

3.1.5 Edwards-Trinity (Plateau)

The Edwards-Trinity (Plateau) aquifer consists of Cretaceous-age limestones, sandstones, and dolomites, located from the Trans Pecos region in West Texas into North and Central Texas, as shown in Figure 11. Although in other parts of the state the Edwards and associated limestones and the formations of the Trinity Group are considered to be individual aquifers, in the Edwards and Stockton Plateau areas these formations are grouped as a single aquifer. Most of the groundwater produced from this aquifer is used for irrigation purposes. However, the aquifer is also used for domestic and stock purposes, and several municipalities, including Fort Stockton and Odessa, use groundwater from the Edwards-Trinity (Plateau) aquifer for municipal water supplies.

The Edwards-Trinity (Plateau) aquifer is comprised of the lower Cretaceous Trinity Group sediments and the limestones and dolomites of the Edwards, Comanche Peak, and Georgetown Formations¹. These strata are relatively flat lying, and located atop relatively impermeable pre-Cretaceous rocks. Groundwater in the Edwards and associated limestones occurs primarily in solution cavities that have developed along faults, fractures, and joints in the limestone. These formations are the main water-producing units in about two-thirds of the aquifer extent. The water-bearing units of the Trinity Group are used primarily in the northern third and on the extreme southeastern edge of the aquifer. The Trinity Group produces water in the south from the Hosston, Sligo, Cow Creek, Hensell and Glen Rose Formations, while in the north where the Glen Rose pinches out, all of the Trinity Group is referred to as the Antlers Sand. The saturated thickness of the entire aquifer is generally less than 400 feet, although the maximum thickness can exceed 1,500 feet. A cross section of the Edwards-Trinity (Plateau) aquifer is shown in Figure 12.

Groundwater in the Edwards-Trinity (Plateau) aquifer occurs under both confined and unconfined conditions. Recharge is primarily through the infiltration of precipitation on the outcrop, in particular where the limestone formations outcrop. Discharge is to wells and to the Pecos River and Rio Grande in the southwest, the Colorado River in the northeast, and to the Frio, Medina, Nueces, and Guadalupe Rivers in the Hill Country area. Groundwater flow in the Edwards-Trinity (Plateau) aquifer generally flows in a south-southeasterly direction, but may vary locally. The hydraulic gradient averages about 10 feet/mile. Long-term water-level declines have been observed in areas of heavy pumping.

Aquifer properties of the Trinity Group formations vary across the aquifer. Transmissivities range from 1,000 to 10,000 gpd/ft, but average about 3,000 gpd/ft. Storage coefficients for the Trinity formations are estimated to be between 1×10^{-4} to 1×10^{-5} , and specific yields are estimated to be 0.05 to 0.10. Specific capacities of wells range from less than 1 to greater than 20 gpm/ft. Reported well yields commonly range from less than 50 gpm from the thinnest saturated section to 1,500 gpm, although higher yields occur in locations where wells are completed in jointed or cavernous limestone. Due to the nature of groundwater flow in the Edwards, it is very difficult to estimate aquifer properties for this portion of the aquifer. However, based on aquifer characteristics of the Edwards elsewhere, transmissivities are estimated to range from 50,000 to more than 300,000 gpd/ft, storage coefficients are estimated to range from $1 \times$

10^{-4} to 1×10^{-5} , and specific yields are probably 0.01 to 0.02. Overall, the Edwards-Trinity (Plateau) aquifer has been described as having transmissivities of between 35,000 and 40,000 gpd/ft in the northern and eastern sections, and 35,000 to 375,000 gpd/ft in the southern and western sections². These aquifer characteristics are predominantly for the fresh section of the aquifer, in particular from wells producing from the Edwards portion of the aquifer, and they are expected to be lower in the brackish section, which tend to be in the Trinity formations.

The chemical quality of the Edwards and associated limestones is generally better than that in the underlying Trinity aquifer in the Plateau region. Groundwater is fairly uniform in quality, with water from the Edwards and associated limestones being a very hard, calcium bicarbonate type, usually containing less than 500 mg/L TDS, although in some areas the TDS can exceed 1,000 mg/L. The water quality in the Trinity tends to be poorer than in the Edwards. The chemical quality of water from the Antlers is of the calcium bicarbonate/sulfate type and very hard, with salinity increasing towards the west. Salinities in the Antlers typically range from 500 to 1,000 mg/L TDS, although groundwater with greater than 1,000 mg/L TDS is common.

Summary

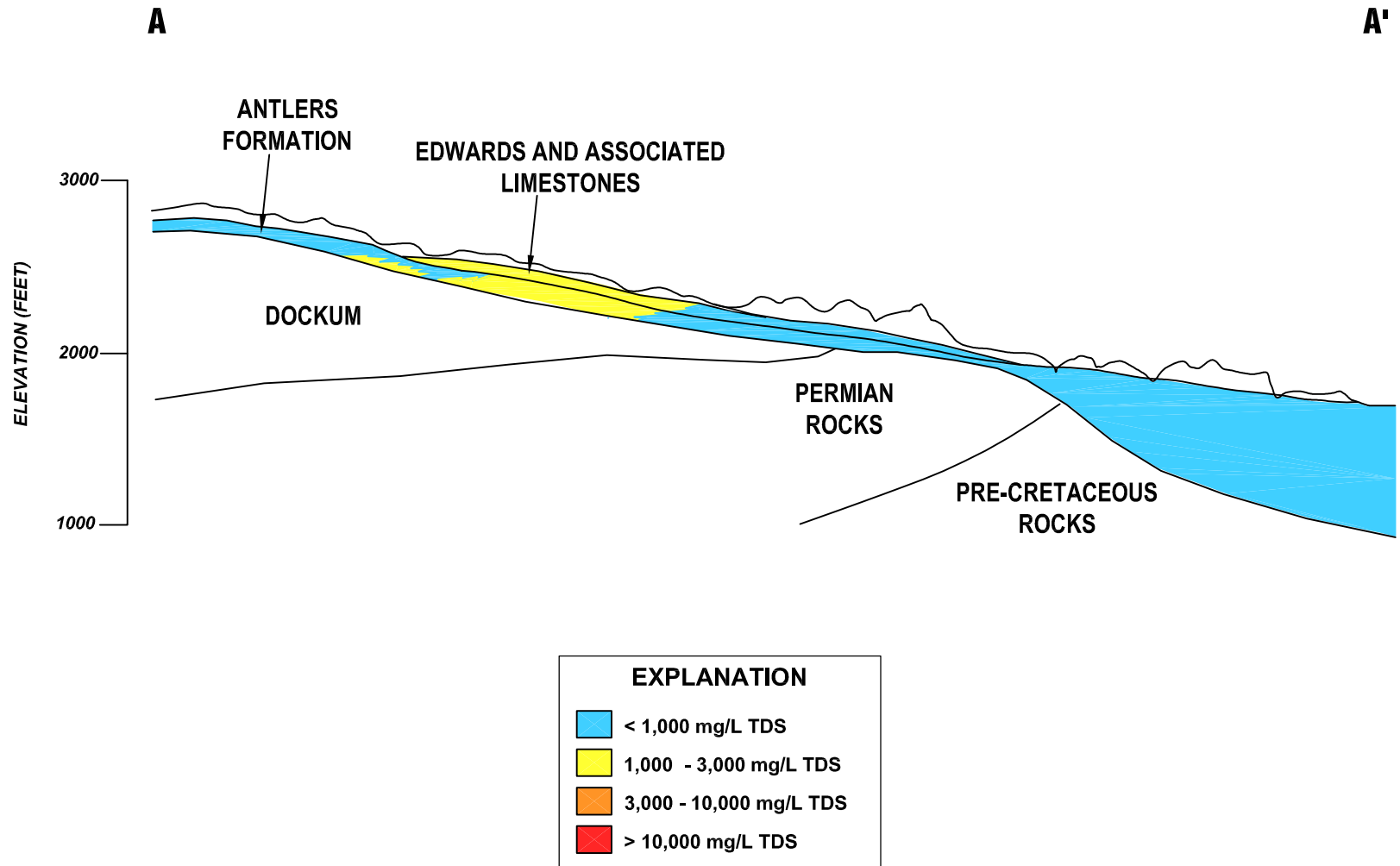
As shown in Figure 11, much of the groundwater found in the Edwards-Trinity (Plateau) aquifer is fresh to slightly-saline. Brackish groundwater appears to mostly be found in the western section of the aquifer, in particular in Reagan, Upton and western Crockett Counties, with lesser amounts in Midland, Ector, Pecos, and Reeves Counties, and in the southwestern edge of the aquifer. In these areas, most of the groundwater production is from the Trinity formations. The brackish groundwater present in the Trinity formations in the lower two-thirds of the aquifer is largely unknown, mainly because few wells penetrate into these formations. In these areas, the Edwards and associated limestones provide sufficient fresh groundwater to meet demands.

Availability- HIGH- In the north, where the Trinity Group formations are used extensively, availability from the Edwards-Trinity (Plateau) aquifer is considered high. In the south, where the Edwards and associated limestones are predominantly used, the availability is unknown, because in this area the availability of brackish groundwater from the Trinity formations is unknown. Groundwater in this area from the Edwards is primarily fresh.

Productivity- LOW- In the northern portion of the aquifer, where the Trinity Group formations would be used for brackish groundwater production, the productivity of the Edwards-Trinity (Plateau) aquifer is low. Relatively shallow wells can be installed in these areas, but transmissivities are relatively low. The productivity of the aquifer in the rest of the area, where the Edwards is the primary groundwater producing unit, is unknown due to the lack of wells penetrating into the Trinity formations where brackish groundwater may be present. However, in these areas it would be expected that the productivity of the Trinity formations would be very low.

Source Water Production Cost- LOW - Shallow wells in the northern portion of the aquifer, producing from the Trinity units, will have a relatively low relative cost for producing groundwater. As with availability and productivity, production costs for Trinity wells in the southern portion of the aquifer, should brackish groundwater exist, is uncertain.

Summary of Brackish Water In the Edwards-Trinity (Plateau) Aquifer			
<i>Region</i>	<i>Availability</i>	<i>Productivity</i>	<i>Source Water Production Cost</i>
E- Far West Texas	None	--	--
F- Region F	High	Low	Low
G- Brazos	None	--	--
J- Plateau	Unknown	Unknown	Unknown
K- Lower Colorado	None	--	--
L- South Central Texas	None	--	--



SIMPLIFIED CROSS SECTION OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER WITH GENERALIZED WATER QUALITY RANGES

(Modified from Walker, 1979)

FIGURE 12