



DEQ Groundwater Monitoring

Virginia Water Monitoring Council 2025 Conference

Matthew C. Richardson, GIT

Groundwater Monitoring Team Lead

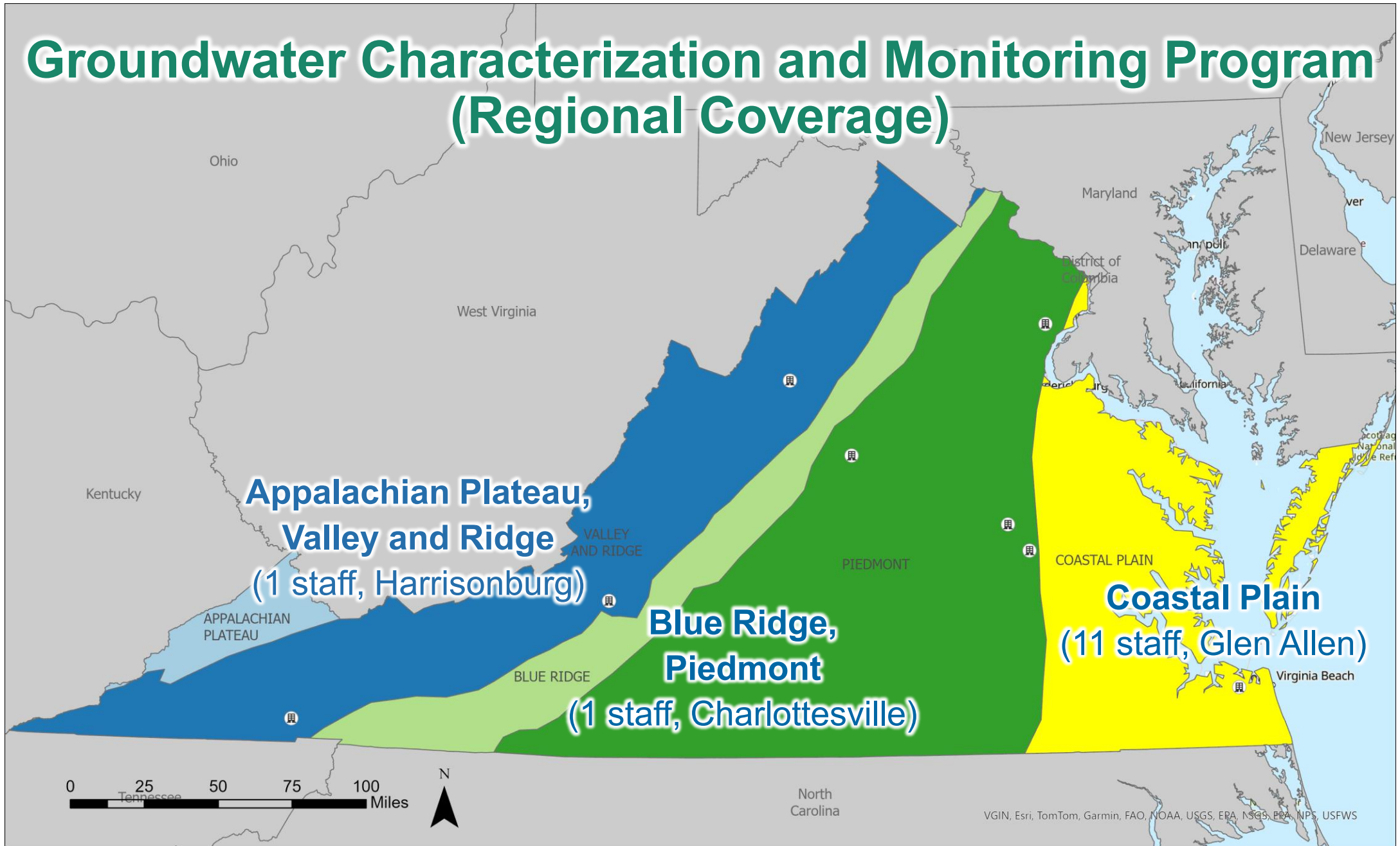
Virginia Department of Environmental Quality

September 30, 2025

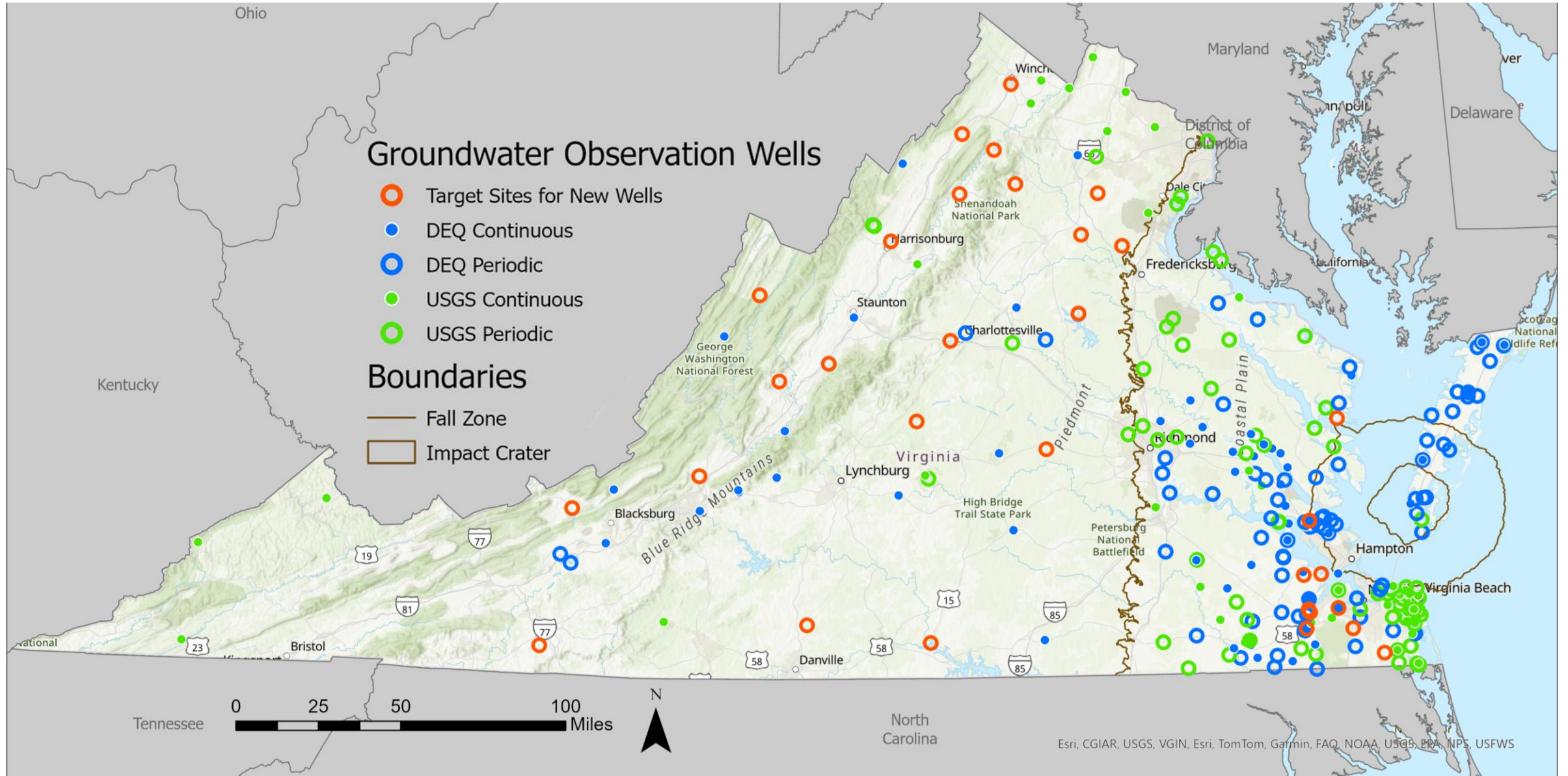
Outline

- Geographic coverage
- Statewide observation well network infrastructure
- Groundwater-level monitoring
 - Drought evaluation
 - Resource management
- Groundwater-quality monitoring
- Data cycle and products
- Ongoing projects
 - Northern Neck
 - North of Fredericksburg
 - James River SWIFT

Groundwater Characterization and Monitoring Program (Regional Coverage)



Statewide Groundwater Observation Well Network



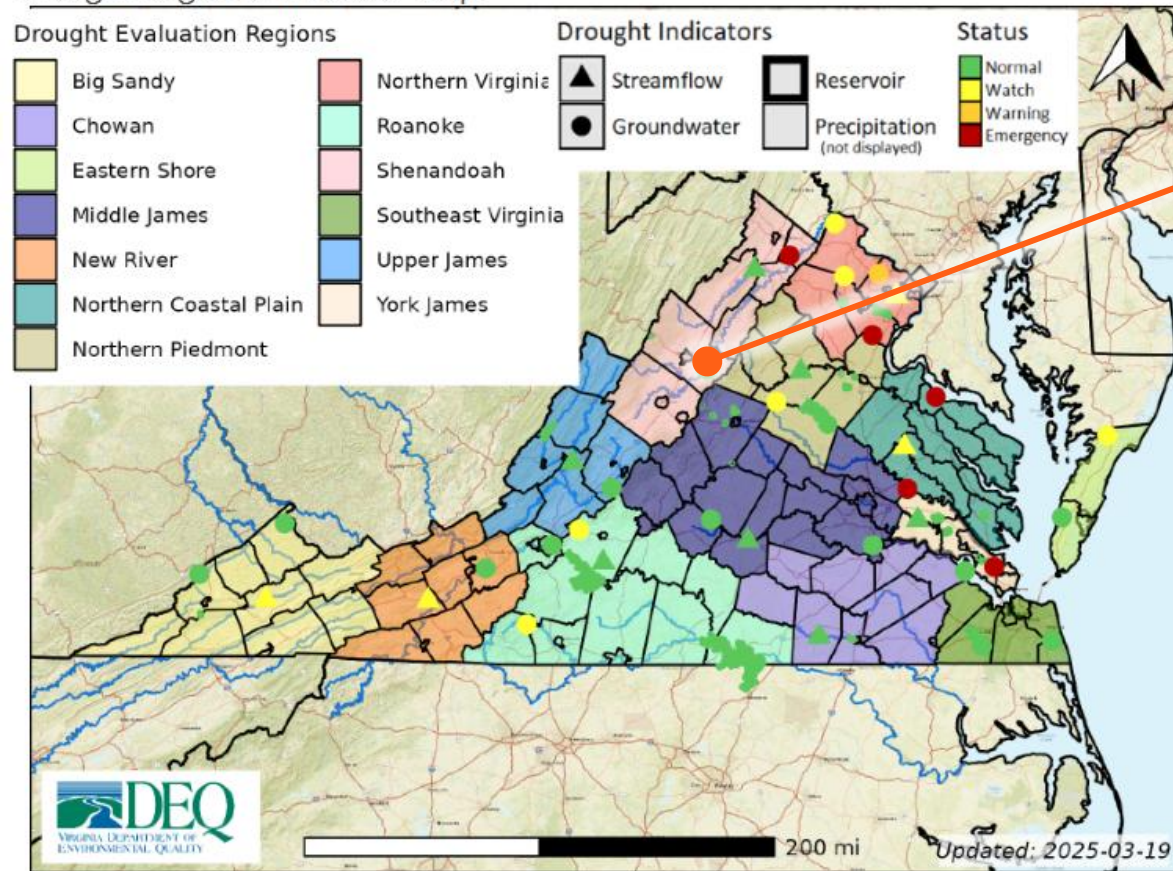
Groundwater-Level Monitoring

- State network operated in partnership with USGS VA-WV Water Science Center
- 358 wells
 - 293 DEQ-operated
 - 65 USGS-operated
 - 148 with continuous monitoring
- Additional USGS wells supported by other partners in Virginia
- Continuous water-level data transmitted to USGS public databases in near-real time



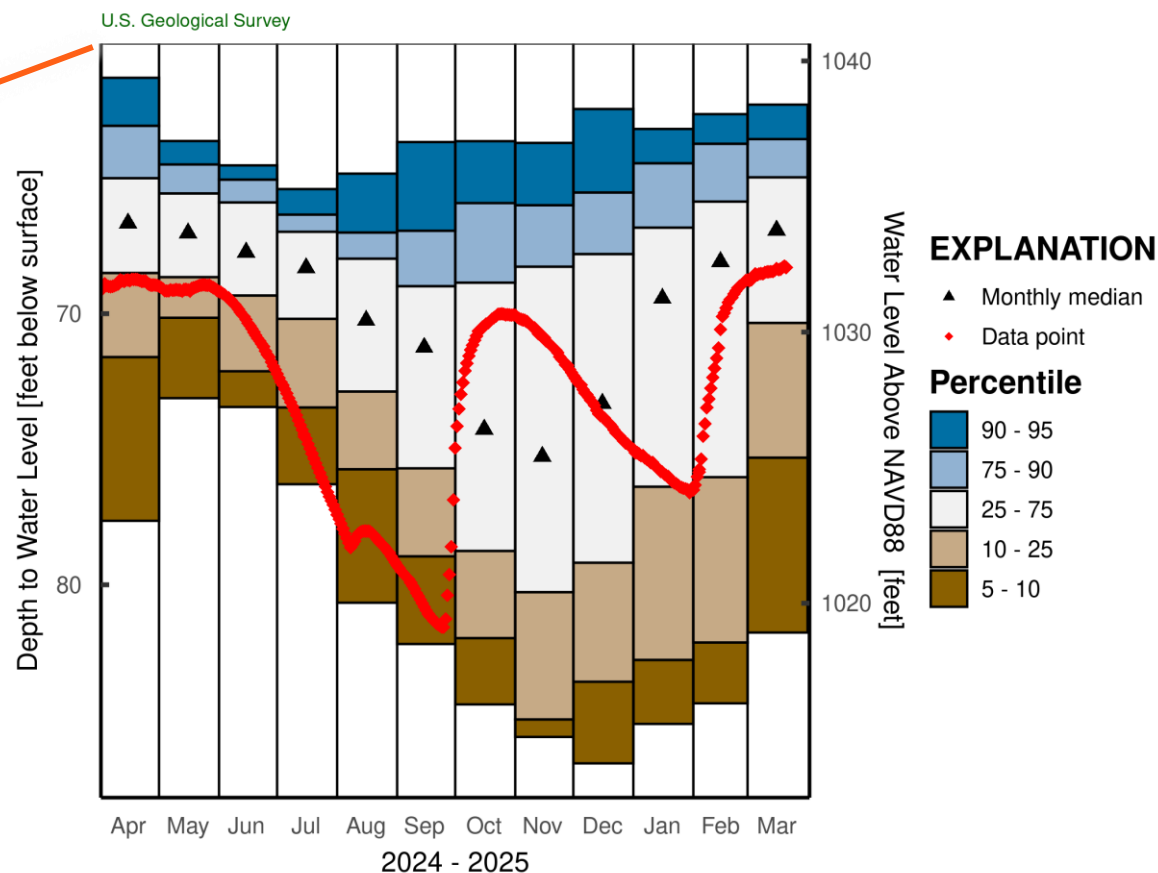
Groundwater-Level Data for Drought Monitoring

Drought Regional Indicator Map:



Current drought map available at
<https://www.deq.virginia.gov/our-programs/water/water-quantity/drought>

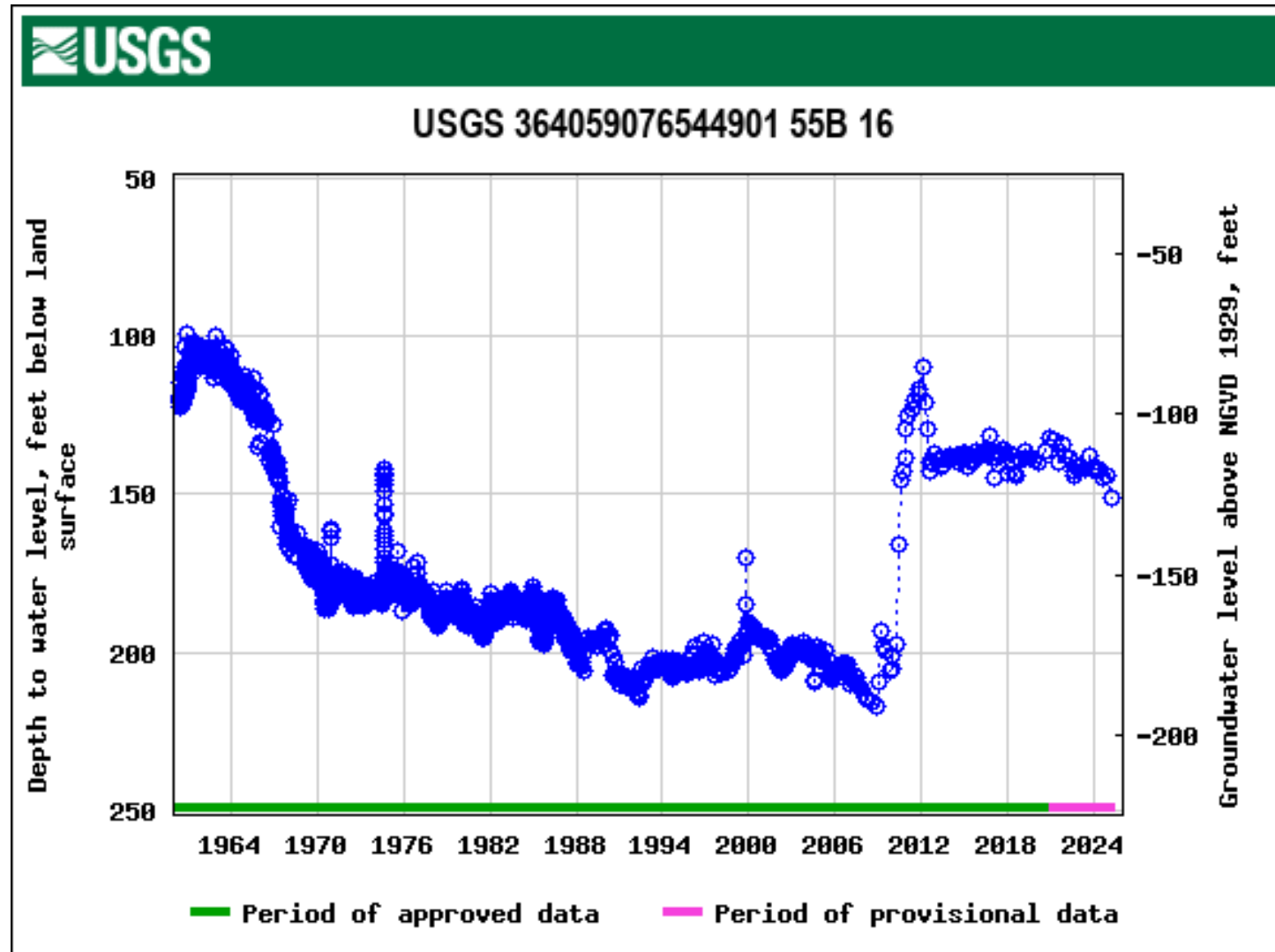
Monthly Statistics Plot
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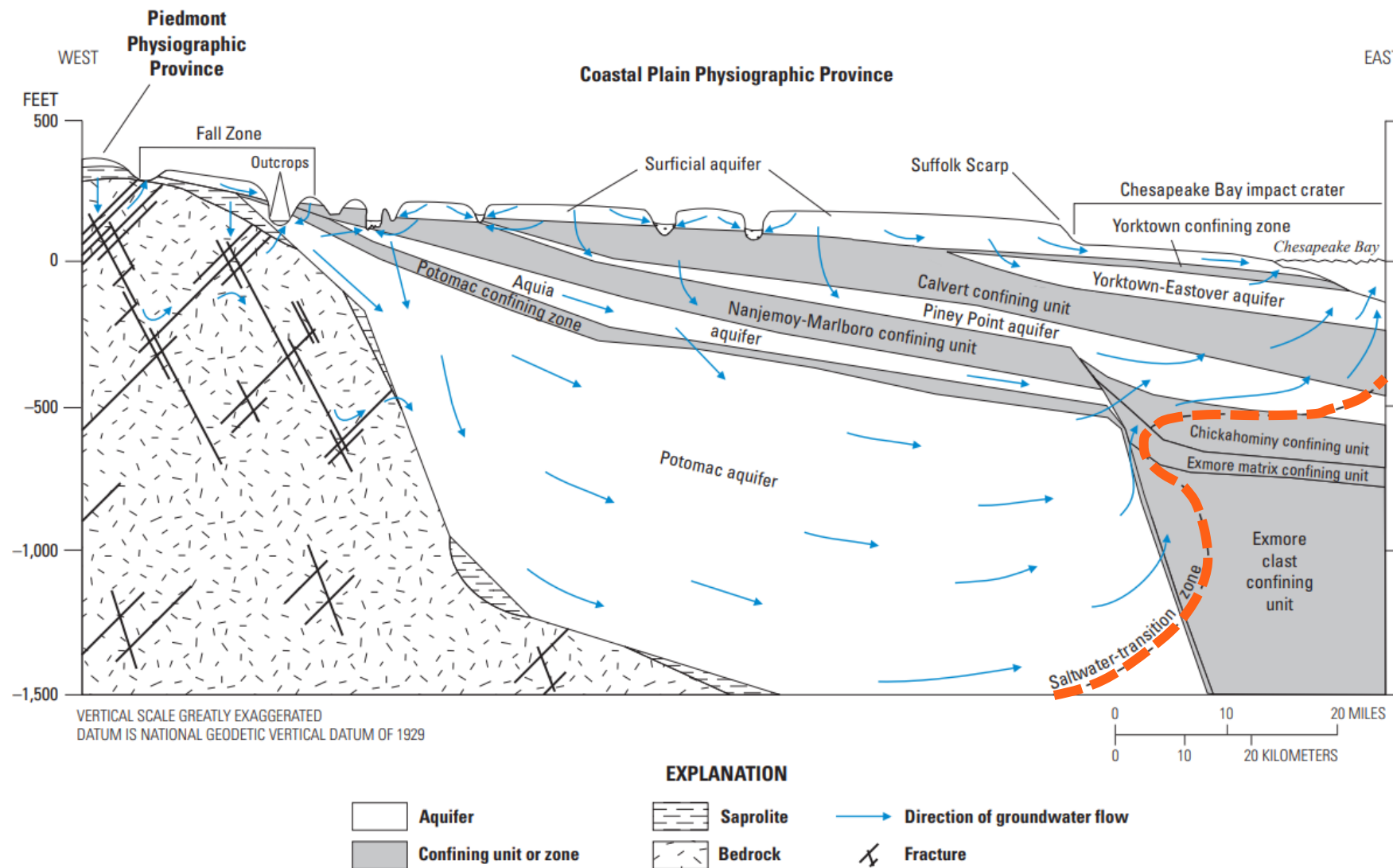
Plot created: 2025-03-21

<https://rconnect.usgs.gov/vawv-groundwater/>

Groundwater-Level Data for Resource Management

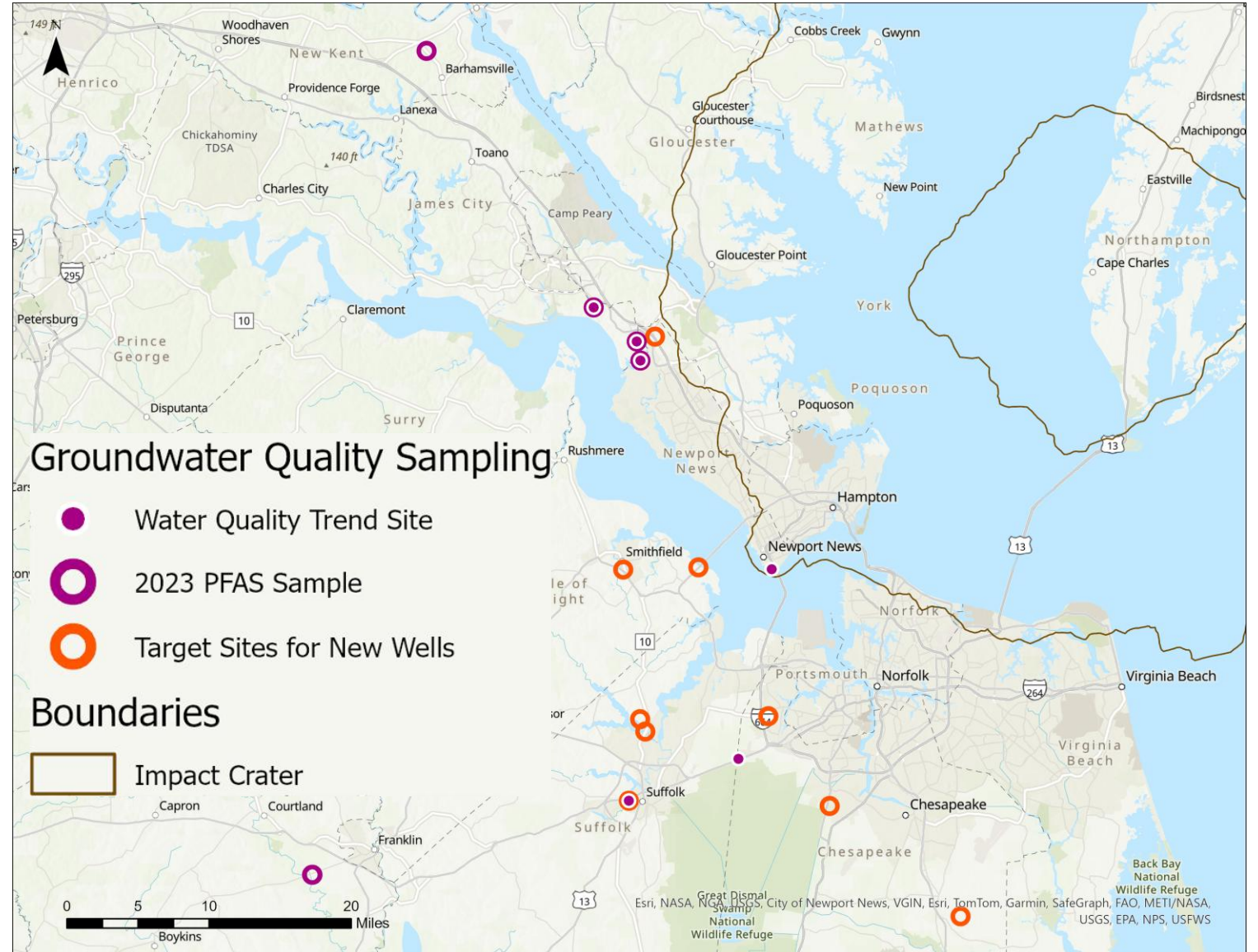


Virginia's Coastal Plain Aquifer System



Ambient Groundwater-Quality Monitoring

- Regular samples from selected trend-monitoring stations
- Additional spot sampling for programmatic needs
- Initial sample from each new State Observation Well
- Add-on PFAS sampling at 11 wells in FY2023
- Withdrawal permittees



Ambient Groundwater-Quality Monitoring, cont'd

- Led by one team member, supported by EPA Performance Partnership Grant
- Procedures developed from USGS and other guidelines
- Samples collected by submersible pump
- Analyses by state lab (DCLS)
- Results transmitted to Water Quality Portal
(<https://www.waterqualitydata.us/>)



Interpretive Publications Synthesize the Data

USGS
science for a changing world

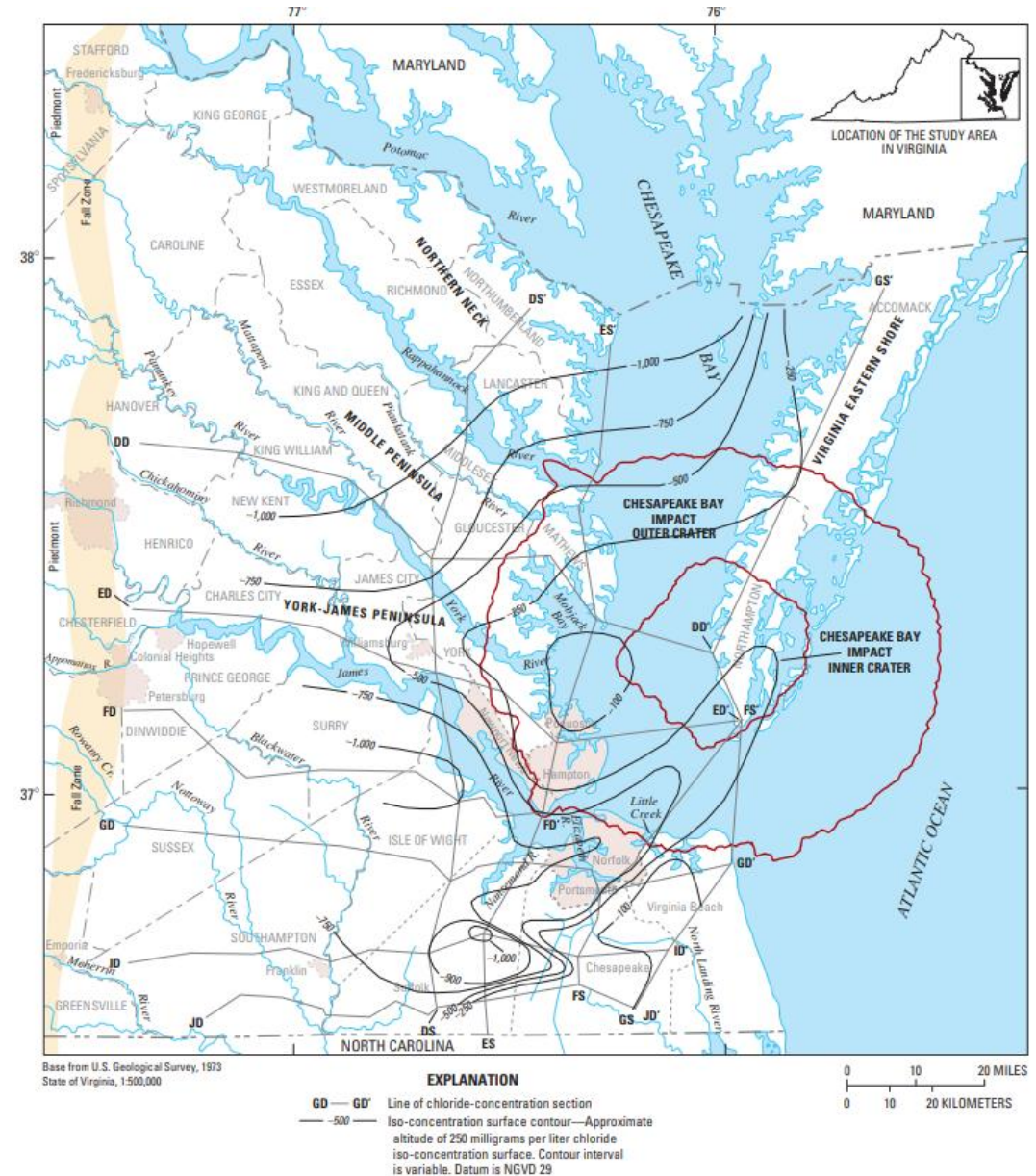
Prepared in cooperation with the Virginia Department of Environmental Quality and the Hampton Roads Planning District Commission

Groundwater-Quality Data and Regional Trends in the Virginia Coastal Plain, 1906–2007

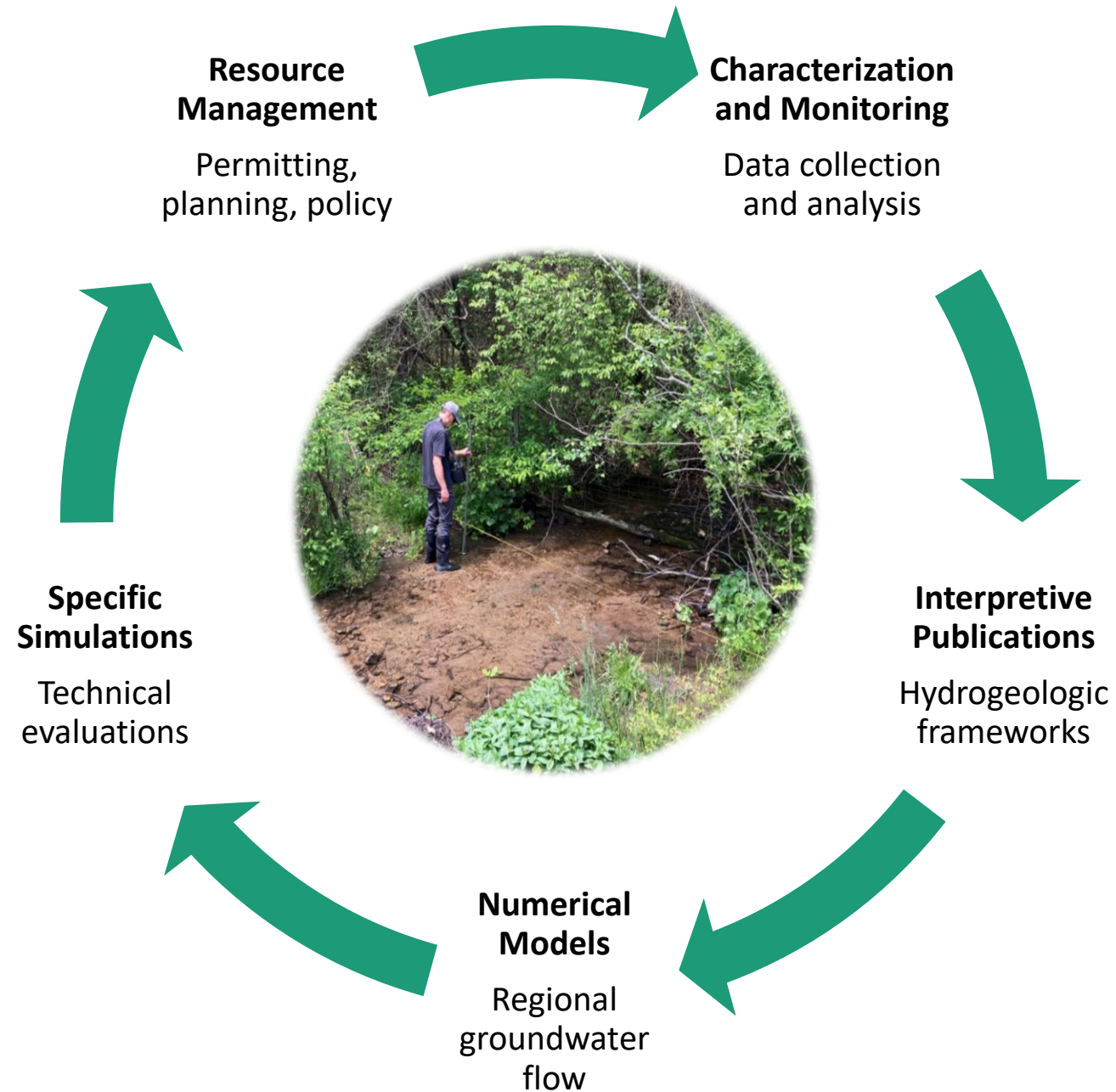


Professional Paper 1772

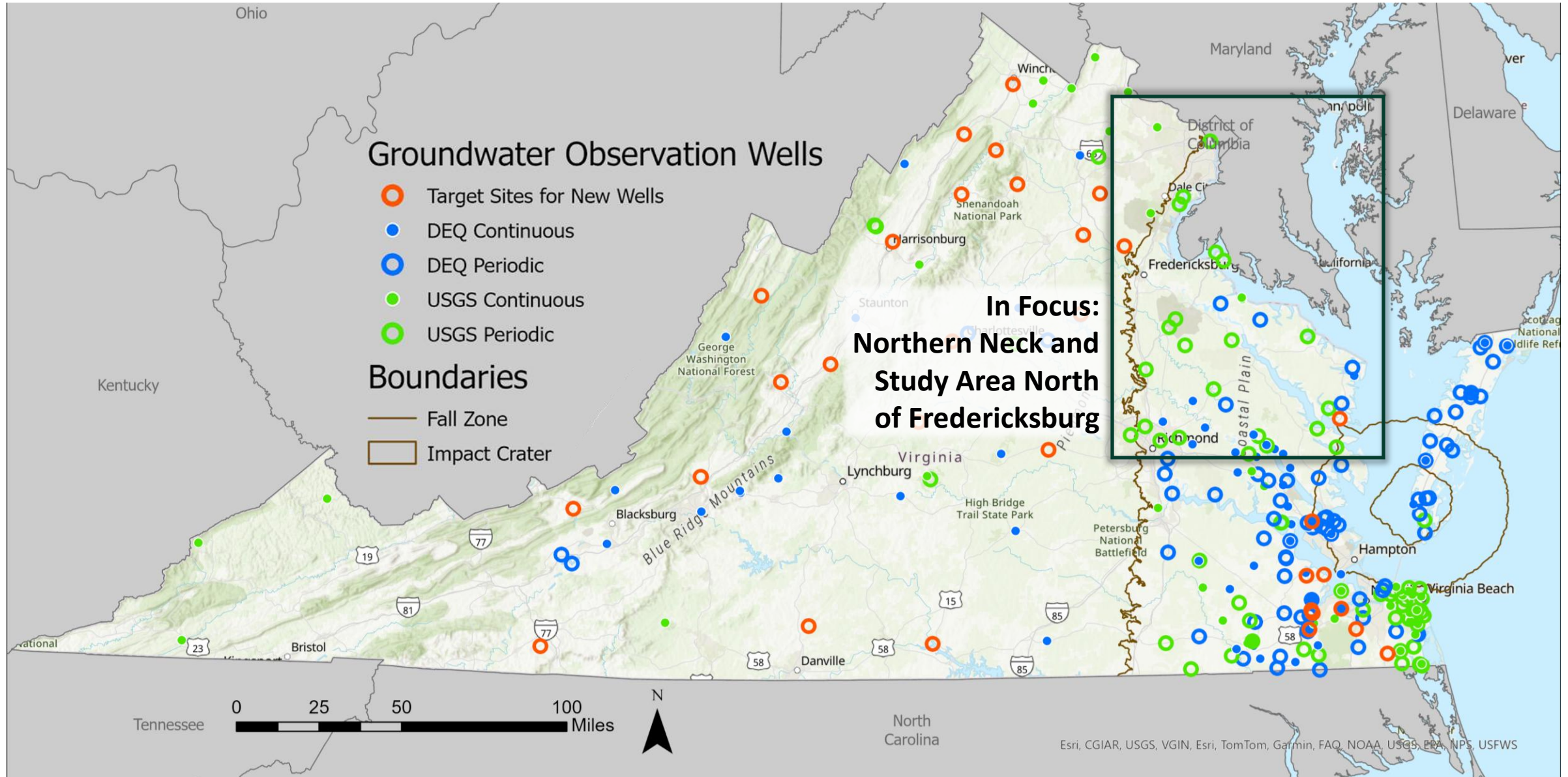
U.S. Department of the Interior
U.S. Geological Survey



DEQ's Groundwater Data Cycle

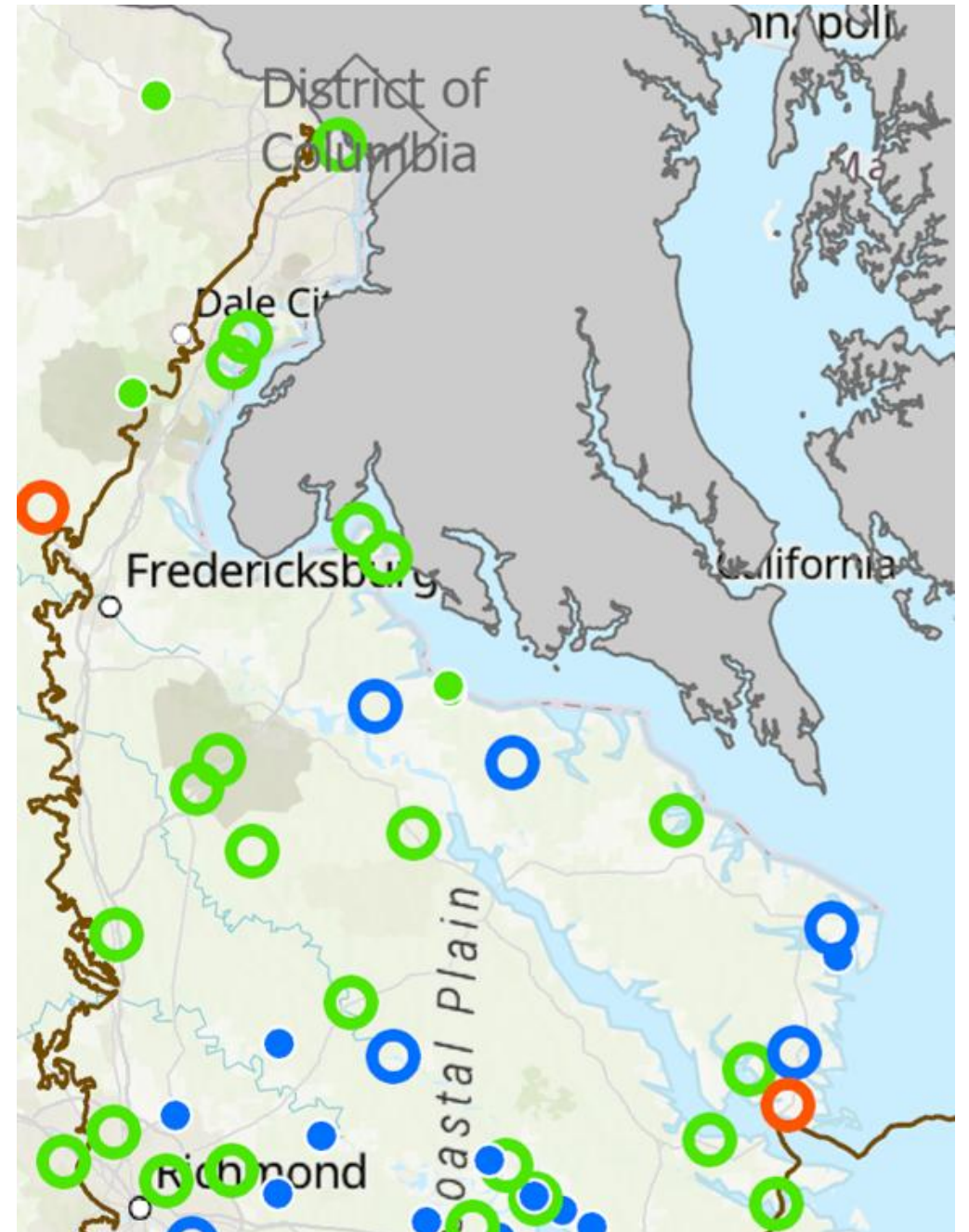


Statewide Groundwater Observation Well Network



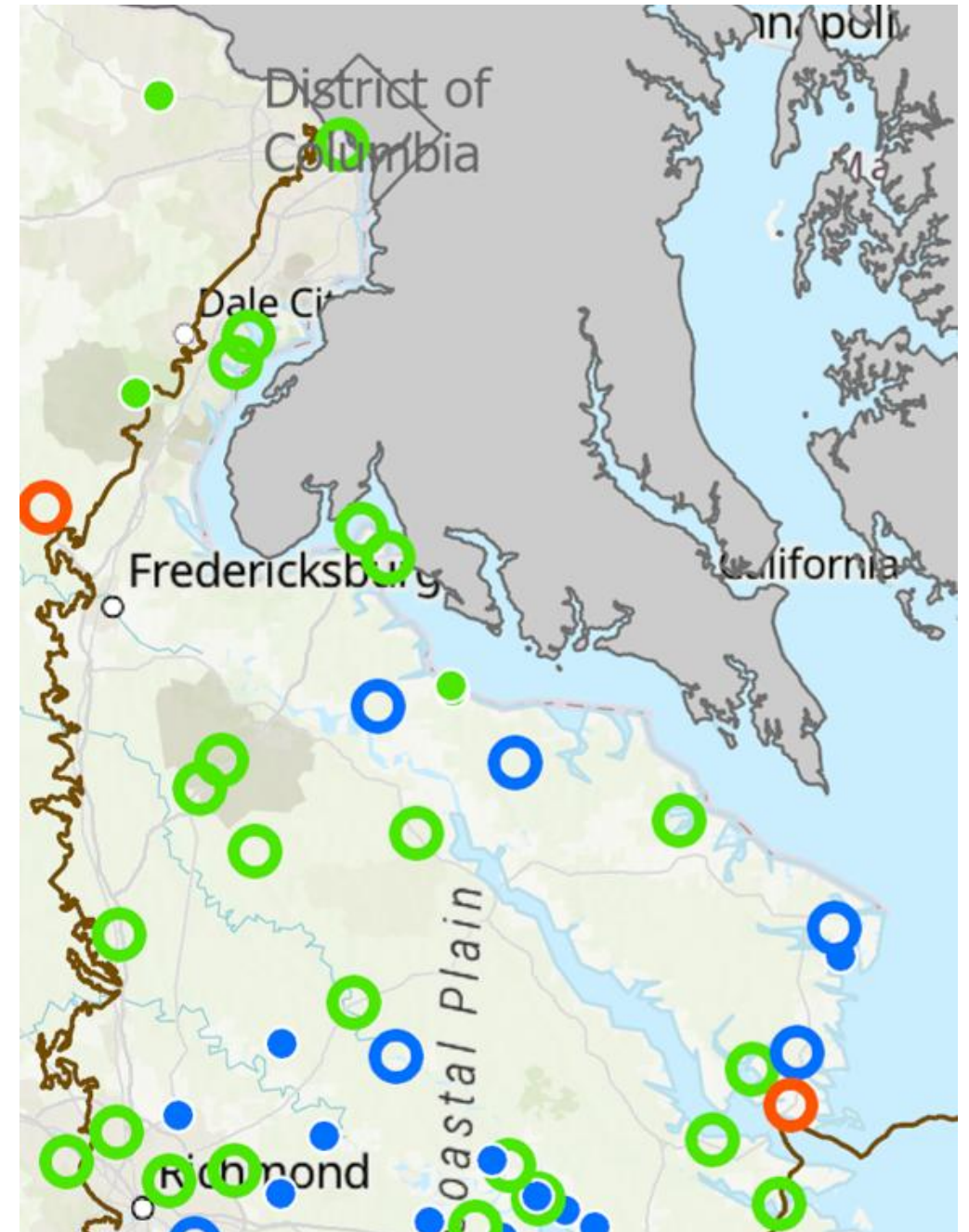
Ongoing Projects: Northern Neck

- 19 active DEQ-USGS observation wells across King George, Westmoreland, Northumberland, and Lancaster Counties
- DEQ exploring possible restoration of real-time monitoring at multi-well Surprise Hill station
- Area included in ongoing DEQ study of groundwater supply east of I-95 requested by Senate Joint Resolution No. 25
- DEQ Groundwater Characterization Team collects hydrogeologic data during well drilling by withdrawal permittees



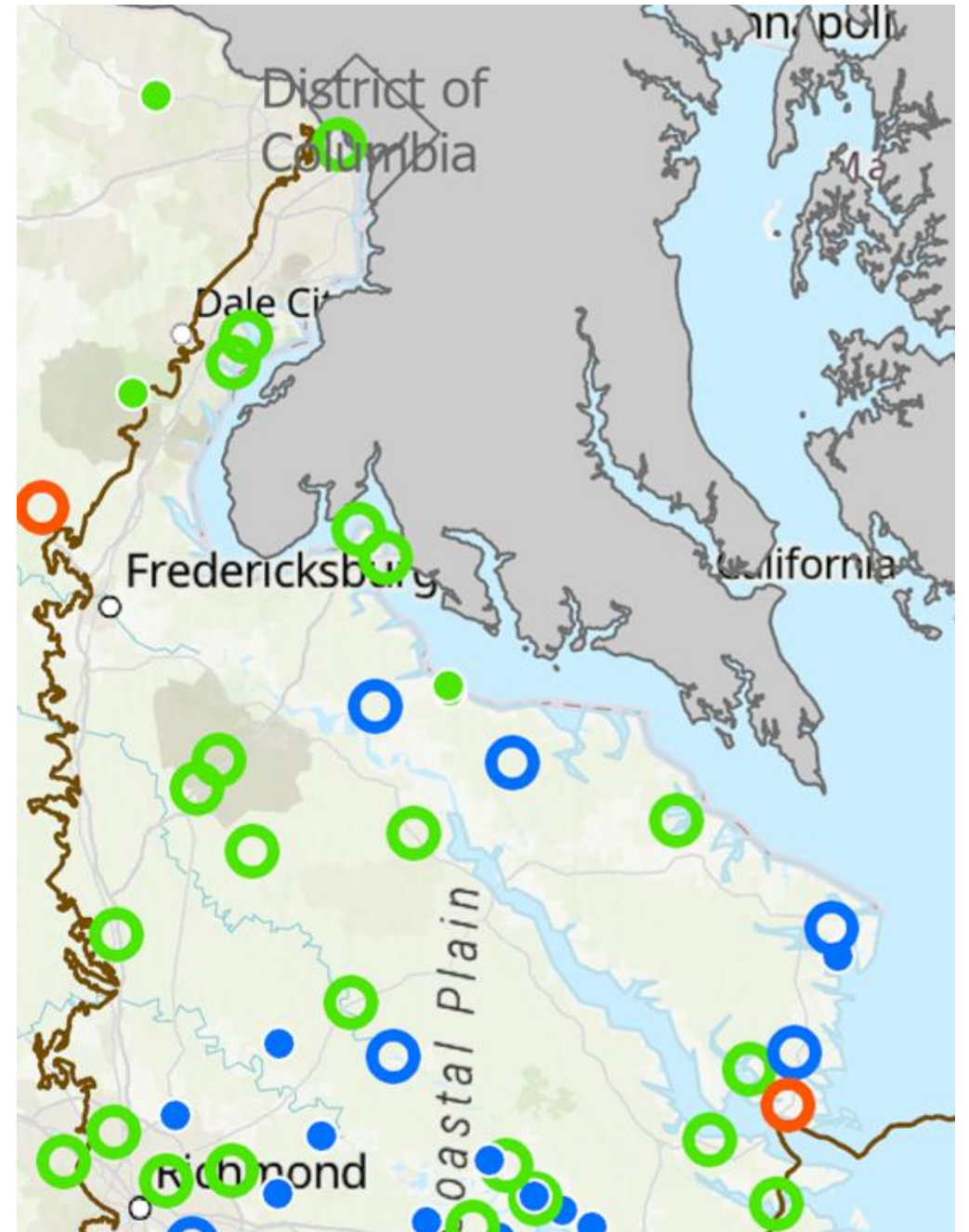
Ongoing Projects: North of Fredericksburg

- USGS currently operates
 - 2 observation wells in Prince William County (in the Groundwater Management Area)
 - 1 in Arlington (outside the GMA)
- Groundwater characterization challenging in complex area between Fall Zone and Potomac River

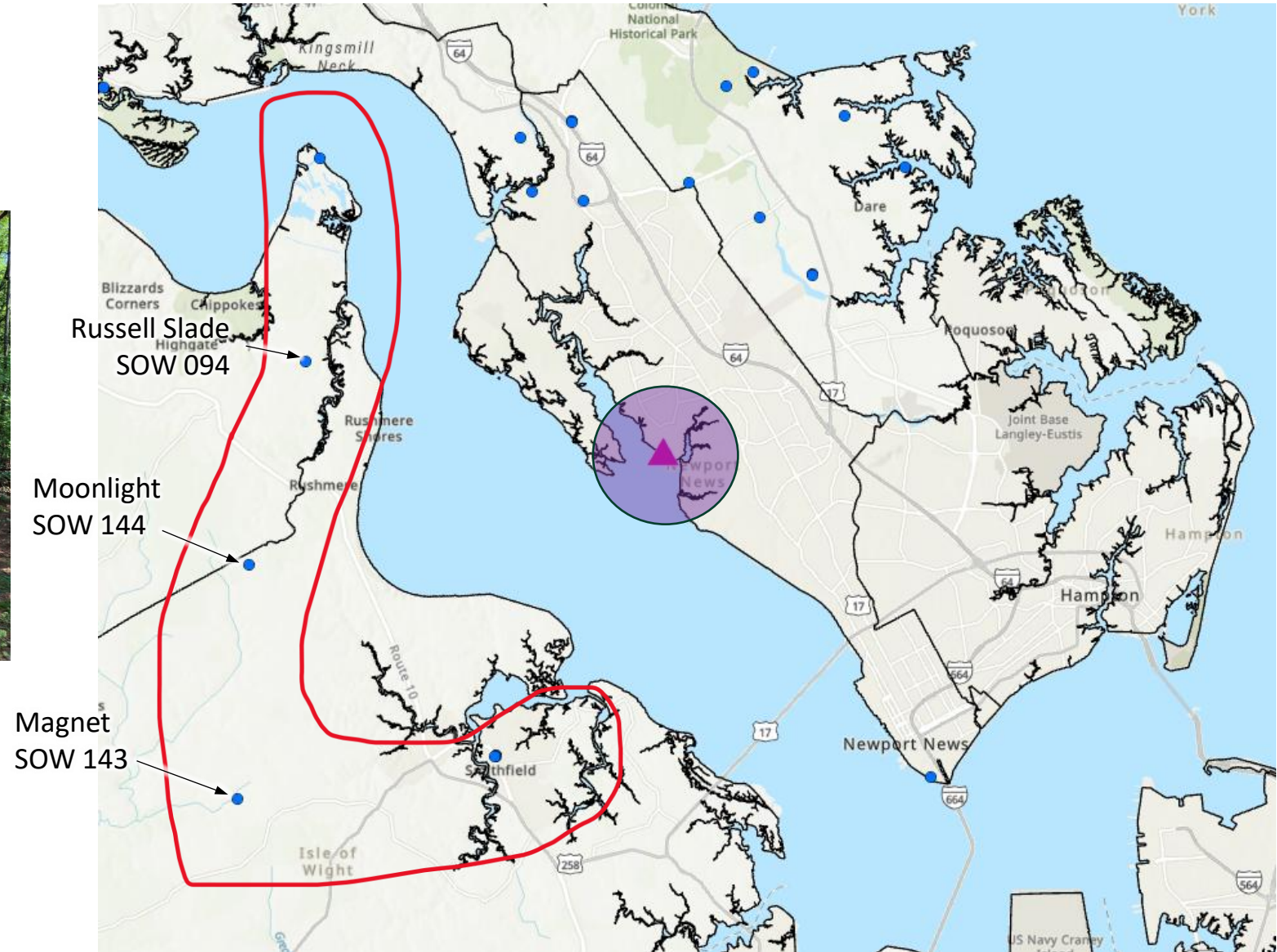


Ongoing Projects: North of Fredericksburg

- Ongoing DEQ-USGS project:
What can we learn from existing infrastructure?
 - Compile historical data
 - Sample selected wells for age-dating of Potomac aquifer groundwater (4 of possible 5 samples collected)
 - Evaluate existing wells for future GW-level monitoring
 - Conduct passive seismic surveys of bedrock depth
- USGS data release expected in fall 2025 or early 2026



DEQ Coverage of Potomac Aquifer – Restore Continuous Monitoring – Preparing for James River SWIFT Plant Injections



We are Hiring!

Groundwater Characterization Geologist P6013





Questions?