

North Carolina 2018 Draft 303(d) List Public Comment NC Division of Water Resources Responsiveness Summary

Submitted to EPA March 14, 2019

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These comments with NC Division of Water Resources (DWR) responses are below.

Commenter: American Rivers, Et al.

We understand that the agency will prioritize consideration of comments on the 303(d) list. However, for the first time, public comment was also invited on the associated 305(b) report. We therefore offer brief comments on this report in Section IV, although the following will focus primarily on the 303(d) list.

I. The 303(d) Listing Requirement

The purpose of the Clean Water Act (“CWA”) is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”¹ Every two years, states must identify the waters within its boundaries for which existing pollution control requirements—including but not limited to effluent limitations—are not stringent enough to implement water quality standards.² After impaired waters are identified pursuant to Section 303(d), the CWA requires the State to establish a total maximum daily load (TMDL) to limit the presence of the pollutant or pollutants that caused the impairment.³ Because inclusion on the 303(d) list triggers legal obligations to address pollution, it is imperative that the list accurately identify impaired waters.

II. Support for Revisions to the 303(d) Listing and De-Listing Methodology

The Environmental Management Commission (“EMC”) is tasked by statute with “identifying and prioritizing impaired waters” and developing associated TMDLs.⁴ For years, the EMC informally delegated the task of developing the listing methodology to staff within the Department of Environmental Quality, in deference to the scientific expertise of agency personnel.⁵

However, in 2013, in response to pressure from regulated interests, the EMC chose, over the objection of many in the environmental community, to disregard this longstanding practice. The Commission ultimately adopted a methodology, crafted by political appointees rather than agency experts, to populate the proposed 2014 303(d) list.⁶ The result was a new methodology that, without scientific justification, decreased the likelihood that waters would be included on the 303(d) list.⁷ The U.S.

¹ 33 U.S.C. § 1251(a).

² Failure to meet water quality standards indicates that effluent limitations placed on point sources proved insufficient to ensure water quality, and the listing requirement is aimed at evaluating the effectiveness of such limits on pollution. See 33 U.S.C. § 1313(d)(1)(A). States are not required to list waters where the following are adequate to attain applicable water quality standards: (1) technology-based effluent limitations required by the CWA; (2) more stringent effluent limitations required by federal, state, or local authority; and (3) other pollution control requirements required by federal, state, or local authority. See 40 C.F.R. § 130.7(b)(1). The “applicable water quality standards” are “those water quality standards established under section 303 of the [CWA], including numeric criteria, narrative criteria, waterbody uses, and antidegradation requirements.” 40 C.F.R. § 130.7(b)(3).

³ 33 U.S.C. § 1313(d)(1)(C).

⁴ N.C. Gen. Stat § 142B-282(c).

⁵ Although the CWA does not require EPA approval of a State’s 303(d) listing methodology, implementing regulations require the State to include, as part of its 303(d) submission, documentation to support the decision to list or not to list its waters. 40 C.F.R. 130.7(b)(6).

⁶ N.C. DENR, 2014 North Carolina 303(d) Listing Methodology 4-5 (Jan. 13, 2014). Although the summary was prepared by DENR, it is undisputed that the methodology itself was dictated by the Environmental Management Commission. The new methodology was approved on March 14, 2013 and amended on January 13, 2014 to reflect the consolidation of DENR’s Division of Water Quality into the Division of Water Resources. Notably, even this consolidation weakened protection of the State’s waters by significantly lowering the number of state employees available to enforce environmental laws.

⁷ The new methodology required a 90% confidence level that 10% of samples exceed a water quality standard. The imposition

Environmental Protection Agency (“EPA”) reviewed the resulting list,⁸ expressed dissatisfaction with the new methodology, conducted an independent assessment of water quality data, and identified more than 50 waterbody-pollutant combinations that merited inclusion on the 303(d) list.⁹

The EMC nonetheless insisted on using the same methodology to draft the proposed 303(d) list in 2016. Once again, EPA found the methodology indefensible and conducted an independent assessment of water quality data.¹⁰ After this review, EPA identified 72 waterbody- pollutant combinations to include on the North Carolina 303(d) list. The EMC objected in writing, to no avail.

Thankfully, rather than continuing to quibble with EPA, the EMC revised the listing methodology for 2018. We continue to believe the people of North Carolina would be better served if the EMC delegated the task of developing the methodology to DEQ staff. However, we are pleased to know the EMC did not unilaterally amend the methodology, as in 2014, but instead consulted with the experts in the Division of Water Resources (“DWR”).

We are particularly grateful for two notable revisions responsive to EPA input: adoption of a de-listing methodology and consideration of historic data to augment smaller data sets.

Establishing Protocol for De-Listing Decisions

First, though we recommend improvements, we appreciate changes made to address the concern that the prior methodology failed to demonstrate good cause for delisting waters.¹¹ Federal regulations require the state, at the request of EPA, to demonstrate “good cause” for removing a waterbody from the 303(d) list.¹² “Good cause included, but is not limited to, more recent or accurate data; more sophisticated water quality modeling; flaws in the original analysis that led to the water being listed...; or changes in conditions, e.g., new control equipment, or elimination of discharges.”¹³

In 2014, DWR proposed delisting at least 130 waterbodies without any evidence that existing effluent limitations were sufficiently stringent to implement applicable water quality. The State offered no argument that the conditions that led to the original listing had changed; nor did the State argue that the initial listing decision was in error. The only justification provided for delisting these waters was the adoption of a new listing methodology, which included a new measure of statistical confidence.

To justify the 2014 requirement of statistical confidence for listing decisions, the EMC relied heavily on the fact that Florida’s 303(d) listing methodology included such a measure and EPA approved Florida’s

of the statistical confidence measure, unnecessary given the quality controls placed on data used to inform listing, meant that more exceedances were required than before to demonstrate impairment. Waters were de-listed based on the new methodology without any indication that conditions in stream had improved.

⁸ The CWA requires approval of each State’s 303(d) list by the U.S. Environmental Protection Agency. 33 U.S.C. § 1313(d)(2).

⁹ Letter from Heather McTeer Toney, Regional Administrator, EPA Region IV, to Tom Reeder, Director, DEQ Division of Water Resources (July 31, 2014). Ultimately, EPA added 51 waterbody-pollutant combinations to the final 2014 North Carolina 303(d) list. See Letter from Heather McTeer Toney, Regional Administrator, EPA Region IV, to Tom Reeder, Director, DEQ Division of Water Resources (Dec. 19, 2014).

¹⁰ Letter from Heather McTeer Toney, Regional Administrator, EPA Region IV, to Jay Zimmerman, Director, DEQ Division of Water Resources (Dec. 8, 2016).

¹¹ Letter from Heather McTeer Toney, Regional Administrator, EPA Region IV, to Jay Zimmerman, Director, DEQ Division of Water Resources (Dec. 8, 2016).

¹² 40 C.F.R. 130.7(b)(6)(iv).

¹³ *Id.*

resulting 303(d) list. Florida's listing methodology was based largely on a technical report from the Department of Statistics at Florida State University.¹⁴ As EPA would later emphasize, requiring statistical confidence in assessments was appropriate in Florida because that state accepted low quality data and the use of a nonparametric statistical test for use support determinations was prudent to account for uncertainty in data quality.¹⁵ However, EPA joined many of the undersigned in questioning the need for statistical confidence in North Carolina's listing decisions, especially given that only high quality data is accepted by DWR.¹⁶ While we continue to object to requiring statistical confidence for inclusion on North Carolina's 303(d) list, we agree with EPA's observation that, if statistical confidence is required for listing, it should be required for de-listing as well.

In 2016, EPA opined that North Carolina's listing methodology "did not contain reasonable, statistically sound delisting procedures for most numeric water quality standards."¹⁷ EPA lamented that the listing methodology did not "address removal of waters from the 303(d) list or provide for statistical confidence to protect against delisting a waterbody when it should not be delisted."¹⁸

In the 2018 methodology, the EMC applied "a combination of nonparametric hypotheses testing based on the binomial distribution as well as an analysis of the dates of excursions to determine if there is good cause to delist a water."¹⁹ According to the new methodology:

For delisting waters, if the 2018 assessment results in greater than 10% exceedance rate with less than 90% statistical confidence and the water was on the 2016 303(d) list, the water will be delisted if there are less than 2 excursions of the criterion in the newer data that have not been previously assessed. If the 2018 assessment results in less than 10% exceedance rate and the water was on the 2016 303(d) list, the water will be delisted if there is greater than 40% statistical confidence that there is less than a 10% exceedance of the criterion or there are less than 3 excursions of the criterion in the newer data that have not been previously assessed.

We appreciate the amendment of the methodology to address de-listing procedures. We also support the augmentation of the evaluation of statistical confidence with a consideration of recent water quality data. There remains room for improvement in the methodology, however.

¹⁴ Pi-Erh Lin et al, A Nonparametric Procedure for Listing and Delisting Impaired Waters Based on Criterion Exceedances (Oct. 2000).

¹⁵ EPA, Decision Document for the Partial Approval of the N.C. Dept. of Environment and Natural Resources' 2014 Section 303(d) List submitted on March 31, 2014 at 17 (July 2014) ("A large proportion of FDEP's sizable data set is from third party sources, including volunteer groups, and its validity is uncertain. These factors weighed heavily in the EPA's evaluation of the use of the nonparametric statistical test for use support determinations for that State.").

¹⁶ "In North Carolina, data validity is ensured through consistent use of standard operating procedures and rigorous quality assurance and quality control processes... Thus, in North Carolina, statistical confidence is not necessary to account for uncertainty in data quality." EPA, Decision Document for the Partial Approval of the N.C. DEQ 2016 Section 303(d) List Submitted on April 1, 2016 at 21 (Dec. 8, 2016).

¹⁷ Letter from Heather McTeer Toney, Regional Administrator, EPA Region IV, to Jay Zimmerman, Director, DEQ Division of Water Resources (Dec. 8, 2016).

¹⁸ EPA, Decision Document for the Partial Approval of the N.C. DEQ 2016 Section 303(d) List Submitted on April 1, 2016 at 10 (Dec. 8, 2016).

¹⁹ EMC, 2018 303(d) Listing and Delisting Methodology 3-4 (Mar. 8, 2018).

First, the methodology should clarify what is meant by “newer data that have not been previously assessed.” Presumably, given the agency’s focus on 2011-2016 data, this is a reference to the two years of data (2015 & 2016) not assessed in the 2014 listing cycle. However, the methodology should clarify that data showing exceedances in 2011-14 is still relevant if, for any reason, it was not assessed to inform prior listing decisions.

Second, we question the use of the same null hypothesis to make listing and delisting decisions. In the 2016 listing methodology, the “null hypothesis is that the overall exceedance probability is less than or equal to the 10% exceedance analysis.”²⁰ As EPA observed, “[o]nce a waterbody is determined to be impaired, however, the null hypothesis should be reversed consistent with a delisting decision.”²¹ It makes no sense, after recognizing the impairment of a waterbody, to start with the contrary assumption.

We also question why the EMC would require 90% statistical confidence for listing decisions, but only 40% statistical confidence for de-listing decisions. Indeed, according to the same technical report the EMC cited to justify requiring statistical confidence, the authors observe “any statistical conclusion that has a confidence level of less than 90% is considered not acceptable by most statistics practitioners.”²²

We recognize that a larger sample size is required to achieve high statistical confidence prior to delisting using a nonparametric procedure.²³ Notably, one of the problems with requiring statistical confidence for listing decisions in the first place is that more samples showing exceedance are required to trigger a listing. As simply stated by EPA, “Confidence and sample size are mathematically linked.”²⁴ Again, we support a return to a methodology that does not employ unnecessary measures of statistical confidence; but if the EMC insists on requiring statistical confidence, it should have the same confidence when affording or depriving a waterbody of the attention and protection stemming from listing.

DWR 303(d) Response:

DWR defines new data as the most recent two years of data that have not been previously assessed. This is defined in the [2018 303\(d\) Listing and Delisting Methodology](#) document as 2015 and 2016 for the current cycle. The 40% confidence in Meeting Criteria was added to assure that delisting would not occur with very low confidence. This is also the area where confidence in Exceeding Criteria is lower as well. The new methods will keep these waters listed until confidence in Meeting Criteria is increased by more sampling without excursions. Also, please refer to [DWR Response to Comments on Delisting Methodology](#) provided below in the DWR Responses to Methodology Comments section.

²⁰ EMC, 2016 303(d) Listing Methodology 5 (May 2015).

²¹ EPA, Decision Document for the Partial Approval of the N.C. DEQ 2016 Section 303(d) List Submitted on April 1, 2016 at 10 (Dec. 8, 2016).

²² Pi-Erh Lin et al, A Nonparametric Procedure for Listing and Delisting Impaired Waters Based on Criterion Exceedances 16 (Oct. 2000)

²³ Although the current listing methodology requires 10 samples, Lin et al opined recommended requiring a minimum of 28 samples for delisting using a nonparametric procedure. Pi-Erh Lin et al, A Nonparametric Procedure for Listing and Delisting Impaired Waters Based on Criterion Exceedances 1 (Oct. 2000); see also id. at 3 (“The delisting procedure is not a mirror image of the listing procedure because a much larger sample size is required for delisting than for listing impaired waters at a comparable level of confidence.”).

²⁴ EPA, Decision Document for the Partial Approval of the N.C. DEQ 2016 Section 303(d) List Submitted on April 1, 2016 at 10 (Dec. 8, 2016).

Expanding the Data Considered to Populate the 303(d) List

While the addition of de-listing procedures was responsive to the most recent EPA review of North Carolina's 303(d) list, we are pleased that the EMC also heeded, in part, EPA's oft-repeated call for relaxation of strict sample size and data age requirements.

Federal rules require the state to "assemble and evaluate all existing and readily available water quality-related data and information" to develop the 303(d) list.²⁵ North Carolina's methodology has long included provisions for limiting the use of data based on age (by only considering data collected in a 5-year window) and sample size (by requiring at least 10 samples). EPA stated, as early as 2008, "In order for 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 sets for future 303(d) lists."²⁶ North Carolina disregarded this guidance when crafting multiple subsequent 303(d) lists.

In 2016, EPA once again recommended that "older data not be automatically excluded, particularly when its inclusion could be used to augment small sets of more current data."²⁷ EPA also observed in 2016 that North Carolina's "methodology related to age of data and minimum sample size were not consistent with federal requirements."²⁸

As such, we support the revision of the methodology such that allows for consideration of historical data when data within the 2012-2016 window is inconclusive. Specifically, we are pleased that, "[f]or the 2018 303(d) assessment, the state will augment small sets of current data (i.e., when $n < 10$) with the previous five years of data (2007-2011) where available."²⁹ While the methodology will still require a minimum of three exceedances in the 2012-2016 data set, the new approach is preferable to the exclusion of available information.

DWR 303(d) Response:

Thank you for your support. Also, refer to [DWR Response to Comments on Augmenting Small Datasets](#) (provided below in the DWR Responses to Methodology Comments section) for more information on how the state implemented the requirement to consider readily available data.

III. Impairment Due to Bacteria

In addition to the foregoing, we believe the State can do more to "assemble and evaluate all existing and readily available water quality-related data and information."³⁰ We are particularly concerned that

²⁵ 40 C.F.R. 130.7(b)(5); see also id. at (b)(6)(iii) (requiring submission of "[a] rationale for any decision not to use any existing and readily available data and information").

²⁶ EPA, Decision Document for the Approval of the N.C. Department of Environment and Natural Resources' 2008 Section 303(d) List Submitted on February 5, 2010 at 9.

²⁷ EPA, Decision Document for the Partial Approval of the N.C. DEQ 2016 Section 303(d) List Submitted on April 1, 2016 at 12 (Dec. 8, 2016).

²⁸ Letter from Heather McTeer Toney, Regional Administrator, EPA Region IV, to Jay Zimmerman, Director, DEQ Division of Water Resources (Dec. 8, 2016).

²⁹ EMC, 2018 303(d) Listing and Delisting Methodology 2 (Mar. 8, 2018).

³⁰ 40 C.F.R. § 130.7.

the State consistently disregards available data, including the results of agency sampling, that may improve the biennial assessment of whether recreational uses of waters are impaired by bacteria.

North Carolina currently uses fecal coliform as a pathogen indicator to measure the suitability of freshwaters for recreational use.³¹ The State's reliance on this standard is out of date and not based on the best available science.³² Worse still, ambient water quality monitoring conducted by DWR is limited, preventing assessment of compliance with the outdated fecal coliform standard as interpreted by the agency.

First, DWR does not deliver samples to the lab for analysis within the prescribed holding time, and therefore qualifies all bacteria data resulting from the agency's ambient water quality testing.³³ We appreciate the importance of holding times, but question the policy of disregarding high fecal coliform counts when samples are overnighted to the DWR lab in Raleigh. After all, research studying the effect of holding time on fecal coliform counts suggests counts remain the same or decrease with additional storage time.³⁴ In other words, DWR could conclude that, if a sample exceeded a numeric threshold when analyzed beyond the holding time, it would have exceeded the same threshold if analyzed sooner. Yet, it is not only the delay in analysis that decreases the utility of DWR assessment of bacteria levels.

In addition, although the water quality standard for fecal coliform contemplates "five consecutive samples examined during any 30-day period,"³⁵ DWR only collects samples once or twice each month.³⁶ As such DWR suggests the current ambient monitoring system sampling regime is "therefore not appropriate for determining exceedance of the standard."³⁷ As EPA observed in 2016, "[t]his means that the data typically collected is not directly used to assess against the water quality standard."³⁸ And even when high levels of fecal coliform are detected in monthly sampling and "5-in-30" sampling is considered, DWR cites resource limitations to conclude "it is not feasible that all waterbodies identified through this process can be sampled."³⁹

In short, we urge DWR to revisit the way that it evaluates bacteria data when assessing recreational use support. Notably, bacteria sampling is conducted in coastal waters to assess shellfish harvesting use support. Although the standards used to assess suitability for shellfish harvesting are different than those used to assess suitability for recreational use, each cycle more waters are listed on the draft 303(d) list because bacteria levels are too high to support shellfish harvesting than for any other reason.

³¹ 15A NCAC 02B .0219(3)(b). The Clean Water Act defines a "pathogen indicator" as "a substance that indicates the potential for human infectious disease." 33 U.S.C. § 1362(23).

³² In 2005, DWR noted, in the Cape Fear basin plan, that "[e]vidence collected during the past several decades suggests that the coliform group may not adequately indicate the presence of pathogenic viruses or parasites in water." DWR, 2005 Cape Fear River Basin Water Quality Plan 261 (2005). More than three decades ago, EPA recommended that *E. coli* or enterococci replace fecal coliform as a pathogen indicator in state water quality standards. EPA, *Bacteriological Ambient Water Quality Criteria for Marine and Fresh Recreational Waters* (1986).

³³ DEQ, DWR, Ambient Monitoring System (AMS) Program Quality Assurance Project Plan § 1.6.4.2 (Feb. 2017).

³⁴ See Ariamalar Selvakumar et al., *Effects of Sample Holding Time on Concentrations of Microorganisms in Water Samples*, 76 *Water Environment Research*, Vol 1., at 67 (2004), available at <https://www.jstor.org/stable/25045746>.

³⁵ 15A NCAC 02B .0219(3)(b).

³⁶ DEQ, DWR, Ambient Monitoring System (AMS) Program Quality Assurance Project Plan § 2.1.2 (Feb. 2017).

³⁷ DEQ, DWR, Ambient Monitoring System (AMS) Program Quality Assurance Project Plan § 1.6.6.2 (Feb. 2017).

³⁸ EPA, Decision Document for the Partial Approval of the N.C. DEQ 2016 Section 303(d) List Submitted on April 1, 2016 at 29 (Dec. 8, 2016).

³⁹ DEQ, DWR, Ambient Monitoring System (AMS) Program Quality Assurance Project Plan § 1.6.6.2 (Feb. 2017).

In other words, there are more 303(d) listings related to fecal coliform than any other pollutant. Given the foregoing limitations in the agency's ambient monitoring approach in freshwaters, we are concerned that the 303(d) list may fail to include waters, especially inland, where bacteria levels threaten recreational use.

DWR 303(d) Response:

Please refer to [DWR Response to Comments on Pathogen Monitoring](#) provided below in the DWR Responses to Methodology Comments section.

IV. 305(b) Report- Support for Current Delineation of Assessment Units

While the 303(d) list is created to identify and trigger remediation of impaired waters, its submission is not the only reporting requirement under the CWA. Of particular relevance, under Section 305(b) of the CWA, States are required to report biennially to EPA on the status of all waters under CWA jurisdiction.⁴⁰ In 2001, EPA recommended merging the 303(d) and 305(b) reports.⁴¹ North Carolina has merged the reports since 2002. For the first time since doing so, the State solicited input on the 305(b) report.⁴² Upon information and belief, this invitation to comment on the 305(b) report stems from an objection, by some stakeholders, regarding the way the State delineates assessment units. We see no reason to depart from the longstanding protocol for delineating assessment units, and encourage consistent delineation using the same protocol to create future 303(d) lists and 305(b) reports.

In 2001, EPA guidance requested, for the first time, a "delineation of water quality assessment units (AUs) based on the National Hydrography Dataset (NHD)."⁴³ In multiple subsequent reporting cycles, North Carolina's 305(b) report noted "North Carolina does not presently use the National Hydrography Dataset (NHD), although it is developing this capability."⁴⁴ By 2008, the State had "completed georeferencing statewide including indexing assessment units to the high resolution [NHD]."⁴⁵

In later years, as the State compiled more data and drainage areas changed, it became necessary to refine the delineation of assessment units. Water quality assessments were still applied to assessment units (AUs) but, because water quality assessments are based on data availability, an AU was occasionally subdivided due to data applicability.⁴⁶ This practice continued in subsequent reporting cycles and, as explained in the 2018 Integrated Report Category Assignment Procedure, "during the

⁴⁰ 33 U.S.C. 1315; 40 C.F.R. 130.8.

⁴¹ Robert H. Wayland III, EPA, 2002 Integrated Water Quality Monitoring and Assessment Report Guidance (Nov. 19, 2001).

⁴² But see *id.* at 3 ("A state or territory should provide the public an opportunity to review and comment on an integrated assessment of the status of all waters within its jurisdiction.").

⁴³ *Id.* at 1.

⁴⁴ DEQ, North Carolina Water Quality Assessment and Impaired Waters List (2002 Integrated 305(b) and 303(d) Report) 11 (Feb. 2003); DEQ, North Carolina Water Quality Assessment and Impaired Waters List (2004 Integrated 305(b) and 303(d) Report) 9 (Nov. 2006). DEQ, North Carolina Water Quality Assessment and Impaired Waters List (2006 Integrated 305(b) and 303(d) Report) 9 (May. 2007).

⁴⁵ EPA, Decision Document for the Approval of the N.C. Dept. of Natural Resources' 2008 Section 303(d) List Submitted on February 5, 2010 at 9 (March 9, 2010). An EPA contractor geo-referenced this dataset to NHD 1:100,000 scale for inclusion in the EPA Reach Address Database.

⁴⁶ See DEQ, 2012 Use Assessment Methodology 3 (Mar. 27, 2012). "For example, if Index number 27-33-43-(1) (12 miles in length) is divided into three segments because of three different available data types the new segments would be 27-33-43-(1)a, 27-33-43-(1)b and 27-33-43-(1)c. The combined mileage of the AUs would be 12 miles." *Id.*

assessment process, an AU may be re-segmented or split into smaller units because of different types of data, assessment result differences between stations in the same AU for any of the assessed parameters, or drainage area characteristics (e.g., major tributaries, land use changes).⁴⁷ We support this approach to segmenting assessment units, as it allows the state and the public to focus on the most relevant data and prevents masking identified problems with data collected in an adjacent segment. We recommend retaining the current approach to AU delineation and segmentation.

DWR 303(d) Response:

Thank you for your support on the segmentation procedure. The state believes that this approach is appropriate for the evaluation of “not to exceed” standards and is a transparent process to provide the public information. Refer to [DWR Response to Comments on Segmentation](#) (provided below in the DWR Responses to Methodology Comments section) for more information on why and how the state changes the delineation of assessment units.

IV. Conclusion

The proper identification of impaired waters is essential to improving the quality, and preserving the best use, of the State’s waters. It also helps the State prioritize its limited resources for remediating impaired waters. We appreciate the opportunity to comment on the 303(d) list and associated 305(b) report, and thank you for your consideration of our input.

⁴⁷ DEQ, 2018 Integrated Report Category Assignment Procedure 3 (2018); see also DEQ, 2014 Water Quality Assessment Process 7 (2014) (“The assessment units (AUs) are the same as the classified named waters except that some of them are resegmented into smaller units because of different types of data, assessment results, or drainage area characteristics (e.g., major tributaries, land use changes).”).

Commenter: City of Charlotte and Mecklenburg County

The City of Charlotte and Mecklenburg County appreciate the opportunity to provide input on the N.C. Division of Water Resources (NCDWR) 2018 Draft 303(d) List. After reviewing the Draft 2018 303(d) List and the data that accompanied the listing decisions, Charlotte-Mecklenburg Storm Water Services (CMSWS) would like to request that the Final 2018 303(d) List be updated to account for the data submitted by CMSWS to DEQ for the purpose of informing the 2018 listing decisions.

On Sept 21, 2017, CMSWS data was submitted to DEQ by Caroline Burgett for the period of Jan 2012-Dec 2016 for multiple monitoring locations within Charlotte-Mecklenburg. This data was submitted along with a QAPP in order to inform DEQ's impairment designations for the 2018 303(d) List. Prior to submitting this data, we were informed by DEQ staff that our data would be combined with DEQ data to help inform the 2018 303(d) listing decisions provided that the data were analyzed by a state certified lab, it was submitted in the correct format, and it was submitted along with a QAPP. After following these instructions and later reviewing the Draft 2018 303(d) List and the 2018 Integrated Report Data that are available on DEQ's website, it appeared that the data that we submitted was not utilized. For instance, hardness corrected dissolved copper data collected by CMSWS for Mallard Creek at Pavillion Blvd., Little Sugar Creek at NC 51 at Pineville, and Sugar Creek at NC 51 at Pineville all show values that are below DEQ's hardness dependent dissolved copper standard, yet these reaches are all listed as impaired for total copper on the Draft 2018 303(d) List. Also, from the 2018 Integrated Report Data available online, it appears that DEQ did not collect any monitoring data at these sites in the 2012-2016 data window, and while separate folders online contain data provided by others that were incorporated into the listing decisions, data from CMSWS is not listed among these data sources.

With this in mind, we would like to request that the 2012-2016 data provided to DEQ by CMSWS on Sept 21, 2017, and included again in this email, be utilized to inform the final 2018 303(d) listing decisions for the monitoring locations covered by this data.

DWR 303(d) Response:

DWR accepts third party data submitted under an approved QAPP, with the condition that all of the data outlined in the QAPP will be submitted as part of the 303(d) assessment. CMSWS QAPP has been approved for assessment purposes. CMSWS has committed to providing a complete dataset in 2020.

The assessment for the stations and assessment units (AUs) has changed as follows:

11-137-1 Total Copper, Lead and Zinc legacy assessments were moved to category 1 and delisted based on current Environmental Management Commission (EMC) assessment methods. When combined with DWR data, the statistical confidence was high enough to move from Data Inconclusive to Meeting Criteria for all three metals assessments. Fish Community assessment was placed back into Category 5 as the only parameter Exceeding Criteria.

11-137b and c Total Copper, Lead and Zinc legacy assessments were moved from Category 5 for Copper (delisting) and Category 1 for Lead and Zinc to Category 3z1 (change of standard). Dissolved Copper, Lead and Zinc assessments were assessed in Category 1 (Meeting Criteria). Benthos assessment was placed back into Category 5 as the only parameter Exceeding Criteria.

11-137-8b and c Total Copper, Lead and Zinc legacy assessments were moved from Category 5 for Copper (delisting) and Category 1 for Lead and Zinc to Category 3z1 (change of standard). Dissolved Copper, Lead and Zinc assessments were assessed in Category 1 (Meeting Criteria). Benthos assessment was placed back into Category 5 as the only parameter Exceeding Criteria.

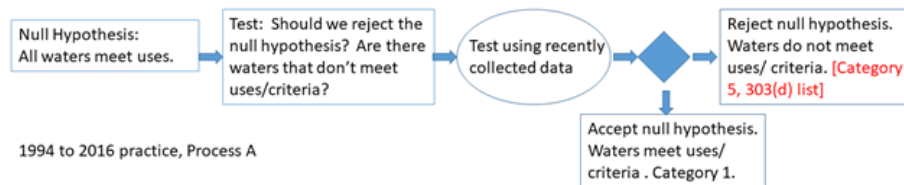
13-17-5a Total Copper, Lead and Zinc legacy assessments were moved from Category 5 for Copper (delisting) and Category 1 for Lead and Zinc to Category 3z1 (change of standard). Dissolved Copper, Lead and Zinc assessments were assessed in Category 1 (Meeting Criteria). Turbidity was reassessed to Category 5 from Category 3a due to increased confidence in Exceeding Criteria when combined with CMSWS data.

Commenter: City of Durham

Comments on Listing Methodology:

- The additional statistical test specifically for delisting assessment units should be removed from the methodology pending a more detailed review and vetting with stakeholders and senior policy makers. The application of this test is in conflict with the approach used by the state since the first 303(d) list and should not be summarily approved by the Environmental Management Commission.

The process used by the state since the 1990s has, appropriately, included an assumption that all NC waters are meeting their uses. Every biennium the state evaluates this assumption, or null hypothesis, for each water body/assessment unit in the state. For waters without data, there is no way to accept or reject the assumption that a water body meets uses, the null hypothesis. These waters would be appropriately placed in Integrated Report Category 3, *Unable to Determine if Meeting or Exceeding Criteria*, with an exception for what I will call a Legacy Listing. If data are available, the null hypothesis is evaluated for each water body using some criteria. Rejecting the assumption that a water body meets uses, or rejecting the null hypothesis, results in placement in Category 5 of the Integrated Report, *Exceeding Criteria & TMDL Required [303(d) List]*. If the null hypothesis is accepted, then waters are meeting their uses and are placed in Category 1 of the Integrated Report (*Assessed Parameter Meeting Criteria*). A simplified diagram of this process is provided below.



A Legacy listing includes those waters previously on the 303(d) list and no new data have been collected. Therefore, a water body cannot be assessed using the above process. The Legacies are summarily placed on the 303(d) list until there are new data to assess or until a TMDL is developed. In summary previous 303(d) lists have included waters based on two criteria, an assessment or a Legacy listing. There has not been a need for additional delisting criteria because the state evaluates all waters for inclusion on the 303(d) list every two years.

The proposed delisting statistical test introduces a new assumption, all waters are not meeting their uses. In the extreme, which has not been proposed by the state, this hypothesis would begin with an assumption that all waters are on the 303(d) list. Each water body is then evaluated to accept or reject the null hypothesis, just as above. Instead of testing “Are there waters that don’t meet uses/criteria?”, the reverse test in this case is “Are there waters that meet uses/criteria?”.

The state is proposing to use this reverse process on a subset of waters, those that were previously included on the 303(d) list. This reverse process would be applied **in addition to** the process used from 1994 to 2016. So in effect, waters on the 2016 303(d) list would be subject to two independent, but opposing, processes for the same 2018 evaluation. With two independent tests, there are now four possible outcomes for waters on the 2016 303(d) list in the 2018 cycle, as shown in the table below.

		Are there waters that don't meet uses/criteria? (Prove that you are bad/don't meet uses)	
		Waters Meet uses/criteria	Waters do not meet uses/criteria
Are there waters that do meet uses/criteria? (Reverse process. Prove that you are good/meet uses)	Waters meet uses/criteria	Both tests indicate water body meets uses/criteria. Waterbody is removed from the 303(d) list.	Tests could conflict. Unclear if reverse process tests would be performed.
	Waters do not meet uses/criteria	Tests conflict. State proposes water body remains on 303(d) list.	Both tests indicate water body doesn't meet uses/criteria. State proposes water body remains on 303(d) list.

The state has not provided support for including a delisting methodology. The 2016 methods provide a path for removing waters from the 303(d) list. Further, the proposed methodology appears to be designed to keep waters on the 303(d) list, even when tests are conflicting. This is a disservice to the public and to regulated entities because it creates the perception of a problem where there may be none.

DWR 303(d) Response:

This is not a waterbody specific 303(d) comment, but is a comment on the assessment methodology. The description of application of the binomial method by the commenter is inaccurate. North Carolina (NC) assessment methods are applied as a series of questions that include evaluating the confidence in both Meeting and Exceeding Criteria. The binomial confidence test is not applied simultaneously as depicted in the graphic, but based on other factors. As an example, the 90% confidence in Exceeding Criteria is only asked if greater than 10 percent of samples are excursions of the standard. If the answer is yes, then the next question is: are there greater than nine samples (this is not scientific and is not needed in a binomial evaluation, but NC uses this to improve statistical confidence for listing a water body - see [DWR Response to Comments on Augmenting Small Datasets](#) provided below). If the dataset is greater than 9 (i.e. $n > 9$) then the water is included on the 303(d) list. No other tests are applied to this assessment.

Also, DWR applies the hypothesis that impaired waters are not meeting uses, not all waters as stated in the comments. These waters were listed with high confidence in a prior assessment and therefore the hypothesis that these waters are impaired holds. This is also required in order to demonstrate good cause for delisting, which is required by Clean Water Act regulations (40 CFR 130.7(b)(6)(iv)).

If $n < 10$ from the above example, then the next question is: was it Exceeding Criteria in the last approved listing cycle? Again, this is not part of the binomial approach, but in addition to. If the answer is yes, then the waterbody remains listed with the assumption there are no new data. Good cause for delisting does not include "data aging out of data window". This would be an example of a legacy listing.

If the AU/parameter combination was not on the previous 303(d) list, then the question is asked: what is the confidence in Exceeding Criteria within the smaller dataset? If there are three or more excursions, then there is greater than 90% confidence that the AU/parameter combination is Exceeding Criteria. If these can be augmented with older datasets so that $n > 9$, the AU/parameter combination is reassessed.

This process is only applied to lakes and the confidence in Exceeding Criteria is increased using this workflow.

It must be stressed that the 2014 and 2016 methods required very high statistical confidence (90% in a 10% exceedance rate) for a standard that is “not to exceed” and applied no statistical confidence test for Meeting Criteria in order to delist. In addition, NC has required a minimum of ten samples that provides even more confidence for listing. In addition, for the 2016 303(d) list, EPA did not allow the state to delist 17 waters where there was greater than 10% exceedance, but less than 90% statistical confidence in Exceeding Criteria. The 2018 method uses multiple levels of confidence and consideration of excursions in new data to reduce the Type I error rate of delisting AU/parameter combinations that should not be delisted.

When both the listing with confidence and delisting with confidence tests are applied, there is an area of five to eight excursions in a data set of 60 (five years of monthly samples) where the statistical confidences in Meeting Criteria and Exceeding Criteria are about the same. The NC 2018 Listing and Delisting Methodology uses statistical confidence ranges of 40 to 70 percent as well as an evaluation of exceedance rates in new data to determine if an AU/parameter combination is Meeting Criteria (these are exceedance rates around 10%) and below 90% for Exceeding Criteria to place assessments in Category 3 and represent a true gray area.

The 2018 assessment approach basically adds up to a weight of confidence (statistical and other) approach to both listing and delisting that addresses concerns of both those who believe NC overlist and those who believe NC underlist and is still able to be implemented by staff and is acceptable to EPA. Also note that these changes affect a total of 44 assessments out of 18,807 or 0.24% of all assessments.

The state welcomed suggestions on how to address concerns that held up approval of the 2016 303(d) list for over a year by receiving public comment on the 2018 Listing and Delisting Methodology. However, the commenter did not provide an alternative solution for consideration.

Also, refer to [DWR 303\(d\) Response to Comments on Delisting Methodology](#) provided below in the DWR Responses to Methodology Comments section.

Comments related to Durham streams:

- Northeast Creek appears on the draft 303(d) list with three parameters of concern: Copper, Zinc, and Turbidity.
 - Copper. Two Assessment Units (AUs) of Northeast Creek appear on the 303(d) list, 16-41-1-17-(0.7)a, from US Highway 55 to the Durham Triangle WWTP, and 16-41-1-17-(0.7)b2, from Kit Creek in Wake County to a point 0.5 miles downstream of Panther Creek. These are both downstream of an industrial facility that processes copper. From the 2017 EPA TRI 2017 dataset, this facility reported copper compounds air emissions of 12,861 pounds in 2016. This is down from 13,851 pounds in 2014. The same facility reported 65 pounds of copper leaving the site in surface water in 2016, compared to 136 pounds in 2014. Public Works measured dissolved copper at three locations in the Northeast Creek watershed. The sample-specific Continuous Criterion Chronic (CCC) for copper was exceeded at all three locations.

- Zinc. Two AUs of Northeast Creek appear on the 303(d) list, 16-41-1-17-(0.7)b1, from the Durham Triangle WWTP to Kit Creek in Wake County and 16-41-1-17-(0.7)b2. Durham monitors both dissolved zinc and hardness at two locations upstream of these assessment units, at US Highway 54 and Sedwick Road. A site-specific and sample-specific CCC is determined for each monitoring date. For the period from January 2012 to December 2016, the CCC was not violated in 72 samples. Therefore, Durham data is consistent with the evaluation of the AU from US Highway 55 to the Durham Triangle WWTP.
- Turbidity should be listed in category 4 above Sedwick Road, not Category 5. One AU of Northeast Creek appears on the 303(d) list, 16-41-17-(0.7)a, from US Highway 55 to Durham Triangle WWTP. In 2013, the City of Durham completed a comprehensive modeling project of Northeast Creek for dissolved oxygen and turbidity. The turbidity modeling found that most of the sediment/turbidity in Northeast Creek came from bank erosion. In 2013 these findings were presented to DWR (Kathy Stecker and Pam Behm). This was followed by a discussion about how to characterize Northeast Creek in the Integrated Report. The consensus was that bank erosion as a source of sediment/turbidity is not consistent with TMDL development and the portion of the stream included in the modeling should be in Category 4. The “source” of pollution is the stream itself. However, the model domain stopped near Sedwick Road and did not extend outside of Durham County. The Public Works Department completed a search of construction-related investigations conducted by the City or Durham County. There were large construction projects during the assessment period, the Meadows at Southpoint and Grandin Trace. These sites were regularly inspected by Durham County Stormwater and Erosion Control and drain to Northeast Creek below Sedwick Road. A copy of the modeling report is available upon request.
- Ellerbe Creek is included on the 303(d) list for impaired fish community (AUs 27-5-(0.3) and 27-5-(0.7)). In the summer of 2017, the City of Durham conducted a survey of fish in the Eno River and Ellerbe Creek (Durham 2017). The sites evaluated in the Eno River were rated Excellent and the sites in Ellerbe Creek were rated Poor and Good-Fair. The Poor rating at Midland Terrace is consistent with 2005 and 1995 fish community surveys conducted by NCDWR. The Fair rating at Glenn Road was unexpected since this stream received a Poor rating from NCDWR in 1995. In 2017, lentic adapted White Bass and Black Crappie were captured at the Glenn Road site. When Falls Lake is elevated, the hydrology at Glenn Road is affected by the elevation of Falls Lake (USGS 2010). This suggests that the monitoring site at Glenn Road is not representative of upstream Ellerbe Creek. The monitoring report and a page from the 2010 USGS summary report are attached for your convenience.
- Both assessment units of Little Lick Creek (27-9-(0.5) and 27-9-(2)) are included on the 303(d) list for turbidity. Since 2014-2015, the NC Department of Transportation has had an active construction site near the headwaters of Little Lick Creek. Construction of the East End Connector has disturbed hundreds of acres of land, removing trees, homes and other commercial buildings. The ultimate goal of the construction is a major interchange connecting the Highway 147 bypass to Highway 70. The Division of Energy, Mining and Land Resources (DEMLR) conducted enforcement actions for sediment violations associated with this construction project. It is likely that Little Lick Creek will be adjusting to the change in sediment and hydrology for many years.

DWR 303(d) Response:

Northeast Creek: Regarding the copper and zinc impairments, thank you for providing this information. It will be shared with the DWR Basin Planning Branch to incorporate into the Cape Fear Basinwide Plan. DWR continues to work towards implementation of the new dissolved metals standards and welcomes data submittal from the City as there is already an approved QAPP.

Regarding turbidity, on February 18, 2014, the City of Durham submitted a request to DWR to reassign the dissolved oxygen impairment to category 4c due to hydrologic modification, but did not include turbidity in that request. The request to recategorize dissolved oxygen was approved. For turbidity, the letter from the City of Durham simply stated, "City hopes that this information will inform any future regulatory decision-making (e.g., TMDL development for turbidity)."

The division agrees that TMDLs are most likely not the appropriate tool to address legacy sediment impairments when current land management practices are not contributing to the impairment. We are evaluating potential mechanisms to address legacy sediment impairments across the state and welcome the city's input.

Ellerbe Creek: Thank you for providing this information. It will be shared with the DWR Basin Planning Branch to incorporate into the Cape Fear Basinwide Plan. DWR welcomes data submittal from the City as there is already an approved QAPP. We will also share this comment with the DWR Biological Assessment Branch for evaluation of the representativeness of monitoring locations.

Little Lick Creek: Thank you for providing this information. It will be shared with the DWR Basin Planning Branch to incorporate into the Cape Fear Basinwide Plan.

Commenter: Citizen – Anne S. McMullan

Thank you for the opportunity to comment on North Carolina's report on impaired waters. In your public notice of availability, you state that you "are required by Section 303(d) of the federal Clean Water Act to list those streams, rivers and other bodies of water that do not meet water quality standards."

I live in the Pasquotank River Basin, but I have family that lives across the state and so am concerned about any waterbodies that don't meet water quality standards. The list published on public notice includes a very brief "reason for rating," which, for the Pasquotank River Basin includes several troubling pollutants like dioxin, copper, nickel, chlorophyll a and numerous problems with shellfishing areas. For this reason and because I have relatives living near farming/animal operations, I'm particularly concerned about waters impaired due to pathogens.

The report published online doesn't explain where these pollutants are coming from and what the DEQ is doing about them. I tried to find more information on the DEQ website and discovered the "Basin Planning Branch" reports are more than 10 years old! Is there a better source for more up to date information?

Also, I noticed on the 303(d) list there are so many shellfishing impairments (~574), apparently due to fecal contamination along the coastal areas, but considerably fewer fecal coliform impairments (~48) and enterococci (0?) across the rest of the state. To me, this begs the question of how often does DEQ monitor our streams to ensure they are safe from pathogen contamination? The 2018 303(d) Listing and Delisting Methodology provides only very brief descriptions of 'assessment' methods. Can you explain how these methods truly show that our streams and rivers are meeting water quality standards?

Concerned citizen Anne S McMullan Nags Head,NC

DWR 303(d) Response:

Thank you for your comments. We appreciate citizen concerns regarding the status of water quality in our state. DEQ monitors pathogen indicators (fecal coliform bacteria and enterococci) at approximately 850 stations in North Carolina to assess for recreational water quality. Monitoring for 303(d) assessments are focused on waters that are classified for full contact recreation. There were 67 waters (assessment units or AUs) on the 303(d) list. There are another 103 waters in Category 3a (data inconclusive, not 303(d) list) that have regular excursions of the water quality standard for pathogen indicators. These AUs were not sampled in a manner that can be used to assess the water quality standard.

In coastal areas, DEQ posts signs to alert citizens to potential risk of contact in waters with elevated pathogen indicators. Several county health departments also sample for pathogen indicators but DEQ does not use these data unless they are submitted for assessment purposes.

Sources of pathogen indicators are highly variable and are often from several different types of land uses. The sources are more thoroughly identified when DEQ develops a management plan to address the pathogen indicator excursions.

The water quality standard for fecal coliform bacteria in shellfish harvesting waters is lower than for recreational uses. Most of the 574 waters noted are considered safe for recreational water contact. The shellfish standard is more conservative because it is to protect against contamination of shellfish tissue that is consumed raw.

Commenter: Citizen – Bill Floyd

In October 1987, the Rabun County Georgia Chapter of Trout Unlimited (“Rabun TU”) petitioned the state of North Carolina to reclassify the Chattooga to ORW pursuant to 15A NCAC 02B .0225 (d) Petition Process. Rabun TU’s petition specifically identified protecting the “outstanding” trout habitat and wild rainbow, brook, and brown trout fisheries as the “*exceptional resource value to be protected.*”¹ Thus, the trout habitat and trout fisheries constitute the *specially designated uses* of the Chattooga’s ORW water quality which must be intensely protected against any non-temporary diminution in quality—with the obligation being to preserve both at an “*outstanding*” level of quality. Unfortunately, both uses *have suffered impermissible non-temporary degradation* due to excessive embedded sediments that have become impounded on an extended segment of the river. Based on the *best available science*, the quantities of embedded sediments present on the Chattooga *exceed any minimum effects threshold* for disrupting the reproductive and early life cycle needs of salmonids. Unfortunately, our current Section 303(d) assessment methodologies *do not make use of the best available science* for recognizing the degradation caused by these excessive sediments.

In preparing the 2018 Section 303(d) list North Carolina needs to supplement its existing methodologies by utilizing the *best available science* for quantifying when embedded sediments will negatively impact the health of salmonid populations. See Bryce, Lomnický & Kaufmann, *Protecting sediment-sensitive aquatic species in mountain streams through the application of biologically based streambed sediment criteria*, Journal of North American Benthological Society, 29(2):657-672(April 2010)(“Combining all lines of evidence, we concluded that for sediment-sensitive aquatic vertebrates, minimum-effect sediment levels were 5% [for <=.06mm fines] and 13% [for <=2mm sand and fines], respectively, both expressed as areal percentages of the wetted streambed surface.”); Bryce, Lomnický, Kaufmann, McAllister, & Ernst, *Development of biologically-based sediment criteria in mountain streams of the western United States*. North American Journal of Fisheries Management 28:1714–1724 (2008); Suttle, Power, Levine & McNeely, *How Fine Sediment in Riverbeds Impair Growth and Survival of Juvenile Salmonids*, Ecological Applications, 14(4)969-974 (2004)(“The linear relationship between deposited fine sediment and juvenile steelhead growth *suggests that there is no threshold below which exacerbation of fine-sediment delivery and storage in gravel bedded rivers will be harmless*, but also that any reduction could produce immediate benefits for salmonid restoration”)(italics added).

Region 10 of the United States Environmental Protection Agency has embraced the Bryce, Lomnický & Kaufmann methodology as a critical tool for recognizing degraded conditions in trout streams in Oregon due to excessive embedded sediments.² Similarly, the state of Virginia

¹ A copy of Rabun TU’s petition to reclassify pursuant to 15A NCAC 02B .0225 (d) is attached to this correspondence. This petition has been lodged within the administrative records of the United States Forest Service as document “N-22 1987 Rabun TU ORW Petition.”

² For bedded sediments, where Oregon had no established measurable methodology for ascertaining impairment, the US EPA developed and applied measurable metrics that are consistent with federal regulations, etc., and which are based on scientific literature and/or peer reviewed methodologies. Applying these methodologies for bedded sediments, the US EPA compelled Oregon to place additional streams on Oregon’s 2010 Section 303(d) list of impaired waterbodies.

has utilized the EPA's concept of Relative Bed Stability to identify when biological communities have been adversely impacted due to excessive embedded sedimentation. North Carolina should apply these methodologies to recognize the Chattooga's impairment from excessive embedded sediments and to place this water quality limited segment on the 2018 Section 303(d) list. Study the log jam @ 35.033897, -83.128544 in the photo below.



EPA Region 10 justified this decision by referencing the following scientific standard: "Bryce et al. (2008 and 2010) determined the optimum sediment tolerance values and medians for areal % fines (≤ 0.06 mm) and areal sand and fines (≤ 2 mm). The median optima for percent sand and fines was 13% for sediment sensitive salmonids and 9.7% for sediment sensitive macroinvertebrates." *Use of Biological Data in 303d Program*, Memorandum, US EPS Region 10, Office of Environmental Assessment, Gretchen Hayslip, at page 3(indexed for this administrative record as Floyd document "00-I"). Stated differently, Region 10 placed certain segments on the 303(d) list because bedded sediments exceeded the aforementioned minimum effects thresholds.

More specifically, EPA Region 10 endorsed the conceptual use of a Fine Sediment Score ("FSS") and Relative Bed Stability ("RBS") to evaluate whether embedded sediments are too excessive.

This methodology applies two tests. "First, fine sediment was assessed as the percentage of substrate composed of particles smaller than 2mm in diameter...Second, EPA assessed Relative Bed Stability (RBS) which evaluates the ability of a stream of a particular size, steepness, discharge and roughness to move substrate downstream. Values less than zero indicate that the stream has a higher level of fine sediment than expected. (Kaufmann, 1999)." *Enclosure 2: EPA 303(d) Listing Methodology*, EPA Region 10, at page 14 of 36 (attachment outlining methodology used by the EPA to assess water quality data and information for compliance with Oregon's water quality standards) downloaded on 12/29/2016 from <http://www.deq.state.or.us/wq/assessment/docs/2010EPAenclosure2.pdf>. (otherwise indexed for the administrative record of the Nantahala National Forest as Floyd document 00-I-A).

This EPA Region 10 endorsed listing methodology offers the best available science for assessing impacts of excessive bedded sediments on a specific reach of a specific wadeable stream. In order for a site on a wadeable stream to be considered impaired because of excessive embeddedness of fine particle sized sediments, it has to fail both tests. A suspect site has to have an actual Relative Bed Stability (RBS) value that is less than a predicted benchmark value, and it has to exhibit a greater percentage of embeddedness compared to actual reference condition standards derived from the results of 10 years of state wide habitat field monitoring applying protocols consistent with those previously articulated by the Environment Monitoring and Assessment Program (EMAP). "Fine Sediment Score (FSS): EPA is supportive of the development of biologically based sediment criteria (Cantilli et al. 2006), where biological data are used to set sediment criteria that protect and maintain populations of native, sediment sensitive species. Sediment is a leading cause of biological impairment in rivers and streams of the US (USEPA 2000). Bryce et al. (2008 and 2010) determined the optimum sediment tolerance values and medians for areal % fines (< 0.06 mm) and areal % sand and fines (< 2 mm). The median optima for percent fines was 6.5% for sediment sensitive salmonids and 2.8% for sediment sensitive macroinvertebrates. The median optima for percent sand and fines was 13% for sediment sensitive salmonids and 9.7% for sediment sensitive macroinvertebrates." G. Hayslip, Aquatic Biologist, Office of Water and Watershed, United States Environmental Protection Agency, Region 10, *Use of Biological Data in the 303(d) Program*, Memorandum. http://www.deq.state.or.us/wq/tmdls/docs/midcoast/Advisory/102814EPA_memo.pdf last downloaded 1/13/2017

The June 2015 photo above documents the depth of the embedded sedimentation that dominates almost 2 miles of the Chattooga’s stream bed. Before September 2016, *the Chattooga’s trout populations were last assessed* between 1992-1996 at two sampling locations. “Site 2” was located approximately 2 km upstream of the Bull Pen bridge or just downstream of this logjam. Electro-fishing at “Site 2” documented trout standing crops which averaged an outstanding 31.22 kg/hectare over the four years sampled—with a high of 43.2 kg/hectare and a low of 22.23 kg/hectare. However, “Site 2” also produced a *curious contrasting anomaly*—an unacceptably low ratio of young-of-the-year trout relative to other age classes of just 17.9%. *In stark contrast*, “Site 1”—located miles downstream from this logjam —yielded an average ratio of young-of-the-year to other age classes of 102%. Today, the quantity of embedded sediments proximate to “Site 1” are far less than the highly visible *foot deep blanket of sediment* being suffered proximate to “Site 2”. This measurable difference in levels of embeddedness suggests the “Site 2’s” unacceptably low numbers of young-of-the-year trout might be explained by this excessive sediment. To press the correlation, the paucity of young-of-the-year trout documented at the Chattooga’s “Site 2” was also much lower than other potential reference trout streams studied at the same time. Clearly, additional study should have taken place.

BROWN TROUT RATIO YOY TO OTHER AGE CLASSES								
	1989	1990	1991	1992	1993	1994	1995	1996
ANDREWS CREEK		55.89%	39.06%	19.06%	71.47%	14.57%	10.53%	
LOST COVE CREEK		75.63%	196.51%	35.39%	118.14%	42.83%		89.91%
KIMSEY CREEK	57.52%	86.21%	182.32%	323.04%	127.80%	17.72%	362.6 %	138.17%
STEELS CREEK			44.76%	123.30%	63.52%			
CURTIS CREEK								
CHATTOOGA RIVER (Site 2)				32.50%	11.30%	9.80%	N/A	19.90%
CHATTOOGA RIVER (Site 1)				225%	95.5%	33.3%	110%	51%
RAINBOW TROUT RATIO YOY TO OTHER AGE CLASSES								
	1989	1990	1991	1992	1993	1994	1995	1996
ANDREWS CREEK								
LOST COVE CREEK		95.21%	165.98%	7.67%	133.51%	72.79%		121.29%
KIMSEY CREEK	364.56%	748.8%	1066.40%	1515.53%	612.07%	512.6%	685.4%	724.42%
STEELS CREEK			52.36%	73.56%	604.69%			
CURTIS CREEK		60.60%	163.41%	10.19%	154.90%	39.74%	179.0%	
TELLICO RIVER						5.24%	21.08%	4.55%

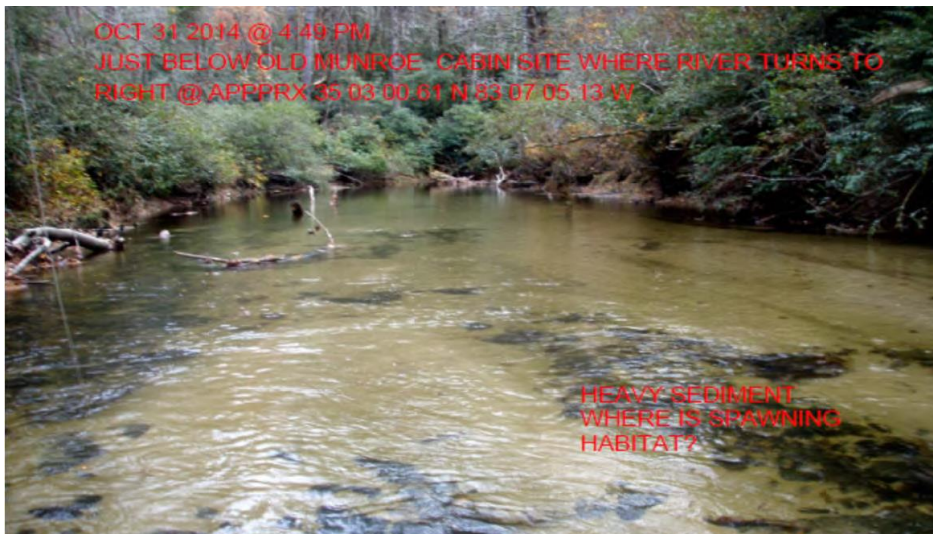
This table was created using data drawn from the document entitled *Wild Trout Population Monitoring, 1989-1996*, James C. Borawa et al, North Carolina Wildlife Resources Commission, Inland Fisheries, 2001.³³ This table demonstrates the variability of young-of-the-year numbers on a year to year basis

³ Otherwise indexed within the administrative record of the USFS as document “00-V Borawa et al 2001”.

based on species of trout, specific site sampled, and specific year sampled. *However, more importantly, this table evidences how something irregular was negatively impacting the reproductive life cycle of trout at Chattooga River "Site 2" compared to "Site 1" - as well as compared to other trout streams in the Nantahala National Forest.*

Despite the drastic differences in young-of-the-year trout counted at Site 2 versus Site 1 during the Chattooga's 1992-1996 trout study, *no efforts were made subsequently* to explain this anomaly. In fact no further monitoring of the Chattooga's trout occurred subsequent to 1996.

A lack of any effort to monitor the trout populations was one of the reasons why I spent considerable time and energy asking the state of North Carolina to undertake a trout assemblage study in September 2016.



The photo above reveals conditions at a site (@ 35.050170, -83.118091) located approximately 1.4 miles upstream from the huge logjam. The underlying character of the stream bottom substrate at this location (presence of cobble) and the shallow depth and low rate of water flow at this location should have been suitable for producing outstanding numbers of young-of-the-year trout—but *for the blanket of this excessive embedded sediment.*

This straight and relatively wide reach of riffle water, lies within the 600 foot reach of water that the North Carolina Department of Environmental Quality ("NC DEQ") defined as "Site No. 10" when it electro-fished in September 2016. *NC DEQ captured just 2 young-of-the-year brown trout on this 600 foot reach.* Similarly, Site No. 10 yielded an extrapolated brown trout standing crop weight of just 10.1 kg/hectare—a *far from outstanding standing crop.* But for the damaging impacts of this blanket of sediment, the physical nature of Site No. 10's stream bottom substrates (availability of cobble) and lower flow characteristics should have yielded much greater young-of-the-year numbers and greater standing crop weights.

This September 2016 study yielded the following raw data:

10/6/2016

Chattooga River Brown Trout Catch Data.xlsx

Chattooga River, September 19-23, 2016													
Direction	Downstream				Log Jam	Upstream							
Waterbody	Chattooga R	Chattooga R	Chattooga R	Chattooga R	Chattooga R	Chattooga R	Chattooga R	Chattooga R	Chattooga R	Chattooga R	All Sites Combined	All Sites Combined, except SR 1100	Comments
Station	SR 1100	Site No. 1	Site No. 2	Site No. 4	Site No. 5	Site No. 8	Site No. 9	Site No. 10					
County	Jackson	Jackson	Jackson	Jackson	Jackson	Jackson	Jackson	Jackson					
Distance Sampled (ft.)	600	566	350	600	600	600	600	600	600	600	4516	3916	
Electrofishing Time (secs.)	4278	5501	1958	3876	2570	3045	2926	2744	26898	22620	26898	22620	standardized to 600 ft.
Area Sampled (acres)	0.907	0.577	0.212	0.635	0.544	0.589	0.521	0.544	4.437	3.551	4.437	3.551	
Area Sampled (hectares)	0.367	0.234	0.086	0.257	0.220	0.239	0.211	0.220	1.795	1.437	1.795	1.437	
No. Fish/600 ft. reach	37	51	9	26	11	21	15	18	25.0	23.1	25.0	23.1	standardized to 600 ft.
No. Fish/Hour, standardized to 600 ft.	31.1	33.4	16.5	24.1	15.4	24.8	18.5	23.6	25.2	24.0	25.2	24.0	standardized to 600 ft.
No. Fish/Acre, standardized to 600 ft.	40.8	88.3	42.5	41.0	20.2	35.6	28.8	33.1	42.4	42.5	42.4	42.5	
No. Fish/Hectare, standardized to 600 ft.	100.8	218.2	105.1	101.2	50.0	88.0	71.1	81.8	104.7	105.1	104.7	105.1	
No. YOY, measured	6	2	2	2	2	8	2	2	25	24	25	24	YOY ≤ 115 mm TL
No. YOY/Hour, measured	5.0	1.3	3.7	1.9	2.8	9.5	2.5	2.6	3.4	3.8	3.4	3.8	YOY ≤ 115 mm TL
No. Adults, measured	31	46	3	24	9	13	13	16	156	120	156	120	
No. Adults/Hour, measured	26.1	30.1	5.5	22.3	12.6	15.4	16.0	21.0	20.9	19.1	20.9	19.1	
Total Ws (g), measured	4426.67	5664.70	181.43	2456.21	1243.14	1712.51	1471.67	2229.82	19386.15	14959.48	19386.15	14959.48	for fish > 140 mm TL
No. Lbs/Acre, measured	10.8	21.6	1.9	8.5	5.0	6.4	6.2	9.0	9.6	9.3	9.6	9.3	for fish > 140 mm TL
No. Kg/Hectare, measured	12.1	24.2	2.1	9.6	5.6	7.2	7.0	10.1	10.8	10.4	10.8	10.4	for fish > 140 mm TL
Multiple Ages	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	with young-of-year

Class A (Bonner 1983) ≥ 10 lbs/acre

Class B (Bonner 1983) 2-10 lbs/acre

Class C (Bonner 1983) 0-2 lbs/acre

Bonner, W. R. 1983. Survey and classification of state-managed trout streams. District Nine. Mountain Fisheries Investigations. Federal Aid in Fish Restoration Project F-24-S. Final Report. North Carolina Wildlife Resources Commission, Raleigh, NC.

Milewski, C. L. and M. L. Brown. 1994. Proposed standard weight (Ws) equation and length-categorization standards for stream-dwelling Brown Trout (*Salmo trutta*). Journal of Freshwater Ecology. 9:111-116.

This September 2016 trout study of almost a mile of water failed to produce *outstanding* metrics. The results were poor in terms of the paucity of young-of-the-year trout counted (26) as well as the low standing crop weights that were projected for 7 of the 8 reaches (600 foot long) that were electro-fished.

To make matters worse, North Carolina projected these standing crop weights using a regression model based on the length of fish instead of weighing individual fish. Additionally, the regression model used applied length/weight data from much more productive trout streams in places like Montana and Colorado. This injected a positive bias of as much as 10% into the results that would not have been observed had NC DEQ used another length/weight model regressed solely on data collected on a comparable stream in North Carolina.⁴

⁴ This September 2016 Chattooga trout study used a regression model detailed in: *Proposed Standard Weight (Ws) Equation and Length-Categorization Standards for Stream-Dwelling Brown Trout (Salmo trutta)*, Journal of Freshwater Ecology, Volume 9, Number 2, June 1994, Craig Milewski and Michael Brown, South Dakota State University, Department of Wildlife and Fisheries Sciences (“Milewski and Brown 1994”).

However, an extensive Colorado fisheries study has specifically documented how Standard Weight equations (like Milewski and Brown 1994) can grossly overstate Brown trout biomass living in degraded in stream habitats:

“Weight-length relationships provide a tool to assess the body condition of brown trout (*Salmo trutta*) populations inhabiting stream reaches where stressors, such as metals, have chronic, sub-lethal toxic impacts. A previously published brown trout standard-weight equation, W_s , overestimated Colorado brown trout weights. Weight-length data from 16 Colorado brown trout populations (n = 9, 8 16) were used to develop a regional standard weight (W_{cl}) equation based on fish from waters free of metal contamination. Relative-

NC DEQ's September 2016 study offered additional evidence of a continuing problem with extremely low young-of-the-year ("YOY") numbers on the segment of the Chattooga where these sediments are most pronounced. The eight sites sampled in 2016 did not produce praiseworthy numbers of either *young-of-the-year* or *outstanding* standing crop weights

Not a single rainbow or brook trout was counted.

This is particularly troubling since the Clean Water Act's antidegradation standard that we are obligated to honor on the Chattooga is one that sustains "*outstanding*" wild rainbow, brook, and brown trout fisheries. The context in which North Carolina's administrative code utilizes the word "*outstanding*" implicates an intention to differentiate the relative quality of "*innate differences ...in...species...productivity*"⁵ that a river's in stream fish habitat must possess, in comparison to all other streams. See 15A NCAC 02B .0225(b) (Outstanding Resource Waters) and 15A NCAC 02B .0201 (Antidegradation Policy)

North Carolina's selection of the word "*outstanding*" as the shared modifier is synonymous with having chosen *exceptional, superlative, first rate, first class, or excellent*. It is conceptually distinguishable from average or sufficient or minimally adequate trout habitat.

North Carolina chose to employ the plain meaning word "*outstanding*" to distinguish the numeric characteristics in "*innate differences ...in...species...productivity*"⁶ that a stream's habitat must exhibit to qualify for ORW protection. North Carolina reserves special ORW antidegradation protection for those few streams possessing the requisite "*outstanding*" or *first rate* or *exceptional* fish habitat needed to sustain an "*outstanding*" fishery.

The NC DEQ report summarizing the September 2016 study places a positive gloss on a field study that in fact confirmed the degrading quality of the trout fisheries—something which anglers with decades of experience on this river knew to be occurring based on their own creel records and the plainly visible amounts of increased embedded sediments.

weights (W_r) were then compared between metal-contaminated and metal-free streams in Colorado using the W_c equation. Brown trout W_r 's were lower in metal contaminated streams than in stream reaches uncontaminated by metals. The development and use of regional standard weight equations is recommended to help assess the weight of brown trout inhabiting metal-contaminated stream reaches."

Standard Weight (Ws) Equations to Assess Body Condition of Brown Trout (Salmo trutta) from Metal-Contaminated Streams, Journal of Freshwater Ecology Volume 16, 2001 Issue 4, Shannon Edward Albeke, John David Woodling & Ann Marie Widmer.

Because of the Chattooga's pronounced embedded sediment problem, the appropriateness of using this statistical methodology should have been vigorously questioned as a best scientific practice. After all, one of the presumed purposes for the study was to determine if the river's trout fishery had suffered negative impacts because of this excessive embedded sediment. Further complicating matters, if NC DEQ had applied the regressed Standard Weight formula developed specifically from Brown trout data collected on Andrews Creek (tributary to Wilson Creek), the amount of biomass projected for the Chattooga's September 2016 sampling would have been 11-13% lower.

⁵ *Water Quality Standards Regulatory Revisions, Final Rule*, 80 Fed. Reg. 51020-51050, at 51024, Aug. 21, 2015 (footnote and internal quotation marks omitted)(to be codified at 40 C.F.R. Part 131)("2015 WQS Revisions")(italics added for emphasis)(otherwise indexed for the USFS administrative record as Floyd document 00-J-2).

⁶ *Id.*

Instead of comparing the results of the September 2016 study to metrics observed on a reference condition “outstanding” trout stream, the summarizing report tried to bootstrap a claim that the Chattooga’s fisheries remain “outstanding” by referencing a trout stream classification approach that had long been abandoned decades earlier by the state of North Carolina. Similarly, *NC DEQ did not electro-fish at legacy sampling “Site 1”—where the ratio of young-of-the-year/other age classes had exceeded 100% during the 1992-1996 study.* Instead, in 2016, NC DEQ only conducted sampling proximate to legacy sampling “Site 2”. NC DEQ should have electro-fished proximate to legacy sampling “Site 1” to see if there had been any degradation at that site.

Today, “Site 2” from the 1992-1996 study can be distinguished from “Site 1” because the amount of embedded sediment that is found proximate to “Site 2” *far exceeds* the amount of embedded sediment found at “Site 1”.

If NC DEQ were to apply the *best available science* for assessing the negative impacts of excessive embedded sediments on salmonids, it seems unlikely that the ORW Chattooga could avoid being recognized as impaired for purposes of the 2018 Section 303(d) list.

To press further, in 1998, Norton Mill Creek, a major tributary dumping into this sediment troubled stretch of the Chattooga, was included on the Section 303(d) list as an impaired stream *due to excessive sediment.* Presumably, the pitiful 1995 NCIBI score of 38 out of 60 (Fair) provided one of the reasons why Norton Mill Creek was listed on the Section 303(d) list of impaired waters in 1998.

Just two years later, Norton Mill Creek was removed from the 2000 Section 303(d) list because of a change in how North Carolina scored its Section 303(d) water quality assessments—not because the sediment problem had been mitigated or resolved or that the NCIBI score had increased to a more acceptable number.

Curiously—the existence of this prior NCIBI score of 38 has been scrubbed from NC DEQ’s more recent website. It is only because I took a “snapshot” of an older version of the website that I was able to confirm that an NCIBI score of 38 had been issued for Norton Mill Creek in 1995.

Norton Mill Creek’s excessive sediment problem did not go away in two short years because of the implementation of some physical abatement strategy by one of the responsible state or federal agencies. Norton Mill Creek was taken off the Section 303(d) list because North Carolina applied a lowered standard to declare a passing score for Norton Mill Creek.

This curious circumstance emphasizes why NC DEQ should take an alternative approach in 2018 while assessing the Chattooga for the purposes of the making a Section 303(d) listing decision. NC DEQ should approach the Chattooga River’s excessive embedded sediment problem like it approached the Tellico River’s sedimentation problems in 2011.

With respect to the Tellico River, the Nantahala National Forest *told* a federal judge that “an NCDENR study [concluded] that *‘aquatic insects are generally poor indicators of ecosystem stress due to sedimentation.’”* See *Southern Four Wheel Drive Association v United States Forest Service*, Case 2:10-cv-00015, ECF #39, page 27, August 3, 2011 (italics added for emphasis).

In swearing this critical admission, the Forest Service cited a study published in a memorandum entitled *Results of Benthic Macroinvertebrate Special Study: Upper Tellico Off-Highway Vehicle (OHV) System (LTN:04, Cherokee County, North Carolina, Monroe County, Tennessee*, Eric Fleek, Acting Supervisor, North Carolina Department of Environmental Quality, Biological Assessment Unit, August 17, 2009. (“Fleek Memo”)(otherwise indexed for the USFS administrative record as Floyd document I-1).

Fleek’s study of the Tellico River was *specifically* conducted *at the request* of the Nantahala Forest. The purpose of the study was to provide scientific background for the Forest Service’s decision to shut down off road vehicle trails within the riparian corridor of the Tellico River and its tributaries—due to concerns about sedimentation getting into those trout waters.

The Fleek Memo admitted that “the [macro invertebrate] data collected on the larger waterbodies sampled...showed no adverse impacts due to sedimentation and (excluding the aforementioned chironomids) were all very similar in invertebrate community structure compared to their respective reference sites. *The moderately high gradients, coupled with the large discharges and abundant, heterogenous habitat available at these locations were likely responsible for attenuating negative impacts to the invertebrate community.* This conclusion is consistent with the results of previous work (Cairns 1977, Lenat et al. 1979, NCDWQ 2008, Zhang et al 2009).” Fleek Memo, document I-1 at page 16 (italics added).

Stated differently, Mr. Fleek’s report explains why the damage being done by excessive sedimentation on the Tellico River’s trout habitat is somewhat masked by looking solely at the results of macroinvertebrate studies.

Mr. Fleek’s memo went on to explain: “*The lack of response in the BI and EPTBI between reference and experimental sites replicates the results of previous work which have demonstrated that biotic indexes are poor measures of sediment effects (Zweig and Rabeni 2001).* Conversely, the negative relationship of the EPTS and EPTN in response to increased sediment *from this study’s smaller streams* further reinforce the deleterious effects of sediment (Kimble and Wesche 1975, Lemly 1982, Hall et al. 1984, Minshall 1984, Hachmoller et al. 1991, Walters, 1995, Zweig and Rabeni 2001) and embeddedness (McClelland and Brusven 1980, Griffith et al. 2002) on EPT diversity and abundance as well as on the diversity and abundance of filter-feeding caddisflies (Lemly 1982, Mackay and Walters 1986, Runde and Hellenthal 1993, Walters 1995, Strand and Merritt 1997).” Fleek Memo, document I-1, at page 16-17 (italics added for emphasis).

In short, in making the Section 303(d) assessment of the Chattooga for 2018, similar to how it addressed the Tellico River, NC DEQ must not place determinative decision making emphasis on the results on macroinvertebrate samples taken from permanent monitoring stations located miles above and miles below the extended segment of river that is plagued by excessive embedded sedimentation. To do so would be to mask the ORW degrading impacts of this excessive embedded sediment on the Chattooga’s once *outstanding* trout habitat and once *outstanding* naturally reproducing trout fisheries.

NC DEQ’s September 2016 trout population study of the Chattooga’s headwaters entailed electro-fishing for trout on eight different 600 foot reaches or almost one mile of the river. Six of the sites that were sampled were located within the heart of the reach of the river where this embedded sediment is often bank to bank or as much as a foot deep.

This study captured just 26 young-of-the-year trout despite sampling almost a mile of water. The ratio of YOY/other age classes was just 26/155 or 16.8%. These are far from “outstanding” trout population metrics.

Noticeably, not a single rainbow or brook trout was captured while electrofishing eight different 600 reaches or almost a mile of water proximate to the Chattooga Cliffs in September 2016.

This single fact alone constitutes clear evidence of impermissible degradation because we know from records retrieved pursuant to a Freedom of Information Act request that the government has admitted that the Chattooga previously provided “fishing for native rainbow and brown trout on Forest Service lands.”⁷ Another document also stated “Green’s Creek, in North Carolina, is well stocked with brook trout.”⁸ In contrast to how this sediment problem is so pronounced proximate to legacy sampling “Site 2”, rainbow and brook trout can be still caught in the main stem of the river downstream of the confluence of Scotsman Creek—proximate to legacy sampling “Site 1.”

Some might assert that that the embeddedness that plagues an extended segment of the Chattooga’s headwaters has been caused by “natural conditions” and that therefore there is no duty to recognize a violation of the water quality standards applicable to outstanding resource waters. 15A NCAC 02B .0205 NATURAL CHARACTERISTICS OUTSIDE STANDARDS LIMITS provides:

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.⁹

Such a view would be wrong. Even if you hypothetically presume that the Chattooga’s excessive embedded sediment problem arises because of “natural conditions”—which I vigorously deny—the fact remains that this embedded sediment problem *does not constitute* an “occasional” or “temporary” condition that prevents the river from satisfying the antidegradation mandate which compels the highest intensity of protection for the wild trout habitat and wild trout fisheries.

The fundamental truth is that the Chattooga’s excessive embedded sediment problem constitutes a chronic and ongoing problem measured in terms of years—as opposed to an entirely past, occasional, or temporary problem measured in terms of weeks or months. Hence, this degraded condition should not be excused pursuant to 15A NCAC 02B .0205.

⁷ The document in which this admission was made was produced by the United States Forest Service in response to a FOIA request (otherwise indexed for the USFS administrative record as document N-33).

⁸ Id.

⁹ History Note: Authority G.S. 143-214.1; 143-215.3(a)(1) Eff. February 1, 1976; Amended Eff. October 1 1989; January 1, 1985. (*italics added*).

The photo on the left shows how the streambed's cobbled substrates are smothered with fine particle sized sandy sediments on October 31, 2014. The photo on the right shows the same location and the non-temporary nature of this embeddedness on June 6, 2015.



Compare these two snapshots of stream bottom conditions to the United States Environmental Protection Agency's ("EPA") rapid assessment protocol photos shown below.



Optimal Range

(William Taft, MI DNR)



Poor Range

(William Taft, MI DNR)

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
2.a Embeddedness (high gradient)	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.																				
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Unfortunately, these examples of what the EPA would call "Poor" stream bed habitat are entirely representative of the kind of degradation being suffered up and down this extended reach of the Chattooga's ORW headwaters.

The limited data that is available shows how the quality of the wild trout fisheries have been allowed to degrade below the requisite “outstanding” level of quality.

As the principal land manager responsible for the Chattooga River, the United States Forest Service has not satisfied its Clean Water Act duty to protect and prevent any diminishment in the once “outstanding” quality of the Chattooga’s trout habitat and wild rainbow, brook, and brown trout fisheries. Preserving the *outstanding* quality of the trout habitat and fisheries constitutes the regulatory obligation that is imposed on all other federal and state agencies pursuant to the Clean Water Act and its regulations.

Instead, the USFS appears to go out of its way to ignore its discrete and nondiscretionary duty to prioritize the protection of this trout habitat and trout fisheries.

This is why the methodologies used to prepare the 2018 303(d) listing process is so important.

Recognizing the impairment that has occurred on the Chattooga’s headwaters during 2018 constitutes the best last chance to prevent additional degrading of the Chattooga’s trout habitat and trout fisheries by USFS management initiatives that ignore the primary obligations owed to the Chattooga’s trout habitat and trout fisheries.

I would respectfully ask that you engage in a deliberative discussion about the benefits of adopting the *best available science* for recognizing the degradation that has been caused by excessive embedded sediments to the Chattooga’s designed uses of ORW water quality. The *best available science* is recognized by Bryce, Lomnický & Kaufmann, *Protecting sediment-sensitive aquatic species in mountain streams through the application of biologically based streambed sediment criteria*, Journal of North American Benthological Society, 29(2):657-672(April 2010)(“Combining all lines of evidence, we concluded that for sediment-sensitive aquatic vertebrates, minimum-effect sediment levels were 5% [for <=.06mm fines] and 13% [for <=2mm sand and fines], respectively, both expressed as areal percentages of the wetted streambed surface.”); Bryce, Lomnický, Kaufmann, McAllister, & Ernst, *Development of biologically-based sediment criteria in mountain streams of the western United States*. North American Journal of Fisheries Management 28:1714–1724 (2008); Suttle, Power, Levine & McNeely, *How Fine Sediment in Riverbeds Impair Growth and Survival of Juvenile Salmonids*, Ecological Applications, 14(4)969-974 (2004)(“ The linear relationship between deposited fine sediment and juvenile steelhead growth suggests that there is no threshold below which exacerbation of fine-sediment delivery and storage in gravel bedded rivers will be harmless, but also that any reduction could produce immediate benefits for salmonid restoration”)(italics added).

Thank you for your careful consideration of the issues outlined in this letter. I look forward to the possibility of working with you to close this critical gap in our Section 303(d) listing process *before* the formal adoption by North Carolina of the 2018 Section 303(d) assessment methodologies.

I would ask that you include me in any public communications regarding the 2018 Section 303(d) listing process etc.

In closing, I would reiterate my intention to work with the respective agencies to source funding for fixing the problem on the ORW Chattooga about which I campaign. But before this can occur, the

responsible agencies have to do their part to recognize the impermissible degrading impacts of this excessive embedded sediment on the designated uses of the Chattooga's ORW water quality. To refuse to acknowledge there are any problems would prove inapposite to the data that has already been put before the respective agencies.

DWR Methodology Response

Thank you for your comments. We appreciate citizen concerns with the status of water quality in our state. The lower 10.4 miles of the Chattooga River AU 3b has a Category 1 assessment for benthos with an Excellent bioclassification from 1998 through 2014. Currently DWR does not have assessment criteria for sediment or embeddedness. DWR will use the information provided by the commenter as well as communicating with other states and EPA to determine a best path to address concerns noted.

Commenter: Citizen – John Wagner

I am very concerned about the increase in the impaired streams in North Carolina. We are seeing an increase in toxic algae due to warming, and increases in flame retardants and various perfluorinated compounds. Due to the heavy rainfalls and severe storms that NC has experienced, the agricultural runoff - especially from CAFO operations has caused river and stream pollution.

The fact that according to NC Policy Watch, NC has more impaired streams than two years ago, and that the "eastern part of the state facing significant water quality problems" should be enough to bring DEQ's Water Quality Division into serious discussions about ways to reverse this trend. With the construction, trenching, horizontal directional drilling, and erosion issues from the Atlantic Coast Pipeline, more impaired streams in eastern North Carolina are inevitable.

I have some experience and familiarity with freshwater macroinvertebrates, and I know that once a stream bed has been contaminated it can take a very long time for a full recovery, and that in many cases the streams may never recover. When federally endangered mussel species that are restricted to a very small range are involved, the chance for irreversible damages or extinction is even more serious.

Please strengthen the protections to prevent new impaired streams and put more resources into working on remediation for streams that are already impaired. Finally, I find it completely unacceptable that any streams that are designated as impaired streams would be removed from the listing due to insufficient data. A stream that is impaired needs to remain in that category until there is data that shows the appropriate level of improvements. If DEQ has insufficient funds and personnel to investigate the status of streams, they should never be cleared until the evidence has been collected and data shows the actual status.

Thank you, John Wagner
Chatham County, NC

DWR 303(d) Response

Thank you for your comments. We appreciate citizen concerns with the status of water quality in our state. NC in 2016 had 1,647 impaired waters or assessment units (AUs). Draft 2018 impaired AUs are 1,593. Although there are fewer than in 2016, these numbers vary widely from cycle to cycle and should not be used for water quality trend analyses. Assessment methods and water quality standards changes in the last six years account for much of this variability.

Environmental Management Commission (EMC) assessment methods now explicitly describe delisting criteria and provide for use of older data to reduce the number of AUs where insufficient data is an issue. The EMC method also reduces the number of delistings with low statistical confidence that the AU is meeting water quality standards. Waters are not delisted when there is insufficient data. NC will work to improve descriptions of reasons for delisting to alleviate any confusion.

Commenter: Haw River Assembly

Thank you for the opportunity to comment on the 303(d) report. Haw River Assembly has also provided comments along with other environmental partners and Waterkeeper organizations regarding the methodology of the 303 (d) process. We additionally submit the following comments in regards to delisting the following stream segments.

Reedy Fork

16-11-(9)b Buffalo Creek to Haw River

This stream segment is currently listed under 5e for zinc contamination, and is proposed to be listed under 3Z1. According to the 2018 Integrated Report Category Assignment Procedure, however, category 3Z1 is assigned only when data are not assessed using an NC water quality standard. We believe the State has failed to show good cause for delisting this waterway.

North Carolina has hardness-dependent water quality standards for zinc intended to prevent acute or chronic impairment of designated uses. In 2016, EPA disapproved proposed revisions to the metals standards including the use of action levels, the use of a low end hardness cap, and the requirement of biological confirmation for toxics in assessments. The stream segment was added by EPA following their own assessment of existing data and conclusion that the segment was not meeting water quality standards. It appears NC is not delisting this segment because of improved conditions in-stream, but rather in furtherance of an ongoing dispute about the relevant standard. However, for purposes of implementing the Clean Water Act, including development of the 303(d) list, the State cannot ignore the superior authority of EPA. Delisting this segment without proper justification invites a more critical assessment of the state's delisting criteria from the federal agency. Standard methods of assessing zinc in waterways are used to document limits on wastewater effluent and drinking water quality, and therefore can and should be used in order to test for zinc impairment in this stream segment. The stream should not be delisted until the data exists to clearly show a lack of impairment.

This particular branch of Reedy Fork drains both the North and South forks of Buffalo Creek. These waterways are often effluent dominated in periods of dry weather. The effluent in these creeks are from wastewater treatment plants with over seventy industrial users, many of them in metals manufacturing where zinc is a likely pollutant. There are also several NPDES direct discharges into these segments draining into the Reedy Fork. Stormwater from fields of land applied biosolids also drain into these creeks. Those biosolids have been sourced from wastewater treatment plants downstream, and in some cases, closed textile or metal finishing facilities. These biosolids are likely to contain heavy levels of zinc. We suspect that this particular section of Reedy Fork continues to be impaired.

DWR 303(d) Response

16-11-(9)b Category 5 assessment for total Zinc is being reclassified to 3z1 because the total Zinc standard no longer applies in North Carolina and the dissolved Zinc standard was assessed in Category 1 (Meeting Criteria) with no excursions during the assessment period. Meeting the new dissolved metals criteria is good cause for delisting. DWR is only delisting total metals impairments when there is new dissolved data. Please refer to [DWR Response to Delisting Total Metals](#) provided below in the DWR Responses to Methodology Comments section. DWR will work with the Environmental Management Commission (EMC) to clarify the process in the 2020 Listing and Delisting Methodology.

16-11-(3.5)b1 Reedy Fork Including Lake Brandt and Lake Townsend

Under the current approved list, this stream segment is listed under 5 for chlorophyll a impairment. The proposed delisting would classify this water under 3a for insufficient data. The dearth of data available for consideration is unsurprising given that DWR samples lakes on a 5-year rotating basin schedule. But limitations in DWR's sampling approach cannot constitute good cause for delisting. If there is not sufficient data explicitly demonstrating a lack of impairment, the stream should remain under the protections of the 303(d) listing. This segment includes two drinking water reservoirs, Lake Brandt and Lake Townsend. These reservoirs have historical data of several water quality parameters, including chlorophyll a. As recently as December 2018, chlorophyll a levels in Lake Townsend were 0.549 mg/l (549 ug/L) and 0.344 mg/L (344 ug/L) in Lake Brandt. Further assessment of existing data needs to be done on this stream segment to justify delisting. The historical data for the water quality of these lakes, and the sampling methods, can be accessed through David Jackson or Greensboro's Water Resources Division. This stream collects stormwater from a highly urbanized area, and we suspect that it should remain under the 303 (d) classification 5.

DWR 303(d) Response

16-11-(3.5)b1 is being recategorized based on current EMC approved delisting methods. DWR is working to increase the number of samples collected in a 5 year assessment period to improve assessment decisions and statistical confidence in assessment decisions. The delisting issues with reservoirs in particular and the lack of data will be reported to the EMC.

Third Fork Creek

16-41-1-12-(1) From source to a point 2.0 miles upstream of NC Hwy. 54

16-41-1-12-(2) From a point 2.0 miles upstream of NC HWY. 54 to New Hope Creek

These segments comprise the entire reach of Third Fork Creek. These segments are proposed to be delisted from a 5 classification for zinc, and dissolve oxygen, and from 5e classification for copper to a 3a for insufficient data. These creek segments drain an increasingly developed area of Durham into the New Hope Creek wetlands. There have been many sediment violations impacting Third Fork Creek in the past two years. Though the data used to determine impairment or delisting must be from the 2012-2016, we have not seen a successful TMDL or management plan to suggest samples from that time justify removal from the 303(d) list. Additionally, a copper impairment was added to this stream by the EPA, following their own analysis. No discharges or effluent sources have been removed from this watershed, and therefore, those impairments likely still exist.

Thank you for consideration of these comments in regards to the 303 (d) list impairment classifications.

DWR 303(d) Response

16-41-1-12-(1) Total Copper and Total Zinc category 5 assessments are being recategorized to Category 3z1 because there are new dissolved standards and data has been collected to assess the water under the new standards. Dissolved Zinc standard is Meeting Criteria and dissolved Copper assessment is inconclusive based on EMC methodology.

16-41-1-12-(2) Total Copper remains in Category 5 as a legacy assessment until Upper Cape Fear River Basin Association samples for dissolved metals. At that time Copper will be reassessed using EMC assessment methods. Dissolved oxygen is Meeting Criteria in this AU.

Commenter: Lower Neuse Basin Association and Neuse River Compliance Association

LNBA and NRCA Comments for the 2018 303(d) List and Integrated Report

1. The Draft 2018 303(d) and Integrated Report information indicates that Chlorophyll-a is an aquatic life standard. There is no technical support for this conclusion. Aquatic life standards normally use detriments to sensitive species thresholds (plus a safety factor) to establish a water quality standard. Chlorophyll-a is an indicator of biological productivity not an aquatic life standard. Chlorophyll-a is best considered a water quality standard for the protection of designated use impairment - aesthetics and recreation. Chlorophyll-a is not toxic. Chlorophyll-a has no levels associated of endangerment of sensitive species. This is an important but minor change. It is important because EPA has established detailed procedures for aquatic life standards that do NOT include chlorophyll-a.

DWR 303(d) Response

This is not a comment on the 303(d) list, the assessment methodology, the integrated report, or the category assignment procedure. This comment has been forwarded to DWR Classification and Standards for review and appropriate action.

2. The EMC has not addressed the establishment of procedures for determining 303(d) Assessment Units (AU's). Changes to Assessment Units are not explained and result is an evaluation process that isolates individual monitoring stations rather than aggregating monitoring locations for a more complete representation of the Assessment Unit with larger data sets. Assessments Units are segments of streams, lakes, or estuaries where monitoring data from different stations provide a representative perspective of the quality of a particular waterbody. Determining the geographical extent of AU's can be the deciding factor in attainment or non-attainment of water quality standards. Example: If there are three monitoring stations within an AU and DWR determines that collectively these three stations are attaining water quality standards but individually if one of these locations is not attaining standards then the DWR can subdivide the AU in order to declare this individual sub-segment as an impaired AU. The 2018 Draft Integrated Report for Assessment Unit 27-(96)b1 provides a good example of this dilemma:

Assessment Unit 27-(96)b1 appeared to be previously represented by two station locations- J8290000, and 18570000. Assessment Unit 27-(96)b1 for the 2018 Draft was apparently subdivided into three different Assessment Units as follows:

	<u>AU 27-(96)b1a</u>	<u>AU 27-(96)b1b</u>	<u>AU 27-(96)b1c</u>
Chlorophyll-a	Category 1	Category 3t ND*	Category 1
Copper (3ug/L)	Category 5 ND*	Category 5 ND*	Category 5 ND*
Dissolved Oxygen	Category 3a	Category ? ND*	Category 1
Monitoring Stations	18290000	None	18570000 18570000

*No Data

Based on a close examination of the Assessment Unit Fact Sheets kindly provided by DWR, it appears that no stations are representative of AU27-(96)b1b since no Physical Chemical Data

Summaries 2012-2016 are included. Also note that none of the three divided AU's has any data for Copper. The segmenting of AU 27-(96)bl into three AU's is highly confusing and without explanation. Assessment Units should be considered management units and not constantly changed based on changes in water quality data. Assessment Units should remain as stable as possible. Monitoring locations are established and remain relatively stable. Assessment Units are evaluated for management purposes and should not be changed based on the flux of highly variable water quality parameters. Observed concentration data should be used for Category assignments not constant changes in Assessment Units.

DWR rules are very clear, Designated Uses and Standards determine the assignment of appropriate Stream Classifications. However, for water quality impairment decisions, DWR has continued to alter 303(d) Assessment Units based on the observed data for each assessment period. Altering Assessment Units based on the changing concentrations of observed data is particularly important in Reservoirs and Estuaries. Concentration data is normally variable even in pristine waterbodies. When DWR observes differences in standards attainment at particular stations within an AU, the AU is subdivided where one may be meeting standards and one not meeting standards. Once an AU has been subdivided based on a particular assessment period, the subdivision is not re-combined. This can help to maximize 303(d) listings. Simply put, if DWR continues to promote 303(d) decisions based on single monitoring stations the number of 303(d) impairments will increase. The end result is that the central tendency of a classified water body segment is not used to evaluate impairment. Impairment decisions are made based on limited sampling sites and limited data rather than an assessment of the entire classified portion of the water body. The EMC has not evaluated or approved the current DWR approach to establishing or splitting AU's.

DWR 303(d) Response

This is not a 303(d) comment, but is a comment on the integrated report category assignment procedure. Refer to [DWR Response to Comments on Segmentation](#) provided below in the DWR Responses to Methodology Comments section.

3. The new 303(d) listing methodology no longer requires 90% statistical confidence for listing impaired waters. Waters may be impaired without 90% confidence if infractions of a numeric water quality standard are exceeded in just three or four observations in the last two years of the assessment period. This change in the assessment methodology does not provide a sufficient level of confidence to render the Assessment Unit impaired and subject to TMDL or strenuous management scenarios.

DWR 303(d) Response

This is not a waterbody specific 303(d) comment, but is a comment on the assessment methodology. The beginning statement (i.e. "The new 303(d) listing methodology no longer requires 90% statistical confidence for listing impaired waters") is an over-generalization that can be misleading without context. While there are a handful of cases where 90% confidence is not met for a new listing, the vast majority are listed based on 90% confidence in Exceeding Criteria.

Refer to [DWR 303\(d\) Response to Comments on new listings for waters where there is not 90% confidence \(greater than 10% exceedance, but less than 90% statistical confidence, and more than three exceedances in new data\)](#) provided below in the DWR Responses to Methodology Comments section.

4. Small data sets are problematic for 303(d) listings. Without a sufficient number of samples to characterize an Assessment Unit over time and space the probability of an erroneous assessment for impairment greatly increases. Based on the proposed methodology, it appears that only three observations collected in a short time period (perhaps a single year) that exceed a numeric criteria could place a segment on the impaired waters list without any additional samples being collected within the last five years. Incorporating older data (more than five years old) to meet a ten sample minimum does not help the representative evaluation of current water quality conditions. The public is entitled to a confident scientific and representative evaluation. The concern is the promotion of selective sampling approaches in order to achieve a 303(d) listing rather than the use of representative samples over time and space.

DWR 303(d) Response

This is not a waterbody specific 303(d) comment, but is a comment on the assessment methodology. The commenter did not provide an alternative methodology for consideration that meets the concerns that the state is not applying readily available data in the 303(d) assessment process.

Refer to [DWR Response to Comments on Augmenting Small Datasets](#) provided below in the DWR Responses to Methodology Comments section.

5. Throughout our review of the detailed Integrated Report Fact Sheets impairments for the parameters Nitrogen and Phosphorus were frequently observed. With the exception of water supply waters (N = 10mg/L), NC has no numerical water quality criteria (standards) for nitrogen or phosphorus. Any reference to exceeding criteria for either nitrogen or phosphorus should be removed.

DWR 303(d) Response

The waters in question are not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. In response to this comment, total phosphorus assessments have been removed from the Neuse Estuary AUs because there is not a TMDL for total phosphorus. These parameters are not assessed in Category 5 and are used in the Integrated Report to accurately track the number of TMDLs in NC. The TMDL for total nitrogen is still represented in the Integrated Report.

6. A detailed review of the Draft 2018 Integrated Report Fact Sheets provided by DWR has identified a number of observations that suggest additional DWR staff review is necessary. These technical evaluations are summarized below:

Review DWR Draft 2018 IR as of December 2018

27-(96)ba

From Bachelor Creek to a line across the river from Renny Creek to 0.5 miles north of Mills Br. Appears to be a new 3 way AU Split from previous Segment 27-(96)b1. No explanations for this split in AU's is provided.

Issue Notes :

- Conflict in Dissolved Oxygen listing Category 3 or Category 5?
- Fact Sheet@ top Data Inconclusive> 10% and >90 conf Dissolved Oxygen (5 mg/l, AL, SW) 3a

- Fact Sheet Indicates Changes from 2016 assessment - New Category 5 For Dissolved Oxygen (5 mg/l)

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. See response below for 27-(96)b1c.

27-(96)b1b NEUSE RIVER Estuary

From a line across the river from Renny Creek to 0.5 miles north of Mills Branch to a line across the river from Jack Smith Creek to 0.5 miles south of Mills Branch

Appears to be a new 3 way AU Split from previous Segment 27-(96)b1. No explanations for this split in AU's is provided.

Issue Notes:

- 2018 Draft Water Quality Assessment Chlorophyll has no assessment listed.
- However, 2018 Draft Category Changes from 2016 Assessment New IR category for chlorophyll 3t but says parameter is meeting criteria.
- No Physical Chemical Data Summaries for stations 2012-2016

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. See response below for 27-(96)b1c.

27-(96)b1c NEUSE RIVER Estuary

From a line across the river from Jack Smith Creek to 0.5 miles south of Mills Branch to Trent River.

Appears to be a new 3-way AU Split from previous Segment 27-(96)b1 Reason unclear. No explanations for this split in AU's is provided.

Issue Notes:

- Fact Sheets should be checked closely as station locations are duplicated and a count of 105 suggests an unrealistic monitoring frequency. Previous station locations from NCSU CAEE and UNC IMS are not apparent -JA112, RRI, UNC IMS 30, J8290000, J8570000
- Physical Chemical Data Summaries for stations 2012-2016 are listed as follows:

<u>Station#</u>	<u>Location</u>	<u>Count</u>	<u>#obs>40</u>	<u>%obs>40</u>	<u>%Confid</u>
J8570000	Neuse R 0.5 mi ups Union Point NB	53	3	9.4%	8.9%
J8570000	Neuse R 0.5 mi ups Union Point NB	105	5	4.7%	1.6%
Dissolved Oxygen (5 mg/L) as follows					
<u>Station#</u>	<u>Location</u>	<u>Count</u>	<u>#obs<5</u>	<u>%obs<5</u>	<u>%Confid</u>
J8570000	Neuse R 0.5 mi ups Union Point NB	53	5	9.4%	38%

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. These AUs were split in 2016 due to differing assessment results for Dissolved Oxygen and Chlorophyll a. The Total Copper assessment is legacy- refer to [DWR Response to Delisting Total Metals](#) provided below in the DWR Responses to Methodology Comments section. Station J8570000 includes data from NC and MODMON. The n = 53 from NC is included in the reassessment with MODMON data. DWR will work to clarify presentation of co-located station data from multiple agencies. CAEE data (only data for b1b)

were not submitted for 2018 assessment, but will be included for the 2020 assessment. The legacy metals assessment and Category 3a assessment for Chlorophyll a were carried forward to 2018.

27-(96)b2 NEUSE RIVER Estuary

From Trent River to a line across Neuse River from Johnson Point to McCotter Point (part of upper model segment) Draft 2018 Status Exceeding Criteria Chlorophyll a (40 µg/l, AL, NC) 4i

Issue Notes:

- Fact Sheets should be checked closely as station location is duplicated and a count of 104 suggests an unrealistic monitoring frequency for DWR station. Suspect Station might be UNC IMS Station SO perhaps 105 observations. Site called Neuse R CM 15 nr Riverdale.
- No data for NCSU CAEE JA115 or JA116

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. MODMON data were combined with the 53 DWR samples for a combined total of 104 observations. DWR will work to clarify presentation of co-located station data from multiple agencies.

27-(104)a1 Neuse River Estuary

From a line across Neuse River from Johnson Point to McCotter Point to a line across the river from 0.6 miles north of Otter Creek and 0.7 miles south of Goose Creek

Appears to be a new AU Split from previous Segment 27-(104)a Reason unclear No explanations for this split in AU's is provided.

Issue Notes:

- Fact Sheets indicate exceeding criteria for Phosphorus and Nitrogen - no WQS criteria
- Fact Sheets from previously combined Segment 27-(104)a included JA110, JA102, JA103, JA105, JA108, UNC 70, J8902500, J8910000. It is unclear how these locations have been distributed or deleted.
- Fact Sheets should be checked closely as station location is not correct- a count of 105 suggests an unrealistic monitoring frequency for DWR station. Suspect Station might be UNC IMS Station 70 perhaps 105 observations.

<u>Station #</u>	<u>Location</u>	<u>Count</u>	<u>#obs>40</u>	<u>%obs>40</u>	<u>%Confid</u>
J8902500	Neuse River at CM 2 at Mouth of Broad Cr	50	17	34%	99%
J8903600	This Station is unknown	105	24	23%	99%

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. 27-(104)a was split in the 2016 assessment. Assessment results for Chlorophyll a were different with a1 Exceeding Criteria and a2 Data Inconclusive. Both AUs are now Exceeding Criteria for Chlorophyll a. J8903600 is a MODMON station MM70.

27-(104)a2 NEUSE RIVER Estuary

From a line across the river from 0.6 miles north of Otter Creek and 0.7 miles south of Goose Creek to 0.5 miles upstream of Beard Creek. Appears to be a new AU Split from previous Segment 27-(104)a. No explanations for this split in AU's is provided.

Issue Notes:

- Fact Sheets indicate exceeding criteria for Phosphorus and Nitrogen - no WQS criteria
- Fact Sheets from previously combined Segment 27-(104)a included JA110, JA102, JA103, JA105, JA108, UNC 70, J8902500, J8910000. It is unclear how these locations have been distributed or deleted.
- Fact Sheets from previously combined Segment 27-(104)a included JA110, JA102, JA103, JA105, JA108, UNC 70, J8902500, J8910000. It is unclear how these locations have been distributed or deleted.

<u>Station #</u>	<u>Location</u>	<u>Count</u>	<u>#obs>40</u>	<u>%obs>40</u>	<u>%Confid</u>
J8910000	NEUSE RIV AT CM 11 NR RIVERDALE	48	13	27%	99%
J8920000	This Station is unknown	1		0%	0%

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. 27-(104)a was split in the 2016 assessment. Assessment results for Chlorophyll a were different with a1 Exceeding Criteria and a2 Data Inconclusive. Both AUs are now Exceeding Criteria for Chlorophyll a. J8920000 is a MODMON station that has been discontinued.

27-(104)b NEUSE RIVER Estuary

From a line across Neuse River from 1.2 miles upstream of Slocum Creek to 0.5 miles upstream of Beard Creek to a line across Neuse River from Wilkinson Point to Cherry Point (bend model segment)

Issue Notes:

- Fact Sheets indicate exceeding criteria for Phosphorus and Nitrogen - no WQS criteria
- Fact Sheets do not offer any information on either: 2018 DRAFT Integrated Reporting Category Changes from 2016 Water Quality Assessment or Physical Chemical Data Summaries 2012-2016 by station
- Consider previous NCSU CAEE JA140, JA100, JA111, JA101, JA107

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. There are no longer active stations in this AU assessment from 2016 was carried forward based on data at stations in the upstream and downstream AUs.

27-(118)a1 NEUSE RIVER Estuary

From a line across Neuse River from Wilkinson Point to Cherry Point to a line across the river From Adams Creek to Wiggins Point (part of lower model segment)

Issue Notes:

- 2018 No Assessment for Chlorophyll
- Fact Sheets do not offer any information on either: 2018 DRAFT Integrated Reporting Category Changes from 2016 Water Quality Assessment or Physical Chemical Data Summaries 2012-2016 by station
- Consider previous NCSU CAEE JA140, JA100, JA111, JA101, JA107
- Previous Assessments may have included J9530000, UNC IMS 120

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. Data from upstream and downstream AUs now being used to assess for Chlorophyll a in Category 4i.

27-(118)a2 NEUSE RIVER Estuary

From a line across Neuse River from Adams Creek to Wiggins Point to Pamlico Sound (mouth of Neuse River described as a line running from Mawpoint to Point of Marsh)

Issue Notes:

- Fact Sheets indicate exceeding criteria for Phosphorus and Nitrogen - no WQS criteria
- Fact Sheets for 2018 Water Quality Assessment for chlorophyll have two conflicting:
 - Exceeding Criteria Chlorophyll a (40 µg/l, AL, NC) 4i
 - Meeting Criteria Chlorophyll a (40 µg/l, AL, NC) 1
- 2018 DRAFT Integrated Reporting Category Changes from 2016 Water Quality Assessment or Physical Chemical Data Summaries 2012-2016 by station
- Physical Chemical Data Summaries 2012-2016 by station do not include UNC IMS 160
- Fact Sheets should be checked closely as station location is duplicated and a count of 105 suggests an unrealistic monitoring frequency for DWR station. Suspect Station might be UNC IMS Station 160 perhaps 105 observations. Site called Neuse River at mouth near Pamlico.

<u>Station#</u>	<u>Location</u>	<u>Count</u>	<u>#obs>40</u>	<u>%obs>40</u>	<u>%Confid</u>
J9810000	Neuse R at CM 7 nr Oriental	47	5	10.6%	48.7%
J9810000	Neuse R at CM 7 nr Oriental	105	13	12.3%	75%
J9930000	Neuse Rat CM NR at mouth nr Pamlico	18	0	0%	0%

DWR 303(d) Response

This water is not on the 303(d) list, this is a comment on the 305(b) component of the Integrated Report. Station J9810000 is MM160. Data were combined to make assessment. This assessment unit will be split in order to reduce the new area Exceeding Criteria for chlorophyll a. Station J9930000 is not in this assessment unit but the data will be used to justify reducing the area Exceeding Criteria so that all of 27-(118)a2 will not be assessed as Exceeding Criteria. In response to these comments, DWR has provided a more detailed review of stations and data directly to the commenter.

Commenter: North Carolina Farm Bureau Federation

The North Carolina Farm Bureau Federation (NCFB) is our state's largest general farm organization, representing the interests of farm and rural people in North Carolina. This letter is to comment on the Draft 2018 303(d) list, the 2018 Integrated Report, and the 2018 Listing and Delisting Methodology. Thank you for the opportunity to provide these comments.

Use of data up to ten years old for listing decisions:

The listing methodology approved in March 2018 allows the use of data up to 10 years old when needed to achieve the minimum sample size of 10. The previous methodology allowed data up to five years old. Allowing data up to 10 years old will lead to non-representative data being used in making listing decisions, and could lead to erroneous listing decisions. In cases where data within the five year assessment period causes concern, DWR should adjust their sampling priorities and use the next assessment period to obtain representative data. This approach would allow listing decisions to be made based on current data without relying on data that can be 10 years old. The EMC should revise the methodology to exclude data more than five years old.

Assessments made with less than 90% statistical confidence:

The 2018 methodology allows a water to be listed where there is greater than 10% exceedance, but less than 90% statistical confidence, and at least 4 excursions in newer data that have previously not been assessed. For waters already on the 303(d) list, it would only require 2 exceedances in the last 2 years to remain listed. In addition to allowing less than 90% confidence, this approach relies on data from the last 2 years, which could be skewed due to a period of drought or heavy precipitation during that time period.

This approach makes it easier for waters to be listed and harder for waters to be delisted. The inclusion of waters on the 303(d) list can have significant economic consequences for the surrounding regulated community. As a result, it is essential that DWR has a high degree of confidence that standards are being violated before listing a waterbody. As with our comments above, additional monitoring during the next two year cycle can increase the statistical significance of the dataset and allow for correct decision making. The EMC should revise the methodology and require a 90% statistical confidence as utilized in the 2016 Assessment Methodology before waters are listed.

DWR 303(d) Response

These are not waterbody specific 303(d) comments, but are comments on the assessment methodology. The commenter did not provide an alternative methodology for consideration that meets the concerns that the state is not applying readily available data in the 303(d) assessment process. Please refer to [DWR 303\(d\) Response to Comments on Augmenting Small Datasets](#) provided below in the DWR Responses to Methodology Comments section.

Also, please refer to [DWR 303\(d\) Response to Comments on new listings for waters where there is not 90% confidence \(greater than 10% exceedance, but less than 90% statistical confidence, and more than three exceedances in new data\)](#) provided below in the DWR Responses to Methodology Comments section.

Commenter: North Carolina Water Quality Association

Please accept the following comments on the draft Section 303(d) list and listing methodology of the North Carolina Department of Environmental Quality (“DEQ”) on behalf of the North Carolina Water Quality Association (“NCWQA”).

The NCWQA comprises public water, sewer, and stormwater utilities throughout North Carolina.

We appreciate the opportunity to comment on the 303(d) list and listing methodology. Our comments are as follows:

Assessment for Toxicants (metals). We understand that DEQ continues to use the binomial method, largely because it allows management of error rates, given the fact that true frequency of criteria exceedances cannot be measured by any finite data set. Determining whether there is a 10% or greater exceedance frequency, at a statistical confidence level of (at least) 90%.

However, it appears that the proposed new procedure adds the following. If >10% exceedance, but <90% confidence, list anyway if ≥ 4 exceedances in newer data (2015-2016). We don’t see anywhere a stated statistical (or other) basis for the ≥ 4 exceedances add-on. In the absence of a real basis for the choice of ≥ 4 , it is an arbitrary and unnecessary change. This is particularly the case given that the list is updated every two years such that a meritorious listing shouldn’t remain unlisted for long.

DWR 303(d) Response

Note that the procedure described above was not adopted or applied for toxicants. DWR continues to work with EPA and other state agencies to resolve the disagreement with regards to toxicants assessment.

This is not a waterbody specific 303(d) comment, but is a comment on the assessment methodology. Please refer to [DWR 303\(d\) Response to Comments on Delisting Methodology for Total Metals](#) provided below in the DWR Responses to Methodology Comments section.

Assessment for Other Pollutants. For similar reasons, we also object to adding the ≥ 4 exceedances point for determining non-toxic impairments.

DWR 303(d) Response

This is not a waterbody specific 303(d) comment, but is a comment on the assessment methodology. Refer to [DWR 303\(d\) Response to Comments on new listings for waters where there is not 90% confidence \(greater than 10% exceedance, but less than 90% statistical confidence, and more than three exceedances in new data\)](#) provided below in the DWR Responses to Methodology Comments section.

Delisting. It appears that where there is currently >10% exceedance, but <90% confidence, the water is delisted if there are fewer than two excursions in the newer data. Moreover, where there is <10% exceedance, the water is delisted if (a) >40% confidence in the <10% exceedance point; or (b) there are fewer than three excursions in the newer data. We do not see a statistical justification for these additional requirements.

DWR 303(d) Response

This is not a waterbody specific 303(d) comment, but is a comment on the assessment methodology. Refer to [DWR 303\(d\) Response to Comments on Delisting Methodology](#) provided below in the DWR Responses to Methodology Comments section.

All Data Used to Support an Actual 303(d) Listing Should Be Available on the Website from the Outset of the Public Comment Period, and New Listings Should Have Fact Sheets. In order to make the public comment period truly meaningful, DEQ must make the data supporting each listing available to the public in a readily accessible format from the outset of the comment period. While the Department has made the data available, there is no discernible way to correlate listed water body sections with the available data. For example, a newly listed Assessment Unit (“AU”) is Buffalo Creek (Kings Mountain Reservoir, which is identified by AU No. 9-53-(2.9)). However, when the underlying data is searched, there is no reference in the spreadsheet to that AU number; the closest is No. 9-53-(5), which is not clearly associated. The availability of data traceable to the specific AUs is critical to allow stakeholders a meaningful opportunity to evaluate DEQ’s available data with an eye toward correcting errors, filling any data gaps, or to collect additional data where more data will better help determine the water body’s true attainment status.

DEQ’s website should also indicate the source and quality of all data provided (i.e., the name of the state agency, private party, etc., that collected the data and certification regarding QA/QC procedures). All such data should be available at the onset of the comment period (if not before – as the data are available).

Finally, underlying information about biological sampling also should be made available, including survey sheets, sampling dates, and any other relevant information (or at least indicate its prompt availability upon request). Additionally, the requisite procedures for biological sampling should be clearly stated, and each survey used for Section 303(d) listing purposes should include a certification that the requirements were followed.

For DEQ to really make public review and comment meaningful, it should prepare an electronic fact sheet for each new listing. The fact sheet should include the following:

1. Summary information about the waterbody or waterbody segment
2. Identify the pollutant(s) of concern
3. Provide a link to the raw data and any associated information (QA/QC, etc.)
4. Explain how the data meet the listing criteria
5. Other appropriate information

Such fact sheets are entirely warranted for impaired waters listings to readily inform interested stakeholders as to the scope and basis for the listing. While we would like to see such fact sheets for all listed waters, we recognize DEQ staff limitations to address prior listings. Nevertheless, given the regulatory significance of impaired waters listings, we urge DEQ to start fact sheet development for waters which will be added (and, perhaps, subtracted) to the 2018 list. We believe the preparation of such fact sheets will play a significant role in enhancing the quality of the listing program and the public’s ability to understand the basis for each listing decision and to provide meaningful input.

The system used by the Missouri Department of Natural Resources to present underlying data for listings in its Section 303(d) list is a good example. See

<https://dnr.mo.gov/env/wpp/waterquality/303d/docs/2018-303d-list-cwc-approved-1-4-2018.pdf>. For each impaired waterbody, an interested person can click on the unique waterbody identification number (WBID) and arrive at a webpage providing the data collected from that waterbody. This organized, concise, and transparent approach fosters meaningful public review of proposed listings/delistings.

DWR 303(d) Response

DWR provided a zip file on the [Integrated Report website](#) with all data used for assessment during public review. In addition, DWR prepared fact sheets upon request. The North Carolina Water Quality Association did not request any fact sheets during review. DWR appreciates that there needs to be a crosswalk between station numbers and associated assessment units and will prepare a crosswalk moving forward.

DEQ Should Explain its Treatment of Non-Quantified Data. We are unclear whether DEQ uses any data which are found to be below applicable quantitation levels. We believe that data below practical quantitation limits should be assigned values of “0” for listing purposes. We would like to know what DEQ’s procedure is in relation to such data.

DWR 303(d) Response

Data that are assigned a non-detect qualifier are not counted as an excursion, even when the detection limit is above the standard. This occurs in rare cases. DWR will clarify this in the [Table of Data Qualifiers](#) referenced in the assessment methodology.

DEQ Should Consider the SAC’s Recommendation on Chlorophyll-*a*. Although we recognize that the chlorophyll-*a* criteria is established in the North Carolina Administrative Code (*see, e.g.,* 15A NCAC 02B § .0211) as being not greater than 40 µg/L for lakes, reservoirs, and other waters (except when designated as trout waters, where the criteria is not greater than 15 µg/L), we wish to remind DEQ that this criteria was intended to be applied as a seasonal/annual geometric mean rather than a never-to-be-exceeded value. Chlorophyll-*a* is an eutrophication indicator, not itself a toxics criteria, and should not be treated as a hard threshold regarding impairment. Finally, before making any further lake impairment decisions, DEQ should consider the recent conclusions and unanimous recommendation of the Scientific Advisory Council on the High Rock Lake pilot chlorophyll-*a* criteria. Those criteria have a magnitude of 35 µg/L, based on a multi-year average of the geometric mean from April to October.

DWR 303(d) Response

DWR remains active in the development of numeric nutrient criteria. The recommendation mentioned above has not been put forth as a proposed new criteria as of yet, the proposal is still in developmental stages. It would be premature to base any 303(d) decisions on the work within the Science Advisory Council.

Commenter: Southern Environmental Law Center

On behalf of MountainTrue, the French Broad Riverkeeper, the Green Riverkeeper, the Broad River Alliance, and the Catawba Riverkeeper, we are submitting comments on North Carolina's draft 2018 §303(d) list of impaired waters. The proper identification of impaired waters is essential to improving the quality, and preserving the best use, of the State's waters. Accurately identifying waterbodies where water quality standards are not attained also enables the State to prioritize its limited resources for remediating impaired waters. Once waters are identified as impaired pursuant to Section 303(d), the Clean Water Act requires the state to establish a total maximum daily load (TMDL) to limit the presence of the pollutant or pollutants that cause the impairment.¹

SELC has previously commented on the methodology used by DWR in recent years in evaluating whether impaired waters should remain on the state's list of impaired waters.² We continue to have concerns with DWR's approach to removing rivers and streams where water quality violations continue or the underlying impairment has not been addressed. These comments focus on particular waterbody segments.

In contrast to situations where water quality has improved in response to remedial action or imposition of a TMDL, here, the delistings stem from errors in delisting approach and gaps in ambient data monitoring that DWR uses to make listing decisions. Because DWR has not demonstrated that the original environmental circumstances that led to the listing of these waterbodies have changed, these impaired segments must remain on the State's 303(d) list. In addition, we suggest new additions to the draft 2018 §303(d) list based on observations and sampling, including DEQ's own enforcement activities, that confirm degradation of other stream segments in our region.

A. The Following Segments Should Not Be Removed From the Impaired List

Segments of the following waterbodies are on the State's 2016 list of impaired waters, as approved by EPA,³ and are now proposed for delisting in the State's 2018 list of impaired waters: the North Toe River; the French Broad River; the Nolichucky River; and Irwin Creek. In each instance, the delisting proposal is unsupported by data warranting removal of the relevant river segments from the State's list of impaired waters.⁴

North Toe River 7-2-(21.5) and (27.7) – Turbidity

Both segments of the North Toe River listed for turbidity are downstream of industrial activities that discharge waste from quartz mining and processing in the region.⁵ The lower segment, from Grassy

¹ 33 U.S.C. § 1313(d)(1)(C).

² See Comments from SELC to DEQ North Carolina's Draft 2016 §303(d) List (Mar. 29, 2016), available at <https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2016/Comments%20Received.pdf>; also Comments from SELC to DEQ re "North Carolina's Draft 2014 §303(d) List" (Mar. 14, 2014), available at <https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2014/Combined%20Comments%203.17.14.pdf>

³ See EPA's Partial Approval of the State of North Carolina's 2016 303(d) List Submittal (Dec. 8, 2016), at https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2016/NC2016_303dDecisionPackage20161208%20%28003%29.pdf.

⁴ See 40 C.F.R. § 130.7(b)(6)(iv) (The State must "demonstrate good cause for not including a water or waters on the list.")

⁵ See, e.g., NPDES Permit No. NC0000353, NPDES Permit No. 0000400, NPDES Permit No. 0000175, NPDES Permit No.0000361, NPDES Permit No.0084620. Each of the industrial discharge permits recognize total suspended solids as sources of pollution.

Creek to South Toe River (27.7), has been listed since at least 2006, and the upper segment, from a point 0.2 miles upstream of Pyatt Creek to a point 0.5 miles upstream of U.S. Hwy. 19E, has been listed since at least 2008.⁶ There is no TMDL in place on the North Toe to address persistent turbidity problems.

In the 2018 draft, DWR proposes to remove both segments from impairment (category 5) and re-categorize them under 3a, an indication that data to determine attainment status is unavailable. In both instances, DWR's ambient data is available and indicates both segments have exceeded turbidity standards in the five-year window DWR considers relevant. Although exceedances persist, DWR's application of its delisting procedure leads the agency to conclude, in error, these segments can be removed from the 303(d) list.

EPA has already rejected the agency's approach. As recently as 2016, DWR attempted to remove the upper portion of the North Toe River from the 303(d) list, under the assumption that the turbidity exceedances in ambient data did not meet its listing criteria of 10 percent exceedance with a 90 percent level of confidence. EPA noted, in applying this statistical method to *delistings* (as opposed to listings), that for the North Toe River, a maximum of three exceedances would be allowed out of 55 sampling events, if the state appropriately adhered to its 90 percent confidence method.⁷ Because the number of exceedances for turbidity in the North Toe River exceeded the maximum allowable exceedances level of three out of 55 events, EPA added the North Toe River segment back to the final, approved list, based on "failure to demonstrate good cause to delist." Appx. C – EPA's North Carolina 2016 303(d) List Decision Document (Att. A); *see also* 40 C.F.R. § 130.7(b)(6)(iv) (requiring a demonstration of "good cause for not including a water or waters on the list").

Here again, the sample size for both segments of the North Toe River is 55 events. In both instances, the agency's own data indicates the number of exceedances is greater than 3 events – the maximum allowable to adhere to a 90 percent confidence level for delisting (which EPA found acceptable). *See* Appx. C – EPA's North Carolina 2016 303(d) List Decision Document, "The EPA's Analysis of the State's Use of Nonparametric Procedure for Delisting" (Att. A). Between 2012 and 2016, DWR's ambient monitoring recorded five violations of turbidity for the upper segment and four violations for the lower segment. In both instances, the number of recorded exceedances is again greater than the allowable limit that would satisfy good cause for delisting. Both segments must remain on the impaired list.

To the extent DWR relies on an Environmental Management Commission ("EMC") policy⁸ for delistings with only 40 percent confidence, we note this is at odds with EPA's prior finding on application of statistical confidence levels for listings and delistings. Even if that were not the case, the report the EMC relies upon for its recent delisting policy would require 90 percent confidence: authors observe "any statistical conclusion that has a confidence level of less than 90% is considered not acceptable by most statistics practitioners."⁹⁹

⁶ *See* https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2014/2014_303dlist.pdf.

⁷ The calculation stems from correct application of a delisting procedure, which reverses the null hypothesis and results in a delisting procedure that ensures 90 percent confidence for delisting, consistent with that supported by EPA, as described in the attached Appx. C – EPA's N.C. 2016 303(d) List Decision Document (Att. A).

⁸ *E.g.*, 2018 303(d) Listing and Delisting Methodology (Mar. 8, 2018), at https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2018/2018%20Listing%20Methodology_ApprovedMarch2018.pdf.

⁹ Pi-Erh Lin et al., *A Nonparametric Procedure for Listing and Delisting Impaired Waters Based on Criterion Exceedances* 16 (2000).

In addition, additional water quality data collected by the French Broad Riverkeeper confirms the North Toe River, in reality, remains impaired for turbidity.¹⁰ Submitted with these comments is a table of sampling for turbidity in multiple locations between upstream of Grassy Creek (the upstream location of impairment) and Penland Bridge (the ambient monitoring station) in the North Toe River from 2015–2018. Att. B. On three dates within the window DWR views as relevant to the draft 2018 list, over ten instream exceedances were measured in the North Toe River in proximity to the lower stream segment, ranging from 23.4 NTU to 955 NTU – including two samples that were too high to register on a turbidometer. Many exceedances recorded by the French Broad Riverkeeper far exceeded the State’s own ambient monitoring data.

This points to another problem: the State’s failure to collect ambient data when impairment is occurring for a parameter like turbidity. The State’s own ambient data for the North Toe River illustrates the problem. Ambient data for turbidity is collected by grab sample on a monthly basis, under the state’s QAPP.¹¹ “Bad weather” is listed among reasons to delay sampling. *Id.* Through 2014, DWR reported data about precipitation in the previous 24 hours in the North Toe River. During that period, every reported exceedance of the turbidity standard occurred following a rain event.¹² But the State only gathered data following such a rain event about 20 percent of the time. The “monthly” sampling itself is also highly variable – occurring anywhere from 12 days to 2.5 months apart.¹³ An ambient monitoring program at subjective intervals and under conditions that avoid “bad weather,” in a region relatively prone to rainfall, is likely to under-record exceedances for pollutants like turbidity, which typically intensifies following rainfall that causes increased sediment discharges.

The French Broad Riverkeeper’s monitoring confirms, on the other hand, that exceedances in the North Toe River are not only ongoing, but extreme. The doubt is not in whether the river is impaired, but in any monitoring protocol that leads to the contrary conclusion. DWR must keep the North Toe River on the impaired list of waters until it can demonstrate with defensible data that the river is not impaired. If the North Toe River is not impaired for turbidity, it is unclear what waterbody would be.

And the excursions of State water quality criteria are not just numeric. Attached with the data are photos of the North Toe River during sampling and a statement describing conditions in September 2015. *See* Photographs and Statement of S. Evans (Att. C and D). The river is not just turbid, but an unnatural chalky white color – almost certainly attributable to mining waste in the river. Deposits have piled up in places at the river’s edge, and the river had a caustic, chemical odor to paddlers. *See id.* These conditions, at a minimum, also violate 2B.0211 (12) (odor and deleterious substances).

¹⁰ In evaluating “all existing and readily available water-quality related data,” federal regulations require states to consider, at a minimum: “Waters for which water quality problems have been reported by ... members of the public These organizations and groups should be actively solicited for research they may be conducting or reporting.” 40 C.F.R. § 130.7.

¹¹ DEQ, DWR, Ambient Monitoring System (AMS) Program Quality Assurance Project Plan § 2.1.3 (Feb. 2017) <https://files.nc.gov/ncdeq/Water%20Quality/Environmental%20Sciences/ECO/AMS%20QAPP/2017%20AMS%20QAPP%20Master%20Updated%20Final%20With%20Appendices.pdf>.

¹² *See* data available at https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2018/2018_IR_Data.zip.

¹³ For example, DEQ sampled on Mar. 1, 2012, and again on Mar. 13, 2012; in contrast DEQ sampled on Dec. 11, 2013, and not again until Feb. 25, 2014.



September 29, 2015 – North Toe River, just below mouth of Little Bear Creek

DWR 303(d) Response

No third-party data were submitted for assessment purposes for these Assessment Units. DWR staff have been in contact with the commenter to explain the process to submit data. Data submitted for 303(d) assessments must be publicly reviewed, which is why it is essential that data are submitted before the 303(d) list goes out for public comment.

Data review for both AUs indicate that the frequency of turbidity excursions has been reduced to less than 10%. Both assessments have been moved to Category 3a Data Inconclusive (note that this does not mean data unavailable). In all previous assessment methods these assessments would have been delisted to Meeting Criteria.

Also, please refer to [DWR 303\(d\) Response to Comments on Delisting Methodology](#) provided below in the DWR Responses to Methodology Comments section.

North Toe River 7-2-(21.5) – Copper

Segment 7-2-(21.5) of the North Toe River is listed under category 5e¹⁴ as impaired for copper on the State's 2016 impaired list of waters, and has remained on the list since 2008.

DWR proposes to move this segment to category 3a, based on a finding that data is insufficient to determine attainment status. Again, DWR's data does not support delisting this segment of the North Toe for copper. DWR's ambient monitoring data includes only nine monitoring events for dissolved copper, in 2015 and 2016.

¹⁴ 5e means the segment has been added to the State's list of impaired waters by EPA. See 2018 Integrated Report Category Assignment Procedure, North Carolina, <https://files.nc.gov/ncdeq/Water%20Quality/Planning/IR- Assessment-Process-2018.pdf>.

EPA has rejected once already DWR's prior attempt to remove this segment of the North Toe River from the list of impaired waters for copper, based upon insufficient data.¹⁵ In 2012, EPA warned against relying on small samples sizes, which "can leave a truly impaired water off the list." Responsiveness Summary to Comments Regarding the EPA's August 16, 2012 Action to Add a Water to North Carolina's 2012 Section 303(d) List (Att. E). For toxics, like copper, EPA warned an excursion should not exceed a one-in-three-year frequency criteria. *See id.* In conducting an "independent assessment" of attainment of water quality in the North Toe, EPA stated the relevant data included "all existing and readily available water quality-related data." *See id.* at 2; *see also* 40 C.F.R. § 130.7(b)(5) (requiring states to assemble and evaluate all existing and readily available water quality-related data). With no data in the 2012 attainment window (because DWR had suspended monitoring for metals in 2007), EPA then relied on earlier data in determining the North Toe must remain on the impaired list for copper. In 2014, EPA *again* added the North Toe River back to the impaired list of waters when the state *again* tried to remove it, because in reviewing all of the available data, EPA determined one exceedance in three years precluded its removal. *See* EPA's Partial Approval of the State's 2014 303(d) List Submittal (July 31, 2014).

Here, DWR apparently relies on only the most recent sampling for dissolved copper, which is nine sampling events that occurred in the space of less than a year (from September 2015 to July 2016),¹⁶ to propose to remove the North Toe from the impaired list. This small sample set cannot provide good cause to support delisting from category 5. In 2016, EPA made abundantly clear that a minimum of 22 samples with no exceedances would be required to remove impaired waters from the 303(d) list, based on the state's 10 percent exceedance rate and 90 percent confidence rate for listings (appropriately applying the same methodology in reverse to delistings). Att. A. EPA added seven impaired waters back to the State's list based on inadequate sample size for delisting – including this same segment of the North Toe River, but for turbidity. *See* Att E.

EPA also made clear that category 3, for waterbodies with insufficient data, is not where the State places impaired waters that it lacks sufficient data to delist. In other words, insufficient data alone is not "good cause" for delisting. As EPA explained previously, "While Integrated Reporting Category 3 is meant for those waters where there are insufficient available data and information to make a use attainment determination, the 'EPA also expects that waters identified as impaired in the previous reporting cycle will not be placed in Category 3 in the subsequent listing cycle unless the State can demonstrate good cause for doing so.'" Att. E. Here, the State recognizes its data is "insufficient" for its determination; based on that alone, the North Toe River should not be removed from the impaired list for copper.

Finally, sampling for copper from 2015 to 2016 – reported alongside dissolved copper – shows an exceedance of the prior water quality standard (7 ug/L)¹⁷ occurred on Feb. 3, 2016, sampling that

¹⁵ In the 2012 cycle, DWR proposed to remove the North Toe River from the impaired list of waters for copper based on a 9.5 percent exceedance frequency. The EPA's independent assessment determined that the state had failed to adequately demonstrate good cause for delisting. *See* EPA's Partial Approval of the State's 2014 303(d) List Submittal (July 31, 2014), and Appx. C, "Responsiveness Summary to Comments Regarding the EPA's August 16, 2012 Action to Add a Water to North Carolina's 2012 Section 303(d) List," at https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2014/NC_2014%20303%28d%29_finalDecision_Document_07%2031%202014.pdf

¹⁶ *See* data on sampling for metals available here: https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2018/2018_IR_Data.zip.

¹⁷ DEQ's assessment fact sheet for the North Toe references the 7 ug/L standard for category 5 impairment that was in place before North Carolina adopted the dissolved metals standard.

detected 11 ug/L. This confirms, as a practical matter, that elevated copper has been detected in the North Toe, even in recent data.

DWR 303(d) Response:

Refer to [DWR 303\(d\) Response to Comments on Delisting Methodology for Total Metals](#) provided below in the DWR Responses to Methodology Comments section.

Nolichucky – Copper

In 2014, the EPA added the Nolichucky to North Carolina’s 303(d) list, based upon an independent assessment that the Nolichucky exceeded the one-in-three criteria for toxics with copper of the then-applicable standard of 7 µg/L. Now, DWR proposes to remove the Nolichucky from category 5e, indicating it was added by EPA, to 3z1. As an initial matter, category 3z1 under State policy is used “when data are not assessed using an NC water quality standard.”¹⁸ At the same time, DWR proposes to place the Nolichucky in category 1 (attaining standards) for the revised dissolved copper standard.

DWR again relies upon an inadequate sampling size, under EPA’s prior analysis, to remove the Nolichucky from the list of impaired waters for copper. Ambient data posted by DWR lists only nine sampling events occurring between August 2015 and July 2016. For the reasons stated above, this limited sampling is too small of a sample size to support removing the Nolichucky from the impaired list, and to the extent DWR believes the data¹⁹ is insufficient to determine attainment, that too warrants leaving the Nolichucky on the impaired list for copper.

DWR 303(d) Response:

Refer to [DWR 303\(d\) Response to Comments on Delisting Methodology for Total Metals](#) provided below in the DWR Responses to Methodology Comments section.

French Broad River 6-(54.75)b– Fecal Coliform

The French Broad River, from Mud Creek to Highway 146, is listed as impaired for fecal coliform. As a Class B water, this segment of the French Broad River is classified for primary recreation, including “swimming” and “outdoor bathing.” 15A N.C.A.C. 2B .0219 (3)(b) (Class B). Among other things, the segment of the French Broad must meet limits on fecal coliform, which includes requirements: “not to exceed geometric mean of 200/100 ml (MF count) based on at least five consecutive samples examined during any 30-day period and not to exceed 400/100 ml in more than 20 percent of the samples examined during such period.” *Id.*

In the 2016 listing cycle, this segment of the French Broad exceeded the “5 in 30” criteria, resulting in listing on the impaired list under category 5. For 2018, DWR proposes to remove the segment from the 303(d) list and re-assign it to category 1, meeting criteria. However, it appears DWR did not repeat the “5 in 30” monitoring that warranted listing in the first place, to support delisting.²⁰

¹⁸ See 2018 Integrated Report Category Assignment Procedure, North Carolina, available at <https://files.nc.gov/ncdeg/Water%20Quality/Planning/IR-Assessment-Process-2018.pdf>.

¹⁹ The available data appears to include both conventional sampling and sampling for dissolved metals.

²⁰ EMC’s recently adopted delisting policy for fecal coliform appears to embrace this approach, creating an off-ramp for waters impaired under the “5-in-30” fecal coliform criteria in the absence of data that would show attainment with that standard. The effect is a paper exercise to allow delisting of waters that may be continuing to violate the fecal coliform standard. See

Apparently this is because DWR only collects samples once or twice each month under its ambient monitoring protocol.²¹ As DWR itself has suggested, the current ambient monitoring system sampling regime is “not appropriate for determining exceedance of the [“5 in 30”] standard.”²² As EPA observed in 2016, “[t]his means that the data typically collected is not directly used to assess against the water quality standard.”²³

Here, however, this segment is already listed for violating the “5 in 30” standard; even if the limited periodic ambient data actually collected has met the fecal coliform standard, that does not, alone, support removing it from the impaired list for the requirement actually violated.

Furthermore, the proposed delisting of the French Broad segment, without testing to demonstrate attainment with the exceeded standard, underscores that DWR should revisit the way it evaluates bacteria data when assessing recreational use support. Given the foregoing limitations in the agency’s ambient monitoring approach in freshwaters, the 303(d) list may fail to include waters, especially inland, where bacteria levels threaten recreational use.

Finally, data from the French Broad Riverkeeper indicates this portion of the river is not complying with fecal coliform standards. Since 2012 volunteers in summer months have sampled the French Broad for the presence of E. coli at Westfeldt Park, just downstream of the confluence of Mud Creek with the French Broad. In every year, data indicates exceedances of EPA’s recommended safe level for E. coli of 235 E. coli colonies per 100 milliliters of water at least 12% of the time. And the problem appears to be getting worse.²⁴ In 2018, samples failed to meet EPA’s recommended safe level 40% of the time. DWR should be looking for ways to solve this problem, not sweep it under the run through delisting.

DWR 303(d) Response:

Refer to [DWR 303\(d\) Response to Comments on Pathogen Assessment Methodology](#) provided below in the DWR Responses to Methodology Comments section.

Irwin Creek 11-137-1– Lead, Zinc, Copper

Irwin Creek has a long and unfortunate history of contamination. The creek has been on North Carolina’s 303(d) list in some capacity for over 20 years²⁵ and it is subject to at least one TMDL, for fecal coliform.²⁶ In some ways its contamination is not surprising. It has the most industrial watershed in Mecklenburg County, with over 18% of land zoned for industrial uses.²⁷ At least one organization has characterized it

https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2018/2018%20Listing%20Methodology_ApprovedMarch2018.pdf.

²¹ DEQ, DWR, Ambient Monitoring System (AMS) Program Quality Assurance Project Plan § 2.1.2 (Feb. 2017).

²² DEQ, DWR, Ambient Monitoring System (AMS) Program Quality Assurance Project Plan § 1.6.6.2 (Feb. 2017).

²³ EPA’s Partial Approval of the State of North Carolina’s 2016 303(d) List Submittal (Dec. 8, 2016), at 29, available at https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2016/NC2016_303dDecisionPackage20161208%20%28003%29.pdf.

²⁴ A summary of the E. coli data for this segment is available at <https://www.theswimguide.org/beach/4340>. We can provide monitoring results upon request.

²⁵ See 1998 303(d) List at <https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/1998%20303d%20list.pdf>.

²⁶ See <https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/FINAL%20TMDLS/Catawba/MCDEPfecalTMDLfinal.pdf>.

²⁷ See <https://keepingwatch.org/wp-content/uploads/creeks-brochures/Brochure-Individual-Irwin.pdf>.

as “one of the most polluted creeks in the state, partly because of factories.” *Id.* When commenting on contamination in the creek in 2015, DWR staff identified another source of contamination, citing the fact that the creek is “probably underneath a hundred roads.”²⁸ Troublingly, staff then expressed that “it doesn’t seem like you can do much” for the creek and DWR has now proposed to delist it. *Id.*

In 2016, DWR also sought to delist Irwin Creek for lead and zinc but EPA added it back to the list “[b]ased on failure to provide a reasonable method to assess toxic pollutants.” See App. B to N.C. 2016 303(d) List Decision Document.²⁹ Like the North Toe, DWR’s data still does not support delisting this segment for those pollutants. DWR proposes to relist this segment as category 3a indicating DWR has not collected the required number of samples. Without sufficient data there is no justification to remove this stream from category 5.

DWR also plans to delist this segment for copper and relist it under category “3z2.” However, there does not appear to be a “3z2” category.³⁰ Regardless, DWR has not taken the requisite number of samples to justify delisting at a 90% confidence interval, and the samples taken include exceedances of the copper standard. Delisting this segment for copper, lead, and zinc is not justified.

DWR 303(d) Response:

Refer to [DWR 303\(d\) Response to Comments on Delisting Methodology for Total Metals](#) provided below in the DWR Responses to Methodology Comments section.

Charlotte Mecklenburg Stormwater Services data combined with DWR data provide greater than 70% confidence that dissolved metals are Meeting Criteria with only 1 excursion in 30 samples for Copper. All other dissolved metals samples had zero excursions.

B. DWR Should Evaluate the Following Waterbodies for Listing

The proper identification of impaired waters is essential to improving the quality, and preserving the best use, of the State’s waters. Based on impacts, and data that may be available

White Oak Creek 9-29-46

White Oak Creek is a Class C water located in the Broad River Basin, index number 9- 29-46. DWR’s 2018 integrated report lists White Oak Creek as category 1, meeting criteria, for fish communities and benthos.

As early as 2008, however, agency biologists identified sediment as a concern for the White Oak Creek watershed.³¹ Since 2014, DWR records show, the creek and associated unnamed tributaries have been heavily impacted due to construction activities for the Tryon International Equestrian Center (“TIEC”). The earliest Notice of Violation (“NOV”) for the site posted to the Division of Water Quality’s Laserfiche online repository is NOV-2014-PC-0168, from an inspection report conducted on July 29, 2014, which

²⁸ See <https://keepingwatch.org/programming/creeks/irwin-creek>.

²⁹ See https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2016/NC2016_303dDecisionPackage20161208%20%28003%29.pdf.

³⁰ See *supra* note 18. in the files of other divisions, DWR should evaluate listing White Oak Creek and Little Bear Creek for turbidity under Section 303(d).

³¹ See <https://files.nc.gov/ncdeq/Water%20Quality/Planning/BPU/BPU/Broad/Broad%20Basin%20Plans/2008%20Plan/Gr een%20River.pdf>.

documented upwards of 24 inches of sediment deposits in multiple stream reaches, violating water quality standards prohibiting “[o]ils, deleterious substances, colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation or to aquatic life and wildlife or adversely affect the palatability of fish, aesthetic quality or impair the waters for any designated uses” (now codified at 15A N.C.A.C. 2B.0211 (12)). TIEC continued to be chronically in violation after 2014. N.C. DWR staff issued two NOVs in 2015, NOV-2015-PC-0229 and NOV-2015-PC-230, the first of which issued violations for deposited sediment up to 8 inches in stream reaches and the second with sediment deposits in associated stream reaches in excess of 24 inches. In 2016 one NOV was issued, NOV-216-PC-0306, violating water quality standards with sediment deposits up to 11 inches. TIEC continues to create conditions leading to violations of water quality standards in White Oak Creek and the associated unnamed tributaries, with additional violations in 2018 resulting in assessed civil penalties of \$64,437.

In addition to considering its inclusion on the current draft 303(d) list, DWR should ensure monitoring occurs for relevant parameters like turbidity to evaluate the stream’s status for future 303(d) listing cycles. Recent data collected by the Green Riverkeeper confirms multiple exceedances for turbidity in White Oak Creek, including exceedances as high as 999 NTU in September 2018. *See Summary of White Oak Creek monitoring, Att. F.*

DWR 303(d) Response:

Data were not submitted for this AU. Benthos and fish community data collected in 2015 are Meeting Criteria. DWR will reassess this AU when new data are collected after the noted violations.

Little Bear Creek 7-2-45b

Little Bear Creek (Class C, Tr) is a tributary to the North Toe River that runs alongside mining facilities near Spruce Pine, in the French Broad River Basin. Its confluence with the North Toe is upstream of the ambient monitoring station for 7-2-(27.7). DWR’s assessment report for Little Bear Creek lists only one criteria for assessment, benthos, for which the data is “inconclusive” because the stream has not been rated. Ambient monitoring data does not appear to be collected by the state for Little Bear Creek. Recent data collected by the French Broad Riverkeeper, however, confirms multiple exceedances for turbidity in Little Bear Creek, including 721 NTU in 2015, and 755 NTU in 2016. *See Att B. Photographs also confirm mine tailing deposits are visible on the bank where Little Bear Creek joins the North Toe River.*

Therefore, in addition to considering its inclusion on the current draft 303(d) list, DWR should ensure monitoring occurs for relevant parameters like turbidity to evaluate the stream’s status for future 303(d) listing cycles.



Dec. 21, 2018 – Mouth of Little Bear Creek

DWR 303(d) Response:

Data were not submitted for this AU. Benthos and fish community data collected in 2015 are Meeting Criteria. DWR will reassess this AU when new data are collected after the noted violations and evaluate the possibility of collecting additional parameters.

Conclusion

We appreciate the opportunity to comment on the 303(d) list and urge DWR to reconsider the listing proposals above. Please do not hesitate to contact us with questions regarding concerns raised or data provided with these comments. Thank you for your consideration.

Commenter: Sound Rivers

Please accept these comments from Sound Rivers regarding North Carolina's draft 303(d) list and 305(b) report as part of the State's obligations to protect water quality under the Clean Water Act (CWA).

Sound Rivers is a nonprofit organization representing over 3,000 members with a mission to monitor and protect the Neuse and Tar-Pamlico River watersheds covering nearly one quarter of North Carolina, and to preserve the health and beauty of the river basin through environmental justice.

Sound Rivers has also submitted comments, along with other members of the local environmental community, including fellow Waterkeeper Organizations, focused on statewide issues. These comments will be focused on specific segments.

Pigeon House Branch (Neuse)

Pigeon House Branch is a tributary to the Neuse River located in Raleigh. In 2002, DEQ identified a 2.9 mile segment of Pigeon House Branch as impaired by fecal coliform and copper. The State developed a Total Maximum Daily Load designed to achieve a 78% reduction in fecal coliform loading and a 66% reduction in copper loading. EPA approved the TMDL in 2003. We suggest, given the time passed since the TMDL was first approved, that it may be helpful to conduct new sampling for copper, fecal bacteria, and benthic macroinvertebrates to evaluate progress and revize the TMDL as needed. The last benthic macroinvertebrates data used by the state appears to be from 2000 (fact sheet provided by Cam McNutt on 1/17/2019). Lastly, the TMDL identifies the need for continued monitoring, and to evaluate progress.

Continued monitoring of the fecal coliform concentration at multiple water quality sampling points in the watershed is critical in characterizing sources of fecal coliform contamination and documenting future reduction of loading. Monitoring should be expanded to provide water quality information to characterize seasonal trends and refined source identification and delineation. In addition, monitoring efforts should be refined and enhanced in order to characterize dry and wet season base flow conditions (concentrations) and promote selective storm response (hydrograph) characterization. The Storm Water Management Program (see previous page) is a good means for achieving the continued and increased monitoring

Pigeon House Branch TMDL pg 27

This TMDL represents an early phase of a long-term restoration project to reduce fecal coliform and copper loading to acceptable levels (meeting water quality standards) in the Pigeon House Branch watershed. DWQ and the City of Raleigh should evaluate the progress of implementation strategies, and refine the TMDL as necessary, in the next phase (five-year cycle). This will include recommending specific implementation plans for identified problem areas.

Pigeon House Branch TMDL pg 28

DWR 303(d) Response:

Pigeon House Branch 27-33-18 is currently assessed in Category 4 for copper, fecal coliform and benthos. DWR will contact City of Raleigh Stormwater to evaluate the need for more monitoring in the future. The watershed is currently undergoing redevelopment including a future park on Pigeon House Branch. DWR welcomes any assistance in developing a Watershed Action Plan that can be used to guide restoration as

the various land use change projects are underway. Currently DWR does not have staff resources available to develop a plan here in the near future.

Swift Creek (Neuse)

Swift Creek is a tributary to the Neuse River located in Greenville. We understand that the City of Greenville is requesting de-listing of Swift Creek, yet we are not aware of data to support this de-listing. Should data be provided that demonstrates meaningful improvements, and if DEQ is shown a sufficient and clearly enforceable management strategy in place to reduce pollution, Sound Rivers would support re-assignment to Category 4b.

DWR 303(d) Response:

No third-party data were submitted for assessment purposes for these AUs. The state did not receive a request from the City of Greenville to delist. These segments are still included on the 303(d) list.

Jacks Creek (Tar-Pamlico)

This stream is a tributary to a segment of the Pamlico River (Upper Pamlico Segment) that is proposed for inclusion on the 303(d) list for impairments related to pH and dissolved oxygen. Segments of the Pamlico River further downstream and Pamlico Sound are additionally proposed for inclusion on the list for fecal, copper and chlorophyll a impairments. Due to the urbanized nature of Jacks Creek as it flows through the town of Washington, we suggest that DEQ add sampling and evaluate for impairments for fecal coliform, copper, and benthic macroinvertebrates. Like many urbanized creeks, impairment is extremely likely, and Sound Rivers is currently pursuing active restoration efforts through the PS Jones and Washington High School stormwater plans completed by Sound Rivers. Should data demonstrate impairments, Sound Rivers has plans for restoration activities to address those impairments on Jacks Creek.

DWR 303(d) Response:

DWR will work with Sound Rivers to evaluate monitoring and restoration approaches for Jack's Creek.

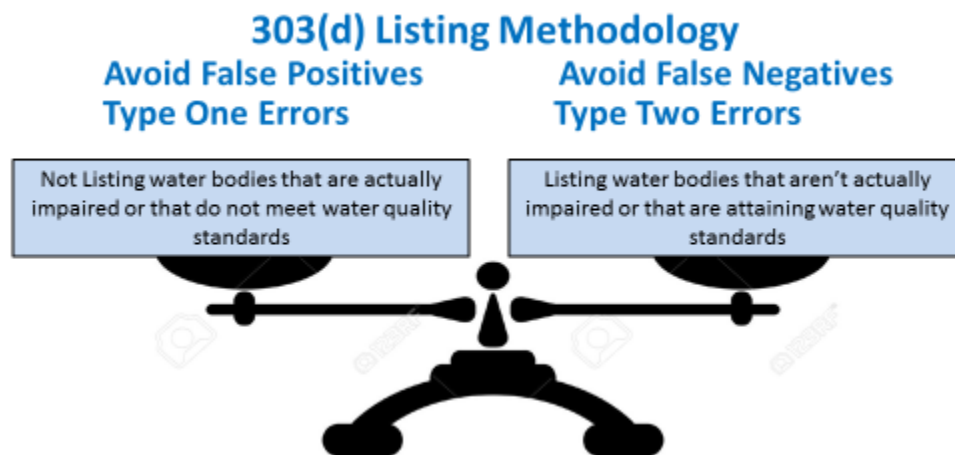
We appreciate the opportunity to provide site-specific recommendations regarding categorization focused on evaluating and improving the water quality in North Carolina. Thank you for considering these issues.

Sincerely,
Forrest English, Pamlico-Tar Riverkeeper Sound Rivers

Commenter: Upper Neuse River Basin Association

UNRBA Comments Concerning November 16, 2018 Public Notice: State of North Carolina Division of Water Resources (DWR) Public Notice of Availability of the DRAFT 2018 303(d) list and Integrated Report

1. The new 2018 methods for numerical assessment make it easier for waters to be placed on the impaired list and will make it more difficult to justify de-listing waters from the 303(d) list. The 2018 methodology functionally removes the previous requirement for a 90% statistical confidence in determining non-attainment of the water quality standards. The EMC should revise the methodology and only place waters on the impaired list if numerical evaluations support a binomial statistical significance of 90% or greater. The 2018 EMC 303(d) Methodology has created an imbalance of potential errors and has skewed the process to favor listing impaired waters. Water bodies that are impaired for their designated uses or in non-attainment of numerical water quality standards should be placed in Category 4 or 5 of the 303(d) list or Integrated Report- but only if there is a high degree of confidence in the numerical assessment. The method of listing and delisting of waters should balance the probability of making listing errors with the clear recognition that the assessment process is repeated every two years. The consequences of the 303(d) decisions on our communities and on our local governments make it absolutely essential that the regulatory agencies and regulated entities alike have a high degree of confidence that actual water quality problems exist (and are not temporary) and that waters are removed from the list when water quality improvements are made. These 303(d) decisions require that comprehensive, often technically difficult, and in many cases costly actions are undertaken to address listed waters. Where these actions are appropriate, it is important to undertake regulatory action. However, there should be a high degree of certainty that a water is impaired before these actions are implemented.



The uncertainty of confidently making standards attainment decisions can be reduced with additional targeted monitoring and re-assessment every two years. Type One errors can be minimized with this approach if the methodology is not skewed towards listing waters. The 2018 methodology reduces this balance by diminishing the requirement for a 90% binomial statistical confidence based on the number of samples collected. The 2018 EMC methodology allows waters to be listed without 90% confidence if 4 excursions have occurred in the last two years as provided in the example below:

Number of Observations	Number Obs > Standard	% observations >Standard	% Confidence Exceeded	# Excursions Last two years	2018 Methodology Status
50	6	12%	62%	4	Impaired

The 2018 methodology results in an approach that doesn't require a 90% statistical confidence in determining non-attainment of the water quality standards. The 2018 approach diminishes the importance of a 5 year assessment and prioritizes the most recent 2 years – which conveys a temporary perspective. When applied to waters previously found on the 2016 list, the new 2018 methodology increases this approach towards listing even further as provided in the example below when only 2 excursions occurred in the last two years.

Number of Observations	Number Obs > Standard	% observations >Standard	% Confidence Exceeded	# Excursions Last two years	2018 Methodology Status
50	6	12%	62%	2	Impaired

The assessment period covers 5 years – there is no justification offered for skewing decisions based on the 2 most recent years. Data sets are generally very small, as in the above example, less than 3% of the time period (50 days out of 1825 days -5 years). There is no justification to skew this assessment towards listing based only on the last two years – which further reduces the sample size. The 2018 methodology no longer requires a binomial statistical confidence of 90% before waters are placed on the list.

DWR 303(d) Response:

This is not a waterbody specific 303(d) comment, but is a comment on the assessment methodology. The beginning statement is not an accurate characterization (i.e. “The new 2018 methods for numerical assessment make it easier for waters to be placed on the impaired list and will make it more difficult to justify de-listing waters from the 303(d) list.”). Refer to [DWR 303\(d\) Response to Comments on Delisting Methodology](#) provided below in the DWR Responses to Methodology Comments section.

Also, refer to [DWR 303\(d\) Response to Comments on new listings for waters where there is not 90% confidence \(greater than 10% exceedance, but less than 90% statistical confidence, and more than three exceedances in new data\)](#) provided below.

The state welcomed suggestions on how to address concerns that held up approval of the 2016 303(d) list for over a year (and caused EPA to disapprove the delisting of 17 waterbodies) by receiving public comment on the 2018 303(d) Listing and Delisting Methodology. However, the commenter did not provide an alternative solution for consideration that addresses the concerns.

- 2. The 2018 EMC 303(d) Methodology should be revised with a procedure for the consistent assignment of Water Quality Assessment Units. The UNRBA recommends and urges that Falls Lake AU's should be consistently applied, independent of individual parameter concentrations and based on a priori knowledge - morphometric, and limnologic features consistent with EPA guidance and more consistent with the Falls Lake Rules. Falls Lake, unlike most of NC's waterbodies, has an exceptionally robust assessment of water quality variables. Combined water quality monitoring activities of the UNRBA, NCSU CAEE, City of Durham, City of Raleigh, and the NC DWR has created a uniquely robust data set for Falls Lake. This data richness in combination**

with the conflicting segmentation approach of the Falls Rules establishes sound reasoning for modification of the proposed AU's in the Draft 2018 IR. The current DWR approach of changing AU's based on the highly variable concentration of parameters (# of exceedances) skews the process in favor of impairing waters without any confirmation of impairment to actual designated uses. The overall assessment of waterbodies must be based on looking at scientifically-valid, realistic and consistent segmentation of the waters. Assessments Units (AU's) are segments of streams, lakes, or estuaries where monitoring station attainment or excursions may be consolidated from different stations in order to provide a representative perspective with a larger sample size of the waterbody. Determining the spatial extent of an AU can be the prime factor in attainment or non-attainment of water quality standards because it determines what monitoring data is reviewed for the AU. If every station in an AU is evaluated independently to determine impairment, that is not a reasonable, representative, scientific, decision process. Water quality numerical standards were adopted considering representative sampling. Representative sampling (although not specifically defined) is acknowledged as important in 15A NCAC 02B.

Representative sampling using multiple locations is particularly important for large, slow-moving waterbodies where cross sectional locations demonstrate the high variability of the waterbody. Unlike many other states, DWR's current approach is to evaluate water quality monitoring stations independently. If there are multiple stations in one assessment unit and one station has observed exceedance frequencies of a parameter different from the others (i.e. one could be considered impaired and the others not impaired) then the AU is split into two or more AU's. This approach tends to increase the number of AU's over time and reduces the number of stations included within a particular AU. AU's can also be split or added because new stations have been added. The rules are very clear - Uses are protected through the appropriate establishment of Stream Classifications. Classifications determine the appropriate Water Quality Standards. Unlike the relatively stable stream classifications, DWR changes AU's, not based on classifications, geo-referencing, or morphology, but on the variability of monitoring data for each assessment period – i.e. if individual locations can be assessed as impaired the AU's are changed to accommodate impairment decisions. This moving target (changing Assessment Units) is particularly important for Reservoirs and Estuaries. The result is a one-way change that results in decisions that maximize the number of 303(d) listings. The Falls Lake 303(d) listing process is a dramatic example of this approach and has made determination of compliance with the Falls Lake Rules unnecessarily complicated and inconsistent with the Rules. The 2008 assessment cycle divided Falls Lake into only two AU's. The entire Falls Lake was determined to be impaired for chlorophyll-a based on the evaluation. Every station was not independently evaluated. The entire lake was determined to be impaired even though none of the monitoring locations in the lower lake exceeded the 10% exceedance threshold. Since the 2008 assessment, the number of AU's has increased incrementally to 11 segments in the 2018 Draft IR. Changing AU's based on concentration data from an individual station is not consistent with EPA guidance nor is it consistent with the Falls Lake Nutrient Management Strategy.

Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act (IRG). Page 47

<https://www.epa.gov/sites/production/files/2015-10/documents/2006irg-report.pdf>

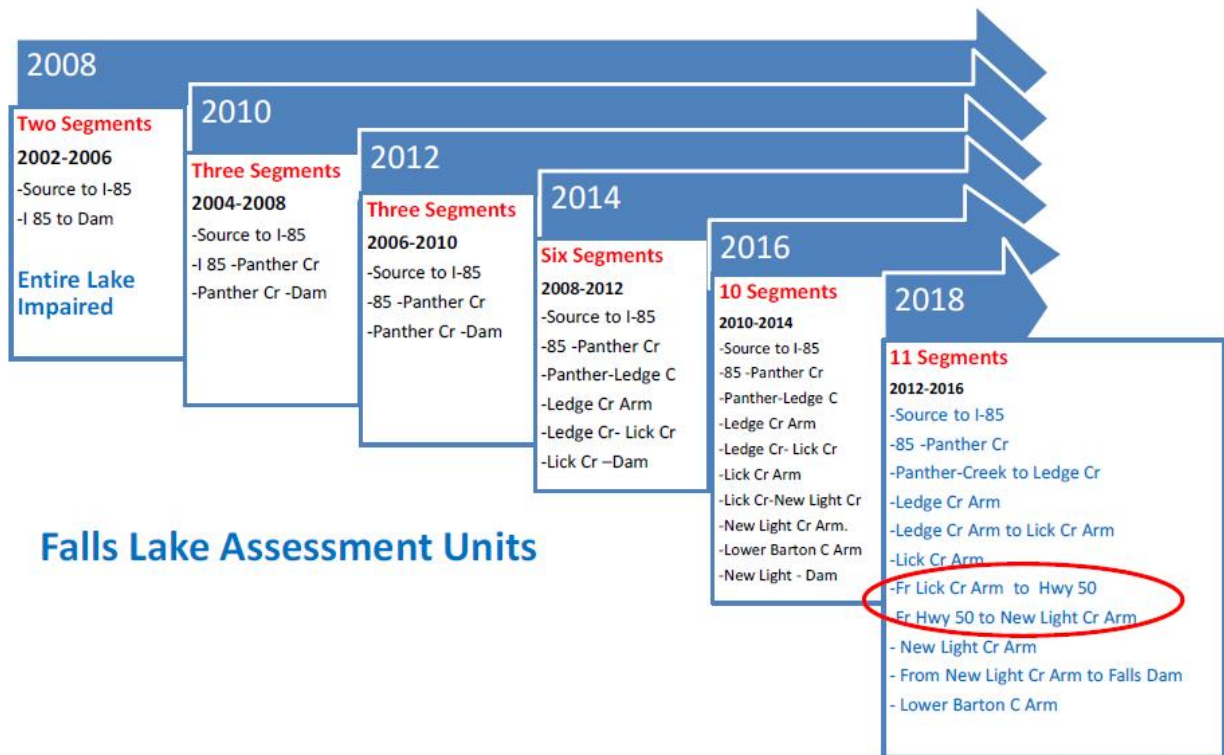
From the EPA Guidance: "Using NHD or other comparable GIS framework, a state should assign a discrete "address" or geo-location to each segment, and document the process used for defining water segments in their methodologies. The physical boundaries (beginning and end points) of a segment should be defined in such a manner that a scientifically valid assessment of each and every segment can be made. The individual

size of a segment will vary based upon methodologies. Segments should, however, be larger than a sampling station but small enough to represent a relatively homogenous parcel of water (with regard to hydrology, land use influences, point and nonpoint source loadings, etc.).”

The current AU division of Falls Lake is not appropriate and results in difficult and often contradictory regulation decisions. The end result is that the central tendency of a classified water body is not used to evaluate impairment. A central tendency evaluation of eutrophication concerns is much more scientifically valid than the single-point, single-value approach that DWR is currently using. A central tendency approach using all the stations within an AU is appropriate for chlorophyll-a, and other nutrient related variables, particularly in lakes, reservoirs, large slow-moving waterbodies and estuaries. This is important because chlorophyll- a is a general indication of trophic status and algal productivity, is variable from site to site, even on the same day and with samples taken in close proximity at the same time. It is much more indicative of general trophic health to use multiple stations within an AU. At a minimum, AU’s should be established based on morphology and sound limnological evaluation as described in the EPA guidance included above. All of the stations within that AU should be evaluated collectively representing the AU. Furthermore, even pristine waterbodies or those that have relatively undeveloped watersheds can have elevated chlorophyll-a values and exhibit chlorophyll-a levels that exceed the current standard. Management strategies for reducing the potential of unacceptable eutrophication impacts may take decades to accomplish. Thus, frequent changes to AU’s based on dynamic changes in parameter concentrations unnecessarily confuses decisions on impairment and further complicates developing consistent regulations, management strategies, and compliance end-point decisions. The current AU approach based on assessment of single stations and then splitting out individual stations that could be impaired results in regulatory decisions that are biased and overly restrictive and greatly diminish the regulated communities understanding and support for management action. For example, the 2018 Draft IR, based on this current methodology, split Falls Lake AU 27-(5.5)b4b into two distinct segments:

27-(5.5)b4b1 Impaired – not meeting the 40ug/L chlorophyll-a criteria
27-(5.5)b4b2 Not Impaired and is meeting the 40ug/L chlorophyll-a criteria

Each of these two new AU’s contain only one station. These locations are approximately 0.25 miles apart. It is inappropriate to split this AU simply to impair station FL50C. It has not been determined if differences in these results can be attributed to differences in the quality of the datasets. If locations NEU019E and FL50C were retained in the same assessment unit the result would be 231 observations with 28 exceeding for 12% and 83% confidence. There were no samples exceeding in the time period 2015-2016 thus the combined locations would yield an assessment of category 3b.



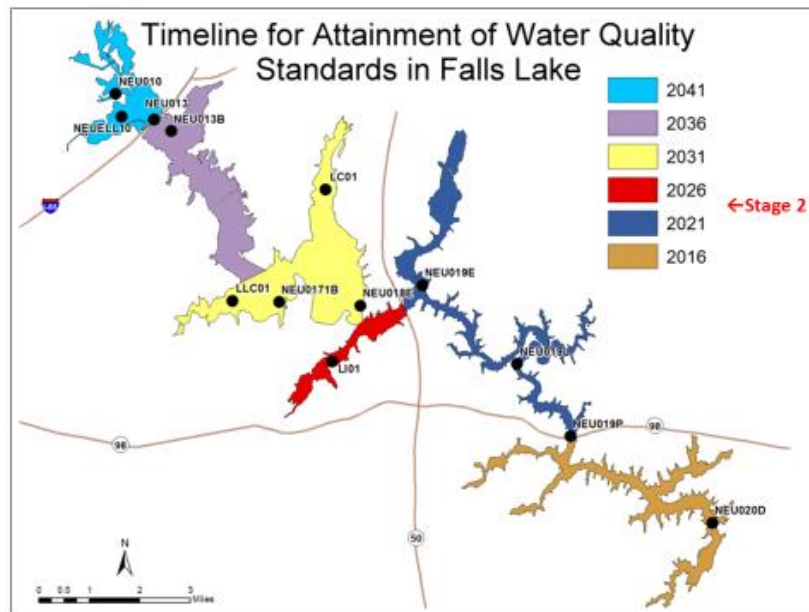
While AU guidance can be interpreted with some variability, the UNRBA supports the guidance provided by the Environmental Protection Agency* in 2006 on the establishment of Assessment Units:

- AU's should be consistent using a rational segmentation and geo-referencing approach.
- AU's should represent homogeneity in physical, biological or chemical conditions.
- AU's should reflect an *a priori* knowledge of factors such as flow, channel morphology, substrate, riparian condition, adjoining land uses, confluence with other waterbodies, and potential sources of pollutant loadings (both point and nonpoint).
- AU's should be larger than a sampling station but small enough to represent a relatively homogenous parcel of water (with regard to hydrology, land use influences, point and nonpoint source loadings).

*See: Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act (IRG). Page 47 - <https://www.epa.gov/sites/production/files/2015-10/documents/2006irg-report.pdf>

In contrast to the overly divided 11 AU segments found in the Draft 2018 IR, the Falls Rules, designed to attain the chlorophyll-a water quality standard, divided the lake into 6 consistent assessment units as depicted below. The UNRBA recommends and urges that Falls Lake AU's should be consistently applied, independent of individual parameter concentrations and based on *a priori* knowledge, morphometric, and limnologic features consistent with EPA guidance. In this manner, individual monitoring stations within an AU can each contribute information and data to a larger sample size more representative of the central tendency of the AU. The current approach of delineating AU's may be appropriate for small, free-flowing streams and rivers because monitoring stations are rarely in close proximity on the same water body. However, applying the current DWR

AU delineation process based on individual stations alone is not appropriate for Falls Lake - one of the most heavily monitored lakes in the country. In regard to the data richness of Falls Lake, the current AU assignment process actually discourages the collection of more data both within the lake and elsewhere. The DWR and the EMC are encouraged to avoid a “one-size-fits-all” approach in the assignment of AU’s for streams, rivers, lakes, reservoirs, and estuaries based on individual station evaluations. This approach is not valid for lakes, reservoirs and estuaries where more data is available and is clearly inappropriate for Falls Lake. AU’s need to be based on the principles identified and advocated in these comments.



DWR 303(d) Response

This is not a waterbody specific 303(d) comment, but is a comment on integrated report category assignment procedure. Refer to [DWR Response to Comments on Segmentation](#) provided below in the DWR Responses to Methodology Comments section. These concerns were first raised in public review of the 2016 303(d) list. DWR recognizes that the UNRBA and other stakeholders are expending significant effort to comply with the Falls Lake Rules, which clearly describes compliance segmentation. Staff have spent a significant amount of resources on this issue and will continue these efforts to reach resolution.

- 3. The 2018 EMC 303(d) Methodology should be changed and should not expand the assessment period from five years to ten years for small data sets to achieve a minimum sample size of 10. This approach only provides potential for listing waters on the basis of outdated data. Rather, the DWR should consider the older data in making a decision to establish additional monitoring priorities for obtaining new data to supplement any small data sets suspected of potential impairment conditions.**

As indicated earlier, Falls Lake has a robust data set and small samples sizes are not usually encountered. However, the UNRBA is very concerned with this change in methodology. Expanding the assessment period to ten years diminishes the representativeness of the sample size. Expanding the assessment period to ten years (in order to obtain 10 samples) is counter to both scientific and statistical practices. Hindcasting for data outside of the assessment period is not justified. If there

are five observations of chlorophyll-a within a five year assessment period your sample size is equal to a representation of five days out of 1,825 days or far less than 1%. Similarly, if you have ten observations of chlorophyll-a within a 10 year assessment period your sample size is equal to a representation of ten days out of 3,650 days, again far less than 1%.

Number of Samples	Assessment Period	Days in Assessment Period	% of Number of days Sampled
5	5 years	1825	0.27%
10	10 years	3650	0.27%

Expanding the Assessment Period for small data sets does not increase the representativeness of the water quality data used for assessment for numerical standards. Expanding the review period to ten years for small data sets in order to obtain 10 samples biases the process toward older data, in either impairing the waters or determining the waters should not be impaired. The conclusion is that small sample sets of numerical standards do not provide an adequate basis for representativeness or confident decisions to impair waters. This lookback approach provides another opportunity to skew the listing process in favor of impairing waters based on expanding the assessment period rather than identifying priorities for additional sampling evaluations. Small data sets with some consideration of older data should be used for screening purposes and for identifying future monitoring priorities.

The UNRBA acknowledges that the 2018 methodology will require a minimum of three exceedances in the current data set (5 years) for inclusion on the 303(d) list. But this also is not a statistically confident binomial approach based on sample size. Rather it could result in a water quality impairment simply because a low flow situation or an abnormal weather period caused the issue and not an actual source-impairment of water quality. Every effort should be made to expand monitoring of these sites of concern to produce an appropriate five-year assessment period. Representative future sampling is a much more reasonable response to these small dataset stations than expanding the period to ten years and requiring 3 exceedances in the current five-year period.

DWR 303(d) Response

This is not a waterbody specific 303(d) comment, but is a comment on the assessment methodology. The commenter did not provide an alternative methodology for consideration that meets the concerns that the state is not applying readily available data in the 303(d) assessment process.

Refer to [DWR 303\(d\) Response to Comments on Augmenting Small Datasets](#) provided below in the DWR Responses to Methodology Comments section.

- The EMC should maintain method consistency and apply the 303(d) numerical methodology established for the 2014 and 2016 listing cycle. The 2018 EMC 303(d) Methodology for evaluating numerical data represents an unnecessarily complex decision tree that implies better evaluations, but in reality, weakens the confidence threshold to well below the 90% used in 2014 and 2016 to list waters as impaired. The UNRBA believes that an assessment methodology that relies on a binomial statistical confidence of 90% is a much better approach than applying an “override” of a few exceedances observed only in the last two years of the assessment. Statistical tests are**

important because they take sample size into consideration in determining the weight of evidence that a water body is impaired.

The UNRBA has reviewed several possible pathways of numerical data assessments using the 2018 303(d) listing methodology. As indicated in the table below, it is our conclusion that the new methodology will result in a much diminished level of confidence in the impairment decision making. Waters that are impaired trigger important and in many cases comprehensive regulatory action. It is reasonable to require a 90% statistical confidence before listing waters. The revised approach for 2018 does not adequately recognize the importance of sample size in the assessment. Nor does it adequately consider duration, frequency, magnitude, and severity.

This provision of the 2018 Methodology does not recognize that even pristine or relatively un-impacted waters can occasionally exhibit elevated or poor monitoring results due to extreme weather events or other natural conditions. The 5 year assessment period represents 1825 days and even with monthly sampling (60 samples) the sample size represents only 3% of the period. Accordingly, there is considerable uncertainty in determining whether waters are/are not meeting standards.

Method Year	Listing Method	Years	Days	# Samples Minimum	Actual # Samples	#Samples > Criteria	% >Criteria	Exceeding Confidence Binomial	303(d) Result	Listing Category
2012	>10%	5	1825	10	10	2	20%	N/A	listed	4 or 5
2102	>10%	5	1825	10	60	7	12%	N/A	listed	4 or 5
2014 & 2016	>10% +90% confidence exceeding	5	1825	10	10	2	20%	74%	not listed	3
2014 & 2016	>10% +90% confidence exceeding	5	1825	10	60	7	12%	60%	not listed	3
2018	>10% + <90% confidence exceeding + 4 obs>in last two years	5	1825	10	10	2	20%	74%	listed**	4 or 5
2018	>10% + <90% confidence exceeding + 4 obs> in last two years	5	1825	10	60	7	12%	60%	listed*	4 or 5

** On 2016 list and two of the samples observed exceeded in last two years

* Not on 2016 list but four of the seven samples observed exceeded in last two years

DWR 303(d) Response

Refer to [DWR 303\(d\) Response to Comments on Delisting Methodology](#) provided below in the DWR Responses to Methodology Comments section. The commenter did not provide an alternative methodology for consideration that meets the concerns that caused EPA to deny delisting of 17 waterbodies and delayed approval of the 2016 303(d) list for over a year.

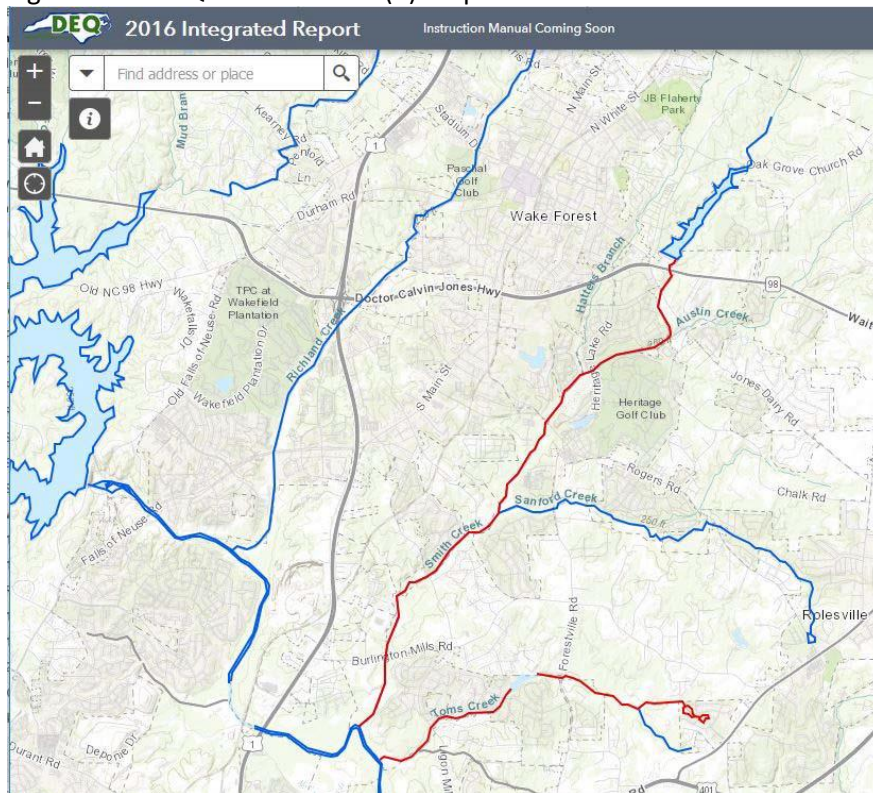
Commenter: WK Dickson

After review of the draft 2018 303(d) list, its supporting documentation and data, I have a number of observations and comments for consideration prior to the submittal of the North Carolina Division of Water Resources' (DWR's) draft 2018 303(d) list to the United States Environmental Protection Agency (EPA). All information presented below is in reference to Smith Creek (AU Number 27-23-(2)).

Observations:

1. Extent of proposed impairment reach described in the 2018 draft list does not match the 2018 draft map:
 - a. The final 2016 303(d) list showed Smith Creek's Assessment Unit (AU) number as 27- 23-(2). Its description was "from dam at Wake Forest Reservoir to Neuse River." DEQ's map showed the extent of impairment as described (Figure 1). Its reason for rating was poor bioclassification, with Benthos based on narrative criteria to protect aquatic life in fresh water (Nar, AL, FW) shown as its parameter of interest.

Figure 1. NCDEQ 2016 Final 303(d) Map



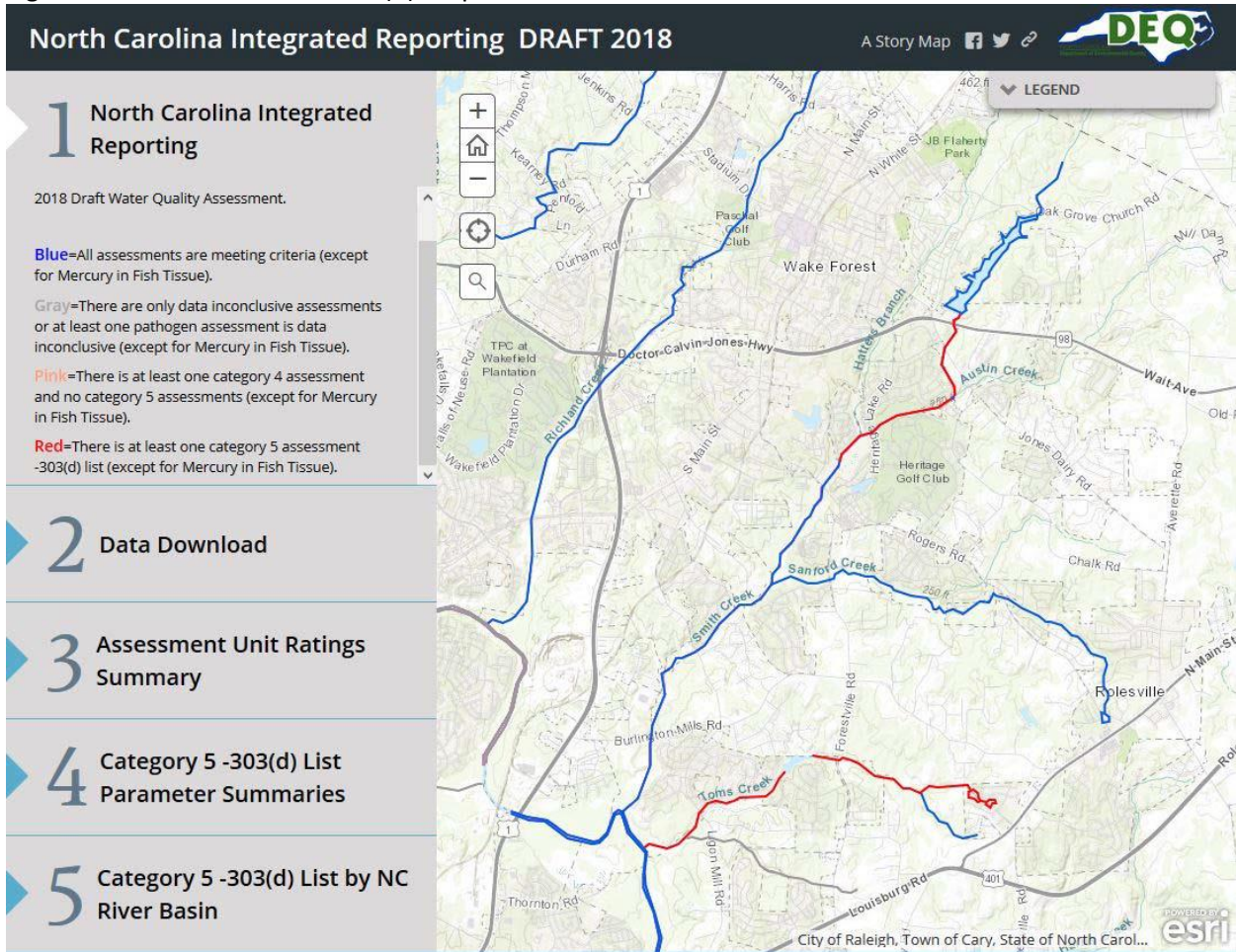
Source:

<https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=e9be6474b041491d8b4c0b77edace6bd>

- b. The draft 2018 303(d) list shows Smith Creek's AU as 27-23-(2)a. Its description is the same as 2016: "from dam at Wake Forest Reservoir to Neuse River." DEQ's 2018 draft map (Figure 2) does not show the extent of impairment as described. Specifically, it shows the impaired

reach (in red) from the Wake Forest Reservoir Dam to a point approximately 2,200 stream feet downstream (southwest) of Heritage Lake Road. It also shows the balance of Smith Creek (downstream from this point to the Neuse River) as supporting (in blue: Figure 2). The 2018 draft map shows the impaired reach's AU the same as the draft 2018 list (i.e. 27-23-(2)a). It shows the supporting reach's AU as 27-23-(2)b. The impaired reach's reason for rating, both on the draft map and in the draft list is "poor bioclassification," with Benthos based on narrative criteria to protect aquatic life in fresh water (Nar, AL, FW) shown as its parameter of interest.

Figure 2. NCDEQ 2018 Draft 303(d) Map

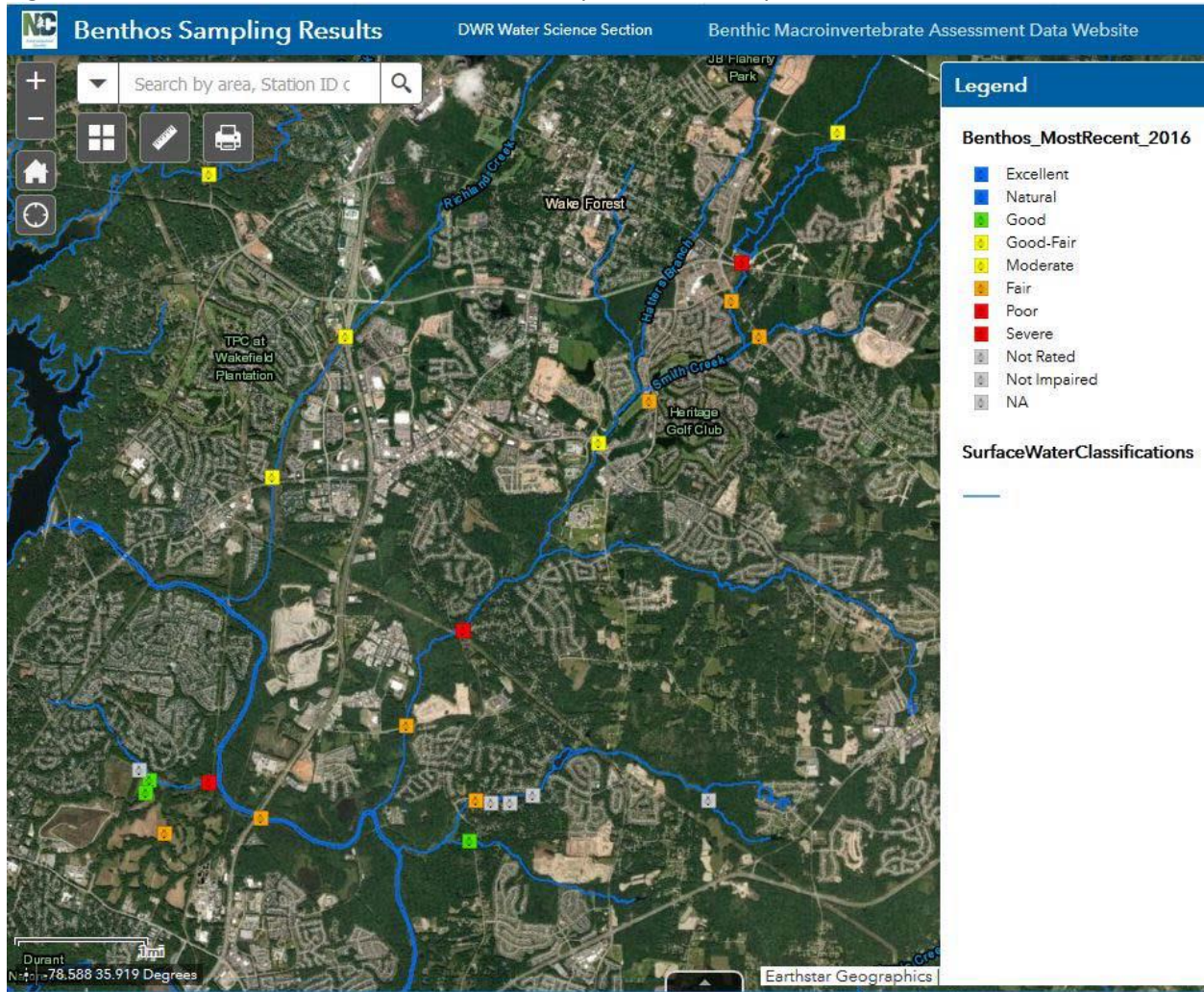


Source:

<https://ncdenr.maps.arcgis.com/apps/MapSeries/index.html?appid=14df5075d8e3437b8476c89c3db3f0a5>

2. Benthic data do not match the impaired reaches described in the draft 2018 list or extents or ratings shown in benthic results map:
 - a. Both the 2018 draft list, as well as the 2018 draft map show the reason for rating as poor and the parameter of interest as Benthos (Nar, AL, FW). The DWR Water Science Section website map shows four sample sites within the impaired reach (AU 27-23-(2)a: Figure 3).

Figure 3. DWR Water Science Section Benthic Sample Location Map



Source:

<https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=8b1c7bf2303740e88fc2d870b054e1bd>

- i. The most recent sample at Site JB344 (31 May 2016), which is located immediately downstream of the Wake Forest Reservoir Dam, is shown with a Fair bioclassification (note that it is shown on the Figure 3 map as having a Poor (red) bioclassification). The site's 1 July 2014 sample's bioclassification was Poor.
- ii. The most recent sample (31 May 2016) at the next site downstream (JB234, located approximately 250 feet downstream from Jones Dairy Road) had a Fair bioclassification. Previous samples' bioclassifications were 1 July 2014: Fair and 25 March 1987: Poor.
- iii. The most recent sample (2 July 2014, the only one recorded/shown) at the next site downstream (JB345, located approximately 350 feet downstream from Heritage Lake Road) also had a Fair bioclassification.
- iv. The most recent sample (2 July 2014, the only one recorded/shown) at the next site downstream (JB346, located approximately 200 feet upstream from Rogers Road) had a Good-Fair bioclassification.

3. Conditions in some of the stream reaches sampled do not reflect conditions within the extent of the impaired reach:
 - a. Benthic Sample Site JB344, as shown in Figure 3, is located between Wake Forest Road and the Wake Forest Reservoir's spillway and normal low flow outfall. In addition to being steep and rocky (both natural and artificial) along approximately the upstream half of this reach, there is significant disturbance and ongoing maintenance throughout. The majority of the balance of Smith Creek's channel downstream of Wake Forest Road, to and including its confluence with the Neuse River, has a sand/silt/gravel-dominated substrate.
 - b. Benthic Sample Site JB345, as shown in Figure 3, is located within a stream reach that was significantly modified, as part of a NC Division of Mitigation Services (DMS, formerly the Ecosystem Enhancement Program (EEP)) project. DMS monitoring reports (<https://deq.nc.gov/about/divisions/mitigation-services/dms-projects>) indicate/document ongoing bed and bank erosion within the reach sampled (Sta 26+00-29+00).
4. The stream reach from Heritage Lake Road, downstream to its confluence with Hatters Branch is not accurately depicted in the both the draft 2018 impaired waters map (Figure 2) or in the benthic sample location map (Figure 3).

Comments:

1. The impaired reach description in the draft 2018 list (AU 27-23-(2)a) should be updated to accurately depict the mapped reach (e.g. From the dam at Wake Forest Reservoir to a point approximately 600 feet upstream from its confluence with Hatters Branch). The supporting reach description (AU 27-23-(2)b) should be similarly adjusted (e.g. From a point approximately 600 feet from its confluence with Hatters Branch to its confluence with the Neuse River).
2. The draft 2018 list's Reason for Rating, as well as the benthic sample location map's depiction should be updated to accurately reflect the most recent benthic results (i.e. changed from Poor to Fair and red to yellow, respectively).
3. Benthic sample sites JB344 and JB345 should be either a) relocated to sites that more accurately represent conditions within Smith Creek, or b) removed from sampling locations used to determine use support.

Thanks for your review of these observations and comments, as well as your ongoing efforts to improve and protect North Carolina's precious natural resources.

Should you have questions, or require further clarification on any point, please call. Sincerely,
WK Dickson & Co., Inc.

DWR 303(d) Response:

DWR worked with the commenter to make the adjustments to the reaches and assure that benthos sites were correctly assigned. Assessment Unit descriptions and map now matching. DWR noted that JB344 should not be used for assessment due to its proximity to the dam. JB345 was used to make the benthic assessment which changed to Fair. A Good-Fair fish community assessment was also added to 27-23-(2)b. The sample site had the incorrect AU number.

Commenter: Yadkin-Pee Dee River Basin Association

The Yadkin-Pee Dee River Basin Association (YPDRBA) appreciates the opportunity to provide comments on the assessment methodology and the draft 303(d) list. The YPDRBA is a coalition of dischargers dedicated to preserving and improving water quality in the Yadkin-Pee Dee River and its tributaries so that they are protected for all of their designated uses. To accomplish this, the association works to:

- Present a collective voice by pooling financial resources and expertise in a sustainable and cost-effective manner;
- Engage members and stakeholders in activities that enhance and preserve water quality in the Yadkin-Pee Dee River Basin (Basin);
- Collect and analyze information and develop, evaluate and implement strategies to reduce, control and manage pollutant discharge; and
- Work in cooperation with stakeholders to provide technical, management, regulatory and legal recommendations regarding the implementation of cost-effective strategies and appropriate effluent limitations on discharges into the Yadkin-Pee Dee River.

The association was formed in 1998 to give dischargers in the Basin a unified voice in dealing with state agencies that affect the Basin and its waters. As such, membership is restricted to entities that hold permits to discharge treated wastewater into the Yadkin/Pee Dee River or its tributaries. Currently there are 29 members -- 25 public and 4 private.

The YPDRBA strongly supports the comments submitted by the NC Water Quality Association (NCWQA) and the Upper Neuse River Basin Association (UNRBA). The YPDRBA has been working with the Division of Water Resources (DWR) for the past 15 years to collect data, develop watershed and lake nutrient response models, and develop a nutrient management strategy for High Rock Lake. While the form and substance of such a strategy is not yet defined, we believe the UNRBA makes an important comment that the assessment units used for the 303(d) listing process should be consistent with management units established by any management strategy.

We also strongly support the work of the North Carolina Division of Water Resources regarding the Nutrient Criteria Development Plan and believe the recent recommendations of the Science Advisory Council regarding pH and chlorophyll-a will provide better approaches for assessing the status of High Rock Lake and other lakes throughout the state. We recognize it is unlikely these recommendations can be used for the 2018 listing; however, we urge staff to move forward expediently so these refined criteria can be used in future listing efforts.

Thank you for considering our comments. Please contact me if you have any questions or require additional information.

DWR 303(d) Response

Thank you for your comments. Please see responses to comments submitted by NCWQA and UNRBA provided above.

DWR Responses to Methodology Comments

DWR 303(d) Response to Comments on Delisting Methodology

The [2018 303\(d\) Listing and Delisting Methodology](#) describes the delisting process that was used in the 2018 assessment. Previous EPA comments were concerned with the lack of a documented delisting process and that confidence in Meeting Criteria was not considered for delisting.

A few commenters included statements that “the state has made it harder to get off the list and easier to get on the list.” This is a misleading statement. The 2018 changes addressed the need to show good cause for delisting (required by (40 CFR 130.7(b)(6)(iv)) and evaluation of readily available data (required by 40 CFR Part 130.7(b)(5)) for small datasets. In fact, by incorporating a delisting process that considers confidence in Meeting Criteria as well as the impact of newer data, the 2018 methodology corrects an imbalance in both of the 2014 and 2016 processes where it was easier to get off the list and harder to get on the list.

In 2014, when the state chose to change to the binomial approach and added statistical confidence, EPA and others cautioned that the state needed to consider both sides of that approach and consider confidence that the waters were Meeting Criteria before delisting. The concern was that the state was not applying the binomial method appropriately because only one side of the equation was considered.

In other words, with the binomial approach as applied in 2014 and 2016, the state was looking for statistical confidence of 90% for listing decisions, meaning there was 90% statistical confidence the water should be listed. But the state was not looking for statistical confidence for delisting decisions, or applying the other side of that equation, which evaluates the confidence that a water is actually Meeting Criteria. As a result, EPA disapproved 17 waters from delisting in 2016 because there was very low statistical confidence that the waters were actually Meeting Criteria, and this was as low as 8%.

In their review of the 2016 303(d) list, EPA’s contention was that the state should use 90% statistical confidence in Meeting Criteria for delisting decisions. The state was able to demonstrate that 90% statistical confidence in Meeting Criteria was not realistic, not necessarily supported by the literature (https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2016/DWRcomments_signed_2-15-17%20303d%20letter.pdf), and, in addition, was not a requirement in other states that apply the binomial method.

The state and EPA held several conference calls to discuss the state’s concerns and EPA agreed to evaluate the approaches of other states where the binomial method is used for assessment. The EPA provided several examples to North Carolina for evaluation. EPA noted that while they would not require 90% statistical confidence in Meeting Criteria as good cause for delisting, the state needed to include a delisting approach in the assessment methodology that considered statistical confidence.

To address the concerns and develop a delisting process, DWR reviewed the delisting strategy for several states that use binomial statistics in assessment as well as performed a thorough analysis of the state’s ambient data to determine natural break points in the data. The end result was a listing and delisting process for 2018 that maintained the overall integrity of the 303(d) listing methodology, but corrected the imbalance between statistical requirements for listing and delisting decisions, and put more

emphasis on more current data for listing decisions rather than older data that might not be reflective of current conditions.

The 2018 303(d) Listing and Delisting Methodology now explicitly considers confidence in Meeting Criteria, whether the water was listed on the previous 303(d) list, and the number of excursions from the last two years of the assessment period. These criteria reduce the number of delistings with low statistical confidence that the assessment is Meeting Criteria. It also considers if the excursions are ongoing in the new data years or that the previous Exceeding Criteria assessment may have been episodic or that water quality improvement projects may have been implemented.

It should be noted that, as mentioned above, the EPA denied delistings for 17 waterbodies in the 2016 303(d) list where there was greater than 10% exceedance but less than 90% statistical confidence. If the 2016 process had included the delisting process used for the 2018 303(d) list, 11 of those waters would have been successfully delisted.

The 2018 assessment approach basically adds up to a weight of confidence (statistical and other) approach to both listing and delisting that addresses concerns of both those who believe NC overlist and those who believe NC underlist and is still able to be implemented by staff and is acceptable to EPA. These changes affect a total of 44 assessments out of 18,807 or 0.24% of all assessments.

DWR 303(d) Response to Comments on Delisting Methodology for Total Metals

The 2018 303(d) Listing and Delisting Methodology does not directly address legacy assessments for total metals that have a new dissolved water quality standard. DWR is delisting Category 5 or 5e assessments for total metals only when current dissolved metals data are available for assessment. Other legacy total metals assessments will be reassessed as dissolved data become available.

In 2018, there were 41 delistings of total metals assessments where dissolved data were assessed in Category 1 or 3, four that remained in Category 5 confirming Exceeding Criteria assessment for dissolved metals, and 1 new listing for dissolved copper.

DWR will work with the Environmental Management Commission to add language to the 2020 303(d) Listing and Delisting Methodology to clarify the process for delisting total metals in cases where there is new dissolved metals data available.

The state continues to work towards resolution of the disagreement between the state and EPA with regards to the appropriate assessment methodology for toxics. It is critical to resolve this issue soon as interest grows to expand dissolved metals monitoring in the state.

DWR 303(d) Response to Comments on Pathogen Indicator Assessment Methodology

The 2018 assessment methodology for pathogen indicators (fecal coliform bacteria) includes a delisting methodology that was not previously published. The listing methodology requires the geometric mean to be greater than 200 or that 20 percent of samples are greater than 400 with samples collected at least 5 times in a 30-day period. DWR uses monthly data to screen sites to determine if either of these criteria may have been exceeded. These sites are then prioritized based on primary recreation status (Class B freshwaters) and some non-class B waters based on complaints and other information. These waters (AUs) are then sampled 5 times in 30 days to assess the standard. Follow up sampling is not part of the protocol due to staff resources. If either criterion are exceeded, the AU is assessed in Category 5 (303d

list). If in subsequent assessment periods the monthly data indicate excursions are ongoing, then follow up sampling is not done, and the assessment remains in Category 5.

Starting in 2018, if monthly data indicate that both parts of the criteria are not being exceeded in the five-year assessment period thus not triggering a follow-up 5 in 30 sampling program then the AU is assessed in Category 1.

There are 669 Fecal Coliform Assessments in the Draft 2018 Integrated Report. There are nine delistings from Category 5 based on assessment of monthly data. There are 105 Category 3 assessments for Fecal Coliform Bacteria that have not had 5 in 30 sampling completed but regularly exceed the geometric mean of 200 or that have greater than 20% of samples exceeding 400 over a five year period. DWR will continue to evaluate how best to sample and assess pathogen indicators in freshwaters.

DWR 303(d) Response to Comments on Augmenting Small Datasets

The EPA has been expressing the concern about North Carolina not evaluating small datasets for 303(d) listing to the state as far back as the early 2000's (e.g. see EPA Approval of the 2008 303(d) List; <https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/EPA%202008%20303d%20Approval.pdf>, page 9). Clean Water Act regulations (40 CFR Part 130.7(b)(5)) require that states use readily available data for 303(d) assessment. The only dataset impacted is through the DWR Ambient Lakes Monitoring program (<https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/intensive-survey-branch/ambient-lakes-monitoring>), which typically only collects five samples every five years from lakes and reservoirs on a rotating schedule. Previous assessment methodologies required a minimum of ten samples in the data window to perform 303(d) assessment. However, resource limitations and focused monitoring efforts in Jordan and Falls Lakes have limited the amount of data that can be collected at other locations.

The [North Carolina 2016 303\(d\) methodology](#) added the following statement: "Older data will not be automatically excluded particularly when its inclusion could be used to augment small sets of more current data." However, although staff recommended several possible approaches to implement an augmentation process, a process was not put into place. As a result, the EPA proposed adding 11 waters to the 2016 303(d) list where there were at least three exceedences in small datasets. However, after communication with the state, EPA did not take final listing action and instead, allowed the state to develop an approach for the 2018 cycle.

The approach adopted for 2018 provides a focused process to expand the data window for small datasets. For datasets with a dataset of less than ten where there were at least three exceedences of an assessed parameter, DWR expanded the data window back an additional five years to 2007 (2007-2016) to augment the dataset. If the dataset was still less than ten after augmenting, the state prioritized these sites for additional monitoring. If the dataset was greater than or equal to ten after augmenting, an assessment was done. The state chose three excursions because if there were ten samples in the current data window (i.e. 2012-2016), the water would be considered impaired. This puts emphasis on the current data to drive the impairment, rather than older augmented data. However, by augmenting and then checking for statistical confidence, the state is confirming impairment of the small dataset.

This approach led to ten waters being added to the 303(d) list in 2018 (seven for chlorophyll-a, two for pH, and one for water temperature). The DWR Modeling and Assessment Branch continues to work with

the DWR Ambient Lakes Monitoring program to limit the number of small datasets as much as possible given available resources.

DWR 303(d) Response to Comments on new listings for waters where there is not 90% confidence (greater than 10% exceedance, but less than 90% statistical confidence, and more than three exceedances in new data)

In general, most water quality assessments result in a determination of Meeting Criteria or Exceeding Criteria. But, there are a few grey areas, including where there is greater than 10% exceedance, but less than 90% statistical confidence in Exceeding Criteria for waters not listed on the previous 303(d) list. DWR added an analysis of new data years to determine if the excursions were due to older or newer data.

During development of this process, staff reviewed ambient data (which is usually monitored monthly) to determine a natural break point in the data. This led to the decision to include the test of greater than three excursions in new data years (i.e. 2015 and 2016 for the 2018 assessment) to determine impairment for a water not on the previous 303(d) list. In a standard monthly dataset (over five years, n=60), four excursions in new data years would equate to a 16.7% exceedance rate.

For the 2018 303(d) list, there were 163 assessments where there was greater than 10% exceedance, but less than 90% confidence and the waters were not on the 2016 303(d) list. It should be noted that prior to the 2014 change to the binomial approach, all 163 of these waters would have been added to the 303(d) list. However, for the 2018 assessment, only 23 had greater than three excursions and were assessed as Exceeding Criteria (five were in Category 4 already with a TMDL and 2 were assessed in 3a due to potential natural conditions for low pH and dissolved oxygen) while 140 were assessed as Data Inconclusive. The majority of the 16 new listings are for turbidity (11), which is a typically noisy parameter. The majority of these waters have been on previous 303(d) lists, although they were not listed in 2016.

The confidence in Meeting Criteria for the waters impacted by this change was below 40% and ranged from 6% - 37%. Confidence in Exceeding Criteria ranged from 45% - 89%. Exceedance rates ranged from 10% – 16%.

It should be noted that there is the potential for cases where there is more frequent data collected and the current methodology could lead to a 303(d) listing decision when, in fact, Exceeding Criteria statistical confidence is low. DWR will evaluate this method for potential modification for the 2020 assessment to address this concern.

DWR Response to Comments on Segmentation

The state currently begins the assessment process by first performing assessment at individual water quality stations for “not to exceed” water quality standards where there is no temporal or spatial averaging component defined. This provides for a consistent, transparent, automated process across the state and is only applied for water quality standards that are written as “not to exceed”. In these cases, individual stations are first assessed independently. If there are differences in the resulting assessment across multiple stations within a single assessment unit (AU), the state will split the AU to reflect the difference in results. For example, if there are two stations in an AU and one station results in Meeting Criteria and one results in Exceeding Criteria, the AU will be split. See section [IV. 305\(b\) Report- Support](#)

[for Current Delineation of Assessment Units](#) above provided by American Rivers, et al. for more information on the history of segmentation changes.

The concept of an assessment unit, as applied to Integrated Reporting, is that it represents an area of similar water quality. If the assessment unit has multiple stations, and assessment results are different across stations, the state will evaluate if the segment should be split. That is, if the finding is that the stations do not have the same assessment result, the assessment unit will be split to reflect the differences.

Differences across stations can be caused by changes in water quality or due to the addition of monitoring stations that change the spatial scale of the assessment. Changes in segmentation are often driven by the addition of third party data. For example, the NC State University Center for Applied Aquatic Ecology submitted third party data for Falls Lake for the 2016 Integrated Report process. One of those stations was on an arm of the lake (Upper Barton Creek Arm) that had not previously been assessed, therefore the original segment included portions of the mainstem and the arm of the lake. Assessment resulted in a determination of Data Inconclusive for the arm of the lake and Meeting Criteria for the mainstem portion. The AU was split due to this difference.

This procedure has been in place since 2004 and was put in place for a number of reasons. These include:

- *Consistent with “not to exceed” standards*
- *Avoids having to impair or rate inconclusive larger areas than necessary*
- *Provides enhanced spatial scale of assessment differences in a reach or reservoir*
- *Can serve as guidance on where to focus restoration efforts*
- *Acknowledges where waters are Meeting Criteria*
- *Acknowledges where there might be localized issues*
- *Adds transparency – these methods are easily reproducible by the public*
- *Avoids having to make arbitrary decisions*
- *Automates the statewide assessment process*

Note that actions taken to address a 303(d) listed water, whether through development of a Total Maximum Daily Load (TMDL), nutrient management strategy, or other TMDL alternative are not in any way impacted by the number of assessment units within a waterbody. Management actions are driven by model results that determine a compliance point (i.e. when standards are met at the compliance point, it is expected that standards would be achieved throughout the waterbody). Progress towards achieving reduction goals is evaluated at the compliance point, not by comparing the number of assessment units or comparing results from one IR to the next. For example, the Neuse Estuary has 17 assessment units, which has grown from 3 when the TMDL was developed in 1990’s, but the compliance point is at Streets Ferry at New Bern for Total Nitrogen. The increase in AUs is due to differences in assessment results for metals, dissolved oxygen, and chlorophyll a. The state evaluates progress towards meeting the Neuse Estuary TMDL reduction goal through trend analysis performed every five years at Fort Barnwell, the closest location to Streets Ferry that is not tidally influenced, not by comparing IR results. The results of the trend analysis are reported in the Neuse Basinwide Plan. The most recent trend analysis results indicate that the 30% Total Nitrogen load reduction has not been met, therefore it is not surprising that there are continuing excursions of the chlorophyll a standard in the estuary.

It should be mentioned that North Carolina is currently in the process of nutrient criteria development, where spatial and temporal context is under consideration with regards to nutrient related standards (see <https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/nutrient-criteria-development-plan>). Any resulting changes to water quality standards that change how segmentation should occur will be addressed through the EMC in future assessment methodologies.

It should also be noted that the Upper Neuse River Basin Association (UNRBA) has submitted comments expressing concern about segmentation procedures specific to Falls Lake. These comments are related to the Integrated Report, Falls Lake specifically, not the 303(d) list, and conversations continue within the Department and the UNRBA to resolve this issue.