Alternative Sources of Water in Georgia

by
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- This talk will focus on alternative ground water resources plus the Tennessee River and Desalination.
- Surface water reservoirs have been around for thousands of years.
- Siting studies of surface water reservoirs is beyond the scope of this talk.

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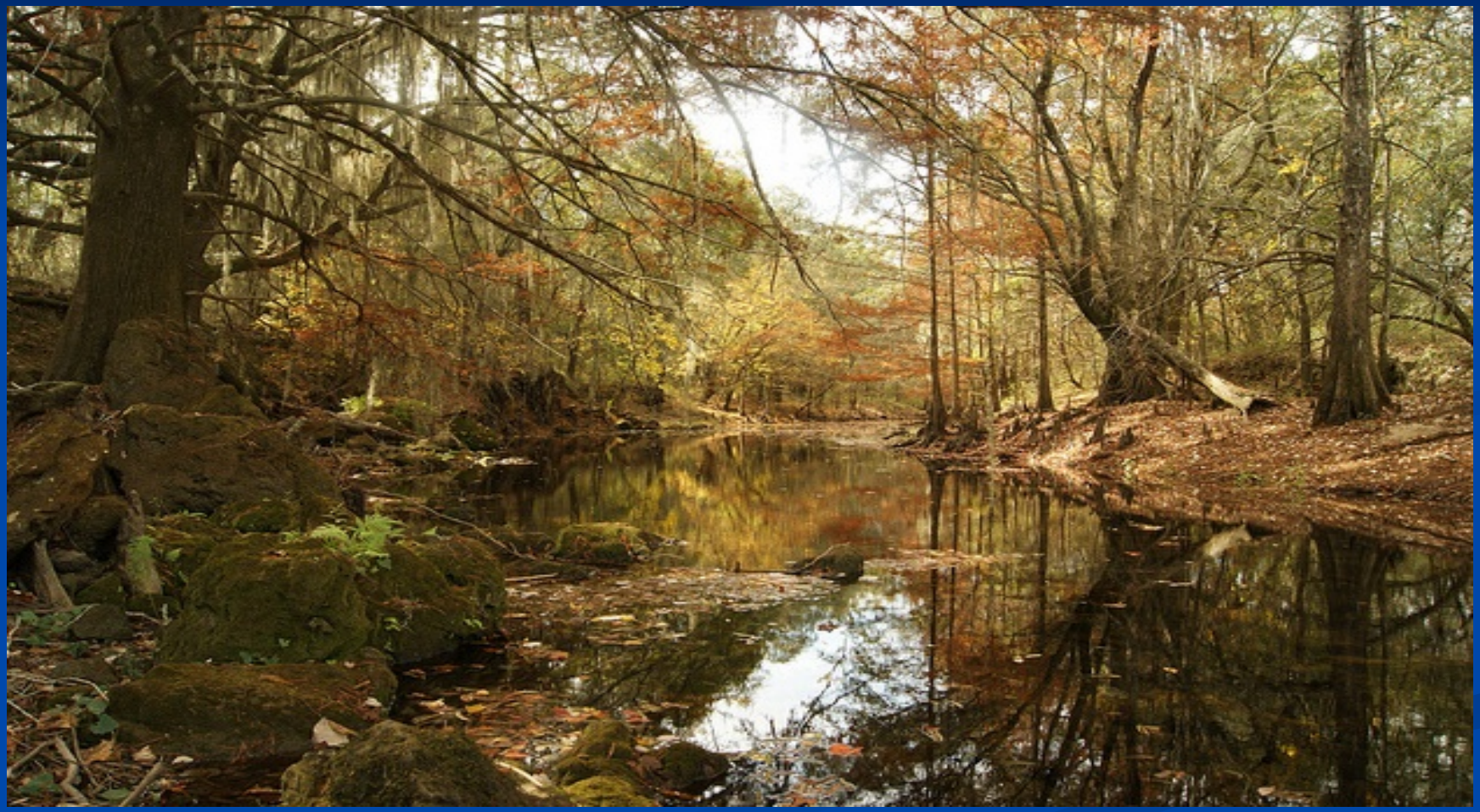

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Georgia pigtoe mussel

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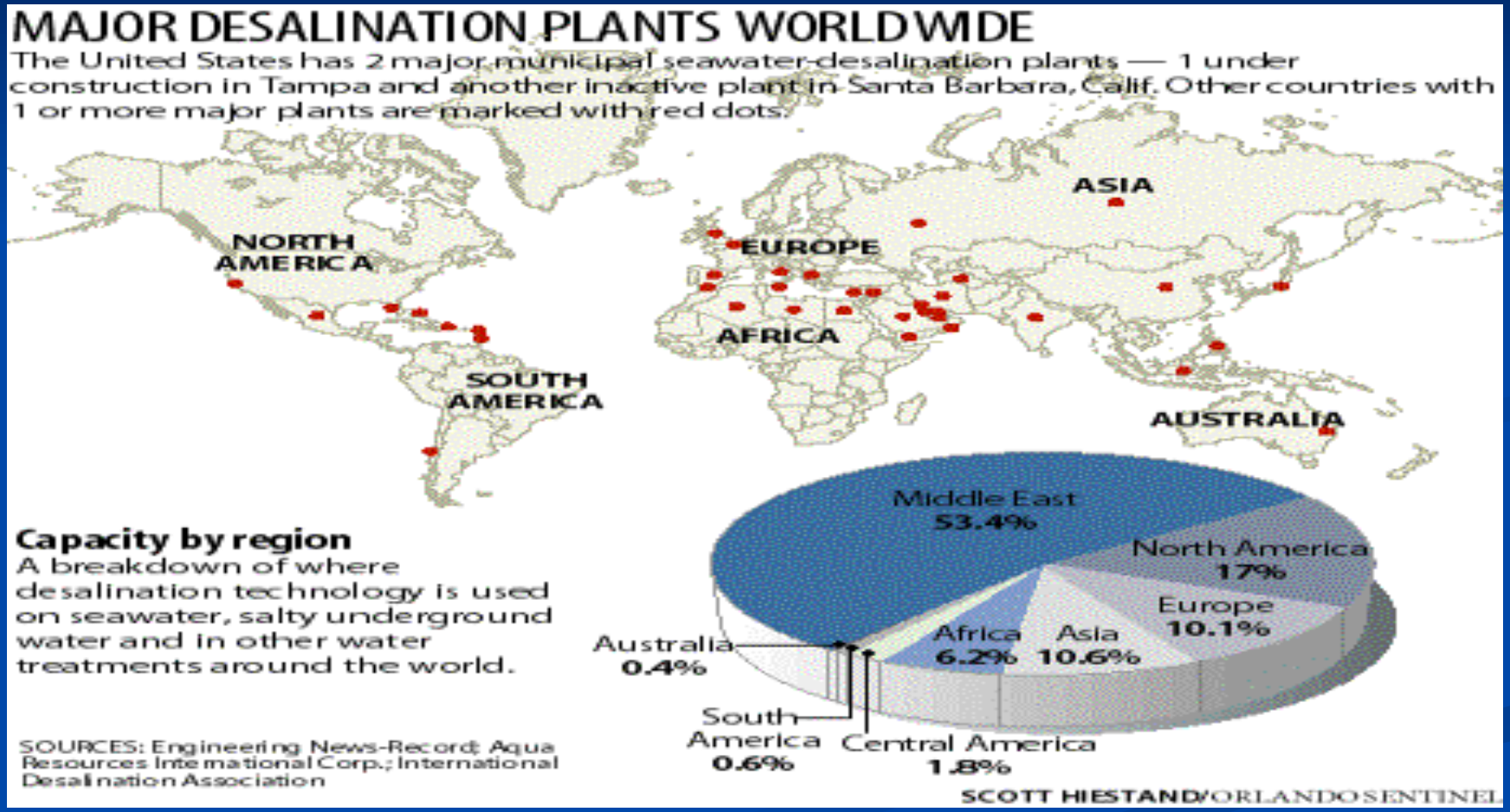

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How much water can Georgia's Water Supplies Be Increased?

In Fall of 2003, an estimate was made by the State of Georgia of how much existing ground-water water supplies could be increased.

This estimate assumed that only existing technologies would be considered; and that such technologies would be cost effective.

The estimate further assumed that EPD had adequate legal regulatory authority to permit these water sources and technologies.

Water savings resultant from conservation were considered.

How Much?

500,000,000-1,000,000,000 gallons/day

¾ from new sources and ¼ from conservation

General Hydrogeology

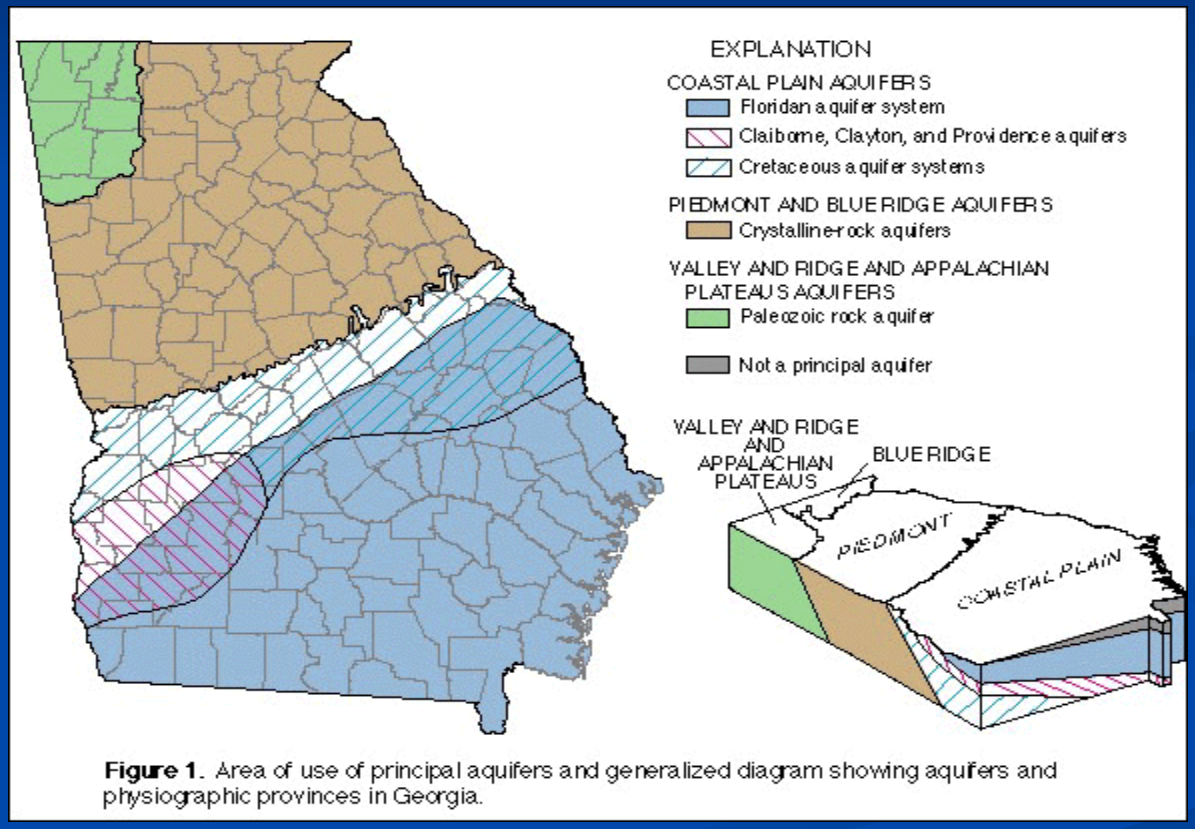


Figure 1. Area of use of principal aquifers and generalized diagram showing aquifers and physiographic provinces in Georgia.

Quarries:

While there are numerous quarries in the crystalline rocks in the Georgia Piedmont; most of the larger ones (capable of storing several billion gallons) are still being mined.

Ground-water inflow into crystalline rock quarries is limited; therefore quarry filling generally must involve pumping from a nearby surface river/stream.

Water stored in a crystalline rock quarry is subject to becoming stagnant.

Quarries (continued)

Quarries completed in carbonate terranes generally have considerable ground-water inflow and can be safely pumped in the 3-6 mgd range.

There are at least 5 such abandoned carbonate quarries in northwest Georgia. One of these has been tested in 5+ mgd range on a sustainable basis or 20 mgd on a short term basis for flow augmentation.

The primary environmental issue is sinkhole inducement; this however, can be mitigated my controlling water levels within the potentiometric cone.

Quarries (continued)

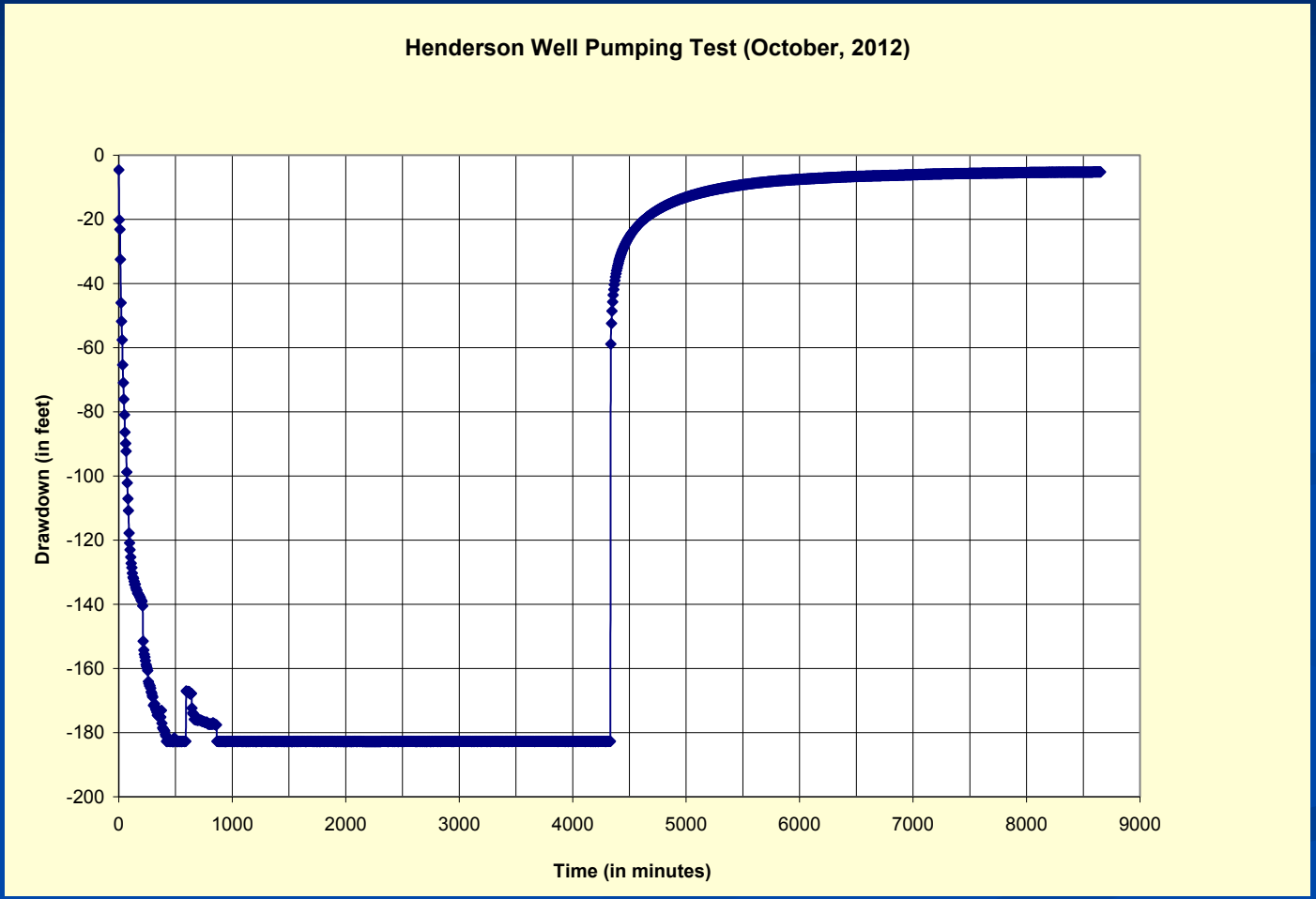
The Piedmont

Typical Piedmont wells yield about 20 gpm; however some large diameter wells can have much larger yields.

There is a well, completed in the Brevard Zone near Demorest, that yields on the order of 1200 gpm.

A 12-inch screened well at Flowery Branch was pump-tested at 588 gpm; recovery was approximately 99% within just a few hours.

The Piedmont



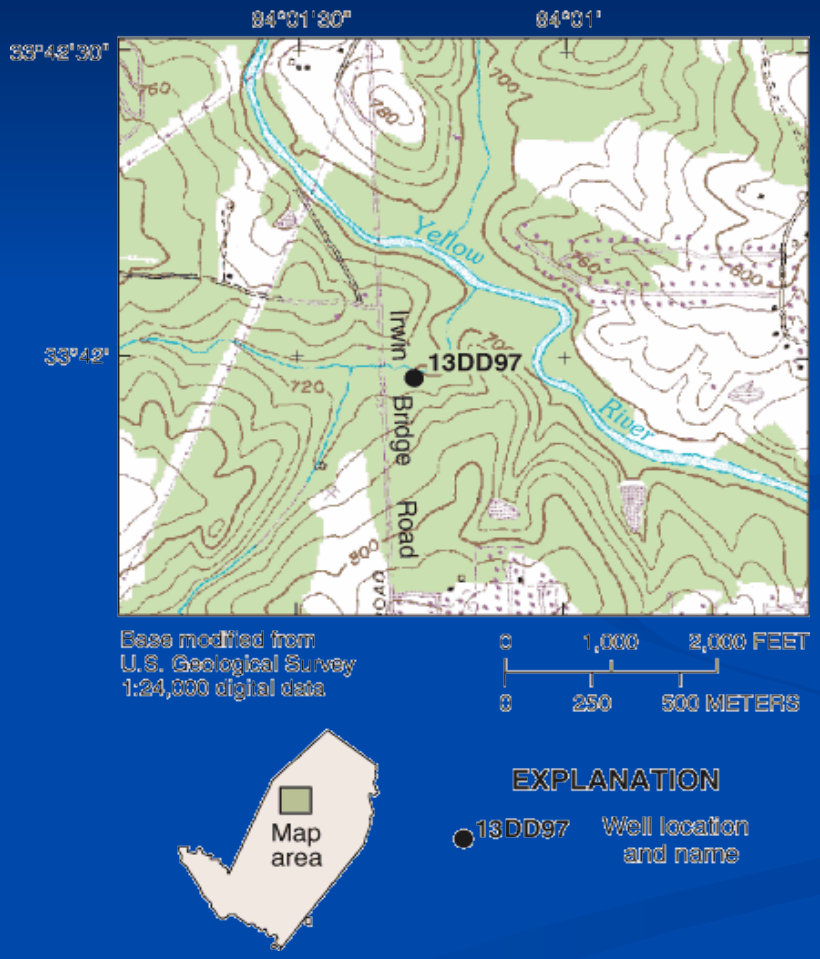
The Piedmont (continued)

There are areas within in the Piedmont where decomposed metamorphic rocks have weathered into sands. These include the quartzites and cataclasites.

Where such rocks occur, there is the potential for relatively high-yielding wells (i.e., 500-1000 gpm).

There are geologists working in Georgia who can consistently site wells yielding 100+ gpm.

The Piedmont (continued)



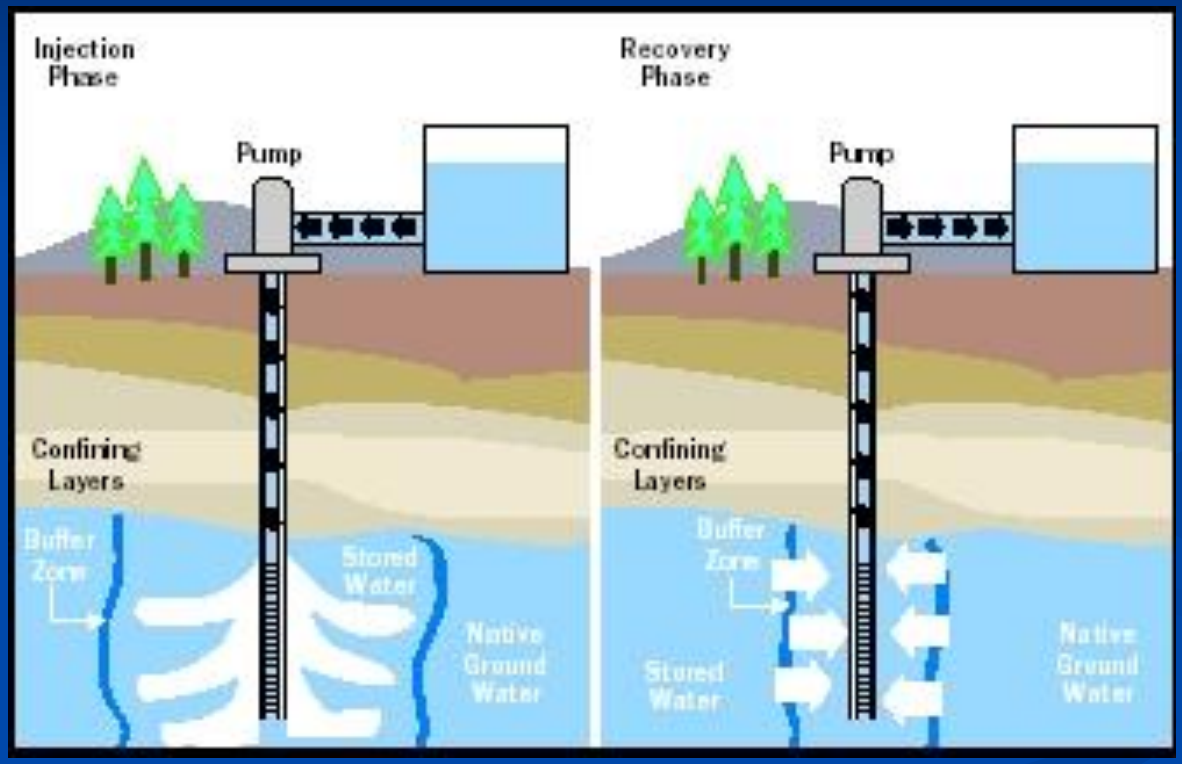
ASR/Flow Augmentation/Salt-Water Barriers

- Concepts are commonly used simultaneously in Georgia.
- Three separate concepts. ASR is a cost effective method of water storage. Flow Augmentation is a methodology to increase flow in a river of stream. Salt-Water Barriers are a method to stop or slow down salt-water intrusion.
- ASR always involves subsurface injection; flow augmentation may or may not involve subsurface injection; salt-water barrier wells typically involve subsurface injection.
- Each of these three concepts will be discussed separately.

ASR

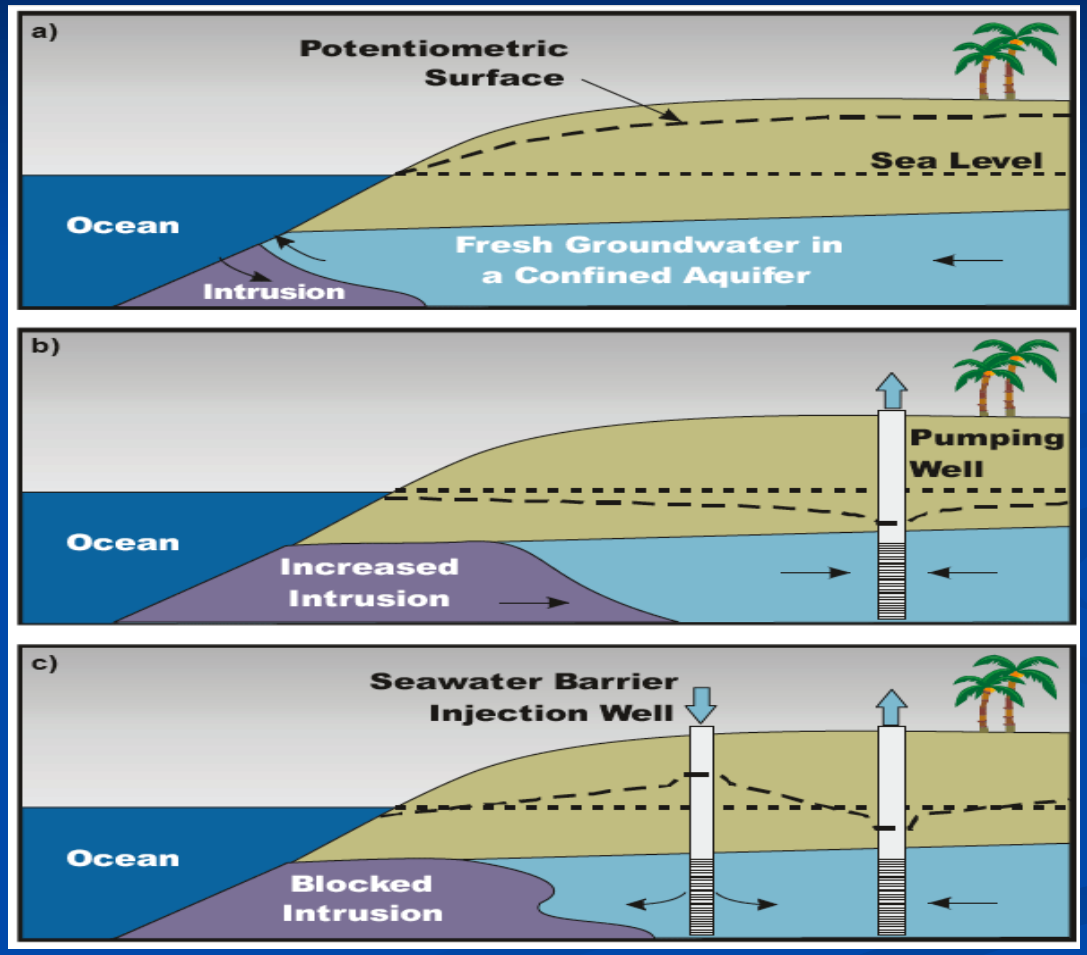
- ASR was suggested in 1996 as part of a water supply project on the Ogeechee River in coastal Georgia as part of a municipal water supply project. The proposing party never provided any specifics and the project died on the vine.
- The proposed project did create considerable controversy. This resulted in a state law prohibiting ASR in coastal Georgia.
- In 2009, ASR was recommended for an area northwest of Dalton. Five wells originally were to be drilled at geologically favorable sites. However, because of the downturn in the economy, only the area in the vicinity of the Dalton Utilities' water treatment plant (a geologically unfavorable site) was actually drilled. The drilling showed that the plant area itself was not suitable for ASR.

ASR


Injection Phase
Pump
Confining Layers
Buffer Zone
Stored Water
Native Ground Water
Recovery Phase
Pump
Confining Layers
Buffer Zone
Stored Water
Native Ground Water

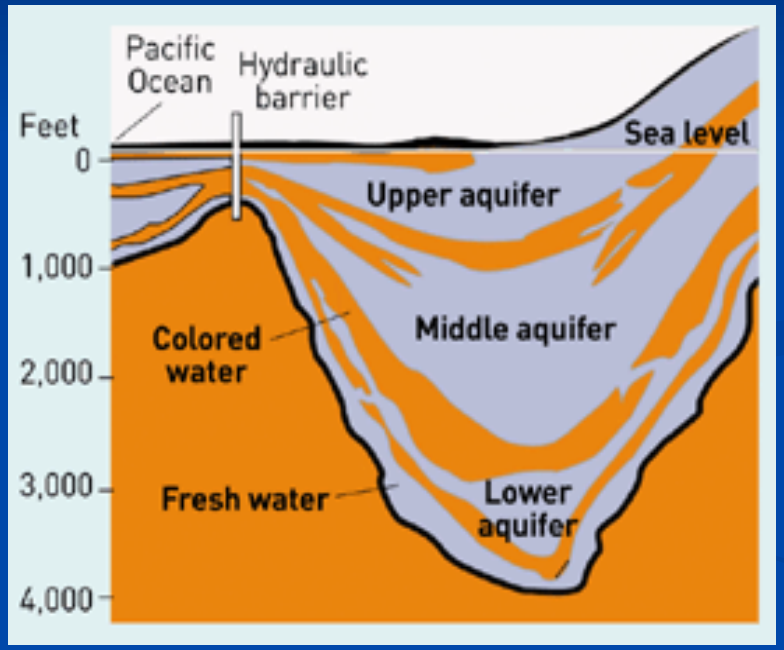
Flow Augmentation

Salt Water Intrusion Barriers



Salt Water Intrusion Barriers

Salt Water Intrusion Barriers



Under-Utilized Aquifers

- There are several aquifers in Georgia that for practical purposes are under-utilized. They have the potential for considerable increases in pumpage.
- These include: the Cretaceous Aquifer System; the Claiborne Aquifer south of Dougherty County; and the carbonate aquifers of northwest Georgia.

Under-Utilized Aquifers

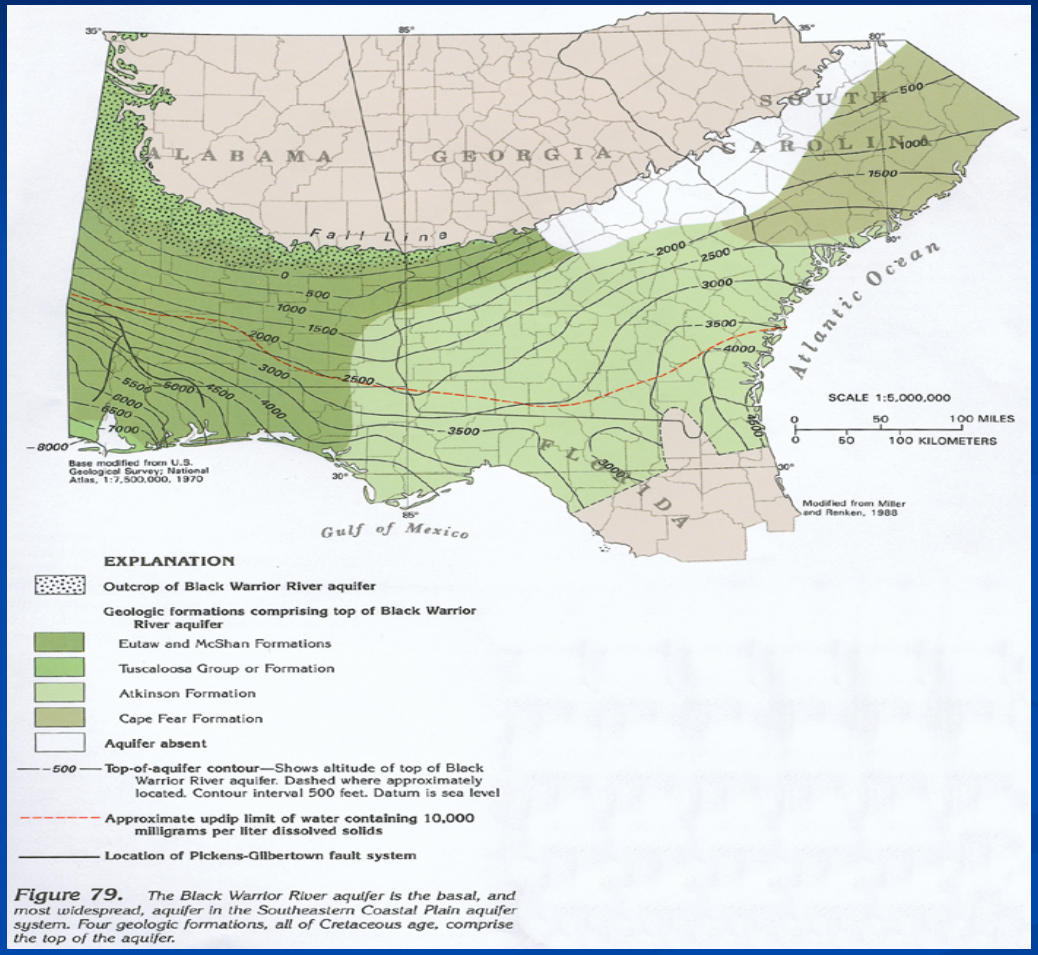


Figure 79. *The Black Warrior River aquifer is the basal, and most widespread, aquifer in the Southeastern Coastal Plain aquifer system. Four geologic formations, all of Cretaceous age, comprise the top of the aquifer.*

Under-Utilized Aquifers

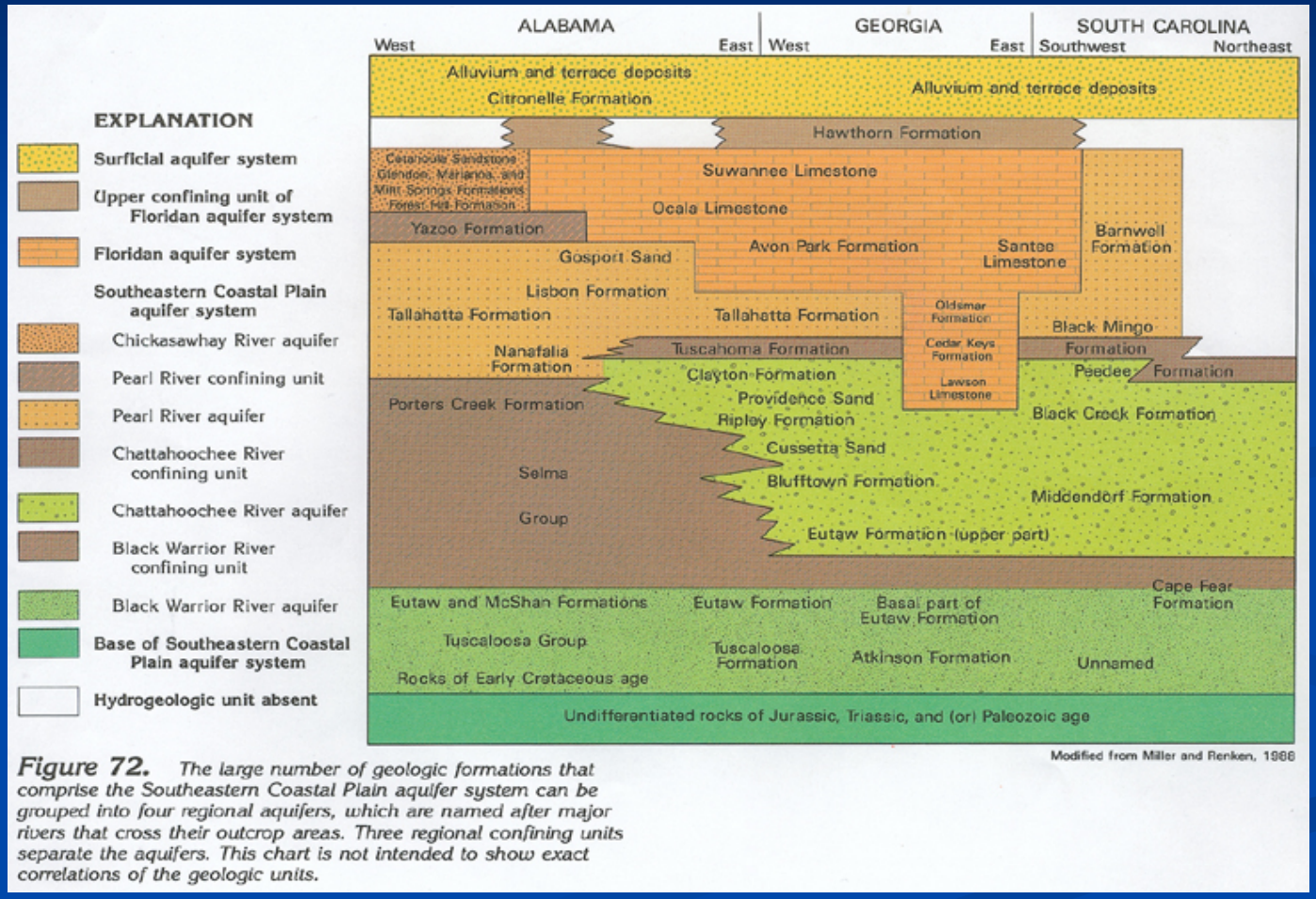


Figure 72. *The large number of geologic formations that comprise the Southeastern Coastal Plain aquifer system can be grouped into four regional aquifers, which are named after major rivers that cross their outcrop areas. Three regional confining units separate the aquifers. This chart is not intended to show exact correlations of the geologic units.*

Limitations

- New paradigms in thinking. (We don't live in a perfect world.)
- Pipeline costs
- Land acquisition costs
- Depth to salt-water

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Real world environmental issues are mostly resolvable.