

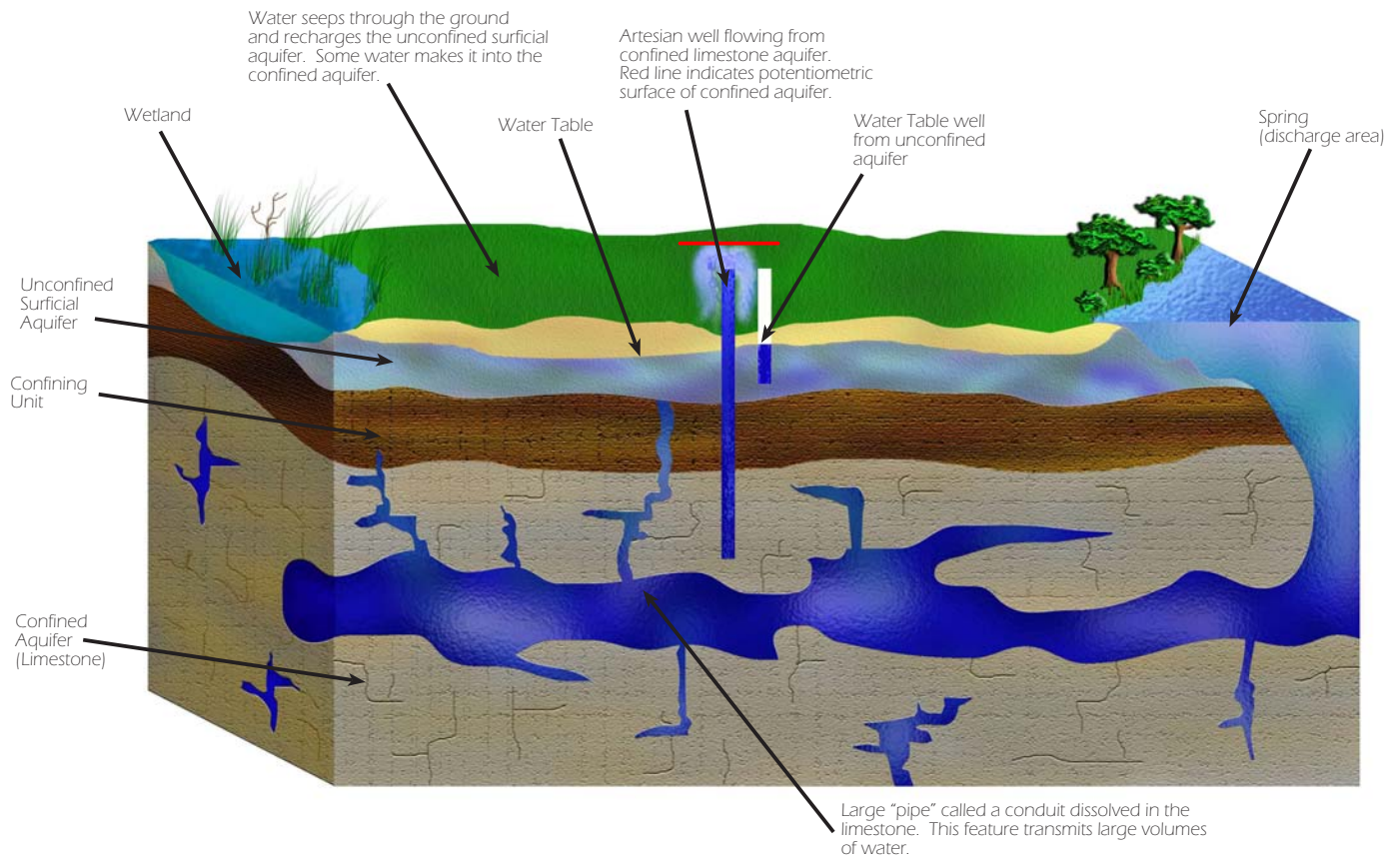
Aquifers

An **aquifer** is a rock or sediment unit that's pore space is saturated and is sufficiently permeable to transmit water to wells and springs in useful or economic quantities. The place where water enters an aquifer, through precipitation or stream input, for example, is called the **recharge area**. Springs or gaining streams, where groundwater comes out of the aquifer, are termed **discharge areas**. Depending on the season, conditions or rainfall, a wetland can either be a source of recharge, or a discharge zone.

A **confining unit** is essentially the opposite of an aquifer. It is a rock or sediment unit with permeability so low that water hardly moves through the unit. In Florida, confining units are often rich in clays. They are called confining units because they may be above of below an aquifer and restrict water flow through the aquifer.

These rock units set up various types of groundwater environments. The simplest is called an **unconfined aquifer**. There is direct interaction between surface water and the saturated zone of the aquifer. The top of the saturated zone in an unconfined aquifer is called the water table.

The other major type of aquifer, a **confined aquifer**, occurs when an aquifer is bounded by a confining unit. If the confining unit lies above the aquifer it can prevent water from recharging the aquifer. If conditions and location of the confining units are correct, the water in the confined aquifer may become pressurized.



This diagram shows an idealized cross-section of Florida's geology. Notice all the ways that surfacewater interacts with the groundwater. It is important to protect all water resources because what you do to one resource will affect another.

The **potentiometric surface** is the level to which groundwater would rise in a narrow well called a **piezometer**. The potentiometric surface is called the **water table** in unconfined aquifers. In the case of a confined aquifer, water may become pressurized and the potentiometric surface is actually above the upper surface of the aquifer. If a well were drilled in this aquifer, water would rise to the potentiometric surface, sometimes many feet above the land surface, and is called an **artesian well**. Each aquifer has its own potentiometric surface.

Hydraulic head is a measure of the total mechanical energy per unit weight of water at a given point in an aquifer and is measured using a piezometer. The difference between head at two points over a horizontal distance is called the **hydraulic gradient**. Groundwater flows from areas of relatively high head to areas of relatively low head; down gradient. Recharge areas generally have higher head while discharge areas have lower head.



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