

INTERSTATE GROUNDWATER DISPUTES AND THE U.S. SUPREME COURT



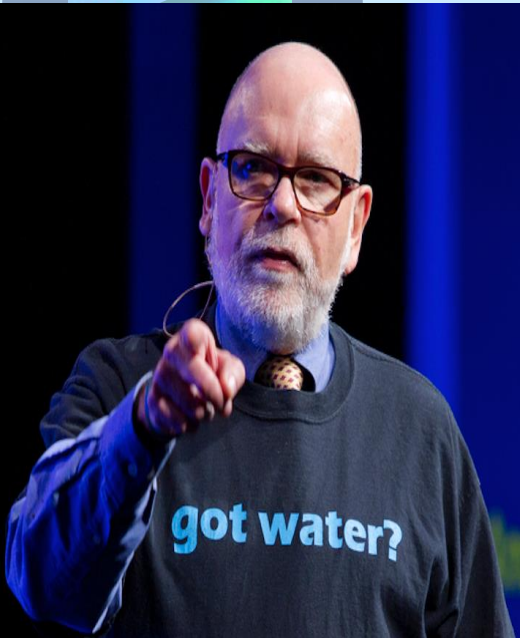
Tuesday, Jan. 24, 2 p.m. EST
FREE CSG webinar *presented by CSG West and
CSG South/Southern Legislative Conference*



AWRA

Community, Conversation, Connections

Grand Theft Groundwater! ***What Would Elvis Do?*** ***Implications of the*** ***Groundbreaking Mississippi v.*** ***Tennessee Groundwater Case***



The Council of State Governments
24 January 2017 Webinar

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Presentation Outline

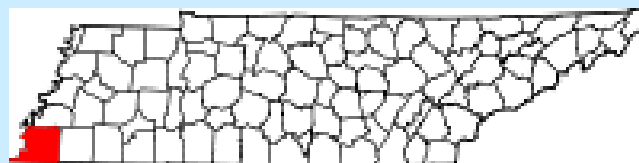
- Why the Interest?
- Location and Background
- Memphis Sand: Some Hydrogeology
- The Issues
- Groundwater Hydraulics: Nice Pictures!
- The Plot Thickens...
- Observations
- Where There's a Dream, There's a Nightmare
- Additional Information and References



So Why Is a Hydrogeologist from Oregon [*and born in NYC!*] Involved in and Intrigued by This Case?

- Contacted by Tom Charlier of the Memphis *Commercial Appeal* and Mississippi Public Radio in 2007
- Area experts reluctant to talk
- Seems like a story made for the Western USA – water quantity at issue
- Hydro-Irony: Two states in one of the USA's wettest regions adjacent to one of the world's largest rivers arguing over *groundwater!*

Location of Memphis, Shelby County, and Tennessee



Memphis Background

- City-owned utility, Memphis Light, Gas, and Water (MLGW) provides water to about **1.1M people**. Started pumping groundwater **c. 1924**.
- High quality groundwater is primarily from **Memphis Sand** (aka Sparta Sand or Middle Claiborne aquifer) & **Fort Pillow Sand** aquifers.
- Daily pumpage: **160 – 200 million gallons per day** (MGD; 490 – 615 acre-feet/day).
- Cameron (2009) claims Memphis is world's largest city relying **solely** on GW (Oh no, San Antonio!)



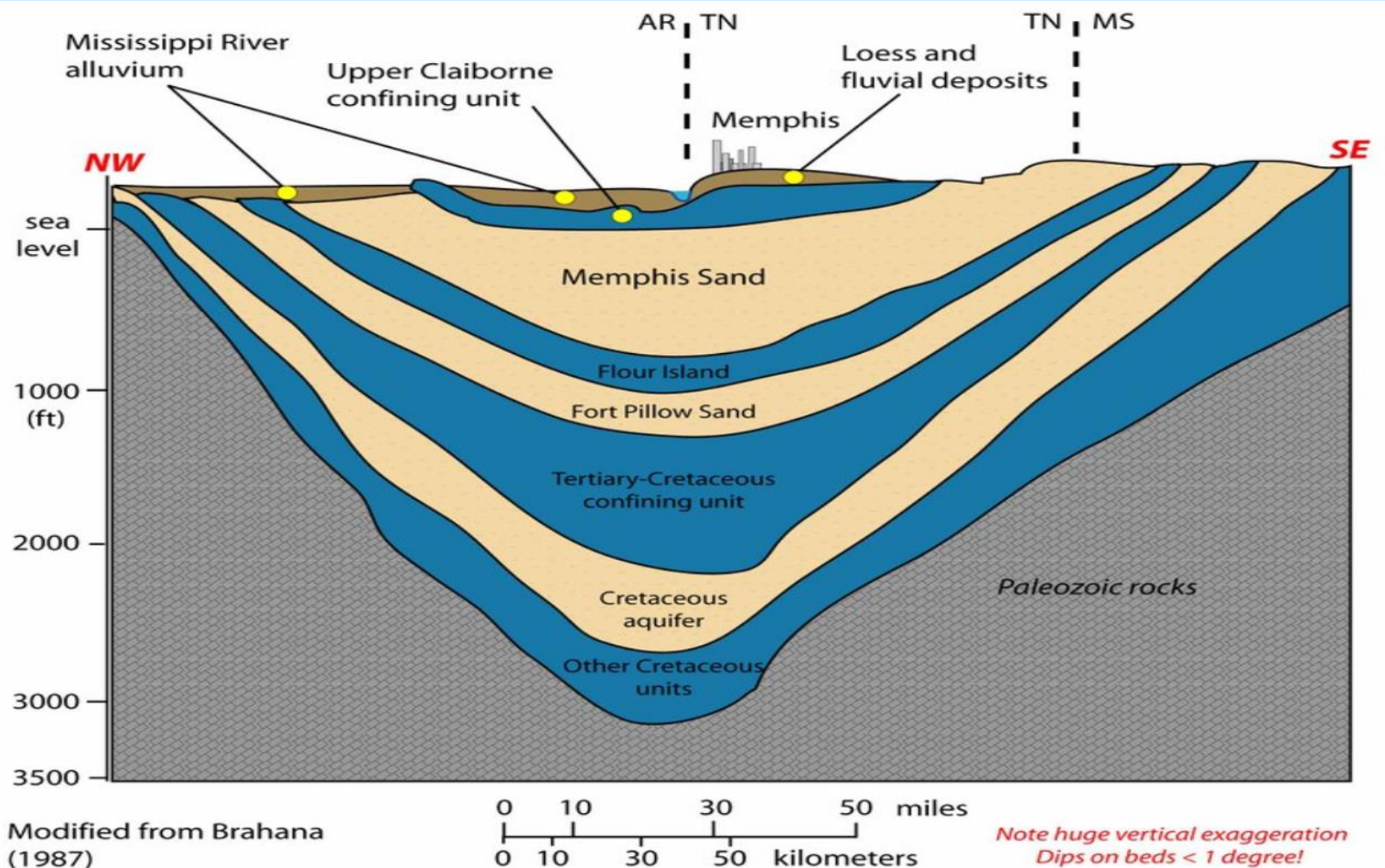
Memphis Sand

- Underlies 10 000 mi² of AR, TN, MS, KY; up to 900 feet thick
- Very coarse sand with interbedded lenses of clay and silt - good water storage & transmissive properties
- Replenished via precipitation (average annual precipitation ~ 55 inches) on outcrop belt in western TN, MS
- Said to contain *100 trillion gallons of water* (MLGW website). That's > 300 MAF!



NW-SE Hydrostratigraphic Cross Section beneath Memphis, Tennessee (TN) and Adjacent States of Arkansas (AR) and Mississippi (MS)

(note vertical exaggeration – strata dip more like 1%)



[Courtesy of the Department of Geosciences, Mississippi State University, Starkville, MS; modified from Brahana et al. (1987)]

The Issues

- **MLGW pumping from 10 well fields and > 175 wells has caused pumping effects to expand into Mississippi**
- **Mississippi claims that MLGW is ‘stealing’ its groundwater: currently ~24 MGD and 365 billion gallons (1.1 MAF), 1965 - 2005**
- **At one time: MS listed Memphis as biggest user of its groundwater!**



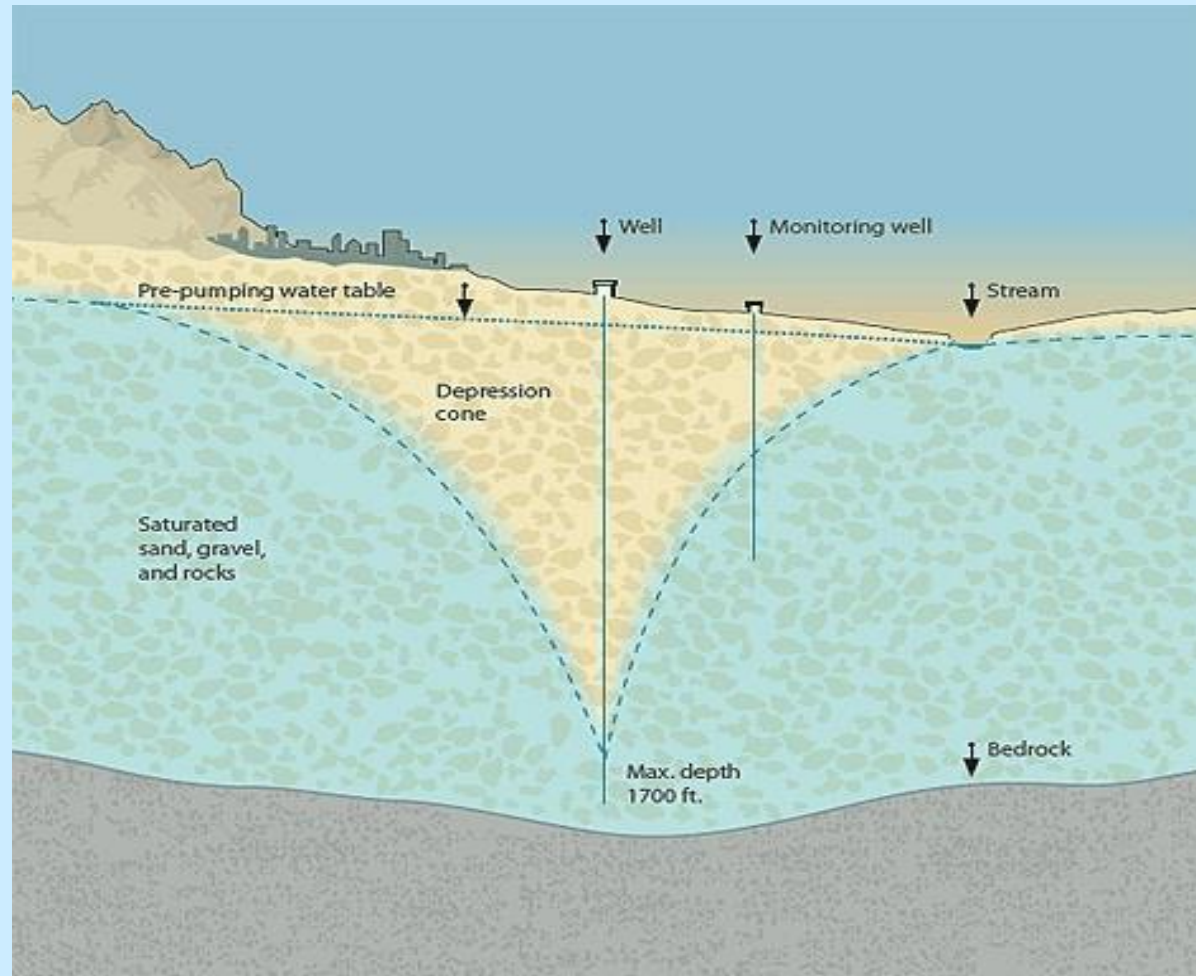
Summary – State Groundwater Allocation Laws

(courtesy Ken Rainwater, Texas Tech University)

Groundwater Allocation	No. of States	Ownership	
		State	Landowner
Absolute Ownership	7		Connecticut, Indiana, Louisiana, Maine, Massachusetts, Rhode Island, Texas
Reasonable Use	16	Arizona, Mississippi , New York, North Carolina	Alabama, Florida, Illinois, Kentucky, Maryland, Missouri, Nebraska, Pennsylvania, South Carolina, Tennessee , Virginia, West Virginia
Prior Appropriation	14	Alaska, Colorado, Idaho, Kansas, Montana, Nevada, New Mexico, North Dakota, Oregon, Utah, Washington, Wyoming	New Jersey, South Dakota
Correlative Rights	5		Delaware, Hawaii, Iowa, Minnesota, Vermont
Beneficial Purpose Doctrine (Restatement of Torts § 858)	3	Michigan, Ohio, Wisconsin	
Reasonable Use / Correlative Rights	4	New Hampshire, Oklahoma	California, Arkansas
Absolute Ownership / Reasonable Use	1		Georgia

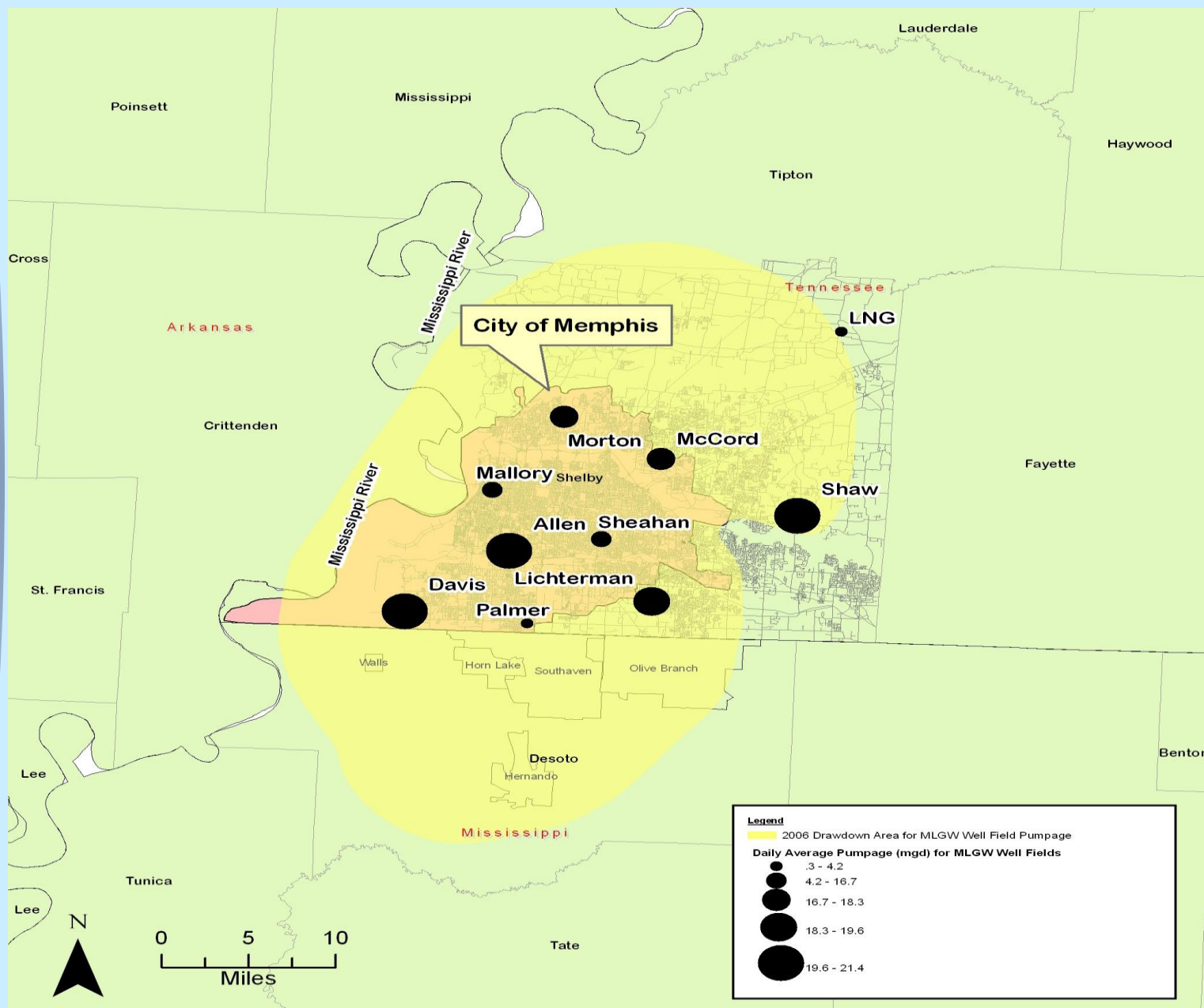
Pumping Well Cone of Depression

(Cameron 2009)



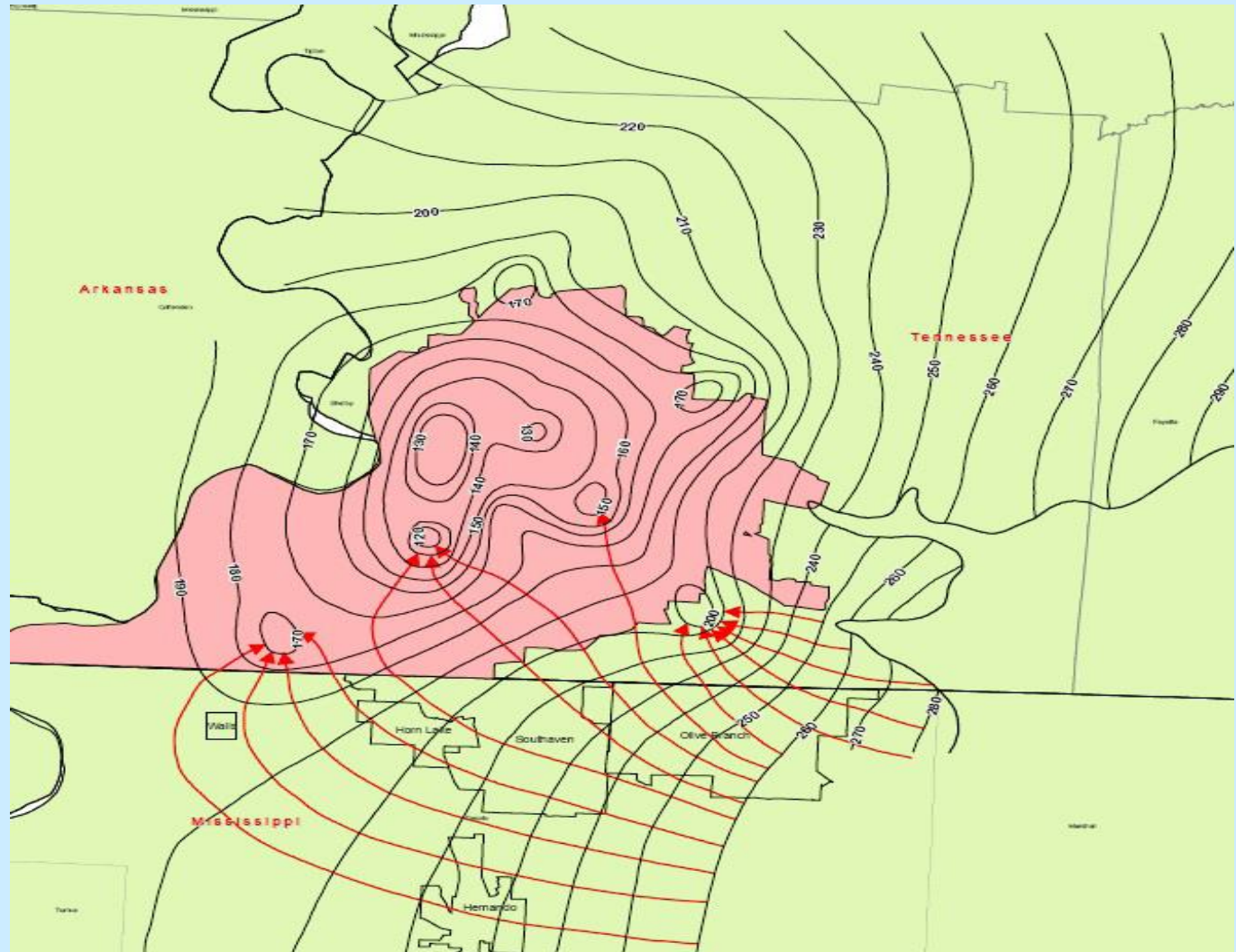
MLGW Well Fields

(Cameron 2009)



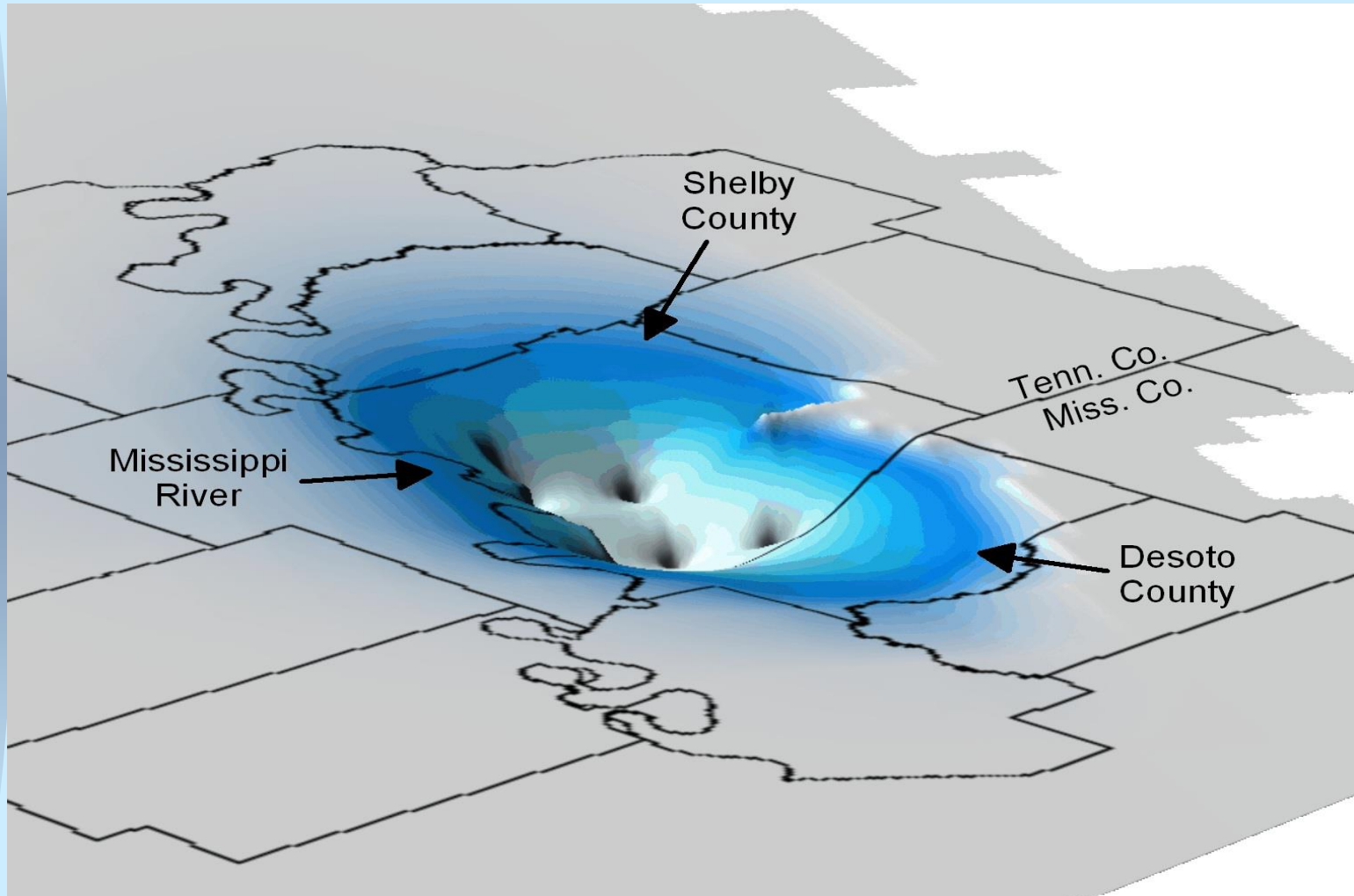
Memphis Sand Aquifer Flow Net showing Groundwater Movement (red arrows) from Mississippi to MLGW Well Fields

Note: Natural Flow is Generally East to West



[Cameron 2009]

Three-Dimensional Representation of the Cones of Depression Created by MLGW's Memphis Sand Aquifer Pumping



[Cameron 2009]



The Plot Thickens...

- Study by U. of Memphis professors Brian Waldron and Daniel Larsen: **MS GW flowed into TN before MLGW pumping; refuted argument that TN is ‘stealing’ MS groundwater.** In fact, pumping in DeSoto County may have ‘stolen’ 10.7 MGD of TN’s water . See more at: <http://bit.ly/lqPKpu>
- Study published in the *Journal of the American Water Resources Association (JAWRA)*. See <http://is.gd/CQbBfb>

Observations - 1

- Prior to the 2005 lawsuit, **TN, MS, and AR** were in discussions about developing a plan to manage the aquifer. **MS** withdrew from the discussions right before it filed suit.
- Lawsuit seemed more appropriate to the **arid Western USA**, not to an area that receives about 55 inches of annual precipitation and abuts one of world's largest rivers. Shape of things to come?
- Similar state v. city case occurred in **Illinois v. Milwaukee** (Cameron, 2009, p.10). **SCOTUS need not be involved.**



Observations - 2

- **Does the ‘public trust’ doctrine apply to groundwater?** Mississippi invoked it - protecting groundwater for its citizens (Cameron 2009; Baxtresser 2010).
- **Institutional asymmetry is interesting:** state v. city in a dispute over water resources. Are new approaches for resolution of such disputes needed?
- **Should we establish regional interstate agencies to manage transboundary groundwater?**



Observations - 3

- Harder to prove groundwater is being diverted (compared to surface water)
- Does MLGW have right to pump so much groundwater? (Feldman and Elmendorf 2000)
- Cameron's (2009) plots neglect pumping in DeSoto County, MS, and elsewhere. This is unrealistic.



My Dream: How About A Compact?

- Propose compact among MS, AR & TN. Use Bellagio Draft Treaty (international) [<http://bit.ly/2aXPymE>] or model compacts as guides
- **Construct management model**
- Agree to allocation of water
- **Compact - needs Congressional approval**
- Would be first 'groundwater-only' compact in USA
- **Template for future – potential GW conflicts? *Chance to set a precedent!***



My Nightmare

**Supreme Court ties 4 - 4,
status quo prevails**





Additional Information

- M. Campana's more detailed PPT and comments by Prof. Gabriel Eckstein of the Texas A&M School of Law:
<http://bit.ly/2bjr08c>
- Article by Boyce Upholt in *The Atlantic* (online - December 2015): *An Interstate Battle for Groundwater*
<http://theatl.in.tc/1XPgLcl>
- Memphis lawmakers plan bill to protect aquifer. <http://memne.ws/2kh8TUB>
- One acre-foot = c. 326,000 gallons = one USA football field covered to a depth of c. one foot (even the Ole Miss field!)

References

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Mississippi and Memphis Representatives Discuss Water Allocation Without Their Lawyers

(courtesy: www.duckboy.com)

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Thank You!



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Questions?

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