

Chapter 3 - Summary of Water Quality Information for the White Oak River Basin

3.1 General Sources of Pollution

Human activities can negatively impact surface water quality, even when the activity is far removed from the waterbody. With proper management of wastes and land use activities, these impacts can be minimized. Pollutants that enter waters can be grouped into two general categories: *point sources* and *nonpoint sources*.

Point Sources

- Piped discharges from municipal wastewater treatment plants
- Industrial facilities
- Small package treatment plants
- Large urban and industrial stormwater systems

Point sources are typically piped discharges and are controlled through regulatory programs administered by the state. All regulated point source discharges in North Carolina must apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit from the state.

Nonpoint Sources

- Stormwater runoff
- Timber harvesting
- Agricultural lands
- Rural residential development
- Septic systems
- Mining

Nonpoint sources are from a broad range of land use activities. Nonpoint source pollutants are typically carried to waters by rainfall, runoff or snowmelt. Sediment and nutrients are most often associated with nonpoint source pollution. Other pollutants associated with nonpoint source pollution include fecal coliform bacteria, heavy metals, oil and grease, and any other substance that may be washed off the ground or deposited from the atmosphere into surface waters.

Unlike point source pollution, nonpoint pollution sources are diffuse in nature and occur intermittently, depending on rainfall events and land disturbance. Given the diffuse nature of nonpoint source pollution, it is difficult and resource intensive to quantify nonpoint contributions to water quality degradation in a given watershed. While nonpoint source pollution control often relies on voluntary actions, the state has many programs designed to reduce nonpoint source pollution.

Every person living in or visiting a watershed contributes to impacts on water quality. Therefore, each individual should be aware of these contributions and take actions to reduce them.

Cumulative Effects

While any one activity may not have a dramatic effect on water quality, the cumulative effect of land use activities in a watershed can have a severe and long-lasting impact.

3.2 Description of Surface Water Classifications and Standards

Program Overview

North Carolina's Water Quality Standards program adopted classifications and water quality standards for all the state's river basins by 1963. The program remains consistent with the Federal Clean Water Act and its amendments. Water quality classifications and standards have also been modified to promote protection of surface water supply watersheds, high quality waters, and the protection of unique and special pristine waters with outstanding resource values.

Statewide Classifications

All surface waters in the state are assigned a *primary* classification that is appropriate to the best uses of that water. In addition to primary classifications, surface waters may be assigned a *supplemental* classification. Most supplemental classifications have been developed to provide special protection to sensitive or highly valued resource waters. Table A-15 briefly describes the best uses of each classification. A full description is available in the document titled: *Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina*. Information on this subject is also available at DWQ's website: <http://h2o.enr.state.nc.us/wqhome.html>.

Table A-15 Primary and Supplemental Surface Water Classifications

PRIMARY FRESHWATER AND SALTWATER CLASSIFICATIONS	
<u>Class</u>	<u>Best Uses</u>
C and SC	Aquatic life propagation/protection and secondary recreation.
B and SB	Primary recreation and Class C uses.
SA	Waters classified for commercial shellfish harvesting.
WS	<i>Water Supply watershed</i> . There are five WS classes ranging from WS-I through WS-V. WS classifications are assigned to watersheds based on land use characteristics of the area. Each water supply classification has a set of management strategies to protect the surface water supply. WS-I provides the highest level of protection and WS-IV provides the least protection. A Critical Area (CA) designation is also listed for watershed areas within a half-mile and draining to the water supply intake or reservoir where an intake is located.
SUPPLEMENTAL CLASSIFICATIONS	
<u>Class</u>	<u>Best Uses</u>
Sw	<i>Swamp Waters</i> : Recognizes waters that will naturally be more acidic (have lower pH values) and have lower levels of dissolved oxygen.
Tr	<i>Trout Waters</i> : Provides protection to freshwaters for natural trout propagation and survival of stocked trout.
HQW	<i>High Quality Waters</i> : Waters possessing special qualities including excellent water quality, Native or Special Native Trout Waters, Critical Habitat areas, or WS-I and WS-II water supplies.
ORW	<i>Outstanding Resource Waters</i> : Unique and special surface waters which are unimpacted by pollution and have some outstanding resource values.
NSW	<i>Nutrient Sensitive Waters</i> : Areas with water quality problems associated with excessive plant growth resulting from nutrient enrichment.

* Primary classifications beginning with "S" are assigned to saltwaters.

Statewide Water Quality Standards

Each primary and supplemental classification is assigned a set of water quality *standards* that establish the level of water quality that must be maintained in the waterbody to support the uses associated with each classification. Some of the standards, particularly for HQW and ORW waters, outline protective management strategies aimed at controlling point and nonpoint source pollution. These strategies are discussed briefly below. The standards for C and SC waters establish the basic protection level for all state surface waters. With the exception of Sw, all of the other primary and supplemental classifications have more stringent standards than for C and SC, and therefore, require higher levels of protection.

Some of North Carolina's surface waters are relatively unaffected by pollution sources and have water quality higher than the standards that are applied to the majority of the waters of the state. In addition, some waters provide habitat for sensitive biota such as trout, juvenile fish, or rare and endangered aquatic species. These waters may be rated as HQW or ORW.

High Quality Waters

Special HQW protection management strategies are intended to prevent degradation of water quality below present levels from both point and nonpoint sources. HQW requirements for new wastewater discharge facilities and facilities which expand beyond their currently permitted loadings address oxygen-consuming wastes, total suspended solids, disinfection, emergency requirements, volume, nutrients (in nutrient sensitive waters) and toxic substances.

Criteria for HQW Classification

- Waters rated as Excellent based on DWQ's chemical and biological sampling.
- Streams designated as native and special native trout waters or primary nursery areas by the Wildlife Resources Commission (WRC).
- Critical habitat areas designated by the WRC or the Department of Agriculture.
- Waters classified by DWQ as WS-I and WS-II are HQW by definition, but these waters are not specifically assigned the HQW classification because the standards for WS-I and WS-II waters are sometimes more stringent than those classified HQW.

For nonpoint source pollution, development activities which require a Sedimentation and Erosion Control Plan in accordance with rules established by the NC Sedimentation Control Commission or an approved local erosion and sedimentation control program, and which drain to and are within one mile of HQWs, are required to control runoff from the development using either a low density or high density option. The low density option requires a 30-foot vegetated buffer between development activities and the stream; whereas, the high density option requires structural stormwater controls. In addition, the Division of Land Resources requires more stringent erosion controls for land-disturbing projects within one mile and draining to HQWs.

Outstanding Resource Waters

A small percentage of North Carolina's surface waters have excellent water quality (rated based on biological and chemical sampling as with HQWs) and an associated outstanding resource.

The ORW rule defines outstanding resource values as including one or more of the following:

- an outstanding fisheries resource;
- a high level of water-based recreation;
- a special designation such as National Wild and Scenic River or a National Wildlife Refuge;
- within a state or national park or forest; or
- a special ecological or scientific significance.

The requirements for ORW waters are more stringent than those for HQWs. Special protection measures that apply to North Carolina ORWs are set forth in 15A NCAC 2B .0225. At a minimum, no new discharges or expansions are permitted, and a 30-foot vegetated buffer or stormwater controls for new developments are required. In some circumstances, the unique characteristics of the waters and resources

that are to be protected require that a specialized (or customized) ORW management strategy be developed.

Nutrient Sensitive Waters

Nutrient sensitive waters (NSW) is a supplemental classification that the Environmental Management Commission may apply to surface waters that are experiencing or are subject to growths of microscopic or macroscopic vegetation. Nutrient strategies are developed to control these growths. For more information on NSW waters and nutrient strategies in the White Oak River, refer to page 62. Refer to 15A NCAC 2B .0223 for specifics on NSW rules.

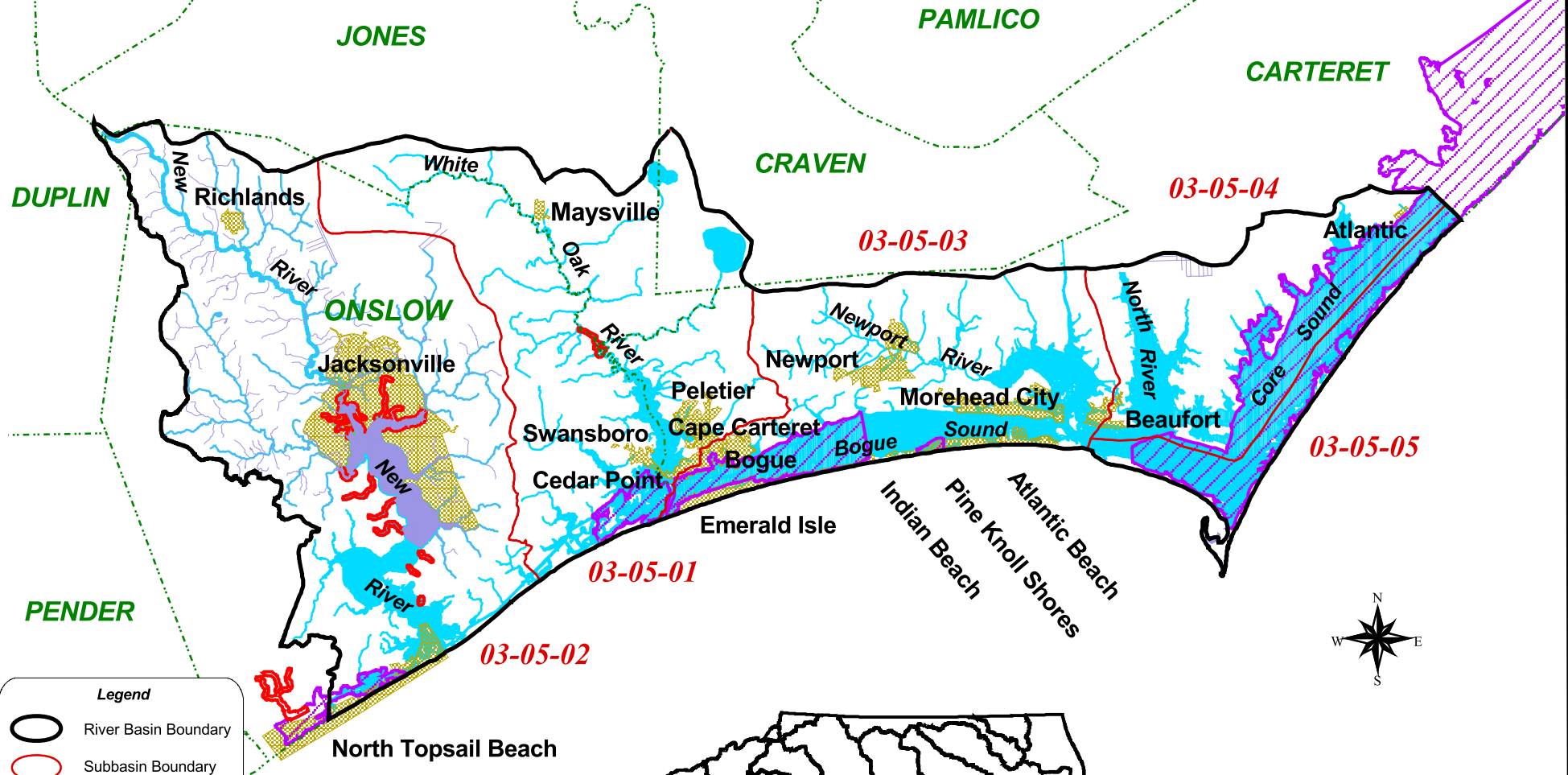
Class SA Waters

The best uses of Class SA waters are for shellfishing for market purposes and any other usage specified by the "SB" or "SC" classification. Fecal coliform bacteria in class SA waters shall meet the current sanitary and bacteriological standards as adapted by the Commission for Health Services. Domestic wastewater discharges are not allowed, and there are provisions for stormwater controls. Refer to 15A NCAC 2B .0221 for specifics on water quality standards in Class SA waters.

Classifications and Standards in the White Oak River Basin

Most of the waters in the White Oak River basin are estuarine or swampy. There are 1,235 acres of HQW waters, 60,494 acres of ORW waters, and 10,565 acres and 203 stream miles of NSW waters (Figure A-13). There are also 117,085 acres of Class SA waters (Figure 14). Appendix III lists the individual indexed segments along with its classification.

Figure A-13 High Quality Waters, Outstanding Resource Waters and Nutrient Sensitive Waters in the White Oak River Basin



Legend

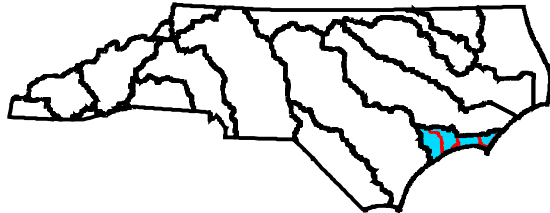
- River Basin Boundary
- Subbasin Boundary

Water Classification

- HQW
- ORW
- NSW

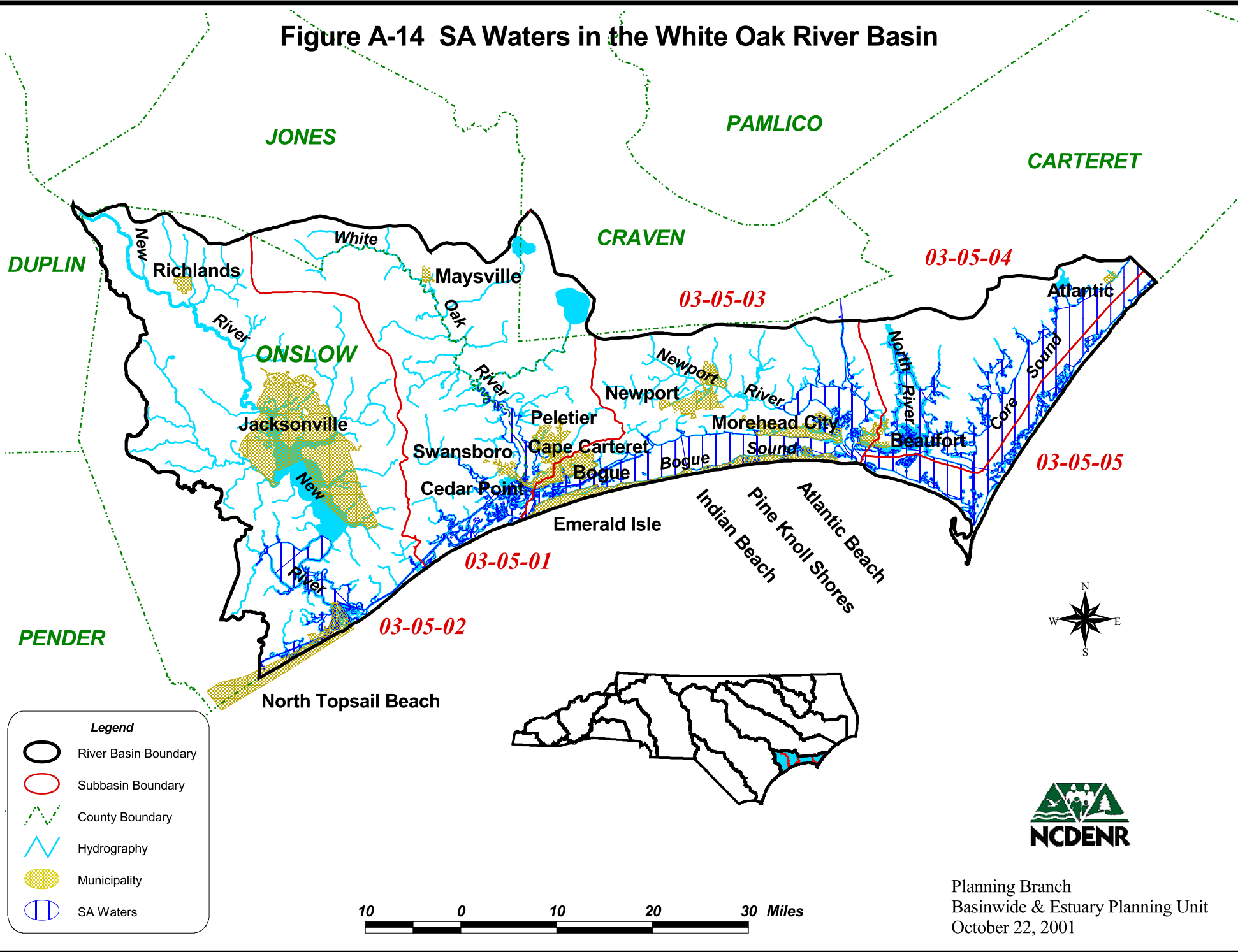
Other Symbols

- County Boundary
- Hydrography
- Municipality



Planning Branch
 Basinwide & Estuary Planning Unit
 October 22, 2001

Figure A-14 SA Waters in the White Oak River Basin



3.3 DWQ Water Quality Monitoring Programs in the White Oak River Basin

Staff in the Environmental Sciences Branch 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 (Section 3.3.1)
- fish assessments (Section 3.3.2)
- aquatic toxicity monitoring (Section 3.3.3)
- ambient monitoring system (Section 3.3.4)

3.3.1 Benthic Macroinvertebrates

Benthic macroinvertebrates, or benthos, are organisms that live in and on the bottom substrates of rivers, streams, swamps and estuaries. These organisms are primarily aquatic insect larvae in freshwater and polychyetes, mollusks and crustaceans in saltwater. 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 a few weeks 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 rating 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, and a Biotic Index value, which gives an indication of overall community pollution tolerance. Different benthic macroinvertebrate criteria have been developed for different ecoregions (mountains, piedmont and coastal plain) within North Carolina. Bioclassifications fall into five categories ranging from Poor to Excellent.

Extensive evaluation of swamp streams across eastern North Carolina suggests that current coastal plain criteria are not appropriate for assessing the condition of water quality in these special systems. Swamp streams are characterized by slower flow, lower dissolved oxygen, lower pH, and sometimes very complex braided channels and dark-colored water. DWQ is working to develop biological criteria for swamps. Criteria for estuaries have also been proposed, but not yet adopted, that may be used in the future to assign bioclassifications to these waters. Refer to page 59 for more detailed information on development of criteria.

Overview of Benthic Macroinvertebrate Data

Appendix A-II lists all the benthic macroinvertebrate collections in the White Oak River basin between 1983 and 1999, giving site location, collection date, taxa richness, biotic index values and bioclassifications. Most of the benthic macroinvertebrates were collected from swamp or estuarine sites and not used to develop use support ratings. Refer to page 59 for more information on biological monitoring issues.

3.3.2 Fish Community Assessments

During the late 1990s, application of the NCIBI has been restricted to wadeable streams that can be sampled by a crew of 2-4 persons using backpack electrofishers and following the DWQ Standard Operating Procedures (NCDEHNR, 1997). Work began in 1998 to develop a fish community boat sampling method that could be used in non-wadeable coastal plain streams. Plans are to sample 10-15 reference sites with the boat method once it is finalized. As with the benthos sampling, several years of reference site data will be needed before solid criteria can be developed to evaluate biological integrity of large streams and rivers using the fish community.

Overview of Fish Tissue Sampling

Fish tissue surveys were conducted by DWQ at three stations within the basin from 1994 to 1999. These surveys were conducted as part of special mercury contamination assessments in the eastern part of the state and during routine basinwide assessments.

The majority of fish tissue samples collected from the White Oak River basin in 1994 and 1999 contained metal and organic contaminants at undetectable levels or levels less than the EPA, Food and Drug Administration, and State of North Carolina consumption criteria. Fish tissue samples were also collected by the Division of Marine Fisheries in the Atlantic to assess mercury levels in king mackerel. Mercury levels appear to be elevated for larger fish. For more detailed information regarding these sampling events and fish consumption advisories, refer to page 61.

White Oak River Basin Fish Kills

The Division of Water Quality has systematically monitored and reported on fish kill events across the state since 1996. Field investigators reported 14 fish kill events in the White Oak River basin from 1994 to 1999. Most events occurred in subbasin 03-05-02 on the New River near Jacksonville.

During June 1995, a large kill of approximately 3,000 fish occurred from the headwaters of the New River to Jacksonville due to a dike rupture at the Ocean View Farms LTD, near the Town of Richlands. A spill of 25 million gallons of hog waste into the New River depleted dissolved oxygen to lethal levels in the river for at least five days. Other large kills on the New River often involved menhaden and were attributed to low dissolved oxygen concentrations and to diseases (NCDENR, 1999a).

3.3.3 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 by their NPDES permit or by administrative letter. Other facilities may be tested by DWQ's Aquatic Toxicology Laboratory.

The Aquatic Toxicology Unit maintains a compliance summary for all facilities required to perform tests and provides a monthly update 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 active facility permits in the White Oak River basin currently require whole effluent toxicity (WET) monitoring with a limit. The compliance rates of these four facilities, in recent years, have stabilized at approximately 95-100% (Figure A-15).

The discharges located at the USMC Camp Lejeune base were consolidated into a single advanced wastewater treatment plant at Frenchs Creek in October of 1998. Prior to then, some of the discharges experienced toxicity problems associated with excess total residual chlorine from the time they initiated monitoring in 1990 until mid-1992. Since consolidating the Camp Johnson, the Hadnot Point 001 and the Tarawa Terrace discharges, the Hadnot Point 002 facility has been in compliance with its permit limits.

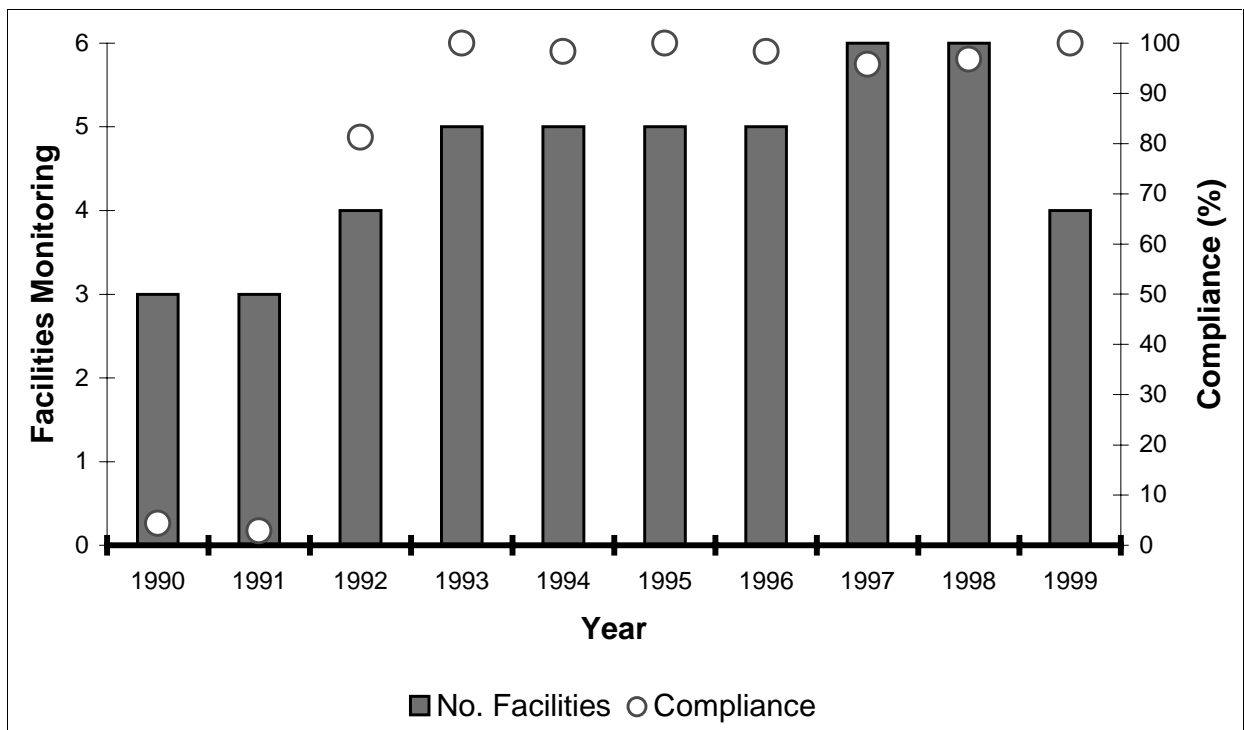


Figure A-15 Summary of Compliance with Aquatic Toxicity Tests in the White Oak River Basin

3.3.4 Ambient Monitoring System Program

The Ambient Monitoring System (AMS) is a network of stream, lake and estuarine sample stations strategically located for the collection of physical and chemical water quality data. North Carolina has 20 stations in the White Oak River basin (Table A-16). There was a decrease in nutrients and fecal coliform bacteria at the New River station near Gum Branch. Six stations had a high proportion of samples with less than 5.0 mg/l of dissolved oxygen (DO) that was attributed mostly to drainage from swampy areas. Extremely low DO was observed following hurricanes. There were also noted increases in turbidity and total suspended solids during periods of runoff.

Eleven additional stations were established in the New River Estuary to evaluate water quality after removal of several discharges in this subbasin. The stations have also been used to monitor algal community activity in the New River. Refer to page 62 for more information.

Fecal coliform bacteria are widely used as an indicator of the potential presence of pathogens typically associated with the intestinal tract of warm-blooded animals. The water quality standard for fecal coliform bacteria is based on a geometric mean of 200 colonies/100ml except in SA waters where waters shall meet the current sanitary and bacteriological standards as adapted by the Commission for Health Services. DEH Shellfish Sanitation does extensive monitoring of estuarine waters for fecal coliform bacteria as part of a shellfish sanitation program and beach monitoring program. Most of the impairment in the White Oak River basin is related to fecal coliform bacteria contamination of Class SA waters. Refer to page 49 for more information on shellfish harvesting issues.

Table A-16 Ambient Monitoring System Stations within the White Oak River Basin

Primary No	STORET No	Station Name	Subbasin
White Oak River Drainage			
02092744	P6400000	White Oak River near Stella NC	03-05-01
02137500	P6850000	White Oak River at Swansboro NC	03-05-01
New River Drainage			
O2093000	P0600000	New River at SR 1313 near Gum Branch NC	03-05-02
O2093032	P1200000	New River at US Hwy 17 at Jacksonville NC	03-05-02
O209317585	P3100000	Little Northeast Creek @ SR 1406 near Jacksonville NC	03-05-02
O2093186	P3700000	Northeast Creek at NC Hwy 24 @ Jacksonville NC	03-05-02
O209319360	P4400000	Wallace Creek @ River Drive @ Camp Lejeune NC	03-05-02
O2093197	P4750000	New River near Sneads Ferry NC	03-05-02
Newport River Drainage			
O2092702	P7300000	Newport River at SR 1247 at Newport NC	03-05-03
WOK037C	P8700000	Newport River @ CM G1 @ Newport Marshes	03-05-03
WOK039C4	P8965500	Morehead City Harbor @ CM G15 near Morehead City	03-05-03
O209270870	P9580000	Bogue Sound @ CM G15 near Salter Path NC	03-05-03
O209270940	P9600000	Bogue Sound at Emerald Isle NC	03-05-03
North River Drainage			
O209270760	P8975000	North River @ US Hwy 70 near Bettie NC OPGF-Q	03-05-04
O209270780	P8976000	Ward Creek @ US Hwy 70 near Otway NC OPGF-Q	03-05-04
O209268982	P8978000	Broad Creek @ US Hwy 70 near Masontown NC OPGF-Q	03-05-04
O209270790	P8990000	North River at CM R56 near Beaufort NC	03-05-04
Coastal Drainage			
WOK045	P9720000	Back Sound at CM G3 at Harkers Island NC	03-05-04
WOK046	P9730000	Core Sound @ CM R36 near Jarrett Bay	03-05-04
WOK047	P9740000	Core Sound @ CM G1 @ entrance to Nelson Bay CA	03-05-04

3.3.5 Division of Environmental Health Shellfish Sanitation and Recreational Water Quality Section

The Shellfish Sanitation and Recreational Water Quality Section of the Division of Environmental Health is responsible for monitoring and classifying coastal waters as to their suitability for shellfish harvesting for human consumption and inspection and certification of shellfish and crustacea processing plants. The section also administers the recreational beach monitoring program and posts advisories under the guidance of the State Health Director of those waters not suitable for bodily contact activities.

The Shellfish Sanitation Program is conducted in accordance with the guidelines set by the Interstate Shellfish Sanitation Conference (ISSC) contained in the *National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish Model Ordinance*. The NSSP is administered by the US Food and Drug Administration (FDA). Classifications of coastal waters for shellfish harvesting are done by means of a Sanitary Survey, which includes: a shoreline survey of sources of pollution, a hydrographic and meteorological survey, and a bacteriological survey of growing waters. Sanitary Surveys are conducted of all potential shellfish growing areas in coastal North Carolina and recommendations are made to the Division of Marine Fisheries of which areas should be closed for shellfish harvesting.

The Recreational Beach Monitoring Program determines the quality of coastal waters and beaches for suitability for bodily contact activities. Shoreline surveys of potential sources of pollution that could affect the area are also conducted. Swimming advisories are posted when bacteriological standards are exceeded or point source discharges are found.

Water samples are collected and analyzed for fecal coliform bacteria from numerous sampling stations located throughout the coastal area for both the shellfish and recreational programs. The recreational monitoring program also tests waters for *Escherichia coli*. The White Oak River basin comprises 17 shellfish growing areas with 377 stations sampled a minimum of six times per year. The recreational monitoring program has 63 sampling stations located in the White Oak River basin that are sampled approximately 24 times per year. Refer to page 49 for more information on shellfish harvesting issues.

3.4 Other Water Quality Research

There are many other water quality sampling programs being conducted throughout the White Oak River basin. Any data submitted to DWQ from other water sampling programs conducted in the White Oak River basin have been reviewed. These research efforts may be used by DWQ to adjust the location of biological and chemical monitoring sites or to better assess impacts to waters. Some of the programs or research that developed these data are presented in Section C.

3.5 Use Support Summary

3.5.1 Introduction to Use Support

Waters are classified according to their best intended uses. Determining how well a water supports its uses (*use support* status) is an important method of interpreting water quality data and assessing water quality. Surface waters are rated *fully supporting* (FS), *partially supporting* (PS) or *not supporting* (NS). The terms refer to whether the classified uses of the water (such as shellfish harvesting, aquatic life protection and swimming) are being met.

For example, waters classified for fishing and secondary contact recreation (Class SC for saltwater) are rated as fully supporting if data used to determine use support did not exceed specific criteria. However, if these criteria were exceeded, then the waters would be rated as PS or NS, depending on the degree of degradation. Waters rated PS or NS are considered to be impaired. Waters lacking data, or having inconclusive data, are listed as not rated (NR).

Use support ratings for surface waters:

- *fully supporting (FS)*
- *partially supporting (PS)*
- *not supporting (NS)*
- *not rated (NR)*

Impaired waters categories:

- Partially Supporting
- Not Supporting

Historically, the non-impaired category was subdivided into fully supporting and fully supporting but threatened (ST). ST was used to identify waters that were fully supporting but had some notable water quality concerns and could represent constant, degrading or improving conditions. North Carolina's past use of ST was very different from that of the US Environmental Protection Agency (EPA), which uses it to identify waters that demonstrate declining water quality (EPA Guidelines for Preparation of the Comprehensive State Water Quality Assessments [305(b) Reports] and Electronic Updates, 1997). Given the difference between the EPA and North Carolina definitions of ST and the resulting confusion that arises from this difference, North Carolina no longer subdivides the non-impaired category. However, these waters and the specific water quality concerns remain identified in the subbasin chapters in Section B so that data, management and the need to address the identified concerns are not lost.

Beginning in 2000 with the Roanoke River basin, an approach to assess ecosystem health and human health risk is applied to use support categories. Six categories are used to assess this approach: aquatic life and secondary recreation, fish consumption, shellfish harvesting, primary recreation, water supply and "other" uses. Each of these categories relates to the primary classifications applied to NC rivers and streams. A single water could have more than one use support rating corresponding to one or more of the multiple use support categories. For many waters, a use support category will not be applicable (NA) to the best use classification of that water (e.g., drinking water supply is not the best use of a Class C water).

This method of determining use support differs from that done prior to 2000; in that, there is no *overall* use support rating for a water. For more detailed information regarding use support methodology, refer to Appendix III.

3.5.2 Comparison of Use Support Ratings to Streams on the 303(d) List

Section 303(d) of the Clean Water Act requires states to identify waters not meeting standards. EPA must then provide review and approval of the listed waters. A list of waters not meeting standards is submitted to EPA biennially. Waters placed on this list, termed the 303(d) list, require the establishment of total maximum daily loads (TMDLs) intended to guide the restoration of water quality. See Appendix IV for a description of 303(d) listing methodology.

Waters are placed on North Carolina's 303(d) list primarily due to a partially or not supporting use support rating. These use support ratings are based on biological and chemical data. When the state water quality standard is exceeded, then this constituent is listed as the problem parameter. TMDLs must be developed for problem parameters on the 303(d) list. Other strategies may be implemented to restore water quality; however, the waterbody must remain on the 303(d) list until improvement has been realized based on either biological ratings or water quality standards.

The 303(d) list and accompanying data are updated as the basinwide plans are revised. In some cases, the new data will demonstrate water quality improvement and waters may receive a better use support rating. These waters may be removed from the 303(d) list since water quality improvement has been attained. In other cases, the new data will show a stable or decreasing trend in overall water quality resulting in the same, or lower, use support rating. Attention remains focused on these waters until water quality standards are being met.

3.5.3 Use Support Ratings for the White Oak River Basin

Aquatic Life and Secondary Recreation

The aquatic life/secondary recreation use support category is applied to all waters in North Carolina. Therefore, this category is applied to the total number of stream miles (416.9), estuarine acres (131,215.9), and coastal miles (91) in the White Oak River basin. Table A-17 presents use support ratings by subbasin for both monitored and evaluated waters in the aquatic life/secondary recreation category. A basinwide summary of current aquatic life/secondary recreation use support ratings is presented in Table A-18.

Approximately 13 percent of stream miles (54 mi.) and 87 percent of estuarine acres (114,565) were monitored for the protection of aquatic life and secondary recreation by DWQ during this basinwide planning cycle. The 91 miles of Atlantic coastline are not currently monitored by DWQ to assess the aquatic life and secondary recreation use support category. There were no impaired stream miles and no impaired estuarine waters in this use support category in the basin during this planning cycle.

Table A-17 Aquatic Life/Secondary Recreation Use Support Ratings for Monitored and Evaluated Waters Listed by Subbasin in Miles and Acres (1995-1999)

Subbasin	Fully Supporting	Partially Supporting	Not Supporting	Not Rated	Total
03-05-01	39.0 mi. 9,658 ac	0 0	0 0	77.0 mi. 2,862.8 ac 8 coastal mi.	116.0 mi. 12,520.8 ac 8 coastal mi.
03-05-02	28.4 mi. 17,997.8 ac	0	0	174.3 mi. 4,497.9 ac 15 coastal mi.	208.4 mi. 22,495.7 ac 15 coastal mi.
03-05-03	0 mi. 31,113.4 ac	0	0	86.9 mi. 3,611.3 ac 25 coastal mi.	86.9 mi. 34,726.8 ac 25 coastal mi.
03-05-04	4.4 mi. 37,705.8	0	0	1.2 mi. 1,792.4 ac	5.6 mi. 39,498.2 ac
03-05-05	21,975.2 ac	0	0	43 coastal mi.	21,975.2 ac 43 coastal mi.
Total Miles	71.8	0	0	339.4	416.9
Total Acres	118,450	0	0	12,766	131,215.9
Total Coast Miles				91	91
Percent miles	17%	0%	0%	83%	100%
Percent acres	90%	0%	0%	10%	100%

Table A-18 Aquatic Life/Secondary Recreation Use Support Summary Information for Waters in the White Oak River Basin (1999)

Aquatic Life/Secondary Recreation Use Support Ratings	Monitored, Evaluated and Not Rated Streams*		Monitored Streams Only**	
	Miles or Acres	%	Miles or Acres	%
Fully Supporting	71.8 mi. 118,450 ac	17.0% 90%	54 mi. 114,565 ac	13% 87%
Impaired	0	0%	0	0%
<i>Partially Supporting</i>	<i>0</i>	<i>0%</i>	<i>0</i>	<i>0%</i>
<i>Not Supporting</i>	<i>0</i>	<i>0%</i>	<i>0</i>	<i>0%</i>
Not Rated	339.4 mi. 12,766 ac	83% 10%	84.9 mi. 721 ac	20% 0.5%
Total	416.9 mi. 131,216.4 ac		139 mi. 115,286 ac	

* = Percent based on total of all waters, both monitored and evaluated.

** = Percent based on total of all monitored waters.

Fish Consumption

Like the aquatic life/secondary recreation use support category, the fish consumption use support category is also applied to all waters in the state. Approximately 7.5 percent of stream miles (31.3 miles) and 100 percent of Atlantic coastline (91 miles) in the White Oak River basin were

monitored for the fish consumption use support category during this basinwide cycle. Fish consumption use support ratings are based on fish consumption advisories issued by the NC Department of Health and Human Services (DHHS). Currently, there is a statewide advisory limiting consumption of bowfin due to high mercury concentrations. Because of this advisory, all waters in the state are considered partially supporting the fish consumption use. Refer to page 61 for more information on fish consumption advisories.

Table A-19 presents use support ratings by subbasin for monitored streams in the fish consumption use support category. A basinwide summary of current fish consumption use support ratings is presented in Table A-20.

Table A-19 Fish Consumption Use Support Ratings for Monitored Waters Listed by Subbasin (1994-1999)

Subbasin	Fully Supporting	Partially Supporting	Not Supporting	Not Rated	Total
03-05-01	0	8 coastal miles	0	0	8 coastal miles
03-05-02	0	15 coastal miles 31.3 stream miles	0	0	15 coastal miles 31.3 stream miles
03-05-03	0	25 coastal miles	0	0	25 coastal miles
03-05-04	0	0	0	0	0
03-05-05	0	43 coastal miles	0	0	43 coastal miles
Total	0	91 coastal miles 41 stream miles	0	0	91 coastal miles 41 stream miles
Percent	0%	100%	0%	0%	100%

Table A-20 Fish Consumption Use Support Summary Information for Waters in the White Oak River Basin (2000)

Fish Consumption Use Support Ratings	Monitored, Evaluated and Not Rated Streams*		Monitored Streams Only**	
	Miles or Acres	%	Miles or Acres	%
Fully Supporting	0		0	
Impaired	416.8 mi. 131,216.7 ac 91 coastal miles	100%	31.3 mi. 91 coastal miles	7.5% 100%
<i>Partially Supporting</i>	<i>416.8 mi. 131,216.7 ac 91 coastal miles</i>	<i>100%</i>	<i>31.3 mi. 91 coastal miles</i>	<i>7.5% 100%</i>
<i>Not Supporting</i>	<i>0</i>		<i>0</i>	
Not Rated	0		0	
TOTAL	416.8 mi. 131,216.7 ac 91 coastal miles		31.3 mi. 91 coastal miles	

* = Percent based on total of all streams, both monitored and evaluated.

** = Percent based on total of all monitored streams.

Primary Recreation

There are 36.3 stream miles, 91 coastal miles and 118,131.7 estuarine acres currently classified for primary recreation in the White Oak River basin. Approximately 80 percent of estuarine acres were monitored by DWQ over the past five years and by Division of Environmental Health Shellfish Sanitation over the last two years; all are fully supporting the primary recreation use. Table A-21 presents use support ratings by subbasin for monitored streams in the primary recreation use support category. A basinwide summary of current primary recreation use support ratings is presented in Table A-22.

Table A-21 Primary Recreation Use Support Ratings for Monitored Waters Listed by Subbasin (1994-1999)

Subbasin	Fully Supporting	Partially Supporting	Not Supporting	Not Rated	Total
03-05-01	0 mi. 7,298.8 ac 8 coastal miles	0	0	6.6 mi. 3,940.4 ac	6.6 mi. 11,239.2 ac 8 coastal miles
03-05-02	0 mi. 9,051.1 ac 15 coastal miles	0	0	9.3 mi. 2,520 ac	9.3 mi. 11,571.1 ac 15 coastal miles
03-05-03	0 mi. 22,895 ac 25 coastal miles	0	0	17.7 mi. 11,274.4 ac	17.7 mi. 34,169.4 ac 25 coastal miles
03-05-04	0 mi. 33,283.9 ac	0	0	2.7 mi. 5,893 ac	2.7 mi. 39,176.9 ac
03-05-05	0 mi. 21,975.2 ac 43 coastal miles	0	0	0	0 mi. 21,975.2 ac 43 coastal miles
Total	0 mi. 94,503.9 ac 91 coastal miles	0	0	36.3 mi. 23,627.9 ac	36.3 mi. 118,131.8 ac 91 coastal miles
Percent	80% ac 100% coastal miles	0%	0%	100% mi. 20% ac	100%

Table A-22 Primary Recreation Use Support Summary Information for Waters in the White Oak River Basin (1999)

Primary Recreation Use Support Ratings	Monitored, Evaluated and Not Rated Streams*		Monitored Streams Only**	
	Miles or Acres	%	Miles or Acres	%
Fully Supporting	94,503.9 ac 91 coastal miles	80% 100%	94,503.9 ac 91 coastal miles	80%
Impaired	0	0	0	0
<i>Partially Supporting</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Not Supporting</i>	<i>0</i>	<i>0</i>	<i>0</i>	
Not Rated	36.3 mi. 23,627.9 ac	100% 20%	0.0	
TOTAL	36.3 mi. 118,131.8 ac 91 coastal miles		94,503.9 ac 91 coastal miles	

* = Percent based on total of all streams, both monitored and evaluated.

** = Percent based on total of all monitored streams.

Shellfish Harvesting

There are 32 stream miles and 117,659 estuarine acres classified for shellfish harvesting (Class SA) in the White Oak River basin. All were monitored during the past five years by DEH Shellfish Sanitation (refer to page 40). Table A-23 presents use support ratings by subbasin for monitored streams in the shellfish harvesting use support category. A basinwide summary of current shellfish harvest use support ratings is presented in Table A-24. For more information on shellfish harvesting issues, refer to page 49.

Table A-23 Shellfish Harvesting Use Support Ratings for Monitored Waters Listed by Subbasin (1994-1999) in Acres

Subbasin	Fully Supporting	Partially Supporting	Not Supporting	Not Rated	Total
03-05-01	4,608.6	3,581.3	3,049.3	0	11,239.2
03-05-02	8,691.3	1,711	719.5	0	11,122.2
03-05-03	26,683.2	2,762.5	4,699.8	0	34,145.5
03-05-04	27,641.8	10,132.1	1,403	0	39,176.9
03-05-05	21,975.2	0	0	0	21,975.2
Total	89,600.1	18,186.9	9,871.6	0	117,659
Percent	76%	16%	8%	0%	100%

Table A-24 Shellfish Harvest Use Support Summary Information for Waters in the White Oak River Basin (1999)

Shellfish Harvest Use Support Ratings	Monitored Streams	
	Acres	%
Fully Supporting	89,601	76%
Impaired	28,058	
<i>Partially Supporting</i>	<i>18,187</i>	<i>16%</i>
<i>Not Supporting</i>	<i>9,872</i>	<i>8%</i>
Not Rated	0	0%
Total	117,659	

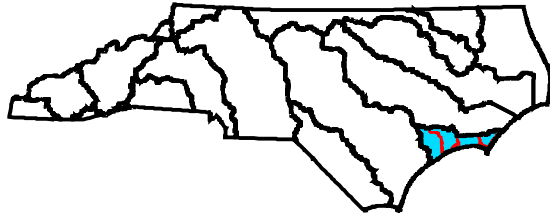
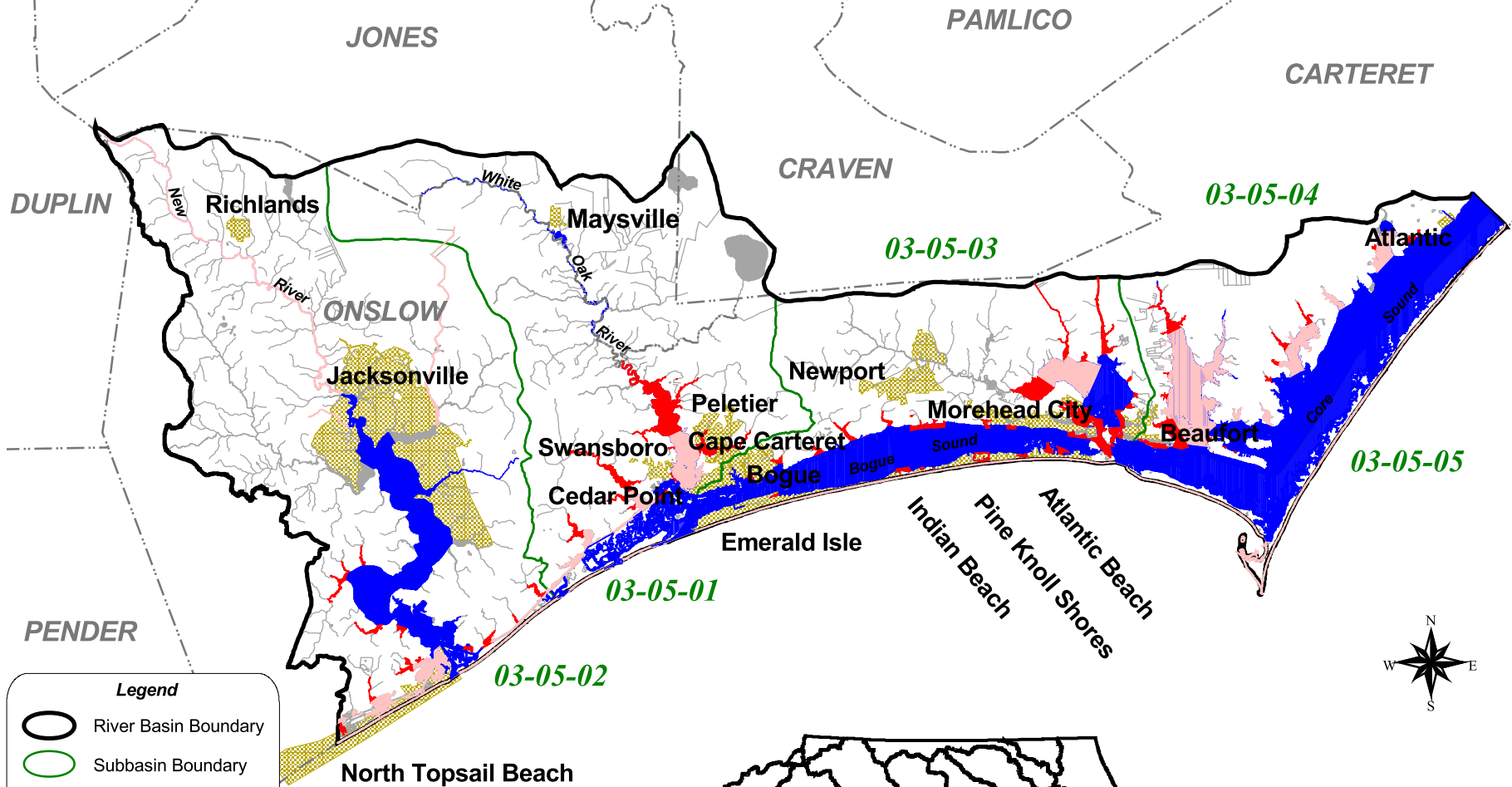
Note: There are also 30 of 32 Class SA stream miles that are considered impaired as well.

Use Support Summary

There are no impaired stream miles or estuarine acres in the aquatic life and secondary recreation use support category and no impaired waters in the primary recreation use support category. All waters are considered impaired for the fish consumption use support category due to a statewide fish consumption advisory for bowfin, although only three streams and the Atlantic Ocean were monitored to assess this category. There are 28,058 estuarine acres impaired for the shellfish harvesting use support category. The water supply use support category was not assessed in this basin because there are no surface water drinking water supplies. Descriptions of impaired segments, as well as problem parameters, are outlined in Appendix III. Management strategies for each water are discussed in detail in the appropriate subbasin chapter.

Color maps showing current use support ratings for the White Oak River basin are presented in Figure A-16. Only waters where fish tissue has been monitored during this basinwide cycle are shown as impaired for fish consumption on the maps. When use support ratings have been assigned to more than one category for a particular water, the rating that represents the most severe impairment is shown on the map.

**Figure A-16 Use Support Ratings in the White Oak River Basin
(Refer to Tables A-17 and A-24)**

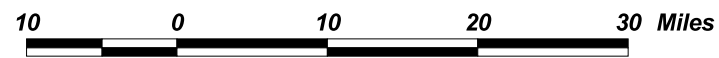


Legend

- River Basin Boundary
- Subbasin Boundary
- County Boundary
- Municipality

Use Support Rating

- Fully Supporting
- Partially Supporting
- Not Supporting
- Not Supporting



Planning Branch
Basinwide & Estuary Planning Unit
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