



Assessment Decision Report

Big Nance Creek

Assessment Unit ID: AL06030005-0105-100

Ammonia, Total

Alabama Department of Environmental Management
Water Quality Branch
Water Division
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1.0 Executive Summary

Big Nance Creek, a part of the Tennessee River basin, is located in Lawrence County near Courtland, Alabama. It was placed on the State of Alabama's §303(d) use impairment list in 1992 for ammonia as nitrogen ($\text{NH}_3\text{-N}$). Its use classification is Fish & Wildlife.

Big Nance Creek was placed in Category 4A after a TMDL for Ammonia as Nitrogen was developed and approved by EPA in 2002. In the TMDL it was noted that the amount and quality of data on which the report is based was limited.

From 2019-2023, the Alabama Department of Environmental Management (ADEM) has collected seventeen (17) ($\text{NH}_3\text{-N}$) samples on Big Nance Creek. None of these sample results exceed the target value used in the TMDL, nor ADEM recommended criteria. All results are shown in the Appendix.

Based on the analysis of all available water quality data and information collected on the 24.75-mile segment of Big Nance Creek from Wilson Lake to its source, there are no longer any issues related to ($\text{NH}_3\text{-N}$). The datasets in this report show that based off Table 19 in the WQALM, the maximum number of samples exceeding ($\text{NH}_3\text{-N}$) criteria have not been exceeded for delisting or declaring unimpaired. Consequently, ADEM has determined that ($\text{NH}_3\text{-N}$) impairments on Big Nance Creek no longer exist.

Figure 1.1: Big Nance Creek Watershed Map:

2.0 Water Quality Target Identification

2.1 Ammonia as Nitrogen Criteria

Alabama's water quality criteria (ADEM Admin. Code R. 335-6-10) does not contain a numeric water quality standard for ammonia as nitrogen. However, the following narrative criterion found at ADEM Admin. Code R. 335-6-10-.06(c) is applicable:

(c) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes in concentrations or combinations which are toxic or harmful to human, animal or aquatic life to the extent commensurate with the designated usage of such waters.

Although ADEM does not have a numeric standard for ammonia as nitrogen, the Waste Load Allocation (WLA) program uses EPA's 1999 revisions to the recommended ammonia criteria, which are given by the following equations, for determining appropriate permit limits which will be used as the instream concentration target:

Chronic Ammonia Toxicity Equation:

$$CCC = [0.0577 / (1 + 10^{(7.688 - \text{pH})}) + 2.487 / (1 + 10^{(\text{pH} - 7.688)})] * \text{Min}[2.85, 1.45 * 10^{(0.028 * (25 - T))}]$$

Where, CCC=criterion continuous concentration for ammonia (same as the chronic toxicity value) and T=temperature (°C).

Acute Ammonia Toxicity Equation:

$$CMC = 0.411 / (1 + 10^{(7.204 - \text{pH})}) + 58.4 / (1 + 10^{(\text{pH} - 7.204)})$$

Where, CMC=criterion maximum concentration for ammonia (same as the acute toxicity value)

Table 2.1 Big Nance Creek Assessment Information

Assessment Unit ID	Waterbody Name	Downstream	Upstream	Size	Category	Use Classification
AL06030005-0105-100	Big Nance Creek	Wilson Lake	Its Source	24.75 miles	5	F&W

2.2 Basis for Removing a Waterbody from Category 5 or 4A

Waterbodies may be removed from a 303(d) list (Category 5) for various reasons, including:

- Assessment of more recent water quality data demonstrates that the waterbody is meeting all applicable water quality standards. (Move to Category 1)
- A review of the original listing decision demonstrates that the waterbody should not have been included in Category 5. (Move to Category 1 or Category 2)
- TMDL has been completed. (Move to Category 4a)
- Other pollution control requirements are reasonably expected to result in the attainment of the water quality standards in the near future. These requirements must be specifically applicable to the particular water quality problem. (Move to Category 4b)
- Impairment is not caused by a pollutant. (Move to Category 4c)
- Natural causes, when it can be demonstrated the exceedance of a numeric water quality criterion is due to natural conditions and not to human disturbance activities. (Move to Category 1)

Table 2.2 (Table 19 in WQALM) shows the allowable number of exceedances of criteria for conventional pollutants for various sample sizes and a 90% confidence level. This table will be used to determine the number of allowable exceedances of Alabama numeric water quality criteria for pollutants listed in ADEM Administrative Code r. 335-6-10, with the exception of chlorophyll *a* criteria and the toxics criteria listed in the appendix to ADEM Administrative Code r. 335-6-10, for the waterbody to be removed from **category 4a** or a 303(d) list (Category 5) for a specific pollutant (move to Category 1). In addition, the original basis for listing the waterbody will be considered as a part of the delisting process. Included in this evaluation will be a review of pollutant sources to determine which ones may have been removed or remediated, changes in land practices or uses, installation of new treatment facilities or best management practices, and changes in stream hydrology or morphology.

Table 2.2 (Table 19 in WQALM): Maximum Number of Samples Exceeding the Numeric Criterion Necessary for Delisting*

Sample Size	Number of Exceedances	Sample Size	Number of Exceedances
8 thru 21	0	104 thru 115	7
22 thru 37	1	116 thru 127	8
38 thru 51	2	128 thru 139	9
52 thru 64	3	140 thru 151	10
65 thru 77	4	152 thru 163	11
78 thru 90	5	164 thru 174	12
91 thru 103	6	175 thru 186	13

*For conventional parameters, including bacteria, at the 90% confidence level.

For waters originally placed in Category 5 due to a specific toxic pollutant or specific toxic pollutants, there should be no violations of the appropriate criteria in a preferred minimum of eight samples collected over a three-year period before the cause of impairment is removed or the water is placed in Category 1. As stated in section 4.10 Minimum Sample Size and Allowable Number of Water Quality Criterion Exceedances, the decision to use smaller data sets for making use support decisions will be made on a case-by-case basis using best professional judgment and the decision will be documented.

3.0 Data Collection & Analysis

From 2019-2023, the Alabama Department of Environmental Management (ADEM) has collected 17 (NH₃-N) samples on Big Nance Creek. None of these sample results exceed the target value used in the TMDL, nor ADEM recommended criteria.

All ammonia samples can be viewed in Table 5.1 of the Appendices. Table 5.1 shows ammonia results with same-visit temperature and pH along with the calculated CCC and CMC. No ammonia sample results exceed any of the criteria.

4.0 Conclusion

Based on the analysis of all available water quality data and information collected on the 24.75-mile segment of Big Nance Creek from Wilson Lake to its source, there are no longer any issues related to (NH₃-N). Based on Table 19 in the WQALM, the datasets in this report show that the maximum number of samples has not exceeded the numeric criterion necessary for delisting or declaring unimpaired. Consequently, ADEM has determined that (NH₃-N) impairments on Big Nance Creek no longer exist.

5.0 Appendices:

Table 5.1 Ammonia

STATION ID	VISIT_DATE	NH3 mg/l	NH3 Detect Conditions	pH (su)	Temp, Water (C)	ADEM's CCC (mg/l)	EPA_CCC (mg/l)	EPA_CMC (mg/l)
BGNL-1	6/4/2019	0.006	JI	7	20.4	4.045	1.839	16.214
BGNL-1	8/6/2019	0.039		7.3	21.6	3.216	1.462	10.661
BGNL-1	10/1/2019	0.025	JI	7.1	21.5	3.613	1.643	13.475
BGNL-1	6/8/2020	0.044	< MDL .044, JQ4	7.3	22.3	3.074	1.398	10.060
BGNL-1	8/5/2020	0.044	< MDL .044	7.2	21.4	3.458	1.572	12.214
BGNL-1	10/14/2020	0.044	< MDL .044	7.2	18.2	4.251	1.933	15.924
BGNL-1	6/2/2021	0.015	< MDL .015	7.2	19.4	3.934	1.789	14.416
BGNL-1	8/3/2021	0.015	< MDL .015	7.1	23.4	3.197	1.453	11.512
BGNL-1	10/5/2021	0.015	< MDL .015	7.4	20.7	3.178	1.445	10.066
BGNL-1	3/14/2023	0.05	< MDL .05	7.4	11.8	4.734	2.565	21.050
BGNL-1	4/11/2023	0.05	< MDL .05	7.3	15.1	4.891	2.224	18.272
BGNL-1	5/10/2023	0.05	< MDL .05	7.2	19.7	3.859	1.755	14.062
BGNL-1	6/14/2023	0.05	< MDL .05	7.3	20.7	3.408	1.550	11.487
BGNL-1	7/12/2023	0.05	< MDL .05	7.4	22.9	2.758	1.254	8.388
BGNL-1	8/9/2023	0.05	< MDL .05	7.2	22.5	3.222	1.465	11.150
BGNL-1	9/13/2023	0.05	< MDL .05	7.2	21.2	3.503	1.593	12.418
BGNL-1	10/10/2023	0.05	< MDL .05	7.3	15.8	4.675	2.125	17.242