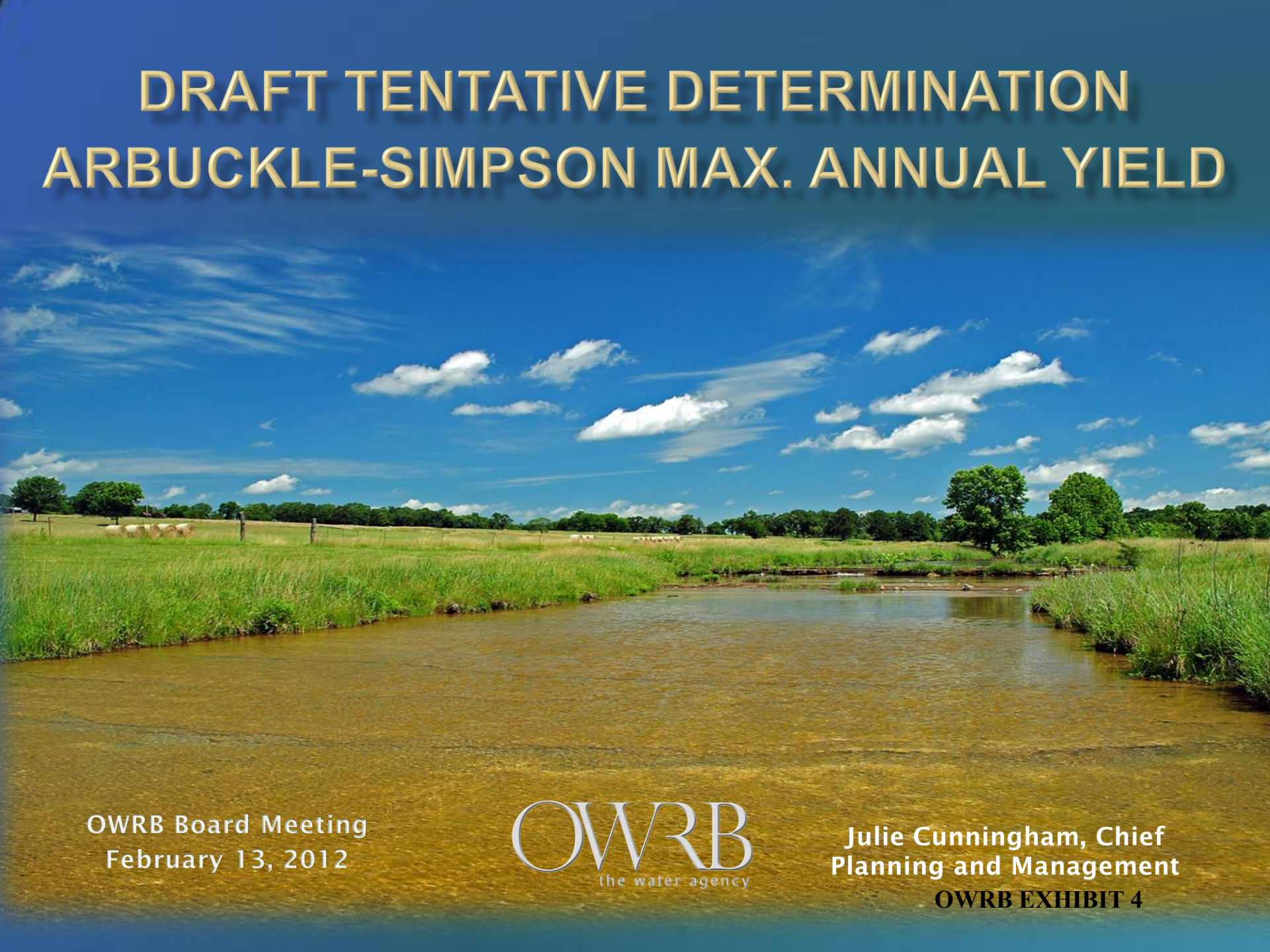
# DRAFT TENTATIVE DETERMINATION
# ARBUCKLE-SIMPSON MAX. ANNUAL YIELD



OWRB Board Meeting
February 13, 2012

OWRB
the water agency

Julie Cunningham, Chief
Planning and Management

OWRB EXHIBIT 4

# Oklahoma Groundwater Law (1973)

- Established allocation system – permits allow owners of land to use gw underlying their land
- Base allocation on Maximum Annual Yield of water underlying the land
- MAY is a determination by the Board of the **total amount of fresh gw** that can be produced from a basin or subbasin allowing a **minimum 20-year life.**
- Mining law that contemplates draw down

# MAY Determination Process

- OWRB conducts hydrologic survey and investigation
- OWRB make tentative determination of MAY
- Call and hold hearing in basin area – 30 days notice – evidence presented
- Proposed final determination submitted to OWRB
- OWRB to hear arguments on proposed findings, conclusions, and order
- Aggrieved persons can appeal to District Court

# Specified Criteria of Tentative Determination of MAY

1. Total land area overlying basin (acres)
2. Amount of water in storage (acre-feet)
3. Rate of recharge *to* basin and total discharge *from* basin
4. Transmissibility (transmissivity)
5. Possibility of pollution of basin from natural sources (deep brine water not included)

*Minimum* basin life of 20 years

# Senate Bill 288- Sensitive Sole Source GW Basins

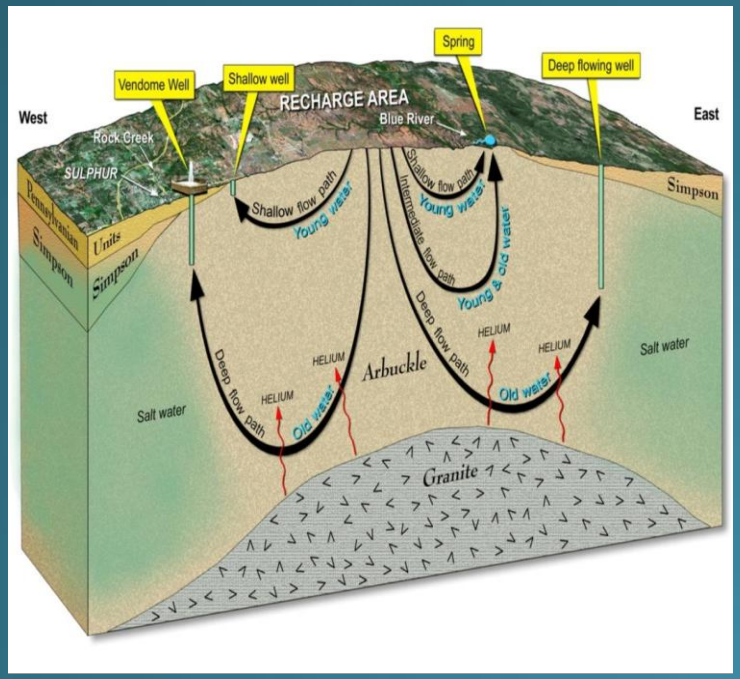
Requires additional determinations for MAY and permit review:

1. **Macro scale**: Moratorium on issuance of temp. permits for municipal use outside overlying counties until such time as the OWRB approves MAY which will ensure any permit *"will not reduce the natural flow of water"* from area springs or streams.
2. **Micro scale**: Provides that before issuing a permit, the OWRB must determine whether the proposed use *"is likely to degrade or interfere"* with basin area springs or streams.

# Life of Groundwater Basin

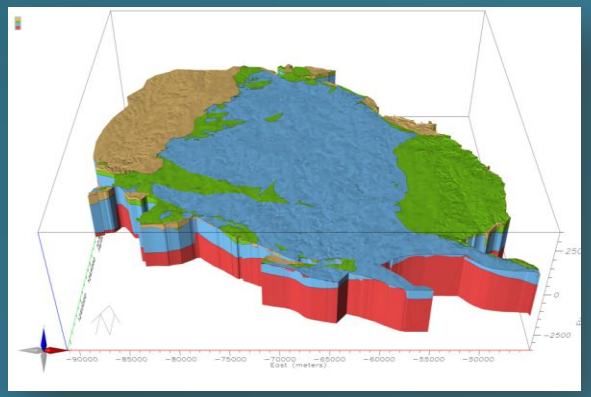
- Defined as that period of time when at least 50% of the total overlying land retains a saturated thickness allowing pumping (15 ft for bedrock aquifers) of the MAY for at min. 20 years

- SB 288 MAY requires springs to flow.



# Arbuckle-Simpson Study

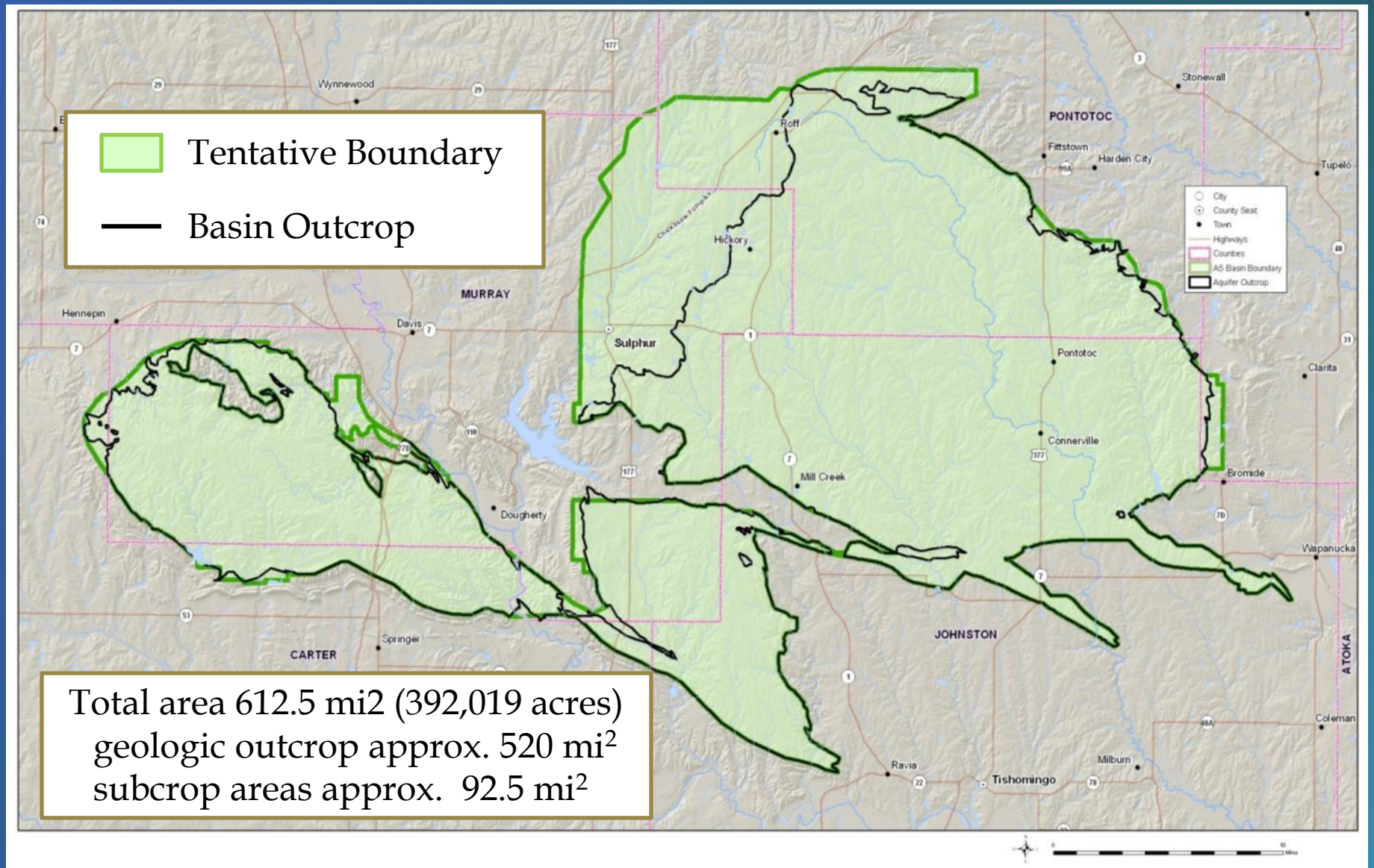
OWRB, with US BOR, USGS, OSU, and University of Oklahoma set out to characterize geologic setting, hydraulic properties, potential natural contaminants, and stream hydrology, and construct digital gw/sw flow model to evaluate allocation of water rights and potential stream impacts.



September 2011 – USGS Published *Hydrogeology and Simulation of Groundwater Flow in the Arbuckle-Simpson Aquifer, South-Central Oklahoma*

Most extensive MAY study in State history

# PROPOSED BASIN BOUNDARY



# Aquifer Characteristics

- Bedrock highly fractured/fault – very complex study
- Distinct body of water located in three aquifer areas (anticlines) overlain by contiguous land that has substantially similar geologic and hydrological characteristics
- Proposed total land overlying basin: 612.5 $mi^2$ includes geologic outcrop (approx. 520 acres) and subcrop areas (approx 92.5) depicted in Appx. 1.
- For land along boundaries, individual permit proceedings allow for provision of site-specific information and determination if in or out of the aquifer

# AQUIFER CHARACTERISTICS

- General Water Quality: good to excellent (<500 ppm TDS)
- Average Aquifer Storage: 9,408,461 acre-feet
  - Overlying Land Area = 392,019 acres
  - Avg. Saturated Thickness = 3,000 feet
  - Storage Coefficient = 0.008

- Average Rate of Recharge: 5.58 inches
- Total recharge: 182,288 (for 20-yr draw down, N/A)
- Total discharge: 108,640 (for 20-yr draw down, N/A)
- Transmissivity: 9,843 ft2/day
- Possibility natural pollution: negligible. "Mineral water " known to surface in formation near CNRA not known to mix with freshwater of the Arbuckle-Simpson aquifer

# Senate Bill 288 MAY Limitation

**Macro, basin-wide scale:**

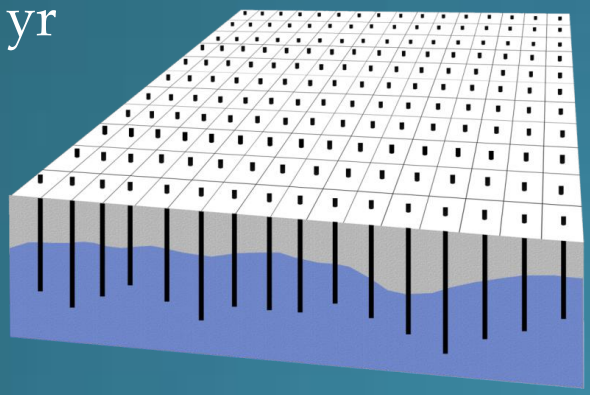
- MAY which will ensure permitted use *"will not reduce the natural flow"* requires additional determinations for MAY
- Open for interpretation— act neither defines "natural flow" nor states how this reduction is to be determined.
- Zero use does not support State's "utilization" and "reasonable use" policies.
- What number is protective yet still considers private property.

# Senate Bill 288 MAY Limitation

- Since flow is an essential component of stream habitat, scientist team decided that analyzing the potential effect of gw withdrawals on habitat would provide a reasonable measure for natural flow protection.
- 4 indicator fish species selected for instream flow study on two streams: Blue R. and Pennington Ck.
- Surface Water Technical Advisory Group deemed a reduction in 5-year avg. base flow by no more than 25% as acceptable limit

# Senate Bill 288 MAY Limitation

- Pumping simulations for various EPS values (0.125, 0.25, 0.392 af/a/yr) at 2 stream locations showed reduction in avg. stream flow of 18-57% and base flow of 24-81%
- Assumed pumping of full EPS over 100% of land area
- Assumes no mining/ drawdown of basin (eg.20-yr)
- Current Development:
  - Avg. permitted reported use = 4,510 af/yr (1964 to 2008)
  - Est. non-permitted use = 285 af/yr
  - 63% public water supply



# Senate Bill 288 MAY Limitation

- Recommendation: Considering model variability, conservative assumptions, statutorily-declared "reasonable regulations for…reasonable use" and private property policy, staff concludes that simulated pumping of all lands with an EPS of 0.20 af/a/yr (2.4 in.) will not reduce base flow by > 25%
- Equates to one tenth of the current 2.0 af/a/yr EPS
- ~Aquifer MAY 78,404 af/year

# Phased Implementation of MAY

- Public water suppliers and others requested 20-year phased-in with incremental reductions
- Other stakeholders request immediate implementation
- GW law and rules do not provide for a timeframe for conversion nor do they authorize regular permits to allow pumping > the MAY.
- Considering several factors, staff recommends temporary permits remain in effect for a period of no more than 5 years from date of final determination, unless good cause is shown (e.g. to acquire gw rights, land, infrastructure). Input re: "good cause" criteria should be solicited during public hearing

# Senate Bill 288
# Permit Assessment

**Micro, site-specific scale**

- Prior to permit issuance, OWRB must determine proposed use is not likely "to degrade or interfere with springs or streams emanating in whole or in part" there from.
- Recommendation: In addition to MAY, consider site-specific cumulative pumping impacts to identified spring or stream of more than 25% of the base flow.
- To reduce uncertainties, promulgate set-back rules for new wells and definitive methodology for determining degradation/ interfere (see Appx. 2). Input should be invited during public hearing

# Sensitive Sole Source Basin

- Definition: major gw basin or subbasin, all or a portion of which has been designated a 'Sole Source Aquifer' by U.S. EPA…and any portion of any contiguous aquifer located within 5 miles of the known areal extent of the surface outcrop
- The 3 aquifer areas, including the "subbcrop" constitutes one "major groundwater basin" as defined in Section 1020.1 of the Oklahoma Groundwater Law.
- The Eastern Aquifer area has US EPA "Sole Source Aquifer" designation
- Therefore Arbuckle-Simpson Groundwater Basin qualifies as a "sensitive sole source groundwater basin" and SB 288 provisions apply

# Order and Directives

1. The Arbuckle-Simpson aquifer underlying areas in Murray, Pontotoc, Johnston, Garvin, Coal and Carter Counties in the south central part of the state shall be and the same is hereby designated the Arbuckle-Simpson Groundwater Basin, with outcrop and subcrop boundaries generally depicted on the map set forth as Appendix 1;
2. The basin is hereby declared to be a major groundwater basin under the provisions of the Oklahoma Groundwater Law;
3. The basin is also declared to be a sensitive sole source groundwater basin under the provisions of the Oklahoma Groundwater Law as amended to Senate Bill 288 enacted in 2003;

# Order and Directives

4. The tentative determination of the MAY is 78,404 acre-feet;
5. The EPP of the yield to be allocated to each acre of land overlying the basin, based MAY and total overlying land area, is tentatively determined to be 0.20 acre-foot per acre per year (or 2.4 inches per acre per year); and
6. For reasonable implementation, before regular permits for the EPP are issued to replace existing valid temporary permits… such temporary permits shall remain in effect (subject to revalidation) for a period of five (5) years from the effective date of a final order determining the MAY, unless an extension of time is granted for good cause shown.

# Order and Directives

IT IS FURTHER ORDERED that a hearing shall be held and notice…provided as required by the Oklahoma Groundwater Law. After said hearing or hearings, a proposed final order shall be prepared and submitted to the Board for consideration as required by law.

IT IS FURTHER ORDERED that in conjunction with the hearing… input should be solicited from interested persons on criteria or standards that could be considered good cause for approval of an extension of time of the five-year implementation period before regular permits are issued to replace existing temporary permits.

# Order and Directives

IT IS FURTHER ORDERED that in conjunction with the hearing…, staff should seek input concerning a potential modification of the well spacing provisions set forth in the current rules relating distances of proposed wells to other wells, and a proposal to adopt an established spacing distance between new proposed wells and springs and streams in the Arbuckle-Simpson Groundwater Basin, and a methodology for assessing and determining the effects of proposed pumping of specifically proposed wells on specific springs and streams, as set forth in Appendix 2 to this order.