



# **Lone Star Groundwater Conservation District and GMA 14 Updates**

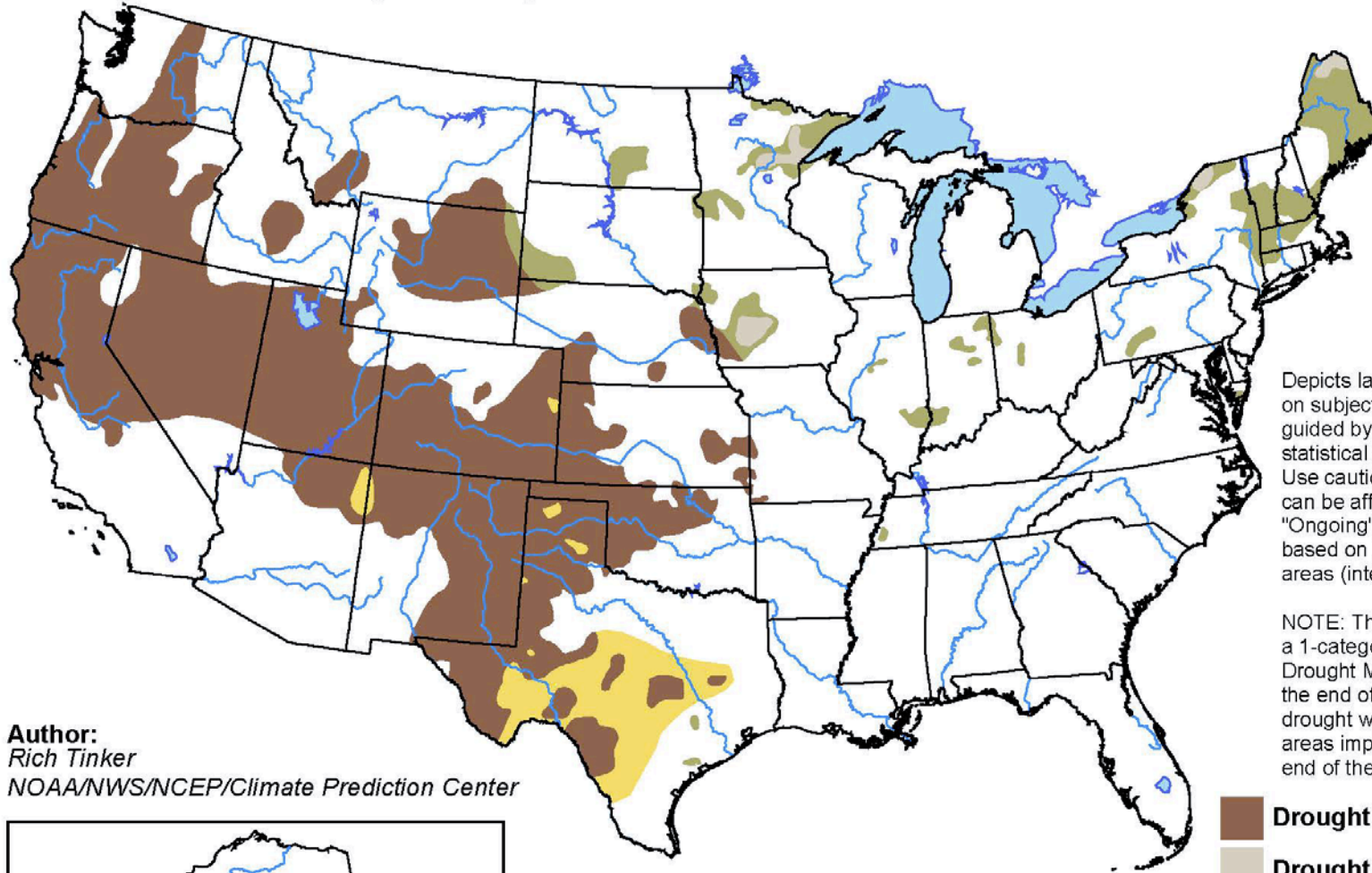
**GRP Review Committee  
July 20, 2020**

First, some context

# U.S. Seasonal Drought Outlook

## Drought Tendency During the Valid Period

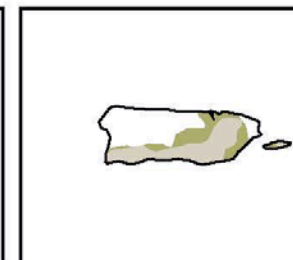
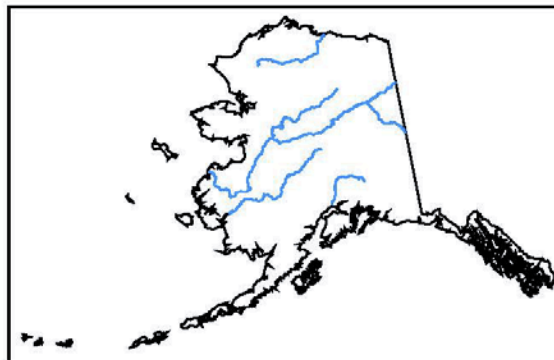
Valid for July 16 - October 31, 2020  
Released July 16



Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

**Author:**  
Rich Tinker  
NOAA/NWS/NCEP/Climate Prediction Center



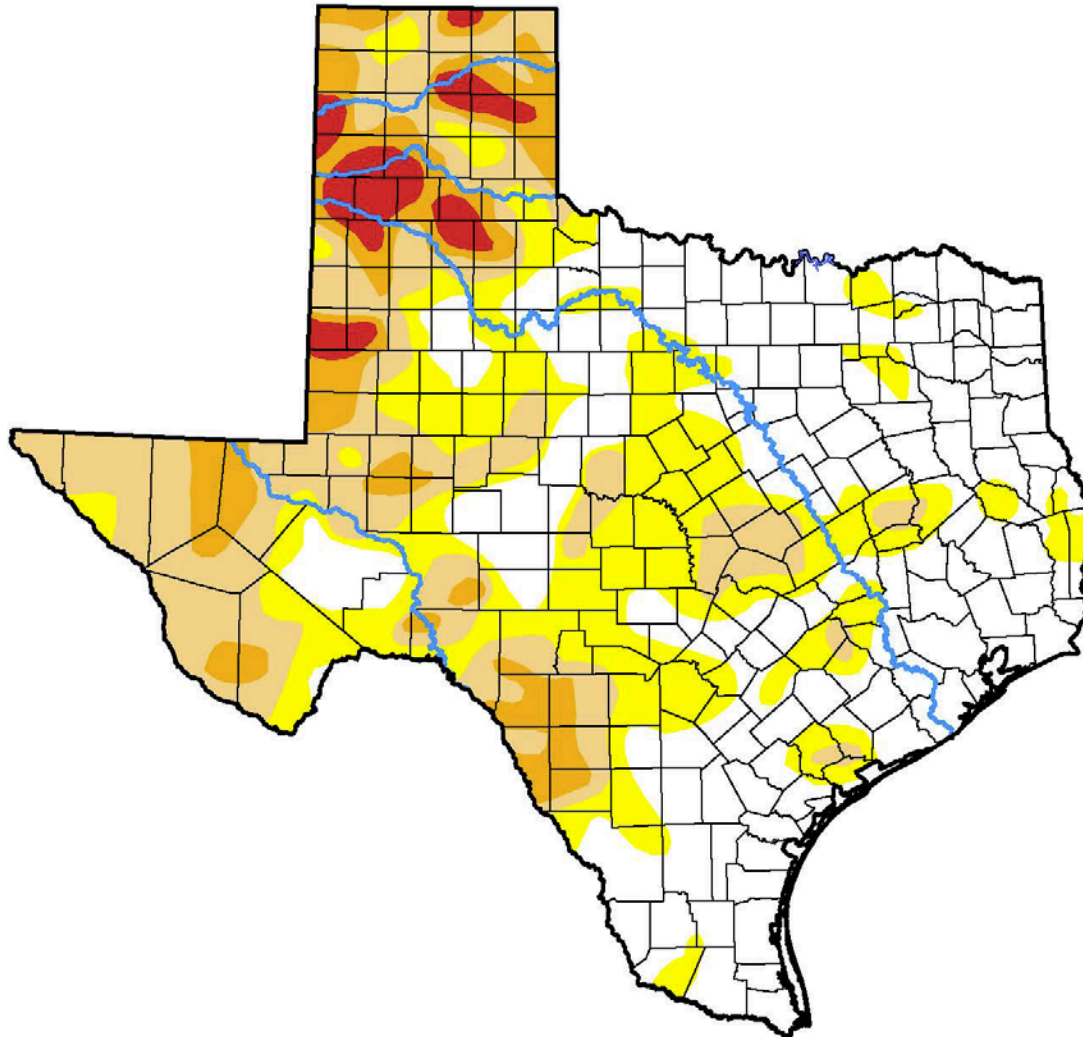
-  Drought persists
-  Drought remains but improves
-  Drought removal likely
-  Drought development likely



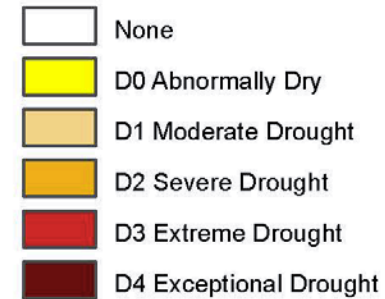
<http://go.usa.gov/3eZ73>

# U.S. Drought Monitor Texas

July 14, 2020  
(Released Thursday, Jul. 16, 2020)  
Valid 8 a.m. EDT



## Intensity:



*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

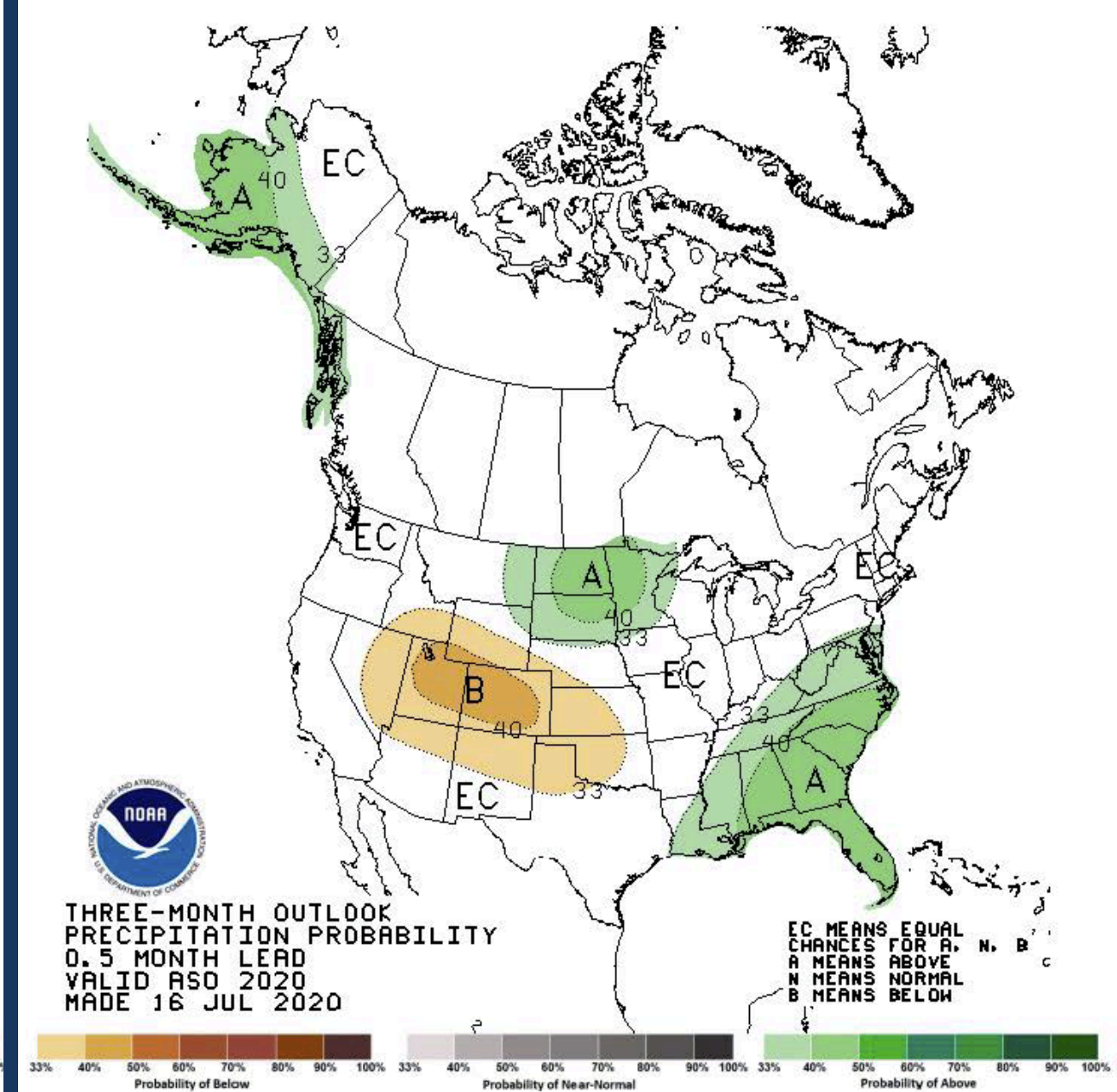
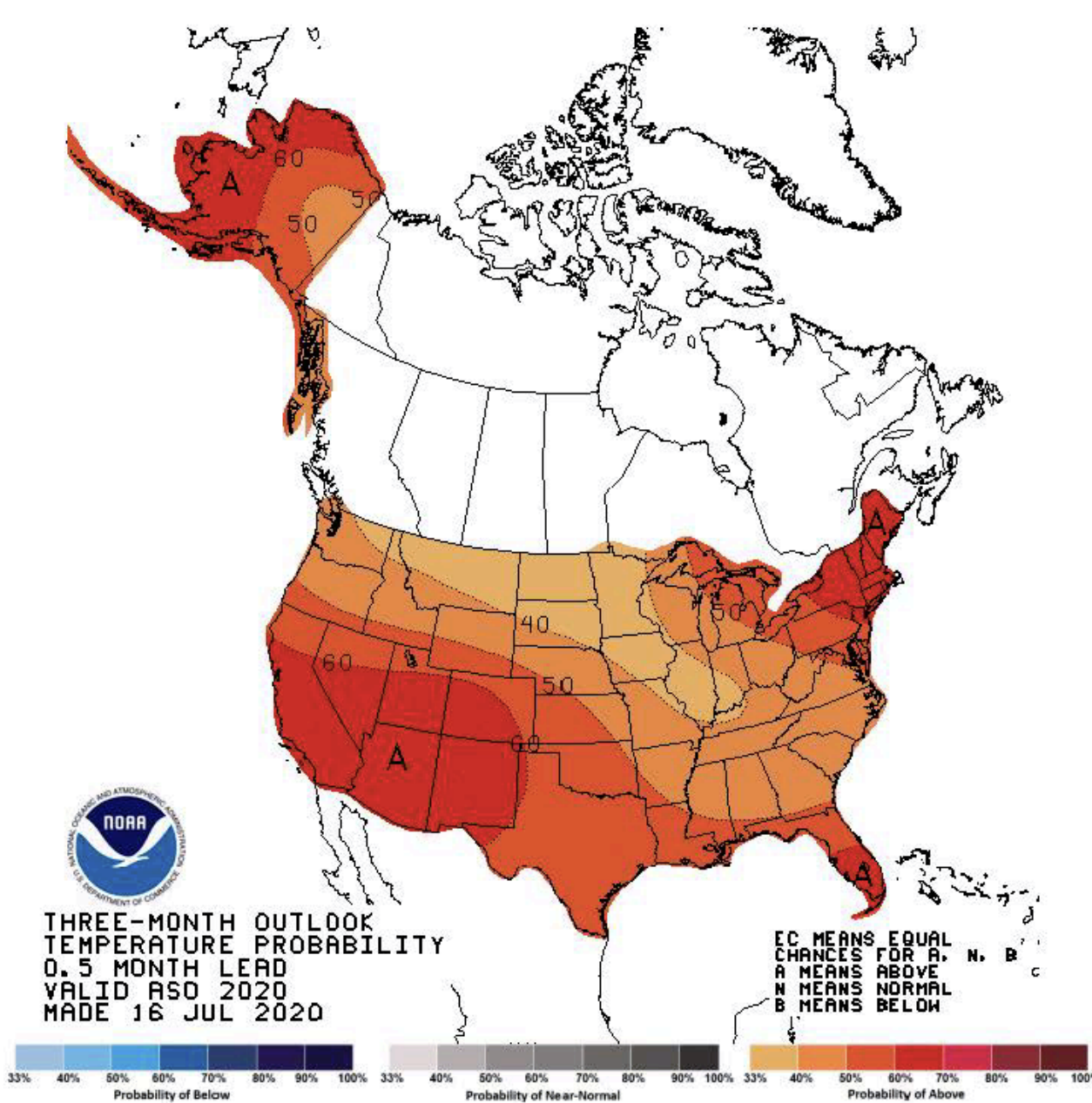
## Author:

David Miskus  
NOAA/NWS/NCEP/CPC



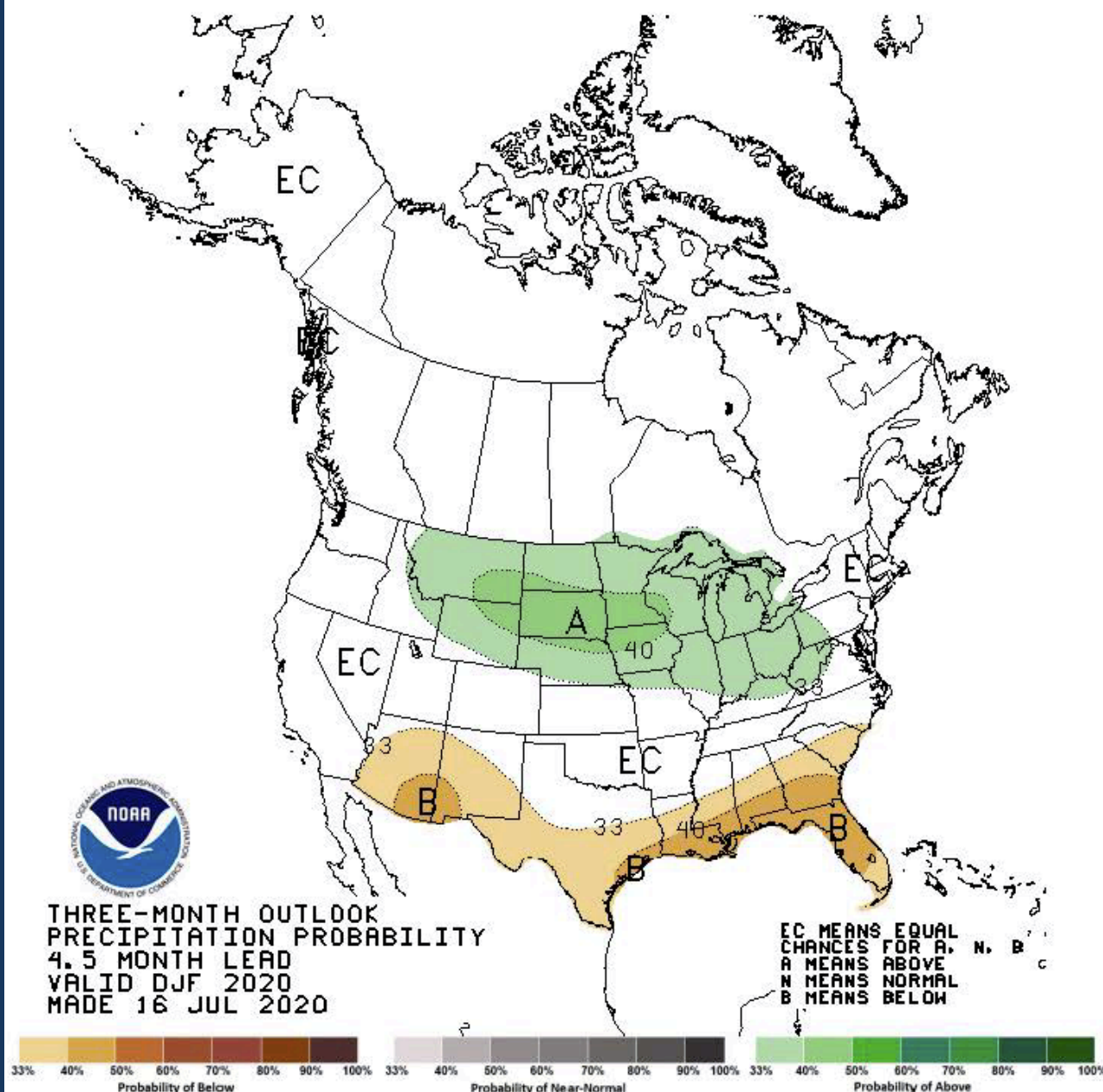
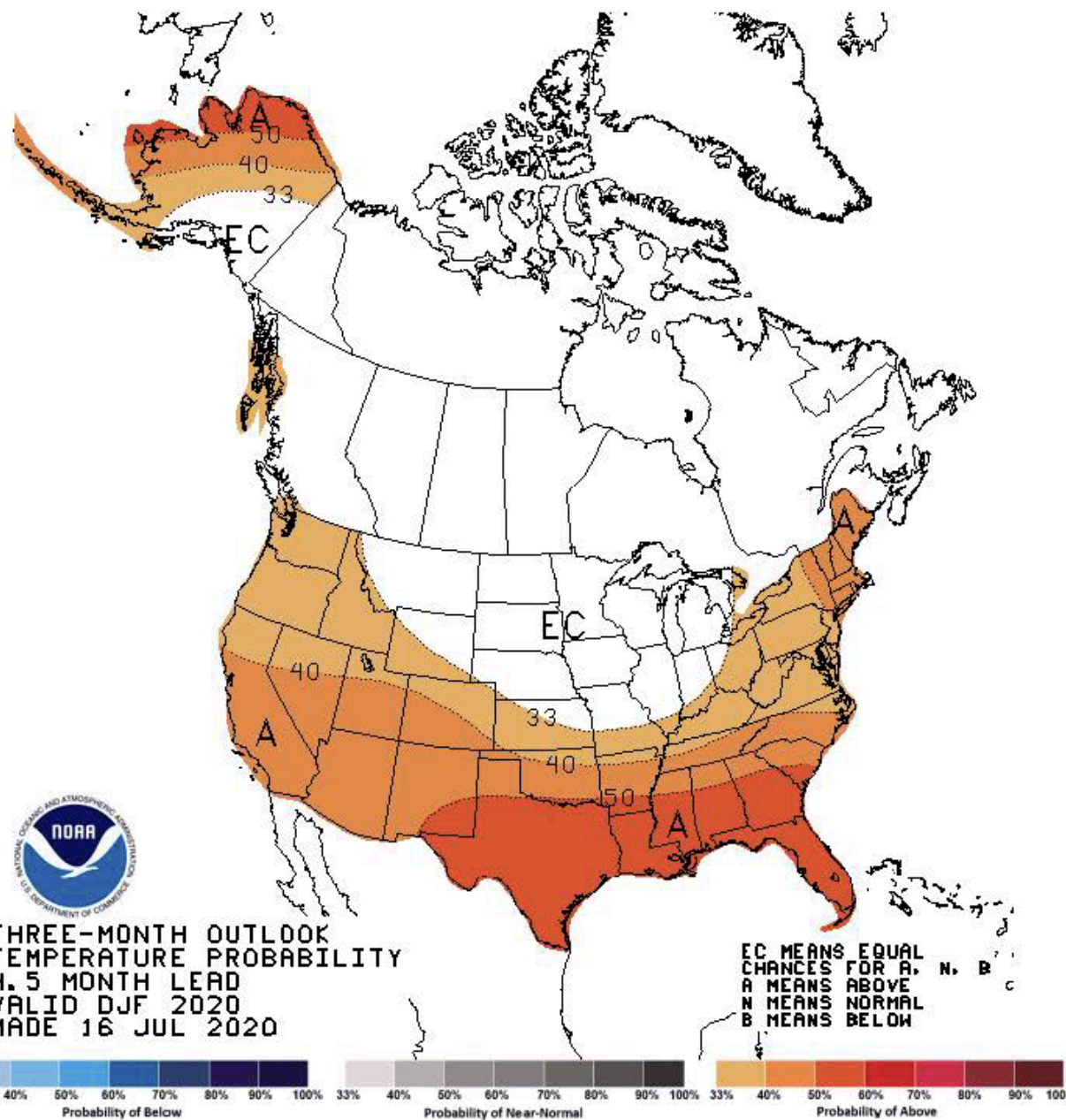
[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)



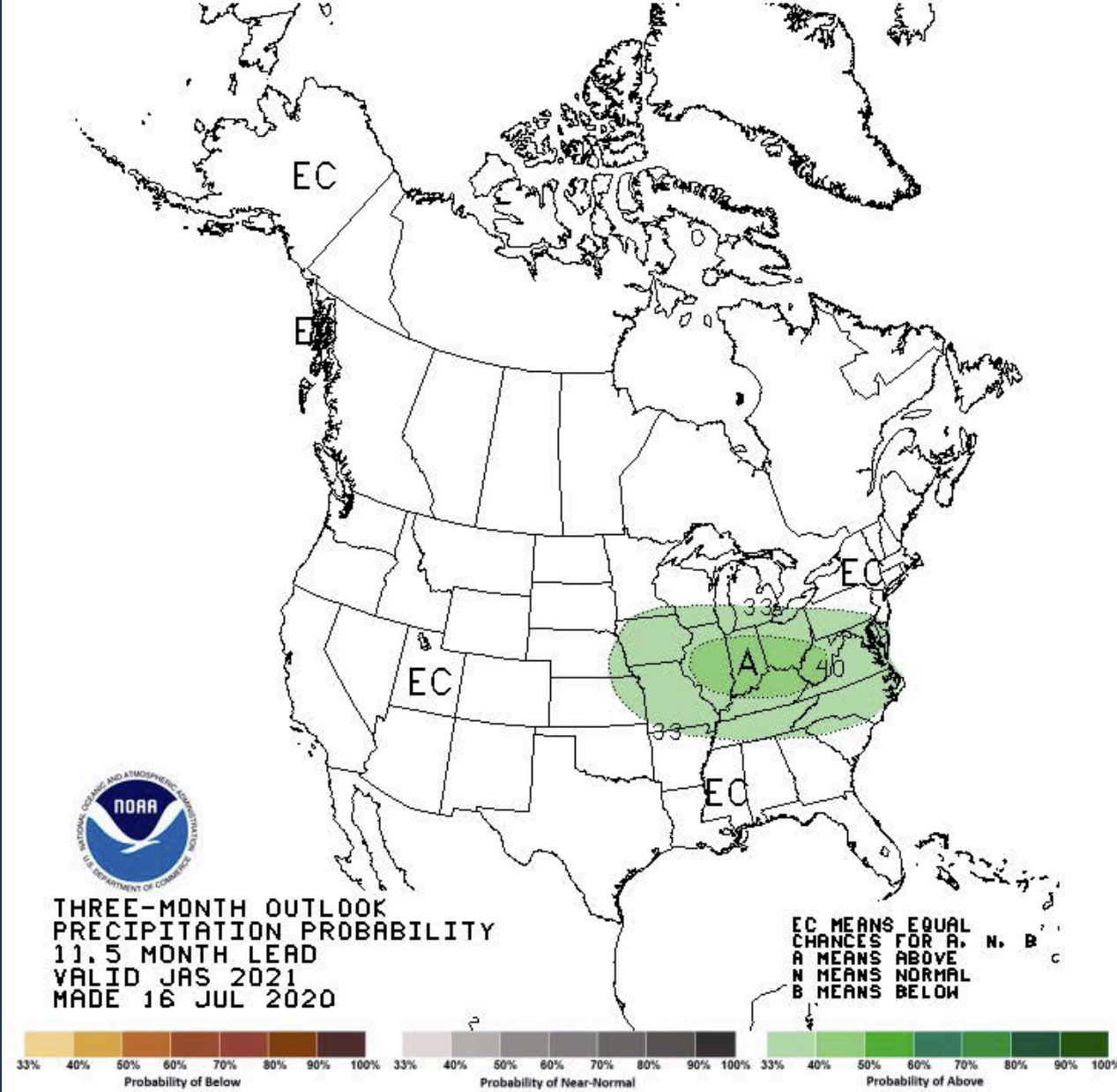
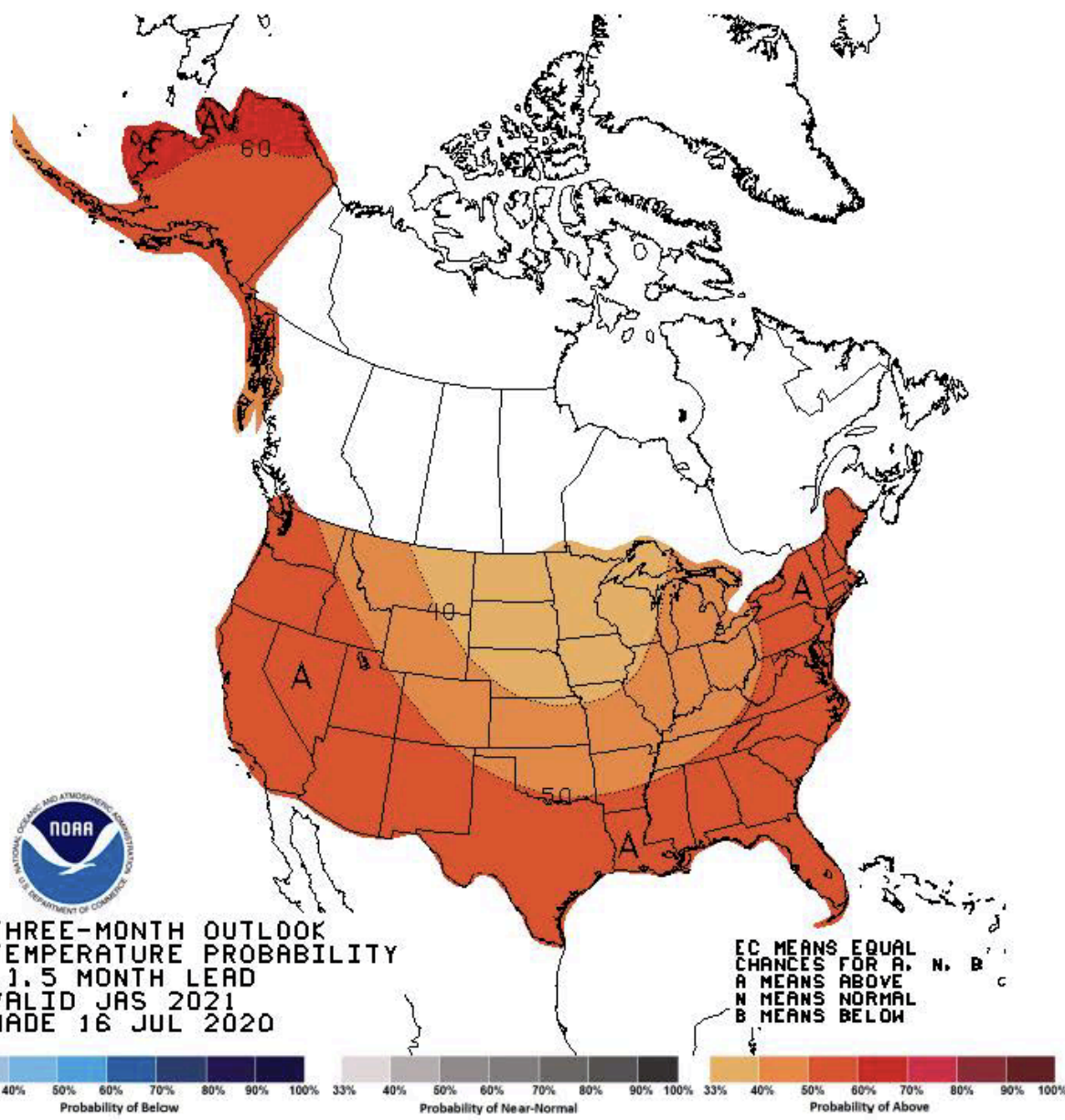


Aug-Sept-Oct 2020









Jul-Aug-Sep 2021



# Texas A&M Study: Texas Will Face Driest Conditions Of The Last 1,000 Years

*The report says the state will be facing hotter and drier conditions for decades to come, especially in West Texas.*

By Keith Randall, Texas A&M University Division of Marketing & Communications • JULY 8, 2020



A drought-stricken wheat field bakes in the sun July 27, 2011 near Hermleigh, Texas. A severe drought had caused the majority of dry-land crops to fail in the region. The past nine months had been the driest in Texas at the time since record keeping began in 1895.

Scott Olson/Getty Images

Texas' future climate will feature drier summers and decreasing water supplies for much of the state for the remainder of the 21st century – likely resulting in the driest conditions the state has endured in the last 1,000 years, according to a team of researchers led by a Texas A&M University professor.

Using the most advanced climate models, the team projected drought conditions and relevant information for stakeholders like agricultural producers, large surface water suppliers, small groundwater water districts and regional water planning districts.

The researchers found the message is clear: Texas is getting hotter and drier, and the time to take action is now.

Regents Professor [John Nielsen-Gammon](#), director of the Texas Center for Climate Studies and the Texas State Climatologist, said data shows Texas was much wetter 10-15,000 years ago coming out of the last Ice Age. Since then, the state's climate has mostly been similar to today's, with the exception of some wetter and drier periods. In the past thousand years, there have been multiple decades of extended

“Texas future climate will feature drier summers and decreasing water supplies for much of the state for the remainder of the 21st century – Mostly resulting in the driest conditions the state has endured in the last 1,000 years, according to a team of researchers led by a Texas University professor.”

Regents Professor John Nielsen-Gammon, Director of the Texas Center for Climate Studies and the Texas State Climatologist

drought periods called “megadroughts” – something Texas will likely see through the end of the century.

“Our study shows that the drier conditions expected in the latter half of the 21st century could be drier than any of those megadroughts, depending on how you measure dryness,” Nielsen-Gammon said.

Nielsen-Gammon and colleagues from the University of Texas at Austin, Texas State University, the University of Oklahoma, NASA and others recently had their work published in the [Earth's Future](#).

Texas policy makers have developed water projections and conservation plans for decades, but these fall short in many areas, the study concluded.

The [drought of the 1950s](#) is still considered the “drought of record” and remains the most severe in Texas in the past 125 years. But current water plans do not take into consideration likely declines in Texas' water supply due to future climate change.

“The state water plan doesn't explicitly consider climate change in figuring out how water supply and water demand will both change,” Nielsen-Gammon said. “As our paper points out, pinning numbers on either of those changes is a difficult challenge, and it's not simply a matter of estimating changes in precipitation. Tying future water supply to criteria established by the drought of record is a defensible choice, but policymakers should be aware that the chances of exceeding the drought of record are probably increasing year by year.”

The report notes that parts of Texas will likely be hit harder by drier conditions than the rest of the state.

West Texas is especially prone to drought or even megadrought conditions, according to the report.

“West Texas seems most likely to get a double whammy: decreased rainfall and increased temperatures,” Nielsen-Gammon said. “Even though rainfall has increased statewide over the past century by about 10 percent, West Texas has seen little to no increase. West Texas is already planning for what happens as one or more critical aquifers get depleted. Climate change is going to make that depletion happen a little bit faster, but the decline of the Ogallala Aquifer is primarily caused by water extraction for irrigation rather than by climate change.”

It's very likely that Texas will continue to become hotter and drier because any long-term changes in precipitation will be “dwarfed” by how much more evaporation will deplete the water supply, he said. But droughts are temporary by definition, so it wouldn't be correct to think of the future as a state of permanent drought, Nielsen-Gammon said.

“It's really a change in the climate, with the normally dry conditions in West Texas slowly migrating toward East Texas,” he said.

Nielsen-Gammon said the severity of the future dryness will likely depend on local circumstances. There are key questions that remain to be answered.

“These include ones such as, does it matter what time of year sees increases or decreases in precipitation? How much water supply is there? Is the most important issue the amount of water or the health of the crops and foliage? Is it more important to get runoff or to have the rainfall soak into the ground?” he said.

The project was funded by the National Science Foundation, the Cynthia and George Mitchell Foundation, and the University of Texas at Austin's Planet Texas 2050 Bridging Barriers research initiative.

## Media contacts:

- John Nielsen-Gammon, 979-862-2248, [n-g@tamu.edu](mailto:n-g@tamu.edu)
- Robyn Blackmon, College of Geosciences, 979-845-6324, [robynblackmon@tamu.edu](mailto:robynblackmon@tamu.edu)
- Keith Randall, [keith-randall@tamu.edu](mailto:keith-randall@tamu.edu)

## 2021 Regional Water Plan

### Water Demand Projections by County for 2020-2070 in Acre-Feet

Total Water Demand for MONTGOMERY County							
County	Category	2020	2030	2040	2050	2060	2070
MONTGOMERY	IRRIGATION	5,642	5,642	5,642	5,642	5,642	5,642
MONTGOMERY	LIVESTOCK	537	537	537	537	537	537
MONTGOMERY	MANUFACTURING	2,135	2,413	2,413	2,413	2,413	2,413
MONTGOMERY	MINING	1,453	1,363	1,077	921	806	728
MONTGOMERY	MUNICIPAL	101,024	125,960	152,557	184,295	224,165	272,018
MONTGOMERY	STEAM ELECTRIC POWER	4,845	4,845	4,845	4,845	4,845	4,845
<b>MONTGOMERY County Total</b>		<b>115,636</b>	<b>140,760</b>	<b>167,071</b>	<b>198,653</b>	<b>238,408</b>	<b>286,183</b>

Source: Texas Water Development Board,  
Region H Planning Group



**What is the value of a reliable long-term  
water supply?**

# **Lone Star Groundwater Conservation District**

## **Special Board Meeting**

### **Phase 1 Subsidence Report**

**June 18, 2020**

**Please go to the following link to watch the entire meeting to gain the full context of the discussion and draw your own conclusions.**

**<https://bit.ly/3jeDeSU>**

## PHASE 1 CONCLUSIONS

- Subsidence has and will continue to occur in the Gulf Coast Area
  - Not known to occur over all of Montgomery County, only the southern portion
- Much of the subsidence in Montgomery County was prior to substantial pumping within the county
- Growth fault movement may be due to several factors
- Compaction susceptibility varies with age, depth, character, and thickness
  - Current modeling indicates the Chicot is nearly 1,000 times more susceptible to compaction than the Jasper
- Developed comprehensive background data and understanding for Phase 2 investigations



Chat



Raise Hand



Q&A



# LSGCD Phase 1 Report Issued June 25, 2020

Please go to the following link  
to review the report and draw  
your own conclusions.

<https://bit.ly/3hmbJ8n>

## SUBSIDENCE INVESTIGATIONS – PHASE 1 ASSESSMENT OF PAST AND CURRENT INVESTIGATIONS

Prepared for:



Lone Star Groundwater Conservation District  
655 Conroe Park N Drive  
Conroe, TX 77303

Prepared by:



Thornhill Group, Inc.  
1106 S. Mays Street, Suite 100  
Round Rock, TX 78664



LRE Water  
1101 Satellite View, Suite 301  
Round Rock, TX 78665

# **Lone Star Groundwater Conservation District Workshop**

## **Phase 1 Subsidence Report**

**July 9, 2020**

**Please go to the following link to watch the entire meeting to gain the full context of the discussion and draw your own conclusions.**

**<https://bit.ly/2ZFO6l7>**





## Harris - Galveston Subsidence District

July 7, 2020

via email and USPS

Samantha Reiter - General Manager  
Lone Star Groundwater Conservation District  
655 Conroe Park North Drive  
Conroe, TX, 77303  
[reiter@lonestargcd.org](mailto:reiter@lonestargcd.org)

Dear Ms. Reiter,

Thank you for the opportunity to review the consultant stamped technical memorandum titled "Subsidence Investigations – Phase 1 Assessment of Past and Current Investigations" prepared by Michael Thomhill, P.G. with the Thomhill Group, Inc. and Michael Keester, P.G. with LRE Water. Although I would have liked to have been able to give this a more detailed review, due to the limited amount of time between the posting of the report (email dated June 25, 2020) and the stakeholder workshop, I have provided some initial thoughts of the work in this letter for your information. The comments included in this letter are not comprehensive. In the interest of brevity, I have included a few examples where the staff and Board of Directors of the Lone Star Groundwater Conservation District (LSGCD) should be cautious in utilizing the interpretations provided by the contract consultant team.

In section 2.1.2 and 2.3 the authors present data developed by other researchers related to the hydrostratigraphy and lithologic properties of the Gulf Coast Aquifer System and discuss the importance of these characteristics in the context of subsidence mechanics. It is mentioned that the primary considerations for subsidence are: 1) The amount of clay in the aquifer material; 2) Aquifer water-level changes; and 3) the lowest historical water level. Please be advised that the historical minimum is not as important as the duration and magnitude of the depressurization (water-level decline). Groundwater and subsidence data from the 2011 drought show this very clearly. Drought is not mentioned at all in the phase one report, but it is an important consideration since those are the times when water demand increases significantly. Recent droughts in the region resulted in large water-level declines and annual rates of subsidence.

Mr. Thomhill and Mr. Keester suggested in their presentation to the Board in June that the susceptibility of the Jasper was 1,000 times less than the Chicot aquifer according to the HAGM. Although the HAGM model is the model of record, HGSD/FBSD/USGS/TWDB are cooperating to update and revise the model to address known limitations which include the simulation of compaction in the Jasper aquifer. It is

**BOARD OF DIRECTORS:** Alan Petrov – *Chairman (Municipalities of West University Place, Southeast Place, Bellare, and Jacinto City)*; Susan Baird – *Vice Chairman (City of Houston)*; Alberto Gonzalez – *Secretary (City of Houston)*; Lindall Mufft (Harris County Commissioners Court); Joe Goins (Harris County Commissioners Court); Chris Canonico (City of Houston); Linn Smyth (Harris County Commissioners Court); William Latimer (Galveston County Commissioners Court); Pete Cote (City of Baytown); James Edwards (Clear Lake Water Authority and the municipalities of Deer Park, Galena Park, La Porte, Nassau Bay, and Seabrook); Pamela Puckett (City of Houston); Kyle Sears (Municipalities of Humble, Piney Point Village, Humble Village, Bonker Hill Village, Hunters Creek Village, Hillshire Village, and Spring Valley); Kathy Rogers (Galveston County Commissioners Court); Shaun Thenot-Smith (City of Houston); Shannon Lucas (Municipalities of Galveston County); Katherine Ostroff (City of Houston); Jason Long (Municipalities of Galveston County); Sarah Benavides (City of Pasadena); Ken Keller (Galveston County Commissioners Court)

**GENERAL MANAGER:** Michael J. Turco

1660 West Bay Area Boulevard - Friendswood, TX 77546 - Phone: 281-486-1105 - [www.subsidence.org](http://www.subsidence.org)

“In the interest of brevity, I have included a few examples where the staff and Board of Directors of the Lone Star Groundwater District (LSGCD) should be cautious in utilizing the interpretations provided by the contract consultant team.”

Regarding Figure 50 – Subsidence Due to Pumping in Subsidence Districts .. “Having had the opportunity to review the technical memorandum associated with the figure, not only is it unrealistic, it is misleading to your Board, and the people of Montgomery County.”

important that Lone Star recognize that the current state of the science is that the Jasper can compact, particularly where it is shallow and used for municipal supply as in Northern Harris and Montgomery County.

As it relates to the compaction of the Jasper aquifer here are some considerations:

- It contains similar, in some cases more, clay as a percentage than the Evangeline Aquifer;
- It is developed over similar depth intervals as other sediments (Chicot/Evangeline) in Harris County (within about 2000 feet of land surface or less);
- It has concentrated areas of high groundwater use and drawdown in southern Montgomery County where subsidence has been measured;
- InSAR data and analysis published in a peer-reviewed journal by Southern Methodist University researchers funded by NASA attribute a portion of the subsidence in southern Montgomery County to "... exploitation of the Jasper aquifer,"
- Recent reductions in groundwater use in The Woodlands, mandated by LSGCD, resulted in increases in water-level in the Jasper aquifer, a significant decrease in the rate of subsidence, and a decrease in the velocity of fault movement in the Woodlands.

It is encouraging to see in your report that LSGCD is committed to a better understanding of compaction in the Jasper aquifer. Considering the reliance Montgomery County has had on the Jasper aquifer and the regulatory uncertainty of future groundwater withdrawals, the impacts of future increases in Jasper production should be well understood.

Although I don't think it was presented as part of the Special Board meeting, or included in the executive summary, the information in the report from a technical memorandum by Michael Keester delivered at the May GMA 14 meeting and shown in Figure 50 misrepresents the impact of groundwater withdrawal in Harris County on subsidence in Montgomery County. Having had the opportunity to review the technical memorandum associated with the figure, not only is it unrealistic, it is misleading to your Board, and the people of Montgomery County.

The most important piece of the report is the plan for future monitoring and research. Subsidence has been, and will continue to be, a policy-driving hazard in this area. Water planning in the context of subsidence requires a long-term approach. The responsibility to prevent or control subsidence in Montgomery County is yours. A robust monitoring plan that compiles and analyzes real data is important for the success of any future groundwater management program in Montgomery County. The type of data collection being proposed in this report will help you better understand the impact of Lone Star's regulatory plan on the future of Montgomery County.

As I have mentioned on several occasions to your staff and consultants, the Subsidence Districts are willing to assist LSGCD in the understanding of the breadth of previous research and data collection as well in the development of future focused science and research. I encourage you to meet with the Subsidence District so that collaboratively we can coordinate your efforts with on-going and future planned programs by the Subsidence District.

Sincerely,

Michael J. Turco – General Manager





Lone Star Groundwater Conservation District Public Workshop  
Phase 1 Subsidence Study  
July 9, 2020

Good afternoon. My name is Ron Kelling and I am the Deputy General Manager of the San Jacinto River Authority ("SJRA"). We appreciate the opportunity to participate in this workshop for stakeholders.

The SJRA owns, operates and maintains 38 groundwater wells and is the single largest producer of groundwater in Montgomery County. As a key stakeholder in this process, we see at least two issues surrounding this report: an inadequate timetable for thorough technical review and your consultants' mixed messages regarding the correlation of subsidence to compaction in the Jasper aquifer resulting from the pumping of groundwater.

The report "Subsidence Investigations – Phase 1, Assessment of Past and Current Investigations" prepared for the Lone Star Groundwater Conservation District ("Lone Star") by Michael R. Thornhill, P.G. and Michael R. Keester, P.G. contains 31 pages of text, 53 figures, six tables of data and references to 53 different articles, studies, publications and other sources of information representing well over a year of effort by Lone Star's consultants that included little transparency and inclusivity with area stakeholders.

We understand that Phase 1 was intended primarily to be a literature review, however it appears that the report also includes conclusions made by Lone Star's consultants regarding the information that was obtained. Unfortunately, it is impossible for stakeholders to thoroughly review all of this information and provide a complete set of conclusions and comments regarding the work presented in this report in the 15 calendar days that the Lone Star provided to stakeholders since the posting of the full report. In particular, the full context of each reference must be thoroughly understood, rather than just reviewing a select sentence or two that may be extracted from a publication, which may or may not reflect the conclusion of each author. In any event, we will provide these preliminary comments within the minimal time allotted by Lone Star for the preparation of this workshop.

Mr. Thornhill and Mr. Keester appear to dispel any correlation of subsidence to compaction in the Jasper aquifer caused by removal of groundwater that is presented in research by others. Yet even though they dismiss correlations drawn by others, Mr. Thornhill and Mr. Keester appear to attempt to justify a substantial lowering of the water levels of the Jasper aquifer by specifically quantifying a small amount of potential compaction and resulting subsidence. In other words, they dismiss reports connecting water-level declines in the Jasper to subsidence, and then they claim to know with confidence that only 0.35 feet of subsidence will occur from massive drawdowns in the Jasper. The following statements from the report lead to this perception.

- On page 12 of the report, Mr. Thornhill and Mr. Keester appear to attempt to cast doubt on the findings of the research supported by NASA and the Shuler-Foscue Endowment at SMU and as reported in the article *Identify and Monitor Growth Faulting Using InSAR over Northern Greater Houston, Texas, USA*. The research was conducted by Feifei Qu, Ph.D. in Geodesy & Surveying Engineering and Postdoctoral Fellow at SMU, Zhong Lu, Ph.D. in Geophysics and Schuler-Foscue Professor of Earth Sciences at SMU, Jin-Woo Kim, Ph.D. in Geodetic Science and SAR/InSAR Research Scientist at SMU, and Weiyou

"... inadequate timetable for thorough technical review..."

Lone Star Groundwater Conservation District  
Public Workshop – Phase 1 Subsidence Report

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Zheng, Ph.D. student at SMU. All are associated with the SMU Radar Laboratory which conducts research involving the use of Interferometric synthetic aperture radar ("InSAR"). It is our understanding that the Harris Galveston Subsidence District (the "Subsidence District") has also engaged the same team in conducting further research in this area. Did Mr. Thornhill and/or Mr. Keester utilize the professional relationship between Lone Star and the Subsidence District to reach out to these highly experienced and qualified experts at SMU to gain a more thorough understanding of the research conducted and to address their concerns regarding the correlation of pumping water from the Jasper aquifer and faulting? If not, we hope that they will during Phase 2 of the subsidence study.

- On page 16 of the report, Mr. Thornhill and Mr. Keester point out the "problematic issues with the HAGM" but also state "However, the HAGM is currently the best available science based on its acceptance by the TWDB and is based on numerous and repetitive efforts to calibrate a model that includes representative compaction parameters for all layers of the GCAS."
- On page 17 of the report, Mr. Thornhill and Mr. Keester select specific sentences from the report *Subsidence Risk Assessment and Regulatory Considerations for the Brackish Jasper Aquifer – Harris-Galveston and Fort Bend Subsidence Districts* as prepared by Van Kelley and others to conclude "the INTERA Jasper model clearly does not definitively predict any certain amount of compaction (also note that all compaction does not translate to surface expressions of subsidence)."
- On page 22 of the report, Mr. Thornhill and Mr. Keester state "...the HAGM has limitations..." and "Results from modeling simply must be interpreted within the model limitations."
- On page 31 of the report, Mr. Thornhill and Mr. Keester conclude "Previous and ongoing studies along with monitoring have provided critical understanding of subsidence and growth faults within the region; however, there are many questions and specific conditions for Montgomery County that must be directly assessed in order to derive conclusive answer; and, Detailed correlating of land-surface movement over time with aquifer changes (particularly, pumping and water-levels) are needed to better assign cause-and-effect relationships regarding subsidence in Montgomery County."
- Yet on page 23 of the report, supported by the data presented in Tables 5 and 6 and Figures 45 and 46, Mr. Thornhill and Mr. Keester appear to insinuate that pumping large amounts of groundwater from the Jasper yield an average drawdown ranging from "nearly zero to almost 700 feet" which results in a "Year 2070 Additional Max Compaction" of only 0.05 to 0.35 feet.

How can Mr. Thornhill and Mr. Keester try to correlate removal of groundwater from the Jasper aquifer to such low amounts of additional long-term compaction with such specificity, when they devote time in their report attempting to disregard the correlation or at least raise concerns about the validity of such correlation? These messages appear to be contradictory.

"...Lone Star's consultants' apparent conflicting information regarding the correlation of subsidence to compaction in the Jasper aquifer caused by groundwater removal..."

Lone Star Groundwater Conservation District  
Public Workshop – Phase 1 Subsidence Report

Page 3

If the Lone Star Board, staff and consultants are unconvinced as to the compactability of the Jasper aquifer due to overpumping of groundwater and the potentially devastating impacts of resulting subsidence and fault activation to the residents of Montgomery County, additional tools and resources are available to quantify compaction of the Jasper and correlate it to subsidence and fault movement with the needed specificity.

As a stakeholder in this process, we suggest that Lone Star aggressively develop and implement a plan to site, install, maintain and monitor a global positioning system network complete with Continuously Operating Reference Stations (CORS), Port-A-Measures (PAM) and extensometers in Montgomery County. Data obtained from this network in coordination and cooperation with the Subsidence District's maintenance and monitoring of their existing system, will provide the specific scientific information needed to address Lone Star's reservations.

The SJRA offers to be a part of the solution to enhance the current collection of scientific data regarding the correlation of pumping in the Jasper aquifer and resulting devastating and irreversible subsidence.

As an initial move, we offer to provide available land at our Lift Station No. 27 in The Woodlands as a site to place the combination of a CORS and an extensometer. The site is located (1) in far southern Montgomery County where subsidence is of concern due to the proximity to Spring Creek, (2) in an area where current and future pumping in the Jasper aquifer is a key to long-term water supplies in Montgomery County, (3) in an area where communication of data to satellites is available and (4) where easy access by the Subsidence District and Lone Star personnel is available. Additional information from the Subsidence District regarding this specific site is attached.

We offer any assistance necessary to facilitate the development of this site to accommodate the tools required to collect the necessary scientific data that will support decisions regarding groundwater management strategies in the future.

We also request that Phase 2 of the Lone Star subsidence study be conducted in a more transparent and inclusive manner with the stakeholders in Montgomery and surrounding counties.

Despite the short timetable available for thorough review as well as Lone Star's consultants' apparent conflicting information regarding the correlation of subsidence to compaction in the Jasper aquifer caused by groundwater removal, we appreciate the opportunity to make these remarks and stand ready to be part of successful groundwater management in Montgomery County.

Respectfully,

Ronald Kelling, P.E.  
Deputy General Manager  
San Jacinto River Authority



# **Lone Star Groundwater Conservation District Rules Workshop**

**July 14, 2020**

**Please go to the following link to watch the entire meeting to gain the full context of the discussion and draw your own conclusions.**

**<https://bit.ly/2WujUHn>**

# PREAMBLE AND SECTION 1

## **Preamble:**

- Revised to address the judgment and new management plan, and repeal of all phases of the regulatory plan.
- Changes will formally abolish LVGU designation, and reduction/conversion and GRP requirement.
- All permitting, invoicing and payment will be directly with District (not by or through a GRP Sponsor).

## **Rule 1.12: Appeal Process**

- Creates a process to appeal a GM or Board decision

## **Rule 1.18: Procedure, Conduct, Decorum**

- Memorializes current policy and practice



# SECTION 3: SPACING AND LOCATION OF WELLS

## **Rule 3.1: Spacing for Existing Wells**

- All existing wells are grandfathered in under current rules

## **Rule 3.2: Spacing for all New Wells**

- 50 feet from property line ( gen. Texas Dep't Licensing & Regulation)

## **Rule 3.3: Spacing for New, Non-exempt Wells**

- Spacing from all registered & permitted wells based on production capacity of new, non-exempt well
  - Chicot/Evan.: not less than 2 feet multiplied by Max. Allow. Pumping Rate (gpm)
  - Jasper: not less than 1.5 feet multiplied by Max. Allow. Pumping Rate (gpm)
  - Catahoula: not less than 1 feet multiplied by Max. Allow. Pumping Rate (gpm)
- Rationale for scope and application

## **Rule 3.4: Exceptions to Spacing Requirements**

- Application must include hydrogeological report; automatically granted if same owner; granted without hearing if obtain waivers; hearing required for all other requests



# SECTION 4: PRODUCTION LIMITS AND DROUGHT BUFFER

## **Rule 4.1: Annual Production Limitations**

- Annual Production Limitations will be assigned for existing permits and determined for all new permits
- All permits are subject to proportional adjustments or other adjustments/reductions as authorized under rules

## **Rule 4.2: Temporary Drought Buffer**

- Authorizes Board by resolution to adopt a drought buffer temporarily increasing Annual Production Limitations based on conditions reported by TWDB:
  - DO abnormally dry conditions: up to 5%;
  - D1 drought-moderate or D2 drought-severe: up to 10%; and
  - D3 drought-extreme or D4 drought-exception: up to 15%.

# SECTION 6: MANAGEMENT ZONES, PROPORTIONAL ADJUSTMENTS

## **Rule 6.1: Purpose**

- Defines purpose of rules

## **Rule 6.2: Management Zones**

- Authorizes a management zone to:
  - assess water availability and water quality,
  - establish more restrictive spacing requirements, or
  - limit and/or adjust total production.

## **Rule 6.3: Proportional Adjustments**

- Tied to achievement of a desired future condition
- May be applicable to all permits in the affected aquifer or management zone on a pro rata basis
- Authorizes issuances of new permits to provide an opportunity for a fair share
- Early conversion credit may offset adjustment if fees are paid

# LSGCD Rules Process

**IF you have an interest in the future of groundwater supplies/use in Montgomery County, we urge you to review the rules and contribute to the discussion.**

<https://www.lonestargcd.org/>

# **Lone Star Groundwater Conservation District Regular Board Meeting**

**July 14, 2020**

**Please go to the following link to watch the entire meeting to gain the full context of the discussion and draw your own conclusions.**

**<https://bit.ly/2OyXWib>**

# Summary of LSGCD Board Meeting

- Board Member Elections, November 3, 2020
- Approved \$5000 for CORS site at SJRA LS 27 (\$15,000 total cost)
- Deferred Phase 1 Subsidence Report, extended comments to July 31, 2020
- Approved draft rules for publication



# **Next Lone Star Groundwater Conservation District Board Meeting**

**Tuesday, August 11, 2020, 6:00 pm**

**LSGCD Offices, Conroe, Texas and/or Web Conference**

**IF you have an interest in the future of groundwater supplies/use in  
Montgomery County, we urge you to participate in this meeting and  
contribute to the discussion.**

# **GMA 14 Joint Planning Committee Meeting**

## **July 15, 2020**

**Please go to the following link to watch the entire meeting to gain the full context of the discussion and draw your own conclusions.**

**<https://bit.ly/393pLJ0>**

# Modeling Subsidence

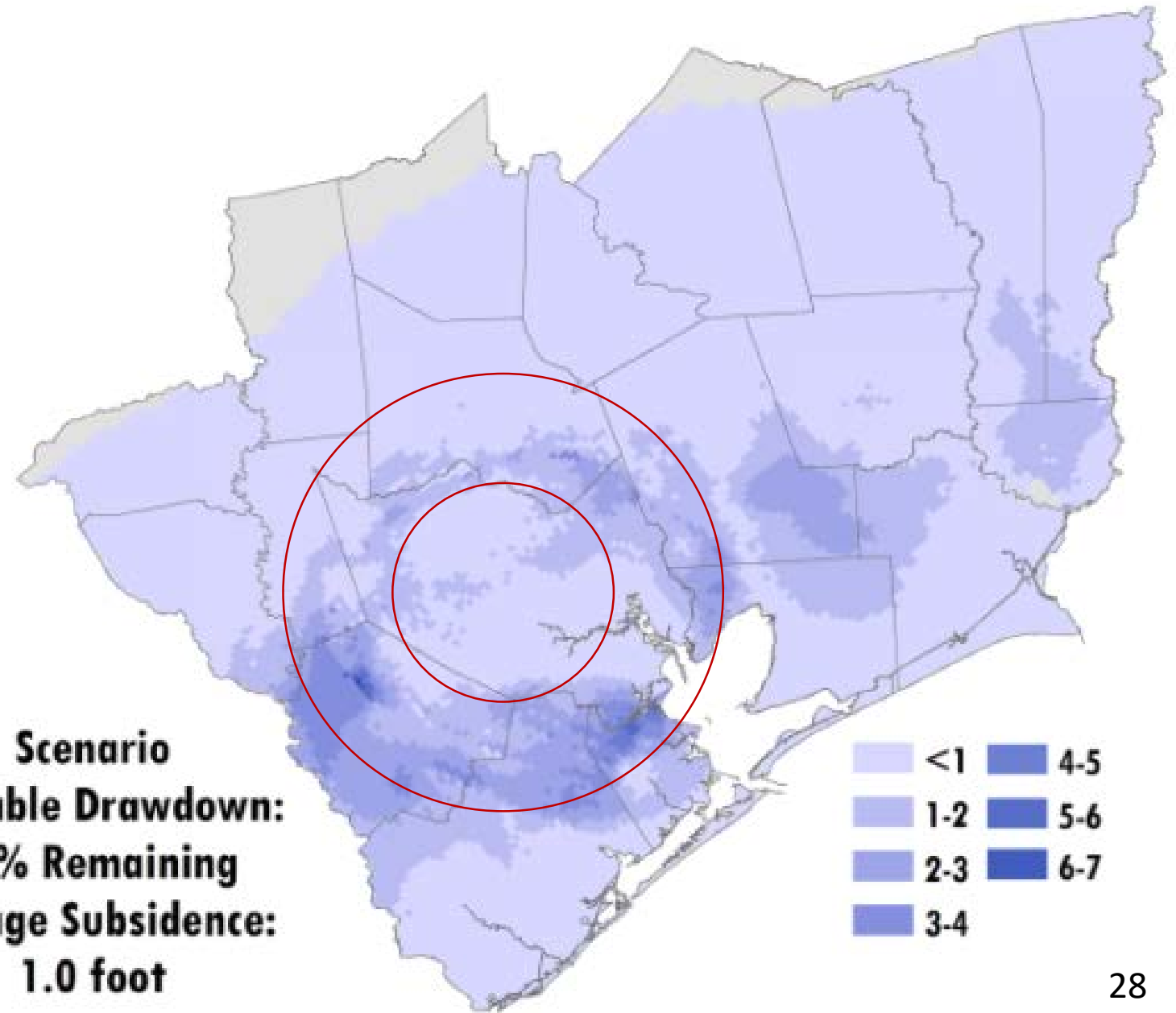
- Houston Area Groundwater Model (HAGM) uses MODFLOW SUB package to estimate compaction and subsidence
- When water level drops below the historical minimum, inelastic (i.e. permanent) compaction can occur
- Head changes in the clays do not lag those in the sands (i.e. no delays)
- Compaction and subsidence can occur within the Jasper in the model, but parameters were set so that it is minimal. The current conceptual model of the Jasper Aquifer is that compaction can occur.

# Scenario

## Modeled Additional Subsidence

Scenario:  
70%, 1.0 ft

**Scenario**  
**Available Drawdown:**  
**70% Remaining**  
**Average Subsidence:**  
**1.0 foot**



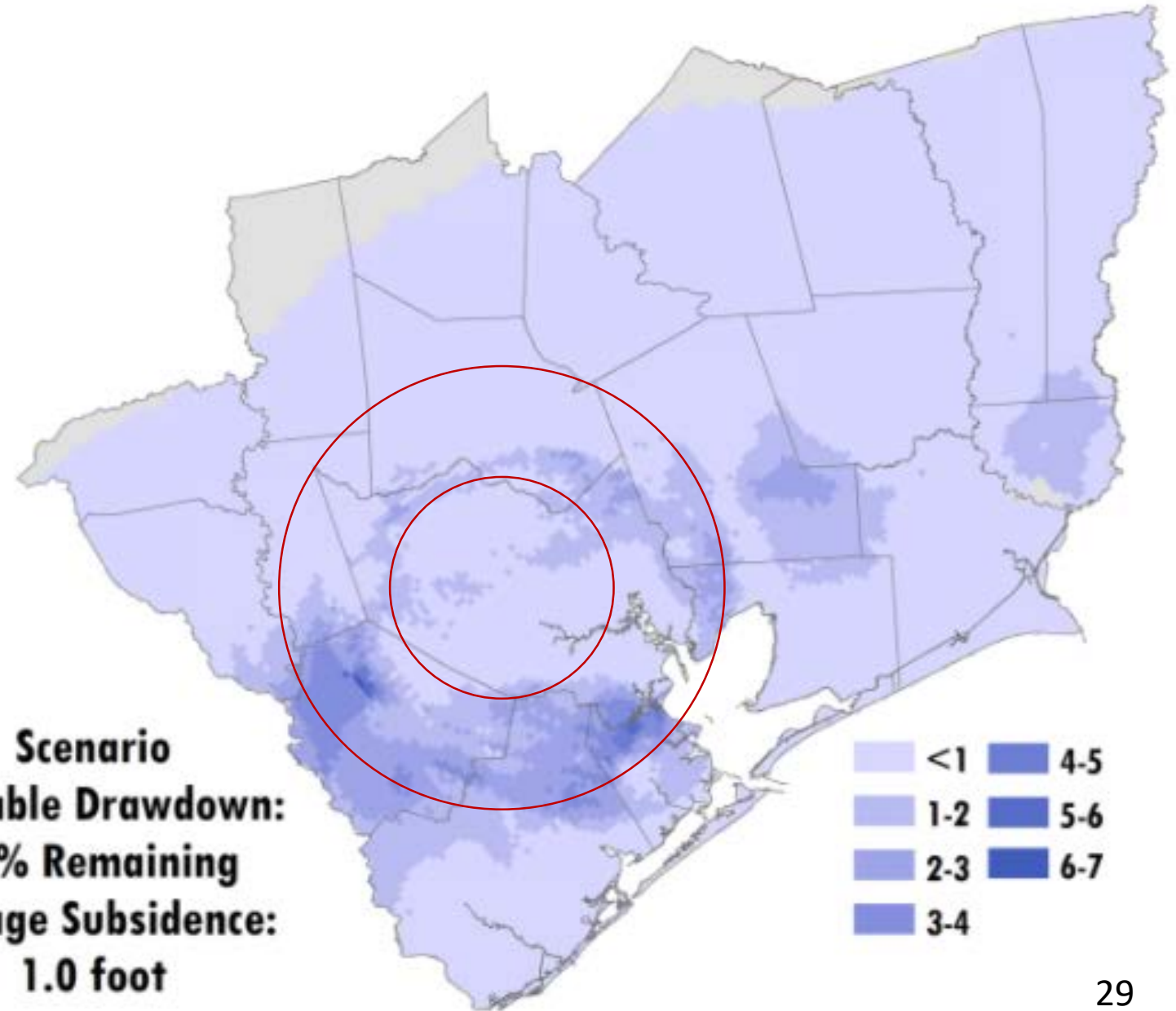


# Scenario

## Modeled Additional Subsidence

Scenario:  
80%, 1.0 ft

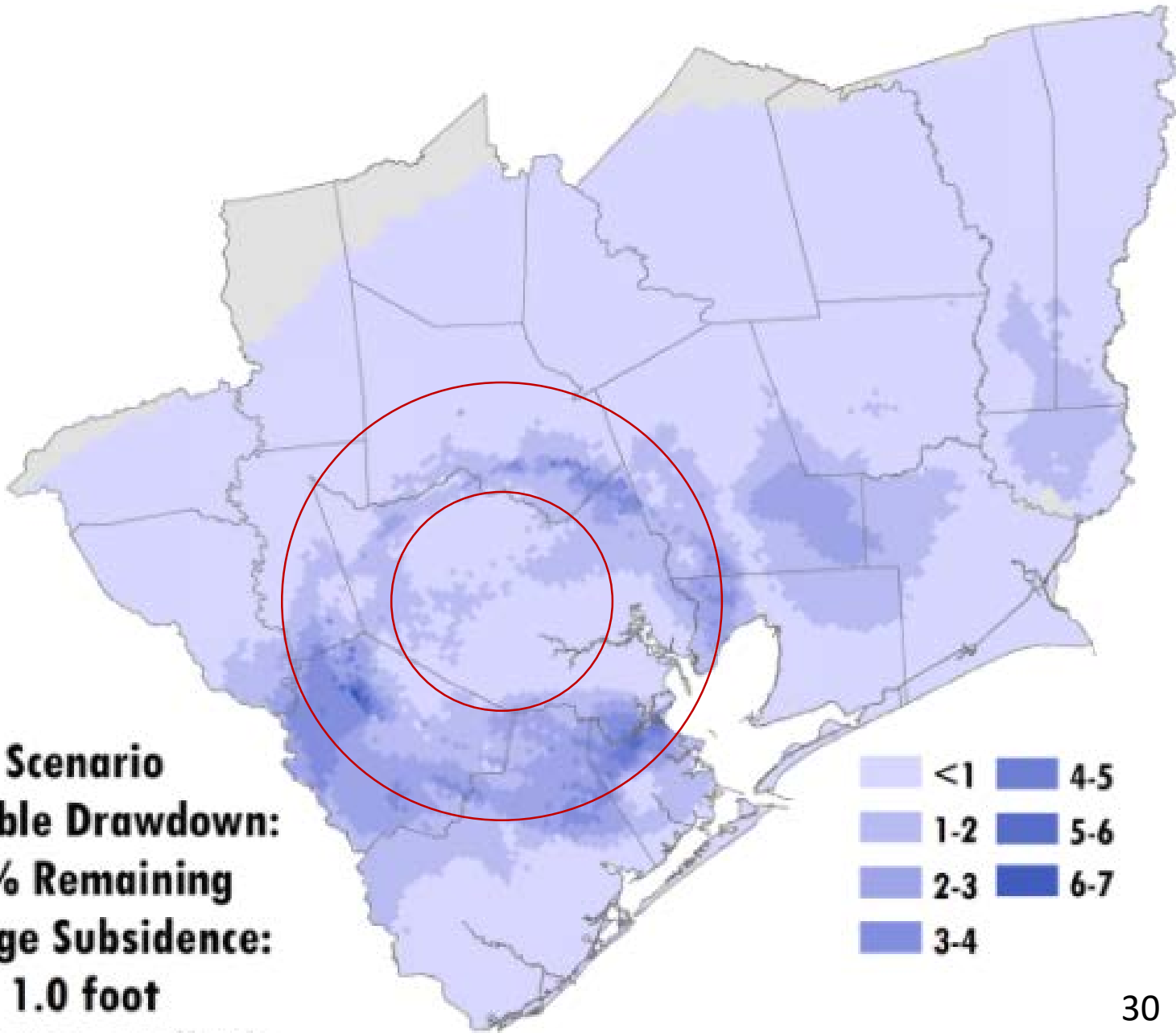
**Scenario**  
**Available Drawdown:**  
**80% Remaining**  
**Average Subsidence:**  
**1.0 foot**



# Scenario

## Modeled Additional Subsidence

Scenario:  
70%, 1.0 ft  
Run D Base  
Well File



**Scenario**  
**Available Drawdown:**  
**70% Remaining**  
**Average Subsidence:**  
**1.0 foot**  
**Run D Base Well File**

# Next Steps

- Evaluate environmental and socioeconomic impacts at next meeting
- Consider items for “other relevant information” factor

Main Joint Planning Topics for Meetings	2019												2020												2021				
	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May
Factor 1: Aquifer Uses and Conditions																													
Factor 2: Water Supply Needs and Management Strategies																													
Factor 3: Hydrological Conditions																													
Factor 4: Environmental Impacts																													
Factor 5: Impact on Subsidence																													
Factor 6: Socioeconomic Impacts																													
Factor 7: Private Property Interests and Rights																													
Factor 8: Feasibility of Achieving the DFCs																													
Factor 9: Other Relevant Information																													
Balancing Test Model Runs																													
Selection of Model Runs for Evaluation																													
Review of Model Run Results																													
Draft Explanatory Report Development																													
Propose DFC(s) for Adoption (Deadline May 1, 2021)																													

# **Next GMA 14 Joint Planning Committee Meeting**

**September 17, 2020**

**10 am**

**Video Conferencing**

**IF you have an interest in the future of groundwater supplies/use in Montgomery County, we urge you to participate in this meeting and contribute to the discussion.**



**What is the value of a reliable long-term water supply?**

**Is it worth your time to be informed, draw your own conclusions and contribute to the discussion?**

# Questions & Discussion

