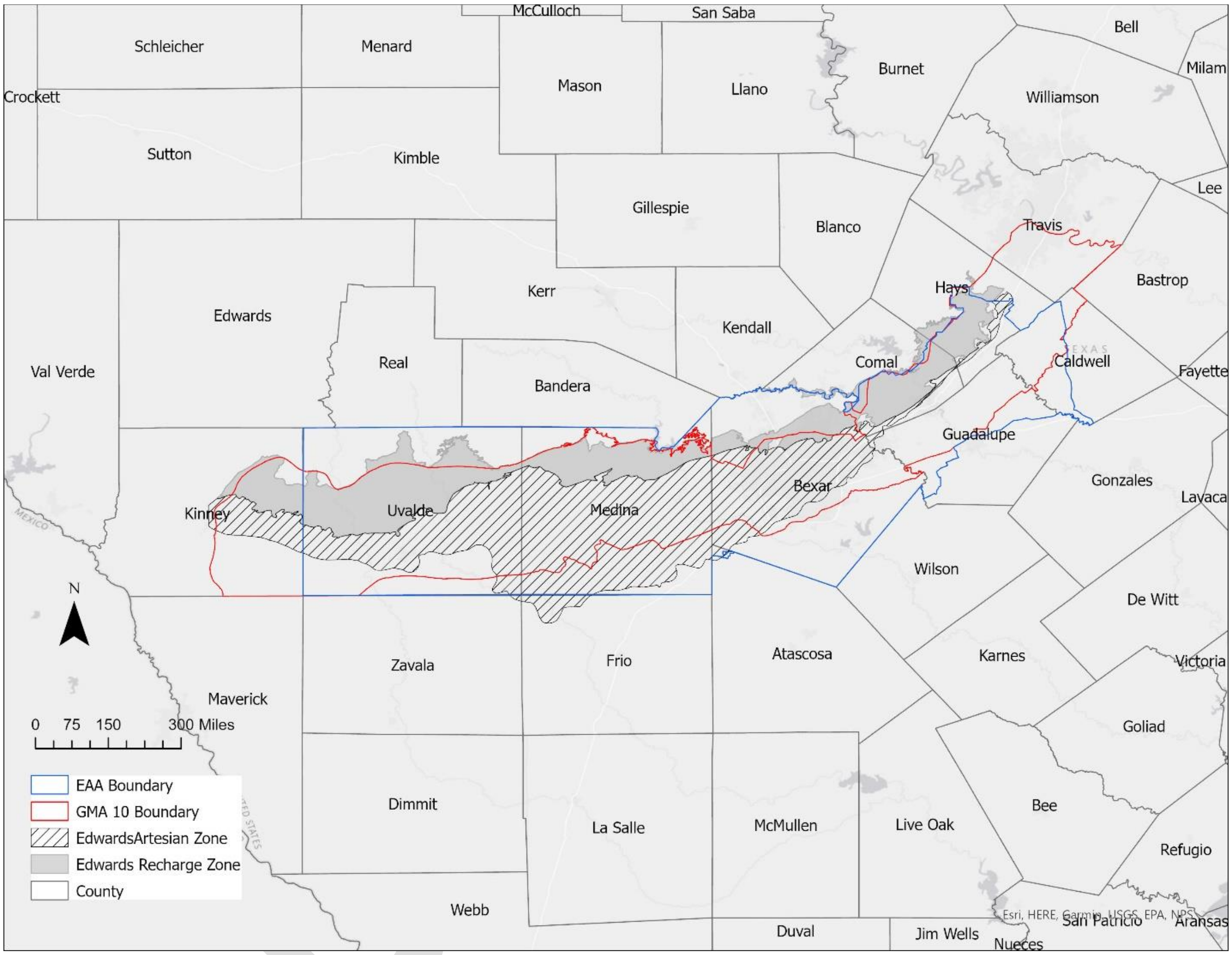
Proposal of designating portions of the Edwards in GMA 10 as non-relevant:

GMA 10 members are proposing to classify the Edwards Aquifer within GMA 10 as non-relevant for the purposes of joint planning. These areas of the Edwards are located within GMA 10, in portions of Hays, Comal, Guadalupe, Bexar, Medina, Uvalde, and Kinney Counties (Map 1). This area is approximately 2.2 million acres.



Map 1

Requirements for proposing a non- relevant aquifer:

According to Texas Administrative Code 356.31(b) "The districts in a groundwater management area may, as part of the process for adopting and submitting desired future conditions, propose classification of a portion or portions of a relevant aquifer as non-relevant if the districts determine that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition. In such a case no desired future condition is required. The districts must submit the following documentation to the agency related to the portion of the relevant aquifer proposed to be classified as non-relevant:

(1) A description, location, and/or **map of the aquifer** or portion of the aquifer;

(2) A summary of **aquifer characteristics**, **groundwater demands**, and current **groundwater uses**, including the **total estimated recoverable storage** as provided by the executive administrator, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and

(3) An explanation of **why** the aquifer or portion of the aquifer is non-relevant for joint planning purposes."

Aquifer Portion Description, Location and Map:

The following section describes the Edwards Aquifer, as taken from the "*About the Edwards Aquifer"* page of the Edwards Aquifer Authority (EAA) website (https://www.edwardsaquifer.org/science-maps/about-the-edwards-aquifer/).

The San Antonio Segment of the Balcones Fault Zone Edwards Aquifer (Aquifer) in South-Central Texas is one of the most productive aquifers in the United States. The Edwards Aquifer is a karst aquifer and is characterized by the presence of sinkholes, sinking streams, caves, large springs and highly productive water wells. Karst aquifers are considered triple permeability aquifers. Water is contained in the rock matrix, in fractures and faults and in caves and conduits. Conduits or solution channels within the Aquifer range from the size of a finger to tens of feet in diameter. The interconnected fractures and conduits in the Edwards Aquifer account for its extremely high yielding wells and springs. As is characteristic of many karst aquifers, the Aquifer exhibits extremely high (cavernous) porosity and permeability, allowing for the transmission of large volumes of water and enabling groundwater levels within the Aquifer to respond quickly to rainfall events (known as recharge). The large, interconnected openings in the rock also exhibit a diverse fauna of more than 40 species including eyeless salamanders, shrimp and two species of catfish.

Geographically, the Aquifer extends through parts of Kinney, Uvalde, Zavala, Medina, Frio, Atascosa, Bexar, Comal, Guadalupe and Hays counties and covers an area approximately 180 miles long and five to 40 miles wide. The total surface area overlying the Aquifer is approximately 3,600 square miles. The Aquifer is the primary water source for much of this area, including the City of San Antonio and its surrounding communities. Historically, the cities of Uvalde, San Antonio, New Braunfels and San Marcos were founded around large springs that discharged from the Aquifer. As the region grew, wells were drilled into the Aquifer to supplement the water supplied by those springs. The Aquifer also serves as the principal source of water for the region's agricultural and industrial activities and provides necessary springflow for endangered species habitat, as well as recreational purposes and downstream uses in the Guadalupe, Nueces and San Antonio River basins.

Water circulates through the Edwards Aquifer as part of the hydrologic cycle from recharge areas to discharge locations (springs and wells). Approximately 1,250 square miles of Edwards Limestone is exposed at the ground surface and composes the Recharge Zone where water enters the Aquifer.

Surface water from springs and streams originating on the Contributing Zone reaches the Recharge Zone where much of the flow sinks into the Edwards Limestone. Some water also enters the Edwards Aquifer through interformational flow (from rock formations adjacent to the Edwards Limestone) and from direct precipitation on the Recharge Zone.

Water from the Recharge Zone flows down gradient to the Artesian Zone where the Aquifer is contained between less permeable beds of the Del Rio Clay (above) and the Upper Glen Rose Limestone (below). Portions of the Artesian Zone are as much as 3,400 feet below the surface where it still contains fresh water. The southern boundary of the Artesian Zone marks the Aquifer's transition from freshwater to saline water (water with a total dissolved solids concentration greater than 1,000 mg/L). Groundwater moves through the Artesian Zone and ultimately discharges from a number of locations, such as Leona Springs in Uvalde County, San Pedro and San Antonio springs in Bexar County, Hueco and Comal springs in Comal County and San Marcos Springs in Hays County. In addition, domestic, livestock, municipal, agricultural and industrial wells throughout the region withdraw water from the Aquifer. The residence time of water in the Aquifer ranges from a few hours or days to much longer, depending on depth of circulation, location and other aquifer parameters.

The Edwards Aquifer is a karst aquifer. Karst aquifers form over soluble rock types such as limestone by reacting with mildly acidic waters. For example, rainwater contains carbonic acid (created when carbon dioxide (CO_2) from the air or decaying vegetation on the ground comes in contact with water droplets).

Because of this reaction, the Edwards Aquifer exhibits extremely high (cavernous) porosity and permeability. In contrast, aquifers that occur in sand and gravel or in other rock types such as sandstone have a much lower permeability. Because the Edwards Aquifer has areas of such high permeability, it allows for the transmission of large volumes of water, enabling groundwater levels to respond quickly to rainfall (recharge) events and to times of drought.

It is important to note, however, that the amount of water in the aquifer does not equal the amount of water that can be recovered from it. There are many factors that determine how much water is available for recovery. First, there are physical factors, such as depth and pressure that limit how much groundwater can be recovered through withdrawal. Second, there are considerations such as economics, well depth and location and the potential impact of other wells. Third, there are the minimum spring flow requirements established pursuant to the Endangered Species Act (ESA) combined with administrative limitations established by the EAA's permitting system mandated within its specific enabling legislation.

Aquifer Characteristics, Groundwater Demands, Current Groundwater Uses, Including Total Estimated Recoverable Storage (TERS):

The following describes the aquifer characteristics: recharge, lateral inflow, and the storage coefficient; with insight from Geologist Feathergail Wilson:

<u>Recharge</u> of the Edwards is dependent largely on the local geographic area. Although an annual effective recharge rate estimate has been set at 4%, some locations, such as sinkholes or faults,

will see 100% of precipitation infiltrate the karst system. The EAA's homepage (www.edwardsaquifer.org) reports a 10-year annual recharge average of 555,780 acre-feet for 2010 to 2020.

<u>Lateral inflow</u> occurs in cavernous systems, which the Edwards exemplifies. As with recharge, which occurs vertically from the ground surface, the horizontal movement of water through the Edwards is dependent on the karstification, or lack thereof, at specific positions. Thus, lateral inflow varies widely throughout the Edwards—not only in the caverns, but also due to faults and conduits.

<u>The storage coefficient</u> for karst systems, such as the Edwards Aquifer, are so low (small of a number) that it may be described as "nearly meaningless." On average, the Edwards Aquifer storage coefficient may be estimated to be 5 X 10^{-4}.

Groundwater Demands:

The 2022 State Water Plan Information for the counties in GMA 10 containing the Edwards Aquifer. All values are in acre-ft/yr. Note that county totals are not limited to the portion of each county in GMA 10.

County		2020	2030	2040	2050	2060	2070
HAYS	Demands	40,729	50,453	61,476	72,555	89,124	107,760
	Existing Supplies	54,630	54,727	56,157	57,587	61,082	62,497
	Needs	626	4,079	10,390	18,751	31,337	48,349
	Strategy Supplies	19,698	35,543	55,564	65,714	78,368	90,058

County		2020	2030	2040	2050	2060	2070
COMAL	Demands	42,052	51,191	59,458	67,595	76,204	84,763
	Existing Supplies	44,176	44,353	44,611	44,792	45,014	46,603
	Needs	8,307	15,421	21,459	27,434	33,874	39,952
	Strategy Supplies	36,887	48,133	53,873	57,496	61,001	63,748

County		2020	2030	2040	2050	2060	2070
GUADALUPE	Demands	40,989	47,698	52,552	57,475	62,659	67,827
	Existing Supplies	56,481	57,901	59,203	59,251	59,315	59,482

	Needs	43	480	2,379	6,552	10,906	14,765
	Strategy Supplies	13,806	24,193	33,761	34,397	36,464	37,631

County		2020	2030	2040	2050	2060	2070
BEXAR	Demands	344,503	370,868	395,122	420,879	446,877	471,297
	Existing Supplies	350,128	352,726	356,461	360,814	364,601	366,478
	Needs	12,387	27,016	47,872	68,266	90,218	112,499
	Strategy Supplies	47,631	186,674	265,999	294,951	371,856	404,066

County		2020	2030	2040	2050	2060	2070
MEDINA	Demands	70,826	71,745	72,527	73,276	74,069	74,822
	Existing Supplies	37,751	37,814	38,202	38,181	38,353	37,643
	Needs	36,808	37,544	37,831	38,489	39,053	40,481
	Strategy Supplies	1,779	2,126	2,519	2,918	3,293	3,726

County		2020	2030	2040	2050	2060	2070
UVALDE	Demands	73,467	74,152	74,647	75,323	76,062	76,818
	Existing Supplies	30,700	30,749	30,813	30,867	30,928	30,988
	Needs	43,173	43,773	44,193	44,779	45,420	46,079
	Strategy Supplies	2,881	3,257	3,613	3,992	4,376	4,738

County		2020	2030	2040	2050	2060	2070
KINNEY	Demands	5,227	5,218	5,205	5,202	5,199	5,199
	Existing Supplies	12,959	12,959	12,959	12,959	12,959	12,959
	Needs	27	27	27	27	27	27
	Strategy Supplies	79	705	705	705	705	705

Edwards Groundwater Use:

The following two charts provide data on Edwards Aquifer groundwater use by type and comes from *Edwards Aquifer Authority Hydrologic Data Fact Sheets, 2019: Groundwater Discharge and Uses* (https://www.edwardsaquifer.org/science-maps/research-scientific-reports/hydrologic-data-reports/).

Annual Estimated Edwards Aquifer Groundwater Discharge by Use (Springflow included), for 2009-2018 (measured in thousands of acre-feet)

	Irrigation	Municipal	Domestic/Livestock	Industrial/Commercial	Springs
Mean	74.7	248.9	13.9	23.2	398.8
Median	76.9	248.3	13.9	23.6	384.7

Edwards Aquifer Groundwater Discharge by Use (Springflow included), for 2019 (measured in thousands of acre-feet)

Year	Irrigation	Municipal	Domestic/Livestock	Industrial/Commercial	Springs
2019	73.7	241.5	14.1	23.8	526.0

Total Estimated Recoverable Storage:

The Total Estimated Recoverable Storage (TERS) is defined as a porosity-adjusted volume of groundwater that might be recovered from the aquifer assuming 25 percent or 75 percent recovery. The numbers should be considered as a very simplistic approach to estimating an upper limit volume of available groundwater on a volumetric basis only. The TERS numbers are based on porosity-adjusted volumetric calculations of projected geologic formations without detailed local subsurface data. The TERS is an estimate of total "water-in-place," but there are many other factors that must be considered in assessing groundwater availability and DFCs.

According to EAA Research Manager, Brent Doty, P.G., the San Antonio Edwards BFZ does not have a TERS in the traditional sense. The Modeled Available Groundwater (MAG), on the other hand, was set by the legislature at 572,000 acre-feet, which is the total of all the permits and cannot be exceeded to protect spring flow to San Marcos and Comal springs.

Rationale for proposing the Edwards as non-relevant:

The following is an explanation of why GMA 10 is proposing to classify the Edwards as non-relevant for the purposes of joint planning in those portions of Hays, Comal, Guadalupe, Bexar, Medina, Uvalde, and Kinney Counties within GMA 10:

- SB 1336 (2015) removed the EAA from the GMA joint planning process (because EAA's DFC and MAG were set by statute).
- HB 2729 (2019) removed applicability of the provisions of Chapter 36 of the Texas Water Code from the EAA.

In summary, GMA 10 determined that due to the EAA's unique role in management of the Edwards Aquifer, as well as their legislative exemptions from both GMA joint planning and Chapter 36 of the Texas Water Code, adoption of a DFC is not warranted. Therefore, GMA 10 is proposing that this aquifer located within the boundaries of GMA 10, specifically, be classified as non-relevant for joint planning purposes.