

**ARKANSAS DEPARTMENT OF ENERGY AND ENVIRONMENTAL,  
DIVISION OF ENVIRONMENTAL QUALITY**

**RE: FRL-comment on FRL-11994-01-R6**

***Exhibit D - Email to EPA on February 21, 2024, providing  
DEQ's assessment of Springs Creek, associated data, and  
narrative explanation.***

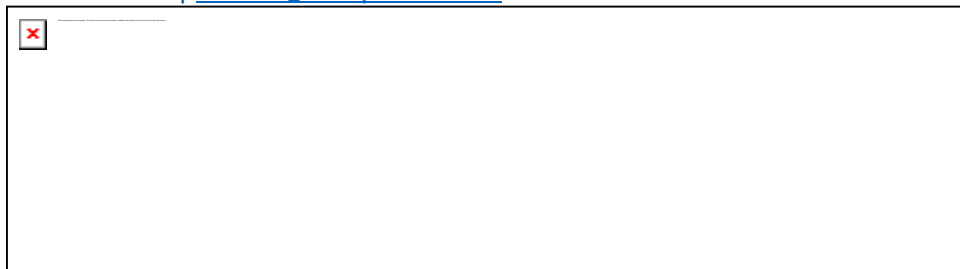
## Basil Hicks (adpce.ad)

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**From:** Stacie Wassell (adpce.ad)  
**Sent:** Thursday, February 22, 2024 11:07 AM  
**To:** Joe Martin (adpce.ad); Basil Hicks (adpce.ad); Bryan Leamons (adpce.ad)  
**Subject:** Fw: 303(d) narrative and associated data  
**Attachments:** Spring Creek short term continuous assessment.xlsx; Spring Creek Fish Data.xlsx; Ozark Highlands Fish Biocriteria.pdf; 303(d) Supplemental Data Narrative.pdf

FYI

**Stacie R. Wassell** | Associate Director  
**Arkansas Energy and Environment**  
**Division of Environmental Quality | Office of Water Quality**  
5301 Northshore Drive | North Little Rock, AR 72118-5317  
501.682.0886 | [wassell@adeq.state.ar.us](mailto:wassell@adeq.state.ar.us)



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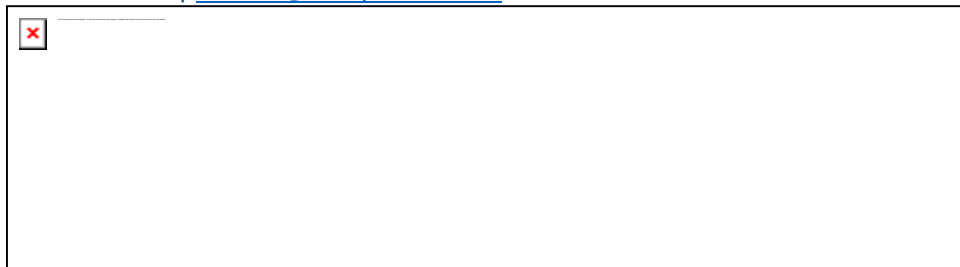
**From:** Stacie Wassell (adpce.ad)  
**Sent:** Wednesday, February 21, 2024 9:47 PM  
**To:** 'Jones, Curry'  
**Cc:** Bailey Taylor (adpce.ad)  
**Subject:** 303(d) narrative and associated data

Curry,

I have attached the data and associated narrative of the data to this email for your review and consideration. Please let me know if you would like to schedule a call or Teams meeting with our team to discuss the data.

Kind regards,

**Stacie R. Wassell** | Associate Director  
**Arkansas Energy and Environment**  
**Division of Environmental Quality | Office of Water Quality**  
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# ARKANSAS

ENERGY & ENVIRONMENT

Arkansas Department of Energy & Environment's Division of Environmental Quality (DEQ) sampled streams in the Illinois River basin as part of DEQ's ecoregion project for the Ozark Highlands and has collected the required data to assess Arkansas Pollution Control and Ecology Commission's (APC&EC) Rule 2, Water Quality Standards for Surface Waters of the State of Arkansas's narrative nutrient criterion for Spring Creek.

#### 1. Total Phosphorus Analysis

The APC&EC Rule 2.509 states,

Materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities or other nuisance aquatic vegetation or otherwise impair any designated use of the waterbody.

While Rule 2 does not specify concentrations in the form of a numeric standard, DEQ does have a process for assessing waterbodies for the narrative nutrient criterion. This process has been reviewed by EPA and is reflective of APC&EC Rule 2.509, which states,

Because nutrient water column concentrations do not always correlate directly with stream impairments, impairments will be assessed by a combination of factors such as water clarity, periphyton or phytoplankton production, dissolved oxygen (D.O.) values, D.O. saturation, diurnal D.O. fluctuations, pH values, aquatic-life community structure and possibly others.

EPA stated in their Record of Decision (ROD) that their evaluation focused on multiple lines of evidence, consistent with APC&EC Rule 2, but EPA did not provide any evidence relating to periphyton production, diurnal D.O. fluctuations, pH values, or aquatic life community structure.

DEQ collected data for Spring Creek throughout 2023 and assessed the data according to DEQ's Assessment Methodology. Due to the data being collected in the summer of 2023, an equivalent period of record was developed for comparison starting in September 2023 and going back five years. The mean total phosphorus concentration was greater than the 75th percentile for the ecoregion so the next step in the flow chart is required (see table below). The 48-hour D.O. and pH datasets do not exceed applicable criteria and, therefore, the stream is supporting the narrative nutrient criteria for the stream. Although not required by the assessment methodology due to D.O. and pH attaining, the fish assemblage was also assessed and was also supporting the aquatic life use. In addition to supporting the use, 10 of the 23 species captured were sensitive species. **DEQ used multiple lines of evidence from empirical data collected on Spring Creek and determined that there was no impairment of DEQ's EPA-approved narrative nutrient criterion using DEQ's Assessment Methodology.**

Nutrient Assessment	Spring Creek	Decision
Are mean TP and/or TN concentrations > 75% for the ecoregion?	Yes	Move to next step
Do continuous datasets for D.O. or pH exceed criteria?	No	Support
Are biological assemblages impaired?	No (fish only)	Support

DEQ's use of its own EPA-approved narrative criterion and assessment methodology is appropriate for assessing waters in the state of Arkansas and demonstrates that there is no impairment due to nutrients in Spring Creek. Spring Creek also had the highest geometric mean total phosphorus of all the assessment units (AU) EPA proposed to promulgate and was determined to not be impaired by DEQ's assessment of the narrative nutrient criterion. If EPA was incorrect about Spring Creek, the stream with the highest total phosphorus concentration, they are likely wrong about the other six assessment units proposed for promulgation in the EPA Record of Decision (ROD).

## 2. Periphyton Growth

EPA evaluated periphyton results from a McGoodwin, Williams and Yates study titled *Water Quality and Ecological Assessment of Osage and Spring creeks in the Illinois River Basin*. EPA's reason for citing this study appears to be due to the passive diffusion periphytometers lack of ability to find statistically significant results with nutrient limitation in the streams. Therefore, if nitrogen or phosphorus are not limiting, the concentrations must be high and the stream must be impaired. This is flawed logic. Not only are nutrient bioassays difficult for statistical significance due to sample size and variability of chlorophyll *a*, the study points out that something other than nutrients such as light, temperature, or turbidity is limiting periphyton growth. The study states,

The conclusion is that there is no evidence that discharge of wastewater from the Rogers WWTP to Osage Creek or the Springdale WWTP to Spring Creek results in any violation of water quality standards according to the criteria of ADEQ Reg. 2. There appears to be no justification from this data for placing Spring and Osage Creeks on the 303(d) list of impaired waters for impairment by nutrients.

Oklahoma's Scenic River phosphorus criterion is based on the Joint Study by Dr. Ryan King, which states that the phosphorus criterion is "based on empirical stressor-response relationships between total phosphorus and response variables related to nuisance levels of algae." DEQ's narrative nutrient criterion is based on the prevention of "objectionable algal densities or other nuisance aquatic vegetation." With nuisance algae being the condition that leads to impairment, it would be helpful to review Dr. King's study to determine what those conditions were during the Joint Study. Previous literature values have stated that 150–200 mg/m<sup>2</sup> represent nuisance conditions, yet Dr. King states that these values are subjective and need context. He further stated that "some of our sites with low phosphorus consistently yielded benthic chlorophyll *a* levels that approached or exceeded literature values for 'nuisance' conditions (>150–200 mg/m<sup>2</sup>), yet virtually none of this algal biomass was *Cladophora* or other nuisance species of filamentous green algae." Dr. King ultimately stated, "150–200 mg/m<sup>2</sup> likely represented the lower end of potential nuisance levels of algal biomass in the Designated Scenic Rivers during a wet year, whereas levels above 300 mg/m<sup>2</sup> should be considered nuisance levels under most conditions." Spring Creek was sampled for periphyton in the summer of 2023, considered abnormally dry/moderate drought by the National Oceanic and Atmospheric Administration's drought monitor. Benthic chlorophyll *a* for Spring Creek was 211 mg/m<sup>2</sup>, well below the 300 mg/m<sup>2</sup> threshold Dr. King developed in his stressor-response study.

EPA stated that the total phosphorus concentrations measured during the MWY study were of similar magnitude to those measured during EPA's analysis that was used to propose promulgation of 303(d) listings on seven AUs in the Illinois River basin. If so, then the corresponding benthic chlorophyll *a* values should also demonstrate nuisance levels of algae that would cause an impairment. As exhibited in the MWY study, this was not the case in Osage Creek sites 1, 2, and 3 corresponding to AU AR\_11110103\_930, or

Osage Creek sites 4 and 5 corresponding to AU AR\_11110103\_030. Mean benthic chlorophyll *a* for all Osage Creek sites during the first critical season were never above 55 mg/m<sup>2</sup>. Mean benthic chlorophyll *a* for all Osage Creek sites during the second critical season were never above 128 mg/m<sup>2</sup> and four of five sites were below 100 mg/m<sup>2</sup>. Mean benthic chlorophyll *a* for all Osage Creek sites during the third critical season were never above 180 mg/m<sup>2</sup> and four of the five sites were below 150 mg/m<sup>2</sup>. None of the Osage Creek sites during the study ever approached the 300 mg/m<sup>2</sup> nuisance condition that Dr. King described and on only one occasion did any site reach over 150 mg/m<sup>2</sup>. The data from this study demonstrates that nuisance levels of algae, under total phosphorus concentrations of similar magnitude as EPA's analysis, did not occur in Osage Creek according to thresholds derived by Dr. King's study of streams in the Illinois River basin.

The sampling sites in the USGS paper, *A comparison of algal, macroinvertebrate, and fish assemblage indices for assessing low-level nutrient enrichment in wadeable Ozark streams*, had land use that was usually less than 5% urban and no wastewater treatment plants discharged to any of the streams, certainly not comparable to the heavily urbanized streams with wastewater discharges on which EPA is proposing to promulgate nutrient impairments. The USGS paper states, "the small size of the data set limits our ability to identify thresholds for TN and TP, however, some literature indicates that TN and TP concentrations near median values for this study are near threshold concentrations that distinguish between reference streams and streams that are slightly enriched (i.e. near background, Table 3)." The 0.018 mg/L total phosphorus concentration EPA used in their ROD was not derived through developing thresholds for nutrient enrichment, rather, it happens to correspond to *some* literature that distinguishes between reference streams and streams that are slightly enriched or near background concentrations. Further, the description of Table 3 in the USGS paper states that the total phosphorus concentrations are "suspected of distinguishing between reference streams and slightly enriched streams." The term "suspected" is used because the indices EPA cites have not been validated to determine if they can accurately differentiate between reference and test streams. The streams in the USGS study are not similar to the streams on which EPA proposes to promulgate nutrient impairments, have nothing to do with Rule 2's narrative nutrient criteria, do not speak to nuisance algae levels, had no reported amount of benthic algae per unit area (even though it was collected), and had poor relationships between nutrients and chlorophyll *a*. EPA's title for this comment was "linking aquatic life community structure to nutrients." When DEQ sampled Spring Creek's aquatic life, the sample demonstrated that 43% of fish sampled were sensitive species and none of the criteria to protect the aquatic life use were impaired.

EPA stated in their Basis for Decision to Disapprove and Add Waters to the Arkansas 2020 Section 303(d) List that the seven AUs are not attaining the narrative nutrient criteria, which states, "Materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities or other nuisance aquatic vegetation or otherwise impair any designated use of the waterbody." EPA failed to produce any evidence that objectionable algal densities or other nuisance aquatic vegetation was present or that any designated use of the waterbody was impaired. EPA stated that they focused on multiple lines of evidence, but EPA provided no evidence in regards to water clarity, periphyton production, diurnal D.O. fluctuations, pH values, or aquatic life community structure—all factors EPA cited in their ROD. When those factors were taken into consideration, as in the case of Spring Creek being assessed with Arkansas's approved assessment methodology, it was clear that there was no violation of the narrative nutrient criterion and that no designated uses were impaired. Further, EPA cited a study on Spring and Osage Creeks that concluded that there appears to be no justification from this data for placing Spring and Osage Creeks on

the 303(d) list of impaired waters for impairment by nutrients. EPA's analysis is flawed and DEQ demonstrated above that the AUs in the Illinois River basin should not be listed as impaired.

**FISH COMMUNITY BIOCRITERIA**  
Ozark Highlands Streams (All Watersheds)

<b>METRIC</b>	<b>5</b>	<b>3</b>	<b>1<sup>†</sup></b>
<b>% Sensitive Individuals</b>	>31	31 – 20	<20
<b>% Cyprinidae (Minnows)</b>	>48 – 64	39 – 48 <b>or</b> >64 – 73	<39 <b>or</b> >73
<b>% Ictaluridae (Catfishes)</b>	>2 <b>and</b> ≤3% bullheads from total catch	1 – 2 <b>and</b> ≤3% bullheads from total catch	<1 <b>or</b> >3% bullheads from total catch
<b>% Centrarchidae (Sunfishes)</b>	4 – 15 <b>and</b> ≤2% Green sunfish from total catch	<4 <b>or</b> > 15 – 20 <b>and</b> ≤ 2% Green sunfish from total catch	>20 <b>or</b> >2% Green sunfish from total catch
<b>% Percidae (Darters)</b>	>11	5 – 11	<5
<b>% Primary Feeders</b>	<42	42 – 49	>49
<b>% “Key” Individuals</b>	>23	23 – 16	<16
<b>Diversity</b>	>2.77	2.77 – 2.37	<2.37
<b># Species</b>	>(wtrshd*0.034)+16.45	(wtrshd*0.034)+16.45 – (wtrshd*0.034)+12.26	<(wtrshd*0.034)+12.26

<sup>†</sup>if a raw metric score is zero, score as zero, except for Primary Feeders

Total Score

37-45 Mostly Similar  
25-36 Generally Similar  
13-24 Somewhat Similar  
12-0 Not Similar