North Carolina
Water Quality Assessment and Impaired Waters List
(2006 Integrated 305(b) and 303(d) Report)

Final

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The Division of Water Quality actively solicited public input and comment concerning the compilation of this Integrated report through the continuing cycles of the rotating basinwide planning process. The draft Integrated Report was noticed and provided to the public for review and comment for a period of 30 days, from February 3 to March 4, 2006. Comments were received from agencies and individuals, including Southern Environmental Law Center, Progress Energy, City of Wilmington, and the Pamlico-Tar River Foundation.

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1 Introduction

The *North Carolina Water Quality Assessment and Impaired Waters List* is an integrated report that includes both the 305(b) and 303(d) reports of previous years. The *305(b) report* is compiled biennially to update the assessment of water quality in North Carolina and to meet the Section 305(b) reporting requirement of the Clean Water Act. In general, 305(b) reports have described the quality of surface waters, groundwaters, and wetlands, and existing programs to protect water quality. The 305(b) reports present how well waters support designated uses (e.g., swimming, aquatic life support, water supply), as well as likely causes (e.g., sediment, nutrients) and potential sources of impairment. The term "Use Support" refers to the process mandated by 305(b). The *303(d) list* is a comprehensive public accounting of all impaired waterbodies that is derived from the 305(b) report/Use Support. An impaired waterbody is one that does not meet water quality uses, such as water supply, fishing or propagation of aquatic life. Best professional judgment, along with numeric and narrative standards criteria and anti-degradation requirements defined in 40 CFR 131, is considered when evaluating the ability of a waterbody to serve its uses.

This integrated report also contains information concerning the supporting Division of Water Quality (DWQ) programs that contribute to the development of use support ratings and the integrated report. Specifically, the report briefly describes the various Monitoring Programs, the Surface Water Classifications and Standards used in North Carolina, the Assessment or Use Support Methodology, the Reporting Methodology, and the TMDL program.

1.1 Requirements Under Section 305(b) of the Clean Water Act

Section 305(b) of the federal Clean Water Act (CWA) requires states to report biennially to the U.S. Environmental Protection Agency (EPA) on the quality of the waters in their state. In general, the 305(b) report describes the quality of surface waters, groundwaters, and wetlands and existing programs to protect water quality. Information is presented on how well a water supports its designated uses (e.g., swimming, aquatic life support, water supply) as well as likely causes (e.g., sediment, nutrients) and sources (both point and nonpoint) of impairment. These data related to sources are presented only to give a general, overall picture of the relative contribution made by different categories of pollution on a statewide and river basin basis.

Lake assessments performed in the early 1990s under Section 314 of the Clean Water Act are now performed on a regular basis under the auspices of 305(b).

1.2 Requirements Under Section 303(d) of the Clean Water Act

Section 303(d) of the federal Clean Water Act (CWA) which Congress enacted in 1972 requires States, Territories and authorized Tribes to identify and establish a priority ranking for waterbodies for which technology-based effluent limitations required by section 301 are not stringent enough to attain and maintain applicable water quality standards, establish total maximum daily loads (TMDLs) for the pollutants causing impairment in those waterbodies,

and submit, from time to time, the list of impaired waterbodies and TMDLs to the U.S. Environmental Protection Agency (EPA). Current federal rules require states to submit 303(d) lists biennially, by April 1st of every even numbered year. EPA is required to approve or disapprove the state-developed §303(d) list within 30 days. For each water quality limited segment impaired by a pollutant and identified in the §303(d) list, a Total Maximum Daily Load (TMDL) must be developed.

In accordance with recent Environmental Protection Agency (EPA) guidance on this matter, the State of North Carolina has elected to submit the required information for 2004 in a format similar to that specified in the *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act* (EPA 2005a). This integrated report is considered a hybrid report, incorporating elements of old and new EPA guidance on 305(b) and 303(d) reporting. According to the EPA, this report will satisfy Clean Water Act (CWA) requirements for both the 2004 Section 305(b) water quality report and the 2004 Section 303(d) priority ranking of impaired waterbodies, commonly referred to as the § 303(d) list.

2 Water Pollution Control Program

The Water Pollution Control Program of North Carolina includes multiple agencies and programs. For a complete description of these programs, refer to "A Citizen's Guide to Water Quality Management in North Carolina", September 2000. This document is available on the Internet at the following address: http://h2o.enr.state.nc.us/basinwide/WQ%20citizen%20guide%20on%20the%20web.pdf. The following sections contain brief descriptions of programs within the Division of Water Quality.

2.1 North Carolina's Rotating Basin Approach

The North Carolina Division of Water Quality assesses its waters for use support as part of its basin planning process. Basinwide water quality management is a watershed-based management approach being implemented by DWQ that features basinwide permitting, integrating existing point and nonpoint source control programs, and preparing basinwide management plans. DWQ is applying this approach to each of the seventeen major river basins in the state as a means of better identifying water quality problems, developing appropriate management strategies, maintaining and protecting water quality and aquatic habitat, and assuring equitable distribution for waste assimilative capacity for dischargers. A map of the seventeen major river basins is provided in Figure 2-1.

Basinwide management entails coordinating and integrating, by major river basin, the water quality program activities of DWQ. These activities include permitting, monitoring, nonpoint source assessments, and planning. Rather than updating use support for the entire state for each biannual 305(b) report, DWQ assesses use support for each river basin according to the basinwide planning schedule (Table 2-1). Intensive monitoring for a river basin is performed once every five years, and use support for the basin is updated with this information the following year. This approach enables DWQ to focus its assessment resources on a few basins each year and provides a better picture of water quality within a basin. Although the integrated report is prepared independently of the basinwide management plans, use support ratings determined as part of the basinwide process are the foundation of this integrated report. The use support ratings for the ***Cape Fear, Catawba, French Broad, Lumber, New and Tar-Pamlico*** river basins have been updated since the 2004 Integrated Report was submitted.

The goals of basinwide planning are to:

- Identify water quality problems and restore full use to impaired waters.
- Identify and protect high value resource waters.
- Protect unimpaired waters yet allow for reasonable economic growth.

DWQ accomplishes these goals through the following objectives:

- Collaborate with other agencies to develop appropriate management strategies.
- Assure equitable distribution of waste assimilative capacity.

- Better evaluate cumulative effects of pollution.
- Improve public awareness and involvement.

Table 2-1. Basinwide Planning Schedule (2000 to 2007)

Basin	DWQ Biological Data Collection	River Basin Public Workshops	Public Mtgs. and Draft Out For Review	Final Plan Receives EMC Approval	Begin NPDES Permit Issuance
Chowan	Summer 2000	3/2001	5/2002	7/2002	11/2002
Pasquotank	Summer 2000	3/2001	5/2002	7/2002	12/2002
Neuse	Summer 2000	6/2001	5/2002	7/2002	1/2003
Broad	Summer 2000	11/2001	11/2002	2/2003	7/2003
Yadkin-Pee Dee	Summer 2001	4/2002	1/2003	3/2003	9/2003
Lumber	Summer 2001	12/2002	9/2003	12/2003	7/2004
Tar-Pamlico	Summer 2002	3/2003	12/2003	3/2004	9/2004
Catawba	Summer 2002	6/2003	3/2004	6/2004	12/2004
French Broad	Summer 2002	11/2003	11/2004	2/2005	9/2005
New	Summer 2003	4/2004	5/2005	9/2005	3/2006
Cape Fear	Summer 2003	5/2004	4/2005	8/2005	4/2006
Roanoke	Summer 2004	3/2006	4/2006	8/2006	2/2007
White Oak	Summer 2004	10/2005	7/2006	9/2006	7/2007
Savannah	Summer 2004	10/2005	12/2006	2/2007	8/2007
Watauga	Summer 2004	11/2005	12/2006	2/2007	9/2007
Hiwassee	Summer 2004	10/2005	12/2006	2/2007	8/2007
Little Tennessee	Summer 2004	11/2005	12/2006	2/2007	10/2007

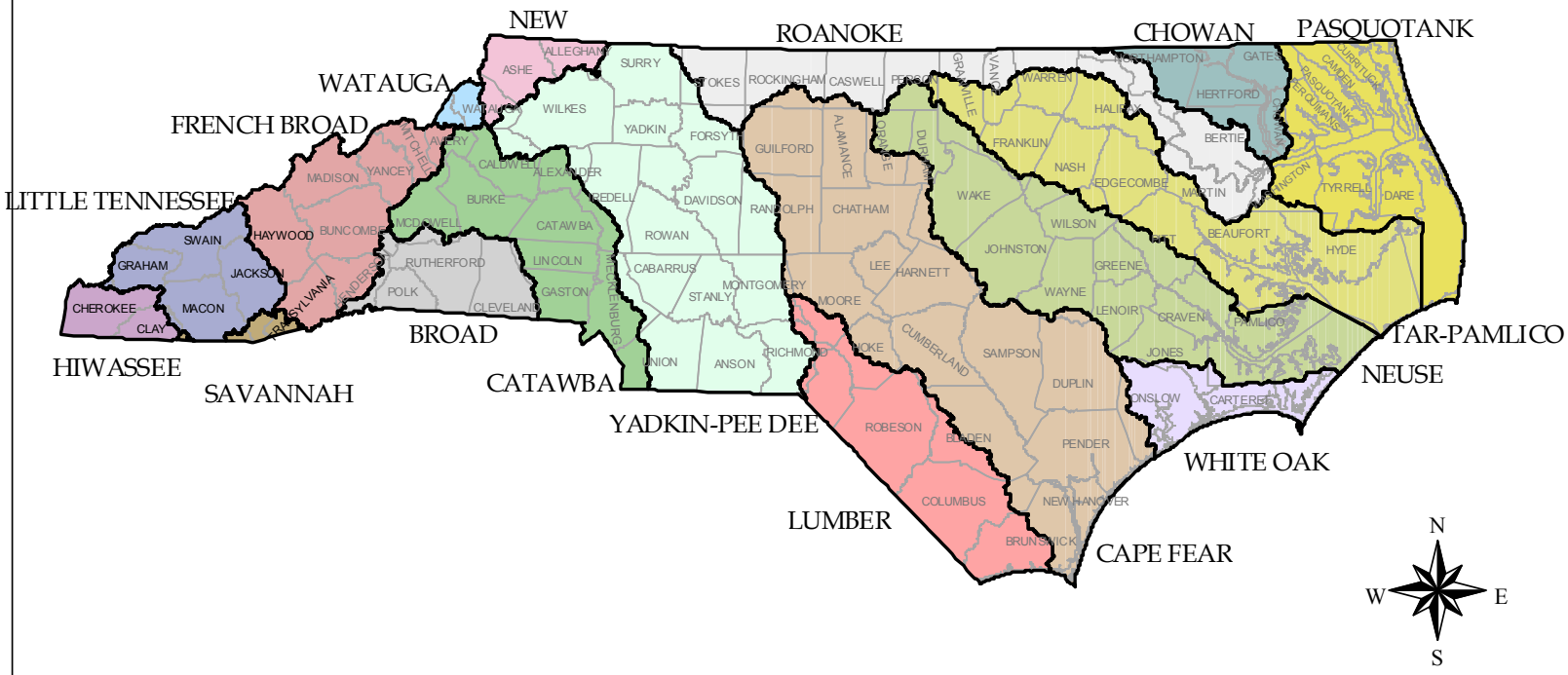
Note: A basinwide plan was completed for all 17 basins during the first cycle (1993 to 1998).

Table 2-2. Five-Year Process for Development of an Individual Basinwide Plan

Years 1 - 2 Water Quality Data Collection and Identification of Goals and Issues	Identify sampling needs Conduct biological monitoring activities Conduct special studies and other water quality sampling activities Coordinate with local stakeholders and other agencies to continue to implement goals within current basinwide plan
Years 2 - 3 Data Analysis and Public Workshops	Gather and analyze data from sampling activities Develop use support ratings Conduct special studies and other water quality sampling activities Conduct public workshops to establish goals and objectives and to identify and prioritize issues for the next basin cycle Develop preliminary pollution control strategies Coordinate with local stakeholders and other agencies

Table 2-2. Five-Year Process for Development of an Individual Basinwide Plan	
Years 3 - 5 Preparation of Draft Basinwide Plan, Public Review, Approval of Plan, Issue NPDES Permits and Begin Implementation of Plan	Develop draft basinwide plan based on water quality data, use support ratings, and recommended pollution control strategies Circulate draft basinwide plan for review and present draft plan at public meetings Revise plan after public review period Submit plan to Environmental Management Commission for approval Issue NPDES permits Coordinate with other agencies and local interest groups to prioritize implementation actions Conduct special studies and other water quality sampling activities

Figure 1. North Carolina River Basins and Counties



2.2 Surface Water Classifications and Standards

2.2.1 Water Quality Classifications

All surface waters in North Carolina are assigned a primary classification. Classifications are designations applied to surface water bodies that define the best uses to be protected within these waters, as required by the Clean Water Act. The most common primary classification within North Carolina is Class C, which protects waters for the propagation of aquatic life and for secondary recreation. Other primary freshwater classifications provide for additional levels of protection for uses consisting of drinking water supplies (Class WS-I through Class WS-V) and for primary recreation (Class B). Specific numeric and narrative water quality standards are associated with each classification in order to protect its designated best uses. The Division of Water Quality under the authority of the Environmental Management Commission assigns classifications.

In addition to the primary classification, one or more supplemental classifications may be assigned to specific surface waters to provide additional protection to waters with special uses or values. Most of the supplemental classifications have been developed in order to promote special protection to sensitive or highly valued resource waters. North Carolina's supplemental classifications include NSW (nutrient sensitive waters), Tr (trout waters), HQW (high quality waters), ORW (outstanding resource waters), and Sw (swamp waters). All primary (Tables 2-3 and 2-4) and secondary (Table 2-5) classifications are described below.

Table 2-3. North Carolina Freshwater Primary Classifications

Classification	Best Usage of Waters
C	Aquatic life propagation and maintenance of biological integrity (including fishing, and fish), wildlife, secondary recreation, agriculture and any other usage except for primary recreation or as a source of water supply for drinking, culinary, or food processing purposes. All freshwaters shall be classified to protect these uses at a minimum.
B	Primary recreation (which includes swimming on a frequent or organized basis) and any other best usage specified for Class C waters.
WS I - WS V	Source of water supply for drinking, culinary, or food-processing purposes for those users desiring maximum protection of their water supplies and any best usage specified for Class C waters.

Table 2-4. North Carolina Saltwater Primary Classifications

Classification	Best Usage of Waters
SC	Aquatic life propagation and maintenance of biological integrity

Table 2-4. North Carolina Saltwater Primary Classifications	
Classification	Best Usage of Waters
	(including fishing, fish and functioning primary nursery areas (PNAs)), wildlife, secondary recreation, and any other usage except primary recreation or shellfishing for market purposes.
SB	Primary recreation (which includes swimming on a frequent or organized basis) and any other usage specified for Class SC waters.
SA	Shellfishing for market purposes and any other usage specified for Class SB or SC waters.

Table 2-5. North Carolina Supplemental Classifications	
Classification	Best Usage of Waters
HQW	High Quality Waters. Waters which are rated as excellent based on biological and physical/chemical characteristics through Division monitoring or special studies, native and special native trout waters (and their tributaries) designated by the Wildlife Resources Commission, primary nursery areas (PNAs) designated by the Marine Fisheries Commission and other functional nursery areas designed by the Marine Fisheries Commission.
NSW	Nutrient Sensitive Waters. Waters that experience or are subject to excessive growths of microscopic or macroscopic vegetation. Excessive growths are growths which the Commission determines impair the use of the water for its best usage as determined by the classification applied to such waters.
ORW	Outstanding Resource Waters. Unique and special surface waters of the state that are of exceptional state or national recreational or ecological significance that require special protection to maintain existing uses.
Sw	Swamp Waters. Waters which are topographically located so as to generally have very low velocities and other characteristics which are different from adjacent streams draining steeper topography.
Tr	Trout Waters. Waters which have conditions that shall sustain and allow for trout propagation and survival of stocked trout on a year-round basis.

2.2.2 Assessment Unit Delineation Approach / Georeferencing System

North Carolina maintains an internal database, which for each surface water's assessment unit, provides a description between two land/water points, name, classification, USGS quad map section, and county. To locate the assessment unit (AU) on a map, one must go to a USGS quad map (either a physical copy or an electronic version available via software such as Terrain Navigator) and find where within the denoted map section the AU lies. For the public, a limited version of the internal database is available; this public version does not provide the name of the USGS quad map an AU is on, so therefore they must use the description and any local knowledge of the area to figure out where on a map the AU lies.

North Carolina does not presently use the National Hydrography Dataset (NHD), although it is developing this capability.

2.2.3 Water Quality Standards

The North Carolina Surface Water Quality Standards are located in Title 15A of the North Carolina Administrative Code (NCAC). Section 15A NCAC 2B .0300 lists surface water bodies and their associated classifications. These classifications are assigned in order to protect the best uses of the water, as previously described in Section 2.2.1 of this document. Sections 15A NCAC 2B .0100 and 2B .0200 contain numeric and narrative surface water quality criteria and procedures for applying the water quality criteria to wastewater dischargers and other sources of pollution. Specific water quality criteria have been developed for each of the surface water quality primary classifications used to designate waters within North Carolina. These numeric and narrative criteria are established at levels that will ensure the protection of the designated best use of the water body.

Procedures described in Section 3 have been developed for use in comparing the applicable water quality criteria to the monitoring data and other information pertaining to a specific water body. Waters subsequently identified as impaired as a result of this process are then listed in the appropriate Category of the integrated report.

2.3 Point Source Program

Discharge permits are issued under the authority of the North Carolina General Statute (NCGS) 143.215.1 and the National Pollutant Discharge Elimination system (NPDES) program. NPDES permits establish effluent limitations on the maximum level of wastes or pollutants, that may be discharged into surface waters. North Carolina has a very comprehensive NPDES program that includes seven major components, as described in the following sections.

2.3.1 NPDES Permit Review and Processing

In North Carolina, the issuance of discharge permits is coordinated with the basinwide planning process. Thus DWQ issues all discharge permits within a given basin at approximately the same time. These permits are valid for five years. New discharge permits issued during an interim period between cycles will have a shorter expiration period in order to coincide with the next basin permitting cycle. Thus, DWQ can more effectively monitor and modify its permitting system consistently across the river basins.

NPDES permits are issued in two categories: individual and general. Individual permits, which are issued to specific facilities, contain site-specific requirements that incorporate recommendations from the basinwide water quality management plan in which the facility is located. General permits are developed for a general type of industry and contain permit

requirements that are appropriate for a typical facility within a specific industrial classification. Facilities engaged in a specific industrial activity are eligible for permit coverage under the general permit. Facilities that are deemed to be atypical, or have a history of water quality problems, are required to obtain an individual permit. Because general permits are specific to a type of industrial activity and are issued statewide, they do not contain basin-specific measures.

DWQ will not process a permit application until the application is complete. The requirements for a discharge permit application and processing are outlined in Administrative Code Section: 15A NCAC 2H .0100 – Wastewater Discharges to Surface Waters. Under this rule, all applications must include a feasibility analysis on alternative disposal options, such as spray irrigation, and justification for the selection of the discharge option.

Applications for new discharges greater than 500,000 gallons per day of wastewater, 10 million gallons per day (MGD) of cooling water, or 1 MGD of any other type of effluent must include an assessment report in addition to the normal permit application. The assessment is to provide sufficient information to describe the impact of the proposed action on the waters in the area. DWQ may also require an Environmental Impact Statement or Environmental Assessment, under the North Carolina (NC) Environmental Policy Act for certain publicly funded projects. Further information on the State Environmental Policy Act can be found at the following address: http://h2o.enr.state.nc.us/sepa/eaguidelns.htm.

DWQ staff establish waste limits for permit applications based on a wasteload allocation process. The staff review also includes a site inspection (for existing facilities up for renewal). If DWQ finds the application acceptable, it will issue a public notice (called a Notice of Intent to Issue) in newspapers having wide circulation in the local area. The Notice of Intent includes all of the permit applications for a particular subbasin(s) that will be issued within a given month. The public then has a 30-day period to comment on the proposed permit. If the public expresses sufficient interest in one or more portions of the application, DWQ may hold a public hearing.

2.3.2 Wasteload Allocations

Effluent limitations, also called waste limits, dictate the amounts of wastes (pollutants), that the permittee is allowed to discharge into surface waters under the NPDES permit. Before DWQ issues a discharge permit, it evaluates the projected impact of the discharge on the receiving waters. This determination, called a wasteload allocation (WLA), is usually based on a computer model that considers many factors, including the characteristics of the waste (e.g., flow and type) and the characteristics of the receiving waters (e.g., flow, waste assimilative capacity, channel configuration, rate of reaeration, and water quality classification). DWQ determines permit limits using models called water quality-based limits. DWQ also bases permit limitations on federal effluent guidelines established by the EPA.

DWQ performs wasteload allocations by using various water quality models, depending on the parameter (type of pollutant) of interest and the characteristics of the receiving waters. When point sources are responsible for water quality problems, WLAs can yield appropriate permit limits that offer adequate water quality protection. Where a sole discharge is responsible for the water quality impacts, DWQ can perform a simple WLA without considering other discharges. In this case, DWQ will establish limits in accordance with the state's Standard Operating Procedures (SOP) for Wasteload Allocations manual. The SOP manual has been developed to support State and Federal regulations and guidelines and has been approved by the EPA.

When numerous discharges affect water quality, the Environmental Management Commission is required to consider the cumulative impacts of all of the permitted discharges to a water body (pursuant to NCGS 143-215.1(b)(2)). Generally, these are areas that have been identified as impaired in Section 4 of this document. Theses water will require the development of a watershed management strategy or total maximum daily load (TMDL).

2.3.3 Compliance Monitoring and Enforcement

Most dischargers are required to periodically sample the treated effluent from their discharge pipes. Also, many larger and more complex dischargers are required to sample points in the receiving waters both up and downstream from the discharge point. This process is called self-monitoring and it is typically required five days a week for some parameters for major facilities. The sampling results (contained in a discharge monitoring report or DMR) are then submitted each month to DWQ for compliance evaluations.

If the plant does not meet its permitted limits, DWQ may take one or more of the following actions: issue a notice of violation, initiate enforcement action, place the facility on moratorium, and/or enter into a Special Order by Consent (SOC). An SOC is a legal commitment entered into by the state and the discharger that establishes a time schedule for bringing the wastewater treatment plant back into compliance. During this time period, interim waste limits may be assigned to the facility until the improvements can be made.

In addition to the DMR data, illegal or improperly treated discharges may be identified in other ways including through third party reports, routine DWQ site inspections and water quality monitoring conducted by DWQ staff.

2.3.4 Other programs

Several other programs provide support to the NPDES permitting program, including monitoring support or municipalities that support significant industrial users. These programs are briefly described below.

Table 2-6. Remaining NPDES support programs	
Program	Description
Aquatic toxicity testing	North Carolina uses an integrated approach to aquatic

Table 2-6. Remaining NPDES support programs	
Program	Description
	toxicity testing that includes monitoring of specific chemicals, assessing resident aquatic populations, and analyzing whole effluent toxicity (WET). Whole effluent toxicity limits predict the impacts of toxicants by measuring those impacts in a laboratory setting. It is from this same foundation of aquatic toxicity laboratory tests that chemical specific limits and criteria are derived for the majority of toxicants.
Pretreatment	The goal of the pretreatment program is to protect municipal treatment plants or publicly-owned treatment works, as well as the environment, from the discharge of hazardous or toxic wastes into a public sewage system. The pretreatment program regulates non-domestic (e.g., industrial) users of WWTPs that discharge toxic wastes under the Domestic Sewage Exclusion of the Resource Conservation and Recovery Act (RCRA). In essence, the program requires that businesses and other entities that use or produce toxic wastes pretreat their wastes prior to discharging their wastewater into the sewage collection system. State-approved pretreatment programs are typically administered by local governments that operate WWTPs.
Operator Certification and Training	Water pollution control systems must be operated by individuals certified by the North Carolina Water Pollution Control System Operators Certification Commission (WPCSOCC). The level of training and certification that the operator must have is based on the type and complexity of the wastewater treatment system. The Technical Assistance and Certification Group of DWQ assists in organizing training for operators in cooperation with the North Carolina University System, the North Carolina Community College System, and through professional associations for operators and pollution control professionals.

2.4 Nonpoint Source Program

Nonpoint source (NPS) pollution is caused mainly by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water. Unlike point source pollution, such as discrete discharges from industrial and sewage treatment plants, nonpoint source pollution comes

from many diffuse sources. Some of the most common nonpoint source pollutants and their causes can be found in Table 2-7.

Table 2-7. Sources of Nonpoint Source Pollutants	
Pollutant	Source of Pollutant
Sediment	Construction sites, disturbed areas, streambank erosion and alterations, cultivated farmland
Nutrients	Fertilizer on agricultural, residential, commercial, and recreational grassed areas, animal wastes, leaky sewers and septic tanks, atmospheric deposition
Bacteria	Failing septic tanks, leaky sewers, animal waste (wild and domestic)
Oxygen Demanding Substances	Animal wastes, leaking sewers and septic tanks, gas stations
Oil and Grease	Leaky automobiles, industrial areas, illegal dumping
Trace Metals	Automobile wear and tear, exhaust, industrial or construction areas
Road Salt	Applications to snow and ice
Toxic and Synthetic Chemicals	Pesticide applications, automobile fluids, accidental spills, illegal dumping
Thermal Impacts	Heated landscape/impervious areas, tree removal, shallow ponds

North Carolina has had a Nonpoint Source Management Program since 1989, the year after it submitted its original NPS Management Program to EPA for approval. The North Carolina NPS Program consists of a broad framework, or umbrella, of federal, state, and local resource and land management agencies, as shown in Table 2-8. It is estimated that there are more than 2,000 individuals administering nonpoint source or related programs within the state. This includes a range of responsibilities that have been delegated to county or municipal programs from the authority to inspect and permit land clearing projects to septic system performance. In the field of agriculture, a well established network of state and federal agricultural conservationists provide technical assistance and program support to individual farmers.

The Division of Water Quality (DWQ), which is housed within the Department of Environment and Natural Resources (DENR), serves as the lead agency for North Carolina's NPS Program. It works with agencies to insure that program goals are incorporated into individual agency's management plans. Coordination between state agencies is achieved through updating the objectives and actions of the agencies in updates to the original 1989 state NPS Program. Annual reports are developed to describe individual program priorities, accomplishments, significant challenges, issues yet to be addressed and resource needs.

Table 2-8. North Carolina Nonpoint Source Management Program			
Category/Program	**Local**	**State**	**Federal**
AGRICULTURE			
Agricultural Cost-Share Program	SWCD	SWCC, DSWC	
NC Pesticide Law of 1971		NCDA&CS	
NCDA Pesticide Disposal Program		NCDA&CS	
Federal Insecticide, Fungicide, and Rodenticide Act			EPA
Animal Waste Management Regulations	SWCD	DWQ, DSWC, CES	NRCS
NC Coop. Ext. Service and Ag Research Service		NCARS, NCCES	
Laboratory Testing Services		NCDA&CS	
Watershed Protection (PL-566)			NRCS
1985, 1990, 1996, and 2002 Farm Bills Programs			USDA NRCS
Ag NPS BMP Database (PRMS)			NRCS
Ag Nutrient Regulations in the Neuse and Tar-Pam River Basins	SWCD	DWQ, DSWC, NCDA&CS, NCCES	NRCS
Agriculture Sediment Initiative	SWCD	DSWC	
Soil, Plant Tissue, and Animal Waste Testing Program		NCDA&CS	
URBAN			
Coastal Stormwater Program		DWQ	
Stormwater Control Program	city, county	DWQ	EPA
Water Supply Watershed Protection Program	city, county	DWQ	
NPDES stormwater permitting		DWQ	EPA
Federal Insecticide, Fungicide, and Rodenticide Act			EPA
CONSTRUCTION AND MINING			
Sedimentation Pollution Control Act	ordinance	DLR, DOT	
Sedimentation and Erosion Control and NPDES program	ordinance	DLR, DOT, DWQ	EPA
Coastal Area Management Act	ordinance	DCM	
Mining Act of 1971 and NPDES program		DLR, DWQ	EPA
ON-SITE WASTEWATER DISPOSAL			
Sanitary Sewage Systems Program	county	DEH	
Wastewater Discharge Elimination Program (WADE)	county	DEH	
Shellfish Sanitation and Recreational Water Quality		DEH	
WASTE MANAGEMENT			
Resource Conservation and Recovery Act (RCRA)		DWM	EPA
Solid Waste Management Act of 1989	city, county	DWM	
Oil Pollution and Hazardous Substance Control Act of 1978 (OPHSCA)- UST Program and Trust Fund		DWM	
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)		DWM	EPA
Inactive Hazardous Sites Response Act (IHSRA)		DWM	
Dry-cleaning Solvent Cleanup Act (DSCA)		DWM	
Brownfields		DWM	EPA
FORESTRY			
Forest Practice Guidelines	county	DFR	
Educational State Forests		DFR	
National Forest Management Act			USFS
Forest Stewardship Program		DFR	

Table 2-8. North Carolina Nonpoint Source Management Program			
WETLANDS and HYDROLOGIC MODIFICATION			
Statewide Wetlands & Stream Management Strategy (SWSMS)		DWQ, DWR	
Ecosystem Enhancement Program (EEP) including WRP		DENR, DWQ	
Clean Water Act, Sections 401 and 404		DCM, DWQ	COE
Coastal Wetlands Dredge and Fill Act		DCM, DWQ	COE
Section 10 Rivers and Harbors Act of 1899			COE
Dam Safety Permit		DLR	
Clean Water Act (Sec. 401 and 404)		DWQ	COE
GROUNDWATER			
Wellhead Protection Program	city, county	DWQ	
Generic State Management Plan		DWQ	
GENERAL			
ORW, HQW, NSW Management Strategies		DWQ	
Section 319 Clean Water Act		DWQ	EPA
CZARA	County	DWQ, DCM	EPA, NOAA
Stream Classification and Standards		DWQ	EPA

One vehicle DWQ uses to promote interagency coordination and assist with the 319 grant program is the NPS Workgroup. Responsibilities of the NPS Workgroup members include:

- Acting as a point of contact and clearinghouse agent for their constituents,
- Providing input for Section 319 Request for Proposals,
- Evaluating and prioritizing Section 319 project proposals.
- Seeks to avoid transfer of problems among environmental media

Members of the NPS Workgroup are listed in Table 2-10.

Table 2-10. NPS Workgroup Membership by Category	
CATEGORY	**AGENCY**
Agriculture	Division of Soil and Water Conservation*
	NCSU-Cooperative Extension Service
	NC Department of Agriculture
	USDA Natural Resources Conservation Service
Construction/Mining	Division of Land Resources*
Forestry	Division of Forest Resources*
Groundwater	DWQ Water Quality Planning Section*
On-site Wastewater	Division of Environmental Health*
Waste Management	Division of Waste Management*
Urban Stormwater	DWQ Water Quality Section, Technical Support
Wetlands	DWQ, Wetlands/401 Unit* DENR, Ecosysteml Enhancement Program (EEP)
General Surface	DWQ Water Quality Planning Section*
	US Fish and Wildlife Service
	US EPA

	Division of Water Resources*
	Division of Coastal Management*
	Wildlife Resources Commission*

** Part of NC DENR*

2.4.1 Non-Discharge Permitting

The DWQ has a non-discharge program that reviews and permits systems using land application as a means of waste disposal. These systems include spray irrigation, animal waste management systems, rapid infiltration basins, trickling systems, land application of residuals programs, wastewater collection systems, and beneficial reuse of wastewater systems. The program, and all associated permits, is regulated by North Carolina General Statutes 143.215.1 and the Administrative Code Section 15A NCAC 2H .0200 – Waste Not Discharged to Surface Waters. These sections not only give DWQ the authority to issue permits, they also provide details on the permitting process and information that must be submitted with a permit application. The Collection System and Pretreatment Program reviews and approves all collection systems.

Sanitary sewer collection systems used to collect the wastewater from NPDES discharge wastewater treatment facilities and non-discharge wastewater treatment facilities are permitted by the Land Application Permits and Compliance and Animal Feeding Operation Permitting Compliance units. The land application of residuals program and the distribution and marketing program are also permitted by NDPU, as required by EPA's 40 CFR Part 503 rules.

The non-discharge program also requires wastewater systems that utilize land application for wastewater disposal to be permitted. The program has operational and monitoring requirements similar to those of the NPDES permit. The primary difference is that treated effluent is not discharged to surface waters. It is usually discharged to a spray irrigation system for land application. Some other options for the land application of effluent include rapid infiltration basins and trickling systems. Rapid infiltration systems are designed to have a much more intense and high rate of land application than spray irrigation. Most rapid infiltration systems are located in the sandy regions of the state where soils can handle an increased application volume. Trickling systems, which are typically used for lower effluent volumes, are located statewide.

Every wastewater treatment facility in the State of North Carolina, including large NPDES systems, pretreatment systems and non-discharge systems produce some form and amount of wastewater residuals. DWQ has a program that requires a permit for the land application of residuals. The program was developed around the EPA rules 40 CFR Part2 257 and 503.

3 Surface Water Assessment

The DWQ makes judgments regarding the health of surface water resources on a regular basis through the basinwide planning process. These judgments, or assessments, are based on a variety of information, including data collected from monitoring programs, land use information, and hydrologic connectivity. Assessments are directly tied to the use of a particular waterbody by combining data and information with the waterbody classification (Section 2.2). This section describes the DWQ monitoring programs, the process for screening non-DWQ data, and how data and information feed into the assessment of uses as described by the classification.

3.1 Surface Water Monitoring Programs

3.1.1 Overview of DWQ Monitoring Programs

The Environmental Sciences Section of DWQ collects a variety of biological, chemical, and physical data that can be used in a myriad of ways. In some waterbodies there may be adequate data from several program areas to allow a fairly comprehensive analysis of ecological integrity or water quality. In other waterbodies, data may be limited to one program area, such as only benthic macroinvertebrates data or only fisheries data, with no other information available. Such data may or may not be adequate to provide a definitive assessment of water quality, but can provide general indications of water quality. The primary programs from which data are typically drawn include benthic macroinvertebrates, fish community, fish tissue, lake assessment, ambient monitoring, and aquatic toxicity monitoring.

3.1.1.1 Biological Monitoring

Benthic Macroinvertebrates

Macroinvertebrates, or benthos, are organisms that live in and on the bottom of 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. Because many taxa in a community have life cycles of six months to 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 stressors.

Sampling methods and criteria have been developed to assign bioclassifications ranging from Poor to Excellent to each benthic sample from flowing fresh waters based on the number of taxa present in the intolerant groups Ephemeroptera, Plecoptera, and Trichoptera (s) and the value of the North Carolina Biotic Index (NCBI). This index summarizes tolerance data for all taxa in each collection. These bioclassifications primarily reflect the influence of

chemical pollutants. The major physical pollutant, sediment, is not assessed as well by a taxa richness analysis.

Different criteria have been developed for different ecoregions within North Carolina for flowing freshwater waterbodies. Thus, criteria are available for the mountains, piedmont and coastal plain physiographic regions. Details of the methods and criteria are presented in the assessment reports for each basin and in the Standard Operating Procedures for Benthic Macroinvertebrates (NCDENR 2001a).

Fish Community Structure

The North Carolina Index of Biotic Integrity (NCIBI) is a modification of the Index of Biotic Integrity (IBI) initially proposed by Karr (1981) and Karr et al. (1986). The IBI method was developed for assessing a stream's biological integrity by examining the structure and health of its fish community. The scores derived from this index are a measure of the ecological health of the waterbody and may not directly correlate to water quality. For example, a stream with excellent water quality, but with poor or fair fish habitat, would not be rated excellent with this index. However, a stream which rated excellent on the NCIBI should be expected to have excellent water quality for aquatic life propagation.

The Index of Biological Integrity incorporates information about species richness and composition, trophic composition, fish abundance, and fish condition. The NCIBI summarizes the effects of all classes of factors influencing aquatic faunal communities (water quality, energy source, habitat quality, flow regime, and biotic interactions). While any change in a fish community can be caused by many factors, certain aspects of the community are generally more responsive to specific influences. Species composition measurements reflect habitat quality effects. Information on trophic composition reflects the effects of biotic interactions and energy supply. Fish abundance and condition information indicate additional water quality effects. However, these responses may overlap. For example, a change in fish abundance may be due to decreased energy supply or a decline in habitat quality, not necessarily a change in water quality. A complete description of methods is provided in the Standard Operating Procedures for Biological Monitoring: Stream Fish Community Assessment and Fish Tissue (NCDENR 2001b).

Fish Tissue

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

The Environmental Sciences Section previously performed fish tissue surveys as part of the basinwide assessment program. Currently, the fish tissue surveys are targeted to areas of existing or suspected contamination. This shift has resulted in less basinwide coverage, but has focused resources on known contaminant issues within the state.

All fish samples were collected according to the agency Standard Operating Procedures for Biological Monitoring: Stream Fish Community Assessment and Fish Tissue (NCDENR 2001b). Analysis results are used as indicators for human health concerns, fish and wildlife concerns, and the presence and concentrations of various chemicals in the ecosystem.

Aquatic Toxicity
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. Facilities without monitoring requirements may have their effluents evaluated for toxicity by the DWQ Aquatic Toxicology Laboratory. If toxicity is detected, DWQ may include aquatic toxicity testing upon permit renewal.

3.1.1.2 Chemical Monitoring

Ambient Monitoring System
Assessments of water quality can be made using information about the fish and benthic invertebrates communities present in a body of water or from chemical measurements of particular water quality parameters. The Ambient Monitoring System is a network of over 365 stream, lake, and estuarine stations strategically located for the collection of physical and chemical water quality data. Each station is visited on a monthly basis, as resources allow. Parametric coverage is determined by freshwater or saltwater waterbody classification and corresponding water quality standards. Under this arrangement, core parameters are based on Class C waters with additional parameters appended when needed.

On the basinwide planning cycle, water quality data collected at all sites are evaluated for the previous five year period. Some stations have little or no data for several parameters. However, for the purpose of standardization, the assessment reports include data summaries for each station, all parameters.

Quality Assurance
All data collected for water quality assessment follows established quality assurance procedures per the appropriate Standard Operating Procedures. In chemical monitoring, laboratory analyses play a key role in the assessment and protection of water quality. Laboratory analyses are needed to identify problems and to monitor the effectiveness of management strategies to abate these problems. The relative accuracy and precision of laboratory data must be considered as part of any data interpretation or analysis of trends and use support. Absolute certainty in laboratory measurements can never be achieved. However, it is the goal of quality assurance and quality control efforts to quantify an acceptable amount of uncertainty. The evaluation of data quality is thus a relative determination. What is high quality for one situation could be unacceptable in another.

The DWQ's Chemistry Laboratory has recently established rigorous internal quality assurance evaluations. These evaluations may have significant implications on interpretations of historical data and how new data are generated and reviewed. DWQ will continue to work on ensuring the quality of water analyses in North Carolina. It is obviously beneficial to generate the highest quality information to apply a statistical level of significance to water quality observations. In addition to quantification limits, lower limits of detection, method detection limits, and instrumentation detection limits must be evaluated on a continuing basis to ensure sound data and information. Because each of these detection limits can represent different levels of confidence, water quality evaluations may change from time to time based on improved laboratory instruments, analytical methods, and improved quality assurance and quality control applications.

Discharger Coalition Monitoring

The Division of Water Quality has several memoranda of agreement with various NPDES permit holders to form coalitions and conduct ambient monitoring programs within specific river basins. In lieu of monitoring upstream and downstream of particular NPDES discharge, a coalition will establish a set of fixed ambient monitoring sites within a specified area, be it a river basin or a portion of a river basin. Parametric coverage at these sites is similar to the DWQ ambient monitoring system, however additional monitoring studies may be undertaken by the coalitions. Each coalition has a quality assurance team to review laboratory reports and procedures to ensure data quality. After data has been quality assured, they are sent to DWQ.

As of 2002, there are five discharger coalitions that perform ambient monitoring in North Carolina. They are the Upper, Middle, and Lower Cape Fear River Basin Associations, the Lower Neuse Basin Association (LNBA), and the Yadkin-Pee Dee River Basin Association (YPDRBA). These discharger coalitions monitor water quality at 230 stations located within the Cape Fear, Neuse, and Yadkin-Pee Dee River Basins.

3.1.2 Soliciting Existing and Readily Available Water Quality Data

DWQ actively solicits outside data and information in the year before biological sampling occurs in a particular basin. The solicitation allows approximately 90 days for data to be submitted. DWQ solicits and requires the following:

- Letters, photographs, and observations regarding the uses of surface waters for boating, drinking water, swimming, aesthetics, and fishing may be submitted.
- Summary reports and memos including distribution statistics, data collection and QA/QC methods may be submitted.
- Raw data should be submitted electronically and accompanied by documentation of quality assurance methods used to collect and analyze the samples.
- If information includes summaries of chemical or biological sampling data, maps showing sampling locations must be included.
- Contact information must be provided with submittals.

Data from sources outside of DWQ are screened for data quality and quantity. If data are of sufficient quality and quantity, they may be incorporated into use support assessments. A minimum of ten samples for more than a one-year period is needed to be considered for use support assessments.

The way the solicited data are used depends on the degree of quality assurance and quality control of the collection and analysis of the data as detailed in Appendix I and shown in the table below. Level 1 data can be used with the same confidence as DWQ data to determine use support ratings. Level 2 or Level 3 data may be used to help identify causes of pollution and problem parameters. They may also be used to limit the extrapolation of use support ratings up or down a stream segment from a DWQ or other Level 1 monitoring location. Where outside data indicate a potential problem, DWQ evaluates the existing DWQ biological and ambient monitoring site locations for adjustment as appropriate. All data collected and regularly submitted to DWQ by the discharger coalitions are considered Level 1 data unless otherwise noted in assessment documents or basinwide management plans.

Table 3-1. Criteria Levels for Use of Outside Data in Use Support Assessments

Criteria	Level 1	Level 2	Level 3
Monitoring frequency of at least 10 samples for more than a one-year period	Yes	Yes or No	No
Monitoring locations appropriately sited and mapped	Yes	Yes	No
State certified laboratory used for analysis according to 15A NCAC 2B .0103	Yes	Yes or No	No
Quality assurance project plan (QAPP) available describing sample collection and handling	Yes, according to EPA guidelines	Yes or No	No

Sources routinely used for data and information include, but are not limited to, the following sources:

- Previous § 303(d) lists;
- Clean Water Act § 305(b) reports;
- Clean Water Act § 319 nonpoint source assessments;
- Waterbodies where specific fishing or shellfish bans and/or advisories are currently in effect;
- Waterbodies identified by the State as impaired in its most recent Clean Lake Assessment conducted under § 314 of the CWA;
- Drinking water source water assessments under § 1453 of the Safe Drinking Water Act;

- Trend analyses and predictive models used for determining designated use, numeric and narrative standard compliance;
- Data, information, and water quality problems reported from local, State, or Federal agencies, Tribal governments, members of the public, and academic institutions.

3.2 General Surface Water Assessment Methodology

3.2.1 Waters Covered and Updated

The use support ratings for the ***Cape Fear, Catawba, French Broad, Lumber, New and Tar-Pamlico*** river basins have been updated since the 2004 North Carolina Integrated 305(b) and 303(d) report. These waters were rated using the methodology summarized in this section. The remaining basins were assessed using the methodology found in the Use Support Methodology and Use Support Ratings appendices found in individual basinwide management plans.

3.2.2 Assessing Use Support

All surface waters of the state are assigned a classification appropriate to the best-intended uses of that water. Waters are assessed to determine how well they are meeting the classified or best intended uses. The assessment results in a use support rating for the use categories that apply to that water.

Use Support Categories
DWQ assesses ecosystem health and human health risk through the use of five use support categories: aquatic life, recreation, fish consumption, water supply, and shellfish harvesting. These categories are tied to the uses associated with the primary classifications applied to NC rivers and streams. Waters are Supporting if data and information used to assign a use support rating meet the criteria for that use category. If these criteria are not met, then the waters are Impaired. Waters with inconclusive data and information are Not Rated. Waters where no data or information are available to make an assessment are No Data. The table below specifies which use support categories apply to which primary classification.

A single water may have more than one use support rating corresponding to one or more of the use support categories, as shown in the following table. For many waters, a use support category will not be applicable (N/A) to the classification of that water (e.g., shellfish harvesting is only applied to Class SA waters). A full description of the classifications is available in the DWQ document titled: *Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina* (Administrative Code 15A NCAC 2B .0100 to .0300). Information can also be found at http://h2o.enr.state.nc.us/csu/.

Table 3-2. Use Support Categories					
Primary Classification	Ecosystem Approach	Human Health Approach			
	Aquatic Life	Fish Consumption	Recreation	Water Supply	Shellfish Harvesting
C	X	X	X	N/A	N/A
SC	X	X	X	N/A	N/A
B	X	X	X	N/A	N/A
SB	X	X	X	N/A	N/A
SA	X	X	X	N/A	X
WS I- WS IV	X	X	X	X	N/A

Assessment Period
Data and information are used to assess water quality and assign use support ratings using a five-year data window that ends on August 31 of the year of basinwide biological sampling. For example, if biological data are collected in a basin in 2004, then the five-year data window for use support assessments would be September 1, 1999 to August 31, 2004. There are occasionally some exceptions to this data window, especially when follow up monitoring is needed to make decisions on samples collected in the last year of the assessment period.

Data and information for assessing water quality and assigning use support ratings for lakes uses a data window of October 1 to September 30. Any data collected by DWQ during the five-year data window that ends on September 30 of the year of biological sampling will be used to develop a Weight-of-Evidence approach to lakes assessment.

Assessment Unit Numbers (AU#)
DWQ identifies waters by index numbers and assessment unit numbers (AU#). The AU# is used to track defined stream segments or waterbodies in the water quality assessment database, for the 303(d) Impaired waters list, and in the various tables in basin plans and other water quality documents. The AU# is a subset of the DWQ index number (classification identification number). A letter attached to the end of the AU# indicates that the AU is smaller than the DWQ index segment. No letter indicates that the AU# and the DWQ index segment are the same.

Interpretation of Data and Information
When interpreting the use support ratings, it is important to understand the associated limitations and degree of uncertainty. Although these use support methods are used for analyzing data and information and determining use support ratings, best professional judgment is applied during these assessments. Use support ratings are intended to provide an assessment of water quality using a five-year data window, describe how well surface waters support their classified use, and document the potential stressors contributing to water quality degradation and the sources of these contributions.

Use support methods continue to improve over time, and the information and technology used to make use support determinations also continue to become more accurate and comprehensive. These improvements sometimes make it difficult to make generalizations comparing water quality between basin plans. However, improvements in technology and methods result in more scientifically sound use support assessments.

3.2.3 Assessment Methodology

Introduction
Many types of data and information are used to determine use support ratings and to identify stressors and sources of water quality degradation. All existing data pertaining to a stream segment for each applicable use support category are entered into a use support database. Assessments and data entries may include: use support ratings for each of the five use support categories; basis of assessment; stressors and potential sources; biological, chemical/physical (ambient monitoring) and lakes assessment data; fish consumption advisories from the NC Department of Health and Human Services (DHHS); swimming advisories and shellfish sanitation growing area classifications from the NC Division of Environmental Health (DEH); and available land cover and land use information. The following describes the data and methodologies used to conduct use support assessments. These methods will continue to be refined as additional information and technology become available.

Basis of Assessment
Assessments are made on an overall basis of either monitored (M) or evaluated (E), depending on the level of information available. A monitored rating is based on the most recent five-year data window and site-specific data and is therefore treated with more confidence than an evaluated rating.

Table 3-3. Basis of Assessment Summary

Rating Basis	Use Support Category	Assessment Applicability*
S/M	AL	Biological community data or ambient water quality parameters do not exceed criteria in AU during assessment period. Biological and ambient data are independently applied.
S/M	REC	Ambient fecal coliform bacteria levels do not exceed criteria in AU or AU with DEH sites is posted with advisories for 61 days or less during assessment period.
S/M	SH	AU is a DEH Approved shellfish growing area
I/M	AL	Biological community data or ambient water quality parameters exceed criteria in AU during assessment period. Biological and ambient data are independently applied.
I/M	REC	Ambient fecal coliform bacteria levels exceeds criteria in AU or AU with DEH sites is posted with advisories for more than 61 days during assessment period.
I/M	FC	Fish tissue data collected in AU during assessment period and basin is under mercury advice or site-specific advisory.

Table 3-3. Basis of Assessment Summary		
Rating Basis	Use Support Category	Assessment Applicability*
I/M	SH	AU is a DEH Conditionally-Approved, Prohibited or Restricted shellfish growing area
NR/M	AL	Biological community is Not Rated or inconclusive, or ambient water quality parameters are inconclusive or there are less than 10 samples in AU during assessment period. Biological and ambient data are independently applied.
NR/M	REC	Ambient fecal bacteria parameter exceeds annual screening criteria, but does not exceed assessment criteria of five samples in 30 days in AU during assessment period.
NR/M	FC	AU does not have a site-specific advisory and is not under a mercury advice or drains to areas within a mercury advice; fish tissue data are available.
S/E	AL	AU is a tributary to a S/M AU and land use is similar between AUs.
S/E	WS	AU is classified as WS, and DEH reports no significant closures at time of assessment.
I/E	FC	AU is in basin under a mercury advice or drains to areas within a mercury advice and has no fish tissue data.
NR/E	AL	AU is tributary to I/M AU, or AU is in watershed with intensive and changing land use, or other information suggests negative water quality impacts to AU. Discharger in AU has noncompliance permit violations or has failed three or more WET tests during the last two years of the assessment period.
NR/E	REC	Discharger has noncompliance permit violations of fecal bacteria parameter during last two years of assessment period.
NR/E	FC	AU does not have site-specific advisory and is not under a mercury advice, or drains to areas within a mercury advice, or has no fish tissue data
ND	AL, REC, SH	No data available in AU during assessment period

Note: S/M = Supporting/Monitored I/M=Impaired/Monitored NR/M=Not Rated/Monitored
S/E = Supporting/Evaluated I/E=Impaired/Evaluated NR/E=Not Rated/Evaluated
ND = No data
AL= Aquatic life REC=Recreation FC=Fish consumption
AH= Shellfish harvesting WS= Water supply
AU# = Assessment Unit Number WET = Whole Effluent Toxicity
DEH = Division of Environmental Health

Supporting ratings are extrapolated up tributaries from monitored streams when there are no problematic dischargers with permit violations or changes in land use/cover. Supporting ratings may also be applied to unmonitored tributaries where there is little land disturbance (e.g., national forests and wildlife refuges, wilderness areas or state natural areas). Problem stressors or sources are not generally applied to unmonitored tributaries. Impaired ratings are not extrapolated to unmonitored tributaries.

Aquatic Life Category

The aquatic life category is an ecosystem approach to assessing the biological integrity of all surface waters of the state. The biological community data and ambient water quality data are used in making assessments in this category. These represent the most important monitoring data for making water quality assessments in the aquatic life category. Evaluation information such as compliance and whole effluent toxicity (WET) information from NPDES dischargers, land cover, and other more anecdotal information are also used to identify potential stressors and to refine assessments based on the monitoring data. The following is a description of each monitoring data type and the criteria used in assigning use support ratings. Criteria used to evaluate the other information and assign use support ratings are also described.

Biological Data

Benthic macroinvertebrate (aquatic insects) and fish community samples are the best way to assess the biological integrity of most waterbodies. Unfortunately, these community measures cannot be applied to every stream size and are further limited by geographic region. These community measures are designed to detect current water quality and water quality changes that may be occurring in the watershed. However, they are only directly applied to the AU# where the sample was collected.

Where recent data for both benthic macroinvertebrates and fish communities are available, both are evaluated for use support assessments. When two biological monitoring data types conflict, best professional judgment is used to determine an appropriate use support rating. Where both ambient monitoring data and biological data are available, biological data may be given greater weight; however, each data type is assessed independently.

Benthic Macroinvertebrate Criteria

Criteria have been developed to assign bioclassifications to most benthic macroinvertebrate samples based on the number of taxa present in the pollution intolerant aquatic insect groups of *Ephemeroptera, Plecoptera* and *Trichoptera* (EPT); and the Biotic Index (BI), which summarizes tolerance data for all taxa in each sample. Because these data represent water quality conditions with a high degree of confidence, use support ratings using these data are considered monitored.

If a Fair macroinvertebrate bioclassification is obtained under conditions (such as drought or flood conditions, recent spills, etc.) that may not represent normal conditions or is borderline Fair (almost Good-Fair), a second sample should be taken within 12-24 months to validate the Fair bioclassification. Such sites will be Not Rated until the second sample is obtained.

Use support ratings are assigned to AU# using benthic macroinvertebrate bioclassifications as follows.

Table 3-4. Relationship between Benthic Bioclassifications and Use Support Ratings		
Waterbody Sample Type or Criteria	Bioclassification	Use Support Rating
Mountain, piedmont, coastal A[3]	Excellent	Supporting
Mountain, piedmont, coastal A[3]	Good	Supporting
Swamp[1]	Natural	Supporting
Mountain, piedmont, coastal A	Good-Fair	Supporting
Smaller than criteria, but Good-Fair[2]	Not-Impaired	Supporting
Swamp[1]	Moderate Stress	Supporting
Mountain, piedmont, coastal A[3]	Fair	Impaired
Swamp[1]	Severe Stress	Impaired
Mountain, piedmont, coastal A[3]	Poor	Impaired
Criteria not appropriate to assign bioclassification	Not Rated	Not Rated

1. Swamp streams for benthos sampling are defined as streams in the coastal plain that have no visible flow for a part of the year, but do have flow during the February to early March benthic index period.
2. This designation may be used for flowing waters that are too small to be assigned a bioclassification (less than three square miles drainage area), but have a Good-Fair or higher bioclassification using the standard qualitative and EPT criteria.
3. Coastal A streams are those located in the coastal plain that have flow year round and are wadeable.

Fish Community Criteria

The North Carolina Index of Biotic Integrity (NCIBI) is a method for assessing a stream's biological integrity by examining the structure and health of its fish community. The NCIBI incorporates information about species richness and composition, indicator species, trophic function, abundance and condition, and reproductive function. Because these data represent water quality conditions with a high degree of confidence, use support ratings using these data are considered monitored. Use support ratings are assigned to AU# using the NCIBI bioclassifications as follows:

NCIBI	Use Support Rating
Excellent	Supporting
Good	Supporting
Good-Fair	Supporting
Fair	Impaired
Poor	Impaired

If a Fair fish bioclassification is obtained under conditions (such as drought or flood conditions, recent spills, etc.) that may not represent normal conditions or is borderline Fair (almost Good- Fair), a second sample should be taken within 12-24 months to validate the Fair bioclassification. Such sites will be Not Rated until the second sample is obtained. The NCIBI was recently revised (NCDENR, 2001), and the bioclassifications and criteria have also been recalibrated against regional reference site data (NCDENR, 2000a, 2000b and 2001a).

NCIBI criteria are applicable only to wadeable streams in the following river basins: Broad, Catawba, Savannah, Yadkin-Pee Dee, Cape Fear, Neuse, Roanoke, Tar-Pamlico, French Broad, Hiwassee, Little Tennessee, New and Watauga. Additionally, the NCIBI criteria are only applicable to streams in the piedmont portion of the Cape Fear, Neuse, Roanoke and

Tar-Pamlico River basins. The definition of "piedmont" for these four river basins is based upon a map of North Carolina watersheds (Fels, 1997). Specifically:

- In the Cape Fear River basin -- all waters except for those draining the Sandhills in Moore, Lee and Harnett counties, and the entire basin upstream of Lillington, NC.
- In the Neuse River basin -- the entire basin above Smithfield and Wilson, except for the south and southwest portions of Johnston County and eastern two-thirds of Wilson County.
- In the Roanoke River basin -- the entire basin in North Carolina upstream of Roanoke Rapids, NC and a small area between Roanoke Rapids and Halifax, NC.
- In the Tar-Pamlico River basin -- the entire basin above Rocky Mount, except for the lower southeastern one-half of Halifax County and the extreme eastern portion of Nash County.

NCIBI criteria have not been developed for:

- Streams in the Broad, Catawba, Yadkin-Pee Dee, Savannah, French Broad, Hiwassee, Little Tennessee, New and Watauga River basins which are characterized as wadeable first to third order streams with small watersheds, naturally low fish species diversity, coldwater temperatures, and high gradient plunge-pool flows. Such streams are typically thought of as "Southern Appalachian Trout Streams".
- Wadeable streams in the Sandhills ecoregion of the Cape Fear, Lumber and Yadkin-Pee Dee River basins.
- Wadeable streams and swamps in the coastal plain region of the Cape Fear, Chowan, Lumber, Neuse, Pasquotank, Roanoke, Tar-Pamlico and White Oak River basins.
- All nonwadeable and large streams and rivers throughout the state.

Ambient Water Quality Monitoring Criteria

Chemical/physical water quality data are collected through the DWQ Ambient Monitoring Program statewide and NPDES discharger coalitions in some basins. All samples collected (usually monthly) during the five-year assessment period are used to assign a use support rating. Ambient water quality data are not direct measures of biological integrity, but the chemical/physical parameters collected can provide an indication of conditions that may be impacting aquatic life. Because these data represent water quality conditions with a high degree of confidence, use support ratings assigned using these data are considered monitored. Where both ambient data and biological data are available, each data type is assessed independently.

The parameters used to assess water quality in the aquatic life category include dissolved oxygen (DO), pH, chlorophyll *a* and turbidity. Criteria for assigning use support ratings to AU# with ambient water quality data of a minimum of ten samples are as follows:

Ratings Criteria	Rating
Numerical standard exceeded in ≤10% of samples	Supporting
Numerical standard exceeded in >10% of samples	Impaired
Less than 10 samples collected	Not Rated

DO and pH standard exceeded in swamp streams Not Rated

Some standards are written with more specific criteria than others, and these specific criteria are used to assess use support. For example, the DO standard has a daily average of 5 mg/l and an instantaneous value of 4 mg/l for Class C waters. Because DWQ does not collect daily DO levels at the ambient stations, the instantaneous value is used for assessment criteria. In areas with continuous monitoring, the daily average of 5 mg/l will also be assessed. In addition, pH has a standard of not less than 6 and not greater than 9; each level is assessed. To assess the fecal coliform bacteria standard, five samples must be collected within a 30 day period (see Recreation Category for more information).

Multiple Monitoring Sites

There are AU# with more than one type of monitoring data. When the data from multiple biological data types are not in agreement, best professional judgment is used to assign a bioclassification and use support rating for that AU#. Biological monitoring is typically assessed independent of ambient monitoring data and either may be used to assign a use support rating for an AU#. Monitoring data are always used over the evaluation information; however, evaluation information can be used to lengthen or shorten the monitored AU# and to assign use support ratings on an evaluated basis to non-monitored AU#.

NPDES Wastewater Whole Effluent Toxicity (WET) Information

Whole Effluent Toxicity (WET) tests are required for all major NPDES discharge permit holders, as well as those minor NPDES dischargers with complex effluent (defined as not being of 100 percent domestic waste). WET tests are evaluated to determine if the discharge could be having negative water quality impacts. If a stream with a WET test facility has not been sampled for instream chronic toxicity, biological community data or has no ambient water quality data, and that facility has failed three or more WET tests in the last two years of the assessment period, the AU# is Not Rated. Because this information is not a direct measure of water quality and the confidence is not as high as for monitoring data, this use support rating is considered evaluated rather than monitored. Problems associated with WET test failures are addressed through NPDES permits.

NPDES Discharger Daily Monitoring Report Information

NPDES effluent data monthly averages of water quality parameters are screened for the last two years of the assessment period. If facilities exceed the effluent limits by 20 percent for two or more months during two consecutive quarters, or have chronic exceedances of permit limits for four or more months during two consecutive quarters, then the AU# is Not Rated if no biological or ambient monitoring data are available. If biological or ambient data are available, that data will be used to develop a use support rating for appropriate stream segments. Because this information is not a direct measure of water quality and the confidence is not as high as for monitoring data, this use support rating is considered evaluated rather than monitored.

Fish Consumption Category

The fish consumption category is a human health approach to assess whether humans can safely consume fish from a waterbody. This category is applied to all waters of the state. The use support rating is assigned using fish consumption advisories or advice as issued by the

NC Department of Health and Human Services (DHHS). The fish consumption category is different from other categories in that assessments are based on the existence of a DHHS fish consumption advice or advisory at the time of assessment. The advice and advisories are based on DHHS epidemiological studies and on DWQ fish tissue data, so a fish tissue monitoring site will constitute a monitored AU# and all other AU# will be evaluated. DWQ fish tissue data are used to inform DHHS of potential fish tissue toxicity. DHHS is responsible for proclaiming a fish tissue advisory for any waterbody. Fish tissue monitoring data are not used directly for assigning a use support rating in this category.

If a limited site-specific fish consumption advisory or a no consumption advisory is posted at the time of assessment, the water is Impaired. If there are no site-specific advisories posted or the stream is not in a basin where mercury advice is applied, then the AU# will be Not Rated in this category.

The DHHS has developed regional fish consumption advice (all waters south and east of I-85) for certain fish species shown to have elevated levels of mercury in their tissue. DWQ applies the DHHS fish consumption advice for mercury on a basinwide scale rather than an AU scale in recognition that fish move up and downstream regardless of the presence of I-85. All AUs draining below or intersecting I-85 are Impaired in the fish consumption category. AUs with monitoring data are considered Impaired/Monitored, and AUs with no monitoring data are considered Impaired/Evaluated. When a DHHS site-specific advisory is in place for a parameter other than mercury, the assessment is based on that advisory and the mercury advice will take a lower ranking in the assessment. Therefore, when a site-specific advisory is in place in a basin with a mercury advice and the AU has fish tissue monitoring data, the AU will be considered Impaired/Monitored for the specific parameter, rather than Impaired/Evaluated for mercury.

Basins under the mercury advice are the Cape Fear, Chowan, Lumber, Neuse, Pasquotank, Roanoke, White Oak and Yadkin-Pee Dee. All waters in these basins are Impaired in the fish consumption category, even when there is a site-specific advisory. All waters are also considered Monitored or Evaluated, dependent upon the availability of monitoring data.

Only a small portion of the Catawba River basin is intersected by I-85 (lower Mecklenberg, Union and Gaston counties). Due to the presence of dams that impede fish travel throughout the Catawba River basin, only those waters draining to and entering the mainstem Catawba below I- 85 and are not impeded by dams are considered Impaired/Evaluated.

Basins not under the mercury advice are the Broad, French Broad, Hiwassee, Little Tennessee, New, Savannah and Watauga. All waters in these basins are Not Rated in the fish consumption category if there is no site-specific advisory; waters are Impaired if there is a site-specific advisory. All waters are also considered Monitored or Evaluated, dependent upon the availability of monitoring data.

In order to separate this regional advice from other fish consumption advisories and to identify actual fish populations with high levels of mercury, only waters with fish tissue monitoring data are presented on the use support maps.

Recreation Category

This human health related category evaluates waters for the support of primary recreation activities such as swimming, water-skiing, skin diving, and similar uses usually involving human body contact with water where such activities take place in an organized manner or on a frequent basis. Waters of the state designated for these uses are classified as Class B, SB and SA. This category also evaluates other waters used for secondary recreation activities such as wading, boating, and other uses not involving human body contact with water, and activities involving human body contact with water where such activities take place on an infrequent, unorganized or incidental basis. Waters of the state designated for these uses are classified as Class C, SC and WS.

The use support ratings applied to this category are currently based on the North Carolina (1) fecal coliform bacteria water quality standard where ambient monitoring data are available or (2) on the duration of local or state health agencies posted swimming advisories. In the future, use support ratings for the recreation category may be based on other bacteriological indicators and standards.

DWQ conducts monthly ambient water quality monitoring that includes fecal coliform bacteria testing. The Division of Environmental Health (DEH) tests coastal recreation waters (beaches) for bacteria levels to assess the relative safety of these waters for swimming. If an area has elevated bacteria levels, health officials will advise that people not swim in the area by posting a swimming advisory and by notifying the local media and county health department.

The North Carolina fecal coliform bacteria standard for freshwater (Class B) is: (1) not to exceed the geometric mean of 200 colonies per 100 ml of at least five samples over a 30-day period and (2) not to exceed 400 colonies per 100 ml in more than 20 percent of the samples during the same period. The AU# being assessed for the five-year data window is Supporting in the recreation category if neither number (1) nor (2) of the standard are exceeded. The AU being assessed is Impaired in the recreation category if either number (1) or (2) is exceeded. Waters without sufficient fecal coliform bacteria data (five samples within 30 days) are Not Rated, and waters with no data are noted as having No Data.

Assessing the water quality standard requires significant sampling efforts beyond the monthly ambient monitoring sampling and must include at least five samples over a 30-day period. Decades of monitoring have demonstrated that bacteria concentrations may fluctuate widely in surface waters over a period of time. Thus, multiple samples over a 30-day period are needed to evaluate waters against the North Carolina water quality standard for recreational use support.

Waters classified as Class SA, SB and B are targeted for this intensive sampling effort due to the greater potential for human body contact. Waters with beach monitoring sites will be Impaired if the area is posted with an advisory for greater than 61 days of the assessment period. Waters with beach monitoring sites with advisories posted less than 61 days will be Supporting. Other information can be used to Not Rate unmonitored waters.

DWQ Ambient Monitoring Fecal Coliform Bacteria Screening Criteria
As with other information sources, all available information and data are evaluated for the recreation category using the assessment period. However, DWQ conducts an annual screening of DWQ ambient fecal coliform bacteria data to assess the need for additional monitoring or immediate action by local or state health agencies to protect public health. Each March, DWQ staff will review bacteria data collections from ambient monitoring stations statewide for the previous sampling year. Locations with annual geometric means greater than 200 colonies per 100 ml, or when more than 20 percent of the samples are greater than 400 colonies per 100 ml, are identified for potential follow-up monitoring conducted five times within 30 days as specified by the state fecal coliform bacteria standard. If bacteria concentrations exceed either portion of the state standard, the data are sent to DEH and the local county health director to determine the need for posting swimming advisories. DWQ regional offices will also be notified.

Due to limited resources and the higher risk to human health, primary recreation waters (Class B, SB and SA) will be given monitoring priority for an additional five times within 30 days sampling. Follow-up water quality sampling for Class C waters will be performed as resources permit. Any waters on the 303(d) list of Impaired waters for fecal coliform will receive a low priority for additional monitoring because these waters will be further assessed for TMDL development.

DWQ attempts to determine if there are any swimming areas monitored by state, county or local health departments or by DEH. Each January, DEH, county or local health departments are asked to list those waters which were posted with swimming advisories in the previous year.

Shellfish Harvesting Use Support
The shellfish harvesting use support category is a human health approach to assess whether shellfish can be commercially harvested and is therefore applied only to Class SA waters. The following data sources are used to assign use support ratings for shellfish waters.

Division of Environmental Health (DEH) Shellfish Sanitation Surveys
DEH is required to classify all shellfish growing areas as to their suitability for shellfish harvesting. Estuarine waters are delineated according to DEH shellfish management areas (e.g., Outer Banks, Area H-5) which include Class SA, SB and SC waters. DEH samples growing areas regularly and reevaluates the areas by conducting shellfish sanitation surveys every three years to determine if their classification is still applicable. DEH classifications may be changed after the most recent sanitary survey. Classifications are based on DEH bacteria sampling, locations of pollution sources, and the availability of the shellfish resource. Growing waters are classified as follows.

Table 3-5. Description of DEH Shellfish Growing Area Classifications

DEH Classification	DEH Criteria
Approved (APP)	Fecal Coliform Standard for Systematic Random Sampling: The median fecal coliform Most Probably Number (MPN) or the

	geometric mean MPN of the water shall not exceed 14 per 100 milliliters (mL), and the estimated 90th percentile shall not exceed an MPN of 43 MPN per 100 mL for a 5-tube decimal dilution test. Fecal Coliform Standard for Adverse Pollution Conditions Sampling: The median fecal coliform or geometric mean MPN of the water shall not exceed 14 per 100 mL, and not more than 10 percent of the samples shall exceed 43 MPN per 100 mL for a 5-tube decimal dilution test.
Conditionally Approved-Open (CAO)	Sanitary Survey indicates an area can meet approved area criteria for a reasonable period of time, and the pollutant event is known and predictable and can be managed by a plan. These areas tend to be open more frequently than closed.
Conditionally Approved-Closed (CAC)	Sanitary Survey indicates an area can meet approved area criteria for a reasonable period of time, and the pollutant event is known and predictable and can be managed by a plan. These areas tend to be closed more frequently than open.
Restricted (RES)	Sanitary Survey indicates limited degree of pollution, and the area is not contaminated to the extent that consumption of shellfish could be hazardous after controlled depuration or relaying.
Prohibited (PRO)	No Sanitary Survey; point source discharges; marinas; data do not meet criteria for Approved, Conditionally Approved or Restricted Classification.

Assigning Use Support Ratings to Shellfish Harvesting Waters (Class SA)

DWQ use support ratings may be assigned to separate segments within DEH management areas. In assessing use support, the DEH classifications and management strategies are only applicable to DWQ Class SA (shellfish harvesting) waters. It is important to note that DEH classifies all actual and potential growing areas (which includes all saltwater and brackish water areas) for their suitability for shellfish harvesting. This will result in a difference of acreage between DEH areas classified as CAC, PRO and RES, and DWQ waters rated as Impaired. For example, if DEH classifies a 20-acre area CAC, but only 10 acres are Class SA, only those 10 acres of Class SA waters are rated as Impaired.

The DEH "Closed" polygon coverage includes CAC, RES and PRO classifications, and it is not currently possible to separate out the PRO from the RES areas. Therefore, these areas are a combined polygon coverage, and DWQ rates these waters as Impaired.

Sources of fecal coliform bacteria are more difficult to separate out for Class SA areas. DEH describes the potential sources in the sanitary surveys, but they do not describe specific areas affected by these sources. Therefore, in the past, DEH identified the same sources for all Class SA sections of an entire management area (e.g., urban runoff and septic systems). Until a better way to pinpoint sources is developed, this information will continue to be used. A point source discharge is only listed as a potential source when NPDES permit limits are exceeded.

DWQ and DEH are developing the database and expertise necessary to assess shellfish

harvesting frequency of closures. In the interim, DWQ has been identifying the frequency of closures in Class SA waters using an interim methodology based on existing databases and GIS shapefiles. There will be changes in reported acreages in future assessments using the permanent methods and tools that result from this project.

Past Interim Frequency of Closure-Based Assessment Methodology
The interim method was used for the 2001 White Oak, 2002 Neuse and 2003 Lumber River basin use support assessments. Shellfish harvesting use support ratings for Class SA waters using the interim methodology are summarized below.

Table 3-6. Relationship between DEH Classifications and Use Support Ratings, Interim Methods

Percent of Time Closed within Basin Data Window	DEH Growing Area Classification	DWQ Use Support Rating
N/A	Approved*	Supporting
Closed ≤10% of the data window	Portion of CAO closed ≤% of data window	Supporting
Closed >10% of the data window	Portion of CAO closed > 10% of data window	Impaired
N/A	CAC and PRO/RES**	Impaired

* Approved waters are closed only during extreme meteorological events (hurricanes).
** CAC and P/R waters are rarely opened to shellfish harvesting.

For CAO areas, DWQ worked with DEH to determine the number of days and acreages that CAO Class SA waters were closed to shellfish harvesting during the assessment period. For each growing area with CAO Class SA waters, DEH and DWQ defined subareas within the CAO area that were opened and closed at the same time. The number of days these CAO areas were closed was determined using DEH proclamation summary sheets and the original proclamations.

The number of days that APP areas in the growing area were closed due to preemptive closures because of named storms was not counted. For example, all waters in growing area E-9 were preemptively closed for Hurricane Fran on September 5, 1996. APP waters were reopened September 20, 1996. Nelson Bay (CAO) was reopened September 30, 1996. This area was considered closed for ten days after the APP waters were reopened.

Current Assessment Methodology
Use support assessment is now conducted such that only the DEH classification will be used to assign a use support rating. By definition, CAO areas are areas that DEH has determined do not, or likely do not, meet water quality standards and these areas will be rated Impaired, along with CAC and PRO/RES areas. Only APP areas will be rated Supporting.
Growing areas that have been reclassified by DEH during the assessment period from a lower classification to APP will be rated Supporting. Areas that are reclassified from APP to any other classification during the assessment period will be rated Impaired.

Over the next few years, DWQ, DEH, Division of Coastal Management (DCM) and Division of Marine Fisheries (DMF) will be engaged in developing a database with georeferenced (GIS) shellfish harvesting areas. The new database and GIS tools will be valuable for the above agencies to continue to work together to better serve the public. Using the new database with georeferenced areas and monitoring sites, DEH will be able to report the number of days each area was closed excluding closures related to named storms.

Water Supply Use Support

This human health related use support category is used to assess all Class WS waters for the ability of water suppliers to provide potable drinking water. Water quality standards established for drinking water apply to water delivered to consumers after it has been treated to remove potential contaminants that may pose risks to human health. Ambient standards established by states under the Clean Water Act are not intended to ensure that water is drinkable without treatment. Modern water treatment technologies are required to purify raw water to meet drinking water standards as established by the North Carolina Division of Environmental Health.

Water supply use support is assessed by DWQ using information from the seven DEH regional water treatment plant consultant staff. Each January, the DEH staff consultants are asked to submit a spreadsheet listing closures and water intake switch-overs for all water treatment plants in their region. This spreadsheet describes the length and time of the event, contact information, and the reason for the closure or switch.

The spreadsheets are reviewed by DWQ staff to determine if any closures/switches were due to water quality concerns. Those closures/switches due to water quantity problems and reservoir turnovers are not considered for use support. The frequency and duration of closures/switches due to water quality concerns are considered when assessing use support. Using these criteria, North Carolina's surface water supplies are currently rated Supporting on an Evaluated basis. Specific criteria for rating waters Impaired are to be determined on a case-by-case basis.

3.2.4 Use of Outside Data

DWQ actively solicits outside data and information in the year before biological sampling in a particular basin. The solicitation allows approximately 90 days for data to be submitted. Data from sources outside DWQ are screened for data quality and quantity. If data are of sufficient quality and quantity, they may be incorporated into use support assessments. A minimum of ten samples for more than a one-year period is needed to be considered for use support assessments.

The way the solicited data are used depends on the degree of quality assurance and quality control of the collection and analysis of the data as detailed in the 303(d) report. Level 1 data can be used with the same confidence as DWQ data to determine use support ratings. Level 2 or Level 3 data may be used to help identify causes of pollution and stressors. They may also be used to limit the extrapolation of use support ratings up or down a stream

segment from a DWQ monitoring location. Where outside data indicate a potential problem, DWQ evaluates the existing DWQ biological and ambient monitoring site locations for adjustment as appropriate.

3.2.5 Lakes and Reservoir Use Assessment

Like streams, lakes are classified for a variety of uses. All lakes monitored as part of North Carolina's Ambient Lakes Monitoring Program carry the Class C (aquatic life) classification, and most are classified Class B and SB (recreation) and WS-I through WS-V (water supply). The surface water quality numeric standard specifically associated with recreation is fecal coliform bacteria. For water supplies, there are 29 numeric standards based on consumption of water and fish. Narrative standards for Class B and Class WS waters include aesthetics such as no odors and no untreated wastes. There are other numeric standards that also apply to lakes for the protection of aquatic life and human health. These standards also apply to all other waters of the state and are listed under the Class C rules. One of the major problems associated with lakes and reservoirs is increasing eutrophication related to nutrient inputs. Several water quality parameters help to describe the level of eutrophication.

For nutrient enrichment, one of the main causes of impacts to lakes and reservoirs, a more holistic or weight of evidence approach is necessary since nutrient impacts are not always reflected by the parameters sampled. For instance, some lakes have taste and odor problems associated with particular algal species, yet these lakes do not have chlorophyll *a* concentrations above 40 µg/l frequently enough to impair them based on the standard. In addition, each reservoir possesses unique traits (watershed area, volume, depth, retention time, etc.) that dramatically influence its water quality, but that cannot be evaluated through standards comparisons. In such waterbodies, aquatic life may be Impaired even though a particular indicator is below the standard. Where exceedances of surface water quality standards are not sufficient to evaluate a lake or reservoir, the weight of evidence approach can take into consideration indicators and parameters not in the standards to allow a more sound and robust determination of water quality.

The weight of evidence approach uses the following sources of information to determine the eutrophication (nutrient enrichment) level as a means of assessing lake use support in the aquatic life category:

- Quantitative water quality parameters - dissolved oxygen, chlorophyll a, pH, etc.
- Algal bloom reports
- Fish kill reports
- Hydrologic and hydraulic characteristics – watershed size, lake volume, retention time, volume loss, etc.
- Third party reports – citizens, water treatment plant operators, state agencies, etc.
- Taste and odor
- Sheens
- Odd colors
- Other aesthetic and safety considerations

In implementing the weight of evidence approach for eutrophication, more consideration is given to parameters that have water quality standards (see table). Each parameter is assessed for percent exceedance of the state standard. Parameters with sufficient (ten or more observations), quality-assured observations are compared to surface water quality standards. When standards are exceeded in more than 10 percent of the assessment period, portions or all of the waterbody are rated Impaired.

In many cases, however, the standards based approach is incapable of characterizing the overall health of a reservoir. The eutrophication-related parameters and water quality indicators without numeric standards are reviewed based on interpretation of the narrative standards in 15A NCAC 2B .0211(2) and (3).

A modification to lake use assessment is the evaluation and rating of a lake or reservoir by assessment unit numbers (AU#). Each lake or reservoir may have one or more AU# based on the classification segments (DWQ index numbers). Each sampling date is considered one sample. Multiple sampling locations within one AU are considered one sample. A minimum of ten samples is needed to assess use support for any AU. Each AU with documented problems (sufficient data, ambient data above standards, and supporting public data) will be rated as Impaired while the other portions are rated as Supporting or Not Rated. The following table lists the information considered during a lake/reservoir use assessment, as well as the criteria used to evaluate that information.

Table 3-7. Weight of Evidence Criteria for Lake and Reservoir Assessment

Assessment type	Criteria
EUTROPHICATION	
Water Quality Standards (a minimum of 10 samples is required for use support assessment)	
Chlorophyll a	Above standard in > 10% of samples
Dissolved oxygen	Below standard in >10% of samples
pH	Below or above standard in > 10% of samples
Turbidity	Above standard in > 10% of samples
% Total dissolved gases	Above standard in > 10% of samples
Temperature	Minor and infrequent excursions of temperature standards due to anthropogenic activity. No impairment of species evident.
Metals (excluding copper, iron and zinc)	Above standard in > 10% of samples
Other Data	
Dissolved oxygen, % saturation	> 10% of samples above 120%
Algae	Blooms during 2 or more sampling events in 1 year with historic blooms
Fish	Kills related to eutrophication
Chemically/Biologically Treated	For algal or macrophyte control – either chemicals or biologically by fish, etc.
Aesthetics Complaints	Documented sheens, discoloration, etc. – written complaint and follow-up by a state agency

Table 3-7. Weight of Evidence Criteria for Lake and Reservoir Assessment	
Assessment type	Criteria
TSI	Increase of 2 trophic levels from one 5-year period to next
Historic DWQ Data	Conclusions from other reports and previous use support assessments
AGPT	Algal Growth Potential Test ≥ 5 mg/L
Macrophytes	Limiting access to public ramps, docks, swimming areas; reducing access by fish and other aquatic life to habitat; clogging intakes
Taste and Odor	Public complaints; potential based on algal species
Sediments	Clogging intakes – dredging program necessary

3.3 The Integrated Database and Impaired Waters List (303(d) List)

3.3.1 Integrated Reporting Database

Guidance from EPA places each waterbody assessment unit, or segment, into one unique assessment category (EPA 2001b). Although EPA specifies five unique assessment categories, North Carolina elects to use seven categories in order to maintain continuity with the previous 303(d) and 305(b) reports. Each category is described in detail below:

Category 1: Attaining the water quality standard and no use is threatened. This category consists of those waters or assessment units where all applicable use support categories are rated "Supporting." Data and information are available to support a determination that the water quality standards are attained and no use is threatened. Future monitoring data will be used to determine if the water quality standard continues to be attained.

Category 2: Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened. This category consists of those waters where at least one of the applicable use support categories are rated " Supporting" and the other use support categories are rated "Not Rated." Also included in this category are waters where at least one of the applicable use support categories, except Fish Consumption, are rated "Supporting," the remaining applicable use support categories except Fish Consumption are rated "Not Rated," and the Fish Consumption category is rated "Impaired-Evaluated." Data and information are available to support a determination that some, but not all, uses are attained. Attainment status of the remaining uses is unknown because there is insufficient or no data or information. Future monitoring data will be used to determine if the uses previously found to be in attainment remain in attainment, and to determine the attainment status of those uses for which data and information was previously insufficient to make a determination.

Category 3: Insufficient or no data and information to determine if any designated use is attained. This category consists of those waters where all applicable use support categories except Fish Consumption are rated "Not Rated" or "No Data" and the Fish Consumption category is rated "Impaired-Evaluated." Measured data or information to support an attainment determination for any use is not available. Supplementary data and information, or future monitoring, will be required to assess the attainment status.

Category 4: Impaired or threatened for one or more designated uses but does not require the development of a TMDL. This category contains three distinct sub-categories:

> **Category 4a: TMDL has been completed**. This category consists of those waters for which EPA has approved or established a TMDL and water quality standards have not yet been achieved. Monitoring data will be considered when evaluating Category 4A waterbodies for potential delisting, although the TMDL strategy will remain in place.
>
> **Category 4b: Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future**. This category consists of those waters for which TMDLs will not be attempted because other required regulatory controls (e.g., NPDES permit limits, Stormwater Program rules, buyout programs, etc.) are expected to attain water quality standards by the next regularly scheduled listing cycle. Future monitoring will be used to verify that the water quality standard is attained as expected.
>
> **Category 4c: Impairment is not caused by a pollutant.** This category consists of waters that are impaired by pollution, not by a pollutant. EPA defines pollution as "The man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of the water." EPA believes that in situations where the impairment is not caused by a pollutant, a TMDL is generally not the appropriate solution to the problem. EPA staff have verbally stated that this category is intended to be used for impairments related to water control structures (i.e., dams). Future monitoring will be used to confirm that there continues to be no pollutant-caused impairment and to support water quality management actions necessary to address the cause(s) of the impairment.

Category 5: Impaired for one or more designated uses by a pollutant(s), and requires a TMDL. This category consists of those waters that are impaired by a pollutant and the proper technical conditions exist to develop TMDLs. As defined by the EPA the term pollutant means "dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt

and industrial, municipal, and agricultural waste discharged into the water." In most cases, data are available to support a determination that a water quality standard is not attained. When more than one pollutant is associated with the impairment of a single assessment unit in this category, the assessment unit will remain in Category 5 until TMDLs for all listed pollutants have been completed and approved by the EPA. Water quality standards relevant to this category are included in 15A NCAC 02B .0211 through 15A NCAC 02B .0222.

Category 6: Impaired biological integrity. This category consists of assessment units historically referred to as "biologically impaired"; these assessment units have no identified cause(s) of impairment although aquatic life impacts have been documented. Waters in this category do not meet the conditions of biological integrity related to best usage as outlined in 15A NCAC 02B .0211(2). Stressors to aquatic life will be identified in a future TMDL study.

Category 7: Impaired, but the proper technical conditions do not yet exist to develop a TMDL. As described in the Federal Register, "proper technical conditions refers to the availability of the analytical methods, modeling techniques and data base necessary to develop a technically defensible TMDL. These elements will vary in their level of sophistication depending on the nature of the pollutant and characteristics of the segment in question" (43 FR 60662, December 28, 1978). These are waters that would otherwise be in Category 5 of the integrated list. As previously noted, EPA has recognized that in some specific situations the data, analyses, or models are not available to establish a TMDL. North Carolina seeks EPA technical guidance in developing technically defensible TMDLs for these waters. Open water and ocean hydrology fecal coliform impaired shellfishing waters are included in this category.

For this integrated list, Categories 1 and 2 are considered fully supporting any assessed uses. This portion of the integrated list is extensive (thousands of segments), thus a printed copy is not included in this document. A table of waters on Categories 1 through 3 is available for downloading on the DWQ website (http://h2o.enr.state.nc.us/tmdl/General_303d.htm). Categories 4, 5, 6, and 7 contain those assessment units that have been determined to be impaired in North Carolina**. Categories 5, 6, and 7 constitute the 2006 North Carolina §303(d) List for the State of North Carolina.**

A waterbody assessment unit will only appear once in one category. This will be true even when an assessment unit has use support ratings for multiple use categories (e.g., aquatic life and primary recreation). Where multiple impairments exist, each use support category and rating are presented in the impaired waters list (303(d) list). However, if any one use is impaired based on a pollutant, the assessment unit will appear in Category 5, regardless of other impairments based on pollution. This is in order to prioritize assessment units needing TMDLs. A complex flow chart of the methodology used to place assessment units into categories is shown in Figure 3-1.

Tables 3-8 through 3-11 present overall assessment information for North Carolina's freshwaters for this report cycle. Table 3-8 contains a summary, by river basin, of the freshwater streams and shorelines in each Integrated Report category. Approximately 9% of freshwater streams and shorelines in North Carolina are considered impaired based upon the current use support methods and historical listings. Use support ratings for lakes, reservoirs, estuarine waters and saltwaters have only recently come under the same technical reporting as those for freshwater streams and shorelines. Thus, these tables are not comparable to any previous summaries.

Tables 3-12 through 3-14 present summaries of the reasons for listing (or cause of impairment) for fresh, estuarine and salt waters.

Table 3-8. Integrated Reporting Category Totals for Freshwater Streams and Shorelines (Assessed by Miles)

	Category						
River Basin	1 (All uses assessed; all uses attained)	2 (Some uses assessed; assessed uses attained)	3 (Insufficient or no data to determine use attainment)	4 (At least one use impaired; no TMDL needed)	5 (At least one use impaired; TMDL needed)	6 (Aquatic Life use impaired; biological integrity)	Totals
Broad	-	491	960	-	2	7	1,460
Cape Fear	-	1,338	4,241	29	493	357	6,457
Catawba	-	561	2,219	35	9	247	3,071
Chowan	-	46	622	-	104	31	803
French Broad	-	733	3,090	-	37	131	3,990
Hiwassee	-	204	768	-	-	-	972
Little Tennessee	-	542	2,045	-	1	9	2,597
Lumber	-	225	1,701	292	-	-	2,218
Neuse	-	688	2,162	77	181	264	3,373
New	-	347	554	-	18	-	918
Pasquotank	-	-	442	-	31	4	477
Roanoke	-	228	1,722	14	228	21	2,213
Savannah	-	43	146	-	-	-	189
Tar-Pamlico	-	684	1,685	-	43	75	2,486
Watauga	-	74	196	-	-	-	270
White Oak	-	21	258	-	37	-	316
Yadkin-Pee Dee	-	1,551	3,714	13	353	266	5,897
Totals	-	7,776	26,524	460	1,536	1,410	37,706
Percentage	0%	21%	70%	1%	4%	4%	100%

Table 3-9. Integrated Reporting Category Totals for Freshwater Lakes, Reservoirs and Impounded Areas (Assessed by Acres)

	Category						
River Basin	1 (All uses assessed; all uses attained)	2 (Some uses assessed; assessed uses attained)	3 (Insufficient or no data to determine use attainment)	4 (At least one use impaired; no TMDL needed)	5 (At least one use impaired; TMDL needed)	6 (Aquatic Life use impaired; biological integrity)	Totals
Broad	-	813	-	-	-	-	813
Cape Fear	-	3,329	15,387	-	12,380	95.2	31,192
Catawba	-	44,533	263	4,020	1,849	-	50,664
Chowan	-	-	-	-	-	-	-
French Broad	-	-	764	773	200	-	1,737
Hiwassee	-	-	-	-	-	-	-
Little Tennessee	-		-	280	-	-	280
Lumber	-	-	30	96	8,840	-	8,966
Neuse	-	14,942	1,381	-	91	-	16,414
New	-	-	-	-	-	-	-
Pasquotank	-	-	4,981	-	15,938	-	20,919
Roanoke	-	9,690	953	-	1476	-	12,119
Savannah	-	-	-	-	-	-	-
Tar-Pamlico	-	817	2,790	370	-	-	3,977
Watauga	-	-	-	-	-	-	-
White Oak	-	-	-	-	-	-	-
Yadkin-Pee Dee	-	6,206	55	-	10,450	-	16,711
Totals	-	80,330	26,605	5,538	51,223	95	163,791
Percentage	0%	49%	16%	3%	31%	1%	100%

Table 3-10. Integrated Reporting Category Totals for Estuarine and Saltwater Streams and Shorelines (Assessed by Miles)

	Categories							
River Basin (a)	1 (All uses assessed; all uses attained)	2 (Some uses assessed; assessed uses attained)	3 (Insufficient or no data to determine use attainment)	4 (At least one use impaired; no TMDL needed)	5 (At least one use impaired; TMDL needed)	6 (Aquatic Life use impaired; biological integrity)	7 (Shellfish use impaired; Unfavorable for a TMDL)	Totals
Broad	-	-	-	-	-	-	-	-
Cape Fear	-	-	-	-	-	-	-	-
Catawba	-	-	-	-	-	-	-	-
Chowan	-	-	-	-	-	-	-	-
French Broad	-	-	-	-	-	-	-	-
Hiwassee	-	-	-	-	-	-	-	-
Little Tennessee	-	-	-	-	-	-	-	-
Lumber	-	10	1		1	-	2	15
Neuse	-	12	101	-	3	8	1	124

Table 3-10. Integrated Reporting Category Totals for Estuarine and Saltwater Streams and Shorelines (Assessed by Miles)

	Categories							
River Basin (a)	1 (All uses assessed; all uses attained)	2 (Some uses assessed; assessed uses attained)	3 (Insufficient or no data to determine use attainment)	4 (At least one use impaired; no TMDL needed)	5 (At least one use impaired; TMDL needed)	6 (Aquatic Life use impaired; biological integrity)	7 (Shellfish use impaired; Unfavorable for a TMDL)	Totals
New	-	-	-	-	-	-	-	-
Pasquotank	-	-	9	-	-	-	-	9
Roanoke	-	-	-	-	-	-	-	-
Savannah	-	-	-	-	-	-	-	-
Tar-Pamlico	-	15	64	-	1	-	-	80
Watauga	-	-	-	-	-	-	-	-
White Oak	-	5	53	-	39	-	-	97
Yadkin-Pee Dee	-	-	-	-	-	-	-	-
Totals	-	42	228	-	43	8	3	324
Percentage	0%	13%	70%	0%	13%	4%	1%	100%

(a) Summaries are provided for river basins that include waters classified as SA, SB or SC.

Table 3-11. Integrated Reporting Totals for Estuarine and Saltwater Bays, Inlets, and Tidal Areas (Assessed by Acres)

	Categories							
River Basin	1 (All uses assessed; all uses attained)	2 (Some uses assessed; assessed uses attained)	3 (Insufficient or no data to determine use attainment)	4 (At least one use impaired; no TMDL needed)	5 (At least one use impaired; TMDL needed)	6 (Aquatic Life use impaired; biological integrity)	7 (Shellfish use impaired; Unfavorable for a TMDL)	Totals
Broad	-	-	-	-	-	-	-	-
Cape Fear	-	18,253	639	-	9,129	-	3,732	31,753
Catawba	-	-	-	-	-	-	-	-
Chowan	-	-	-	-	-	-	-	-
French Broad	-	-	-	-	-	-	-	-
Hiwassee	-	-	-	-	-	-	-	-
Little Tennessee	-	-	-	-	-	-	-	-
Lumber	-	674	27	-	1,488	-	2,118	4,307
Neuse	-	330,473	4,016	31,767	2,074	-	1,637	369,967
New	-	-	-	-	-	-	-	-
Pasquotank	-	689,888	215,219	21	6,807	-	4,525	916,459
Roanoke	-	-	-	-	-	-	-	-
Savannah	-	-	-	-	-	-	-	-
Tar-Pamlico	-	645,071	4,933	3,417	9,955	-	218	663,593
Watauga	-	-	-	-	-	-	-	-

Table 3-11. Integrated Reporting Totals for Estuarine and Saltwater Bays, Inlets, and Tidal Areas (Assessed by Acres)								
	Categories							
River Basin	1 (All uses assessed; all uses attained)	2 (Some uses assessed; assessed uses attained)	3 (Insufficient or no data to determine use attainment)	4 (At least one use impaired; no TMDL needed)	5 (At least one use impaired; TMDL needed)	6 (Aquatic Life use impaired; biological integrity)	7 (Shellfish use impaired; Unfavorable for a TMDL)	Totals
White Oak	-	92,105	906	8,560	24,336	-	3,722	129,629
Yadkin-Pee Dee	-	-	-	-	-	-	-	-
Totals	-	1,776,464	225,739	43,766	53,789	-	15,951	2,115,708
Percentage	0%	84%	11%	2%	3%	0%	1%	100%

(a) Summaries are provided for river basins that include waters classified as SA, SB or SC.

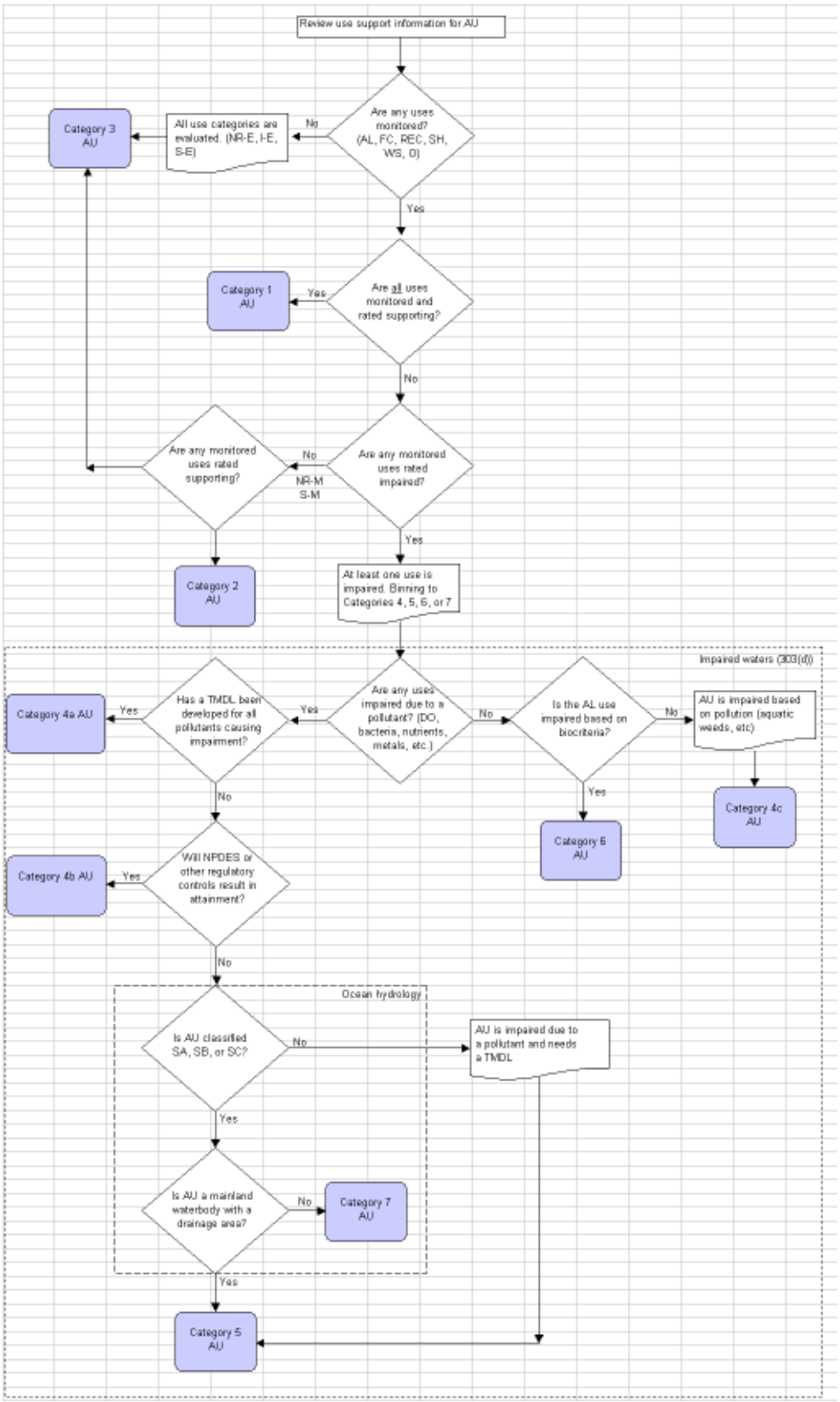


Figure 3-1. AU Category Hierarchy

Table 3-12. Reasons for Impairment of Freshwater Streams and Shorelines (Assessed by miles)										
River Basin	Impaired biological integrity	Fish advisory-Mercury	Low DO	Fecal coliform	Turbidity	Low pH	Historical decision: Nutrients	Fish advisory-Dioxin	Copper	Other (a)
Broad	7	-	-	-	-	-	-	-	-	-
Cape Fear	407	315	25	77	63	92	-	-	-	
Catawba	262	-	-	76	80	-	-	-	-	
Chowan	31	40	44	-	-	42	22	-	-	
French Broad	146	-	-	30	15	-	-	-	-	
Hiwassese	-	-	-	-	-	-	-	-	-	
Little Tennessee	9	-	-	-	-	-	1	-	-	
Lumber	-	21	-	-	-	-	-	-	-	
Neuse	317	69	177	3	5	-	-	-	3	
New	11	-	-	-	-	7	4	-	4	
Pasquotank	4	-	31	-	-	20	-	-	-	
Roanoke	42	208	10	-	14	-	-	32	11	
Savannah	-	-	-	-	-	-	-	-	-	
Tar Pamlico	89	29	14	14	-	-	-	-	-	
Watauga	-	-	-	-	-	-	-	-	-	
White Oak	-	28	8	-	-	-	-	-	-	
Yadkin-Pee Dee	423	16	109	125	68	-	11	-	11	
Totals	1748	1000	418	325	246	161	39	32	29	

(a) The other category includes iron, zinc, aquatic weeds, chlorides, ammonia, toxicity, sediment, chlorophyll a, and unknown reasons for listing.

Table 3-13. Reasons for Impairment of Freshwater Lakes, Reservoirs, and Impounded Areas (Assessed by Acres)

River Basin	Fish advisory-Mercury	Chlorophyll a	Turbidity	High pH	Fish advisory-dioxin	Historical decision: Nutrients	Low pH	Aquatic weeds
Broad	-	-	-	-	-	-	-	
Cape Fear	2846	10,834	-	1446	-	75	-	92
Catawba	-	4020	-	4020	-	-	-	-
Chowan	-	-	-	-	-	-	-	-
French Broad	-	-	-	-	773	-	200	-
Hiwassese	-	-	-	-	-	-	-	-
Little Tennessee	-	-	-	-	-	280	-	-
Lumber	8936	-	-	-	-	-	-	-
Neuse	-	-	-	-	-	-	-	91
New	-	-	-	-	-	-	-	-
Pasquotank	15,938	-	-	-	-	-	-	-
Roanoke	1803(?)	-	-	-	1476	-	-	-
Savannah	-	-	-	-	-	-	-	-
Tar Pamlico	-	370	-	370	-	-	-	-
Watauga	-	-	-	-	-	-	-	-
White Oak	-	-	-	-	-	-	-	-
Yadkin-Pee Dee	-	5569	10,450	5569	-	-	-	-
Totals	29,522	20,792	10,450	20,792	2249	355	200	183

Table 3-14. Reasons for Impairment of Estuarine and Saltwater Bays, Inlets, and Tidal Areas (Assessed by Acres)						
River Basin	Shellfish closure: Fecal coliform	Chlorophyll a	Low DO	Low pH	Recreational posting: Enterococcus	Fecal coliform
Broad	-	-	-	-	-	-
Cape Fear	6501	-	6,527	6360	97	-
Catawba	-	-	-	-	-	-
Chowan	-	-	-	-	-	-
French Broad	-	-	-	-	-	-
Hiwassee	-	-	-	-	-	-
Little Tennessee	-	-	-	-	-	-
Lumber	3606	-	-	-	-	-
Neuse	3711	31,767	-	-	-	-
New	-	-	-	-	-	-
Pasquotank	5089	-	6264	-	21	-
Roanoke	-	-	-	-	-	-
Savannah	-	-	-	-	-	-
Tar-Pamlico	7516	6071	-	-	-	3
Watauga	-	-	-	-	-	-
White Oak	28,058	8560	-	-	-	-
Yadkin-Pee Dee	-	-	-	-	-	-
Totals	54,480	46,398	12,791	6360	118	3

Table 3-15. Primary Sources of Impairment of Freshwater Streams and Shorelines (Assessed by Miles)

River Basin	Source Unknown	Runoff from urban & built-up areas (a)	Agriculture/ Row crop production	Wastewater, permitted	Atmosopheric deposition	Animal management/ Pasture (b)	Land application, permitted/ Non-discharge (c)	Construction/ Land disturbance (d)	Mining
Broad	-	5	2	7	-	-	-	-	-
Cape Fear	740	71	93	358	-	36	2	68	-
Catawba	14	328	27	107	-	-	-	-	3
Chowan	-	-	44	66	38	-	2	-	-
French Broad	-	10	49	-	-	2	-	-	-
Hiwassee	-	-	-	-	-	-	-	-	-
Little Tennessee	-	1	-	1	-	-	-	2	-
Lumber	-	-	-	-	-	-	-	-	-
Neuse	34	139	294	39	-	90	112	18	-
New	67	33	17	19	-	70	-	9	19
Pasquotank	-	11	48	20	-	35	15	-	-
Roanoke	-	18	18	49	207	-	-	-	14
Savannah	-	-	-	-	-	-	-	-	-
Tar-Pamlico	85	77	148	78	-	-	18	-	-
Watauga	-	-	-	-	-	-	-	-	-
White Oak	-	8	-	-	-	-	-	-	-
Yadkin-Pee Dee	146	230	185	110	-	5	-	25	-
Totals	1,086	931	925	853	245	238	150	123	36

(a) Runoff from urban & built up areas includes permitted stormwater from MS4s and industrial facilities, land develoment, urban development, and urban development/storm sewers.
(b) Animal management/pasture includes livestock access and off-farm animal holding/management.
(c) Land application, permitted/ Non-discharge systems includes concentrated animal feeding operations, intensive animal feeding operations and on-site wastewater.
(d) Construction/Land disturbance includes land clearing and road construction.

Table 3-16. Primary Sources of Impairment of Freshwater Lakes, Reservoirs and Impounded Areas (Assessed by Acres)							
River Basin	Source Unknown	Runoff from urban & built-up areas	Wastewater, permitted	Agriculture/ Row crop production	Atmospheric deposition	Aquaculture	Animal management/ Pasture
Broad	-	-	-	-	-	-	-
Cape Fear	4,375	12,431	12,033	3,327	-	-	263
Catawba	6,243	-	-	-	-	-	-
Chowan	-	-	-	-	-	-	-
French Broad	-	-	-	-	-	-	-
Hiwassee	-	-	-	-	-	-	-
Little Tennessee	-	-	-	-	-	280	-
Lumber	-	-	-	-	-	-	-
Neuse	-	-	-	-	-	-	-
New	-	-	-	-	-	-	-
Pasquotank	-	-	-	-	-	-	-
Roanoke	-	-	-	-	1,476	-	-
Savannah	-	-	-	-	-	-	-
Tar-Pamlico	1,186	-	-	-	-	-	-
Watauga	-	-	-	-	-	-	-
White Oak	-	-	-	-	-	-	-
Yadkin-Pee Dee	10,450	-	-	-	-	-	-
Totals	22,254	12,431	12,033	3,327	1,476	280	263

3.3.2 Identification of Interstate Impairments

With the exception of the Tar, Neuse, White Oak and Cape Fear River Basins, all river basins either deliver or receive water from a neighboring state. North Carolina shares borders and waterbodies with Virginia, Tennessee, Georgia, and South Carolina. Due to different monitoring strategies, water quality standards and use support methodologies, a waterbody may be impaired in a neighboring state while supporting uses in North Carolina. The reverse can also occur, with a waterbody impaired in North Carolina and supporting uses in a neighboring state. If upstream surface waters contribute to an impairment in a downstream state, permit holders may be subject to a TMDL and standards from a downstream state. These types of TMDLs are currently under development in the Catawba, Roanoke and Lumber River Basins.

3.3.3 Delisting Waters

In general, waters will move from the 303(d) list categories (i.e., Categories 5, 6 or 7) when data show that a water is supporting its uses. In some cases, mistakes have been discovered in the original listing decision and the mistakes are being corrected. Waters appearing on the impaired waters categories will be moved to Categories 1, 2, 3 or 4 under the following circumstances:

- An updated 305(b) use support rating of supporting, as described in the basinwide management plans.
- Applicable water quality standards are being met (i.e., no longer impaired for a given pollutant) as described in either basinwide management plans or in technical memoranda.
- The basis for putting the water on the list is determined to be invalid (i.e., was mistakenly identified as impaired in accordance with 40 CFR 130.7(b)(6)(iv) and/or National Clarifying Guidance for State and Territory 1998 Section 303(d) Listing Decisions. Robert Wayland, III, Director. Office of Wetlands, Oceans, and Watersheds. Aug 27, 1997.)
- A water quality variance has been issued for a specific standard (e.g., chloride).
- Removal of fish consumption advisories or modification of fish eating advice.
- Typographic listing mistakes identifying the wrong water body.
- A TMDL has been approved by USEPA Region IV.

Delisted waters are shown in Table 3-16. Waters were not delisted in the following river basins: Broad, Chowan, Hiwassee, Little Tennessee, Lumber, Neuse, Pasquotank, Roanoke, Savannah, Yadkin-Pee Dee, Watauga, White Oak.

Table 3-17. Waters Delisted from Categories 5, 6 and 7 (or the 303(d) list)

River basin	Name	Reason for Listing	Assessment Unit(s)	Description
Cape Fear	Haw River	Impaired biological integrity	16-(1)b	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	Brush Creek	Impaired biological integrity	16-11-4-(1)a2	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	Marys Creek	Impaired biological integrity	16-26	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	Robeson Creek	Impaired biological integrity	16-38-(3)d	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	New Hope Creek	Impaired biological integrity	16-41-1-(0.5)b	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	Bolin Creek	Impaired biological integrity	16-41-1-12-(2)	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	Troublesome Creek	Impaired biological integrity	16-6-(0.3)	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	Rocky River	Impaired biological integrity	17-43-(1)a	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	Kenneth Creek	Impaired biological integrity	18-16-1-(1)	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
	Rock Fish Creek	Impaired biological integrity	18-74-29c	Cape Fear River Basinwide Water Quality Plan (DWQ 2005d)
Catawba	Henry Fork	Turbidity	11-129-1-(12.5)c	Total Maximum Daily Loads (TMDLs) for Turbidity in Long Creek, McAlpine Creek, Sugar Creek, Little Sugar Creek, Irwin Creek, Henry Fork, and Mud Creek in North Carolina (DWQ 2005a)
French Broad	Pigeon River	Impaired biological integrity	50(7)a	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	Hyatt Creek	Impaired biological integrity	5-16-6b	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	Richland Creek	Impaired biological integrity	5-16-(16)b	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	Mills River	Impaired biological integrity	6-54-(1)b 6-54-(4.5) 6-54-(5) 6-54-(6.5)	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	Mud Creek	Turbidity; Impaired biological	6-55a	Total Maximum Daily Loads (TMDLs) for Turbidity in Long Creek,

Table 3-17. Waters Delisted from Categories 5, 6 and 7 (or the 303(d) list)

River basin	Name	Reason for Listing	Assessment Unit(s)	Description
		integrity		McAlpine Creek, Sugar Creek, Little Sugar Creek, Irwin Creek, Henry Fork, and Mud Creek in North Carolina (DWQ 2005a) and French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	Clear Creek	Impaired biological integrity	6-55-11-(1)b	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	Hominy Creek	Impaired biological integrity	6-76b 6-76c	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	South Hominy Creek	Impaired biological integrity	6-76-5	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	Little Ivy Creek (River)	Impaired biological integrity	6-96-10b	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
	Right Fork Cane Creek	Impaired biological integrity	7-2-59-1	French Broad River Basinwide Water Quality Plan. (DWQ 2005b)
New	Naked Creek	Impaired biological integrity	10-1-32b	New River Basinwide Water Quality Plan (DWQ 2005c)
Tar-Pamlico	Fishing Creek	Impaired biological integrity	28-11e	Tar-Pamlico River Basinwide Water Quality Plan (DWQ 2004)
	Stony Creek (Boddies Millpond)	Impaired biological integrity	28-68a	Tar-Pamlico River Basinwide Water Quality Plan (DWQ 2004)
	Conetoe Creek	Impaired biological integrity	28-87-(0.5)c	Tar-Pamlico River Basinwide Water Quality Plan (DWQ 2004)

3.3.4 TMDL Development Schedule

Category 5 waters, those for which a TMDL is needed, are at many different stages on the path to an approved TMDL. Some require additional data collection to adequately define the problem in TMDL terms. Some require more outreach to increase stakeholder involvement. Others need to have a technical strategy budgeted, funded, and scheduled. Some are ready for EPA submittal. North Carolina has listed waters targeted for TMDL development within the next two years. Targeted waters are listed in Table 3-17.

Table 3-18. Waters Scheduled for TMDL Development (a)

(North Carolina expects to submit TMDLs for the following water/pollutant combinations by the beginning of calendar year 2008)

River basin	Name	Reason for Listing	Assessment Unit(s)	Description
Broad	Catheys Creek	Impaired biological integrity	9-41-13-(6)a 9-41-13-(6)b	From 0.4 miles downstream of Rutherford County SR 1538 to S Broad Rd.
	Hollands Creek	Impaired biological integrity	9-41-13-7-(3)	From Duke Power Co. old auxiliary raw water supply intake to Catheys Creek
Cape Fear	Haw River B. Everett Jordan Reservoir New Hope Creek Morgan Creek	Chlorophyll a pH	16-(37.3) 16-(37.5) 16-41-1-(14) 16-41-(0.5) 16-41-(3.5)a 16-41-2-(9.5)	All ponded areas at normal pool
	Cape Fear Estuary	Dissolved oxygen	18-(71)a	From upstream mouth of Toomers Cr to a line across the river between Lilliput Creek and Snows Cut
	Greenfield Lake(a)	Nutrients	18-76-1	Entire lake
	Little Troublesome Creek	Impaired biological integrity	16-7a	From source to Reidsville WWTP
Catawba	Lower Creek	Impaired biological integrity	11-39-(0.5)a 11-39-(0.5)b 11-39-(6.5) 11-39-(9)	From source to Rhodhiss Lake
	Clark Creek	Impaired biological integrity	11-129-5-(9.5) 11-129-5-(0.3)b	From Miller Branch to South Fork Catawba River
	Indian Creek	Impaired biological integrity	11-129-8-(6.5)	From a point 0.3 miles upstream of Lincoln County SR 2269 to South Fork Catawba River
	Mauney Creek	Impaired biological integrity	11-129-15-5	From source to Hoyle Creek
	Catawba Creek	Impaired biological integrity	11-130a 11-130b 11-130c	From source to Lake Wylie
	Crowders Creek	Impaired biological integrity	11-135a 11-135c 11-135d 11-135e 11-135f 11-135g	From source to NC-SC State line
	McGill Creek	Impaired biological integrity	11-135-2	From source to Crowders Creek
Lumber	Waccamaw River (a) (b)	Mercury – Fish Consumption	15-(1)a 15-(1)b 15-(1)c 15-(1)d 15-(1)e	From source to NC/SC state line
Neuse	Middle Creek	Low dissolved oxygen	27-57-(20.2)a 27-57-(8.5)b	From Little Buffalo Creek to 4.2 miles upstream of NC581

Table 3-18. Waters Scheduled for TMDL Development (a)
(North Carolina expects to submit TMDLs for the following water/pollutant combinations by the beginning of calendar year 2008)

River basin	Name	Reason for Listing	Assessment Unit(s)	Description
	Knap of Reeds Creek	Impaired biological integrity	27-4-(6) 27-4-(8)	From Dam at Butner Lake to Falls Lake, Neuse River
	Flat River	Impaired biological integrity	27-3-(8)	From dam at Lake Michie to 0.2 miles upstream of Durham County SR 1004
	Ellerbe Creek	Impaired biological integrity	27-5-(0.3) 27-5-(0.7) 27-5-(2)	From source to Falls Lake, Neuse River
	Lick Creek	Impaired biological integrity	27-11-(0.5) 27-11-(1.5)	From source to Falls Lake, Neuse River
	Little Lick Creek	Impaired biological integrity; Low dissolved oxygen	27-9-(0.5)	From source to a point 0.4 miles upstream of Durham County SR 1811
		Impaired biological integrity	27-9-(2)	From a point 0.4 miles upstream of Durham County SR 1811 to Falls Lake, Neuse River
New	Little Peak Creek (a)	Standard Violation: pH; Action level violation: Copper; Impaired biological integrity	10-1-35-4	From source to Peak Creek
	Ore Knob Branch (a)	Standard Violation: pH; Action level violation: Copper; Action level violation: Iron; Action level violation: Zinc; Impaired biological integrity	10-1-35-3	From source to Peak Creek
	Peak Creek (a)	Standard violation: pH; Impaired biological integrity	10-1-35-(2)b	From Ore Knob Branch to South Fork New River
Roanoke	Cashie River	Mercury-Fish consumption	24-2-(11) 24-2-(15)	From the Thoroughfare (The Gut between Cashie and Roanoke Rivers) to Albemarle Sound (Batchelor Bay)
White Oak	Jarrett Bay (Area E8)	Fecal coliform	21-35-7-22a 21-35-7-22b 21-35-7-22c	From head of bay to Core Sound
Yadkin Pee-Dee	Elk Creek	Fecal coliform	12-24-(10)	From Dugger Creek to Yadkin River
	Faulkner Creek (a)	Impaired biological integrity	12-72-6	From source to Ararat River
	Salem Creek	Fecal coliform; Turbidity	12-94-12-(4)	From Winston-Salem Water Supply Dam to Muddy Creek
	South Yadkin River	Impaired biological integrity	12-108-(19.5)b	From mouth of Fourth Creek to Yadkin River

Table 3-18. Waters Scheduled for TMDL Development (a)
(North Carolina expects to submit TMDLs for the following water/pollutant combinations by the beginning of calendar year 2008)

River basin	Name	Reason for Listing	Assessment Unit(s)	Description
	Third Creek	Impaired biological integrity	12-108-20-4b	From SR2359 to SR1970
	Fourth Creek	Impaired biological integrity	12-108-20a 12-108-20c	From source to SR1972 and from SR1985 to South Yadkin River
	Second Creek	Impaired biological integrity	12-108-21	From source to South Yadkin River
	Grants Creek	Turbidity	12-110b	From SR1910 to Yadkin River
	Abbotts Creek	Impaired biological integrity	12-119-(6)	From upstream side of culvert at US Hwys 29 & 70 to Abbotts Creek Arm of High Rock Lake
	Rich Fork	Impaired biological integrity	12-119-7	From source to Abbotts Creek
	Hunts Fork	Impaired biological integrity	12-119-7-3	From source to Rich Fork
	Hamby Creek	Impaired biological integrity	12-119-7-4	From source to Rich Fork
	North Hamby Creek	Impaired biological integrity	12-119-7-4-1	From source to Hamby Creek
	Dye Creek	Impaired biological integrity	13-17-2	From source to Rocky River
	Clarke Creek	Impaired biological integrity	13-17-4	From source to Rocky River
	McKee Creek	Impaired biological integrity	13-17-8-4	From source to Reedy Creek
	Clear Creek	Impaired biological integrity	13-17-8-4-1	From source to McKee Creek
	Rocky River	Turbidity; Impaired biological integrity	13-17a	From source to mouth of Reedy Creek

(a) USEPA Region IV is developing this TMDL
(b) The Waccamaw River Mercury TMDL is a Phase II TMDL as agreed to in the TMDL Study Phase I: Mercury Loads to Impaired Waters in the Lumber River Basin, North Carolina (DWQ 2000)

Many of these waters have not been evaluated to determine if adequate data is available for TMDL development. When adequate data is not available, another waterbody may be substituted in the schedule. Compliance with this schedule depends upon DWQ and EPA resources during the next two years. TMDLs for waters not listed above may also be developed within this time.

Several large reservoirs, including B. Everett Jordan Lake, High Rock Lake and Lake Rhodhiss, have been rated impaired for eutrophication –related parameters, including chlorophyll a and pH. TMDL development for these reservoirs is technically challenging and will require significant resources, over a period of years, in order to be completed. The

impact of these large, multi-year, complex TMDLs includes an overall reduction in the total number of TMDLs that will be developed on an average annual basis.

Waters prioritized for TMDL development in the 2004 Integrated Report are shown in Table 3-18. Monitoring, delisting, or TMDL development actions have taken place in many of these watersheds. Those waterbodies that do not have an approved TMDL or where field study is ongoing will be targeted for TMDL development during the next two years.

Table 3-19. Status of Waters Targeted for TMDL Development in the 2004 Integrated Report as of January 2, 2006

River basin	Name	Cause of Impairment	Assessment Unit	Status
Cape Fear	North Buffalo Creek	Fecal coliform	16-11-14-1a	TMDL approved
	East Fork Deep River	Fecal coliform	17-2-(0.3)	TMDL approved
	Richland Creek	Fecal coliform	17-7-(0.5) 17-7-(4)	TMDL approved
	Muddy Creek	Fecal coliform	17-9-(1) 17-9-(2)	TMDL approved
	Deep River	Fecal coliform	17-(4)b	TMDL approved
	Greenfield Lake	Nutrients	18-76-1	(a)
Catawba	Lower Creek	Turbidity	11-39-(0.5)b 11-39-(6.5) 11-39-(9)	TMDL approved
	Long Creek	Turbidity	11-120-(0.5) 11-120-(2.5) 11-120-(7)	TMDL approved
	Crowders Creek	Fecal coliform	11-135e 11-135f 11-135g	TMDL approved
French Broad	Newfound Creek	Fecal coliform	6-84b 6-84c 6-84d	TMDL approved
Pasquotank	Phelps Lake	Mercury – Fish consumption	30-14-4-6-1	Field study completed
Roanoke	Marlowe Creek	Copper	22-58-12-6	TMDL delayed
	Cashie River	Mercury – Fish consumption	24-2-(1)b 24-2-(1)a 24-2-(9) 24-2-(11) 24-2-(15)	Public notice of draft TMDL completed
White Oak	Jarrett Bay (E8)	Fecal coliform	21-35-7-22a 21-35-7-22b 21-35-7-22c	Draft TMDL completed; awaiting public notice
Yadkin-Pee Dee	Grants Creek	Turbidity	12-110b	At internal review
	Rich Fork	Fecal coliform	12-119-7	TMDL approved
	Hamby Creek	Fecal coliform	12-119-7-4	TMDL approved
	Fourth Creek	Turbidity	12-108-20-(1)b	At internal review
	Faulkner Creek	Sediment	12-72-6	(a)
	Goose Creek	Fecal coliform	13-17-18	TMDL approved
	Salem Creek	Fecal coliform	12-94-12-(4)	At internal review

Table 3-19. Status of Waters Targeted for TMDL Development in the 2004 Integrated Report as of January 2, 2006

River basin	Name	Cause of Impairment	Assessment Unit	Status
	Ledbetter Lake	Mercury-Fish consumption	13-39-(1)	TMDL delayed
	Hitchcock Creek	Fecal coliform	13-39-(10)b	Delisted

(a) USEPA Region IV is developing this TMDL.

3.3.5 Prioritization of Impaired Waters

According to EPA guidance (EPA 2004), prioritization of water for TMDL development need not be reflected in a "high, medium or low" manner. Instead, prioritization can be reflected in the TMDL development schedule. Thus, the "high, medium, and low" priority previously provided in the 303(d) list (Categories 5 through 7) is no longer provided. North Carolina now prioritizes impaired waters using the TMDL development schedule.

Generally, North Carolina attempts to develop TMDLs within 10 years of the original pollutant listing. Other information for each assessment unit is also utilized to determine the priority in the TMDL development schedule. This information includes the following:

- Year listed. Assessment units that have been on the 303(d) list for the longest period of time will receive priority for TMDL development and/or stressor studies. Generally, North Carolina attempts to develop TMDLs within 10 years of the original listing. Stressor studies will be completed within two basinwide planning cycles.
- Reason for listing. (Applicable to Category 5 AUs only) AUs with an impairment due to a standard violation will be prioritized based on which standard was violated. Freshwater standard violations due to fecal coliform currently receive priority for TMDL development. Since many AUs have violations for both fecal coliform and turbidity, turbidity TMDLs receive priority. Beginning calendar year 2006, AUs impaired due to biological integrity will become a priority and TMDL development on these AUs will begin in earnest.
- Classification. Following assessment of year listed and reason for listing, AUs classified for primary recreation (Class B), water supply (Class WS-I through WS-V), trout(Tr), high quality waters (HQW), and outstanding resource waters (ORW) will continue to receive priority for TMDL development and/or stressor studies.
- Basinwide Monitoring Schedule. (Applicable to Category 6 AUs only). Following assessment of year listed and reason for listing, the basinwide schedule provided in Table 2-1 is utilized to prioritize stressor studies. Thus, waters needing stressor studies in the Lumber and Yadkin river basins will receive a higher scheduling priority than waters in other basins during the summer of 2006. Scheduling priority will be given to waters needing stressor studies in the Catawba, French Broad and Tar-Pamlico river basins for the summer of 2007.

3.3.6 Impaired Waters Restoration Projects

This section of the integrated report highlights watersheds (or portions of watersheds) where the improvement in these watersheds can be attributed to more than a revision to monitoring protocol, sample analysis or some other procedural item. Specific efforts in these watersheds that contributed to water quality improvement are summarized in this section. As can be seen by reading the following descriptions, the most effective watershed efforts most often involve several stakeholders working together to restore the watershed.

French Broad River Basin – Mills River
Several segments of the Mills River were included in the 2000 EPA 303d (impaired waters) list. The river was also on the 2002 and 2004 impaired waters lists. The river had impaired biological integrity and specialty crop production was listed as a potential source of impairment.

As stated in the French Broad River Water Quality Plan, the latest sampling of the Mills River (2002) indicates that the entire river is supporting its uses due to Good and Good-Fair bioclassification ratings at monitoring sites.

Water quality improvement can be attributed to initiatives in the watershed. The Mills River Partnership is a non-regulatory organization dedicated to implementing the Mills River Watershed Protection Project whose main goal is to improve water quality in the Mills River in a way that also benefits landowners. The Mills River Watershed Protection Project Coordinator has managed or assisted in the management of several projects that have contributed to Mills River water quality improvement. The Clean Water Management Trust Fund approved two grants in 1999 that covered the acquisition of conservation easements, buffer plantings, streambank and logging road stabilization, feed-waste barn construction, watering tank installation, stock trail development, cattle fencing, and agrichemical handling facility construction. Agrichemical handling facilities move agrichemical mixing away from streams and thus greatly minimize or eliminate the potential for these chemicals entering the water. The USDA NRCS and Henderson County Soil and Water Conservation District (SWCD) also provide additional agricultural cost share assistance to landowners in the Mills River Watershed.

EPA funds have also contributed to Mills River Watershed improvement. During the end of 2002, an EPA Source Water Protection grant was acquired by the Land-of-Sky Regional Council of Governments to implement workshops, meetings, and inventories related to land conversion, hazardous spills, erosion, stormwater, and general watershed education in the Mills River area. In 2003, a Section 319 grant was approved that funded a stormwater monitoring program and the development of best management practices such as stormwater wetlands' construction, riparian buffer planting, and streambank stabilization.

It should be noted that although the Mills River has improved, it is not the time to discontinue efforts in this watershed. This area is under intense development pressure and is one of the fast growing areas in western North Carolina. Continual work must be done in this area to protect this valuable resource.

New River Basin – Naked Creek

A section of Naked Creek from Jefferson WWTP to South Fork New River was included on the 2000 EPA 303d (impaired waters) list. The creek was also on the 2002 and 2004 303d lists. The creek was listed for impaired biological integrity and the WWTP and land development were listed as potential sources of impairment.

As stated in the New River Water Quality Plan, the latest sampling of Naked Creek (2003) indicates that the creek is supporting its uses due to a Good-Fair bioclassification rating at the creek monitoring site.

Water quality improvement can be attributed to different efforts in the watershed. The Town of Jefferson has made $1.9 Million worth of upgrades at their WWTP. Funding was provided by the NCDENR – Construction Grants and Loans Section, NC Rural Economic Development Center (Clean Water Bonds), and the NC Dept of Commerce – Economic Development Administration.

In addition, several agricultural BMPs were installed in the watershed including water tanks, stream crossings, spring and well development and cattle fencing. BMPs at a total cost of $53,224, were funded by the NC Agriculture Cost Share Program (NCACSP) and were administered by the New River Soil and Water Conservation District (SWCD).

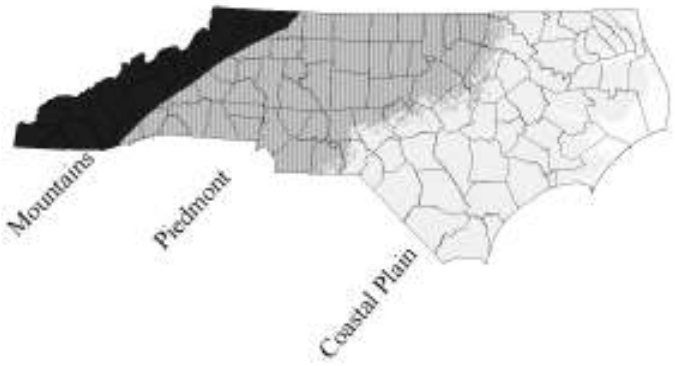
4 Groundwater Protection Program

Groundwater is a critically important resource for the State of North Carolina because more than one-half of the citizens rely on it as a source of drinking water. Virtually all private residential drinking water supplies depend upon groundwater as do over one million of the State's citizens that use community water systems. In many rural counties, more than 90 percent of the citizens rely on groundwater as their sole source of drinking water.

North Carolina's groundwater, although generally abundant, is not inexhaustible and is not evenly distributed or of uniform quality. The groundwater resource, regardless of depth, is vulnerable to contamination introduced at the land surface. Shallow groundwater is the most vulnerable to contamination. Once contaminated, groundwater quality is extremely difficult to restore and the cleanup process is usually expensive and slow.

The natural quality of groundwater in North Carolina is generally very good. With the exception of a few coastal areas, potable groundwater occurs throughout the state. The natural mineral content of the water in the Mountain region and much of the Piedmont is very low, having generally less than 100 mg/l (milligrams per liter) total dissolved solids. In the eastern Piedmont and western part of the Coastal Plain region, the total dissolved solids content ranges from about 100 to 300 mg/l. In the eastern-most part of the Coastal Plain, the mineral content of the water increases with depth toward the coast because of its brackish content.

Groundwater protection standards have been established by North Carolina at a level adequate to allow its use for drinking water without the necessity for treatment. Most residences not connected to public water supplies rely on untreated groundwater for their drinking water source. In addition, most public water supplies in North Carolina that use groundwater do not treat the water, except for disinfection prior to use. State standards for groundwater quality protection must be used by every agency in North Carolina that has responsibilities for managing facilities and substances that can impair groundwater quality.



This report is a multi-program effort between the agencies in North Carolina that have groundwater protection roles. The following agencies in the Department of Environment and Natural Resources contributed the information that is shown in tables 5-1 through 5-4:

- The Aquifer Protection Section and the Planning Section; Division of Water Quality
- The Underground Storage Tank Section; Division of Waste Management
- The Hazardous Waste Section; Division of Waste Management
- The Superfund Section; Division of Waste Management

4.1 North Carolina Groundwater Protection Program

The Division of Water Quality (DWQ) is the primary agency for groundwater quality protection in North Carolina and its mission is to promote stewardship of North Carolina's groundwater resources for the protection of human health and the environment by preventing pollution, managing and restoring degraded groundwater, and protecting the resource.

The Program's major program objectives are:
1. Develop and implement programs to prevent groundwater pollution from occurring;
2. Identify, assess, and manage polluted groundwaters for the protection of public health and the environment;
3. Determine the conditions under which groundwater resources occur, assess the quality and potential for use of those resources, and make that information available to groundwater users; and
4. Maintain a comprehensive database for the assessment and management of groundwater contamination sites.

Within this broad operational framework, the Division has set a goal to maintain and enhance groundwater quality for beneficial use by the citizens of North Carolina. Where groundwater is degraded, the state strategy is to manage, and where possible, restore the quality of degraded groundwaters to the highest practical level commensurate with the need to protect human health and the environment.

Natural groundwater in North Carolina is generally of good quality but is subject to contamination from man's activities. As the population has continued to grow, it has become necessary to establish rules to protect the groundwater resource and its use. The primary purpose of the North Carolina Groundwater Protection Program is to develop and implement rules and programs that will protect the groundwater resources for use by present and future citizens.

4.2 Groundwater Program Priority Program Tasks

The Division of Water Quality has identified four program areas as primary issues of concern for protecting groundwater quality:

1. Waste disposal. Issue permits for the protection of groundwater quality from municipal, industrial, commercial, and animal waste storage and disposal and assure maintenance of groundwater quality standards.
2. Pollution management. Determine accurate locations of groundwater contamination sources and areas where groundwater is or may be used as a water supply, and make data easily available for public review and program use in protecting groundwater quality.
3. Well program. Implement contractor certification rules; assure proper well construction; add consumer protection to the resource emphasis; and provide education and outreach to assist local health departments in protecting private drinking water wells.
4. Resource evaluation. Protect vulnerable groundwater through characterizing discharge and recharge areas, quantifying impacts on streams and deeper aquifers and determining areas that are highly vulnerable to contamination

4.3 Major Groundwater Program Initiatives for 2004

The Groundwater Section established program initiatives for the current year to make progress toward the mission of protecting human health and the environment.

4.3.1 Waste Disposal

The nondischarge permit program regulates waste disposal activities not discharging to surface waters and is administered by the Division of Water Quality under the authority of NCGS 143-215.1. This is in essence a groundwater protection permit, regulating activities such as the land application of sludge, wastewater lagoons, spray irrigation of wastewater, and other systems that potentially impact groundwater.

Experience clearly demonstrates that waste disposal facilities can develop non-compliant conditions resulting from over application of wastes to the surface, transfer equipment failure, or storage lagoon leakage. Many operations with individual permits have established review/regulatory boundaries and are required to monitor groundwater quality to assure protection of standards. Protocols have been developed for the review of facilities with general permits and performing reviews to determine the need for additional monitoring at waste management facilities where permit violations have occurred.

4.3.2 Pollution Management

North Carolina has more than 14,000 documented soil and groundwater pollution sites. Approximately 70 percent of these groundwater contamination incidents result from petroleum underground storage tank leaks. However, the vast majority of the known contaminated water supply wells have been contaminated by sources other than from

underground storage tanks.

A Division of Water Quality study completed in 1998 shows that when water supply wells become contaminated, about half of the well owners have no alternate source for a safe drinking water supply. These well owners are forced to use bottled water, have costly filter systems installed, or go to a neighbor or relative's house for baths and showers.

Many contaminated sites include non-petroleum contaminant plumes that are larger and sink deep into the subsurface, thus requiring intensive drilling and sampling programs for assessment. These are the most perplexing and challenging sites to assess and clean up. As a result, the level of expertise and the overall costs for the assessment and cleanup of these types of sites far exceeds what is typical for an average petroleum underground storage tank release. The Division of Water Quality is focusing increased attention toward identifying parties responsible for groundwater contamination and on the review and approval of corrective action plans. An incident management database is maintained that contains information on all groundwater contamination incidents reported to the Division.

4.3.3 Well Program

The ultimate goal of the State Well Program is to protect the citizens who use groundwater as a drinking water supply and to eliminate channels for pollution into the subsurface.

The Division of Water Quality administers rules that specify standards by which water supply wells and monitoring wells are constructed, maintained and abandoned. Every well drilling contractor is required to submit a well construction record to the Division for every well that is drilled. The Division is currently receiving approximately 30,000 well construction records per year and that number is expected to continue to increase in the future. Management of these paper records has become very difficult.

Technology has progressed to the point that the Division can now do a better job of storing and retrieving the information that is submitted on the well construction records. For the past two years, a team of Division staff along with Departmental programmers has been developing a new well construction records database. The new computer database is capable of storing all of the information that is contained on the Well Construction Record. This database has been through initial conceptualization and programming and is now in the final stages of development.

The new database can be used for locating the information contained on the well construction record. It will have the ability to be searched and cross referenced to determine things such as the number and locations of wells drilled by a well contractor and estimating the depth to bedrock, yield, and depths of water bearing zones in a given area of the state. This database will have the ability to interact with other State databases. Information such as the location of nearby wells and potential pollution sources can be identified. In the near future this database will be available to EPA and the general public through the internet.

4.3.4 Resource Evaluation

Currently 2 to 20 percent of groundwater used for drinking water from private wells throughout the State can contain pesticides or nitrates at levels that may threaten human health. In Wake County alone, there are more than 370 groundwater contamination incidents and 60 wells impacted. In order to reduce these threats to the groundwater resources, it is necessary to not only control the contaminant sources but to also be able to understand how the contaminants move through the subsurface and into streams and the drinking water aquifers. With this understanding will come the knowledge to locate and construct drinking water wells to minimize the possibility of pollution and to reduce the possibility that citizens will be exposed to contaminated groundwater. Improved knowledge of groundwater vulnerability will also enable the Division to appropriately site waste management facilities to prevent the movement of contamination into drinking water wells and streams.

Because of program priorities, state agencies have only previously developed limited data about the groundwater system in the shallow aquifers in either the Coastal Plain, Piedmont or Mountains of the state. The Division of Water Quality believes that there is a clear need to characterize the shallow groundwater system throughout the state where it is most vulnerable to contamination, before this critical part of the resource becomes irrevocably contaminated.

A comprehensive groundwater quality monitoring network is being developed in an effort to better characterize and protect the groundwater resource. The groundwater quality network is comprised of a number of groundwater research stations. The Piedmont and Mountains area hydrogeology is being characterized in cooperation with the US Geological Survey. This characterization will allow the State to provide appropriate protection for groundwater through detailed knowledge of the aquifers, their characteristics, and the quality and availability of groundwater in the aquifers.

A study of shallow groundwater quality in the Coastal Plain of North Carolina is also being conducted. At present, some of the deeper aquifer systems in this region of the state are being overdrawn and impacted from saltwater intrusion. The result of this is the potential for an increase in shallow groundwater being used to supply drinking water. Even in pristine conditions, shallow groundwater is of lesser quality than the groundwater found deeper in confined aquifers. The shallow aquifers in the coastal plain have not been adequately assessed in regard to quantity, quality, or hydrogeological characteristics. It is also necessary to understand the relationship between shallow groundwater and recharge to the drinking water aquifers and discharge to the State's streams. The Division of Water Quality provides periodic reports on this ongoing study.

Table 4-1. Major Sources of Groundwater Contamination			
Contaminant Source	Ten Highest-Priority Sources (T) [1]	Factors Considered in Selecting a Contaminant Source [2]	Contaminants [3]
Agricultural Activities			
Agricultural chemical facilities			
Animal feedlots			
Drainage wells			
Fertilizer applications			
Irrigation practices			
Pesticide applications			
On farm agricultural mixing and loading procedures			
land application of manure (unregulated)			
Storage and Treatment Activities			
Land application(regulated or permitted)	T	A,D,F	C,E,H,J,L
Material stockpiles			
Storage tanks (above ground)			
Storage tanks (underground)	T	A, B, C, D, F	C, D
Surface impoundments	T	A, D, E, F	A, B, C, D, E, H, J
Waste piles	T	A, D	C, D, H
Waste tailings			
Disposal Activities			
Deep injection wells			
Landfills	T	A, D	B, C, D, H
Septic systems	T	A, B, C, D, E, F	C, D, E, H, J, K, L
Shallow injection wells			
Other			
Hazardous waste generators			
Hazardous waste sites	T	A, D	A, B, C, D, H
Industrial facilities	T	A, D	A, B, C, D, H
Material transfer operations			
Mining and mine drainage			
Pipelines and sewer lines			
Salt storage and road salting			
Salt water intrusion			
Spills	T	A, B, C, D, E, F	A, B, C, D, E, H, J
Transportation of materials			
Urban runoff			
Small-scale manufacturing and repair shops			
Other sources (please specify) Land application of animal wastes (regulated)	T	A, B, C, D, E, F,H	E, H, J, K, L

(1) The ten contaminant sources identified as highest priority in the State. These sources are not ranked.
(2) Key to Factors Considered in Selecting a Contaminant Source:
   A. Human health and/or environmental risk (toxicity)
   B. Size of the population risk
   C. Location of the sources relative to drinking water sources
   D. Number and/or size of contaminant sources
   E. Hydrogeologic sensitivity
   F. State findings, other findings
   G. Documented from mandatory reporting
   H. Geographic distribution/occurrence
   I. Other criteria
(3) Key to Contaminants
   A. Inorganic pesticides
   B. Organic pesticides
   C. Halogenated solvents
   D. Petroleum compounds
   E. Nitrate
   F. Flouride
   G. Salinity/brine
   H. Metals
   I. Radionuclides
   J. Bacteria
   K. Protozoa
   L. Viruses
   M. Other

Table 4-2. Summary of State Groundwater Protection Programs

Programs or Activities	Check (T)	Implementation Status	Responsible State Agency
Active SARA Title III Program	T	existing	Div. of Emergency Management
Ambient ground water monitoring system	T	existing	Div. of Water Quality / USGS
Aquifer vulnerability assessment	T	existing	Div. of Water Quality
Aquifer mapping	T	existing	USGS
Aquifer characterization	T	existing	USGS
Comprehensive data management system	T	under development	DENR
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)	T	Submitted to EPA in 1995	Div. of Water Quality
Ground water discharge permits	T	existing	Div. of Water Quality
Ground water Best Management Practices	T	existing	Div. of Water Quality
Ground water legislation	T	partial	Div. of Water Quality
Ground water classification	T	existing	Div. of Water Quality
Ground water quality standards	T	existing	Div. of Water Quality
Interagency coordination for ground water protection initiatives	T	existing	Div. of Water Quality
Nonpoint source controls	T	existing	Div. of Water Quality
Pesticide State Management Plan	T	existing	NC Dept. of Agriculture
Pollution Prevention Program	T	existing	Div. of Environmental Assistance
Resource Conservation and Recovery Act (RCRA) Primacy	T	existing	Div. of Waste Mgmt.
Source Water Assessment Program [4]	T	existing	Div. Of Env. Health
State Superfund	T	existing	Div. of Waste Mgmt.
State RCRA Program incorporating more stringent requirements than RCRA Primacy	T	existing	Div. of Waste Mgmt.
State septic system regulations	T	existing	Div. of Env. Health
Underground storage tank installation requirements	T	existing	Div. of Waste Mgmt.
Underground Storage Tank Remediation Fund	T	existing	Div. of Waste Mgmt.
Underground Storage Tank Permit Program	T	existing	Div. of Waste Mgmt.
Underground Injection Control Program	T	existing	Div. of Water Quality
Vulnerability assessment for drinking water/wellhead protection	T	existing	Div. of Env. Health/ Div. of Water Quality
Well abandonment regulations	T	existing	Div. of Water Quality
Wellhead Protection Program (EPA-approved)	T	existing	Div. of Env. Health
Well installation regulations	T	existing	Div. of Water Quality & Div. of Env. Health

Table 4-3. Groundwater Contamination Summary

Hydrogeological Setting: Varies
Spatial Description (optional):
Map Available (optional):
Data Reporting Period: 1973- September 30, 2005

Source Type	Number of sites	Number of sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL	31	31	31	Organics, metals, PCBs, pesticides					
CERCLIS (non-NPL)	1036	Unknown	Unknown	Same as above					
DOD/DOE	5	5	5	Same as above					
LUST	27,177	20,944	9,756	Gasoline, diesel					12,147
RCRA Corrective Action	103	78	78	Organics,Metals , pesticides					
Underground Injection	101	101	Unknown	Petroleum, chlorinated solvents, sewage, and others					At least 49
State Sites	1,882	1456	354	Organics, metals, PCBs, pesticides		401	117	117	426
Nonpoint Source									

Table 4-3. Groundwater Contamination Summary

Hydrogeological Setting: Varies
Spatial Description (optional):
Map Available (optional):
Data Reporting Period: 1973- September 30, 2005

Source Type	Number of sites	Number of sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of sites with active remediation (optional)	Number of sites with cleanup completed (optional)
Other (specify) Dry-cleaners	204+	204	unknown	Chlorinated solvents					
FUDs	200+	Unknown	Unknown	Organics, metals, PCBs, pesticides					
Permitted Landfill sites	240	119	109	Organics, metals, pesticides, inorganics					
Totals	30,979	22,938	10,333		2	402	117	117	12573

(#1) All Division of Waste Management sites are nonpoint source
(#2) Some sites may be included in multiple Source Types

NPL – National Priority List
CERCLIS (non-NPL) – Comprehensive Environmental Response, Compensation, and Liability Information System
DOE – Department of Energy
DOD – Department of Defense
LUST – Leaking Underground Storage Tanks
RCRA – Resource Conservation and Recovery Act
FUDs – Formerly Used Defense site

Table 4-4. Aquifer Monitoring Data

Hydrogeological Setting: Varies
Spatial Description (optional):
Map Available (optional):
Data Reporting Period: 1973- September 30, 2005

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l. No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 (or MDL) to less than or equal to 10 mg/L[1] Other parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs	Parameters are detected at concentrations exceeding the MCLs	Number of wells removed from service	Number of wells requiring Special Treatment	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	ND/ Nitrate $\leq$ 5mg/l	Number of wells in sensitive or vulnerable areas (optional)					
Ambient Monitoring Network (Optional) **Piedmont - Mountains Groundwater Study**	65	VOC									
		SOC									
		NO_3	25		35		6	5			
		Other Sulfate Arsenic	23 59				39	2 6			
Untreated Water Quality Data from Public Water Supply Wells		VOC									
		SOC									
		NO_3									
		Other									
Finished Water Quality Data From Public Water Supply Wells	Not Reported	VOC									
		SOC									
		NO_3									
		Other									

Other Sources **Southeastern Coastal Plain Groundwater Study**	32	VOC	32				0	0	0	0	0
		SOC									
		NO_3	21		9		2	0	0	0	0
		Other									

Major uses of the aquifer or hydrologic unit (optional)[16]	___ Public water supply ___ Private water supply	___ Irrigation ___ Thermoelectric	___ Commercial ___ Livestock	___ Mining ___ Industrial	___ Baseflow Maintenance
Uses affected by water quality problems (optional)[16]	___ Public water supply ___ Private water supply	___ Irrigation ___ Thermoelectric	___ Commercial ___ Livestock	___ Mining ___ Industrial	___ Baseflow Maintenance

5 References

North Carolina Department of Environment and Natural Resources (NCDENR). Biological Assessment Unit (BAU) 2000a. *Fish Community Metric Re-Calibration and Biocriteria Development for the Inner Piedmont, Foothills, and Eastern Mountains (Broad, Catawba, Savannah, and Yadkin-Pee Dee River Basins)*. September 22, 2000. Biological Assessment Unit. Environmental Sciences Branch. Water Quality Section. Division of Water Quality. North Carolina Department of Environment and Natural Resources, Raleigh, NC

_____. BAU. 2000b. *Fish Community Metric Re-Calibration and Biocriteria Development for the Outer Piedmont (Cape Fear, Neuse, Roanoke and Tar River Basins)*. October 17, 2000. *Ibid*.

_____. BAU. 2001a. *Standard Operating Procedure*. *Biological Monitoring*. *Stream Fish Community Assessment and Fish Tissue*. Biological Assessment Unit. Environmental Sciences Branch. Water Quality Section. Division of Water Quality. North Carolina Department of Environment and Natural Resources, Raleigh, NC.

_____. BAU. 2001b. *Fish Community Metric Re-Calibration and Biocriteria Development for the Western and Northern Mountains (French Broad, Hiwassee, Little Tennessee, New and Watauga River Basins)*. January 05, 2001. *Ibid*.

_____. BAU. 2003. Standard Operating Procedures for Benthic Macroinvertebrates. Biological assessment Unit. Division of Water Quality.

North Carolina Department of Environment and Natural Resources (NCDENR). Division of Water Quality. Water Quality Section. 2002. Hiwassee River Basinwide Water Quality Plan.

North Carolina Department of Environment and Natural Resources (NCDENR). Division of Water Quality. Water Quality Section. 2002. Savannah River Basinwide Water Quality Plan.

U.S. Environmental Protection Agency (EPA). 2001a. Effective Date of Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revisions to the Water Quality Planning and Management Regulations; and Revision of the Date for state Submission of the 2002 List of Impaired Waters. Fed. Reg. 66:53044-53048

U.S. Environmental Protection Agency (EPA). 2001b. 2002 Integrated Water Quality Monitoring Assessment Report Guidance. November 19

U.S. Environmental Protection Agency (EPA). 2003. Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act; TMDL-01-03. Office of Wetlands, Oceans, and Watersheds. July 21

U.S. Environmental Protection Agency (EPA). 2005. Guidance for 2006 Assessment, Listing and Reporting Requirements Prusuant to Sections 303(d), 305(b) and 314 of the Clean Water Act. Office of Wetlands, Oceans and Watersheds. July 29

Karr, J.R. 1981. Assessment of biotic integrity using fish communities. Fisheries. 6:21-27

_____, K.D. Fausch, P.L. Angermeier, P.R. Yant, and I.J. Schlosser. 1986. Assessing Biological Integrity in Running Water: A Method and its Rationale. Ill. Nat. Hist. Surv. Spec. Publ. 5. 28pp

Appendix I – Procedure for Soliciting and Evaluating Outside Data for *Use Support* Purposes

EPA rules to implement section 303(d) of the Clean Water Act require states to "assemble and evaluate all existing and readily available water quality-related data and information" when developing the biennial 303(d) list (EPA 1999). Many other agencies, universities, industries, municipalities, and environmental groups perform studies on North Carolina's surface waters. This information can be used for determining use support ratings for waters of the state.

All data, reports, models and other information not collected by the Division of Water Quality-Water Quality Section are considered outside data. The procedure for soliciting and evaluating outside information is outlined below.

Step 1. Mail solicitations to other government agencies, basinwide and NPDES stakeholders and issue a press release. Both the solicitations and the press release explicitly state that the information may be used in the 303(d) listing process. Generally, solicitations and press releases indicating agency interest in outside data will be issued in October of the year prior to the summer lake and biological sampling performed by the Environmental Sciences Branch of the Water Quality Section. Solicitations are mailed for those basins scheduled to be evaluated in the coming summer. The agency is interested in all information that citizens may provide. While water quality data is preferred, qualitative statements are also welcome. A copy of a recent solicitation is attached. In the future, the schedule for soliciting outside information will be posted on the Water Quality Section website.

Step 2. Accept responses to solicitation received by the due date. Generally, solicitations will be mailed in October with a deadline in January of the new year. Thus, approximately 60 days will pass between the notice of solicitation and the deadline. Compelling information received after the deadline may be processed at the discretion of the Division.

Step 3. Is the response a basinwide comment? Although the solicitations state that basinwide comments are not actively sought, some may take the opportunity to comment on the basinwide process. Basinwide comments may include comments regarding current basin plans or the public review process, or may include complaints regarding general policies in a particular basin or statewide. These comments are forwarded to the Basinwide and Estuary Planning Unit.

Step 4. Is the information related to a lake or saltwater system? Use support for lake, estuarine, and saltwater systems is performed by the Environmental Sciences Branch Use Support Coordinators (includes the Intensive Survey and Biological Assessment Units). Any information obtained on these types of waters is forwarded to this unit for evaluation.

Step 5. Is the information quantitative? Both quantitative and qualitative information is accepted in the consideration of outside information. However, each type of information is evaluated differently. Quantitative information generally includes some field work involving the collection of data, whether chemical or biological. Qualitative information includes statements about water quality perception (e.g., the fishing is bad).

Quantitative Information

Step 1. Were raw data submitted? This step is to identify the data requiring additional processing by Water Quality Section Personnel.

If raw data were submitted, follow track a; if not, follow track b.

Step 2a. If raw data were submitted, were they submitted in an electronic format? If raw data were not received in an electronic format, the stakeholder will be contacted to attempt to get data in electronic format. Depending upon the response of the stakeholder, this may be the last step in the evaluation of the outside data.

Step 3a. Process data for use support. If raw data are in an electronic format, process the data to determine relevant benchmarks for use support.

Steps 4a and 2b. Conduct a Level of Confidence Review (LOC Review) of data/report. The LOC review will determine how to integrate the outside data/report into use support. This step is especially important when evaluating a waterbody for which data indicate some impairment. Before placing this waterbody on the state's 303(d) list, there should be a high level of confidence in the information suggesting the waterbody is impaired. The description of the LOC review is shown below.

Steps 5a and 3b. Distribute information based on LOC review. If information is considered Level 1, forward to use support coordinator. If information is considered Level 2, forward to both use support coordinator and ESB: Biological Assessment Unit for further monitoring.

Qualitative Information

Step 1. Review qualitative information.

Step 2. Determine if Water Quality Section or other outside information exist for waterbody(ies) in question. Search the available quantitative information to determine if other comments/information have been obtained for the waterbody(ies) in question. If WQS or other outside quantitative information exists, continue to Step 3. If not, forward qualitative information to ESB: Biological Assessment Unit for future monitoring.

Step 3. Review and summarize relevant information.

Step 4. Does the relevant quantitative information support or refute the qualitative information? If the two are in agreement, forward the qualitative comment and review to the use support coordinator. If the two are not in agreement, conduct additional review or monitoring to determine the status of the waterbody(ies) in question.

References

Environmental Protection Agency (EPA). 1999. Proposed Revisions to the Water Quality Planning and Management Regulation; Proposed Rule. Fed Reg. 64:46012-46055 (August 23, 1999)

Appendix II Example of Data Solicitation

Catawba River Basin
French Broad River Basin
Tar-Pamlico River Basin

NCDENR

Solicitation for Water Quality Information

September 2001

Send information to:

Mr. Tom Reeder
NCDENR
DWQ PLANNING BRANCH
1617 MAIL SERVICE CENTER
RALEIGH NC 27699-1617
(919) 733-5083 ext.557

All information must be postmarked by **January 11, 2002** in order for NCDENR-DWQ to consider it for use in the basinwide water quality plans. For questions about the basinwide planning schedule, please contact Darlene Kucken at (919) 733-5083 (ext. 354).

The North Carolina Department of Environment and Natural Resources, Division of Water Quality (NCDENR-DWQ) invites all interested parties to submit water quality information relevant to the Catawba, French Broad and Tar-Pamlico River Basins. These basins include the Catawba, South Fork, French Broad, Pigeon, and Tar Rivers. Submitted information will be used to assess the health of the waters in the basin. This information is relevant to the development of the basinwide water quality plans and as a reporting requirement to the US EPA under Section 303(d) of the Federal Clean Water Act.

Letters, photographs, and observations regarding the uses of surface waters for ***boating, drinking water, swimming, aesthetics, and fishing*** may be mailed to NCDENR-DWQ at this time. ***Scientific information*** may also be submitted; guidelines for submitting scientific information are presented below. Materials will not be returned. The name and telephone number of a contact person must also be provided.

Additional opportunities to comment on the basinwide process or programs will occur during public workshops and meetings to be held in each basin beginning in the Spring of 2003. Notices of these opportunities will be mailed in advance of the meetings.

Guidelines for submitting scientific data or reports:

- **Summary reports** and memos including pollutant distribution statistics will be welcomed. Only information collected between October 1997 and December 2001 will be considered.
- **Raw data** should be submitted electronically and accompanied by a Quality Assurance Project Plan (QAPP) that includes documentation of quality assurance methods used to collect and analyze the samples and the analytical methods used.
- Instream National Pollutant Discharge Elimination System **(NPDES) monitoring** data should be electronically submitted.
- **Maps** showing sampling locations must be included. Maps may be scanned and transmitted electronically.

Electronic Database Needs

- All information and data, including special studies, should pertain to the period from October 1997 through December 2001.
- Qualifiers must be in separate fields and must be defined (e.g. < is non-detected value)
- Pollutant name, with units, must be defined. STORET codes may also be used.
- All sampling locations must be shown on maps or latitude and longitude must be provided.
- For co-located samples at multiple depths, depths must be specified in a separate field.
- Electronic data will be accepted in ASCII, spreadsheet (e.g., Excel, Quattro Pro, Lotus), or database (e.g., Access, dBase, or SAS) platforms.

NCDENR
DWQ PLANNING BRANCH
1617 MAIL SERVICE CENTER
RALEIGH NC 27699-1617

MICHELLE WOOLFOLK
DWQ-PLANNING BRANCH
ARCHDALE BLDG 7TH FL
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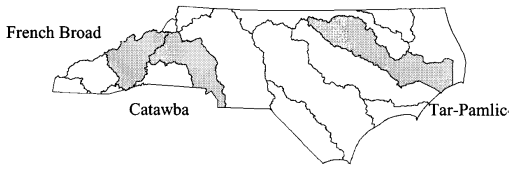

Tell us what you know about water quality in the Catawba, French Broad and Tar-Pamlico River Basins

Appendix III. Sources of Data and Information (Non-exclusive List)

Data and information were received from the following sources during the solicitation period of the basinwide planning cycle. These data were considered for use in the use support process in the *Cape Fear, Catawba, French Broad, Lumber, New and Tar-Pamlico* river basins. This list is presented to help characterize the breadth of sources considered in the development of the integrated list. The list that follows in non-exclusive since other agency information and data is regularly sought throughout the basinwide process.

Basin	Contact agency or person
Cape Fear	City of High Point
Cape Fear	City of Burlington
Cape Fear	Lower Cape Fear River Program
Broad	Earth Connections
Broad	South Carolina Department of Health and Environmental Control, Bureau of Water
Neuse	Citizens monitoring network
Neuse	J. Stroup (Private citizen)
Neuse	Friends of South Ellerbe Creek
Neuse	Lower Neuse Riverkeeper

Appendix IV: Decision Factors Used in 305(b) Reporting and 303(d) Listing Process

ID Decision Factor
-99 Lakes assessment
0 No code listed
100 QUALITATIVE (EVALUATED) ASSESSMENT - UNSPECIFIED
110 Information from local residents
120 Surveys of fish and game biologists/other professionals
130 Land use information and location of sources
140 Incidence of spills and/or fish kills
150 Monitoring data more than 5 years old
170 Best professional judgement
175 Occurrence of conditions judged to cause impairment
180 Screening models (desktop models; models not calibrated or verified)
190 Biological/habitat data extrapolated from upstream or downstream waterbody (tribbing)
191 Physical/chemical data extrapolated from upstream or downstream waterbody (tribbing)
192 Physical/Chemical data from outside source (lesser degree of confidence in quality)
200 PHYSICAL/CHEMICAL MONITORING
210 Fixed station physical/chemical monitoring, conventional pollutants only
220 Non-fixed station physical/chemical monitoring, conventional pollutant only
222 Non-fixed-station monitoring, conventional, during key seasons and flows
230 Fixed station physical/chemical, conventional plus toxic pollutants
231 Highest quality fixed-station P/C, conventional plus toxicants
240 Non-fixed station physical/chemical, conventional plus toxicants
242 Non-fixed station physical/chemical, conv plus toxicants, key seasons,flows
250 Chemical monitoring of sediments
260 Fish tissue analysis
270 PWS chemical monitoring (ambient water)
275 PWS chemical monitoring (finished water)
300 BIOLOGICAL MONITORING
310 Ecological/habitat surveys
315 Regional reference site approach
320 Benthic macroinvertebrate surveys
321 RBP III or equivalent benthos surveys
322 RBP I or II or equivalent benthos surveys
330 Fish surveys
331 RBP V or equivalent fish surveys
340 Primary producer surveys (phytoplankton, periphyton, and/or macrophyton)
350 Fixed station biological monitoring
400 PATHOGEN MONITORING
410 Shellfish surveys
420 Water column surveys (e.g., fecal coliform)
430 Sediment analysis
440 PWS pathogen monitoring (ambient water)
450 PWS pathogen monitoring (finished water)
500 TOXICITY TESTING
510 Effluent toxicity testing, acute
520 Effluent toxicity testing, chronic
530 Ambient toxicity testing, acute
540 Ambient toxicity testing, chronic
550 Toxicity testing of sediments
600 MODELING
610 Calibrated models (calibration data are less than 5 years old)

700 INTEGRATED INTENSIVE SURVEY (field work exceeds a 24hr period, multimedia)
710 Combined sampling of water column, sediment, biota for chemical analysis
720 Biosurveys of multiple taxonomic groups (e.g., fish, invertebrates, algae)
800 ASSESSMENTS BASED ON DATA FROM OTHER SOURCES
810 (VOL.) Chem./phys. monitoring data by quality-assured volunteer program
820 (VOL.) Benthic macroinvertebrate surveys by quality-assured volunteers
830 (VOL.) Bacteriological water column sampling by quality-assured volunteers
840 (Effl.) Discharger self-monitoring data
850 (Ambt.) Discharger self-monitoring data
860 Other Agencies/Organizations provided monitoring data
870 Drinking water supply closures or advisories (source-water quality based
900 DISCREPANCY IN AQUATIC LIFE ASSESSMENT RESULTS
910 Physical/Chemical ALUS; Discrepancy among different data types
920 Biological/Habitat ALUS; Discrepancy among different data types
930 Toxicity Testing ALUS; Discrepancy among different data types
940 Evaluated (qualitative) ALUS; Discrepancy among different data types
950 Tributary to PS/NS stream

Appendix V. Glossary and acronyms

AU	Assessment Unit
B (Class B)	Class B Water Quality Classification. This classification denotes freshwaters protected for primary recreation and other uses suitable for Class C. Primary recreational activities include frequent and/or organized swimming and other human contact such as skin diving and water skiing
C (Class C)	Class C Water Quality Classification. This classification denotes freshwaters protected for secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, and others uses.C
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (also known as Superfund). An act establishing the collection and dispension of funds for cleaning up abandoned or uncontrolled hazardous waste sites.
CFR	Code of Federal Regulations
CWA	Clean Water Act. One of two major acts aimed at water quality protection. The act provides regulatory control of pollutant discharges (effluent limitations) and establishes the designation of uses and setting of water quality standards for navigable waters
DCM	North Carolina Division of Coastal Management, an agency of DENR
DEH	North Carolina Division of Environmental Health, an agency of DENR.
DENR	Department of Environment and Natural Resources.
DLR	North Carolina Division of Land Resources, an agency of DENR.
DO	Dissolved oxygen.
DOT	Department of Transportation
DSWC	North Carolina Division of Soil and Water Conservation, an agency of DENR
DWM	North Carolina Division of Waste Management, an agency of DENR.
DWQ	North Carolina Division of Water Quality, an agency of DENR.
EMC	Environmental Management Commission.
EPA	United States Environmental Protection Agency.
GIS	Geographic Information System. An organized collection of computer hardware, software, geographic data and personnel designed to efficiently capture, store, update, manipulate, analyze and display all forms of geographically referenced information.
HQW	High Quality Waters. A supplemental surface water classification.
HU	Hydrologic unit. See definition below.
hydrologic unit	A watershed area defined by a national uniform hydrologic unit system that is sponsored by the Water Resources Council. This system divides the country into 21 regions, 222

	subregions, 352 accounting units and 2,149 cataloging units. A hierarchical code consisting of two digits for each of the above four levels combined to form an eight-digit hydrologic unit (cataloging unit). An eight-digit hydrologic unit generally covers an average of 975 square miles. There are 54 eight-digit hydrologic (or cataloging) units in North Carolina. These units have been further subdivided into eleven and fourteen-digit units.
NCAC	North Carolina Administrative Code
NCARS	North Carolina Agricultural Research Service
NCCES	North Carolina Cooperative Extension Service
NCDA	North Carolina Department of Agriculture
NCGS	North Carolina General Statutes
NHD	National Hydrography Dataset.
NPDES	National Pollutant Discharge Elimination System.
NOAA	National Oceanic and Atmospheric Administration
NPS	Nonpoint source.
NR	Not rated. A waterbody that is not rated for use support due to insufficient data.
NRCS	Natural Resources Conservation Service, an agency of the U.S. Department of Agriculture
NSW	Nutrient Sensitive Waters. A supplemental surface water classification intended for waters needing additional nutrient management due to their being subject to excessive growth of microscopic or macroscopic vegetation. Waters classified as NSW include the Neuse, Tar-Pamlico and Chowan River basins; the New River watershed in the White Oak basin; and the watershed of B. Everett Jordan Reservoir (including the entire Haw River watershed)
ORW	Outstanding Resource Waters. A supplemental surface water classification intended to protect unique and special resource waters having excellent water quality and being of exceptional state or national ecological or recreational significance. No new or expanded wastewater treatment plants are allowed, and there are associated stormwater runoff controls enforced by DWQ.
PNA	Primary nursing area
RCRA	Resource Conservation and Recovery Act. An act that authorizes EPA, and delegated state programs, to regulate waste management activities, including solid and hazardous wastes.
SA	Class SA Water Classification. This classification denotes saltwaters that have sufficient water quality to support commercial shellfish harvesting.
SB	Class SB Water Classification. This classification denotes saltwaters with sufficient water quality for frequent and/or organized swimming or other human contact.
SC	Class SC Water Classification. This classification denotes saltwaters with sufficient water quality to support secondary recreation and aquatic life propagation and survival
SOC	Special Order by Consent. An agreement between the Environmental Management Commission and a permitted discharger found responsible for causing or contributing to

	surface water pollution. The SOC stipulates actions to be taken to alleviate the pollution within a defined time. The SOC typically includes relaxation of permit limits for particular parameters, while the facility completes the prescribed actions. SOCs are only issued to facilities where the cause of pollution is not operational in nature (i.e., physical changes to the wastewater treatment plant are necessary to achieve compliance)
Sw	Waters. A supplemental surface water classification denoting waters that have naturally occurring low pH, low dissolved oxygen and low velocities. These waters are common in the Coastal Plain and are often naturally discolored giving rise to their nickname of "blackwater" streams
SWCD	Soil and Water Conservation District
TMDL	Total maximum daily load. The amount of a given pollutant that a waterbody can assimilate and maintain its uses and water quality standards.
Tr	Trout water supplemental classification
WaDE	Wastewater Discharge Elimination program (Straight pipe program)
WET	Whole effluent toxicity. The aggregate toxic effect of a wastewater measured directly by an aquatic toxicity test.
WLA	Wasteload allocation
WWTP	Wastewater treatment plant.
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

Appendix VI. Impaired Waters for which a TMDL is Not Required (Category 4)

Category 4 of the Integrated Report contains assessment units for which a TMDL is not required. In some cases, a TMDL has been approved by EPA Region IV and in other cases a TMDL is not needed. The three subcategories of Category 4 in this 2006 Integrated Report are as follows:

> **Category 4a: TMDL has been completed**. This category consists of those waters for which EPA has approved or established a TMDL and water quality standards have not yet been achieved.
> **Category 4b: Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future**. This category consists of those waters for which TMDLs will not be attempted because other required regulatory controls (e.g., NPDES permit limits, Stormwater Program rules, buyout programs, etc.) are expected to attain water quality standards by the next regularly scheduled listing cycle.
> **Category 4c: Impairment is not caused by a pollutant.** This category consists of waters that are impaired by pollution, not by a pollutant. EPA defines pollution as "The man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of the water." EPA believes that in situations where the impairment is not caused by a pollutant, a TMDL is generally not the appropriate solution to the problem.

When a waterbody moves from Categories 5 through 7 to Category 4, as occurs when a TMDL has been approved, a 303(d) delisting has occurred. Thus, assessment units appearing in Table 3-16 and in this appendix constitute delistings from the 2004 North Carolina 303(d) list. North Carolina will continue to explicitly report delistings as a result of updated data (Table 3-16), TMDL approval, or other cause in the biennial Integrated Report.

Appendix VII. The 2006 North Carolina 303(d) List
(as required by 40CFR130.7)

The North Carolina 2006 303(d) List includes assessment units placed in Categories 5 through 7. In some cases a waterbody assessment unit is impaired for multiple reasons and a TMDL has been completed for a subset of those reasons. Category 4 labels may be assocaited with a subset of the reason for listing, although all TMDLs associated with that AU have not been completed. A summary of integrated reporting categories that may appear in the 303(d) list is as follows:

Category 4: Impaired or threatened for one or more designated uses but does not require the development of a TMDL. This category contains three distinct sub-categories:

Category 4a: TMDL has been completed. This category consists of those waters for which EPA has approved or established a TMDL and water quality standards have not yet been achieved.

Category 4b: Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future. This category consists of those waters for which TMDLs will not be attempted because other required regulatory controls (e.g., NPDES permit limits, Stormwater Program rules, buyout programs, etc.) are expected to attain water quality standards by the next regularly scheduled listing cycle.

Category 4c: Impairment is not caused by a pollutant. This category consists of waters that are impaired by pollution, not by a pollutant. EPA defines pollution as "The man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of the water." EPA believes that in situations where the impairment is not caused by a pollutant, a TMDL is generally not the appropriate solution to the problem.

Category 5: Impaired for one or more designated uses by a pollutant(s), and requires a TMDL. This category consists of those waters that are impaired by a pollutant and the proper technical conditions exist to develop TMDLs. As defined by the EPA the term pollutant means "dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into the water." In most cases, data are available to support a determination that a water quality standard is not attained. When more than one pollutant is associated with the impairment of a single assessment unit in this category, the assessment unit will remain in Category 5 until TMDLs for all listed pollutants have been completed and approved by the EPA.

Category 6: Impaired biological integrity. This category consists of assessment units historically referred to as “biologically impaired”; these assessment units have

no identified cause(s) of impairment although aquatic life impacts have been documented. Waters in this category do not meet the conditions of biological integrity related to best usage as outlined in 15A NCAC 02B .0211(2).

Category 7: Impaired, but the proper technical conditions do not yet exist to develop a TMDL. As described in the Federal Register, "proper technical conditions refers to the availability of the analytical methods, modeling techniques and data base necessary to develop a technically defensible TMDL. These elements will vary in their level of sophistication depending on the nature of the pollutant and characteristics of the segment in question" (43 FR 60662, December 28, 1978). These are waters that would otherwise be in Category 5 of the integrated list. As previously noted, EPA has recognized that in some specific situations the data, analyses, or models are not available to establish a TMDL. North Carolina seeks EPA technical guidance in developing technically defensible TMDLs for these waters. Open water and ocean hydrology fecal coliform impaired shellfishing waters are included in this category.