

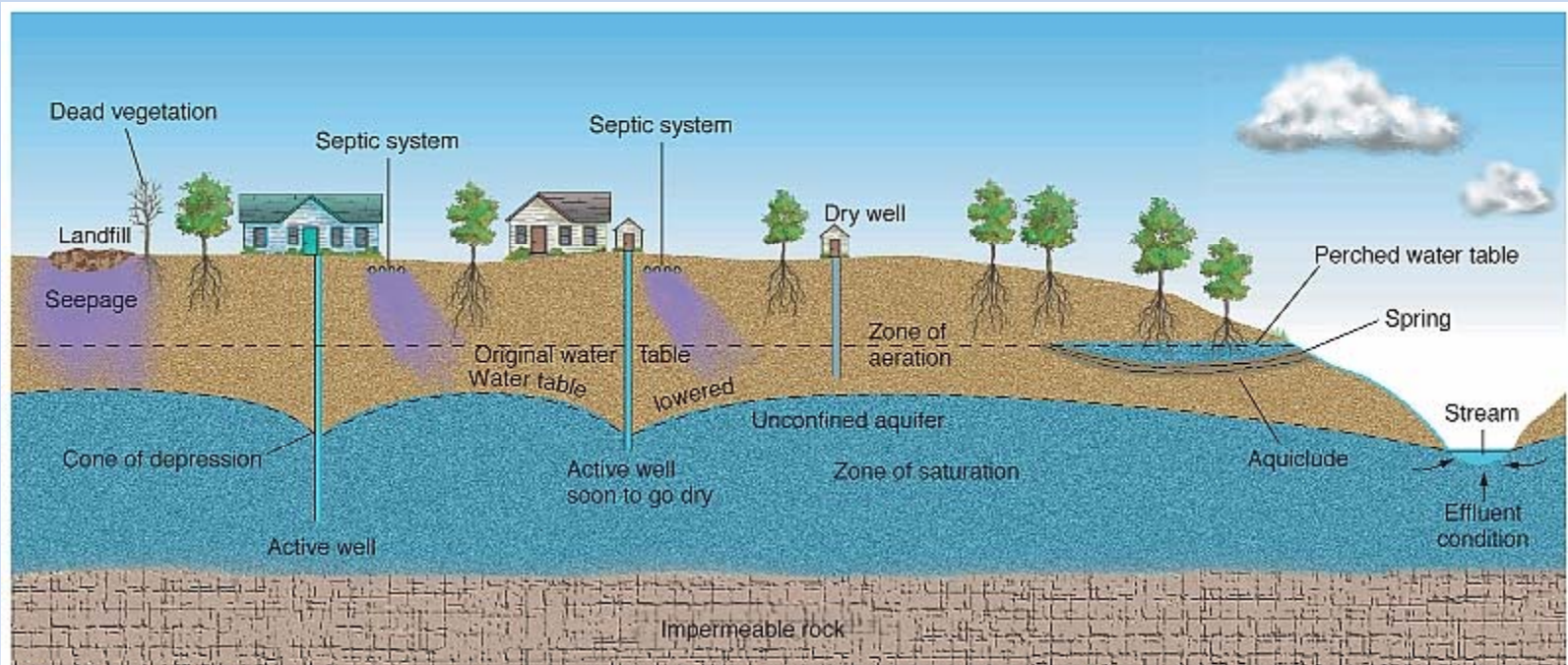
# An Aquifer is a Pool of Groundwater Large Enough to be an Economic Resource

There are 3 major types

1. Unconfined is most common.
2. Confined is less common but can be very important.
3. Karst is a special type that occurs in limestone rocks when a system of caves is connected and has water flowing through it.

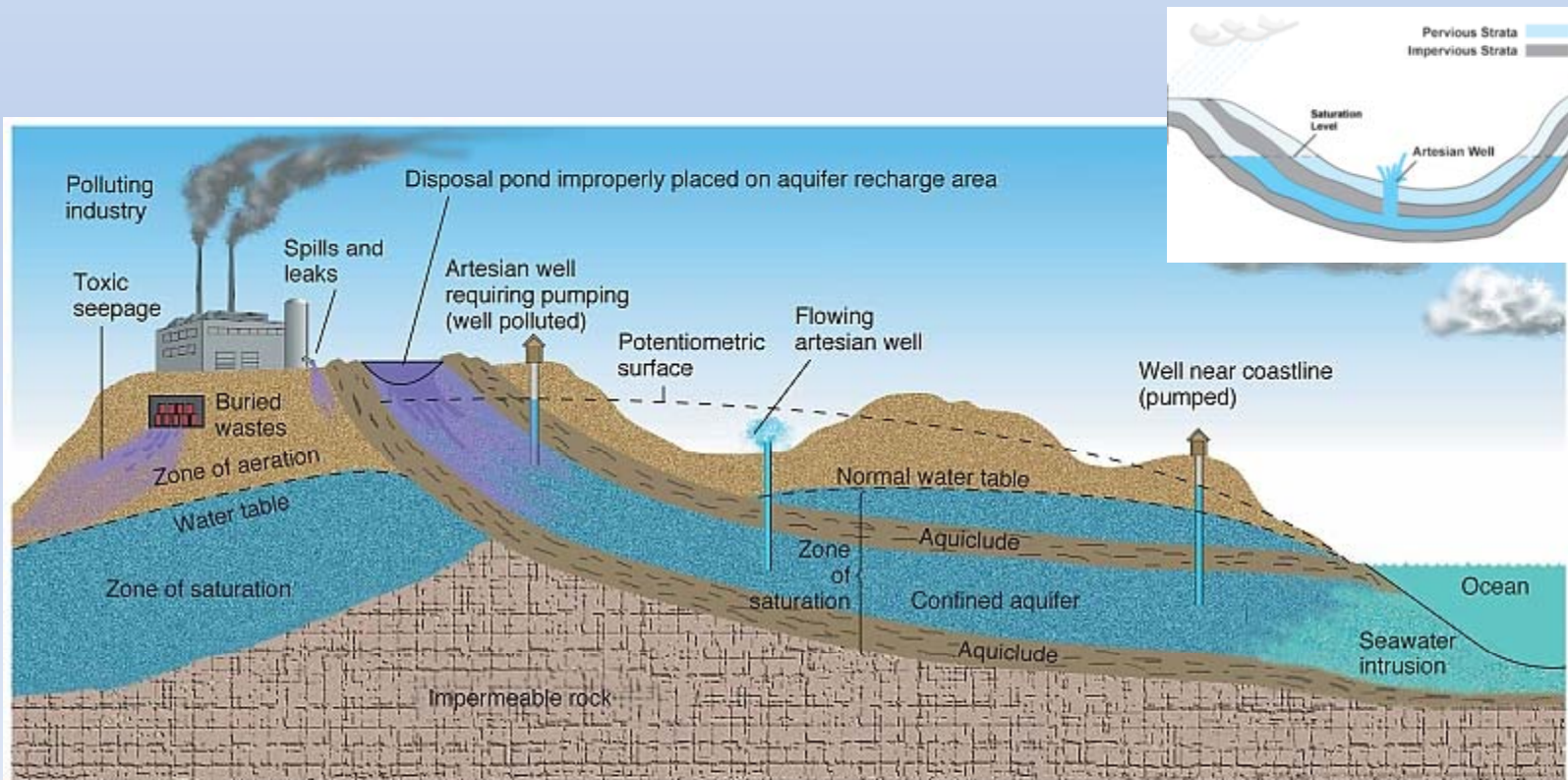
# Unconfined Aquifer

Water Seeps through Porous Materials near Surface,  
But Is Trapped by Impermeable Rock Below.  
Water Must Be Pumped to the Surface.



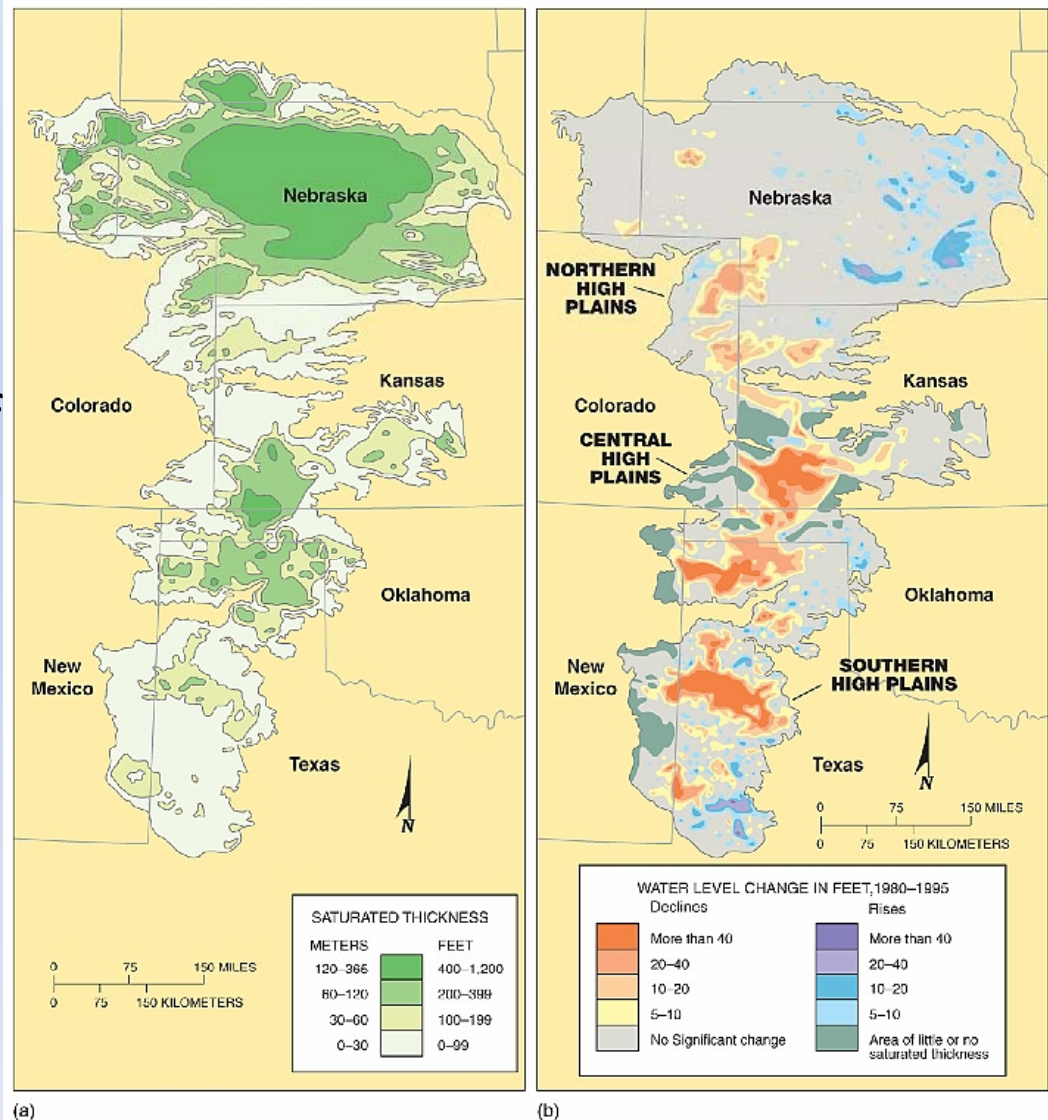
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Confined Aquifer Has Impermeable Rock Above and Below. Rock Strata Must Bend and Outcrop at Surface for Rain to Recharge Porous Material In Between. If Water Level is Higher than Well Head, It Is a Pressurized or Artesian System.



# The High Plains Aquifer is One of the Largest Fresh Water Aquifers in the World

It is the most important water resource in parts of 8 states and is the basis for the agricultural economy of the Texas Panhandle. It is being used at a rate that can not be sustained.



# Most of the Water Is Used to Irrigate Cropland with Center Pivot Systems



Center Pivot Irrigation Systems Rotate Around a Central Well Head and Spray Water Onto Crops.  
Losses to Evaporation are Huge



# The Ogallala Aquifer

Area of 174,000 square miles.

Irrigates 27% of U.S. irrigated land and 30% of ground water used.

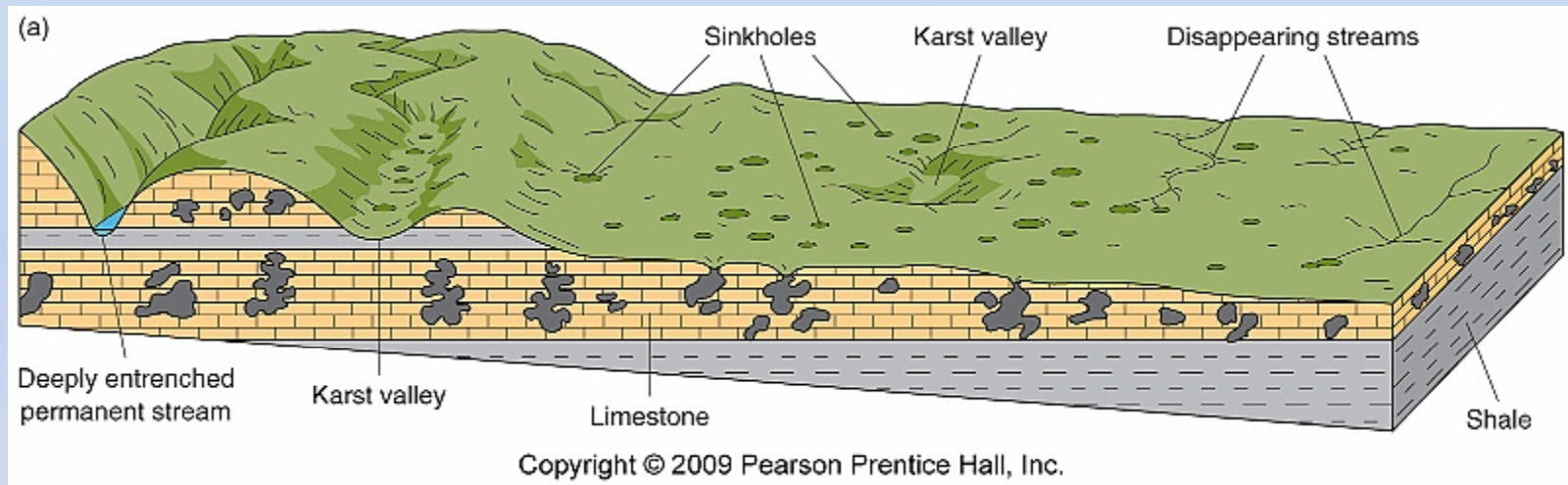
Depth to water is fairly shallow from 100 - 400 ft. deep.

Saturated thickness ranges from a few feet to more than 1000 ft.

Total storage is about 3,000 million acre feet. About 10 % has been pumped since the 1950s although wells are running dry in some places.

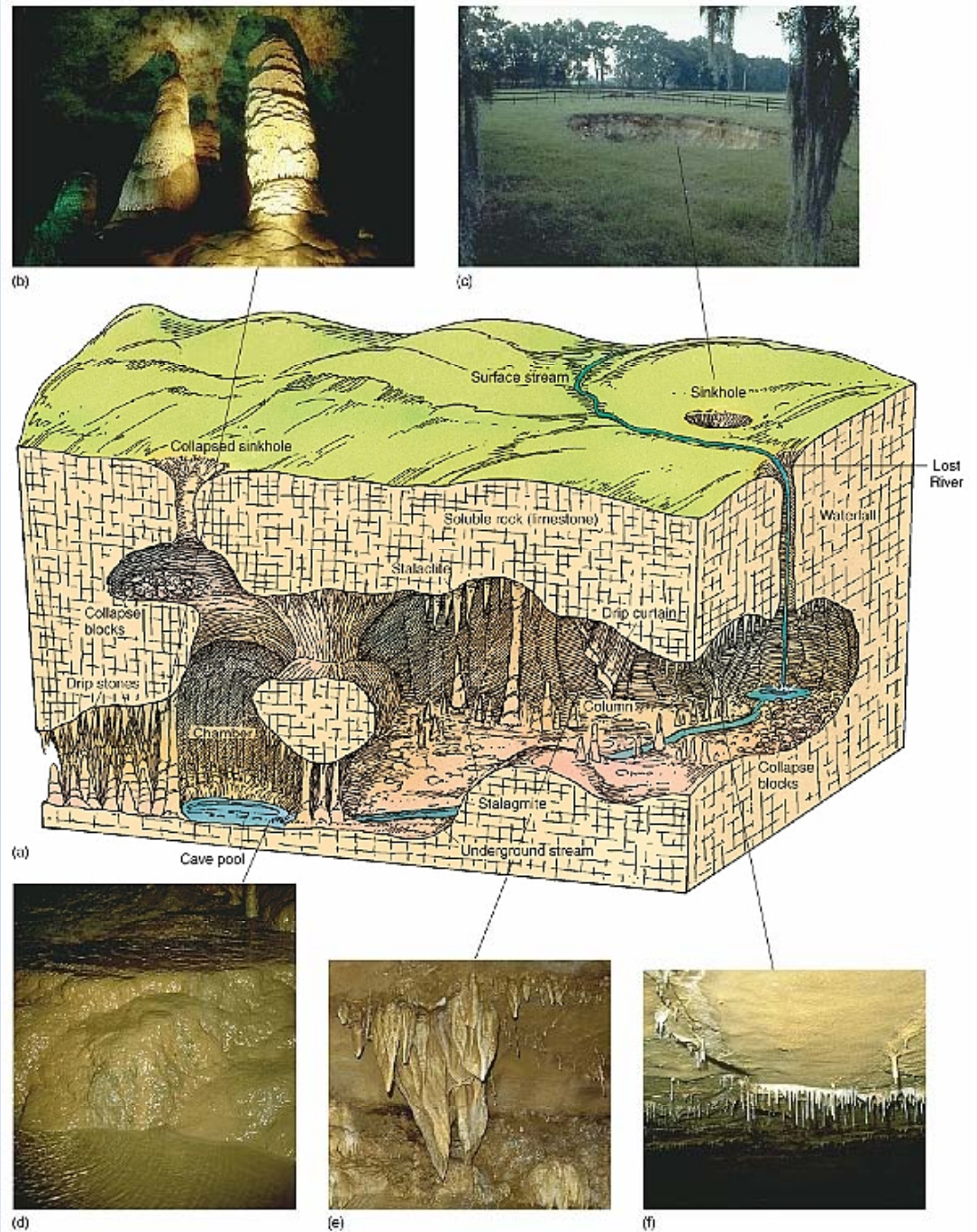
Estimated recharge is about  $\frac{1}{2}$  inch per year.

# Karst Topography Develops in Thick Limestone Formations, Usually in Humid Climates. Karst Has Both Surface and Subsurface Features

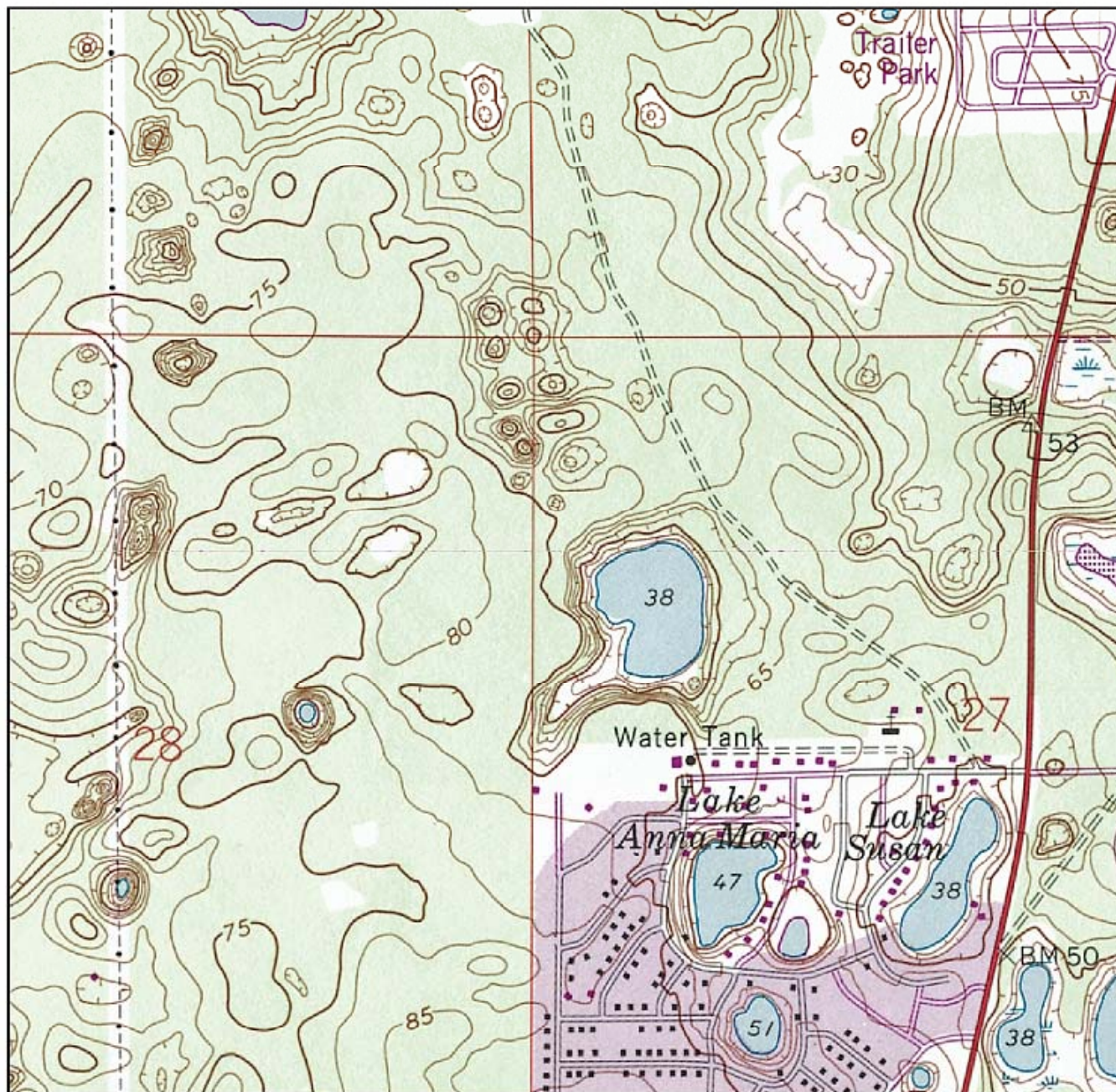




The classic surface landform feature of Karst is the sinkhole where the water goes underground. The classic subsurface feature is the cave also called a solution cavern. Rainwater is slightly acidic, dissolves limestone rock and carries the calcium carbonate away one molecule at a time.

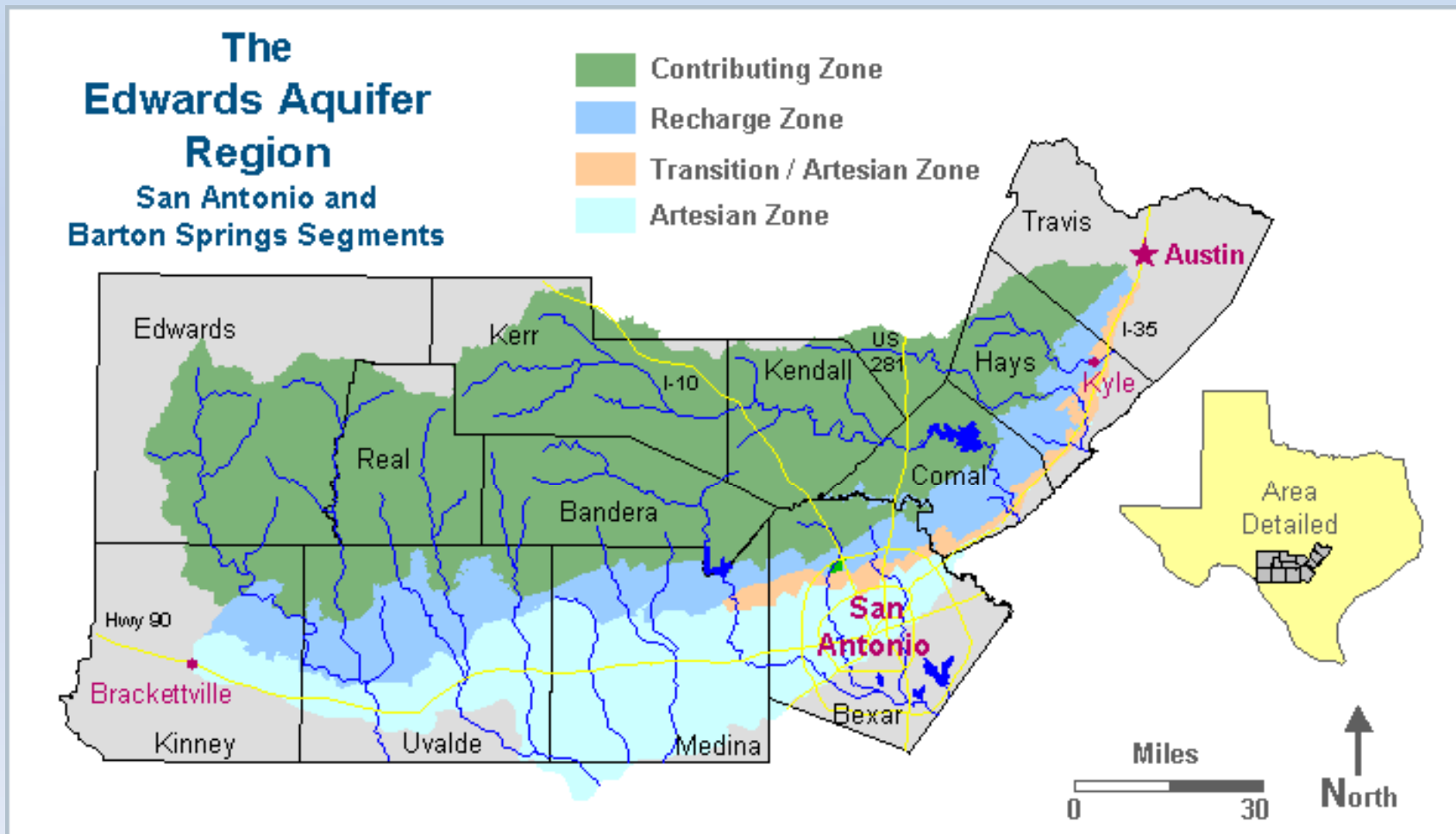


Topographic map showing Karst features, primarily sinkholes. Some are filled with water. There are no streams on the map.



(b)

The Edwards Aquifer is a Karst System that Developed in the Thick Limestone Deposits of the Hill Country.



Aquarina Springs in San Marcos Is One of the Largest in the U.S. Where One Million Gallons of Water a Day Come Out of the Ground.

