Update of the Priority Watershed Matrix

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Multiple Choice Question: What is the Priority Watershed Matrix?

A. Another sequel to a popular 1999 movie
B. A nightmare from a math class you took long ago
C. A procedure for identifying priority watersheds for the Arkansas Nonpoint Source Pollution Management Plan
History of the Priority Watershed Matrix

- Originally developed in 2004.
- Updated in 2010.
- The 2022 update uses the same procedures as the 2010 version, but more recent data.
Overview of the Priority Watershed Matrix

• Data are compiled for all 58 HUC8 watersheds in Arkansas.
• Numeric scores are generated for each watershed for each of 12 categories of risk factors.
• The 58 watersheds are ranked by total score.
• The top 20% (12 watersheds) are identified as priority watersheds.
Categories of Risk Factors

Category 1 – Waterbody Impairment
Category 2 – Designated Use Impact
Category 3 – Biotic Impact
Category 4 – Potential Human Exposure
Category 5 – Urban/Suburban Population
Category 6 – Impervious Area

Category 7 – Economic Activity
Category 8 – Cropland
Category 9 – Livestock and Pasture
Category 10 – Unpaved Roads
Category 11 – Forestry
Category 12 – Adjacent State Priority
Calculation of Overall Score

- Individual score for each category is from 0 to 10.
- Overall score = Category 1 score $\times$ sum of scores for Categories 2 through 12
- This places emphasis on Category 1 score (waterbody impairment).
Category 1 – Waterbody Impairment

- Data sources: 2018 final 303(d) list and ANRC Nutrient Surplus Areas
- Score = 10 for waterbodies in Categories 4a, 4b, and 5alt
- Score = 8 for waterbodies in Category 5, high priority
- Score = 6 for waterbodies in Category 5, medium priority
- Score = 5 for ANRC Nutrient Surplus Areas
- Score = 2 for waterbodies in Category 5, low priority
Category 1 Water Body Impairment
Category 2 – Designated Use Impact

- Data sources: 2018 final 303(d) list and ESW/ERW shape files
- Score = 10 for aquatic life impairment
- Score = 9 for primary or secondary contact recreation impairment
- Score = 8 for drinking water impairment
- Score = 5 for Ecologically Sensitive Waterbody
- Score = 4 for Extraordinary Resource Water
- Score = 2 for agricultural & industrial water supply impairment
Category 3 – Biotic Impairment

- Data source: 2018 final 303(d) list
- Score = 10 for aquatic life impairment
- Score = 10 for siltation/turbidity impairment
- Score = 9 for dissolved oxygen impairment
- Score = 8 for priority organics impairment
- Score = 4 for ammonia nitrogen impairment
Category 3 Biotic Impact

Data Source: ADEQ

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Category 4 – Potential Human Exposure

- Data sources: 2018 final 303(d) list, ADH public water systems, AGFC recreational lakes & public use facilities, DEQ Natural and Scenic Waterways, municipal boundaries
- Score = 10 for impairment of public water supply
- Score = 8 for impairment of recreational lake
- Score = 8 for impairment of NSW or urban stream
- Score = 2 for other impairments
Category 4 Potential Human Exposure

Data Source: ADEQ, ADH, AGFC, AR GIS office

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Category 5 – Urban/Suburban Population

- Data source: 2019 population for each county
- Population density = Population / area
- All 58 HUC8’s ranked based on population density and assigned a percentile (0.0 – 1.0)
- Score = percentile × 10.0
Category 6 – Impervious Area

• Data source: 2019 National Land Cover Database
• All 58 HUC8’s ranked based on percentage of impervious area and assigned a percentile (0.0 – 1.0)
• Score = percentile × 10.0
Category 6 Impervious Surface

Data Source: NLCD
Category 7 – Economic Activity

- Data sources: 2011 and 2019 NLCD, oil & gas well data from AOGC, environmental permit location data from DEQ
- Construction activity based on urban acreage increase; all 58 HUC8’s ranked and assigned a percentile; construction activity score = percentile $\times$ 5.0
- Shale development score = 4 if active permit(s) for extracting natural gas
- Mining activity score = 1 if active permit(s) for mining
Category 7 Economic Activity

Data Source: NLCD, AR oil & Gas Commission, DEQ
Category 8 – Cropland

- Data source: 2017 Census of Agriculture
- All 58 HUC8’s ranked based on percentage of cropland and assigned a percentile (0.0 – 1.0)
- Score = percentile × 10.0
Category 8 Cropland

Data Source: USDA
Category 9 – Livestock and Pasture

• Data source: 2017 Census of Ag., 2019 NLCD
• Animal units calculated for each county
• All 58 HUC8’s ranked based on animal unit density and assigned a percentile (0.0 – 1.0)
• Livestock score = percentile × 5.0
• All 58 HUC8’s ranked based on percentage of pasture and assigned a percentile (0.0 – 1.0)
• Pasture score = percentile × 5.0
Category 9 Livestock and Pasture

Data Source: NLCD, USDA
Category 10 – Unpaved Roads

• Data source: 2015 Arkansas Centerline File
• Density = miles of unpaved roads per unit of watershed area
• All 58 HUC8’s ranked based on density of unpaved roads and assigned a percentile (0.0 – 1.0)
• Score = percentile × 10.0
Category 10 Unpaved Roads

Category 10 score
- 0.0-2.0
- 2.0-4.0
- 4.0-6.0
- 6.0-8.0
- 8.0-10.0
Category 11 – Forestry

• Data source: Public land boundaries (AHTD), 2019 NLCD
• Forest area divided by federal, state, or private ownership
• All 58 HUC8’s ranked based on percentage of forest in each type of ownership and assigned percentiles (0.0 – 1.0)
• State owned forest score = percentile $\times$ 2.0
• Federally owned forest score = percentile $\times$ 3.0
• Private owned forest score = percentile $\times$ 5.0
Category 11 Forestry
Category 12 – Adjacent State Priority

• Data sources: Nonpoint source management plans for Oklahoma, Missouri, and Louisiana; MRBI report for LA

• Score = 10 if the watershed is considered to be a priority watershed by the adjacent state immediately downstream
Watersheds with Highest Overall Scores

1. Beaver Reservoir
2. Little Red River
3. Lake Conway – Point Remove
4. Illinois River
5. Ouachita Headwaters
6. Bayou Bartholomew
7. Poteau River
8. Cadron Creek
9. Lower Saline River
10. Upper Saline River
11. Lower Little River
12. Lower St. Francis River
Final Risk Matrix Ranking
<table>
<thead>
<tr>
<th>2010 Top 12 Watersheds</th>
<th>2022 Top 12 Watersheds</th>
<th>2010 Top 12 Watersheds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Beaver Reservoir</td>
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</tr>
<tr>
<td>2. Poteau River</td>
<td>2. Little Red River</td>
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</tr>
<tr>
<td>5. Ouachita Headwaters</td>
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</tr>
<tr>
<td>11. Strawberry River</td>
<td>11. Lower Little River</td>
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</tbody>
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Questions?

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