Chapter 23
Cape Fear River Subbasin 03-06-23

Including: Northeast Cape Fear River, Burnt Mill Creek, Smith Creek and Burgaw Creek

23.1 Subbasin Overview

Subbasin 03-06-23 at a Glance

Land and Water Area

Total area:	795 mi²
Land area:	789 mi²
Water area:	6 mi²

Population Statistics

2000 Est. Pop.: 117,200 people
Pop. Density: 148 persons/mi²

Land Cover (percent)

Forest/Wetland:	82.5%
Surface Water:	0.9%
Urban:	2.1%
Cultivated Crop:	11.2%
Pasture/ Managed Herbaceous:	3.2%

Counties

Duplin, New Hanover, Onslow and Pender

Municipalities

Burgaw, Holly Ridge, Saint Helena, Watha and Wilmington

Subbasin 03-06-23 is in the coastal plain where many streams stop flowing during summer months. Most of the watershed is forested with some agriculture present and increasing development. Development is occurring north around Wilmington. Population is expected to grow by 140,000 people in counties with portions or all of their areas in this subbasin by 2020.

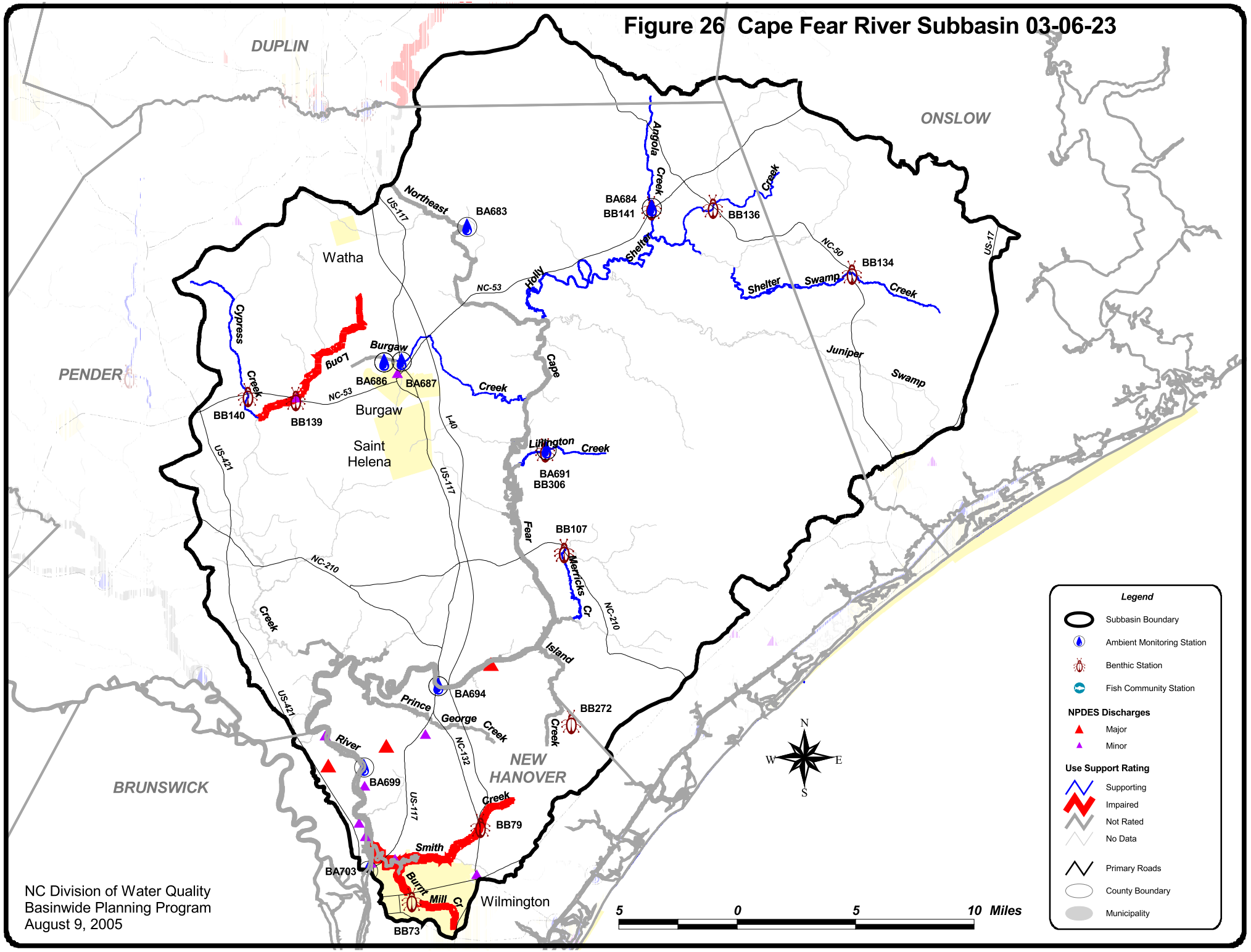
There are seven individual NPDES wastewater discharge permits in this subbasin with a permitted flow of 3.8 MGD (Figure 26). The largest are Global Nuclear Fuels (1.9 MGD) and Elementis Chromium (1 MGD). Refer to Appendix VI and Chapter 30 for more information on NPDES permit holders. Issues related to compliance with NPDES permit conditions are discussed below in Section 23.3 for Impaired waters.

There is one registered horse and 52 registered swine operations in this subbasin.

There were ten benthic community samples (Figure 26 and Table 26) collected during this assessment period. Data were also collected from eight ambient monitoring stations including two LCFRP (Appendix V) stations and two DWQ ambient station and four shared stations. Two 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 26 Cape Fear River Subbasin 03-06-23



NC Division of Water Quality
Basinwide Planning Program
August 9, 2005

Table 26 CAPE FEAR Subbasin 03-06-23

AU Number / Description	Classification	Length/Area	Aquatic Life Assessment						Recreation Assessment			Stressors	Sources
			AL Rating	Station	Result	Year/ Parameter	% Exc		REC Rating	Station	Result		
Angola Creek													
18-74-33-3	C Sw	6.5 FW Miles	**S**	BA684	NCE	Low DO	44.1		**S**	BA684	NCE	Low Dissolved Oxygen	Unknown
From source to Holly Shelter Creek				BB141	G	2003							
Burgaw Creek													
18-74-39a	C Sw	2.1 FW Miles	**NR**	BA686	NCE	Chlor a	15.2		**NR***	BA686	NCE	Fecal Coliform Bacteria	Impervious Surfac
				BA686	NCE	Low DO	31.7					Chlorophyll a	Agriculture
From source to Osgood Branch												Chlorophyll a	Impervious Surfac
												Chlorophyll a	WWTP NPDES
18-74-39b	C Sw	9.5 FW Miles	**S**	BA687	NCE				**NR***	BA687	NCE	Fecal Coliform Bacteria	Unknown
From Osgood Branch to Northeast Cape Fear River													
Burnt Mill Creek													
18-74-63-2	C Sw	4.6 FW Miles	**I**						ND			Toxic Impacts	MS4 NPDES
From source to Smith Creek				BB73	P	2001						Habitat Degradation	MS4 NPDES
Cypress Creek													
18-74-55-2	C Sw	8.3 FW Miles	**S**						ND				
From source to Long Creek				BB140	M	2003							
Holly Shelter Creek													
18-74-33	C Sw	25.9 FW Miles	**S**						ND				
From source to Northeast Cape Fear River				BB136	M	2003							
Island Creek													
18-74-50	C Sw	6.7 FW Miles	**NR**						ND				
From source to Northeast Cape Fear River				BB272	NR	2003							
Lillington Creek													
18-74-42	C Sw	5.0 FW Miles	**S**	BA691	NCE	Low DO	16.7		**S**	BA691	NCE		
				BA691	NCE	Low pH	61.5						
From source to Northeast Cape Fear River				BB306	N	2003							

Table 26 CAPE FEAR Subbasin 03-06-23

AU Number / Description	Classification	Length/Area	Aquatic Life Assessment: AL Rating	Station	Result	Year/ Parameter	% Exc	Recreation Assessment: REC Rating	Station	Result	Stressors	Sources
Long Creek												
18-74-55a	C Sw	7.7 FW Miles	I					ND			Habitat Degradation	Unknown
From source to Cypress Creek				BB139	S	2003						
18-74-55b	C Sw	21.5 FW Miles	ND					ND				
From Cypress Creek to Northeast Cape Fear River												
Merricks Creek												
18-74-49-2	C Sw	5.3 FW Miles	S					ND				
From source to Harrisons Creek				BB107	N	2003						
				BB107	N	1999						
Northeast Cape Fear River												
18-74-(47.5)	B Sw	15.6 FW Miles	NR	BA694	NCE	Low DO	23.3	S	BA694	NCE	Low Dissolved Oxygen	Unknown
From NC Hwy 210 to Princes George Creek												
18-74-(52.5)	C Sw	12.4 FW Miles	NR	BA699	NCE	Low DO	10.4	S	BA699	NCE	Total Suspended Solids	WWTP NPDES
From Prince George Creek to mouth of Ness Creek											Low Dissolved Oxygen	WWTP NPDES
18-74-(61)	SC Sw	1.0 S acres	NR	BA703	NCE	Low DO	39.3	S	BA703	NCE	Low Dissolved Oxygen	Unknown
From mouth of Ness Creek to Cape Fear River												
Shelter Swamp Creek												
18-74-33-2-2	C Sw	13.3 FW Miles	S					ND				
From source to Sandy Run Swamp				BB134	N	1999						
Smith Creek												
18-74-63	C Sw	11.1 FW Miles	I					ND			Low Dissolved Oxygen	WWTP NPDES
From source to Northeast Cape Fear River				BB79	S	2003						

Table 26 CAPE FEAR Subbasin 03-06-23

AU Number / Description	Classification	Length/Area	Aquatic Life Assessment					Recreation Assessment				
			AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	Stressors	Sources

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

NR	m	1.0	S acres
S	m	73.8	FW Miles
NR	m	36.8	FW Miles
I	m	23.4	FW Miles
NR	e	8.3	FW Miles
ND		233.2	FW Miles

Recreation Rating Summary

S	m	1.0	S acres
S	m	39.5	FW Miles
NR*	m	11.6	FW Miles
ND		324.5	FW Miles

Fish Consumption Rating Summary

I	m	37.1	FW Miles
I	e	1.0	S acres
I	e	338.4	FW Miles

23.2 Use Support Assessment Summary

Use support ratings were assigned for waters in subbasin 03-06-23 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 waters 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 134 stream miles (35.7 percent) monitored during this assessment period in the aquatic life category. There are 23.4 stream miles (6.2 percent) identified as Impaired in this same category.

23.3 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.

23.3.1 Burgaw Creek [AU#18-74-39a]

Current Status
The 2000 basin plan recommended that Burgaw Creek be resampled. Burgaw Creek from source to Osgood Branch (2.1 miles) is Not Rated for aquatic life because chlorophyll *a* exceeded the standard in 15 percent of samples collected at site BA686. The chlorophyll *a* data were not collected and processed using a certified laboratory, and therefore, cannot be used by DWQ to make use support determinations. Site BA686 is monitored by the Lower Cape Fear River Program (Appendix V).

2005 Recommendations
DWQ and LCFRP will continue to monitor the Burgaw Creek watershed. DWQ recommends that the Burgaw WWTP optimize plant processes to reduce nutrients that may be causing algal blooms in Burgaw Creek. The LCFRP is in the process of becoming state certified for chlorophyll *a* analysis.

Water Quality Initiatives
In 2002, The Nature Conservancy received a $606,000 CWMTF grant to purchase 521 floodplain acres. The overall project included 795 acres along Burgaw Creek near the Northeast Cape Fear River (Chapter 34).

23.3.2 Burnt Mill Creek [AU#18-74-63-2]

2000 Recommendations
The 2000 basin plan recommended that Burnt Mill Creek be resampled using the 303(d) approach.

Current Status
Burnt Mill Creek from source to Smith Creek (4.6 miles) is Impaired for aquatic life because of a Poor benthic community rating at site BB73. A Collaborative Assessment of Watersheds and Streams (CAWS) in 2003 indicated that the benthic community in Burnt Mill Creek was primarily impacted by toxicity and sedimentation, with lack of instream habitat and nutrient enrichment as chronic stressors to the benthic community. The watershed drains a highly urbanized portion of Wilmington. A Local Watershed Plan (Chapter 34) was developed by NCEEP in 2002 that identified similar habitat problems in the watershed. The plan also outlines restoration strategies and locations for BMPs.

2005 Recommendations
DWQ will continue to monitor the Burnt Mill Creek watershed. DWQ will work with NCEEP and the watershed stakeholders, including the City of Wilmington, to assist where possible in implementation of the restoration strategy. Burnt Mill Creek will remain on 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 2002, Wilmington received a $120,000 Section 319 grant (Chapter 34) to install urban BMP demonstration projects in the Burnt Mill Creek watershed. The grant projects will be completed in 2005. UNCW has also increased monitoring efforts in Burnt Mill Creek with funding from the 319 program.

The NCEEP completed the New Hanover County Local Watershed Plan in 2003. The EEP currently has two stream restoration projects in design for a total of 3,000 feet of stream restoration, and has a stormwater wetland that was constructed in 2000 and is in the fourth year of post-construction monitoring. Additionally, a team headed by Watershed Education for Communities and Officials at NCSU and including the City of Wilmington, Cape Fear River Watch, NCSU Dept. of Biological and Agricultural Engineering, UNC-Wilmington, and the New Hanover Local Watershed Group obtained an EPA 319 Grant of $608,000. The project purpose is to construct 6 stormwater BMP retrofits, monitor and analyze the impacts of retrofit activities on the watershed, involve the community in residential BMP retrofits, and conduct an educational campaign. The project implements recommendations from the Local Watershed Plan that was sponsored by EEP, and builds on educational activities conducted by the City of Wilmington with their previous EPA 319 grant.

Additionally, Watershed Education for Communities and Officials (WECO) received a 319 grant to fund the construction of two stormwater ponds in the Burnt Mill Creek watershed. NCEEP has also completed 0.6 acres of riverine restoration and 3,000 linear feet of stream restoration in the Burnt Mill Creek watershed (Chapter 34). The final report is available for download at: http://www.nceep.net/services/lwps/new%20hanover/newhanover.htm

23.3.3 Northeast Cape Fear River [AU#18-74-(47.5)]

Current Status and 2005 Recommendations
The Northeast Cape Fear River from Hwy 210 to Prince George Creek (15.6 miles) is Impaired on a monitored basis in the fish consumption category and will be added to the 303(d) list of Impaired waters.

23.3.4 Long Creek [AU#18-74-55a and b]

Current Status
Long Creek was Fully Supporting in the 2000 basin plan; however, Long Creek [18-74-55a] from source to Cypress Creek (7.7 miles) is currently Impaired for aquatic life because of a Severe benthic community rating at site BB139. Long Creek is channelized and has poor habitat conditions. The stream is affected by beaver dams. Conductivity was high at the sample site and the benthic community was dominated by tolerant species.

Long Creek [18-74-55b] from Cypress Creek to (21.5 miles) is Impaired on a monitored basis in the fish consumption category. No other data were collected in this segment.

2005 Recommendations
DWQ will continue to monitor the Long Creek watershed and evaluate impacts of NPDES discharges into Long Creek. DWQ will contact DSWC to evaluate if agricultural BMPs can be implemented to improve water quality.

Both 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.

23.3.5 Smith Creek [AU#18-74-63]

Current Status
Smith Creek was Not Rated in the 2000 basin plan; however, Smith Creek from source to Northeast Cape River (11.1 miles) is currently Impaired for aquatic life because of a Severe benthic community rating at site BB79. The Smith Creek WWTP (NC0000817) had significant violations of dissolved oxygen permit limits during the assessment period that could have negatively impacted aquatic life. This facility is no longer discharging.

2005 Recommendations
DWQ will continue to monitor the Smith Creek watershed. The NPDES compliance process will be used to address the significant permit violations noted above.

Smith Creek 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
The NCEEP completed the New Hanover County Local Watershed Plan in 2003 that includes Smith Creek. The plan is discussed under Burnt Mill Creek in this chapter. The plan is available for download at: http://www.nceep.net/services/lwps/new%20hanover/newhanover.htm

23.4 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.

23.4.1 Angola Creek [AU# 18-74-33-3]

Current Status and Water Quality Initiatives
Angola Creek from source to Holly Shelter Creek (6.5 miles) is Supporting aquatic life because a Good benthic community rating at site BB141. The benthic community suggested inputs of organic particulate material, and dissolved oxygen was very low at time of sampling (<4 mg/l in 44 percent of samples collected) at site BA684. Angola Creek is classified as C Sw, which acknowledges natural characteristics of swamps such as low dissolved oxygen. In 2001, The Nature Conservancy received a $442,000 CWMTF (Chapter 34) grant to purchase conservation easements on 82 acres along Angola Creek.

23.4.2 Dero Creek [AU# 18-74-32]

Current Status and Water Quality Initiatives
Dero Creek from source to Northeast Cape Fear River (2.8 miles) was not assessed during this assessment period. In 2003, the North Carolina Coastal Land Trust received a $992,000 CWMTF grant to purchase conservation easements on 94 riparian acres. The overall project also included 775 acres of donated easements in upland areas (Chapter 34).

23.4.3 Holly Shelter Creek [AU# 18-74-33]

Current Status and 2005 Recommendations
Holly Shelter Creek from source to Northeast Cape Fear River (25.9 miles) is Supporting aquatic life because of a Moderate benthic community rating at site BB136. The creek had a diverse benthic community and one rare species was found.

Water Quality Initiatives
In 2001, The Nature Conservancy received a $7,900,000 CWMTF (Chapter 34) grant to acquire 14,391 acres along Holly Shelter Creek and several tributaries.

23.4.4 Prince George Creek [AU# 18-74-53]

Current Status and 2005 Recommendations
Prince George Creek from source to Northeast Cape Fear River (8.3 miles) is Not Rated on an evaluated basis. Hermitage House Rest Home (NC 0051969) had significant violations of chlorine permit limits that may have adversely impacted aquatic life during the last two years of the assessment period.

Water Quality Initiatives
In 2002, The Nature Conservancy received a $148,000 CWMTF grant to purchase 160 floodplain acres. The overall project included 421 acres along Shelter Swamp Creek and Sandy Run Swamp. In 2003, The Nature Conservancy received a $671,000 CWMTF grant to purchase 970 acres along Prince George Creek and the Northeast Cape Fear River (Chapter 34).

23.4.5 Shaken Creek [AU# 18-74-33-4]

Current Status and Water Quality Initiatives
Shelter Swamp Creek from source to Holly Shelter Creek (19.5 miles) was not assessed during this assessment period, but is in a watershed that has extensive agriculture. In 2003, the North Carolina Coastal Land Trust received a $366,000 CWMTF grant to purchase conservation easements on 303 riparian acres. The project also included 862 acres of donated easements in upland areas. The acquisition completes protection of the entire creek (Chapter 34).

23.4.6 Shelter Swamp Creek [AU# 18-74-33-2-2]

Current Status and 2005 Recommendations
Shelter Swamp Creek from source to Sandy Run Swamp (13.3 miles) is Supporting aquatic life because of a Natural benthic community rating at site BB134. The creek had a diverse benthic community and one rare species was found.

Water Quality Initiatives
In 2002, The Nature Conservancy received a $148,000 CWMTF grant to purchase 160 floodplain acres. The overall project included 421 acres along Shelter Swamp Creek and Sandy Run Swamp (Chapter 34).

23.4.7 Northeast Cape Fear River [AU# 18-74-(47.5) and (52.5)]

Current Status and 2005 Recommendations
The Northeast Cape Fear River from NC 210 to Ness Creek (28 miles) is Not Rated for aquatic life because dissolved oxygen was below 4 mg/l in 23 and 10 percent of samples collected at sites BA694 and BA699. Northeast Cape Fear River is classified as C Sw, which acknowledges natural characteristics of swamps such as low dissolved oxygen. Walnut Hills WWTP (NC0039527) had significant violations of total suspended solids permit limits, and New Hanover County Landfill WWTP (NC0049743) had significant violations of biological oxygen demand permit limits during the last two years of the assessment period. The NPDES compliance process will be used to address the significant permit violations noted above.

Water Quality Initiatives
In 1998, the NC Wildlife Resource Commission received a $1,070,000 CWMTF (Chapter 34) grant to acquire 1,076 acres in this watershed near the confluence with Turkey Creek.