Groundwater Resources of the Lower Savannah-Salkehatchie Basin

Lower Savannah-Salkehatchie River Basin Council – Meeting #2, December 7th, 2023

Bull Durham Center, Estill, SC

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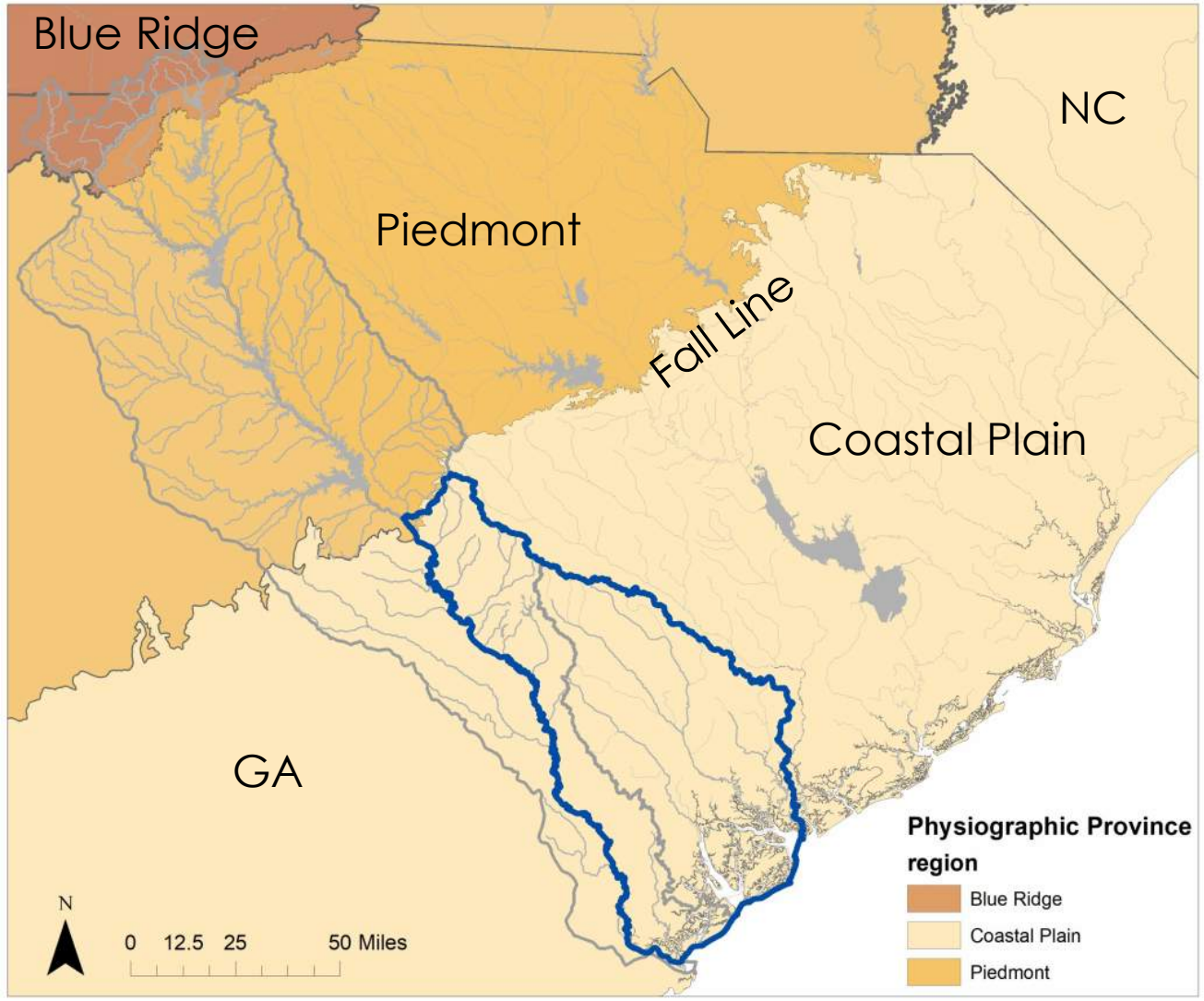
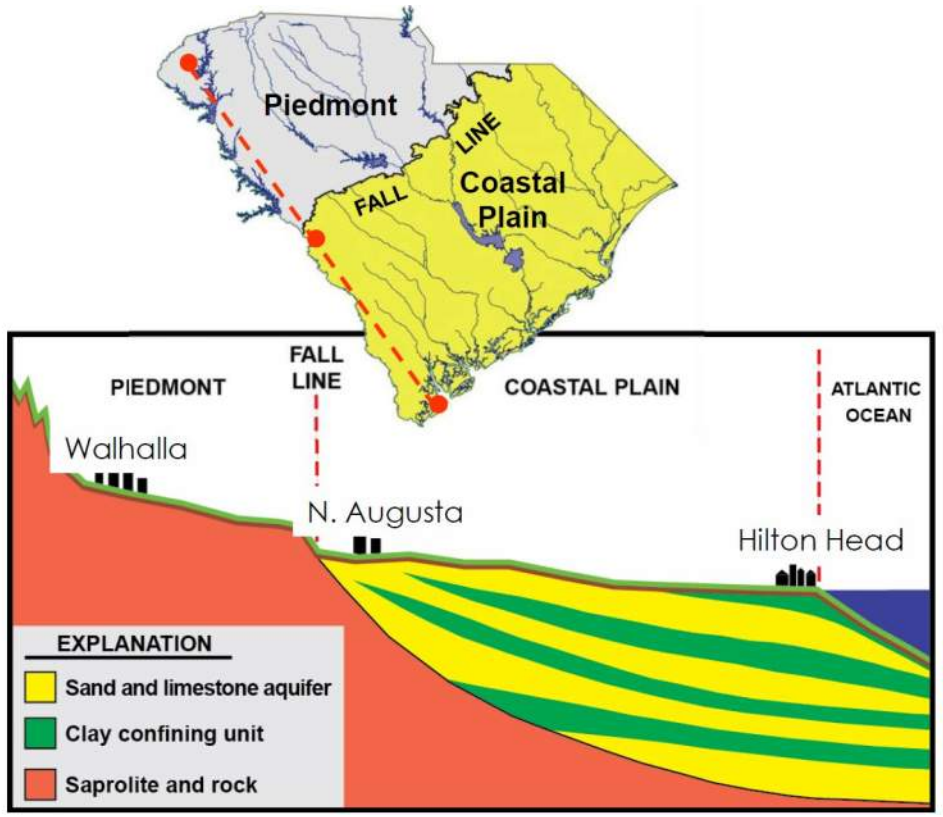
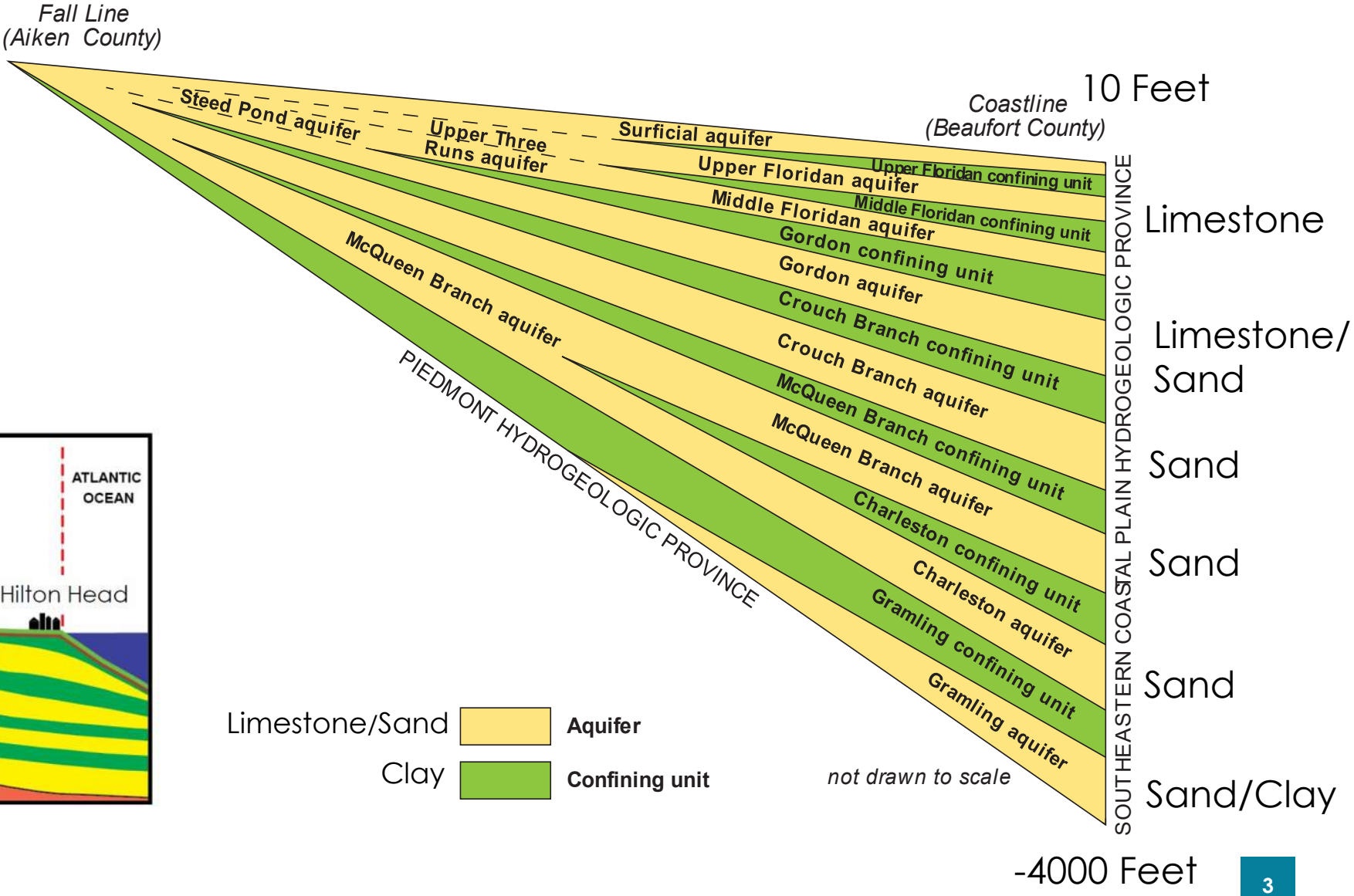
Physiographic Provinces

- Blue Ridge and Piedmont
  - Elevation ranges from 3,300 (Blue Ridge) to 1,000 ft at the foothills (Piedmont) to 450 ft near the Fall Line
  - Underlain by metamorphic and igneous bedrock
    - Groundwater wells tap crystalline rock fractures and saprolite
- Coastal Plain
  - Elevation ranges from 450 ft at Fall Line to near Sea level at the coast
    - Sediments thicken from zero at the Fall line to 4,000 feet in Beaufort County
  - Encompasses nearly 2/3 of the state and characterized as a wedge of sand, clay, silt, and limestone
  - Permeable sand and limestone form the State's most important aquifers
    - Aquifers store an abundant volume of water representing a vital resource throughout the Coastal Plain

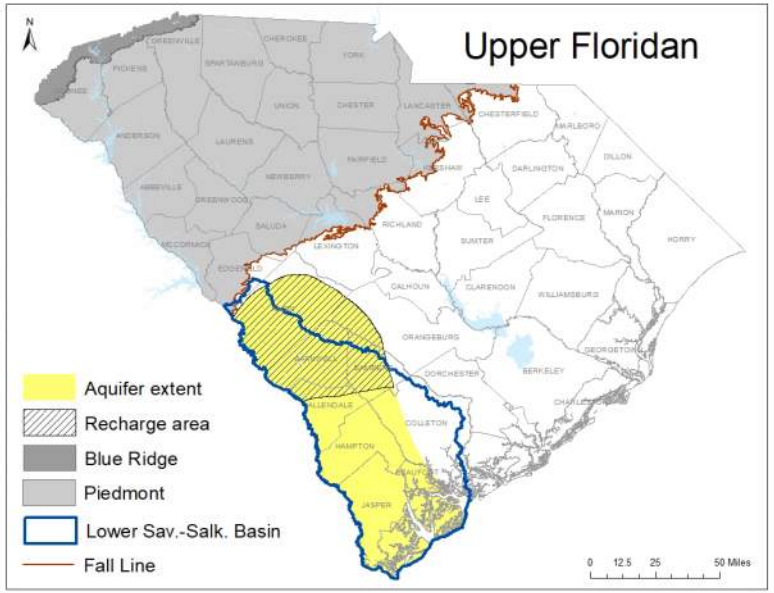


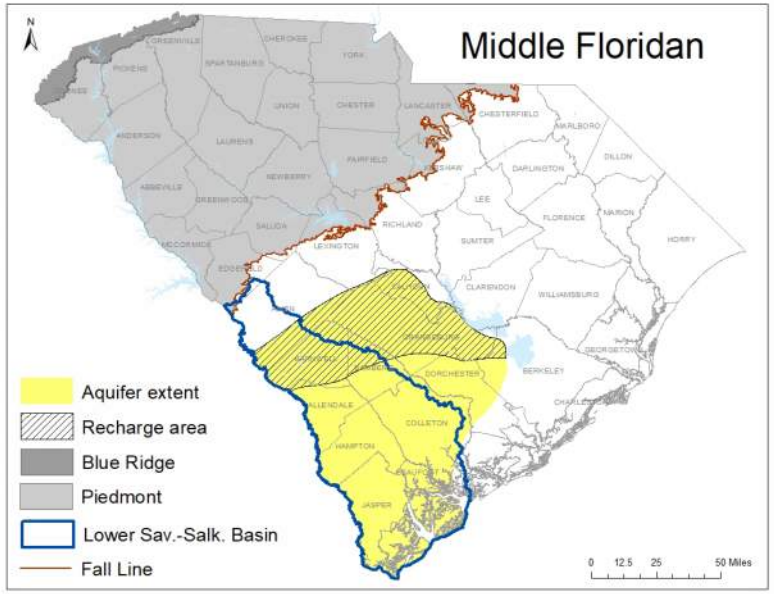
SC Hydrogeologic Framework Along Dip

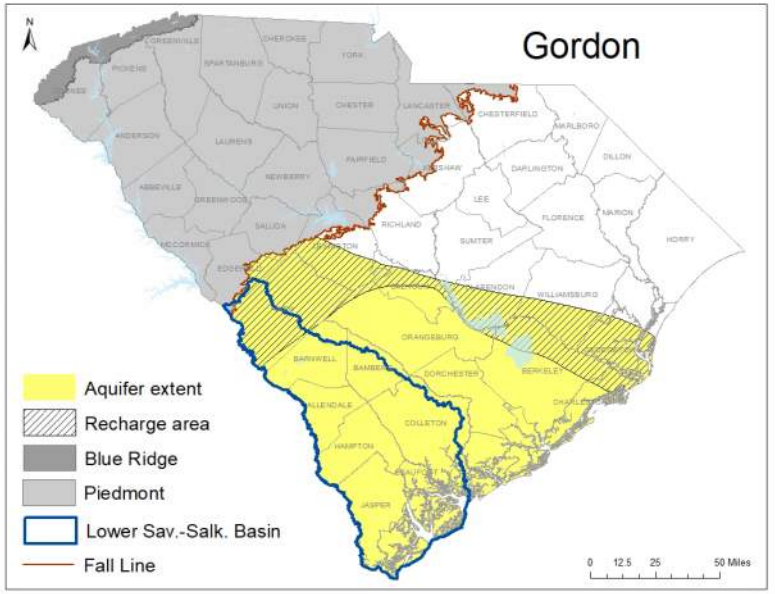


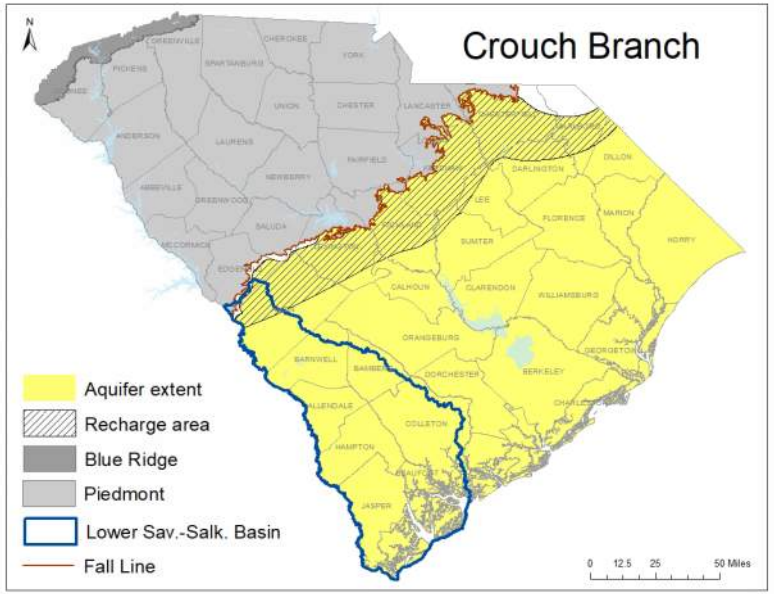


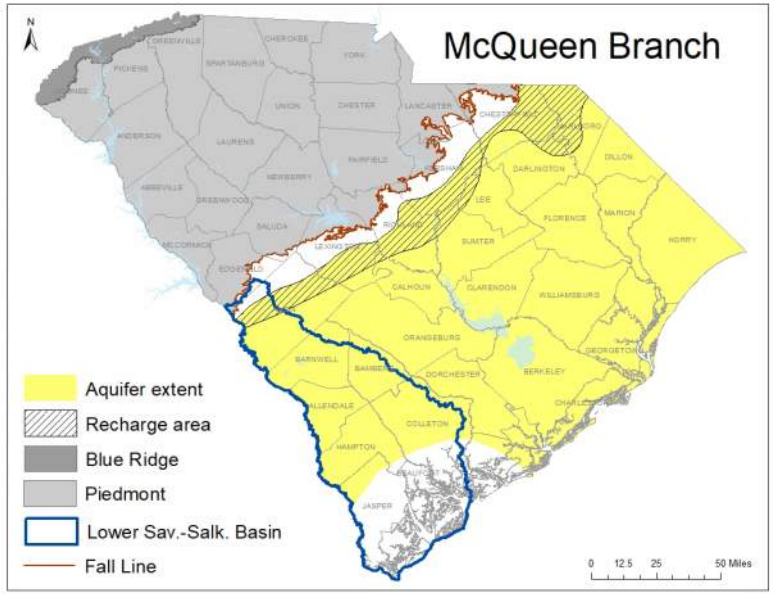
Coastal Plain Aquifer Extents

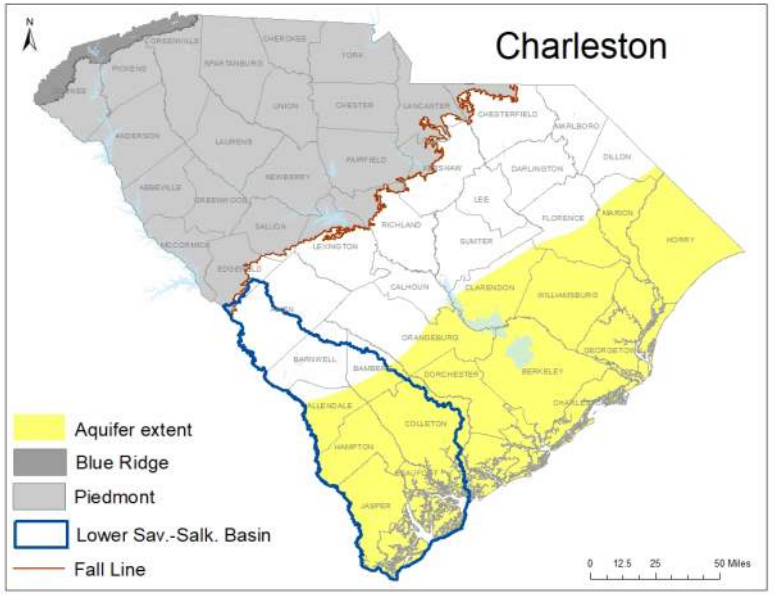




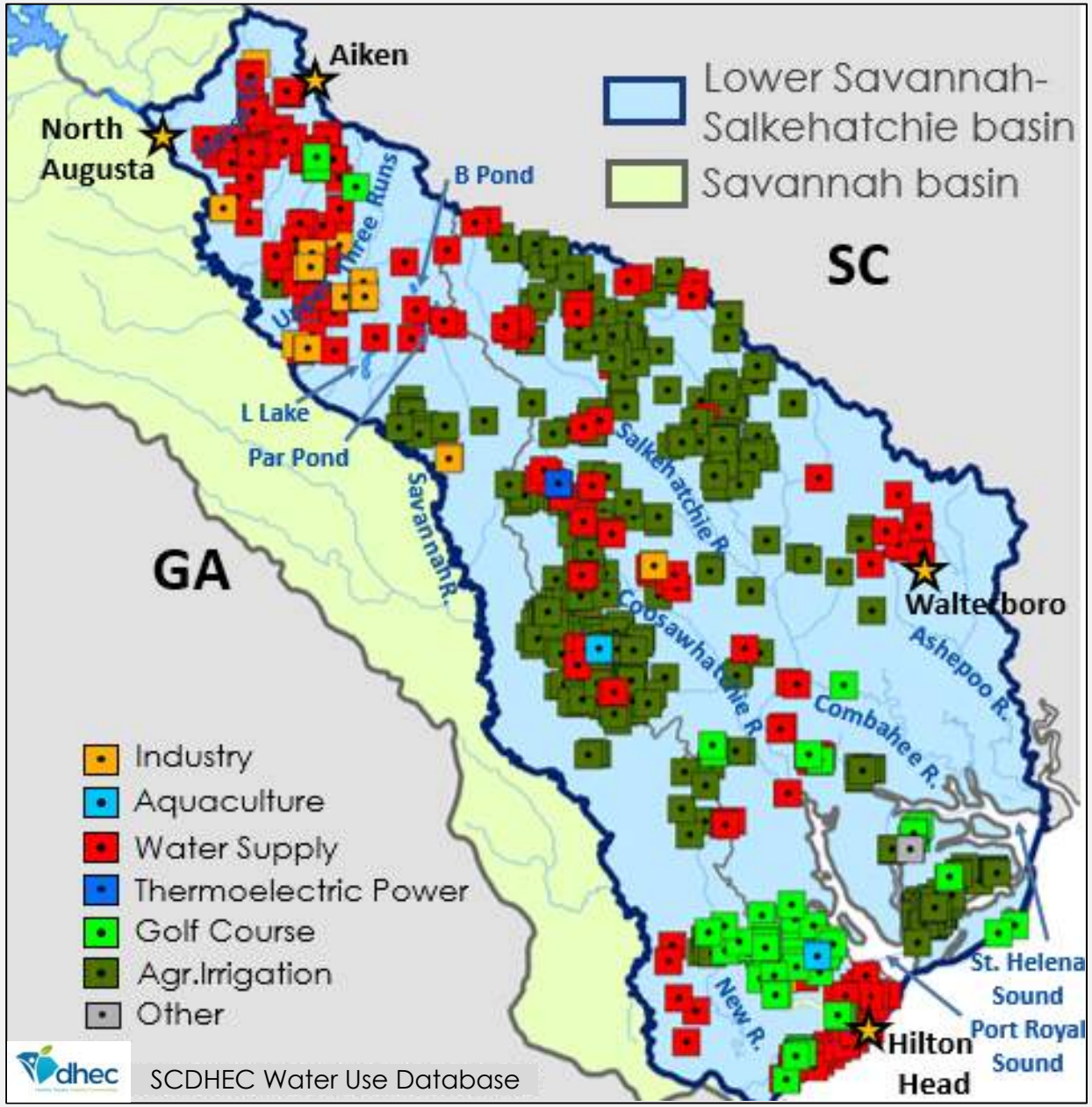








Reported SC Water Withdrawals (2022 Groundwater)



Including Energy

SW : 68% 155 MGD

GW: 32% 73 MGD

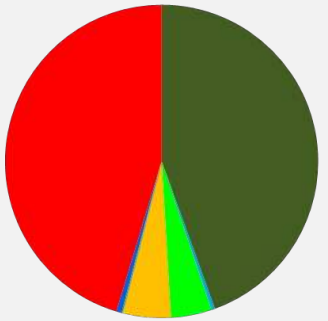
Excluding Energy

SW : 47% 66 MGD

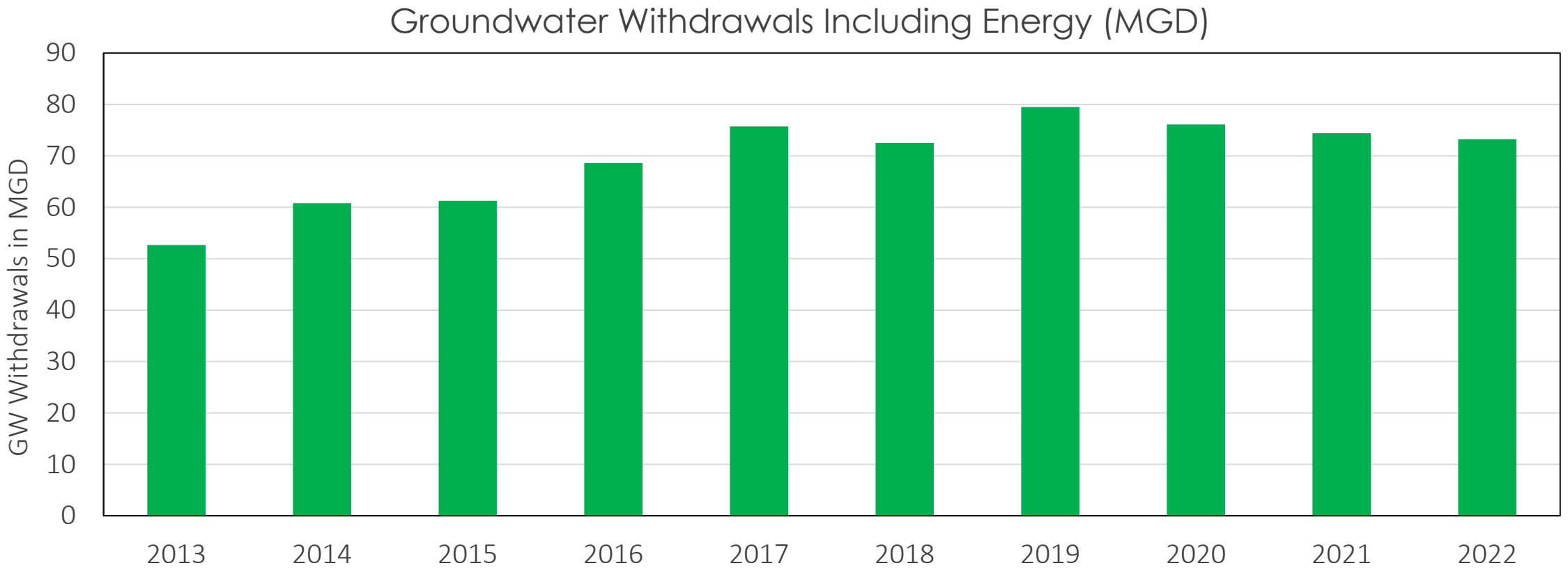
GW: 53% 73 MGD

Groundwater Including Energy

- Water Supply (47%, 34 MGD)
- Agr. Irrigation (43%, 32 MGD)
- Industry (5%, 4 MGD)
- Golf Course (4%, 3 MGD)
- Thermoelectric Power (1%, 0.4 MGD)
- Aquaculture (<1%, 0.3 MGD)
- Other (<1%, 0.07 MGD)

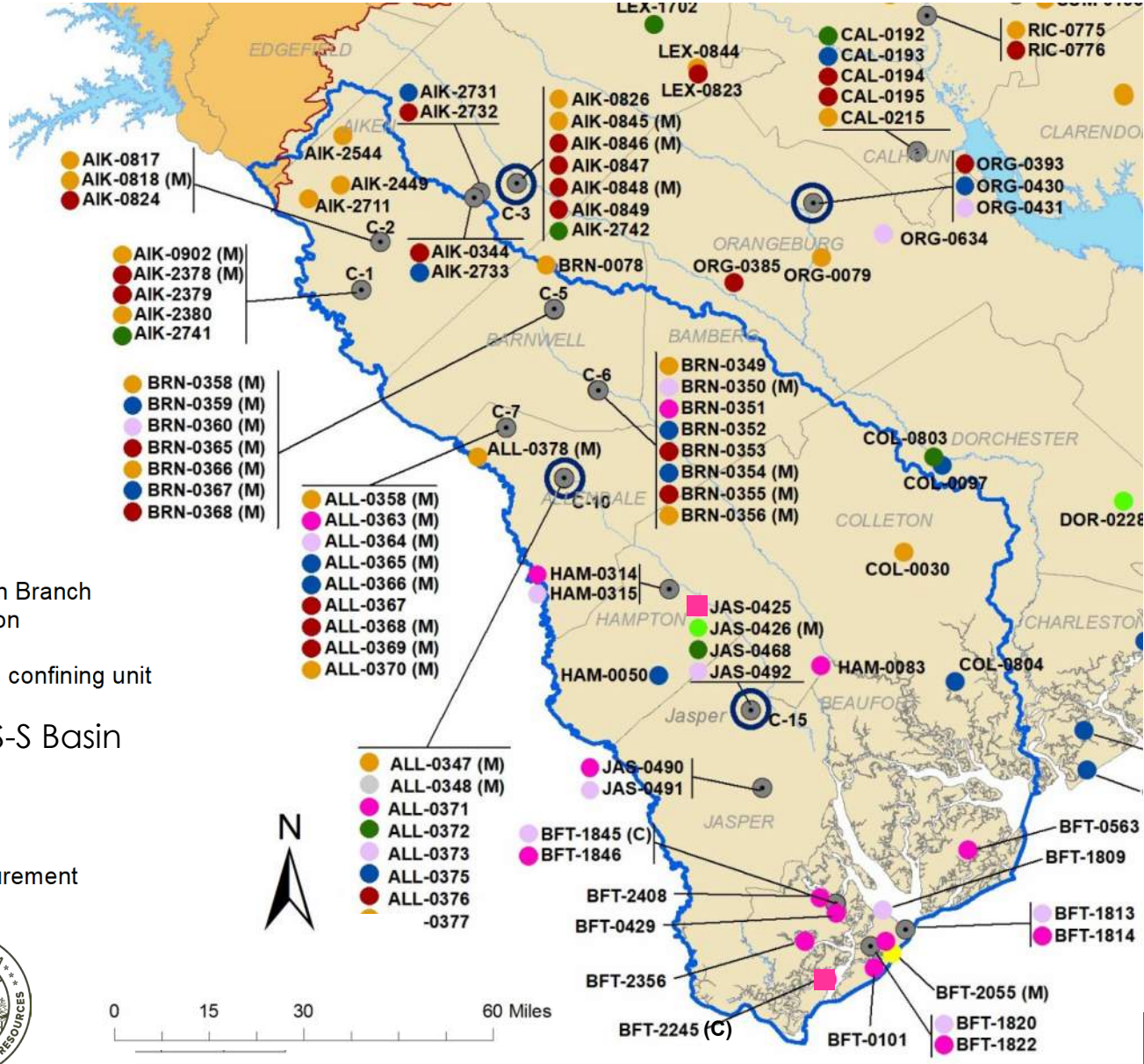


Reported Groundwater Withdrawals (2013 – 2022)



Groundwater Monitoring Network

- 75 well sites actively monitored completed in 9 aquifers
- Period of record ranges from 3 to 68 years



Aquifer

- Surficial aquifer system
- Gordon
- Upper Floridan
- Middle Floridan
- Crouch Branch
- McQueen Branch
- Charleston
- Gramling
- Gramling confining unit

LS-S Basin

Agency

- SCDNR
- USGS
- Cluster site

(M) Manual water level measurement
(C) Water level and conductivity measurement
(T) Telemetry Site

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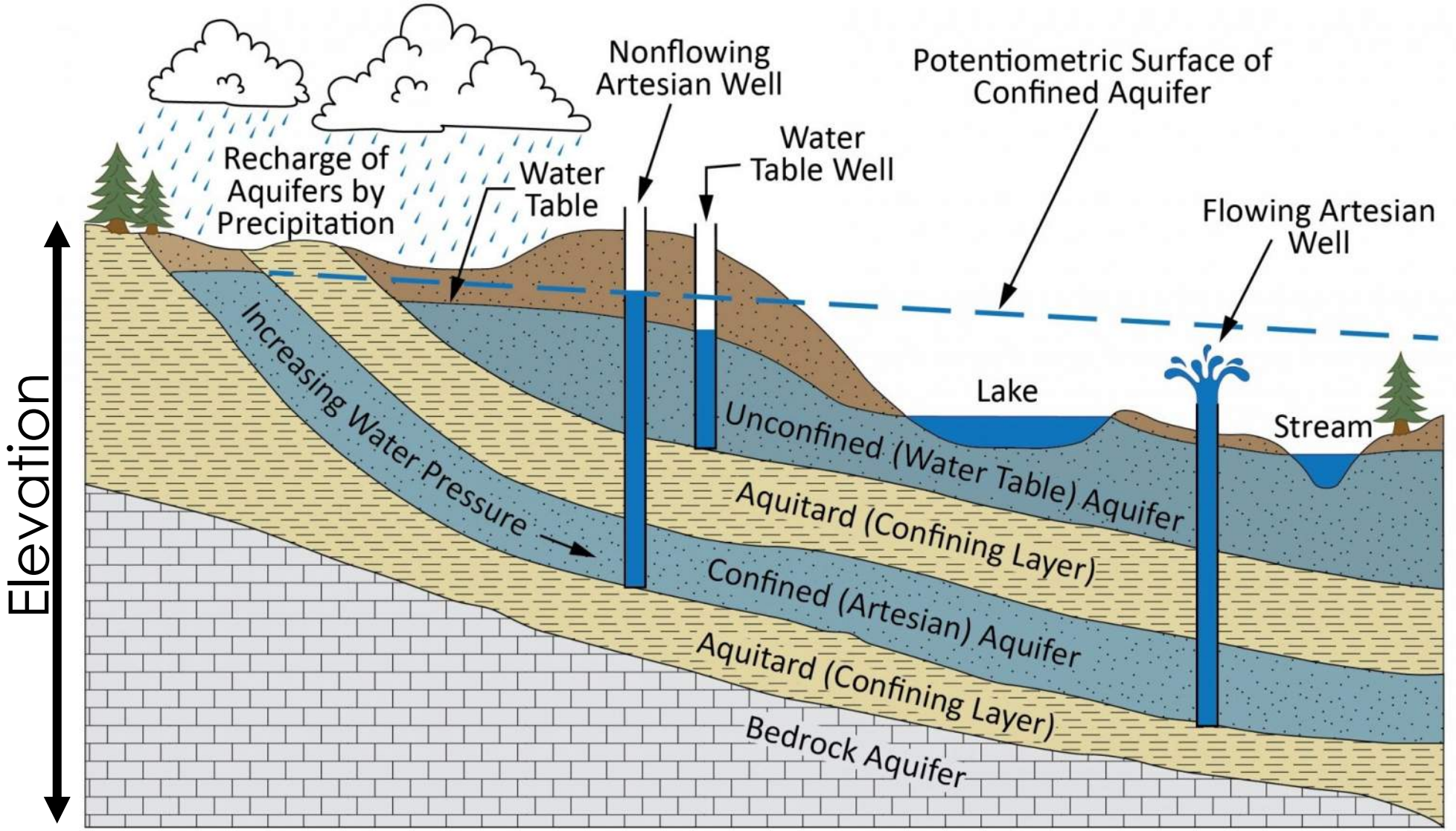
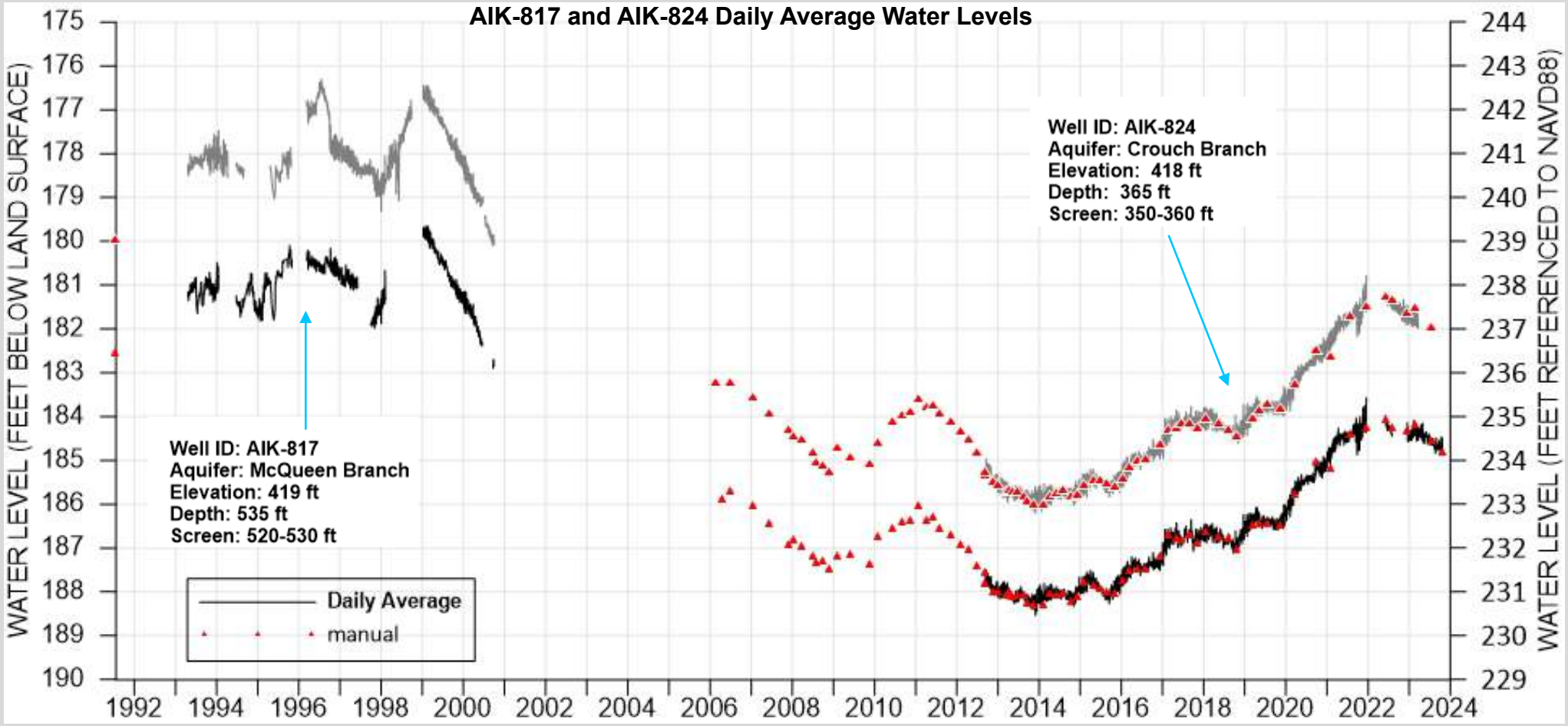
SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES

Water-Level Measurements of an Aquifer

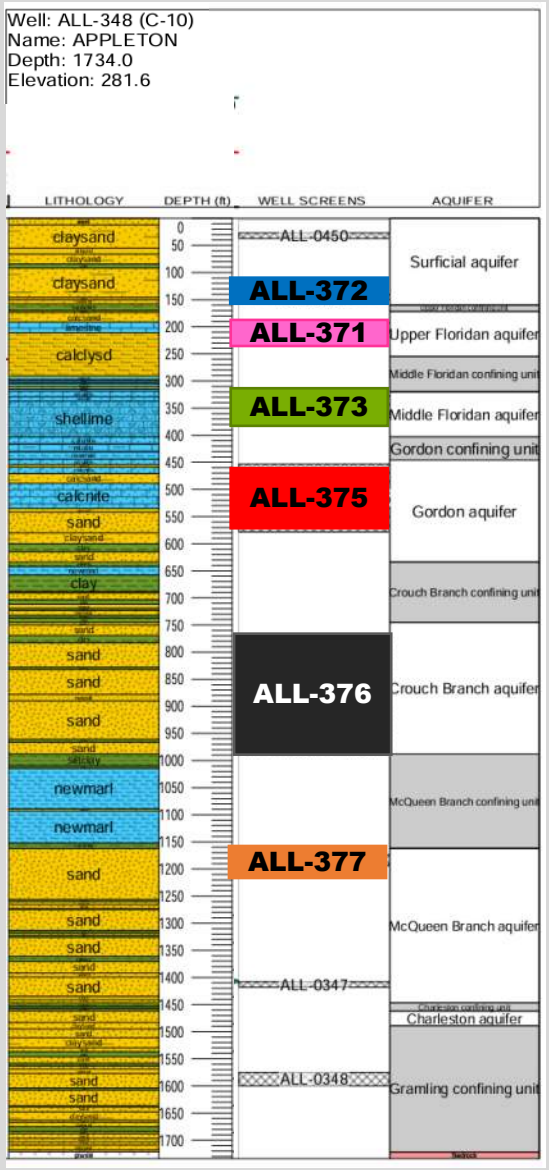


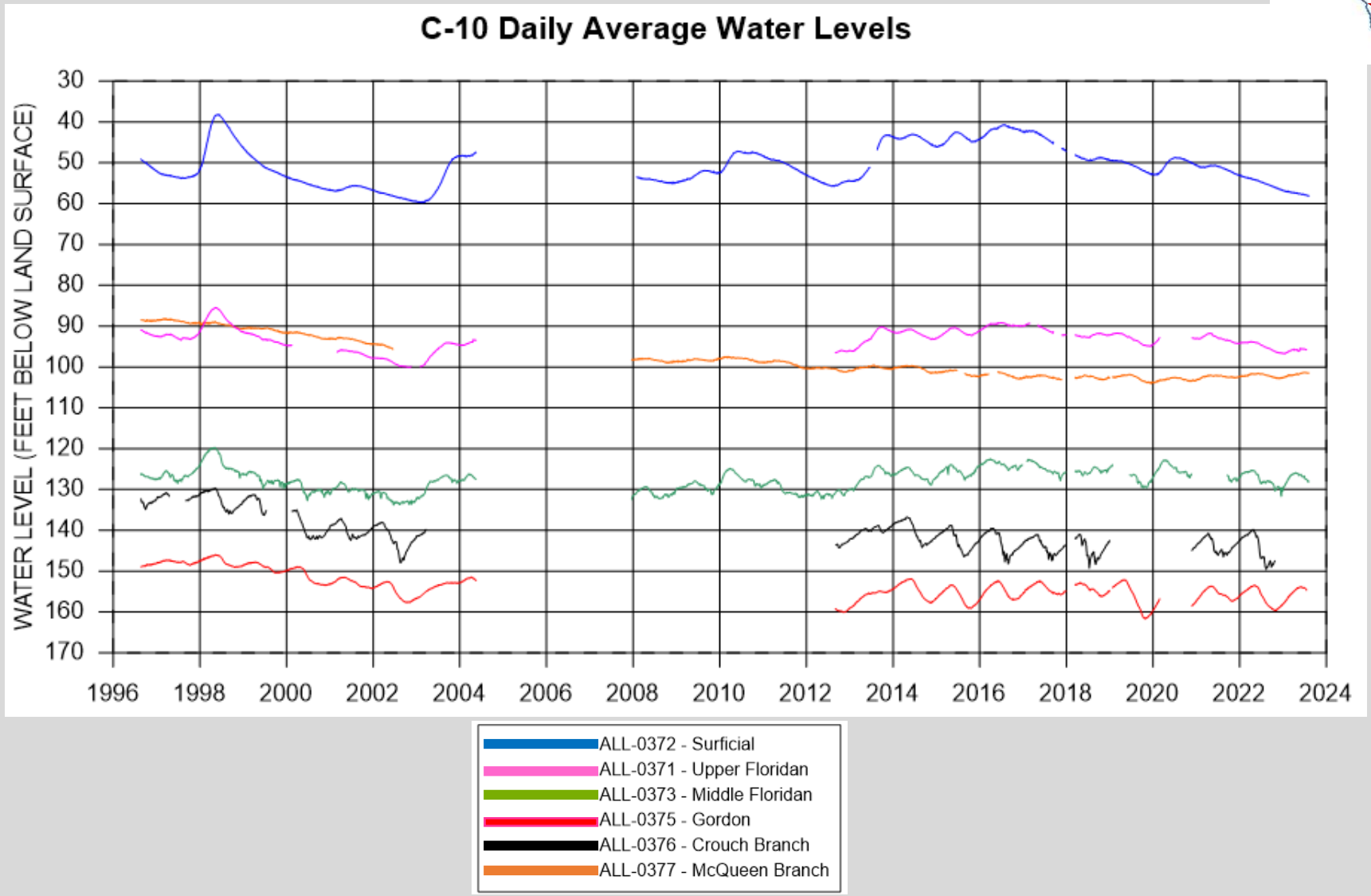
https://geology.utah.gov/

Example: Well Cluster Site in Aiken County (C-2)

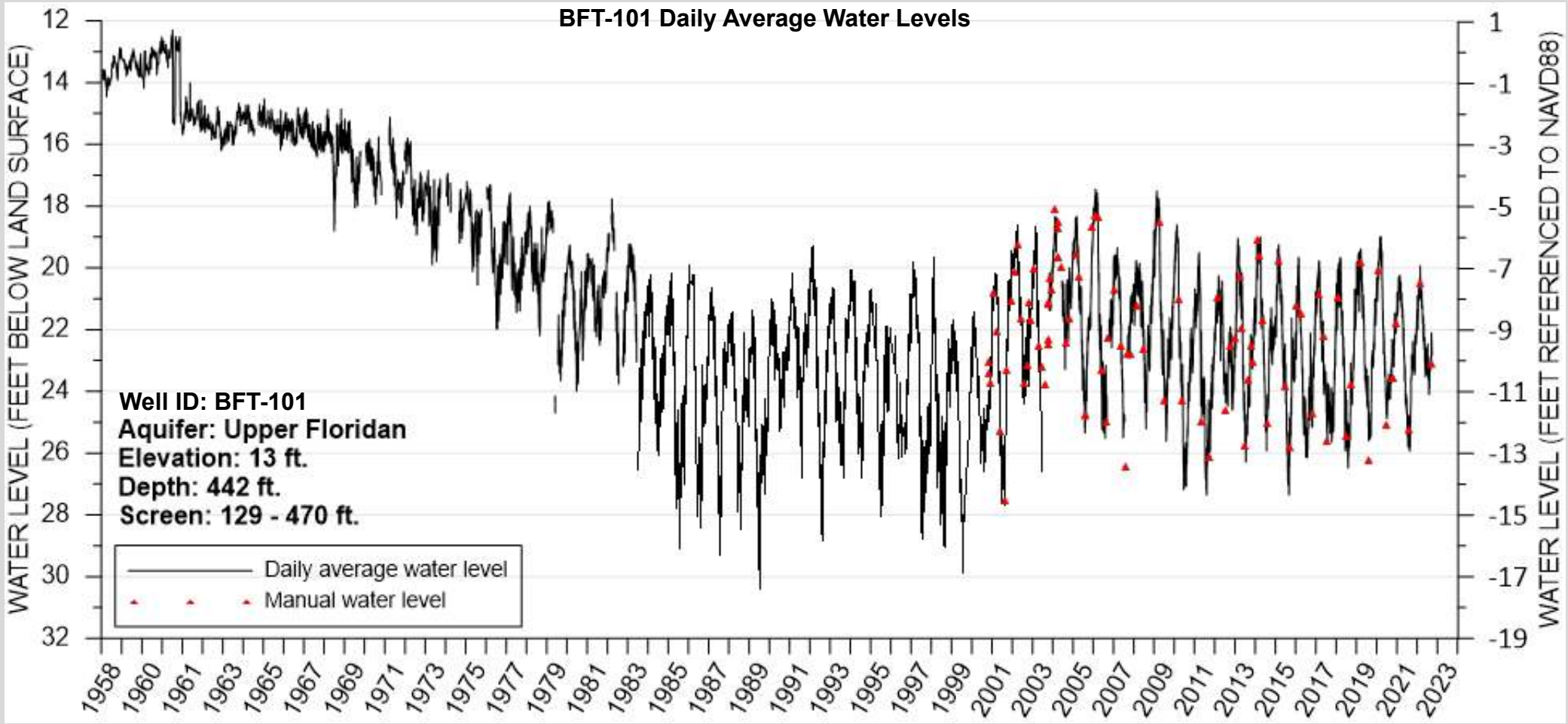


Example: Well Cluster site in Allendale County



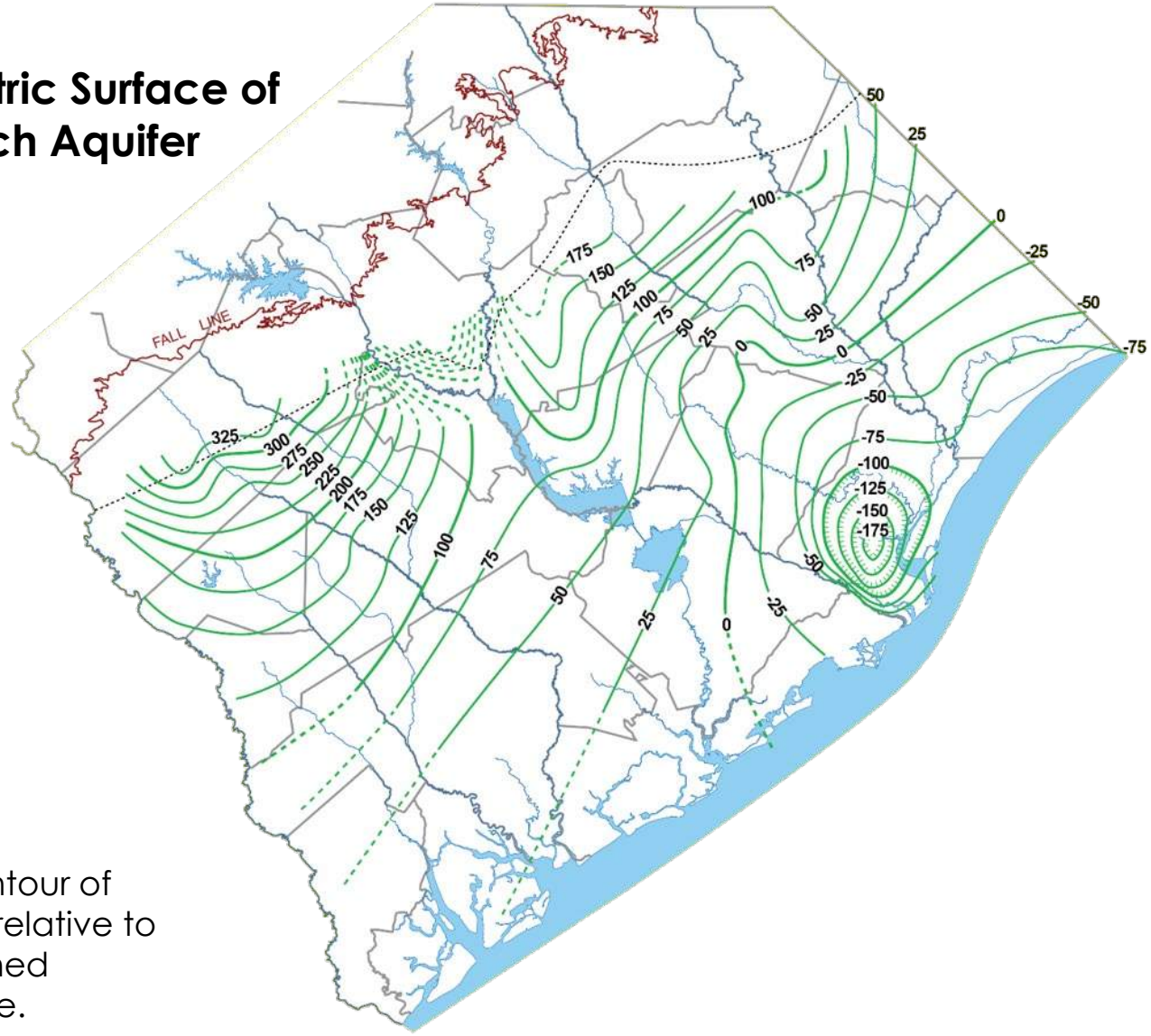


Example: Upper Floridan Aquifer in Beaufort County



Potentiometric Water-Level of an Aquifer

2016 Potentiometric Surface of the Crouch Branch Aquifer



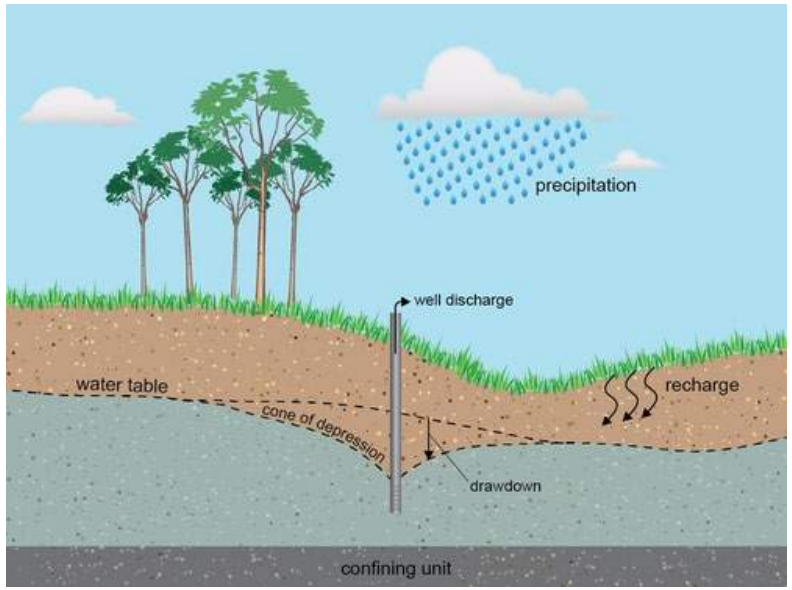
EXPLANATION

100

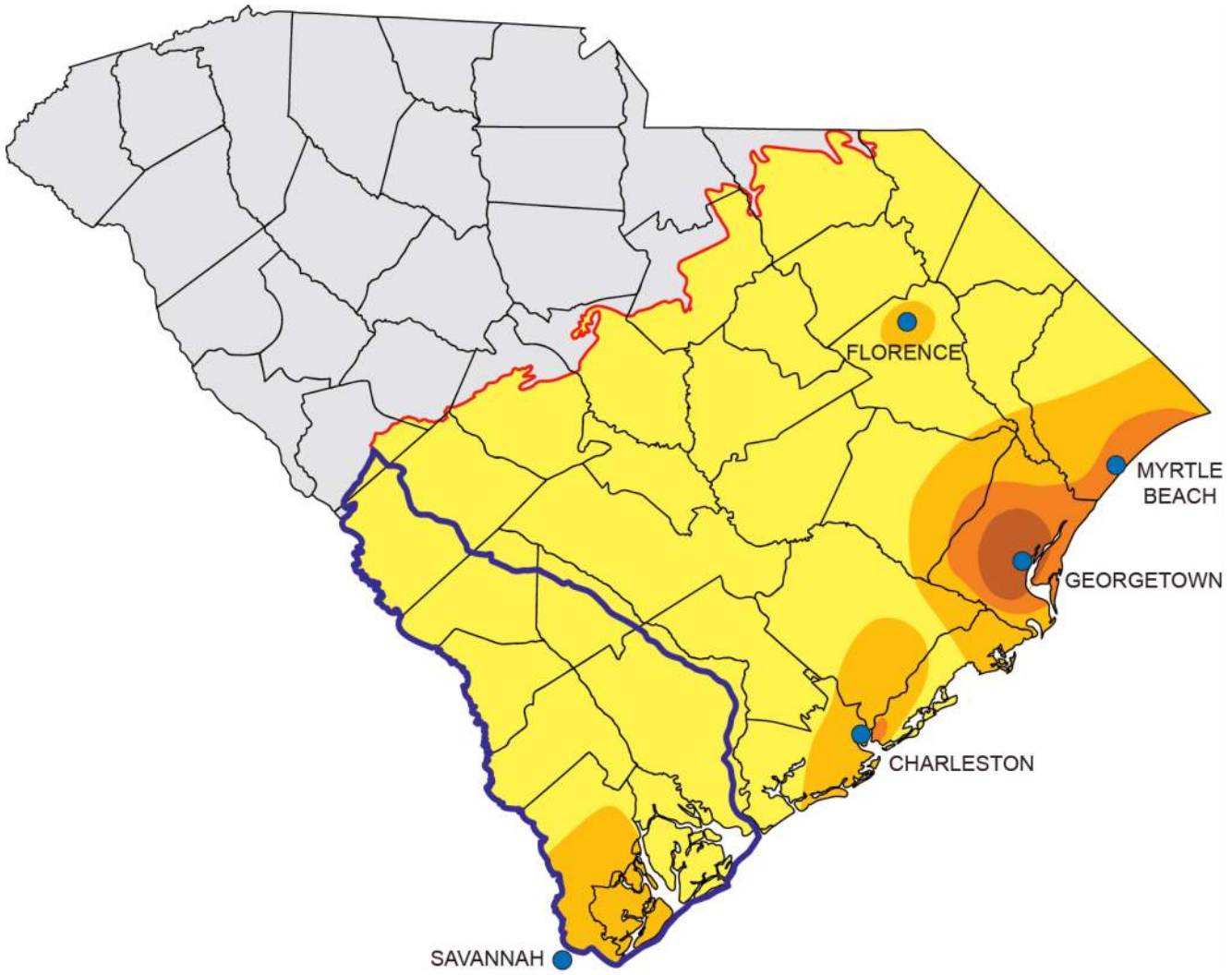
Potentiometric contour of the aquifer in feet relative to feet NAVD88. Dashed where approximate.

- The potentiometric surface is the level, in feet, referenced to a vertical datum to which water rises as measured in tightly cased wells open to specific aquifers.
- Some groundwater model results will be presented as potentiometric contours.

Cones of Depression in SC

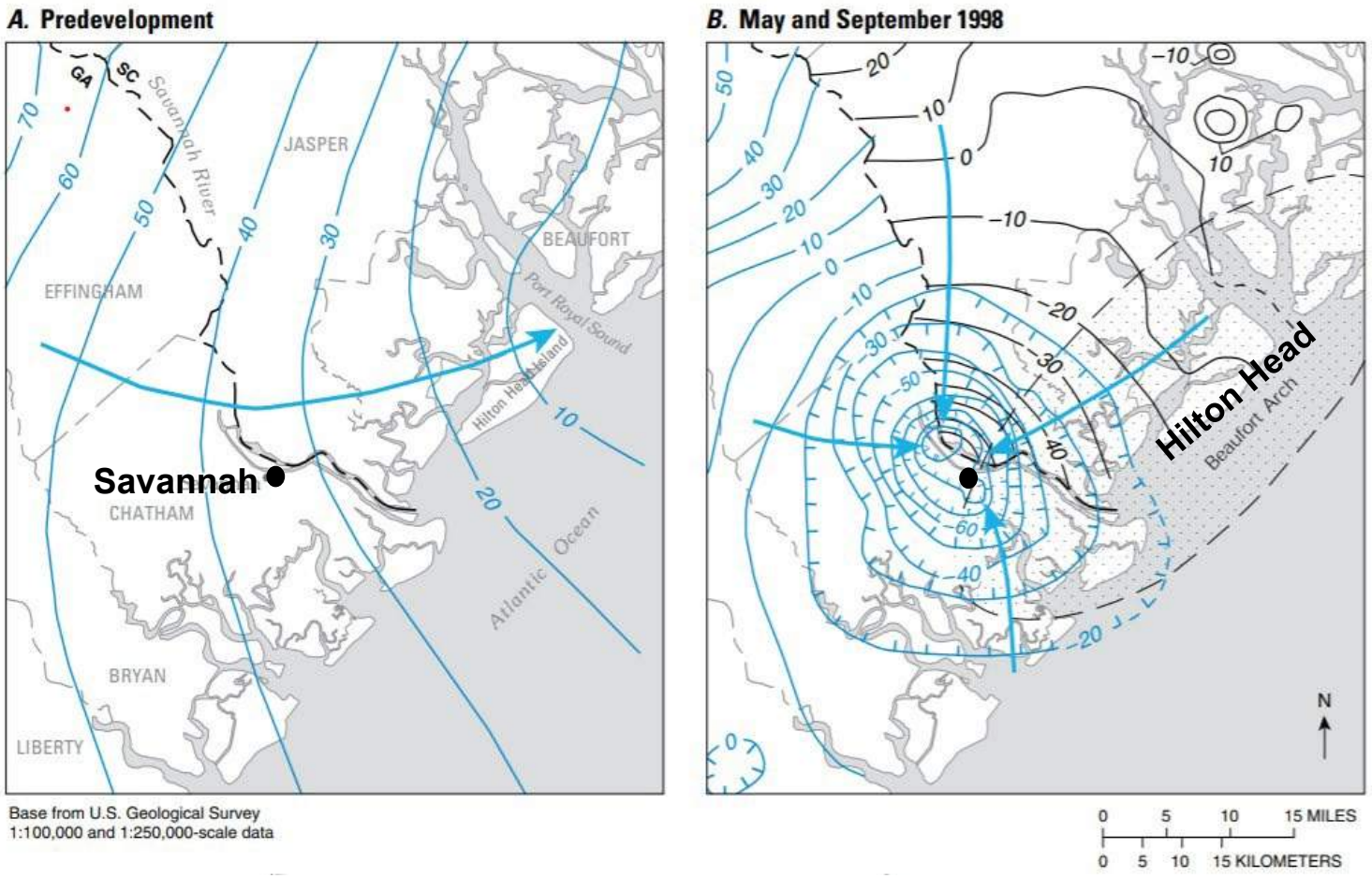


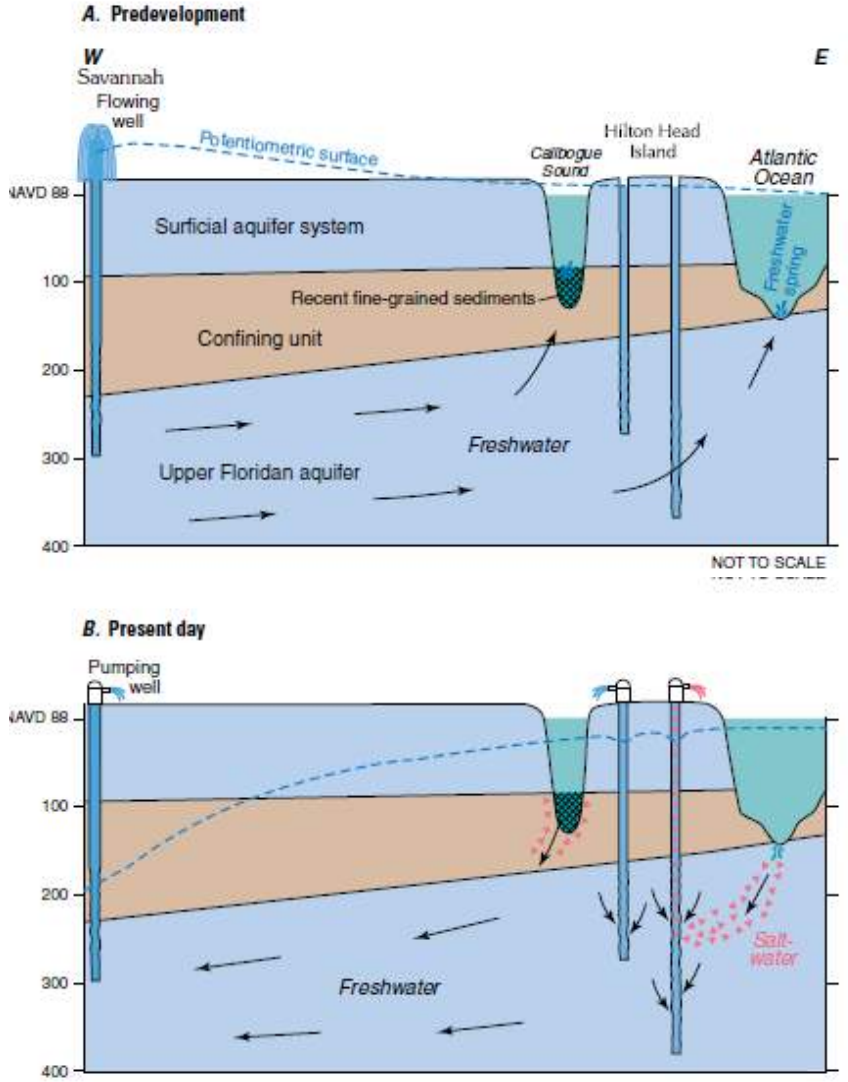
Long-term pumping can result in "cones of depression", which are areas where groundwater levels have declined. The greatest declines are centered at the pumping wells, but the zone of influence can spread out for tens of miles.



Cone of Depression in Savannah, GA

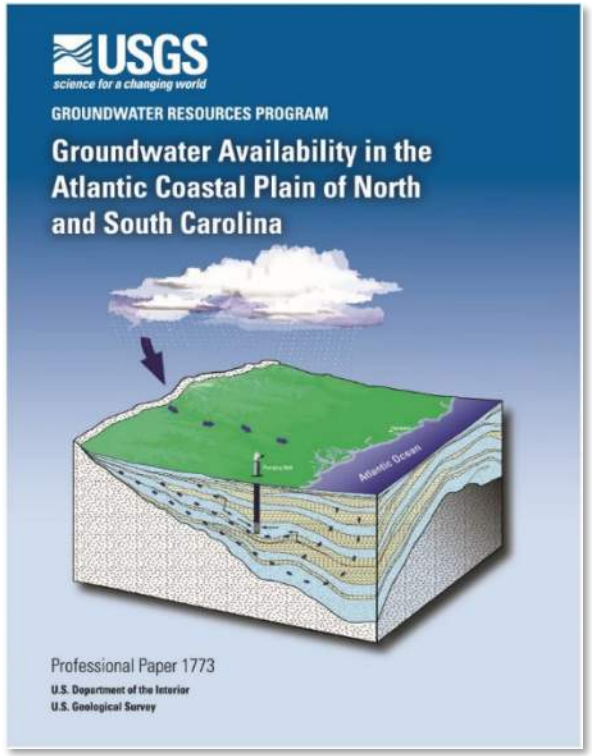
Upper Floridan Aquifer





From: Provost et al., 2006; USGS SIR 2006-5058

Lower Savannah-Salkehatchie Groundwater Model



- USGS Coastal Plain Groundwater model completed in 2021.
  - Regional model will be developed in coming year.
- ***Model is a decision-making tool used to assess groundwater availability and management strategies and will support the development of River Basin Plans.***
- More information can be found at https://hydrology.dnr.sc.gov/groundwater-models.html.

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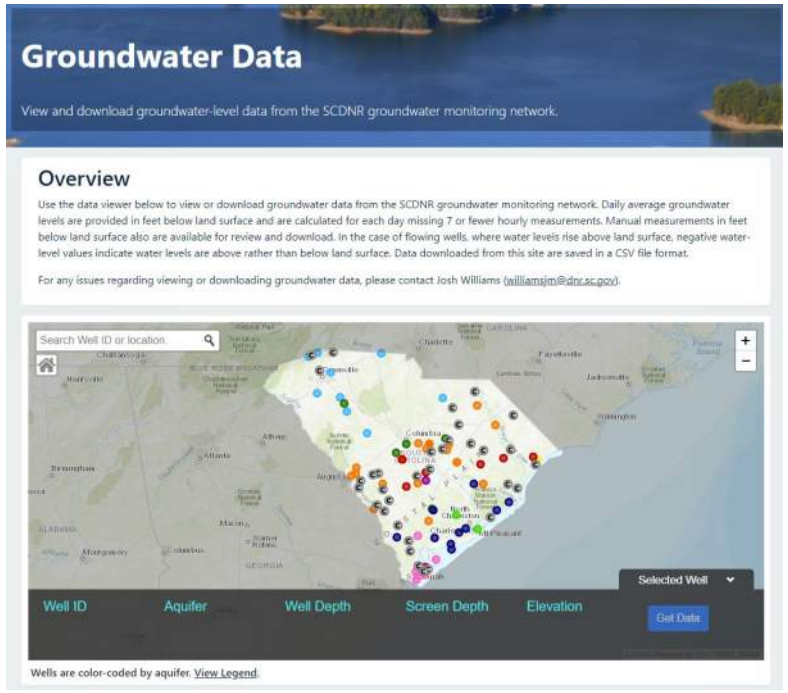
Groundwater Data and Publications



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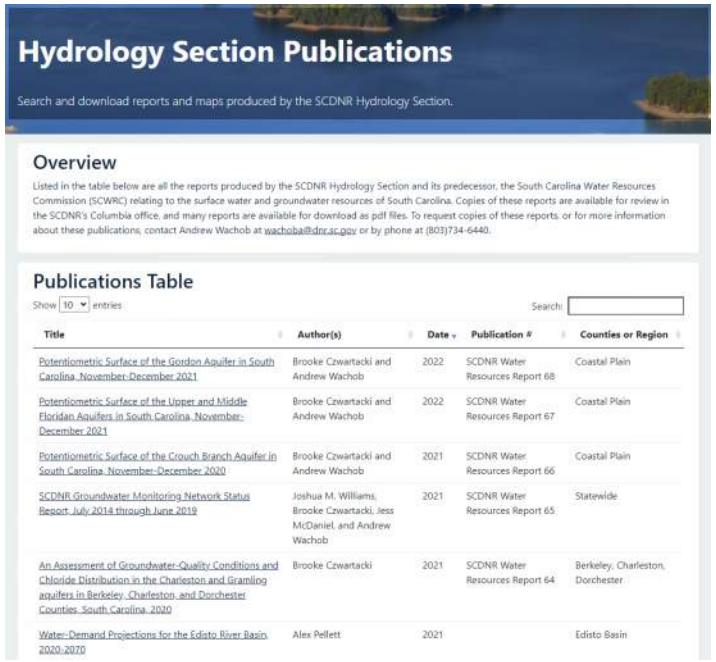

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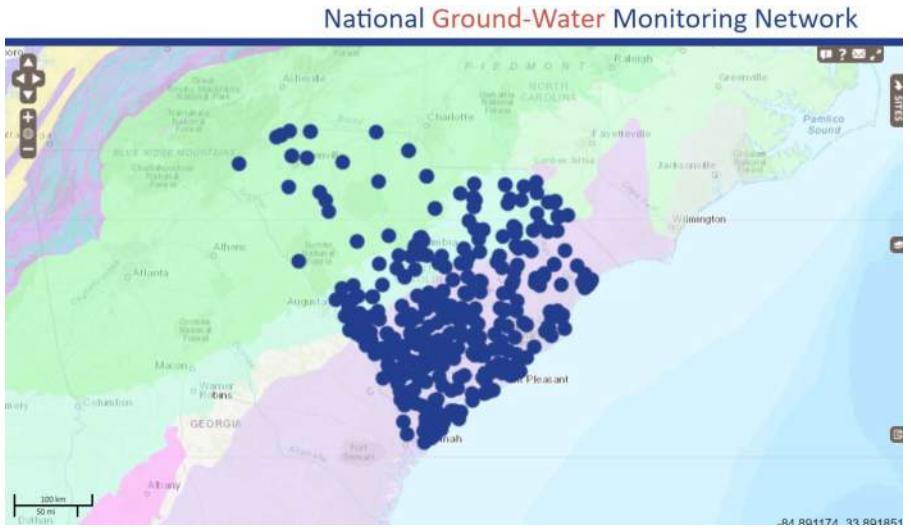

https://cida.usgs.gov/ngwmn/index.jsp

Summary

- Groundwater is an important resource in the basin
- The Coastal Plain aquifer system is highly productive and capable of transmitting large volumes of water
- Crouch Branch and McQueen Branch aquifers are the primary aquifers in the upper portions of the LSS Basin
- Upper-Middle Floridan and Gordon aquifers are the primary aquifers in the lower portions of the LSS Basin
- Groundwater-level data and potentiometric maps illustrate changes in groundwater storage and hydrologic gradients
- These datasets can identify data gaps and inform where additional monitoring is needed

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