Notes on the Texas Panhandle

High Plains, Llano Estacado, Staked Plains

A broad, flat, treeless, upland plain - essentially a huge mesa

Elevation

N-S transects, east escarpment

790 to 970 m (2600 to 3200 ft) S of the Canadian River, decreasing to the south

850 to 910 m (2800 to 3000 ft) N of the Canadian River, decreasing to the north

N-S transects, west escarpment

910 to 1450 m (3000 to 4800 ft) S of the Canadian River, decreasing to the south

1270 to 1520 m (4200 to 5000) feet N of the Canadian River, increasing to the north

E-W transects

North escarpment, 1520 to 850 m (5000 to 2800 ft), decreasing to the east

N rim, Canadian River, 1360 to 910 m (4500 to 3000 ft), decreasing to the east

S rim, Canadian River, 1450 to 970 m (4800 to 3200 ft), decreasing to the east

South escarpment, 910 to 790 m (3000 to 2600 ft), decreasing to the east

More than 50,000 km^2 (20,000 mi^2) in the Texas and Oklahoma Panhandles, eastern New Mexico, and southeastern Colorado

Cut off on the west and south by the Pecos River valley

Drained on the east by the headwaters of the Red, Colorado, and Brazos Rivers

Dissected in the middle (west to east) by the Canadian River

General slope is about 1 foot per mile to the southeast

Most drainageways obtained maximum depth and width near the end of the Pleistocene (last ice age). Some filling, but little incision, has occurred since then. Since the landscape is young, there are few streams or rivers, and most water runs into local depression, basins called "playas", which range in size from less than 0.5 ha to more than 1000 ha. There are 15,000 to 20,000 playas in the High Plains. Playas are smaller and more frequent in the southern High Plains, and larger and less frequent in the north.

The climate is characterized by extremes.

The annual rainfall ranges from about 350 mm (14") in the west to about 500 mm (20") in the east, increasing about 25 mm (1") for each 40 km (25 mi), with dry winters and summer rainfall (50% of annual precipitation occurs in May-August, 13% from November-February).

The maximum historical rainfall is about twice the mean, and the minimum is about half.

Most precipitation comes in thunderstorms, which can dump >50 mm (2") per hour. Some town or area in the region usually receives 25% of the mean in one storm each year.

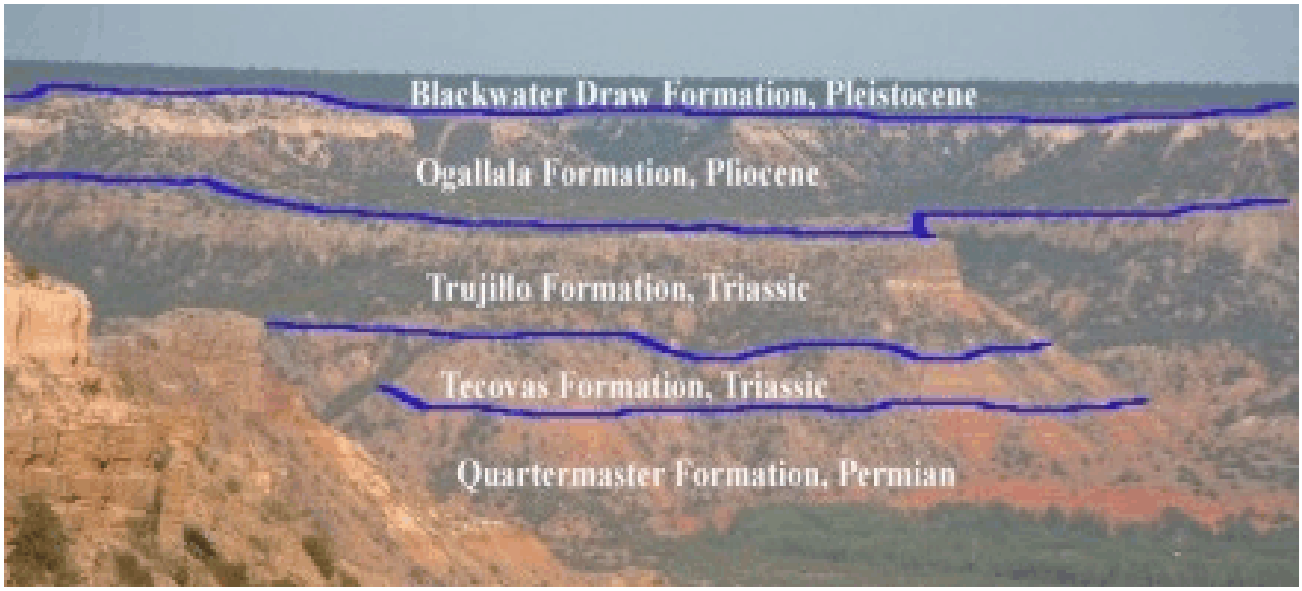
The temperatures are mild in the winter and hot in the summer. Diurnal swings exceeding 15 C (30°F) are not uncommon in the spring and fall. When a norther (continental polar cold front) comes in the winter, temperature changes exceeding 32 C (60°F) may occur within an hour.

The evapotranspiration rate is among the highest for any inhabited region in the world. Measured values of 18 mm (3/4") per day have been recorded in May. Daily winter ET averages 2.5 mm (0.1 in), while spring and fall ET usually exceed 5 mm (0.2 in) d^{-1}. The ET from about April 15 to September 15 exceeds 6 mm (0.25") d^{-1}, with the ET in June and July exceeding 7.5 mm (0.30") d^{-1}.

At least three factors contribute to the high evapotranspiration rate in the High Plains: clear, sunny days, low humidity, and constant winds. The average windspeed for the region is 7.5 to 8 m/s (17 to 18 mi/hr, 24/7/365). Chinook winds dominate the spring as hot, dry, downslope winds come from the southwest.

Palo Duro Canyon is the largest canyon system in Texas, and the second largest in the USA. The most famous landmark in Palo Duro Canyon is the Lighthouse Rock formation. The canyon marks the eastern extent of the High Plains and the beginning of the Rolling Plains. The High Plains Escarpment, or "Caprock", rims the High Plains on all sides, including the northern and southern exposures of the Canadian River Breaks. The escarpment is formed by Ogallala caliche at the top of the Ogallala formation.

Below the Ogallala sediments are sediments of the Dockum group (late Triassic), the Trujillo and Tecovas (about 60 m thick) Formations. These formations have a "caprock" of their own, the Trujillo sandstone, forming the mid-elevation mesas in the Canadian River Breaks, Palo Duro Canyon, and the Lighthouse Rock.



Texas Panhandle soils formed under grassland vegetation. Sandy soils accumulate less organic matter, are reddish, have less aggregation, and are typically Entisols, Inceptisols, or Alfisols. Fine-textured soils are generally Mollisols.

Generally deep soils, 1 to 2 m (3 to 6.5 ft) or deeper
- Except sands, generally test high in phosphorus and potassium
- Except sands, pH is usually between 6.5 and 8.3
- Free carbonates are usually present in the soil profile
- Depth to carbonates increases with rainfall (west to east across Panhandle)
- A calcic horizon is often present, > 15% pedogenic calcium carbonates
- An argillic horizon is often present
- Often 1 to 2% organic carbon in native soils
- Organic carbon in cropped soils is about half of the original amount
- Soils are generally fertile
- Water is the most limiting factor to crop production
- Root zone plant available water (PAW) ranges from 160 to 250 mm (1.25 to 2 in/ft)
  - This leads to the dryland practice of fallow to store water for use in growing a crop.

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