Section A - Chapter 3

Summary of Water Quality Information for the Tar-Pamlico 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 fall 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 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.

Nonpoint Sources

- Construction activities
- Roads, parking lots and rooftops
- Agriculture
- Failing septic systems and straight pipes
- Timber harvesting
- Hydrologic modifications

Unlike point source pollution, nonpoint pollution sources are diffuse in nature and occur intermittently, depending on rainfall events and land disturbance. Given these characteristics, 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.

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.

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.

3.2 Description of Surface Water Classifications and Standards

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*	
Class	**Best Uses**
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	*Water Supply watershed*. 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	
Class	**Best Uses**
Sw	*Swamp Waters*: Recognizes waters that will naturally be more acidic (have lower pH values) and have lower levels of dissolved oxygen.
Tr	*Trout Waters*: Provides protection to freshwaters for natural trout propagation and survival of stocked trout.
HQW	*High Quality Waters*: 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	*Outstanding Resource Waters*: Unique and special surface waters which are unimpacted by pollution and have some outstanding resource values.
NSW	*Nutrient Sensitive Waters*: Areas with water quality problems associated with excessive plant growth resulting from nutrient enrichment.

* Primary classifications beginning with a "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. 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.

High Quality Waters (Class HQW)

There are approximately 168 acres of HQW waters (Figure A-10) in the Tar-Pamlico River basin. 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

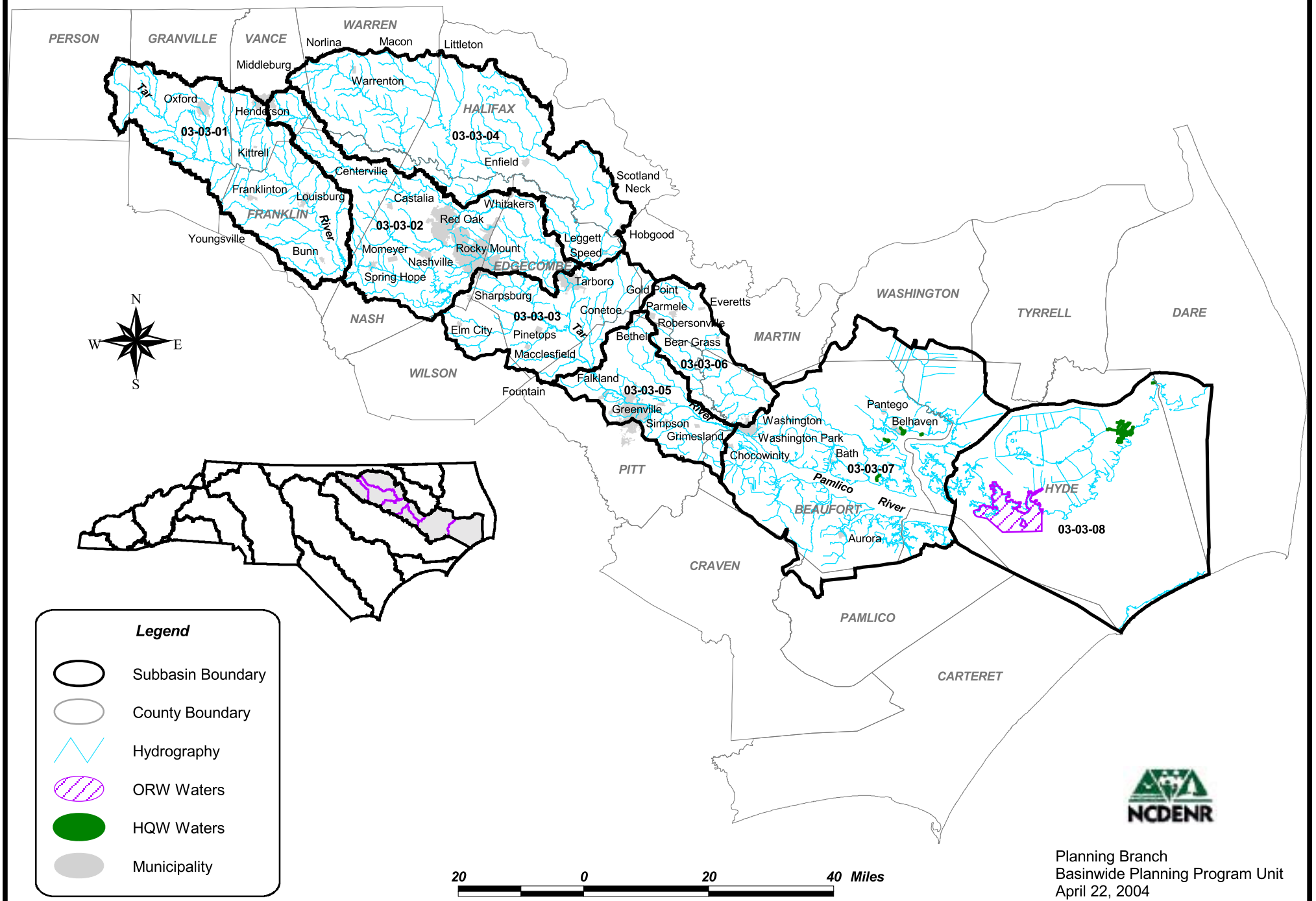
- Waters rated as Excellent based on DWQ's chemical and biological sampling.
- Streams designated as native or special native trout waters by the Wildlife Resources Commission.
- Waters designated as primary nursery areas or other functional nursery areas by the Division of Marine Fisheries.
- Waters classified by DWQ as WS-I, WS-II or SA.

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 of and draining to HQWs.

Outstanding Resource Waters (Class ORW)

There are 24,178 acres of ORW waters (Figure A-10) in the Tar-Pamlico River basin. These waters have excellent water quality (rated based on biological and chemical sampling as with HQWs) and an associated outstanding resource.

Figure A-10 ORWs and HQWs in the Tar-Pamlico River Basin



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.

Primary Recreation (Class B and SB)

There are 618 freshwater acres, 50,092 estuarine acres, 82 stream miles and 17.3 miles of Atlantic coastline classified for primary recreation in the Tar-Pamlico River basin. Primary recreation is also a classified use of Class SA waters.

Water Supply Watersheds (Class WS)

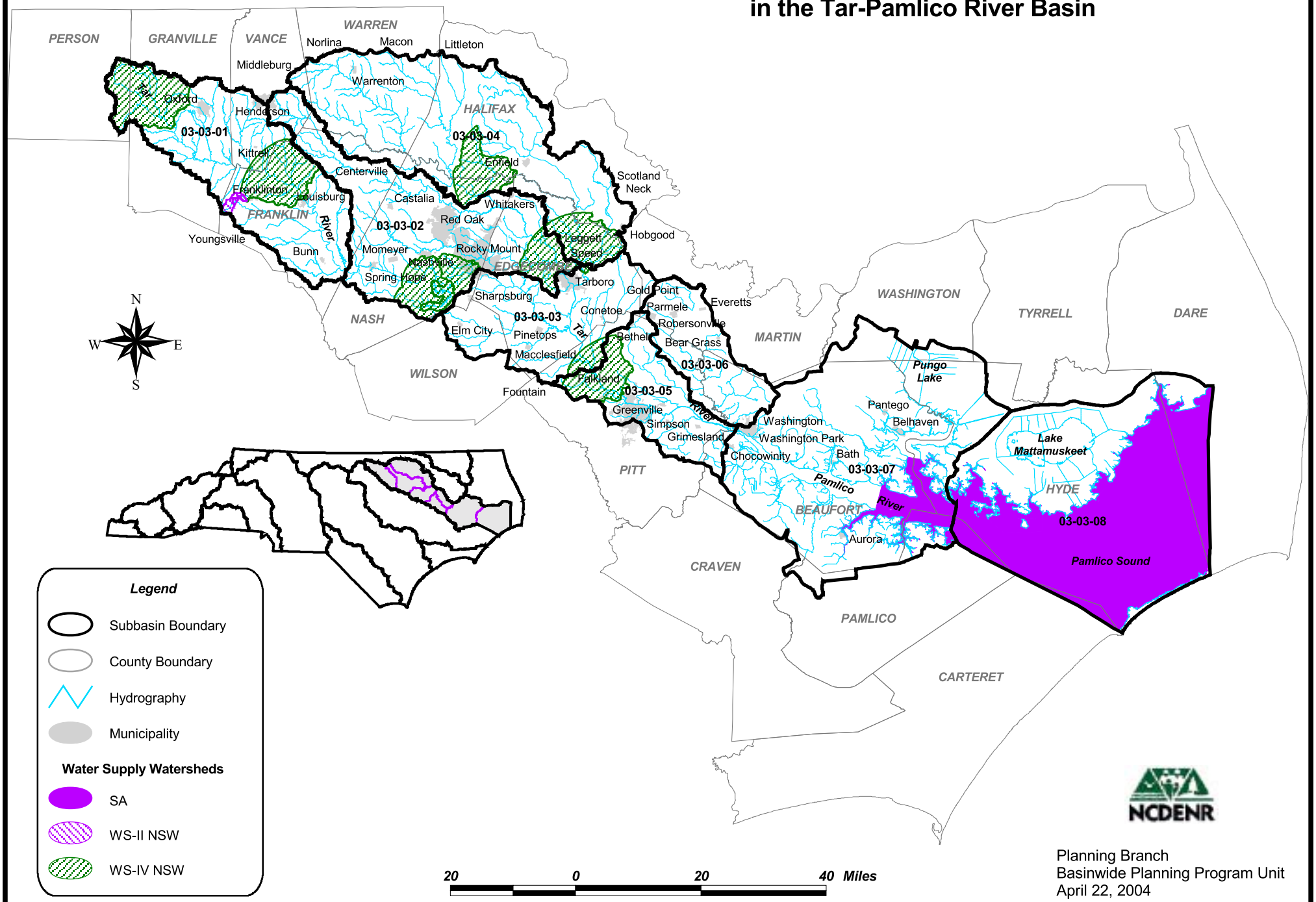
There are 821 freshwater lake acres and 481 stream miles within 566.4 square miles of water supply watershed in the Tar-Pamlico River basin (Figure A-11). The purpose of the Water Supply Watershed Protection Program is to provide a proactive drinking water supply protection program for communities. Local governments administer the program based on state minimum requirements. There are restrictions on wastewater discharges, development, landfills and residual application sites to control the impacts of point and nonpoint sources of pollution to water supplies.

There are five water supply classifications (WS-I to WS-V) that are defined according to the land use characteristics of the watershed. The WS-I classification carries the greatest protection for water supplies. No development is allowed in these watersheds. Generally, WS-I lands are publicly owned. WS-V watersheds have the least amount of protection and do not require development restrictions. These are either former water supply sources or sources used by industry. WS-I and WS-II classifications are also HQW by definition because requirements for these levels of water supply protection are at least as stringent as those for HQWs. Those watersheds classified as WS-II through WS-IV require local governments having jurisdiction within the watersheds to adopt and implement land use ordinances for development that are at least as stringent as the state's minimum requirements. A 30-foot vegetated setback is required on perennial streams in these watersheds. The Tar-Pamlico River basin currently contains only WS-II and WS-IV water supply watersheds.

Shellfish Harvesting (Class SA)

There are 564,938.6 acres of estuarine waters classified for shellfish harvesting (Figure A-11) in the Tar-Pamlico River basin. 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

Figure A-11 Water Supply Watersheds and Class SA Waters in the Tar-Pamlico River Basin



bacteria in Class SA waters shall meet the current sanitary and bacteriological standards as adopted 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.

Nutrient Sensitive Waters (Class NSW)

All waters in the Tar-Pamlico River basin have a supplemental classification of NSW. 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 that can impact the aquatic community. Nutrient strategies are developed to control the water quality impacts associated with excess nutrients. For more information on NSW waters and nutrient strategies in the Tar-Pamlico River basin, refer to page 61.

Pending and Recent Reclassifications in the Tar-Pamlico River Basin

A portion of Swift Creek and a portion Sandy Creek, in Nash County, were reclassified from C NSW to C ORW NSW in August 2003 per House Bill 566. This segment has excellent water quality and endangered species (page 34). Sandy Creek above SR 1004 was reclassified from C NSW to C NSW "+" at the same time. The + indicates that the special management strategy in place in the downstream ORW section will also be implemented in the entire Sandy Creek watershed. House Bill 566 was introduced in 2003 to not include the lower portion of Swift Creek (from SR 1003 to Tar River) as part of the reclassification, although this segment was part of the public hearing process and was approved to have the management strategy by the EMC. A site-specific water quality plan to protect the endangered species in the lower portion of Swift Creek is being developed for submission to the Environmental Review Commission as directed by HB 566. For more information on surface water classifications, visit the website at http://h2o.enr.state.nc.us/csu/.

3.3 DWQ Water Quality Monitoring Programs in the Tar-Pamlico 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 Tar-Pamlico 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 Tar-Pamlico 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 Tar-Pamlico River Basin include:

- Benthic Macroinvertebrates (Section 3.3.1)
- Fish Assessments (Section 3.3.2)
- Aquatic Toxicity Monitoring (Section 3.3.3)
- Lake Assessment (Section 3.3.4)
- Ambient Monitoring System (Section 3.3.5)

3.3.1 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; 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, coastal plain and swamp) within North Carolina. Bioclassifications fall into five categories in the mountains, piedmont and coastal plain, and three categories in swamp areas.

Overview of Benthic Macroinvertebrate Data

Appendix II lists all the benthic macroinvertebrate collections in the Tar-Pamlico River basin between 1983 and 2002, giving site location, collection date, taxa richness, biotic index values and bioclassifications. There were 46 benthic samples collected during this assessment period. Table A-16 lists the most recent bioclassifications (by subbasin) for all benthos sites in the Tar-Pamlico 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. Many streams also ceased flowing during the summer drought of 2002.

Table A-16 Summary of Bioclassifications for All Freshwater Benthic Macroinvertebrate Sites (using the most recent rating for each site) in the Tar-Pamlico River Basin

Subbasin	Excellent	Good	Good-Fair	Fair	Poor	Natural	Moderate Stress	Severe Stress	Not Rated	Total
03-03-01		2	4		1					7
03-03-02		1	4				1		2	8
03-03-03	1			1	1		2	5	3	13
03-03-04		2	1				2		1	6
03-03-05			1			1	1	1	1	5
03-03-06						2	3			5
03-03-07							1		1	2
03-03-08										0
Total (#)	**1**	**5**	**10**	**1**	**2**	**3**	**10**	**6**	**8**	**46**
Total (%)	**2**	**10.8**	**21.7**	**2**	**4**	**6.5**	**21.7**	**13**	**17.4**	100

3.3.2 Fish Assessments

Historical studies of fish communities in the Tar-Pamlico River basin were conducted primarily by the North Carolina Wildlife Resources Commission (NCWRC) in the 1960s and late 1970s. Several streams were sampled by DWQ during the past basinwide planning cycle (1994), and two samples were collected in 1999. Scores are assigned to these samples using the North Carolina Index of Biotic Integrity (NCIBI). The NCIBI uses a cumulative assessment of twelve parameters or metrics. Each metric is designed to contribute unique information to the overall assessment. The scores for all metrics are then summed to obtain the overall NCIBI score. Appendix II contains more information regarding the NCIBI.

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 nonwadeable coastal plain streams. Plans are to sample 10-15 reference sites with the boat method once it is finalized. As with other biological monitoring programs, many 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 assessment.

Overview of Fish Community Data

Appendix II lists all of the fish community collections in the Tar-Pamlico River basin between 1990 and 2002, giving site location, collection date and NCIBI rating. Fish community samples have been collected at 31 sites in eight of the Tar-Pamlico River subbasins during this assessment period. Table A-17 lists the most recent ratings since 1990, by subbasin, for all fish community sites.

Table A-17 Summary of NCIBI Categories for All Freshwater Fish Community Sites (using the most recent rating for each site) in the Tar-Pamlico River Basin

Subbasin	Excellent	Good	Good-Fair	Fair	Poor	Not Rated	Total
03-03-01	5	6	1				12
03-03-02		2	1			3	6
03-03-03						1	1
03-03-04	2	4					6
03-03-05						4	4
03-03-06							0
03-03-07						2	2
03-03-08							0
Total (#)	**7**	**12**	**2**			**10**	**31**
Total (%)	**22.5**	**38.7**	**6.4**			**32.3**	100

Tar-Pamlico River Basin Fish Kills

DWQ has systematically tracked reported fish kill events across the state since 1996. From 1996 to 2002, DWQ field investigators reported 70 fish kill events in the Tar-Pamlico River basin.

Several of these fish kills were extensive. Total fish mortality was under 100,000 from 1996 to 1998 and again in 2002. Mortality was just over 100,000 in 1999, over 200,000 in 2000, and over 500,000 in 2001. The 23 events and over 500,000 mortality in 2001 suggest that fish kills continue to be of concern in the Tar-Pamlico River basin. Refer to Figure A-12 for a summary of fish kills in the Tar-Pamlico River basin. Many of the fish kills occurred in the Pamlico River Estuary. The extent to which fish kills are related to land use activities is not known. Excessive nutrient loading to the estuary creates eutrophic conditions, lowers dissolved oxygen, and may activate harmful algal blooms. For more information on fish kills in North Carolina, refer to the website at http://www.esb.enr.state.nc.us/Fishkill/2002killrep.pdf.

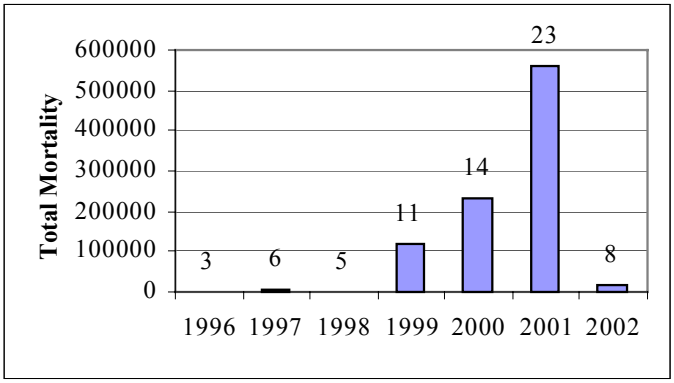


Figure A-12 Tar-Pamlico River Basin Fish Kill Summary 1996-2002
(Number above bar represents number of reported events.)

Overview of Fish Tissue Sampling

Fish tissue surveys were conducted by DWQ at three stations within the basin in 2000. 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 Tar-Pamlico River basin in 2000 contained metal and organic contaminants at undetectable levels or at levels less than the EPA, Food and Drug Administration, and State of North Carolina consumption criteria. More detailed information regarding these sampling events and streams can be found in the appropriate subbasin chapter in Section B.

Elevated mercury concentrations were most often detected in largemouth bass and chain pickerel. These two species are at the top of the food chain and are most often associated with mercury bioaccumulation in fish tissue in North Carolina. For more information on this issue, refer to page 90.

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 (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.

In addition, 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.

Thirty NPDES permits in the Tar-Pamlico River basin currently require WET testing. Twenty-one permits have a WET limit; the other facilities have episodic discharges, and their permits specify monitoring but with no limit. The number of facilities required to monitor WET has increased steadily since 1987, the first year that WET limits were written into permits in North Carolina. The compliance rate has risen as well. Since 1996, the compliance rate has stabilized at approximately 85-90 percent. Figure A-13 summaries WET monitoring compliance in the Tar-Pamlico River basin from 1987 to 1999. Facilities with toxicity problems during the most recent two-year review period are discussed in Section B subbasin chapters.

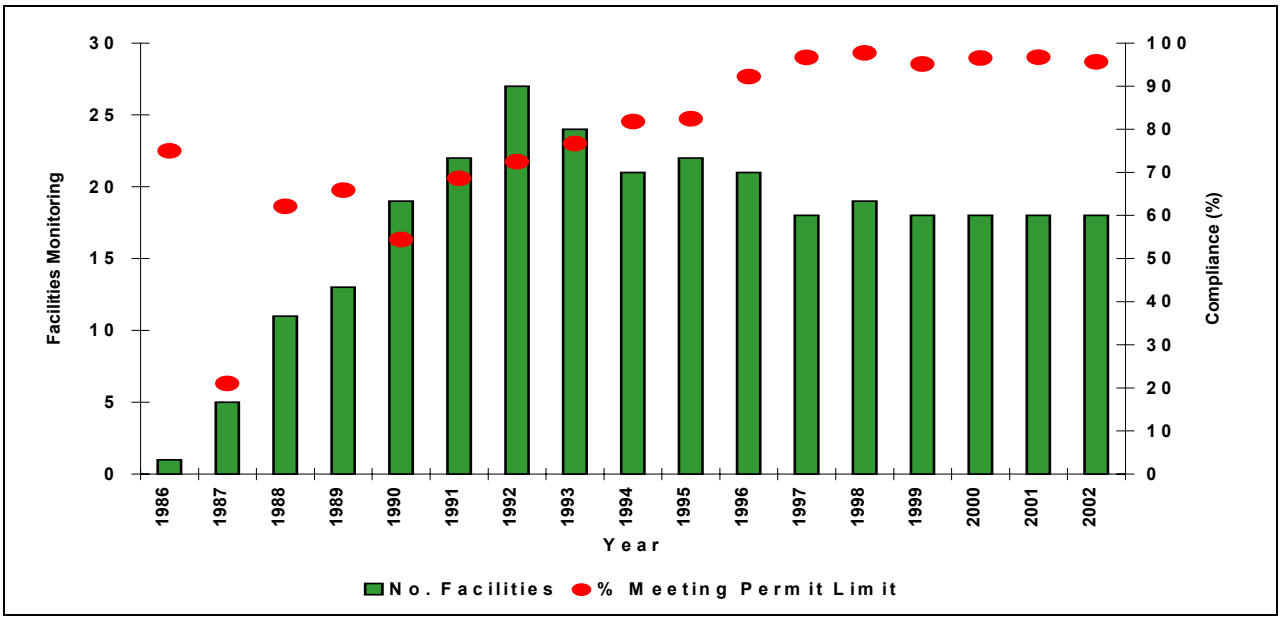


Figure A-13 Summary of Compliance with Aquatic Toxicity Tests in the Tar-Pamlico River Basin

3.3.4 Lakes Assessment Program

Three lakes in the Tar-Pamlico River basin (Tar River Reservoir, Lake Mattamuskeet and Devin Lake) were sampled as part of the Lakes Assessment Program in summer of 2002. Lakes with noted water quality impacts are discussed in the appropriate subbasin chapter in Section B.

3.3.5 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 approximately 380 water chemistry monitoring stations statewide, including 46 stations in the Tar-Pamlico River basin. The location of these stations is shown on individual subbasin maps in Section B. Notable ambient water quality parameters are discussed in the subbasin chapters by station.

There were no notable changes detected in levels of dissolved oxygen at ambient stations in the Tar-Pamlico River basin over the five-year assessment period. The stations where dissolved oxygen exceeded water quality standards are located in swampy areas where low dissolved oxygen levels and low pH are likely natural conditions. There was also no long-term increasing or decreasing pattern in turbidity levels observed at ambient stations in the basin.

Fecal coliform bacteria geometric means decreased from the last assessment period from 237 colonies/100ml water to 80 colonies/100ml water in the Tar River near Bunn. This decrease may be related to drought. Fecal coliform bacteria levels are generally lower in the lower subbasins than in subbasins 03-03-01 and 03-03-02.

A separate nutrient trend analysis was completed by DWQ in June of 2003 (page 63). Refer to *2003 Tar-Pamlico River Basinwide Assessment Report* at http://www.esb.enr.state.nc.us/bar.html for more analysis of ambient water quality monitoring data.

3.3.6 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, for 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*.

3.4 Other Water Quality Research

North Carolina actively solicits "existing and readily available" data and information for each basin as part of the basinwide planning process. Data meeting DWQ quality assurance objectives are used in making use support determinations. Data and information indicating possible water quality problems are investigated further. Both quantitative and qualitative information are accepted during the solicitation period. High levels of confidence must be present in order for outside quantitative information to carry the same weight as information collected from within DWQ. This is particularly the case when considering waters for the Impaired categories in the Integrated Report (303(d) list). Methodology for soliciting and evaluating outside data is presented in *North Carolina's 2002 Integrated Report* http://h2o.enr.state.nc.us/tmdl/2002%20Integrated%20Rept.pdf. The next data solicitation period for the Tar-Pamlico River is planned for fall 2006.

DWQ data solicitation includes the following:

- Information, letters and photographs regarding the uses of surface waters for boating, drinking water, swimming, aesthetics and fishing.
- Raw data submitted electronically and accompanied by documentation of quality assurance methods used to collect and analyze the samples. Maps showing sampling locations must also be included.
- Summary reports and memos, including distribution statistics and accompanied by documentation of quality assurance methods used to collect and analyze the data.

Contact information must accompany all data and information submitted.

East Carolina University collected 1,900 chlorophyll *a* samples during the assessment period at 11 locations in the Pamlico estuary. These generally agree with DWQ ambient monitoring data but were not used directly in use support assessments.

3.5 Use Support Assessment

3.5.1 Introduction to Use Support Assessment

Surface waters are classified according to their best-intended uses as described earlier in Part 3.2 of this chapter. Determining how well a waterbody supports the best-intended uses (use support assessment) is an important method of interpreting water quality data. A use support rating is assigned during use support assessment and refers to whether the best-intended uses of the water (such as water supply, aquatic life protection, shellfish harvesting and recreation) are being

supported. For example, waters with a healthy biological community (Excellent, Good or Good-Fair) are *Supporting*, and waters with an unhealthy biological community (Fair or Poor) are *Impaired*. Waters with inconclusive data (biological community Not Rated) are *Not Rated*. Waters lacking data are not assigned a use support rating and listed as *No Data*. Specific details on use support assessment and assigning use support ratings can be found in Appendix III.

There are six use categories: aquatic life, fish consumption, recreation, shellfish harvesting, water supply and "other" uses. A use support rating is assigned to applicable categories depending on the surface water classification or best-intended use. For example, all waters with appropriate data are assigned a use support rating in the aquatic life, recreation and fish consumption categories. Class WS waters are assigned a use support rating for the water supply category as well as for the aquatic life, recreation and fish consumption categories. A single waterbody could potentially be assigned a use support rating in all six categories, though most waters are assigned a use support rating for the aquatic life, recreation and fish consumption categories. For many waters, a category will not be applicable to the best-intended use of that water (e.g., the shellfish harvesting category does not apply to Class C, SC, B, SB or WS waters) and no assessment is made in that category. A full description of the classifications is available in the DWQ document titled: *Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina*. For more detailed information regarding use support assessment methodology, refer to Appendix III.

In previous use support assessments, surface waters were rated fully supporting (FS), partially supporting (PS), not supporting (NS) and not rated (NR). FS was used to identify waters that were meeting their designated uses. Impaired waters were rated PS and NS, depending on their degree of degradation. NR was used to identify waters lacking data or having inconclusive data. The 2002 Integrated Water Quality Monitoring and Assessment Report Guidance issued by the EPA requested that states no longer subdivide the Impaired category. In agreement with this guidance, North Carolina no longer subdivides the Impaired category and assigns the following use support ratings: Supporting, Impaired, Not Rated or No Data.

Historically, the Supporting use support rating was also subdivided into fully supporting (FS) 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 water quality 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 arose from this difference, North Carolina no longer subdivides the Supporting category. However, these waters and the specific water quality concerns are identified in the Section B subbasin chapters so that data, management and the need to address the identified concerns are presented.

3.5.2 Comparison of Use Support Rating to Streams on 2002 Integrated Report

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 use support rating of Impaired. Use support ratings are based on biological and chemical data and, for some categories, human health advisories. 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 bioclassifications 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 when water quality standards are 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 met. Currently, there are 13 segments and eight growing areas listed on the *North Carolina's 2002 Integrated 305(b) and 303(d) Report* in the Tar-Pamlico River basin. These waters are listed for fish consumption advisories related to mercury, chlorophyll *a*, fecal coliform bacteria and unknown causes. Refer to Appendix III for more information. Refer to the website at http://h2o.enr.state.nc.us/tmdl/ for the report.

3.5.3 Use Support Assessment in the Tar-Pamlico River Basin

Aquatic Life Category

The aquatic life category is applied to all waters in North Carolina. Therefore, this category is applied to all 2,566.4 freshwater miles, 3,976.8 freshwater acres, 663,593.4 estuarine acres, and 17.3 Atlantic coastline miles in the Tar-Pamlico River basin. Biological, chemical and physical monitoring data collected between September 1997 and August 2002 were used to assign a use support rating in this category. Use support ratings by subbasin are summarized in Section B.

Approximately 32.9 percent of stream miles (845.5 miles) were monitored. Impaired stream miles (64.1 miles) accounted for 2.5 percent of all stream miles and 7.6 percent of monitored stream miles. Approximately 29.8 percent of freshwater acres (1,186.5 acres) were monitored. Impaired freshwater acres (369.9) accounted for 9.3 percent of all freshwater acres and 31.1 percent of monitored acres. Approximately 91.5 percent of estuarine acres (607,211.4 acres) were monitored. Impaired estuarine acres (6,070.9) accounted for 0.95 percent of all estuarine acres and 1.0 percent of monitored acres. No data were collected along the 17.3-mile coastline to assess water quality in the aquatic life category. Table A-18 summarizes aquatic life use support ratings in the Tar-Pamlico River basin.

Table A-18 Aquatic Life Use Support Ratings Summary for Waters in the Tar-Pamlico River Basin (1997-2002)

Aquatic Life Ratings/Basis	Freshwater		Estuarine Acres	Coastline Miles
	Miles	Acres		
Impaired/Monitored	64.1	369.9	6,070.9	0.0
Supporting/Monitored	699.3	816.6	598,786.2	0.0
Not Rated/Monitored	82.1	0.0	2,354.2	0.0
Total Monitored	**845.5**	**1,186.5**	**607,211.4**	**0.0**
Supporting/Evaluated	153.4	0.0	77.0	0.0
Not Rated/Evaluated	153.0	0.0	690.4	0.0
No Data	1,414.5	2,790.3	55,614.4	17.3
Total Unmonitored	**1,720.9**	**2,790.3**	**56,381.8**	**17.3**
Total	**2,566.4**	**3,976.8**	**663,593.2**	**17.3**

Aquatic Life Summary Percentages	Freshwater		Estuarine Acres	Coastline Miles
	Miles	Acres		
Percent of Total Monitored	32.9	29.8	91.5	0.0
Percent of Monitored/Impaired	7.6	31.1	1.0	0.0
Percent of Total Impaired	2.5	9.3	0.95	0.0

Recreation Category

Like the aquatic life category, the recreation category is applied to all waters in North Carolina. Therefore, this category is applied to all 2,566.4 freshwater miles, 3,976.8 freshwater acres, 663,593.4 estuarine acres, and 17.3 Atlantic coastline miles in the Tar-Pamlico River basin. DWQ fecal coliform monitoring data and DEH Recreational Water Quality Monitoring Program data collected between September 1997 and August 2002 were used to assign use support ratings in this category. Use support ratings by subbasin are summarized in Section B.

Approximately 9.4 percent of stream miles (242.4 miles) were monitored. There were no Impaired stream miles in this category. No freshwater acres were monitored. Approximately 14.7 percent of estuarine acres (97,266.4 acres) were monitored. Impaired estuarine acres (2.8) were less than one percent of all estuarine acres. Table A-19 summarizes recreation use support ratings in the Tar-Pamlico River basin.

Table A-19 Recreation Use Support Ratings Summary for Waters in the Tar-Pamlico River Basin (1997-2002)

Recreation Ratings and Basis	Freshwater		Estuarine Acres	Coastline Miles
	Miles	Acres		
Impaired/Monitored	0.0	0.0	2.8	0.0
Supporting/Monitored	242.4	0.0	97,266.4	0.0
Not Rated/Monitored	0.0	0.0	0.0	0.0
Total Monitored	**242.4**	**0.0**	**97,269.2**	**0.0**
Supporting/Evaluated	0.0	0.0	0.0	0.0
Not Rated/Evaluated	0.0	0.0	0.0	0.0
No Data	2,324.0	3,976.8	566,324.0	17.3
Total Unmonitored	**2,324.0**	**3,976.8**	**566,324.0**	**17.3**
Total	**2,566.4**	**3,976.8**	**663,593.2**	**17.3**

Recreation Summary Percentages	Freshwater		Estuarine Acres	Coastline Miles
	Miles	Acres		
Percent of Total Monitored	9.4	0.0	14.7	0.0
Percent of Monitored/Impaired	0.0	0.0	<1	0.0
Percent of Total Impaired	0.0	0.0	<1	0.0

Fish Consumption Category

Like the aquatic life and recreation categories, the fish consumption category is applied to all waters in North Carolina. Therefore, this category is applied to all 2,566.4 freshwater miles, 3,976.8 freshwater acres, 663,593.4 estuarine acres, and 17.3 Atlantic coastline miles in the Tar-Pamlico River basin. The Department of Health and Human Services Fish Consumption Advice was used to assign a use support rating in this category. Use support ratings by subbasin are summarized in Section B.

Fish tissue data were collected on 28.6 miles of the Tar River and for 17.3 Atlantic coastline miles. These waters are Impaired/Monitored in the fish consumption category. All waters in the basin are Impaired/Evaluated because of widespread fish consumption advice (page 90).

Shellfish Harvesting Category

There are 564,938.6 estuarine acres classified for shellfish harvesting (Class SA) in the Tar-Pamlico River basin. All were monitored during the past five years by DEH Shellfish Sanitation (refer to page 51). DEH growing area classifications were used to assign a use support rating in this category. Impaired estuarine acres accounted for 1.3 percent (7,515.9 acres) of the estuarine acres in the shellfish harvesting category. Use support ratings by subbasin are summarized in

Section B. Table A-20 summarizes shellfish harvesting use support ratings in the Tar-Pamlico River basin.

Table A-20 Shellfish Harvesting Use Support Ratings Summary for Waters in the Tar-Pamlico River Basin (1997-2002)

Shellfish Harvesting Status and Basis	Estuarine Acres
Impaired/Monitored	7,515.9
Supporting/Monitored	557,422.7
Total Monitored	**564,938.6**
Shellfish Harvesting Summary Percentages	**Estuarine Acres**
Percent of Monitored/Impaired	1.3
Percent of Total Impaired	1.3

Water Supply Category

There are 481.3 freshwater stream miles and 821.0 freshwater acres currently classified for water supply in the Tar-Pamlico River basin. All water supply waters have been assigned a use support rating of Supporting/Evaluated based on reports from DEH regional water treatment consultants. The reports are used to evaluate the ability of water treatment plants to provide potable water to consumers for Class WS waters. Raw water quality is not assessed in this category.

Impaired Waters

Table A-21 presents Impaired waters (in all categories) in the Tar-Pamlico River basin that were monitored by DWQ within the last five years. The category for which a water is Impaired is indicated in the table. Descriptions of Impaired segments, as well as problem parameters, are outlined in Appendix III. Current status and recommendations for restoration of water quality for each water are discussed in detail in the appropriate subbasin chapter. Maps showing current use support ratings for waters in the Tar-Pamlico River basin are presented in each subbasin chapter in Section B.

Table A-21 Impaired Monitored Waters within the Tar-Pamlico River Basin (1997 to 2002) [1]

Name	Assessment Unit	Class	Subbasin	Miles	Acres	Category
Fishing Creek	28-11c	C NSW	03-03-01	0.9	0.0	Aquatic Life
Fishing Creek	28-11d	C NSW	03-03-01	1.0	0.0	Aquatic Life
Cokey Swamp	28-83-3a	C NSW	03-03-03	8.6	0.0	Aquatic Life
Bynums Mill Creek	28-83-4	C NSW	03-03-03	9.7	0.0	Aquatic Life
Conetoe Creek	28-87-(0.5)d	C NSW	03-03-03	6.7	0.0	Aquatic Life
Conetoe Creek	28-87-(0.5)b	C NSW	03-03-03	5.9	0.0	Aquatic Life
Crisp Creek	28-87-1	C NSW	03-03-03	8.7	0.0	Aquatic Life
Ballahack Canal	28-87-1.2	C NSW	03-03-03	8.4	0.0	Aquatic Life
Chicod Creek	28-101	C NSW	03-03-05	14.1	0.0	Aquatic Life
TAR RIVER	28-(102.5)	C NSW	03-03-07	0.0	338.0	Aquatic Life
Kennedy Creek	28-104	C NSW	03-03-07	0.0	32.0	Aquatic Life
PAMLICO RIVER	29-(1)	SC NSW	03-03-07	0.0	739.5	Aquatic Life
Rodman Creek	29-4-(2)	SC NSW	03-03-07	0.0	19.1	Aquatic Life
PAMLICO RIVER	29-(5)a	SB NSW	03-03-07	0.0	1,765.6	Aquatic Life
Chocowinity Bay	29-6-(1)	SC NSW	03-03-07	0.0	389.6	Aquatic Life
Chocowinity Bay	29-6-(5)	SB NSW	03-03-07	0.0	503.2	Aquatic Life
Pantego Creek	29-34-34-(2)	SC NSW	03-03-07	0.0	952.4	Aquatic Life
Pungo Creek	29-34-35	SC NSW	03-03-07	0.0	1,701.6	Aquatic Life
Pungo River	29-34-(12)b	SB NSW	03-03-07	0.0	2.8	Recreation
TAR RIVER	28-(66.5)	WS-IV NSW CA	03-03-02	0.7	0.0	Fish Consumption
TAR RIVER	28-(80)	C NSW	03-03-03	14.8	0.0	Fish Consumption
TAR RIVER	28-(94)	C NSW	03-03-05	13.1	0.0	Fish Consumption
Atlantic Ocean	99-(6)	SB	03-03-08	17.3	0.0	Fish Consumption
South Creek	29-28-(6.5)	SA NSW	03-03-07	0.0	3,073.5	Shellfish Harvesting
Whitehurst Creek	29-28-7-(2)	SA NSW	03-03-07	0.0	15.6	Shellfish Harvesting
Jacks Creek	29-28-8-(2)	SA NSW	03-03-07	0.0	8.8	Shellfish Harvesting
Little Creek	29-28-9-(2)	SA NSW	03-03-07	0.0	21.3	Shellfish Harvesting
Jacobs Creek	29-28-10-(2)	SA NSW	03-03-07	0.0	13.4	Shellfish Harvesting
Drinkwater Creek	29-28-10-3-(2)	SA NSW	03-03-07	0.0	10.3	Shellfish Harvesting
Short Creek	29-28-11	SA NSW	03-03-07	0.0	6.5	Shellfish Harvesting
Tooley Creek	29-28-12-(2)	SA NSW	03-03-07	0.0	15.4	Shellfish Harvesting
Long Creek	29-28-13-(2)	SA NSW	03-03-07	0.0	30.4	Shellfish Harvesting
Schooner Creek	29-28-14	SA NSW	03-03-07	0.6	0.0	Shellfish Harvesting

Bond Creek	29-28-15-(2)	SA NSW	03-03-07	0.0	373.2	Shellfish Harvesting
Alligator Gut	29-28-15-3	SA NSW	03-03-07	0.0	3.2	Shellfish Harvesting
Flannigan Gut	29-28-15-4	SA NSW	03-03-07	0.0	4.0	Shellfish Harvesting
Muddy Creek	29-28-15-5-(2)	SA NSW	03-03-07	0.0	97.2	Shellfish Harvesting
Robin Gut	29-28-15-5-3	SA NSW	03-03-07	0.0	0.2	Shellfish Harvesting
Wilson Gut	29-28-15-5-4	SA NSW	03-03-07	0.0	0.1	Shellfish Harvesting
Sheepskin Creek	29-28-15-5-5	SA NSW	03-03-07	0.0	1.6	Shellfish Harvesting
North Creek	29-29-(2)a	SA NSW	03-03-07	0.0	162.0	Shellfish Harvesting
Garrett Gut	29-29-4	SA NSW	03-03-07	0.0	8.0	Shellfish Harvesting
Eastham Creek	29-33-3a	SA NSW	03-03-07	0.0	62.5	Shellfish Harvesting
Alligator Creek	29-33-3-1	SA NSW	03-03-07	0.0	1.8	Shellfish Harvesting
Long Creek	29-33-3-2	SA NSW	03-03-07	0.0	1.1	Shellfish Harvesting
Slade Creek	29-34-40a	SA NSW	03-03-07	0.0	591.0	Shellfish Harvesting
Jones Creek	29-34-40-1	SA NSW	03-03-07	0.0	15.1	Shellfish Harvesting
Jarvis Creek	29-34-40-2	SA NSW	03-03-07	0.0	8.0	Shellfish Harvesting
Raffing Creek	29-34-40-3	SA NSW	03-03-07	0.0	5.0	Shellfish Harvesting
Becky Creek	29-34-40-4	SA NSW	03-03-07	0.0	19.6	Shellfish Harvesting
Neal Creek	29-34-40-5	SA NSW	03-03-07	0.0	68.0	Shellfish Harvesting
Wood Creek	29-34-40-6	SA NSW	03-03-07	0.0	26.7	Shellfish Harvesting
Spellman Creek	29-34-40-7	SA NSW	03-03-07	0.0	15.2	Shellfish Harvesting
Speer Creek	29-34-40-8	SA NSW	03-03-07	0.0	10.7	Shellfish Harvesting
Jordan Creek	29-34-41a	SA NSW	03-03-07	0.0	90.0	Shellfish Harvesting
Satterthwaite Creek	29-34-48a	SA NSW	03-03-07	0.0	85.8	Shellfish Harvesting
Wrights Creek	29-34-49	SA NSW	03-03-07	0.0	40.1	Shellfish Harvesting
North Prong Wrights Creek	29-34-49-1	SA NSW	03-03-07	0.0	37.6	Shellfish Harvesting
South Prong Wrights Creek	29-34-49-2	SA NSW	03-03-07	0.0	45.2	Shellfish Harvesting
Bradley Creek	29-34-49-2-1	SA NSW	03-03-07	0.0	9.6	Shellfish Harvesting
Oyster Creek	29-35a	SA NSW	03-03-07	0.0	117.6	Shellfish Harvesting
Bill Daniels Gut	29-35-1	SA NSW	03-03-07	0.0	1.7	Shellfish Harvesting
Bill Gut	29-35-2	SA NSW	03-03-07	0.0	6.2	Shellfish Harvesting
River Ditch	29-35-3	SA NSW	03-03-07	0.0	8.4	Shellfish Harvesting
PAMLICO RIVER AND PAMLICO SOUND	29-(40.5)e	SA	03-03-08	0.0	48.9	Shellfish Harvesting
PAMLICO RIVER AND PAMLICO SOUND	29-(40.5)c	SA	03-03-08	0.0	0.4	Shellfish Harvesting
PAMLICO RIVER AND PAMLICO SOUND	29-(40.5)b	SA	03-03-08	0.0	48.7	Shellfish Harvesting
PAMLICO RIVER AND PAMLICO SOUND	29-(40.5)d	SA	03-03-08	0.0	120.0	Shellfish Harvesting
Germantown Bay	29-42-1a	SA	03-03-08	0.0	179.7	Shellfish Harvesting

Long Creek	29-42-1-1	SA	03-03-08	0.0	53.6	Shellfish Harvesting
Midgette Creek	29-42-1-2	SA	03-03-08	0.0	8.4	Shellfish Harvesting
Rose Bay	29-44a	SA	03-03-08	0.0	318.0	Shellfish Harvesting
Rose Bay Creek	29-44-1	SA	03-03-08	0.0	154.3	Shellfish Harvesting
Swanquarter Bay	29-49a	SA ORW	03-03-08	0.0	136.2	Shellfish Harvesting
Oyster Creek	29-49-3a	SA ORW	03-03-08	0.0	35.3	Shellfish Harvesting
Juniper Bay	29-52a	SA ORW	03-03-08	0.0	66.6	Shellfish Harvesting
Northwest Creek	29-52-2	SA	03-03-08	0.0	19.4	Shellfish Harvesting
Wysocking Bay	29-60a	SA	03-03-08	0.0	126.3	Shellfish Harvesting
Middle Town Creek	29-66	SA	03-03-08	0.0	71.5	Shellfish Harvesting
Cedar Creek	29-67	SA	03-03-08	0.0	12.2	Shellfish Harvesting
Lone Tree Creek	29-69	SA	03-03-08	0.0	1.8	Shellfish Harvesting
Far Creek	29-70-(4)	SA	03-03-08	0.0	389.5	Shellfish Harvesting
Waupopin Creek	29-70-5-(3)	SA	03-03-08	0.0	96.2	Shellfish Harvesting
Oyster Creek	29-70-6	SA	03-03-08	0.0	50.1	Shellfish Harvesting
Berrys Bay	29-71a	SA	03-03-08	0.0	12.5	Shellfish Harvesting
Long Shoal River	29-73-(2)a	SA	03-03-08	0.0	419.8	Shellfish Harvesting
Long Shoal River	29-73-(2)c	SA	03-03-08	0.0	35.2	Shellfish Harvesting

* Although all waters in the basin are considered Impaired for the fish consumption category, only the Tar River (28.6 miles) and the Atlantic coastline (17.3 miles) were monitored. Refer to Appendix III for a description of the Impaired segments.