

# Chapter 5

## Cape Fear River Subbasin 03-06-05

Including: New Hope Creek, Northeast Creek and Jordan Reservoir

### 5.1 Subbasin Overview

#### *Subbasin 03-06-05 at a Glance*

##### **Land and Water Area**

Total area:	269 mi <sup>2</sup>
Land area:	251 mi <sup>2</sup>
Water area:	18 mi <sup>2</sup>

##### **Population Statistics**

2000 Est. Pop.:	112,558 people
Pop. Density:	419 persons/mi <sup>2</sup>

##### **Land Cover (percent)**

Forest/Wetland:	78.2%
Surface Water:	8.2%
Urban:	6.4%
Cultivated Crop:	0.6%
Pasture/ Managed Herbaceous:	6.6%

##### **Counties**

Chatham, Durham, Orange and Wake

##### **Municipalities**

Apex, Cary, Durham and Morrisville

Subbasin 03-06-05 overlies the geology of the Triassic basin, with all but the largest streams having regular very low flow periods. Most of the watershed is forested, with large urban areas in the eastern upland areas. Jordan Reservoir is a substantial percentage of the subbasin area. Development is occurring in the Wake County portion of the subbasin. Population is expected to grow by 250,000 people in counties with portions or all of their areas in this subbasin by 2020. Most of the growth is expected in Wake County, with only a small portion in this subbasin.

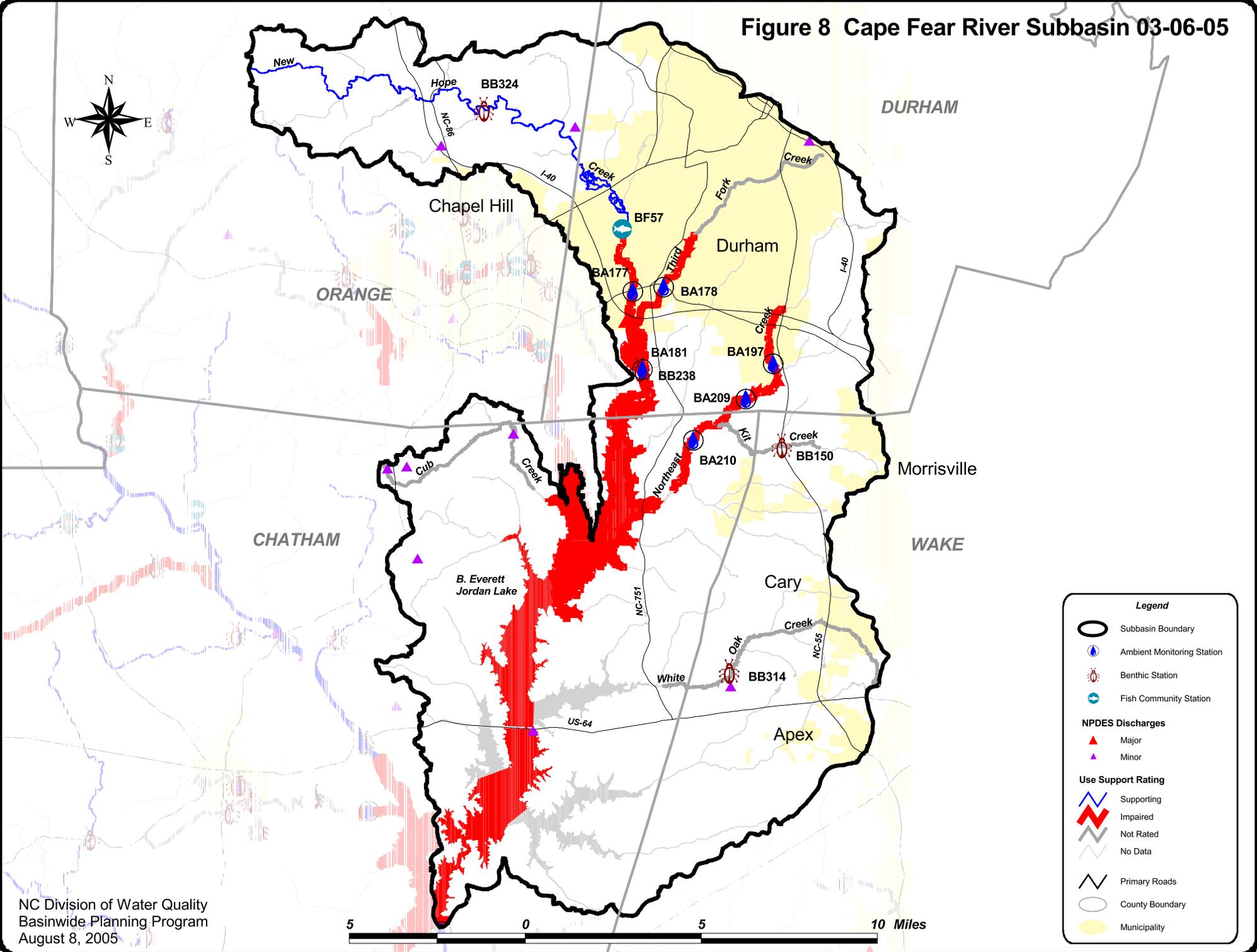
There are 11 individual NPDES wastewater discharge permits in this subbasin with a permitted flow of 32.4 MGD (Figure 8). The largest are Triangle WWTP (12 MGD) and South Durham WRF (20 MGD). Refer to Appendix VI and Chapter 30 for more information on NPDES permit holders. Issues related to compliance with NPDES permit conditions are discussed below in Section 5.3 for Impaired waters and in Section 5.4 for other waters.

Apex, Cary, Durham and Morrisville are required to develop Phase II stormwater programs (Chapter 31).

There were four benthic macroinvertebrate community samples and one fish community sample (Figure 8 and Table 8) collected during this assessment period. Data were also collected from six ambient monitoring stations including one DWQ station, four UCFRBA (Appendix V) stations and one shared ambient station. Three 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 8 Cape Fear River Subbasin 03-06-05



**Table 8 CAPE FEAR Subbasin 03-06-05**

AU Number	Classification	Length/Area	Aquatic Life Assessment				Recreation Assessment			
			AL Rating	Station	Result	Year/ Parameter % Exc	REC Rating	Station	Result	Stressors
<b>Kit Creek</b>										
16-41-1-17-2-(0.7)	WS-IV NS	4.2 FW Miles	<b>NR</b>							
From a point 1.3 miles upstream of NC Hwy 55 to Northeast Creek				BB150	NR	2003				
<b>New Hope Creek</b>										
16-41-1-(0.5)a	C NSW	17.5 FW Miles	<b>S</b>							
From source to Sandy Creek				BB324	GF	2003				
16-41-1-(0.5)b	C NSW	0.7 FW Miles	<b>S</b>						Habitat Degradation	MS4 NPDES
From Sandy Creek to a point 0.3 mile upstream of Durham County SR 2220				BF57	GF	2003				
16-41-1-(11.5)a	WS-IV NS	0.4 FW Miles	<b>S</b>						Habitat Degradation	MS4 NPDES
From a point 0.3 mile upstream of Durham County SR 2220 to SR 2220				BF57	GF	2003				
16-41-1-(11.5)b	WS-IV NS	3.5 FW Miles	<b>I</b>	BA177	CE	Low DO 12.5	<b>NR*</b>	BA177	NCE	Fecal Coliform Bacteria MS4 NPDES
From SR 2220 to I 40				BA177	CE	Turbidity 12.2				Turbidity MS4 NPDES
										Low Dissolved Oxygen MS4 NPDES
16-41-1-(11.5)c	WS-IV NS	4.0 FW Miles	<b>I</b>	BA181	CE	Turbidity 12.2	<b>S</b>	BA181	NCE	Habitat Degradation MS4 NPDES
From I-40 to a point 0.8 mile downstream of Durham County SR 1107				BA181	NCE	Low DO 9.1				Low Dissolved Oxygen WWTP NPDES
				BB238	F	2003				Low Dissolved Oxygen MS4 NPDES
										Turbidity MS4 NPDES
<b>New Hope Creek (including New Hope Creek Arm of New Hope River Arm of B. Everett Jordan Lake)</b>										
16-41-1-(14)	WS-IV NS	1,415.7 FW Acres	<b>I</b>	BL14	CE	Chlor a 73				Chlorophyll a MS4 NPDES
From a point 0.8 mile downstream of Durham County SR 1107 to confluence with Morgan Creek Arm of New Hope River Arm of B. Everett Jordan Lake										Chlorophyll a WWTP NPDES

**Table 8 CAPE FEAR Subbasin 03-06-05**

AU Number	Classification	Length/Area	Aquatic Life Assessment						Recreation Assessment				
			AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	Stressors	Sources	
<b>New Hope River Arm of B. Everett Jordan Lake (below normal pool elevation)</b>													
16-41-(0.5)	WS-IV&B	1,199.8 FW Acres	<b>I</b>	BL12	CE	Chlor a	40	ND				Chlorophyll a Chlorophyll a	MS4 NPDES WWTP NPDES
From source at confluence of Morgan Creek and New Hope Creek Arm of B. Everett Jordan Lake (a east-west line across the southern tip of the formed peninsula) to Chatham Co													
16-41-(3.5)a	WS-IV&B	5,673.3 FW Acres	<b>I</b>	BL13	CE	Chlor a	14.3	ND				Chlorophyll a Chlorophyll a	WWTP NPDES MS4 NPDES
From Chatham County SR 1008 to Haw River Arm of B. Everett Jordan Lake, Haw River													
<b>Northeast Creek</b>													
16-41-1-17-(0.7)a	WS-IV NS	3.3 FW Miles	<b>I</b>	BA197	CE	Low DO	11.3	<b>S</b>	BA197	NCE		Turbidity	MS4 NPDES
From US Hwy 55 to Durham Triangle WWTP													
16-41-1-17-(0.7)b1	WS-IV NS	3.3 FW Miles	<b>I</b>	BA197	CE	Turbidity	14.6	<b>I</b>	BA197	NCE		Low Dissolved Oxygen	MS4 NPDES
From Durham Triangle WWTP to Kit Creek													
16-41-1-17-(0.7)b2	WS-IV NS	3.2 FW Miles	<b>I</b>	BA209	CE	Turbidity	10.3	<b>I</b>	BA209	CE		Turbidity	MS4 NPDES
From Kit Creek to a point 0.5 mile downstream of Panther Creek													
<b>Third Fork Creek</b>													
16-41-1-12-(2)	WS-IV NS	3.9 FW Miles	<b>I</b>	BA210	CE	Turbidity	14.6	<b>S</b>	BA210	NCE		Turbidity	MS4 NPDES
From Kit Creek to a point 0.5 mile downstream of Panther Creek													
16-41-1-12-(2)	WS-IV NS	3.9 FW Miles	<b>I</b>	BA178	NCE			<b>NR*</b>	BA178	NCE		Turbidity	MS4 NPDES
From a point 2.0 miles upstream of NC HWY. 54 to New Hope Creek													
From a point 2.0 miles upstream of NC HWY. 54 to New Hope Creek													
<b>White Oak Creek</b>													
16-41-6-(0.3)	C NSW	3.7 FW Miles	<b>NR</b>					ND				Habitat Degradation	
From source to a point 0.6 mile upstream of Jack Branch													
From source to a point 0.6 mile upstream of Jack Branch													
From source to a point 0.6 mile upstream of Jack Branch													
16-41-6-(0.7)	WS-IV NS	5.9 FW Miles	<b>NR</b>					ND				Habitat Degradation	MS4 NPDES
From a point 0.6 mile upstream of Jacks Branch to a point 0.3 mile upstream of NC Hwy 751													
From a point 0.6 mile upstream of Jacks Branch to a point 0.3 mile upstream of NC Hwy 751													
From a point 0.6 mile upstream of Jacks Branch to a point 0.3 mile upstream of NC Hwy 751													

**Table 8 CAPE FEAR Subbasin 03-06-05**

AU Number	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				<b>Results</b>			
	<b>Miles/Acres</b>				NI - Not Impaired				CE-Criteria Exceeded > 10% and more than 10 samples			
	FW - Fresh Water				S- Severe Stress				NCE-No Criteria Exceeded			
	S- Salt Water				M-Moderate Stress							
					N- Natural							

**Aquatic Life Rating Summary**

S	m	18.6	FW Miles
NR	m	13.9	FW Miles
I	m	21.1	FW Miles
I	m	8,288.8	FW Acres
NR	e	13.2	FW Miles
ND		121.2	FW Miles
ND		2,613.6	FW Acres

**Recreation Rating Summary**

S	m	10.5	FW Miles
NR*	m	7.4	FW Miles
I	m	3.3	FW Miles
ND		166.8	FW Miles
ND		10,902.4	FW Acres

**Fish Consumption Rating Summary**

I	e	187.9	FW Miles
I	e	10,902.4	FW Acres

## 5.2 Use Support Assessment Summary

Use support ratings were assigned for waters in subbasin 03-06-05 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 (10,902.4 acres and 124.9 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 53.6 stream miles (28.5 percent) and 8,288.8 freshwater acres (76 percent) monitored during this assessment period in the aquatic life category. There were 21.1 miles (11.2 percent) and 8,288.8 acres (76 percent) of Impaired waters in this category. There were also 3.3 miles (1.7 percent) Impaired for recreation in this subbasin.

## 5.3 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.

### 5.3.1 B. Everett Jordan Reservoir

**New Hope Creek Arm [AU # 16-41-1-(14)]**

**New Hope River Arm [AU # 16-41-(0.5) and (3.5)a]**

**Morgan Creek Arm [AU # 16-41-2-(9.5)] (Subbasin 03-06-06)**

**Haw River Arm [AU # 16-(37.3) and (37.5)] (Subbasin 03-06-04)**

#### 2000 Recommendations

The 2000 basin plan recommended that DWQ continue to monitor Jordan Reservoir to assess impacts from increasing wastewater discharges and development in the watershed and to update the NSW strategy for the reservoir and its watershed.

#### Current Status

Jordan Reservoir (9,766.5 acres) is Impaired because the chlorophyll *a* standard was violated at stations in all mainstem segments of the reservoir and because modeling indicated violations of the chlorophyll *a* standard in the New Hope Creek, Morgan Creek and Haw River Arms of the reservoir. The highest chlorophyll *a* levels were collected from August to November. Chlorophyll *a* levels exceeded the standard in 73 percent of samples in the New Hope River Arm and in 13 percent of samples in mid reservoir. Blooms of blue-green algae associated with taste and odor problems in drinking water were observed in July 2003. The reservoir has been eutrophic since 1982. The Beaver Creek, Parkers Creek and White Oak Creek Arms (2,613.5

acres) are Not Rated for aquatic life. Data to assess recreation use support were not collected in the reservoir.

### 2005 Recommendations

Refer to Chapter 36 for complete discussions of the Jordan NSW strategy, TMDLs, modeling, monitoring, HB515 and SB1366. DWQ, with the Jordan stakeholders, will continue to monitor the reservoir to assess water quality changes associated with implementation of the NSW strategies.

Segments 16-41-1-(14), 16-41-1-(0.5) and 16-41-2-(9.5) will remain on the 303(d) list. The Haw River and New Hope River Arms will be added to the 303(d) list. TMDLs are currently being developed to address the Impairment in Jordan Reservoir (Chapter 36).

## **5.3.2 New Hope Creek [AU# 16-41-1-(0.5)a, b, and (11.5)a, b and c]**

### 2000 Recommendations

The 2000 basin plan recommended that DWQ work with the stormwater programs to help improve water quality in New Hope Creek. DWQ also encouraged smaller facilities to connect to the regional WWTP where possible.

### Current Status

New Hope Creek [16-41-1-(0.5)a] from source to Sandy Creek (17.4 miles) is Supporting aquatic life because of a Good-Fair benthic community rating at site BB324.

New Hope Creek [16-41-1-(0.5)b and (11.5)a] from Sandy Creek to SR 2220 (1.1 miles) is Supporting aquatic life because of a Good-Fair fish community rating at site BF57. The creek had no intolerant species indicating degraded water quality.

New Hope Creek [16-41-1-(11.5)b] from SR 2220 to I-40 (3.5 miles) is Impaired for aquatic life because the dissolved oxygen standard was violated in 13 percent of samples and the turbidity standard was violated in 12 percent of samples collected during the assessment period at site BA177. This segment is Not Rated for recreation because fecal coliform bacteria screening criteria were exceeded at site BA177.

DWQ performed a statistical trend analysis at site BA177 using total nitrogen, total phosphorus and total suspended solids data collected from 1990 to 2004. There was a significant decrease in total nitrogen of 0.17 mg/l per year in New Hope Creek. Downward trends were noted for total phosphorus and total suspended solids, although these trends were not significant.

New Hope Creek [16-41-1-(11.5)c] from I-40 to SR 1107 (4 miles) is Impaired for aquatic life because of a Fair benthic community rating at site BB238. The riparian zone was intact at site BB238, but the banks were steep and eroding and there was little pool and riffle habitat. The stream also contains trash from the surrounding urban watershed. DWQ completed a fecal coliform study in New Hope Creek in 2000 and determined that fecal coliform bacteria did not exceed the standard in this segment. This segment is Supporting recreation because of this sampling. There are many single family NPDES permitted discharges in this watershed that may contribute oxygen-consuming wastes as well as bacteria and nutrients.

### 2005 Recommendations

DWQ will continue to monitor the New Hope Creek to identify stressors to the benthic community. DWQ will continue to work with Durham stormwater program to pursue funding for BMPs in the New Hope Creek watershed to further decrease nutrient loading into Jordan Reservoir. Further recommendations to protect streams in urbanizing areas and to restore streams in existing urban areas are discussed in Chapter 31.

Segment 16-41-1-(11.5)b and c remain on the 303(d) list. Segments 16-41-(0.5)a and b and 16-41-(11.5)a will be removed from the 303(d) list. TMDLs (Chapter 35) will be developed for identified stressors within 8-13 years of listing.

### Water Quality Initiatives

In 1997, Durham County received a \$750,000 CWMTF (Chapter 34) grant to purchase 340 acres of conservation easements along New Hope Creek [16-41-1-(0.5)a] and Mud Creek [16-41-1-10] in this watershed. The Triangle Land Conservancy (Chapter 34) also received a \$2,750,000 CWMTF grant to acquire 392 acres along the New Hope Creek Greenway. In 1998, Chapel Hill received a \$502,000 CWMTF grant to acquire 105 acres of permanent easements along Dry Creek. In 1999, NCEEP (Chapter 34) received a \$582,500 CWMTF grant to stabilize and restore 450 linear feet of Sandy Creek [16-41-1-11] in Duke Forest and to construct a bioretention areas to treat runoff from 25 acres of urban area. This grant also included restoration of 8.2 acres of bottomland hardwood wetlands in the New Hope Creek watershed. The NCEEP completed 3,000 linear feet of stream enhancement in the Sandy Creek watershed.

### **5.3.3 Northeast Creek [AU # 16-41-1-17-(0.7)a, b1 and b2]**

#### 2000 Recommendations

The 2000 basin plan recommended that DWQ work with the stormwater programs to help improve water quality in Northeast Creek.

#### Current Status

Northeast Creek [16-41-1-17-(0.7)a] from US 55 to Durham Triangle WWTP (3.3 miles) is Impaired for aquatic life because the turbidity standard was violated in 15 percent of samples and the dissolved oxygen standard was violated in 11 percent of samples at sites BA197. This segment is Supporting recreation because the fecal coliform bacteria standard was not violated during intensive sampling to assess the standard at site BA197.

Northeast Creek [16-41-1-17-(0.7)b1] from Durham Triangle WWTP to Kit Creek (3.3 miles) is Impaired for aquatic life because the turbidity standard was violated in 10.3 percent of samples at site BA209. This segment is Impaired for recreation because the fecal coliform bacteria standard was violated during intensive sampling to assess the standard at site BA209.

Northeast Creek [16-41-1-17-(0.7)b2] from Kit Creek to downstream of Panther Creek (3.2 miles) is Impaired for aquatic life because the turbidity standard was violated in 15 percent of samples at site BA209. This segment is Supporting for recreation because the fecal coliform bacteria standard was not violated during intensive sampling at site BA209. DWQ developed a fecal coliform bacteria TMDL that was approved by EPA in September 2003. The TMDL recommended a 90 percent reduction in bacteria loading from urban stormwater in Durham (Chapter 35).

### 2005 Recommendations

DWQ will continue to monitor Northeast Creek. DWQ will work with Durham stormwater services where possible to help reduce the impacts of stormwater and to reduce bacteria loading by 90 percent. Further recommendations to protect streams in urbanizing areas and to restore streams in existing urban areas are discussed in Chapter 31.

All three segments will remain on the 303(d) list. TMDLs (Chapter 35) will be developed for identified stressors within 8-13 years of listing.

### **5.3.4 Third Fork Creek [AU # 16-41-1-12-(1) and (2)]**

#### 2000 Recommendations

The 2000 basin plan recommended that DWQ continue to monitor Third Fork Creek to determine the impacts of development in the watershed.

#### Current Status

Third Fork Creek [16-41-1-12-(1)] from source to 2 miles upstream of NC 54 (5.2 miles) is Not Rated on an evaluated basis because Brenntag Southeast Incorporated (NC0086827) failed whole effluent toxicity (WET) tests five times during the last two years of the assessment period. The facility is in the headwaters of Third Fork Creek and instream impacts of these failures could not be assessed. Chemical leaching at Brenntag may be a potential source of toxicity.

Third Fork Creek [16-41-1-12-(2)] from 2 miles upstream of NC 54 to New Hope Creek (3.9 miles) is Impaired for aquatic life because the turbidity standard was violated in 12 percent of samples collected at site BA178 during the assessment period. This segment is Not Rated for recreation because the fecal coliform bacteria screening criteria were exceeded at site BA178.

A TMDL (Chapter 35) was approved in January 2005 for total suspended solids that recommended a 56 percent reduction in TSS mostly from the Durham stormwater system.

#### 2005 Recommendations

DWQ will continue to monitor Third Fork Creek. DWQ will work with Durham stormwater services where possible to help reduce the impacts of stormwater. DWQ will determine if intensive sampling is needed to assess the fecal coliform bacteria standard in this creek (Appendix X). The NPDES compliance process will be used to address the significant permit violations noted above.

Segment 16-41-1-12-(2) will be added to the 303(d) list. TMDLs (Chapter 35) will be developed for identified stressors within 8-13 years of listing.

#### Water Quality Initiatives

The NCEEP completed 3,200 linear feet of stream restoration in this watershed (Chapter 34).

## 5.4 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.

### 5.4.1 Beaver Creek [AU# 16-41-10-(0.5)]

#### Current Status and 2005 Recommendations

Beaver Creek from NC 55 to SR 1141 (6 miles) was not assigned a use support rating during this assessment period. Beaver Creek drains urbanized areas in and around Apex and is likely impacted by runoff. Further recommendations to protect streams in urbanizing areas and to restore streams in existing urban areas are discussed in Chapter 31.

#### Water Quality Initiatives

The Town of Apex (Chapter 34) received a \$387,000 CWMTF grant to acquire 43.2 acres of riparian floodplain to add to 81.6 acres already owned by the town as part of a greenway system.

### 5.4.2 Cub Creek [AU # 16-41-2-10-(0.5)]

#### Current Status and 2005 Recommendations

Cub Creek from the source to downstream of SR 1008 (8 miles) is currently Not Rated for aquatic life on an evaluated basis because Cole Park Plaza (NC0051314) had significant violations of surfactant permit limits, which could have adversely impacted aquatic life in the creek. The NPDES compliance process will continue to be used to address significant permit violations.

### 5.4.3 White Oak Creek [AU# 16-41-6-(0.3) and (0.7)]

#### Current Status and 2005 Recommendations

White Oak Creek from source to NC 751 (9.6 miles) is Not Rated for aquatic life, and a benthic community rating could not be assigned at site BB314 because the stream dries in summer months. The benthic community was impacted by 2002 drought conditions. The upper portions of White Oak Creek drain urbanized Cary. Further recommendations to protect streams in urbanizing areas and to restore streams in existing urban areas are discussed in Chapter 31.

#### Water Quality Initiatives

The Town of Cary (Chapter 34) requires 100-foot buffers on all USGS mapped perennial and intermittent streams. The buffer requirements will help minimize water quality impacts in the White Oak Creek watershed as development proceeds. In 2000, Cary (Chapter 34) received an \$86,000 CWMTF grant to produce a greenway feasibility study in the White Oak Creek watershed. In 2001, Cary received a \$1,084,000 CWMTF grant to purchase conservation easements along 197 acres of White Oak Creek to be part of a greenway system.

## **5.5 Additional Water Quality Issues within Subbasin 03-06-05**

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.

### **5.5.1 Jordan Haw River Watershed Nutrient Sensitive Waters Strategy**

All land uses and discharges of wastewater and stormwater in subbasin 03-06-05 potentially contribute nutrients to Jordan Reservoir in subbasins 03-06-04 and 03-06-05. The reservoir is Impaired for aquatic life because chlorophyll *a* violated the standard in all segments of the reservoir. Refer to Chapter 36 for more information on this strategy.