Appendix III

Use Support Methodology
and
Use Support Ratings

Multiple-Category Use Support Methods

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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 *supporting and impaired*. These ratings refer to whether the classified uses of the water (such as water supply, aquatic life protection and recreation) are being met. For example, waters classified for fish consumption, aquatic life protection and secondary recreation (Class C for freshwater or SC for saltwater) are rated Supporting if data used to determine use support meet certain criteria. However, if these criteria were not met, then the waters would be rated as Impaired. Waters with inconclusive data are listed as Not Rated. Waters lacking data are listed as No Data. More specific methods are presented in Part C of this appendix.

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

Historically, the Supporting use support rating was also subdivided into fully supporting (FS) and fully supporting but threatened (ST). ST was used to identify waters that were fully supporting but had some notable water quality concerns and could represent constant, degrading or improving water quality conditions. North Carolina's past use of ST was very different from that of the US Environmental Protection Agency (EPA), which uses it to identify waters that demonstrate declining water quality (EPA Guidelines for Preparation of the Comprehensive State Water Quality Assessments [305(b) Reports] and Electronic Updates, 1997). Given the difference between the EPA and North Carolina definitions of ST and the resulting confusion that arose from this difference, North Carolina no longer subdivides the supporting category. However, these waters and the specific water quality concerns are identified in the Section B subbasin chapters so that data, management and the need to address the identified concerns are presented.

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 growing area classification from the NC Division of Environmental Health (as appropriate). Available land cover and land use information is also used, along with annual 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.

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 the development of use support ratings for six categories: aquatic life and secondary recreation, fish consumption, shellfish harvesting, primary recreation, water supply and "other" uses. These categories are tied to the uses associated with 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 six use support categories, as shown in the table below. For many waters, a use support category will not be applicable (N/A) to the use classification of that water (e.g., shellfish harvesting is only applied to Class SA waters). A full description of the classifications is available in the DWQ document titled: *Classifications and Water Quality Standards Applicable to Surface Waters 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 water quality impairment. A use support data file is maintained for each of the 17 river basins. All existing data pertaining to a stream segment for each applicable use support category are entered into its record and can include, but is not limited to, use support ratings, basis of assessment, biological data, ambient monitoring data, problem parameters and potential sources. The following describes the data and methodologies used to make use support assessments for the surface water classifications (described in Section A, Chapter 3 of each basin

plan) using the six use support categories. These methods will continue to be refined, as additional information becomes available.

Basis of Assessment

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

Summary of Basis for Assigning Use Support Ratings to Surface Waters			
Use Support Status	**Overall Basis**	**Specific Basis**	**Description**
Supporting/ Impaired	Monitored	Monitored (M)	Monitored stream segments[a] with data[b] ≤5[c] years old where a bioclassification has been assigned to the sampling site and/or ambient and/or fish tissue data exist and/or DEH shellfish growing area data and/or information on posted swimming closures are available; may be applied to any use support category assessed.
Not Rated		Monitored (M)	Monitored stream segments[a] with data[b] ≤5[c] years old where a bioclassification has not been assigned to the sampling site; can only be applied to the Aquatic Life/Secondary Recreation use support category.
Supporting		Monitored/ Evaluated (ME)	Stream segment[a] is not monitored, but is assigned a use support rating based on another segment of same stream for which data[b] ≤5[c] years old are available where a bioclassification has been assigned to the sampling site and/or ambient data are available and the segment is given a Supporting rating; can only be applied to the Aquatic Life/Secondary Recreation use support category.
Supporting	Evaluated	Evaluated (E)	Applied to unmonitored streams that are direct or indirect tributaries to monitored stream segments rated Supporting in the Aquatic Life/Secondary Recreation use support category that share similar land use to the monitored stream segment; waters in the Water Supply use support category where no significant problems have been noted in the Regional Surface Water Supply Reports; waters in the Fish Consumption use support category in river basins that do not contain documented populations of bowfin.
Impaired		Evaluated (E)	Only applied to waters in the Fish Consumption use support category in river basins that contain documented bowfin populations.
Not Rated		Evaluated (E)	Unmonitored streams that receive effluent from a NPDES discharger that has been found to be in "significant noncompliance" or has failed three or more WET tests during the two-year review period; only applied to the Aquatic Life/Secondary Recreation use support category.
No Data (ND)			Insufficient or no data available to determine use support; includes unmonitored streams that are direct or indirect tributaries to stream segments rated Impaired.

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 and fish community bioclassifications and chemical/physical monitoring data.
c) From the year that basin monitoring was done.

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

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.

Potential Sources

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

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 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 protection of aquatic life and secondary recreation.

Biological Data

There are two main types of biological data: benthic marcoinvertebrate 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 monitoring data and biological data are available, biological data are given greater weight.

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

Benthic Macroinvertebrate Bioclassifications

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

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

Due to the increased emphasis placed on Fair or Poor bioclassifications and the borderline nature of some bioclassification scores, 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	Not Rated; resample	Good-Fair, Good or Excellent	Supporting
N/A	Fair	Not Rated; resample	Fair or Poor	Impaired
N/A	Poor	Impaired	N/A	Impaired
Good-Fair, Good or Excellent	Fair	Not Rated; resample	Good-Fair, Good or Excellent	Supporting
Good-Fair, Good or Excellent	Fair	Not Rated; resample	Fair or Poor	Impaired
Good-Fair, Good or Excellent	Poor	Impaired	N/A	Impaired

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 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 bioclassification criteria for these waters can be used with confidence. Benthic macroinvertebrate data are also not used to develop

use support ratings for estuarine waters. Until bioclassification criteria for swamp and estuarine waters are developed, a designation of Not Rated will be used, and these waters will be listed as Not Rated for aquatic life and secondary recreation use support assessments.

Benthic macroinvertebrate data are used to provide bioclassifications for high elevation trout streams. The benthic macroinvertebrate 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 benthic macroinvertebrate and fish communities. For these reasons, the benthic macroinvertebrate bioclassifications provide a valuable assessment of the integrity of trout waters.

A designation of Not Impaired may be used for flowing waters that are too small to be assigned a bioclassification (less than 4 meters in width), but meet the criteria for a Good-Fair or higher bioclassification using the standard qualitative and EPT criteria. This designation will translate into a use support rating of Supporting.

Fish Community Bioclassifications

The North Carolina Index of Biotic Integrity (NCIBI) is a method for assessing a stream's biological integrity by examining the structure and health of its fish community. The NCIBI incorporates information about species richness and composition, indicator species, trophic function, abundance and condition, and reproductive function. The NCIBI is translated into use support ratings according to the following scheme:

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

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 (NCDENR, 2000a, 2000b and 2001a).

NCIBI criteria are applicable only to wadeable streams in the following river basins: Broad, Catawba, Savannah, Yadkin-Pee Dee, Cape Fear, Neuse, Roanoke, Tar-Pamlico, French Broad, Hiwassee, Little Tennessee, New and Watauga. Additionally, the NCIBI criteria are only applicable to streams in the piedmont portion of the Cape Fear, Neuse, Roanoke and Tar-Pamlico River basins. The definition of 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 – all waters except for those draining the Sandhills in Moore, Lee and Harnett counties and the entire basin upstream of Lillington, NC.

- In the Neuse River basin -- the entire basin above Smithfield and Wilson, except for the south and southwest portions of Johnston County and eastern two-thirds of Wilson County.
- In the Roanoke River basin -- the entire basin in North Carolina upstream of Roanoke Rapids, NC and a small area between Roanoke Rapids and Halifax, NC.
- In the Tar-Pamlico River basin -- the entire basin above Rocky Mount, except for the lower southeastern one-half of Halifax County and the extreme eastern portion of Nash County.

NCIBI criteria have not been developed for:

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

Due to the increased emphasis placed on Fair or Poor bioclassifications and the borderline nature of some bioclassification scores, 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 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	Not Rated; resample	Good-Fair, Good or Excellent	Supporting
N/A	Fair	Not Rated; resample	Fair or Poor	Impaired
N/A	Poor	Impaired	N/A	Impaired
Good-Fair, Good or Excellent	Fair	Not Rated; resample	Good-Fair, Good or Excellent	Supporting
Good-Fair, Good or Excellent	Fair	Not Rated; resample	Fair or Poor	Impaired
Good-Fair, Good or Excellent	Poor	Impaired	N/A	Impaired

N/A – Not Applicable NR = Not Rated

Ambient Monitoring Data

Chemical/physical water quality data are collected through the DWQ Ambient Monitoring System. These data are downloaded from the Surface Water Information Management System for analysis. Total number of samples and percent of samples exceeding the NC water quality standards are evaluated for the development of 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 that ends on August 31 of the year of biological sampling is used. For example, if biological data are collected in a basin in 2000, then the five-year window for the ambient data 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 ammonia, dissolved oxygen, pH, chloride, arsenic, cadmium, chromium, nickel and lead. These parameters are measured against standards for a minimum of ten samples as follows:

Standards Violation	Rating
Criterion exceeded ≤10%	Supporting
Criterion exceeded 11-25%	Impaired

Data for copper, iron and zinc are not used according to the 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 copper and iron are screened at the 85^{th} 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 85^{th} percentile of ≥20 µg/l of copper and/or ≥2000 µg/l of iron 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 Supporting rating, then the stream can be rated Impaired 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*. Two fails result in an Impaired rating.

It is important to note that some waters may exhibit characteristics outside the numerical 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 according to state NPDES discharge permit requirements, a review of the results of a five-year window that ends on August 31 of the year of biological sampling is used. For example, if biological data are collected in a basin in 2000, then the five-year window for the aquatic toxicity data 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 failed three or more WET tests in the most recent two 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 of data ending on August 31 of the year of biological sampling in a basin. Prior to May 31, 2000, facilities were screened for criterion 40 percent in excess of state water quality standards for conventional pollutant limitations or 20 percent in excess of state water quality standards for toxic pollutants for two or more months during two consecutive quarters, or chronic violations of either conventional or toxic pollutant limitations for four or more months during two consecutive quarters.

After May 31, 2000, facilities are screened for criterion 20 percent in excess of state water quality standards for both conventional and toxic pollutants for two or more months during two consecutive quarters, or chronic violations of either conventional or toxic pollutant limitations for four or more months during two consecutive quarters. 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 impaired based on effluent data alone. Appropriate DWQ staff will be given a list of these facilities for follow-up.

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 or advice issued by the NC Department of Health and Human Services. If a limited fish consumption advisory or a no consumption advisory is posted at the time of use support assessment, the water is rated Impaired.

The current statewide limited fish consumption advice for bowfin due to elevated levels of mercury in fish tissue is an exception. It is recognized that bowfin only live and reproduce in waters of the piedmont and coastal plain. Therefore, the use support ratings will be based on the combination of the current statewide fish consumption advice for bowfin and the documented presence of bowfin in each river basin as found in *Freshwater Fisheries of North Carolina* (Menhinick, 1991). In river basins where there are documented populations of bowfin (Roanoke,

Chowan, Pasquotank, White Oak, Lumber, Neuse, Tar-Pamlico, Cape Fear, Yadkin-Pee Dee and Catawba), all waters will be rated Impaired for the fish consumption category. In river basins where there are no documented populations of bowfin (Little Tennesee, Hiwassee, Savannah, Watauga, New, French Broad and Broad), the waters will be rated Supporting for the fish consumption category unless there is a site-specific advisory.

In order to separate this statewide advisory from 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 of the basin plans. A review of the present methods for assessing the fish consumption use support category is being conducted, and methods may be modified in the future.

Primary Recreation Use Support

This human health related use support category evaluates waters for the support of primary recreation activities such as swimming, water-skiing, skin diving, and similar uses usually involving human body contact with water where such activities take place in an organized manner or on a frequent basis. Waters of the state designated for supporting these uses are classified as Class B, SB and SA waters. This use support category also evaluates whether waters support secondary recreation activities such as wading, boating, and other uses not involving human body contact with water, and activities involving human body contact with water where such activities take place on an infrequent, unorganized, or incidental basis. Waters of the state designated for supporting these uses are classified as Class C, SC and WS waters. The use support ratings applied to this category are based on the North Carolina water quality standard for fecal coliform bacteria where data are available or where swimming advisories are posted by local and state health agencies.

Water quality standards for fecal coliform bacteria are intended to ensure safe use of waters for recreation (refer to Administrative Code Section 15A NCAC 2B .0200). The North Carolina fecal coliform bacteria standard for freshwater is not to exceed the geometric mean of 200 colonies per 100 ml of at least five samples over a 30-day period and not to exceed 400 colonies per 100 ml in more than 20 percent of the samples during the same period. The 200 colonies per 100 ml standard is intended to ensure that waters are safe enough for water contact through recreation.

Beginning in the summer of 1997, the Division of Environmental Health (DEH) began testing coastal recreation waters (beaches) for fecal coliform bacteria levels to assess the relative safety of these waters for swimming. The Shellfish Sanitation Section of DEH routinely tests approximately 275 coastal sites once a week during the tourist recreational season (April to September), less often the rest of the year. These tests give researchers and the public a gauge of bacteria levels along the North Carolina coast. If an area has elevated bacteria levels, health officials will advise that people not swim there by posting a swimming advisory in the area, and by notifying the local media and county health department.

The Division of Water Quality (DWQ) does not have a comprehensive weekly monitoring program to assess inland waters for fecal coliform bacteria levels. North Carolina has more than 37,000 miles of inland waters and resources are not sufficient to perform comprehensive weekly bacteria monitoring. Rather, DWQ conducts monthly ambient water quality monitoring at

approximately 375 locations across the state. These monthly samplings include fecal coliform bacteria testing of selected lakes, rivers and streams. Ambient water quality samples are routinely collected and sent to DWQ laboratories for analysis using EPA approved laboratory methods, with the exception that sample holding times are not typically within the prescribed six hour limit. These data collection and analysis restrictions may impact the quality assurance of the sample results.

Because use support decisions are made in conjunction with the development of DWQ's basinwide water quality management strategies, all available information and data are evaluated for use support ratings using a five-year assessment period. A five-year data window that ends on August 31 of the year of biological sampling is used. For example, if biological data are collected in a basin in 2000, then the five-year window for the fecal coliform data and swimming advisories would be September 1, 1995 to August 31, 2000. However, an annual screening review of all DWQ ambient fecal coliform data is conducted by DWQ to assess the need for additional monitoring or the need for immediate action by the local or state health agencies to protect public health. In most cases, management strategies to correct waters considered to be impaired due to elevated fecal coliform bacteria levels may require substantial resources and time. Therefore, impairment decisions for bacteria must be made using sound science and data.

Decades of monitoring experience have demonstrated that bacteria concentrations may fluctuate widely in surface waters over a period of time. Thus, a five-year data window and multiple sampling efforts are used to evaluate waters against the North Carolina water quality standard for recreational use support. This level of sampling is needed before waters should be considered impaired and therefore in need of TMDL's or other management strategies. This procedure however, does not preclude any health agency from immediately posting health advisories to warn recreational users of a temporary increase in health risks related to bacterial contamination or other health related episodes.

Each March, DWQ staff will review bacteria data collections from ambient monitoring stations statewide for the previous sampling year. Locations with annual geometric means greater than 200 colonies per 100 ml, or when more than 20 percent of the samples are greater than 400 colonies per 100 ml, are identified for potential follow-up monitoring conducted five times within 30 days as specified by the state fecal coliform bacteria standard. In addition, appropriate health agencies are notified of these locations. If an initial five times within 30 days sampling indicates a geometric mean greater than 200 colonies per100 ml, or more than 20 percent of these samples exceed 400 colonies per100 ml, then the location will continue to be sampled for bacteria persistence. If bacteria concentrations exceed either portion of the state standard, the data are sent to DEH and the local county health director to determine the need for posting swimming advisories. DWQ regional offices will also be notified.

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

Recreational use support decisions are based on a review of both DWQ and DEH monitoring data for the five-year data window. A formal solicitation for readily available and suitable fecal coliform bacteria monitoring data from other sources is conducted in accordance with EPA Section 303(d) guidance. Recreational use support assessments include an annual review of all readily available DWQ ambient monitoring data and may include additional sampling of five times within 30 days. The use support impairment status of any given water and the resulting listing of that water on the State 303(d) List will be determined using two procedures.

Monitored Class B, SB and SA waters are rated supporting for primary recreation if the geometric mean over the five-year data window is less than or equal to 200 colonies per 100 ml, and if less than 20 percent of these samples did not exceed 400 colonies per100 ml. These waters will be rated impaired if either portion of these state standards are not met, or if additional five times within 30 days sampling exceeded either portion of the state standard. Monitored Class C, SC and WS waters are rated impaired if a fecal coliform standard has been exceeded for that waterbody during the five-year data window and subsequent monitoring of five times within 30 days exceeded the 200 colonies per 100 ml geomean, or greater than 20 percent of these samples exceeded 400 colonies per 100 ml over the five-year data window. These waters are rated supporting for secondary recreation if neither portion of the state standard is exceeded. Waters without sufficient fecal coliform data or swimming advisories are not rated and waters with no data are noted as having no data.

DWQ attempts to determine if there are any inland swimming areas monitored by county or local health departments or estuarine (Class SA and SB) waters as assessed by DEH. Each January, DEH, county or local health departments are asked to list those waters which were posted with swimming advisories in the previous year. When reviewing DEH fecal coliform data and local swimming advisories, the same five-year window that ends on August 31 of the year of biological sampling is used. If a water was posted with a swimming advisory for at least two months within the five-year data window, it is further evaluated for the persistence of elevated fecal coliform bacteria levels. Those waters posted with swimming advisories for more than two months in the five-year data window are rated impaired unless county or state health agencies believe that the cause of the swimming advisory is not persistent. If DEH has no data on an estuarine water, that water will not be rated for recreational uses.

Shellfish Harvesting Use Support

The shellfish harvesting use support category is a human health approach to assess whether shellfish can be commercially harvested and is therefore applied only to Class SA waters. The following data sources are used to determine use support ratings for shellfish waters and to determine causes and sources of impairment for these waters.

Division of Environmental Health (DEH) Shellfish Sanitation Surveys

DEH is required to classify all shellfish growing areas as to their suitability for shellfish harvesting. Estuarine waters are delineated according to DEH shellfish management areas (e.g., Outer Banks, Area H-5) which include Class SA, SB and SC waters. DEH samples growing areas regularly and reevaluates the areas by conducting shellfish sanitation surveys every three years to determine if their classification is still applicable. DEH classifications may be changed after the most recent sanitary survey. Classifications are based on DEH fecal coliform bacteria

sampling, locations of pollution sources, and the availability of the shellfish resource. Growing waters are classified as follows:

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

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

It is important to note that DEH classifies all actual and potential growing areas (which includes all saltwater and brackish water areas) for their suitability for shellfish harvesting. Thus, the DWQ Class SA waters must be separated out and rated for shellfish harvesting use support. The acreage of Supporting and Impaired waters are calculated using GIS showing DWQ and DEH classifications as attribute information. However, the DEH "Closed" polygon coverage includes CAC, RES and PRO classifications, and it is not currently possible to separate out the PRO from the RES areas. Therefore, these areas are a combined polygon coverage, and DWQ rates these waters as Impaired.

DWQ use support ratings may be assigned to separate segments within DEH management areas. In assessing use support, the DEH classifications and management strategies are only applicable to those areas that DWQ Class SA (shellfish harvesting waters). This will result in a difference of acreage between DEH areas classified as CAC, PRO, RES and DWQ waters rated as Impaired. For example, if DEH classifies a 20-acre area CAC, but only ten acres are Class SA, only those ten acres of Class SA waters are rated as Impaired.

Sources of fecal coliform bacteria are more difficult to separate out for Class SA areas. DEH describes the potential sources in the sanitary surveys, but they do not describe specific areas affected by these sources. Therefore, in the past, DEH identified the same sources for all Class SA sections of an entire management area (e.g., urban runoff and septic systems). Until a better

way to pinpoint sources is developed, this procedure will continue to be used. A point source discharge is only listed as a potential source when NPDES permit limits are exceeded.

DWQ and DEH are developing the database and expertise necessary to assess shellfish harvesting use support using a frequency of closures-based approach. This database will allow DWQ to better assess the extent and duration of closures in Class SA waters. These tools will not be available for use support determinations in Class SA waters for the 2001 White Oak, 2002 Neuse and 2003 Lumber River basin use support assessments. DWQ believes it is important to identify frequency of closures in these waters, so an interim methodology will be used based on existing databases and GIS shapefiles. There will likely be changes in reported acreages in future assessments using the permanent methods and tools that result from this project. DWQ and DEH hope to have these tools fully developed for using the frequency of closure-based methods for the 2005 Cape Fear River use support assessment and basin plan.

Interim Frequency of Closure-Based Assessment Methodology

The interim method will be used for the 2001 White Oak, 2002 Neuse and 2003 Lumber River basin use support assessments. Shellfish harvesting use support ratings for Class SA waters using the interim methodology are summarized below.

Interim Frequency of Closure-Based Use Support Ratings

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

* Approved waters are closed only during extreme meteorological events (hurricanes).

** CAC and P/R waters are rarely opened to shellfish harvesting.

For CAO areas, DWQ will work with DEH to determine the number of days and acreages that CAO Class SA waters were closed to shellfish harvesting during a five-year window of data that ends on August 31 of the year of biological sampling. For example, if biological data are collected in a basin in 2000, then the five-year window for data review would be September 1, 1995 to August 31, 2000. For each growing area with CAO Class SA waters, DEH and DWQ staff will define subareas within the CAO area that were opened and closed at the same time. The number of days these CAO areas were closed will be determined using DEH proclamation summary sheets and the original proclamations.

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

Proposed Permanent Frequency of Closure-Based Assessment Methodology

Over the next few years DWQ, DEH, Division of Coastal Management (DCM) and Division of Marine Fisheries (DMF) will be engaged in developing a fully functionally database with related georeferenced (GIS) shellfish harvesting areas. The new database and GIS tools will be valuable for the above agencies to continue to work together to better serve the public. DWQ proposes to use information generated by these new tools to do frequency of closure-based shellfish harvesting use support assessments in Class SA waters, starting with the 2005 Cape Fear River basin use support assessment.

Using the new database with georeferenced areas and monitoring sites, DEH will be able to report the number of days each area was closed excluding closures related to named storms. The percent of the five-year data window that individual Class SA waters are closed will be used to make use support determinations for areas that are classified by DEH as CAO. PRO, RES and CAC areas will be rated Impaired and CAO areas will be rated Supporting or Impaired based on the methodology outlined above in the interim methods. Growing areas that have been reclassified by DEH during the data window from a lower classification to APP will be rated FS. Areas that are reclassified from APP to CAO during the data window will be rated as described above in the interim methods, taking into account the total days closed during the data window, including when the area was classified as APP.

Water Supply Use Support

This use support category is used to assess all Class WS waters and is a human health approach to assess whether a water can be used for water supply purposes. Many 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 submit a spreadsheet listing closures and water intake switch-overs for all water treatment plants in their region. This spreadsheet describes the length and time of the event, contact information for the WTP, and the reason for the closure or switch.

The WTP consultants' spreadsheets are reviewed to determine if any closures/switches were due to water quality concerns. Those closures/switches due to water quantity problems and reservoir turnovers are not considered for use support. The frequency and duration of closures/switches due to water quality concerns are considered when assessing use support. In general, North Carolina's surface water supplies are currently rated supporting. Specific criteria for rating waters impaired 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 could 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 for 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 the year before biological sampling in a particular basin. The solicitation allows approximately 60 days for data to be submitted. Data from sources outside DWQ are screened for data quality and quantity. If data are of sufficient quality and quantity, they may be incorporated into use support assessments. A minimum of ten samples for more than a one-year period is needed to be considered for use support assessments.

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

One of the main causes of impacts to lakes is nutrient enrichment, or eutrophication. Several water quality variables 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. Climate, hydrology, morphology and water chemistry also play important roles in controlling the impacts of nutrients on a system. In addition, many of North Carolina's lakes are human-made reservoirs that do not mimic natural systems. Therefore, any analysis related to eutrophication must consider these variables as well.

North Carolina's lakes and reservoirs support a variety of uses including aquatic life propagation and maintenance, recreation and water supply. Prior to 2002, lake and reservoir use support was determined based mainly on extent and duration of documented algal blooms, extensive aquatic weed infestations, fish advisories and habitat degradation. Beginning in 2002, lakes and reservoirs will also be evaluated similarly to free-flowing waters where sufficient, quality-

assured, surface water quality data (10 or more observations) are available for a more reliable comparison to surface water quality standards.

The first step in a lake analysis is the identification of the water quality parameters that assist in describing the level of eutrophication of a system. North Carolina has adopted surface water quality standards for all of the enrichment-related parameters except phosphorus and nitrogen. Control of phosphorus and nitrogen inputs to North Carolina water bodies has been achieved through a variety of management strategies including the use of the current eutrophication-related standards and the Nutrient Sensitive Waters supplemental classification. Working with EPA, the state is developing an action plan to achieve better nutrient management and continue moving to a more proactive approach to nutrient control.

DWQ uses many sources of information to assess the water quality and trophic status of lakes (refer to Appendix A-II for further information). These sources include:

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

Beginning in 2002, another modification to lake use assessment is the evaluation and subsequent rating of a lake or reservoir by segments. In some situations, portions of a waterbody, such as shallow coves, may have documented impairment while other areas of the same waterbody are not impaired based on ambient monitoring and outside data. In such cases, those portions with documented impairment (sufficient data, ambient data above standards, and supporting outside data) will be rated as impaired.

The management of lakes and reservoirs to support multiple uses presents an interesting challenge in that removal of sufficient nutrients to control nuisance blooms may result in decreases in fish populations or shifts in forage species needed to support a favored fishery. These considerations must be addressed in the process of developing lake management strategies, including the implementation of TMDLs.

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Yadkin River	From source to mouth in W. Kerr Scott Reservoir at Elevation 1030	03-07-01	35.0		S	M	Organic Enrichment Habitat degradation Turbidity	Agriculture Highway/Bridge/Road Runoff
Yadkin River (W. Kerr Scott Reservoir)	From mouth in W. Kerr Scott Reservoir at Elevation 1030 (1.4 mile downstream of Stony Fork) to a point 3.2 mile downstream of Stony Fork	03-07-01		66.7	S	ME		
Yadkin River (W. Kerr Scott Reservoir)	From a point 3.2 mile downstream of Stony Fork to W. Kerr Scott Dam	03-07-01		882.1	S	M		
Yadkin River	From W. Kerr Scott Dam to Moravian Creek	03-07-01	3.1		S	ME		
Yadkin River	From Moravian Creek to a point 1.0 mile upstream of Roaring River	03-07-01	11.5		S	M	Fecal coliform	
Yadkin River	From a point 1.0 mile upstream of Roaring River to a point 0.2 mile upstream of the mouth of Big Bugaboo Creek	03-07-01	4.2		S	M	Fecal coliform	
Yadkin River	From a point 0.2 mile upstream of Big Bugaboo Creek to a point 0.9 mile upstream of mouth of Elkin Creek (River)	03-07-01	9.7		S	M		
Yadkin River	From a point 0.9 mile upstream of the to mouth of Elkin Creek (River) to point 0.3 mile upstream of the mouth of Elkin Creek (Town of Jonesville water supply intake)	03-07-01	0.5		S	ME		
Buffalo Creek	From source to Yadkin River	03-07-01	14.9		S	M		
Elk Creek	From source to Dugger Creek	03-07-01	13.5		S	ME		
Elk Creek	From Dugger Creek to Yadkin River	03-07-01	9.1		S	M	Fecal coliform	
Beaver Creek	From source to Yadkin River	03-07-01	9.9		S	M		
Stony Fork	From source to Wilkes County SR 1168	03-07-01	10.7		S	ME		
Stony Fork	From Wilkes County SR 1168 to Yadkin River	03-07-01	5.9		S	M		
Lewis Fork	From source to W. Kerr Scott Reservoir, Yadkin River	03-07-01		91.6	S	ME		
N Prong Lewis Fork	From source to Wilkes County SR 1300	03-07-01	7.3		S	ME		

Habitat degradation is noted as a problem parameter where there is a notable reduction in habitat diversity or a negative change in habitat. This term includes sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour.

Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
N Prong Lewis Fork	From Wilkes County SR 1300 to a point 1.0 mile upstream of Purlear Creek	03-07-01	4.7		S	M		
N Prong Lewis Fork	From a point 1.0 mile upstream of mouth of Purlear Creek to Lewis Fork	03-07-01	3.9		S	ME		
Little Fork	From source to North Fork Lewis Fork	03-07-01	2.2		S	M		
Purlear Creek	From source to a point 2.0 mile upstream of mouth	03-07-01	2.9		S	M		
S Prong Lewis Fork	From source to Wilkes County SR 1155	03-07-01	9.5		S	M		
S Prong Lewis Fork	From Wilkes County SR 1155 to a point 1.1 mile upstream of mouth	03-07-01	5.8		S	ME		
S Prong Lewis Fork	From a point 1.1 miles upstream of mouth to Lewis Fork	03-07-01	0.7		S	ME		
Moravian Creek	From source to Yadkin River	03-07-01	11.4		S	M	Habitat degradation	Agriculture Urban Runoff/Storm Sewers
Reddies River	From source to a point 0.4 mile downstream of Hoopers Branch	03-07-01	14.3		S	ME		
Reddies River	From North Wilkesboro Water Supply Dam to Yadkin River	03-07-01	0.9		S	M		
Reddies River	From a point 0.4 mile downstream of Hoopers Branch to North Wilkesboro Water Supply Dam	03-07-01	0.6		S	ME		
Mid Fork Reddies River	From source to Reddies River	03-07-01	7.9		S	M		
S Fork Reddies River	From source to Reddies River	03-07-01	7.5		S	M		
N Fork Reddies River	From source to Reddies River	03-07-01	11.2		S	M		
Cub Creek	From source to Yadkin River	03-07-01	10.8		S	M	Habitat degradation	Agriculture Urban Runoff/Storm Sewers
Mulberry Creek	From source to Yadkin River	03-07-01	19.7		S	M		
Roaring River	From source to Yadkin River	03-07-01	5.9		S	M		
Mid Prong Roaring River	From source to Wilkes County SR 1736	03-07-01	5.8		S	ME		

Habitat degradation is noted as a problem parameter where there is a notable reduction in habitat diversity or a negative change in habitat. This term includes sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour.

Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Mid Prong Roaring River	From Wilkes County SR 1736 to Roaring River	03-07-01	3.1		S	M		
E Prong Roaring River	From source to Garden Creek	03-07-01	0.9		S	M		
E Prong Roaring River	From Garden Creek to Wilkes County SR 1737	03-07-01	1.7		S	M		
E Prong Roaring River	From Wilkes County SR 1737 to Roaring River	03-07-01	11.8		S	ME		
Yadkin River	From a point 0.3 mile upstream of the mouth to Elkin Creek (River) to a point 0.3 mile upstream of Ararat River	03-07-02	24.7		S	M		
Yadkin River	From a point 0.3 mile upstream of Ararat River to mouth of Carters Creek (Winston-Salem Water Supply Intake)	03-07-02	36.8		S	ME		
Yadkin River	From the mouth of Carters Creek to a point 0.7 mile upstream of Muddy Creek	03-07-02	3.1		S	M	Turbidity	
Yadkin River	From a point 0.7 mile upstream of mouth of Muddy Creek to a point 0.5 mile upstream of US Highway 64	03-07-02	9.6		S	ME	Turbidity	
Elkin Creek (River)	From source to Elkin Water Supply Intake	03-07-02	17.1		S	ME		
Elkin Creek (River)	From Elkin Water Supply Intake to Yadkin River	03-07-02	1.8		S	M	Habitat degradation	Agriculture Urban Runoff/Storm Sewers
Elkin Reservoir	Entire reservoir and connecting stream to Elkin Creek (River)	03-07-02		8.5	S	ME		
Mitchell River	From source to mouth of Christian Creek (North Fork Mitchell River)	03-07-02	8.5		S	M	Habitat degradation	Agriculture Timber Harvesting
Mitchell River	From Surry County SR 1315 to South Fork Mitchell River	03-07-02	4.3		S	ME		
Mitchell River	From South Fork Mitchell River to Yadkin River	03-07-02	6.9		S	M		
Mitchell River	From mouth of Christian Creek (North Fork Mitchell River) to Surry County SR 1315	03-07-02	7.5		S	ME		
S Fork Mitchell River	From source to Mitchell River	03-07-02	17.7		S	M	Habitat degradation	Agriculture Timber Harvesting

Habitat degradation is noted as a problem parameter where there is a notable reduction in habitat diversity or a negative change in habitat. This term includes sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour.

Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Snow Creek	From source to Mitchell River	03-07-02	9.6		S	M	Habitat degradation	Agriculture
Fisher River	From NC-VA State Line To Burris Creek	03-07-02	14.0		S	ME		
Fisher River	From Burris Creek to a point 1.0 mile upstream of the Town of Dobson water supply intake	03-07-02	6.3		S	M		
Fisher River	From a point 1.0 mile upstream of Town of Dobson water supply intake to Town of Dobson water supply intake (Located 0.9 mile upstream of Surry County SR 1345)	03-07-02	1.0		S	ME		
Fisher River	From Town of Dobson water supply intake to Yadkin River	03-07-02	21.2		S	M	Habitat degradation	
Little Fisher River	From NC-VA State Line to Surry County SR 1615	03-07-02	7.3		S	ME		
Little Fisher River	From Surry County SR 1615 to Fisher River	03-07-02	8.9		S	M	Habitat degradation	
Little Beaver Creek	From source to Fisher River	03-07-02	4.4		S	M		
Little Yadkin River	From source to Yadkin River	03-07-02	12.5		S	M	Organic enrichment Habitat degradation Turbidity	Agriculture Land Development Urban Runoff/Storm Sewers
Forbush Creek	From source to a point 0.4 mile upstream of Yadkin County SR 1600	03-07-02	10.6		S	ME	Organic Enrichment	Agriculture
Forbush Creek	From a point 0.4 mile upstream of Yadkin County SR 1600 to Yadkin River	03-07-02	4.9		S	M	Organic Enrichment	Agriculture
Logan Creek	From source to a point 0.4 mile upstream of mouth of Loney Creek	03-07-02	10.6		S	ME	Habitat degradation	
North Deep Creek	From source to a point 1.0 mile downstream of Yadkin County SR 1515	03-07-02	17.3		S	M	Habitat degradation Turbidity Fecal coliform	Agriculture
North Deep Creek	From a point 1.0 mile downstream of Yadkin County SR 1515 to Deep Creek	03-07-02	2.2		S	M	Fecal coliform	
Ararat River	From NC-VA State Line to the mouth of Johnson Creek	03-07-03	2.5		S	M		

Habitat degradation is noted as a problem parameter where there is a notable reduction in habitat diversity or a negative change in habitat. This term includes sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour.

Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Ararat River	From mouth of Johnson Creek to Town of Mount Airy proposed water supply intake (0.5 mi upstream of Champ Creek)	03-07-03	0.9		S	ME	Fecal coliform	
Ararat River	From Town of Mount Airy proposed water supply intake to a point 0.1 mile upstream of Surry County SR 2080	03-07-03	27.9		S	M	Habitat degradation Fecal coliform	
Ararat River	From a point 0.1 mile upstream of Surry County SR 2080 to Yadkin River	03-07-03	2.0		S	M	Turbidity Fecal coliform	
Flat Shoal Creek	From source to Ararat River	03-07-03	8.2		S	M		
Toms Creek	From source to a point 0.6 mile downstream of mouth of Chinquapin Creek	03-07-03	11.1		S	ME		
Toms Creek	From a point 0.6 mile downstream of mouth of Chinquapin Creek to Town of Pilot Mountain water supply intake	03-07-03	0.7		S	ME		
Toms Creek	From Town of Pilot Mountain water supply intake (Located 0.2 mile upstream of US Highway 52) to Ararat River	03-07-03	5.7		S	M		
Heatherly Creek	From source to NC 268	03-07-03	2.0		S	M	Habitat degradation	
Heatherly Creek	**From NC 268 to Toms Creek**	**03-07-03**	**1.4**		**I**	**M**	**Unknown**	**Urban Runoff/Storm Sewers Major Municipal Point Source**
Faulkner Creek	**From source to Ararat River**	**03-07-03**	**6.1**		**I**	**M**	**Unknown toxicity Sediment Habitat degradation**	**Agriculture Timber Harvesting Highway/Road/Bridge Runoff**
Lovills Creek (Lovell Creek)	From NC-VA State Line to a point 0.5 mile upstream of Town of Mount Airy Water Supply Dam	03-07-03	2.5		S	M	Habitat degradation	Sources outside state jurisdiction
Lovills Creek (Lovell Creek)	From a point 0.5 mile upstream of Town of Mount Airy Water Suppy Dam to Town of Mount Airy Water Supply Dam	03-07-03	0.5		S	ME		
Lovills Creek (Lovell Creek)	**From Town of Mount Airy Water Supply Dam to Ararat River**	**03-07-03**	**4.2**		**I**	**M**	**Unknown toxicity Habitat degradation**	**Minor Industrial Point Source Urban Runoff/Storm Sewers**

Habitat degradation is noted as a problem parameter where there is a notable reduction in habitat diversity or a negative change in habitat. This term includes sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour.

Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Stewarts Creek	From NC-VA State Line to Surry County SR 1622	03-07-03	5.0		S	M		
Stewarts Creek	From Surry County SR 1622 to a point 0.7 mile downstream of mouth of Pauls Creek	03-07-03	3.3		S	M	Habitat degradation	
Stewarts Creek	From a point 0.7 mile downstream of mouth of Pauls Creek to Town of Mount Airy water supply intake	03-07-03	0.8		S	ME	Habitat degradation	
Stewarts Creek	From Town of Mount Airy water supply intake to Ararat River	03-07-03	6.8		S	M	Habitat degradation	Land Development Urban Runoff/Storm Sewers
Muddy Creek	From source to Mill Creek #3	03-07-04	10.3		S	M	Habitat degradation	Land Development
Muddy Creek	**From Mill Creek #3 to SR 2995**	**03-07-04**	**15.2**		**I**	**M**	**Habitat degradation**	**Urban Runoff/Storm Sewers Minor Non-municipal Point Source**
Muddy Creek	From SR 2995 to a point 0.8 mile upstream of mouth	03-07-04	4.8		S	M	Habitat degradation Turbidity Nutrients Fecal coliform	Urban Runoff/Storm Sewers
Muddy Creek	From a point 0.8 mile upstream of mouth to Yadkin River	03-07-04	0.7		S	ME	Habitat degradation Turbidity Nutrients Fecal coliform	Urban runoff/Storm sewers
Reynolds Creek	From source to Muddy Creek	03-07-04	3.3		NR	M	Organic enrichment Habitat degradation	Minor Non-municipal Point Source
Silas Creek	From source to Muddy Creek	03-07-04	10.1		S	M	Habitat degradation	Urban runoff/Storm sewers
Salem Creek (Salem Lake)	From source to Winston-Salem Water Supply Dam (Salem Lake)	03-07-04		275.3	S	M		Land Development Urban runoff/Storm sewers
Salem Creek	**From Winston-Salem Water Supply Dam (Salem Lake) to Muddy Creek**	**03-07-04**	**12.0**		**I**	**M**	**Habitat degradation Fecal coliform**	**Urban runoff/Storm sewers**
S Fork Muddy Cr	From source to Muddy Creek	03-07-04	14.3		S	M	Habitat degradation	Land Development Urban runoff/Storm sewers
Yadkin River	From a point 0.5 mile upstream of US Highway 64 to a point 0.3 mile downstream of US Highway 64	03-07-04	0.5		S	M	Turbidity Fecal coliform	

Habitat degradation is noted as a problem parameter where there is a notable reduction in habitat diversity or a negative change in habitat. This term includes sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour.

Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Yadkin River	From a point 0.3 mile downstream of US Highway 64 to the mouth of Grants Creek	03-07-04	18.6		S	ME	Turbidity Fecal coliform	
Grants Creek	From source to SR 1910	03-07-04	19.7		S	M	Organic enrichment Habitat degradation Fecal coliform	
Grants Creek	**From SR 1910 to Yadkin River**	**03-07-04**	**1.2**		**I**	**M**	**Habitat degradation Turbidity Fecal coliform**	**Urban Runoff/Storm Sewers Minor Municipal Point Source**
Town Creek	**From source to Crane Creek**	**03-07-04**	**15.4**		**I**	**M**	**Habitat degradation**	**Urban Runoff/ Storm Sewers**
Yadkin River (High Rock Lake)	**From mouth of Grants Creek to High Rock Dam**	**03-07-04**		**10,449.7**	**I**	**M**	**% DO Saturation Chlorophyll a Nutrients Turbidity**	**Agricuture Land Development Urban Runoff/Storm Sewers Major Municipal Point Sources**
Yadkin River (Tuckertown Lake)	**From High Rock Dam to mouth of Cabin Creek**	**03-07-04**	**3.5**		**I**	**M**	**Low DO**	**Hydromodification**
Dutchman Creek	From Davie County SR 1002 to Elisha Creek	03-07-05	25.5		S	M	Habitat degradation Organic enrichment Turbidity, Low DO Fecal coliform	Agriculture Highway/Road/Bridge Runoff
Dutchman Creek	From Elisha Creek to a point 0.9 mile upstream of mouth	03-07-05	0.0		NR	M		
Cedar Creek	From source to Davie County SR 1410	03-07-05		41.6	S	ME		
Cedar Creek	From Davie County SR 1410 to Dutchman Creek	03-07-05	7.0		S	M		
South Yadkin River	From source to Alexander County SR 1456	03-07-06	17.1		S	ME	Habitat degradation	
South Yadkin River	From Alexander County SR 1456 to a point 0.6 mile downstream of Iredell County SR 1907	03-07-06	14.6		S	M	Habitat degradation	
South Yadkin River	From a point 0.6 mile downstream of Iredell County SR 1907 to a point 1.0 mile upstream of Davie County SR 1159	03-07-06	23.8		S	ME	Habitat degradation Turbidity Fecal coliform	

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
South Yadkin River	From a point 1.0 mile upstream of Davie County SR 1159 to NC Highway 801	03-07-06	9.5		S	M	Habitat degradation Turbidity Fecal coliform	
South Yadkin River	From a point 1.0 mile upstream of NC Highway 801 to mouth of Fourth Creek	03-07-06	5.3		S	ME	Habitat degradation Turbidity Fecal coliform	
South Yadkin River	**From mouth of Fourth Creek to Yadkin River**	**03-07-06**	**5.3**		**I**	**M**	**Turbidity Fecal coliform**	**Minor Municipal Point Source Agriculture**
Rocky Creek (Rocky River)	From source to South Yadkin River	03-07-06	42.2		S	M		
Patterson Creek	From source to Rocky Creek	03-07-06	10.6		S	M		
Hunting Creek	From source to a point 1.1 miles upstream of Davie County SR 1147	03-07-06	49.3		S	M	Habitat degradation Fecal coliform	
Hunting Creek	From a point 1.1 miles upstream of Davie County SR 1147 to South Yadkin River	03-07-06	7.8		S	ME	Habitat degradation	
North Little Hunting Creek	From source to Hunting Creek	03-07-06	23.8		S	M	Organic enrichment Habitat degradation	Agriculture
Bear Creek	From source to a point 0.2 mile downstream of US Highway 64	03-07-06	9.3		NR	ME	Low DO Fecal coliform	
Bear Creek	From a point 0.2 mile downstream of US Highway 64 to South Yadkin River	03-07-06	8.6		NR	M	Low DO Fecal coliform	
Fourth Creek	**From source to SR 1972**	**03-07-06**	**23.8**		**I**	**M**	**Habitat degradation Turbidity Nutrients Fecal coliform**	**Urban Runoff/Storm Sewers Agriculture**
Fourth Creek	From SR 1972 to SR 1985	03-07-06	6.7		S	M	Habitat degradation Turbidity Fecal coliform	Urban Runoff/Storm Sewers Agriculture
Fourth Creek	**From SR 1985 to South Yadkin River**	**03-07-06**	**5.5**		**I**	**M**	**Habitat degradation Turbidity Fecal coliform**	**Urban Runoff/Storm Sewers Agriculture**

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Third Creek	From source to SR 2359	03-07-06	16.8		NR	M	Habitat degradation Turbidity Fecal coliform	Agriculture Land Development
Third Creek	**From SR 2359 to SR 1970**	**03-07-06**	**22.1**		**I**	**M**	**Habitat degradation Nutrients Fecal coliform**	**Agriculture Land Development**
Third Creek	From SR 1970 to Fourth Creek	03-07-06	4.3		S	M	Habitat degradation Fecal coliform	
Second Creek (North Second Cr)	From source to South Yadkin River	03-07-06	10.4		I	M	Habitat degradation Fecal coliform	
Withrow Creek	From source to Second Creek (North Second Creek)	03-07-06	11.2		S	M	Habitat degradation	
Swearing Creek	**From source to High Rock Lake**	**03-07-07**	**14.4**		**I**	**M**	**Habitat degradation Fecal coliform**	**Urban Runoff/Storm Sewers Agriculture**
Abbotts Creek	From source to a point 0.5 mile upstream of Davidson County SR 1810	03-07-07	18.8		S	M	Fecal coliform	
Abbotts Creek (Thom-A-Lex Lake)	**From a point 0.5 mile upstream of Davidson County SR 1810 to the upstream side of culvert at US Highways 29 & 70**	**03-07-07**		**34.2**	**I**	**M**	**% DO Saturation**	**Agriculture**
Abbotts Creek	**From upstream side of culvert at US Highways 29 & 70 to Abbotts Creek Arm of High Rock Lake (At I-85 bridge)**	**03-07-07**	**8.0**		**I**	**M**	**Low DO Turbidity**	**Major Municipal Point Sources Urban Runoff/Storm Sewers**
Abbotts Creek Arm of High Rock Lake	**From source at I-85 to Davidson County SR 2294**	**03-07-07**		**855.7**	**I**	**M**	**Low DO Turbidity**	**Major Municipal Point Sources**
Brushy Fork	From source to Buck Branch	03-07-07	9.5		S	M	Habitat degradation	
Rich Fork	**From source to Abbotts Creek**	**03-07-07**	**20.6**		**I**	**M**	**Low DO Organic Enrichment Habitat degradation Unknown Toxicity Fecal coliform**	**Major Municipal Point Sources Urban Runoff/Storm Sewers**
Hunts Fork	From source to Rich Fork	03-07-07	7.1		NR	M	Habitat degradation	Urban Runoff/ Storm Sewers
Hamby Creek	**From source to Rich Fork**	**03-07-07**	**11.1**		**I**	**M**	**Copper Nutrients**	**Major Municipal Point Source**

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
North Hamby Creek	**From source to Hamby Creek**	**03-07-07**	**5.8**		**I**	**M**	**Unknown**	**Unknown**
Leonard Creek	From source to dam at City Lake	03-07-07	6.7		S	ME	Habitat degradation	Agriculture Minor Non-municipal Point Sources
Leonard Creek	From dam at City Lake to Abbotts Creek	03-07-07	2.6		S	M	Habitat degradation	Hydromodification
Yadkin River (Tuckertown and Badin Lakes)	From the mouth of Cabin Creek to Badin Dam	03-07-08			S	M		
Yadkin River (Falls Reservoir)	From Badin Dam to a point 0.5 mile upstream of Falls Dam	03-07-08		169.5	S	M		
Lick Creek	**From East Branch Lick Creek to Yadkin River**	**03-07-08**	**7.8**		**I**	**M**	**Habitat degradation Low DO**	**Agriculture**
Cabin Creek	From source to NC Highway 109	03-07-08	3.5		S	ME		Agriculture
Cabin Creek	From NC Highway 109 to a point 0.1 mile downstream of Davidson County SR 2536	03-07-08	5.8		S	M	Organic enrichment	Agriculture
Cabin Creek	From a point 0.1 mile downstream of Davidson County SR 2536 to Yadkin River	03-07-08	0.6		S	ME	Organic enrichment	Agriculture
Pee Dee River (Lake Tillery)	From mouth of Uwharrie River to Norwood Dam	03-07-08		4,845.5	S	M		
Mountain Creek	From source to Stanly County SR 1542	03-07-08	5.1		S	ME	Habitat degradation	Agriculture
Mountain Creek	From Stanly County SR 1542 to a point 0.5 mile upstream of mouth	03-07-08	7.3		S	M	Habitat degradation	Agriculture
Mountain Creek	From a point 0.5 mile upstream of mouth to Pee Dee River	03-07-08	0.5		S	M		
Little Mountain Creek	**From a point 0.5 mile upstream of Stanly County SR 1545 to Mountain Creek**	**03-07-08**	**5.7**		**I**	**M**	**Habitat degradation**	
Uwharrie River	From source to a point 0.4 mile downstream of Little Uwharrie River	03-07-09	18.3		S	M	Habitat degradation	Land Development Urban Runoff/Storm Sewers
Uwharrie River	From a point 0.4 mile downstream of Little Uwharrie River to Randolph County SR 1314 (including Lake Reese)	03-07-09		61.1	S	M	Nutrients	Agriculture

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Uwharrie River	**From Randolph County SR 1314 to mouth of Betty McGees Creek**	**03-07-09**		**126.5**	**I**	**M**	**Low DO**	**Hydromodification**
Uwharrie River	From mouth of Betty McGees Creek to a point 1.3 mile upstream of mouth of Barnes Creek	03-07-09	26.7		S	M		
Uwharrie River	From a point 1.3 miles upstream of the mouth of Barnes Creek to mouth of Dutchmans Creek	03-07-09	9.3		S	M		
Uwharrie River	From the mouth of Dutchmans Creek to Lake Tillery, Pee Dee River	03-07-09	0.9		S	ME		
Little Uwharrie River	From source to Uwharrie River	03-07-09		25.8	S	M	Habitat degradation	Agriculture Land Development
Back Creek Lake	**From a point 1.0 mile downstream of Randolph County SR 1504 to dam at Back Creek Lake (City of Asheboro water supply intake)**	**03-07-09**		**228.3**	**I**	**M**	**Dissolved gases Nutrients**	**Agriculture Land Development**
Lake Bunch	From a point 1.1 miles upstream of mouth to Cedar Fork Creek	03-07-09		27.7	NR	M	Nutrients	Urban Runoff/Storm Sewers
Caraway Creek	From source to Uwharrie River	03-07-09	26.4		S	M	Habitat degradation	Agriculture Minor Non-municipal Point Source
Barnes Creek	From source to a point 0.2 mile upstream of Montgomery County SR 1303	03-07-09	11.6		S	M		
Dutchmans Creek	From source to Uwharrie River	03-07-09	4.9		S	M		
Betty McGees Creek	From source to Uwharrie River	03-07-09	9.4		S	M		
Mountain Creek	From source to a point 1.1 miles upstream of mouth	03-07-10	4.6		S	M	Habitat degradation	
Big Mountain Creek	From source to Richmond County SR 1005	03-07-10	13.8		S	M		
Big Mountain Creek	From Richmond County SR 1005 to Mountain Creek	03-07-10	2.1		S	ME		
Pee Dee River	**From Norwood Dam to mouth of Turkey Top Creek**	**03-07-10**	**15.3**		**I**	**M**	**Low DO**	**Hydromodification Minor Municipal Point Source**

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Pee Dee River	From Turkey Top Creek to a point 0.8 mile downstream of mouth Savannah Creek	03-07-10	4.7		S	ME		
Pee Dee River (Blewett Falls Lake)	From a point 0.8 mile downstream of mouth of Savannah Creek to Blewett Falls Dam	03-07-10		2,170.0	S	M		
Clarks Creek	From source to Pee Dee River	03-07-10	12.6		S	M	Fecal coliform	
Brown Creek	From NC-SC State Line to mouth of Lick Creek	03-07-10	16.5		S	M	Habitat degradation	
Cedar Creek	From source to Pee Dee River	03-07-10	10.7		S	M	Habitat degradation	
Brown Creek	From mouth of Lick Creek to Pee Dee River	03-07-10	28.5		NR	M	Low DO	Natural conditions Agriculture
Rocky River	**From source to mouth of Reedy Creek**	**03-07-11**	**34.1**		**I**	**M**	**Habitat degradation Turbidity Fecal coliform**	**Urban Runoff/Storm Sewers Land Development Major and Minor Point Sources**
Dye Creek (Branch)	**From source to Rocky River**	**03-07-11**	**4.4**		**I**	**M**	**Habitat degradation Chlorine**	**Urban Runoff/Storm Sewers Minor Municipal Point Source**
Mallard Creek	From source to mouth of Stoney Creek	03-07-11	13.1		S	M	Cause Unknown	Urban Runoff/ Storm Sewers
Coddle Creek	From a point 0.2 mile upstream of NC Highway 73 to Rocky River	03-07-11	14.5		I	M	Habitat degradation	
Reedy Creek	From source to Rocky River	03-07-11	15.2		S	M	Habitat degradation	
Rocky River	**From mouth of Reedy Creek to mouth of Dutch Buffalo Creek**	**03-07-12**	**8.5**		**I**	**M**	**Organic enrichment Turbidity Fecal coliform Phosphorus**	**Urban Runoff/Storm Sewers Major Municipal Point Source**
Dutch Buffalo Creek	From source to a point 0.5 mile upstream of NC Highway 49	03-07-12	13.1		S	ME	Nutrients	Agriculture
Dutch Buffalo Creek	From a point 0.5 mile upstream of NC Highway 49 to Rocky River	03-07-12	11.3		S	M	Habitat degradation Nutrients	Agriculture
Clear Creek	From source to Rocky River	03-07-12	13.1		S	M	Habitat degradation Low DO Fecal coliform	

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Goose Creek	From source to SR 1524	03-07-12	3.2		S	M	Habitat degradation Nutrients	Urban Runoff/Storm Sewers
Goose Creek	**From SR 1524 to Rocky River**	**03-07-12**	**13.1**		**I**	**M**	**Organic enrichment Habitat degradation Low DO Fecal coliform**	**Agriculture Minor Non-municipal Point Sources Combined Sewer Overflow**
Stevens Creek	From source to Goose Creek	03-07-12	2.3		S	M	Habitat degradation	Urban Runoff/ Storm Sewers
Duck Creek	From source to Goose Creek	03-07-12	9.7		S	M		
Crooked Creek	From source to Rocky River	03-07-12	12.9		S	M	Organic enrichment Turbidty Fecal coliform	
North Fork Crooked Creek	**From source to Crooked Creek**	**03-07-12**	**12.0**		**I**	**M**	**Habitat degradation Low DO Turbidity Fecal coliform**	**Urban Runoff/Storm Sewers**
Irish Buffalo Creek (Kannapolis Lake)	From a point 0.5 mile upstream of Rowan County SR 1197 to Kannapolis Water Supply Dam	03-07-12		4.2	NR	M	Habitat degradation	Urban Runoff/Storm Sewers
Irish Buffalo Creek	From Kannapolis Water Supply Dam to Rocky River	03-07-12	16.7		S	M	Turbidity Phosphorus Fecal coliform	Urban Runoff/Storm Sewers
Cold Water Creek (Lake Fisher)	From a point 0.5 mile downstream of Rowan County SR 1221 to dam at Lake Fisher	03-07-12		230.6	NR	M		
Cold Water Creek	From dam at Lake Fisher to Irish Buffalo Creek	03-07-12	12.5		S	M	Habitat degradation Fecal coliform	Land Development Urban Runoff/Storm Sewers
Long Creek	From source to Rocky River	03-07-13	26.7		S	M		
Big Bear Creek	From source to Long Creek	03-07-13	19.9		S	M		
Stony Run	From source to Big Bear Creek	03-07-13	11.9		NR	M		
Rocky River	From the mouth of Island Creek to the Pee Dee River	03-07-14	29.3		S	M	Nutrients Fecal coliform	
Island Creek	From source to Rocky River	03-07-14	10.0		S	M		

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Richardson Creek	From source to a point 0.2 mile downstream of mouth of Beaverdam Creek	03-07-14	7.6		S	M	Habitat degradation	Agriculture
Richardson Creek (Lake Lee)	From a point 0.2 mile downstream of mouth of Beaverdam Creek to Monroe Water Supply Dam (Lake Lee)	03-07-14		106.3	NR	M		
Richardson Creek	**From Monroe Water Supply Dam (Lake Lee) to mouth of Negro Head Creek**	**03-07-14**	**9.9**		**I**	**M**	**Nutrients Low DO Fecal coliform**	**Urban Runoff/Storm Sewers Agriculture**
Negro Head Creek	From source to Richardson Creek	03-07-14	13.0		S	M		
Lanes Creek	**From source to Marshville Water Supply Dam (located 0.1 mile downstream of Beaverdam Creek)**	**03-07-14**	**27.4**		**I**	**M**	**Low DO**	**Unknown**
Richardson Creek	From mouth of Negro Head Creek to Rocky River	03-07-14	23.2		S	M		
Rocky Creek	From source to NC Highway 27	03-07-15	6.9		S	ME		
Rocky Creek	From NC Highway 27 to Little River	03-07-15	6.4		S	M		
Disons Creek	From source to Little River	03-07-15	6.9		S	M		
Cheek Creek	From source to NC 731	03-07-15	9.3		S	M		
Cheek Creek	From NC 731 to Little River	03-07-15	8.1		NR	M	Habitat degradation	
Hamer Creek	From source to Little River	03-07-15	11.7		NR	M		
Little River	From Suggs Creek to Densons Creek	03-07-15	12.9		S	M		
Little River	From Densons Creek to Hammer Creek	03-07-15	18.5		S	M	Turbidity	
West Fork Little R.	From source to Little River	03-07-15	23.7		S	M		
Dumas Creek	From source to Densons Creek	03-07-15	9.4		S	M		
Pee Dee River	**From Blewett Falls Dam to mouth of Hitchcock Creek**	**03-07-16**	**6.3**		**I**	**M**	**Low DO**	**Hydromodification**
Cartledge Creek	From source to Pee Dee River	03-07-16	10.2		S	M		
Hitchcock Creek (McKinney Lake, Ledbetter Lake)	From source to a point 0.5 mile downstream of Richmond County SR 1442	03-07-16		66.9	S	M	Habitat degradation	Hydromodification

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Aquatic Life/Secondary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Miles	Acres	Rating	Basis	Problem Parameter(s)	Potential Source(s)
Hitchcock Creek (Roberdel Lake)	From a point 0.5 mile downstream of Richmond County SR 1442 to dam at Roberdel Lake	03-07-16		48.4	NR	M		
Hitchcock Creek	From dam at Roberdel Lake to Pee Dee River	03-07-16		0.5	S	M	Habitat degradation	Urban Runoff/Storm Sewers
Rocky Fork Creek	From source to Hitchcock Creek	03-07-16	9.5		NR	M		
Beaver Dam Creek	From source to Rocky Fork Creek	03-07-16	5.2		S	M		
Marks Creek (Water Lake)	From source to a point 1.3 miles upstream of dam of lower Water Lake	03-07-16		4.6	NR	ME		
Marks Creek (Water Lake)	From a point 1.3 miles upstream of dam of lower Water Lake to dam of lower Water Lake	03-07-16		48.1	NR	M		
Marks Creek	From dam of lower Water Lake to NC-SC State Line	03-07-16		23.6	NR	M		
Pee Dee River	From mouth of Hitchcock Creek to NC-SC State Line	03-07-16	9.4		S	M		
Jones Creek	From source to Pee Dee River	03-07-17	12.5		S	M	Habitat degradation Turbidity	Agriculture
North Fork Jones Creek (City Pond)	From a point 1.0 mile downstream of Anson County SR 1122 to Wadesboro Water Supply Intake	03-07-17		76.2	NR	M		
North Fork Jones Creek	From Wadesboro Water Supply Intake to Jones Creek	03-07-17	7.4		S	M	Habitat degradation	
Bailey Creek	From source to North Fork Jones Creek	03-07-17	2.0		S	M	Habitat degradation Organic enrichment	Urban Runoff/Storm Sewers Agriculture
South Fork Jones Creek	From source to Jones Creek	03-07-17	15.0		S	M		

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Primary Recreation Use Support Summary – Yadkin-Pee Dee River Basin

Name	Description	Subbasin	Classification	Miles	Acres	Rating	Basis	Potential Source(s)
Yadkin River (W. Kerr Scott Reservoir)	From mouth in W. Kerr Scott Reservoir at Elevation 1030 (1.4 mile downstream of Stony Fork) to a point 3.2 mile downstream of Stony Fork	03-07-01	B Tr		66.7	S	ME	
Yadkin River (W. Kerr Scott Reservoir)	From a point 3.2 mile downstream of Stony Fork to W. Kerr Scott Dam	03-07-01	WS-IV&B Tr		882.1	S	ME	
Elk Creek	**From Dugger Creek to Yadkin River**	**03-07-01**	**B ORW**	**9.1**		**I**	**M**	**Agriculture**
Roaring River	From source to Yadkin River	03-07-01	B	5.9		S	M	
East Prong Roaring River	From Garden Creek to Wilkes County SR 1737	03-07-01	B Tr	1.7		S	ME	
East Prong Little Yadkin River	From source to a point 0.4 mile uptream of Surry County SR 1136	03-07-02	B	8.7		S	ME	
East Prong Little Yadkin River	From a point 0.4 mile upstream of Surry County SR 1136 to Little Yadkin River	03-07-02	WS-IV&B	0.9		S	ME	
Yadkin River (High Rock Lake)	From a line across High Rock lake from the downstream side of mouth of Crane Creek to the downstream side of mouth of Swearing Creek to a point 0.6 mile upstream of dam of High Rock Lake	03-07-04	WS-IV&B		4,870.1	S	M	
Yadkin River (High Rock Lake)	From a point 0.6 mile upstream of dam of High Rock Lake to High Rock Dam	03-07-04	WS-IV&B		10.8	S	M	
Abbotts Creek Arm of High Rock Lake	From source at I-85 to Davidson County SR 2294	03-07-07	WS-V&B		855.7	S	M	
Yadkin River	From High Rock Dam to mouth of Cabin Creek	03-07-08	WS-IV&B	3.5		S	M	
Yadkin River (Tuckertown Lake, Badin Lake)	From the mouth of Cabin Creek to Badin Dam	03-07-08	WS-IV&B			S	M	
Yadkin River (Falls Reservoir)	From Badin Dam to a point 0.5 mile upstream of Falls Dam	03-07-08	WS-IV&B		169.5	S	ME	
Yadkin River	From a point 0.5 mile upstream of Falls Dam to Uwharrie River	03-07-08	WS-IV&B		33.8	S	ME	
Pee Dee River (Lake Tillery)	From mouth of Uwharrie River to Norwood Dam	03-07-08	WS-IV&B		4,845.5	S	M	
Pee Dee River	From Norwood Dam to mouth of Turkey Top Creek	03-07-10	WS-V&B	15.3		S	M	
Pee Dee River	From Turkey Top Creek to a point 0.8 mile downstream of mouth Savannah Creek	03-07-10	WS-IV&B	4.7		S	ME	
Pee Dee River (Blewett Falls Lake)	From a point 0.8 mile downstream of mouth of Savannah Creek to Blewett Falls Dam	03-07-10	WS-IV&B		2,170.0	S	M	