



RESEARCH BRIEF

Clean Wisconsin Environmental Health Initiative

Harmful Algal Blooms & Potential Human Health Harms

By Meghan Parmentier, Paul Mathewson, Ph.D.,
& Kayla Rinderknecht, MPH



Source: WDHS 2025.

SUMMARY –Algal blooms are a common occurrence in Wisconsin lakes. While many are relatively harmless and may simply be a nuisance, certain types such as cyanobacteria harmful algal blooms (cyanoHABs) can pose risks to people and pets spending time in the water through their production of toxins (cyanotoxins). Cyanobacteria (typically referred to as blue-green algae) are commonly confused with true algae due to their similar appearance. Like algae, cyanobacteria undergo photosynthesis and exist naturally in every aquatic ecosystem in Wisconsin.

The prevalence of algal blooms has been exacerbated by human activities like land use changes, historic and current over-application and runoff of nutrients in agriculture, the introduction of certain aquatic invasive species into Wisconsin, and climate change. Cyanobacteria thrive in nutrient-rich water and are typically found in warmer water bodies, two factors causing the proliferation of cyanoHABs in Wisconsin waterbodies.

CyanoHABs can produce cyanotoxins that are harmful for human health depending on the level of exposure, the person's pre-existing conditions, how they were exposed, the concentration of cyanotoxins in the bloom, and the specific cyanotoxin that is produced. Main pathways of exposure are through direct consumption of contaminated water, inhaling water spray during recreation, direct skin and eye contact with contaminated water, and eating contaminated fish.

Wisconsin has a strong base of policies related to phosphorus reduction and cyanotoxin regulation, but there is more to be done. With targeted and science-based policies focused on priority watersheds, local municipalities, farmers, and homeowners can target their reduction efforts to protect local lakes that they love. Everyone plays a part, and everyone wants to swim and enjoy beautiful Wisconsin lakes without worrying about their health being impacted by cyanoHABs.

Key takeaways from this brief include:

- In Wisconsin, human activities have increased nutrient levels in lakes and rivers, and climate change has created more favorable conditions for cyanobacterial growth.
 - Nutrient pollution is largely driven by runoff from agriculture, discharges from wastewater treatment plants, and urban runoff including home lawn fertilizers.
 - Wisconsin has lost half of its original wetlands — natural filters for our water — which has made it difficult for aquatic ecosystems to filter out excessive nutrients.

- Climate change in Wisconsin has resulted in warmer and wetter seasons that are both longer and more extreme, creating conditions for cyanoHABs to grow rapidly throughout the humid summer months.
- The most common and potent cyanotoxin in Wisconsin is microcystin-LR, which can cause health complications like liver disease, abdominal pain, headache, sore throat, nausea, dry cough, diarrhea, blistering around the mouth, pneumonia, and acute hepatitis.
 - Other cyanotoxins include anatoxin-a, which harms neurological functions, and cylindrospermopsin which harms liver, kidney, and cellular functions.
 - There is emerging evidence of a connection between cyanotoxins and neurodegenerative diseases like amyotrophic lateral sclerosis, Alzheimer's disease and Parkinson's disease.
- The Wisconsin Department of Health Services (DHS) has confirmed 99 harmful algal bloom-related illness cases since 2016, with between 4 and 25 reported every year.
- For most people in Wisconsin, it is unlikely for their drinking water to be contaminated by cyanotoxins because all private wells and many public water systems get their water from groundwater, which is not affected by cyanoHABs. Thus, the primary exposure is recreational exposure in waters with active or recent blooms.
 - Limited monitoring at large public water systems in Wisconsin getting water from surface water indicates cyanotoxin levels below detection levels.
- Information about cyanHABs in the state is limited due to the lack of formal surveillance. A dedicated statewide monitoring program is needed to better understand the full extent of the problem in the state, along with improved efforts to reduce non-point sources of nutrient pollution to our waterbodies.

Definitions

- **Cyanobacteria:** A type of photosynthetic bacteria also known as blue-green algae. Cyanobacteria are found in all lakes, rivers, and ponds in Wisconsin and all over the world (WDHS 2025).
- **Cyanotoxin:** A type of toxin produced from some species of cyanobacteria that are harmful to human health (WDHS 2025). The most prominent types of cyanotoxins include Microcystin, Cylindrospermopsin, and Anatoxin-a.
- **Harmful Algal Bloom (HAB):** A type of bloom produced by cyanobacteria which can create cyanotoxins that are harmful for humans and animals, also known as a cyanobacteria harmful algal bloom (cyanoHAB) (Khanna 2021; LaLiberte 2012; Lindsey & Scott 2010).
- **Acidification:** A process where the chemical makeup of the lake becomes acidic through the input of substances that shift the pH balance (EPA 2025d).
- **Lake stratification:** The vertical layers, called the water column, of differing water densities in a lake, which become weak or strong depending on the conditions of the lake, such as temperature, pH, and wind speed (ILEPA 1997).
- **Total Maximum Daily Loads (TMDLs):** A calculation of the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody can meet water quality standards (EPA 2025f).

- **Eutrophication:** The process by which lakes are enriched, or abundant, with nutrients (phosphorus and nitrate), increasing plant and algae growth (Taguchi et al. 2020).
 - **Nonpoint source pollution:** Pollution that can come from multiple sources, like fertilizers and manure from farm fields, stormwater, road salt application, and manure storage pits, and is distributed to water bodies indirectly by land runoff, precipitation, drainage, and groundwater seepage (EPA 2024).
 - **Point source pollution:** A single identifiable direct pollution source like a pipe, ditch, concentrated animal feeding operation, tunnel, and other discrete conveyance that directly discharges to surface waterbodies (EPA 2024).
 - **Internal loading:** The process of nutrient release, typically phosphorus, from the bottom sediments of a lake to be moved into and recycled throughout the water column (James 2016).
 - **External loading:** The process by which nutrients are distributed into water bodies from external sources like runoff or discharge pipes (James 2016; EPA 2024).
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Introduction

Algae are in every river, pond, and lake in Wisconsin, and they are essential for the growth and survival of aquatic and terrestrial ecosystems. Like plants, algae take in carbon dioxide from our atmosphere and release oxygen (Lindsey & Scott 2010). As primary producers, algae are essential to food webs because they are eaten by zooplankton, insects, snails, and other microorganisms which in turn feed fish and other aquatic organisms (Lindsey & Scott 2010; LaLiberte 2012). Algae require nitrogen and phosphorus for growth, so their abundance is limited by the amount of these nutrients in the water (Lindsey & Scott 2010; LaLiberte 2012). When there is an excess of these nutrients, algae can grow rapidly, a process known as a “bloom” (Lindsey & Scott 2010).

Commonly misconceived, algae on its own does not produce harmful toxins. Harmful algal blooms are produced by cyanobacteria which can produce toxins that are harmful for humans and animals when they grow into a cyanobacteria harmful algal bloom (cyanoHAB) (Khanna 2021; LaLiberte 2012; Lindsey & Scott 2010). Cyanobacteria (referred to as blue-green algae) are commonly confused with algae because of their similar appearance. Both are found in all Wisconsin waters, and both undergo photosynthesis (Khanna 2021; Nave 2017; WDNR 2025a). Cyanobacteria thrive by absorbing nutrients, as they can store phosphorus to be used later when supply is low (Paerl & Otten 2013; Nave 2017). The toxic

potential of cyanobacteria prevents aquatic organisms that typically eat algae from eating them. These biological processes allow cyanobacteria to thrive in both nutrient-rich and nutrient-scarce environments.

In Wisconsin, human activity has increased phosphorus and nitrogen in aquatic ecosystems through expansion of crop and livestock agriculture, urban wastewater discharge, and home fertilizer runoff (LaLiberte 2012; Paerl & Otten 2013). Furthermore, draining wetlands for urban development has removed natural filtration systems that help keep Wisconsin waters clean and nutrient levels low (LaLiberte 2012; Paerl & Otten 2013). When cyanobacteria are exposed to an excess amount of nutrients in warm and moist conditions, they can grow rapidly to form cyanoHABs (Khanna 2021; Paerl & Otten 2013).

CyanoHABs can produce toxins that are harmful for human health. The severity of harm depends on the level of exposure, the person’s pre-existing conditions, how they were exposed, and the concentration of toxins in the bloom (WDHS 2025; French et al. 2023; Hernandez et al. 2023; Lad et al. 2021; Lad et al. 2022). Potential consequences of cyanotoxin exposure include liver disease, abdominal pain, headache, sore throat, vomiting, diarrhea, fever, cough, skin rash, pneumonia, and more (CDC 2025).

Causes of Cyanobacterial Blooms (CyanoHABs)

Cyanobacteria grow rapidly to form cyanoHABs when there is an increase in moisture, humidity, and nutrients like phosphorus and nitrogen in water bodies (Khanna 2021; Paerl & Otten 2013). While cyanoHABs are naturally occurring events, their frequency and prevalence in Wisconsin has been exacerbated by climate change, internal and external

loading of nutrients, wetland loss, and invasive species.

Warmer and wetter seasons are longer and more intense in Wisconsin due to climate change, allowing blooms to form rapidly throughout the humid summer. The warmer weather increases water

temperatures, which provides cyanobacteria with ideal conditions to grow. They can maintain their functions in waters that reach up to 85°F, unlike algae that do not tolerate more extreme water temperatures (Paerl & Otten 2013). Warmer water temperatures accelerate the release of phosphorus from the bottom-most lake sediments because the heat reduces the sediment's ability to absorb phosphorus, releasing it into the water to be absorbed by cyanobacteria, increasing cyanoHAB growth (Wu et al. 2014).

Warmer temperatures also intensify lake stratification, where vertical layers of different temperatures (and thus densities) are more pronounced in the lake, preventing mixing of water in the lake, causing reduced oxygen levels at the bottom layer. When this occurs, the sediments release phosphorus into the water, making the nutrient available to cyanobacteria, fostering increased cyanoHAB presence (Hupfer & Lewandowski 2008; LaLiberte 2012; Taguchi et al. 2020; Wu et al. 2017; Wu et al. 2014). Internal loading of phosphorus into lakes has become more prevalent due to climate change and other human activities which alter the biochemical makeup of the lakes, making cyanoHABs more prevalent (Fay & Shi 2012).

External loading of phosphorus into Wisconsin lakes and rivers is caused by point and nonpoint source pollution. Point sources of nutrients include wastewater treatment plants and industrial discharges. Nonpoint source pollution includes nutrients that originate from farms and cropland (fertilizers and manure), residential lawn fertilizers, and septic systems. These nutrients are carried to water bodies by rain or snowmelt runoff. Nonpoint source pollution is the source of impairment for 82% of Wisconsin's impaired rivers and streams, and 57% of impaired lakes, ponds, and reservoirs due to the difficulty of regulating these sources. (WDNR 2021; Skidmore et al. 2023). These excess nutrients, in

Wisconsin lakes are what cyanobacteria use to grow into cyanoHABs.

Wetlands are very important for the health of aquatic ecosystems because they filter water that passes through them. Wetlands reduce floods and drought effects, anchor shorelines, and increase biodiversity (Thompson & Luthin 2010). The water filtration processes are particularly important because they help capture excess nutrients and chemical pollutants that are delivered through runoff. They also cycle nutrients to the terrestrial and aquatic environments that need them (Thompson & Luthin 2010; Greb et al. 2006). This process is significant for cyanobacterial growth because, as wetlands have decreased over time, their natural filtration system capacity has diminished. Wisconsin has lost about half of its original wetland acreage (WDNR 2025), contributing to an increase of nutrients in water bodies, which in turn causes an influx of cyanoHABs.

Invasive species such as carp and zebra mussels also impact cyanobacterial growth in Wisconsin. Carp are bottom-feeding fish, meaning they eat aquatic plants that live on the sediments at the bottom of lakes and rivers. These aquatic plants would normally absorb nutrients that flow into the water, but decreasing aquatic plant population causes increased eutrophication and allows cyanobacteria to thrive with reduced competition (LaLiberte 2012; WDNR 2025a). Zebra mussels are an invasive species in the Great Lakes region, appearing in a plethora of Wisconsin lakes. Zebra mussels filter-feed on phytoplankton but reject cyanobacteria, which reduces competition for cyanobacterial cells and allows blooms to form more frequently. Zebra mussels are common in Wisconsin as they maintain their filtration function in warmer water temperatures, and they adapted to filtering water with high food levels (Haltiner et al. 2023; Karatayev et al. 2010).

Human Health Impacts of Cyanotoxins

Exposure to water that is contaminated with cyanotoxins can occur through direct consumption, inhaling water spray during water-related recreation, direct skin and eye contact, and eating contaminated fish (EPA 2025g; CDC 2025; WDHS 2025; Lad et al. 2021; Meyer 2024). The health outcomes from these exposures depend on whether exposure is chronic or acute, the patient’s preexisting conditions, the specific cyanotoxin they encounter, and the toxin concentration.

Cyanobacteria can produce a variety of cyanotoxins depending on the species of cyanobacteria, and it is unknown how many cyanotoxins there are (Nugumanova et al. 2023). Variants of each cyanotoxin exist, but the most prevalent and most dangerous cyanotoxin in Wisconsin is Microcystin, which has over 200 known variants, the most

common being Microcystin-LR (Dittman et al. 2013; Bláha et al. 2009; Nugumanova et al. 2023; EPA 2025e).

Different toxins have different health effects (Table 1). Among the most common and best-studied toxins, microcystin-LR exposure primarily causes abdominal pain, headache, sore throat, and nausea; anatoxin-a causes numbness, drowsiness, incoherent speech, and tingling; and cylindrospermopsin causes fever, headache, vomiting, and bloody diarrhea (EPA 2025g).

There is also increasing epidemiological evidence that cyanotoxin exposure may be connected to neurodegenerative diseases such as amyotrophic lateral sclerosis, Alzheimer’s Disease and Parkinson’s Disease (Sini et al. 2021, Herick et al. 2025, Morris et al. 2025). For example, some studies have found that people living in close proximity to water bodies with regular cyanoHABs have increased rates of these diseases (Caller et al. 2009, Masseret et al. 2013, Torbick et al. 2014, Torbick et al. 2018.).

Table 1. This table outlines the three best-studied cyanotoxins in Wisconsin, the potential health impacts, the concentration in drinking water that would pose danger, and the concentration in recreational water that officials use to monitor safety. The unit µg/L is micrograms per liter.

Cyanotoxin	Potential Health Impacts	Drinking Health Advisory Level	Recreational Swimming Advisory Level
Microcystin	Depending on route of exposure, this toxin effects the liver, kidney, lungs, skin, and gut (Lad et al. 2022)	At-risk populations: 0.3 µg/L (EPA 2025b) Adults: 1.6 µg/L (EPA 2025b)	4-8 µg/L = Beach “caution” (WDHS 2018) > 8 µg/L = Beach closure (WDHS 2018)
Cylindrospermopsin	Affects the liver and cellular/DNA functions (CDC 2025)	At-risk populations: 0.7 µg/L (EPA 2025b) Adults: 3 µg/L (EPA 2025b)	4-8 µg/L = Beach “caution” (WDHS 2018) > 8 µg/L = Beach closure (WDHS 2018)
Anatoxin-a	Affects the brain and nerve functions (CDC 2025)	Acute exposure: 30 µg/L (Chorus & Welker 2021)	60 µg/L (Chorus & Welker 2021)

Eating fish contaminated with cyanotoxins is another exposure risk. Fish can accumulate cyanotoxins in their tissue to varying degrees, with one study finding that microcystin-LR concentrations were highest in the gut and liver, followed by the kidneys and gonads, and lowest in the muscle tissue (Drobac et al. 2013). Different species in the same waterbody have also been found to have varying concentrations. For example, one study found that cyanotoxin concentrations in walleye were twice that of perch (Wituszynski et al. 2017). Due to this potential exposure, it is advised to avoid eating fish caught in waterbodies with active cyanoHABs (Wituszynski et al. 2017; Drobac et al. 2013, WDHS 2025).

At-Risk Populations

Those with existing skin conditions like dermatitis, skin infections, allergies, or cancer are more susceptible to dermal and internal effects of microcystin poisoning even at low exposures (French et al. 2024). These existing conditions increase the absorption of toxins and susceptibility to inflammatory damage within the skin and body due to the body's reduced ability to remove the toxin (French et al. 2024).

Those with pre-existing liver, gastrointestinal diseases, and respiratory conditions can face advanced effects of microcystin exposure due to the toxin specifically targeting these areas and their limited ability to respond to the toxic presence (French et al. 2023; Lad et al. 2022). For example, liver disease can potentially further advance liver cancer in response to high levels of microcystin exposure (Hernandez et al. 2023; Lad et al. 2021; Lad et al. 2022). Pre-existing inflammatory bowel disease (IBD) will also increase susceptibility to microcystin toxins and can result in severe colitis, inflammation, and shortening of the colon, even in low dose exposure (Lad et al. 2021; Lad et al. 2022).

Those with uncontrolled asthma can have worsening responses to microcystin exposure including respiratory stress and pneumonia (French et al. 2023). Those with other chronic respiratory illnesses can be susceptible to cyanoHABs, especially those with high concentrations of microcystin-LR.

Finally, those who were using tampons while swimming faced worse symptoms such as those from toxic shock syndrome, due to the increased and prolonged absorption of toxins from the tampon materials (French et al. 2023).

Drinking Water Contamination

In Wisconsin, approximately two-thirds of residents, including all private wells, get their drinking water from groundwater sources (WDNR 2025c), which are not subject to cyanoHABs. Public water systems that use surface water from Lake Superior or Lake Michigan have intake pipes far enough offshore and deep enough that there is limited concern about cyanotoxin contamination (Cheung et al. 2013). However, some communities do get their drinking water from shallower inland lakes like Lake Winnebago, where there is a higher possibility of cyanotoxin contamination. While there are guideline levels for cyanotoxin exposure through drinking water, cyanotoxins are unregulated drinking water contaminants and therefore are not required to be removed through public drinking water systems (EPA 2025c). In the Environmental Protection Agency's (EPA) fourth monitoring of unregulated drinking water contaminants, all systems in Wisconsin using surface water as its source and serving more than 10,000 residents were required to test for microcystins, anatoxin-a and cylindrospermopsin. No system detected any of these cyanotoxins above the detection level, let alone health-based reference levels (EPA 2025c).

A drinking water study of Lake Winnebago found that drinking water treatment plants can typically filter microcystin-LR and other cyanotoxins relatively

effectively (below the 0.3 µg/L guideline). However, these capabilities are uncertain in extreme bloom events (Beverdorf et al. 2018).

For example, Lake Erie experienced an extreme cyanoHAB event in August 2014 that resulted in a “No Drink” notice for about 400,000 people in Toledo and other areas in Michigan and Canada for several days (French et al. 2023). Microcystin-LR was the most prevalent toxin and concentrations reached 14 µg/L in the raw water at the Toledo intake site, and as high as

2.5 µg/L in the finished drinking water, well above the EPA’s drinking water guidelines of 0.3 µg/L for at-risk populations and 1.6 µg/L for adults (Raymond 2016; EPA 2025b). This extreme cyanoHAB event resulted in at least \$65 million worth of related economic losses throughout Toledo, where hospitals, local restaurants, homes, and businesses were required to flush the existing contaminated water from their systems and were provided with alternative sources in the meantime (Steffen et al. 2017; Bullerjahn 2016).

Prevalence of CyanoHABs in Wisconsin

Despite their regular occurrence, there is still a lack of regular monitoring of cyanoHABs and cyanotoxin levels due to the expensive testing and resources required (WDNR 2025a). However, the Wisconsin Department of Health Services (DHS) Harmful Algal Bloom Program reported that out of 253 bloom reports in 2024, 75% consisted of cyanobacteria (WDHS 2024).

Between 2004-2006, the WDNR tested reported nuisance algal blooms for the presence of cyanobacteria and cyanotoxins. Approximately 75% of the blooms tested had cyanobacteria, with hotspots of cyanoHABs in the south-central and west-central regions of the state (Harrahy et al. 2005).

Microcystins were found in about half of the samples, with concentrations ranging from 1.2 - 7,600 µg/L. Anatoxin-a was found in less than 10% of samples, with concentrations ranging from 0.68-1,750 µg/L, with 1,750 µg/L being the highest concentration of anatoxin-a reported in the world (Hedman et al. 2008). Although *Cylindrospermopsis*-producing cyanobacteria were found, the toxin was not detected. (Hedman et al. 2008).

Despite the rapid and overnight nature of their growth, cyanoHAB’s presence in a waterbody does not mean that cyanotoxins will be present.

Cyanotoxins can present themselves and diminish very rapidly, which poses difficult circumstances for local officials to protect public health. The rapid growth of cyanobacteria populations explains the wide range of concentrations in this data. Multiple cyanotoxins can also exist in the same bloom at varying concentrations (Graham et al. 2010). The concentrations given in the studies mentioned frequently exceed recreational advisory limits, which poses a concern for the current widespread concentration of cyanotoxins in Wisconsin water bodies.

Illness Reports in Wisconsin

Since 2016, DHS has tracked and confirmed harmful algal bloom (HAB) illnesses from submitted illness reports. Over the nine-year period there were on average 11 (range: 4-25) HAB confirmed illnesses reported each year (out of an average of 23 reported illnesses per year), with 99 total HAB related illnesses since 2016 (WDHS 2024). Approximately half of illness complaints across the nine-year period were determined to be HAB-related (WDHS 2024). Because the most common symptoms were diarrhea and fever, the existing data may underestimate the true number of cyanoHAB illnesses since these symptoms tend to resolve themselves and never get reported (Chorus & Welker 2021; French et al. 2023; WDHS 2024).

Beach Closures

Since 2021, the prevalence of cyanoHABs in Wisconsin has been tracked through beach closures and advisories. On average, Wisconsin has seen about 15 beach closures each year due to likely harmful algal blooms, with 2024 bringing the most beach closures

at 27 in total (WDNR 2024). While this data does not always reflect the tested presence of cyanobacteria or cyanotoxins, it shows the growing recognition of the dangers associated with blooms. In other words, public health staff across Wisconsin can declare an algae advisory or closure due to confirmed algal toxins, or simply due to a visual observation of algae.

Policy Implications & Recommendations

CyanoHABs can impact public health across the country, but minimal federal action has been taken to prevent cyanoHABs or reduce their impact. Cyanotoxins are not regulated as drinking water contaminants, which means that local drinking water treatment plants are not required to test their water for cyanotoxin presence. However, under the Safe Drinking Water Act, EPA may publish Health Advisories for contaminants that are not subject to federal drinking water regulation (42 US Code § 300g-1(b)(1)(F)). Advisory levels exist for cyanotoxins but are not legally enforceable by federal standards (EPA 2025b).

To aid in cyanotoxin health reporting, the Wisconsin State Legislature revised DHS's communicable disease reporting requirements in 2018 to include "blue-green algae" (cyanobacteria) and cyanotoxin poisoning incidents (Wis. Admin Code Ch. DHS 145). This change requires health care providers to report suspected human cases of cyanotoxin poisoning to DHS for investigation. While there have been improvements to health reporting, there is still a lack of statewide cyanoHAB monitoring. WDNR has attempted to solve this issue by requesting funding in the 2023-2025 and 2025-2027 state budgets, specifically asking for funding to hire more staff to oversee statewide monitoring of cyanobacteria/cyanotoxins (DNR 2025e; DNR 2023). Unfortunately, both requests were denied by the State Legislature and WDNR has been unable to independently fund a monitoring program (DNR 2025e; DNR 2023).

Prevention of cyanoHABs by the state of Wisconsin mainly focuses on reducing the flow of nutrient-rich runoff into lakes (WDNR 2025a). WDNR set numerical phosphorus limits for surface waters in 2010, establishing various discharge limits for surface waters including rivers and streams, reservoirs and lakes, nearshores of Lake Superior and Michigan, and wetlands/bogs (Wis. Admin Code NR 102.06). Discharge limits to date have mainly regulated the amount of phosphorus that wastewater treatment plants, industrial waste generators, and food processing plants can release into surface waters. While this regulation has reduced the phosphorus contributions from these point sources, agricultural runoff continues to occur with very little regulation and enforcement. For example, biosolid permits between wastewater treatment plants to farmers do not account for phosphorus limits but account for higher nitrate limits than those needed for phosphorus. This allows for the application of biosolid fertilizers to be unevenly regulated, where higher amounts of phosphorus are applied before reaching the permitted nitrate limit.

As a response to concerns about agricultural sources of phosphorus, the Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) created the Producer-Led Watershed Protection Grant program which aims to give farmers (producers) grants to implement conservation practices that reduce phosphorus losses like cover crops, no-till, alternative forages, grazing, and more on their acreage. Since 2019, the program has generated a 293% increase in acreage of cover crops planted in Wisconsin and a 370% increase in no-till acres (WDATCP

2025a). While these are important increases, only 25% of the state's 9.6 million acres of cropland are employing no-till practices, while even less (8%) use cover crops (USDA 2022). These figures indicate the need for further investment and expansion of runoff-reducing practices and programs (USDA 2022).

Dane County has implemented numerous programs aimed at reducing phosphorus contributions to the Yahara Chain of Lakes, including a phosphorus adaptive management reduction plan and a legacy sediment removal project. Yahara Watershed Improvement Network (Yahara WINS) was developed by the Madison Metropolitan Sewerage District (MMSD) in collaboration with multiple entities in the Yahara Lakes watershed including wastewater treatment plants, farmers, and nearby towns, cities, and villages that contribute to phosphorus pollution. They collaborate on a shared timeline to reduce their production and have reduced 457,158 pounds of phosphorus since 2017, meeting 68% of their yearly reduction goals (Yahara WINS 2025).

In 2014, the Dane County Land and Water Resources Department and WDNR identified centuries-old phosphorus concentrations in the stream sediments of Dorn Creek, which leads to Lake Mendota (DCRWLD 2025). They determined that if the sediment remained, it would take about 100 years for the nutrients to be fully released (DCRWLD 2025). The prevalence of cyanoHABs in Lake Mendota and throughout the Yahara watershed resulted in a hydraulic dredging and prairie restoration project to remove the phosphorus laden sediments from the bottom layer of various creeks that feed into the watershed.

Addressing cyanoHABs in Wisconsin will require a multi-faceted approach, with policy implementation and revision at all levels developed in a collaborative effort. A combination of voluntary, incentive-based and regulatory actions will be needed, and policy recommendations include:

- Federal designation of cyanotoxins as drinking water contaminants with establishment of concentration limits for prominent cyanotoxins.
- Allocate funding to the DNR for the establishment of a statewide cyanobacteria/cyanotoxins monitoring program.
- Expand and increase funding for WDATCP's Producer-Led Watershed Program, including project evaluation to increase durability and longevity of runoff reducing practices by farm participants.
- Fully enforce watershed Total Maximum Daily Loads (TMDLs) for phosphorus and prioritize high economic value and/or environmentally sensitive watersheds (i.e. waterbodies that serve as a public drinking water source or popular recreation area for tourism, etc.). Enforcing TMDLs will require WDNR rulemaking to:
 - Require counties within that watershed to align their nutrient management plans with updated TMDLs. Include wastewater treatment plants and nonpoint polluters like dairy and agriculture farms and stormwater infrastructure.
 - Increase funding for routine monitoring and testing of cyanotoxins.
 - Incentivize municipalities in priority watersheds to reduce road salt application.
 - Implement producer privacy waivers to allow local conservation departments to access data from local farms while maintaining their privacy.

- Require local municipalities to report beach closures/advisories to WDNR's beach database for a centralized source of waterbody health status.
- Revise WDNR's biosolid application regulations to include phosphorus-based application limits (current regulations allow biosolids to be applied up to the nitrogen limit of the crop) and enforce via WPDES permits.
- Expand statewide education to homeowners to encourage nonpoint source pollution friendly lawn care and management, and provide more resources for waterfront homeowners, those who live in a priority watershed, or any Wisconsinite.
- Expand informative signage at beaches and waterfronts to help identify cyanoHABs compared to other algal blooms.

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Additional Resources

Centers for Disease Control and Prevention: [Harmful Algal Blooms and Your Health](#)

National Institute of Environmental Health Sciences: [Algal Blooms](#)

United States National Office for Harmful Algal Blooms: [Harmful Algae](#)

Wisconsin Department of Natural Resources: [Blue Green Algae](#)

Wisconsin Department of Natural Resources: [Beach Closings and Advisories Map](#)

Wisconsin Department of Health Services: [Cyanobacterial Harmful Algal Blooms](#)

Wisconsin Department of Health Services: [Health Concerns Related to Cyanobacterial Harmful Algal Blooms](#)

Report Harmful Algal Bloom: [Department of Health Services](#) or [Department of Natural Resources](#)