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**BIOSYSTEMS AND
AGRICULTURAL ENGINEERING**

EXTENSION

**OKLAHOMA WATER
RESOURCES CENTER**

Drinking Water Quality Challenges in Rural Oklahoma

Jeff Sadler

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Professor

**Central Plains Drinking Water Quality and
Rural Health Symposium**

**June 2, 2026
Lawrence, KS**

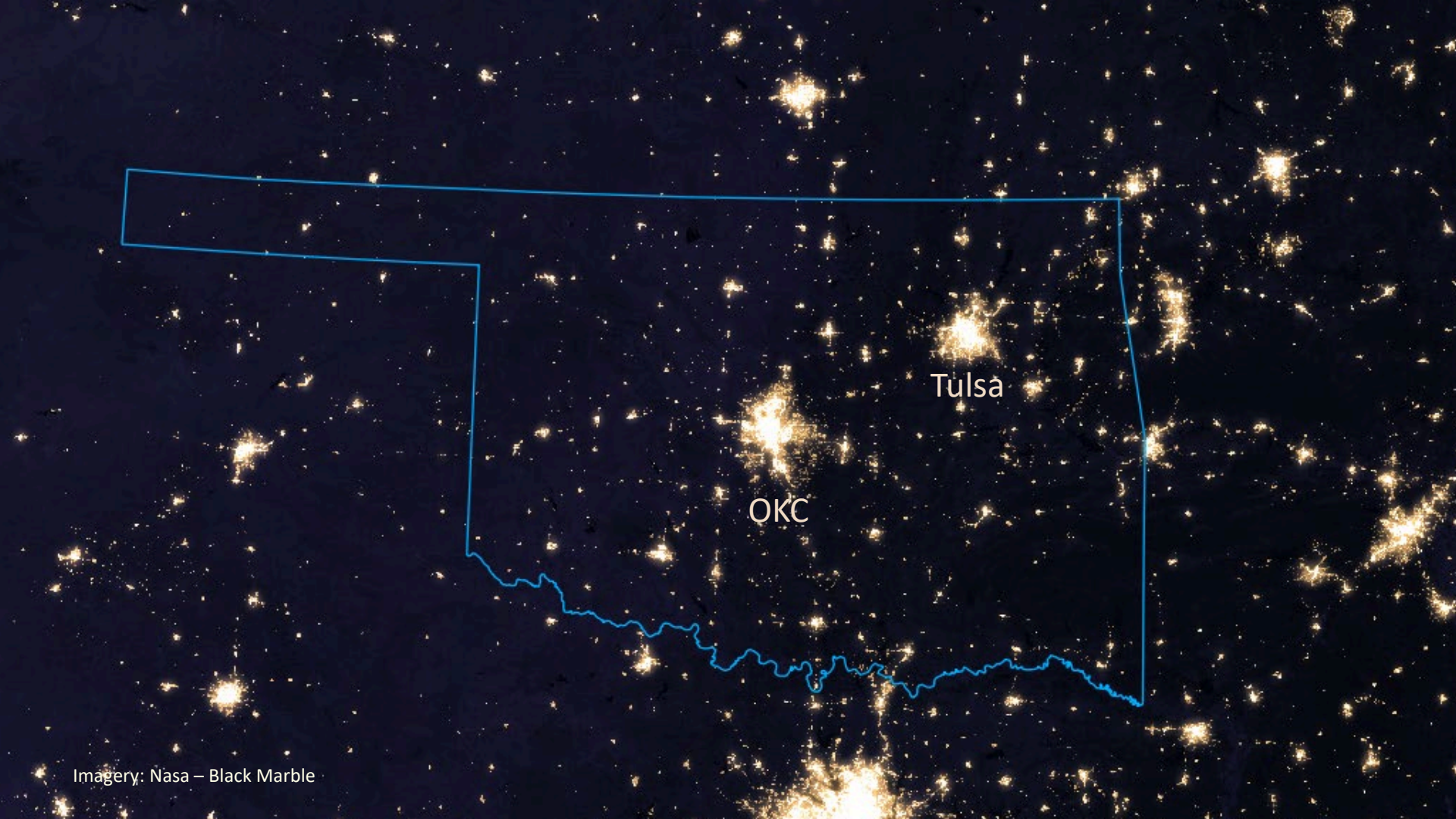


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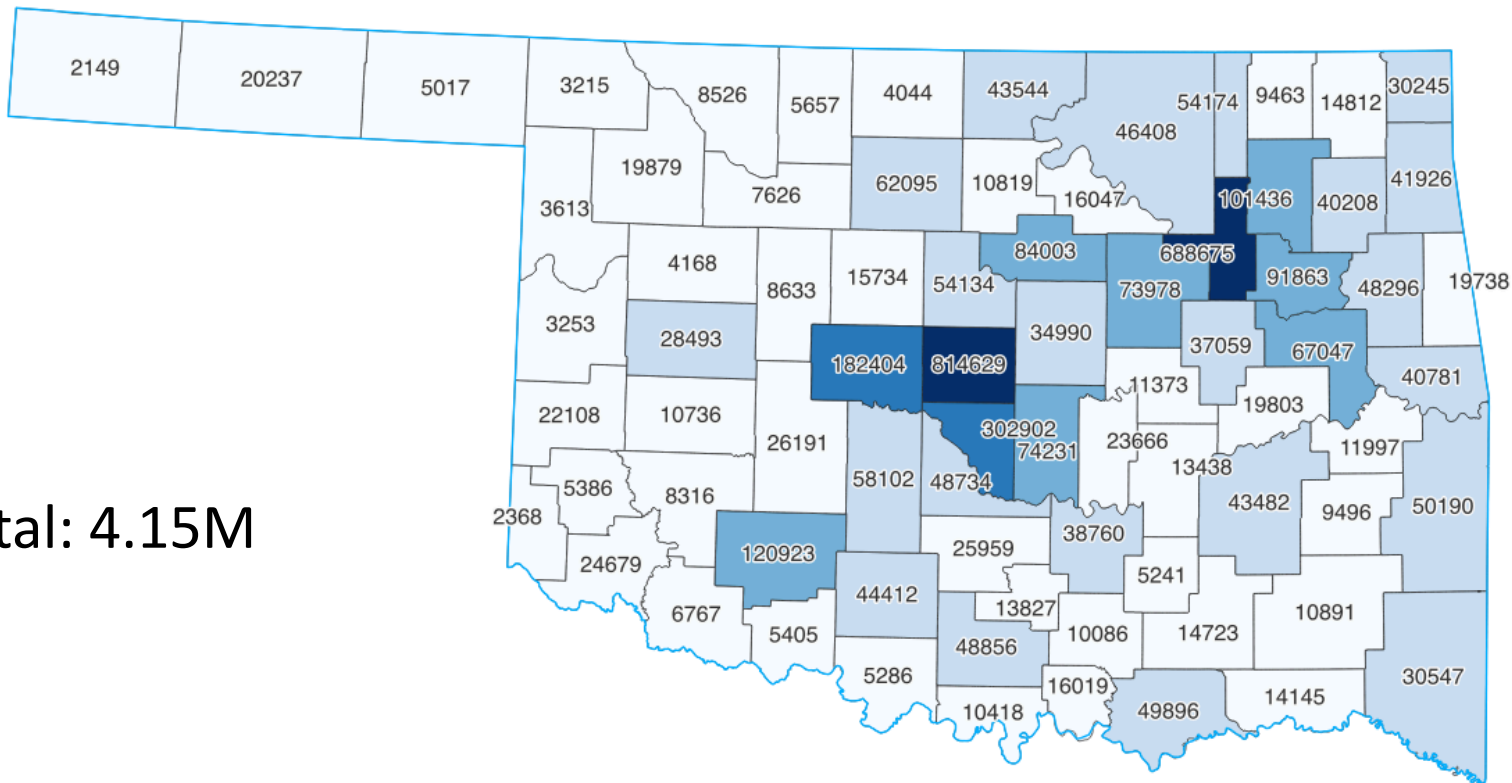
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src: Google Earth



Population

Total: 4.15M

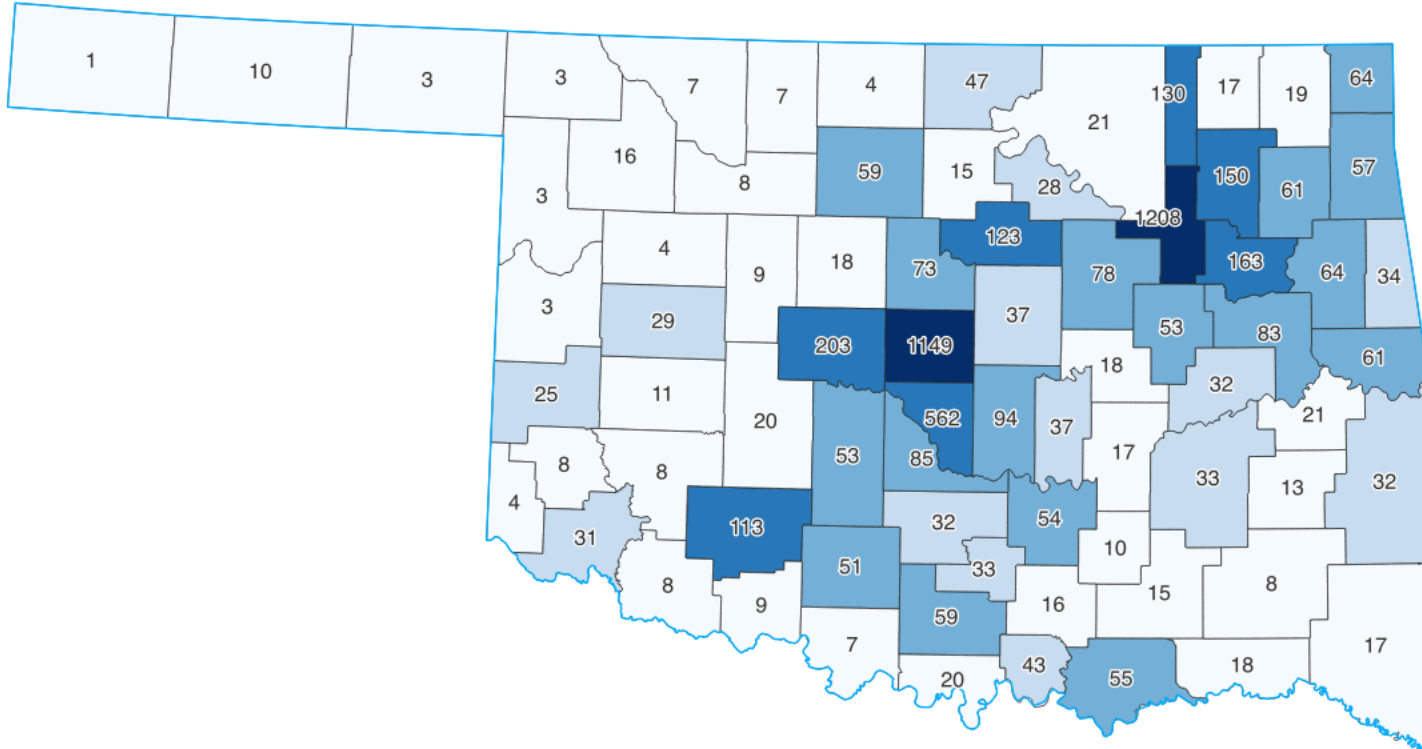


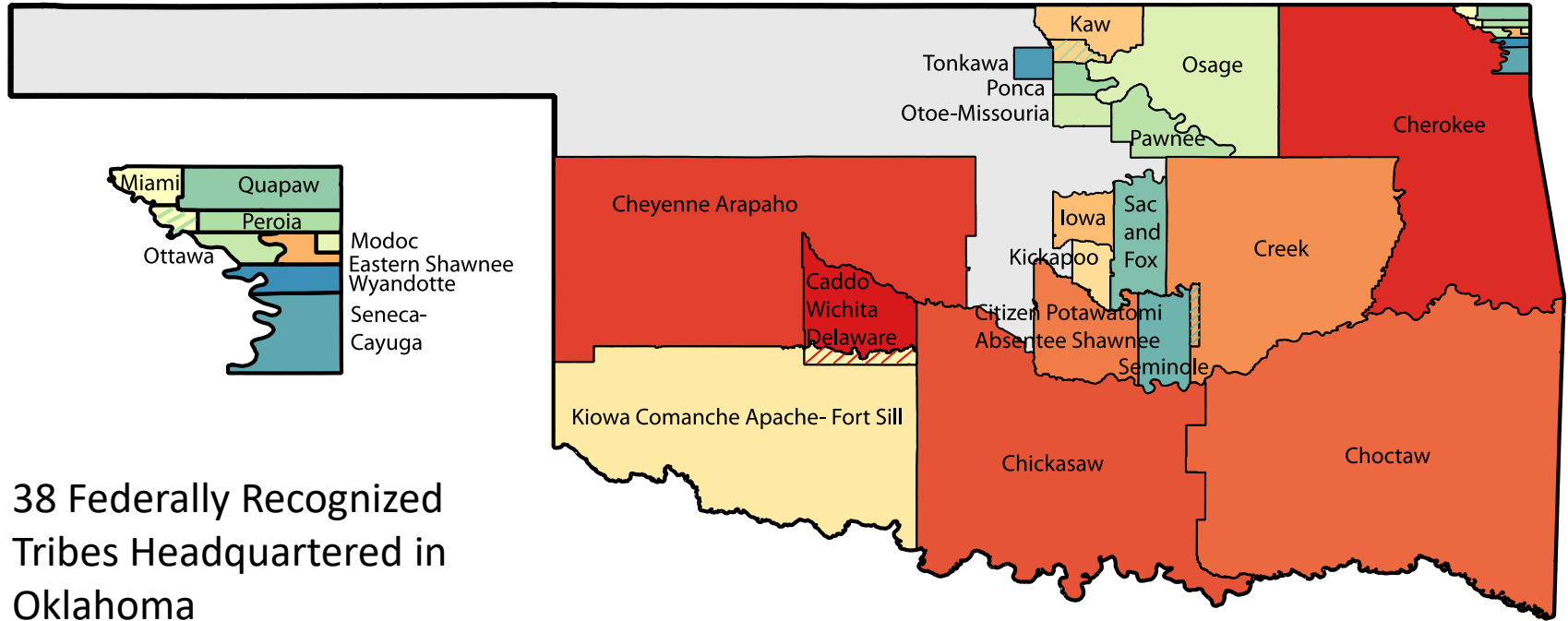
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Population Density

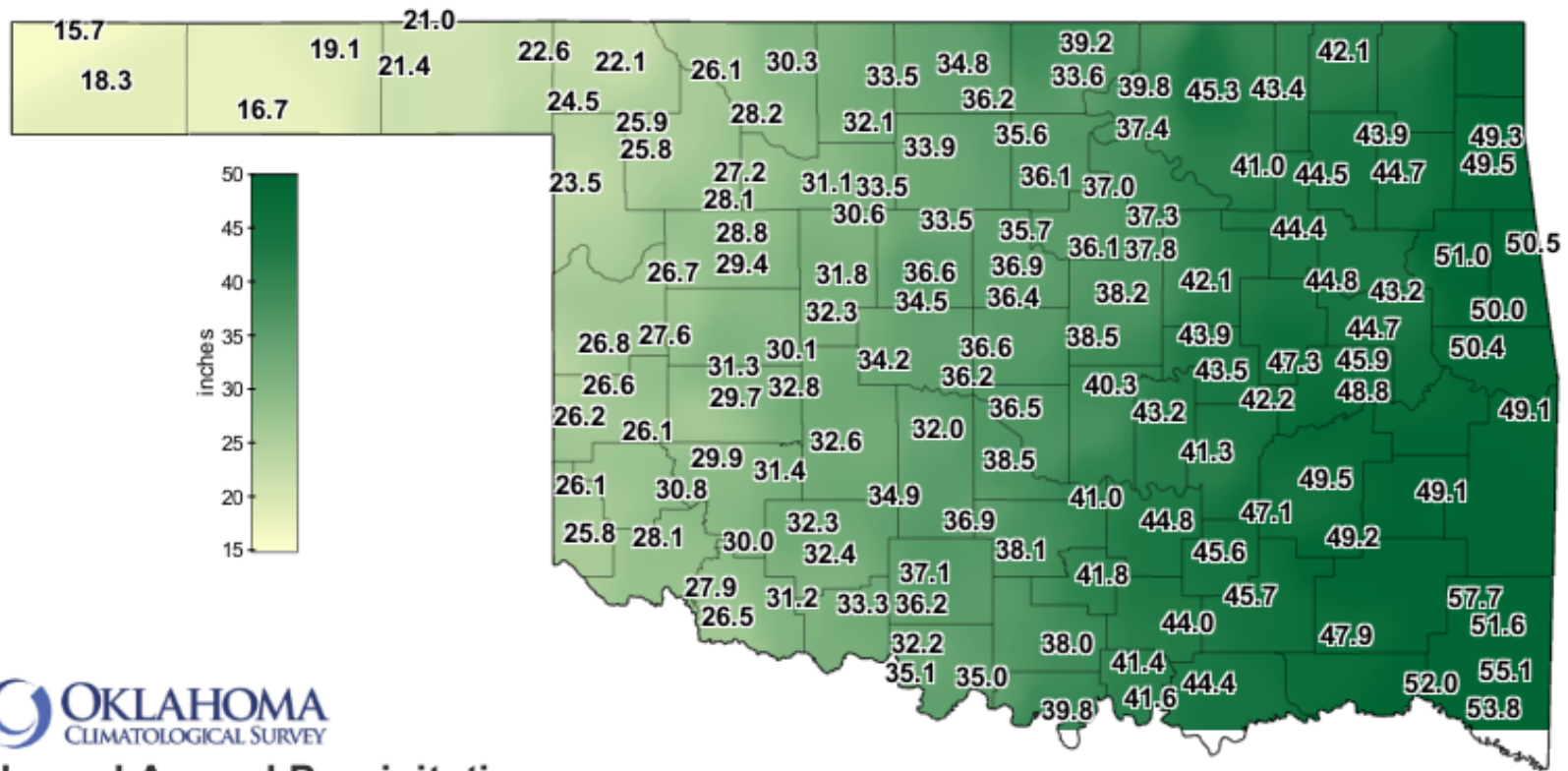




38 Federally Recognized Tribes Headquartered in Oklahoma

By Crimsonedge34 - Own work, CC0, <https://commons.wikimedia.org/w/index.php?curid=18101792>





Normal Annual Precipitation

1991-2020 NCEI Normals

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https://data.mesonet.org/data/public/climate/ok/archive/normals/images/1991-2020/avg_precip.1991-2020.png



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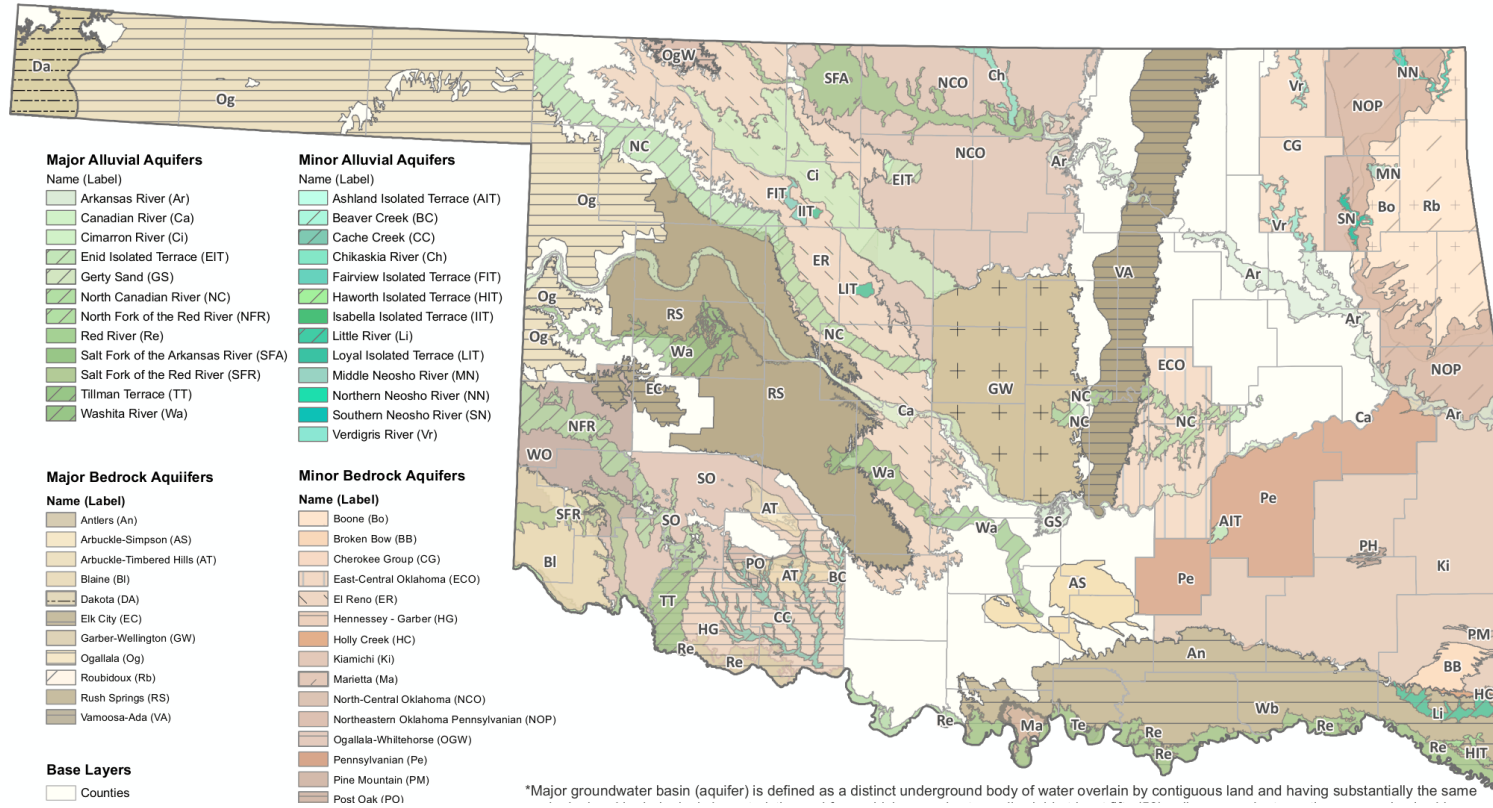
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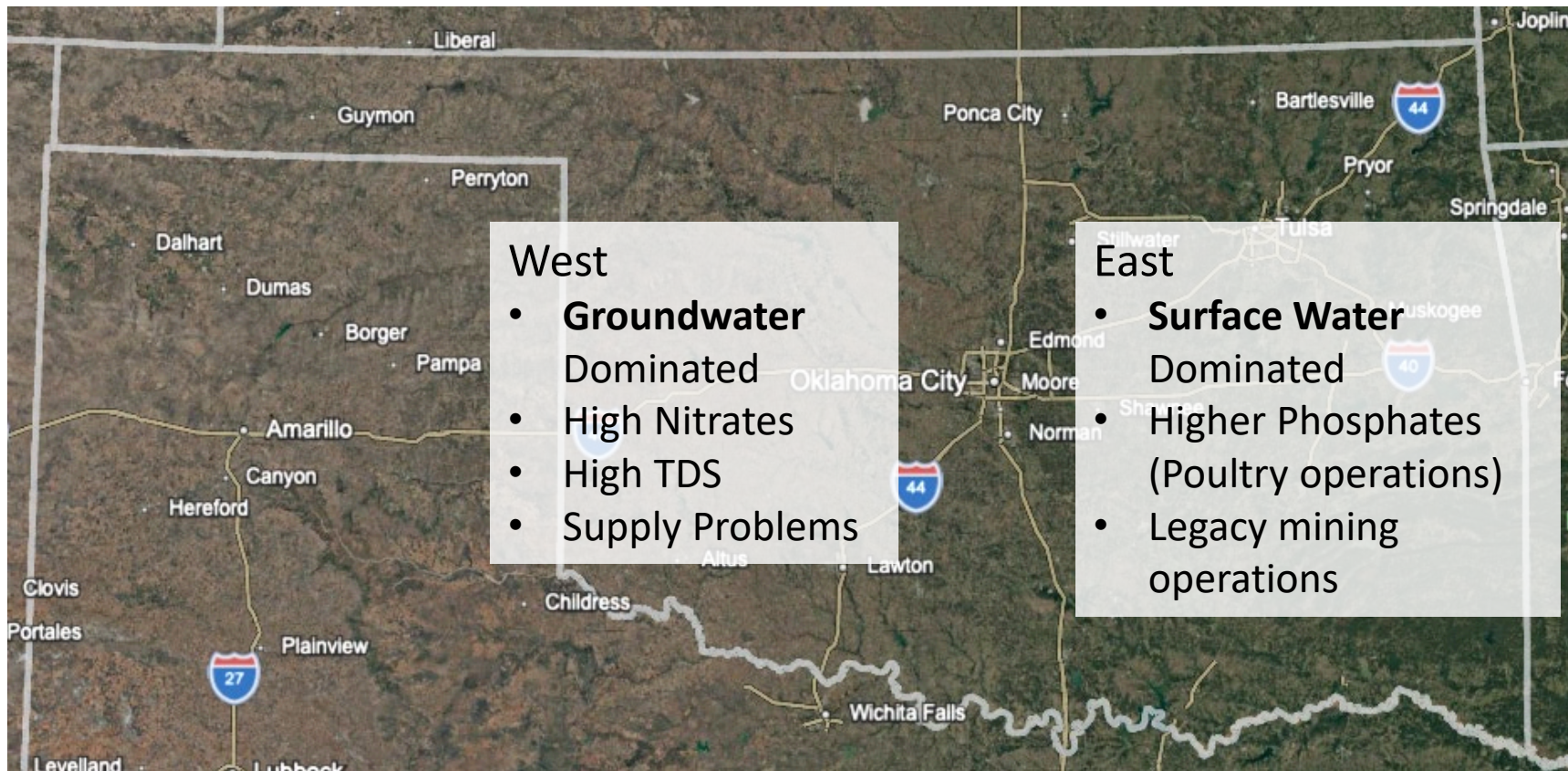
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<https://gisgeography.com/oklahoma-lakes-rivers-map/>

Oklahoma Groundwater Resources

Major and Minor Aquifers of Oklahoma





West

- **Groundwater Dominated**
- High Nitrates
- High TDS
- Supply Problems

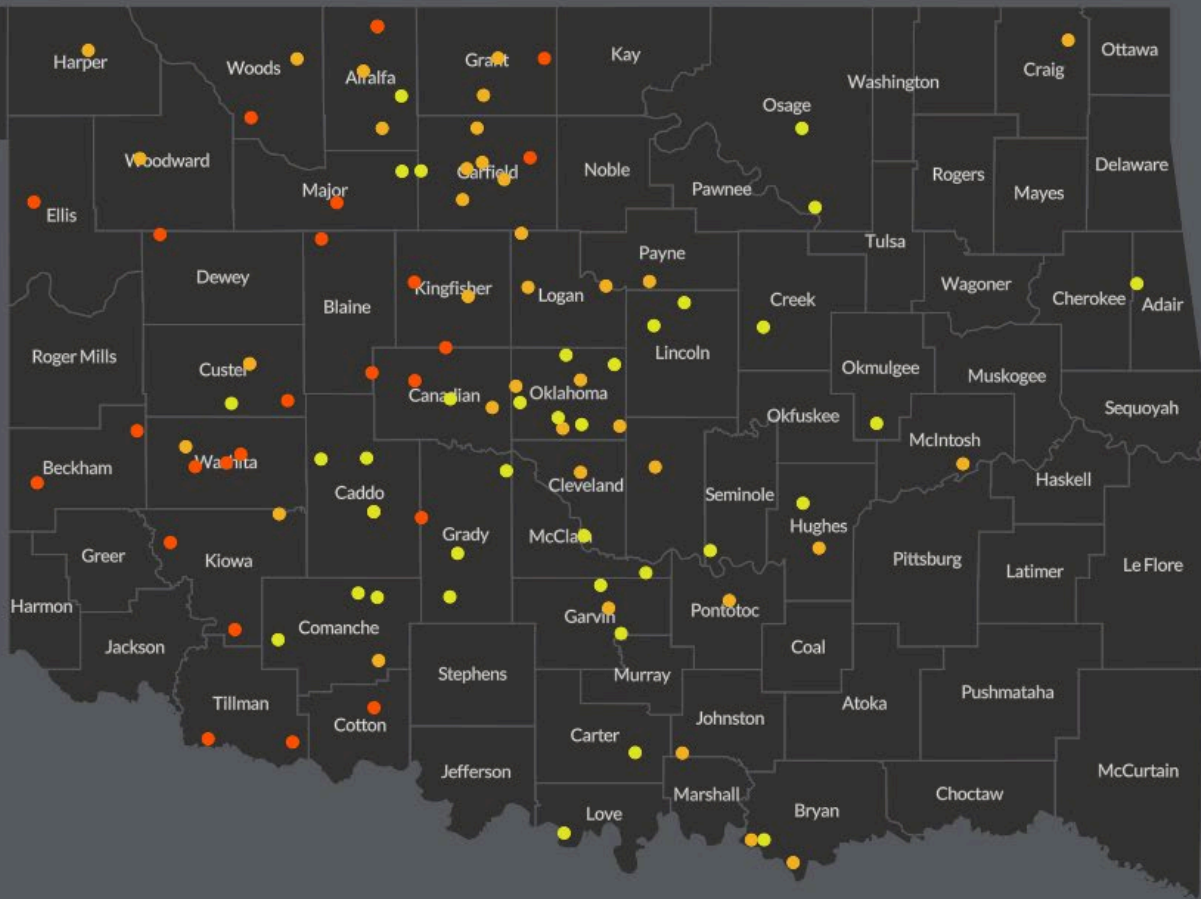
East

- **Surface Water Dominated**
- Higher Phosphates (Poultry operations)
- Legacy mining operations





- At least one test at or above 3 mg/L
- At least one test at or above 5 mg/L
- At least one test at or above 10 mg/L



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src: <https://www.ewg.org/interactive-maps/2020-nitrate-pollution-of-drinking-water-for-more-than-20-million-americans-is-getting-worse/ok/>

Effects of Oil and Gas Operations

- Orphaned Wells
- Improperly constructed or maintained (injection) wells



Challenges in Oklahoma's Drinking Water Systems

Public



Private



<https://extension.psu.edu/five-parts-of-sanitary-water-well-construction>



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Many Small Public Water Supplies

- 1300+ public water supplies in OK
- 95+% serve less than 10k people



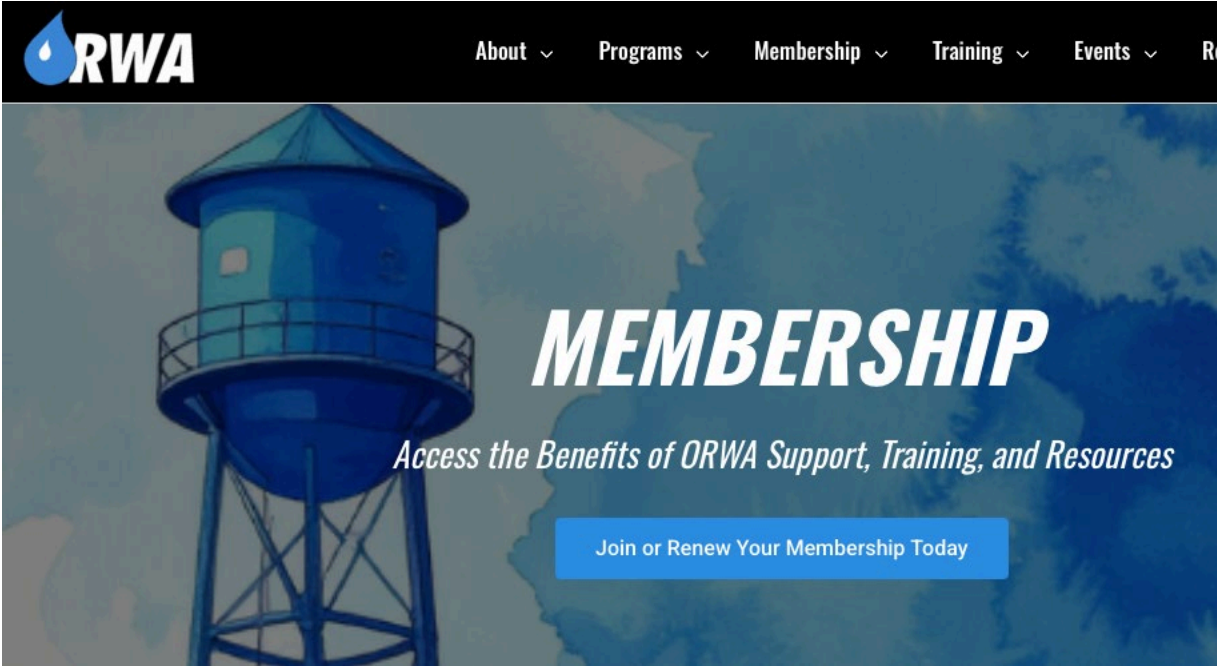
Challenges for Small Treatment Plants

- Workforce recruitment/retention
- Tightening regulations
- Aging infrastructure
 - Treatment plants
 - Distribution system



Strategies to Address Challenges

Oklahoma
Rural Water
Association



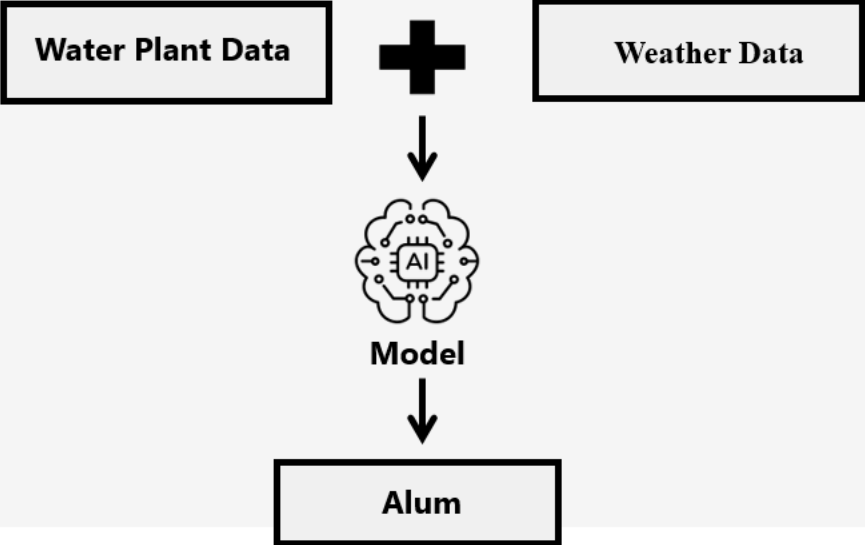
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Strategies to Address Challenges

Proposed Solution: Predictive AI Model



Private Water Wells

- **It is the responsibility of well owners themselves to ensure their water is safe**

Estimated numbers

- 316,000 Oklahomans rely on private well water
- 67,000 known residential wells across the state



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Strategy to Address These Challenges: Oklahoma Well Owner Network

- An Extension Program to serve private well owners in Oklahoma
- Focus
 - Education
 - Screening Events



<https://extension.psu.edu/five-parts-of-sanitary-water-well-construction>



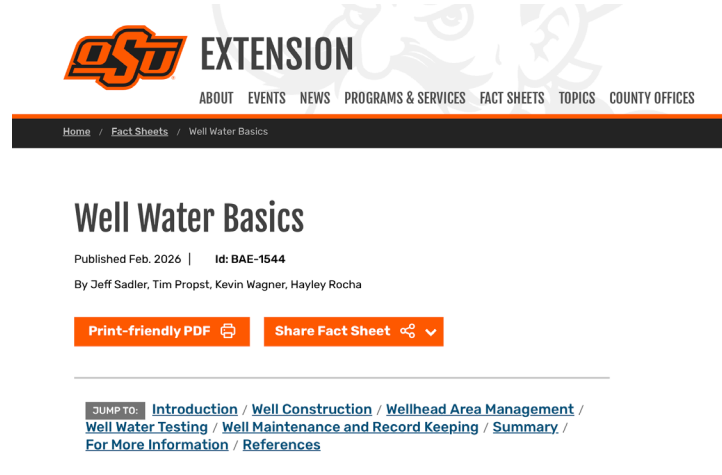
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Oklahoma Well Owner Network

- Education
 - Fact Sheets
 - *Well Water Basics*
 - *Understanding Your Household Water Test Report*
 - In progress
 - *In-Home Water Treatment Devices Fact Sheet*
 - *Online course*



The screenshot shows the Oklahoma State University Extension website. At the top is the OSU logo and the word 'EXTENSION'. Below that is a navigation menu with links for 'ABOUT', 'EVENTS', 'NEWS', 'PROGRAMS & SERVICES', 'FACT SHEETS', 'TOPICS', and 'COUNTY OFFICES'. A breadcrumb trail reads 'Home / Fact Sheets / Well Water Basics'. The main heading is 'Well Water Basics', with a sub-heading 'Published Feb. 2026 | Id: BAE-1544' and the authors 'By Jeff Sadler, Tim Propst, Kevin Wagner, Hayley Rocha'. There are two buttons: 'Print-friendly PDF' and 'Share Fact Sheet'. Below the buttons is a 'JUMP TO:' section with links for 'Introduction', 'Well Construction', 'Wellhead Area Management', 'Well Water Testing', 'Well Maintenance and Record Keeping', 'Summary', 'For More Information', and 'References'. The page title 'Introduction' is visible at the bottom of the screenshot.



Oklahoma Well Owner Network Screenings

- Screening Events
 - Test for
 - Total Coliform
 - E Coli
 - Nitrates
 - TDS
 - pH

~70% of participating well owners had never had their well tested



Number one challenge?

Private Well Water Quality

- Unregulated
- No consistent source of funding
- Private well owners are often most vulnerable



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