February 25, 2022

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Re: Tennessee's Draft 2022 List Of Impaired and Threatened Waters

Dear Mr. Cochran:

Thank you for the opportunity to comment on Tennessee's Draft 2022 List Of Impaired and Threatened Waters . Harpeth Conservancy ("HC") is a science-based conservation organization dedicated to clean water and healthy ecosystems for rivers in Tennessee. Since 1999, the Harpeth Conservancy's mission is to restore and protect clean water and healthy ecosystems for rivers in Tennessee. We employ scientific expertise and collaborative relationships to develop, promote and support broad community stewardship and action.

For this year's draft 303(d) list, HC would like to concentrate on one particular aspect of Tennessee's 303(d) list program, the criteria by which streams are assessed for listing. Additionally, because most of the issues we raised with respect to the 2020 303(d) list remain unresolved, we also offer as comments on the 2022 list those comments we submitted on the 2020 list. A copy of our letter to TDEC dated February 14, 2020, is attached to this letter, and is incorporated by reference. Please respond to those comments at the same time as you respond to our new comments in this letter.

Concern over Listing Criteria

The comments made at the January 11, 2022, public hearing by Mr. Darren Gore of the City of Murfreesboro are of particular concern. Mr. Gore made similar comments in an email dated May 24, 2021, to Ms. April Grippo of TDEC. A copy of Mr. Gore's email and Ms. Grippo's response dated May 26, 2021, are also attached to this letter (and are available on TDEC's dataviewer).[1]

[1] https://dataviewers.tdec.tn.gov/pls/enf_reports/f?p=9034:34051:::::34051:P34051_PERMIT_NUMBER:TN0022586 (accessed Feb. 23, 2022)

At the public hearing, Mr. Gore lamented what he claimed was a lack of consistency and transparency in TDEC's stream assessments. The City complained that TDEC changed its view of whether prior bioassessments in Sinking Creek, the receiving stream for effluent discharges from the City's wastewater treatment plant ("WWTP"), were representative. The City complained about TDEC's current emphasis on reviewing algae activity in the stream, and that DO standards in the stream should be changed because macroinvertebrate levels in the stream were "good." The City also complained that TDEC was imperiling the new, huge Legacy Sports complex for the City by effectively limiting hookups and thus growth.[2]

Apart from the fact that good (and legally-compliant) environmental values and economic growth are not mutually incompatible as those comments seem to imply, the comments raise significant questions about how stream assessments should properly be done. The City's position seems to be that well-established standards such as dissolved oxygen ("DO") levels, should be ignored in determining whether a stream is considered impaired. The City would like TDEC to consider only one parameter -- what it believes are acceptable microinvertebrate ("TMI") scores – to delist various stream segments in order to obtain an NPDES permit for its proposed WWTP.

We are also concerned about TDEC's apparent response or concession to this demand by Murfreesboro to change how streams are assessed. At the January 11, 2022, public hearing, we understood TDEC to say that it is (supposedly) listing rivers for nutrient contamination based on "negative biologic responses" rather than exceedances of regional chemical goals (supposedly to recognize the higher phosphatic content of local geology and better capture what are limiting nutrients). A copy of a slide presented at that hearing is also attached. We have previously noted that TDEC is already mis-using "reference streams" to allow greater pollution of our streams than is justified or acceptable.[3] TDEC should not go further down this road, and indeed should reverse course.

We understand that there are growth pressures in the Murfreesboro area tied to water and sewer availability but manipulating stream assessment methodologies is not the way to solve them. Instead, the issues should be addressed directly.[4]

A determination as important as whether a stream is impaired must be based on good science, as TDEC itself has noted.[5] Good science requires a weight-of evidence approach based on multiple, accepted parameters that have withstood peer-review and the test of time. Murfreesboro's claims simply do not meet these tests. TDEC should reject any demand by Murfreesboro or any other regulated entity to

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[2] *See* https://www.dnj.com/story/news/2021/12/09/legacy-sports-invest-350-million-entertainment-venue-murfreesboro-rutherford-county/6447326001/. The history of spills and overflows at the site currently should not be overlooked either. *See* Thousands of gallons of raw sewage spills onto family's farm in Murfreesboro | News | wsmv.com. (https://www.wsmv.com/news/thousands-of-gallons-of-raw-sewage-spills-onto-familys-farm-in-murfreesboro/article_c3cca8a2-5c00-11e9-bae0-0f5cac643de2.html) (accessed Feb. 24. 2022).

[3] *See* the report of JoAnn Burkholder, Ph.D., Assessment of the Nitrogen and Phosphorus Pollutant Provisions in the Draft NPDES Permit for the Franklin Water Reclamation Facility (City of Franklin, Tennessee), dated 21 November 2016, discussed further below.

[4] *See, e.g.*, https://usace.contentdm.oclc.org/digital/collection/p16021coll7/id/6940/ (accessed Feb. 25, 2022).

[5] *See* the discussion below of Tennessee's "CALM" methodology.

short-circuit the need to do good science or abandon time-tested approaches to assessing pollution levels.

Tennessee's Dissolved Oxygen Standard Serves an Important Protective Purpose

Tennessee's DO standard is of long-standing and for good reason – it protects fish and other aquatic life from changes in water column conditions.

First, Tennessee's standard prohibits dips ("excursions") below five (5.0) mg/L. The standard is not based on daily or other averages, but prohibits all excursions below 5.0 mg/L:

> (3) The criteria for the use of Fish and Aquatic Life are the following.
>
> (a) Dissolved Oxygen - The dissolved oxygen shall not be less than 5.0 mg/l with the following exceptions…. [none of which apply in the case of Sinking Creek].

The standard further notes that:

> Substantial and/or frequent variations in dissolved oxygen levels, including diel fluctuations, are undesirable if caused by man-induced conditions. Diel fluctuations in wadeable streams shall not be substantially different than the fluctuations noted in reference streams in that region.
>
> In lakes and reservoirs, the dissolved oxygen concentrations shall be measured at mid-depth in waters having a total depth of 10 feet or less, and at a depth of five feet in waters having a total depth of greater than 10 feet and shall not be less than 5.0 mg/L.[6]

The reasons for the prohibition against excursions below the 5.0 mg/L standard are well known. As one source puts it with respect to warm water species common to Tennessee:

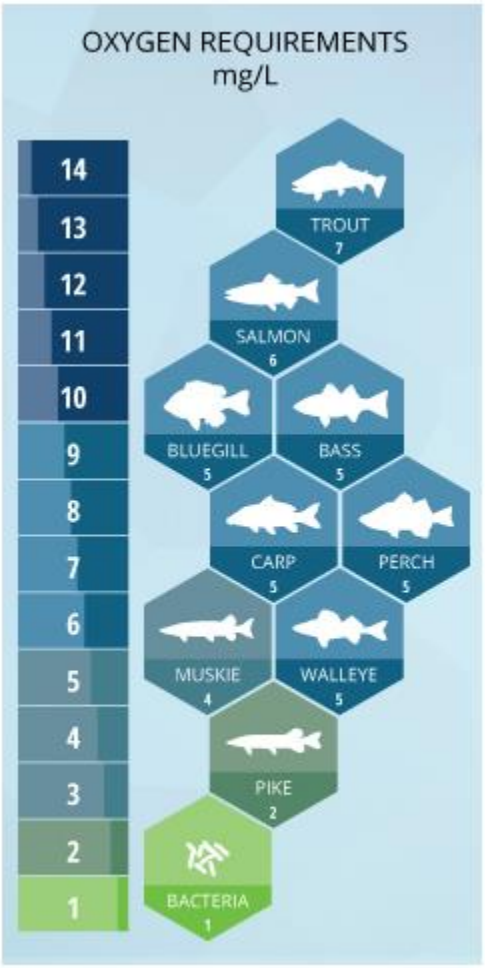
> Bluegill, Largemouth Bass, White Perch, and Yellow Perch are considered warmwater fish and depend on dissolved oxygen levels above 5 mg/L. …The mean DO levels should remain near 5.5 mg/L for optimum growth and survival…. If dissolved oxygen concentrations drop below a certain level, fish mortality rates will rise…. Dissolved oxygen depletion is the most common cause of fish kills. [7]

[6] TN. Comp. R. & Regs, Rule 0400-40-03-.03 (3) (emphasis added).

[7] *See, e.g.*, https://www.fondriest.com/environmental-measurements/parameters/water-quality/dissolved-oxygen/ (Emphasis added.)(accessed Feb. 23, 2022). The source also notes that "They [Bluegill, Largemouth Bass, White Perch, and Yellow Perch] will avoid areas where DO levels are below 3 mg/L, but generally do not begin to suffer fatalities due to oxygen depletion until levels fall below 2 mg/L ."

Of course, in connection with statewide standards, TDEC must consider that other species of fish have much higher oxygen requirements, as illustrated by this simple chart, from the same source:

The association between nutrient pollution such as that from WWTPs and low dissolved oxygen levels is almost too well known to require citation.[8] It is also well known that benthic or microinvertebrate organisms are more tolerant of lower DO levels than even warm water fish.[9] Lowering the permissible threshold for DO to what may be tolerated by benthic organisms simply does not protect animals like fish living higher in the water column, and could cause fish kills, which would be bad publicity for Murfreesboro's reputation and growth aspirations. Therefore, lowering or ignoring the DO standard as the City of Murfreesboro proposes is short-sighted and both bad science and bad environmental and economic policy. TDEC should not entertain any such proposals, either for Sinking Creek or statewide.



Minimum dissolved oxygen requirements of freshwater fish

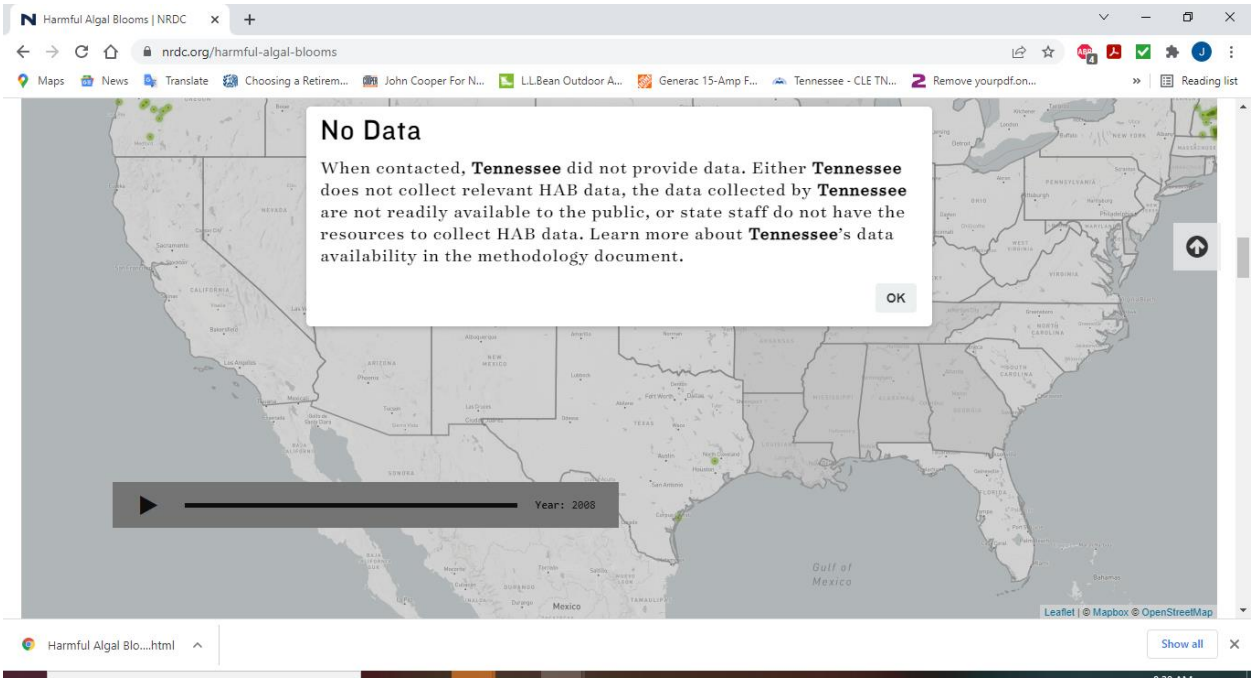
[8] *Ibid*.

[9] *Ibid. E.g.*, "Below 2.0 mg/L, invertebrates also leave and below 1 mg/L even benthic organisms show reduced growth and survival rates"

Tennessee's Criteria for Including Consideration of Algae in Protecting Water Quality Should be Fortified

The City of Murfreesboro complains that TDEC's consideration of the role of algae in water quality is changing. Rather than condemn that evolution, HC applauds it. TDEC has historically not done a good job of either measuring or attempting to control algal conditions (e.g., harmful algae blooms, blue-green algae) or restore rivers affected by it.

A major study published in 2019 by the Natural Resources Defense Council noted visually and verbally Tennessee's failure to collect and assessment data regarding harmful algal blooms:



Source: Natural Resources Defense Council, HARMFUL ALGAL BLOOMS.[10]

[10] https://www.nrdc.org/harmful-algal-blooms (accessed Feb. 24, 2022). NRDC also noted as follows:

> How to Interpret the State Maps
>
> Each state's map represents the data collected by that state. We cannot guarantee that each map is comprehensive of all HAB events in that state. Just because a water body lacks a pinpoint does not mean it has not experienced a HAB—it may be that the water body has never been tested by the state. Furthermore, a map that does not display any HAB events does not mean there were no HABs in the state; the lack of pinpoints may be a result of the state's lack of HAB data. This is the case for … and Tennessee.
>
> In this round of data collection, we did not receive information from 13 states: [including]…, Tennessee, …. https://www.nrdc.org/harmful-algal-blooms-methodology(accessed (Feb. 24, 2022) (Emphasis added.)

HC's comments on the 2016 renewal of the NPDES permit for the Franklin sewer permit also noted the failure of TDEC to consider appropriately the presence of algal bloom-causing conditions as well as the actual presence of harmful algal blooms in the Harpeth River.[11]

TDEC's failure to properly control algal bloom-causing conditions was well-documented in the 2016 Mississippi River Collaborative report, *Decades of Delay*.[12] That report documents that TDEC had then yet to finalize a single full Total Maximum Daily Load for nutrients.[13] That state of affairs continues to this day, apparently.[14]

So, TDEC's concern with the presence of, and apparent attempts to understand and remedy, algae and algal bloom-causing conditions, while tardy, is necessary and should be encouraged, contrary to Murfreesboro's complaints.[15]

Focus on a Single Parameter Violates the Guidance in TDEC's CALM Methodology for Stream Assessment

The attempt to focus on a single parameter – the condition of benthic organism in a stream – is contrary to the guidance contained TDEC's Consolidated Assessment and Listing Methodology ("CALM"). [16]

The fundamental conclusion of the CALM document is succinctly summarized in the following statement:

> Stream assessment decisions are based on multiple sources of evidence and the agency must weigh all available information to arrive at a conclusion.[17]

Additionally, the CALM document notes that the methodology for assessing benthic organisms is evolving "as we speak":

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[11] *See* the reports of Clifford Randall, Ph.D., and JoAnn Burkholder, Ph.D., both dated November 21, 2016, and Dr. Burkholder's separate report dated December 7, 2016, regarding impacts in Davidson County, submitted as part of HC's comments on the Franklin sewer permit, TN TN0028827, already in TDEC's possession. https://dataviewers.tdec.tn.gov/pls/enf_reports/f?p=9034:34051:::::34051:P34051_PERMIT_NUMBER:TN0028827 (accessed Feb. 24, 2022)

[12] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.msrivercollab.org%2Fwp-content%2Fuploads%2FDecades-of-Delay-MRC-Nov-2016.pdf&clen=4563918&chunk=true. (accessed Feb. 24, 2022)

[13] *Ibid*. at pps. 61-64.

[14] The state's 2022 Draft 303(d) list contains at the tab entitled "5-Alt" references to eight (8) such 5-Alt plans, but these plans simply do not carry the same weight or legal effect as a TMDL and cannot be considered substitutes for actual TMDLs.

[15] We do note and appreciate the Tennessee Department of Health's voluntary reporting of harmful algal bloom date to the US Centers for Disease Control. https://www.cdc.gov/habs/data/2019-ohhabs-data-summary.html (accessed Feb. 24, 2022)

[16] Tennessee's Consolidated Assessment and Listing Methodology, Revised October 2021. Available at chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.tn.gov%2Fcontent%2Fdam%2Ftn%2Fenvironment%2Fwater%2Fplanning-and-standards%2Fwr_wq_pub-2021-impaired-waters-calm.pdf&chunk=true. (accessed Feb. 24, 2022).

[17] CALM, at p. 9.

> TDEC DWR has developed three Quality System Standard Operating Procedures (QSSOP) for use as guidance for collecting water pollution control data and appropriate quality control in the state. The QSSOP for Macroinvertebrate Stream Survey (TDEC, 2017) was first published in March of 2002 and was revised in October 2006 and June 2011. It is currently under revision to reflect recent changes in taxonomic nomenclature and biometric recalibrations that were implemented in 2021. The QSSOP for Chemical and Bacteriological Sampling of Surface Waters was first published in March of 2004 and revised in 2009, June 2011, and August 2018 (TDEC, 2018). The QSSOP for Periphyton Stream Surveys was completed in 2010 (TDEC, 2010) and is currently under revision to reflect a diatom-based approach.[18]

It would therefore be inappropriate to base a decision on stream assessment on a single parameter such as macroinvertebrate condition that is itself changing in real time.

As the CALM document further notes:

> Division staff utilize a weight-of-evidence approach to interpreting the narrative criterion for fish and aquatic life protection. Factors considered in this approach include concentrations of nutrient parameters such as total phosphorus or nitrate+nitrite, ecosystem dominance by taxa tolerant of excessive nutrients, reductions in available habitat, excessive algal growth, biomass concentrations, harmful algae blooms, or other response variables such as significant diel oxygen swings, elevated temperatures or pH levels. Streams causing or contributing to downstream nutrient issues can also be considered impaired.
>
> In wadable streams, regional numeric nutrient goals (Denton et al., 2001) for the protection of fish and aquatic life are used as guidance regarding acceptable concentrations. At least four nutrient samples are needed for a valid assessment, in combination with other weight of evidence factors. Assessment staff should note that regional nutrient goals should not be applied as if they are acute or chronic criteria based on toxicity. In order for concentrations to be considered excessive, they should on average be higher than regional goals.[19]

(Our comments do not represent a wholesale endorsement of TDEC's stream assessment methodologies. Without reaching the issue of the failure to assess many of Tennessee's streams, we have previously noted that TDEC's incorrectly minimizes impaired conditions by mis-use of reference stream comparisons, among other issues.[20])

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[18] CALM, at p. 16.

[19] CALM, at p. 36 (emphasis added).

[20] *See, e.g.*, the following:

> TDEC… selected the 90th percentile concentrations from its [non]-"reference" streams for interpreting the Tennessee narrative standard for nutrients. This decision was not made in an effort to protect the water quality of Tennessee streams. Instead, as explained by TDEC, the choice was made to err on the side of less protection (Denton et al. 2001, pp. 31-38), because TDEC worried that the 75th percentile [as recommended by USEPA] might be "too protective."

Assessment of the Nitrogen and Phosphorus Pollutant Provisions in the Draft NPDES Permit for the Franklin Water Reclamation Facility (City of Franklin, Tennessee) by JoAnn Burkholder, Ph.D., 21 November 2016, at p. 9. *See also* HC's comments on the 2020 303(d) list attached to these comments.

In short, because TDEC has chosen to utilize narrative water quality standards, instead of perhaps more defensible and protective numeric standards,[21] TDEC must utilize the weight-of-the-evidence approach embodied in its CALM methodology. TDEC therefore has no choice but to reject attempts to focus on a single parameter or any other approach that does not rely on multiple accepted, peer-reviewed methodologies. And, TDEC must reject attempts to use the subjectivity of its narrative water quality standards to justify whatever permitting or other decision may be convenient or expedient at the moment.

Conclusion

We applaud TDEC for relying on a full weight-of-the-evidence approach with respect to the City of Murfreesboro's sewer plant and Sinking Creek. TDEC should continue with that approach and reject attempts to deviate from using multiple accepted, peer-reviewed methodologies by other regulated entities in listing, planning, and enforcement decisions. Indeed, TDEC should also reinvigorate its approach to reference streams (and other methodologies) to prevent and abate the unwarranted pollution of Tennessee's streams.

Sincerely yours,

Harpeth Conservancy

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Tennessee Water Groups

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Director Jeaneanne Gettle, Water Division, USEPA Region 4

[21] JoAnn Burkholder, Ph.D., DEVELOPING NUMERIC NUTRIENT CRITERIA FOR FRESHWATERS, 2018, available at https://www.msrivercollab.org/wp-content/uploads/Numeric-Nutrient-Criteria-for-Freshwaters.pdf (accessed Feb. 23, 2023).