Appendix III

Use Support Methodology
and
Use Support Ratings

Multiple-Category Use Support Methods

DRAFT June 4, 2001

A. Introduction to Use Support

Surface waters are classified according to their best intended uses. Determining how well a waterbody supports its uses (*use support* status) is an important method of interpreting water quality data and assessing water quality.

Surface waters are rated *fully supporting* (FS), *partially supporting* (PS) or *not supporting* (NS). The terms refer to whether the classified uses of the water (i.e., aquatic life protection, recreation and water supply) are being met. For example, waters classified for fishing and secondary contact recreation (Class C for freshwater or SC for saltwater) are rated FS if data used to determine use support did not exceed specific criteria. However, if these criteria were exceeded, then the waters would be rated as PS or NS, depending on the degree of degradation. Waters rated PS or NS are considered to be impaired. Waters lacking data, or having inconclusive data, are listed as not rated (NR). More specific methods are presented in Part C of this appendix.

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

B. Interpretation of Data and Information

Data used in the use support assessments include biological data, chemical/physical data, lakes assessment data, fish consumption advisories from the NC Department of Health and Human Services, and swimming advisories and shellfish sanitation surveys from the NC Division of Environmental Health (as appropriate). Available land cover and land use information is also used, along with water supply reports from regional water treatment plant consultants.

Although there is a general procedure for analyzing the data and information for determining use support ratings, each waterbody is reviewed individually, and best professional judgment is applied during these determinations. Assessments are made on either a monitored (M) or evaluated (E) basis depending on the level of information available. Refer to Part E for more information on the basis of assessments.

When interpreting the use support ratings, it is important to understand its associated limitations and degree of uncertainty. The assessments are not intended to provide precise conclusions about pollutant budgets for specific watersheds. Rather, the intent of use support assessments is

to gain an overall picture of water quality, to describe how well surface waters support the uses for which they were classified, and to document the potential contribution made by different pollution sources.

C. Assessment Methodology

Beginning in 2000 with the *Roanoke River Basinwide Water Quality Plan*, DWQ assesses ecosystem health and human health risk through several use support categories. Six categories are used to assess this approach: aquatic life and secondary recreation, fish consumption, shellfish harvesting, primary recreation, water supply and "other" uses. These categories are tied to the primary classifications applied to NC rivers and streams. A single water could have more than one use support rating corresponding to one or more of the multiple use support categories, as shown in the table below. For many waters, a use support category will not be applicable (N/A) to the best use classification of that water (e.g., swimming is not a best use of a Class C water). A full description of the stream classifications is available in the DWQ document titled: *Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina*.

	Use Support Categories					
Primary Classification	**Ecosystem Approach**	**Human Health Approach**				
	Aquatic Life/Secondary Recreation	**Fish Consumption**	**Primary Recreation**	**Water Supply**	**Shellfish Harvesting**	**Other**
C	X	X	N/A	N/A	N/A	X
SC	X	X	N/A	N/A	N/A	X
B	X	X	X	N/A	N/A	X
SB	X	X	X	N/A	N/A	X
SA	X	X	X	N/A	X	X
WS I – WS IV	X	X	N/A	X	N/A	X

Many types of information are used to determine use support ratings and to identify causes and sources of use support impairment. A use support data file is maintained for each of the 17 river basins. In these files, stream segments are listed as individual records. All existing data pertaining to a stream segment are entered into its record. The following describes the data and methodologies used to make use support assessments for the surface water classifications (described in Section A, Chapter 3) using the six use support categories. These methods will continue to be refined, as additional information becomes available.

Aquatic Life and Secondary Recreation Use Support

The aquatic life and secondary recreation use support category is an ecosystem approach to assess whether aquatic life (benthic macroinvertebrates and fish) can live in and reproduce in the waters of the state and whether waters support secondary recreation (i.e., wading, boating and minimal human body contact with water). This category is applied to all waters of the state. Biological data, ambient monitoring data and NPDES discharger data are all considered in

assessing the aquatic life and secondary recreation use support category. The following is a description of each data type and methods used to assess how well a water is meeting the criteria for aquatic life and secondary recreation protection.

Biological Data

There are two main types of biological data: benthic marcoinvertebrates and fish community. Where recent data for both benthic macroinvertebrates and fish communities are available, both are evaluated in assessing use support. It is important to note that where both ambient data and biological data are available, biological data are given greater weight.

Benthic Macroinvertebrate Bioclassification

Criteria have been developed to assign bioclassifications ranging from Poor to Excellent to each benthic macroinvertebrate sample based on the number of taxa present in the pollution intolerant aquatic insects groups of *Ephemeroptera, Plecoptera* and *Trichoptera* (EPTs) and the Biotic Index (BI), which summarizes tolerance data for all taxa in each collection. The benthos bioclassifications are translated to use support ratings according to the following scheme:

Bioclassification	Use Support Rating
Excellent	Fully Supporting (FS)
Good	Fully Supporting (FS)
Good-Fair	Fully Supporting (FS)
Fair	Partially Supporting (PS)
Poor	Not Supporting (NS)

Due to the increased emphasis put on Fair or Poor bioclassifications and the borderline nature of some bioclassifications, sites should be resampled within 12-24 months after a Fair rating is obtained in 1999 and beyond, if this Fair rating will result in a lower use support rating or if data are from a site never sampled before. This resampling will be done to validate the Fair bioclassification. Such sites will not be given a use support rating until the second sample is obtained. The table below shows how a final use support rating is obtained for sites that are resampled.

New Benthic Macroinvertebrate Classifications (1999 and Beyond) and Data Causing a Decline in Use Support Ratings				
Pre-1999 Bioclassification	**1st sample Bioclassification**	**Draft Use Support Rating**	**2nd sample Bioclassification**	**Final Use Support Rating**
N/A	Fair	NR; resample	Good-Fair, Good or Excellent	FS
N/A	Fair	NR; resample	Fair	PS
N/A	Fair	NR; resample	Poor	NS
N/A	Poor	NS	N/A	NS
Good-Fair, Good or Excellent	Fair	NR; resample	Good-Fair, Good or Excellent	FS
Good-Fair, Good or Excellent	Fair	NR; resample	Fair	PS
Good-Fair, Good or Excellent	Fair	NR; resample	Poor	NS
Good-Fair, Good or Excellent	Poor	NS	N/A	NS

N/A – Not Applicable NR = Not Rated

The use of benthic macroinvertebrate data can be limited in some waters. The accumulation of swamp stream data over nearly a decade suggests that not all swamp streams support similar fauna. The development of swamp stream criteria is complex, and one set of criteria is likely not appropriate for all swamp streams. Benthic macroinvertebrate data will not be used in waters characterized or classified by DWQ as swamp waters until the biological rating criteria for these waters can be used with confidence.

Benthic macroinvertebrate data are not used to develop use support ratings for estuarine waters because the data have not been found to be suitable for use support assessment due to the influence of salinity and bottom substrate on the benthic community structure and the difficulty in determining the aerial extent of a rating from an estuarine macroinvertebrate site.

Benthic macroinvertebrate data are use to provide bioclassifications for high elevation trout streams. These benthos data, while not a direct measure of the trout population, are a robust measure of stream integrity. Loss of canopy, increase in stream temperature, increased nutrients, toxicity and increased sedimentation will affect the benthos and fish community. For these reasons, the benthos bioclassifications provide a valuable assessment of the integrity of trout waters.

Fish Community Bioclassification

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 index incorporates information about species richness and composition, indicator species, trophic function, abundance and condition, and reproductive function. The index is translated to use support rating according to the following scheme:

NCIBI	Use Support Rating
Excellent	Fully Supporting (FS)
Good	Fully Supporting (FS)
Good-Fair	Fully Supporting (FS)
Fair	Partially Supporting (PS)
Poor	Not Supporting (NS)

The NCIBI was recently revised by DWQ (NCDENR, 2001). Currently, the focus of using and applying the NCIBI is restricted to wadeable streams that can be sampled by a crew of four persons. Infrequently, larger wadeable streams can be sampled if there is a crew of six persons. The bioclassifications and criteria have also been recalibrated against regional reference site data (BAU, 2000a, 2000b and 2001).

Criteria and ratings are applicable only to wadeable streams in the following river basins: Broad, Catawba, Savannah, Yadkin-Pee Dee, Cape Fear, Neuse, Roanoke, Tar-Pamilco, French Broad, Hiwassee, Little Tennessee, New and Watauga. In the Cape Fear, Neuse, Roanoke and Tar River basins, the criteria and ratings are only applicable to streams in the piedmont portion of these basins. The definition of the "piedmont" for these four river basins is based upon a map of North Carolina watersheds (Fels, 1997). Specifically:

- In the Cape Fear River basin -- except for the streams draining the Sandhills in Moore, Lee and Harnett counties; the entire basin upstream of Lillington, NC.
- In the Neuse River basin -- the entire basin above Smithfield and Wilson, NC, except for the south and southwest portions of Johnston County and the 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, NC, except for the lower southeastern one-half of Halifax County and the extreme eastern portion of Nash County.

Criteria and ratings 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, cold water 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 non-wadeable and large streams and rivers throughout the state.

New Fish Community Classifications (1999 and Beyond) and Data Causing a Decline in Use Support Ratings				
Pre-1999 Bioclassification	**1st sample Bioclassification**	**Draft Use Support Rating**	**2nd sample Bioclassification**	**Final Use Support Rating**
N/A	Fair	NR; resample	Good-Fair, Good or Excellent	FS
N/A	Fair	NR; resample	Fair	PS
N/A	Fair	NR; resample	Poor	NS
N/A	Poor	NS	N/A	NS
Good-Fair, Good or Excellent	Fair	NR; resample	Good-Fair, Good or Excellent	FS
Good-Fair, Good or Excellent	Fair	NR; resample	Fair	PS
Good-Fair, Good or Excellent	Fair	NR; resample	Poor	NS
Good-Fair, Good or Excellent	Poor	NS	N/A	NS

N/A = Not Applicable; NR = Not Rated; FS = Fully Supporting, PS = Partially Supporting, and NS = Not Supporting.

Ambient Monitoring Data

Chemical/physical water quality data are collected through the DWQ Ambient Monitoring System. These data are downloaded from the ambient database, the Surface Water Information Management System, for analysis. Total number of samples and percent of samples exceeding the NC standards are used for use support ratings along with other data or alone when other data are not available. Where both ambient data and biological data are available, biological data are given greater weight.

When reviewing ambient data, a five-year window of data that ends on August 31 of the year of biological sampling is used. For example, if a basin is sampled in 2000, then the five-year window for the basin would be September 1, 1995 to August 31, 2000. Selected ambient parameters are used to assess aquatic life/secondary recreation use support. These parameters include NH_3, dissolved oxygen, pH, Cl, As, Cd, Cr, Ni and Pb. These parameters are measured against standards for a minimum of ten samples as follows:

Standards Violation	Rating
Criterion exceeded ≤10%	Fully Supporting
Criterion exceeded 11-25%	Partially Supporting
Criterion exceeded >25%	Not Supporting

Data for copper, iron and zinc are not used according to the percent criterion exceeded scheme outlined above. These metals have action level standards because they are generally not bioaccumulative and have variable toxicity to aquatic life depending on chemical form, solubility and stream characteristics. In order for an action level standard to be violated, there must be a toxicological test that documents an impact on a sensitive aquatic organism. The action level standard is used to screen waters for potential problems with copper, iron and zinc.

Metals data for Cu and Fe are screened at the 85th percentile of five years of ambient data ending on August 31 of the year of biological sampling. Sites, other than estuarine and swamp waters, with an 85th percentile of ≥20 µg/l of Cu and/or ≥2000 µg/l of Fe are identified and flagged for instream chronic toxicity testing by DWQ. Chronic toxicity testing in estuarine and swamp waters is not ecologically meaningful. Criteria are still being developed for zinc. If a stream does not have biological data that would deem a FS rating, then the stream can be rated PS or NS for aquatic life if instream chronic toxicity is found. Criteria for evaluating instream chronic toxicity are three chronic pass/fail tests over three months using *Ceriodaphnia*. Three fails result in a NS rating, and two fails result in a PS rating.

It is important to note that some waters may exhibit characteristics outside the appropriate standards due to natural conditions (e.g., many swamp waters are characterized by low pH and dissolved oxygen). These natural conditions do not constitute a violation of water quality standards.

NPDES Discharger Data

Aquatic Toxicity Data

For facilities that perform Whole Effluent Toxicity (WET) tests per state NPDES discharge permit requirements, a review of the results of a five-year window of data that ends on August 31 of the year of biological sampling is used. For example, if a basin is sampled in 2000, then the five-year window for the basin would be September 1, 1995 to August 31, 2000. If a stream with a WET test facility has not been sampled for instream chronic toxicity, biological community data or has no ambient data, and that facility has ≥3 fails in the most recent 2 years, the stream is not rated. If failures continue, DWQ will work with the facility to correct the failures and assess stream impacts before the next basin sampling cycle begins with either a biological survey or instream chronic toxicity testing, if possible.

Discharge Effluent Data

NPDES effluent data are reviewed by analyzing monthly averages of water quality parameters over a two-year period (date ending on August 31 of the year of biological sampling). Prior to May 31, 2000, facilities are screened for criterion 40% in excess of state standards for conventional pollutant limitations or 20% in excess of state standards for toxic pollutants for two or more months during two consecutive quarter review periods or chronic violations of either conventional or toxic pollutant limitations for four or more months during 2 consecutive quarter review periods. After May 31, 2000, facilities are screened for criterion 20% in excess of state standards for both conventional and toxic pollutants for two or more months during two consecutive quarter review periods or chronic violations of either conventional or toxic pollutant limitations for four or more months during 2 consecutive quarter review periods. Streams with discharges that are in excess of permit limits will not be rated if no biological or ambient monitoring data are available. Therefore, streams will not be rated PS or NS based on effluent data alone. Appropriate DWQ staff will be given a list of these facilities for follow-up.

In special situations, where there are currently insufficient biological data available, the basinwide planner will make a request of the DWQ Environmental Sciences Branch to determine whether a biological survey is appropriate. If a biological survey is appropriate, the stream

rating will be determined by the bioclassification resulting from the survey. If a biological survey is not appropriate, then the stream will be given a NR rating.

Problem Parameters

Where an ambient parameter is identified as a potential concern, the parameter is listed in the DWQ database and use support summary table. Where habitat degradation is identified by DWQ biologists based on site visits, it is listed and attempts are made to identify the type of habitat degradation (e.g., sedimentation, loss of woody habitat, loss of pools, loss of riffles, channelization, lack of riparian vegetation, streambed scour and bank erosion). Habitat evaluation methods are being developed to better identify specific types of habitat degradation.

Sources

General nonpoint sources (NP) and point sources (P) of pollution are identified where there is sufficient information.

Basis of Assessment

FS ratings are extrapolated up tributaries from monitored streams when no problematic dischargers or change in land use/cover are identified. The FS rating may be applied to unmonitored tributaries where there is little land disturbance (e.g., national forests). Problem parameters or sources (except general NPS) are not applied to unmonitored tributaries. PS or NS ratings are not extrapolated to unmonitored tributaries. Refer to Part E for more information.

Fish Consumption Use Support

The fish consumption use support category is a human health approach to assess whether humans can safely consume fish from a water. This use support category is applied to all waters of the state. The use support rating is assigned using fish consumption advisories issued by the NC Department of Health and Human Services.

If a limited fish consumption advisory is posted at the time of use support assessment, the water is rated PS. If a no consumption advisory is posted at the time of use support assessment, the water is rated NS. The current statewide fish consumption advisory for bowfin due to elevated levels of mercury in fish tissue is an exception. For this reason, the fish consumption use support rating for all waters of the state is PS. However, it is recognized that bowfin only live and reproduce in waters of the piedmont and coastal plain. In order to separate out other fish consumption advisories and to identify actual bowfin populations with high levels of mercury, only waters with fish tissue monitoring data are presented on the use support maps and in the use support summary tables. A review of the present methods for assessing the fish consumption use support category is being conducted, and methods could be modified to take in account fish tissue and fish population data.

Only those waters that have been monitored for fish tissue and do not have an advisory are rated FS. Only waters sampled from 1989 on are considered, because these waters were sampled using more rigorous methods than those sampled before this date. All waters not monitored or evaluated and without advisories are not rated.

Primary Recreation Use Support

In addition to the use support categories applicable to Class C and SC waters, the primary recreation use support category will be assessed for all Class B, Class SA and Class SB waters where data are available. This use support category is a human health approach to assess whether waters support primary recreation activities such as swimming, water-skiing, skin diving, and similar uses involving human body contact in an organized or frequent basis. The use support rating is based on swimming advisories issued by local health departments and by the NC Division of Environmental Health (DEH) beach monitoring program.

Freshwaters

Fecal coliform bacteria data are used to assess Class B waters. Each January, the geometric mean for ambient stations in Class B waters for the prior sampling year is obtained and a screen is conducted for waters with geometric means >200 colonies per 100 ml. Monitored Class B waters are rated FS if the geometric mean is ≤200 colonies per 100 ml. If the geometric mean is >200 colonies per 100 ml during the past year, fecal coliform bacteria are noted as a problem parameter, and a request is made of the DWQ regional office to sample this water 5 times/30 days in June during non-runoff events, if possible. If this 5 times/30-day monitoring, as required to assess the NC standard, indicates a geometric mean above 200 colonies per 100 ml, then the data are sent to DEH for consideration of posting swimming advisories. The DWQ regional office should continue to sample the stream 5 times/30 days during the months of July and August and send the data to DEH. Because North Carolina's fecal coliform bacteria standard is 200 colonies per 100 ml for the geometric mean of *five samples taken in a thirty-day period*, fecal coliform bacteria are listed as a cause of impairment for the 303(d) list only when additional sampling has determined that the standard is being exceeded.

If a water is posted with an advisory for at least two months in the past five years ending on August 31 of the year of biological sampling, it is rated as PS unless DEH staff believes that the cause of fecal problems is not persistent. Those waters posted as "Do Not Swim" for more than two months in the past five years are rated NS. Class B waters without fecal or advisory data are not rated.

DWQ attempts to determine if there are any inland swimming areas monitored by county or local health departments. County or local health departments are asked to list those waters with swimming advisories posted for at least two months in the past five years ending on August 31 of the year of biological sampling.

Estuarine waters

DEH fecal coliform data are used to assess estuarine (SA and SB) waters. Each January, DEH submits a letter to DWQ stating which coastal waters were posted with an advisory reporting an increased risk from swimming during the prior year. Those Class SA or SB waters with an advisory for at least two months in the past five years ending on August 31 of the year of biological sampling are rated PS, unless DEH staff believes that the cause of fecal problems is not persistent. Those waters posted as "Do Not Swim" for more than two months in the past five years are rated NS. If DEH has no data on a water, that water will not be rated. If ambient data show fecal coliform bacteria geometric mean of >200 colonies per 100 ml, then a request is

made of the DWQ regional office to sample this water 5 times/30 days in June during non-runoff events, if possible. If this 5 times/30-day monitoring, as required to assess the NC standard, indicates a geometric mean above 200 colonies per 100 ml, then the data are sent to DEH for consideration of posting swimming advisories. The DWQ regional office should continue to sample the water 5 times/30 days during the months of July and August and send the data to DEH. Because North Carolina's fecal coliform bacteria standard is 200 colonies per 100 ml for the geometric mean of *five samples taken in a thirty-day period*, fecal coliform bacteria are listed as a cause of impairment for the 303(d) list only when additional sampling has determined that the standard is being exceeded.

Water Supply Use Support

This use support category is used to assess all Class WS waters. The water supply use support category is a human health approach to assess whether a water can be safely consumed after adequate treatment. Most drinking water supplies in NC are drawn from human-made reservoirs that often have multiple uses.

Water supply use support is assessed using information from the seven regional water treatment plant (WTP) consultants. Each January, the WTP consultants will submit a spreadsheet listing each closure and water intake switch-over for every water treatment plant in their region. This spreadsheet will describe the length and time of the event, contact information for the WTP, and the cause of the closure or switch.

Use support for water supply will be fine-tuned to determine what closures/switches were due to water quality concerns. Those closures/switches due to water quantity and reservoir turnovers will not be considered for use support. The frequency and duration of closures/switches due to water quality concerns are considered when assessing use support. In general, North Carolina's surface water supplies are in good condition and most, if not all, will be rated FS. Specific criteria for rating waters PS or NS are yet to be determined.

Other Uses: All Waters in the State

This category of use will be assessed infrequently but could be applied to any water in the state. Examples of uses that fall into this category are aesthetics and industrial and agricultural water supply. This category allows for the assessment of any use that is not considered by aquatic life and secondary recreation, primary recreation, fish consumption, shellfish harvesting or water supply.

D. Use of Outside Data

DWQ actively solicits outside data and information in October prior to the basinwide sampling year. The solicitation allows for approximately 60 days to submit data. 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 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 draft 2000 303(d) report and shown in the table below.

Level 1 data can be used in the same fashion 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 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.

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/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/No	No
Quality assurance plan available describing sample collection and handling	Yes, rigorous scrutiny	Yes/No	No

E. Monitored vs. Evaluated

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

FS ratings are extrapolated up tributaries to monitored streams where there are no dischargers with permit violations or changes in land use/cover. Problem parameters or sources (except general NPS) are not applied to unmonitored tributaries. PS or NS ratings are not applied to unmonitored tributaries. Refer to the following summary for the basis of assigning use support ratings.

Summary of Basis for Assigning Use Support Ratings to Freshwater Streams

Overall Basis	Specific Basis	Description
Monitored	Monitored (M)	Monitored stream segments[a] with data[b] ≤5[c] years old.
	Monitored/Evaluated (ME)	Stream segment[a] is unmonitored, but is assigned a use support rating based on another segment of same stream for which data[b] ≤5[c] years old are available.
Evaluated	Evaluated (E)	Unmonitored streams that are direct or indirect tributaries to monitored stream segments rated FS. Must share similar land use to the monitored stream segment.
	Evaluated/Old Data (ED)	Monitored stream segments[a] with available data[b] >5[c] years old.
Not Rated	Not Rated (NR)	Insufficient or no data available to determine use support. Includes unmonitored streams that are direct or indirect tributaries to stream segments rated PS or NS.

a) A stream segment is a stream, or a portion thereof, listed in the Classifications and Water Quality Standards for a river basin. Each segment is assigned a unique identification number (index number).
b) Major data sources include benthic macroinvertebrate bioclassifications and chemical/physical monitoring data.
c) From the year that basin monitoring was done.

F. Nutrient Enrichment Issues

The complex and dynamic ecosystem interactions that link chemical and physical water quality parameters and biological response variables must be considered when evaluating use support. In general, North Carolina assesses use support by determining if a water's *uses*, such as water supply, fishing and recreation, are met. Violations of water quality standards in lakes or estuaries are not equated with use impairment unless uses are not met. In following this approach, use support for aquatic life propagation, maintenance of biological integrity, recreation and water supply can be holistically evaluated.

One of the main causes of impacts to lakes and estuaries is nutrient enrichment, or eutrophication. Several water quality variables may help to describe the level of eutrophication. These include pH, chlorophyll *a*, dissolved oxygen, phosphorus, nitrogen, turbidity, total dissolved gases and other quantitative indicators, some of which have specific water quality standards. It is generally agreed that excessive amounts of nitrogen and phosphorus are the principal culprits in eutrophication related use impairment. These variables are important concerns; however, climate, hydrology and biological response factors (chlorophyll, phytoplankton, fish kills, etc.) are also essential to evaluate because they may control the frequency of episodes related to potential use impairment. In addition, many of North Carolina's lakes are human-made reservoirs that do not mimic natural systems.

North Carolina does not determine eutrophication related use impairment with the quantitative assessment of an individual water quality variable (i.e., chlorophyll *a*). Likewise, North Carolina does not depend on a fixed index composed of several water quality variables, which does not have the flexibility to adapt to numerous hydrological situations, to determine use impairment. Instead, the weight of evidence approach is most appropriate to determine use support in terms of nutrient enrichment in lakes. This approach can be flexibly applied depending on the amount and quality of available information. The approach uses the following sources of information:

- multiple quantitative water quality variables (e.g., dissolved oxygen, chlorophyll *a*)
- third party reports
- analysis of water quality complaints
- algal bloom reports
- macrophyte observations
- reports from water treatment plant operators
- reports from lake associations
- fish kill reports
- taste and odor observations
- aesthetic complaints
- frequency of noxious algal activity
- reports/observations of the NC Wildlife Resources Commission, NC Division of Marine Fisheries and other agencies

References

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Aquatic Life/Secondary Recreation Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Miles	Rating	Basis	Problem Parameter(s)	Potential Source(s)
DAN RIVER (NC portion)	From North Carolina-Virginia State Line to Big Creek	03-02-01	20.2	FS	M	Turbidity	
DAN RIVER	From Big Creek to US Hwy. 311 in Stokes County	03-02-01	23.5	FS	M		
North Double Creek	From source to Dan River	03-02-01	14.0	FS	M	Habitat degradation	Agriculture
Cascade Creek	From source to backwaters of swimming lake	03-02-01	0.8	FS	M		
Cascade Creek	From backwaters of swimming lake to Dan River	03-02-01	4.3	FS	M		
Snow Creek	From source to Dan River	03-02-01	18.9	FS	M	Habitat degradation	Agriculture
Town Fork Creek	From source to Timmons Cr.	03-02-01	8.0	NS	M	Habitat degradation	Minor Non-municipal Point Source, Agriculture, Hydromodification
Neatman Creek	From source to Town Fork Creek	03-02-01	12.7	FS	M	Habitat degradation	
Belews Creek (Kernersville Lake)	From a point 0.5 mile upstream of backwaters of Kernersville Lake to Town of Kernersville Water Supply Dam	03-02-01	0.5	FS	M		
Mayo River	From North Carolina-Virginia State Line to a point 0.6 mile downstream of Hickory Creek	03-02-02	3.6	FS	M		
Mayo River	From a point 0.6 mile downstream of Hickory Creek to a point 0.9 mile downstream of Avalon Dam	03-02-02	10.8	FS	ME		
Mayo River	From a point 0.9 mile downstream from Avalon Dam to dam at Mayodan Water Supply Intake	03-02-02	0.5	FS	ME		
Mayo River	From dam at Mayodan Water Supply Intake to Dan River	03-02-02	2.4	FS	M	Habitat degradation	Urban Runoff/Storm Sewers, Land Development

Aquatic Life/Secondary Recreation Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Miles	Rating	Basis	Problem Parameter(s)	Potential Source(s)
DAN RIVER	From a point 0.7 mile upstream of Jacobs Creek to a point 0.8 mile downstream of Matrimony Creek	03-02-03	14.2	PS	M	Turbidity	Instream Mining, Agriculture, Land Development
DAN RIVER (NC portion)	From Mill Branch to last crossing of North Carolina-Virginia State Line	03-02-03	7.5	FS	M	Turbidity	
Smith River	From North Carolina-Virginia State Line to a point 0.8 mile downstream of Rockingham County SR 1714 (Aiken Road)	03-02-03	2.8	PS	ME	Habitat degradation	Sources Outside State Jurisdiction or Borders
Smith River	From a point 0.8 mile downstream of Rockingham County SR 1714 (Aiken Road) to Fieldcrest Mills Water Supply Intake	03-02-03	0.5	PS	ME	Habitat degradation	Sources Outside State Jurisdiction or Borders, Urban Runoff/Storm Sewers
Smith River	From Fieldcrest Mills Water Supply Intake to Dan River	03-02-03	1.8	PS	M	Habitat degradation	Sources Outside State Jurisdiction or Borders, Urban Runoff/Storm Sewers
Country Line Creek	From a point 1.0 mile downstream of Nats Fork to dam at Farmer Lake (Town of Yanceyville water supply intake located 1.8 mile upstream of N.C. Hwy. 62)	03-02-04	3.5	FS	M	Habitat degradation	Land Development, Silviculture
Hyco River, including Hyco Lake	From source in Hyco Lake to dam of Hyco Lake, including tributary arms	03-02-05	0.2	FS	M		
Hyco Creek (North Hyco Creek)	From source to Hyco Lake, Hyco River	03-02-05	16.8	FS	M	Habitat degradation	Land Development, Silviculture
Hyco River	From dam of Hyco Lake to North Carolina-Virginia State Line, including all portions in North Carolina	03-02-05	6.8	FS	M		

Aquatic Life/Secondary Recreation Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Miles	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Marlowe Creek	From source to Storys Creek	03-02-05	10.9	PS	M	Unknown toxicity Habitat degradation	Minor Industrial Point Source Municipal Collection System Overflows, Urban Runoff/Storm Sewers, Land Development
Mayo Creek (Maho Creek) (Mayo Reservoir)	From source to dam of Mayo Reservoir	03-02-05	6.5	FS	M		
Grassy Creek (Grass Creek)	From source to John H. Kerr Reservoir at Granville County SR 1431	03-02-06	18.3	FS	M		
Island Creek (Island Creek Reservoir)	From source to North Carolina-Virginia State Line	03-02-06	6.4	FS	M		
Nutbush Creek (Including Nutbush Cr Arm of John H. Kerr Reservoir)	From source to Crooked Run	03-02-06	4.6	PS	M	Unknown toxicity Habitat degradation Nutrients	Major Municipal Point Source Municipal Collection System Overflows, Urban Runoff/Storm Sewers, Land Development Source Unknown
Nutbush Creek Arm of John H. Kerr Reservoir	From Crooked Run to North Carolina-Virginia State Line	03-02-06		FS	M		
Smith Creek	From source to North Carolina-Virginia State Line	03-02-07	10.4	PS	M	Habitat degradation	Agriculture
ROANOKE RIVER (Lake Gaston)	From North Carolina-Virginia State Line to a line across Lake Gaston following the Warren-Northampton County Line	03-02-07	0.1	FS	M		
Sixpound Creek	From source to Lake Gaston, Roanoke River	03-02-07	6.3	FS	M		
ROANOKE RIVER (Lake Gaston)	From a line across Lake Gaston following the Warren-Northampton County Line to a line across Lake Gaston 0.5 mile upstream of Lake Gaston Dam	03-02-07	5.2	FS	M	Aquatic Weeds	

Aquatic Life/Secondary Recreation Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Miles	Rating	Basis	Problem Parameter(s)	Potential Source(s)
ROANOKE RIVER (Roanoke Rapids Lake	From a line across Lake Gaston 0.5 mile upstream of Lake Gaston Dam to Roanoke Rapids Dam	03-02-07 03-02-08	4,893 acres	PS	M	Aquatic Weeds	
Deep Creek	From source to a point 0.5 mile upstream of mouth	03-02-08	11.6	NR	M		
ROANOKE RIVER	From Roanoke Rapids Dam to a point 0.6 mile upstream of N.C. Hwy. 48 bridge	03-02-08	1.6	FS	ME		
ROANOKE RIVER	From a point 0.6 mile upstream of N.C. Hwy. 48 bridge to a line across river 50 feet downstream of N.C. Hwy. 48 (City of Roanoke Rapids, Town of Weldon water supply intakes)	03-02-08	1.7	FS	ME		
ROANOKE RIVER	From a line across the river 50 ft downstream of NC Hwy 48 bridge to the confluence of Sandy Run Cr at the Bertie/Northampton/Halifax Co. line	03-02-08	50.1	FS	M		
ROANOKE RIVER	From the confluence of Sandy Run Cr at the Bertie/ Northampton/Halifax Co. line to the 18 mile marker at Jamesville	03-02-08	70.3	FS	M	Habitat degradation	Hydromodification, Erosion and Sedimentation
Quankey Creek	From source to Little Quankey Creek	03-02-08	16.0	NR	M		
Quankey Creek	From Little Quankey Creek to Roanoke River	03-02-08	3.4	PS	M	Habitat degradation	Hydromodification
Occoneechee Creek	From source to Roanoke River	03-02-08	14.6	NR	M		
Conoconnara Swamp	From source to Roanoke River	03-02-08	17.71	NR	M	Habitat degradation	Agriculture

Aquatic Life/Secondary Recreation Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Miles	Rating	Basis	Problem Parameter	Potential Source(s)
Kehukee Swamp (White Millpond)	From source to Roanoke River	03-02-08	10.6	NR	M		
Conoho Creek	From source to Martin Co 1417 below Beaverdam Cr	03-02-09	24.5	NR	M	Habitat degradation	Agriculture
Conoho Creek	From Martin Co 1417 to Roanoke River	03-02-09	7.0	FS	M		
Hardison Mill Creek	From source to Sweetwater Creek	03-02-09	19.9	NR	M	Habitat degradation	Agriculture, Hydromodification
Deep Run Swamp	From source to Gardners Creek	03-02-09	9.4	NR	M	Habitat degradation	Agriculture, Hydromodification
ROANOKE RIVER	From 18 mile marker at Jamesville to Albemarle Sound (Batchelor Bay)	03-02-09	18.3	FS	M		
Welch Creek	From source to Roanoke River	03-02-09	13.3	NR	M		
ALBEMARLE SOUND (Batchelor Bay)	West of a line extending from a point of land 0.3 mile north of mouth of Morgan Swamp in a southerly direction to a point of land on the eastside of the mouth of Roanoke River	03-02-09	2,586 acres	FS	M		
Cashie River	From source to Bertie County SR 1225	03-02-10	15.2	NR	M		
Cashie River	From Bertie County SR 1225 to a point 1 mile upstream from Bertie Co. SR 1500	03-02-10	30.1	NR	M		
Hoggard Mill Creek	From source to Cashie River	03-02-10	7.4	NR	M		
Roquist Creek	From source to Cashie River	03-02-10	26.3	NR	M	Habitat degradation	
Wading Place Creek	From source to Cashie River	03-02-10	7.4	NR	M	Habitat degradation	

Fish Consumption Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Classification	Miles	Rating	Basis	Problem Parameter
East Belews Creek (East Belews Creek Arm of Belews Lake)	From backwaters of Belews Lake (Forsyth County SR 2140) to Southern Railroad Bridge	30201	B	0.5	PS	M	Fish consumption advisory Statewide Bowfin
Arm of Belews Lake immediately southeast of Belews Lake Dam	Entire Arm	30201	WS-IV&B	3,500 acres	PS	M	Fish consumption advisory Statewide Bowfin
Hyco River, including Hyco Lake below elevation 410	From source in Hyco Lake to dam of Hyco Lake, including tributary arms below elevation 410	30205	WS-V&B	3,750 acres	PS	M	Fish consumption advisory Statewide Bowfin & Selenium
ROANOKE RIVER	From Roanoke Rapids Dam to a point 0.6 mile upstream of N.C. Hwy. 48 bridge	30208	WS-IV	1.6	PS	ME	Fish consumption advisory Statewide Bowfin
ROANOKE RIVER	From a point 0.6 mile upstream of N.C. Hwy. 48 bridge to a line across river 50 feet downstream of N.C. Hwy. 48	30208	WS-IV CA	1.7	PS	ME	Fish consumption advisory Statewide Bowfin
ROANOKE RIVER	From the confluence of Sandy Run Cr at the Bertie/Northampton/Halifax Co. line to the 18 mile marker at Jamesville	30208	C	70.3	PS	M	Fish consumption advisory Statewide Bowfin
ROANOKE RIVER	From a line across the river 50 ft downstream of NC Hwy 48 bridge to the confluence of Sandy Run Cr at the Bertie/Northampton/Halifax Co. line	30208	C	50.1	PS	M	Fish consumption advisory Statewide Bowfin
ROANOKE RIVER	From 18 mile marker at Jamesville to Albemarle Sound (Batchelor Bay)	30209	C Sw	18.3	PS	M	Fish consumption advisory Statewide Bowfin & Dioxin
Welch Creek	From source to Roanoke River	30209	C Sw	13.3	NS	M	Fish consumption advisory Statewide Bowfin & Dioxin
ALBEMARLE SOUND (Batchelor Bay)	West of a line extending from a point of land 0.3 mile north of mouth of Morgan Swamp in a southerly direction to a point of land on the eastside of the mouth of Roanoke River	30209	B Sw		PS	ME	Fish consumption advisory Statewide Bowfin & Dioxin

Fish Consumption Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Classification	Miles	Rating	Basis	Problem Parameter
Cashie River	From source to Bertie County SR 1225	30210	C Sw	15.2	PS	ME	Fish consumption advisory Statewide Bowfin
Cashie River	From source to Bertie County SR 1225	30210	C Sw	15.2	PS	ME	Fish consumption advisory Statewide Bowfin
Cashie River	From Bertie County SR 1225 to a point 1 mile upstream from Bertie Co. SR 1500	30210	C Sw	30.1	PS	M	Fish consumption advisory Statewide Bowfin
Cashie River	From a point 1.0 mile upstream from Bertie County SR 1500 to the Thoroughfare (The Gut between Cashie and Roanoke Rivers)	30210	B Sw	2.3	PS	ME	Fish consumption advisory Statewide Bowfin
Cashie River	From the Thoroughfare (The Gut between Cashie and Roanoke Rivers) to N.C. Hwy. 45	30209	C Sw	5.8	PS	ME	Fish consumption advisory Statewide Bowfin
Cashie River	From N.C. Hwy. 45 to Albemarle Sound (Batchelor Bay)	30209	B Sw	1.2	PS	ME	Fish consumption advisory Statewide Bowfin

Primary Recreation Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Classification	Miles	Rating	Basis
Cascade Creek	From source to backwaters of swimming lake	03-02-01	B ORW	0.8	FS	ME
Cascade Creek	From backwaters of swimming lake to Dan River	03-02-01	B	4.3	FS	M
Arm of Belews Lake immediately southeast of Belews Lake Dam (Below elevation 725)	Entire Arm	03-02-01	WS-IV&B	3,500 acres	FS	M
Hyco River, including Hyco Lake below elevation 410	From source in Hyco Lake to dam of Hyco Lake, including tributary arms below elevation 410	03-02-05	WS-V&B	3,750 acres	FS	M
South Hyco Creek (Lake Roxboro)	From backwaters of Lake Roxboro to dam at Lake Roxboro	03-02-05	WS-II&B	3.6	FS	M
Nutbush Creek Arm of John H. Kerr Reservoir	From Crooked Run to North Carolina-Virginia State Line	03-02-06	B	21,700 acres	FS	M
Little Nutbush Creek	From source to Nutbush Creek Arm of John H. Kerr Reservoir	03-02-06	B	1.3	FS	ME
Dodson Creek (Dobson Creek)	From source to Nutbush Creek Arm of John H. Kerr Reservoir	03-02-06	B	0.7	FS	ME
Case Quarry Creek	From source to Nutbush Creek Arm of John H. Kerr Reservoir	03-02-06	B	1.1	FS	ME
Dix Branch (Dicks Creek)	From source to Nutbush Creek Arm of John H. Kerr Reservoir	03-02-06	B	1.0	FS	ME
ROANOKE RIVER (Lake Gaston)	From North Carolina-Virginia State Line to a line across Lake Gaston following the Warren-Northampton County Line	03-02-07	WS-V&B	10,100 acres	FS	M
ROANOKE RIVER (Lake Gaston)	From a line across Lake Gaston following the Warren-Northampton County Line to a line across Lake Gaston 0.5 mile upstream of Lake Gaston Dam	03-02-07	WS-IV&B	3,300 acres	FS	M
ROANOKE RIVER (Roanoke Rapids Lake)	From a line across Lake Gaston 0.5 mile upstream of Lake Gaston Dam to Roanoke Rapids Dam	03-02-07	WS-IV&B CA	4,893 acres	FS	M
ALBEMARLE SOUND (Batchelor Bay)	West of a line extending from a point of land 0.3 mile north of mouth of Morgan Swamp in a southerly direction to a point of land on the eastside of the mouth of Roanoke River	03-02-09	B Sw	2,586 acres	FS	M

Water Supply Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Classification	Miles	Rating	Basis
DAN RIVER	From Big Creek to US Hwy. 311 in Stokes County	03-02-01	WS-V	23.5	FS	M
Unnamed Tributary at Camp Sertoma	From source to a point 0.6 mile upstream of Stokes County SR 2011	03-02-01	WS-II	0.3	FS	ME
Unnamed Tributary at Camp Sertoma	From a point 0.6 mile upstream of Stokes County SR 2011 to Camp Sertoma raw water intake (Lat: 36 24’ 02" Long: 80 18’ 25")	03-02-01	WS-II CA	0.6	FS	ME
DAN RIVER	From a point 0.2 mile downstream of Town Fork Creek to a point 0.3 mile upstream of Reed Creek	03-02-01	WS-IV	9.2	FS	M
Eurins Creek	From source to Dan River	03-02-01	WS-IV	5.9	FS	ME
Belews Creek	From source to a point 0.5 mile upstream of backwaters of Kernersville Lake	03-02-01	WS-IV	0.2	FS	ME
Belews Creek (Kernersville Lake)	From a point 0.5 mile upstream of backwaters of Kernersville Lake to Town of Kernersville Water Supply Dam	03-02-01	WS-IV CA	0.5	FS	M
Belews Creek (including Belews Lake below elevation 725)	From a point 1.8 mile downstream of the Forsyth-Stokes County Line to Dan River, excluding the Arm of Belews Lake described below which are classified "WS-IV&B"	03-02-01	WS-IV	0.7	FS	M
West Belews Creek (West Belews Creek Arm of of Belews Lake)	From a point 0.4 mile downstream of Powerplant to Belews Creek	03-02-01	WS-IV	2.0	FS	ME
Arm of Belews Lake immediately southeast of Belews Lake Dam	Entire Arm	03-02-01	WS-IV&B	3,500 acres	FS	M
DAN RIVER	From a point 0.3 mile upstream of Reed Creek to Rockingham County SR 1138 (Madison water supply intake)	03-02-02	WS-IV CA	0.6	FS	M
Reed Creek	From source to a point 0.3 mile upstream of mouth	03-02-02	WS-IV	7.8	FS	ME
Reed Creek	From a point 0.3 mile upstream of mouth to Dan River	03-02-02	WS-IV CA	0.4	FS	ME
DAN RIVER	From Rockingham County SR 1138 to a point 0.7 mile upstream of Jacobs Cr.	03-02-02	WS-V	9.1	FS	M

Water Supply Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Classification	Miles	Rating	Basis
Mayo River	From North Carolina-Virginia State Line to a point 0.6 mile downstream of Hickory Creek	03-02-02	WS-V	3.6	FS	M
Mayo River	From a point 0.6 mi downstream of Hickory Creek to a point 0.9 mi downstream of Avalon Dam	03-02-02	WS-IV	10.8	FS	M
Pawpaw Creek	From a point 1.3 mile upstream of Rockingham County SR 1360 to Mayo R.	03-02-02	WS-IV	1.8	FS	ME
Means Creek	From source to Mayo River	03-02-02	WS-IV	4.2	FS	ME
Boaz Creek	From source to Mayo River	03-02-02	WS-IV	4.5	FS	ME
Unnamed Tributary near Stoneville	From source to Mayo River	03-02-02	WS-IV	4.3	FS	ME
Mayo River	From a point 0.9 mile downstream from Avalon Dam to dam at Mayodan Water Supply Intake	03-02-02	WS-IV CA	0.5	FS	M
DAN RIVER	From a point 0.7 mile upstream of Jacobs Creek to a point 0.8 mile downstream of Matrimony Creek	03-02-03	WS-IV	14.2	FS	M
Jacobs Creek	From N.C. Hwy. 704 to Dan River	03-02-03	WS-IV	1.8	FS	ME
Massy Creek	From source to Dan River	03-02-03	WS-IV	3.7	FS	ME
Rock House Creek	From Rockingham Countly SR 2381 to Dan River	03-02-03	WS-IV	6.5	FS	ME
Roach Creek	From source to Dan River	03-02-03	WS-IV	5.7	FS	ME
Whetstone Creek	From source to Dan River	03-02-03	WS-IV	2.4	FS	ME
Buffalo Creek	From source to Dan River	03-02-03	WS-IV	10.2	FS	ME
Matrimony Creek (NC portion)	From source to Dan River	03-02-03	WS-IV	11.2	FS	ME
Bear Creek	From source to North Carolina-Virginia State Line	03-02-03	WS-IV	0.8	FS	ME
Jones Branch (Jones Creek)	From North Carolina-Virginia State Line to Matrimony Creek	03-02-03	WS-IV	0.6	FS	ME
Little Matrimony Creek	From source to Matrimony Creek	03-02-03	WS-IV	4.7	FS	ME
Poplar Creek	From North Carolina-Virginia State Line to Matrimony Creek	03-02-03	WS-IV	1.4	FS	ME
Boiling Springs Branch	From source to Matrimony Creek	03-02-03	WS-IV	0.64	FS	ME

Water Supply Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Classification	Miles	Rating	Basis
DAN RIVER	From a point 0.8 mile downstream of Matrimony Creek to Mill Branch (Town of Eden water supply intake)	03-02-03	WS-IV CA	0.60	FS	M
Mill Branch	From source to Dan River	03-02-03	WS-IV	0.30	FS	ME
Smith River	From North Carolina-Virginia State Line to a point 0.8 mile downstream of Rockingham County SR 1714 (Aiken Road)	03-02-03	WS-IV	2.8	FS	M
Martin Creek	From source to North Carolina-Virginia State Line	03-02-03	WS-IV	1.6	FS	M
Smith River	From a point 0.8 mile downstream of Rockingham County SR 1714 (Aiken Road) to Fieldcrest Mills Water Supply Intake	03-02-03	WS-IV CA	0.5	FS	M
Country Line Creek	From source to a point 1.0 mile downstream of Nats Fork	03-02-04	WS-II	12.0	FS	ME
Hostler Branch	From source to Country Line Creek	03-02-04	WS-II	5.1	FS	ME
Nats Fork	From source to Country Line Creek	03-02-04	WS-II	2.4	FS	ME
Country Line Creek	From a point 1.0 mile downstream of Nats Fork to dam at Farmer Lake	03-02-04	WS-II CA	3.5	FS	M
Fullers Creek	From source to a point 0.8 mile upstream of Yanceyville water supply dam	03-02-04	WS-II	1.0	FS	ME
Fullers Creek	From a point 0.8 mi upstream of Yanceyville water supply dam to Yanceyville water supply dam	03-02-04	WS-II CA	0.6	FS	ME
Hyco River, including Hyco Lake below elevation 410	From source in Hyco Lake to dam of Hyco Lake, including tributary arms below elevation 410	03-02-05	WS-V&B	0.2	FS	M
South Hyco Creek	From source to backwaters of Lake Roxboro	03-02-05	WS-II	5.3	FS	M
Sugartree Creek	From source to South Hyco Creek	03-02-05	WS-II	5.0	FS	ME
South Hyco Creek (Lake Roxboro)	From backwaters of Lake Roxboro to dam at Lake Roxboro	03-02-05	WS-II&B	3.6	FS	M
South Hyco Creek	From dam at Lake Roxboro to a point 0.6 mile downstream of Double Creek	03-02-05	WS-II	4.0	FS	M
Double Creek	From source to South Hyco Creek	03-02-05	WS-II	4.68	FS	ME

Water Supply Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Classification	Miles	Rating	Basis
Broachs Mill Creek	From source to Double Creek	03-02-05	WS-II	5.52	FS	ME
Snipe Creek	From source to Broachs Mill Creek	03-02-05	WS-II	3.22	FS	ME
South Hyco Creek	From a point 0.6 mile downstream of Double Creek to Hyco Lake, Hyco River (City of Roxboro water supply intake)	03-02-05	WS-II CA	0.75	FS	ME
Storys Creek	From source to a point 0.9 mile downstream of N.C. Hwy. 57	03-02-05	WS-II	3.13	FS	ME
Storys Creek [Roxboro City Lake (Lake Issac Walton)]	From a point 0.9 mile downstream of N.C. Hwy. 57 to Roxboro City Lake Dam	03-02-05	WS-II CA	1.2	FS	M
Satterfield Creek	From source to a point 0.5 mile downstream of N.C. Hwy. 57	03-02-05	WS-II	2.4	FS	ME
Satterfield Creek	From a point 0.5 mile downstream of N.C. Hwy. 57 to Roxboro City Lake, Storys Creek	03-02-05	WS-II CA	0.6	FS	ME
Lick Branch	From source to a point 0.6 mile upstream of mouth	03-02-05	WS-II	0.7	FS	ME
Lick Branch	From a point 0.6 mile upstream of mouth to Roxboro City Lake, Storys Cr.	03-02-05	WS-II CA	0.6	FS	ME
Mayo Creek (Maho Creek) (Mayo Reservoir)	From source to dam of Mayo Reservoir	03-02-05	WS-V	6.5	FS	M
Anderson Swamp Creek (Including Anderson Swamp Creek Arm of John H. Kerr Reservoir)	From source to a point 0.6 mile upstream of Vance County SR 1374	03-02-06	WS-III&B	4.1	FS	ME
Anderson Swamp Creek (Including Anderson Swamp Creek Arm of John H. Kerr Reservoir)	From a point 0.6 mile upstream of Vance County SR 1374 to Mill Creek	03-02-06	WS-III&B CA	0.6	FS	ME
ROANOKE RIVER (Lake Gaston)	From North Carolina-Virginia State Line to a line across Lake Gaston following the Warren-Northampton County Line	03-02-07	WS-V&B	10,100 acres	FS	M
ROANOKE RIVER (Lake Gaston)	From a line across Lake Gaston following the Warren-Northampton County Line to a line across Lake Gaston 0.5 mile upstream of Lake Gaston Dam	03-02-07	WS-IV&B	3,300 acres	FS	M

Water Supply Use Support Summary Table – Roanoke River Basin

Name	Description	Subbasin	Classification	Miles	Rating	Basis
Mill Creek	From source to Lake Gaston, Roanoke River	03-02-07	WS-IV	3.0	FS	ME
Poe Creek	From source to Lake Gaston, Roanoke River	03-02-07	WS-IV	2.1	FS	ME
Jimmies Creek (Jimmies Run)	From North Carolina-Virginia State Line to Lake Gaston, Roanoke River	03-02-07	WS-IV	1.1	FS	ME
ROANOKE RIVER (Roanoke Rapids Lake)	From a line across Lake Gaston 0.5 mile upstream of Lake Gaston Dam to Roanoke Rapids Dam	03-02-07	WS-IV&B CA	4,893 acres	FS	M
Black Gut Creek	From source to Devils Branch	03-02-08	WS-IV	1.4	FS	ME
Black Gut Creek	From Devils Branch to Roanoke Rapids Lake, Roanoke River	03-02-08	WS-IV CA	1.0	FS	ME
Devils Branch (Double Branch)	From source to Black Gut Creek	03-02-08	WS-IV	2.5	FS	ME
Deep Creek	From source to a point 0.5 mile upstream of mouth	03-02-08	WS-IV	11.6	FS	ME
Deep Creek	From a point 0.5 mile upstream of mouth to Roanoke Rapids Lake, Roanoke River	03-02-08	WS-IV CA	0.6	FS	ME
ROANOKE RIVER	From Roanoke Rapids Dam to a point 0.6 mile upstream of N.C. Hwy. 48 bridge	03-02-08	WS-IV	1.6	FS	ME
ROANOKE RIVER	From a point 0.6 mile upstream of N.C. Hwy. 48 bridge to a line across river 50 feet downstream of N.C. Hwy. 48 (City of Roanoke Rapids, Town of Weldon water supply intakes)	03-02-08	WS-IV CA	1.7	FS	ME