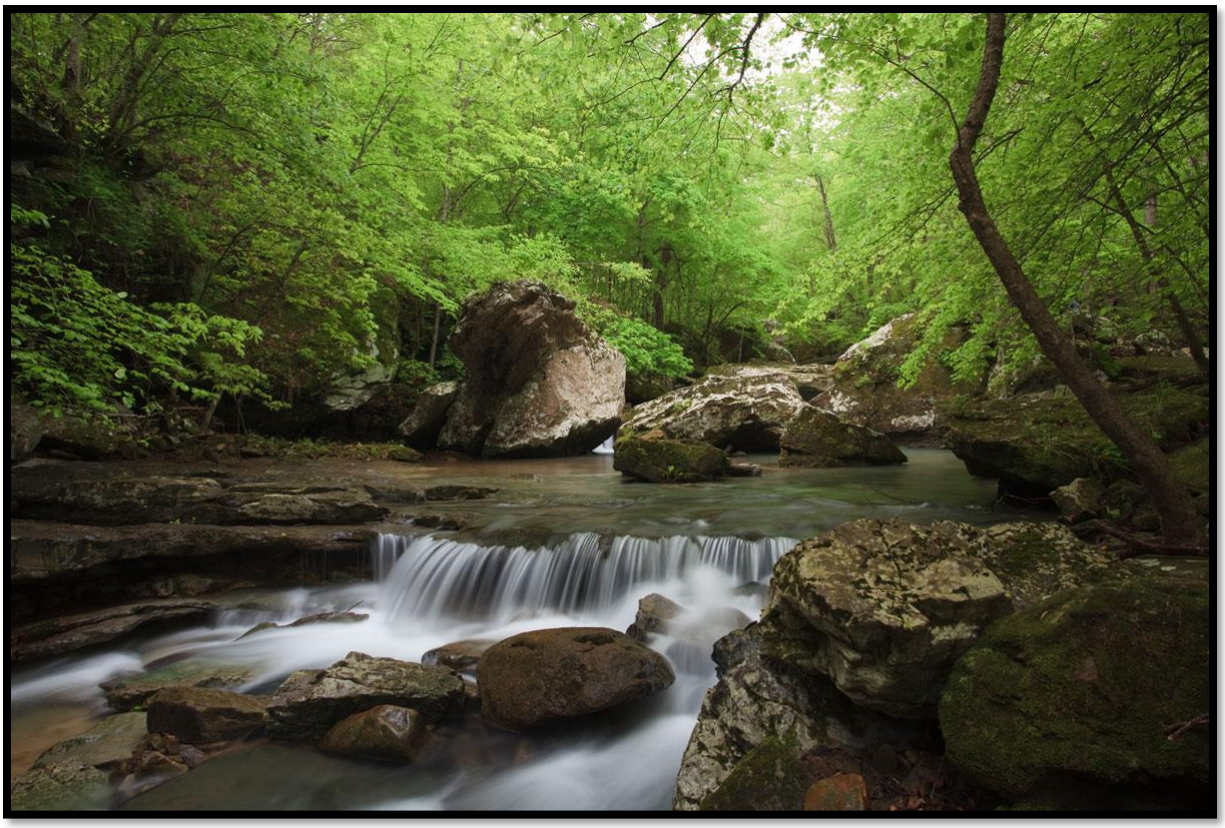
Integrated Water Quality Monitoring Assessment Report

Prepared pursuant to Section 305(b) and 303(d) of the Federal Pollution Control Act



2026

ARKANSAS DEPARTMENT OF ENERGY AND ENVIRONMENT

ARKANSAS
ENERGY & ENVIRONMENT

"To Protect, Enhance, and Restore
the
Natural Environment
for the
Well-being of all Arkansans."

This report is maintained by:
Arkansas Department of Energy and Environment
Division of Environmental Quality
Office of Water Quality

Prepared pursuant to Sections 305(b) and 303(d)
of the
Federal Water Pollution Control Act

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Abbreviations and Acronyms

ADH	Arkansas Department of Health
AGFC	Arkansas Game and Fish Commission
PC&EC	Pollution Control and Ecology Commission
AU	Assessment Unit
AWAPCA	Arkansas Water and Air Pollution Control Act
AWQMN	Ambient Water Quality Monitoring Network
BMP	Best Management Practice
BOD5	Biochemical Oxygen Demand (5 day)
CAR	Code of Arkansas Rules
CBOD5	Carbonaceous Biochemical Oxygen Demand (5 day)
C.F.R.	Code of Federal Regulations
CPP	Continuing Planning Process
CWA	Clean Water Act
DEQ	Arkansas Department of Energy and Environment, Division of Environmental Quality
DLG	Digital Line Graph
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
E&E	Arkansas Department of Energy and Environment
EIP	Environmental Improvement Project
EMP	Effectiveness Monitoring Plan
EPA	Environmental Protection Agency
EPT	Ephemeroptera/Plecoptera/Trichoptera
ERW	Extraordinary Resource Waters
ESW	Ecologically Sensitive Waterbody
HESI	Halliburton Energy Services, Inc.
HUC	Hydrologic Unit Code
IGP	Industrial Stormwater General Permit
IR	Integrated Report
IRWP	Illinois River Watershed Partnership
IWC	Instream Waste Concentration
LWQMN	Lakes Water Quality Monitoring Network
MOA	Memorandum of Agreement
MS4	Municipal Separate Storm Sewer System
NFH	National Fish Hatchery
NH3-N	Ammonia Nitrogen
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NOEC	No Observed Effect Concentration

NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulations
NPS	Non-Point Source
NPSBNR	National Park Service – Buffalo National River
NRCS	Natural Resources Conservation Service
NSPAR	Nonpoint Source Pollution Assessment Report
NSW	Natural and Scenic Waterways
ORW	Outstanding Resource Waters
OWQ	Office of Water Quality
PCB	Polychlorinated biphenyl
POR	Period of Record
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance / Quality Control
RADD	Remedial Action Decision Document
RF3	River Reach File
SI	Site Investigation
SIC	Standard Industrial Code
SOP	Standard Operating Procedure
SRAC	Selected Remedial Alternative Combination
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TRE	Toxicity Reduction Evaluation
TSS	Total Suspended Solids
USACE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
W/A	Watershed to Lake Area Ratio
WBP	Watershed Based Plan
WER	Water Effects Ratio
WET	Whole Effluent Toxicity
WIP	Watershed Improvement Plan
WMP	Watershed Management Plan
WPS	Watershed Protection Strategy
WQMP	Water Quality Management Plan
WQS	Water Quality Standards
WQX	Water Quality Portal

Acknowledgements

Appreciation is given to all those individuals, agencies, and groups who provided information and/or data for the development of this report.

PART A: INTRODUCTION

Section 305(b) of the Clean Water Act (CWA) requires states to perform a comprehensive assessment of the State's water quality, which is to be reported to Congress every two years. In addition, Section 303(d) of the Clean Water Act requires states to prepare a list of impaired waters on which Total Maximum Daily Loads (TMDL) or other corrective actions must be implemented. Current U.S. Environmental Protection Agency (EPA) guidance recommends producing an integrated report (IR) combining requirements of the Clean Water Act for Sections 305(b) reporting and 303(d) submissions. The combined report is the Integrated Water Quality Monitoring and Assessment Report. This report is prepared using the Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b), and 314 of the Clean Water Act (EPA 2005) and supplements (EPA 2006, 2009, 2011, 2013, 2015, 2017, 2021, 2023, and 2025).

All states use specific guidance developed by EPA to aid in making water quality standards (WQS) and designated use attainment determinations. This guidance provides national consistency in the assessment process. However, to be meaningful, assessments must take into account the variations in ecology and WQS within a state, as well as data type, quantity, and quality. Accordingly, the Assessment Methodology should address federal requirements and reflect each state's individual reference conditions and water quality objectives and goals.

The Department of Energy and Environment, Division of Environmental Quality's (DEQ) water quality monitoring networks database is the primary database used for this assessment in Arkansas. Data are gathered for inclusion into DEQ's Laboratory Information Management System (LIMS) database through several monitoring networks. The Ambient Water Quality Monitoring Network (AWQMN) comprises approximately 165 stations sampled monthly or bi-monthly for chemical parameters and flow when available. The AWQMN focuses on characterizing big river systems, potentially problematic nonpoint source areas, and least-disturbed reference streams. Samples are collected year-round as appropriate for each network and parameter.

Special projects also comprise part of DEQ's LIMS database. Special project area and sampling parameters are project specific. Parameters can be physical, chemical, and biological. Among other special projects this cycle, DEQ continues work on new or revised criteria development that has rotated through Arkansas's ecoregions two to three years at a time. See part C.1 for a full list of special projects for this cycle.

The Lake Water Quality Monitoring Network (LWQMN) comprises approximately 90 publicly owned lakes that are sampled on a three-year rotational cycle. Between 20 and 30 lakes are selected every three years for quarterly sampling. The LWQMN focuses on identifying potential reference lakes, verifying reference lakes, and developing WQS for lakes.

The Ambient Ground Water Quality Monitoring Network (GWQMN) comprises approximately 200 stations sampled triennially for major ions, metals, nutrients, and total organic carbon at selected sites. The GWQMN focuses on characterizing major aquifers and documenting natural background conditions.

In addition to the data gathered by DEQ's Office of Water Quality (OWQ), all readily available data are solicited from other DEQ offices, state and federal agencies, universities, public, and private entities. All data received are evaluated against the acceptability requirements outlined in Arkansas's Assessment Methodology as described in Appendix C.

DEQ LIMS data and outside data that have passed DEQ's quality assurance/quality control (QA/QC) protocols are compared against Arkansas Pollution Control and Ecology Commission's (PC&EC or the Commission) 8 CAR Part 21 and Arkansas's Assessment Methodology to make water quality criteria and designated use attainment decisions. The 2026 303(d) list was compiled using the January 28, 2022 version of 8 CAR Part 21.

Exact estimates and percentages for waterbodies meeting all designated uses cannot be extrapolated to all waters of the state for the following reasons:

(a) designated uses and assigned water quality criteria depend on specific parameters or waterbody features. A waterbody may not attain one use but may attain other uses.

(b) many of the water quality monitoring stations were historically selected in areas known, or suspected of having, water quality contamination. This results in a higher percentage of areas of concern being monitored, thereby skewing results toward the impaired use category.

(c) some parameters require a more intensive sampling effort and sample collection for those parameters may not be evenly distributed throughout the state.

(d) although fish consumption is not a statutory or a WQS designated use, EPA guidelines suggest this be evaluated. Waters with restricted fish consumption advisories as per Arkansas Department of Health (ADH) are evaluated as impaired on a case-by-case basis.

Previously, overall use support was based on the full support of all designated uses; if one designated use is not assessable, the stream segment was not counted as supporting all uses. New guidance requires tabulation of waters supporting all *assessed* uses; therefore, if one or more uses were not assessed, but all assessed uses were fully supported, the water is counted as "supporting all assessed uses."

Potential impacts to water quality could include point and nonpoint sources. The National Pollutant Discharge Elimination System (NPDES) program, delegated to the state by the EPA, manages Arkansas's point source discharge controls. This program is guided by the State's

Water Quality Management Plan (WQMP) and the State's Surface WQS. Enforcement activities are based on non-compliance as reported through the NPDES permitting system, with monitoring data compiled through discharge monitoring reports and inspections of NPDES facilities. Additionally, Section 401 (water quality certification) is utilized to review all federal licenses or permits, including but not limited to Section 404, which may result in any discharge of dredged or fill materials into navigable waters. Such certification is determined on the basis of protection of designated uses and the antidegradation requirement of the State's WQS.

Nonpoint source (NPS) impacts to water quality are managed through non-regulatory activities. The formation of watershed groups and educational outreach programs has encouraged the implementation of watershed restoration activities that address nonpoint source issues through the voluntary implementation of watershed management plans (WMP).

PART B: BACKGROUND

B.1 TOTAL WATERS

The State of Arkansas covers approximately 52,023 square miles of land. Land use and land cover were summarized for the state using the Annual National Land Cover Database (NLCD) 2023 (www.mrlc.gov/data). Agriculture is the most prominent land use in Arkansas, comprising 34.9% of the state's land cover. Cultivated crops (20.2%) and pastures for hay and livestock (14.6%) are the primary agricultural land uses in the state. Most cultivated crops are in the Mississippi Alluvial Plain ecoregion (92.6% of row crop in the state), but crop lands are also found to lesser extents near the Red River in the South Central Plains ecoregion (4.6%) and in the Arkansas Valley ecoregion (2.0%). Pastures for hay and livestock are found throughout the state but are most concentrated in the Ozark Highlands ecoregion (29.6% of pasture land in the state), the Arkansas Valley ecoregion (27.8%), and the western South Central Plains ecoregion (18.1%).

Though agriculture is the prominent land use in Arkansas, forested land (41.4%) comprises a higher proportion of land cover. Deciduous forest (18.4%) and evergreen forest (17.5%) make up most of Arkansas's forested land, followed by mixed forests (5.5%). Deciduous forests are most prominent in the Ozark Highlands (34.1% of deciduous forest in the state), Boston Mountains (33.4%), and the southern ranges of the Ouachita Mountains, with evergreen forests dominating the South Central Plains (61.2% of evergreen forest in the state) and northern ranges of the Ouachita Mountains. While land management practices are not directly quantified by the NLCD; the NLCD Land Cover Change Index (www.mrlc.gov/data) can provide estimates of land use and land cover changes through time. Within this period of record (POR) for the state, there was a 0.22% increase in developed land and <0.01% increase in forested land. However, the Land Cover Change Index allows analysis from 1985 to 2023, and in using that time frame to determine change in those land uses for the state it was found that there has been an overall 1.7% increase in developed land and 2.8% decrease in total forested land. As these numbers are statewide, the percent change may be more significant in different counties where development is significantly greater.

Following forested cover and agricultural use, wetland areas and herbaceous grassland areas (not used to support livestock) comprise approximately 14.5% of the state. Woody wetlands (10.3%) make up most of this land cover group, followed by herbaceous grassland (2.0%), shrub and scrubland (1.9%), and emergent herbaceous wetlands 0.3%). The lowland areas of the state harbor most of the wetlands, with the South Central Plains and Mississippi Alluvial Plain ecoregions containing 94.3% of the state's wetland areas. The state's herbaceous grassland areas that are not used to support livestock are primarily concentrated in the South Central Plains (62.9% of grassland areas in the state) and Ozark Highlands (16.9%) ecoregions.

Developed land use in Arkansas makes up approximately 6.8% of the state's land area. Most of this developed land use exists as open space (3.8% of the state's land area), like parking lots, followed by low-intensity development (2.1%), medium-intensity development (0.7%), and high-intensity development (0.2%). Medium and high-intensity development tends to be concentrated in urban centers and areas of intense industry, with low-intensity development, like rural residential areas and town centers, being more diffuse throughout the landscape. Figure 1-B depicts overall land use in the state.

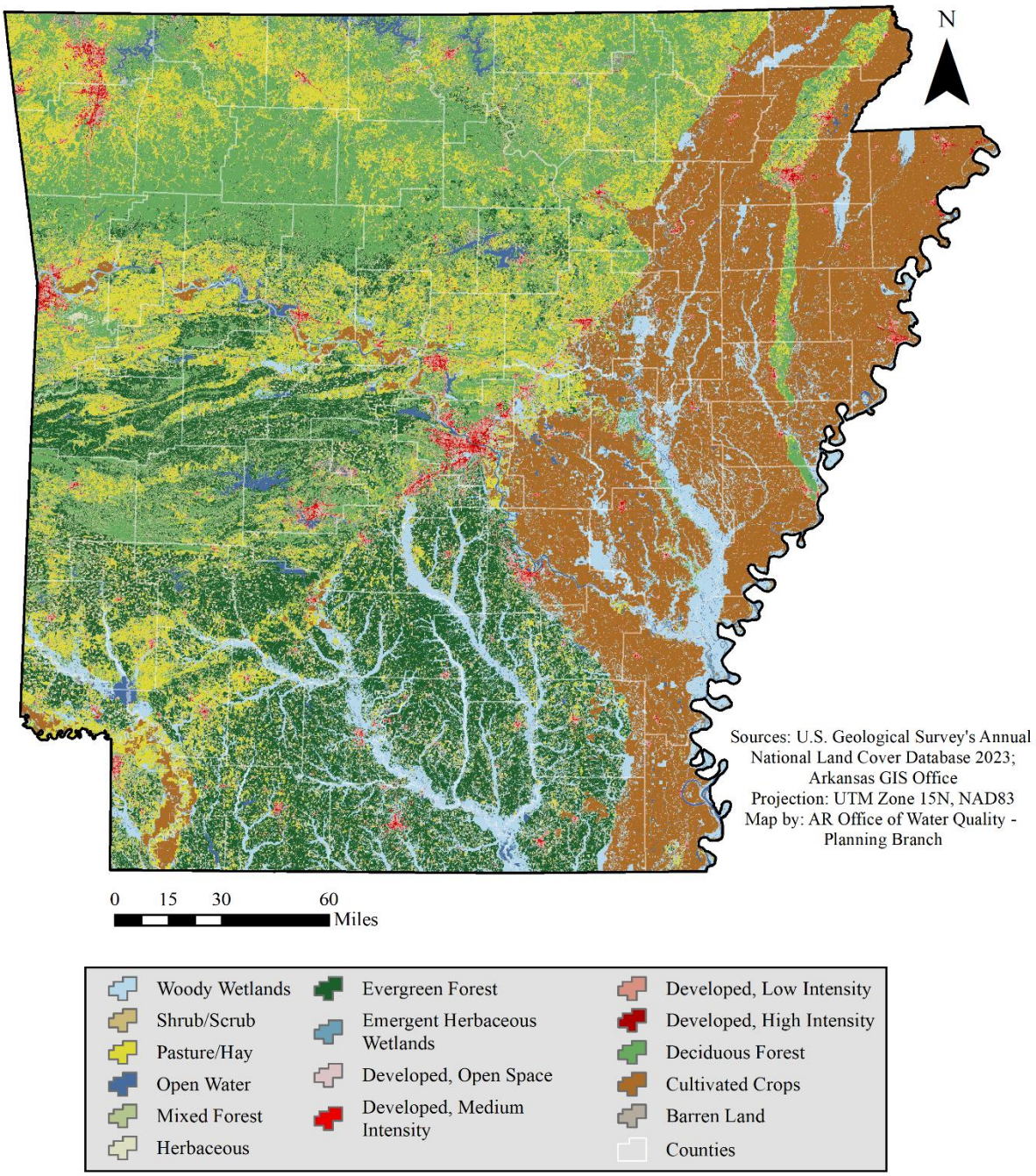

Figure 1-B: Land Use and Land Cover in Arkansas

Ecoregions

The original ecoregion survey (PC&EC 1987) identified six distinct ecoregions (Level III Ecoregions, Figure 2-B) in Arkansas, categorizing them by physical, chemical, and biological features.

Water quality in the Mississippi Alluvial Plain (MAP) ecoregion is primarily influenced by nonpoint source runoff from agricultural areas. Most waterways within this region form a network of extensively channelized drainage ditches. Government programs have been used to develop this highly productive agricultural land. In contrast, many of the practices utilized in making this land more productive impair designated water quality uses. Most agency work within this region indicates that, in most of these waters, the best that can be expected in terms of a fishery is an altered fishery. Once a natural stream is channelized, only those organisms that do not require in-stream cover and can exist in highly turbid waters will flourish and/or survive. Within these systems, the fishable goal of the CWA is being met, even though the aquatic life communities have been substantially altered.

The South Central Plains (SCP) ecoregion of southern Arkansas exhibits site specific impacts due to historic resource extraction activities including the extraction of petroleum products, brine, bromine, barite, gypsum, bauxite, gravel, and other natural resources. Timber is the major resource harvested in this area as well as the primary land use. Water quality impacts occur from the extraction, storage, transport, and processing of resources.

The Ouachita Mountain (OM) ecoregion is a recreational region with exceptionally high-quality water. The predominant land use is silviculture, both in private timber companies and national forest holdings. Additional concerns have been voiced by various groups and organizations regarding potential erosion and siltation as a result of management practices used in timber harvest. Potential impairments to waters in this region include land clearing for pasture without protective riparian zones, in-stream gravel removal, resource extraction remediation areas, and existing areas of confined animal production.

The Arkansas Valley (AV) ecoregion exhibits distinct seasonal characteristics of its surface waters with zero flow common during summer critical conditions. Peak runoff events from within this region tend to introduce contaminants from the predominantly agricultural land uses, which are primarily pasture lands with increasing poultry production. Exploitation of natural gas deposits has resulted in some site-specific water quality degradation. Soil types in much of this area are highly erosive and tend to stay suspended in the water column, thus causing long-lasting, high turbidity values.

The Boston Mountains (BM) ecoregion, located in north central Arkansas, is a sparsely populated area. The dominant land use is silviculture and much of the region is located within the Ozark National Forest. It is a high recreational use region with exceptionally high-quality

water. Many of the streams from this region are designated as extraordinary resource waters (ERW). Major concerns about potential water quality degradation include: 1) conversion of hardwood timberland to improved pastures, 2) confined animal operations, 3) even-aged timber management, and 4) localized natural gas production.

The Ozark Highlands (OH) ecoregion, located in extreme northern Arkansas, is noted for its mountainous terrain with steep gradients and fast-flowing, spring-fed streams. Many of the streams from within this region are designated as ERWs. The fractured limestone and dolomite lithology of the region allows a potential direct linkage from surface waters to groundwater. The water quality concerns within this region are primarily related directly to land use. The large human population increase in this area also has the potential to result in increased water contamination from infrastructure development as well as surface erosion from construction activities. This region has some of the highest population growth and animal production rates in the state. Additionally, removal of gravel from the banks and beds of streams is a frequent activity that causes direct habitat degradation and greatly accelerates siltation within the streams.

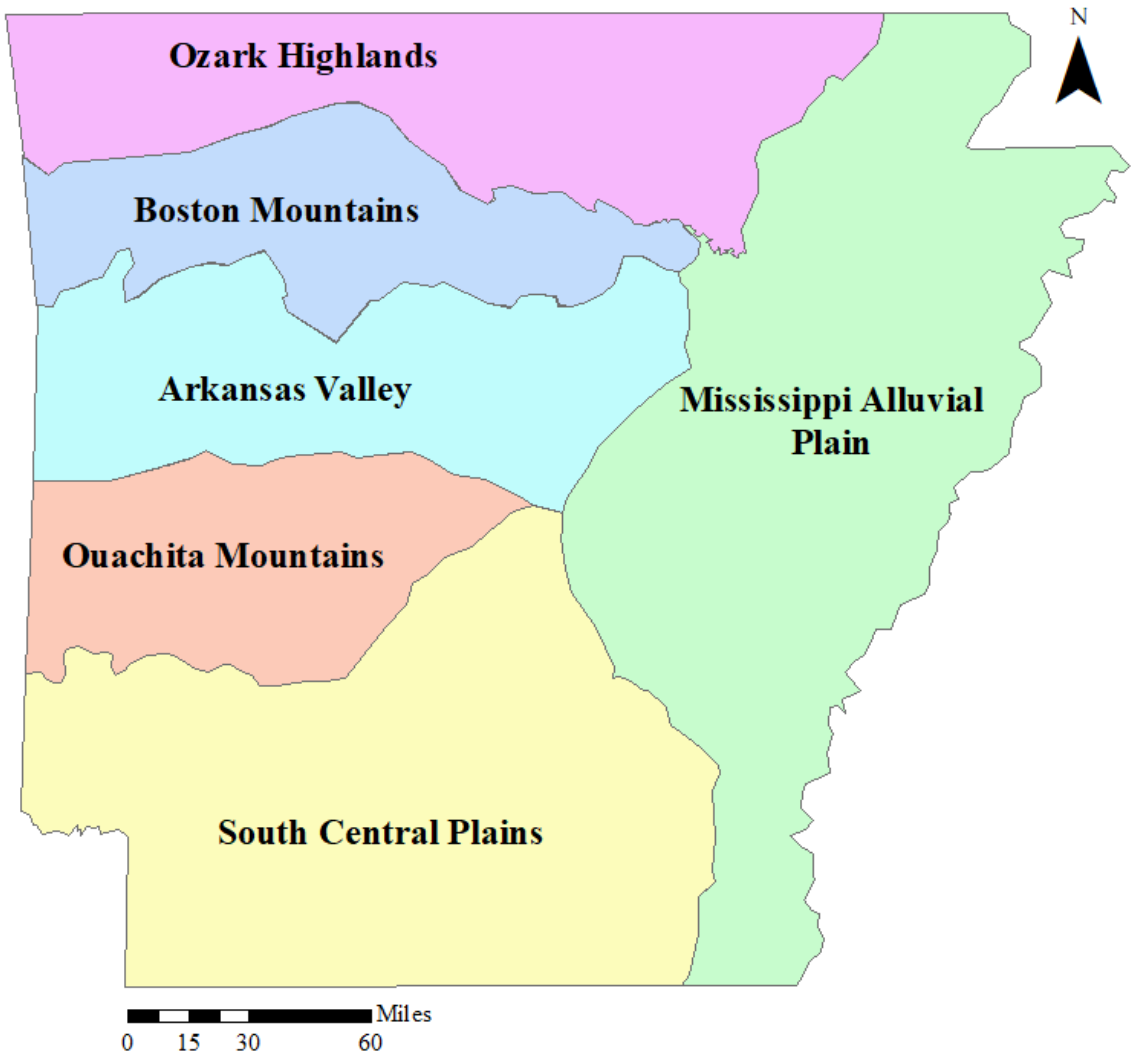

Figure 2-B: Arkansas's Ecoregions

River Basins / Total River Miles

Arkansas is divided into six major river basins: Red River, Ouachita River, Arkansas River, White River, St. Francis River, and the Mississippi River. Arkansas has approximately 19,000 miles of rivers and streams digitized in the DEQ Water Base Layer. The DEQ Water Base Layer is a record of spatial metadata including assessment unit (AU), watershed size, reach length, etc. and was created from the High Resolution (1:24,000-scale) National Hydrography Dataset (NHD) (Dewitz and USGS, 2019). In 2018, DEQ began using high resolution NHD for determination of AU mileages. Several AUs got longer due to more accurately defined headwaters. Others got shorter due to high resolution NHD not naming some upper headwaters as the main body of the AU.

The NHD combines the following elements of the Digital Line Graph (DLG) and EPA River Reach File (RF3): spatial accuracy and comprehensiveness from the DLG and network relationships, names, and a unique identifier (reach code) for surface water features from RF3. The NHD supersedes DLG and RF3 by incorporating them, not by replacing them. As of October 1, 2023, the NHD will no longer be maintained, however the existing data is still available. Arkansas has approximately 137,229 miles of rivers and streams digitized in the high resolution NHD. The replacement for the NHD is the 3D Hydrography Program, which will house the most current data. This is not currently available but is expected to be within the coming years.

The six river basins are subdivided into thirty-eight (38) planning segments (Figure 3-B) based on hydrological characteristics, human activities, geographic characteristics, and other factors. The planning segments are further broken down into 1,558 smaller watersheds, based on discrete hydrological boundaries as defined by the United States Geological Survey (USGS) 12-digit hydrologic unit codes (HUC).

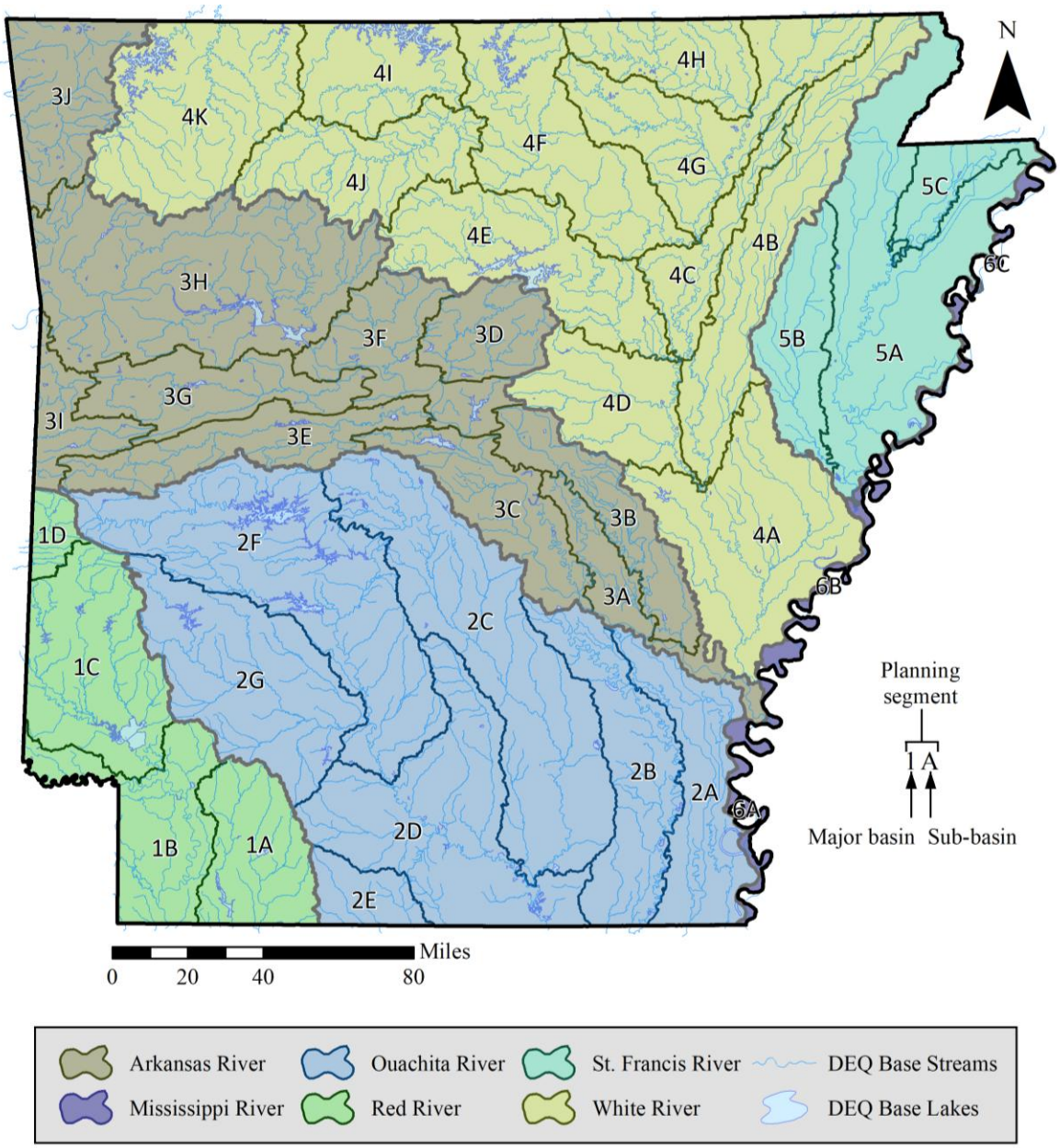

Figure 3-B: DEQ Planning Segments

Publicly Owned Lakes and Reservoirs

A discussion of lakes and reservoirs is included in Part C.3 and includes a map and list of Arkansas's significant publicly owned lakes and reservoirs and their trophic status. Arkansas has approximately 339,000 acres digitized on the DEQ base lakes layer (the DEQ base lakes layer does not delineate sections of Felsenthal National Wildlife Refuge). The USGS High Resolution NHD identifies a total of approximately 885,146 acres of lakes, ponds, and other impounded waters in the state. This value is calculated on AUs that range from 1 to 34,041 acres. This total value is significantly larger than the EPA RF3/DLG calculation of 515,635 acres due to the increased accuracy and detail of the USGS High Resolution NHD.

Summary of Classified Uses

Waters of the state are classified for specific designated uses:

Extraordinary Resource Waters (ERW) (Figure 4-B) – This beneficial use is a combination of the chemical, physical, and biological characteristics of a waterbody and its watershed which is characterized by scenic beauty, aesthetics, scientific values, broad scope recreation potential, and intangible social values.

Ecologically Sensitive Waterbody (ESW) (Figure 5-B) – This beneficial use identifies stream segments known to provide habitat within the existing range of threatened, endangered, or endemic species of aquatic or semi-aquatic life forms.

Natural and Scenic Waterways (NSW) (Figure 6-B) – This beneficial use identifies stream segments which have been legislatively adopted into a state or federal system.

Primary Contact Recreation – This beneficial use designates waters where full body contact recreation is involved.

Secondary Contact Recreation – This beneficial use designates waters where secondary activities like boating, fishing, or wading are involved.

Aquatic Life – This beneficial use provides for the protection and propagation of fish, shellfish, and other forms of aquatic life and is further subdivided in these following categories:

- Trout
- Lake and Reservoir
- Stream
    - Ozark Highlands
    - Boston Mountains

- Arkansas River Valley
- Ouachita Mountains
- Typical Gulf Coastal (SCP ecoregion)
- Spring water-influenced Gulf Coastal (SCP ecoregion)
- Least-altered Delta (MAP ecoregion)
- Channel-altered Delta (MAP ecoregion)

Domestic Water Supply – This beneficial use designates water which will be protected for use in public and private water supplies. Conditioning or treatment may be necessary prior to use.

Industrial Water Supply – This beneficial use designates water which will be protected for use as process or cooling water. Quality criteria may vary with the specific type of process involved and the water supply may require prior treatment or conditioning.

Agricultural Water Supply – This beneficial use designates waters which will be protected for irrigation of crops and/or consumption by livestock.

Other Uses – This category of beneficial use is generally used to designate uses not dependent upon water quality such as hydroelectric power generation and navigation.

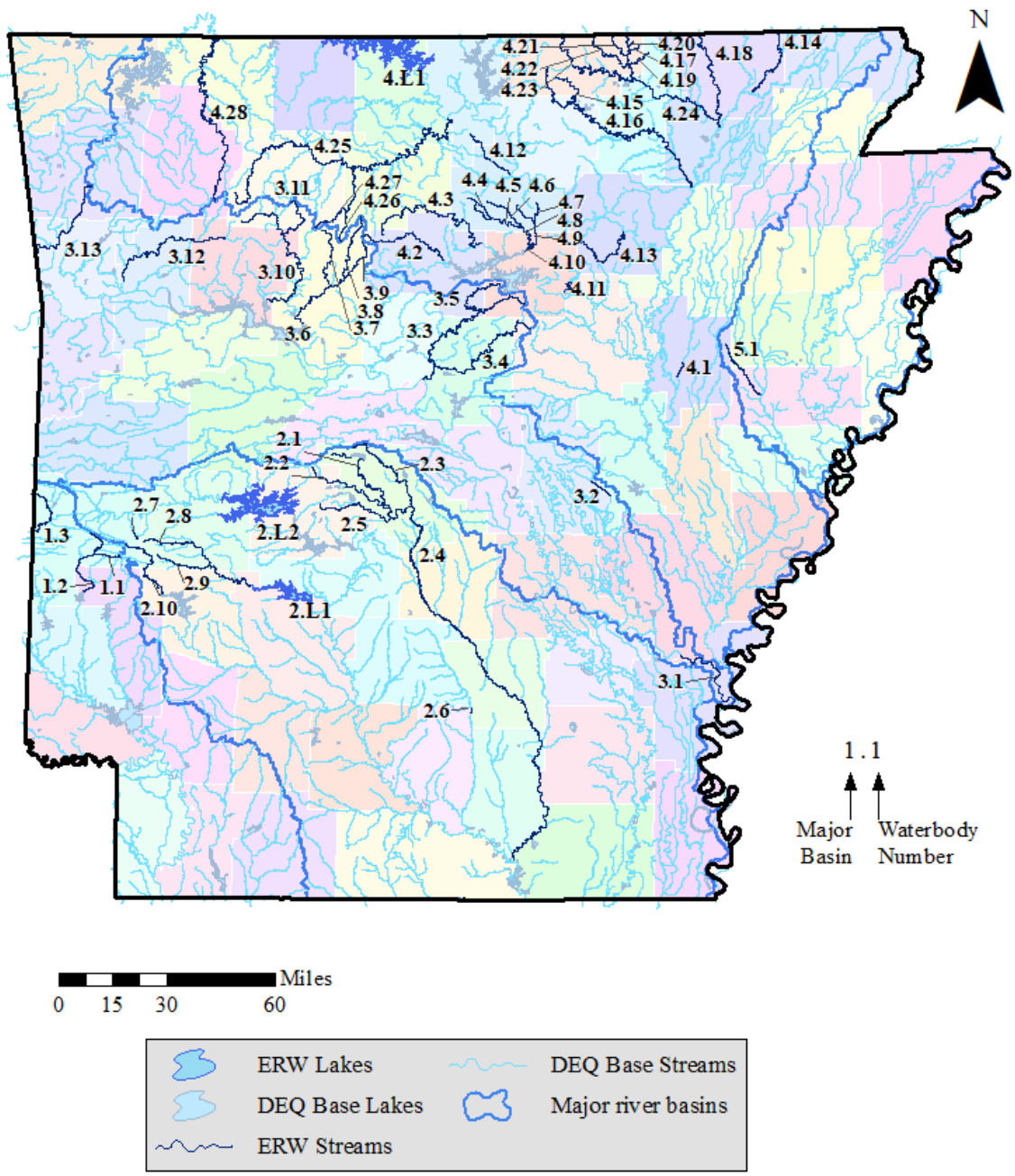

Figure 4-B: Arkansas's Extraordinary Resource Waters. Key in Table I-B

Table I-B. Stream names corresponding to numerical identifier in Figure 4-B.

1. Red River Basin	**3. Arkansas River Basin**	4.3 Mid. Fork Little Red River	4.21 English Creek
1.1 Caney Creek	3.1 Arkansas River	4.4 Lick Creek	4.22 Myatt Creek
1.2 Cossatot River	3.2 Bayou Two Prairie	4.5 Turkey Creek	4.23 South Fork Spring River
1.3 Mountain Fork	3.3 Cadron Creek	4.6 Tomahawk Creek	4.24 Spring River
2. Ouachita River Basin	3.4 East Fork Cadron Creek	4.7 Beech Creek	4.25 Buffalo River
2.L.1 DeGray Lake	3.5 North Fork Cadron Creek	4.8 Little Raccoon Creek	4.26 Falling Water Creek
2.L.2 Lake Ouachita	3.6 Illinois Bayou	4.9 Raccoon Creek	4.27 Richland Creek
2.1 Alum Fork Saline River	3.7 North Fork Illinois Bayou	4.10 Devils Fork Little Red River	4.28 Kings River
2.2 Mid Fork Saline River	3.8 Mid. Fork Illinois Bayou	4.11 Big Creek	**5. St. Francis Basin**
2.3 North Fork Saline River	3.9 East Fork Illinois Bayou	4.12 North Sylamore Creek	5.1 Second Creek
2.4 Saline River	3.10 Big Piney Creek	4.13 Salado Creek	
2.5 South Fork Saline River	3.11 Hurricane Creek	4.14 Current River	
2.6 Moro Creek	3.12 Mulberry River	4.15 Little Strawberry River	
2.7 Big Fork	3.13 Lee Creek	4.16 Strawberry River	
2.8 Caddo River	**4. White River Basin**	4.17 Big Creek	
2.9 Caney Creek	4.L.1 Bull Shoals Lake	4.18 Eleven Point River	
2.10 South Fork Caddo River	4.1 Cache River	4.19 Gut Creek	
2.11 Little Missouri River	4.2 Archey Creek	4.20 Field Creek	

There are approximately 2,100 stream miles and 83,249 lake acres delineated on the DEQ Base Layer as ERWs.

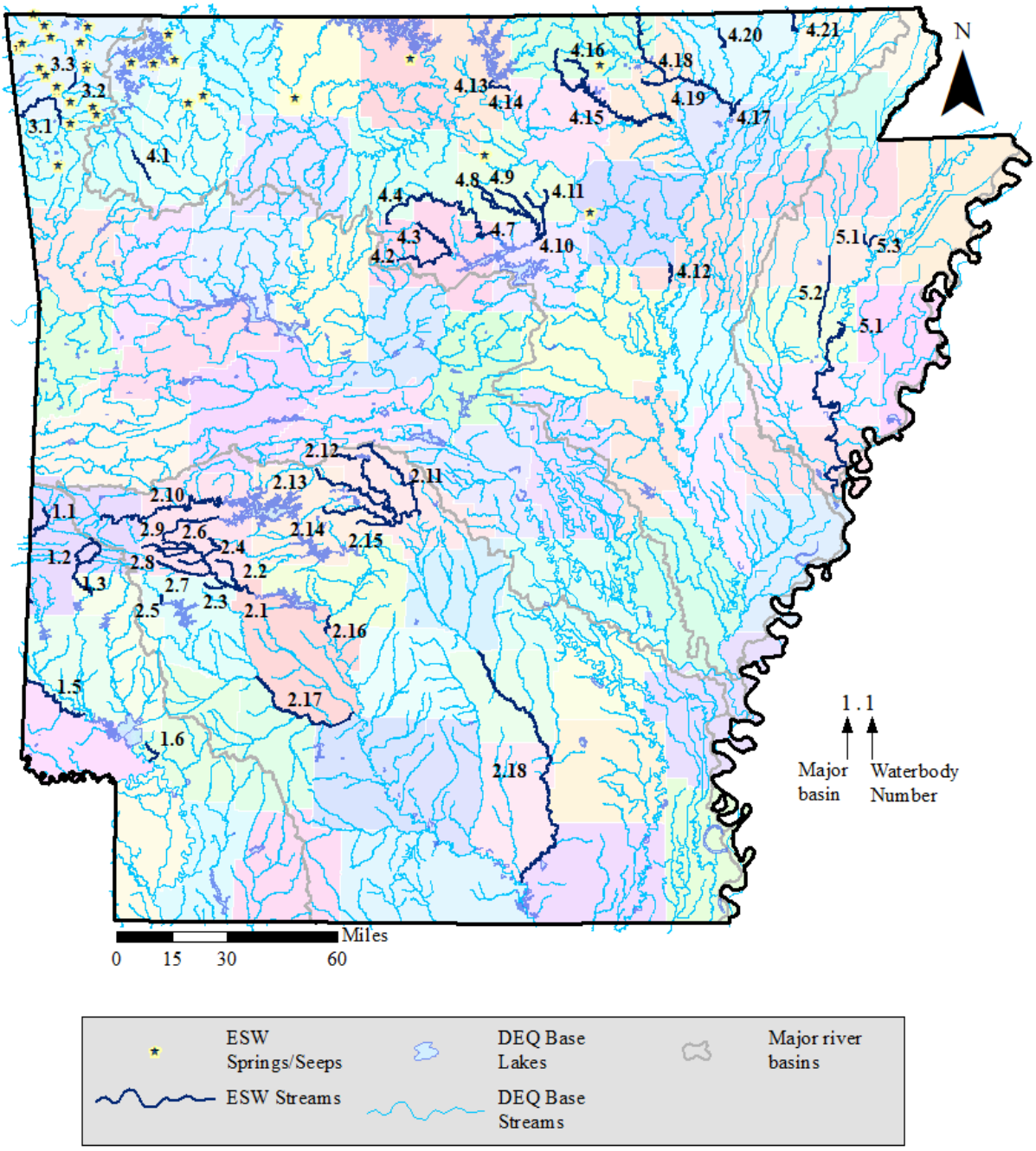

Figure 5-B: Arkansas's Ecologically Sensitive Waters. Key in Table II-B

Table II-B. Stream names corresponding to numerical identifier in Figure 5-B.

1. Red River Basin	2.11 North Fork Saline River	4.5 Devils Fork Little Red River	**5. St. Francis Basin**
1.1 Mountain Fork	2.12 Alum Fork Saline River	4.6 Beech Fork	5.1 Saint Francis River
1.2 Brushy Creek	2.13 Middle Fork Saline River	4.7 Turkey Creek	5.2. Straight Slough
1.3 Cossatot River	2.14 South Fork Saline River	4.8 Lick Creek	5.3 Right Hand Chute Little River
1.4 Robinson Creek	2.15 Tenmile Creek	4.9 Tomahawk Creek	
1.5 Little River	2.16 Ouachita River	4.10 Raccoon Creek	
1.6 Yellow Creek	2.17 Little Missouri River	4.11 Little Raccoon Creek	
2. Ouachita River Basin	2.18 Saline River	4.12 Departee Creek	
2.1 Caddo River	**3. Arkansas River Basin**	4.13 North Fork River	
2.2 Caney Creek	3.1 Illinois River	4.14 Otter Creek	
2.3 Rock Creek	3.2 Osage Creek	4.15 Strawberry River	
2.4 Collier Creek	3.3 Little Osage Creek	4.16 Little Strawberry River	
2.5 South Fork Caddo River	**4. White River Basin**	4.17 Black River	
2.6 Lick Creek	4.1 White River	4.18 Spring River	
2.7 Mill Creek	4.2 South Fork Little Red River	4.19 Rock Creek	
2.8 Polk Creek	4.3 Archey Creek	4.20 Eleven Point River	
2.9 South Fork Ouachita River	4.4 Middle Fork Little Red River	4.21 Current River	

There are approximately 1,500 stream miles delineated on the DEQ Base Layer as ESWs.

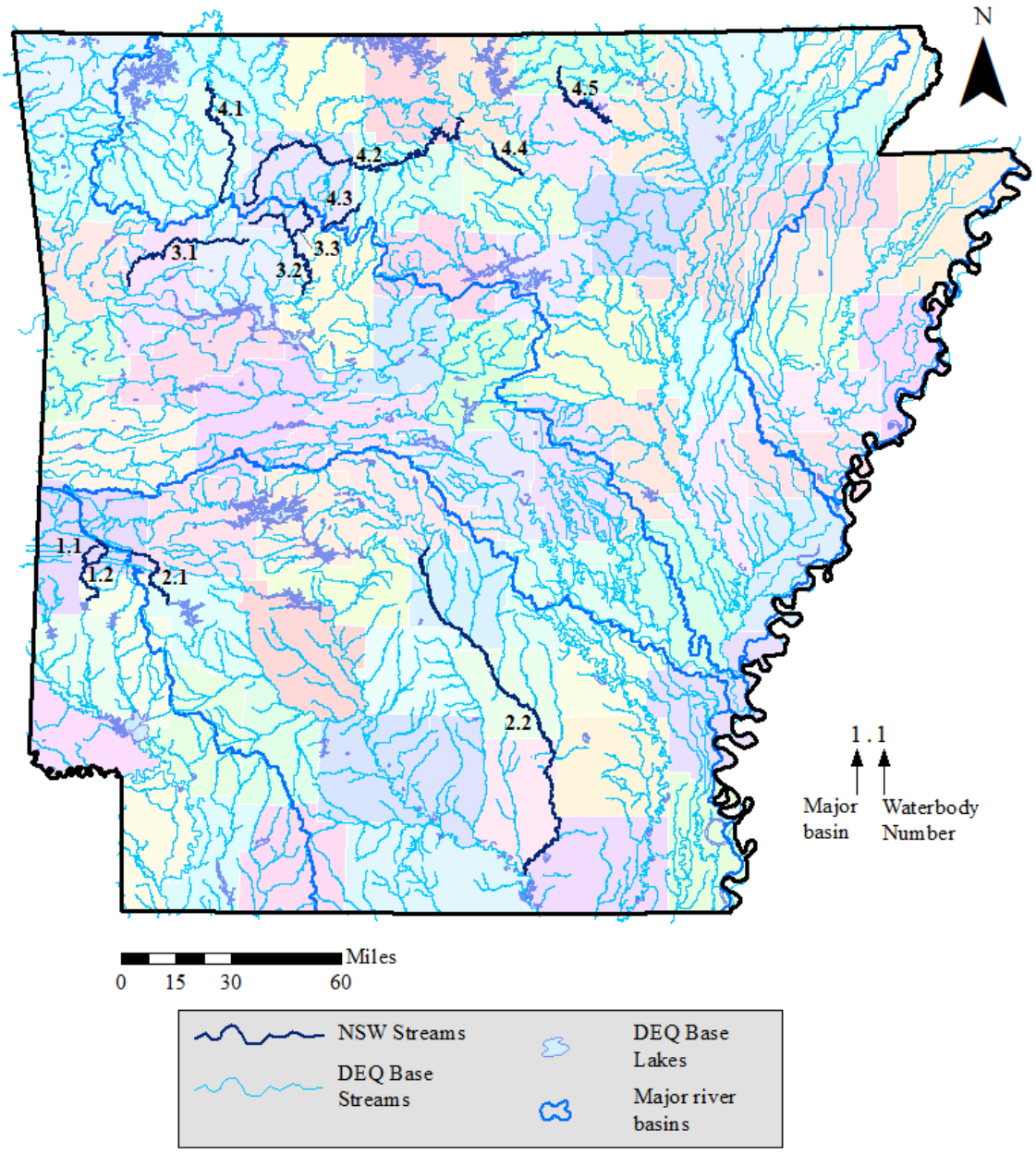

Figure 6-B: Arkansas's Natural and Scenic Waters. Key in Table III-B

Table III-B. Stream names corresponding to numerical identifier in Figure 6-B.

1. Red River Basin	2. Ouachita River Basin	3. Arkansas River Basin	4. White River Basin
1.1 Brushy Creek	2.1 Little Missouri River	3.1 Mulberry	4.1 Kings River
1.2 Cossatot River	2.2 Saline River	3.2 Big Piney Creek	4.2 Buffalo River
		3.3 Hurricane Creek	4.3 Richland Creek
			4.4 North Sylamore Creek
			4.5 Strawberry River

There are approximately 720 stream miles delineated on the DEQ Base Layer as NSWs.

B.2 WATER POLLUTION CONTROL PROGRAMS

Water Quality Standards

The Arkansas Water and Air Pollution Control Act (AWAPCA) designates DEQ as the state water pollution control agency for purposes of the CWA pursuant to Arkansas Code Ann. § 8-4-206. Under the AWAPCA, pursuant to Ark. Code Ann. § 8-4-201, DEQ is empowered to administer and enforce all laws and rules relating to the pollution of waters of the state and PC&EC is authorized to promulgate rules, including WQS and the classification of the waters of the state. Ark. Code Ann. § 8-4-102 broadly defines "waters of the state" as:

> *...all streams, lakes, marshes, ponds, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flows through, or border upon the state or any portion of the state.*

Arkansas' water quality standards are located in Title 8 of the Code of Arkansas Rules (8 CAR) Part 21, Rule Establishing Water Quality Standards for Surface Waters of the State of Arkansas.

Surface Water

Waters of the state have been designated to support multiple uses based on the potential attainability of the use.

Specific criteria to protect the designated uses of each waterbody were developed, in part, from the intensive ecoregion studies, an abundance of historical data, numerous additional scientific data, and considerable public and other governmental agency input. Criteria are numeric (measurable water quality benchmarks) or narrative (statements that establish water quality requirements). Aquatic life uses are specifically defined to provide a framework for aquatic life designated use support, which includes community structure and toxicity investigations.

In part, WQS are developed with physical, chemical, and biological data from least-disturbed streams with characteristics most typical of a particular Level III ecoregion. Ecoregions were established based on land surface forms, natural vegetation, soil types, and land uses. A single Level III ecoregion can span from one edge of the state to the other and encompass two or three major river basins. The physical, chemical, and biological characteristics of one river basin within a particular Level III ecoregion may or may not be similar to the characteristics of the other river basins in the same ecoregion. In addition, the characteristics of transitions zones between ecoregions, the transition zone of a stream from a highland stream to a lowland stream, and the areas within atypical features of ecoregions may or may not be similar to typical ecoregion characteristics. Therefore, provisions are established in the WQS to allow modifications of the criteria and the designated uses of specific waterbodies based on current

actual uses, social and economic needs of the area of concern, existing uses, and ERW, ESW, or NSW designation.

Point Source Control Program

On November 1, 1986, EPA delegated the NPDES Permit Program to DEQ. The Permits Branch of the OWQ administers this program.

In accordance with the CWA, Section 303(e), Arkansas maintains a Continuing Planning Process (CPP) to integrate the NPDES Program, Arkansas's WQS, and the WQMP. In accordance with Section 208 of the Clean Water Act, the WQMP is an inventory of all permitted municipal and industrial point source dischargers in Arkansas that contain permit limits for water quality-based conventional pollutants including, but not limited to, carbonaceous biochemical oxygen demand ($CBOD_5$), biochemical oxygen demand (BOD_5), total suspended solids (TSS), ammonia nitrogen (NH_3-N), and dissolved oxygen (DO). The WQMP also contains information associated with each facility such as facility name, permit number, location, design flows, receiving stream name, and critical flows along with waste load allocations consistent with an approved TMDL. As new information is developed, revisions to the WQMP are made and public noted in accordance with the public participation requirements of the CWA.

The Commission has adopted by reference in 8 CAR Part 25, the federal regulations applicable to a NPDES wastewater discharge permitting program. Figure 7-B illustrates the distribution of Arkansas's major and selected minor NPDES permits. Individual and general NPDES Permits are issued for point source discharges made to waters of the state. The OWQ issues non-stormwater general permits for discharges from landfill sediment ponds, aggregate facilities, individual sanitary treatment units, water treatment plants, hydrostatic testing, car/truck washes, groundwater cleanup, non-contact cooling water, cooling tower blowdown, and boiler blowdown. A general permit for pesticide discharges has also been issued and pesticide discharges are permitted by rule in accordance with 8 CAR § 25-206.

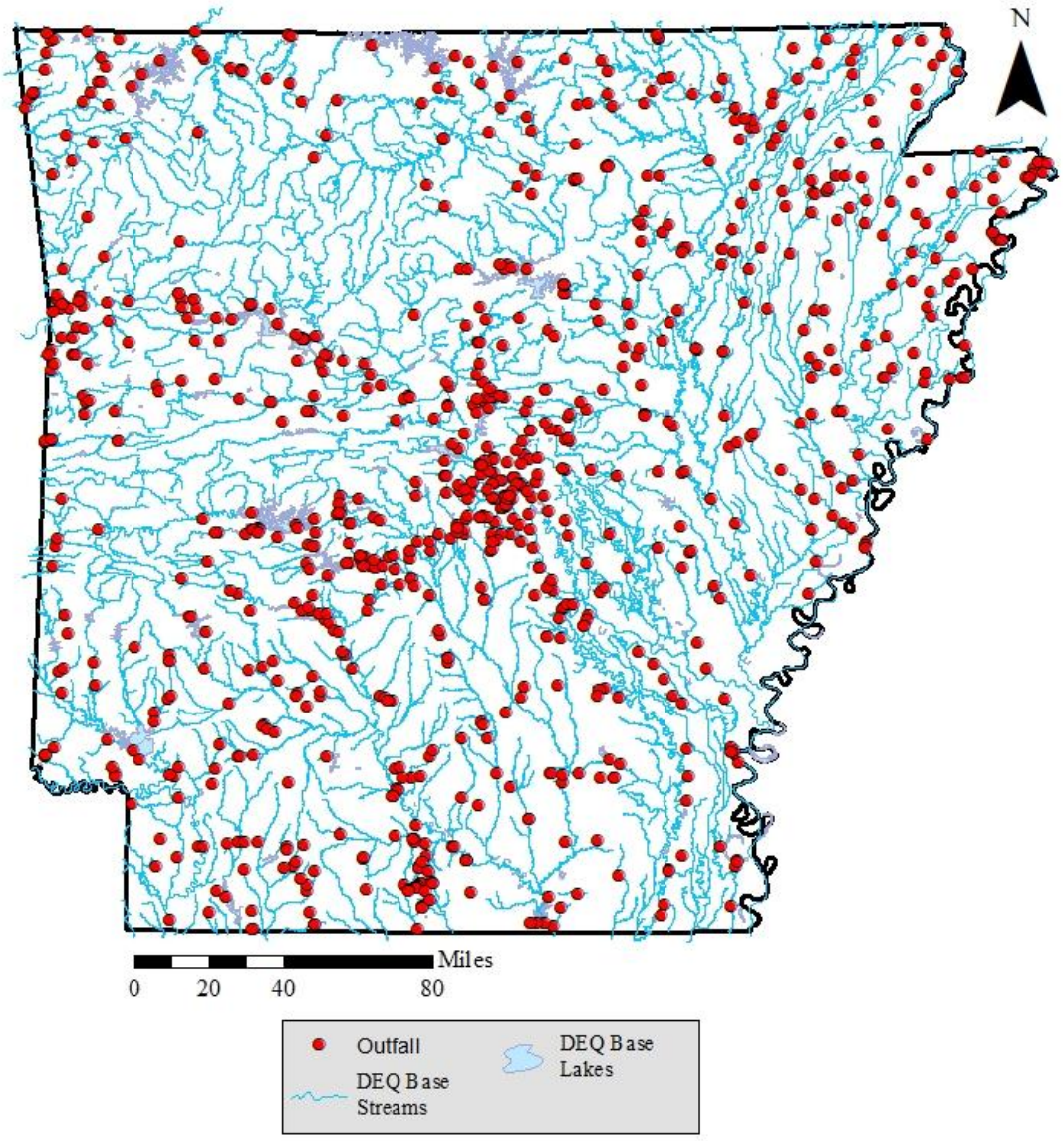

Figure 1-B: Active NPDES Permitted Facilities

Stormwater Requirements

The OWQ Permits Branch manages three (3) general permits covering various stormwater discharges. The Construction Stormwater General Permit (ARR150000) covers any type of construction activity that is subject to permitting requirements. This general permit requires the development of a Stormwater Pollution Prevention Plan (SWPPP) using best management practices (BMP) to control sediment contamination from stormwater runoff, erosion, and other waste generated at a construction site. The SWPPP must include a detailed description of the construction project; a detailed site map showing drainage, sediment and erosion controls, discharge locations, etc.; a description of the sediment and erosion controls used on the site; inspection and maintenance procedures for the sediment and erosion controls, documentation for TMDL, and water quality standards compliance; and certifications.

The Industrial Stormwater General Permit (IGP; ARR000000) covers many industrial types that are required by federal regulation to obtain permit coverage based on the specific Standard Industrial Code or specific industrial activity. Industries covered under the IGP, except no-exposure IGP, are required to monitor for two basic parameters, TSS and pH, once per year within the first thirty minutes of a storm event. In addition, some industries, based on the specific industrial sector or activity defined in the IGP, are required to monitor for additional parameters. Facilities subject to effluent limitation guidelines must monitor numeric effluent limits once per quarter until a reduced frequency is approved by DEQ. Facilities that discharge into an impaired waterbody or a waterbody that has a TMDL within five (5) stream miles are required to monitor once per quarter for the pollutants for which the waterbody is impaired or contribute to the impairment until a reduced frequency is approved by DEQ. Facilities that discharge into an ERW, NSW, or ESW waterbody within five (5) stream miles are required to monitor benchmark parameters once per quarter until a reduced frequency is approved by DEQ. Facilities with permit coverage must conduct quarterly routine inspections. At least one routine inspection must be conducted during the period when a stormwater discharge is occurring. They must schedule and conduct corrective action if their monitoring results indicate a parameter benchmark exceedance. The monitoring results, routine inspections, and any corrective action needed must be included and kept at the site with the annual report. This general permit requires the development of a SWPPP using BMPs to address the reduction in pollutants exposed to the stormwater runoff and/or removal of the pollutants from contaminated stormwater. The SWPPP must include a list of personnel who are responsible for implementing and maintaining control measures, including non-stormwater discharge certification, good housekeeping, spill prevention and response, and inventory of exposed materials.

Industries that do not have any part of their operation exposed to stormwater may submit a no-exposure certification request. Facilities with a no-exposure certification are not required to develop a SWPPP, monitor, or produce an annual report.

The Small Municipal Separate Storm Sewer System (MS4) General Permit (ARR040000) covers all the regulated small MS4s (generally serving populations less than 100,000) in the state. This general permit requires the development of a Stormwater Management Plan (SWMP) to address the six minimum control measures: public education, public participation, illicit discharge detection, construction site control, post-construction control, and good housekeeping, as required by federal regulation. Each Small MS4 permittee with coverage under this general permit is required to submit an annual report explaining the different activities carried out under their SWMPs that year and the progress toward the defined goals set out in the SWMP.

The Permits Branch also manages one individual medium MS4 Permit (ARS000002) covering the storm sewer discharges from the City of Little Rock and the Arkansas Department of Transportation. This permit requires the development of a program to address the same basic measures as the ARR040000 general permit. This permit also requires the co-permittees to sample the stormwater discharges from selected, representative, permitted outfalls on a quarterly basis.

Point Source Impacts Monitoring

Impacts from major point source discharges of concern are monitored primarily through strategically located water quality monitoring stations within the statewide AWQMN. The water quality data collected at these stations enable DEQ to identify impacts potentially caused by the discharge and identify areas of concern needing enforcement or some other type of abatement activity. Data can also indicate improvement of water quality conditions resulting from pollution control activities. In addition, self-monitoring through monthly discharge monitoring reports is required in the NPDES permits of most dischargers (see “Enforcement” section below).

Toxics Strategy

Since fiscal year 1987, DEQ has utilized toxicity testing as a monitoring tool to measure compliance with its narrative toxicity standard, which states (in part), “Toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life, or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota” (8 CAR § 21-508). The implicit intent of the toxics strategy is that there shall be no discharge of any wastewater from any source that:

1. Results in the endangerment of any domestic water supply;
2. Results in aquatic bioaccumulation that endangers human health;
3. Results in any in-stream acute or chronic aquatic toxicity; or
4. Violates any applicable general or numeric state or federal WQS.

The current toxicity testing program consists of self-monitoring conducted by the NPDES permittees. DEQ has been and will continue to implement the post-third round permit policy

endorsed by EPA Region 6, with minor revisions. Whole effluent toxicity (WET) testing requirements are included in all major and selected minor permits.

Between 1981 and 1988, the PC&EC adopted numeric aquatic life criteria for twelve (12) pollutants for acute and chronic toxicity, 8 CAR § 21-508. In 1991, seven (7) human health criteria were adopted. On December 22, 1992, EPA promulgated the National Toxics Rule which included numeric aquatic life criteria for ten (10) heavy metals and cyanide. These criteria were initially expressed as total recoverable metals. Later EPA modified these values by applying a conversion factor to the total recoverable values and expressed them as dissolved values. The EPA National Toxics Rule aquatic life criteria for chromium (VI), mercury, and cyanide are expressed as a function of the pollutant's water-effect ratio (WER), while aquatic life criteria for cadmium, chromium (III), copper, lead, nickel, silver, and zinc are expressed as a function of the pollutant's WER and as a function of hardness. In January 1998, the PC&EC adopted the eleven (11) aquatic life criteria that were part of the EPA's National Toxics Rule. In 2025, PC&EC adopted five (5) human health criteria.

When NPDES permit applications are submitted, in-stream waste concentrations (IWC) for all potential pollutants for which there is no adopted state standard are calculated and compared to values listed in the EPA's National Recommended Water Quality Criteria tables for both aquatic life and human health. Values are also compared against the National Primary Drinking Water Regulations (NPDWR) to evaluate potential for domestic water supply use impairment. If toxicity values published in the tables are exceeded by the calculated IWC, permitting may:

1. Require monitoring and reporting for the pollutant once per quarter for one (1) year (EPA aquatic life/human health recommended values);
2. Require monitoring and reporting for the pollutant for five (5) years (unable to determine reasonable potential to cause impairment of domestic water supply use based on NPDWR criteria); or
3. Require limits for the pollutant (determined reasonable potential to cause impairment of domestic water supply use based on NPDWR criteria)

Self-Monitoring for Toxicity

The objective of WET testing is to estimate the no observed effect concentration (NOEC) of a facility's effluent. The NOEC is defined as the greatest effluent dilution at and below which toxicity (lethal or sub-lethal) that is statistically different from the control (0% effluent) at the 95% confidence level does not occur. This concentration will allow continued protection of normal propagation of fish and other aquatic life in the receiving waters. Chronic toxicity tests are conducted for a period of seven (7) days and utilize the fathead minnow (*Pimephales promelas)* and the water flea (*Ceriodaphnia dubia).* The endpoints that are considered to determine adverse effects of toxicants for the fathead minnow are survival and growth. The

endpoints that are considered to determine adverse effects of toxicants for the water flea are survival and reproduction.

Acute toxicity tests are conducted for a period of forty-eight (48) hours and utilize the fathead minnow (*Pimephales promelas)* and the water flea (*Daphnia pulex).* The endpoint that is considered to determine adverse effects of toxicants for the fathead minnow and the water flea is survival.

WET testing is included in the major and significant minor industrial NPDES permits. WET testing is also included in both major and some minor municipal NPDES permits and in three (3) federal permits.

When a facility's effluent experiences a certain number of toxic events, a Toxicity Reduction Evaluation (TRE) is required. A sub-lethal TRE is triggered based on one (1) sub-lethal failure and sub-lethal failures in two (2) out of three (3) consecutive re-tests. A lethal TRE is triggered based on one (1) lethal failure and lethal failure in one (1) out of three (3) consecutive re-tests. A TRE is an investigation intended to determine those actions necessary to achieve compliance with water quality-based effluent limits by reducing an effluent's toxicity to an acceptable level. A TRE is defined as a step-wise process that combines toxicity testing and analyses of the physical and chemical characteristics of a toxic effluent to identify the constituents causing effluent toxicity and/or treatment methods that will reduce the effluent toxicity. The goal of the TRE is to reduce the toxic effects of effluent at the critical dilution. Depending on the results of the TREs, a facility will have either corrected treatment issues, relocated the effluent discharge, improved treatment capabilities, or assigned WET limits in their NPDES permits.

The NPDES General Permit number ARG790000, Groundwater Clean-Up located within the State of Arkansas, authorizes the discharge of treated groundwater/surface water that may have been contaminated with petroleum fuels. Determinations of coverage under this general permit are issued for short duration discharges, which sometimes only last for several months. The initial general permit was first issued on April 10, 1990. The initial general permit contained monthly acute WET testing requirements for all treated groundwater discharges, which included all permittees covered by the general permit. A notable difference for this specific permit's WET testing is that it is done on a pass/fail instead of NOEC basis. The monthly acute WET testing requirement has been continued with the effective date of the renewal permit on March 1, 1995; February 1, 2001; April 1, 2006; April 1, 2011; April 1, 2016; and April 1, 2021.

Accreditation of Monitoring Data

Ark. Code Ann. § 8-2-201 *et seq*., Environmental Laboratory Accreditation Program Act, establishes mandatory accreditation for certain environmental testing laboratories. Ark. Code Ann. § 8-2-204 clarifies DEQ's authority to refuse to accept analytical results from a laboratory

and establishes DEQ's enforcement powers over environmental testing. 8 CAR § 12-701 establishes the fee system for laboratory accreditation.

Enforcement

The Enforcement Branch of the OWQ implements the NPDES enforcement program. The primary basis for enforcement is self-monitoring data submitted by permittees on a discharge monitoring report (DMR). DMR data are entered into the Integrated Compliance Information System (ICIS) national database and reviewed by enforcement staff. DEQ addresses all permit violations reported by permittees initially through informal enforcement action where feasible. An escalation of enforcement action occurs if the violation(s) are not resolved. Other violations are judged on their severity and actions are taken, as necessary. Inspections from the OWQ's Compliance Branch are also an important source of violations data and a formal enforcement action may be initiated in proportion to the severity of the violations noted by DEQ staff in the field.

Wastewater Licensing and Training

Wastewater treatment plant operator licensing and training continues to be a necessary and integral part of the overall scope of the point source pollution control program. The licensing and training verification administered by the Wastewater Licensing Program operates within the authority of Ark. Code Ann. § 8-5-201 *et seq*. These statutes, and the rules promulgated thereunder, set the requirement by law that all operators of a public or private wastewater treatment plant be licensed and certified as competent by DEQ. Ark. Code Ann. § 8-5-207, as established by Act 211 of 1971, has required licensed operators at publicly operated treatment works since 1971. Ark. Code Ann. § 8-5-207 was amended by Act 1103 of 1991, adding the requirement for licensed operators at private wastewater treatment plants. There are currently approximately 3200 licensed operators in Arkansas, which includes both municipal and industrial operators. Classification of wastewater treatment plants by the unit processes determine the level of operator staffing and the licensing level of the plant operators.

The Arkansas Environmental Training Academy, a branch of Southern Arkansas University located at Camden, Arkansas, and the Arkansas Rural Water Association, Lonoke, Arkansas perform most wastewater treatment plant operator courses required to obtain a wastewater operator license. Over 60 classroom sessions and 700 license exams are administered annually at various locations around the state by approved trainers and DEQ staff with courses covering all class levels of wastewater operations. Private contractors, professional organizations, and other institutions of higher learning provide other sources of continuing education for wastewater licensing.

Nonpoint Source Control Program

In 1988, DEQ conducted a nonpoint source (NPS) assessment and prepared a management plan pursuant to Section 319 of the CWA. This assessment and portions of the original management program were approved by EPA Region 6.

In 1996, the former Arkansas Soil and Water Conservation Commission, now the Arkansas Department of Agriculture's Natural Resources Division, was designated as the NPS program management agency and the lead agency for the agriculture nonpoint source category. The Arkansas Forestry Commission assumed the responsibilities for the silviculture category. DEQ has retained the responsibility of assessing and reporting on nonpoint source pollution and the responsibilities associated with resource extraction (mining). The University of Arkansas Division of Agriculture, Cooperative Extension Service was designated for education outreach.

The Arkansas Department of Agriculture's collaborative partners include the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Arkansas Department of Energy and Environment, University of Arkansas System Division of Agriculture Cooperative Extension Service, The Nature Conservancy, Arkansas Department of Commerce, Discovery Farms, Arkansas Association of Conservation Districts, and many other entities which are involved in nonpoint source pollution reduction activities. The NPS Management Program prioritizes watersheds using a matrix approach. The 8-digit HUCs are further broken down into 12-digit HUCs to facilitate focus in implementing projects in critical areas. In addition, both entities and numerous other cooperators lend assistance and/or support to each of the priority watersheds.

Assessment

The initial Arkansas nonpoint source pollution assessment was completed in 1988. This assessment was updated in June 1997 using updated assessment criteria. The *Nonpoint Source Pollution Assessment Report* (NSPAR, DEQ, 1997) assessed 8,700 stream miles and indicated that nonpoint source pollution was impacting (but not necessarily impairing) over 4,100 stream miles. Agricultural activities were identified as the major cause of impacts on 3,197 stream miles. Other impacts were related to silviculture activities, road construction/maintenance activities, and unknown sources.

To reduce the confusion between the NSPAR and this document, DEQ no longer publishes a separate NSPAR. This document, updated every two (2) years, serves as the NSPAR.

Management Program

The 2024–2029 Arkansas NPS Management Plan (ADA, 2024) is developed and implemented by the Arkansas Department of Agriculture. It provides for continued monitoring of water quality, demonstrations of the effectiveness of BMPs, and implementation strategies of BMPs to

reduce nonpoint source pollutants and is updated every five (5) years. In-stream water quality monitoring is conducted in various priority areas as defined by the NPS Program. This work attempts to determine project effectiveness, evaluate NPS contribution trends, and verify water quality improvement as related to best management practice implementation specifically to known NPS sources. These data are used in DEQ's water quality assessment when appropriate.

No-Discharge State Permits

The No-Discharge Section of the Permits Branch issues individual permits relating to waste disposal systems that do not discharge directly to the waters of the state. These systems are most commonly located at commercial facilities and residential developments, with centralized or decentralized wastewater treatment systems, including septic tanks and leach fields. Individual permits are also issued for the land application of waste generated by different types of treatment facilities such as wastewater treatment plants, poultry processing plants, food-processing plants, and drilling fluids from oil and gas field exploration activities. The Permits branch issues general permits for commercial facilities (carwashes, slaughterhouses, animal care facilities, and laundromats) and land application of water treatment plant residuals. This Branch also administers the Underground Injection Control Program for Class I, III, and V wells (excluding bromine-related spent brine disposal wells).

Groundwater

DEQ is empowered to enforce and administer all laws and rules relating to pollution of the waters of the state, including groundwater, per Ark. Code Ann. § 8-4-201, because "waters of the state" include "…all bodies or accumulations of water, surface *and* underground…."

DEQ's Groundwater Protection Program maintains an ambient monitoring network to record historical and current groundwater-quality conditions. The Office of Land Resources within DEQ has rules pertaining to groundwater protections. DEQ's Brownfields Program uses the EPA Region 6 Human Health Media-Specific Screening Levels for purposes of evaluating risk to human health and the environment during site evaluation. Methodologies and standards for risk assessment at contaminated sites have been established. Risk assessments demonstrate the difficulty of simply establishing numerical standards for all contaminated sites, because groundwater quality standards must be established in a manner that will augment existing rules, provide a uniform set of criteria for defining and addressing groundwater contamination, and fill existing gaps in groundwater protection. Chief among the issues are fundamental policy decisions such as a non-degradation policy versus a risk-based or numeric cleanup standard, the role of stakeholders, coordination among applicable state agencies, and legislative support. In the event that statewide groundwater standard development is undertaken, these policy decisions must be made by a multi-agency team and receive input from multiple levels of agency management.

B.3 Cost / Benefit Analysis

CWA section 305(b) (and associated sections) requires states to provide an estimate of the environmental, economic, and social costs and benefits needed to achieve CWA objectives and an estimate of the date of such achievement.

A true cost/benefit analysis described above to fulfill CWA requirements would be burdensome and expensive. Therefore, EPA guidance (2005) suggests states include a brief narrative that includes as much of the following information as possible.

For costs, states may include "capital investments in municipal and industrial facilities, investments in nonpoint source measures, annual operation and maintenance costs of municipal and industrial facilities, total annual costs of municipal and industrial facilities, and annual costs to states and local governments to administer water pollution control activities."

For benefits, states may include "information on improvements in recreational and commercial fishing; extent of stream miles, lake acres, etc., improved from meeting WQS; reduced costs of drinking water treatment due to cleaner source water; and increase in use of beaches and recreational boating due to improved water quality."

Cost Information

Costs for implementing CWA regulations are summarized as agency programmatic implementation expenses, pollution abatement capital expenditures, and operating costs. Much of the water quality related budget is self-generated through permit fees; however, a portion is derived through federal grants. These grants include §106 grant money for water pollution control activities, § 319 grant money for nonpoint source management issues, and § 604(b) grant money for state ambient water quality analysis. Funds from these grants are divided throughout the appropriate water-quality related state programs as directed by each grant and provide funding for personnel, equipment, survey and research work, and ambient water quality monitoring.

State of Arkansas Budget for Water Quality Control Activities

DEQ has primary responsibility for permitting and enforcement of CWA provisions in Arkansas, but the implementation of water quality control activities is distributed across several state agencies, including DEQ, ADH, Rural Water Association of Arkansas, and ADA-NRD, among others.

Federal CWA Section 604(b) Budget

The § 604(b) grant program provides funding to OWQ's laboratory in the amount of approximately $50–100 thousand per fiscal year. The § 604(b) funds are used to help defray expenses for analytical work performed in the OWQ laboratory. Expenses include the equipment

and supplies necessary to perform sampling and chemical analyses of ambient river, stream, and lake water quality samples and compliance sampling inspection samples.

Federal CWA Section 106 Budget

The § 106 grant program provides funding for DEQ's general water pollution control/water quality management program. Activities funded under the § 106 grant include ambient water quality monitoring, assessment of ambient water quality data, development of the Integrated Report, revision of Arkansas's Water Quality Management Plan, development and revision of surface WQS, development and issuance of wastewater discharge permits (NPDES Program), compliance inspections, compliance investigations, and development of enforcement actions. For this period of record (POR), DEQ received approximately $2 million per fiscal year in federal CWA § 106 grant funding for these activities.

Federal CWA Section 319 Budget

The Clean Water Act § 319 grant for nonpoint source management in Arkansas is implemented by the Arkansas Department of Agriculture and its partners to prevent, control, and remediate nonpoint source pollution throughout Arkansas. Part B.2, Nonpoint Source Pollution Control has more information about the Nonpoint Source Program. The Arkansas Department of Agriculture receives approximately $3 million per fiscal year in federal funding for the NPS management program. For the period of record of this report, or federal grant years 2020–2024, $16,698,174 in federal funding was received and approximately $12,765,070 in match funds were generated for this program.

Benefits Information

The benefits of implementing the CWA are numerous. Clean water means higher revenue from aquatic related tourism and recreation, decreased costs to treat drinking water, and higher revenue from commercial fishing and aquaculture. Because economic reports are not specific to 305(b) reporting needs, DEQ reports these benefits as conservative estimates of ten percent (10%) of expenditures or revenue gains.

Tourism and Recreation

Arkansas has an abundance of streams, lakes, reservoirs, and ponds; most of which are used for some sort of aquatic recreation: fishing, swimming, kayaking, scuba diving, canoeing, hunting, motor boating, and waterskiing. All of these activities benefit from clean water, as does Arkansas's tourism revenue (directly or indirectly).

The Arkansas tourism industry was on a steady incline from 2016 – 2019, declined in 2020, and then saw a continued increase in visitors, with a 56% increase in visitors between 2020 and

2024[1]. However, many recreational areas experienced increased visitation in 2020. It's likely that, due to the COVID-19 pandemic, outdoor recreation was experienced more on a local level, which may explain the decline in tourism dollars. A conservative estimate for tourism revenue that directly benefited from implementation of the CWA (fishing, boating, canoeing, etc.) would be 10%. Using data from previous 305(b) reports, a conservative estimate of tourism revenue that directly benefited from implementation of the CWA, for the 2026 POR, is over $4.34 billion dollars.

Table IV-B: Estimate of tourism revenue in Arkansas that benefits from implementation of the CWA

Year	Travel expenditures in Arkansas (in billions of dollars)	Estimated tourism revenue that directly benefited from implementation of the CWA (in millions of dollars)
2020	$6.0	$600
2021	$8.0	$800
2022	$9.2	$920
2023	$9.9	$990
2024	$10.3	$1,030
Total		**$4,340**

According to a report given by Arkansas Game and Fish Commission (https://www.agfc.com/news/national-survey-sheds-new-light-on-outdoor-participation/) for the most recent data available (2022), an estimated $3.8 billion was spent in Arkansas for fishing related expenditures. If we assume a conservative ten percent (10%) benefit from the CWA that would be approximately $380 million.

Drinking Water

Arkansas has eighty (80) surface water intake systems that produce (collectively) an average of 386 million gallons per day (ADH personal communication). Cost to treat drinking water due to diminished water quality varies by contaminant and is dependent on multiple variables. Dearmont *et al.* (1998) conducted a case study in Texas and found that costs of treatment increased by $95 per million gallons when contamination is present. If we extrapolate this to

[1]Arkansas Tourism Economic Impact Report, 2024

Arkansas, this translates to a cost of over $36,000 per day or over $13 million annually. They also found that a one percent (1%) increase in turbidity increased chemical treatment costs by one-quarter percent (0.25%).

Aquaculture

According to the 2022 USDA Census of Agriculture (the most recent report), Arkansas has an approximate $83 million aquaculture industry, showing an approximate fourteen percent (14%) increase from the 2017 report[2].

Warm-water (smallmouth bass, striped bass, and walleye) and cold-water (trout) fisheries are another economically important industry for Arkansas. Arkansas has six (6) hatcheries operated by the Arkansas Game and Fish Commission (AGFC) and three (3) National Fish Hatcheries (NFH). According to the most recent report from the USFWS, for each $1 spent of budget expenditures at the Norfork NFH, $95 is invested at the state and local level. For every $1 of hatchery operational budget Greers Ferry hatchery spends, $113 is put back into the economy[3].

[2] https://www.nass.usda.gov/Publications/AgCensus/2022/index.php#full_report
[3] https://www.govinfo.gov/content/pkg/CHRG-113hhrg87010/pdf/CHRG-113hhrg87010.pdf

PART C: SURFACE WATER MONITORING PROGRAM

C.1 MONITORING PROGRAM

Water Quality Monitoring Program

Arkansas monitors more than 150 ambient river and stream surface water monitoring sites on a monthly to bi-monthly basis. The current monitoring program operates under four goals:

1) to better assess the effects of point source discharges upon water quality

2) to observe nonpoint source contributions over time

3) to continue monitoring the major rivers due to their basic importance to the State

4) to monitor high quality (least impaired) streams to provide long-term chemical data by physiographic region for use in future WQS revisions.

DEQ's monitoring program is thoroughly outlined in State of Arkansas Water Quality Monitoring and Assessment Program, Revision 6 (DEQ, 2020).

In 2019, DEQ initiated a routine lakes sampling program for approximately ninety (90) significant public lakes (see section C.3 for more), which will be sampled on a three-year rotation. Every three (3) years, priority lakes are re-evaluated and a new set of lakes are selected to be sampled. Ultimately, all of the publicly owned lakes should have three (3) years' worth of data every nine (9) to twelve (12) years. Before the establishment of the rotating program, DEQ had been sampling sixteen (16) of the largest lakes in Arkansas, with most being owned and operated by the United States Army Corps of Engineers (USACE), since 2011.

If a waterbody assesses as impaired, needs more information, or needs criteria re-evaluation, a special or intensive survey may be implemented, or the waterbody may be added to routine sampling. Table I-C lists DEQ - Water Quality Planning Branch projects within the 2026 POR. These surveys can include biological and/or special needs data collection dependent upon the impairment or type of information needed. All sample sites with data collection during the 2026 POR can be found in Figure 8-C.

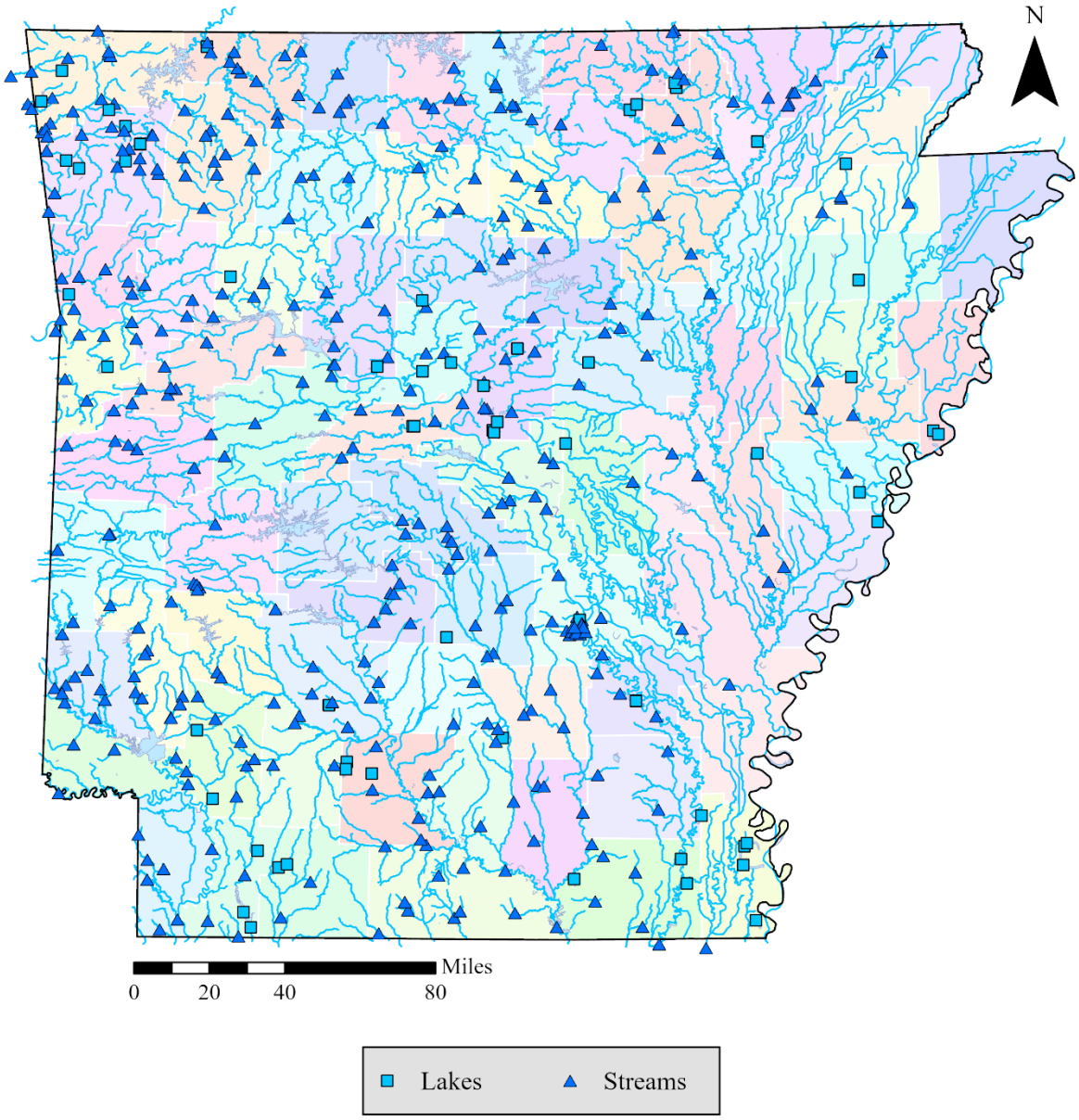

Figure 2-C: Sample Sites Collected by DEQ during the 2026 POR

Table I-C: DEQ Water Quality Planning Branch special projects during the 2026 POR

Name	Project Year(s)
Data Collection for the Development of Water Quality Criteria for Wadeable Streams in the Western South Central Plains	2018 – 2020
Data Collection for the Development of Water Quality Criteria for Wadeable Streams in the Central South Central Plains Ecoregion	2019 – 2022
Data Collection for the Development and/or Revision of Water Quality Criteria for Wadeable Streams in the Eastern South Central Plains	2020 – 2022
Assessment of the Effects of Holding Time on *E. coli* Densities in Arkansas Surface Water Samples	2021 – 2022
National Aquatic Resource Survey - National Lakes Assessment	2022
Data Collection for the Development of Water Quality Criteria for Wadeable Streams in the Arkansas Valley	2023 – 2024
Pine Bluff lead study	2022 – 2025
Supplemental Data Collection for Development and Refinement of Water Quality Criteria in Ozark Highlands and Boston Mountains Ecoregion Wadeable Streams	2022 – 2024
Data Collection for the Development of Water Quality Criteria for Wadeable Streams in the Mississippi Alluvial Plains Ecoregion	2025 – 2029

C.2 DATA USAGE

Arkansas strives to achieve comprehensive assessments by utilizing both DEQ data and data from outside sources. Assessment highlights are described below, but the full 2026 Assessment Methodology used for assessments can be found in Appendix C.

DEQ Data

Arkansas's water quality monitoring network is discussed in section C.1 and data are used as long as they meet the requirements laid out in the Assessment Methodology.

The majority of data that DEQ collects, analyzes, and maintains is stored in DEQ's LIMS, accessible through

https://www.adeq.state.ar.us/techsvs/env_multi_lab/water_quality_station.aspx. Two queries were conducted through DEQ's LIMS database entitled "Water Quality Monitoring Data":

Query 1:

Dates Queried	**Parameters Queried**
04/01/2020 – 03/31/2025	Chloride (mg/L)
	Dissolved Oxygen (DO) (mg/L)
	Escherichia coli (cfu/100mL)
	Escherichia coli (MPN/100 mL)
	Nitrite+Nitrate as Nitrogen (mg/L)
	pH (none)
	Sulfate (mg/L)
	Temperature, water (°C)
	Total dissolved solids (mg/L)
	Total Phosphorus (mg/L)
	Total Nitrogen from Lachat (mg/L)
	Turbidity (NTU)

Query 2:

Dates Queried	**Parameters Queried**
04/01/2022 – 03/31/2025	Ammonia-nitrogen (mg/L)
	Cadmium (mg/L)
	Cadmium (ug/L)
	Chromium (mg/L)
	Chromium (ug/L)
	Copper (mg/L)

	Copper (ug/L)
	Hardness, Ca, Mg (mg/L)
	Lead (mg/L)
	Lead (ug/L)
	Nickel (mg/L)
	Nickel (ug/L)
	Silver (mg/L)
	Silver (ug/L)
	Total Recoverable Beryllium (mg/L)
	Total Recoverable Beryllium (ug/L)
	Total Recoverable Selenium (mg/L)
	Total Recoverable Selenium (ug/L)
	Zinc (mg/L)
	Zinc (ug/L)

Data were not queried for the Beaver Lake nutrient criteria (Chlorophyll A (ug/L) and Secchi depth (m)) applicable from 1/1/2020 to 12/31/2024 at the Hickory Creek Site since that is not an established DEQ water quality monitoring station. This location is routinely sampled by other entities.

Data not stored in DEQ's LIMS includes:

- macroinvertebrate data, which can be accessed through https://www.adeq.state.ar.us/water/planning/surface/macroinvertebrates.aspx
- fish data, which can be accessed through https://www.adeq.state.ar.us/water/planning/surface/fish.aspx
- continuous data, which is stored internally at DEQ, but is available upon request.

Data from Outside DEQ

In accordance with the CWA under Section 303(d) and implementing regulations in 40 C.F.R. § 130.7, DEQ actively solicits existing and readily available water quality data from Arkansas and neighboring states. DEQ conducted data solicitation via electronic and postal correspondence to various agencies, municipalities, universities, and other entities who may have collected water quality data within the POR. DEQ also uses data uploaded to the Water Quality

Portal (WQX) (https://www.waterqualitydata.us/) as well as what is otherwise available (continuous data) on the USGS database (https://waterdata.usgs.gov/ar/nwis/current/?type=flow).

The 2026 Call for Data implemented a standardized submission platform for non-WQX data-submitters using DEQ's ePortal (https://eportal.adeq.state.ar.us/app/#/formversion/bb5bd0c4-7162-48d5-997d-8e61c1368d0b).

For the 2026 cycle, DEQ directly contacted 138 entities. In response, data were received and evaluated from entities listed in Table II-C. Figure 9-C shows where data were collected by each entity.

To be considered for assessment and attainment purposes, outside data must first pass all Phase I requirements:

- Be characteristic of the main water mass or distinct hydrologic areas. For example, not taken within a mixing zone, side channel, tributary, or stagnant backwater, etc.
- Be reported in standard units recommended in the relevant approved method and that conform to 8 CAR Part 21 or can be directly compared or converted to units within 8 CAR Part 21.
- Have been collected and analyzed under a DEQ accepted QA/QC protocol. Data collection protocols (QAPP and SOP, as apply) should accompany the data.
- All laboratory analyzed parameters (not *in situ*) must be analyzed pursuant to the rules outlined in the Environmental Laboratory Accreditation Program Act, Ark. Code Ann. § 8-2-201 *et seq.* The name and location of the laboratory should accompany the data.
- Be accompanied by precise collection metadata such as time, date, stream name, parameters sampled, and sample site location(s), preferably latitude and longitude in either decimal degrees or degrees, minutes, seconds.
- Be received in either a Microsoft Excel spreadsheet or compatible format not requiring excessive formatting by DEQ, preferably in the template provided by DEQ.
- Have been collected within the period of record for the current assessment cycle.

Once data pass Phase I requirements, they are then evaluated against Phase II requirements. Phase II requirements are specific to each parameter, but generally consist of temporal, quantity, distribution, and spatial requirements. See the Assessment Methodology (Appendix C) for specifics of Phase II requirements for each parameter.

Data that pass Phase I are assigned an assessment unit according to the site location on the DEQ base layer (see discussion in B.1). Phase II requirements are considered for aggregated data on the entire assessment unit and not based on site alone. There are instances where data collected at one site may not pass Phase II requirements alone but can be used for assessments after aggregation with data from another site on the assessment unit. Phase II requirements may be

considered by site alone when investigating possible differences in attainment within an assessment unit, which may result in the decision to split the assessment unit.

Data Not Used

In general, and as described in the Assessment Methodology (Appendix C), some existing and readily available data were evaluated but not used for assessments during the 2026 assessment cycle if they were:

- unable to meet all Phase I requirements (see above);
- unable to meet Phase II quantity, temporal, distribution, or spatial requirements on their own, or were unable to be aggregated with other data sets to meet Phase II requirements;
- duplicates within the same AU on the same day (most protective value was used for assessment purposes);
- taken outside of applicable watershed size requirements. For example, primary contact recreation is not assessed in watersheds less than ten square miles unless primary contact is verified;
- taken within springs or other groundwater sources;
- taken in non-stream or lake areas such as roadside ditches, puddles, etc.; or
- preliminary or provisional.

Specific existing and readily available data or data sets not used during the 2026 assessment cycle are described below.

The following describes data not used for each entity that submitted data in the 2026 POR:

Adventure Scientists – All data excluded due to calibration procedures, which were conducted once every six months.

Arkansas Division of Environmental Quality – Data collected in springs, seeps, mixing zones, or within 0.5 miles of a dam; data flagged for QC; and lake/reservoir data collected outside the epilimnion (for all applicable parameters) were excluded.

Arkansas State University – All total phosphorus and total nitrogen data were excluded due to no lab accreditation. All non-in situ parameters collected during 6/4/2022 through 9/15/2022 were excluded due to lapse in accreditation. Data from site CLC associated with project 17-200 and all data from sites SSC and NSC were excluded as DEQ could not verify site locations.

Arkansas Water Resources Center – Data collected during targeted storm flow events were excluded. Data collected during 2/15/2023 through 3/14/2023 were excluded due to lapse in accreditation.

Beaver Water District – Data from sites in backwater coves (Hotspot and Long Run projects) were excluded as these sites were not representative. All Secchi data was removed except what is applicable per 8 CAR § 21-509 (Hickory Creek site). All copper data were excluded due to no lab accreditation.

Buffalo River Watershed Alliance – QAPPs and SOPs were not received with data submission to validate data collection and analysis procedures, and as such all data newly submitted to the 2026 cycle was excluded.

Cherokee Nation – All data were excluded as the site was too close to a dam (75 meters below Siloam Springs Lake) and therefore not representative of the stream.

EPA National Aquatic Resources Survey – Data from site NARS_WQX-NRS_AR_10261 were excluded as the site was not representative.

Mississippi Department of Environmental Quality – Data collected from depths greater than 2 meters were excluded.

National Park Service – Data reported as summary statistics were excluded. Lapse in pH accreditation occurred from 3/13/2023 – 3/13/2024. Any submitted pH data within that time frame was excluded. Any data marked as a storm sample was excluded.

North American Lake Management Society – Data were excluded due to lack of QAPP documentation.

United States Geological Survey – Data collected from depths greater than 2 meters were excluded. Data marked as preliminary was excluded.

Table II-C: Entities with outside data submitted for the 2026 POR

Entity Name
Adventure Scientists
Arkansas State University (ASUERF)
Arkansas Water Resources Center (AWRC)
Beaver Water District (BWD)
Buffalo River Watershed Alliance (BRWA)
Cherokee Nation (CNO)
EPA National Aquatic Resources Survey (NARS)
Equilibrium
H2Ozarks
Illinois River Watershed Partnership (IRWP)
Mississippi Department of Environmental Quality (MSDEQ)
National Park Service – Buffalo National River (NPSBNR)
North American Lake Management Society (NALMS)
Texas Commission on Environmental Quality (TCEQ)
United States Geological Survey – Arkansas (USGS-AR)
United States Geological Survey – Oklahoma (USGS-OK)
United States Geological Survey – Louisiana (USGS-LA)

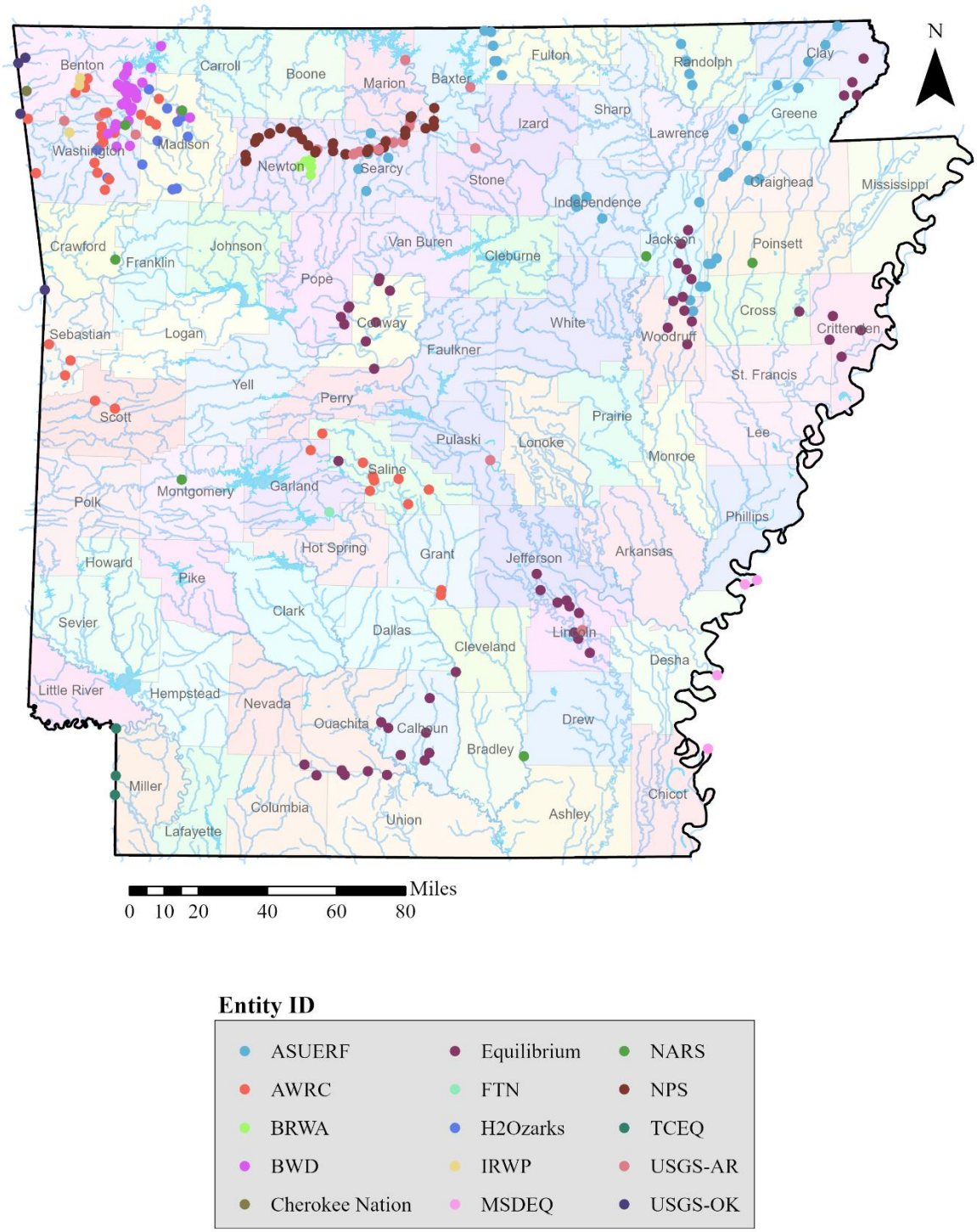

Figure 3-C: Data Used from Outside Sources

C.3 ASSESSMENT RESULTS

Rivers and Streams Assessment Summary

Attainment Summary

Tables III-C through V-C summarize the designated use support and WQS attainment status of Arkansas's rivers and streams. Non-support encompasses categories 5, 5-*r*, 4a, and 4b.

Table III-C: Designated use and WQS support in Arkansas's rivers and streams

Degree of Use Support	Assessed Total (Miles)
River and stream miles with no known use impairments for a designated use	3,350
River and stream miles that don't support at least one use	11,385
Total waters with insufficient or no data for a designated use (Category 3)	1,284

Table IV-C: Non-support of assessed rivers and streams by use type

Use Type	Non-Support (miles)
Agricultural & industrial water supply	152
Aquatic life	3,876
Domestic water supply	130
Fish consumption [4]	373
Other	3,750
Outstanding resource water	922
Primary contact	492

[4]Not a designated use.

Table V-C: Total river and stream miles not attaining WQS by parameter

Parameter	Stream Miles
Aluminum	2
Ammonia	36
Beryllium	2
Biological Integrity	527
Chloride	354
Copper	123
Dissolved Oxygen	2,977
E. coli	555
Lead	662
Mercury	434
Nitrate	67
pH	1,517
Phosphorus	32
Priority Organics	56
Selenium	17
Sulfates	310
Temperature	338
Total Dissolved Solids	388
Toxicity	6
Turbidity	2,960
Zinc	22

Lakes Assessment Summary

Background

Although selected lakes have had some historic, long-term assessments, the water quality data from many Arkansas lakes are sparse. Some lakes have been investigated as a short-term project when a specific or potential problem was identified. Such studies were associated with the Clean Lakes Section of the Water Quality Act, or municipal water supply reservoirs with treatment related concerns. In contrast, the Corps' lakes of the Little Rock District have a relatively large amount of historic, multi-parameter and multi-site water quality data. Additionally, DeGray Reservoir probably has the most extensive historic water quality database of any reservoir in this region of the country.

Arkansas currently has identified approximately ninety (90) significant publicly owned lakes (Figure 10-C) ranging in size from 40 to over approximately 40,000 acres. In 2007, construction was completed on the Lake Fort Smith dam in Crawford County in northwest Arkansas, which combined Lake Shepherd Springs and the original Lake Fort Smith. The new Lake Fort Smith is 1390 surface acres, 422 surface acres larger than the original two lakes combined.

As stated in section C.1, DEQ recently initiated a routine lakes sampling program for approximately ninety (90) significant public lakes, which utilizes a three-year rotation. Every three (3) years, priority lakes are re-evaluated and a new set of lakes are selected to be sampled. All of Arkansas's publicly owned lakes should have three (3) years of data every nine (9) years, when possible. Before the establishment of the rotating program, DEQ had been sampling only sixteen (16) of the largest lakes in Arkansas, with most being owned and operated by the United States Army Corps of Engineers (USACE), since 2011.

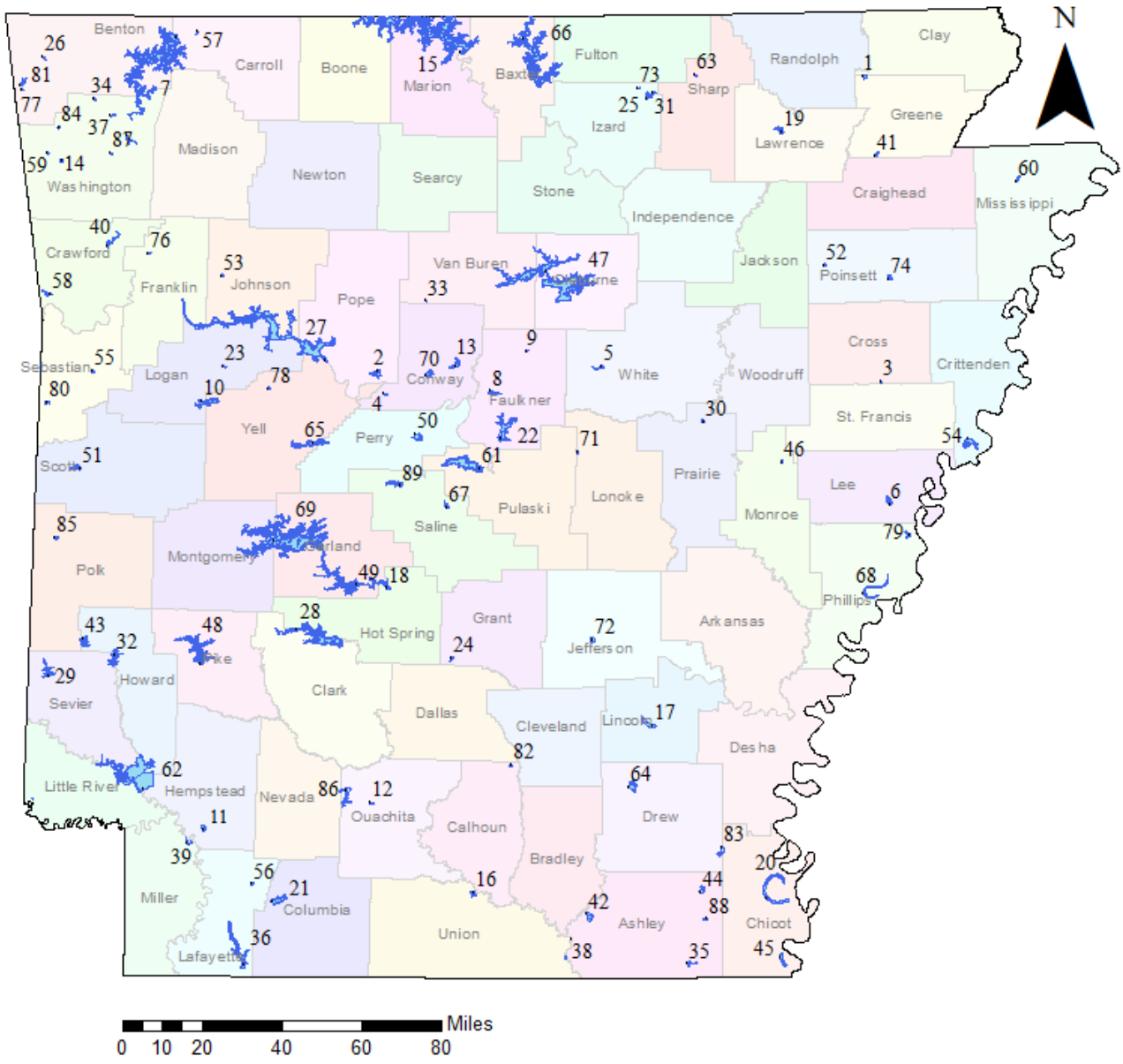

Figure 4-C: Significant Publicly Owned Lakes. Key in Table VI-C

Table VI-C: Lake names and characteristics corresponding to numerical identifier in Figure 10-C

Number	Lake	County	Acres	Average Depth (m)	Watershed (mi^2)	W/A[5]	Ecoregion[6]	Primary Purpose[7]
1	Ashbaugh	Greene	437	5	5.59	8.19	MAP	A
2	Atkins	Pope	129	6	10.8	53.58	AV	A
3	Austell	Cross	60	3	0.78	8.32	MAP	A
4	Bailey	Conway	111	8	9.27	53.45	AV	R
5	Barnett	White	257	27	37.5	93.39	AV	A
6	Bear Creek	Lee	493	10	6.04	7.84	MAP	R
7	Beaver	Benton	28117	58	1190	27.09	OH	H
8	Beaver Fork	Faulkner	722	10	11	9.75	AV	R
9	Bennet	Faulkner	32	N/A	3.33	66.60	AV	F
10	Blue Mountain	Logan	2972	9	488	105.09	AV	F
11	Bois D'Arc	Hempstead	642	4	4	3.99	SCP	A
12	Bragg	Ouachita	172	1.5	8.6	32.00	SCP	A
13	Brewer	Conway	131	20	36.4	177.83	AV	W
14	Budd Kidd	Washington	193	13	3.94	13.07	OH	A
15	Bull Shoals	Marion	33544	67	6036	115.16	OH	H
16	Calion	Union	495	6	18.4	23.79	SCP	A
17	Cane Creek	Lincoln	1734	6	23.8	8.78	SCP	A
18	Catherine	Hot Spring	1528	18	1500	628.27	OM	H

[5] Watershed (acres)/lake acres
[6] AV=Arkansas Valley; BM=Boston Mountains; MAP=Mississippi Alluvial Plains; OH=Ozark Highlands; OM=Ouachita Mountains; SCP=South Central Plains
[7] Corresponds with lake creation needs, not necessarily designated use(s). W=Water Supply; F=Flood Control; H=Hydropower; A=Angling; N=Navigation, R=Recreation

Number	Lake	County	Acres	Average Depth (m)	Watershed (mi^2)	W/A[5]	Ecoregion[6]	Primary Purpose[7]
19	Charles	Lawrence	550	8	19.7	22.92	OH	A
20	Chicot	Chicot	3828	15	17.4	2.91	MAP	R
21	Columbia	Columbia	2380	11	48	12.91	SCP	W
22	Conway	Faulkner	878	5	136	99.13	AV	A
23	Cove	Logan	126	10	9.87	50.13	AV	R
24	Cox Creek	Grant	245	6	9.09	23.75	SCP	A
25	Crown	Izard	610	N/A	13.5	14.16	OH	R
26	Crystal	Benton	38	12	5.3	89.26	OH	A
27	Dardanelle	Pope	34041	14	153666	2889.05	AV	N
28	DeGray	Clark	11521	49	432	24.00	OM	H
29	DeQueen	Sevier	1625	21	171	67.35	OM	F
30	Des Arc	Prairie	295	6	1	2.17	MAP	A
31	Diamond	Izard	113	N/A	1.86	10.53	OH	R
32	Dierks	Howard	1363	22	112	52.59	OM	F
33	Driver Creek	Van Buren	28	N/A	17.1	390.86	AV	A
34	Elmdale	Washington	146	8	7.77	34.06	OH	A
35	Enterprise	Ashley	198	5	2	6.46	MAP	A
36	Erling	Lafayette	5929	7	398	42.96	SCP	W
37	Fayetteville	Washington	171	15	9.38	35.11	OH	R
38	First Old River	Union	220	4	5.07	14.75	SCP	A
39	Felsenthal	Miller/Hempstead	1780	1.33	10800	3883.15	SCP	N
40	Fort. Smith	Crawford	1313	58	75	36.56	BM	W
41	Frierson	Greene	343	8	10.2	19.03	MAP	A
42	Georgia Pacific	Ashley	1559	4	4	1.64	SCP	W
43	Gillham	Howard	1157	21	273	151.01	OM	F

Number	Lake	County	Acres	Average Depth (m)	Watershed (mi^2)	W/A[5]	Ecoregion[6]	Primary Purpose[7]
44	Grampus	Ashley	335	6	2	3.82	MAP	A
45	Grand	Chicot	1192	7	9.81	5.27	MAP	A
46	Greenlee	Monroe	270	6	0.5	1.19	MAP	A
47	Greers Ferry	Cleburne	31034	60	1150	23.72	BM	H
48	Greeson	Pike	7085	39	238	21.50	OM	H
49	Hamilton	Garland	6706	26	1460	139.34	OM	H
50	Harris Brake	Perry	1260	6	11.2	5.69	AV	A
51	Hinkle	Scott	969	15	27.8	18.36	AV	A
52	Hogue	Poinsett	237	4	2	5.40	MAP	A
53	Horsehead	Johnson	109	16	17.3	101.58	BM	R
54	Horseshoe	Crittenden	2388	10	13.5	3.62	MAP	R
55	Jack Nolan	Sebastian	182	9	3.1	10.90	AV	A
56	June	Lafayette	75	5	6.35	54.19	SCP	A
57	Leatherwood	Carroll	85	N/A	13	97.88	OH	F
58	Lee Creek	Crawford	582	11	465	511.34	BM	W
59	Lincoln	Washington	85	N/A	12.5	94.12	OH	W
60	Mallard	Mississippi	318	6	0.5	1.01	MAP	A
61	Maumelle	Pulaski	8960	23	138	9.86	OM	W
62	Millwood	Little River	27920	5	4120	94.44	SCP	F
63	Mirandy	Sharp	26	N/A	1.07	26.34	OH	R
64	Monticello	Drew	1476	12.5	6.8	2.95	SCP	A
65	Nimrod	Yell	2594	8	680	167.77	AV	F
66	Norfork	Baxter	17960	57	1810	64.50	OH	H
67	Norrell	Saline	270	N/A	7.03	16.66	OM	W
68	Old Town	Phillips	2135	4	29.2	8.75	MAP	R

Number	Lake	County	Acres	Average Depth (m)	Watershed (mi^2)	W/A[5]	Ecoregion[6]	Primary Purpose[7]
69	Ouachita	Garland	38184	51	1100	18.44	OM	H
70	Overcup	Conway	805	4	16.6	13.20	AV	A
71	Pickthorne	Lonoke	325	5	13.2	25.99	MAP	A
72	Pine Bluff (Saracen)	Jefferson	467	6	42.2	57.83	MAP	A
73	Pioneer	Izard	30	N/A	0.45	9.60	OH	R
74	Poinsett	Poinsett	338	7	4.4	8.33	MAP	A
75	Sequoyah	Washington	425	8	274	412.61	OH	R
76	Shores	Franklin	72	10	49.9	443.56	BM	R
77	Siloam Springs	Benton	55	N/A	29.3	340.95	OH	R
78	Spring	Yell	81	23	17	134.32	AV	R
79	Storm Creek	Phillips	273	7	9.13	21.40	MAP	R
80	Sugarloaf	Sebastian	291	12	2.33	5.12	AV	A
81	SWEPCO (Flint Creek)	Benton	416	17	14	21.54	OH	W
82	Tricounty	Calhoun	287	7	15.3	34.12	SCP	A
83	Wallace	Drew	321	5	7.05	14.06	MAP	A
84	Wedington	Washington	86	16	3.96	29.47	OH	R
85	White Oak	Ouachita	1652	8	21	8.14	SCP	A
86	Wilhelmina	Polk	197	10	13.4	43.53	OM	A
87	Wilson	Washington	29	N/A	2.55	56.28	OH	W
88	Wilson Break	Ashley	148	5	1	4.32	MAP	A
89	Winona	Saline	1170	30	44.3	24.23	OM	W

Water Quality Standards Development

Lake Criteria Revision and Development

DEQ is currently sampling sets of lakes once a quarter in three (3) year cycles. The 2020–2022 cycle included twenty-three (23 lakes) across the state. The 2023–2025 cycle included twenty-eight (28) lakes. The data collected during these studies will be analyzed in support of numeric lake criteria revision and development.

In 2024, DEQ with EPA Region 6 and TetraTech conducted an update (Phase 2) with additional data to the original 2019 (Phase 1) Nutrient Scientific Technical Exchange Partnership and Support (NSTEPS) lake project. Since the end of the Phase 2 report, data collections on additional lakes have been completed.

Stream Criteria and Development

In 2024, DEQ with EPA Region 6 and TetraTech conducted an update (Phase 2) to the original 2019 (Phase 1) Interior Highlands ecoregions wadeable streams NSTEPS project to integrate additional data.

Data have been collected across a disturbance gradient in the Ouachita Mountains, South Central Plains, Arkansas Valley, Boston Mountains, and Ozark Highlands. These data are in the final processing stages and initial analyses have begun. A current and similarly designed study is being conducted in the Mississippi Alluvial Plain ecoregion, which will end in 2029. The data collected from these stream studies will support revision and development of criteria and Tiered Aquatic Life Uses (TALUs).

Attainment Summary

Tables VII-C through IX-C summarize the designated use support and WQS attainment status of the state's lakes. Non-support encompasses categories 5, 5-*r*, 4a, and 4b. Total surface acres of oxbow lakes in the Ouachita River basin are unknown. Some of these oxbow lakes are impaired for Hg and do not meet the fish consumption use, so there is an underestimate for fish consumption.

Table VII-C: Designated use and WQS support in Arkansas's lakes

Degree of Use Support	Assessed Total (acres)
Lake acres with no known use impairments for a designated use	32,682
Lake acres that don't support at least one use	104,960
Total lake acres with insufficient or no data for a designated use (Category 3)	19,529

Table VIII-C: Non-support of assessed lakes by use type

Designated Use Type	Non-Support (acres)
Agricultural and Industrial Water Supply	0
Aquatic life	20,116
Domestic water supply	902
Fish consumption[8]	72,909
Other uses	12,423
Outstanding Resource Waters	0
Primary contact recreation	877
Secondary contact recreation	877

Table IX-C: Total lake acres not attaining WQS by parameter

Parameter	Lake Acres
Chlorophyll-*a*	902
Dissolved oxygen	1,901
Mercury	72,448
Nutrients	17,651
Polychlorinated biphenyl (PCB)	461
pH	10,963
Turbidity	1,210
Zinc	243

[8] Not a designated use

Section 303(d)

Clean Water Act Section 303(d) requires states to identify waters that do not meet or are not expected to meet applicable WQS. These waterbodies are compiled into a list known as the 303(d) list or list of impaired waterbodies. The 2026 list of impaired waterbodies (303(d) list) (Tables XII-C through XVIII-C) contained in this report has not yet been approved by the EPA.

As with the 2024 list, the 2026 303(d) list format identifies specific conditions on which an assessment unit was listed, if known. Several parameters are subdivided by data type, season, or magnitude. Understanding the condition for the listing helps assessors know how the segment can be delisted in the future. DEQ also hopes that this extra level of detail will help guide future sampling or implementation of best management practices. This method may create what is perceived as more listings, but it reflects the listing condition more accurately. For example, an assessment unit may have been listed once for dissolved oxygen in 2018 but may have been impaired for both the critical and primary seasons, which have different criteria. The new format list is set up to reflect both of those conditions. This additional information was integrated into the "Parameter" column for the 2024 303(d) list. The column "Listing Status" was also added to help assessors track the longevity of a pollutant pair's placement on the list, which will aid in prioritizing re-sampling or TMDL development. "Remnant" listings are those that had either no data or not enough data to assess during the current POR. "Carry forward" listings are those that were already on the list and had enough assessable data during the current POR to assess as impaired. "New" listings are those that had not previously been on the list but were assessed as impaired during the current POR. Beginning in 2020, a column was added to track "Year Listed."

Deviations from Methodology and Corrections

Occasionally assessors will deviate from methodology. These deviations can result in an assessment of support/attainment (not impaired) or non-support/non-attainment (impaired). Such deviations are performed on a case-by-case basis using a weight of evidence approach. For example, if the minimum number of samples is not met, but there are a large percentage of exceedances in the samples provided, the AU may be assessed as impaired.

For the 2026 assessment, there were a few deviations from methodology or corrections from previous lists to report and these are outlined below:

- Due to the approval of the 2023 8 CAR Part 21 occurring after the 2026 assessment had begun, the 2026 assessment utilized the previously approved standards. The 2026 assessment occurred using the same standards used in the 2024 assessment.
- For macroinvertebrate assessments, if the data provided had only non-riffle habitat the final decision was determined as not enough information as the current assessment metrics cannot appropriately account for non-riffle habitat.

- The ADH issues fish consumption advisories for the state. While fish consumption is not a designated use, waterbodies under a fish consumption advisory will be listed as impaired for mercury in fish tissue on a case-by-case basis. Current fish consumption advisories can be found here: https://ark-dept-health.maps.arcgis.com/apps/dashboards/ebdce96cfa424186a38084517d34364b . A mercury taskforce between ADH, AGFC, and DEQ has been formed and works collaboratively to determine if mercury is exceeding the recommended limits in fish tissue.
- DEQ issues Harmful Algal Bloom advisories for the state. If a waterbody was found to have had two or more advisories within the POR, that waterbody was listed as impaired for Harmful Algal Blooms. The assessment methodology for these listings is attached to this report in the Appendices. Current and historical advisories can be found here: https://www.adeq.state.ar.us/water/planning/hab/

Assessment Categories

DEQ places AUs into categories upon assessment. AUs may be placed into more than one category if different parameters assess differently (Example: pH could attain and be placed in Category 1 while temperature does not attain and is placed in Category 5 for the same AU). Categories are listed below. Categories 4 and 5 contain AUs that do not attain their WQS. Categories 1 and 2 contain AUs that do attain WQS. Category 1b contains AUs that attain WQS but have a TMDL already in place for that parameter. Category 3 AUs need more data or information to make an attainment decision.

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 delisted with future revisions to 8 CAR Part 21, 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 DEQ assessed as unimpaired but were assessed as impaired by EPA.

***r* (*formerly referred to as alt*)**

- Waters currently not attaining one or more water quality standards, but alternative restoration approaches may be more immediately beneficial or practicable in achieving water quality standards than pursuing a TMDL approach in the near term.

Waterbodies listed on the 2024 list of impaired waterbodies are depicted on Figure 11-C (Category 4a and 1b listings) and Figure 12-C (Category 5, 5-*r*, and 4b listings).

Waterbodies not currently meeting WQS but have completed TMDLs for the impaired parameter are divided into two tables:

1) a list of stream segments in Category 4a (Table XII-C)
2) a list of lake segments in Category 4a (Table XIII-C)

Waterbodies not currently meeting WQS, but other management alternatives are expected to result in the attainment (Category 4b) can be found in Table XIV-C.

The 2024 list of impaired waterbody segments (Category 5) is divided into four tables:

1) a list of stream segments in Category 5 (Table XV-C)
2) a list of lake segments in Category 5 (Table XVI-C)
3) a list of stream segments in Category 5-*r* (Table XVII-C)
4) a list of lake segments in Category 5-*r* (Table XVIII-C)

TMDL Prioritization

In 2013, DEQ created the "Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act (CWA) 303(d) Program" in accordance with new measures set forth by EPA. This prioritization plan became known as "the Vision." DEQ has finalized five (5) TMDLs started under this prioritization plan:

- Overflow Creek (AR_08040205_908) – chloride, turbidity base flows, and turbidity storm flows
- Ables Creek (AR_08040205_911) – turbidity base flows and turbidity storm flows

EPA introduced a renewed framework, Vision 2.0, to pick up where the first Vision left off. For Vision 2.0 DEQ prioritizes developing new turbidity TMDLs for listed streams. Revising existing TMDLs, particularly those written as part of the May 2000 Consent Decree[9], also continues to be a priority.

[9] Sierra Club V. Whitman, Case No. LR-C-99-114 (E.D. Ark)

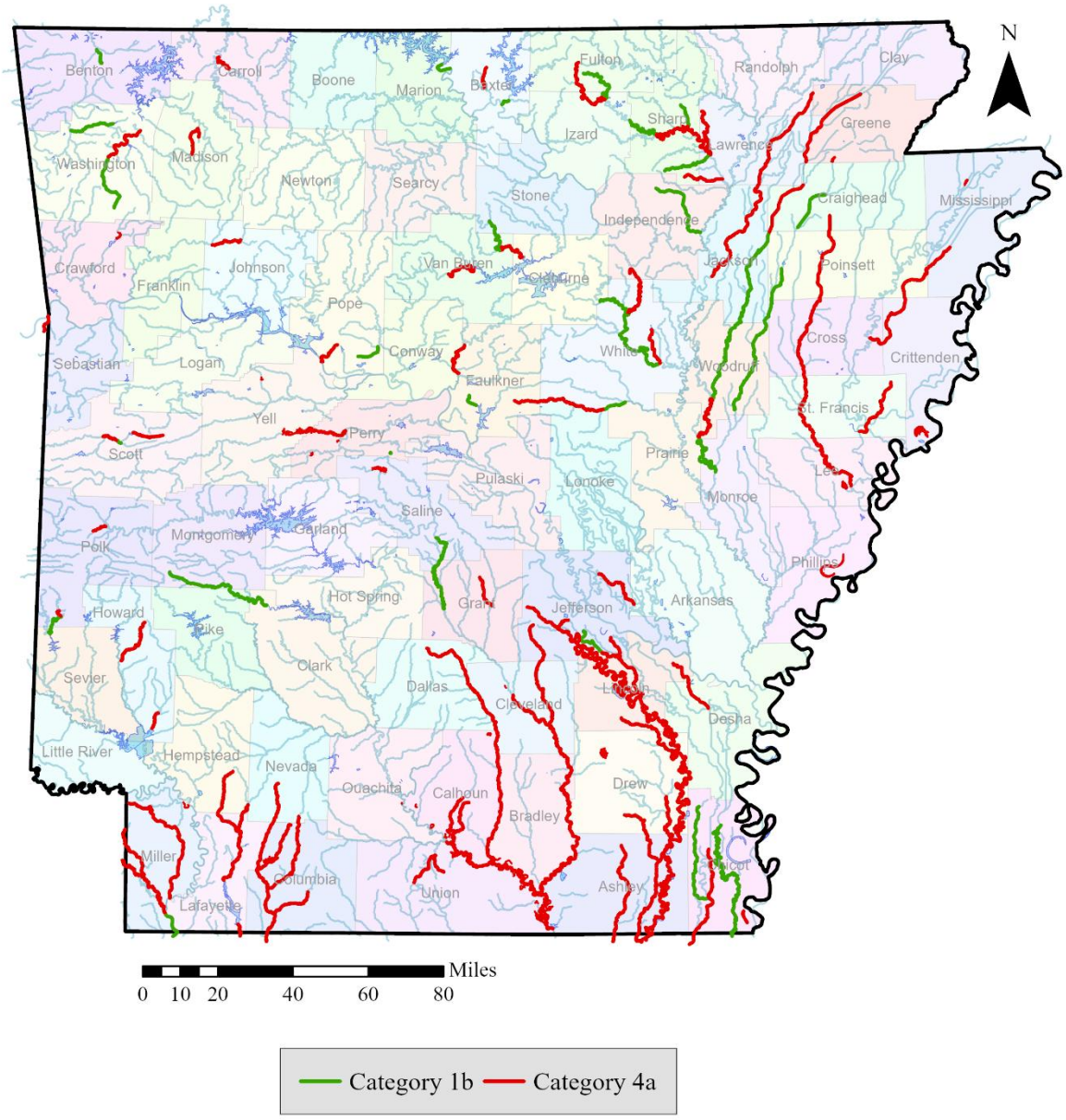

Figure 5-C: Arkansas's Waterbodies with non-attaining and attaining TMDLs (Categories 4a and 1b, respectively)

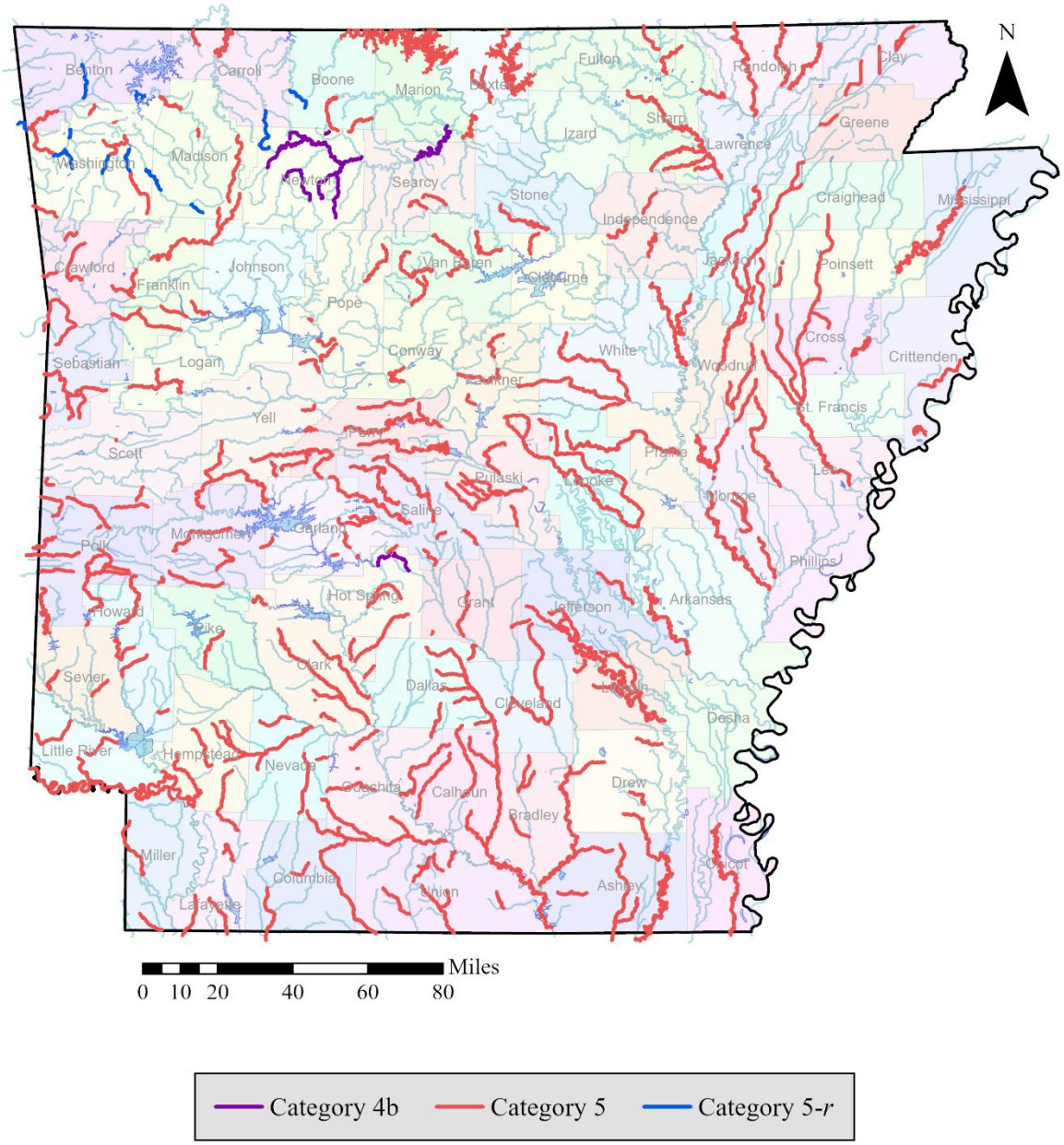

Figure 6-C: Arkansas's Impaired Waterbodies without Completed TMDLs (Category 5, 5-*r,* and 4b)

New and Removed Listings

Most of Arkansas's WQS were developed after the completion of the ecoregions of Arkansas survey. Least-disturbed waterbodies, approximately six (6), in each ecoregion were studied; the data compiled; average concentrations of water quality constituents were calculated; and standards were set based on those averages. On occasion, WQS for certain constituents, such as dissolved oxygen, temperature, and pH, will not be attained simply because of weather related conditions. As a result, some waterbodies will be evaluated as impaired during one period of record, only to be evaluated as fully supporting the next.

In addition, some waterbodies have been evaluated as impaired for a constituent simply because the natural background characteristics of the waterbody are significantly different than the ecoregion average. This occurs mostly with the WQS for pH, dissolved oxygen, and temperature. The table below (Table XI-C) lists the number of pollutant pairs that have been delisted from the 2024 POR. New listings can be identified in Tables XII-C through XVIII-C, which is now formatted to include a column for year listed. For now, only the new listings for the 2020, 2022, 2024, and 2026 cycles have this information filled out, but it is a goal to have this column completed for future 303(d) lists.

A pollutant pair is one waterbody and one water constituent. One waterbody may have more than one constituent not meeting WQS, such as pH and temperature. In this case, that would equal two pollutant pairs. There are some constituents that get subdivided further based on criteria found in 8 CAR Part 21 or by the Assessment Methodology. For example, metals are subdivided into acute and chronic toxicity, which have different criteria depending on the paired hardness. Beginning in the 2020 assessment, these details were included in the list, which creates a perception of more listings. Adding this level of detail is helpful both in knowing how to remediate the impairment, but also in delisting. As stated in the Assessment Methodology for metals, "An AU can only be delisted by the same criterion that was used to list it. For example, if an AU was listed using the [8 CAR § 21-512(a)] acute criterion, it can only be delisted using the [8 CAR § 21-512(a)] acute criterion delisting methodology."

To the extent possible, assessors identified the original reason for listing some of the parameters with different methodologies or criteria (i.e. dissolved oxygen, metals, turbidity, minerals, bacteria), which is reflected in the delisting table (Table X-C).

Table XI-C contains summary listings and delistings for each parameter.

Table X-C: Pollutant pairs delisted from the 2026 303(d) list

Previous Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Uses
5	1A	AR_11140205_010	pH	Little Bodcau Creek	26.46	Miles	OU
5	1A	AR_11140205_013	pH	Dooley Creek	19.46	Miles	OU
5	1B	AR_11140201_007	Turbidity Base Flow	Red River	41.01	Miles	OU
5	1B	AR_11140302_006	Critical Season DO	Sulphur River	8.15	Miles	AL
5	1B	AR_11140302_903	pH	Mill Creek	3.31	Miles	OU
5	1C	AR_11140109_021	pH	Pond Creek	21.10	Miles	OU
5	1C	AR_11140109_810	pH	Rock Creek	3.19	Miles	OU
5	1C	AR_11140109_935	pH	Mine Creek	10.72	Miles	OU
5	2B	AR_08040205_006	Lead Acute	Bayou Bartholomew	97.00	Miles	AL
5	2C	AR_08040203_007	Turbidity Base Flow	Saline River	10.42	Miles	OU
5	2C	AR_08040203_020	Critical Season DO	South Fork Saline River	16.44	Miles	AL, ORW
5	2C	AR_08040203_804	Critical Season DO	Hurricane Creek	4.01	Miles	AL
5	2C	AR_08040203_904	pH	Big Creek	15.62	Miles	OU
5	2D	AR_08040201_301	Critical Season DO	Pickett Creek	15.10	Miles	AL
5	2D	AR_08040201_306	Critical Season DO	North Fork Smackover Creek	9.55	Miles	AL
5	2D	AR_08040201_406	Critical Season DO	Smackover Creek	17.60	Miles	AL
5	2D	AR_08040201_701	Turbidity Base Flow	Lloyd Creek	19.10	Miles	OU
5	2D	AR_08040201_905	Lead Chronic	Two Bayou	35.68	Miles	AL
5	2D	AR_08040202_008	pH	Bayou de Loutre	4.50	Miles	OU
5	2D	AR_08040202_909	Chloride	Loutre Creek	0.97	Miles	AG, I
5	2D	AR_08040202_909	Sulfate	Loutre Creek	0.97	Miles	AG, I
5	2D	AR_08040202_909	Total Dissolved Solids	Loutre Creek	0.97	Miles	AG, I
5	2D	AR_08040201_616	Copper Acute	ECC Creek	4.67	Miles	AL
5	2D	AR_08040201_616	Copper Chronic	ECC Creek	4.67	Miles	AL

Previous Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Uses
5	2D	AR_08040201_616	Lead Chronic	ECC Creek	4.67	Miles	AL
5	2D	AR_08040202_008	Lead Chronic	Bayou de Loutre	4.50	Miles	AL
5	2D	AR_08040202_008	Selenium Acute	Bayou de Loutre	4.50	Miles	AL
5	2D	AR_08040202_008	Selenium Chronic	Bayou de Loutre	4.50	Miles	AL
5	2D	AR_08040202_008	Zinc Acute	Bayou de Loutre	4.50	Miles	AL
5	2D	AR_08040202_008	Zinc Chronic	Bayou de Loutre	4.50	Miles	AL
5	2D	AR_08040202_909	Selenium Acute	Loutre Creek	0.97	Miles	SAL
5	2D	AR_08040202_909	Selenium Chronic	Loutre Creek	0.97	Miles	SAL
5	2F	AR_08040102_003	Biological Integrity - Fish	L'Eau Frais Creek	32.75	Miles	AL
5	2F	AR_08040102_807	Biological Integrity - Fish	Chatman Creek	13.97	Miles	AL
5	2F	AR_08040102_807	pH	Chatman Creek	13.97	Miles	OU
5	2F	AR_08040102_011	Critical Season DO	Marshall Creek	14.34	Miles	AL
5	2G	AR_08040103_028	pH	North Fork Ozan Creek	23.77	Miles	OU
5	2G	AR_08040103_808	pH	Howard Creek	6.13	Miles	OU
5	2G	AR_08040103_833	pH	De Ann Creek	9.63	Miles	OU
5	2G	AR_08040103_933	pH	Pate Creek	8.34	Miles	OU
5	2G	AR_08040203_410	Biological Integrity - Fish	Clift Creek	8.28	Miles	AL
5	3A	AR_08020401_001	Critical Season DO	Arkansas River	31.24	Miles	AL, ORW
5	3D	AR_11110205_016	pH	Cove Creek	25.17	Miles	OU

Previous Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Uses
5	3E	AR_11110206_014	Turbidity Base Flow	South Fourche LaFave River	30.18	Miles	OU
5	3E	AR_11110206_014	Turbidity Storm Flow	South Fourche LaFave River	30.18	Miles	OU
5	3F	AR_11110203_018	pH	West Fork Point Remove Creek	11.13	Miles	OU
5	3F	AR_11110203_918	pH	Trimble Creek	3.50	Miles	OU
5	3H	AR_11110104_003	Biological Integrity - Macroinvertebrates	Webber Creek	4.61	Miles	AL
5	3H	AR_11110201_006	Turbidity Base Flow	Mulberry River	11.28	Miles	OU, ORW
5-*r*	3J	AR_11110103_028	Escherichia coli	Illinois River	2.85	Miles	PC
5	4A	AR_08020303_005	Critical Season DO	White River	50.68	Miles	AL
5	4A	AR_08020303_014	Primary Season DO	Boat Gunwale Slash	15.47	Miles	AL
5	4A	AR_08020304_014	Copper Acute	Prairie Cypress Creek	14.08	Miles	AL
5	4A	AR_08020304_014	Copper Chronic	Prairie Cypress Creek	14.08	Miles	AL
5	4B	AR_08020302_906	Turbidity Storm Flow	Threemile Creek	6.13	Miles	OU
5	4C	AR_11010013_017	Temperature	White River	12.76	Miles	AL
5	4C	AR_11010013_021	Zinc Acute	Glaise Creek	43.14	Miles	AL
5	4C	AR_11010013_021	Zinc Chronic	Glaise Creek	43.14	Miles	AL
5	4C	AR_11010013_020	Zinc Acute	Departee Creek	21.62	Miles	AL
5	4C	AR_11010013_020	Zinc Chronic	Departee Creek	21.62	Miles	AL
5	4D	AR_08020301_009	Primary Season DO	Bull Creek	46.75	Miles	AL
5	4D	AR_08020301_009	Zinc Acute	Bull Creek	46.75	Miles	AL
5	4D	AR_08020301_009	Zinc Chronic	Bull Creek	46.75	Miles	AL
5	4E	AR_11010014_007	pH	Little Red River	16.77	Miles	OU

Previous Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Uses
5	4E	AR_11010014_036	pH	South Fork Little Red River	4.01	Miles	OU
5	4E	AR_11010014_036	Turbidity Base Flow	South Fork Little Red River	4.01	Miles	OU
5	4E	AR_11010014_037	pH	Archey Creek	18.06	Miles	OU, ORW
5	4I	AR_11010003_048	Temperature	Crooked Creek	27.39	Miles	AL
5-*r*	4K	AR_11010001_4041	Turbidity Storm Flow	Beaver Lake	1.97	Square Miles	OU
5	5A	AR_08020203_008	Critical Season DO	Saint Francis River	43.40	Miles	AL, ORW

Table XI-C: Waterbody pollutant pairs added and removed for the 2026 period of record

Pollutant	Number of Pollutant Pairs Added	Number of Pollutant Pairs Removed
Ammonia-N	1	0
Biological Integrity	18	4
Dissolved Oxygen	9	12
Harmful Algal Blooms	2	0
Metals (Cu, Pb, Zn, Se)	12	20
Minerals (Cl, SO_4, TDS)	8	3
Nutrients	2	0
Pathogens (*E. coli*)	0	1
pH	3	19
Temperature	3	2
Turbidity	9	9
TOTAL	**78**	**70**

Waterbodies in Category 4b

Assessment units placed in Category 4b are assessed as not meeting WQS; however, required control measures, other than a TMDL, are expected to result in the attainment of WQS in a reasonable amount of time. EPA IR Guidance (2006) outlines six (6) elements that should be included in the State's rationale to place AUs in Category 4b:

1. Identification of assessment units and a statement of the problem causing the impairment.
2. A description of the proposed implementation strategy and supporting pollution controls necessary to achieve WQS, including the identification of point and nonpoint source loadings that when implemented assure the attainment of all applicable WQS.
3. An estimate or projection of the time when WQS will be met.
4. A reasonable schedule for implementing the necessary pollution measures.
5. A description of, and schedule for, monitoring milestones for tracking and reporting progress to EPA on the implementation of the pollution controls.
6. A commitment to revise as necessary the implementation strategy and corresponding pollution controls if progress towards meeting WQS is not being shown.

For the 2026 assessment cycle, no additional pollutant pairs were placed in category 4b. In total, sixteen (16) assessment units consisting of twenty-eight (28) pollutant pairs are in category 4b

for the 2026 assessment cycle (Table XIV-C). Rationale for including the AUs found in the Buffalo River Watershed (1101005) and Chamberlin Creek, Cove Creek, Reyburn Creek, Skull Creek, and Lucinda Creek AUs in Category 4b can be found in Appendix A.

Waterbodies in Category 5-*r*

Assessment units placed in Category 5-*r* are assessed as not meeting WQS; however, alternate restoration approaches may be more immediately beneficial or practical in achieving WQS than pursuing a TMDL in the near-term. EPA IR Guidance (2015) outlines eight elements that that should be included in the State's rationale to place AUs in Category 5-*r*:

1. Identification of specific impaired water segments or waters addressed by the alternative restoration approach, and identification of all sources contributing to the impairment.
2. Analysis to support why the State believes the implementation of the alternative restoration approach is expected to achieve WQS.
3. An Action Plan of Implementation Plan to document:
    a) The actions to address all sources—both point and nonpoint sources, as appropriate—necessary to achieve WQS (this may include e.g., commitments to adjust permit limits when permits are re-issued or a list of nonpoint source conservation practices of BMPs to be implemented, as part of the alternative restoration approach); and,
    b) A schedule of actions designed to meet WQS with clear milestones and dates, which includes interim milestones and target dates with clear deliverables.
4. Identification of available funding opportunities to implement the alternative restoration plan.
5. Identification of all parties committed, and/or additional parties needed, to take actions that are expected to meet WQS.
6. An estimate of projection of the time when WQS will be met.
7. Plans for effectiveness monitoring to: demonstrate progress made toward achieving WQS following implementation; identify needed improvement for adaptive management as the project progresses; and evaluate the success of actions and outcome.
8. Commitment to periodically evaluate the alternative restoration approach to determine if it is on track to be more immediately beneficial or practicable in achieving WQS than pursuing a TMDL in the near-term, and if the impaired water should be assigned a higher priority for TMDL development.

For the 2026 assessment cycle, no additional AUs were placed in category 5-*r*. In total thirteen (13) AUs consisting of fifteen (15) pollutant pairs are in category 5-*r* for the 2026 cycle (Tables XVII-C and XVIII-C). Rationale for including these AUs in Category 5-*r* can be found in Appendix A.

Key to Tables XII-C through XVIII-C

Planning Segment – two-digit alpha-numeric code that identifies the DEQ Planning Segment in which a waterbody is located. Figure 3-B is a map of DEQ's Planning Segments. DEQ's thirty-eight (38) water quality planning segments are based on hydrological characteristics, human activities, geographic characteristics, and other factors.

Assessment Unit – stream segment or lake area assessed. AUs are coded as:
AR_8-digit HUC_ reach number

AR = Arkansas
8-digit HUC = 8-digit hydrologic unit the AU is in
Reach number = a three or four digit code assigned to stream reaches and lake areas by DEQ

Stream Names/Lake Names – the name of the waterbody according to the DEQ base layer.

Miles – the total length (in miles) of the AU measured using the high resolution (1:24,000-scale) NHD.

Acres – total surface acreage for lake.

Parameter – the water quality constituent of which the WQS is not being met.

There are no WQS in 8 CAR Part 21 for nitrate listings. This parameter was promulgated by EPA.

Descriptor – further details (e.g. season, data type) of the impaired parameter.

Designated Use Not Supported – uses specified in 8 CAR Part 21 for each waterbody or stream segment not being supported.

AL = aquatic life
PC = primary contact
DWS = domestic water supply
I = industrial water supply
FC = fish consumption[10]
OU = other use
SC = secondary contact
Ag = agricultural water supply
ORW = outstanding resource water

Sources of Contamination or Source – the probable source of the contaminant causing impairment.

AG = agriculture activities
IP = industrial point source
SE[11] = surface erosion
UR = urban runoff
HP = hydropower
MP = municipal point source
UN = unknown
RE = resource extraction (mining; oil and gas)

[10] Not a designated use
[11] Surface Erosion – This category includes erosion from agriculture activities; unpaved road surfaces; in-stream erosion, mainly from unstable stream banks; and any other land surface disturbing activity.

Priority Rank – a ranking of waters in order of need for corrective action taking into account the severity of the pollution and designated uses of the waters. Applies to waters in Cat. 5 and 5-*r*. See section called "Assessment Categories" for more information regarding priority placements.

Table XII-C: A TMDL has been developed, but segment is attaining (Category 1b)

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
1b	1A	AR_11140203_020	Lead Acute	Bayou Dorcheat	11.4	Miles	AL
1b	1A	AR_11140203_020	Sulfate	Bayou Dorcheat	11.4	Miles	AG, DWS, I, AL
1b	1A	AR_11140203_021	Lead Acute	Horsehead Creek	31.1	Miles	AL
1b	1A	AR_11140203_022	Lead Acute	Bayou Dorcheat	11.5	Miles	AL
1b	1A	AR_11140203_022	pH	Bayou Dorcheat	11.5	Miles	OU
1b	1A	AR_11140203_022	Sulfate	Bayou Dorcheat	11.5	Miles	AG, DWS, I, AL
1b	1A	AR_11140203_023	Lead Acute	Big Creek	4.4	Miles	AL
1b	1A	AR_11140203_023	Chloride	Big Creek	4.4	Miles	AG, DWS, I, AL
1b	1A	AR_11140203_023	Sulfate	Big Creek	4.4	Miles	AG, DWS, I, AL
1b	1A	AR_11140203_023	Total Dissolved Solids	Big Creek	4.4	Miles	AG, DWS, I, AL
1b	1A	AR_11140203_025	Lead Acute	Beech Creek	21.1	Miles	AL
1b	1A	AR_11140203_026	Lead Acute	Bayou Dorcheat	9.6	Miles	AL
1b	1A	AR_11140203_923	Lead Acute	Big Creek	35.1	Miles	AL
1b	1A	AR_11140205_002	Copper Acute	Bodcau Bayou	5.1	Miles	AL
1b	1A	AR_11140205_002	Copper Chronic	Bodcau Bayou	5.1	Miles	AL
1b	1A	AR_11140205_002	Lead Acute	Bodcau Bayou	5.1	Miles	AL
1b	1A	AR_11140205_002	Lead Chronic	Bodcau Bayou	5.1	Miles	AL
1b	1A	AR_11140205_006	Copper Acute	Bodcau Bayou	23.3	Miles	AL
1b	1A	AR_11140205_006	Copper Chronic	Bodcau Bayou	23.3	Miles	AL
1b	1A	AR_11140205_006	Lead Acute	Bodcau Bayou	23.3	Miles	AL
1b	1A	AR_11140205_006	Turbidity Storm Flow	Bodcau Bayou	23.3	Miles	OU
1b	1A	AR_11140205_007	Lead Acute	Bodcau Bayou	11.7	Miles	AL
1b	1A	AR_11140205_010	Lead Acute	Bodcau Creek	33.1	Miles	AL
1b	1B	AR_11140201_003	Temperature	Red River	8.5	Miles	AL
1b	1B	AR_11140201_003	Turbidity Base Flow	Red River	8.5	Miles	OU
1b	1B	AR_11140201_003	Turbidity Storm Flow	Red River	8.5	Miles	OU
1b	1B	AR_11140302_001	Sulfate	Sulphur River	7.91	Miles	AL
1b	1B	AR_11140302_001	Temperature	Sulphur River	7.91	Miles	AL
1b	1B	AR_11140302_001	Total Dissolved Solids	Sulphur River	7.91	Miles	AG, DWS, I, AL

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
1b	1B	AR_11140302_002	Sulfate	Sulphur River	10.41	Miles	AL
1b	1B	AR_11140302_002	Temperature	Sulphur River	10.41	Miles	AL
1b	1B	AR_11140302_002	Total Dissolved Solids	Sulphur River	10.41	Miles	AG, DWS, I, AL
1b	1B	AR_11140302_003	Acute Ammonia	Days Creek	17.6	Miles	AL
1b	1B	AR_11140302_003	Chronic Ammonia - ELS absent	Days Creek	17.6	Miles	AL
1b	1B	AR_11140302_003	Chronic Ammonia - ELS Present	Days Creek	17.6	Miles	AL
1b	1B	AR_11140302_004	Sulfate	Sulphur River	0.23	Miles	AL
1b	1B	AR_11140302_004	Temperature	Sulphur River	0.23	Miles	AL
1b	1B	AR_11140302_004	Total Dissolved Solids	Sulphur River	0.23	Miles	AG, DWS, I, AL
1b	1B	AR_11140302_006	Sulfate	Sulphur River	8.2	Miles	AG, DWS, I, AL
1b	1B	AR_11140302_006	Temperature	Sulphur River	8.2	Miles	AL
1b	1B	AR_11140302_006	Total Dissolved Solids	Sulphur River	8.2	Miles	AG, DWS, I, AL
1b	1B	AR_11140302_008	Sulfate	Sulphur River	3.02	Miles	AG, DWS, I, AL
1b	1B	AR_11140302_008	Temperature	Sulphur River	3.02	Miles	AL
1b	1B	AR_11140302_008	Total Dissolved Solids	Sulphur River	3.02	Miles	AG, DWS, I, AL
1b	1C	AR_11140109_927	Nitrate	Rolling Fork	9.64	Miles	AL
1b	1C	AR_11140109_927	Total Phosphorus	Rolling Fork	9.64	Miles	AL
1b	2A	AR_08050001_018	Chloride	Boeuf River	16.4	Miles	AG, DWS, I, AL
1b	2A	AR_08050001_018	Sulfate	Boeuf River	16.4	Miles	AG, DWS, I, AL
1b	2A	AR_08050001_018	Total Dissolved Solids	Boeuf River	16.4	Miles	AG, DWS, I, AL
1b	2A	AR_08050001_018	Turbidity Base Flow	Boeuf River	16.4	Miles	OU
1b	2A	AR_08050001_022	Chloride	Big Bayou	33.35	Miles	AL
1b	2A	AR_08050001_022	Turbidity Base Flow	Big Bayou	33.35	Miles	OU
1b	2A	AR_08050001_022	Turbidity Storm Flow	Big Bayou	33.35	Miles	OU
1b	2A	AR_08050002_003	Turbidity Base Flow	Bayou Macon	23.33	Miles	OU
1b	2A	AR_08050002_003	Turbidity Storm Flow	Bayou Macon	23.33	Miles	OU
1b	2A	AR_08050002_006	Turbidity Base Flow	Bayou Macon	37.79	Miles	OU
1b	2A	AR_08050002_006	Turbidity Storm Flow	Bayou Macon	37.79	Miles	OU
1b	2A	AR_08050002_910	Chloride	Oak Log Bayou	24	Miles	AL

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
1b	2B	AR_08040205_001	Chloride	Bayou Bartholomew	54	Miles	AG, DWS, I, AL
1b	2B	AR_08040205_001	Sulfate	Bayou Bartholomew	54	Miles	AG, DWS, I, AL
1b	2B	AR_08040205_001	Total Dissolved Solids	Bayou Bartholomew	54	Miles	AG, DWS, I, AL
1b	2B	AR_08040205_001	Turbidity Storm Flow	Bayou Bartholomew	54	Miles	OU
1b	2B	AR_08040205_005	Turbidity Base Flow	Deep Bayou	33.2	Miles	OU
1b	2B	AR_08040205_005	Turbidity Storm Flow	Deep Bayou	33.2	Miles	OU
1b	2B	AR_08040205_013	Chloride	Bayou Bartholomew	34.4	Miles	AG, DWS, I, AL
1b	2B	AR_08040205_013	Sulfate	Bayou Bartholomew	34.4	Miles	AG, DWS, I, AL
1b	2B	AR_08040205_013	Total Dissolved Solids	Bayou Bartholomew	34.4	Miles	AG, DWS, I, AL
1b	2B	AR_08040205_705	Turbidity Base Flow	Split of Deep Bayou	11.63	Miles	OU
1b	2B	AR_08040205_705	Turbidity Storm Flow	Split of Deep Bayou	11.63	Miles	OU
1b	2C	AR_08040203_010	Total Dissolved Solids	Saline River	27.64	Miles	AG, DWS, I, AL, ORW
1b	2C	AR_08040203_904	Primary Season DO	Big Creek	15.6	Miles	AL
1b	2C	AR_08040203_913	Total Dissolved Solids	Saline River	10.2	Miles	AG, DWS, I, AL, ORW
1b	2C	AR_08040204_005	Turbidity Storm Flow	Big Creek	48.7	Miles	OU
1b	2D	AR_08040201_001	Turbidity Storm Flow	Moro Creek	56.4	Miles	OU, ORW
1b	2D	AR_08040201_616	Acute Ammonia	ECC Creek	4.67	Miles	AL
1b	2D	AR_08040201_616	Chloride	ECC Creek	4.67	Miles	AG, DWS, I
1b	2D	AR_08040201_616	Chronic Ammonia - ELS absent	ECC Creek	4.67	Miles	AL
1b	2D	AR_08040201_616	Sulfate	ECC Creek	4.67	Miles	AG, DWS, I
1b	2D	AR_08040201_616	Total Dissolved Solids	ECC Creek	4.67	Miles	AG, DWS, I
1b	2F	AR_08040101_048	Turbidity Storm Flow	Prairie Creek	1.5	Miles	OU
1b	2F	AR_08040101_948	Turbidity Storm Flow	Prairie Creek	1.56	Miles	OU
1b	2F	AR_08040102_016	Copper Acute	Caddo River	7	Miles	AL, ORW
1b	2F	AR_08040102_016	Copper Chronic	Caddo River	7	Miles	AL, ORW
1b	2F	AR_08040102_016	Zinc Acute	Caddo River	7	Miles	AL, ORW
1b	2F	AR_08040102_016	Zinc Chronic	Caddo River	7	Miles	AL, ORW
1b	2F	AR_08040102_018	Copper Acute	Caddo River	4.78	Miles	AL, ORW
1b	2F	AR_08040102_018	Copper Chronic	Caddo River	4.78	Miles	AL, ORW

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
1b	2F	AR_08040102_018	Zinc Acute	Caddo River	4.78	Miles	AL, ORW
1b	2F	AR_08040102_018	Zinc Chronic	Caddo River	4.78	Miles	AL, ORW
1b	2F	AR_08040102_019	Copper Acute	Caddo River	8.76	Miles	AL, ORW
1b	2F	AR_08040102_019	Copper Chronic	Caddo River	8.76	Miles	AL, ORW
1b	2F	AR_08040102_019	Zinc Acute	Caddo River	8.76	Miles	AL, ORW
1b	2F	AR_08040102_019	Zinc Chronic	Caddo River	8.76	Miles	AL, ORW
1b	2F	AR_08040102_023	Copper Acute	Caddo River, S. Fork	18.57	Miles	AL, ORW
1b	2F	AR_08040102_023	Copper Chronic	Caddo River, S. Fork	18.57	Miles	AL, ORW
1b	2F	AR_08040102_023	Zinc Acute	Caddo River, S. Fork	18.57	Miles	AL, ORW
1b	2F	AR_08040102_023	Zinc Chronic	Caddo River, S. Fork	18.57	Miles	AL, ORW
1b	3C	AR_11110207_4050	Mercury In Tissue	Lake Sylvia	0.01	Square Miles	FC
1b	3F	AR_11110203_904	Acute Ammonia	Stone Dam Creek	4.8	Miles	SAL
1b	3F	AR_11110203_904	Chronic Ammonia - ELS absent	Stone Dam Creek	4.8	Miles	SAL
1b	3F	AR_11110203_904	Nitrate	Stone Dam Creek	4.8	Miles	SAL
1b	3F	AR_11110203_927	Turbidity Base Flow	White Oak Creek	7.6	Miles	OU
1b	3F	AR_11110203_927	Turbidity Storm Flow	White Oak Creek	7.6	Miles	OU
1b	3H	AR_11110201_009	pH - ST Continuous	Mulberry River	9.8	Miles	OU, ORW
1b	3I	AR_11110105_031	Copper Acute	Poteau River	6.7	Miles	AL
1b	3I	AR_11110105_031	Copper Chronic	Poteau River	6.7	Miles	AL
1b	3I	AR_11110105_031	Zinc Acute	Poteau River	6.7	Miles	AL
1b	3I	AR_11110105_031	Zinc Chronic	Poteau River	6.7	Miles	AL
1b	3I	AR_11110105_631	Turbidity Base Flow	East Fork Poteau River	10.1	Miles	OU
1b	3I	AR_11110105_631	Turbidity Storm Flow	East Fork Poteau River	10.1	Miles	OU
1b	3I	AR_11110105_631	Copper Acute	East Fork Poteau River	10.1	Miles	AL
1b	3I	AR_11110105_631	Copper Chronic	East Fork Poteau River	10.1	Miles	AL
1b	3I	AR_11110105_631	Zinc Acute	East Fork Poteau River	10.1	Miles	AL
1b	3I	AR_11110105_631	Zinc Chronic	East Fork Poteau River	10.1	Miles	AL
1b	3J	AR_11070208_903	Total Phosphorus	Town Branch	5	Miles	SAL
1b	3J	AR_11110103_029	Escherichia coli	Clear Creek	14.5	Miles	PC, SC

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
1b	4B	AR_08020302_004	Turbidity Base Flow	Bayou De View	25.3	Miles	OU
1b	4B	AR_08020302_004	Turbidity Storm Flow	Bayou De View	25.3	Miles	OU
1b	4B	AR_08020302_005	Turbidity Base Flow	Bayou De View	8.32	Miles	OU
1b	4B	AR_08020302_005	Turbidity Storm Flow	Bayou De View	8.32	Miles	OU
1b	4B	AR_08020302_006	Turbidity Base Flow	Bayou De View	10.14	Miles	OU
1b	4B	AR_08020302_006	Turbidity Storm Flow	Bayou De View	10.1	Miles	OU
1b	4B	AR_08020302_007	Turbidity Base Flow	Bayou De View	6.17	Miles	OU
1b	4B	AR_08020302_007	Turbidity Storm Flow	Bayou De View	6.17	Miles	OU
1b	4B	AR_08020302_009	Turbidity Base Flow	Bayou De View	12.95	Miles	OU
1b	4B	AR_08020302_009	Turbidity Storm Flow	Bayou De View	12.95	Miles	OU
1b	4B	AR_08020302_016	Turbidity Base Flow	Cache River	25.03	Miles	OU
1b	4B	AR_08020302_016	Turbidity Storm Flow	Cache River	25.03	Miles	OU
1b	4B	AR_08020302_017	Turbidity Storm Flow	Cache River	22.9	Miles	OU
1b	4B	AR_08020302_018	Turbidity Base Flow	Cache River	20.63	Miles	OU
1b	4B	AR_08020302_018	Turbidity Storm Flow	Cache River	20.63	Miles	OU
1b	4B	AR_08020302_019	Turbidity Base Flow	Cache River	18.77	Miles	OU
1b	4B	AR_08020302_019	Turbidity Storm Flow	Cache River	18.77	Miles	OU
1b	4B	AR_08020302_020	Turbidity Base Flow	Cache River	27.62	Miles	OU
1b	4B	AR_08020302_020	Turbidity Storm Flow	Cache River	27.62	Miles	OU
1b	4B	AR_08020302_818	Turbidity Base Flow	Cache River	5.95	Miles	OU
1b	4B	AR_08020302_818	Turbidity Storm Flow	Cache River	5.95	Miles	OU
1b	4B	AR_08020302_918	Turbidity Base Flow	Cache River	6.89	Miles	OU, ORW
1b	4B	AR_08020302_918	Turbidity Storm Flow	Cache River	6.89	Miles	OU, ORW
1b	4D	AR_08020301_010	Escherichia coli	Cypress Bayou	7.79	Miles	PC, SC
1b	4E	AR_11010014_006	Escherichia coli	Overflow Creek	12	Miles	PC
1b	4E	AR_11010014_007	Escherichia coli	Little Red River	16.77	Miles	PC, SC
1b	4E	AR_11010014_008	Escherichia coli	Little Red River	8.4	Miles	PC, SC
1b	4E	AR_11010014_010	Escherichia coli	Little Red River	3.7	Miles	PC, SC
1b	4E	AR_11010014_012	Escherichia coli	Little Red River	8.4	Miles	PC, SC
1b	4E	AR_11010014_028	Escherichia coli	Little Red River, Middle Fork	14.17	Miles	PC, SC, ORW

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
1b	4E	AR_11010014_038	Escherichia coli	Little Red River, South Fork	9.7	Miles	SC, ORW
1b	4F	AR_11010006_001	Dissolved Oxygen - year round	White River, North Fork	2.59	Miles	AL
1b	4G	AR_11010009_902	Escherichia coli	Data Creek (Dota)	25.38	Miles	PC
1b	4G	AR_11010012_006	Turbidity Storm Flow	Strawberry River	20.3	Miles	OU, ORW
1b	4G	AR_11010012_009	Turbidity Base Flow	Strawberry River	16.43	Miles	OU, ORW
1b	4G	AR_11010012_009	Turbidity Storm Flow	Strawberry River	16.43	Miles	OU, ORW
1b	4G	AR_11010012_010	Escherichia coli	Little Strawberry Creek	19.52	Miles	PC, ORW
1b	4G	AR_11010012_010	Turbidity Base Flow	Little Strawberry Creek	19.52	Miles	OU, ORW
1b	4G	AR_11010012_010	Turbidity Storm Flow	Little Strawberry Creek	19.52	Miles	OU, ORW
1b	4G	AR_11010012_011	Escherichia coli	Strawberry River	27.1	Miles	PC, SC, ORW
1b	4G	AR_11010012_014	Escherichia coli	Reeds Creek	17.89	Miles	PC
1b	4G	AR_11010012_016	Escherichia coli	Mill Creek	7.3	Miles	PC, SC
1b	4I	AR_11010003_902	Dissolved Oxygen - year round	White River	13.46	Miles	AL
1b	4K	AR_11010001_023	Turbidity Storm Flow	White River	1.9	Miles	OU
1b	4K	AR_11010001_623	Turbidity Base Flow	White R, W. Fork	13.46	Miles	OU
1b	4K	AR_11010001_623	Turbidity Storm Flow	White R, W. Fork	13.46	Miles	OU
1b	4K	AR_11010001_624	Turbidity Base Flow	White R, W. Fork	5.8	Miles	OU
1b	4K	AR_11010001_624	Turbidity Storm Flow	White R, W. Fork	5.8	Miles	OU
1b	5B	AR_08020205_001	Turbidity Storm Flow	L'Anguille River	17.2	Miles	OU
1b	5B	AR_08020205_004	Turbidity Base Flow	L'Anguille River	17	Miles	OU
1b	5B	AR_08020205_004	Turbidity Storm Flow	L'Anguille River	17	Miles	OU

Table XIII-C: A TMDL has been developed, but segment is impaired (Category 4a)

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	1A	AR_08040201_4040	Mercury In Tissue	Big Johnson Lake	0.16	Square Miles	FC
4a	1A	AR_08040201_4050	Mercury In Tissue	Hollingsworth Brake	0.3	Square Miles	FC
4a	1A	AR_08040201_4060	Mercury In Tissue	Snow Lake	0.12	Square Miles	FC
4a	1A	AR_08040203_4090	Mercury In Tissue	Grays Lake	0.1	Square Miles	FC
4a	1A	AR_08040203_4100	Mercury In Tissue	Lake Winona	0.51	Square Miles	FC
4a	1A	AR_08040203_4101	Mercury In Tissue	Lake Winona	1.32	Square Miles	FC
4a	1A	AR_11140203_020	Lead Chronic	Bayou Dorcheat	11.4	Miles	AL
4a	1A	AR_11140203_020	Mercury In Tissue	Bayou Dorcheat	11.4	Miles	FC
4a	1A	AR_11140203_020	pH	Bayou Dorcheat	11.4	Miles	OU
4a	1A	AR_11140203_021	Lead Chronic	Horsehead Creek	31.1	Miles	AL
4a	1A	AR_11140203_021	pH	Horsehead Creek	31.1	Miles	OU
4a	1A	AR_11140203_022	Lead Chronic	Bayou Dorcheat	11.5	Miles	AL
4a	1A	AR_11140203_022	Mercury In Tissue	Bayou Dorcheat	11.5	Miles	FC
4a	1A	AR_11140203_023	Lead Chronic	Big Creek	4.4	Miles	AL
4a	1A	AR_11140203_024	Mercury In Tissue	Bayou Dorcheat	7.6	Miles	FC
4a	1A	AR_11140203_024	pH	Bayou Dorcheat	7.6	Miles	OU
4a	1A	AR_11140203_025	Critical Season DO	Beech Creek	21.1	Miles	AL
4a	1A	AR_11140203_025	Lead Chronic	Beech Creek	21.1	Miles	AL
4a	1A	AR_11140203_025	Turbidity Base Flow	Beech Creek	21.1	Miles	OU
4a	1A	AR_11140203_025	Turbidity Storm Flow	Beech Creek	21.1	Miles	OU
4a	1A	AR_11140203_026	Lead Chronic	Bayou Dorcheat	9.6	Miles	AL
4a	1A	AR_11140203_026	Mercury In Tissue	Bayou Dorcheat	9.6	Miles	FC
4a	1A	AR_11140203_026	pH	Bayou Dorcheat	9.6	Miles	OU
4a	1A	AR_11140203_923	Lead Chronic	Big Creek	35.1	Miles	AL
4a	1A	AR_11140203_923	pH	Big Creek	35.1	Miles	OU

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	1A	AR_11140203_926	Mercury In Tissue	Bayou Dorcheat	21.84	Miles	FC
4a	1A	AR_11140205_002	pH	Bodcau Bayou	5.1	Miles	OU
4a	1A	AR_11140205_002	Turbidity Base Flow	Bodcau Bayou	5.1	Miles	OU
4a	1A	AR_11140205_002	Turbidity Storm Flow	Bodcau Bayou	5.1	Miles	OU
4a	1A	AR_11140205_006	Lead Chronic	Bodcau Bayou	23.3	Miles	AL
4a	1A	AR_11140205_006	pH	Bodcau Bayou	23.3	Miles	OU
4a	1A	AR_11140205_006	Turbidity Base Flow	Bodcau Bayou	23.3	Miles	OU
4a	1A	AR_11140205_007	Lead Chronic	Bodcau Bayou	11.7	Miles	AL
4a	1A	AR_11140205_010	Lead Chronic	Bodcau Creek	33.1	Miles	AL
4a	1B	AR_11140201_012	Chloride	Mckinney Bayou	17.8	Miles	AL
4a	1B	AR_11140201_012	Sulfate	Mckinney Bayou	17.8	Miles	AL
4a	1B	AR_11140201_012	Total Dissolved Solids	Mckinney Bayou	17.8	Miles	AL
4a	1B	AR_11140201_014	Sulfate	Mckinney Bayou	27	Miles	AL
4a	1B	AR_11140201_014	Total Dissolved Solids	Mckinney Bayou	27	Miles	AL
4a	1B	AR_11140302_001	Turbidity Base Flow	Sulphur River	7.9	Miles	OU
4a	1B	AR_11140302_001	Turbidity Storm Flow	Sulphur River	7.9	Miles	OU
4a	1B	AR_11140302_002	Turbidity Base Flow	Sulphur River	10.4	Miles	OU
4a	1B	AR_11140302_002	Turbidity Storm Flow	Sulphur River	10.4	Miles	OU
4a	1B	AR_11140302_003	Nitrate	Days Creek	17.6	Miles	AL
4a	1B	AR_11140302_004	Turbidity Base Flow	Sulphur River	0.2	Miles	OU
4a	1B	AR_11140302_004	Turbidity Storm Flow	Sulphur River	0.2	Miles	OU
4a	1B	AR_11140302_006	Turbidity Base Flow	Sulphur River	8.2	Miles	OU
4a	1B	AR_11140302_006	Turbidity Storm Flow	Sulphur River	8.2	Miles	OU
4a	1B	AR_11140302_008	Turbidity Base Flow	Sulphur River	3	Miles	OU
4a	1B	AR_11140302_008	Turbidity Storm Flow	Sulphur River	3	Miles	OU
4a	1C	AR_11140109_013	Escherichia coli	Holly Creek	11.2	Miles	PC, SC
4a	1C	AR_11140109_033	Escherichia coli	Mine Creek	6.6	Miles	PC, SC
4a	1C	AR_11140109_913	Escherichia coli	Holly Creek	11.26	Miles	PC, SC
4a	1C	AR_11140109_919	Nitrate	Rolling Fork	7.3	Miles	AL
4a	1C	AR_11140109_919	Total Phosphorus	Rolling Fork	7.3	Miles	AL
4a	2A	AR_08050001_018	Turbidity Storm Flow	Boeuf River	16.4	Miles	OU

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	2A	AR_08050001_019	Chloride	Boeuf River	15.6	Miles	AL
4a	2A	AR_08050001_019	Sulfate	Boeuf River	15.6	Miles	AL
4a	2A	AR_08050001_019	Total Dissolved Solids	Boeuf River	15.6	Miles	AL
4a	2A	AR_08050001_019	Turbidity Base Flow	Boeuf River	15.6	Miles	OU
4a	2A	AR_08050001_019	Turbidity Storm Flow	Boeuf River	15.6	Miles	OU
4a	2A	AR_08050002_910	Total Dissolved Solids	Oak Log Bayou	24	Miles	AG, DWS, I
4a	2A	AR_08050002_910	Turbidity Base Flow	Oak Log Bayou	24	Miles	OU
4a	2A	AR_08050002_910	Turbidity Storm Flow	Oak Log Bayou	24	Miles	OU
4a	2B	AR_08020204_4010	Nutrients	Mallard Lake	1.28	Square Miles	AL
4a	2B	AR_08040205_001	Turbidity Base Flow	Bayou Bartholomew	54	Miles	OU
4a	2B	AR_08040205_002	Chloride	Bayou Bartholomew	17.5	Miles	AL
4a	2B	AR_08040205_002	Mercury In Tissue	Bayou Bartholomew	17.5	Miles	FC
4a	2B	AR_08040205_002	Sulfate	Bayou Bartholomew	17.5	Miles	AL
4a	2B	AR_08040205_002	Total Dissolved Solids	Bayou Bartholomew	17.5	Miles	AL
4a	2B	AR_08040205_002	Turbidity Base Flow	Bayou Bartholomew	17.5	Miles	OU
4a	2B	AR_08040205_002	Turbidity Storm Flow	Bayou Bartholomew	17.5	Miles	OU
4a	2B	AR_08040205_005	Escherichia coli	Deep Bayou	33.2	Miles	PC, SC
4a	2B	AR_08040205_006	Turbidity Base Flow	Bayou Bartholomew	97	Miles	OU
4a	2B	AR_08040205_006	Turbidity Storm Flow	Bayou Bartholomew	97	Miles	OU
4a	2B	AR_08040205_007	Mercury In Tissue	Cutoff Creek	19.4	Miles	FC
4a	2B	AR_08040205_007	Turbidity Base Flow	Cutoff Creek	19.4	Miles	OU
4a	2B	AR_08040205_007	Turbidity Storm Flow	Cutoff Creek	19.4	Miles	OU
4a	2B	AR_08040205_012	Mercury In Tissue	Bayou Bartholomew	49.4	Miles	FC
4a	2B	AR_08040205_012	Turbidity Base Flow	Bayou Bartholomew	49.4	Miles	OU
4a	2B	AR_08040205_012	Turbidity Storm Flow	Bayou Bartholomew	49.4	Miles	OU
4a	2B	AR_08040205_013	Escherichia coli	Bayou Bartholomew	34.4	Miles	PC, SC
4a	2B	AR_08040205_013	Turbidity Base Flow	Bayou Bartholomew	34.4	Miles	OU
4a	2B	AR_08040205_013	Turbidity Storm Flow	Bayou Bartholomew	34.4	Miles	OU
4a	2B	AR_08040205_901	Escherichia coli	Bearhouse Creek	34.5	Miles	PC, SC

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	2B	AR_08040205_902	Escherichia coli	Harding Creek	4.29	Miles	SC
4a	2B	AR_08040205_903	Escherichia coli	Melton's Creek	5.4	Miles	PC, SC
4a	2B	AR_08040205_904	Escherichia coli	Jack's Creek	7.4	Miles	PC, SC
4a	2B	AR_08040205_905	Escherichia coli	Cross Bayou	2.5	Miles	PC, SC
4a	2B	AR_08040205_907	Escherichia coli	Chemin-A-Haut Creek	51.2	Miles	PC, SC
4a	2B	AR_08040205_912	Chloride	Bayou Bartholomew	47.1	Miles	AL
4a	2B	AR_08040205_912	Sulfate	Bayou Bartholomew	47.1	Miles	AL
4a	2B	AR_08040205_912	Total Dissolved Solids	Bayou Bartholomew	47.1	Miles	AL
4a	2B	AR_08040205_912	Turbidity Base Flow	Bayou Bartholomew	47.1	Miles	OU
4a	2B	AR_08040205_912	Turbidity Storm Flow	Bayou Bartholomew	47.1	Miles	OU
4a	2B	AR_08040205_911	Turbidity Base Flow	Ables Creek	27.97	Miles	OU
4a	2B	AR_08040205_911	Turbidity Storm Flow	Ables Creek	27.97	Miles	OU
4a	2B	AR_08040205_908	Chloride	Overflow Creek	29.22	Miles	AL
4a	2B	AR_08040205_908	Turbidity Base Flow	Overflow Creek	29.22	Miles	OU
4a	2B	AR_08040205_908	Turbidity Storm Flow	Overflow Creek	29.22	Miles	OU
4a	2C	AR_08040203_001	Mercury In Tissue	Saline River	1.5	Miles	FC
4a	2C	AR_08040203_904	Critical Season DO	Big Creek	15.6	Miles	AL
4a	2C	AR_08040203_904	Turbidity Base Flow	Big Creek	15.6	Miles	OU
4a	2C	AR_08040203_904	Turbidity Storm Flow	Big Creek	15.6	Miles	OU
4a	2C	AR_08040204_001	Mercury In Tissue	Saline River	3.8	Miles	FC
4a	2C	AR_08040204_002	Mercury In Tissue	Saline River	60.1	Miles	FC
4a	2C	AR_08040204_004	Mercury In Tissue	Saline River	20.6	Miles	FC
4a	2C	AR_08040204_005	Turbidity Base Flow	Big Creek	48.7	Miles	OU
4a	2C	AR_08040204_006	Mercury In Tissue	Saline River	17.3	Miles	FC
4a	2D	AR_08040201_001	Turbidity Base Flow	Moro Creek	56.4	Miles	OU, ORW
4a	2D	AR_08040201_001	Mercury In Tissue	Moro Creek	56.4	Miles	FC, ORW
4a	2D	AR_08040201_002	Mercury In Tissue	Ouachita River	23.4	Miles	FC
4a	2D	AR_08040201_003	Mercury In Tissue	Campagnolle Creek, Lower	19.7	Miles	FC
4a	2D	AR_08040201_004	Mercury In Tissue	Ouachita River	2.8	Miles	FC
4a	2D	AR_08040201_4030	Mercury In Tissue	Crane Lake	0.02	Square Miles	FC

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	2D	AR_08040201_606	Acute Ammonia	ECC Creek	5.2	Miles	SAL
4a	2D	AR_08040201_606	Chloride	ECC Creek	5.2	Miles	AG, DWS, I
4a	2D	AR_08040201_606	Chronic Ammonia - ELS absent	ECC Creek	5.2	Miles	SAL
4a	2D	AR_08040201_606	Sulfate	ECC Creek	5.2	Miles	AG, DWS, I
4a	2D	AR_08040201_606	Total Dissolved Solids	ECC Creek	5.2	Miles	AG, DWS, I
4a	2D	AR_08040201_616	Chronic Ammonia - ELS Present	ECC Creek	4.67	Miles	AL
4a	2D	AR_08040201_626	Chloride	ECC Creek	2.36	Miles	AG, I
4a	2D	AR_08040201_626	Sulfate	ECC Creek	2.36	Miles	AG, I
4a	2D	AR_08040201_626	Total Dissolved Solids	ECC Creek	2.36	Miles	AG, I
4a	2D	AR_08040201_706	Chloride	Flat Creek	2.41	Miles	AG, I
4a	2D	AR_08040201_706	Sulfate	Flat Creek	2.41	Miles	AG, I
4a	2D	AR_08040201_706	Total Dissolved Solids	Flat Creek	2.41	Miles	AG, I
4a	2D	AR_08040201_806	Chloride	Salt Creek	7.2	Miles	AG, DWS, I
4a	2D	AR_08040201_806	Total Dissolved Solids	Salt Creek	7.2	Miles	AG, DWS, I
4a	2D	AR_08040201_901	Turbidity Base Flow	Moro Creek	57	Miles	OU
4a	2D	AR_08040201_901	Turbidity Storm Flow	Moro Creek	57	Miles	OU
4a	2D	AR_08040201_903	Mercury In Tissue	Champagnolle Creek	14.6	Miles	FC
4a	2D	AR_08040202_002	Mercury In Tissue	Ouachita River	10.3	Miles	FC
4a	2D	AR_08040202_003	Mercury In Tissue	Ouachita River	9	Miles	FC
4a	2D	AR_08040202_004	Mercury In Tissue	Ouachita River	32.5	Miles	FC
4a	2D	AR_08040202_4020	Mercury In Tissue	Green Slough	0.3	Square Miles	FC
4a	2D	AR_08040202_4030	Mercury In Tissue	Pereogeethe Lake	0.24	Square Miles	FC
4a	2D	AR_08040202_4040	Mercury In Tissue	Jones Lake	0.37	Square Miles	FC

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	2D	AR_08040202_4050	Mercury In Tissue	Eagle Lake	0.2	Square Miles	FC
4a	2D	AR_08040202_4060	Mercury In Tissue	Benjamin Lake	0.16	Square Miles	FC
4a	2D	AR_08040202_4070	Mercury In Tissue	Raymond Lake	0.2	Square Miles	FC
4a	2D	AR_08040202_4080	Mercury In Tissue	Hoop Lake	0.13	Square Miles	FC
4a	2D	AR_08040202_4100	Mercury In Tissue	Marais Saline Lake	0.26	Square Miles	FC
4a	2D	AR_08040202_4110	Mercury In Tissue	Fishtrap Lake	0.2	Square Miles	FC
4a	2D	AR_08040202_4120	Mercury In Tissue	Lipsey Brake	0.07	Square Miles	FC
4a	2D	AR_08040202_4130	Mercury In Tissue	Panther Brake	0.05	Square Miles	FC
4a	2D	AR_08040202_4140	Mercury In Tissue	Crossett Flatwater	0.55	Square Miles	FC
4a	2D	AR_08040202_4150	Mercury In Tissue	Mud Lake and Round Brake	0.47	Square Miles	FC
4a	2D	AR_08040202_4160	Mercury In Tissue	Redeye Lake, Wildcat Lake, etc.	1.5	Square Miles	FC
4a	2D	AR_08040202_4170	Mercury In Tissue	Felsenthal	2.47	Square Miles	FC
4a	2D	AR_08040202_4180	Mercury In Tissue	Horseshoe Lake	0.15	Square Miles	FC
4a	2D	AR_08040202_4190	Mercury In Tissue	Key Hole Lake	0.01	Square Miles	FC
4a	2D	AR_08040202_4200	Mercury In Tissue	Fist Flatwater, Standard Break, etc.	0.43	Square Miles	FC
4a	2D	AR_08040202_4210	Mercury In Tissue	Buffalo Break	0.02	Square Miles	FC
4a	2D	AR_08040202_4220	Mercury In Tissue	Pete Wilson Lake, Otter, Bull, Hornet Brakes	1.24	Square Miles	FC
4a	2D	AR_11110206_4040	Mercury In Tissue	Cove Creek Lake	0.51	Square Miles	FC

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	2D	AR_11110206_4050	Mercury In Tissue	Lake Nimrod	0.71	Square Miles	FC
4a	2D	AR_11110206_4051	Mercury In Tissue	Lake Nimrod	1.21	Square Miles	FC
4a	2D	AR_11110206_4052	Mercury In Tissue	Lake Nimrod	5.54	Square Miles	FC
4a	2D	AR_11110206_4060	Mercury In Tissue	Dry Fork Lake	0.67	Square Miles	FC
4a	2D	AR_11140201_4020	Nutrients	First Old River Lake	1.18	Square Miles	AL
4a	2F	AR_08040101_048	Turbidity Base Flow	Prairie Creek	1.5	Miles	OU
4a	2F	AR_08040101_848	Turbidity Storm Flow	Prairie Creek	1.33	Miles	OU
4a	2F	AR_08040101_848	Turbidity Base Flow	Prairie Creek	1.33	Miles	OU
4a	2F	AR_08040101_948	Turbidity Base Flow	Prairie Creek	1.56	Miles	OU
4a	3A	AR_08020401_003	Turbidity Base Flow	Wabbaseka Bayou	42.3	Miles	OU
4a	3A	AR_08020401_003	Turbidity Storm Flow	Wabbaseka Bayou	42.3	Miles	OU
4a	3D	AR_11110205_011	Turbidity Base Flow	Cadron Creek	2.8	Miles	OU, ORW
4a	3D	AR_11110205_011	Turbidity Storm Flow	Cadron Creek	2.8	Miles	OU, ORW
4a	3D	AR_11110205_012	Turbidity Base Flow	Cadron Creek	13	Miles	OU, ORW
4a	3D	AR_11110205_012	Turbidity Storm Flow	Cadron Creek	13	Miles	OU, ORW
4a	3E	AR_11110204_4070	Mercury In Tissue	Spring Lake	0.33	Square Miles	FC
4a	3E	AR_11110206_002	Mercury In Tissue	Fourche La Fave River	10.1	Miles	FC
4a	3E	AR_11140203_4010	Mercury In Tissue	Lake Columbia	1.07	Square Miles	FC
4a	3E	AR_11140203_4011	Mercury In Tissue	Lake Columbia	1.07	Square Miles	FC
4a	3F	AR_11110203_931	Copper Acute	Whig Creek	10.1	Miles	AL
4a	3F	AR_11110203_931	Copper Chronic	Whig Creek	10.1	Miles	AL
4a	3F	AR_11110203_931	Nitrate	Whig Creek	10.1	Miles	AL
4a	3H	AR_11110201_009	pH	Mulberry River	9.8	Miles	OU, ORW
4a	3H	AR_11110201_4070	Mercury In Tissue	Lake Fort Smith - upper	0.63	Square Miles	FC

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	3I	AR_11110105_001	Turbidity Base Flow	Poteau River	4.9	Miles	OU
4a	3I	AR_11110105_001	Turbidity Storm Flow	Poteau River	4.9	Miles	OU
4a	3I	AR_11110105_031	Total Phosphorus	Poteau River	6.7	Miles	AL
4a	3I	AR_11110105_631	Total Phosphorus	East Fork Poteau River	10.1	Miles	AL
4a	4B	AR_08020302_017	Turbidity Base Flow	Cache River	22.9	Miles	OU
4a	4B	AR_08020302_021	Turbidity Base Flow	Cache River	17.03	Miles	OU
4a	4B	AR_08020302_021	Turbidity Storm Flow	Cache River	17.03	Miles	OU
4a	4B	AR_08020302_027	Turbidity Base Flow	Cache River	2.2	Miles	OU
4a	4B	AR_08020302_027	Turbidity Storm Flow	Cache River	2.2	Miles	OU
4a	4B	AR_08020302_028	Turbidity Base Flow	Cache River	6	Miles	OU
4a	4B	AR_08020302_028	Turbidity Storm Flow	Cache River	6	Miles	OU
4a	4B	AR_08020302_029	Turbidity Base Flow	Cache River	5.4	Miles	OU
4a	4B	AR_08020302_029	Turbidity Storm Flow	Cache River	5.4	Miles	OU
4a	4B	AR_08020302_031	Turbidity Base Flow	Cache River	2.9	Miles	OU
4a	4B	AR_08020302_031	Turbidity Storm Flow	Cache River	2.9	Miles	OU
4a	4B	AR_08020302_032	Turbidity Base Flow	Cache River Ditch #1	11	Miles	OU
4a	4B	AR_08020302_032	Turbidity Storm Flow	Cache River Ditch #1	11	Miles	OU
4a	4B	AR_08050002_4020	Nutrients	Grand Lake	4.82	Square Miles	AL
4a	4C	AR_11010013_006	Turbidity Base Flow	Village Creek	29.1	Miles	OU
4a	4C	AR_11010013_006	Turbidity Storm Flow	Village Creek	29.1	Miles	OU
4a	4C	AR_11010013_007	Turbidity Base Flow	Village Creek	1.2	Miles	OU
4a	4C	AR_11010013_007	Turbidity Storm Flow	Village Creek	1.2	Miles	OU
4a	4C	AR_11010013_008	Turbidity Base Flow	Village Creek	12.2	Miles	OU
4a	4C	AR_11010013_008	Turbidity Storm Flow	Village Creek	12.2	Miles	OU
4a	4C	AR_11010013_012	Turbidity Base Flow	Village Creek	7.7	Miles	OU
4a	4C	AR_11010013_012	Turbidity Storm Flow	Village Creek	7.7	Miles	OU
4a	4C	AR_11010013_014	Turbidity Base Flow	Village Creek	25.7	Miles	OU
4a	4C	AR_11010013_014	Turbidity Storm Flow	Village Creek	25.7	Miles	OU
4a	4D	AR_08020301_011	Escherichia coli	Cypress Bayou	11.3	Miles	PC, SC
4a	4D	AR_08020301_012	Escherichia coli	Cypress Bayou	28.2	Miles	PC, SC

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	4D	AR_08020302_4020	Turbidity Base Flow	Lake Frierson	1.39	Square Miles	OU
4a	4E	AR_08040201_4010	Mercury In Tissue	Little Bay Lake	0.23	Square Miles	FC
4a	4E	AR_08040201_4020	Mercury In Tissue	Pedron Lake	0.07	Square Miles	FC
4a	4E	AR_11010014_004	Escherichia coli	Overflow Creek	0.9	Miles	PC, SC
4a	4E	AR_11010014_006	Escherichia coli	Overflow Creek	12	Miles	SC
4a	4E	AR_11010014_009	Escherichia coli	Tenmile Creek	23.5	Miles	PC, SC
4a	4E	AR_11010014_009	Turbidity Base Flow	Tenmile Creek	23.5	Miles	OU
4a	4E	AR_11010014_009	Turbidity Storm Flow	Tenmile Creek	23.5	Miles	OU
4a	4E	AR_11010014_027	Escherichia coli	Little Red River, M. Fork	3.4	Miles	PC, SC, ORW
4a	4E	AR_11010014_036	Mercury In Tissue	Little Red River, S. Fork	4	Miles	FC
4a	4E	AR_11010014_038	Escherichia coli	Little Red River, South Fork	9.7	Miles	PC, ORW
4a	4F	AR_11010004_015	Nitrate	Hicks Creek	13.2	Miles	AL
4a	4G	AR_08020302_4020	Turbidity Storm Flow	Lake Frierson	1.39	Square Miles	OU
4a	4G	AR_08020303_4010	Nutrients	Old Town Lake	8.64	Square Miles	AL
4a	4G	AR_11010012_003	Escherichia coli	Coopers Creek	20.2	Miles	PC, SC
4a	4G	AR_11010012_004	Turbidity Base Flow	Strawberry River	0.1	Miles	OU, ORW
4a	4G	AR_11010012_004	Turbidity Storm Flow	Strawberry River	0.1	Miles	OU, ORW
4a	4G	AR_11010012_005	Turbidity Base Flow	Strawberry River	1.8	Miles	OU, ORW
4a	4G	AR_11010012_005	Turbidity Storm Flow	Strawberry River	1.8	Miles	OU, ORW
4a	4G	AR_11010012_006	Turbidity Base Flow	Strawberry River	20.3	Miles	OU, ORW
4a	4G	AR_11010012_008	Escherichia coli	Strawberry River	12.4	Miles	PC, SC, ORW
4a	4G	AR_11010012_008	Turbidity Base Flow	Strawberry River	12.4	Miles	OU, ORW
4a	4G	AR_11010012_008	Turbidity Storm Flow	Strawberry River	12.4	Miles	OU, ORW
4a	4G	AR_11010012_011	Turbidity Base Flow	Strawberry River	27.1	Miles	OU, ORW
4a	4G	AR_11010012_011	Turbidity Storm Flow	Strawberry River	27.1	Miles	OU, ORW
4a	4G	AR_11010012_015	Escherichia coli	Caney Cr	12.4	Miles	PC, SC

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	4K	AR_08040204_4020	Mercury In Tissue	Lake Monticello	5.97	Square Miles	FC
4a	4K	AR_11010001_023	Turbidity Base Flow	White River	1.9	Miles	OU
4a	4K	AR_11010001_024	Turbidity Base Flow	White River, West Fork	10.7	Miles	OU
4a	4K	AR_11010001_024	Turbidity Storm Flow	White River, West Fork	10.7	Miles	OU
4a	4K	AR_11010001_059	Nitrate	Holman Creek	10.6	Miles	AL
4a	4K	AR_11010001_823	Turbidity Base Flow	White River	5.1	Miles	OU
4a	4K	AR_11010001_823	Turbidity Storm Flow	White River	5.1	Miles	OU
4a	4K	AR_11010001_923	Turbidity Base Flow	White River	0.4	Miles	OU
4a	4K	AR_11010001_923	Turbidity Storm Flow	White River	0.4	Miles	OU
4a	4K	AR_11010001_945	Total Phosphorus	Osage Creek	7.80	Miles	AL
4a	4K	AR_11010001_959	Nitrate	Town Branch	2.6	Miles	SAL
4a	5A	AR_08020203_003	Turbidity Base Flow	Blackfish Bayou	2.1	Miles	OU
4a	5A	AR_08020203_003	Turbidity Storm Flow	Blackfish Bayou	2.1	Miles	OU
4a	5A	AR_08020203_005	Turbidity Base Flow	Blackfish Bayou	2.6	Miles	OU
4a	5A	AR_08020203_005	Turbidity Storm Flow	Blackfish Bayou	2.6	Miles	OU
4a	5A	AR_08020203_007	Turbidity Base Flow	Blackfish Bayou	16.8	Miles	OU
4a	5A	AR_08020203_007	Turbidity Storm Flow	Blackfish Bayou	16.8	Miles	OU
4a	5A	AR_08020203_012	Turbidity Base Flow	Tyronza River	35.4	Miles	OU
4a	5A	AR_08020203_012	Turbidity Storm Flow	Tyronza River	35.4	Miles	OU
4a	5A	AR_08020203_909	Turbidity Base Flow	Tyronza River	30.3	Miles	OU
4a	5A	AR_08020203_909	Turbidity Storm Flow	Tyronza River	30.3	Miles	OU
4a	5A	AR_08020203_912	Turbidity Base Flow	Tyronza River	4.7	Miles	OU
4a	5A	AR_08020203_912	Turbidity Storm Flow	Tyronza River	4.7	Miles	OU
4a	5B	AR_08020203_4020	Nutrients	Bear Creek Lake	2	Square Miles	AL
4a	5B	AR_08020203_4060	Nutrients	Horseshoe Lake	9.66	Square Miles	AL
4a	5B	AR_08020205_001	Turbidity Base Flow	L'Anguille River	17.2	Miles	OU
4a	5B	AR_08020205_002	Turbidity Base Flow	L'Anguille River	23	Miles	OU
4a	5B	AR_08020205_002	Turbidity Storm Flow	L'Anguille River	23	Miles	OU
4a	5B	AR_08020205_003	Turbidity Base Flow	L'Anguille River	2.9	Miles	OU

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Units	Uses
4a	5B	AR_08020205_003	Turbidity Storm Flow	L'Anguille River	2.9	Miles	OU
4a	5B	AR_08020205_004	Escherichia coli	L'Anguille River	17	Miles	PC, SC
4a	5B	AR_08020205_005	Escherichia coli	L'Anguille River	53.4	Miles	PC, SC
4a	5B	AR_08020205_005	Turbidity Base Flow	L'Anguille River	53.4	Miles	OU
4a	5B	AR_08020205_005	Turbidity Storm Flow	L'Anguille River	53.4	Miles	OU
4a	5B	AR_08040201_4070	Mercury In Tissue	Calion Lake	2	Square Miles	FC
4a	5B	AR_08040201_4080	Mercury In Tissue	Tri-County Lake	1.16	Square Miles	FC

Table XIV-C: Impaired, but other management alternatives are expected to result in attainment (Category 4b). See Appendix A for rationale.

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Source	Uses	Year Listed
4b	2C	AR_08040203_824	pH	Skull Creek	0.45	Miles	Remnant	IP, RE	OU	
4b	2C	AR_08040203_924	pH	Reyburn Creek	8.13	Miles	Remnant	IP, RE	OU	
4b	2F	AR_08040102_970	Critical Season DO	Cove Creek	3.67	Miles	Remnant	IP, RE	AL	2024
4b	2F	AR_08040102_970	Toxicity	Cove Creek	3.67	Miles	Remnant	IP, RE	AL	
4b	2F	AR_08040102_971	Aluminum	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	OU	
4b	2F	AR_08040102_971	Beryllium	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	DWS	
4b	2F	AR_08040102_971	Copper Acute	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	SAL	
4b	2F	AR_08040102_971	Copper Chronic	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	SAL	
4b	2F	AR_08040102_971	pH	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	OU	
4b	2F	AR_08040102_971	Primary Season DO	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	SAL	
4b	2F	AR_08040102_971	Sulfate	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	AG, DWS, I	
4b	2F	AR_08040102_971	Total Dissolved Solids	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	AG, DWS, I	
4b	2F	AR_08040102_971	Toxicity	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	SAL	
4b	2F	AR_08040102_971	Zinc Acute	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	SAL	
4b	2F	AR_08040102_971	Zinc Chronic	Chamberlain Creek	2.48	Miles	Remnant	IP, RE	SAL	
4b	2F	AR_08040102_975	pH	Lucinda Creek	0.78	Miles	Remnant	RE	OU	
4b	4J	AR_11010005_004	Temperature	Buffalo River	29.70	Miles	Carry forward	UN	AL	2024
4b	4J	AR_11010005_010	Escherichia coli	Buffalo River	6.83	Miles	Remnant	UN	PC, ORW	
4b	4J	AR_11010005_011	Escherichia coli	Buffalo River	7.49	Miles	Remnant	UN	PC, ORW	
4b	4J	AR_11010005_012	Escherichia coli	Buffalo River	33.57	Miles	Carry forward	UN	PC, ORW	2024
4b	4J	AR_11010005_016	Biological Integrity - Fish	Little Buffalo River	7.51	Miles	Remnant	AG, UN	AL	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Source	Uses	Year Listed
4b	4J	AR_11010005_019	Biological Integrity - Fish	West Fork Shop Creek	10.70	Miles	Remnant	UN	AL	2024
4b	4J	AR_11010005_020	Critical Season DO	Big Creek	3.71	Miles	Carry forward	UN	AL	
4b	4J	AR_11010005_021	Critical Season DO	Left Fork Big Creek	13.66	Miles	Carry forward	AG	AL	2024
4b	4J	AR_11010005_022	Biological Integrity - Fish	Big Creek	15.05	Miles	Remnant	UN	AL	2024
4b	4J	AR_11010005_022	Escherichia coli	Big Creek	15.05	Miles	Remnant	UN	PC	
4b	4J	AR_11010005_712	Primary Season DO	Unnamed Trib of Mill Creek	1.59	Miles	Remnant	UN	SAL	
4b	4J	AR_11010005_911	Critical Season DO	Cecil/Cove Creek	7.84	Miles	Remnant	AG	AL	2024

Table XV-C: Impaired, but alternative restoration approaches are thought to be more immediately beneficial than a TMDL (Category 5-*r*). See Appendix A for rationale.

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Source	Uses	Year Listed
5-*r*	3J	AR_11110103_018	Turbidity Base Flow	Illinois River	4.53	Miles	Remnant	AG, UR, SE	OU, ORW	2022
5-*r*	3J	AR_11110103_018	Turbidity Storm Flow	Illinois River	4.53	Miles	Remnant	AG, UR, SE	OU, ORW	2022
5-*r*	3J	AR_11110103_024	Turbidity Base Flow	Illinois River	2.76	Miles	Carry forward	UN	OU, ORW	2024
5-*r*	3J	AR_11110103_026	Escherichia coli	Moores Creek	4.86	Miles	Remnant	IP, MP, SE	PC	
5-*r*	3J	AR_11110103_027	Escherichia coli	Muddy Fork	7.14	Miles	Remnant	IP, MP, SE	PC	
5-*r*	3J	AR_11110103_630	Escherichia coli	Little Osage Creek	7.22	Miles	Carry forward	IP, MP, SE, AG	PC	
5-*r*	3J	AR_11110103_933	Escherichia coli	Little Osage Creek	4.35	Miles	Carry forward	IP, MP, SE	PC, ORW	
5-*r*	4K	AR_11010001_026	Biological Integrity - Fish	Middle Fork White River	8.14	Miles	Remnant	AG	AL	2024
5-*r*	4K	AR_11010001_624	Biological Integrity - Macroinvertebrates	West Fork White River	5.78	Miles	Remnant	AG	AL	2024
5-*r*	4K	AR_11010001_046	Biological Integrity - Fish	Kenner Creek	15.63	Miles	Remnant	AG	AL	2024
5-*r*	4K	AR_11010001_058	Biological Integrity - Fish	Terrapin Creek	8.75	Miles	Remnant	AG	AL	2024
5-*r*	4K	AR_11010001_058	Critical Season DO	Terrapin Creek	8.75	Miles	Carry forward	AG	AL	2024
5-*r*	4K	AR_11010001_4042	Chlorophyll a	Beaver Lake	1.41	Square Miles	Carry forward	SE, UN	DWS	2022
5-*r*	4K	AR_11010001_924	Turbidity Base Flow	White River	9.15	Miles	Carry forward	AG	OU	2024
5-*r*	4K	AR_11010001_929	pH	Baldwin Creek	4.33	Miles	Carry forward	UN	OU	2024

Table XVI-C: Impaired Waterbodies (Category 5)

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	1A	AR_11140203_020	Turbidity Base Flow	Bayou Dorcheat	9.80	Miles	Remnant	Low	SE	OU	
5	1A	AR_11140203_022	Turbidity Base Flow	Bayou Dorcheat	11.59	Miles	Carry forward	Low	SE	OU	
5	1A	AR_11140203_823	Lead Chronic	Nations Creek	9.89	Miles	Remnant	High	UN	AL	2022
5	1A	AR_11140203_823	Biological Integrity - Macroinvertebrates	Nations Creek	9.89	Miles	Remnant	High	UN	AL	2024
5	1A	AR_11140203_823	pH	Nations Creek	9.89	Miles	Carry forward	High	UN	OU	2022
5	1A	AR_11140203_823	Turbidity Base Flow	Nations Creek	9.89	Miles	Remnant	Medium	AG, UR, UN	OU	2024
5	1A	AR_11140203_823	Turbidity Storm Flow	Nations Creek	9.89	Miles	Remnant	Medium	AG, UR, UN	OU	2024
5	1A	AR_11140205_010	Critical Season DO	Little Bodcau Creek	26.46	Miles	Carry forward	Medium	AG, RE	AL	2024
5	1A	AR_11140205_010	Turbidity Base Flow	Little Bodcau Creek	26.46	Miles	Carry forward	Medium	AG, RE	OU	2024
5	1A	AR_11140205_013	Turbidity Base Flow	Dooley Creek	19.46	Miles	Remnant	Medium	AG	OU	2024
5	1A	AR_11140205_013	Turbidity Storm Flow	Dooley Creek	19.46	Miles	Remnant	Medium	AG	OU	2024
5	1A	AR_11140205_902	Lead Chronic	Steel Creek	9.37	Miles	Remnant	High	MP, IP	AL	2022
5	1A	AR_11140205_902	pH	Steel Creek	9.37	Miles	Carry forward	High	MP, IP	OU	2022
5	1A	AR_11140205_902	Turbidity Base Flow	Steel Creek	9.37	Miles	Remnant	Medium	MP, IP	OU	2024
5	1B	AR_11140106_001	Turbidity Base Flow	Red River	36.47	Miles	Remnant	Low	SE	OU	
5	1B	AR_11140106_001	Turbidity Storm Flow	Red River	36.47	Miles	Remnant	Low	SE	OU	
5	1B	AR_11140106_002	Turbidity Base Flow	Bull Creek	13.63	Miles	Remnant	Medium	AG	OU	2024
5	1B	AR_11140106_002	Turbidity Storm Flow	Bull Creek	13.63	Miles	Remnant	High	AG	OU	2022
5	1B	AR_11140106_003	Turbidity Base Flow	Red River	17.01	Miles	Remnant	Low	SE	OU	
5	1B	AR_11140106_005	Turbidity Base Flow	Red River	20.77	Miles	Carry forward	Low	SE	OU	
5	1B	AR_11140106_025	Turbidity Base Flow	Red River	5.48	Miles	Remnant	Low	SE	OU	

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	1B	AR_11140201_002	Critical Season DO	Posten Bayou	13.05	Miles	Carry forward	Medium	AG	AL	2024
5	1B	AR_11140201_002	Primary Season DO	Posten Bayou	13.05	Miles	Carry forward	High	AG	AL	2022
5	1B	AR_11140201_002	Turbidity Base Flow	Posten Bayou	13.05	Miles	Remnant	Medium	AG	OU	2024
5	1B	AR_11140201_002	Turbidity Storm Flow	Posten Bayou	13.05	Miles	Remnant	High	AG	OU	2022
5	1B	AR_11140201_008	Critical Season DO	Bois D'Arc Creek	10.00	Miles	Remnant	Low	UN	AL	
5	1B	AR_11140201_008	Primary Season DO	Bois D'Arc Creek	10.00	Miles	Remnant	Low	UN	AL	
5	1B	AR_11140201_009	Critical Season DO	Bois D'Arc Creek	18.74	Miles	Remnant	Low	UN	AL	
5	1B	AR_11140201_009	Primary Season DO	Bois D'Arc Creek	18.74	Miles	Remnant	Low	UN	AL	
5	1B	AR_11140201_010	Critical Season DO	Bridge Creek	15.66	Miles	Carry forward	High	RE, IP	AL	2022
5	1B	AR_11140201_010	pH	Bridge Creek	15.66	Miles	Carry forward	High	RE, IP	OU	2022
5	1B	AR_11140201_010	Turbidity Base Flow	Bridge Creek	15.66	Miles	Carry forward	High	RE, IP	OU	2022
5	1B	AR_11140201_913	Primary Season DO	Gillespie Ditch	16.74	Miles	Remnant	High	AG	AL	2022
5	1B	AR_11140302_803	Biological Integrity - Fish	Nix Creek	2.77	Miles	Remnant	Low	UR	AL	2024
5	1B	AR_11140304_908	Critical Season DO	West Fork Kelly Bayou	12.39	Miles	Carry forward	Medium	RE	AL	2024
5	1B	AR_11140304_908	pH	West Fork Kelly Bayou	12.39	Miles	Carry forward	Medium	RE	OU	2022
5	1B	AR_11140304_908	Turbidity Base Flow	West Fork Kelly Bayou	12.39	Miles	Remnant	Medium	RE	OU	2024
5	1B	AR_11140304_908	Turbidity Storm Flow	West Fork Kelly Bayou	12.39	Miles	Remnant	Medium	RE	OU	2024
5	1B	AR_11140201_011	Turbidity Base Flow	Red River	14.93	Miles	New	Medium	MP, IP, SE	OU	2026
5	1B	AR_11140201_4010	pH	Bois d'Arc Lake	1	Square Miles	New	Medium	UN	OU	2026
5	1B	AR_11140302_003	Turbidity Base Flow	Days Creek	19.73	Miles	New	Medium	SE	OU	2026
5	1B	AR_11140106_001	Temperature	Red River	36.47	Miles	New	Low	SE, MP	AL	2026
5	1B	AR_11140201_002	Biological Integrity - Fish	Posten Bayou	13.05	Miles	New	Low	AG	AL	2026

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	1B	AR_11140201_4010	Harmful Algal Bloom	Bois d'Arc Lake	1	Square Miles	New	High	UN	PC, SC	2026
5	1C	AR_11140109_001	Temperature	Little River	4.89	Miles	Remnant	Low	UN	AL	
5	1C	AR_11140109_011	Turbidity Storm Flow	Messer Creek	16.74	Miles	Remnant	Medium	AG	OU	2022
5	1C	AR_11140109_013	Biological Integrity - Fish	Holly Creek	7.94	Miles	Remnant	Low	MP, IP	AL	2024
5	1C	AR_11140109_013	Critical Season DO	Holly Creek	7.94	Miles	Carry forward	Low	MP, IP	AL	2022
5	1C	AR_11140109_018	Temperature	Cossatot River	18.53	Miles	Carry forward	Low	UN	AL, ORW	2020
5	1C	AR_11140109_019	pH	Cossatot River	17.17	Miles	Remnant	Medium	UN	OU, ORW	2020
5	1C	AR_11140109_020	pH	Brushy Creek	11.63	Miles	Remnant	Medium	UN	OU, ORW	2020
5	1C	AR_11140109_025	Copper Acute	Bear Creek	14.02	Miles	Carry forward	Medium	AG, UR, MP	AL	2024
5	1C	AR_11140109_025	Copper Chronic	Bear Creek	14.02	Miles	Carry forward	Medium	AG, UR, MP	AL	2024
5	1C	AR_11140109_029	Critical Season DO	Robinson Creek	15.09	Miles	Remnant	Medium	UN	AL	2020
5	1C	AR_11140109_029	pH	Robinson Creek	15.09	Miles	Remnant	Medium	UN	OU	2020
5	1C	AR_11140109_032	Critical Season DO	West Flat Creek	17.06	Miles	Carry forward	Medium	AG	OU	2024
5	1C	AR_11140109_533	Chronic Ammonia - ELS absent	Brushy Creek	3.91	Miles	Remnant	Medium	AG	AL	2024
5	1C	AR_11140109_533	Primary Season DO	Brushy Creek	3.91	Miles	Remnant	Low	AG	AL	2022
5	1C	AR_11140109_533	Turbidity Storm Flow	Brushy Creek	3.91	Miles	Remnant	Low	AG	OU	2024
5	1C	AR_11140109_719	pH	Short Creek	7.15	Miles	Remnant	Medium	UN	OU	2020
5	1C	AR_11140109_820	Turbidity Base Flow	Big Bellville Creek	8.19	Miles	Remnant	Medium	AG, UR	OU	2024
5	1C	AR_11140109_916	Copper Chronic	Lick Creek	14.18	Miles	Remnant	Medium	AG, UN	AL	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	1C	AR_11140109_916	Critical Season DO	Lick Creek	14.18	Miles	Carry forward	Medium	AG, UN	AL	2024
5	1C	AR_11140109_916	Turbidity Base Flow	Lick Creek	14.18	Miles	Remnant	Medium	AG, UN	OU	2024
5	1C	AR_11140109_916	Turbidity Storm Flow	Lick Creek	14.18	Miles	Remnant	Medium	AG, UN	OU	2024
5	1C	AR_11140109_921	pH	Caney Creek	8.19	Miles	Remnant	Low	UN	OU, ORW	
5	1C	AR_11140109_929	Critical Season DO	Cross Creek	11.23	Miles	Remnant	Medium	UN	AL	2020
5	1C	AR_11140109_929	pH	Cross Creek	11.23	Miles	Remnant	Medium	UN	OU	2020
5	1C	AR_11140109_014	Critical Season DO	Saline River	33.75	Miles	New	Medium	UN	AL	2026
5	1D	AR_11140108_012	pH	Sixmile Creek	17.48	Miles	Remnant	Medium	AG, UN	OU	2020
5	1D	AR_11140108_014	Critical Season DO	Mountain Fork	11.31	Miles	Carry forward	High	AG	AL, ORW	2022
5	1D	AR_11140108_014	Temperature	Mountain Fork	11.31	Miles	Remnant	Low	UN	AL, ORW	2020
5	1D	AR_11140108_019	pH	Mill Creek	12.32	Miles	Remnant	Low	UN	OU	
5	1D	AR_11140108_907	Critical Season DO	Barren Creek	11.65	Miles	Remnant	Medium	AG	AL	2022
5	1D	AR_11140108_907	pH	Barren Creek	11.65	Miles	Remnant	Low	UN	OU	
5	1D	AR_11140108_907	Primary Season DO	Barren Creek	11.65	Miles	Remnant	Medium	UN	AL	2020
5	1D	AR_11140108_907	Turbidity Base Flow	Barren Creek	11.65	Miles	Remnant	Medium	UN	OU	2020
5	2A	AR_08050002_003	Chloride	Bayou Macon	23.33	Miles	Remnant	Low	UN	AL	2012
5	2A	AR_08050002_006	Chloride	Bayou Macon	37.79	Miles	Remnant	Low	UN	AL	2016
5	2B	AR_08040205_001	Critical Season DO	Bayou Bartholomew	64.48	Miles	Carry forward	Low	UN	AL	
5	2B	AR_08040205_006	Lead Chronic	Bayou Bartholomew	97.00	Miles	Carry forward	Low	UN	AL	
5	2B	AR_08040205_703	Biological Integrity - Fish	Rainbow Creek	12.50	Miles	Remnant	Low	UN	AL	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2B	AR_08040205_703	Primary Season DO	Rainbow Creek	12.50	Miles	Carry forward	Medium	UN	AL	2024
5	2B	AR_08040205_707	Biological Integrity - Fish	White Oak Creek	20.04	Miles	Remnant	Low	UN	AL	2024
5	2B	AR_08040205_707	pH	White Oak Creek	20.04	Miles	Remnant	Medium	UN	OU	2024
5	2B	AR_08040205_707	Primary Season DO	White Oak Creek	20.04	Miles	Carry forward	Medium	UN	AL	2024
5	2B	AR_08040205_707	Total Nitrogen	White Oak Creek	20.04	Miles	Carry forward	Medium	UN	AL	2024
5	2B	AR_08040205_711	pH	Panther Creek	12.00	Miles	Carry forward	Medium	AG	OU	2024
5	2B	AR_08040205_813	Biological Integrity - Fish	Flat Creek	6.83	Miles	Remnant	Low	UN	AL	2024
5	2B	AR_08040205_813	Biological Integrity - Macroinvertebrates	Flat Creek	6.83	Miles	Remnant	Low	UN	AL	2024
5	2B	AR_08040205_813	pH	Flat Creek	6.83	Miles	Carry forward	Medium	UN	OU	2024
5	2B	AR_08040205_901	Primary Season DO	Bearhouse Creek	34.59	Miles	Remnant	Low	UN	AL	2016
5	2B	AR_08040205_902	Copper Acute	Harding Creek	4.29	Miles	New	Low	UR	SAL	2026
5	2B	AR_08040205_902	Copper Chronic	Harding Creek	4.29	Miles	New	Low	UR	SAL	2026
5	2B	AR_08040205_902	Zinc Chronic	Harding Creek	4.29	Miles	New	Low	UR	SAL	2026
5	2B	AR_08040205_902	Lead Chronic	Harding Creek	4.29	Miles	Carry forward	Low	UR	SAL	
5	2B	AR_08040205_905	Critical Season DO	Cross Bayou	2.46	Miles	Remnant	Low	UN	SAL	2012
5	2B	AR_08040205_905	Primary Season DO	Cross Bayou	2.46	Miles	Remnant	Low	UN	SAL	2012
5	2B	AR_08040205_906	Biological Integrity - Fish	Cane Creek	7.81	Miles	Remnant	Low	AG, UR	AL	2024
5	2B	AR_08040205_906	Biological Integrity - Macroinvertebrates	Cane Creek	7.81	Miles	Remnant	Low	AG, UR	AL	2024
5	2B	AR_08040205_907	Critical Season DO	Chemin-A-Haut Creek	48.96	Miles	Remnant	Low	UN	AL	
5	2B	AR_08040205_907	Primary Season DO	Chemin-A-Haut Creek	48.96	Miles	Carry forward	Medium	UN	AL	2024
5	2B	AR_08040205_909	Zinc Chronic	Main Street Ditch	3.29	Miles	New	Medium	UR, UN	SAL	2026
5	2B	AR_08040205_909	Copper Acute	Main Street Ditch	3.29	Miles	New	Medium	UR, UN	SAL	2026

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2B	AR_08040205_909	Copper Chronic	Main Street Ditch	3.29	Miles	Carry forward	Medium	UR, UN	SAL	2024
5	2B	AR_08040205_909	Critical Season DO	Main Street Ditch	3.29	Miles	Remnant	Low	UR, UN	SAL	
5	2B	AR_08040205_909	Lead Chronic	Main Street Ditch	3.29	Miles	Carry forward	Low	UR, UN	SAL	
5	2B	AR_08040205_909	Primary Season DO	Main Street Ditch	3.29	Miles	Carry forward	Low	UR, UN	SAL	
5	2B	AR_08040205_910	Copper Chronic	Bayou Imbeau	5.29	Miles	New	High	UR	SAL	2026
5	2B	AR_08040205_910	Lead Chronic	Bayou Imbeau	5.29	Miles	Carry forward	High	UR	SAL	
5	2B	AR_08040205_910	Escherichia coli	Bayou Imbeau	5.29	Miles	Remnant	High	UR	PC	
5	2B	AR_08040205_910	Primary Season DO	Bayou Imbeau	5.29	Miles	Remnant	High	UR	SAL	2018
5	2B	AR_08040205_006	Primary Season DO	Bayou Bartholomew	97.00	Miles	New	Medium	AG	AL	2026
5	2B	AR_08040205_013	Primary Season DO	Bayou Bartholomew	34.43	Miles	New	Medium	AG	AL	2026
5	2B	AR_08040205_005	Temperature	Deep Bayou	20.63	Miles	New	Low	AG	AL	2026
5	2C	AR_08040203_008	Critical Season DO	Lost Creek	21.30	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040203_008	pH	Lost Creek	21.30	Miles	Carry forward	High	AG	OU	2022
5	2C	AR_08040203_008	Turbidity Base Flow	Lost Creek	21.30	Miles	Remnant	Medium	UN	OU	2024
5	2C	AR_08040203_011	Critical Season DO	North Fork Saline River	22.64	Miles	Carry forward	Medium	UN	AL, ORW	2022
5	2C	AR_08040203_014	Critical Season DO	Alum Fork Saline River	19.34	Miles	Remnant	Medium	UN	AL, ORW	
5	2C	AR_08040203_014	pH	Alum Fork Saline River	19.34	Miles	Remnant	Medium	UN	OU, ORW	
5	2C	AR_08040203_018	pH	Alum Fork Saline River	7.67	Miles	Remnant	Medium	UN	OU, ORW	2014
5	2C	AR_08040203_019	Critical Season DO	Middle Fork Saline River	38.05	Miles	Remnant	Medium	UN	AL, ORW	
5	2C	AR_08040203_021	Critical Season DO	Cedar Creek	1.16	Miles	Remnant	Medium	UN	AL	2020

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2C	AR_08040203_022	Biological Integrity - Fish	South Fork Saline River	13.62	Miles	Remnant	Medium	UN	AL, ORW	2020
5	2C	AR_08040203_022	Biological Integrity - Macroinvertebrates	South Fork Saline River	13.62	Miles	Remnant	Medium	UN	AL, ORW	2020
5	2C	AR_08040203_4100	pH	Winona Lake	0.50	Square Miles	Remnant	Medium	UN	OU	
5	2C	AR_08040203_4101	pH	Winona Lake	1.30	Square Miles	Remnant	Medium	UN	OU	
5	2C	AR_08040203_4110	pH	Cox Creek Lake	0.38	Square Miles	Remnant	Low	UN	OU	
5	2C	AR_08040203_4110	Zinc Acute	Cox Creek Lake	0.38	Square Miles	Remnant	Medium	UN	AL	2024
5	2C	AR_08040203_4110	Zinc Chronic	Cox Creek Lake	0.38	Square Miles	Remnant	Medium	UN	AL	2024
5	2C	AR_08040203_611	Critical Season DO	North Fork Saline River	14.89	Miles	Remnant	Medium	UN	AL, ORW	2020
5	2C	AR_08040203_611	pH	North Fork Saline River	14.89	Miles	Remnant	High	UN	OU, ORW	2020
5	2C	AR_08040203_813	Biological Integrity - Macroinvertebrates	Depot Creek	3.59	Miles	Remnant	Low	UR, UN	AL	2024
5	2C	AR_08040203_902	pH	Johnson Creek	8.61	Miles	Carry forward	Medium	UN	OU	2024
5	2C	AR_08040203_902	Primary Season DO	Johnson Creek	8.61	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040203_907	Lead Chronic	Cow Head Creek	8.47	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040203_907	pH	Cow Head Creek	8.47	Miles	Carry forward	Medium	UN	OU	2024
5	2C	AR_08040203_922	Biological Integrity - Fish	Lockett Creek	8.83	Miles	Remnant	Low	UN	AL	2022
5	2C	AR_08040203_922	Critical Season DO	Lockett Creek	8.83	Miles	Remnant	Low	UN	AL	2020
5	2C	AR_08040203_922	pH	Lockett Creek	8.83	Miles	Remnant	Medium	UN	OU	2020
5	2C	AR_08040204_002	Critical Season DO	Saline River	60.20	Miles	Remnant	Medium	UN	AL, ORW	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2C	AR_08040204_002	Turbidity Base Flow	Saline River	60.20	Miles	Carry forward	Low	SE, UN	OU, ORW	2020
5	2C	AR_08040204_005	Critical Season DO	Big Creek	48.74	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040204_005	Lead Chronic	Big Creek	48.74	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040204_005	pH	Big Creek	48.74	Miles	Carry forward	Low	UN	OU	
5	2C	AR_08040204_006	Turbidity Base Flow	Saline River	17.46	Miles	Carry forward	Low	SE	OU, ORW	2022
5	2C	AR_08040204_602	pH	Langford Creek	17.21	Miles	Carry forward	Medium	UN	OU	2024
5	2C	AR_08040204_602	Primary Season DO	Langford Creek	17.21	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040204_702	pH	Fountain Creek	18.78	Miles	Carry forward	Medium	UN	OU	2024
5	2C	AR_08040204_702	Primary Season DO	Fountain Creek	18.78	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040204_707	Lead Chronic	Camp Creek	8.04	Miles	Carry forward	Medium	SE, UN	AL	2024
5	2C	AR_08040204_707	pH	Camp Creek	8.04	Miles	Carry forward	Medium	SE, UN	OU	2024
5	2C	AR_08040204_807	Lead Chronic	Steepbank L'Aigle Creek	15.92	Miles	Carry forward	Medium	SE, UN	AL	2024
5	2C	AR_08040204_807	pH	Steepbank L'Aigle Creek	15.92	Miles	Carry forward	Medium	SE, UN	OU	2024
5	2C	AR_08040204_906	Lead Chronic	Panther Creek	7.49	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040204_906	pH	Panther Creek	7.49	Miles	Carry forward	Medium	UN	OU	2024
5	2C	AR_08040204_906	Primary Season DO	Panther Creek	7.49	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040204_907	Critical Season DO	Beech Creek	10.83	Miles	Carry forward	Medium	UN	AL	2024
5	2C	AR_08040204_907	pH	Beech Creek	10.83	Miles	Carry forward	Medium	UN	OU	2024
5	2C	AR_08040203_410	Primary Season DO	Clift Creek	8.28	Miles	New	Medium	UR, IP	AL	2026

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2C	AR_08040203_706	Total dissolved solids	Hurricane Creek	7.08	Miles	New	Low	UR, IP	AG, DWS, I	2026
5	2C	AR_08040203_907	Turbidity Storm Flow	Cow Head Creek	8.47	Miles	New	Medium	UN	OU	2026
5	2C	AR_08040204_002	Temperature	Saline River	60.20	Miles	Carry forward	Medium	UN	AL, ORW	
5	2D	AR_08040201_001	Critical Season DO	Moro Creek	56.42	Miles	Remnant	High	AG	AL, ORW	2022
5	2D	AR_08040201_001	Lead Chronic	Moro Creek	56.42	Miles	Carry forward	Low	UN	AL, ORW	
5	2D	AR_08040201_001	pH	Moro Creek	56.42	Miles	Carry forward	Medium	IP, MP	OU, ORW	2024
5	2D	AR_08040201_006	Lead Chronic	Smackover Creek	4.66	Miles	Remnant	Low	IP, UN	AL	2006
5	2D	AR_08040201_006	pH	Smackover Creek	4.66	Miles	Remnant	Low	IP, UN	OU	2018
5	2D	AR_08040201_006	Primary Season DO	Smackover Creek	4.66	Miles	Remnant	Low	IP, UN	AL	2006
5	2D	AR_08040201_006	Turbidity Base Flow	Smackover Creek	4.66	Miles	Remnant	Low	IP, UN	OU	2018
5	2D	AR_08040201_007	pH	Smackover Creek	49.84	Miles	Carry forward	Low	IP, UN	OU	
5	2D	AR_08040201_007	Turbidity Base Flow	Smackover Creek	49.84	Miles	Carry forward	Low	IP, UN	OU	
5	2D	AR_08040201_301	Lead Chronic	Pickett Creek	15.10	Miles	Carry forward	Medium	SE, UN	AL	2024
5	2D	AR_08040201_301	Turbidity Storm Flow	Pickett Creek	15.10	Miles	New	Medium	SE, UN	OU	2026
5	2D	AR_08040201_301	pH	Pickett Creek	15.10	Miles	Carry forward	Medium	SE, UN	OU	2024
5	2D	AR_08040201_301	Primary Season DO	Pickett Creek	15.10	Miles	Carry forward	Medium	SE, UN	AL	2024
5	2D	AR_08040201_306	Primary Season DO	North Fork Smackover Creek	9.55	Miles	Carry forward	Medium	SE, UN	AL	2024
5	2D	AR_08040201_406	pH	Smackover Creek	17.60	Miles	Carry forward	Low	IP	OU	
5	2D	AR_08040201_406	Turbidity Base Flow	Smackover Creek	17.60	Miles	Carry forward	Low	IP	OU	

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2D	AR_08040201_501	Turbidity Base Flow	Bryant Creek	13.79	Miles	Carry forward	High	UN	OU	2020
5	2D	AR_08040201_505	Critical Season DO	Locust Bayou	26.94	Miles	Carry forward	Medium	UN	AL	2024
5	2D	AR_08040201_505	pH	Locust Bayou	26.94	Miles	Carry forward	Medium	UN	OU	2024
5	2D	AR_08040201_601	Turbidity Base Flow	Guice Creek	11.38	Miles	Carry forward	High	UN	OU	2020
5	2D	AR_08040201_606	Copper Acute	ECC Creek	5.21	Miles	Remnant	High	IP	SAL	
5	2D	AR_08040201_606	Copper Chronic	ECC Creek	5.21	Miles	Remnant	High	IP	SAL	
5	2D	AR_08040201_606	Nitrate	ECC Creek	5.21	Miles	Remnant	High	IP	SAL	
5	2D	AR_08040201_606	pH	ECC Creek	5.21	Miles	Remnant	High	IP	OU	
5	2D	AR_08040201_616	Turbidity Base Flow	ECC Creek	4.67	Miles	Carry forward	Medium	IP	OU	2020
5	2D	AR_08040201_626	Copper Acute	ECC Creek	2.36	Miles	Remnant	High	IP, UR	SAL	2022
5	2D	AR_08040201_626	Copper Chronic	ECC Creek	2.36	Miles	Carry forward	High	IP,UR	SAL	2022
5	2D	AR_08040201_701	Lead Chronic	Lloyd Creek	19.10	Miles	Carry forward	Medium	UN	AL	2024
5	2D	AR_08040201_701	pH	Lloyd Creek	19.10	Miles	Carry forward	Medium	UN	OU	2024
5	2D	AR_08040201_701	Primary Season DO	Lloyd Creek	19.10	Miles	Carry forward	Medium	UN	AL	2024
5	2D	AR_08040201_705	pH	North Bayou	21.88	Miles	Carry forward	Medium	AG	OU	2022
5	2D	AR_08040201_705	Turbidity Base Flow	North Bayou	21.88	Miles	Remnant	Medium	AG	OU	2024
5	2D	AR_08040201_726	pH	Unnamed Trib to Haynes Creek (ECC Creek)	4.89	Miles	Remnant	Medium	IP	OU	2020
5	2D	AR_08040201_801	Turbidity Base Flow	Whitewater Creek	21.36	Miles	Carry forward	High	UN	OU	2020
5	2D	AR_08040201_806	pH	Salt Creek	7.21	Miles	Remnant	Low	UN	OU	2012
5	2D	AR_08040201_901	Critical Season DO	Moro Creek	52.18	Miles	Remnant	Low	UN	AL	2018
5	2D	AR_08040201_901	Lead Chronic	Moro Creek	52.18	Miles	Remnant	Low	UN	AL	
5	2D	AR_08040201_902	pH	Tom Creek	5.25	Miles	Carry forward	Medium	IP, UN	OU	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2D	AR_08040201_905	pH	Two Bayou	35.68	Miles	Carry forward	High	UN	OU	
5	2D	AR_08040201_905	Escherichia coli	Two Bayou	35.68	Miles	Remnant	High	UN	PC	
5	2D	AR_08040201_910	Critical Season DO	Jug Creek	7.18	Miles	Carry forward	High	IP, MP, UR	SAL	2022
5	2D	AR_08040202_002	Critical Season DO	Ouachita River	7.23	Miles	Carry forward	Low	AG	AL	2022
5	2D	AR_08040202_003	Critical Season DO	Ouachita River	9.04	Miles	Remnant	Low	UN	AL	2020
5	2D	AR_08040202_003	Lead Chronic	Ouachita River	9.04	Miles	Remnant	Low	UN	AL	2020
5	2D	AR_08040202_006	Critical Season DO	Bayou de Loutre	13.15	Miles	Carry forward	High	IP	AL	2022
5	2D	AR_08040202_006	pH	Bayou de Loutre	13.15	Miles	Carry forward	High	IP	OU	
5	2D	AR_08040202_006	Turbidity Base Flow	Bayou de Loutre	13.15	Miles	Carry forward	High	IP	OU	
5	2D	AR_08040202_007	Lead Chronic	Bayou de Loutre	1.87	Miles	Remnant	High	IP	AL	
5	2D	AR_08040202_007	pH	Bayou de Loutre	1.87	Miles	Remnant	High	IP	OU	2018
5	2D	AR_08040202_007	Turbidity Base Flow	Bayou de Loutre	1.87	Miles	Remnant	High	IP	OU	2018
5	2D	AR_08040202_007	Zinc Acute	Bayou de Loutre	1.87	Miles	Remnant	High	IP	AL	
5	2D	AR_08040202_007	Zinc Chronic	Bayou de Loutre	1.87	Miles	Remnant	High	IP	AL	
5	2D	AR_08040202_008	Total Dissolved Solids	Bayou de Loutre	4.50	Miles	New	High	IP	OU	2026
5	2D	AR_08040202_008	Turbidity Base Flow	Bayou de Loutre	4.50	Miles	Remnant	High	IP	OU	
5	2D	AR_08040202_803	Copper Acute	Little Brushy Creek	11.10	Miles	Remnant	Medium	IP, UR	AL	2024
5	2D	AR_08040202_803	Copper Chronic	Little Brushy Creek	11.10	Miles	Remnant	Medium	IP, UR	AL	2024
5	2D	AR_08040202_803	Lead Chronic	Little Brushy Creek	11.10	Miles	Carry forward	Medium	IP, UR	AL	2024
5	2D	AR_08040202_803	Primary Season DO	Little Brushy Creek	11.10	Miles	Carry forward	Medium	IP, UR	AL	2024
5	2D	AR_08040202_805	Lead Chronic	Cannon Creek	8.14	Miles	Carry forward	Medium	UN	AL	2024
5	2D	AR_08040202_805	pH	Cannon Creek	8.14	Miles	Carry forward	Medium	UN	OU	2024
5	2D	AR_08040202_805	Primary Season DO	Cannon Creek	8.14	Miles	Carry forward	Medium	UN	AL	2024
5	2D	AR_08040202_806	Lead Chronic	Hibank Creek	7.83	Miles	Remnant	Medium	UN	AL	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2D	AR_08040202_806	pH	Hibank Creek	7.83	Miles	Carry forward	Medium	UN	OU	2024
5	2D	AR_08040201_707	Turbidity Base Flow	Sloan Creek	15.52	Miles	New	Medium	SE, UN	OU	2026
5	2D	AR_08040201_807	Turbidity Base Flow	Gum Creek	31.47	Miles	New	Medium	SE, UN	OU	2026
5	2D	AR_08040201_907	Turbidity Base Flow	Unnamed trib to Smackover Cr	2.45	Miles	New	Medium	UR, SE	OU	2026
5	2D	AR_08040202_002	Turbidity Base Flow	Ouachita River	7.23	Miles	New	Medium	UN	OU	2026
5	2D	AR_08040202_004	Critical Season DO	Ouachita River	32.53	Miles	New	Medium	SE, UN	AL	2026
5	2D	AR_08040201_910	Chronic Ammonia - ELS Present	Jug Creek	7.18	Miles	New	High	UR, MP	SAL	2026
5	2D	AR_08040202_803	Biological Integrity - Fish	Little Brushy Creek	11.10	Miles	New	Low	UR, MP, UN	AL	2026
5	2D	AR_08040202_909	Copper Chronic	Loutre Creek	0.97	Miles	Carry forward	Medium	IP	SAL	2024
5	2D	AR_08040202_909	Lead Chronic	Loutre Creek	0.97	Miles	Carry forward	Medium	IP	SAL	2024
5	2D	AR_08040201_803	Turbidity Base Flow	Campagnolle Creek	37.51	Miles	Carry forward	High	SE	OU	2020
5	2E	AR_08040206_002	Lead Chronic	Beech Creek	16.72	Miles	Remnant	Medium	AG	AL	2024
5	2E	AR_08040206_002	pH	Beech Creek	16.72	Miles	Carry forward	Medium	AG	OU	2024
5	2E	AR_08040206_002	Primary Season DO	Beech Creek	16.72	Miles	Carry forward	Medium	AG	AL	2024
5	2E	AR_08040206_015	Critical Season DO	Cornie Bayou	55.09	Miles	Carry forward	Low	IP, UN	AL	2020
5	2E	AR_08040206_015	Turbidity Storm Flow	Cornie Bayou	55.09	Miles	New	Medium	IP, UN	OU	2026
5	2E	AR_08040206_015	pH	Cornie Bayou	55.09	Miles	Carry forward	Low	IP, UN	OU	
5	2E	AR_08040206_015	Turbidity Base Flow	Cornie Bayou	55.09	Miles	Carry forward	Low	IP, UN	OU	
5	2F	AR_08040101_032	Biological Integrity - Fish	Fiddlers Creek	12.78	Miles	Remnant	Medium	UN	AL	2020
5	2F	AR_08040101_032	Critical Season DO	Fiddlers Creek	12.78	Miles	Remnant	Low	UN	AL	
5	2F	AR_08040101_032	pH	Fiddlers Creek	12.78	Miles	Remnant	Low	UN	OU	

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2F	AR_08040101_032	Turbidity Base Flow	Fiddlers Creek	12.78	Miles	Remnant	Low	UN	OU	2020
5	2F	AR_08040101_039	Critical Season DO	Ouachita River	17.53	Miles	Remnant	Medium	UN	AL	2020
5	2F	AR_08040101_039	pH	Ouachita River	17.53	Miles	Remnant	Medium	UN	OU	2020
5	2F	AR_08040101_043	Critical Season DO	South Fork Ouachita River	25.70	Miles	Remnant	Low	UN	AL, OR W	2020
5	2F	AR_08040101_043	Total Dissolved Solids	South Fork Ouachita River	25.70	Miles	Remnant	Low	MP, UR, UN	AL, OR W	2022
5	2F	AR_08040101_501	pH	Gulpha Creek	6.00	Miles	Remnant	High	UR	OU	2020
5	2F	AR_08040101_838	Critical Season DO	Irons Fork	10.39	Miles	Remnant	Low	UN	AL	
5	2F	AR_08040101_838	pH	Irons Fork	10.39	Miles	Remnant	Medium	UN	OU	
5	2F	AR_08040101_838	Turbidity Base Flow	Irons Fork	10.39	Miles	Remnant	Low	UN	OU	2020
5	2F	AR_08040101_848	Biological Integrity - Fish	Prairie Creek	1.33	Miles	Remnant	High	MP	AL	2022
5	2F	AR_08040101_848	Critical Season DO	Prairie Creek	1.33	Miles	Carry forward	High	UN	AL	
5	2F	AR_08040101_848	Escherichia coli	Prairie Creek	1.33	Miles	Remnant	High	MP	PC	2022
5	2F	AR_08040101_902	Sulfate	Indian Springs Creek	0.71	Miles	Remnant	Medium	UN	AG, DW S, I	
5	2F	AR_08040101_902	Total Dissolved Solids	Indian Springs Creek	0.71	Miles	Remnant	Medium	UN	AG, DW S, I	
5	2F	AR_08040101_907	pH	Stokes Creek	1.76	Miles	Remnant	Medium	UR	OU	2022
5	2F	AR_08040101_920	Total Dissolved Solids	Walnut Creek	5.11	Miles	Remnant	Low	UN	SAL	2022
5	2F	AR_08040101_929	Biological Integrity - Fish	Irons Fork	28.42	Miles	Remnant	Medium	UN	AL	2020
5	2F	AR_08040101_929	Biological Integrity - Macroinvertebrates	Irons Fork	28.42	Miles	Remnant	Medium	UN	AL	2022
5	2F	AR_08040101_929	Critical Season DO	Irons Fork	28.42	Miles	Remnant	Medium	UN	AL	2020
5	2F	AR_08040101_929	pH	Irons Fork	28.42	Miles	Remnant	Low	UN	OU	
5	2F	AR_08040102_003	pH	L'Eau Frais Creek	32.75	Miles	Carry forward	Medium	UN	OU	2022
5	2F	AR_08040102_011	pH	Marshall Creek	14.34	Miles	Carry forward	Medium	UN	OU	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2F	AR_08040102_016	Critical Season DO	Caddo River	7.02	Miles	Carry forward	High	UN	AL, ORW	2024
5	2F	AR_08040102_023	Critical Season DO	South Fork Caddo River	18.57	Miles	Remnant	Low	UN	AL, ORW	
5	2F	AR_08040102_027	Lead Chronic	Deceiper Creek	33.97	Miles	Remnant	High	IP, MP	AL	2022
5	2F	AR_08040102_027	pH	Deceiper Creek	33.97	Miles	Carry forward	High	IP	OU	2022
5	2F	AR_08040102_027	Turbidity Storm Flow	Deceiper Creek	33.97	Miles	Remnant	High	IP	OU	2022
5	2F	AR_08040102_706	pH	Black Branch	9.55	Miles	Carry forward	High	IP	OU	2022
5	2F	AR_08040102_706	Turbidity Base Flow	Black Branch	9.55	Miles	Remnant	Medium	IP	OU	2024
5	2F	AR_08040102_807	Turbidity Base Flow	Chatman Creek	13.97	Miles	Remnant	Medium	UR, AG, RE, IP	OU	2024
5	2F	AR_08040102_821	Critical Season DO	Collier Creek	12.67	Miles	Remnant	Low	UN	AL, ORW	2020
5	2F	AR_08040102_902	pH	Casa Massa Creek	5.57	Miles	Carry forward	Medium	AG	OU	2022
5	2F	AR_08040102_904	Lead Chronic	Tupelo Creek	8.47	Miles	Remnant	Low	UN	SAL	2022
5	2F	AR_08040102_904	pH	Tupelo Creek	8.47	Miles	Carry forward	Low	UN	OU	2022
5	2F	AR_08040102_904	Turbidity Base Flow	Tupelo Creek	8.47	Miles	Remnant	Medium	AG	OU	2024
5	2F	AR_08040102_929	pH	French Creek	12.15	Miles	Carry forward	High	UN	OU	2022
5	2F	AR_08040102_976	Critical Season DO	Cove Creek	3.30	Miles	Remnant	Medium	UN	SAL	
5	2F	AR_08040102_976	pH	Cove Creek	3.30	Miles	Remnant	Medium	UN	OU	
5	2F	AR_08040102_4010	pH	Bragg Lake	0.27	Square Miles	New	Medium	UN	OU	2026
5	2G	AR_08040103_002	pH	Terre Noire Creek	38.92	Miles	Remnant	Low	UN	OU	2010
5	2G	AR_08040103_003	Critical Season DO	Terre Noire Creek	23.53	Miles	Carry forward	Low	UN	AL	2024
5	2G	AR_08040103_003	pH	Terre Noire Creek	23.53	Miles	Carry forward	Low	UN	OU	

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2G	AR_08040103_016	Biological Integrity - Fish	Prairie Creek	15.93	Miles	Remnant	High	MP	AL	2022
5	2G	AR_08040103_023	Critical Season DO	Little Missouri River	3.33	Miles	Remnant	Medium	UN	AL, ORW	2020
5	2G	AR_08040103_031	Turbidity Base Flow	Terre Rouge Creek	25.96	Miles	Remnant	Low	SE	OU	2010
5	2G	AR_08040103_031	Turbidity Storm Flow	Terre Rouge Creek	25.96	Miles	Remnant	Low	SE	OU	2010
5	2G	AR_08040103_033	Turbidity Base Flow	Terre Rouge Creek	31.90	Miles	Remnant	Medium	SE, AG	OU	2024
5	2G	AR_08040103_033	Turbidity Storm Flow	Terre Rouge Creek	31.90	Miles	Remnant	Low	SE, AG	OU	2022
5	2G	AR_08040103_035	pH	Caney Creek	28.74	Miles	Remnant	Medium	UN	OU	2022
5	2G	AR_08040103_733	Critical Season DO	Trammel Creek	5.82	Miles	Carry forward	Medium	UN	AL	2024
5	2G	AR_08040103_733	pH	Trammel Creek	5.82	Miles	Carry forward	Medium	UN	OU	2022
5	2G	AR_08040103_733	Turbidity Base Flow	Trammel Creek	5.82	Miles	Remnant	Medium	UN	OU	2024
5	2G	AR_08040103_833	Critical Season DO	De Ann Creek	9.63	Miles	Carry forward	High	AG	AL	2022
5	2G	AR_08040103_833	Turbidity Base Flow	De Ann Creek	9.63	Miles	Remnant	Medium	AG	OU	2024
5	2G	AR_08040103_902	Chronic Ammonia - ELS Present	Caney Creek	15.43	Miles	Remnant	High	MP	AL	2022
5	2G	AR_08040103_902	Turbidity Base Flow	Caney Creek	15.43	Miles	Remnant	Medium	SE, AG, UR	OU	2024
5	2G	AR_08040103_902	Turbidity Storm Flow	Caney Creek	15.43	Miles	Remnant	High	SE, AG, UR	OU	2022
5	2G	AR_08040103_905	Biological Integrity - Fish	West Fork Beech Creek	7.52	Miles	Remnant	Low	UN	AL	2022
5	2G	AR_08040103_905	Critical Season DO	West Fork Beech Creek	7.52	Miles	Carry forward	Low	UN	AL	2022
5	2G	AR_08040103_905	pH	West Fork Beech Creek	7.52	Miles	Carry forward	Low	UN	OU	2022
5	2G	AR_08040103_908	pH	Garland Creek	11.65	Miles	Carry forward	High	AG	OU	2022
5	2G	AR_08040103_908	Biological Integrity - Fish	Garland Creek	11.65	Miles	Remnant	High	AG	AL	2022

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	2G	AR_08040103_908	Critical Season DO	Garland Creek	11.65	Miles	Carry forward	High	AG	AL	2022
5	2G	AR_08040103_933	Turbidity Base Flow	Pate Creek	8.34	Miles	Remnant	Medium	UR	OU	2024
5	2G	AR_08040103_937	pH	Mill Creek	3.09	Miles	Carry forward	Medium	AG	OU	2022
5	2G	AR_08040203_410	Critical Season DO	Clift Creek	8.28	Miles	Carry forward	Medium	UN	AL	2022
5	2G	AR_08040203_410	pH	Clift Creek	8.28	Miles	Carry forward	Medium	UN	OU	2022
5	2G	AR_08040103_4040	Copper Chronic	Gurdon Lake	0.08	Square Miles	New	High	UR	AL	2026
5	3A	AR_08020401_003	Primary Season DO	Wabbaseka Bayou	19.52	Miles	Remnant	Low	UN	SAL	2014
5	3B	AR_08020402_001	Critical Season DO	Bayou Meto	6.07	Miles	Remnant	Low	UN	AL	2006
5	3B	AR_08020402_003	Critical Season DO	Bayou Meto	41.42	Miles	Carry forward	High	UN	AL	
5	3B	AR_08020402_006	Critical Season DO	Two Prairie, Bayou	4.49	Miles	Remnant	Low	UN	AL	2004
5	3B	AR_08020402_607	Dioxin	Bayou Meto	5.19	Miles	Remnant	Low	IP, UN	FC	
5	3B	AR_08020402_007	Dioxin	Bayou Meto	51.29	Miles	Remnant	Low	IP, UN	FC	
5	3B	AR_08020402_106	Critical Season DO	Two Prairie, Bayou	1.86	Miles	Remnant	Low	UN	AL, ORW	2004
5	3B	AR_08020402_206	Critical Season DO	Two Prairie, Bayou	11.10	Miles	Carry forward	Low	UN	AL	
5	3B	AR_08020402_206	Primary Season DO	Two Prairie, Bayou	11.10	Miles	Carry forward	Low	AG	AL	2024
5	3B	AR_08020402_206	Turbidity Base Flow	Two Prairie, Bayou	11.10	Miles	Carry forward	High	AG	OU	2024
5	3B	AR_08020402_306	Critical Season DO	Two Prairie, Bayou	43.30	Miles	Remnant	Low	UN	AL	2004
5	3B	AR_08020402_4010	Turbidity Storm Flow	Pickthorne Lake	0.50	Square Miles	Remnant	Low	UN	OU	
5	3B	AR_08020402_4010	Turbidity Base Flow	Pickthorne Lake	0.50	Square Miles	Remnant	Low	UN	OU	
5	3B	AR_08020402_4020	Dissolved Oxygen - year round	Rodgers Reservoir	0.86	Square Miles	Remnant	Low	UN	AL	2020
5	3B	AR_08020402_507	Primary Season DO	Bayou Meto	8.64	Miles	Carry forward	High	UN	AL	2024
5	3B	AR_08020402_607	Critical Season DO	Bayou Meto	5.19	Miles	Carry forward	High	MP	AL	2022

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	3B	AR_08020402_806	Critical Season DO	Two Prairie, Bayou	6.65	Miles	Remnant	Low	UN	AL, ORW	2004
5	3B	AR_08020402_807	pH	Bridge Creek	8.45	Miles	Remnant	Medium	UN	OU	2020
5	3B	AR_08020402_807	Primary Season DO	Bridge Creek	8.45	Miles	Remnant	Medium	UN	AL	2020
5	3B	AR_08020402_907	pH	Bayou Meto	17.14	Miles	Remnant	High	UN	OU	2020
5	3B	AR_08020402_4060	Dioxin	Dupree Lake	0.01	Square Miles	New	Low	UR	FC	2026
5	3B	AR_08020402_607	Turbidity Base Flow	Bayou Meto	5.19	Miles	Remnant	Low	IP, UN	OU	2020
5	3C	AR_11110207_018	Critical Season DO	Maumelle River	29.79	Miles	Carry forward	Low	UR, UN	AL	2020
5	3C	AR_11110207_022	Temperature	Fourche Creek	12.83	Miles	Carry forward	High	UR	AL	2022
5	3C	AR_11110207_023	Biological Integrity - Fish	Rock Creek	13.42	Miles	Remnant	High	UR	AL	2022
5	3C	AR_11110207_023	pH	Rock Creek	13.42	Miles	Remnant	High	UR	OU	2022
5	3C	AR_11110207_023	Escherichia coli	Rock Creek	13.42	Miles	Remnant	High	UR	PC	2022
5	3C	AR_11110207_024	Copper Chronic	Fourche Creek	22.09	Miles	Carry forward	High	UR, IP, MP	AL	2022
5	3C	AR_11110207_024	Copper Acute	Fourche Creek	22.09	Miles	New	High	UR, IP, MP	AL	2026
5	3C	AR_11110207_024	Turbidity Base Flow	Fourche Creek	22.09	Miles	Carry forward	Medium	SE, UR, UN	OU	
5	3C	AR_11110207_024	Turbidity Storm Flow	Fourche Creek	22.09	Miles	Carry forward	High	SE, UR, UN	OU	2024
5	3C	AR_11110207_4010	PCB	Saracen Lake	0.72	Square Miles	Remnant	Low	IP	FC	
5	3C	AR_11110207_4071	pH	Maumelle Lake	9.13	Square Miles	Remnant	Medium	UN, RE	OU	2022
5	3C	AR_11110207_724	Copper Chronic	McHenry Creek	8.91	Miles	Remnant	Low	UR, UN	SAL	2020
5	3C	AR_11110207_724	pH	McHenry Creek	8.91	Miles	Remnant	Low	UR, UN	OU	2020
5	3C	AR_11110207_822	Critical Season DO	Fourche Creek	3.57	Miles	Carry forward	High	UR, UN	AL	2020

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	3C	AR_11110207_822	Primary Season DO	Fourche Creek	3.57	Miles	New	Medium	UR, UN	AL	2026
5	3C	AR_11110207_822	Turbidity Base Flow	Fourche Creek	3.57	Miles	Carry forward	High	UR, UN	OU	2020
5	3C	AR_11110207_822	Turbidity Storm Flow	Fourche Creek	3.57	Miles	Carry forward	High	UR, UN	OU	2022
5	3C	AR_11110207_824	Biological Integrity - Macroinvertebrates	Brodie Creek	10.48	Miles	Remnant	Medium	UR, UN	AL	2020
5	3C	AR_11110207_824	pH	Brodie Creek	10.48	Miles	Remnant	Medium	UR, UN	OU	2020
5	3C	AR_11110207_826	Critical Season DO	Fish Creek	9.42	Miles	Carry forward	Medium	MP, RE	AL	2022
5	3C	AR_11110207_826	pH	Fish Creek	9.42	Miles	Remnant	Medium	MP, RE	OU	2022
5	3C	AR_11110207_826	Primary Season DO	Fish Creek	9.42	Miles	Remnant	Medium	MP, RE	AL	2022
5	3C	AR_11110207_912	pH	White Oak Bayou	19.50	Miles	Remnant	Low	UR, UN	OU	2020
5	3C	AR_11110207_022	Copper Chronic	Fourche Creek	12.83	Miles	New	High	UR	AL	2026
5	3C	AR_11110207_022	Copper Acute	Fourche Creek	12.83	Miles	New	High	UR	AL	2026
5	3C	AR_11110207_919	Copper Chronic	Caney Bayou	6.01	Miles	New	High	UR	AL	2026
5	3C	AR_11110207_919	Lead Chronic	Caney Bayou	6.01	Miles	New	High	UR	AL	2026
5	3D	AR_11110205_002	Turbidity Base Flow	East Fork Cadron Creek	19.56	Miles	Carry forward	Low	SE, UN	OU, ORW	
5	3D	AR_11110205_002	Turbidity Storm Flow	East Fork Cadron Creek	19.56	Miles	Carry forward	Low	AG	OU, ORW	2022
5	3D	AR_11110205_008	pH	Mill Creek	11.89	Miles	New	Medium	UN	OU	2026
5	3E	AR_11110206_001	Critical Season DO	Fourche LaFave River	53.68	Miles	Remnant	Low	UN	AL	2008
5	3E	AR_11110206_012	pH	West Gafford Creek	14.65	Miles	Remnant	low	UN	OU	
5	3E	AR_11110206_012	Turbidity Base Flow	West Gafford Creek	14.65	Miles	Remnant	low	UN	OU	2020
5	3E	AR_11110206_014	Critical Season DO	South Fourche LaFave River	30.18	Miles	Carry forward	Low	UN	AL	
5	3E	AR_11110206_015	Biological Integrity - Macroinvertebrates	Bear Creek	12.31	Miles	Remnant	Medium	UN	AL	2022
5	3E	AR_11110206_015	pH	Bear Creek	12.31	Miles	Remnant	Medium	UN	OU	2020

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	3E	AR_11110206_4052	Dissolved Oxygen - year round	Nimrod Lake	2.11	Square Miles	Remnant	High	AG	AL	2022
5	3E	AR_11110206_514	Biological Integrity - Macroinvertebrates	Negro Branch	4.98	Miles	Remnant	Low	AG, UN	SAL	2022
5	3E	AR_11110206_514	pH	Negro Branch	4.98	Miles	Remnant	Low	UN	OU	
5	3E	AR_11110206_514	Turbidity Base Flow	Negro Branch	4.98	Miles	Remnant	Low	UN	OU	2020
5	3E	AR_11110206_808	pH	Turner Creek	4.76	Miles	Remnant	Low	UN	OU	
5	3E	AR_11110206_808	Turbidity Storm Flow	Turner Creek	4.76	Miles	Remnant	Low	UN	OU	
5	3E	AR_11110206_914	Critical Season DO	Dry Fork Creek	12.20	Miles	Remnant	Low	UN	AL	2020
5	3E	AR_11110206_914	pH	Dry Fork Creek	12.20	Miles	Remnant	Low	UN	OU	
5	3E	AR_11110206_901	Biological Integrity - Fish	West Fork Mill Creek	5.85	Miles	New	Low	UN	AL	2026
5	3F	AR_11110203_011	Turbidity Base Flow	Point Remove Creek	13.86	Miles	Carry forward	High	UN	OU	2020
5	3F	AR_11110203_018	Critical Season DO	West Fork Point Remove Creek	11.13	Miles	Remnant	Low	UN	AL	2020
5	3F	AR_11110203_033	Turbidity Base Flow	Rocky Cypress Creek	19.90	Miles	Carry forward	Low	SE	OU	
5	3F	AR_11110203_4020	pH	Driver Creek Lake	0.04	Square Miles	Carry forward	Low	UN	OU	
5	3F	AR_11110203_904	Turbidity Base Flow	Stone Dam Creek	4.80	Miles	Carry forward	Medium	UN	OU	2020
5	3F	AR_11110203_918	Turbidity Base Flow	Trimble Creek	3.50	Miles	Remnant	Low	AG	OU	2022
5	3F	AR_11110203_931	Primary Season DO	Whig Creek	10.12	Miles	Carry forward	Low	IP, UN	AL	
5	3F	AR_11110203_931	Critical Season DO	Whig Creek	10.12	Miles	Carry forward	Low	IP, UN	AL	
5	3F	AR_11110203_931	Zinc Acute	Whig Creek	10.12	Miles	Carry forward	Low	IP, UN	AL	2024
5	3F	AR_11110203_931	Zinc Chronic	Whig Creek	10.12	Miles	Carry forward	Low	IP, UN	AL	2024
5	3F	AR_11110203_018	Primary Season DO	West Fork Point Remove Creek	11.13	Miles	New	Medium	UN	AL	2026
5	3F	AR_11110203_033	Biological Integrity - Fish	Rocky Cypress Creek	19.90	Miles	New	Low	MP, UN	AL	2026
5	3F	AR_11110203_132	Biological Integrity - Fish	Smiley Bayou	9.36	Miles	New	Low	UN	AL	2026

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	3G	AR_11110204_011	Turbidity Base Flow	Petit Jean River	24.06	Miles	Carry forward	Low	SE	OU	
5	3G	AR_11110204_902	Primary Season DO	Keeland Creek	6.67	Miles	New	Medium	UR, IP, MP	AL	2026
5	3G	AR_11110204_902	Total Nitrogen	Keeland Creek	6.67	Miles	New	High	UR, IP, MP	AL	2026
5	3G	AR_11110204_911	Biological Integrity - Macroinvertebrates	Booneville Creek	6.46	Miles	New	Low	UR, UN	AL	2026
5	3G	AR_11110204_902	Biological Integrity - Fish	Keeland Creek	6.67	Miles	New	Low	UR, IP, MP	AL	2026
5	3H	AR_11110104_003	Critical Season DO	Webber Creek	4.61	Miles	Carry forward	Low	AG	AL	2024
5	3H	AR_11110104_006	pH	Lee Creek	5.27	Miles	Remnant	Low	UN	OU, ORW	2020
5	3H	AR_11110104_013	Critical Season DO	Arkansas River	6.31	Miles	Carry forward	Low	UR, IP, MP	AL	2024
5	3H	AR_11110201_008	pH	Mulberry River	29.96	Miles	Remnant	High	UN	OU, ORW	
5	3H	AR_11110201_012	pH	Little Mulberry Creek	19.29	Miles	Remnant	High	UN	OU	
5	3H	AR_11110201_019	Critical Season DO	Cedar Creek	18.40	Miles	Carry forward	Low	AG, UN	AL	2024
5	3H	AR_11110201_912	pH	Friley Creek	7.18	Miles	Remnant	High	UN	OU	
5	3H	AR_11110202_013	Critical Season DO	East Fork Illinois Bayou	16.52	Miles	Remnant	Medium	UN	AL, ORW	
5	3H	AR_11110202_013	Primary Season DO	East Fork Illinois Bayou	16.52	Miles	Remnant	Medium	UN	AL, ORW	
5	3H	AR_11110202_4070	pH	Huckleberry Reservoir	0.58	Square Miles	Remnant	Low	AG, UN	OU	2024
5	3H	AR_11110104_001	Critical Season DO	Arkansas River	9.22	Miles	New	Medium	UR, IP, MP	AL	2026
5	3H	AR_11110201_006	Critical Season DO	Mulberry River	11.28	Miles	New	Medium	UN	AL	2026
5	3H	AR_11110202_037	Primary Season DO	Smith Creek	9.47	Miles	New	Medium	UN	AL	2026
5	3H	AR_11110202_038	Primary Season DO	Cedar Creek	8.47	Miles	New	Medium	UR, AG, UN	AL	2026

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	3H	AR_11110202_037	Total Nitrogen	Smith Creek	9.47	Miles	New	High	UN	AL	2026
5	3H	AR_11110104_901	Biological Integrity - Fish	Massard Creek	9.95	Miles	New	Low	UR, IP	AL	2026
5	3H	AR_11110201_028	Biological Integrity - Fish	Onion Creek	13.35	Miles	New	Low	SE, UN	AL	2026
5	3H	AR_11110201_406	Biological Integrity - Fish	Vine Prairie Creek	6.14	Miles	New	Low	SE, UN	AL	2026
5	3H	AR_11110202_032	Biological Integrity - Fish	Prairie Creek	7.99	Miles	New	Low	SE, UR	AL	2026
5	3H	AR_11110202_037	Biological Integrity - Fish	Smith Creek	9.47	Miles	New	Low	UN	AL	2026
5	3H	AR_11110202_038	Biological Integrity - Fish	Cedar Creek	8.47	Miles	New	Low	IP, SE, UN	AL	2026
5	3H	AR_11110202_041	Biological Integrity - Fish	Hurricane Creek	17.39	Miles	New	Low	UN	AL	2026
5	3I	AR_11110105_001	Critical Season DO	Poteau River	4.91	Miles	Carry forward	Medium	UN	AL	
5	3I	AR_11110105_033	Turbidity Base Flow	James Fork	28.19	Miles	Carry forward	High	AG, UN	OU	2024
5	3I	AR_11110105_034	Turbidity Base Flow	Sugarloaf Creek	6.87	Miles	Remnant	High	AG	OU	2024
5	3I	AR_11110105_036	Turbidity Base Flow	Cherokee Creek	10.64	Miles	Remnant	Low	AG, UN	OU	2022
5	3I	AR_11110105_831	Chloride	Unnamed trib to Poteau	0.37	Miles	Remnant	Low	UN	SAL	2014
5	3I	AR_11110105_831	Total Dissolved Solids	Unnamed trib to Poteau	0.37	Miles	Remnant	Low	UN	SAL	2014
5	3I	AR_11110105_925	pH	Briery Creek	3.84	Miles	Remnant	Medium	UN	OU	2020
5	3I	AR_11110105_035	Biological Integrity - Fish	Prairie Creek	14.00	Miles	New	Low	MP, UN	AL	2026
5	3J	AR_11110103_024	Sulfate	Illinois River	2.76	Miles	Carry forward	Medium	UN	AL, ORW	
5	3J	AR_11110103_026	Sulfate	Moores Creek	4.86	Miles	Remnant	Medium	UN	AG, DWS, I	2014
5	3J	AR_11110103_027	Sulfate	Muddy Fork	7.14	Miles	Remnant	Medium	UN	AG, DWS, I	
5	3J	AR_11110103_4080	pH	Fayetteville Lake	0.26	Square Miles	Remnant	Medium	UN	OU	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	3J	AR_11110103_733	Primary Season DO	Unnamed Tributary to Brush	3.46	Miles	Remnant	Medium	UN	SAL	2020
5	3J	AR_11110103_020	Sulfate	Illinois River	2.00	Miles	New	Low	UN	AL	2026
5	3J	AR_11110103_022	Sulfate	Illinois River	12.95	Miles	New	Low	SE, UN	AL	2026
5	3J	AR_11110103_021	Critical Season DO	Cincinnati Creek	13.16	Miles	New	Low	UN	AL	2026
5	3J	AR_11110103_012	Biological Integrity - Fish	Evansville Creek	8.82	Miles	New	Low	UN	AL	2026
5	4A	AR_08020303_005	Turbidity Base Flow	White River	50.68	Miles	Carry forward	High	UN	OU	2024
5	4A	AR_08020303_014	Critical Season DO	Boat Gunwale Slash	15.47	Miles	Carry forward	Low	UN	AL	2020
5	4A	AR_08020303_914	Critical Season DO	Boat Gunwale Slash	9.96	Miles	Remnant	Low	UN	AL	2014
5	4A	AR_08020303_914	Primary Season DO	Boat Gunwale Slash	9.96	Miles	Remnant	Low	UN	AL	2014
5	4A	AR_08020304_010	Chloride	Big Creek	40.69	Miles	Remnant	Low	UN	AG, DWS, I	2004
5	4A	AR_08020304_010	Total Dissolved Solids	Big Creek	40.69	Miles	Remnant	Low	UN	AG, DWS, I	2004
5	4A	AR_08020304_014	Critical Season DO	Prairie Cypress Creek	14.08	Miles	Carry forward	Low	UN	AL	
5	4A	AR_08020304_014	Primary Season DO	Prairie Cypress Creek	14.08	Miles	Carry forward	Low	UN	AL	
5	4B	AR_08020302_002	Critical Season DO	Bayou De View	15.79	Miles	Remnant	Low	UN	AL	2014
5	4B	AR_08020302_002	Primary Season DO	Bayou De View	15.79	Miles	Remnant	Low	UN	AL	2014
5	4B	AR_08020302_004	Critical Season DO	Bayou De View	25.29	Miles	Remnant	Low	AG, UN	AL	
5	4B	AR_08020302_004	Sulfate	Bayou De View	25.29	Miles	Carry forward	Low	AG, UN	AL	2024
5	4B	AR_08020302_007	Critical Season DO	Bayou De View	6.17	Miles	Carry forward	Low	AG, UN	AL	
5	4B	AR_08020302_012	Turbidity Base Flow	Cow Lake Ditch	18.23	Miles	Carry forward	High	AG, UN	OU	2020
5	4B	AR_08020302_012	Turbidity Storm Flow	Cow Lake Ditch	18.23	Miles	Carry forward	Low	AG, UN	OU	2022
5	4B	AR_08020302_014	Critical Season DO	Buffalo Creek	10.54	Miles	Remnant	Low	UN	AL	
5	4B	AR_08020302_014	Primary Season DO	Buffalo Creek	10.54	Miles	Remnant	Low	UN	AL	

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	4B	AR_08020302_016	Critical Season DO	Cache River	25.03	Miles	Remnant	Low	AG, UN	AL	
5	4B	AR_08020302_018	Critical Season DO	Cache River	20.63	Miles	Remnant	Low	UN	AL	2020
5	4B	AR_08020302_019	Sulfate	Cache River	18.77	Miles	Carry forward	Low	UN	AL	2024
5	4B	AR_08020302_030	Temperature	Swan Pond Ditch	5.70	Miles	Remnant	Low	UN	AL	2020
5	4B	AR_08020302_038	Turbidity Base Flow	Little Cache River Ditch	3.80	Miles	Carry forward	High	AG, UN	OU	2020
5	4B	AR_08020302_041	Turbidity Base Flow	Cache River Ditch Number 1	8.86	Miles	Carry forward	High	AG, UN	OU	2020
5	4B	AR_08020302_044	Turbidity Storm Flow	Big Gum Lateral	12.29	Miles	Remnant	High	AG	OU	2024
5	4B	AR_08020302_055	Primary Season DO	Locust Creek Ditch	13.24	Miles	Remnant	Low	AG, UN	AL	2020
5	4B	AR_08020302_819	Turbidity Base Flow	Gourd Neck Creek	5.40	Miles	Carry forward	High	AG	OU	2024
5	4B	AR_08020302_819	Turbidity Storm Flow	Gourd Neck Creek	5.40	Miles	Carry forward	High	AG	OU	2024
5	4B	AR_08020302_901	Primary Season DO	Unnamed Trib to Cache River (AR_08020302_001)	0.69	Miles	Remnant	Low	AG, UN	SAL	2020
5	4B	AR_08020302_903	Critical Season DO	Caney Creek	18.01	Miles	Remnant	Low	UN	AL	2014
5	4B	AR_08020302_903	Primary Season DO	Caney Creek	18.01	Miles	Remnant	Low	UN	AL	2014
5	4B	AR_08020302_919	Turbidity Storm Flow	Eight-mile Creek	6.87	Miles	Carry forward	High	AG	OU	2024
5	4B	AR_08020302_921	Turbidity Base Flow	West Cache River Slough	10.20	Miles	Carry forward	High	AG, UN	OU	2020
5	4B	AR_08020302_921	Turbidity Storm Flow	West Cache River Slough	10.20	Miles	Remnant	High	AG	OU	2024
5	4B	AR_08020302_937	Turbidity Base Flow	East Slough	7.23	Miles	Carry forward	High	AG, UN	OU	2020
5	4B	AR_08020302_937	Turbidity Storm Flow	East Slough	7.23	Miles	Remnant	High	AG, UN	OU	2020
5	4B	AR_08020302_020	Sulfate	Cache River	27.62	Miles	New	Medium	AG	AL	2026
5	4B	AR_08020302_021	Temperature	Cache River	17.04	Miles	New	Low	AG, MP	AL	2026
5	4B	AR_08020302_4010	Harmful Algal Bloom	Lake Hogue	0.37	Square Miles	New	High	AG	PC, SC	2026
5	4C	AR_11010013_006	Critical Season DO	Village Creek	29.20	Miles	Remnant	Low	UN	AL	

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	4C	AR_11010013_006	Primary Season DO	Village Creek	29.20	Miles	Remnant	Low	UN	AL	2004
5	4C	AR_11010013_007	Critical Season DO	Village Creek	1.23	Miles	Remnant	Low	UN	AL	
5	4C	AR_11010013_007	Primary Season DO	Village Creek	1.23	Miles	Remnant	Low	UN	AL	2004
5	4C	AR_11010013_008	Critical Season DO	Village Creek	12.24	Miles	Remnant	Low	UN	AL	
5	4C	AR_11010013_008	Primary Season DO	Village Creek	12.24	Miles	Remnant	Low	UN	AL	2004
5	4C	AR_11010013_020	Critical Season DO	Departee Creek	21.62	Miles	Remnant	Low	AG, UN	AL	2014
5	4C	AR_11010013_020	Primary Season DO	Departee Creek	21.62	Miles	Remnant	Low	AG, UN	AL	2014
5	4C	AR_11010013_021	Critical Season DO	Glaise Creek	43.14	Miles	Remnant	Low	AG, UN	AL	2014
5	4C	AR_11010013_021	Primary Season DO	Glaise Creek	43.14	Miles	Remnant	Low	AG, UN	AL	2014
5	4D	AR_08020301_007	Critical Season DO	Bayou Des Arc	50.10	Miles	Remnant	High	UN	AL	2022
5	4D	AR_08020301_007	Turbidity Base Flow	Bayou Des Arc	50.10	Miles	Remnant	High	SE	OU	2022
5	4D	AR_08020301_009	Critical Season DO	Bull Creek	46.75	Miles	Remnant	Low	UN	AL	
5	4D	AR_08020301_010	Critical Season DO	Cypress Bayou	7.79	Miles	Remnant	Low	UN	AL	
5	4D	AR_08020301_010	Primary Season DO	Cypress Bayou	7.79	Miles	Remnant	Low	UN	AL	
5	4D	AR_08020301_015	Critical Season DO	Wattensaw Bayou	69.54	Miles	Carry forward	Low	UN	AL	
5	4D	AR_08020301_015	Primary Season DO	Wattensaw Bayou	69.54	Miles	New	Medium	UR, UN	AL	2026
5	4E	AR_11010014_031	Biological Integrity - Fish	Weaver Creek	16.78	Miles	Remnant	Low	UN	AL	2024
5	4E	AR_11010014_031	Critical Season DO	Weaver Creek	16.78	Miles	Carry forward	Low	UN	AL	2024
5	4E	AR_11010014_037	Critical Season DO	Archey Creek	18.06	Miles	Carry forward	High	UN	AL, ORW	2024
5	4E	AR_11010014_038	pH	South Fork Little Red River	9.70	Miles	Remnant	Low	UN	OU, ORW	
5	4E	AR_11010014_040	Critical Season DO	South Fork Little Red River	7.71	Miles	Carry forward	High	UN	AL	2024
5	4E	AR_11010014_925	Biological Integrity - Macroinvertebrates	Turkey Creek	22.61	Miles	Remnant	Low	AG	AL, ORW	2024

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	4E	AR_11010014_925	Critical Season DO	Turkey Creek	22.61	Miles	Carry forward	Low	AG	AL, ORW	2024
5	4E	AR_11010014_930	Critical Season DO	Little Red Creek	7.15	Miles	Carry forward	High	AG	AL	2024
5	4E	AR_11010014_931	Biological Integrity - Macroinvertebrates	Cove Creek	8.71	Miles	Remnant	Low	AG	AL	2024
5	4E	AR_11010014_931	Critical Season DO	Cove Creek	8.71	Miles	Carry forward	High	AG	AL	2024
5	4E	AR_11010014_940	pH	South Fork Little Red River	13.77	Miles	Remnant	Low	UN	OU	
5	4E	AR_11010014_044	Biological Integrity - Fish	Hill Creek	8.55	Miles	Remnant	Low	AG	AL	2024
5	4F	AR_11010004_012	Turbidity Base Flow	Salado Creek	14.46	Miles	Carry forward	High	AG	OU	2024
5	4F	AR_11010004_015	Escherichia coli	Hicks Creek	6.83	Miles	Remnant	High	MP, UR, UN	PC	
5	4F	AR_11010004_017	Critical Season DO	Greenbrier Creek	13.07	Miles	Carry forward	Low	UN	AL	
5	4F	AR_11010004_017	Primary Season DO	Greenbrier Creek	13.07	Miles	New	Medium	UN	AL	2026
5	4F	AR_11010004_017	Turbidity Base Flow	Greenbrier Creek	13.07	Miles	Carry forward	High	UN	OU	2024
5	4F	AR_11010004_915	pH	Big Creek	14.63	Miles	Remnant	Low	UN	OU	2020
5	4F	AR_11010006_4010	Mercury in Fish Tissue	Norfork Lake	6.45	Square Miles	Carry forward	Low	UN	FC	2024
5	4F	AR_11010006_4011	Mercury in Fish Tissue	Norfork Lake	21.61	Square Miles	Carry forward	Low	UN	FC	2024
5	4F	AR_11010004_803	Biological Integrity - Macroinvertebrates	Pfeiffer Creek	7.88	Miles	New	Low	UR, UN	AL	2026
5	4G	AR_11010008_001	Turbidity Base Flow	Current River	26.65	Miles	Carry forward	Medium	AG	OU, ORW	2020
5	4G	AR_11010009_008	Turbidity Base Flow	Fourche River	31.41	Miles	Remnant	Low	SE	OU	
5	4G	AR_11010009_008	Turbidity Storm Flow	Fourche River	31.41	Miles	Remnant	Low	SE	OU	
5	4G	AR_11010012_002	Temperature	Strawberry River	10.42	Miles	Remnant	Low	AG, UN	AL, ORW	2020

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	4G	AR_11010012_006	Temperature	Strawberry River	20.30	Miles	Carry forward	Low	AG, UN	AL, ORW	2020
5	4G	AR_11010012_007	Temperature	North Big Creek	24.82	Miles	Remnant	Low	UN	AL	2020
5	4G	AR_11010012_013	Temperature	South Big Creek	26.74	Miles	Remnant	Low	AG, UN	AL	2020
5	4G	AR_11010012_014	Turbidity Base Flow	Reeds Creek	17.89	Miles	Remnant	High	AG, UN	OU	2020
5	4G	AR_11010012_902	Temperature	Steep Bank Creek	6.95	Miles	Remnant	High	AG	AL	2022
5	4G	AR_11010012_902	Turbidity Base Flow	Steep Bank Creek	6.95	Miles	Remnant	High	AG	OU	2022
5	4H	AR_11010010_003	Turbidity Base Flow	Spring River	10.61	Miles	Carry forward	Low	UN	OU, ORW	2020
5	4H	AR_11010010_006	Temperature	Spring River	5.20	Miles	Carry forward	Low	UN	AL, ORW	
5	4H	AR_11010010_009	Critical Season DO	English Creek	9.63	Miles	Remnant	Low	UN	AL, ORW	
5	4H	AR_11010010_906	Critical Season DO	Gut Creek	9.37	Miles	Remnant	Low	UN	AL, ORW	
5	4H	AR_11010011_001	Turbidity Base Flow	Eleven Point River	41.71	Miles	Carry forward	Low	AG, SE	OU, ORW	2020
5	4I	AR_11010003_4010	Mercury in Fish Tissue	Bull Shoals Lake	20.38	Square Miles	Carry forward	Low	UN	FC	2024
5	4I	AR_11010003_4011	Mercury in Fish Tissue	Bull Shoals Lake	32.03	Square Miles	Carry forward	Low	UN	FC	2024
5	4I	AR_11010003_949	Turbidity Base Flow	Crooked Creek	14.27	Miles	Carry forward	High	UR, AG	OU	2022
5	4I	AR_11010003_949	Critical Season DO	Crooked Creek	14.27	Miles	New	Low	UR, MP	AL	2026
5	4I	AR_11010003_951	Biological Integrity - Fish	Hog Creek	10.04	Miles	New	Low	UN	AL	2026
5	4J	AR_11010005_001	Temperature	Buffalo River	13.14	Miles	Carry forward	Low	SE, UN	AL, ORW	2022

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	4K	AR_11010001_023	Critical Season DO	White River	1.90	Miles	New	Low	UR, AG, MP	AL	2022
5	4K	AR_11010001_023	Temperature	White River	1.90	Miles	Carry forward	Low	UR, AG, MP	AL	2022
5	4K	AR_11010001_024	Sulfate	West Fork White River	10.72	Miles	Carry forward	Low	UN	AL	
5	4K	AR_11010001_024	Temperature	West Fork White River	10.72	Miles	Carry forward	Low	UN	AL	2020
5	4K	AR_11010001_026	Critical Season DO	Middle Fork White River	8.14	Miles	Carry forward	Low	UN	AL	2020
5	4K	AR_11010001_442	pH	Kings River	4.86	Miles	Remnant	Low	UN	OU, ORW	2020
5	4K	AR_11010001_542	Critical Season DO	Kings River	18.18	Miles	Remnant	Medium	UN	AL, ORW	
5	4K	AR_11010001_624	Critical Season DO	West Fork White River	5.79	Miles	Carry forward	Medium	UN	AL	
5	4K	AR_11010001_624	Sulfate	West Fork White River	5.79	Miles	Carry forward	Medium	UN	AL	
5	4K	AR_11010001_916	Critical Season DO	Leatherwood Creek	5.47	Miles	Remnant	Medium	UN	AL	
5	4K	AR_11010001_926	Critical Season DO	Middle Fork White River	15.53	Miles	Remnant	Medium	UN	AL	2018
5	4K	AR_11010001_926	Primary Season DO	Middle Fork White River	15.53	Miles	Remnant	Medium	UN	AL	2018
5	4K	AR_11010001_959	Total Dissolved Solids	Town Branch	2.08	Miles	Remnant	Low	IP, MP	AG, DWS, I	2018
5	4K	AR_11010001_024	Total dissolved solids	West Fork White River	10.72	Miles	New	Low	UR, SE	AL	2026
5	4K	AR_11010001_037	Total dissolved solids	Kings River	19.71	Miles	New	Low	UN	AL	2026
5	4K	AR_11010001_034	Critical Season DO	War Eagle Creek	10.18	Miles	New	Low	UN	AL	2026
5	4K	AR_11010001_824	Critical Season DO	Town Branch	4.24	Miles	New	Low	UR, UN	AL	2026
5	5A	AR_08020203_009	Chloride	Saint Francis River	13.65	Miles	Remnant	Low	UN	AL, ORW	2004

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	5A	AR_08020203_009	Critical Season DO	Saint Francis River	13.65	Miles	Remnant	Low	UN	AL, ORW	2014
5	5A	AR_08020203_4060	pH	Horseshoe Lake	3.67	Square Miles	Remnant	Medium	AG	OU	2024
5	5A	AR_08020203_906	Primary Season DO	Tenmile Bayou	17.84	Miles	Remnant	Low	UN	AL	2004
5	5B	AR_08020205_001	Chloride	L'Anguille River	23.44	Miles	Carry forward	Medium	AG, UR	AL	2024
5	5B	AR_08020205_001	Critical Season DO	L'Anguille River	23.44	Miles	Carry forward	Low	UN	AL	
5	5B	AR_08020205_002	Critical Season DO	L'Anguille River	23.06	Miles	Remnant	Low	UN	AL	2006
5	5B	AR_08020205_003	Critical Season DO	L'Anguille River	2.89	Miles	Remnant	Low	UN	AL	2006
5	5B	AR_08020205_004	Chloride	L'Anguille River	16.99	Miles	Carry forward	Medium	UN	AL	2024
5	5B	AR_08020205_004	Critical Season DO	L'Anguille River	16.99	Miles	Carry forward	Low	UN	AL	
5	5B	AR_08020205_004	Selenium Chronic	L'Anguille River	16.99	Miles	Carry forward	Medium	UN	AL	2024
5	5B	AR_08020205_004	Total Dissolved Solids	L'Anguille River	16.99	Miles	Carry forward	Medium	UN	AL	2024
5	5B	AR_08020205_005	Chloride	L'Anguille River	53.41	Miles	Remnant	Low	UN	AL	
5	5B	AR_08020205_005	Critical Season DO	L'Anguille River	53.41	Miles	Remnant	Low	UN	AL	
5	5B	AR_08020205_005	Primary Season DO	L'Anguille River	53.41	Miles	Carry forward	Low	UN	AL	
5	5B	AR_08020205_005	Sulfate	L'Anguille River	53.41	Miles	Remnant	Low	UN	AL	
5	5B	AR_08020205_005	Total Dissolved Solids	L'Anguille River	53.41	Miles	Remnant	Low	UN	AL	2018
5	5B	AR_08020205_007	Critical Season DO	First Creek	31.20	Miles	Remnant	Low	UN	AL	2016
5	5B	AR_08020205_007	Primary Season DO	First Creek	31.20	Miles	Remnant	Low	UN	AL	2016
5	5B	AR_08020205_008	Critical Season DO	Second Creek	26.04	Miles	Carry forward	Low	UN	AL, ORW	
5	5B	AR_08020205_901	Critical Season DO	Williams Creek	7.06	Miles	Remnant	Low	UN	AL	2016
5	5B	AR_08020205_901	Primary Season DO	Williams Creek	7.06	Miles	Remnant	Low	UN	AL	2016
5	5B	AR_08020205_902	Total Dissolved Solids	Prairie Creek	8.40	Miles	Remnant	Low	UN	AG, DWS, I	

Listing Cat.	Planning Segment	Assessment Unit	Parameter	Waterbody Name	Segment Size	Size Unit	Listing Status	Priority	Source	Uses	Year Listed
5	5B	AR_08020205_001	Total dissolved solids	L'Anguille River	23.44	Miles	New	Low	AG, SE	AL	2026
5	5C	AR_08020204_001	Primary Season DO	Left Hand Chute of Little River	17.61	Miles	Remnant	Low	UN	AL	2014
5	5C	AR_08020204_002	Primary Season DO	Left Hand Chute of Little River	51.04	Miles	Remnant	Low	UN	AL	2014

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[13] Act 910 of the 2019 regular session of the General Assembly established The Transformation and Efficiencies Act of 2019, which organized the Arkansas Department of Environmental Quality (ADEQ) into the Arkansas Department of Energy and Environment (E&E), Division of Environmental Quality (DEQ)

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MAP INFORMATION

Maps depicting currently approved impaired waterbodies are available via an online interactive map.

https://experience.arcgis.com/experience/57e4fa8751524d54bd69ab58a7296e3e/

CATEGORY 4B RATIONALE BUFFALO RIVER WATERSHED

Buffalo River watershed 4b Plan for Pathogens, Dissolved Oxygen, Temperature, and Biological Integrity (fish). No additional impairments were added to this plan for the 2026 cycle. Information about the impairments within this plan reflects the status as of the 2024 cycle unless otherwise stated.

1. Identification of segment(s) and statement of the problem(s) causing the impairment(s).

Four parameters assessed as not attaining water quality criteria within the Buffalo River watershed have been placed in Category 4b – pathogens (*Escherichia coli* (*E. coli*)), dissolved oxygen (DO), temperature, and biological integrity (fish).

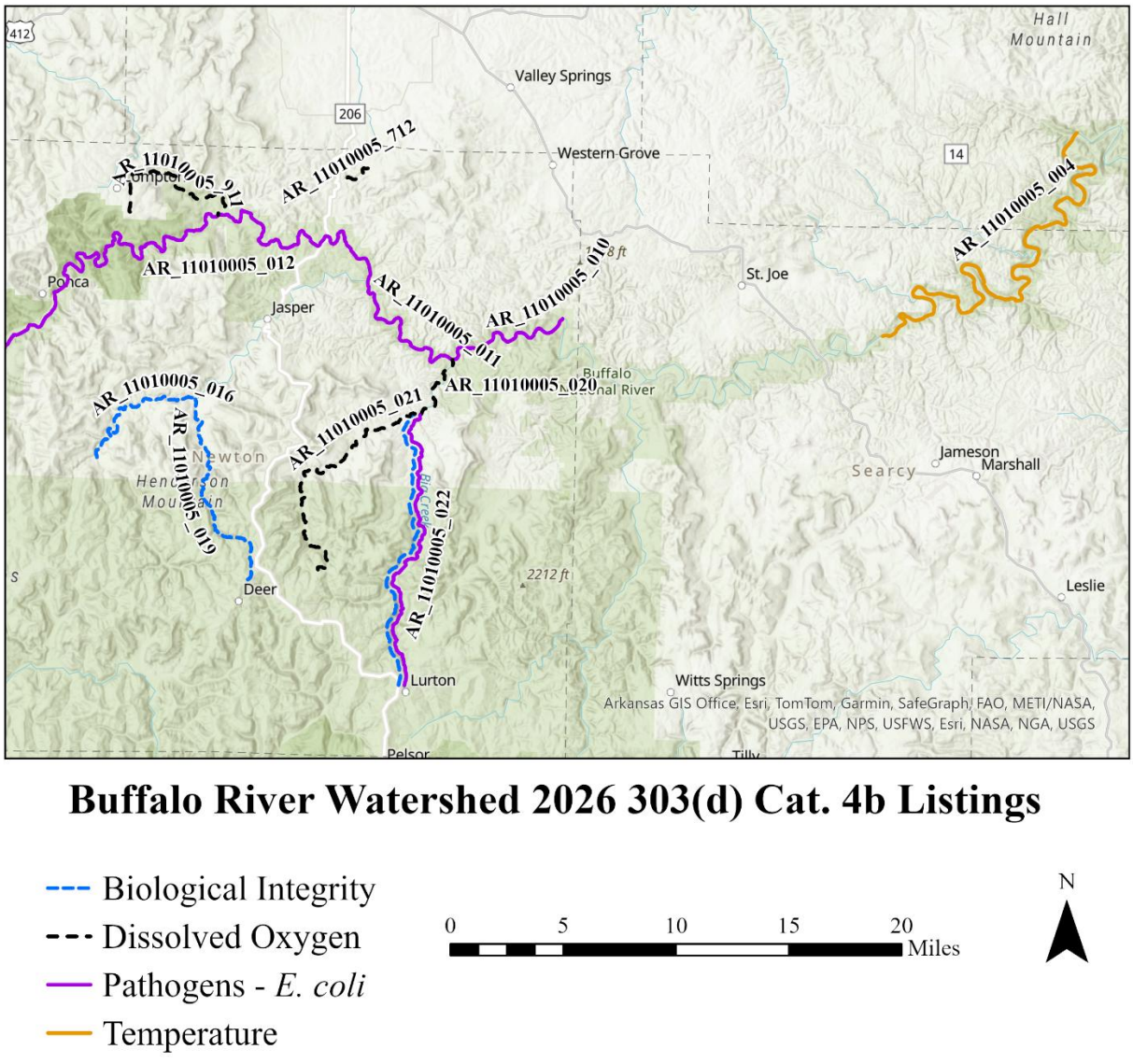

Figure A1. Impaired Segments in 4b, Buffalo River watershed

1a. Pathogens

Four Assessment Units (AUs) were impaired due to concentrations of *E. coli* that exceeded water quality criteria;

- AR_11010005_010 (Buffalo River)
- AR_11010005_011 (Buffalo River)
- AR_11010005_012 (Buffalo River)
- AR_11010005_022 (Big Creek)

These AUs are shown in Figure A1. The percent exceedance rate and/or geometric means of the data indicated the AUs were not supporting the primary contact recreation designated use.

Sources and causes for elevated pathogen levels in Big Creek and the Buffalo River have not been specifically identified. Land use in the HUC12 subwatersheds associated with these AUs is listed in Table A1. However, because of the karst nature of the surrounding geology, it is possible that pathogens are transported to these AUs via subsurface, as well as surface, flow. The results of dye studies in the Buffalo River watershed indicate that pollutants can travel across surface hydrologic divides via subsurface conduits (Soto, 2014). Potential pathogen sources present in the vicinity of the 4b AUs include manure application (swine and chicken) to pastures, livestock, leaking septic tanks, community sewer systems, tourism (primarily on the Buffalo River), and wildlife (including feral swine).

Extensive monitoring was conducted in Big Creek upstream and downstream of a swine concentrated animal feeding operation (CAFO) that was previously operating in the Big Creek subwatershed. The monitoring data at the downstream station showed no consistent increase or decrease in pathogen concentrations between the period prior to manure slurry application (September – December 2013) and the same four months in subsequent years after manure application began (Sharpley et al., 2019).

In partnership with USGS and Buffalo National River (BUFF), the Division (DEQ) is finalizing the report for a microbial source tracking study in the Mill Creek subwatershed of the Buffalo River (https://www.fondriest.com/news/investigating-pollution-tainted-groundwater-in-buffalo-river-watershed.htm). The Mill Creek Study suggests that cattle, and to a lesser extent, poultry are major contributors of *E. coli*, especially during high storm-flow events. Genetic markers also suggest that external sources in the Crooked Creek watershed, which is connected through a series of springs, also contribute to *E. coli* concentrations (Justus *et al*., in prog.).

The Marble Falls Sewage Improvement District (SID) wastewater treatment plant discharges to AR_11010005_712, which drains to AR_11010005_912, and eventually a segment impaired for *E. coli*, (AR_11010005_012 (Buffalo)) for a total distance of approximately 2.3 river miles. The Mill Creek report found human contributions to *E. coli*, but records indicate that most residences

in the watershed use septic systems for wastewater treatment (Justus *et al*., in prog.). Land use in the HUC12 associated with AR_11010005_712 is shown in Table A2. The Buffalo River experienced 1.5 million visitors in 2020. This peak in primary contact recreation may also be a contributor to the *E. coli* impairment.

Table A1. AUs listed for *E. coli* in the Buffalo River watershed

AU	Name	Monitoring Station(s)	HUC12(s) in which the AU is located	Selected land uses in watershed (NLCD 2023)*
AR_11010005_010	Buffalo River	BUFR0415	110100050304	Pasture = 7% Developed = 2% Forest = 89% Other = 1%
AR_11010005_011	Buffalo River	BUFR04, BUFR0414	110100050303	Pasture = 16% Developed = 4% Forest = 76% Other = 18%
AR_11010005_012	Buffalo River	BUFR02, BUFR0218, BUFR0220, BUFR0258, BUFR0259, BUFR0280, BUFR0281, BUFR03, BUFR0304, BUFT55	110100050207 110100050205	Pasture = 8% Developed = 2% Forest = 88% Other = 1%
AR_11010005_022	Big Creek upstream of the Left Fork	BC6, BC7	110100050302	Pasture = 12% Developed = 3% Forest = 83% Other = 1%

* Note that percentages may not sum to 100 because the area of open water is not included or because values were rounded to the closest whole number. NLCD = National Land Cover Database.

1b. Dissolved Oxygen

Four AUs were impaired due to concentrations of DO that exceeded water quality criteria:

- AR_11010005_020 (Big Creek)
- AR_11010005_021 (Left Fork Big Creek)
- AR_11010005_712 (Unnamed Trib. of Mill Creek)
- AR_11010005_911 (Cecil/Cove Creek)

DO concentrations in AU AR_11010005_020 (Big Creek downstream of the Left Fork; shown in Figure A1) do not meet water quality criteria at times. Monitoring stations that are located on this AU include BUFT06 (DEQ) and 07055814 (USGS). Continuous DO data were collected at the 07055814 station from December 2018 through December 2019. Diurnal fluctuations ranging 6 mg/L were common and caused numerous instantaneous values to fall below the criterion. All exceedances averaged to 4.9 mg/L.

Available data do not point to an obvious cause of the low DO in the Big Creek AU. Land use in the HUC12 associated with AR_11010005_020 is shown in Table 2 (HUC12 110100050303). Nutrient concentrations in the Big Creek watershed have been classified as low, i.e., below biological response levels reported in literature (Sharpley et al. 2019). The USGS has been conducting a study to evaluate the occurrence and possible causes of filamentous algae blooms in the Buffalo River during recent years (https://www.fondriest.com/news/investigating-pollution-tainted-groundwater-in-buffalo-river-watershed.htm). A recent publication (Justus et al, 2021) found that nutrient concentrations were typically higher at the Big Creek sampling location compared to other sampled areas on the Buffalo River, however the other down-stream sites were not found to be different from the control site. The in-field DO data provided in this study showed Big Creek to have a median DO value of 10.3 mg/L, which was higher than 4/5 of the other sites (Justus et al., 2021). This higher DO value may be related to an increase in primary productivity, which supports the larger diel fluctuations seen with the assessed data as continued respiration during times of low light, or darkness, will decrease DO.

Left Fork Big Creek (AR_11010005_021) exceeded the DO criteria 34% of the time during two diel sonde deployments. These deployments occurred July 19–21, 2022, and August 15–18, 2022. There were more exceedances in July compared to August, with the lowest DO value of 2.75 mg/L occurring on July 21, 2022. The average of all exceedances was 4.2 mg/L. During the starting dates for both deployments, flow severity was noted as a "3," representing low flow conditions. This is where flow is detectable but not considered typical. It is possible that lower flow conditions may have contributed to the DO exceedances for this stream.

Cecil/Cove Creek (AR_11010005_911) was assessed using long term continuous data from May – August 2018. Exceedances occurred 38% of the time, with large diel fluctuations. The lowest DO value was 4.2 mg/L in July 2018, and all exceedances averaged 5.31 mg/L.

DO concentrations in AR_11010005_712 (Unnamed Trib. of Mill Creek) did not meet water quality criteria at times during the 2022 cycle, and therefore is a remnant listing. No new data was available to assess this AU for the 2024 or the 2026 cycle. The monitoring station that is located on AU AR_11010005_712 includes WHI0212 (DEQ). Data were collected from June 2016 through May 2018. Data collected in August and September of 2017 exceeded the primary season (when the water temperature is below 22°C) DO standard of 6 mg/L.

The Marble Falls Suburban Improvement District (SID) wastewater treatment plant discharges to AR_11010005_712 but discharge monitoring data from the time of the excursions show that the plant was not discharging. Available data do not point to an obvious cause of the low DO in this AU. Land use in the HUC12 associated with AR_11010005_712 is shown in Table A2 (HUC12 110100050206).

Fluctuations in DO concentrations can be caused by chemical, physical, and/or natural environmental processes. One such cause is the natural diurnal fluctuations in response to respiration and photosynthesis (Wetzel, 2001). Other causes could be the physical habitat composition of the stream, bedrock or any other smooth streambed surface, and the chemical oxygen demand of water quality constituents found in the water.

Table A2. AUs listed for DO in the Buffalo River watershed

AU	Name	Monitoring Station(s)	HUC12(s) in which the AU is located	Selected land uses in watershed (NLCD 2023)*
AR_11010005_020	Big Creek	BUFT06, BC1, BC2, BC3, 07055814	110100050303	Pasture = 16% Developed = 4% Forest = 76% Other = 18%
AR_11010005_021	Left Fork Big Creek	WHIO216, BUFT602	110100050301	Pasture = 16% Developed = 3% Forest = 80% Other = 0.5%
AR_11010005_712	Unnamed Trib. of Mill Creek	WHI0212	110100050206	Pasture = 16% Developed = 5% Forest = 77% Other = 1%
AR_11010005_911	Cecil/Cove Creek	BUFT03	110100050204	Pasture = 12% Developed = 3% Forest = 84% Other = 1%

* Note that percentages may not sum to 100 because the area of open water is not included or because values were rounded to the closest whole number. NLCD = National Land Cover Database.

1c. Temperature

One AU was impaired due to temperature measurements that exceeded water quality criteria;

- AR_11010005_004 (Buffalo River)

Table A3. AU listed for temperature in the Buffalo River watershed

AU	Name	Monitoring Station(s)	HUC12(s) in which the AU is located	Selected land uses in watershed (NLCD 2023)*
AR_11010005_004	Buffalo River	BUFR0605, BUFT14, BUFR0625, BUFR0626, BUFR0675, BUFP0675, BUFR0730, BFR0771, BUFP0790, BUFR08	110100050504, 110100050502, 110100050409, 110100050406	Pasture = 13% Developed = 3% Forest = 81% Other = 2%

* Note that percentages may not sum to 100 because the area of open water is not included or because values were rounded to the closest whole number. NLCD = National Land Cover Database.

This AU's impairment status for temperature has changed over the past three reporting cycles. The AU was listed as impaired for temperature during the 2020 cycle, de-listed in the 2022 cycle, and is impaired for temperature in the 2024 cycle. This AU remains impaired for the 2026 cycle. There is one permitted discharger along this AU, Buffalo River National Park – Buffalo Point Lower Plant, which had effluent violations in December 2019. However, there are no temperature limits on this permit and none of the parameters violated in the effluent would be expected to cause an increase in temperature. There are multiple headwater streams that flow into this reach, and none are impaired for temperature. With no obvious anthropogenic source for the increased temperature on this reach, this may be due to natural occurrences of increased overall temperature. While the majority of the reach contains vegetative riparian area, pockets of pasture and developed area do exist, as shown in Table A3. The decrease in canopy cover as well as the larger width of the river in comparison to other streams in the ecoregion could also contribute to its susceptibility for warming. The mean of the exceedances was 30.9°C, with the standard for this ecoregion being 29°C.

1e. Biological Integrity (fish)

Three AUs were impaired due to fish community data that exceeded water quality criteria:

- AR_11010005_016 (Little Buffalo River)
- AR_11010005_019 (West Fork Shop Creek)
- AR_11010005_022 (Big Creek)

Table A4. AUs listed for biological integrity (fish) in the Buffalo River watershed

AU	Name	Monitoring Station(s)	HUC12(s) in which the AU is located	Selected land uses in watershed (NLCD 2023)*
AR_11010005_016	Little Buffalo River	WHI0228	110100050104	Pasture = 13% Developed = 6% Forest = 79% Other = 1%
AR_11010005_019	West Fork Shop Creek	WHI0218	110100050101	Pasture = 8% Developed = 4% Forest = 86% Other = 1%
AR_11010005_022	Big Creek	WHI0217, BUFT601	110100050302	Pasture = 12% Developed = 3% Forest = 83% Other = 1%

* Note that percentages may not sum to 100 because the area of open water is not included or because values were rounded to the closest whole number. NLCD = National Land Cover Database.

Biological integrity (fish) was determined based on community data from sampling events conducted by DEQ. These events included the use of electroshocking as well as seining, when able, to allow the best representative sample to be collected and assessed. In an attaining community it is expected to represent a balanced trophic structure as well as a high species richness, signifying a healthy fish community. For these impairments, none of the AUs were found to also be impaired for DO or temperature, which suggests a habitat issue may be contributing to community impairment. Details on the specific AUs that were found to be impaired for this parameter follow:

The community similarity index (CSI) score for AR_11010005_016 (Little Buffalo River) was 4, which classifies this AU as "not similar." A score of 17 would be needed for attainment in this ecoregion. During the sampling event it was found that this reach was not continuously wetted throughout the summer and tended to dry out at ~100 m below the sampling reach. This could explain the impairment, as non-wetted streams can influence community dynamics as not all fish species are capable of quickly re-colonizing after periods of intermittency.

The CSI score for AR_11010005_022 (Big Creek) was 6. This classified the AU as "not similar." This stream reach is typically more intermittent compared to the other two reaches listed for fish community impairment, as it is a headwater stream. This stream is also listed for *E. coli* as a remnant impairment suggesting some human, or other animal(s), influence on the stream has occurred in the past. A high Cyprinidae percentage was found in the overall community (78%), and of these most were *Campostoma* (40%). It has been shown that *Campostoma* recolonize once favorable conditions are present (Husemann et al. 2012). This could explain the high presence of *Campostoma* in both this AU and West Fork Shop Creek, as both were sampled after a drying event. Other fish may not have been capable of re-colonizing as quickly, which could assist in understanding the low CSI score.

For AR_11010005_019 (West Fork Shop Creek), the CSI score was 4, which puts this AU in the category of "not similar." The reach was found to not be continuously wetted through the summer. Shallow depth and large boulders also prevented seining during sampling, which may have prevented some fish species from being accounted for in the community. High Cyprinidae (94% of the community) were found during the sampling event, which were dominated by *Campostoma* (60%).

2. Description of pollution controls and how they will achieve water quality standards.

The water quality target for *E. coli* in the 4b AUs is the state water quality criteria for primary contact recreation. Since there is no definitive indication that the low DO conditions in the 4b AU are the result of nutrient inputs, the water quality target for DO is the state water quality criteria.

The proposed strategy for achieving water quality standards in these 4b AUs is through the implementation of the Buffalo River WMP (WMP; FTN 2018) by the Buffalo River Conservation Committee (BRCC; the successor of the Beautiful Buffalo River Action Committee) and its partners.

In August 2016, Arkansas Governor Asa Hutchinson formed the Beautiful Buffalo River Action Committee (BBRAC) to establish an Arkansas-led approach to identify and address potential issues of concern in the Buffalo River watershed. BBRAC was comprised of the Arkansas Department of Energy and Environment, Division of Environmental Quality (DEQ); Arkansas

Department of Agriculture, Natural Resource Division (NRD); Arkansas Game and Fish Commission; Arkansas Department of Transformation and Shared Services, Arkansas Geographic Information Systems; Arkansas Department of Health; and Arkansas Department of Parks, Heritage, and Tourism. One of the most significant charges of BBRAC to date was to develop a non-regulatory management plan for the watershed. On January 15, 2018, the NRD finalized the Buffalo River WMP. It was accepted by EPA in June 2018. The WMP outlines voluntary measures that may help to reduce nonpoint source runoff and makes recommendations for water quality monitoring and studies within the watershed. Stakeholders and BBRAC partners are necessary for successful strategy milestone development. DEQ and BRCC (the successor of BBRAC) are committed to revising the strategy as necessary to work towards achieving attainment of water-quality standards for the Buffalo River.

The WMP recommends implementing best management practices (BMPs) only after sources and transport pathways of pathogens, particularly *E. coli*, have been identified. This would allow for more effective use of BMPs and a more efficient use of resources. A number of nonpoint source pollution control practices, and studies, are proposed and discussed in the WMP.

In September 2019, Arkansas Governor Asa Hutchinson formed BRCC. BRCC is the next step in the process that began in 2016 with the BBRAC. Members of the committee will utilize the Buffalo River WMP to prioritize and fund projects in the most critical areas of the watershed. BRCC comprises the following Cabinet Secretaries or their designates: Wes Ward, Secretary of Agriculture – Chair; Shane Khoury, Secretary of Energy and Environment; Shea Lewis, Secretary of Parks, Heritage, and Tourism; and Renee Mallory, Secretary of Health. One million dollars in state general revenue funds and $1 million matched private funds were allocated for conservation and water quality grants within the Buffalo River watershed. Funding has been used for the unpaved roads program, feral hog eradication, filamentous algae research, and wastewater treatment facility upgrades. Remaining funding as of 2022 is $103,903.

Two suspected permitted sources of pathogens in the listed AUs have recently been addressed. The first is a swine CAFO located in the Big Creek watershed. The closure of the farm was deemed complete in May 2020, the CAFO has been closed and the property converted to a conservation easement and manure holding ponds on the property have been remediated (ADEQ 2020; Walkenhorst 2020; Buffalo River Watershed Alliance 2021a).

The second is the Marble Falls SID wastewater treatment plant. This facility has a history of discharges of partially treated sewage and pathogen permit limit exceedances. It discharges to Mill Creek, which joins the Buffalo River approximately 3.6 miles above the upper end of AR_11010005_011. However, this facility met pathogen permit limits for pathogens from 2022 – 2024 (https://echo.epa.gov/effluent-charts#AR0034088). This facility is exploring options for replacing the existing treatment system and has been granted funding assistance for this project

from BRCC (BRCC, 2020). The facility is also seeking funding from USDA Rural Development and other sources (Newton County Times, 2020).

A septic tank remediation program for the Buffalo River watershed has also been funded by the BRCC (BRCC, 2020). This program has the potential to reduce *E. coli* and nutrient loads to the impaired AUs.

3. An estimate or projection of the time when water quality standards will be attained.

Pathogen criteria attainment in Big Creek and the Buffalo River is contingent upon source and cause identification and subsequent implementation of BMPs designed to address those sources and causes at the appropriate spatial and temporal scales. Attaining water quality standards in these 4b AUs within 10–15 years is considered to be a reasonable goal based on experience in streams in eastern Oklahoma that was previously impaired for pathogens; practices were installed in that watershed beginning in 2002 and streams were delisted in 2006 and 2016 (US EPA, 2019).

Dissolved oxygen criteria attainment in Big Creek and unnamed tributary of Mill Creek is contingent upon source and cause identification and subsequent implementation of BMPs designed to address those sources and causes at the appropriate spatial and temporal scales. Because Big Creek and the unnamed tributary of Mill Creek have smaller watersheds than the main stem of the Buffalo River, implementation of practices on a relatively small scale can yield noticeable improvements in water quality. These improvements in water quality are also expected to lead to improvements in biological impairments (fish). Due to the differences in fish re-colonization and habitat requirements, continued improvements in water quality paired with the protections that reduce habitat changes, fish communities are expected to become more diverse and attain in the future. The date of which these AUs would attain cannot be determined due to differences in response time for fish communities to adapt to the improvements. As temperature cannot be determined to be due to point source dischargers, these improved watershed conditions are also expected to assist in a decrease in water temperature for the impaired reach.

4. Reasonable schedule for implementing the necessary pollution controls.

Table ES.3 of the WMP (https://www.adeq.state.ar.us/water/planning/integrated/303d/pdfs/2018/2018-05-22-final-buffalo-river-wmp.pdf) provides a proposed schedule for implementation of the plan. The table includes clear milestones, dates, and responsible parties. Activities include monitoring, investigative studies, education and outreach, planning, additional management strategies, evaluation of milestones, and a schedule to update the WMP as needed. The information in Table ES.3 is discussed in Section 7.8 of the WMP, including the evaluation schedule for meeting the milestones toward the implementation of pollution controls. This discussion also includes a well-

defined structure identifying the parties responsible for monitoring, the type of activities that will occur, and the indicators that will be used to determine success of the program.

On June 1, 2022, $278,400 was approved from the Water Development Fund to administer the Septic Tank Remediation Pilot Program in the Buffalo River watershed. Additionally, Newton County was granted $1 million through the Water Sewer Solid Waste Fund to improve wastewater treatment plants.

Information regarding a schedule for work on the Marble Falls SID wastewater treatment system is not currently available. The septic tank remediation pilot program for the Buffalo River watershed will last three years (Buffalo River Watershed Alliance 2021b; https://www.agriculture.arkansas.gov/wp-content/uploads/2020/07/00-AR-CWSRF-IUP-SFY-2021-DRAFT-07-27-2020-0722-hrs.pdf).

5. Description of, and schedule for, monitoring milestones for tracking and reporting effectiveness of the pollution controls.

Routine water quality monitoring programs described in the Buffalo River WMP will continue. On-going special water quality studies by USGS and its partners are identified in Item 1. Water quality data relevant to tracking effectiveness of pollution controls is evaluated as part of the Arkansas Integrated Report. The results of the integrated assessment are reported to EPA and the public every two years.

6. Commitment to revise, as necessary, the implementation strategy and corresponding pollution controls if progress toward meeting water quality standards is not attained.

Duties of the BRCC include annual review of the Buffalo River WMP with recommendations for updates, and a report of progress to the Governor of Arkansas on successes during the year (BRCC, 2022). Table ES.3 of the WMP specifies that the plan would be updated as needed starting 2023 (or sooner). Section 7.9 of the WMP outlines the information that will be addressed or considered during the review of the plan. If an update of the WMP specifies any changes in recommended implementation of conservation practices, the agencies and organizations involved with implementation will carry out the recommended changes.

Evaluation components of alternative restoration approaches would be very similar to those provided in table ES.3 of the Buffalo River WMP. A key element that will be included is implementation tracking of BMPs in the Buffalo River watershed from 2018–2028. Indicators of this element would be measured through the linear feet/acres of BMPs implemented. The WMP also includes a proposed revision date of 2024–2025 utilizing data collected from the previous seven years. The WMP is intended to be a living document that reflects stakeholder interest and concerns related to protection of the Buffalo River watershed.

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CATEGORY 4B RATIONALE COVE CREEK WATERSHED

No additional impairments were added to this plan for the 2026 cycle. Information about the impairments within this plan reflects the status as of the 2024 cycle unless otherwise noted. The following stream segments associated with the former Dresser Industries-Magcobar former mine site ("DIM Site") are listed in the DEQ 2024 303(d) listing:

- Cove Creek (AR_08040102_970) - dissolved oxygen (as of 2024 cycle), toxicity, and macroinvertebrates
- Chamberlain Creek (AR_08040102_971) - dissolved oxygen, pH, sulfate, TDS, copper, zinc, aluminum, beryllium, and toxicity
- Lucinda Creek (AR_08040102_975) - pH
- Reyburn Creek (AR_08040203_924) - pH
- Skull Creek (AR_08040203_824) - pH

In a letter dated November 6, 2018, Halliburton Energy Services, Inc. Project Manager, James McGinty presented DEQ with the following Category 4b rationale[14]:

In response to DEQ's October 18, 2018 email request for additional site Category 4b qualification details, Halliburton Energy Services, Inc. (HESI) provided the following information to further support the DIM Site request to change the related stream segments from Category 5 to Category 4b.

HESI and DEQ have developed and initiated detailed corrective action plans for improving these 303(d) listed streams. As requested by DEQ, HESl has further detailed below the appropriate references to site improvement project documents that satisfy the six conditions for qualifying for the Category 4b designation.

1. Identification of segment and statement of problem causing the impairment.

Stream segment information for each reach, and the cause for impairment, is provided. HESI, in cooperation with EPA and DEQ, performed an extensive site investigation (SI) for the site and receiving streams. The April 19, 2007 DIM Site, Site Investigation Report (SIR) identifies the stream segments and problems leading to the 303(d) listing of these stream segments. A complete version of the DIM Site SIR can be found on the Pollution Control and Ecology Commission (PC&EC) website in Docket 16-003-R at the following link: https://www.adeq.state.ar.us/regs/drafts/3rdParty/reg02/16-003-R/.

[14] DEQ added relevant information for Reyburn and Skull Creeks.

HESl is providing the following DIM Former Mine Site Environmental Improvement Project (EIP) Notice of Intent (NOI), Appendix A, SI Report references that identify the stream segments and statement of problems causing the impairment:

All Creeks

- SIR, Executive Summary (pages ES-1 through ESC-10) gives an overview of the site conditions that are causing the stream segment water quality impairment. In general, the production of acid rock drainage (ARD) and its subsequent migration to the streams resulting in elevated dissolved minerals, low pH, and increased metals' mobility describes the stream reach impairment.
- SIR, Sections 6.2 and 6.3 explains the persistence and migration of potential contaminants at the DIM Site and how these contaminants are derived from naturally occurring geologic materials present prior to mining or other human activities in the area. The current environmental conditions have occurred because disturbance to the site from former mining activities accelerated weathering and ARD generation. Dissolved minerals and metals are leached from the site to surface waters related to the site at concentrations above background levels.
- SIR, Section 5.4.2.1 Cove Creek identifies the water quality impairments (metals, sulfates, and TDS). Chamberlain Creek water flowing into Cove Creek is causing this impairment in Cove Creek.

Chamberlain Creek

- SIR, Section 5.4.2.3 Chamberlain Creek identifies the water quality impairments. Chamberlain Creek flows directly from the DIM Site Southwest Spoil Area. The DIM Site stormwater run-off and shallow groundwater, which contain ARD, negatively affects Chamberlain Creek.
- SIR, Section 2.1.1 Land Use In The Site Vicinity describes other mining operations and exploratory prospects that may also contribute contaminants to the listed streams (specifically the Christy Mine on Chamberlain Creek).

Lucinda Creek

- SIR, Section 5.4.2.4 Lucinda and Rusher Creeks describes the impacts from ARD in these creeks. Rusher Creek flows into Lucinda Creek below Lucinda Lake.

Reyburn and Skull Creeks

- SIR, Section 5.4.2.5 Reyburn and Skull Creeks describes the impacts from ARD in these creeks. Scull Creek flows through Clearwater Lake and then joins Reyburn Creek.

2. Description of pollution controls and how they will achieve water quality standards.

The DEQ required pollution controls and site improvements to be implemented at the DIM Site per Consent Administrative Order (CAO) LIS 16-043[15] (2016) are specifically described in the Remedial Action Decision Document (RADD; ADEQ, 2016). RADD, DIM Former Mine Site). These pollution controls will, in combination, achieve applicable water quality standards for the reaches of Cove Creek, Chamberlain Creek, and Lucinda Creek noted above. A complete version of the RADD report can be found on the PC&EC website in Docket 16-003-R at the following link: https://www.adeq.state.ar.us/regs/drafts/3rdParty/reg02/16-003-R/.

Appendix C of the DIM Site EIP NOI includes the RADD, which identifies pollution controls and how HESI will achieve water quality standards as follows:

RADD, Section 9.0 Justification for Selections of Remedial Alternatives explains that the following pollution control combination would meet the Remedial Action Levels (RADD, Section 8.1) in off-site streams, would reduce identified risks to acceptable levels, and is implementable at a reasonable cost. Thus, this Selected Remedial Alternative Combination (SRAC) provides overall protection of human health and the environment and high levels of short-term and long-term effectiveness. This SRAC will also promote the reduction of toxicity by reducing mobility of Site contaminants. The SRAC for the DIM Site includes:

- Pit Lake -PL2 modified -Operate Existing WTS, Maintain Pit Lake Water Level with temporary water quality standards for minerals as part of the EIP process;
- Spoil Pile -SP2- Selective Regrading, Augment Vegetation, and ARD Capture;
- Shallow Groundwater System -SGW3 -Expanded ARD Capture/Treatment System;
- Bedrock Groundwater -BOW2 -Verify Connection to Municipal Water System;
- Sludge Ponds -SLU2- Soil Cover, Revegetate;
- Chamberlain Creek -CHM2 -Source Control;
- Tailings Impoundments -TI2 -Regrade, Stabilize Dams, Revegetate;
- Affected Streams -AS2 -Source Control; and
- Clearwater Lake -CWL2 -Source Control.

RADD, Section 10 - Selected Remedy/Site Plan and Implementation Schedule. Pollution controls primarily consist of actions to prevent contact of precipitation with former spoils and/or collection and treatment of low pH water that remains affected by contact with disturbed areas of the site.

[15] CAO LIS 16-043: https://www.adeq.state.ar.us/downloads/WebDatabases/Legal/CAO/LIS_Files/16-043.pdf

3. An estimate or projection of the time when WQS will be met.

A detailed schedule of the remedial actions detailed herein is included in Table 10 of the RADD (2016) and Section 7 of the DEQ approved EIP NOI. The project schedules reflect a long-term approach for compliance with remedial goals including meeting Arkansas water quality standards at the site. Current versions of the DEQ DIM Site RADD and EIP NOI reports can be found on the PC&EC website in Docket 16-003-R at the following link: https://www.adeq.state.ar.us/regs/drafts/3rdParty/reg02/16-003-R/.

Table A5. EIP NOI/RADD Implementation Schedule[16]

Schedule	Date Submitted	Date Approved	Activity
Within 3 months of CAO effective date	8/30/2016	2/3/2017	Verification report for connection status of residents submitted to DEQ
Within 9 months of CAO effective date	2/24/2017	5/26/2017	Draft remedial design for sludge ponds submitted to DEQ for review and approval
Within 12 months of CAO effective date	2/16/2017	3/14/2017	Identified, unconnected residents connected to public water system if authorization is given
Within 13 months of CAO effective date	7/3/2017	8/2/2017	Final remedial design for sludge ponds submitted to DEQ
Within 18 months of CAO effective date	5/14/2018	8/17/2018	Remediation of sludge ponds completed
Within 2 months of EIP approval	11/13/2017	3/9/2018	Draft EMP submitted to DEQ for review and approval
Within 4 months of receipt of DEQ comments on draft EMP	7/29/2019	8/20/2019	Final EMP submitted to DEQ
Within 6 months of DEQ approval of final EMP	1/24/2020	5/26/2020	Draft RDP submitted to DEQ for review and approval
Within 4 months of receipt of DEQ comments on draft RDP	2/2/2021	9/15/2021	Final RDP submitted to DEQ
Within 6 months of DEQ approval of final RDP	3/15/2022	4/27/2022	Draft RAIWP submitted to DEQ for review and approval.
Within 6 months of receipt of DEQ comments on draft RAIWP	2/12/2024	3/21/2024	Final RAIWP submitted to DEQ.
Within 48 months of DEQ approval of final RAIWP			Remediation construction activities completed.
Within 160 months of EIP approval[17]			Post-project water quality standards become effective.

[16] This schedule is tentative and dependent on the effective date of the CAO or EIP (as noted). The schedule is contingent on construction occurring during the summer months. The schedule also assumes that DEQ comments will be received within 2 months of each submittal.

[17] Basis for the total time frame is included in the EIP NOI. April 26, 2032.

4. Schedule for implementing pollution controls. See item 3 above.

Table A6. General EIP task schedule[18]

Task Name	Duration (days)	Start	Finish
EPA Approval of EIP	0	1/7/2020	1/7/2020
Prepare Draft Remedial Design Plan	113	8/21/2019	1/24/2020
Submit Draft Remedial Design Plan	0	1/24/2020	1/24/2020
DEQ Review of Draft Remedial Design Plan	120	1/29/2020	7/14/2020
Receive DEQ Comments on Draft Remedial Design Plan	0	7/14/2020	7/14/2020
Prepare Final Remedial Design Plan	90	7/14/2020	11/16/2020
Submit Final Remedial Design Plan	0	11/13/2020	11/13/2020
Submit EIP Annual Report	0	12/21/2020	12/21/2020
EIP Annual Meeting of DEQ, EPA, and HESI	0	1/20/2021	1/20/2021

Table A7. EIP Year-3 Significant Actions[19]

Task Name	Duration (days)	Start	Finish
EIP Annual Meeting of DEQ, EPA, and HESI	0	2/4/2021	2/4/2021
Receive DEQ Comments on Final Remedial Design Plan	0	12/31/2020	12/31/2020
Response to DEQ Comments on Final Remedial Design Plan	0	2/2/2021	2/2/2021
DEQ Review of Final Remedial Design Plan	223	2/4/2021	9/15/2021

[18] From Haliburton Energy Services, Inc. Dresser Industries-Magcobar Former Mine Site Environmental Improvement Project NPDES Permit No. AR009794 Progress Report Year 1 December 16, 2020.
[19] From Haliburton Energy Services, Inc. Dresser Industries-Magcobar Former Mine Site Environmental Improvement Project NPDES Permit No. AR009794 Progress Report Year 2 January 7, 2022.

Task Name	Duration (days)	Start	Finish
DEQ Approval of Final Remedial Design Plan	0	9/15/2021	9/15/2021
Prepare Remedial Action Implementation Work Plan	181	9/16/2021	3/16/2022
Project Update Meeting with DEQ and HESI	0	11/8/2021	11/8/2021
Submit EIP Annual Report	0	1/7/2022	1/7/2022
EIP Annual Meeting of DEQ, EPA and HESI	0	1Q/2022	1Q/2022

Table A8. EIP Year-3 Significant Actions[20]

Task Name	Duration (days)	Start	Finish
Submit Remedial Action Implementation Work Plan to DEQ	0	3/15/2022	3/15/2022
DEQ Review of Remedial Action Implementation Work Plan	31	3/16/2022	4/27/2022
Submit Revised Remedial Action Implementation Work Plan to DEQ	0	5/12/2022	5/12/2022
USACE Issuance of 404 Permit	0	6/22/2022	6/22/2022
DEQ Review and Approval of Remedial Action Implementation Work Plan	38	5/13/2022	7/5/2022
Conduct Effectiveness Monitoring Plan (EMP) Biological and Water Chemistry Sampling	24	7/19/2022	8/12/2022
Submit Shallow Groundwater Installation Plan for DEQ Review	0	10/3/2022	10/3/2022
DEQ Review and Approval of Shall Groundwater Installation Plan	0	10/3/2022	12/1/2022
Conduct EMP Biological and Water Chemistry Sampling	TBD	4Q/2022	4Q/2022
Submit EIP Annual Report	0	By 1/6/2023	By 1/6/2023
EIP Annual Meeting of DEQ, EPA, and HESI	0	1Q/2023	1Q/2023

[20] From Haliburton Energy Services, Inc. Dresser Industries-Magcobar Former Mine Site Environmental Improvement Project NPDES Permit No. AR009794 Progress Report Year 3 January 6, 2023.

5. Monitoring plan to track effectiveness of pollution controls.

The Effectiveness Monitoring Plan (EMP) (FTN Associates, Ltd. 2017. DIM Former Mine Site, EMP) addresses tracking of effectiveness of pollution controls at the DIM Site. The EMP was finalized August 20, 2019, and implemented according to the project schedule and will satisfy the requirement that a monitoring plan track the effectiveness of pollution controls in the three waterbodies noted above.

6. Commitment to revise pollution controls, as necessary.

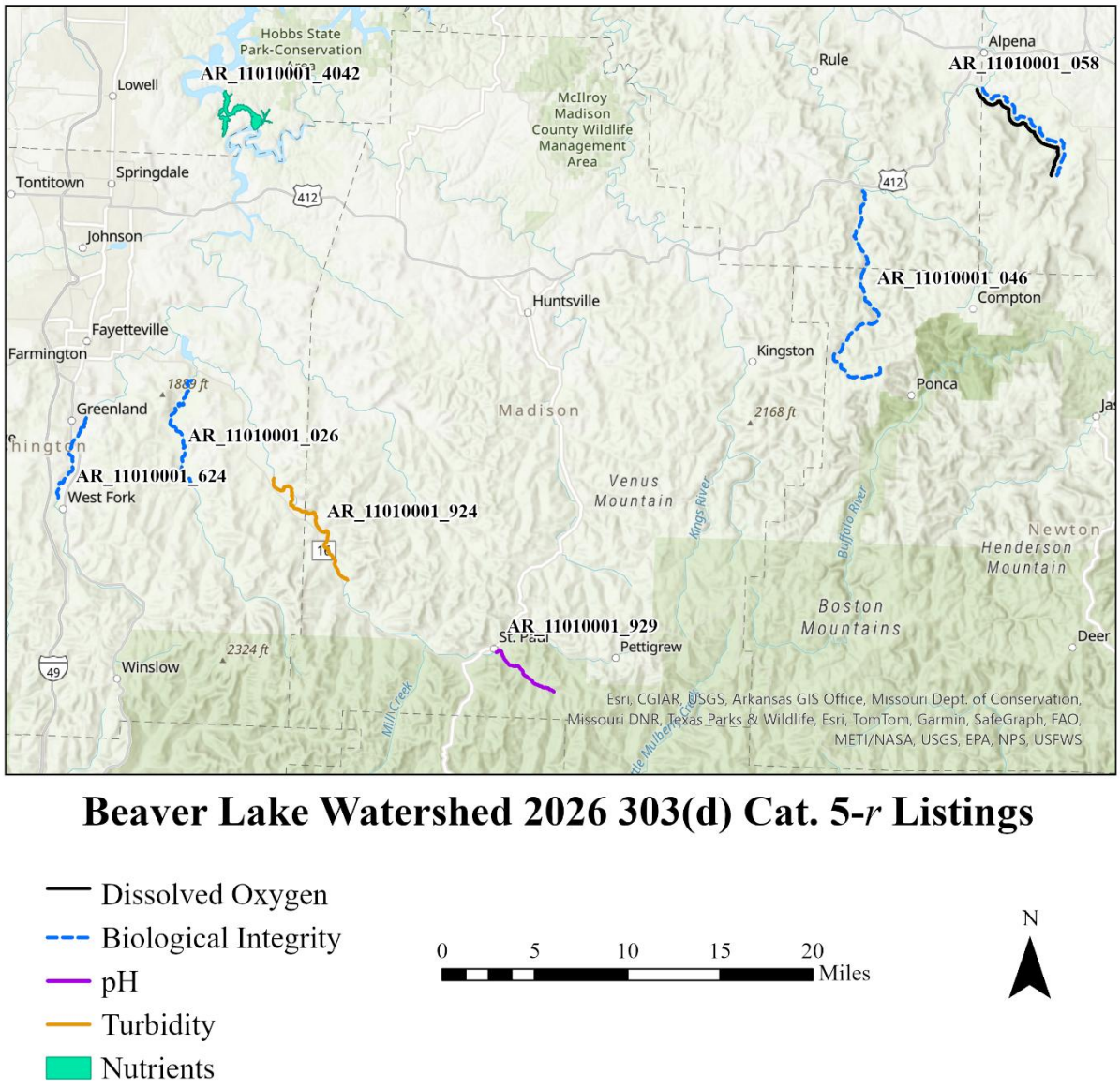
The DEQ RADD addresses monitoring and progress towards achieving site goals as well as evaluations of remedial alternatives as necessary during the RADD implementation. The DEQ DIM site RADD report Section 11 states:

> *If compliance or progress toward compliance, to include obtaining the necessary access agreements and/or institutional controls, is not demonstrated, the RADD may be modified so that additional remedial alternatives can be considered, evaluated, and implemented in a reasonable timeframe.*

Additionally, the DIM Site CAO LIS 16-043 (2016) Section 20, page 10 explains that DEQ has the right to revise the RADD during the implementation of the RADD. Consequently, a mechanism exists to revise the pollution controls for the three waterbodies noted above if necessary.

CATEGORY 5-*r* RATIONALE FOR BEAVER LAKE WATERSHED

Beaver Lake watershed 5-*r* Plan for Dissolved Oxygen, Biological Integrity, pH, Nutrients, and Turbidity. No additional impairments were added to this plan for the 2026 cycle. Information about the impairments within this plan reflects the status as of the 2024 cycle unless otherwise noted. One impairment was delisted during the 2026 cycle and is detailed in section 1e.



Beaver Lake Watershed 2026 303(d) Cat. 5-*r* Listings

- Dissolved Oxygen
- Biological Integrity
- pH
- Turbidity
- Nutrients

0 5 10 15 20 Miles

N

Figure A2. Impaired Segments in 5-*r*, Beaver Lake watershed

1. Assessment Units (AUs) in 5-*r* associated water quality criteria not in attainment, and identification of possible sources contributing to non-attainment.

- Beaver Lake, Hickory Creek site (AR_11010001_4042) – Nutrients - chlorophyll *a*
- Middle Fork White River (AR_11010001_026) – Biological integrity (fish)
- West Fork White River (AR_11010001_624) – Biological integrity (macroinvertebrates)
- White River (AR_11010001_924) – Turbidity base flow
- Kenner Creek (AR_11010001_046) – Biological integrity (fish)
- Baldwin Creek (AR_11010001_929) – pH
- Terrapin Creek (AR_11010001_058) – Biological integrity (fish) and critical season DO

Table A9 shows land use in the immediate watershed (12-digit Hydrologic Unit Code, HUC12) for each AU, and the location of the 5-*r* AUs is shown on Figure A2.

Table A9. Selected land uses for the AUs listed in the Beaver Lake watershed

Assessment Unit	Name	Monitoring Station(s)	HUC12(s) in which the AU is located	Selected land uses in HUC12 (NLCD 2023)*
AR_1101001_4042	Beaver Lake – Hickory Creek	07049187 (USGS) HC (AWRC)	110100010703	29% pasture 12% developed 46% forest 3% other
AR_11010001_026	Middle Fork White River	WHI0103/WHI 0219/WHI0102 (DEQ)	110100010203	32% pasture 5% developed 61% forest 1% other
AR_11010001_624	West Fork White River	WHI0098/WHI 0229 (DEQ)	110100010403	32% pasture 14% developed 50% forest 4% other
AR_11010001_924	White River	WHI0106/110 White River (OWW)	110100010302	19% pasture 4% developed 77% forest 1% other
AR_11010001_046	Kenner Creek	WHI0230 (DEQ)	110100011001	15% pasture 4% developed 79% forest 1% other

Assessment Unit	Name	Monitoring Station(s)	HUC12(s) in which the AU is located	Selected land uses in HUC12 (NLCD 2023)*
AR_11010001_929	Baldwin Creek	H2Ozarks (103 Baldwin Creek)	110100010102	4% pasture 3% developed 92% forest 0.3% other
AR_11010001_058	Terrapin Creek	WHI0232 (DEQ)	110100011302	27% pasture 4% developed 68% forest 1% other

* Note that percentages will not sum to 100 because the area of open water is not included. NLCD = National Land Cover Database.

1a. Dissolved Oxygen

Many factors could influence a change in dissolved oxygen (DO). An increase in temperature of the water could impact the ability for the water to hold oxygen, as higher water temperatures result in a decrease in the solubility of oxygen. This AU, AR_11010001_058, did attain overall for temperature, however water temperatures did exceed 25°C at times during the sonde deployment. While higher temperatures were not matched with exceeding DO data, it may have had an influence on other parameters, which may have led to DO changes in the AU. Loss of riparian area can contribute to increases in water temperature, as the shade effect from canopy cover is minimized or lost. The presence of organic matter in the stream could also contribute to lower DO levels, as bacteria utilize DO during decomposition of plant material, either as an allochthonous or autochthonous process. Common diel changes due to respiration and photosynthesis of algae and other aquatic plants and organisms also influence DO shifts (Wetzel, 2001).

Terrapin Creek (AR_11010001_058) was found to be impaired for critical season DO. Assessing from 106 total hours of short-term continuous data, taken July 5–7 2022, and August 15–18, 2022, there were 45 hours where the average DO was found to exceed the standard. Only 15 exceedances would have been permitted for the AU to attain for this parameter. The mean of exceedances in July was 3.64 mg/L and the mean in August was 4.67 mg/L. This stream is an intermittent stream, and low water levels may contribute to low DO as this could cause respiring organisms to concentrate into certain areas of the reach, where respiration may then outpace photosynthesis.

1b. Biological Integrity

DEQ assesses biological integrity using both fish and macroinvertebrate community data when available. For both fish and macroinvertebrates, watershed improvement measures to improve stream habitat and reduce runoff into waterbodies is expected to improve habitat conditions and thus have a positive influence on the health of the biological communities.

Fish community impairments were found for the following AUs:

Middle Fork White River (AR_11010001_026) was also listed for critical season DO as well as fish community impairments. No upstream dischargers are present for this AU. AR_11010001_926 does flow into this reach and is also listed for critical season DO. The fish community was dominated by cyprinids, however some sensitive taxa were still present. It was found that during sampling there was notable stream alteration occurring that may have influenced the fish community and possibly other water parameters (personal communication with DEQ staff). The CSI score for this community was 12, which indicates a “somewhat similar” categorization per DEQ’s assessment methodology.

Kenner Creek (AR_11010001_046) is a headwater stream that is not listed for any other parameter. There is a continuous flow into a portion of the stream, however the rest of the stream stays dry during most of the year with only wetted spring influence. The CSI score for this fish community was 8, which indicates a “somewhat similar” categorization.

Terrapin Creek (AR_11010001_058) is also newly listed for critical season DO, short term continuous only. It is possible that low DO could contribute to the biological integrity listings. There is one permitted facility on the reach of the stream, but they have had no enforcement actions against them. This is an intermittent stream that dries in the late summer, and this intermittency may contribute to reducing the establishment of a diverse fish community. The CSI for this community was 17, however due to the added species aspect in the Ozark Highlands, a community score of 24 would be needed to reach an attaining assessment status.

Macroinvertebrate impairments were found for the following AU:

Macroinvertebrates are organisms known for their sensitivity to their environment. When considering macroinvertebrate communities, Ephemeroptera, Plecoptera, and Tricoptera (EPT) taxa are typically considered to be the most sensitive taxa, and representative of a healthy habitat. For West Fork White River's (AR_11010001_624) assessment, the EPT taxa did score highly (6/6), however the EPT/Chironomids and Scrapers/Filter-Collectors were both found to be 0/6. The overall comparable estimate (%) was 47, with 54 needed for the community to be attaining.

1c. pH

pH impairment can be due to multiple different causes, and as such can be hard to identify the exact sources of impairment when no point-source dischargers are present. Changes in carbon dioxide, for example, can influence the pH of water (Talling, 2010), and these changes are heavily influenced by aquatic organisms' respiration and photosynthetic rates. These organic pH changes occur diurnally, due in part to light availability influencing photosynthesis from algae and aquatic plants. If there was an increase in these mentioned processes due to other, non-measured environmental parameters it could be expected that respiration may have been higher at certain times and influenced lower pH values due to the time of day that the stream is sampled or during certain weather conditions. Limestone also plays a significant role in pH changes, acting as a buffer to acidity (Barton and Vatanatham, 1976). This is dependent on the dissolution rate of limestone in the current environment, which is dependent on other environmental factors such as temperature and pH (Alkattan et al., 1998). Diffusion of CO_2 from the atmosphere into surface water also contributes to pH changes (Ahmadi et al., 2020).

All waterbodies in the state are assessed with the pH standard of 6 – 9 s.u. One AU within the watershed was found to be impaired for pH (Baldwin Creek, AR_11010001_929). Of the 17 submitted samples from H2Ozarks for the 2026 cycle, three were found to be outside of the standard at measurements of 5.5, 5.7 and 5.8 s.u.

There are no active dischargers along the stream, so it is not expected that point-source pollution would be a contributor to these exceedances. This stream is expected to be re-assessed in the 2028 cycle with new data being provided from H2Ozarks.

1d. Nutrients

The Upper White River watershed was declared a nutrient surplus area in 2005 by the Arkansas General Assembly, a designation that requires a nutrient management plan and permitting requirements for phosphorus removal. There are two facilities in the watershed above Hickory Creek (AR_11010001_4042) defined as a major municipal facility (≥1 MGD). Both facilities have phosphorus limits and neither have had phosphorus exceedances from April 2016 – April 2023. One former minor facility (<1 MGD) in the watershed had a history of permit violations

but did not have phosphorus limits. This facility was regionalized with one of the major facilities in December 2020 and no longer discharges directly into this watershed.

In 2016, site specific criteria for nutrient targets were adopted for Beaver Lake, which established a growing season geometric mean of 8 ug/L for chlorophyll *a* and an annual average Secchi transparency of 1.1 m. These values were based on a 2008 study and are implemented using data from the Hickory Creek site (approximate location: 36.25439, -94.02657) due to the proximity of the estimated plunge point, a drinking water intake, and the confluence of two major tributaries.

Compared to nonpoint nutrient sources, point sources have a relatively small contribution, especially in watersheds where permit limits include nutrients. As explained in previous sections, sediment load, population growth, and agriculture have been identified as sources of listings for other parameters, and it is likely that nutrients are introduced by the same processes.

1e. Turbidity

The May 2012 Revision of the Beaver Lake Watershed Protection Strategy (WPS) lists the following water quality threats and possible sources of sediment (turbidity): hydrologic modification resulting from land use change due to urbanization, runoff from new development, construction site runoff, streambank erosion, loss of stream buffers, inadequate pasture best management practices (BMPs), and unpaved roads (Beaver Watershed Alliance, 2012).

The WPS identifies channel erosion as contributing 60% of the sediment load to Beaver Lake, and pasture as contributing approximately 16%. Soil and Water Assessment Tool (SWAT) modeling indicates that the Beaver Lake and War Eagle Creek HUC10 subbasins contribute the largest portions of sediment load to the reservoir (TetraTech, 2009). The Beaver Lake and War Eagle Creek HUC10s cover 20.1% and 28.0%, respectively, of the entire Beaver Lake HUC8 watershed.

The Beaver Lake HUC10, which includes the impaired AUs, is also identified as a high priority area for sediment control in the WPS. This subbasin is estimated to generate 45% of the sediment load that enters Beaver Lake. Sediment sources identified for this HUC10 are "residential low density land uses, construction sites, and channel erosion." Unpaved roads are also identified as a sediment source to be addressed in this subbasin. Local word of mouth suggests that reservoir shoreline erosion has become more of a concern recently. There is a perception that there has been an increase in the frequency and duration of pool levels at or near flood stage, and this is exposing new areas to wave erosion, potentially increasing sediment input to the reservoir, and reservoir turbidity (personal communication, K. Farmer, FTN, 4/21/21).

Expansion of development associated with future community growth is anticipated within this watershed. Significant expansion of development associated with growth of Springdale is anticipated in the 110100010703 HUC12 and may also occur in the 110100010611 HUC12. Growth of Goshen is expected to significantly increase developed area in the 110100010701 and 110100010702 HUC12s (TetraTech, 2009; 2012).

The assessment unit that remains in 5-*r* for turbidity base flows (AR_11010001_924) for the 2026 assessment cycle had 9 samples exceed out of the 23. As of the 2026 cycle, AR_11010001_4041 was delisted for turbidity storm flow as 0 exceedances were found out of 48 samples.

2. Analysis supporting the State's belief that the implementation of the alternative restoration approach is expected to achieve water quality standards (WQS).

The WPS has been in place since before 2012 and is currently implemented with the support of the Beaver Watershed Alliance (BWA). Because BMP implementation is voluntary, it is important to have an active, well organized, and sustainable watershed advocacy group. BWA is an active stewardship group that "... works to proactively protect, enhance, and sustain the high water quality of Beaver Lake and its tributaries through voluntary BMP implementation, outreach and education, and scientific evaluation." This group has been active in the watershed since 2011, and has good relationships with state and federal agencies, local governments, local businesses, and other non-governmental organizations (NGOs). The work of the BWA and its partners has resulted in the implementation of BMPs in both urban and rural areas of the watershed. According to BWA's 2023 annual report (https://www.beaverwatershedalliance.org/annual-reports-newsletters/), they assisted in implementing 214 BMPs, 58 management plans, and 6 acres of floodplain were restored within the 2023 year. They have led 14 workshops and have had over 2,000 participants attend their programs. They also have other programs available, newsletters, a podcast, a quarterly speaker series, and educational brochures available for download.

While much of the focus of the WPS is practices to reduce erosion and turbidity, BMPs that reduce erosion and turbidity also reduce nutrients and pathogens (Irvine et al., 2002). A summary of published sediment, nutrient, and pathogen reduction efficiencies of selected BMPs can be found in the Middle White River Watershed-Based Management Plan (FTN, 2019). Together, it is expected all these restoration projects will contribute to better habitat suitability regarding the fish and macroinvertebrate impairments.

There has been significant work in the Beaver Lake watershed, particularly in the watershed of the West Fork of the White River and in Fayetteville and Springdale, to reduce or control erosion and sediment loads. From a 2021 presentation on the BWA webpage, between 2017–2021 they provided technical assistance to 178 landowners and installed 158 land management practices. Over 50 of these participating landowners were within the War Eagle sub watershed, over 5 were within the Middle Fork sub watershed, and over 60 were within the West Fork sub watershed. Trend analysis of water quality data collected from tributaries upstream of Beaver Lake show a slight decreasing trend in turbidity concentrations, despite continued expansion of development and construction in this area of the watershed (Scott et al., 2016; Scott and Haggard, 2019). This

suggests that programs and practices implemented are preventing water quality decline and are beginning to improve water quality.

Pollution Load Estimates in the Beaver Lake Watershed:

In 2024, BWA adopted the US EPA's Pollutant Load Estimation Tool (PLET). A full review was conducted to quantify Sediment and Nutrient Load Reduction Estimates and Conservation Impact Metrics in the Beaver Lake watershed from 2011 to December 2024. Data is shown in Table A10.

Table A10. Sediment and nutrient load reduction estimates and conservation impact metrics in the Beaver Lake watershed from 2011 to December 2014 from PLET.

Description	*Nitrogen (lbs./yr)*	*Phosphorus (lbs./yr)*	*Sediment (tons/yr)*
Load Reductions, Sept. 30, 2023 – Sept. 15, 2024	29,433	15,023	33,936
Total Annual Load Reductions, 2011 – Sept. 15, 2024	65,402	34,740	67,035
	(lbs.)	(lbs.)	(US tons)
Cumulative Reduction, 2011 – Sept. 15, 2024	402,712	208,952	308,904

Table A10 summarizes estimated load reductions achieved by BWA via the implementation of conservation practices in the Beaver Lake watershed. As shown, the first row of numbers summarizes the estimated load reductions from Sept. 30, 2023 – Sept. 15, 2024. The second row includes reduction estimates from legacy projects (i.e., 2011 to 2023) as well as the current year's reductions to give an idea of cumulative annual load reductions. The bottom row is the total cumulative pollutant reduction, a running tally of total nutrient and sediment reductions from 2011 to the present. This number was calculated by multiplying the time in years since practice implementation by the estimated annual load reduction rates.

The conservation practices for the calculations include projects that the BWA has installed and/or was a partner in implementing.

Methodology:

The Pollution Load Estimation Tool (PLET), approved by US EPA, the USDA-approved Water Erosion Prediction Project (WEPP) tool, and partner organization's reported metrics were used to estimate the impact of installed conservation practices (CPs) on sediment and nutrient loading to the Beaver Lake watershed.

PLET uses the Universal Soil Loss Equation, considering site-specific attributes such as soil properties (e.g., rainfall erosivity/erodibility, and soil hydrologic group class), climate precipitation data, and contributing drainage landscape properties (i.e., slope and flow path length) to estimate the amount nutrient and sediment running off the land.

Nutrient and reduction efficiencies associated with CPs are then used to estimate the impact implementation has on sediment and nutrient loading. For example, many of the stream restoration/streambank stabilization projects estimates provided by project partners via on-the-ground streambank monitoring were used to develop sediment and nutrient reduction amounts. For unpaved road projects, WEPP was used to estimate sediment loading rates which were then multiplied by reduction efficiencies to calculate expected reductions in sediment. Historically, reduction rates consisted primarily of streambank restoration projects. The addition of new practices with known reduction rates will add and build on these metrics. New practices include, but are not limited to, ponds, sediment basins, permeable paver installations, pasture aeration, prairie restoration, riparian plantings, unpaved road practices, and barrier removals.

The BWA has numerous legacy projects implemented between 2011 and 2023 that will be added to the overall totals, as time allows. In addition, an effort will be made to work with partnering organizations on additional metrics to gain clarity on water quality improvement impacts.

3. **Action Plan**
    a. **Actions to address all sources**
    b. **Schedule of actions designed to meet WQS with**
        i. **Milestones**
        ii. **Dates**
        iii. **Interim milestones**
        iv. **Deliverables**

The WPS outlines an action plan for protection and improvement of Beaver Lake water quality, including the 5-*r* AUs. The WPS includes water quality targets, milestones, and a proposed implementation schedule. Since the 2012 revision of the WPS, many of the milestones and deliverables have been achieved. However, additional work is still needed to bring the AUs in the Beaver Lake watershed into attainment with water quality standards. The table below shows a schedule of actions associated with several applicable new programs that are not included in the 2012 WPS. These programs would promote implementation of BMPs that can reduce turbidity and pathogens in the 5-*r* AUs.

Table A11. Restoration programs within the Beaver Lake watershed

Program (lead entity)	Dates	Milestones	Interim milestones	Deliverables
Arkansas Unpaved Roads Program (NRD)	2015 – ongoing	Environmentally Sensitive Maintenance (ESM) of county unpaved roads	County road personnel trained in ESM	Reduced sediment and nutrient loads
Controlled Access & Livestock Fencing Initiative (Arkansas Assoc. of Conservation Districts, USFWS[1])	2015 – ongoing	Reduce livestock use of riparian corridor	Landowner outreach, install BMPs within critical subbasins	Reduced sediment and pathogen loads
Working Lands for Northern Bobwhite Quail/North Arkansas Quail Focal Landscape RCPP[2] (NRCS)	2018 – ongoing	Increase quail habitat	Landowner outreach, install BMPs	Increase in quail populations[3]
Septic Tank Remediation Program (H2Ozarks)	2021 – ongoing	Reduce number of failing septic systems in Beaver Lake watershed	Tank owner outreach	Reduced pathogen loads

Program (lead entity)	Dates	Milestones	Interim milestones	Deliverables
Brush Creek – Roberts Creek National Water Quality Initiative (NRCS)	2021–2024	15% of critical source areas with conservation 15% reduction in sediment load Pasture condition improved on 50% of contracted area	Landowner outreach, contract and install BMPs	Reduced sediment and pathogen loads
Low Impact Development chapter added to Fayetteville municipal code	2014	Reduce runoff volume	Implement and maintain LID elements	Reduce sediment and pathogen loads from Fayetteville
West Fork White River Initiative RCPP[2] (NRCS)	2016 – ongoing	Large-scale river restoration, reduce streambank erosion	Landowner outreach, contract and install BMPs, design and implement river restoration projects	Reduced sediment and pathogen loads
Experimental demonstration of ponds for source water protection and watershed management (BWA)	2017–2020	Demonstration of water quality benefits of ponds	Design and implement pond, water quality monitoring, field day(s)	Reduced sediment and pathogen loads
Riparian, Forest and Source Water Protection Landowner Outreach (BWA)	2014 – ongoing	Increase use of BMPs by landowners	Landowner outreach, assist with design of BMPs, install/implement BMPs	Reduce sediment and pathogen loads
Low Impact Development / Green Infrastructure construction, LID Mini Grant Program & LID Management (BWA)	2017 – ongoing	Increase use of LID elements, particularly rain gardens	Landowner outreach; design, install, and maintain rain gardens	Reduce runoff, and sediment and pathogen loads

Program (lead entity)	Dates	Milestones	Interim milestones	Deliverables
Lakeside Watershed Opportunity Assessment (BWA)	2015	Identify locations for implementation of BMPs	Landowner outreach	Reduce runoff, sediment, and pathogen loads

Notes:
1. USFWS = US Fish and Wildlife Service
2. RCPP = Regional Conservation Partnership Program
3. Conservation practices recommended in this program can reduce sediment, nutrient, and bacteria loads, e.g., prescribed grazing, forage and biomass planting, and access control. Therefore, while improved water quality is not a stated deliverable of this program, its implementation could reduce sediment, nutrient, and bacteria loads.

Stormwater management plans currently in use in the City of Springdale and City of Fayetteville can also protect and improve water quality in the 5-*r* AUs.

4. Identify funding sources to implement the Plan

From 2011 to 2024, the total for all monetary grant awards to the BWA since the Beaver Lake WPS has been put in place is $40,615,995. An additional $3,756,900 has been awarded for Source Water Protection Services by the BWA, provided by Beaver Water District through their Source Water Protection Funds, supported by water sales since 2016. BWA has received funding for seven (7) Section 319 non-point source projects in the Beaver Lake watershed, totaling $4,425,023 with $1,968,577 of associated match. Additionally, BWA receives contributions from local business, cities, counties, and other water providers that have added more than $350,000 to the investment in watershed protection services.

The watershed benefits tremendously from the USDA NRCS Regional Conservation Partnership Program, which has brought $8.4 million ($4 million in NRCS FA dollars) for stream restoration and watershed protection in the West Fork White River Watershed, and $5,017,250 ($2.4 million in NRCS FA dollars) for streambank restoration, forestry practices and pasture practices in the War Eagle Creek watershed. Over 220 landowners and producers have been assisted in the West Fork White River and War Eagle watersheds through these RCPP programs, with thousands more educated on best practices for conservation implementation.

In the WPS, Table 5-1 under Adaptive Management identifies potential funding sources, including but not limited to: tax credits, Conservation Reserve Program, Conservation Reserve Enhancement Program, Environmental Quality Incentives Program, Arkansas Game and Fish Habitat Team and Private Lands programs, 319 Grants, land trusts, fees, and legislative appropriations. Programs mentioned in the table in Item 3 provide financial assistance to

landowners for implementing BMPs. In addition, the City of Fayetteville, AR has implemented a stormwater utility fee to provide dedicated funds to water infrastructure and stormwater management needs.

5. **Identify potential partners to implement the Plan**

In the WPS, Table 5-1 under Adaptive Management identifies the following responsible groups needed to implement the WPS: Beaver Watershed Alliance, County Farm Service agencies, NRCS, local governments, local water suppliers, AGFC, Arkansas Forestry Commission, Land Trusts, MS4s, DEQ, UA- Fayetteville Extension Service, US Army COE, Beaver Lake Watershed Council, Northwest Arkansas Council, UA- Fayetteville, Homebuilders Association, Illinois River Watershed Partnership, H2Ozarks (formerly Ozarks Water Watch), Kings River Watershed Partnership, conservation groups, landowners, and USGS. The BWA currently works with these partners.

6. **Estimate of time when WQS will be met**

Table 4-1 of the WPS lists estimated total reductions in sediment and phosphorus loads from implementing core BMPs through 2055. Water quality modeling was used to evaluate the impact of implementing these core BMPs on reservoir water quality. It is expected that these improvements will result in AU attainment within this scheduled timeframe.

7. **Plans for monitoring that:**
   a. **Demonstrate progress made toward achieving WQS following implementation**
   b. **Identify needed improvement for adaptive management as the project progresses**
   c. **Evaluate the success of actions and outcome**

Current water quality sampling within and upstream of the 5-*r* AUs includes:

- DEQ collected quarterly epilimnion samples from a station in AR_11010001_4042 during 1999–2019. Samples were tested for sixty-seven (67) water quality parameters. These samples were not analyzed for pathogens due to the difficulty of meeting holding time requirements with the driving time to the DEQ laboratory in North Little Rock. Beginning in April 2026, it is planned for DEQ to resume quarterly sampling at this station for the same parameters through 2029.
- BWD currently collects monthly samples on nine (9) Beaver Lake tributary sites and tests for twenty-four (24) water quality parameters. All monitoring stations are sampled within the epilimnion. BWD collects daily measurements of turbidity and bacteria at the BWD water intake, which is located downstream of the 5-*r* AUs.
- The annual Beaver Lake Secchi Day held in August is organized by the BWD. This event provides lake water transparency data as well as chlorophyll-a, total phosphorus, and total nitrogen. It is both a monitoring tool and community engagement event.

- In 2012, StreamSmart, a voluntary citizen science-based monitoring program, was launched to increase the extent and frequency of water quality monitoring in the Beaver Lake watershed. Middle Fork White River (AR_11010001_026) and Baldwin Creek (AR_11010001_929) are monitored stations within the 5-*r* AUs that are the focus of this justification. This continued sampling will help inform pH changes at Baldwin Creek and also contribute further water chemistry data for Middle Fork White River. Other monitoring stations are also located upstream of the 5-*r* AUs. Water quality improvement at these stations could translate to improvement in the listed AUs. Samples are collected in February, May, August, and November. Analyses conducted through this program that are relevant to the impairments of concern are measurement of TSS concentration, habitat assessment, pH, and macroinvertebrate assessment. The StreamSmart program was developed by the Beaver Water District, Audubon Arkansas, and the Arkansas Water Resources Center (AWRC) (Ozarks Water Watch, 2019a; Danovi, 2020).
- Beaver Lake Volunteer Program, a volunteer citizen science monitoring program, began in 2014. It is a partnership between H2Ozarks and Beaver Water District. Data are collected one to two times a month during April – September. All monitoring stations are located downstream of the 5-*r* AUs (Ozarks Water Watch, 2019b; Thorpe and Danovi, 2020).
- Streambank erosion monitoring was conducted during 2016–2017 at sites located upstream of 5-*r* AUs (Watershed Conservation Resource Center, 2018).
- USGS is collecting samples every two months from a station in AU AR_11010001_4041.

8. Commitment to periodically evaluate the alternative restoration approach to determine if it is on track to be more immediately beneficial or practicable in achieving WQS than pursuing a TMDL in the near-term, and if the impaired water should be assigned a higher priority for TMDL development.

Every two (2) years DEQ compiles and evaluates available water quality data from Beaver Lake for water quality criteria attainment. This assessment will be used to determine if the alternative restoration approach is making progress toward addressing the water quality impairments.

BWA states, “The Beaver Watershed Alliance has adopted the [WPS] document for revision and periodic updates with input from the original Policy and Technical Advisory Group organizations. The Protection Strategy will remain ‘evergreen’ in that new and important issues, water quality data, and emerging pollutants will be addressed on a repeating cycle and in a timely manner.” (Beaver Watershed Alliance, 2019). BWA has been working to develop watershed success metrics that will serve other watershed organizations in defining their goals. Multiple ongoing projects including monitoring, stream restoration, low impact development, and nutrient transport studies are being carried out by the BWA and their partners.

The May 2012 WPS is an update for the 2009 version and is currently undergoing a revision. Additionally, H2Ozarks held the first public meeting for developing the WMP for the Upper White River watershed in January 2022 and the plan was accepted on July 24, 2025. H2Ozarks produces annual water quality summaries for the Upper White River watershed, including Beaver Lake and its tributaries. These reports summarize the water quality data collected by citizens, including data from the StreamSmart and Beaver Lake Volunteer Programs.

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CATEGORY 5-*r* RATIONALE FOR ILLINOIS RIVER WATERSHED

1. **Assessment Units (AUs) in 5-*r* and identification of sources contributing to impairments**

Two parameters (pathogens and turbidity) were assessed as not attaining water quality criteria within the Illinois River watershed that have been placed in Category 5-*r*. No additional impairments were added to this plan for the 2026 cycle. Information about the impairments within this plan reflects the status as of the 2024 cycle unless otherwise noted. One impairment was delisted during the 2026 cycle and is detailed in section 1a.

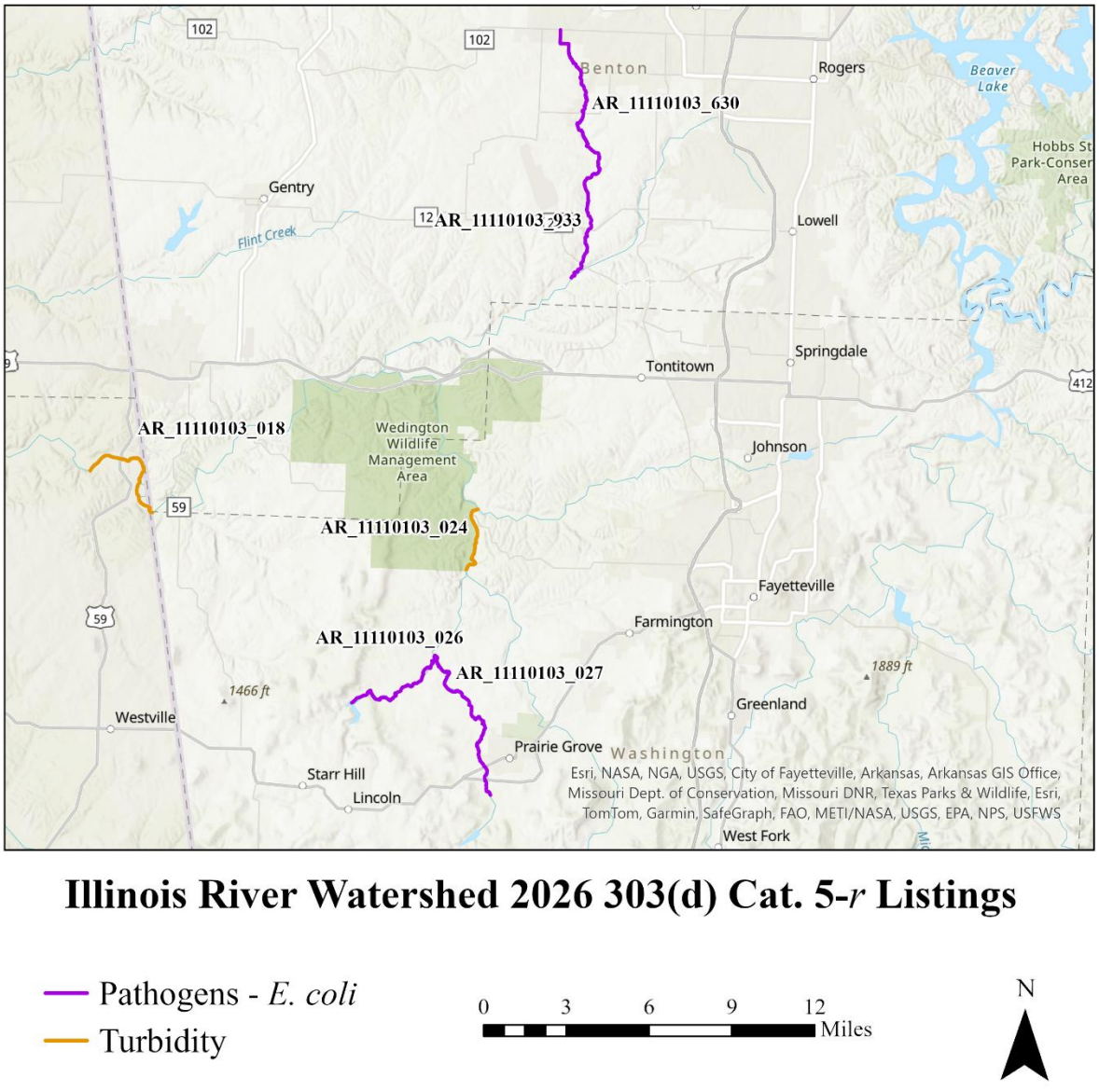

Figure A3. Impaired Segments in 5-*r*, Illinois River watershed

1a. Pathogens

Four Assessment Units (AUs) were impaired due to concentrations of *E. coli* that exceeded water quality criteria;

- AR_11110103_026 (Moores Creek)
- AR_11110103_027 (Muddy Fork)
- AR_11110103_630 (Little Osage Creek)
- AR_11110103_933 (Little Osage Creek)

The 2012 EPA-accepted Upper Illinois River WMP lists possible sources of pathogens from urban contributions as failing septic systems, wildlife, illicit discharges, agriculture, urban runoff, and others. The possible agricultural pathogen sources identified were manure/litter application runoff, livestock access to streams, poultry litter storage, and animal feeding operations (FTN, 2012). This WMP was updated in 2024 with an EPA-approved WMP.

Table A12. AUs listed for *E. coli* in the Illinois River watershed

Assessment Unit	Stream name	Reach length (miles)	HUC12(s) in which the AU is located	Selected land uses in HUC12 (NLCD 2023)
AR_11110103_026	Moores Creek	4.8	111101030102	60% pasture 9% developed 29% forest 1% herbaceous & shrub
AR_11110103_027	Muddy Fork	7.1	111101030101	44% pasture 12% developed 42% forest 1% herbaceous & shrub
AR_11110103_933	Little Osage Creek	4.3	111101030302	59% pasture 31% developed 9% forest 1% herbaceous & shrub
AR_11110103_630	Little Osage Creek	7.2		

* Note that percentages may not sum to 100 because the area of open water is not included or because values were rounded to the closest whole number. NLCD = National Land Cover Database.

Point source discharges may contribute to the pathogen impairments in AU AR_11110103_027. The only discharge of treated sanitary wastewater directly into one of the listed AUs is the City of Prairie Grove wastewater treatment plant (NPDES permit number AR0022098), which discharges into the Muddy Fork of the Illinois River (AU AR_11110103_027). While publicly owned treatment works are not the singular cause of an impairment, violations of the permitted effluent limits may contribute to an impairment. During the period of April 2018 – March 2023, discharge from this wastewater treatment plant violated permit fecal coliform bacteria limits twelve (12) times: four (4) violations in 2019, two (2) violations in 2020, four (4) violations in 2021, one (1) violation in 2022, and one (1) violation in 2023 (US EPA, 2025).

The only other discharge associated with the listed AUs is from the City of Fayetteville West Side wastewater treatment plant (NPDES permit number AR0050288). Discharge from this wastewater treatment plant eventually drains into the Illinois River (AU AR_11110103_028), but only after traveling more than 5 miles through Goose Creek. During the April 2018 – March 2023 period, discharge from this wastewater treatment plant met all bacteria permit limits (US EPA, 2025).

A bacteria monitoring study included sampling of AUs AR_11110103_028 (this AU was delisted for *E. coli* in 2026) and AR_11110103_933, as well as other previously listed AUs, including AU AR_11110103_025 on the Muddy Fork. This study identified pasture in riparian zones, and deposition of manure in streams by livestock, and possibly wildlife, as the most likely sources of high bacterial levels at sampling sites. The study also noted that high bacteria levels in most sampled streams is a localized issue, and bacteria levels can vary significantly over time (Scott et al., 2015). The results of this study suggest that bacteria sources causing listing of these AUs are most likely located near the water quality stations (within 2 km). Possible pathogen sources associated with riparian pastures include manure/litter application runoff, and livestock access to streams (FTN, 2012).

Another study attempted to identify *E. coli* sources by identifying associated viruses. Samples were analyzed for the presence of viruses specific to humans, cows, and swine (Gibson, 2016). Samples were collected in the following streams/AUs:

- AR_11110103_013 Baron Fork,
- AR_11110103_023 Illinois River,
- AR_11110103_029 Clear Creek,
- AR_11110103_028 Illinois River,
- AR_11110103_025 Muddy Fork,
- AR_11110103_030 Osage Creek,
- AR_11110103_931 Spring Creek, and
- AR_11110103_933 Little Osage Creek (Gibson, 2013).

The results of one of the tests in this study indicate that, in samples with high virus levels, associated with rainstorms, a higher proportion (71%) of fecal pollution in Clear Creek, Muddy

Fork, and Little Osage Creek is from animal sources (cow) than from human sources. Other test results indicate that, at other times and in other streams, human wastewater may account for the majority of fecal pollution in the sampled streams. Unfortunately, there was not a statistically significant correlation between *E. coli* and virus levels ($r^2 = 0.379$), i.e., high *E. coli* levels did not necessarily occur in the same samples as high virus levels (Water Currents, 2016; Gibson, 2015; Gibson, 2016). The results of this study suggest that both human and animal waste contribute *E. coli* to the five AUs in Category 5-*r*, but did not show that either human waste or animal waste contributes the majority of *E. coli* in the streams that were sampled.

1b. Turbidity

Two AUs are impaired due to concentrations of turbidity that exceeded water quality criteria;

- AR_11110103_018 (Illinois River; base and storm flow)
- AR_11110103_024 (Illinois River; base flow)

Table A13. AUs listed for turbidity in the Illinois River watershed

Assessment Unit	Stream name	Reach length (miles)	HUC12(s) in which the AU is located	Selected land uses in watershed (NLCD 2023)
AR_11110103_018	Illinois River	4.5	111101030606	41% pasture 7% developed 50% forest 2% herbaceous & shrub
AR_11110103_024	Illinois River	2.8	111101030403	32% pasture 6% developed 59% forest 2% herbaceous & shrub

* Note that percentages may not sum to 100 because the area of open water is not included or because values were rounded to the closest whole number. NLCD = National Land Cover Database.

The WBP lists possible sources of turbidity as impervious roads, unpaved roads, construction, stream bank erosion, cattle in stream, and overgrazed pasture (FTN, 2012). With almost half of the land use in this watershed in pasture, this has the potential to be a large contributor to sedimentation. The next largest land use in the watershed is forest. Use of unpaved roads for forestry activities can contribute to increased sedimentation in surface waters. Stream bank erosion

is listed in the WBP as a possible source of turbidity in the watershed. Changes in flow regime due to watershed disturbance can cause stream bank erosion to occur. Between both HUC12s, thirteen percent (13%) of the watershed is urbanized (Table A13) and hydrologic modification due to any land use change has the potential for bank erosion or bed scour.

2. **Analysis to support why the State believes the implementation of the alternative restoration approach is expected to achieve water quality standards (WQS).**

An alternative restoration strategy is well-suited for the Illinois River watershed because impairment sources are primarily from non-point source contributions. Rural land use in the HUC12s associated with the impaired stream reaches ranges from 59% forested with 32% pasture to 9% forested and 59% pasture. Discharges from point sources are regulated through the National Pollution Discharge Elimination System permitting program. Any corrective actions that may be needed for point sources will occur under the direction of this program.

The Memorandum of Agreement (MOA) signed in November 2018, between the states of Arkansas and Oklahoma also supports the development and use of alternative restoration measures. The MOA outlines the formation of a Watershed Improvement Plan (WIP), which will include and update 319 projects, and a WIP Advisory Group. The WIP will identify possible water-quality improvement strategies for point and nonpoint sources outlined in each state's watershed-based management plans.

Implementation of urban and pasture-related conservation practices in Oklahoma and Arkansas was part of a successful effort to reduce bacteria in Oklahoma stream reaches in the Illinois River watershed (US EPA, 2019). A February 16, 2016, USDA Blog post credited BMPs implemented through the Natural Resources Conservation Service (NRCS) Illinois River Sub-Basin and Eucha-Spavinaw Lake Watershed Initiative as contributing to de-listing of two segments of the Illinois River. These reports suggest that implementation of BMPs in the Illinois River watershed is already improving water quality.

Bacteria reduction efficiencies have been reported by the Texas A&M Extension Service and Virginia Tech for some BMPs that restore riparian buffer, improve pasture, and reduce livestock access to streams. A summary of these efficiencies can be found in the Strawberry River Watershed-Based Management Plan (FTN, 2016). These bacteria reduction efficiencies include 37–46% reduction for fencing cattle out of streams, 46% reduction for stream crossings, 85% reduction for water facilities, and 66–72% reduction for prescribed grazing.

Similar strategies for livestock and forestry have been published by the University of Arkansas Cooperative Extension Service. BMPs for improving riparian zones for livestock grazing and limiting sediment runoff through forestry activities are available through the extension service as well as the Arkansas Forestry Commission.

Because BMP implementation is voluntary, it is important to have an active, well-organized, and sustainable watershed advocacy group such as the Illinois River Watershed Partnership (IRWP). This group has been active in the watershed for fifteen (15) years and has good relationships with state and federal agencies, local governments, local businesses, and other non-governmental organizations (NGOs). The work of the IRWP and its partners has resulted in implementation of BMPs in both urban and rural areas of the watershed. Examples of IRWP's early work in the Illinois River watershed are listed in the WBP. Examples of more recent activities, during 2024, include educating 10,004 students on the importance of protecting the Illinois River, restored and improved functionality of twenty-one (21) stream miles, and funding the replacement of eighteen (18) septic systems (IRWP, 2024). IRWP's Riparian Restoration Program supports implementation of BMPs in priority watersheds, including Moores Creek and Muddy Fork Illinois River. As of 2021, IRWP has committed over $1 million to this program since 2018 and expected to invest $1.5 million through 2024. The final year for IRWP's Riparian Restoration Program occurred in 2024, and totaled 21.8 stream miles of restoration over the course of the program and implemented 94 BMPs to improve water quality. They also assisted in 1,843 agricultural acres were served with alternative water sources for livestock to keep cattle out of streams, installed 90,701 linear feet of fencing for the same effort, and enhanced 277 acres of riparian buffer (IRWP, 2024).

3. Action Plan

a. Actions to address all sources

b. Schedule of actions designed to meet WQS with

i. Milestones

ii. Dates

iii. Interim milestones

iv. Deliverables

Based on the information in Item 1, outreach activities and BMPs that will be targeted are those that improve vegetation in riparian areas and reduce or control livestock access to impacted streams. The WBP includes a description of measurable milestones for education and outreach, best management practice implementation, and water quality monitoring. Since the completion and implementation of the WBP, many of the milestones and deliverables have been achieved. However, additional work is still needed to bring all the AUs in the Illinois River watershed into attainment for pathogens and turbidity. Table A14 includes a schedule of actions associated with applicable new programs that are not included in Table 5.9 of the 2024 WMP. These programs would promote implementation of BMPs that can reduce agricultural bacteria and turbidity sources associated with targeted stream reaches.

Table A14. Schedule of Restoration Activities

Program (lead entity)	Dates	Milestones	Interim milestones	Deliverables
Riparian Restoration Program (IRWP)	2019 – 2024	Restore 20 miles of riparian corridor; add 2 sq. miles of rotational grazing	Landowner outreach	BMPs on 20 miles of riparian corridor; reduced sediment, nutrient, and bacteria loads
Controlled Access & Livestock Fencing Initiative (Arkansas Assoc. of Conservation Districts, USFWS[1])	2015 – ongoing	Reduce livestock use of riparian corridor	Landowner outreach; install BMPs within 2 km of critical areas	Reduced sediment, nutrient, and bacteria loads
Working Lands for Northern Bobwhite Quail/North Arkansas Quail Focal Landscape RCPP[2] (NRCS)	2018 – ongoing	Increase quail habitat	Landowner outreach; install BMPs	Increase in quail populations[3]
Septic Tank Remediation Program (IRWP)	2021 – 2023	Reduce number of failing septic systems in Arkansas Illinois River watershed	Tank owner outreach	Reduced nutrient and bacterial loads
Unpaved Roads Program (IRWP/NRD)	2021 – 2023	Reduce non-point source sediment loads in Illinois River Watershed	Landowner outreach; install BMPs	Reduced sedimentation
Wastewater Treatment Plant Upgrades (NRD)	2022 – ongoing	Increase capacity and reduce point source contributions	Funding allocations	Reduced nutrient and bacterial loads
Illinois River Watershed RCPP[2] (NRCS)	2015 – 2019	Increase implementation of BMPs	Landowner outreach	Reduce sediment, nutrient, and bacteria loads; improve wildlife habitat

Program (lead entity)	Dates	Milestones	Interim milestones	Deliverables
Blue Cities/Blue Neighborhoods Program (IRWP)	2021 – 2022	Improve infrastructure to reduce stormwater runoff	Community outreach	Reduce stormwater runoff, reduce stream bank erosion

Notes:
1. USFWS = US Fish and Wildlife Service
2. RCPP = Regional Conservation Partnership Program
3. Conservation practices recommended in this program can reduce bacteria and sediment loads, e.g., prescribed grazing, forage and biomass planting, and access control. Therefore, while improved water quality is not a stated deliverable of this program, its implementation could reduce sediment and bacteria loads.

4. Identify funding sources to implement the Plan

As of 2022, up to forty million dollars have been invested in nonpoint source controls in the Illinois River watershed through USDA and EPA programs. During 2008–2020 USDA NRCS provided around $1 million in funding assistance to the Upper Illinois River watershed through Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program, and Regional Conservation Partnership Program (Christianson, 2021).

An informal survey of the mayors of Fayetteville, Springdale, Rogers, Bentonville, and Siloam Springs was conducted to get an idea of the amount of capital investment that has occurred since 2000 to reduce the phosphorus loadings from the discharges of the wastewater treatment facilities. As a conservative amount, more than $225 million has been invested in the last two decades. This figure does not include any of the investments made for infrastructure improvements. Most recently (July 2022) Prairie Grove City Council approved a bid to expand the wastewater treatment facility to keep up with projected population growth.

On September 10, 2018, the Arkansas Natural Resource Commission (ANRC) and the Illinois River Watershed Partnership (IRWP) announced a new agreement to improve water quality in the Illinois River by implementing the Riparian Restoration Program. IRWP received an initial $1.4 million grant to assist landowners with implementing BMPs in the watershed. The Walton Foundation provided the necessary matching funds for the project. Private grant funds included $1.8 million dollars invested and $3.2 million of private dollars including landowner contributions and private grants, as each public dollar invested was matched with $1.78 in private funding. The goal was to protect or restore twenty (20) miles of riparian area. Since the finalization of the

riparian restoration program in 2024, 227 acres of riparian buffer were enhanced; 21.8 miles of streams were enhanced, restored, and/or protected; 1,843 agricultural acres were served by alternative watering systems; 94 BMPs were installed; and 90,701 linear feet of fencing was constructed to keep cattle out of streams. The implemented BMPs estimated reductions of total phosphorus by 5,991 lbs/year, total nitrogen by 25,538 lbs/year, and sediment by 2,793 tons/year (irwp.org/rrp).

Additional potential funding sources include, but are not limited to: tax credits, Conservation Reserve Program, Conservation Reserve Enhancement Program, Environmental Quality Incentives Program, Arkansas Stream Team, 319 Grants, land trusts, fees, private entities, corporations, legislative appropriations, County Conservation District Controlled Access & Livestock Fencing Initiative (Illinois River watershed is a focus area), NRCS Conservation Stewardship Program, and NRCS Agricultural Conservation Easement Program. Programs mentioned in the table in Item 3 provide financial assistance to landowners for implementing BMPs.

5. Identify potential partners to implement the Plan

Tables 5.2 and 5.5 of the updated 2024 WMP identifies potential partners that may share common goals within the watershed. Potential partners include NGOs; governmental entities at the city, state, and federal level; academia; and businesses/industries. The IRWP currently works with many of these partners and is developing partnerships in Oklahoma (irwp.org).

6. Estimate of time when WQS will be met

Implementation of effective nonpoint source BMPs to address this issue is strictly on a voluntary basis. However, implementation of the BMPs could lead to timely attainment of the turbidity and primary contact recreation designated use in the Illinois River watershed. In Oklahoma, practices were installed beginning in 2002, and streams were delisted in 2006 and 2016. Based on this, achievement of WQS could be possible in ten (10) years.

7. Plans for monitoring that:

- **a. Demonstrate progress made toward achieving WQS following implementation**
- **b. Identify needed improvement for adaptive management as the project progresses**
- **c. Evaluate the success of actions and outcome**

The following continues to reflect the 2024 list, when new listings were last included in the Plan: In preparation of the 2024 303(d) list, data from forty-nine (49) water quality monitoring stations was used to assess twenty-two (22) stream Assessment Units and three (3) lake Assessment Units,

approximately 161 river miles and 450 lake acres within the Illinois River watershed. A portion of those stations are operated by DEQ as part of the Ambient Water Quality Monitoring Network. Additional information was from stations operated by the Oklahoma Conservation Commission, Cherokee Nation, Illinois River Watershed Partnership, USGS, and the Arkansas Water Resource Center. Water quality samples collected are analyzed for numerous water quality constituents including turbidity. It is widely accepted in scientific literature that storm water runoff mobilizes both pathogens and sediment, and there is a strong relationship between turbidity levels and pathogen concentrations (Irvine, et al., 2002). Therefore, decreasing the turbidity in the streams should result in the reduction of pathogens as well.

8. Commitment to periodically evaluate the alternative restoration approach to determine if it is on track to be more immediately beneficial or practicable in achieving WQS than pursuing a TMDL in the near-term, and if the impaired water should be assigned a higher priority for TMDL development.

Water quality in the Illinois River basin is routinely monitored as part of the DEQ Ambient Water Quality Monitoring Network. Every two (2) years the data is compiled and evaluated for water quality criteria attainment. This assessment, and other readily available information, will aid in determining if the alternative restoration approach is making progress toward addressing the water quality issues.

The states of Arkansas and Oklahoma, through a Memorandum of Agreement (MOA) signed in November 2018, agreed to establish a Monitoring and Assessment Workgroup (MAW) and to develop a WIP (Arkansas and Oklahoma, 2018).

A Technical Advisory Committee, a subcommittee of the MAW, was established and began meeting in early 2019. Their focus is to develop a monitoring and assessment program to ascertain progress toward meeting the Oklahoma aesthetic total phosphorus criterion. Delegates from Arkansas and Oklahoma have convened on several occasions since January 2019. The determination of base flow, sampling methodologies, data quality objective, and other factors are being developed.

The MOA outlines the formation of a WIP, which will include and update 319 projects, and a WIP Advisory Group. The WIP will identify possible water-quality improvement strategies for point and nonpoint sources outlined in each state's watershed-based management plans.

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2026

ASSESSMENT METHODOLOGY

For the Preparation of:

The 2026 Integrated Water Quality Monitoring and Assessment Report

Pursuant to Clean Water Act Sections 303(d) and 305(b)

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1.0 ASSESSMENT BACKGROUND

Section 305(b) of the Federal Water Pollution Control Act (hereinafter "Clean Water Act") requires states to perform a comprehensive assessment of the state's water quality to be reported to the U.S. Environmental Protection Agency (EPA) every two years. The report provides information on the quality of the state's waters; the extent to which state waters provide for the protection and propagation of a balanced population of fish, shellfish, and wildlife, and allow recreational activities in and on the water; and how pollution control measures are leading to water quality standards attainment.

In addition, Section 303(d) of the Clean Water Act requires each state to identify waters where existing pollution controls are not stringent enough to achieve state water quality standards and establish a priority ranking of these waters. States must develop Total Maximum Daily Loads (TMDLs) or other corrective actions for the identified waters. TMDLs describe the amount of each pollutant a waterbody can receive and not violate water quality standards. States submit the list of impaired waters (303(d) list) to EPA. EPA has the option to approve, disapprove, or take no action on the list within 30 days of submission.

Arkansas Department of Energy and Environment, Division of Environmental Quality (DEQ) follows the specific requirements of 40 C.F.R. § 130.7-130.8 and EPA's most current 305(b) reporting and 303(d) listing requirements and guidance when developing this assessment methodology. Current EPA guidance recommends producing one report combining requirements of the Clean Water Act for Sections 305(b) reporting and 303(d) submissions. This is, in general, referred to as the Integrated Report (IR).

Arkansas's combined report is the *Integrated Water Quality Monitoring and Assessment Report* (305(b) Report). The 305(b) Report describes the quality of all surface waters of the state that were evaluated for a specified assessment period (period of record (POR)). This report is prepared using the *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b), and 314 of the Clean Water Act* (EPA 2005) which is supplemented by memoranda regarding development of the 2008, 2010, 2012, 2014, 2016, 2018, 2022, 2024, and 2026 305(b) Reports (EPA 2006, 2009, 2011, 2013, 2015, 2017, 2021, 2023, and 2025 respectively). Arkansas's waters are evaluated in terms of whether their assigned water quality criteria and designated uses, as delineated in the Arkansas Pollution Control and Ecology Commission's (APC&EC) *Rule[1] 2 Water Quality Standards for Surface Waters of the State of Arkansas* (APC&EC 2022), herein referred to as Rule 2, are being attained.

Rule 2 provides the foundation for the 305(b) Report, establishing water quality standards for surface waters of the State of Arkansas; designated uses associated with those water quality standards; and criteria and policies established to protect, maintain, and restore designated uses. Water quality data are assessed for compliance with Rule 2 to determine impairment and designated use support, based upon the frequency, duration, and/or magnitude of water quality criteria exceedances as delineated in DEQ's assessment methodology.

[1]Act 315 of 2019 was enacted by the Arkansas General Assembly requiring revisions of the use of Rule in lieu of Regulation.

2.0 INTEGRATED REPORTING CATEGORIES

Arkansas's waters are assessed based on water quality criteria and designated use support, according to Rule 2 and this assessment methodology. Water quality standard attainment is determined based on support of designated uses and/or criteria in place to protect those designated uses. An assessment unit (AU), previously referred to as a monitoring segment, is the basic unit of record for conducting and reporting water quality assessments. AUs are individual stream reaches, lakes, lake areas, or other defined waterbodies and are grouped by planning segments and 8-digit hydrologic unit codes (HUC). AUs are delineated using GIS layers and several real-world considerations such as tributaries, land use boundaries, point source dischargers, monitoring stations, physical breaks, and other factors.

Arkansas's assessments are formatted to reflect EPA's 305(b)/303(d) Integrated Report (IR) guidance (EPA 2005, 2006, 2009, 2011, 2013, 2015, 2017, 2021, 2023, and 2025) which suggests placing AUs into the following five integrated reporting categories upon assessment. AUs may be assessed 'support' and placed in Category 1 if all water quality criteria and designated uses, for which data are available, are attained. AUs may be assessed as 'non-support' if any water quality criteria or designated use is not attained, and may be placed in Category 4 or 5, as appropriate. AUs may be placed in Category 3 if there is not enough information to make a scientifically defensible attainment decision. Historically, Category 2 is rarely used in Arkansas.

Some impaired AUs will be distinguished between pollutant causes currently without a TMDL (Category 5) and pollutant causes for which TMDLs have already been approved (Category 4a). In some instances, a regulatory response outside of a TMDL is permissible, and the AU/pollutant pair is assigned to Category 4b (alternative pollution control) or Category 5r (formerly 5-alt). In instances where non-attainment is not caused by a pollutant, AUs will be placed in Category 4c. Examples of this would be naturally occurring deviations from current criteria where site specific criteria would be more appropriate but are yet to be developed. Note that Category 4 waters are not part of the 303(d) list of impaired waterbodies; however, a list of Category 4 waters are submitted for public notice along with the 303(d) list (Category 5).

The 303(d) list of impaired waterbodies (Category 5) consists of AUs not supporting one or more designated use and/or not meeting water quality criteria. Category 5 is prioritized by DEQ for planning and management purposes in accordance with 40 § C.F.R. 130.7(b)(4) which states: "The list required under §§ 130.7(b)(1) and 130.7(b)(2) of this section shall include a priority ranking for all listed water quality-limited segments still requiring TMDLs, taking into account the severity of the pollution and the uses to be made of such waters and shall identify the pollutants causing or expected to cause violations of the applicable water quality standards. The priority ranking shall specifically include the identification of waters targeted for TMDL development in the next two years." Therefore, any waterbody ranked as "high" within Category 5 may be targeted for TMDL development.

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 or quantity requirements outlined in this assessment methodology.
- 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 water bodies in Category 3b may be prioritized (on a case-by-case basis) for additional investigation: waters designated as Extraordinary Resource Waters (ERW), Ecologically Sensitive Waterbodies (ESW), or Natural and Scenic Waterways (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. Water bodies 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 delisted with future revisions to APC&EC Rule 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 criteria, 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 water bodies in Category 5 may 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 DEQ assessed as unimpaired but were assessed as impaired by EPA.

r (formerly alt.)

- Waters where alternative restoration approaches may be more immediately beneficial or practicable in achieving water quality standards than pursuing the TMDL approach in the near-term.

3.0 DATA MANAGEMENT

Data assessment forms the basis of water quality standard attainment decisions. In order to conduct accurate assessments, evaluated data must:

- reflect current ambient surface water quality conditions,
- adhere to robust quality and quantity considerations,
- and represent accurate temporal and spatial requirements.

Data are assessed based on the current EPA-approved water quality standards for the State of Arkansas (APC&EC 2022) and this assessment methodology. In some cases, a weight of evidence approach may be used to supersede a preliminary assessment. When this occurs, justification will be provided within the 305(b) Report as well as submitted with the 303(d) list for public notice, and any supporting documentation will be provided. A more robust discussion of how final attainment decisions are determined can be found in Section 3.8 Final Attainment Determination Process.

3.1 WATER QUALITY DATA TYPES AND CONDITIONS

3.1.1 Data Types

Water quality data are collected in a variety of ways in Arkansas and are utilized differently for assessment purposes. Data sets are generally classified as discrete or continuous. Unless otherwise specified, assessment methodologies are designed for use with discrete data sets. When continuous data are used for assessment purposes, assessment methodologies will be identified as such. Different data types will not be combined for assessment purposes. If multiple data types exist for one AU, both will be assessed, and the most protective assessment will apply.

3.1.1.1 Discrete Data

Discrete data are generally characterized as data generated from samples taken at the same location with a significant amount of time passing, or a significant event (such as a storm event) occurring between each sample such that potential changes in water chemistry can be noted. These samples can be *in situ* measurements (pH, temperature, etc.) or grab samples to be taken to a lab for analysis (metals, toxics, etc.). An example of a discrete data set would be DEQ's ambient monitoring network where samples are collected from the same locations on a monthly basis. Discrete sampling works well when resources are limited, allowing entities to sample a larger area over time.

3.1.1.2 Continuous Data

Continuous data are generally characterized as data generated from a series of discrete *in situ* samples taken at frequent, regular intervals at the same location over time. Typically, these data are collected using a continuous logging meter taking measurements in regular time increments such as from once a second to once an hour. Water quality parameters typical of this collection are pH, dissolved oxygen, and temperature.

For assessment purposes, DEQ considers two types of continuous data: long-term and short-term.

- Long-term continuous data spans long time periods, from weeks to years. Long-term continuous data are typically collected at minute to hourly intervals.
- Short-term continuous data spans a shorter time frame, typically a 48 – 96-hour period. These time periods target diurnal shifts in certain water quality parameters, and readings are typically collected every few seconds or minutes.

When managing data for assessment purposes, both long-term and short-term continuous data taken in less than hourly readings (e.g., data recorded every fifteen minutes) will be calculated into hourly averages. All long-term and short-term assessments require at least hourly readings. Short-term continuous data must span 90% of the 24-hour period to be used for that day. Long-term continuous data must span ~90% of the applicable seasonal requirement dependent on the parameter being assessed.

3.1.2 Data Conditions

At times, data results are "censored," meaning they are reported as less than some value, greater than some value, or as an interval or range of numbers. For data processing and management, DEQ will handle these data in the following ways.

3.1.2.1 Data below detection limits

Data that are lower than detection limits of laboratory methods or equipment are typically represented as less than the numerical detection limit. In these cases, DEQ will use one-half the detection limit and assign that value as the numeric result for that data point (e.g., <0.05mg/L = 0.025mg/L; Clarke 1998, Scott et al. 2016, Croghan and Egeghy 2003, and Dixon 2005).

3.1.2.2 Data above detection limits

Data that are greater than detection limits of laboratory methods will be represented as the numerical detection limit (e.g., >1500cfu/100 mL = 1500cfu/100mL) as long as the detection limit is greater than applicable criteria. Maximum detection limits that are below applicable criteria will not be used for assessment purposes.

3.1.2.2 Other data conditions

Some data are represented as approximate. Approximate data will be used in assessments by dropping the approximate sign and using the whole number value (e.g., ~125cfu = 125cfu).

3.2 DATA ASSEMBLY

Pursuant to 40 C.F.R. § 130.7(b)(5), DEQ assembles and considers all existing and readily available water quality data and information, from DEQ and outside entities, to make water quality standard attainment decisions. Data are quality assured for use by determining adherence (or not) to data quality considerations outlined in this document (Sections 3.3 and 6.0 and subsections thereof).

The largest percentage of data used in the assessment of Arkansas's water quality are generated as part of DEQ's water quality monitoring activities, described in the *State of Arkansas's Water Quality Monitoring and Assessment Program, Revision 6* (DEQ 2020). Additionally, local, state,

and federal agencies, and other entities are solicited by DEQ to provide water quality data that meets or exceeds DEQ's QA/QC protocols.

Any entity may submit water quality data to DEQ without solicitation. All data received will undergo a quality assurance process to determine if it can be used. The 305(b) Report will include a list of all outside entities who provided data as well as a map of where data were collected that were used in assessments.

PERIOD OF RECORD FOR THE 2026 305(b) REPORT:

Metals and ammonia toxicity analysis: *April 1, 2022 through March 31, 2025*

*Beaver Lake site specific nutrient criteria: *January 1, 2020 through December 31, 2024*

All other analyses: *April 1, 2020 through March 31, 2025*

*Beaver Lake period of record is for data collected for analysis of the site specific water quality criteria that apply to the old thalweg near Hickory Creek (Rule 2.509).

3.2.1 No New Data

If no new qualifying water quality data have been generated for an AU during the current period of record, water quality standard and designated use attainment decisions from the preceding assessment period will be carried forward unless a substantial change in water quality standards or assessment methodology has occurred. If substantial changes in water quality standards or assessment methodology have occurred since the preceding assessment period, and those changes would affect previous assessment decisions, the data from the preceding period of record may be re-assessed using newly adopted water quality standards and newly defined methodology to determine current water quality standard attainment.

3.3 DATA QUALITY CONSIDERATIONS

DEQ maintains a strong commitment to the collection and use of high-quality data to support environmental decisions and regulatory programs. DEQ uses data submitted by various entities in different ways, depending on the quality and quantity of the data; however, all data submitted to DEQ will undergo a quality assurance process to determine if it can be used. Although all existing and readily available water quality data are considered, not all data can be used to make assessments or attainment decisions.

Data must adhere to data quality requirements as defined below.

- Phase I requirements are general to all parameters.
- Phase II requirements are specific to the parameter being assessed. Phase II requirements are explained in more detail in Section 6.0 and subsections thereof.

Data sets that meet all Phase I and Phase II data quality requirements can be used for attainment decisions. In some cases, a weight of evidence approach may be used to supersede Phase II requirements. When this occurs, justification will be provided within the 305(b) Report. A more

robust discussion of how final attainment decisions are determined can be found in Section 3.8 Final Attainment Determination Process.

Phase I Data Quality Requirements

Essential data requirements:

- Be characteristic of the main water mass or distinct hydrologic areas (e.g., not taken within a mixing zone, side channel, tributary, or stagnant back water).
- Be reported in standard units recommended in the relevant approved method and that conform to Rule 2 or can be directly compared or converted to units within Rule 2.
- Have been collected and analyzed under a QA/QC protocol equivalent to or more stringent than that of DEQ. Data collection protocols (Quality Assurance Project Plans (QAPPs) and Standard Operating Procedures (SOPs), as apply) must accompany the data.
- All laboratory analyzed parameters (not *in situ*) must be analyzed pursuant to the rules outlined in the Environmental Laboratory Accreditation Program Act, Ark. Code Ann. § 8-2-201 *et seq.* The name and location of the laboratory should accompany the data.
- Be accompanied by precise collection metadata such as time, date, stream name, parameters sampled, and sample site location(s), preferably latitude and longitude in either decimal degrees or degrees, minutes, seconds.
- Be received in the template provided in the ePortal data submission platform or compatible format not requiring excessive formatting by DEQ.
- Have been collected within the POR for the current assessment cycle.

Phase II Data Quality Requirements

Phase II data quality requirements will be specific for each parameter and will be detailed in the appropriate subsection of section 6.0 Specific Standards.

These requirements apply to the entire data set for a given AU, whether individual or aggregate, that will be considered for assessment.

- Meet sampling temporal conditions described for each parameter or designated use being assessed. These conditions include season (time of year) such as “critical season,” “secondary contact season,” or “primary contact season,” each defined within the applicable parameter.
- Meet data quantity requirements for each parameter or designated use being assessed.
- Meet data distribution throughout the appropriate season(s) or overall time frame appropriate for each parameter or designated use being assessed. Samples should always be “evenly distributed” for the temporal conditions outlined for each parameter. “Evenly distributed” is defined in Section 6.0.
- Meet sample spatial requirements described for each parameter or designated use being assessed. These can include lake sampling depth, specific sampling locations, or other spatial requirements.

3.3.1 Aggregating Data Sets

Data sets are defined as those collected by a single entity, at a single site, under a single QAPP. If multiple data sets pass Phase I data quality requirements for the same AU, they may be combined and considered as an aggregate data set for Phase II data quality requirements. If only one data set for a given AU passes Phase I data quality requirements, it will be the only data set considered for Phase II data quality requirements.

AUs are delineated to represent homogenous waters with regard to water quality. Therefore, it follows that any independent sample taken from an AU is representative of conditions within that AU. Occasionally, more than one monitoring station with available data exists within an AU, or several entities may provide data for the same monitoring location. Since each independent sample is considered to be representative of the AU at the time of collection, aggregation of independent samples into one data set within an AU is appropriate. Aggregation can occur for data from the same entity or from different entities.

If two entities sample the same parameter on the same AU on the same day, those data will be considered duplicates. Duplicate data points per day will be omitted, regardless of sampling entity, and only the most protective data point per day per AU will be retained. Data sets of different types (i.e., discrete vs. continuous) will not be combined into an aggregate data set.

3.4 DATA QUANTITY CONSIDERATIONS

DEQ strives to follow EPA guidance, which encourages collection of adequate data to make well-grounded attainment determinations (EPA 2005). Use of limited data is acceptable to EPA as limited financial, field, and laboratory resources often dictate the number of samples that can be collected and analyzed (EPA 2002). EPA has not established, required, nor encouraged the establishment of rigid minimum sample set size requirements in the water quality standards attainment status determination process (EPA 2005). As such, EPA discourages the use of target sample sizes applied in an assessment methodology as absolute exclusionary rules (EPA 2005).

However, EPA recognizes that assessments based on larger sample sets are more likely to yield accurate conclusions than assessments based on smaller sample sets, and that it may be appropriate to identify an initial sample size screen, but also provide for a further assessment of sample sets that do not meet the target sample size (EPA 2005).

DEQ requires a minimum of 10 water quality samples to make water quality criteria and designated use attainment decisions. Exceptions to the 10 sample minimum include bacteria, radioactivity, toxics, and ammonia. The primary goal of obtaining 10 data points is to protect against the occurrence of Type I and Type II errors. A Type I error would result in assessing an AU as non-support when it is actually fully supporting its criteria and uses. A Type II error occurs when an assessment unit is assessed as support despite it actually not meeting its criteria or uses.

3.5 DATA REPRESENTATIVENESS CONSIDERATIONS

Spatial and temporal representativeness of data and information must be considered when characterizing annual ambient conditions for a given AU. Specifics of spatial and temporal distribution will be outlined within each parameter in Section 6.0 and subsections thereof.

Spatial and temporal representativeness of a grab sample is a qualitative assessment addressed primarily in sample design, through selection of sampling sites, and use of procedures that reflect project goals and environment being sampled (e.g., monitoring the presence and magnitude of toxicity at specific sites for potential impacts on aquatic life may require specialized parameter sampling).

For assessment purposes, grab samples from a given monitoring site are considered representative of the waterbody for that distance upstream and downstream in which there are no significant influences to the waterbody that might cause a change in water quality (e.g., point source discharges, confluence with another stream, etc.) or when there is an absence of contextual information indicating unstable hydrologic conditions, such as: 1) precipitation, 2) stream flow, 3) differing land use patterns, or 4) historic patterns of pollutant concentrations in the AU. The QAPP or work plan under which the data were collected should provide context for data representativeness and is required during data submission.

Continuous data are considered representative when the data set accurately represents seasonality in the waterbody. Data sets with significant blocks of missing time that do not reflect ambient conditions will not be used for assessment purposes. Generally, continuous data sets are used that contain 90% of the temporal requirements.

3.6 STATISTICAL CONFIDENCE

Past EPA guidelines (EPA 1996 and 2002) have recommended listing waterbody segments as impaired (for conventional pollutants) when "10% of measurements exceed the water quality criterion." Making attainment decisions by simply applying a literal percent exceedance rate (10 exceedances out of 100 equals 10%) is referred to as a "raw score" assessment method. While this "raw score" assessment method can be applied, it errs significantly toward making false positive listings (Washington State Department of Ecology 2002).

In an effort to limit or reduce false positive (Type 1 error) listings, DEQ utilizes binomial distribution methodology for certain parameters, as appropriate. It will not be used on parameters where only one or two excursions of the criteria will result in an assessment of non-attainment such as toxics, radioactivity, and ammonia. Additionally, binomial distribution method will not be applied to bacteria data due to assessment language established in Rule 2.507. The binomial distribution method will be applied to the following parameters: temperature, turbidity, pH, dissolved oxygen, and minerals.

When the binomial distribution method is not applied, the specific method used for each parameter is described within applicable Sections 6.1 - 6.12.

The binomial distribution method is a non-parametric, robust, and well-known method for characterizing the probability of proportions; in this case, the percent a data set exceeds a predetermined constant. Statistical analysis methods, such as the binomial distribution method,

are used to increase the confidence level of the final decision of attainment of water quality criteria.

Use of the binomial distribution method also allows DEQ to statistically consider the waterbody as a whole rather than just the available sample set. The “raw score” method only determines exceedances in the available sample set, which are only a representation of the whole waterbody. The binomial distribution method allows for a margin of safety to statistically declare, with a set degree of confidence, that the sample set accurately represents the waterbody as a whole. This is more effective, from an environmental standpoint, than simply determining whether or not the sample set exceeds standards.

The EPA suggests that states determine the level of error they are willing to accept during the decision making process. Statistical methods should be employed to help achieve the state’s acceptable level of error. DEQ strives to attain a greater than ninety percent (>90%) confidence level when determining the water quality attainment status of an AU. Table 1 specifies the minimum number of exceedances required per sample size to list an AU on the 303(d) list of impaired water bodies. Conversely, Table 2 specifies the maximum number of exceedances allowed per sample size to de-list a listed AU. Each table assumes >90% confidence level for a decision with exceedance rates of 10, 20, and 25 percent using the binomial distribution method.

Utilizing the mathematical functions in Microsoft Excel, the exceedance rates were calculated using the following formula:

BINOM.INV(X,Y,Z)

Where:

X = number of samples in the data set (Trials)

Y = percent exceedance rate expressed as a decimal, (Probability_s); 10%=0.10, 20%=0.20, 25%=0.25

Z = confidence level to be attained, expressed as a decimal, (Alpha) 90%=0.9

Text above in parentheses is language input for Microsoft Excel arguments.

Thus, for a data set that contains 10 samples, to be assessed on a 10% exceedance rate and attain a 90% confidence level in the final decision, the formula would be:

BINOM.INV(10,0.1,0.9)

Table 1: Minimum number of sample exceedances required to assess as non-attaining (list) water quality standards, using binomial distribution, with 90% confidence that the true exceedance percentage in the waterbody is greater than or equal to 10%, 20%, or 25%.

10% Exceedance Rate	
Sample Size	Minimum Number of Exceedances Needed to Assess as Non-Attains
10-11	2
12-18	3
19-25	4
26-32	5
33-40	6
41-47	7
48-55	8
56-63	9
64-71	10
72-79	11
80-88	12
89-96	13
97-100	14

20% Exceedance Rate	
Sample Size	Minimum Number of Exceedances Needed to Assess as Non-Attains
10-13	4
14-16	5
17-20	6
21-24	7
25-28	8
29-32	9
33-36	10
37-40	11
41-45	12
46-49	13
50-53	14
54-57	15
58-62	16
63-66	17
67-70	18
71-75	19
76-79	20
80-83	21
84-88	22
89-92	23
93-96	24
97-100	25

25% Exceedance Rate	
Sample Size	Minimum Number of Exceedances Needed to Assess as Non-Attains
10	4
11-13	5
14-16	6
17-19	7
20-23	8
24-26	9
27-29	10
30-33	11
34-36	12
37-39	13
40-43	14
44-46	15
47-50	16
51-53	17
54-57	18
58-60	19
61-64	20
65-67	21
68-71	22
72-74	23
75-78	24
79-81	25
82-85	26
86-88	27
89-92	28
93-96	29
97-99	30
100	31

Table 2: Maximum number of sample exceedances allowed in order to assess as attaining (delist) water quality standards, using binomial distribution, with 90% confidence that the true exceedance percentage in the waterbody is greater than or equal to 10%, 20%, or 25%.

10% Exceedance Rate	
Sample Size	Maximum Number of Exceedances Needed to Assess as Attains
10-11	1
12-18	2
19-25	3
26-32	4
33-40	5
41-47	6
48-55	7
56-63	8
64-71	9
72-79	10
80-88	11
89-96	12
97-100	13

20% Exceedance Rate	
Sample Size	Maximum Number of Exceedances Needed to Assess as Attains
10-13	3
14-16	4
17-20	5
21-24	6
25-28	7
29-32	8
33-36	9
37-40	10
41-45	11
46-49	12
50-53	13
54-57	14
58-62	15
63-66	16
67-70	17
71-75	18
76-79	19
80-83	20
84-88	21
89-92	22
93-96	23
97-100	24

25% Exceedance Rate	
Sample Size	Maximum Number of Exceedances Needed to Assess as Attains
10	3
11-13	4
14-16	5
17-19	6
20-23	7
24-26	8
27-29	9
30-33	10
34-36	11
37-39	12
40-43	13
44-46	14
47-50	15
51-53	16
54-57	17
58-60	18
61-64	19
65-67	20
68-71	21
72-74	22
75-78	23
79-81	24
82-85	25
86-88	26
89-92	27
93-96	28
97-99	29
100	30

3.7 IMPAIRMENT SOURCE DETERMINATION

For any monitored AU where a water quality standard has been evaluated as non-support, the source(s) of impairment will be identified using available information (field observation, land use maps, point source location, nonpoint source assessment reports, special studies, and knowledge of field personnel familiar with the waterbody). However, DEQ acknowledges that tracking sources of impairment can be difficult when doing so on a state-wide level.

3.8 FINAL ATTAINMENT DECISION PROCESS

For parameters that allow for both discrete and continuous data (pH, temperature, and dissolved oxygen), data types will not be combined. Discrete data and continuous data will be assessed separately. Attainment decisions will include all necessary information for future determination of attainment (e.g., season, duration of exposure, designated use). Attainment decisions will be based on the most appropriate and protective decision for the AU. Factors that could determine which data set will be used for attainment decisions could include quantity of data, quality of data sets, and time of year data were collected. A weight of evidence approach can be used to make the final attainment decision, which may differ from the initial attainment result, but an explanation will be added to the 305(b) Report.

4.0 WATER QUALITY STANDARDS

Water quality standards are comprised of:

1) an antidegradation policy,

2) designated uses, and

3) narrative and numeric criteria.

4.1 ANTIDEGRADATION

An antidegradation policy is a requirement of the federal Clean Water Act, which is designed to prevent or limit future degradation of the nation's waters. Rule 2 contains an antidegradation policy that applies to all surface waters of the state. Per Rule 2.201, existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. Arkansas's High Quality Waters, as described in Rule 2.202, and Outstanding Resource Waters, as described in Rule 2.203, are to be protected and maintained for those beneficial uses and water quality for which the outstanding resource designation was granted. These water bodies may be listed as non-support if the chemical, physical, and/or biological characteristics for which the waterbody was designated have been determined to be impaired or absent, as defined by the following assessment criteria. Per Rule 2.204, in those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Clean Water Act, 33 U.S.C. § 1326.

4.2 DESIGNATED USES

The primary purpose of the 303(d) list of impaired water bodies is to identify those waters that are not currently supporting one or more designated uses or not attaining one or more water quality criteria. The support/non-support status of designated uses is most often determined utilizing water quality criteria or other water quality indicators. EPA guidance (2005) makes suggestions as to which water quality constituents are protective of which designated uses to determine the support status of those designated uses.

Table 3 illustrates which water quality criteria may be used, either independently or together, to assist in determining the support status of each designated use. Fish Consumption is not a designated use in Rule 2; however, it can be used to list a waterbody on the 303(d) list. Fish advisories are issued by the Epidemiology Branch of the Arkansas Department of Health (ADH). Parameters for which no assessment methodology exists in this document were not included within this table.

Table 3: Designated Uses for Arkansas's surface waters and rules used for assessment.

	Extraordinary Resource Waters, Ecologically Sensitive Waterbodies, and Natural and Scenic Waterways Rule 2.302 (A), (B), and (C)	Primary and Secondary Contact Rule 2.302 (D) & (E)	Aquatic Life Rule 2.302 (F)	Domestic Water Supply Rule 2.302 (G)	Industrial & Agriculture Water Supply Rule 2.302 (H) & (I)	Other Uses Rule 2.302(J)
Biological Integrity Rule 2.405	•		•			
Temperature Rule 2.502	•		•			
Turbidity Rule 2.503	•					•
pH Rule 2.504	•					•
Dissolved Oxygen Rule 2.505	•		•			
Radioactivity Rule 2.506	•	•	•	•	•	
Bacteria Rule 2.507	•	•				
Toxic Substances Rule 2.508	•		•	•		
Nutrients Rule 2.509	•		•			
Site Specific Minerals Rule 2.511(A)	•		•			
Minerals Rule 2.511(C)	•			•	•	
Ammonia Rule 2.512	•		•			

4.3 WATER QUALITY CRITERIA

4.3.1 Narrative Criteria

Rule 2 contains narrative criteria (written descriptions) that apply to all waters of the state and are used to evaluate support of applicable designated uses. Narrative criteria include general descriptions, such as the existence of nuisance species, biological integrity, taste and odor producing substances, visible globules on surface waters, nutrients, and toxins.

When listing and delisting methodologies are not specified for a particular narrative criterion within the assessment methodology, the following general methods may be used. Narrative criteria are evaluated by using screening levels established by EPA or other scientific literature, if they are available, as well as other information, including water quality studies, documentation of fish kills or contaminant spills, and photographic evidence. A weight of evidence approach may be used and final attainment decisions will be justified within the 305(b) Report as well as submitted with the 303(d) list for public notice, and any supporting documentation will be provided.

4.3.2 Numeric Criteria

Numeric criteria are values established in Rule 2 that provide a quantitative basis for assessing designated use support, developing permit limitations, and for managing point and nonpoint loadings in Arkansas's surface waters. Listing and delisting methodologies for instream water quality against numerical criteria are outlined in Section 6.0 and subsections thereof.

5.0 BIOLOGICAL INTEGRITY

This section establishes the protocol for assessment of biological integrity for Arkansas's surface waters, per APC&EC Rule 2.405:

> *For all waters with specific aquatic life use designated in Appendix A, aquatic biota should not be impacted. Aquatic biota should be representative of streams that have the ability to support the designated fishery, taking into consideration the seasonal and natural variability of the aquatic biota community under naturally varying habitat and hydrological conditions; the technical and economic feasibility of the options available to address the relevant conditions; and other factors.*
>
> *An aquatic biota assessment should compare biota communities that are similar in habitat and hydrologic condition, based upon either an in-stream study including an upstream and downstream comparison, a comparison to a reference waterbody within the same ecoregion, or a comparison to community characteristics from a composite of reference waters. Such a comparison should consider the seasonal and natural variability of the aquatic biota community. It is the responsibility of the Department to evaluate the data for an aquatic biota assessment to protect aquatic life uses designated in Appendix A. Such data may be used to develop permit effluent limitations or conditions.*

ASSESSMENT METHODOLOGY FOR BIOLOGICAL INTEGRITY

Biological integrity is evaluated using macroinvertebrate and/or fish communities collected within the waterbody. At a minimum, paired biological and physical data must be collected using methods outlined in a QAPP with requirements equal to or more stringent than that of DEQ. Results from acute and chronic toxicity tests of vertebrates and invertebrates in ambient water can also be evaluated, when available, but are not required to make a use determination.

To assess an AU for biological integrity, the support status of either macroinvertebrates and/or fish communities will be determined using the methods outlined in Sections 5.1 and/or 5.2. Results from fish and/or macroinvertebrate community analysis, and/or ambient toxicity test data if available, will be used to determine support or non-support of the aquatic life designated use.

5.1 MACROINVERTEBRATE COMMUNITY ANALYSIS

Six modified metrics set forth in *Rapid Bioassessment Protocols for Use in Stream and Rivers* (Plafkin et al. 1989) are used in analysis of macroinvertebrate community samples. Each site will have a Rapid Bioassessment score derived from a multi-metric analysis, which includes:

- taxa richness,
- Ephemeroptera-Plecoptera-Trichoptera Index (EPT Index),
- Hilsenhoff Biotic Index (HBI),
- percent contribution of dominant taxa,
- ratio of EPT to Chironomid taxa,
- ratio of scrapers to filter-collectors.

See *Arkansas's Water Quality and Compliance Monitoring Quality Assurance Project Plan* (DEQ 2021) at the DEQ website: https://www.adeq.state.ar.us/water/planning/surface/pdfs/2021-deq-qapp-signed-qtrak.pdf for more information. DEQ's metric modification or deviation from Plafkin et al. (1989) includes removal of the ratio of shedders to total taxa metrics and community loss index. DEQ field sampling methodologies do not always include the collection of coarse particulate organic matter (CPOM) (i.e. leaf packs) to evaluate macroinvertebrate communities. Collection of CPOM is required to calculate the ratio of shredders to total taxa. Community loss index assumes more taxa always indicates a healthier waterbody, which has not always been the case when there is a high diversity of resilient species in impaired streams. Additionally, community loss index was removed from the updated rapid bioassessment (Barbour 1999).

The general steps for macroinvertebrate assessment are as follows:

1. Determine representativeness of data (e.g., not collected in the summer, not collected during a scouring event, collected in the richest targeted habitat).
2. Compile all sites sampled in a given ecoregion.
3. Select a subset of sites to act as references of high quality using the "Top 15% Method" as detailed below.
4. Using Plafkin et al. (1989), calculate 6 metrics for each reference site.
5. Take the average of each metric to get the reference condition.
6. Calculate the metrics for each individual site.
7. Compare each site's metrics to the reference condition as **Percent Comparisons**.
8. Score the **Percent Comparisons** for each metric with either a 0, 2, 4, or 6 based on Table 4.
9. Sum the scores for each site and divide by 30 plus the percent dominance score to create a **Scored Percentage (**percent contribution of dominant taxa is not a comparison to reference value, but rather actual percent contribution for the given site.**)**.
10. Determine if the **Scored Percentage** indicates support or non-support using Table 5 (< 50% is *Non-Support* and ≥54% is *Support*. This range is reserved for staff to use a weight of evidence approach to make a final decision).

Reference Condition Data Requirements:

- A minimum of 17 sites are required to calculate the reference condition.
- Sampling methods must be consistent across sites.

- Samples taken during the summer months or immediately following a scouring event will not be considered.
- Sites must be collected in the same ecoregion.
- Sites must be selected across a disturbance gradient.

Reference Condition Calculation:

1. Determine the number of sites that make up 15% of the total data set. Use conventional rounding. The minimum statistically significant number of sites for establishing reference condition is 3, hence the minimum number of sites in the total data set is 17 (i.e., 17*0.15 = 2.55, which rounds to 3).
2. Calculate the HBI and EPT to Chironomid Ratio (EPT:C) for each site and rank them in order of best ecological condition (HBI = lowest score, EPT:C = highest score).
3. Using the value derived from 15% of the data set, select the top number of sites for each metric (e.g., 15% of 17 sites ≈3, so select the best (lowest) 3 HBI scores and best (highest) 3 EPT:C scores. This may result in anywhere from 3 – 6 sites depending on the amount of overlap between the metrics).
4. Average the values for each of the 6 Plafkin et al. (1989) metrics to determine reference condition.

If macroinvertebrate data are submitted for the assessment cycle that do not meet the requirements needed to calculate a reference condition, DEQ may use reference conditions that were calculated previously for the applicable ecoregion if they exist. This will be noted and reflected in the 305(b) Report.

Table 4: Macroinvertebrate bioassessment metrics and scoring criteria[1].

Metric	Biological Condition Scoring Criteria			
	6	4	2	0
Taxa Richness[2]	≥80%	<80-60%	<60-40%	<40%
Hilsenhoff Biotic Index[3]	≥85%	<85-70%	<70-50%	<50%
Ratio of EPT to Chironomid Abundances[2]	≥75%	<75-50%	<50-25%	<25%
Contribution of Dominant Taxa[4]	<20%	20-<30%	30-<40%	≥40%
EPT Index[2]	≥90%	<90-80%	<80-70%	<70%
Ratio of Scrapers to Filter-Collectors[2]	≥50%	<50-35%	<35-20%	<20%

[1] Modified from Plafkin, J. L., M. T. Barbour, K. D. Porter, S. K. Gross, and R. M. Hughes. 1989. Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish. U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington D.C. EPA 440-4-89-001.

[2] Score is a ratio of study site to reference site X 100.

[3] Score is a ratio of reference site to study site X 100.

[4] Scoring criteria evaluate actual percent contribution, not percent comparability, to reference site.

Table 5: Scoring criteria for macroinvertebrate community attainment decisions[1].

	Biological Condition Category	Comparable Estimate (%)	Attribute
Support	Comparable to reference	≥83	Comparable to the best situation in an ecoregion.
	Supporting	54-79	Community structure less than reference site. Taxa richness lower and tolerant forms are more prevalent.
Non-Support	Partially Supporting	21-50	Obvious decline in community structure with loss of intolerant forms. EPT index reduced.
	Non-supporting	<20	Community dominated by 1 or 2 taxa, few taxa present.

[1] Modified from Plafkin, J. L., M. T. Barbour, K. D. Porter, S. K. Gross, and R. M. Hughes. 1989. Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish. U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington D.C. EPA 440-4-89-001.

If the percent comparable estimates fall between the 50-54% cutoff for support vs non-support, a weight of evidence approach may be utilized to make a final support or non-support decision using available physical, chemical, and biological data and information.

5.2 FISH COMMUNITY ANALYSIS

DEQ's Community Similarity Index (CSI; Table 6) will be used in the analysis of fish communities. The CSI was established using information from the 1987 ecoregion survey (APC&EC 1987) and supplemented with data from additional least-disturbed streams identified by DEQ personnel. The current metric scores and similarity ranking categories were established using the prevailing deviations in the ecoregion survey data set and best professional judgment. Ecoregion-specific metric scores for watersheds (>10 mi^2), outlined in Appendix I, are calculated for each site, and total scores are assessed as follows:

Table 6: Fish Community Similarity Index (CSI) ecoregion values.

Ecoregion	Total Score	Category	Attribute
Ozark Highlands	**37-45**	Mostly Similar	Comparable to the best situation to be expected. Balanced trophic structure and optimum community structure present.
	25-36	Generally Similar	Community structure less than expected. Taxa richness lower than expected. Some intolerant taxa loss. Percent contribution of tolerant forms may increase.
	13-24	Somewhat Similar	Obvious decline in taxa richness due to the loss of tolerant forms. Loss of Key and Indicator taxa.
	0-12	Not Similar	Few taxa present and normally dominated by one or two taxa.
Boston Mountains **Ouachita Mountains** **AR River Valley** **Typical Gulf Coastal** **Spring-Influenced Gulf Coastal**	**25-32**	Mostly Similar	Comparable to the best situation to be expected. Balanced trophic structure and optimum community structure present.
	24-17	Generally Similar	Community structure less than expected. Taxa richness lower than expected. Some intolerant taxa loss. Percent contribution of tolerant forms may increase.
	16-9	Somewhat Similar	Obvious decline in taxa richness due to the loss of tolerant forms Loss of Key and Indicator taxa.
	0-8	Not Similar	Few taxa present and normally dominated by one or two taxa.
Channel Altered Delta **Least-Disturbed Delta**	**22-28**	Mostly Similar	Comparable to the best situation to be expected. Balanced trophic structure and optimum community structure present.
	21-15	Generally Similar	Community structure less than expected. Taxa richness lower than expected. Some intolerant taxa loss. Percent contribution of tolerant forms may increase.
	14-8	Somewhat Similar	Obvious decline in taxa richness due to the loss of tolerant forms. Loss of Key and Indicator taxa.
	0-8	Not Similar	Few taxa present and normally dominated by one or two taxa.

5.3 AQUATIC LIFE USE ATTAINMENT DETERMINATION

LISTING METHODOLOGY:

AUs may be listed as non-support when one or both of the evaluated biological communities (macroinvertebrates and/or fish) indicate perturbation/degradation (Table 7), or when one or both of the toxicity test organisms (vertebrate and/or invertebrate) fail greater than one acute or chronic ambient toxicity test in a three-year period.

Aquatic life designated use support can be assessed using both biological integrity data and water chemistry data. When only water chemistry data are available for an AU and assessment results indicate water quality impairment for temperature, dissolved oxygen, ammonia, radioactivity, site specific minerals, or toxic substances, it will be assumed that the aquatic life designated use is not supported. However, if physical and biological data are collected post-assessment which indicate the aquatic life designated use is supported, the water quality impairment will remain, but it will be noted that the aquatic life designated use is being supported in the subsequent assessment cycle.

DELISTING METHODOLOGY:

AUs may be listed as support when evaluated biological communities (macroinvertebrates and/or fish, whichever community led to the impaired attainment decision) do not indicate perturbation/degradation (Table 7) or when there have been no ambient toxicity test failures, acute or chronic, in a three-year period.

Table 7: Biological community assessment determination.

Data Type	Support	Non-Support
Macroinvertebrate Community Data Available	Macroinvertebrate community structure analysis (Table 5) indicates comparable to reference or supporting	Macroinvertebrate community structure analysis (Table 5) indicates partially supporting or non-supporting*
Fish Community Data Available	CSI score (Table 6) is either mostly or generally similar; general presence of sensitive and indicator species	CSI score (Table 6) is either somewhat or not similar; absence of sensitive and indicator species*

* The aquatic life designated use may be assessed as support or insufficient data available, despite an initial evaluation of non-support, if it is demonstrated that the non-support assessment is due to unrepresentative biological community data, and not toxicity, based on acceptable variances in ecoregion community structures. Under certain conditions, biological community data can be skewed due to an unrepresentative sample, which includes but is not limited to:

- Collection of irruptive species (e.g., large percentage of young-of-year in an isolated area that is not representative of the entire reach), which could trigger an inaccurate non-support determination.
- Transitional areas between ecoregions.

A weight of evidence approach is used in these circumstances to prevent the inappropriate listing of waters. If a support or insufficient data determination is made due to an unrepresentative sample, it will be explained in detail in the 305(b) Report, and supporting documentation will be provided.

6.0 SPECIFIC STANDARDS

Per Rule 2.501, unless otherwise indicated, the following specific standards shall apply to all surface waters of the state at all times except during periods when flows are less than the applicable critical flow. Streams with regulated flow will be addressed on a case-by-case basis to maintain designated instream uses. These standards apply outside the applicable mixing zone.

6.0.1 General Description of Phase II Data Quality Requirements

In general, Phase II requirements are categorized by:

- temporal,
- distribution and quantity,
- and spatial qualities.

Phase II data quality requirements are discussed in detail for each parameter within their respective section (6.1 - 6.12). Each general category is described below.

Temporal requirements

Temporal requirements relate to time of year, season, or other time dependent sample collection considerations. If a parameter does not have a particular season, such as pH, temporal requirements may not be listed for this parameter, or the temporal requirement may read "year-round". These parameters should be collected throughout the year without preference to any particular season or time of year. Conversely, a parameter with specific seasonal considerations, such as bacteria, will have temporal requirements listed for the particular sampling season(s).

Distribution and quantity requirements

Distribution requirements are intended to be a guideline unless otherwise explicitly stated. In general, the term "month" refers to a 30-day period rather than a calendar month. If more samples are taken over a longer time period, then DEQ will assess the data set for appropriate distribution. "Evenly distributed" is meant to be a general guideline for sample distribution. It does not mean that monthly samples must be taken exactly 30 days apart without exception or that an exact number of days must exist between each sample in a data set. "Evenly distributed" is also intended to guard against samples being clumped or concentrated toward one time of the year when the parameter should be collected year-round. DEQ welcomes entities to ask about sample distribution prior to finalizing sampling plans for data intended to be submitted for assessment purposes.

Quantity requirements are intended to be minimum number of samples necessary to assess waters. This applies to both listing and delisting methodologies. For radioactivity (Section 6.5), toxic substances (Section 6.7), and ammonia (Section 6.12), an assessment of non-attainment can be achieved before reaching 10 samples because these parameters are not assessed based on a percentage for non-attainment purposes; they are assessed as "not attained" whenever an absolute threshold is reached. A minimum of 10 samples are still required to delist or to assess as "attains" for these three parameters.

Spatial requirements

Spatial requirements relate to where samples should be taken within the waterbody, if any particular requirements exist beyond Phase I requirements or QAPP requirements. As per Phase I

data requirements, all data must be characteristic of the main water mass or hydrologic area. Spatial requirements may also be spelled out in the QAPP accompanying the data.

Spatial requirements for lakes and reservoirs are intended to ensure assessment consistent with standards development. Primary contact recreation, secondary contact recreation, and the majority of lake aquatic life productivity occur in the epilimnion (uppermost stratified layer). For these reasons, Arkansas's water quality standards for lakes and reservoirs were developed using data collected within the epilimnion. If no epilimnion exists—due to natural depth limitations or seasonal mixing—samples should be taken between 0.33 and 2.0 meters of the surface unless otherwise noted within the Phase II quality requirements for a parameter.

6.0.2 Continuous data

For assessment purposes, both short-term and long-term continuous data taken in less than hourly readings (e.g., data recorded every 15 minutes) will be calculated into hourly averages.

Short-term continuous data must span at least 90% of the 24-hour period to be used for that day. Long-term continuous data must span approximately 90% of the applicable temporal requirements.

6.1 TEMPERATURE

This section establishes the protocol for assessment of temperature criteria within Arkansas's surface waters, per APC&EC Rule 2.502:

The following standards are applicable:

Waterbodies	***Limit ˚C (˚F)***
Streams	
Ozark Highlands	*29 (84.2)*
Boston Mountains	*31 (87.8)*
Arkansas River Valley	*31 (87.8)*
Ouachita Mountains	*30 (86.0)*
Springwater-influenced Gulf Coastal	*30 (86.0)*
Typical Gulf Coastal	*30 (86.0)*
Least-Altered Delta	*30 (86.0)*
Channel-Altered Delta	*32 (89.6)*
White River (Dam #1 to mouth)	*32 (89.6)*
St. Francis River	*32 (89.6)*
Mississippi River	*32 (89.6)*
Arkansas River	*32 (89.6)*
Ouachita River (L. Missouri to Louisiana state line)	*32 (89.6)*
Red River	*32 (89.6)*
Lakes and Reservoirs	*32 (89.6)*
Trout Waters	*20 (68.0)*

PHASE II DATA QUALITY REQUIREMENTS FOR TEMPERATURE

Both discrete and long-term continuous data can be considered for temperature assessment of all waters.

Temperature – Trout Waters – Lakes and Streams

1. Temporal requirements

- Discrete and long-term continuous data
  - Collected year-round.

2. Minimum distribution and quantity requirements

- Discrete data
  - A minimum of 10 samples.
  - Evenly distributed over at least 2 years and 3 quarters per year.
- Long-term continuous data
  - Covers 10 months of a 12-month period.
  - Collected at least hourly.

3. Spatial requirements

- For streams and rivers, none that are not already covered in Phase I requirements.
- For lakes and reservoirs, samples are to be taken within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

Temperature – Non-Trout Waters – Streams and Rivers

1. Temporal requirements

- Discrete Data
  - Collected year-round.
- Long-Term Continuous Data
  - Data should be collected during the critical season.
    - Critical season is defined, in Rule 2, as that time of year when water temperatures naturally exceed 22 degrees Celsius for the given AU.
    - Only data above 22 degrees Celsius will be utilized for assessments made using long-term continuous data.

2. Minimum distribution and quantity requirements

- Discrete Data
  - A minimum of 10 samples.
  - Evenly distributed over at least 2 and 3 quarters per year.
- Long-Term Continuous Data
  - Evenly distributed throughout the critical season.
  - Collected at least hourly.

3. Spatial requirements

- None that are not already covered in Phase I requirements.

Temperature – Non-Trout Waters – Lakes and Reservoirs

1. Temporal requirements

- Discrete Data
  - Collected year-round.
- Long-Term Continuous Data
  - Collect during the critical season.
    - Critical season is defined, in Rule 2, as that time of year when water temperatures naturally exceed 22 degrees Celsius for the given AU.
    - Only data above 22 degrees Celsius will be utilized for assessments made using long-term continuous data.

2. Minimum distribution and quantity requirements

- Discrete data
  - A minimum of 10 quarterly samples.
- Long-term Continuous Data
  - Evenly distributed throughout the critical season.
  - Collected at least hourly.

3. Spatial requirements

- Take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

ASSESSMENT METHODOLOGY FOR TEMPERATURE

Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2; however, differing data types (discrete and long-term continuous) will not be combined. Refer to Section 3.11 for information regarding final attainment decisions should both types of data exist for an AU. Temperature assessments can be made using long-term continuous data measured for only one critical season; however, if multiple critical season data sets exist from different years, within the period of record, data sets will be combined. Continuous data will be calculated to hourly average for assessment purposes. Binomial distribution method will be applied for temperature data assessments, per Section 3.6.

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as non-attainment when, using the **10% exceedance rate** within Table 1, greater than or equal to the minimum number of samples allowed for the entire qualifying data set exceed the applicable temperature criteria listed in Rule 2.502 (or site specific in Rule 2's Appendix A). This methodology applies to both discrete and long-term continuous data sets.

DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as support when, using the **10% exceedance rate** within Table 2, no more than the maximum number of samples allowed for the entire qualifying data set exceed the applicable temperature criteria listed in Rule 2.502 (or site specific in Appendix A). This methodology applies to both discrete and long-term continuous data sets.

In some instances, DEQ may use discrete data to delist AUs that were listed using continuous data, and vice versa. However, this will not be the rule, it will be the exception. When this

occurs, justification of use of a different type of data for delisting will be provided within the 305(b) Report as well as submitted with the 303(d) list for public notice, and any supporting documentation will be provided. Justification for this methodology could include limited data availability, inability to acquire the same type of data that was used to list, or other special circumstances.

6.2 TURBIDITY

This section establishes the protocol for assessment of turbidity criteria within Arkansas's surface waters, per APC&EC Rule 2.503:

> *There shall be no distinctly visible increase in turbidity of receiving waters attributable to discharges or instream activities. The values below should not be exceeded during base flow (June to October) in more than 20% of samples. The values below should not be exceeded during storm flows in more than 25% of samples taken in not less than 24 monthly samples.*

Waterbodies	***Base Flow Values (NTU)***	***Storm Flow Values (NTU)***
Streams		
Ozark Highlands	*10*	*17*
Boston Mountains	*10*	*19*
Arkansas River Valley	*21*	*40*
Ouachita Mountains	*10*	*18*
Springwater-influenced Gulf Coastal	*21*	*32*
Typical Gulf Coastal	*21*	*32*
Least-Altered Delta	*45*	*84*
Channel-Altered Delta	*75*	*250*
Arkansas River	*50*	*52*
Mississippi River	*50*	*75*
Red River	*50*	*150*
St. Francis River	*75*	*100*
Trout	*10*	*15*
Lakes and Reservoirs	*25*	*45*

PHASE II DATA QUALITY REQUIREMENTS FOR TURBIDITY

Turbidity assessments can be made with discrete data collected in Nephelometric Turbidity Units (NTU) only. Data collected in Formazin Nephelometric Units (FNU) will be used for screening purposes only.

Turbidity Base Flow – Streams and Rivers

Base flow season is defined, in Rule 2, as June to October (June 1st – September 30th)

1. Temporal requirements
- Collect during base flow season.

2. Minimum distribution and quantity requirements
- A minimum of 10 samples.
- Evenly distributed throughout the base flows season.
- Collected over at least 2 seasons.

3. Spatial requirements
- None that are not already covered in Phase I requirements.

Turbidity Base Flow – Lakes and Reservoirs

Base flow season is defined, in Rule 2, as as June to October (June 1st – September 30th)

1. Temporal requirements
- Collect during base flows season.

2. Minimum distribution and quantity requirements
- A minimum of 5 samples.
- Evenly distributed over at least 3 years.

3. Spatial requirements
- Take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

Turbidity Storm Flow – All Waters

Storm flow season is defined, in Rule 2, as year-round.

1. Temporal requirements
- Collect year-round.

2. Minimum distribution and quantity requirements
- No less than 24 monthly samples are required.

3. Spatial requirements
- For lakes and reservoirs, take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.
- For streams and rivers, none that are not already covered in Phase I requirements.

ASSESSMENT METHODOLOGY FOR TURBIDITY

Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2. If discrete samples from multiple base flow seasons within the period of record exist, they will be combined for assessments. If an AU is assessed as not meeting either the base flow or storm flow values, or both, it may be listed as non-attainment for turbidity. Binomial distribution method will be applied to turbidity data, per Section 3.6.

BASE FLOWS LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as non-attainment when, using the **20% exceedance rate** within Table 1, greater than or equal to the minimum number of samples for the entire qualifying data set from June through September exceed the applicable base flows values listed in APC&EC Rule 2.503.

BASE FLOWS DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as in attainment when, using the **20% exceedance rate** in Table 2, no more than the maximum number of samples allowed for the entire qualifying data set from June through September exceed the applicable base flow values listed in APC&EC Rule 2.503.

STORM FLOWS LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as non-attainment when, using the **25% exceedance rate** within Table 1, greater than or equal to the minimum number of samples for the entire qualifying data set (sample set not to be fewer than 24 data points) exceed the applicable storm flow values listed in APC&EC Rule 2.503.

STORM FLOWS DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as in attainment when, using the **25% exceedance rate** in Table 2, no more than the maximum number of samples allowed for the entire qualifying data set (sample set not to be fewer than 24 data points) exceed the applicable storm flow values listed in APC&EC Rule 2.503.

6.3 PH

This section establishes the protocol for assessment of pH criteria within Arkansas's surface waters, per APC&EC Rule 2.504:

> *pH between 6.0 and 9.0 standard units are the applicable standards for streams.*

PHASE II DATA QUALITY REQUIREMENTS FOR pH

pH assessments can be made using discrete data, short-term continuous data, or long-term continuous data in streams and rivers; and discrete data, short-term continuous data, and long-term continuous data in lakes and reservoirs.

pH – Streams and Rivers

1. Temporal requirements
   - Collected year-round.

2. Minimum distribution and quantity requirements
   - Discrete Data
     - A minimum of 10 samples.
     - Evenly distributed over at least 2 years and 3 quarters per year.
   - Short-term Continuous Data
     - A minimum of 2 diel deployments of at least 48 hours each.
     - Taken at least 2 weeks apart.
     - The 2 diel deployments must be within the same year.
     - Collected at least hourly.
   - Long-term Continuous Data
     - Covers 10 months of a 12-month period.
     - Collected at least hourly.

3. Spatial requirements
   - None that are not already covered in Phase I requirements.

pH – Lakes and Reservoirs

1. Temporal requirements
   - Collected year-round.

2. Minimum distribution and quantity requirements
   - Discrete Data
     - A minimum of 10 quarterly samples.
   - Short-term Continuous Data
     - A minimum of 2 diel deployments of at least 48 hours each.
     - Taken at least 2 weeks apart.
     - The 2 diel deployments must be within the same year.
     - Collected at least hourly.
   - Long-Term Continuous Data
     - Covers 10 of the 12-month period.
     - Collected at least hourly.

3. Spatial requirements

- Take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

ASSESSMENT METHODOLOGY FOR pH

Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2; however, differing data types (discrete, short-term continuous, and long-term continuous) will not be combined. Refer to Section 3.8 for information regarding final attainment decisions should more than one type of data set exist for an AU. Binomial distribution method will be applied to pH data, per Section 3.6.

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as non-attainment when, using the **10% exceedance rate** in Table 1, greater than or equal to the minimum number of samples for the entire qualifying data set exceed the applicable pH criteria listed in APC&EC Rule 2.504. This methodology applies to discrete, short-term continuous, and long-term continuous data.

DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as attainment when, using the **10% exceedance rate** within Table 2, no more than the maximum number of samples allowed for the entire qualifying data set exceed the applicable pH criteria listed in APC&EC Rule 2.504. This methodology applies to discrete, short-term continuous, and long-term continuous data.

In some instances, DEQ may use discrete data to delist AUs that were listed using continuous data, and vice versa. However, this will not be the rule, it will be the exception. When this occurs, justification of use of a different type of data for delisting will be provided within the 305(b) Report as well as submitted with the 303(d) list for public notice, and any supporting documentation will be provided. Justification for this methodology could include limited data availability, inability to acquire the same type of data that was used to list, or other special circumstances.

6.4 DISSOLVED OXYGEN

This section establishes the protocol for assessment of dissolved oxygen criteria within Arkansas's surface waters, per APC&EC Rule 2.505, and any site specific dissolved oxygen criteria within Appendix A of Rule 2:

Rivers and Streams

The following dissolved oxygen standards must be met:

Waterbodies	***Limit (mg/L)***	
Streams	*Primary*	*Critical*
Ozark Highlands		
<10 mi^2 watershed	*6*	*2*
10 to 100 mi^2	*6*	*5*
>100 mi^2 watershed	*6*	*6*
Boston Mountains		
<10 mi^2 watershed	*6*	*2*
>10 mi^2 watershed	*6*	*6*
Arkansas River Valley		
<10 mi^2 watershed	*5*	*2*
10 mi^2 to 150 mi^2	*5*	*3*
151 mi^2 to 400 mi^2	*5*	*4*
>400 mi^2 watershed	*5*	*5*
Ouachita Mountains		
<10 mi^2 watershed	*6*	*2*
>10 mi^2 watershed	*6*	*6*
Typical Gulf Coastal		
<10 mi^2 watershed	*5*	*2*
10 mi^2 to 500 mi^2	*5*	*3*
>500 mi^2 watershed	*5*	*5*
Springwater-influenced Gulf Coastal		
All size watersheds	*6*	*5*
Delta (least-altered and channel altered)		
<10 mi^2 watershed	*5*	*2*
10 mi^2 to 100 mi^2	*5*	*3*
>100 mi^2 watershed	*5*	*5*
Trout Waters		
All size watersheds	*6*	*6*

Lakes and Reservoirs

Specific dissolved oxygen standards for lakes and reservoirs shall be 5 mg/L.

In streams with watersheds of less than 10 mi^2, it is assumed that insufficient water exists to support a fishery during the critical season. During this time, a dissolved oxygen standard of

2 mg/l will apply to prevent nuisance conditions. However, field verification is required in areas suspected of having significant groundwater flows or enduring pools which may support unique aquatic biota. In such waters the critical season standard for the next size category of stream shall apply.

All streams with watersheds of less than 10 mi^2 are expected to support aquatic life during the primary season when stream flows, including discharges, equal or exceed 1 cubic foot per second (cfs). However, when site verification indicates that aquatic life exists at flows below 1 cfs, such aquatic biota will be protected by the primary standard (refer to the State of Arkansas Continuing Planning Process for field verification requirements).

Also, in these streams with watersheds of less than 10 mi^2, where waste discharges are 1 cfs or more, they are assumed to provide sufficient water to support aquatic life and, therefore, must meet the dissolved oxygen standards of the next size category of streams.

PHASE II DATA QUALITY REQUIREMENTS FOR DISSOLVED OXYGEN

Assessments for dissolved oxygen can be made using discrete data, short-term continuous data, or long-term continuous data depending on season. Concurrent temperature data must accompany dissolved oxygen data to be used for assessments.

Dissolved Oxygen – Trout Waters

1. Temporal requirements
   - Discrete data and long-term continuous data
     - Collected year-round.
   - Short-term continuous data
     - Collected during the critical season.

2. Minimum distribution and quantity requirements
   - Discrete data
     - A minimum of 10 discrete sample.
     - Evenly distributed over at least 2 years and 3 quarters per year.
   - Short-term continuous data
     - A minimum of 2 diel deployments of no less than 48 hours each.
     - Taken at least two weeks apart.
     - The two diel deployments must be within the same year.
     - Collected at least hourly.
   - Long-term continuous data
     - Cover 10 months of a 12-month period.
     - Collected at least hourly.

3. Spatial requirements
   - For streams and rivers, none that are not already covered in Phase I requirements.
   - For lakes and reservoirs, samples are to be taken within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

Dissolved Oxygen – Non-Trout Waters
Streams and Rivers – Primary Season

1. Temporal requirements
   - Discrete, short-term, and long-term continuous data
     - Collected during the primary season.
       - "Primary season" is defined as the time of year when water temperatures are less than or equal to 22 degrees Celsius.

2. Minimum distribution and quantity requirements
   - Discrete data
     - A minimum of 10 discrete samples.
     - Evenly distributed over at least 2 primary seasons.
   - Short-term continuous data
     - A minimum of 2 diel deployments of no less than 48 hours each.
     - Taken at least two weeks apart.
     - The 2 diel deployments must be within the same year.
     - Collected at least hourly.
   - Long-term continuous data
     - Evenly distributed throughout the primary season.
     - Collected at least hourly.

3. Spatial requirements
   - None that are not already covered in Phase I requirements.

Dissolved Oxygen – Non-Trout Waters
Streams and Rivers – Critical Season

1. Temporal requirements
   - Discrete, short-term continuous, and long-term continuous data
     - Collected during the critical season.
       - "Critical season" is defined as the time of year when water temperatures are greater than 22 degrees Celsius.

2. Minimum distribution and quantity requirements
   - Discrete data
     - A minimum of 10 discrete samples.
     - Evenly distributed over at 2 seasons.
   - Short-term continuous data
     - A minimum of 2 diel deployments of no less than 48 hours each.
     - Taken at least 2 weeks apart.
     - The 2 diel deployments must be within the same year.
     - Collected at least hourly.
     - At least 90% of the paired temperature for the entire dataset is > 22 ^{o}C.
   - Long-term continuous data
     - Evenly distributed throughout the critical season.
     - Collected at least hourly.
     - At least 90% of the paired temperature for the entire dataset is > 22 ^{o}C.

3. Spatial requirements

- None that are not already covered in Phase I requirements.

Dissolved Oxygen – Non-Trout Waters
Lakes and Reservoirs

1. Temporal requirements

- Discrete, short-term continuous, and long-term continuous data
  - Collected year-round.

2. Minimum distribution and quantity requirements

- Discrete data
  - A minimum of 10 quarterly samples.
- Short-term continuous data
  - A minimum of 2 diel deployments of no less than 48 hours each.
  - The two diel deployments must be within the same year.
  - Collected at least hourly.
- Long-term continuous data
  - Covers 10 months of a 12-month period.
  - Collected at least hourly.

3. Spatial requirements

- Taken within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

ASSESSMENT METHODOLOGY FOR DISSOLVED OXYGEN

Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2; however, differing data types (discrete, short-term continuous, and long-term continuous) will not be combined. Refer to Section 3.8 for information regarding final attainment decisions should more than one type of data set exist for an AU. Concurrent temperature data must accompany dissolved oxygen data for attainment decisions. Binomial distribution method will be applied to all data types of dissolved oxygen data, per Section 3.6. If long term continuous data sets do not meet requirements for long term assessments, they may be used to assess critical season if they meet short term data requirements. Continuous data sets will be calculated into hourly averages.

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as non-attainment when, using the **10% exceedance rate** within Table 1, greater than or equal to the minimum number of samples for the entire qualifying data set fail to meet the minimum applicable dissolved oxygen criteria listed in APC&EC Rule 2.505 (or site specific in Appendix A) for either the primary or critical season, or year-round, as appropriate. This methodology applies to discrete, short-term continuous, and long-term continuous data.

DELISTING METHODOLOGY:

Stream, river, lake, and reservoir AUs may be assessed as attainment when, using the **10% exceedance rate** within Table 2, no more than the maximum number of samples allowed for the entire qualifying data set fail to meet the applicable dissolved oxygen criteria listed in APC&EC

Rule 2.505 (or site specific in Appendix A) for either the primary or critical season, or year-round as appropriate. This methodology applies to discrete, short-term continuous, and long-term continuous data.

In some instances, DEQ may use discrete data to delist AUs that were listed using continuous data, and vice versa. However, this will not be the rule, it will be the exception. When this occurs, justification of use of a different type of data for delisting will be provided within the 305(b) Report as well as submitted with the 303(d) list for public notice, and any supporting documentation will be provided. Justification for this methodology could include limited data availability, inability to acquire the same type of data that was used to list, or other special circumstances.

6.5 RADIOACTIVITY

This section establishes the protocol for assessment of radioactivity criteria within Arkansas's surface waters, per APC&EC Rule 2.506:

> *The Rules for the Control of Sources of Ionizing Radiation of the Division of Radiological Health, Arkansas Department of Health, limits the maximum permissible levels of radiation that may be present in effluents to surface waters in uncontrollable areas. These limits shall apply for the purposes of these standards, except that in no case shall the levels of dissolved radium-226 and strontium-90 exceed 3 and 10 picocuries/liter, respectively, in the receiving water after mixing, nor shall the gross beta concentration exceed 1000 picocuries/liter.*

PHASE II DATA QUALITY REQUIREMENTS FOR RADIOACTIVITY

Assessments for radioactivity will be made using discrete data only.

1. Temporal requirements
   - Collected year-round.

2. Minimum distribution and quantity requirements
   - A minimum of 10 samples unless an assessment of non-attainment can be reached in fewer than 10 samples.
   - For streams and rivers, evenly distributed over at least 2 years and 3 quarters per year; unless an assessment of non-attainment can be reached in fewer than 10 samples.
   - For lakes and reservoirs, 10 quarterly samples over not less than 3 years; unless an assessment of non-attainment can be reached in fewer than 10 samples.

3. Spatial requirements
   - None that are not already covered in Phase I requirements.

ASSESSMENT METHODOLOGY FOR RADIOACTIVITY

Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2.

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as non-attainment when a **single sample within the period of record exceeds** the concentration of 3 picocuries/liter for radium-226, or the concentration of 10 picocuries/liter for strontium-90, or if the gross beta concentration exceeds 1000 picocuries/liter per APC&EC Rule 2.506, even if the minimum of 10 samples has not been reached.

DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as attainment when no **samples in the period of record exceed** the concentration of 3 picocuries/liter for radium-226, or the concentration of 10 picocuries/liter for strontium-90, or if the gross beta concentration does not exceeds 1000 picocuries/liter per APC&EC Rule 2.506. A minimum of 10 samples must be reached to make an assessment of attainment.

6.6 BACTERIA

This section establishes the protocol for assessment of bacteria criteria within Arkansas's surface waters, per APC&EC Rule 2.507:

For the purposes of this rule, all streams with watersheds less than 10 mi^2 shall not be designated for primary contact unless and until site verification indicates that such use is attainable. No mixing zones are allowed for discharges of bacteria.

For assessment of ambient waters as impaired by bacteria, the below listed applicable values for E. coli shall not be exceeded in more than 25% of samples in no less than eight (8) samples taken during the primary contact season or during the secondary contact season.

The following standards are applicable:

Contact Recreation Seasons	***Limit (col/100mL)***			
Primary Contact[1]	*E. coli*		*Fecal Coliform*	
	IS[3]	*GM[4]*	*IS[3]*	*GM[4]*
ERW, ESW, NSW, Reservoirs, Lakes	*298*	*126*	*400*	*200*
All Other Waters	*410*	*NA*	*400*	*200*
Secondary Contact[5]				
ERW, ESW, NSW, Reservoirs, Lakes[2]	*1490*	*630*	*2000*	*1000*
All Other Waters	*2050*	*NA*	*2000*	*1000*

[1] May 1 to September 30
[3] For assessment of Individual Sample Criteria – at least eight (8) data points.
[4] For calculation and assessment of Geometric Mean – calculated on a minimum of five (5) samples spaced evenly and within a thirty (30)-day period.
[5] Year-round.

The Arkansas Department of Health has the responsibility of approving or disapproving surface waters for public water supply and of approving or disapproving the suitability of specifically delineated outdoor bathing places for body contact recreation, and it has issued rules and regulations pertaining to such uses.

PHASE II DATA QUALITY REQUIREMENTS FOR BACTERIA

Bacterial assessments are made with discrete *Escherichia coli* (*E. coli*) data. In the absence of *E. coli* data, discrete fecal coliform data may be utilized.

Bacteria – Primary Contact Season

1. Temporal requirements

- Collected during the primary contact season
  - The primary contact season is defined, in Rule 2, as May 1 to September 30.

2. Minimum distribution and quantity requirements

- Individual Samples

- A minimum of 1 primary contact season.
- A minimum of 8 discrete samples per primary contact season.
- Evenly distributed within the primary contact season.

- Geometric Mean
  - A minimum of 5 samples.
  - Evenly distributed within a 30-day period.

3. Spatial requirements

- Individual Samples
  - None that are not already covered in Phase I requirements.
  - For lakes and reservoirs, samples are to be taken within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.
- Geometric Mean
  - *E. coli* – Applicable for assessments only in ERW, ESW, NSW waters; lakes and reservoirs.
  - Fecal Coliform – Applicable for assessments in all waters.
  - For lakes and reservoirs, samples are to be taken within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

Bacteria – Secondary Contact Season

1. Temporal requirements

- Collected during the secondary contact season.
  - The secondary contact season is defined, in Rule 2, as year-round.

2. Minimum data distribution and quantity requirements

- Individual Samples
  - A minimum of 1 secondary contact season.
  - A minimum of 8 discrete samples per secondary contact season.
  - Evenly distributed within the secondary contact season.
- Geometric Mean
  - A minimum of 5 samples.
  - Evenly distributed within a 30-day period.

3. Spatial requirements

- Individual Samples
  - None that are not already covered in Phase I requirements.
  - For lakes and reservoirs, samples are to be taken within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.
- Geometric Mean
  - *E. coli* - Applicable for assessments only in ERW, ESW, NSW waters; lakes and reservoirs.
  - For lakes and reservoirs, samples are to be taken within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

ASSESSMENT METHODOLOGY FOR BACTERIA

Bacterial assessments are made with discrete *E. coli* data. In the absence of *E. coli* bacteria data, fecal coliform bacteria data may be utilized for assessments. Bacterial assessments are made with

discrete data only. Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2. Data in most probable number (MPN) units will be evaluated for use in assessments of *E. coli*.

Assessments can be made using individual samples or geometric mean (as appropriate per spatial requirements described above). If adequate data sets exist for both single sample and geometric mean assessment (within the same year), both methods will be assessed separately, and the most protective result will be used as the final assessment decision.

The binomial distribution method will not be applied. A straight mathematical 25% exceedance rate will be used to assess attainment (e.g., 2 exceedances in 8 samples equal 25%).

For assessment of ambient waters using bacteria:

- Primary Contact Season
  - Individual Samples - Assessments can be made using data from only one primary contact season within the period of record. However, if complete data sets exist for more than one primary contact season within the period of record, data sets will be combined for assessment. Each primary contact season must contain 8 evenly distributed samples (per Phase II requirements above). Primary contact seasons with fewer than 8 samples will not be combined with data from other primary contact seasons and will not be used for assessment purposes.
  - Geometric Mean - All geometric means calculated for any primary contact season within the period of record will be considered for assessment purposes. All samples within a 30-day period that meet the "evenly spaced" requirement must be used for geometric mean calculation.

- Secondary Contact Season
  - Individual Samples - Assessments can be made using data from only one secondary contact season within the period of record. However, if complete data sets exist for more than one secondary contact season within the period of record, data sets will be combined for assessment. Each secondary season must contain 8 evenly distributed samples (per Phase II requirements above). Secondary contact seasons with fewer than 8 samples will not be combined with data from other secondary contact seasons and will not be used for assessment purposes.
  - Geometric Mean - All geometric means calculated for any secondary contact season within the period of record will be considered for assessment purposes. All samples within a 30-day period that meet the "evenly spaced" requirement must be used for geometric mean calculation. Example: If daily readings exist for a 30-day period, all 30 readings must be used, not just any 5 or more of those readings.

LISTING METHODOLOGY:

Individual Samples

Stream, river, reservoir, and lake AUs may be assessed as non-support when the applicable criteria is exceeded in **greater than 25%** of samples collected during months within the applicable contact season (as described above).

If the assessment of non-support is based on only one season of data, (eight discrete samples within one primary contact season, or within one secondary contact season), the AU may be

placed in Category 3, and more data may be collected for re-assessment in a future assessment cycle.

If the assessment of non-support is based on more than one season of data, the AU will be placed in Category 5, truly impaired.

Geometric Mean

Stream, river, lake and reservoir AUs may be assessed as non-support **when the geometric mean for the applicable contact season is exceeded**. If one or more geometric mean calculations within the season exceed the criteria the AU may be assessed as non-support.

DELISTING METHODOLOGY:

Individual Samples

Stream, river, lake and reservoir AUs may be assessed as support when the applicable criteria is **exceeded in 25% or less** of samples collected during months within the applicable contact season (as described above). This assessment result will apply for single season and multi-season assessments.

Geometric Mean

Stream, river, lake and reservoir AUs may be assessed as support **when the geometric mean for the applicable contact season is not exceeded**. If more than one geometric mean calculation exists, all must not exceed the criteria.

Table 8: Statewide bacteria assessment criteria.

	Escherichia coli	CRITERIA	SUPPORT	NON-SUPPORT
PRIMARY CONTACT	ERW, ESW, and NSW Waters	GM 126 col/100 mL*	≤ criteria	> criteria
	Lakes, Reservoirs	298 col/100 mL (May-Sept)	≤ 25% exceedance	>25% exceedance
	All other waters	410 col/100 mL (May-Sept)	≤ 25% exceedance	>25% exceedance
SECONDARY CONTACT	ERW, ESW, and NSW Waters	GM 630 col/100 mL*	≤ criteria	> criteria
	Lakes, Reservoirs	1490 col/100 mL (Oct. - April)	≤ 25% exceedance	>25% exceedance
	All other waters	2050 col/100 mL (Oct. - April)	≤ 25% exceedance	>25% exceedance

ERW: Extraordinary Resource Water, **NSW**: Natural and Scenic Waterway, **ESW**: Ecologically Sensitive Water

*Geometric mean can be calculated for any 30-day period within a season (primary contact season May 1 to September 30; secondary season year-round).

6.7 TOXIC SUBSTANCES

This section establishes the protocol for assessment of toxic substances criteria within Arkansas's surface waters, per APC&EC Rule 2.508:

> *Toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant or aquatic life or to interfere with the normal propagation, growth and survival of the indigenous aquatic biota. For non-permit issues and as a guideline for evaluating toxic substances not listed in the following tables, the Division may consider No Observed Effect Concentrations or other literature values as appropriate. For the substances listed below, the following standards shall apply:*

ALL WATERBODIES - AQUATIC LIFE CRITERIA

Substance	***Acute Values (µg/L)***	***Chronic Values (µg/L) (24-hr Average)***
PCBs		*0.0140*
Aldrin	*3.0*	
Dieldrin	*2.5*	*0.0019*
DDT (& metabolites)	*1.1*	*0.0010*
*Endrin**	*0.18*	*0.0023*
Toxaphene	*0.73*	*0.0002*
Chlordane	*2.4*	*0.0043*
*Endosulfan**	*0.22*	*0.056*
Heptachlor	*0.52*	*0.0038*
*Hexachlorocyclohexane**	*2.0*	*0.080*
Pentachlorophenol	$e^{[1.005(pH)-4.869]}$	$e^{[1.005(pH)-5.134]}$
Chlorpyrifos	*0.083*	*0.041*

** Total of all isomers*

*DISSOLVED METALS**

	Acute Criteria (CMC) - µg/L(ppb)		***Chronic Criteria (CCC) - µg/L(ppb)***	
Substance	***Formula X***	***Conversion***	***Formula X***	***Conversion***
Cadmium	$e^{[1.128(\ln hardness)]-3.828}$	*(a)*	$e^{[0.7852(\ln hardness)]-3.490}$	*(c)*
Chromium(III)	$e^{[0.819(\ln hardness)]+3.688}$	*0.316*	$e^{[0.8190(\ln hardness)]+1.561}$	*0.860*
Chromium (VI)	*16*	*0.982*	*11*	*0.962*
Copper	$e^{[0.9422(\ln hardness)]-1.464}$	*0.960*	$e^{[0.8545(\ln hardness)]-1.465}$	*0.960*
Lead	$e^{[1.273(\ln hardness)]-1.460}$	*(b)*	$e^{[1.273(\ln hardness)]-4.705}$	*(b)*
Mercury	*2.4*	*0.85*	*0.012***	*NONE*
Nickel	$e^{[0.8460(\ln hardness)]+3.3612}$	*0.998*	$e^{[0.8460(\ln hardness)]+1.1645}$	*0.997*
*Selenium***	*20*	*NONE*	*5*	*NONE*
Silver	$e^{[1.72(\ln hardness)]-6.52}$	*0.85*	----------	*NONE*
Zinc	$e^{[0.8473(\ln hardness)]+0.8604}$	*0.978*	$e^{[0.8473(\ln hardness)]+0.7614}$	*0.986*
*Cyanide***	*22.36*	*NONE*	*5.2*	*NONE*

**These values may be adjusted by a site specific Water Effects Ratio (WER) as defined in 40 CFR Part 131.36 (c).*

(a) Calculated as: 1.136672 - [(ln hardness)(0.041838)]

(b) Calculated as: 1.46203 - [(ln hardness)(0.145712)]

(c) Calculated as: 1.101672 - [(ln hardness)(0.041838)]

***Expressed as total recoverable.*

Mercury based on bioaccumulation of residues in aquatic organisms, rather than toxicity.

ALL WATERBODIES - HUMAN HEALTH CRITERIA

Substance	***Criteria (ng/L)****
Dioxin (2,3,7,8 TCDD)	*0.001*
Chlordane	*5.0*
PCBs (polychlorinated biphenyls)	*0.4*
alpha Hexachlorocyclohexane	*37.3*
Beryllium	*4000***
Dieldrin	*1.2*
Toxaphene	*6.3*

**Criteria based on a lifetime risk factor of 10^{-5}.*

***4000 ng/l is also represented as 4.0 ug/l, which is the Maximum contaminant level (MCL) under the EPA Safe Drinking Water Act [40 U.S.C. s/s 300f et seq. (1974)]*

PHASE II DATA QUALITY REQUIREMENTS FOR TOXICS

Only discrete data will be used to make attainment decisions regarding toxicity. Concurrent instream hardness data must accompany metals data for metals toxicity attainment decisions.

Toxics – Streams and Rivers

1. Temporal requirements
   - Collected year-round.

2. Data distribution and quantity requirements
   - A minimum of 10 samples unless an assessment of non-attainment can be reached in fewer than 10 samples.
   - Evenly distributed over at least 2 years and 3 quarters per year; unless an assessment of non-attainment can be reached in fewer than 10 samples.

3. Spatial requirements
   - None that are not already covered in Phase I requirements.

Toxics – Lakes and Reservoirs

1. Temporal requirements
   - Collect toxics data quarterly, at a minimum.

2. Minimum distribution and quantity requirements
   - A minimum of 10 quarterly samples unless an assessment of non-attainment can be reached in fewer than 10 samples.

3. Spatial requirements
   - Take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

ASSESSMENT METHODOLOGY FOR TOXIC SUBSTANCES

Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2. Metals toxicity will be evaluated based on instream hardness values at the time of sample collection. If the ambient hardness value is less than 25 mg/L, then a hardness value of 25 mg/L will be used to calculate metals toxicity.

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as non-support when **more than one (>1) exceedance** of the criterion, per APC&EC Rule 2.508, occurs during the period of record, even if the minimum of 10 samples has not been reached.

DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as support when there are **one or fewer (≤ 1) exceedances** of the criterion, per APC&EC Rule 2.508, during the period of record. A minimum of 10 samples must be reached to make an assessment of attainment.

6.8 FISH CONSUMPTION

This section establishes the protocol for determining attainment of fish consumption within Arkansas's surface waters.

ASSESSMENT METHODOLOGY FOR FISH CONSUMPTION

Fish consumption listings are based on fish consumption advisories issued by the Epidemiology Branch at Arkansas Department of Health.

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs will be listed as non-support for fish consumption if a primary segment of the fish community (e.g., all predators or all largemouth bass) **has restrictions for any group of people** (e.g., general population or high risk groups).

DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs will be listed as support if there **are no fish consumption restrictions or only a *limited consumption*** of fish is recommended (e.g., no more than 2 meals per month or no consumption of fish over 15 inches).

6.9 NUTRIENTS

This section establishes the protocol for assessment of nutrients within Arkansas's surface water, per APC&EC Rule 2.509:

> *(A) 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. Impairment of a waterbody from excess nutrients is dependent on the natural waterbody characteristics such as stream flow, residence time, stream slope, substrate type, canopy, riparian vegetation, primary use of waterbody, season of the year and ecoregion water chemistry. 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 values, dissolved oxygen saturation, diurnal dissolved oxygen fluctuations, pH values, aquatic-life community structure and possibly others. However, when excess nutrients result in an impairment, based upon Department assessment methodology, by any Arkansas established numeric water quality standard, the waterbody will be determined to be impaired by nutrients.*
>
> (*B)Site Specific Nutrient Standards*

Lake	*Chlorophyll a (ug/L)***	*Secchi Transparency (m)****
*Beaver Lake**	*8*	*1.1*

> **These standards are for measurement at the Hickory Creek site over the old thalweg, below the confluence of War Eagle Creek and the White River in Beaver Lake.*
> ***Growing season geometric mean (May - October)*
> ****Annual Average*

SCREENING REQUIREMENTS FOR NUTRIENTS

Discrete data will be used to screen total nitrogen (TN) and total phosphorus (TP). TN and TP data will be screened per ecoregion using the 75th percentile of TN and TP for the appropriate period of record. The 75th percentile should be calculated from all available TN/TP data that meet Phase I requirements. Combine fractions of TN/TP only if they were collected on the same day from the same AU.

Data in each assessment unit for comparison against ecoregion values must meet the following initial screening requirements:

Nutrient Screening – Wadeable Streams and Rivers

1. Temporal requirements
   - Collected year-round.
2. Data distribution and quantity requirements
   - A minimum of 10 samples.
   - Evenly distributed over at least 1 year.
3. Spatial requirements
   - None that are not already covered in Phase I requirements.

Arithmetic mean TN and TP concentrations for each AU will be compared to the 75th percentile screening values for the appropriate ecoregion and evaluated according to Figure 1.

PHASE II DATA QUALITY REQUIREMENTS FOR NUTRIENTS

Continuous and biological data requirements must be met for full nutrient assessment of impairment. Nutrient screenings will be made by calculating the average concentration of each site for the POR, which will be compared to the 75th percentile for that ecoregion. For purposes of nutrient assessment, a "year" is defined as a 12-month period.

Nutrients – Wadeable Streams and Rivers

1. Temporal requirements:

- Short-term and long-term continuous pH or DO data
  - Collected within the critical season.
    - Critical season is defined, in Rule 2, as that time of year when water temperatures naturally exceed 22 degrees Celsius for the given AU.
  - Paired with TN/TP data.
- Biological communities
  - Fish communities must be collected during the same critical season as the continuous data.
  - Macroinvertebrate communities must be collected during the same year as fish collections, during either fall or spring base flow conditions.

2. Minimum distribution and quantity requirements

- Short-term continuous data
  - A minimum of 2 diel deployments of at least 48 hours each.
  - Taken at least 2 weeks apart.
  - The 2- diel deployments must be within the same year.
  - Collected at least hourly.
- Long-term continuous data
  - Evenly distributed throughout the critical season.
  - Collected at least hourly.
- Biological communities
  - A minimum of 1 fish community or 1 macroinvertebrate community data set per year.

3. Spatial and other requirements

- Short-term and long-term continuous pH or DO data
  - None that are not already covered in Phase 1 requirements.
- Biological communities
  - Collected in representative habitats of the AU.

Nutrients – Beaver Lake

1. Temporal requirements

- Secchi disk transparency
  - Collected year-round.
- Chlorophyll *a*
  - Collected during the growing season.
    - Growing season is defined as May – October per Rule 2.509(B).

2. Minimum distribution and quantity requirements

- Secchi disk transparency
  - A minimum of 10 samples.
  - Evenly distributed over 12 calendar months to calculate an annual average.
- Chlorophyll *a*
  - A minimum of 5 samples.
  - Evenly distributed throughout the growing season.
    - Growing season is defined as May – October per Rule 2.509(B).

3. Spatial requirements

- Secchi disk transparency and Chlorophyll *a*.
  - All data shall be collected at the Hickory Creek site over the old thalweg, below the confluence of War Eagle Creek and the White River in Beaver Lake.
- Chlorophyll *a* sample depth shall not exceed 2 meters.

ASSESSMENT METHODOLOGY FOR NUTRIENTS

Assessment methodologies for nutrients have only been developed for, and only apply to, wadeable streams and Beaver Lake. Methodologies for wadeable streams were developed defining "wadeable" as fourth order streams and smaller using Strahler stream order (Strahler 1952). Site verification and best professional judgement was used to classify an AU as wadeable.

Nutrient assessment relies on "paired data". This means that physical, chemical, and biological data must be collected within the same year or season. Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2; however, differing data types (discrete, short-term continuous, and long-term continuous) will not be combined.

Beaver Lake Secchi disk readings and growing season chlorophyll *a* concentrations will be assessed per calendar year. If multiple chlorophyll *a* samples exist on the same day, at the same depths, the most protective sample at each depth will be used for assessments.

LISTING METHODOLOGY FOR WADEABLE STREAMS:

Wadeable stream and river AUs will be listed as non-support for nutrients when the following conditions occur:

- The mean TP or TN concentration of the AU is greater than the 75th percentile of the TN or TP within an ecoregion, **and**
- When either the short-term or long-term data sets indicate at least pH or dissolved oxygen are exceeded (as per methodologies in Sections 6.3 and 6.4), **and**
- At least one biological community is evaluated as impaired.

Any wadeable stream or river segment that exceeds screening level criteria, but lacks adequate data to assess may be placed into Category 3b, Insufficient Data. Category 3 streams may be prioritized based on the magnitude of nutrient concentration, available data, and staff resources.

DELISTING METHODOLOGY FOR WADEABLE STREAMS:

- The mean TP or TN concentration of the AU is less than the 75th percentile of the TP or TN data from wadeable stream and river AUs within an ecoregion, **and**
- When neither the short-term or long-term datasets indicate pH or dissolved oxygen are not exceeded (as per methodologies in 6.3 and 6.4), **and**

- Biological communities used to make the listing are evaluated as unimpaired.

LISTING METHODOLOGY FOR BEAVER LAKE:

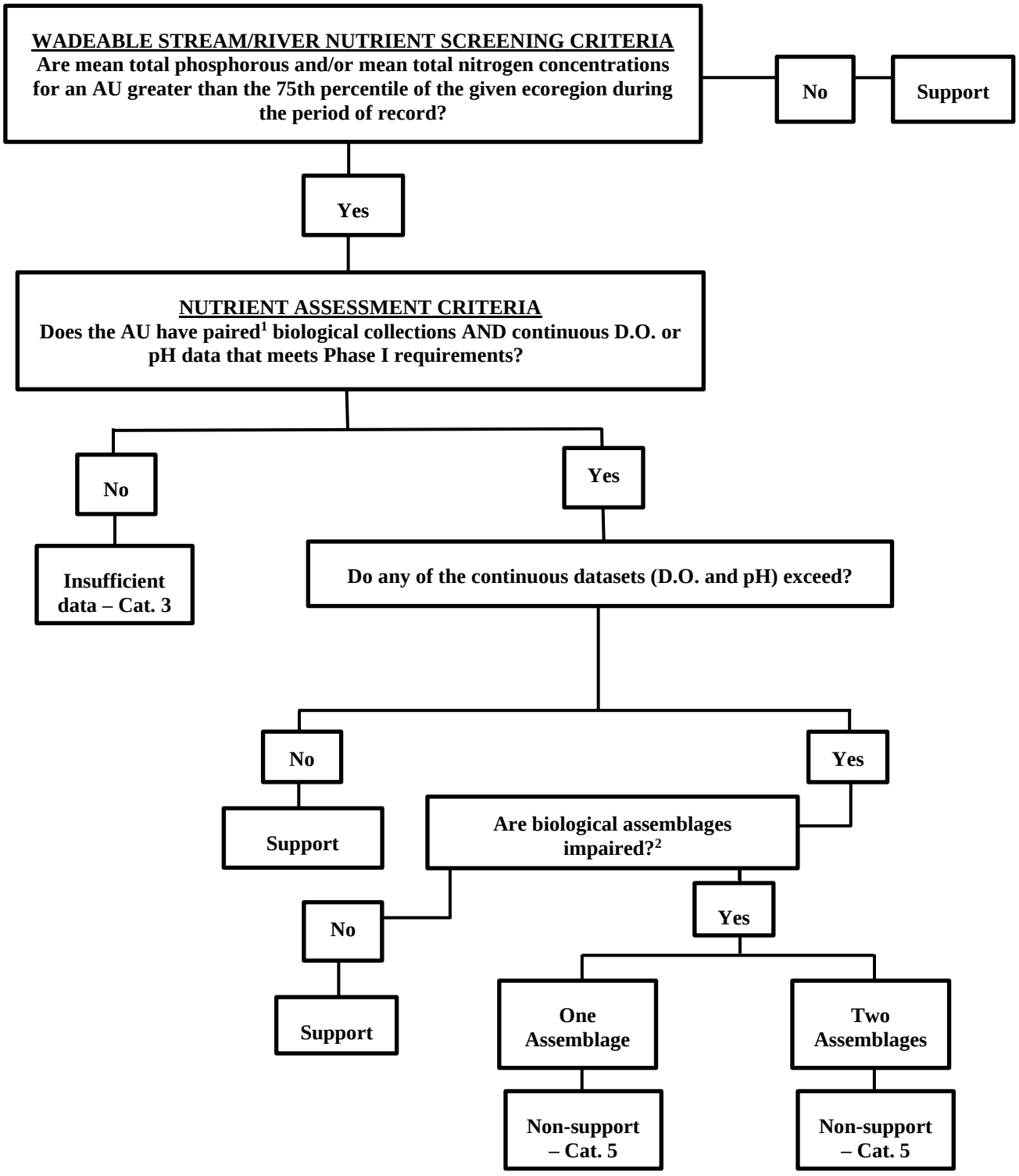
The Hickory Creek AU of Beaver Lake may be listed as non-support of its domestic water supply designated use when there are **three or more (≥3) geometric mean exceedances** of the chlorophyll *a* criteria within the five-year period of record.

The Hickory Creek AU of Beaver Lake may be listed as non-support of its domestic water supply designated use when there are **three or more (≥3) annual average exceedances** of the Secchi transparency criteria within the five-year period of record.

DELISTING METHODOLOGY FOR BEAVER LAKE:

The Hickory Creek AU of Beaver Lake may be listed as supporting its domestic water supply designated use when there **are no more than two (<=2) geometric mean exceedances of the chlorophyll *a* criteria *and* no more than two (<=2) annual averages exceedances** of the Secchi transparency criteria within the five-year period of record.

Figure 1: Nutrient assessment flowchart for wadeable streams and rivers



[1]Paired data/collections are defined as combined physical, chemical, and biological collections within the same calendar year and/or season.

[2]Section 5.0 discusses the determining factors for biological impairment.

6.10 SITE SPECIFIC MINERAL QUALITY

This section establishes the protocol for assessment of site specific mineral criteria within Arkansas's waters, per APC&EC Rule 2.511 (A):

> *(A) Site Specific Mineral Quality Criteria*
>
> *Mineral quality shall not be altered by municipal, industrial, other waste discharges or instream activities so as to interfere with designated uses. The following criteria apply to the streams indicated.*

PHASE II DATA QUALITY REQUIREMENTS FOR MINERALS

Minerals data (chloride, sulfates, total dissolved solids (TDS)) will be used to assess site specific minerals. Only discrete data will be used.

Site Specific Minerals – Streams and Rivers

1. Temporal requirements
   - Collected year-round.
2. Minimum distribution and quantity requirements
   - A minimum of 10 samples.
   - Evenly distributed over at least 2 years and 3 quarters per year.
3. Spatial requirements
   - None that are not already covered in Phase I requirements.

Site Specific Minerals – Lakes and Reservoirs

1. Temporal requirements
   - Collected year-round.
2. Minimum distribution and quantity requirements
   - A minimum of 10 quarterly samples.
3. Spatial requirements
   - Take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters

ASSESSMENT METHODOLOGY FOR SITE SPECIFIC MINERAL QUALITY

Waters with site specific mineral criteria are assessed according to site specific values for chlorides, sulfates, and/or TDS listed in APC&EC Rule 2.511(A). Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2. Binomial distribution method will be applied to site specific mineral data, per Section 3.6.

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs with site specific mineral criteria may be assessed as non-support when, using the **25% exceedance rate** within Table 1, greater than or equal to the minimum number of samples for the entire qualifying data set exceed the applicable site specific mineral criteria listed in APC&EC Rule 2.511(A).

DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs with site specific mineral criteria may be assessed as support when, using the **25% exceedance rate** within Table 2, no more than the maximum number of samples allowed for the entire qualifying data set exceed the applicable site specific mineral criteria listed in APC&EC Rule 2.511(A).

6.11 NON-SITE SPECIFIC MINERAL QUALITY; AND DOMESTIC, AGRICULTURAL, AND INDUSTRIAL WATER SUPPLY USES

This section establishes the protocol for assessment of non-site specific mineral quality criteria and domestic water supply designated uses within Arkansas's surface waters, per APC&EC Rule 2.511(C):

> *(C) Domestic Water Supply Criteria*
>
> *In no case shall discharges cause concentrations in any waterbody to exceed 250, 250 and 500 mg/L of chlorides, sulfates and total dissolved solids, respectively, or cause concentrations to exceed the applicable criteria, except in accordance with Rules 2.306 and 2.308.*

This section is written in accordance with the Federal Safe Drinking Water Act (40 § C.F.R 143.3) and also establishes the protocol for assessing impairment due to exceedance of limits for agricultural and industrial water supplies.

PHASE II DATA QUALITY REQUIREMENTS FOR NON-SITE SPECIFIC MINERAL QUALITY; AND DOMESTIC, AGRICULTURAL, AND INDUSTRIAL WATER SUPPLY USES

Minerals data (chloride, sulfates, TDS) will be used to assess non-site specific minerals quality as well as Domestic, Agricultural, and Industrial Water Supply Uses. Only discrete data will be used.

Non-Site Specific Minerals – Streams and Rivers

1. Temporal requirements
   - Collected year-round.
2. Minimum distribution and quantity requirements
   - A minimum of 10 samples.
   - Evenly distributed over at least 2 years and 3 quarters per year.
3. Spatial requirements
   - None that are not already covered in Phase I requirements.

Non-Site Specific Minerals – Lakes and Reservoirs

1. Temporal requirements
   - Collected year-round.
2. Minimum distribution and quantity requirements
   - A minimum of 10 quarterly samples.
3. Spatial requirements
   - Take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

ASSESSMENT METHODOLOGY FOR NON-SITE SPECIFIC MINERALS QUALITY; AND DOMESTIC, AGRICULTURAL, AND INDUSTRIAL WATER SUPPLY USE

Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2. Binomial distribution method will be applied to non-site specific mineral data, as per Section 3.6.

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as non-support when, using the **10% exceedance rate** within Table 1, greater than or equal to the minimum number of samples for the entire qualifying data set exceed the applicable mineral criteria listed in APC&EC Rule 2.511(C).

DELISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be assessed as support when, using the **10% exceedance rate** within Table 2, no more than the maximum number of samples allowed for the entire qualifying data set exceed the applicable mineral criteria listed in APC&EC Rule 2.511(C).

6.12 AMMONIA

This section establishes the protocol for assessment of ammonia criteria in Arkansas's surface waters, per APC&EC Rule 2.512:

> *The total ammonia nitrogen (N) criteria and the frequency of occurrence are as follows:*
>
> *(A) The one-hour average concentration of total ammonia nitrogen shall not exceed, more than once every three years on the average, the acute criterion as shown in the following table:*

pH-Dependent Values of the CMC (Acute Criterion) - mg/L

pH	*Salmonids* Present*	*Salmonids Absent*
6.5	*32.6*	*48.8*
6.6	*31.3*	*46.8*
6.7	*29.8*	*44.6*
6.8	*28.1*	*42.0*
6.9	*26.2*	*39.1*
7.0	*24.1*	*36.1*
7.1	*22.0*	*32.8*
7.2	*19.7*	*29.5*
7.3	*17.5*	*26.2*
7.4	*15.4*	*23.0*
7.5	*13.3*	*19.9*
7.6	*11.4*	*17.0*
7.7	*9.65*	*14.4*
7.8	*8.11*	*12.1*
7.9	*6.77*	*10.1*
8.0	*5.62*	*8.40*
8.1	*4.64*	*6.95*
8.2	*3.83*	*5.72*
8.3	*3.15*	*4.71*
8.4	*2.59*	*3.88*
8.5	*2.14*	*3.20*
8.6	*1.77*	*2.65*
8.7	*1.47*	*2.20*
8.8	*1.23*	*1.84*
8.9	*1.04*	*1.56*
9.0	*0.885*	*1.32*

**Family of fishes, which includes trout.*

(B) The monthly average concentration of total ammonia nitrogen shall not exceed those values shown as the chronic criterion in the following tables:

Temperature and pH-Dependent Values of the CCC (Chronic Criterion)

for Fish Early Life Stages Present – mg/L

	Temperature °C									
pH	***0***	***14***	***16***	***18***	***20***	***22***	***24***	***26***	***28***	***30***
6.5	*6.67*	*6.67*	*6.06*	*5.33*	*4.68*	*4.12*	*3.62*	*3.18*	*2.80*	*2.46*
6.6	*6.57*	*6.57*	*5.97*	*5.25*	*4.61*	*4.05*	*3.56*	*3.13*	*2.75*	*2.42*
6.7	*6.44*	*6.44*	*5.86*	*5.15*	*4.52*	*3.98*	*3.50*	*3.07*	*2.70*	*2.37*
6.8	*6.29*	*6.29*	*5.72*	*5.03*	*4.42*	*3.89*	*3.42*	*3.00*	*2.64*	*2.32*
6.9	*6.12*	*6.12*	*5.56*	*4.89*	*4.30*	*3.78*	*3.32*	*2.92*	*2.57*	*2.25*
7.0	*5.91*	*5.91*	*5.37*	*4.72*	*4.15*	*3.65*	*3.21*	*2.82*	*2.48*	*2.18*
7.1	*5.67*	*5.67*	*5.15*	*4.53*	*3.98*	*3.50*	*3.08*	*2.70*	*2.38*	*2.09*
7.2	*5.39*	*5.39*	*4.90*	*4.31*	*3.78*	*3.33*	*2.92*	*2.57*	*2.26*	*1.99*
7.3	*5.08*	*5.08*	*4.61*	*4.06*	*3.57*	*3.13*	*2.76*	*2.42*	*2.13*	*1.87*
7.4	*4.73*	*4.73*	*4.30*	*3.78*	*3.32*	*2.92*	*2.57*	*2.26*	*1.98*	*1.74*
7.5	*4.36*	*4.36*	*3.97*	*3.49*	*3.06*	*2.69*	*2.37*	*2.08*	*1.83*	*1.61*
7.6	*3.98*	*3.98*	*3.61*	*3.18*	*2.79*	*2.45*	*2.16*	*1.90*	*1.67*	*1.47*
7.7	*3.58*	*3.58*	*3.25*	*2.86*	*2.51*	*2.21*	*1.94*	*1.71*	*1.50*	*1.32*
7.8	*3.18*	*3.18*	*2.89*	*2.54*	*2.23*	*1.96*	*1.73*	*1.52*	*1.33*	*1.17*
7.9	*2.80*	*2.80*	*2.54*	*2.24*	*1.96*	*1.73*	*1.52*	*1.33*	*1.17*	*1.03*
8.0	*2.43*	*2.43*	*2.21*	*1.94*	*1.71*	*1.50*	*1.32*	*1.16*	*1.02*	*0.897*
8.1	*2.10*	*2.10*	*1.91*	*1.68*	*1.47*	*1.29*	*1.14*	*1.00*	*0.879*	*0.773*
8.2	*1.79*	*1.79*	*1.63*	*1.43*	*1.26*	*1.11*	*0.973*	*0.855*	*0.752*	*0.661*
8.3	*1.52*	*1.52*	*1.39*	*1.22*	*1.07*	*0.941*	*0.827*	*0.727*	*0.639*	*0.562*
8.4	*1.29*	*1.29*	*1.17*	*1.03*	*0.906*	*0.796*	*0.700*	*0.615*	*0.541*	*0.475*
8.5	*1.09*	*1.09*	*0.990*	*0.870*	*0.765*	*0.672*	*0.591*	*0.520*	*0.457*	*0.401*
8.6	*0.920*	*0.920*	*0.836*	*0.735*	*0.646*	*0.568*	*0.499*	*0.439*	*0.386*	*0.339*
8.7	*0.778*	*0.778*	*0.707*	*0.622*	*0.547*	*0.480*	*0.422*	*0.371*	*0.326*	*0.287*
8.8	*0.661*	*0.661*	*0.601*	*0.528*	*0.464*	*0.408*	*0.359*	*0.315*	*0.277*	*0.244*
8.9	*0.565*	*0.565*	*0.513*	*0.451*	*0.397*	*0.349*	*0.306*	*0.269*	*0.237*	*0.208*
9.0	*0.486*	*0.486*	*0.442*	*0.389*	*0.342*	*0.300*	*0.264*	*0.232*	*0.204*	*0.179*

Temperature and pH-Dependent Values of the CCC (Chronic Criterion)

for Fish Early Life Stages Absent – mg/L

Temperature °C

pH	***0-7***	***8***	***9***	***10***	***11***	***12***	***13***	***14***	***15****	***16****
6.5	*10.8*	*10.1*	*9.51*	*8.92*	*8.36*	*7.84*	*7.35*	*6.89*	*6.46*	*6.06*
6.6	*10.7*	*9.99*	*9.37*	*8.79*	*8.24*	*7.72*	*7.24*	*6.79*	*6.36*	*5.97*
6.7	*10.5*	*9.81*	*9.20*	*8.62*	*8.08*	*7.58*	*7.11*	*6.66*	*6.25*	*5.86*
6.8	*10.2*	*9.58*	*8.98*	*8.42*	*7.90*	*7.40*	*6.94*	*6.51*	*6.10*	*5.72*
6.9	*9.93*	*9.31*	*8.73*	*8.19*	*7.68*	*7.20*	*6.75*	*6.33*	*5.93*	*5.56*
7.0	*9.60*	*9.00*	*8.43*	*7.91*	*7.41*	*6.95*	*6.52*	*6.11*	*5.73*	*5.37*
7.1	*9.20*	*8.63*	*8.09*	*7.58*	*7.11*	*6.67*	*6.25*	*5.86*	*5.49*	*5.15*
7.2	*8.75*	*8.20*	*7.69*	*7.21*	*6.76*	*6.34*	*5.94*	*5.57*	*5.22*	*4.90*
7.3	*8.24*	*7.73*	*7.25*	*6.79*	*6.37*	*5.97*	*5.60*	*5.25*	*4.92*	*4.61*
7.4	*7.69*	*7.21*	*6.76*	*6.33*	*5.94*	*5.57*	*5.22*	*4.89*	*4.59*	*4.30*
7.5	*7.09*	*6.64*	*6.23*	*5.84*	*5.48*	*5.13*	*4.81*	*4.51*	*4.23*	*3.97*
7.6	*6.46*	*6.05*	*5.67*	*5.32*	*4.99*	*4.68*	*4.38*	*4.11*	*3.85*	*3.61*
7.7	*5.81*	*5.45*	*5.11*	*4.79*	*4.49*	*4.21*	*3.95*	*3.70*	*3.47*	*3.25*
7.8	*5.17*	*4.84*	*4.54*	*4.26*	*3.99*	*3.74*	*3.51*	*3.29*	*3.09*	*2.89*
7.9	*4.54*	*4.26*	*3.99*	*3.74*	*3.51*	*3.29*	*3.09*	*2.89*	*2.71*	*2.54*
8.0	*3.95*	*3.70*	*3.47*	*3.26*	*3.05*	*2.86*	*2.68*	*2.52*	*2.36*	*2.21*
8.1	*3.41*	*3.19*	*2.99*	*2.81*	*2.63*	*2.47*	*2.31*	*2.17*	*2.03*	*1.91*
8.2	*2.91*	*2.73*	*2.56*	*2.40*	*2.25*	*2.11*	*1.98*	*1.85*	*1.74*	*1.63*
8.3	*2.47*	*2.32*	*2.18*	*2.04*	*1.91*	*1.79*	*1.68*	*1.58*	*1.48*	*1.39*
8.4	*2.09*	*1.96*	*1.84*	*1.73*	*1.62*	*1.52*	*1.42*	*1.33*	*1.25*	*1.17*
8.5	*1.77*	*1.66*	*1.55*	*1.46*	*1.37*	*1.28*	*1.20*	*1.13*	*1.06*	*0.990*
8.6	*1.49*	*1.40*	*1.31*	*1.23*	*1.15*	*1.08*	*1.01*	*0.951*	*0.892*	*0.836*
8.7	*1.26*	*1.18*	*1.11*	*1.04*	*0.976*	*0.915*	*0.858*	*0.805*	*0.754*	*0.707*
8.8	*1.07*	*1.01*	*0.944*	*0.885*	*0.829*	*0.778*	*0.729*	*0.684*	*0.641*	*0.601*
8.9	*0.917*	*0.860*	*0.806*	*0.756*	*0.709*	*0.664*	*0.623*	*0.584*	*0.548*	*0.513*
9.0	*0.790*	*0.740*	*0.694*	*0.651*	*0.610*	*0.572*	*0.536*	*0.503*	*0.471*	*0.442*

**At 15 °C and above, the criterion for fish Early Life Stage absent is the same as the criterion for fish Early Life Stage present.*

(C) The highest four-day average within a 30-day period should not exceed 2.5 times the chronic values shown above.

(D) Temperature values used will be 14 °C when fish early life stages are absent and the ecoregion temperature standard for the season when fish early life stages are present. The pH values will be the ecoregion mean value from least-disturbed stream data.

PHASE II DATA QUALITY REQUIREMENTS FOR AMMONIA:

Only discrete data will be used for ammonia assessments. Total ammonia – nitrogen samples must be paired with concurrently measured *in situ* pH and temperature data, as applicable.

Ammonia - Acute Exposure

1. Temporal requirements
   - Collected year-round.

2. Minimum distribution and quantity requirements
   - A minimum of 10 samples; unless an assessment of non-attainment can be reached in fewer than 10 samples.
   - For streams and rivers:
     - Evenly distributed over at least 2 years and 3 quarters; unless an assessment of non-attainment can be reached in fewer than 10 samples.
   - For lakes and reservoirs:
     - A minimum of 10 quarterly samples; unless an assessment of non-attainment can be reached in fewer than 10 samples.

3. Spatial requirements
   - For streams and rivers – none that are not already covered in Phase I requirements.
   - For lakes and reservoirs – take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

Ammonia - Chronic Exposure
Fish Early Life Stages Present

1. Temporal requirements
   - Collected when early life stage fishes are present.
     - The months used in assessment are April through October, except on the trout water segment of the Little Red River, which is year-round.

2. Minimum distribution and quantity requirements
   - A minimum of 10 samples unless an assessment of non-attainment can be reached in fewer than 10 samples.
   - For streams and rivers – evenly distributed over at least 2 years and 3 seasons; unless non – attainment can be reached in fewer than 10 samples.
   - For lakes and reservoirs – a minimum of 10 quarterly samples unless non-attainment can be reached in fewer than 10 samples.

3. Spatial requirements
   - For streams and rivers – none that are not already covered in Phase I requirements.
   - For lakes and reservoirs – take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

Ammonia - Chronic Exposure
Fish Early Life Stages Absent

1. Temporal requirements

- Collected when early life stage fishes are absent.
  - The months used in assessment are November through March, except on the trout water segment of the Little Red River, which is year-round.

2. Minimum distribution and quantity requirements

- A minimum of 10 samples unless an assessment of non-attainment can be reached in fewer than 10 samples.
- For streams and rivers – evenly distributed over at least 2 years and 3 seasons; unless non – attainment can be reached in fewer than 10 samples.
- For lakes and reservoirs – a minimum of 10 quarterly samples unless non-attainment can be reached in fewer than 10 samples.

3. Spatial requirements

- For streams and rivers, none that are not already covered in Phase I requirements.
- For lakes and reservoirs, take samples within the epilimnion (if present). Sample depth shall be between 0.33 and 2.0 meters.

ASSESSMENT METHODOLOGY FOR AMMONIA:

Like data sets (e.g., discrete and discrete) from various sources may be combined into an aggregate data set as per Section 3.3.2. Total ammonia nitrogen will be evaluated based on concurrently measured instream pH and temperature, as applicable, at the time of sample collection using APC&EC Rule 2.512(A)–(C) criteria. The Chronic Criterion for fish early life stages present (Rule 2.512(B)) apply when early life stage fishes are present in rivers and streams, or within the epilimnion of lakes and reservoirs

LISTING METHODOLOGY:

Stream, river, lake and reservoir AUs may be listed as non-support for ammonia toxicity if any one of the following criteria are violated:

For Rule 2.512(A) Acute Criterion - If **more than one (>1) violation** of the 1-hour average concentration of total ammonia nitrogen exceeds the calculated acute criterion within the 3-year period of record, even if the minimum of 10 samples has not been reached.

For Rule 2.512(B) Chronic Criterion – If the **monthly average concentration of total ammonia nitrogen exceeds** the chronic criterion, even if the minimum of 10 samples has not been reached. This method can only be applied if there are **at least 5 samples** per month. This applies regardless if fish early life stages are present or absent.

OR

– If the **highest 4-day average within a 30-day period exceeds 2.5 times** the chronic criterion, even if the minimum of 10 samples has not been reached. This method can also apply to individual samples if there are **less than 5 samples** per month. This applies regardless if fish early life stages are present or absent.

DELISTING METHODOLOGY:

An AU can only be delisted by the same criterion that was used to list it. For example, if an AU was listed using the Rule 2.512(A) acute criterion, it can only be delisted using the Rule 2.512(A) acute criterion delisting methodology. Stream and river AUs, as well as lakes and reservoirs, may be listed as support for ammonia toxicity criteria:

For Rule 2.512(A) Acute Criterion – If **no more than one violation (<1)** of the 1-hour average concentration of total ammonia nitrogen exceeds the calculated acute criterion within the 3-year period of record. A minimum of 10 samples must be reached to make an assessment of attainment.

For Rule 2.512(B) Chronic Criterion – If the **monthly average concentration of total ammonia nitrogen does not exceed** the chronic criterion. A minimum of 10 evenly distributed samples must be reached to make an assessment of attainment. This method can only be applied if there are **at least 5 samples** per month. Must de-list using the same fish early life stage status as was used to list.

Chronic Criterion – If the **highest 4-day average within a 30-day period does not exceed 2.5 times** the chronic criterion. A minimum of 10 evenly distributed samples must be reached to make an assessment of attainment. This method can also apply to individual samples if there are **less than 5 samples** per month. Must de-list using the same fish early life stage status as was used to list.

Arkansas River Valley Streams (>10 mi^2 watershed)

METRIC	4	2	0
Sensitive Individuals (%) Avg. = 12.8 Std. = 11.8	>3	1 – 3	<1
Cyprinidae (%) (Minnows) Avg. = 35.3 Std. = 8.3	>27 – 43	20 – 27 **or** >43 – 51	<20 **or** >51
Ictaluridae (%) (Catfishes) Avg. = 15.7 Std. = 10.4	>5 total ictalurids **and** ≤7 bullheads from total catch	3 – 5 **and** ≤7 bullheads from total catch	<3 total ictalurids **or** >7 bullheads from total catch
Centrarchidae (%) (Sunfishes) Avg. = 21.0 Std. = 4.6	>16 – 26 **and** ≤12 green sunfish from total catch	11 – 16 **or** >26 – 31 **and** ≤12% green sunfish from total catch	<11 **or** >31 **or** >12% green sunfish from total catch
Percidae (%) (Darters) Avg. = 11.9 Std. = 7.6	>4	1 – 4	<1
Primary Feeders (%) Avg. = 25.8 Std. = 5.9	<30	30 – 35	>35
"Key" Individuals (%) Avg. = 40.0	>20	10 – 20	<10
Diversity Avg. = 3.74 Std. = 0.23	>3.51	3.51 – 3.28	<3.28

Total Score

25-32 Mostly Similar
24-17 Generally Similar
16-9 Somewhat Similar
8-0 Not Similar

Boston Mountains Streams (>10 mi^2 watershed)

METRIC	4	2	0
Sensitive Individuals (%) Avg. = 43.0 Std. = 13.0	>30	30 – 16	<16
Cyprinidae (%) (Minnows) Avg. = 43.0 Std. = 17.0	>25 – 60	15 – 25 **or** > 60 - 75	<15 **or** >75
Ictaluridae (%) (Catfishes) Avg. = 8.8 Std. = 7.3	>4 **and** ≤1 bullheads from total catch	2 – 4 **and** ≤1 bullheads from total catch	<2 **or** >1 bullheads from total catch
Centrarchidae (%) (Sunfishes) Avg. = 23.4 Std. = 14.8	>10 – 40 **and** ≤18 green sunfish from total catch	6 – 10 **or** >40 – 55 **and** ≤18 green sunfish from total catch	<6 **or** >55 **or** >18 green sunfish from total catch
Percidae (%) (Darters) Avg. = 16.6 Std. = 4.8	>10	6 – 10	<6
Primary Feeders (%) Avg. = 24.3 Std. = 11.1	<35	35 – 45	>45
"Key" Individuals (%) Avg. = 42.7 Std. = 6.7	>35	25 – 35	<25
Diversity Avg. = 3.45 Std. = 0.3	>3.15	3.15 – 2.85	<2.85

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Total Score
25-32 Mostly Similar
24-17 Generally Similar
16-9 Somewhat Similar
8-0 Not Similar

Delta – Channel Altered Streams (>10 mi^2 watershed)

METRIC	4	2	0
Sensitive Individuals (%)	N/A	N/A	N/A
Cyprinidae (%) (Minnows) Avg. = 18.8 Std. = 6.9	<10 – 26	2 – 10 **or** >26 – 34	<2 **or** >34
Ictaluridae (%) (Catfishes) Avg. = 24.7 Std. = 15.2	<6 – 40 **and** ≤3 bullheads from total catch	3 – 6 **or** > 40 – 50 **and** ≤3 bullheads from total catch	<3 **or** >50 **or** >3 bullheads from total catch
Centrarchidae (%) (Sunfishes) Avg. = 23.6 Std. = 14.5	>6 – 40 **and** ≤30 green sunfish from total catch	3 – 6 **or** >40 - 55 **and** ≤30 green sunfish from total catch	<3 **or** >55 **or** >30 green sunfish from total catch
Percidae (%) (Darters) Avg. = 0.1 Std. = 0.9	>0.1	0.1 – 0.05	<0.05
Primary Feeders (%) Avg. = 12.5 Std. = 8.1	<20	20 – 30	>30
"Key" Individuals (%) Avg. = 47.5 Std. = 18.8	>25	10 – 25	<10
Diversity Avg. = 2.72 Std. = 0.21	>2.51	2.51 – 2.30	<2.30

Total Score
22-28 Mostly Similar
21-15 Generally Similar
14-8 Somewhat Similar
7-0 Not Similar

Delta – Least Disturbed Streams (>10 mi^2 watershed)

METRIC	4	2	0
Sensitive Individuals (%)	N/A	N/A	N/A
Cyprinidae (%) (Minnows) Avg. = 22.8 Std. = 19.9	<10 – 40	5 – 10 **or** >40 – 55	<5 **or** >55
Ictaluridae (%) (Catfishes) Avg. = 9.2 Std. = 7.5	>3 **and** ≤13 bullheads from total catch	1 – 3 **and** ≤13 bullheads from total catch	<1 **or** >13 bullheads from total catch
Centrarchidae (%) (Sunfishes) Avg. = 31.4 Std. = 16.5	>20 – 45 **and** ≤8 green sunfish from total catch	15 – 20 **or** >45 – 60 **and** ≤8 green sunfish from total catch	<15 **or** >60 **or** >8 green sunfish from total catch
Percidae (%) (Darters) Avg. = 9.8 Std. = 6.3	>3	1 – 3	<1
Primary Feeders (%) Avg. = 6.5 Std. = 6.7	<15	15 – 25	>25
"Key" Individuals (%) Avg. = 16.9 Std. = 14.9	>10	5 – 10	<5
Diversity Avg. = 3.73 Std. = 0.36	>3.37	3.37 – 3.01	<3.01

Total Score

22-28 Mostly Similar
21-15 Generally Similar
14-8 Somewhat Similar
7-0 Not Similar

Gulf Coastal – Spring Influenced Streams (>10 mi^2 watershed)

METRIC	4	2	0
Sensitive Individuals (%) Avg. = 18.4 Std. = 5.2	>3	2 – 3	<2
Cyprinidae (%) (Minnows) Avg. = 31.5 Std. = 10.9	>15 – 45	5 – 15 **or** >45 – 60	<5 **or** >60
Ictaluridae (%) (Catfishes) Avg. = 16.3 Std. = 8.3	>5 **and** ≤8 bullheads from total catch	<2 – 5 **and** ≤8 bullheads from total catch	<2 **or** >8 bullheads from total catch
Centrarchidae (%) (Sunfishes) Avg. = 19.0 Std. = 7.0	>9 – 28 **and** ≤8 green sunfish from total catch	4 – 9 **or** >28 – 38 **and** ≤8 green sunfish from total catch	<4 **or** >38 **or** >8 green sunfish from total catch
Percidae (%) (Darters) Avg. = 8.0 Std. = 0.8	>6	3 – 6	<3
Primary Feeders (%) Avg. = 9.5 Std. = 9.0	<20	20 – 30	>30
"Key" Individuals (%) Avg. = 43.4 Std. = 12.2	>26	12 – 26	<12
Diversity Avg. = 3.89 Std. = 0.03	>3.79	3.79 – 3.69	<3.69

Total Score
25-32 Mostly Similar
24-17 Generally Similar
16-9 Somewhat Similar
8-0 Not Similar

Gulf Coastal – Typical Streams (>10 mi^2 watershed)

METRIC	4	2	0
Sensitive Individuals (%) Avg. = 1.8 Std. = 1.4	>1	1 – 0.5	<0.5
Cyprinidae (%) (Minnows) Avg. = 19.5 Std. = 13.0	>5 – 35	<5 **or** >35 – 45	>45
Ictaluridae (%) (Catfishes) Avg. = 3.1 Std. = 2.9	>1 **and** ≤8 bullheads from total catch	0.5 – 1 **and** ≤8 bullheads from total catch	<0.5 **or** >8 bullheads from total catch
Centrarchidae (%) (Sunfishes) Avg. = 32.3 Std. = 10.9	>28 – 47 **and** ≤8 green sunfish from total catch	18 – 28 **or** >47 – 57 **and** ≤8 green sunfish from total catch	<18 **or** >57 **or** >8 green sunfish from total catch
Percidae (%) (Darters) Avg. = 14.5 Std. = 3.4	>10	6 – 10	<6
Primary Feeders (%) Avg. = 8.0 Std. = 6.5	<15	15 – 22	>22
"Key" Individuals (%) Avg. = 22.4 Std. = 8.4	>19	13 – 19	<13
Diversity Avg. = 4.13 Std. = 0.24	>3.89	3.89 – 3.65	<3.65

Total Score
25-32 Mostly Similar
24-17 Generally Similar
16-9 Somewhat Similar
8-0 Not Similar

Ouachita Mountains Streams (>10 mi^2 watershed)

METRIC	4	2	0
Sensitive Individuals (%) Avg. = 33.8 Std. = 7.3	>24	16 – 24	<16
Cyprinidae (%) (Minnows) Avg. = 51.7 Std. = 7.0	>45 – 60	36 – 45 **or** >60 – 67	<36 **or** >67
Ictaluridae (%) (Catfishes) Avg. = 3.0 Std. = 1.7	>1 **and** ≤2 bullheads from total catch	0.5- 1 **and** ≤2 bullheads from total catch	<0.5 **or** >2 bullheads from total catch
Centrarchidae (%) (Sunfishes) Avg. = 18.9 Std. = 7.1	>8 – 26 **and** ≤7 green sunfish from total catch	3 – 8 **or** >26 – 33 **and** ≤7 green sunfish from total catch	<3 **or** >33 **or** >7 green sunfish from total catch
Percidae (%) (Darters) Avg. = 20.0 Std. = 5.4	>14	8 – 14	<8
Primary Feeders (%) Avg. = 37.3 Std. = 9.6	<48	48 – 58	>58
"Key" Individuals (%) Avg. = 36.0 Std. = 11.8	>23	10 – 23	<10
Diversity Avg. = 3.15 Std. = 0.52	>2.63	2.63 – 2.11	<2.11

Total Score
25-32 Mostly Similar
24-17 Generally Similar
16-9 Somewhat Similar
8-0 Not Similar

Ozark Highlands Streams (All Watersheds)

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

†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

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