



Groundwater Resources of the Lower Savannah-Salkehatchie Basin

Lower Savannah-Salkehatchie River Basin Council – Meeting #2, December 7th, 2023
Bull Durham Center, Estill, SC

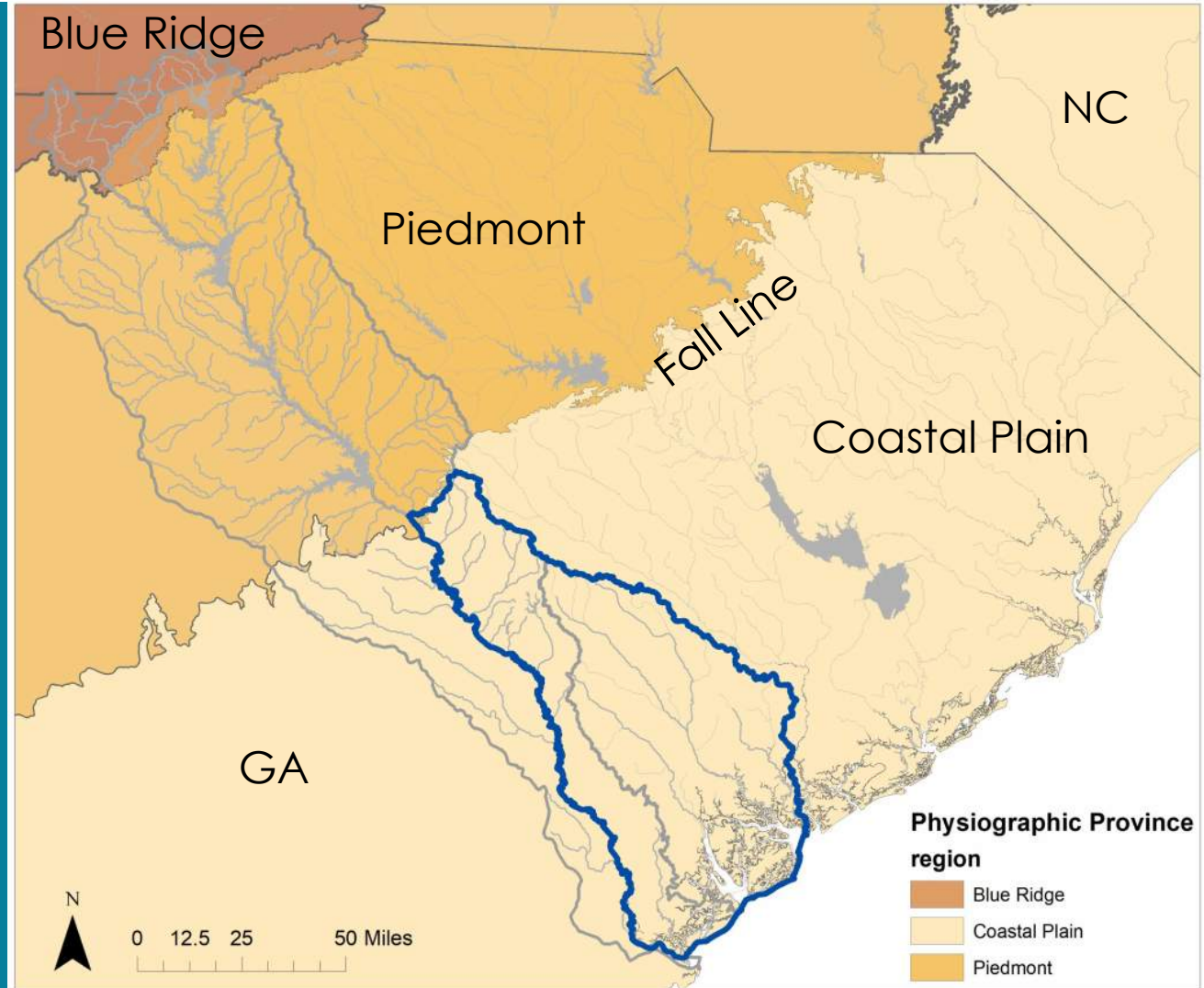
Brooke Czwartacki
Hydrologist
South Carolina Department of Natural Resources



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

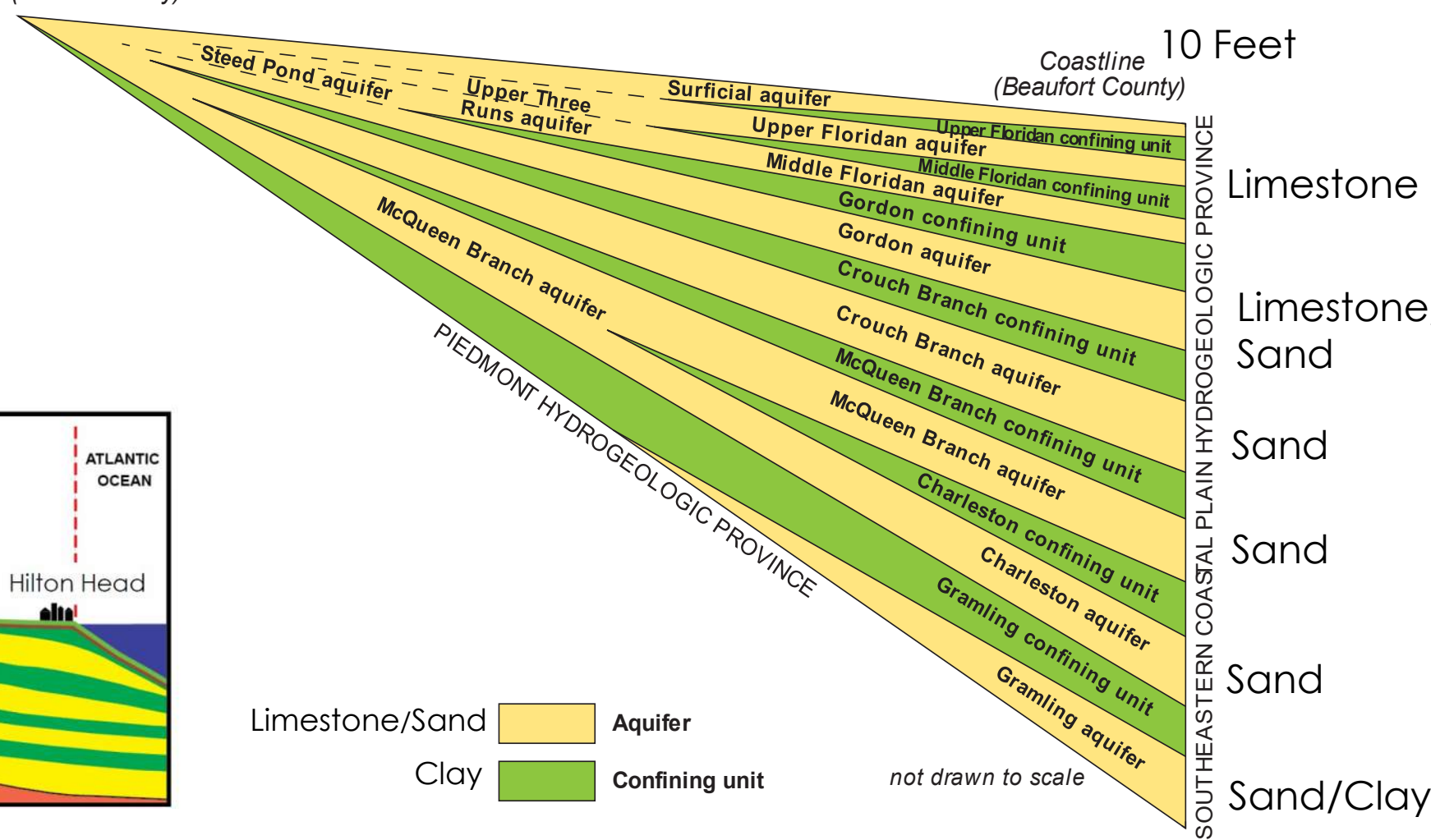
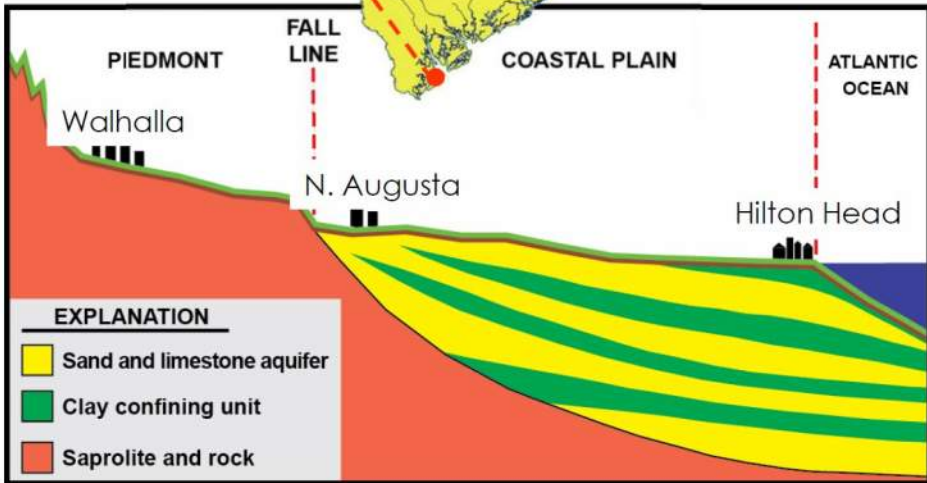
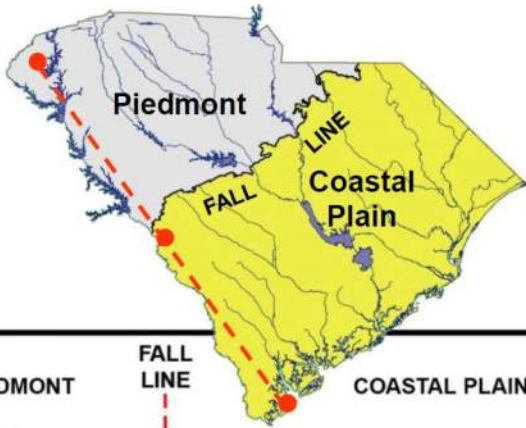




SC Hydrogeologic Framework Along Dip

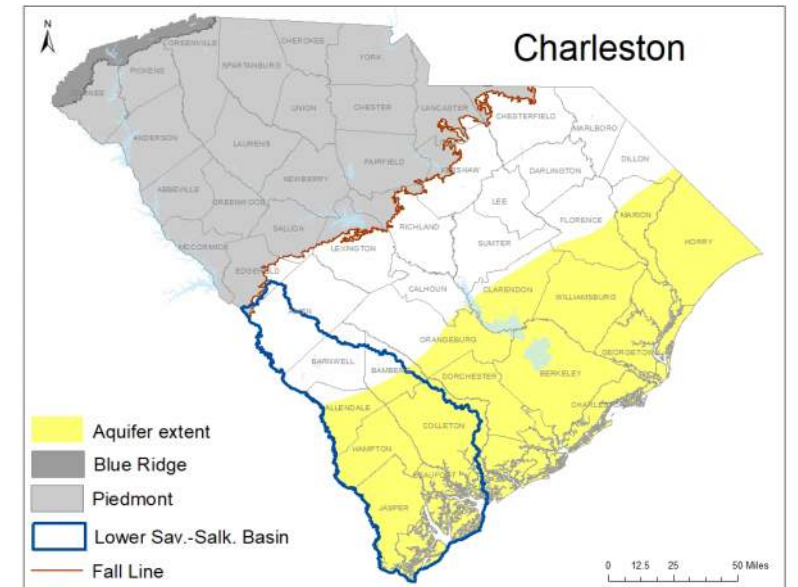
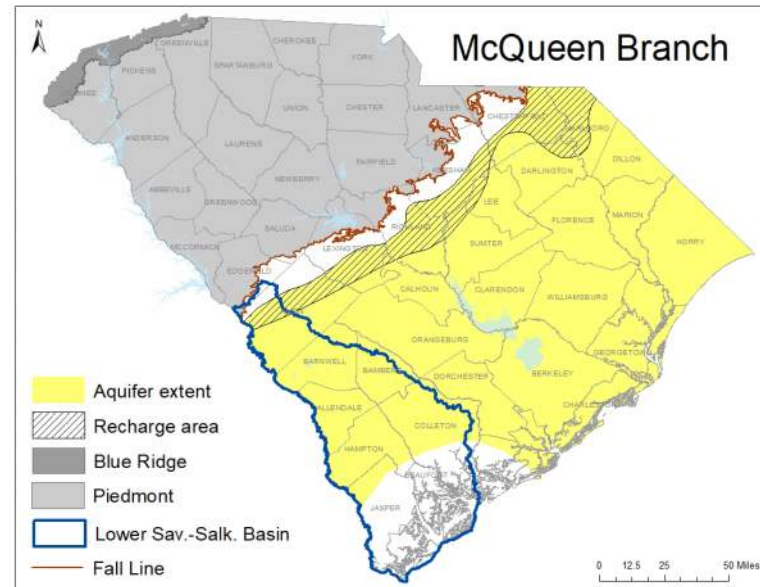
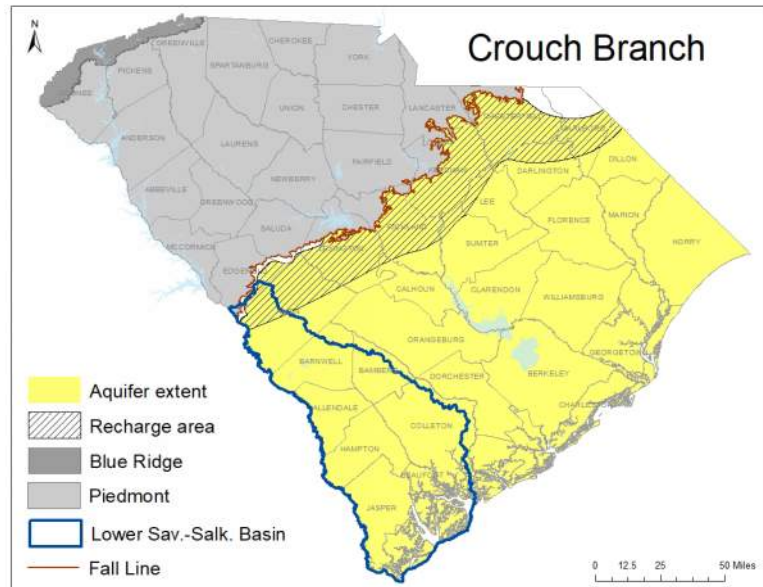
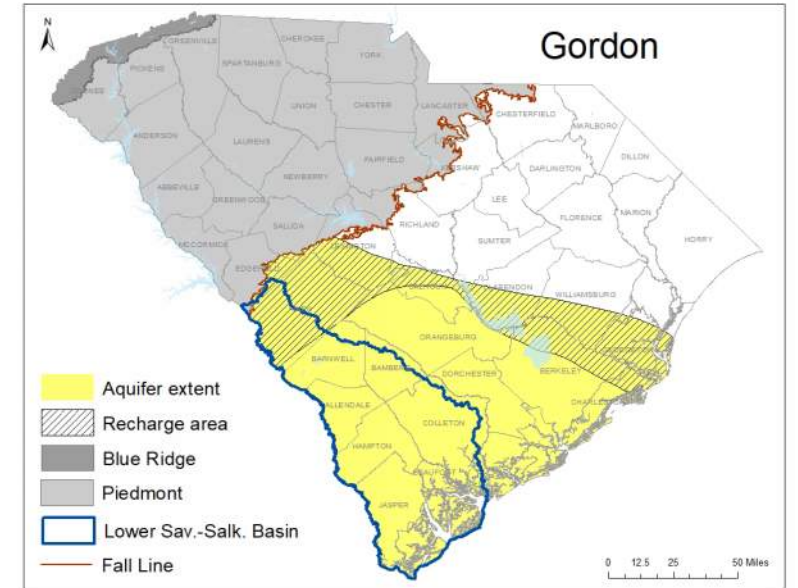
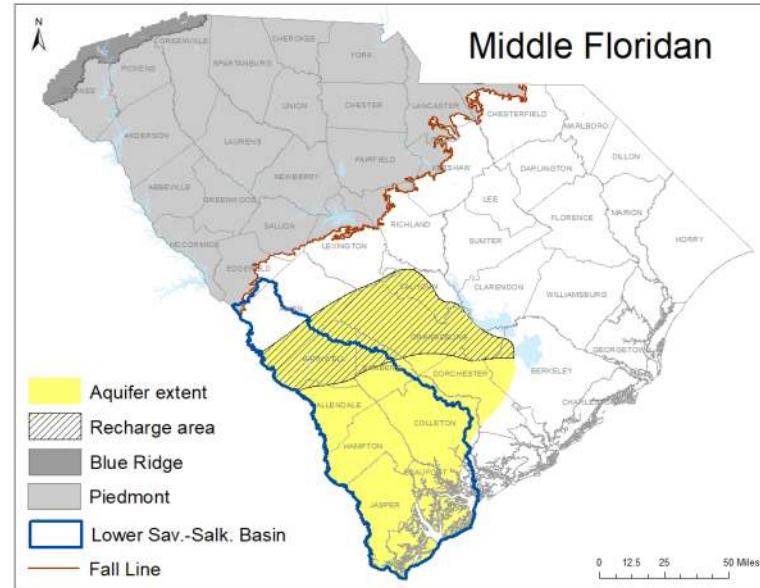
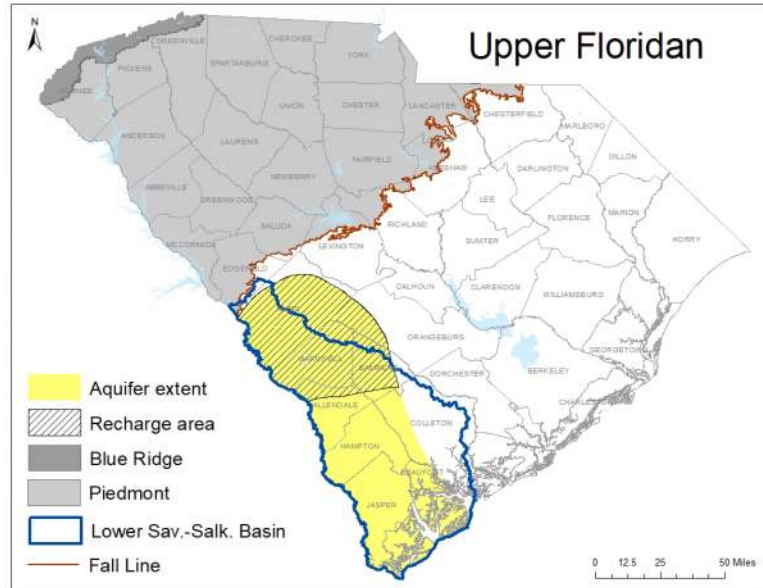
450 Feet *Fall Line (Aiken County)*

10 Feet *Coastline (Beaufort County)*

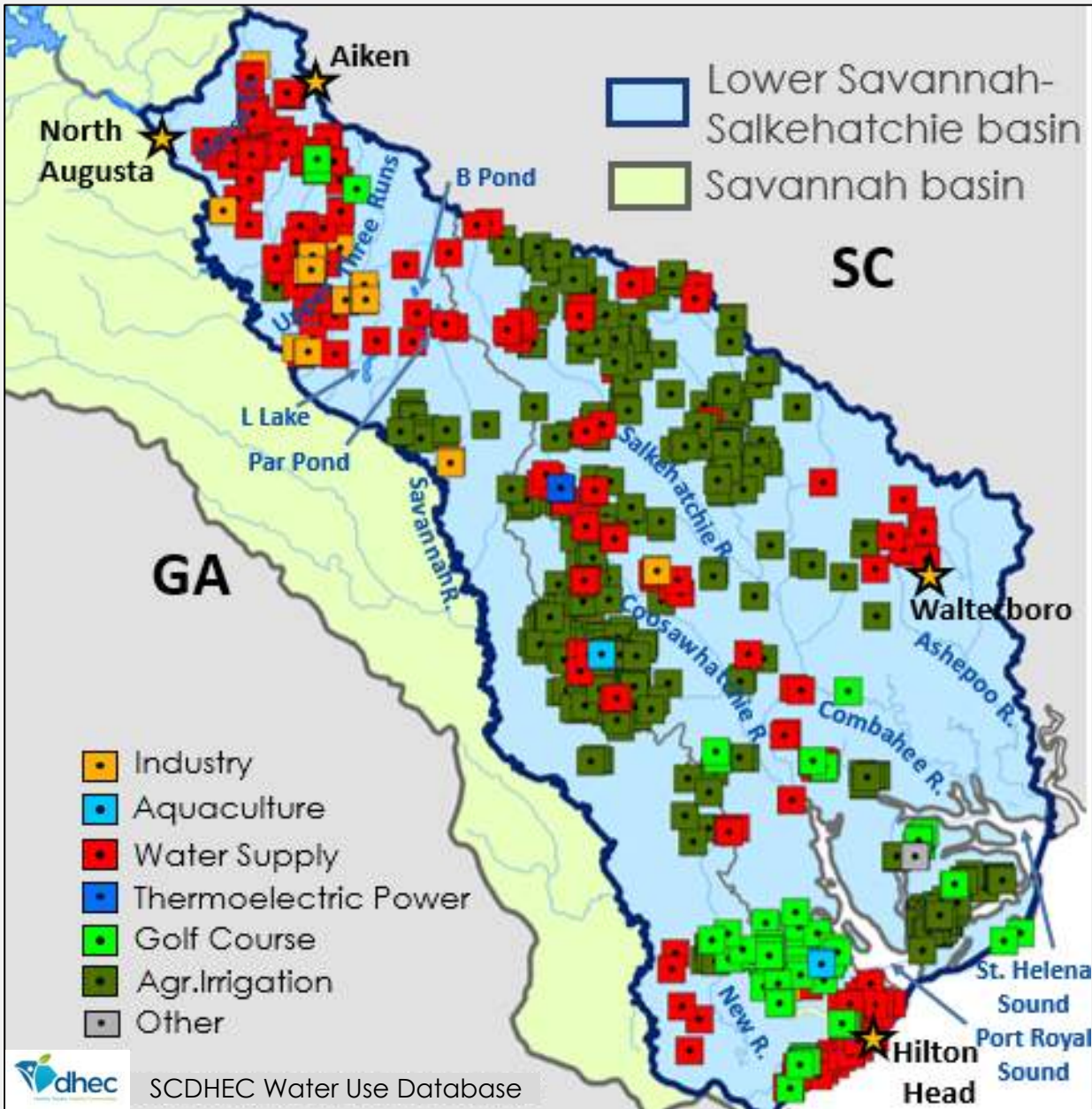


-4000 Feet

Coastal Plain Aquifer Extents

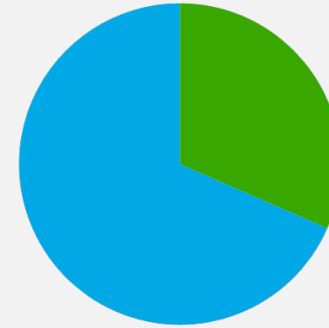


Reported SC Water Withdrawals (2022 Groundwater)



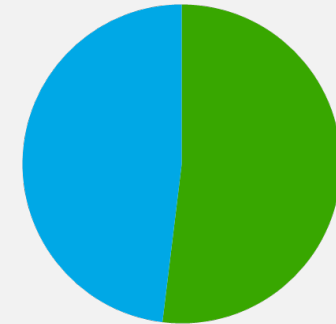
Including Energy

SW : 68% 155 MGD
 GW: 32% 73 MGD



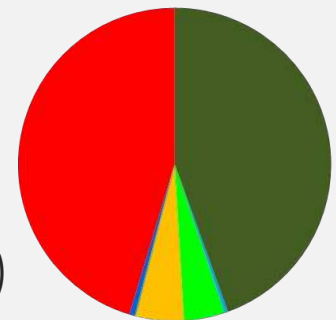
Excluding Energy

SW : 47% 66 MGD
 GW: 53% 73 MGD



Groundwater Including Energy

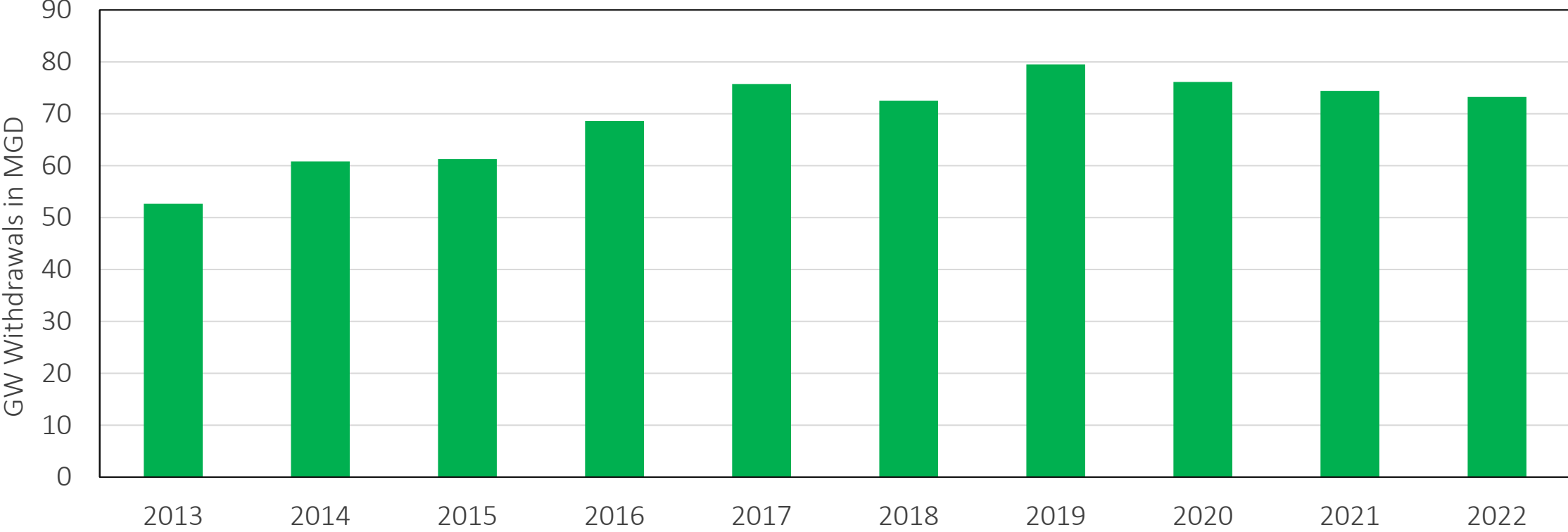
- Water Supply (47%, 34 MGD)
- Agr. Irrigation (43%, 32 MGD)
- Industry (5%, 4 MGD)
- Golf Course (4%, 3 MGD)
- Thermoelectric Power (1%, 0.4 MGD)
- Aquaculture (<1%, 0.3 MGD)
- Other (<1%, 0.07 MGD)





Reported Groundwater Withdrawals (2013 – 2022)

Groundwater Withdrawals Including Energy (MGD)



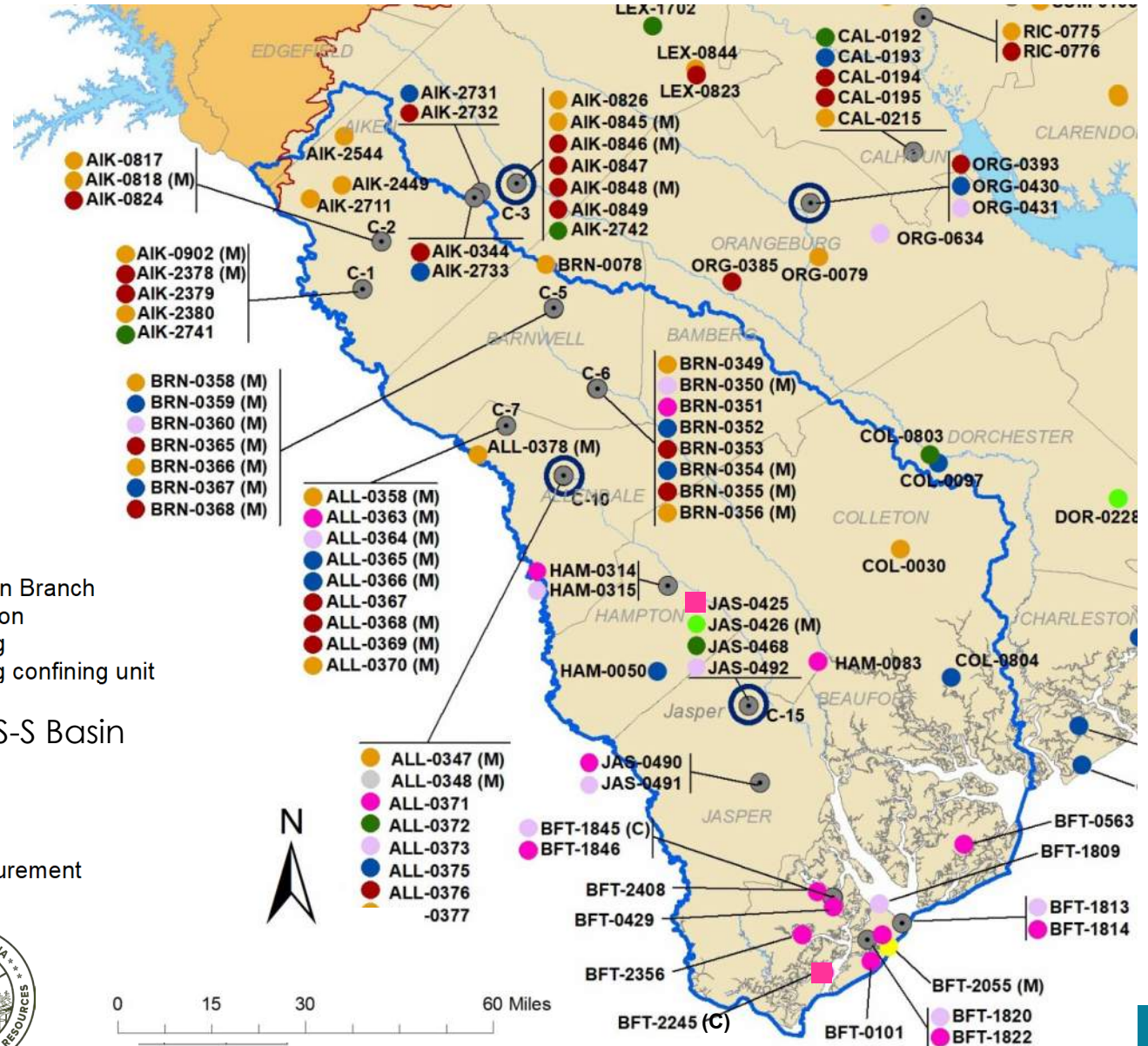
Groundwater Monitoring Network



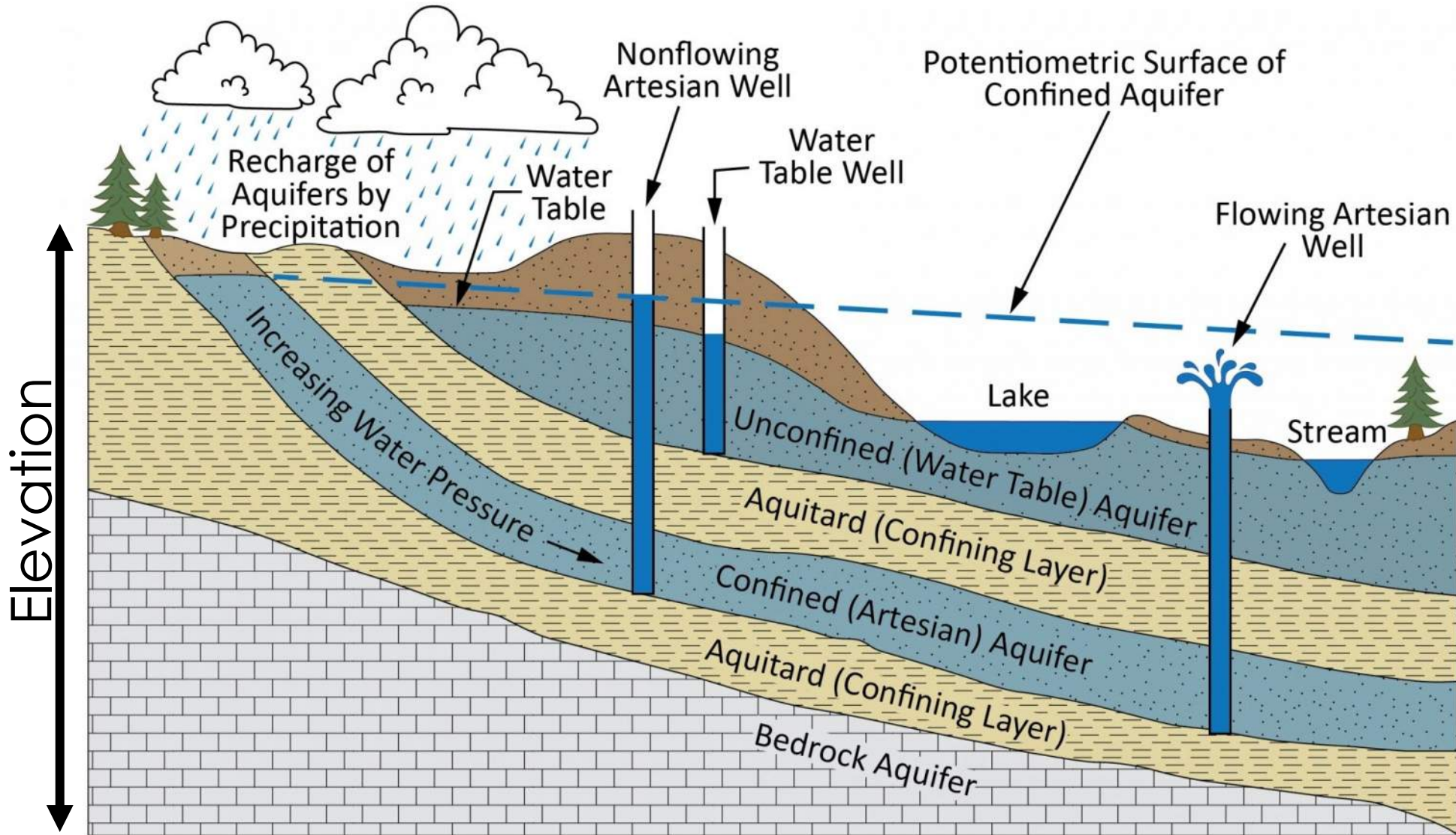
- 75 well sites actively monitored completed in 9 aquifers
- Period of record ranges from 3 to 68 years



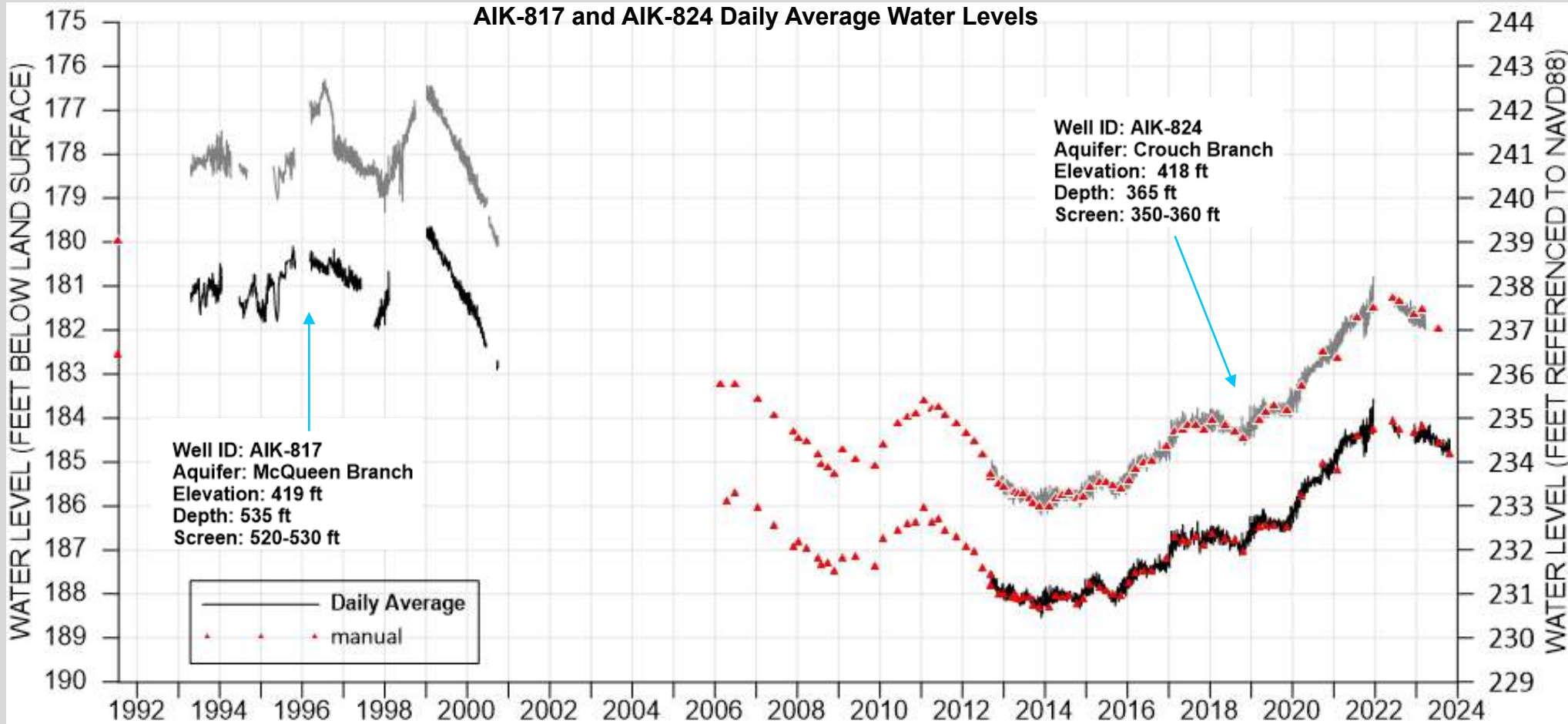
- Aquifer**
- Surficial aquifer system
 - Gordon
 - Upper Floridan
 - Middle Floridan
 - Crouch Branch
 - McQueen Branch
 - Charleston
 - Gramling
 - Gramling confining unit
- Agency**
- SCDNR
 - USGS
 - Cluster site
- (M) Manual water level measurement
(C) Water level and conductivity measurement
(T) Telemetry Site
- LS-S Basin



Water-Level Measurements of an Aquifer



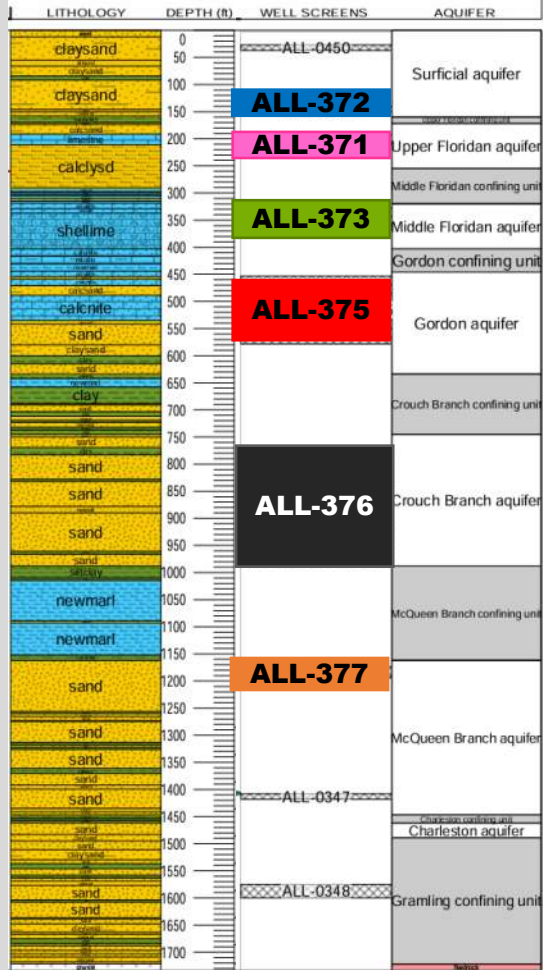
Example: Well Cluster Site in Aiken County (C-2)



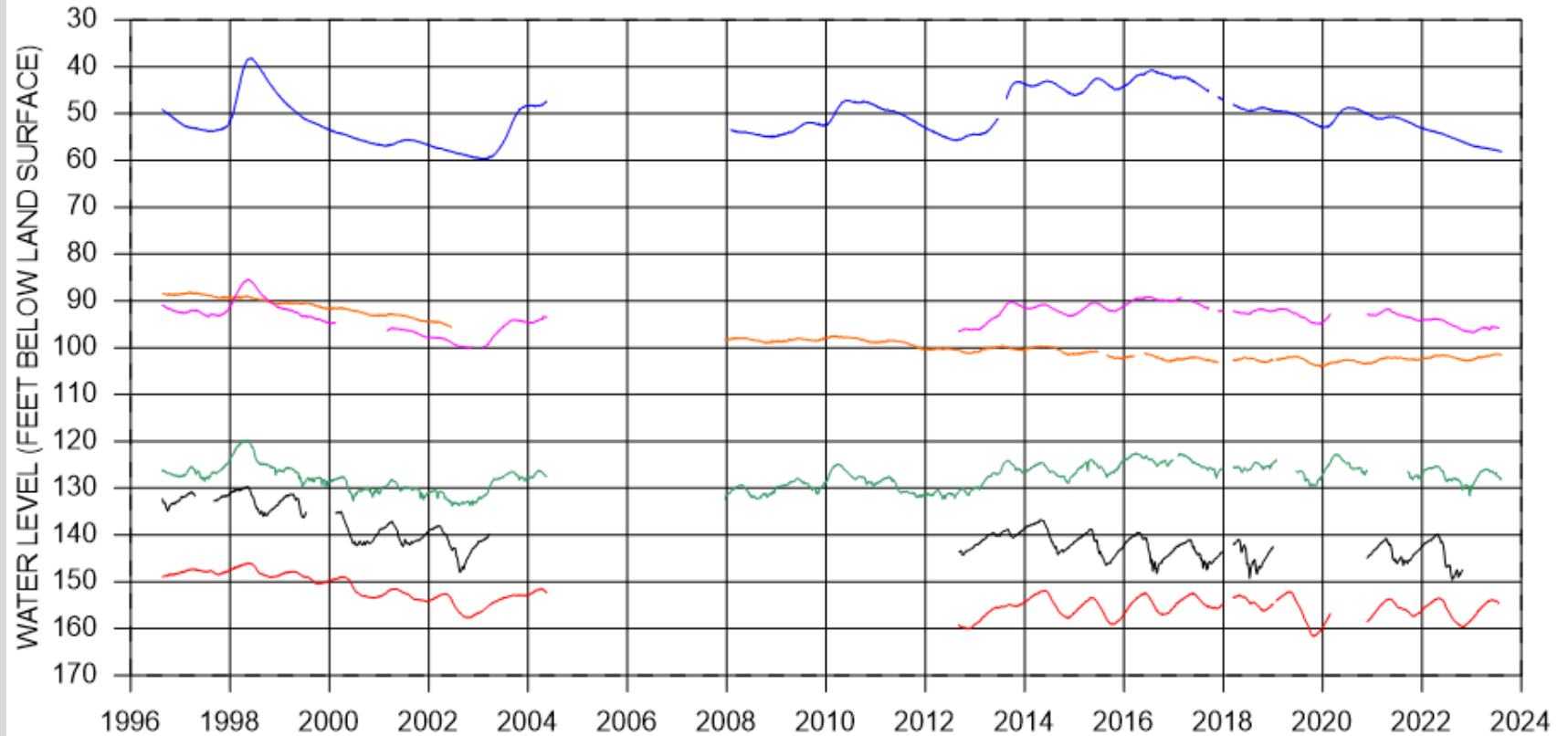
Example: Well Cluster site in Allendale County



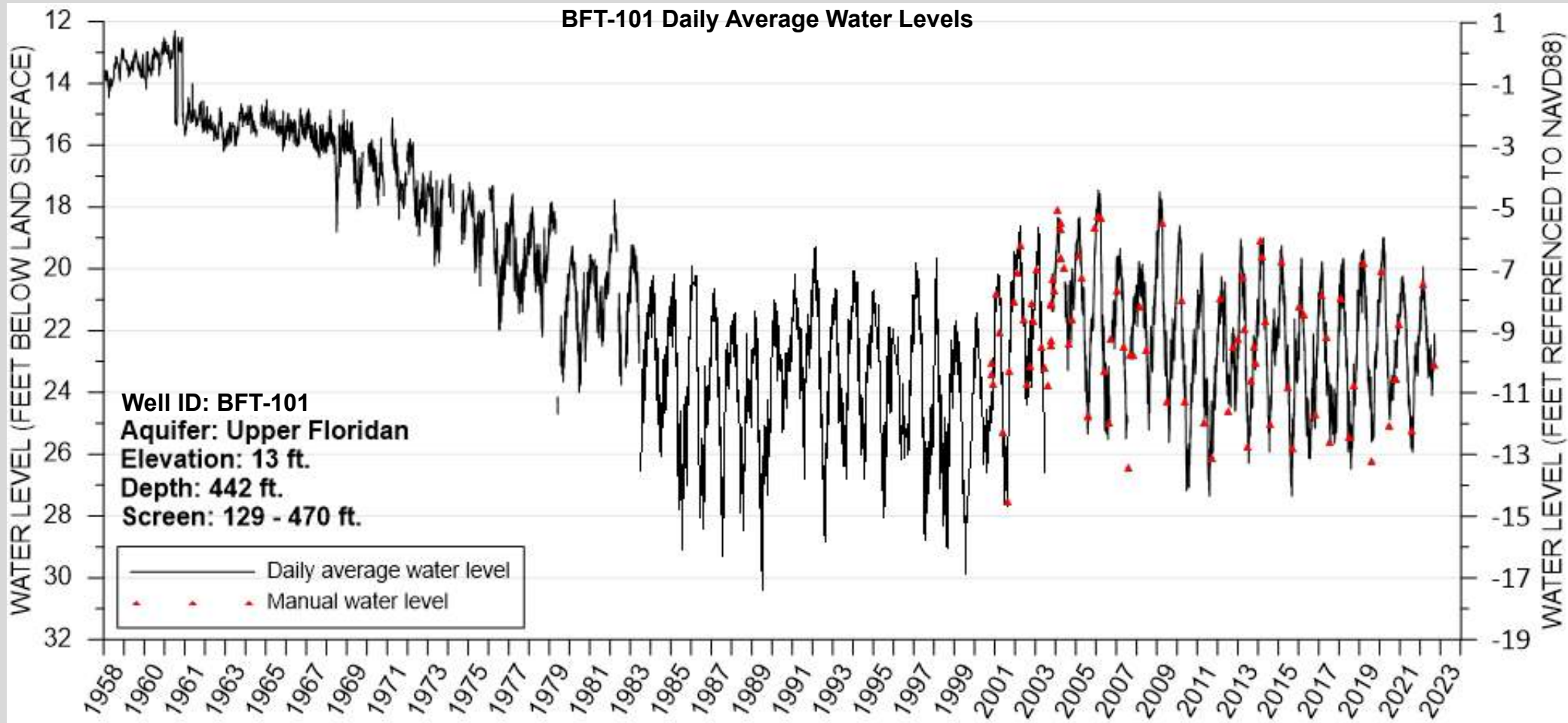
Well: ALL-348 (C-10)
 Name: APPLETON
 Depth: 1734.0
 Elevation: 281.6



C-10 Daily Average Water Levels



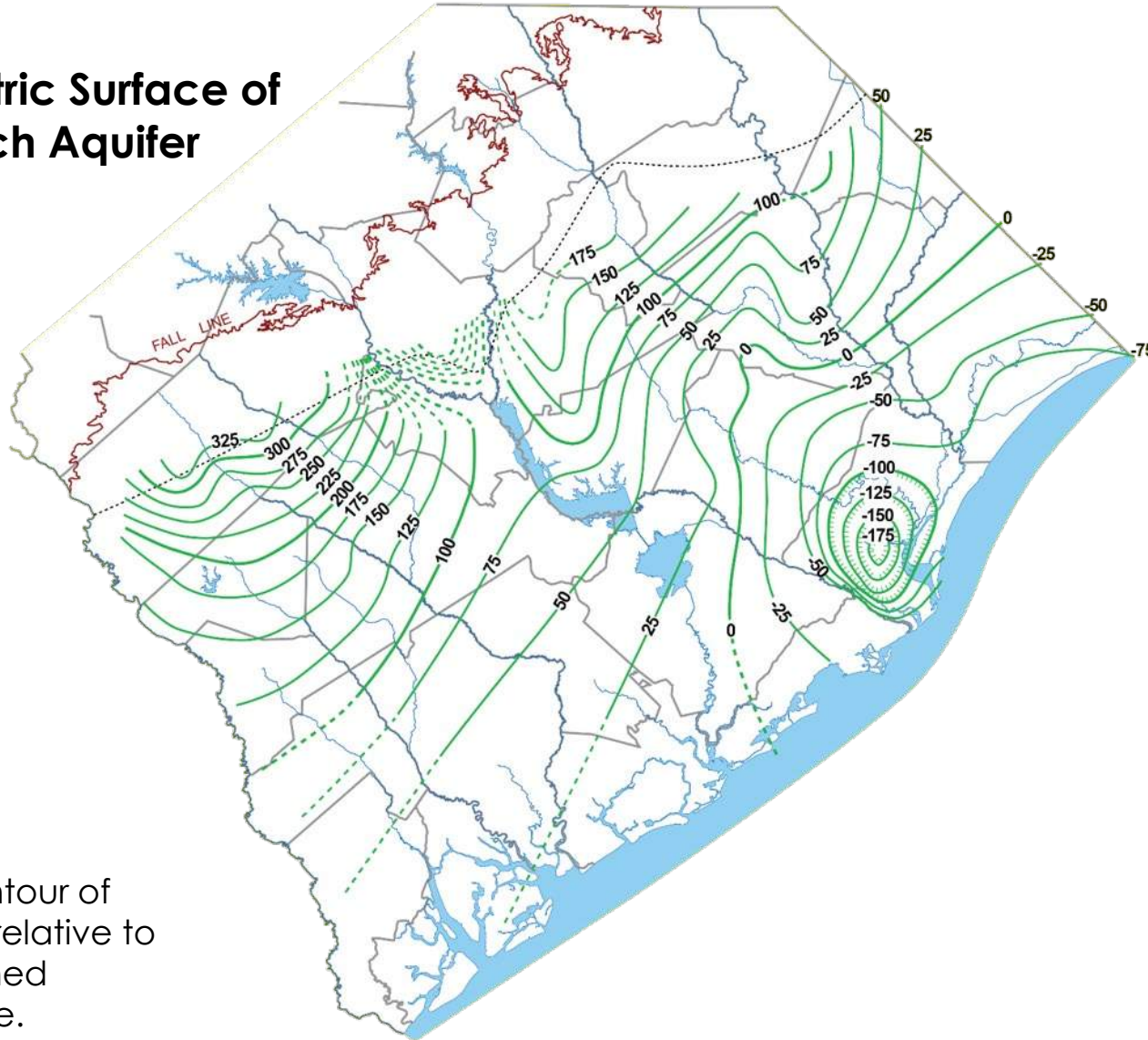
Example: Upper Floridan Aquifer in Beaufort County





Potentiometric Water-Level of an Aquifer

2016 Potentiometric Surface of the Crouch Branch Aquifer



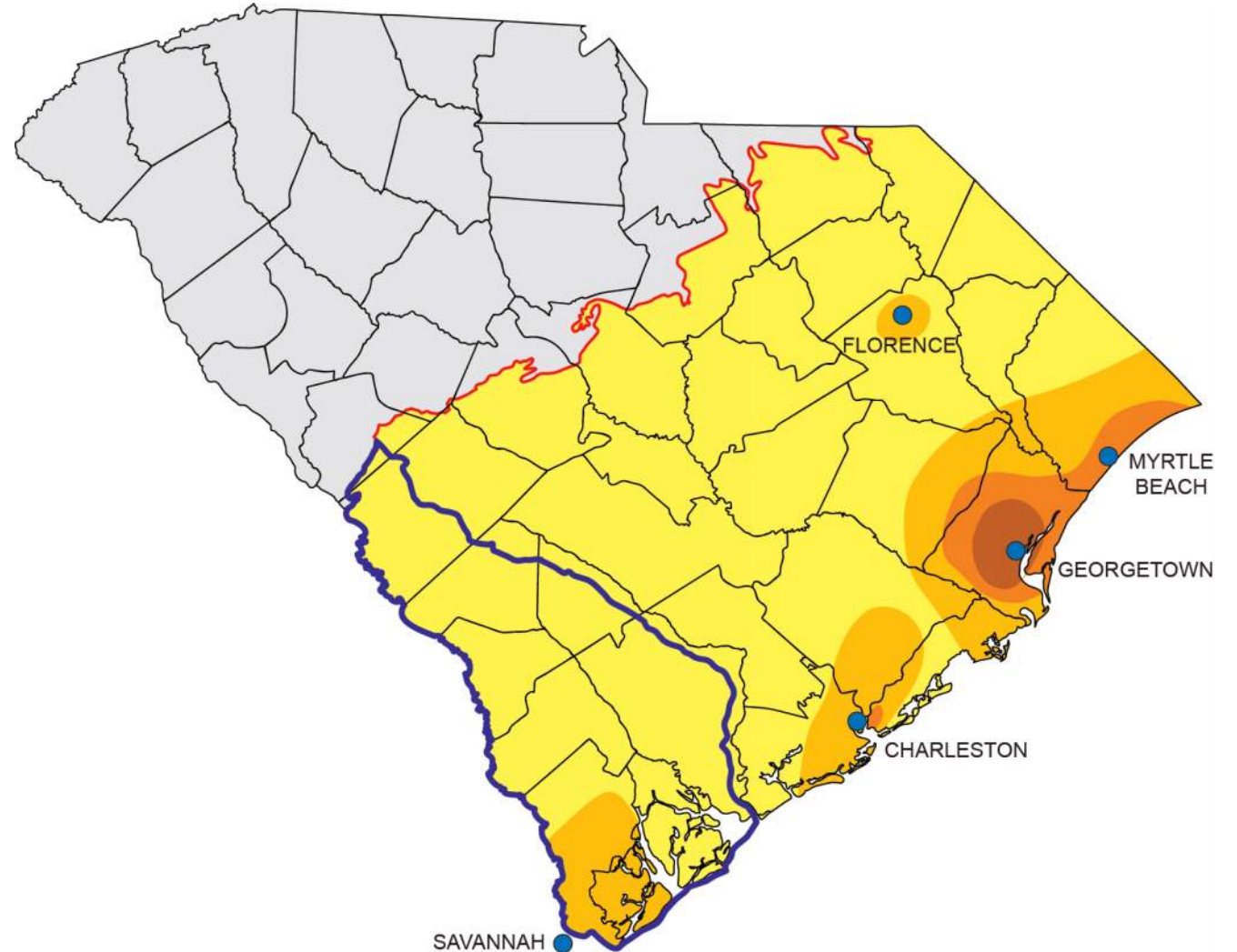
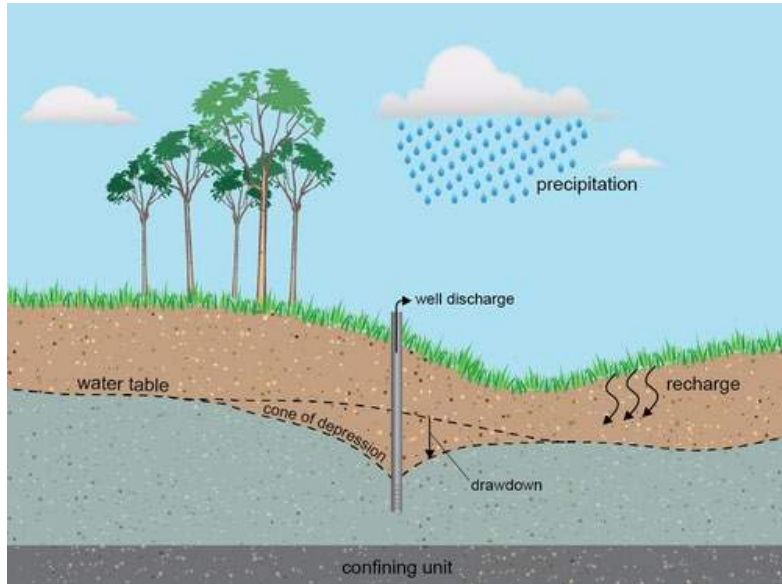
EXPLANATION

— 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



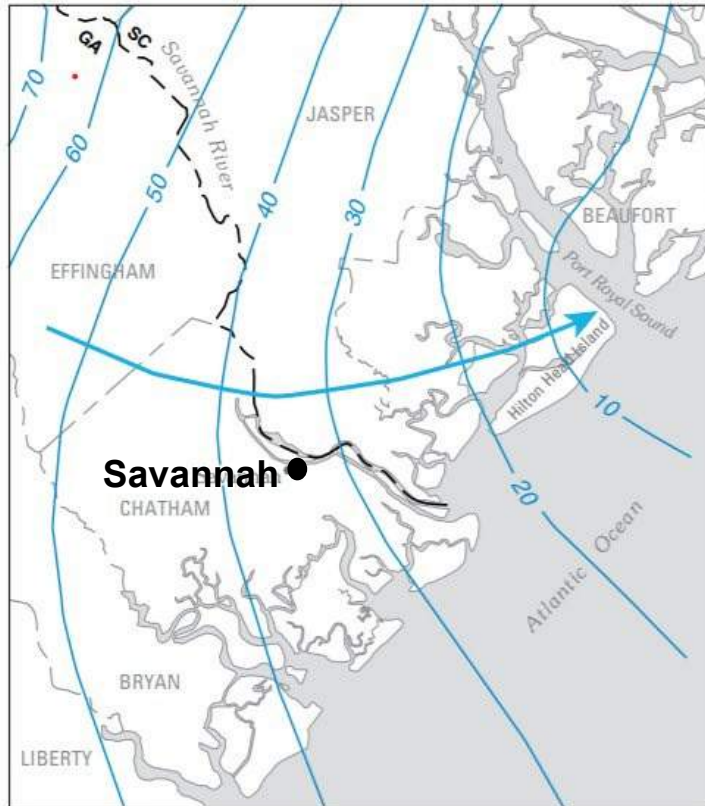
Long-term pumping can result in “cones of depression”, which are areas where groundwater levels have declined. The greatest declines are centered at the pumping wells, but the zone of influence can spread out for tens of miles.

Cone of Depression in Savannah, GA



Upper Floridan Aquifer

A. Predevelopment



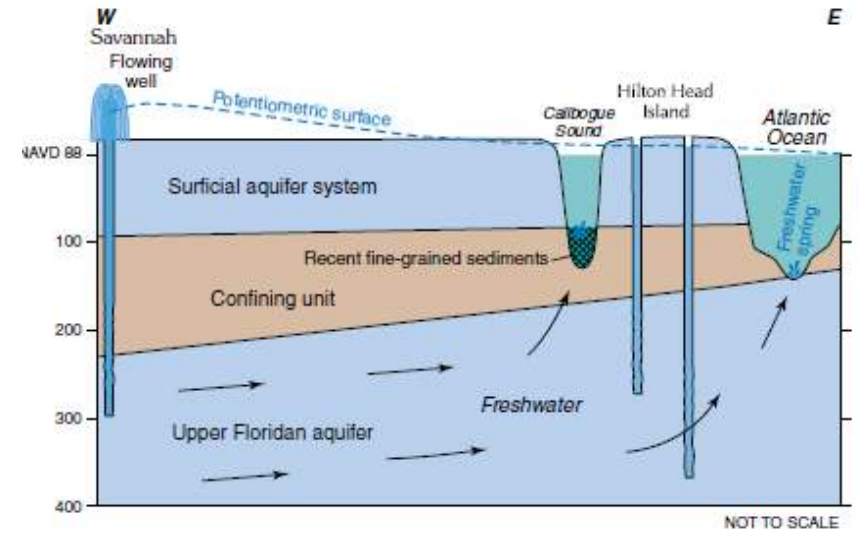
Base from U.S. Geological Survey
1:100,000 and 1:250,000-scale data

B. May and September 1998



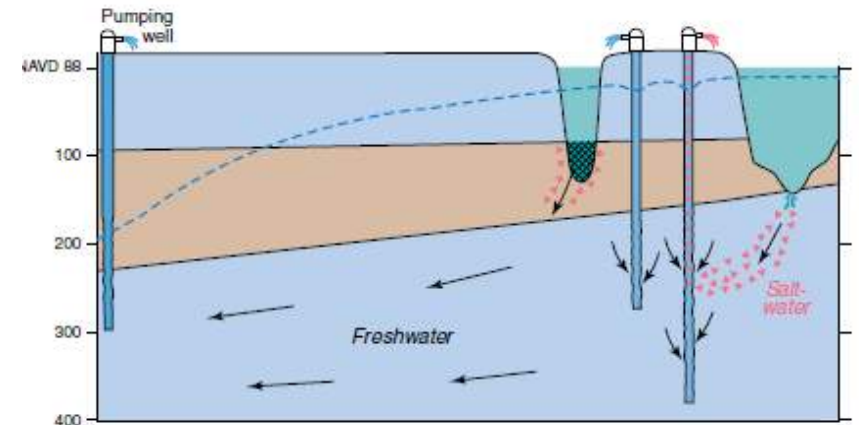
0 5 10 15 MILES
0 5 10 15 KILOMETERS

A. Predevelopment

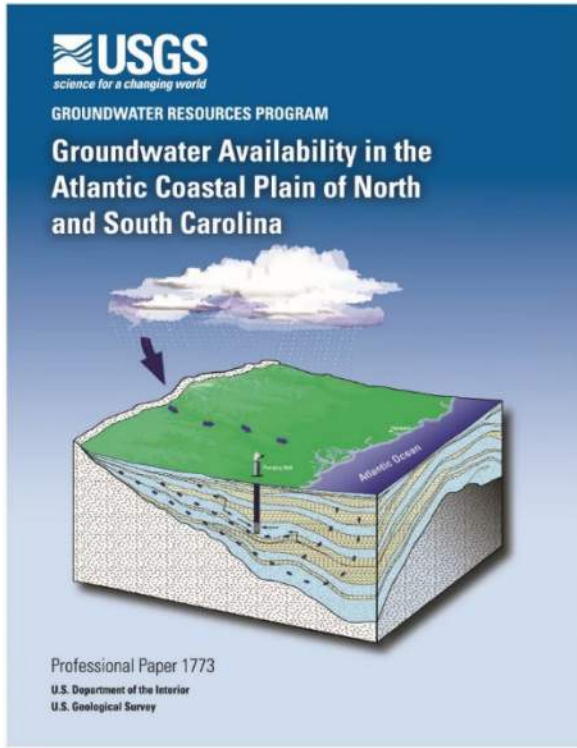


NOT TO SCALE

B. Present day



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>.

Groundwater Data and Publications



Groundwater Data

View and download groundwater-level data from the SCDNR groundwater monitoring network.

Overview

Use the data viewer below to view or download groundwater data from the SCDNR groundwater monitoring network. Daily average groundwater levels are provided in feet below land surface and are calculated for each day missing 7 or fewer hourly measurements. Manual measurements in feet below land surface also are available for review and download. In the case of flowing wells, where water levels rise above land surface, negative water-level values indicate water levels are above rather than below land surface. Data downloaded from this site are saved in a CSV file format.

For any issues regarding viewing or downloading groundwater data, please contact Josh Williams (williamsjm@dnr.sc.gov).

Search Well ID or location

Well ID Aquifer Well Depth Screen Depth Elevation Get Data

Wells are color-coded by aquifer. [View Legend](#)

<https://hydrology.dnr.sc.gov/groundwater-data/>

Hydrology Section Publications

Search and download reports and maps produced by the SCDNR Hydrology Section.

Overview

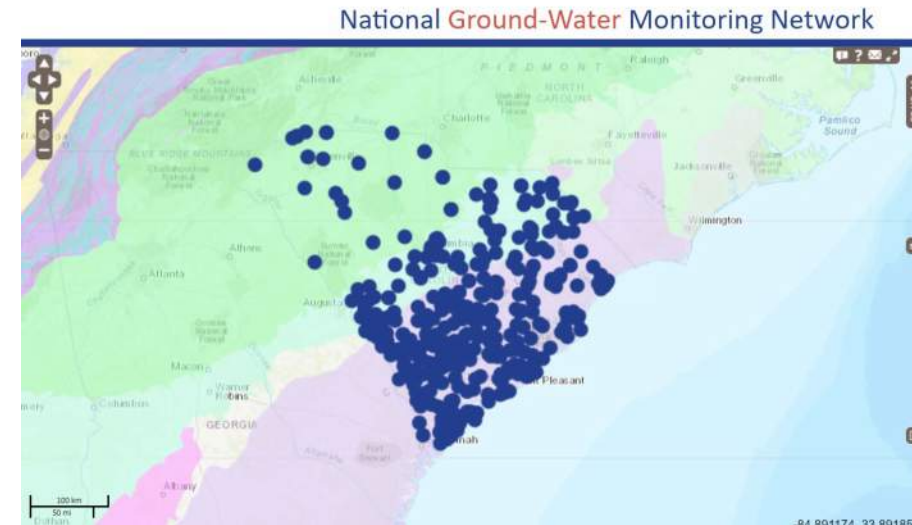
Listed in the table below are all the reports produced by the SCDNR Hydrology Section and its predecessor, the South Carolina Water Resources Commission (SCWRC) relating to the surface water and groundwater resources of South Carolina. Copies of these reports are available for review in the SCDNR's Columbia office, and many reports are available for download as pdf files. To request copies of these reports, or for more information about these publications, contact Andrew Wachob at wachoba@dnr.sc.gov or by phone at (803)734-6440.

Publications Table

Show 10 entries

Title	Author(s)	Date	Publication #	Counties or Region
Potentiometric Surface of the Gordon Aquifer in South Carolina, November-December 2021	Brooke Czwartacki and Andrew Wachob	2022	SCDNR Water Resources Report 68	Coastal Plain
Potentiometric Surface of the Upper and Middle Floridan Aquifers in South Carolina, November-December 2021	Brooke Czwartacki and Andrew Wachob	2022	SCDNR Water Resources Report 67	Coastal Plain
Potentiometric Surface of the Crouch Branch Aquifer in South Carolina, November-December 2020	Brooke Czwartacki and Andrew Wachob	2021	SCDNR Water Resources Report 66	Coastal Plain
SCDNR Groundwater Monitoring Network Status Report July 2014 through June 2019	Joshua M. Williams, Brooke Czwartacki, Jess McDaniel, and Andrew Wachob	2021	SCDNR Water Resources Report 65	Statewide
An Assessment of Groundwater-Quality Conditions and Chloride Distribution in the Charleston and Gramling aquifers in Berkeley, Charleston, and Dorchester Counties, South Carolina, 2020	Brooke Czwartacki	2021	SCDNR Water Resources Report 64	Berkeley, Charleston, Dorchester
Water-Demand Projections for the Edisto River Basin, 2020-2070	Alex Pellett	2021		Edisto Basin

<https://hydrology.dnr.sc.gov/publications.html>



<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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