



# RESEARCH BRIEF

Clean Wisconsin Environmental Health Initiative

## PFAS and Health: Contamination in Private and Public Wells in Wisconsin

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**SUMMARY** – Per- and polyfluoroalkyl substances, or PFAS, are a group of harmful manufactured chemicals. PFAS are widespread in the environment, in our food and in our work, and exposure to PFAS is associated with a wide range of health harms.

The unique physical and chemical characteristics of PFAS gives them functional properties in a variety of industrial and commercial applications, including resistance to oil, water and temperature. They are found in many products that we use every day, from non-stick cooking pans to food packaging and waterproof rain jackets. PFAS are characterized by a chain of carbon atoms with fluorine atoms attached at most or all binding sites along the carbon chain. The carbon-fluorine bond is a very strong chemical bond, and thus PFAS do not break down easily, earning them the nickname “forever chemicals.” This persistence means they accumulate over time in the environment and in our bodies.



Exposure to PFAS is linked to a variety of health problems. These issues can include elevated cholesterol, reduced vaccine effectiveness, thyroid disease, certain cancers, high blood pressure, pre-eclampsia, lower birth weight, decreased fertility, developmental delays, hormonal disruption, and obesity. Nearly all Wisconsinites are exposed to PFAS via water, food, and household items and are therefore at risk for these health threats. However, it is important to note that vulnerable populations, including children and communities of color, can be disproportionately exposed to PFAS sources.

PFAS enter the environment from a variety of sources, including wastewater treatment plants, landfills, and industrial emissions. Once in the environment, PFAS can pollute drinking water sources, soil, and food sources like fish. In this brief, we focus on PFAS contamination of drinking water in Wisconsin, as it has become a growing concern in the state.

PFAS contamination in drinking water has been identified all over the state, typically found near military bases, airports, and industrial sites. Drinking water standards, which apply only to public drinking water systems, have been established for some PFAS. Due to these standards, public water systems are required to regularly test for PFAS in water being distributed to homes. This provides an opportunity to see how widespread PFAS contamination is in Wisconsin’s drinking water. These tests indicate that PFAS detections are common, but concentrations above the health-based drinking standards are relatively rare. There are also hot spots of PFAS contamination in public wells in counties such as Marathon and Waukesha. Wisconsin has no requirement for PFAS testing in private wells, resulting in less information on PFAS contamination of private drinking water sources.

### Key takeaways from this analysis include:

- The United States Environmental Protection Agency estimates that drinking water standards will result in \$1.5 billion in avoided health costs annually in the United States from avoided developmental effects, cardiovascular effects, and kidney cancers.

- Assuming that these effects are evenly distributed across the population, Wisconsin could expect to see over \$21 million annually in avoided health costs from reduced PFAS in public drinking water supplies.
- A recent analysis estimated the costs of preterm birth, low birthweight births, and infant mortality caused by maternal consumption of PFAS-contaminated water in the United States to be over \$13 billion annually, including \$230 million in Wisconsin.
- PFAS contamination is widespread in Wisconsin's public water systems.
  - PFAS were detected in 32% of tested public water systems, with detections in 70 of the 71 counties with test results.
  - However, only 5% of systems had concentrations above health-based standards.
    - 7% of municipal community systems contained PFAS levels above health-based standards, compared to 5% for other-than community wells, and 4% for non-community wells.
    - Marathon and Waukesha counties are hotspots of PFAS contamination, accounting for 1/3 of public water systems exceeding at least one health-based standard.
  - Notably, 14 school or daycare facilities had PFAS contamination exceeding the EPA's MCL, indicating priority areas for remediation because young people are more vulnerable to the harmful effects of PFAS.
- Less is known about private well contamination due to lack of testing requirements.
  - The Wisconsin Department of Natural Resources tested 450 shallow private wells across the state to get a better sense of contamination in aquifers used by private wells.
    - PFAS were detected in 71% of wells.
    - Overall, 4% of the tested wells were above health-based standards.
    - Wells in developed areas had a higher rate of PFAS detection (89% detection rate), but the wells with the highest overall concentrations were in agricultural areas.
  - Serious, widespread private well contamination has been identified in the Town of Stella, Peshtigo/Marinette, and Town of Campbell/French Island. These areas are considered hotspots due to their proximity and contamination from industrial waste and use of firefighting foam.
    - 30% of private drinking wells in these areas had PFAS contamination above health-based standards.
    - Some wells have PFAS concentrations hundreds to thousands of times over health-based standards.
- Continued monitoring of public water systems and expanded testing of private wells, transparent reporting, and proactive remediation are critical for protecting public health in Wisconsin.

## Definitions

**Hazard Index:** A risk assessment tool, mainly utilized by the U.S. EPA, that evaluates the noncancer health risk from simultaneous exposure to multiple chemicals sharing similar toxic effects.

**Maximum Contaminant Level (MCL):** A water quality standard established by the United States Environmental Protection Agency to protect public health and well-being, representing the highest level of a contaminant that is allowed in drinking water.

**Per- and polyfluoroalkyl substances (PFAS):** A large group of thousands of manufactured compounds characterized by a carbon-fluorine chain to which functional groups are added. The following six PFAS have drinking water standards: PFOA; PFOS; GenX ; PFBS; PFHxS; PFNA.

**Private drinking well:** A drinking water source not part of a public water system, typically serving a single home

**Public water system:** A system providing water for human consumption to at least 15 connections or regularly serving an average of 25 people each day for at least 60 days each year.

- **Community public water systems:** Public water systems serving people where they live.
  - **Municipal community systems:** Public water systems owned by a municipality (city, village, etc.)
  - **Other-than-municipal community systems:** Community public water systems privately-owned and serving residences in mobile home parks, apartments, and housing subdivisions.
- **Non-Community public water systems:** Public water systems serving people at work, school or dining or entertainment establishments.
  - **Non-transient, non-community systems:** Non-community public water systems serving the same people day after day (e.g., workplaces, schools, daycares)
  - **Transient non-community systems:** Non-community public water systems not serving the same population consistently (e.g., bars, restaurants, motels, campgrounds, gas stations).

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## Contents

1	<b>Introduction</b>
1	<b>Health Impacts of PFAS</b>
3	<b>PFAS Exposure Routes</b>
4	<b>Drinking Water Contamination in Wisconsin</b>
11	<b>Current Drinking Water Recommendations and Future Policy Recommendations</b>
14	<b>References</b>
15	<b>Additional Resources</b>
15	<b>Appendix</b>



## Introduction

PFAS, which stands for per- and polyfluoroalkyl substances, are a class of thousands of synthetic chemicals that have been produced since the 1940s. The unique physical and chemical characteristics of PFAS give them functional properties valuable in a variety of industrial and commercial applications, including resistance to oil, water, and heat. One of the best-known uses of these chemicals is firefighting foam, as its heat-resistance allows it to quickly extinguish intense fires. PFAS are also present in our everyday lives, commonly used in textile manufacturing (think waterproof outerwear or stain- or flame-resistant carpet or upholstery), grease-resistant paper products (e.g., fast food wrappers, pizza boxes), household products (non-stick cookware), metal plating processes, medical products, personal care products (shampoos, dental floss), and many other products.

A defining characteristic of PFAS structure is a carbon-fluorine chain. The carbon-fluorine bond is very strong, so PFAS do not break down easily, leading some to refer to PFAS as “forever chemicals.” This strong bond, while useful in industrial and commercial applications, also means that once PFAS get into the environment or our bodies, they do not break down, and environmental contamination continues to build as more PFAS are introduced to the environment.



## Human Health Effects of PFAS

PFAS exposure has been connected to a variety of human health impacts. Ongoing research is studying how different levels of PFAS exposure influence specific health outcomes, even as it is known that any exposure to PFAS can pose health risks. Exposure to high levels of PFAS has been linked to increased cholesterol levels, reduced vaccine effectiveness, increased risk of thyroid disease, increased risk of some cancers, increased risk of conditions such as high blood pressure or pre-eclampsia during pregnancy, and may lower infant birth weights (Wisconsin Department of Health Services, 2025).

Peer-reviewed scientific studies have found that PFAS exposure is associated with decreased fertility, developmental effects in children, disruption of hormone function, and increased risk of metabolic outcomes such as obesity (ATSDR 2022). Epidemiological studies have linked PFAS exposure to reproductive and developmental effects, including impacts on fetal growth and child development, while evidence also suggests PFAS act as endocrine disruptors affecting thyroid and reproductive hormones (Sunderland et al). In addition, toxicological

and animal studies demonstrate that PFAS exposure can adversely affect development, immune function, and liver health, providing biological plausibility for the health effects observed in human populations (US EPA 2024).

Much of the research on the health effects of PFAS are based on animal studies, and it should be noted that animals and humans may not react to PFAS in the same way. Furthermore, the health effects of PFAS are challenging to identify and understand due to the thousands of varieties of PFAS chemicals, different types of exposure people face at various points in their lifetimes, individual factors (e.g., pre-existing conditions), and other determinants of health (Wisconsin Department of Health Services, 2025). Thus, more scientific research is needed to fully understand the relationship between various PFAS exposures and impacts on human health.

To date, we are unaware of any quantifications of the health burden of PFAS exposure in Wisconsin specifically. One study estimated medical burdens (including direct medical costs and lost productivity from illness) from PFAS in the United States as \$6-63 billion annually (Obeskov 2023). Another analysis of

PFAS exposures in Europe estimated direct medical costs of \$52-82 billion annually (Goldman 2019). This would result in equivalent costs in the United States (accounting for population differences) of \$37-59 billion annually (Cordner 2021). Assuming that these per-person medical costs are representative of Wisconsin, these analyses suggest healthcare burdens of \$107 million to \$1.1 billion from PFAS in the state.<sup>1</sup>

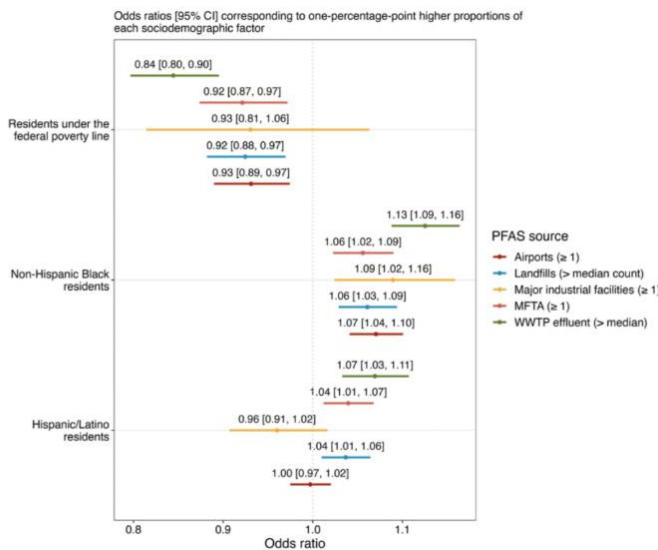
The EPA estimated that its PFAS drinking water standards would result in \$1.5 billion in avoided health costs annually in the United States from avoided developmental effects, cardiovascular effects, and kidney cancers (EPA 2024). Assuming that these effects are evenly distributed across the population in the country, Wisconsin could expect to see over \$21 million annually in avoided health costs from reduced PFAS in public drinking water supplies.<sup>1</sup> Importantly, the EPA recognizes a number of additional health benefits of the drinking water standards that they could not quantify, including immune, endocrine, metabolic effects and reproductive effects (EPA 2024), and thus these estimated benefits are conservative.

Finally, Baluja et al. (2025) found that maternal consumption of PFAS-contaminated water significantly increased the risk of preterm birth, low birthweight births, and infant mortality. These

adverse birth outcomes are estimated to have a social cost (including medication costs, additional education services, and lost labor productivity) of over \$13 billion annually in the United States, including \$230 million in Wisconsin (Baluja et al. 2025).

Some groups may be more vulnerable to PFAS exposure. Children are particularly susceptible due to their rapidly developing bodies, and an increased number of exposure pathways. Young children may drink formula mixed with PFAS-containing water, ingest more contaminated dust while crawling; put objects that may contain PFAS in their mouths, and drink more contaminated water or breathe more contaminated air per pound of body weight than adults. Additionally, some adults may experience more PFAS exposure due to their jobs, such as industrial workers involved with PFAS-containing materials, members of the military, or firefighters.

PFAS may also disproportionately impact communities of color or populations with a lower socioeconomic status. This is because sources of PFAS pollution, such as major manufacturers, airports, military bases, wastewater treatment plants, and landfills, are more often located in these communities (Fig. 1).



**Figure 1.** Community sociodemographic characteristic associations with the presence of PFAS sources in watersheds of community water systems across 18 states, including Wisconsin. An odds ratio above 1 indicates that the community is more likely to be closer to a given PFAS source. Communities with higher proportions of people of color are more likely to live near PFAS sources, such as airports using firefighting foam, industrial facilities, landfills, military fire training areas (MFTAs), and wastewater treatment plants (WWTPs), reflecting historical segregation, selective migration, and limited influence in siting decisions. These findings highlight that environmental hazards are disproportionately located near marginalized communities (Liddie 2023).

<sup>1</sup> Calculated by applying the proportion of Wisconsin’s population (5.9 million) to the total United States population (331 million) in the 2020 US Census to the estimated health burden in the United States.

## PFAS Exposure Routes

PFAS are ubiquitous in our society, and there are a variety of pathways through which PFAS get into the environment. Wastewater treatment plants (WWTPs) and landfills serve as centralized collection points for a community's waste, which often contains PFAS. PFAS not removed during treatment at a WWTP will be discharged back into the environment along with all the other treated water. Furthermore, biosolids from WWTPs are commonly spread on agricultural fields to provide nutrients, and this land application represents another source of PFAS discharged to the environment. Similarly, landfills can leak PFAS into the environment as the waste is broken down and mixes with stormwater. Industries directly using PFAS in their operations can release PFAS to the environment in their water discharges or air emissions. Another important source of PFAS to the environment is the use of PFAS-containing firefighting foam, which has historically been used in practice exercises and true emergencies, most commonly at airports or military bases. Once in the environment, PFAS are very mobile and can infiltrate groundwater and surface waters, contaminating our drinking water sources. In addition to waterways, PFAS have been found in soil, air, household dust, and accumulated in fish and wildlife that have been exposed to contamination (Wisconsin DNR 2025). The ubiquity of PFAS in the environment means that there are a variety of routes through which PFAS can get into our bodies and nearly everyone is exposed. Indeed, studies suggest that 98% of the United States population has PFAS in their bodies (ATSDR 2022). In Wisconsin, higher PFAS levels in blood were found in older adults, males, and non-Hispanic white residents (Pomazal 2024). Additional research is needed to understand why this is the case despite other studies showing non-white residents may be exposed to more PFAS environmental pollution, but one potential explanation is the relative importance of exposure routes (e.g., exposure from consumer products and food vs. drinking water or inhalation of airborne emissions).

When establishing drinking water standards for PFOS and PFOA, the EPA estimated that 20% of a person's exposure to these chemicals comes from drinking water (Hu et al 2019, US EPA 2024). This is consistent with a study of tap water contributions to PFAS concentration in United States women, finding that tap water contributed 2-34% of five different PFAS compounds, including 11-14% of PFOA and 5-7% of PFOS exposure. However, near contaminated sites, drinking water can contribute up to 75-90% of total PFAS exposure (Emmett 2006, Vestergren & Cousins 2009; Xu et al. 2020).

Thus, for people not living near contamination sites, the majority of PFAS exposure comes from other routes including diet, consumer products, and household dust. Of these, diet is thought to be the primary route of exposure, representing 64% of PFOA exposure, 85% of PFOS exposure and 40-90% of exposure for other PFAS (Sunderland 2019).

Dietary exposure comes from food that has taken up PFAS during growth and production (e.g., seafood, meat and other animal products) and from PFAS migrating into the food from contact with food packaging materials containing PFAS. PFAS are also used in food packaging materials due to their oil and water-repellent properties. Indeed, studies have reported that consumption of food packaged in these materials, such as fast food, pizza and salty snacks, is associated with elevated levels of numerous PFAS compounds (Park et al. 2019, Susmann et al. 2019).

Another study found that contaminated house dust contributed 13% of PFOA, 3% of PFOS, 7% of PFNA, and 25% of PFHxS exposure. (DeLuca 2022) While all sources of PFAS exposure need to be addressed, the focus of this brief is on drinking water contamination in Wisconsin.



## Drinking Water Contamination in Wisconsin

### Public Drinking Water Contamination

Wisconsin's 2022 PFAS drinking water rule required most types of public drinking water systems<sup>2</sup> to test for PFAS in the water being distributed to homes. This testing requirement provides an opportunity to understand the scope of PFAS drinking water contamination in Wisconsin.

We obtained all public water system PFAS testing results from August 2022 through December 2025 from the WDNR's Drinking Water System Portal (WDNR 2026). We analyzed the data for maximum PFOS concentration, PFOA concentration, and EPA's hazard index for each system. The hazard index accounts for mixtures of PFAS compounds and represents the ratio of observed concentration of a given PFAS compound to that compound's health-based standard. The EPA's hazard index includes four PFAS compounds (PFNA, PFHxS, PFBS, and GenX) and a hazard index equal to or greater than 1 indicates a potential health risk. Our analysis focused on this subset of PFAS because they are the only ones with federal drinking water standards.

We compared maximum PFOA, PFOS, and hazard index values in each system to the EPA's health-based drinking water standards of four parts per trillion (ppt) for PFOA and PFOS or a hazard index of 1 for PFNA, PFHxS, PFBS, and GenX.

To look at broader PFAS contamination beyond the six compounds with drinking water standards, we also looked at Wisconsin DHS hazard index values in each system. Similar to the EPA hazard index, the DHS hazard index represents the ratio of the observed concentration of a given PFAS compound to that compound's recommended health advisory limit. The DHS hazard index contains 18 PFAS compounds and thus allows us to identify contamination by additional PFAS.<sup>3</sup>

Wisconsin's public water system testing indicates that PFAS detections are common. All but one of the counties (70 of the 71) with public water systems reporting PFAS test results had detections, with only Green County not having any detections (Fig. 2). Detections of any PFAS were found in 32% of all tested public water systems across the state (Table 1). PFAS were more frequently detected in municipal community systems than in smaller systems (Table 1).

While PFAS detections are widespread, extremely high PFAS contamination is rare in the state. For example, only three systems had concentrations above the current state drinking water standard of 70 ppt<sup>4</sup> for PFOA and PFOS (Appendix A). A total of 101 systems (accounting for 5% of all tested systems) had maximum PFAS concentrations above any of the EPA MCLs (Table 2).<sup>5</sup>

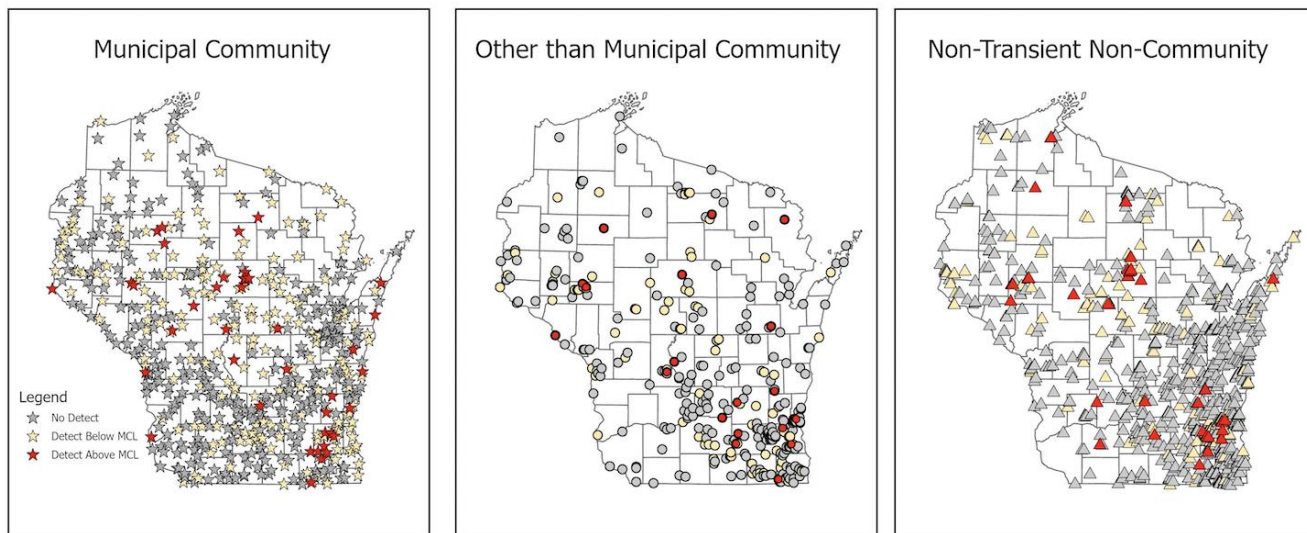
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<sup>2</sup> Municipal community systems, non-municipal community systems, and non-transient, non-community systems were all subject to the testing requirement. Transient, non-community systems, such as bars and restaurants, are not required to test for PFAS.

<sup>3</sup> DONA, PFBS, PFHxS, PFNA, PFDA, PFTeA, PFUnA, PFD<sub>o</sub>A, PFODA, HFPO-DA, PFBA, PFHxA, N-EtFOSE, NEtFOSAA, NEtFOSA, FOSA, PFOA, and PFOS. As of February 2025, the DHS removed PFOA, PFOS, NEtFOSE, NEtFOSAA, NEtFOSA, and FOSA from the hazard index, leaving the remaining 12 compounds in subsequent hazard index calculations.

<sup>4</sup> As of January 2026, the Wisconsin DNR was undergoing rulemaking to update the state drinking water standards (70 parts per trillion for PFOA and PFOS) to align with the EPA's maximum contaminant levels (4 parts per trillion for PFOA and PFOS or hazard index greater than 1).

<sup>5</sup> Note that these results do not include systems like Wausau Water Works that identified and addressed PFAS contamination prior to the drinking water rule being effective in 2022



**Figure 2.** Wisconsin public water system PFAS testing results through December 2025. PFAS detections are represented relative to the US EPA’s maximum contaminant levels (MCL) of 4 parts per trillion for PFOA or PFOS or hazard index greater than 1 for PFHxS, PFNA, GenX, and PFBS. Municipal community systems are city-run water supplies serving residents at their homes year-round; other-than-municipal community systems are privately operated wells that also serve people at their homes year-round (e.g., apartments or mobile home parks); non-transient non-community systems are wells that regularly serve the same group of people but not at their residences (e.g., schools or workplaces).

**Table 1.** Percent of public water systems with PFAS detections. Note: PFAS (PFOS, PFBS) were detected in three of the 11 transient, non-community wells\* that have been tested as of December 2025.

	All Public Systems	Municipal Community <sup>1</sup>	Other-Than-Municipal Community <sup>2</sup>	Non-Transient, Non-community <sup>3</sup>
Any PFAS <sup>4</sup>	32%	44%	30%	25%
PFOA	19%	28%	17%	14%
PFOS	18%	29%	15%	12%
PFBS	25%	38%	23%	18%
PFHxS	20%	31%	20%	13%
PFNA	2%	4%	1%	2%
HFPO-DA	0%	0%	0%	0%

<sup>1</sup>A public water system owned by a municipality (e.g., city, village) providing water to residences.

<sup>2</sup>A privately-owned public water system providing water to residences (e.g., apartment buildings, mobile home parks, housing subdivisions)

<sup>3</sup>A privately-owned well providing water to people at their workplace, school, or daycares.

<sup>4</sup>Includes detections of any of the 18 PFAS compounds included in the DHS Hazard Index (included here to capture a broader range of PFAS contamination than the six compounds with a federal drinking water standard)

\*Transient, non-community systems are privately-owned systems serving different people day to day at places other than their residences (e.g., restaurants, hotels, campgrounds)

**Table 2.** Count and percentage of Wisconsin public drinking water systems with PFAS contamination that exceeds EPA maximum contaminant levels.

PFAS Contamination Threshold	All Public Systems (n=1,916)	Municipal Community Systems (n=569)	Other-than Municipal Community (n=419)	Non-transient, non-community (n=917)	Transient, non-community (n=11)
PFOS >4 ppt	68 (3.6%)	28 (4.9%)	12 (2.9%)	26 (2.8%)	2
PFOA >4 ppt	75 (3.9%)	31 (5.5%)	15 (3.6%)	29 (3.2%)	0
EPA Hazard Index > 1	32 (1.7%)	21 (3.7%)	3 (0.7%)	8 (0.9%)	0
Any EPA MCL (PFOA, PFOS, EPA HI >1) <sup>a</sup>	101 (5.1%)	41 (7.2%)	20 (4.8%)	38 (4.1%)	2

<sup>a</sup> Count and percentage of unique systems that exceed any EPA maximum contaminant level. For example, a single system may have both PFOS and PFOA greater than 4 ppt

Marathon and Waukesha counties had the most systems with PFAS contamination (Table 3). Marathon and Rusk counties each had about 40% of public water systems exceeding at least one of the EPA MCL (Table 3). Notably, 17 schools or daycare facilities had PFAS contamination exceeding the EPA’s MCL. Another 17 systems at or above the EPA’s MCL were systems that served mobile home parks. This contamination underscores the need to prioritize resources to assist with treatment of contaminated source water to those most vulnerable and least able to afford treatment. Young children are most

vulnerable to the toxic health effects of PFAS exposure, so assisting the schools and daycares with contamination exceeding the health-based standards should get priority for financial assistance to address their contamination. Similarly, mobile home parks represent another vulnerable population: those with lower income and less power to address drinking water contamination on their own.

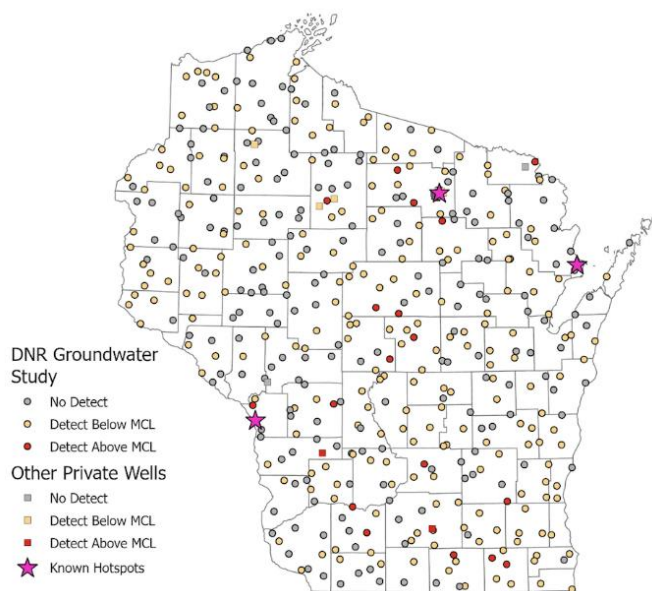
The systems with the 10 highest concentrations for PFOS, PFOA, and EPA’s hazard index are summarized in the Appendix.

**Table 3.** Wisconsin counties ranked by number or percent of public water systems above any EPA Maximum Contaminant Level. The top 10 counties with the highest values for each metric are shown.

County	Count of systems that exceeded at least one health-based standard (percent of systems in parentheses)	County	Percentage of systems that exceeded at least one health-based standard (count of systems in parentheses)
Marathon	18 (39%)	Rusk	40% (4)
Waukesha	13 (8%)	Marathon	39% (18)
Washington	8 (16%)	Eau Claire	21% (7)
Eau Claire	7 (21%)	Lincoln	20% (2)
Dodge	4 (8%)	Washington	16% (8)
Jefferson	4 (8%)	Clark	14% (3)
Rusk	4 (40%)	Adams	14% (2)
Clark	3 (14%)	Oneida	13% (3)
Oneida	3 (13%)	Door	13% (2)
Walworth	3 (6%)	Crawford	11% (1)
Wood	3 (12%)		

### Private Well Contamination

There is relatively little testing of PFAS in private wells in Wisconsin because there is no requirement for private wells to test for PFAS. In this section, we explore what information is available, largely based on a Wisconsin DNR study testing 450 private wells around the state during the summer and fall of 2022, as well as summaries of contamination identified in the Town of Stella, Marinette/Peshtigo area, and the Town of Campbell/French Island (Figure 3).



**Figure 3.** The map shows the various private water system wells across the state of Wisconsin and their PFAS levels. The map distinguishes between the wells represented in the DNR’s random testing of 450 private wells sourcing water from shallow aquifers. The DNR’s testing database also contained tests from approximately 30 other private wells tested through March 2025, excluding tests from the Town of Stella (detailed below). The map also highlights the three known hotspots for private well PFAS contamination, including the Town of Stella, Town of Campbell, and Peshtigo/ Marinette.

### Private Well Contamination: PFAS Shallow Groundwater Study

The WDNR, in partnership with the Wisconsin State Laboratory of Hygiene and the University of Wisconsin- Stevens Point, collected drinking water samples from Wisconsin homes that contained shallow (no deeper than 40 ft) private wells to assess the amount of PFAS in private groundwater wells throughout the state in 2022. (WDNR 2025). Shallow groundwater was selected for monitoring as these wells can provide early warning signals to the overall condition of groundwater resources because shallow aquifers are generally more susceptible to contamination. The samples were tested for 44 PFAS compounds. The purpose of this study was to identify the current presence of PFAS in shallow groundwater and to better understand what the sources and levels of these contaminants are. Analyzing groundwater contamination is crucial in understanding drinking

water quality in the state as over 95% of Wisconsin’s communities and about 70% of Wisconsin residents rely on groundwater for their water supply (WDNR 2025).

PFAS were detected in 71% of the tested wells (Silver et al. 2023). PFBA was the most frequently detected compound (46% of samples), followed by PFOA (45% of samples). However, few of these overall samples were above the EPA MCL (19 wells or 4% of all samples). PFAS were most frequently detected in developed areas (89% of wells had detections) followed by forested (70% detection rate), grassland (69% detection rate), and agricultural areas (65% detection rate). Developed areas also had the highest median PFAS concentration. However, the wells with the overall highest concentrations were found in agricultural or grassland areas. Forested areas, on the other hand, had the lowest overall levels of PFAS (Silver et al. 2023).

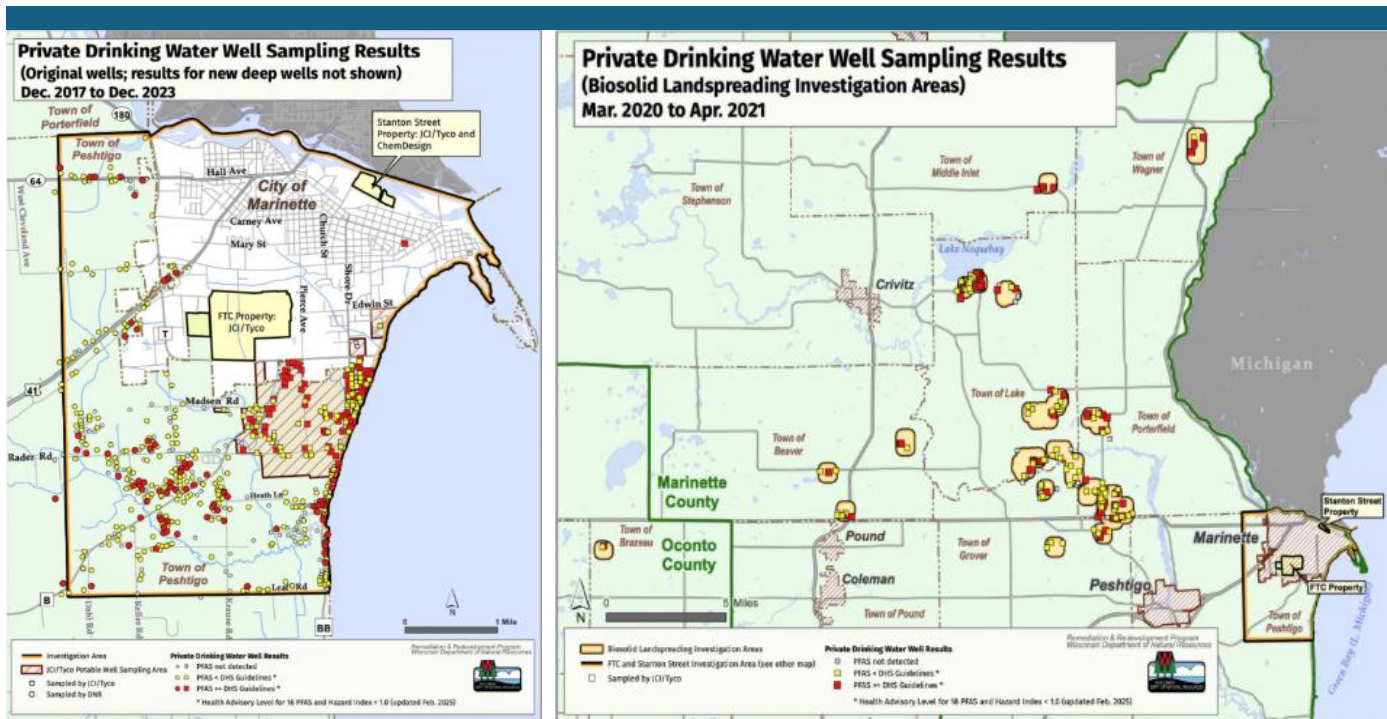
This study suggests that PFAS contamination in Wisconsin’s shallow groundwater is widespread, at least at low levels. To better understand its extent, additional targeted sampling is needed, particularly around known hotspots. For example, a site in the Town of Stella had a PFOA concentration of 11,300 ppt which is 161x the current state drinking standard

of 70ppt and nearly 3,000x the EPA MCL of 4 ppt. Follow-up testing identified at least 31 nearby wells exceeding 1,000 ppt (see Town of Stella details below). The study also recommended broader geographic screening of private wells and surface waters in areas with potential PFAS sources.

**Private Well Contamination: Peshtigo/Marinette**

The Peshtigo and Marinette area was among the first areas in Wisconsin discovered to have extensive PFAS contamination in private wells. The PFAS contamination in this area is primarily linked to the Johnson Controls/Tyco Fire Technology Center (FTC) and associated biosolid land spreading fields. These facilities produce and test aqueous film-forming foam (AFFF), a firefighting foam which can contaminate soil, groundwater, and surface water.

Results from the private well sampling in the area impacted by the FTC include 588 tested wells, with 163 wells (28%) being above current DHS guidelines<sup>6</sup>, 302 wells (51%) with PFAS detections below DHS guidelines and 123 wells (15%) with no PFAS detections. In the land spreading area, 188 wells were tested, with 73 (39%) above DHS guidelines. Some wells in these areas had PFOA concentrations over 2,000 ppt, which is 500 times the health-based drinking water standard.



**Figure 4.** Areas that have been investigated for PFAS drinking water contamination in Peshtigo and Marinette. The main PFAS sources are highlighted, including the biosolids land spreading fields, the Fire Technology Center (FTC) Property and the Stanton Street Property, a site owned by Johnson Controls and Tyco Fire Products, PFAS-containing materials are processed at this site. Investigations in this area have been ongoing since 2017.

<sup>6</sup> These guidelines refer to the February 2025 guidance, consistent with the EPA MCL values

### **Private Well Contamination: French Island/Town of Campbell**

The Town of Campbell is another PFAS drinking water contamination hotspot in Wisconsin. Drinking water contamination in this area is linked to the use of AFFF firefighting foam at the La Crosse Regional Airport on French Island.



**Figure 5.** Drinking water test results on French Island in the Town of Campbell. The red circles indicate wells with concentrations above health-based recommendations.

As of September 2021, there was PFAS sampling for 539 private drinking water wells on French Island (Fig. 5). Of these wells tested, 139 (26%) had PFAS concentrations above the 2019/2020 Wisconsin Department of Health Services (DHS) recommended groundwater standards<sup>7</sup>, with 26 wells exceeding the PFAS Hazard Index, which indicates that there are combined PFAS risks even if no single compound has surpassed a standard. Only 12 wells (2%) showed no PFAS detections

### **Private Well Contamination: Town of Stella**

The Town of Stella in Oneida County is the most recently identified hotspot for PFAS drinking water contamination in Wisconsin. As of June 2025, the DNR has received PFAS results for 241 private wells in this area (Fig. 6). Of these results, 88 wells reported PFAS concentrations above DHS's current recommended guidelines.<sup>88</sup> Overall, 39 wells reported PFAS detections below the DHS guidelines, and the remaining 122 wells had no detectable PFAS. Some private wells in Stella have the highest concentrations of PFAS in the state, including concentrations over 10,000 parts per trillion (over 2,500 times the EPA drinking water standard).

In September 2025 the DNR named paper companies as a responsible party for the PFAS contamination in the area due to historic land spreading of papermill industrial sludge contaminated with PFAS (Kaeding 2025).

<sup>7</sup> Note that the standards referred to here are the Department of Health Services Cycle 11 recommendations. The most recent recommendations from DHS, issued in February 2025, have lowered the recommended standards to align with EPA maximum contaminant levels. Thus, the number of wells exceeding current health-based recommendations is higher.

<sup>8</sup> These guidelines refer to the February 2025 guidance

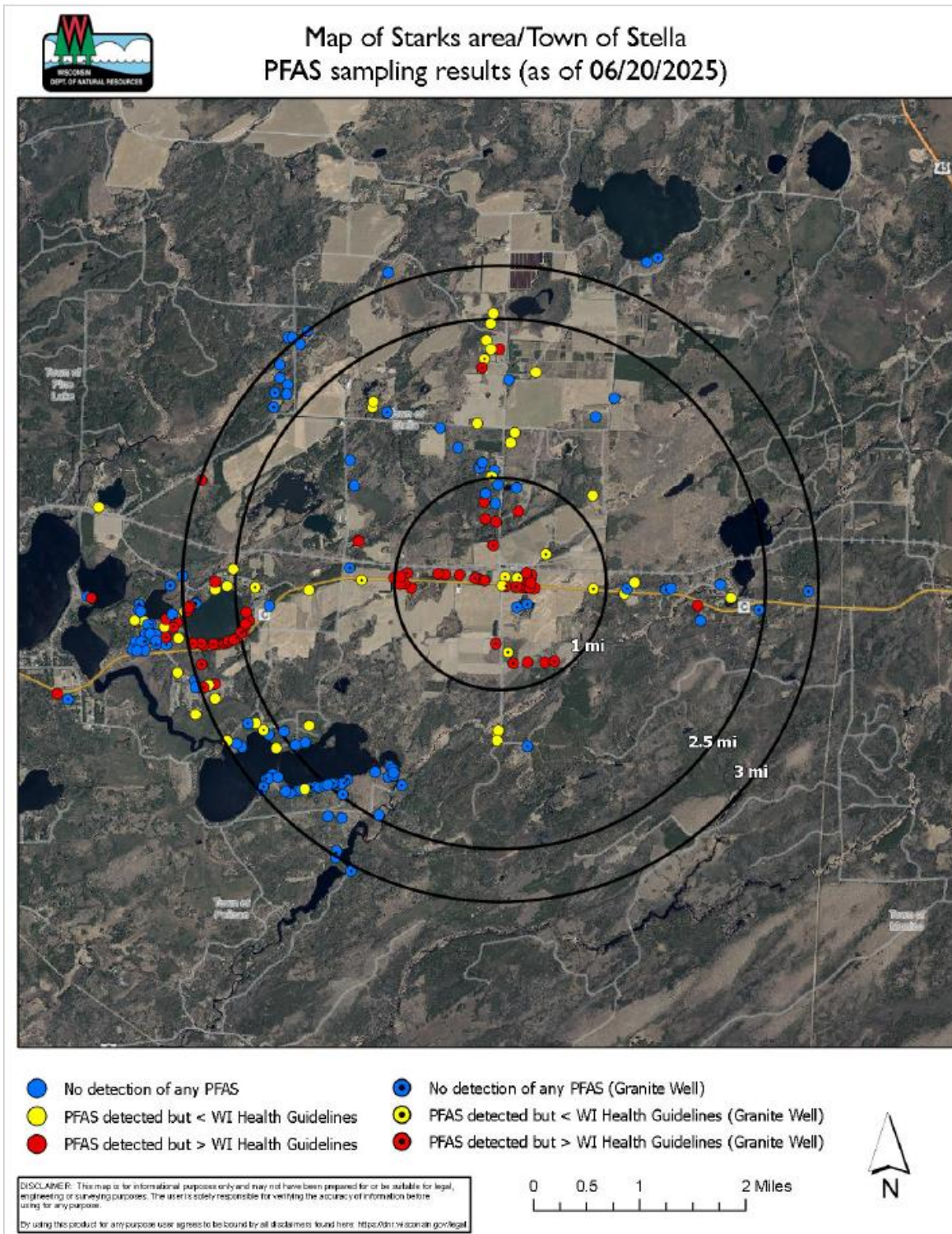


Figure 6. Private wells tested for PFAS in and around the Town of Stella as of June 2025.

## Current Drinking Water Regulations and Policy Recommendations

In 2022, the DNR established a state public drinking water maximum contaminant level (MCL) of 70 parts per trillion (ppt) for PFOA and PFOS, which is currently in effect. This means that public water systems must ensure that the water they are distributing to their customers is below this MCL.

In 2024, the EPA established federal public drinking water standards for five individual PFAS chemicals: PFOA (4 ppt), PFOS (4 ppt), PFHxS (10 ppt), PFNA (10 ppt), GenX (HFPO-DA; 10 ppt), as well as a mixture of PFHxS, PFNA, GenX, and PFBS (hazard index >1, as described above in the definitions section). The federal PFAS rule also requires public drinking water systems to monitor PFAS, allowing three years to complete the initial monitoring, followed by ongoing compliance monitoring thereafter. In Wisconsin, the Department of Natural Resources implemented the federal PFAS rule by requiring public water systems to begin PFAS monitoring and by conducting extensive statewide sampling of drinking water, groundwater, and surface waters to assess the scope of contamination and inform future drinking water standards.

Due to Federal requirements, public drinking water systems are also required to educate the public and

provide information on the levels of the six regulated PFAS in their drinking water beginning in 2027.

Following the finalization of EPA's federal drinking water standards, the DNR notified public water systems in 2024 of the new federal MCLs and the roughly three-year window to incorporate them into state regulations. In fall of 2024, the Natural Resources Board approved the scope statement created by DNR to update state standards and add new ones consistent with EPA regulations, and by June 2025 the DNR had completed a draft PFAS rule revision reflecting the EPA's MCLs and released it for public comment. This implementation is still in progress.

Currently, Wisconsin does not have groundwater quality standards for PFAS. While public water systems are regulated under state drinking water standards established in Wis. Admin. Code s. NR 809, private wells remain unprotected. Groundwater quality standards for PFAS are essential to protect the health of the 25–30% of Wisconsinites who rely on private wells and to enable the state to provide cost-sharing for remediation of PFAS-contaminated private wells. For these reasons, establishing these standards is a priority.

Addressing PFAS drinking water contamination requires a multi-faceted approach due to the ubiquity of PFAS in society. The Wisconsin PFAS Action Council (WisPAC, established in 2019 and active through 2022) developed statewide initiatives to address growing public health and environmental concerns regarding PFAS in Wisconsin in its Wisconsin PFAS Action Plan. The state's ongoing response to PFAS contamination spans environmental protection, public health, waste management, and community engagement. To coordinate these efforts, recommendations have been organized into eight thematic areas that together provide a strategic framework for statewide PFAS management. Here, we summarize these eight areas with some key policies or actions that fit within that theme.

### 1. Standard Setting

Adopting protective environmental standards is essential to minimize harmful exposure to PFAS.

- DNR's proposed Cycle 12 groundwater standards provide health-based benchmarks that would guide cleanup, enforcement, and private drinking water protection across Wisconsin.
- Establishing drinking water and groundwater standards for additional PFAS compounds as sufficient information becomes available.

### 2. Sampling

Expanded sampling is needed to understand the extent of PFAS contamination.

- Expanding private well sampling will help identify impacts, particularly in rural areas that could be at risk of significant contamination, as identified by the WDNR's shallow groundwater study discussed above.
- Increased sampling of PFAS in municipal biosolids and industrial wastes and sludges is needed to ensure responsible land-based disposal of these materials.

### 3. **Pollution Prevention**

Preventing PFAS from entering the environment in the first place remains one of the most effective long-term strategies. Recommendations include:

- Developing Best Management Practices (BMPs) for PFAS-containing waste covering handling, storage, treatment, and disposal to prevent further releases. Once EPA advances research on PFAS destruction and disposal technologies, these BMPs should be incorporated into Wisconsin's administrative rules.
- Identify PFAS sources and reduce discharges to wastewater facilities. This includes using wastewater discharge permits to enforce new surface water standards, requiring monitoring and source reduction plans for facilities exceeding limits, and developing strategies for biosolids to manage these persistent contaminants.
- Develop clear management recommendations for PFAS-containing landfill leachate in partnership with stakeholders, focusing on pollution prevention, improved management at treatment plants (POTWs), and exploring advanced treatment technologies.

### 4. **Engagement, Education, and Communication**

Effective communication and coordination are essential for a successful PFAS response.

Strengthening cross-sector communication, such as routine sharing of PFAS recommendations between DNR and DHS, would support unified public health messaging.

- Public right-to-know initiatives, including recently introduced legislation to inform private well owners of potential contamination, would improve awareness of contamination risks.
- Increased information and resources on PFAS in Wisconsin food products, including outreach on fish and wildlife consumption advisories.
- Collaboration with airports, firefighting associations, and federal agencies is important for reducing exposures related to Class B firefighting activities and military installations. This collaboration includes state laws restricting foam, creation of a PFAS fund, and airport cleanups, all aimed at reducing environmental contamination from these sources.
- Providing farmers with information regarding PFAS levels in biosolids they accept on their fields and what pesticides have PFAS before purchasing or applying.
- Developing exposure-reduction guidance for higher-risk public sector employees
- Centering environmental justice in decision-making ensures that communities most affected by PFAS receive meaningful support.

### 5. **Research and Knowledge**

Improved understanding of PFAS is critical to effective action in other thematic areas. Important research needs include:

- Evaluating emerging and other less-studied PFAS compounds
- Analyzing environmental fate and transport, including within agricultural systems and how PFAS may contaminate food systems.
- Assessing treatment and destruction technologies
- Improving environmental monitoring

- Expanding biomonitoring and health-impact research. Biomonitoring refers to a process that detects PFAS in human tissues such as blood or urine to evaluate exposure, identify contamination sources (like drinking water or firefighting foams), assess population-level exposure, and guide public health actions.

## 6. Phase out the use of PFAS

Reducing reliance on PFAS is crucial for preventing future contamination. Recommendations include:

- Establishing product stewardship mechanisms that hold manufacturers and sellers accountable for reducing the health and environmental impacts of PFAS across a product's entire life cycle, from design and production through use and disposal
- Minimizing state purchasing of PFAS-containing products such as firefighting foam
- Assessing essential versus non-essential PFAS uses and restricting non-essential uses
- Researching effective alternatives to PFAS for existing essential uses
- Securing Funding for long-term cleanup and prevention

## 7. Investments to Address Contamination

Local governments often bear the greatest financial burden from PFAS impacts. Providing financial tools, such as grants, loans, or state-supported funding mechanisms, would support drinking water treatment, site investigation, and remediation activities.

- If significant agricultural contamination is found, it will be important to have programs to assist agricultural landowners in clean-up and cost defrayal.
  - The Maine DACF PFAS Assistance & Response Program is an example to consider. The Maine Department of Agriculture, Conservation and Forestry (DACF) runs a comprehensive PFAS Assistance initiative for farms impacted by PFAS contamination. This includes financial and technical support to help keep farms operational and safe (Maine Department of Agriculture, Conservation and Forestry 2025).

## 8. Identify and Address Historic Discharges

Finally, addressing legacy contamination requires robust legal and legislative tools. Holding polluters accountable will help ensure responsible parties contribute to cleanup and deter future violations.

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## Additional Resources

ATSDR/CDC: [PFAS and your health](#)

Clean Wisconsin: [Protecting our Health from PFAS](#)

Environmental Working Group PFAS Contamination in the US: [Interactive Map](#)

Interstate Technology & Regulatory Council: [PFAS Homepage](#)

United States Environmental Protection Agency: [Per-and Polyfluoroalkyl Substances](#)

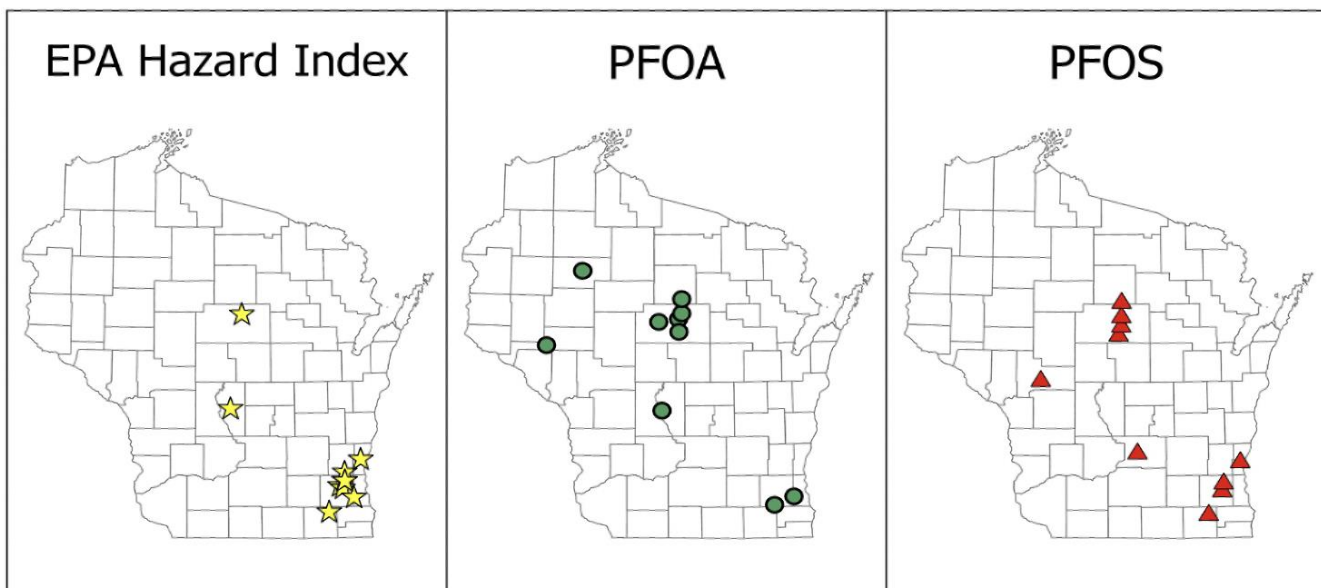
Wisconsin DHS: [PFAS Health Information](#)

Wisconsin DNR: [PFAS Resources for the Community and Interactive Data Viewer](#)

Wisconsin Groundwater Coordinating Council: [PFAS Recommendations](#)

Wisconsin PFAS Action Council: [Wisconsin PFAS Action Plan](#)

## APPENDIX



**Figure A.1.** The map panel shows the Wisconsin public water systems with the highest contaminant levels. The yellow stars indicate the highest EPA Hazard Index levels (representing the cumulative contamination by four PFAS compounds: PFNA, PFHxS, PFBS, and GenX), the green circles indicate the highest PFOA levels and the red triangles indicate the highest PFOS levels.

**Table A.1:** Public water systems with the 10 highest PFOA concentrations (EPA MCL = 4 ppt)

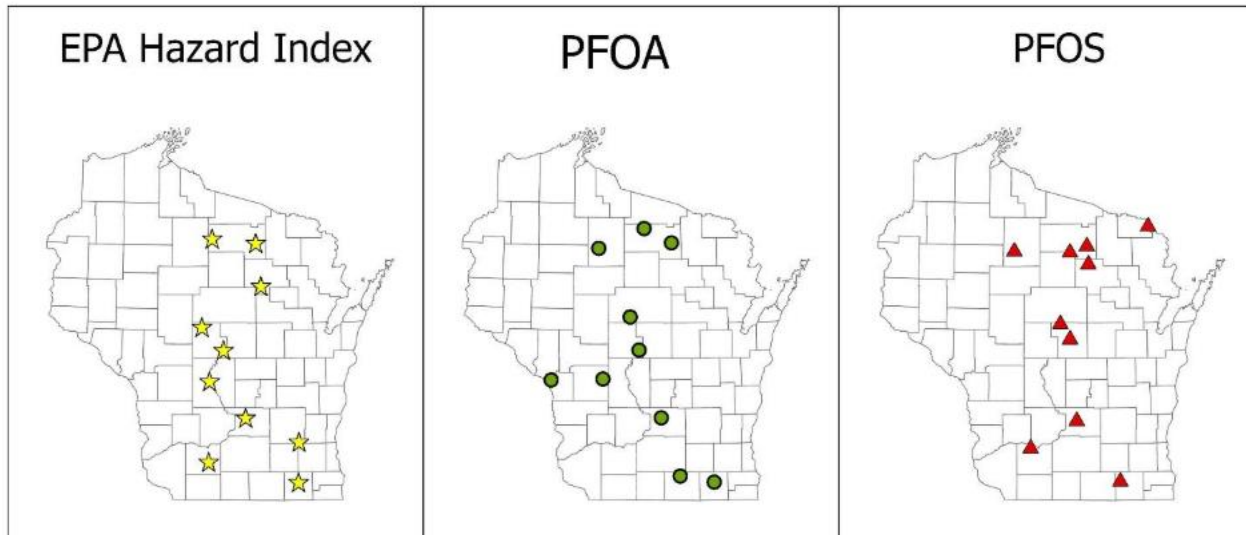
Public Water System Name	Public Water System Type	County	Maximum PFOA (ppt)
3M CO GREYSTONE PLANT	Non-transient, non-community	Marathon	310
WESTWIND ESTATES	Other than Municipal, community	Adams	126
PINE RIVER SCHOOL FOR YOUNG LEARNERS	Non-transient, non-community	Lincoln	68
ANTHONY ACRES SCHOOL	Non-transient, non-community	Eau Claire	49
EDGAR WATERWORKS	Municipal community	Marathon	49
HALES HAPPINESS SUBDIVISION	Other than Municipal, community	Milwaukee	31
MOSINEE EAST SYSTEM	Municipal community	Marathon	26
WILLOW LANE ESTATES	Other than Municipal, community	Rusk	26
MUKWONAGO WATERWORKS	Municipal community	Waukesha	25
VERITAS STEEL 2	Non-transient, non-community	Marathon	25

**Table A.2:** Public water systems with the 10 highest PFOS concentrations (EPA MCL = 4 ppt)

Public Water System Name	Public Water System Type	County	Maximum PFOS (ppt)
3M CO GREYSTONE PLANT	Non-transient, non-community	Marathon	380
PINE RIVER SCHOOL FOR YOUNG LEARNERS	Non-transient, non-community	Lincoln	93
MOSINEE EAST SYSTEM	Municipal community	Marathon	86
EAST TROY WATERWORKS	Municipal community	Walworth	51
WILLOW SPRINGS MHP 2 & 3	Other than Municipal, community	Waukesha	49
BROCKWAY SANITARY DIST 1	Municipal community	Jackson	38
ALLIANT COLUMBIA ENERGY CENTER	Non-transient, non-community	Columbia	34
RIB MOUNTAIN WATER UTILITY	Municipal community	Marathon	34
SAUKVILLE WATERWORKS	Municipal community	Ozaukee	32
PEWAUKEE CITY WATER AND SEWER UTILITY	Municipal community	Waukesha	32

**Table A.3:** Public water systems with the 10 highest EPA PFAS Hazard Index (values >1 considered hazardous)

Public Water System Name	Public Water System Type	County	Maximum EPA Hazard Index
HALES HAPPINESS SUBDIVISION	Other than Municipal, community	Milwaukee	45.6
EAST TROY WATERWORKS	Municipal community	Walworth	18.9
PEWAUKEE CITY WATER AND SEWER UTILITY	Municipal community	Waukesha	14.5
FOX BROS PIGGLY WIGGLY INC - HUBERTUS	Non-transient, non-community	Washington	7.8
ADAMS WATERWORKS	Municipal community	Adams	7.1
3M CO GREYSTONE PLANT	Non-transient, non-community	Marathon	6.9
WILLOW SPRINGS MHP 2 & 3	Other than Municipal, community	Waukesha	6.9
SAUKVILLE WATERWORKS	Municipal community	Ozaukee	6.6
WILLOW SPRINGS SCHOOL	Non-transient, non-community	Waukesha	5.7
PEWAUKEE VILLAGE WATERWORKS	Municipal community	Waukesha	4.8



**Figure A.2.** Maps showing private wells from the WDNR shallow groundwater study (Silver et al. 2023) with the highest PFAS contaminant levels. The yellow stars indicate the highest EPA Hazard Index levels (representing the cumulative contamination by four PFAS compounds: PFNA, PFHxS, PFBS, and GenX), the green circles indicate the highest PFOA levels and the red triangles indicate the highest PFOS levels.