

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

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://aag.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

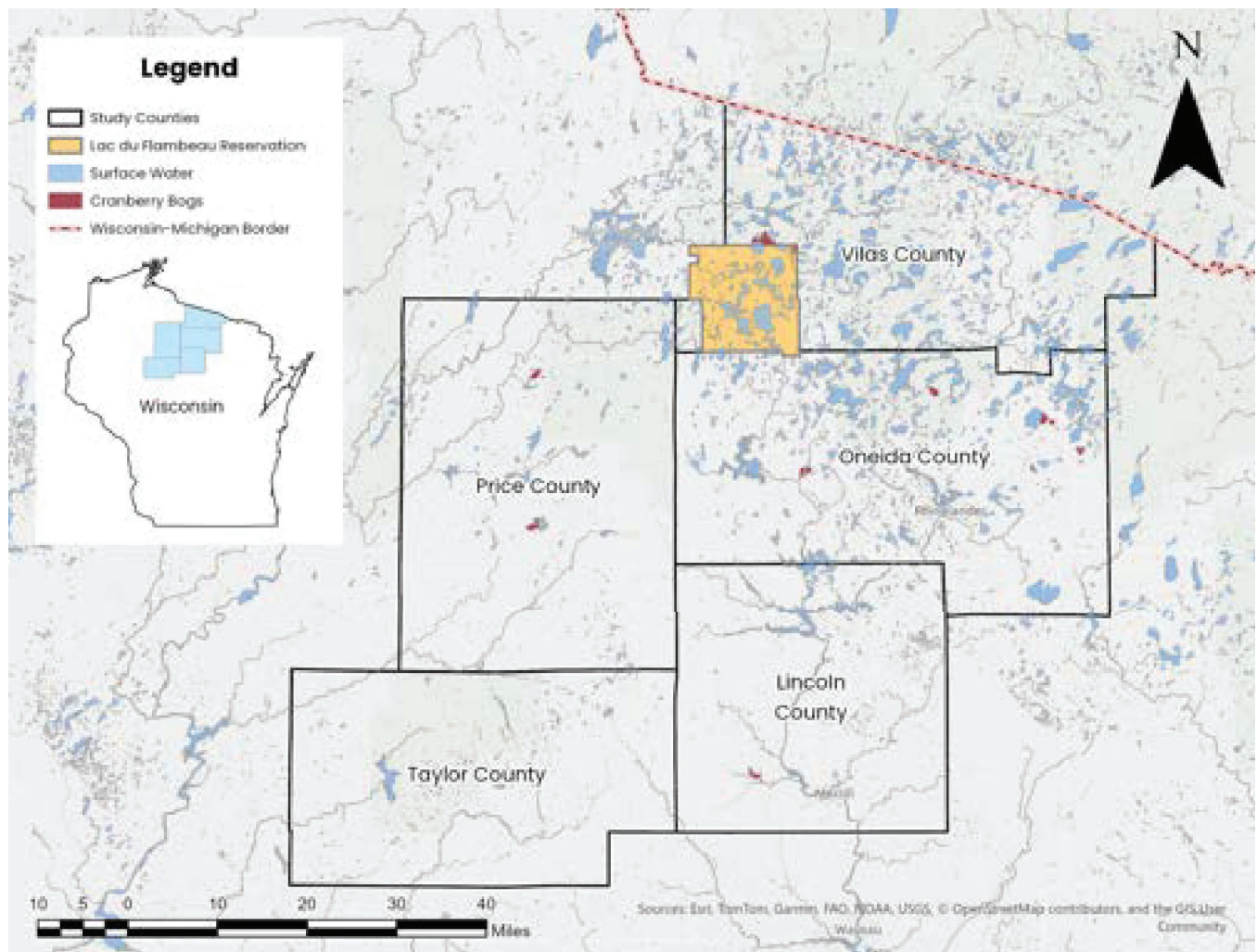


Figure 1. The Lac du Flambeau Reservation, Cranberry Bogs, and Surface Water in the Study Area

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.

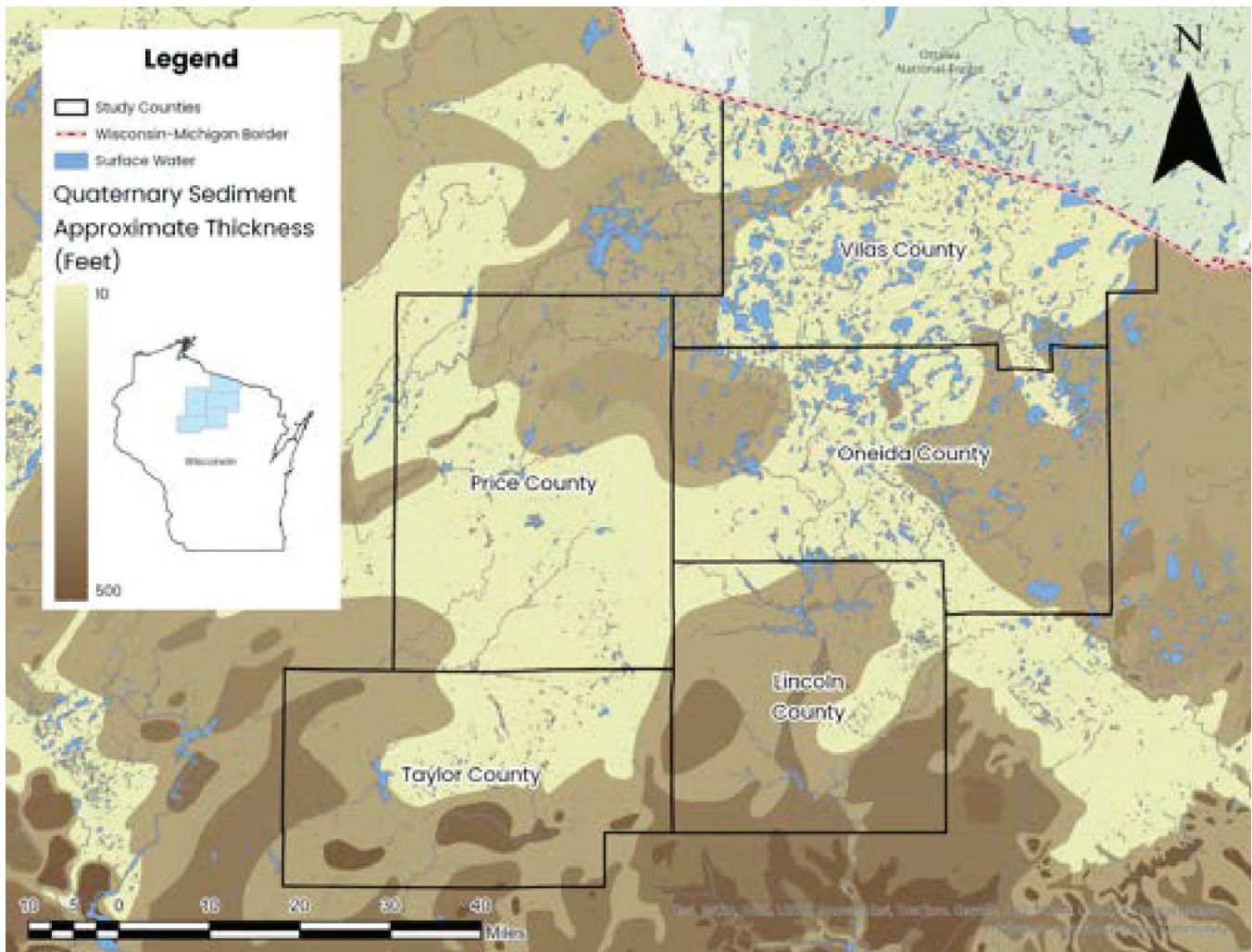


Figure 2. Thickness of Quaternary Sediment

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.

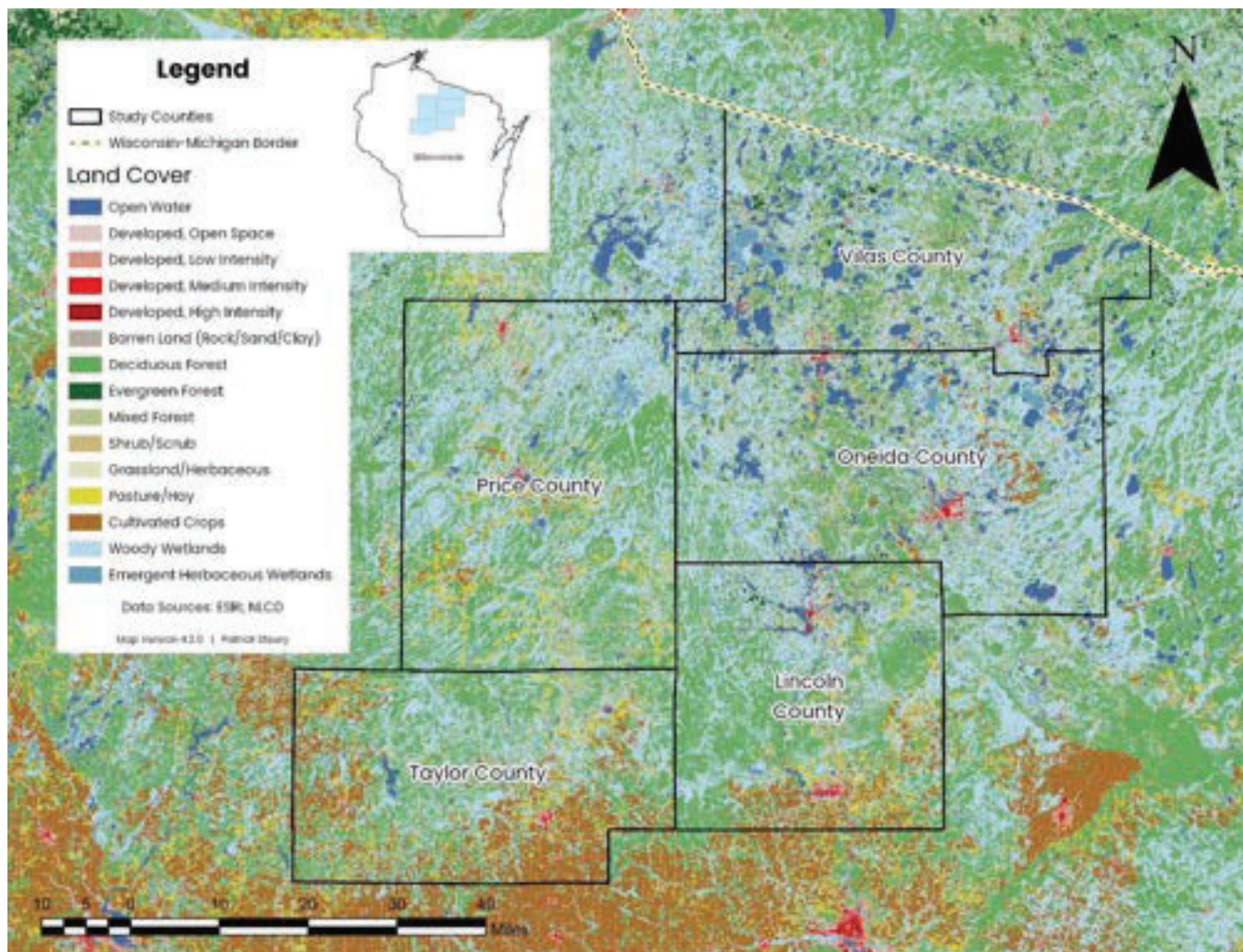


Figure 3. Land Cover in the Study Area

As generated by the National Land Cover Database in 2023.