Groundwater Resources of the Pee Dee Basin

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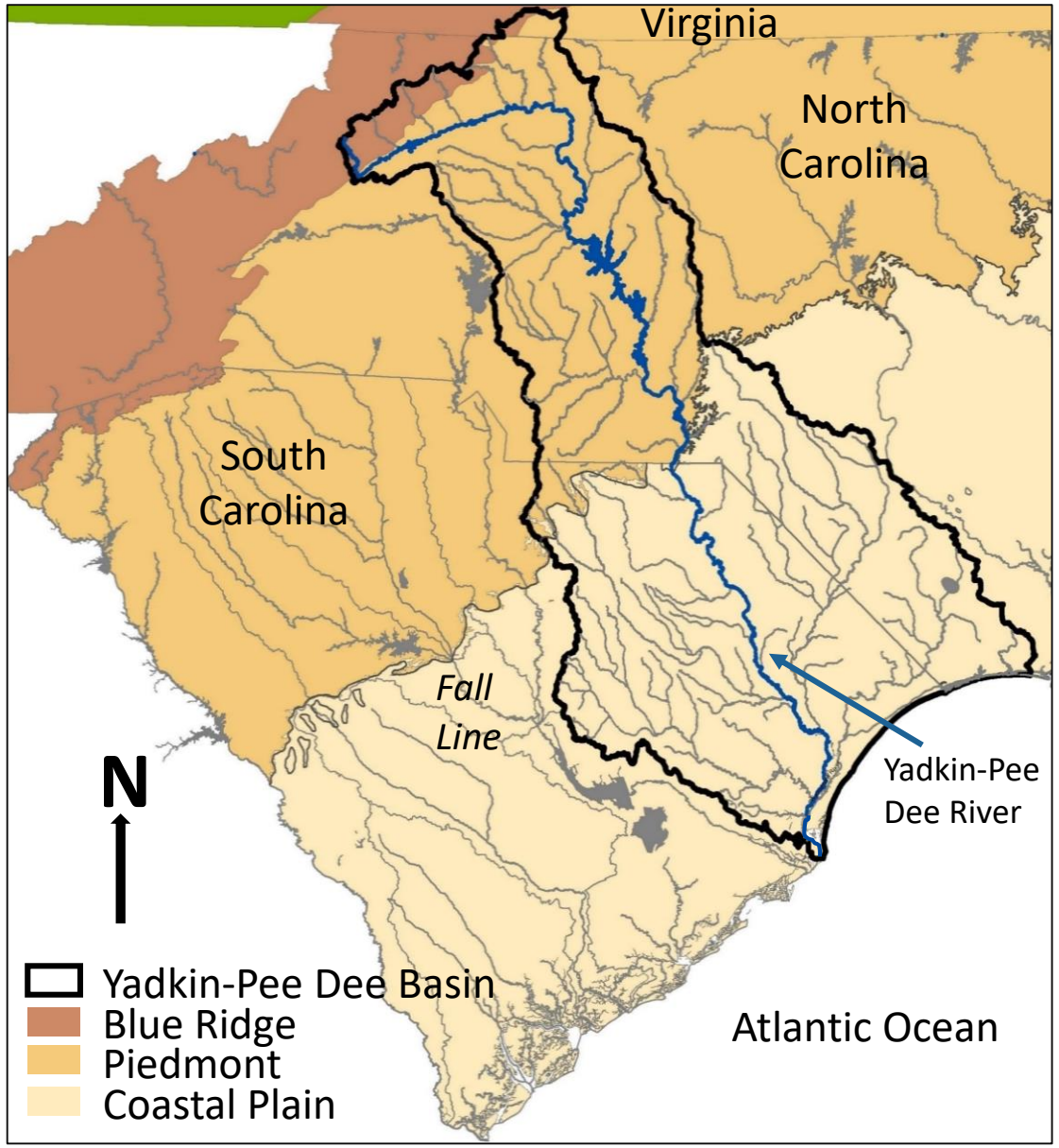
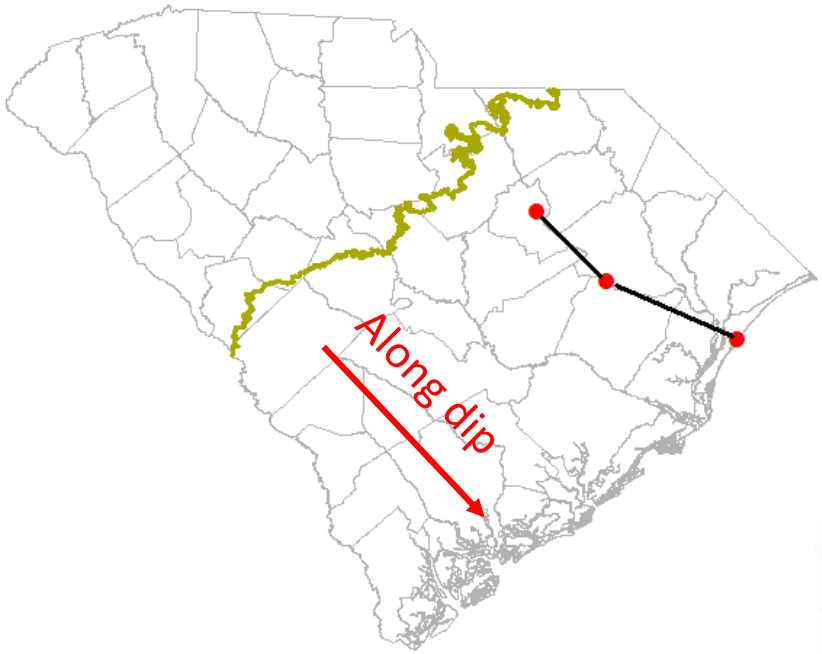
Pee Dee River Basin Council – Meeting #12
Clemson Pee Dee REC
May 23, 2023

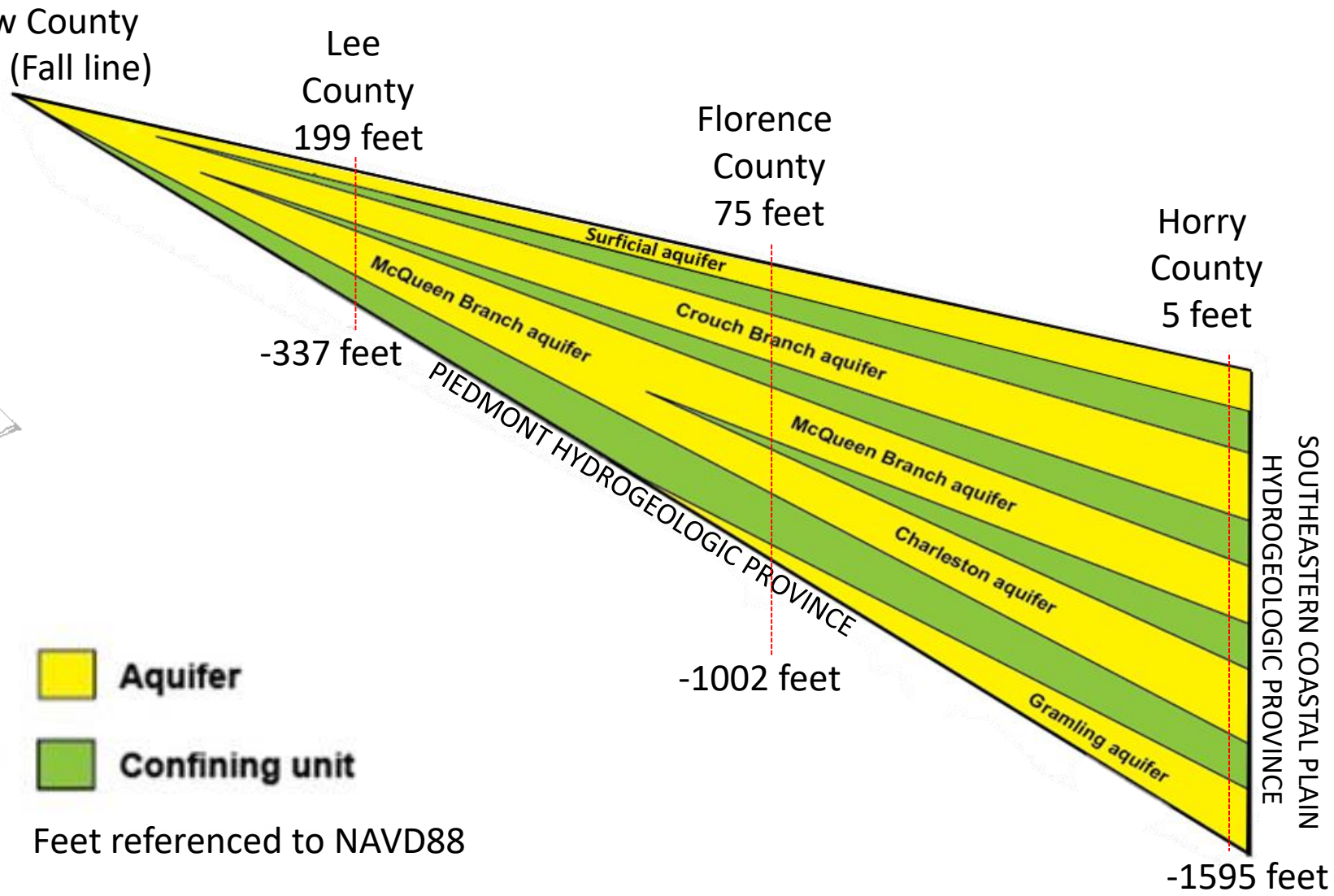
South Carolina Physiographic Provinces

- 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 Sea level at the coast
    - Sediments thicken from zero at the Fall line to greater than 1,500 feet in Horry 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
    - Abundant volume of stored water represents a vital resource throughout Coastal Plain

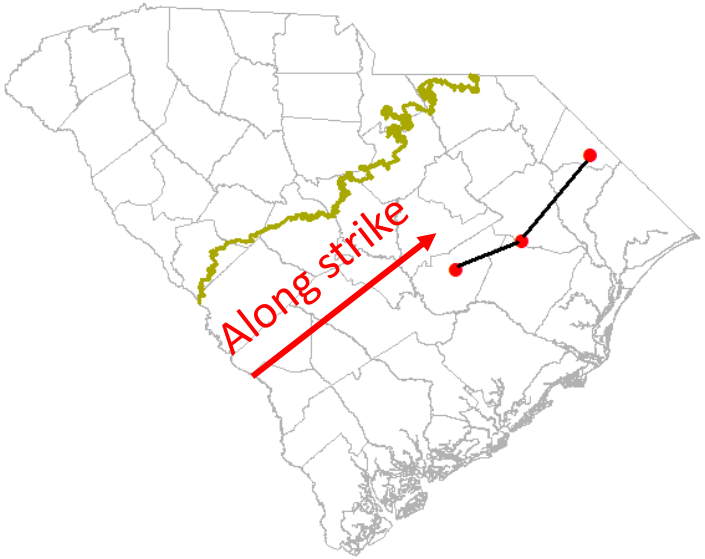


SC Hydrogeologic Framework Along Dip



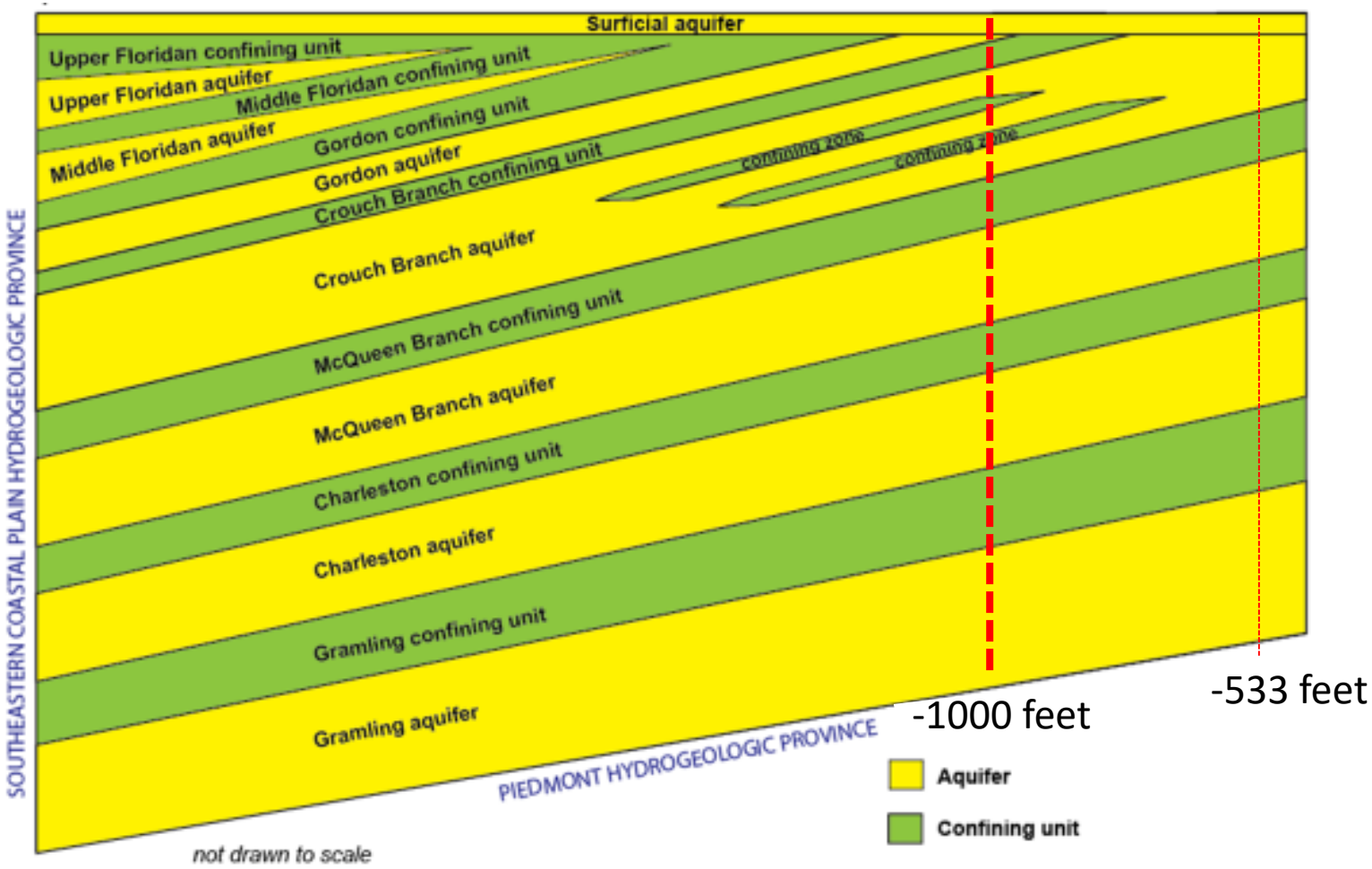


SC Hydrogeologic Framework Along Strike



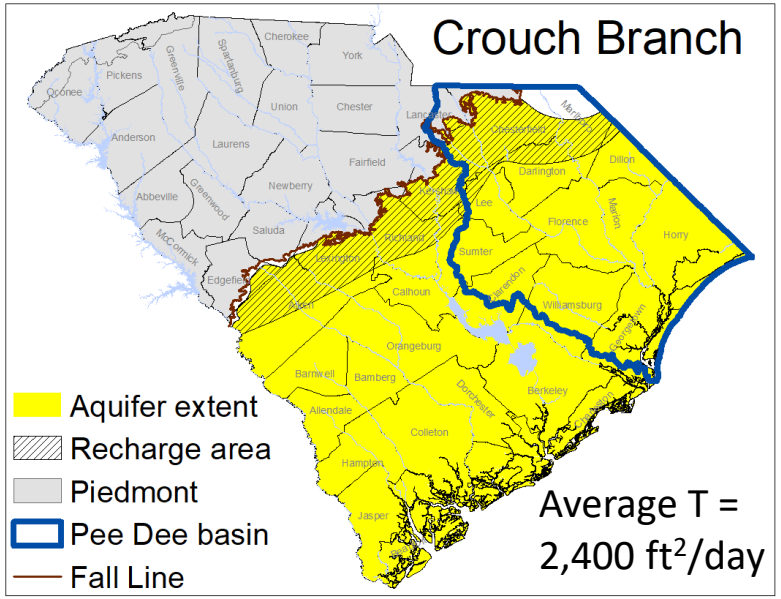
Clarendon County 125 feet

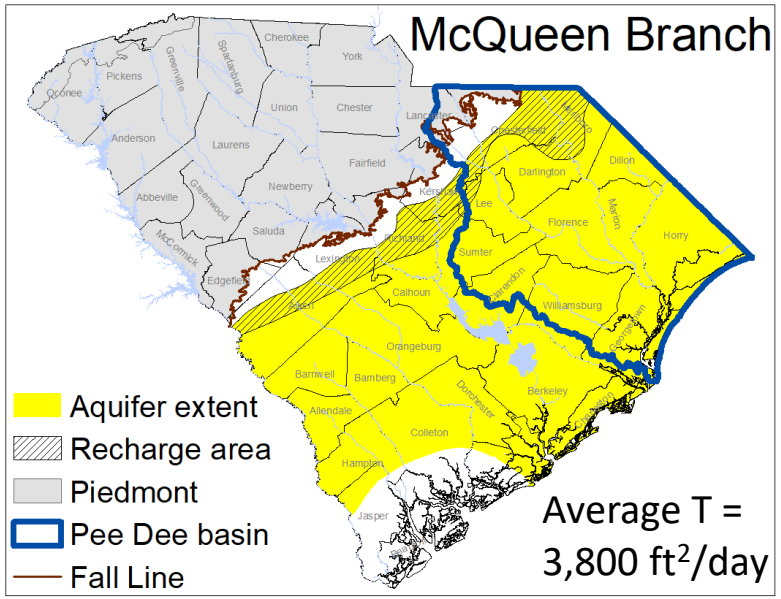
Dillon County 95 feet

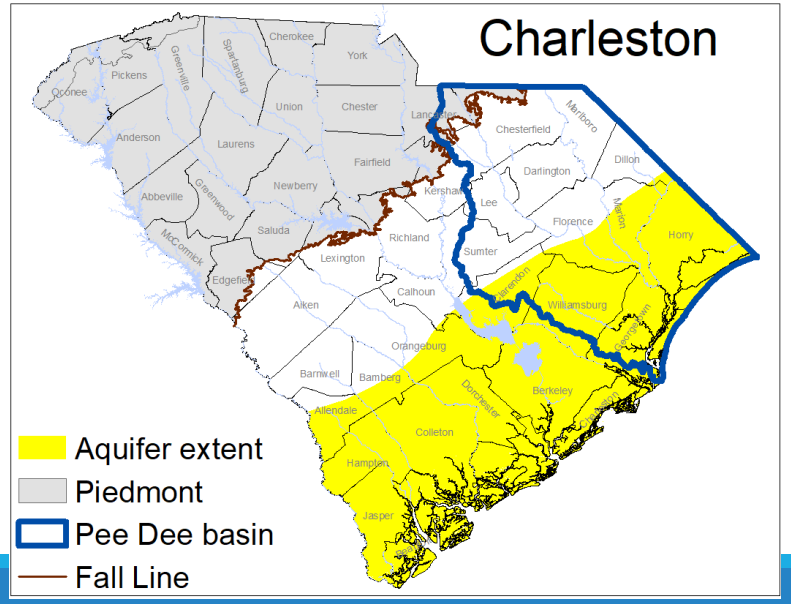


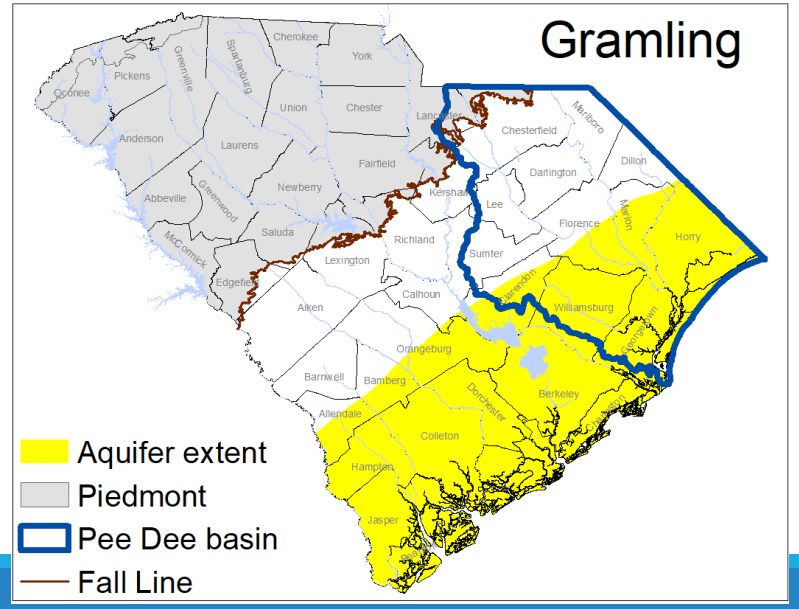
Feet referenced to NAVD88

Aquifer Extents and Recharge Areas





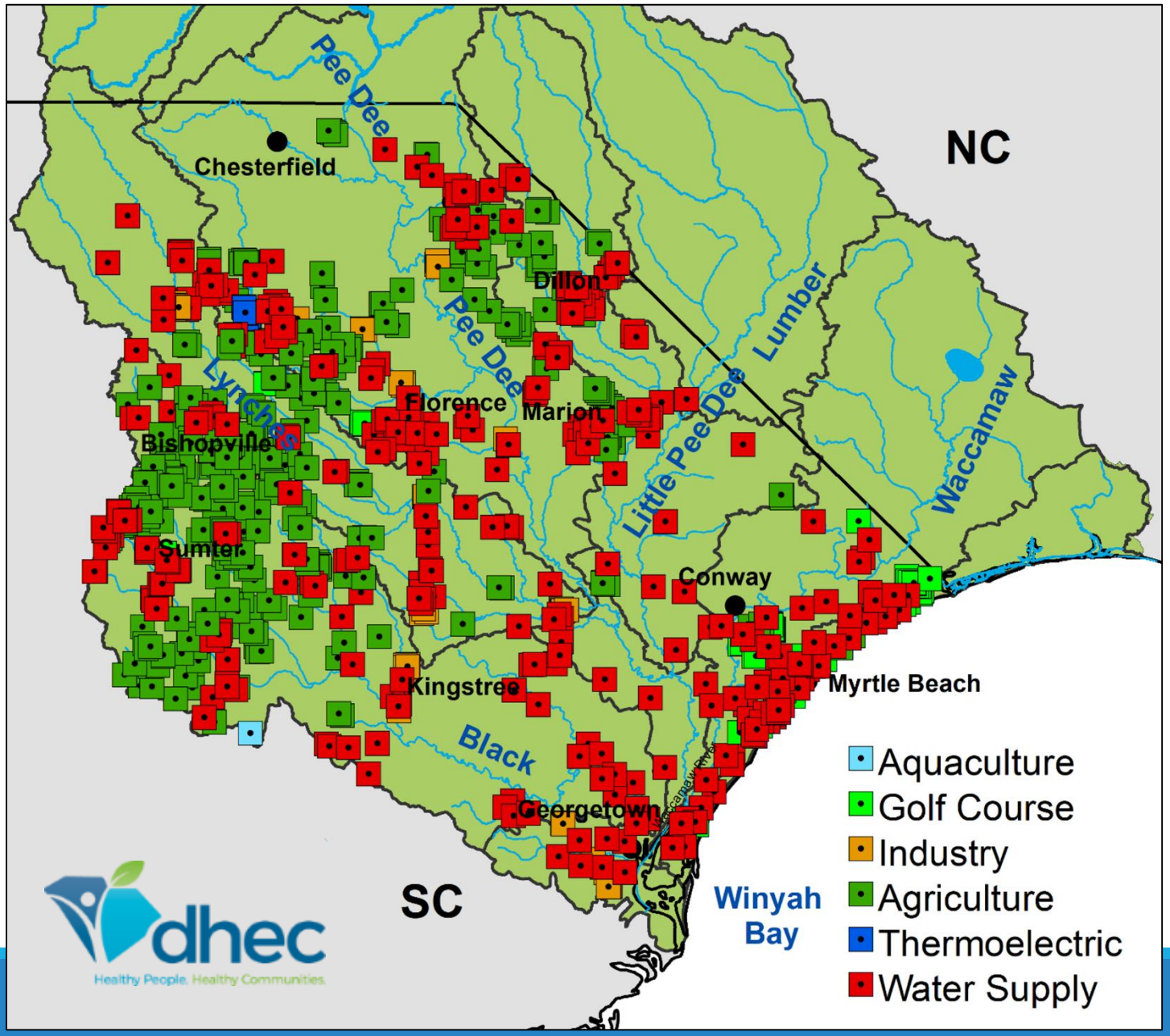




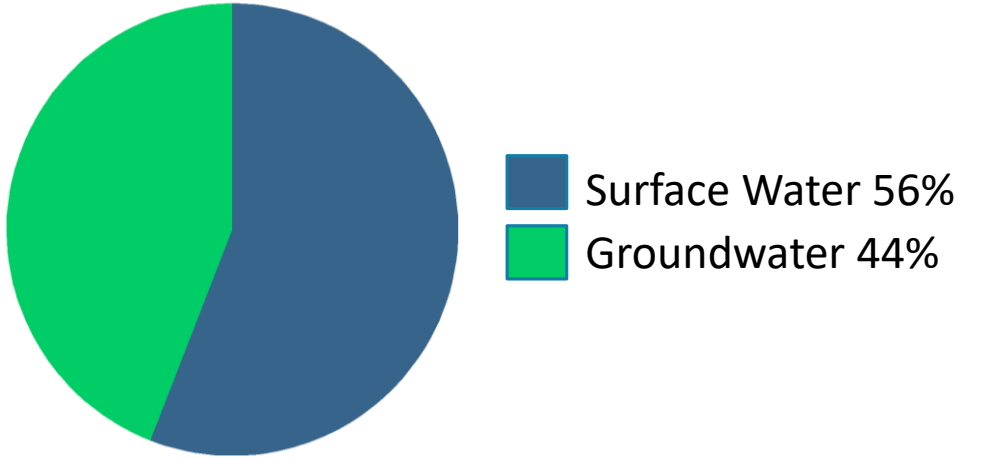
Recharge is
0 - 2 in/year

Transmissivity (T) is the ability of an aquifer to transmit water over its entire saturated thickness.

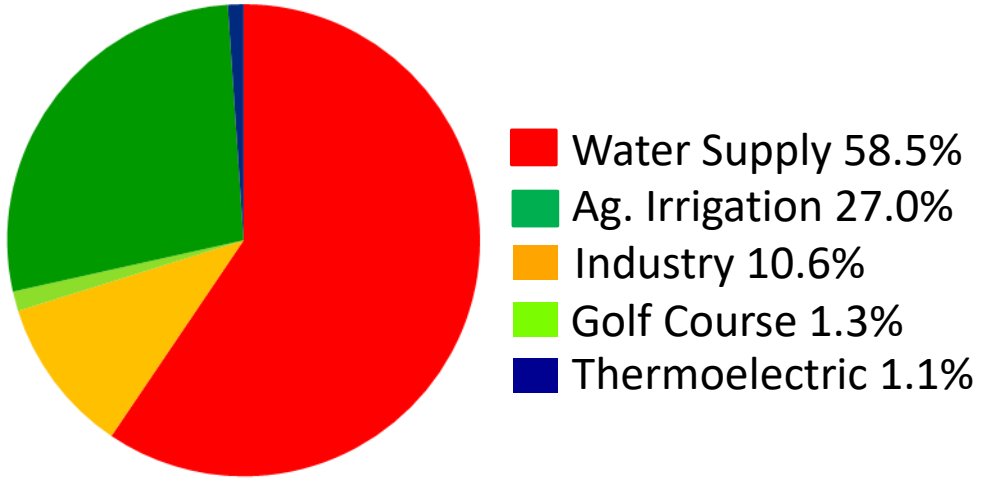
Reported Groundwater Withdrawals in SC



SC water withdrawal excluding energy in basin, 2021

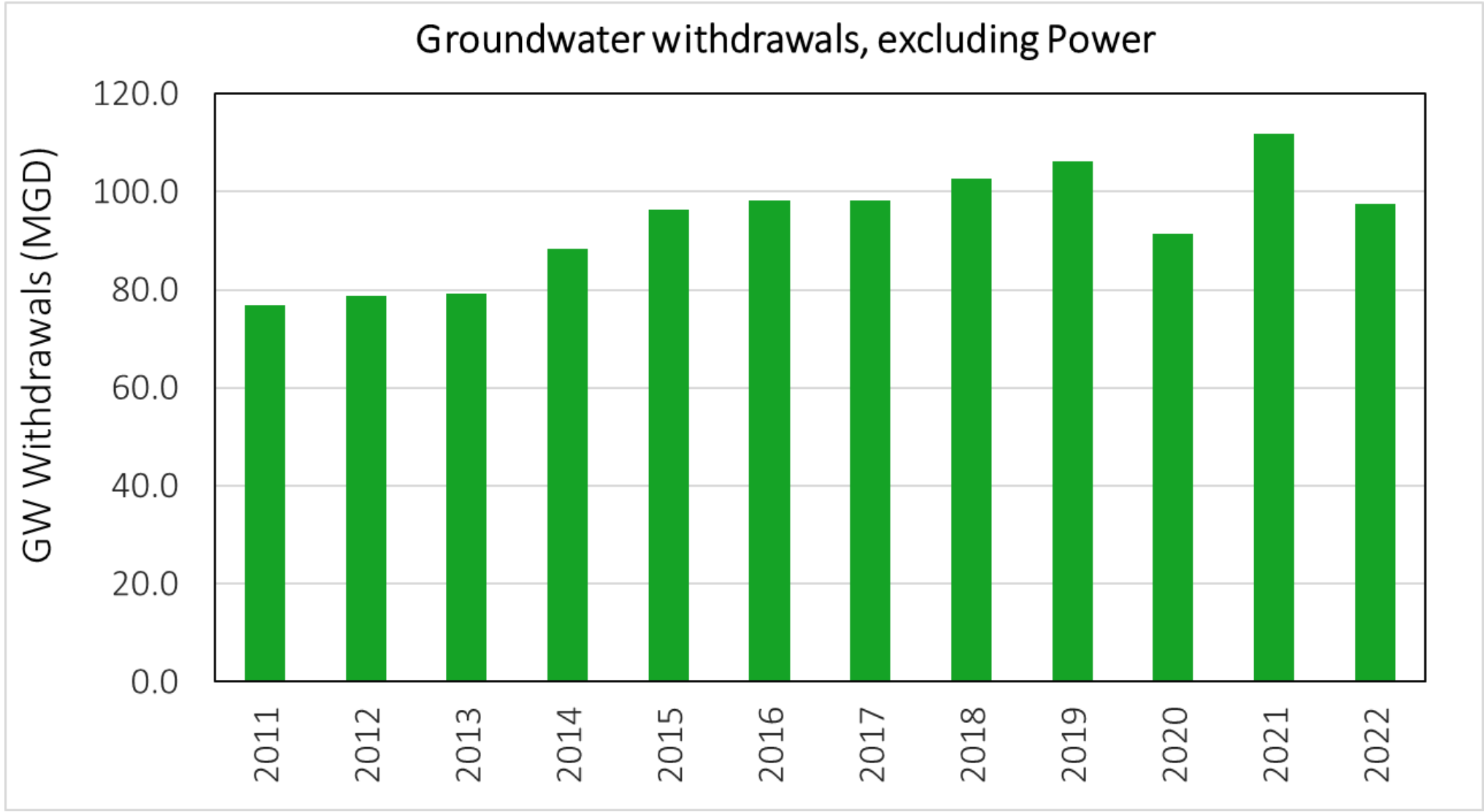


SC water withdrawal by sector, 2022



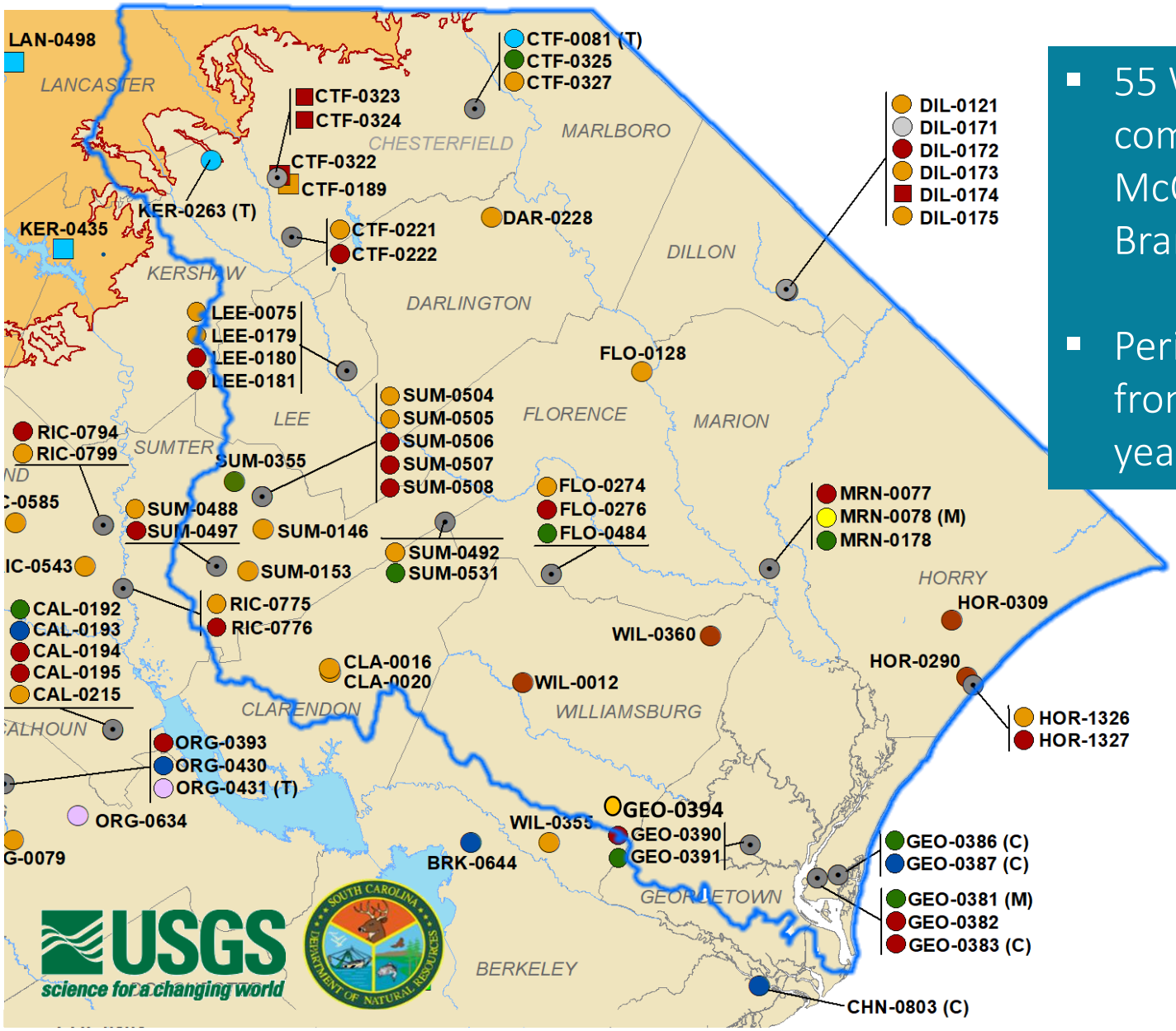
Data source: SCDHEC Water Use Database

Groundwater Withdrawals (2011-2022)



Data source: SCDHEC Water Use Database

Groundwater Monitoring Network



- 55 Wells in Pee Dee Basin completed primarily in McQueen and Crouch Branch aquifers
- Period of record ranges from 0 (just installed) to 40 years

Aquifer

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

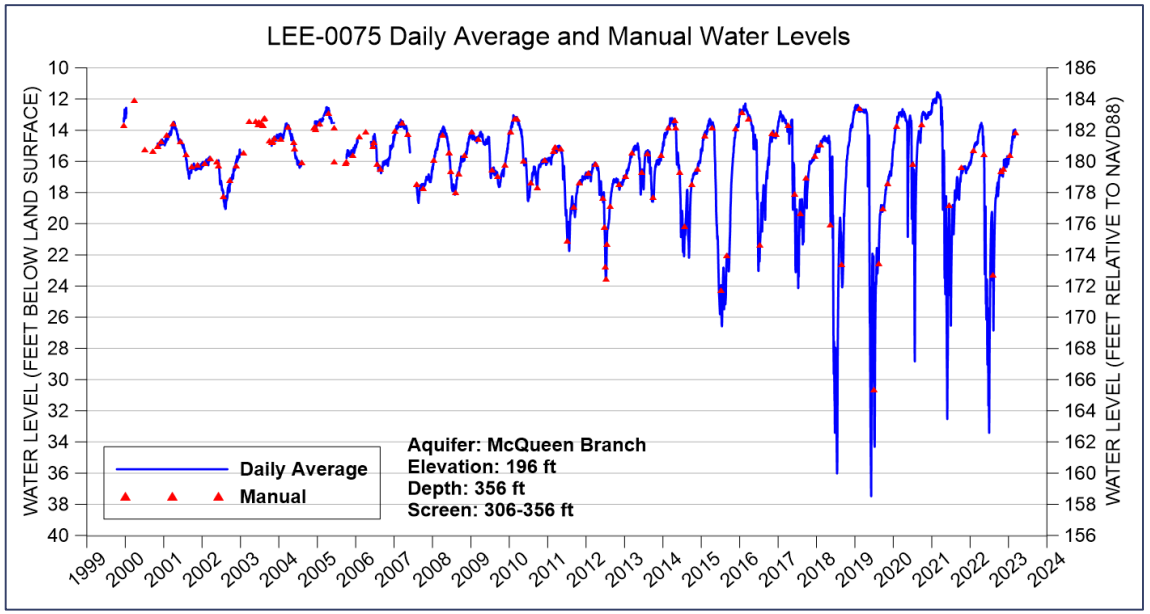
Agency

- SCDNR
- USGS
- Cluster site

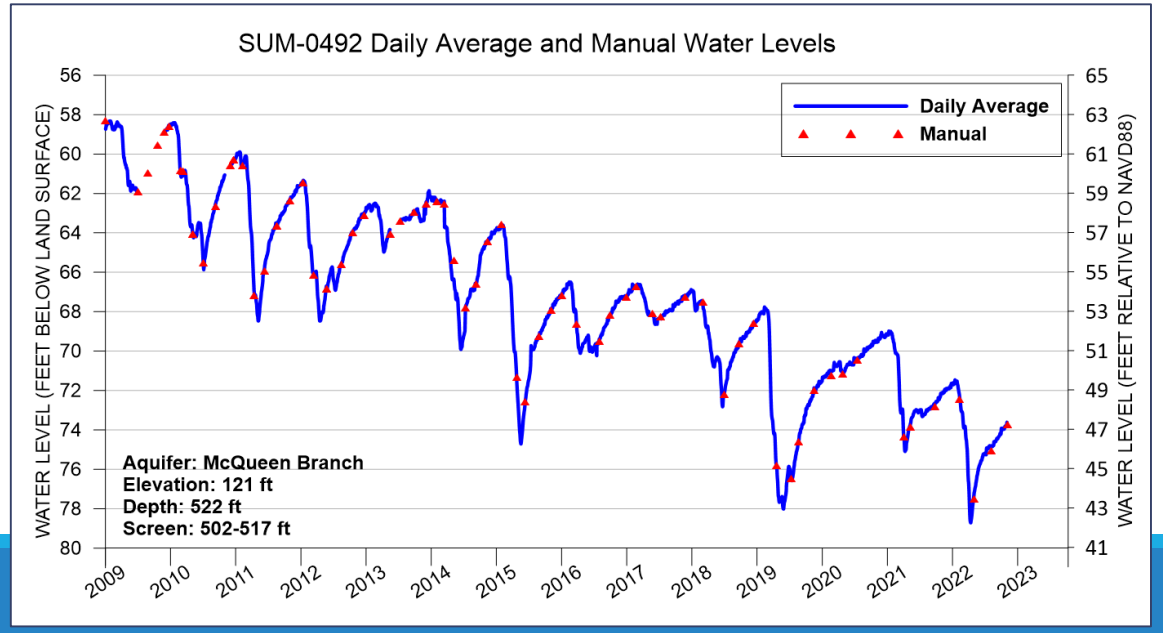
Pee Dee Basin

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

Pee Dee Basin Aquifer Groundwater-level Trends

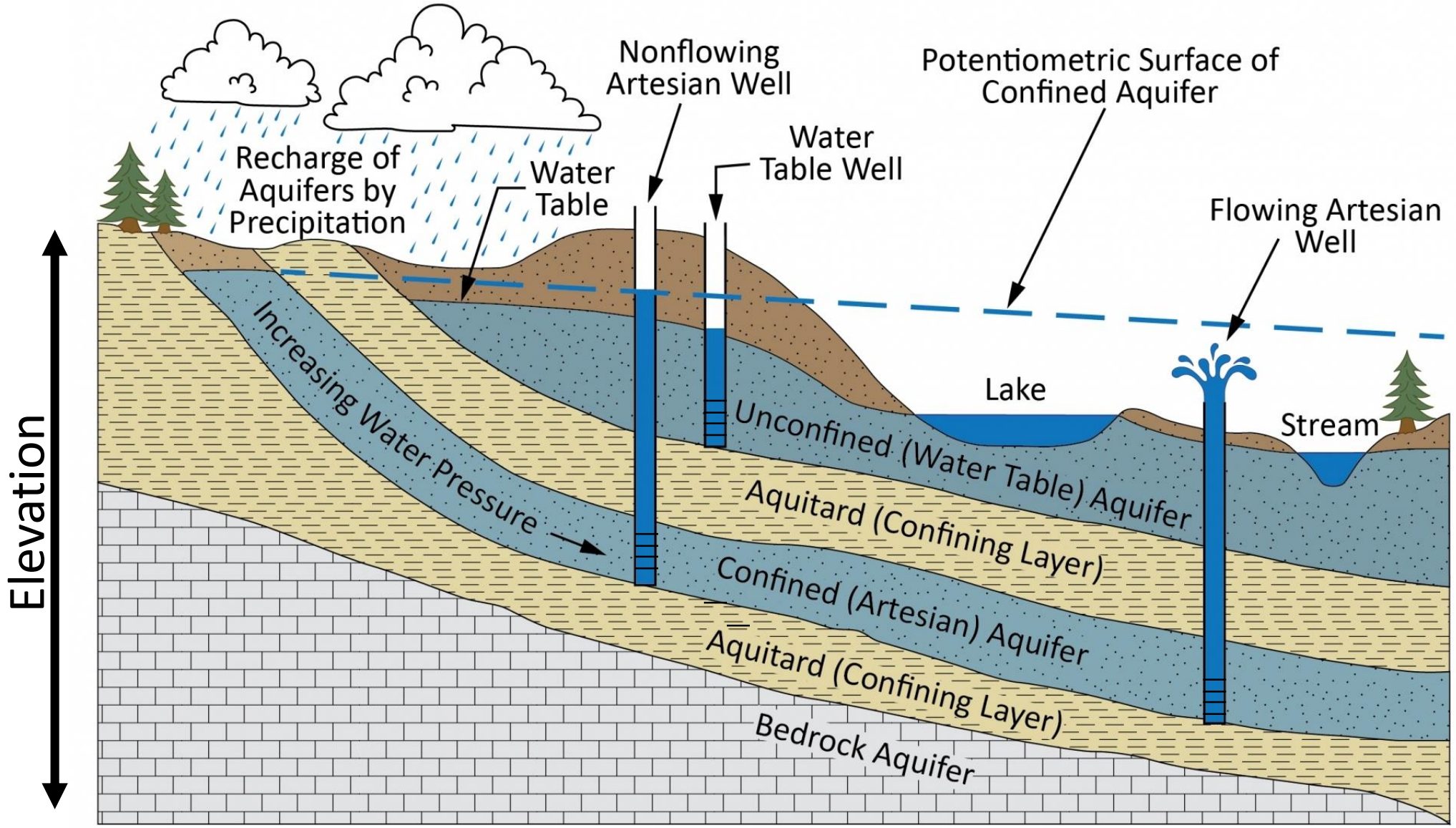


Lee County



Sumter County

Potentiometric Water-Level of an Aquifer

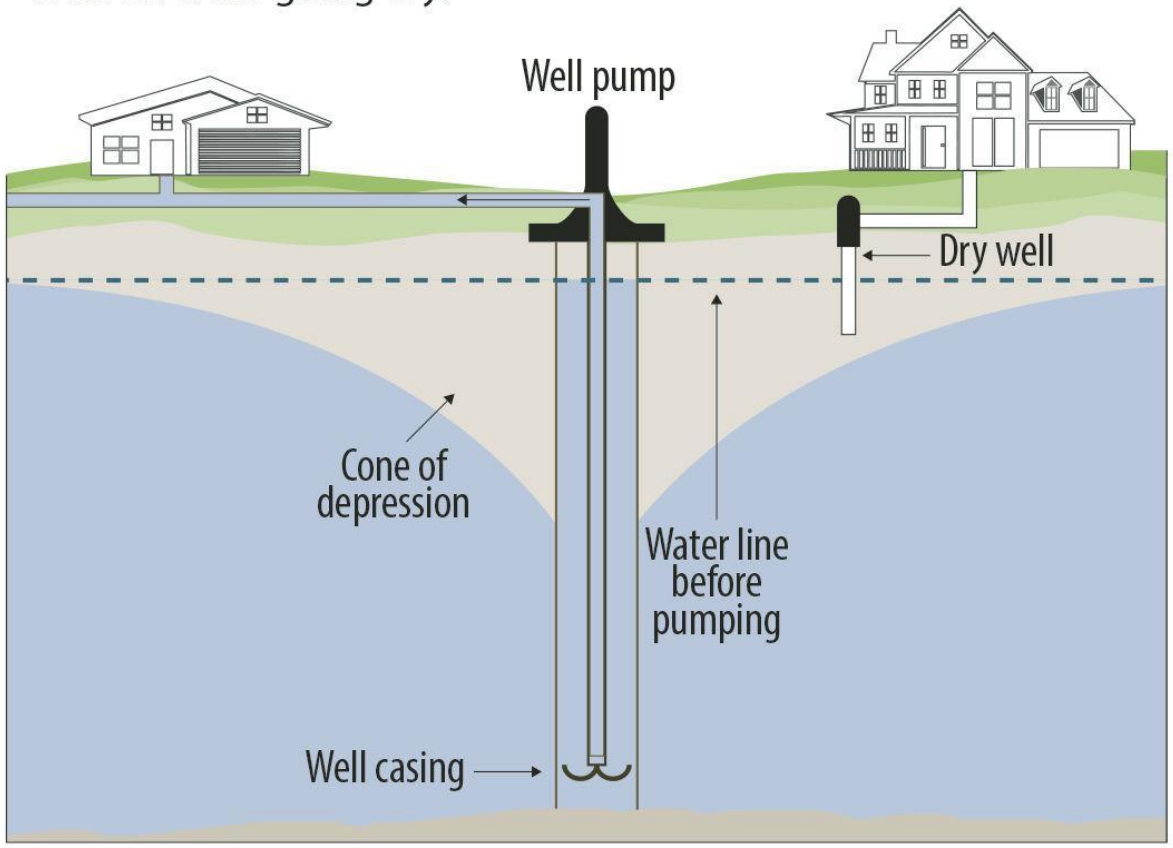


https://geology.utah.gov/

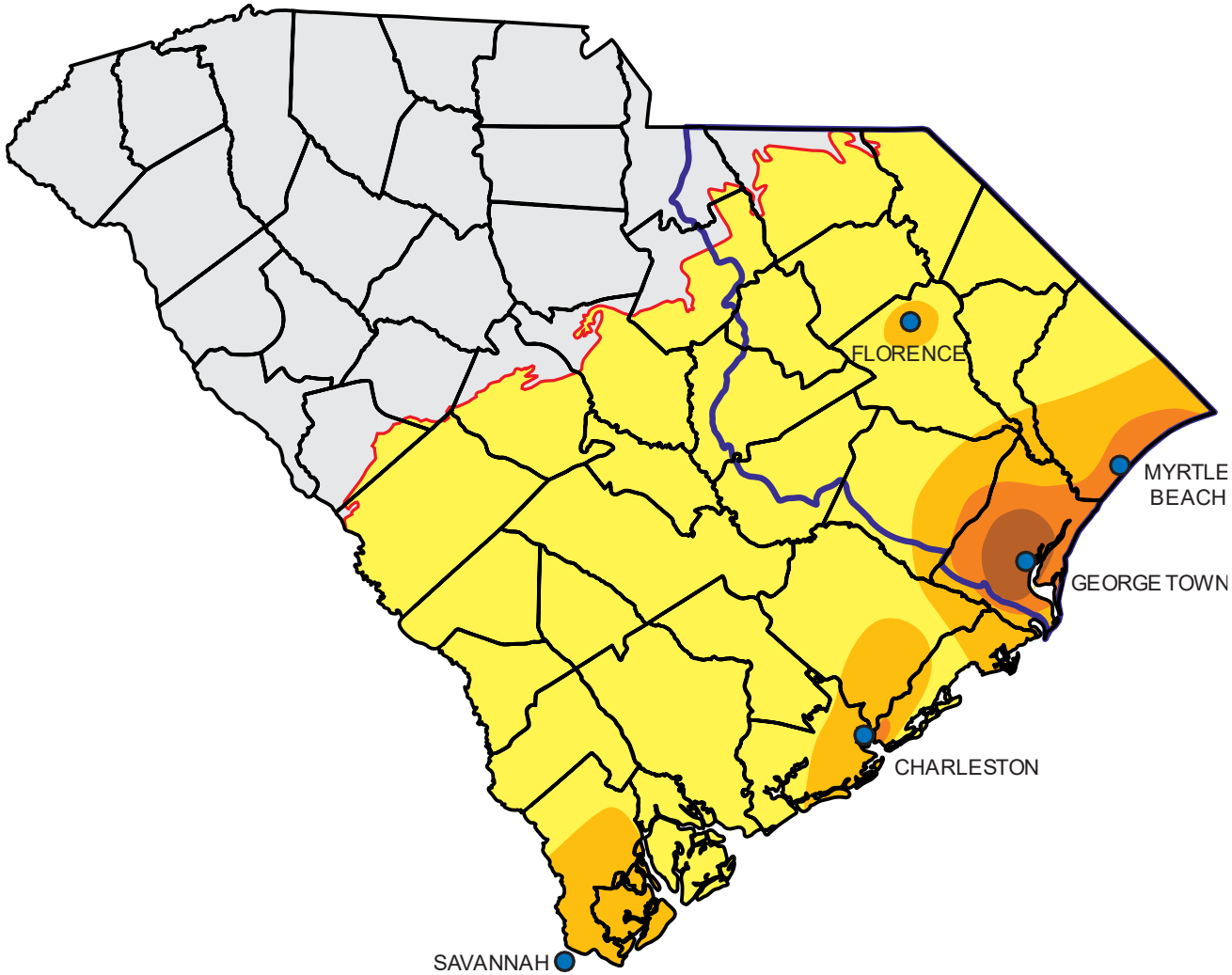
Major Cones of Depression in SC

A cone of depression

Large water withdrawals from an aquifer can lower the water table and create a "cone of depression" that can result in shallow wells going dry.



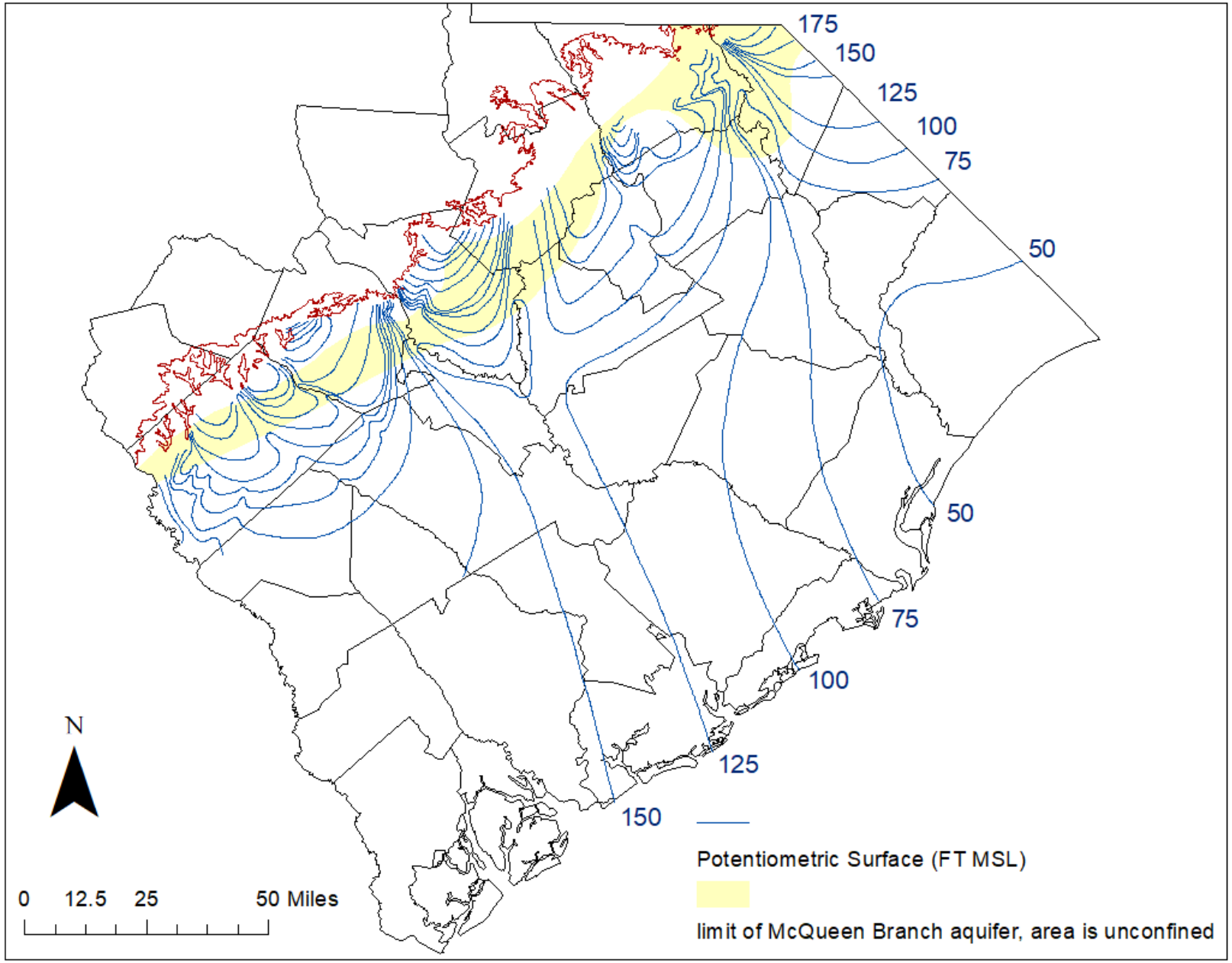
SOURCE: MOUNT PLEASANT WATERWORKS AND U.S. GEOLOGICAL SURVEY STAFF



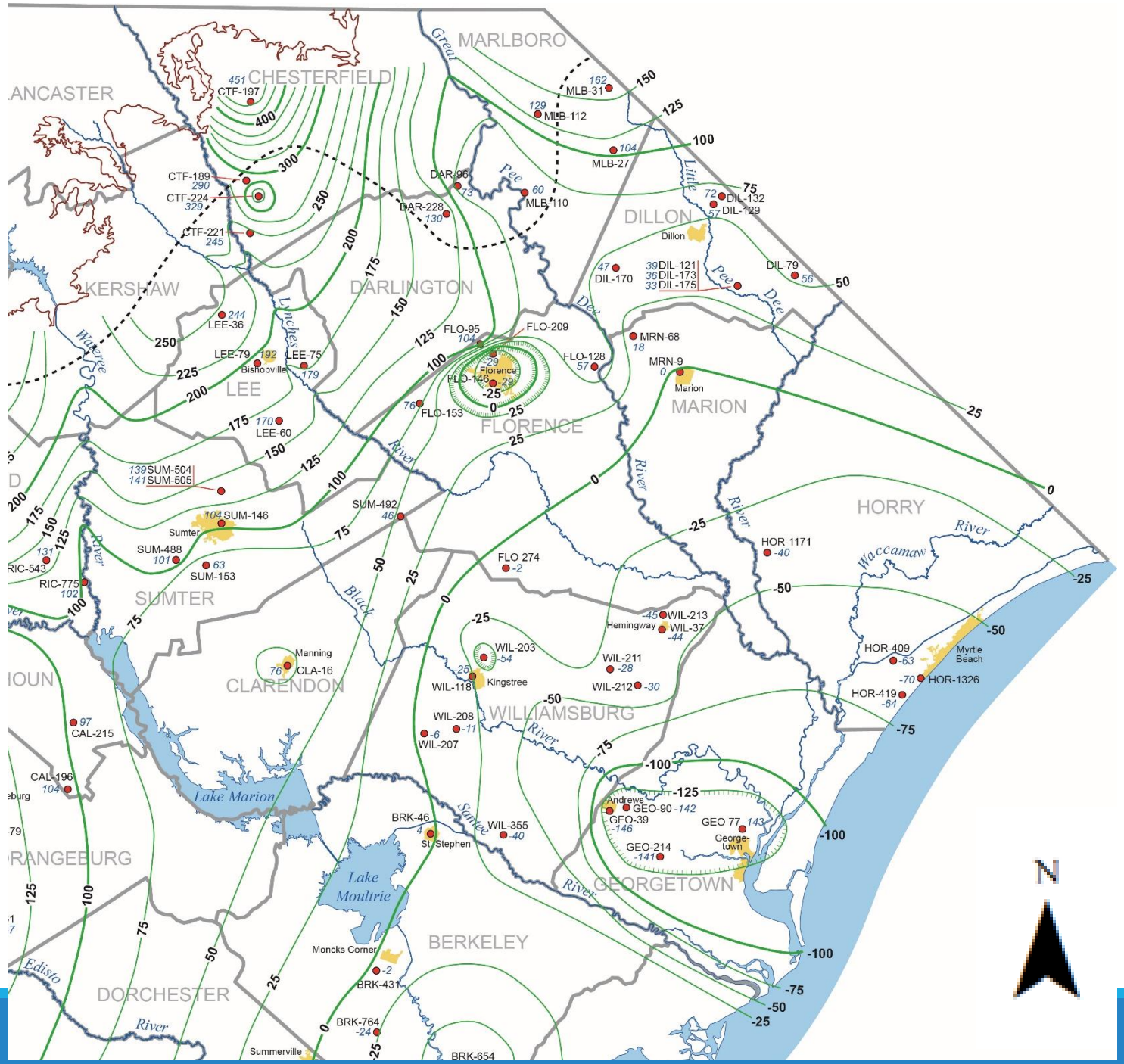
www.postandcourier.com/news/little-known-about-flow-future-of-aquifers/article_8970d504-7226-11e7-b116-cb02cc5b4d64.html

Charleston-McQueen Branch Aquifer Potentiometric Surface Pre-Development (1880's)

Potentiometric surface = the level in feet referenced to land surface elevation to which water rises as measured in tightly cased wells open to specific aquifers.



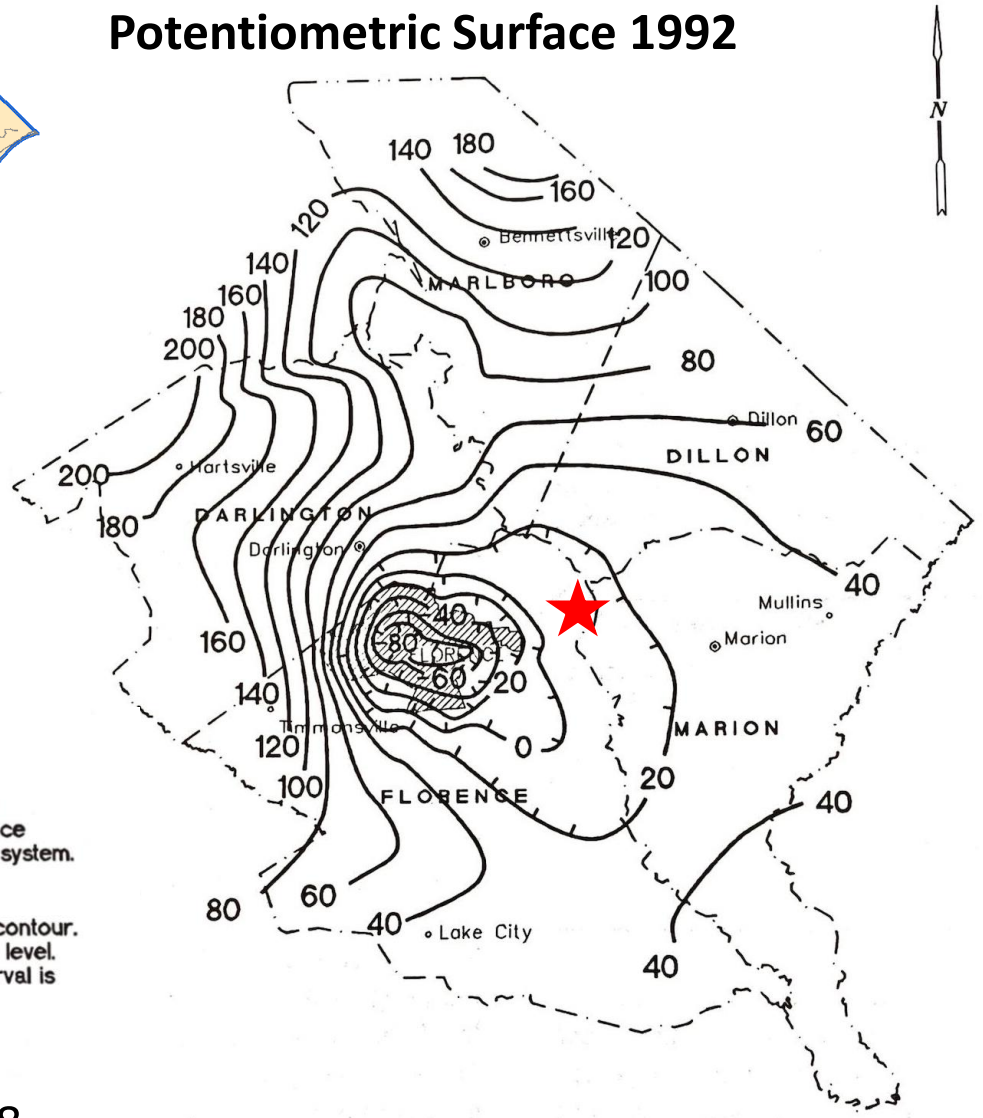
Charleston-McQueen Branch Aquifer Potentiometric Surface Present-day (2019)



Cone of Depression in the McQueen Branch Aquifer

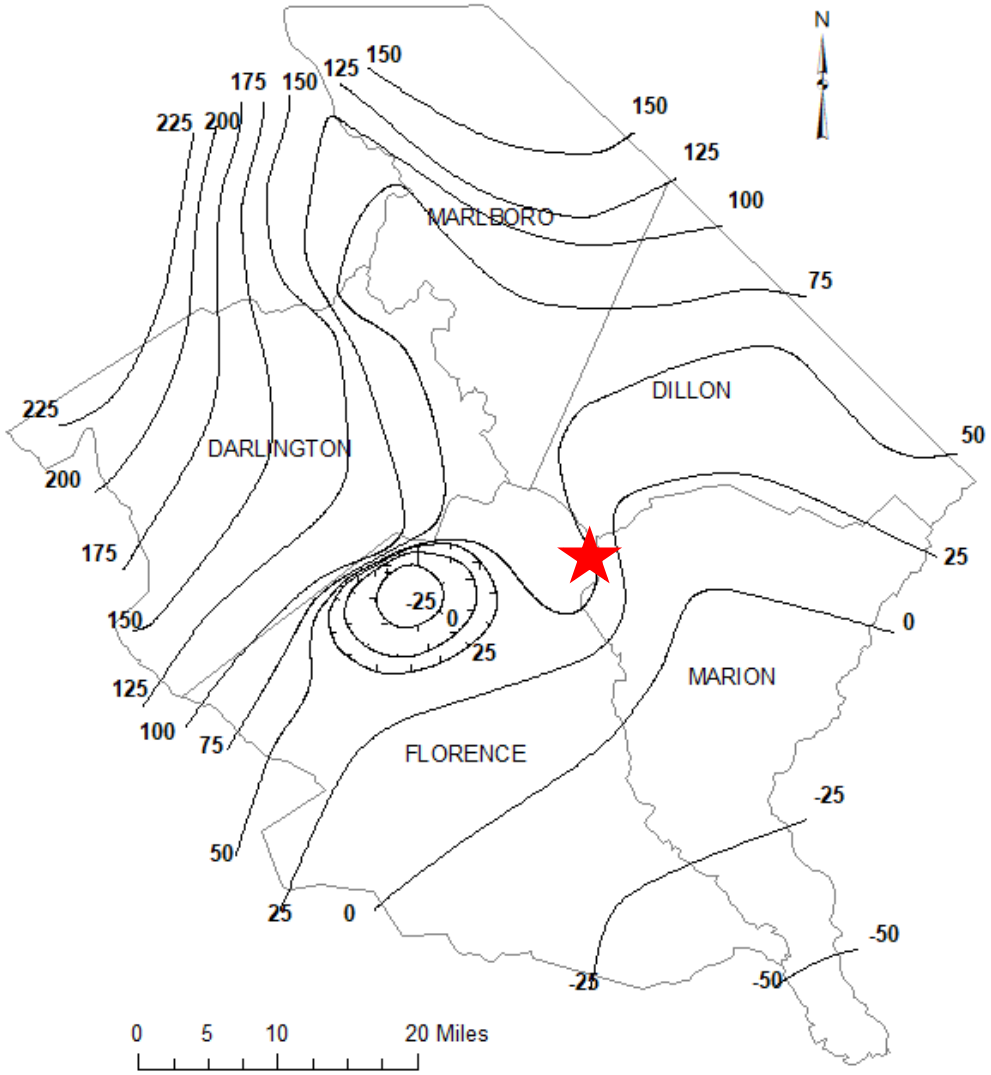
Florence County

Potentiometric Surface 1992



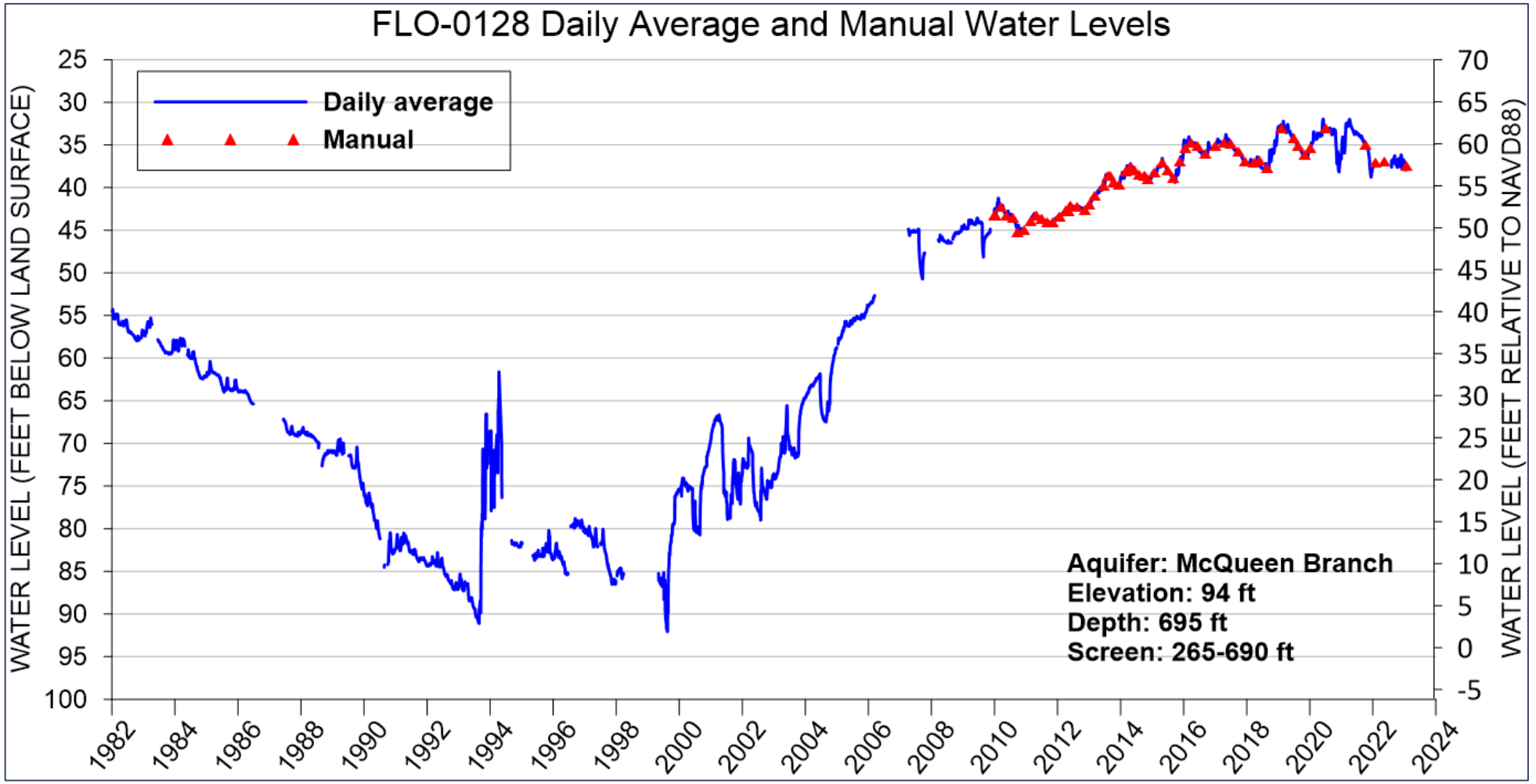
FLO-0128

Potentiometric Surface 2019

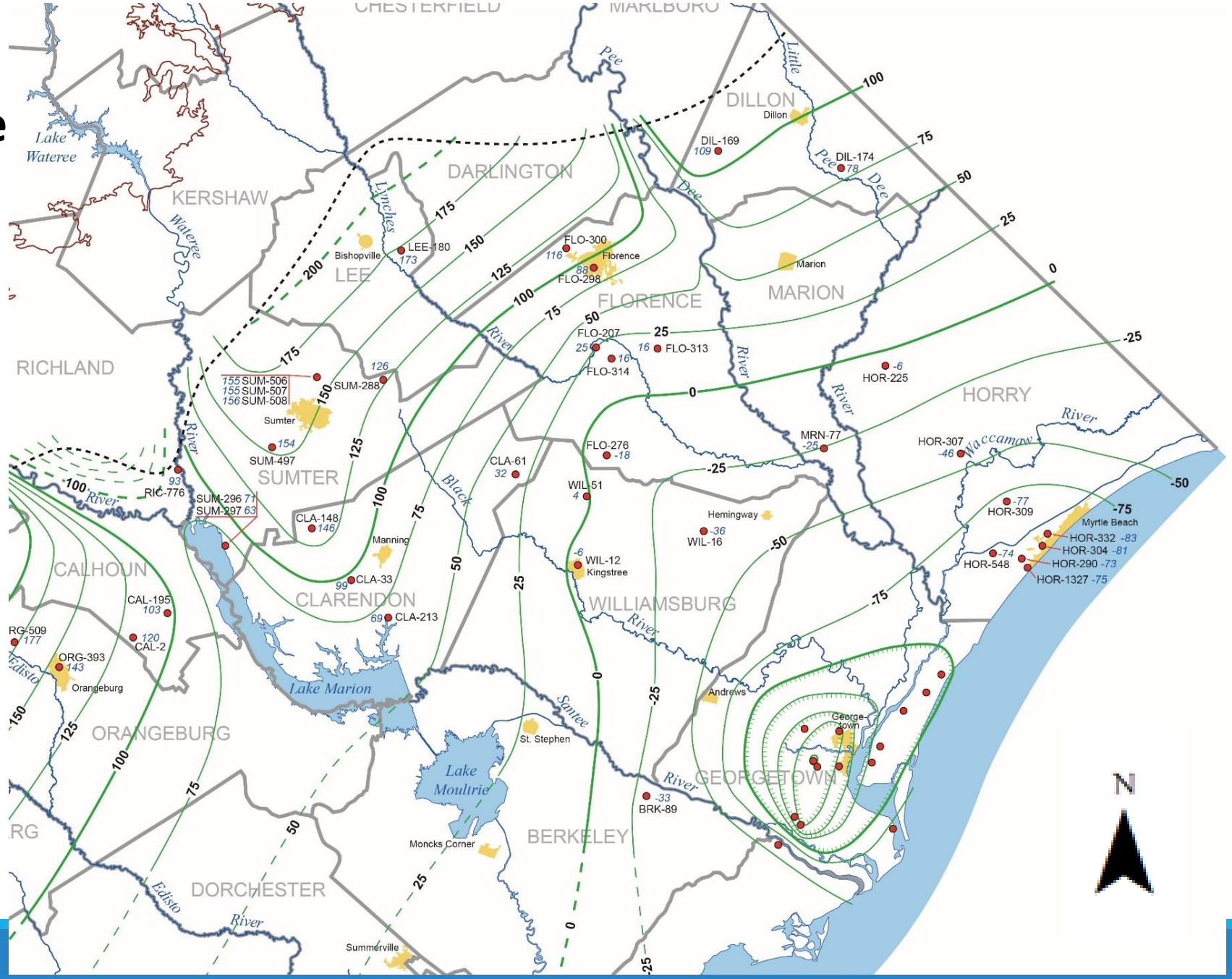


McQueen Branch Aquifer Groundwater-Level Trends

Florence County

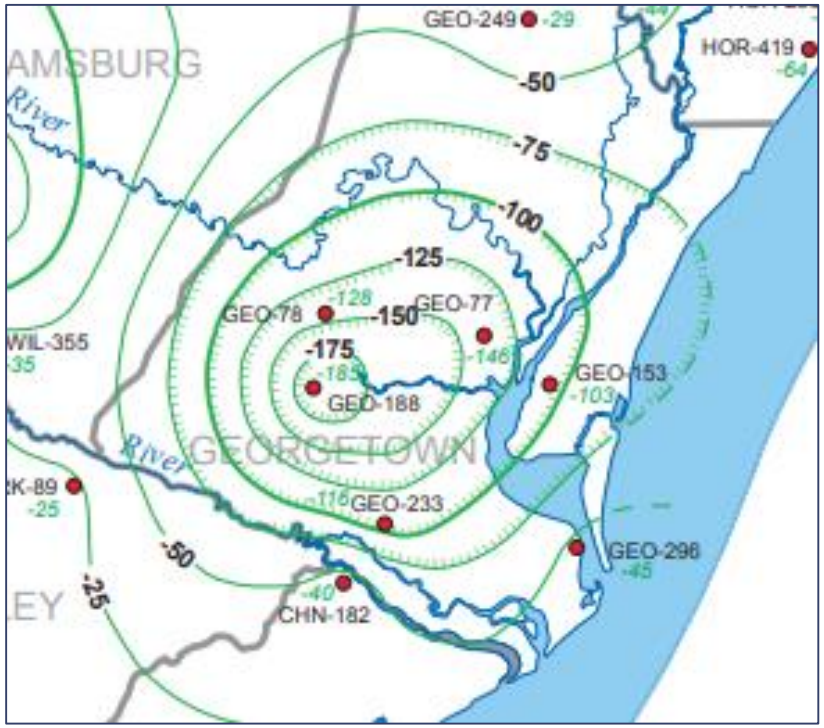


Crouch Branch Aquifer Potentiometric Surface Present-day (2020)

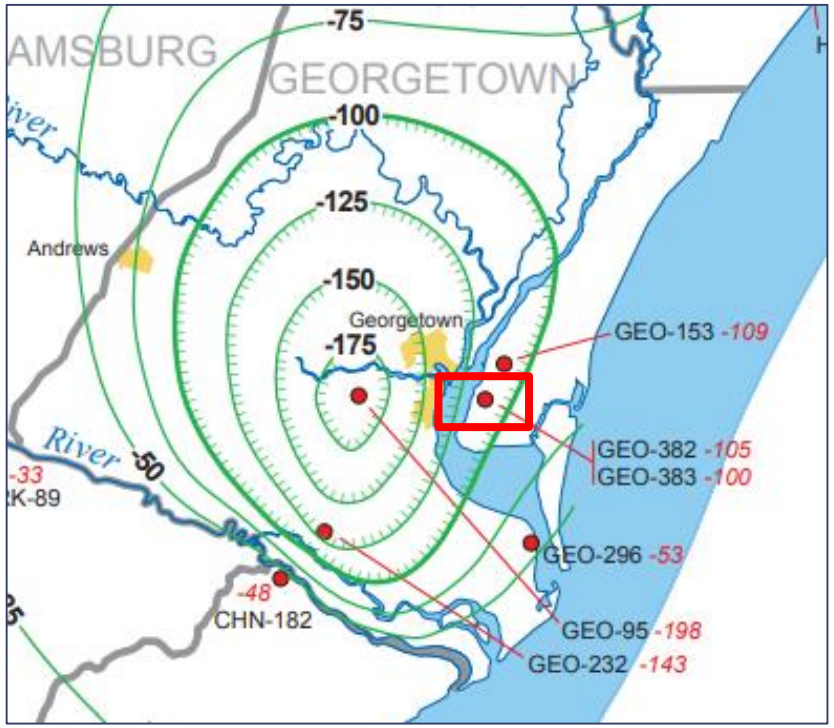


Cone of Depression in the Crouch Branch Aquifer

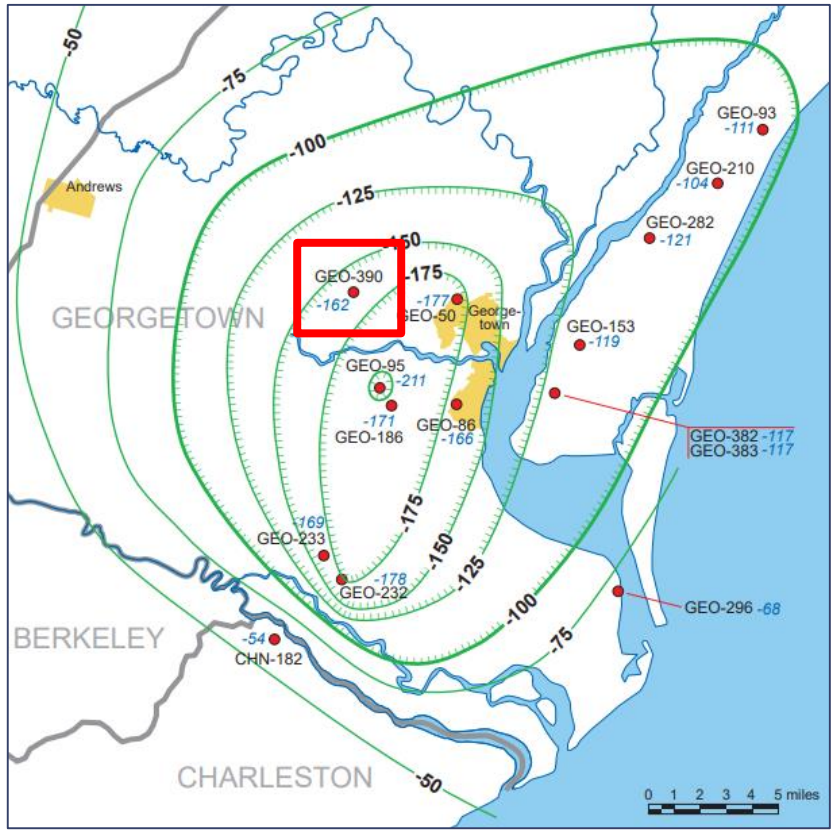
Potentiometric Surface 2012



Potentiometric Surface 2016



Potentiometric Surface 2020



EXPLANATION

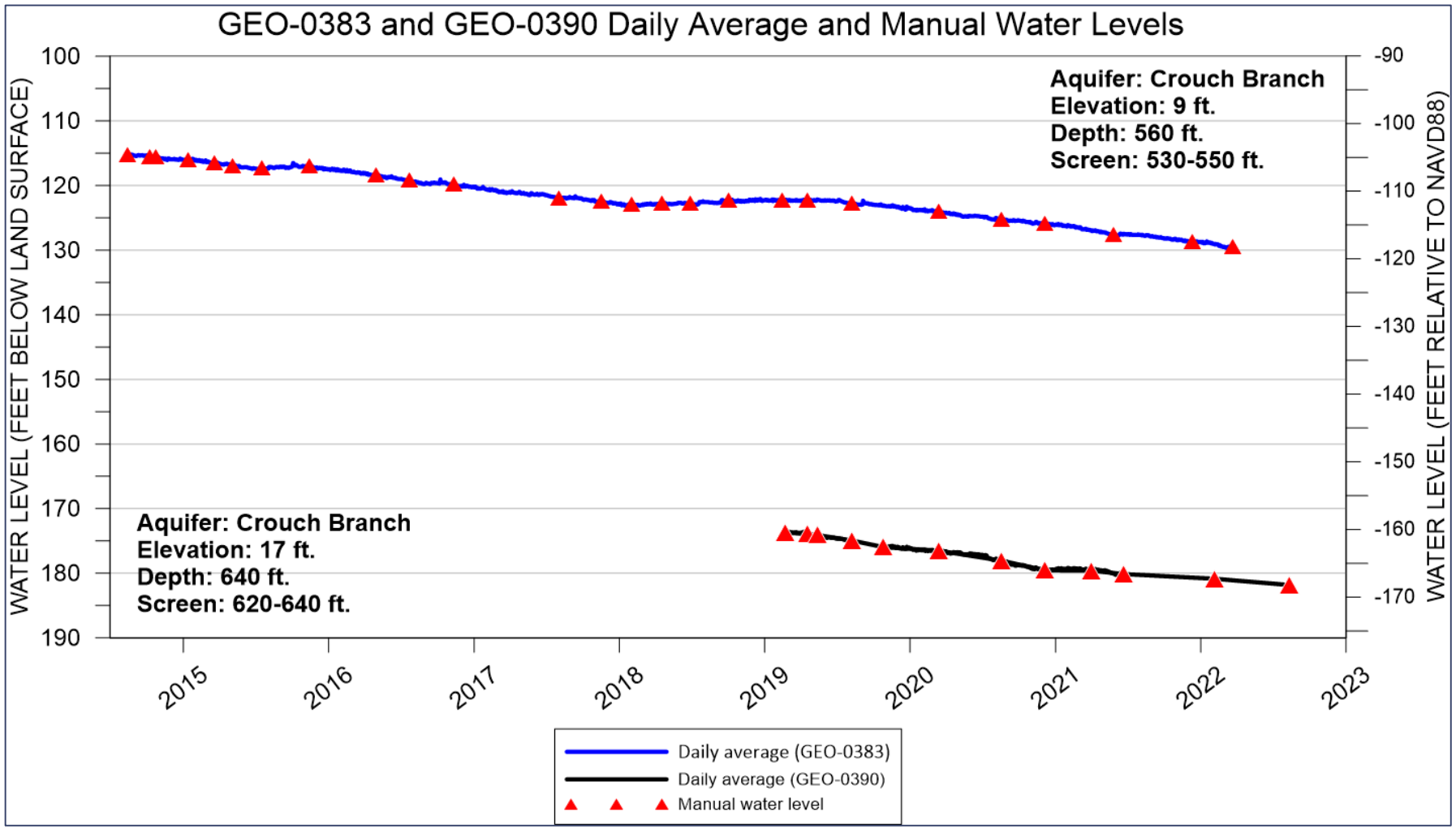
125 Potentiometric contour, in feet NAVD 88; dashed where inferred

FLO-276 18 Measured well, with county well number and potentiometric elevation, in feet NAVD 88

Approximate updip limit of Crouch Branch confining unit

Kingstree Municipality

Crouch Branch Aquifer Groundwater-Level at Georgetown



Georgetown County

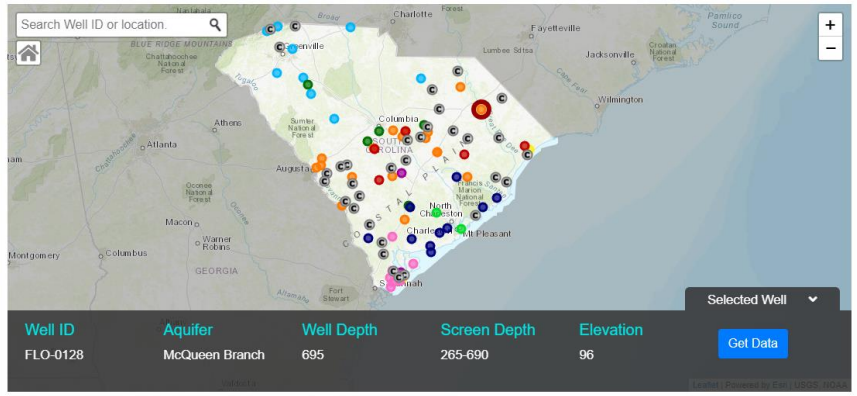
Aquifer: McQueen Branch
Depth: 845 ft.
Screen: 825-845 ft.

Groundwater Data and Publications

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).



Hydrograph

GEO-0390 --- Crouch Branch

Custom Axis Options

Set custom range values for the X and Y axes of the hydrograph. You can click and drag your cursor on the hydrograph to select a custom date range. Double-click the chart to return to the full period of record.

Date Range (X-Axis)

Start Date 02/08/2019

End Date 08/22/2022

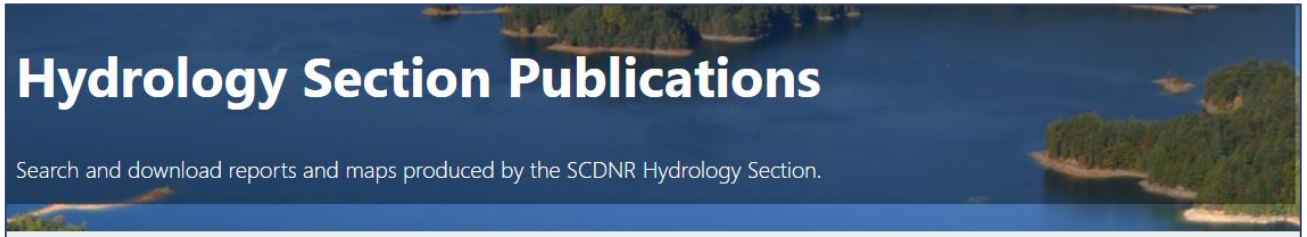
Update | Full Record

Value Range (Y-Axis)

Upper 172.8

Lower 182.6

Update | Default



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 Search:

Title	Author(s)	Date	Publication #	Counties or Region
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

Summary

SCDNR Contacts

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Andrew Wachob
WachobA@dnr.sc.gov

- Groundwater is an important resource in the Pee Dee basin
  - Crouch Branch and McQueen Branch aquifers are the primary aquifers in the Pee Dee Basin
  - Aquifers are highly transmissive with large volumes of water
- Regional groundwater declines have been observed due to pumping rates exceeding the recharge rates
- Groundwater-level data and potentiometric maps illustrate areas of decline
  - These datasets can identify data gaps and inform where additional monitoring is needed