



# surface **water**-groundwater interactions in Texas

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Geography Department  
Texas State University

*presented at*

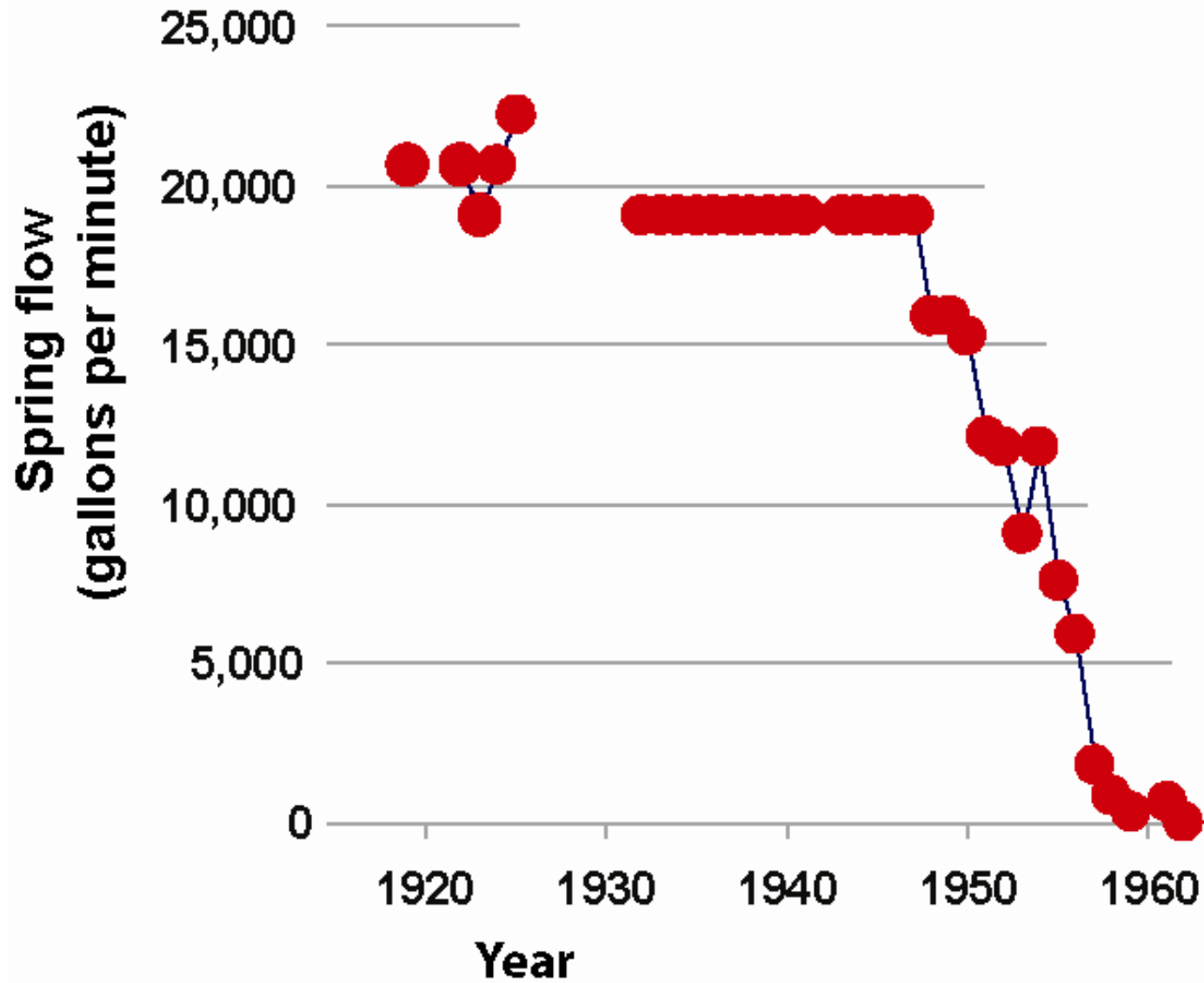
Milam and Burleson Counties 2019 Ground**water** Summit  
Caldwell, Texas; August 14, 2019

*hosted by*

*Post Oak Savannah Ground**water** Conservation District*



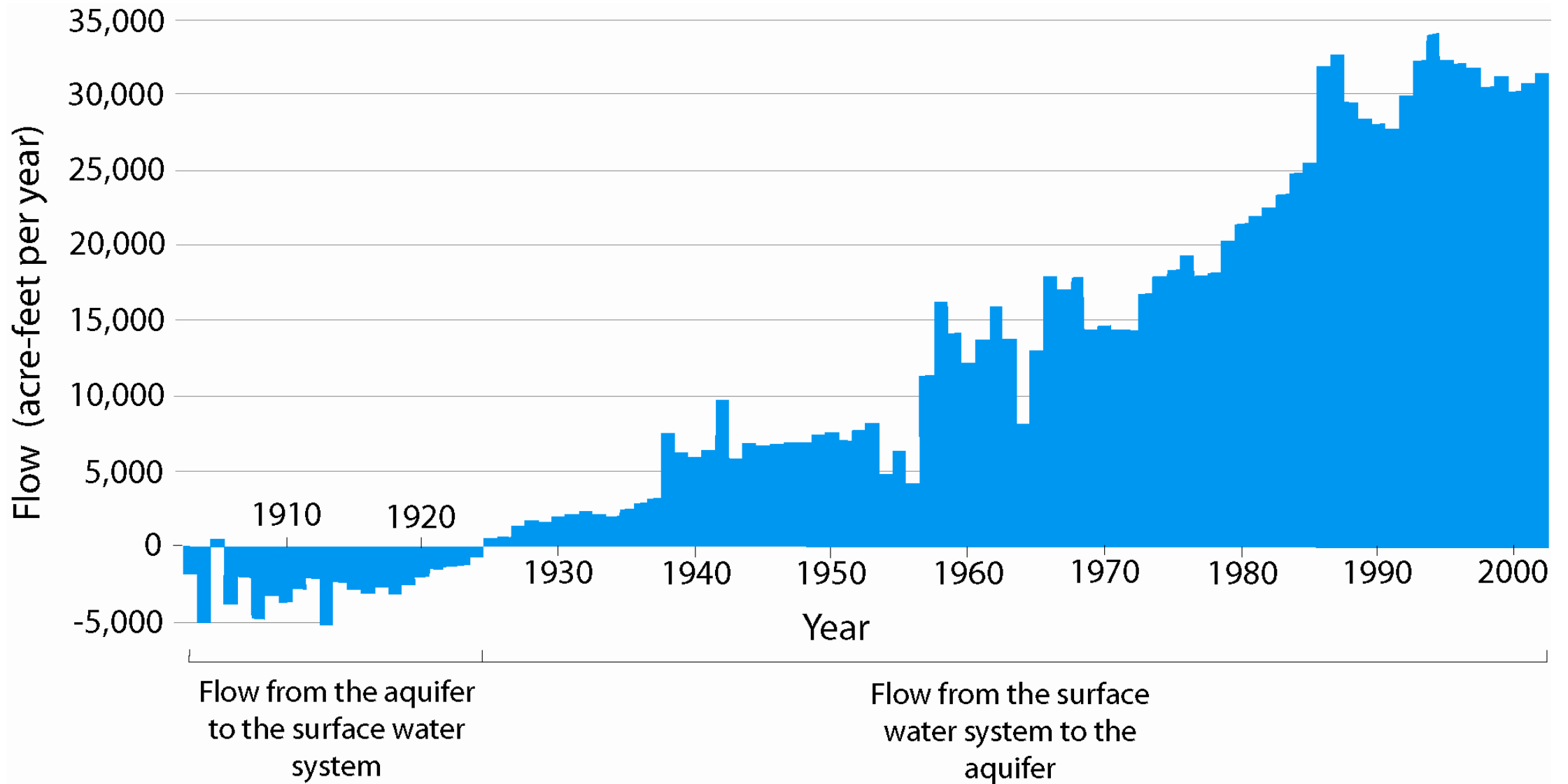
# Comanche Springs



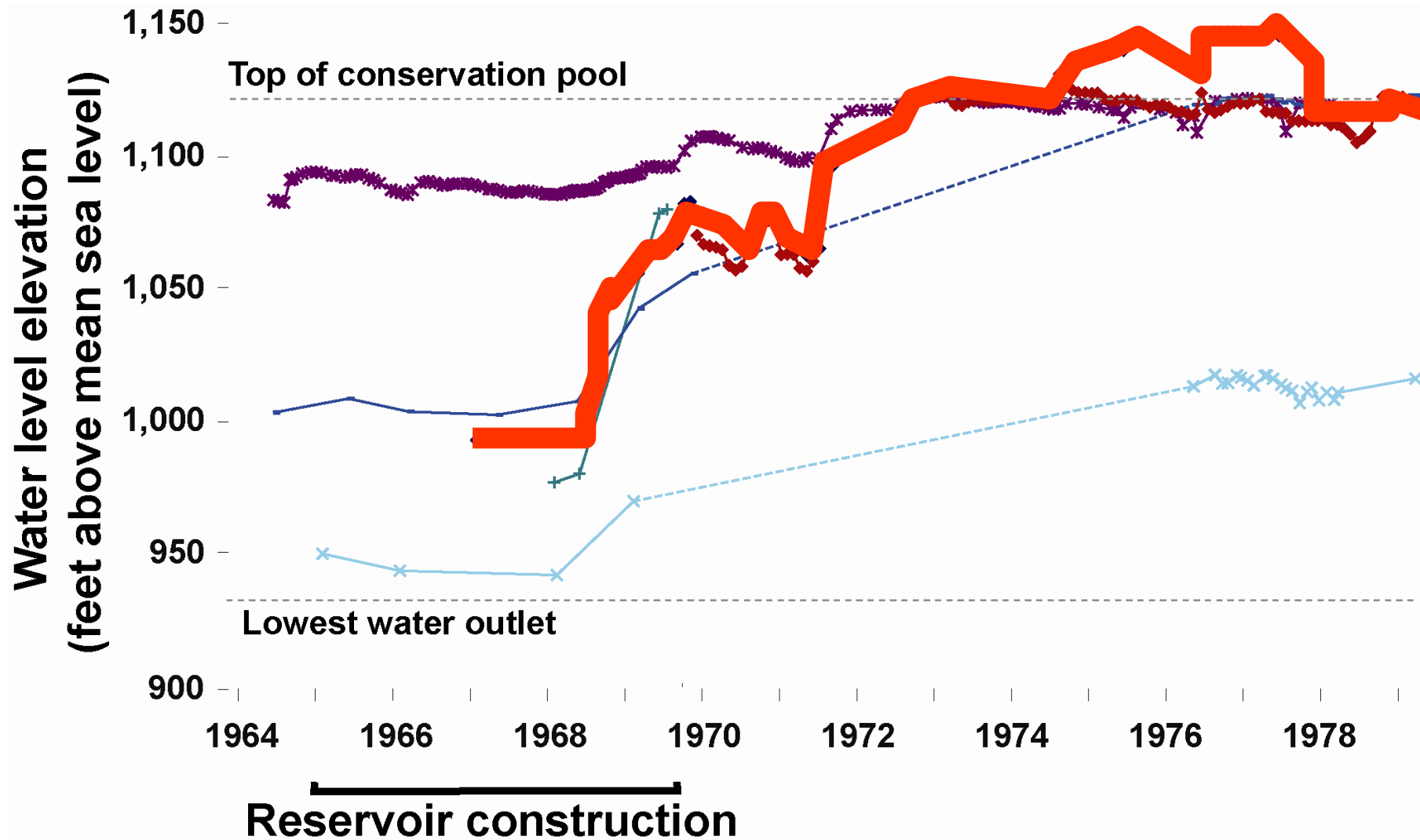
**Belding Farms**

photo from NRCS

# Rio Grande-Hueco Bolson



# Lake Amistad-Edwards-Trinity



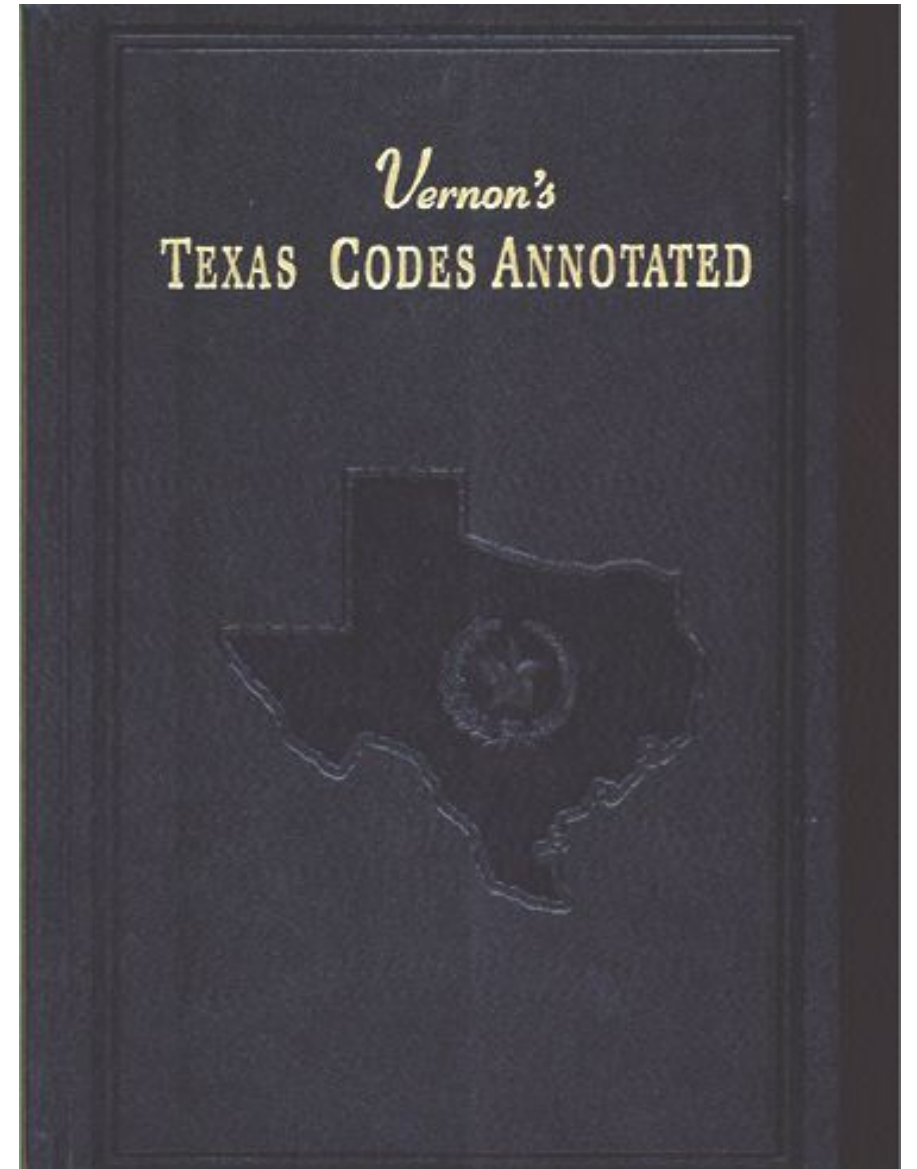
# increasing interest in surface water-groundwater interaction

- Texas v. New Mexico on the Rio Grande
  - Texas v. New Mexico on the Pecos River
- San Saba River
- Devils River
- Legislative interim charge:
  - Speaker asked House Natural Resources Committee to evaluate “emerging issues in groundwater and surface-water interaction, in particular in areas of increasing competition for scarce resources.”
- HB 4570 (Larson)
  - Relating to establishing an advisory board to study surface water and groundwater interaction
  - Did not pass...

# Texas Water Code

State water is “[t]he water of the ordinary flow, **underflow**, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico...”

TWC §11.021



# TCEQ Rules

Underflow is “[w]ater in sand, soil, and gravel below the bed of the watercourse, together with the water in the lateral extensions of the water-bearing material on each side of the surface channel, such that the **surface flows are in contact with the subsurface flows**, the latter flows being confined within a space reasonably defined and having a direction corresponding to that of the surface flow”

TAC §297.1



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## Texas Administrative Code

Titles

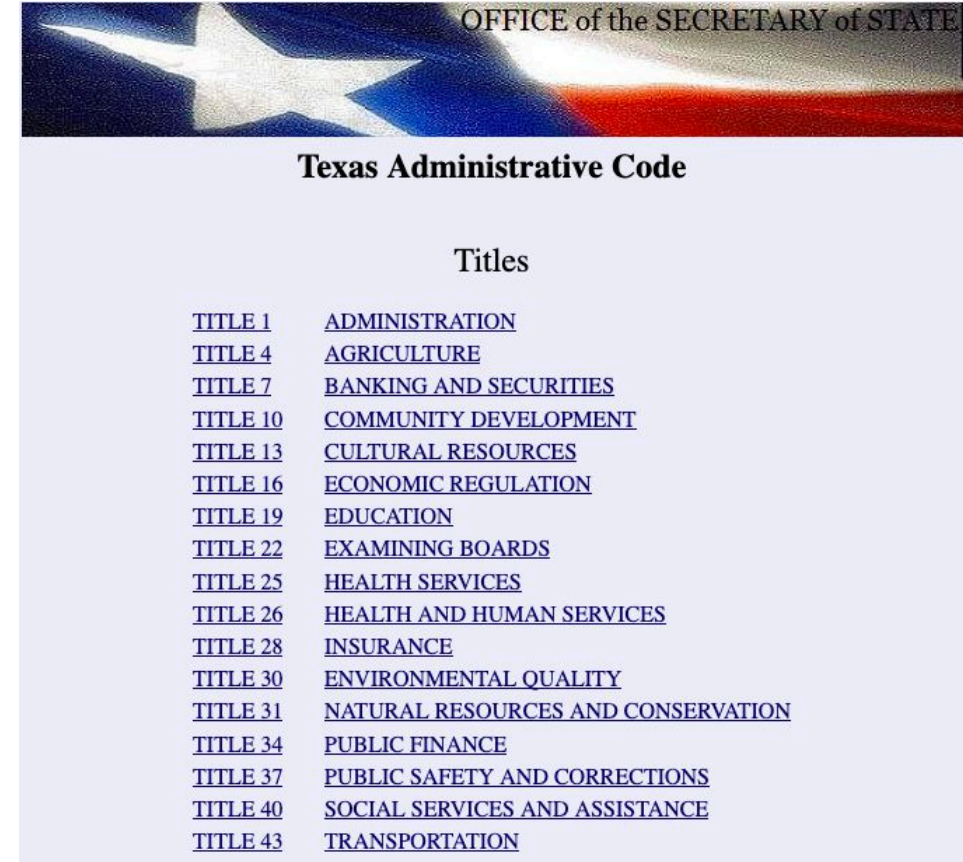
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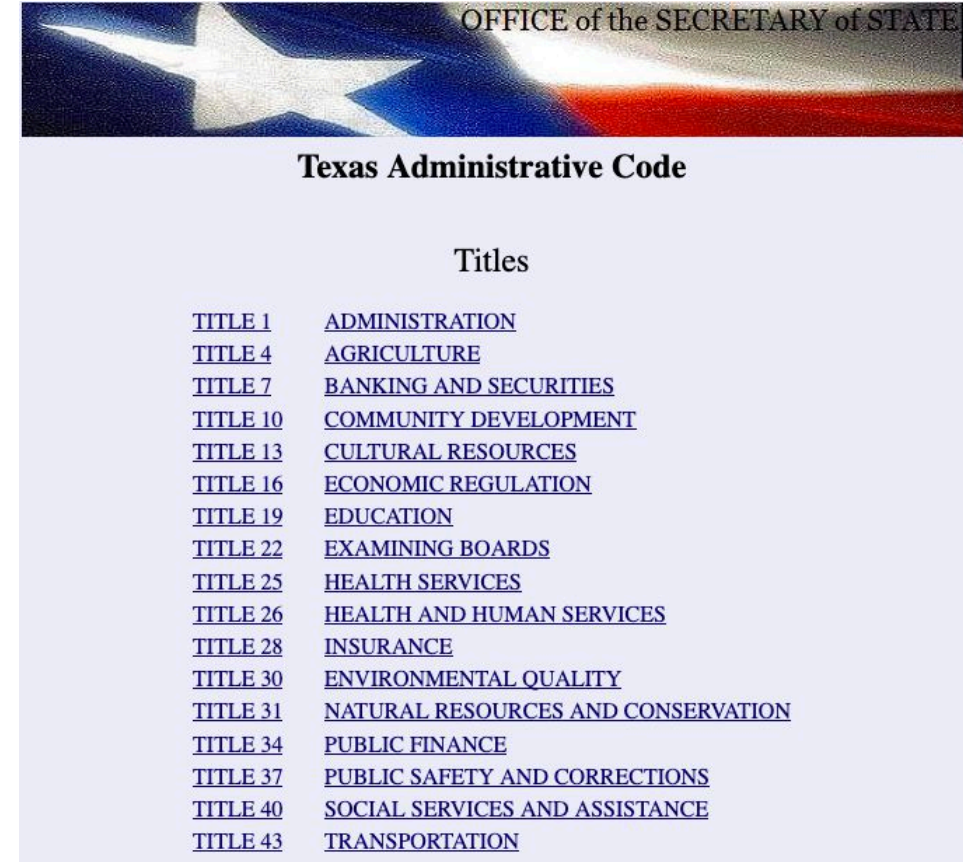
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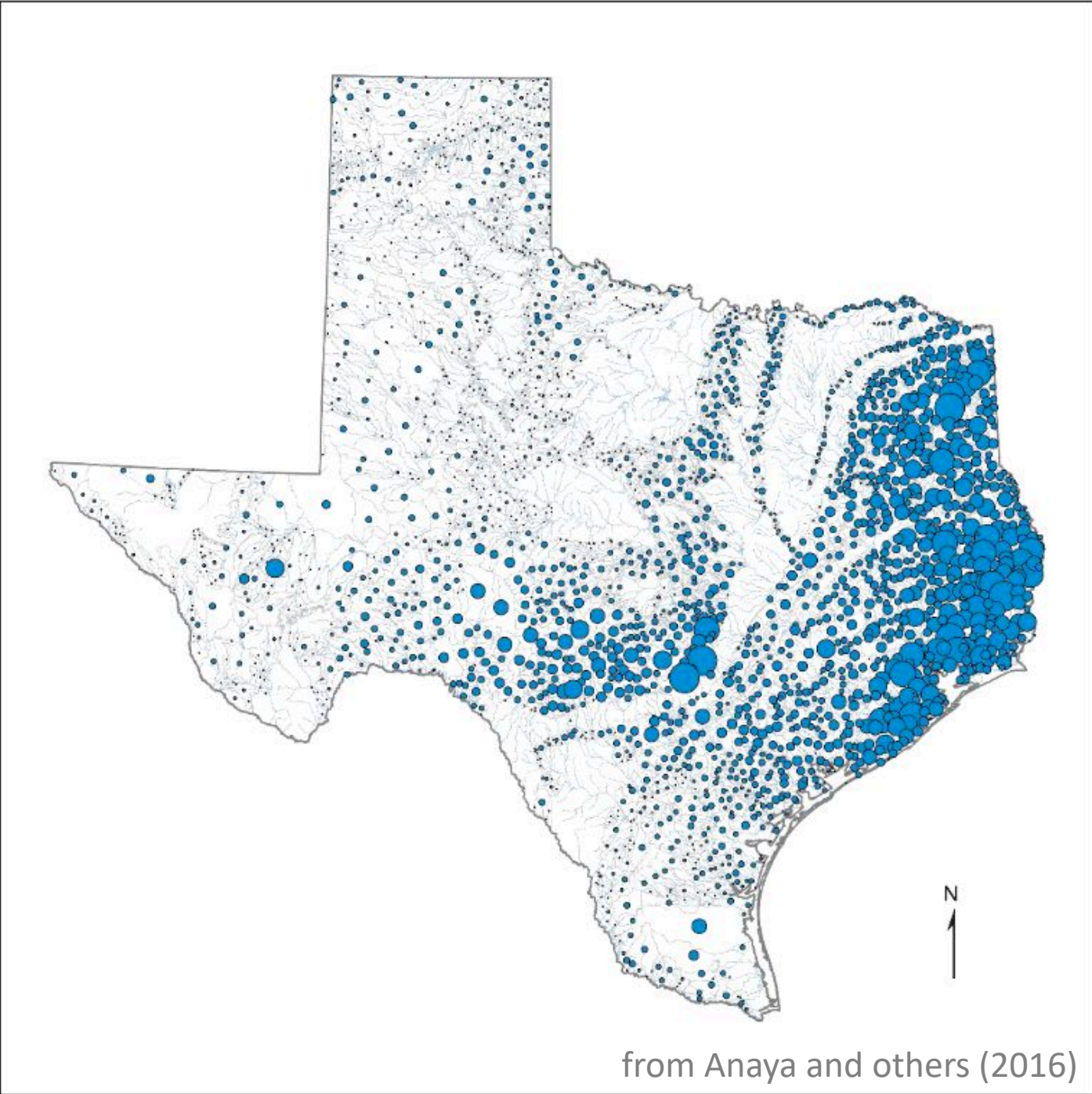
Major streams

Major lakes

Recharge zones  
of the major and  
minor aquifers

Bays, estuaries, gulf

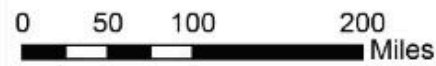
does not include the Cross Timbers Aquifer

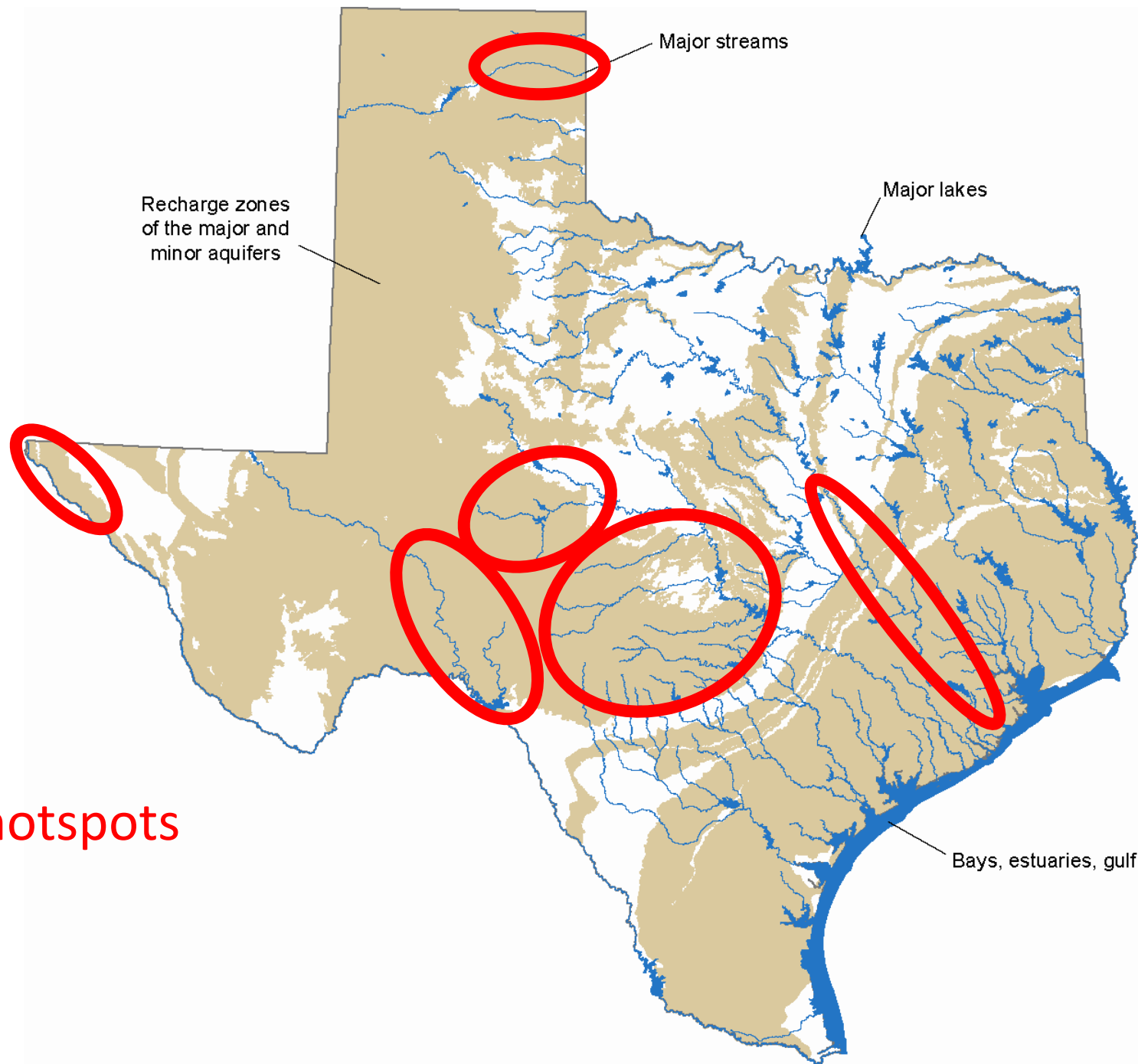


**Baseflow from major and minor aquifers of Texas by hydrologic landscape unit (cubic feet per second)**

- 0.0–0.5
- 0.5–1.0
- 1.0–2.0
- 2.0–5.0
- 5.0–10
- 10–20
- 20–30
- 30–50
- 50–100
- 100–288

*NOTE: Baseflows greater than 50 cubic feet per second represent drainage basins with major Texas springs*

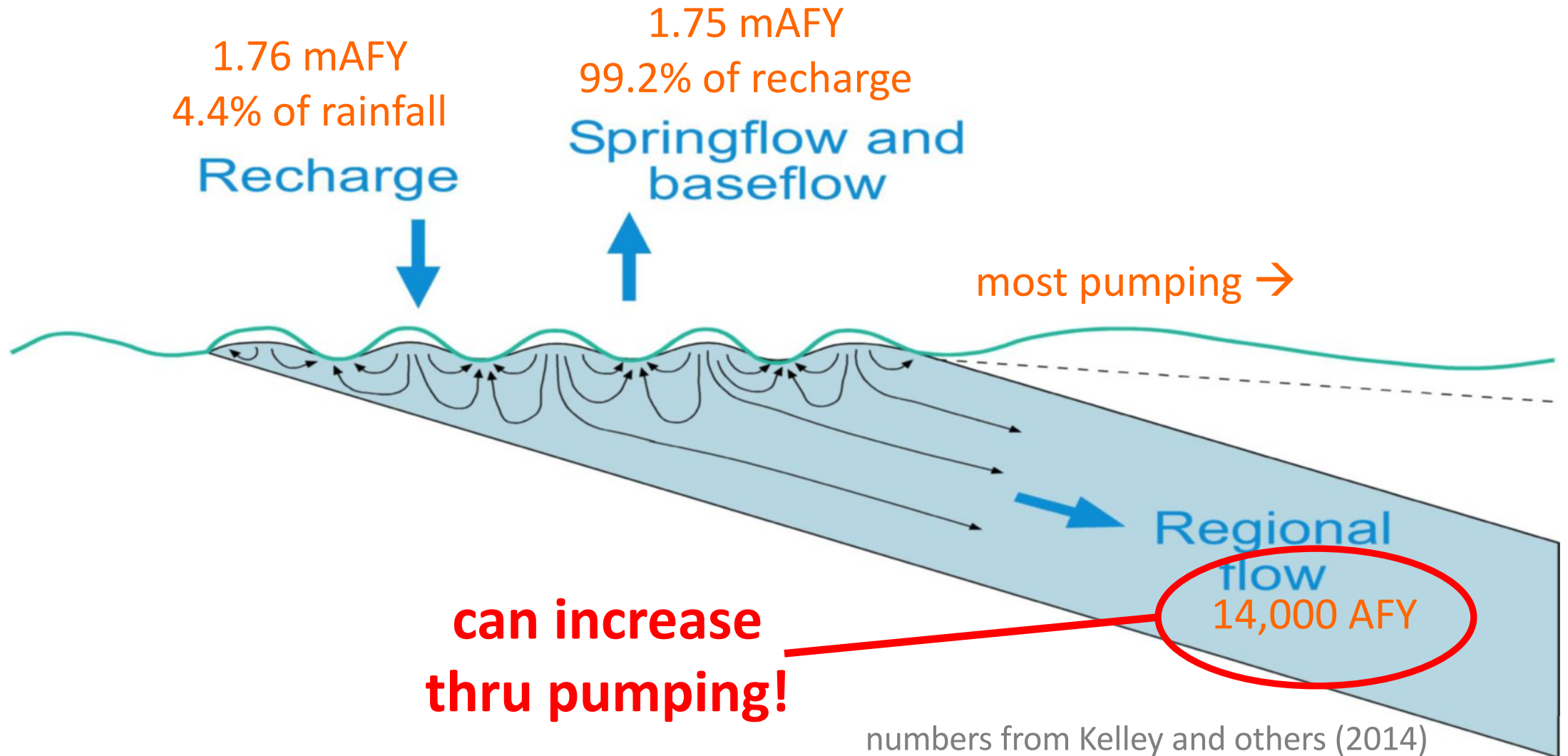




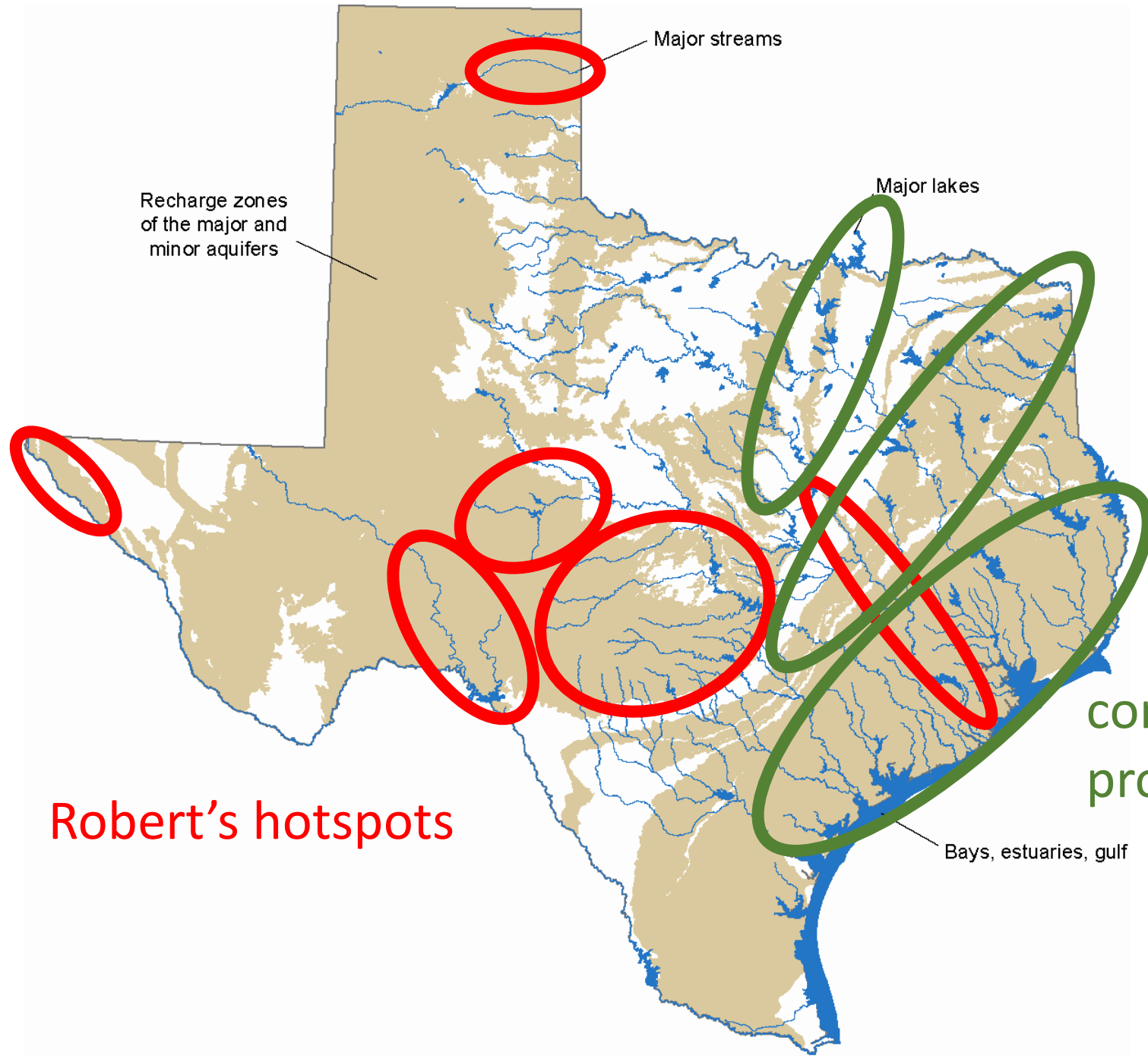
Robert's hotspots

# Trinity Aquifer

north of the Colorado



numbers from Kelley and others (2014)



Major streams

Major lakes

Recharge zones  
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minor aquifers

Bays, estuaries, gulf

Robert's hotspots

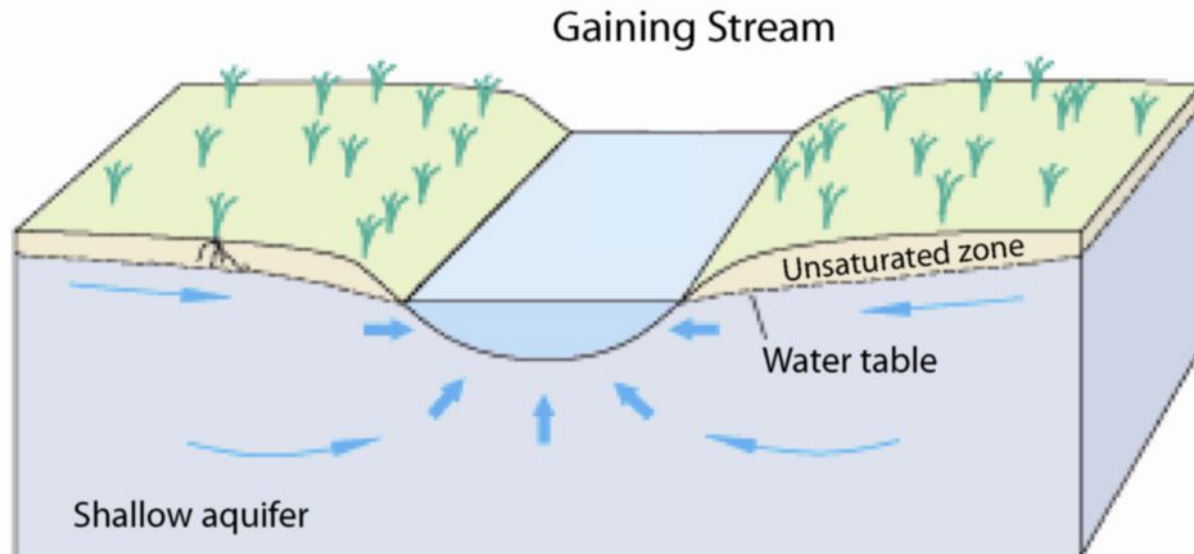
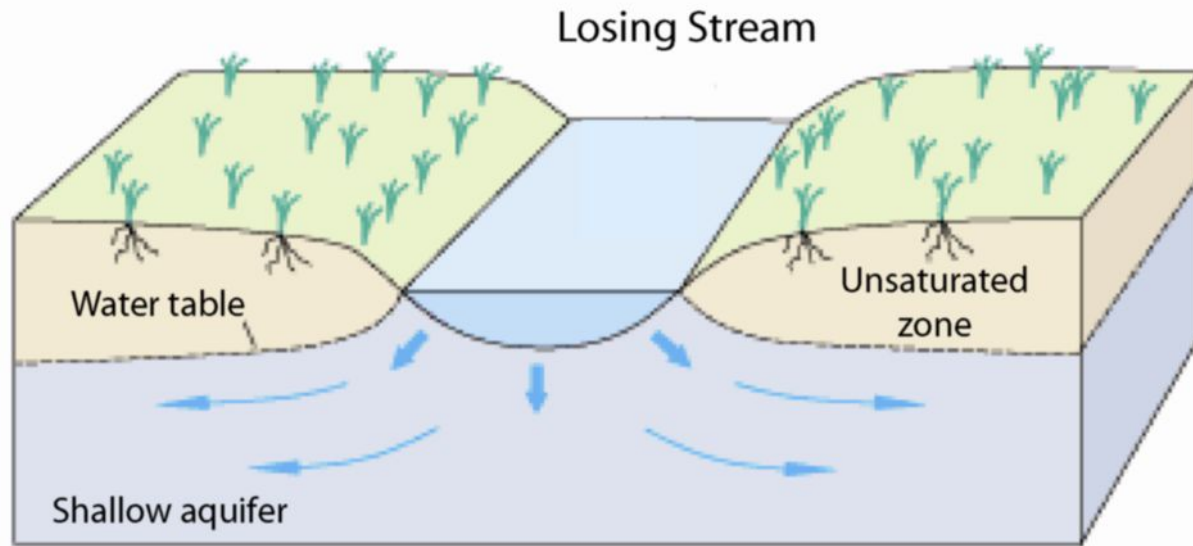
confined pumping  
proolly not an issue

What can we do better?

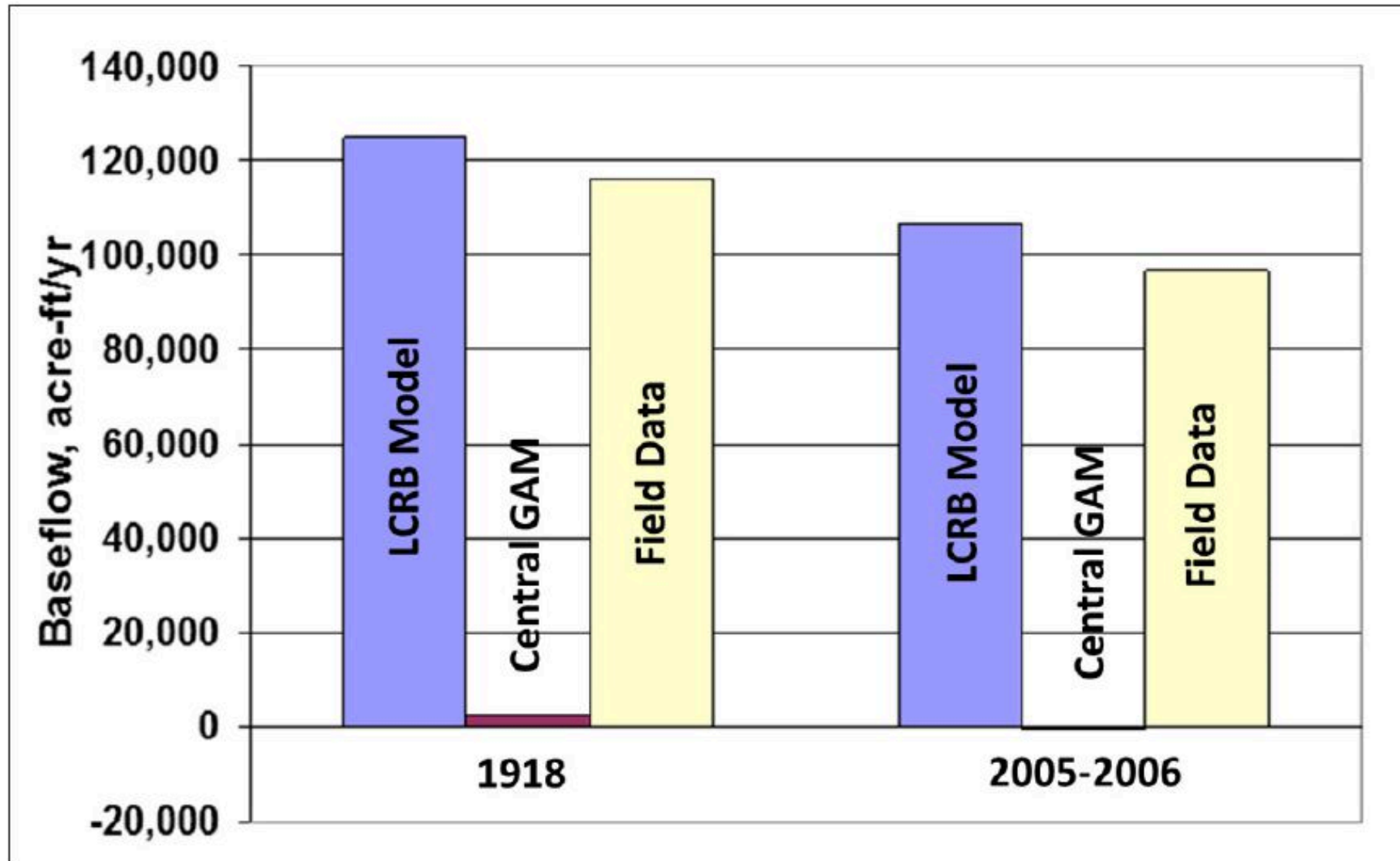




# detailed field studies



# improve the GAMs







# questions?

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