

South Carolina DNR's Groundwater Monitoring Network

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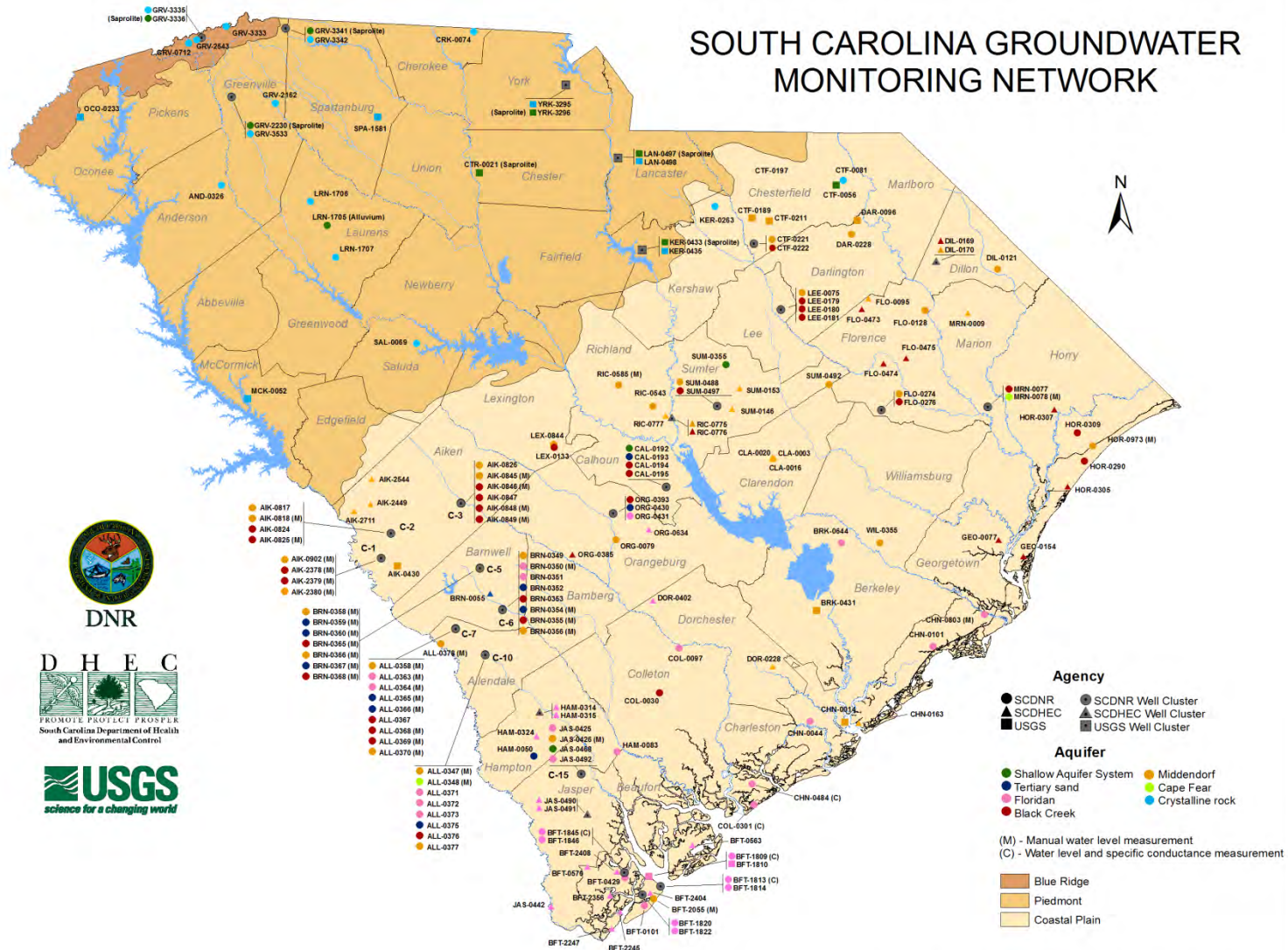
South Carolina Ground-Water Monitoring Network

- Collaborative effort between 3 agencies:
 - South Carolina Department of Natural Resources (SCDNR) - 122 wells
 - South Carolina Department of Health and Environmental Control (SCDHEC) - 41 wells
 - United States Geologic Survey (USGS) - 18 wells

“The goal of this cooperative effort is to develop and maintain a statewide ground-water monitoring network that provides scientifically defensible information for use in planning, managing, and developing South Carolina’s ground-water resources in a responsible and sustainable manner for all current and future users.”



SOUTH CAROLINA GROUNDWATER MONITORING NETWORK



Map prepared by the Land, Water & Conservation Division of the South Carolina Department of Natural Resources-February, 2014.

Purpose of the Monitoring Network

- Establish a long-term groundwater dataset to support:
 - Groundwater management and permitting
 - Drought assessments
 - Identification of long-term trends
 - Groundwater flow modeling
 - Water-level (potentiometric) mapping
 - Evaluation of groundwater availability

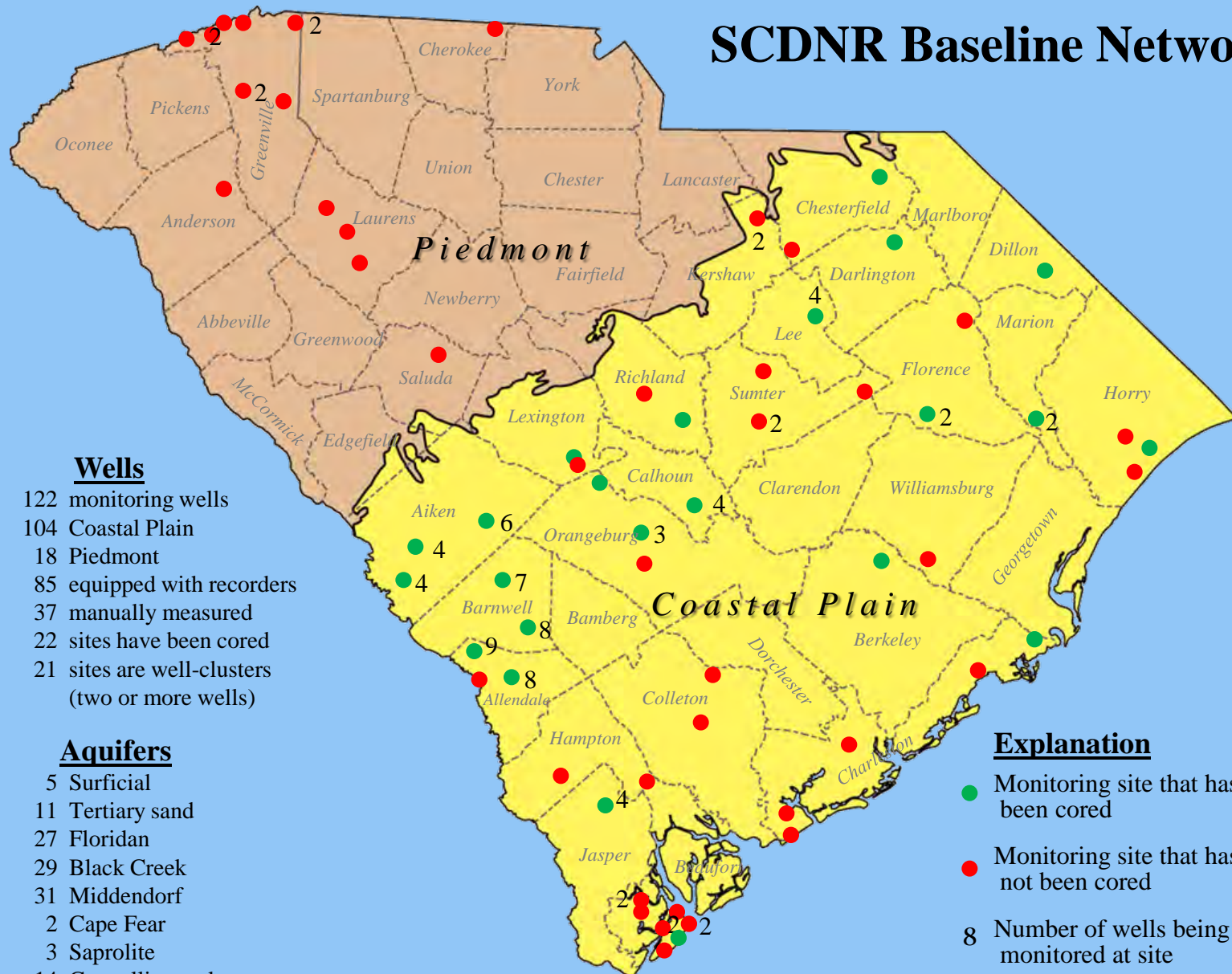
SCDNR Baseline Groundwater Monitoring Network

- 122 wells – most owned by SCDNR.
- 86 wells – Equipped with automatic data recorders (ADRs) which record hourly water levels.
- 36 wells – Periodic measurements made every 2-3 months.
- Periods of Record:
 - range from several months to over 50 years.
 - 10-15 years is typical.





SCDNR Baseline Network

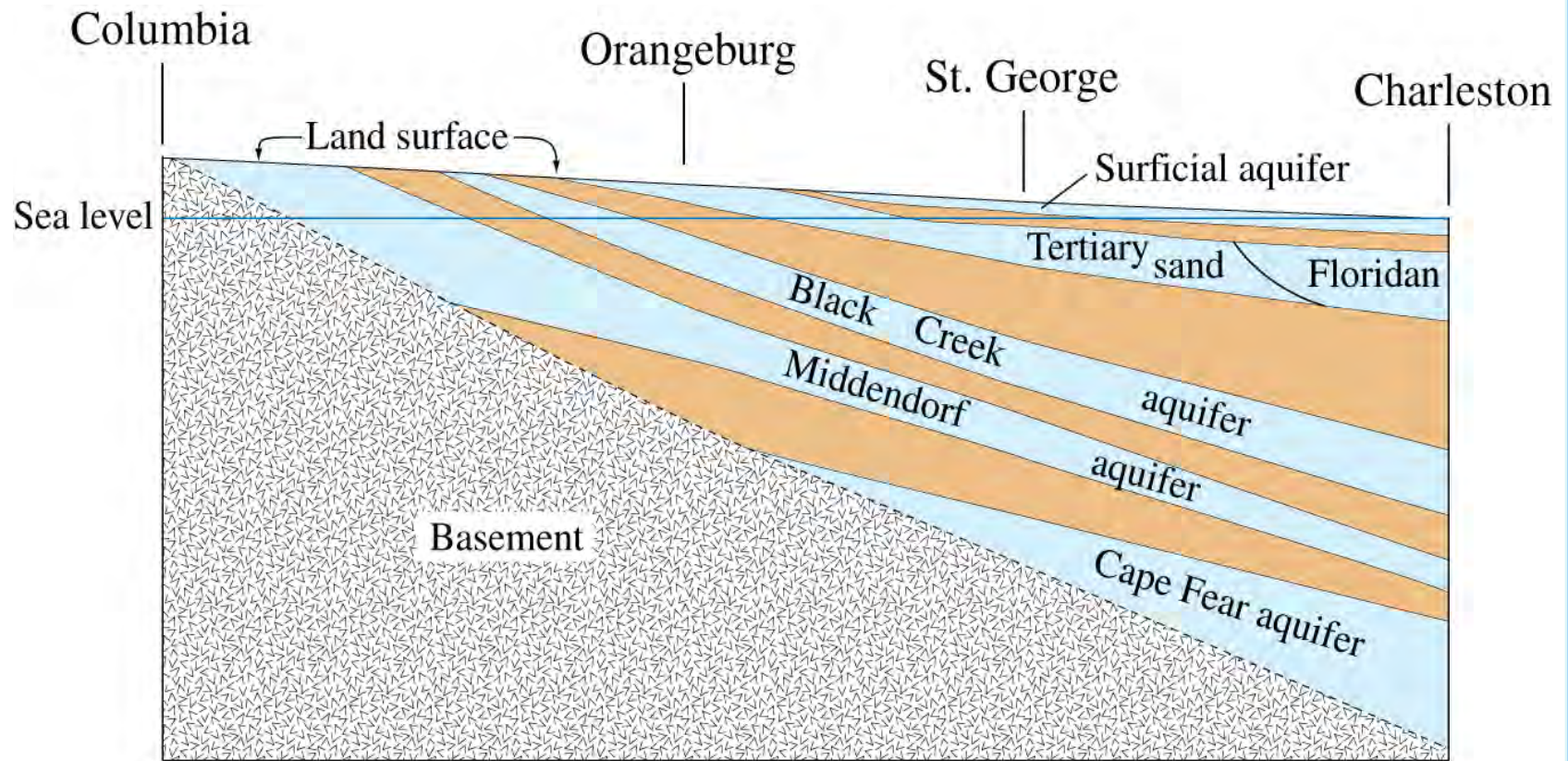


Methods

- Field visits are taken every 2-3 months:
 - Manual measurements are recorded.
 - ADRs (predominantly of the pressure transducer variety) are downloaded.
 - ADRs are calibrated, fixed or replaced as needed.
- Manual and downloaded hourly data are checked for quality assurance and quality control and entered into SCDNR database.
- Daily average water levels are computed from hourly data and converted to depths below land surface.



Principal Coastal Plain Aquifers

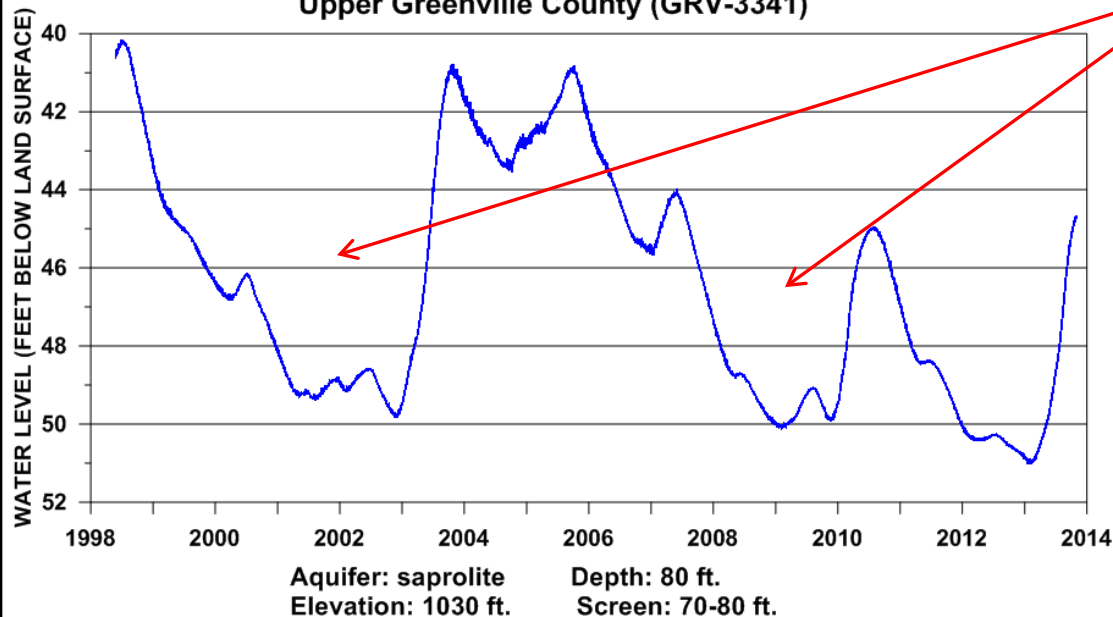


Interpreting Groundwater Behavior Can Be Challenging:

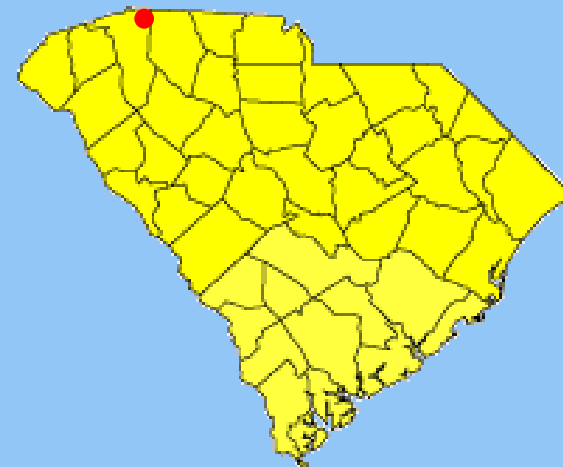
- Some sites have inadequate periods of record from which to evaluate long-term trends.
- Can be difficult to distinguish between the impacts of drought and impacts of pumping.
- Limited spatial distribution of wells.
- Incomplete groundwater use data (historically and currently).
- Incomplete data on where wells are screened.

Crystalline Rock/Saprolite Aquifer System

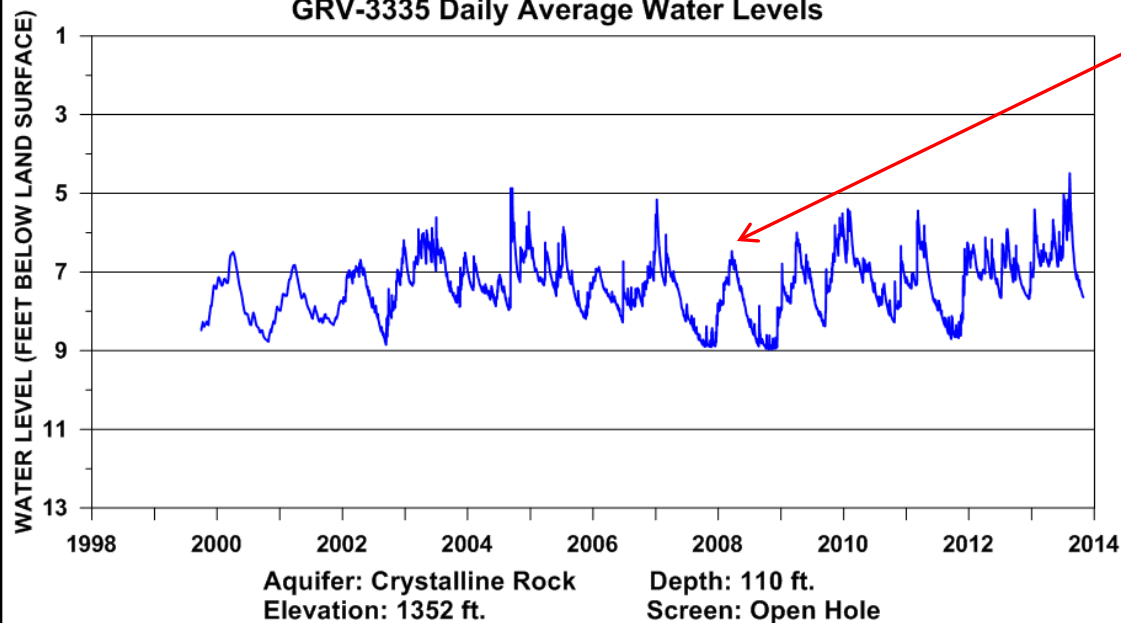
**Daily Average Water Levels
Upper Greenville County (GRV-3341)**



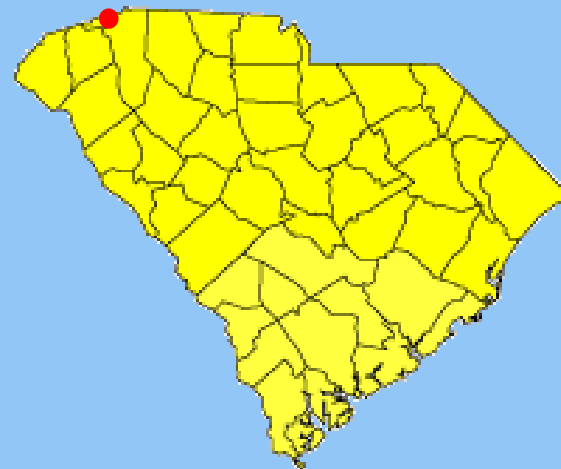
- Strong drought signature
- Typically recovers from drought



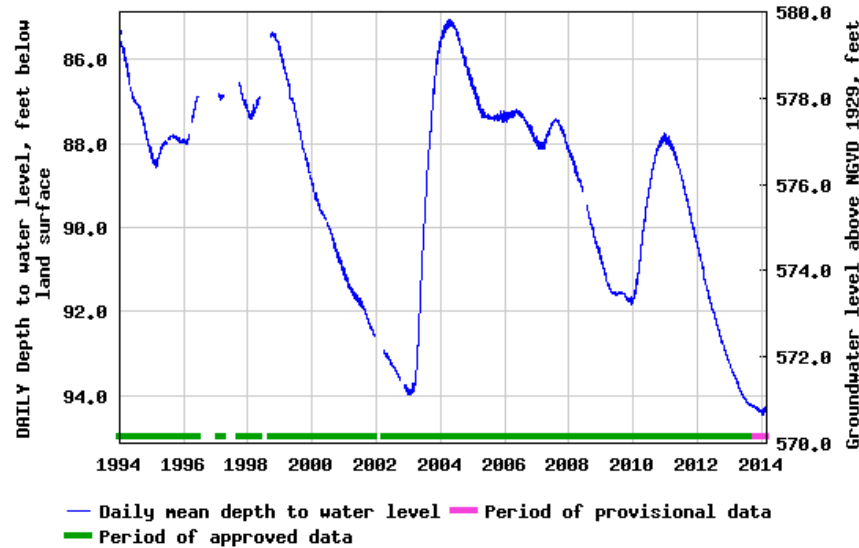
GRV-3335 Daily Average Water Levels



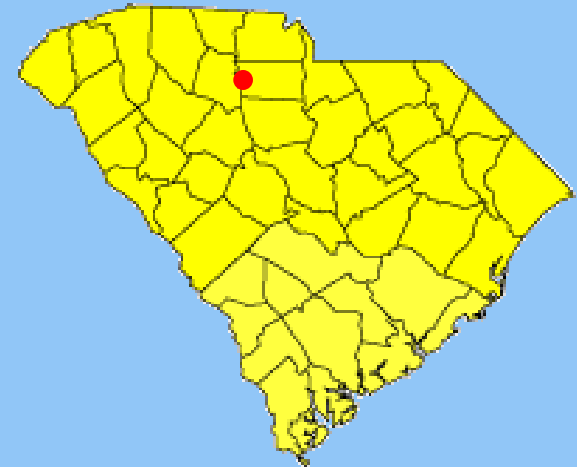
- Weak drought signature



USGS 344000081250011 CTR- 21

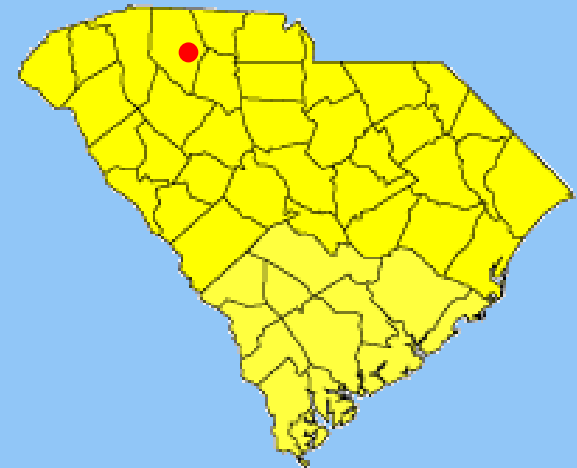
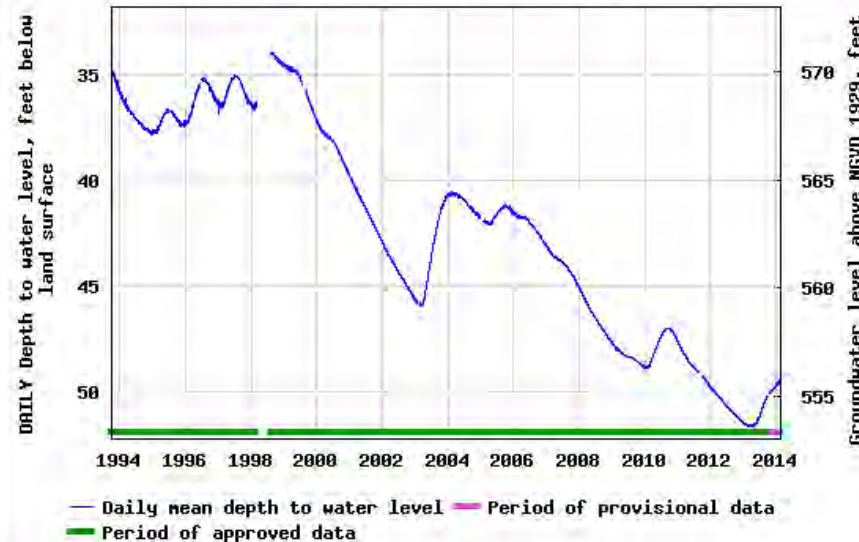


- Strong recovery after 1998-2002 and 2007-2008 droughts, but no recovery after 2012 drought

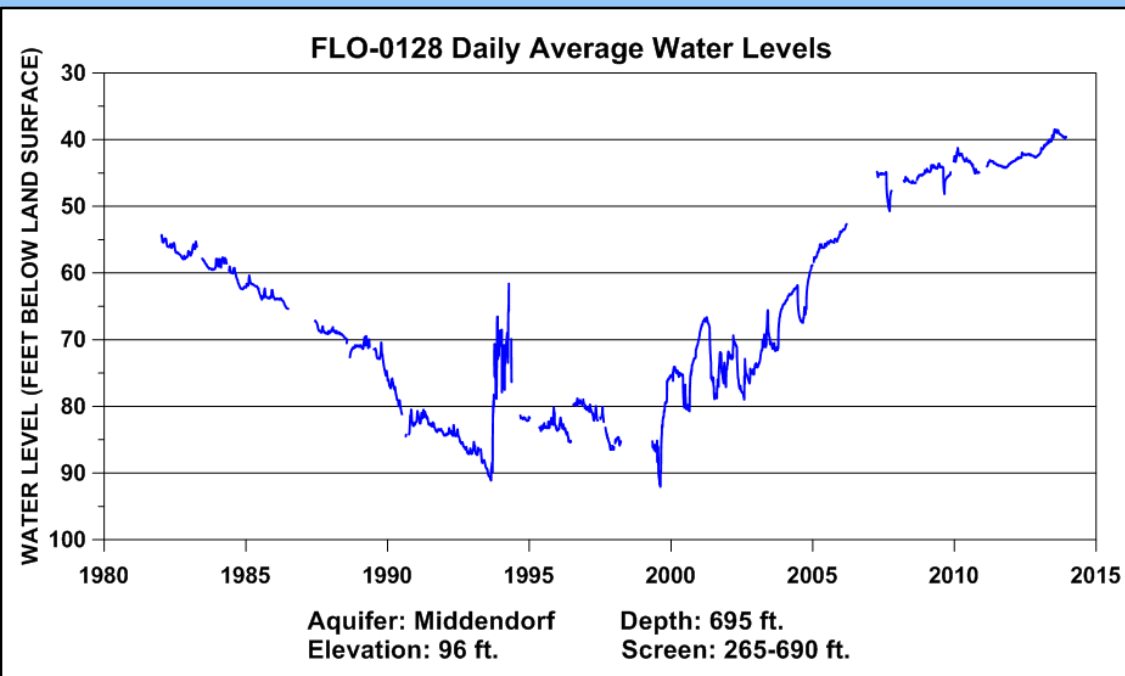


- Weak recovery after 1998-2002 and 2007-2008 droughts and overall downward trend

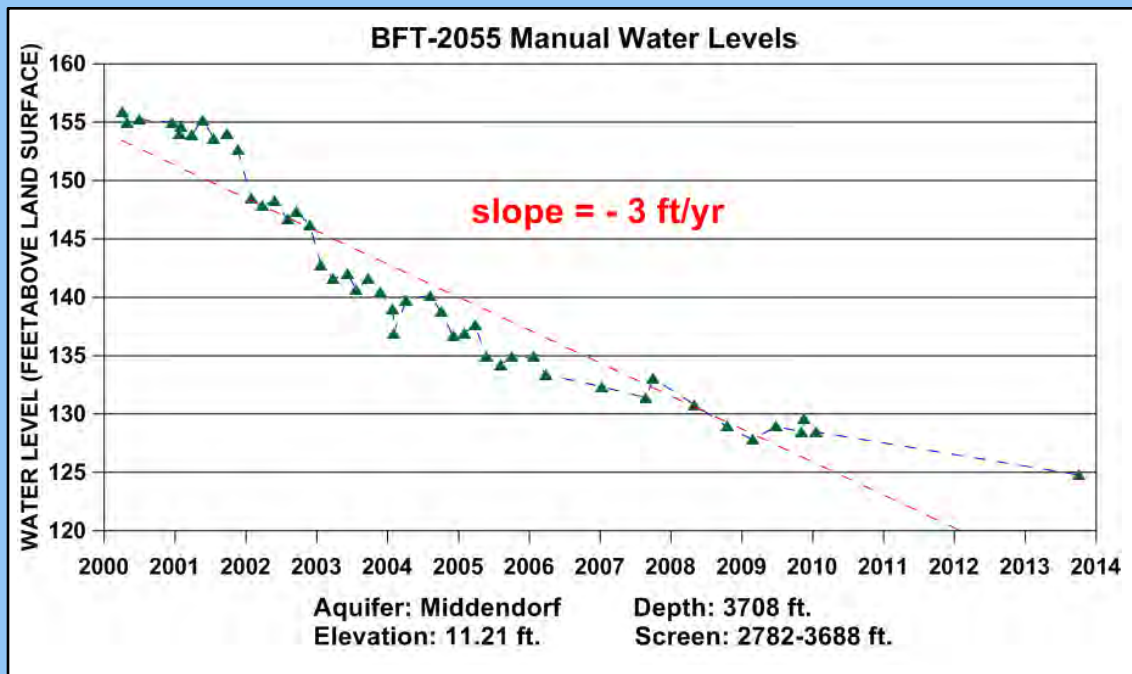
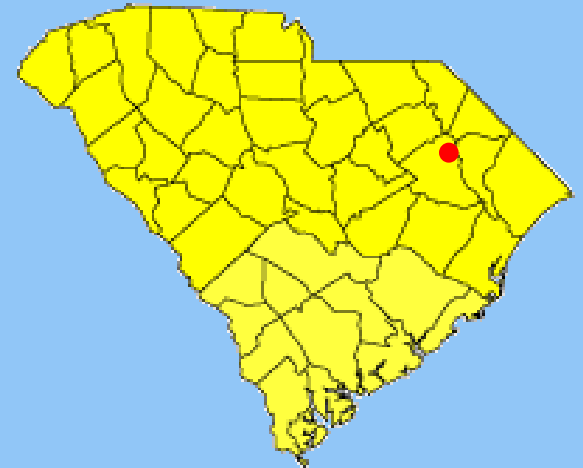
USGS 345145081502900 SP-1581



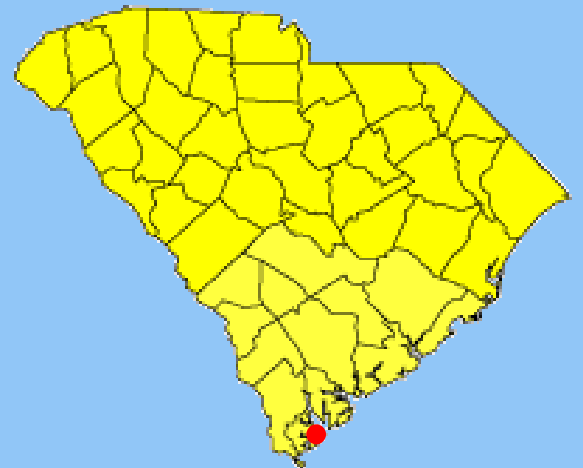
Middendorf Aquifer



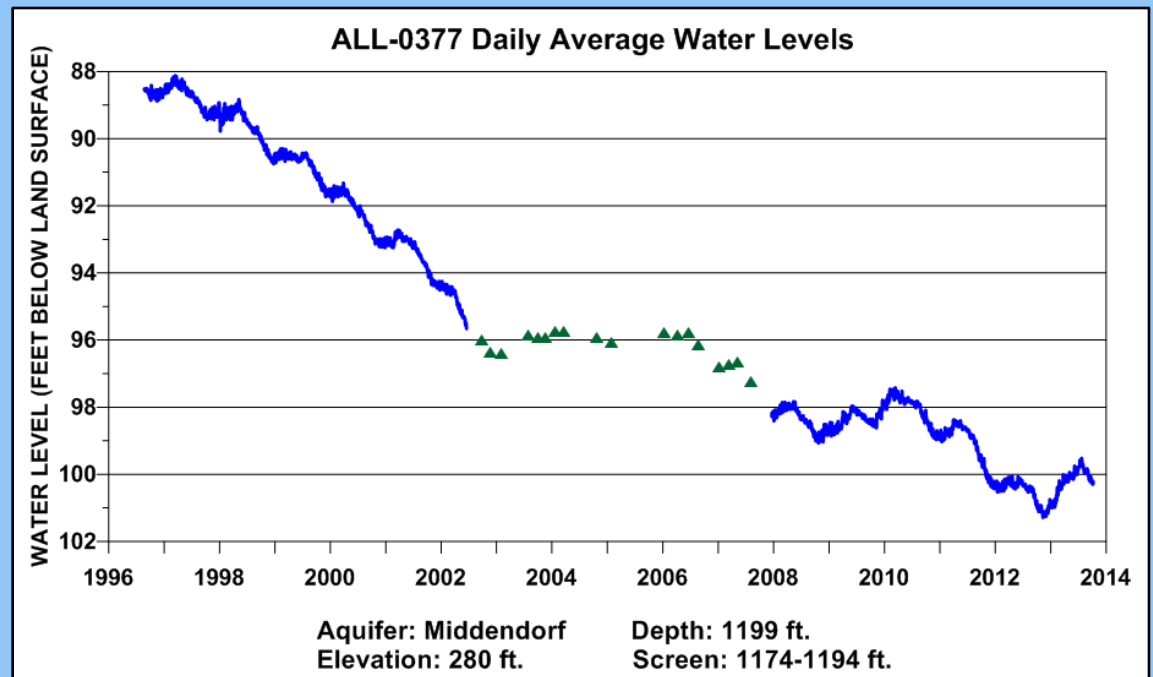
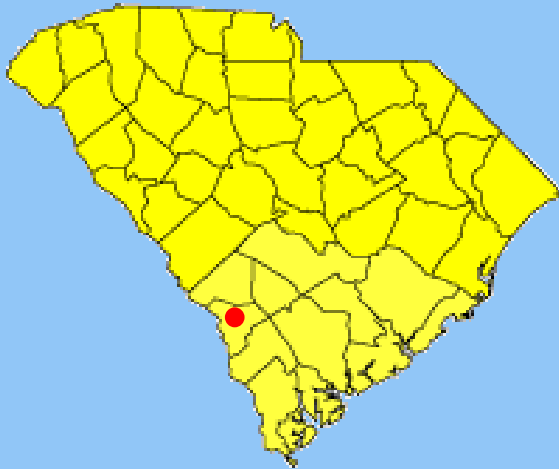
- Significant recovery after City of Florence supplemented ground-water supply with Pee Dee River



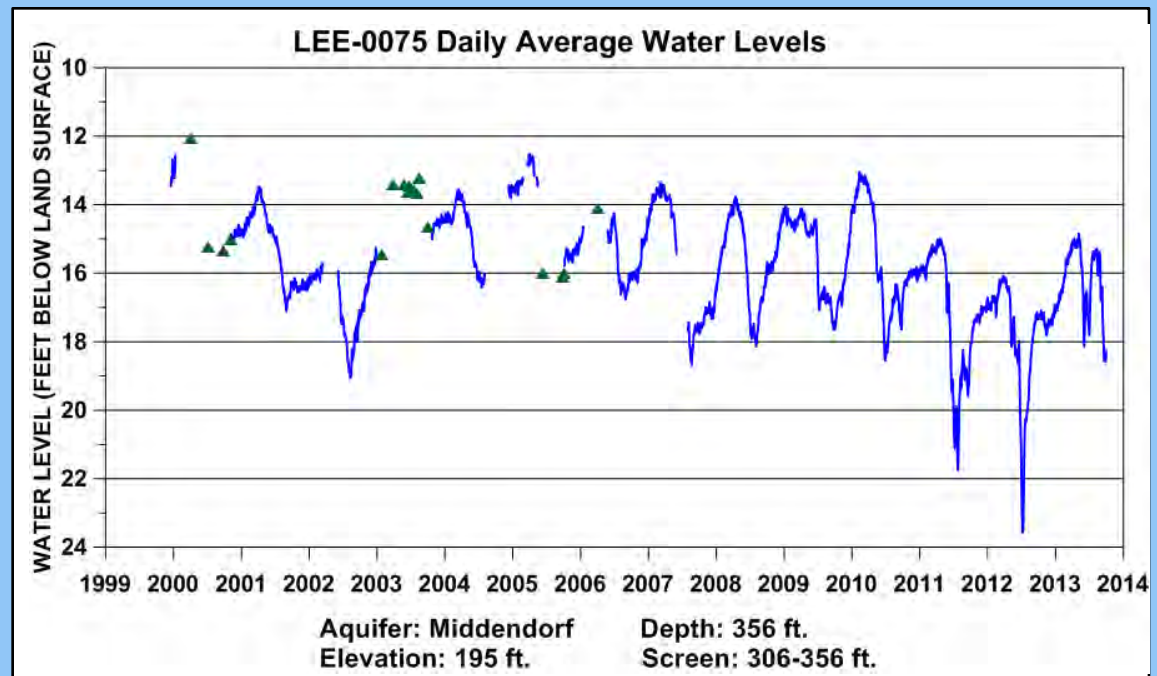
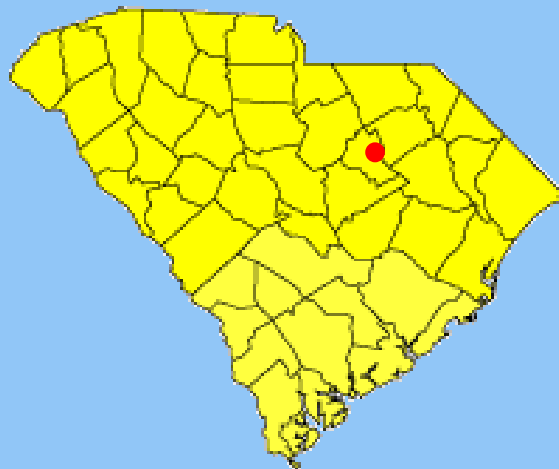
- Decline likely due to pumping on Hilton Head



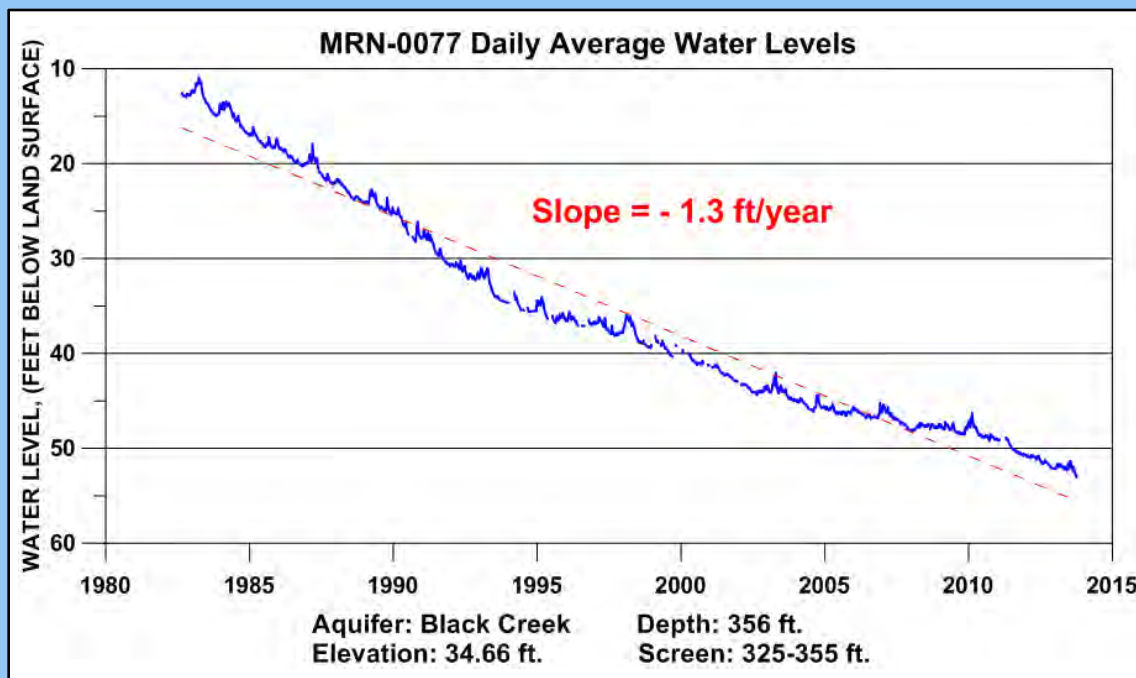
- Little to no recovery after 1998-2002 drought
- Overall downward trends



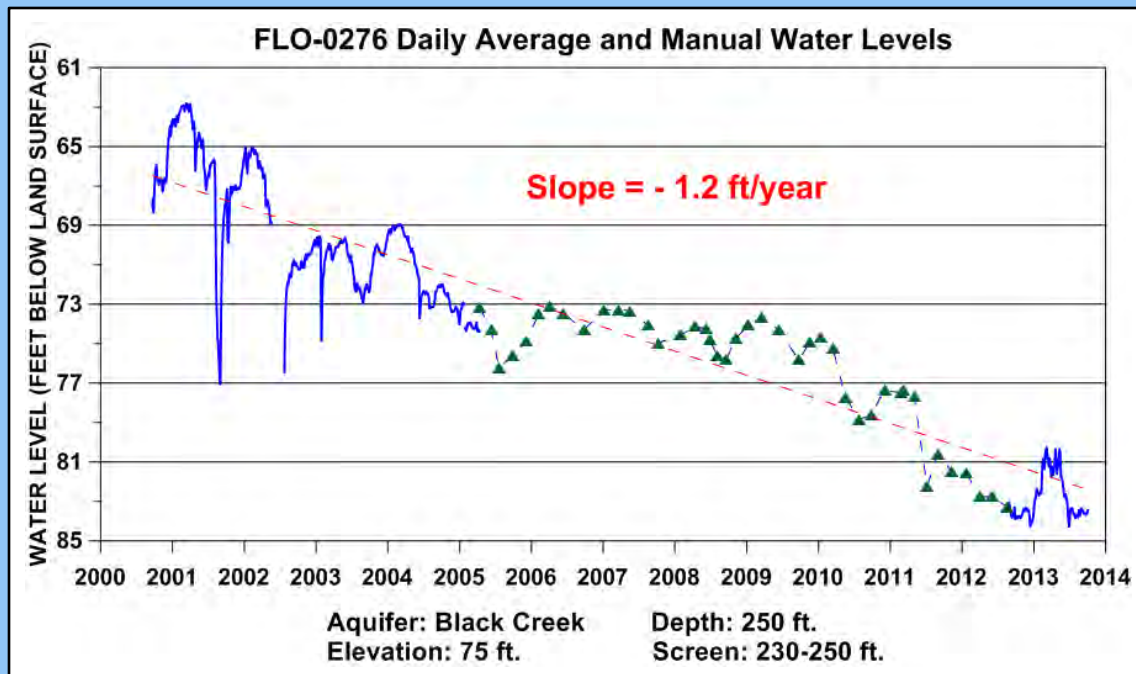
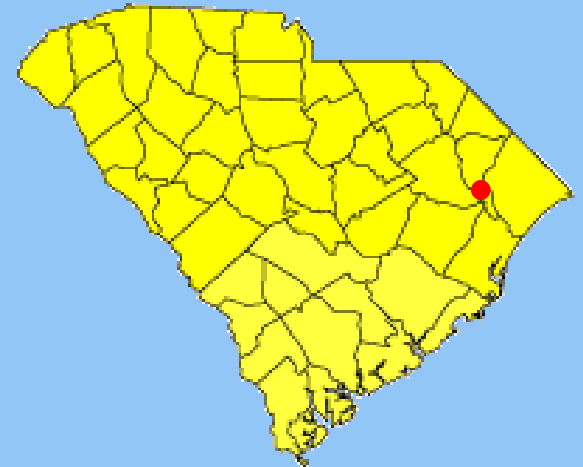
- Smaller downward trends,
- Stronger recovery from drought
- Evidence for recent increased pumping



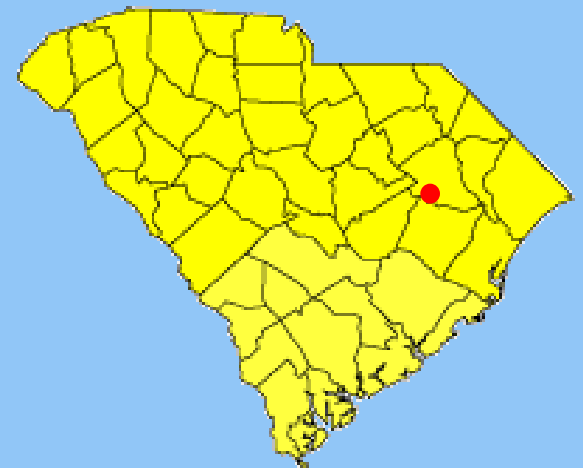
Black Creek Aquifer



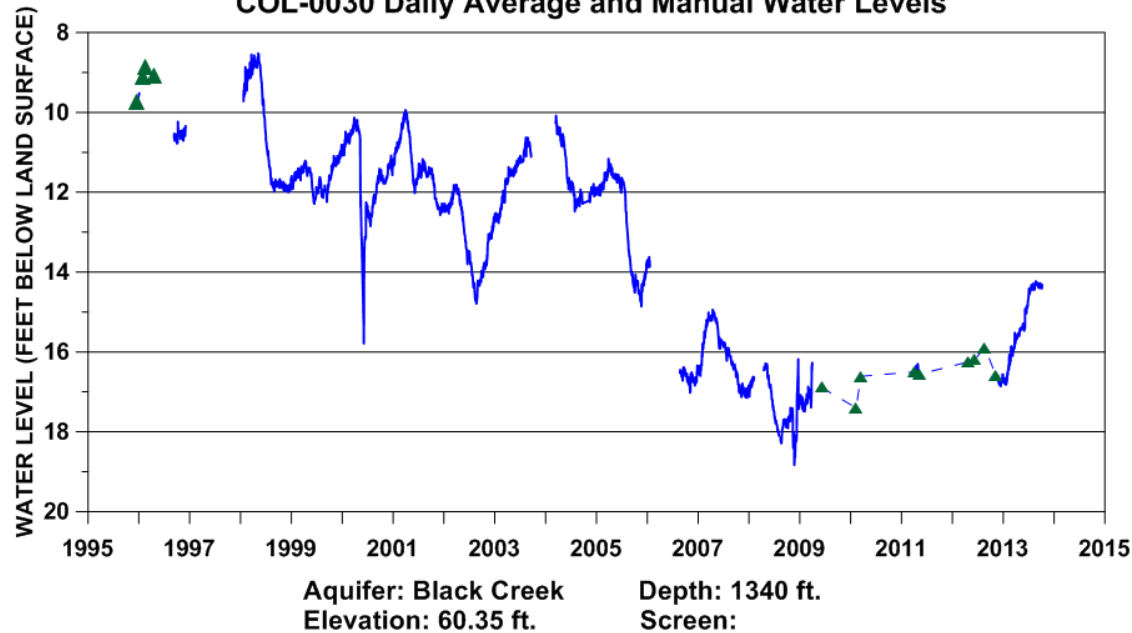
- **Industrial and Municipal Pumping in southeastern Florence County**



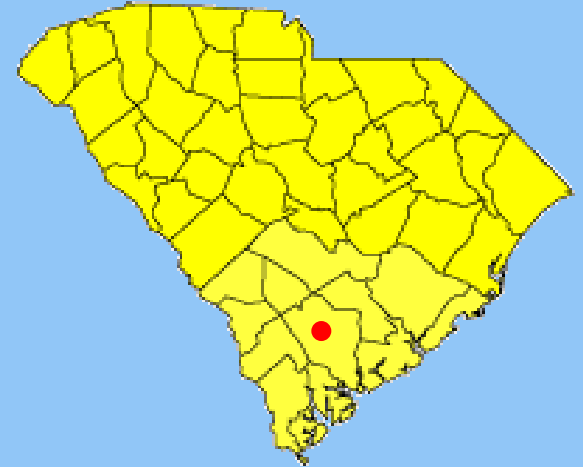
- **Steady decline over past 10 years likely due to municipal pumping**



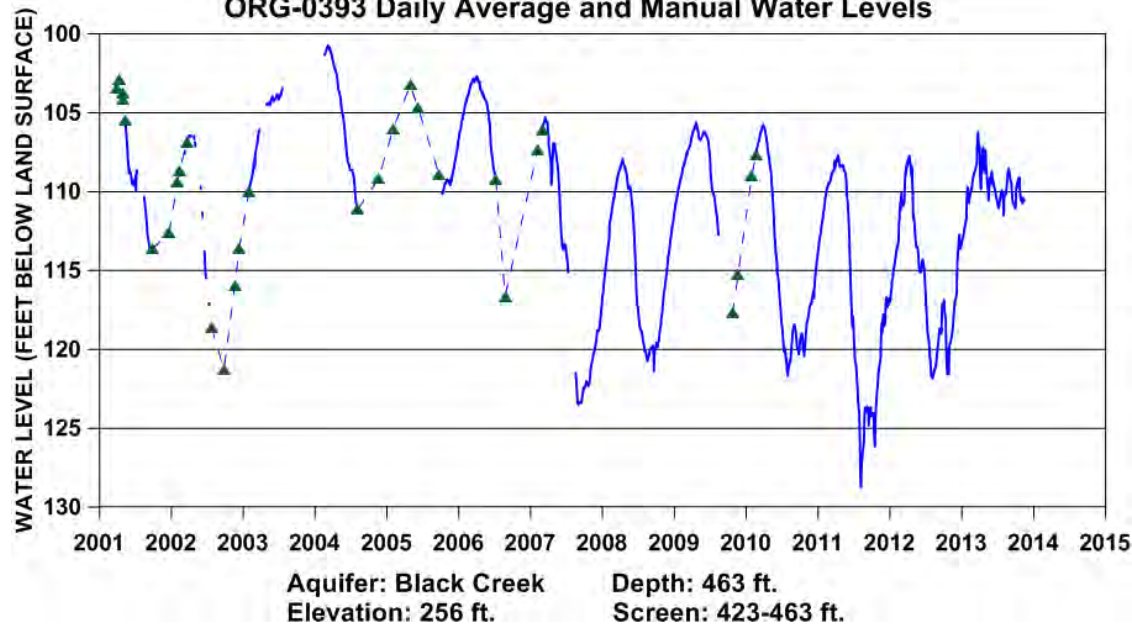
COL-0030 Daily Average and Manual Water Levels



- Decline, in part, due to 2007-2008 drought
- Significant recharge related to 2013 summer rainfall



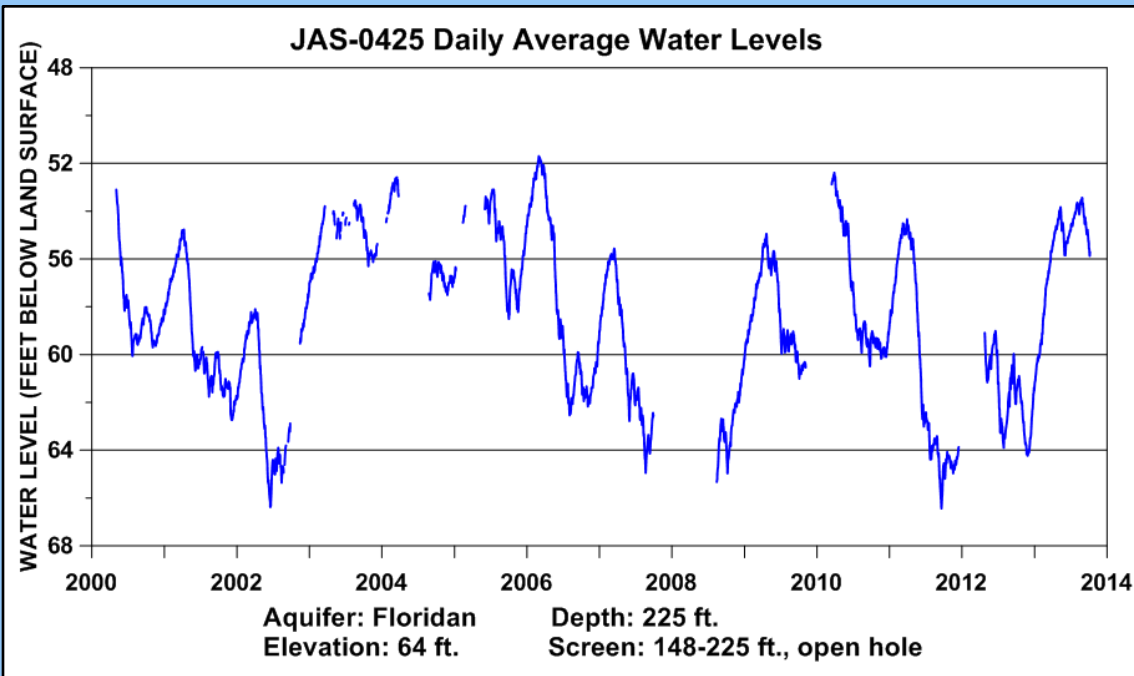
ORG-0393 Daily Average and Manual Water Levels



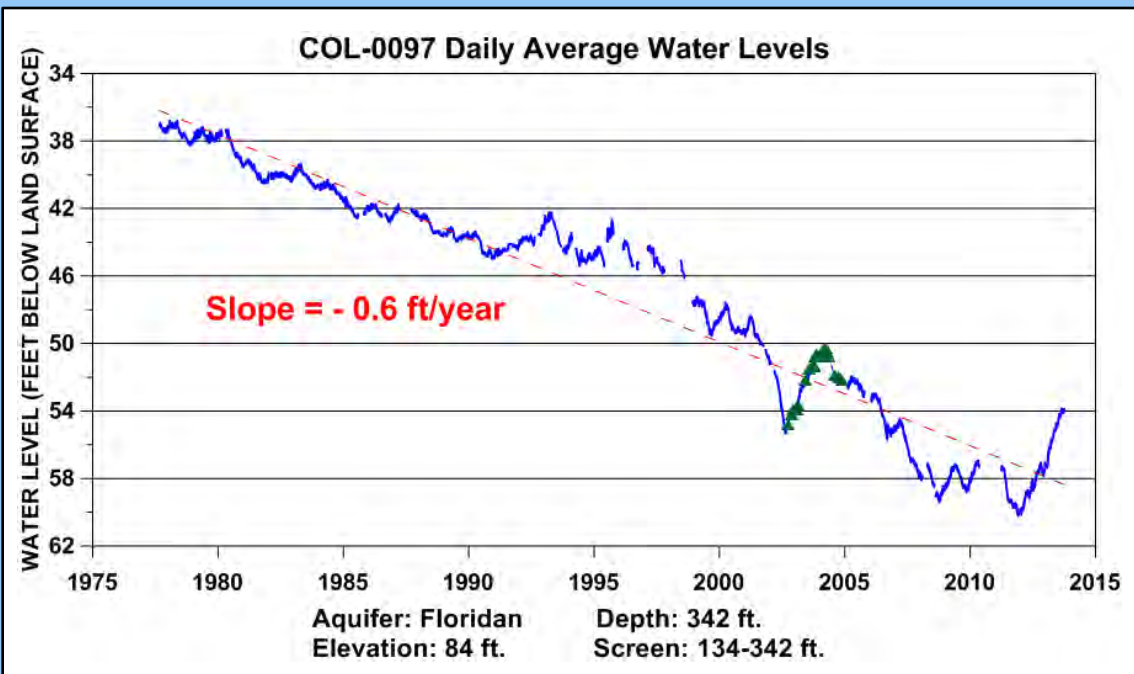
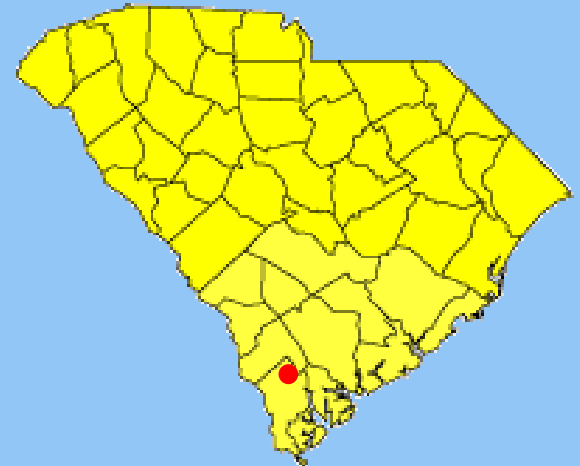
- Strong seasonal signature - likely due to irrigation
- Little to no 2013 seasonal decline



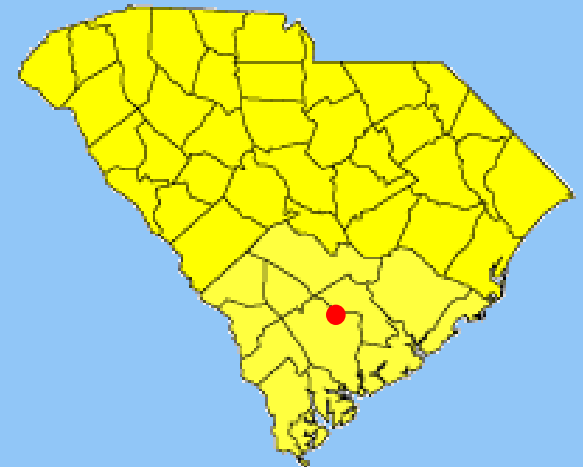
Floridan Aquifer

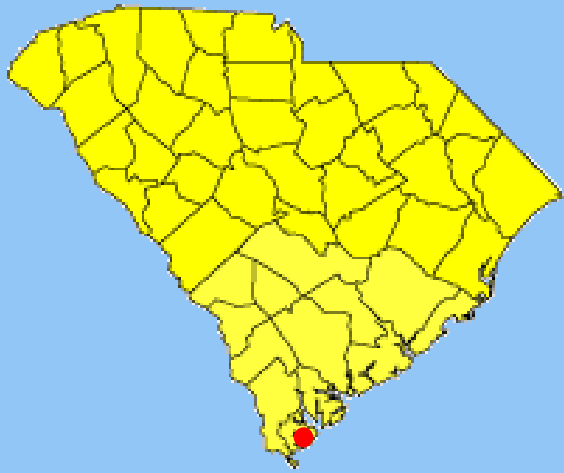


- Recovered well from past droughts
- No long-term decline

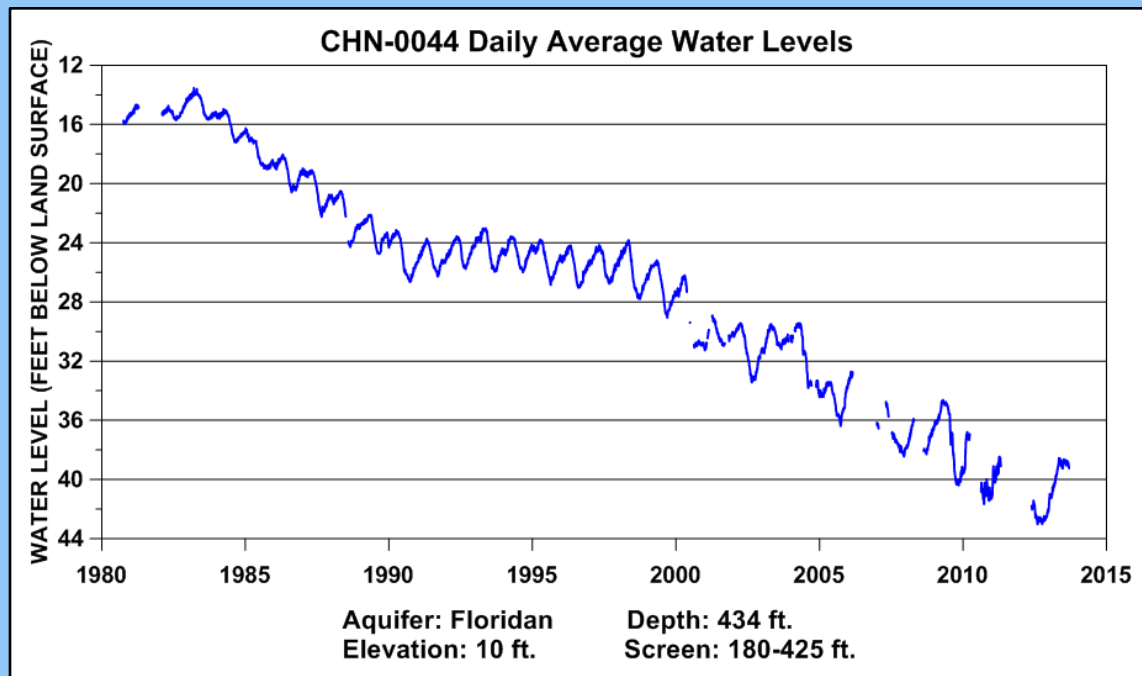
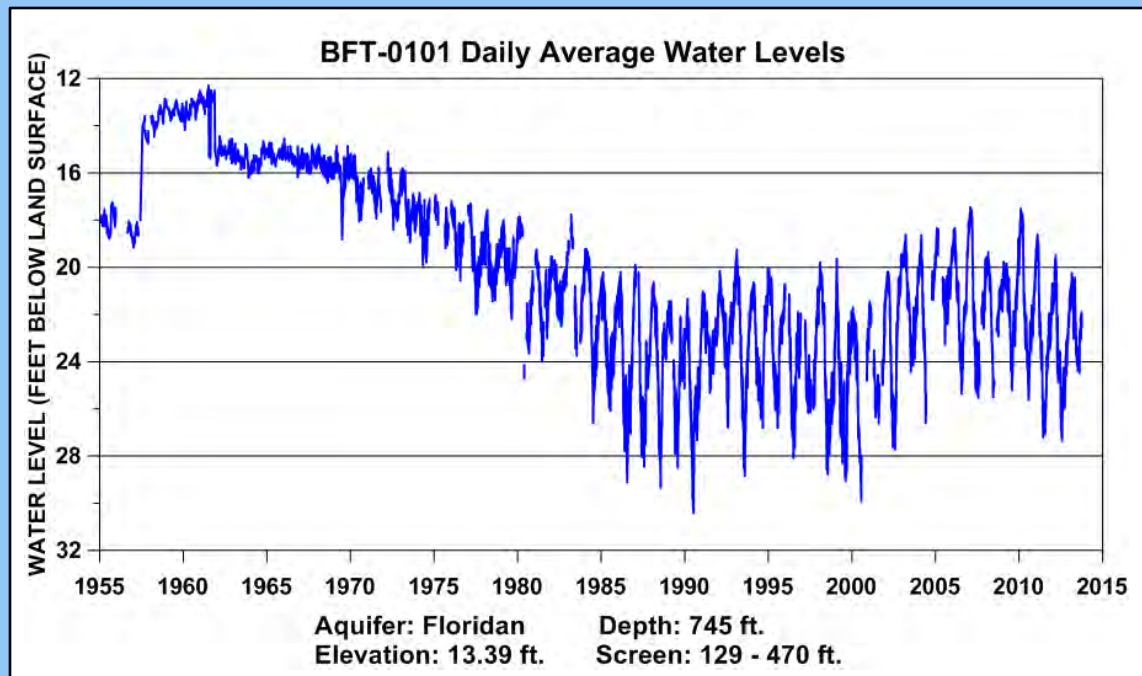
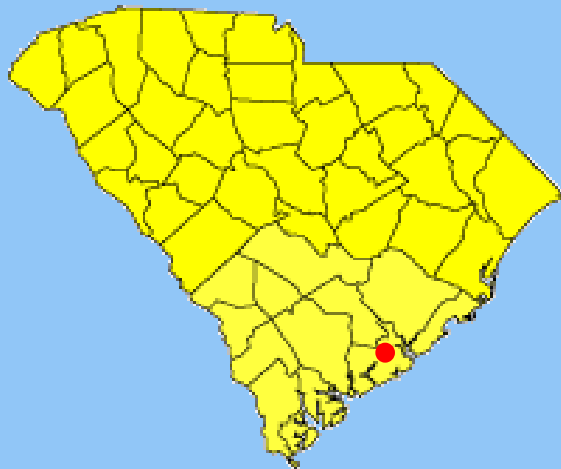


- Long-term downward trend
- Noticeable 2013 summer recharge





Water levels have leveled off after declines during the 1960s, 1970s and 1980s, but have greater seasonal variations



Summary

- Many of our well sites are experiencing downward trends.
 - Declines are generally more severe along the Coastal counties.
 - Largest declines associated with known pumping centers
 - Substantial number of sites had little to no recovery after 1998-2002 drought.
 - Water level behavior likely a function of increased drought frequency and local/regional pumping.
 - Noticeable recharge from 2013 rainfall in the Floridan and Black Creek aquifers in some areas
- Long-term upward trends associated with areas where water users have supplemented water supply with surface water or transitioned from ground water to surface water.

Future Work/Considerations

- Need a detailed study of water withdrawals from each aquifer to better understand ground water trends:
 - *How much of a decline is due to the severe droughts over the last 15 years and how much is due to pumping?*
- Need a better understanding on the significance of water level declines:
 - *When is a decline severe enough to cause concern?*
- Need to *strategically* expand our baseline monitoring network

Recent Drilling Activities

A photograph of a drilling operation in a forest. On the left, a tall red drilling rig stands vertically. In the center, a red dump truck is parked, its bed raised. To the right, a red pickup truck is parked. The background is filled with tall pine trees and a small white building with a blue roof. The ground is dirt and covered with pine needles.

Lee State Park in Lee County – 3 wells

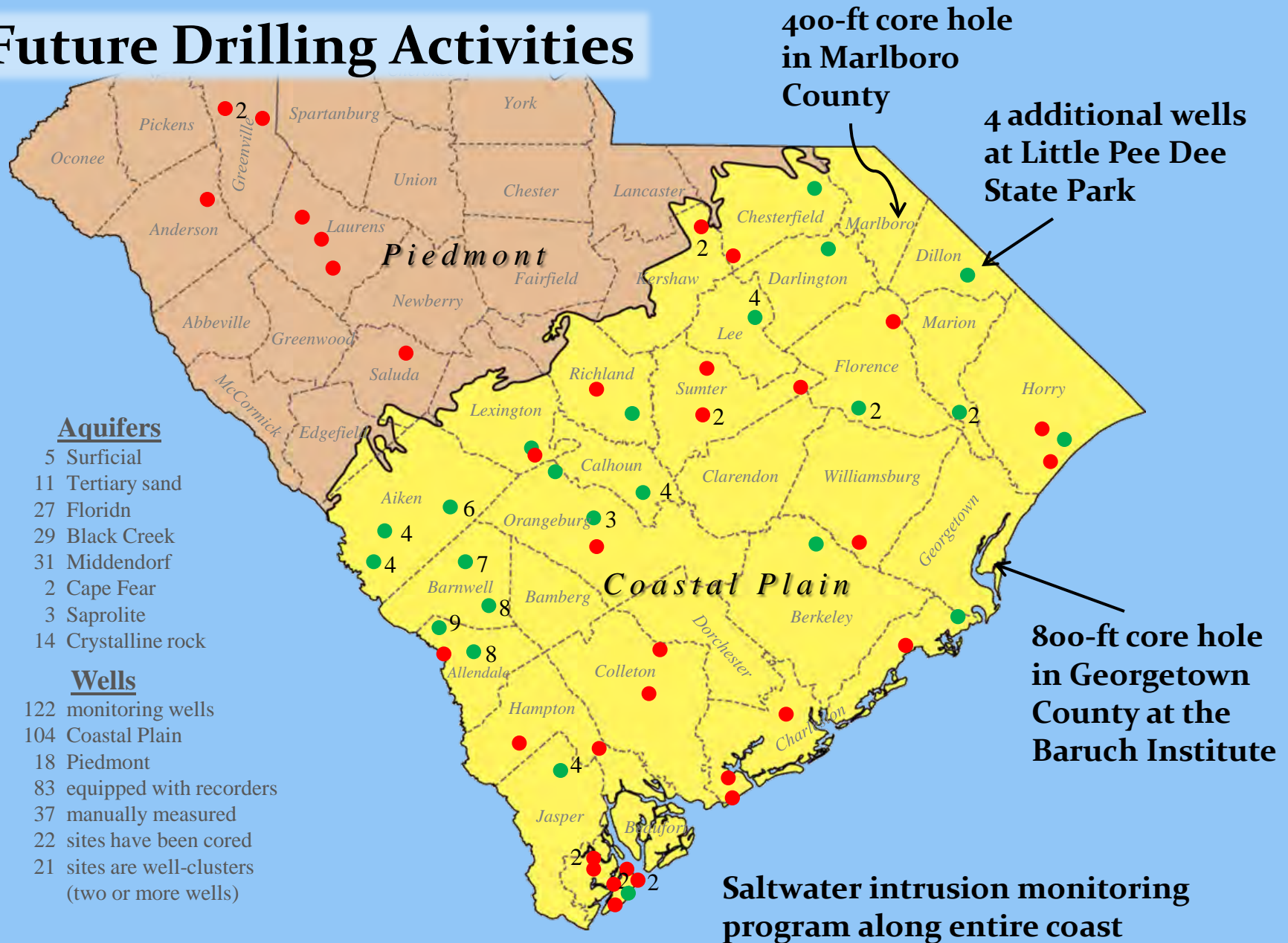
Wee Tee State Forest in Williamsburg County – 1 well

Creston Fire Station in Calhoun County – 4 wells

Continuous core to 1,057 feet at Creston, Calhoun County



Future Drilling Activities



- Hydrographs and other information about the network can be found in:
 - *Ground-Water Levels in South Carolina, 2006-2010*
South Carolina Department of Natural Resources
Water Resources Report 50
- Report is available at:
[*http://dnr.sc.gov/water/hydro/PubsDNRrep.htm*](http://dnr.sc.gov/water/hydro/PubsDNRrep.htm)
- Data are available at:
[*http://dnr.sc.gov/water/hydro/groundwater/groundwater.html*](http://dnr.sc.gov/water/hydro/groundwater/groundwater.html)
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End of
presentation.