

The challenges and opportunities to effectively communicate and educate with earthquake affected communities in Oklahoma



*Danielle F. Sumy (IRIS), Wendy Bohon (IRIS),
Norma Neely (Univ. of OK), Kathy Ellins (UT-Austin),
Michael Hubenthal (IRIS), John Taber (IRIS),
and Cathy Manduca (Carleton College)*

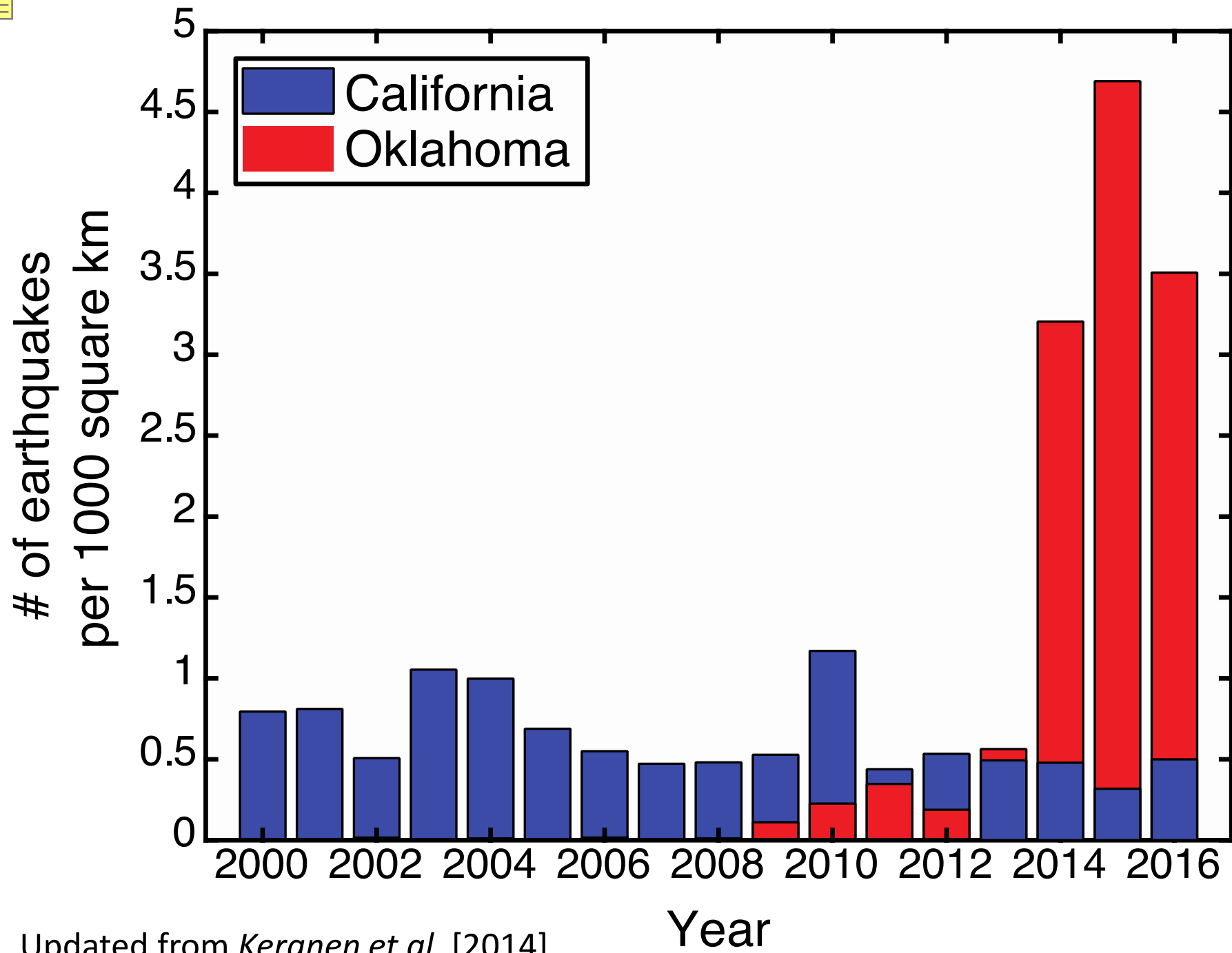

IRIS



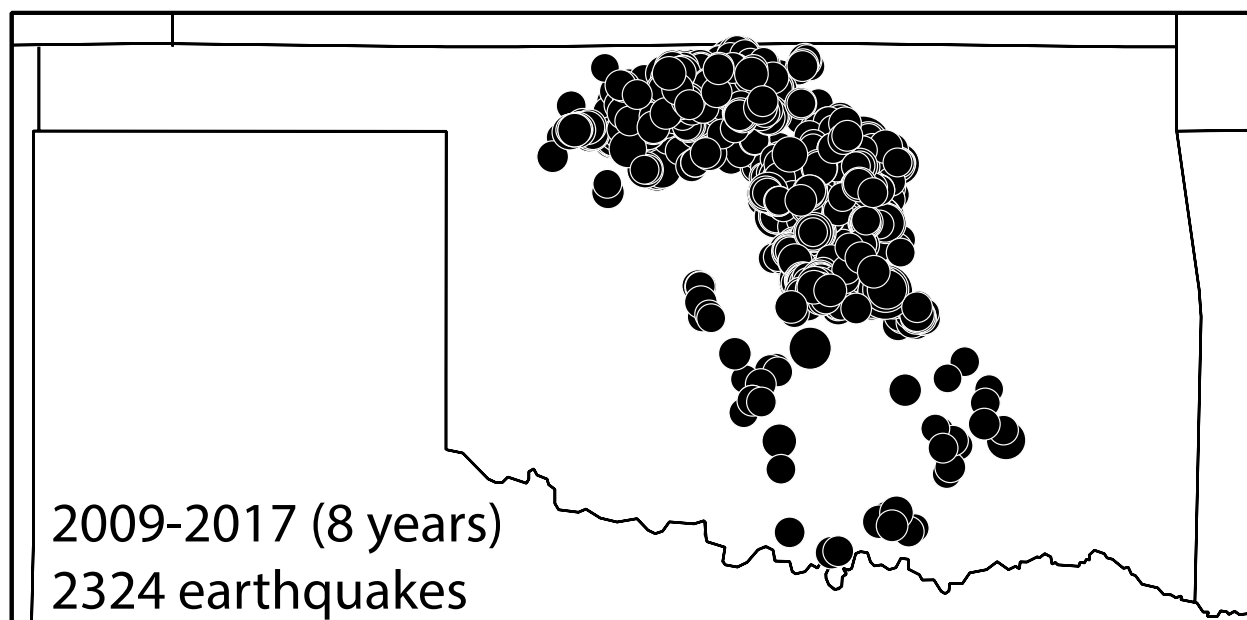
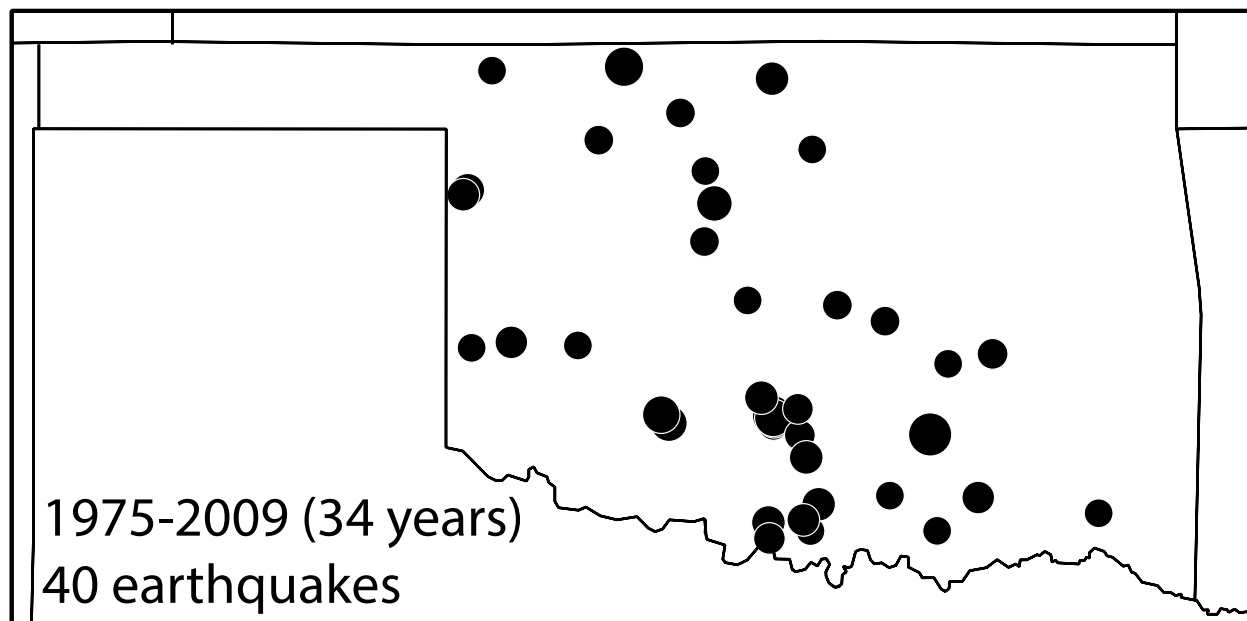
As of today, what is the most seismically active state in the lower 48?

- A. Washington**
- B. Oregon**
- C. Oklahoma**
- D. California**

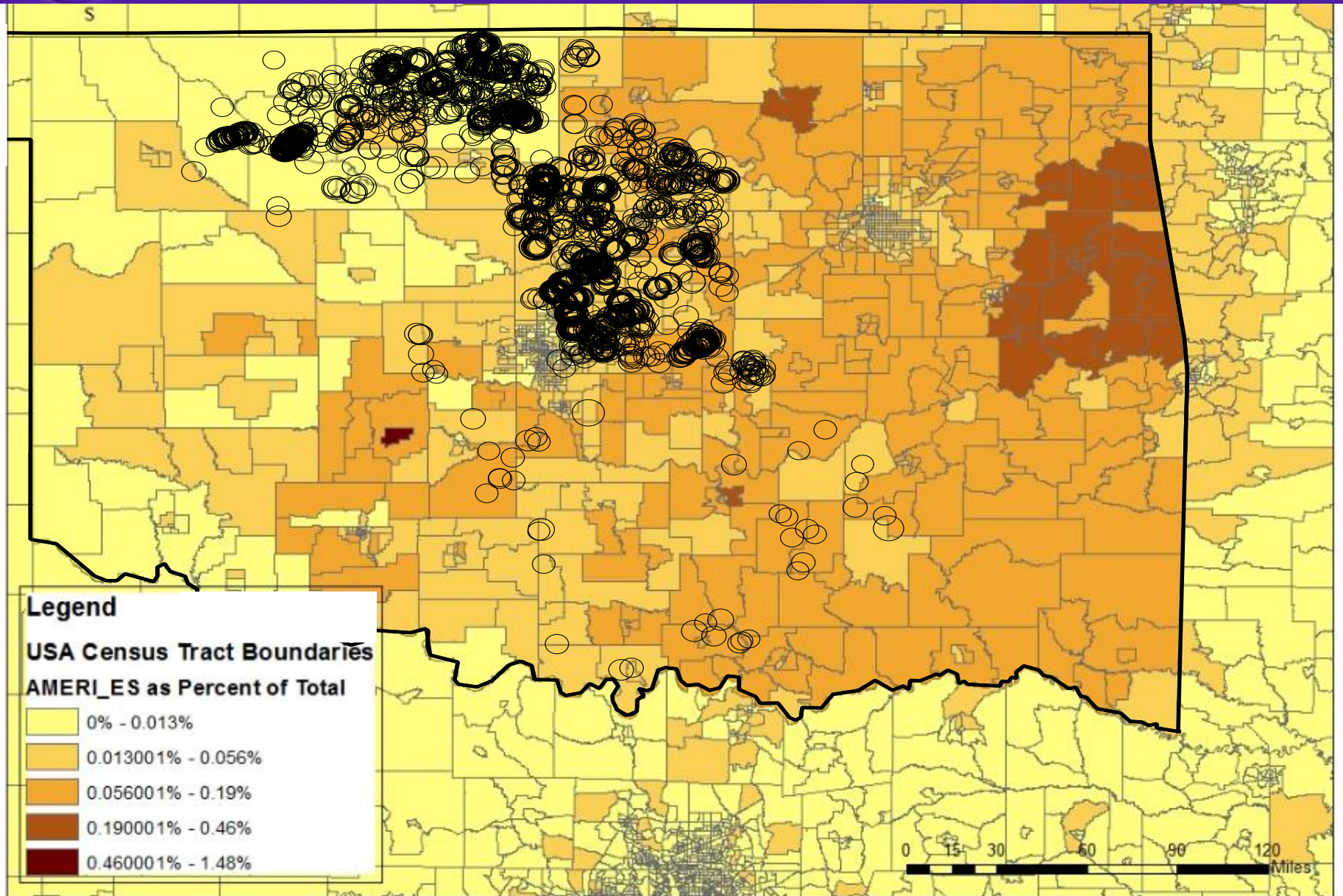




Updated from *Keranen et al.* [2014]



Native American population





OH
FRACK



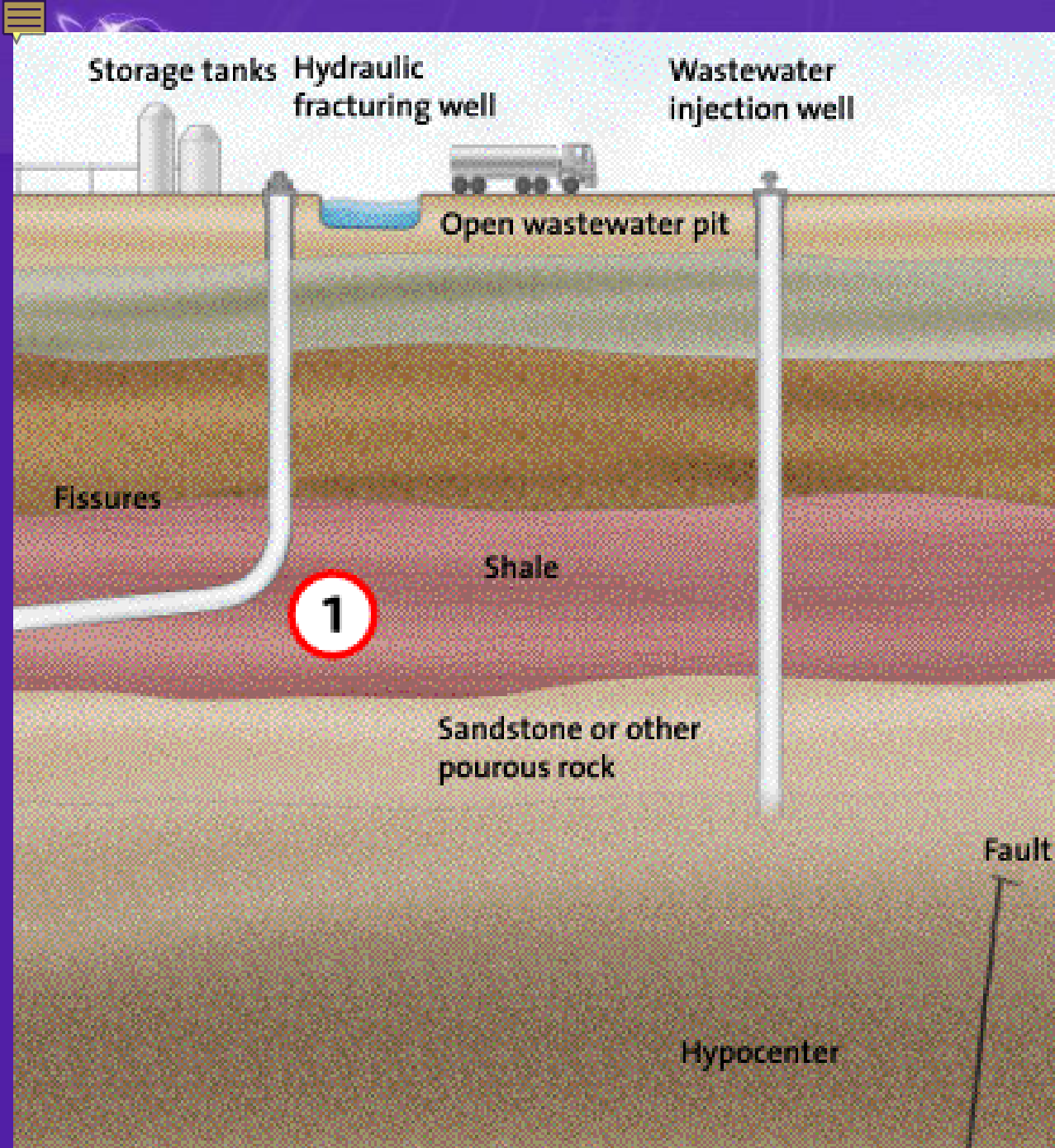
ANOTHER **FRACKING** PROBLEM: EARTHQUAKES

The underground injection of fracking wastewater has been linked to **earthquakes** in Ohio, Texas, Pennsylvania and internationally where fracking is prevalent.

What EPA **really**
said about Wyo.
fracking pollution

By Mike Soraghan, E&E reporter



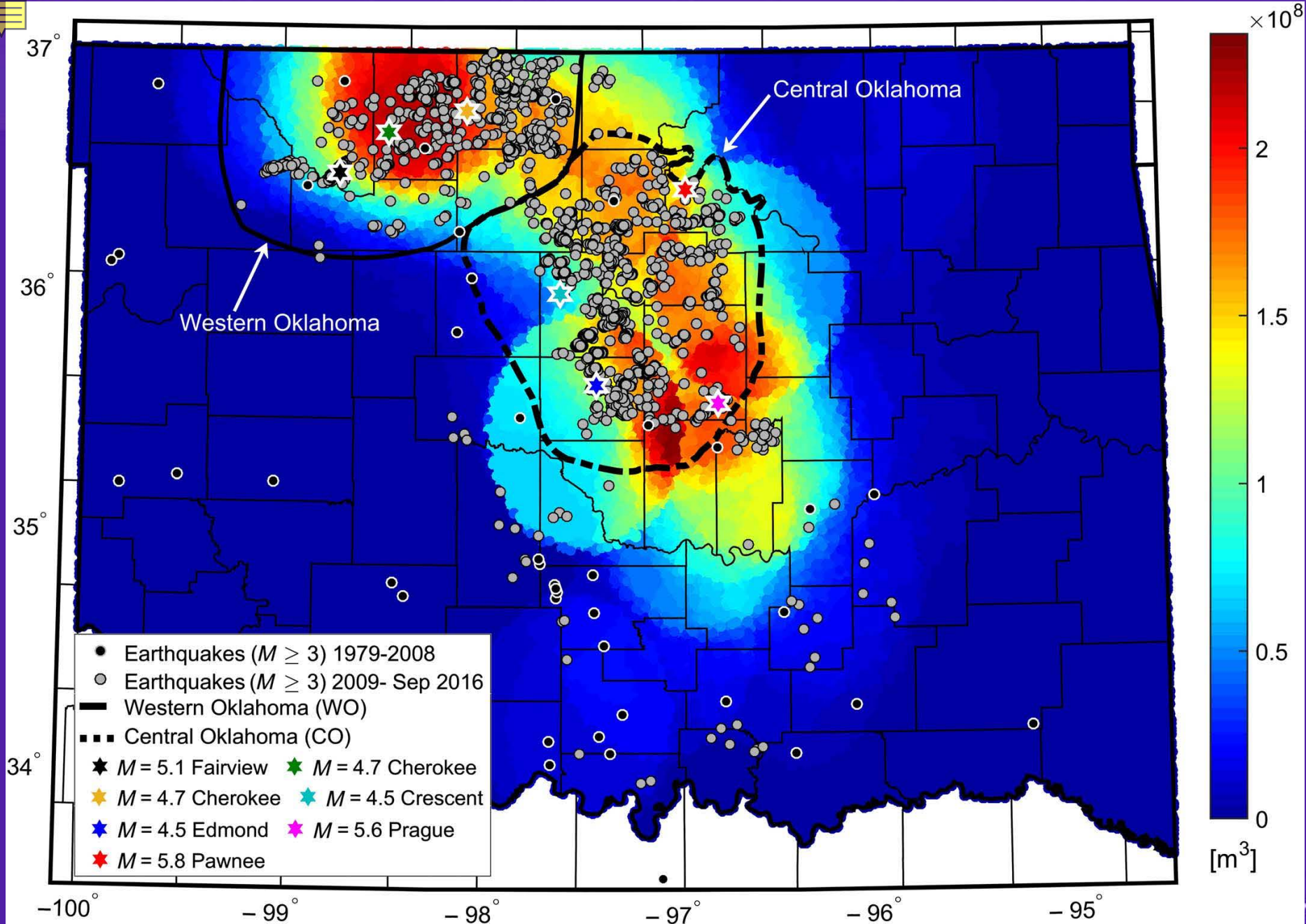


Fracked Up?

1

Drillers inject high-pressure fluids down a fracking well, opening slight fissures in a layer of shale rock.

Mother Jones





Problem: Some Are Damaging



2011 M5.7 Prague, OK



2016 M5.8 Pawnee, OK

Hydraulic Fracturing: $M_{\max} \sim 4.6$

Wastewater Injection: $M_{\max} \sim 5.8$



Communication Failures

The screenshot shows a web page from StateImpact, a reporting project of NPR member stations. The page is for Oklahoma and covers topics like Economy, Energy, and Natural Resources. The article title is 'Former Seismologist: Reluctance to Act on Earthquake Science Was 'Ingrained' at State Agency'. It was published on February 9, 2016, at 4:35 PM by Joe Wertz. There are 5 comments, an email link, a tweet button, and a Facebook recommend button with 303 recommendations.

“When I first got there (to the Oklahoma Geological Survey), it did feel like people were trying to-,” she trails off. “Not lie, but they were trying to soften. I had the feeling they were trying to protect something.”

- Amberlee Darold, former OGS seismologist (now at USGS)



Pawnee Nation Sues Oklahoma Oil Companies in Tribal Court Over Earthquake Damage

By THE ASSOCIATED PRESS MARCH 4, 2017

New York Times



Talia Pershall cleaning up at White's Foodliner grocery store in Pawnee in September after a quake in north-central Oklahoma. David Bitton/The News Press, via Associated Press

OKLAHOMA CITY — A Native American tribe here has filed a lawsuit in its own tribal court system accusing several [oil](#) companies of causing an earthquake that damaged near-century-old tribal buildings.



Conclusions

- Change in hazards - weather to earthquakes
- Confusion as to cause of earthquakes
- Earthquakes impact tribal communities



Earth Connections – Pathways to Geoscience

Video Redacted



Natural Hazard

*Knowledge of Potential Catastrophic
and Chronic Physical Events*

- Past Recurrence Intervals
- Future Probability
- Speed of Onset
- Magnitude
- Duration
- Spatial Extent

Vulnerable System

Exposure, Sensitivity and Resilience of:

- Population
- Economy
- Land Use and Development
- Infrastructure and Critical Facilities
- Cultural Assets
- Natural Resources

Ability, Resources and/or Willingness to:

- Mitigate
- Prepare
- Respond
- Recover

***Risk
of
Disaster***



“Listening Meeting” – March 24

- **Audience:** Cherokee, Shawnee, Pawnee, Choctaw, Chickasaw, Wichita
- **Why?** establish trust and make geoscience accessible
- Ask participants about their concerns/priorities, and intersection with geoscience?
- Dialogue between scientists and participants
- How can education help your community address your concerns?