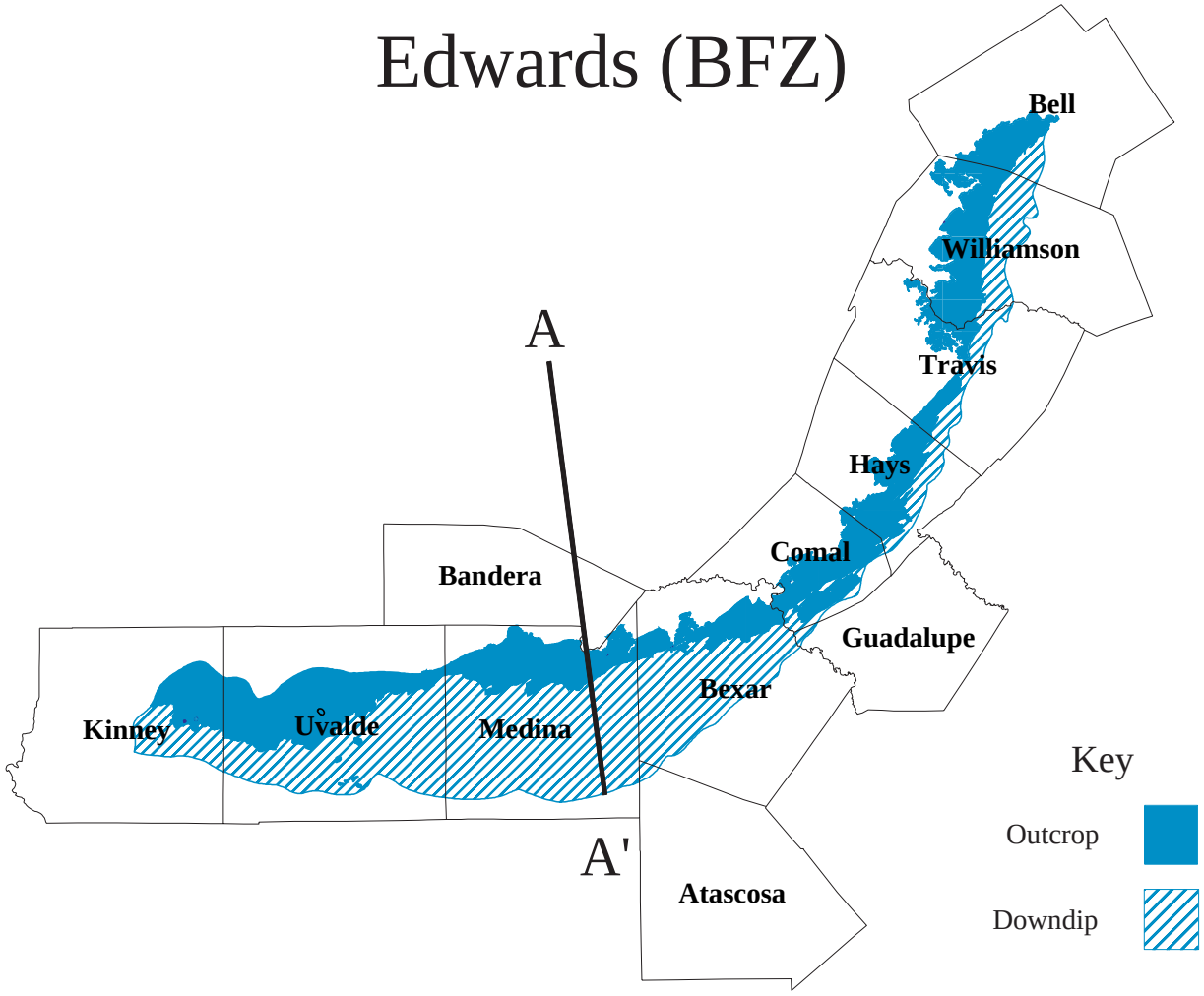
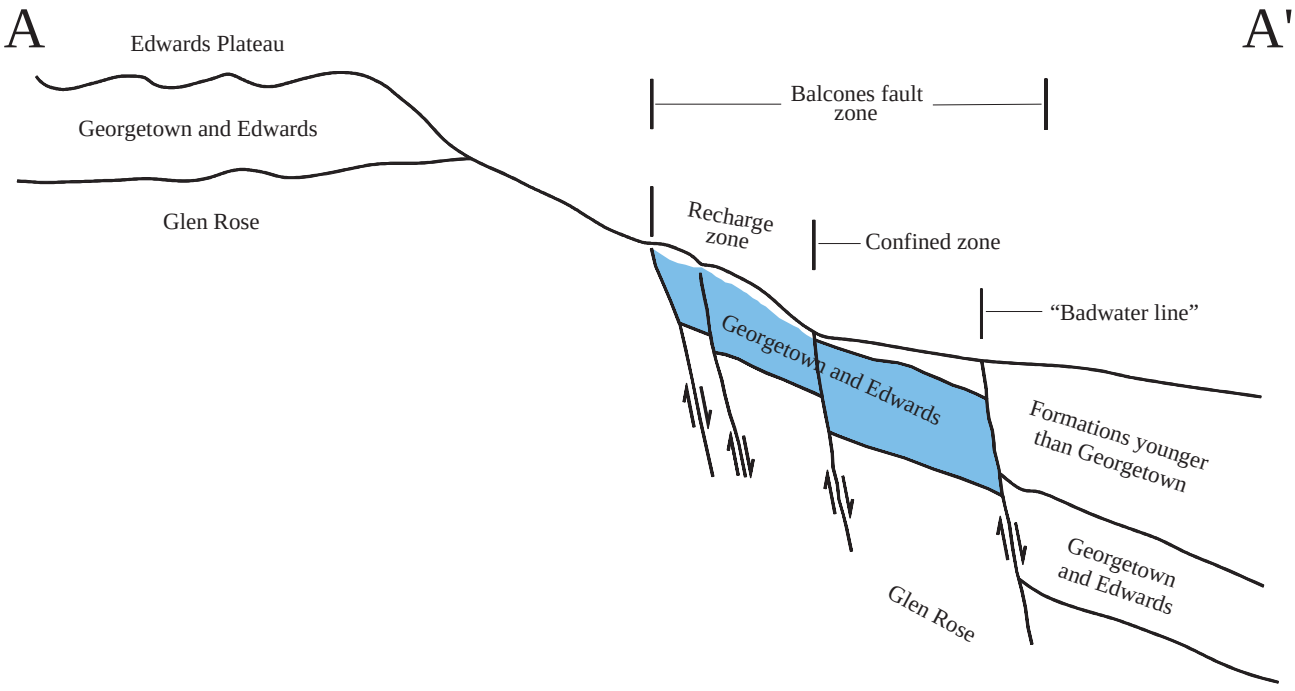
Edwards (BFZ)





Modified from Maclay and Small, 1986

Edwards (Balcones Fault Zone)

The Edwards (Balcones Fault Zone, or BFZ) aquifer covers approximately 4,350 square miles in parts of 11 counties. The aquifer forms a narrow belt extending from a ground-water divide in Kinney County through the San Antonio area northeastward to the Leon River in Bell County. A poorly defined ground-water divide near Kyle in Hays County hydrologically separates the aquifer into the San Antonio and Austin regions. The name Edwards (BFZ) distinguishes this aquifer from the Edwards-Trinity (Plateau) and the Edwards-Trinity (High Plains) aquifers.

Water from the aquifer is primarily used for municipal, irrigation, and recreational purposes; approximately 54 percent is used for municipal supply. San Antonio, which obtains its entire municipal water supply from the Edwards aquifer, is one of the largest cities in the world to rely solely on a single ground-water source. The aquifer feeds several well-known recreational springs and underlies some of the most environmentally sensitive areas in the state.

The aquifer, composed predominantly of limestone formed during the early Cretaceous Period, exists under water-table conditions in the outcrop and under artesian conditions where it is confined below the overlying Del Rio Clay. The Edwards aquifer consists of the Georgetown Limestone, formations of the Edwards Group (the primary water-bearing unit) and their equivalents, and the Comanche Peak Limestone where it exists. Thickness ranges from 200 feet to 600 feet.

Recharge to the aquifer occurs primarily by the downward percolation of surface water from streams draining off the Edwards Plateau to the north and west and by direct infiltration of precipitation on the outcrop. This recharge reaches the aquifer through crevices, faults, and sinkholes in the unsaturated zone. Unknown amounts of ground water enter the aquifer as lateral underflow from the Glen Rose Formation. Water in the aquifer generally moves from the recharge zone toward natural discharge points such as Comal, San Marcos, Barton, and Salado springs. Water is also discharged artificially from hundreds of pumping wells, particularly municipal supply wells in the San Antonio region and irrigation wells in the western extent.

In the updip portion, ground water moving through the aquifer system has dissolved large amounts of rock to create highly permeable solution zones and channels that facilitate rapid flow and relatively high storage capacity within the aquifer. Highly fractured strata in fault zones have also been preferentially dissolved to form conduits capable of transmitting large amounts of water. Due to its extensive honeycombed and cavernous character, the aquifer yields moderate to large quantities of water. Some wells yield in excess of 16,000 gal/min, and one well drilled in Bexar County flowed 24,000 gal/min from a 30-inch diameter well. The aquifer is significantly less permeable farther downdip where the concentration of dissolved solids in the water exceeds 1,000 mg/l.

The chemical quality of water in the aquifer is typically fresh, although hard, with dissolved-solids concentrations averaging less than 500 mg/l. The downdip interface between fresh and slightly saline water represents the extent of water containing less than 1,000 mg/l. Within a short distance downgradient of this “bad water line,” the ground water becomes increasingly mineralized.

Due to its highly permeable nature in the fresh-water zone, the Edwards aquifer responds quickly to changes and extremes of stress placed on the system. This is indicated by rapid water-level fluctuations during relatively short periods of time. During times of adequate rainfall and recharge, the Edwards aquifer is able to supply sufficient amounts of water for all demands as well as sustain spring flows at many locations throughout its extent. However, under conditions of below-average rainfall or drought when discharge exceeds recharge, spring flows may be reduced to environmentally detrimental levels, and mandatory rationing may be established.

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