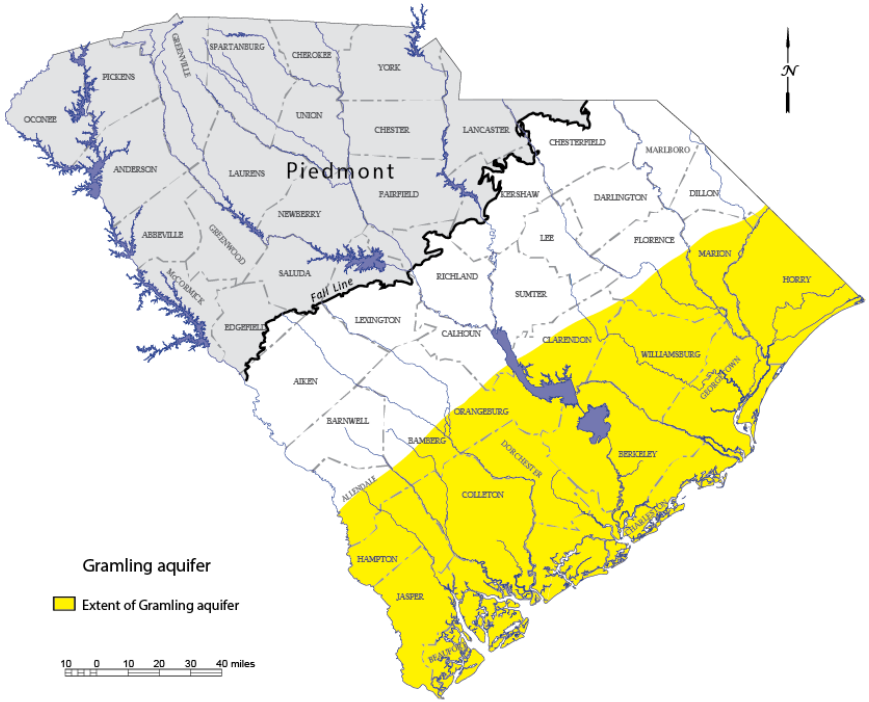
Update of the State Water Plan

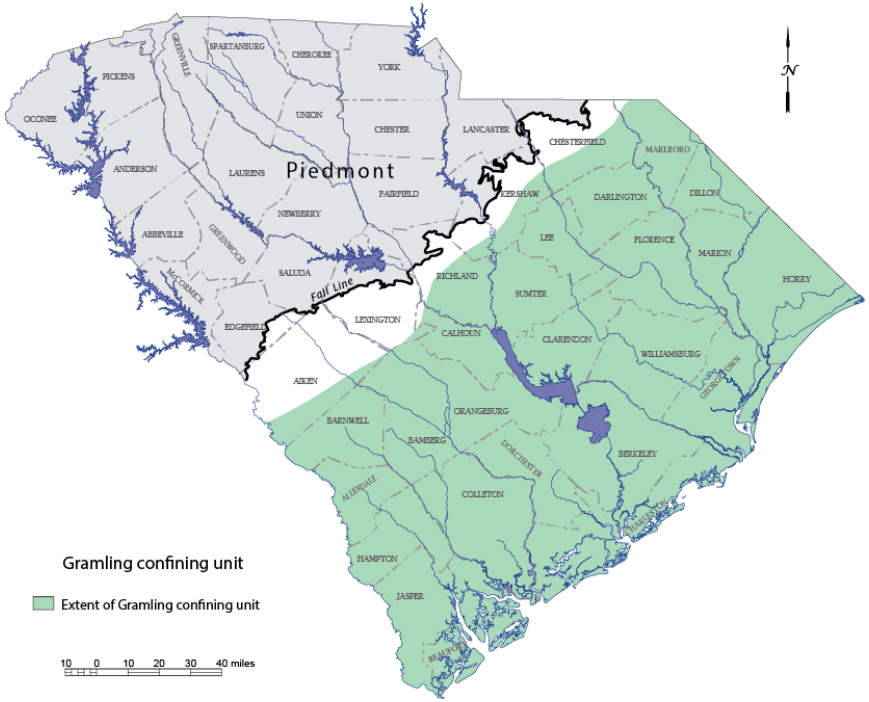
Groundwater Availability Assessment
Stakeholder Meeting
North Charleston, S.C.
November 28, 2017

Joe Gellici - Hydrologist
Land, Water and Conservation Division
S.C. Department of Natural Resources



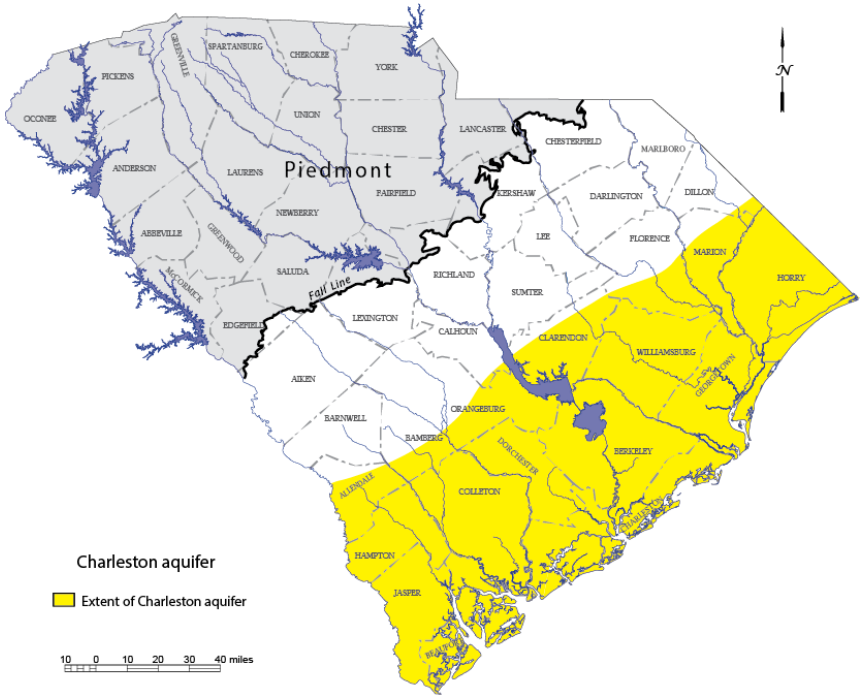
GRAMLING AQUIFER

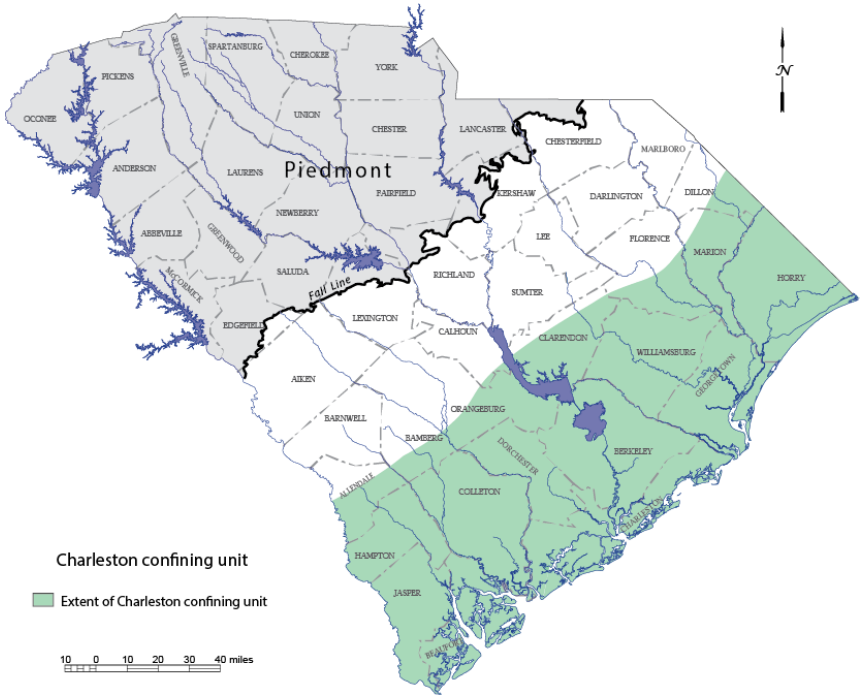
- 0 to 1,000 ft thick.
- 650 to 2,800 ft deep.
- Interbedded sand and clay aquifer.
- Few hydrologic data are available for the aquifer.
- Low yields.
- Transmissivity calculated from a pumping test at Hilton Head is 9,000 gpd/ft (low).



GRAMLING CONFINING UNIT

- 0 to 300 ft thick.
- 190 to 2,700 ft deep.
- Clayey sand, and clay.
- Much of the confining unit is consolidated in varying degrees by silica cement.
- Florence has wells screened in sand beds in the confining unit.



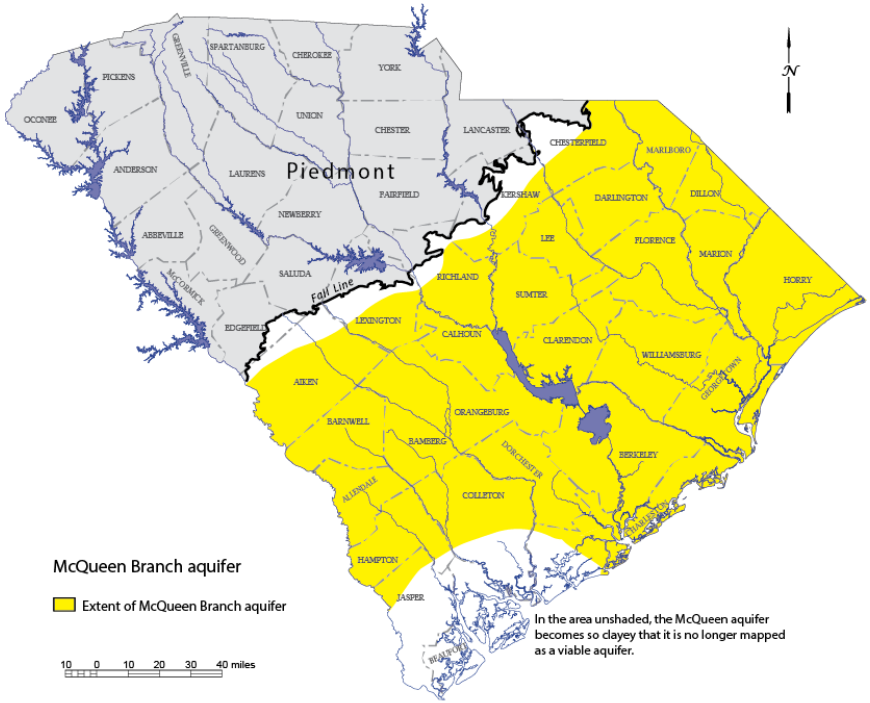


CHARLESTON AQUIFER

- 0 to 350 ft thick.
- 450 to 2,600 ft deep.
- Interbedded sand and clay aquifer.
- Low to moderate yields.
- Transmissivity values from St. Stephen and Mount Holly in Berkeley County are 23,000 and 31,000 gpd/ft, respectively.
- Transmissivity values of six tests at Mount Pleasant in Charleston County range from 11,000 to 18,000 gpd/ft and average 13,500 gpd/ft.

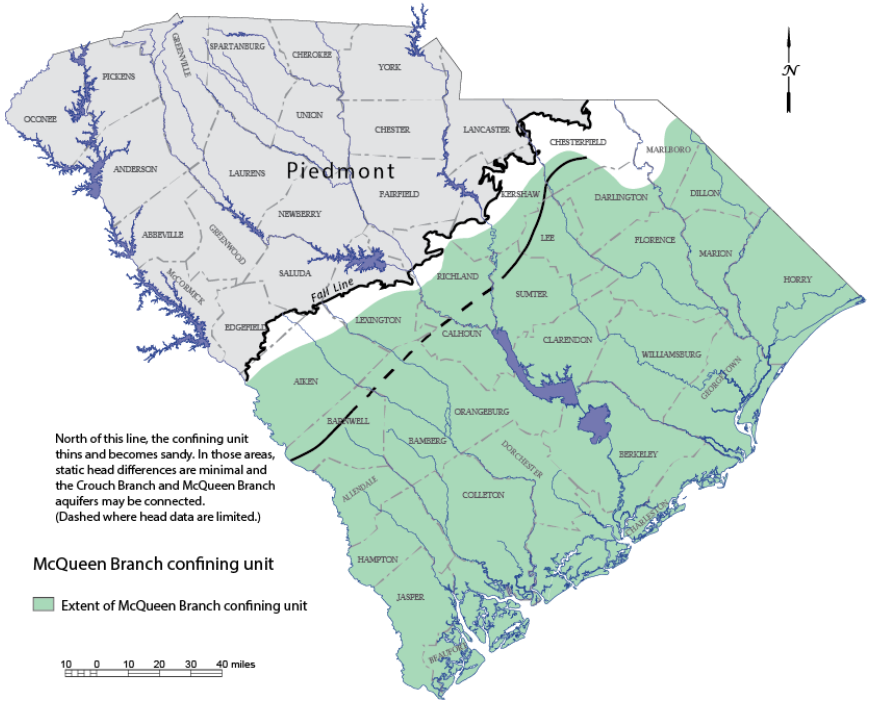
CHARLESTON CONFINING UNIT

- 0 to 460 ft thick.
- 430 to 2,230 ft deep
- Slightly calcareous, clay, silt, and sand.
- Often laminated with very fine to fine-grained sand.
- Some parts of the confining unit consist of indurated clay that is described in cores as “hard and dry”.



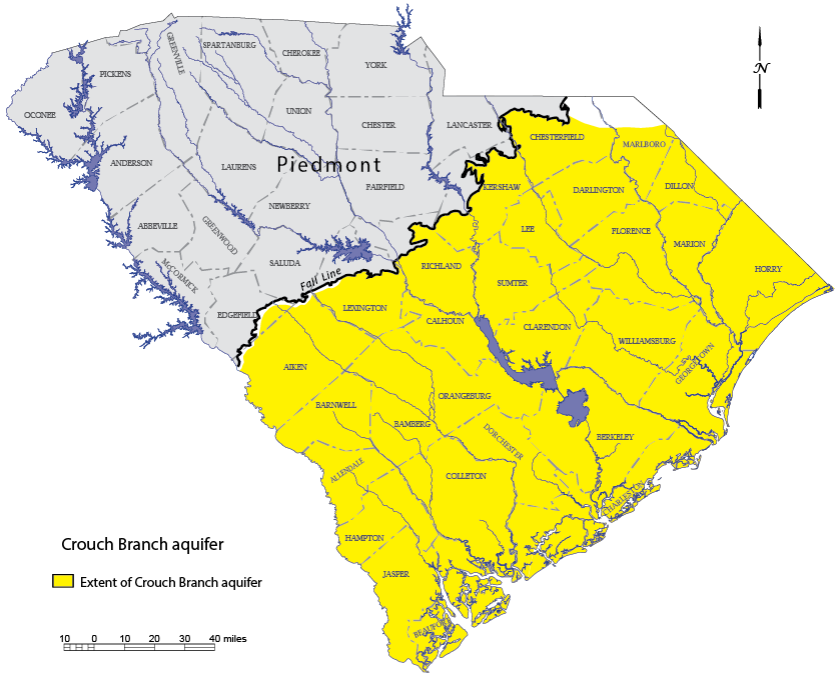
MCQUEEN BRANCH AQUIFER

- 0 to 360 ft thick.
- 40 to 1,500 ft deep.
- Interbedded sand and clay aquifer.
- Low to very high yields. One of the most productive in the State, especially in the west-central and updip parts of the Coastal Plain. Becomes fine-grained and less productive downdip.
- Transmissivity values of eight pumping tests at SRS average 215,000 gpd/ft.



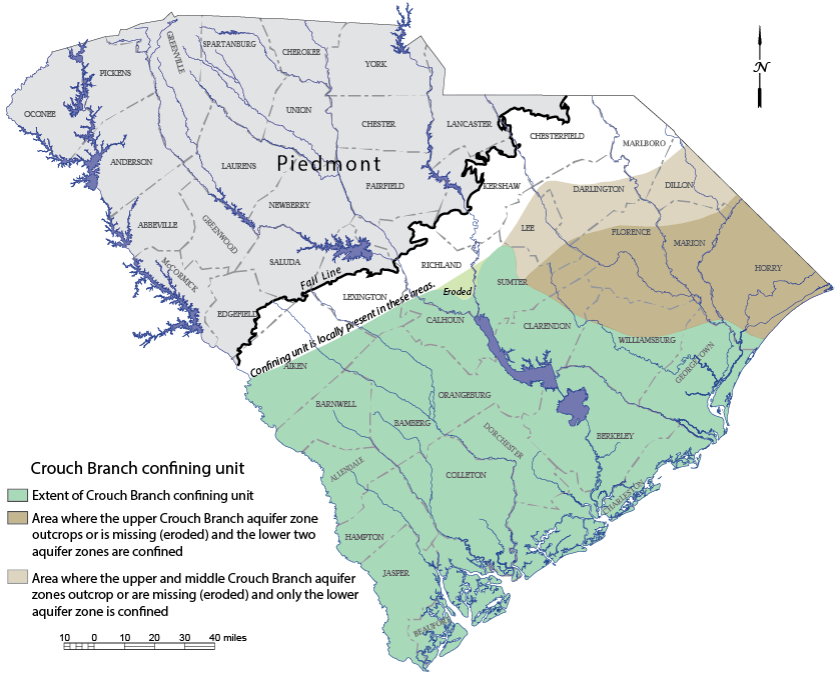
MCQUEEN BRANCH CONFINING UNIT

- 0 to 360 ft thick.
- 50 to 2,000 ft deep.
- Calcareous sand, silt and clay.



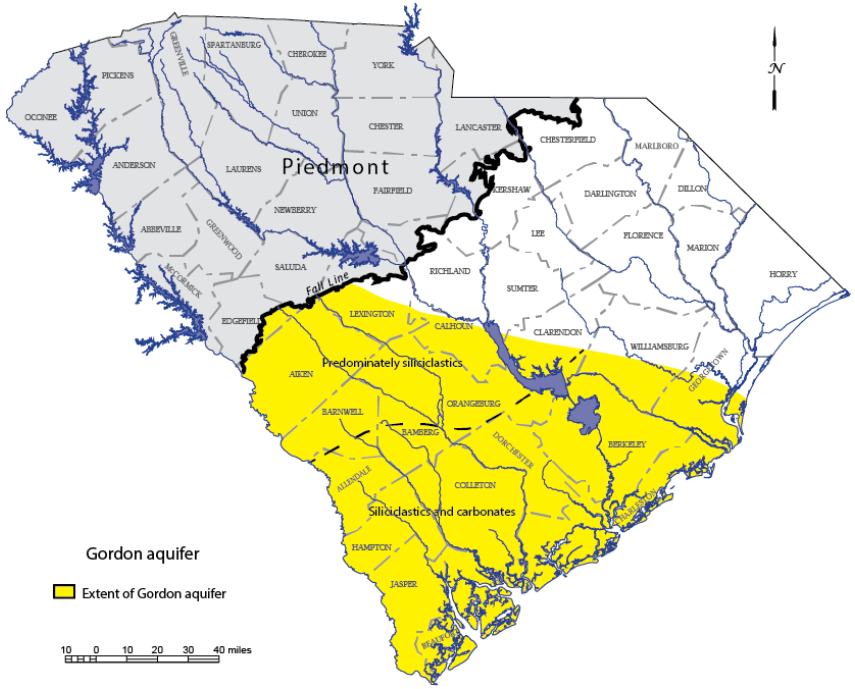
CROUCH BRANCH AQUIFER

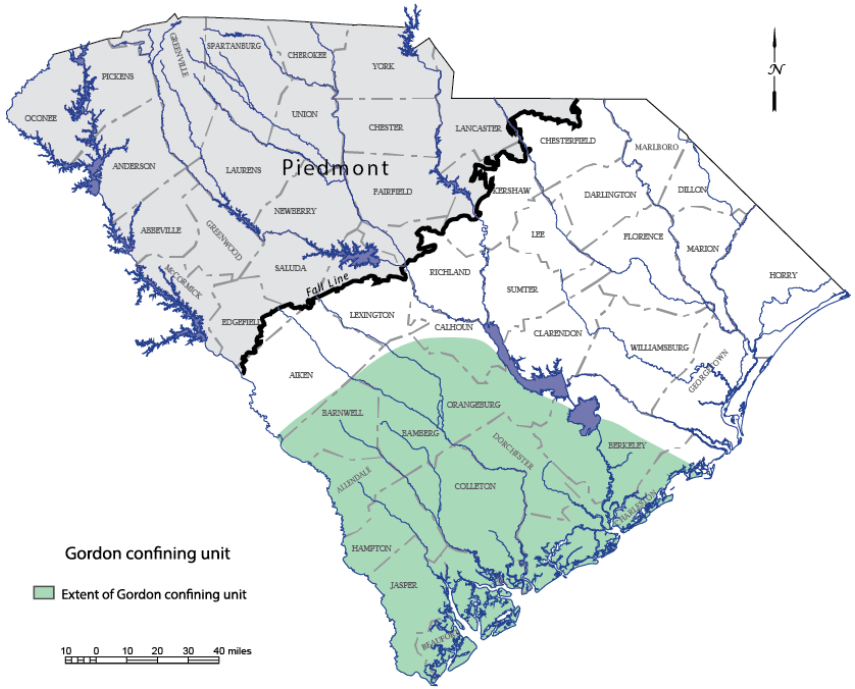
- 0 to 550 ft thick.
- 0 to 1,700 ft deep.
- Interbedded sand and clay aquifer.
- Low to high yields. Becomes fine-grained and less productive downdip.
- Transmissivity values of ten pumping tests at SRS average 80,000 gpd/ft.
- Transmissivity from a 7-day pumping test at Cope in western Orangeburg County is 82,000 gpd/ft.



CROUCH BRANCH CONFINING UNIT

- 0 to 360 ft thick.
- 0 to 1,500 ft deep.
- Silty-clay that is thinly laminated with very fine quartz sand and silt.



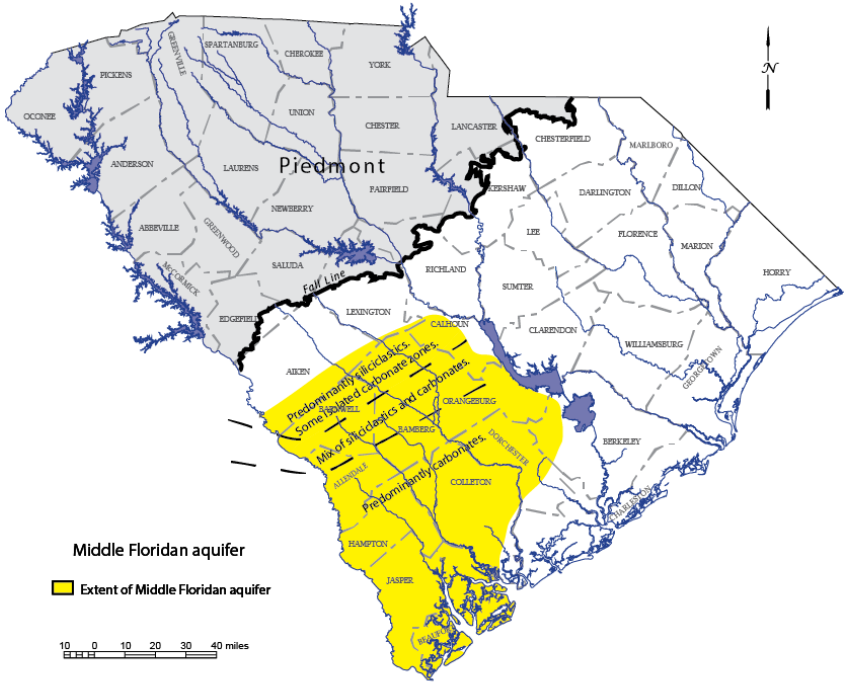


GORDON AQUIFER

- 0 to 360 ft thick.
- 0 to 1,230 ft deep.
- Interbedded sand and clay aquifer in updip areas. Downdip, consists of quartz-bearing limestone and calcarenites.
- Low to moderate yields. Transmissivity calculated from 15 pumping tests in the central part of SRS average 15,000 gpd/ft.
- In central Barnwell County, transmissivity averages 37,000 gpd/ft.
- Two pumping tests in southern Charleston County have transmissivity values of 5,600 and 6,700 gpd/ft.

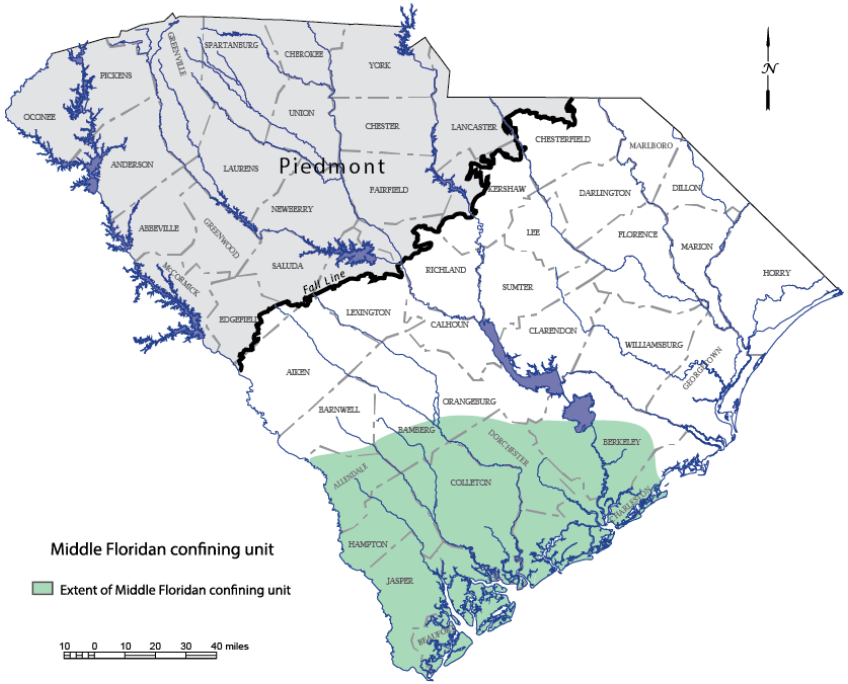
GORDON CONFINING UNIT

- 0 to 630 ft thick.
- 40 to 600 ft deep.
- Updip, consists of fine-grained glauconitic clayey sand and clay.
- Downdip, consists of marl.



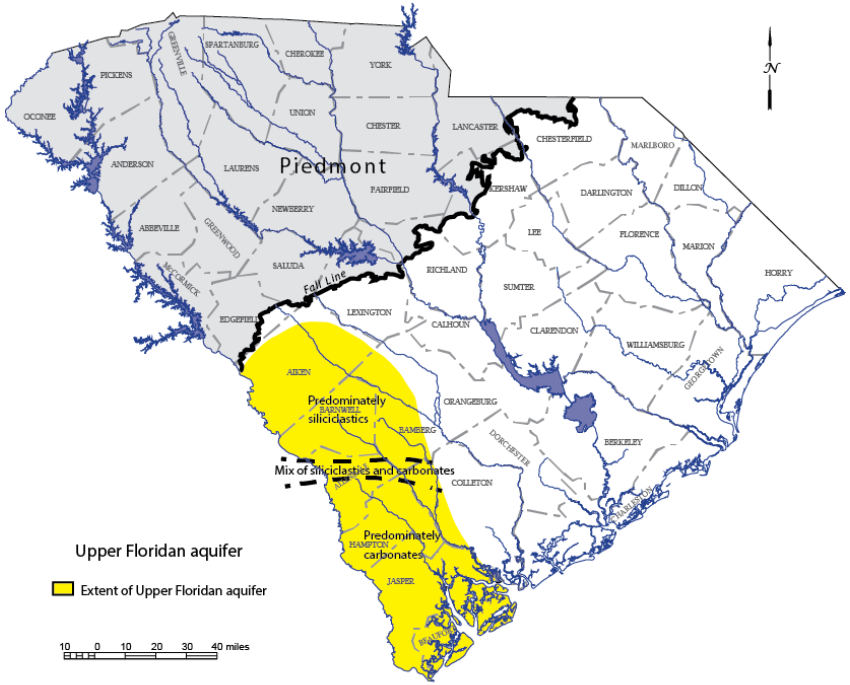
MIDDLE FLORIDAN AQUIFER

- 0 to 100 ft thick.
- 10 to 600 ft deep
- Updip, consists of sand and clay.
- Downdip, consists of limestone.
- Low to high yields. Transmissivity values from six pumping tests at Hilton Head Island range from 17,000 to 200,000 gpd/ft and average about 80,000 gpd/ft.
- Transmissivity values from four tests in Allendale County average 33,000 ft^2/d.
- A test conducted at Lake Warren State Park in Hampton County yielded no water.



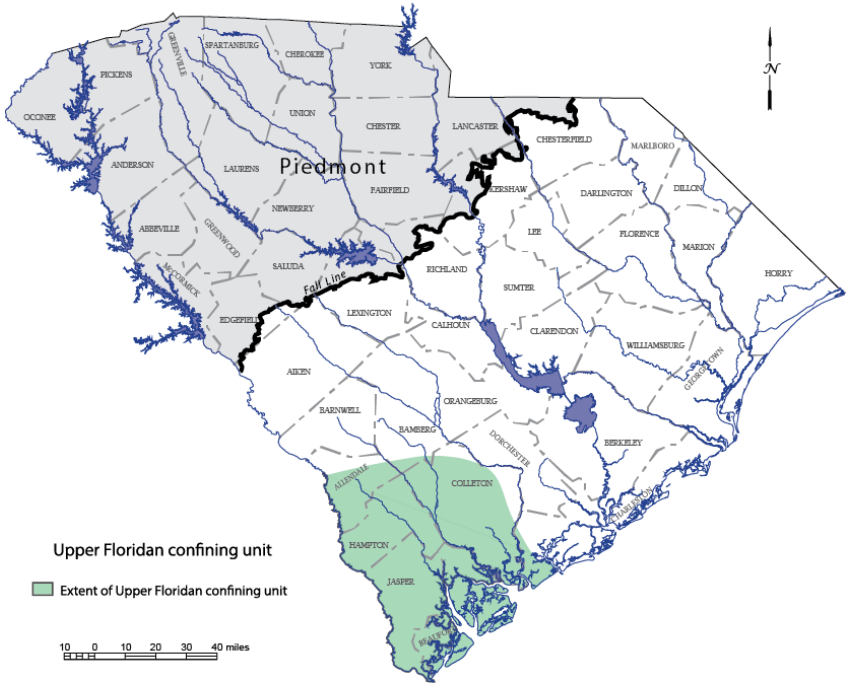
MIDDLE FLORIDAN CONFINING UNIT

- 0 to 320 ft thick.
- 10 to 250 ft deep.
- Consists of fine-grained carbonates containing minor amounts of quartz sand and clay.



UPPER FLORIDAN AQUIFER

- 0 to 170 ft thick.
- 0 to 170 ft deep.
- Updip, interbedded sand and clay aquifer.
- In Allendale County, transitions to a mix of clastic and carbonate sediments.
- Downdip, consists of limestone.
- Low to very high yields. Transmissivity values range from less than 3,700 gpd/ft at Port Royal Island to 525,000 gpd/ft at Hilton Head Island.



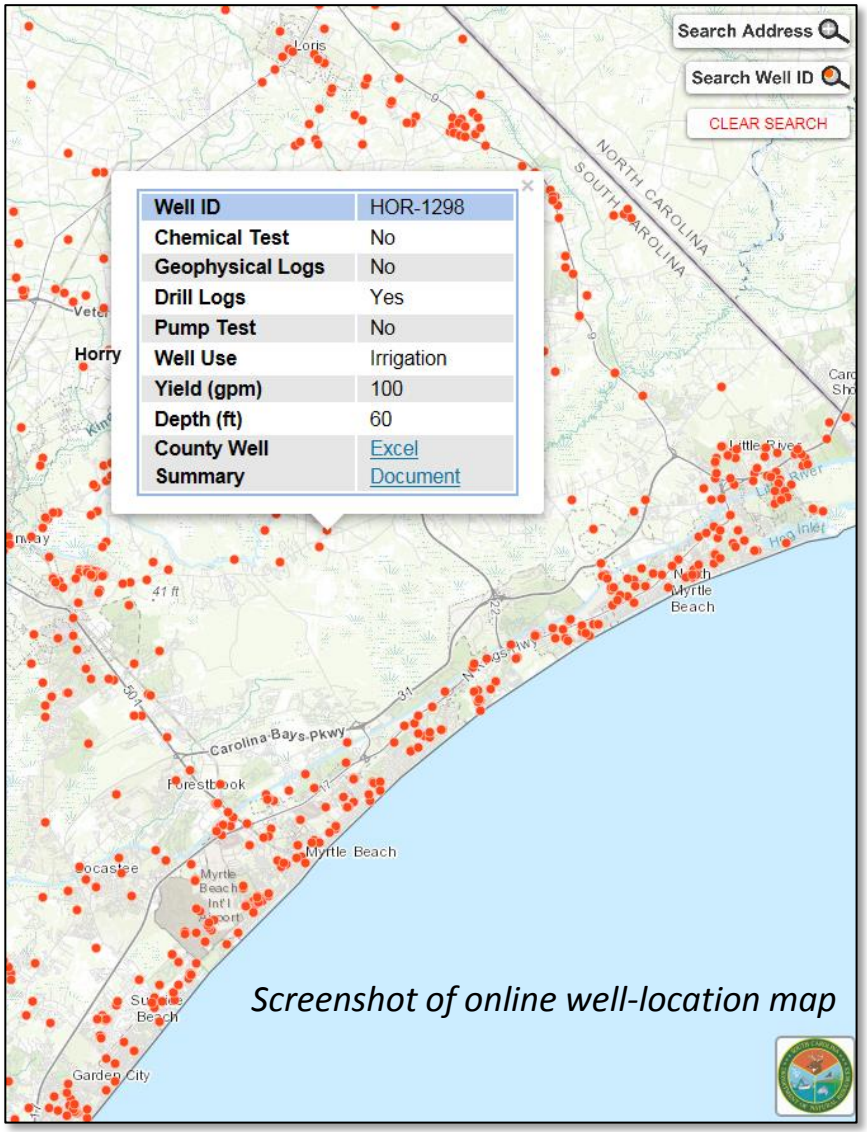
UPPER FLORIDAN CONFINING UNIT

- 0 to 100 ft thick.
- 10 to 100 ft deep.
- Consists of phosphatic sandy clay, clayey sand, and calcareous clayey sand.
- A hard phosphatic limestone occasionally occurs at the base of the confining unit that is referred to as “cap rock.”

Well Inventory/Database

- The Hydrology Section maintains files containing detailed information for nearly 15,000 water wells in the Coastal Plain region. This includes over 700 pumping tests and thousands of geophysical logs and driller's logs.

- A summary of this inventory is available online
- An interactive well-location map is also available online
- Well information is useful for
    - Aquifer delineation and geologic studies
    - Determining aquifer properties and well yields
    - Groundwater use studies
    - Groundwater quality studies
    - Providing information about the construction of existing wells



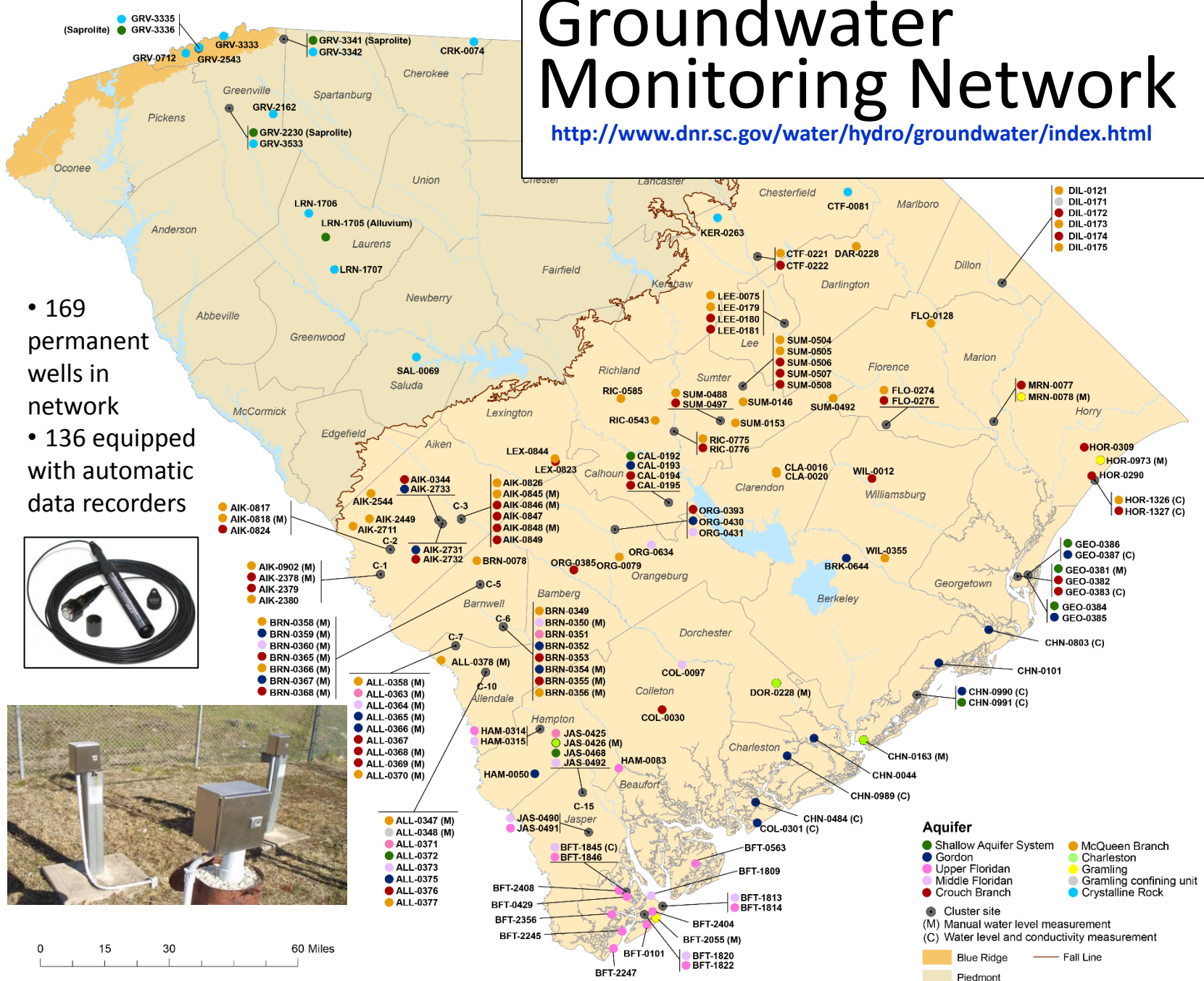
Screenshot of online well-location map

http://www.dnr.sc.gov/water/hydro/WellRecords/Wells_main.htm

Groundwater Monitoring Network

http://www.dnr.sc.gov/water/hydro/groundwater/index.html

- 169 permanent wells in network
- 136 equipped with automatic data recorders



Map prepared by the Land, Water & Conservation Division of the South Carolina Department of Natural Resources: Nov. 2017

We can use:

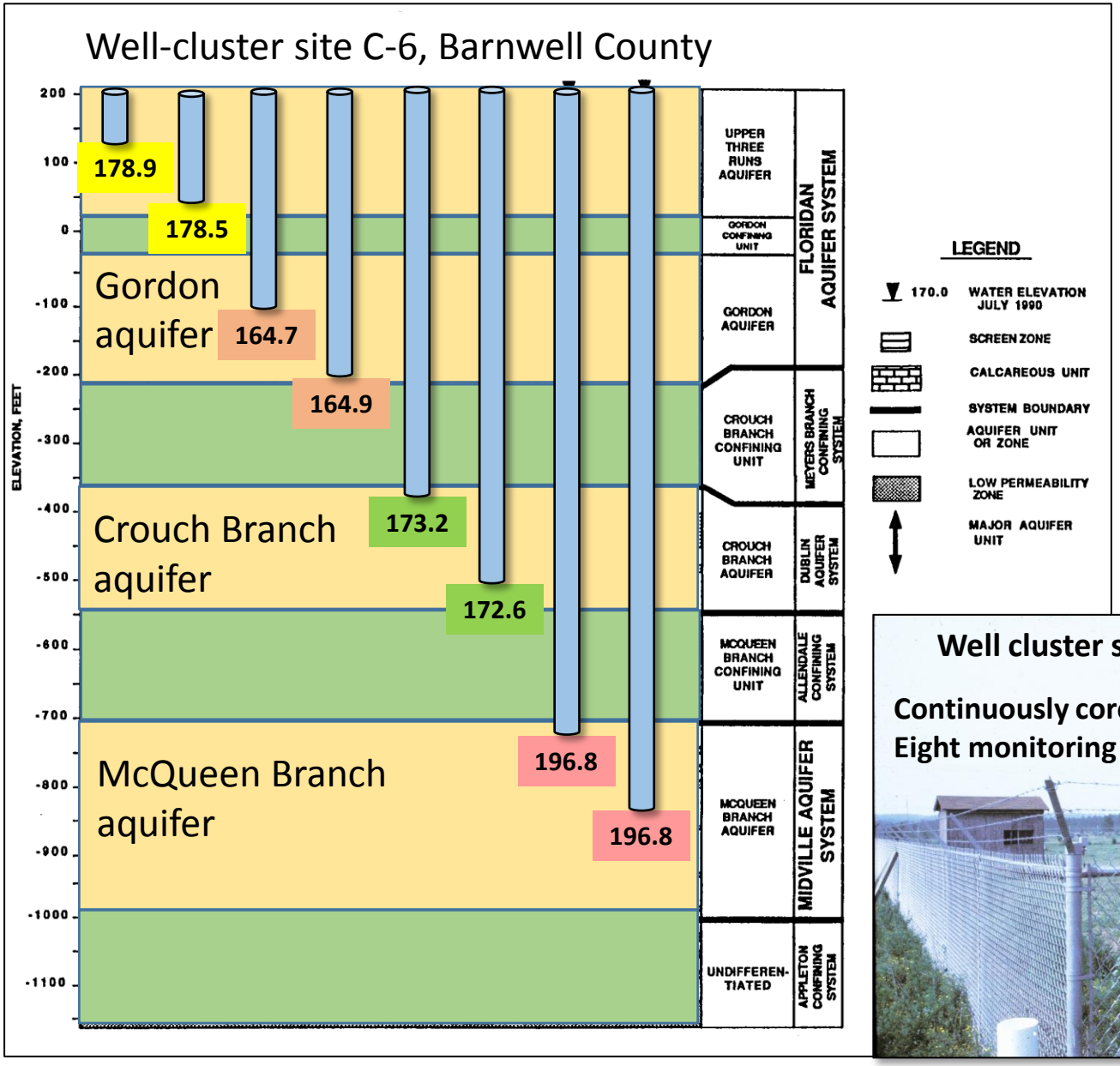
Geophysical logs
Pumping tests

Joe Gellici
803-734-6428
gellicij@dnr.sc.gov

Rock/sediment repository at the S.C. Geological Survey

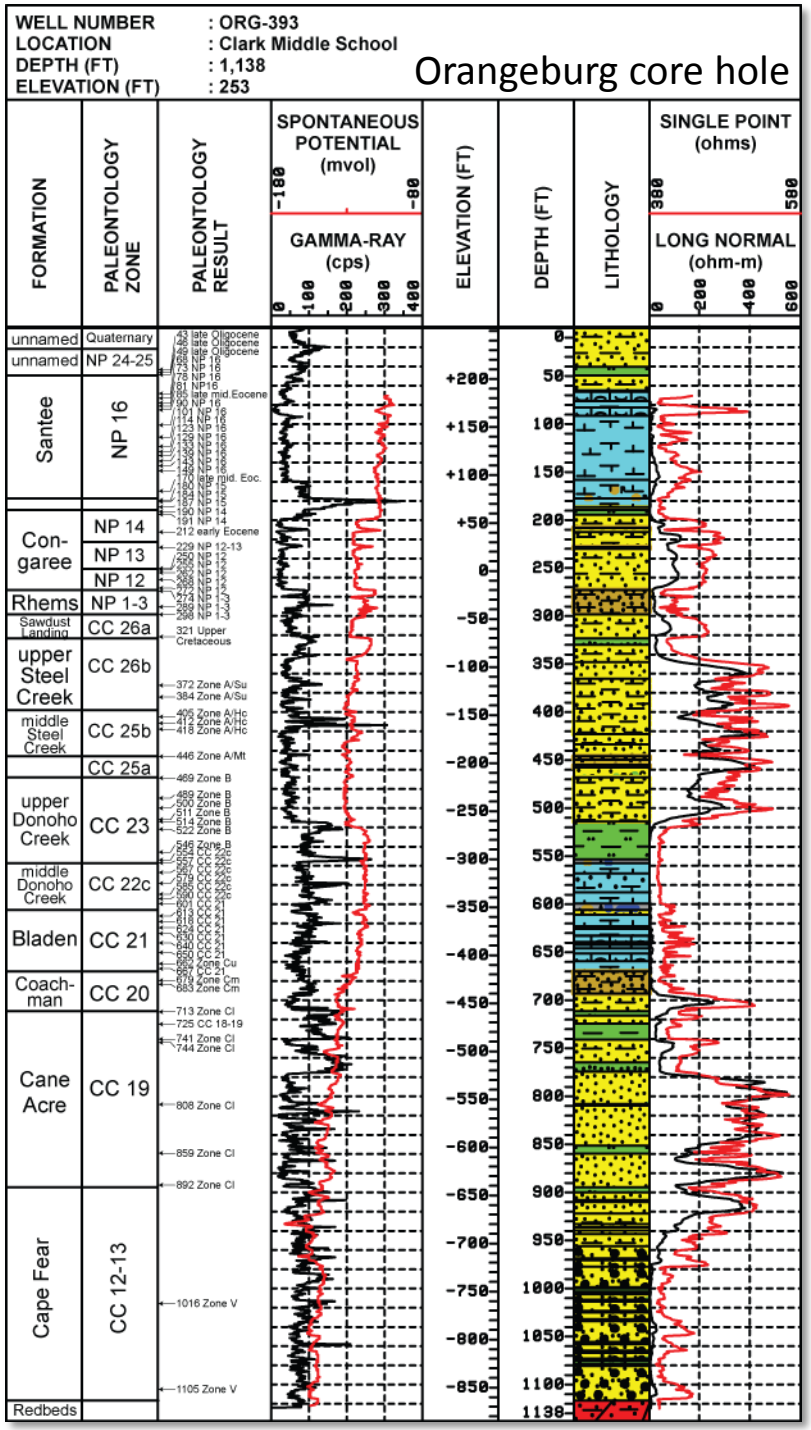
Photograph courtesy of Michael Foster, S.C. Wildlife Magazine

Hydraulic Head Data



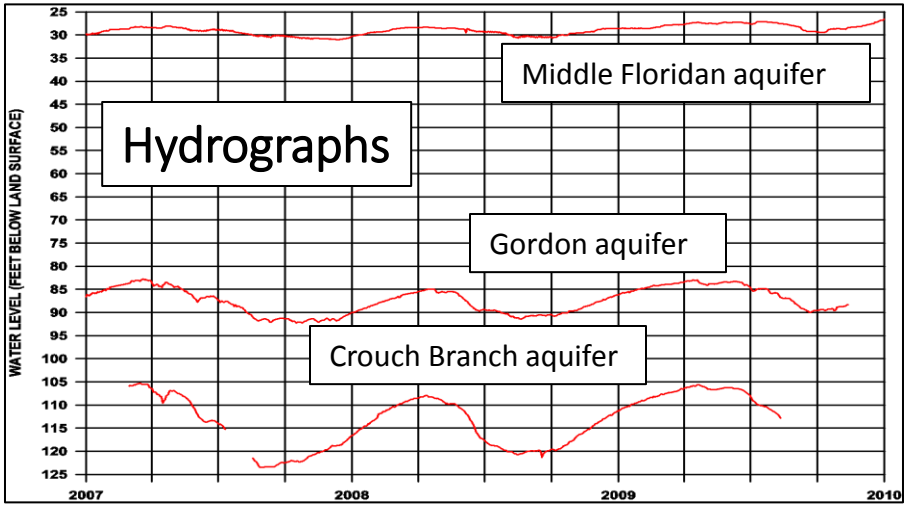
Well cluster site C-6, Town of Barnwell

Continuously cored to 1,300 feet.
Eight monitoring wells from 90 to 1,040 ft deep.



3 wells

Middle Floridan aquifer
(Santee Fm; late middle Eocene; NP16)

Gordon aquifer
(Congaree Fm; early middle Eocene; NP12-14)

Crouch Branch aquifer
(Steel Creek and Donoho Creek Fms;
Maastrichtian and upper Campanian; CC25-26 and CC23)