HRSD

Cleaning wastewater every day for a better Bay.

swift

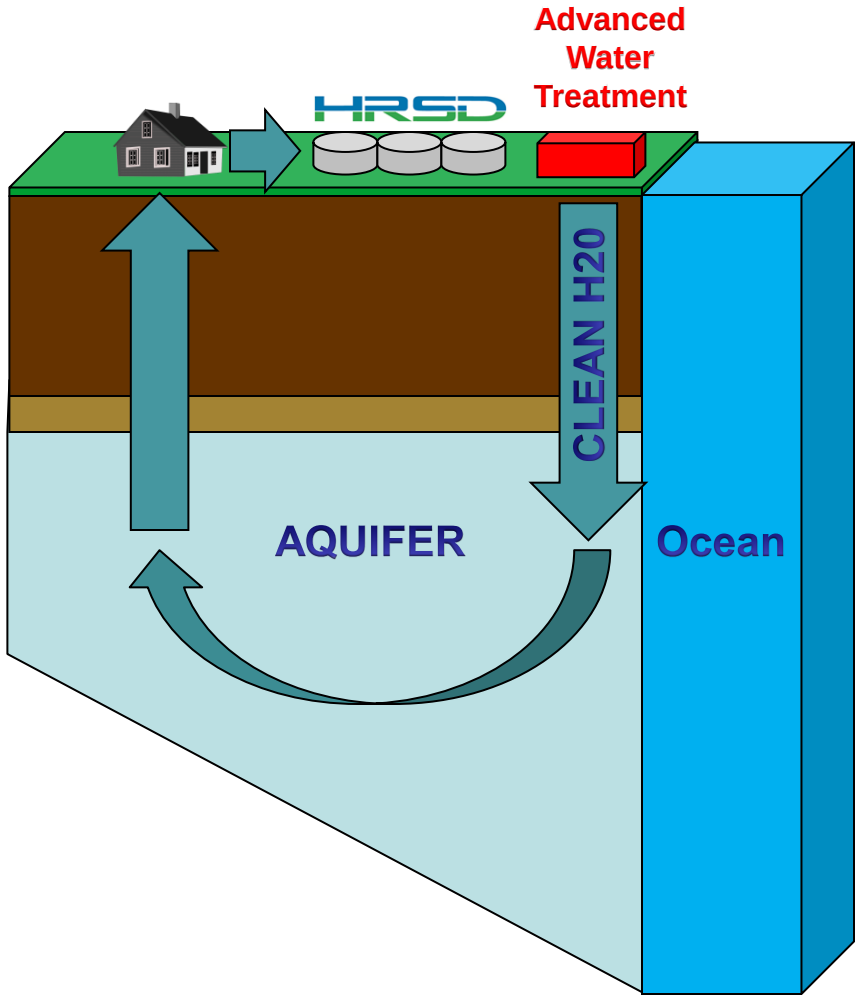
Sustainable
Water Initiative
for Tomorrow

Water issues challenging Virginia and Hampton Roads

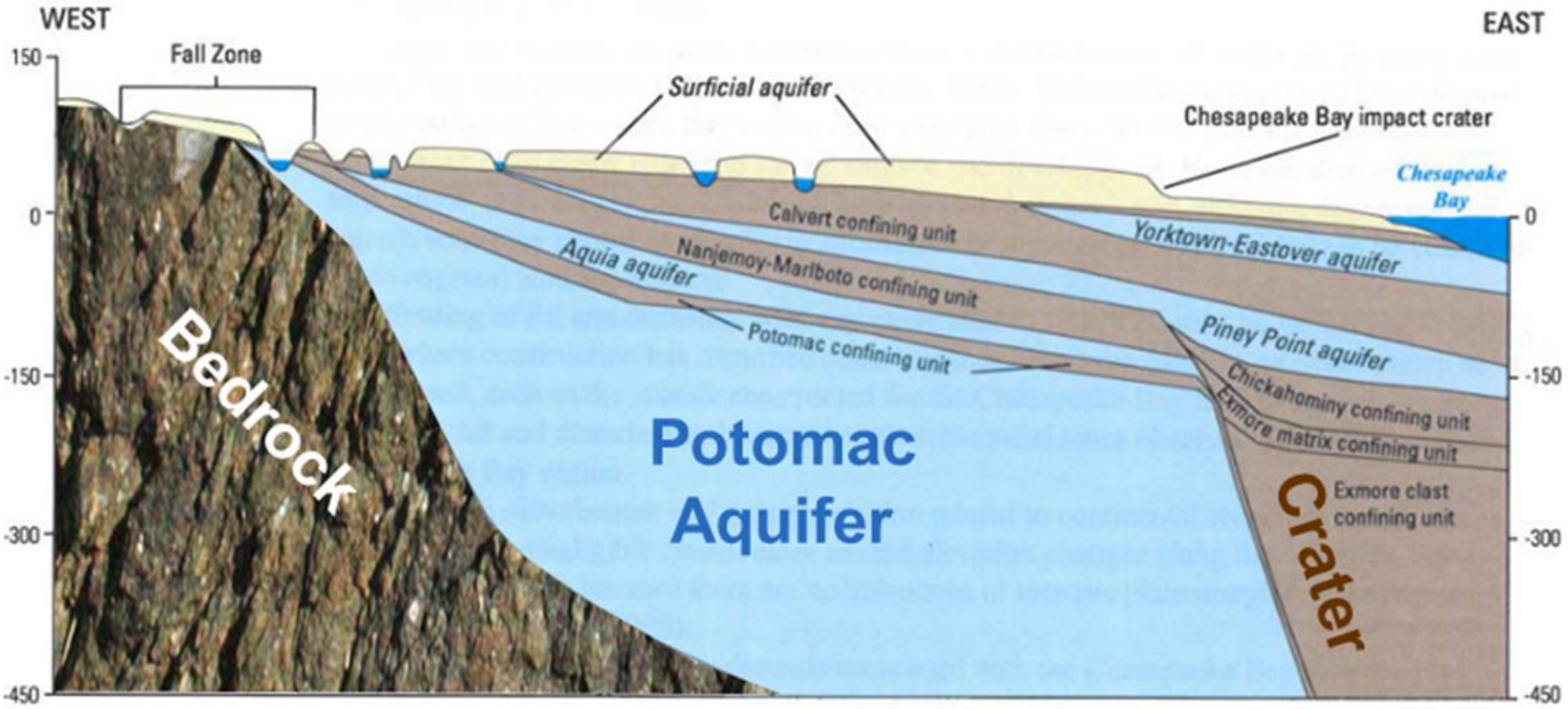
- Restoration of the Chesapeake Bay
  - Harmful Algal Blooms
  - Localized bacteria impairments
  - Urban stormwater retrofits (cost and complexity)
- Depletion of groundwater resources
  - Including protection from saltwater contamination
- Adaptation to sea level rise
  - Recurrent flooding
- Wet weather sewer overflows
  - Compliance with Federal enforcement action

SWIFT – Sustainable Water Initiative for Tomorrow

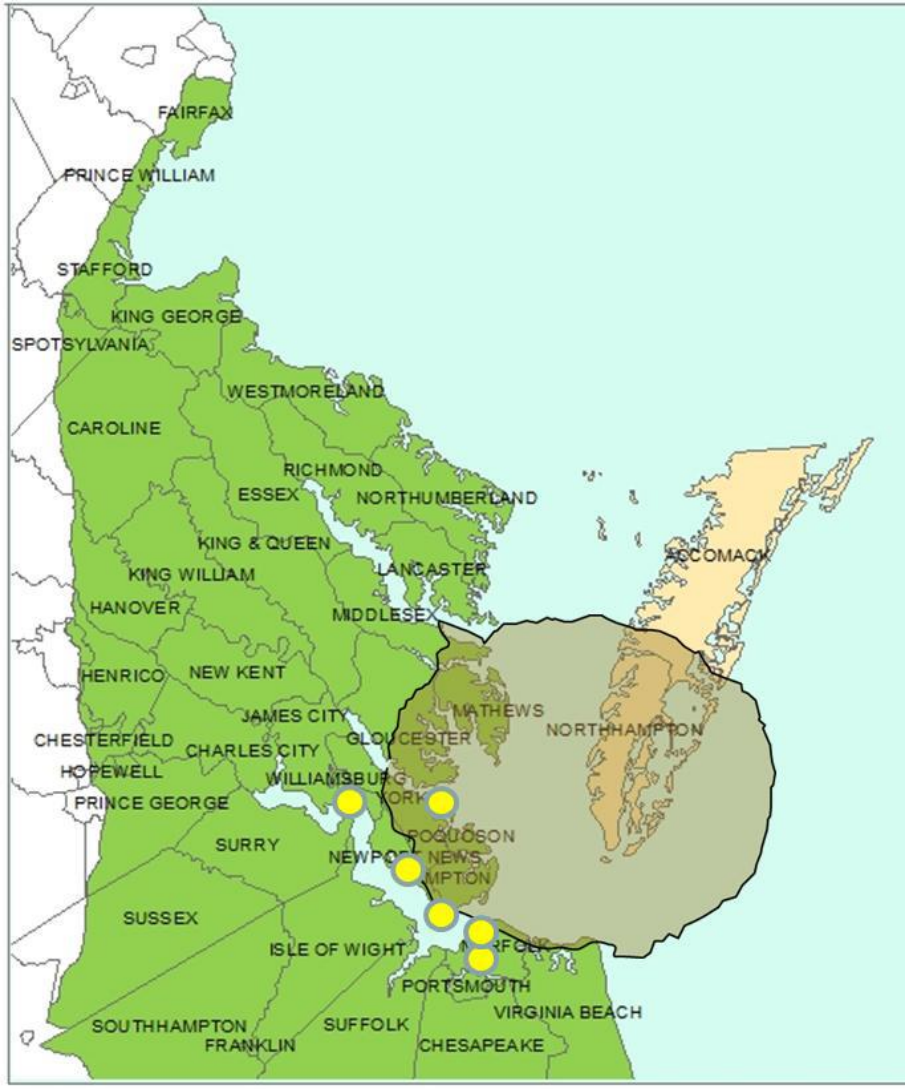
- Treat water to meet drinking water standards and replenish the aquifer with clean water to:
  - Provide regulatory stability for wastewater treatment
  - Reduce nutrient discharges to the Bay
  - Reduce the rate of land subsidence
  - Provide a sustainable supply of groundwater
  - Protect the groundwater from saltwater contamination



Cross section through Potomac Aquifer



Eastern Virginia Groundwater Management Area



Advanced water treatment – to drinking water standards

- Advanced treatment used throughout world, many locations in USA and even in Virginia to produce water that exceeds drinking water standards
  - Upper Occoquan Service Authority/Fairfax Water
  - Loudoun Water
  - Montebello Forebay, CA 1962
  - El Paso, TX 1985
  - Scottsdale, AZ 1999
  - Orange County, CA 2008
  - Arapahoe, CO 2009

Membrane based

Carbon based

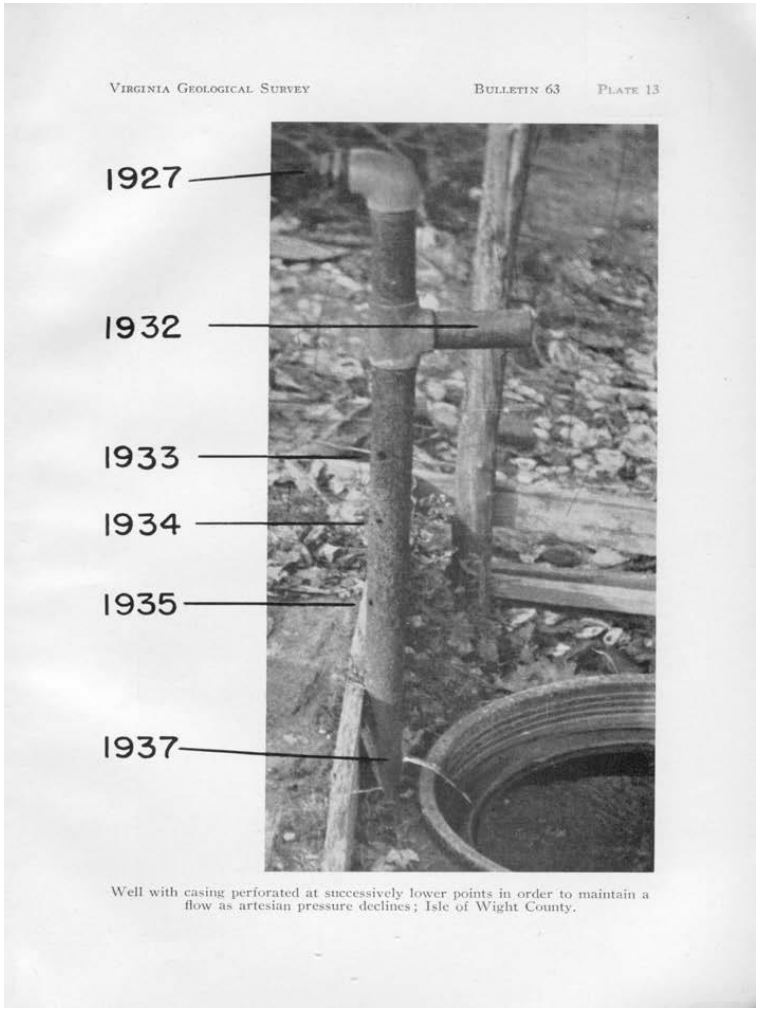
Groundwater replenishment

- Aquifer replenishment also done in many places including Virginia
  - City of Chesapeake Aquifer Storage and Recovery system – over 2.8 billion gallons pumped to date

Water must meet human health criteria and match existing groundwater geochemistry.

Groundwater depletion has been rapid

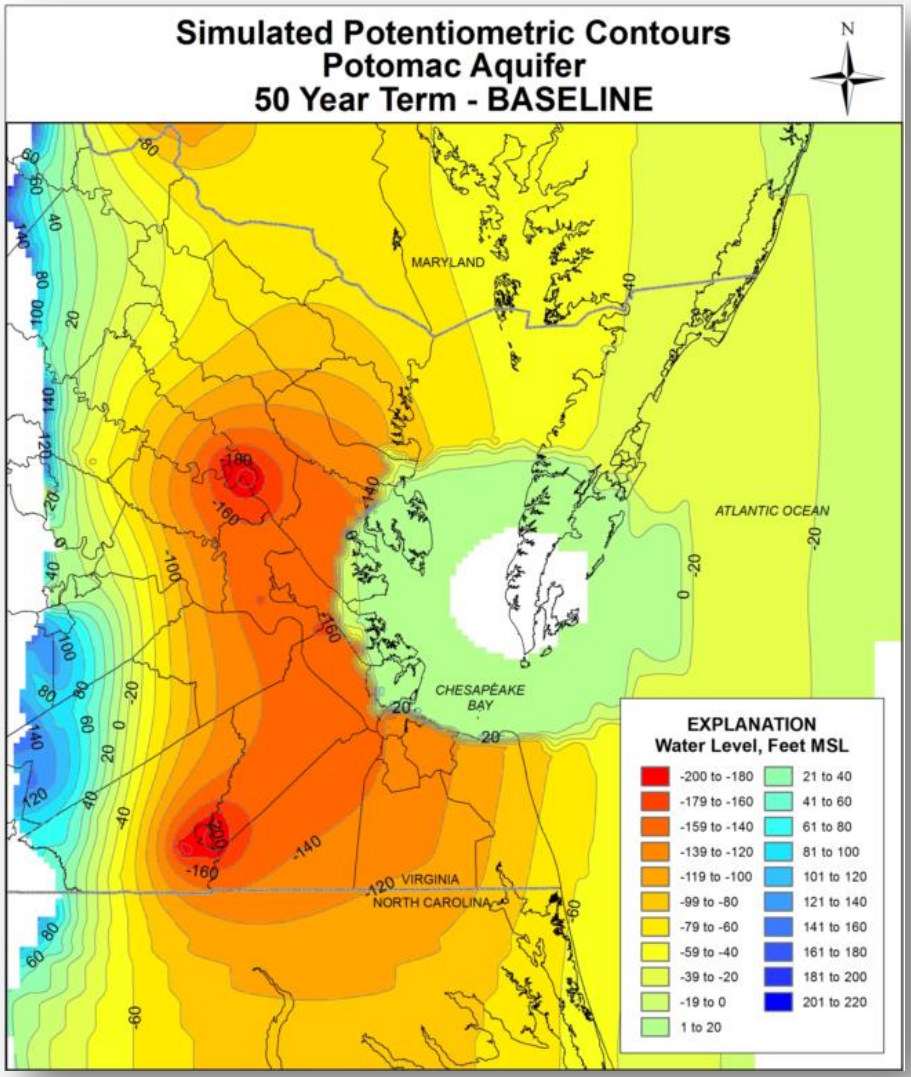
A, Overflow from artesian well in Isle of Wight County is wasted.

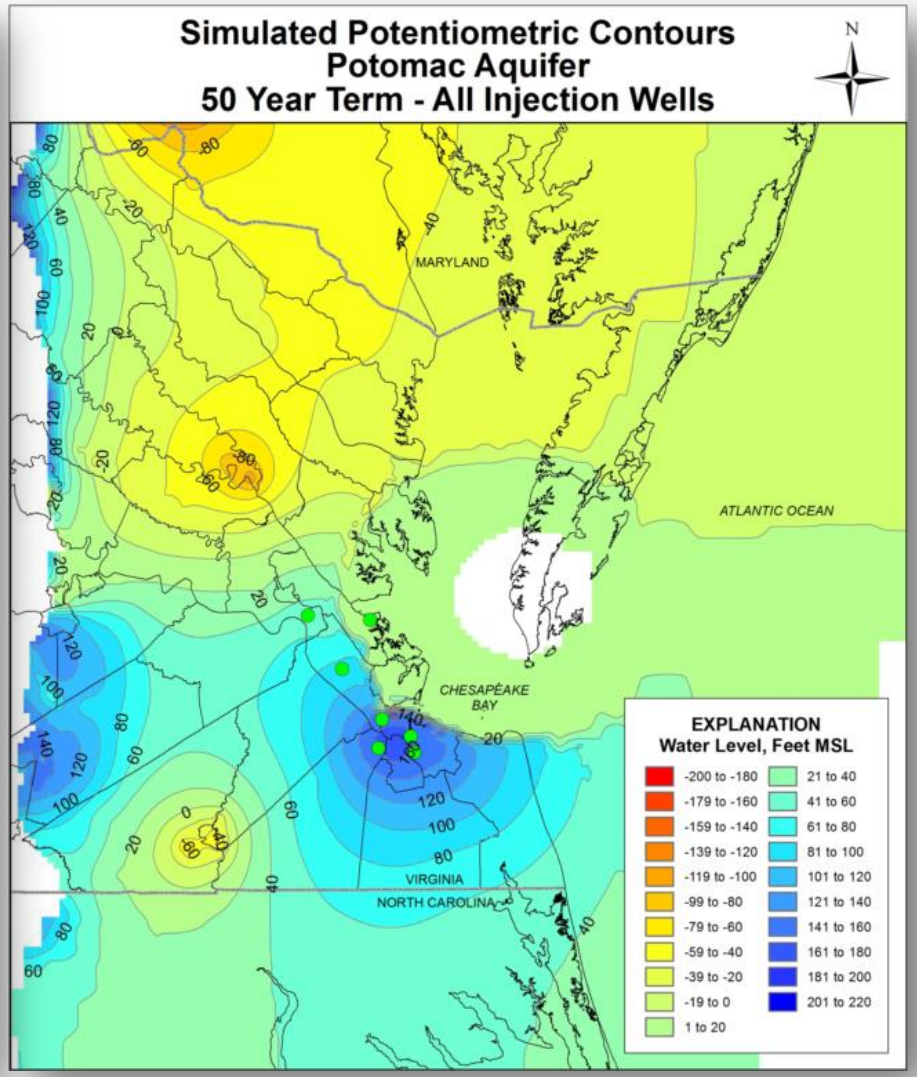


Well with casing perforated at successively lower points in order to maintain a flow as artesian pressure declines; Isle of Wight County.

- Artesian wells in early 1900s – groundwater wells required valves not pumps!
- In about 100 years have gone from water levels at 31 feet above sea level to 200± feet below.

Potomac Aquifer water levels without and with SWIFT

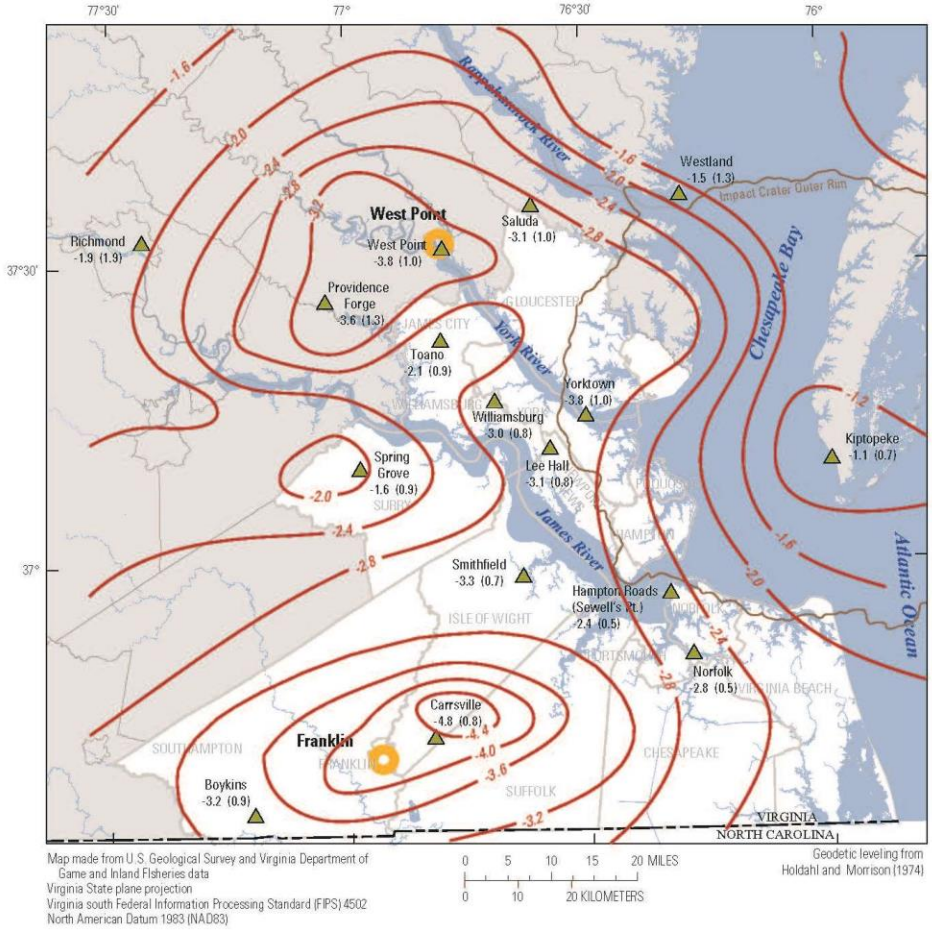




Land subsidence – *we are sinking*

- According to USGS
  - Up to 50% of sea-level rise may be due to land subsidence
  - **Up to 50% of land subsidence may be due to aquifer compaction**
  - 3 to 4 mm/yr or approximately

    0.15 in/yr

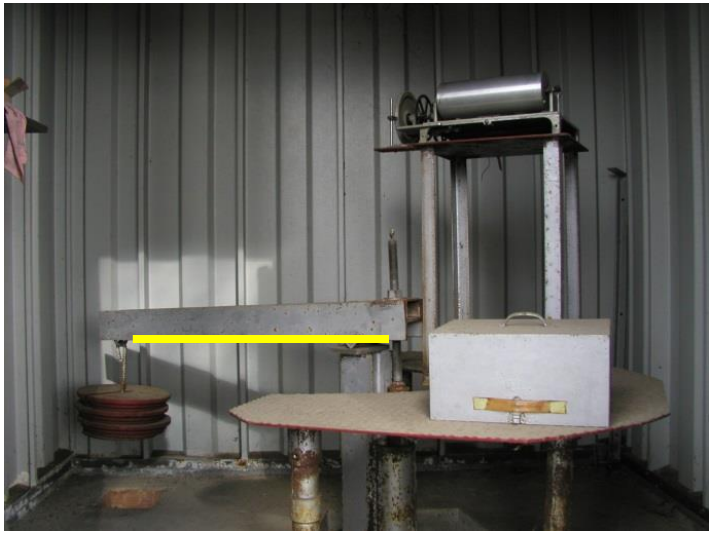


HAMPTON ROADS IS THE #2 LARGEST POPULATION CENTER AT RISK

HRSD

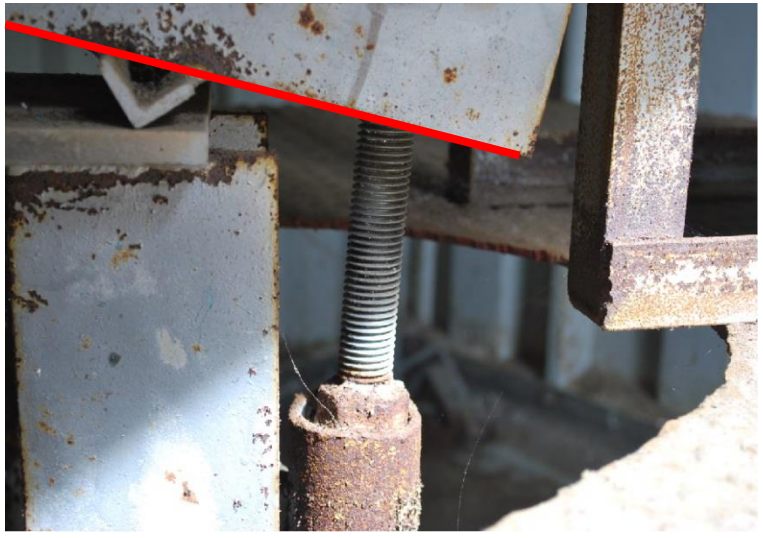
Evidence of groundwater impacts on subsidence

2002



USGS found ground level rose 32 mm (1.25 inches) between 2002 and 2015 coinciding with reduced groundwater withdrawal by Franklin paper mill.

2015



USGS science for a changing world

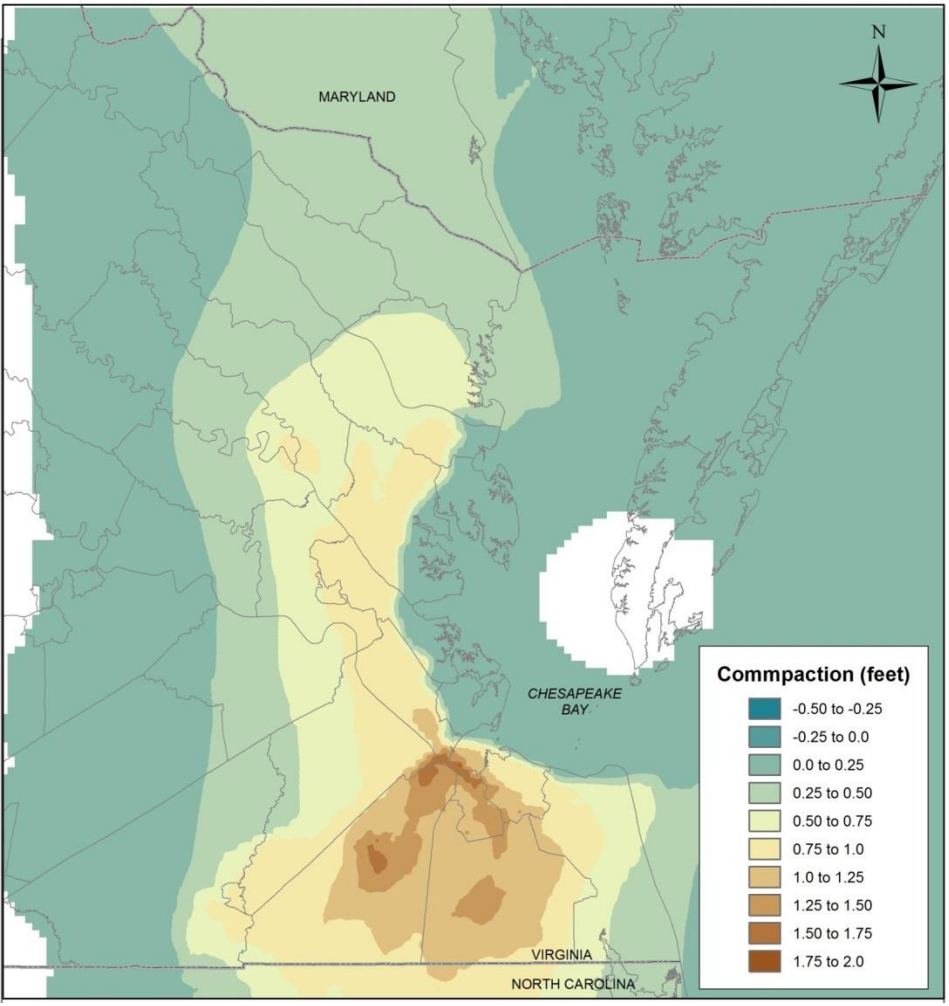
HRSD

Land subsidence modeling

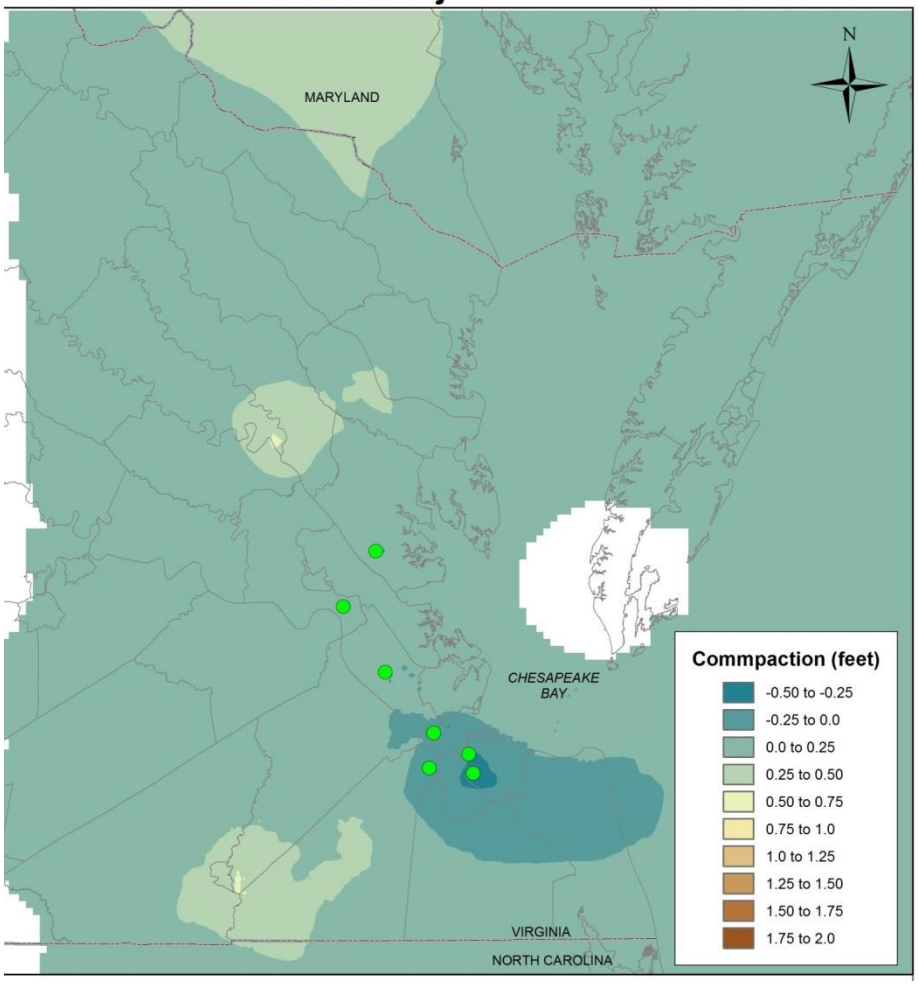
- All models are wrong, some are useful
- DEQ updated the VAHydro-GW model to simulate aquifer compaction
  - Calibrated with aquifer compaction data from the 2 extensometers
  - Model simulations closely matched previous estimates by USGS (contours shown on earlier slide)
  - Model is currently best tool available to estimate land subsidence within the Virginia Coastal Plain
- Virginia needs more data on subsidence
  - HRSD has contracted with USGS to construct third extensometer in region – at Nansemond Plant
  - Will be seeking reimbursement funding from state

Aquifer compaction without and with SWIFT

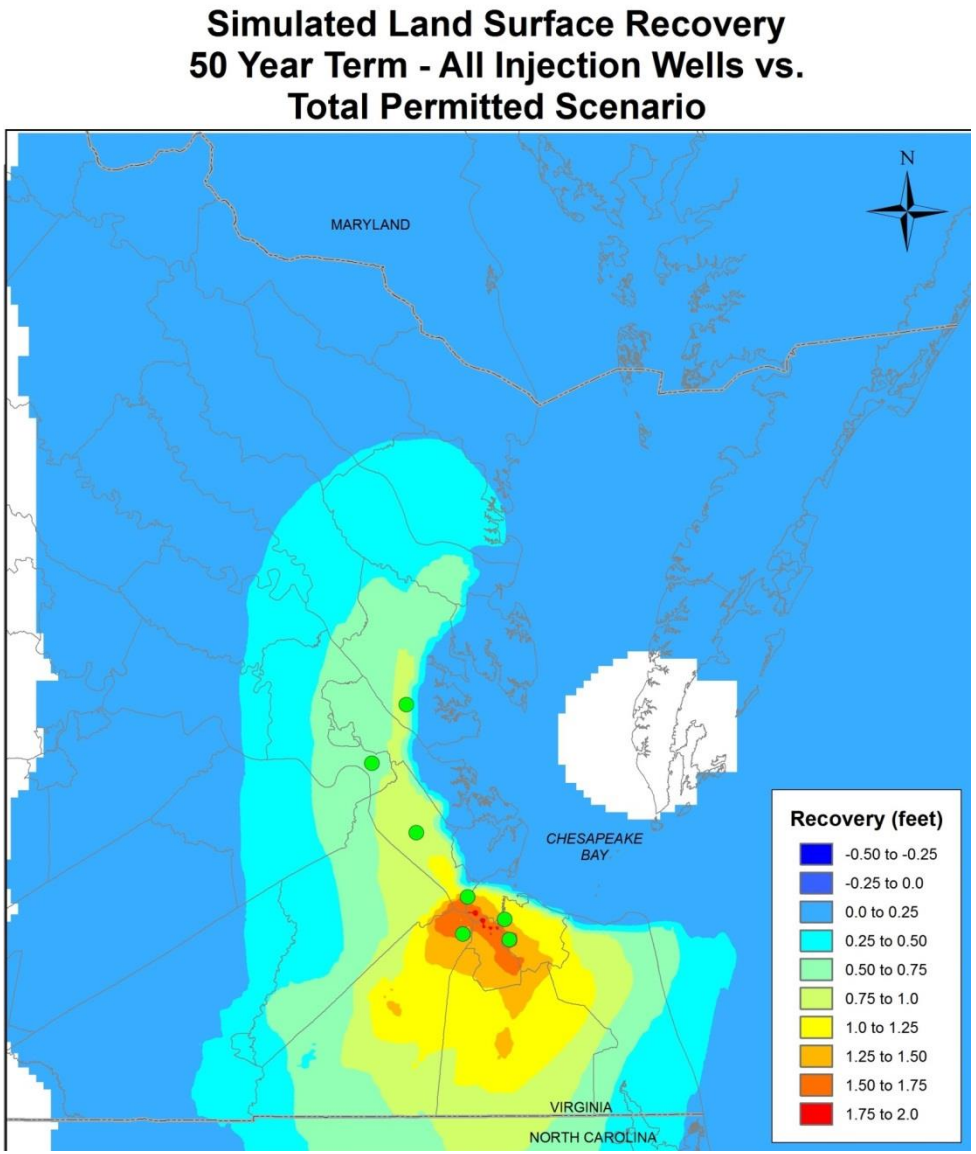
Simulated Total Aquifer System Compaction from 1890 to 2064 - Total Permitted



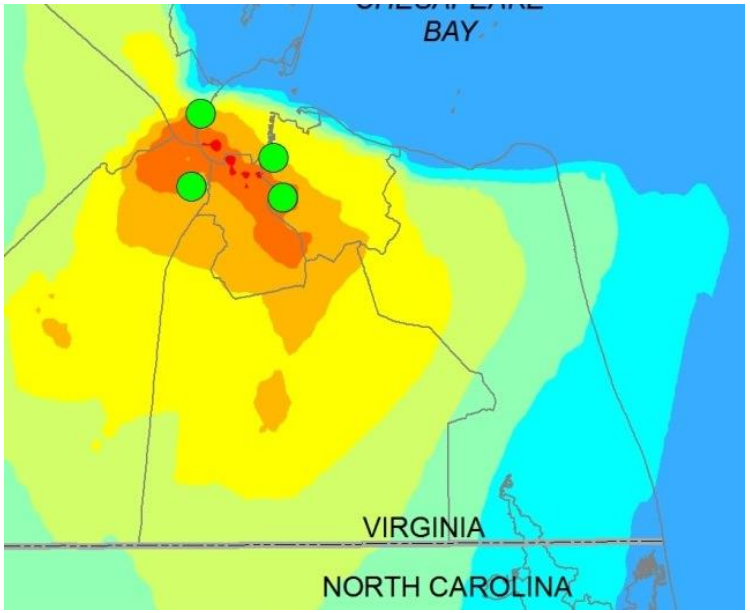
Simulated Total Aquifer System Compaction from 1890 to 2064 - Total Permitted with All Injection Wells



Simulated land surface recovery



Based on modeling results land surface is simulated to be as much as 2 feet higher with SWIFT after 50 years than is simulated with total permitted withdrawals over the same time frame. **That is a net difference.**



Benefits to the Commonwealth

- Initiative produces benefits to Virginians well beyond Hampton Roads
  - "Wireless" solution to provide water for economic development throughout Eastern Virginia
  - Chesapeake Bay nutrient reductions frees up allocation for other uses regionally and helps Virginia meet state obligations under TMDL
    - Reduces need to do cost prohibitive stormwater retrofits in Hampton Roads' localities - frees up resources to focus on recurrent flooding and other adaptation needs
  - Slowing rate of land subsidence extends the productive use of low lying coastal lands that provide state tax revenues


The Virginian-Pilot
Can your sinks and toilets fight sea-level rise?
Virginia GOP asks state to cancel "loyalty oath"


Daily Press
SUNDAY, OCTOBER 11, 2015
GROUNDWATER DRAIN: A BIG-DOLLAR DILEMMA
PENINSULA CITIES IN ECONOMIC DOLDRUMS
Groundwater water level decreases


HRSD doesn't want to waste wastewater
By Dave Mayfield
The Virginian-Pilot
SEAFORD
Ted Henifin crouched next to a floor drain at the Hampton Roads Sanitation District's York County treatment plant. Into his palm ran a soft stream of clear water – clean enough, probably, to drink. But the lab results aren't back to confirm that. So, Henifin will hold off before he sips.
Waiting isn't exactly Henifin's style these days. He has dived into a project to prove that HRSD can turn what Hampton Roads flushes down
recycled
The sanitation district wants to launch a $1 billion, decadelong project that would refill the region's aquifers with treated wastewater.
See WASTE, PAGE 10


NO WASTING WATER
Following the lead of other regions, local plant tries treating wastewater
By Dave Ress
SEAFORD — With a sip of specially treated wastewater, Hampton Roads Sanitation District general manager Ted Henifin put his mouth where his money is — what could be a $1 billion effort to replenish eastern Virginia's rapidly shrinking pool of groundwater.
A pilot program at the agency's York River Treatment Plant shows it is possible to clean the water Hampton Roads residents flush out of their homes and businesses so that it is safe to drink, he told a gathering of state and local officials.
Not that he expects anyone will be drinking it any time soon. The plan is to eventually inject 180 million gallons a day of treated water deep underground to begin replenishing the wedge of water-logged sand tapped by wells that serve hundreds of thousands of people and businesses.
They're currently drawing about 100 million gallons a day from those wells, resulting in groundwater levels in parts of eastern Virginia dropping 200 feet over the past century.
Online
See more photos and video at dailypress.com.
See WATER/Page 8
JONATHON GRUENKE/DAILY PRESS PHOTOS
Top: Process engineering and research manager Chris Wilson is reflected in a window displaying the first step of the carbon-based advanced water treatment process at a conference at the York River Treatment Plant Thursday. Above: HRSD general manager Ted Henifin holds a glass of purified water during the conference at the plant.


STEVE EARLEY | THE VIRGINIAN-PILOT
Ted Henifin, Hampton Roads Sanitation District general manager, vowed to take the first gulp of HRSD's treated wastewater. He made good on his promise Thursday.
Sip shape
Hampton Roads Sanitation District's treated sewage water tastes great, say officials, and could shore up the area's sea level rise and bay cleanup issues
By Dave Mayfield
The Virginian-Pilot
YORK COUNTY
Earlier this year, as the Hampton Roads Sanitation District ramped up plans to make its wastewater clean enough to drink, general manager Ted Henifin vowed he'd take the first gulp.
On Thursday at the HRSD's York County treatment plant, Henifin made good on the promise, leading dozens of employees and invited guests in downing glasses of water that came from a sewage stream fed by sinks and toilets.
"Great!" he proclaimed after his first sip. "Ahhh."
To Henifin, it was no mere stunt. It was an early demonstration of the potential for an ambitious initiative to turn what goes down Hampton Roads'
See HRSD, BACK PAGE

Questions?

Future generations will inherit clean waterways and ***be able to keep them clean****.*

thenifin@hrsd.com
http://www.swiftva.com

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