



OWRB Produced Water Working Group &
Reuse/Recycling Study

Presented at: Oklahoma Governor's Water Conference

October 11, 2016

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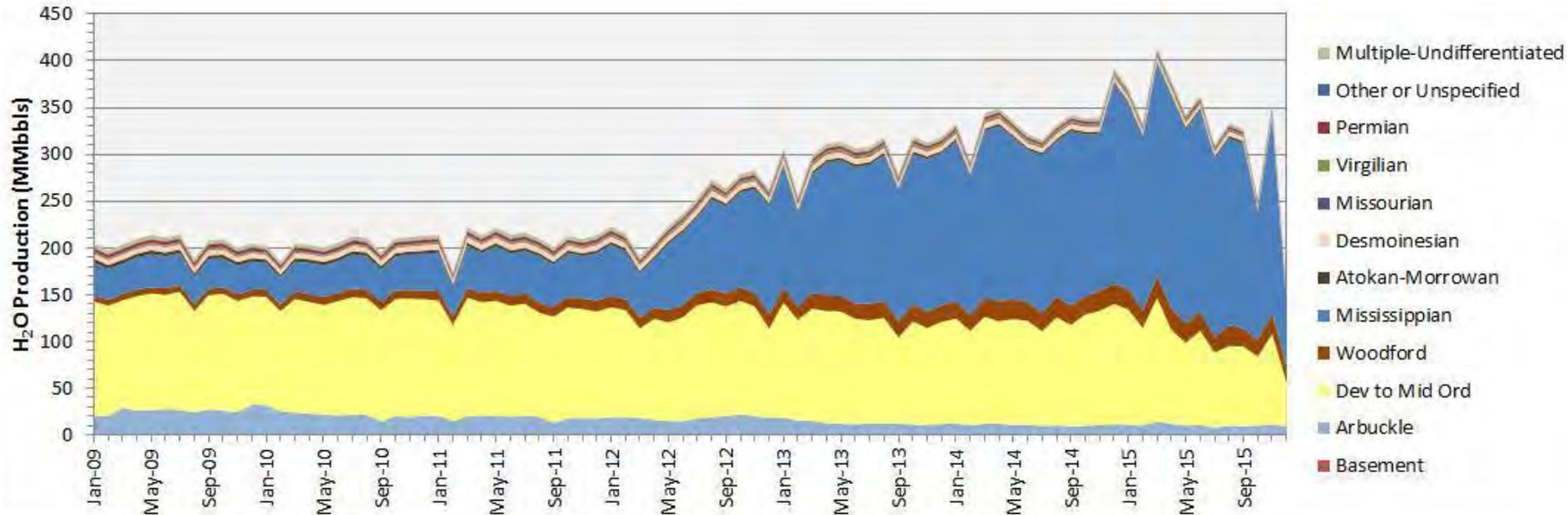
Background

1. Governor Mary Fallin announced plans for Produced Water Working Group (PWWG) at Oklahoma Governor's Water Conference in December, 2015
2. OWRB forms PWWG
 - A. 17 members with a broad spectrum of expertise
 - B. JD Strong as chairman
 - C. Three meetings to date
3. DOE funding for study related to re-use and recycling (started in late August)



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Defining the Challenge

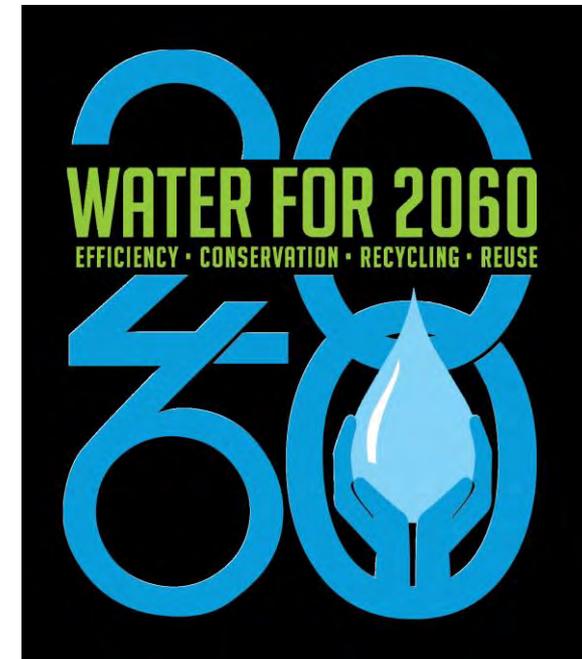


- **Too much produced water**
- Long term need to conserve fresh water sources
- What are the economically viable alternatives?

PWWG Committee

Members

- J.D. Strong (Chairman)
- Secretary of Agriculture Jim Reese(Oklahoma Department of Agriculture, Food & Forestry)
- Tim Rhodes (Oklahoma Corporation Commission)
- Scott Thompson (Oklahoma Department of Environmental Quality)
- Michael Dunkel (CH2M)
- Jesse Sandlin(Oklahoma Oil & Gas Association)
- Mike Mathis (Oklahoma Independent Petroleum Association)
- Brent Kisling (Enid Regional Development Alliance)
- Alan Riffel (Oklahoma Municipal League)
- Mark Matheson (Oklahoma Rural Water Association)
- Dr. Garey Fox (Oklahoma State University)
- Terry Stowers (Coalition of Oklahoma Surface & Mineral Owners)
- Bud Ground (Environmental Federation of Oklahoma)
- Usha Turner (Oklahoma Gas & Electric)
- Mike Ming (GE Global Research)
- Mike Paque (Groundwater Protection Council)
- Fred Fischer (Oklahoma Panhandle Agriculture & Irrigation Association)



PWWG Subcommittees

1. Agriculture

- A. Spread across state
- B. Seasonality for irrigation – Desalination required

2. Water Users and Water Discharge

- A. Power, chemical plants, other or discharge to stream
- B. Desalination required

3. Oil and Gas

- A. Re-use requires minimal treatment

4. Regulatory and Challenges

- A. How can legislators or regulators help?

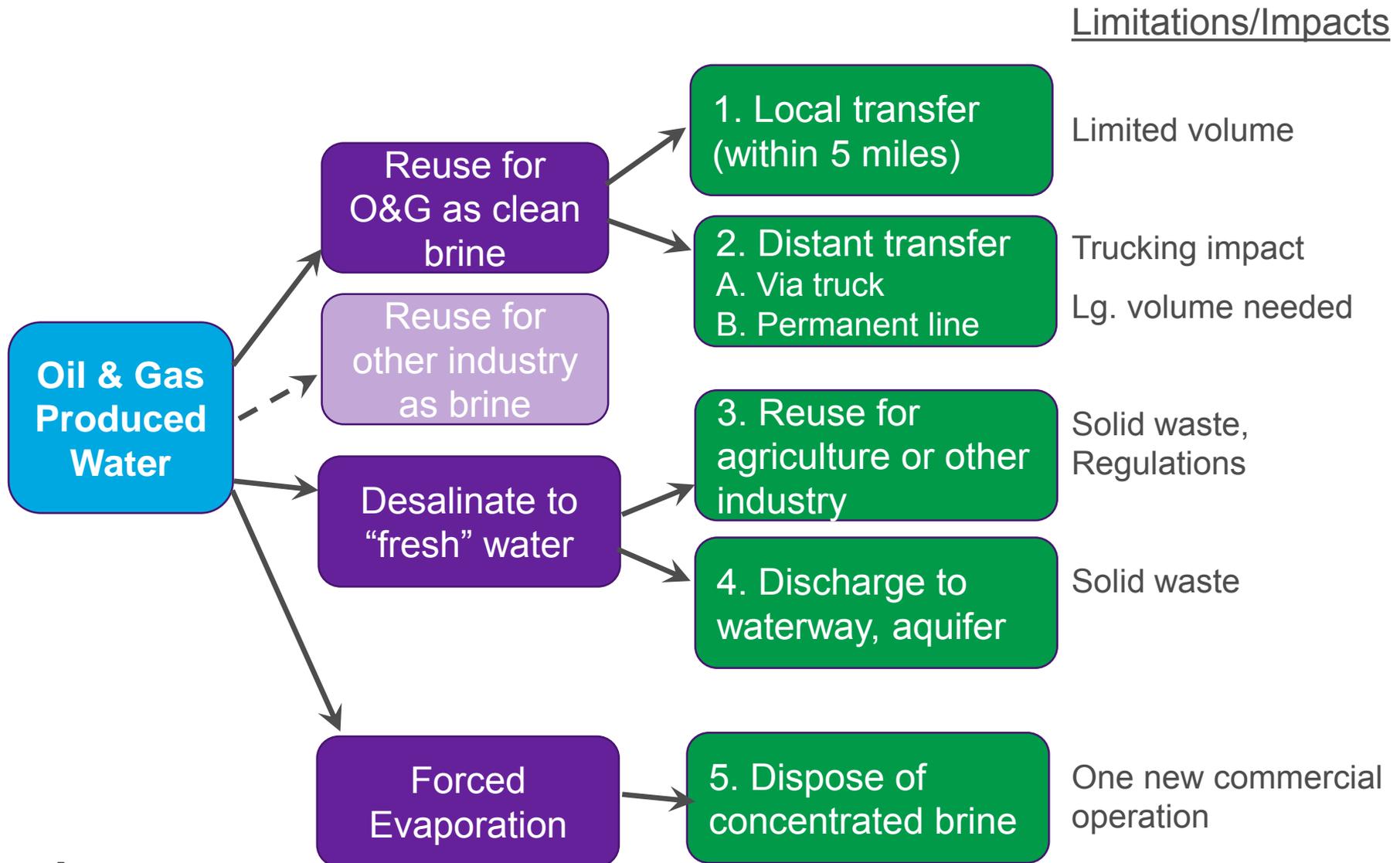
Scope of Work

1. Gather data about produced water and users of water
 - A. Volumes and use by county
 - B. Produced water volumes
 - C. Potential users of treated produced water
 - D. Quality of produced water and quality needed by users
 - E. Spatial relationship of supply and demand
2. Evaluate appropriate water treatment technologies
 - A. Solicit cost estimates from vendors
3. Evaluate economic options and costs
4. Assess challenges and impacts
5. Prepare Final Study Report
 - A. Document methods, data and findings
 - 6 B. Recommendations to support planning and policymaking



Red River

Options Overview

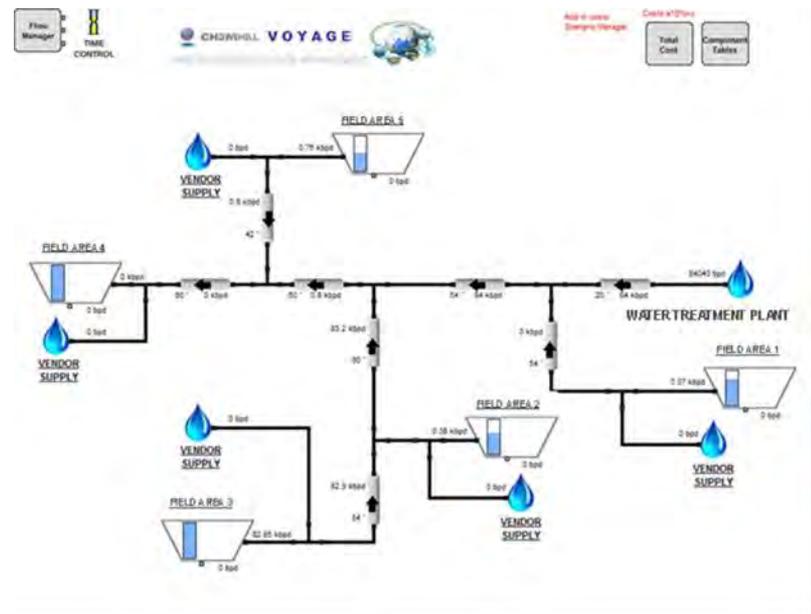


Economic Proposition for Recycling

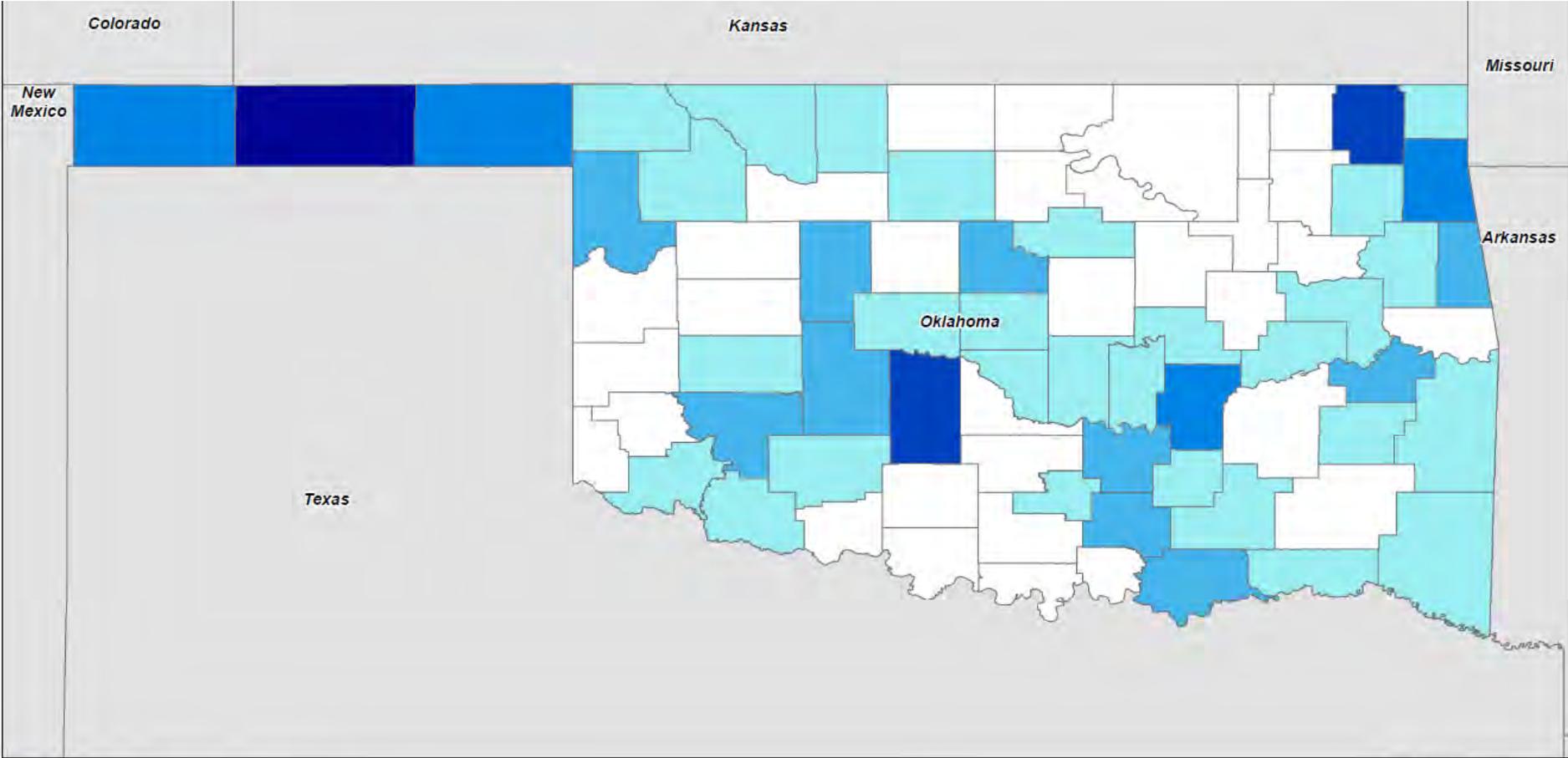
**Disposal cost savings +
Value of useable water**

Versus

**Produced Water transport +
Treatment costs**



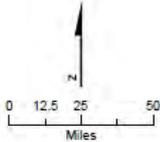
Agricultural Water use by County



LEGEND
Agriculture Primary Use (MGD)

 0.01 - 0.45	 County Boundary
 0.46 - 1.22	 State Boundary
 1.23 - 2.77	
 2.78 - 4.81	
 4.82 - 14.83	

FIGURE X
 Agriculture Use by County
 Produced Water Study
 Oklahoma



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Commercial Water use by County

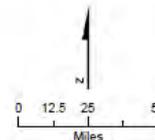
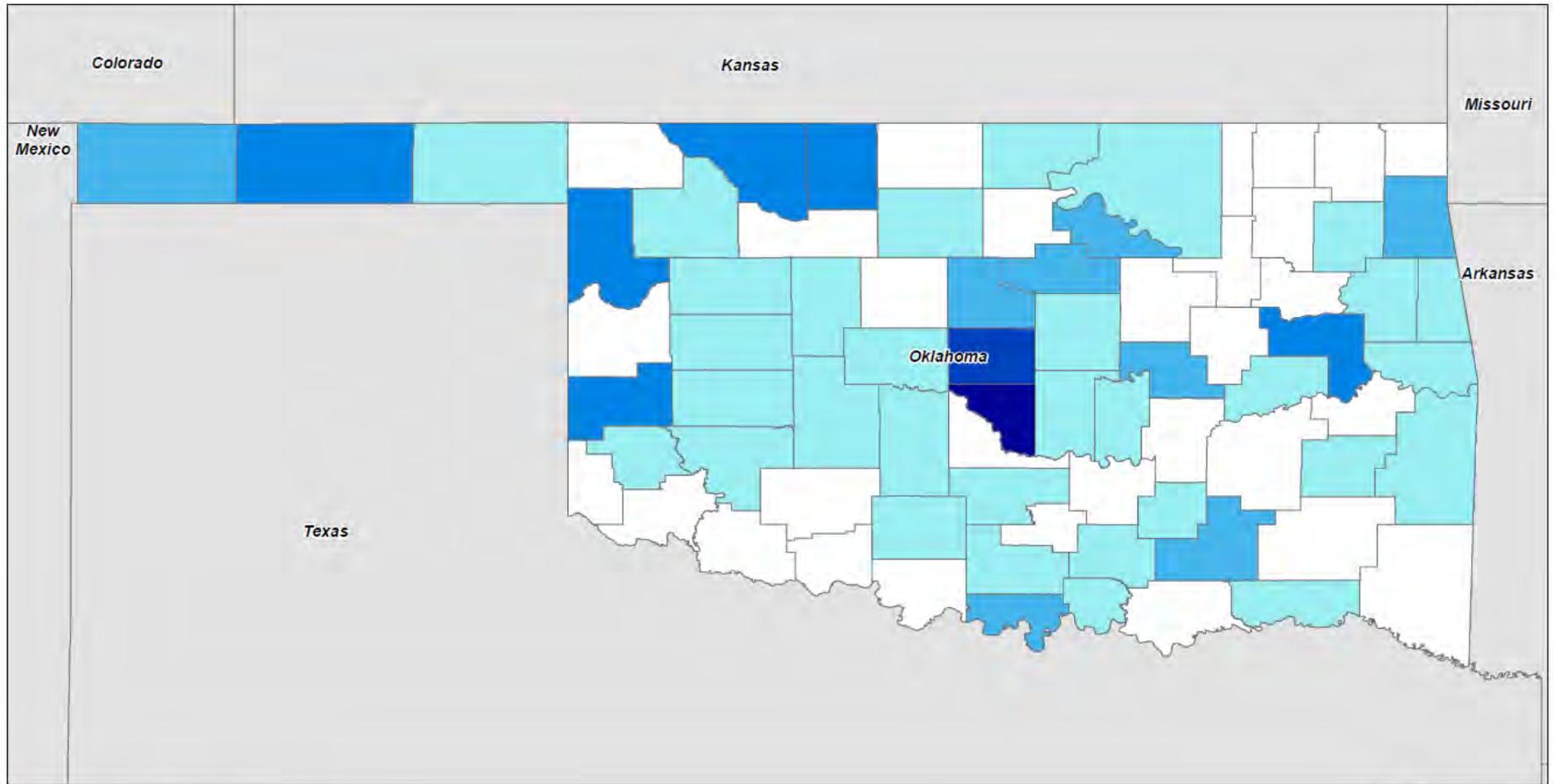


FIGURE X
Commercial Use by County
Produced Water Study
Oklahoma

Industrial Water use by County

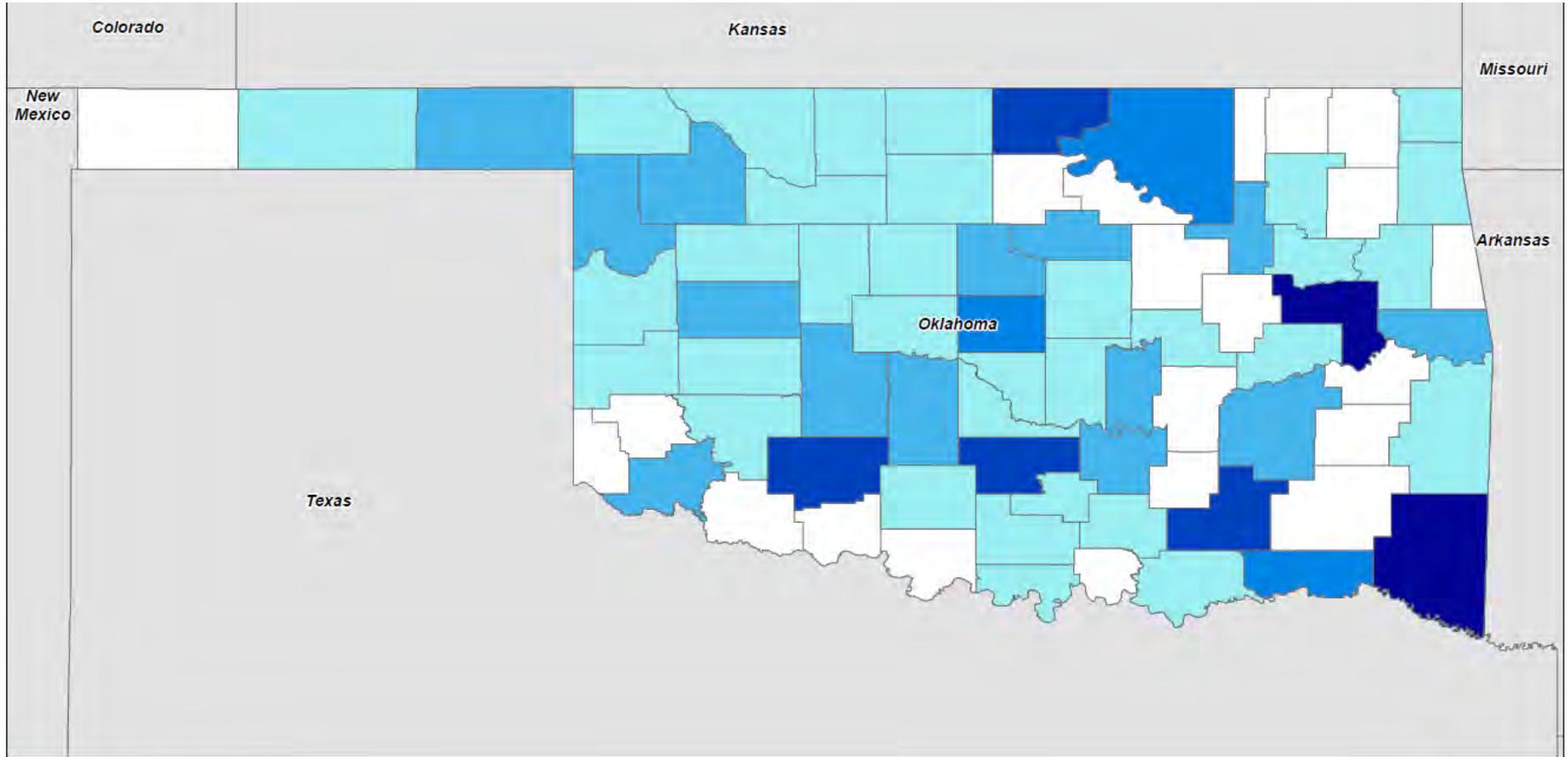
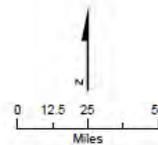
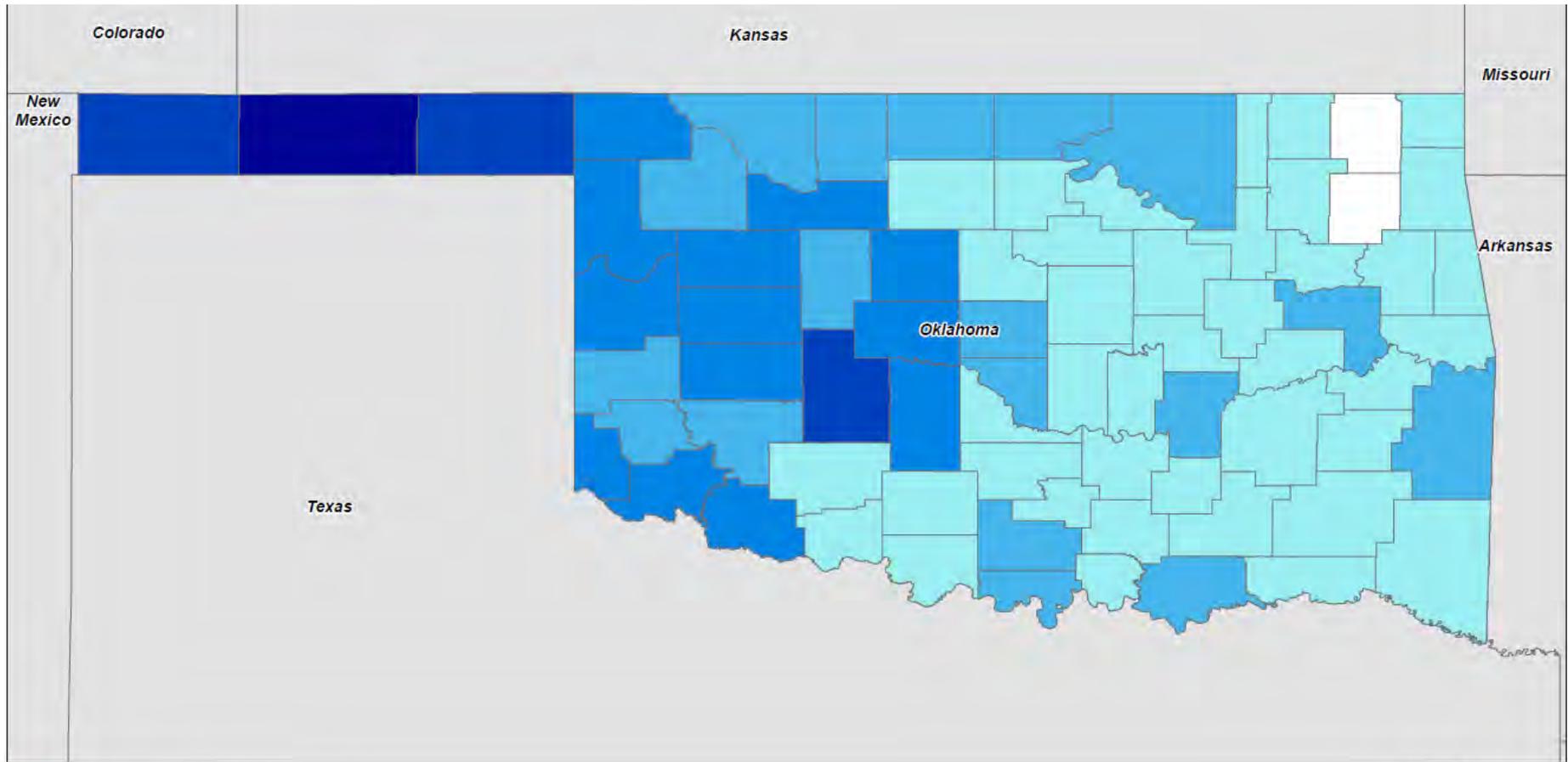


FIGURE X
Industrial Use by County
Produced Water Study
Oklahoma



Irrigation Water use by County



LEGEND
Irrigation Primary Use (MGD)

0.46 - 12.22	County Boundary
12.23 - 42.71	State Boundary
42.72 - 124.02	
124.03 - 275.07	
275.08 - 602.14	

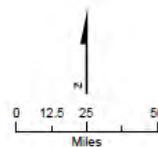


FIGURE X
Irrigation Use by County
Produced Water Study
Oklahoma

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Power Industry's Water use by County

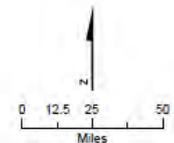
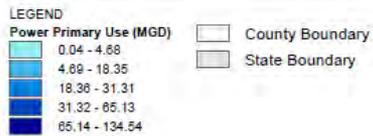
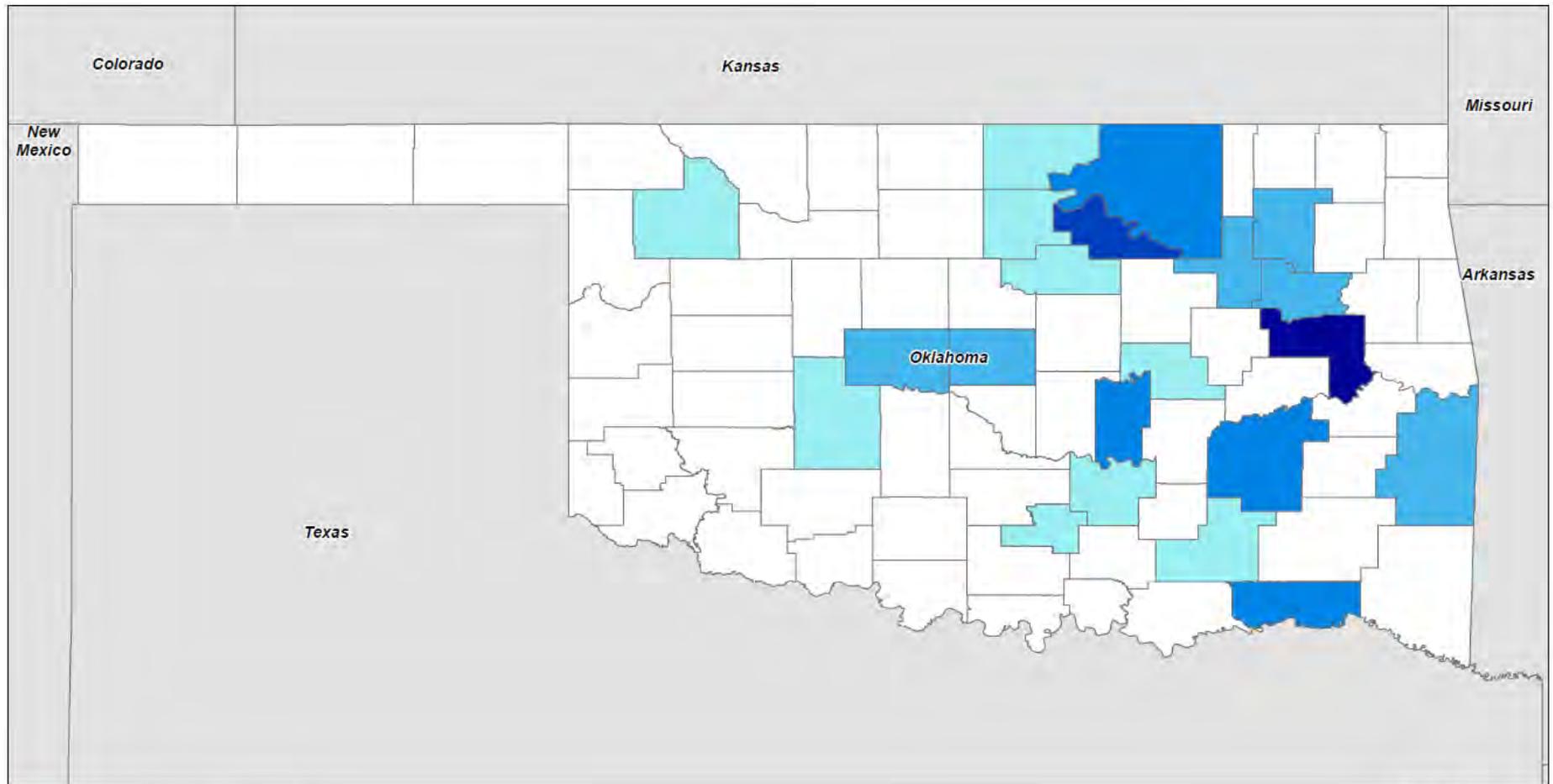


FIGURE X
Power Use by County
Produced Water Study
Oklahoma

Recreation, Fish & Wildlife - Water use by County

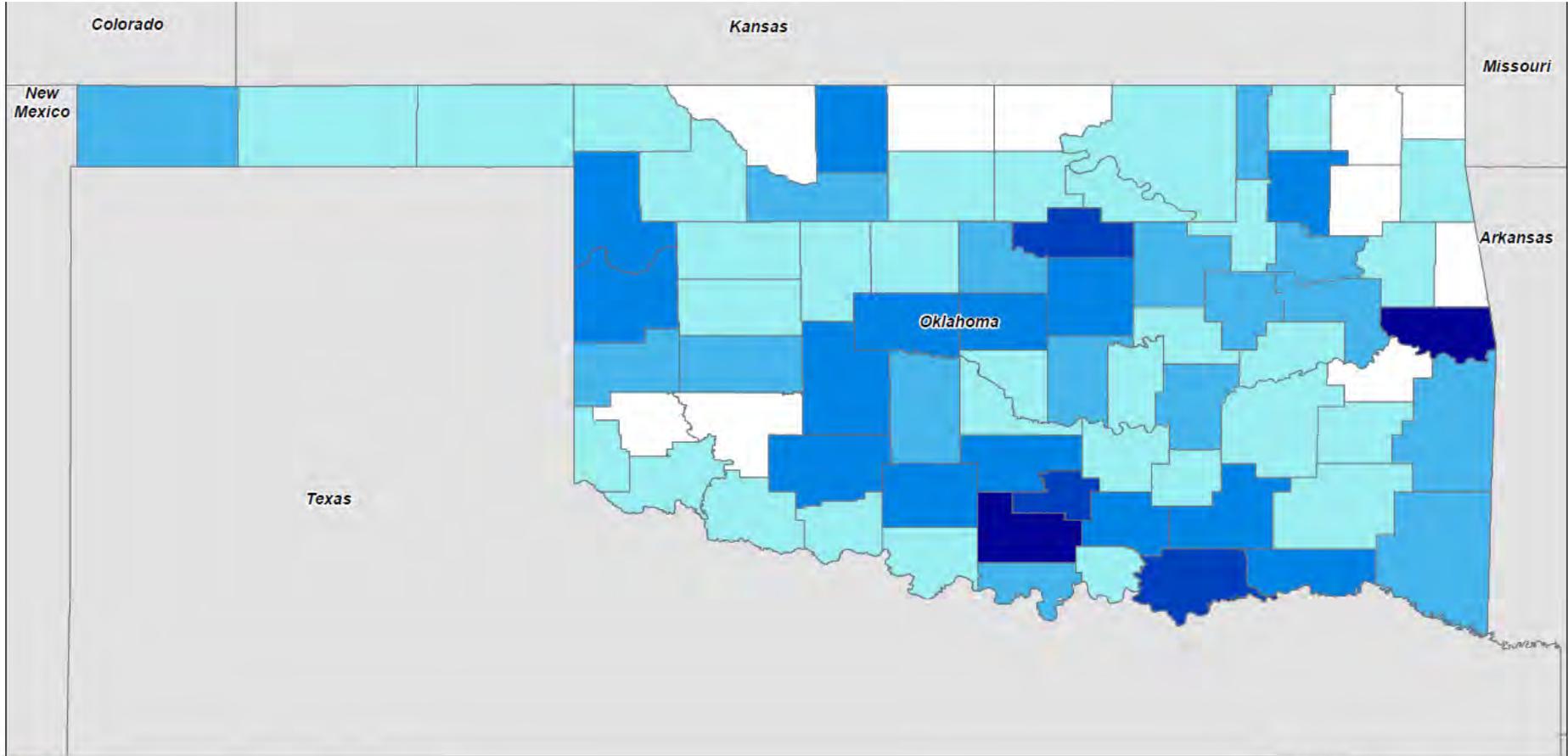
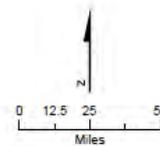


FIGURE X
 Recreation, Fish and Wildlife Use by County
 Produced Water Study
 Oklahoma



Produced Water Disposal & Water Users

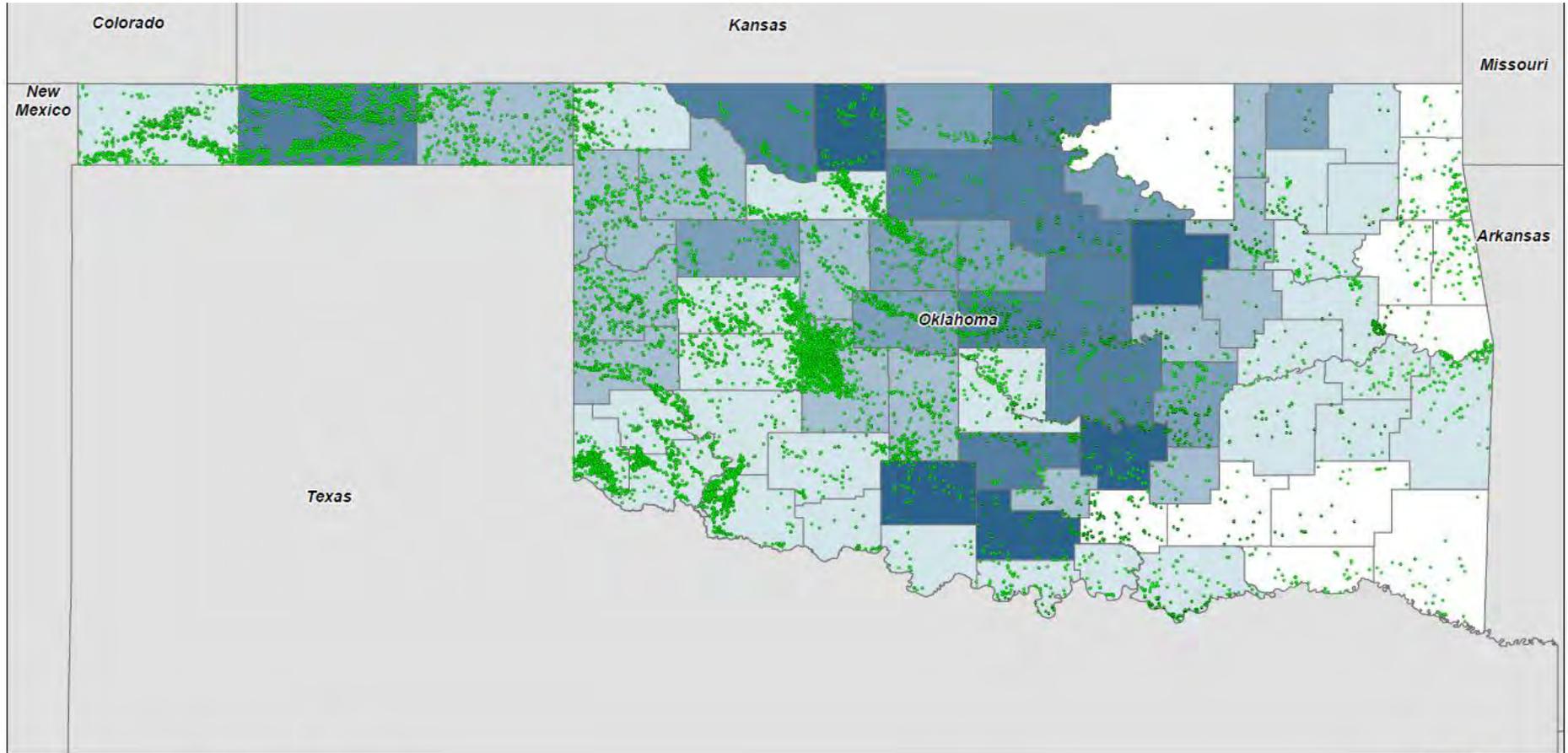
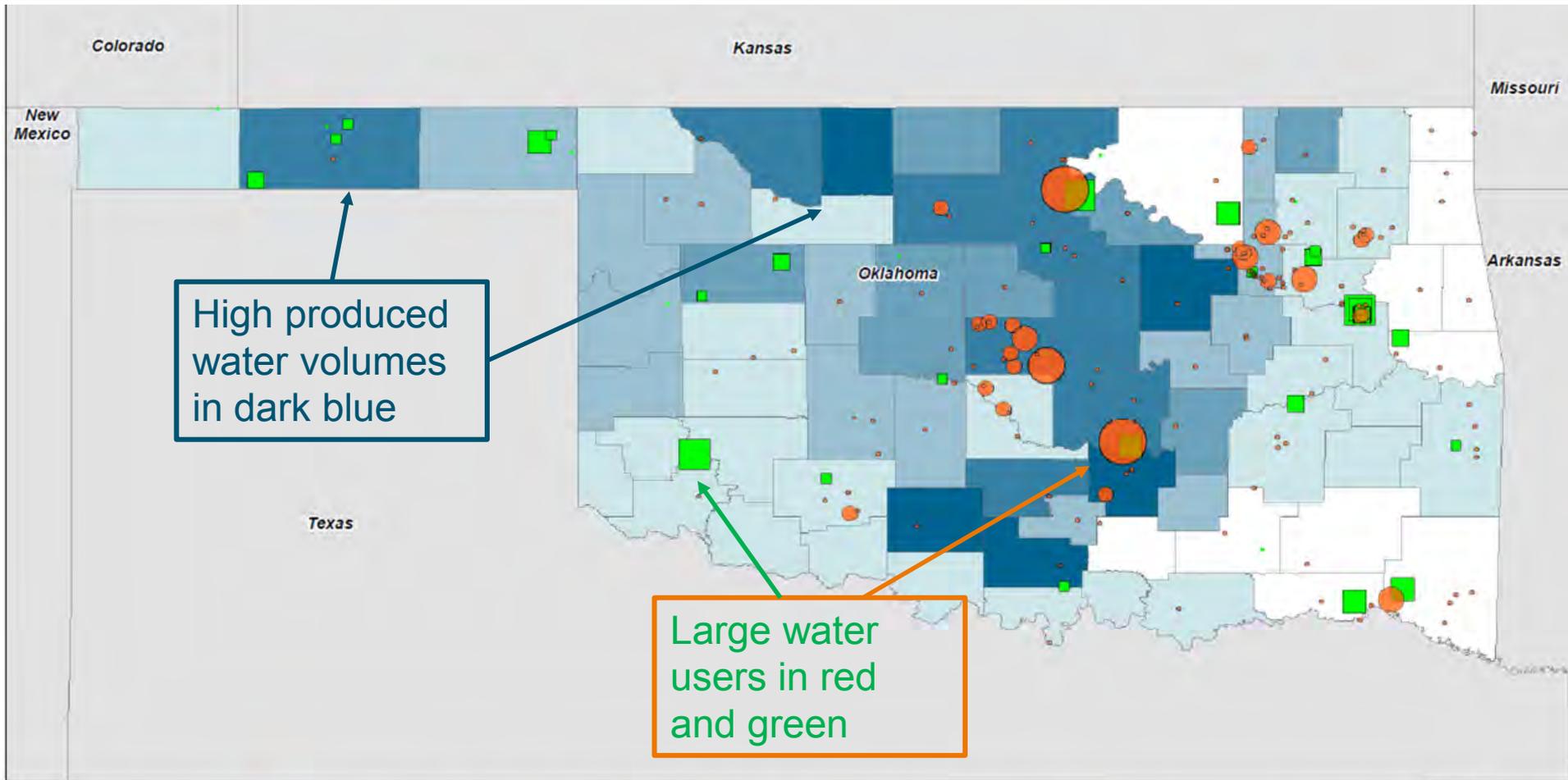


FIGURE X
Water Users
Produced Water Study
Oklahoma

Preliminary Matches of PW & Water Users



High produced water volumes in dark blue

Large water users in red and green

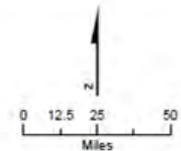
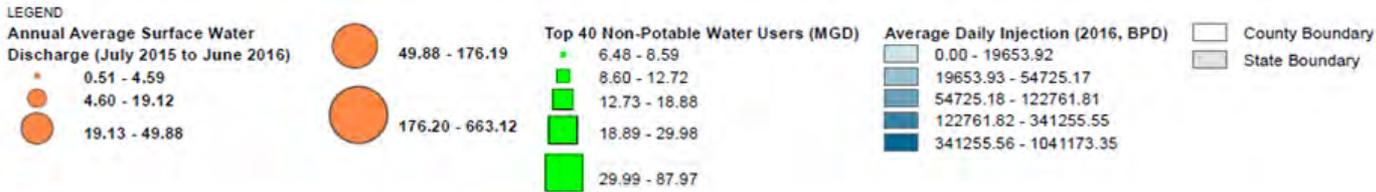


FIGURE 1
Produced Water Study
Oklahoma

Study Summary Points

1. Started work in late August
2. PWWG is resource to study effort
3. Hope to draft report by December 2016
4. Emphasis on scoping evaluation of possibilities





Thank You

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