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WEATHER

Exactly where does rain need to fall in South Texas to fill up the Edwards Aquifer?

San Antonio Express-News

e-Edition

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Chester, an employee of a private ranch about a two hours' drive west of San Antonio, stands on the edge of a large sinkhole on May 19, 2016, as water flows at about 500 cubic feet per second into the Edwards Aquifer. The sinkhole is one of the largest single recharge features for the aquifer.

William Luther/San Antonio Express-News

The Edwards Aquifer is one of the largest natural aquifers in the world and one of the most important ecological resources available to South and Central Texas. The aquifer extends over parts of 10 Texas counties, covering an area of about 3,600 square miles. But where exactly does rain need to fall to keep the aquifer relatively full of water?

It's important to keep the aquifer full because it is the primary water source for the city of San Antonio and other communities, providing water to more than 2 million people. The aquifer also supplies water for agriculture and industry, as well as providing the necessary spring flow for the habitat of several endangered species.

LEARN MORE: [Here are five things to know about the Edwards Aquifer.](#)

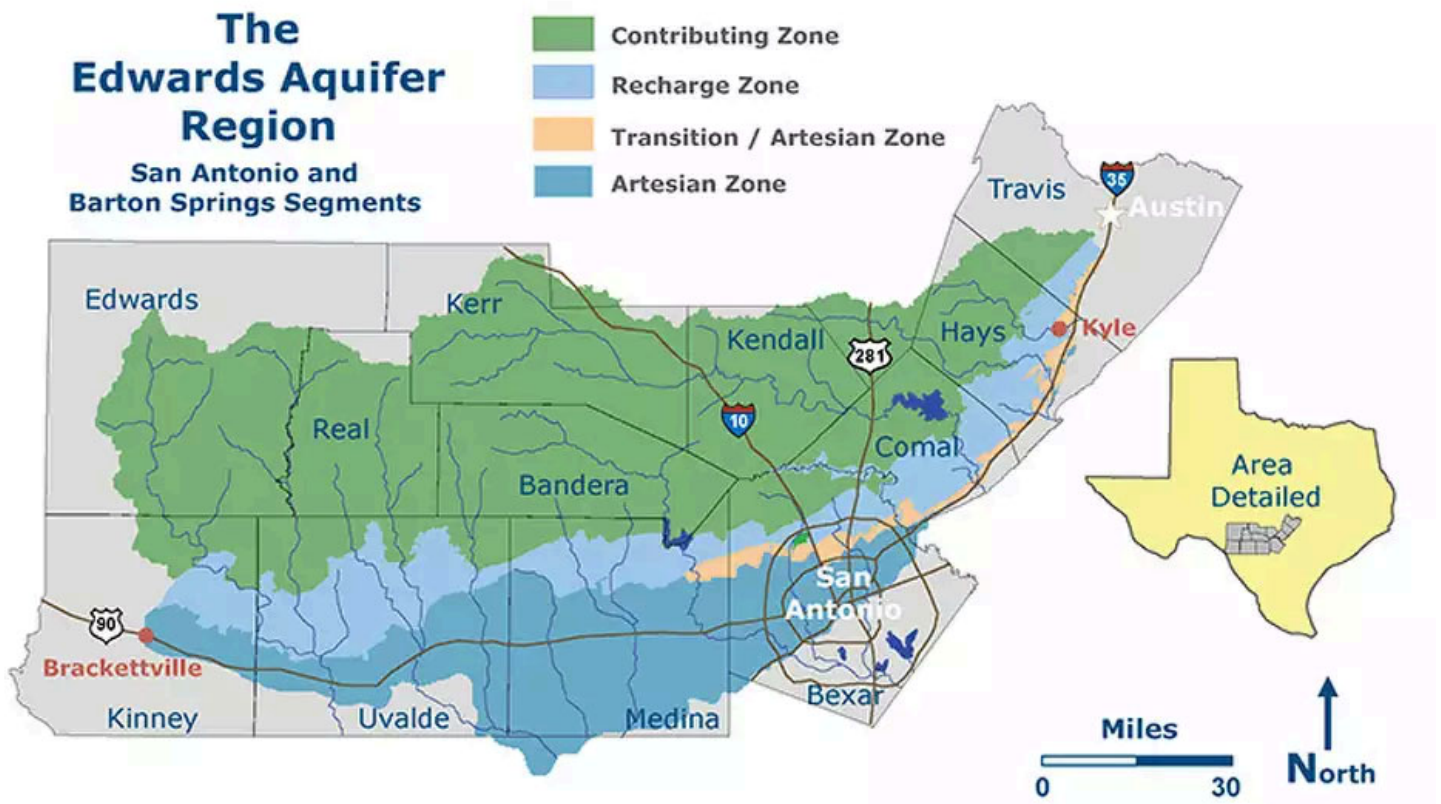
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However, droughts over the past few years have significantly reduced aquifer well levels from their historical average. When that happens, restrictions are put into place to limit how much water can be pumped out of the aquifer.

How do we bring well levels back up? Unfortunately, we can't do a whole lot ourselves. It's up to Mother Nature to produce significant rainfall to a specific geographic location: the Edwards Aquifer recharge zone.

Where is the Edwards Aquifer recharge zone?

Water enters the aquifer through the recharge zone, which consists of about 1,250 square miles of exposed limestone at the ground surface. It's also highly permeable, which allows for large volumes of water to pass through it and move into the underground aquifer.



Shown is a map of the Edwards Aquifer, which shows the geographic locations of the recharge and contributing zones. Edwards Aquifer Authority

The recharge zone is a relatively thin strip of land that stretches across parts of Kinney and Uvalde counties, northern Medina County, northwestern Bexar County, eastern Comal and Hays counties, as well as southern Travis County.

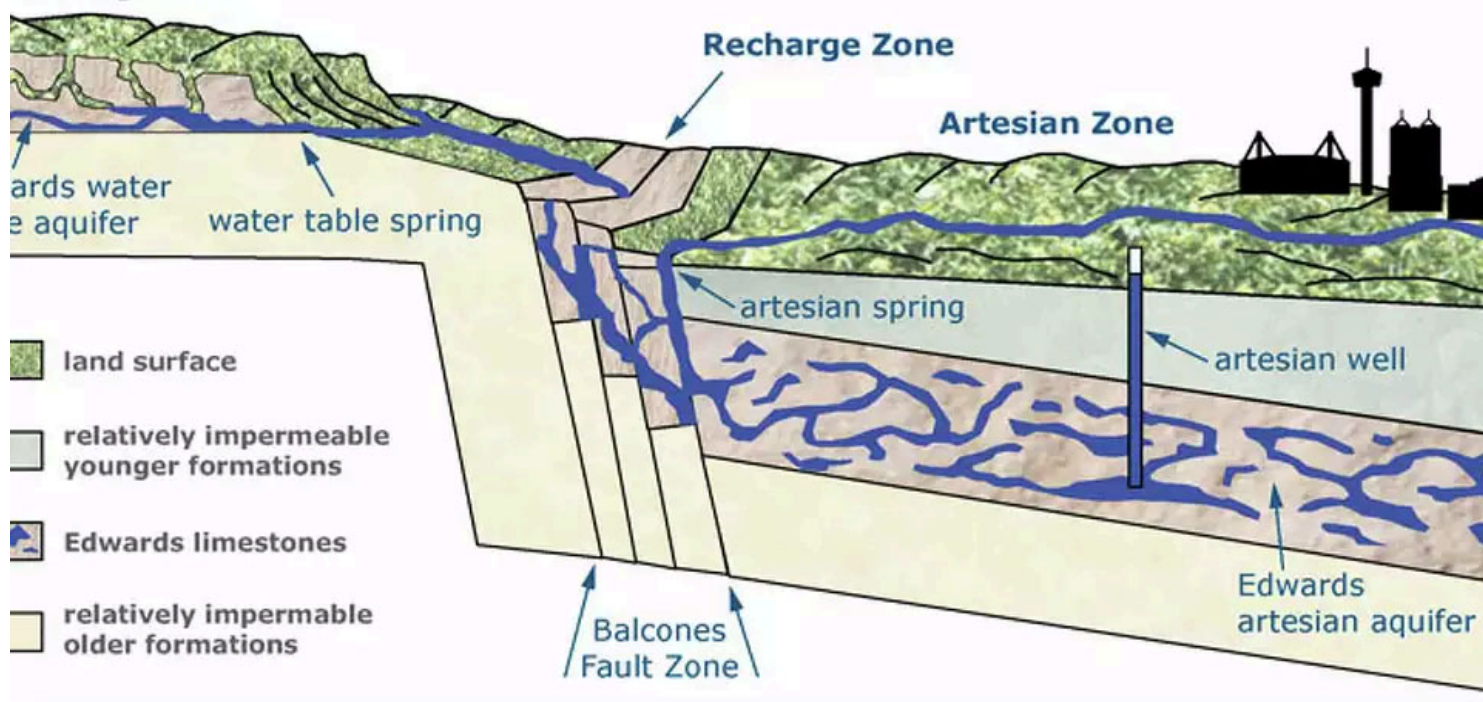
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Water can enter the recharge zone in several ways. First, precipitation directly over the recharge zone provides some rainwater. However, a more significant source of water comes from springs and streams that originate in the Edwards Aquifer contributing zone, which is adjacent and directly north of the recharge zone.

Large parts of Edwards, Real, Kerr, Bandera, Kendall, Comal and Hays counties make up the contributing zone. Whenever this region gets heavy rainfall, the runoff flows from high elevations to lower elevations. This forces water into the recharge zone, which raises well levels.

Typical Cross-Section of the Edwards Aquifer

Drainage Area



Shown is a cross-section of the Edwards Aquifer. Water flows into the recharge zone from the north, moving underground into the aquifer.
Edwards Aquifer Authority

Rain needs to fall north and west of San Antonio to have any real effect on aquifer well levels. Most of the rain that falls directly over the San Antonio metro area does not make it into the aquifer.

Recent rainfall

Because of the high permeability of the recharge zone, well levels often respond quickly to heavy rainfall events. Parts of the recharge and contributing zones already have received 2 to 5 inches of rain since Sunday, with more rain possible over the next couple of days.

Thanks to the increasing moisture, water levels measured at the J-17 index well in northwestern Bexar County already are rising. As of 8:00 a.m. Wednesday, the well level was at 633.2 feet, which is 2.5 feet higher than the average over the past 10 days.

Additional water level increases are anticipated as more rain falls over the recharge and contributing zones. Some areas could receive another 1 to 2 inches of rain before the week is done.

That could bring changes to drought restrictions set by the Edwards Aquifer Authority, which manages the groundwater system. Those rules limit how much permit holders can pump from the aquifer, based on levels in the index well and spring flows at San Marcos and Comal springs.

"Fortunately, today's rainfall was ideally placed for effective recharge," said Paul Bertetti, the authority's senior director for aquifer science research and modeling. Substantial, relatively slow-moving storms dropped significant rain in the crucial parts of Uvalde, Medina and Bandera counties, he said, unlike previous storms that have brought more rainfall east of Interstate 35 and south of U.S. 90.

"It's likely that we get some good flows in the Nueces and the Frio (rivers), and it will likely have a very positive effect on the aquifer," he said. Recharge is most efficient when those rivers are flowing across the recharge zone.

That could trigger a move from Stage 4 restrictions, which cut permits by 40%, to Stage 3, which mandates 35% permit cuts. The change would allow users like the San Antonio Water System to pump more water from the aquifer. The J-17 index well average is already at the Stage 3 threshold, but flow at Comal Springs in New Braunfels

would need to increase to trigger the change.

If the aquifer level rises as he expects, the region could remain in Stage 3 for three to four weeks, he said.

The rainfall won't bring the aquifer anywhere close to "normal" levels: J-17 is still almost 30 feet below the historical monthly average, and it would likely take about 20 inches of rain over a few days to get the aquifer close to that level, he said. But the recent precipitation could be enough to help keep the aquifer levels from approaching the record lows of the 1950s drought.

"Given events that we've had today, if we have those continued rainfall events and sequences, water levels may stay low, but they're probably not going to be down in the range that we've never seen before," he said. "It should be a good bump upwards that will help us essentially weather the rest of the summer."

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Anthony Franze
NEWSROOM METEOROLOGIST



Anthony Franze is a native Texan and very passionate about covering any weather that is thrown at him. He can be reached at anthony.franze@express-news.net.

Anthony earned a degree in Meteorology from Valparaiso University in 2017. He has worked as a broadcast meteorologist for six years, one at NBC Montana and the next five at NewsWest 9 in Midland before joining the Express-News in July 2023.

In his free time, Anthony enjoys watching sports, checking out local restaurants and breweries, and getting outside whenever the heat allows for it. If you have any story ideas, questions about the weather or restaurant suggestions, drop him a line.



Liz Teitz
REPORTER



Liz Teitz covers the Hill Country for the San Antonio Express-News. She can be reached at liz.teitz@express-news.net.

She previously covered education and news in Texas, Colorado and Connecticut. She grew up in Rhode Island and graduated from Georgetown University.

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