

DECISION DOCUMENT
FOR THE
PARTIAL APPROVAL OF THE
NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES'
2012 SECTION 303(d) LIST SUBMITTED ON
March 30, 2012



Prepared by the
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I. Executive Summary

On March 30, 2012, the North Carolina Department of Environment and Natural Resources, Division of Water Quality (DWQ), submitted its final 2012 section 303(d) list of impaired waters to the Environmental Protection Agency for review. After a thorough review of North Carolina's submittal, the EPA is partially approving the State's section 303(d) list. This Decision Document summarizes the EPA's review and the basis for the Agency's decision.

Section 303(d)(1) of the Clean Water Act (CWA or Act) directs states to identify those waters within their jurisdictions for which effluent limitations required by section 301(b)(1)(A) and (B) are not stringent enough to implement any applicable water quality standard (referred to as water quality limited segments, defined in Title 40 of the *Code of Federal Regulations* (CFR) section 130.7), and to establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters. The section 303(d) listing requirement applies to water quality limited segments impaired by pollutant loadings from both point and/or nonpoint sources. After a State submits its section 303(d) list to the EPA, the Agency is required to approve or disapprove that list.

This report updates the State's most recently approved section 303(d) list, approved by the EPA on August 31, 2010 (the 2010 list). North Carolina's initial Public Review Draft of the 2012 section 303(d) list was issued on February 10, 2012. The State submitted the final list to the EPA on March 30, 2012.

The EPA has identified one waterbody/pollutant combination for which the State failed to adequately demonstrate good cause for delisting and which will be included on the EPA's approved section 303(d) list for the State. The EPA is also deferring action on Waterville Reservoir, pending implementation of a sampling effort to better determine water column dioxin concentrations.

II. Statutory and Regulatory Background

A. Identification of Water Quality Limited Segments for Inclusion on the Section 303(d) List

Section 303(d)(1) of the CWA directs states to identify those waters within its jurisdictions for which effluent limitations required by sections 301(b)(1)(A) and (B) are not stringent enough to implement any applicable water quality standard, and to establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters. The section 303(d) listing requirement applies to waters impaired by point and/or nonpoint sources, pursuant to the EPA's long-standing interpretation of section 303(d).

The EPA regulations at 40 CFR 130.7(b)(1) state, "Each State shall identify those water quality-limited segments still requiring TMDLs within its boundaries for which: (i) Technology-based effluent limitations required by sections 301(b), 306, 307, or other sections of the Act; (ii) More stringent effluent limitations (including prohibitions) required by either State or local authority preserved by section 510 of the Act, or Federal authority (law, regulation, or treaty); and (iii) Other pollution control requirements (e.g., best management practices) required by local, State, or Federal authority are not stringent enough to implement any water quality standards (WQS) applicable to such waters." The EPA regulations define water quality limited segment as "[a]ny segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality

standards, even after the application of the technology-based effluent limitations required by section 301(b) and section 306 of the Act.” See 40 CFR 130.2(j). Note: The term “water quality limited segment” as defined by federal regulations may also be referred to as “impaired waterbodies” or “impairments” throughout this decision document. TMDL is the acronym for [Total Maximum Daily Load](#). A TMDL is a calculation of the maximum amount of a [pollutant](#) that a [waterbody](#) can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant.

The EPA’s 2006 *Integrated Water Quality Monitoring and Assessment Report Guidance* (July 29, 2005), recommends the use of five categories, described below, to classify the water quality standard attainment status for each waterbody segment, or assessment unit. The *Guidance* includes three sub-categories for Category 4. North Carolina currently uses the five categories recommended by the EPA plus some additional sub-categories within those categories. A description of the State’s sub-categories is provided in Appendix A.

Category 1: All designated uses are supported, no use is threatened;

Category 2: Available data and/or information indicate that some, but not all of the designated uses are supported;

Category 3: There is insufficient available data and/or information to make a use support determination;

Category 4: Available data and/or information indicate that at least one designated use is not being supported or is threatened, but a TMDL is not needed because:

4a - A TMDL to address a specific segment/pollutant combination has been approved or established by the EPA.

4b - A use impairment caused by a pollutant is being addressed by the state through other pollution control requirements.

4c - A use is impaired, but the impairment is not caused by a pollutant.

Category 5: Available data and/or information indicate that at least one designated use is not being supported or is threatened, and a TMDL is needed.

B. Consideration of Existing and Readily Available Water Quality Related Data and Information (40 CFR Part 130.7(b)(5)(i-iv))

In developing section 303(d) lists, states are required to assemble and evaluate all existing and readily available water quality-related data and information, including, at a minimum, consideration of existing and readily available data and information about the following categories of waters: (1) waters identified as partially meeting or not meeting designated uses, or as threatened, in the State’s most recent section 305(b) report; (2) waters for which dilution calculations or predictive modeling indicate non-attainment of applicable standards; (3) waters for which water quality problems have been reported by governmental agencies, members of the public, or academic institutions; and (4) waters identified as impaired or threatened in any section 319 nonpoint assessment submitted to the EPA. See 40 CFR 130.7(b)(5). In addition to these minimum categories, states are required to consider any other water quality-related data and information that is existing and readily available. The EPA’s 1991 *Guidance for Water Quality-Based Decisions* describes categories of water quality-related data and information that may be existing and readily available. See Appendix C of *Guidance for Water Quality-Based Decisions: The TMDL Process*, EPA Office of Water, 1991. While states are required to evaluate all existing and readily available water quality-related data and information, states may decide to rely or not rely on particular data or information in determining whether to list particular waters.

In addition to requiring states to assemble and evaluate all existing and readily available water quality-related data and information, the EPA regulations at 40 CFR 130.7(b)(6) require states to include, as part of its submissions to the EPA, documentation to support decisions to list or not list waters. Such documentation needs to include, at a minimum, the following information: (1) a description of the methodology used to develop the list, (2) a description of the data and information used to identify waters, (3) a rationale for any decision to not use any existing and readily available data and information, and (4) any other reasonable information requested by the Region.

C. Priority Ranking

The EPA regulations also codify and interpret the requirement in section 303(d)(1)(A) of the Act that states establish a priority ranking for listed waters. The regulations at 40 CFR 130.7(b)(4) require states to prioritize waters on their section 303(d) lists for TMDL development, and also to identify those impaired waterbodies targeted for TMDL development in the next two years. In prioritizing and targeting waters, states must, at a minimum, take into account the severity of the pollution and the uses to be made of such waters. See CWA § 303(d)(1)(A). As long as these factors are taken into account, the Act provides that states establish priorities. States may consider other factors relevant to prioritizing waters for TMDL development, including immediate programmatic needs; vulnerability of particular waters as aquatic habitats; recreational, economic, and aesthetic importance of particular waters; degree of public interest and support; and state or national policies and priorities.

III. Analysis of the North Carolina Submittal

A. Review of North Carolina's Identification of Waters (40 CFR 130.7(b)(6)(i - iv))

In reviewing North Carolina's submittal, the EPA first reviewed the methodology used by the State to develop the list update in light of the State's approved water quality standards, and then reviewed the actual list of waters. This section describes the State's listing methodology and outlines the EPA's evaluation of both that methodology and the actual list of impaired waterbodies included in the submittal. In cases where the EPA could not determine if the State's listing methodology identified all impaired waterbodies for a given designated use or water quality criteria, the EPA conducted a review of water quality data to determine whether any waterbodies should be added to the section 303(d) list.

Each of the assessment and listing methodologies was compared against the North Carolina water quality standards as found in the North Carolina Division of Water Quality "Redbook" (*Surface Waters and Wetlands Standards, North Carolina Administrative Code 15A NCAC 02B .0100, .0200 & .0300*; amended effective May 1, 2007, hereafter "North Carolina Water Quality Standards.") Information on monitoring procedures was obtained from the DWQ Monitoring Program Strategy (Version 2.2, May 2010), as well as DWQ's Basinwide Assessment Reports (<http://portal.ncdenr.org/web/wq/ess/reports>) and Basinwide Water Quality Plans (<http://portal.ncdenr.org/web/wq/ps/bpu/basin>).

1. North Carolina's Water Quality Standards and Section 303(d) List Development

The CWA requires each State to identify and prioritize those waters where technology-based controls are inadequate to implement water quality standards:

Each State shall identify those waters within its boundaries for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough

to implement any water quality standards applicable to such waters. 33 U.S.C. 1313(d)(1)(A); see also 40 CFR 130.7(b) (EPA section 303(d) listing regulations)

EPA regulations expressly provide that “[f]or purposes of listing waters under 130.7(b), the term ‘water quality standard applicable to such waters’ and ‘applicable water quality standards’ refer to those water quality standards established under section 303 of the Act, including numeric criteria, narrative criteria, water body uses, and anti-degradation requirements.” See 40 CFR 130.7(b)(3). The EPA’s review of the North Carolina section 303(d) list ensures that the list identifies water quality limited segments consistent with existing State standards.

Water quality criteria can be expressed either as narrative or numeric criteria. Numeric criteria typically establish either a maximum level or a range of levels of a pollutant which can be present in the waterbody while still attaining water quality standards. Narrative criteria typically describe a condition (e.g., waters shall be suitable for aquatic life propagation and maintenance of biological integrity) which must be met for the waterbody to meet water quality standards. Determining whether a waterbody is meeting water quality standards for narrative criteria requires the identification of reference points against which the waterbody can be evaluated. The EPA defers to a State’s interpretation of its water quality standards, including how narrative criteria should be interpreted, when that interpretation is consistent with the underlying narrative criteria and is a reasonable translation of those criteria.

Narrative Water Quality Criteria

The following is a list of the primary narrative criteria considered in North Carolina’s water quality assessment. The sections below summarize the EPA’s review of the State’s methodology against these narrative criteria.

- North Carolina Administrative Code (NCAC) 15A 02B .0208 (Narrative for toxics and temperature).
- NCAC 15A 02B .0211 (Several narratives related to making all fresh waters suitable for aquatic life propagation and maintenance of biological integrity, wildlife, secondary recreation and agriculture).
- NCAC 15A 02B .0220 (Several narratives related to making all salt waters suitable for aquatic life propagation and maintenance of biological integrity, wildlife, and secondary recreation).
- NCAC 02B 15A .0231 (Narratives related to wetlands).

Numeric Criteria

The primary numeric criteria related to water quality assessment in North Carolina are detailed in 15A NCAC 02B .0100, .0200 & .0300 (amended effective date May 1, 2007). The State expresses its numeric water quality criteria in a variety of ways, which are delineated for each parameter in the following sections. In general, numeric criteria are written as “maximum permissible levels” or values which “shall not be exceeded.”

2. Consideration of Existing and Readily Available Water Quality-Related Data and Information

Federal regulations provide that each state “shall assemble and evaluate all existing and readily available water quality-related data and information to develop the list required by sections 130.7(b)(1) and

130.7(b)(2).” See 40 CFR 130.7(b)(5). The North Carolina DWQ collects a variety of biological, chemical, and physical data from six primary programs, including benthic macroinvertebrates, fish community, fish tissue, lake assessment, ambient monitoring, and aquatic toxicity monitoring.

Sources of data and information include the following: previous section 303(d) lists; CWA section 305(b) reports; CWA section 319 nonpoint source assessments; waterbodies where specific fishing or shellfish bans and/or advisories are currently in effect; waterbodies identified by the State as impaired in its most recent Clean Lake Assessment conducted under section 314 of the CWA; drinking water source water assessments under section 1453 of the Safe Drinking Water Act; trend analyses and predictive models used for determining designated use, numeric and narrative standard compliance; and data, information, and water quality problems reported from local, State, or Federal agencies, Tribal governments, members of the public, and academic institutions.

DWQ maintains a standing solicitation for data on their website (<http://portal.ncdenr.org/web/wq/ps/mtu/assessment>). For data to be used for impairment determinations, data must meet specific submission criteria, including quality assurance and quality control of the collection and analysis of the data.

Use support is assessed for all basins statewide. The 2012 list is based on all data collected in calendar years 2006 through 2010. In some cases, older biological data is used for waters that have not been re-sampled during this data window or where the current impairment is based on that sample.

According to DWQ’s Use Assessment Methodology, a minimum of ten samples is needed to be considered for use support assessments (other than biological data). The Methodology states that if fewer than ten samples are collected and greater than ten percent of the samples exceed the numeric criteria, the assessment unit will be Not Rated and targeted for further sampling (Category 3a). DWQ’s monitoring program routinely collects more than ten samples at each monitoring site.

EPA Conclusion

North Carolina's assessment methodology contains provisions, as described above, for limiting the use of data based on the age of data (five year window) and sample size (at least ten samples). North Carolina does include older data in their assessment when no current data is available. However, the EPA recommends that older data not be automatically excluded, particularly when its inclusion could be used to augment small sets of more current data.

The EPA identified the State’s provisions as being overly restrictive and conducted a data review to determine if waters, which should be considered impaired, may have been omitted from the list due to these provisions. The EPA conducted the review by reviewing all data received from DWQ for the applicable data window. For most parameters, there were no data sets which contained fewer than ten data points. Only the data sets for metals are very small because monitoring for metals was suspended in 2007. See Section 4. *e. Aquatic Life Use Support / Impairments Indicated by Toxic and Non-Conventional Pollutants*, below, for a discussion of the EPA’s independent review of metals data. Because all other data sets contained more than ten samples, there were no instances where the State would have needed to augment their data sets with older data. Therefore, the EPA did not identify any waters that should be added to the section 303(d) list due to small data sets or due to lack of consideration of older data.

In order for the EPA to conclude that the State's process is consistent with federal requirements for consideration of data and information, the State should revise its methodology to allow consideration of older data and data contained within smaller data sets for future section 303(d) lists.

3. Assessment Unit Delineation Approach / Geo-referencing

North Carolina maintains a water quality assessment database, which for each assessment unit provides a description, use support ratings, parameters of interest, potential stressors and sources as well as the capability to track changes through time. This database is linked with other North Carolina water quality databases including ambient, benthic and fish community data as well as 1:24,000 hydrography. Assessment units are delineated to the 1:24,000 statewide hydrography and can be easily located using a Geographic Information System (GIS). The State has completed georeferencing statewide including indexing assessment units to the high resolution National Hydrography Dataset (NHD).

EPA Conclusion

The State provided a GIS dataset of the State's assessment units at NHD 1:24,000 scale. For previous 303(d) lists, the EPA contractor RTI geo-referenced this dataset to NHD 1:100,000 scale for inclusion in the EPA Reach Address Database. For the 2012 303(d) list DWQ posted draft GIS data on its website and will finalize the data after the EPA approval (<http://portal.ncdenr.org/web/wq/ps/mtu/assessment>).

4. Aquatic Life Use Support

The State considers biological and ambient monitoring data in assessing the aquatic life use support category. The EPA separated its review of North Carolina's assessment of aquatic life use support into five categories, as follows: waterbodies not listed due to natural conditions; assessment based on physical (naturally variable) parameters, nutrient enrichment, biological indicators; and toxic/non-conventional pollutants.

a. Waterbodies Not Listed Due to Natural Conditions

North Carolina does not list waterbodies where it is determined that measured concentrations of pH (potential of Hydrogen ions, a measure of acidity or alkalinity) or dissolved oxygen (DO) do not meet the numeric criteria due to natural conditions. North Carolina's water quality standards address natural conditions, providing that "natural waters may on occasion, or temporarily, have characteristics outside of the normal range established by the standards. The adopted water quality standards relate to the condition of waters as affected by the discharge of sewage, industrial wastes or other wastes including those from nonpoint sources and other sources of water pollution. Water quality standards will not be considered violated when values outside the normal range are caused by natural conditions. Where wastes are discharged to such waters, the discharger will not be considered a contributor to substandard conditions provided maximum treatment in compliance with permit requirements is maintained and, therefore, meeting the established limits is beyond the discharger's control." (15A NCAC 02B .0205)

North Carolina has assigned a supplemental classification category for Swamp Waters (Sw) which is intended to recognize those waters that generally have naturally occurring very low velocities, low pH and low DO. State water quality standards acknowledge that DO and pH may be natural conditions that

are outside the required standard range. For DO, 15A NCAC 02B .0211(3) (b) states, “swamp water, lake coves or backwaters, and the lake bottom waters may have lower values if caused by natural conditions.” For pH, 15A NCAC 02B .0211(3) (g) states, “...swamp waters may have a pH as low as 4.3 if it is the result of natural conditions.”

If DWQ identifies natural condition waters with point source discharges, DWQ conducts an analysis of the likely impact of the discharges. The waters will be listed if the discharges may be contributing to the low DO or pH. DWQ’s assessment methodology for classified swamp waters and for waters identified as swamp-like is as follows:

A classified swamp (Sw) AU was not rated for aquatic life when greater than 10% of DO samples were below 4 mg/l (5mg/l for salt) for instantaneous samples (monthly) or when greater than 10% of samples were below a daily average of 5 mg/l (freshwater only). There is not a numerical standard for these water bodies and natural background conditions cannot be determined. This is a category 3a listing not requiring a TMDL. A classified swamp (Sw) AU was assessed as Impaired when greater than 10% of pH samples were below 4.3 (SU).

A swamp like AU (not classified Sw) was not rated for aquatic life when greater than 10% of DO samples were below 4 mg/l (5 for saltwater) for instantaneous samples (monthly) or when greater than 10% of samples were below a daily average of 5mg/l (freshwater only) and when greater than 10% of samples were below a pH of 6.0 (SU) for freshwater or 6.8 (SU) for saltwater. Geographic location, biological data, tributary classifications, discharges and land use were considered when making use support determinations on waters considered to be swamp like or receiving significant swamp water input.

EPA Conclusion

DWQ has identified waterbodies containing low pH and DO which are believed due to natural conditions. These are generally slow-moving blackwater streams, low-lying swamps and productive estuarine waters in the Coastal Plain. Based on the available data and information, North Carolina’s decision that these waterbodies should be included in Category 3 rather than on the State’s section 303(d) list is reasonable. However, these segments should be considered high priority for follow-up monitoring in order to confirm that the low pH and DO found in these waterbodies is due solely to natural conditions.

b. Impairments Indicated by Physical Parameters

Naturally variable physical parameters are those that fluctuate in a waterbody due to non-anthropogenic influences such as rainfall/flow, depth, time of day, salinity, etc. Naturally variable parameters assessed by DWQ during this listing cycle include DO, pH, temperature and turbidity. Comparison against the North Carolina water quality standards is as follows (note: mg/l is milligrams per liter).

Water Quality Standard	State Assessment Methodology
Freshwater Dissolved Oxygen NCAC 15A 02B .0211(3)(b) DO not less than 6.0 mg/l for trout water, not less than a daily average of 5.0 mg/l with a minimum	Minimum of 10 samples or 10 daily averages. Criterion exceeded ≤10%: Supporting Criterion exceeded >10%: Impaired

<p>instantaneous value of not less than 4.0 mg/l; swamp waters, lake coves or backwaters, and lake bottom waters may have lower values if caused by natural conditions (see section 4a, above).</p> <p>Saltwater Dissolved Oxygen NCAC 15A 02B .0220(3)(b) DO not less than 5.0 mg/l, except that swamp waters, poorly flushed tidally influenced streams or embayments, or estuarine bottom waters may have lower values if caused by natural conditions.</p>	<p>If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling. Minimum of 10 samples or 10 daily averages.</p> <p>Criterion exceeded $\leq 10\%$: Supporting Criterion exceeded $>10\%$: Impaired</p> <p>If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.</p>
<p>Freshwater pH NCAC 15A 02B .0211 (3)(g) pH shall be normal for the waters in the area, which generally shall range between 6.0 and 9.0 except that swamp waters may have a pH as low as 4.3 if it is the result of natural conditions</p> <p>Saltwater pH NCAC 15A 02B .0220(3)(g) pH shall be normal for the waters in the area, which generally shall range between 6.8 and 8.5.</p>	<p>Minimum of 10 samples.</p> <p>Criterion exceeded $\leq 10\%$: Supporting Criterion exceeded $>10\%$: Impaired</p> <p>If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.</p>
<p>Freshwater Temperature NCAC 15A 02B .0211 (3)(j)</p> <p>Temperature not to exceed 2.8° C above the natural water temperatures, and in no case to exceed 29° C for mountain and upper piedmont waters and 32° C for lower piedmont and coastal plain waters. The temperature for trout waters shall not be increased by more than 0.5° C due to the discharge of heated liquids but in no case to exceed 20° C.</p> <p>Saltwater Temperature NCAC 15A 02B .0220(3)(k)</p> <p>Temperature shall not be increased above the natural water temperature by more than 0.8° C during June, July and August nor more than 2.2° C during other months and in no cases to exceed 32° C due to the discharge of heated liquids.</p>	<p>Minimum of 10 samples.</p> <p>Criterion exceeded $\leq 10\%$: Supporting Criterion exceeded $>10\%$: Impaired</p> <p>If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.</p> <p>A trout water (Tr) AU was not rated for aquatic life when greater than 10% of samples were greater than 20° C. The presence of heated discharges was not determined. This is a Category 3a listing (instream data inconclusive).</p> <p>A waterbody that exceeds the above criteria may be not rated for aquatic life because of meteorological conditions that occur on a regular basis. These conditions must be documented and reassessment will occur after</p>

	<p>more normal conditions return. This is a category 3a listing (instream data inconclusive). Examples of extreme conditions may include extreme drought, reservoir drawdown, hurricane impacts and flooding, dam failure, and saltwater encroachment.</p>
<p>Turbidity NCAC 15A 02B .0211 (3)(k)</p> <p>Turbidity in the receiving water shall not exceed 50 Nephelometric Turbidity Units (NTU) in streams not designated as trout waters and 10 NTU in streams, lakes or reservoirs designated as trout waters; for lakes and reservoirs not designated as trout waters the turbidity shall not exceed 25 NTU; if turbidity exceeds these levels due to natural conditions the existing turbidity level cannot be increased.</p>	<p>Minimum of 10 samples.</p> <p>Criterion exceeded $\leq 10\%$: Supporting Criterion exceeded $>10\%$: Impaired</p> <p>If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.</p>

The State currently does not list trout waters for temperature excursions where thermal discharges are present because they have not determined background conditions. The EPA recommends that the State begin a monitoring program to determine background conditions and to assess such waters.

The State’s water quality standards for DO, pH and turbidity do not specify an allowable percent of samples outside of the criteria. However, North Carolina’s use of a ten percent threshold for determining use support for naturally variable parameters is consistent with EPA’s guidance (*2006 Integrated Water Quality Monitoring and Assessment Report Guidance*, July 29, 2005; and *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement*, EPA-841-B-97-002B, p.3-17.) Other EPA guidance (*Consolidated Assessment and Listing Methodologies*, July 2002, “CALM”) recommends that the “state’s assessment and listing methodology should describe how chemical data are collected and how they are used to determine the attainment of water quality standards.” The web page for DWQ’s Ambient Monitoring System references a draft standard operating procedure (*Intensive Survey Unit Standard Operating Procedures*, November 2011; <http://portal.ncdenr.org/web/wq/ess/isu>) that provides additional information on the collection of samples which satisfies that provision.

EPA conclusion

DWQ’s methodology for assessment of DO, pH, temperature and turbidity is consistent with North Carolina’s existing, EPA-approved water quality standards and with EPA regulations.

The EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on the EPA’s independent review of the existing and readily available data, the provisions of the State’s methodology related to age of data and minimum sample size did not result in DWQ failing to identify any waters not attaining DO, pH, temperature and turbidity standards. The EPA is, therefore, approving DWQ’s listing decisions for DO, pH, temperature and turbidity. For trout waters, the EPA recommends that the State’s monitoring program target waters with thermal discharges to determine background conditions.

c. Impairments Indicated by Nutrient Enrichment

North Carolina’s water quality standards include a numeric criterion for chlorophyll *a*, which is used as an indicator of nutrient enrichment in waters of the State.

Water Quality Standard	State Assessment Methodology
<p>NCAC 15A 2B .0211 (3) (a) “Chlorophyll <i>a</i>: not greater than 40 ug/l for lakes, reservoirs, and other waters subject to growths of macroscopic or microscopic vegetation not designated as trout waters, and not greater than 15 ug/l for lakes, reservoirs, and other waters subject to growths of macroscopic or microscopic vegetation designated as trout waters (n/a to lakes and reservoirs less than 10 acres in surface area).”</p>	<p>Minimum of 10 samples.</p> <p>Criterion exceeded ≤10%: Supporting Criterion exceeded >10%: Impaired</p> <p>If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.</p>

EPA conclusion

The EPA has determined that North Carolina’s use of a ten percent threshold for determining use support for chlorophyll *a* is consistent with North Carolina’s existing, EPA-approved water quality standards.

The EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on the EPA’s independent review of the existing and readily available data, the provisions of the State’s methodology related to age of data and minimum sample size did not result in DWQ failing to identify any waters not attaining chlorophyll *a* standards. The EPA is, therefore, approving DWQ’s listing decisions for chlorophyll *a*.

d. Impairments Indicated by Biological Information

The EPA reviewed North Carolina’s listing methodology for assessment of Aquatic Life designated use support indicated by biological monitoring. North Carolina’s water quality standards include a narrative for biological integrity applicable to all Class C waters, as follows.

Water Quality Standard	State Assessment Methodology
<p>NCAC 15A 2B .0211 (2) “The waters shall be suitable for aquatic life propagation and maintenance of biological integrity, wildlife, secondary recreation and agriculture; sources of water pollution which preclude any of</p>	<p>“An AU was assessed as Impaired for aquatic life when a fish or benthic macroinvertebrate community sample received a bioclassification of Severe, Poor or Fair and there were no other Aquatic Life standards violations. This is a Category 5 listing requiring a TMDL.</p> <p>An AU was assessed as Impaired for aquatic life when a fish or benthic macroinvertebrate community sample received a</p>

<p>these uses on either a short-term or long-term basis shall be considered to be violating a water quality standard.”</p>	<p>bioclassification of Severe, Poor or Fair and there were other Aquatic Life numeric standards violations. This is a Category 4s listing requiring a TMDL for the identified aquatic life numerical standards violation (Category 5 or 4t listing) impairing the ecological/biological integrity of the waterbody.</p>
<p>NCAC 15 A 2B .0202 (11) Biological integrity is defined as “...the ability of an aquatic ecosystem to support and maintain a balanced and indigenous community of organisms having species composition, diversity, population densities and functional organization similar to that of reference conditions.”</p>	<p>An AU was assessed as Impaired for aquatic life when a fish or benthic macroinvertebrate community sample received a bioclassification of Severe, Poor or Fair and an approved TMDL for an aquatic life numerical water quality standard has been completely implemented. This is a Category 5s listing requiring a TMDL.”</p>

Benthic macroinvertebrate and fish community assessments are completed by the DWQ Biological Assessment Unit. The most recent Standard Operating Procedures for macroinvertebrate and fish community assessment, data and scores and ratings are available on the DWQ website (<http://portal.ncdenr.org/web/wq/ess/bau>). If both macroinvertebrate and fish community data are available, both are used to evaluate use support. The State’s use of multiple assemblages is in conformance with the EPA’s recommendation in the 2002 CALM guidance that the use of more than one biological index enhances “confidence in the assessment finding.”

EPA Conclusion

The DWQ assessment listing methodology for biological data is consistent with North Carolina’s existing, EPA-approved water quality standards and EPA regulations. The EPA is approving DWQ’s listing decisions based on biological data.

e. Impairments Indicated by Toxic and Non-Conventional Pollutants

Many pollutants which exert a toxic effect in water react and behave differently in the environment than the naturally variable pollutants discussed above. Unlike the naturally variable pollutants described above, toxic and non-conventional pollutants do not generally have wide variability in concentration under natural conditions that would still be protective of the designated use. Therefore, the EPA carefully considered waterbodies with data related to toxic and non-conventional pollutants when reviewing North Carolina’s section 303(d) list. In considering this data, the EPA paid particular attention to the magnitude and duration of any exceedances, and also considered any compensating periods of time when no exceedances were observed. See the Technical Support Document for Water Quality-based Toxics Control, Appendix D - Duration and Frequency, U.S. Environmental Protection Agency, March 1991, EPA/505/2-90-001 (<http://www.epa.gov/npdpub/pubs/owm0264.pdf>).

North Carolina’s numeric water quality standards for toxic and non-conventional pollutants are listed as “maximum permissible levels to protect aquatic life applicable to all fresh surface waters” (NCAC 15A 02B .0211(3) (1)). (Note: µg/l is micrograms per liter.)

Parameter	Water Quality Standard NCAC 15A 02B .0211(3)(1) 15A NCAC 02B .0211(4)	State Assessment Methodology
Arsenic	50 µg/l	Minimum of 10 samples. An assessment unit was assessed as Impaired for aquatic life when greater than 10% of samples were greater than the above standards.
Chromium	50 µg/l (Total recoverable)	
Lead	25 µg/l (Total recoverable)	
Cadmium	0.4 µg/l for trout waters and 2.0 µg/l for non-trout waters.	If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling. Iron was not assessed in this cycle. Previous iron data that was assessed showed elevated levels to be a natural condition statewide. DWQ will review Copper and Zinc assessments that result in Category 5 listings to determine if the listing is appropriate. The review takes into account several lines of information including collocated biological ratings, quality of data and possibility of natural conditions.
Nickel	88 µg/l	
Iron	1.0 mg/l	
Copper	7 µg/l	
Zinc	50 µg/l	

“Ten percent” Methodology

For toxic pollutants, EPA guidance recommends use of one-exceedance-in-three-years frequency for listing decisions. According to the *Consolidated Assessment and Listing Methodology (CALM)–Toward a Compendium of Best Practices*, July 2002, the EPA recommends that acute and chronic aquatic life criteria for toxics not be exceeded more than once every three-year period (1-in-3) on the average. A state may use an alternative methodology to assess waters where the state has provided a scientifically defensible rationale that its methodology is no less stringent than the EPA’s recommended water quality standards.

DWQ’s assessment methodology states: “An assessment unit was assessed as Impaired for aquatic life when greater than 10% of samples were greater than the above standards.” The EPA has reviewed the justification North Carolina submitted supporting its listing methodology for toxic and non-conventional pollutants and does not believe the State has demonstrated that the ten percent frequency methodology for toxics is no less stringent than the 1-in-3 frequency methodology recommended in the EPA’s assessment guidance.

For the 2008 and 2010 section 303(d) list cycles, given the amount of data available in North Carolina, the ten percent exceedance methodology resulted in the same (or more) listings as the EPA-recommended frequency. Within the five-year data window for each listing cycle, DWQ conducted

metals monitoring quarterly for most sampling stations, resulting in twenty samples, sometimes fewer. In most cases, just two exceedances would trigger an impaired designation.

In 2007, DWQ suspended most ambient monitoring for all metals. Limited metals monitoring was resumed in 2010. For the 2012 cycle, there was very little new metals data within the five-year data window (2006-2010). North Carolina includes older data in their assessment when no current data is available and did not propose delisting of metals impairments due to small sample size or age of data.

Iron

DWQ provided USGS data to support the determination that high iron in many North Carolina surface waters is a natural condition. The EPA analyzed the information and concurs that the levels of iron found do appear to be naturally occurring, related to the sediment in streams and the geochemistry of the ecoregions within the state.

Copper and Zinc

For the NC 2006 section 303(d) list and earlier lists, DWQ did not assess use support for copper and zinc but used monitoring data to screen waters for potential problems. DWQ and the EPA worked together to develop an acceptable methodology that the State used to assess copper and zinc for the 2008 and 2010 lists. In the meantime, DWQ began the process of revising all of its metals standards.

DWQ's proposed methodology called for site specific reviews in cases when copper or zinc exceeded the criteria (>10%) but biological sampling indicated no impairment (or in the absence of biological data). The review consisted of an evaluation of all available relevant information, including, but not limited to, natural or background conditions, sample quality and representativeness of data. The same methodology was applied to the 2012 section 303(d) list.

DWQ did not provide sufficient information to show that the proposed combination of biological and chemical methods were protective. While the EPA supports the use of an approach with multiple lines of evidence, DWQ's proposal placed an exceedingly high value on biological assessment over chemical data. The EPA's *Policy on the Use of Biological Assessments and Criteria in the Water Quality Program* (Memorandum from T.T. Davis, Director, Office of Science and Technology to Water Management Division Directors, Regions 1-10, June 19, 1991) states: "Because biosurvey, chemical-specific and toxicity testing methods have unique as well as overlapping attributes, sensitivities, and program applications, no single approach for detecting impact should be considered uniformly superior to any other approach. EPA recognizes that each method can provide valid and independently sufficient evidence of aquatic life use impairment, irrespective of any evidence, or lack of it, derived from the other two approaches. The failure of one method to confirm an impact identified by another method would not negate the results of the initial assessment. This policy, therefore, states that appropriate action should be taken when any one of the three types of assessment determines that the standard is not attained. States are encouraged to implement and integrate all three approaches into their water quality programs and apply them in combination or independently as site-specific conditions and assessment objectives dictate."

DWQ subsequently added copper and/or zinc impairments to 82 waterbodies on the 2008 and 2010 section 303(d) lists. Two copper impairments were added to waterbodies on the 2012 list. The initial review for the 2008 303(d) list also resulted in a list of several assessment units requiring further

investigation for potential impairments of copper and/or zinc. The EPA anticipates that these waterbodies will be treated as high-priority for additional assessment monitoring once new metals standards are adopted. DWQ has monitored several of these waterbodies as part of a special study to assist in the new standards development. See Appendix B for an update on the status of these waterbodies.

Three copper impairments have been proposed to be delisted in the 2012 list. One was a misidentified monitoring station and the impairment was moved to the proper location. Another was placed in Category 4b (see Section III.A.9 Other Pollution Control Requirements for more information). The third was a proposal to delist the copper impairment on part of the North Toe River. However, the EPA has not determined that DWQ's methodology is a reasonable method to assess toxic pollutants. This waterbody/pollutant combination will be included on the EPA's approved section 303(d) list for North Carolina. See Appendix C for more information.

EPA Conclusion

The EPA concurs that the levels of iron found appear to be naturally occurring. The EPA recommends, and the State has agreed, that DWQ will continue to assess iron data to identify any waters with high levels not attributable to natural conditions.

As described above, DWQ and the EPA worked together to develop a methodology that DWQ used to assess copper and zinc. High priority follow-up monitoring during the next listing cycle is recommended for the waterbodies identified as potentially impaired for copper and zinc. Monitoring and assessment of those and all waterbodies must be based on North Carolina's EPA-approved water quality standards that might include any revised metals standards that have been approved by the EPA prior to the next listing cycle. See Appendix B for an update on the status of these waterbodies.

As discussed earlier in this section, the EPA has not determined that use of the "> 10% exceedance" test is a reasonable method for DWQ to assess toxic or non-conventional pollutants consistent with the State's currently applicable, EPA-approved water quality standards. The EPA also does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on the EPA's independent review, the provisions of the State's methodology related to age of data, minimum sample size, and toxic or non-conventional pollutants did not result in DWQ failing to identify any waters not attaining toxic or non-conventional pollutant water quality standards. The EPA is, therefore, approving DWQ's listing decisions for toxic and non-conventional pollutants.

However, the EPA has identified one waterbody for which the State failed to adequately demonstrate good cause for delisting. The North Toe River (Assessment Unit 7-2-(21.5)) was listed for copper on the 2008 and 2010 section 303(d) lists. DWQ propose to delist it citing flaws in the analysis, indicating it should not have been listed initially. However, DWQ's methodology (> 10% exceedance) is not consistent with EPA guidance (>one-exceedance-in-3 years). This waterbody/pollutant combination will be included on the EPA's approved section 303(d) list for North Carolina. See Appendix C for more information.

5. Fish Consumption Use Support

Class C waters are freshwaters protected for several uses, including fishing. Class SC represents saltwater protected for several uses, including fishing. All waters in the state are protected at a minimum at the Class C or SC level. The fish consumption use support category is based on protecting human health, so these waters are assessed to determine whether humans can safely consume fish from a particular waterbody.

Water Quality Standard	State Assessment Methodology
<p>15A NCAC 02B.0211(I)(ix) (I) Toxic substances: numerical water quality standards (maximum permissible levels) for the protection of human health applicable to all fresh surface waters are in Rule .0208 of this Section. Numerical water quality standards (maximum permissible levels) to protect aquatic life applicable to all fresh surface waters: (ix) Mercury (water column criteria): 0.012 µg/l</p> <p>NCAC 15A 02B .0208(a)(2) Standards for Toxic Substances and Temperature Human Health Standards: The concentration of toxic substances will not exceed the level necessary to protect human health through exposure routes of fish (or shellfish) tissue consumption, water consumption, or other route identified as appropriate for the water body. (A) For non-carcinogens, WQS or criteria used to calculate water quality based effluent limitations to protect human health for fish consumption. (See reg. for details on calculation.) (B) For carcinogens: WQS applicable to protect human health from carcinogens through the consumption of fish are: Beryllium: 117 ng/l Benzene: 71.4 ug/l Carbon tetrachloride: 4.42 ug/l Dioxin: 0.000014 ng/l Hexachlorobutadiene: 49.7 ug/l PCBs: 0.079 ng/l PAHs: 31.1 ng/l Tetrachloroethylene: 92.4 ug/l Trichloroethylene: 92.4 ug/l Vinyl chloride: 525 ug/l Aldrin: 0.136 ng/l Chlordane: 0.588 ng/l DDT: 0.591 ng/l Dieldrin: 0.144 ng/l Heptachlor: 0.214 ng/l</p>	<p>Fish Consumption was assessed based on site-specific fish consumption advisories. The advisories were based on the NC Department of Health and Human Services (DHHS) consumption advisories developed using fish tissue data that exceed standards.</p> <p><u>Additional Mercury Assessment Criteria</u> An assessment unit was assessed as Impaired for fish consumption when greater than 10% of samples were greater than 0.012 µg/l. A minimum of 10 samples was needed to rate the water as Impaired.</p>

The Monitoring Program Strategy states that DWQ conducts fish tissue testing for mercury, selenium, cadmium, PCBs and pesticides (including dioxins). Data are provided to the North Carolina Department of Health and Human Services (DHHS) for that agency to make fish consumption advisories.

Dioxins in Waterville Reservoir

The EPA's independent analysis of fish tissue data from Waterville Reservoir indicates a probable standard exceedance of dioxin in the water column. DWQ's assessment methodology for dioxin is based on fish consumption advisories issued by the DHHS, not an evaluation of compliance with the water quality standard. DWQ has listed the Pigeon River and Waterville Reservoir in the past based on fish advisories. However, levels in fish tissue (monitored annually) have been declining and, when the fish advisories were dropped, these waterbodies were removed from the State's section 303(d) list. The presence of an advisory indicates impairment, however, lack of an advisory does not necessarily indicate lack of impairment.

The North Carolina water quality standard for dioxin is given as a water column number (0.005 parts per quadrillion, or ppq). Levels in the water column are below detection limits with normal sampling methods. Because dioxin bioaccumulates in aquatic organisms, fish tissue data is used to determine use support. However, the level of dioxin in fish tissue which triggers a fish consumption advisory in the state (3.0 parts per trillion, or ppt) is less stringent than the level (0.025 ppt) that would indicate the water is not attaining the standard for dioxin.

Since the time that Blue Ridge Paper Products, a facility upstream of the Reservoir, stopped releasing detectable levels of dioxin in the early 1990s, levels in fish tissue have been declining. The EPA's review of the Blue Ridge Paper Products NPDES permit renewal in 2009 led to review of recent fish tissue data in Pigeon River and Waterville Reservoir (no probable exceedances were found in the Pigeon River). Though the current fish tissue data for Waterville Reservoir does not trigger a fish advisory, the EPA conducted back calculations of this fish tissue data to determine the level of dioxin in the water column, and these calculations indicate that the water column levels are elevated.

Based on the data analysis, the EPA has determined that it is likely the Waterville Reservoir continues to be impaired for dioxin. In order to further confirm the dioxin levels that currently exist in the water column of Waterville Reservoir, and make a determination about whether water quality standards are currently being met, the EPA has discussed with DWQ the use of high volume sampling, a technique developed by the EPA Region 4's Science and Ecosystems Support Division. High volume sampling can achieve a much lower detection limit, allowing direct comparison of the water column monitoring data with the state water column standard.

Statewide Fish Consumption Advisory for Mercury

In North Carolina, a statewide fish consumption advisory exists for mercury in Largemouth Bass. Due to this advisory, the designated uses of all water bodies statewide are impaired by mercury. Therefore, all named water bodies in North Carolina were included in the section 303(d) list for mercury impairment.

EPA Conclusion

The EPA has determined that, in general, North Carolina’s use of fish tissue data and fish consumption advisories is consistent with North Carolina’s existing, EPA-approved water quality standards. However, the methodology should allow flexibility to address site specific data as in the case of Waterville Reservoir. The EPA's *Consolidated Assessment and Listing Methodology* guidance advises "...for fish and shellfish advisories for 'dioxin and dioxin-like compounds,' the EPA recommends that because of the unique risk characterization issues, listing decisions should be made on a case-by-case basis.”

The EPA is deferring action on Waterville Reservoir, pending implementation of a plan of study to better determine water column dioxin concentrations. A draft plan of study is provided in Appendix D. DWQ has agreed to work with the EPA as expeditiously as possible to complete this additional sampling effort in order to make final determination regarding impairment status of this water.

The EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. Also, for the reasons set out in the section addressing assessment of section III.A.4.e above, the EPA has not determined that use of the “> 10% exceedence” test is a reasonable method for DWQ to assess toxic or non-conventional pollutants such as mercury. However, based on the EPA’s independent review, the provisions of the State’s methodology related to age of data, minimum sample size and toxic or non-conventional pollutants did not result in DWQ failing to identify any waters based on fish consumption use. Therefore, the EPA is approving DWQ’s listing decisions for fish consumption use support.

6. Shellfish Consumption Use Support

The methodology for Shellfish Harvesting Use Support is applicable only to Class SA waters: tidal salt water bodies used for shellfish harvesting for market purposes.

Water Quality Standard	State Assessment Methodology
<p>15A NCAC 02B .0221 Waters shall meet the current sanitary and bacteriological standards as adopted by the Commission for Health Services and shall be suitable for shellfish cultures...Quality standards applicable: (a) Floating solids; settleable solids; sludge deposits: none attributable to sewage, industrial or other wastes. (b) Sewage: None (c) Industrial Wastes or other wastes: none which are not effectively treated...in accordance with the requirements of the Division of Health Services. (d) Organisms of the coliform group: fecal</p>	<p>An assessment unit was assessed as Impaired when the geometric mean was greater than 14 colonies/100ml or greater than 10% of the samples were higher than 43 colonies/100ml.</p> <p>An assessment unit was assessed as Impaired when the North Carolina Division of Environmental Health growing area classification was Prohibited or Conditionally approved.</p> <p>This is a Category 5 listing requiring a TMDL.</p>

coliform group not to exceed a median MF of 14/100 ml and not more than 10 percent of the samples shall exceed an MF count of 43/100 ml in those areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions. (Note: MF is an abbreviation for the membrane filter procedure for bacteriological analysis)	
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The North Carolina Division of Environmental Health (DEH) operates its monitoring program under guidelines outlined in the National Shellfish Sanitation Program’s Guide for the Control of Molluscan Shellfish. When a condition or event occurs that impacts the open status of waters, DEH closes those waters to protect public health. According to the DEH website (<http://portal.ncdenr.org/web/mf/shellfish-sanitation>), conditionally approved “areas are generally open to shellfishing, but can be closed after a significant rainfall event due to the resultant runoff. The area will then remain closed until water sampling indicates a return to acceptable bacteria levels.” By definition, conditionally approved areas do not meet the water quality criteria based on a sanitary survey involving detailed water quality assessments conducted under the national protocols. Consequently, EPA’s guidance advises, and DWQ’s listing methodology agrees, that all conditionally approved areas be listed on the section 303(d) list.

EPA Conclusion

The EPA agrees that North Carolina’s listing methodology provides for DWQ to make listing decisions based on bacteriological data and shellfish harvesting classification information and in a manner consistent with the State’s currently applicable water quality standards and EPA regulations.

The EPA does not agree that provisions in the State’s methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on the EPA’s independent review of the existing and readily available data, the provisions of the State’s methodology related to age of data and minimum sample size did not result in DWQ failing to identify any waters not attaining shellfish use. Therefore, the EPA is approving DWQ’s listing decisions for shellfish use support based on that methodology.

7. Recreational Use Support

In addition to all Class C requirements, Primary Recreation Use Support (e.g., swimming, water-skiing, skin diving) is assessed for all Class B, SA and SB waters. Secondary Recreation Use Support (e.g., wading, boating) is assessed for all Class C and SC waters. Water quality standards applicable to Class C waters also apply to all waters classified as water supply.

North Carolina bases its determination of use support on (1) the fecal coliform bacteria water quality standard for fresh water (applicable to all Class C, B and SA waters), (2) the enterococcus water quality standard for coastal waters (applicable to all Class SA, SB and SC waters), and (3) the duration of swimming advisories issued by state and local health departments.

Water Quality Standard	State Assessment Methodology
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<p>15A NCAC 2B .0211 (3)(e) (Class C) 15A NCAC 2B .0219 (3)(b) (Class B) 15A NCAC .0220 (3)(e) Class SC 15A NCAC .0222 (3)(c) Class SB Water quality standards applicable to Class SC and SB waters also apply to Class SA waters.</p> <p><u>Fresh Waters</u> Organisms of the coliform group: fecal coliforms shall not exceed (1) a geometric mean of 200/100 ml (MF count) based upon at least five consecutive samples examined during any 30 day period, nor exceed (2) 400/100 ml in more than 20 percent of the samples examined during such period. (Note: MF is an abbreviation for the membrane filter procedure for bacteriological analysis)</p> <p><u>Coastal Waters</u> Enterococcus, including <i>Enterococcus faecalis</i>, <i>Enterococcus faecium</i>, <i>Enterococcus avium</i> and <i>Enterococcus gallinarium</i>: not to exceed a geometric mean of 35 enterococci per 100 ml based upon a minimum of five samples within any consecutive 30 days.</p>	<p>Recreation Use Support <u>Fresh Waters</u> Supporting: neither part of the standard (#1 and 2, at left) is exceeded. Impaired: either part of the standard (#1 and 2, at left) is exceeded. Not Rated: insufficient fecal coliform bacteria data (less than 5 samples in 30 days). This is a Category 3a listing (instream data inconclusive).</p> <p><u>Coastal Waters</u> Impaired: geometric mean greater than 35 colonies/100ml. At least 5 samples must have been collected within the same 30-day period. Not Rated: geometric mean was greater than 35 colonies/100ml and samples were not collected in the same 30-day period. This is a Category 3a listing (instream data inconclusive).</p> <p>Advisory Posting Assessment An AU was assessed as Impaired when a swimming advisory was posted for greater than 61 days in any 5 year period (includes permanent postings).</p>
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DWQ conducts monthly fecal coliform bacteria testing as part of its ambient monitoring program for fresh waters. The North Carolina Division of Environmental Health (DEH) tests coastal recreation waters for Enterococcus levels. According to recent discussions with DWQ staff and as stated in North Carolina’s 2006 Integrated Report, “Locations with annual geometric means greater than 200 colonies per 100 ml, or when more than 20 percent of the samples are greater than 400 colonies per 100 ml, are

identified for potential follow-up monitoring conducted five times within 30 days as specified by the state fecal coliform bacteria standard. If bacteria concentrations exceed either portion of the state standard, the data are sent to DEH and the local county health director to determine the need for posting swimming advisories.”

EPA Conclusion

Based on the EPA’s review of DWQ’s assessment submittals, DWQ’s assessment methodology for recreational use is consistent with North Carolina’s existing, EPA-approved water quality standards.

The EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on the EPA’s independent review of the existing and readily available data, the provisions of the State’s methodology related to age of data and minimum sample size did not result in DWQ failing to identify any waters not attaining recreational use. Therefore, the EPA is approving DWQ’s listing decisions for bacteria related to recreational use based on that methodology.

8. Drinking Water Use Support and Protection of Human Health

Water supply watersheds are classified as WS-I through WS-V waters. Water quality standards applicable to Class C waters also apply to Class WS-I through WS-V waters. The following water quality standards apply to surface waters within water supply watersheds.

Water Quality Standard	State Assessment Methodology
<p>NCAC 15A 02B .0212, .0214, .0215, .0216, .0218 Waters of this class are protected by numerous management strategies including significantly limiting the point and non-point sources and imposing development management practices. Chloride: 250 mg/l Nickel: 25 ug/l Nitrate nitrogen: 10 mg/l Barium: 1.0 mg/l 2,4-D: 100 ug/l 2,4,5-TP (Silvex): 10 ug/l Sulfates: 250 mg/l</p>	<p>An assessment unit was assessed as Impaired for water supply when greater than 10% of samples were greater than these standards. A minimum of 10 samples was needed to rate the water as Impaired.</p> <p>If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.</p>
<p>Coliforms: total coliforms not to exceed 50/100ml (MF count) as a monthly geometric mean value in watersheds serving as unfiltered water supplies (in Class WS-I only) TDS: not greater than 500 mg/l Total hardness: not greater than 100 mg/l as calcium carbonate</p>	<p>The Use Support Methodology does not discuss an assessment methodology for these parameters.</p> <p>A number of indicators with associated standards are not monitored or infrequently monitored by the DWQ Ambient Monitoring Program, primarily due to expense of analysis or current analytical methods have reporting limits above the applicable standard. Since 2007, DWQ</p>

Phenolic compounds: not greater than 1.0 ug/l Beryllium: 6.8 ng/l Benzene: 1.19 ug/l Carbon Tetrachloride: 0.254 ug/l Chlorinated benzenes: 488 ug/l Dioxin: 0.000013 ng/l Hexachlorobutadiene: 0.445 ug/l Polynuclear aromatic hydrocarbons: 2.8 ng/l Tetrachloroethane: 0.172 ug/l Tetrachloroethylene: 0.8 ug/l Trichloroethylene: 3.08 ug/l Vinyl Chloride: 2 ug/l Aldrin: 0.127 ng/l Chlordane: 0.575 ng/l DDT: 0.588 ng/l Dieldrin: 0.135 ng/l Heptachlor: 0.208 ng/l	has conducted a Random Ambient Monitoring System (RAMS) on freshwater streams statewide which collects many of these parameters. [See Probabilistic Monitoring of North Carolina Freshwater Streams - 2007-2010 (DWQ, 2012; page 6) and North Carolina Monitoring Program Strategy (DWQ, 2005; page 18)]
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All Toxics are Maximum Permissible Concentrations to protect human health through water consumption and fish tissue consumption for carcinogens and non-carcinogens.

EPA Conclusion

DWQ’s methodology to assess attainment of drinking water and human health uses for conventional pollutants is consistent with North Carolina’s existing, EPA-approved water quality standards and with EPA regulations. The EPA does not agree that provisions in the State’s methodology related to age of data and minimum sample size are consistent with federal requirements.

However, for the reasons set out in the section addressing assessment of section III.A.4.e above, the EPA has not determined that use of the “> 10% exceedence” test is a reasonable method for DWQ to assess toxic or non-conventional pollutants. Based on the EPA’s independent review of the existing and readily available data, the provisions of the State’s methodology related to age of data, minimum sample size, and toxic or non-conventional pollutants did not result in DWQ failing to identify any waters not attaining drinking water and human health uses. The EPA is, therefore, approving DWQ’s listing decisions for drinking water and human health uses.

9. Other Pollution Control Requirements (40 CFR 130.7(b)(1))

EPA’s regulations provide that Total Maximum Daily Loads (TMDLs) are not required for waterbodies where “[o]ther pollution control requirements (e.g., best management practices) required by local, State, or Federal authority are stringent enough to implement any water quality standards [WQS] applicable to such waters.” 40 C.F.R. section 130.7(b)(1)(iii). The EPA’s *2006 Integrated Water Quality Monitoring and Assessment Report Guidance* acknowledges that the most effective method for achieving water quality standards for some water quality impaired segments may be through controls developed and implemented without TMDLs (referred to as a “4b alternative”). The EPA expects that these controls must be specifically applicable to the particular water quality problem and be expected to result in

standards attainment in the near future. The EPA evaluates on a case-by-case basis a State's decision to exclude certain segment/pollutant combinations from Category 5 (the section 303(d) list) based on the 4b alternative.

There are four new Category 4b listings in North Carolina's 2012 section 303(d) list. Three assessment units in the Neuse River, 27-(1), 27-(5.5)a and 27-(5.5)b, comprise Falls Lake. Assessment unit 12-119-(6)a is a segment of Abbotts Creek downstream of Lake Thom-a-Lex. All waters proposed to be placed in Category 4b were reviewed to ensure that the following six elements were addressed:

1. Identification of segment and statement of problem causing the impairment;
2. Description of pollution controls and how they will achieve water quality standards;
3. An estimate or projection of the time when WQS will be met;
4. Schedule for implementing pollution controls;
5. Monitoring plan to track effectiveness of pollution controls; and
6. Commitment to revise pollution controls, as necessary.

Falls Lake, in the Upper Neuse River Basin, covers almost 12,500 acres and stretches 28 miles from the confluence near Durham to the dam located just outside of Raleigh. Falls Lake serves many functions: a drinking water reservoir for many surrounding communities, a flood control reservoir for downstream communities, habitat for wildlife and a recreational area for outdoor enthusiasts. Falls Lake was placed on the 2008 section 303(d) list due to chlorophyll *a* standard exceedances in the entire lake. DWQ states this is the result of high nutrient and sediment loading occurring in the watershed (Neuse River Basin Water Quality Plan, July 2009). The Falls Lake Nutrient Management Rules were adopted in January 2011 to restore water quality in the lake by reducing the amount of pollution entering upstream. The rules are a staged nutrient management strategy designed to reduce nutrient discharges to the lake from various sources, including stormwater runoff from new and existing development, wastewater treatment plants and agriculture. The rules contain schedules, commitments and monitoring plans.

Abbotts Creek downstream of the Lake Thom-a-Lex, near the City of Lexington, was placed on the 2008 section 303(d) list due to copper level exceedances. Copper sulfate was historically used to suppress algal growth in the lake, impaired for exceeding chlorophyll *a* levels. Solar-powered aerators are now used to suppress algal growth. The Piedmont Triad Council of Governments, in conjunction with DWQ and the North Carolina Clean Water Management Trust Fund, is implementing a Lower Abbotts Creek Watershed Restoration Plan. The City of Lexington has conducted more recent monitoring in the Creek which indicates levels of copper have significantly declined. DWQ will verify the City's data quality and will check for all other available data before the next 303(d) listing cycle.

In summary, for all waterbodies identified in Category 4b, the State expects that other required regulatory controls (e.g., NPDES permit limits, Stormwater Program Rules, Nutrient Management Rules, etc.) will result in compliance with standards within a reasonable period of time. North Carolina has also confirmed that future monitoring will be used to verify standards achievement. The EPA agrees with all of DWQ's listing decisions based on the applicability of other pollution control requirements.

B. North Carolina's 2012 Section 303(d) List of Impaired Waters (40 CFR 130.7(b)(4))

1. North Carolina's Addition of Water Quality Limited Segments

North Carolina identified additional water quality limited segments in its 2012 section 303(d) list submittal, consistent with section 303(d) and EPA's implementing regulations. The EPA is approving the addition of those water quality limited segments to North Carolina's section 303(d) list. The newly listed waterbodies are identified in Appendix E.

2. North Carolina's 2010 Section 303(d) Delistings (40 CFR 130.7(b)(6)(iv))

North Carolina proposed to remove specific water quality limited segments from its 2010 section 303(d) list submittal, consistent with section 303(d) and EPA's implementing regulations. The EPA has reviewed the good cause justification for those delisting requests and is approving the delisting of all but one of those water quality limited segments from North Carolina's section 303(d) list. The delisted waterbodies are identified in Appendix F.

C. Priority Ranking and Targeting (40 CFR 130.7(b)(4))

In previous Integrated Report submittals, DWQ provided a description of how water quality limited segments were prioritized for TMDL development. Prioritization was determined according to the severity of the impairment and the designated uses of the segment, taking into account the most serious water quality problems, most valuable and threatened resources, and risk to human health and aquatic life. According to the EPA's *Final Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act; TMDL-01-03* dated July 21, 2003, "...States need not specifically identify each TMDL as high, medium or low priority. Instead, the schedule itself can reflect the State's priority ranking." The section 303(d) list submittal provides a Development Schedule (see below) as required but does not provide a description of the method used for prioritization. The EPA recommends inclusion of North Carolina's method for prioritization of TMDL development in future lists.

D. Schedule for Development of TMDLs for Listed Waters and Pollutants

Pursuant to 40 CFR Section 130.7(b)(4), the State's submittal shall include "the identification of waters targeted for TMDL development in the next two years." The State has identified several waterbody-pollutant combinations that will be addressed over the next two years, as shown in Appendix G. The EPA has determined that the State's priority ranking adequately considered the severity of pollution and the designated uses of such waterbodies, and that the State's schedule for TMDL development represents adequate progress.

E. Government to Government Consultation

The EPA recognizes its unique legal relationship with Tribal Governments as set forth in the United States Constitution, treaties, statutes, executive orders, and court decisions. Government wide and EPA specific policies call for regular and meaningful consultation with Indian Tribal Governments when developing policies and regulatory decisions on matters affecting their communities and resources. The *EPA Policy on Consultation and Coordination with Indian Tribes* (Policy) was finalized on May 4, 2011, in accordance with the Presidential Memorandum issued November 5, 2009, directing agencies to develop a plan to implement fully Executive Order 13175. This Policy reflects the principles expressed in the *1984 EPA Policy for the Administration of Environmental Programs on Indian Reservations* (1984 Policy). The 1984 Policy remains the cornerstone for the EPA's Indian program and "assure[s]

that tribal concerns and interests are considered whenever the EPA's actions and/or decisions may affect" tribes (1984 Policy, p.3, principle no.5).

On March 30, 2012, the State of North Carolina submitted its final section 2012 303(d) list to the EPA for review. This submittal triggered the EPA's mandatory duty under section 303(d) of the CWA to review the State's section 303(d) list for consistency with the requirements of the CWA and to take action to approve or disapprove the 303(d) list.

The State of North Carolina's section 303(d) list and the EPA's decision on this list will apply to waters in the State of North Carolina and will not apply to waters in Indian Country. Nonetheless, because some of the State waters are adjacent to Tribal waters, Tribal resources could be impacted by this action. As such, the EPA identified and offered government to government consultation to two federally recognized tribal governments to ensure that tribal input was considered prior to a final Agency action on the North Carolina 2012 section 303(d) list.

By letter of April 13, 2012, the EPA formally offered consultation to the Eastern Band of Cherokee Indians and the Catawba Indian Nation. The consultation and coordination process was conducted in accordance with the EPA Policy (www.epa.gov/tribal/consultation/consult-policy.htm). The process began on April 13, 2012 and ended on May 14, 2012.

The Catawba Indian Nation did not choose to consult. Written comments were received from the Eastern Band of Cherokee Indians (EBCI) in a May 4, 2012, email. The EBCI comments covered a number of topics related to North Carolina's WQS and surface water quality monitoring program that fall outside the scope of the EPA's review of the North Carolina 2012 303(d) list. However, the EPA acknowledges the validity the EBCI comments and will initiate discussions with the DWQ in order to more fully address the comments.

As discussed in Section III.4(e) of this document, the EPA has determined that DWQ failed to adequately demonstrate good cause for delisting the North Toe River for its copper impairment; therefore, the North Toe River will be included on the EPA's approved section 303(d) list for the State of North Carolina. The EPA will open a comment period to solicit comments on the proposed addition of the North Toe River copper impairment to the North Carolina 2012 section 303(d) list. The EPA's proposed addition to North Carolina's 2012 section 303(d) list will not trigger an offer of tribal consultation and coordination.

IV. Final Recommendation on North Carolina's 2012 Section 303(d) List Submittal

After careful review of the final section 303(d) list submittal package, the EPA Region 4 Water Protection Division recommends that the EPA partially approve the State of North Carolina's 2012 section 303(d) list. The Water Protection Division's review concluded that DWQ's approach was acceptable for the vast majority of waterbody impairments. However, the EPA has identified one waterbody/pollutant combination for which the State failed to adequately demonstrate good cause for delisting. DWQ proposed to delist the copper impairment on part of the North Toe River citing flaws in the analysis. However, the EPA has not determined that DWQ's methodology is a reasonable method for DWQ to assess toxic or non-conventional pollutants consistent with the State's currently applicable, EPA-approved water quality standards. This waterbody/pollutant combination will be included on the EPA's approved section 303(d) list for North Carolina. See Appendix C for more information.

The EPA is deferring action on Waterville Reservoir, pending implementation of a sampling effort to better determine water column dioxin concentrations. A draft plan of study is provided in Appendix D. DWQ has agreed to work with the EPA as expeditiously as possible to complete this additional sampling effort in order to make a final determination regarding impairment status of this water.

The EPA's approval of North Carolina's section 303(d) list extends to all other waterbodies on the list with the exception of those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove the State's list with respect to those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under section 303(d) for those waters.

Appendix A: North Carolina Integrated Reporting Classifications

IRC	IRC_desc
1	All designated uses are monitored and supporting
1b	Designated use was impaired other management strategy in place and no standards violations for the parameter of interest
1nc	DWQ have made field determination that parameter in exceedance is due to natural conditions.
1r	Assessed as supporting watershed is in restoration effort status
1t	No criteria exceeded but approved TMDL for parameter of interest
2	Some designated uses are monitored and supporting none are impaired Overall only
2b	Designated use was impaired other management strategy in place and no standards violations Overall only
2r	Assessed as supporting watershed is in restoration effort status overall only
2t	No criteria exceeded but approved TMDL for POI Overall only
3a	Inconclusive instream data
3b	Evaluation information no instream data available
3c	No data or information to make assessment
3n1	Chlorophyll a exceeds TL value and SAC is met-draft
3n2	Chlorophyll a exceeds EL value and SAC is not met first priority for further monitoring-draft
3n3	Chlorophyll a exceeds threshold value and SAC is not met first second priority for further monitoring-draft
3n4	Chlorophyll a not available determine need to collect-draft
3t	No data or information to make assessment but AU is in watershed where a TMDL/model is valid
4b	Designated use impaired other management strategy expected to address impairment
4c	Designated use impaired by something other than pollutant
4cr	Recreation use impaired no instream monitoring data or screening criteria exceeded
4cs	Shellfish harvesting impaired no instream monitoring data- no longer used
4ct	Designated use impaired but water is subject to approved TMDL or under TMDL development
4s	Impaired Aquatic Life with approved TMDL for Aquatic Life POI or category 5 listing
4t	Designated use impaired approved TMDL
5	Designated use impaired because of biological or ambient water quality standards violations and needing a TMDL.
5r	Assessed as impaired watershed is in restoration effort status

Appendix B: Assessment Units where further investigation is required for potential impairments of copper and/or zinc

Assessment Unit #	Waterbody Name	NC Basin	Impairment	NC DWQ Notes	Progress of Investigation
10b	New River (North Carolina Portion)	New	Copper	Benthos station KB34 co-located with K7900000 has had Excellent or Good bioclassifications since 1983. There are no identified sources of copper or zinc in the watershed upstream in Virginia -2008 NAIP. DWQ will pursue a natural conditions study for this	DWQ reported some copper monitoring data in STORET in 2010 and 2011 for this Assessment Unit
10b	New River (North Carolina Portion)	New	Zinc	Benthos station KB34 co-located with K7900000 has had Excellent or Good bioclassifications since 1983. There are no identified sources of copper or zinc in the watershed upstream in Virginia -2008 NAIP. DWQ will pursue a natural conditions study for this	DWQ reported some zinc monitoring data in STORET in 2010 and 2011 for this Assessment Unit
12-(124.5)c	YADKIN RIVER (including Tuckertown Lake, Badin Lake)	Yadkin	Copper	Copper, chlorophyll a, and turbidity exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
12-108-21c	Second Creek (North Second Creek)	Yadkin	Copper	Benthos station QB504 co-located with Q4165000 has only been sampled once in 2008. There are no identified sources of copper-2008 NAIP. DWQ will continue to monitor copper to determine if the exceedances are regular and ongoing.	No update available.
12-110b	Grants Creek	Yadkin	Copper	Copper or zinc Assessment exceedances not assessed in category 5 due to insufficient samples N<10.	DWQ reported some copper monitoring data in STORET in 2010 and 2011 for this Assessment Unit
12-110b	Grants Creek	Yadkin	Zinc	Copper or zinc Assessment exceedances not assessed in category 5 due to insufficient samples N<10.	DWQ reported some zinc monitoring data in STORET in 2010 and 2011 for this Assessment Unit
13-17-40-(1)	Lanes Creek	Yadkin	Copper	Copper and zinc exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
13-17-40-(1)	Lanes Creek	Yadkin	Zinc	Copper and zinc exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
13-17-40-10	Barkers Branch	Yadkin	Copper	Copper exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
13-2-3-3-(0.7)	Back Creek (Back Creek Lake)	Yadkin	Copper	Copper exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.

Assessment Unit #	Waterbody Name	NC Basin	Impairment	NC DWQ Notes	Progress of Investigation
13-45-(1)	Marks Creek (Water Lake)	Yadkin	Copper	Chlorophyll a and copper exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
16-(1)d2	HAW RIVER	Cape Fear	Zinc	Zinc exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
17-(4)b	DEEP RIVER	Cape Fear	Zinc	Combined data are below 20% exceedance for fecal coliform	No update available.
17-(4)b	DEEP RIVER	Cape Fear	Zinc	Zinc exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
22-58-12-6b	Marlowe Creek	Roanoke	Copper	Zinc and Copper exceedances not assessed in category 5 due to insufficient samples N<10.	This Assessment Unit was listed in Category 5 (Impaired) on the 2008 and 2010 303(d) lists.
22-58-12-6b	Marlowe Creek	Roanoke	Zinc	Zinc and copper exceedances not assessed in category 5 due to insufficient samples N<10.	This Assessment Unit was listed in Category 5 (Impaired) on the 2008 and 2010 303(d) lists.
27-(118)a2	NEUSE RIVER Estuary	Neuse	Copper	Copper exceeds by exactly 10% at nearby J9930000. J9810000 is a mid channel station with no nearby sources. Not 95% confident in 10% exceedance of standard. DWQ will continue to monitor.	No update available.
27-(49.5)a	NEUSE RIVER	Neuse	Copper	Benthos station JB34 co-located with J5250000 has had Good bioclassifications since 1995. Do not have 95% confidence in copper exceedance of standard. There are no identified sources of copper in the watershed. DWQ will pursue a natural conditions study for this.	No update available.
27-(96)b2	NEUSE RIVER Estuary	Neuse	Copper	J8900800 is a mid channel station with no nearby sources. DWQ will continue to monitor stations in immediate upstream freshwater do not exceed criteria.	This Assessment Unit was listed in Category 5 (Impaired) on the 2010 303(d) list.
27-23-(2)	Smith Creek	Neuse	Zinc	Zinc exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
27-33-(10)c	Crabtree Creek	Neuse	Copper	Copper exceedances not assessed in category 5 due to insufficient samples N<10.	No update available.
28-11e	Fishing Creek	Tar-Pamlico	Zinc	Do not have 95% confidence in copper and zinc Exceedances. Co-located Benthos at OB10 has remained stable or improved since 1990. Co-located fish community at OF17 has improved since 1992 and is currently Excellent.	DWQ reported some copper monitoring data in STORET in 2010 and 2011 for this Assessment Unit
28-11e	Fishing Creek	Tar-Pamlico	Copper	Do not have 95% confidence in copper and zinc Exceedances. Co-located Benthos at OB10 has remained stable or improved since 1990. Co-located fish community at OF17 has improved since 1992 and is currently Excellent.	DWQ reported some zinc monitoring data in STORET in 2010 and 2011 for this Assessment Unit
29-6-(5)	Chocowinity Bay	Tar-Pamlico	Copper	O7710000 is a mid-channel station with no nearby sources. Immediate upstream freshwater stations do not exceed criteria. DWQ will continue to monitor	This Assessment Unit was listed in Category 5 (Impaired) on the 2010 303(d) list.

Appendix C: Failure to demonstrate good cause: water quality limited segment added to the 2012 Section 303(d) List by the EPA

Waterbody: North Toe River, Avery County, North Carolina
Assessment Unit#: 7-2-(21.5) **Monitoring Station: E700000**
Basin: French Broad River **Classification: water supply, trout**

The copper impairment for this segment of the North Toe River, first identified on the 2008 303(d) list, was based on data gathered from 2002 through 2006. There were 21 samples and two exceedances, a 9.5% exceedance of the 7 µg/l copper criteria. The two exceedances, 25 µg/l and 15 µg/l, were nine months apart (greater than 1-in-3). Because of the cessation of metals monitoring in 2007, there is no copper data for the North Toe River beyond 2007.

The EPA guidance for use support determinations recommends that aquatic life criteria for toxics not be exceeded more than once every three-year period (1-in-3). The North Carolina Division of Water Quality's (NCDWQ) assessment methodology for toxics considers a waterbody impaired for aquatic life when more than 10% of samples are greater than the criteria. Although a state may use an alternative scientifically defensible methodology, the EPA does not believe NCDWQ has demonstrated that the 10% frequency methodology is no less stringent than the recommended 1-in-3 frequency methodology. In cases such as this, where the EPA cannot determine if the methodology identified all impaired waterbodies, the EPA conducts an independent review of water quality data to determine whether any waterbodies should be added to the 303(d) list.

For the 2008 and 2010 303(d) list cycles, given the amount of data available in North Carolina, the 10% exceedance methodology resulted in the same or more listings as the 1-in-3 frequency. Within the five-year data window for each of those listing cycles, NCDWQ conducted metals monitoring quarterly for most sampling stations, resulting in about twenty samples per station. In most cases, just two exceedances triggered an impaired designation.

For the 2012 cycle, the five-year data window (01/01/06 to 12/31/10) includes significantly less metals data. In 2007, NCDWQ suspended most ambient monitoring for all metals, as the State anticipated development of new metals water quality standards. Limited metals monitoring was resumed in 2010. NCDWQ did not re-assess (or delist) waterbodies for metals impairment based on the smaller pool of data in the 2012 cycle.

NCDWQ listed the North Toe even though the data showed less than 10% exceedance. The State received a comment on the Public Review Draft of the 303(d) list pointing out the apparent discrepancy with their methodology and recommending removal of the North Toe River copper impairment. In its Final 303(d) list submittal to the EPA on March 30, 2012, NCDWQ proposed to delist the North Toe River, citing flaws in the analysis and indicating it should not have been listed initially (9.5% was not greater than 10% exceedance).

NCDWQ's methodology is not consistent with the EPA's 1-in-3 guidance. The State has failed to adequately demonstrate good cause for delisting of the copper impairment on the North Toe River.

Appendix D: Draft Plan of Study for High Volume Sampling of Dioxin in Waterville Reservoir and Pigeon River

Description of Issue

In August, 2010, the EPA, Region 4 Water Protection Division (WPD) requested assistance from the EPA, Region 4 Science and Ecosystem Support Division (SESD) to evaluate the concentrations of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) that may be present in Waterville Reservoir, Haywood County, North Carolina. This study is being performed in support of the North Carolina Division of Water Quality's (NCDWQ's) efforts to fully assess the impairment status of Waterville Reservoir with respect to dioxin. The project is tentatively scheduled for Fall 2012/Summer 2013.

Based on calculations conducted by the EPA WPD using fish tissue data collected from 1990-2008, concentrations of 2,3,7,8-TCDD may be present in the water column above NC's water quality standard (WQS) of 0.005 parts per quadrillion (ppq). Traditional sampling and analytical techniques are not capable of reporting 2,3,7,8-TCDD at very low concentrations. The primary objective of this study is to quantify current 2,3,7,8-TCDD levels in the water column of Waterville Reservoir in order to verify use support assessment (human health effects due to fish consumption).

Background

Blue Ridge Paper Products (BRPP), a facility upstream of Waterville Reservoir in Canton, NC, is a fully integrated pulp and paper mill that produces both bleached and unbleached pulp and paper using the kraft process. During past operations, 2,3,7,8-TCDD was contained within wastewaters as a result of the kraft process. The kraft process was changed in the early 1990's to eliminate discharge of 2,3,7,8-TCDD in BRPP wastewater. As required by their NPDES permit, BRPP collects fish tissue samples for 2,3,7,8-TCDD analysis.

NCDWQ's assessment methodology for dioxin is based on fish consumption advisories. NC has listed the Pigeon River and Waterville Reservoir in the past based on fish advisories. Once BRPP stopped releasing detectable levels of 2,3,7,8-TCDD in the early 1990s, levels in fish tissue (monitored annually) have been declining in the Pigeon River and Waterville Reservoir. When the last fish advisory was dropped in 2007, these waterbodies were removed from NC's 303(d) list. However, the level of dioxin in fish tissue which triggers a fish tissue advisory in NC is less stringent than the level that would indicate the water is not attaining the WQS for dioxin. The EPA WPD's review of the BRPP NPDES permit renewal in 2009 led to review of recent fish tissue data. Back calculations of these data indicate that the water column levels in the Reservoir are elevated above the State's WQS for dioxin.

NCDWQ believes that it is likely that the 2,3,7,8-TCDD levels found in fish tissue are due primarily to sediment contamination. The EPA is deferring action on placing Waterville Reservoir on the 303(d) list, pending implementation of this plan of study to further verify water column 2,3,7,8-TCDD concentrations.

Primary objective

The primary objective of this study is to quantify the amount of 2,3,7,8-TCDD present in Waterville Reservoir and the Pigeon River and to determine whether the concentration is above NC's WQS of 0.005 ppq. To do this, high volume sampling, a technique developed by SESD, will be employed. High volume sampling can achieve a much lower detection limit, allowing direct comparison of the water column monitoring data with the state water column WQS. Water column sampling will be conducted on the Pigeon River above and below the BRPP facility, in the Reservoir, as well as at the NC/TN line. Sediment sampling will be conducted in the Reservoir and at one reference site (above the BRPP facility). Final sample site locations will be established after consultation with NCDWQ.

Study Approach

The study approach will involve deployment of field crews using SESD vessels to collect water and sediment samples. Additional land-based support team would be established for sample management and shipping.

A high-volume (Infiltrix™300) trace organic sampler will be used to collect the water column samples for PCDD and PCDF analyses. The Infiltrix™300 sampler is designed to remove particulate and dissolved fractions of organic constituents *in situ* by passing a high volume of water through a one micrometer glass fiber filter (for the particulate phase) and two columns packed with adsorptive (XAD-2) resin (for the dissolved phase). The particulate and dissolved fractions will be analyzed separately for PCDD and PCDF using a modified version of EPA Method 1613: Tetra- Through Octa – Chlorinated Dioxins and Furans By Isotope Dilution HRGC/HRMS (Revision B). A contract lab will be used for all 2,3,7,8-TCDD analyses.

In addition to the samples collected with the Infiltrix™300 samplers, grab samples for total suspended solids (TSS) and measurements for pH, specific conductance, dissolved oxygen, temperature, depth and turbidity will be collected during the sampling period. This data will provide information regarding the variability of these parameters within the sampling stream during sample collection and will be used to assist with the assessment of the dioxin data.

Appendix E: Water quality limited segments added to the 2012 Section 303(d) List

Assessment Unit Number	Waterbody Name	BasinName	Reason for Listing	Impairment
NOTE Impairment abbreviations: EBIB/F = Ecological: biological Integrity Benthos/Fish Community; REC FCB = Fecal Coliform (recreation); SGA PRO = shellfish growing area Prohibited				
9-41-12-(5.5)	Cane Creek	Broad	Fair Bioclassification	EBIF
9-50-32-3	Sugar Branch	Broad	Standard Violation	Low DO
9-55-1-(10)	North Pacolet River	Broad	Fair Bioclassification	EBIF
16-(1)c2	HAW RIVER	Cape Fear	Standard Violation	Turbidity
16-11-(1)a	Reedy Creek	Cape Fear	Fair Bioclassification	EBIF
16-11-14-1a2	North Buffalo Creek	Cape Fear	Poor Bioclassification	EBIF
16-11-14-1b	North Buffalo Creek	Cape Fear	Standard Violation	NO2+NO3-N
16-11-14-2a	South Buffalo Creek	Cape Fear	Fair Bioclassification	EBIF
16-18-(1.5)a1	Back Creek (Graham-Mebane Reservoir)	Cape Fear	Standard Violation	Turbidity
16-30-(1.5)	Collins Creek	Cape Fear	Fair Bioclassification	EBIB
16-38-4	Turkey Creek	Cape Fear	Fair Bioclassification	EBIB
16-41-1-12-(1)	Third Fork Creek	Cape Fear	Standard Violation	Copper
16-41-1-17-(0.7)b1	Northeast Creek	Cape Fear	Standard Violation	Turbidity
17-(4)b	DEEP RIVER	Cape Fear	Standard Violation	Turbidity
17-3-(0.3)	West Fork Deep River	Cape Fear	Standard Violation	Turbidity
17-3-(0.7)a	West Fork Deep River(Oak Hollow Reservoir)	Cape Fear	Standard Violation	Turbidity
17-43-(5.5)a	Rocky River	Cape Fear	Standard Violation	Low DO
17-43-(8)b2	Rocky River	Cape Fear	Standard Violation	Chlorophyll a
17-43-10b	Loves Creek	Cape Fear	Standard Violation	Low DO
18-(87.5)b1b	CAPE FEAR RIVER	Cape Fear	Loss of Use	SGA PRO
18-16-1-(2)	Kenneth Creek	Cape Fear	Standard Violation	Low pH
18-4-(2)	Lick Creek	Cape Fear	Standard Violation	Low pH
18-74-33-5	Mill Pond	Cape Fear	Standard Violation	Low pH
18-88-9a	Intracoastal Waterway	Cape Fear	Standard Violation	Low DO
11-129-16-(4)	Long Creek	Catawba	Standard Violation	Turbidity
11-138	Twelvemile Creek	Catawba	Standard Violation	Low DO
11-36-(0.3)	Hunting Creek	Catawba	Standard Violation	REC FCB
11-36-(0.7)a	Hunting Creek	Catawba	Standard Violation	REC FCB
11-36-(0.7)a	Hunting Creek	Catawba	Fair Bioclassification	EBIB
11-36-(0.7)b	Hunting Creek	Catawba	Standard Violation	REC FCB

11-36-1	East Prong Hunting Creek	Catawba	Standard Violation	REC FCB
11-36-1-1	Fiddlers Run	Catawba	Standard Violation	REC FCB
11-36-2	Pee Dee Branch	Catawba	Standard Violation	REC FCB
11-39-(0.5)b	Lower Creek	Catawba	Standard Violation	REC FCB
11-39-1	Zacks Fork Creek	Catawba	Standard Violation	REC FCB
11-39-3	Spainhour Creek	Catawba	Standard Violation	REC FCB
11-39-3-1	Blair Fork	Catawba	Standard Violation	REC FCB
11-39-4b	Greasy Creek	Catawba	Standard Violation	REC FCB
5-2-16	Inman Branch	French Broad	Standard Violation	Turbidity
6-(1)	FRENCH BROAD RIVER	French Broad	Standard Violation	Turbidity
6-(54.5)b	FRENCH BROAD RIVER	French Broad	Standard Violation	REC FCB
6-(54.5)c	FRENCH BROAD RIVER	French Broad	Standard Violation	Turbidity
6-76-6-2ut1	UT to Little Pole Creek	French Broad	Standard Violation	Turbidity
1-41	Mission Branch	Hiwassee	Standard Violation	REC FCB
1-44-5	Lamb Branch	Hiwassee	Standard Violation	REC FCB
1-44-9	Slow Creek	Hiwassee	Standard Violation	REC FCB
1-44a	Peachtree Creek	Hiwassee	Standard Violation	REC FCB
1-49	Martin Creek	Hiwassee	Fair Bioclassification	EBIF
1-49	Martin Creek	Hiwassee	Standard Violation	REC FCB
2-190-(3.5)	Cheoah River	Little Tennessee	Standard Violation	Turbidity
2-22a	Crawford Branch	Little Tennessee	Standard Violation	REC FCB
2-22b	Crawford Branch	Little Tennessee	Fair Bioclassification	EBIB
2-22b	Crawford Branch	Little Tennessee	Standard Violation	REC FCB
2-23-4a	Cat Creek	Little Tennessee	Standard Violation	REC FCB
2-23-4b	Cat Creek	Little Tennessee	Standard Violation	REC FCB
2-23a	Rabbitt Creek	Little Tennessee	Standard Violation	REC FCB
2-23b	Rabbitt Creek	Little Tennessee	Standard Violation	REC FCB
2-24	Watauga Creek	Little Tennessee	Standard Violation	REC FCB
2-26	Rocky Branch	Little Tennessee	Standard Violation	REC FCB
2-27	Iotla Creek	Little Tennessee	Standard Violation	REC FCB
2-27-1	Iotla Branch	Little Tennessee	Standard Violation	REC FCB

2-29-4	Caler Fork Creek	Little Tennessee	Poor Bioclassification	EBIF
2-33	Bradley Creek	Little Tennessee	Standard Violation	REC FCB
2-40b	Tellico Creek	Little Tennessee	Fair Bioclassification	EBIB
27-(38.5)	NEUSE RIVER	Neuse	Standard Violation	Copper
27-121	Gatlin Creek	Neuse	Loss of Use	SGA PRO
27-128-3a	Back Creek (Black Creek)	Neuse	Standard Violation	Chlorophyll a
27-150-20-2	Pasture Creek	Neuse	Loss of Use	SGA PRO
27-150-20b1	Ball Creek	Neuse	No Criteria Exceeded	SGA PRO
27-18-(1)	Cedar Creek	Neuse	Fair Bioclassification	EBIB
27-2-(1)	Eno River	Neuse	Fair Bioclassification	EBIB
27-23-(2)	Smith Creek	Neuse	Fair Bioclassification	EBIB
27-43-(8)a	Swift Creek	Neuse	Fair Bioclassification	EBIB
27-43-15-(1)b2	Middle Creek	Neuse	Standard Violation	Turbidity
27-43-15-(1)b2	Middle Creek	Neuse	Fair Bioclassification	EBIB
27-43-15-(1)but3	UT to Middle Creek	Neuse	Standard Violation	Turbidity
27-43-15-8-(2)	Terrible Creek	Neuse	Fair Bioclassification	EBIB
27-53-(0.5)	Moccasin Creek (Holts Pond)	Neuse	Fair Bioclassification	EBIB
27-57-(1)b	Little River (Moore's Pond, Mitchell Mill Pond)	Neuse	Standard Violation	Low pH
10-1-10-3	Cobb Creek	New	Standard Violation	Turbidity
10-1-2-(1)a	Middle Fork South Fork New River (Chetola Lake)	New	Fair Bioclassification	EBIB
22-27-(1.5)	Belews Creek (Kernersville Lake)	Roanoke	Standard Violation	Chlorophyll a
22-58-12-6b	Marlowe Creek	Roanoke	Fair Bioclassification	EBIB
22-58-4-(1.4)	South Hyco Creek (Lake Roxboro)	Roanoke	Standard Violation	Chlorophyll a
23-10c	Smith Creek	Roanoke	Standard Violation	Turbidity
28-(15.5)	TAR RIVER	Tar-Pamlico	Standard Violation	Turbidity
28-11e	Fishing Creek	Tar-Pamlico	Standard Violation	Turbidity
18-87-10-1a2	Banks Channel	White Oak	Loss of Use	SGA PRO
18-87-10-1a3	Banks Channel	White Oak	Loss of Use	SGA PRO
18-87-31b	Myrtle Sound Shellfishing Area	White Oak	Loss of Use	SGA PRO

19-(7)	New River	White Oak	Standard Violation	Enterrococcus
21-35-1-7a	Ward Creek	White Oak	Standard Violation	Turbidity
12-(124.5)b	YADKIN RIVER (including upper portion of Tuckertown Lake)	Yadkin-Pee Dee	Standard Violation	Chlorophyll a
12-(124.5)b	YADKIN RIVER (including upper portion of Tuckertown Lake)	Yadkin-Pee Dee	Standard Violation	Low DO
12-(53)	YADKIN RIVER	Yadkin-Pee Dee	Standard Violation	Turbidity
12-(97.5)	YADKIN RIVER	Yadkin-Pee Dee	Standard Violation	Turbidity
12-108-20-4a	Third Creek	Yadkin-Pee Dee	Standard Violation	Turbidity
12-108-21a	Second Creek (North Second Creek)	Yadkin-Pee Dee	Standard Violation	Turbidity
12-108-21c	Second Creek (North Second Creek)	Yadkin-Pee Dee	Standard Violation	Turbidity
12-119-(6)b	Abbotts Creek	Yadkin-Pee Dee	Standard Violation	Turbidity
12-119-7a	Rich Fork	Yadkin-Pee Dee	Standard Violation	Turbidity
12-63-(9)	Fisher River	Yadkin-Pee Dee	Standard Violation	Turbidity
12-67	East Double Creek	Yadkin-Pee Dee	Standard Violation	REC FCB
12-84-1-(0.5)	North Deep Creek	Yadkin-Pee Dee	Standard Violation	Turbidity
12-84-1-(0.5)ut14ut13	UT to UT to North Deep Creek	Yadkin-Pee Dee	Standard Violation	REC FCB
12-94-12-(1)a	Salem Creek (Middle Fork Muddy Creek, Salem Lake)	Yadkin-Pee Dee	Standard Violation	Chlorophyll a
13-(34)a	PEE DEE RIVER	Yadkin-Pee Dee	Standard Violation	Low Dissolved Oxygen
13-17-20	Crooked Creek	Yadkin-Pee Dee	Fair Bioclassification	EBIB
13-17-36-9-(4.5)	Stewarts Creek [Lake Twitty (Lake Stewart)]	Yadkin-Pee Dee	Standard Violation	Low Dissolved Oxygen
13-17-8a	Reedy Creek	Yadkin-Pee Dee	Fair Bioclassification	EBIF
13-17-9-4-(1.5)	Cold Water Creek	Yadkin-Pee Dee	Standard Violation	Turbidity
13-2-3-3-(0.3)ut8	UT to Back Creek	Yadkin-Pee Dee	Poor Bioclassification	EBIB
13-2-3-3-2-2-(2)	Unnamed Tributary to Cedar Fork Creek (Lake Bunch)	Yadkin-Pee Dee	Standard Violation	Chlorophyll a

Appendix F: Water quality limited segments removed from the 2010 Section 303(d) list

Assessment Unit Number	Waterbody Name	BasinName	Impairment	Delist Reason (moved to Category in parentheses; see Appendix A)
			EBIB/F = Ecological: biological Integrity Benthos/Fish Community	
9-(22)b2	BROAD RIVER	Broad	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
9-26-(0.5)b	Cleghorn Creek	Broad	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
9-46-(1)	Sandy Run Creek	Broad	EBIF	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
9-50-(1)	First Broad River	Broad	Low pH	TMDL completed and approved by EPA (4t)
9-50-32-3	Sugar Branch	Broad	Low pH	TMDL completed and approved by EPA (4t)
9-53-(5)	Buffalo Creek	Broad	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
16-(1)b	HAW RIVER	Cape Fear	Copper	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (3c)
16-11-5-(2)	Horsepen Creek	Cape Fear	EBIF	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
16-18-(1.5)a1	Back Creek (Graham-Mebane Reservoir)	Cape Fear	Chlorophyll a	TMDL completed and approved by EPA (4t)
16-18-(1.5)a2	Back Creek (Graham-Mebane Reservoir)	Cape Fear	Chlorophyll a	TMDL completed and approved by EPA (4t)
16-18-(1.5)b	Back Creek (Graham-Mebane Reservoir)	Cape Fear	Chlorophyll a	TMDL completed and approved by EPA (4t)
16-27-(2.5)b	Cane Creek (Cane Creek Reservoir)	Cape Fear	Chlorophyll a	TMDL completed and approved by EPA (4t)
16-31-(2.5)	Terrells Creek (South Side Haw River)	Cape Fear	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)

16-41-(0.5)	New Hope River Arm of B. Everett Jordan Lake (below normal pool elevation)	Cape Fear	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
16-41-(3.5)a	New Hope River Arm of B. Everett Jordan Lake (below normal pool elevation)	Cape Fear	High pH	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
16-41-1-(11.5)a	New Hope Creek	Cape Fear	Low Dissolved Oxygen	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (4c)
16-41-1-(11.5)b	New Hope Creek	Cape Fear	Low Dissolved Oxygen	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (4c)
16-41-2-(1)	Morgan Creek	Cape Fear	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
16-41-2-(1.5)	Morgan Creek (University Lake)	Cape Fear	Chlorophyll a	TMDL completed and approved by EPA (4t)
16-41-2-(5)	Morgan Creek	Cape Fear	NO2+NO3-N	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
17-26-5-3b2	Cotton Creek	Cape Fear	NO2+NO3-N	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
17-26-5-3b2	Cotton Creek	Cape Fear	Low pH	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
17-26-5-3c	Cotton Creek	Cape Fear	Low pH	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
17-43-10b	Loves Creek	Cape Fear	EBIB	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards (4s)
17-8-2	Jenny Branch	Cape Fear	EBIB	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (3a)
18-27-4-(1)e	Little Cross Creek (Bonnie Doone Lake, Kornbow Lake, Mintz p	Cape Fear	EBIB	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (4c)
18-27-4-(2)	Little Cross Creek (Glenville Lake)	Cape Fear	EBIB	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (4c)
18-74-2	Barlow Branch	Cape Fear	Chloride	Watershed management plan implementation will result in attainment of water quality standards (4b)

11-(114)	CATAWBA RIVER (Mountain Island Lake below elevation 648)	Catawba	Low pH	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
11-(123.5)b	CATAWBA RIVER (Lake Wylie South FK Catawba Arm) NC portion	Catawba	High Water Temperature	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (3a)
11-129-(0.5)	South Fork Catawba River	Catawba	Low pH	TMDL completed and approved by EPA (4t)
11-129-(0.5)	South Fork Catawba River	Catawba	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
11-129-(15.5)	South Fork Catawba River	Catawba	Low pH	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
11-129-1-(12.5)b	Henry Fork	Catawba	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
11-129-1-(12.5)b	Henry Fork	Catawba	Low pH	TMDL completed and approved by EPA (4t)
11-129-16-(4)	Long Creek	Catawba	Low pH	TMDL completed and approved by EPA (4t)
11-129-5-7-2-(1)	Maiden Creek	Catawba	EBIB	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (3c)
11-129-5-7-2-(3)	Maiden Creek	Catawba	EBIB	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (4c)
11-129-8-(6.5)	Indian Creek	Catawba	Low pH	TMDL completed and approved by EPA (4t)
11-129-8-(6.5)	Indian Creek	Catawba	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
11-129-9-1-(2)	Little Beaverdam Creek	Catawba	Low pH	TMDL completed and approved by EPA (4t)
11-29-22	Shooks Creek	Catawba	Low pH	TMDL completed and approved by EPA (4t)
11-38-32-9ut3	UT to Frankum Creek	Catawba	Low pH	TMDL completed and approved by EPA (4t)

11-38-34-14	Harper Creek	Catawba	Low pH	TMDL completed and approved by EPA (4t)
11-69-(0.5)	Lower Little River	Catawba	Low pH	TMDL completed and approved by EPA (4t)
6-34-(15.5)	Davidson River	French Broad	Low pH	TMDL completed and approved by EPA (4t)
6-54-3-(17.5)	South Fork Mills River	French Broad	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
6-55-11-(1)a	Clear Creek	French Broad	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
6-55-8-1a	Bat Fork	French Broad	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
7-10	Hollow Poplar Creek	French Broad	Low pH	TMDL completed and approved by EPA (4t)
7-2-52-(1)	South Toe River	French Broad	Low pH	TMDL completed and approved by EPA (4t)
1-(50)	HIWASSEE RIVER (Hiwassee Lake below elevation 1525)	Hiwassee	Low pH	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
2-21-(0.5)a	Cullasaja River(Ravenel Lake)	Little Tennessee	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
2-27-1	lotla Branch	Little Tennessee	EBIB	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
2-79-(24)ut4	UT TUCKASEGEE R	Little Tennessee	Low pH	TMDL completed and approved by EPA (4t)
15-25-1-(16)a	Lockwoods Folly River	Lumber	Shellfish Growing Area-Prohibited	TMDL completed and approved by EPA (4t)
15-25-1-(16)b	Lockwoods Folly River	Lumber	Shellfish Growing Area-Prohibited	TMDL completed and approved by EPA (4t)

15-25-1-(16)c	Lockwoods Folly River	Lumber	Shellfish Growing Area-Prohibited	TMDL completed and approved by EPA (4t)
15-25-1-(16)d	Lockwoods Folly River	Lumber	Shellfish Growing Area-Prohibited	TMDL completed and approved by EPA (4t)
27-(1)	NEUSE RIVER (Falls Lake below normal pool elevation)	Neuse	Chlorophyll a	Watershed management plan implementation will result in attainment of water quality standards (4b)
27-(104)b	NEUSE RIVER Estuary	Neuse	High pH	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
27-(22.5)a	NEUSE RIVER	Neuse	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
27-(38.5)	NEUSE RIVER	Neuse	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
27-(41.7)	NEUSE RIVER	Neuse	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
27-(5.5)a	NEUSE RIVER (Falls Lake below normal pool elevation)	Neuse	Chlorophyll a	Watershed management plan implementation will result in attainment of water quality standards (4b)
27-(5.5)b	NEUSE RIVER (Falls Lake below normal pool elevation)	Neuse	Chlorophyll a	Watershed management plan implementation will result in attainment of water quality standards (4b)
27-125-(6)b	Dawson Creek	Neuse	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
27-150-(9.5)b2	Bay River	Neuse	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
27-23-(2)	Smith Creek	Neuse	EBIF	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)

27-25-(1)	Perry Creek (Greshams Lake)	Neuse	EBIB	TMDL completed and approved by EPA (4t)
27-25-(2)	Perry Creek	Neuse	EBIB	TMDL completed and approved by EPA (4t)
27-33-(10)b	Crabtree Creek	Neuse	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
27-33-(3.5)b	Crabtree Creek (Crabtree Lake)	Neuse	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
27-34-(4)b	Walnut Creek	Neuse	Turbidity	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
27-43-15-(1)a	Middle Creek	Neuse	Low Dissolved Oxygen	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (3c)
27-52-6a	Hannah Creek	Neuse	Low pH	Determination that exceedances of the parameter of interest are due to natural conditions (1nc)
27-62	Stoney Creek	Neuse	EBIB	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
27-97-(6)	Swift Creek	Neuse	EBIB	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (3c)
30-1-15b	Dowdys Bay (Poplar Branch Bay)	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
30-1-6b	Coinjock Bay	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
30-19-1b	Colington Creek	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
30-1a3	Currituck Sound	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)

30-1c	Currituck Sound	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
30-21e2	Roanoke Sound	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
30d	ALBEMARLE SOUND	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
99-(7)b2	Atlantic Ocean	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
99-(7)d	Atlantic Ocean	Pasquotank	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
23-10a	Smith Creek	Roanoke	Low Dissolved Oxygen	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (1nc)
23-10c	Smith Creek	Roanoke	Low Dissolved Oxygen	Determination that exceedances of the parameter of interest are due to natural conditions (1nc)
23-55	Welch Creek	Roanoke	Low pH	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
28-(1)	TAR RIVER	Tar-Pamlico	Low Dissolved Oxygen	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
29-44a2	Rose Bay	Tar-Pamlico	Shellfish Growing Area-Prohibited	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
29-49-3a	Oyster Creek	Tar-Pamlico	Shellfish Growing Area-Prohibited	TMDL completed and approved by EPA (4t)
18-87-24	Wrightsville Recreational Area (including Lees Cut, MOtts Channel and portions of Banks Channel)	White Oak	Enterrococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)

18-87-24-3b	Banks Channel area around RECMON station S22B	White Oak	Enterococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
19-(10.5)	New River	White Oak	Enterococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
19-(11)	New River	White Oak	Enterococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
19-12	Brinson Creek	White Oak	High pH	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
19-14	Wilson Bay	White Oak	Enterococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
21-(17)h	Newport River	White Oak	Enterococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
21-33a	Town Creek	White Oak	Enterococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
99-(3)b	Atlantic Ocean	White Oak	Enterococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
99-(4)f	Atlantic Ocean	White Oak	Enterococcus	Flaws in the original analysis of data and information led to the segment being incorrectly listed in Category 5 (1)
12-(80.7)	YADKIN RIVER	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-(86.7)	YADKIN RIVER	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-108-(14.5)	South Yadkin River	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-108-(19.5)b	South Yadkin River	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-108-16-(0.5)b	Hunting Creek	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-108-20-4b	Third Creek	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)

12-108-20a1	Fourth Creek	Yadkin-Pee Dee	EBIB	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards (4s)
12-108-20a3	Fourth Creek	Yadkin-Pee Dee	EBIF	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards (4s)
12-108-20a3	Fourth Creek	Yadkin-Pee Dee	EBIB	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards (4s)
12-108-20c	Fourth Creek	Yadkin-Pee Dee	EBIF	The assessment and interpretation of more recent or more accurate data in the record demonstrate that the applicable water quality standard is being met (1)
12-108-21b	Second Creek (North Second Creek)	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-119-(6)a	Abbotts Creek	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-119-(6)a	Abbotts Creek	Yadkin-Pee Dee	Copper	Watershed management plan implementation will result in attainment of water quality standards (4b)
12-119-(6)b	Abbotts Creek	Yadkin-Pee Dee	EBIB	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards (4s)
12-46	Roaring River	Yadkin-Pee Dee	Fecal Coliform (recreation)	TMDL completed and approved by EPA (4t)
12-72-(18)	Ararat River	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-72-(4.5)b	Ararat River	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-84-2-(5.5)	South Deep Creek	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
12-94-(0.5)c	Muddy Creek	Yadkin-Pee Dee	Turbidity	TMDL completed and approved by EPA (4t)
13-(15.5)a	PEE DEE RIVER	Yadkin-Pee Dee	Low pH	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (4c)
13-(15.5)a	PEE DEE RIVER	Yadkin-Pee Dee	Low Dissolved Oxygen	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed in Category 5 by EPA regulations (4c)
13-20b	Brown Creek	Yadkin-Pee Dee	Low Dissolved Oxygen	TMDL completed and approved by EPA (4t)

Appendix G: North Carolina TMDL Schedule

Priority Ranking of Waterbodies for TMDL Development March 2012

Waters Targeted for TMDLs in the Next Two Years

Waterbody Name	Pollutant
Statewide	Mercury
Shallotte River – 15-25-2-(10)a	Fecal coliform
Shallotte River - 15-25-2-(10)b	Fecal coliform
Shallotte River - 15-25-2-(10)c	Fecal coliform
Shallotte River - 15-25-2-(10)d1	Fecal coliform
Shallotte River - 15-25-2-(10)d2	Fecal coliform
The Mill Pond – 15-25-2-11-(2)	Fecal coliform
Sams Branch – 15-25-2-12-(2)	Fecal coliform
The Swash – 15-25-2-14	Fecal coliform
Shallotte Creek – 15-25-2-15-(3)	Fecal coliform
Saucepan Creek – 15-25-2-16	Fecal coliform
Jinnys Branch – 15-25-2-16-1-(2)	Fecal coliform
Goose Creek – 15-25-2-16-4-(2)	Fecal coliform
North River and tributaries	Fecal coliform
Nelson Bay and tributaries	Fecal coliform

Waterbodies listed in the table are considered High priority for TMDL development. Waters listed for ecological/biological integrity are Low priority for TMDL development at this time. All other listed Category 5 waterbodies are ranked Medium priority.

The order in which TMDLs are established is subject to modification, based on logistical efficiencies or data availability. USEPA will be notified of any changes in the TMDL schedule.