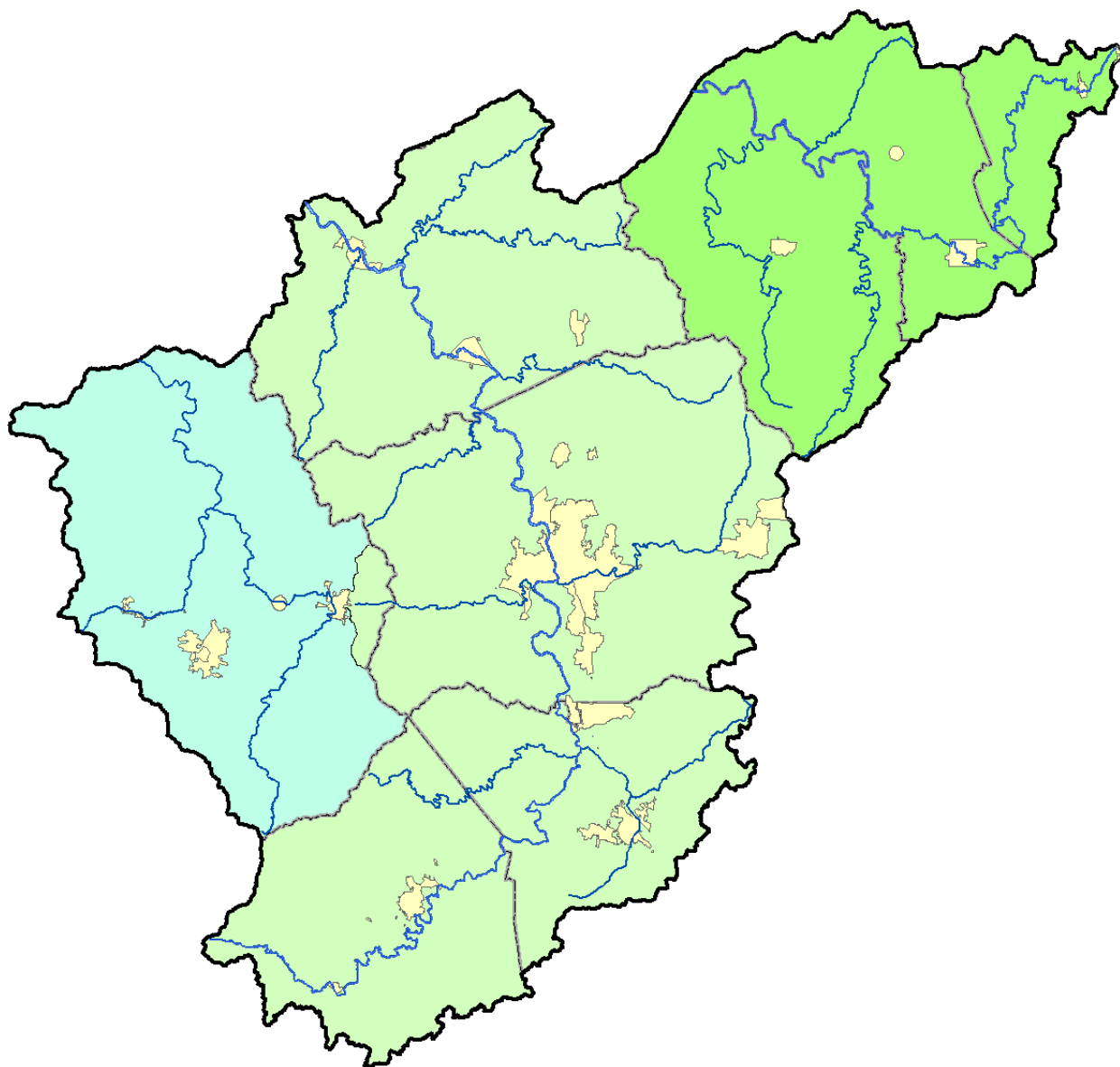




French Broad River Basin Ambient Monitoring System Report

January 1, 2003 through December 31, 2007

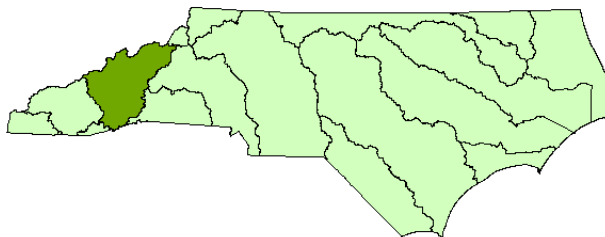


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Evaluation Levels

In order to assist the reader in developing a rapid understanding of the summary statistics provided throughout this data review, concentrations of water quality variables may be compared to an Evaluation Level (EL). Evaluation levels may be a water quality standard, an action level, an ecological threshold, or simply an arbitrary threshold that facilitates a rapid data review. Evaluation levels are further examined for frequency to determine if they have been exceeded in more than 10 percent of the observed samples. This summary approach facilitates a rapid and straightforward presentation of the data but may not be appropriate for making specific use support decisions necessary for identification of impaired waters under the Clean Water Act's requirements for 303(d) listings. The reader is advised to review the states 303(d) listing methodology for this purpose. (see http://h2o.enr.state.nc.us/tmdl/General_303d.htm).

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EXECUTIVE SUMMARY

A general understanding of human activities and natural forces that affect pollution loads and their potential impacts on water quality can be obtained through routine sampling from fixed water quality monitoring stations. During this assessment period (January 1, 2003 through December 31, 2007) chemical and physical measurements were obtained by DWQ from 24 stations located throughout the French Broad River Basin.

In order to evaluate acceptable water quality criteria at least 10 observations are desired. If at least 10 results were collected for a given site for a given parameter, the results are then compared to water quality evaluation levels. The water quality evaluation level may be an ecological evaluation level, a narrative or a numeric standard. If less than 10 results were collected, then no comparison to evaluation levels was made. When more than 10 percent of the results exceeded the evaluation level (10% criteria), a binomial statistical test was employed to determine how much statistical confidence there is that the results statistically exceed the 10% criteria. If at least 95% confidence was found that a 10% exceedance occurred, then that is termed a statistically significant exceedance (SSE). This method was applied for all parameters with an evaluation level, except for fecal coliform bacteria, which uses a 20% criteria in most waters as well as a geometric mean criteria. See page 12 for an explanation of fecal coliform methods. The results of the data analysis are displayed in tables, box plots, scatter plots, and maps. For complete summaries on each station, reference the AMS Station Summary Sheets located in Appendix A.

This review of water quality exceedances was performed using data that were collected between January 1, 2003 and December 31, 2007. A total of six sites were found with SSEs. None of these sites were found to have more than one SSE however. SSEs were found for fecal coliform screening at three sites and turbidity at three sites. Eleven sites with 10% exceedances did not rise to the level of SSEs, and six sites did not have any 10% exceedances.

Table 1 summarizes areas of potential concern in the French Broad River Basin using these criteria. While reading the table please note the following: The majority of the parameters listed are compared directly to their standards. There is one exception, however. The fecal coliform standard requires that five samples be taken in the span of 30 days, which was not done for the ambient data. Therefore the review of fecal coliform ambient data should be taken as a screening only. A summary of the evaluation level data is included as **Figure 1**.

With three sites having SSEs for fecal coliform screening and seven more having 20% exceedances, fecal coliform appears to be the most widespread issue in the basin. Fecal coliform screening data is assessed annually. When the annual screening indicates that the standard may have been violated, additional sampling will be done to assess the standard. To assess the standard five samples must be collected a span of 30 days or less. This is called "5 in 30" sampling. Class B waters identified as potential concerns during the annual screening are prioritized for 5 in 30 sampling. 5 in 30 sampling is completed for other waters as resources permit.

The French Broad River Basin includes many Class B recreational waters. Nine of these have been assessed with 5 in 30 sampling for compliance with the fecal coliform standard during the current assessment period. The site is considered impaired if greater than 20% of the samples are above 400 colonies per 100 mL, or the geometric mean of the samples is greater than 200 colonies per 100 mL. Four sites, the French Broad River at Skyland, the French Broad River at Marshall, Richland Creek near Waynesville, and the Swannanoa River at Black Mountain Recreational Park, were found to be in violation of the standard. The remaining five were not. Note that the Swannanoa River site is not an ambient site.

Other parameters of note in the basin include turbidity and pH. Ten stations in the basin exceeded the standard for Turbidity more than 10% of the time. In particular, four of the five stations in the Nolichucky HUC exceed the standard for turbidity. Half of the ten impaired sites are trout waters, which have stricter limits on turbidity. pH exceeded the standard at two sites more than 10% of the time.

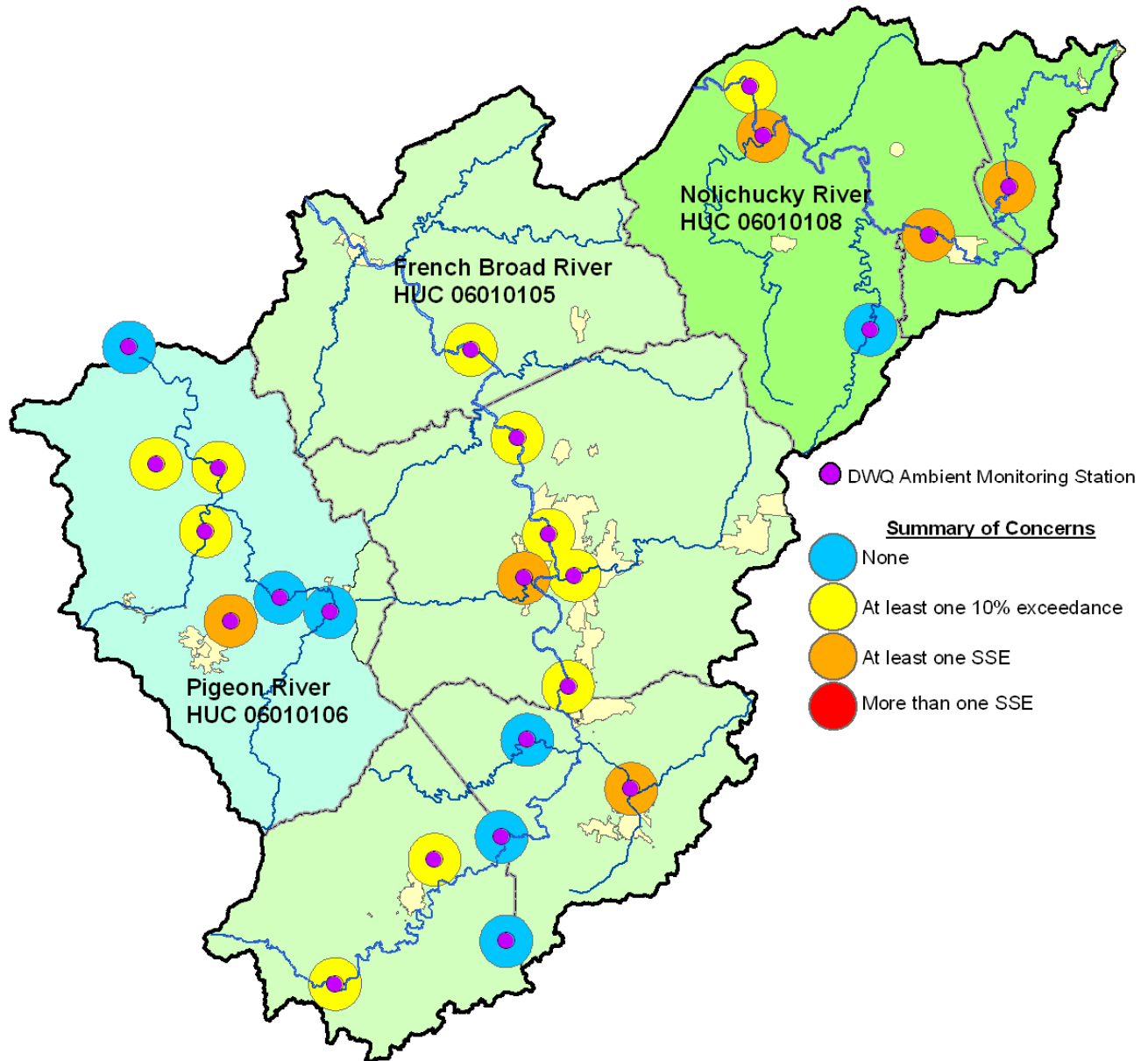
Table 1. Areas of Concern in the French Broad River Basin

Station	Location	Stream Class	303(d) ₁ List?	Parameter	%Exceed	%Conf
French Broad River: HUC 06010105						
E0150000	French Broad Riv At Us 178 At Rosman	B Tr	Turbidity 2008	Turbidity (>10 NTU)	11.10%	70.70%
E0850000	Davidson Riv At Us 64 Nr Brevard	WS-V B Tr	pH 2008	ph (<6 SU)	15.40%	92.90%
E2120000	Mud Crk At Sr 1508 Nr Balfour	C	EBI ₂ 2006	Fecal Coliform (>400 col/100mL)	40.40%	100.00%
				Fecal Coliform (Geomean >200)	359	
E2730000	French Broad Riv At Sr 3495 Glenn Bridge Rd Nr Skyland	B	Fecal Coliform 2006	Fecal Coliform (>400 col/100mL)	20.80%	63.30%
E3520000	Hominy Crk At Sr 3413 Nr Asheville	C	Turbidity 2008	Fecal Coliform (>400 col/100mL)	29.40%	96.30%
				Turbidity (>50 NTU)	13.70%	86.70%
E4170000	Swannanoa Riv At Us 25 Biltmore Ave At Asheville	C	EBI ₂ 2006 Turbidity 2008	Fecal Coliform (>400 col/100mL)	26.50%	90.30%
				Turbidity (>50 NTU)	12.20%	78.50%
E4280000	French Broad Riv At Sr 1348 At Asheville X Ref E3420000	B	Turbidity 2008	Fecal Coliform (>400 col/100mL)	20.40%	60.60%
E4770000	French Broad Riv At Sr 1634 At Alexander	B	EBI ₂ 2006	Turbidity (>50 NTU)	15.40%	92.90%
E5120000	French Broad Riv At Blennerhassett Island At Marshall	B	Turbidity 2008	Turbidity (>50 NTU)	14.00%	87.80%
Pigeon River: HUC 06010106						
E6110000	Richland Crk At Sr 1184 Nr Waynesville	B	EBI ₂ 2006 Fecal Coliform 2006	Fecal Coliform (>400 col/100mL)	43.40%	100.00%
				Fecal Coliform (Geomean >200)	341	
E6300000	Jonathans Crk At Us 276 Nr Cove Creek	C Tr	Turbidity 2008	Fecal Coliform (>400 col/100mL)	23.50%	79.30%
				Fecal Coliform (Geomean >200)	215	
				Turbidity (>10 NTU)	11.80%	75.50%
E6450000	Cataloochee Crk At Sr 1395 Nr Cataloochee	C Tr ORW	No	ph (<6 SU)	10.60%	67.10%
E6480000	Pigeon Riv At Sr 1338 Nr Hepco	C	EBI ₂ 2008	Fecal Coliform (>400 col/100mL)	23.50%	79.30%
Nolichucky River: HUC 06010108						
E7000000	N Toe Riv At Us 19E Nr Ingalls	WS-IV Tr	Turbidity 2008	Turbidity (>10 NTU)	17.60%	97.20%
E8100000	N Toe Riv At Sr 1162 At Penland	C Tr	Turbidity 2006	Fecal Coliform (>400 col/100mL)	25.50%	87.40%
				Turbidity (>10 NTU)	41.20%	100.00%
E9850000	Cane Riv At Sr 1343 Nr Sioux	C Tr	Turbidity 2006	Turbidity (>10 NTU)	30.00%	100.00%
E9990000	Nolichucky Riv Beside Sr 1321 At Poplar	B	Turbidity 2008	Fecal Coliform (>400 col/100mL)	23.70%	78.40%
				Turbidity (>50 NTU)	13.20%	82.50%

SSEs are shown in **blue**.

1. 303(d) List: Locations on the 303(d) list are considered impaired and are prioritized for corrective action.
2. EBI: Ecological/Biological Integrity, EBI is assessed by examination of the macroinvertebrate community and/or fish community in a stream.

Figure 1. A Summary of Station Exceedances



INTRODUCTION

The DWQ's Ambient Monitoring System (AMS) is a network of stream, lake, and estuarine stations strategically located for the collection of physical and chemical water quality data. The stations are located at convenient access points (e.g. bridge crossings) that are sampled on a monthly basis. These locations were chosen to characterize the effects of point source dischargers and nonpoint sources such as agriculture, animal operations, and urbanization within watersheds.

The data are used to identify long term trends within watersheds, to develop Total Maximum Daily Loads (TMDLs) and to compare measured values with water quality standards to identify possible areas of impairment. Parametric coverage is determined by freshwater or saltwater waterbody classification and corresponding water quality standards. Under this arrangement, core parameters are based on Class C waters with additional parameters added when justified (**Table 2**).

Within this document, an analysis of how monitoring results compare with water quality standards and evaluation levels is presented. A conceptual overview of water quality standards is provided at: <http://www.epa.gov/waterscience/standards>. Specific information on North Carolina water quality standards is provided at: <http://h2o.enr.state.nc.us/csu/swstdsfaq.html>. A summary of selected water quality standards are listed in **Table 3**.

Water quality data are evaluated in five year periods. Some stations have little or no data for several parameters over the period. However, for the purpose of standardization, data summaries for each station are included in this report. DWQ monitored water quality and collected samples at 24 stations throughout the basin. The locations of the sampling sites are illustrated in **Figure 2**, and listed in **Table 4**.

In January 2007 the DWQ began collection of samples from a series of randomly determined sites. A description of the Random Sampling Program can be found here: <http://h2o.enr.state.nc.us/esb/rams.html>. There are three random sites located in the French Broad River Basin. Because this report assesses in a five-year window and RAMS stations will only have 2 years of data, they are not included in the ambient report. Once a sufficient number of samples have been collected statewide, RAMS data will be discussed in a separate report.

Table 2. Parametric coverage for the Ambient Monitoring System.

Parameter
Dissolved oxygen (s)
pH (s)
Specific conductance
Temperature (s)
Total phosphorus
Ammonia as N
Total Kjeldahl as N
Nitrate+nitrite as N (s)
Total suspended solids
Turbidity (s)
Fecal coliform bacteria (s)
Chlorophyll a (s)

Notes:

An 's' indicates the parameter has a standard.

Chlorophyll a and nutrient sampling is only done in areas of concern, such as NSW, estuaries, lakes, and areas with known enrichment issues.

Table 3. Selected water quality standards

Parameter	Standards for All Freshwater			Standards to Support Additional Uses		
	Aquatic Life	Human Health	Water Supply Classifications	Trout Water	HQW	Swamp Waters
Chloride (mg/l)	230		250			
Chlorophyll a (ug/L)	40 ²			15 ²		
Coliform, total (MFTCC/100 ml) ³			50 ² (WS-I only)			
Coliform, fecal (MFFCC/100 ml) ⁴		200 ²				
Dissolved oxygen (mg/L)	4.0 ^{5,6}			6.0		2, 6
Hardness, total (mg/L)			100			
Nitrate nitrogen (mg/L)			10			
pH (units)	6.0 - 9.0 ^{2, 6}					2, 6
Solids, total suspended (mg/L)					10 Trout, 20 other ⁷	
Turbidity (NTU)	50, 25 ²			10 ²		

Notes:

Standards apply to all classifications. For the protection of water supply and supplemental classifications, standards listed under Standards to Support Additional Uses should be used unless standards for aquatic life or human health are listed and are more stringent. Standards are the same for all water supply classifications (Administrative Code 15A NCAC 2B 0200, eff. August 1, 2004).

²Refer to 2B.0211 for narrative description of limits.

³Membrane filter total coliform count per 100 ml of sample.

⁴Membrane filter fecal coliform count per 100 ml of sample.

⁵An instantaneous reading may be as low as 4.0 mg/L, but the daily average must be 5.0 mg/L or more.

⁶Designated swamp waters may have a dissolved oxygen less than 5.0 mg/L and a pH as low as 4.3, if due to natural conditions.

⁷For effluent limits only, refer to 2B.0224(1)(b)(ii).

Figure 2. DWQ's Ambient Monitoring System in the French Broad River Basin.

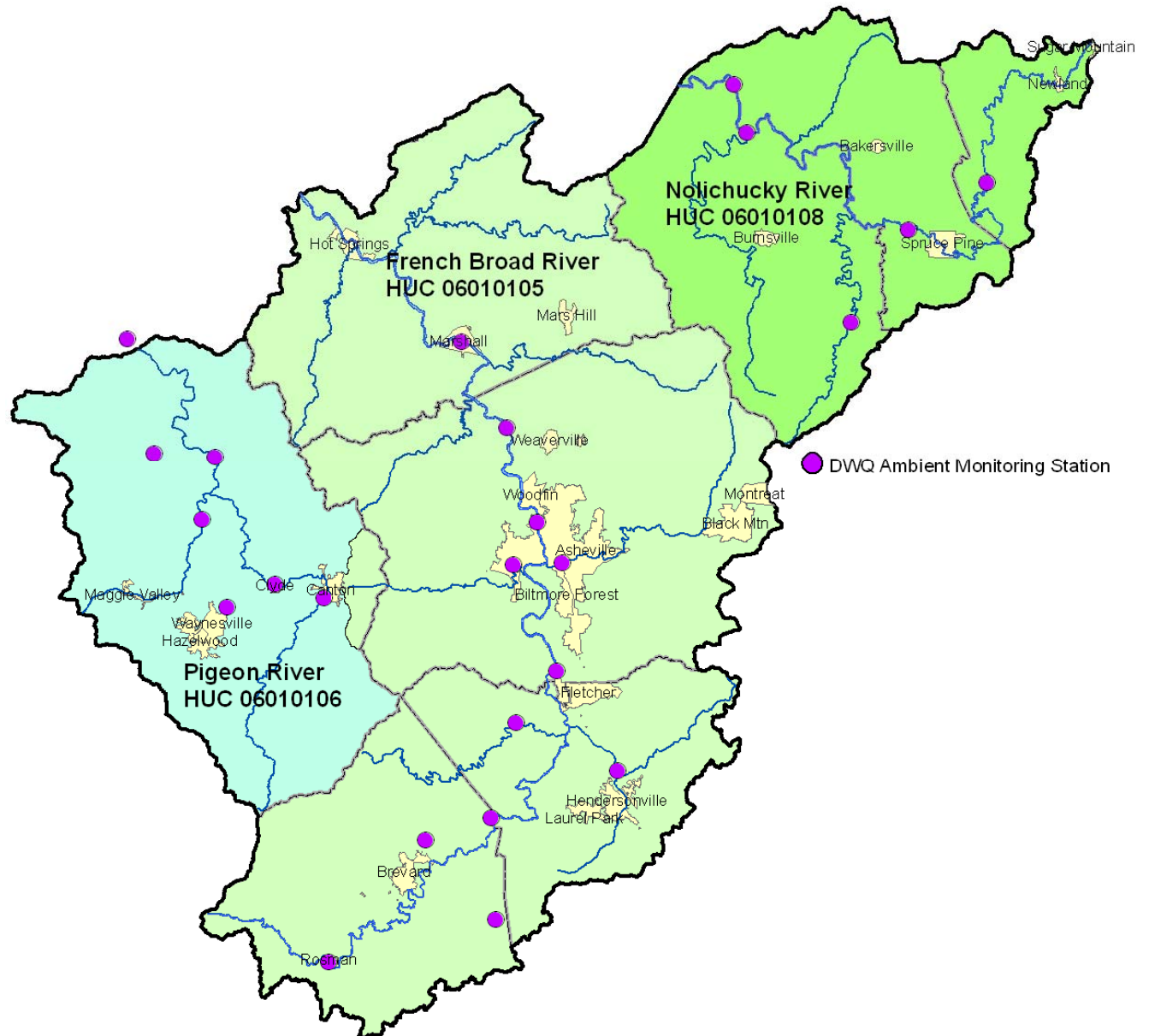


Table 4. Monitoring stations in the French Broad River Basin, 2003 - 2007.

Station	Location	Stream Class	Latitude	Longitude
French Broad River: HUC 06010105				
E0150000	French Broad Riv At Us 178 At Rosman	B Tr	35.142	-82.824
E0850000	Davidson Riv At Us 64 Nr Brevard	WS-V B Tr	35.273	-82.706
E1130000 ₁	Little Riv Ups High Falls At Dupont Plant Nr Cedar Mountain	C Tr	35.1924	-82.6131
E1270000	French Broad Riv At Sr 1503 At Blantyre	B	35.299	-82.6236
E1490000	Mills Riv At End Of Sr 1337 Nr Mills River	WS-II Tr HQW	35.399	-82.596
E2120000	Mud Crk At Sr 1508 Nr Balfour	C	35.3527	-82.4642
E2730000	French Broad Riv At Sr 3495 Glenn Bridge Rd Nr Skyland	B	35.4549	-82.5474
E3520000	Hominy Crk At Sr 3413 Nr Asheville	C	35.5642	-82.6078
E4170000	Swannanoa Riv At Us 25 Biltmore Ave At Asheville	C	35.5687	-82.5443
E4280000	French Broad Riv At Sr 1348 At Asheville X Ref E3420000	B	35.6094	-82.5784
E4770000	French Broad Riv At Sr 1634 At Alexander	B	35.708	-82.622
E5120000	French Broad Riv At Blennerhassett Island At Marshall	B	35.7963	-82.6845
Pigeon River: HUC 06010106				
E5495000	Pigeon Riv At Nc 215 Nr Canton	WS-III Tr CA	35.522	-82.848
E5600000	Pigeon Riv At Sr 1642 At Clyde	C	35.535	-82.911
E6110000	Richland Crk At Sr 1184 Nr Waynesville	B	35.509	-82.972
E6300000	Jonathans Crk At Us 276 Nr Cove Creek	C Tr	35.5998	-83.0076
E6450000	Cataloochee Crk At Sr 1395 Nr Cataloochee	C Tr ORW	35.667	-83.073
E6480000	Pigeon Riv At Sr 1338 Nr Hepco	C	35.666	-82.995
E6500000 ₂	Pigeon Riv at Waterville	C	35.785	-83.113
Nolichucky River: HUC 06010108				
E7000000	N Toe Riv At Us 19E Nr Ingalls	WS-IV Tr	35.981	-82.016
E8100000	N Toe Riv At Sr 1162 At Penland	C Tr	35.9293	-82.1152
E8200000	S Toe Riv At Sr 1168 Nr Celo	B Tr ORW	35.831	-82.184
E9850000	Cane Riv At Sr 1343 Nr Sioux	C Tr	36.0251	-82.3272
E9990000 ₁	Nolichucky Riv Beside Sr 1321 At Poplar	B	36.075	-82.345
1. Sample collection at these sites ceased during the current sampling period.				
2. This site is located in Tennessee, but for comparison was assessed for compliance with North Carolina standards.				

PARAMETERS

Dissolved Oxygen

Dissolved oxygen is one of the most important of all the chemical measurements. Dissolved oxygen provides valuable information about the ability of the water to support aquatic life and the capacity of water to assimilate point and nonpoint discharges. Water quality standards for dissolved oxygen vary depending on the classification of the body of water. For freshwaters, 15A NCAC 02B .0211 (3)(b) specifies:

Dissolved oxygen: not less than 6.0 mg/l for trout waters; for non-trout waters, not less than a daily average of 5.0 mg/l with a minimum instantaneous value of not less than 4.0 mg/l; swamp waters, lake coves or backwaters, and lake bottom waters may have lower values if caused by natural conditions.

pH

The pH of natural waters can vary throughout the state. Low values, such as less than 7.0 Standard Units (SU), can be found in waters rich in dissolved organic matter, such as swamp lands. High values, such as greater than 7.0 SU may be found during algal blooms. Point source dischargers can also influence the pH of a stream. The measurement of pH is relatively easy; however the accuracy of field measurements is limited by the abilities of the field equipment, which is generally accurate to within 0.2 SU. This is due, in part, because the scale for measuring pH is logarithmic (i.e. a pH of 8 is ten times less concentrated in hydrogen ions than a pH of 7). The water quality standards for pH in freshwaters consider values less than 6.0 SU. or greater than 9.0 SU. to warrant attention. In swamp waters, a pH below 4.3 SU. is of concern.

Specific Conductance

In this report, conductivity is synonymous with specific conductance. It is reported in micro-mhos per centimeter ($\mu\text{mhos/cm}$) at 25°C. Conductivity is a measure of the ability of water to conduct an electric current. The presence of ions and temperature are major factors in the ability of water to conduct a current. Clean freshwater has a low conductivity, whereas high conductivities may indicate polluted water or saline conditions. Measurements reported are corrected for temperature, thus the range of values reported over a period of time indicate the relative presence of ions in water. North Carolina freshwater streams have a natural conductance range of 17-65 $\mu\text{mhos/cm}$ (USGS 1992).

Conductivity can be used to evaluate variations in dissolved mineral concentrations (ions) among sites with varying degrees of impact resulting from point source discharges. Generally, impacted sites show elevated and widely ranging values for conductivity.

Turbidity

Turbidity data may denote episodic high values on particular dates or within narrow time periods. These can often be the result of intense or sustained rainfall events; however elevated values can occur at other times.

Nutrients

Compounds of nitrogen and phosphorus are major components of living organisms and thus are essential to maintain life. These compounds are collectively referred to as "nutrients." Nitrogen compounds include ammonia-nitrogen ($\text{NH}_3\text{-N}$), total Kjeldahl nitrogen (TKN) and nitrite+nitrate nitrogen ($\text{NO}_2\text{+NO}_3\text{-N}$). Phosphorus is measured as total phosphorus. When nutrients are introduced to an aquatic ecosystem from municipal and industrial treatment processes, or runoff from urban or agricultural land, the excessive growth of algae (algal blooms) and other plants may be accelerated.

At neutral pH in water, ammonia normally forms an ionized solution of ammonium hydroxide, with a small amount of deionized ammonia. However, as pH increases, more ammonia is left deionized. Deionized ammonia is toxic to fish and other aquatic organisms.

Fecal Coliform Bacteria

Concentrations of fecal coliform bacteria can vary greatly. The descriptive statistics used to evaluate fecal coliform bacteria data include the geometric mean and the median depending on the classification of the waterbody. For all sites in the French Broad River Basin, the standard specified in Administrative Code 15A NCAC 02B.0211 (3)(e) (May 1, 2007) is applicable:

"Organisms of the coliform group: fecal coliforms shall not exceed a geometric mean of 200/100ml (MF count) based upon at least five consecutive samples examined during any 30 day period, nor exceed 400/100ml in more than 20 percent of the samples examined during such period; violations of the fecal coliform standard are expected during rainfall events and, in some cases, this violation is expected to be caused by uncontrollable nonpoint source pollution; all coliform concentrations are to be analyzed using the membrane filter technique unless high turbidity or other adverse conditions necessitate the tube dilution method; in case of controversy over results, the MPN 5-tube dilution technique shall be used as the reference method."

All of the French Broad basin in North Carolina is composed of fresh waters. All sites where the geometric mean was greater than 200 colonies/100ml, or where greater than 20 percent of the results exceed 400 colonies/100ml (i.e. all sites that exceed the evaluation level) are indicated on the respective station summary sheets.

Fecal coliform problems are screened using annual summaries of Ambient sampling results. If the screening indicates that the station may be in violation of the standard, the standard is assessed using the method required by law. All such class B (and class SB/SA in coastal basins) waters are assessed, and other waters as resources permit. The required assessment method is known as "5 in 30", collecting a minimum five samples within a span of 30 days. If a water body exceeds the standard more than 20% of the time during the 30-day period or the geomean for the 30-day period is greater than 200, then that water body is considered impaired and is added to the impaired water list, the 303(d) list.

WATER QUALITY MONITORING RESULTS SUMMARY

Water Quality within the basin during the evaluation period is summarized in the following tables. **Table 5** shows how often water quality evaluation levels were exceeded. **Table 6** shows average values, for comparison against HUC and basinwide averages.

Table 5. Frequency of Evaluation Level Exceedances

Station ID	Stream Class	Water Temperature (>29 °C) Mountain/U. Piedmont Waters	Dissolved Oxygen (<4 mg/L)	Dissolved Oxygen (<6 mg/L) Trout Waters	pH (<6 SU) (freshwater)	pH (>9 SU) (freshwater)	Turbidity (>10 NTU) Trout Waters	Turbidity (>50 NTU)	Nitrate & Nitrite (>10 mg/L)	Flouride (>1.8)	Fecal Coliform (>400 colonies/100 mL)
French Broad River: HUC 06010105											
E0150000	B Tr	0.0%	NS	0.0%	3.8%	0.0%	11.1%	NS	NS	NC	9.3%
E0850000	WS-V B Tr	0.0%	NS	0.0%	15.4%	0.0%	1.9%	NS	L10	NC	0.0%
E1130000	C Tr	0.0%	NS	0.0%	4.3%	0.0%	2.2%	NS	L10	NC	0.0%
E1270000	B	0.0%	0.0%	NS	3.8%	1.9%	NS	1.9%	L10	NC	11.1%
E1490000	WS-II Tr HQW	0.0%	NS	0.0%	2.0%	0.0%	5.9%	NS	0.0%	NC	9.8%
E2120000	C	0.0%	0.0%	NS	2.0%	0.0%	NS	5.8%	NS	NC	40.4%
E2730000	B	0.0%	0.0%	NS	0.0%	0.0%	NS	9.4%	NS	NC	20.8%
E3520000	C	0.0%	0.0%	NS	0.0%	0.0%	NS	13.7%	NS	NC	29.4%
E4170000	C	0.0%	0.0%	NS	0.0%	0.0%	NS	12.2%	NS	NC	26.5%
E4280000	B	0.0%	0.0%	NS	0.0%	0.0%	NS	9.3%	NS	NC	20.4%
E4770000	B	0.0%	0.0%	NS	0.0%	0.0%	NS	15.4%	NS	NC	17.3%
E5120000	B	0.0%	0.0%	NS	0.0%	0.0%	NS	14.0%	NS	NC	18.0%
Pigeon River: HUC 06010106											
E5495000	WS-III Tr CA	0.0%	NS	0.0%	4.2%	0.0%	3.9%	NS	0.0%	NC	7.8%
E5600000	C	0.0%	0.0%	NS	0.0%	0.0%	NS	3.9%	NS	NC	13.7%
E6110000	B	0.0%	0.0%	NS	0.0%	0.0%	NS	1.9%	L10	NC	43.4%
E6300000	C Tr	0.0%	NS	0.0%	0.0%	0.0%	11.8%	NS	L10	NC	23.5%
E6450000	C Tr ORW	0.0%	NS	0.0%	10.6%	0.0%	2.1%	NS	NS	NC	0.0%
E6480000	C	0.0%	0.0%	NS	0.0%	0.0%	NS	5.9%	NS	NC	23.5%
E6500000	C	0.0%	0.0%	NS	0.0%	0.0%	NS	0.0%	NS	NC	11.8%
Nolichucky River: HUC 06010108											
E7000000	WS-IV Tr	0.0%	NS	0.0%	0.0%	0.0%	17.6%	NS	NC	0.0%	11.8%
E8100000	C Tr	0.0%	NS	0.0%	0.0%	0.0%	41.2%	NS	L10	4.1%	25.5%
E8200000	B Tr ORW	0.0%	NS	0.0%	8.3%	0.0%	4.0%	NS	NS	NC	6.0%
E9850000	C Tr	0.0%	NS	0.0%	0.0%	0.0%	30.0%	NS	NS	NC	18.0%
E9990000	B	0.0%	0.0%	NS	0.0%	0.0%	NS	13.2%	L10	0.0%	23.7%

Notes:

NS: No Standard exists for this parameter in this stream class.

NC: Samples for this parameter were **Not Collected**.

L10: Less than 10 samples were collected for this parameter, therefore the results were not assessed.

1: In trout waters, a dissolved oxygen standard of 6 mg/L applies.

Table 6. Summary of Water Quality Parameter Averages (Arithmetic Means)

Station	Stream Class	N Sample Dates	Water Temperature (°C)	D.O. (mg/L)	pH (SU)	Spec. conductance (umhos/cm at 25°C)	Turbidity (NTU)	Fecal coliform (# colonies per 100mL)	Total Inorganic Nitrogen (mg/L)	Total Organic Nitrogen (mg/L)	NH3 as N (mg/L)	NO2 + NO3 as N (mg/L)	TKN as N (mg/L)	Total Phosphorus (mg/L)	Flouride(mg/L)
Entire Basin		1215	13.6	10.4	6.9	67.6	12.6		0.36	0.23	0.04	0.32	0.27	0.07	0.63
HUC 06010105		619	13.8	10.1	6.8	39.4	13.9		0.42	0.23	0.05	0.38	0.27	0.07	NC
E0150000	B Tr	54	12.4	10.6	6.7	18.0	5.2	38	0.24	0.18	0.03	0.22	0.21	0.05	NC
E0850000	WS-V B Tr	53	11.8	10.7	6.4	14.0	2.1	18	L10	L10	L10	L10	L10	L10	NC
E1130000	C Tr	46	13.6	9.8	6.5	16.5	2.8	35	L10	L10	L10	L10	L10	L10	NC
E1270000	B	54	13.8	9.6	6.6	23.8	10.3	82	L10	L10	L10	L10	L10	L10	NC
E1490000	WS-II Tr HQB	51	12.5	10.7	6.6	15.1	4.0	64	0.12	0.19	0.02	0.10	0.21	0.03	NC
E2120000	C	52	13.7	9.5	6.6	59.4	15.3	359	0.64	0.24	0.04	0.61	0.27	0.06	NC
E2730000	B	53	13.8	9.8	6.8	36.6	16.8	156	0.37	0.20	0.03	0.34	0.23	0.08	NC
E3520000	C	51	14.5	10.1	7.0	69.2	25.0	198	0.55	0.26	0.05	0.50	0.30	0.07	NC
E4170000	C	49	14.8	10.2	7.0	59.4	16.7	187	NC	NC	NC	NC	NC	NC	NC
E4280000	B	54	14.2	10.3	7.1	44.5	21.4	82	0.38	0.24	0.03	0.34	0.27	0.08	NC
E4770000	B	52	15.7	9.9	7.2	59.6	25.1	39	0.67	0.30	0.13	0.54	0.43	0.16	NC
E5120000	B	50	15.1	10.3	7.2	62.3	22.1	48	NC	NC	NC	NC	NC	NC	NC
HUC 06010106		356	13.5	10.4	7.1	127.1	7.7		0.30	0.24	0.03	0.26	0.28	0.08	NC
E5495000	WS-III Tr CA	51	13.1	10.9	6.8	23.4	7.0	60	0.22	0.19	0.02	0.20	0.21	0.04	NC
E5600000	C	51	15.8	9.9	7.5	374.2	10.5	118	0.29	0.32	0.05	0.24	0.37	0.16	NC
E6110000	B	53	12.8	10.5	6.9	50.2	8.3	341	L10	L10	L10	L10	L10	L10	NC
E6300000	C Tr	51	12.5	10.5	6.9	40.1	8.3	215	L10	L10	L10	L10	L10	L10	NC
E6450000	C Tr ORW	48	11.5	10.8	6.6	15.2	2.0	4	0.16	0.19	0.02	0.14	0.21	0.03	NC
E6480000	C	51	14.4	10.2	7.7	237.4	12.6	173	0.49	0.27	0.04	0.45	0.32	0.12	NC
E6500000	C	51	14.1	9.9	7.1	151.2	5.0	30	NC	NC	NC	NC	NC	NC	NC
HUC 06010108		240	13.4	10.9	7.0	50.5	16.6		0.14	0.19	0.02	0.12	0.21	0.03	0.63
E7000000	WS-IV Tr	51	12.8	10.9	7.1	47.0	13.6	42	NC	NC	NC	NC	NC	NC	0.50
E8100000	C Tr	51	13.3	10.8	7.1	83.5	27.3	86	L10	L10	L10	L10	L10	L10	0.85
E8200000	B Tr ORW	50	11.9	11.0	6.5	15.7	2.1	23	0.12	0.18	0.02	0.10	0.21	0.02	NC
E9850000	C Tr	50	14.3	11.0	7.2	48.2	16.1	91	NC	NC	NC	NC	NC	NC	NC
E9990000	B	38	15.0	10.7	7.1	59.1	25.7	106	L10	L10	L10	L10	L10	L10	0.50

Notes: **NC:** Samples for this parameter were **Not Collected**.
L10: less than 10 samples were collected for this parameter.
 Fecal Coliform shows geometric means for stations.

ASSESSMENT AND INTERPRETATION METHODS

Monitoring and sampling results considered in this report represent samples collected or measurements taken at less than one-meter depth.

Percentile statistics were calculated for most of the data using JMP statistical software (version 5.01; SAS Institute, Cary, NC). Values less than the minimum reporting level (non-detects) were evaluated as equal to the reporting level. Box and whisker plots (constructed using SigmaPlot version 9) and maps are presented for most water quality parameters collected at each monitoring station. Significant trends in water quality parameters (constructed using Microsoft Excel) are illustrated as scatterplots. Significant trends are found by assessing the probability that the linear model explains the data no better than chance. If that chance is 5% or less (an observed significance probability of 0.05 or less) then that is considered evidence of a regression effect in this document. The strength of the regression effect is given as an r^2 value, the portion of the data that is explained by the linear model. There are many other types of modeling (non-linear) that can be used to explore trends, but they were not used in this document.

Assessment Considerations

Total Metals

The North Carolina Division of Water Quality is currently reviewing water quality standards for metals. Review of historical total metals data and biological data has shown that no correlation exists between exceedance of total metals ambient standards and biological impairment. Therefore, as of May 2007 DWQ has suspended collection of total metals at AMS stations.

Providing Confidence in the Exceedance of Water Quality Standards

Historically, NC DWQ has used guidance provided by the US EPA for determining when the number of results that exceed a water quality standard indicate potential water quality issues. The US EPA has suggested that management actions be implemented when 10 percent of the results exceeded a water quality standard. This interpretation is the same whether 1 out of 10, or 5 out of 50, or 25 out of 250 results exceed a standard. Evaluating exceedances in this manner is termed the “raw-score” approach. Although this “10 percent exceedance criterion” defines a point where potential water quality issues may be present, it does not consider uncertainty. Some results are subject to chance or other factors such as calibration errors or sample mishandling. Uncertainty levels change with sample size. The smaller the sample size, the greater the uncertainty.

This document uses a nonparametric procedure (Lin *et al.* 2000) to identify when a sufficient number of exceedances have occurred that indicate a true exceedance probability of 10 percent. Calculating the minimum number of exceedances needed for a particular sample size was done using the BINOMDIST function in Microsoft Excel®. This statistical function suggests that at least three exceedances need to be observed in a sample of 10 in order to be [about] 95 percent confident that the results statistically exceed the water quality standard more than 10% of the time. For example, there is less statistical confidence associated with a 1 exceedance out of 10 (74 percent) than when there are 3 exceedances out of 10 (99 percent confidence) (**Table 7**).

Table 7. Exceedance Confidence

Number of Samples	Number of Exceedances																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
10	74%	93%	99%	100%	100%	100%	100%	100%	100%	100%							
12	66%	89%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%					
14	58%	84%	96%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
16	51%	79%	93%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
18	45%	73%	90%	97%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
20	39%	68%	87%	96%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
22	34%	62%	83%	94%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
24	29%	56%	79%	91%	97%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
26	25%	51%	74%	89%	96%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
28	22%	46%	69%	86%	94%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30	18%	41%	65%	82%	93%	97%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
32	16%	37%	60%	79%	91%	96%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
34	13%	33%	55%	75%	88%	95%	98%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%
36	11%	29%	51%	71%	85%	94%	98%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%
38	10%	25%	46%	67%	83%	92%	97%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%
40	8%	22%	42%	63%	79%	90%	96%	98%	99%	100%	100%	100%	100%	100%	100%	100%	100%
42	7%	20%	38%	59%	76%	88%	95%	98%	99%	100%	100%	100%	100%	100%	100%	100%	100%
44	6%	17%	35%	55%	73%	85%	93%	97%	99%	100%	100%	100%	100%	100%	100%	100%	100%
46	5%	15%	31%	51%	69%	83%	92%	96%	99%	100%	100%	100%	100%	100%	100%	100%	100%
48	4%	13%	28%	47%	65%	80%	90%	95%	98%	99%	100%	100%	100%	100%	100%	100%	100%
50	3%	11%	25%	43%	62%	77%	88%	94%	98%	99%	100%	100%	100%	100%	100%	100%	100%
52	3%	10%	22%	40%	58%	74%	86%	93%	97%	99%	100%	100%	100%	100%	100%	100%	100%
54	2%	8%	20%	36%	54%	71%	83%	91%	96%	98%	99%	100%	100%	100%	100%	100%	100%
56	2%	7%	18%	33%	51%	67%	81%	90%	95%	98%	99%	100%	100%	100%	100%	100%	100%
58	2%	6%	16%	30%	47%	64%	78%	88%	94%	97%	99%	100%	100%	100%	100%	100%	100%
60	1%	5%	14%	27%	44%	61%	75%	86%	93%	97%	99%	99%	100%	100%	100%	100%	100%
62	1%	5%	12%	24%	40%	57%	72%	84%	91%	96%	98%	99%	100%	100%	100%	100%	100%
64	1%	4%	11%	22%	37%	54%	69%	81%	90%	95%	98%	99%	100%	100%	100%	100%	100%
66	1%	3%	9%	20%	34%	51%	66%	79%	88%	94%	97%	99%	99%	100%	100%	100%	100%
68	1%	3%	8%	18%	31%	47%	63%	76%	86%	93%	96%	98%	99%	100%	100%	100%	100%
70	1%	2%	7%	16%	29%	44%	60%	74%	84%	91%	96%	98%	99%	100%	100%	100%	100%
72	0%	2%	6%	14%	26%	41%	57%	71%	82%	90%	95%	97%	99%	100%	100%	100%	100%
74	0%	2%	5%	13%	24%	38%	54%	68%	80%	88%	94%	97%	99%	99%	100%	100%	100%
76	0%	1%	5%	11%	22%	35%	51%	65%	77%	86%	93%	96%	98%	99%	100%	100%	100%
78	0%	1%	4%	10%	20%	33%	48%	62%	75%	85%	91%	95%	98%	99%	100%	100%	100%
80	0%	1%	4%	9%	18%	30%	45%	59%	72%	83%	90%	95%	97%	99%	99%	100%	100%

Note: Bold entries indicate that there is at least 95% confidence that at least 10% of the possible samples exceed the evaluation level.

Methods Used to Summarize Results

Methods used to summarize the results in this report encompass both tabular and graphical formats. Individual summary sheets for each station provide details on station location, stream classification, along with specifics on what parameters were measured, the number of samples taken (i.e. sample size), the number of results below reporting levels, the number of results exceeding a water quality standard or evaluation level, statistical confidence that 10% of results exceeded the evaluation level, and a general overview of the distribution of the results using percentiles. These station summary sheets provide the greatest details on a station-by-station basis. They are included as **Appendix A** to this report.

Box and whisker plots, scatterplots, and maps were used to depict data for a variety of water quality parameters throughout the basin. For the box plots, stations with fewer than 10 data points for a given parameter were not included. This occasionally occurred when a new station was added, an old station was removed, or a station was moved to a new location in the basin.

Comparisons were depicted in the following ways:

- Comparing stations – box plots
- Assessing Stations – tables
- Comparing HUCs – box plots and scatterplots
- Assessing trends - scatterplots
- Assessing the basin – maps

Box and Whisker Plots

The primary method of analyzing data in this report is through the use of box and whisker plots. **Figure 3** is an annotated example of a box and whisker plot that illustrates the distribution of the results for a particular parameter at a single site. This box plot contains both the median and mean values. Differences between the median and mean can illustrate the distribution of the results. For example, if the mean is considerably larger than the median, then there are likely a few very high concentrations raising the mean. Another useful measure is to compare the 90th percentile against the evaluation level. For most parameters, 10% exceedance of the evaluation levels is considered a violation. Therefore the 90th (or 10th in the case of minimum evaluation levels) percentile exceeding the evaluation level is an equivalent statement.

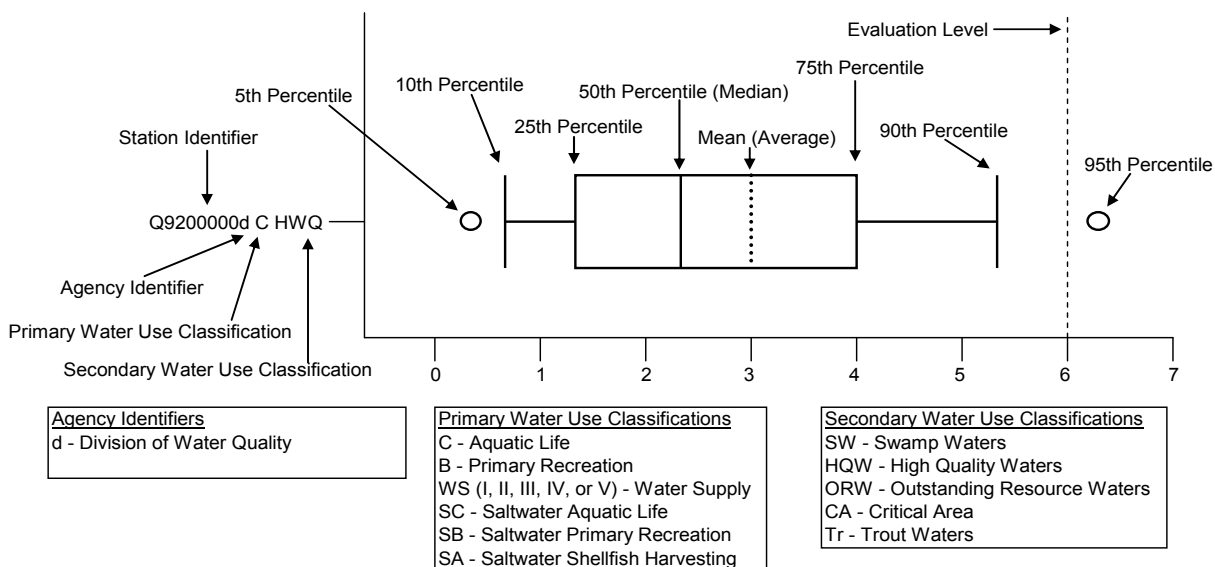


Figure 3. An Example Box Plot for a Station

Figure 4 is an example of a box and whisker plot that is comparing four HUCs for a single parameter. In this case the box plots are vertical instead of horizontal. Also note that a “mean diamond” is present on each. The center line of each diamond is the average. The short lines above and below the center are called “overlap marks” and represent a 95% confidence interval for the mean. To compare means, extend the overlap marks as shown in the figure. If the overlap mark of one diamond is closest to the mean line of another diamond then the two averages are not significantly different. If the overlap line is closer to the other diamond’s overlap mark, then they are significantly different.

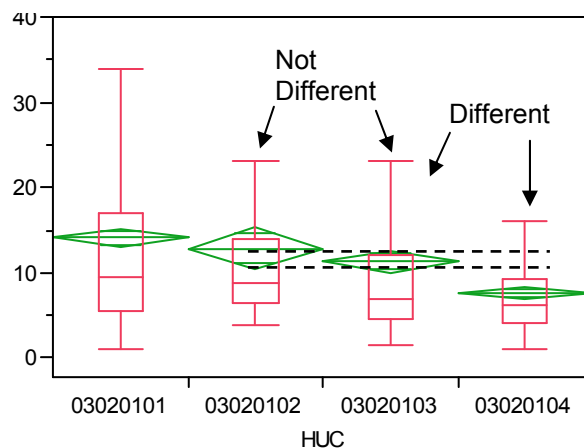
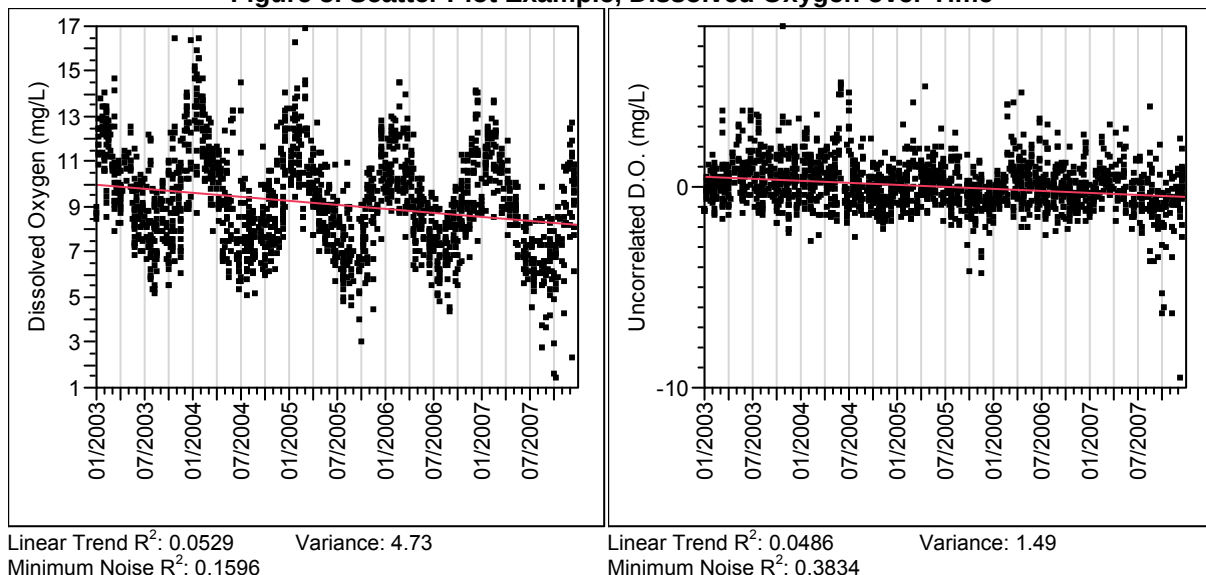


Figure 4. A Box Plot for Comparing HUCs

Scatter Plots – Change Over Time

Change over time trends are illustrated in scatterplots. If there is at least 95% confidence that a particular linear trend explains the data better than chance ($\text{Prob} > F$ of 0.05 or less) then that linear trend was included on the graph. Note that this is different from the r^2 . The percentage of variance explained by the linear model (r^2 value) is displayed for each trend. Occasionally other effects can give the appearance of a trend. This is most common when the number of samples is high and the correlation is small. In the example below on the right, drought events in 2005 and 2007 may be responsible for the slight trend present in the data.

Figure 5. Scatter Plot Example, Dissolved Oxygen over Time



In the example above, two types of change over time graphs are shown. The left graph shows *raw* dissolved oxygen results over time. The Linear Trend RSquare value estimates how much of the variation in the results can be explained by the linear trend, in this case only about 5%. The Minimum Noise RSquare is the amount of variation that definitely cannot be explained by variation over time. This is based on the variation that can be found in results from a single day, such as the variation between sites. This is likely an underestimate of noise in most cases. The greater the noise, the less likely there is a trend that has not been captured.

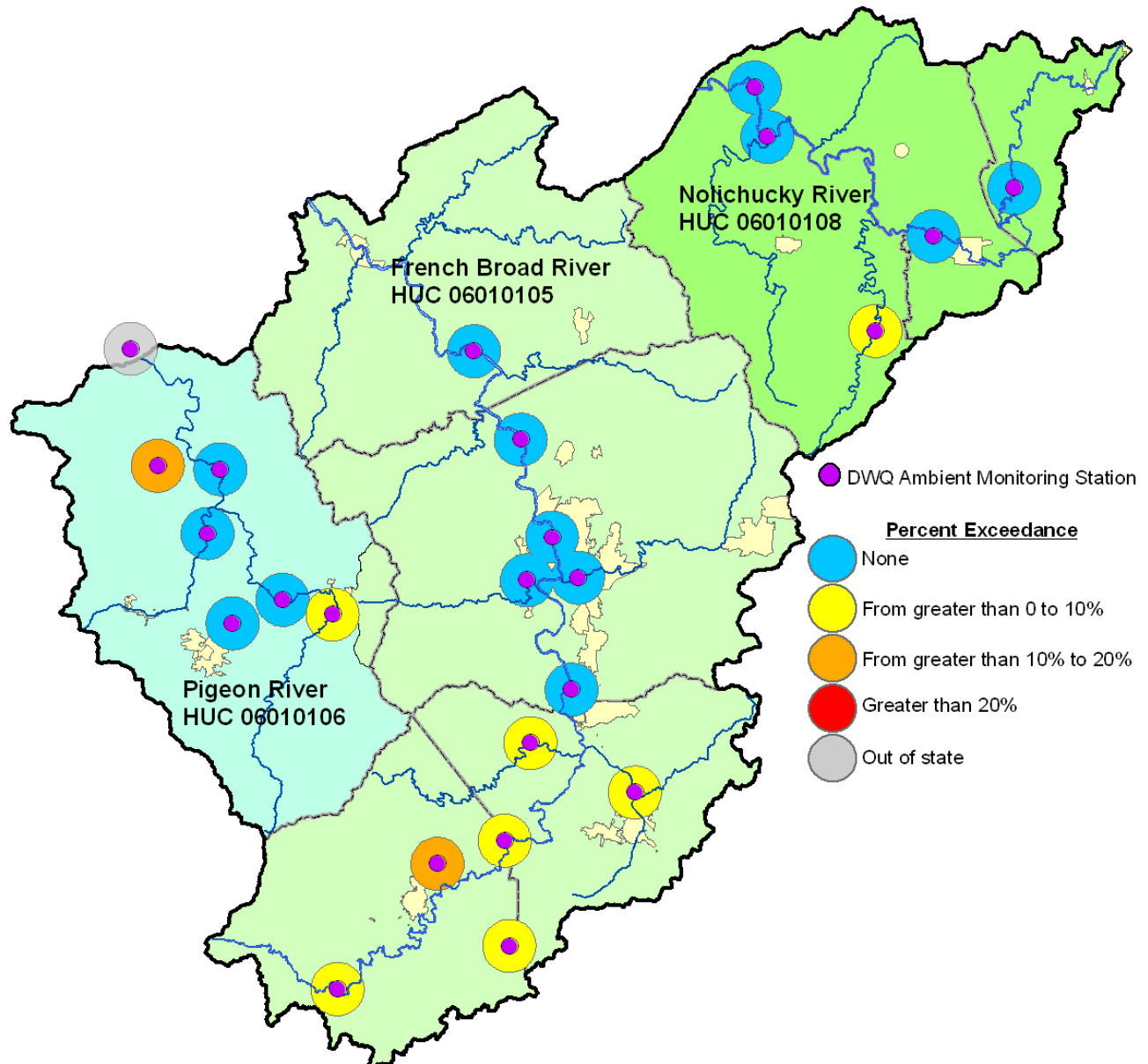
When helpful/possible, seasonal or other cyclical variation has been removed from the data via regression so that trends can be seen more easily. The graph on the left shows more variation within each year than there is between years. The variance is 4.73 mg/L. In the graph on the right, all variation that correlates to variation in water temperature

has been removed via linear regression. This reduces the variance by over half to 1.49 mg/L. Then it becomes clear visually that there are no strong temporal trends in the dissolved oxygen data that cannot be explained by changes in temperature.

Maps

Maps are used to display data for the whole basin at once, so that the relationship of stations to each other can be seen, and regional patterns become clear. The colors signify the degree of exceedance at each location.

Figure 6 Example Map

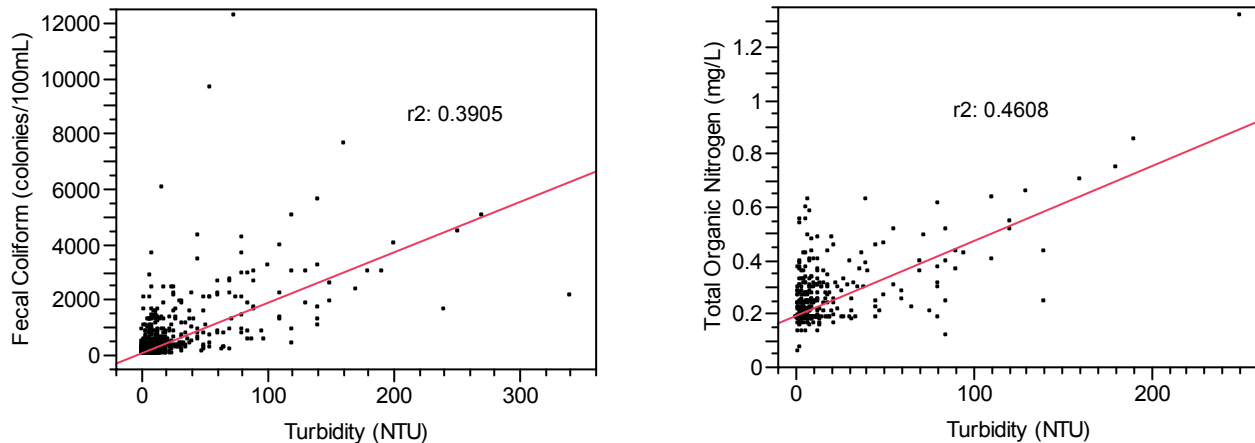


WATER QUALITY ANALYSIS

Basinwide Correlations

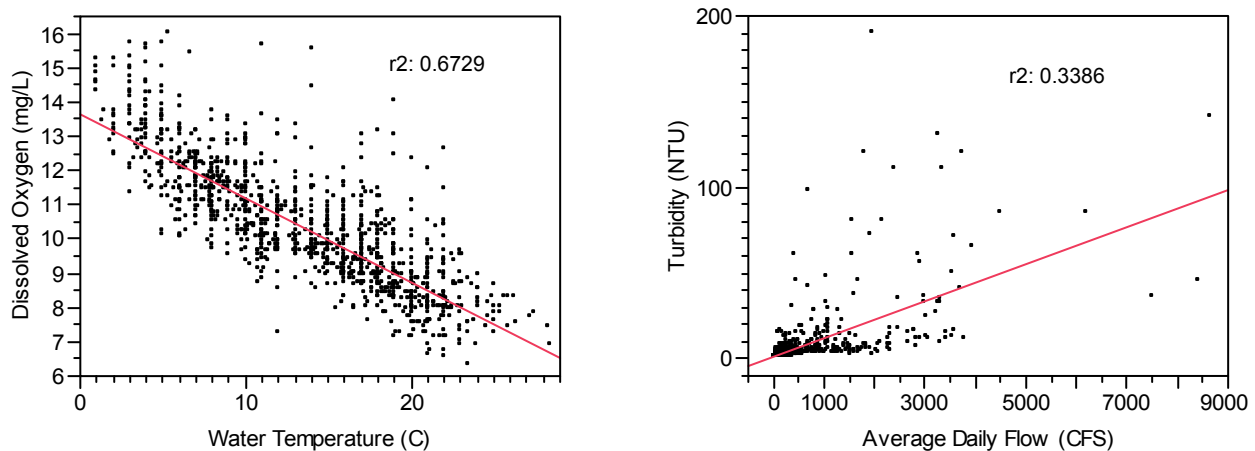
Looking for correlations between the various water quality parameters gives insight into the possible causes of water quality problems, as well as helping to differentiate natural impacts from anthropogenic ones. The following four correlations are the strongest linear correlations that apply to the entire French Broad River Basin.

Figure 7. Fecal Coliform & Total Organic Nitrogen vs. Turbidity



Turbidity and fecal coliform are both related to high flow rain events. Heavy rains wash sediment along with fecal matter into rivers and streams. High flows can also churn up sediment from stream bottoms, which can include fecal coliform. Total Organic Nitrogen is typically present in decomposing organic matter, and likewise can be washed in or stirred up during high flow events. Both fecal matter and decaying organic matter will contribute to turbidity.

Figure 8. Dissolved Oxygen vs. Water Temperature & Turbidity vs. Water Flow

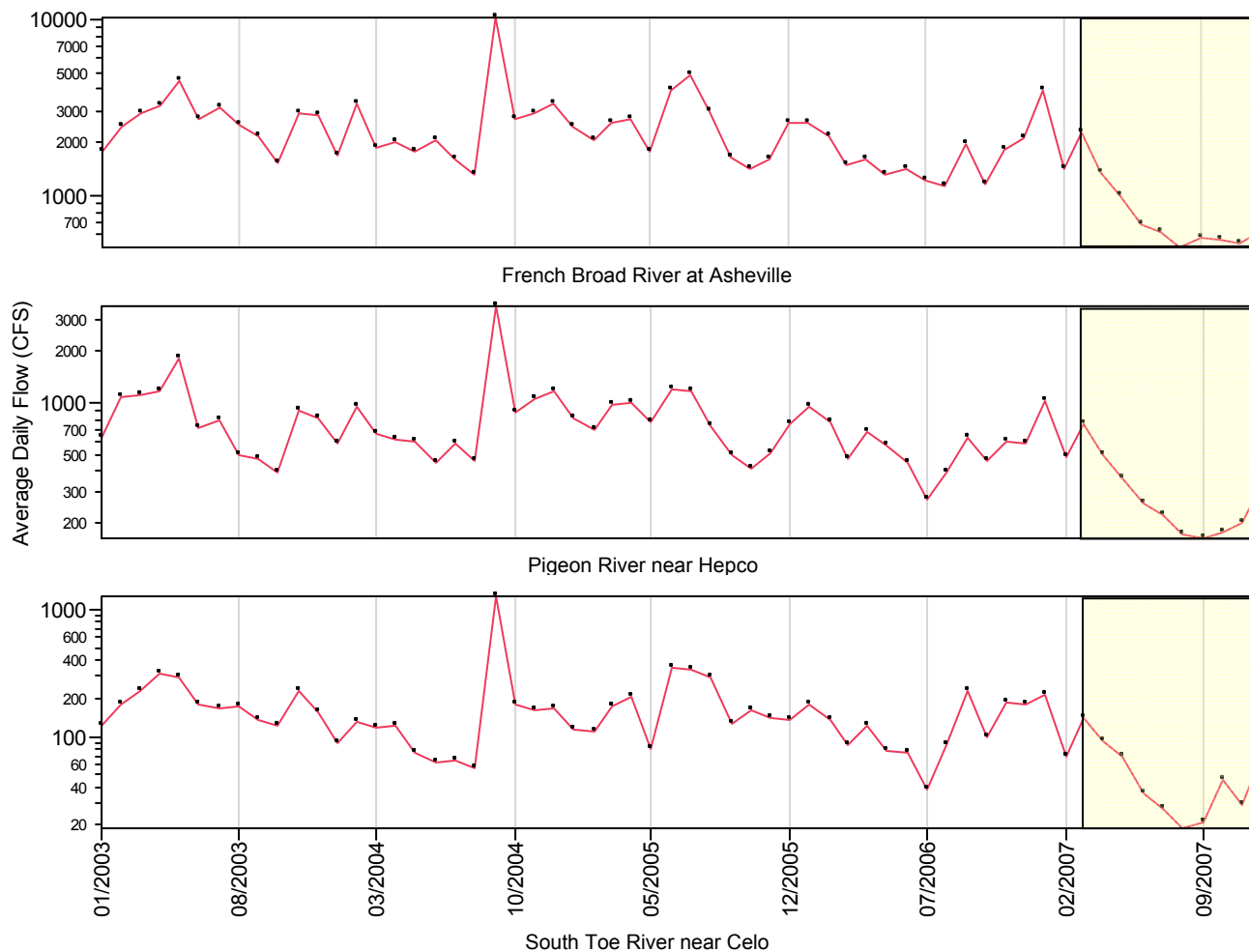


The ability of oxygen to dissolve into water is significantly impacted by water temperature. The warmer the water is, the less that can be dissolved into it. This basic physical property of water is reflected in the graph. Other causes of correlation between water temperature and dissolved oxygen include increased biological activity at higher temperatures (more oxygen consumed), and less agitation of the water during summer droughts (less oxygen mixing into the water). As stated above, turbidity correlates with flow. Turbidity, fecal coliform, various forms of organic nitrogen, and phosphorous all correlate positively with flow throughout the basin. All these are related to increased runoff and agitation of stream bed sediment during periods of high flow.

Stream Flow and Drought

The rate at which a volume of water moves through a stream (the flow rate) can have an impact on the measurement of other parameters. In particular, droughts can have major effects on parameters such as dissolved oxygen, turbidity, pH, and others by dropping stream flow. Therefore it is useful to track changes in stream flow over the course of the assessment period, to see when drought or high flow events might be present. A significant drought affected the French Broad River Basin from March 2007 to beyond the end of the assessment period.

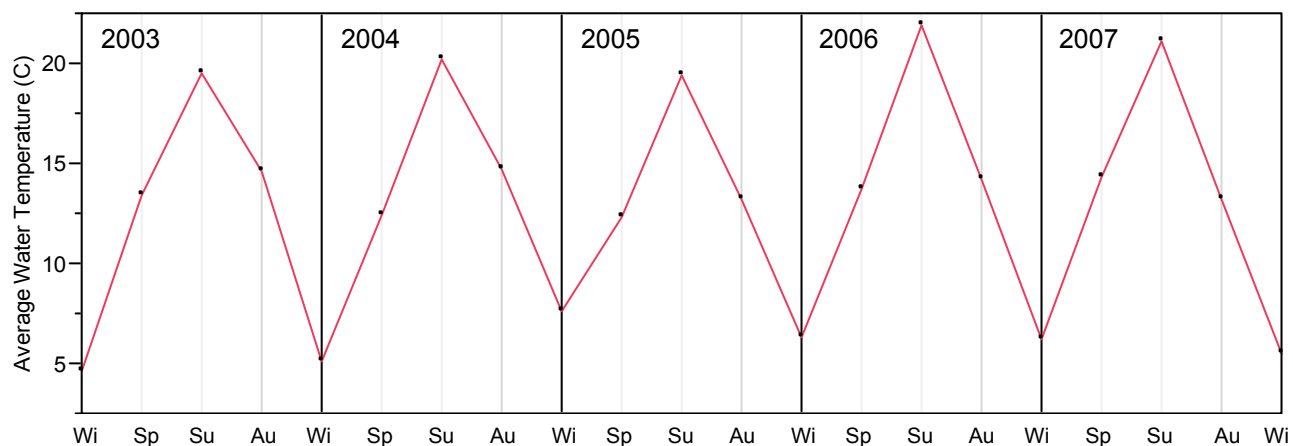
Figure 9. Average Monthly Flow at Three Locations in the French Broad River Basin



Seasonal Variation

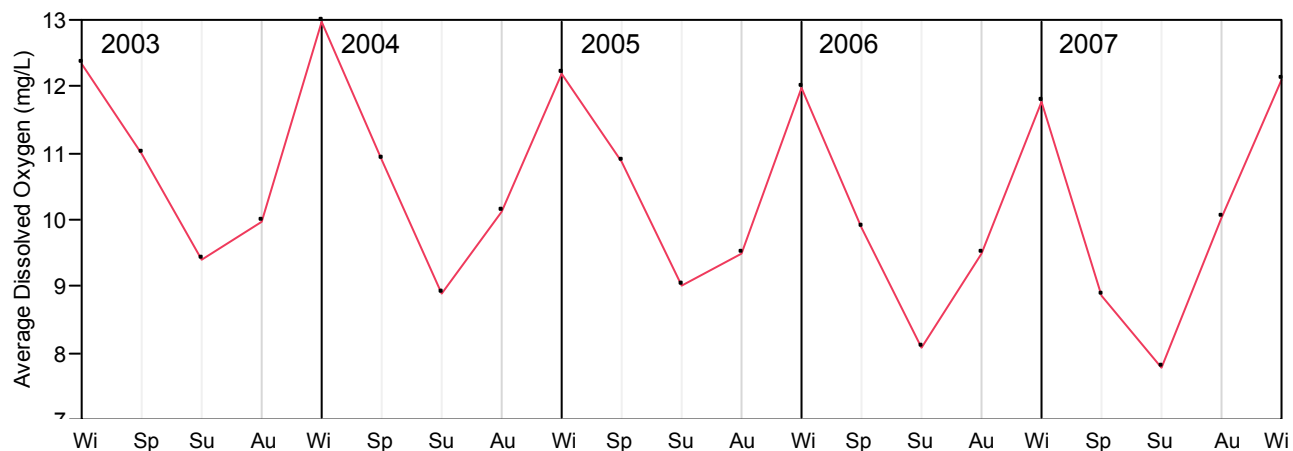
Many water quality parameters vary from season to season. By comparing seasonal averages, we can better understand the natural cycles, and more easily discern natural variation from anthropomorphic impacts in the French Broad. We assess whether a parameter has seasonal variation by checking for seasonal autocorrelation: correlation between the same season in different years for a single parameter. In the following graphs each point represents an average of all results for a parameter in one season in one year. For example, if the results for summer 2003 and summer 2004 are high and similar, and the results for winter 2003 and 2004 are low and similar, then seasonal autocorrelation is present.

Figure 10. Seasonal Variation in Water Temperature



Over 78% of variation in water temperature can be explained by the seasonal cycle. That water temperature varies seasonally is not a surprise. However, it is a reminder that strong seasonal pressures are present in water quality parameters.

Figure 11. Seasonal Variation in Dissolved Oxygen

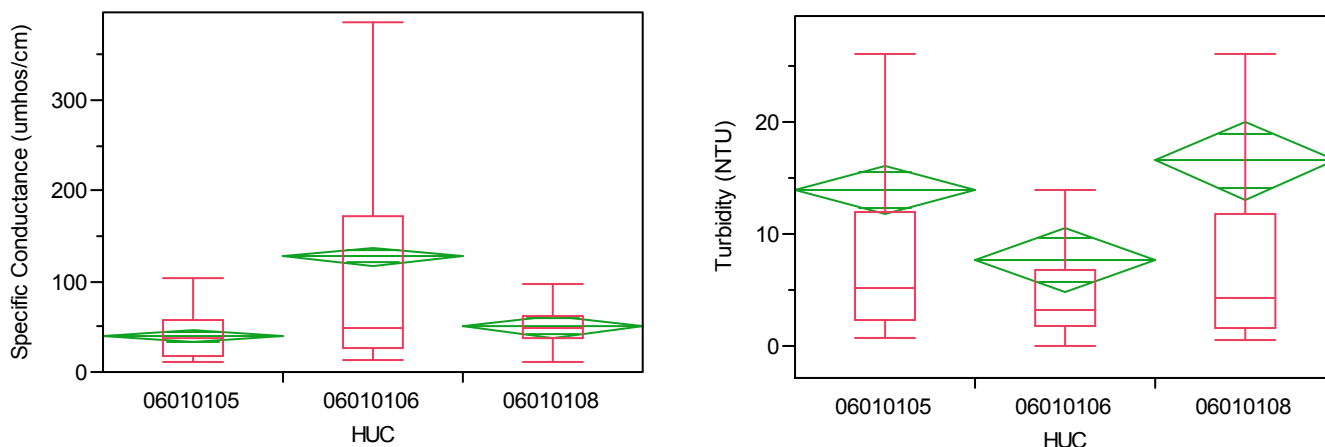


Over 74% of the variation in dissolved oxygen can be explained by the seasonal cycle. In this case, it is related to the physical properties of dissolved oxygen, utilization of dissolved oxygen in biological systems, and the effect of flow rate (as explained in the Basinwide Correlations section).

Comparing Hydrologic Regions

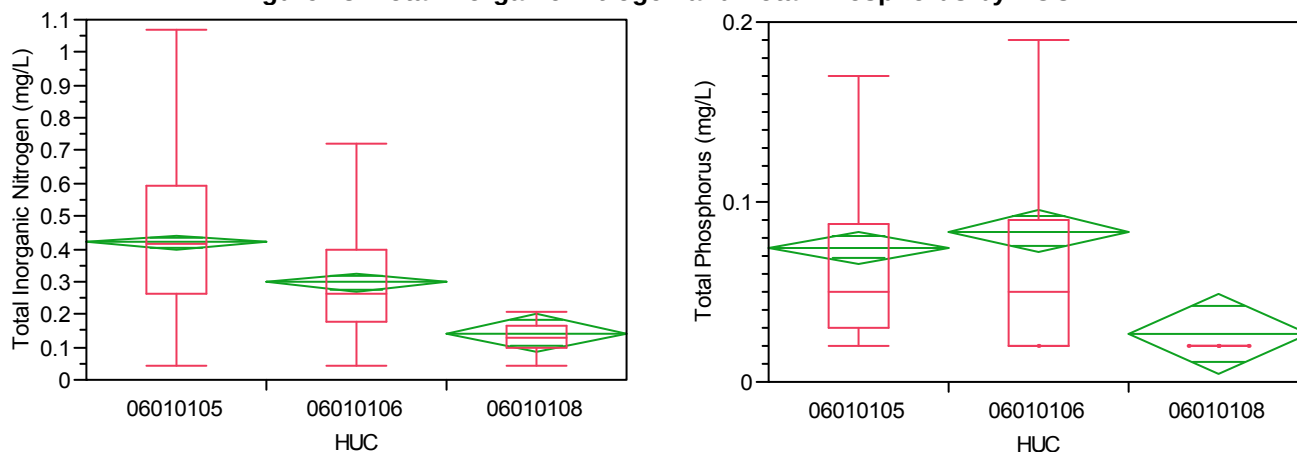
Comparisons between the three hydrologic unit codes (HUCs) are illustrated with box and whisker plots. For each box plot, the data for each station in the HUC is composited. For HUC locations, refer to **Figure 2**, and **Table 4**. Refer to **Figure 4** and **Figure 5** for a description of box and whisker plots. In the following discussion, each HUC is referred to by its last two digits, e.g. HUC 03020101 is HUC01.

Figure 12. Fecal Coliform and Turbidity By HUC



Specific conductance in HUC 06010106 (the Pigeon River and tributaries) appears to be elevated compared to the rest of the basin. This may be caused by effluent from the Champion Paper Mill, as the elevated conductance first appears downstream of the mill effluent, and continues further downstream. If Pigeon River stations are not included in the average, the Pigeon River HUC is similar to the other HUCs. Turbidity is low throughout the basin. High turbidity can typically be caused by runoff or disturbance of stream sediments. Observe that the mean turbidity is noticeably higher than the median in each HUC. This is caused by a few large flow events that were accompanied by heavy sediment load. These events are not numerous enough to raise the median.

Figure 13. Total Inorganic Nitrogen and Total Phosphorus by HUC



Inorganic Nitrogen and total Phosphorus are commonly correlated with population and/or livestock centers. Nitrogen and phosphorus are ingredients in fertilizer, and are also found in wastewater effluent. Therefore both agriculture, urban, and suburban areas will tend to have higher nitrogen and phosphorus concentrations than undeveloped areas. HUC 06010105 includes the Asheville area, which likely explains the higher Inorganic Nitrogen concentration there. HUC 06010108 is less developed than the other two, however there is only one station in that HUC that collected significant nutrient data during the monitoring period, so the displayed average may not be accurate for the whole HUC. These concentrations are all low when compared to other more developed portions of the state. Inorganic Nitrogen concentrations in the Charlotte area for the same time period are approximately 10 times greater than these.

Significant Issues

Significant issues in the basin are discussed in this section. Information on other parameters or other stations can be found in **Appendix A** (station summary sheets) and **Appendix B** (box plots). Box plots were constructed for each of the following parameters: water temperature, dissolved oxygen, pH, specific conductance, turbidity, fecal coliform, ammonia, total kjeldahl nitrogen, total nitrates and nitrites, and total phosphorus.

Fecal Coliform

Sources of fecal coliform include surface runoff from livestock operations, residential areas, and urban areas. Sources also include sewer overflows, failed septic tanks, or malfunctioning wastewater treatment plants. Fecal coliform may also already be in the stream sediment, and be stirred up by heavy flow.

Fecal coliform results are screened using annual summaries of ambient sampling results. When the screenings indicate that the standard may have been violated, the standard is assessed by collecting five samples within 30 days. Priority for assessment of the standard is given to waters with Class B (recreational) uses. Some Class B waters in the French Broad River basin have exceeded the fecal coliform evaluation level and have been assessed for compliance with the standard.

Based on the screening results, nine stations were assessed for compliance with the standard from 2003 to 2007. Four of the nine locations were found to violate the fecal coliform standard. The other five did not violate the standard. The results of these “5 in 30” standard assessments are summarized in **Table 8**. There are also some stations that are not used for recreation that exceeded the evaluation level. In keeping with North Carolina’s methodology, these stations will be assessed for the standard as resources permit.

Table 8. Fecal Coliform Standard Assessments 2003-2007

Station	Location	Year	Percent Exceedance of 400 col/100 mL	Geomean (std 200 col/100 mL)
E0150000	French Broad River at US 178 at Rosman	2006	0%	24
E1270000	French Broad River at SR 1503 at Blantyre	2006	0%	57
E2730000	French Broad River at SR 3495 at Skyland	2003	40%	151
		2004	50%	850
E4280000	French Broad River at SR 1348 at Asheville	2003	20%	148
		2004	20%	90
		2007	0%	30
E4770000	French Broad River at SR 1634 at Alexander	2004	0%	41
E5120000	French Broad River at Blennerhasset Is at Marshall	2005	20%	207
E6110000	Richland Creek at SR 1642 at Clyde	2003	80%	881
E9990000	Nolichucky River beside SR 1321 at Poplar	2005	20%	74
Not Ambient	Swannanoa River at Black Mtn Rec Park	2005	80%	678

When the ambient data from 2003 through 2007 is taken together, ten out of 24 stations in the basin (see **Table 6**) have exceeded the evaluation level of 400 colonies per 100mL more than 20% of the time. Three of those stations also exceeded a fecal coliform geomean 200 colonies per 100mL. Four of the ten stations (E2730000, E4280000, E6110000, and E9990000) are Class B waters and were assessed with “5 in 30” sampling. Two of those four (E2730000 and E6110000) were found to be impaired, and were added to the 303(d) list in 2006. **Figure 16** illustrates the geographic spread of fecal coliform exceedances.

In 2005 a situation that likely contributed to the fecal coliform violations on the French Broad was discovered. A small dairy farm was found siphoning waste from their waste lagoon into an unnamed tributary of the French Broad River, upstream of E2730000. Fecal coliform counts in the tributary were over 60,000 colonies per 100mL. Once discovered, this discharge was stopped and significant improvement has been seen in the unnamed tributary.

Turbidity

Ten out of 24 stations in the basin (see **Table 6**) have exceeded the evaluation level of either 10 NTU (for trout streams) or 50 NTU (for all other waters) over the five-year time period more than 10% of the time. As stated in the Basinwide Correlation section, turbidity is correlated to stream flow. Heavy rains in developed areas where stream buffers are insufficient can result in sediment-laden water being added to the river, or in stream bottom sediments being re-suspended. In recent years residential and commercial development has increased significantly in the French Broad river basin, increasing the effect of heavy rains on stream turbidity. **Figure 15** illustrates turbidity through the basin.

pH

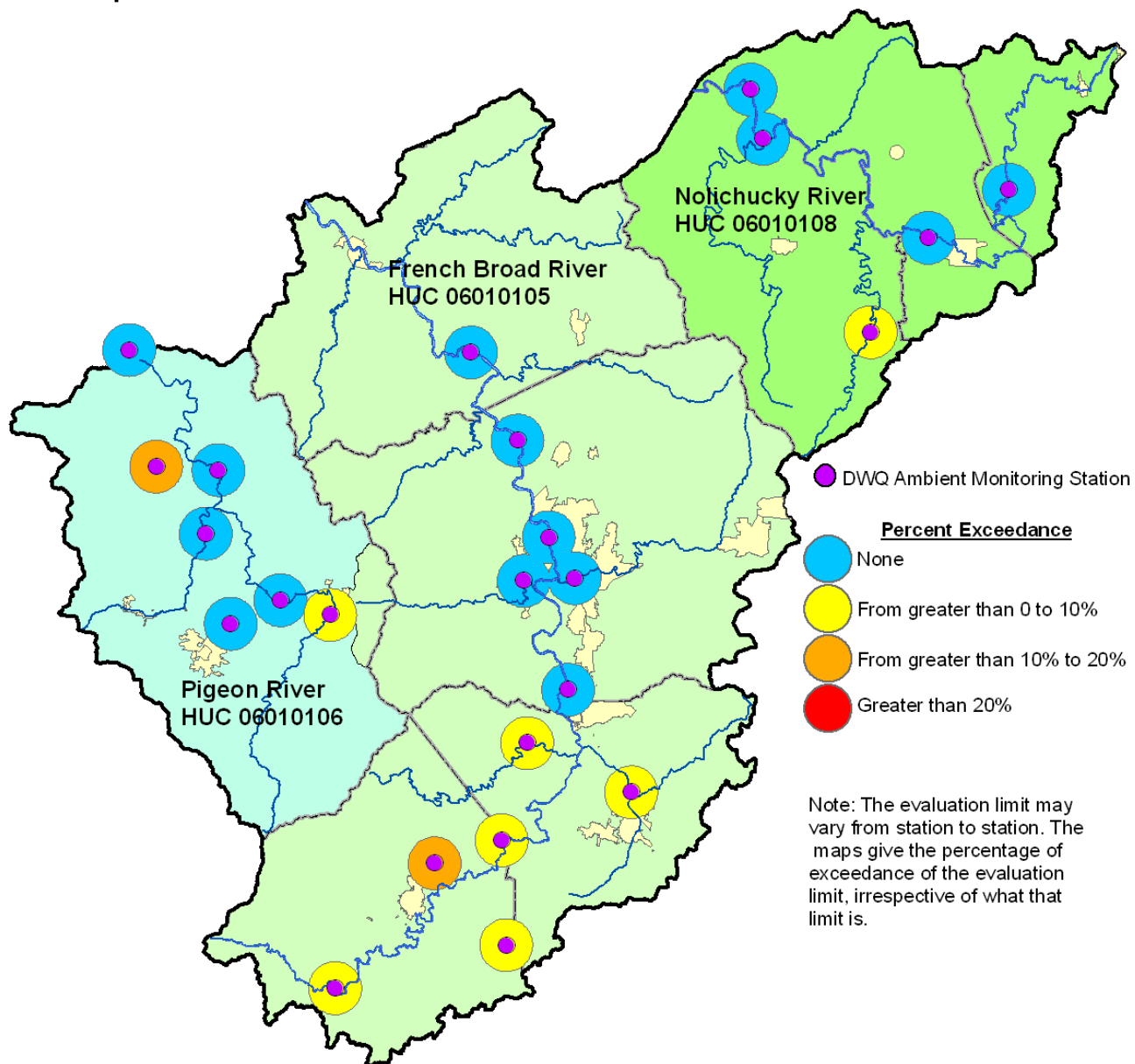
Two of 24 stations in the basin (see **Table 6**) have exceeded the evaluation level of less than six SU over the five year time period more than 10% of the time. The stations are both located in relatively undisturbed areas. One (E6450000) is located within the boundary of the Great Smoky Mountains National Park, and the other (E0850000) is downstream of Pisgah National Forest land. One potential source of low pH is rockfalls and road construction. There are many rock formations in the Southern Appalachians that contain graphitic-sulfidic rocks that when exposed by construction activities or rockfall create acidic runoff. **Figure 14** illustrates pH throughout the basin.

Basinwide Assessment

The following maps help to assess the basin as a whole.

Figure 14. pH in the French Broad River Basin

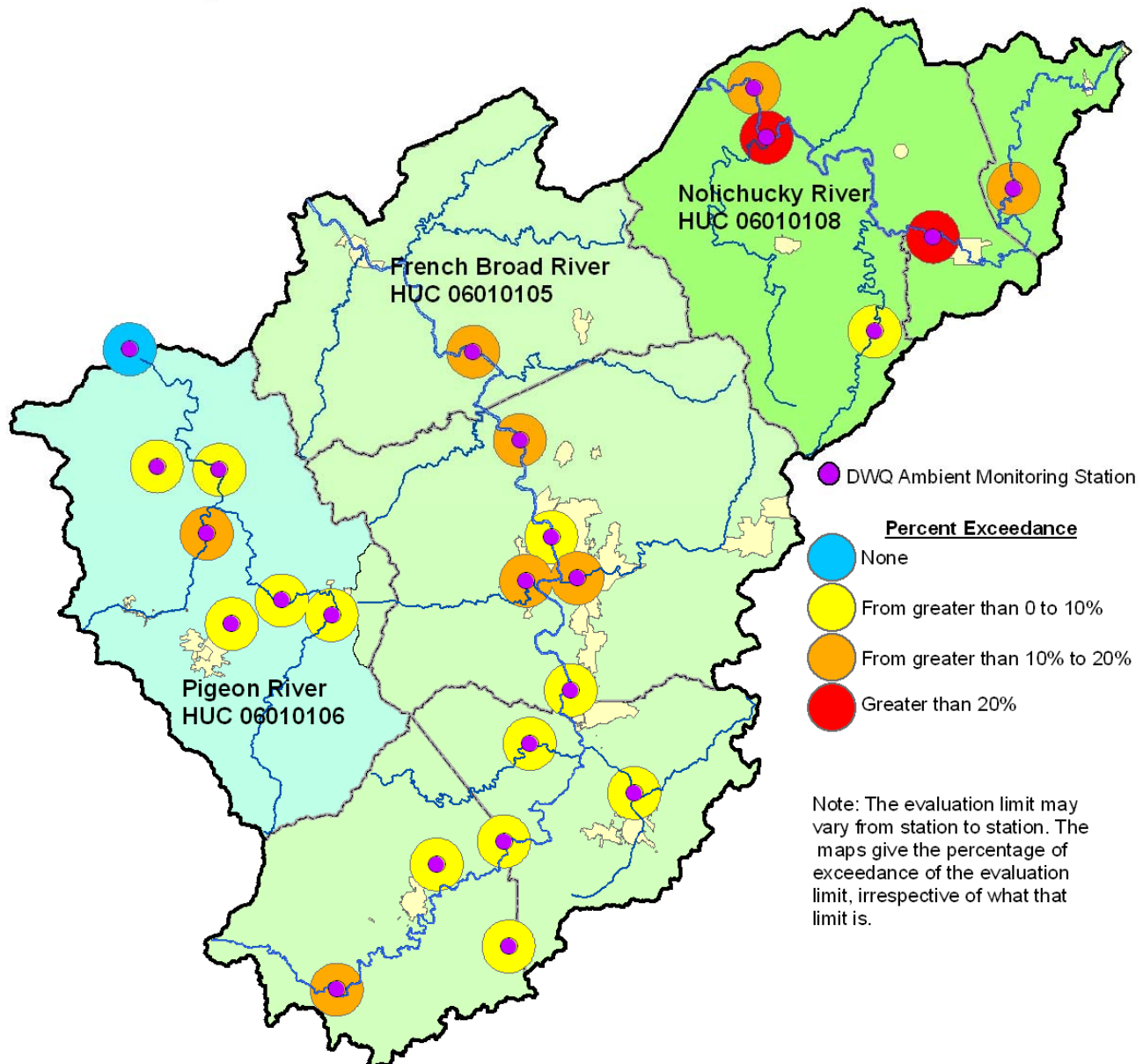
pH Percent Exceedance of Evaluation Levels



All the stations with exceedances are in the upper portions of the basin or in smaller tributaries, where the impact of population is less. The source of the pH violations may be related to natural conditions or agriculture.

Figure 15. Turbidity in the French Broad River Basin

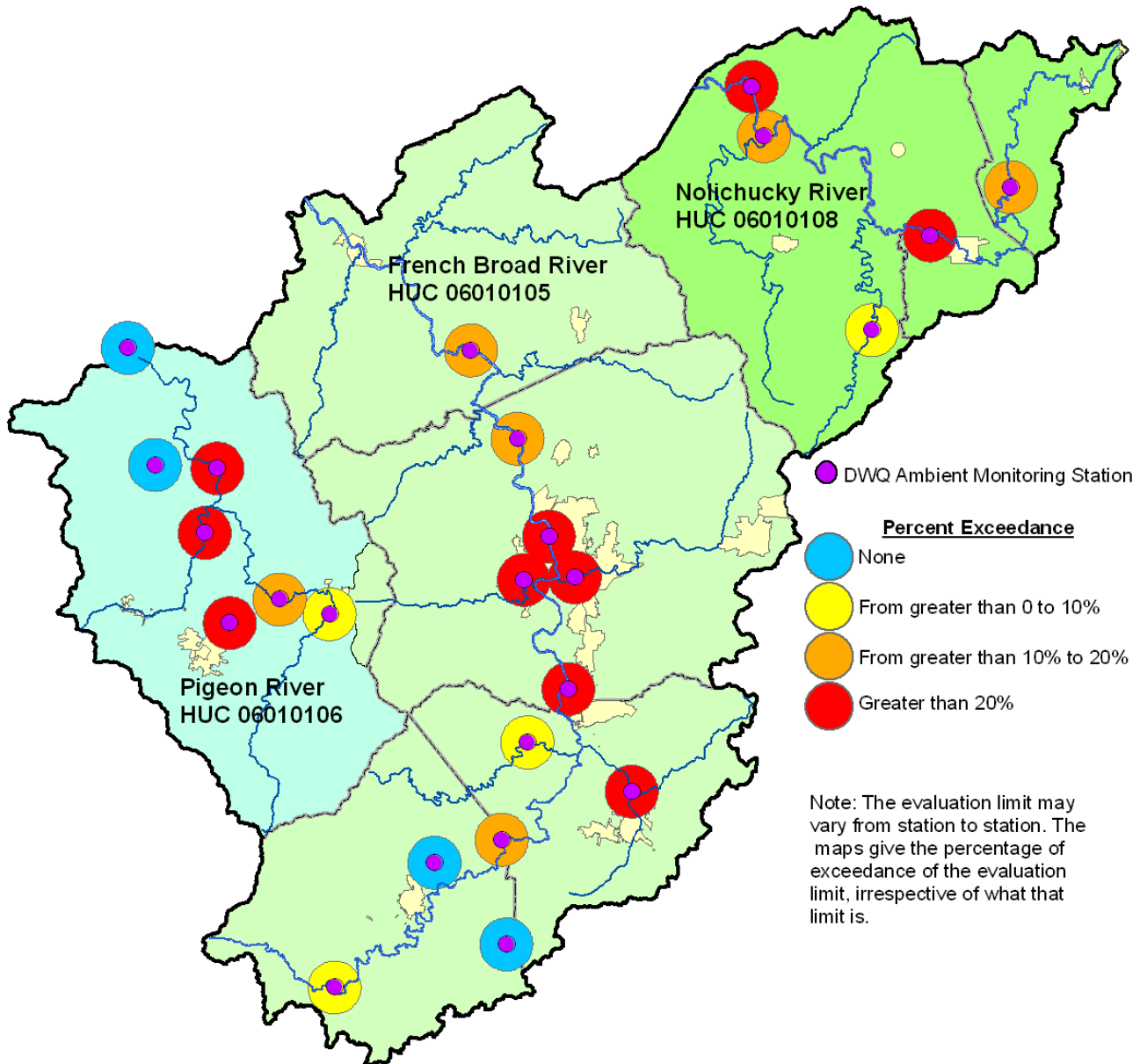
Turbidity Percent Exceedance of Evaluation Levels



Every station in the basin has occasionally exceeded the turbidity standard. One episode of heavy rain is enough to cause an exceedance in areas where there are not thick vegetative buffers surrounding the rivers and streams, either by introduction of new sediment into the stream or by scouring the banks of the stream. In and downstream of urban areas, turbidity exceedances may also be due to the turbidity of wastewater treatment plant effluent, or storm sewer runoff. Many agricultural areas are lacking in vegetative buffers as well.

Figure 16. Fecal Coliform in the French Broad River Basin

Fecal Coliform Percent Exceedance of Evaluation Levels



Areas with elevated concentrations of fecal coliform appear to be widespread throughout the basin. Some of these high concentrations may be related to wastewater treatment plants, or runoff from agricultural, suburban, or urban areas. Several of these sites are Class B waters, and have been assessed for violation of the standard, as stated in the previous section. Waters that exceed the evaluation limit but are not Class B waters will be assessed for violation of the standard as resources permit.

Appendix A: Station Summary Sheets

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: FRENCH BROAD RIV AT US 178 AT ROSMAN

Station #: E0150000

Hydrologic Unit Code: 06010105

Latitude: 35.14200 **Longitude:** -82.82401

Stream class: B Tr

Agency: NCAMBNT

NC stream index: 6-(1)

Time period: 01/29/2003 to 12/19/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	51	0	<6	0	0		8	8.6	9.5	10.4	11.7	12.7	14.9
pH (SU)	53	0	<6	2	3.8		5.6	6.1	6.6	6.7	6.9	7	7.5
	53	0	>9	0	0		5.6	6.1	6.6	6.7	6.9	7	7.5
Spec. conductance (umhos/cm at 25°C)	52	0	N/A				13	14	15	16	19	21	60
Water Temperature (°C)	53	0	>29	0	0		2	4.8	9.1	12.5	17	18.4	20.4
Other													
TSS (mg/L)	21	11	N/A				2.5	2.5	2.5	4	6.4	7.5	53
Turbidity (NTU)	54	3	>10	6	11.1	70.7	1	1.3	1.8	2.6	5.7	12.5	60
Nutrients (mg/L)													
NH3 as N	48	24	N/A				0.02	0.02	0.02	0.02	0.03	0.04	0.05
NO2 + NO3 as N	48	0	N/A				0.09	0.11	0.13	0.17	0.27	0.44	0.55
TKN as N	48	38	N/A				0.2	0.2	0.2	0.2	0.2	0.24	0.29
Total Phosphorus	48	1	N/A				0.02	0.02	0.03	0.04	0.06	0.07	0.08
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				82	89	125	210	345	976	2400
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>0.4	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	16	>7	0	0		2	2	2	2	2	2	4
Iron, total (Fe)	17	0	>1000	1	5.9		84	90	115	200	310	680	1600
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	14	>50	0	0		10	10	10	10	10	21	25

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
54	38	5	9

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf : States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: DAVIDSON RIV AT US 64 NR BREVARD

Station #: E0850000

Hydrologic Unit Code: 06010105

Latitude: 35.27300

Longitude: -82.70600

Stream class: WS-V B Tr

Agency: NCAMBNT

NC stream index: 6-34-(15.5)

Time period: 01/29/2003 to 12/19/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	50	0	<6	0	0		8	8.9	9.5	10.3	11.6	12.7	15
pH (SU)	52	0	<6	8	15.4	92.9	5.6	5.7	6.1	6.5	6.6	6.9	7.2
	52	0	>9	0	0		5.6	5.7	6.1	6.5	6.6	6.9	7.2
Spec. conductance (umhos/cm at 25°C)	51	0	N/A				10	12	13	14	15	16	26
Water Temperature (°C)	52	0	>29	0	0		2	3.6	7.9	11.1	17	18.1	19.3
Other													
Chlorophyll a (ug/L)	1	1	>15	0	0		1	1	1	1	1	1	1
TSS (mg/L)	20	15	N/A				2.4	2.5	2.5	2.5	3.3	6.9	17
Turbidity (NTU)	53	22	>10	1	1.9		1	1	1	1.1	1.9	4	12
Nutrients (mg/L)													
NH3 as N	1	1	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
NO2 + NO3 as N	1	0	>10	0	0		0.05	0.05	0.05	0.05	0.05	0.05	0.05
TKN as N	1	1	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Phosphorus	1	0	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
Metals (ug/L)													
Aluminum, total (Al)	17	4	N/A				50	50	52	87	130	268	620
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>0.4	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	16	>7	0	0		2	2	2	2	2	2	2
Iron, total (Fe)	17	5	>1000	0	0		50	50	50	82	115	236	500
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Manganese, total (Mn)	17	16	>200	0	0		10	10	10	10	10	12	20
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>25	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	15	>50	0	0		10	10	10	10	10	12	14

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
53	18	0	0

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: LITTLE RIV UPS HIGH FALLS AT DUPONT PLANT NR CEDAR MOUNTAIN
Station #: E1130000 **Hydrologic Unit Code:** 06010105
Latitude: 35.19238 **Longitude:** -82.61308 **Stream class:** C Tr
Agency: NCAMBNT **NC stream index:** 6-38-(1)

Time period: 01/29/2003 to 12/05/2006

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	45	0	<6	0	0		7.1	8	8.8	9.8	10.8	11.6	14.2
pH (SU)	46	0	<6	2	4.3		5.6	6.1	6.3	6.5	6.7	7	7.5
	46	0	>9	0	0		5.6	6.1	6.3	6.5	6.7	7	7.5
Spec. conductance (umhos/cm at 25°C)	46	0	N/A				13	14	15	16	18	18	25
Water Temperature (°C)	46	0	>29	0	0		3	5.6	10	13.2	19	20	21.5
Other													
TSS (mg/L)	17	10	N/A				2.4	2.5	2.5	2.5	4.7	8	13
Turbidity (NTU)	46	0	>10	1	2.2		1.1	1.2	1.4	1.7	3.1	6.6	16
Nutrients (mg/L)													
NH3 as N	1	1	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
NO2 + NO3 as N	1	0	N/A				0.03	0.03	0.03	0.03	0.03	0.03	0.03
TKN as N	1	1	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Phosphorus	1	0	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
Metals (ug/L)													
Aluminum, total (Al)	16	0	N/A				54	68	76	104	210	559	790
Arsenic, total (As)	16	16	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	16	16	>0.4	0	0		2	2	2	2	2	2	2
Chromium, total (Cr)	16	16	>50	0	0		25	25	25	25	25	25	25
Copper, total (Cu)	16	15	>7	0	0		2	2	2	2	2	2	2
Iron, total (Fe)	16	0	>1000	0	0		180	201	220	280	352	518	630
Lead, total (Pb)	16	16	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	16	16	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	16	13	>50	0	0		10	10	10	10	10	35	50

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
46	35	0	0

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf : States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: FRENCH BROAD RIV AT SR 1503 AT BLANTYRE

Station #: E1270000

Hydrologic Unit Code: 06010105

Latitude: 35.29898

Longitude: -82.62364

Stream class: B

Agency: NCAMBNT

NC stream index: 6-(27)

Time period: 01/29/2003 to 12/06/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	51	0	<4	0	0		6.7	7.5	8.5	9.6	10.8	11.9	14.5
	51	0	<5	0	0		6.7	7.5	8.5	9.6	10.8	11.9	14.5
pH (SU)	53	0	<6	2	3.8		5.8	6.2	6.4	6.5	6.7	6.9	10.6
	53	0	>9	1	1.9		5.8	6.2	6.4	6.5	6.7	6.9	10.6
Spec. conductance (umhos/cm at 25°C)	52	0	N/A				16	20	21	24	27	28	31
Water Temperature (°C)	53	0	>29	0	0		4	5.1	9.8	13.4	19	21	22.1
Other													
TSS (mg/L)	21	4	N/A				2.5	2.8	5	8.4	16.5	31.4	50
Turbidity (NTU)	54	0	>50	1	1.9		1.6	2.5	3.1	4.8	12.2	27	60
Nutrients (mg/L)													
NH3 as N	1	0	N/A				0.07	0.07	0.07	0.07	0.07	0.07	0.07
NO2 + NO3 as N	1	0	N/A				0.16	0.16	0.16	0.16	0.16	0.16	0.16
TKN as N	1	1	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Phosphorus	1	0	N/A				0.03	0.03	0.03	0.03	0.03	0.03	0.03
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				110	142	230	310	995	2020	2100
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>2	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	15	>7	0	0		2	2	2	2	2	3	4
Iron, total (Fe)	17	0	>1000	3	17.6	91.7	200	224	265	410	855	1520	1600
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	11	>50	0	0		10	10	10	10	14	18	23

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
54	82	6	11

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: MILLS RIV AT END OF SR 1337 NR MILLS RIVER

Station #: E1490000

Hydrologic Unit Code: 06010105

Latitude: 35.39900 **Longitude:** -82.59600

Stream class: WS-II Tr HQW

Agency: NCAMBNT

NC stream index: 6-54-(1)

Time period: 01/15/2003 to 12/06/2007

	# results	# ND	EL	#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	50	0	<6	0	0		7.5	8.6	9.4	10.8	12	13.1	13.8
pH (SU)	50	0	<6	1	2		5.7	6.1	6.5	6.6	6.8	6.9	7.2
	50	0	>9	0	0		5.7	6.1	6.5	6.6	6.8	6.9	7.2
Spec. conductance (umhos/cm at 25°C)	47	0	N/A				12	13	14	15	16	17	21
	1	1	N/A				15	15	15	15	15	15	15
Water Temperature (°C)	50	0	>29	0	0		2	4.1	7	14	17	19	22.7
Other													
TSS (mg/L)	20	15	N/A				2.3	2.3	2.5	2.5	4.9	11.4	38
Turbidity (NTU)	51	7	>10	3	5.9		0.8	1	1.1	1.9	3.3	6.9	45
Nutrients (mg/L)													
NH3 as N	46	43	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.05
NO2 + NO3 as N	46	1	>10	0	0		0.02	0.04	0.06	0.07	0.09	0.12	0.55
TKN as N	46	41	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.34
Total Phosphorus	46	21	N/A				0.02	0.02	0.02	0.02	0.02	0.05	0.2
Metals (ug/L)													
Aluminum, total (Al)	18	3	N/A				50	50	59	84	158	567	1800
Arsenic, total (As)	18	18	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	18	18	>0.4	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	18	18	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	18	16	>7	0	0		2	2	2	2	2	2	2
Iron, total (Fe)	18	0	>1000	1	5.6		53	61	71	110	192	537	1500
Lead, total (Pb)	18	18	>25	0	0		10	10	10	10	10	10	10
Manganese, total (Mn)	18	12	>200	0	0		10	10	10	10	11	27	120
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	18	18	>25	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	18	18	>50	0	0		10	10	10	10	10	10	10

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
51	64	5	10

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: MUD CRK AT SR 1508 NR BALFOUR

Station #: E2120000

Hydrologic Unit Code: 06010105

Latitude: 35.35267 **Longitude:** -82.46420

Stream class: C

Agency: NCAMBNT

NC stream index: 6-55

Time period: 01/15/2003 to 12/06/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	50	0	<4	0	0		6.5	7.2	7.9	9.2	10.9	12.2	14.2
	50	0	<5	0	0		6.5	7.2	7.9	9.2	10.9	12.2	14.2
pH (SU)	50	0	<6	1	2		5.8	6.3	6.5	6.7	6.8	6.9	7
	50	0	>9	0	0		5.8	6.3	6.5	6.7	6.8	6.9	7
Spec. conductance (umhos/cm at 25°C)	48	0	N/A				50	53	56	60	63	65	68
	1	0	N/A				59	59	59	59	59	59	59
Water Temperature (°C)	51	0	>29	0	0		3	5.5	8	15	19	20.8	23.5
Other													
TSS (mg/L)	20	1	N/A				3.2	3.2	4	8.4	11.8	19.9	38
Turbidity (NTU)	52	0	>50	3	5.8		2	3.6	5.3	7.8	16.2	45	90
Nutrients (mg/L)													
NH3 as N	47	8	N/A				0.02	0.02	0.02	0.03	0.04	0.06	0.11
NO2 + NO3 as N	47	0	N/A				0.06	0.47	0.53	0.6	0.7	0.78	0.86
TKN as N	47	13	N/A				0.2	0.2	0.2	0.24	0.32	0.39	0.48
Total Phosphorus	47	0	N/A				0.02	0.03	0.03	0.05	0.07	0.12	0.22
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				120	144	210	400	730	1280	2400
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>2	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	17	12	>7	0	0		2	2	2	2	3	5	6
Iron, total (Fe)	17	0	>1000	2	11.8	76.2	360	376	490	540	890	1320	2200
Lead, total (Pb)	17	16	>25	1	5.9		10	10	10	10	10	13	27
Mercury, total (Hg)	15	15	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	10	>50	1	5.9		10	10	10	10	18	104	430

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400:	%Conf:
52	359	21	40	100

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: FRENCH BROAD RIV AT SR 3495 GLENN BRIDGE RD NR SKYLAND
Station #: E2730000 **Hydrologic Unit Code:** 06010105
Latitude: 35.45486 **Longitude:** -82.54743 **Stream class:** B
Agency: NCAMBNT **NC stream index:** 6-(54.5)

Time period: 01/15/2003 to 12/10/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	51	0	<4	0	0		6.3	7.6	8.2	9.8	11.1	12.2	13.3
	51	0	<5	0	0		6.3	7.6	8.2	9.8	11.1	12.2	13.3
pH (SU)	51	0	<6	0	0		6.2	6.4	6.7	6.8	6.9	7	8.2
	51	0	>9	0	0		6.2	6.4	6.7	6.8	6.9	7	8.2
Spec. conductance (umhos/cm at 25°C)	49	0	N/A				29	31	34	36	39	43	47
	1	0	N/A				37	37	37	37	37	37	37
Water Temperature (°C)	52	0	>29	0	0		3	6	8.1	14.5	19.7	21	25.4
Other													
TSS (mg/L)	19	1	N/A				2.4	3.2	4	11	18	26	78
Turbidity (NTU)	53	0	>50	5	9.4		1.5	3	4.4	8.1	15.5	53	140
Nutrients (mg/L)													
NH3 as N	48	15	N/A				0.02	0.02	0.02	0.02	0.03	0.04	0.07
NO2 + NO3 as N	48	0	N/A				0.24	0.27	0.3	0.33	0.38	0.43	0.57
TKN as N	48	25	N/A				0.2	0.2	0.2	0.2	0.25	0.34	0.35
Total Phosphorus	48	0	N/A				0.03	0.04	0.05	0.06	0.1	0.15	0.28
Metals (ug/L)													
Aluminum, total (Al)	18	0	N/A				130	139	202	385	712	1360	2800
Arsenic, total (As)	18	18	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	18	18	>2	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	18	18	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	18	14	>7	0	0		2	2	2	2	2	4	4
Iron, total (Fe)	18	0	>1000	1	5.6		240	249	320	485	812	1150	2500
Lead, total (Pb)	18	18	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	18	18	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	18	13	>50	0	0		10	10	10	10	11	13	15
Fecal Coliform Screening(#/100mL)													
# results:	Geomean	# > 400:	% > 400:	%Conf:									
53	156	11	21	63.3									

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: HOMINY CRK AT SR 3413 NR ASHEVILLE

Station #: E3520000

Hydrologic Unit Code: 06010105

Latitude: 35.56422 **Longitude:** -82.60777

Stream class: C

Agency: NCAMBNT

NC stream index: 6-76

Time period: 01/15/2003 to 12/10/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	49	0	<4	0	0		7.7	8.1	8.7	9.8	11.3	13	13.7
	49	0	<5	0	0		7.7	8.1	8.7	9.8	11.3	13	13.7
pH (SU)	49	0	<6	0	0		6.3	6.7	6.9	7	7.1	7.2	7.4
	49	0	>9	0	0		6.3	6.7	6.9	7	7.1	7.2	7.4
Spec. conductance (umhos/cm at 25°C)	46	0	N/A				48	58	62	70	74	80	104
	1	0	N/A				59	59	59	59	59	59	59
Water Temperature (°C)	49	0	>29	0	0		2	6	8.3	16	20.1	21.4	25.6
Other													
TSS (mg/L)	20	0	N/A				2.5	2.9	3.7	7.2	28	46	140
Turbidity (NTU)	51	0	>50	7	13.7	86.7	1.4	3.5	5.3	10	23	77	250
Nutrients (mg/L)													
NH3 as N	45	14	N/A				0.02	0.02	0.02	0.02	0.03	0.06	0.78
NO2 + NO3 as N	45	0	N/A				0.03	0.39	0.45	0.51	0.59	0.63	0.66
TKN as N	45	21	N/A				0.2	0.2	0.2	0.2	0.26	0.48	1.5
Total Phosphorus	45	1	N/A				0.02	0.02	0.03	0.05	0.07	0.15	0.53
Metals (ug/L)													
Aluminum, total (Al)	18	0	N/A				92	117	155	300	1325	2910	3000
Arsenic, total (As)	18	18	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	18	18	>2	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	18	18	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	18	10	>7	0	0		2	2	2	2	3	4	4
Iron, total (Fe)	18	0	>1000	6	33.3	99.9	390	390	475	640	1925	3330	4500
Lead, total (Pb)	18	18	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	18	18	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	18	10	>50	0	0		10	10	10	10	17	25	26
Fecal Coliform Screening(#/100mL)													
# results:	Geomean	# > 400:		% > 400:		%Conf:							
51	198	15		29		96.3							

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: SWANNANOVA RIV AT US 25 BILTMORE AVE AT ASHEVILLE

Station #: E4170000

Hydrologic Unit Code: 06010105

Latitude: 35.56872

Longitude: -82.54434

Stream class: C

Agency: NCAMBNT

NC stream index: 6-78

Time period: 01/15/2003 to 11/15/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	46	0	<4	0	0		7.2	8.1	8.5	10.1	11.3	12.6	14.3
	46	0	<5	0	0		7.2	8.1	8.5	10.1	11.3	12.6	14.3
pH (SU)	47	0	<6	0	0		6.1	6.6	6.8	7	7.2	7.3	7.5
	47	0	>9	0	0		6.1	6.6	6.8	7	7.2	7.3	7.5
Spec. conductance (umhos/cm at 25°C)	44	0	N/A				37	45	51	58	65	78	100
	1	0	N/A				49	49	49	49	49	49	49
Water Temperature (°C)	47	0	>29	0	0		2	6.2	8.3	16	20.5	22	26.2
Other													
TSS (mg/L)	20	5	N/A				2.3	2.4	2.5	6.2	14.5	75.3	100
Turbidity (NTU)	49	0	>50	6	12.2	78.5	1.3	1.8	3.2	5.7	12	55	130
Metals (ug/L)													
Aluminum, total (Al)	18	1	N/A				50	63	78	170	588	2300	2300
Arsenic, total (As)	18	18	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	18	18	>2	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	18	18	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	18	13	>7	1	5.6		2	2	2	2	2	5	11
Iron, total (Fe)	18	0	>1000	4	22.2	97.2	260	305	390	520	1068	3930	4200
Lead, total (Pb)	18	18	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	18	18	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	18	9	>50	1	5.6		10	10	10	10	19	31	64

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400:	%Conf:
49	187	13	27	90.3

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: FRENCH BROAD RIV AT SR 1348 AT ASHEVILLE X REF E3420000
Station #: E4280000 **Hydrologic Unit Code:** 06010105
Latitude: 35.60943 **Longitude:** -82.57841 **Stream class:** B
Agency: NCAMBNT **NC stream index:** 6-(54.5)

Time period: 01/15/2003 to 12/17/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	51	0	<4	0	0		6.7	7.9	8.9	10.2	11.4	12.8	14.5
	51	0	<5	0	0		6.7	7.9	8.9	10.2	11.4	12.8	14.5
pH (SU)	52	0	<6	0	0		6.3	6.5	6.8	7	7.3	7.6	8.5
	52	0	>9	0	0		6.3	6.5	6.8	7	7.3	7.6	8.5
Spec. conductance (umhos/cm at 25°C)	50	0	N/A				32	37	39	44	48	56	70
	1	0	N/A				40	40	40	40	40	40	40
Water Temperature (°C)	53	0	>29	0	0		2	5.9	8	16	20	22	25.8
Other													
TSS (mg/L)	20	2	N/A				2.3	2.4	4	11.5	33.2	44.4	130
Turbidity (NTU)	54	0	>50	5	9.3		1.7	2.6	4.2	8.4	20.2	61	190
Nutrients (mg/L)													
NH3 as N	48	30	N/A				0.02	0.02	0.02	0.02	0.03	0.07	0.33
NO2 + NO3 as N	48	0	N/A				0.23	0.28	0.29	0.34	0.39	0.44	0.49
TKN as N	48	21	N/A				0.2	0.2	0.2	0.2	0.31	0.43	0.92
Total Phosphorus	48	0	N/A				0.02	0.03	0.04	0.05	0.08	0.19	0.37
Metals (ug/L)													
Aluminum, total (Al)	18	0	N/A				96	118	178	495	1475	2300	3200
Arsenic, total (As)	18	18	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	18	18	>2	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	18	18	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	18	12	>7	0	0		2	2	2	2	2	4	4
Iron, total (Fe)	18	0	>1000	5	27.8	99.4	220	256	320	620	1575	2290	4000
Lead, total (Pb)	18	18	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	18	18	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	18	11	>50	0	0		10	10	10	10	13	20	25
Fecal Coliform Screening(#/100mL)													
# results:	Geomean		# > 400:	% > 400:		%Conf:							
54	82		11	20		60.6							

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: FRENCH BROAD RIV AT SR 1634 AT ALEXANDER

Station #: E4770000

Hydrologic Unit Code: 06010105

Latitude: 35.70800

Longitude: -82.62200

Stream class: B

Agency: NCAMBNT

NC stream index: 6-(54.5)

Time period: 01/15/2003 to 11/13/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	49	0	<4	0	0		7.2	7.7	8.4	10.1	11.2	12.2	13.3
	49	0	<5	0	0		7.2	7.7	8.4	10.1	11.2	12.2	13.3
pH (SU)	51	0	<6	0	0		6.1	6.8	7.1	7.3	7.4	7.6	7.7
	51	0	>9	0	0		6.1	6.8	7.1	7.3	7.4	7.6	7.7
Spec. conductance (umhos/cm at 25°C)	47	0	N/A				40	47	52	58	63	78	90
	1	0	N/A				56	56	56	56	56	56	56
Water Temperature (°C)	51	0	>29	0	0		3	7	9.4	17	21.7	24.7	28.3
Other													
TSS (mg/L)	20	3	N/A				2.1	2.5	6	10.2	33.5	73.8	190
Turbidity (NTU)	52	0	>50	8	15.4	92.9	1.9	3.8	5.2	10	23	78.5	180
Nutrients (mg/L)													
NH3 as N	47	0	N/A				0.04	0.06	0.09	0.13	0.17	0.19	0.28
NO2 + NO3 as N	47	0	N/A				0.28	0.38	0.42	0.5	0.59	0.85	1.3
TKN as N	47	0	N/A				0.22	0.28	0.34	0.4	0.51	0.61	0.83
Total Phosphorus	47	0	N/A				0.08	0.09	0.1	0.14	0.19	0.25	0.38
Metals (ug/L)													
Aluminum, total (Al)	18	0	N/A				100	154	210	445	1650	3920	5900
Arsenic, total (As)	18	18	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	18	18	>2	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	18	18	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	18	10	>7	1	5.6		2	2	2	2	3	6	8
Iron, total (Fe)	18	0	>1000	5	27.8	99.4	230	293	355	600	1700	3620	7400
Lead, total (Pb)	18	18	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	18	18	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	18	9	>50	0	0		10	10	10	10	18	29	35

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
52	39	9	17

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: FRENCH BROAD RIV AT BLENNERHASSETT ISLAND AT MARSHALL
Station #: E5120000 **Hydrologic Unit Code:** 06010105
Latitude: 35.79630 **Longitude:** -82.68447 **Stream class:** B
Agency: NCAMBNT **NC stream index:** 6-(54.5)

Time period: 01/15/2003 to 11/13/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	47	0	<4	0	0		7	8	8.6	10.2	11.4	12.9	15
	47	0	<5	0	0		7	8	8.6	10.2	11.4	12.9	15
pH (SU)	49	0	<6	0	0		6.5	6.8	7	7.2	7.4	7.6	7.7
	49	0	>9	0	0		6.5	6.8	7	7.2	7.4	7.6	7.7
Spec. conductance (umhos/cm at 25°C)	46	0	N/A				43	50	55	59	70	82	92
	1	0	N/A				62	62	62	62	62	62	62
Water Temperature (°C)	49	0	>29	0	0		2	6	8.6	16	21.5	24	27.4
Other													
TSS (mg/L)	20	3	N/A				2.4	2.8	5.1	9.5	34.8	61.2	200
Turbidity (NTU)	50	0	>50	7	14	87.8	1.9	3.6	5	10.2	26.8	64.5	140
Metals (ug/L)													
Aluminum, total (Al)	18	0	N/A				110	128	188	455	1850	3160	6400
Arsenic, total (As)	18	18	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	18	18	>2	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	18	18	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	18	9	>7	1	5.6		2	2	2	2	3	5	9
Iron, total (Fe)	18	0	>1000	5	27.8	99.4	240	276	325	600	1950	4040	8000
Lead, total (Pb)	18	18	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	18	18	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	18	8	>50	0	0		10	10	10	10	19	23	34

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
50	48	9	18

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf : States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: PIGEON RIV AT NC 215 NR CANTON

Station #: E5495000

Latitude: 35.52200

Longitude: -82.84800

Agency: NCAMBNT

Hydrologic Unit Code: 06010106

Stream class: WS-III Tr CA

NC stream index: 5-(6.5)

Time period: 01/13/2003 to 12/17/2007

	# results	# ND	EL	#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	47	0	<6	0	0		7.8	8.7	9.5	10.9	11.9	13.5	15.1
pH (SU)	48	0	<6	2	4.2		5.6	6.2	6.6	6.8	7	7.2	7.6
	48	0	>9	0	0		5.6	6.2	6.6	6.8	7	7.2	7.6
Spec. conductance (umhos/cm at 25°C)	47	0	N/A				17	20	21	22	26	28	33
Water Temperature (°C)	49	0	>29	0	0		2	4.9	8.1	13	19	21	25.4
Other													
Chlorophyll a (ug/L)	1	0	>15	0	0		5	5	5	5	5	5	5
TSS (mg/L)	20	16	N/A				2.2	2.4	2.5	2.5	5.6	6.2	6.2
Turbidity (NTU)	51	9	>10	2	3.9		0.1	1	1.3	1.9	3.3	6.2	120
Nutrients (mg/L)													
NH3 as N	45	42	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.03
NO2 + NO3 as N	45	0	>10	0	0		0.02	0.1	0.16	0.2	0.25	0.27	0.29
TKN as N	45	40	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.57
Total Phosphorus	45	12	N/A				0.02	0.02	0.02	0.02	0.03	0.05	0.35
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				51	52	56	82	160	282	290
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>0.4	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	15	>7	0	0		2	2	2	2	2	3	5
Iron, total (Fe)	17	0	>1000	0	0		64	74	86	150	255	410	530
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Manganese, total (Mn)	17	5	>200	0	0		10	10	10	14	18	23	33
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>25	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	16	>50	0	0		10	10	10	10	10	11	14

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
51	60	4	8

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: PIGEON RIV AT SR 1642 AT CLYDE

Station #: E5600000

Hydrologic Unit Code: 06010106

Latitude: 35.53500

Longitude: -82.91100

Stream class: C

Agency: NCAMBNT

NC stream index: 5-(7)

Time period: 01/13/2003 to 12/17/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	47	0	<4	0	0		6.9	7.6	8.4	9.9	11.3	12.3	15.7
	47	0	<5	0	0		6.9	7.6	8.4	9.9	11.3	12.3	15.7
pH (SU)	48	0	<6	0	0		6.6	7	7.2	7.6	7.8	7.9	8.4
	48	0	>9	0	0		6.6	7	7.2	7.6	7.8	7.9	8.4
Spec. conductance (umhos/cm at 25°C)	47	0	N/A				45	117	224	317	495	667	1640
Water Temperature (°C)	49	0	>29	0	0		5	8	10	16	21.9	24	28.4
Other													
TSS (mg/L)	20	8	N/A				2.4	2.5	2.5	4.5	8.2	12.9	20
Turbidity (NTU)	51	1	>50	2	3.9		1	1.7	2.5	4.1	6.4	11.5	160
Nutrients (mg/L)													
NH3 as N	45	22	N/A				0.02	0.02	0.02	0.02	0.03	0.1	0.48
NO2 + NO3 as N	45	0	N/A				0.07	0.14	0.21	0.24	0.3	0.31	0.34
TKN as N	45	7	N/A				0.2	0.2	0.23	0.3	0.42	0.66	1.1
Total Phosphorus	45	0	N/A				0.04	0.05	0.07	0.12	0.2	0.34	0.62
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				110	110	125	190	305	708	1100
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>2	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	12	>7	1	5.9		2	2	2	2	2	4	8
Iron, total (Fe)	17	0	>1000	1	5.9		110	118	145	180	430	888	1400
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	13	>50	0	0		10	10	10	10	10	13	13

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
51	118	7	14

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: RICHLAND CRK AT SR 1184 NR WAYNESVILLE

Station #: E6110000

Hydrologic Unit Code: 06010106

Latitude: 35.50900

Longitude: -82.97200

Stream class: B

Agency: NCAMBNT

NC stream index: 5-16-(11.5)

Time period: 01/21/2003 to 12/17/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	49	0	<4	0	0		8.2	8.6	9.2	10.7	11.5	12.8	13.4
	49	0	<5	0	0		8.2	8.6	9.2	10.7	11.5	12.8	13.4
pH (SU)	51	0	<6	0	0		6.4	6.6	6.8	6.9	7.1	7.2	7.5
	51	0	>9	0	0		6.4	6.6	6.8	6.9	7.1	7.2	7.5
Spec. conductance (umhos/cm at 25°C)	50	0	N/A				26	38	42	47	54	68	104
Water Temperature (°C)	51	0	>29	0	0		4.7	6.5	9.4	12	18	19.2	20.2
Other													
TSS (mg/L)	20	5	N/A				2.4	3	3.8	5.7	11.5	19.6	22
Turbidity (NTU)	53	1	>50	1	1.9		1	2	2.9	5.3	8.5	18	54
Nutrients (mg/L)													
NH3 as N	1	1	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
NO2 + NO3 as N	1	0	N/A				0.62	0.62	0.62	0.62	0.62	0.62	0.62
TKN as N	1	1	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Phosphorus	1	1	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				60	108	165	240	450	766	910
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>2	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	13	>7	0	0		2	2	2	2	2	3	3
Iron, total (Fe)	17	0	>1000	1	5.9		110	182	240	320	595	952	1200
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	9	>50	0	0		10	10	10	10	12	17	18

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400:	%Conf:
53	341	23	43	100

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: JONATHANS CRK AT US 276 NR COVE CREEK

Station #: E6300000

Hydrologic Unit Code: 06010106

Latitude: 35.59977 **Longitude:** -83.00760

Stream class: C Tr

Agency: NCAMBNT

NC stream index: 5-26-(7)

Time period: 01/21/2003 to 12/04/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	49	0	<6	0	0		8.3	8.7	9.3	10.4	11.5	12.8	14.2
pH (SU)	51	0	<6	0	0		6.2	6.5	6.7	6.9	7.1	7.2	7.3
	51	0	>9	0	0		6.2	6.5	6.7	6.9	7.1	7.2	7.3
Spec. conductance (umhos/cm at 25°C)	50	0	N/A				23	34	36	39	42	46	80
Water Temperature (°C)	51	0	>29	0	0		4.2	6.2	8.3	12.4	16.8	18.7	19.5
Other													
TSS (mg/L)	20	5	N/A				2.2	2.4	2.9	6.6	10.8	13.8	20
Turbidity (NTU)	51	1	>10	6	11.8	75.5	1	1.3	2.5	5.2	7.7	12.8	74
Nutrients (mg/L)													
NH3 as N	1	1	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
NO2 + NO3 as N	1	0	N/A				0.59	0.59	0.59	0.59	0.59	0.59	0.59
TKN as N	1	1	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Phosphorus	1	0	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				53	65	98	270	390	822	990
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>0.4	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	16	>7	0	0		2	2	2	2	2	2	2
Iron, total (Fe)	17	0	>1000	1	5.9		100	124	140	320	485	900	1100
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	14	>50	0	0		10	10	10	10	10	11	13

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
51	215	12	24 79.3

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf : States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: CATALOOCHEE CRK AT SR 1395 NR CATALOOCHEE

Station #: E6450000

Hydrologic Unit Code: 06010106

Latitude: 35.66700 **Longitude:** -83.07301

Stream class: C Tr ORW

Agency: NCAMBNT

NC stream index: 5-41

Time period: 02/04/2003 to 12/04/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	45	0	<6	0	0		8.5	8.8	9.6	10.5	12.1	13.2	14.4
pH (SU)	47	0	<6	5	10.6	67.1	5.3	5.8	6.4	6.8	7	7.1	7.3
	47	0	>9	0	0		5.3	5.8	6.4	6.8	7	7.1	7.3
Spec. conductance (umhos/cm at 25°C)	47	0	N/A				13	14	14	15	16	17	23
Water Temperature (°C)	48	0	>29	0	0		3.4	5.9	7.7	11.5	15.8	17	18.3
Other													
TSS (mg/L)	19	14	N/A				2.2	2.2	2.5	2.5	4	6.2	10
Turbidity (NTU)	48	18	>10	1	2.1		1	1	1	1.3	2.3	3.4	16
Nutrients (mg/L)													
NH3 as N	44	44	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
NO2 + NO3 as N	44	2	N/A				0.02	0.05	0.11	0.15	0.18	0.2	0.28
TKN as N	44	40	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.33
Total Phosphorus	44	11	N/A				0.02	0.02	0.02	0.02	0.03	0.04	0.09
Metals (ug/L)													
Aluminum, total (Al)	16	6	N/A				50	50	50	66	96	151	270
Arsenic, total (As)	16	16	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	16	16	>0.4	0	0		1	1	2	2	2	2	2
Chromium, total (Cr)	16	16	>50	0	0		10	10	25	25	25	25	25
Copper, total (Cu)	16	16	>7	0	0		2	2	2	2	2	2	2
Iron, total (Fe)	16	8	>1000	0	0		50	50	50	55	92	162	320
Lead, total (Pb)	16	16	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	15	15	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	16	16	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	16	16	>50	0	0		10	10	10	10	10	10	10

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
48	4	0	0

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf : States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: PIGEON RIV AT SR 1338 NR HEPCO

Station #: E6480000

Hydrologic Unit Code: 06010106

Latitude: 35.66600

Longitude: -82.99500

Stream class: C

Agency: NCAMBNT

NC stream index: 5-(7)

Time period: 01/21/2003 to 12/04/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	49	0	<4	0	0		7.7	8	8.9	10	11.6	12.3	16
	49	0	<5	0	0		7.7	8	8.9	10	11.6	12.3	16
pH (SU)	51	0	<6	0	0		6.9	7.2	7.4	7.7	8	8.1	8.9
	51	0	>9	0	0		6.9	7.2	7.4	7.7	8	8.1	8.9
Spec. conductance (umhos/cm at 25°C)	50	0	N/A				54	129	162	214	318	400	484
Water Temperature (°C)	51	0	>29	0	0		5.3	6.3	9.4	14	19.4	22.1	24
Other													
Chlorophyll a (ug/L)	1	0	>40	0	0		5	5	5	5	5	5	5
TSS (mg/L)	20	7	N/A				2.5	2.5	4.2	6.2	8	16.7	35
Turbidity (NTU)	51	1	>50	3	5.9		1	1.7	3	6.2	10	37.2	97
Nutrients (mg/L)													
NH3 as N	46	10	N/A				0.02	0.02	0.02	0.03	0.05	0.08	0.16
NO2 + NO3 as N	46	0	N/A				0.27	0.35	0.39	0.44	0.5	0.58	0.68
TKN as N	46	8	N/A				0.2	0.2	0.21	0.28	0.41	0.49	0.69
Total Phosphorus	46	0	N/A				0.04	0.06	0.07	0.09	0.12	0.2	0.77
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				90	98	150	280	425	1012	1500
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>2	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	12	>7	0	0		2	2	2	2	2	3	6
Iron, total (Fe)	17	0	>1000	2	11.8	76.2	130	162	200	340	605	1240	1800
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	12	>50	0	0		10	10	10	10	12	23	24

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400:	%Conf:
51	173	12	24	79.3

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: PIGEON RIV AT WATERVILLE

Station #: E6500000

Hydrologic Unit Code: 06010106

Latitude: 35.78506

Longitude: -83.11300

Stream class: C

Agency: NCAMBNT

NC stream index: 5-(7)

Time period: 01/21/2003 to 12/04/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	49	0	<4	0	0		6.9	7.7	8.4	9.7	11.5	12.4	15.4
	49	0	<5	0	0		6.9	7.7	8.4	9.7	11.5	12.4	15.4
pH (SU)	51	0	<6	0	0		6.7	6.9	7	7.1	7.2	7.4	7.8
	51	0	>9	0	0		6.7	6.9	7	7.1	7.2	7.4	7.8
Spec. conductance (umhos/cm at 25°C)	50	0	N/A				20	86	104	128	176	233	430
Water Temperature (°C)	51	0	>29	0	0		5	6	9	15.8	19.3	21.7	23
Other													
TSS (mg/L)	20	11	N/A				2.5	2.5	2.5	4.1	6.2	6.6	12
Turbidity (NTU)	51	0	>50	0	0		1.4	1.7	2.5	3.2	5.6	9.8	24
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				73	75	90	140	255	426	970
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>2	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	14	>7	0	0		2	2	2	2	2	3	3
Iron, total (Fe)	17	0	>1000	0	0		110	118	135	240	340	486	950
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	14	>50	0	0		10	10	10	10	10	13	14

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
51	30	6	12

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: N TOE RIV AT US 19E NR INGALLS

Station #: E7000000

Hydrologic Unit Code: 06010108

Latitude: 35.98100 **Longitude:** -82.01601

Stream class: WS-IV Tr

Agency: NCAMBNT

NC stream index: 7-2-(21.5)

Time period: 01/28/2003 to 12/05/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	46	0	<6	0	0		7.5	8.4	9	10.6	12.9	13.8	15.5
pH (SU)	48	0	<6	0	0		6.1	6.7	6.9	7.1	7.5	7.6	8.5
	48	0	>9	0	0		6.1	6.7	6.9	7.1	7.5	7.6	8.5
Spec. conductance (umhos/cm at 25°C)	47	0	N/A				25	40	43	47	52	56	59
Water Temperature (°C)	48	0	>29	0	0		1	3.6	6.6	13.5	19	20.6	22.7
Other													
Chloride (mg/L)	6	0	>250	0	0		4	4	4	5	5	6	6
Fluoride (mg/L)	49	46	>1.8	0	0		0	0	0	0	0	0	1
Sulfate (mg/L)	6	6	>250	0	0		2	2	2	2	2	2	2
TSS (mg/L)	20	5	N/A				2.4	2.5	3.1	6.4	9.6	19.3	480
Turbidity (NTU)	51	2	>10	9	17.6	97.2	1	1.5	2.3	4.2	8.4	18.8	240
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				56	107	140	290	440	4000	16000
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	18	18	>0.4	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	18	18	>50	0	0		10	24	25	25	25	25	25
Copper, total (Cu)	18	13	>7	2	11.1	73.4	2	2	2	2	2	16	25
Iron, total (Fe)	17	0	>1000	2	11.8	76.2	120	168	225	400	615	5440	22000
Lead, total (Pb)	18	16	>25	0	0		10	10	10	10	10	14	14
Manganese, total (Mn)	17	0	>200	1	5.9		10	11	14	21	30	162	640
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	18	17	>25	0	0		10	10	10	10	10	11	17
Zinc, total (Zn)	18	16	>50	1	5.6		10	10	10	10	10	26	82

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
51	42	6	12

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: N TOE RIV AT SR 1162 AT PENLAND

Station #: E8100000

Hydrologic Unit Code: 06010108

Latitude: 35.92929 **Longitude:** -82.11521

Stream class: C Tr

Agency: NCAMBNT

NC stream index: 7-2-(27.7)

Time period: 01/28/2003 to 12/05/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	46	0	<6	0	0		7.6	8	8.9	10.7	12.6	13.8	15.2
pH (SU)	48	0	<6	0	0		6.1	6.6	6.8	7	7.4	7.6	8.5
	48	0	>9	0	0		6.1	6.6	6.8	7	7.4	7.6	8.5
Spec. conductance (umhos/cm at 25°C)	47	0	N/A				41	52	63	75	90	127	217
Water Temperature (°C)	48	0	>29	0	0		1	3	6.4	14	20	22.1	24.2
Other													
Chloride (mg/L)	6	0	>230	0	0		5	5	6	8	9	10	10
Fluoride (mg/L)	49	13	>1.8	2	4.1		0	0	0	1	1	1	3
TSS (mg/L)	21	0	N/A				3	3.6	5.1	7.6	15	73.4	550
Turbidity (NTU)	51	0	>10	21	41.2	100	1.3	2.4	4.4	8.9	16	102	340
Nutrients (mg/L)													
NH3 as N	2	0	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
NO2 + NO3 as N	2	0	N/A				0.46	0.46	0.46	0.5	0.54	0.54	0.54
TKN as N	2	2	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Phosphorus	2	1	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
Metals (ug/L)													
Aluminum, total (Al)	18	0	N/A				200	209	270	655	1275	9690	24000
Arsenic, total (As)	18	18	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	19	19	>0.4	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	19	18	>50	0	0		10	25	25	25	25	25	28
Copper, total (Cu)	19	10	>7	1	5.3		2	2	2	2	3	7	33
Iron, total (Fe)	18	0	>1000	5	27.8	99.4	270	288	328	715	1450	7210	28000
Lead, total (Pb)	19	18	>25	0	0		10	10	10	10	10	10	20
Mercury, total (Hg)	17	17	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	19	18	>88	0	0		10	10	10	10	10	10	20
Zinc, total (Zn)	19	9	>50	1	5.3		10	10	10	11	15	20	89
Fecal Coliform Screening(#/100mL)													
# results:	Geomean		# > 400:	% > 400:		%Conf:							
51	86		13	25		87.4							

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: S TOE RIV AT SR 1168 NR CELO

Station #: E8200000

Hydrologic Unit Code: 06010108

Latitude: 35.83100 **Longitude:** -82.18401

Stream class: B Tr ORW

Agency: NCAMBNT

NC stream index: 7-2-52-(1)

Time period: 01/28/2003 to 12/05/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	46	0	<6	0	0		7.5	8.6	9.6	10.7	12.6	13.6	15.6
pH (SU)	48	0	<6	4	8.3		5.4	6	6.4	6.5	6.8	7	7.2
	48	0	>9	0	0		5.4	6	6.4	6.5	6.8	7	7.2
Spec. conductance (umhos/cm at 25°C)	46	0	N/A				12	14	14	15	17	18	23
Water Temperature (°C)	48	0	>29	0	0		1	3.9	6.1	12	17.2	19	20.8
Other													
TSS (mg/L)	20	17	N/A				2.1	2.4	2.5	2.5	2.5	6.2	48
Turbidity (NTU)	50	26	>10	2	4		0.6	1	1	1	1.6	3.7	21
Nutrients (mg/L)													
NH3 as N	45	43	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.15
NO2 + NO3 as N	45	2	N/A				0.02	0.03	0.07	0.11	0.13	0.16	0.26
TKN as N	45	43	N/A				0.2	0.2	0.2	0.2	0.2	0.2	0.39
Total Phosphorus	45	27	N/A				0.02	0.02	0.02	0.02	0.02	0.03	0.08
Metals (ug/L)													
Aluminum, total (Al)	17	3	N/A				50	50	54	78	125	512	1800
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>0.4	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	15	>7	0	0		2	2	2	2	2	2	3
Iron, total (Fe)	17	4	>1000	1	5.9		50	50	54	95	135	596	2100
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	17	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	17	14	>50	0	0		10	10	10	10	10	27	39

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
50	23	3	6

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf : States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: CANE RIV AT SR 1343 NR SIOUX

Station #: E9850000

Hydrologic Unit Code: 06010108

Latitude: 36.02505

Longitude: -82.32715

Stream class: C Tr

Agency: NCAMBNT

NC stream index: 7-3-(13.7)

Time period: 02/05/2003 to 11/13/2007

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	42	0	<6	0	0		7.8	8.7	9.4	10.7	12.5	14.4	15.7
pH (SU)	48	0	<6	0	0		6.4	6.6	6.8	7.1	7.7	8	8.3
	48	0	>9	0	0		6.4	6.6	6.8	7.1	7.7	8	8.3
Spec. conductance (umhos/cm at 25°C)	47	0	N/A				25	37	44	48	53	58	73
Water Temperature (°C)	49	0	>29	0	0		1	4	8.3	15	21	23	25.3
Other													
TSS (mg/L)	20	6	N/A				2.3	2.5	4.5	7.6	15.5	40.6	440
Turbidity (NTU)	50	0	>10	15	30	100	1.1	1.6	2.4	7.5	13.5	33.8	270
Metals (ug/L)													
Aluminum, total (Al)	17	0	N/A				51	57	175	370	730	4360	17000
Arsenic, total (As)	17	17	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	17	17	>0.4	0	0		1	2	2	2	2	2	2
Chromium, total (Cr)	17	17	>50	0	0		10	22	25	25	25	25	25
Copper, total (Cu)	17	10	>7	1	5.9		2	2	2	2	2	6	16
Iron, total (Fe)	17	0	>1000	4	23.5	97.8	110	134	280	570	1050	5360	20000
Lead, total (Pb)	17	17	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	17	16	>88	0	0		10	10	10	10	10	10	12
Zinc, total (Zn)	17	11	>50	1	5.9		10	10	10	10	16	46	74

Fecal Coliform Screening(#/100mL)

# results:	Geomean	# > 400:	% > 400: %Conf:
50	91	9	18

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Ambient Monitoring System Station Summaries
 NCDENR, Division of Water Quality
 Basinwide Assessment Report

Location: NOLICHUCKY RIV BESIDE SR 1321 AT POPLAR

Station #: E9990000

Hydrologic Unit Code: 06010108

Latitude: 36.07500

Longitude: -82.34500

Stream class: B

Agency: NCAMBNT

NC stream index: 7

Time period: 02/05/2003 to 10/18/2006

	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
Field													
D.O. (mg/L)	36	0	<4	0	0		7.4	8.2	9	10.4	12.3	14.3	15.6
	36	0	<5	0	0		7.4	8.2	9	10.4	12.3	14.3	15.6
pH (SU)	37	0	<6	0	0		6.7	6.8	6.9	7.1	7.4	7.4	8
	37	0	>9	0	0		6.7	6.8	6.9	7.1	7.4	7.4	8
Spec. conductance (umhos/cm at 25°C)	37	0	N/A				30	46	50	59	66	73	90
Water Temperature (°C)	37	0	>29	0	0		2	3.9	9.2	15.2	22	23.6	26.4
Other													
Fluoride (mg/L)	36	33	>1.8	0	0		0	0	0	0	0	0	1
TSS (mg/L)	14	2	N/A				2.5	2.5	2.9	8.4	33	206	310
Turbidity (NTU)	38	0	>50	5	13.2	82.5	1.1	1.7	2.6	10.5	23.2	90.5	170
Nutrients (mg/L)													
NH3 as N	1	1	N/A				0.02	0.02	0.02	0.02	0.02	0.02	0.02
NO2 + NO3 as N	1	0	N/A				0.19	0.19	0.19	0.19	0.19	0.19	0.19
TKN as N	1	0	N/A				0.53	0.53	0.53	0.53	0.53	0.53	0.53
Total Phosphorus	1	0	N/A				0.21	0.21	0.21	0.21	0.21	0.21	0.21
Metals (ug/L)													
Aluminum, total (Al)	16	0	N/A				63	74	145	210	2850	5950	9100
Arsenic, total (As)	16	16	>10	0	0		5	5	5	5	10	10	10
Cadmium, total (Cd)	16	16	>2	0	0		2	2	2	2	2	2	2
Chromium, total (Cr)	16	16	>50	0	0		25	25	25	25	25	25	25
Copper, total (Cu)	16	7	>7	3	18.8	93.2	2	2	2	3	5	11	13
Iron, total (Fe)	16	0	>1000	5	31.2	99.7	150	199	250	370	3950	7800	12000
Lead, total (Pb)	16	16	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	16	16	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	16	15	>88	0	0		10	10	10	10	10	11	13
Zinc, total (Zn)	16	10	>50	0	0		10	10	10	10	21	35	48
Fecal Coliform Screening(#/100mL)													
# results:	Geomean		# > 400:	% > 400:		%Conf:							
38	106		9	24		78.4							

Key:

result: number of observations

ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf: States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

Stations with less than 10 results for a given parameter were not evaluated for statistical confidence

Appendix B: Station Box & Whisker Plots

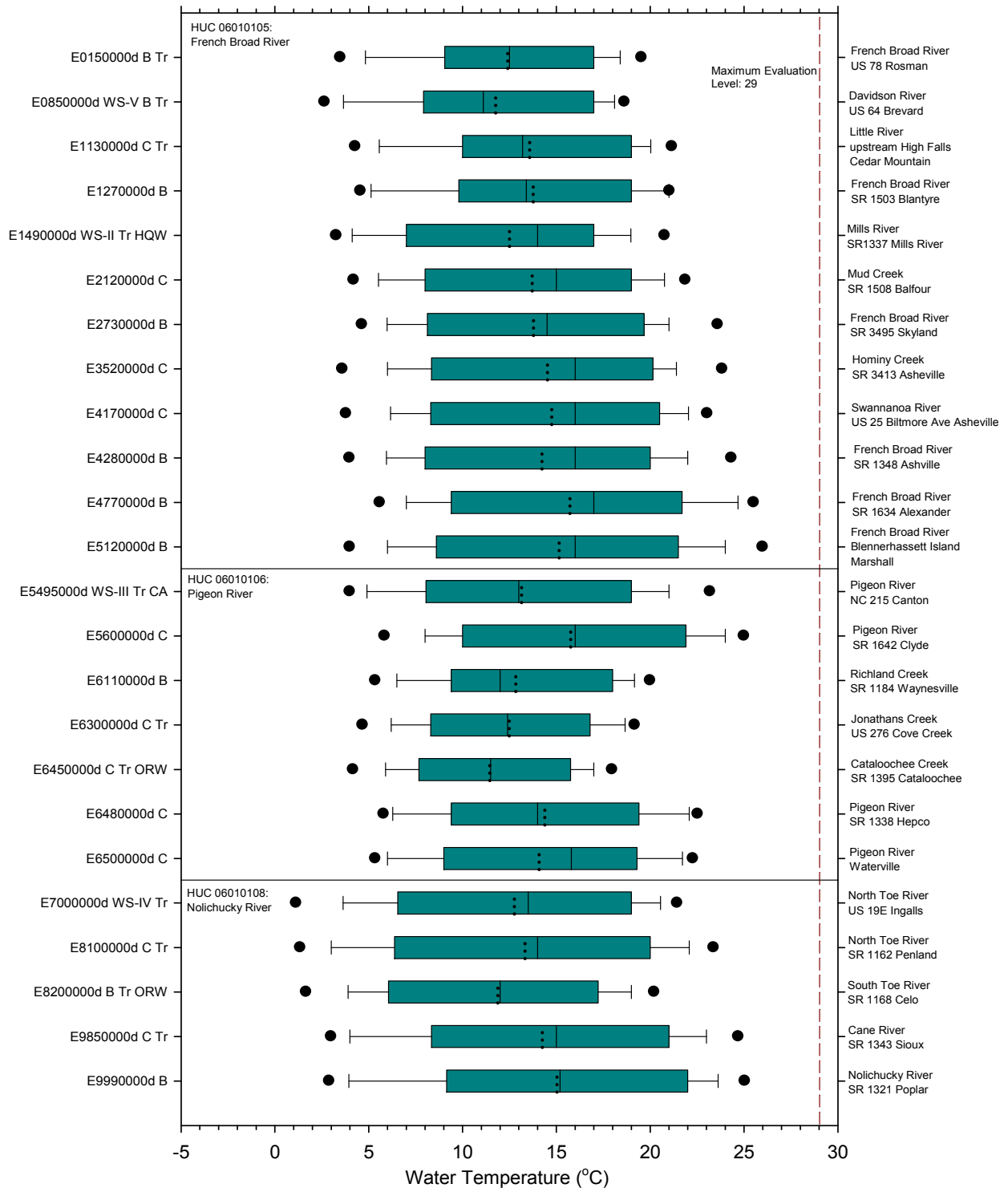


Figure 17. Box Plots of Temperature in the French Broad River Basin



Figure 18. Box Plots of Dissolved Oxygen in the French Broad River Basin

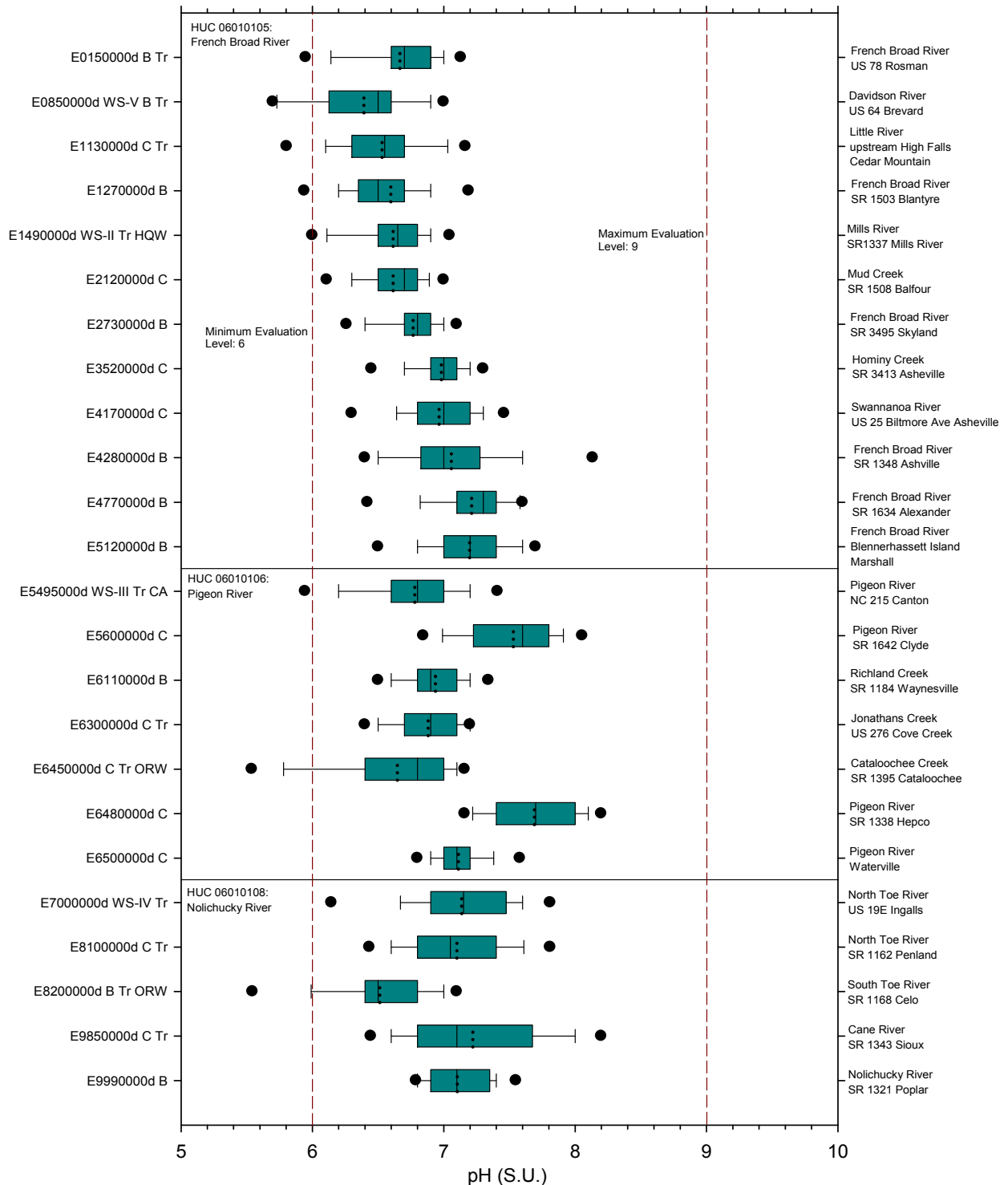


Figure 19. Box Plots of pH in the French Broad River Basin

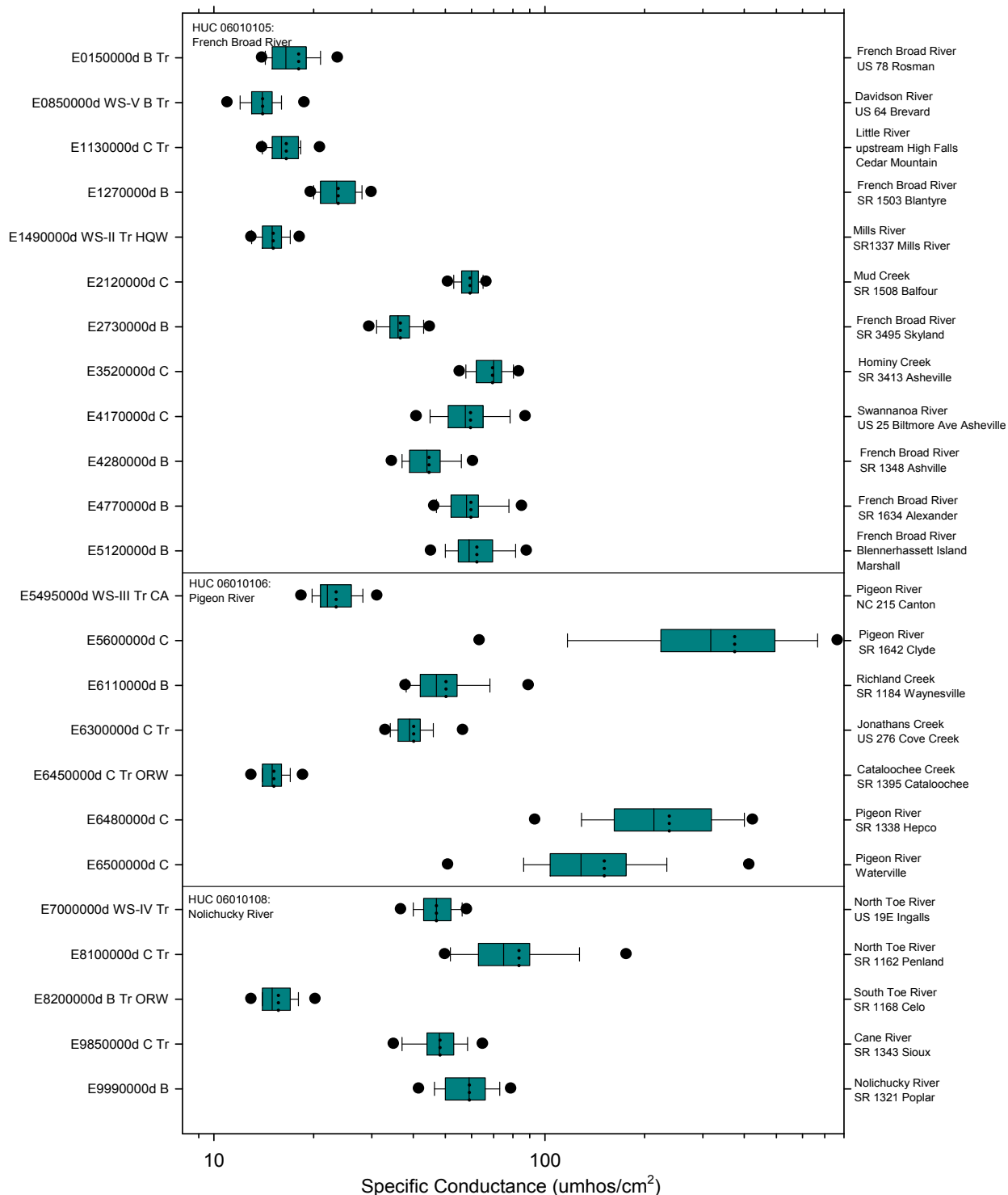


Figure 20. Box Plots of Specific Conductance in the French Broad River Basin

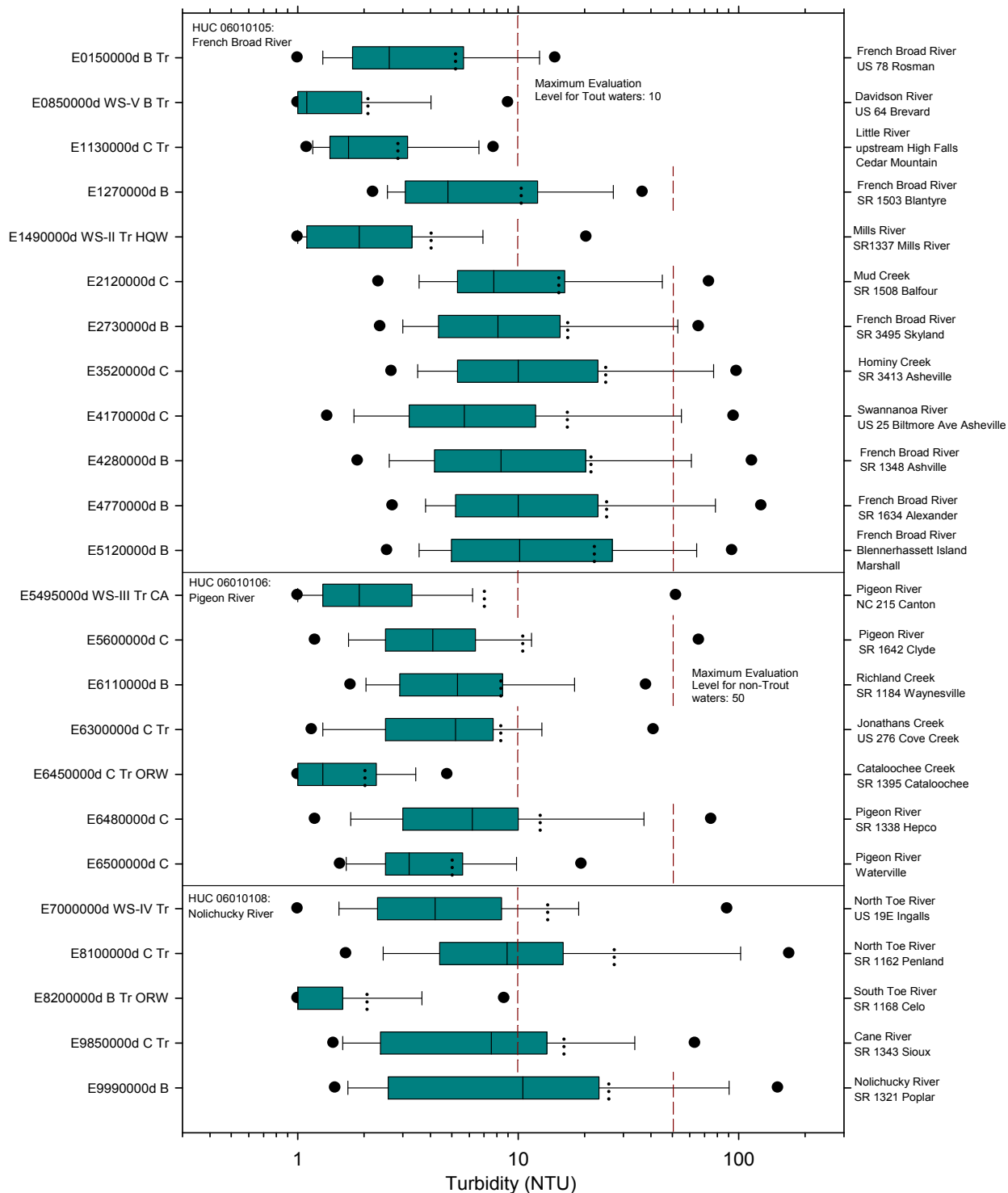


Figure 21. Box Plots of Turbidity in the French Broad River Basin

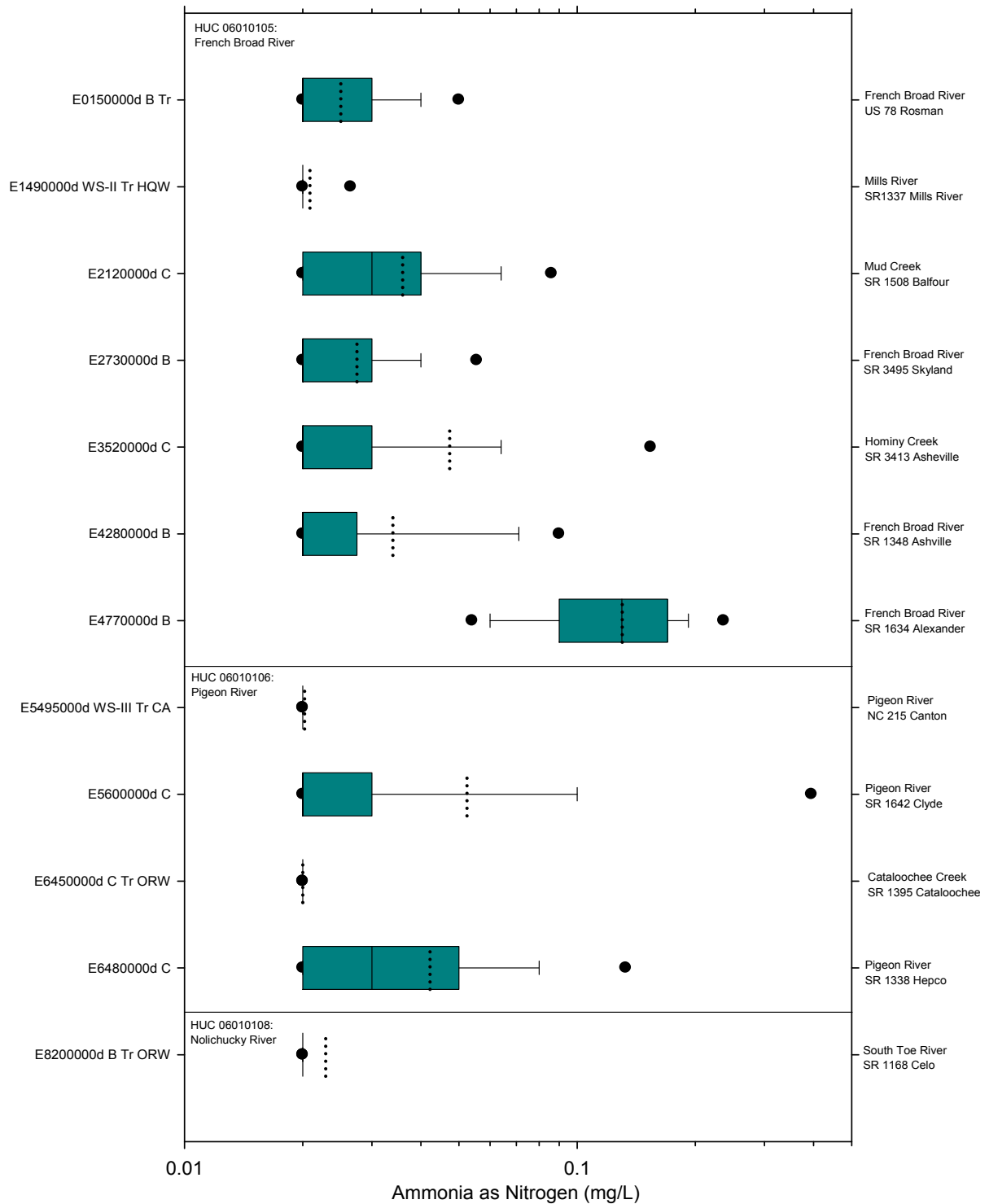


Figure 22. Box Plots of Ammonia as Nitrogen in the French Broad River Basin

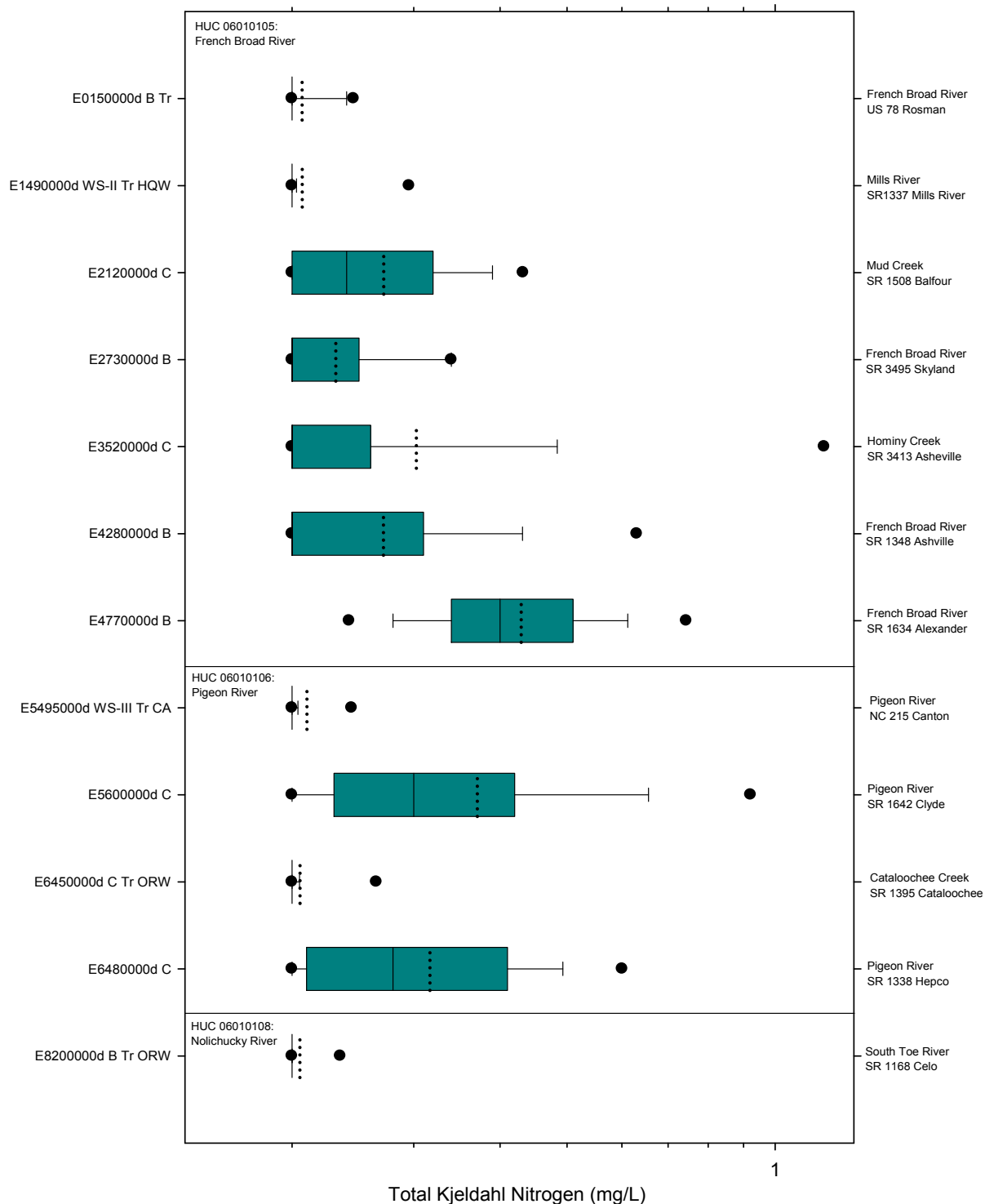


Figure 23. Box Plots of Total Kjeldahl Nitrogen in the French Broad River Basin

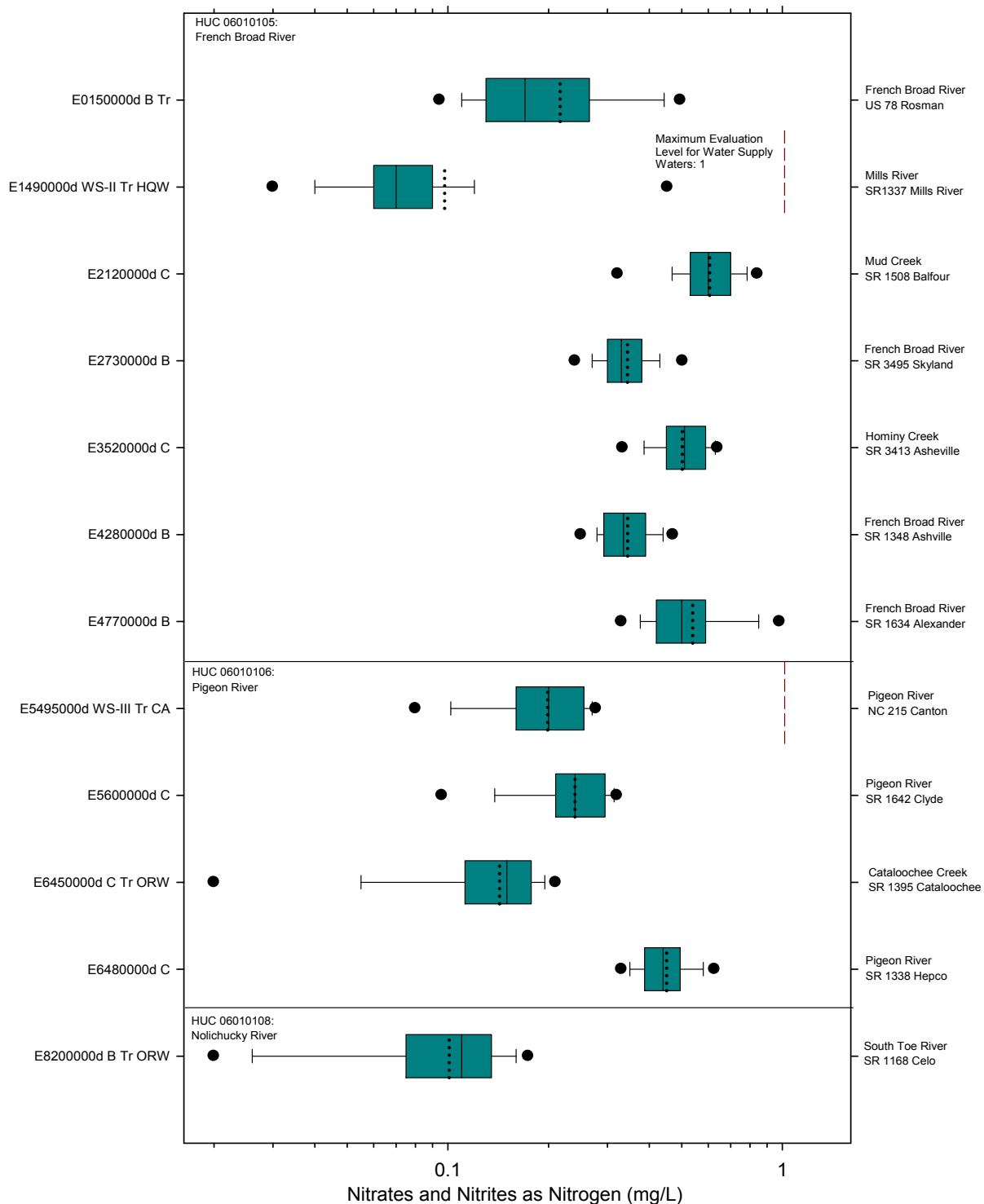


Figure 24. Box Plots of Total Nitrate & Nitrite as Nitrogen in the French Broad River Basin

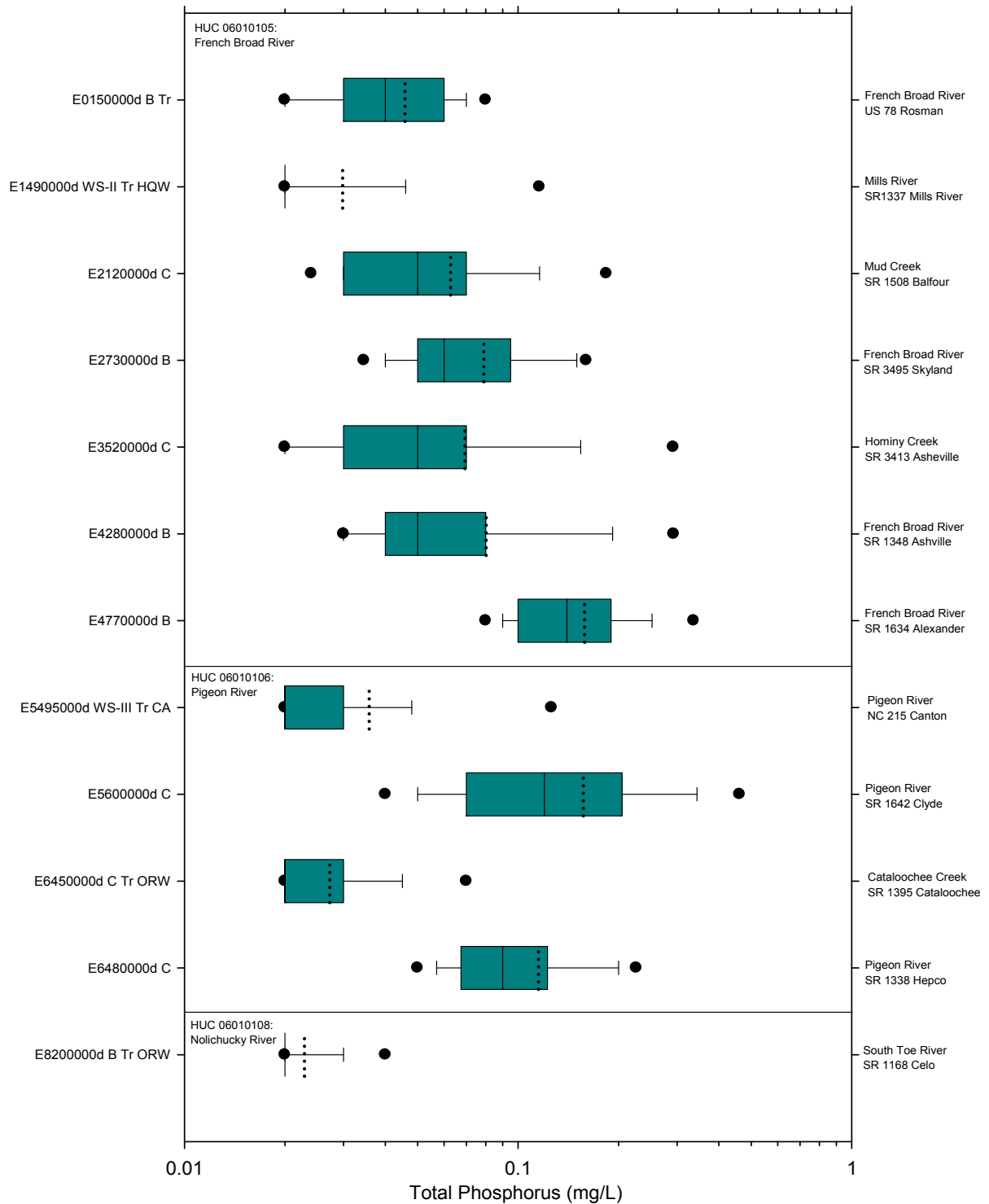


Figure 25. Box Plots of Total Phosphorus in the French Broad River Basin

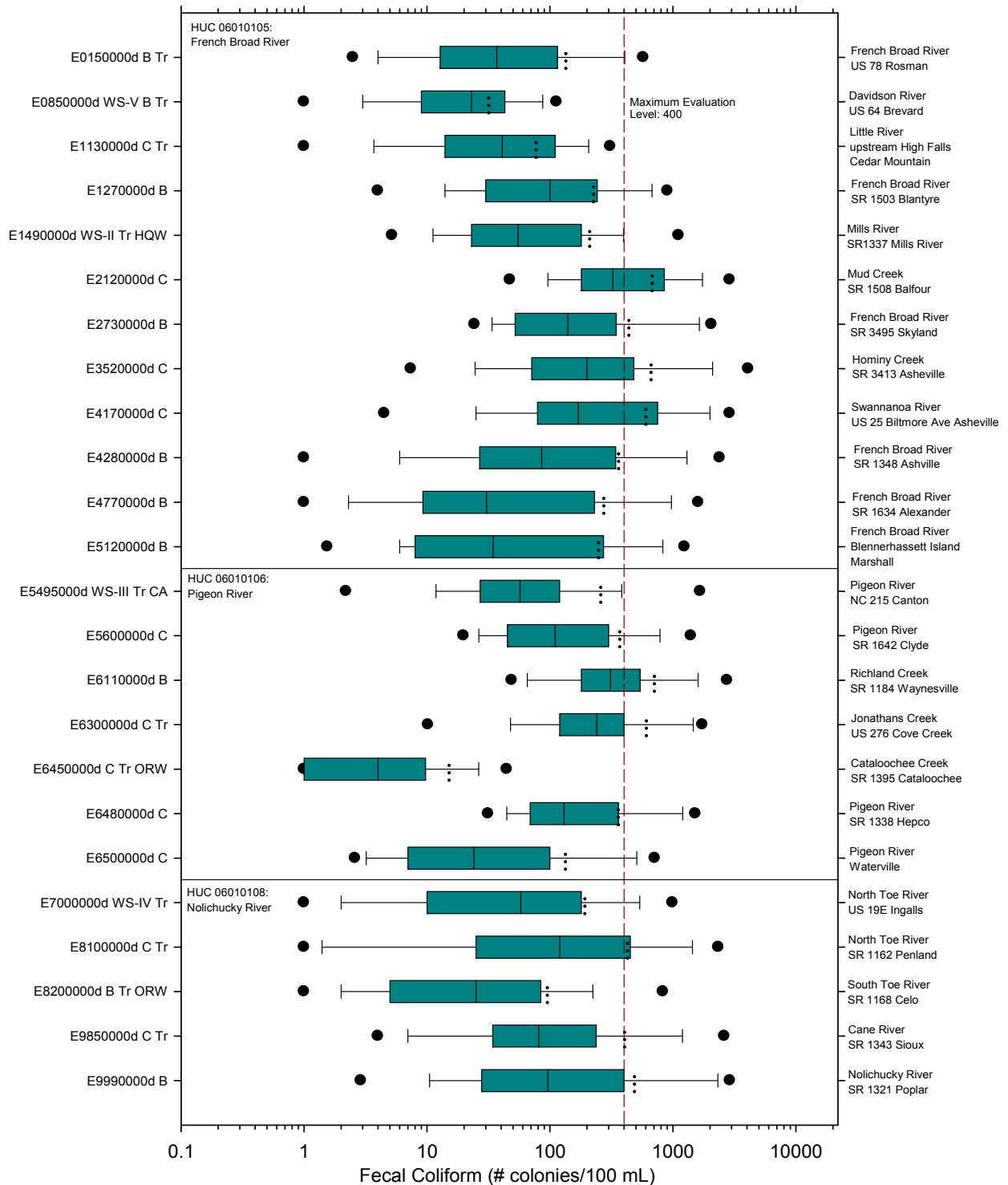


Figure 26. Box Plots of Fecal Coliform in the French Broad River Basin

Appendix C: References

North Carolina Division of Water Quality, North Carolina Administrative Code Section 15A 2B .0200 (Red Book), May 1, 2007.

North Carolina Division of Water Quality, Planning Section Website, 303d and 305b Lists, http://h2o.enr.state.nc.us/tmdl/General_303d.htm.

North Carolina Division of Water Quality, 2004 French Broad River Basinwide Assessment Report.

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Pi-Erh Lin, Duane Meeter, and Xu-Feng Niu, A Nonparametric Procedure for Listing and Delisting Impaired Waters Based on Criterion Exceedances, Florida State University, Tallahassee, FL., October 2000.