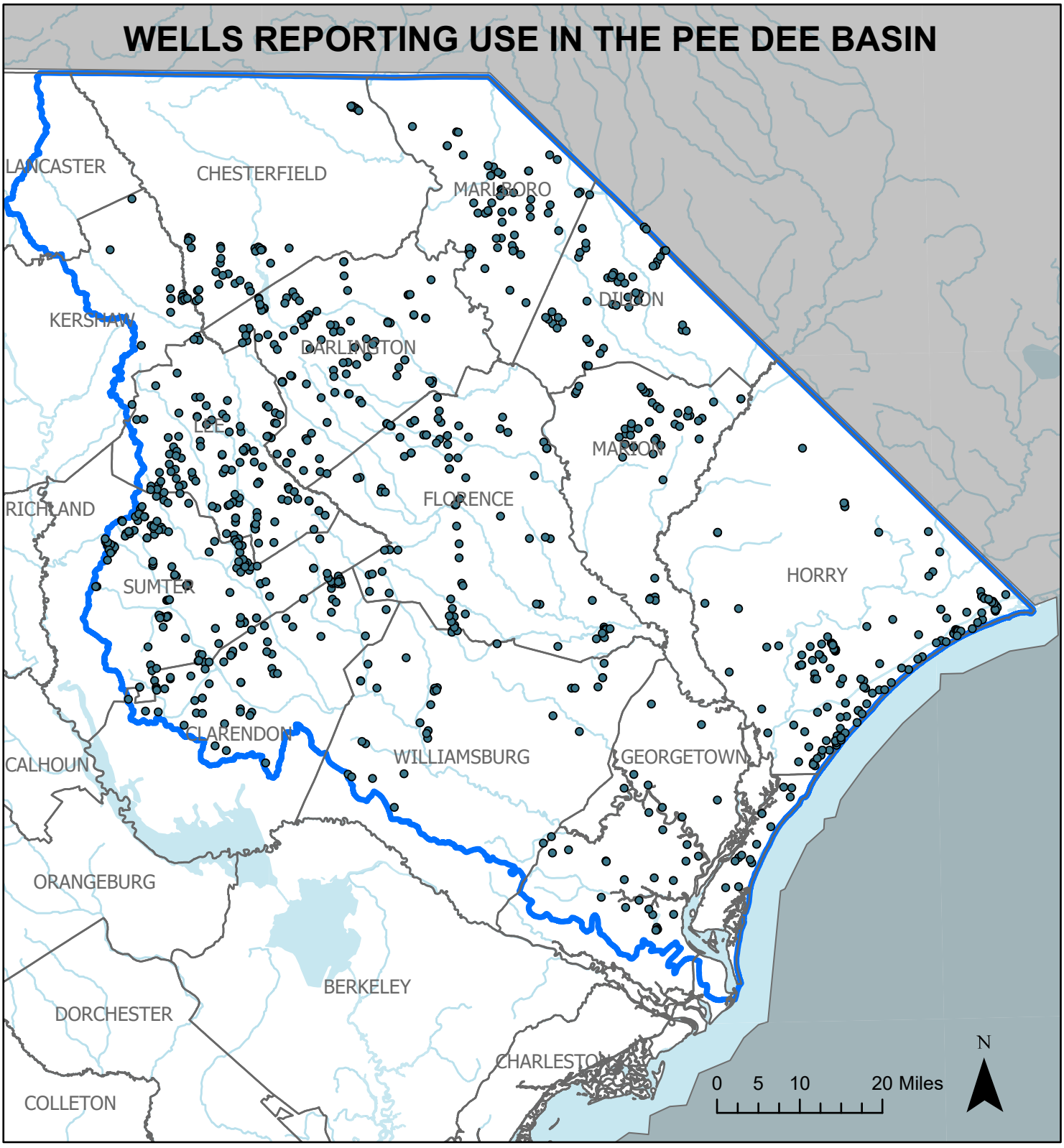
Review of Groundwater Information in the Pee Dee Basin

Pee Dee River Basin Council Meeting

3/26/2024


WELLS REPORTING USE IN THE PEE DEE BASIN
LANCASTER
CHESTERFIELD
MARLBORO
DILLON
KERSHAW
DARLINGTON
LEE
MARION
FLORENCE
RICHLAND
SUMTER
HORRY
CLARENDON
WILLIAMSBURG
GEORGETOWN
CALHOUN
ORANGEBURG
BERKELEY
DORCHESTER
CHARLESTON
COLLETON
N
0 5 10 20 Miles
DHEC_GW_Wells_Pee Dee basin
CountyBND_DetailedCoast
Pee_Dee_Basin

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

10 0 10 20 30 40 miles

N

LANCASTER
CHESTERFIELD
MARLBORO
FAIRFIELD
KERSHAW
DARLINGTON
DILLON
LEE
FLORENCE
MARION
SALUDA
RICHLAND
LEXINGTON
SUMTER
HORRY
EDGEFIELD
AIKEN
CALHOUN
CLARENDON
WILLIAMSBURG
ORANGEBURG
GEORGETOWN
BARNWELL
BAMBERG
BERKELEY
DORCHESTER
ALLENDALE
COLLETON
CHARLESTON
HAMPTON
JASPER
BEAUFORT

Lake Murray
Lake Wateree
Lake Marion
Lake Moultrie
FALL LINE
Great Pee Dee River
Little Pee Dee River
Lynches River
Wateree River
Congaree River
Wateree River
Black River
Waccamaw River
North Fork Edisto River
South Fork Edisto River
Edisto River
Santee River
Salkehatchie River
Savannah River
Coosawhatchie River
Combahee River

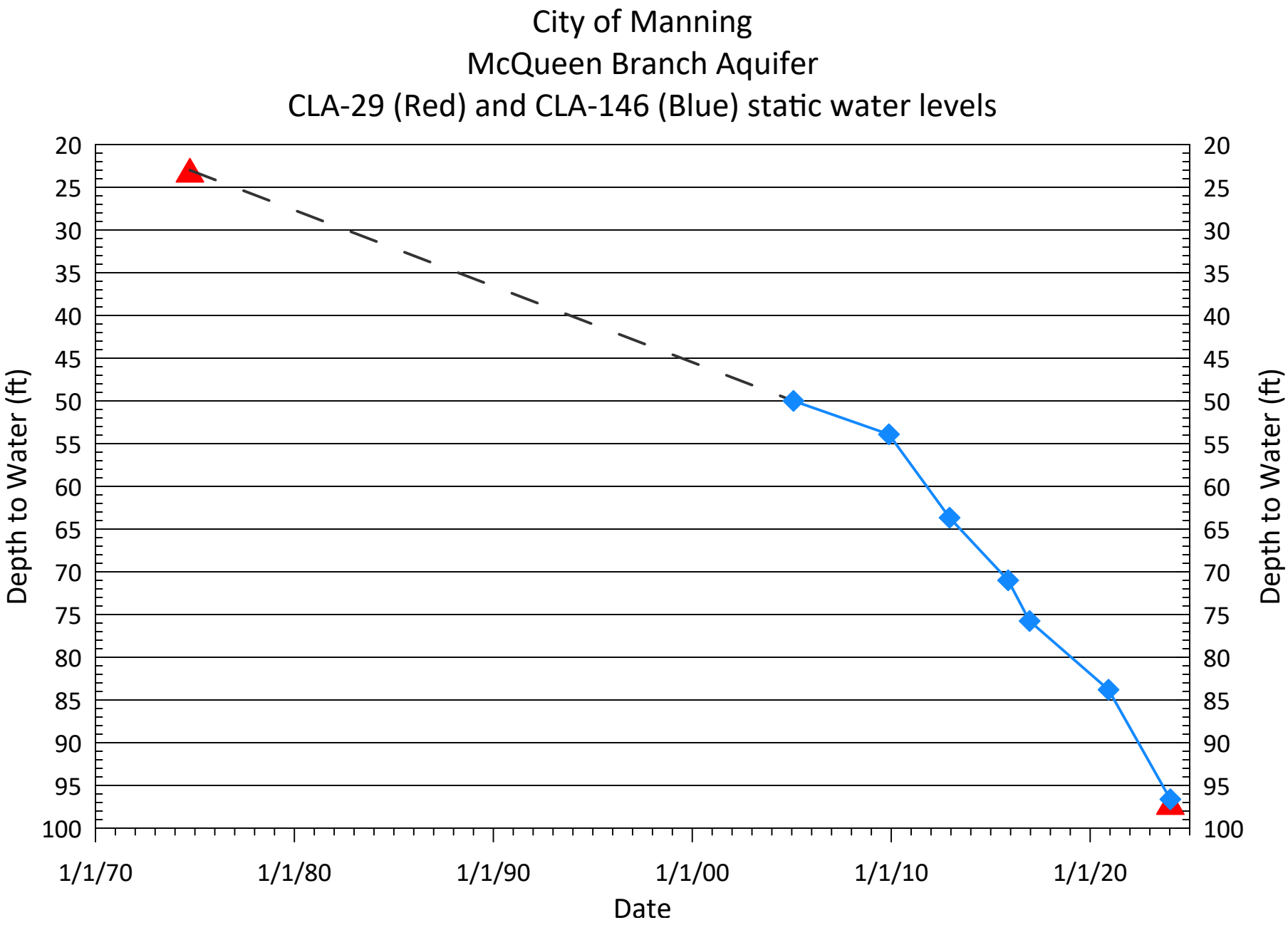
Dillon
Bishopville
Florence
Marion
Sumter
Hemingway
Manning
Kingstree
Andrews
Georgetown
Orangeburg
Bamberg
Aiken
Moncks Corner
St. Stephen
Summerville
Walterboro
Mt. Pleasant
Isle of Palms
Sullivans Island
Charleston
Kiawah Island
Seabrook Island
Beaufort
Hilton Head Island
Myrtle Beach

DIL-169 109
DIL-174 78
LEE-179 180
FLO-300 116
FLO-298 88
FLO-207 25
FLO-313 16
FLO-314 16
HOR-225 -6
SUM-506 155
SUM-507 155
SUM-508 156
SUM-288 126
SUM-497 154
RIC-776 93
SUM-296 71
SUM-297 63
CLA-148 146
CLA-61 32
WIL-51 4
FLO-276 -18
MRN-77 -25
WIL-16 -36
WIL-12 -6
CLA-33 99
CLA-213 69
HOR-307 -46
HOR-309 -77
HOR-332 -83
HOR-304 -81
HOR-290 -73
HOR-1327 -75
HOR-548 -74
LEX-823 288
AIK-846 272
AIK-847 273
AIK-849 256
AIK-2468 336
AIK-497 327
AIK-2450 307
ORG-509 177
ORG-393 143
ORG-385 157
CAL-195 103
CAL-2 120
BAM-27 143
BRK-89 -33
BRN-353 159
BRN-355 160
ALL-376 136
COL-30 52
CHN-182 -54
GEO-50 -177
GEO-93 -111
GEO-210 -104
GEO-282 -121
GEO-390 -162
GEO-153 -119
GEO-95 -211
GEO-186 -171
GEO-86 -166
GEO-382 -117
GEO-383 -117
GEO-233 169
GEO-232 -178
GEO-296 -68

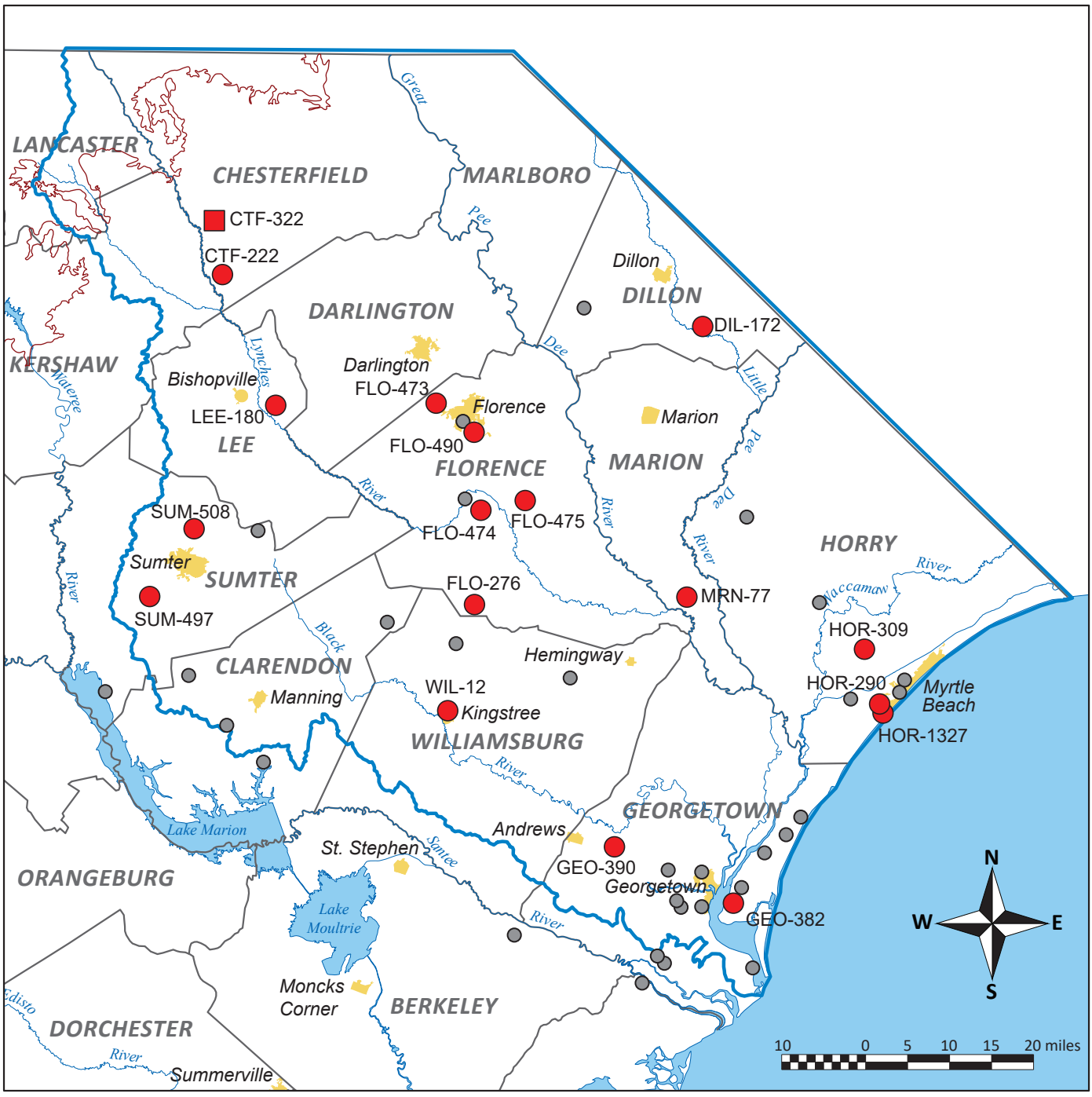
AIK-824 236
AIK-2379 165
AIK-888 168
BRN-324 187
BRN-325 187
BRN-380 179
BRN-432 179
BRN-389 210
BRN-365 202
BRN-368 202
BRN-375 183
BRN-437 170
BRN-393 176
BRN-418 176
BRN-424 166
BRN-331 171
BRN-328 165
BRN-406 166
AIK-863 146
AIK-874 152
BRN-377 158
BRN-402 157
ALL-367 150
ALL-368 150
ALL-369 150

0 1 2 3 4 5 miles

DNR
SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES


City of Manning
McQueen Branch Aquifer
CLA-29 (Red) and CLA-146 (Blue) static water levels
Depth to Water (ft)
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
1/1/70
1/1/80
1/1/90
1/1/00
1/1/10
1/1/20
Date

Groundwater Monitoring Network Wells and Potentiometric Wells in the Pee Dee Basin — Crouch Branch Aquifer



- SCDNR Monitoring Well
- USGS Monitoring Well
- Well used for potentiometric maps
- Fall Line
- Pee Dee Basin boundary

Well ID: HOR-0290

County: Horry

Aquifer: Crouch Branch

Latitude / Longitude: 33.67080° / -78.93918°

Location: Myrtle Beach

Land Surface Elevation: 22 ft

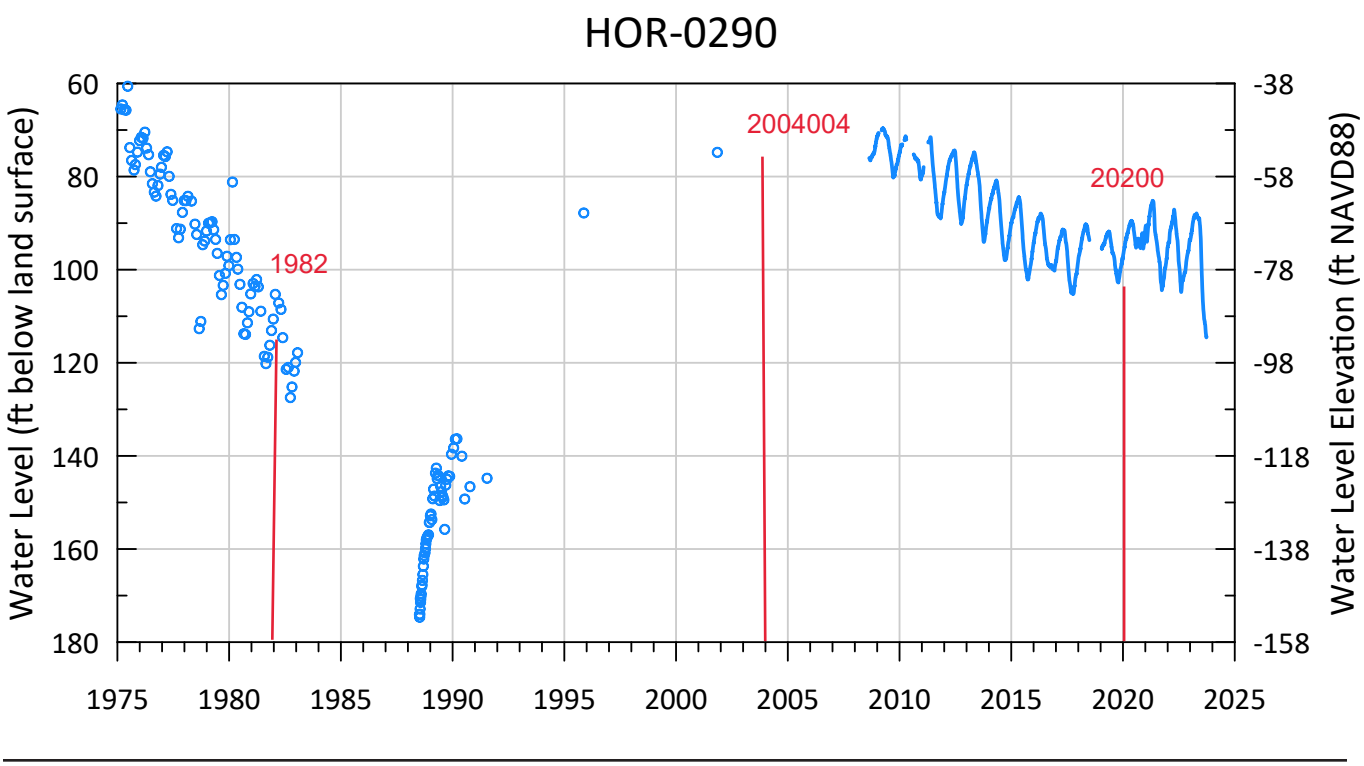
Depth of Screened Interval: ??? to 459 ft

Period of Record: August 2008 to present

Highest Water Level: 60.60 ft (6/19/1975)

Lowest Water Level: 174.65 ft (7/12/1988)

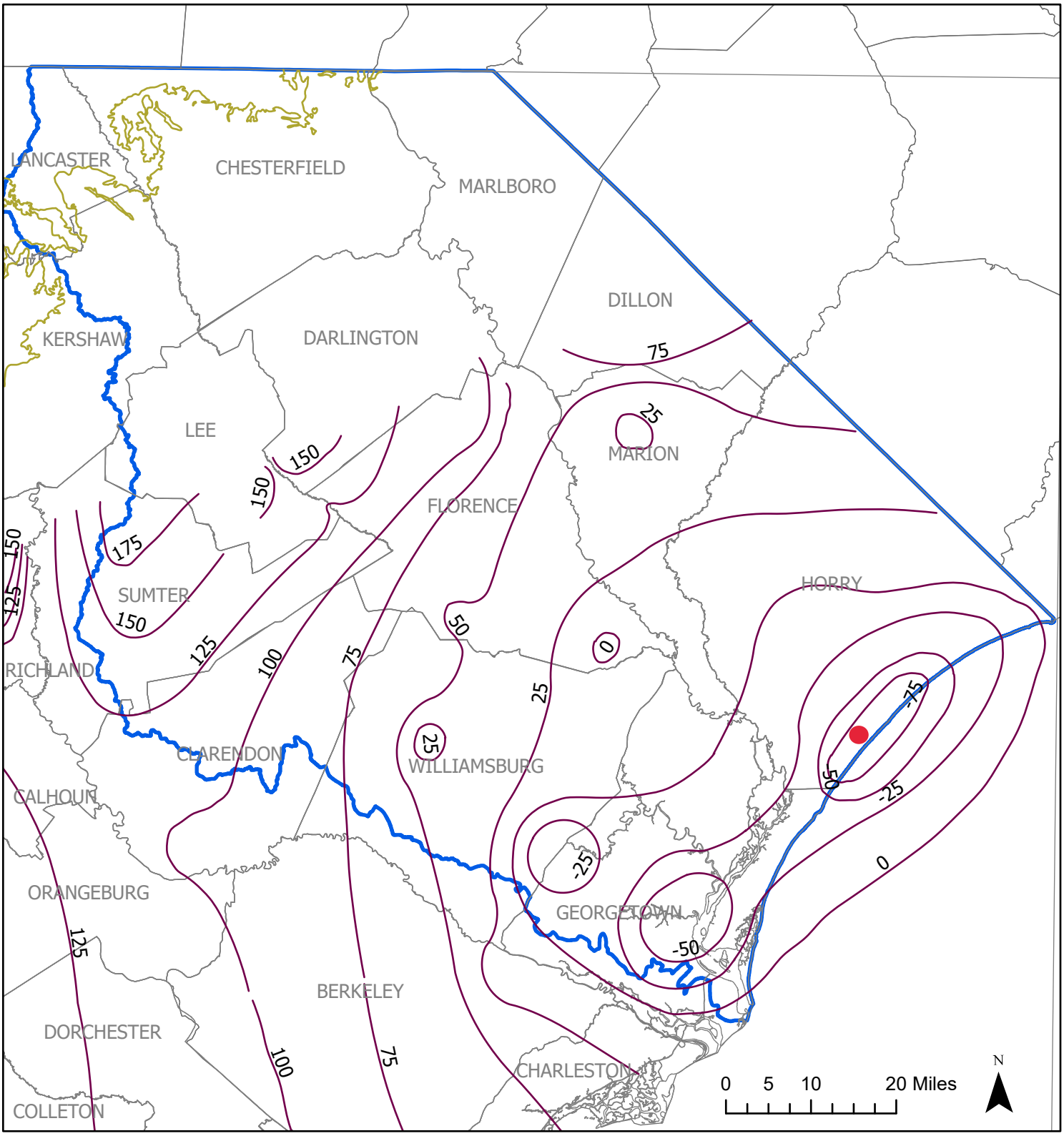
Average Water Level: 89.19 ft (from 8/2008)



Comments:

- Significant decline seen in 1970s and 1980s reversed after 1988 due to decreased groundwater use.
- Fairy steady annual decline from 2011 to 2018, then fairly stable water levels until late 2023.
- Recent seasonal drawdowns are very consistent from year to year.
- What happened in late 2023? Similar drop seen in nearby HOR-1326 (McQueen Branch well).

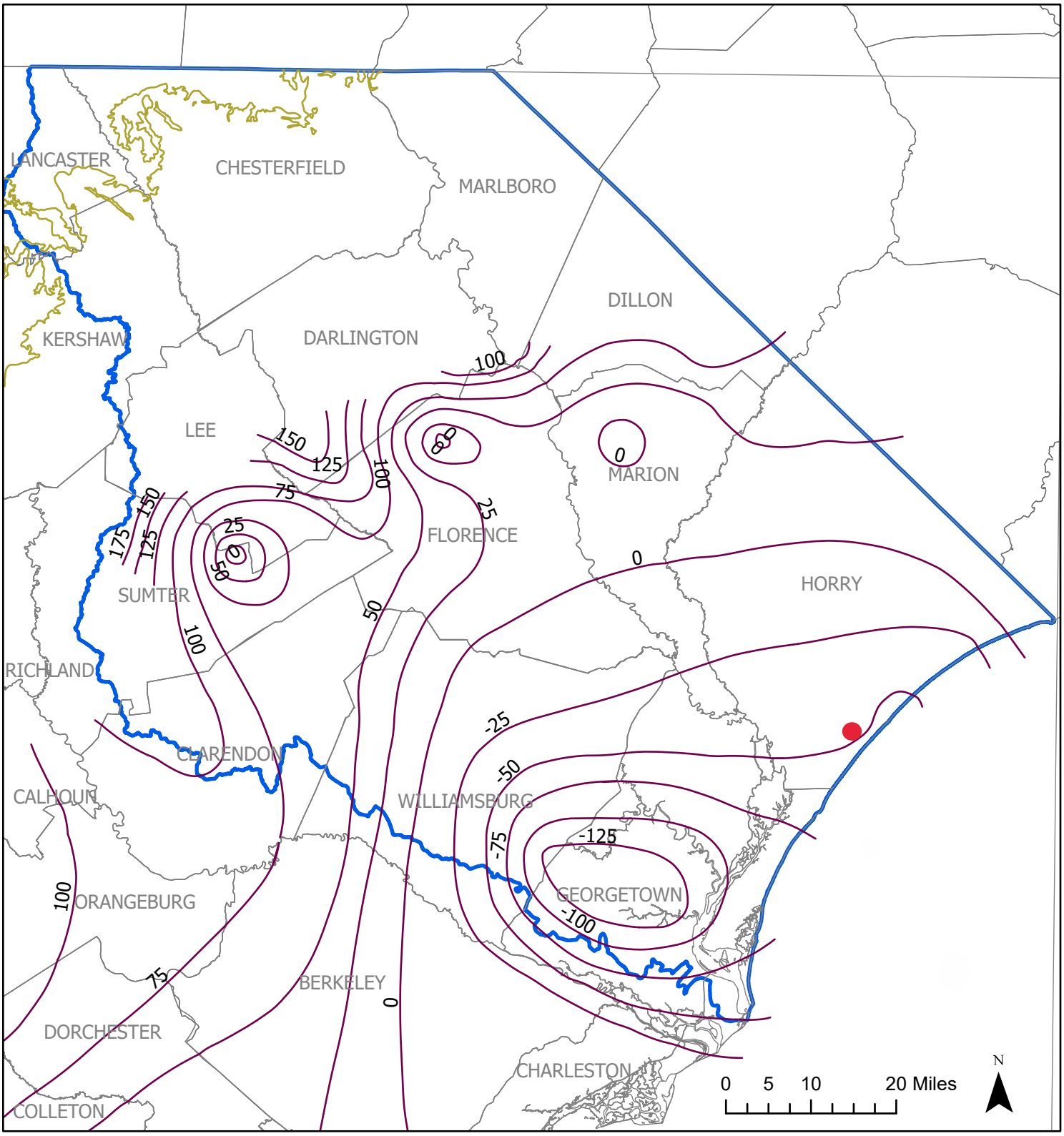
Crouch Branch Aquifer Potentiometric Surface, 1982



cb1982 contour, elevation in feet referenced to NAVD88

HOR-290; WL at -80 Feet0

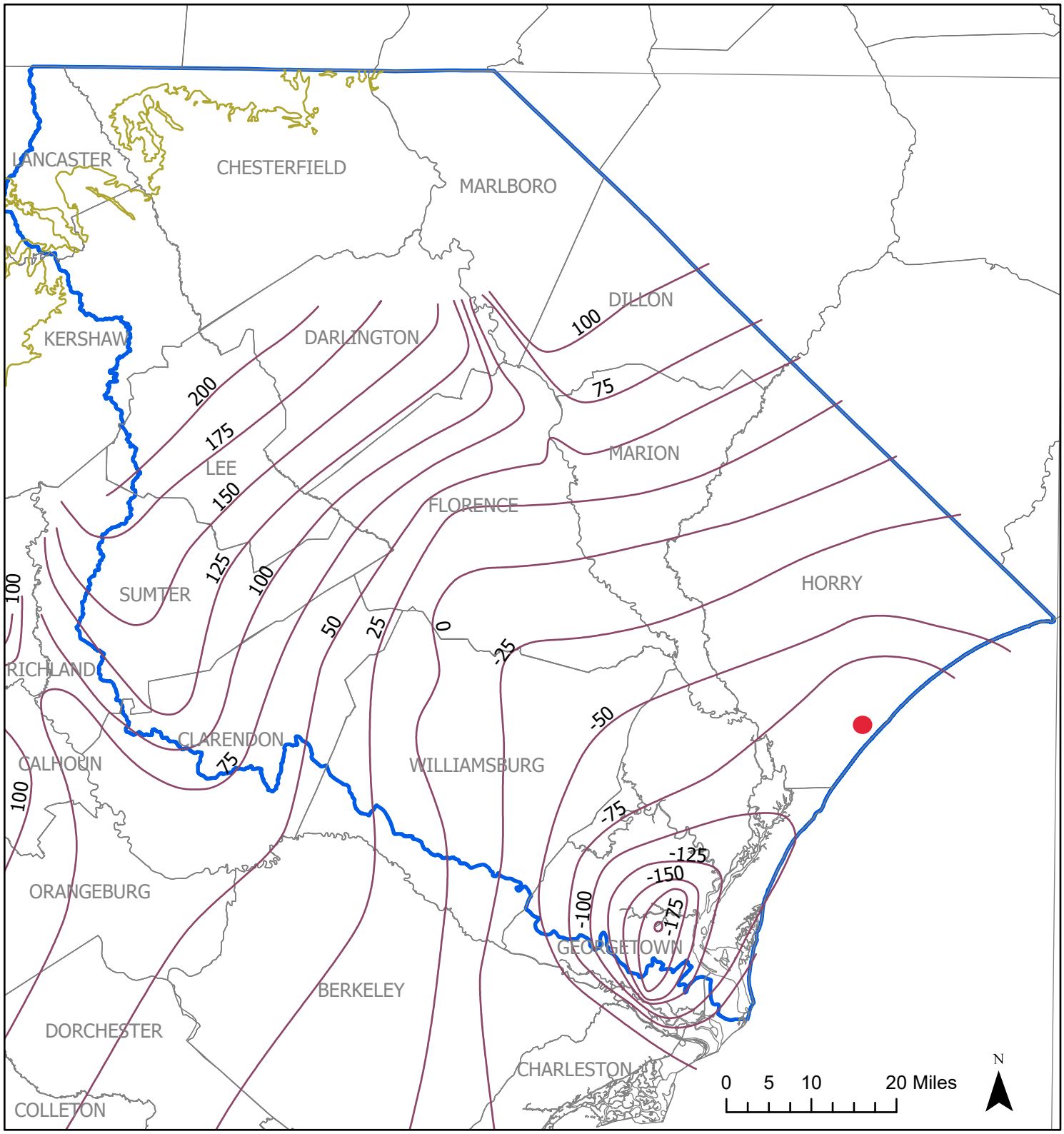
Crouch Branch Aquifer Potentiometric Surface, 2004



cb2004 contour, elevation in feet referenced to NAVD88

HOR-290; WL at -48 Feet90

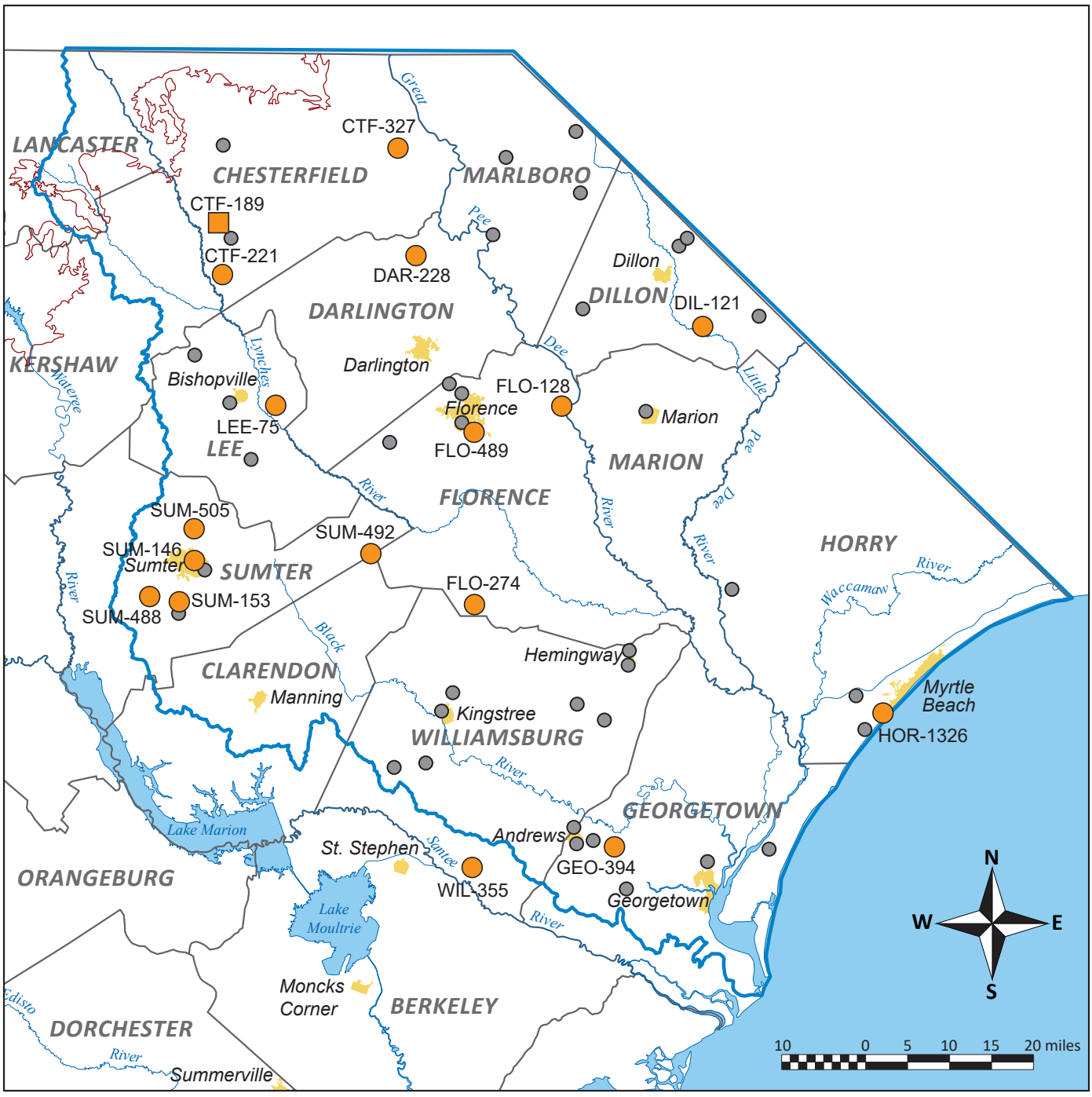
Crouch Branch Aquifer Potentiometric Surface, 2020



cb2020 contour, elevation in feet referenced to NAVD88

HHOR-290; WL at -73 Feet90

Groundwater Monitoring Network Wells and Potentiometric Wells in the Pee Dee Basin — McQueen Branch Aquifer



- SCDNR Monitoring Well
- USGS Monitoring Well
- Well used for potentiometric maps
- Fall Line
- Pee Dee Basin boundary

Well ID: FLO-0128

County: Florence

Aquifer: McQueen Branch

Latitude, Longitude: 34.19567, -79.58037

Location: 10 miles east of City of Florence

Land Surface Elevation: 94 ft

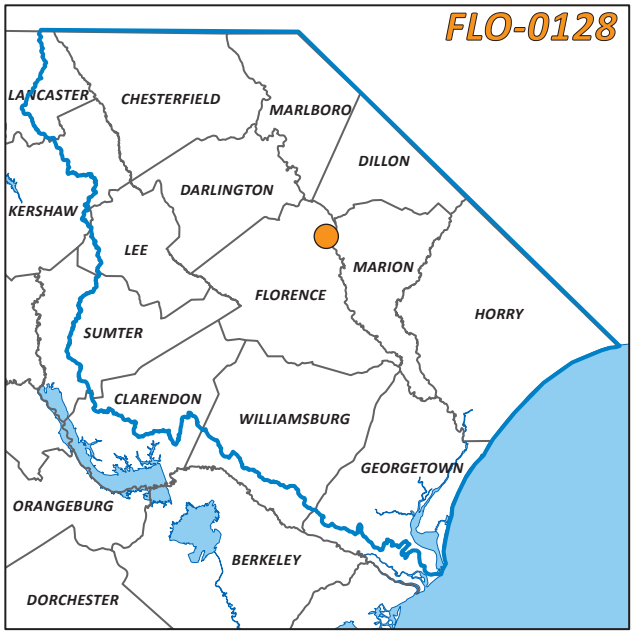
Depth of Screened Interval: 265 to 690 ft

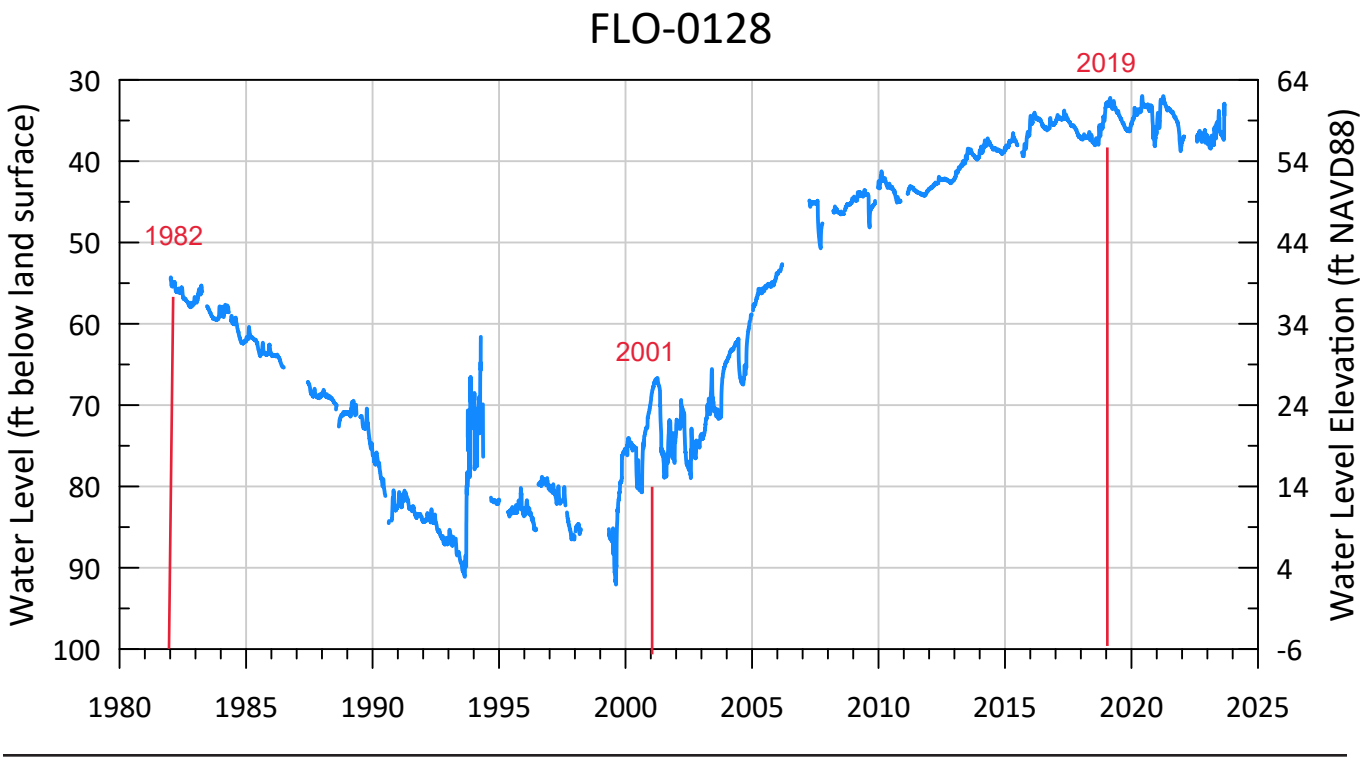
Period of Record: January 1982 to present

Highest Water Level: 31.98 ft (6/4/2020)

Lowest Water Level: 92.07 ft (8/16/1999)

Average Water Level: 57.93 ft

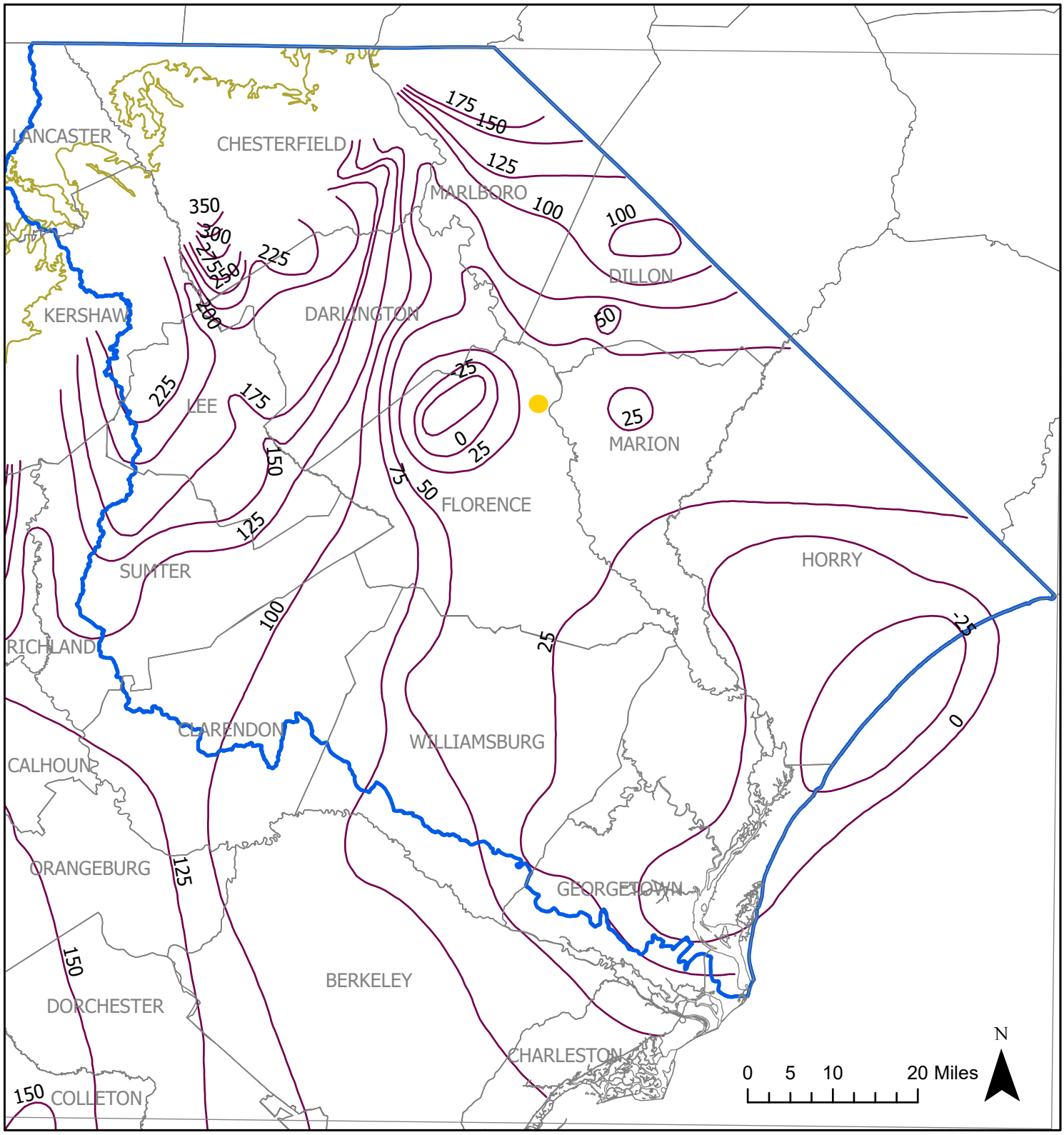




Comments:

- Declining water level prior to the mid-1990s is caused largely by groundwater pumping by the City of Florence.
- Recovery of water level after 2000 is primarily the result of City of Florence pumping less groundwater because began using surface water in addition to groundwater.

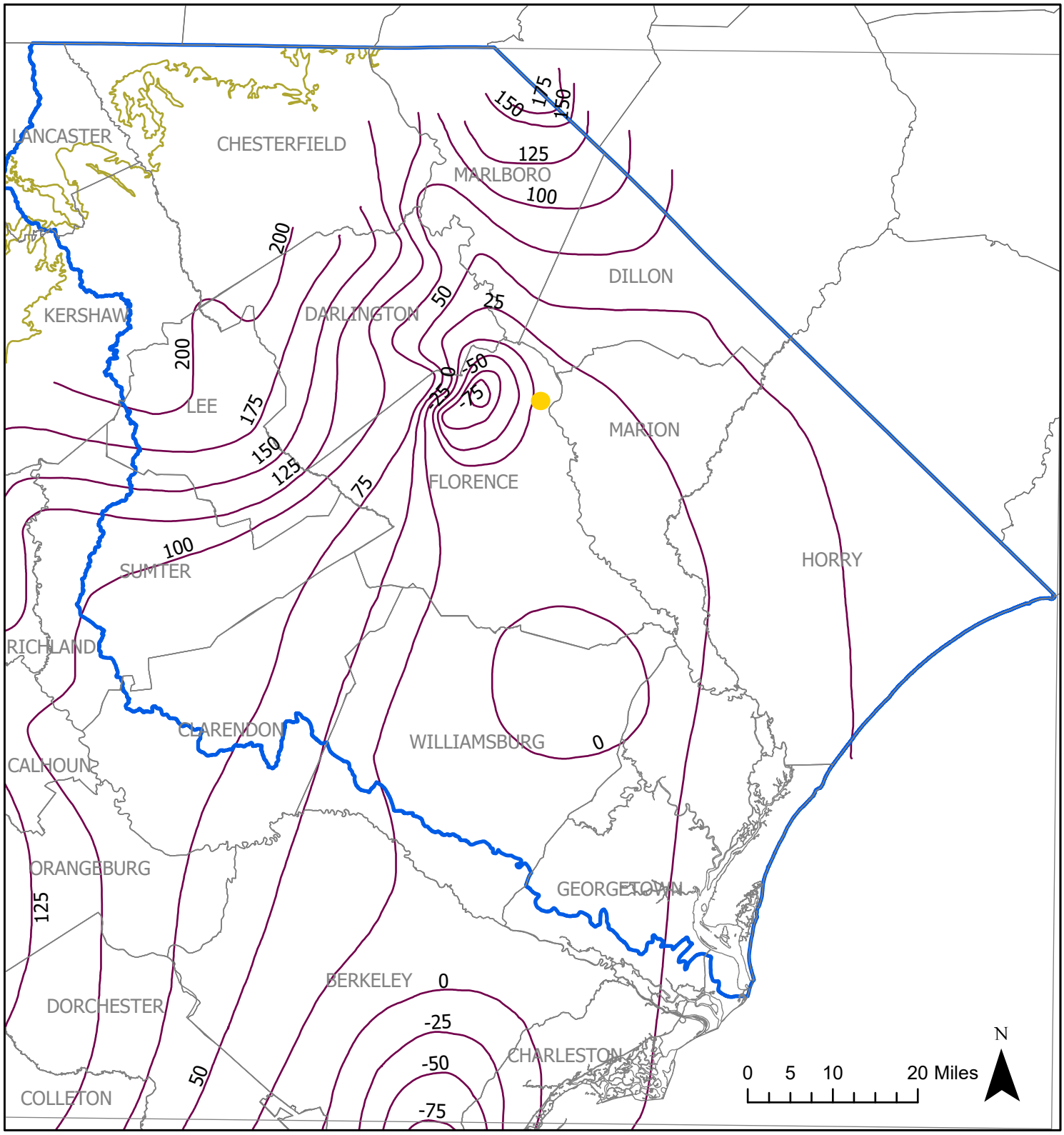
McQueen Branch Aquifer Potentiometric Surface, 1982



mqb 1982 contour, elevation in feet referenced to NAVD88

FLO-128; WL at 40 Feet

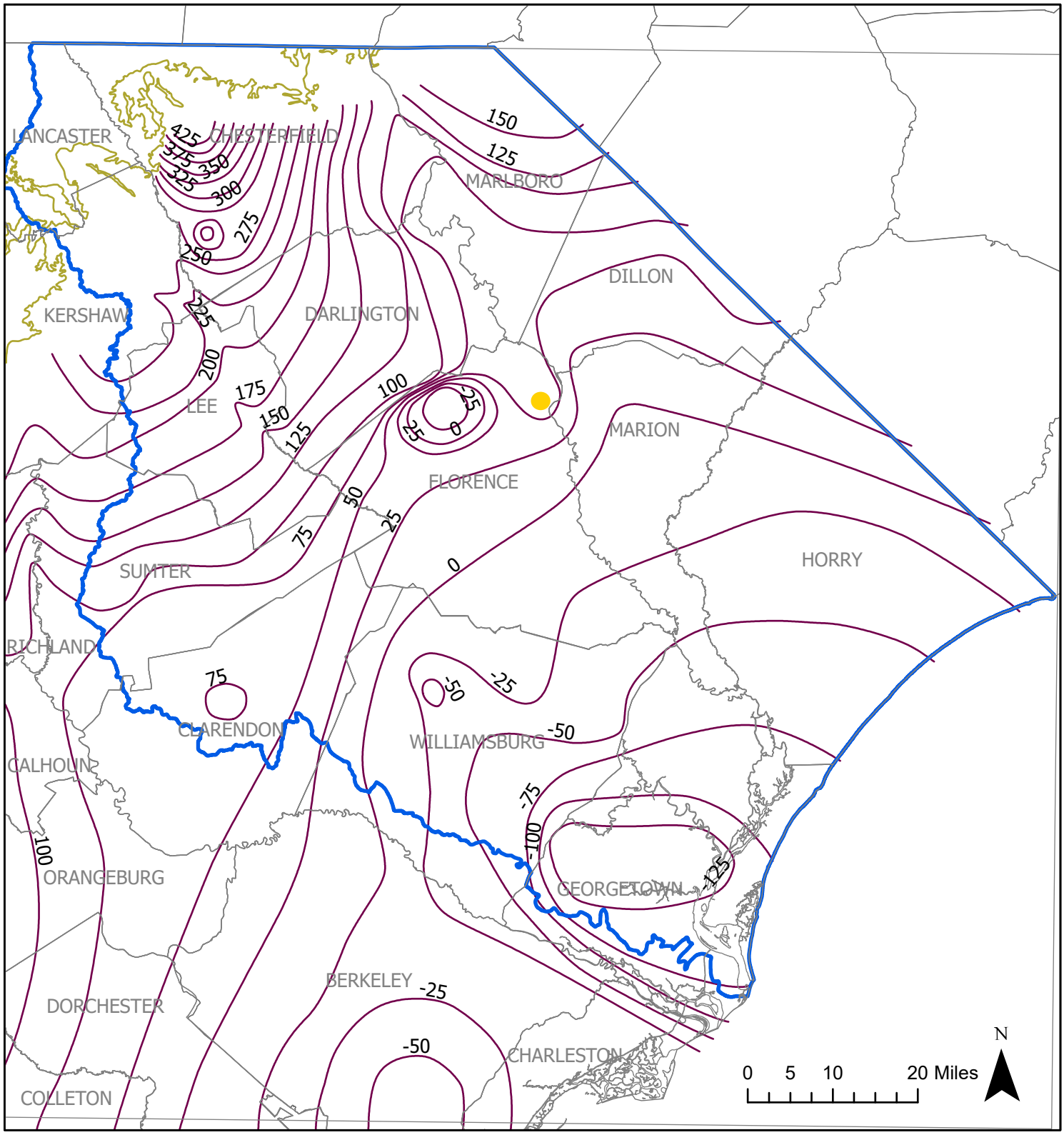
McQueen Branch Aquifer Potentiometric Surface, 2001



mqb 2001 contour, elevation in feet referenced to NAVD88

FLO-128; WL at 16 Feet

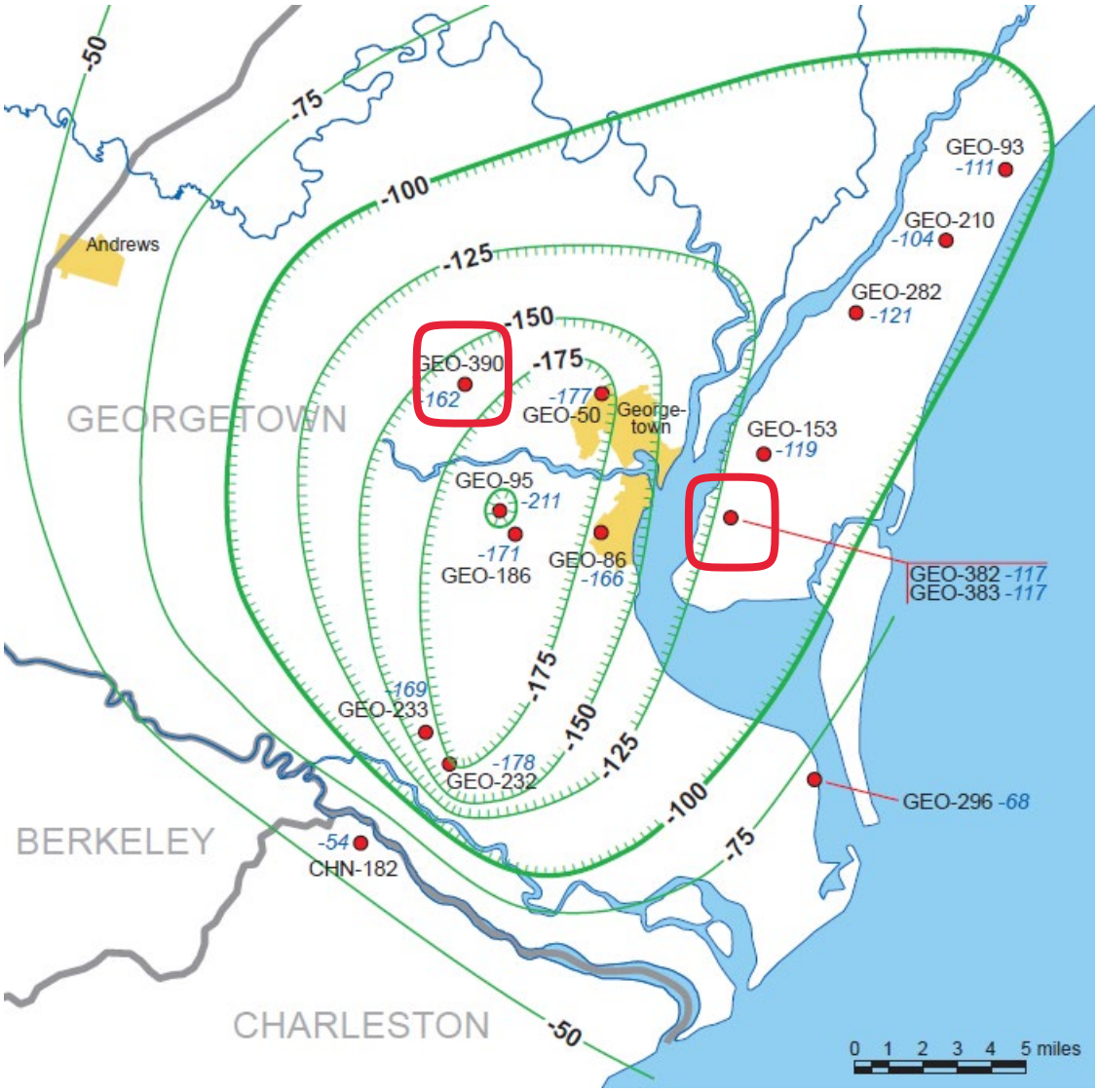
McQueen Branch Aquifer Potentiometric Surface, 2019



mqb 2019 contour, elevation in feet referenced to NAVD88

FLO-128; WL at 57 Feet

Georgetown Cone of Depression
Crouch Branch Aquifer 2020



The continued growth and expansion of a cone of depression in the potentiometric surfaces of groundwater in the Crouch Branch and McQueen Branch aquifers in Georgetown County South Carolina has been monitored for years.

Possible causes include: reported withdrawals, unreported withdrawals, and geologic factors

Well ID: GEO-0382

County: Georgetown

Aquifer: Crouch Branch

Latitude, Longitude: 33.33580, -79.24458

Location: Hobcaw Barony

Land Surface Elevation: 8 ft

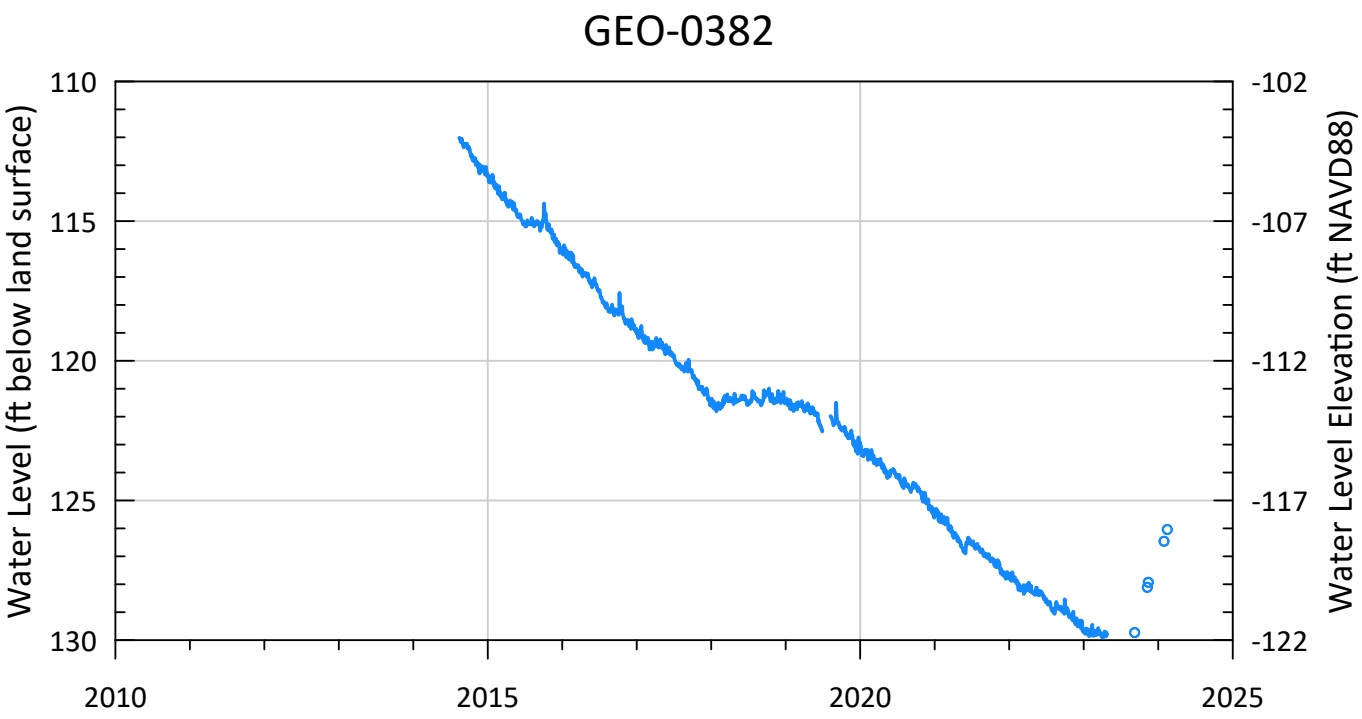
Depth of Screened Interval: 700 to 720 ft

Period of Record: August 2014 to present

Highest Water Level: 112.02 ft (8/14/2014)

Lowest Water Level: 129.91 ft (4/6/2023)

Average Water Level: 121.78 ft



Comments:

- Water levels hace been declining steadily at almost 2 feet per year until 2023.
- Recovery beginning in mid-2023 may be the result of a reduction in pumping in the Georgetown area. Can such a reduction in pumping be verified?

Well ID: GEO-0390

County: Georgetown

Aquifer: Crouch Branch

Latitude, Longitude: 33.39442, -79.37804

Location: 8 Oaks Park

Land Surface Elevation: 18 ft

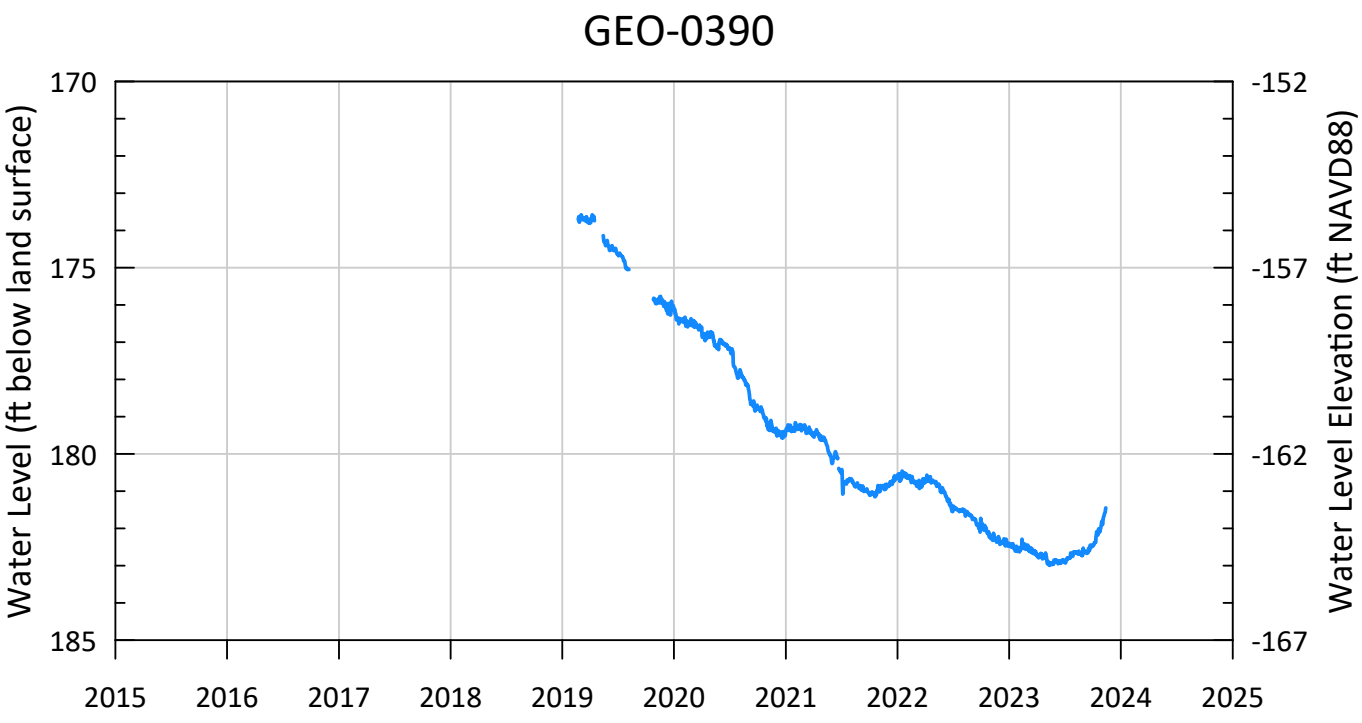
Depth of Screened Interval: 620 to 640 ft

Period of Record: February 2019 to present

Highest Water Level: 173.58 ft (3/4/2019)

Lowest Water Level: 182.99 ft (5/12/2023)

Average Water Level: 179.69 ft



Comments:

- Water levels declined at more than 2 feet per year from 2019 into mid-2013.
- Recovery beginning in mid-2023 may be the result of a reduction in pumping in the Georgetown area. Can such a reduction in pumping be verified?

Waccamaw CUA Recommendations

All aquifers below the Waccamaw Area counties have experienced water level declines and therefore the ongoing pressure on these groundwater sources should be carefully monitored. The primary area of concern remains the pumping cone that exists below the towns of Andrews and Georgetown in southern Georgetown County. Due to continued water level declines in the Crouch Branch and McQueen Branch aquifer, the Department has issued the following recommendations.

Crouch Branch Aquifer and McQueen Branch Aquifer

- No increases in permitted groundwater withdrawal rates should be approved for existing wells screened in the Crouch Branch aquifer or McQueen Branch aquifer in either of the Waccamaw Area counties. This hold should remain in effect until the Waccamaw Area undergoes its next 5-year review in 2029 at which time the hold on withdrawal rate increases should be re-evaluated based on new water level information.
- No new wells with associated groundwater withdrawal rate increases should be permitted for construction and production in the Crouch Branch aquifer or McQueen Branch aquifer in either of the Waccamaw Area counties. This hold should remain in effect until the Waccamaw Area undergoes its next 5-year review in 2029 at which time the hold on new construction should be re-evaluated based on new water level information.
- New Groundwater Withdrawal Permit Applications and renewals with requested withdrawal rate increases which propose to use the Crouch Branch aquifer or McQueen Branch aquifer should be diverted to the Surficial, Charleston, or Gramling aquifers in Georgetown and Horry Counties as appropriate for the proposed use.
- Increase the use of Aquifer Storage and Recovery (ASR) wells and increase the use of Artificial Recharge (AR) to aid in the recovery of the pumping cone below southern Georgetown County.
- Each new and renewal permit for water supply wells should require that a water audit be conducted annually in accordance with the American Water Works Association policy statement for Water Loss Management, Metering, and Accountability (2019).

Waccamaw Capacity Use Area

- Encourage the use of surface water as a source for future water demands to further reduce the groundwater demands in and around the Georgetown County pumping cone to aid in recovery of the cone and to minimize the risk of saltwater intrusion and land subsidence in the region.
- Encourage groundwater withdrawers to discontinue using and properly abandon wells that have been screened across multiple aquifers and ensure that all future wells are screened in the target aquifer only, with appropriate grouting starting at the plug above the screen interval or the first confining bed immediately above the target aquifer to the top of land surface.
- Cooperative work with SCDNR should continue in preparing the potentiometric surface maps, and future maps should be based on data from individual aquifers to the greatest extent possible to better aid in evaluation of how groundwater withdrawals from capacity use wells (which must be screened into single aquifers) are impacting the local groundwater conditions.
- Work toward educating all South Carolinians on best practices for water conservation must continue in cooperation with all stakeholders.
- Work in conjunction with local, state, and federal partners to expand the groundwater monitoring network in all Waccamaw Area aquifers by identifying wells scheduled for abandonment that may be incorporated and of benefit to the well network.

Source: Kemmer, C. and Wyant, P., 2023, Waccamaw Capacity Use Area Groundwater Evaluation Report, Permitting Year 2024, S.C. Department of Health and Environmental Control Technical Report Number: 006-2023.

Pee Dee CUA Recommendations

In order to both protect groundwater below the Pee Dee Area counties from further lowering and the potential negative effects described previously, as well as to continue to develop groundwater as a resource, the following are the Department's recommendations.

- Encourage the conjunctive use of surface water and groundwater to meet water demands in the Pee Dee CUA. Utilize groundwater as a supplemental and/or backup source if possible. The Department should engage permitted users to develop plans to transition to alternatives sources where the existence or potential for adverse effects arise.

- New or modified Groundwater Withdrawal Permit Applications which propose to use the Crouch Branch aquifer in the in those areas of the Pee Dee Capacity Use area where the potentiometric surface has declined below Mean Sea Level should be diverted to the alternative aquifers when available as appropriate for the proposed use.

- Each new and renewal permit for water supply wells should require that a water audit be conducted annually in accordance with the American Water Works Association policy statement for Water Loss Management, Metering and Accountability11. All permitted withdrawers should keep their Best Management Plan updated every 5 years on the same schedule as the permit renewals. BMP must take all reasonable actions to reduce the demand on the aquifers in the Pee Dee CUA.

- Encourage groundwater withdrawers to discontinue using and properly abandon wells that have been screened across multiple aquifers. Ensure that all future wells are screened in the target aquifer only, with appropriate grouting at the surface and at each confining layer encountered during drilling.

- Conduct a targeted public education campaign on water conservation practices and the extent of the current over-pumping evidence. Targeted public education means that each campaign is designed for a particular segment of the population in the Pee Dee Area. For all water users from agriculture to industry to water suppliers to residents, it should include information on the broad range of water conservation methods available to them.

Source: Foxworth, L. and Hughes, A., 2020, Pee Dee Capacity Use Area Groundwater Evaluation Report, S.C. Department of Health and Environmental Control Technical Report Number: 008-2020.

Breakout Group Questions

1. Do you have knowledge of or experience with groundwater management issues and solutions in areas with cones of depression and/or declining groundwater levels? If so, talk about the challenges, effective solutions, and the keys to success.

2. What surprised you most about this information?

3. How does this information help you make decisions on groundwater strategies and their prioritization?

4. How does this information help you make policy recommendations?

5. What additional information would you like to see?