Appendix I

DWQ Water Quality Monitoring Programs in the White Oak River Basin

DWQ Water Quality Monitoring Programs in the White Oak River Basin

Staff in the Environmental Sciences Branch (ESB) and Regional Offices of DWQ collect a variety of biological, chemical and physical data. The following discussion contains a brief introduction to each program, followed by a summary of water quality data in the White Oak River basin for that program. For more detailed information on sampling and assessment of streams in this basin, refer to the *Basinwide Assessment Report* for the White Oak River basin, available from the Environmental Sciences Branch website at http://www.esb.enr.state.nc.us/bar.html or by calling (919) 733-9960.

DWQ monitoring programs for the White Oak River Basin include:

- Benthic Macroinvertebrates
- Fish Assessments
- Aquatic Toxicity Monitoring
- Lake Assessment
- Ambient Monitoring System

Benthic Macroinvertebrate Monitoring

Benthic macroinvertebrates, or benthos, are organisms that live in and on the bottom substrates of rivers and streams. These organisms are primarily aquatic insect larvae. The use of benthos data has proven to be a reliable monitoring tool, as benthic macroinvertebrates are sensitive to subtle changes in water quality. Since macroinvertebrates have life cycles of six months to over one year, the effects of short-term pollution (such as a spill) will generally not be overcome until the following generation appears. The benthic community also integrates the effects of a wide array of potential pollutant mixtures.

Criteria have been developed to assign a bioclassification to each benthic sample based on the number of different species present in the pollution intolerant groups of Ephemeroptera (Mayflies), Plecoptera (Stoneflies) and Trichoptera (Caddisflies), commonly referred to as EPTs. A Biotic Index (BI) value gives an indication of overall community pollution tolerance. Different benthic macroinvertebrate criteria have been developed for different ecoregions (mountains, piedmont, coastal plain and swamp) within North Carolina and bioclassifications fall into five categories: Excellent, Good, Good-Fair, Fair and Poor.

Overview of Benthic Macroinvertebrate Data

There were 7 benthic samples collected during this assessment period. The following table lists the total bioclassifications (by subbasin) for all benthos sites in the White Oak River basin. Benthos sampling may slightly overestimate the proportion of Fair, Poor and Severe stress sites, as DWQ special studies often have the greatest sampling intensity (number of sites/stream) in areas where it is believed that water quality problems exist. For detailed information regarding the samples collected during this assessment period, refer to the tables at the end of this appendix.

Summary of Bioclassifications for All Freshwater Benthic Macroinvertebrate Sites (using the most recent rating for each site) in the White Oak River Basin

Subbasin	Excellent	Good	Good-Fair	Fair	Poor	Not Rated	Natural	Moderate	Severe Stress	Total
03-05-01	0	0	1	0	0	1	0	1	0	3
03-05-02	0	0	1	0	0	0	0	2	0	3
03-05-03	0	0	0	0	0	1	0	0	0	1
03-05-04	0	0	0	0	0	0	0	0	0	0
03-05-05	0	0	0	0	0	0	0	0	0	0
Total (#)	**0**	**0**	**2**	**0**	**0**	**2**	**0**	**3**	**0**	**7**
Total (%)	**0**	**0**	**28.6%**	**0**	**0**	**28.6%**	**0**	**42.8%**	**0**	**100**

Benthic Macroinvertebrate Data Collected in the White Oak River Basin, (Current basinwide sampling sites are in bold print.)

Waterbody	Location	County	Map No.	Index No.	Date	ST	EPTS	BI	BIEPT	BioClass
Subbasin 01										
White Oak R	US 17	Jones	**B-1**	20-(1)	6/04	72	21	6.36	5.38	Good-Fair
					7/99	70	15	7.07	6.16	Good-Fair
					2/99	61	11	7.11	5.83	Not Rated
Starkeys Cr	SR 1434	Onslow	**B-2**	20-10	3/04	50	11	6.24	-	Moderate
					2/99	93	15	7.27	-	Moderate
Pettiford Cr	USFS Rd	Carteret	**B-3**	20-29-1	3/04	35	10	6.13	-	Not Rated
					2/99	38	10	6.38	-	Natural
Subbasin 02										
New R	SR 1314	Onslow	**B-1**	19-(1)	6/04	76	13	6.39	5.72	Good-Fair
					7/99	53	11	6.40	6.08	Good-Fair
L Northeast Cr	SR 1423	Onslow	**B-2**	19-16-2	3/04	50	11	6.16	-	Moderate
					2/99	62	15	6.61	-	Natural
Harris Cr	SR 1109	Onslow	**B-3**	19-17-3	3/04	50	11	6.24	-	Moderate
					2/99	63	13	7.13	-	Natural
Subbasin 03										
NW Pr Newport R	SR 1206	Carteret	**B-1**	21-2	3/04	25	6	5.89	-	Not Rated
					2/99	40	6	6.53	-	Natural

Assessing Benthic Macroinvertebrate Communities in Small Streams

The benthic macroinvertebrate community of small streams is naturally less diverse than the streams used to develop the current criteria for flowing freshwater streams. The benthic macroinvertebrate database is being evaluated and a study to systematically look at small reference streams in different ecoregions is being developed with the goal of finding a way to evaluate water quality conditions in such small streams.

Presently, a designation of Not Impaired may be used for flowing waters that are too small to be assigned a bioclassification (less than 4 meters in width) but meet the criteria for a Good-Fair or higher bioclassification using the standard qualitative and EPT criteria. This designation will translate into a use support rating of Supporting. However, DWQ will use the monitoring information from small streams to identify potential impacts to small streams even in cases when a use support rating cannot be assigned.

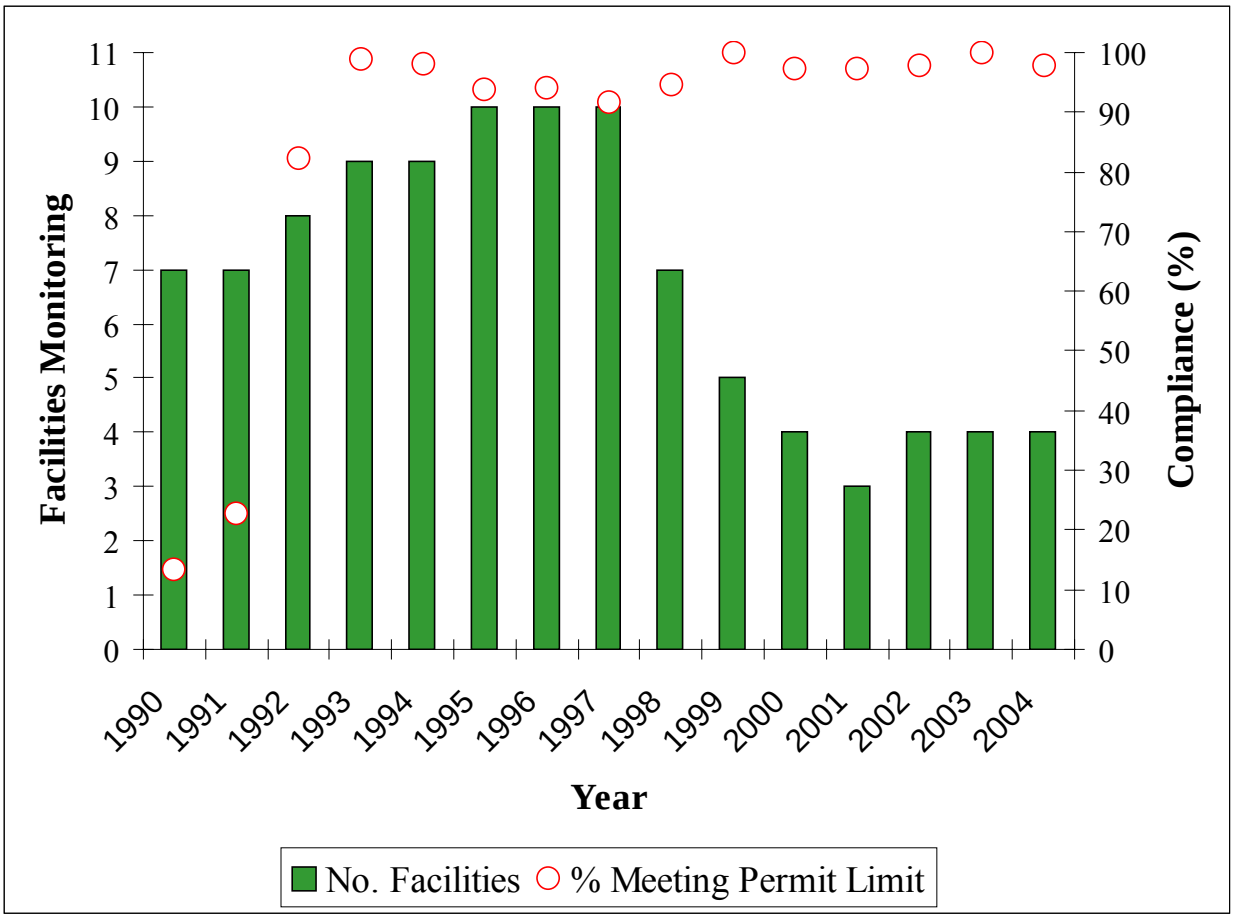
DWQ will use this monitoring information to identify potential impacts to these waters even though a use support rating is not assigned. DWQ will continue to develop criteria to assess water quality in small streams.

Aquatic Toxicity Monitoring

Acute and/or chronic toxicity tests are used to determine toxicity of discharges to sensitive aquatic species (usually fathead minnows or the water flea, *Ceriodaphnia dubia*). Results of these tests have been shown by several researchers to be predictive of discharge effects on receiving stream populations. Many facilities are required to monitor whole effluent toxicity (WET) by their NPDES permit or by administrative letter. Other facilities may also be tested by DWQ's Aquatic Toxicology Unit (ATU). Per Section 106 of the Clean Water Act, the ATU is required to test at least 10 percent of the major discharging facilities over the course of the federal fiscal year (FFY). However, it is ATU's target to test 20 percent of the major dischargers in the FFY. This means that each major facility would get evaluated over the course of their five-year permit. There are no requirements or targets for minor dischargers.

The ATU maintains a compliance summary for all facilities required to perform tests and provides monthly updates of this information to regional offices and DWQ administration. Ambient toxicity tests can be used to evaluate stream water quality relative to other stream sites and/or a point source discharge.

Four NPDES permits in the White Oak River basin currently require WET testing. All four permits have a WET limit. Across the state, the number of facilities required to perform WET has increased steadily since 1987, the first year that WET limits were written into permits in North Carolina. Consequently, compliance rates have also risen. Since 1996, the compliance rate has stabilized at approximately 90 percent.



NPDES facility whole effluent toxicity compliance in the White Oak River basin, 1990-2004. The compliance values were calculated by determining whether facilities with WET limits were meeting their ultimate permit limits during the given time period, regardless of any SOCs in force.

Lakes Assessment Program

Two lakes in the White Oak River basin (Catfish and Great Lakes) were sampled as part of the Lakes Assessment Program in summer of 2004. Lakes with noted water quality impacts are discussed in the appropriate subbasin chapter.

Ambient Monitoring System

The Ambient Monitoring System (AMS) is a network of stream, lake and estuarine stations strategically located for the collections of physical and chemical water quality data. North Carolina has more than 378 water chemistry monitoring stations statewide, including 35 stations in the White Oak River basin. Between 23 and 32 parameters are collected monthly at each station. The locations of these stations are listed in the following table and shown on individual subbasin maps. Notable ambient water quality parameters are discussed in the subbasin chapters. Refer to *2005 White Oak River Basinwide Assessment Report* at http://www.esb.enr.state.nc.us/bar.html for more detailed analysis of ambient water quality monitoring data.

Locations of Ambient Monitoring Stations in the White Oak River Basin by Subbasin

Subbasin/ Station ID	Location	Class	Lat.	Long.	County	Map ID
01	***White Oak River***					
P6400000	White Oak R at SR 1442 near Stella	SA HQW	34.77486	-77.15383	Onslow	PA1
P6850000	White Oak R at NC 24 at Swansboro	SA HQW	34.68271	-77.11291	Onslow	PA2
02	***New River***					
P0600000	New R at SR 1314 near Gum Branch	C NSW	34.84897	-77.51961	Onslow	PA3
P1200000	New R at US 17 at Jacksonville	SB HQW NSW	34.75304	-77.43433	Onslow	PA4
P2105000	Brinson Cr at mouth at Jacksonville	SC NSW	34.73475	-77.44025	Onslow	PA5
P2113000	New R at Wilson Bay at center point	SC HQW NSW	34.73854	-77.42746	Onslow	PA6
P2210000	New R at channel marker 55 at Jacksonville	SC HQW NSW	34.72783	-77.42696	Onslow	PA7
P3100000	Little Northeast Cr at SR 1406 near Jacksonville	C NSW	34.74835	-77.32925	Onslow	PA8
P3700000	Northeast Cr at NC 24 at Jacksonville	SC HQW NSW	34.73479	-77.35358	Onslow	PA9
P3960000	Northeast Cr above Paradise Point[1]	SC HQW NSW	34.72639	-77.39556	Onslow	PA10
P4000000	Northeast Cr (above Paradise Point) near Jacksonville[2]	SC NSW	34.718	-77.40300	Onslow	PA11
P4075000	Southwest Cr at channel marker R2 near Camp Lejeune	C HWQ NSW	34.69467	-77.42463	Onslow	PA12
P4087500	New R at channel marker 50 near Ragged Point[3]	SC NSW	34.70317	-77.40405	Onslow	PA13
P4100000	Southwest Cr at the narrows	C HQW NSW	34.68399	-77.42621	Onslow	PA14
P4200000	New R at channel marker 47 at Morgan Bay	SC NSW	34.68839	-77.39716	Onslow	PA15
P4400000	Wallace Cr at Main Service Road at Camp Lejeune	SB NSW	34.68172	-77.35857	Onslow	PA16
P4570000	New R at channel marker 43 at Town Point	SC NSW	34.66959	-77.36359	Onslow	PA17
P4600000	New R upstream of Frenchs Creek	SC NSW	34.64669	-77.34756	Onslow	PA18
P4700000	New R at channel marker 37 near Grey Point	SC NSW	34.62658	-77.36771	Onslow	PA19
P4750000	New R at NC 172 near Sneads Ferry	SA HQW	34.57847	-77.39893	Onslow	PA20
P9860000	Intracoastal Waterway at NC 210 near Goose Bay	SA ORW	34.49724	-77.43887	Onslow	PA21
03	***Newport River & Coastal Drainages***					
P7300000	Newport R at SR 1247 at Newport	C	34.78054	-76.85971	Carteret	PA22
P8700000	Newport R at channel marker G1 at Newport Marshes	SA HWQ	34.73793	-76.67825	Carteret	PA23
P8750000	Calico Cr at SR 1243 at Morehead City[4]	SC HQW	34.73383	-76.74269	Carteret	PA24
P8800000	Calico Cr at SR 1176 at Morehead City[4]	SC HQW	34.728	-76.73100	Carteret	PA25
P8965500	Morehead City Harbor at channel marker G17 near Morehead City	SA HQW	34.69518	-76.67389	Carteret	PA26
P9580000	Bogue Sound at channel marker G15 near Salter Path	SA HQW	34.72414	-76.85134	Carteret	PA27
P9600000	Bogue Sound at channel marker R24 at Emerald Isle	SA ORW	34.71449	-76.92773	Carteret	PA28
04	***North River & Coastal Drainages***					
P8975000	North R at US 70 near Bettie	SA HQW	34.78901	-76.61005	Carteret	PA29
P8976000	Ward Cr at US 70 near Otway	SA HQW	34.78086	-76.57383	Carteret	PA30
P8978000	Broad Cr at US 70 near Masontown	SC	34.8798	-76.41476	Carteret	PA31
P8990000	North River at channel marker 56 near Beaufort	SA HQW	34.70372	-76.59821	Carteret	PA32
P9720000	Back Sound at channel marker G3 at Harkers Island	SA ORW	34.68744	-76.56354	Carteret	PA33
P9730000	Core Sound at channel marker R36 near Jarrett Bay	SA ORW	34.74249	-76.49079	Carteret	PA34
P9740000	Core Sound at channel marker G1 mouth of Nelson Bay	SA ORW	34.85596	-76.40208	Carteret	PA35