Water Quality in the Floridan Aquifer Region ("Water 101")

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UF UNIVERSITY of FLORIDA
The Foundation for The Gator Nation

Photo Credit: John Moran

1. Speaking “hydrolog-ese”: ***The water cycle***
2. Water quality in the Floridan Aquifer region

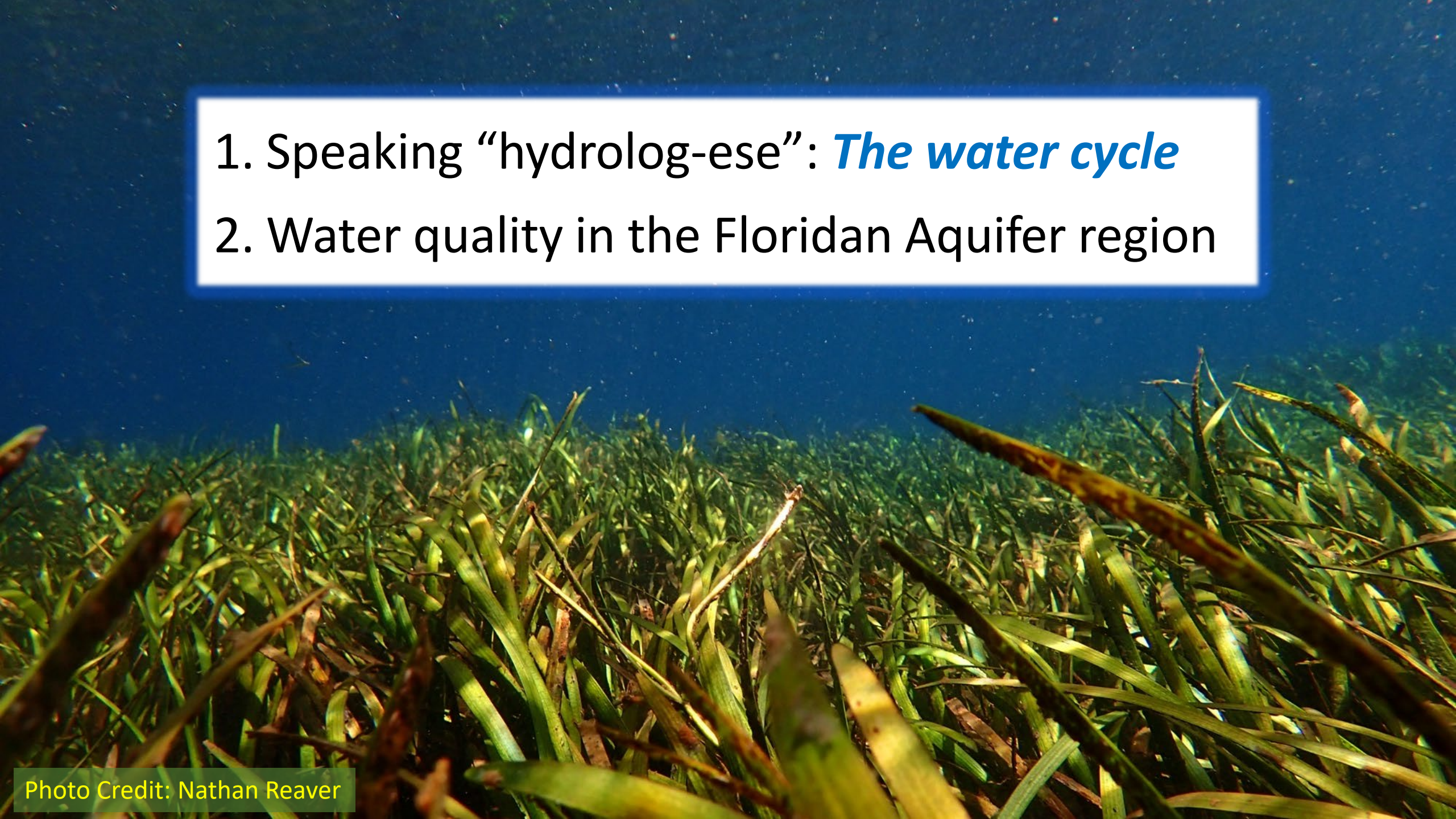
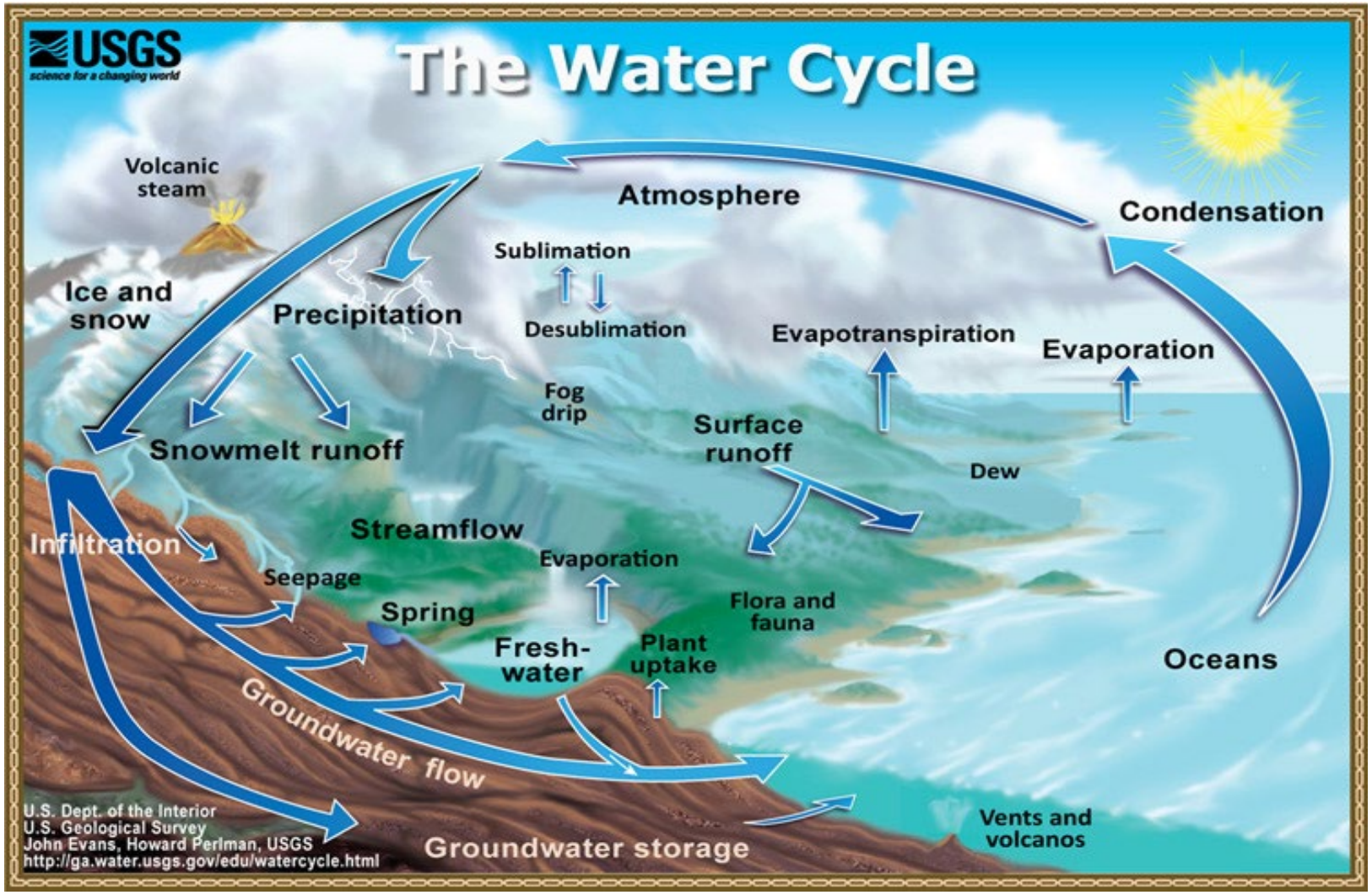


Photo Credit: Nathan Reaver

The Water ***Cycle***: Storages + Flows

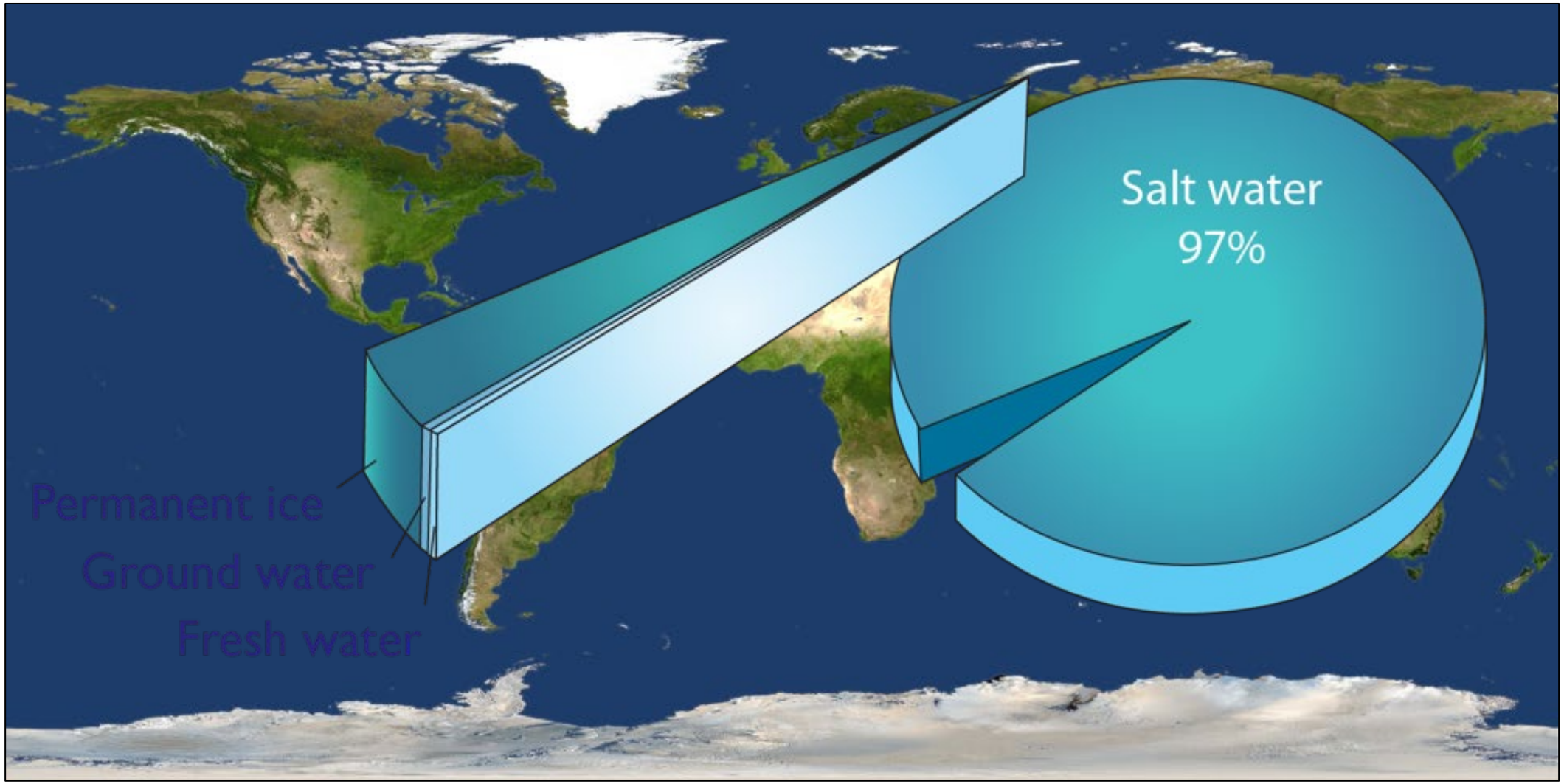


Storages = Nouns
(*groundwater*, *surface water*)

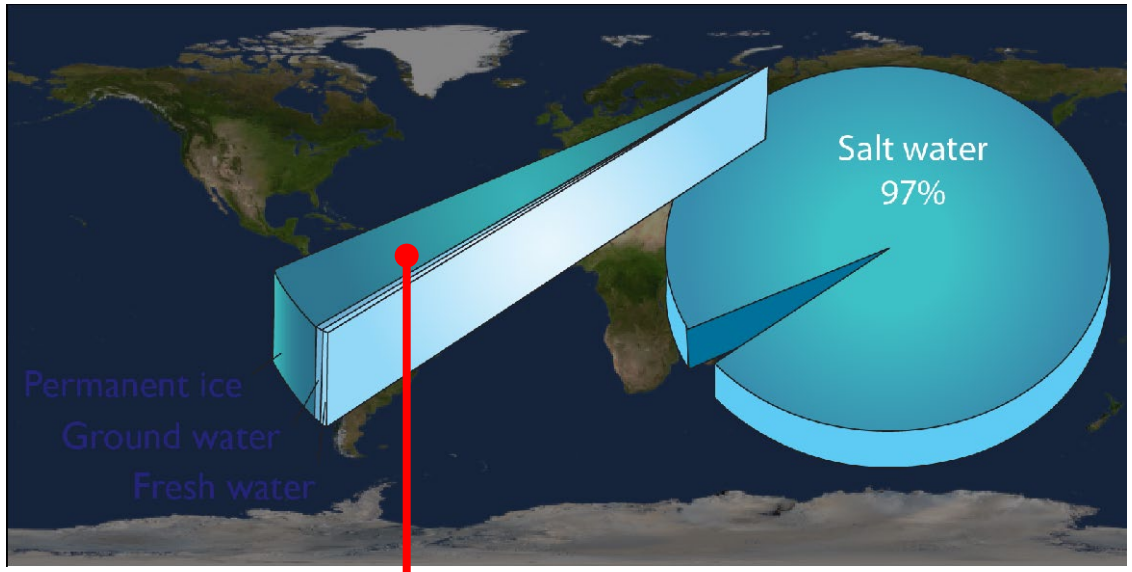
Flows = Verbs
(*evaporate*, *infiltrate*)

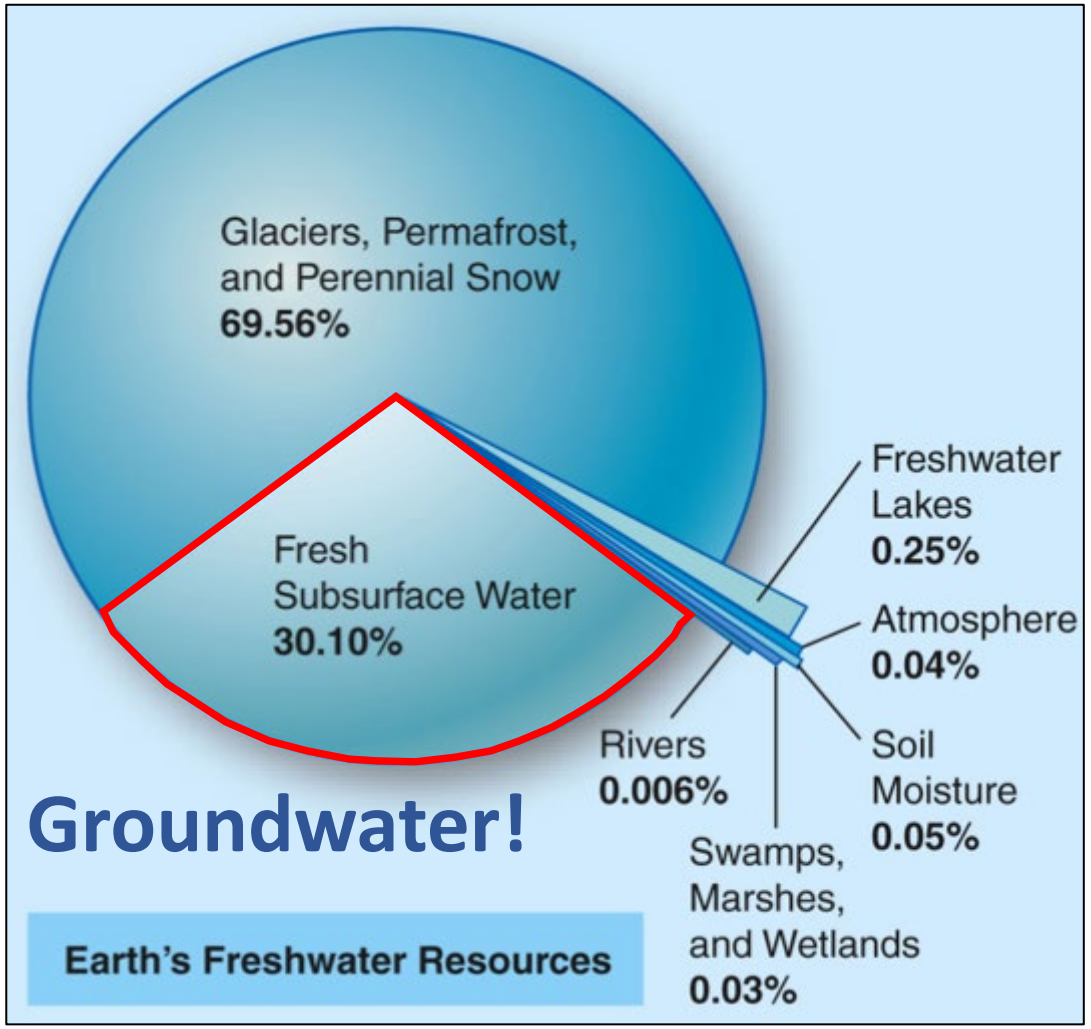
Adjectives?!

Storages: Where's the Water?

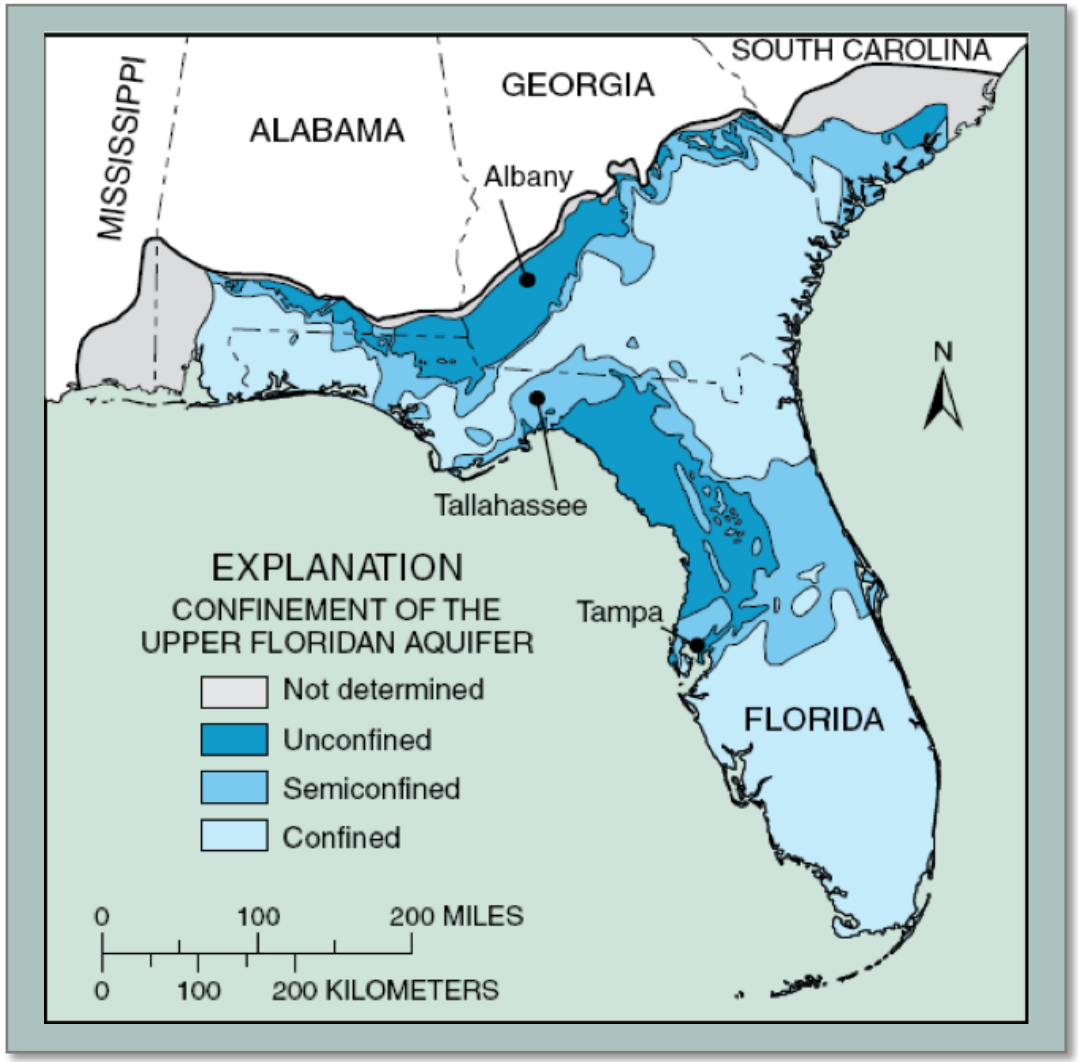


Storages: Where's the Water?



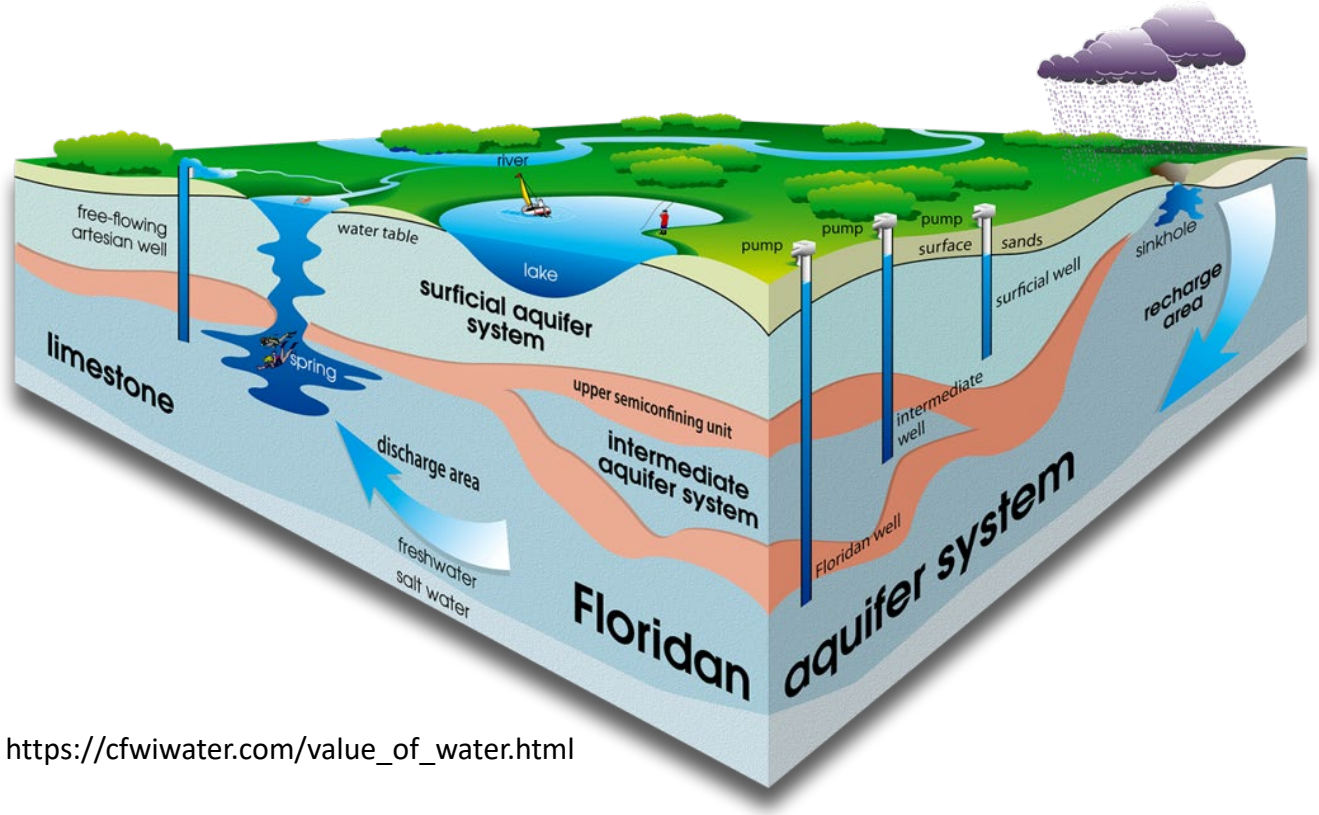


Storages: The Floridan Aquifer



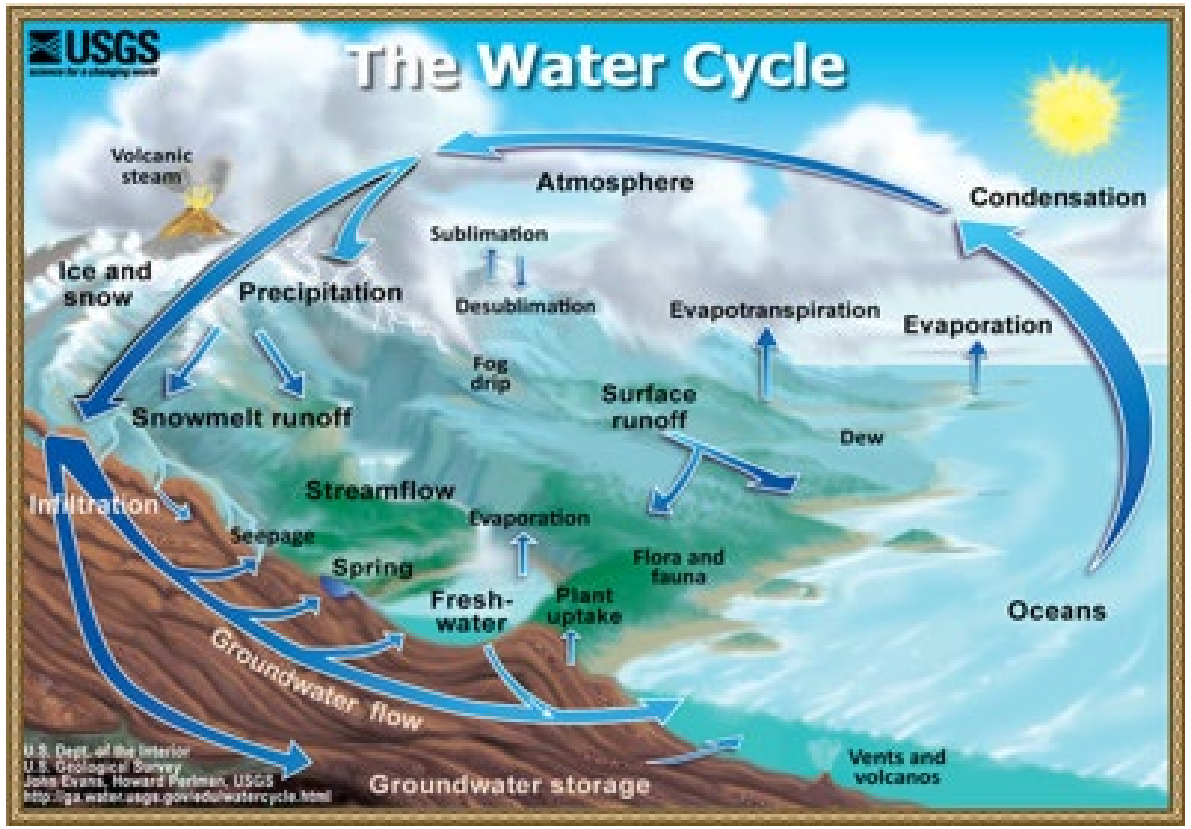
USGS Circular 1278

- Provides drinking water for >11 million people
- Supports agricultural activities worth >$7.5 billion
- Provides flows to iconic spring and rivers



https://cfwiwater.com/value_of_water.html

The Water Cycle → Water Balance



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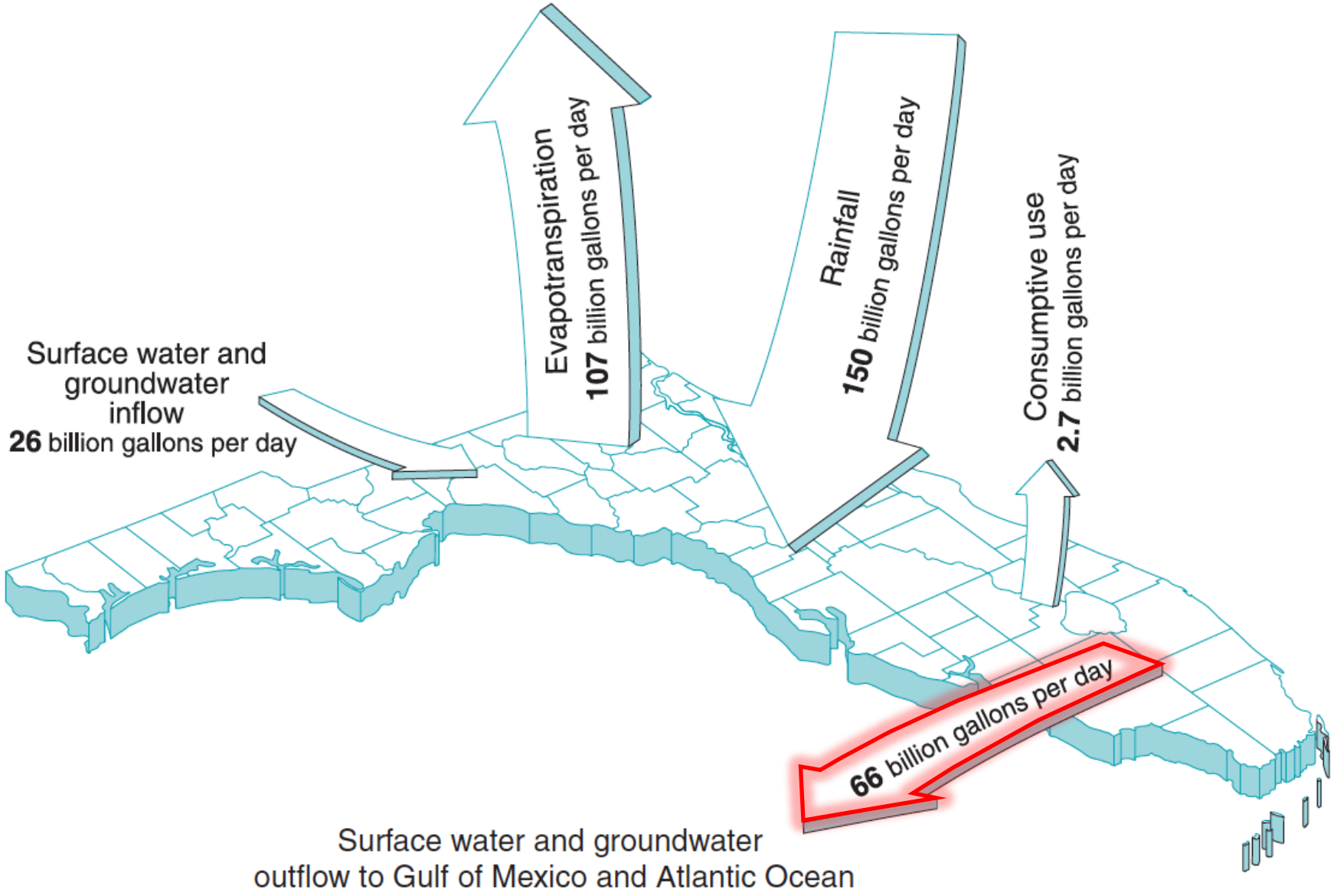
The Water Cycle → Water Balance

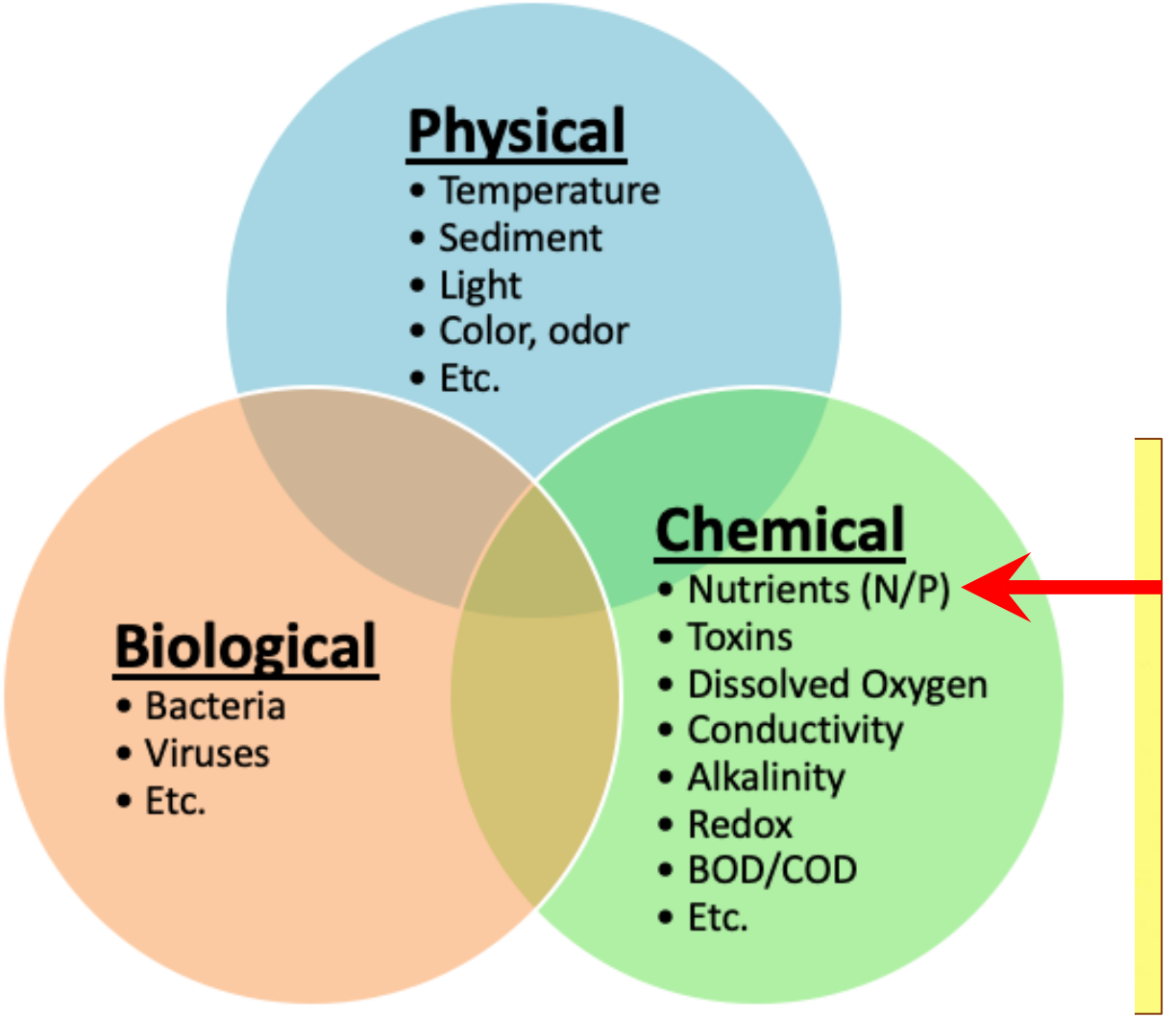
If Faucet > Drain ?	Tub fills
If Faucet < Drain ?	Tub drains
If Faucet = Drain ?	No change ⇆

Florida's Water Balance (*over an average year*)

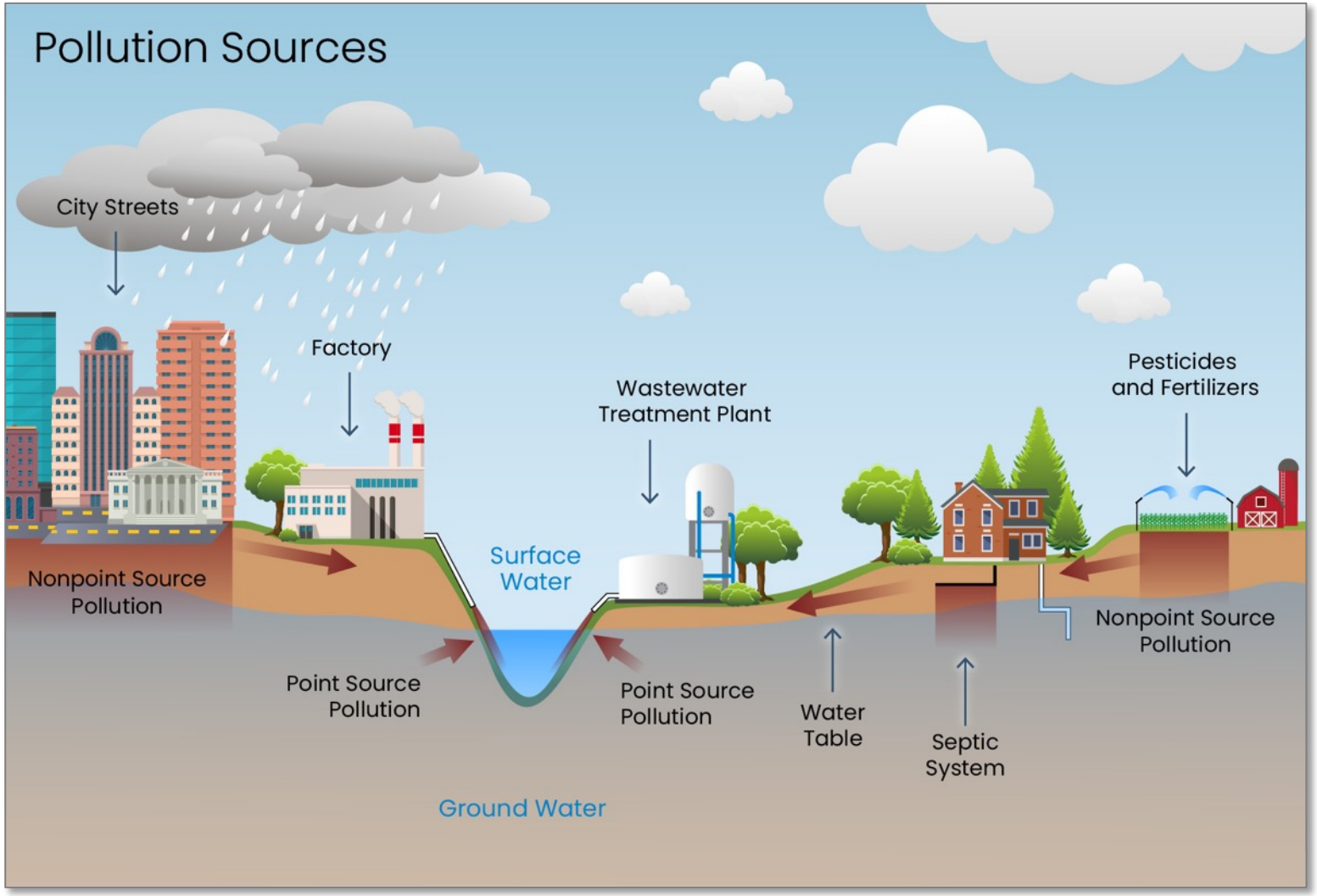


Fernald and Purdum, 1998

OK...so what about water quality?



Water Pollution



https://www.bcwater.org/threats/

Point-Source Pollution

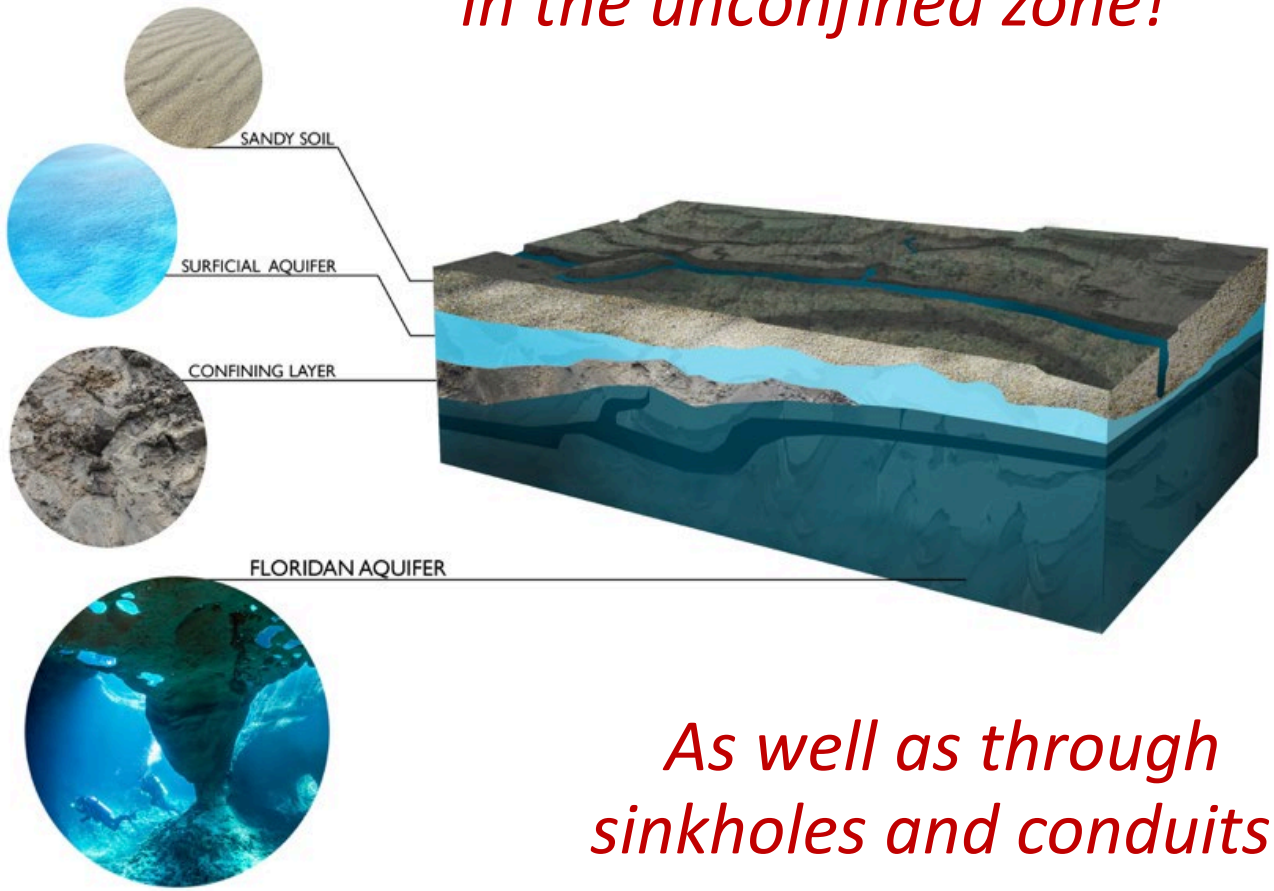
Pollutants that can be traced to specific locations (like wastewater treatment plants or industries)

Non-point Source Pollution

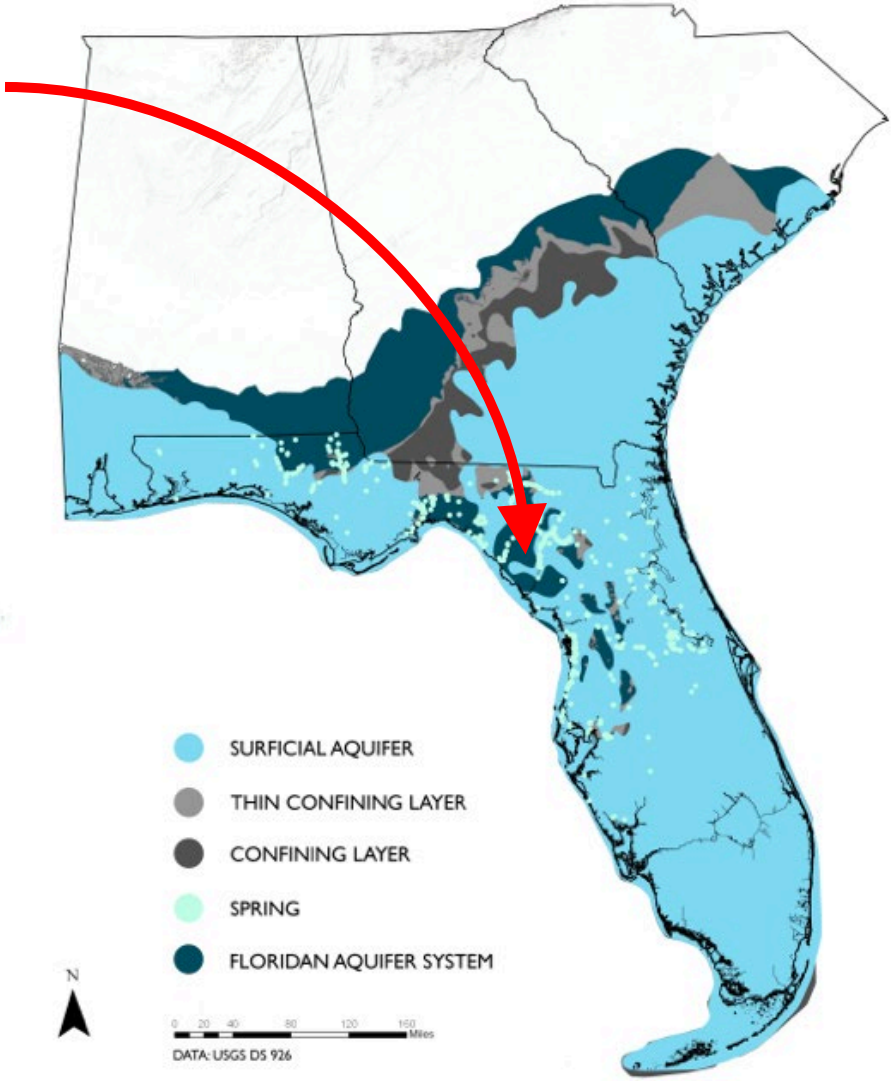
Pollutants from more diffuse and extensive sources (such as septic tanks, agricultural and urban runoff into surface/groundwater)

Where is groundwater vulnerable to pollution?

Groundwater is most vulnerable in the unconfined zone!



As well as through sinkholes and conduits!



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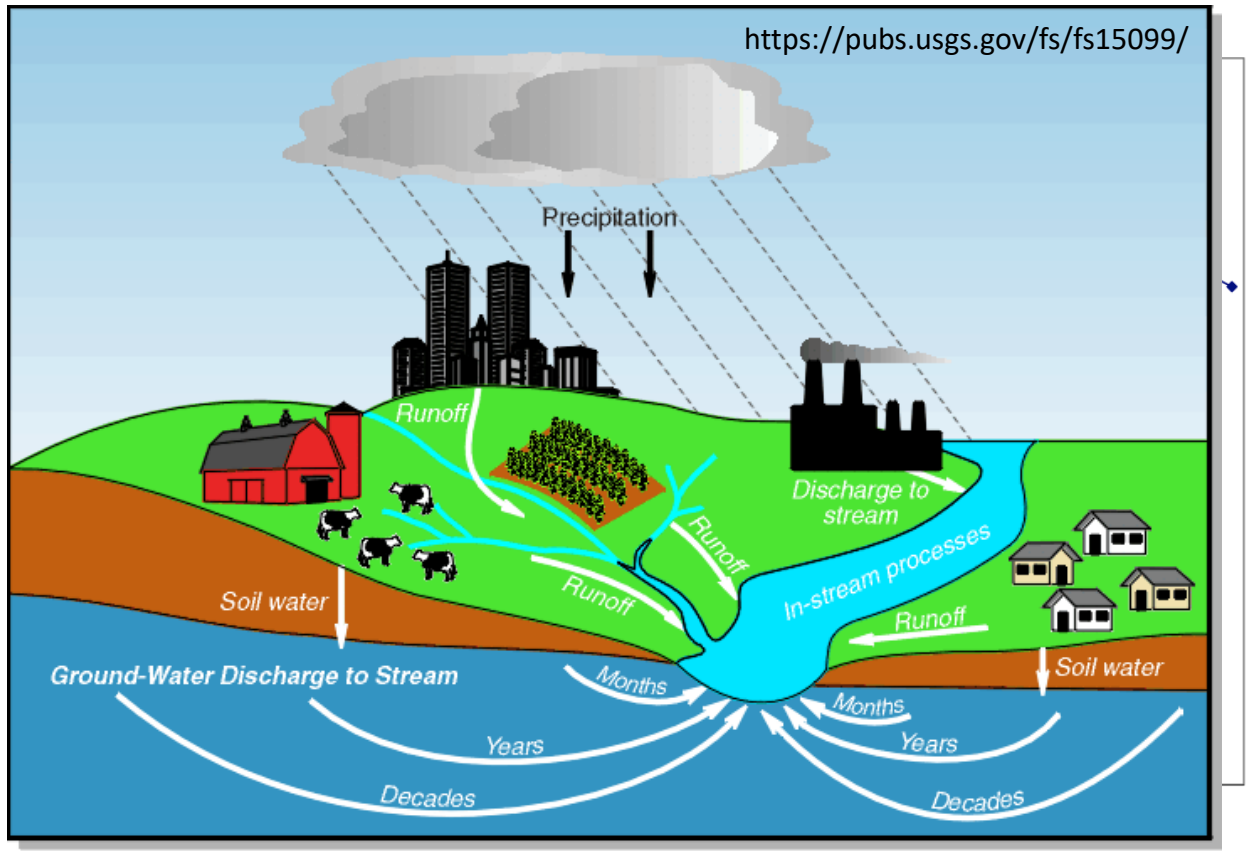
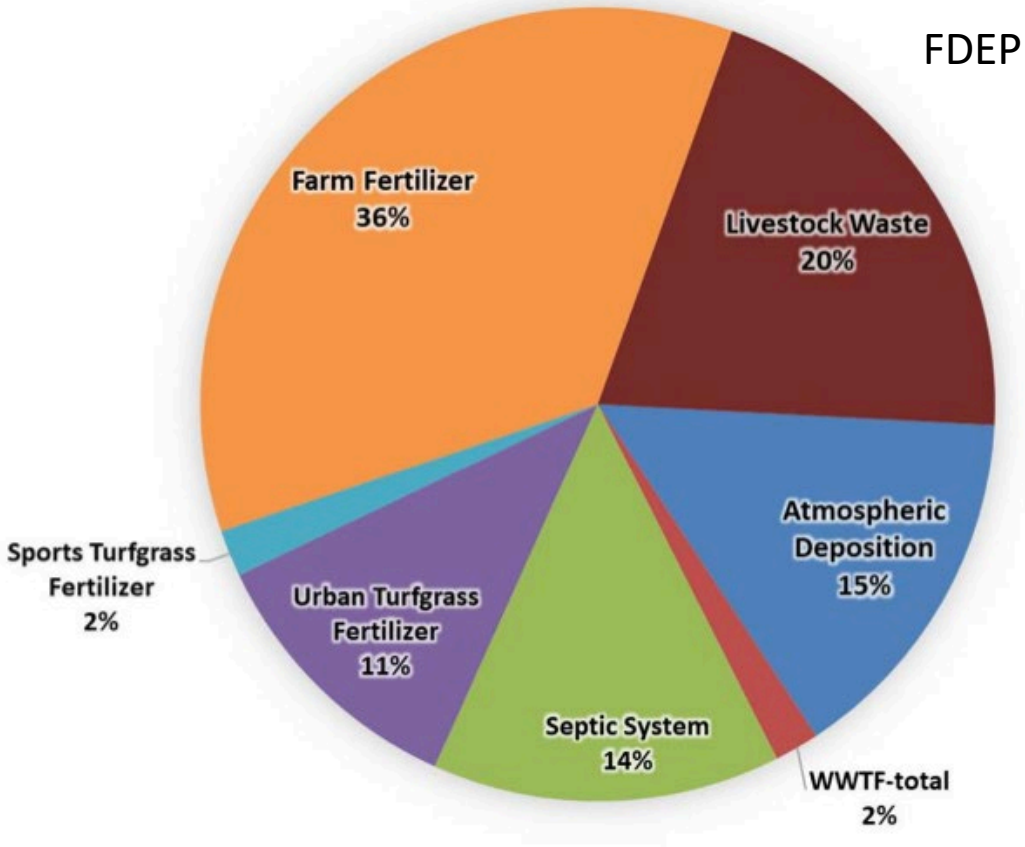
https://bluewateraudit.org/about-the-aquifer/

Nutrient Pollution (**N**itrogen and **P**hosphorus)

- Leading cause of water quality degradation in the region (and across US!)
- Many possible sources; tools exist to estimate relative amounts from each



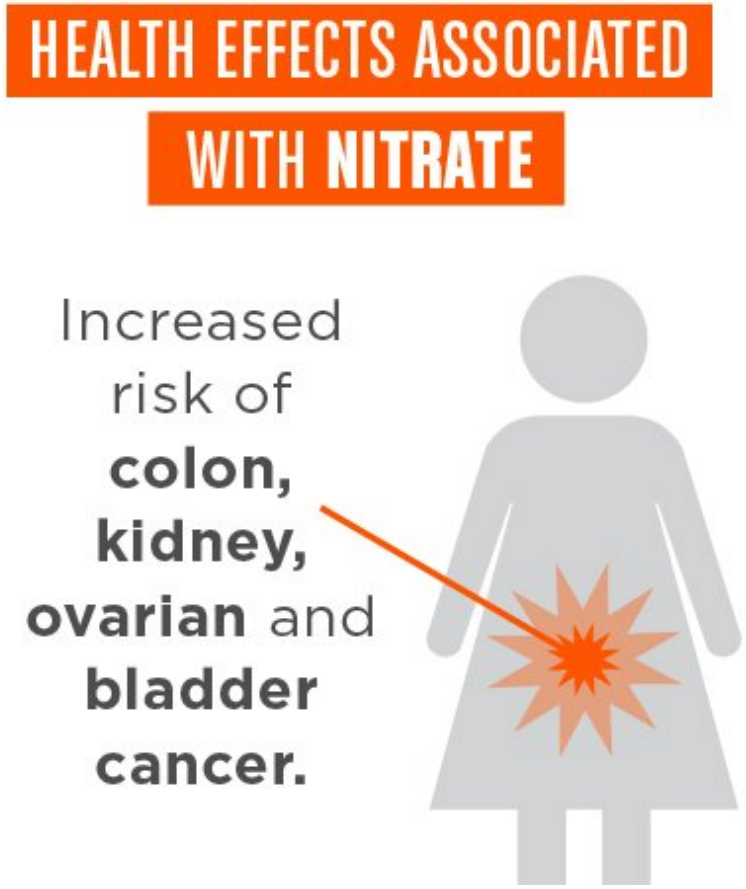
FDEP 2018



Effects of Nutrient Pollution

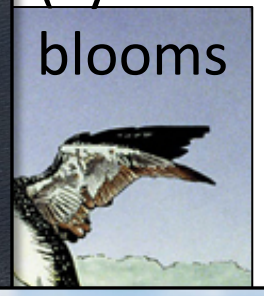
- Higher concentrations (>10 mg/L NO_3^-)
- Increased risk of hyper-tension, diabetes, cancer, blue-baby syndrome
- ***Relatively rare, very local***

Human Health

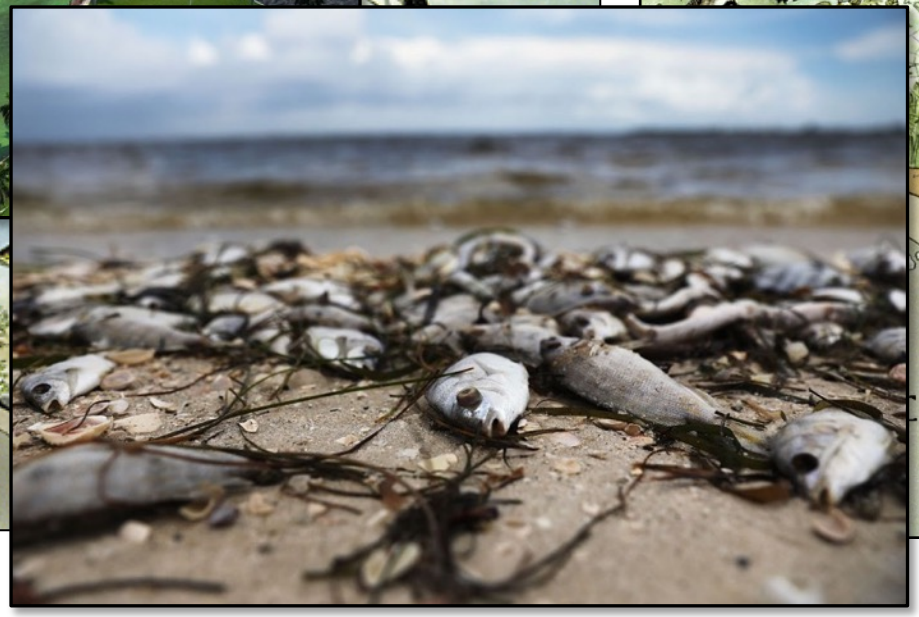


Eutrophication*

Blue-green algae (cyanobacteria) blooms



Filamentous macroalgae



Red tide (dinoflagellate) blooms?


Thank you! Questions?
Photo Credit: Nathan Reaver