

# Chapter 4

## Neuse River Subbasin 03-04-04

Including the: Hannah Creek, Black Creek and Mill Creek

### 4.1 Subbasin Overview

*Subbasin 03-04-04 at a Glance*

**Land Cover (percent)**

Forest/Wetland:	50.1
Surface Water:	1.1
Urban:	1.9
Cultivated Cropland:	45.9
Pasture/ Managed Herbaceous:	0.2

**Counties**

Johnston, Sampson, Wake and Wayne

**Municipalities**

Benson, Four Oaks and Smithfield

**Stream Statistics**

Total Streams:	227.1 mi
Total Supporting:	2.0 mi
Total Impaired:	32.9 mi
Total Not Rated:	48.2 mi
Total No Data:	144.1 mi

This subbasin is primarily located in southern Johnston County. The uppermost portion of the subbasin lies in Wake County. Very small segments of the subbasin also reside in Sampson and Wayne Counties. Streams are characteristically of low to moderate gradient with sandy substrates. This subbasin includes the entire watershed of Black Creek, to its confluence with the Neuse River. Mill Creek and all of its tributaries (including Hannah Creek and Stone Creek) are also included in this subbasin to the Neuse River confluence.

Population growth in this subbasin is concentrated on the I-95 corridor between Benson and Smithfield. In the decade between 1990 and 2000, the town of Smithfield increased in population by 46 percent (3,327), making it the largest municipality in the watershed. Land cover in the subbasin consists of mixed forest, forested wetlands, pasture, and cropland. Roughly half is forest/wetland, and the majority of the remainder is cropland. Primary crops are cotton, soybeans, corn, wheat, sweet potatoes, peanuts, and tobacco.

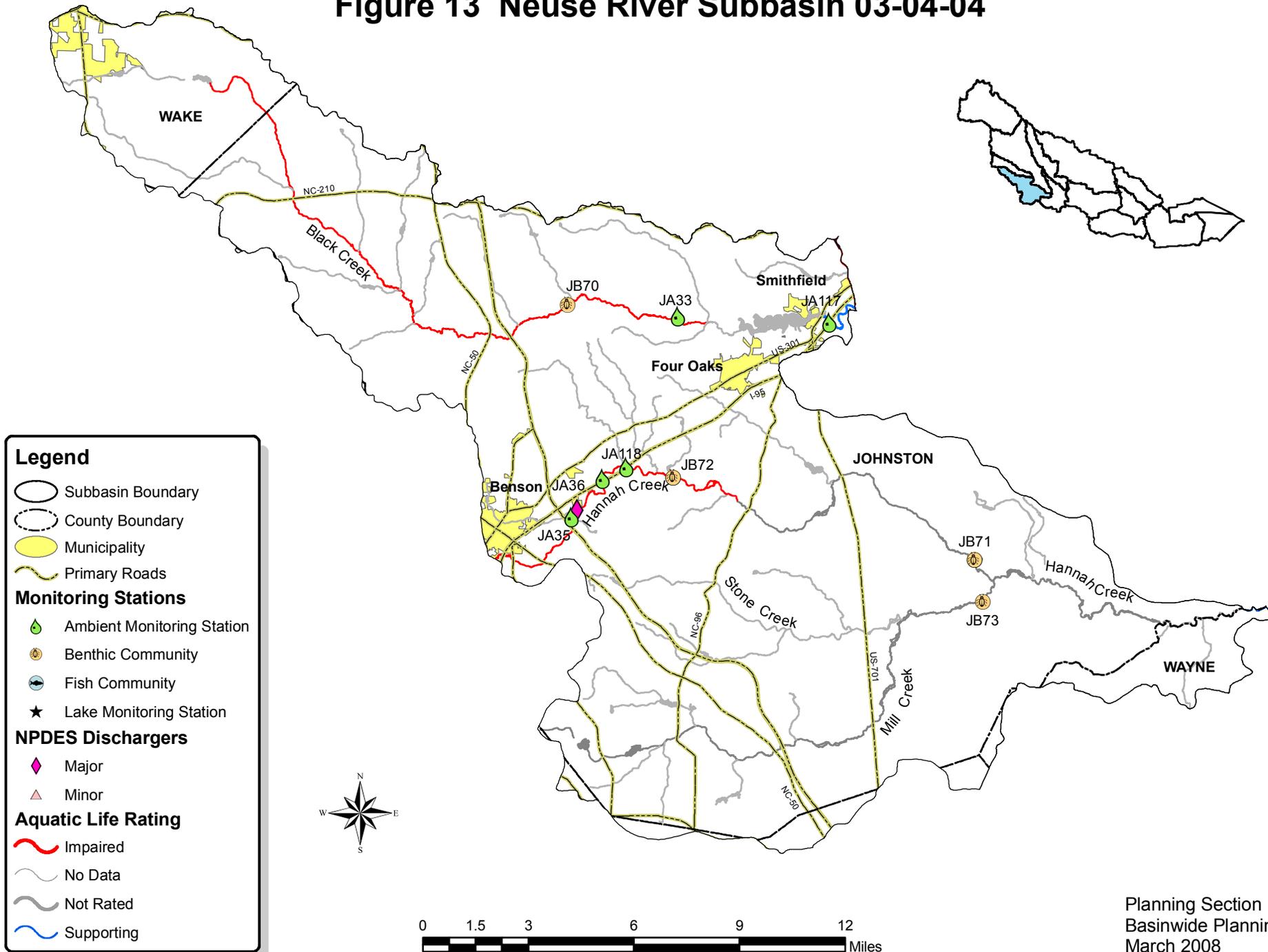
Additional information regarding population and land use changes throughout the entire basin can be found in Chapter 16.

There is 1 major (Benson WWTP, 1.9 MGD) and no minor active permitted NPDES discharger in this subbasin. There are also nine individual NPDES stormwater permits. Refer to Appendix III for identification and more information on NPDES permit holders. Johnston and Wake Counties have model stormwater ordinances as required by the Neuse NSW strategy stormwater rules (Chapter 18). There are also 26 permitted animal operations in this subbasin.

An ambient monitoring station was added above the Benson WWTP to help determine if the low dissolved oxygen (DO) issues in Hannah Creek were the result of the WWTP discharge. It was apparent from the DO and fecal coliform bacteria data that there is a problem upstream of the WWTP; however the number of the DO standard violations increased significantly downstream from the WWTP. Local officials have mentioned that at times there are cattle in the creek above the WWTP. An attempt to work with local landowners to incorporate appropriate BMPs should be made to help improve the water quality in the segment of Hannah Creek.

A biological sample was collected below the WWTP to see if the conditions in the stream could be impacting the benthic community. The low DO levels measured during sampling suggests that it is limiting the benthic community at the site. This site is impaired for biological integrity due to a fair bioclassification.

# Figure 13 Neuse River Subbasin 03-04-04



**Table 13 Neuse River Basin**

**Subbasin (WBD-8 Number) 03020201**

**DWQ Subbasin**

**03-04-04**

Assessment Unit Number	Name		Overall Category	Potential Stressors Potential Sources	Use Support Category	Use Support Rating	Reason for Rating	Parameter of Interest	Collection Year	Listing Year	IR Category
Description	DWQ Subbasin	Miles/Acres									
<b>Watershed (WBD-10 Number) 0302020112</b>					<b>Black Creek</b>						
<b>Subwatershed (WBD-12 Number) 030202011201</b>					<b>Little Black Creek-Black Creek</b>						
<b>27-45-(2)</b>	<b>Black Creek</b>		<b>5</b>	<b>Low Dissolved Oxygen</b>	Aquatic Life	Impaired	Standard Violation	Low Dissolved Oxygen	2006	2008	5
From dam at Panther Lake to mouth of Sassarixa Creek				Natural Conditions	Aquatic Life	Not Rated	Data Inconclusive	Ecological/biological Integrity Benthos	2005		3a
C;NSW	03-04-04	22.6 FW Miles			Recreation	Supporting	No Criteria Exceeded	Fecal Coliform (recreation)	2006		1
<b>Subwatershed (WBD-12 Number) 030202011203</b>					<b>Holts Lake-Black Creek</b>						
<b>27-45-(14)</b>	<b>Black Creek</b>		<b>2</b>		Aquatic Life	Supporting	No Criteria Exceeded	Water Quality Standards Aquatic Life	2006		1
From dam at Holts Lake to Neuse River					Recreation	Supporting	No Criteria Exceeded	Fecal Coliform (recreation)	2006		1
C;NSW	03-04-04	2.0 FW Miles									
<b>Watershed (WBD-10 Number) 0302020113</b>					<b>Mill Creek</b>						
<b>Subwatershed (WBD-12 Number) 030202011301</b>					<b>Upper Hannah Creek</b>						
<b>27-52-6a</b>	<b>Hannah Creek</b>		<b>5</b>	<b>Fecal Coliform Bacteria</b>	Aquatic Life	Impaired	Standard Violation	Low Dissolved Oxygen	2006	2004	5
From source to NC 96				General Agriculture/Pasture	Aquatic Life	Impaired	Biological Criteria Exceeded	Ecological/biological Integrity Benthos	2005	2008	4s
C;NSW	03-04-04	10.3 FW Miles		<b>Low Dissolved Oxygen</b>	Recreation	Supporting	No Criteria Exceeded	Fecal Coliform (recreation)	2006		1
				General Agriculture/Pasture WWTP NPDES							
<b>Subwatershed (WBD-12 Number) 030202011302</b>					<b>Lower Hannah Creek</b>						
<b>27-52-6b</b>	<b>Hannah Creek</b>		<b>3a</b>		Aquatic Life	Not Rated	Data Inconclusive	Ecological/biological Integrity Benthos	2005		3a
From NC 96 to Mill Creek											
C;NSW	03-04-04	13.4 FW Miles									
<b>Subwatershed (WBD-12 Number) 030202011303</b>					<b>Upper Mill Creek</b>						
<b>27-52-(1)</b>	<b>Mill Creek (Moorewood Pond)</b>		<b>3a</b>		Aquatic Life	Not Rated	Data Inconclusive	Ecological/biological Integrity Benthos	2005		3a
From source to Mill Branch											
C;NSW	03-04-04	34.7 FW Miles									

Note:

See Section 23.3 for Overall and IR Category explanation.

Supporting waters are listed in Categories 1-3.

Impaired waters are listed in Categories 4 or 5.

A map including the locations of the NPDES facilities and water quality monitoring stations is presented in Figure 7. Table 13 contains a list of assessment unit numbers (AU#) and length, streams monitored, monitoring data types, locations and use support ratings for waters in the subbasin. Refer to [http://h2o.enr.state.nc.us/tmdl/General\\_303d.htm](http://h2o.enr.state.nc.us/tmdl/General_303d.htm) for more information about use support methodology.

Waters in the following sections and in Table 13 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 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.

## 4.2 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. For aquatic life, an Excellent, Good, Good-Fair, Fair, or Poor bioclassification is assigned to a stream based on the biological data collected by DWQ. For more information about bioclassification and use support assessment, refer to [http://h2o.enr.state.nc.us/tmdl/General\\_303d.htm](http://h2o.enr.state.nc.us/tmdl/General_303d.htm). Appendix X provides definitions of the terms used throughout this basin plan.

Refer to Table 14 for a summary of use support for waters in subbasin 03-04-04 (see Chapter 23, Section 23.3 for description of the IR category (for each parameter of interest) and Overall (river segment) category).

## 4.3 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 can be found at [http://h2o.enr.state.nc.us/tmdl/General\\_303d.htm](http://h2o.enr.state.nc.us/tmdl/General_303d.htm).

Table 14 Summary of Use Support Ratings in Subbasin 03-04-04

Units	Total Monitored Waters	Total Impaired Waters		Total Supporting Waters		Total Not Rated Waters	Total No Data	Total
	Miles/Acres	Miles/Acres	%	Miles/Acres	%	Miles/Acres	Miles/Acres	Miles/Acres
Freshwater miles (streams)	83	33	15	2	1	48	144	227

% - Percent of total miles/acres.

### **4.3.1 Black Creek Watershed [AU# 27-45-(2) & 27-45-(14)]**

#### Current Status

##### Black Creek [AU# 27-45-(2)]

Black Creek [AU# 27-45-(2); C; NSW] from the dam at Panther Lake to the mouth of Sassarixa Creek (22.6 miles) is Impaired for aquatic life due to a low DO standard violation in 12 percent of the samples (< 4 mg/l) at ambient monitoring station JA33. DO levels were also below 5 mg/l in 29 percent of the samples. This was a new LNBA station, which was added in December 2004 (moved station JA117 to this location in order to get a better assessment of the overall watershed). This is likely due to swamp drainage. A further assessment will have to be made in order to determine if this is natural or not.

DWQ biologist could Not Rate the benthic community at site JB70. This stream is in a transitional zone between a Swamp and Coastal A stream category and therefore should not be rated until criteria are developed for such streams. Until new criteria are developed, this site will be dropped as a basinwide site. The riparian zone was found to be wide and intact on both sides and there was no evidence of channelization or stream bank erosion occurring at the sampling site.

This segment will be added to the 2008 303(d) list of impaired waters for low DO violations.

##### Black Creek [27-45-(14)]

Black Creek [27-45-(14); C; NSW] from the dam at Holts Lake to the Neuse River (2.0 miles) is currently on the 303(d) list for low DO standards violation. This segment will be removed from the 303(d) list as of 2008 because the DO standards violation was only exceeded in 2 percent of the samples, which is less than the 10 percent state limit. This segment of the Black Creek is Supporting for both aquatic life and for recreation at site JA117. This site was moved further up in the watershed above Holts Lake in order to get a better assessment of this area.

#### Recommendations

A DO TMDL will have to be produced for this watershed within 13 years, unless natural conditions are determined to be the cause of the low DO. The entire Black Creek watershed will be incorporated into a DO TMDL at that time.

### **4.3.2 Hannah Creek Watershed [27-52-6a & 27-52-6b]**

#### 2002 Recommendations

DWQ and LNBA will continue to monitor the site to detect any water quality changes. DWQ will work with Benson to remedy toxicity problems and to determine the source of low dissolved oxygen in Hannah Creek.

Currently (2007) Hannah Creek 27-52-6a (from source to NC96 (10.3 miles)) is on the 303(d) for Low DO standards violation.

#### Current Status

##### Hannah Creek [AU# 27-52-6a]

Hannah Creek [27-52-6a; C; NSW] from the source to NC96 (10.3 miles) is Impaired for aquatic life due to a fair benthic bioclassification at site JB72 and due to low DO standards violation at

ambient monitoring stations JA35, JA36 and JA118. The DO was below 4 mg/l in 16, 58 and 23 percent of the samples and fecal coliform bacteria levels were elevated above 400 CFU /100 ml in 17, 14 and 16 percent of the samples at JA35, JA36 and JA118 respectively. The fecal numbers are not above the state standard of 20 percent. Therefore, this area is Supporting for recreational uses. Station JA35 is located ~ 0.2 mile above the Benson WWTP and sampling was initiated at this station in February 2004 to help determine if the low DO issues in Hannah Creek were the result of the WWTP discharge. It is apparent from the DO and fecal coliform bacteria data that there is a problem upstream of the WWTP, however the number of the DO standard violations increased significantly downstream from the WWTP. There has been mention of cattle in the creek above the WWTP. An attempt to work with local landowners to incorporate appropriate BMPs should be made to help improve the water quality in the segment of Hannah Creek.

Ambient monitoring station JA36 replaced JA118 in February 2004 due to sampling safety issues and is about 1 mile upstream of JA118. Elevated conductivity was also recorded at these sites with values ranging between 60 and 377  $\mu\text{mhos/cm}$ . These sites are 1.7 and 2.7 miles below the Benson WWTP. The data indicates that the WWTP as well as other current land uses in the area are contributing to the degraded water quality in this stream.

Benthic site JB72 was requested in order to determine if the water quality in this area is having a detrimental effect on the aquatic organisms and to see if the low DO levels could be associated with natural conditions. This site was sampled in February 2005 using swamp methods and again in July 2005 using standard qualitative methods. It was determined at the time of the July sample, that the good stream flow during the summer period indicated that this site does not have the characteristics of a swamp site so, sampling using standard qualitative methods is the appropriate method to assess this section of Hannah Creek. The banks were well stabilized by the vegetation present. The riparian zone was wide and intact at the sampling site. The conductivity was moderately elevated (97  $\mu\text{mhos/cm}$ ) and the DO at the time of sampling was 3.0 mg/l. This site was rated as Fair. Unfortunately, benthic sampling without a historical data set cannot address the original question of whether low DO levels are associated with natural conditions. The low DO level measured during sampling suggests that it is limiting the benthic community at the site.

Benson WWTP (NC0020389) is the single active major NPDES permitted discharger upstream of these sites. Discharge is limited to 1.5 MGD. They have not had any major discharge issues over the past several years. There has been discussion of the WWTP moving out of Hannah Creek and discharging into the Neuse River or possibly the Cape Fear River.

The 10.3 mile stretch of Hannah Creek will remain on the 303(d) list for low DO standard violation and will be added to the 2008 303(d) list for impaired biological integrity due to the Fair benthic bioclassification during this assessment period.

#### Hannah Creek [AU# 27-52-6b]

Hannah Creek [27-52-6b; C; NSW] from NC96 to Mill Creek (13.4 miles) is Not Rated for aquatic life due to sampling at site JB71. This site was rated twice as Good-Fair (1995, 2001) and twice as Fair (1991, 2000) and in September 2005 it received a Not Rated bioclassification. The conditions found at this location in 2005 were impacted possibly by extreme low flow conditions. This area, as seen by a USGS flow gauge at Little River near Princeton (within 15 miles of the benthic site) was experiencing a 25 year low flow event for the month of September

2005 (see ESS Neuse River Basinwide Assessment Report for a graph of the data). The drought in this area continued through November of 2005. This area did not see much relief from the drought for most of 2006 as well. The 2005 sample found the lowest number of taxa ever sampled at this site. Erosional areas were present on both sides of the streambanks. Grasses were dominant on one bank, giving a high potential for bank failure during high flow events. Breaks in the moderately narrow riparian zone were common on one side and rare in the wide zone on the other side. Because of the extreme low flow conditions resulting from a very dry September for the area, the site was Not Rated.

#### Recommendation

DWQ encourages the local SWCD and NRCS office to work with landowners to voluntarily adopt and install conservation practices in this watershed. Work with landowners above the WWTP is needed to eliminate the direct access cattle have to the stream. This will likely improve the water quality conditions above the WWTP.

#### Water Quality Initiative

From 2000-2006 in this 14 digit watershed, the NCACSP installed 99 acres of cropland conversion to grass, 4 acres of critical area planting, 0.3 acre of grassed waterway, 9.9 acres of riparian buffers, and 1 incinerator at a cost of \$20,595. These BMPs affect 137 acres in the watershed, saving 996 Tons of soil per year, saving 2,611 pounds of nitrogen per year, and reducing 232 pounds of phosphorus each year.

## **4.4 Status and Recommendations for Waters with Noted Impacts**

The surface waters discussed below 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#. Nonpoint source program agency contacts are listed in Appendix IV.

### **4.4.1 Mill Creek [AU# 27-52-(1)]**

Mill Creek [AU# 27-52-(1); C; NSW] from source to Mill Branch (34.7 miles) is Not Rated for aquatic life due to the benthic bioclassification at site JB73. As described above for Hannah Creek AU# 27-52-6b, this area experienced an extreme low flow conditions during the sampling period for Mill Creek. This site had been sampled three times before 2005. On each previous occasion it was rated Good-Fair with either 12 or 13 EPT taxa present. During the 2005 assessment only 4 EPT taxa were present. The conditions found at this location in 2005 were highly impacted by extreme low flow conditions. This site will have to be resampled at a later date to see if these impacts are reversed upon normal flow conditions or whether there are other stressors in this watershed that has also lead to the decline in the benthic macroinvertebrate community.

### Recommendation

DWQ will continue to monitor the benthic community in Mill Creek to see if it was able to recover after the devastating drought period in late 2005.

DWQ encourages the local SWCD and NRCS office to work with landowners to voluntarily adopt and install conservation practices in this watershed.

## **4.5 Additional Water Quality Issues within Subbasin 03-04-04**

The previous sections discussed water quality concerns for specific stream segments. 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.

### **4.5.1 Mercury Contamination – Fish Tissue Assessment**

The Division conducted fish tissue surveys at four stations within the Neuse River Basin from 1999 to 2004. These surveys were conducted as part of the mercury contaminant assessments in the eastern part of the state and during statewide pesticide assessments.

Tissue samples collected from the Neuse River at Goldsboro contained organic contaminants at undetectable levels or at levels less than the US EPA, US FDA, and State of North Carolina criteria. The Goldsboro samples consisted of composites of largemouth bass.

Elevated mercury concentrations (greater than the EPA and NC level of 0.4 ppm) were detected in fish samples collected from all four stations within the Neuse Basin. These included the Eno River near Durham, Neuse River at Goldsboro, Neuse River at Kinston, and Contentnea Creek at Snow Hill. Elevated levels were most often detected in largemouth bass, a species at the top of the food chain and most often associated with mercury bioaccumulation in North Carolina. Presently, there are no site-specific fish consumption advisories for mercury in the Neuse River basin; however, an advisory for the consumption of bowfin, and chain pickerel east of Interstate 85 was issued by NCDHHS in 2002 and a statewide advisory for the consumption of largemouth bass in 2006.

Because fish spend their entire lives in the aquatic environment, they incorporate chemicals from this environment into their body tissues. Contamination of aquatic resources has been documented for heavy metals, pesticides, and other complex organic compounds. Once these contaminants reach surface waters, they may be available for bioaccumulation, either directly or through aquatic food webs, and may accumulate in fish and shellfish tissues. Results from fish tissue monitoring can serve as an important indicator of further contamination of sediments and surface water.