

In James City County, a water crisis by 2.83 million (gallon) cuts

By Sarah Vogelsong - August 18, 2019



The International Paper mill at Franklin, Va., photographed in August 2019, is one of the largest users of groundwater in the Eastern Virginia Groundwater Management Area. (Sarah Vogelsong/The Virginia Mercury)

JAMES CITY COUNTY — From Sandy Bay Bridge, a stone's throw from Jamestown, an eye cast in any direction lands inevitably upon water.

During the summer in this part of James City County, where the county seal shows three sails floating atop a blue wave, the Jamestown-Scotland ferry crosses the James River 86 times a day. Just off Sandy Bay, on Powhatan Creek, the county operates a marina for residents; elsewhere, public parks contain a beach, a reservoir and access to the Chickahominy River.

And yet the county, more than any other place in Virginia, is preparing for water shortfalls. Facing new restrictions from the state Department of Environmental Quality, James City has found itself squeezing every drop as it plans for a future where water is neither as cheap nor as readily available as it has been for decades.

“I don't know that the value of water is always appreciated, and everything it takes to get from the source to the customer's tap,” said Doug Powell, who as general manager of the James City Service Authority oversees the transmission of that water to about 50,000 mostly residential customers in the county. “It's out of sight, out of mind.”

Or at least it was. Around 2009, DEQ began an aggressive response to the finding that the state was rapidly depleting its most precious source of coastal groundwater: the 1,000-foot-deep Potomac aquifer.

For more than 60 years, eastern Virginians had been squabbling over groundwater — who had it, who had a right to it and the status of reserves.

But the 2009 models showed a more dire forecast than older ones. At the same time, growing populations were driving up water-usage predictions, and the Great Recession was heightening anxieties about the need to attract and retain industries, many of which are dependent on large quantities of water, to keep local economies afloat.

DEQ “was between a rock and a hard place,” said David Jurgens, director of public utilities for the city of Chesapeake, which would eventually have its groundwater withdrawal permit slashed by 68 percent. Everyone agreed groundwater use needed to be cut dramatically, he said, but “nobody wanted to give away the rights to any drop of water.”

With few users willing to concede any supply, DEQ began an effort to cut the withdrawal permits of the 14 largest users in the Eastern Virginia Groundwater Management Area, which lies east of Interstate 95 from North Carolina up to part of eastern Fairfax.

Local governments worried that they would have to invest scarce money in developing new infrastructure to make up for the cuts. Industries feared that the reductions would cut into profit margins.

Ultimately, although DEQ “came in incredibly hard” during negotiations, said Jurgens, most of the permits were cut down to a figure palatable to both the user and the agency.

But for four permittees, DEQ set a withdrawal target below the actual usage that was occurring, which is now forcing tough choices. Three of those users are private enterprises: the International Paper mill in Franklin, the WestRock paper mill in West Point and Colonial Williamsburg.

The fourth is James City County, where, due to geological quirks and the greatest reliance on groundwater of any public water system in the state, “they live and die by their groundwater,” as Jurgens put it.

There, the state has cut the water authority’s permit from 8.83 million gallons per day to 6, with plans to cut it to 3.8 to 4 million gallons in the next permit cycle.

According to Michael Vergakis, chief water engineer for the James City Service Authority, it’s not possible for the county to meet DEQ’s target. Nor is it sustainable

given the inevitability of growth.

Nevertheless, although DEQ will revisit its targets at the end of the current permit cycle, the agency is holding its line. To Scott Kudlas, director of the Office of Water Supply, the task of restoring the aquifer is something akin to “turning a battleship – it takes some time.”

“It took 60-70 years to draw down the aquifer to where it is today,” he wrote in an email, “and it is likely to take another 10-20 years to get back to levels that are sustainable over the long term.”

Dividing scarce resources

Eastern Virginia’s decades-long quest to stabilize its water supply is just one example of a struggle that is increasingly common as changing precipitation patterns and ever-growing populations [strain groundwater reserves globally](#). And while climate change didn’t cause the region’s groundwater woes – overuse did – the recognition that natural resources once seen as unbounded can, and will, disappear without intervention may be one of the defining epiphanies of the 21st century.

“We have spent the last decade reducing amounts of groundwater withdrawal that people believed they were entitled to by several orders of magnitude,” said Kudlas. “The amounts that people historically believed they were entitled to were truly unsustainable.”

Exactly what rate of water withdrawal *is* sustainable is “the eternal question,” said Randy McFarland, a hydrogeologist with the U.S. Geological Survey’s Virginia Water Science Center.

What is groundwater?

Groundwater is water that lies beneath the earth’s surface in the spaces between rock and sediment. When concentrations of it are found in permeable rock, the supply is called an aquifer. Aquifers can contain billions of gallons of water that can be tapped with wells and pumps, and they often appear in layers hundreds to thousands of feet thick.

In eastern Virginia, the deepest, largest and most important is the Potomac aquifer, which stretches from Georgia to New Jersey. The Potomac is known as a “confined” aquifer because it is surrounded by impermeable rock and clay that keep its waters tightly contained. That means that not only is its water highly pressurized, it also takes a long time for precipitation to trickle down and “recharge” it. As water is drawn out of the aquifer, pressure declines and the sediments surrounding the water compact, causing land subsidence over time.

The Potomac aquifer. (Virginia Joint Legislative Audit Committee)

To preserve its vulnerable eastern resources, Virginia has established two groundwater management areas, where users withdrawing more than 300,000 gallons of water per day must get a permit from the state. The Eastern Virginia Groundwater Management Area lies east of Interstate 95, from the eastern part of Fairfax to the North Carolina border. The Eastern Shore Groundwater Management Area oversees resources in that region.

It's one that Virginians have debated for years. Between 1950 and 1981, 22 studies were conducted on southeastern Virginia's water needs.

Some were conflicting: one state-commissioned report by groundwater engineering firm Geraghty & Miller in 1979 found that up to 200 million gallons of water per day could be safely drawn from the aquifer in southeastern Virginia and would be cheaper than piping surface water.

Today, such a number is seen as absurdly high. When DEQ concluded that withdrawals were unsustainable and began negotiating permit cuts in 2013, the 14 largest users in the eastern Virginia groundwater management area (a region larger than that studied by Geraghty & Miller) were allowed to withdraw a total of 145.6 million gallons per day.

Officials thought that number ought to be far lower, and eventually the totals would settle around 50 million gallons per day. But as negotiations began, what started out as a fairly technical administrative process soon became a full-blown debate about the rights of the public versus the rights of industry — an uncomfortable conflict in a state that prides itself on its friendliness to business.

By law, not only do [all state waters in Virginia](#) “belong to the public for use by the people,” but when proposed uses are in conflict or there is more demand than supply, “preference shall be given to human consumption purposes over all other uses.”

Officials and legislators alike, however, noticed that when it came to groundwater allocations, the balance was skewed. In the eastern management area, six of the 14 largest users were private companies. Together, they held the rights to more than 50 percent of all permitted withdrawals. Two, the paper mills at West Point and Franklin, held the rights to more than 40 percent.

During the 2018 General Assembly session, a group of lawmakers — including Sen. Janet Howell, D-Reston, and Dels. Betsy Carr, D-Richmond, Kenneth Plum, D-Fairfax, and Danny Marshall, R-Danville, — put pressure on DEQ to increase its cuts to industrial users and prioritize human consumption. That imperative, [a House bill](#) implied, was enshrined in statute and needed to be reaffirmed.

The problem was that while almost everyone thought that the human consumption priority was good in principle, it just wasn't “doable” in the context of local governments that often felt the need to increase their economic base.

The consensus among one advisory group convened in 2016 to address eastern groundwater management was, “We want a solution for everybody. We do not want big cuts to industrial uses,” recalled Whitney Katchmark, who heads the water resources department of the Hampton Roads Planning District Commission.

“It’s a choice that no one wants to make,” she said. “Any industrial user that’s providing jobs and is going to have an impact to the community, people want to see those companies stick around and grow.”

To Jurgens, prioritizing human consumption over industry needs ignored how closely the two were intertwined.

“If the paper mills shut down, how many people lose their job?” he asked. “To segregate them is not acknowledging reality.”

Even James City County’s Powell was reluctant to argue for human consumption prioritization above all else. “The difficulty is that utilities and local governments, on the one hand we want human consumption to be the priority, but we also want water to be provided for economic development,” he said.

Nevertheless, data show that DEQ’s permit reductions came down hard on industry. At first glance, the cuts dealt out to the 14 largest users appeared to most aggressively slash municipal permits and go easy on businesses: the three highest cuts went to Norfolk (77%), Portsmouth (68%) and Chesapeake (66%), while International Paper’s permit declined 54 percent and WestRock’s 31 percent.

But those numbers, while alarming, are also misleading. That’s because historically, many public water systems and industries guarded their water allocations jealously. Fearful of drought and in anticipation of population growth, they regularly held permits for far more withdrawals than they were actually making. And because of long permit cycles, some systems still had the right to withdraw water even when they had developed alternate sources.

Chesapeake is one example. At the time the city’s last permit was granted, it had been directed by the U.S. Army Corps of Engineers to develop non-surface water sources. Chesapeake did so, and at the time DEQ began its cuts, the city’s average daily groundwater use was 3.5 million gallons, even though its permit was for 11 million gallons.

It was an “allocation for bad times, not for normal times,” said Jurgens.

Consequently, when DEQ came knocking, there was ample room for most permits to be cut without causing undue hardship.

Most, but not all. Colonial Williamsburg, the paper mills and James City County weren’t so lucky: Colonial Williamsburg saw its permit cut 20 percent below its actual use, while DEQ set 20-year targets that would reduce use from current levels by up to 12 to 27 percent for the International Paper mill, 44 to 50 percent for the WestRock mill and 26 to 30 percent for James City County.

But while industry may have been feeling the cuts most keenly, the permit targets were the result of a range of factors, with geography — where in the aquifer the users were located — one of the most important.

Aquifers, like the land above them, are not uniform: they swell and narrow. And underneath James City County, Williamsburg and the paper mills, the Potomac aquifer is relatively thin. What that means is that, in those areas, withdrawals will reduce pressure and water levels faster than elsewhere.

“Location,” Jurgens said, “is critical in the aquifer.”

‘It’s about the money’: a price tag on a public resource

So what comes next? In James City County, which is home to three rivers — the James, York and Chickahominy — Powell, the general manager of the service authority, conceded that “for us, it’s not really a question of, ‘Are we going to have a supply?’ It’s how much it’s going to cost.”

Katchmark agreed: “So much of it is not about the water — it’s about the money, the cost of water,” she said. In eastern Virginia, where the closeness of the Chesapeake Bay washes saltwater far up the rivers and creeks and makes them undrinkable without treatment, “a groundwater permit was and is the cheapest water source.”

Any surface water treatment facility in the region has come with a hefty price tag. Chesapeake’s Lake Gaston Water Treatment Plant, which treats raw water from Norfolk and one day will handle water piped from Lake Gaston on the Virginia-North Carolina border, cost \$69 million in 2006. The reverse-osmosis treatment capability added in 1996-99 to the Northwest River Water Treatment Plant, which treats both brackish groundwater and surface water, came with a \$44 million price tag.

The WestRock paper mill at West Point, Va. (Ned Oliver/Virginia Mercury)

James City County has secured a surface water withdrawal permit from the state, but the most recent estimate to construct a facility on the Chickahominy was \$128 million – not counting the cost of distribution.

Other options are on the table. Since 2008, James City County and Newport News have had [an agreement](#) that ensures the county a supply of 4 million gallons per day. To secure that amount, James City County initially paid \$25 million, with another \$25 million due July 1, 2019. But that deadline passed with no payment, both Powell and a representative for Newport News confirmed. Powell said that the two were in discussion about the potential for the city to sell water to the authority.

The third option is an unusual one, but [it may become more common](#) as changing climate conditions create new water shortages: private sales of water resources.

In 2009, Restoration Systems, LLC, a firm that develops and sells environmental mitigation credits, purchased Cranston's Mill Pond in James City County after a dam blew out. When DEQ started cutting permits, the business saw an opportunity and began exploring the option of obtaining a surface water withdrawal permit from DEQ and then transferring it to the county.

“There’s only so many places you can get water from,” said Jeff Corbin, Restoration Systems’ senior vice president for water quality markets and mitigation. And in his view, Cranston’s Mill Pond is “a very, very unique and somewhat rare resource.”

The proposal has gotten bogged down by environmental permitting – DEQ and the Virginia Institute of Marine Science disagree over some of its potential impacts – and concerns about issuing a permit to an entity that isn't the final end user, but talks between the company and the county have continued.

Whatever James City decides to do, it's "inevitable" that rates will go up for customers, said Powell. (The county currently has the lowest public water rates in the Hampton Roads region for the typical residential customer.)

Katchmark expressed sympathy for the county's plight, noting that while work groups had talked about the possibility of the state developing a pool of money that localities like James City could draw on for water infrastructure, no definitive recommendation emerged.

"You're talking about any one user absorbing a big chunk of cost to take pressure off a system," she said. "Without any money, those conversations are really hard."

Talks at the state level have focused on the possibility of developing a water trading system similar to other market-based incentive systems like cap and trade. Under that framework, permittees who "banked" groundwater by injecting it back into the aquifer could then sell credits to other permittees that needed to withdraw more than they were otherwise allowed to.

The work group charged with drafting a law to create such a system was formed at the order of the General Assembly after Del. Keith Hodges, R-Urbanna, proposed it in 2018. DEQ won't take a stance on the merits of the proposal, but at one meeting of the group, Office of Water Supply Director Kudlas expressed concern about what the idea might be incentivizing.

In a "capped system," he pointed out, where only some users have the financial ability to purchase credits, a trading scheme could result in "concentrating more and more control of the available water in fewer and fewer hands" rather than making the extra water available to more users.

"There are some people from a policy perspective who would see that as problematic," he said.

Right now, the most significant injections – and the project on which almost everyone in eastern Virginia is pinning some degree of hope – are occurring as part of the much-lauded [SWIFT effort](#) launched in Suffolk. Formally known as the Sustainable Water Initiative for Tomorrow, the project treats wastewater to drinking-water quality and then injects it into the aquifer, recharging that body and offsetting subsidence. When fully built out in 2030, it should be capable of injecting 100 million gallons a day back into the groundwater reserves.

So far, the injections seem to be working, but the complexity of the aquifer makes it unclear just what the final outcome will be.

“Until we get that going and we model it, there’s still a little uncertainty about whether or not you’d have the capacity in the geographic parts of the region that most need it,” Katchmark said.

In James City County, which is looking at a 2027 deadline for a plan to address its water needs, SWIFT, with its 2030 completion date, may not come swiftly enough.

Still, James City engineer Vergakis, used to the long timescale of water planning, says fixes take time.

“Solutions aren’t today,” he said. “They have to mature.”

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