

Introduction to Florida's Aquifers

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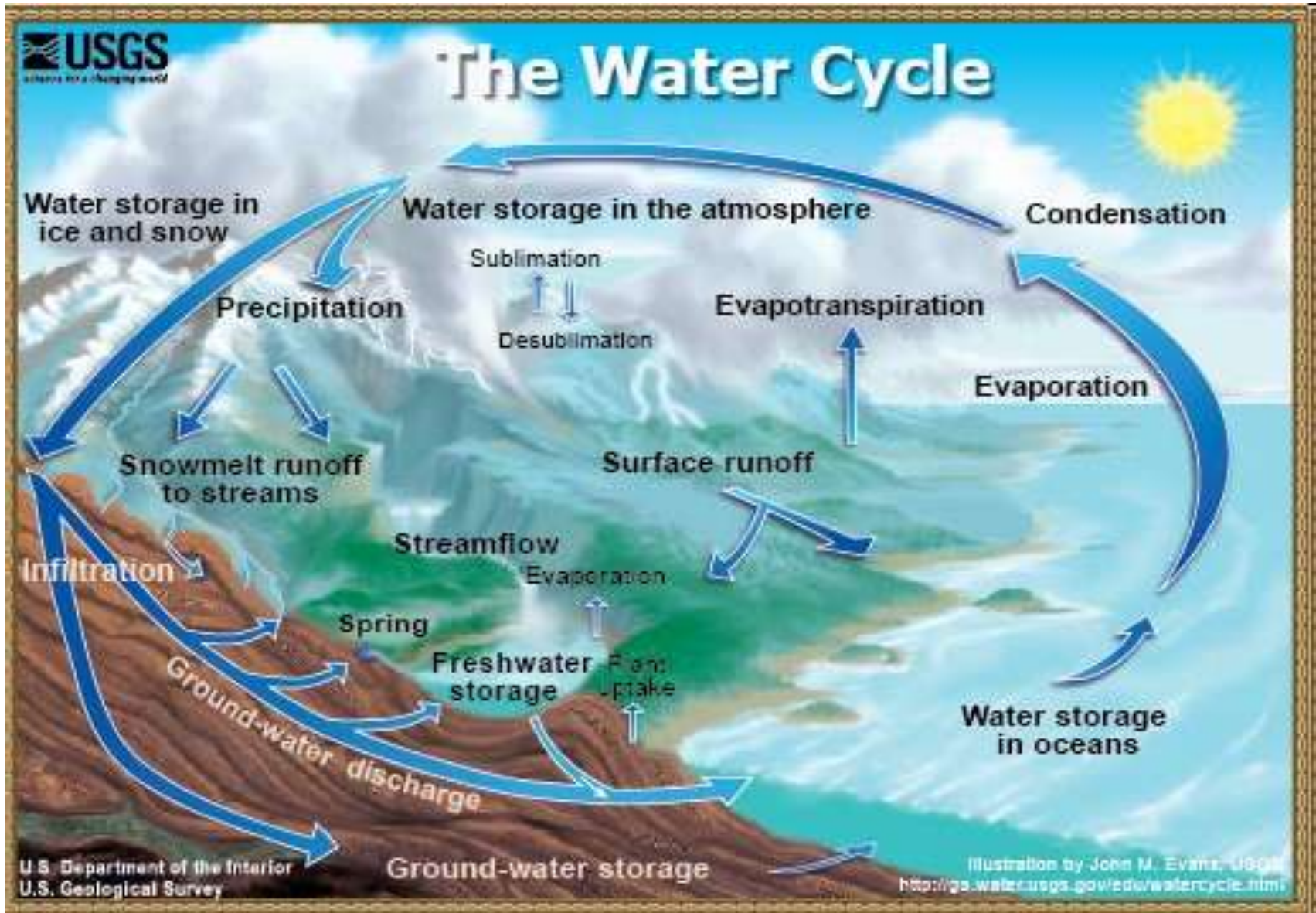
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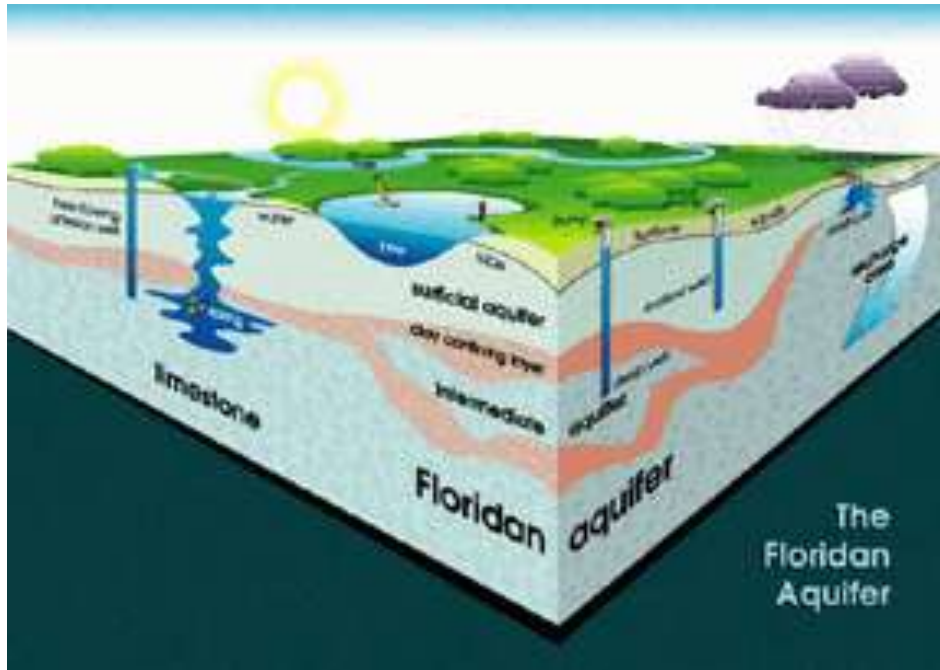
Talk Outline

- Basics on the Hydrologic Cycle
- Aquifers and ground water in Florida
- Impacts of ground water use
- Keystone Heights Lake Brooklyn
- Please stop!



Where we choose to remove water impacts other parts of the cycle!

The Floridan Aquifer is critical to meet our water demands.
90% of our water is from ground water (that may be changing)



Gainesville Precipitation
(about 50 inches/year)
How much do we use?



Floridan Aquifer: Thickness and depth increases as you travel South

Note, next figure cross section through the state

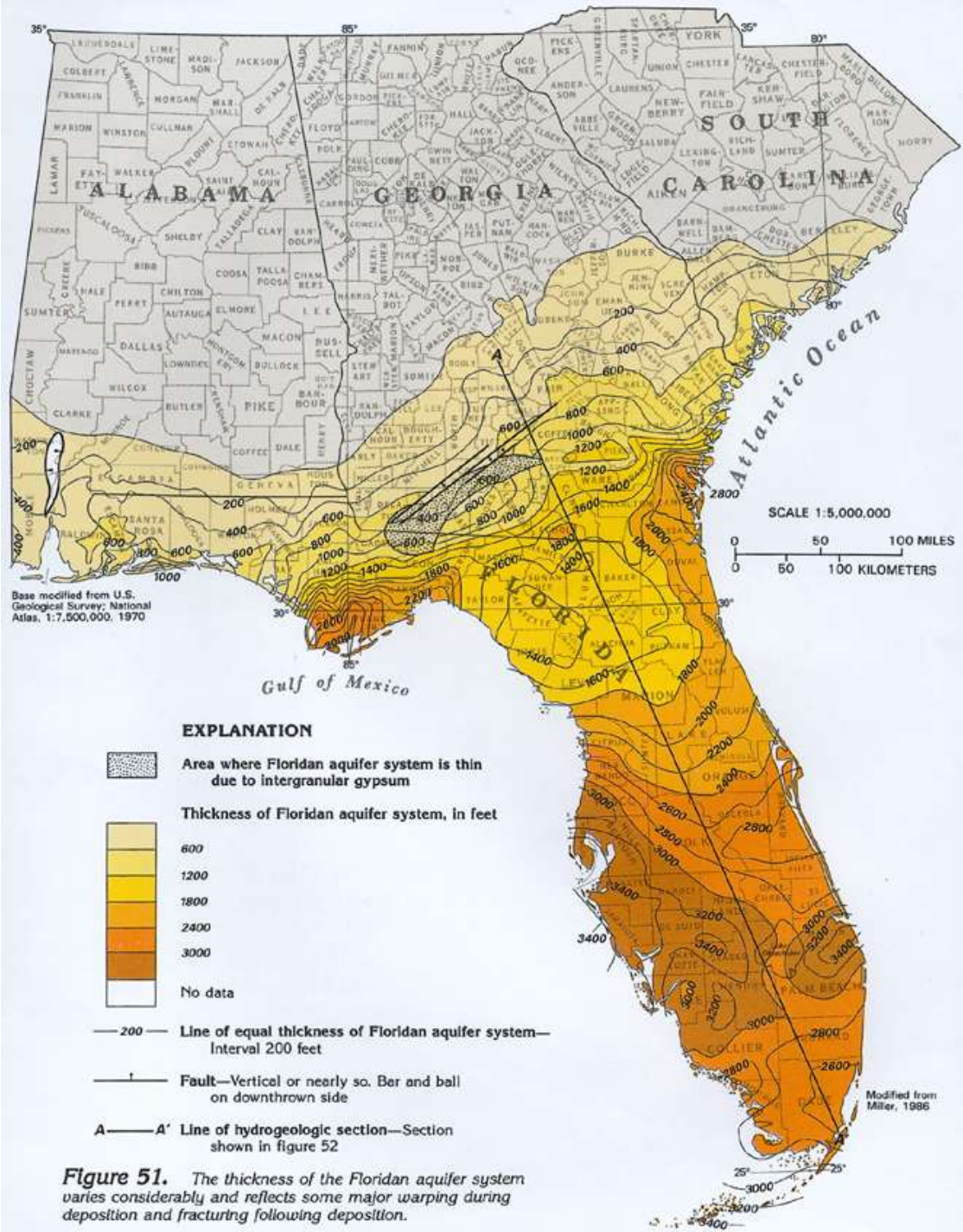
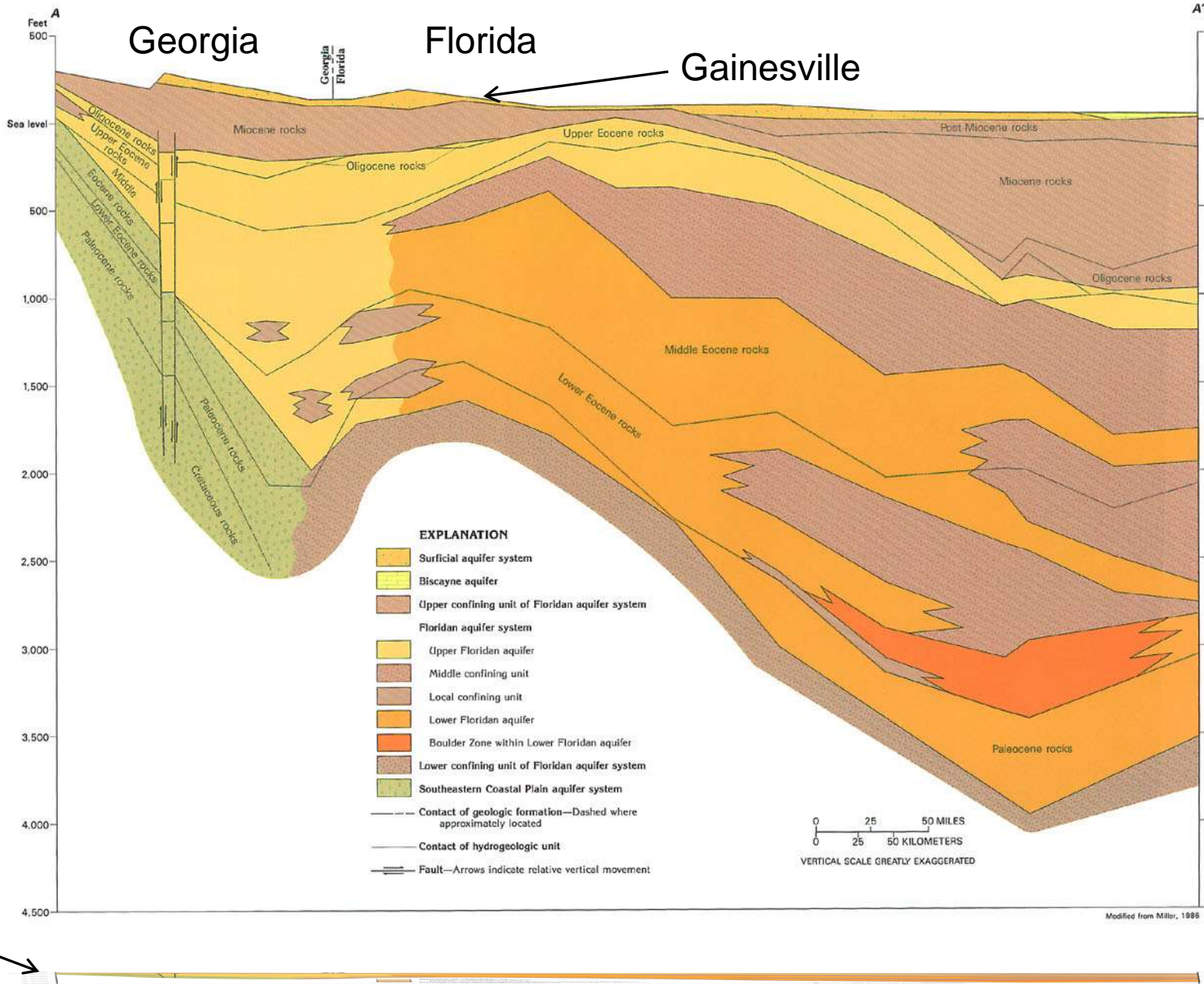


Figure 51. The thickness of the Floridan aquifer system varies considerably and reflects some major warping during deposition and fracturing following deposition.

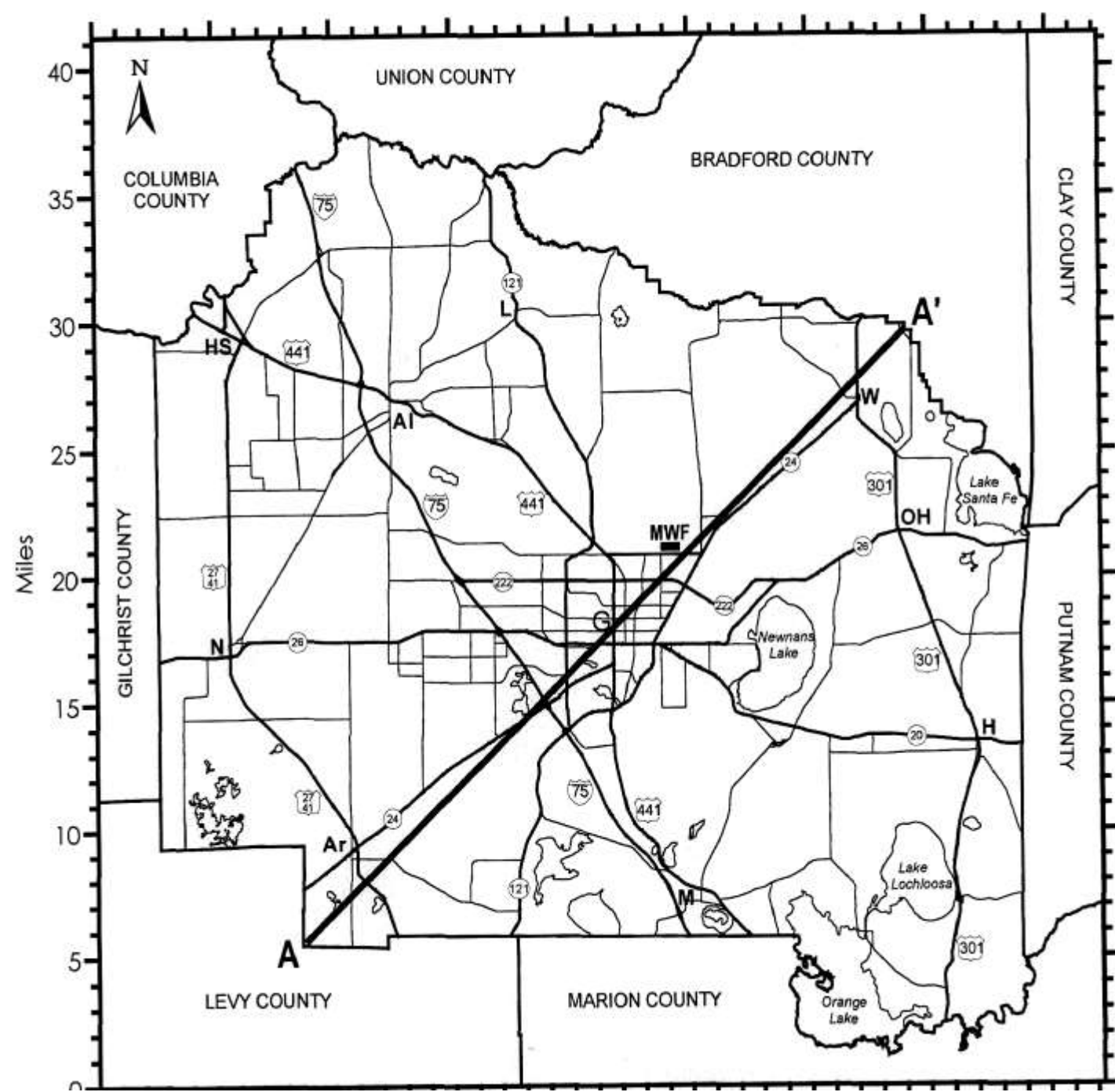
Cross section of the aquifer system under Florida

Figure 52. The Floridan aquifer system changes significantly from south-central Georgia to southern Florida. Aquifers and confining units in the system thicken and thin from well to well, and generally resemble complexly inter-fingering, lens-shaped bodies of rock. The line of the hydrogeologic section is shown in figure 51.



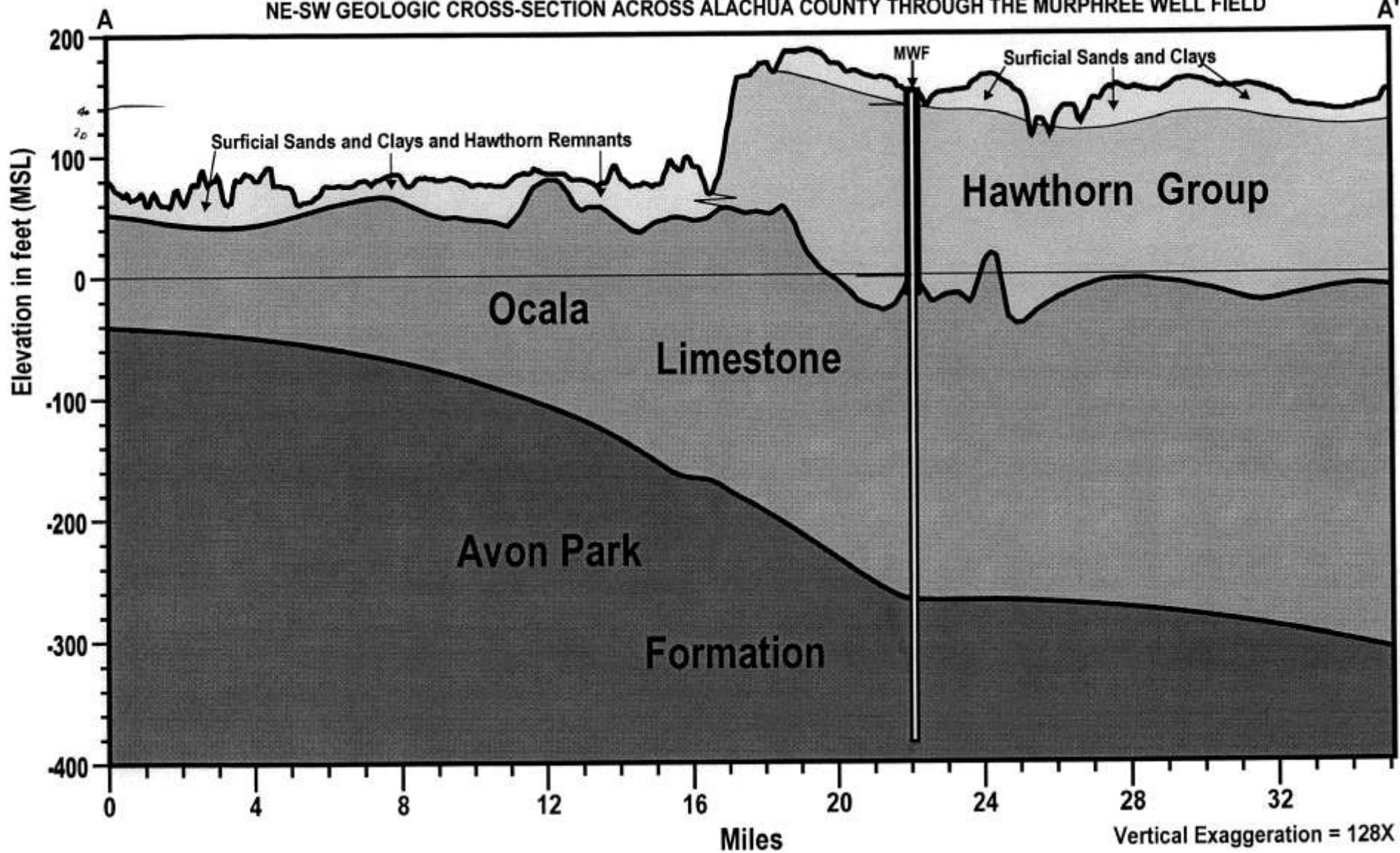
True cross section thickness



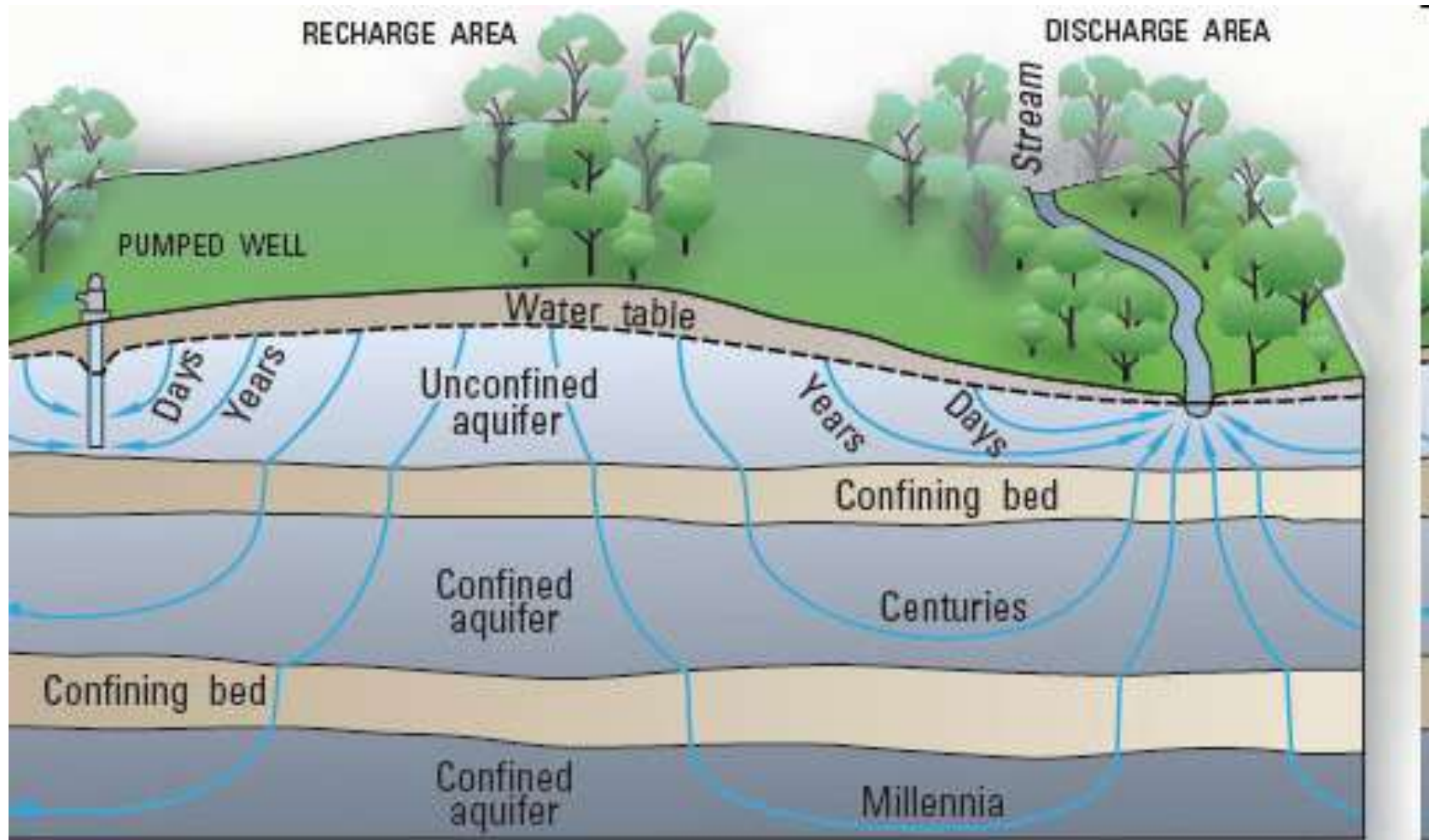


Alachua County

NE-SW GEOLOGIC CROSS-SECTION ACROSS ALACHUA COUNTY THROUGH THE MURPHREE WELL FIELD



Water movement on a local scale



Solution pipes and possible channels, Haile Quarry

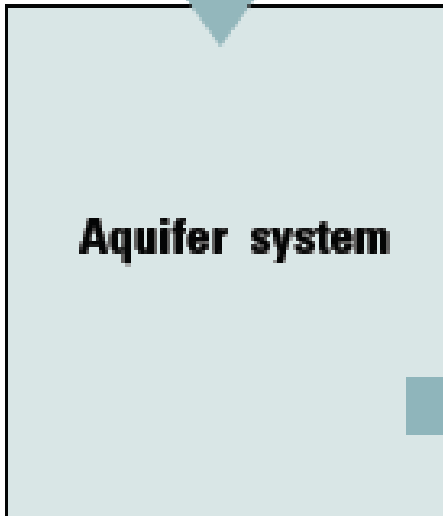


Vertical fractures, upper Ocala Fm, Haile Quarry

The Impact of Water Use

Predevelopment conditions

Natural and induced recharge
4,500 cfs



Discharge to surface-water bodies and evapotranspiration:
4,500 cfs

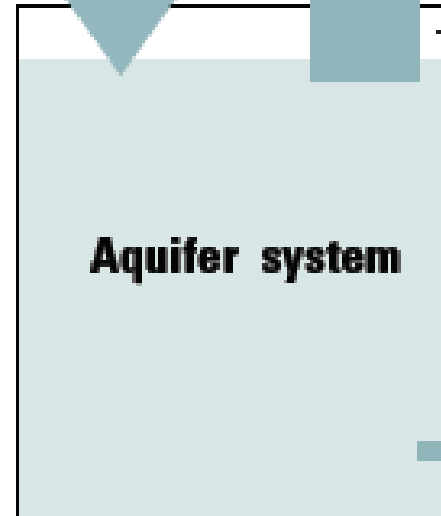


Development conditions (1985)

Natural and induced recharge
13,400 cfs



Pumpage
13,500 cfs



Rate of decrease in storage:
1,700 cfs

Discharge to surface-water bodies and evapotranspiration:
1,600 cfs



Impacts of Water Extraction on Surface Water

The Problem

Increased ground water use Florida can produce adverse impacts on surface water ecosystems (the Tampa Bay experience is a good example)



Will Jax guzzle our water?

Projection: City's growing consumption may impact Alachua County down road



Article in
Gainesville Sun

Erica Brough/Staff photographer

[Buy photo](#)

A dock sits well above the water line on Lake Geneva in Keystone Heights, Fla., Thursday, September 17, 2009.

Water Use Impacts on Florida Lakes? What about reduce precipitation?





State Rd 100

Keystone Heights

State Rd 100

100

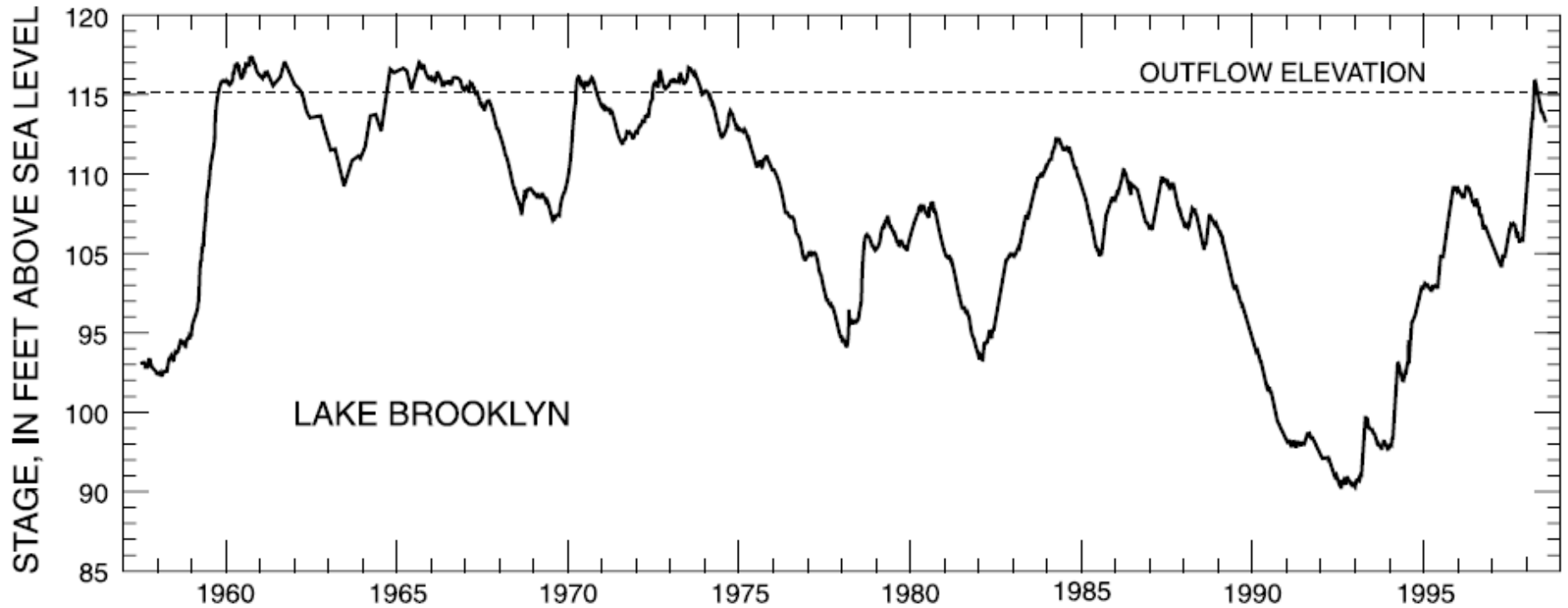
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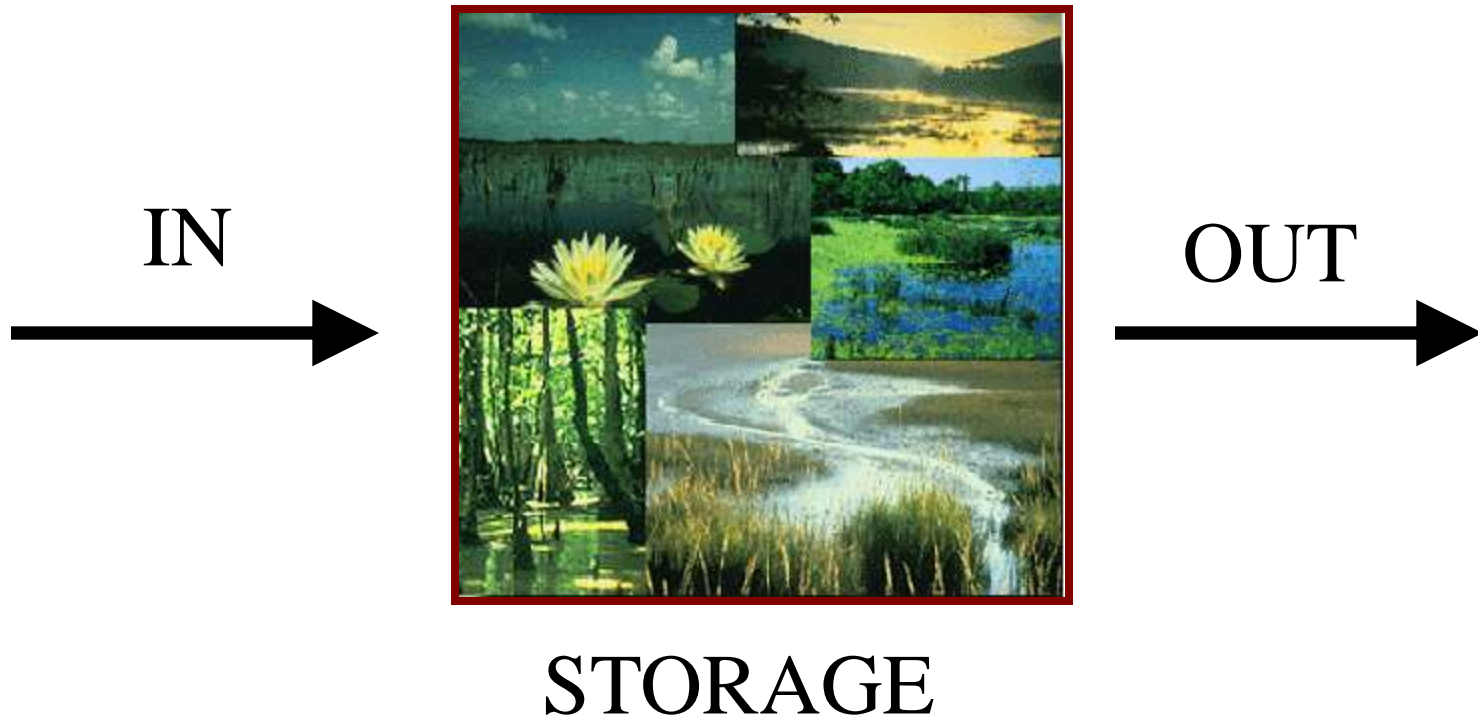
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Why do lake levels fluctuate?

INFLOW \neq OUTFLOW



Water Mass Balance



Components of the Water Budget

(change in storage = inflows – outflows)

Inflows:

Precipitation

Overland flow

Stream inflow

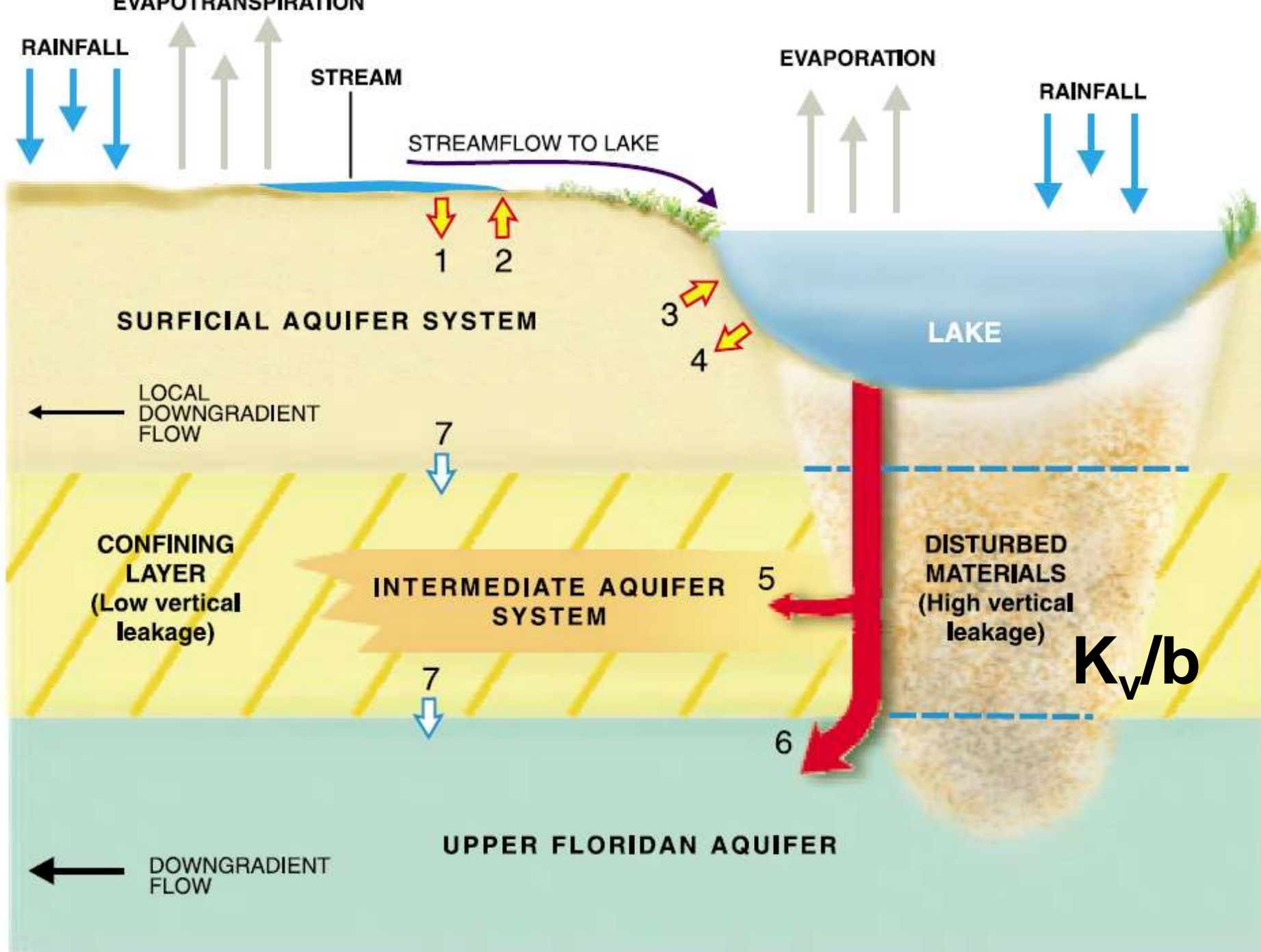
Groundwater inflow

Outflows:

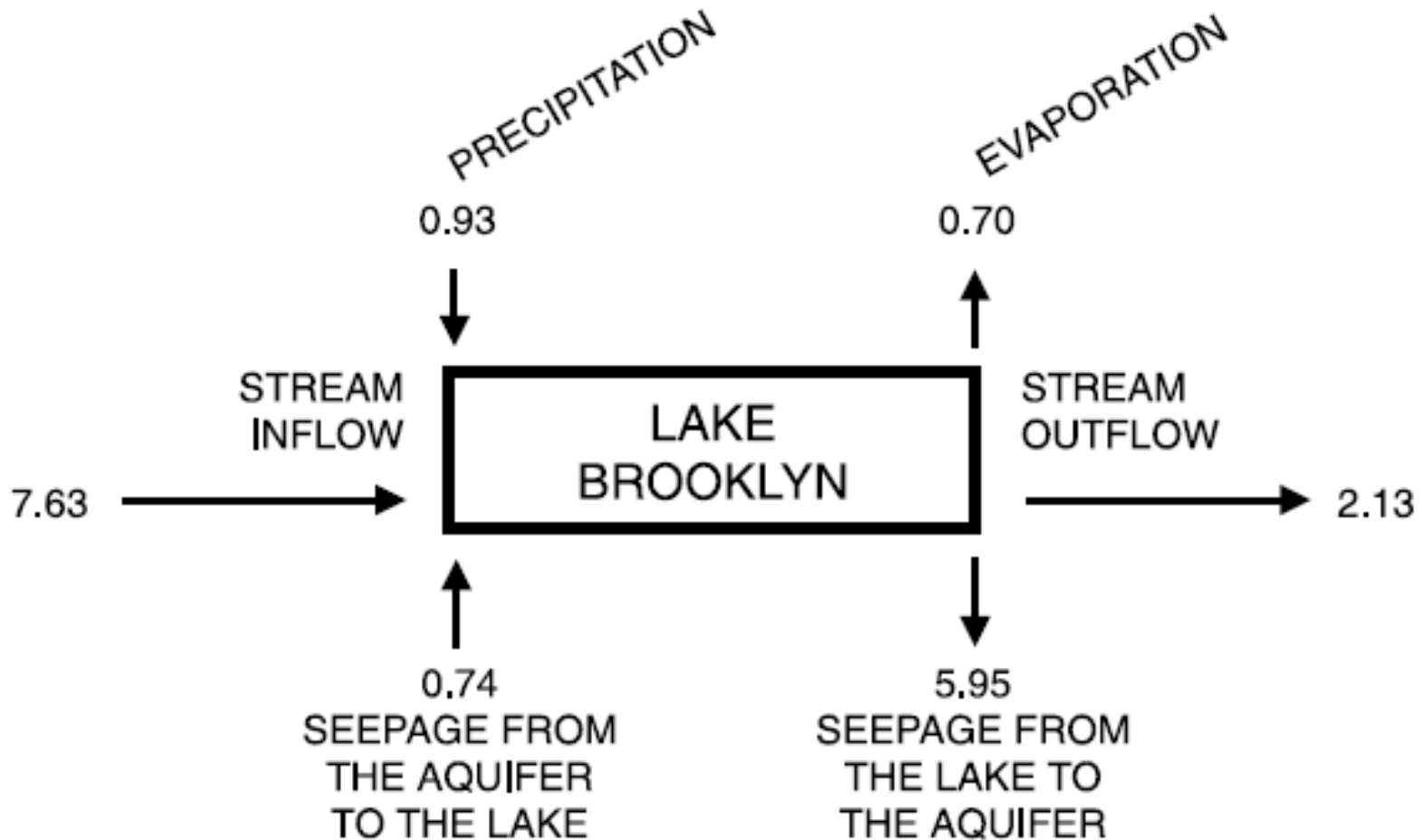
Evapotranspiration

Stream outflow

Groundwater outflow



Example Water Budget (Merritt 2001)



Ground water inflow and outflow
tend to be fairly constant over time
and helps to stabilize or slow down
lake fluctuation

Some notable exceptions.....

Alachua Lake
1891 dropped
8 feet in 10 days

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29°35'03.69" N 82°20'13.28" W

elev 61 ft

Dec 22, 2005

Eye alt 38562 ft

Most major lake fluctuations are driven by changes to inputs to the water balance. Precipitation tends to be the primary cause. In some cases some portion of lake level fluctuation can be attributed to human activities.



Summary

- Lake fluctuation controlled by water budget
- Shifts in components can induce significant changes in lake stage
- Natural and man made shifts in lake water budgets both occur
- Quantifying natural vs. man made impacts is very challenging

The End!

