



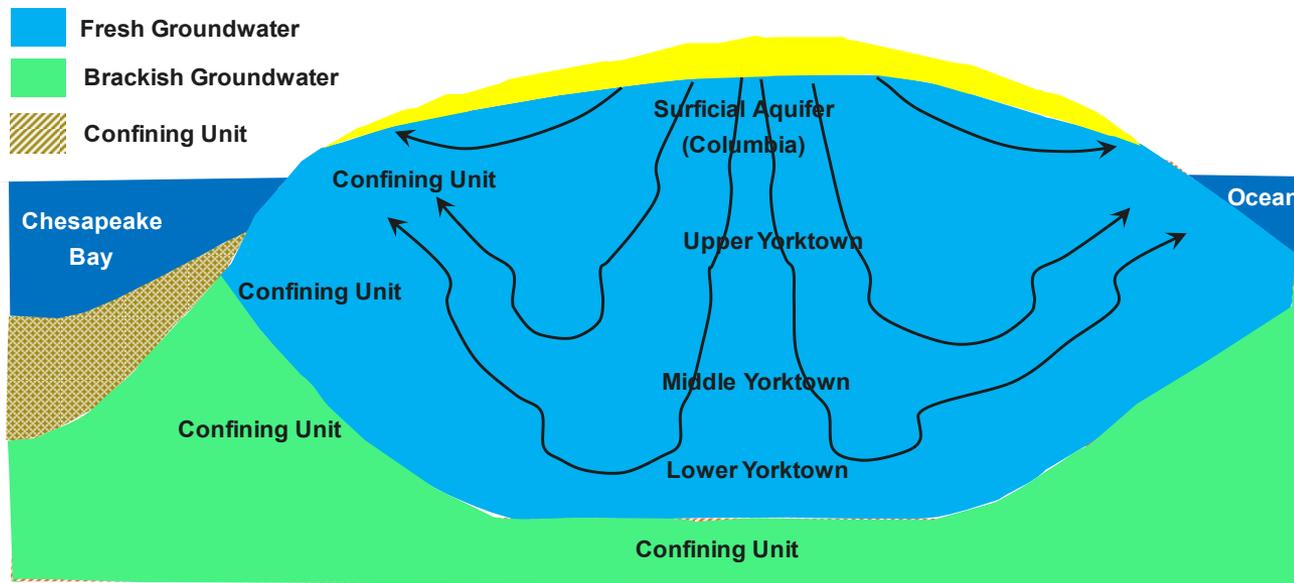
DEVELOPING SUSTAINABLE GROUNDWATER USE ON THE EASTERN SHORE OF VIRGINIA

November 2019

Why is Sustainable Development Important for Groundwater on the Eastern Shore?

Fresh Water is Limited:

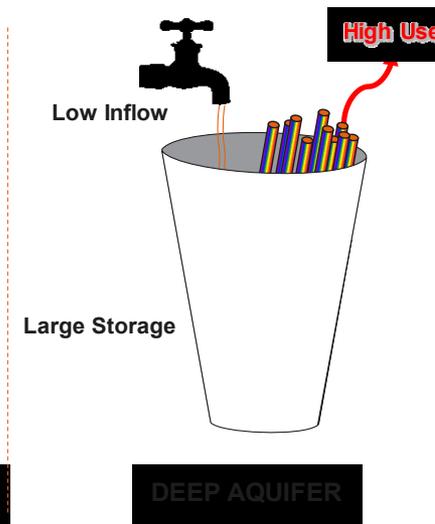
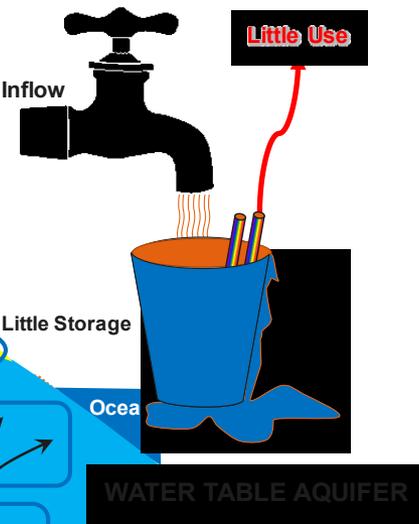
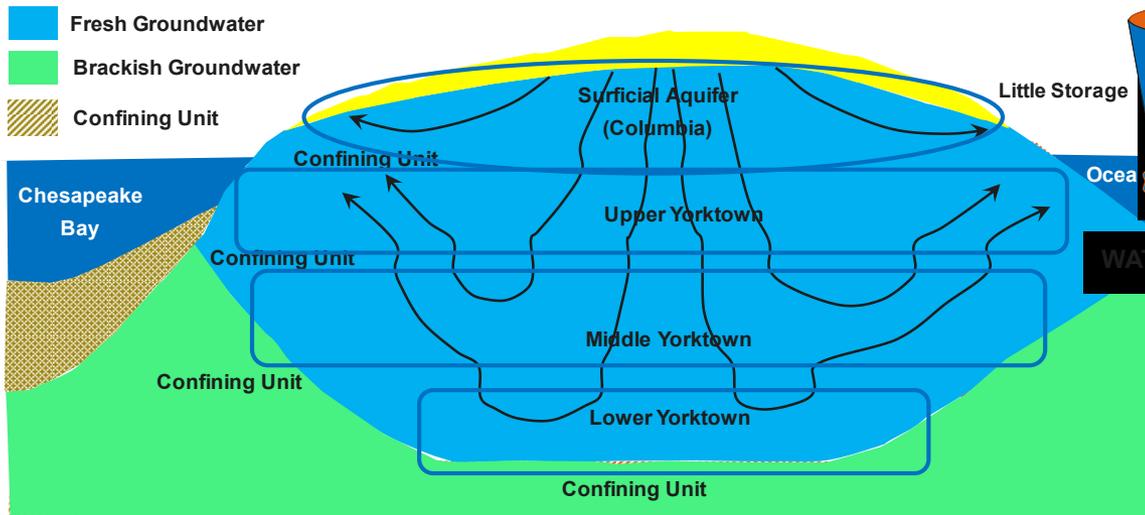
- Designated by the USEPA as a Sole Source Aquifer: no significant fresh water from streams or rivers.
- Fresh groundwater restricted to a “lens” less than 350 feet thick.



“...development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (United Nation’s World Commission on Environment and Development 1987)

Most groundwater is stored in the Yorktown-Eastover aquifer. But the Yorktown-Eastover aquifer is replenished at a rate 100x less than the Columbia aquifer

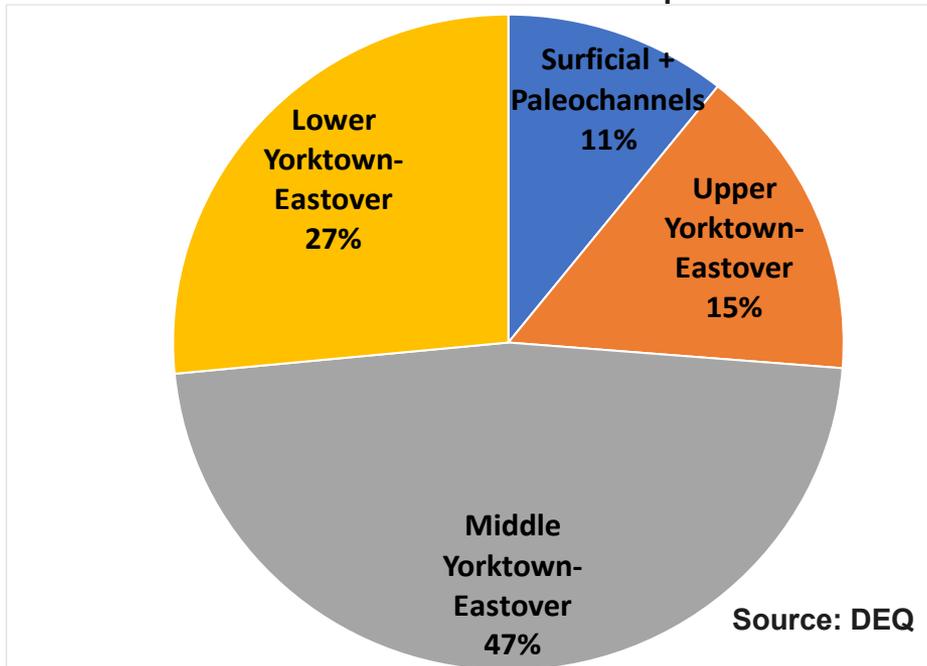
- This makes the Yorktown-Eastover aquifer a valuable source for groundwater, but vulnerable to overuse.
- High recharge protects the surficial aquifer from overuse.



Surficial aquifer is a far more sustainable source

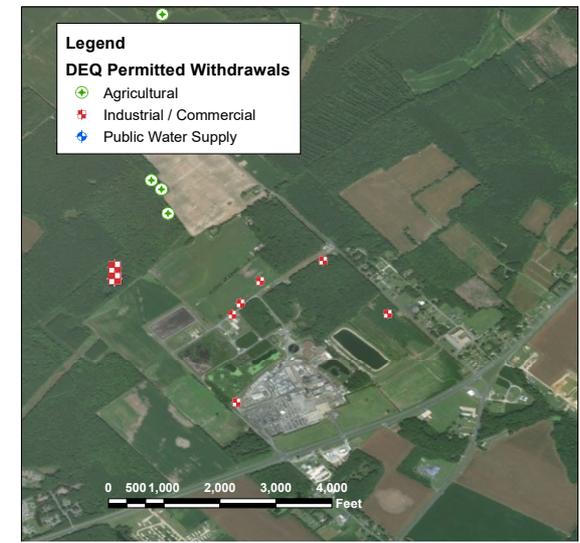
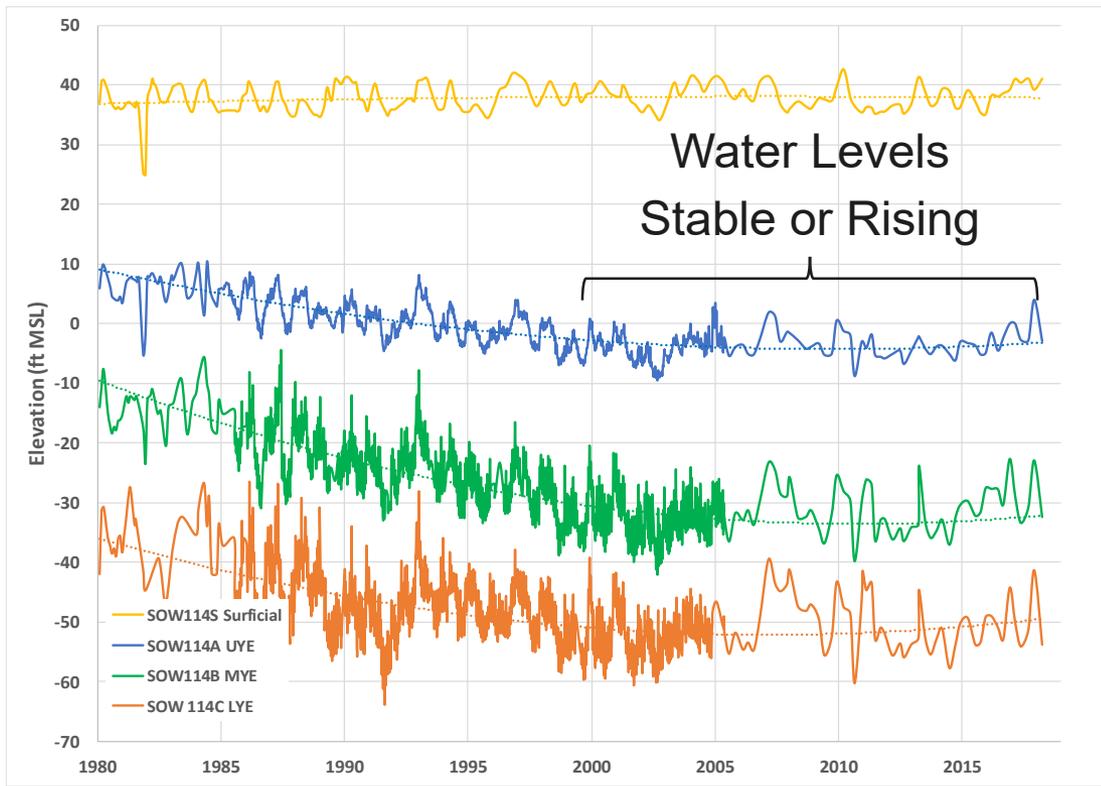
Most Groundwater Use is from the Deeper Yorktown-Eastover aquifer

- ≈90% is from the confined Yorktown-Eastover aquifer
- The remainder is from the surficial aquifer and Paleochannels



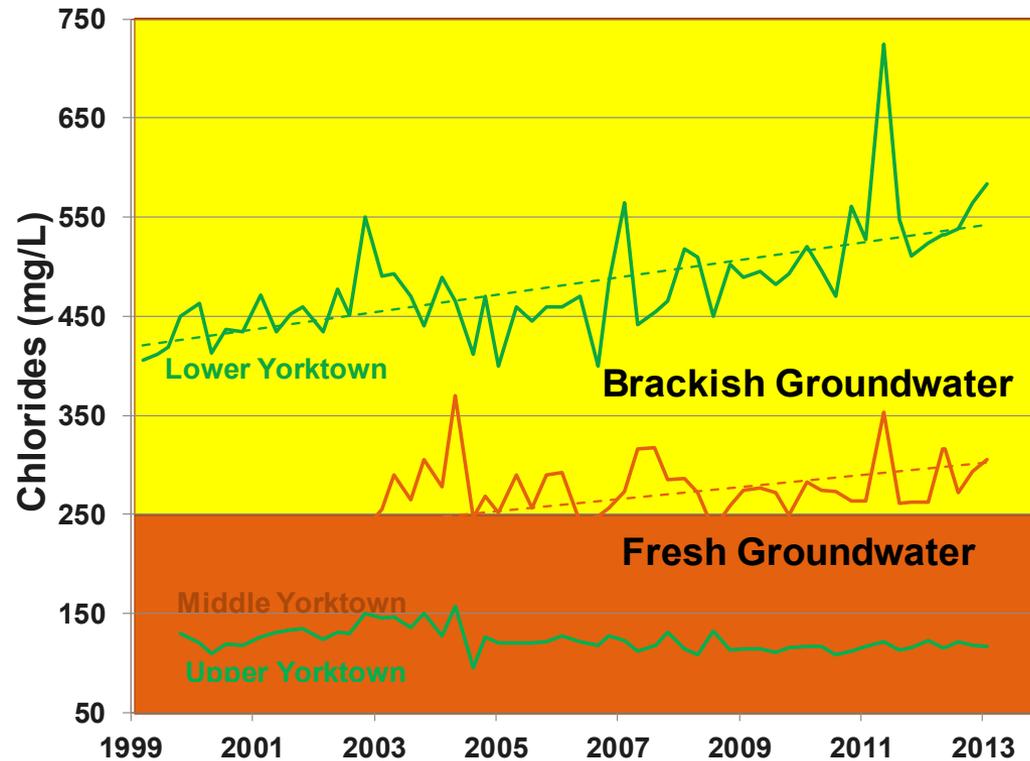
The middle and lower Yorktown-Eastover are the **least** sustainable aquifers

Overall Current Use Appears Sustainable



There is no evidence of significant **regional** drawdown or saltwater intrusion

The System can be Overdrawn as Already Observed in Local Areas



Currently the extent of saltwater intrusion is limited to near the withdrawal

Sustainable Use Approach for the Eastern Shore Focus on:

- Use reduction →
 - Promoted use and obtained grants and loans to convert irrigation systems to high efficiency systems
- Increased use of the surficial aquifer
 - Irrigation ponds instead of deep irrigation wells
 - Constructing agricultural, commercial, and industrial production wells in the surficial aquifer



| System Name | Use Type |
|---------------------------|-------------|
| AL Mathews Farm | Agriculture |
| Broadleaf Farms | Agriculture |
| Christian Ames Farm | Agriculture |
| Drummond | Agriculture |
| Grapeland Farm | Agriculture |
| Holly Grove Farm | Agriculture |
| Home Farm | Agriculture |
| Lang Farm | Agriculture |
| Machipongo Farm | Agriculture |
| Middleton Farm | Agriculture |
| Northam Somers Farm | Agriculture |
| Painter Farm | Agriculture |
| Peach Orchard Farm | Agriculture |
| Roberts Farm | Agriculture |
| Sterling Farm | Agriculture |
| Turner Farm | Agriculture |
| Wes Powers Farm | Agriculture |
| Eastern Shore Yacht | Commercial |
| Sunset Beach Inn | Commercial |
| Trails End Utility Co Inc | Commercial |
| CCC | Industrial |
| Town of Chincoteague | Municipal |

There have been notable successes on the Shore

Most recent success: 2019 General Assembly Legislation

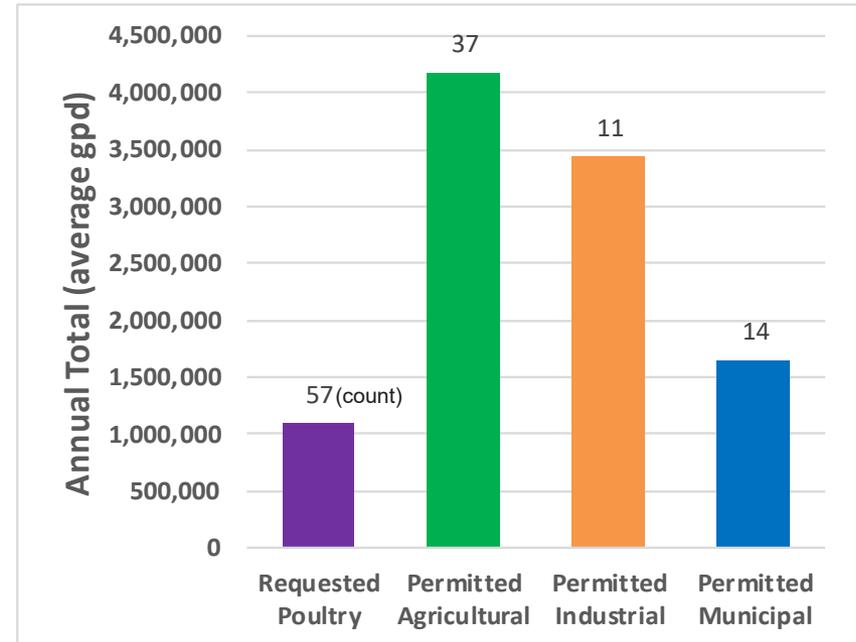
- **SB1599 – Senator Lewis: Ground water withdrawal; Eastern Shore Groundwater Management Area; incentives for use**
 - Adopt regulations providing incentives for the withdrawal of water from the surficial aquifer, rather than the deep aquifer
 - Passed House and Senate unanimously and approved by the Governor on March 21st.

Possible incentives allowed are open-ended

Current Challenge – Expanding use of Surficial aquifer

- 57 additional draft groundwater withdrawal applications for poultry houses submitted to DEQ
- As of August 2018 requested additional annual amount for the poultry houses represented $\approx 12\%$ increase in total permitted amount

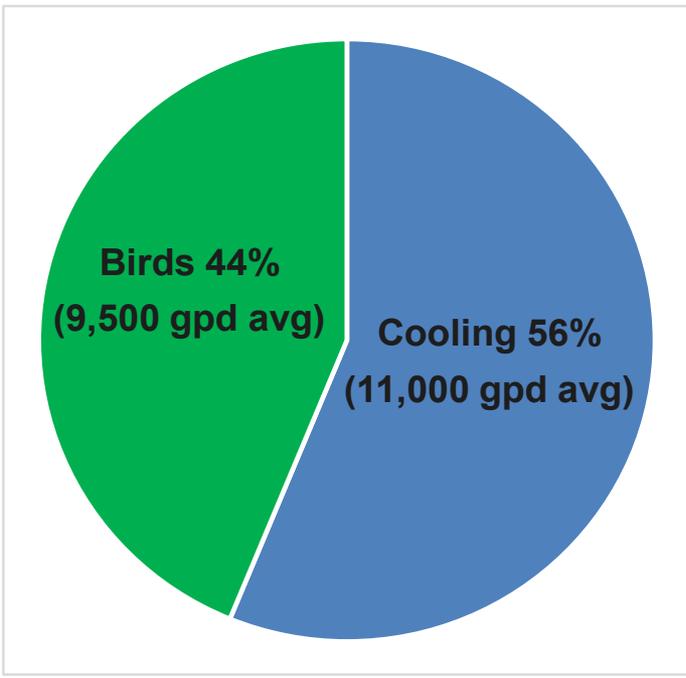
Annual Total



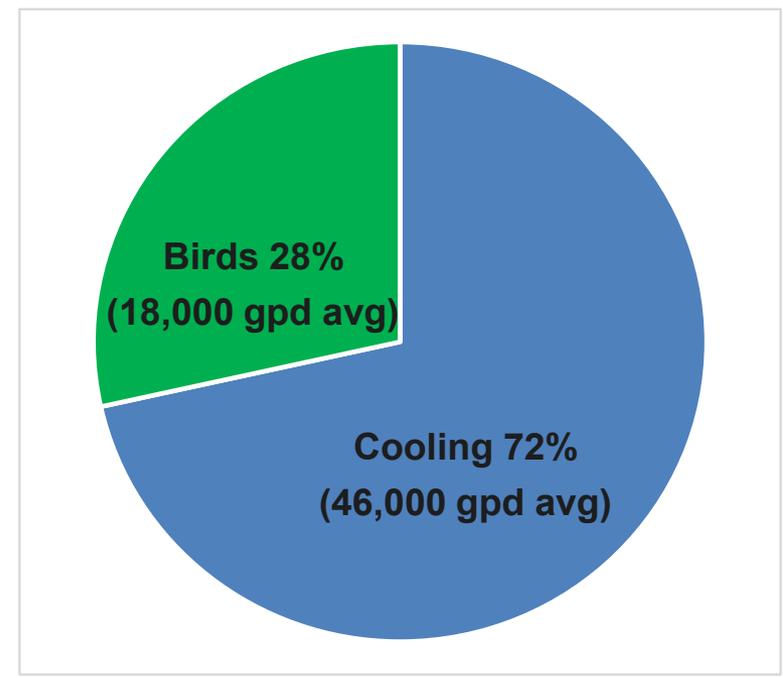
Few of the 57 permit applications propose to use the surficial aquifer

Most of the proposed use is for cooling

Annual Total



Monthly Maximum



Cooling water has been a primary target for use of the surficial aquifer

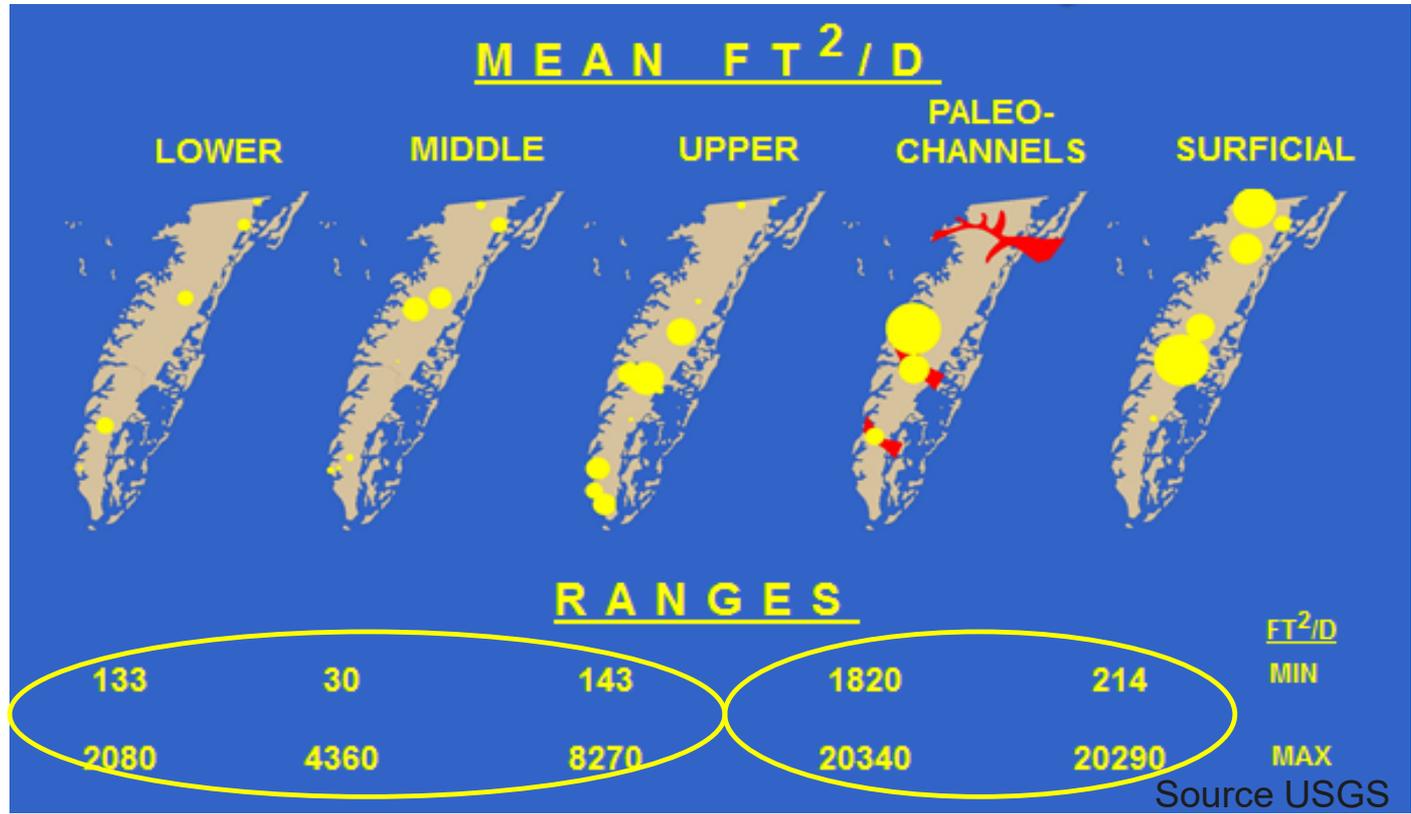
Stated Reasons to Avoid Surficial aquifer

- Most applications gave one of the following reasons for not using the surficial aquifer:
 - *“it is believed that a shallow groundwater supply system would lack the reliability, volume, and/or quality”*
 - *“the surficial aquifer does not yield water of sufficient quantity or suitable quality for meat production at this location”*



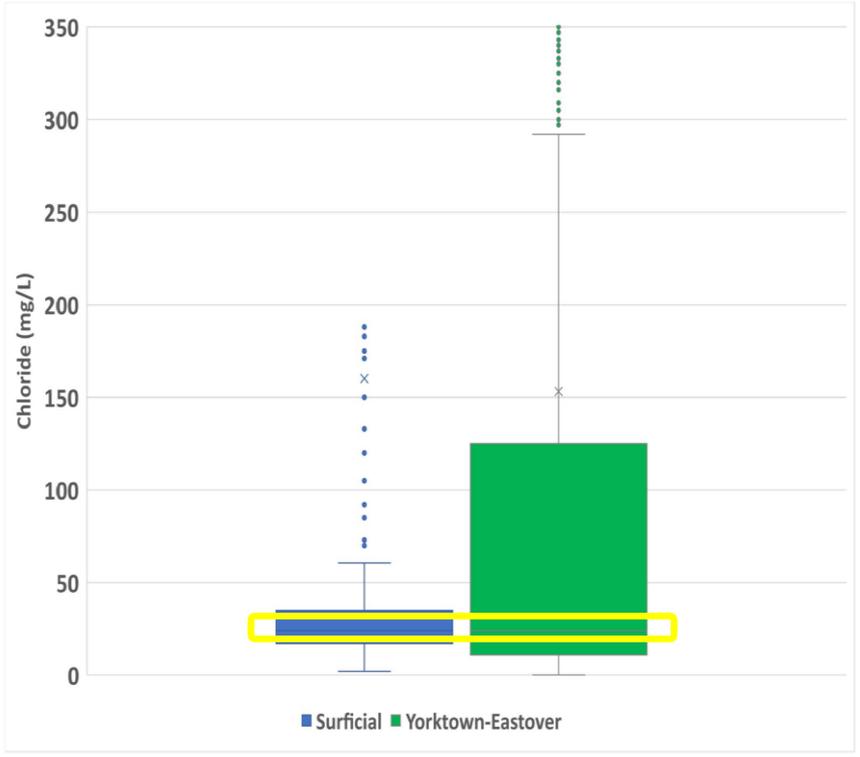
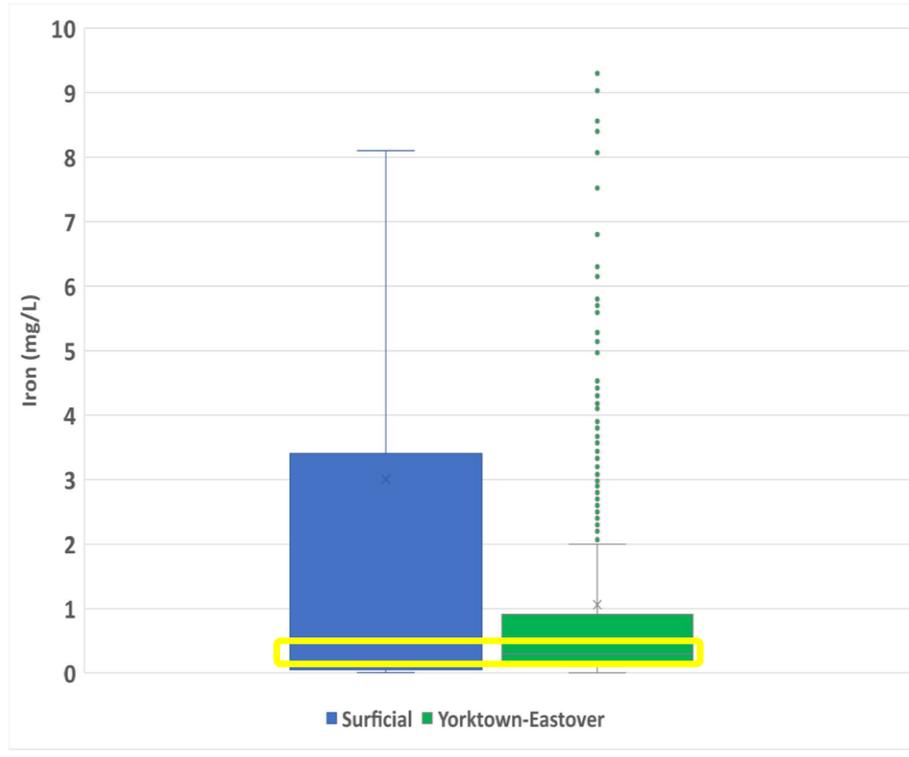
From available DEQ data, the Columbia aquifer can yield in excess of 40 gpm over most of Accomack County. 40 gpm meets the requirements for most of the poultry houses.

USGS also found Transmissivity of the Surficial aquifer more often higher



The overall higher yields are overshadowed by uncertainty

While not the same, both Surficial and Yorktown-Eastover aquifers have water quality concerns



Surficial more likely has higher iron → Yorktown-Eastover more likely has higher salts

Potential Solutions

- Promote increased use of the surficial aquifer → Senate Bill 1599
- Institutional mechanism → Local ordinances
- Address data gaps:
 - Spatial variability in groundwater quality and yield for the Surficial aquifer → Improve reporting on GW-2 forms; expand water quality sampling programs
 - Position and movement of the fresh-water / saltwater interface for the Yorktown-Eastover aquifer → Various research by the USGS funded by both DEQ and Groundwater Committee
 - Hydraulic function of the paleochannels → Ongoing USGS research funded by DEQ
 - Identifying unpermitted use →??
- Continue community and stakeholder meetings
- Other measures → TBD

Close partnership with State and Federal Agencies have been critical to current and future success

Next Steps

- Work toward developing effective measures to encourage use of the Surficial aquifer under SB1599
- Continue and expand research conducted by USGS and others
- Revise and update the “*Eastern Shore of Virginia Groundwater Resource Protection and Preservation Plan*” (2013)
 - Planned 5-year updates
 - Groundwater committee has initiated review of the plan

Groundwater Committee made sustainable use a mandate over 20-years ago and will continue striving to maintain this goal