



Update of the Priority Watershed Matrix

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FTN Associates, Ltd.**

**Arkansas Nonpoint Source Annual Meeting
June 28, 2022**

(PowerPoint file revised July 18, 2022)

July 18, 2022 revisions to this PowerPoint file

Several days after the presentation at the June 28, 2022 NPS Meeting, a mistake was found in the scoring for Category 3. After this mistake was corrected, this PowerPoint file was updated with the new Category 3 results (slide 13) and the overall results (slides 32-34). With this correction, the Lower St. Francis and Upper Saline watersheds moved out of the top quintile, while the Middle White and Lower White-Bayou Des Arc watersheds moved into the top quintile.

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.

Arkansas' Nonpoint Source Pollution Watershed Risk Matrix - Update 2010

By:

Ben Hancock, Naresh Pai, Dharmendra Saraswat, and Tom Riley

September, 2010

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

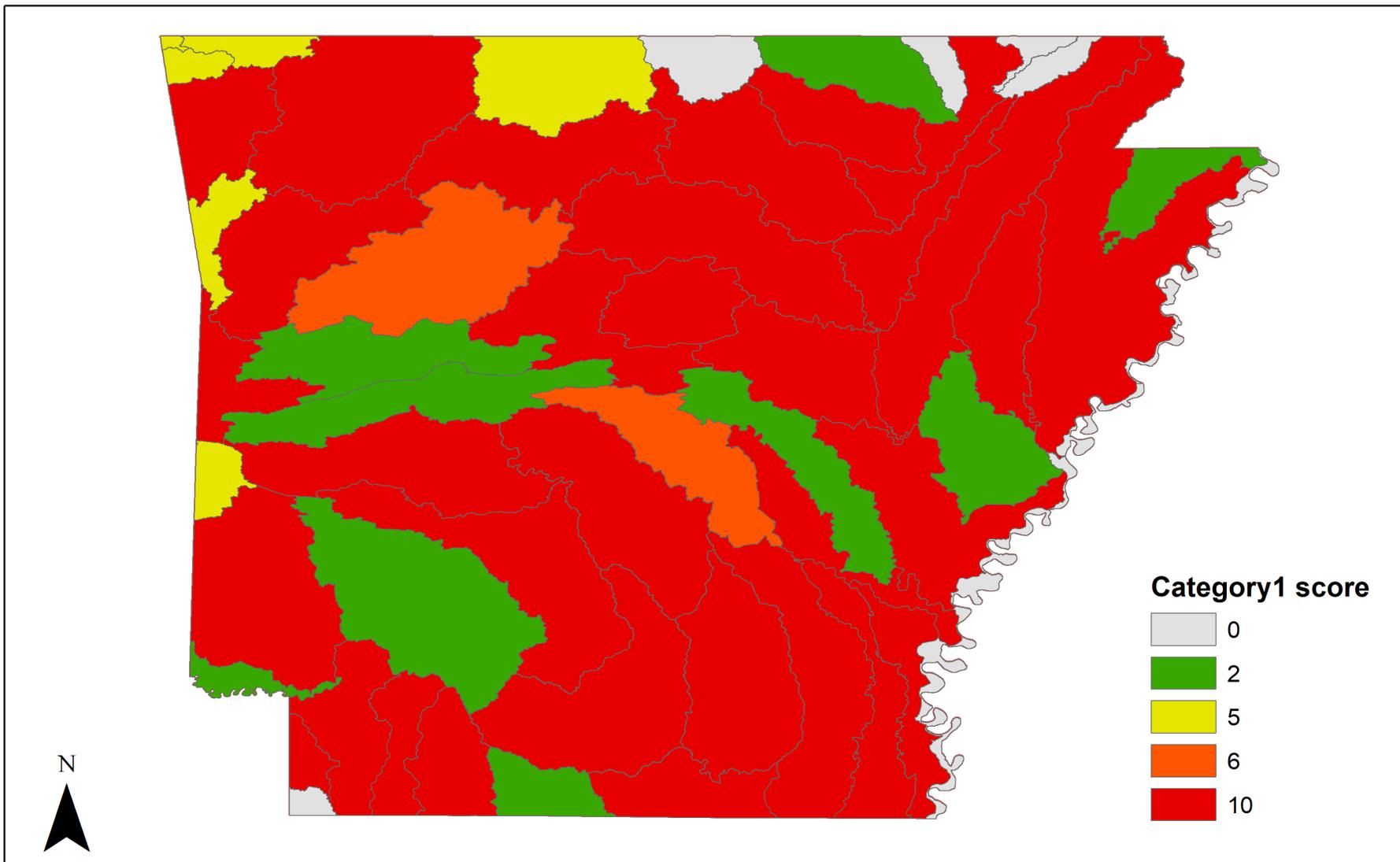
Category 12 – Adjacent State Priority

Calculation of Overall Score

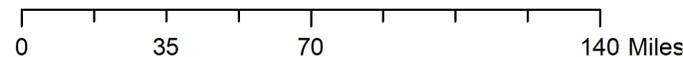
- Individual score for each category is from 0 to 10.
- Overall score = Category 1 score × sum of scores for Categories 2 through 12
- This places emphasis on Category 1 score (waterbody impairment).

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

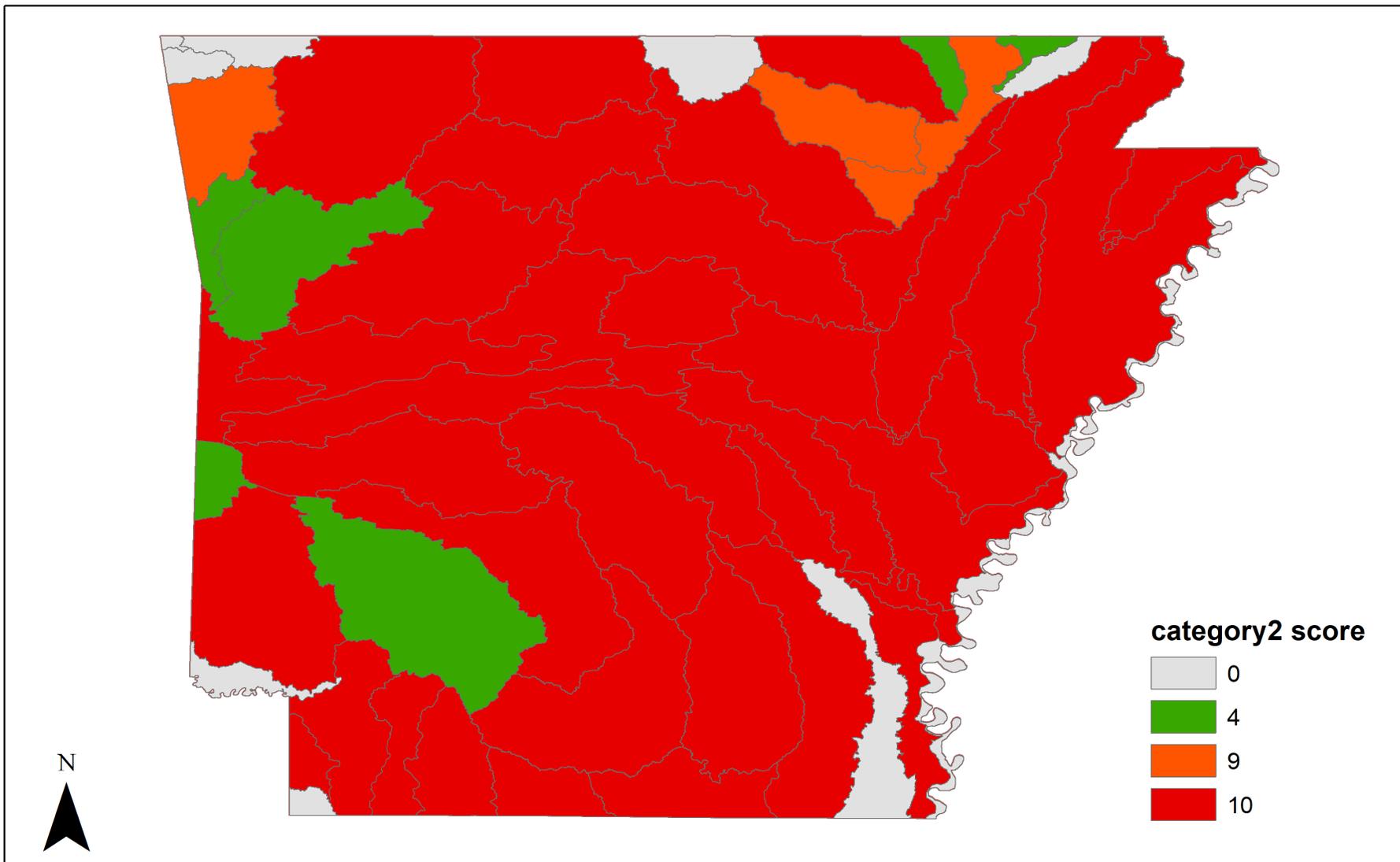


Data Source: ADEQ

R:\projects\03015-0008-032\gis\doc\map\Risk_Matrix_cat1.mxd

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**



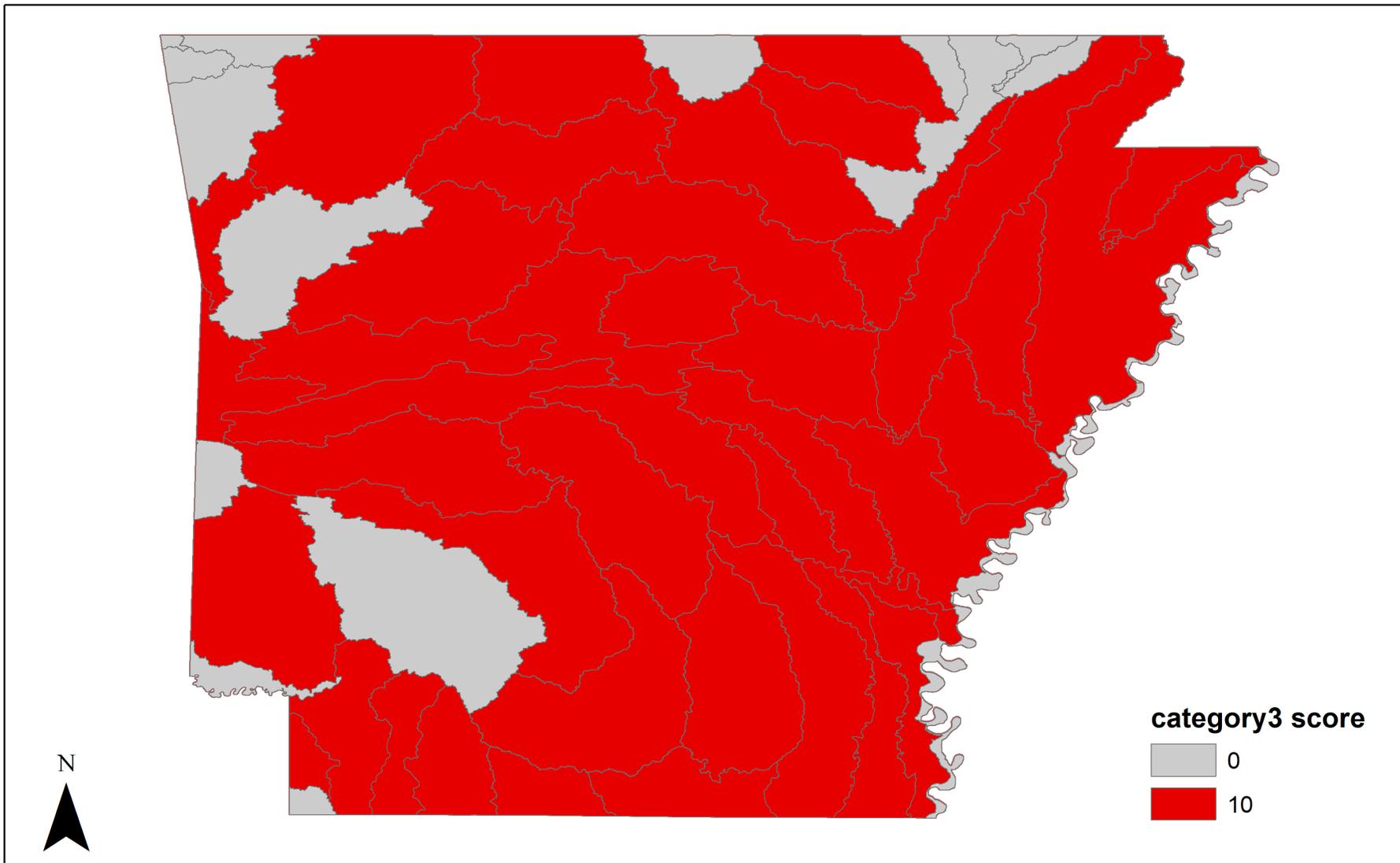
Category 2 Designated Use Impact

0 35 70 140 Miles

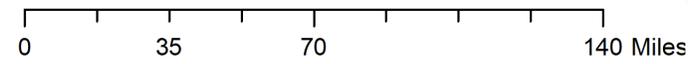


Category 3 – Biotic Impairment

- **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

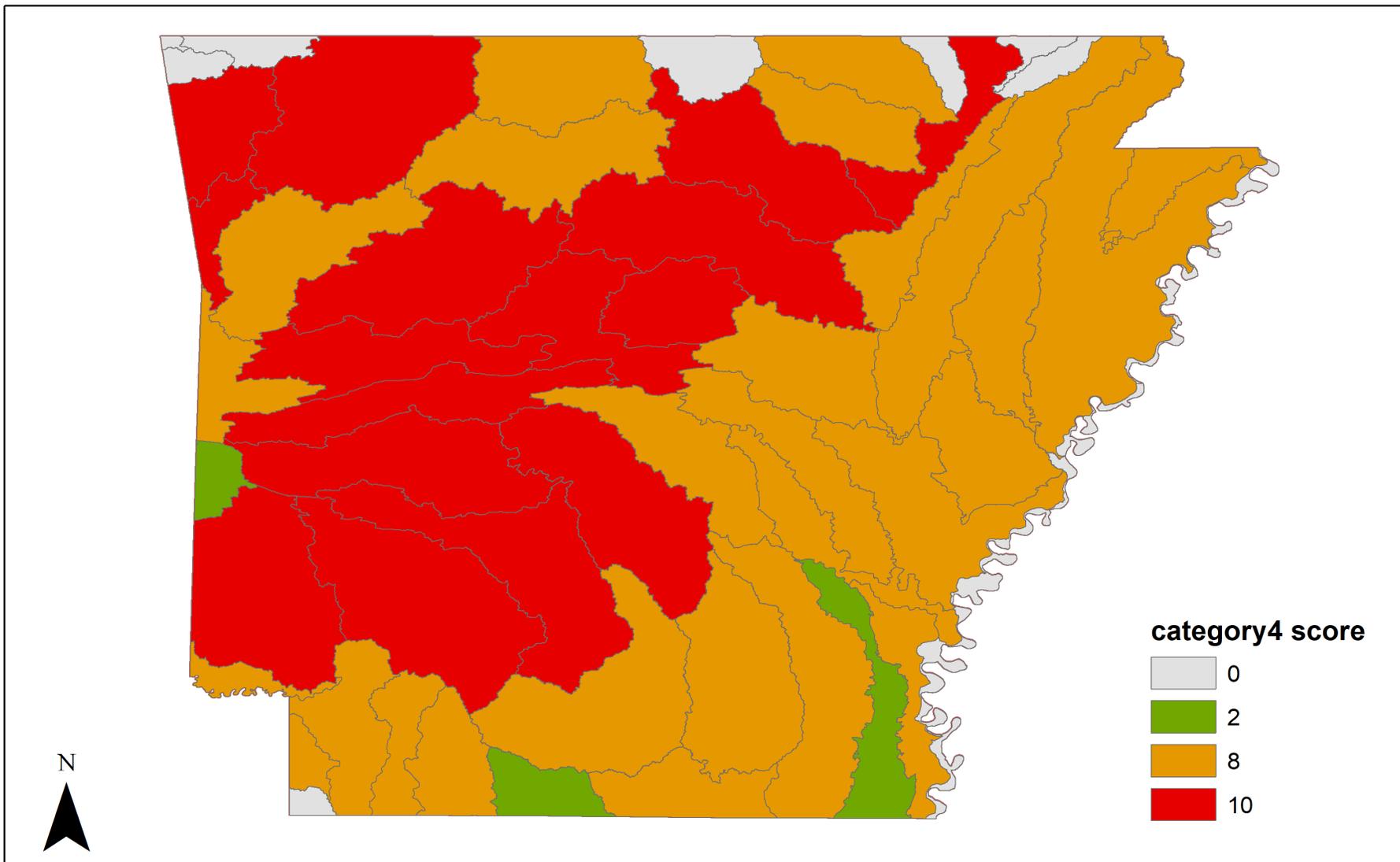


Data Source: ADEQ

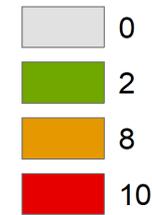
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Category 4 – Potential Human Exposure

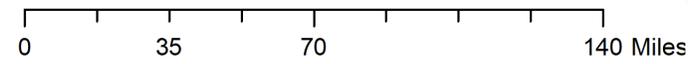
- **Data sources: 2018 final 303(d) list, ADH public water systems, AGFC recreational lakes & public use facilities, DEQ Natural and Scenic Waterways, municipal boundaries**
- **Score = 10 for impairment of public water supply**
- **Score = 8 for impairment of recreational lake**
- **Score = 8 for impairment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



category4 score

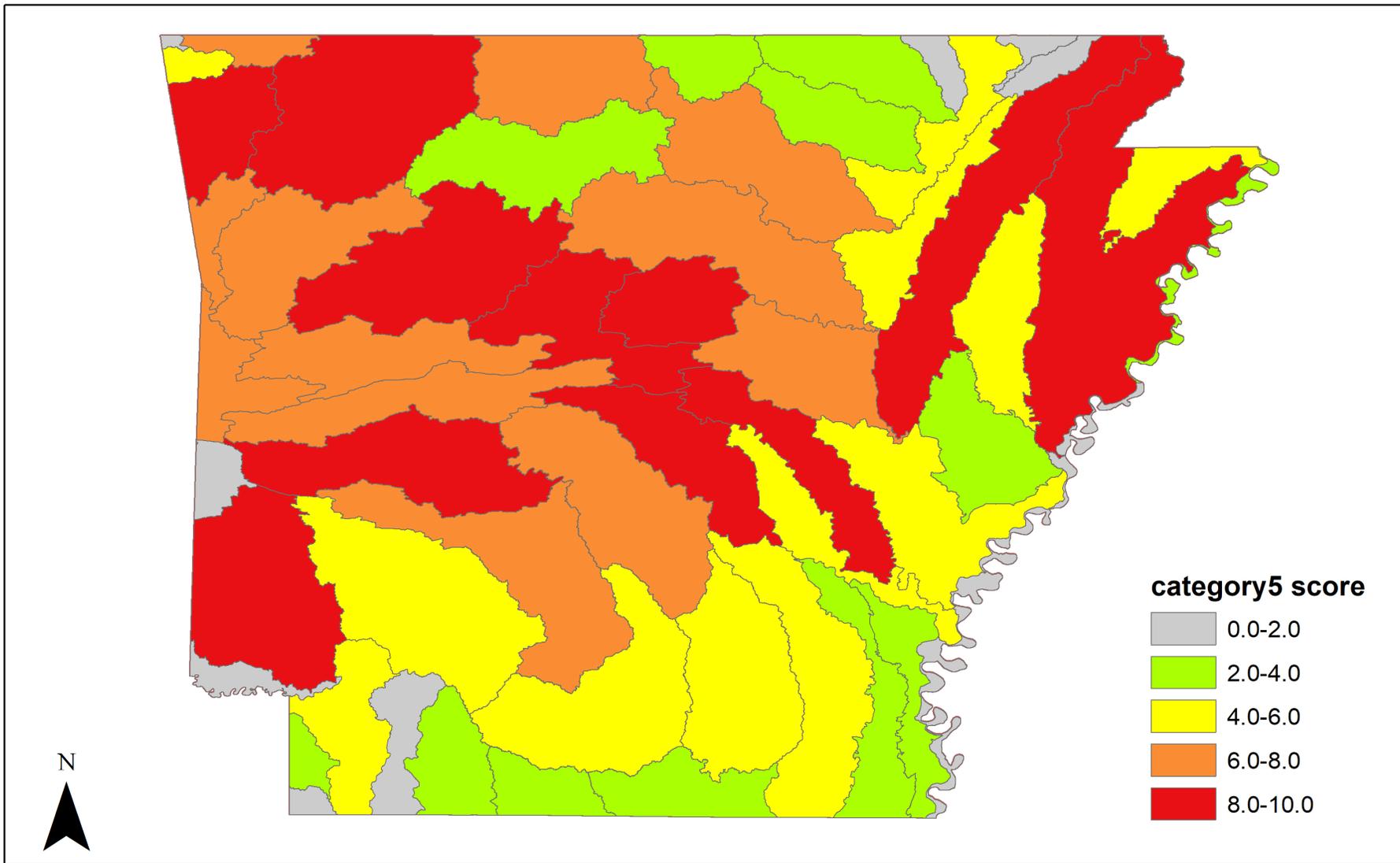


Category 4 Potential Human Exposure

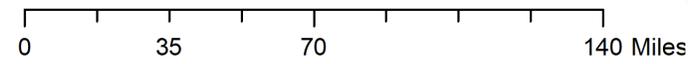


Category 5 – Urban/Suburban Population

- 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



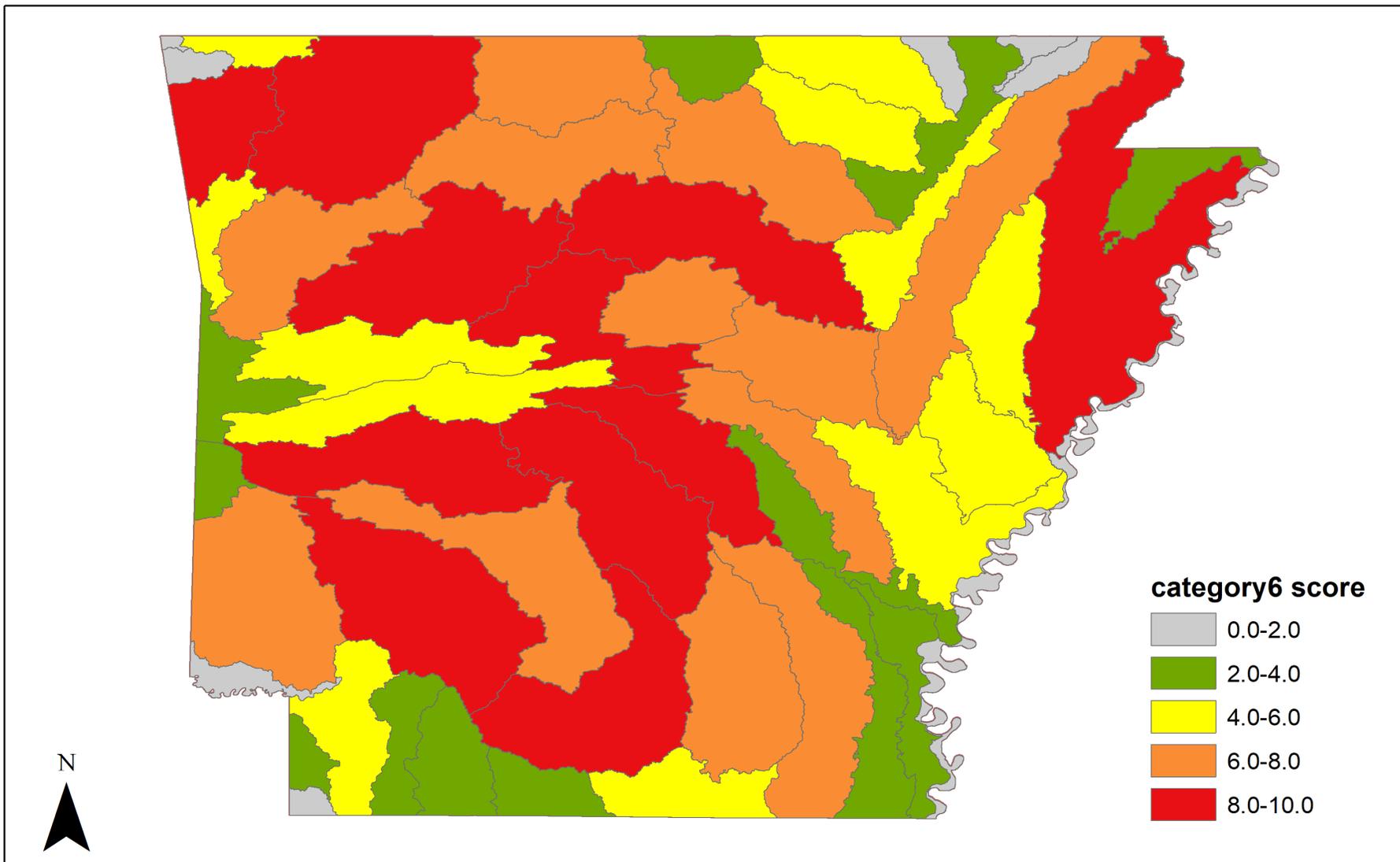
Category 5 Urban Suburban Population



Data Source: US Census Bureau

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**



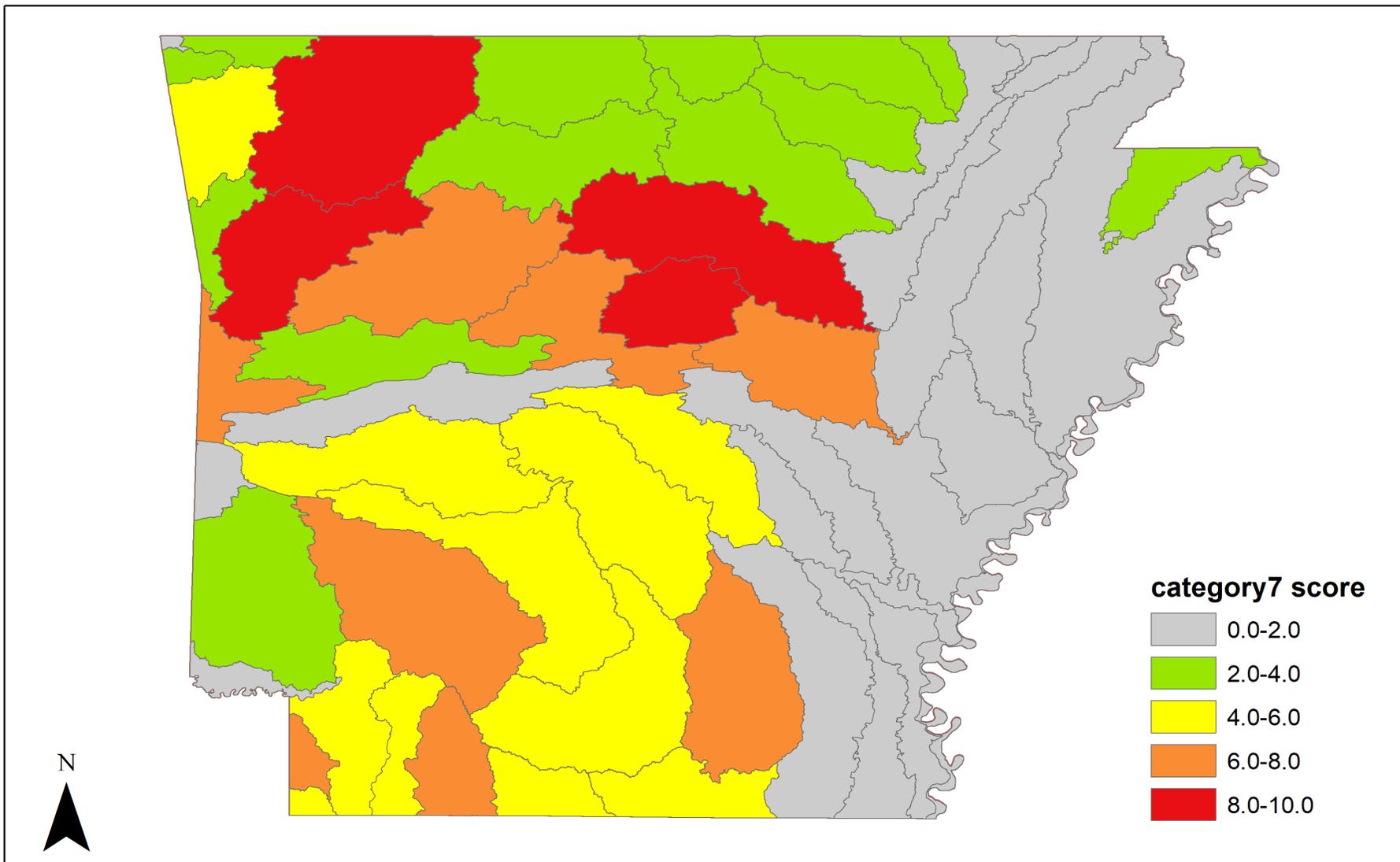
Category 6 Impervious Surface

0 35 70 140 Miles



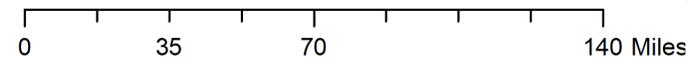
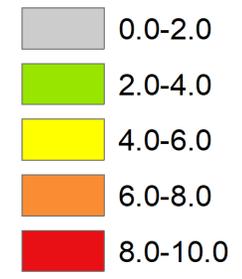
Category 7 – Economic Activity

- **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 × 5.0**
- **Shale development score = 4 if active permit(s) for extracting natural gas**
- **Mining activity score = 1 if active permit(s) for mining**



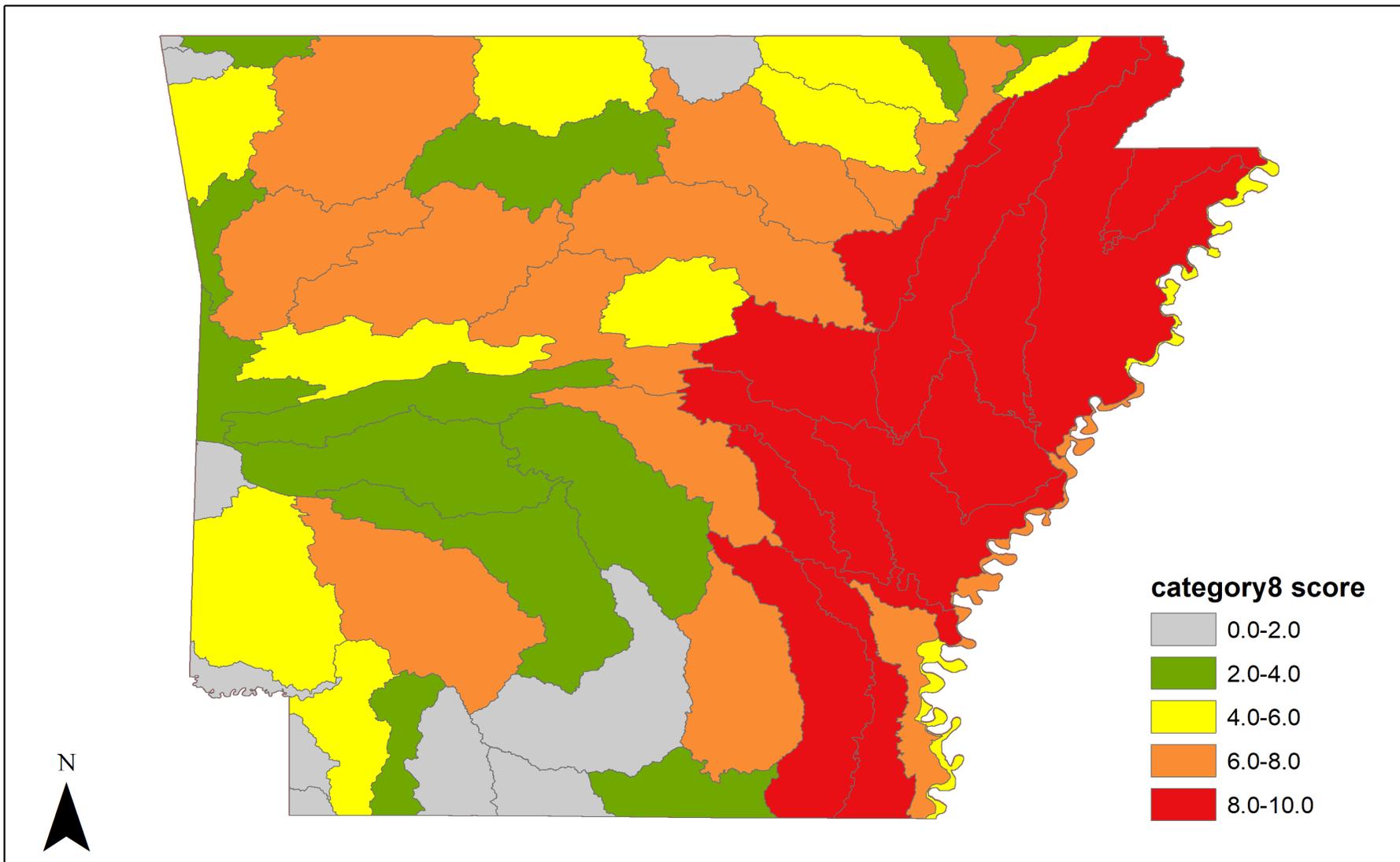
Category 7 Economic Activity

category7 score



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**



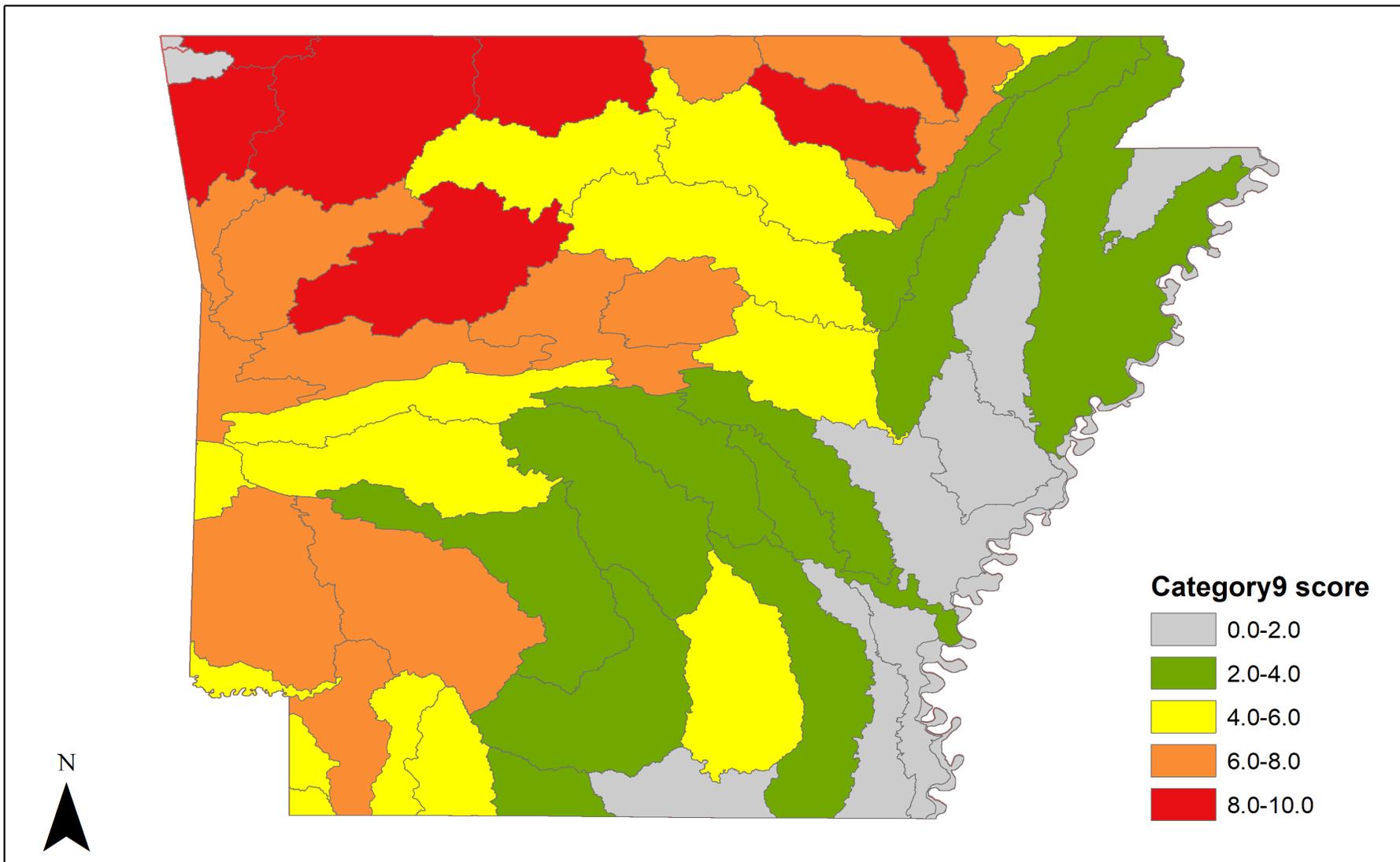
Category 8 Cropland



0 35 70 140 Miles

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**



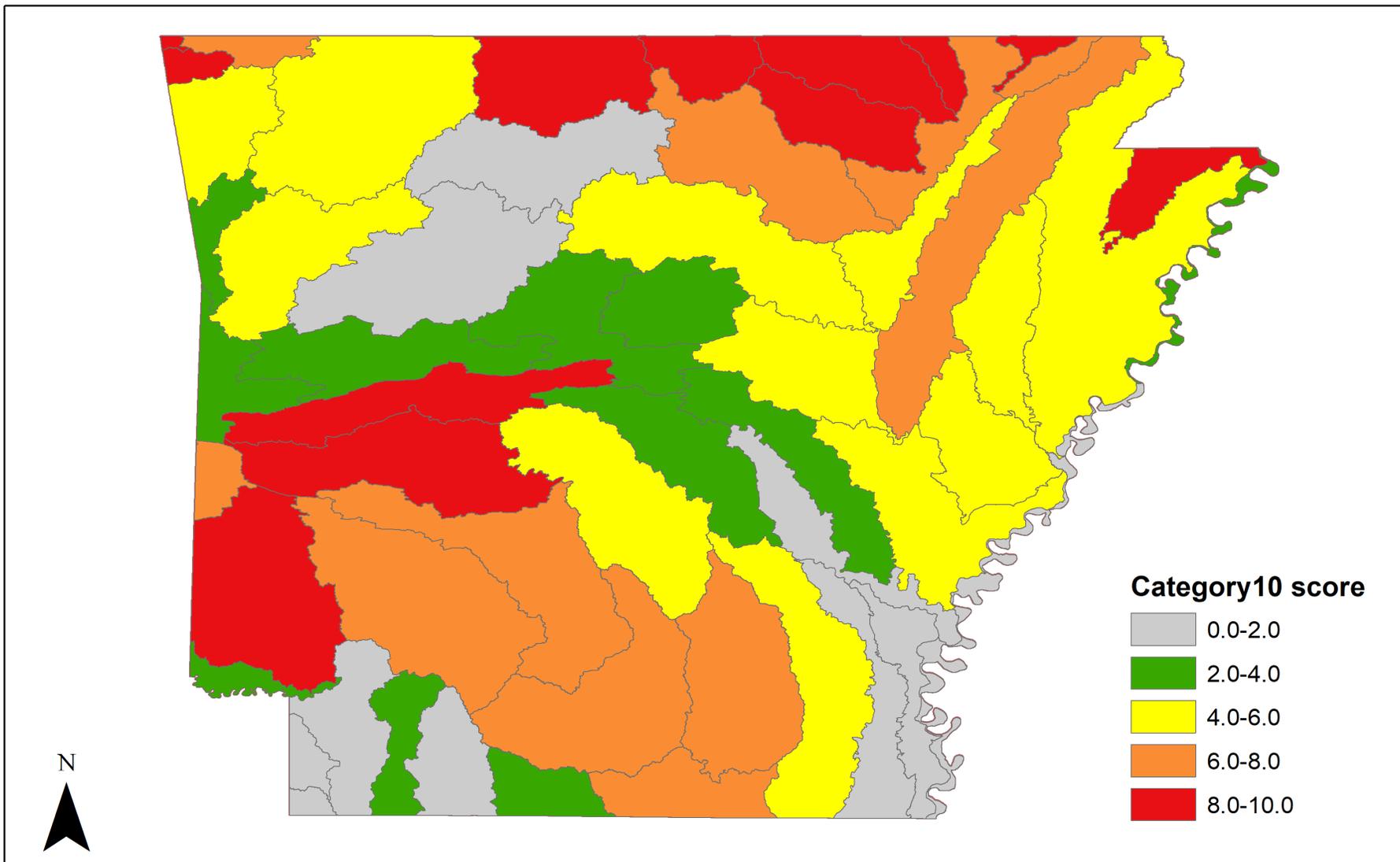
Category 9 Livestock and Pasture



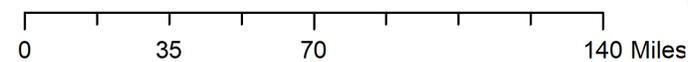
0 35 70 140 Miles

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**

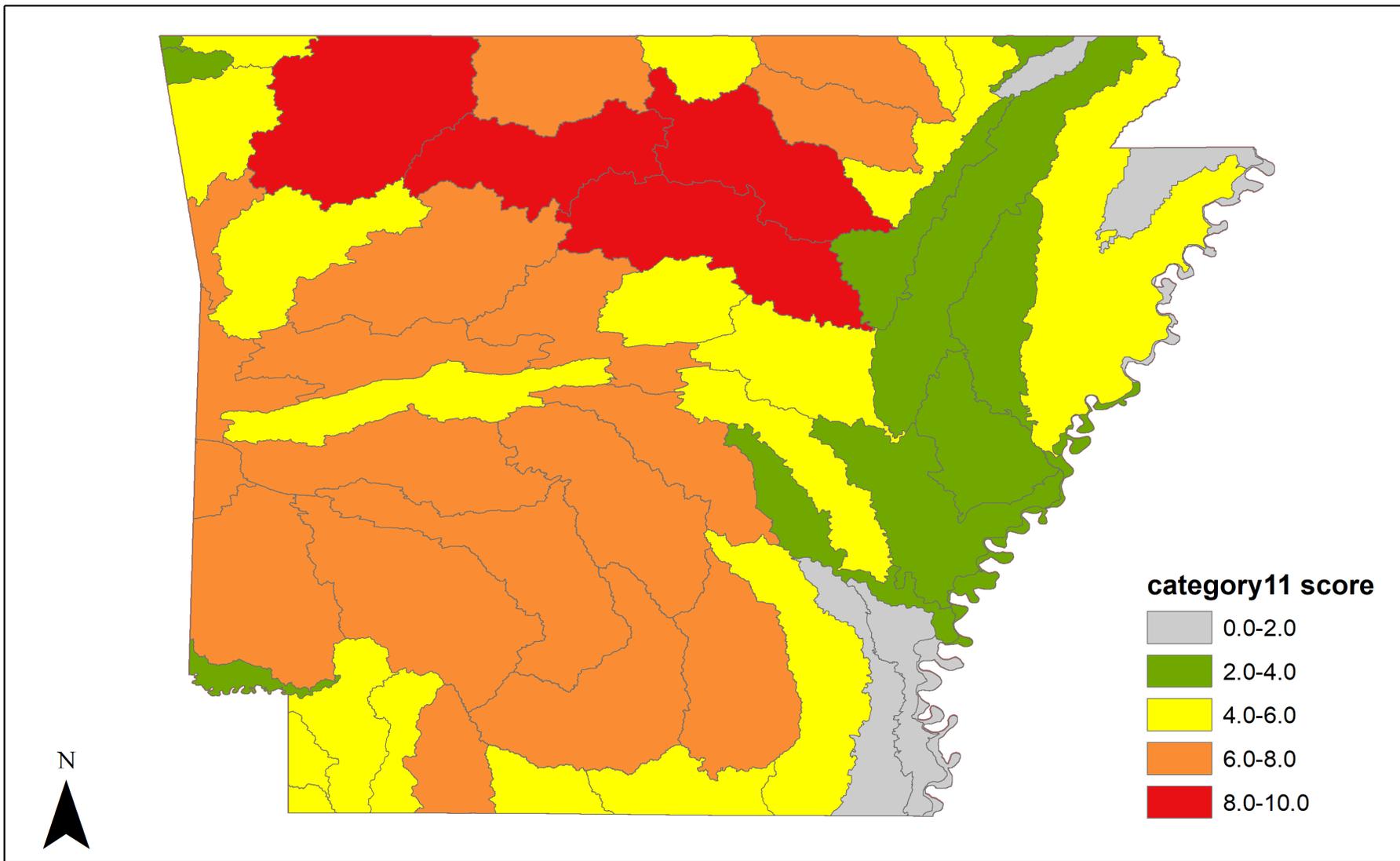


Category 10 Unpaved Roads

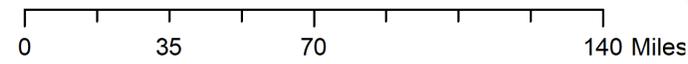


Category 11 – Forestry

- **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 × 2.0**
- **Federally owned forest score = percentile × 3.0**
- **Private owned forest score = percentile × 5.0**

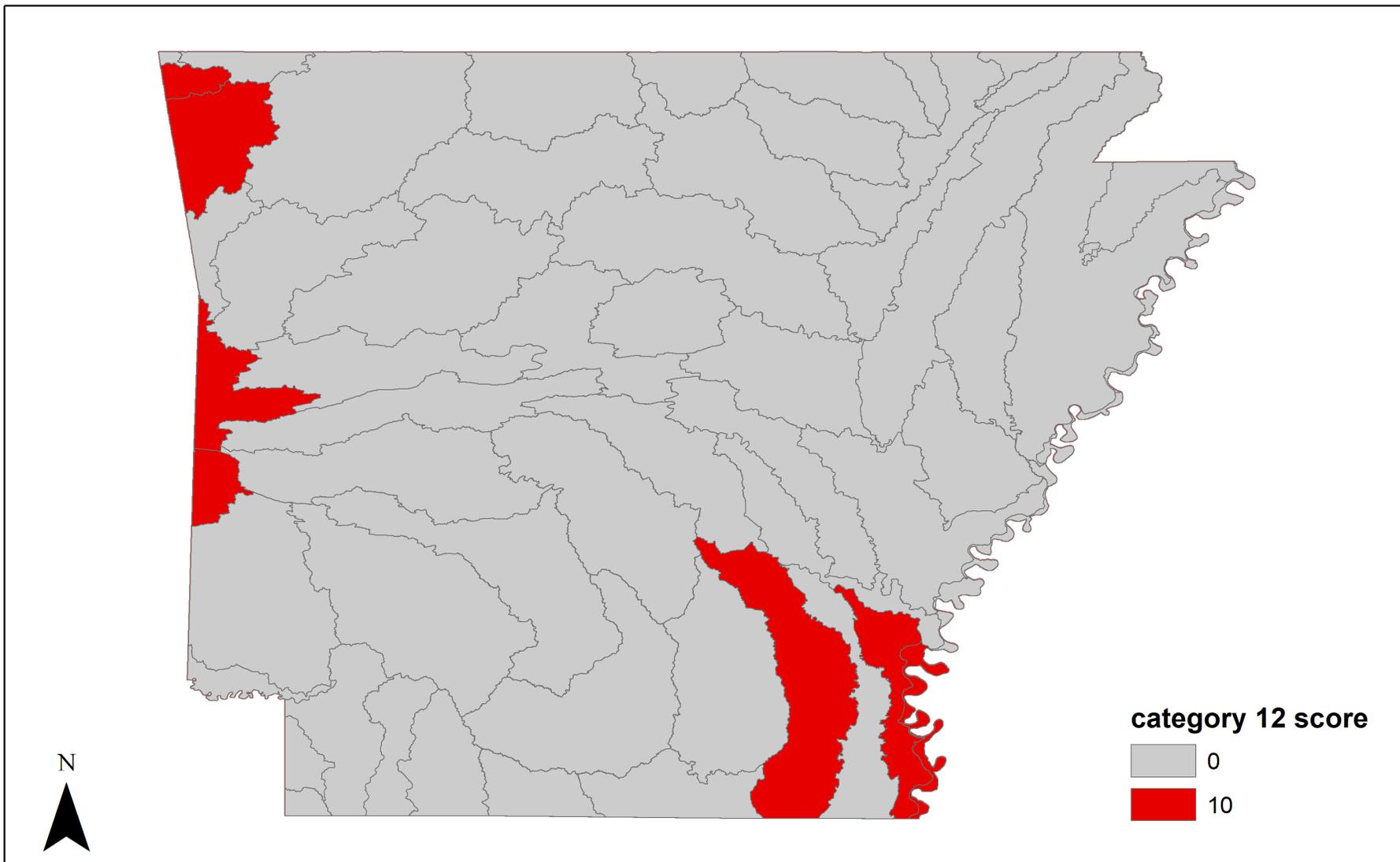


Category 11 Forestry

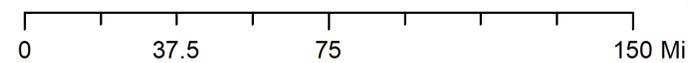


Category 12 – Adjacent State Priority

- **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**

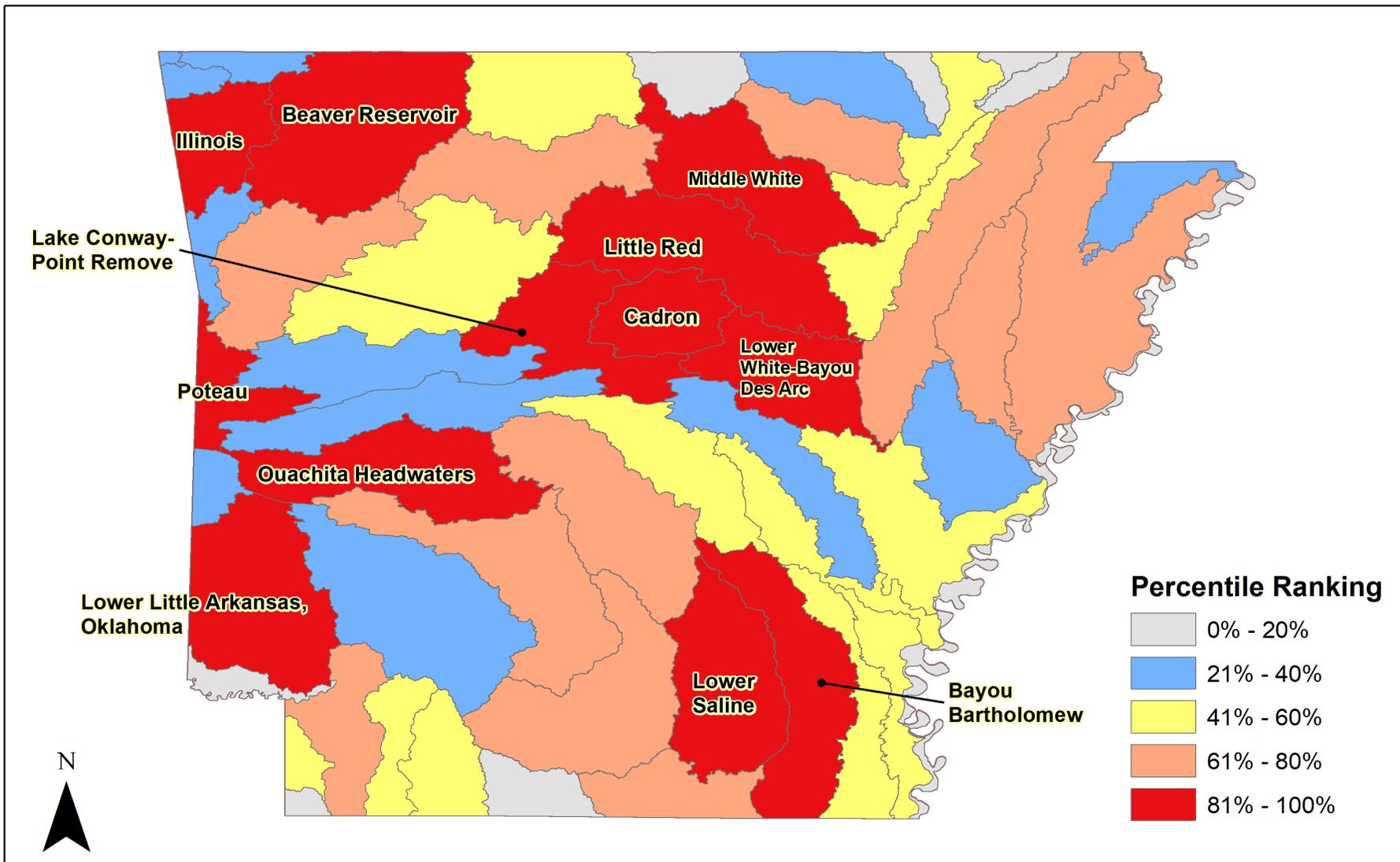


Category 12 Adjacent State Priority



Watersheds with Highest Overall Scores

1. Beaver Reservoir
2. Lower Little River
3. Little Red River
4. Lake Conway – Point Remove
5. Illinois River
6. Ouachita Headwaters
7. Bayou Bartholomew
8. Middle White
9. Poteau River
10. Cadron Creek
11. Lower White-Bayou Des Arc
12. Lower Saline River



Final Risk Matrix Ranking



0 37.5 75 150 Miles

2010 Top 12 Watersheds

1. Beaver Reservoir
2. Poteau River
3. Bayou Bartholomew
4. Illinois River
5. Ouachita Headwaters
6. Lake Conway – Point Remove
7. Upper Ouachita River
8. Upper Saline River
9. Cache River
10. L'Anguille River
11. Strawberry River
12. Lower Ouachita – Smackover

2022 Top 12 Watersheds

1. Beaver Reservoir
2. Lower Little River
3. Little Red River
4. Lake Conway – Point Remove
5. Illinois River
6. Ouachita Headwaters
7. Bayou Bartholomew
8. Middle White River
9. Poteau River
10. Cadron Creek
11. Lower White-Bayou Des Arc
12. Lower Saline River

Differences in Results from 2010 to 2022

- Six of the twelve watersheds in 2022 top quintile were not included in the 2010 top quintile.
- Lower Little River and Little Red River changed from outside the top quintile in 2010 to the second and third highest rankings in 2022. In 2010, the Category 1 scores were 8 for Lower Little River and 2 for Little Red River (both watersheds had a Category 1 score of 10 in 2022).

Questions?

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