Section

6

Workshop Area Case Studies

Throughout Phase II, a collective of organizations provided an overview of existing groundwater institutions and actors, governance approaches, and challenges. These case studies highlight specific groundwater issues within the workshop focus areas.

Case Study

Michindoh AquaBounty

The AquaBounty aquaculture operation in Pioneer, Ohio was a point of discussion at the Michindoh Aquifer Groundwater Governance workshop because of its proposal to make regular large withdrawals from the Michindoh aquifer. In 2022, the proposed operation was approved by Ohio's Department of Natural Resources to withdraw 5.25 million gallons daily (MGD) from the Michindoh aquifer.[1]

Figure 1. The Michindoh Tri-State Region

With the approximate Michindoh Aquifer boundaries, Tribal stakeholders, and select municipal stakeholders. Data sourced and adapted from ESRI, GLIFWC, and the City of Bryan, Ohio.

1 "AquaBounty Water Withdrawal and Consumptive Use Permit - East Well Field." Ohio Department of Natural Resources. Accessed February 15, 2025. https://ohiodnr.gov/discover-and-learn/safety-conservation/about-odnr/water-resources/water-inventory-planning/ab1-public-comments.

Economic development opportunities were a driving force of this operation, as over 100 jobs were to be created. Incentives were generated from public dollars to assist in this development. For example, the Toledo Lucas County Port Authority authorized up to $425 million in revenue bonds to help AquaBounty finance the project.[2] While the project gained the backing of the village of Pioneer, Williams County, the state of Ohio, JobsOhio, and the regional growth partnership, others protested the move for such a large draw from the Michindoh aquifer.

The Williams County Alliance raised concerns about the capacity of the aquifer to sustainably supply residents with drinking water. In 2007, the nearby town of Bryan, Ohio had petitioned the EPA for sole source designation of the Michindoh Aquifer.[3] In response to comments received in 2010, a scoping study was conducted to assess available geologic information. However, EPA determined the necessary data to make this designation was not available and requested further information from the City of Bryan. The city did not have the means to collect this data, so it was determined that until this information was received, EPA would indefinitely suspend the petition. In 2019, citizens of Williams County petitioned to have rights granted to the Michindoh Aquifer,[4] but this was denied by the County and the State of Ohio. Furthermore, a ruling by the State of Ohio banned the enforcement of Rights of Nature.[5] These issues created a challenging context for the Williams County Alliance as they advocated their concerns about AquaBounty's proposal.

One Tribal Nation with ceded territory within the aquifer's extent, the Pokagon Band of Potawatomi, wrote a letter during Ohio DNR's public comment process for the permit. This letter outlined concerns about threats to wetlands in the projected 13,000 acre cone of depression, as these wetlands are a source of traditional medicines and ecosystem health in the region. AquaBounty responded, "It was determined…that the glacial till layer exists consistently at varying thickness throughout the modeled area between the shallow and deep aquifer zones, providing a "barrier" to impact from the effects of pumping the production wells on surface water resources".[6]

In 2022, the Ohio DNR approved the permit for the aquaculture operation's water use of 5.25 MGD. Despite concerns raised by community groups and the Pokagon Band of the Potawatomi, no monitoring of wetlands was included in the Groundwater and Surface Water Monitoring Plan.[7]

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2 Henry, Tom. "Ohio DNR Drilling 10 Water-Research Wells to Learn More about a Mysterious Tri-State Aquifer." The Blade, January 11, 2025. https://www.toledoblade.com/local/environment/2025/01/11/ohio-dnr-drilling-10-new-water-research-wells-tri-state-aquifer.

3 Sole Source Aquifer Petition: Michindoh Glacial Aquifer. Bryan, Ohio, 2007. https://www.epa.gov/sites/default/files/2016-02/documents/michindoh-sole-source-aquifer-petition-2007-69pp.pdf.

4 "Ohio Group Submits Signatures to Recognize Rights for Michindoh Aquifer." Community Environmental Legal Defense Fund, June 26, 2019. https://celdf.org/2019/06/media-statement-ohio-group-submits-signatures-to-recognize-rights-for-michindoh-aquifer/.

5 "Ohio Legislature Bans Rights of Nature Enforcement." Community Environmental Legal Defense Fund, July 18, 2019. https://celdf.org/2019/07/rights-of-nature-ban/.

6 Wulf, Sylvia, AquaBounty. Letter to Dena Barnhouse, Division of Water Resources, Ohio Department of Natural Resources. "AquaBounty's Response to Public Comments Received by the Ohio Department of Natural Resources Regarding AquaBounty's East Well Field Groundwater Withdrawal and Consumptive Use Permit Application," September 21, 2022. https://dam.assets.ohio.gov/image/upload/ohiodnr.gov/documents/water/aquabounty2/AquaBountyResponsetoPublicComments-AQBEastWellfield-09212022.pdf

7 Groundwater and Surface Water Monitoring Plan: AquaBounty Farms, LLC. Pioneer, Ohio: Burgess & Niple, 2023.

AquaBounty drilled wells to monitor the groundwater and respond to the requirements of the permit. This data was requested by Michigan's Department of Environment, Great Lakes, and Energy (EGLE) to support the United States Geologic Survey (USGS) in building a groundwater flow model for the Michindoh Aquifer.[8] The model was a direct response to the data gaps that prevent sound decisions about high capacity well permitting. According to EGLE, a partner on the USGS project, AquaBounty refused to share this information. Therefore 5 wells were installed at two locations within 2.5 miles of the border, and in the 5-to-10-foot projected cone of depression. They were equipped with pressure transducers to monitor water-level impacts from pumping and support the model.

AquaBounty could not meet their financial obligations, having not made a profit in 30 years and announced they would no longer be developing this site. As of February 2025, AquaBounty discontinued operation and was expected to pay the village of Pioneer millions of dollars a year for the electricity it used and reimburse it for certain costs associated with building the substation. The $5 million note matures in November 2025. The village said it will pay any debt that it owes, "even if AquaBounty should cease to exist".[9]

One community organizer involved in the dispute from the beginning reflected that this halt was not the result of more equitable groundwater policy. She says, "We seem to have dodged the "bullet" on AquaBounty, but not because of any systemic changes that would shift western perspectives of the commodification of water. We witnessed how so many people dependent upon the Michindoh aquifer understood how critical water is to all life, yet existing law doesn't reflect that value. We can only hope that indigenous knowledge and belief can guide a shift in law."

Other similar business models with larger access to investors may still present themselves in this same area again soon, with some community members hearing talk about the site being redeveloped into a potential data center or a solar farm.[10]

8 Ohio-Kentucky-Indiana Water Science Center. "Hydrogeologic Mapping, Data Collection, and Geologic Framework of Glacial Deposits in a Multi-County Area of Northwest Ohio, Northeast Indiana, and South Michigan." USGS, September 4, 2020. https://www.usgs.gov/centers/ohio-kentucky-indiana-water-science-center/science/hydrogeologic-mapping-data-collection.

9 Clark, Anna. "The One That Got Away: This Small Town Is Left in Limbo After Betting Big on GMO Salmon." ProPublica, February 18, 2025. https://www.propublica.org/article/aquabounty-pioneer-ohio-gmo-salmon-fish.

10 Henry, Tom. "Ohio DNR Drilling 10 Water-Research Wells to Learn More about a Mysterious Tri-State Aquifer." The Blade, January 11, 2025. https://www.toledoblade.com/local/environment/2025/01/11/ohio-dnr-drilling-10-new-water-research-wells-tri-state-aquifer.

Case Study

Northeast Illinois and Multi-Aquifer Wells

Geographic Context

There are a variety of water sources in the Chicago metropolitan area. This case study focuses on Kane County in northeastern Illinois on the western edge of the Chicago metropolitan area (Figure 1). Drinking water for northeast Illinois is either surface water piped from Lake Michigan or sourced from the Fox and Kankakee rivers, or groundwater used by municipal public water systems and private wells.

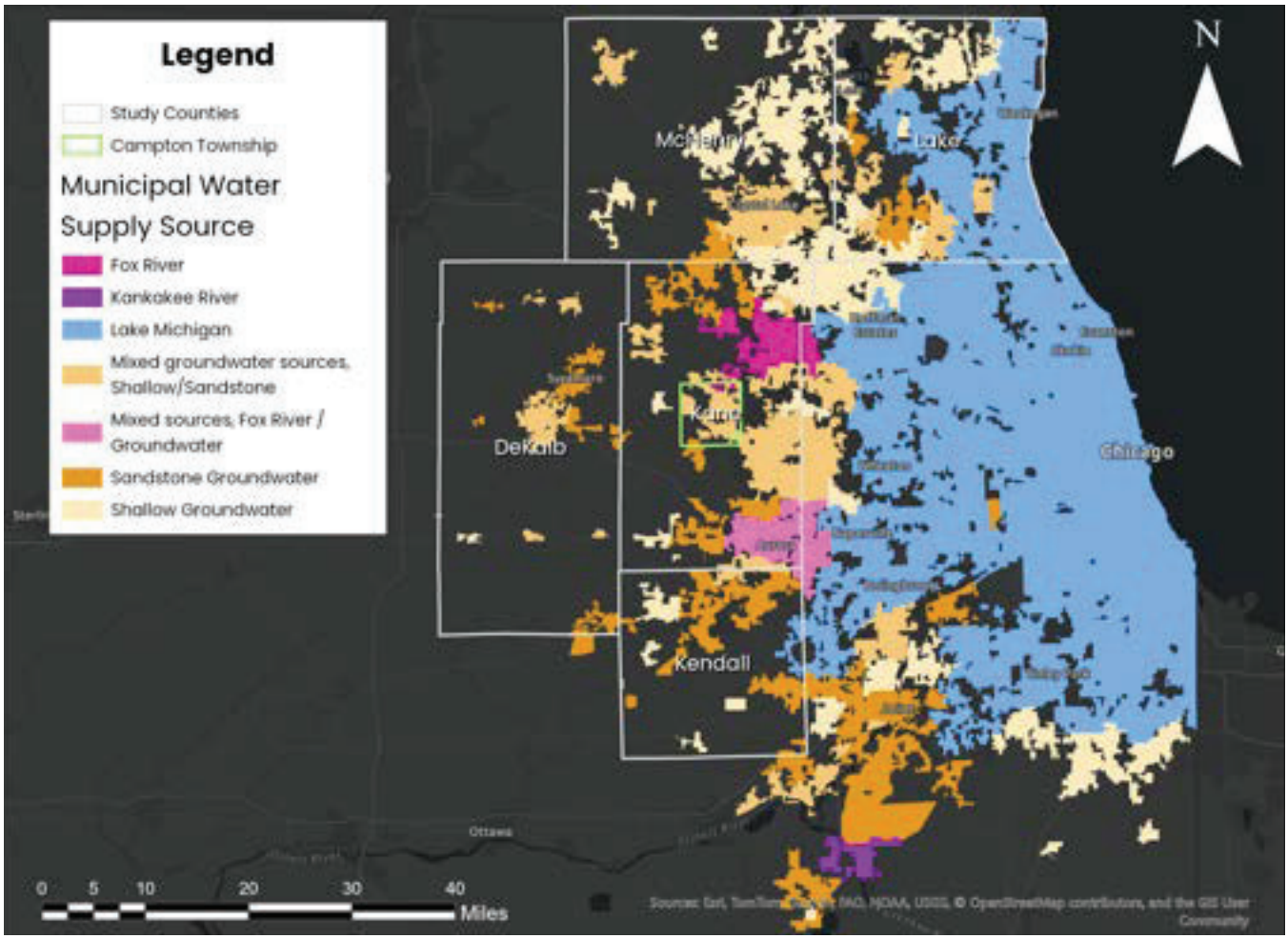

Figure 1. Northeast Illinois

Kane County is a transitional county between rural and suburban at the western fringe of metropolitan Chicago. Campton Township is highlighted in Kane County. Data sourced from ESRI, Chicago Metropolitan Area Planning (CMAP), and DeKalb County.

Residents and businesses in Kane County receive water through either community water suppliers or are self-supplied through private wells.[1] Residents may have individual private wells or share private well access with a neighbor or neighbors in their area as part of non-community water supply in a subdivision.[2] Wells in this area use groundwater from four major geologic units: 1) the unconsolidated glacial sand and gravel aquifer; 2) the Silurian-Maquoketa aquifer; 3) the Galena-Platteville aquifer; and 4) Ironton-Galesville sandstones of the Glenwood Formation and historically, the St. Peter Sandstone (the Ancell aquifer).[3] Due to collective withdrawals, the St. Peter Sandstone layer was observed to be partially desaturated and is no longer considered to be a useable aquifer in Kane County.[4]

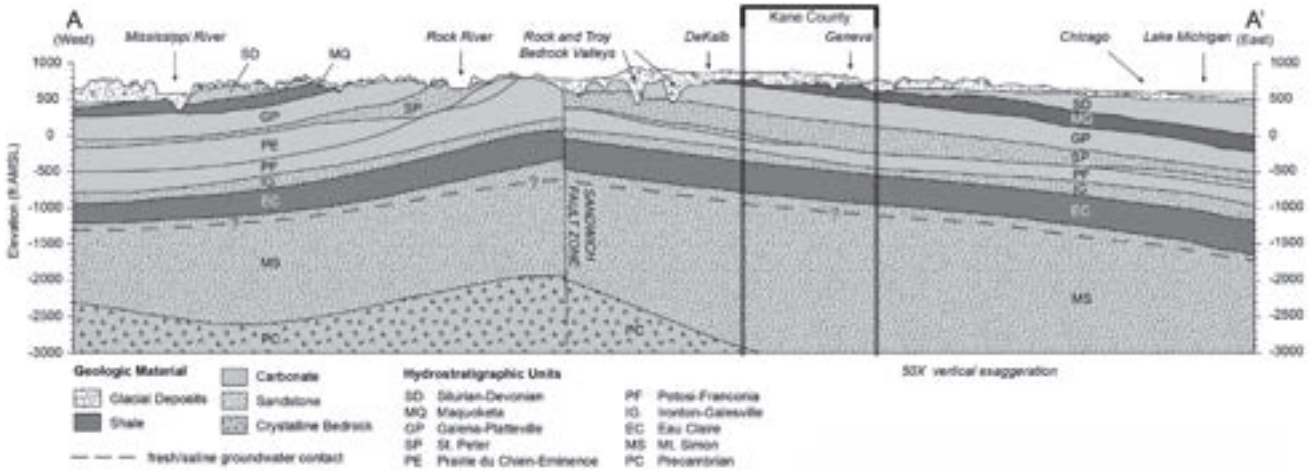

Figure 2. Cross Section of Geologic Units Across Northeast Illinois

Cross section of the geologic units across northeast Illinois with Kane County highlighted. Layers SP, IG, and MS are water-bearing sandstone aquifers; layers SD, GP, PE, and PF are water-bearing carbonate aquifers; layers MQ and EC are fine-grained (shale) confining layers that originally separated the water-bearing layers. The primary aquifers accessed in Campton Township are glacial sand and gravel (surface), the dolomite of Silurian to Devonian age, the dolomitic portion of the Galena and Platteville formations, and the St. Peter Sandstone, which is now partially dewatered locally.[5] Data adapted from Abrams et al, 2015.

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1 "Kane County Water Resources Investigations: Simulation of Groundwater Flow in Kane County and Northeastern Illinois." University of Illinois at Urbana-Champaign. Illinois State Water Survey, May 2009, 2. https://www.isws.illinois.edu/pubmore/ISWSCR2009-07/ISWSCR2009-07.pdf.

2 Hadley, Daniel R., Daniel B. Abrams, Devin H. Mannix, and Cecilia Cullen. "Establishment of a Groundwater Monitoring Network And ..." Northwest Water Planning Alliance, August 2020. http://www.nwpa.us/uploads/1/2/9/8/129889926/campton_letter_report_final_publicversion.pdf.

3 Hadley, Daniel R., Daniel B. Abrams, Devin H. Mannix, and Cecilia Cullen. "Establishment of a Groundwater Monitoring Network And ..." Northwest Water Planning Alliance, August 2020. http://www.nwpa.us/uploads/1/2/9/8/129889926/campton_letter_report_final_publicversion.pdf.

4 Abrams, Daniel B., Daniel R. Hadley, Devin H. Mannix, George S. Roadcap, Scott C. Meyer, Kenneth J. Hlinka, Kevin L. Rennels, Kenneth R. Bradbury, Peter M. Chase, and Jacob J. Krause. Rep. Changing Groundwater Levels in the Sandstone Aquifers of Northern Illinois and Southern Wisconsin: Impacts on Available Water Supply. Illinois State Water Survey, September 16, 2015. https://www.isws.illinois.edu/pubdoc/CR/ISWSCR2015-02.pdf.

5 Abrams, Daniel B., Daniel R. Hadley, Devin H. Mannix, et al. Rep. Changing Groundwater Levels in the Sandstone Aquifers of Northern Illinois and Southern Wisconsin: Impacts on Available Water Supply. Illinois State Water Survey, September 16, 102, 2015. https://www.isws.illinois.edu/pubdoc/CR/ISWSCR2015-02.pdf.

Water in Kane County

Water use in Kane County has evolved over time as the population has grown. Kane County has never sourced water from Lake Michigan, unlike surrounding communities. Beginning in the late 1980s, the eastern communities of Elgin and Aurora moved to source public water from the Fox River.[6] Drinking water in the region is now sourced from three groundwater aquifers and from the Fox River as a surface water source.[7] As the western suburbs of Chicago expand, the region is attempting to manage resource allocation sustainably when demand outpaces supply.

There is a finite amount of water and land, as predetermined by geology and available recharge. Since the mid-1990s, the U.S. Geological Survey (USGS), the Illinois State Water Survey (ISWS), Northwest Planning Alliance (NWPA), and Illinois Department of Natural Resources (IDNR) have worked with Kane County to model groundwater flow, map the impacts of well density, and track the impact of multi-aquifer wells on water quality and quantity. The 2009 and 2015 ISWS studies indicate three pressures on shallow groundwater aquifers: drought, seasonal irrigation, and multi-aquifer wells. [8] [9]

During droughts and points of seasonal irrigation, groundwater models show a lowering of the water surface in shallow aquifers. Shallow aquifers also impact surface water stream flow where communities source drinking water. Multi-aquifer wells present a challenge because they allow in-ground exchange of formerly separated waters. Deep multi-aquifer wells also show impact to shallow wells as a deeper aquifer (e.g. the St. Peter Sandstones or the Galena-Platteville Sandstones) can depressurize and allow the nearby shallow aquifer (e.g. the Maquoketa and Silurian-Devonian dolomites) to drain into the deeper one. [10] [11] Shallow aquifers also impact surface stream flow where communities source drinking water.

6 Meyer, Scott C., George S. Roadcap, Yu-Feng Lin, and Douglas D. Walker. Rep. Kane County Water Resources Investigations: Simulation of Groundwater Flow in Kane County and Northeastern Illinois. Champaign, Illinois: Illinois State Water Survey, 2009, 2.

7 *Ibid*.

8 Meyer, Scott C., George S. Roadcap, Yu-Feng Lin, and Douglas D. Walker. Rep. Kane County Water Resources Investigations: Simulation of Groundwater Flow in Kane County and Northeastern Illinois. Champaign, Illinois: Illinois State Water Survey, 2009.

9 Abrams, Daniel B., Daniel R. Hadley, Devin H. Mannix, et al. Rep. Changing Groundwater Levels in the Sandstone Aquifers of Northern Illinois and Southern Wisconsin: Impacts on Available Water Supply. Illinois State Water Survey, September 16, 2015. https://www.isws.illinois.edu/pubdoc/CR/ISWSCR2015-02.pdf.

10 Meyer, Scott C., George S. Roadcap, Yu-Feng Lin, and Douglas D. Walker. Rep. Kane County Water Resources Investigations: Simulation of Groundwater Flow in Kane County and Northeastern Illinois. Champaign, Illinois: Illinois State Water Survey, 2009.

11 Cullen, Cecelia, and Daniel R. Hadley. Rep. KANE COUNTY SHALLOW GROUNDWATER QUALITY 2023: A TWENTY-YEAR RETROSPECTIVE. Champaign, Illinois: Illinois State Water Survey, 2024.

Campton Township in Kane County has one of the highest densities of both private wells and multi-aquifer wells in Illinois.[12] [13] As of 2020, there were 2,638 domestic well records found in ISWS/ISGS databases for Campton Township, though only 2,113 of the records were had enough data to analyze if they were multi-aquifer wells.[14] Of the 2,113 domestic wells, approximately 54% of those were multi-aquifer wells.[15] Very few of the deep wells were open to only a single geologic unit, and the well records were defined by the deepest aquifer a well was open to. Approximately 18 percent of Maquoketa wells were considered multi-aquifer, approximately 84 percent of Galena-Platteville wells were considered multi-aquifer, and all the St. Peter wells were considered multi-aquifer.

What is a Multi-Aquifer Well?

In Illinois, a minimum of 40 feet of casing must be used to protect the well from surface contaminants.[16] Some states in EPA Region 5 only allow one aquifer to be screened. Historically, Illinois has allowed screened intervals to cross formerly separated aquifers.[17] These "cross-connected," multi-aquifer wells can pull groundwater from different geological units and allows the mixing of groundwater between those layers.[18] [19]

To access groundwater, a hole is drilled until water is reached and a well is constructed within that hole. A well has multiple components which include casing or the solid pipe that lines the hole and spans the sediment and rock layers that are not of interest; grout that seals the annular space between the solid pipe and the drilled hole; a screened interval near the bottom that allows water to flow in from the water-bearing layer(s) being accessed, and a gravel pack which fills the annular space around the well screen to maintain access to the groundwater while keeping sediment out of the well (Figure 3). It is believed that a properly constructed groundwater well can last between 25 to 100 years.[20]

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12 "Campton Township Monitoring, Kane County," n.d. https://www.isws.illinois.edu/groundwater-science/gs-archive/campton-township-monitoring-kane-county.

13 Hadley, Daniel R., Daniel B. Abrams, Devin H. Mannix, and Cecilia Cullen. "Establishment of a Groundwater Monitoring Network And …" Northwest Water Planning Alliance, August 2020, 24. http://www.nwpa.us/uploads/1/2/9/8/129889926/campton_letter_report_final_publicversion.pdf.

14 *Ibid*, 6.
Note: This amount and availability of data is typical for both the county and the state.

15 *Ibid*, 8.

16 Illinois Water Well Construction Code. § 920.70 (1973).

17 Abrams, Daniel B., Daniel R. Hadley, Devin H. Mannix, George S. Roadcap, Scott C. Meyer, Kenneth J. Hlinka, Kevin L. Rennels, Kenneth R. Bradbury, Peter M. Chase, and Jacob J. Krause. Rep. Changing Groundwater Levels in the Sandstone Aquifers of Northern Illinois and Southern Wisconsin: Impacts on Available Water Supply. Illinois State Water Survey, September 16, 2015, 17. https://www.isws.illinois.edu/pubdoc/CR/ISWSCR2015-02.pdf.

18 *Ibid*, 67.

19 Hadley, Daniel R., Daniel B. Abrams, and Devin H. Mannix. Rep. Changing Groundwater Levels in the Sandstone Aquifers: Synoptic Measurement of Deep Sandstone Wells in 2021 throughout Northern Illinois, June 8, 2024. https://storymaps.arcgis.com/stories/6a8ff45c39134e168da93b45626fef36.

20 "Groundwater Monitoring Well Network," Illinois Department of Agriculture. https://agr.illinois.gov/environment/groundwater.html.

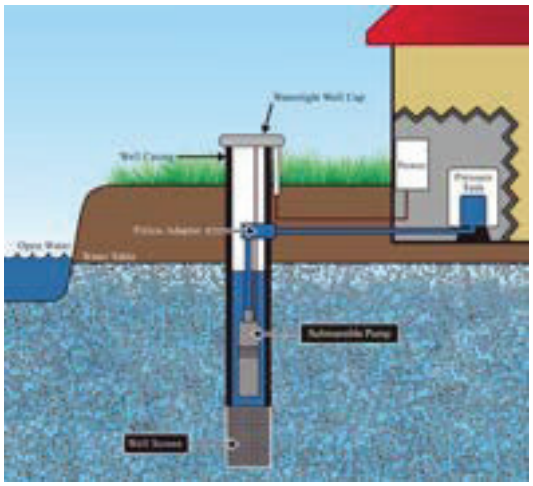

Figure 3. Single-Aquifer Well

Simplified diagram of a single-aquifer well. The casing extends from above the surface to the water-bearing layer of interest. The aquifer being accessed has a screened interval to allow water to flow into the casing and rise to its natural level which varies with topography and water pressure. A submersible pump is typically submerged below the normal water table level.[21]

At this time, private wells are required to be permitted by the local county health department, drilled by a registered well driller, and reported to the Illinois Department of Health.[22] All private wells must also be constructed according to the state well code.[23] The 1983 Water Use Act also sets forth "reasonable use" groundwater withdrawal rules for the state and requires the registration of high-capacity wells and requires data be supplied to Soil and Water Conservation districts (SWCDs) by the land occupier.[24] This data allows ISWS to conduct analysis on well conflicts and well interference. At this point, well inference analysis is not robust. This could be improved by requiring land occupiers to report data to local SCWDs, and by improving support to local SCWDs and to ISWS through funding and staffing capacity to provide data collection and management, and well interference models and reports.

A records review of domestic wells found that between 1989 and 2002, eight wells in Kane County were redrilled, with five of those eight deepened from the Galena-Platteville Dolomite to the St. Peter Sandstone.[25] Currently, Illinois allows for the construction of multi-aquifer wells under certain conditions. Well drillers are expected to evaluate which aquifer(s) will be available to satisfy the proposed well-water system.[26] If the system is designed for a shallow aquifer, and the shallow aquifer cannot provide sufficient water, the system may be in violation of the Water Well Construction Code and may need to be sealed abandoned, or a variance may be required.[27] According to the Design Factors section of the Illinois State Water Well Construction Code, if "multiple water-bearing formations of different static water levels are penetrated in the construction of a water well and the lower water-bearing formation has sufficient yield for the water well, the upper water-bearing formation shall be excluded by installing casing or a liner and properly sealing to prevent dewater of the upper water-bearing formations." [28] At this time, enforcement mechanisms for this are unclear.

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21 "Well Basics - What Is a Well? - Well Water Testing." The Groundwater Foundation, October 7, 2022. https://groundwater.org/wells/.

22 Illinois Water Well Construction Code. § 920.70 (1973).

23 *Ibid*.

24 Illinois Water Use Act of 1983 § 3(c) (1973).

25 Hadley, Daniel R., Daniel B. Abrams, Devin H. Mannix, and Cecilia Cullen. "Establishment of a Groundwater Monitoring Network And …" Northwest Water Planning Alliance, August 2020, 9. http://www.nwpa.us/uploads/1/2/9/8/129889926/campton_letter_report_final_publicversion.pdf.

26 Ilinois Department of Health. "THE 'HOW TO' MANUAL CONSTRUCTION OF WATER WELL SYSTEMS ACCORDING TO ILLINOIS CODES," 5-6. https://dph.illinois.gov/content/dam/soi/en/web/idph/files/publications/ww-contractor-studyguide-042716.pdf.

27 *Ibid*.

28 Illinois Water Well Construction Code. § 920.40.c (1973).

What is Campton Township Doing?

Municipal governments allocate and manage land, water, energy, and the distribution of residents and industries through zoning and management plans. To better understand the available resources in a region, and to more effectively distribute those resources, studies are often used by municipalities. Over the past decade, multiple studies have been conducted in the township with support from Kane County. These studies have focused on the sustainability of shallow aquifers, expanded groundwater monitoring, and examined conservation efforts.

The ongoing assessment of shallow groundwater sustainability has three components: 1) community discussions and modeling to define sustainability methodology and constrain metrics for the shallow aquifer system; 2) real-time telemetry to monitor water level throughout Kane County; 3) repeat water quality studies in Kane County wells and homeowner wells to determine if water quality has changed over time.[29] This assessment should allow for greater understanding of current water needs and community desires, while supporting community members and decision makers with the information for planning based on available groundwater in the area. This process also provides the community with knowledge of how behavior and actions impact resources, and links water quantity to water quality.

Campton Township is part of a greater effort to expand the monitoring network throughout Kane County.[30] Another nearby township, Sugar Grove, also has monitoring wells. This network supports assessments of seasonal and long-term trends that are used in county-wide water supply planning efforts.[31]

As part of broader conservation efforts and awareness of water sustainability planning, Campton Township also is receiving technical assistance through Kane County.[32] Support includes community water conservation plans, water loss audits, reviewing or updating water conservation ordinances, and other public education campaigns or programs. Technical assistance includes direct assistance with tools and technology, financial support for expert consultants, or purchase of water efficiency devices.

Campton Township has a high density of both private wells and multi-aquifer wells. Industrial, agricultural and residential users all compete for this limited water supply. As water levels in the deep aquifers decline, the question is how to move forward to manage both long-term availability of remaining deep groundwater, the shallow groundwater, and the surface water to ensure all residents have a shared sustainable future.

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29 Hadley, Daniel R., Cecelia Cullens, and Daniel B. Abrams. "Kane County Energy and Environmental Committee Agenda: Kane County Shallow Groundwater Sustainability Kickoff Meeting.", June 16, 2023. https://www.kanecountyil.gov/Lists/Events/Attachments/6627/AG%20PKT%2023-05%20Administration.pdf.

30 "ArcGIS Web Application," Illinois State Water Survey. https://univofillinois.maps.arcgis.com/apps/webappviewer/index.html?id=e364cd4c39d847f3ba4f794986a85883.

31 "Kane County Groundwater Monitoring Network," Illinois State Water Survey, 2025. https://www.isws.illinois.edu/groundwater-science/groundwater-monitoring-well-networks/kane-county.

32 "Home - Conserve Water for Kane County | Technical Assistance. " Conserve for Kane, 2025. https://conservewaterforkane.org/.

Case Study

Southwest Metro: Niagara Bottling

In 2021, Niagara Bottling approached Elko-New Market, Minnesota, a city in the southeast corner of the Southwest Metro Water Supply Planning Area, with plans to develop a water bottling facility within a 118-acre industrial park,[1] requiring an estimated 13 million gallons of city water per month (an amount exceeding the city of Elko-New Market's average water use of 9 million gallons per month). The bottling company would connect to the City's water system as a large water user. Using the City's 2025 industrial water use rate of $1.37 per 1,000 gallons, revenue to the City would be over $12,000 per month plus tax revenue. This format of approaching the City directly for an agreement effectively bypasses the MN DNR Water Appropriation Permit Program that a stand-alone water appropriator would have to file that would require regulatory review and public processes.[2] In this case, the public was made aware of this development plan when a portion of the planned construction required a conditional use permit. The public was concerned about the increase in city water use and the impact on their regional water resources and adjacent private wells.

No to Niagara, a citizens group, collected data to support concerns over water quality and quantity changes to the regional aquifer. This data was used to request environmental review, which, after a prolonged period of mounting public pressure, resulted in a lengthy aquifer pump test by the designated state agency. The citizens group hosted two clinics for screening private well water quality. Pump test results were used in conditions for the City's water permit and private litigation. In this instance, community advocates revealed policy gaps in the approval process and influenced the development of a more comprehensive permit evaluation process.

The project's timeline started in 2020, when Elko-New Market's Economic Development Board began exploring options for addressing ongoing challenges in funding the water system, and large water users were explored as a solution. Niagara Bottling was incentivized to come to Minnesota and Elko New Market by both the city and state. Minnesota's Department of Employment and Economic Development and the City of Elko-New Market offered Niagara $4.3 million in waived fees, forgivable loans, and tax rebates.

The city signed a non-disclosure agreement (NDA) with Niagara Bottling in 2022. NDAs are a common tool that provide expediency, preserve competitiveness, but limit transparency.[3] In October 2022, Bring Me The News published an article capturing the attention of the public, which resulted in a petition signed by 400 people as part of an Environmental Assessment Worksheet (EAW) submitted to Minnesota's Environmental Quality Board who assigns the appropriate agency to determine

1 "Elko New Market," Niagara bottling, accessed March 17, 2025, https://www.niagarawater.com/about-us/elkonewmarket/.

2 "Water Appropriation Permit Program." Minnesota Department of Natural Resources, June 13, 2024. https://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/index.html.

3 Eva Herscowitz, "Farmington Residents Couldn't Get Answer about a Proposed Data Center. Then They Saw the NDA.," MSN, January 9, 2025, https://www.msn.com/en-us/news/us/farmington-residents-couldn-t-get-answers-about-a-proposed-data-center-then-they-saw-the-nda/ar-BB1ra0RI.

if an Environmental Impact Statement is (EIS) is required.[4] In this case, the Minnesota DNR was the designated agency, and they determined that an EIS was not needed, however, they eventually did require and administer a 6-week aquifer pump test.

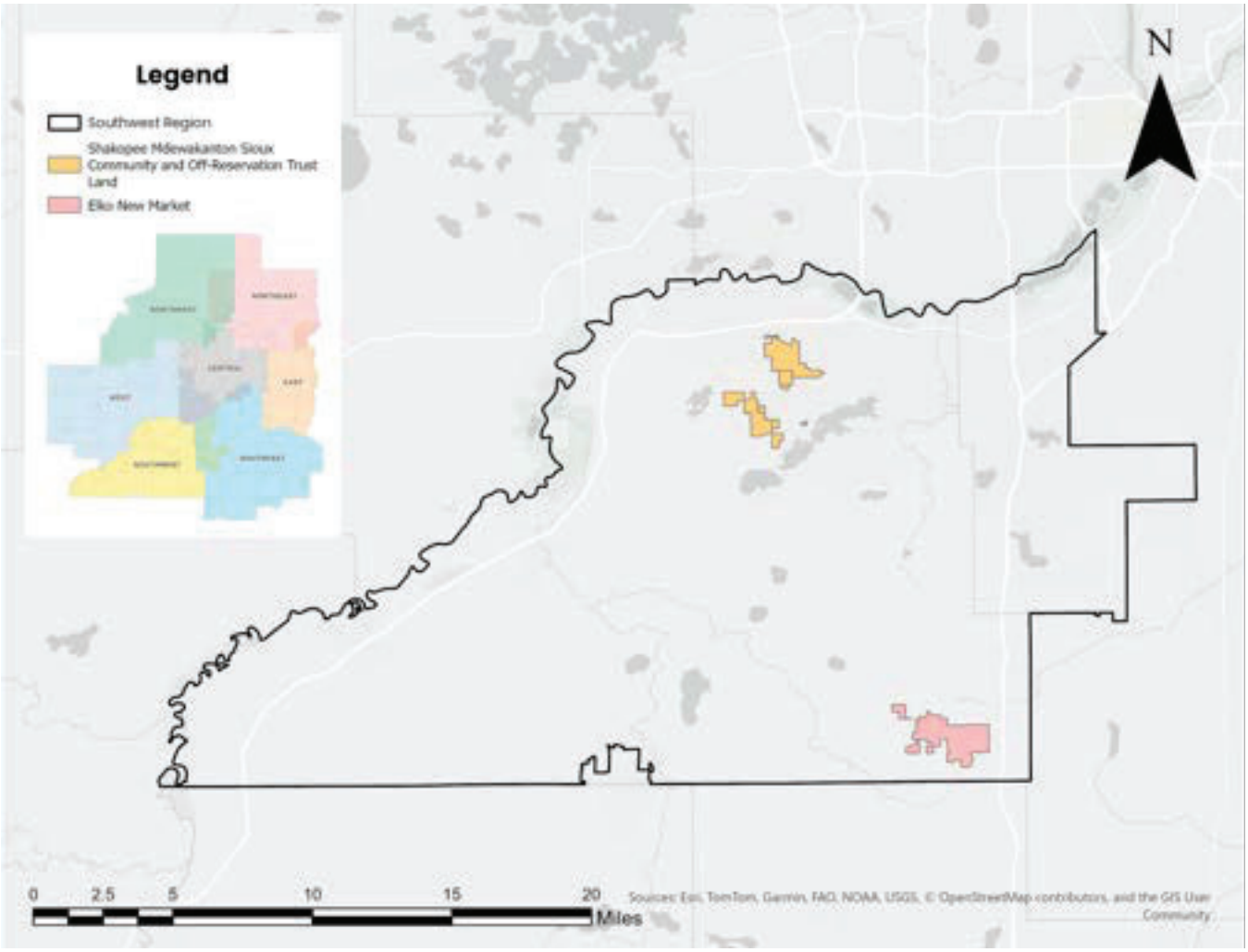

Figure 1. The Metropolitan Council's Southwest Metro Water Supply Planning Area

With the location of the SMSC, SMSC off-reservation trust land, and city of Elko New Market. Data sourced and adapted from ESRI, U.S. Census, and Metropolitan Council.

4 Schuster, Christine. "A Massive Bottling Plant Could Be Coming to the Southern Twin Cities." Bring Me The News, October 7, 2022. https://bringmethenews.com/minnesota-business/a-massive-bottling-plant-could-be-coming-to-the-southern-twin-cities.

A pump test yields critical information about the capacity of the aquifer to provide the required water without impacting surrounding wells. A number of those wells were used to monitor for water-level drawdown during the test. Broader communication about the timing, duration and potential impact of a pump test is not part of the DNR methodology. However, community members within a 5-mile radius of the test reported changes to their water quality during the test, with significant and costly impacts. Others who found out about the test after it had been completed recognized that the changes they had been experiencing were linked to the testing period; many reported ongoing issues with their private wells that persisted for up to 6 months. In all, over 75 private well owners reported water quality issues and three reported water quantity issues.

These reports raised concerns from citizens about how they would be protected if issues were to arise when Niagara started full operations, and the city increased their groundwater pumping. This also prompted questions about the practice of conducting a pump test without public awareness. In response, although the DNR proceeded to issue the permit, they did so only after significant consultation with drinking water and public health experts on what had potentially caused the mobilization of harmful geologic constituents (manganese and iron) and added conditions to the permit that would require the City of Elko New Market to create a response plan impacted well owners. Niagara Bottling built their plant in the proposed location, but the City must investigate water quality issues within two miles and water quantity issues within one mile of the City wells. Well owners experiencing problems outside of these areas need to report problems directly to the MN DNR who will decide if further investigation is warranted.

In December of 2024, at the request of the citizens group, a second well-testing clinic was hosted by the Minnesota Well Owners Organization (MNWOO) and the Minnesota Ground Water Association (MGWA) in advance of pumping by Niagara Water Bottling's completion. Volunteers staffed "ask a geologist" tables to consult with well owners. Local organizers promoted and worked at the event and supported it with independent funding. Over 220 samples were run with most people agreeing for their data to be released to establish baseline water quality values.

No to Niagara convened citizens to challenge, under law, the DNR and later the City of Elko New Market on their decision to approve the water bottling plant. As part of their efforts, No to Niagara developed a set of issues to capture their concerns. These issues are:

- **The regional approach to groundwater management is lacking** in protection of surface waters, rare fens, trout streams, wetlands and lakes that are connected to the groundwater; preservation of water for future use, prioritizing drinking water over other use; guards against emerging pollutants like PFAS, nitrates, pesticides, and other carcinogens; and equitable management of groundwater for everyone's interests in the region (i.e., multiple cities in the region exceed their water appropriation permits, agency not considering totality of water use for the region)
- **Industrial large water users requesting water from municipalities** prioritizes industrial use over municipal and private well use, avoids responsibility (i.e., municipality on the hook for issues), and offers less scrutiny by the agencies of a municipal permit.
- **Exporting water out of state in tiny bottles for profit removes water from the region**, which would be denied if it were done in bulk but appears acceptable when done as a single use. The process used requires 2.4 billion water bottles a year, of which very few are recycled.

- **State and Local subsidies being used to fund this for-profit company.**
- **An aquifer pump test that resulted in 75 private well-owner reports of water quality issues and 3 reports of water quantity issues** was completed with no notification to the wider community.
- **Investigation into the cause of manganese increases, a neurotoxin, in private domestic wells is warranted.** The permit made the city responsible for water issues that arise within a 2-mile radius rather than denying the permit, but the burden of proof is on the well owner.

Even now, so much about the legal pathway to participation remains unclear. While many local leaders and knowledge keepers were able to navigate the decision-making process, many citizens and decision makers were not aware of the consequences of a bottling plant in their region. As a result, information gaps remain and questions are unanswered about how action will be taken to repair harm if it does occur, and what will take priority if those issues do arise.

Case Study

Cranberries, Groundwater Withdrawals, and the Impact

Cranberries are the edible fruit of multiple species of cranberry shrub native to Wisconsin, and their commercial cultivation began in the state in the early 1850s near the town of Berlin.[1] They are now grown in bogs throughout the state. Wisconsin has been the largest cranberry grower in the U.S. since 1994, when its output surpassed that of Massachusetts.[2] Cranberries are now among Wisconsin's biggest cash crops generating over one billion dollars in economic impact a year and are cultivated across 18,000 acres in 19 counties as of 2007.[3] Wisconsin supplies over 50% of the world's cranberries and produces 60% of all cranberries grown in the U.S.[4]

In a 2021 Water Use Report, Wisconsin reported 358 active high-capacity well withdrawal permits specifically for cranberry production.[5] Most of this groundwater extraction is in the central part of the state, but some high-capacity wells are withdrawing large volumes in the area with the state's lowest groundwater capacity.[6] This north central region is peppered with so-called "seepage lakes" that receive water through the thin glacial sediment layer.[7] The fractured, lower-water-yielding bedrock is a few dozen feet below the surface. Wells that withdraw water in this region where groundwater and surface water are intrinsically linked present ongoing challenges for ecosystem health. The scope of this case study is the five-county region of Vilas, Oneida, Taylor, Price, and Lincoln counties in north central Wisconsin, and the Lac du Flambeau Band of Lake Superior Chippewa.

Cranberry bog flooding occurs in the spring for frost protection and to prepare for the growing season and again in the fall to facilitate harvest. Large water withdrawals have been reported to impact nearby lake levels. Withdrawals in the spring can be problematic because even a drop of a few inches can expose the shallow beds along the shore where fish spawning occurs. This disruption can negatively impact fish populations in affected lakes, leading to ecosystem imbalance and limited fish supply for local anglers.

It is unclear whether the reported lowering of lake levels on the Lac du Flambeau reservation is a result

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1 "Cranberry Farming in Wisconsin." Wisconsin Historical Society, August 19, 2013. https://www.wisconsinhistory.org/Records/Article/CS3858.

2 *Ibid*.

3 Thiel, Abriela. "Wisconsin Expected to Lead U.S. in Cranberry Production." https://www.wmtv15news.com, August 16, 2022. https://www.wmtv15news.com/2022/08/16/wisconsin-expected-lead-us-cranberry-production/.

4 Deller, Steven, and Jeffrey Hadachek. "The Contribution of Agriculture to the Wisconsin Economy: Wisconsin Cranberry Industry." University of Wisconsin-Madison Extension, October 2024. https://aae.wisc.edu/wp-content/uploads/2024/11/The-Contribution-of-Agriculture-to-the-Wisconsin-Economy.pdf.

5 "Wisconsin Water Use - 2021 Withdrawal Summary." Wisconsin Department of Natural Resources, 2021. https://dnr.wisconsin.gov/sites/default/files/topic/WaterUse/WithdrawalReport/2021.pdf.

6 *Ibid*.

7 Admin. "Lake Types." Wisconsin Lakes, August 29, 2016. https://wisconsinlakes.org/lake-types/.

of groundwater withdrawal or surface water diversion but in any event, fish spawning has been negatively impacted by water-level lowering of up to two feet. Some of the high-capacity wells used for cranberry production in state are "grandfathered in," meaning they are not subject to the same permitting requirements as other irrigators because these wells were drilled before the current high-capacity well-permitting system was established. They may also not have well logs recording their depth and aquifer they draw from. The Wisconsin DNR is not authorized to regulate high-capacity wells approved prior to the creation of Wis. Stat. § 227.10(2m).[8] Therefore, regulating these withdrawals if they are shown to impact fish spawning poses a significant challenge

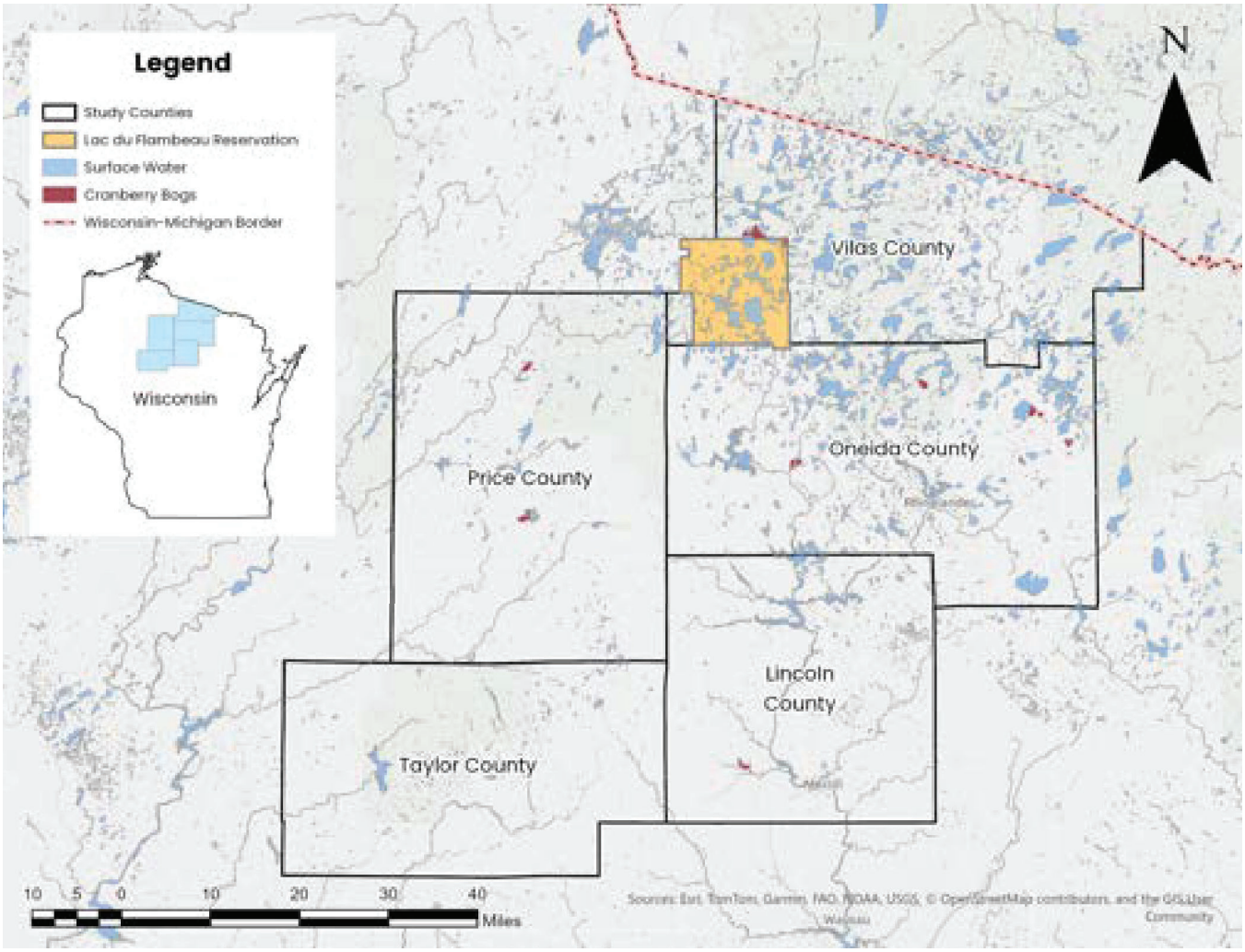

Figure 1. The Lac du Flambeau Reservation, Cranberry Bogs, and Surface Water in the Study Area

Data sourced and adapted from ESRI, Wisconsin Department of Natural Resources, Wisconsin Statewide Parcel Map Initiative, and Wisconsin State Cranberry Growers Association.

8 Koehnke, Christopher T., Andrew T. Phillips von Briesen, and Roper s.c. "Regulating High Capacity Wells in Wisconsin." Legal News Papers, June 2016. https://www.wicounties.org/wp-content/uploads/2020/03/legal-news-pages1.pdf.

During the North Central Wisconsin groundwater workshop, participants suggested that a best practice would be communicating with nearby cranberry producers. The producers typically work and manage their own lands but may be under contract with buyers who require certain practices for viable production. Having conversations with producers can lead to greater understanding of the ecosystem impacts, along with their personal financial impacts, which could lead to practices that benefit all parties.

This region is very sensitive to changes in groundwater and all those who use these resources must be considered as projected water demands grow alongside an increasingly changing climate. More work is needed to understand the effect of cranberry water management on local ecosystems.

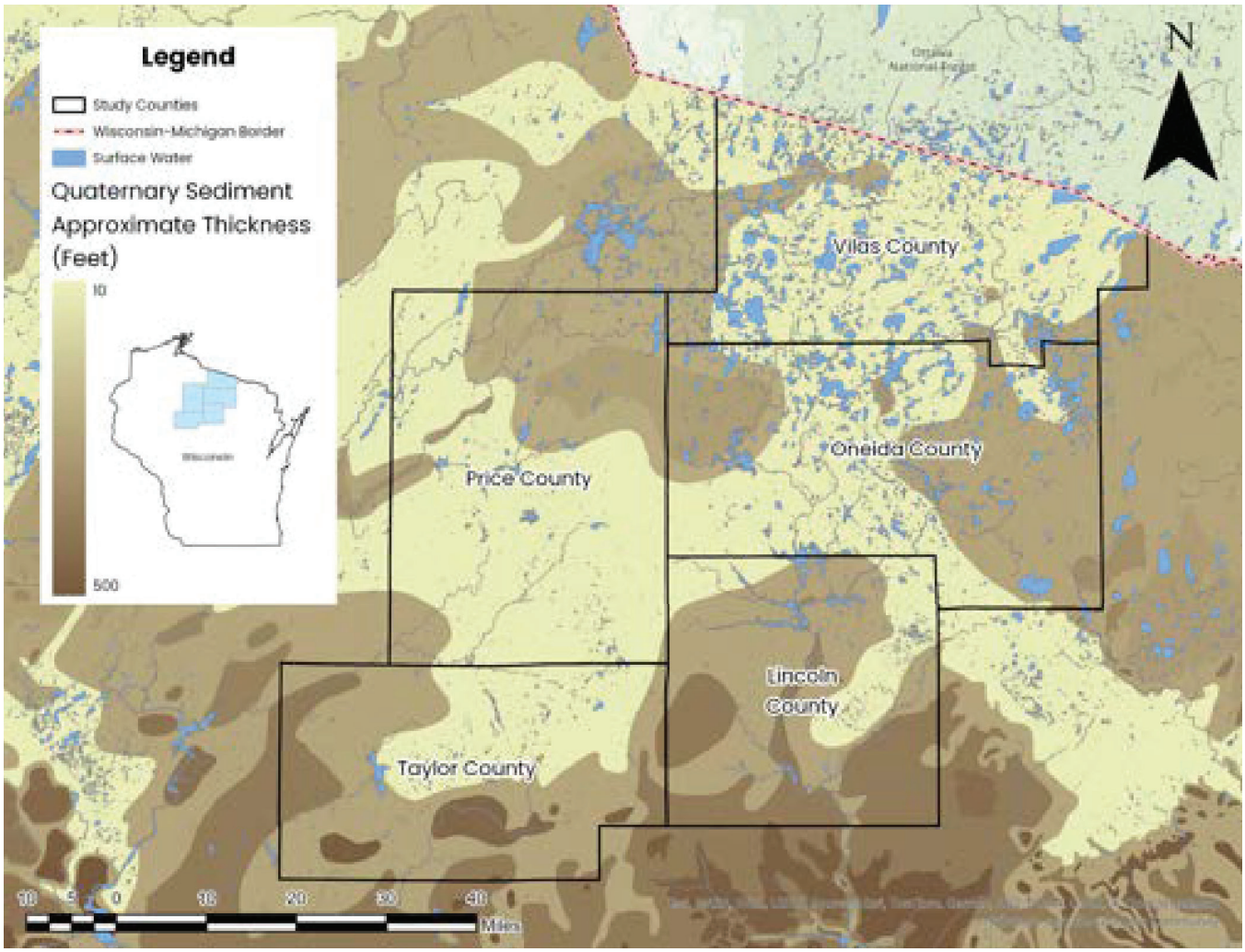

Figure 2. Thickness of Quaternary Sediment

Sediment layers of glacial origin overlie fractured crystalline bedrock across the study area counties (black outlines). These are among the lowest-yielding aquifers in the state and are highly connected to the many surface water features. Data sourced and adapted from ESRI and the Wisconsin Department of Natural Resources.

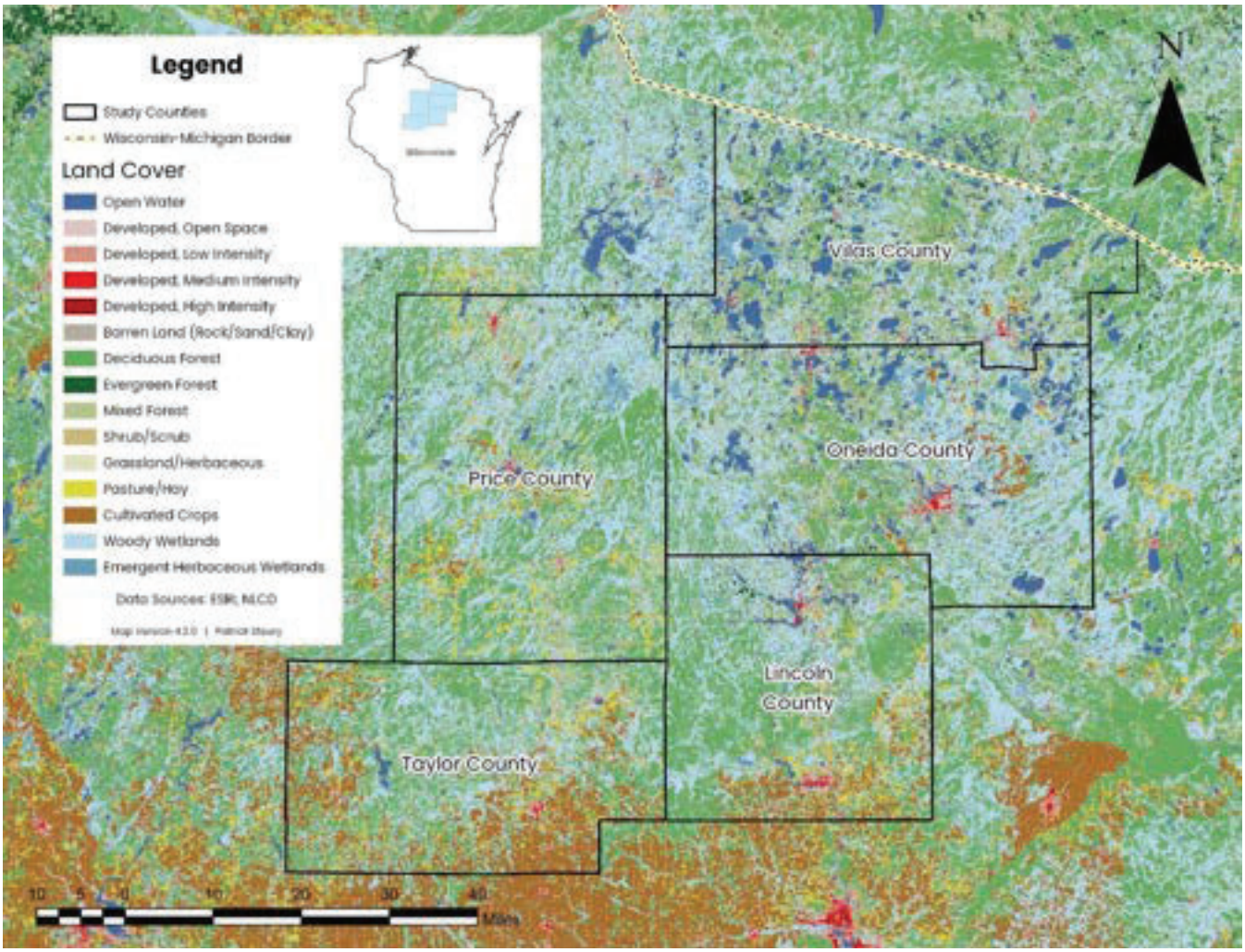

Figure 3. Land Cover in the Study Area

As generated by the National Land Cover Database in 2023.