate samples collected during this assessment period. Six of the sites sampled in 2005 were also sampled in 2000. Overall, conditions in the subbasin appear similar to the samples collected in 2000; however, four sites showed a decrease in biotic index. Sites sampled indicated better water quality in the upper Chowan River than in the Wiccacon River or the middle reaches of the Chowan River near Gatesville. The benthic sample collected in the Wiccacon River indicated problems associated with nutrient enrichment and low dissolved oxygen.

All of the basinwide swamp streams in this subbasin were sampled at least twice. Three of the four streams sampled during the winter period rated Moderate in 2005. No swamp water quality trends were identified. Data were also collected from four ambient monitoring stations. Refer to the *2006 Chowan River Basinwide Assessment Report* (<http://www.ncwaterquality.org/esb/Basinwide/ChowanBASINWIDEFinal.pdf>) and Appendix I for more information on monitoring.

All waters in this subbasin receive the supplemental classification of Nutrient Sensitive Waters (NSW) in addition to the primary classification of Class C or Class B. See Chapter 5 for more information on water classifications.

Waters in the following sections and in Table 3 are identified by an assessment unit number (AU#). This number is used to track defined segments in the water quality assessment database, list 303(d) Impaired waters, and to identify waters throughout the basin plan. The AU# is a subset of the DWQ index number (classification identification number). A letter attached to the end of the AU# indicates that the assessment is smaller than the DWQ index segment. No letter indicates that the AU# and the DWQ index segment are the same.

1.2 Use Support Assessment Summary

All surface waters in the state are assigned a classification appropriate to the best-intended use of that water. Waters are regularly assessed by DWQ to determine how well they are meeting their best-intended use. Refer to Table 4 for a summary of use support for waters in subbasin 03-01-01.

In this subbasin, use support was assigned for aquatic life, recreation, and fish consumption categories. Waters are Supporting, Impaired, Not Rated, and No Data in the aquatic life and recreation categories on a monitored or evaluated basis. Waters are Impaired in the fish consumption category on an evaluated basis based on fish consumption advice issued by the Department of Health and Human Services (DHHS).

For more information about use support determinations, refer to Appendix II or the *Supplemental Guide to North Carolina's Basinwide Planning: Support Document for Basinwide Water Quality Plans* found at DWQ's website:

Table 4 Summary of Use Support Ratings by Category in Subbasin 03-01-01

Use Support Rating	Aquatic Life	Recreation
Monitored Waters		
Supporting	70.6 mi	39.8 mi
Impaired*	22.5 mi (16.3%)	0
Not Rated	44.6 mi	0
Total	137.7 mi	39.8 mi
Unmonitored Waters		
Not Rated	0	9.5 mi
No Data	278.5 mi	376.0 mi
Total	278.5 mi	376.5 mi
All Waters	416.2 mi	416.3 mi
* The noted percent Impaired is the percent of monitored mile/acres only.		
** Total Monitored + Total Unmonitored = Total All Waters.		

<http://www.newaterquality.org/basinwide/SupplementalGuide.htm>. Appendix V provides definitions of the terms used throughout this basin plan.

1.3 Status and Recommendations of Previously and Newly Impaired Waters

The following waters were either identified as Impaired in the previous basin plan (2002) or are newly Impaired based on recent data. If previously identified as Impaired, the water will either remain on the state's 303(d) list or will be delisted based on recent data showing water quality improvements. If the water is newly Impaired, it will likely be placed on the 2008 303(d) list. The current status and recommendations for addressing these waters are presented below, and each is identified by an AU#. Information regarding 303(d) listing and reporting methodology is presented in Chapter 11.

1.3.1 Chowan River [AU# 25a1, a2a, a2b, a2c]

2002 Status

The Chowan River was listed on the 2002 and 2004 303(d) list of impaired waters for low dissolved oxygen (DO). Potential sources included agriculture and intensive animal feeding operations. Through the Albemarle-Pamlico National Estuary Program, North Carolina signed a Memorandum of Agreement (MOA) with the Virginia Department of Conservation and Recreation to reduce nutrient levels crossing the state line and facilitate discussions to protect and restore water quality along the coastal rivers and sounds. It was recommended that DWQ continue to participate in the MOA and include the upper Chowan River in a swamp water study plan to determine natural DO and pH levels in the river.

Current Status

The upper Chowan River [AU# 25a1], from the Virginia-North Carolina state line to near Riddicksville (1.8 miles), is Not Rated⁺ in the aquatic life category. Site DB5 was sampled using draft criteria for Coastal B Rivers. Coastal B rivers are defined as waters in the coastal plain that are deep (nonwadeable), freshwater systems with little or no visible current under normal or low flow conditions. Other characteristics may include an open canopy, low pH and low DO. Boat sampling is required for these waters. Site DB5 received a Good benthic bioclassification based on draft criteria for Coastal B rivers. Any bioclassification derived from sampling data should be considered draft and not used for use support decisions; therefore the upper Chowan River is Not Rated (BAU, July 2006).

The four ambient monitoring stations in this subbasin are located in the upper Chowan watershed. Three of these ambient stations are located in Virginia. The fourth is located near Riddicksville, near the benthic sampling site. The sampling locations are approximately one mile downstream of the confluence of the Blackwater and Nottoway Rivers. The drainage area above the sampling point is over 2,400 square miles. The substrate of this large, slow-moving coastal river is mostly sand with some silt. Riparian vegetation appeared natural and undisturbed and the stream banks were stable. No water quality standards were exceeded at the ambient station near Riddicksville (DA4); however, the water quality standard for dissolved oxygen was exceeded near the confluence of the Nottoway and Blackwater Rivers (DA3). This exceedence is likely associated with swamp water drainage and is considered a natural condition. No water quality standards were exceeded further upstream on the Nottoway (DA1) or Blackwater (DA2) Rivers in Virginia. Heavy flooding events have been noted as a reoccurring problem on the

Virginia side of the Chowan River basin. This may be associated with the development and the loss of permeable surface.

The Chowan River [AU# 25a2b], from Deep Creek to the Wiccacon River (9.5 miles), is Not Rated⁺ in the aquatic life category. A Fair benthic bioclassification at site DB4 was given based on draft criteria for Coastal B rivers. This is a decrease of two bioclassifications from the Good rating it received in 2000. In 2000 and 2005, the benthic site was rated on draft criteria for Coastal B rivers. The Gatesville site is located approximately 15 miles downstream of the Riddicksville site, and approximately three miles upstream of where the Wiccacon River joins the Chowan. The drainage area is over 2,500 square miles. This sampling area is within one mile downstream of CF Industries and Nucor Corporation. Currently, CF Industries, a closed fertilizer plant superfund site, is being monitored and considered stable. This section of the river is very different from the Riddicksville site mostly because of the slower velocities and a notably greater depth in the channel. Benthic substrate consisted of mostly sand with some silt, and both banks were dominated by forested wetlands.

Two other segments (AU#s 25a2a and 25a2c) are Supporting due to no criteria exceeded at ambient stations DA7 and DA8.

2007 Recommendations

DWQ recommends that the upper Chowan River [AU# 25a1] be removed from the 2008 303(d) list of impaired waters for water quality standards. Ambient monitoring indicates that no criteria were exceeded beyond natural conditions. Benthic sampling also shows that the biological community has improved since the previous assessment period. Increased interaction and cooperation with Virginia Department of Conservation and Recreation is necessary to develop appropriate strategies to manage potential pollutant runoff associated with increased flooding events in the upper watershed.

1.3.2 Wiccacon River (Hoggard Swamp) [AU# 25-14]

2002 Status

The Wiccacon River was listed on the 2002 and 2004 303(d) list of impaired waters for aquatic life. Potential sources were not identified; however, the watershed consists primarily of agricultural land and many of the tributaries have been channelized throughout the years. DWQ recommended the implementation of nonpoint source best management practices (BMPs) to reduce nutrient and sediment loads.

Current Status

The Wiccacon River (Hoggard Swamp), from source to the Chowan River (22.5 miles), is Impaired in the aquatic life category due to a Fair bioclassification at site DB8. A total of eight benthic samples have been collected from the Wiccacon River since 1983, with all eight samples remaining Fair and/or Poor. Benthic species collected in 2005 suggested nutrient enrichment, degraded water quality and low dissolved oxygen. Further evidence of low dissolved oxygen in the river was the abundance of freshwater sponges growing on snags in both 2000 and 2005.

The sample site for the Wiccacon River is located near a NC Wildlife Resources Commission boat ramp off SR 1433. The drainage area (253 sq mi.) is partially channelized and ditched. The water is cloudy and has a tannic color and conditions reflect an ongoing algal bloom. Benthic substrate is dominated by silt and clay with a small amount of gravel present.

Farming activities are considered more intense here than in other areas of the basin, with predominantly poultry and hog operations. Within in the Wiccacon River watershed, there are 13 poultry operations, with eight of them having poultry litter drystack, five without drystack and one is planned for installation in 2007. There are five operating swine facilities and one facility is in the process of closure. Conservation Reserve Enhancement Program (CREP) has contracted to maintain over 851 acres in trees for at least five years within this watershed.

2007 Recommendations

This segment of the Wiccacon River will remain on the draft 2008 303(d) list of impaired waters and will be placed on a schedule for TMDL development. DWQ continues to recommend the use of nonpoint source BMPs to reduce nutrient and sediment loads. Funds should be appropriated to encourage more traditional BMPs (strip planting, no-till, cover crops) and new technologies. DWQ will work closely with other resource agencies to prioritize implementation of efforts to address agriculture impacts within this watershed.

1.4 Status and Recommendations for Waters with Noted Impacts

Based on DWQ's most recent use support methodologies, the surface waters discussed in this section are not Impaired. However, notable water quality problems and concerns were documented for these waters during this assessment. Attention and resources should be focused on these waters to prevent additional degradation and facilitate water quality improvements. DWQ will notify local agencies of these water quality concerns and work with them to conduct further assessments and to locate sources of water quality protection funding. Additionally, education on local water quality issues and voluntary actions are useful tools to prevent water quality problems and to promote restoration efforts. The current status and recommendations for addressing these waters are presented below, and each is identified by an AU#. Refer to Section 1.1 for more information about AU#. Nonpoint source program agency contacts are listed in Appendix IV.

1.4.1 Cole Creek (Lilley's Millpond) [AU# 25-12-7]

Cole Creek, from source to Sarem Creek (9.5 miles), is Supporting in the aquatic life category due to a Moderate swamp benthic bioclassification at site DB6. This is the same rating it received in 2000; however, benthic species collected during the 2005 biological sampling indicated nutrient enrichment and lower dissolved oxygen levels. Significant noncompliance issues were also identified at the permitted wastewater treatment facility for Buckland Elementary School (Gates County Schools Permit NC0043974). Levels for total suspended solids (TSS) and fecal coliform bacteria exceeded permit limits during the last two years of the assessment period.

The sampling location of Cole Creek at US 158 in 2000 was erroneously labeled as NC 58 in the prior basinwide report. This swamp stream was sampled at the same location in 2005. It is an eastern tributary of Sarem Creek, and has a braided channel that flows into a single cut (approximately five to seven meters wide) before flowing under US 158. In the past, the creek has been straightened and channelized (>2 meters deep) from this channel cut downstream. The swamp above this point appears to be in a more natural condition, averaging 0.5 to 1 meter in depth. The drainage area here is 32 square miles. The landscape and lack of flow causes this creek to appear lake-like (>20 meters wide) before exiting through an artificial cut. Thick

filamentous algae had formed on woody surfaces such as logs and tree trunks. The benthic surface was a muck of silt and clay.

2007 Recommendations

DWQ will continue to work with the County School System to improve the function and compliance of the permitted WWTP. Agriculture and forestry BMPs are encouraged to limit nutrient and sediment runoff from these predominant land use activities in Cole Creek's watershed. Residential development has increased in this watershed, creating the potential to increase water quality degradation associated with residential areas (e.g., impervious surface runoff, ineffective sewage treatment, lawn runoff). Local governments and agencies are encouraged to proactively plan and implement conservation strategies to prevent water quality degradation.

1.4.2 Ahoskie Creek [AU# 25-14-1]

Ahoskie Creek (Bear Swamp), from source to the Wiccacon River (33.3 miles), is Not Rated in the aquatic life category due to Not Rated benthic bioclassifications at site DB1. Ahoskie Creek was sampled twice in 2005 – once in February during the swamp sampling period and once in August during the summer basinwide sampling period. The stream was rated based on swamp criteria in the past (1995), but due to its transitional nature (from Coastal A to Swamp), a Not Rated bioclassification was assigned until additional data can be collected from this site. This section of Ahoskie Creek is located at NC 42 and has a drainage area of 125 square feet. The stream has deep carvings and lacks in-stream habitat such as logs, snags and leaf packs. Along one side of the channelized stream, the riparian zone showed little to no native woody vegetation. The benthic substrate was made up of sand.

2007 Recommendations

The Town of Ahoskie holds Permit No. WQ0003855 for the continued operation of a 901,000 GPD wastewater treatment and disposal system that utilizes spray irrigation for disposal purposes. The spray irrigation fields are incapable of handling the amount of wastewater that is land applied. Because the hydraulic loading rates are higher than what the fields can accept, significant runoff occurs. Recent investigations report average daily runoff to be approximately 200,000 to 300,000 GPD. Ahoskie Creek is the receiving waterbody for the runoff. Ahoskie currently operates the facility under a Special Order by Consent due to the inability to maintain permit compliance. Ahoskie has evaluated multiple alternatives or potential modifications to bring the facility into compliance. However, no simple solution has been identified. Improving inflow and infiltration will aid in eliminating non-wastewater from being processed by the WWTP. DWQ will continue to work with the town to develop appropriate long-term wastewater treatment facilities. As of July 2007, a draft permit for the Town of Ahoskie has been issued for discharge into Ahoskie Creek.

The Town of Powellsville received a Clean Water Management Trust Fund grant to construct a wastewater treatment facility that will help reduce pollutant delivery to Ahoskie Creek. The project is to eliminate 168 failing septic tanks in the town by constructing a collection system and land application waste treatment facility.

1.4.3 Stony Creek [AU# 25-14-1-6]

Stony Creek, from source to Ahoskie Creek (2.2 miles), is Supporting in the aquatic life category due to a Moderate swamp benthic bioclassification at site DB7. This is the same bioclassification it received in 2000 where no serious water quality problems were identified. As in 2000, no serious water quality problems were identified in 2005 and the biological community did not indicate nutrient enrichment or low dissolved oxygen problems. There were even a few aquatic species that are unique to the Chowan River basin.

Stony Creek is a southern tributary of Ahoskie Creek and drains an area of 39 square miles. The habitat in this stream includes extensive cypress wetlands adjacent to the stream on both banks. This watershed has active forestry operations and clear-cutting can be seen on the eastern riparian zone of this site. The benthic surface consists of about 95 percent silt and fine particles and five percent sand particles.

1.4.4 Bennetts Creek (Merchants Millpond) [AU# 25-17]

Bennetts Creek (Merchants Millpond) was not sampled during the last assessment period; however, aquatic weeds were a noted impact in the 1997 basinwide water quality plan. Bennetts Creek was sampled as part of a special study requested by the DWQ Washington Regional Office (WaRO) during this assessment period to assess biological water quality conditions.

Bennetts Creek (Merchants Millpond), from source to the Chowan River (23.3 miles) is Supporting in the aquatic life category due to a Moderate swamp benthic bioclassification at site DB2, with the lowest total taxa of any stream or river in the Chowan River basin. The benthic community represented a highly pollution tolerant community. Three permitted dischargers (Gatesville and T.S. Cooper Elementary and Sunbury Primary Schools) are located in this watershed and all have a history of noncompliance.

The sampling location of Bennett's Creek is just below the outfall of the millpond, downstream of SR 1400, and drains an area of 74 square miles. The sampling of this site was done in February 2005 (during the swamp sampling period) upstream of one discharger (Gatesville Elementary School WWTP), but downstream of the other two.

The biological community in Bennetts Creek did not contain pollution intolerant species as were found in similar streams nearby. DWQ was unable to determine to what extent the millpond itself was affecting the biological community. Impoundments such as a millpond can result in downstream reaches having lowered dissolved oxygen levels and flows, as well as increased temperatures. In winter, those affects are minimized and this sampling effort would likely not have recorded these effects. Also, the large size of the millpond relative to Bennetts Creek could act as a sink for upstream pollutants and mask the effects from the two dischargers noted above.

2007 Recommendations

Infrastructure and flow problems have been resolved with the Gatesville schools. Gates County middle and high schools have tied into the Department of Correction Prison non-discharge system (WQ0000267). Gully formation outside the facility shows signs of effluent leaking (runoff) to surface waters. Better management of sprayfield operations is needed to help meet compliance standards. DWQ recommends the facility seek additional land to expand sprayfield application and to assess and manage for the amount of flows received from the schools.

Agriculture and forestry are the predominant land use activities in this watershed and the SWCD has identified this drainage as an area of concern. Implementation of agricultural BMPs are needed to continue to protect the waters of Bennett Creek, a popular recreational area.