Carol Bitting
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September 8, 2018

COMMENTS ON DRAFT 303D LIST FOR 2018

Dear Director Keogh:

I love to read that ADEQ's goal is to "Protect, Enhance and Restore the Natural Environment for the well being of all Arkansans"

Upon reviewing the draft 303d list of impaired waters of Arkansas, I have a number of comments I would like to make for the record. Although there are many streams within the State which need attention, I feel the Buffalo River with its highest level of protection needs the full attention and effort of your agency to restore it from the continual degrading as noted in the water assessments and the visual algal blooms.

The Buffalo River was designated as America's very first National River on March 1,1972 when President Richard M. Nixon signed Public Law 92-237. Congressman John Paul Hammerschmidt was the major driving force in Washington DC. behind this effort. Every Congressman and Senator from Arkansas, and the Governor supported his efforts. The legislative history describes the river as "clean, clear, and unpolluted by industrial activities".

Stating,*"That for the purposes of conserving and interpreting an area containing unique scenic and scientific features, and preserving as a free-flowing stream an important segment of the Buffalo River in Arkansas for the benefit and enjoyment of present and future generations, the Secretary of the Interior may establish and administer the Buffalo National River"* [1]

My earliest memories of the Buffalo River are from playing in it when I was a small child and family vacations throughout my life. I remember clear water where I could open my eyes and swim and so clear I could drink it.There were beautiful views and hikes to Indian Rock House where clear cool water flowed thru the darkness of the cave going underground to unknown springs and river pools. It was Paradise but due to lack of action and agency neglect, much of that Paradise is now lost. The draft 303d list is a continuation of what I see as an abject failure to take responsibility for your agency's lack of action, and those inactions which have steadily debased the water quality of the river.

As a citizen, the Buffalo River was conserved and preserved for me so that I might have the benefit and enjoyment of its unique scenic and scientific features. Arkansas agencies have the management of the Buffalo National River, her tributaries and her watersheds. She is unique in that she is karst, she is scenic with high bluffs and until now clear waters where swimming, hiking horseback riding supported historical uses. Scientifically she has been the study of many scientific documents, publications and many a university student has written their thesis from the many various diversities she offers.

The Clean Water Act (CWA) (Public Law 92-500) [86 Stat. 816, et seq.] was also signed by President Nixon. Part 303 of the CWA discusses water quality standards (WQS) and implementation plans. Part 303(d)(1)(A) charges each State to identify waters in the State for which effluent standards are not stringent enough to meet the applicable water quality standards. In the current draft 303(d) list, ADEQ identifies a significant portion of the Buffalo River (18.2 miles, 29.4 km); including 7.5 miles (12.1 km) upstream (AR_11010005_011) and 10.7 miles (17.3 km) downstream (AR_11010005_010) of the mouth of Big Creek at Carver as not meeting bacterial standards based upon *Escherichia coli* (*E. coli*), a section of Big Creek (AR_11010005_022) not meeting the *E. coli* standards, and the lower portion of the same Big Creek (AR_11010005_020) not meeting dissolved oxygen standards. In each of these cases, the cause for the impairment is listed as "unknown". The cause of the impairments in this area seems pretty obvious, based upon solid scientific data which I helped gather and which has been submitted to ADEQ (See Figure 9 in Brahana and others, 2017)[2]. Arkansas is required to rank the streams not meeting the standards "taking into account the severity of the

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[1] Public Law 92-237, Buffalo National River Establishment Act

[2] Brahana, J.V., Bitting, C., Kosic-Ficco, K., Turk, T., Murdoch,J., Thompson, B., and Quick, R., 2017. Utilizing fluorescent dyes to identify meaningful water quality sampling locations and enhance understanding of groundwater flow near a hog CAFO on mantled karst – Buffalo National River, southern Ozarks. 26pp.

pollution and the uses to be made of such waters." The specific regulations codifying CWA are published in Title 40 of the Code of Federal Regulations (40 CFR).

The Buffalo River is a Tier 3 stream see Anti degradation Policy found in 40 CFR 131.12(a)(3).

"Where high quality waters constitute an outstanding National resource, such as waters of ***National and State parks*** *and wildlife refuges and* ***waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected****."*

Tier 3 streams, such as the Buffalo River are known as "Outstanding National Resource Waterbodies" (ONRW). ONRW is the highest standard found in the Clean Water Act. Accordingly, the Buffalo River is classified by the Arkansas Pollution Control and Ecology Commission (APC&E) Regulation 2.203 as an "Extraordinary Resource Water" and a "Natural and Scenic Waterway" which are both analogous to ONRW status. In addition to the main stem of the Buffalo River, the regulation is clear that the tributaries to the Buffalo River which lie within the administrative boundary of Buffalo National River (National Park) should also be classified as ONRW. The water quality of ONRW streams **shall be maintained and protected**. This provides for a higher standard of protection than simply meeting WQS criteria for pollutants and designated uses.

"**Maintained and protected**" means no new or increased discharges to ONRWs and no new or increased discharge to tributaries of ONRWs that would result in lower water quality in the ONRWs[3]. There are several activities which trigger the Antidegradation policy analysis. Activities such as the **issuance of NPDES permits**, **scheduled water quality standards review** (such as the current draft 305(b) report), and the triennial review of water quality standards all trigger the Anti degradation policy analysis. Anti degradation policy analyses are not limited to point source dischargers; they also apply to non point source activities. "Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for non point source control...".[4] In my opinion, ADEQ, ANRC, and the Beautiful Buffalo River Action Committee (BBRAC) have completely failed to even try to meet this legal requirement. Specifically, when C&H Hog Farm, Inc. was initially granted coverage under the NPDES General Permit ARG590000, there was **No Anti degradation Policy Analysis**. When ADEQ developed the 2016 305(b) report, the ONRW values of the Buffalo River were ignored, despite considerable amounts of high quality data being provided by agencies and citizen scientists, and a very large body of public comment regarding impairment issues. When C&H Hog Farm, Inc. applied for a Regulation 5 permit (5264-W) **ADEQ again failed to conduct an Anti degradation Policy Analysis**. When BBRAC devel-

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[3] USEPA Water Quality Standards Handbook, Chapter 4: Antidegradation. Office of Water, EPA-823-B-12-002

[4] 40 CFR 131.12(a)(2)

oped the Buffalo River Watershed-Based Management Plan, **I can find no evidence that an Anti degradation Policy Analysis was conducted**. In fact, Big Creek was not even one of the priority watersheds in the plan, despite the fact that impacts from C&H Hog Farm, Inc, and citizens who are extremely upset about ADEQ permitting this facility in such a sensitive location provided the impetus for the Governor to establish BBRAC. In spite of a large body of evidence for the need, ANRC did not put the Buffalo River watershed in their 2018-2023 Non point Source Pollution Management Plan[5], and from what I can find, **has not conducted an Anti degradation Policy Analysis** on the impacts of utilizing the Arkansas Phosphorus Index (API) in karst watersheds for the development of Nutrient Management Plans for land application of animal wastes.

The regulations require Arkansas to rank streams on the Impaired Waterbodies List. Because ADEQ proposes to use Category 4b for Big Creek and the Buffalo River, the draft list gives these streams a low rank. This is puzzling when I consider that the Buffalo River is a Tier 3 stream which supports a thriving tourism industry in some of the poorest counties in Arkansas. In fact, for 2017, tourism related to Buffalo National River is estimated to have resulted in $62,634,500 in spending which supported 911 jobs in the local communities.[6] Such economic value in addition to the recreation value and bragging rights The Natural State gains for having America's First National River would indicate that the Buffalo River and her tributaries should be ranked at the top of the list, and should receive the highest level of effort by all concerned State agencies to reverse the impairments.

The draft 303d list fails to list the Buffalo River as impaired for algae. I have seen algal blooms the past three years unlike any I have ever seen on the Buffalo River. The algae is so dense in many places that swimming is impossible and is actually hazardous because of cyanobacteria. The algae blooms are so large and extensive that it is nearly impossible to fish many sections of the river without tangling line and lure. The algal blooms are so extensive and dense that they can stop a canoe in its tracks. The algae in many areas has severely reduced the available habitat for aquatic organisms. To date, ADEQ has done very little to measure the extent and density of the algal blooms, and has neither proposed nor done anything to reduce the algal impairment of the "scenic and scientific" features of the Buffalo River.

Arkansas Pollution Control and Ecology Commission Regulation 2.509(A) discusses algal growth in concentrations sufficient to cause objectionable algal densities or otherwise impair designated uses of the waterbody as being caused by nutrients. Certainly, this seems to fit the conditions on the Buffalo River.

Because of the rapid increase in algal production in the Buffalo River downstream of Big Creek, and the location of C&H Hog Farm, Inc. on this tributary since late 2012, it is al-

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[5] Arkansas Natural Resource Commission 2018-2023 Nonpoint Source Pollution Management Plan

[6] 2017 National Park Service Visitor Spending Effects: Economic Contributions to Local Communities, States, and the Nation. Natural Resource Report NPS/NRSS/EQD/NRR--2018-1616

most inescapable that the CAFO is the source of the increased nutrients which have "tipped the scale" in the direction of impairment. EPA regulations allow for short-term or temporary lowering of water quality in an ONRW, but this generally refers to a period of time of weeks and months, not years.[7] Algal production in the Buffalo River downstream of Big Creek at Carver is severely limiting my enjoyment of the river. I now consider the Buffalo River as impaired by algae for 90 miles. The water quality of the Buffalo River **has not been maintained and protected** as required by 40 CFR 131.12(a)(3). Coverage under NPDES Permit ARG590000 which allowed for the development of C&H Hog Farm, Inc. within the watershed did not take into consideration the karst geology of the watershed, nor did it consider the potential impacts of discharging up to 45.5 tons of N and 36 tons of P_2O_5 per year into the groundwater and onto the surface of the land.[8]

The design for C&H Hog Farm and the Nutrient Management Plan and EC Farms does not provide stringent enough requirements and best management practices (BMPs) to restore the water quality of the Buffalo River in a reasonable period of time. The Buffalo River Watershed-Based Management Plan (BRWMP) is completely voluntary, and is unlikely to restore the water quality of the Buffalo River or Big Creek.[9] To use Category 4b for Big Creek and the Buffalo River, ADEQ must be able to show that appropriate pollution control requirements exist, and that if these requirements are followed, they are expected to reverse the impairment within a reasonable period of time.[10]

The six elements to address in order to list as a Category 4b are.
1. The identification of the segment and a statement of the problem causing the impairment. ADEQ has done this, except for the 90 miles of the Buffalo River impaired with algae.
2. A description of the pollution controls and how they will achieve water quality standards (WQS), including describing the pollutant loads needed to meet WQS and a description of the requirements for implementing the controls. ADEQ has not done this.
3. An estimate of the time it will take for the WQS to be met. ADEQ has not done element 2, so you have not done element 3 either.
4. A schedule for implementing the pollution controls. ADEQ has not done elements 2 or 3, so you cannot provide a schedule for implementing pollution controls.
5. A plan to monitor the water and track the effectiveness of the pollution controls. ADEQ has not done this. The frequency of monitoring on the mainstem of the river is inadequate to track effectiveness of pollution controls, even if they actually existed.

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[7] USEPA Water Quality Standards Handbook, Chapter 4: Antidegradation. Office of Water, EPA-823-B-12-002

[8] DeHaan, Grabs, and Associates. C&H Hog Farm, Major Construction Approval Application, May 18, 2012

[9] FTN Associates, 2018. Buffalo River Watershed-Based Management Plan. https://www.adeq.state.ar.us/water/planning/integrated/303d/pdfs/2018/2018-05-22-final-buffalo-river-wmp.pdf. 794 pp.

[10] Monschein, E. and Mann, L, 2009. Category 4b – A regulatory alternative to TMDLs: TMDL 2007. USEPA

6. A commitment on the part of the State of Arkansas to revise the pollution controls, as needed to meet WQS. ADEQ has shown no inclination to commit to pollution controls period, much less to revise them to meet WQS.

I request that you place the Buffalo River below Big Creek on the 303d list for algae. I also request that you give the impaired sections of the Buffalo River, and any tributary within the boundary of Buffalo National River which shows an impairment when viewed as an ONRW a Category 5 rank. I implore you to take some of the $821,775 received from EPA in May to begin righting the wrongs your agency has done to the Buffalo River.

Several cases of illness have been reported this year and in years previous after visitors swam in the Buffalo River. The skin rashes and gastrointestinal illness' could be caused by algae toxicity and likely other pollutants that aren't identified entering the watershed. The Arkansas Department of Health issued 2 letters in August this year. (Attachment 1 & 2) I am enclosing those letters because in all the nights I've spent on the River I have always filled a bucket and boiled the water for consumption. I was unaware boiling algae water would be more toxic and I'm sure many others are also unaware.

This is a violation to me as a citizen due to I am no longer able to recreate below Big Creek on the Buffalo National River due to extensive algal blooms. How can you address this if you don't give the Buffalo River highest priority? Does Dr Sharpely's BCRET data and all the collected data not give you a clue as to the action you should be implementing instead of 'another study'. Monitoring is just that and regardless of the 'who' the data is available and citizens have saved the state hundreds of thousands of dollars and all you have to do is **take action**. If Big Creek and the Buffalo River enter category 5 permitted facilities will be affected and you will have to take immediate action because the data from algae and water standards are not met and the initiation of more studies is like continuing to stir the soup and never eating it. (Attachment 3, 2018 Assessment Catagories) Big Creek was not impaired prior to the permitting of C&H Hog Farm and EC Farms and now it is impaired and impairment of 14 miles of the Buffalo River that receives flow from Big Creek watershed. See Brahana Dye Trace.[11]

It might be that ADEQ would like to only impair 14 miles of the Buffalo River but it is apparent that during contact season 90 miles of the Buffalo River was impaired for objectionable algae in 2018. The 90 miles are all within watershed of Big Creek at Carver. Recent algae studies verified the presence of cyanobacteria and another study was initiated. Meanwhile the ADH posts its warnings of swimming in recreational waters with the presence of algae. Again my citizen rights as stated above have been violated and I can no longer enjoy sharing the middle and lower section of the Buffalo National River with myself or my

[11]http://buffaloriveralliance.org/resources/Documents/Brahana%20Utilizing%20Flourescent%20Dyes.pdf

grandchildren if water activities are the plan. This saddens me deeply that Arkansas has shown ignorance and continues to permit water polluting industry over the health and well being of its citizens.

Attachment 1:

For Immediate Release:

August 1, 2018

Tips to prevent Recreational Water Illness (RWI) this summer

Little Rock, Ark. – The Arkansas Department of Health (ADH) encourages Arkansans to take some simple steps to stay healthy and prevent Recreational Water Illnesses (RWIs) while relaxing at the state's rivers, lakes, streams, and ponds. RWIs are caused when people swallow water that is contaminated with common germs or bacteria, such as E. coli. People can also become sick when swimming during a harmful algal bloom (HAB).

To stay healthy while enjoying the water:

- Do not swallow water.
- Avoid swimming in algae.
- When in doubt, stay out.

You should avoid entering or playing in bodies of water that:

- Smell bad.
- Look discolored.
- Have foam, scum or algal mats on the surface.
- Contain dead fish or animals or if they are nearby (for example, do not enter a body of water if dead fish have washed up on its shore or beach).

Water quality can change quickly. In general, there is a higher risk of getting sick after a rainfall event or in cloudy water. Rainfall can wash contaminates into the water. Cloudy water due to runoff can contain contaminates that may be harmful. Not all of the contaminates can be seen by the naked eye.

Not all algae are harmful but some algae produce toxins that can make people and animals sick. It is not possible to tell if algae are producing toxins just by looking at the water. The size of the bloom is not related to the amount of toxins that could be present. Children and pets are at the greatest risk from swimming or drinking water when algae are present. You should never drink water when algae are present, even if you have filtered it first. Personal filter equipment and treatment options do not eliminate the risks associated with HABs. Never drink, cook or try to filter water affected by HABs.

Symptoms for RWIs include vomiting and diarrhea. If you believe you have gotten sick from recreational water use, contact the ADH Communicable Disease Nurses at 501-537-8969.

The Arkansas Department of Health (ADH) routinely tests designated swim beaches for E. coli levels in the summer months and recommends closure when E. coli levels are too high. Swim

beach closures can be found at both the ADH (https://www.healthy.arkansas.gov/programs-services/topics/arkansas-swim-beach-program) and Corp of Engineers (https://www.swl.usace.army.mil/) websites.

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Arkansas Department of Health

4815 West Markham Street ● Little Rock, Arkansas 72205-3867 ● Telephone (501) 661-2000
Governor Asa Hutchinson
Nathaniel Smith, MD, MPH, Director and State Health Officer

3 August 2018

Dear Veterinarian:

Subject: Harmful algal blooms and toxin poisoning in dogs

Harmful algal blooms (HAB) from blue-green algae (cyanobacteria) may be intermittently present in parts of the Buffalo River National Park, specifically the lower river region. These algae can produce toxins, such as microcystins and anatoxins, that affect people, pets, and livestock that swim in and drink from algae-contaminated water. Buffalo River National Park manages multiple high-use recreational swim/float areas where people frequently recreate with their dogs. Though we have received only a few reports of human illnesses possibly associated with HABs, we want to inform you of the current situation and provide additional resources should a potential case present at your clinic.

Though this notice is specific to HAB activity within the lower Buffalo River region, it is important to note that HABs are an issue for many lakes, ponds, and possibly rivers nationwide, and their incidence is on the rise. Please consider water exposure and travel history as elements of a patient's medical history.

Clinical Signs and Diagnosis

Signs of cyanobacterial toxin poisoning depend on the type of toxin (hepatotoxin, neurotoxin, or dermatoxin), toxin concentration, amount consumed, size of the animal, and exposure route. The majority of exposures result in no or self-limiting clinical signs, but ingestion of large amounts of toxin can result in serious illness and presentation for emergency care. Common signs of hepatotoxin poisoning (e.g. microcystins) include vomiting, diarrhea, anorexia, jaundice, abdominal tenderness, and dark urine. Death can occur within days after exposure due to liver failure. Neurotoxins (e.g. anatoxin-a) cause excessive drooling, disorientation, seizures, and respiratory failure. Death follows within minutes to hours after exposure from respiratory paralysis. Additionally, cyanobacteria may produce dermatoxins, which result in rash, hives, or an allergic reaction in the exposed animal.

Diagnosis is based primarily on history of recent exposure to cyanobacteria, clinical signs of poisoning, and necropsy findings. Diagnostic methods include analysis of stomach and fecal content and liver histopathology.

Treatment

Untreated, cyanobacterial toxin poisonings may be fatal in animals. Prompt veterinary care is critical for patients showing hepatic or neurologic symptoms and should include supportive care. There are no antidotes to these toxins, but experimentally, oral cholestyramine has shown promise for treatment in dogs. Inducing vomiting within the first two hours of ingestion may minimize absorption of ingested toxins. Activated charcoal slurry may be of benefit to bind toxins in the gut if cholestyramine is not available. Pet Poison Hotlines may be consulted for additional treatment advice.

To report an illness: contact Arkansas Department of Health at adh.zoonotic@arkansas.gov or 501-280-4136.

To report suspect nuisance or harmful algal blooms: contact Arkansas Department of Environmental Quality at https://www.adeq.state.ar.us/complaints/forms/nuisance_algae_complaint.aspx or https://www.adeq.state.ar.us/complaints/forms/harmful_algae_complaint.aspx or 501-682-0923.

For additional information:
Laura Rothfeldt, DVM, DACVPM
State Public Health Veterinarian
Arkansas Department of Health
Zoonotic Disease Section
Office: 501-280-4136
Laura.Rothfeldt@arkansas.gov

Attachment 3

2018 Assessment Categories

Category 1. Attains all water quality criteria and supports all designated uses; categorized by existence of a TMDL or not for one or more constituents.

1a. Attaining all water quality criteria and supporting all designated uses, no use is threatened. No TMDL exists for any constituents.

1b. Attaining all water quality criteria and supporting all designated uses; however, a TMDL remains in place for one or more constituents.

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

Category 3. Insufficient data and/or information are available to make a use support determination.

3a. No data available.

3b. Insufficient data available.

- Data do not meet all quality requirements outlined in this assessment methodology;
- Waters in which the data are questionable because of Quality Assurance and/or Quality Control (QA/QC) procedures and/or the AU requires confirmation of impairment before a TMDL is scheduled.
- Where limited available data and/or information indicate potential impacts or downward trends in water quality, the following waterbodies in Category 3 will be prioritized (on a case-by-case basis) for additional investigation: waters designated as ERW, ESW, or NSW; domestic water supplies; and waters located in known karst areas.

Category 4. Water quality standards are not attained for one or more designated uses but the development of a TMDL is not required because:

4a. A TMDL has been completed for the listed parameter(s); or

4b. Other management alternatives are expected to result in the attainment of the water quality standard; or

4c. Non-support of the water quality standard is not caused by a pollutant.

Category 5. The waterbody is impaired, or one or more water quality standards are not attained. Waterbodies in Category 5 will be prioritized as:

High

- Truly impaired; develop a TMDL or other corrective action(s) for the listed parameter(s)

.Medium

- Waters currently not attaining standards, but may be de-listed with future revisions to APC&EC Regulation No. 2, the state water quality standards; or
- Waters which are impaired by point source discharges and future permit restrictions are expected to correct the problem(s).

Low

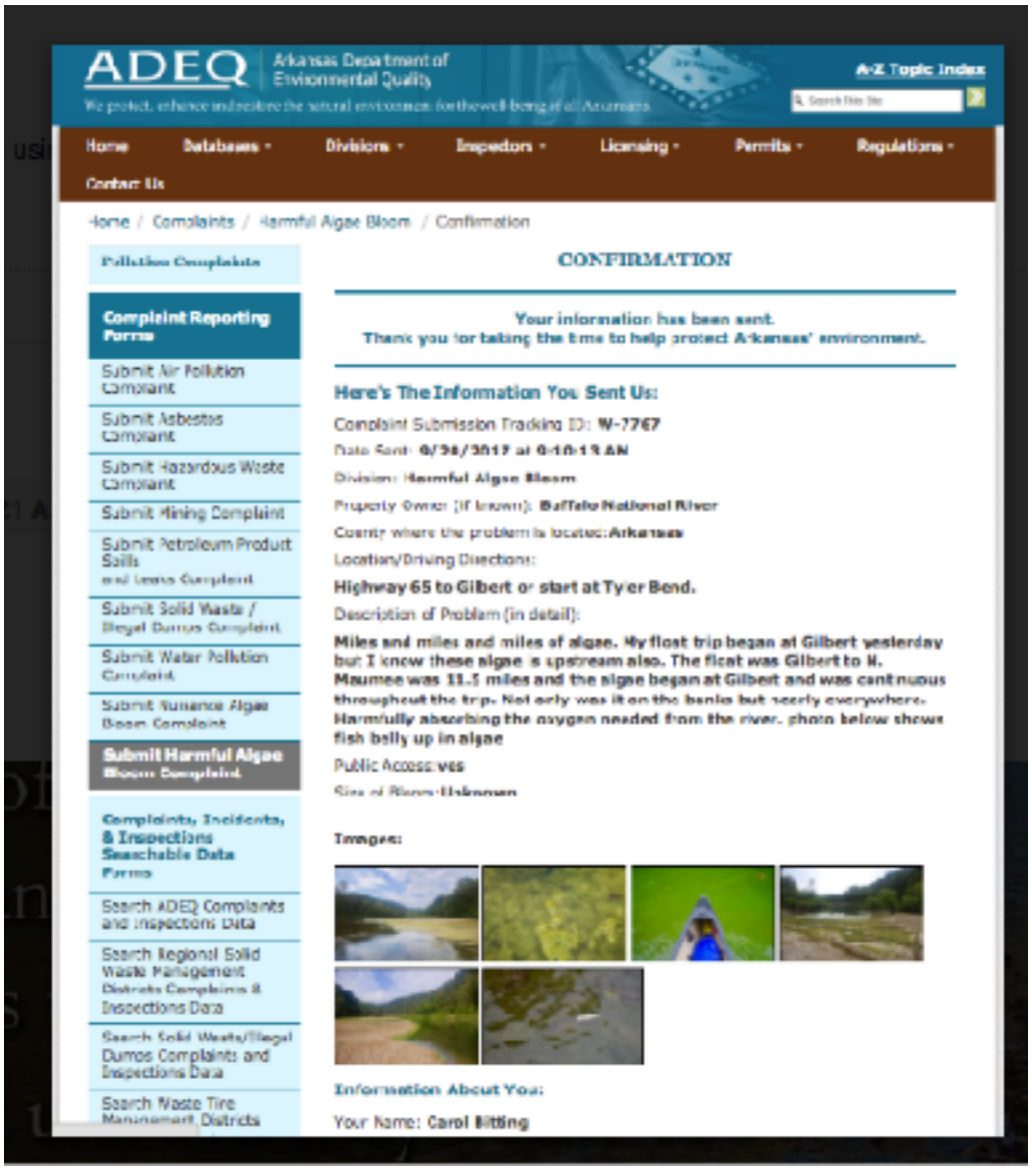
- Waters currently not attaining one or more water quality standards, but assessed designated uses are determined to be supported; or
- There is insufficient data to make a scientifically defensible decision concerning designated use attainment. Where more data and/or information are needed to verify the need for TMDL development or other corrective action(s) for the listed parameter(s), the following waterbodies in Category 5 will be prioritized (on a case-by-case basis) for additional investigation: waters designated as ERW, ESW, or NSW; domestic water supplies; and waters located in known karst areas; or
- Waters ADEQ assessed as unimpaired, but were assessed as impaired by EPA.

A letter from Jessie Green, White River Waterkeeper to ADEQ Tate Wentz, brought this reply though 3 summers of increase in algae has brought no action of lessening the pollution to the Buffalo River but studies will continue.

From: **Wentz, Tate** <WENTZ@adeq.state.ar.us>
Date: Wed, Jul 18, 2018, 3:03 PM
Subject: RE: Buffalo Harmful Algal Bloom
To: Jessie Green <jessie@whiteriverwaterkeeper.org>
Cc: Clem, Sarah <CLEM@adeq.state.ar.us>, Olsen, Brianna <olsen@adeq.state.ar.us>, Osborne, Caleb <osbornec@adeq.state.ar.us>

Ms. Green,
ADEQ Office of Water Quality is aware of the confirmation of *Microseira woolei* (formerly *Lyngbya*) downstream of Spring Creek confluence with the Buffalo River. Water column samples were collected on Tuesday, July 17, 2018 for the purpose of evaluating presence and concentration of two common cyanotoxins, microcystin and cylindrospermopsin, and *E. coli*. Locations sampled were Highway 65 (Grinders Ferry), South Maumee access, approximately 0.75miles downstream of Spring Creek confluence, and Highway 14 (Dillards Ferry). Results are pending and will be submitted to the Buffalo National River (BNR) and Arkansas Department of Health (ADH) for evaluation and any necessary action. Future sampling will be discussed between ADEQ, BNR, and ADH.
Thank you for your questions regarding water quality in the Buffalo River.
Regards,
Tate Wentz
AFS Certified Fisheries Profession

I have made several algae complaints during the last few years. The 2016 303 (d) list included photos of algae in Big Creek and the Buffalo River. The year 2017 and then the summer of 2018 have shown increasing algae growth. A few of the complaints I've submitted are Tracking ID: A-4f8cec; A-727fed; A-637ecl; A-26d063; Aeefo9d; A-984520; A-e22F43; A-682dec; A-7e7faf; A-915004; A-d66069 and they go on but you get the message, complaints are information to take action on, but so far there is no action and the increasing agriculture brought to the porous limestone regions of the state are quick transport to the streams that rely on filtration to filter the pollution.



Recently I read thru an environmental assessment pertaining to a turkey cafo. It was so poorly written it didn't even address the 70 tons of extra litter that would be produced other than to say it would be removed from the site(the cafo owners didn't own enough land to apply it to). How can Arkansas waters be protected when tons of litter is produced and then not addressed with proper disposal? This is one of many operations that will be contributing to the pollution of Arkansas streams and there is no course of action. Is it fair to the growers to permit then deny due to pollution when the studies already indicate the waters of karst areas in Arkansas are vulnerable to nitrate and phosphorus pollution and algae growth is a visual impairment and indicator? (See ANRC studies by Randy Young)

According to Regulation 2.301 and I hold you to it : Substantially all the waters of the State have been designated for specific uses as shown in Appendix A. In those instances where waters are classified for multiple uses and different criteria are specified for each use, the criteria to protect the most sensitive use shall be applicable.

ADEQ is empowered to enforce and administer all laws and regulations relating to pollution of the waters of the state and the Commission is authorized to promulgate rules and regulations relating to pollution of waters of the state. Ark. Code Ann. § 8-4-201. Because "waters of the state" include "...all bodies or accumulations of water, surface and underground...," the Commission is authorized under state law to develop standards for the protection of groundwater.

Since 1972 Arkansas has been aware of the wonderful treasure of the Buffalo River. It went through an expensive and lengthy process of having this river designated as a National River. Are we to continue to ignore this beauty with neglect because we want to excel in industry? Of course industry wants to move into our state….we have water. They have moved into the most sensitive area of our state and because of that they are now progressing across the whole northern part of the state where we once had beautiful clear streams and lakes. Even the southern and eastern part of our state has abused its waters to the level of over drafting the aquifer and now want to redirect water from the northern part of the state. Don't you think its time to become a leader in what Arkansas is best known for "**The Natural State**"?

You must do what is best for the streams and rivers of this state. It is long overdue that Arkansas become progressive in environmental teachings. To try to turn this state into a ruin by exploiting her resources and ignoring the citizens and the science that shows the degrading is wrong. It is denying me and my grandchildren what Congress has set aside and preserved for us. I request you do the best for the streams and rivers by taking the highest quality of knowledge and applying that to the management of the waters of this state.

Sincerely,

Carol Bitting

Below you will find the 2017 Algae study by ADEQ furthering impairment on the Buffalo River.

ADEQ
ARKANSAS
Department of Environmental Quality

Memorandum

TO: **Caleb J. Osborne, Associate Director, OWQ**

THROUGH: **Sarah Clem, Branch Manager, OWQ**

FROM: **Nathan Wentz, Ecologist Coordinator, OWQ**

DATE: October 18, 2017

SUBJECT: **2017 Buffalo River Nuisance Algae Report**

2017 Buffalo River Nuisance Algae Report

Notification of Bloom

The ADEQ Nuisance Algae Complaint tool received two notifications of nuisance algae blooms on the Buffalo River near Sand Hole which were observed on August 4, 2017 (Figure 1). Complaints were received by Ms. Jessie Green and Mrs. Carol Bitting on August 6, 2017 and August 7, 2017, respectively. ADEQ Office of Water Quality Planning Branch investigated the reported occurrence of the lower event approximately 1 mile below Tomahawk Creek confluence. Planning Branch representatives were Mandy Bates and Tate Wentz. National Park Service staff Shawn Hodges and Ashley Rodman assisted Planning in accessing and measuring extent of the events. Three separate locations were reported to ADEQ (Figure 1) and spanned approximately 4.5 miles, starting downstream of the confluence of Brush Creek and terminating 1 mile downstream of Tomahawk Creek confluence. Further discussion with complainants indicated that the lower event near Rocky Hollow was significantly larger than the other two.

Investigation

Investigation began approximately 2.5 miles downstream of the beginning of the lowest reported location near the Tomahawk Creek confluence. The river was accessed via Sanders Field Road at a large pool with minimal visible flow. One of three potential algal taxa (herein referred to as taxon A) appeared to be dominant in this pool, and total algal coverage was estimated to be >50% of the bottom substrate. Increasing areal coverage and density of taxa B and C were observed as the team progressed upstream to the coordinates provided by one of the complainants. However, habitats seemingly suitable for colonization were observed with no or minimal algal coverage.

Because of sporadic occurrence and coverage, it was determined in field that an individual bloom event would be based upon distance from upstream or downstream events/blooms and areal coverage. For the purpose of this investigation, an individual bloom would be considered distinct from others when a minimum of 100 linear meters separated a previous location and covered greater than 50% of wetted channel. In-situ dissolved oxygen, dissolved oxygen saturation, temperature, specific conductance, and pH were collected at the upper, middle, and lower portions of each bloom event. Parameters were collected from a YSI Pro-DSS Multi- Parameter handheld meter. Visual estimates of substrate type, depth, and measured wetted width were also recorded.

Bloom 1 began approximately 1 mile downstream of Tomahawk Creek confluence and extended unabated through a pool-glide complex for 555 meters. Average pool depth was 1.5 meters. Average in-situ parameters for bloom 1 were 9.16 mg/L dissolved oxygen, 114.3 % saturation, 230.5 µS/cm, 27.1oC, and 7.67 pH. Algae observed in the pool were loose, unattached, and gelatinous forms ranging in color from dark to neon green (Figure 2). Algae present in shallow, higher velocity habitat were more filamentous, developed long strands, and were attached to the substrate (Figures 3-4).

Bloom 2 length was the shortest measured at 380 meters. It began approximately 380 meters downstream of Bloom 1 terminus. Average in-situ readings were 10.25 mg/L dissolved oxygen, 130.3 % saturation, 226.8 µS/cm, 27.5 oC, and 8.03 pH.

Bloom 3 was the most extensive in terms of coverage, density, and habitats. Bloom length was approximately 930 meters and began almost 1 kilometer downstream from bloom 2. Average in- situ readings were

10.3 mg/L dissolved oxygen, 130.5 % saturation, 228 µS/cm, 27.5 oC, and 7.76 pH.

For all blooms, preferred substrate appeared to be small diameter gravel and was less dense in areas with bedrock, boulder, and cobble substrate. The team observed that greater current velocity appeared to reduce algal density; however, long filamentous strands were present amidst higher velocity riffles. Other variables are likely influencing algae presence in pools. Between blooms 2 and 3, multiple habitat types were observed to be free from any form of algae.

Following investigation of blooms between Tomahawk Creek confluence and Sanders Field, the team evaluated two downstream access points, North Maumee and Highway 14 (Dillard's Ferry). At both sites, visually estimated coverage of filamentous and loosely attached algae was ≥75% of channel width. Communication with a National Park Service Ranger indicated that algae was extensive from Spring Creek to Dillard's Ferry on August 10, 2017. He was unaware of any indication of algal presence downstream to Rush.

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Flow conditions were evaluated from the USGS 07056000 Buffalo River gage near St. Joe. On the day of the investigation, gage height (feet) was 3.6 ft (Figure 5).

Updates:

August 14, 2017

National Park Service staff indicated little to no change in bloom conditions near Sand Hole. This bloom was first observed on August 4, 2017, first reported on August 7, 2017 and evaluated by NPS staff on August 9, 2017. NPS staff also evaluated the river below Bear Creek and Brush Creek and observed some dislodged algae floating in the current, but minimal coverage.

August 17, 2017

Heavy rains fell for several day throughout the watershed. The Buffalo River near St. Joe rose approximately 2.5' (Figure 5).

August 25,2017

Algae reported in isloated pools of Brush Creek by NPS staff (Figure 6). The river crested, but visability is poor to evaluate whether a scour occurred.

August 31,2017

NPS staff reported to ADEQ that no major algae coverage was observed at Highway 14 (Dillard's Ferry) as of August 29, 2017. Algal blooms were observed on August 28, 2017 within the Lower Wildneress Area and on August 30, 2017 above Highway 65 near Mt. Hersey (Figure 7-8). Bloom coverage was not included with the NPS observation.

September 20, 2017

Ms. Carol Bitting submitted a complaint and photos from the 11.5 mile portion of the Buffalo River from Gilbert to North Maumee and "algae was continuous through the trip" (Figure 9). Correspondence with NPS staff observed less algal coverage in the area of Sand Hole, which was a previously submitted bloom on August 14, 2017. Verbal correspondence with NPS and USGS staff did indicate increased coverage in pools above Highway 65 in the vicinity of Mt. Hersey.

ADEQ staff will continue to converse with the NPS on locations and size of blooms during the 2017 growing season.

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Figure 1. Locations of complaintant observed events (August 4, 2017) and those observed by ADEQ and NPS on 11August2017.

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Figure 2. Presence of gelatinous algae within pool margins.

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Figure 3. Long filamentous algae present at bloom 3.

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Figure 4. Long filamentous algae across wetted width at bloom 3.

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Table 1. Average in-situ water quality. [DO]

Water Quality Parameters

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Bloom 1	Bloom 2	Bloom 3
9.16 mg/L	10.25 mg/L	10.3 mg/L
114.3%	130.3%	130.5%

Temperature

27.1°C 27.5°C 27.5°C

Specific Conductance pH

230.5 µS/cm 7.67 226.8 µS/cm 8.03 228 µS/cm 7.76

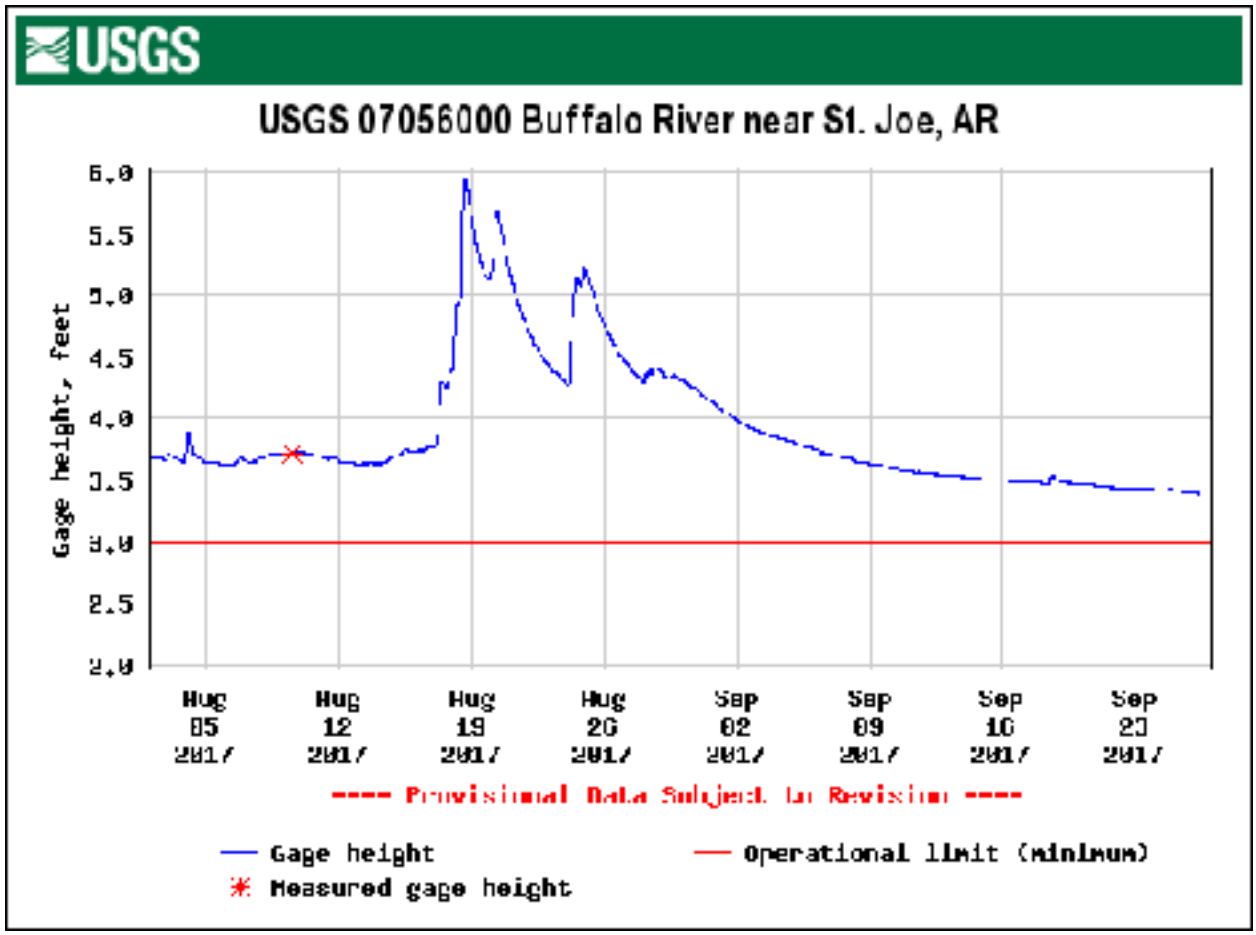

Figure 5. Measured gage height for the Buffalo River near St. Joe, Arkansas.

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Figure 6. Brush Creek on August 24, 2017 upstream of Searcy County Road 416.

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Figure 7. Long filamentous algae coverage observed in the Lower Wilderness Area by NPS staff on August 29, 2017.

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Figure 8. Underwater photo of attached algae at NPS reported bloom at Mt. Hersey on August 30, 2017.

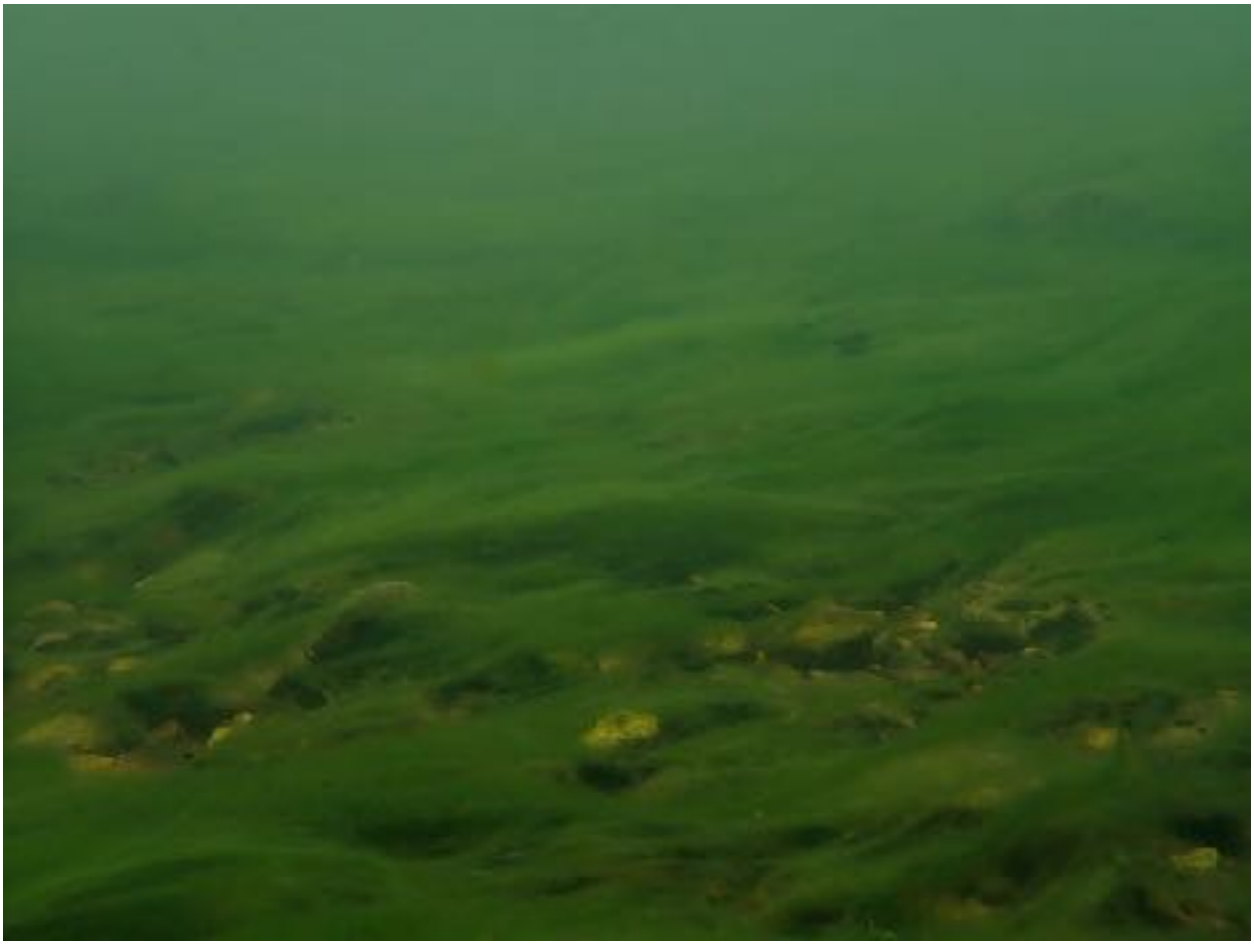

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Figure 9. Photo taken on September 19, 2017 just downstream of the Gilbert access and submitted by complainant on September 20, 2017.