ALLIANCE *for the* GREAT LAKES

A Finite Resource: Managing the Growing Water Needs of Data Centers, Critical Minerals Mining, and Agriculture

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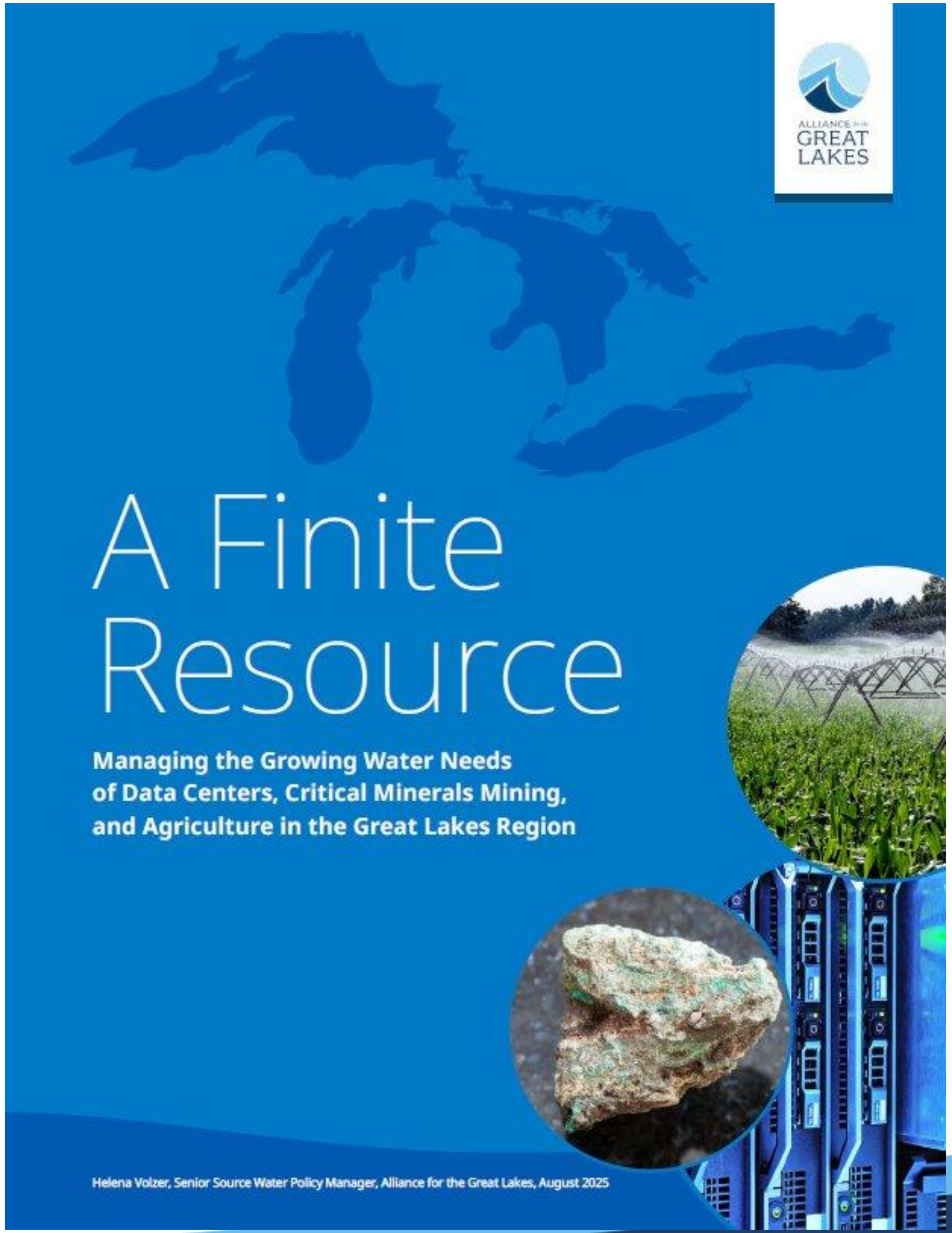
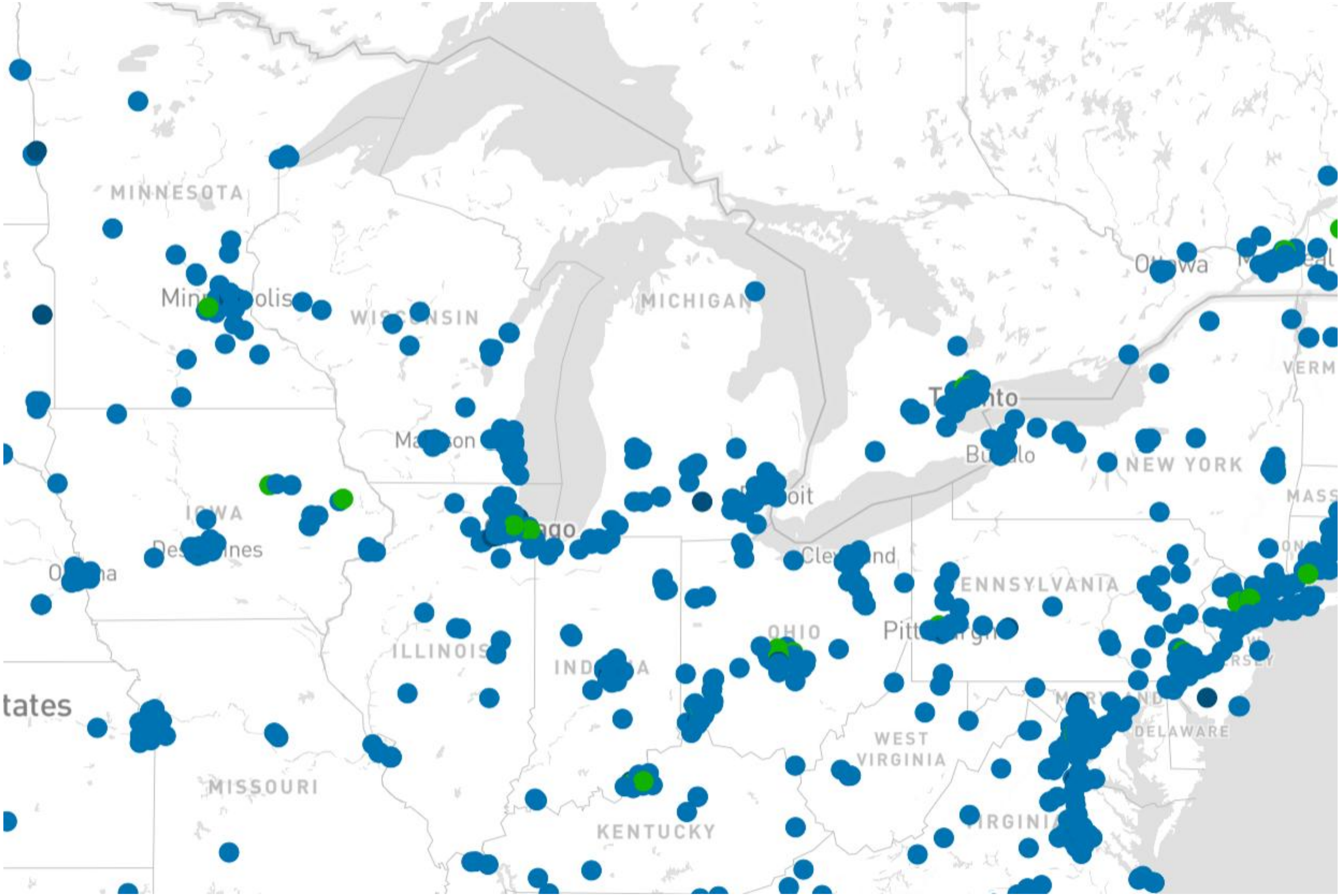
Three sectors of the report

- Data centers
- Critical minerals mining
- Agriculture





Source:
Datacenter
map.com
11/14/25

Hyperscale data centers

- Gen AI, cloud computing, IoT, crypto, and digital services are driving unprecedented demand for data centers
- GenAI requires vast data processing capabilities that only hyperscale (using between 1 and 5 MGD and evaporative cooling) can handle
- Hyperscale: 10,000+ sq ft, 5,000 + servers, 20+ MW of load
- A data center using 1 MGD for a year = *12,000 Americans*

Cooling methods data centers use

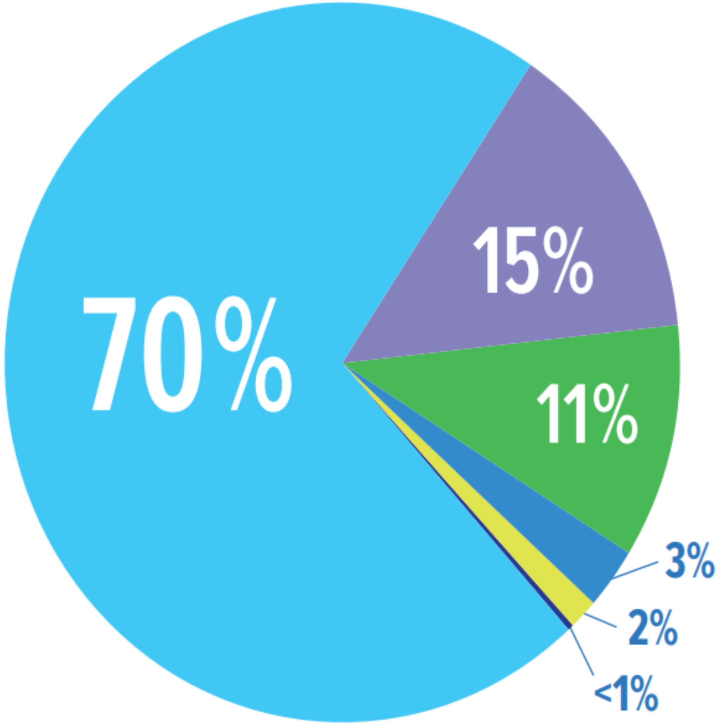
- Evaporative cooling is currently most common in the industry – consumptive use of water is high; lower electricity use but high water consumption
- Liquid immersion and direct to chip – direct use of water to cool equipment and needs less water and electricity but can introduce contaminants in discharged wastewater
- Closed loop - coolant is delivered directly to server racks as opposed to cooling the air in an entire room (an “open-loop” system)
- Air cooling – high electricity usage but insufficient to meet AI demands

Discharge and recirculation

- Evaporative cooling – more than half evaporates, the rest discharged as wastewater or recirculated
    - Recirculation isn't forever – ph, scaling, hardware, etc.
    - Discharge water is warmed, regulated as a discharge – need for WWTP capacity as well
- Closed loop and immersive cooling systems may resolve some of these issues and this may be where industry is headed
- A shell game? A shift to more electricity use still requires water for cooling, just at the power plant

Great Lakes Water Use

Water use fluctuates from year to year, most often due to variable weather. In 2023, the total reported water withdrawal from the Great Lakes-St. Lawrence River basin was **35.4** billion gallons per day or **134.1** billion liters per day, representing a 13% decrease from total 2022 withdrawals. These numbers include groundwater and surface water withdrawals, but do not include in-stream hydroelectric power production.



70% of water use was associated with generating electrical power — to generate steam or in cooling systems for thermoelectric power production and in off-stream hydroelectric power production.

15% of water use was for public water supply by cities and villages. In addition to residential water use, public water supply also includes commercial, institutional, and industrial users that are connected to a municipality's public system.

11% of water use was for industrial facilities that have their own water supply system (water purchased from the public water system used for industrial purposes included under public water supply).

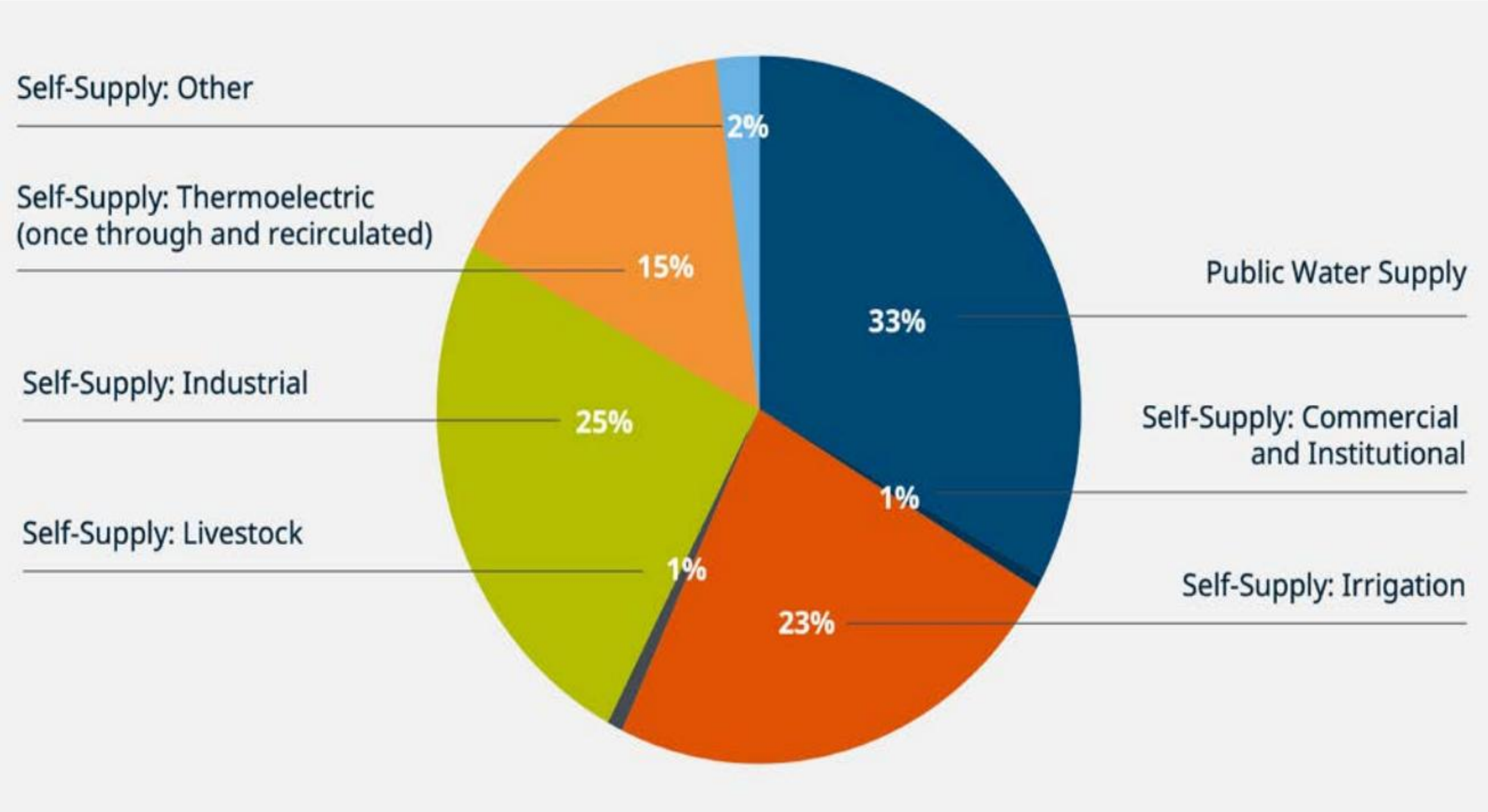
Nearly 3% of water use was for other self supply, which includes withdrawals to maintain water levels for navigation, creation/enhancement of fish and wildlife habitat, and water quality purposes.

2% of water use was for agriculture, including irrigation, livestock, and fish hatcheries. While this is small overall, these withdrawals are often groundwater withdrawals and may have high consumptive use, which can be significant at a local watershed scale.

Less than 1% of water use was associated with dedicated systems at **commercial and institutional facilities.**

Credit: Great Lakes Commission

Consumptive use



Perspective: indirect water use

- Indirect water use by a hyperscale data center using closed loop can be substantial
- Example: Vantage data center in Port Washington, WI
  - 3.5 GW at full build out (no info on seasonal variation/hourly use)
  - That varies both by fuel type and cooling method but on average could equate to:
    - Coal – 66 MGD – 1.2 B GPD withdrawn, 26 – 52 MGD consumed
    - Natural Gas – 54 MGD – 1.9 B GPD withdrawn, 14 - 39 MGD consumed
    - Nuclear – 92 MGD – 3.7 B GPD withdrawn, 22 – 56 MGD consumed
  - Natural gas withdrawal of 54 MGD = 970,000 Wisconsinites – more than 2x every home, business, and manufacturer in Green Bay

Credit: Clean Wisconsin

Gaps

- What is the total water use footprint of a data center? We don't really know.
  - Unless the data center itself is withdrawing water, registration and consumptive use permit requirements don't apply - no reporting requirements where users hook into municipal water systems
  - Less than 1/3 are tracking water use – no requirement to do so
  - Electricity from coal, gas, and nuclear also needs water – and we don't know and can't calculate how much of that water use is driven by data centers
  - NDAs can obscure how much water a project is proposing to use at the outset

Great Lakes – St. Lawrence River Basin Water Resources Compact

- Generally prohibits diversions (transfer to another watershed)
- Requires states to manage Great Lakes water use within the Basin
- Sets water conservation and efficiency goals, objectives, programs
- Establishes common water use reporting protocols

Per the Compact, programs:

“**need to adjust to new demands** and the potential **impacts of cumulative effects and climate**"

Beyond the Compact - groundwater laws are inadequate to curb use before crises occur

- 40 – 75% of Great Lakes state residents get drinking water from groundwater but -
  - Ohio – relies on litigation of disputes; no rules on groundwater stress areas
  - Michigan – water users committee; voluntary
  - Indiana – restricted use areas – but only after surveys indicate the safe annual yield and that withdrawal exceeds or threatens natural replenishment
  - Illinois – Dept. of Agriculture can impose emergency restrictions; but only where a complaint and investigation have found a draw down impact, or, where it determines that restriction of a high-capacity well is needed to preserve an adequate public supply

Complicating factors – other large water use sectors converging on the region

- Critical minerals mining
- Other industrial use – chip manufacturing, quantum computing, etc.
- Irrigation from agriculture – climate change and seasonal variations – both agriculture and data centers will need more water in summer
- Associated population growth – not necessarily climate migration driven, but economic development driven
- Groundwater conflicts – SW MI, Central Sands, Little Rock Creek, South Bend, IN

Development process

Economic development teams site the project → Municipality approached to evaluate land, power, and water use → Agreements are reached: public → Concerns raised by public, legislators, water managers

- Water managers and regional planners usually not involved

- NDAs
- Land and power needs first
- Partners approached with short timeline

- Municipal water supply connection

Credit: Freshwater.org

Questions to ask early in the process

- What are the water quantity and quality needs?
- What is the source and is it at risk?
- Opportunities for reuse? Closed loop? Stormwater or wastewater?
- Local water bodies or impacted well owners?
- Reviewed water projections from regional planning study?
- Co-locate complementary industry or land use?
- Could you attract a business to share water source or reuse discharged wastewater from the data center?

Credit: Freshwater.org

Why local solutions alone aren't enough

- Threat to groundwater integrity – convergence of demand
- Water/energy nexus
- State level economic development corporations may make decisions without local input – aren't considering water demands
- Local temporary moratoria or restrictions create a patchwork
  - Community benefit agreements are one tool
- State legislatures may respond
  - Example: Ohio HB 392 – severely limits local control over data center regulation
    - Enacted: MT SB 212

Policy solutions: regional

- Regional recommendations the Compact Council could make to the states – submitted comments on the Draft IJC report:
  - Regional water demand studies that consider environmental and ecosystem needs and collaboration where watersheds don’t respect state lines
  - Track and report water use to improve data in the Great Lakes Regional Water Use Database
  - Expand and strengthen registration and consumptive use permitting programs, including lower consumptive use permit thresholds
  - Develop efficiency standards specifically tailored for large water using industries

State policy solutions: Planning and Mapping

- Groundwater mapping
- Regional demand studies – OH, IL, IN
    - Incorporate as an ongoing part of conservation programs vs. one-off projects
    - Evaluate ecosystem and environmental needs as part of demand
    - Economic development agencies and local governments should turn to these studies when siting and incentivizing new projects

State policy solutions: transparency and accountability

- Public disclosure – CA
  - All large water users above a threshold vs. just data centers
  - CBAs – one tool to involve communities; pushback and moratoria
- Ongoing reporting - NJ
  - Tracking and water use reporting requirements for large water users - irrespective of municipal supply connection; build on existing registration and consumptive use permitting
  - EU required annual reporting beginning in September 2024

State	Consumptive Use Permitting Threshold	Citation
Indiana	• 5 MGD from Lake Michigan • 100,000 GPD from salmonoid stream • 1 MGD from other surface or groundwaters	IC 14-25-15-7
Illinois	• N/A	Great Lakes Compact § 4.14
Michigan	• 2 MGD statewide • Certain high-risk withdrawals above 1 MGD	Mich. Comp. Laws § 324.32723
Minnesota	• 10,000 GPD statewide	Minn. Stat. § 103G.271; Minn. Rule 6115.0620
New York	• 100,000 GPD statewide	NYS ECL § 15-1501 and 1502
Ohio	• 2 MGD statewide • In the Lake Erie Basin: • 2.5 MGD from Lake Erie or navigation channel • 1 MGD from river, stream, or groundwater in Lake Erie watershed • 100,000 GPD from a high-quality river or stream	R.C. 1521.23 and 1522.12
Pennsylvania	• 5 MGD	32 P.S. § 817.26
Wisconsin	**General permit required:** • In the Great Lakes Basin and withdrawing or planning to withdraw 100,000 but less than 1 MGD, general permit needed **Individual permit required:** • In the Great Lakes Basin, 1 MGD (some 100,000-1,000,000 if in groundwater protection or management area) • Any other lake or stream, 2 MGD	Wis. Stat. § 281.346

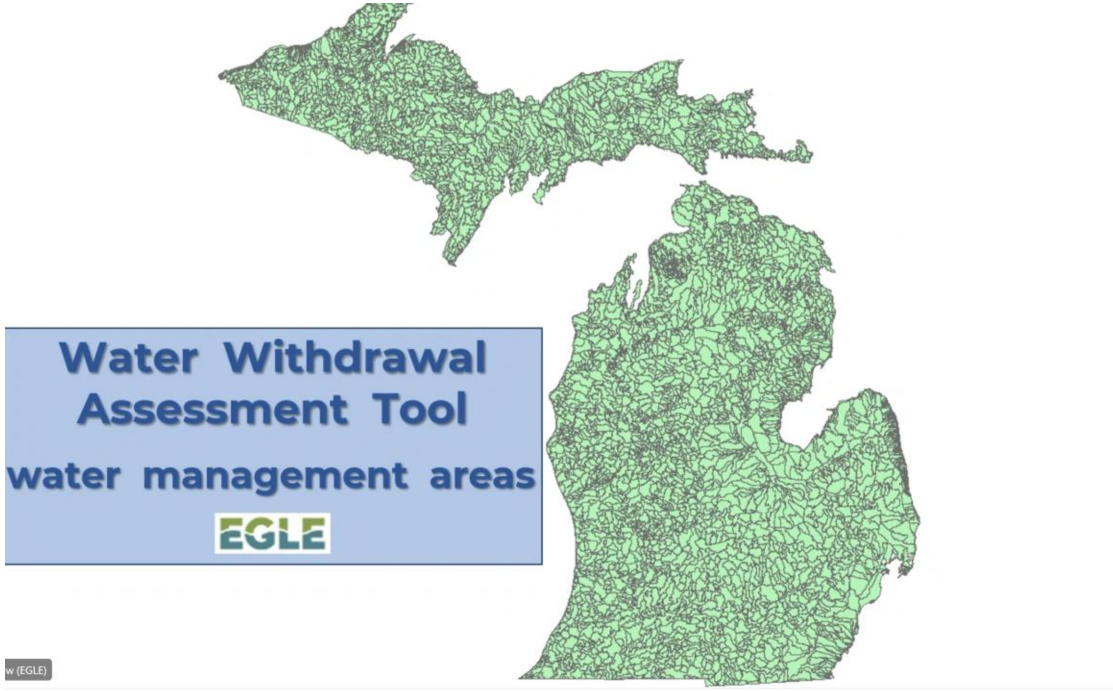
Michigan

Michigan’s Water Conservation and Efficiency Program

- Assessment process for withdrawals over 100,000 gpd in 30-day period (but less than 2 million) are subject to environmental impact standard (no significant impacts at the Great Lakes and sub-watershed levels)
  - Specific limits set, cumulative impact tracked in an online portal
  - Water withdrawal assessment tool

Michigan's WWAT

- A user with **capacity** to withdraw 100,000 gpd must register and use WWAT
- WWAT measures potential **adverse resource impacts** on local streams and rivers –if it passes → can proceed to immediate registration
- baseline withdrawals before 4/1/2009 are not included
- If a withdrawal fails WWAT, a site-specific review can be requested
- Annual report to MDARD or EGLE if agricultural use; all others to EGLE



Policy solutions: state

- Water efficiency standards; self-certify and for permit holders only
- Conservation and efficiency standards for data centers – CT, SB 1292 requires:
  - Multi-agency energy efficiency performance standard study
  - Energy and Environmental Protection Commissioners to adopt regulations that:
    - Prioritize cost effectiveness, technological feasibility, and align with state greenhouse gas emission reduction targets and state water plan
    - Consider best practices for energy and water usage effectiveness, energy and water management systems, and the use of renewable energy resources
    - Require new AI data centers and substantial alterations to existing data centers to incorporate load management and load-shifting capabilities, including the ability to participate in demand response programs
  - Recirculation, co-location with WWTP, use of non-potable water

Policy solutions: state

- How to pay for it?
  - Sales and use tax incentives - redirect
  - Permit and registration fees

States in the region

MN – SSHF16 -

- Requires pre-application evaluation of projects using more than 100 million gallons of water per year (about 274,000 GPD);
- Requires data center inquiries to be referred to the Department of Employment and Economic Development’s Minnesota Business First Stop program.

Federal legislation

- Water Reuse tax credit – HR 2940 – A 30% tax credit to scale up reuse
- AI "Sandbox" bill – Senator Cruz – S. 2750; waiver of federal regulations

Future work and learn more

- To learn more about the Alliance, the increasing demand for water in the Great Lakes region, and these policy solutions, visit:
- Greatlakes.org
  - Report
  - Factsheet
  - Webinar