

CHAPTER 2 – HOW NORTH CAROLINA EVALUATES WATER QUALITY

Basinwide water quality planning is a non-regulatory, watershed-based approach to restoring and protecting the quality of North Carolina’s surface waters. The North Carolina Division of Water Quality (DWQ) prepares basinwide water quality plans (basin plans) for each of the seventeen major river basins in the state (Figure 2-1). Even though basin plans are prepared by DWQ, their implementation and the protection of water quality entail the coordinated efforts of many agencies, local governments and stakeholders throughout the state. This chapter provides an overview of the basinwide planning process and how North Carolina evaluates water quality. It defines water quality classifications, identifies water quality monitoring programs and explains how waters are listed on the State Impaired Waters List as required by Section 303(d) of the Clean Water Act.

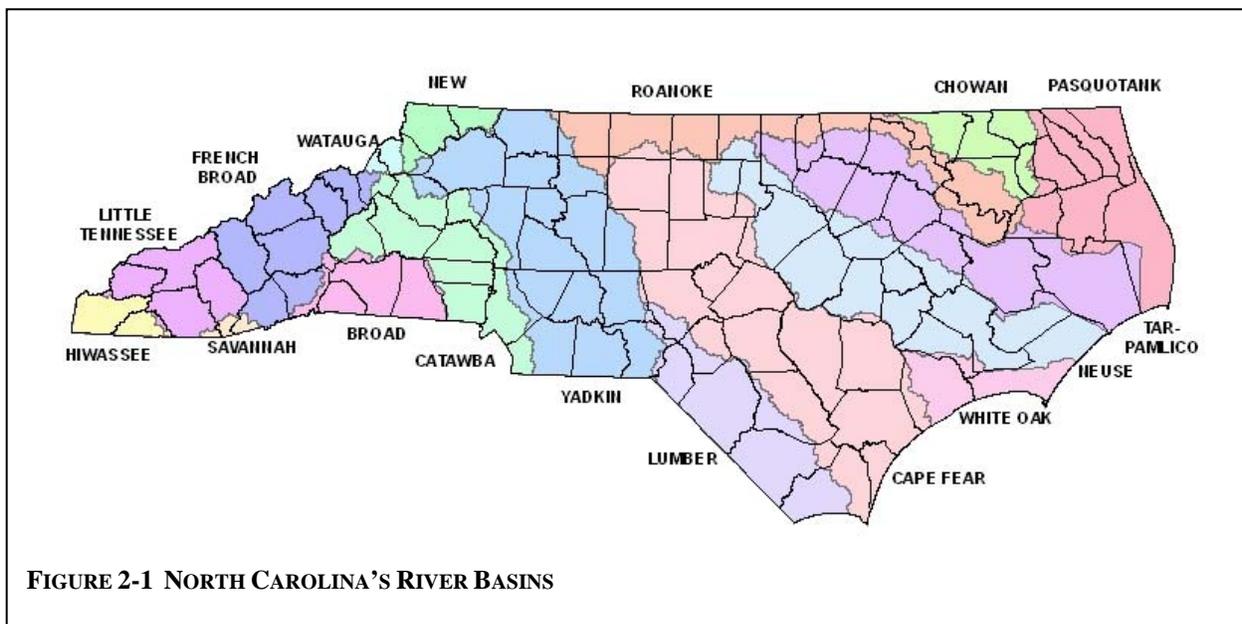


FIGURE 2-1 NORTH CAROLINA’S RIVER BASINS

2.1 BASINWIDE PLANNING PROCESS

The goals of basinwide planning are to identify water quality problems and restore full use of impaired waters; identify and protect high value resource waters; and protect unimpaired waters while allowing for reasonable economic growth. DWQ accomplishes these goals by collaborating with regional and local agencies to develop appropriate management strategies; assuring equitable distribution of waste assimilative capacity; evaluating the cumulative effects of pollution; improving public awareness and involvement; and regulating point and nonpoint sources of pollution where other approaches are unsuccessful. By collaborating with regional and local agencies, DWQ can identify and provide agencies information related to financial and funding opportunities.

Preparation of a basinwide water quality plan is a continuous process that results in a basin plan at least every five years. The process is broken down into three phases (Table 2-1). To assure that basinwide plans are accurately written and effectively implemented, it is important for

Table 2-1 Basinwide Planning Process

Water Quality Data Collection and Identification of Goals and Issues	Data Analysis and Information Collected from State and Local Agencies	Preparation of Draft Basin Plan, Public Review, Approval of Plan, Issue NPDES Permits, and Begin Implementation of Plan
<ul style="list-style-type: none"> <input type="checkbox"/> Identify sampling needs <input type="checkbox"/> Conduct biological monitoring activities <input type="checkbox"/> Conduct special studies and other water quality sampling activities <input type="checkbox"/> Coordinate with local stakeholders and other agencies to continue to implement goals within current basinwide plan 	<ul style="list-style-type: none"> <input type="checkbox"/> Gather and analyze data from sampling activities <input type="checkbox"/> Develop use support ratings every two years for the Impaired waters list <input type="checkbox"/> Conduct special studies and other water quality sampling activities <input type="checkbox"/> Coordinate state and local agencies to establish goals and objectives <input type="checkbox"/> Identify and prioritize issues <input type="checkbox"/> Develop preliminary pollution control strategies <input type="checkbox"/> Coordinate with local stakeholders and other state/local agencies to identify implementations needs 	<ul style="list-style-type: none"> <input type="checkbox"/> Develop draft basinwide plan based on water quality data, use support ratings, and recommended pollution control strategies <input type="checkbox"/> Circulate draft basinwide plan for review and present draft plan for public review <input type="checkbox"/> Revise plan (when appropriate) to reflect public comments <input type="checkbox"/> Submit plan to Environmental Management Commission for approval <input type="checkbox"/> Issue NPDES permits <input type="checkbox"/> Coordinate with other agencies and local interest groups to prioritize implementation actions <input type="checkbox"/> Conduct special studies and other water quality sampling activities

citizens and local stakeholders to participate in all phases of the planning process. DWQ is continually coordinating with the Soil and Water Conservation Districts (SWCD), council of governments, NC Cooperative Extension Service Centers, the county Natural Resources Conservation Service (NRCS) Centers, and stakeholder groups to develop language and identify water quality concerns throughout the state. Citizens and local communities can participate by contacting their county extension service, local SWCD or the basin planners directly.

Basinwide planning and water quality management benefits water quality by focusing resources on one river basin at a time;

- Using sound ecological planning and fostering comprehensive permitting strategies on a watershed scale;
- Ensuring better consistency and equitability by clearly defining the program's long-term goals and approaches regarding permits and water quality improvement strategies;
- Fostering public participation to increase involvement and awareness about water quality; and
- Integrating and coordinating programs and agencies to improve implementation of point and nonpoint source pollution reduction strategies.

2.2 NORTH CAROLINA SURFACE WATER CLASSIFICATIONS AND STANDARDS

Waters in North Carolina were classified for their “best use” beginning in the early 1950s, with classification and water quality standards for all the state's river basins adopted by 1963. This effort entailed identifying all named waterbodies on USGS 7.5 minute topographic maps; conducting river basin studies to document sources of pollution and appropriate best uses; and formal adoption of standards/classifications through public hearings.

Table 2-2 Primary and Supplemental Surface Water Classifications

PRIMARY FRESHWATER AND SALTWATER CLASSIFICATIONS	
<u>Class*</u>	<u>Best Uses</u>
C and SC	Aquatic life propagation/protection and secondary recreation.
B and SB	Primary recreation and Class C and SC uses.
SA	Suitable for commercial shellfish harvesting and SB and SC uses.
WS	<i>Water Supply (WS)</i> : Assigned to watersheds based on land use characteristics. The WS classifications have management strategies to protect the surface water supply. For WS-I through WS-IV, these include limits on point source discharges and local programs to control nonpoint source and stormwater runoff. A WS Critical Area (CA) has more stringent protection measures and is designated within one-half mile from a WS intake or WS reservoir. All WS classifications are suitable for Class C uses.
WS-I	Generally located in natural and undeveloped watersheds.
WS-II	Generally located in predominantly undeveloped watersheds.
WS-III	Generally located in low to moderately developed watersheds.
WS-IV	Generally located in moderately to highly developed watersheds.
WS-V	Generally upstream of and draining to Class WS-IV waters. No categorical restrictions on watershed development or treated wastewater discharges.
SUPPLEMENTAL CLASSIFICATIONS	
<u>Class</u>	<u>Best Uses</u>
Sw	<i>Swamp Waters</i> : Waters that have low velocities and other natural characteristics that are different from adjacent streams (i.e., lower pH, lower levels of dissolved oxygen).
Tr	<i>Trout Waters</i> : Provides protection to freshwaters for natural trout propagation and survival of stocked trout.
HQW	<i>High Quality Waters</i> : Waters that have excellent water quality, primary nursery areas and other functional nursery areas, WS-I and WS-II or SA waters.
ORW	<i>Outstanding Resource Waters</i> : Unique and special waters of exceptional state or national recreational or ecological significance which require special protection.
NSW	<i>Nutrient Sensitive Waters</i> : Waters subject to excessive plant growth and requiring limitations on nutrient inputs.
UWL	<i>Unique Wetland</i> . Wetlands of exceptional state or national ecological significance. These wetlands may include wetlands that have been documented to the satisfaction of the Environmental Management Commission (EMC) as habitat essential for the conservation of state or federally listed threatened or endangered species.

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

The water quality standards program in North Carolina has evolved over time and has been modified to be consistent with the federal Clean Water Act and its amendments. Water quality classifications and standards have also been modified to promote additional protection of surface water supply watersheds (WSWS), high quality waters (HQW) and the protection of unique and special pristine waters with outstanding resource values (ORW). Classifications and standards are applied to provide protection of uses from both point and nonpoint source pollution.

2.2.1 STATEWIDE CLASSIFICATIONS AND WATER QUALITY STANDARDS

All surface waters in the state are assigned a *primary* classification that is appropriate to the best use(s) of that water. In addition to primary classifications, surface waters may be assigned a *supplemental* classification. Most supplemental classifications have been developed to provide special protection to sensitive or highly valued resource waters. For example, a mountain stream might have a C Tr classification, where C is the primary classification followed by a Tr (Trout) supplemental classification. Table 2-2 briefly describes the best uses of each classification. A full description is available in the document titled *Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina* (15A NCAC 2B .0200). Information is also available on the DWQ Classifications and Standards Unit website (www.ncwaterquality.org/csu/).

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

Surface Waters (Class C and SC)

Class C and SC water quality standards are basic standards for water quality applicable to all surface water across the state. Uses include aquatic life propagation and maintenance of biological diversity (i.e, fish and fishing), wildlife, secondary recreation, agriculture and any other usages except for primary recreation or as a source of water supply for drinking, culinary or food processing purposes. Secondary recreation includes wading, boating and other uses involving human body contact with water where such activities take place in an infrequent, unorganized or incidental manner. Rule 15A NCAC 02B .0211 and 15A NCAC 02B .0220 outline standards for freshwater (Class C) and saltwater (Class SC).

Primary Recreation (Class B and SB)

Waters classified as Class B are protected for primary recreation, include frequent and/or organized swimming, and must meet water quality standards for fecal coliform bacteria. Class C and SC uses are also applicable. Sewage and all discharged wastes into Class B waters must be treated to avoid potential impacts to the existing water quality. Primary recreation is also a classified use of Class SA waters. Rule 15A NCAC 02B .0219 and 15A NCAC 02B .0222 outline standards for primary recreation in freshwater (Class B) and saltwater (Class SB).

Shellfish Harvesting (Class SA)

The best uses for Class SA waters are for shellfishing for market purposes and any other usage specified by Class SB and SC. Fecal coliform bacteria in Class SA waters shall meet the current sanitary and bacteriological standards as adopted by the Commission for Health Services. Domestic wastewater discharges are not allowed, and there are provisions for stormwater controls. Rule 15A NCAC 02B 0.221 outlines standards for Class SA waters.

Water Supply Watersheds (Class WS)

The purpose of the Water Supply Watershed (WSWS) Protection Program (<http://h2o.enr.state.nc.us/wswp/>) is to provide a proactive drinking water supply protection program for local communities. Local governments administer the program based on state minimum requirements. There are restrictions on wastewater discharges, development, landfills and residual application sites to control the impacts of point and nonpoint sources of pollution to water supplies.

There are five water supply classifications (WS-I to WS-V) that are defined according to the land use characteristics of the watershed. The WS-I classification carries the greatest protection for water supplies, and no development is allowed in these watersheds. Generally, WS-I lands are publicly owned. WS-V watersheds, however, have the least amount of protection and there are no development restrictions. WS-V watersheds are either former water supply sources or water sources used by industry. WS-I and WS-II classifications are also HQW by definition because requirements for these levels of water supply protection are at least as stringent as those for HQW. Those watersheds classified as WS-II through WS-IV require local governments with jurisdiction within the watersheds to adopt and implement land use ordinances for development that are at least as stringent as the state's minimum requirements. Requirements include a 30-foot vegetated setback on perennial streams in WS-II, WS-III and WS-IV watersheds. Rules 15A NCAC 02B .0212, 15A NCAC 02B .0214, 15A NCAC 02B .0215, 15A NCAC 02B .0216, and 15A NCAC 02B .0218 outline standards for Class WS-I, WS-II, WS-III, WS-IV and WS-V.

High Quality Waters (Class HWQ)

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

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

Criteria for HQW Classification

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

For nonpoint source pollution, development activities which drain to and are within one mile of an HQW and which require a Sedimentation and Erosion Control Plan (<http://www.dlr.enr.state.nc.us/pages/sedimentation.html>) in accordance with rules established by (1) the NC Sedimentation Control Commission (<http://www.dlr.enr.state.nc.us/pages/ncsedcontrolcommission.html>) or (2) an approved local

erosion and sedimentation control program

(<http://www.dlr.enr.state.nc.us/pages/sedimentlocalprograms.html>) must control runoff. A low-density option requires a 30-foot vegetated buffer between development activities and the stream. A high-density option requires structural stormwater controls (i.e., stormwater infiltration system, wet detention ponds). Rule 15A NCAC 02B .0224 outlines protection measures for Class HQW. North Carolina's Division of Land Resources (DLR) also requires more stringent erosion controls for land-disturbing projects within one mile of and draining to an HQW.

Outstanding Resource Waters (Class ORW)

ORWs have excellent water quality based on biological and chemical sampling and are designated as an outstanding resource. Outstanding resource designations include outstanding fisheries, high level of water-based recreation, National Wild and Scenic River, National Wildlife Refuge, state or national park, and/or special ecological or scientific significance.

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

Outstanding resource values for ORW designation includes one or more of the following:

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

Trout (Class Tr)

Different water quality standards for certain chemical and physical parameters, including dissolved oxygen, temperature and turbidity, have been developed to protect freshwaters for natural trout propagation and survival of stocked trout. These water quality standards result in more restrictive limits for wastewater discharges to trout waters. Even though there are no watershed development restrictions associated with the trout classification, the NC Division of Land Resources (DLR), under the NC Sedimentation and Pollution Control Act (SPCA), has a requirement to protect trout streams from land-disturbing activities. Under General Statute 113A-57(1), "waters that have been classified as trout waters by the NC Environmental Management Commission (EMC) shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the twenty-five percent of the buffer zone nearest the land-disturbing activity, whichever is greater." This rule also applies to unnamed tributaries flowing to the affected trout water stream. Further clarification on classifications of unnamed tributaries can be found under 15A NCAC 02B .0301(i)(1). More information regarding land-disturbing activities along designated trout streams can be found on the DLR website (www.dlr.enr.state.nc.us/).

In additions to the DWQ Tr classification, the Wildlife Resources Commission (WRC) administers a state fishery management classification, Designated Public Mountain Trout Waters. It provides for public access to streams for fishing and regulates fishing activities (i.e., season, size limits, creel limits, bait and lure restrictions). Although many of these waters are also classified Tr by DWQ, this is not the same classification.

Nutrient Sensitive Waters (Class NSW)

NSW is a supplemental classification that the NC Environmental Management Commission (EMC) may apply to surface waters that are experiencing or are subject to microscopic (algal) or macroscopic (aquatic weeds) vegetative growth that can impact aquatic communities. Nutrient strategies have been developed to control point and nonpoint source pollution. Nutrient management strategies have been developed for the Neuse and Tar-Pamlico River basins. Management strategies have also been developed for Randleman Lake in the Cape Fear River basin. Rules are outlines in the *Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina* (<http://h2o.enr.state.nc.us/admin/rules/documents/rb080104.pdf>) (15A NCAC 2B .0200).

2.3 WATER QUALITY MONITORING PROGRAMS

Water quality in North Carolina is assessed using a variety of biological, chemical and physical data. Several different divisions within the NC Department of Environment and Natural Resources (DENR) collect data used for evaluating water quality with the DWQ Environmental Sciences Section (ESS) and the Division of Environmental Health (DEH) Shellfish Sanitation and Recreational Water Quality Section taking the lead roles. Below is a brief introduction to water quality monitoring programs. More specific monitoring information can be found on the ESS website (www.ncwaterquality.org/esb) or on the DEH website (www.deh.enr.state.nc.us/).

2.3.1 BENTHIC MACROINVERTEBRATE MONITORING

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

Bioclassification criteria have been developed based on the number of species present and the relative pollution tolerance of each of the species. Commonly referred to as EPT, the number of different species present is dependent upon the pollution intolerant groups of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies). The Biotic Index (BI) value is an indication of the overall community tolerance for pollution. The bioclassifications take into consideration the four major ecoregions (mountains, piedmont, coastal plain and swamp) and are used to assess the various impacts of both point and nonpoint source pollution.

Based on the EPT and BI value, mountain, piedmont and coastal plain streams and rivers are given a final bioclassification of Excellent, Good, Good/Fair, Fair or Poor. Slower flow, lower dissolved oxygen, lower pH and (sometimes) complex braided channels and dark-colored waters characterize swamps. They are given a final bioclassification of Natural, Moderate Stress or Severe Stress. In addition to assessing the effects of water pollution, biological information is also used to define high quality and outstanding resource waters (HQW and ORW), support enforcement of water quality standards, and measure improvements associated with management actions. The results of biological investigations are an integral part of the basin plans and North Carolina's basinwide monitoring program.

2.3.2 FISH COMMUNITY MONITORING

Fish communities are one of the most meaningful indicators of ecological integrity. Fish occupy the upper levels of the aquatic food chain and are directly and indirectly affected by chemical and physical changes in the environment. Water quality conditions that significantly affect lower levels of the food chain (such as benthic macroinvertebrates) will also affect the abundance, species composition and condition of fish populations.

To assess the structure and health of fish communities, DWQ uses the North Carolina Index of Biotic Integrity (NCIBI). The NCIBI uses a cumulative assessment of twelve parameters or metrics including information about species richness and composition, indicator species, trophic function, abundance, condition and reproductive function. Each metric is designed to contribute unique information to the overall assessment. An overall NCIBI is given a final bioclassification of Excellent, Good, Good/Fair, Fair, Poor or Not Rated.

Currently, the NCIBI is applicable only to streams that are wadeable from one shoreline across to the other and for a distance of 600 feet. The NCIBI is only applicable to wadeable streams in the Western and Northern Mountains (French Broad, Hiwassee, Little Tennessee, New and Watauga River basins); the Inner Piedmont, Foothills, and Eastern Mountains (Broad, Catawba, Savannah and Yadkin River basins); and the Outer Piedmont (Cape Fear, Neuse, Roanoke and Tar River basins). Criteria for the NCIBI are continually being refined for greater applicability to wadeable streams in North Carolina.

In addition to assessing the effects of water pollution, biological information is also used to define high quality and outstanding resource waters (HQW and ORW), support enforcement of water quality standards, and measure improvements associated with management actions. The results of biological investigations are an integral part of the basin plans and North Carolina's basinwide monitoring program.

2.3.3 AMBIENT MONITORING

Statewide, chemical, physical and bacteriological water quality data are collected through the DWQ Ambient Monitoring Program (<http://h2o.enr.state.nc.us/esb/ams.html>). The program consists of a network of stations established throughout the state to provide site-specific, long-term water quality information on significant rivers, streams and estuaries. Currently, there are 365 ambient monitoring stations across the state.

A basic set of indicators, or parameters, is measured at all ambient monitoring stations. The indicators are primarily selected from those chemicals that have current state water quality standards and can be cost-effectively analyzed. These include water temperature, specific conductance, turbidity, total suspended residue, dissolved oxygen, metals (including arsenic, cadmium, chromium, copper, iron, lead, nickel, zinc, aluminum and mercury), fecal coliform bacteria and weather conditions. Depending on site-specific concerns such as stream classification, discharge types and historical or suspected issues, additional indicators may be included. Examples of these site-specific indicators include salinity, depth, flow, nutrients (including nitrogen and phosphorus), fluoride, sulfate, color, oil and grease and chlorophyll *a*. Metals and residue are sampled quarterly at all stations. All other indicators are sampled monthly.

Although ambient water quality data is not a direct measurement of biological integrity, the chemical and physical data collected can provide an indication of conditions that may be impacting aquatic life. Parameters used to assess water quality for aquatic life include dissolved oxygen, pH, chlorophyll *a* and turbidity. In order for ambient monitoring to be used for water quality assessments, a minimum of ten samples must be collected.

All data collected for water quality assessment through the Ambient Monitoring Program follows established quality assurance procedures. 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.

DWQ's Chemistry Laboratory (<http://h2o.enr.state.nc.us/lab/index.htm>) has established rigorous internal quality assurance evaluations to generate the highest quality information in order 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 improvements to laboratory instruments, analytical methods and quality assurance and quality control applications.

2.3.4 FISH TISSUE MONITORING

Throughout North Carolina, heavy metals, pesticides and other complex organic compounds have been documented in freshwater, estuarine and marine fish and shellfish. By analyzing fish tissue, DWQ can determine what chemicals are in the water based on the amount found in the tissue. Results from fish tissue monitoring can also serve as an important indicator of contamination of sediment and surface water. Data for DWQ fish tissue monitoring are also used by the NC Department of Health and Human Services (DHHS) (<http://www.ncdhhs.gov/>) to issue fish consumption advisories (<http://www.epi.state.nc.us/epi/fish/>).

2.3.6 AQUATIC TOXICITY MONITORING

Many numeric water quality standards are based on measured effects of individual chemicals, but measurements can only be made on a small percentage of chemicals in production today and many cannot predict the effects of complex chemical mixtures. In order to evaluate the cumulative effects of all constituents in solution, the DWQ Aquatic Toxicology Unit (ATU) conducts acute and/or chronic toxicity tests. Using sensitive aquatic species (usually the fathead minnow or the water flea, *Ceriodaphnia dubia*), aquatic toxicity tests are very efficient and effective at predicting aquatic effects without having to chemically analyze individual chemical constituents. Tests may be conducted on samples of complex wastewater, individual chemical compounds or on actual stream samples. The tests can be sensitive enough to determine not only the lethal dose but also suppression of reproduction or growth of the aquatic organism, effects that may ultimately reduce instream populations. By incorporating whole effluent toxicity (WET) monitoring with "action level" water quality standards, North Carolina has been able to avoid costly and unnecessary regulation of several ubiquitous wastewater constituents.

All permitted dischargers of complex wastewater treatment in the state are required to perform self-monitoring of aquatic toxicity of their wastewater. Also referred to as WET monitoring, there are approximately 580 industrial and municipal facilities required to perform aquatic toxicity tests. The ATU reviews all toxicity data reported by these facilities to verify data quality, track compliance and make enforcement recommendations for non-compliant situations. Where a facility has indicated potential toxicity, the ATU will review and comment on toxicity reduction plans submitted by the facility. All toxicity analyses reported by dischargers must, by water quality regulations, be performed by a state certified biological laboratory.

2.3.7 LAKES ASSESSMENT PROGRAM

Lakes are valued for the multiple benefits they provide to the public, including recreational boating, fishing, drinking water and aesthetic enjoyment. The Lake Assessment Program (<http://h2o.enr.state.nc.us/esb/isu.html>) seeks to protect these waters through monitoring, pollution prevention and control, restoration and public education activities. Assessments have been made at many publicly accessible lakes, lakes that supply domestic drinking water and lakes (public or private) where water quality problems have been observed. Data are used to determine the trophic state of each lake (a relative measure of nutrient enrichment and productivity) and whether the designated uses of the lake have been threatened or impacted by pollution.

2.3.8 SPECIAL STUDIES – INTENSIVE SURVEY UNIT

Throughout the year, the DWQ Intensive Survey Unit (ISU) (<http://h2o.enr.state.nc.us/esb/isu.html>) conducts numerous special studies including lake assessments, water quality characterization studies for model support, sediment evaluations for oxygen demand, nutrient flux, chemical contamination and a variety of intensive water quality investigations. ISU collects and interprets a variety of biological, chemical and physical data that are incorporated in the DWQ basinwide planning process. Data collected by ISU is often used in water quality simulation models for the purpose of developing total daily maximum loads

(TMDLs) or wasteload allocations for permitted wastewater dischargers through the National Pollutant Discharge Elimination System (NPDES) Program.

2.3.9 NPDES DISCHARGE MONITORING COALITION PROGRAM

The federal government under the Clean Water Act (CWA) established the National Pollutant Discharge Elimination System (NPDES) program to control point source pollution from industrial, municipal and commercial dischargers. The NPDES Permitting and Compliance Programs of DWQ (<http://h2o.enr.state.nc.us/NPDES/>) are responsible for administering the NPDES Program. Permits issued by DWQ are to protect, maintain and enhance North Carolina's waters by fostering compliance with North Carolina's environmental statutes, rules and regulations.

Many of the NPDES permits issued by the State require instream monitoring in order to determine the effect of the wastewater discharged. DWQ and NPDES permit holders have developed the NPDES Discharge Monitoring Coalition Program (<http://h2o.enr.state.nc.us/esb/coalitions.html>) in order to utilize the data collected by the permit holders for water quality evaluations. Participating permit holders work in partnership with DWQ to develop a monitoring program. The program is designed to characterize water quality issues basinwide to evaluate coalition interests and other specific issues. Monitoring locations are coordinated with the state's existing ambient and biological monitoring networks. This integrated management of monitoring resources reduces duplication and provides a more complete picture of water quality in a particular watershed. Through this program DWQ facilitates the collection of water quality data at 270 monitoring locations on a monthly basis. The Coalition Program has substantially increased the data resources available to the State for making basinwide water quality management decisions.

All coalition monitoring and reporting requirements are documented in a memorandum of agreement (MOA) between DWQ and the individual permit holders. The MOA only affects requirements for instream monitoring. Permit requirements for effluent monitoring are not altered. Each coalition collects data using a state certified laboratory, and all data are submitted in an electronic format. The use of a single contract laboratory for each coalition produces data that is more comparable and consistent than data collected by multiple facilities. Data collected through the Coalition Program is used to evaluate water quality standards and to document water quality changes. Currently, more than 40,000 records are maintained in the coalition database. There are six active coalitions in four river basins (Neuse, Cape Fear, Tar-Pamlico and Yadkin-Pee Dee River basins) with over 140 permitted facilities participating. The first coalition, the Lower Neuse River Basin Association, began working with DWQ in 1994. The Tar-Pamlico River Basin Association, the most recent to form, will begin monitoring in March 2007.

NPDES Discharge Monitoring Coalitions

- Lower Neuse River Basin Association
- Lower Cape Fear River Program
- Middle Cape Fear River Basin Association
- Upper Cape Fear River Basin Association
- Yadkin Pee-Dee River Basin Association
- Tar-Pamlico River Basin Association

2.3.10 DIVISION OF ENVIRONMENTAL HEALTH SHELLFISH SANITATION AND RECREATIONAL WATER QUALITY SECTION

The Shellfish Sanitation and Recreational Water Quality Section of the Division of Environmental Health (DEH) (<http://www.deh.enr.state.nc.us/shellfish/index.html>) is responsible for monitoring and classifying coastal waters as to their suitability for shellfish harvesting for human consumption and coastal recreational swimming. The Shellfish Sanitation Program protects the public from consuming shellfish and crustaceans that could cause illness. Rules and regulations follow national guidelines set forth by the Interstate Shellfish Sanitation Conference (ISSC) and contained within the National Shellfish Sanitation Program (NSSP) *Guide for the Control of Molluscan Shellfish* (<http://www.cfsan.fda.gov/~ear/nss3-toc.html>). The U.S. Food and Drug Administration (FDA) administer the NSSP.

Classifications of coastal waters for shellfish harvesting in North Carolina are done by means of a Sanitary Survey, which includes a shoreline survey of sources of pollution, a hydrographic and meteorological survey, and a bacteriological survey of shellfish growing waters. Sanitary Surveys are conducted of all potential shellfish growing areas in coastal North Carolina and recommendations for closure are made to the Division of Marine Fisheries (DMF) (<http://www.ncfisheries.net/>). Waters are sampled regularly and closed if levels of fecal coliform bacteria indicate that harvesting shellfish from these waters could cause a human health risk.

The Recreational Water Quality Program protects the public by monitoring the water quality of coastal recreational waters and notifying the public when bacteriological standards for safe bodily contact are exceeded. The coastal waters monitored include ocean beaches, sounds, bays and estuarine rivers. The program tests 241 ocean and sound-side areas. All ocean beaches and high-use sound-side beaches are tested weekly from April 1 to September 30. Lower-use beaches are tested twice a month. All sites are tested twice a month in October and then monthly from November through March. Coastal waters are sampled for enterococcus bacteria, an indicator organism found in the intestines of warm-blooded animals. While the enterococcus bacterium will not cause illness, its presence is correlated with that of other organisms that can cause illness.

2.3.11 OTHER WATER QUALITY DATA AND RESEARCH

North Carolina actively solicits "existing and readily available" data and information for each basin as part of the basinwide planning process. Data meeting DWQ quality assurance objectives are used in evaluating water quality. Data and information indicating possible water quality problems are investigated further. Both quantitative and qualitative information are accepted during the solicitation period. High levels of confidence must be present in order for outside

DWQ Data Solicitation Includes:

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

Contact information must accompany all data and information submitted.

quantitative information to carry the same weight as information collected by DWQ and DEH. This is particularly the case when considering waters for the Impaired Waters List (Section 303(d) of the Clean Water Act).

The way solicited data are used depends on the degree of quality assurance and quality control of sample collection and data analysis (Table 2-3). Level 1 data can be used with the same confidence as DWQ data. Level 2 or Level 3 data may be used to help identify causes of pollution and problem parameters.

Table 2-3 Criteria Levels for Use of Outside Data

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 (EPA Guidelines)	Yes or No	No

Level 2 and Level 3 data may also be used to limit the extrapolation of supporting and impaired stream segments or other Level 1 monitoring locations. Where outside data indicates a potential problem, DWQ evaluates the existing DWQ biological and ambient monitoring site locations for appropriate adjustments. All data collected and regularly submitted to DWQ by the NPDES Discharge Monitoring Coalitions are considered Level 1 unless otherwise noted in assessment document or in the basin plans.

2.4 NORTH CAROLINA’S USE SUPPORT CATEGORIES

Under the directive of the federal Clean Water Act (CWA) of 1972, states were required to adopt water quality standards to restore and maintain the chemical, physical and biological integrity of the nation's surface waters. Many states established surface water classifications as a way to manage water quality (Section 2.2). In most cases, the classification is based on the “designated use” or best-intended use for a waterbody. It also became a national policy that each state develop and implement areawide treatment management plans to assure adequate control of point and nonpoint source pollution. In North Carolina, the determination of whether a waterbody is meeting water quality standards for its classification is termed ‘use support assessment’.

Designated uses are descriptions of water quality expectations or water quality goals. A designated use is a legally recognized description of a desired use of the waterbody (EPA, October 2005). Examples of designated uses in North Carolina include: supporting the growth and reproduction of aquatic life; swimming; fish consumption; public drinking water supply; and shellfish harvesting. These are uses that the state wants the waterbody to be healthy enough to support. The Clean Water Act requires that waters attain or maintain the level of water quality needed to support one or more of these designated uses.

The designated use must meet numeric and narrative standards as established by each state. Numeric standards are often expressed as minimum and maximum concentrations of pollutants and include specified averages and frequency and/or recurrence periods. Numeric standards are often associated with chemical and physical parameters such as turbidity, dissolved oxygen, bacteria and pH, among others. Narrative standards are associated with biological monitoring and include the bioclassifications. North Carolina assesses both numeric and narrative standards.

DWQ assesses designated uses by applying five use support categories that assess ecosystem and human health risk. These categories are aquatic life, recreation, fish consumption, water supply and shellfish harvesting. The five categories are tied to the state's surface water classifications and standards adopted by the NC Environmental Management Commission (EMC) (Table 2-4). Water quality standards established by the EMC protect for ecosystem and/or human health depending on the classification. Below is a brief description of each of the five use support categories used to assess water quality in North Carolina and how decisions are currently made for each designated use.

2.4.1 AQUATIC LIFE

Biological community data and water chemistry data are used to make assessments in the aquatic life category. Benthic macroinvertebrate (aquatic insects) and fish samples are the best way to assess the biological integrity of most waterbodies. Insect and fish communities are evaluated once every five years unless a special study is conducted by DWQ's Environmental Sciences Section (ESS). A special study may be conducted to evaluate biological communities for stream reclassifications, potential restoration projects, or to identify potential stream impacts. Chemical parameters that are used to assess aquatic life include dissolved oxygen, pH, chlorophyll *a* and turbidity, just to name a few. Chemical parameters are collected by DWQ on a monthly basis at 365 ambient monitoring stations across the state.

2.4.2 RECREATION

Water quality standards for fecal coliform and enterococci bacteria are used to make assessments in the recreation category. These bacteria do not pose an immediate threat to humans or animals; however, they may indicate the potential presence of other disease-causing organisms that may threaten human health. For the coastal areas and beaches, the NC Division of Environmental Health (DEH) Recreational Monitoring (RECMON) Program is responsible for posting swimming advisories where enterococci bacteria are detected above water quality standards.

2.4.3 FISH CONSUMPTION

Statewide and site-specific fish consumption advisories issued by the DHHS (<http://www.epi.state.nc.us/epi/fish/>) form the basis of assessments in the fish consumption category. This category is based on the human health approach and assesses whether humans can safely consume fish from a particular waterbody.

Table 2-4 Primary Classifications and 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

2.4.4 WATER SUPPLY

Drinking water standards are established by the Division of Environmental Health (DEH) and apply to water that is treated by drinking water facilities. Each year DEH regional water treatment consultants provide DWQ with reports that indicate whether a surface water supply (raw water) had to be closed or switched due to water quality problems. Reports include the frequency and duration of the closure or switch and a description of the water quality concern. This information is then used to assess use support in the water supply category.

2.4.5 SHELLFISH HARVESTING

Shellfish growing areas defined and evaluated by the DEH (<http://www.deh.enr.state.nc.us/shellfish/index.html>) are used to make assessments for shellfish harvesting. DEH defines and evaluates growing areas by surveying the existing land use, determining rainfall amounts in a watershed, and sampling water and shellfish for fecal coliform bacteria. The fecal coliform bacteria standard for human consumption of shellfish must be met for a growing area to be approved for shellfish harvesting.

2.5 DATA INTERPRETATION AND WATER QUALITY ASSESSMENTS

In North Carolina, criteria are established for each of the use support categories to define the minimum pollutant limits, goals, conditions or other requirements necessary for a waterbody to maintain or attain its designated use(s). Waters are supporting their designated use if the criteria for the use support category are met. Waters are impaired if the criteria are not met. Waters with inconclusive data are not rated, and waters where no information is available are no data (Table 2-5). Water quality assessments are used to develop the State's Integrated Report and Impaired Waters List (Section 305(b) and 303(d) of the Clean Water Act) for the federal Environmental Protection Agency (EPA). Water quality assessments and use support ratings also identify waters to be targeted for special studies related to TMDLs and aid other agencies and watershed groups in identifying watersheds for restoration or protection activities.

Many types of data and information are used to determine if the water quality standards, biological aquatic life criteria, and the designated uses of the water are attained. Data from all of the water quality monitoring programs are used in determining use support ratings including data collected for benthic macroinvertebrates and fish communities, chemical/physical parameters (ambient monitoring), fish consumption advisories from DHHS, swimming advisories and shellfish surveys from DEH. Data also includes information collected from other organizations (i.e., universities, coalitions and volunteer monitoring programs) that have an approved Quality Assurance Project Plan (QAPP) (http://h2o.enr.state.nc.us/esb/qa_000.html) with DWQ. Organizations without a QAPP can still submit data and information to assist DWQ in the development of basinwide water quality plans.

When interpreting data and other descriptive and qualitative information, it is important to understand the associated limitations and degree of uncertainty. Although use support methods have been established and are used for analyzing data and information and determining use support ratings, best professional judgment is also used. 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 designated use, and document potential stressors contributing to water quality degradation and the sources of those contributions.

Assessment methods continue to improve over time. The information and technology used to make use support decisions continue to become more accurate and comprehensive as scientific methodology changes, data becomes more readily available, and EPA guidance changes.

2.5.1 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 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.

2.5.2 BASIS OF ASSESSMENT – MONITORED V. EVALUATED

Assessments are made on an overall basis of either monitored (M) or evaluated (E), depending on the level of available information. A monitored rating is based on the most recent data and is site-specific; therefore, monitored ratings are treated with more confidence than an evaluated rating. Evaluated ratings are used when there are no site-specific data.

2.5.3 MULTIPLE MONITORING SITES

There are assessment units with more than one type of monitoring data. When the data from multiple biological data types are gathered, each data type is assessed independently. Biological monitoring is typically assessed independent of ambient monitoring data and either may be used to assign a use support rating for an assessment unit. Monitored data are always used over evaluated information; however, evaluated information can be used to lengthen or shorten

monitored assessment units and to assign use support ratings on an evaluated basis to non-monitored assessment units.

2.5.4 ASSESSMENT METHODOLOGIES – FRESHWATER V. SALTWATER

Both freshwater and saltwater water quality assessments require data analyses of biological data, chemical/physical data and other descriptive and qualitative information in order to determine use support. Unlike freshwater, however, saltwater or estuarine waters also include shellfish growing areas. The Division of Environmental Health (DEH) delineates shellfish growing areas and classifies them based on their suitability for shellfish harvesting and includes Class SA, SB and SC waters. DEH samples growing areas regularly and reevaluates the areas by conducting shellfish sanitation shoreline surveys every three years to determine if the classification is still applicable. Classifications are based on bacteria levels, locations of pollution sources and the availability of shellfish resources (Section 2.4.5).

Freshwater and saltwater are assigned use support ratings of supporting, impaired, not rated or no data depending the classification, data analyses and other quantitative and qualitative information. Table 2-5 provides an overview of water quality assessments associated with freshwater streams and Table 2-6 provides an overview of water quality assessments associated with saltwater or estuarine waters based on DEH growing area classifications.

Table 2-5 Data Interpretation and Water Quality Assessments (Freshwater Streams)

Benthic Macroinvertebrate and/or Fish Community Bioclassification	Ambient Monitoring Criteria	Water Quality Assessments (Use Support Rating)
Excellent Good Good/Fair Natural (Sw) ¹ Moderate Stress (Sw) ¹ Not Impaired ²	Numerical Standard exceeded in ≤10 percent of samples	Supporting
Fair Poor Severe Stress (Sw) ¹	Numerical Standards exceeded in ≥ 10 percent of samples	Impaired
Not Rated	Less than 10 samples collected OR Standard exceeded for dissolved oxygen and pH in swamp streams	Not Rated

Table 2-6 Data Interpretation and Water Quality Assessments (Saltwater or Estuarine Waters)

DEH Classification	DEH Growing Area Description/Criteria	Water Quality Assessment (Use Support Rating)
Approved (APP)	Sanitary Survey indicate the area is in compliance.	Supporting
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 close.	Impaired
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.	Impaired
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.	Impaired
Prohibited (PRO)	No Sanitary Survey; point source discharges; marinas; data do not meet criteria for Approved, Conditionally Approved or Restricted Classification.	Impaired

- 1 Swamp (Sw) streams for benthic macroinvertebrate sampling are defined as streams in the coastal plain that have no visible flow for part of the year but flow during the February to early March benthic monitoring period.
- 2 This designation may be used for flowing waters that are too small to assign a bioclassification (less than a three square mile drainage area) but have a Good/Fair or higher bioclassification using the benthic macroinvertebrate standard qualitative and EPT criteria.
- 3 Swamp (Sw) streams for benthic macroinvertebrate sampling are defined as streams in the coastal plain that have no visible flow for part of the year but flow during the February to early March benthic monitoring period.
- 4 This designation may be used for flowing waters that are too small to assign a bioclassification (less than a three square mile drainage area) but have a Good/Fair or higher bioclassification using the benthic macroinvertebrate standard qualitative and EPT criteria.

2.6 INTRODUCTION TO NORTH CAROLINA’S IMPAIRED WATERS LIST

The *North Carolina Water Quality Assessment and Impaired Waters List* is an integrated report that includes both the 305(b) and 303(d) reports. The *305(b) Report* is compiled to meet the Section 305(b) reporting requirement of the federal Clean Water Act (CWA). The 305(b) portion of the integrated report presents how well waters support designated uses (e.g., swimming, aquatic life support, water supply), as well as likely stressors (e.g., sediment, nutrients) and potential sources of impairment. The *303(d) List* is a comprehensive accounting of all Impaired waters and is derived from the 305(b) Report. North Carolina refers to the Impaired Waters List as the *Integrated Report* because it fulfills both the 305(b) and 303(d) requirements.

Section 303(d) of the CWA enacted in 1972 required States, Territories and authorized Tribes to 1) identify and establish a priority ranking for waters for which technology-based effluent limitations are not stringent enough to attain and maintain water quality standards, 2) establish total maximum daily loads (TMDLs) for the pollutants causing impairment in those waters, and 3) develop and submit the list of Impaired waters and TMDLs biennially by April 1st of every even numbered year to the US Environmental Protection Agency (EPA). EPA is required to approve or disapprove the state-developed 303(d) list within 30 days. For each segment Impaired by a pollutant and identified in the 303(d) list, a TMDL must be developed. TMDLs are not required for waters Impaired by pollution. Here, pollution is defined by the EPA as,

“man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of the water,” and is related to water control structures.

2.6.1 CONTENTS OF THE INTEGRATED REPORT

The Integrated Report includes descriptions of monitoring programs, the use support methodology, and the Impaired waters list. New guidance from EPA places all waterbody assessment units into one unique assessment category (EPA, 2001b). Although EPA specifies five unique assessment categories, North Carolina elects to use seven categories. Each category is described in detail below:

Category 1: Attaining the water quality standard and no use is threatened. This category consists of those waterbody 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 are available to determine if the remaining uses are attained or threatened. This category consists of those waterbody assessment units where at least one of the applicable use support categories are rated "Supporting" and the other use support categories are rated "Not Rated" or "No Data". 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 are 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 were 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 waterbody assessment units where all applicable use support categories, except Fish Consumption, are rated "Not Rated", and the Fish Consumption category is rated "Impaired-Evaluated". Measured data or information to support an attainment determination for any use are 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 waterbody assessment units for which EPA has approved or established a TMDL

and water quality standards have not yet been achieved. Monitoring data will be considered before moving an assessment unit from Category 4a to Categories 1 or 2.

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 waterbody assessment units for which TMDLs will not be attempted because other required regulatory controls (e.g., NPDES permit limits, Stormwater Program rules, etc.) are expected to attain water quality standards within a reasonable amount of time. 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 assessment units 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 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 an absence of 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 waterbody assessment units 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". When more than one pollutant is associated with the impairment of a single waterbody 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 based on biological data. This category consists of waterbody assessment units historically referred to as "Biologically Impaired" waterbodies; these assessment units have no identified cause(s) of impairment although aquatic life impacts have been documented. The waterbody assessment unit will remain in Category 6 until TMDLs have been completed and approved by the EPA.

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" refer 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 assessment units 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 provided. 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 5, 6 and 7 constitute the 2004 North Carolina 303(d) List for the State of North Carolina.

2.6.2 HOW NORTH CAROLINA PROPOSES DELISTING WATERS

In general, waters will move from Categories 5, 6 or 7 when data show that uses are fully supported or when a TMDL has been approved by EPA. In some cases, mistakes have been discovered in the original listing decision and the mistakes are being corrected. Waters appearing on the previously approved Impaired waters list 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 (i.e., the wrong water was identified).
- ❑ EPA has approved a TMDL.

2.7 INTRODUCTION TO TMDLS

A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the state had designated. The calculation must also account for seasonal variation and critical conditions in water quality.

A TMDL includes a water quality assessment that provides the scientific foundation for an implementation plan that outlines the steps necessary to reduce pollutant loads to restore and

maintain standards and aquatic life. For more information on TMDLs and the 303(d) listing process, visit the TMDL website at <http://h2o.enr.state.nc.us/tmdl/>.

Point source implementation plans are included in TMDLs. Thus, any point source discharging to Impaired waters will receive a discharge allocation within the TMDL. In some cases, the allocation may be equal to existing permit limits and therefore not require further action by the wastewater permittee. In other cases, the allocation may require a reduction in loading.

Nonpoint source implementation plans are not included in TMDLs, nor are they required by federal law. Nonpoint source implementation plans can be developed by DWQ, other agencies within DENR, COGs or local government offices.

EPA has provided guidance regarding TMDLs and NPDES stormwater permits. As a result, selected NPDES stormwater permits may contain additional language when subject to a TMDL. Per EPA, MS4s identified in TMDLs as contributors to impairment may be required to develop a management plan that includes additional monitoring and BMP installation associated with pollutants of concern.

2.7.1 SCHEDULING TMDLS

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 prioritized TMDL development for waters Impaired due to bacteria or turbidity. The approach of prioritizing TMDL development based on pollutant has been successfully used in other states. Limited resources are used more effectively with a focus on a particular pollutant. Waters Impaired by other pollutants (i.e., not bacteria) are not excluded from the schedule. However, the majority of waters prioritized for the next few years are associated with bacterial contamination. Compliance with TMDL development schedules provided in the Integrated Report depends upon DWQ and EPA resources.

North Carolina uses biological data to place the majority of waterbody assessment units on the 303(d) list. Additional consideration and data collection are necessary if the establishment of a TMDL for waters on Category 6 is to be expected. It is important to understand that the identification of waters in Category 6 does not mean that they are low priority waters. The assessment of these waters is a high priority for the State of North Carolina. However, it may take significant resources and time to determine the environmental stressors and potentially a cause of impairment. Assigning waters to Category 6 is a declaration of the need for more data and time to adequately define the problems and whether pollution, pollutants or a combination affects waters.

According to EPA guidance (EPA 2004), prioritization of waterbody assessment units for TMDLs need not be reflected in a “high, medium or low” manner. Instead, prioritization can be reflected in 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.
- ❑ 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. Standard violations due to bacteria or turbidity currently receive priority for TMDL development.
- ❑ Classification. 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 a higher priority for TMDL development and/or stressor studies.
- ❑ Basinwide Planning Schedule. (Applicable to Category 6 AUs only). The basinwide schedule is utilized to establish priority for stressor studies.

2.7.2 REVISING TMDLS

Current federal regulations do not specify when TMDLs should be revised. However, there are several circumstances under which it would seem prudent to revisit existing TMDLs. The TMDL analysis of targets and allocations is based upon the existing water quality standards, hydrology, water quality data (chemical and biological), and existing, active NPDES wastewater discharges. Conditions related to any of these factors could be used to justify a TMDL revision. Specific conditions that the Division will consider prior to revising an existing, approved TMDL include the following:

- ❑ A TMDL has been fully implemented and the water quality standards continue to be violated. If a TMDL has been implemented and water quality data indicate no improvement or a decline in overall water quality, the basis for the TMDL reduction or the allocation may need to be revised;
- ❑ A change of a water quality standard (e.g., fecal coliform to *E. coli*). The Division will prioritize review of existing TMDLs and data to determine if a revision to TMDLs will be required;
- ❑ The addition or removal of hydraulic structures to a waterbody (e.g., dams). Substantial changes to waterbody hydrology and hydraulics have the potential to change many aspects of target setting, including the water quality standard upon which the TMDL was developed, the water quality data, and the water quality modeling;
- ❑ Incorrect assumptions were used to derive the TMDL allocations. This would include errors in calculations and omission of a permitted discharge.

Should a TMDL be revised due to needed changes in TMDL targets, the entire TMDL would be revised. This includes the TMDL target, source assessment, and load and wasteload allocations. However, the Division may elect to revise only specific portions of the TMDL. For example, changes may be justifiable to the load and wasteload allocation portions of a TMDL due to

incorrect calculations or inequities. In these cases, revisions to the TMDL allocations would not necessarily include a revision of TMDL targets.