Chapter 15
Cape Fear River Subbasin 03-06-15
Including: Cape Fear River, Cross Creek, Little Cross Creek and Rockfish Creek

15.1 Subbasin Overview

Subbasin 03-06-15 at a Glance

Land and Water Area

Total area:	600 mi²
Land area:	595 mi²
Water area:	5 mi²

Population Statistics

2000 Est. Pop.: 206,406people
Pop. Density: 344 persons/mi²

Land Cover (percent)

Forest/Wetland:	64.2%
Surface Water:	1.6%
Urban:	9.9%
Cultivated Crop:	14.2%
Pasture/Managed Herbaceous:	10.0%

Counties

Bladen, Cumberland, Harnett, Hoke, Moore and Robeson

Municipalities

Fayetteville, Hope Mills, Raeford and Southern Pines

Subbasin 03-06-15 drains mostly the Sandhills region. Most of the watershed is forested with extensive agriculture present. Development is occurring mostly around Fayetteville and along the southern boundary of Fort Bragg. Population is expected to grow by 170,000 people in counties with portions or all of their areas in this subbasin by 2020.

There are six individual NPDES wastewater discharge permits in this subbasin with a permitted flow of 53.3 MGD (Figure 18). The largest are Cross Creek WWTP (25 MGD) and Rockfish Creek WWTP (24 MGD). Refer to Appendix VI and Chapter 30 for more information on NPDES permit holders. Issues related to compliance with NPDES permit conditions are discussed below in Section 15.3 for Impaired waters.

There are 11 registered swine operations in this subbasin.

There were 14 benthic community samples and seven fish community samples (Figure 18 and Table 18) collected during this assessment period. Data were also collected from 16 ambient monitoring stations including 9 MCFRBA (Appendix V) stations, three DWQ ambient stations and one shared station. Four reservoirs were also monitored. Refer to the *2003 Cape Fear River Basinwide Assessment Report* at http://www.esb.enr.state.nc.us/bar.html and Appendix IV for more information on monitoring.

Waters in the following sections are identified by assessment unit number (AU#). This number is used to track defined segments in the water quality assessment database, 303(d) Impaired waters list and the various tables in this basin plan. The assessment unit number 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 assessment unit and the DWQ index segment are the same.

Figure 18 Cape Fear River Subbasin 03-06-15

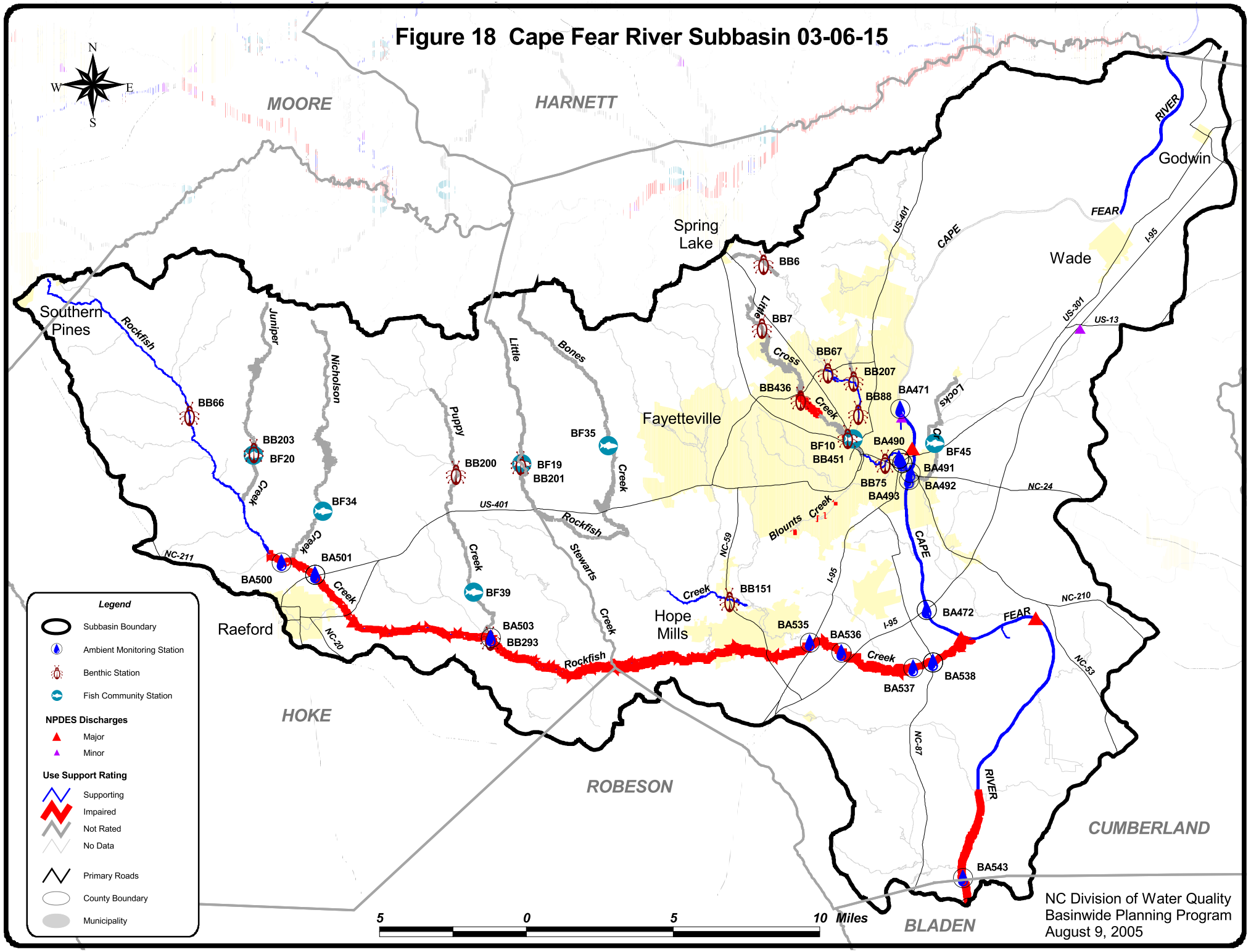

Table 18 CAPE FEAR Subbasin 03-06-15

AU Number	Classification	Length/Area	Description	Aquatic Life Assessment					Recreation Assessment			Stressors	Sources
				AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result		
Bones Creek													
18-31-24-2	C	12.0 FW Miles	From source to Little Rockfish Creek	**NR**	BF35	NR	2003		ND				
CAPE FEAR RIVER													
18-(20.7)b	WS-V	6.0 FW Miles	From Lower Little River to a point 8.2 mile upstream of Carvers Creek	**S**	BA471	NCE			**S**	BA471	NCE		
18-(26)a	C	6.4 FW Miles	From City of Fayettville water supply intake to Peares Mill Creek	**S**	BA492 BA493	NCE NCE			**S**	BA492 BA493	NCE NCE		
18-(26)b	C	13.1 FW Miles	From Peares Mill Creek to Grays Creek	**S**	BA472	NCE	Turbidity	7.9	**NR***	BA472	NCE	Turbidity Fecal Coliform Bacteria	Unknown Unknown
18-(26)c	C	4.0 FW Miles	From Grays Creek to Lock and Dam 3	**I**	BA543	CE	Chlor a	26.7	**S**	BA543	NCE	Chlorophyll a	Unknown
Cross Creek (Big Cross Creek)													
18-27-(3)a	C	0.7 FW Miles	From water supply intake at Murchison Road in Fayetteville to Hillsboro Street	**NR**	BF10	NR	2003		ND				
18-27-(3)b	C	1.4 FW Miles	From Hillsboro Street to Blounts Creek	**S**	BB75	GF	2003		ND			Habitat Degradation	MS4 NPDES
18-27-(3)c	C	1.4 FW Miles	From Blount Street to Cape Fear River	**S**	BA490 BA491	NCE NCE			**NR***	BA490 BA491	NCE NCE	Fecal Coliform Bacteria	MS4 NPDES
Cross Creek (Big Cross Creek) (Texas Pond, Smith Lake, Rose													
18-27-(1)a	WS-IV	2.0 FW Miles	From source to Honeycutt Road	**NR**	BB6	NR	1998		ND				
18-27-(1)c	WS-IV	2.7 FW Miles	From Country Club Road to a point 0.5 mile upstream of water supply intake at Murchison Road in Fayetteville	**S**	BB67 BB88	GF GF	2003 2003		ND			Habitat Degradation	MS4 NPDES

Table 18 CAPE FEAR Subbasin 03-06-15

AU Number	Classification	Length/Area	Description	Aquatic Life Assessment					Recreation Assessment			Stressors	Sources
				AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result		
Juniper Creek (MCKietham Pond)													
18-31-10	C	9.0 FW Miles		**NR**					ND				
	From source to Rockfish Creek				BB203	NR	2003						
					BF20	NR	2003						
Little Cross Creek (Bonnie Doone Lake, Kornbow Lake, Mintz p													
18-27-4-(1)a	WS-IV	1.6 FW Miles		**NR**					ND			Habitat Degradation	MS4 NPDES
	From source to Bonnie Doone Lake				BB7	NR	1998						
18-27-4-(1)b	WS-IV	22.4 FW Acres		**NR**	BL26	NCE	Low pH	100	ND			Low pH	
	Bonnie Doone Lake												
18-27-4-(1)c	WS-IV	47.1 FW Acres		**NR**	BL27	NCE	Low pH	100	ND			Low pH	
	Kornbow Lake												
18-27-4-(1)d	WS-IV	14.9 FW Acres		**NR**	BL28	NCE	Low pH	100	ND			Low pH	
	Mintz Pond												
18-27-4-(1)e	WS-IV	1.1 FW Miles		**I**					ND			Habitat Degradation	MS4 NPDES
	From Kornbow Lake to a point 0.5 mile upstream of backwaters of Glenville Lake				BB436	F	2003						
Little Cross Creek (Glenville Lake)													
18-27-4-(1.5)	WS-IV CA	25.7 FW Acres		**NR**	BL29	NCE	Low pH	50	ND			Low pH	
	From a point 0.5 mile upstream of backwaters of Glenville Lake to dam at Glenville Lake												
18-27-4-(2)	WS-IV CA	2.1 FW Miles		**I**					ND				
	From dam at Glenville Lake to Cross Creek				BB451	F	2003						
Little Rockfish Creek													
18-31-24-(4)	C	4.0 FW Miles		**S**					ND			Habitat Degradation	MS4 NPDES
	From Unnamed Tributary at Lakewood Lake to backwaters of Hope Mill Lake				BB151	G	2003						
Little Rockfish Creek (Lake William)													
18-31-24-(1)	C	12.4 FW Miles		**NR**					ND				
	From source to mouth of Bones Creek				BB201	NR	2003						
					BF19	NR	2003						

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AU Number / Description	Classification	Length/Area	Aquatic Life Assessment						Recreation Assessment				
			AL Rating	Station	Result	Year/ Parameter	% Exc		REC Rating	Station	Result	Stressors	Sources
Locks Creek													
18-28	C	5.7 FW Miles	**NR**						ND				
From source to Cape Fear River				BF45	NR	2003							
Nicholson Creek (Mott Lake)													
18-31-14	C	10.9 FW Miles	**NR**						ND				
From source to Rockfish Creek				BF34	NR	2003							
Puppy Creek													
18-31-19	C	10.5 FW Miles	**NR**						ND				
From source to Rockfish Creek				BB200	NR	2003							
				BF39	NR	2003							
Rockfish Creek													
18-31-(1)	C	14.4 FW Miles	**S**						ND				
From source to mouth of Dry Branch				BB66	G	2001							
18-31-(12)	B	3.8 FW Miles	**I**	BA500	CE	Low pH	88.5		**NR***	BA500	NCE	Low pH	Unknown
				BA501	NCE	Low DO	50			BA501	NCE		
				BA501	NCE	Low pH	100						
From mouth of Dry Branch to mouth of Pedler Branch													
18-31-(15)	C	5.9 FW Miles	**I**	BA535	CE	Low pH	40		**S**	BA535	NCE	Low pH	Unknown
From mouth of Pedler Branch to mouth of Puppy Creek													
18-31-(23)	C	18.8 FW Miles	**I**	BA535	CE	Low pH	40		**NR***	BA535	NCE	Fecal Coliform Bacteria	Unknown
				BA536	CE	Low pH	69.8			BA538	NCE	Turbidity	Unknown
				BA537	CE	Low pH	21.6					Low pH	Unknown
				BA538	CE	Low pH	50						
				BA538	NCE	Turbidity	7.1						
From dam at Old Brower Mill Pond to Cape Fear River													
Rockfish Creek [(Upchurches Pond, Old Brower Mill Pond (Number Two Lake)]													
18-31-(18)	B	25.0 FW Miles	**I**	BA503	CE	Low pH	52.1		**S**	BA503	NCE	Fecal Coliform Bacteria	Unknown
From mouth of Puppy Creek to dam at Old Brower Mill Pond Dam				BB293	G	2003						Low pH	Unknown
				BB293	G	2003							

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AU Number / Description	Classification	Length/Area	Aquatic Life Assessment					Recreation Assessment				
			AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	Stressors	Sources
Ut near Rosehill Road												
18-27-2-(2)	WS-IV	0.8 FW Miles	**NR**					ND				
From dam at Country Club Lake to Cross Creek				BB207	NR	2003						

AL - Aquatic Life	BF - Fish Community Survey	E - Excellent	S - Supporting, I - Impaired
REC - Recreation	BB - Benthic Community Survey	G - Good	NR - Not Rated
	BA - Ambient Monitoring Site	GF - Good-Fair	NR*- Not Rated for Recreation (screening criteria exceeded)
	BL- Lake Monitoring	F - Fair	ND-No Data Collected to make assessment
	S- DEH RECMON	P - Poor	**Results**
		NI - Not Impaired	CE-Criteria Exceeded > 10% and more than 10 samples
	Miles/Acres	S- Severe Stress	NCE-No Criteria Exceeded
	FW- Fresh Water	M-Moderate Stress	
	S- Salt Water	N- Natural	

Aquatic Life Rating Summary

S	m	49.4	FW Miles
NR	m	65.5	FW Miles
I	m	60.7	FW Miles
NR	m	110.1	FW Acres
ND		276.0	FW Miles
ND		160.5	FW Acres

Recreation Rating Summary

S	m	47.3	FW Miles
NR*	m	37.1	FW Miles
ND		367.2	FW Miles
ND		270.7	FW Acres

Fish Consumption Rating Summary

I	e	451.6	FW Miles
I	e	270.7	FW Acres

15.2 Use Support Assessment Summary

Use support ratings were assigned for waters in subbasin 03-06-15 in the aquatic life, recreation, fish consumption and water supply categories. All waters are Impaired on an evaluated basis in the fish consumption category because of fish consumption advice that applies to the entire basin. In the water supply category, all WS classified waters (145.1 acres and 57.4 miles) are Supporting on an evaluated basis based on reports from DEH regional water treatment plant consultants. Refer to Appendix X for a complete list of monitored waters and more information on Supporting monitored waters.

There were 175.6 stream miles (38.9 percent) and 110.1 freshwater acres (40.7 percent) monitored during this assessment period in the aquatic life category. There are 60.7 stream miles (13.4 percent) identified as Impaired in this same category.

15.3 Status and Recommendations of Previously and Newly Impaired Waters

The following waters were either identified as Impaired in the previous basin plan (2000) 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 2006 303(d) list. The current status and recommendations for addressing these waters are presented below, and each is identified by an assessment unit number (AU#). Refer to the overview for more information on AUs. Information regarding 303(d) listing and reporting methodology is presented in Appendix VII.

15.3.1 Cape Fear River [AU#18-(26)b and c]

Current Status
The Cape Fear River was Fully Supporting in the 2000 plan; however, NPDES permit limits were recommended. Refer to Chapter 30 for information on NPDES permitting. The Cape Fear River [18-(26)c] from Grays Creek to Lock and Dam 3 (4 miles) is Impaired for aquatic life because the chlorophyll *a* standard was violated in 27 percent of samples collected at site BA543. A DWQ study in 2003 noted nutrient levels behind Lock and Dam 3 were high enough to support nuisance algal blooms and nitrogen was a limiting factor. Studies by UNC and MCFRBA indicate that nutrients are not limiting due to light limitations and hydraulic mixing upstream of the lock and dam structure. Continuous monitoring at BA543 indicated that dissolved oxygen levels were below the standard during the 2001 and 2002 drought. The water behind the lock and dam structure became more reservoir like with the greatly reduced flow during the drought. Data from 2003 at this station indicated far fewer exceedances because of the return of regular to high flows during that summer.

The Cape Fear River [18-(26)b] from Peares Mill Creek to Grays Creek (13.1 miles) is Not Rated for recreation because the fecal coliform bacteria screening criteria were exceeded at site BA472.

2005 Recommendations
DWQ and MCFRBA (Appendix V) will continue to monitor the Cape Fear River. DWQ will determine if further assessment of the fecal coliform standard is warranted in segment 18-(26)b. Refer to Chapter 30 for recommendations for discharges into the Cape Fear River.

Segment 18-(26)c will be added to the 303(d) list of Impaired waters. TMDLs (Chapter 35) will be developed for identified stressors within 8-13 years of listing.

Water Quality Initiatives
In 2003, Sandhills Area Land Trust received a CWMTF minigrant of $25,000 to pay for transactional costs for purchase of 83 acres of permanent conservation easemsents at Methodist College along the Cape Fear River (Chapter 34).

15.3.2 Cross Creek [AU#18-27-(1)a, c, 18-27-(3)a, b and c]

2000 Recommendations
The 2000 basin plan recommended that Cross Creek be resampled using the 303(d) approach, and that DWQ would work with the City of Fayetteville stormwater program to improve water quality.

Current Status
Cross Creek [18-27-(1)a] from source to Honeycutt Road (2 miles) is Not Rated for aquatic life because a benthic community rating could not be assigned at site BB6. Segment 18-27-(1)b consists of Texas Lake, Smith Lake and Rose Lake, which were not monitored during the assessment period. Cross Creek [18-27-(1)c] from Country Club Road to Murchinson Road (2.7 miles) is Supporting aquatic life because of Good-Fair benthic community ratings at sites BB67 and BB88.

Cross Creek [18-27-(3)a] from Murchinson Road to Hillsboro Street (0.7 miles) is Not Rated for aquatic life because a fish community rating could not be assigned at site BF10. Habitat conditions were poor at this mostly urbanized site, and there were indications of nutrient enrichment.

Cross Creek [18-27-(3)b] from Hillsboro Road to Blounts Street (1.4 miles) is Supporting aquatic life because of a Good-Fair benthic community rating at site BB75. The site has been Fair in the past, and 2003 monitoring indicated no real change in water quality. Habitat conditions in the creek are poor.

Cross Creek [18-27-(3)c] from Blounts Creek to the Cape Fear River (1.4 miles) is Supporting aquatic life because no criteria were exceeded at sites BA490 and BA491. This segment is not rated for recreation because the fecal coliform bacteria screening criteria were exceeded at sites BA490 and BA491.

A stressor study, completed in 2003, indicated that altered hydrology and sedimentation are the likely stressors to the benthic community in Cross Creek.

2005 Recommendations
DWQ will continue to monitor the Cross Creek watershed. DWQ will determine if further assessment of the fecal coliform standard is warranted in segment 18-27-(3)c. DWQ will work with the City of Fayetteville stormwater program to look for opportunities to improve water quality in Cross Creek.

Water Quality Initiatives
In 1998, Cape Fear Botanical Garden received a $77,000 CWMTF (Chapter 34) grant to stabilize and restore a streambank on Cross Creek just above the confluence with the Cape Fear River. Fayetteville Pubic Works Commission (PWC) identified one illicit discharge using photography of the Cross Creek watershed. In 2005, PWC completed an extensive fecal coliform bacteria study in the watershed and has identified a tributary with regular excursions of the fecal coliform bacteria standard. PWC is continuing to find and eliminate potential sources of fecal coliform bacteria in the Cross Creek watershed. The NCEEP completed 2,400 linear feet of stream restoration in this watershed (Chapter 34).

15.3.3 Little Cross Creek [AU#18-27-4-(1)a through e (1.5) and (2)]

2000 Recommendations
The 2000 basin plan recommended that Cross Creek be resampled using the 303(d) approach, and that DWQ would work with the City of Fayetteville stormwater program to improve water quality. This rating did not intend to include ratings for the impoundments on Little Cross (see 15.4 below).

Current Status
Little Cross Creek [18-27-4-(1)a] from source to Bonnie Doone Lake (1.6 miles) is Not Rated for aquatic life because a benthic community rating could not be assigned at site BB7 because of the small size of the stream.

Bonnie Doone Lake [18-27-4-(1)b] (22.4 acres), Kornbow Lake [18-27-4-(1)c] (47.1 acres), Mintz Pond [18-27-4-(1)d] (14.9 acres), and Glenville Lake [18-27-4-(1.5)] (25.7 acres) are Not Rated for aquatic life (See 15.4 below for more information).

Little Cross Creek [18-27-4-(1)e] from Kornbow Lake to backwaters of Glenville Lake (1.1 miles) is Impaired for aquatic life because of a Fair benthic community rating at site BB436.

Little Cross Creek [18-27-4-(2)] from Glenville Lake to Cross Creek (2.1 miles) is Impaired for aquatic life because of a Fair benthic community rating at site BB451. The benthic community is dominated by tolerant species and the stream bottom was hardpan clay. A few riffles were formed by urban debris, and the stream is channelized and has little riparian buffer.

A stressor study completed in 2003 indicated that altered hydrology causing bank erosion and sedimentation are likely stressors to the benthic community in Little Cross Creek. A stressor survey in 2003 also noted tannin stained waters, trash and urban debris, and elevated ammonia levels and periphyton growths.

2005 Recommendations
DWQ will continue to monitor the Little Cross Creek watershed. Because the impoundments on Little Cross Creek are treated separately, it is recommended that 18-27-4-(1)b, c, d and (1.5) be removed from the 303(d) list. Segments 18-27-4-(1)a, e and (2) will remain on the 303(d) list. Further recommendations to protect streams in urbanizing areas and to restore streams in existing urban areas are discussed in Chapter 31.

Water Quality Initiatives
In 1998, Fayetteville received a $63,000 CWMTF grant to conduct a nutrient, sediment and bacteria susceptibility study in this watershed. Fayetteville and PWC have undertaken efforts to restore water quality in the Little Cross Creek watershed. The study has identified 98 projects to reduce sediment loading and have prioritized 35 of the projects. In 2002, Fayetteville received a $766,000 CWMTF grant to design five stormwater structures and to acquire 21 acres for one of the ponds (Chapter 34).

15.3.4 Rockfish Creek [AU#18-31-(12), (15), (18) and (23)]

Current Status
Little Rockfish Creek was Fully Supporting in the 2000 plan; however, Rockfish Creek [18-31-(12)] from Dry Branch to Pedlar Branch (3.8 miles) is currently Impaired for aquatic life because pH was below standard in 89 percent of samples collected at site BA500 and 100 percent of samples at BA501, although a Good benthic community rating was found at site BB66 upstream of this segment.

Rockfish Creek [18-31-(15)] from Pedlar Branch to Puppy Creek (5.9 miles) is Impaired for aquatic life because pH was below the standard in 40 percent of samples collected at site BA535. Raeford WWTP (NC0026514) had significant violations of biological oxygen demand permit limits and had three whole effluent toxicity test failures during the last two years of the assessment period.

Rockfish Creek [18-31-(18) and (23)] from Puppy Creek to the Cape Fear River (43.8 miles) is Impaired for aquatic life because pH was below the standard in 40, 70, 22, 50 and 52 percent of samples collected at sites BA535, BA536, BA537, BA538 and BA503. However, a Good benthic community rating was found at site BB293 in segment 18-31-(18). Turbidity also exceeded the standard in 7 percent of samples at site BA538 in segment 18-31-(23). This segment is Not Rated for recreation because the fecal coliform bacteria screening criteria were exceeded at site BA538.

DWQ performed a statistical trend analysis at site BA503 using total nitrogen, total phosphorus and total suspended solids data collected from 1990 to 2004. There were no significant trends in any of the parameters analyzed in Rockfish Creek.

2005 Recommendations
DWQ will continue to monitor the Rockfish Creek watershed to determine if low pH levels are related to drought conditions or from other sources. DWQ will determine if further assessment of the fecal coliform standard is warranted in segment 18-31-(23). The NPDES compliance process will be used to address the significant permit violations noted above.

All four segments will be added to the 303(d) list of Impaired waters. TMDLs (Chapter 35) will be developed for identified stressors within 8-13 years of listing.

15.4 Status and Recommendations for Waters with Noted Impacts

The surface waters discussed in this section are not Impaired. However, notable water quality problems and concerns have been documented for some waters based on this assessment. While these waters are not Impaired, attention and resources should be focused on these waters to prevent additional degradation or facilitate water quality improvement. Waters in the following section are identified by assessment unit number (AU#). See overview for more information on AU#s.

15.4.1 Bonnie Doone Lake [AU#18-27-4-(1)b], Glenville Lake [AU#18-27-4-(2)], Kornbow Lake [AU#18-27-4-(1)c] and Mintz Pond [AU#18-27-4-(1)d]

Current Status and 2005 Recommendations
Bonnie Doone Lake (22.4 acres), Glenville Lake (25.7 acres), Kornbow Lake (47.1 acres) and Mintz Pond (14.9 acres) are Not Rated for aquatic life because pH was below the standard in 100 percent of lake monitoring samples collected in 2003. However, not enough samples were collected to assign a use support rating. The pH levels may be due to natural conditions. The impoundments are in the heavily urbanized and Impaired Little Cross Creek watershed. Glenville Lake is filling in with sediment, and riparian buffers have been removed at the head of the impoundment. Fayetteville PWC has an intensive monitoring program for these lakes. Fayetteville should continue efforts to protect the lakes from further degradation associated with urban runoff. Further recommendations to protect streams in urbanizing areas and to restore streams in existing urban areas are discussed in Chapter 31. DWQ will determine if increased monitoring efforts in these lakes are warranted to better assess water quality.

Water Quality Initiatives
In 1997, Fayetteville received a $502,000 CWMTF (Chapter 34) grant to acquire 122 acres in this watershed. In 1998, Fayetteville also received a $63,000 CWMTF grant to conduct a nutrient, sediment and bacteria susceptibility study in this watershed.

15.4.2 Pedler Branch [AU# 18-31-16]

Current Status and 2005 Recommendations
Pedler Branch from source to Rockfish Creek (2.8 miles) was not assessed for aquatic life during this assessment period. Pedler Branch drains the Town of Raeford and is impacted by urban stormwater runoff.

Water Quality Initiatives
In 2000, Raeford received a $194,000 CWMTF (Chapter 34) grant to acquire 40 acres along Pedler Branch. The grant included design of a stormwater wetland and pond to treat 55 percent of runoff from Raeford. In 2002, Raeford received a $296,000 CWMTF grant to construct a stormwater wetland to treat 50 percent of Raeford's runoff (964 acres).

15.4.3 Puppy Creek [AU# 18-31-19]

Current Status and 2005 Recommendations
Puppy Creek from source to Rockfish Creek (10.5 miles) is Not Rated for aquatic life. Benthic and fish community ratings could not be assigned at sites BB200 or BF39, although there are indications of water quality problems. This stream is mostly within Fort Bragg and DWQ recommends that Fort Bragg implement measures to reduce impacts to Puppy Creek.

15.5 Additional Water Quality Issues within Subbasin 03-06-06

The following section discusses issues that may threaten water quality in the subbasin that are not specific to particular streams, lakes or reservoirs. The issues discussed may be related to waters near certain land use activities or within proximity to different pollution sources.

15.5.1 Fort Bragg BMP Implementation

Fort Bragg has worked with Hoke and Cumberland SWCDs and NRCS in planning and implementing BMPs on the base to take care of erosion problems that may have been negatively impacting water quality in the Cross Creek, Rockfish Creek and Lower Little River watersheds.