# AVERSION TO DIVERSION

## Wisconsin's Artesian Resources and Implications for Future Withdrawals

Fall 2021


**Mary Griggs Burke Center for Freshwater Innovation**
NORTHLAND COLLEGE

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# INTRODUCTION

Every day, even during frigid northern winters, numerous people visit Maslowski Beach in Ashland, Wis. and stop outside a small wooden structure. They are toting empty milk bottles and other assorted containers to be filled with the artesian water that constantly flows from a pipe inside the building. The same holds true for a similar artesian well located a few miles north in Washburn, and yet another, even farther up the highway in tiny Cornucopia. Artesian wells are a hallmark of the communities that hug the Lake Superior shoreline in Ashland and Bayfield counties. Numerous local residents have wells in their yards. These wells symbolize the vast abundance of water that defines the area, from Lake Superior—the largest lake in the world by surface area—to the region's storied groundwater.


In 2021, yard signs with images of Lake Superior and the slogan "Not for Sale" appeared throughout Bayfield and Ashland counties.
Photo by Danielle Kaeding/WPR

Local residents cherish these waters. They have a fervent interest in protecting them so that the region's signature artesian groundwater system does not suffer the same fate other artesian groundwater systems have experienced in so many other parts of the state. Wisconsin's water history has shown that, time and again, artesian springs and wells have declined or disappeared due to unsustainable groundwater withdrawals. As a result, some of the state's most famous artesian wells—such as the "Great Artesian Well" in Prairie du Chien that shot 60 feet into the air—have been reduced to trickles or have vanished altogether.

Thus, it was no surprise that an uproar ensued in 2021 when a company called Kristle KLR proposed capturing water from an artesian well near Herbster in northern Bayfield County. Under the plan, the artesian water would be trucked to Superior to be bottled and sold. The artesian well's flow rate is small—reportedly between 3.5 to 5 gallons per minute, or about the same as a garden hose. But the local concern was not so much about volume, as precedent—that the Kristle proposal might be the first of many water bottling operations that could ultimately threaten the region's artesian groundwater system by a death of a thousand straws.

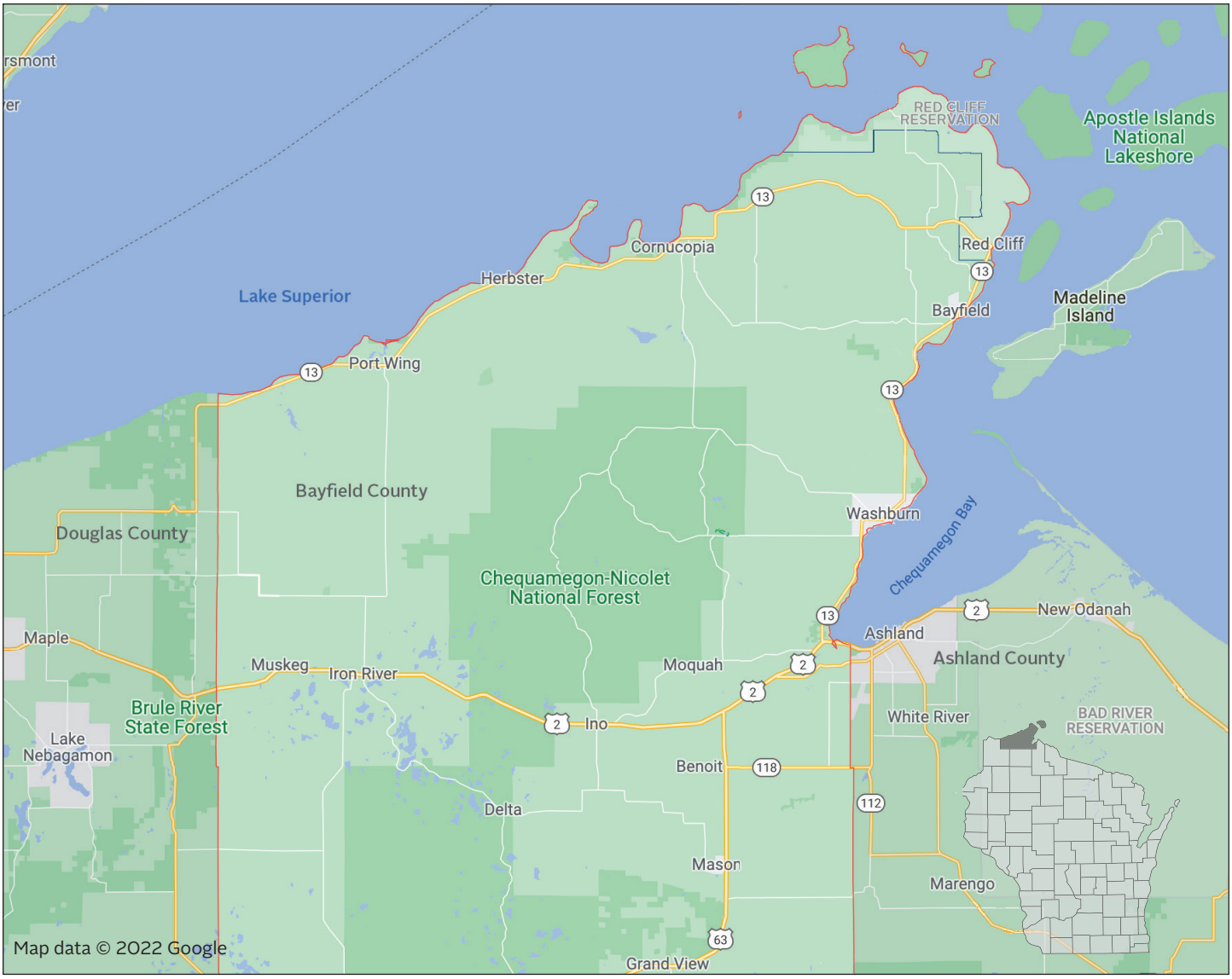
Even though the company was not proposing to increase the amount of water that was already flowing out of the ground—at least for now—the public objected to the regional precedent of commercializing artesian water, and people were concerned that the proposal would remove water from the watershed rather than allowing its diminutive volume to continue flowing to a state natural area and, ultimately, into Lake Superior.

Local opposition was formidable. In no time at all, yard signs with images of Lake Superior and the slogan "Not for Sale" appeared everywhere. An opposition group formed, and county meetings on the plan overflowed with critics. More than 1,600 comments poured in objecting to Kristle's proposal—an enormous number for a zoning issue in a county with just 15,000 residents. Bayfield County denied Kristle's permit, despite persistent appeals. The company has challenged the county's denials in circuit court. Among other issues, Kristle argues the county does not have jurisdiction —maintaining instead that regulatory authority over such water withdrawals lies with the state.

On the evening of Sept. 27, 2021, more than 150 people gathered in the dusky light beneath the tent at Big Top Chautauqua outside Bayfield to listen to an expert panel convened by the Mary Griggs Burke Center for Freshwater Innovation at Northland College. The panelists focused on big-picture issues raised by the Herbster controversy with the goal of providing more context and perspective about the region's unique artesian groundwater resources. This white paper is an outgrowth of that evening's proceedings and focuses on some of the broader questions that have been raised by the Herbster proposal. The paper offers a closer look at implications of future withdrawals and provides contextual background on the hydrogeology of the region's artesian resources, putting them in a statewide context.

The debate has raised a suite of broader questions about water law and regulation that stretch far beyond the Herbster proposal. These questions have touched on everything from the Great Lakes Compact, to the Commerce Clause in the U.S. Constitution, not to mention local zoning ordinances. The controversy has also shed light on just how little is known about the artesian system in northern Bayfield County, a remote and scenic corner of the state. The artesian zone has not been completely mapped, and there is little information on how the recharge rate of the confined aquifer that produces the artesian wells compares to the current level of water withdrawal. The dispute has also raised questions about how a small rural county with limited resources can protect its unique artesian groundwater system so that the region's artesian wells do not end up disappearing like so many others have during the last 150 years. This white paper aspires to answer some of these questions and proposes next steps that officials could consider in order to address some of the local concerns about the region's groundwater system.

## Northern Bayfield County and Surrounding Areas



# BACKGROUND

The now-controversial artesian well in Herbster is one of many near the shores of Lake Superior in Bayfield and Ashland counties. Bayfield County alone may boast as many as 70 such wells, according to Kenneth Bradbury, director of the Wisconsin Geological and Natural History Survey, and one of the state's leading groundwater experts. Some of the wells date back decades. Bradbury tells of a book, *The Underground and Surface Water Supplies of Wisconsin*, on the region's hydrogeology that documents artesian wells dating to the early 1900s. Artesian systems are different from other groundwater features because they produce water that can flow from wells under natural pressure without pumping.

The artesian conditions along the south shore of Lake Superior exist because of the region's geologic history. That history created the perfect setting for an artesian groundwater system: a sand-and-gravel aquifer, combined with a sandstone aquifer, hold water underground near the shore of Lake Superior.
A layer of clay on top of that confines the groundwater. At the Earth's surface, a largely contiguous forested upland efficiently catches rainwater and snowmelt, which soak into the ground and recharges the aquifer. Pressure to create the flowing artesian water comes from the underground movement of water from the upland recharge area down to the sand-and-gravel and sandstone aquifers where water is stored. Because of that pressure, natural springs arise where the confining layer of the aquifer is broken by joints or faults, allowing the water to bubble to the surface. Similarly, water will flow, under pressure, in a well that is punched through the clay layer, tapping into the naturally pressurized confined aquifer below.

The "Great Artesian Well" located in Prairie du Chien, Wis., 1880.
Photo courtesy of Wisconsin Historical Society

Bradbury said the Bayfield County artesian system is important simply because it is a classic hydrogeologic feature operating in an area that is mostly undeveloped so that numerous springs and wells flow unimpaired by development and overpumping. And the upland recharge area is largely pristine, thanks to the undeveloped nature of the thousands of acres of public forest. "It's almost a textbook example of flowing wells," Bradbury said. "And Bayfield County is an area of little development, so the springs and wells are much like they've always been."

Such a system wasn't always unique. Bradbury says there are other collections of artesian wells and springs in the state. But he said the artesian system in Bayfield and Ashland counties is, in effect, a historic artifact—a groundwater system that exists in nearly the same condition as it did in pre-settlement times. That's unusual, Bradbury said, when you consider that so many other systems have been negatively impacted by development and overpumping. A statewide survey of springs sponsored by the Wisconsin Wildlife Federation in 2007 showed as many as 1,000 springs had dried up in the previous 50 years because of development or unsustainable groundwater withdrawals. Consider these examples:

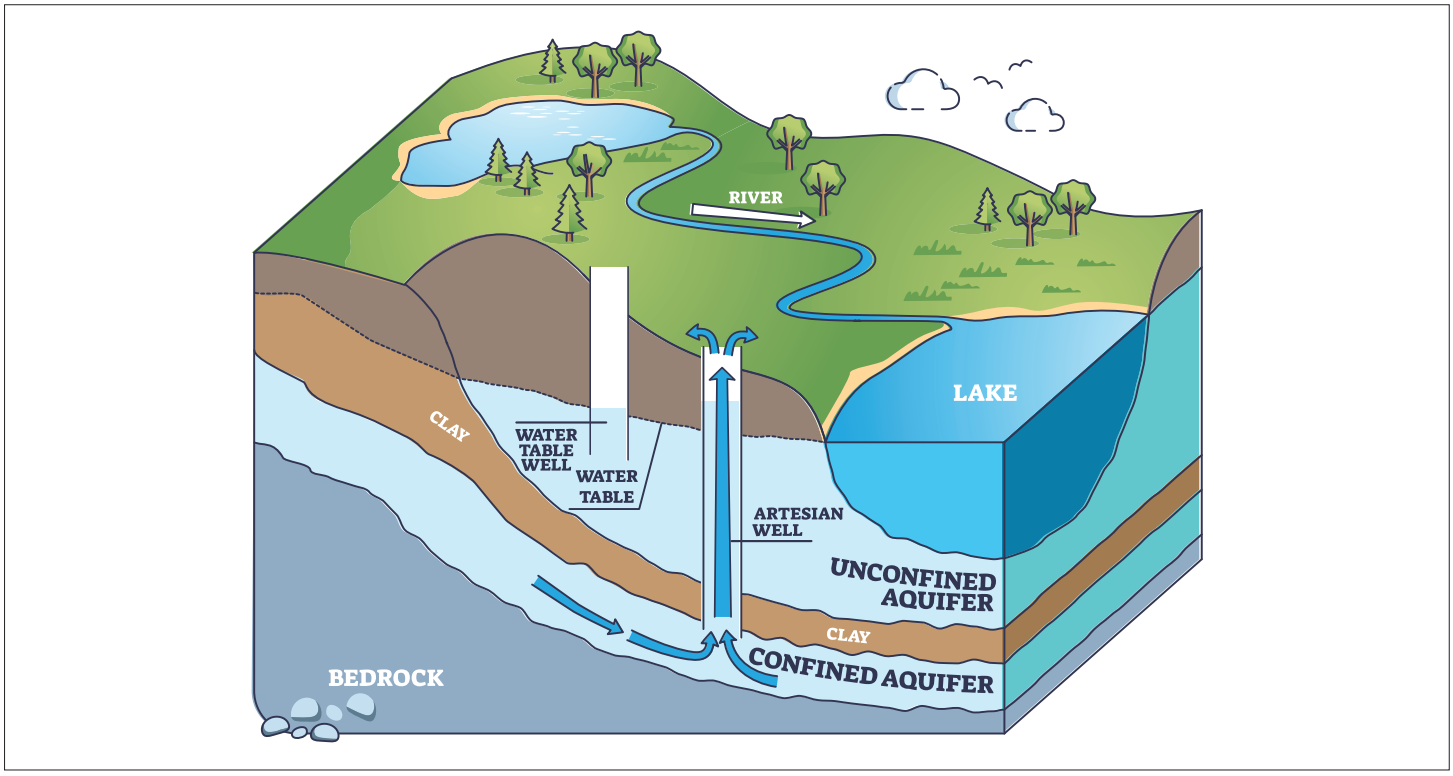
- One of the state's most renowned artesian wells was in **Prairie du Chien,** near the Mississippi River. Drilling on the "Great Artesian Well" started in 1876, sending a spray of water 60 feet in the air. The pipe was adapted so that the water spread out in a great flowering fountain. Other artesian wells followed. The Great Artesian Well can still be visited on the grounds of the Wachute Memorial Library on Wacouta Ave., but it is a trickle of its former self.
- In **Green Bay,** aquifer drawdown became an issue by the early 1900s. Geologic records show that during the late 1800s the water pressure at the land's surface was about 42 pounds per square inch, or enough to lift a column of water 97 feet in the air. By about 1905, that column would reach only 21 feet due to extensive pumping and loss of pressure. As pumping continued, the groundwater level dropped further, and by 1949 it was as much as 300 feet below the surface.
- **Waukesha,** outside Milwaukee, was once so blessed with springs that it was known as "Spring City." In the late 1800s, as many as 25 trainloads of tourists disembarked daily to enjoy dozens of springs and

stay in any of the numerous elaborate resorts built to service the trade. Many believed the water could treat ailments such as diabetes and depression. When an enterprising businessman tried to pipe Waukesha spring water to Chicago for the 1893 World's Fair, residents brandishing pistols and rifles sent his crew packing. The vast majority of Waukesha's famed springs are now gone. By the early 2000s, the city had illegally high levels of radium in its wells. It became so desperate for a safe and sustainable water supply that it was one of the first to apply for—and receive—highly unusual permission to divert 8.2 million gallons of water per day from Lake Michigan under the Great Lakes Compact. That 2016 decision is the latest chapter in a remarkable riches-to-rags water story.

- **Madison**'s lakes once had a reputation for their complement of springs. Lake Wingra, in particular, had long attracted people for its many springs. Historical records show that more than a dozen springs along the lake's shore have disappeared as pumping increased and important groundwater recharge areas were paved over.
- In the **Central Sands** region, the Little Plover River, a popular trout stream, began drying up starting in the summer of 2005 as agricultural production, industry, and growing communities drew more and more water from the underlying aquifer. Area lakes have also dried up, leaving homes in resort communities stranded on mud flats.
- In the 1990s, Perrier proposed pumping more than 500,000 gallons of water a day from the headwater springs of the **Mecan River,** a 48-mile, Class 1 trout stream in central Wisconsin. The company's plans to build a $35-million bottling plant were met with fierce opposition from anglers, environmentalists and homeowners. Yard signs in opposition to Perrier became ubiquitous. Faced with such an uprising and several contentious government meetings, Perrier pulled the plug on its plan in 2000. So concerning was the failed plan that it later became the major driver of improvements to the state's groundwater laws. The company would later build its water bottling operation in Michigan, where it has drawn similar controversy. A recent proposal to expand the operation, which is now known as Ice Mountain, attracted more than 80,000 comments from the public.

Much of the damage from many of these examples occurred before modern groundwater regulations were implemented in the state, starting with the 2004 Groundwater Quantity Law. Others, like the Plover River example, are the result of state regulations inadequately taking cumulative impacts into account. The Perrier case shows the role that an engaged public can sometimes have on the debate. The challenge for Bayfield County is to find a way to regulate groundwater use in the artesian zone so that its wells do not end up suffering the same fate as the Great Artesian Well in Prairie du Chien, while also leaving room for reasonable economic development in the county.

## Artesian Groundwater System




A confined aquifer helps create the water pressure that produces artesian wells.

# REGULATORY FRAMEWORK

## The Great Lakes Compact

In 1998 the Nova Group, a small consulting firm in Sault Ste. Marie, Ontario, shocked the Great Lakes region by announcing that it had received a provincial permit to start exporting tankers of pristine Lake Superior water to Asia. The plan became immediately controversial in the United States and Canada, as citizens and politicians rose up in opposition. The concern was not about the volume of the proposal, 158 million gallons per year. That would be difficult to measure in a system as large as Lake Superior, which holds approximately three quadrillion gallons. Rather, the concern was about precedent.

The Nova proposal could not be stopped by laws in Canada or the United States at the time. For years, governors and premiers in the Great Lakes region had grown increasingly concerned that the global water crisis would eventually lead to a run on Great Lakes water. But they struggled to create a comprehensive binational regulatory system to protect the watershed, which holds 20 percent of all the fresh surface water on the planet. Lawyers told the governors and premiers that the Nova proposal threatened to set a precedent for long-range, large-scale diversions of water from the Great Lakes watershed. Nova was seen as a nightmare scenario. If Great Lakes water could be diverted to Asia, where couldn't it be sent?

The Nova proposal, which was eventually withdrawn under withering pressure, triggered years of negotiations that eventually led to the Great Lakes Compact's adoption in 2008, as well as a companion international agreement with Ontario and Quebec. The compact is a legal water fence designed to keep Great

## Great Lakes Watershed


US Army Corps of Engineers, Detroit District

Lakes water inside the Great Lakes watershed. It bans water diversions from the Great Lakes basin, including groundwater, with limited exceptions. In the rare instances where water is allowed to leave the watershed, it must be treated to modern treatment standards and then returned to the lakes after it is used.

Because the compact is primarily designed to prevent long-range, large-scale diversions, the Great Lakes governors and premiers, after much debate, decided to exempt water in bottles smaller than 20 liters, or roughly 5.7 gallons. Any water in a container smaller than 20 liters can be sent outside the watershed without penalty under the compact. Essentially the governors and premiers were saying that they didn't think the Great Lakes could be drained by bottled water exports, and they left it up to state and local officials to regulate such uses, if desired. They were also concerned about impacting the Great Lakes economy by over-regulating Great Lakes water, which is a major driver of the region's economic engine. Regardless, the compact's so-called "bottled water loophole" remains controversial in some circles.

Another key aspect of the compact focused on a Supreme Court case, Sporhase v. Nebraska. The Sporhase case determined that it was illegal for one state to ban diversions of water to another, ruling that it violated the dormant commerce clause of the U.S. Constitution. Sporhase was a rancher in Nebraska who owned property on both sides of the Nebraska-Colorado line. A Nebraska law prevented him from sending water to the Colorado side of his spread. He challenged the Nebraska law and won.

The compact circumvented the restrictions in Sporhase by treating citizens in the Great Lakes states by the same standards as citizens in other states. In other words, because the compact bans diversions to places such as Madison, St. Paul, and Indianapolis—communities within Great Lakes states, but outside the Great Lakes watershed—as well as Los Angeles, Phoenix, or Atlanta, (which are also outside the Great Lakes watershed) legal experts believed the compact would survive any challenge under the commerce clause. But the legal foundations of the Sporhase case could be important for local officials to keep in mind as they contemplate ways to protect the groundwater systems in rural counties like Bayfield. In short, the compact bans diversions, including groundwater, above 20 liters—and leaves regulation of smaller water withdrawals up to local and state governments.

## State Law

How does Wisconsin regulate groundwater withdrawals? The Wisconsin Department of Natural Resources only regulates properties with a total pump capacity at or above 70 gallons per minute, or 100,000 gallons per day—levels much higher than those involved in cases like the proposed Herbster water bottling operation, which has a maximum of 5 gallons per minute, or 7,200 gallons per day. Consequently, Wisconsin's groundwater regulations were of no assistance to Bayfield County officials in regulating the Herbster proposal.

As was mentioned above, one key aspect of the Herbster legal challenge involves a debate about whether the state or the county has jurisdiction over such water proposals. Kristle's legal team argues the county does not have jurisdiction. But during the Sept. 27 panel discussion at Big Top Chautauqua, Todd Ambs, deputy secretary at the Wisconsin DNR, suggested otherwise. In what was perhaps the most salient point of the evening, he said that counties were welcome to regulate groundwater withdrawals below the state minimum of 70 gallons per minute. "Certainly, if somebody wants to do something in terms of local zoning," Ambs said, "They're welcome to take those choices if they choose to."

> **"It is unclear whether the protections of the Public Trust Doctrine extend to groundwater."**
>
> Todd Ambs
> DNR Deputy Secretary

Even so, for Bayfield County, zoning may not have proven sufficient.

When news of the Kristle plan first surfaced, Bayfield County officials turned immediately to their zoning laws. The proposal was turned down because the Kristle property is zoned for residential development and associated recreational use. But Kristle appealed, arguing, as mentioned above, that the board lacked jurisdiction to make such a decision and that the DNR has sole authority to regulate low-capacity wells. The company has now appealed to the Circuit Court. Meanwhile, Bayfield County amended zoning laws to completely prohibit the construction of bottling plants in the county.

So it remains uncertain whether the proposal will move forward, even in the face of local zoning laws. Other options for fighting the plan were few. As already noted, neither state groundwater rules nor the provisions of the Great Lakes Compact offered protections. Consequently, the controversy has raised important questions about how local communities faced with smaller but potentially cumulatively damaging water withdrawals—especially from artesian aquifers—can protect their water from what may be unsustainable use. The regulatory vacuum left the county with little room to maneuver. "I found the process to be really frustrating," says Charly Ray, a county board member, who has an artesian well.


Panelists discuss artesian resources at the Aversion to Diversion event on Sept. 27, 2021. From left to right, Peter Annin, Burke Center; Ken Bradbury, Wisconsin Geological and Natural History Survey; Todd Ambs, Wisconsin DNR.
Photo courtesy of Big Top Chautauqua

Another challenge for the county was trying to regulate an artesian system that had not been fully mapped. Few studies have been done on how much water is being withdrawn from the artesian system in northern Bayfield County, especially when compared to the natural recharge rate of the confined aquifer that creates it. "How fast," asks Ken Bradbury of the Wisconsin Geologic and Natural History Survey, "is water getting through the soil?" This raises an important question for Bayfield County officials. How can the county effectively regulate something, when officials haven't fully quantified the groundwater system that they are trying to protect?

As county officials pondered their options, the local debate raged. "We have corporate-funded semi-residents who are trying to extract water from our watershed and take it out of our region for bottling," county resident Michael Parent told the *Ashland Daily Press*. "There is artesian water all along [Lake Superior's] South Shore, and if we let the crack open, I think we would have the likelihood of a lot of cracks opening, and I don't think that is in anyone's best interest. I think it's in our best interest to protect the lake and to protect our water."

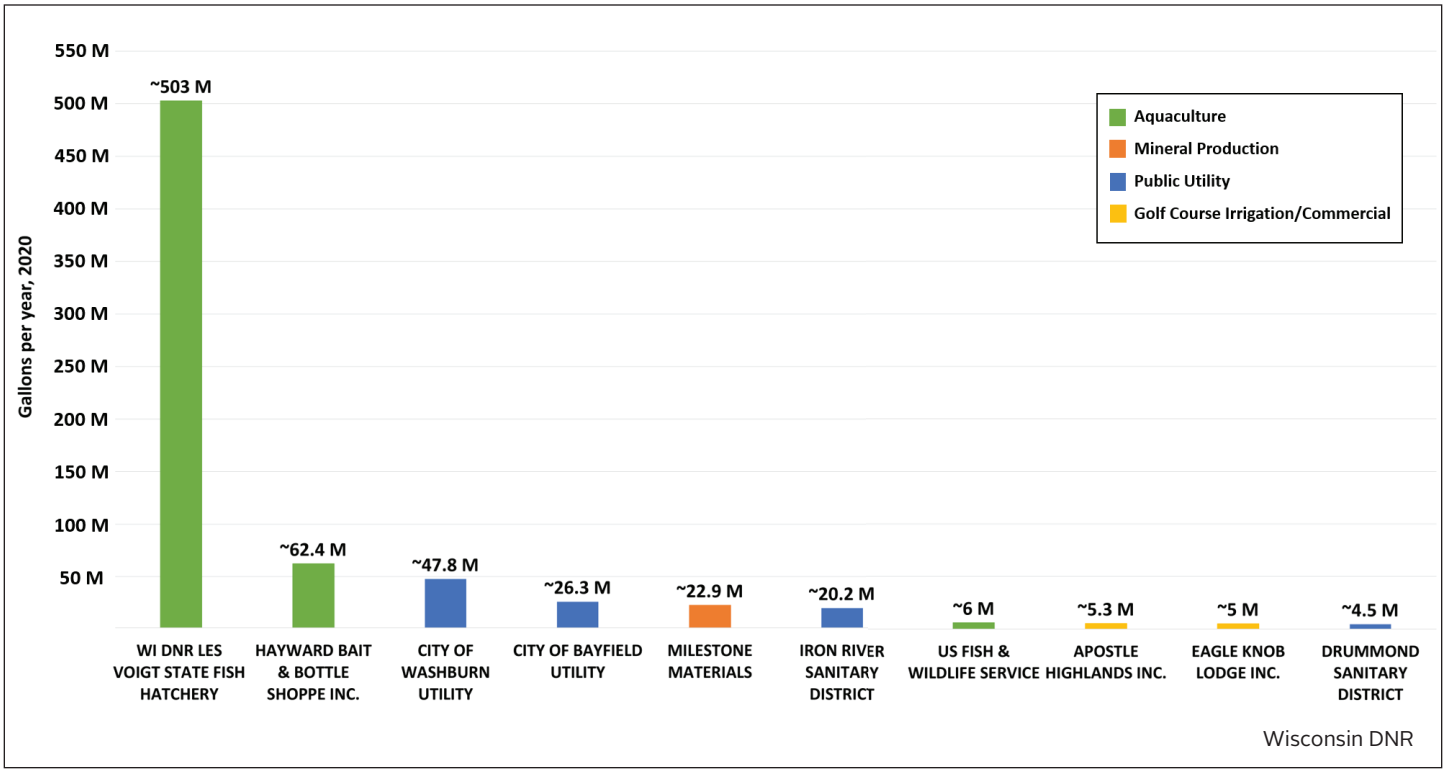
Others, however, wondered whether too much was being made of a proposal involving such a small amount of water.

"I just don't think it makes for any kind of quantity to get worked up about," said resident Bill Bland, a retired soil scientist who moved to the area to enjoy boats and sailing. "In terms of the water budget of Lake Superior, it just doesn't seem to be anything to worry about."

While that may be true in the Herbster case, it is the unknown effect of cumulative impacts that concerns many, including Ken Bradbury, who said during the Chautauqua event that a major increase in water withdrawals could harm the aquifer, as has happened elsewhere. "That is certainly a possibility if somebody started pumping a lot more groundwater," he said. Bradbury and others have said there are just too many things we don't know about the groundwater system that feeds the scores of artesian wells in the area. Chief among those concerns are the recharge and discharge rates of water feeding and leaving the system. Without such information, it is difficult to confidently make management decisions to protect the resource.

> **"A major increase in water withdrawals could harm the aquifer, as has happened elsewhere."**

## Largest Groundwater Users in Bayfield County




Wisconsin DNR

# RECOMMENDATIONS

### Thoroughly map the regional artesian zone, calculate its volume, and quantify recharge and discharge rates.

While some basic mapping of Bayfield County's groundwater system has been done, the work has been limited in scope in terms of the artesian zone in the county's northern tier. Officials don't know how expansive the artesian zone is, or the volume of groundwater that it holds. The same is true for the discharge rate and the recharge rate of the confined aquifer that produces the artesian wells. Ken Bradbury said a first step in filling in those gaps is simply to map and inventory the wells.

More information is also needed on the rates at which the aquifer is being recharged and how fast the rainwater and snowmelt are moving from the upland areas—where it is collected—down to the wells along the shoreline. By the same token, information on the discharge of water from the wells is also necessary. "There are classic equations of groundwater flow based on basic physics," Bradbury said. "So, when you know the discharge [rate], ... its hydraulic conductivity or its ability to transmit water, and the recharge rate, you can make pretty good calculations and predictions about these things."

While Bradbury said the state has recently installed two monitoring wells in the upland recharge areas, he added that more information is also needed on those important areas, including thorough mapping.

Finally, Bradbury said studies need to be done on the distribution of pressure in the artesian aquifer. Called the potentiometric surface of the aquifer, this is the level the water would rise to if not confined. "That's important because in an aquifer, water flows in response to that pressure. If you put another well in, you could have a drawdown of that pressure."

Bayfield County officials have already applied for a $20,000 grant to map the wells, sample water quality, and study flow rates and discharge rates. But a comprehensive analysis of the entire artesian system would cost much more. Bradbury estimated that $100,000 to $150,000 would be necessary.

### Declare the mapped artesian zone as a special area of concern.

Declaring a special area of concern has precedent in areas of both water protection and land use, according to experts. Todd Ambs, deputy secretary at the DNR, pointed out that the state designates valuable surface waters as either "Outstanding" or "Exceptional Resource Waters" to afford them additional protections. The agency is able to provide these kinds of protections for special surface waters under the Public Trust Doctrine, which holds that these waters belong to all the state's citizens and are to be managed as a public resource. The problem, Ambs said, is that it is unclear whether the protections of the Public Trust Doctrine extend to groundwater. "Many of us have held

that it does," Ambs said. It's an important question that hasn't been tested in court.

Bradbury said there are examples of special geologic features that are afforded a range of protections. He cited the Niagara Escarpment Resource Network, which advocates for better zoning protections. The escarpment is a unique geologic formation in Northeast Wisconsin that is part of a larger landscape feature, a 400-million-year-old ledge that extends in a great arc through Door County and into Michigan,

## "Many residents in Ashland and Bayfield counties have newfound appreciation for artesian water."

Canada and New York. It is the geologic feature that creates Niagara Falls. So unique is the escarpment that counties cooperated to create special zoning and development guidelines designed to protect the unique geologic feature. According to the literature explaining the approach, such overlay districts can manage development in or near environmentally sensitive areas, such as groundwater recharge areas or floodplains. Whether such special designations might be applied to hydrogeologic features, like a mapped artesian zone, has not been explored, Bradbury added. Were such protections to be applied to a large artesian zone, such as that in Bayfield or other counties with an artesian system, it could be precedent setting.

### Adopt new zoning ordinances that directly relate to the mapped/designated artesian area of concern.

Bayfield County could rewrite its zoning laws to represent its own thresholds for regulation of water withdrawals in a designated artesian zone, according to Todd Ambs. "I don't see why you couldn't," he said. "There's no conflict with state laws or what we do with high-capacity wells. It's just a question for them of asking what their parameters are. Do you meet the following criterion? If you do, then you can operate. If not, then no." Other experts also said the county might find a solution by rewriting its zoning codes to include a special category for artesian wells that flow at levels below the state regulatory threshold of 70 gallons per minute (gpm) or 100,000 gallons per day. Ambs said the 70 gpm threshold was selected simply because wells that flowed at a higher rate were those that posed the biggest problems. Minnesota, he added, has a much lower state regulatory threshold of 10,000 gallons per day.

Others agreed that the county could exert more control over smaller extractions by using its zoning powers. Dan Bahr, who handles government affairs for the Wisconsin Counties Association, said counties have the power to promulgate rules for smaller operations that would probably include water bottlers and water extraction. Through their zoning laws, he added, counties have exerted greater control over everything from frac sand operations to wind farms and factory farms. "If we come up with something like that," Bahr said, "there's no reason why a county can't pass an ordinance [about groundwater]." Other zoning experts suggested the county might elevate artesian resources to a special area of regulation by creating a groundwater resources office similar to the zoning department. Such an office could be charged with registering private and municipal artesian wells, which is not currently done. New artesian wells could be evaluated and permitted under special guidelines set up for such wells while existing artesian wells could be grandfathered for existing flow rates and uses.

Ambs said that wells are registered with the state but are not identified as being artesian. Given the marked decline of artesian wells in the state, it would be helpful for the DNR to consider creating a separate category for artesian well registration, which would include flow rate and depth.

### Wisconsin should consider a groundwater sustainability framework similar to Minnesota's.

Ambs said Wisconsin officials are collecting more data on water use and quantity than they did in the past because of requirements under the Great Lakes Compact. "We have a lot more data now than historically," he added. But those data are only being collected for wells on high-capacity properties, those properties that pump 70 gpm or more. Nor does the collection of data take into consideration whether a well is artesian. Other states, such as Minnesota, have more ambitious programs that might be adopted in Wisconsin for tracking water use, including from artesian aquifers. Ken Bradbury said it would be worthwhile to examine such programs to see if there may be versions that would work in Wisconsin.

Minnesota has adopted a water management framework that includes a specific plan for studying and collecting data on groundwater, including some springs. Some of the information being collected has been largely unknown before now, despite its importance in making management decisions. The plan, for example, is set up to collect data on water balance, uses/withdrawals, recharge rates, and amounts of stored water in layered aquifers. The management plan also offers assistance to communities and to counties that are interested in knowing more about their aquifers. According to the description of the plan, engagement with local communities is "designed to explore and define a community's unique groundwater story."

Ambs said such an approach in Wisconsin is less feasible because the DNR lacks the money and staff that Minnesota has to administer the program.

# CONCLUSION

The Herbster controversy caught Bayfield County officials off guard. While managing the controversy has been a challenge, it has also presented an opportunity for the county (and perhaps neighboring counties) to become a leader in the protection of artesian resources, which have clearly been neglected elsewhere in the state. While regulations for large withdrawals are in place at the state level, and through the Great Lakes Compact, counties such as Bayfield are left largely to deal with smaller extractions of artesian water on their own. This often means falling back on local zoning laws, which tend to be limited, especially when it comes to regulating unique artesian water systems.

Many residents in Ashland and Bayfield counties have newfound appreciation for the artesian water below their feet, whether from springs hidden in remote forest glens, or pipes protected by carefully constructed wellhouses such as the tamarack shelter at Maslowski Beach. These residents are demanding more reliable groundwater protection. But concrete action cannot come without more information. Much has yet to be learned about the hydrogeology of northern Bayfield County. Expensive geologic mapping is necessary, as is data on recharge and discharge rates, and a host of other important parameters. Meaningful discussion of proposed withdrawals and effective decision-making cannot happen without a better grasp of the underlying science.

That science can create the foundation for a new regulatory paradigm, assuming the public interest and official commitment do not wane. Financial resources are always an issue in remote, rural counties. Science is expensive. Will the public support the additional cost? The bigger burden, over time, may be the expense of ongoing groundwater monitoring, recordkeeping, data management and staffing to support more rigorous regulation at the county level. On the other hand, what is the value to the community of having one of Wisconsin's last remaining intact artesian systems? Given the uncertainty of climate change, and even future development, now would be a good time for officials to obtain basic baseline data on the regional groundwater system. If the public supports these kinds of investments, regional officials will have a unique opportunity to create heightened awareness, new guidance, and regulations that could help ensure that the region's springs and artesian wells continue to flow for many generations to come.

Children enjoy a drink from an artesian fountain in Ashland, Wis.
Photo by Valerie Damstra


The Mary Griggs Burke Center for Freshwater Innovation at Northland College promotes the health and sustainable use of the world's freshwater resources, which is one of the greatest global challenges of our time. The Burke Center integrates scientific research, applied resource management, environmental communication, policy, education, and thought leadership about freshwater issues in northwest Wisconsin, the Great Lakes region, and beyond.

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September 27, 2021 Big Top Chautauqua, Bayfield, Wisconsin

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Big Top Chautauqua Staff and Volunteers

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