

Kansas Dam Safety Conference

Earl Lewis
Kansas Water Office
March 11, 2020

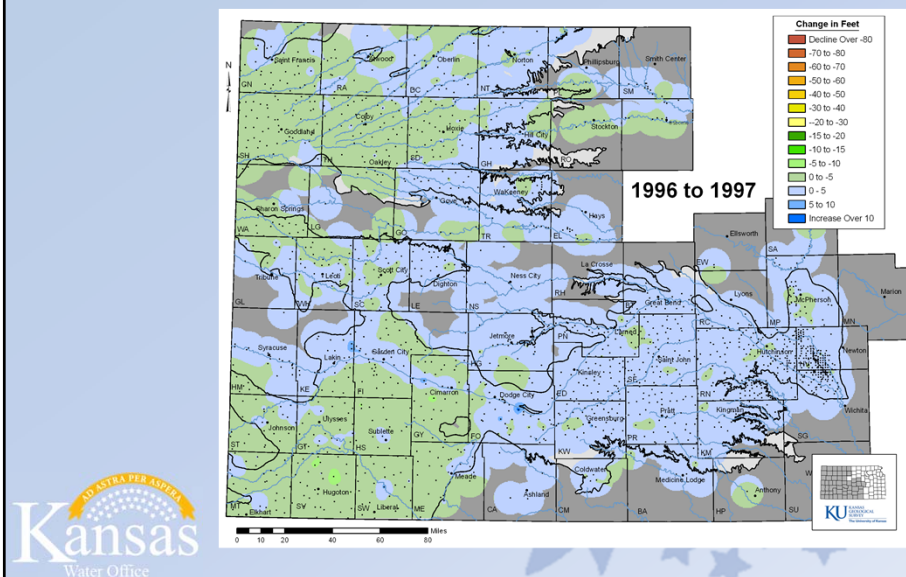


Main Issues

1. Groundwater level decline
2. Nutrients
3. Sedimentation
4. Flooding
5. Arbuckle



Aquifer declines 1996 - 2017



Water Technology Farms



LEMA/WCA

- ❑ GMD 4 District Wide LEMA
- ❑ Wichita County LEMA Proposal
- ❑ WCA's Increasing
 - More than 86,000 acres enrolled
 - Almost Half in 2019



Tech Farms/WCA Results



- ❑ Roth - Garden City
 - Yield – 241 bu. on 5"
 - Neighbor's yields
 - 233 bu. on 14"
 - 222 bu. on 13.5"
 - Soil moisture probes made the difference

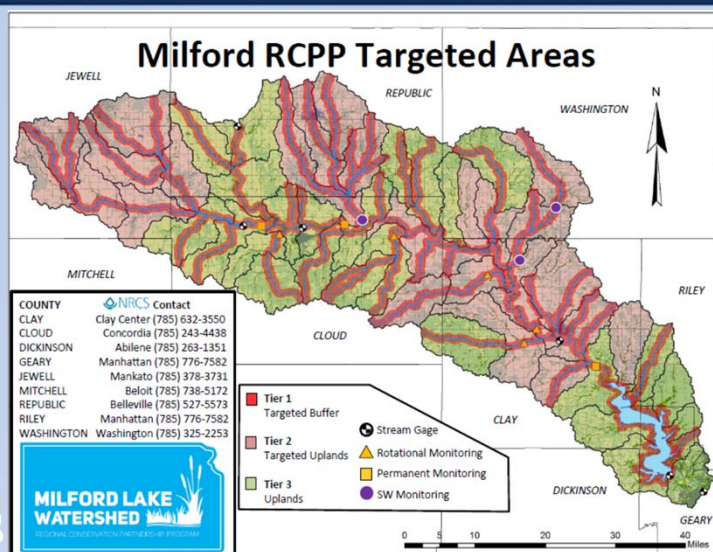


Nutrients in Surface Water



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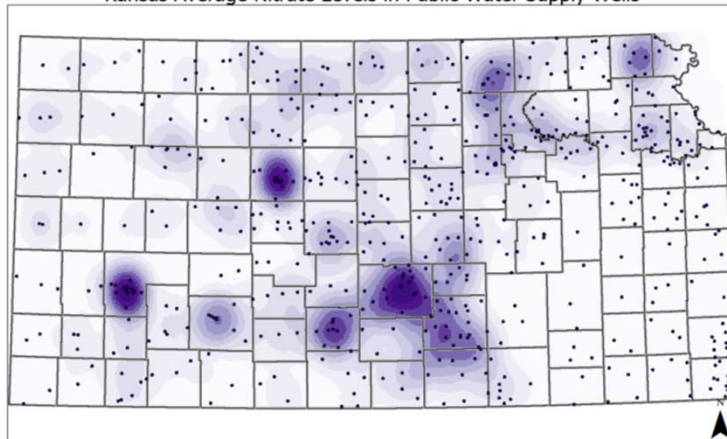
Milford Lake RCPP



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Nutrients in Groundwater

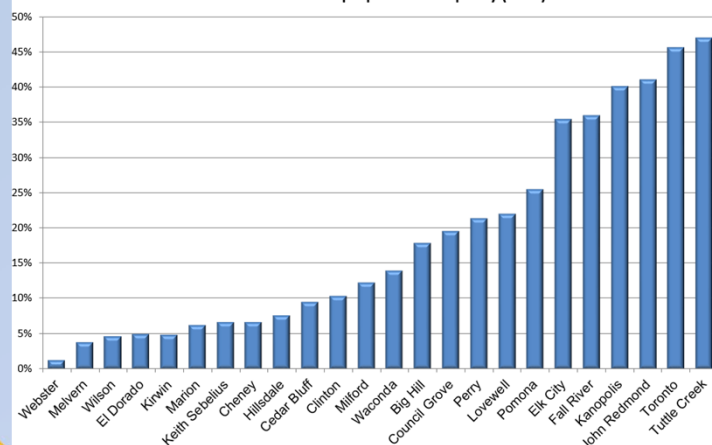
Kansas Average Nitrate Levels in Public Water Supply Wells



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Sedimentation Impacting Water Supply

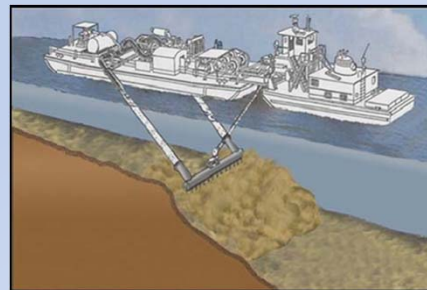
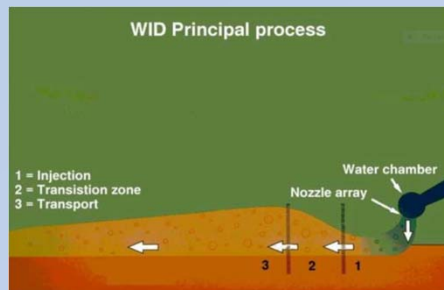
Percent Loss of Multi-purpose Pool Capacity (2018)

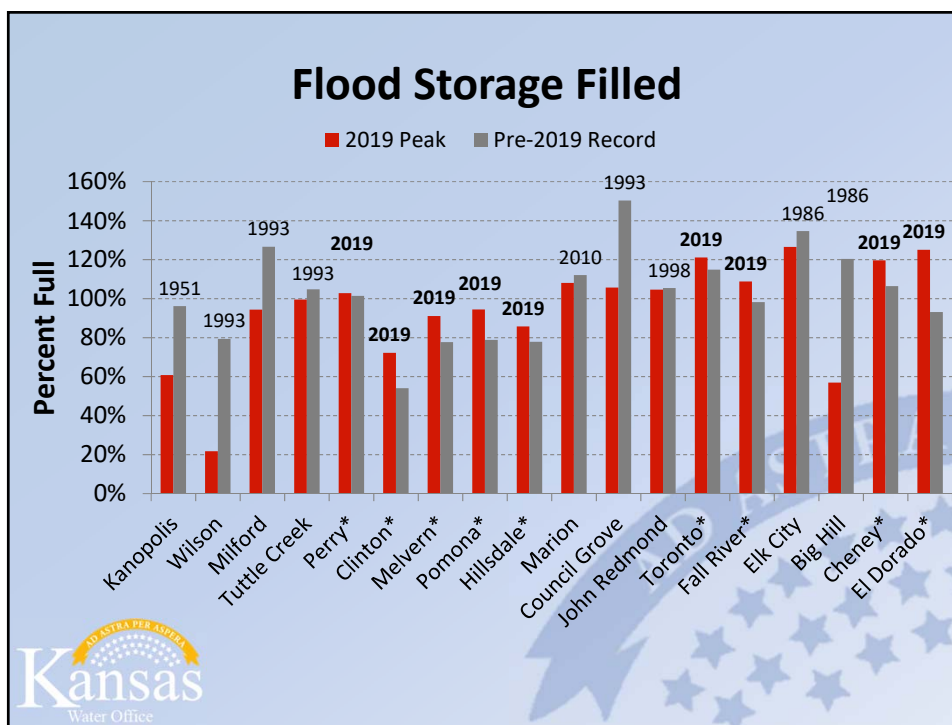
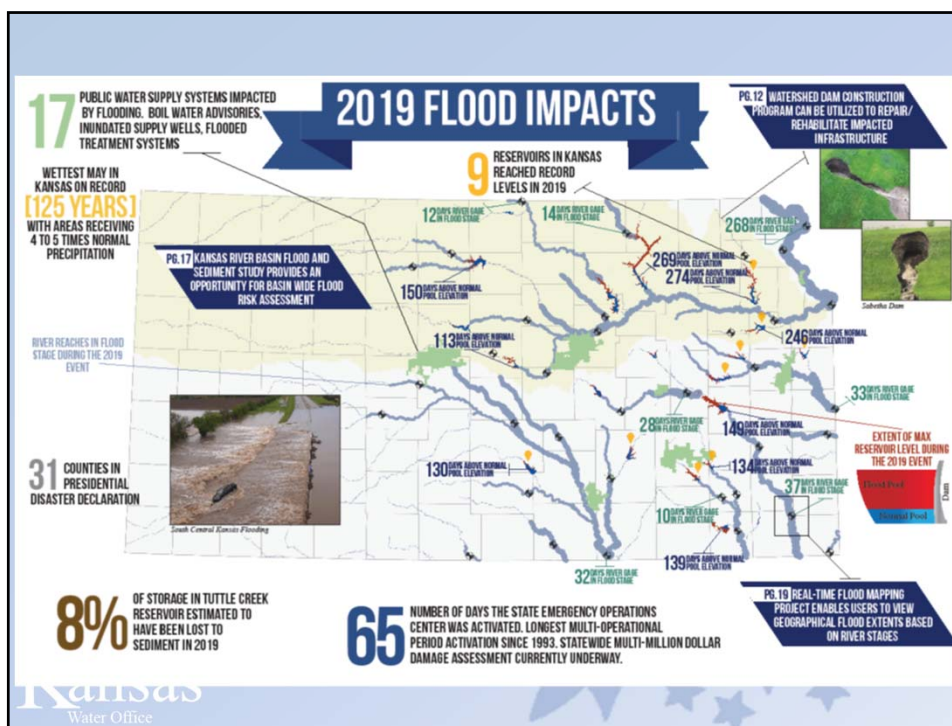


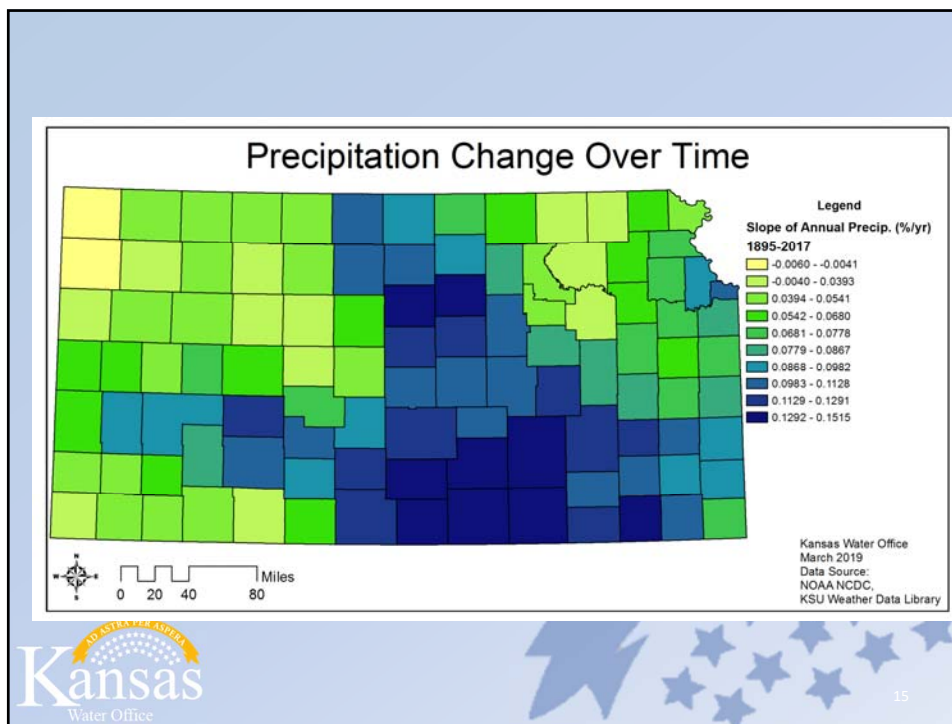
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Water Injection Dredging (WID)

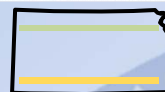
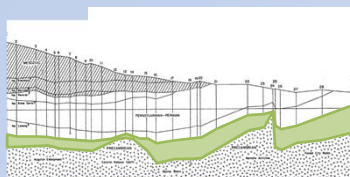






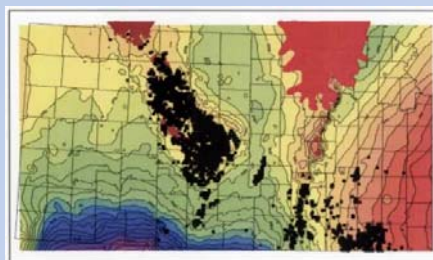
What is the Arbuckle Group?

- ❑ Thick sequence of sedimentary rocks
 - directly above basement (granite) rocks
 - highly permeable in intervals
 - vital to many industries in Kansas
- ❑ There is a lot we don't know
 - large number of unmapped faults
 - highly variable zones/areas
 - karst, highly localized dissolution
 - some zones more favorable for disposal
 - knowing could help place new wells
 - water chemistry (in situ and disposal fluids)
 - fluid flow



Uses of the Arbuckle Group

- ❑ Oil and gas (KCC)
 - **production**
 - oilfield brine disposal
- ❑ Industrial waste disposal (KDHE)
 - hazardous and non-hazardous
 - oil refining
 - product storage
 - chemical manufacturing
 - food production
- ❑ Drinking water (KDHE)
 - municipal water treatment
 - freshwater source
- ❑ CO₂ sequestration (EPA)



● = Arbuckle production well

200 6000
depth to Arbuckle

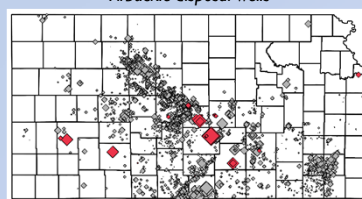


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Arbuckle Disposal

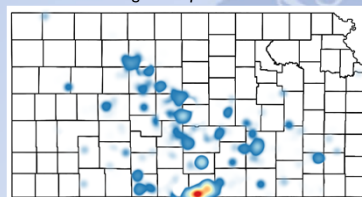
- ❑ Class I wells: 49
 - industrial and municipal waste
 - gravity feed
 - monitored and tested
- ❑ Class II wells: > 2,000
 - oilfield brine (extracted during production)
 - pressurized
 - less monitoring/testing
- ❑ Oil and gas development in south-central Kansas
 - 2011 to 2015
 - tenfold increase (Harper Co)

Arbuckle disposal wells



◆ Class I ◆ Class II

change in disposal volume

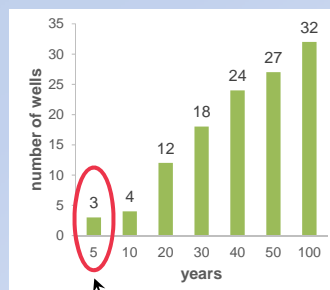


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Implications and Hypothetical Scenarios

- ❑ Loss of gravity feed
 1. **Existing facilities**
 - could lose use of disposal wells
 - would require cost-prohibitive measures
 2. Hypothetical facility
 - freshwater can't enter Arbuckle
 - sits in wellbore
- ❑ Drinking water contamination
 - fluid level above water source
 - inadequately plugged wells
 - *reality of leaks*: sinkholes
- ❑ The possibility is real within 20 years or less

projected lifetime of 40 Class I wells



3 wells within
five years



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Questions?

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