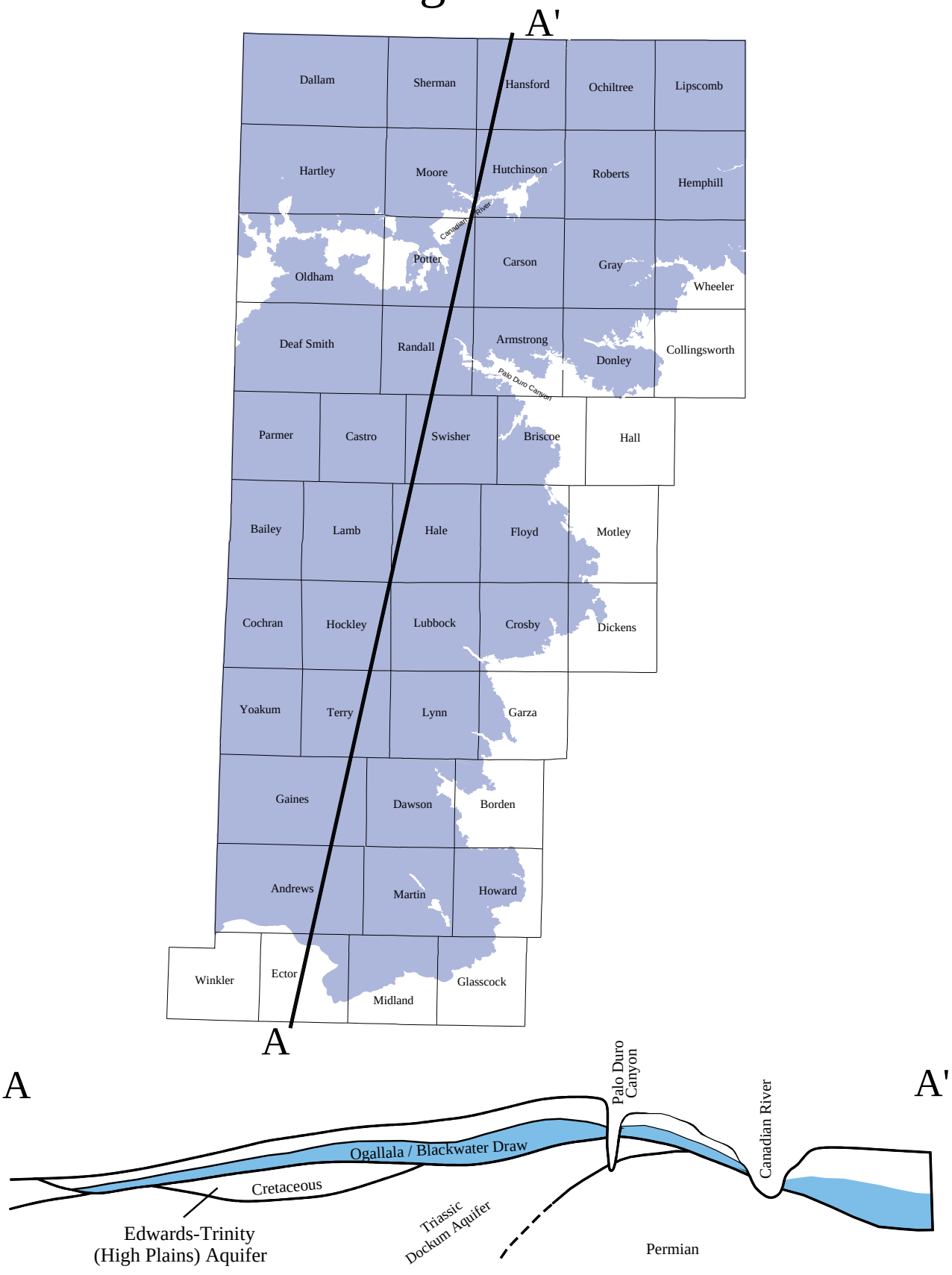
Ogallala


A'
Dallam
Sherman
Hansford
Ochiltree
Lipscomb
Hartley
Moore
Hutchinson
Roberts
Hemphill
Canadian River
Oldham
Potter
Carson
Gray
Wheeler
Deaf Smith
Randall
Armstrong
Donley
Collingsworth
Palo Duro Canyon
Parmer
Castro
Swisher
Briscoe
Hall
Bailey
Lamb
Hale
Floyd
Motley
Cochran
Hockley
Lubbock
Crosby
Dickens
Yoakum
Terry
Lynn
Garza
Gaines
Dawson
Borden
Andrews
Martin
Howard
Winkler
Ector
Midland
Glasscock
A
A
A'
Palo Duro Canyon
Canadian River
Ogallala / Blackwater Draw
Cretaceous
Edwards-Trinity
(High Plains) Aquifer
Triassic
Dockum Aquifer
Permian

Ogallala Aquifer

The Ogallala aquifer, the major water-bearing unit in the High Plains of Texas, provides water to all or parts of 46 counties. Water-bearing areas of the Ogallala are laterally connected except where the Canadian River has eroded through the formation, thereby forming the boundary between two separate flow systems referred to as the Northern and Southern High Plains. Vertical hydrologic communication also occurs between the Ogallala and the underlying Cretaceous, Jurassic, and Triassic formations in many areas and between the overlying Quaternary Blackwater Draw Formation where present. Although many communities use the Ogallala aquifer as their sole source of drinking water, approximately 95 percent of the water is used for irrigation.

The Ogallala is composed primarily of sand, gravel, clay, and silt deposited during the Tertiary Period. Ground water, under water-table conditions, moves slowly through the Ogallala Formation in a southeastward direction toward the caprock edge or eastern escarpment of the High Plains. Saturated thickness of the aquifer is generally greater in the northern part of the region and thinner in the southern part where the formation overlaps Cretaceous rocks. The saturated thickness, greatest where sediments have filled previously eroded drainage channels, ranges up to approximately 600 feet. Coarse-grained sediments in these channels also have the greatest permeability and supply water to wells with yields of up to 2,000 gal/min. Average yield of Ogallala wells is approximately 500 gal/min.

The chemical quality of the water in the aquifer is generally fresh; however, both dissolved-solids and chloride concentrations increase from north to south. In the Northern High Plains, dissolved solids are usually less than 400 mg/l. Dissolved-solids concentrations typically exceed 400 mg/l in the Southern High Plains, where extensive areas with concentrations exceeding 1,000 mg/l are common, especially in the vicinity of alkali lakes. The chemical quality in the south is probably influenced by upward leakage and subsequent mixing of water from the underlying Cretaceous aquifers. Fluoride content is commonly high, and selenium concentrations locally are in excess of drinking water standards.

Recharge to the Ogallala occurs principally by infiltration of precipitation on the surface and, to a lesser extent, by upward leakage from underlying formations. Only about one inch of the precipitation actually reaches the water table annually because rainfall is minimal, the evaporation rate is high, and the infiltration rate is slow. The highest recharge infiltration rates occur in areas overlain by sandy soils and in playa-lake basins.

Since the expansion of irrigated agriculture in the mid-1940s, greater amounts of water have been pumped from the aquifer than have been recharged. As a result, some areas have experienced water-level declines in excess of 100 feet from predevelopment to 1990. Reduced pumpage in some areas of the High Plains has resulted in a reduction in the rate of water-level decline.

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