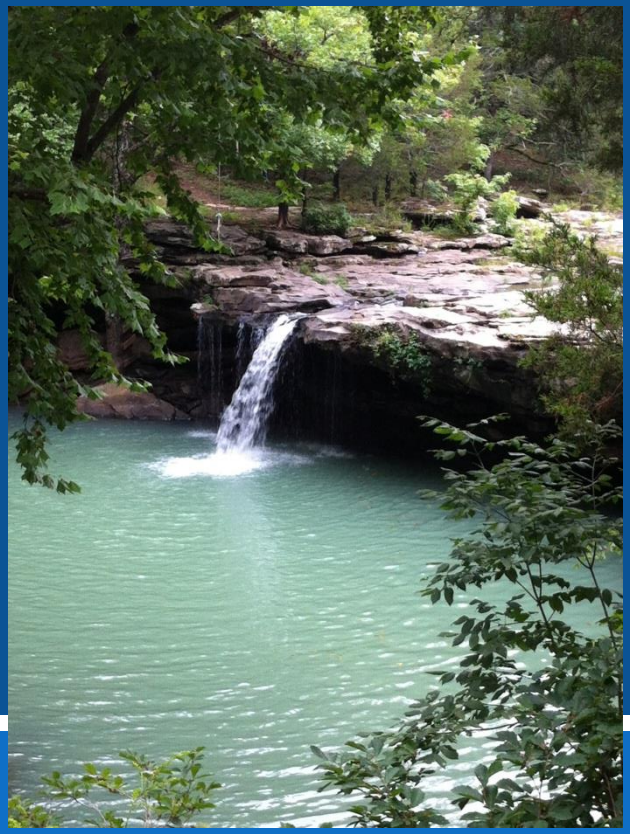
ADEQ'S WATER QUALITY MONITORING AND ASSESSMENT

Presented to Arkansas House of Representatives Agricultural, Forestry, and Economic Development Committee

Introduction by ADEQ Director Becky Keogh



Falling Water Falls, AR.

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March 29, 2016

Water Quality Standards

WQS are composed of two main components:

Designated Uses

Extraordinary Resource Waters
Ecologically Sensitive Waterbody
Primary Contact Recreation
Aquatic Life (Fisheries)

&

Criteria to Protect those Uses

Numeric:
pH, temperature, bacteria

Narrative:
oil and grease, nutrients

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Arkansas Water Quality Standards

- Designated Uses
  - Extraordinary Resource Waters
  - Ecologically Sensitive Waterbody
  - Natural and Scenic Waterways
  - Primary Contact Recreation
  - Secondary Contact Recreation
  - Aquatic Life (Fisheries)
  - Domestic Water Supply
  - Industrial Water Supply
  - Agricultural Water Supply
  - Other Uses – Hydroelectric Power and Navigation for example

Arkansas Water Quality Standards

- Criteria
  - Temperature
  - Turbidity
  - pH
  - Dissolved Oxygen
  - Radioactivity
  - Bacteria
  - Toxic Substances
  - Nutrients
  - Oil and Grease
  - Minerals
  - Ammonia

305(b) Report

- 40 CFR 130.8 tasks states with submitting a biennial report in accordance with section 305(b) of the Clean Water Act. This report serves as the primary assessment of the State's water quality.

305(b) Report – 40 CFR130.8 con't.

- **(b)** Each such report shall include but is not limited to the following:
  - **(1)** A description of the water quality of all waters of the United States and the extent to which the quality of waters provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water.
  - **(2)** An estimate of the extent to which CWA control programs have improved water quality or will improve water quality for the purposes of paragraph (b)(1) of this section, and recommendations for future actions necessary and identifications of waters needing action.
  - **(3)** An estimate of the environmental, economic and social costs and benefits needed to achieve the objectives of the CWA and an estimate of the date of such achievement.
  - **(4)** A description of the nature and extent of nonpoint source pollution and recommendations of programs needed to control each category of nonpoint sources, including an estimate of implementation costs.
  - **(5)** An assessment of the water quality of all publicly owned lakes, including the status and trends of such water quality as specified in section 314(a)(1) of the Clean Water Act.

303(d) List

- 40 CFR 130.7(d) requires states to submit, biennially, to the Regional Administrator a list of waters, pollutants causing impairment, and the priority ranking including waters targeted for TMDL development.

305(b)/303(d) Integrated Report

- Most states submit biennially both the 305(b) report and the 303(d) list of impaired waterbodies as a single integrated report.

Introduction of Process 303(d)

- Solicitation of data from outside sources
- Assessment of ADEQ data via WQAR software
- Ensure all data from outside sources meet all requirements to be used for assessment
- Assessment of outside data that meets requirements
- QAQC draft 303(d) list

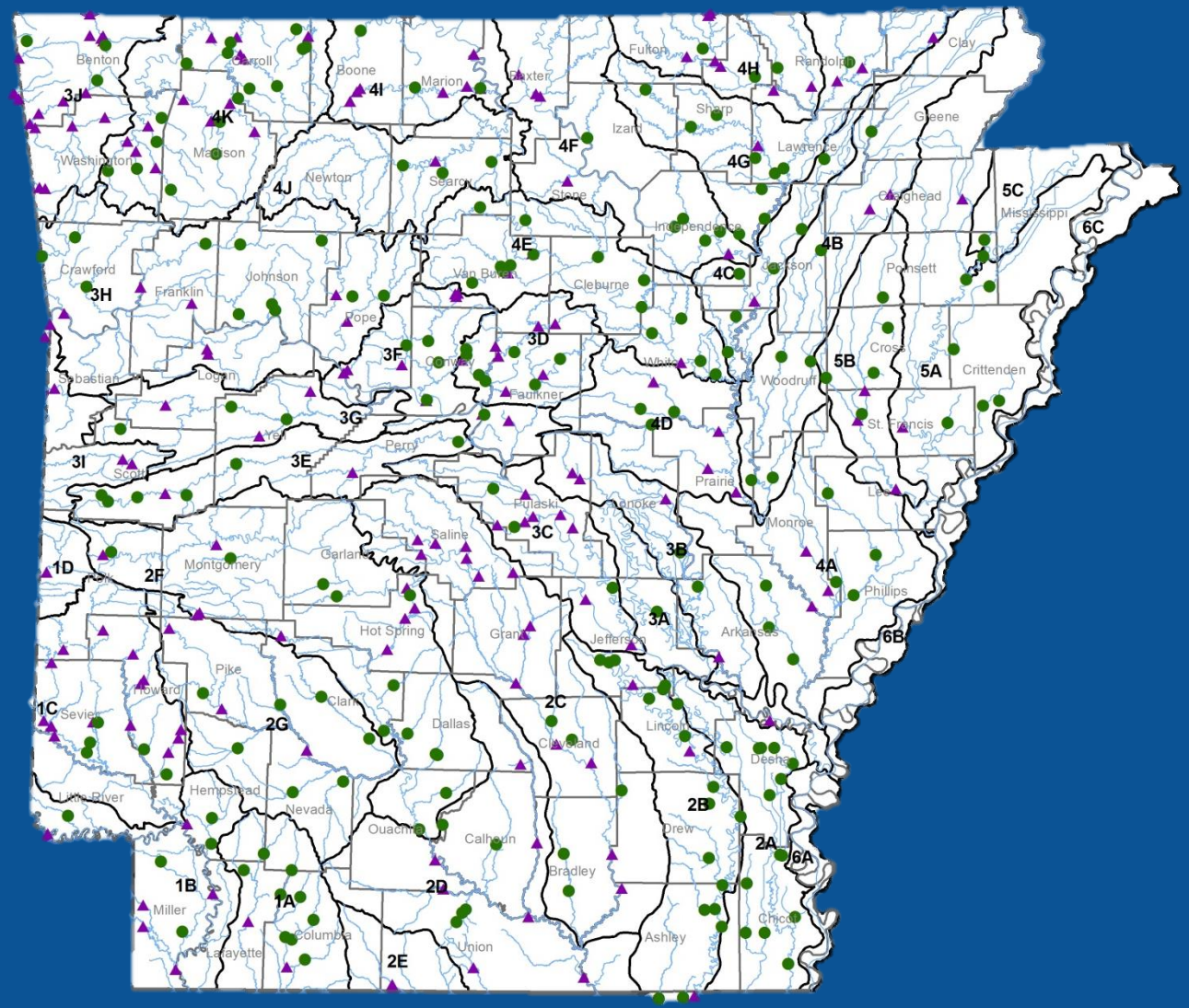
Monitoring

- ADEQ has approximately 1200 monitoring stations for streams and lakes
- Traditionally, stations have been broken into:
  - Ambient – sampled monthly around the state
  - Roving – traditionally sampled for two years in one area of the state, then move to a new area
  - Special Project – sampled for the duration of the project and in some cases beyond

Monitoring Stations

Ambient Stations

Roving Stations



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Stream Segments

	Assessed Total (miles)
Supporting all assessed uses	6,803.1
Not supporting a use	3,355.3
Total Waters Assessed	10,018.0

Parameters

- The following parameters are evaluated:
  - Temperature Reg. 2.502
  - Turbidity Reg. 2.503
  - pH Reg. 2.504
  - Dissolved Oxygen Reg. 2.505
  - Radioactivity Reg. 2.506
  - Bacteria Reg. 2.507
  - Toxic Substances Reg. 2.508
  - Nutrients Reg. 2.509
  - Oil and Grease Reg. 2.510
  - Minerals Reg. 2.511
  - Ammonia Reg. 2.512

Data Points

- Approximately 589,000 data points from within ADEQ were evaluated for this period of record
- Over 1,000,000 data points were evaluated, including qualifying outside data

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Monitoring and Assessment by Dr. Robert Blanz P. E.

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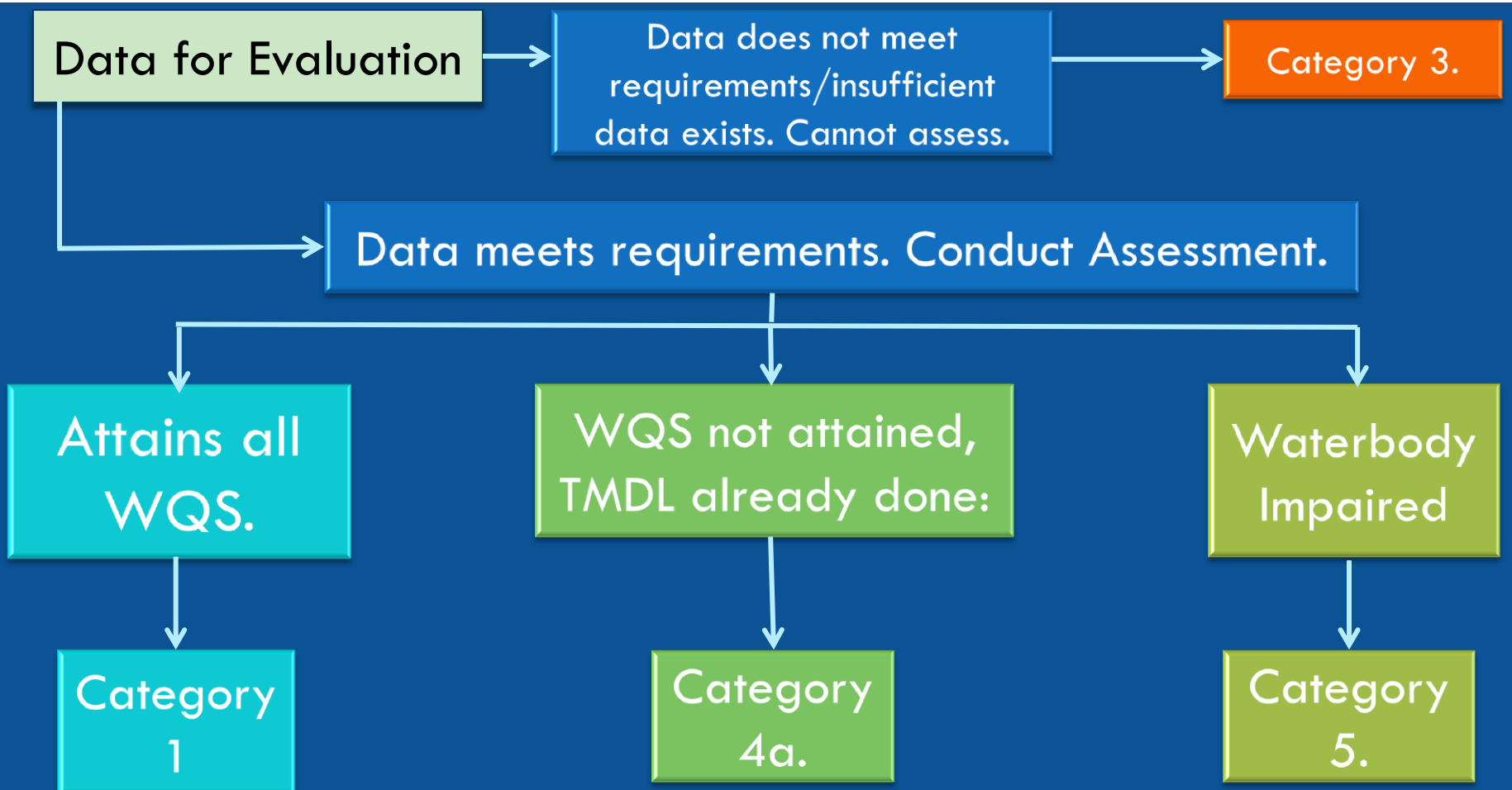
Assessment of Water Quality

- Arkansas publishes its Assessment Methodology with the Integrated Water Quality Report and 303(d) List of Impaired Waterbodies.
- The Assessment Methodology ensures that all stream segments are assessed the same for each parameter.

Assessment of Water Quality



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Assessment-Dissolved Oxygen (DO)

Dissolved oxygen standards are divided into two (2) categories:

- **Primary season:** Water temperatures are at or below 22°C.
- **Critical season:** Water temperatures exceed 22°C.

LISTING METHODOLOGY:

- Stream and river monitoring segments will be listed as non-support when more than 10 percent of the total samples for primary or critical season within the period of record fail to meet the minimum applicable dissolved oxygen standard listed in APC&EC Reg. 2.505.

- Lakes and reservoirs will be listed as non-support when more than 10 percent of the samples for primary or critical season within the period of record fall below 5 mg/L. Samples collected at 1.0 meter below the surface of the water will be used to make lake and reservoir attainment decisions.

DELISTING METHODOLOGY:

- Stream and river monitoring segments will be listed as support when 10 percent or less of the total samples for primary or critical season within the period of record fail to meet the minimum applicable dissolved oxygen standard listed in APC&EC Reg. 2.505.

- Lakes and reservoirs will be listed as support when 10 percent or less of the total samples for primary or critical season in the period of record do not fall below 5 mg/L. Samples collected at 1.0 meter below the surface of the water will be used to make lake and reservoir attainment decisions.

Assessment-Metals

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:

- Monitoring segments will be listed as non-support when more than one exceedance of the criterion occurs during the period of record. Samples collected at 1.0 meter below the surface of the water will be used to make lake and reservoir attainment decisions.

DELISTING METHODOLOGY:

- Monitoring segments will be listed as support when there are one or fewer (≤ 1) exceedances of the criterion during the period of record. Samples collected at 1.0 meter below the surface of the water will be used to make lake and reservoir attainment decisions.

Assessment-Bacteria (*E. coli*)

For the assessment of ambient waters:

- Individual samples: per APC&EC Reg. 2.507, at least eight data points must be taken during the primary contact season (May 1 through September 30) or during the secondary contact season (October 1 through April 30) of contiguous months to make an evaluation.
- Geometric mean: calculated on a minimum of five samples spaced evenly and within any 30-day period during either the primary contact season (May 1 through September 30) or during the secondary contact season (October 1 through April 30), when such data are available.
- In either case, the most recent complete dataset (as described above) will be utilized for assessment evaluation.

Assessment-Bacteria (*E. coli*) (cont.)

LISTING METHODOLOGY:

- Stream and river monitoring segments will be listed as non-support when the geometric mean for the applicable contact season is exceeded, or when the applicable standard is exceeded in greater than 25 percent of the samples collected during contiguous months within the applicable contact season (as described above).

DELISTING METHODOLOGY:

- Stream and river monitoring segments will be listed as support when the geometric mean for the applicable contact season is not exceeded, or when the applicable standard is exceeded in 25 percent or less of the samples collected during contiguous months within the applicable contact season.

Assessment-Bacteria (*E. coli*) (cont.)

		Standard	Support	Non-Support
Primary Contact	ERW, ESW, NSW, Lakes, Reservoirs	GM 126 col/100 mL*	≤ standard	> standard
		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, NSW, Lakes, Reservoirs	GM 630 col/100 mL*	≤ standard	> standard
		1490 col/100 mL (any time)	≤ 25% exceedance	>25% exceedance
	All other waters	2050 col/100 mL (any time)	≤ 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 season May 1 through September 30; secondary season October 1 through April 30).

Assessment Categories (1-2)

1. Attains all water quality standards for all designated uses; categorized by existence of a TMDL or not for one or more constituents:

- 1a. Attaining water quality standards for all designated uses, no use is threatened. No TMDL exists for any constituents.
- 1b. Attaining all water quality standards for all designated uses; however, a TMDL remains in place for one or more constituents.

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

Assessment Categories (3)

3. Insufficient data and information are available to determine if any water quality standards are or are not being attained.

- No data available;
- A water quality standard has not been approved for Clean Water Act purposes and therefore and assessment cannot be made;
- Data do not meet the spatial and/or temporal 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 stream segment requires confirmation of impairment before a TMDL is scheduled.

Assessment Categories (4)

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);
- 4b. Other pollution control requirements 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.

Assessment Categories (5)

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

High

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

Medium

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

Low

- Waters currently not attaining one or more water quality standards, but all designated uses are determined to be supported; or
- There is insufficient data to make a scientifically defensible decision concerning designated use attainment; or
- Waters ADEQ assessed as unimpaired, but were assessed as impaired by EPA.

303(d) List Example Page

						Designated Use Not Supported						Water Quality Standard Non-Attainment												Source of Contamination					
Stream Name	HUC	Reach	Planning Segment	Miles	Monitoring Station	FC	FSH	PC	SC	DW	AI	DO	pH	Tm	Tb	Cl	SO4	TDS	PA	Cu	Pb	Zn	Hg	Other	Other	IP	MP	SE	AG	UR	Other
Bodcau Creek	11140205	-007	1A	7.80	RED0057																4a										
Bodcau Creek	11140205	-006	1A	22.40	RED0027								4a		4a					1b	4a										
Bodcau Creek	11140205	-002	1A	6.00	e-RED0027								4a		4a					4a	4a										
Beech Creek	11140203	-025	1A	15.70	UWBCH01							4a			4a						4a										
Big Creek	11140203	-923	1A	18.50	UWBIG01								4a								4a										

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Key for 303(d) List

						Designated Use Not Supported						Water Quality Standard Non-Attainment														Source of Contamination					
Stream Name	HUC	Reach	Planning Segment	Miles	Monitoring Station	FC	FSH	PC	SC	DW	AI	DO	pH	Tm	Tb	Cl	SO4	TDS	PA	Cu	Pb	Zn	Hg	Other	Other	IP	MP	SE	AG	UR	Other
Bodcau Creek	11140205	-007	1A	7.80	RED0057																4a										
Bodcau Creek	11140205	-006	1A	22.40	RED0027								4a		4a					1b	4a										

A "Reach" is a segment of stream. Reach codes, -007 for example, will be duplicated for different streams, but not for the same stream.

"Miles" is the linear distance of the reach.

"Monitoring Station" refers to the station used to make the assessment.

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Stream Name	HUC	Reach	Planning Segment	Miles	Monitoring Station	FC	FSH	PC	SC	DW	AI	DO	pH	Tm	Tb	Cl	SO4	TDS	PA	Cu	Pb	Zn	Hg	Other	Other	IP	MP	SE	AG	UR	Other
Bodcau Creek	11140205	-007	1A	7.80	RED0057																4a									
Bodcau Creek	11140205	-006	1A	22.40	RED0027								4a		4a					1b	4a									

A HUC is a Hydrologic Unit Code based on discrete hydrological boundaries defined by the U. S. Geological Survey (USGS). For the 303(d) list, 8-digit HUCs are used.

A Planning Segment is unique to ADEQ and is delineated based on hydrological characteristics, human activities, geographic characteristics and other factors.

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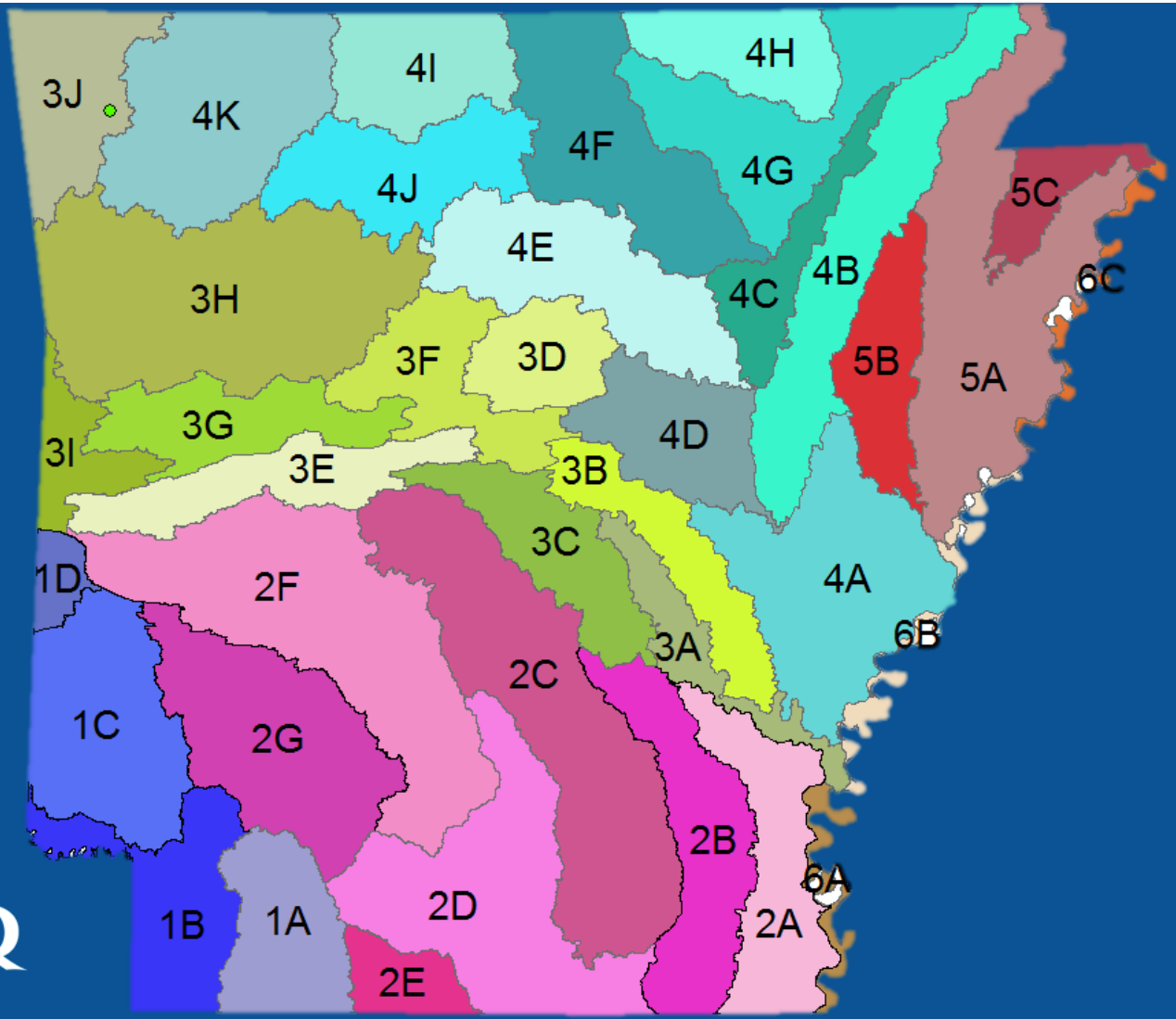
Planning Segments



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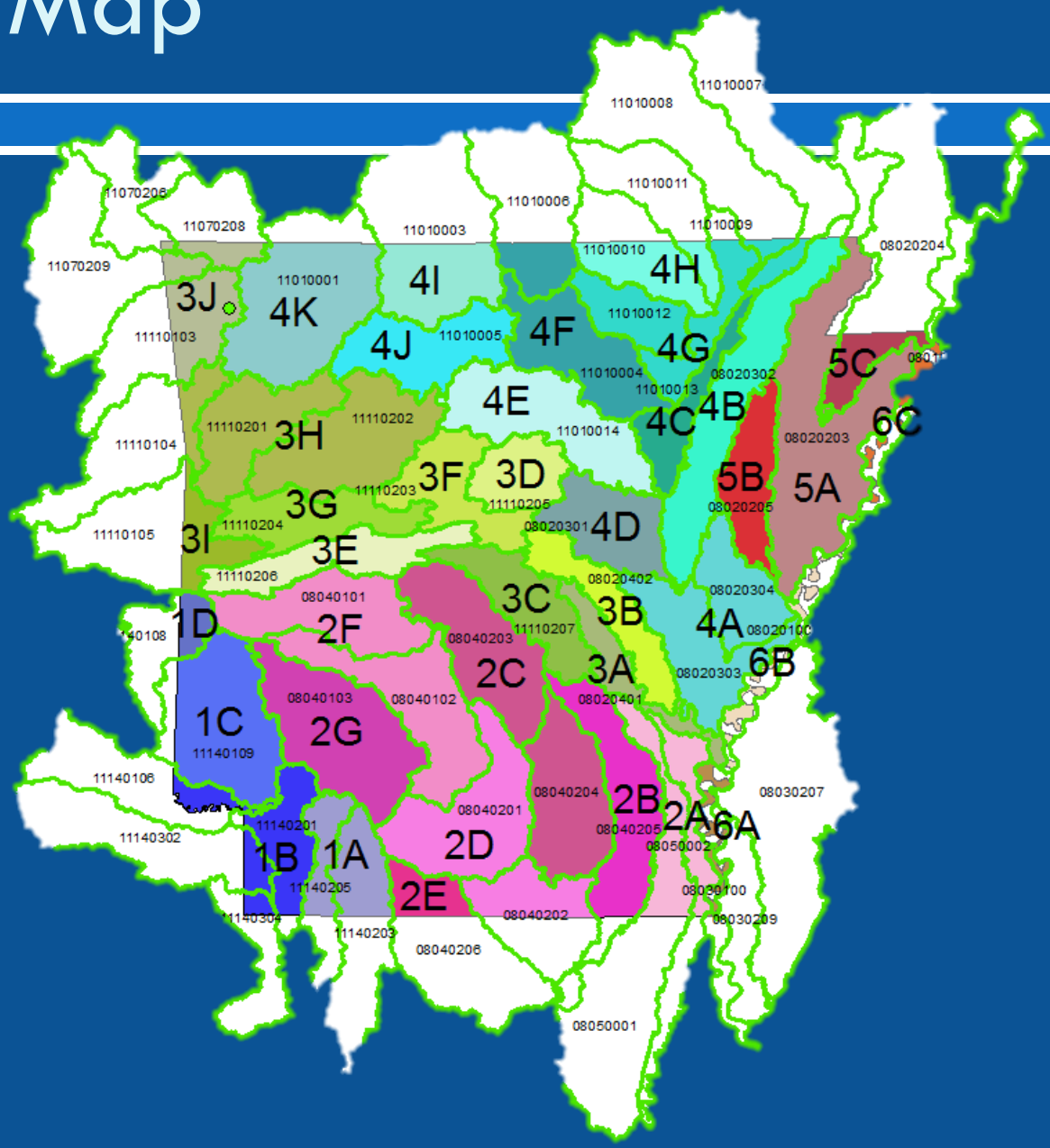
8-Digit HUC Map

Planning Segments within the AR are color coded, whereas 8-digit HUCs are outlined in lime green. HUCs extend beyond state boundaries.

Some Planning Segments are bisected by multiple 8-digit HUCs.

For example Planning Segments 1A, 2C, 2F, 3H, 4F, and others.



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Bodcau Creek	11140205	-007	1A	7.80	RED0057																4a									
Bodcau Creek	11140205	-006	1A	22.40	RED0027								4a		4a					1b	4a									

Designated use codes:
FC – Fish Consumption (Advisory)
FSH – Fisheries (Aquatic Life)
PC – Primary Contact (swimming)
SC – Secondary Contact (wading)
DW – Domestic Water Supply
AI – Agriculture and Industrial uses

If any Designated Uses were not being attained, an "x" would be filled in for that cell.

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Key for 303(d) List

						Designated Use Not Supported						Water Quality Standard Non-Attainment														Source of Contamination					
Stream Name	HUC	Reach	Planning Segment	Miles	Monitoring Station	FC	FSH	PC	SC	DW	AI	DO	pH	Tm	Tb	Cl	SO4	TDS	PA	Cu	Pb	Zn	Hg	Other	Other		MP	SE	AG	UR	Other
Bodcau Creek	11140205	-007	1A	7.80	RED0057																4a										
Bodcau Creek	11140205	-006	1A	22.40	RED0027								4a		4a					1b	4a										

Non-Attainment use codes:

DO – Dissolved Oxygen
pH – pH
Tm – Temperature
Tb – Turbidity
Cl – Chlorides
SO4 – Sulfates
TDS – Total Dissolved Solids
PA – Pathogens (*E. coli*)
Cu – Copper
Pb - Lead
Zn – Zinc
Hg – Mercury
Other – Less common standards such as Ammonia, Total Phosphate, Nitrates

4a and 1b denote assessment category

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Stream Name	HUC	Reach	Planning Segment	Miles	Monitoring Station	FC	FSH	PC	SC	DW	AI	DO	pH	Tm	Tb	Cl	SO4	TDS	PA	Cu	Pb	Zn	Hg	Other	Other	IP	MP	SE	AG	UR	Other
Bodcau Creek	11140205	-007	1A	7.80	RED0057																4a										
Bodcau Creek	11140205	-006	1A	22.40	RED0027								4a		4a					1b	4a										

Source of Contamination codes:
IP – Industrial Point Source
MP – Municipal Point Source
SE – Surface Erosion
AG – Agricultural Activities
UR – Urban Runoff
Other – Unknown or less common sources like resource extraction or hydropower

If the Source of contamination is known, an "x" would be placed in the cell.

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