WHERE'S THE WATER AT?

A HYDROLOGIST'S VIEW OF THE OGALLALA

TAWC 10TH ANNUAL WATER COLLEGE

JANUARY 24, 2024

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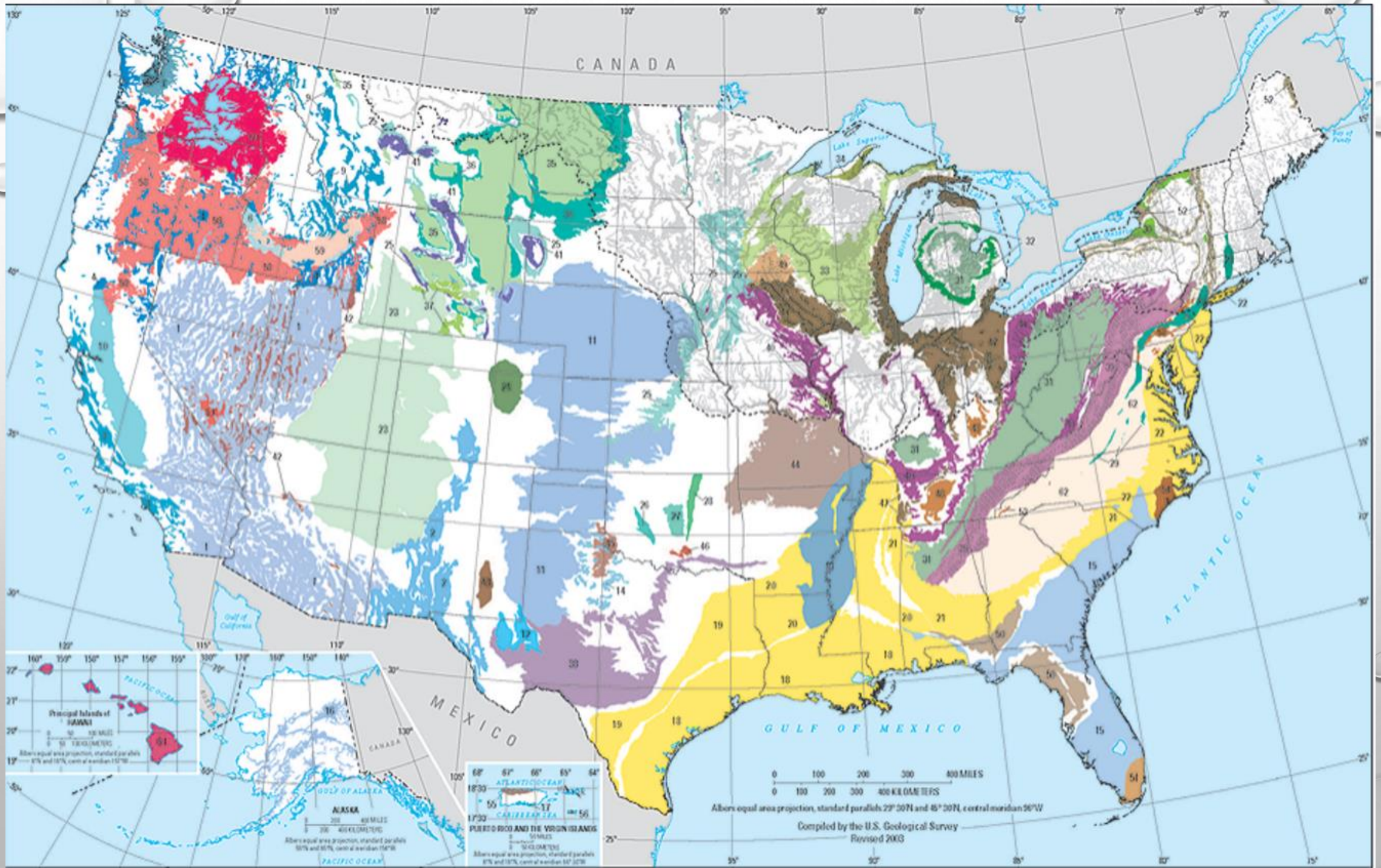
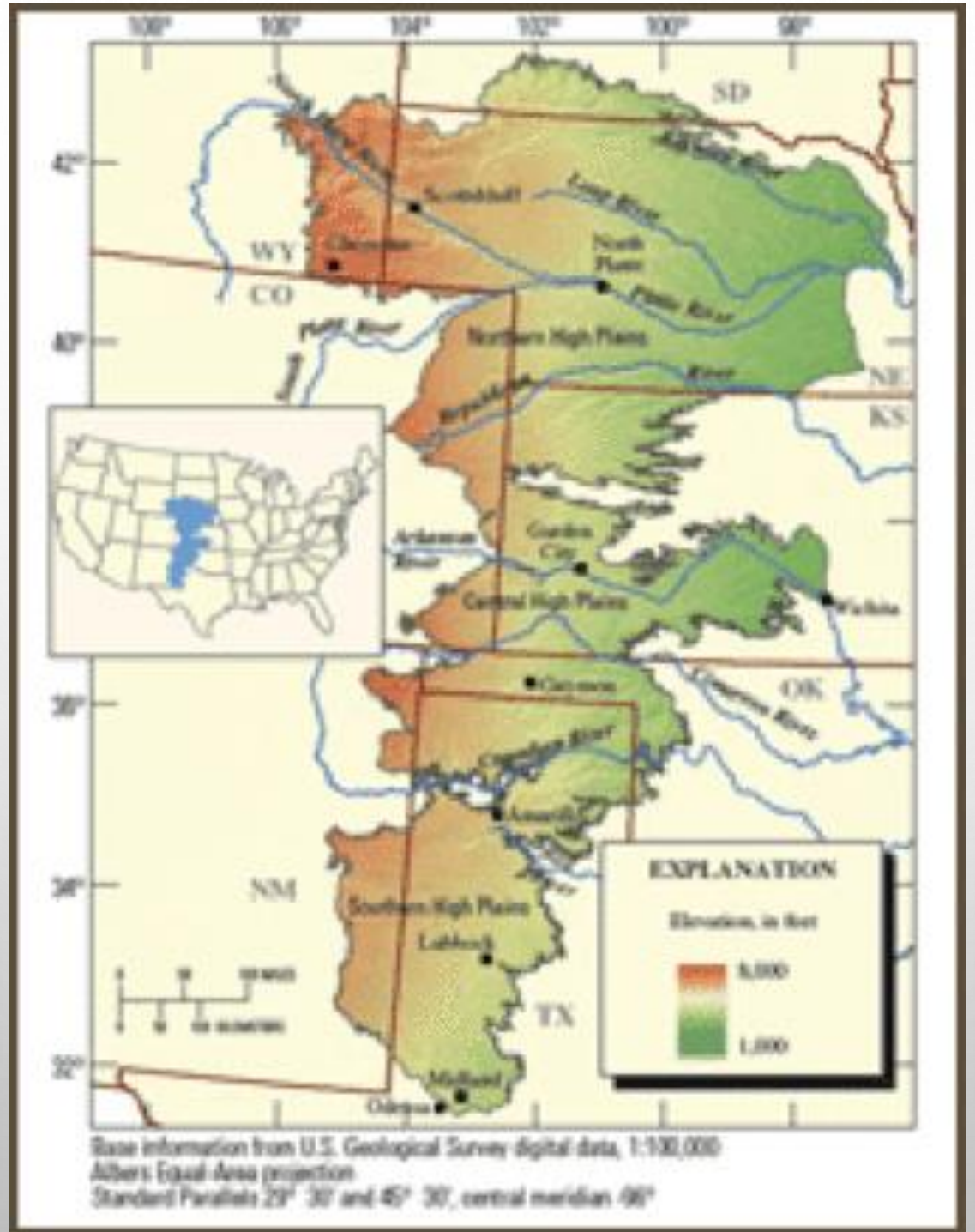
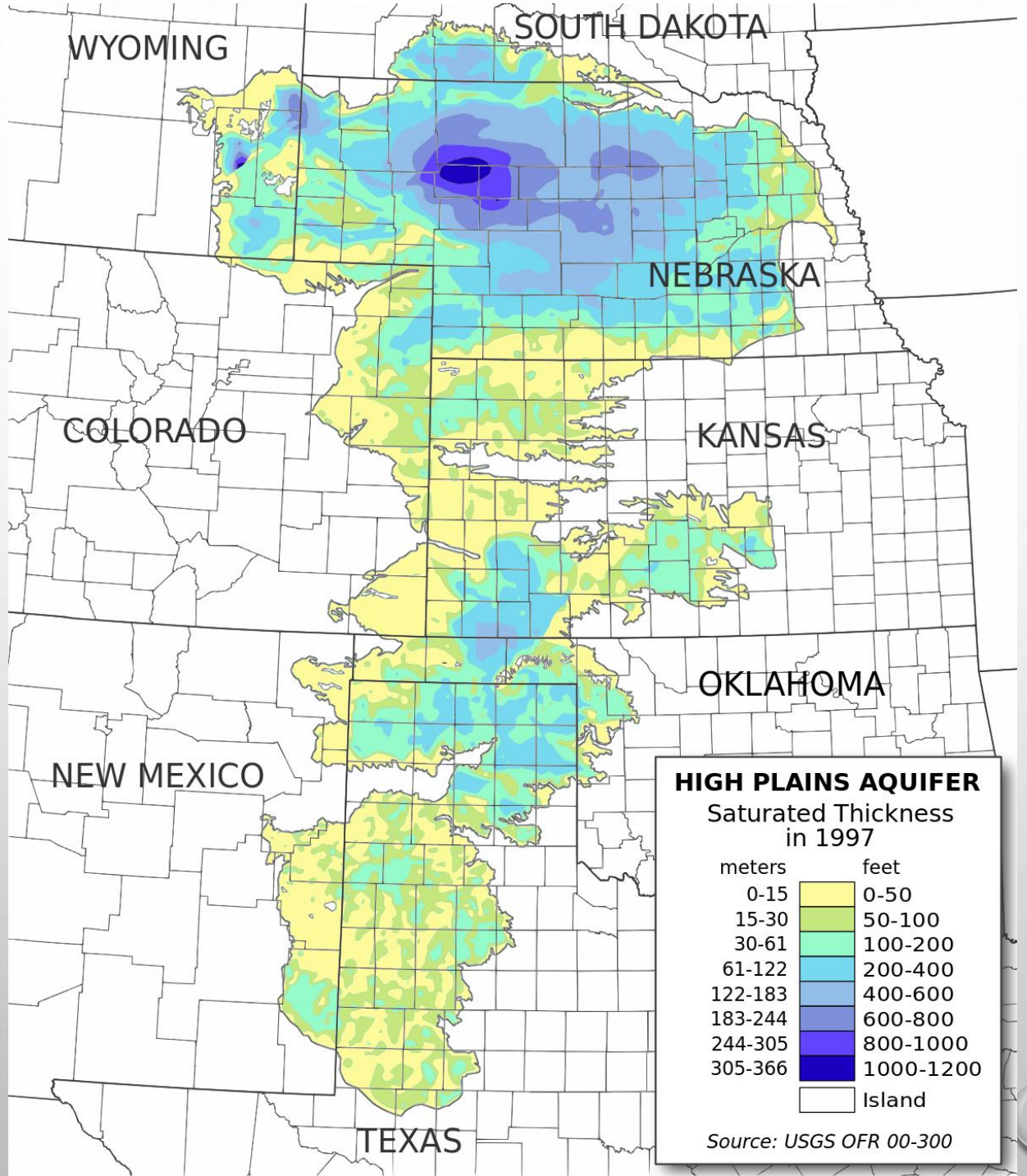
HYDROLOGIST, RMBJ GEO, INC.

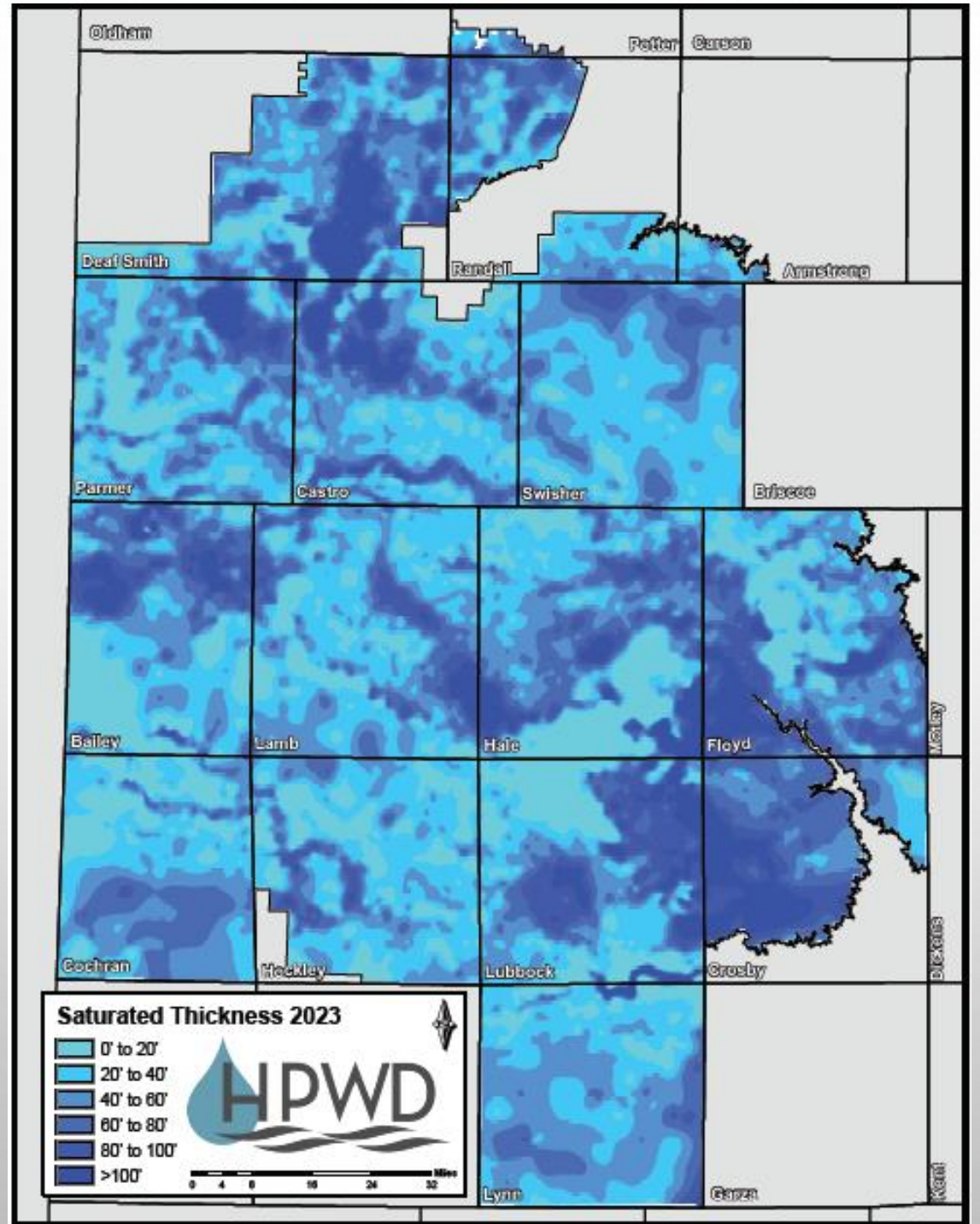
WHERE'S THE WATER?


CANADA
PACIFIC OCEAN
ATLANTIC OCEAN
MEXICO
GULF OF MEXICO
Gulf of California
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Gulf of St. Lawrence
Bay of Fundy
Principal Islands of HAWAII
ALASKA
GULF OF ALASKA
PUERTO RICO AND THE VIRGIN ISLANDS
ATLANTIC OCEAN
CARIBBEAN SEA
0 100 200 300 400 MILES
0 100 200 300 400 KILOMETERS
Albers equal area projection, standard parallels 29° 30'N and 45° 30'N, central meridian 96°W
Compiled by the U.S. Geological Survey
Revised 2003


SD
WY
CO
NE
KS
OK
NM
TX
Northern High Plains
Central High Plains
Southern High Plains
EXPLANATION
Elevation, in feet
8,000
1,000
Base information from U.S. Geological Survey digital data, 1:100,000
Albers Equal-Area projection
Standard Parallels 29° 30' and 45° 30', central meridian -96°

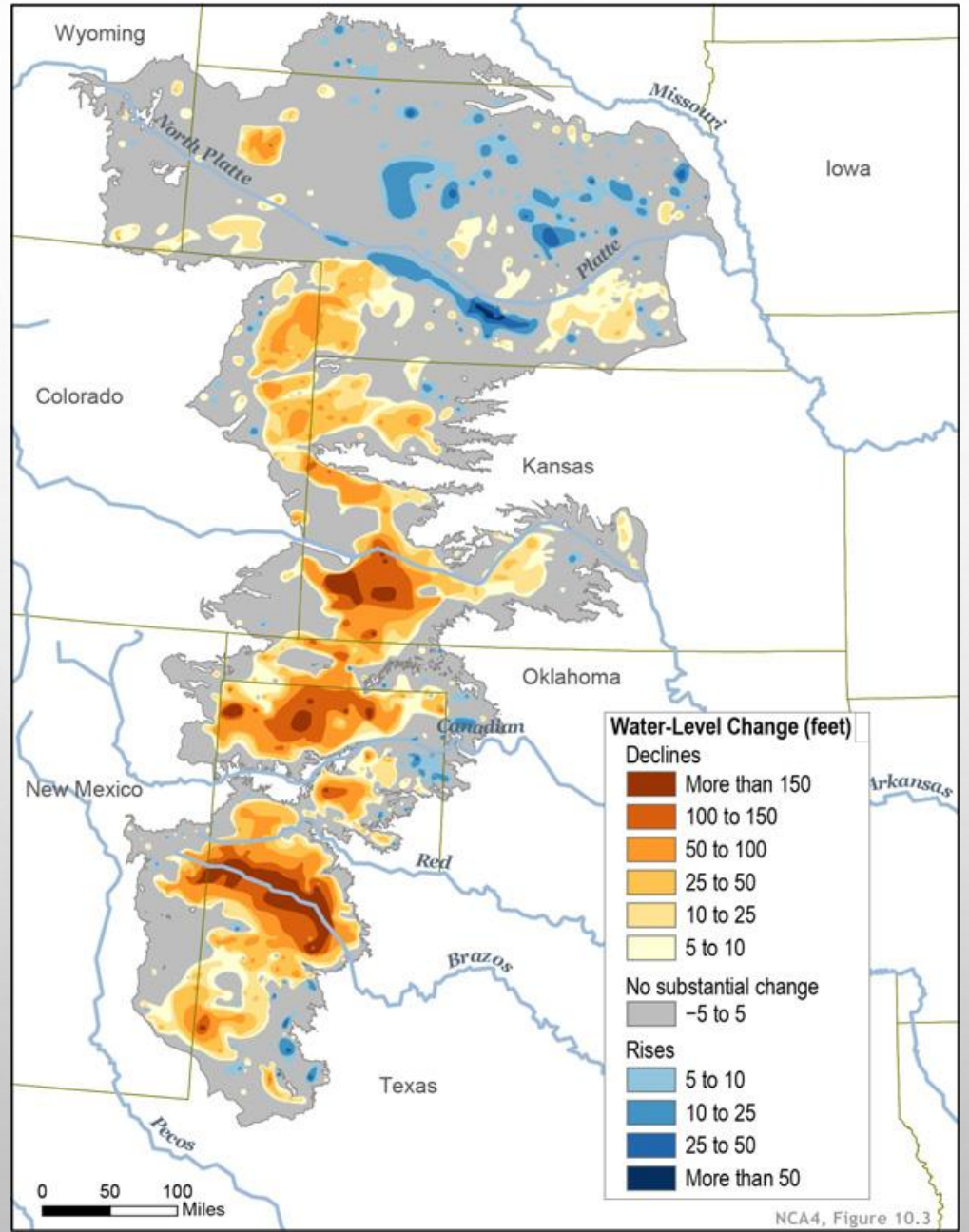
HOW MUCH WATER?


WYOMING
SOUTH DAKOTA
NEBRASKA
COLORADO
KANSAS
OKLAHOMA
NEW MEXICO
TEXAS
HIGH PLAINS AQUIFER
Saturated Thickness
in 1997
meters
feet
0-15
0-50
15-30
50-100
30-61
100-200
61-122
200-400
122-183
400-600
183-244
600-800
244-305
800-1000
305-366
1000-1200
Island
Source: USGS OFR 00-300


Oldham
Potter
Carson
Deaf Smith
Randall
Armstrong
Parmer
Castro
Swisher
Briscoe
Bailey
Lamb
Hale
Floyd
Motley
Cochran
Hockley
Lubbock
Crosby
Dickens
Lynn
Garza
Kent
Saturated Thickness 2023
0' to 20'
20' to 40'
40' to 60'
60' to 80'
80' to 100'
>100'
HPWD
0 4 8 16 24 32
Miles

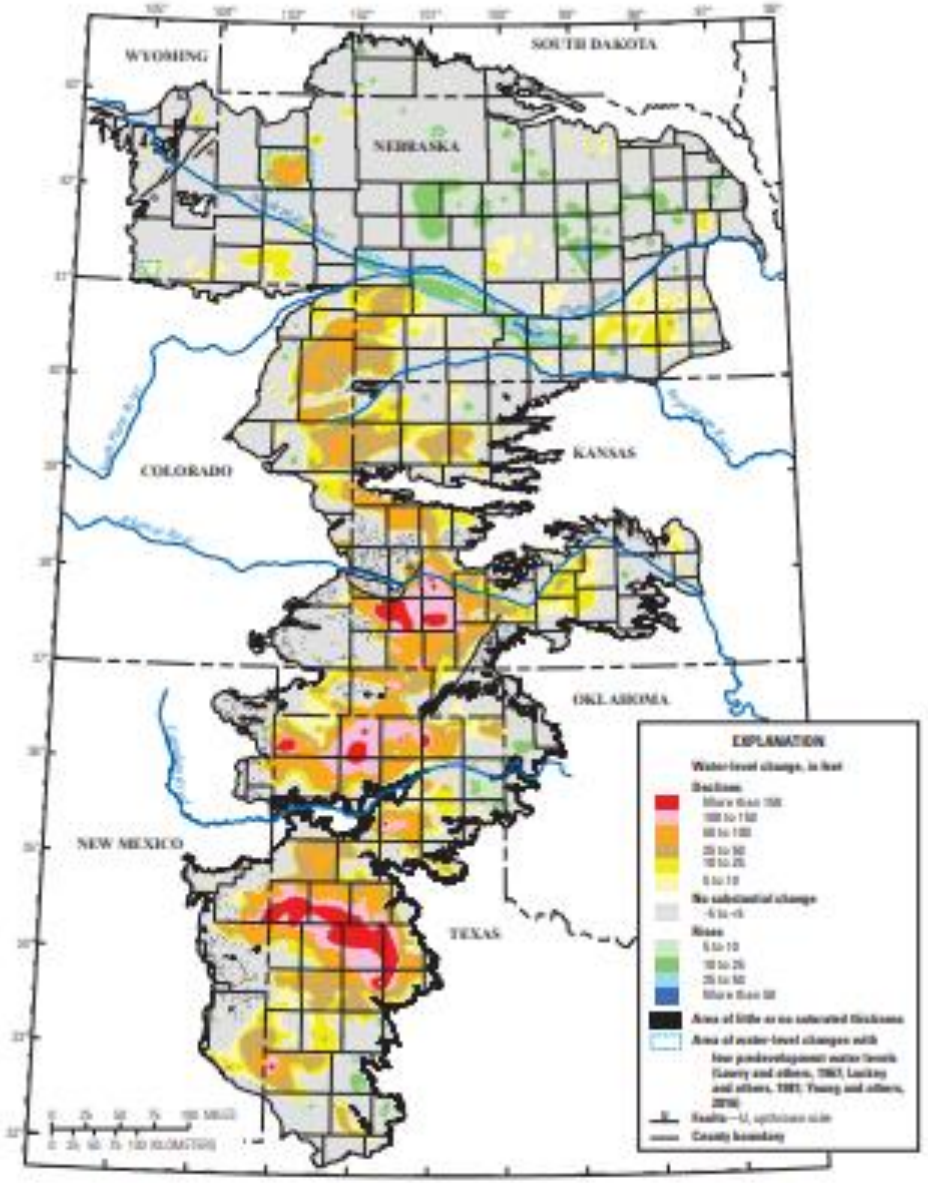
WHAT'S HAPPENING?

DECLINE FROM PRE-DEVELOPMENT THROUGH 2015

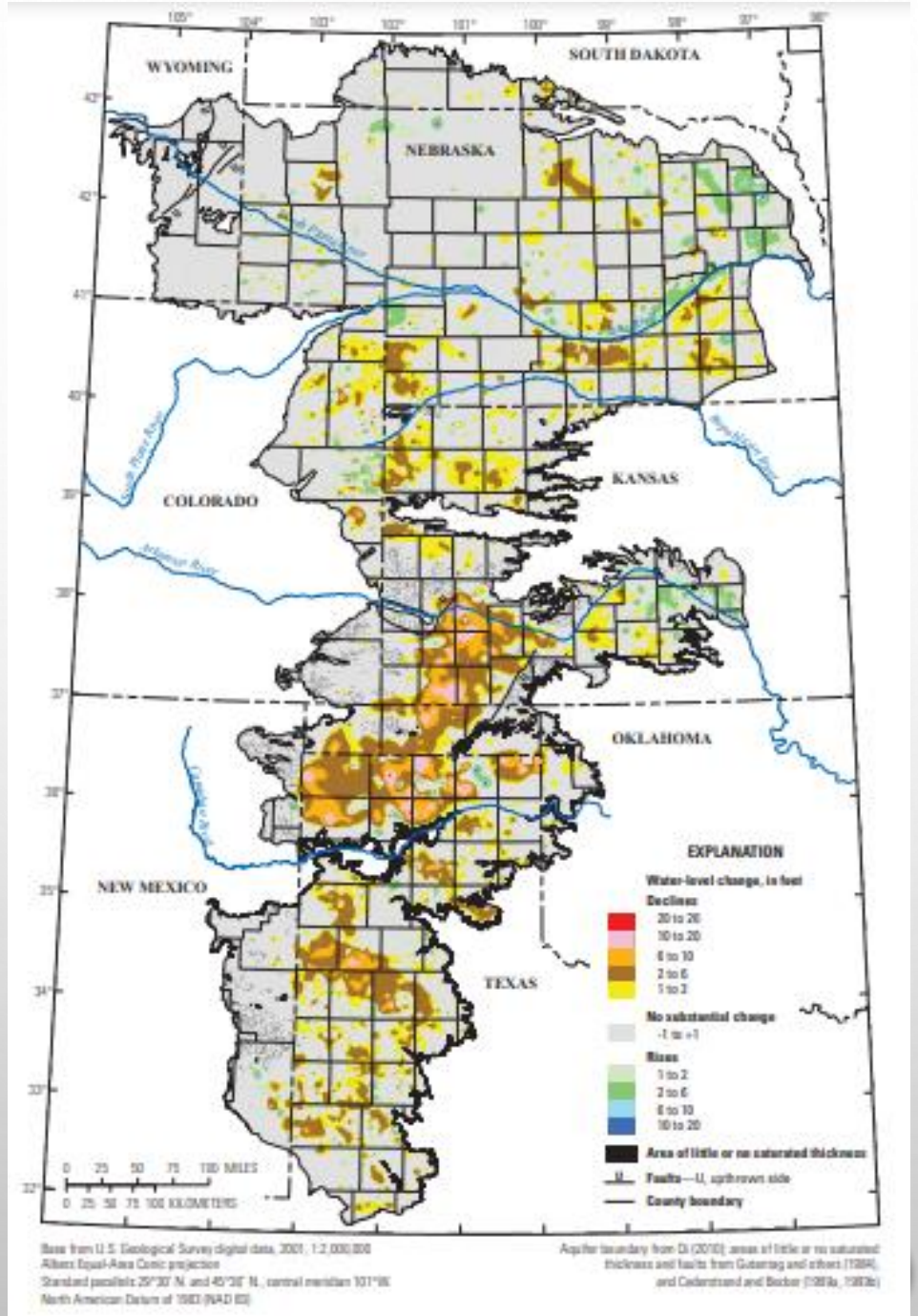


www.climate.gov

Water-Level and Recoverable Water in Storage Changes, High Plains Aquifer, Predevelopment to 2015 and 2013–15



Scientific Investigations Report 2017–5040

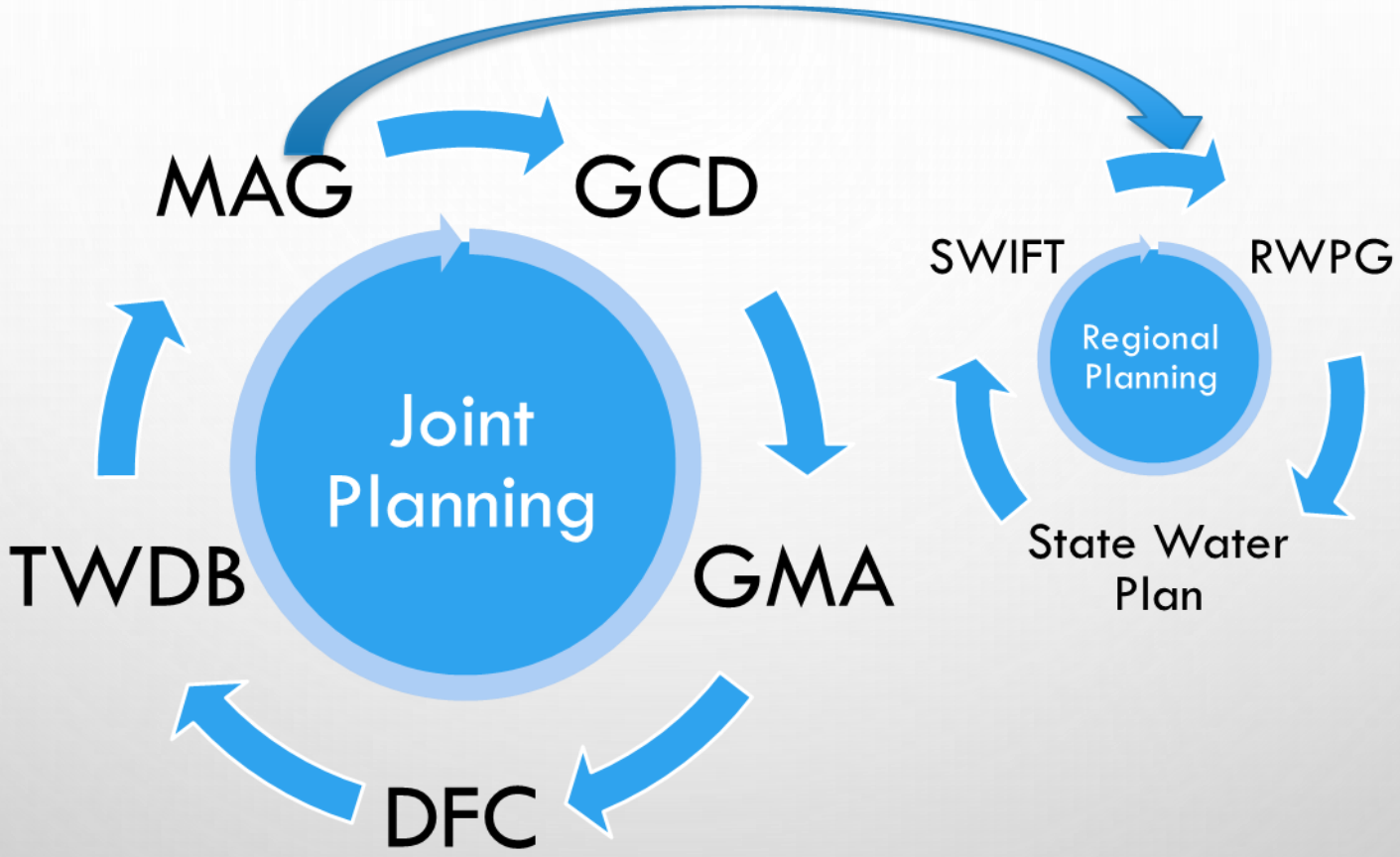


Base from U.S. Geological Survey digital data, 2001, 1:2,000,000
Albers Equal-Area Conic projection
Standard parallels 29°30' N. and 45°30' N., central meridian 101°W.
North American Datum of 1983 (NAD 83)

Aquifer boundary from DI (2010); areas of little or no saturated thickness and faults from Gutentag and others (1984), and Cederstrand and Becker (1985a, 1985b)

Figure 2. Water-level changes in the High Plains aquifer, 2013–15.

WHAT'S GOING TO HAPPEN?


MAG
GCD
SWIFT
RWPG
Regional Planning
Joint Planning
TWDB
GMA
State Water Plan
DFC

Texas Water Development Board

Home Board Financial Assistance Water Planning Groundwater Surface Water Flood D

Ogallala Aquifer

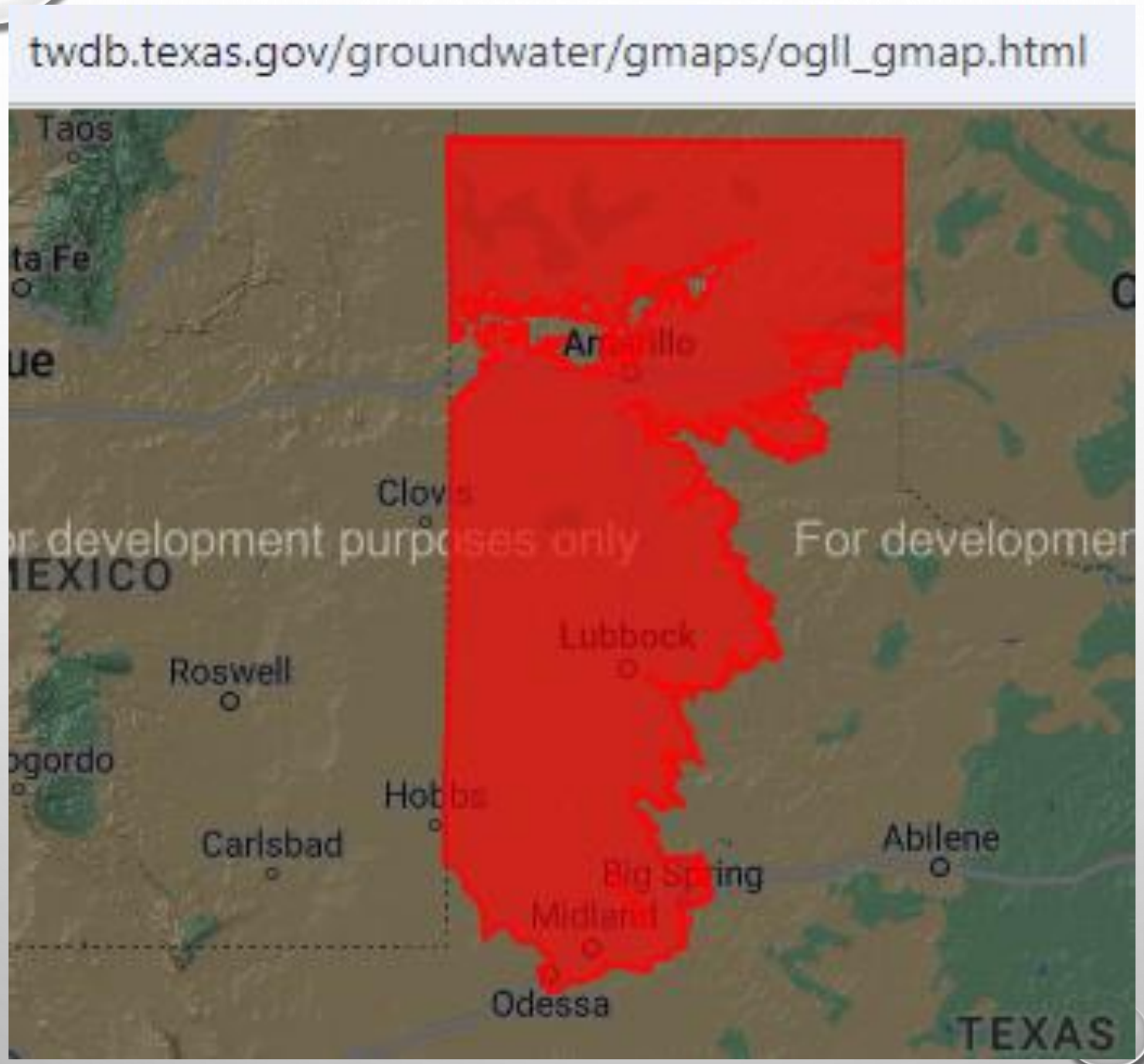
interactive map

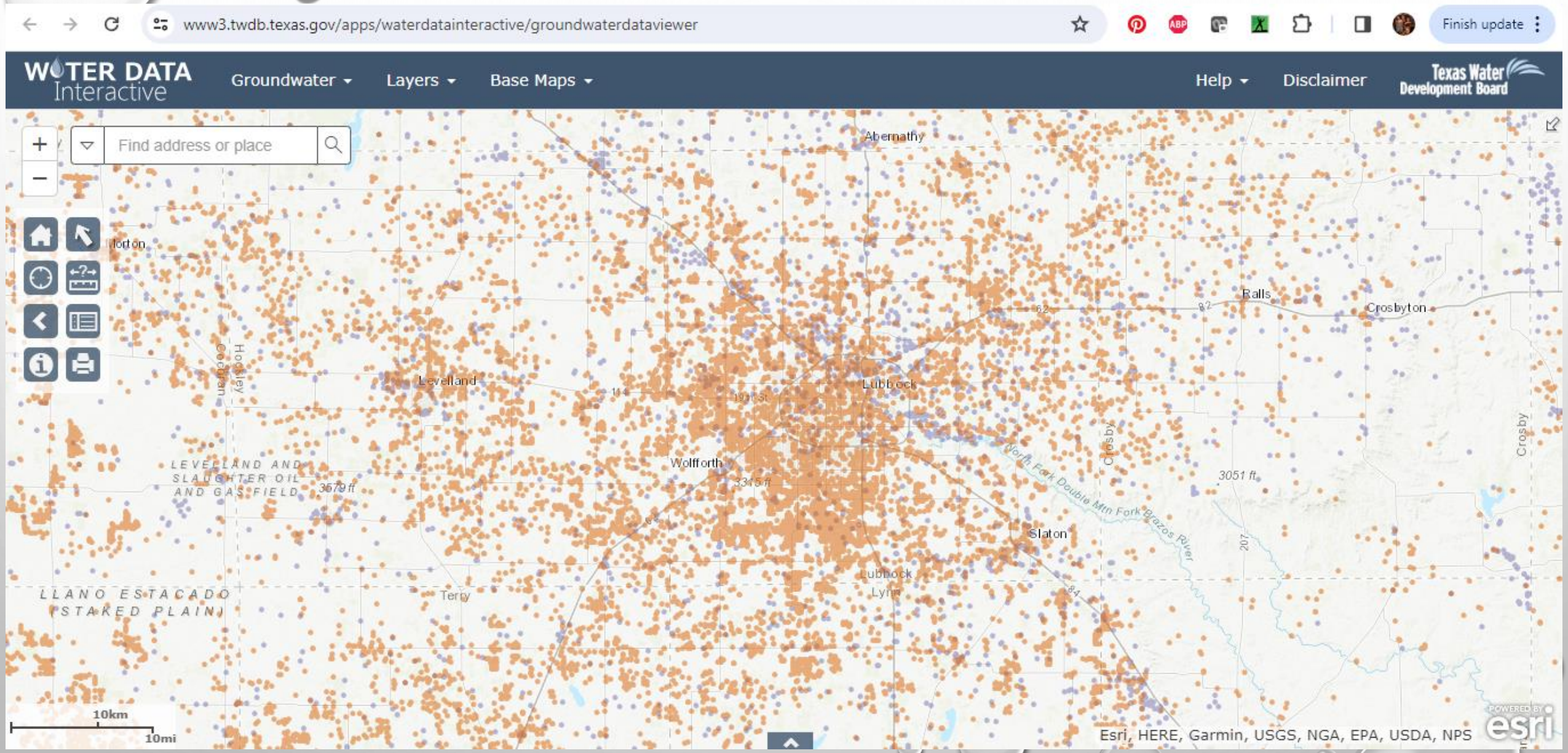
Aquifer Facts

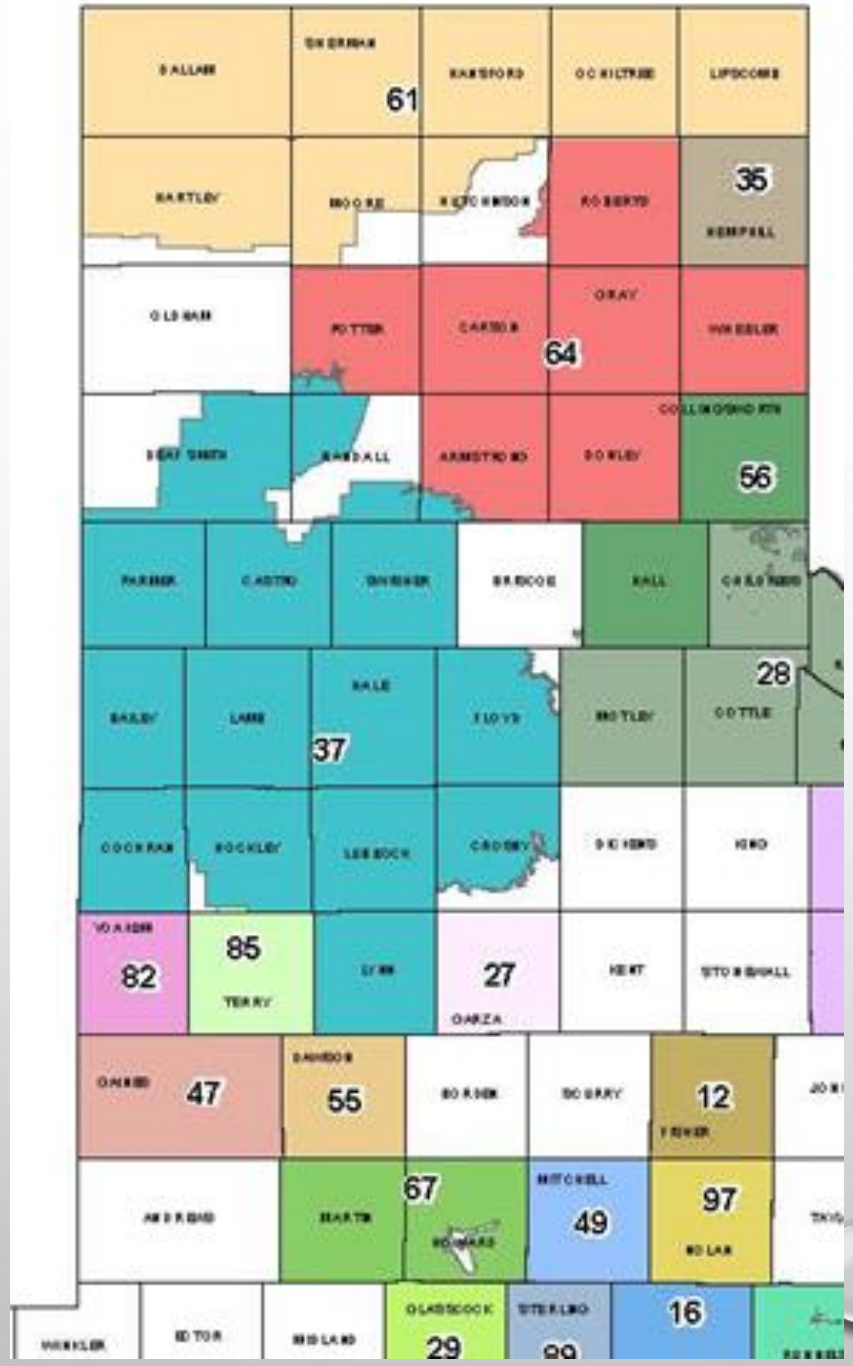
- Aquifer type: unconfined
- Area of aquifer: 36,293 square miles
- Proportion of aquifer with groundwater conservation districts: 86 percent
- Number of counties containing the aquifer: 49

Summary

The Ogallala Aquifer is the largest aquifer in the United States and is a major aquifer of Texas underlying much of the High Plains region. The aquifer consists of sand, gravel, clay, and silt and has a maximum thickness of 800 feet. Freshwater saturated thickness averages 95 feet.


twdb.texas.gov/groundwater/gmaps/ogll_gmap.html
Taos
Roswell
Carlsbad
Hobbs
Lubbock
Abilene
Odessa
TEXAS
MEXICO
For development purposes only


www3.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer
Finish update
WATER DATA Interactive
Groundwater
Layers
Base Maps
Help
Disclaimer
Texas Water Development Board
Find address or place
Abernathy
Idalou
Ralls
Crosbyton
Levelland
Lubbock
Wolfforth
Slaton
Lubbock Lynn
Terry
Hockley
Cochran
Crosby
LEVELLAND AND SLAUGHTER OIL AND GAS FIELD
3679 ft
3345 ft
3051 ft
North Fork Double Mtn Fork Brazos River
LLANO ESTACADO (STAKED PLAINS)
62
82
84
114
207
10km
10mi
Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS
POWERED BY esri


61
35
64
56
28
37
85
82
27
47
55
12
67
49
97
16
29

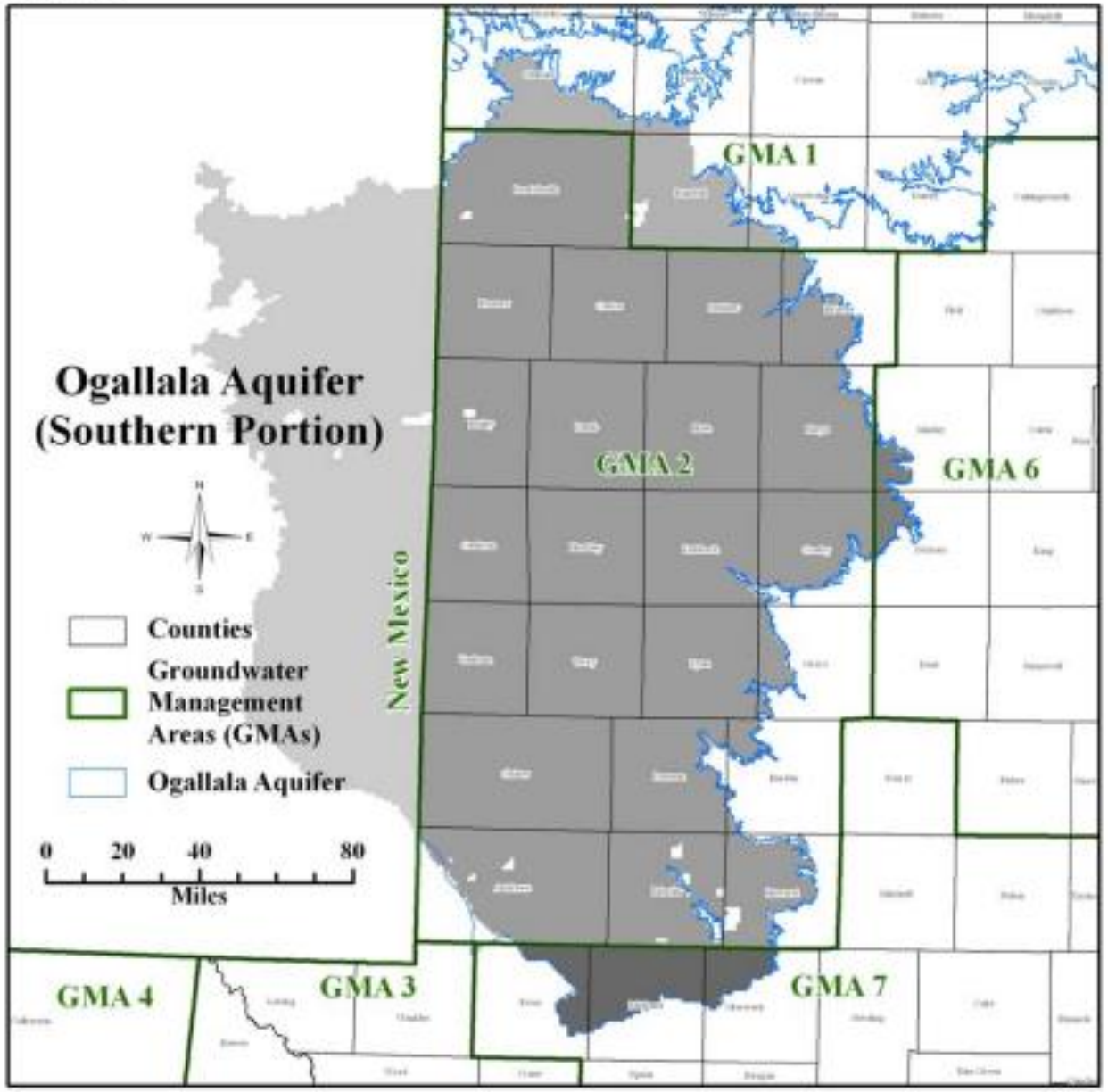


Figure 1. Location map showing model grid cells representing the southern portion of the Ogallala Aquifer, groundwater management areas, and the Ogallala Aquifer boundary.

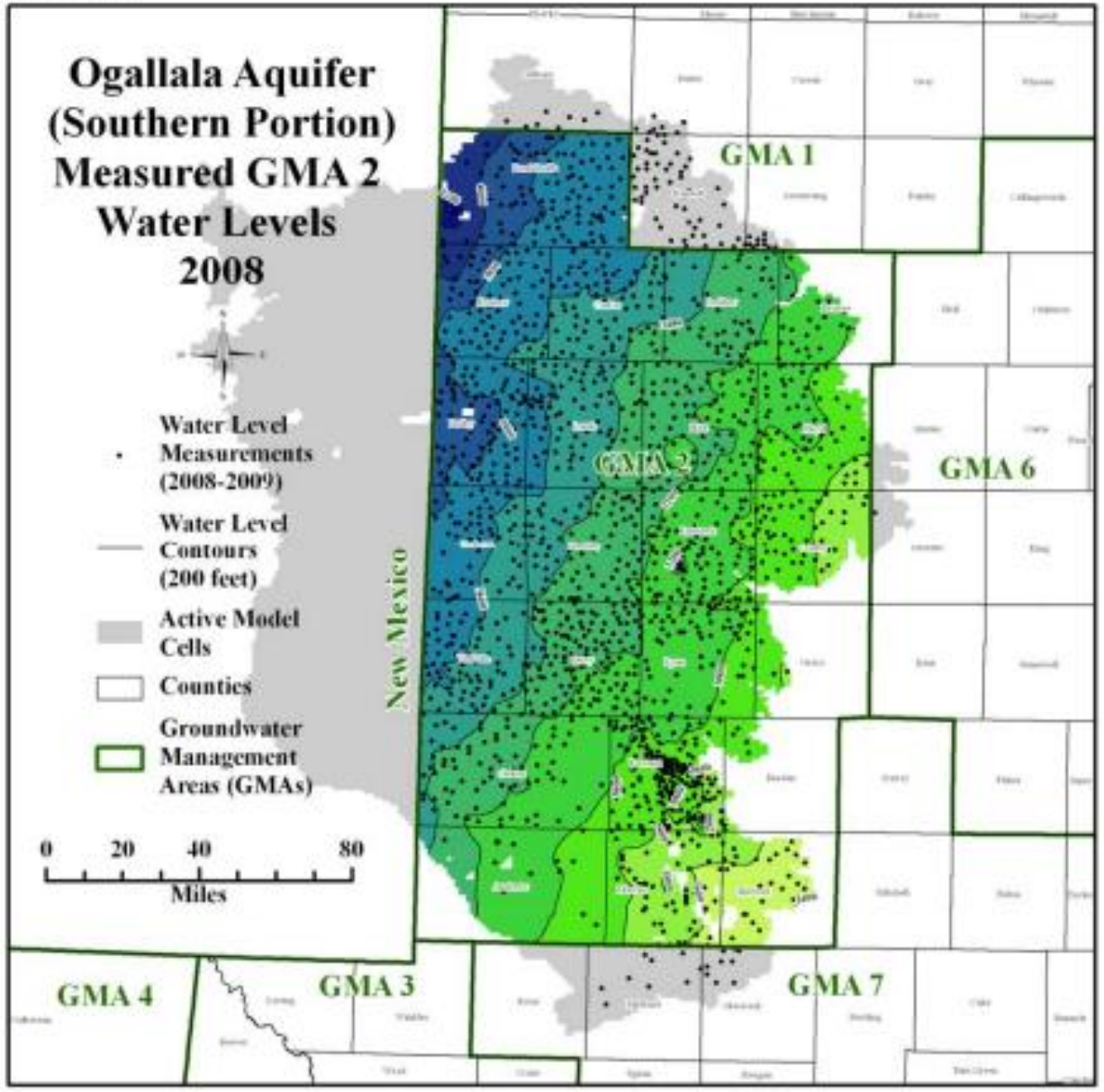


Figure 2. Water level measurements used to create a surface representing 2008 water levels and to estimate the initial Ogallala Aquifer volume within Groundwater Management Area 2.

MODELS

- MODELS ARE BASED ON BEST AVAILABLE DATA AT THE TIME
- MODELS ARE ONLY AS GOOD AS THE DATA THAT GOES INTO THEM
- MODELS PREDICT POSSIBILITIES
- “ALL MODELS ARE WRONG, BUT SOME ARE USEFUL.” GEORGE BOX

NORTHERN OGALLALA

Saturated Thickness in the Ogallala Aquifer in the Panhandle Water Planning Area—
Simulation of 2000 through 2050 Withdrawal Projections

by

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Prepared for

Panhandle Water Planning Group
Panhandle Regional Planning Commission
(contract number UTA01-462)

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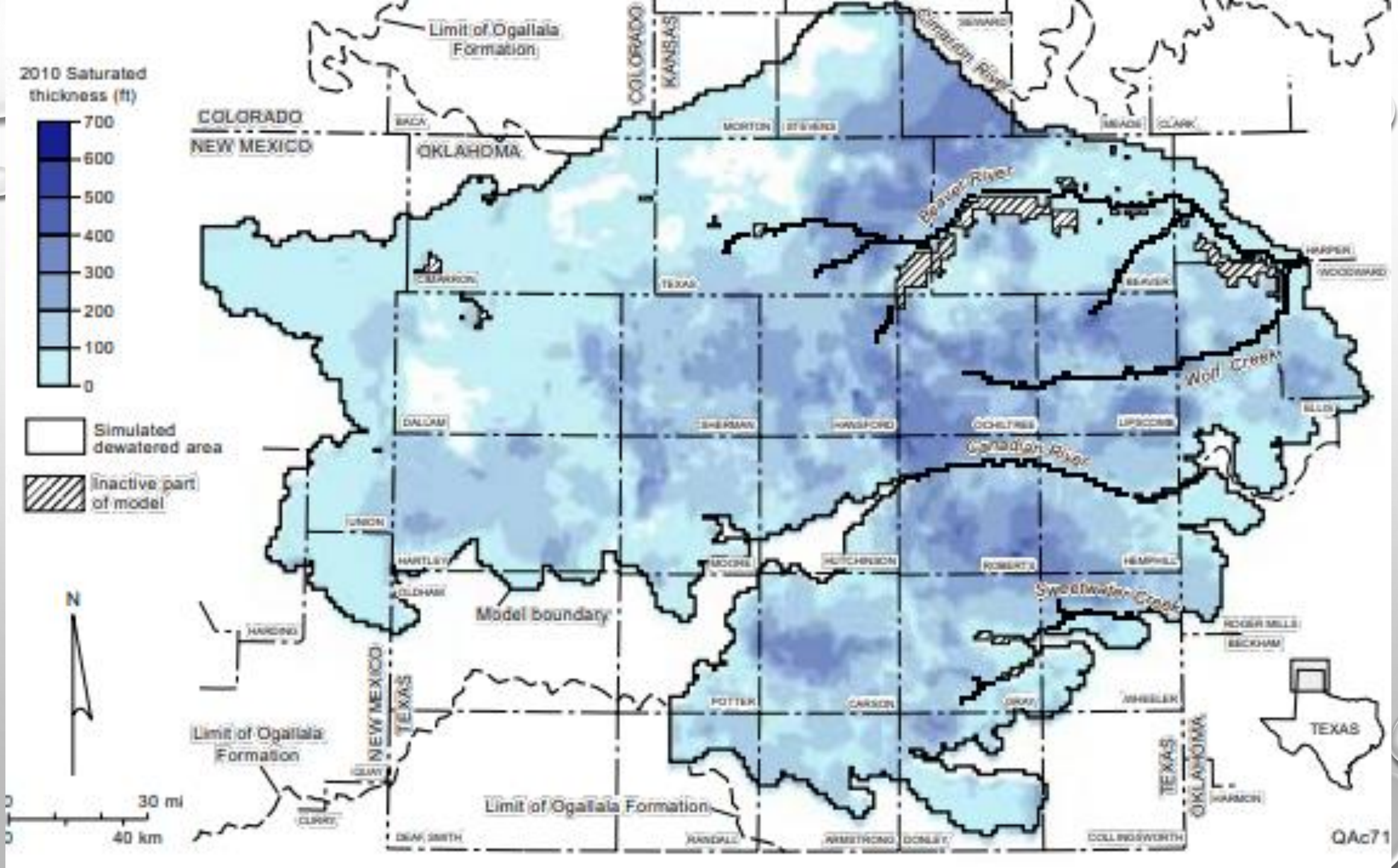
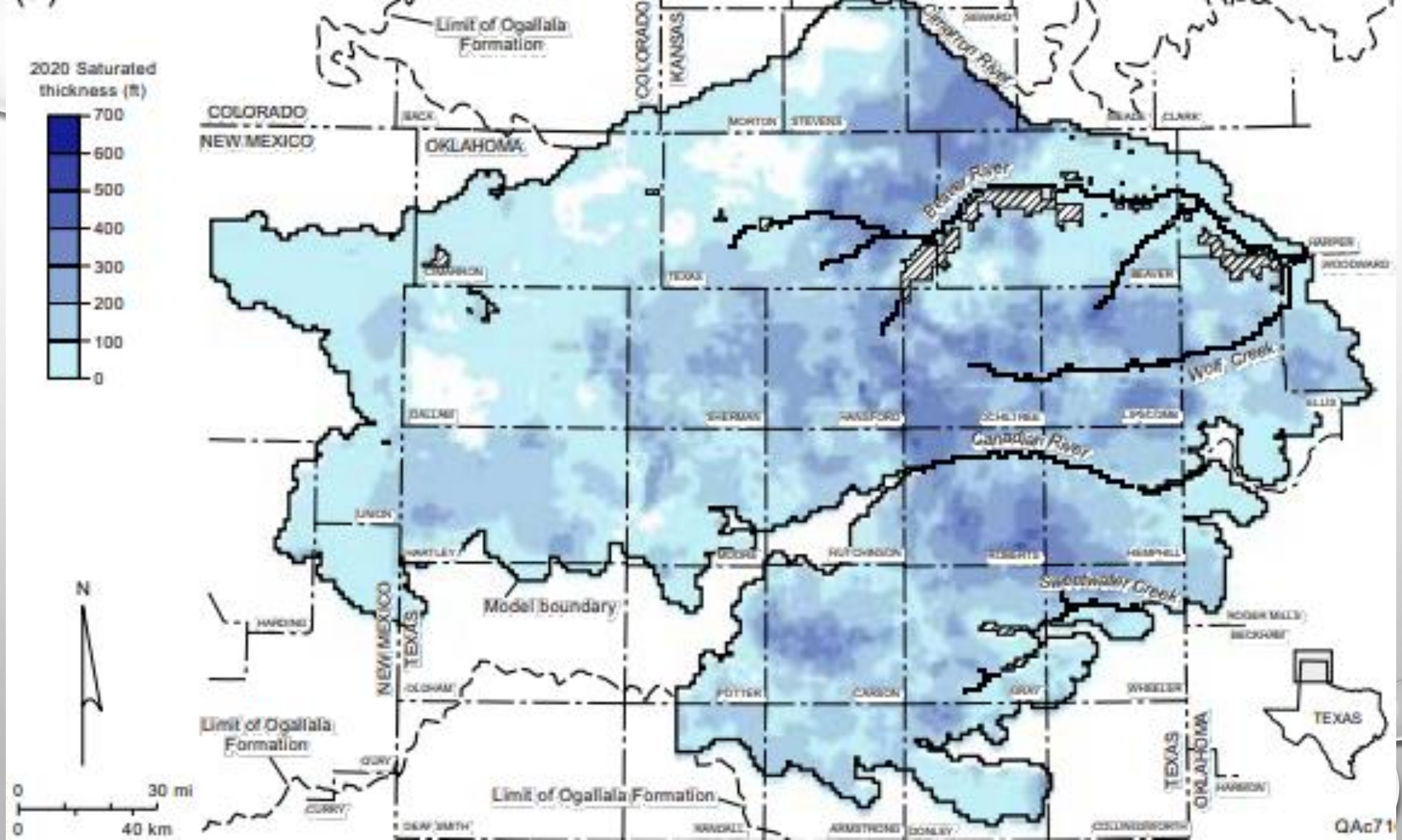
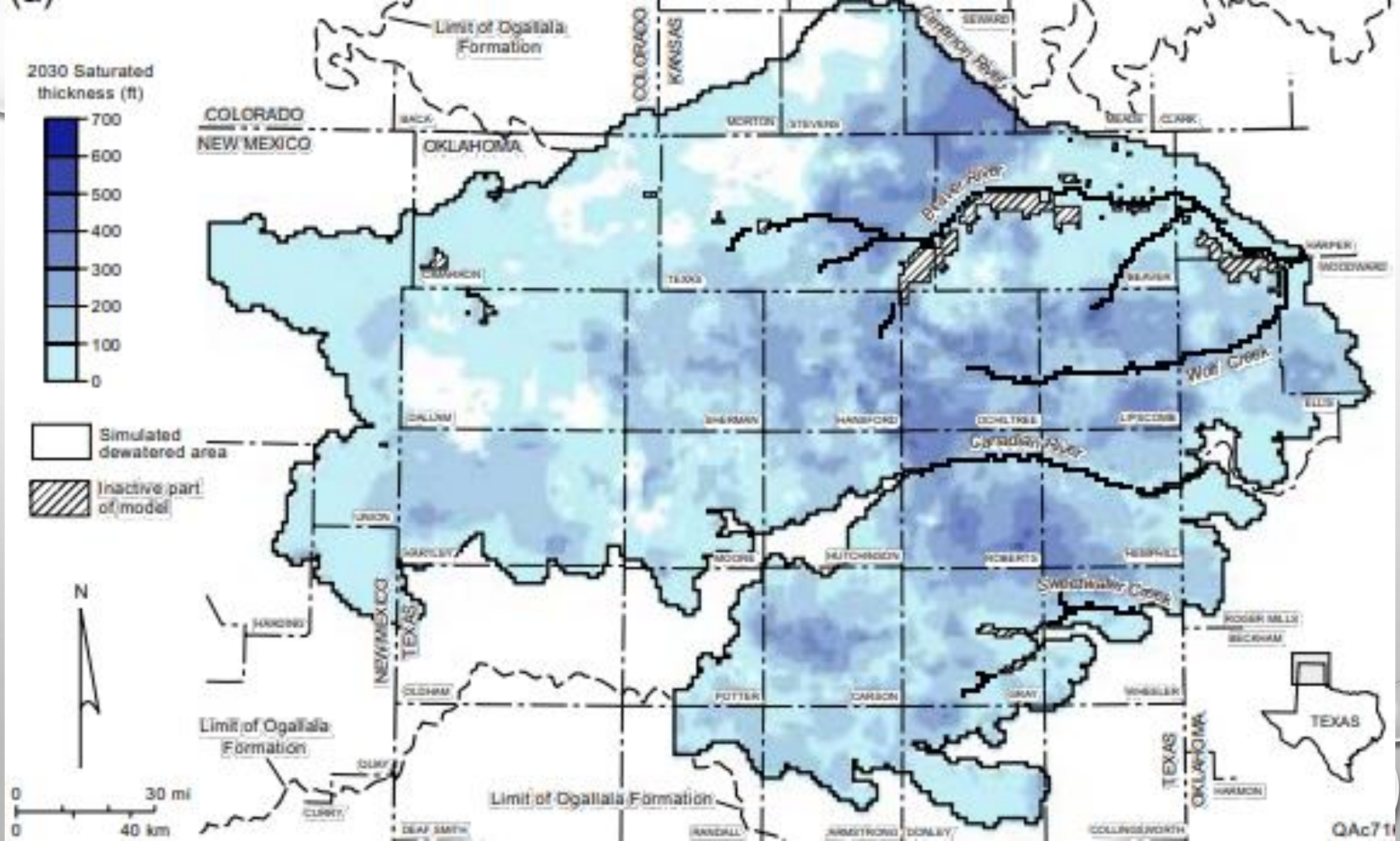
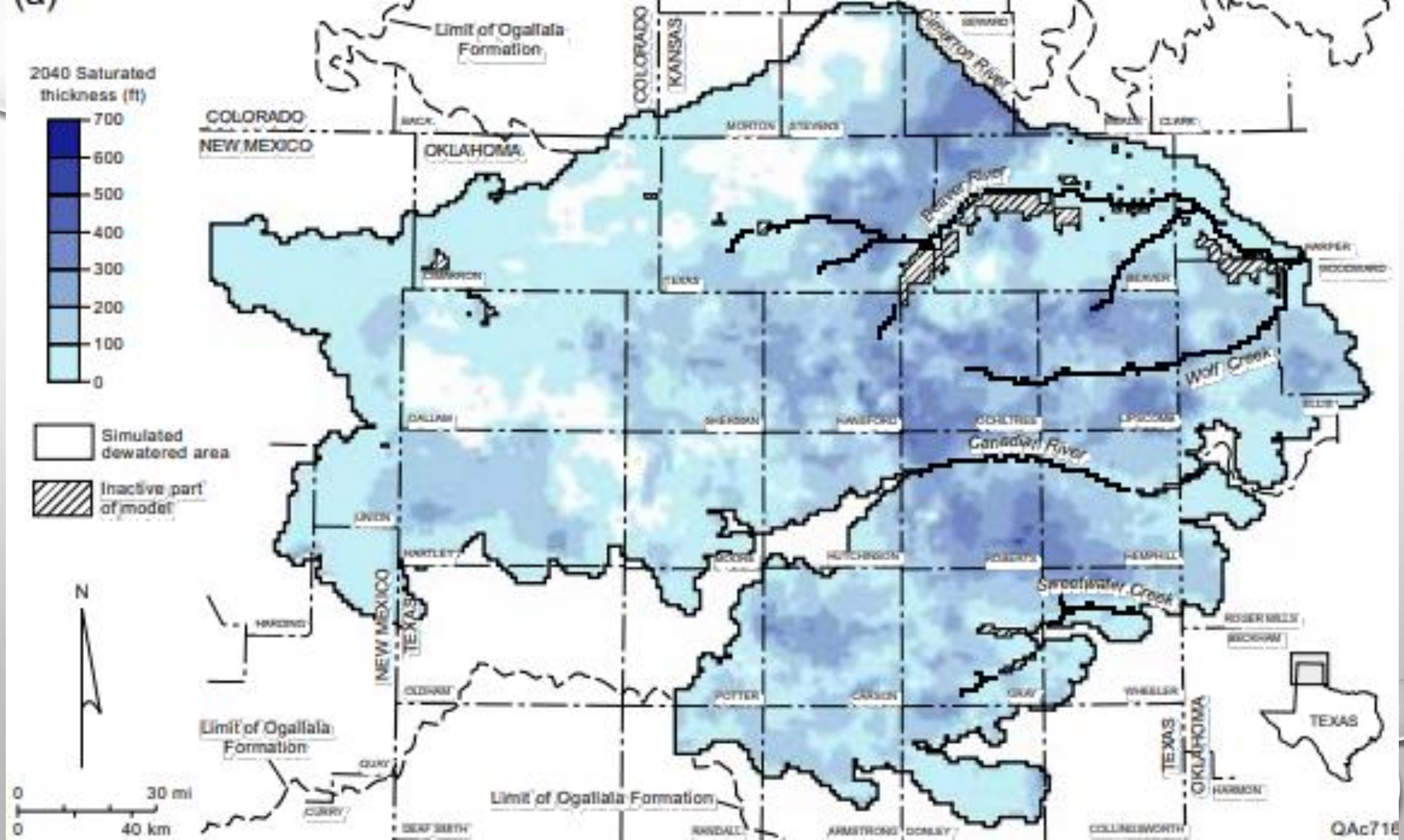
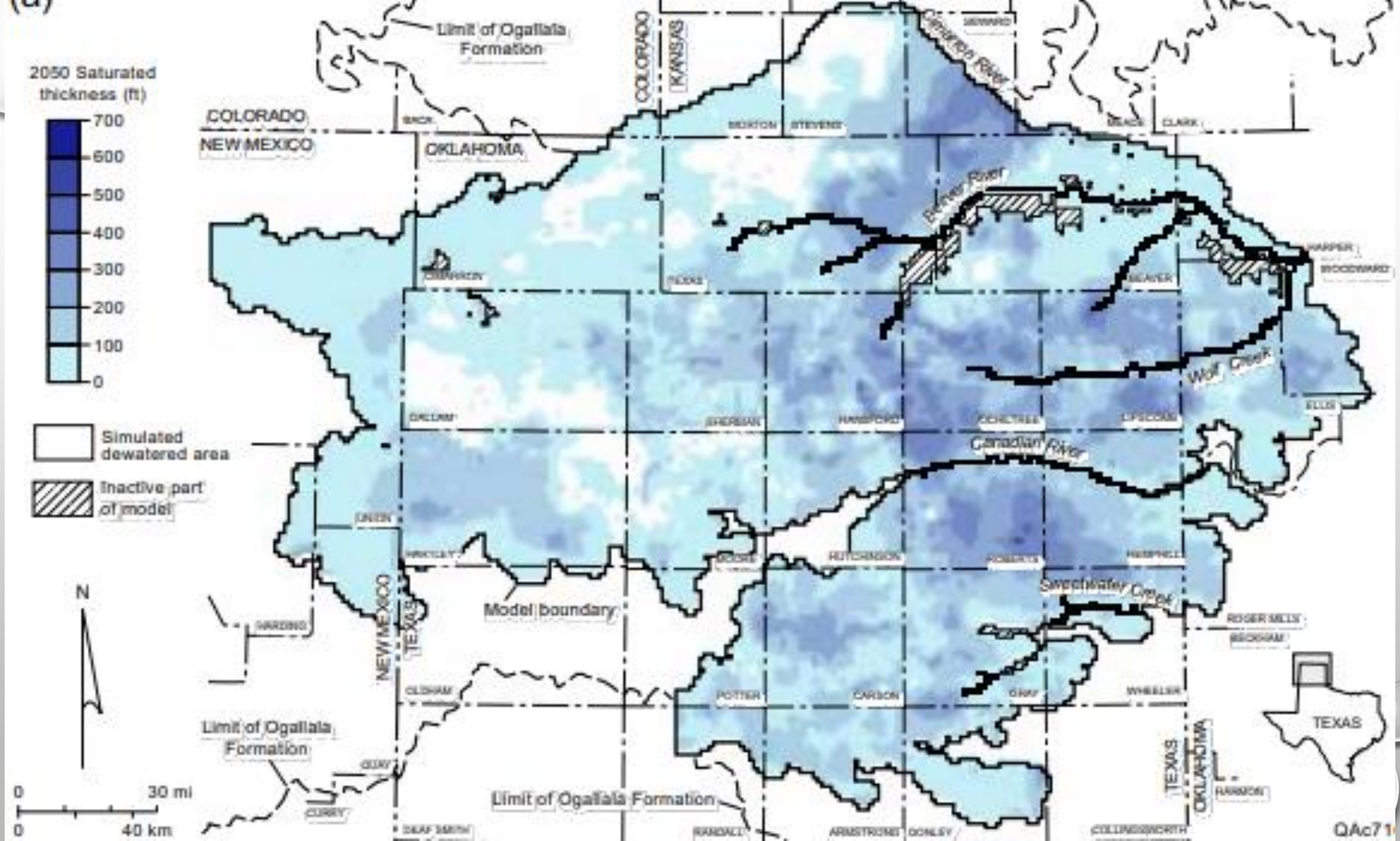
December 2001


2010 Saturated thickness (ft)
700
600
500
400
300
200
100
0
Simulated dewatered area
Inactive part of model
Limit of Ogallala Formation
COLORADO
KANSAS
NEW MEXICO
OKLAHOMA
TEXAS
Cimarron River
Beaver River
Wolf Creek
Canadian River
Sweetwater Creek
Model boundary
Limit of Ogallala Formation
Limit of Ogallala Formation
N
30 mi
40 km
TEXAS
QAc71

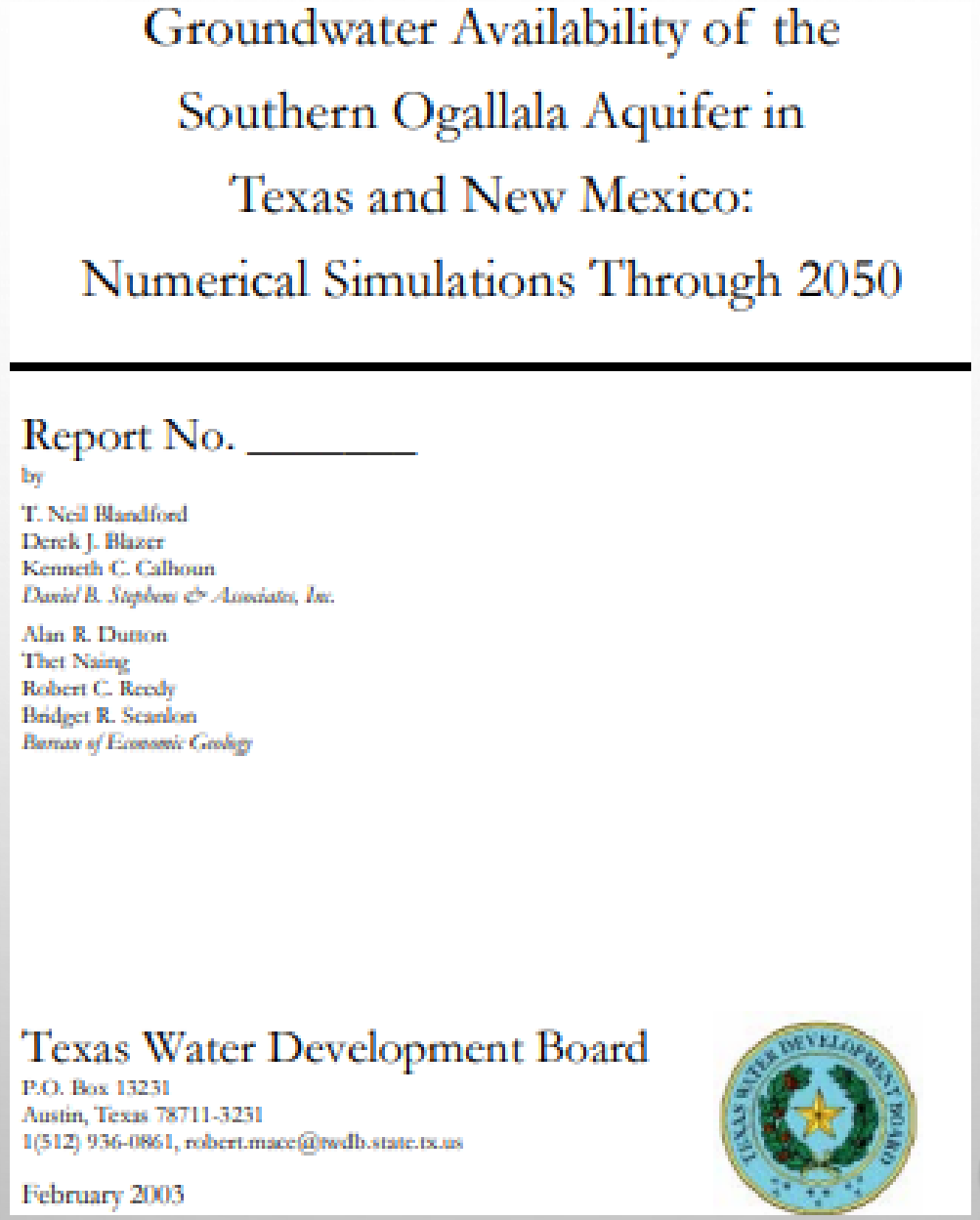

2020 Saturated thickness (ft)
700
600
500
400
300
200
100
0
Limit of Ogallala Formation
COLORADO
KANSAS
NEW MEXICO
OKLAHOMA
TEXAS
Cimarron River
Beaver River
Wolf Creek
Canadian River
Sweetwater Creek
Model boundary
Limit of Ogallala Formation
Limit of Ogallala Formation
TEXAS
OKLAHOMA
N
0
30 mi
0
40 km


2030 Saturated thickness (ft)
700
600
500
400
300
200
100
0
Simulated dewatered area
Inactive part of model
Limit of Ogallala Formation
COLORADO
KANSAS
NEW MEXICO
OKLAHOMA
TEXAS
Cimarron River
Beaver River
Wolf Creek
Canadian River
Sweetwater Creek
Limit of Ogallala Formation
Limit of Ogallala Formation
N
0 30 mi
0 40 km


2040 Saturated thickness (ft)
700
600
500
400
300
200
100
0
Simulated dewatered area
Inactive part of model
Limit of Ogallala Formation
COLORADO
KANSAS
NEW MEXICO
OKLAHOMA
TEXAS
Arkansas River
Beaver River
Wolf Creek
Canadian River
Sweetwater Creek
N
0 30 mi
0 40 km
TEXAS
QAc716


(a)
2050 Saturated thickness (ft)
700
600
500
400
300
200
100
0
Simulated dewatered area
Inactive part of model
Limit of Ogallala Formation
COLORADO
KANSAS
COLORADO
NEW MEXICO
OKLAHOMA
Arkansas River
Canadian River
Wolf Creek
Sweetwater Creek
Model boundary
NEW MEXICO
TEXAS
Limit of Ogallala Formation
Limit of Ogallala Formation
TEXAS
OKLAHOMA
TEXAS
N
0
30 mi
0
40 km

SOUTHERN HIGH PLAINS



Groundwater Availability of the
Southern Ogallala Aquifer in
Texas and New Mexico:
Numerical Simulations Through 2050

Report No. _____

by

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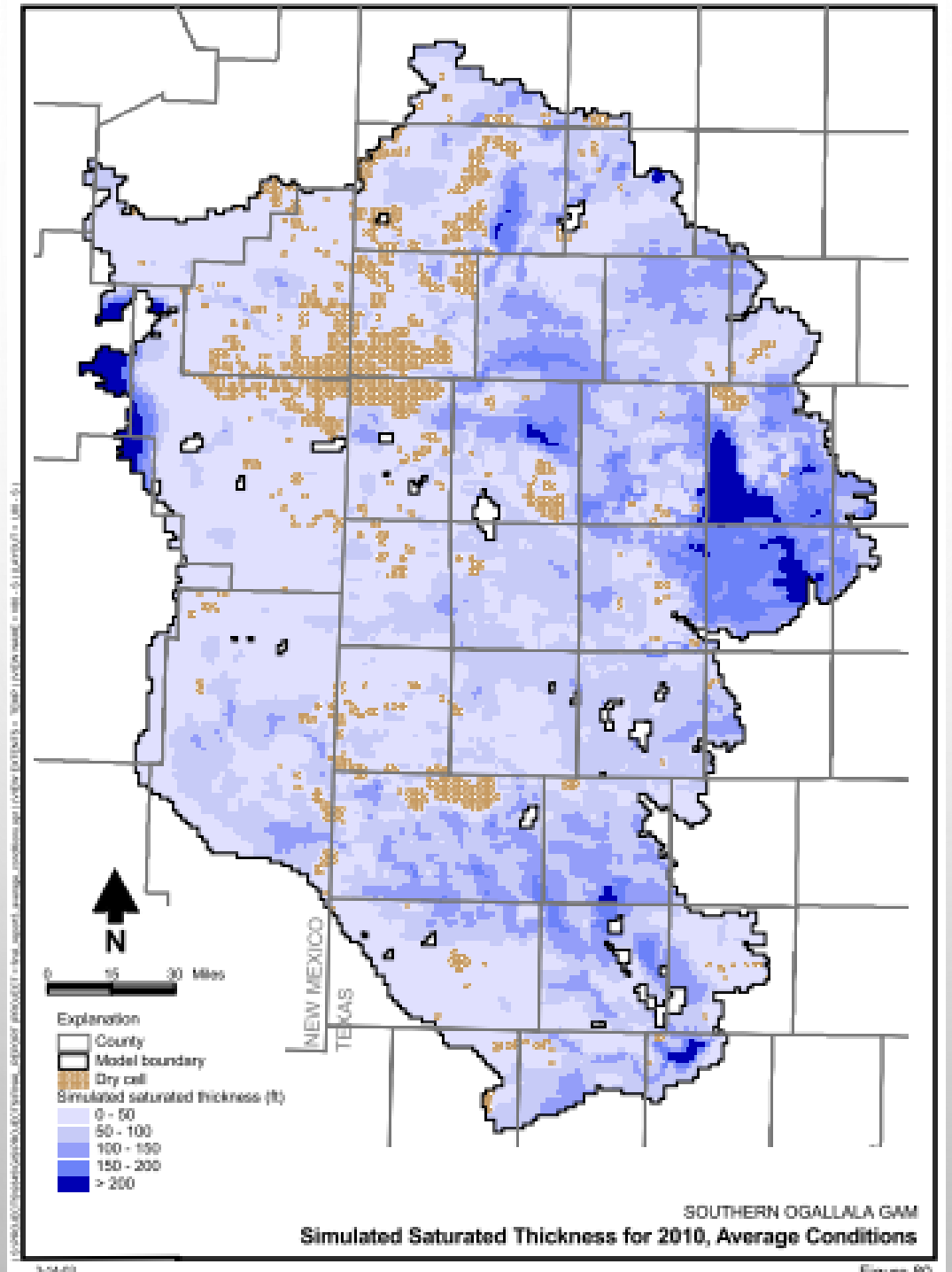
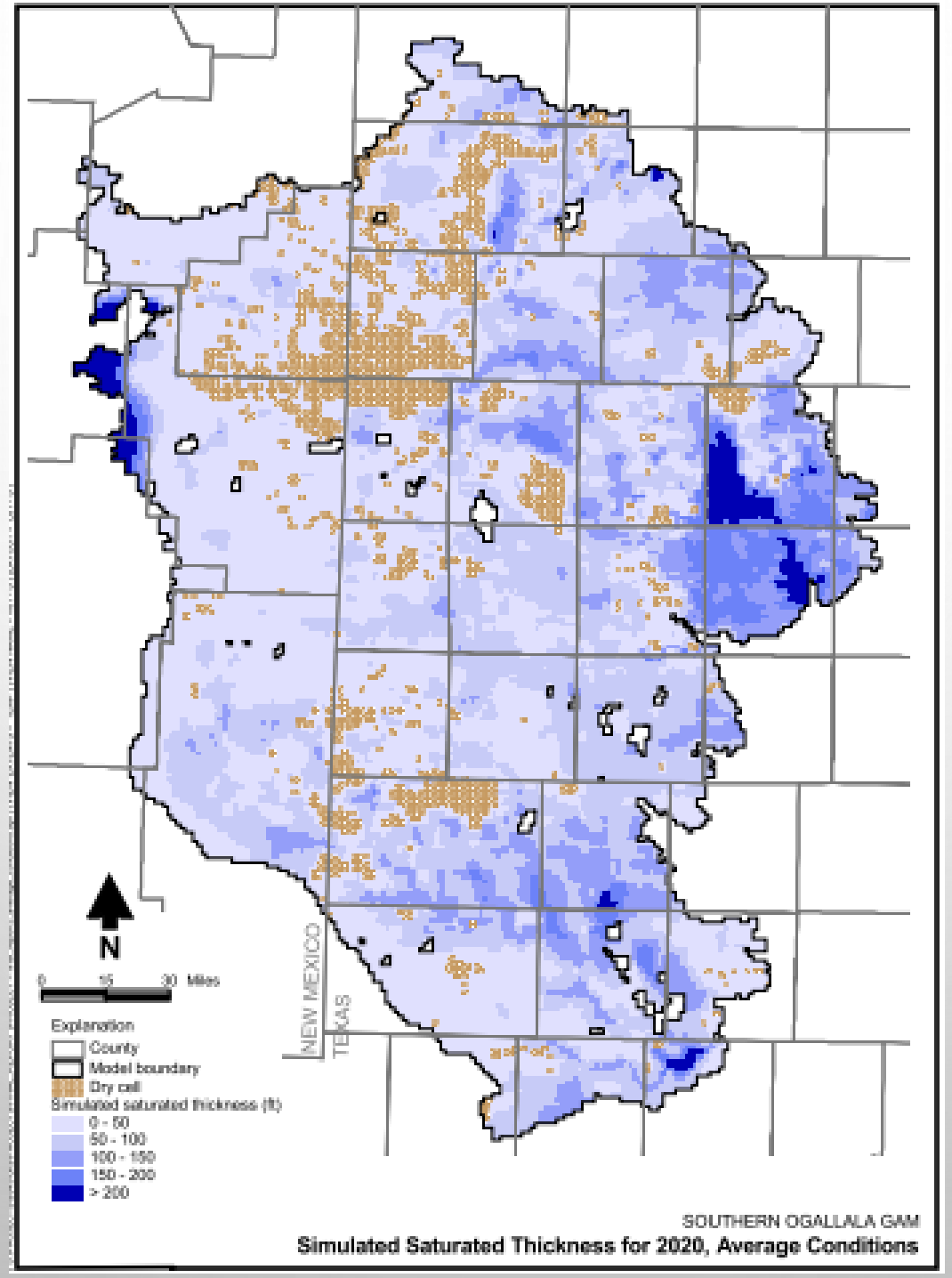
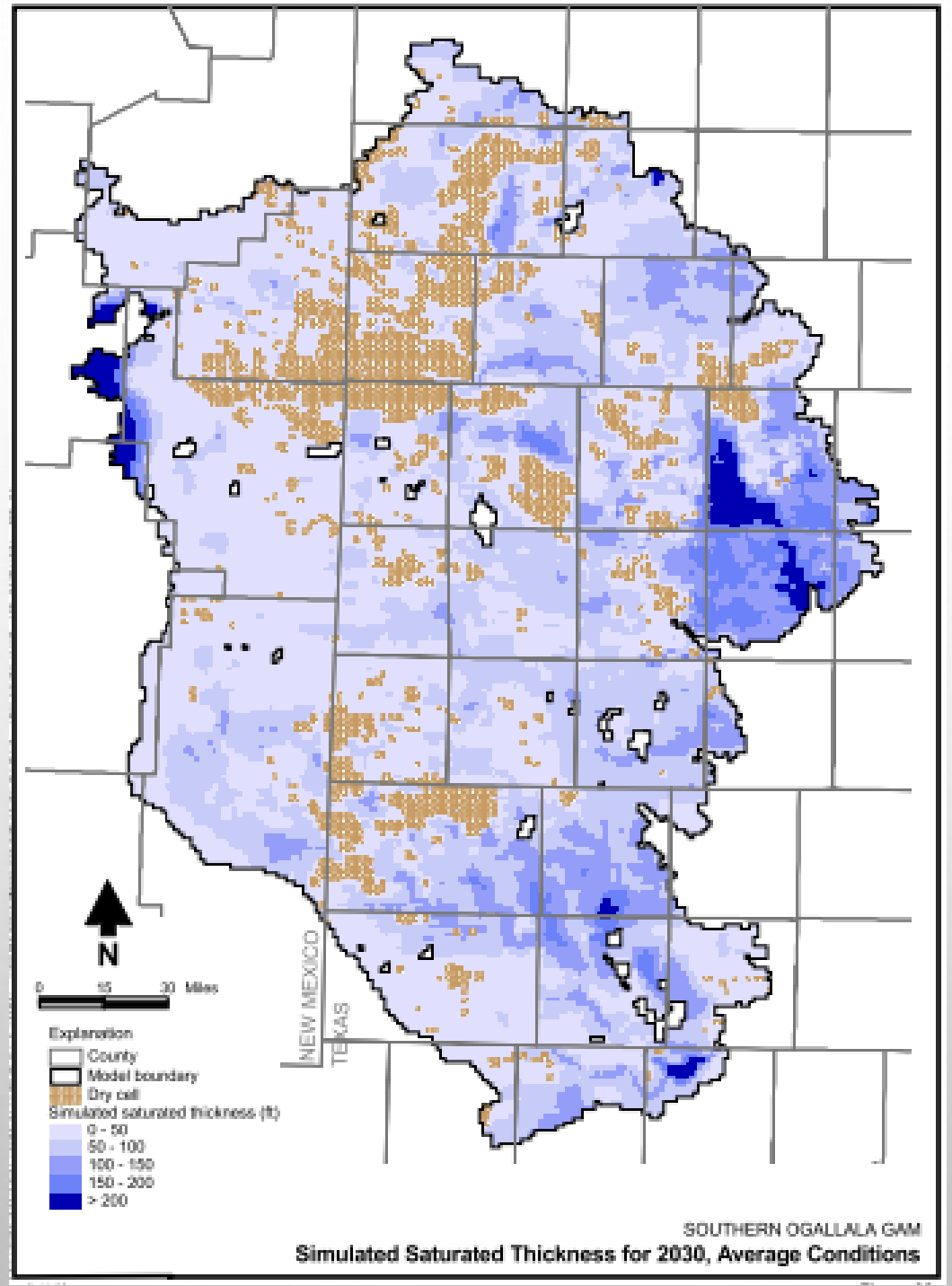
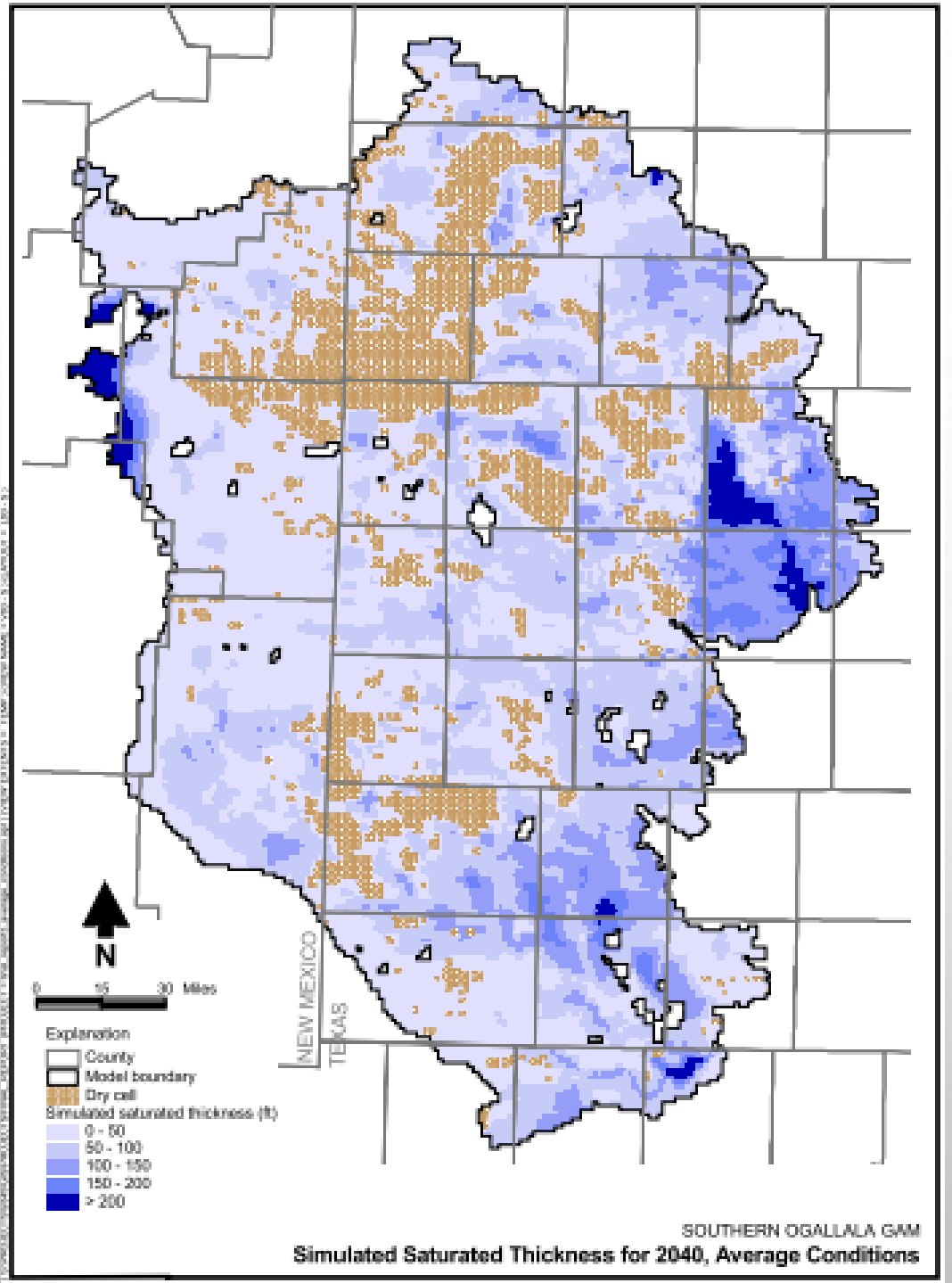
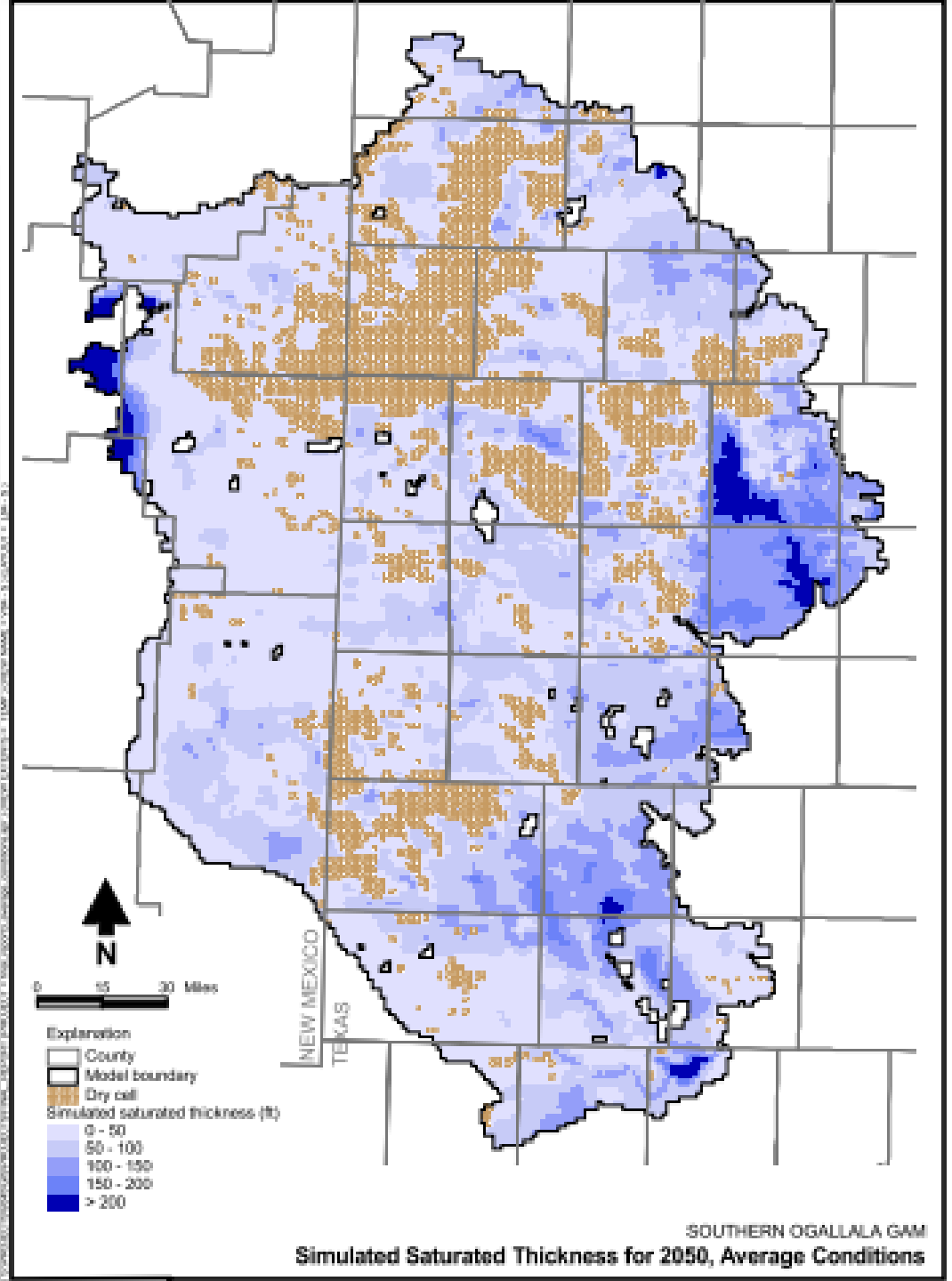
February 2003


N
0
15
30 Miles
NEW MEXICO
TEXAS
Explanation
County
Model boundary
Dry cell
Simulated saturated thickness (ft)
0 - 50
50 - 100
100 - 150
150 - 200
> 200
SOUTHERN OGALLALA GAM
Simulated Saturated Thickness for 2010, Average Conditions


N
0
15
30 Miles
NEW MEXICO
TEXAS
Explanation
County
Model boundary
Dry cell
Simulated saturated thickness (ft)
0 - 50
50 - 100
100 - 150
150 - 200
> 200
SOUTHERN OGALLALA GAM
Simulated Saturated Thickness for 2020, Average Conditions


N
0 15 30 Miles
NEW MEXICO
TEXAS
Explanation
County
Model boundary
Dry cell
Simulated saturated thickness (ft)
0 - 50
50 - 100
100 - 150
150 - 200
> 200
SOUTHERN OGALLALA GAM
Simulated Saturated Thickness for 2030, Average Conditions


N
0 15 30 Miles
NEW MEXICO
TEXAS
Explanation
County
Model boundary
Dry cell
Simulated saturated thickness (ft)
0 - 50
50 - 100
100 - 150
150 - 200
> 200
SOUTHERN OGALLALA GAM
Simulated Saturated Thickness for 2040, Average Conditions


N
0 15 30 Miles
Explanation
County
Model boundary
Dry cell
Simulated saturated thickness (ft)
0 - 50
50 - 100
100 - 150
150 - 200
> 200
NEW MEXICO
TEXAS
SOUTHERN OGALLALA GAM
Simulated Saturated Thickness for 2050, Average Conditions

SUMMARY

- THE OGALLALA HAS BEEN STUDIED IN DEPTH FOR YEARS
- THE OGALLALA AQUIFER IS RELATIVELY UNIFORM AND EASIER FOR MODELS TO SIMULATE
- WE HAVE REASONABLY ACCURATE METHODS OF DETERMINING THE STATUS OF OUR WATER

WHAT WILL HAPPEN IS UP TO US

POLICIES THAT WE ADOPT

BASED ON THE SCIENTIFIC INFORMATION WE HAVE

WILL DETERMINE WHERE WE ARE IN THE FUTURE

QUESTIONS?

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