

# 15 Years of Surface Water Pesticide Data in Wisconsin

SPECIAL REPORT



Wisconsin Department of Agriculture, Trade and Consumer Protection

*Division of Agricultural Resource Management*

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## Executive Summary

In 2007, the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), in collaboration with the Wisconsin Department of Natural Resources (DNR), created the Surface Water Sampling Program. Initiated in 2008, this program carries out surface water sampling each year with the primary objective of assessing the impact of pesticides on the quality of surface water at selected rivers, streams, and springs across Wisconsin. This ongoing initiative involves the collection of surface water samples each month between March and December, and chemical analysis by DATCP's Bureau of Laboratory Services (BLS). The calendar year 2022 marked the 15<sup>th</sup> anniversary of DATCP's consistent sampling, demonstrating a sustained commitment to monitoring and understanding the effects that pesticide use has on Wisconsin's surface water quality and ecosystems.

Since the program started in 2008, and through 2022, a total of 1,186 samples were collected from 77 sites across Wisconsin. Several sampling locations on streams and rivers were sampled consistently during the first 15 years of the Surface Water Sampling Program. Between five and 10 years, sampling was performed at locations at several streams and rivers, including the Mississippi River, the Wisconsin River, the Milwaukee River, the Root River, Fourteen Mile Creek, Tenmile Creek, and Leola Ditch.

Over the years, the number of compounds tested in each samples increased from 18 to 108 pesticide compounds, as well as nitrogen as nitrate plus nitrite. With 85,590 data points collected between 2008 and 2022, there were a total of 5,900 pesticide detections exceeding laboratory reporting limits (6.9%). A total of 56 compounds were detected at least once during the 15-year period. The three most frequently detected pesticide compounds (with at least 100 samples collected and tested) were metolachlor ethane sulfonic acid (ESA), alachlor ESA, and acetochlor ESA, found in 91.7%, 53.3%, and 31.9% of samples, respectively.

Analysis of the data indicates that pesticide detections are most prevalent during the months of May, June, and July, with June exhibiting the highest monthly detection rate at 10.7%.

Atrazine and Atrazine Total Chlorinated Residue (TCR), the sum of atrazine and three of its metabolites, exceeded the Wis. Admin. Code ch. NR 140 Enforcement Standard (ES) of 3 µg/l in 0.1% of samples tested. Wis. Admin. Code ch. NR 140 Preventive Action Limits (PAL) were also exceeded for several pesticide compounds, including acetochlor, alachlor, alachlor ESA, atrazine, atrazine TCR, cyanazine, de-ethyl atrazine, deisopropyl atrazine, diamino atrazine, and simazine.

U.S. Environmental Protection Agency (EPA) aquatic life benchmarks were exceeded in several instances by the neonicotinoid pesticides imidacloprid and clothianidin. Specifically, imidacloprid concentrations exceeded the 0.01 µg/L chronic benchmark for invertebrates in 7.8% of the samples, while clothianidin concentrations exceeded the 0.05 µg/L chronic benchmark for invertebrates in 2.4% of the samples.

Nitrogen as nitrate plus nitrite was detected in 89.6% of the samples, and concentrations exceeded the Wis. Admin. Code ch. NR 140 ES of 10 mg/L in 6.8% of the samples.

This document provides an in-depth summary of pesticide observations and trends observed over the first 15 years of data collection for the Surface Water Sampling Program.

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# Introduction

## Purpose and History of DATCP Surface Water Sampling Program

Agriculture is a major part of Wisconsin's economy, contributing over \$116 billion to it annually (Wisconsin Department of Agriculture, Trade and Consumer Protection, 2025). Growers in Wisconsin use millions of pounds of pesticides and millions of tons of fertilizers annually to grow a wide variety of crops typically produced in one Wisconsin growing season. The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP)'s Surface Water Sampling Program is one form of monitoring the agency performs to meet its statutory obligation to protect human health and the environment. Wisconsin's groundwater law, Wis. Stats. Chapter 160, requires state agencies to sample and monitor groundwater for substances related to facilities, activities, and practices under their jurisdiction that have a reasonable probability of entering the groundwater resources of the state, and to determine whether preventive action limits (PAL) or enforcement standards (ES) have been exceeded at points of standard application.

The legislative intent of the Chapter 160, Wis. Stats, also states that "a regulatory agency may take any actions within the context of regulatory programs established in statutes outside of this chapter, if those actions are necessary to protect public health and welfare or prevent a significant damaging effect on groundwater or surface water quality for present or future consumptive or non-consumptive uses."

Considering that groundwater and surface waters are highly interconnected, DATCP initiated the Surface Water Sampling Program to meet its statutory obligation to further evaluate the quality of the waters of the state and to identify areas at risk of surface water and/or groundwater pollution from routine pesticide use at agricultural fields. The Surface Water Sampling Program satisfies the following statutory monitoring requirement (Wis. Stats., Ch. §160.27):

1. Problem assessment monitoring, to detect substances in the groundwater and to assess the significance of the concentrations of the detected substances.

In 2007, DATCP coordinated with the Wisconsin Department of Natural Resources (DNR) to plan and conduct a surface water sampling project in 2008 that would examine pesticide impacts on several small streams and watersheds in Wisconsin. The original locations were 10 streams that were a part of the DNR's "wadeable" stream sampling project. Additionally, these 10 streams were selected based on the percentage of agricultural land present in each streams' respective drainage basin. Samples were collected monthly from April to September. The goal was to compare water samples prior to pesticide application (April), during the main application season (May, June, July) and after the pesticide application season was over (August and September). This strategy was employed to provide an indication of how the timing of pesticide application is related to surface water quality. Samples were collected by DNR staff or under DNR supervision. Collected samples were sent to DATCP's Bureau of Laboratory Services (BLS) for analysis of 16 pesticide compounds which included atrazine and three of its metabolites, acetochlor, acetochlor ethane sulfonic acid (ESA), acetochlor oxanilic acid (OA), alachlor, alachlor ESA, alachlor OA, metolachlor, metolachlor ESA, metolachlor OA, simazine, metribuzin, and cyanazine, as well as nitrogen and phosphorus.

Since that time, the 2008 Surface Water Sampling Project has evolved into an annual sampling program, now testing surface water samples for over 100 pesticide compounds and nitrogen as nitrate plus nitrite.

## Methods

### Sample Collection

Surface water samples were collected using DNR standard protocols (Wisconsin Department of Natural Resources, 2018) and DATCP standard operating procedures (Wisconsin Department of Agriculture,

Trade and Consumer Protection, 2021), designed to reduce bias to collect surface water samples with respect to flow, weather, and other factors. Surface water samples were collected by directly filling one laboratory-provided, one-liter, amber-colored glass sampling bottle at the designated sampling, and each sample was collected in free-flowing, well-mixed areas of the rivers, streams, and springs. Samples were then transported with chain-of-custody records to the BLS laboratory for analysis within 24 hours of collection.

BLS performed surface water analytical testing using GC/MS/MS and LC/MS/MS methods in accordance with ISO 17025 accreditation standards. Each sample was tested for between 18 and 108 pesticides, pesticide metabolites, and/or agricultural nutrients such as nitrogen or phosphorus.

## Location Selection

Perennial streams and rivers selected for the Surface Water Sampling Program have changed for multiple reasons throughout the program's history, particularly during its first 15 years. Initially, streams were selected based on their inclusion in DNR's "wadeable" stream sampling project. Some years, the focus was sampling on rivers with large watersheds while others focused on streams with smaller watersheds. Besides agricultural use, other criteria are considered when determining which flowing water body is to be included in the Surface Water Sampling Program. Selection criteria are primarily based on local geology or environmental conditions, predominant crop types within the stream's watershed, or characteristics of the predominant pesticides used on crops in the watershed. These criteria may vary from year to year. Some specific criteria examples used for river or stream sampling in the first 15 years of the program include:

- The stretch of water needs to be accessible for sampling (i.e., locations with public access);
- The watershed is within an area susceptible to groundwater contamination due to geologic conditions like sandy soils with shallow groundwater, shallow depth to bedrock, or karst geology;
- Areas where prior testing by others (federal government, university, other state agencies, etc.) identified high concentrations of nitrate, pesticides, or other unusual test results;
- Areas where the same crops are grown year after year on the same fields/area (e.g., corn, cranberry, ginseng, etc.) increasing the likelihood of repetitive pesticide use in the area;
- Areas where crops are grown typically require extensive chemical or fertilizer inputs and/or irrigation;
- Areas where pesticides with known characteristics of high mobility and resistance to degradation are used; and/or
- Requests of a partnering agency, such as DNR.

Over the years, the Surface Water Monitoring Program has evolved into a mix of 1) continuous monthly sampling of long-term repeat locations; and 2) several "new" locations, added to the program each year. Program planning starts in the prior year, so sampling can start as soon as BLS completes annual maintenance and can accept samples, usually in March. Since DNR staff typically complete much of the sampling, time commitment and willingness to assist are necessary for the yearly program's planning and success. To this point, DATCP has not been limited in sampling selection locations based on this arrangement. Surface water program goals have been achieved through this collaborative effort.

## Locations Sampled

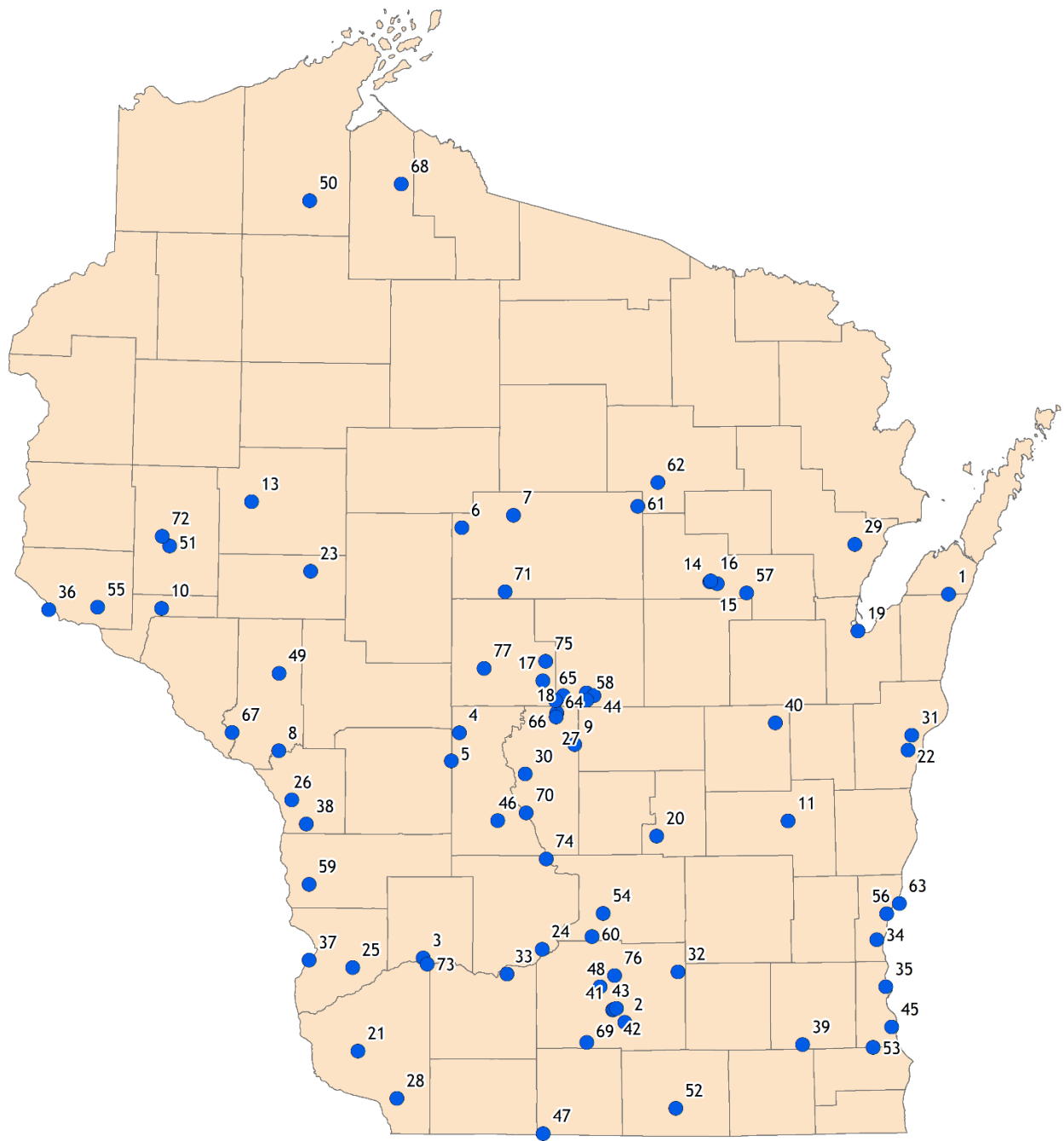
Over the course of the first 15 years of the Surface Water Sampling Program, surface water samples were collected from 77 locations at rivers, streams, and springs across Wisconsin. Table 1 displays all 77 sampling locations, their associated Surface Water Integrated Monitoring System (SWIMS) database information, and the year(s) that the location was sampled as part of the Surface Water Sampling Program. Figure 1 shows these locations on a map of Wisconsin.

Table 1: Surface Water Sampling Locations (2008-2022)

Figure 1 Number	SWIMS Station Name	SWIMS Station ID	Year(s) Sampled	Latitude	Longitude
1	Ahnapee River at CTH X Nr Forestville	153029	2008	44.675564	-87.483574
2	Badfish Creek at Schneider Rd	10033395	2011	42.96088	-89.347825
3	Balmoral Pond	10022318	2015-2016	43.2237	-90.4664
4	Beaver Creek - All (Off 9th)	10017128	2012	44.140429	-90.26893
5	Beaver Creek Upstream Of Sth 21	10020936	2012	44.025947	-90.314134
6	Big Eau Pleine River West Branch - Chestnut Rd	373143	2012	44.973652	-90.258933
7	Black Creek at Cth H	373052	2011	45.024494	-89.963863
8	Black River DS of STH 53 Bridge at Galesville	623001	2013	44.06027778	-91.28722222
9	Carter Creek - CTH G (CC-2 DS)	10013259	2016	44.0924	-89.6183
10	Chippewa River - Sth 10 Bridge	473008	2014	44.6286	-91.9684
11	De Neveu Creek at 4th St (Cth T)	10007739	2008	43.770947	-88.42212
12	Ditch 5 / N Branch 10 Mile Creek - Taft Rd (Site 14)	10009200	2021	44.302	-89.54962
13	Duncan Creek at 157th Ave	093072	2020-2021	45.07107	-91.46631
14	Embarrass River 5m us Hayman Falls Lane	10052089	2019	44.74806	-88.84319
15	Embarrass River at Cth M	593168	2019	44.74052	-88.80112
16	Embarrass River North Branch Rd. Ibi	10022027	2019	44.75263	-88.83763
17	Fourmile Creek at Buena Vista Creek Near Griffith Avenue	10021760	2008-2009	44.351595	-89.79722
18	Fourteen Mile Creek (Ditch # 7) - CTH D	013173	2017-2022	44.21998	-89.71865
19	Fox River at Green Bay Yacht Club	053222	2014	44.5368	-88.0047
20	Grand River at Cth H (Bi)	243029	2008-2009	43.716686	-89.16091
21	Grant River - University Farm Rd.	223221	2008	42.843636	-90.8238
22	Hartlaub Lake -- Access at NW Side Of Lake W	10019451	2013	44.0475	-87.7393
23	Hay Creek - Hay Creek 1- Cth Nl	10011573	2010	44.790792	-91.121118
24	Honey Creek-50m Upstream Of Cth P Bridge	10014475	2011	43.259518	-89.804348
25	Kickapoo River at Bridge St in Steuben	123017	2013, 2017-2019	43.18277778	-90.85833333
26	La Crosse River - Near Mouth	323017	2013	43.86083333	-91.21027778
27	Leola Ditch Downstream Of Confluence W/Ditch 13-13 Site 4a	10009165	2017-2022	44.20384	-89.72163
28	Little Platte River - Oak Rd. (Bi)	223242	2008	42.65216	-90.60655
29	Little River at Sth 22	433205	2008	44.888382	-88.010124
30	Little Roche A Cri Creek at Cth J	10010836	2011	43.972949	-89.898365
31	Manitowoc River at Cth Jj(Michigan Ave)	363069	2013	44.10722	-87.71528
32	Maunasha River Upstream Sth. 19	10013097	2011	43.163816	-89.049598
33	Mill Creek at CTH C	10030075	2010	43.159313	-90.000582
34	Milwaukee River at Cth C (Pioneer Rd)	463098	2015	43.2803	-87.9418
35	Milwaukee River at Estabrook Park At Milwaukee WI	413640	2011, 2014-2022	43.088894	-87.898343
36	Mississippi River - Pool 3 at Lock & Dam 3 (L/D3)	483027	2015-2018	44.61147	-92.61016
37	Mississippi River at Lock And Dam 9 Lynxville	123016	2013-2022	43.21002778	-91.10058333
38	Mormon Coulee Creek #6 - Bridge at Cth Yy	10008928	2021-2022	43.7641	-91.12647
39	Mukwonago River at Cth I 2m (Bi Sur)	683298	2008	42.860825	-88.3654
40	Neenah Slough - Neenah Slough - Cecil St	10011360	2011	44.170929	-88.484269
41	Nine Springs - Big Spring	10051661	2022	43.01127	-89.41371
42	Nine Springs - Nursery Springs	10051660	2022	43.0146	-89.40873
43	Nine Springs - Syene Springs	10051662	2019-2022	43.01785	-89.39422
44	North Branch Tenmile Creek at Isherwood/Harding	10042017	2021	44.29	-89.50864
45	Oak Creek US of 15th Ave N of Beech St	413913	2016	42.92475	-87.87097
46	Onemile Creek Miller Easement	10013400	2012	43.783588	-90.053281
47	Pecatonica River at Martintown WI	233002	2014, 2022	42.5103	-89.8012
48	Pheasant Branch - Cth M East Brdg	133313	2009	43.10688	-89.48321
49	Pigeon Creek At Sth 53	10021104	2011	44.374657	-91.293343
50	Porcupine Creek Upstream Of Culvert. 187	10020966	2019	46.29732	-91.15691
51	Red Cedar River at Menomonie Hydro	173208	2014	44.8838	-91.9294
52	Rock River at Afton WI	543001	2013-2014, 2022	42.60916667	-89.07055556
53	Root River at Eight Mile Road	10039425	2017-2018, 2020-2022	42.84354	-87.97573
54	Rowan Creek - Cth J	113145	2012	43.405101	-89.463637

Figure 1 Number	SWIMS Station Name	SWIMS Station ID	Year(s) Sampled	Latitude	Longitude
55	4 - Rush River - 385th St.	10008903	2008	44.627148	-92.331856
56	Sauk Creek - South Wisconsin Street	10030655	2010	43.385276	-87.882166
57	Schoenick Creek 175m US Long Lake Confluence	10042141	2014	44.7002	-88.634
58	South Branch Tenmile Creek - Taft Rd (Site 7)	10009196	2021	44.272	-89.54892
59	South Fork Bad Axe River - Oliver Rd.	10022633	2021-2022	43.51921	-91.10715
60	Spring (Lodi) Creek at Pleasant St.	113096	2012	43.310397	-89.5264
61	Spring Br - Bear Lake Rd	373374	2012	45.058574	-89.249223
62	Spring Brook at North Ave	343058	2012	45.15446	-89.133882
63	Sucker Creek - Sucker Brook Lane	10030656	2010	43.424855	-87.810596
64	Tenmile Creek - CTH U (Site 3)	10009190	2014-2016	44.2714	-89.7245
65	Tenmile Creek - Evergreen Rd. (40 Yards Upstream)	10016427	2015-2022	44.2908	-89.6822
66	Tenmile Creek Cty U	10009128	2021	44.271	-89.72469
67	Trempeleau River at Cth P At Dodge WI	623039	2013	44.13166667	-91.55277778
68	Tyler Forks at footbridge above Brownstone Falls in Copper Falls S.P.	10030684	2010	46.36976	-90.621126
69	West Branch Sugar River at CTH PB	10017221	2009-2010, 2020-2022	42.879894	-89.5597
70	White Creek at CTH Z	10030252	2009 - 2010	43.814117	-89.892585
71	Wild Creek at Maple Road	373130	2012	44.714289	-90.011363
72	Wilson Creek at 390th St Bridge	173222	2010	44.92246	-91.973182
73	Wisconsin River at Sth 80 Bridge At Muscoda WI	223282	2013-2022	43.19805556	-90.44333333
74	Wisconsin River at Wisconsin Dells	573052	2014, 2022	43.6274	-89.7807
75	Wisconsin River Below Biron Dam temporary site	10031139	2014, 2022	44.4308	-89.7818
76	Yahara River at Sth 113 At Madison WI	133040	2008-2009	43.150833	-89.40194
77	Yellow River - Below Pittsville Stp	723237	2011	44.401374	-90.129434

Figure 1: Surface Water Sampling Locations (2008-2022)



## Water Quality Standards and Benchmarks

An essential part of Wisconsin's groundwater protection laws was the creation of water quality standards for different substances, outlined in Wis. Admin. Code ch. NR 140. DNR sets standards for substances of public health concern based on recommendations from DHS. The groundwater standards have two components: an enforcement standard (ES) and a preventative action limit (PAL). The ES is a concentration that, if exceeded, requires intervention from the appropriate authority. The PAL is a percentage of the ES; 10% of the ES for carcinogenic, mutagenic, or teratogenic properties; and 20% of the ES for the remaining substances. The intention of the PAL is for it to act as a trigger for intervention before a pollutant becomes a serious risk to public health or the environment.

It is important to note that these water quality standards are only enforceable on groundwater. Wisconsin does not, at this time, have any surface water quality standards established by state statute or administrative rule. Therefore, DATCP compares surface water quality data to a variety of water quality standards as a way of providing context for the data. For example, data of compounds with existing groundwater quality standards laid out in Wis. Admin. Code ch. NR 140 are typically compared to these standards.

For compounds without these standards, DATCP typically uses United States Environmental Protection Agency (EPA)'s Aquatic Life Benchmarks (ALB)'s as a benchmark of comparison (United States Environmental Protection Agency, 2025a). Some compounds tested in DATCP surface water samples have both kinds of standards and are consequently compared to both while other compounds may have neither kind of standard. Additionally, the use of these water quality standards creates inconsistencies in the data, since groundwater quality standards laid out in Wis. Admin. Code ch. NR 140 are established from a human health perspective, while EPA ALB's take into consideration ecological and environmental health concerns.

Nevertheless, without some benchmark to make a comparison, the data would be far less useful, and as such, DATCP evaluates surface water data using this varied-source approach.

## Results

### Detection Rates

Over the course of the first 15 years of the Surface Water Sampling Program, 1,186 surface water samples were collected from 77 sites at rivers, streams, and springs in Wisconsin. 56 out of a total of 108 pesticide compounds tested during this period were detected at least once. Of the 85,590 analyte tests performed, there were 5,900 detections, meaning that the overall pesticide compound detection rate for this period was 6.9%. Metolachlor ethane sulfonic acid (ESA), a metabolite of the herbicide metolachlor, was the most frequently detected pesticide compound, with a detection rate of 91.7%. The second most frequently detected pesticide compound was alachlor ESA, a metabolite of the herbicide alachlor, with a detection rate of 50.4%. Between these two compounds, nitrogen (as nitrate plus nitrite), a nutrient used in agriculture, had a detection rate of 89.6%. Figure 2 shows the detection rates of the 20 most frequently detected compounds from samples collected between 2008 and 2022, as well as the rates at which these compounds exceeded certain relevant water quality standards. Table 2 lists the 10 most frequently detected pesticides, along with information about their detection rates and concentration ranges of detection.

Figure 2: Pesticide Detection Rates in Surface Water (2008-2022)

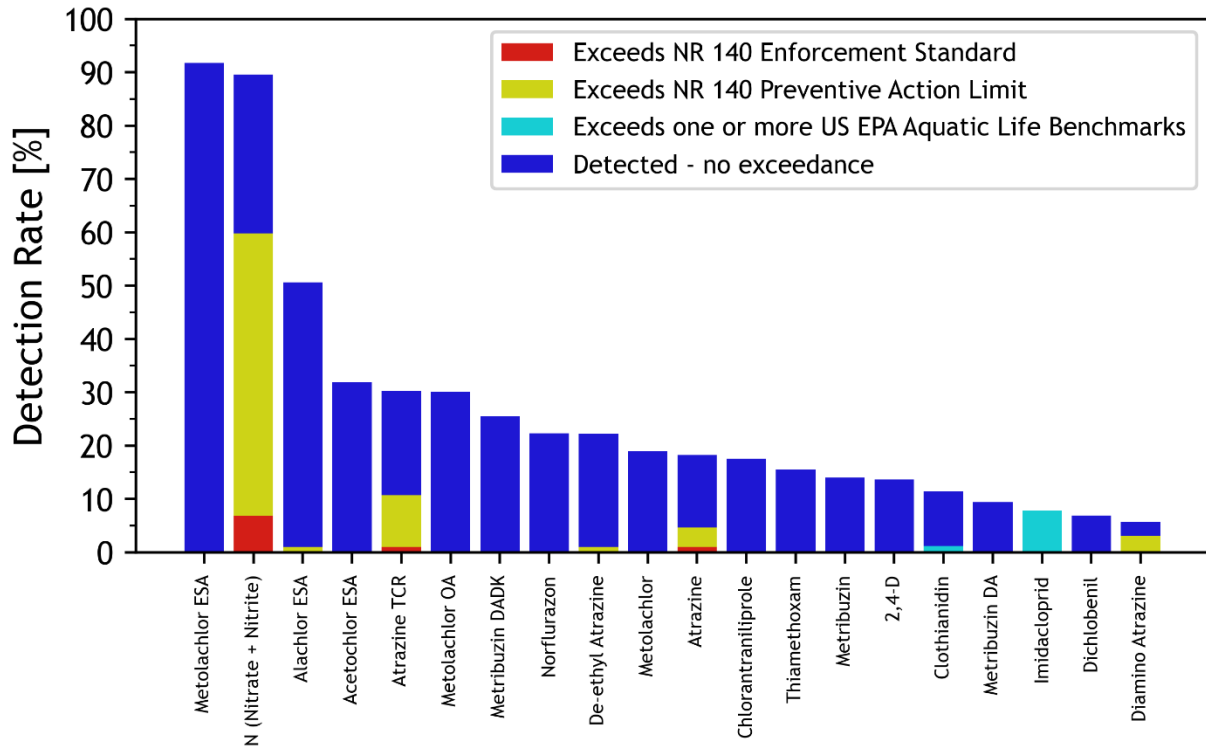


Table 2: Ten Most Frequently Detected Pesticide Compounds in Surface Water (2008-2022)

Pesticide Compound	Number of Detections	Number of Samples Tested	Detection Rate	Lowest Detected Concentration (µg/L)	Highest Detected Concentration (µg/L)
Metolachlor ESA	1084	1182	91.7%	0.0611	6.36
Alachlor ESA	598	1182	50.4%	0.0504	7.33
Acetochlor ESA	377	1182	31.9%	0.0513	1.61
Atrazine TCR	359	1183	30.3%	0.0502	8.153
Metolachlor OA	356	1182	30.1%	0.101	5.19
Metribuzin DADK	169	662	25.5%	0.247	1.34
Norflurazon	165	739	22.3%	0.0507	4.43
De-ethyl Atrazine	262	1183	22.1%	0.05	0.59
Metolachlor	224	1183	18.9%	0.0501	6.44
Atrazine	215	1183	18.2%	0.0502	7.77

## Seasonal Variations

Pesticide compounds can be found year-round in the environment due to the varying rates at which each compound breaks down. However, the fact that pesticides are not applied to the land surface year-round leads to some seasonal variation in their detection. The typical pesticide application season occurs from April through July each year. Understandably, the spring months (March, April, and May) and summer months (June, July, and August) show higher overall detection rates for pesticides. Data from 2008 to 2022 shows that the summer months yield the highest overall pesticide detection rate (8.6%) while the winter months (December, January, and February) yield the lowest overall detection rate (5.6%). Table 3 shows overall detections and detection rates for each season.

*Table 3: Seasonal Detection Analysis*

Season	Detections	Non-detections	Total Number of Analytes Tested	Seasonal Detection Rate
Winter (Dec, Jan, Feb)	539	9068	9607	5.6%
Spring (Mar, Apr, May)	1362	19878	21240	6.4%
Summer (Jun, Jul, Aug)	2404	25496	27900	8.6%
Fall (Sep, Oct, Nov)	1595	25248	26843	5.9%

A closer look at the temporal variation in overall detection rates reveals that there is considerable variation in month-to-month detection rates. Between 2008 and 2022, the month with the highest overall pesticide detection rate was June (10.7%), which was more than twice the overall detection rate of the lowest month, January (5.0%). Table 4 shows overall detections and detection rates for each month.

*Table 4: Monthly Detection Analysis*

Month	Detections	Non-detections	Total Number of Analytes Tested	Monthly Detection Rate
January	42	798	840	5.0%
February	152	2558	2710	5.6%
March	343	5602	5945	5.8%
April	440	7117	7557	5.8%
May	579	7159	7738	7.5%
June	936	7774	8710	10.7%
July	804	8825	9629	8.3%
August	664	8897	9561	6.9%
September	674	9306	9980	6.8%
October	497	8209	8706	5.7%
November	424	7733	8157	5.2%
December	345	5712	6057	5.7%

## Notable Detected Compounds

### Acetochlor

Acetochlor is an herbicide registered for use on corn in Wisconsin (Wisconsin Department of Agriculture, Trade and Consumer Protection and Kelly Registration Systems Inc., 2026). Acetochlor parent material was detected in 53 of 1,183 samples tested (4.5% detection rate). Two of its metabolites, acetochlor ESA and acetochlor OA, were detected in 377 of 1,182 samples tested (31.9% detection rate) and 47 of 1,182 samples tested (4.0% detection rate), respectively. The 31.9%

detection rate of acetochlor ESA makes it the third most detected pesticide compound between 2008 and 2022.

Acetochlor concentrations exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.7 µg/L in three of the 1,183 samples tested. These samples were collected from the Yellow River on 6/7/2011, Neenah Slough on 6/23/2011, and the Root River on 6/30/2020. The acetochlor concentration of both of these samples also exceeded the EPA ALB for nonvascular plants of 1.43 µg/L. The acetochlor concentration of the Yellow River sample on 6/7/2011 also exceeded the EPA ALB for vascular plants of 3.4 µg/L. The concentration of acetochlor did not exceed the Wis. Admin. Code ch. NR 140 ES in any samples, nor did the concentrations of acetochlor ESA or acetochlor OA exceed any Wis. Admin. Code ch. NR 140 groundwater quality standards.

For maps of locations where concentrations of acetochlor compounds were detected or exceeded any Wis. Admin. Code ch. NR 140 groundwater standards, refer to Appendix D - Maps of Detections of Notable Compounds.

## Alachlor

Alachlor is an herbicide that was formerly used on crops such as corn and soybeans in Wisconsin. On 6/30/2016, the U.S. EPA issued a Product Cancellation Order that prohibited the sale of alachlor products in the U.S. after 6/30/2017, although farmers were still allowed to use their existing stocks of the pesticide beyond that date (United States Environmental Protection Agency, 2016). Consequently, there are no longer any pesticide products registered in Wisconsin with alachlor as an active ingredient. Alachlor parent material was detected in four of 1,183 samples tested (0.3% detection rate). Two of its metabolites, alachlor ESA and alachlor OA, were detected in 598 of 1,123 samples tested (50.6% detection rate) and 32 of 1,182 samples tested (2.7% detection rate), respectively. The 50.6% detection rate of alachlor ESA makes it the second most detected pesticide compound between 2008 and 2022.

Alachlor concentrations exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.2 µg/L in two of the 1,183 samples tested. These samples were collected from the Yellow River on 6/7/2011 (this sample also exceeded the Wis. Admin. Code ch. NR 140 PAL for acetochlor and the ES for atrazine) and the Milwaukee River on 6/19/2014. The concentration of Alachlor ESA also exceeded the Wis. Admin. Code ch. NR 140 PAL of 4 µg/L in two of the 1,182 samples tested. These samples were both collected on 8/24/2015 from two different locations on Tenmile Creek. The Wis. Admin. Code ch. NR 140 ES was not exceeded by alachlor or alachlor ESA in any samples tested. The concentration of alachlor OA did not exceed any Wis. Admin. Code ch. NR 140 groundwater standards in any of the samples tested.

For maps of locations where concentrations of alachlor compounds were detected or exceeded any Wis. Admin. Code ch. NR 140 groundwater standards, refer to Appendix D - Maps of Detections of Notable Compounds.

## Atrazine

Atrazine is an herbicide registered for use on crops such as corn and sorghum in Wisconsin (Wisconsin Department of Agriculture, Trade and Consumer Protection and Kelly Registration Systems Inc., 2026). Atrazine parent material was detected in 215 of 1,183 samples tested (18.2% detection rate). Three of its metabolites - de-ethyl atrazine, deisopropyl atrazine, and diamino atrazine - were detected in 262 of 1,183 samples tested (22.1% detection rate), 65 of 1,183 samples tested (5.5% detection rate), and 68 of 1,183 samples tested (5.7% detection rate), respectively. Atrazine Total Chlorinated Residues (TCR), the sum concentration of atrazine and these three of its metabolites, was detected in 359 of 1,183 samples tested (30.3% detection rate). De-ethyl atrazine, the most frequently detected singular compound in the atrazine family, was the ninth most detected pesticide compound between 2008 and 2022, while atrazine parent material was the 11th most detected pesticide compound. Atrazine exceedances are as follows:

- Atrazine concentrations exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L in 42 of the 1,183 samples tested and the atrazine concentration of one of these samples also exceeded the Wis. Admin. Code ch. NR 140 ES of 3 µg/L.

- De-ethyl atrazine concentrations exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L in seven of the 1,183 samples tested. Deisopropyl atrazine concentrations exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L in one of the 1,183 samples tested.
- Diamino atrazine concentrations exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L in 37 of the 1,183 samples tested.
- Atrazine TCR concentrations exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L in 115 of the 1,183 samples tested, and the Wis. Admin. Code ch. NR 140 ES of 3 µg/L was exceeded in one sample.

Atrazine concentrations exceeded the EPA ALB for nonvascular plants of <1 µg/L (the atrazine concentration in these samples was greater than or equal to 1 µg/L) in at least nine of the 1,183 samples tested. In one sample collected from the Yellow River on 6/7/2011, the atrazine concentration exceeded the EPA ALB for vascular plants of 4.6 µg/L.

Table 5 lists the locations where concentrations of atrazine compounds exceeded any Wis. Admin. Code ch. NR 140 groundwater quality standards, as well as how many times each standard was exceeded. For a full table of detections of atrazine compounds by location, refer to Appendix C - Tables of Detections of Notable Compounds. For maps of locations where concentrations of atrazine compounds were detected or exceeded Wis. Admin. Code ch. NR 140 groundwater quality standards, review Appendix D - Maps of Detections of Notable Compounds.

*Table 5: Exceedances of Water Quality Standards by Atrazine Compounds in Surface Water (2008-2022)*

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of PAL Exceedances	Number of ES Exceedances	Number of ALB Exceedances
Ahnapee River at CTH X Nr Forestville	153029	Atrazine	6	1	0	0
		Atrazine TCR	6	1	0	0
Balmoral Pond	10022318	Atrazine	19	2	0	1
		Atrazine TCR	19	2	0	0
Big Eau Pleine River West Branch - Chestnut Rd	373143	Atrazine	6	4	0	1
		De-ethyl atrazine	6	2	0	0
		Atrazine TCR	6	4	0	0
Black Creek at Cth H	373052	Atrazine	8	1	0	0
		De-ethyl atrazine	8	1	0	0
		Atrazine TCR	8	2	0	0
Carter Creek - CTH G (CC-2 DS)	10013259	Diamino atrazine	10	1	0	0
		Atrazine TCR	10	9	0	0
De Neveu Creek at 4th St (Cth T)	10007739	Atrazine	6	1	0	0
		Atrazine TCR	6	1	0	0
Duncan Creek at 157th Ave	093072	Atrazine TCR	16	1	0	0

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of PAL Exceedances	Number of ES Exceedances	Number of ALB Exceedances
Grand River at Cth H (Bi)	243029	Atrazine	14	1	0	1
		Atrazine TCR	14	1	0	0
Manitowoc River at Cth Jj(Michigan Ave)	363069	Atrazine	5	1	0	0
		Atrazine TCR	5	1	0	0
Milwaukee River at Cth C (Pioneer Rd)	463098	Atrazine	9	1	0	0
		Atrazine TCR	9	1	0	0
Milwaukee River at Estabrook Park At Milwaukee WI	413640	Atrazine	86	4	0	1
		De-ethyl atrazine	86	1	0	0
		Atrazine TCR	86	4	0	0
Mississippi River - Pool 3 at Lock & Dam 3 (L/D3)	483027	Atrazine TCR	41	1	0	0
Mississippi River at Lock And Dam 9 Lynxville	123016	Atrazine	91	6	0	0
		Atrazine TCR	91	7	0	0
Mormon Coulee Creek #6 - Bridge at Cth Yy	10008928	Atrazine	18	1	0	1
		Atrazine TCR	18	1	0	0
Neenah Slough - Neenah Slough - Cecil St	10011360	Atrazine	8	1	0	1
		Atrazine TCR	8	1	0	0
Nine Springs - Big Spring	10051661	Diamino atrazine	3	3	0	0
		Atrazine TCR	3	3	0	0
Nine Springs - Nursery Springs	10051660	Atrazine TCR	3	3	0	0
Nine Springs - Syene Springs	10051662	Diamino atrazine	36	30	0	0
		Atrazine TCR	36	34	0	0
Pecatonica River at Martintown WI	233002	Atrazine	20	1	0	1
		Atrazine TCR	20	2	0	0
Red Cedar River at Menomonie Hydro	173208	Atrazine	9	2	0	0
		Atrazine TCR	9	2	0	0
Rock River at Afton WI	543001	Atrazine	26	6	0	0
		Atrazine TCR	26	6	0	0
Root River at Eight Mile Road	10039425	Atrazine	41	2	0	0
		Atrazine TCR	41	4	0	0
	10008903	Atrazine	6	1	0	0

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of PAL Exceedances	Number of ES Exceedances	Number of ALB Exceedances
4 - Rush River - 385th St.		Atrazine TCR	6	1	0	0
Sauk Creek - South Wisconsin Street	10030655	Atrazine	8	1	0	0
		De-ethyl atrazine	8	1	0	0
		Deisopropyl atrazine	8	1	0	0
		Diamino atrazine	8	1	0	0
		Atrazine TCR	8	1	0	0
Sucker Creek - Sucker Brook Lane	10030656	Atrazine	8	1	0	0
		Atrazine TCR	8	1	0	0
West Branch Sugar River at CTH PB	10017221	Diamino atrazine	34	1	0	0
		Atrazine TCR	34	13	0	0
Wild Creek at Maple Road	373130	Atrazine	6	2	0	0
		Atrazine TCR	6	2	0	0
Wisconsin River at Sth 80 Bridge At Muscoda WI	223282	Atrazine	92	1	0	0
		Diamino atrazine	92	1	0	0
		Atrazine TCR	92	5	0	0
Yellow River - Below Pittsville Stp	723237	Atrazine	8	1	1	3
		De-ethyl atrazine	8	2	0	0
		Atrazine TCR	8	1	1	0

## Metolachlor

Metolachlor is an herbicide registered for use on crops such as corn and soybeans in Wisconsin (Wisconsin Department of Agriculture, Trade and Consumer Protection and Kelly Registration Systems Inc., 2026). Metolachlor parent material was detected in 224 of 1,183 samples tested (18.9% detection rate). Two of its metabolites, metolachlor ESA and metolachlor OA, were detected in 1,084 of 1,182 samples tested (91.7% detection rate) and 356 of 1,182 samples tested (30.1% detection rate), respectively. The 91.7% detection rate of metolachlor ESA makes it the most frequently detected compound between 2008 and 2022. Likewise, metolachlor OA was the fifth most frequently detected pesticide compound, and metolachlor parent material was the ninth most frequently detected pesticide compound.

There were no exceedances of Wis. Admin. Code ch. NR 140 groundwater standards or EPA ALB's by metolachlor, metolachlor ESA, or metolachlor OA in any samples tested for these compounds between 2008 and 2022.

For maps of locations where concentrations of metolachlor compounds were detected, refer to Appendix D - Maps of Detections of Notable Compounds.

## Neonicotinoids

Neonicotinoids are a class of insecticides that target insects using chemicals similar in structure to the molecule nicotine. In 2011, DATCP began testing for one neonicotinoid pesticide, thiamethoxam, in surface water samples. The following year, 2012, four additional neonicotinoid pesticides - acetamiprid, clothianidin, dinotefuran, imidacloprid - were added to the list of compounds tested. Finally, a sixth neonicotinoid, thiacloprid, was added in 2015. DATCP continued to test for these compounds in surface water samples through 2022. Three of these neonicotinoid pesticides - acetamiprid, dinotefuran, and thiacloprid - were not detected in any samples during this period.

There are currently no established Wis. Admin. Code ch. NR 140 groundwater standards established for any of the six neonicotinoid compounds that DATCP tested between 2008 and 2022.

Thiamethoxam was detected in 158 of 1,017 samples tested (15.5% detection rate). There were no exceedances of EPA ALB's by thiamethoxam in any samples tested between 2008 and 2022.

Clothianidin was detected in 108 of 947 samples tested (11.4% detection rate). In 11 samples tested, the clothianidin concentration exceeded the EPA chronic ALB for invertebrates of 0.05 µg/L.

Imidacloprid was detected in 74 of 947 samples tested (7.8% detection rate). In all 74 of these samples, the imidacloprid concentration exceeded the EPA chronic ALB for invertebrates of 0.01 µg/L.

Table 6 lists the number of total samples tested at each sampling location and where the concentration of clothianidin and/or imidacloprid exceeded the U.S. EPA chronic ALB for invertebrates at least once between 2012 and 2022. For a full table of detections of neonicotinoids by location, review Appendix C - Tables of Detections of Notable Compounds. For maps of locations where detected concentrations of neonicotinoid pesticides were detected or exceeded U.S. EPA chronic ALB's for invertebrates, refer to Appendix D - Maps of Detections of Notable Compounds.

*Table 6: Exceedances of Water Quality Standards by Neonicotinoids in Surface Water (2008-2022)*

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of ALB Exceedances
Carter Creek - CTH G (CC-2 DS)	10013259	Imidacloprid	10	6
Ditch 5 / N Branch 10 Mile Creek - Taft Rd (Site 14)	10009200	Clothianidin	1	1
		Imidacloprid	1	1
Fourteen Mile Creek (Ditch # 7) - CTH D	013173	Clothianidin	48	3
		Imidacloprid	48	15
Leola Ditch Downstream Of Confluence W/Ditch 13-13 Site 4a	10009165	Clothianidin	49	2
		Imidacloprid	49	12
Milwaukee River at Estabrook Park At Milwaukee WI	413640	Imidacloprid	78	1
North Branch Tenmile Creek at Isherwood/Harding	10042017	Clothianidin	1	1
		Imidacloprid	1	1
Root River at Eight Mile Road	10039425	Clothianidin	41	2
		Imidacloprid	41	8
South Branch Tenmile Creek - Taft Rd (Site 7)	10009196	Clothianidin	1	1
		Imidacloprid	1	1
South Fork Bad Axe River - Oliver Rd.	10022633	Imidacloprid	18	1
Tenmile Creek - CTH U (Site 3)	10009190	Imidacloprid	19	4
Tenmile Creek - Evergreen Rd. (40 Yards Upstream)	10016427	Imidacloprid	67	23
Tenmile Creek Cty U	10009128	Clothianidin	1	1
		Imidacloprid	1	1

## Nitrogen

Nitrogen is a nutrient essential for plant growth and is commonly applied to crops in a variety of forms as a fertilizer. In 2011, DATCP began testing surface water samples for nitrogen as nitrate plus nitrite. This resulted in 672 surface water samples being tested for nitrogen (nitrate + nitrite) between 2011 and 2022. Nitrogen (nitrate + nitrite) was detected in 602 of the 672 samples tested (89.6% detection rate). The nitrogen concentration exceeded the Wis. Admin. Code ch. NR 140 PAL of 2 mg/L in 356 of the 672 samples tested. It also exceeded the Wis. Admin. Code ch. NR 140 ES of 10 mg/L in 46 of the 672 samples tested.

Table 7 lists the numbers of total samples tested at each sampling location where the concentration of nitrogen (nitrate + nitrite) exceeded a Wis. Admin. Code ch. NR 140 PAL and/or ES at least once between 2011 and 2022. For a full table of detections of nitrogen (nitrate + nitrite) by location, review Appendix C - Tables of Detections of Notable Compounds. For maps of locations where concentrations of nitrogen (nitrate + nitrite) were detected or exceeded Wis. Admin. Code ch. NR 140 groundwater quality standards, refer to Appendix D - Maps of Detections of Notable Compounds.

*Table 7: Exceedances of Water Quality Standards by Nitrogen (Nitrate + Nitrite) in Surface Water (2008-2022)*

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of PAL Exceedances	Number of ES Exceedances
Badfish Creek at Schneider Rd	10033395	Nitrogen (nitrate + nitrite)	8	0	8
Carter Creek - CTH G (CC-2 DS)	10013259	Nitrogen (nitrate + nitrite)	10	6	4
Ditch 5 / N Branch 10 Mile Creek - Taft Rd (Site 14)	10009200	Nitrogen (nitrate + nitrite)	1	0	1
Duncan Creek at 157th Ave	093072	Nitrogen (nitrate + nitrite)	16	15	0
Embarrass River 5m us Hayman Falls Lane	10052089	Nitrogen (nitrate + nitrite)	9	2	0
Embarrass River at Cth M	593168	Nitrogen (nitrate + nitrite)	9	2	0
Embarrass River North Branch Rd. Ibi	10022027	Nitrogen (nitrate + nitrite)	9	2	0
Fourteen Mile Creek (Ditch # 7) - CTH D	013173	Nitrogen (nitrate + nitrite)	48	37	0
Leola Ditch Downstream Of Confluence W/Ditch 13-13 Site 4a	10009165	Nitrogen (nitrate + nitrite)	49	48	0
Milwaukee River at Estabrook Park At Milwaukee WI	413640	Nitrogen (nitrate + nitrite)	62	6	0
Mississippi River - Pool 3 at Lock & Dam 3 (L/D3)	483027	Nitrogen (nitrate + nitrite)	30	28	0
Mississippi River at Lock And Dam 9 Lynxville	123016	Nitrogen (nitrate + nitrite)	65	25	0
Mormon Coulee Creek #6 - Bridge at Cth Yy	10008928	Nitrogen (nitrate + nitrite)	18	4	0

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of PAL Exceedances	Number of ES Exceedances
Nine Springs - Big Spring	10051661	Nitrogen (nitrate + nitrite)	3	3	0
Nine Springs - Nursery Springs	10051660	Nitrogen (nitrate + nitrite)	3	3	0
Nine Springs - Syene Springs	10051662	Nitrogen (nitrate + nitrite)	36	6	29
North Branch Tenmile Creek at Isherwood/Harding	10042017	Nitrogen (nitrate + nitrite)	1	0	1
Pecatonica River at Martintown WI	233002	Nitrogen (nitrate + nitrite)	10	10	0
Rock River at Afton WI	543001	Nitrogen (nitrate + nitrite)	10	2	0
Root River at Eight Mile Road	10039425	Nitrogen (nitrate + nitrite)	41	10	0
South Branch Tenmile Creek - Taft Rd (Site 7)	10009196	Nitrogen (nitrate + nitrite)	1	0	1
South Fork Bad Axe River - Oliver Rd.	10022633	Nitrogen (nitrate + nitrite)	18	18	0
Tenmile Creek Cty U	10009128	Nitrogen (nitrate + nitrite)	1	1	0
Tenmile Creek - Evergreen Rd. (40 Yards Upstream)	10016427	Nitrogen (nitrate + nitrite)	58	58	0
West Branch Sugar River at CTH PB	10017221	Nitrogen (nitrate + nitrite)	25	24	1
Wisconsin River at Sth 80 Bridge At Muscoda WI	223282	Nitrogen (nitrate + nitrite)	68	0	1

## Concentration Trends of Multi-year Locations

### Fourteen Mile Creek

Fourteen Mile Creek was sampled 48 times across six consecutive years between 2017 and 2022 at the “Fourteen Mile Creek (Ditch # 7) - CTH D” location (SWIMS ID: 013173). The numbers of samples collected each year during this period ranged from one to 10, but samples were typically collected monthly between March and December. This sampling site is located in Adams County, within the Central Sand Plains region of Wisconsin. This region is characterized by a large amount of agricultural activity, mostly sandy soils with shallow depths to groundwater, and considerable groundwater discharge to streams in the area (Wisconsin Department of Natural Resources, 2015).

The following is a list of pesticide compounds that were consistently detected at this location, along with any exceedances of relevant water quality standards:

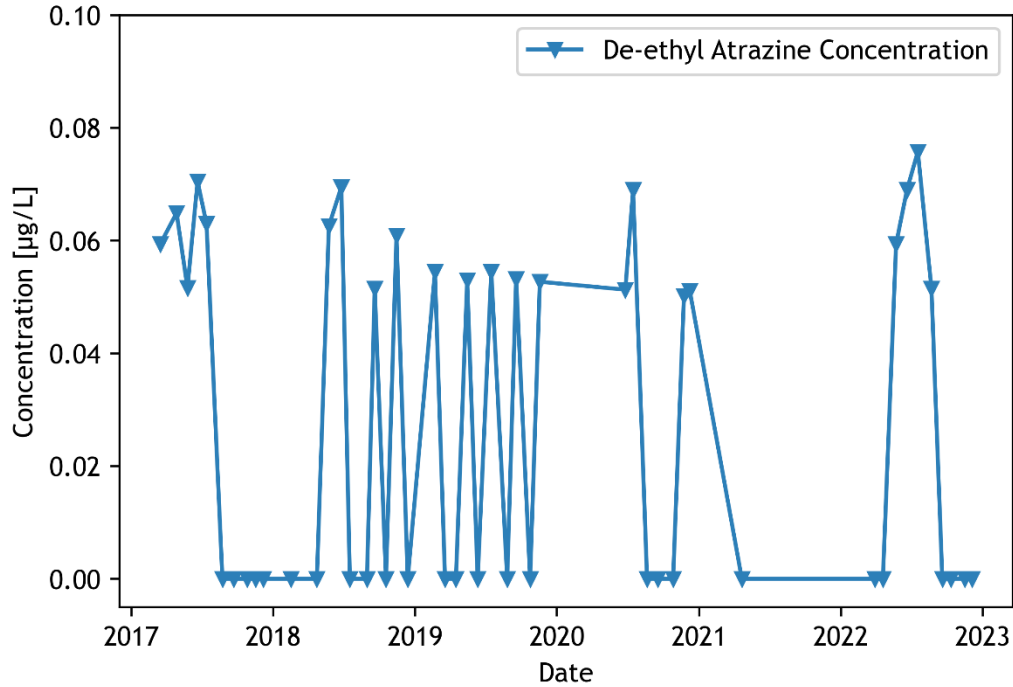
- 2,4-D was detected in 16 of 48 samples tested (33.3%).
- Alachlor ESA was detected in 48 of 48 samples tested (100.0%).
- Bentazon was detected in 11 of 48 samples tested (22.9%).
- Chlorantraniliprole was detected in 48 of 48 samples tested (100.0%).

- Clothianidin was detected in 21 of 48 samples tested (43.8%).
  - Two detections, both in 2022, exceeded the U.S. EPA chronic ALB for invertebrates of 0.05 µg/L.
- De-ethyl atrazine was detected in 22 of 48 samples tested (45.8%).
- Dichlobenil was detected in 17 of 48 samples tested (35.4%).
- Imidacloprid was detected in 15 of 48 samples tested (31.3%).
  - All 15 detections exceeded the U.S. EPA chronic ALB for invertebrates of 0.01 µg/L.
- Metolachlor was detected in 29 of 48 samples tested (60.4%).
- Metolachlor ESA was detected in 48 of 48 samples tested (100.0%).
- Metolachlor OA was detected in 48 of 48 samples tested (100.0%).
- Metribuzin was detected in 27 of 48 samples tested (56.3%).
- Metribuzin DA was detected in 30 of 48 samples tested (62.5%).
- Metribuzin DADK was detected in 48 of 48 samples tested (100.0%).
- Nitrogen as nitrate plus nitrite was detected in 46 of 48 samples tested (95.8%).
  - 37 detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 2 mg/L.
- Norflurazon was detected in 47 of 48 samples tested (97.9%).
- Thiamethoxam was detected in 38 of 48 samples tested (79.2%).

Figure 3, Figure 4, and Figure 5 display concentrations of de-ethyl atrazine, nitrogen, and neonicotinoid pesticides, respectively, between 2017 and 2022 at this location.

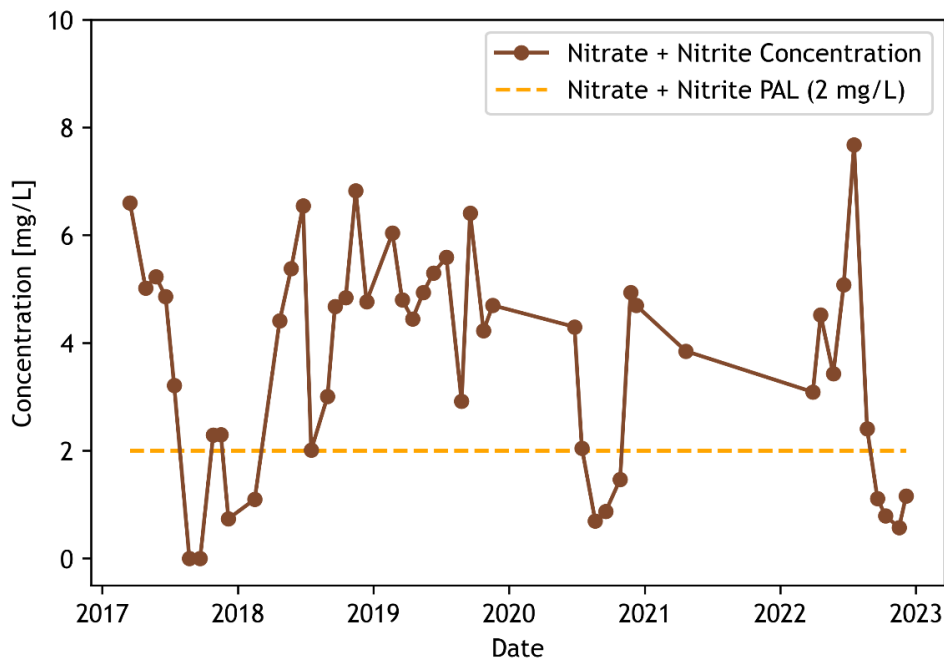
De-ethyl atrazine was the only atrazine compounds detected at this location between 2017 and 2022. As shown in Figure 3, detections of this compound appear to fluctuate, especially between 2018 and 2019. Apparent fluctuations are likely the result of low concentrations detected slightly above the 0.05 µg/L BLS reporting limit for de-ethyl atrazine. Detected concentrations are fairly consistent, fluctuating between 0.05 and 0.08 µg/L over the entire six-year period while results less than the detection limit (i.e. “non-detections”) are plotted as a concentration of 0 µg/L.

Figure 3: De-ethyl Atrazine Detected in Fourteen Mile Creek (2017-2022)



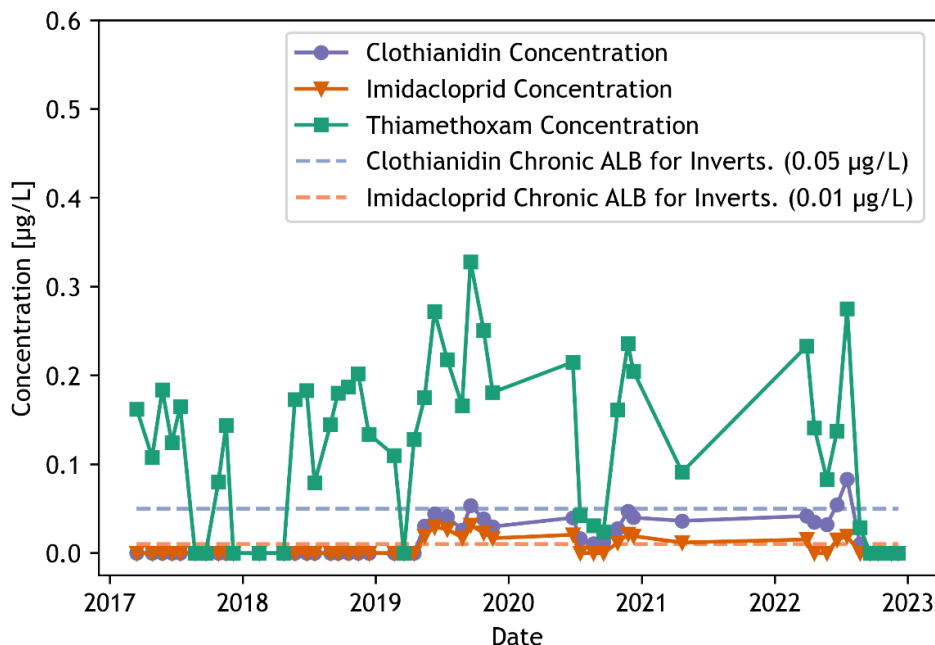
Nitrogen as nitrate plus nitrite was detected year-round at this location between 2017 and 2022. The magnitude of concentrations varied widely, without much seasonal consistency. Yearly peak concentrations were observed during different months across the six years that this location was sampled.

Figure 4: Nitrogen (Nitrate + Nitrite) Detected in Fourteen Mile Creek (2017-2022)



Clothianidin, imidacloprid, and thiamethoxam were all detected at this location during the period from 2017 to 2022. The BLS laboratory reporting limit of these pesticides was 0.05 µg/L until 2019, when the reporting limit was lowered to 0.01 µg/L. This likely explains why clothianidin and imidacloprid were not detected at this location until 2019; detected concentrations are typically below 0.05 µg/L.

Figure 5: Neonicotinoids Detected in Fourteen Mile Creek (2017-2022)



### Leola Ditch

Leola Ditch was sampled 49 times across six consecutive years between 2017 and 2022. Samples were collected at the “Leola Ditch Downstream Of Confluence W/Ditch 13-13 Site 4a” location (SWIMS ID: 10009165) in Adams County, within the Central Sand Plains region of Wisconsin. Numbers of samples collected each year during this period ranged from one to 10, but samples were typically collected monthly between March and December.

The following is a list of pesticide compounds that were consistently detected at this location, along with any exceedances of relevant water quality standards:

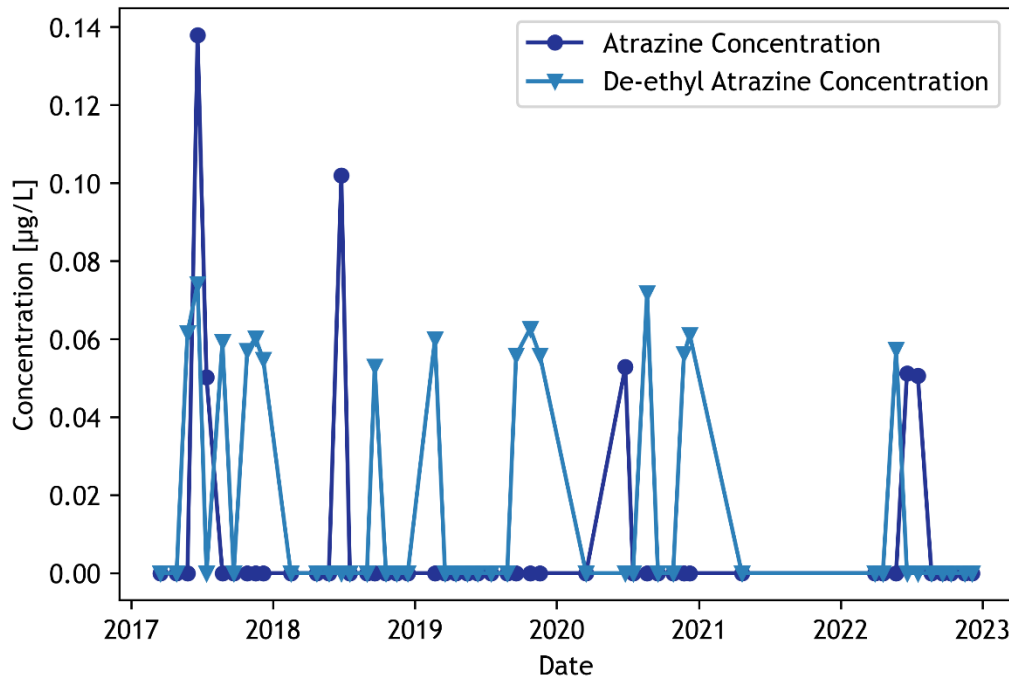
- Alachlor ESA was detected in 49 of 49 samples tested (100.0%).
- De-ethyl atrazine was detected in 15 of 49 samples tested (30.6%).
- Atrazine TCR was detected in 20 of 49 samples tested (40.8%).
- Chlorantraniliprole was detected in 45 of 49 samples tested (91.8%).
- Clothianidin was detected in 23 of 49 samples tested (46.9%).
  - Two detections, exceeded the U.S. EPA chronic ALB for invertebrates of 0.05 µg/L.
- Dichlobenil was detected in 20 of 49 samples tested (40.8%).
- Imidacloprid was detected in 12 of 49 samples tested (24.5%).
  - All 12 detections exceeded the U.S. EPA chronic ALB for invertebrates of 0.01 µg/L.
- Metolachlor was detected in 12 of 49 samples tested (24.5%).
- Metolachlor ESA was detected in 49 of 49 samples tested (100.0%).

- Metolachlor OA was detected in 47 of 49 samples tested (95.9%).
- Metribuzin was detected in 37 of 49 samples tested (75.5%).
- Metribuzin DADK was detected in 49 of 49 samples tested (100.0%).
- Nitrogen as nitrate plus nitrite was detected in 49 of 49 samples tested (100.0%).
  - 48 detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 2 mg/L.
- Norflurazon was detected in 42 of 49 samples tested (85.7%).
- Thiamethoxam was detected in 44 of 49 samples tested (89.8%).

Figure 6, Figure 7, and Figure 8 show concentrations of atrazine compounds, nitrogen, and neonicotinoid pesticides, respectively, in samples collected between 2017 and 2022 at this location.

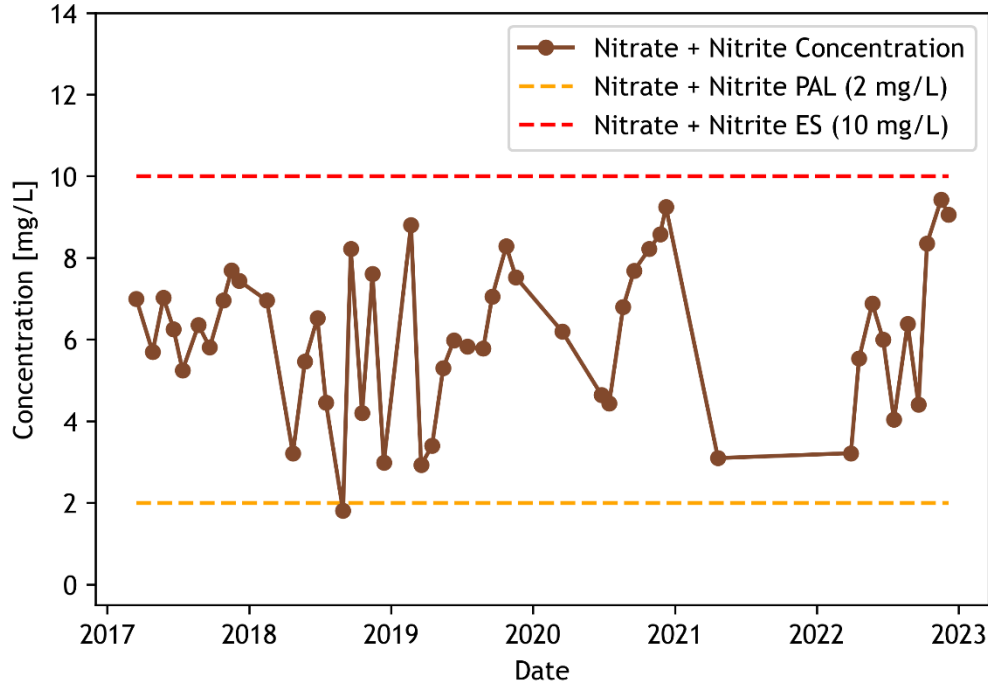
Atrazine parent material and de-ethyl atrazine were the only atrazine compounds detected at this location between 2017 and 2022. These compounds were typically not detected within the same samples. Atrazine was typically detected in the summer months while de-ethyl atrazine was typically detected during the fall and winter months.

*Figure 6: Atrazine Compounds Detected in Leola Ditch (2017-2022)*



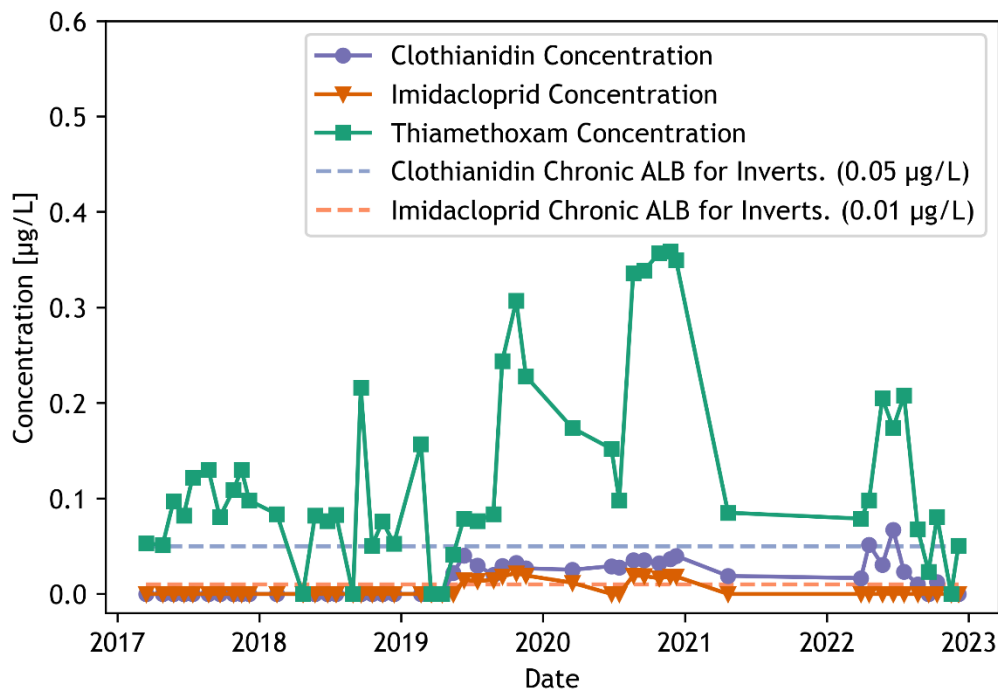
Nitrogen as nitrate plus nitrite was detected year-round at this location in samples collected between 2017 and 2022. Detected concentrations ranged from a low of 1.81 mg/L to a high of 9.43 mg/L. Concentrations fluctuated widely from month to month, but the highest nitrogen concentrations were consistently detected in the fall and winter months.

Figure 7: Nitrogen (Nitrate + Nitrite) Detected in Leola Ditch (2017-2022)



Clothianidin, imidacloprid, and thiamethoxam were all detected at this location sampled between 2017 and 2022. The BLS laboratory reporting limit for these pesticides was 0.05 µg/L until 2019, when the reporting limit was lowered to 0.01 µg/L. This likely explains why clothianidin and imidacloprid were not detected at this location until 2019, as detected concentrations are typically below 0.05 µg/L.

Figure 8: Neonicotinoids Detected in Leola Ditch (2017-2022)



## Milwaukee River

The Milwaukee River was sampled eight times in 2011 and 78 times over nine consecutive years between 2014 and 2022. Samples were collected at the “Milwaukee River at Estabrook Park At Milwaukee WI” location (SWIMS ID: 413640) in Milwaukee County. This sampling location’s watershed is located within and just outside the Milwaukee metropolitan area and has a large proportion of urban and suburban land use. The number of samples collected each year during this period ranged from five to 10, but samples were typically collected monthly between March and December.

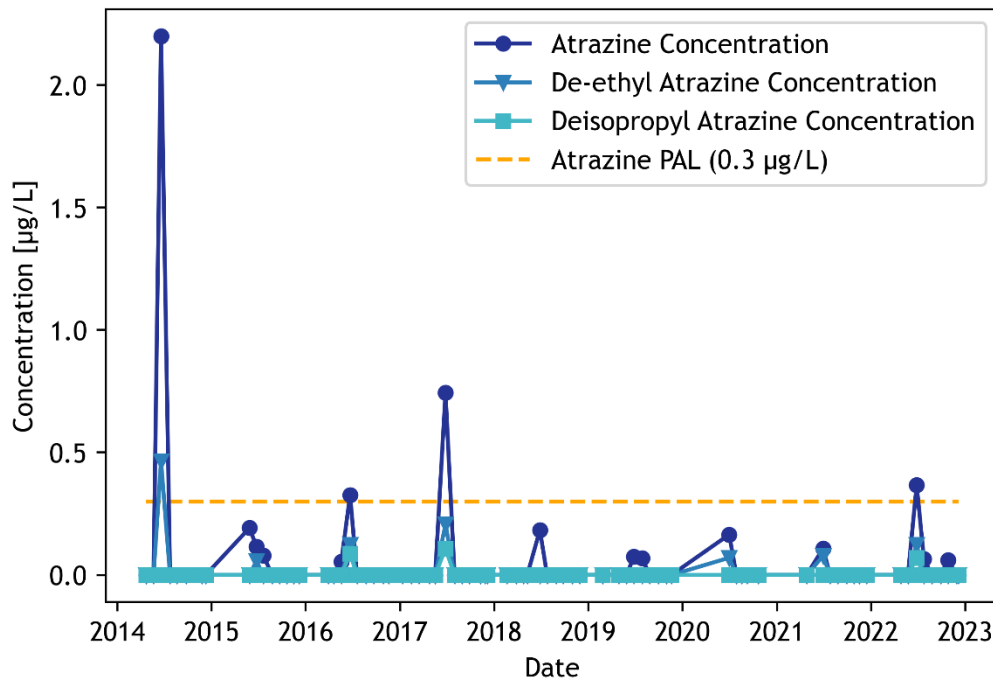
The following is a list of pesticide compounds that were frequently detected at this location, along with any exceedances of relevant water quality standards.

- 2,4-D was detected in 30 of 80 samples tested (37.5%).
- Atrazine was detected in 16 of 86 samples tested (18.6%).
  - Four detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L.
- Metolachlor was detected in 14 of 86 samples tested (16.3%).
- Metolachlor ESA was detected in 84 of 86 samples tested (97.7%).
- Nitrogen as nitrate plus nitrite was detected in 56 of 62 samples tested (90.3%).
  - Six detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 2 mg/L.

Figure 9 and Figure 10 show concentrations of atrazine compounds and nitrogen, respectively, detected in samples collected between 2014 and 2022 at this location.

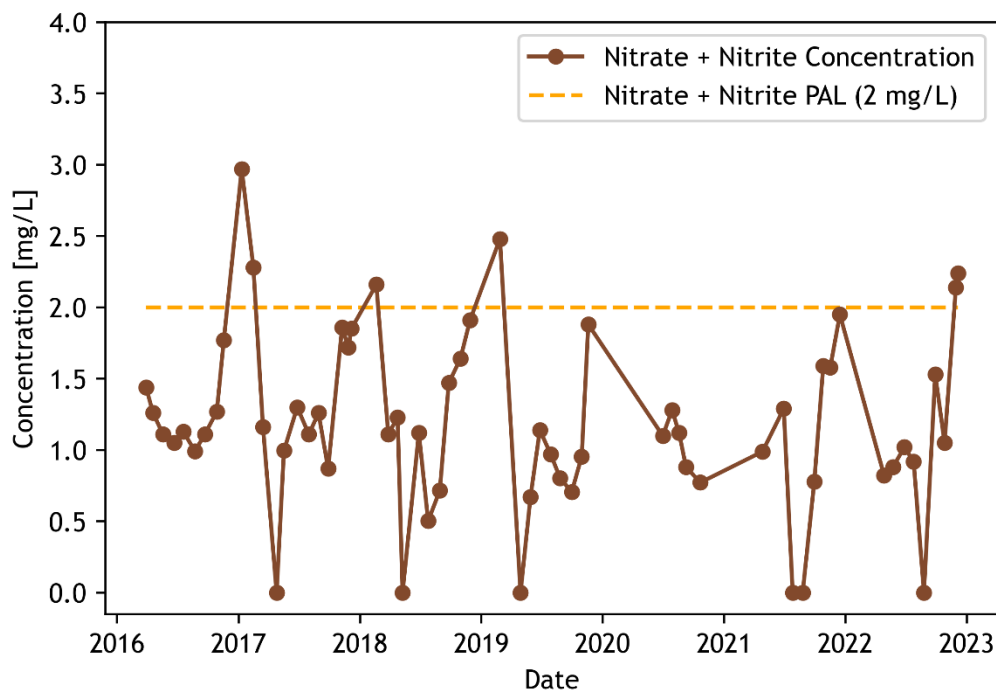
Atrazine parent material, de-ethyl atrazine, and deisopropyl atrazine were detected at this location between 2014 and 2022. Metabolite compounds (i.e. de-ethyl and deisopropyl atrazine) were typically detected alongside atrazine parent material, and detections typically occurred during the summer months.

*Figure 9: Atrazine Compounds Detected in the Milwaukee River (2014-2022)*



Nitrogen as nitrate plus nitrite was detected year-round at this location between 2014 and 2022. Concentrations fluctuated throughout each year, but the highest nitrogen concentrations were typically detected during winter months, while concentrations tended to dip somewhat during the spring and summer months.

Figure 10: Nitrogen (Nitrate + Nitrite) Detected in the Milwaukee River (2016-2022)



## Mississippi River

The Mississippi River was sampled 91 times over 10 consecutive years between 2013 and 2022. Samples were collected at the “Mississippi River at Lock And Dam 9 Lynxville” location (SWIMS ID: 123016) in Crawford County. The numbers of samples collected each year during this period ranged from five to 10, but samples were typically collected monthly between March and December.

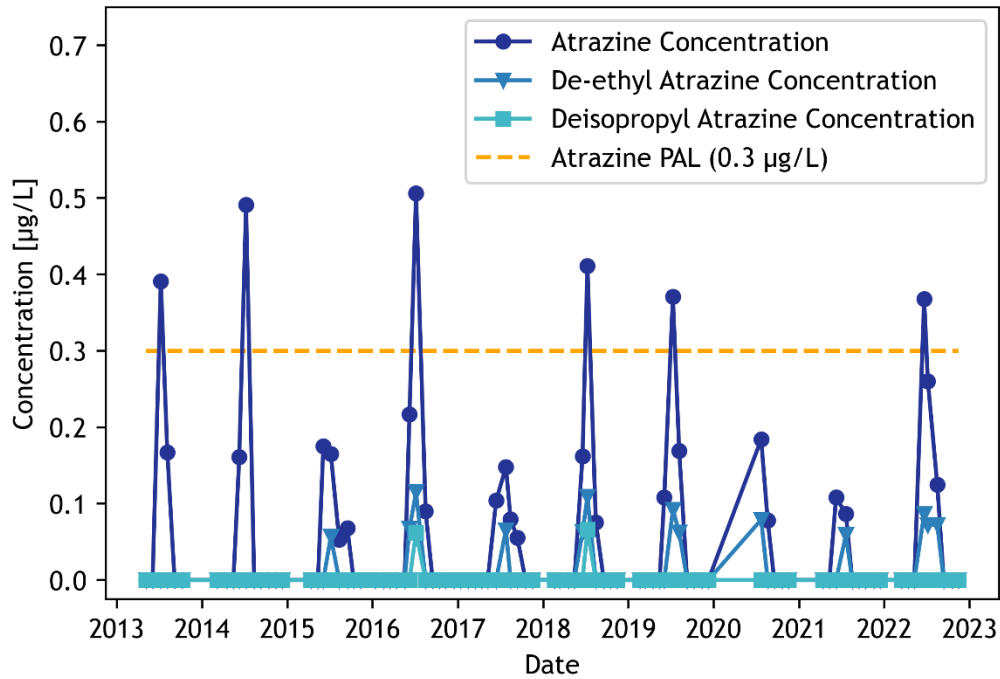
The following is a list of pesticide compounds that were consistently detected at this location, along with any exceedances of relevant water quality standards:

- Acetochlor was detected in 14 of 91 samples tested (15.4%).
- Acetochlor ESA was detected in 79 of 90 samples tested (87.8%).
- Alachlor ESA was detected in 28 of 82 samples tested (34.1%).
- Atrazine was detected in 28 of 91 samples tested (30.8%).
  - Six detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L.
- De-ethyl atrazine was detected in 13 of 91 samples tested (14.3%).
- Atrazine TCR was detected in 28 of 91 samples tested (30.8%).
  - Seven detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L.
- Fomesafen was detected in 14 of 75 samples tested (18.7%).
- Metolachlor was detected in 26 of 91 samples tested (28.6%).
- Metolachlor ESA was detected in 89 of 90 samples tested (98.9%).
- Nitrogen as nitrate plus nitrite was detected in 63 of 65 samples tested (96.9%).
  - 25 detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 2 mg/L.

Figure 11 and Figure 12 show concentrations of atrazine compounds and nitrogen, respectively, detected in samples collected between 2013 and 2022 at this location.

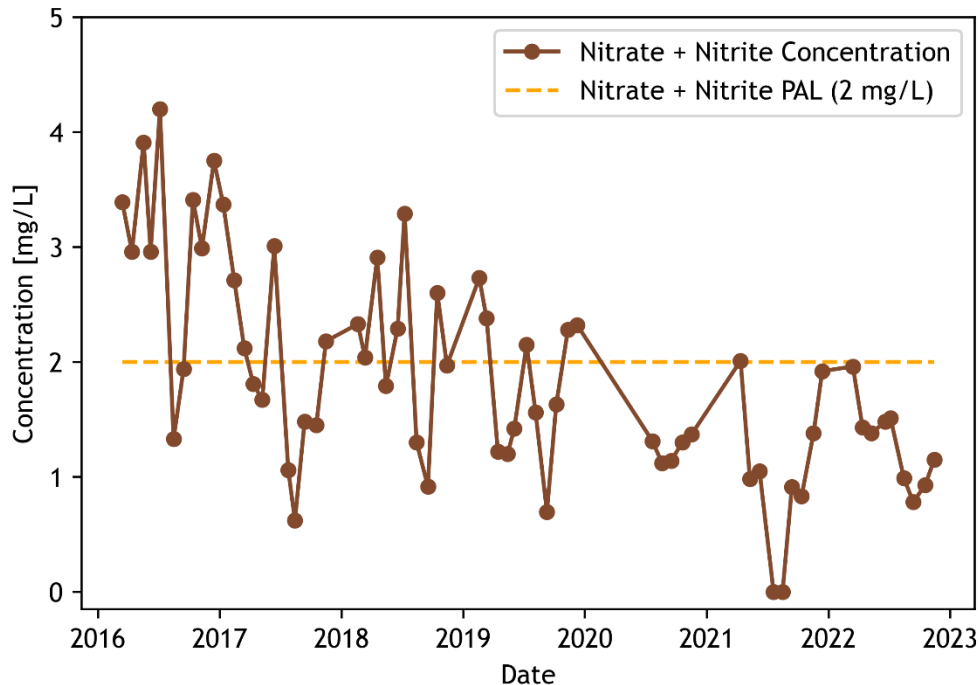
Atrazine parent material, de-ethyl atrazine, and deisopropyl atrazine were detected at this location between 2013 and 2022. Metabolite compounds (i.e. de-ethyl and deisopropyl atrazine) were typically detected alongside atrazine parent material, and detections typically occurred during the summer months. Atrazine parent material was consistently detected at concentrations several times greater than concentrations of its metabolites detected in the same sample.

*Figure 11: Atrazine Compounds Detected in the Mississippi River (2013-2022)*



Nitrogen as nitrate plus nitrite was detected year-round at this location between 2013 and 2022. Although concentrations fluctuated considerably throughout each year, an overall decreasing trend in nitrogen concentration was observed over the period shown in Figure 12.

Figure 12: Nitrogen (Nitrate + Nitrite) Detected in the Mississippi River (2016-2022)



## Root River

The Root River was sampled 41 times over six consecutive years between 2017 and 2022. Samples were collected at the “Root River at Eight Mile Road” location (SWIMS ID: 10039425) in Racine County. This sampling location’s watershed is located within and just outside the greater Milwaukee metropolitan area and has a large proportion of urban and suburban land use. The numbers of samples collected each year during this period ranged from five to 11, but samples were typically collected monthly between March and December.

The following is a list of pesticide compounds that were consistently detected at this location, along with any exceedances of relevant water quality standards:

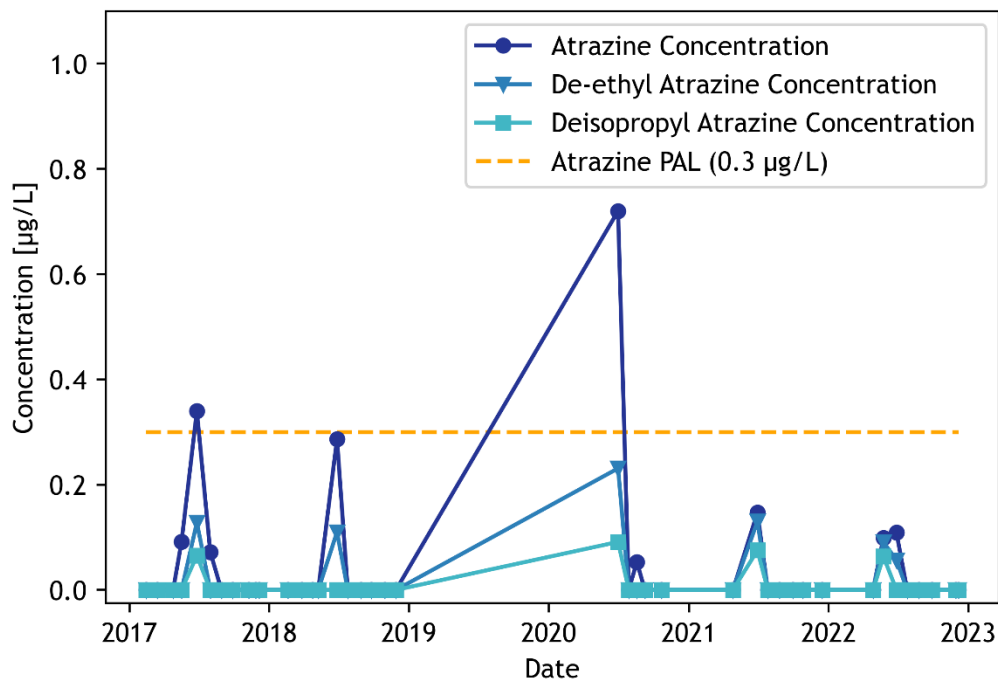
- 2,4-D was detected in 22 of 41 samples tested (53.7%).
- Acetochlor was detected in six of 41 samples tested (14.6%).
  - One detection exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.7 µg/L.
- Acetochlor ESA was detected in 30 of 41 samples tested (73.2%).
- Atrazine was detected in nine of 41 samples tested (22.0%).
  - Two detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L.
- De-ethyl atrazine was detected in six of 41 samples tested (14.6%).
- Atrazine TCR was detected in nine of 41 samples tested (22.0%).
  - Four detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L.
- Clothianidin was detected in six of 41 samples tested (14.6%).
  - Two detections exceeded the U.S. EPA chronic ALB for invertebrates of 0.05 µg/L.
- Imidacloprid was detected in eight of 41 samples tested (19.5%).
  - All eight detections exceeded the U.S. EPA chronic ALB for invertebrates of 0.01 µg/L.
- MCPP was detected in eight of 41 samples tested (19.5%).

- Metolachlor was detected in seven of 41 samples tested (17.1%).
- Metolachlor ESA was detected in 36 of 41 samples tested (87.8%).
- Nitrogen as nitrate plus nitrite was detected in 33 of 41 samples tested (80.5%).
  - Ten detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 2 mg/L.
- Sulfentrazone was detected in eight of 41 samples tested (19.5%).
- Thiamethoxam was detected in six of 41 samples tested (14.6%).

Figure 13, Figure 14 and Figure 15 show concentrations of atrazine compounds, nitrogen, and neonicotinoid pesticides, respectively, detected in samples collected at this location between 2017 and 2022.

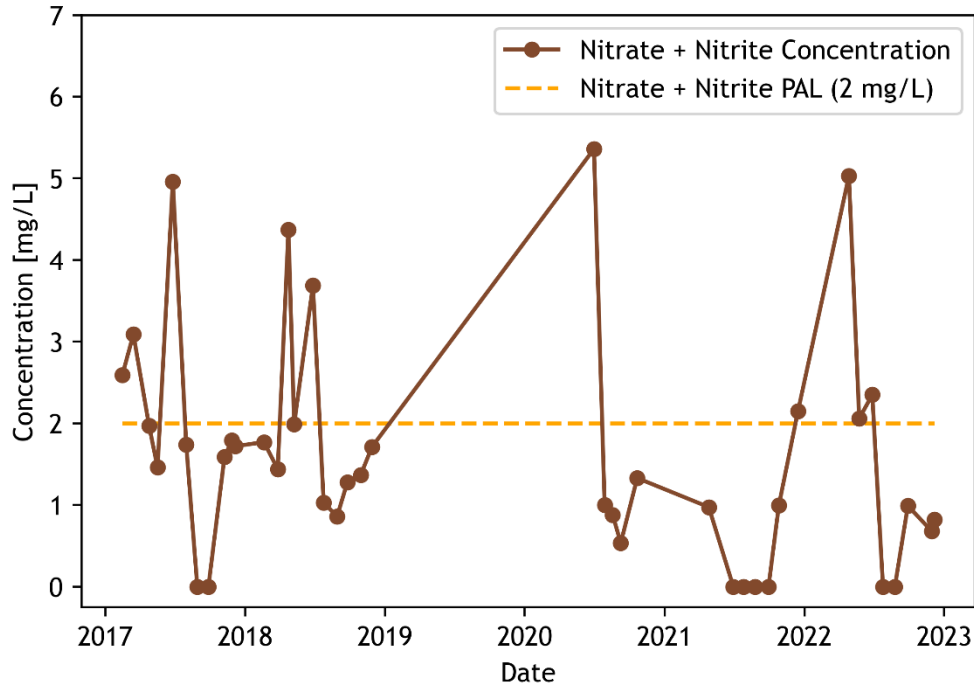
Atrazine parent material, de-ethyl atrazine, and deisopropyl atrazine were detected at this location between 2017 and 2022. Metabolite compounds (i.e. de-ethyl and deisopropyl atrazine) were typically detected alongside atrazine parent material, and detections typically occurred during the summer months. Between 2017 and 2020, atrazine parent material was consistently detected at concentrations several times greater than concentrations of its metabolites detected in the same sample. However, these differences in concentration were much less pronounced in detections from samples collected between 2021 and 2022.

*Figure 13: Atrazine Compounds Detected in the Root River (2017-2022)*



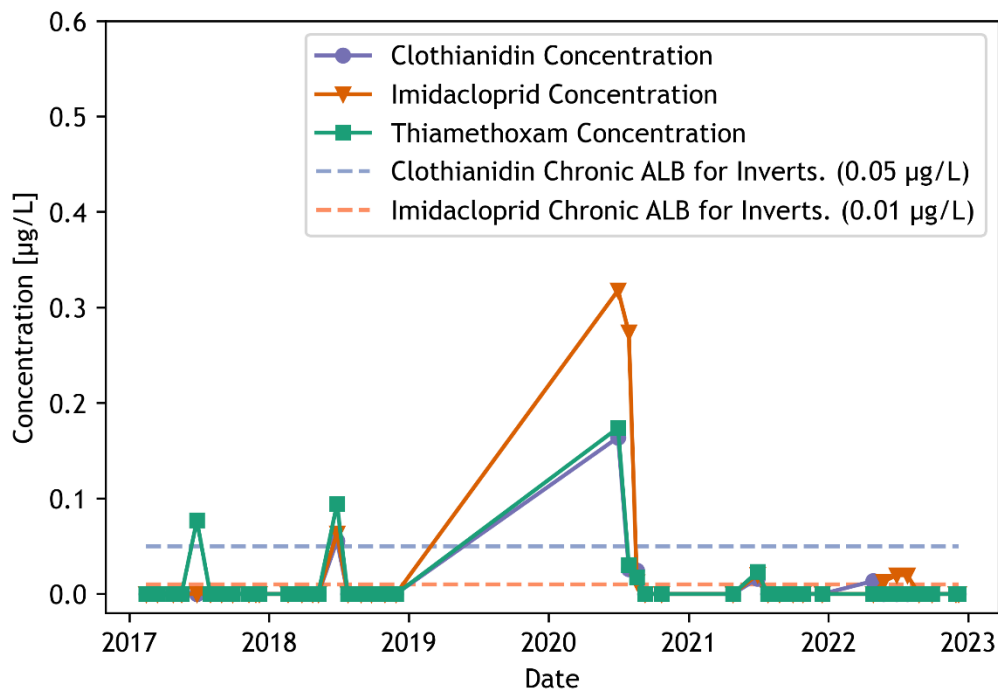
Nitrogen as nitrate plus nitrite was detected year-round at this location between 2013 and 2022. Concentrations fluctuated throughout each year, but tended to peak during the spring and early summer months before declining in the late summer and fall months.

Figure 14: Nitrogen (Nitrate + Nitrite) Detected in the Root River (2017-2022)



Clothianidin, imidacloprid, and thiamethoxam were all detected at this location in samples collected between 2017 to 2022. These three compounds were often detected together in samples. As shown in Figure 15, concentrations of these compounds peaked during summer in 2017 and 2018 and spiked in samples collected in the summer of 2020, but subsequently declined.

Figure 15: Neonicotinoids Detected in the Root River (2017-2022)



## Tenmile Creek

Tenmile Creek was sampled 67 times over eight consecutive years between 2015 and 2022. Samples were collected at the “Tenmile Creek - Evergreen Rd. (40 Yards Upstream)” location (SWIMS ID: 10016427) in Portage County, within the Central Sand Plains region of Wisconsin. The number of samples collected each year during this period ranged from one to 12, but samples were typically collected monthly between March and December.

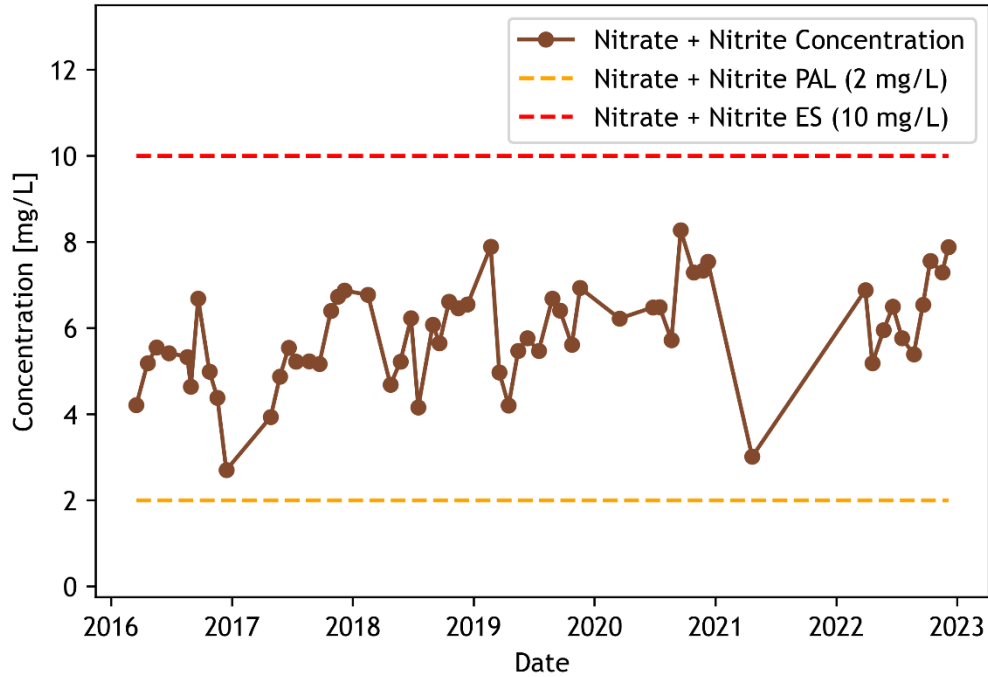
The following is a list of pesticide compounds that were consistently detected at this location, along with any exceedances of relevant water quality standards:

- Alachlor ESA was detected in 61 of 61 samples tested (100.0%).
  - One detection exceeded the Wis. Admin. Code ch. NR 140 PAL of 4 µg/L.
- Bentazon was detected in nine of 67 samples tested (13.4%).
- Chlorantraniliprole was detected in 21 of 58 samples tested (36.2%).
- Clothianidin was detected in 21 of 67 samples tested (31.3%).
- De-ethyl atrazine was detected in seven of 67 samples tested (10.4%).
- Dichlobenil was detected in 13 of 65 samples tested (20.0%).
- Imidacloprid was detected in 23 of 67 samples tested (34.3%).
  - All 23 detections exceeded the U.S. EPA chronic ALB for invertebrates of 0.01 µg/L.
- Metolachlor was detected in 10 of 67 samples tested (14.9%).
- Metolachlor ESA was detected in 67 of 67 samples tested (100.0%).
- Metolachlor OA was detected in 67 of 67 samples tested (100.0%).
- Metribuzin was detected in 67 of 67 samples tested (100.0%).
- Metribuzin DA was detected in 14 of 58 samples tested (24.1%).
- Metribuzin DADK was detected in 58 of 58 samples tested (100.0%).
- Nitrogen as nitrate plus nitrite was detected in 58 of 58 samples tested (100.0%).
  - All 58 detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 2 mg/L.
- Norflurazon was detected in 65 of 67 samples tested (97.0%).
- Thiamethoxam was detected in 55 of 67 samples tested (82.1%).

Figure 16 and Figure 17 show concentrations of nitrogen and neonicotinoid pesticides, respectively, in samples collected at this location between 2015 and 2022.

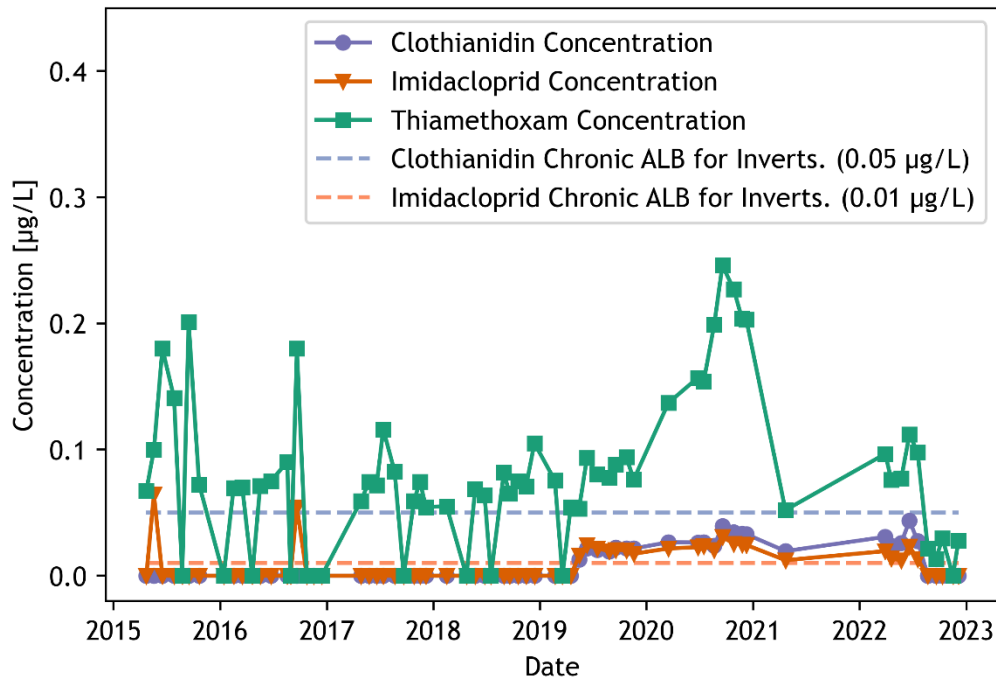
Nitrogen as nitrate plus nitrite was detected year-round at this location between 2016 and 2022. Concentrations fluctuated throughout each year, but tended to peak in the fall and winter months while declining in the spring and summer months. As shown in Figure 16, results indicate a slightly increasing trend over the seven-year period.

Figure 16: Nitrogen (Nitrate + Nitrite) Detected in Tenmile Creek (2016-2022)



Clothianidin, imidacloprid, and thiamethoxam were all detected at this location in samples collected between 2016 and 2022. The BLS laboratory reporting limit of these pesticides was 0.05  $\mu\text{g/L}$  until 2019, when the reporting limit was lowered to 0.01  $\mu\text{g/L}$ . This likely explains why there were fewer detections of clothianidin and imidacloprid at this location until 2019, as detected concentrations were typically below 0.05  $\mu\text{g/L}$ .

Figure 17: Neonicotinoids Detected in Tenmile Creek (2015-2022)



## Wisconsin River

The Wisconsin River was sampled 92 times over 10 consecutive years between 2013 and 2022 at the “Wisconsin River at Sth 80 Bridge At Muscoda WI” location (SWIMS ID: 223282) in Grant County. The numbers of samples collected each year during this period ranged from five to 11, but samples were typically collected monthly between March and December.

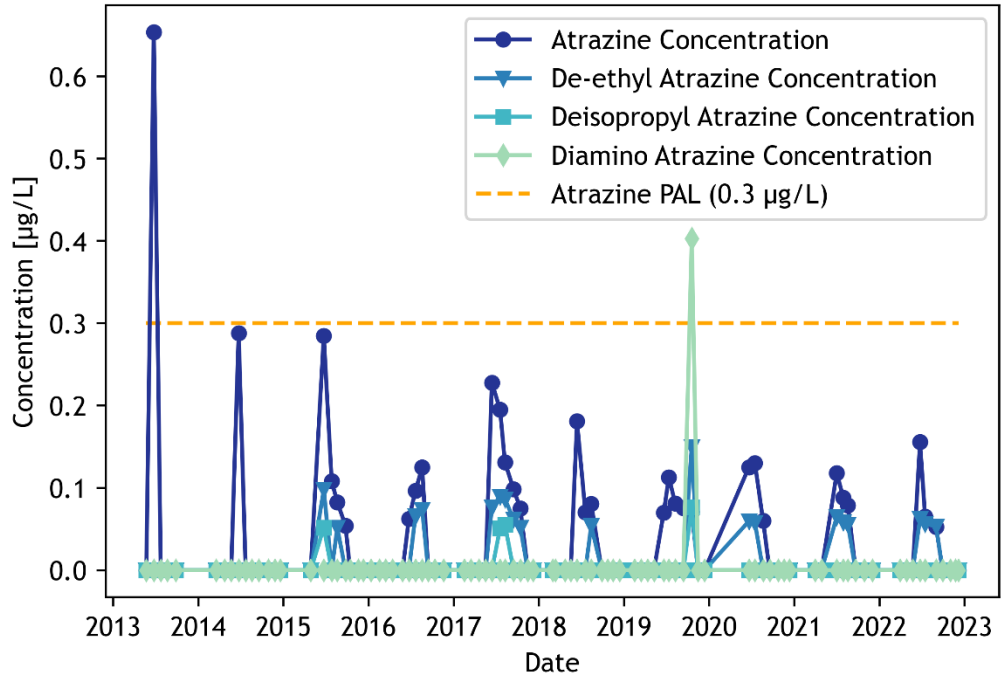
The following is a list of pesticide compounds that were consistently detected at this location, along with any exceedances of relevant water quality standards:

- Acetochlor ESA was detected in 24 of 92 samples tested (26.1%).
- Alachlor ESA was detected in 69 of 85 samples tested (81.2%).
- Atrazine was detected in 31 of 92 samples tested (33.7%).
  - One detection exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L.
- De-ethyl atrazine was detected in 19 of 92 samples tested (20.7%).
- Diamino atrazine was detected in one of 92 samples tested (1.1%).
  - The one detection exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L.
- Atrazine TCR was detected in 31 of 92 samples tested (33.7%).
  - Five detections exceeded the Wis. Admin. Code ch. NR 140 PAL of 0.3 µg/L.
- Metolachlor was detected in 19 of 92 samples tested (20.7%).
- Metolachlor ESA was detected in 90 of 92 samples tested (97.8%).
- Nitrogen as nitrate plus nitrite was detected in 41 of 68 samples tested (60.3%).
  - One detection exceeded the Wis. Admin. Code ch. NR 140 ES of 10 mg/L.

Figure 18 and Figure 19 show concentrations of atrazine compounds and nitrogen, respectively, in samples collected at this location between 2013 and 2022.

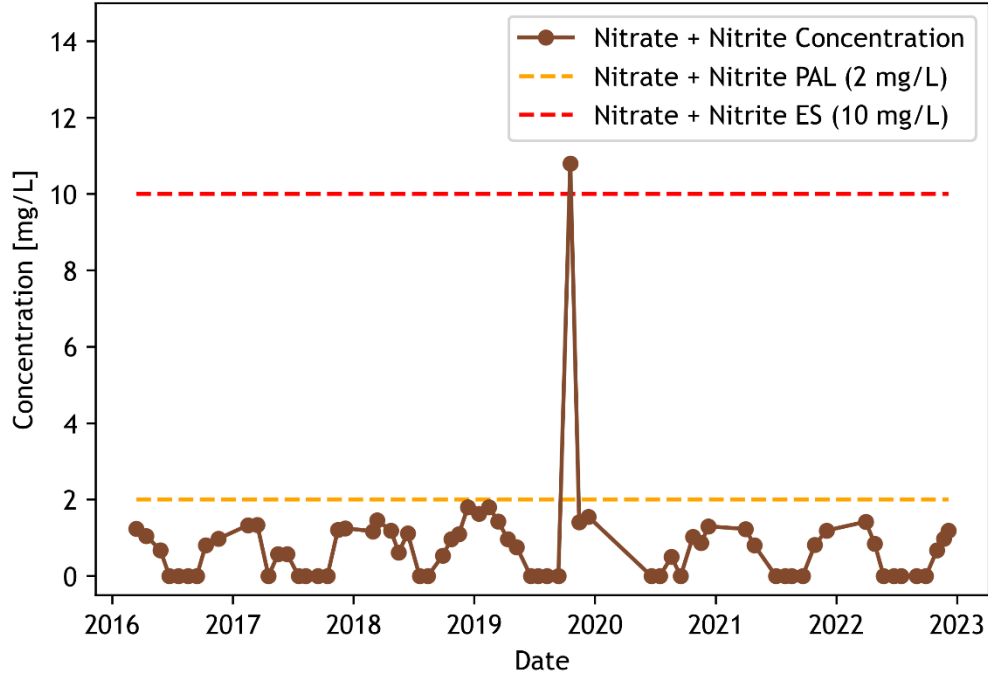
Atrazine parent material, de-ethyl atrazine, deisopropyl atrazine, and diamino atrazine were detected in samples collected at this location between 2013 and 2022. Metabolite compounds (i.e. de-ethyl, deisopropyl, and diamino atrazine) were typically detected alongside atrazine parent material, and detections of all atrazine compounds typically occurred during the summer months. There were separate detections of anomalously high concentrations of atrazine parent material and diamino atrazine on 6/24/2013 and 10/18/2019, respectively.

Figure 18: Atrazine Compounds Detected in the Wisconsin River (2013-2022)



Nitrogen as nitrate plus nitrite was detected year-round at this location between 2016 and 2022. Nitrogen concentrations were observed to follow a cycle of declining concentrations decreasing during the spring months, low concentration during the summer months followed by an increase in the fall months, and peak concentrations in the winter months before repeating this seasonal pattern. There was an anomalously high concentration of nitrogen detected on 10/18/2019. This was the same sample with an anomalously high diamino atrazine concentration.

Figure 19: Nitrogen (Nitrate + Nitrite) Detected in the Wisconsin River (2016-2022)



## Conclusions and Recommendations

A variety of pesticides and pesticide metabolites were detected in surface water throughout Wisconsin between 2008 and 2022. Overall, during the first 15 years of the Surface Water Sampling Program, the most commonly detected pesticide compounds are consistent with the most commonly detected pesticide compounds observed by the Surface Water Sampling Program from 2023 to the present (Wisconsin Department of Agriculture, Trade and Consumer Protection, 2026) (Wisconsin Department of Agriculture, Trade and Consumer Protection, 2024).

Several specific regions in Wisconsin, including the Central Sand Plains region, the Lower Wisconsin River Valley, and Dane County saw persistent detections of pesticide compounds and exceedances of both Wis. Admin. Code ch. NR 140 groundwater health standards and U.S. EPA ALB's. These regions are characterized by large areas of agricultural land use. Based on this land use, persistent detections of pesticide compounds in these locations would be expected. However, the region surrounding the Milwaukee metropolitan area (Ozaukee, Milwaukee, and Racine counties) also saw persistent detections of pesticide compounds over this period. This suggests that urban land use may also be a considerable source of pesticides in Wisconsin surface waters.

From a human health perspective, atrazine compounds were the group of pesticide compounds with the most exceedances of Wis. Admin. Code ch. NR 140 PAL's and ES's. Atrazine compounds made up three of the 10 most commonly detected pesticide compounds as well. From an ecological health perspective, neonicotinoid pesticides like imidacloprid and clothianidin also showed comparatively high exceedance rates of U.S. EPA chronic Aquatic Life Benchmarks for invertebrates, which could impact not just stream and lake dwelling invertebrates, but also the larger vertebrates such as fish, birds, and amphibians that prey on them.

Pesticides are not the only compounds detected during the first 15 years of the Surface Water Sampling Program. Nitrogen was consistently found to be a widespread surface water contaminant in Wisconsin's surface waters during this period. Nitrogen as nitrate plus nitrite recorded more exceedances of Wis. Admin. Code ch. NR 140 PAL's and ES's than all tested pesticide compounds combined.

Although a significant amount of data was collected during the first 15 years of the Surface Water Sampling Program, it is difficult to conclude if surface water quality is improving or becoming worse in regard to the presence of pesticide contaminants. There were some specific examples of decreasing trends at sites with long-term sampling data, such as the decreasing trend of nitrogen as nitrate plus nitrite at the Lock and Dam 9 location on the Mississippi River (Figure 12). However, other locations, such as the Evergreen Road location at Tenmile Creek (Figure 16), show an increasing trend for nitrogen as nitrate plus nitrite. It is notable that these two examples, with perhaps the strongest observable trends, are both for nitrogen rather than pesticides. Generally, year-to-year detected concentrations of pesticides tended to be fairly stable, with some trends observed to be year-specific, or seasonal fluctuations likely corresponding to seasonal agricultural activities.

Based on these conclusions, the DATCP Environmental Quality Unit recognizes the need for continued surface water monitoring of pesticide contamination in Wisconsin. Recently proposed changes by EPA to federal pesticide labels (United States Environmental Protection Agency, 2025b) indicate a growing emphasis on the ecological risks of pesticide contamination of surface water. These proposed label changes have the potential to alter pesticide use patterns in Wisconsin, in turn impacting the pesticides that may be detected in Wisconsin's surface water resources. Additionally, DATCP recognizes a growing concern from researchers, regulators, and the public regarding the ecological impacts of surface water contamination by certain pesticides, especially neonicotinoids. As such, maintaining or expanding DATCP's surface water monitoring is necessary to continue collecting data that can be used to quantify ecological risk associated with pesticide contamination in surface water.

Finally, with several multi-year datasets from specific regions of the state showing persistent pesticide detections and many water quality standard exceedances, it may be prudent in future years to devote resources to monitoring strategies that focus on specific watersheds, emphasizing finer spatial and temporal resolution in sampling.

## Acknowledgements

The primary sources of revenue for ACM are industry fees for licenses, permits, registrations, and tonnage under the feed, fertilizer, soil and plant additive, lime, and pesticide programs. In addition, a cooperative agreement with the EPA provides some funding to cover annual pesticide program expenses. ACM recognizes these important partnerships with the industry and the federal government and works hard to maximize the use of this funding for the benefit of industry, consumers, and the environment.

Additionally, the DATCP Environmental Quality Unit would like to recognize the efforts of Dr. Carla Romano for her work in the analysis of this dataset while she worked at DATCP. Without her work, this report would not have been possible.

The raw data required to reproduce the above findings is available upon request. For any questions and clarifications, please contact us at [DATCPGW@wisconsin.gov](mailto:DATCPGW@wisconsin.gov) or at (608) 224-4503.

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## Appendix A - Acronyms and Definitions

The acronyms and terminology included on this list are generic definitions intended to help understand the Surface Water Sampling Program. Some of these terms are more specifically defined in various regulations.

### Acronyms

µg/L	_____	Micrograms per Liter
ACM	_____	DATCP Bureau of Agrichemical Management
BLS	_____	DATCP Bureau of Laboratory Services
CTH	_____	County Highway
CTY	_____	County Highway
DATCP	_____	Wisconsin Department of Agriculture, Trade and Consumer Protection
DHS	_____	Wisconsin Department of Health Services
DNR	_____	Wisconsin Department of Natural Resources
EPA	_____	United States Environmental Protection Agency
ES	_____	Enforcement Standard
ESA	_____	Ethane Sulfonic Acid
GC	_____	Gas Chromatography
ISO	_____	International Organization for Standardization
LC	_____	Liquid Chromatography
mg/L	_____	Milligrams per Liter
MS	_____	Mass Spectroscopy
N	_____	Nitrogen
ND	_____	No Detect (concentration less than laboratory reporting limits)
OA	_____	Oxanilic Acid
PAL	_____	Preventive Action Limit
STH	_____	State Highway
Rd	_____	Road
SWIMS	_____	Surface Water Integrated Monitoring System
TCR	_____	Total Chlorinated Residues
Wis. Admin. Code	_____	Wisconsin Administrative Code

## Definitions

**Analyte** - A chemical substance that has a defined Chemical Abstract Service (CAS) number.

**Aquatic Life Benchmarks** - EPA-developed pesticide toxicity values for freshwater species. They are estimates of the concentrations below which pesticides are not expected to present a risk of concern for freshwater organisms.

**Atrazine Prohibition Area** - An area where atrazine use is currently prohibited under Wis. Admin. Code ch. ATCP 30.

**Chronic exposure value** - The highest concentration of a chemical to which the organism can be exposed without causing chronic toxicity to the organism in question.

**Compound** - A substance formed by the chemical union of two or more ingredients.

**Detection** - When an analyte has a concentration that can be quantified (i.e., a concentration greater than the Laboratory Reporting Limit).

**Enforcement Standard (ES)** - The Enforcement Standard (ES) is set to ensure that the concentration of a compound in groundwater does not exceed a specific level that could harm human health or the environment. If the ES for a certain compound in groundwater is exceeded, intervention from the appropriate authority is required.

**Herbicide** - A pesticide used to kill or inhibit the growth of plants, weeds, or grasses.

**Insecticide** - A pesticide used to kill or inhibit the growth of insects.

**Metabolite or Residual compound or Breakdown product** - A chemical substance left behind by a parent compound that has degraded through natural chemical breakdown and/or been metabolized by bacteria.

**Neonicotinoids** - Insecticides that target the neurological systems of insects. The neonicotinoid family includes acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, nithiazine, thiacloprid, and thiamethoxam.

**NR 140** - Wisconsin administrative code which establishes groundwater quality standards and required responses when the standards are exceeded.

**Perennial stream** - A stream that has flowing water year-round.

**Pesticide** - Substance used to kill, repel, or control certain forms of plant or animal life considered to be pests. The pesticide category includes herbicides, insecticides, rodenticides, fungicides, and bactericides.

**Preventive Action Limit (PAL)** - The Preventive Action Limit (PAL) is a percentage of the Enforcement Standard (ES); 10% of the ES for carcinogenic, mutagenic, or teratogenic substances; and 20% of the ES for the remaining substances. The intention of the PAL is for it to act as a trigger for intervention before a pollutant becomes a serious risk to public health or the environment.

**Reporting limit** - The minimum analyte concentration that can be reliably quantified and reported by the laboratory.

**Total chlorinated residues (TCR) of atrazine** - Sum of atrazine and three atrazine metabolites (de-ethyl atrazine, de-isopropyl atrazine, and diamino atrazine).

**Vadose zone** - The area of soil that exists between the land surface and the water table.

**Watershed** - A land area that channels rainfall and snowmelt water into a specific waterbody (e.g., a creek, a stream, a river, etc.).

**Wadeable** - Refers to streams and rivers recognized as natural habitats that support a diversity of both aquatic and terrestrial species.

## Appendix B - 2008-2022 Surface Water Sampling Program Analytical Results Summary

Analyte Name	Number of Samples Tested	Number of Detections	Lowest Detection (µg/L)	Highest Detection (µg/L)	Wisconsin Admin. Code Ch. NR 140 Standards (µg/L)		US Environmental Protection Agency Aquatic Life Benchmarks (µg/L)					
					PAL	ES	Freshwater Vertebrates (Acute)	Freshwater Vertebrates (Chronic)	Freshwater Invertebrates (Acute)	Freshwater Invertebrates (Chronic)	Nonvascular Plants (IC50)	Vascular Plants (IC50)
2,4,5-T	819	0	0	0	---	---	---	---	---	---	---	---
2,4,5-TP	819	0	0	0	5	50	---	---	---	---	---	---
2,4-D	889	121	0.0509	3.34	7	70	---	---	12500	---	---	299.2
2,4-DB	819	0	0	0	---	---	7150	1660	12500	1500	932	83
2,4-DP	819	0	0	0	---	---	> 45750	---	279000	100000	77	32000
3,5-Dichlorobenzoic Acid	45	0	0	0	---	---	---	---	---	---	---	---
Acetamiprid	947	0	0	0	---	---	> 50000	19200	10.5	2.1	> 1000	> 1000
Acetochlor	1183	53	0.0525	3.99	0.7	7	190	130	4100	22.1	1.43	3.4
Acetochlor ESA	1182	377	0.0513	1.61	46	230	> 90000	---	> 62500	---	9900	---
Acetochlor OA	1182	47	0.106	1.17	46	230	---	---	---	---	---	---
Acifluorfen	819	2	0.0837	0.187	---	---	8500	< 3400	14050	---	> 355000	378000
Alachlor	1183	4	0.18	0.917	0.2	2	900	187	1250	110	1.64	2.3
Alachlor ESA	1123	598	0.0504	7.33	4	20	> 52000	---	> 52000	---	3600	> 120000
Alachlor OA	1182	32	0.107	0.452	---	---	> 50000	---	> 47500	---	---	---
Aldicarb Sulfone	738	0	0	0	---	---	21000	---	140	---	---	---
Aldicarb Sulfoxide	679	0	0	0	---	---	3570	---	21.5	---	---	---
Aminopyralid	773	0	0	0	---	---	> 50000	1360	7500	102000	18000	> 88000
AMPA	10	0	0	0	---	---	249500	---	341500	---	---	---
Atrazine	1183	215	0.0502	7.77	0.3	3	2650	5	360	60	< 1	4.6
Atrazine TCR	1183	359	0.0502	8.153	0.3	3	---	---	---	---	---	---
Azoxystrobin	738	6	0.059	0.168	---	---	235	147	130	44	49	3400
Benfluralin	679	0	0	0	---	---	34.85	1.9	1090	15.5	> 100	---
Bentazon	819	44	0.0503	0.44	60	300	95000	9830	31150	101200	4500	5350
Bicyclopyrone	662	0	0	0	---	---	> 46700	10000	> 46650	103700	2000	13
Bifenthrin	400	0	0	0	---	---	0.075	0.004	0.0002465	0.00005	> 290	> 330
Bromacil	738	1	0.066	0.066	---	---	18000	3000	60500	8200	6.8	45
Bromoxynil	45	0	0	0	---	---	1050	---	7855	---	---	---
Carbaryl	714	0	0	0	4	40	110	6.8	0.85	0.5	340	1550
Carbofuran	738	0	0	0	8	40	44	5.7	1.115	0.75	---	---
Chloramben	774	0	0	0	30	150	---	---	---	---	---	---

Analyte Name	Number of Samples Tested	Number of Detections	Lowest Detection (µg/L)	Highest Detection (µg/L)	Wisconsin Admin. Code Ch. NR 140 Standards (µg/L)		US Environmental Protection Agency Aquatic Life Benchmarks (µg/L)					
					PAL	ES	Freshwater Vertebrates (Acute)	Freshwater Vertebrates (Chronic)	Freshwater Invertebrates (Acute)	Freshwater Invertebrates (Chronic)	Nonvascular Plants (IC50)	Vascular Plants (IC50)
Chlorantraniliprole	662	116	0.0502	0.97	---	---	> 6900	110	8.3	3.02	> 1780	> 2000
Chlorothalonil	662	0	0	0	---	---	9	0.77	27	0.6	12	640
Chlorpyrifos	686	0	0	0	0.4	2	0.9	0.57	0.05	0.04	140	---
Chlorpyrifos Oxygen Analog	738	0	0	0	---	---	---	---	---	---	---	---
Clomazone	723	0	0	0	---	---	1450	350	2700	2200	167	30200
Clopyralid	821	6	0.0589	1.18	---	---	51500	10000	116500	4700	6900	90300
Clothianidin	947	108	0.01	0.268	---	---	> 50750	9700	11	0.05	64000	> 280000
Cyanazine	166	1	0.59	0.59	0.1	1	---	---	---	---	---	---
Cyantraniliprole	376	0	0	0	---	---	> 5000	10700	10.2	6.56	> 10000	> 12100
Cyclaniliprole	662	0	0	0	---	---	> 68.5	200	40.4	9.6	> 99	> 187
Cyfluthrin	686	0	0	0	---	---	0.034	0.0042	0.0125	0.00012	> 2	---
Cypermethrin	662	0	0	0	---	---	0.195	0.051	0.00028	< 0.00005	25000	> 1.62
Cyprosulfamide	738	0	0	0	---	---	---	---	---	---	---	---
Dacthal	724	0	0	0	14	70	15000	---	13500	---	> 11000	> 11000
Dacthal Di-Acid	296	1	0.545	0.545	---	---	---	---	---	---	---	---
Dacthal Mono-Acid	341	0	0	0	---	---	---	---	---	---	---	---
DEET	7	7	0.529	21.2	---	---	37500	---	37500	---	---	---
De-ethyl Atrazine	1183	262	0.05	0.59	0.3	3	---	---	---	---	1000	---
Deisopropyl Atrazine	1183	65	0.0508	0.37	0.3	3	8500	---	63000	---	2500	---
Desthio Prothioconazole	376	0	0	0	---	---	---	148	---	103	4.8	35
Diamino Atrazine	1183	68	0.156	0.61	0.3	3	> 50000	---	> 50000	---	---	---
Diazinon	723	0	0	0	---	---	45	< 0.55	0.105	0.17	3700	---
Diazinon Oxygen Analog	679	0	0	0	---	---	---	---	---	---	---	---
Dicamba	889	5	0.066	3.41	60	300	14000	> 9900	> 50000	> 42000	61	1290
Dichlobenil	723	50	0.0506	1.2	---	---	2465	< 330	3100	560	1500	30
Dimethenamid	724	2	0.0508	1.45	5	50	3150	120	6000	1360	14	8.9
Dimethenamid ESA	738	22	0.0504	0.09	---	---	---	---	---	---	---	---
Dimethenamid OA	738	0	0	0	---	---	---	---	---	---	---	---
Dimethoate	662	0	0	0	0.4	2	3100	430	21.5	0.5	20000	> 92600
Dinotefuran	947	0	0	0	---	---	> 49550	6360	> 484150	> 95300	> 97600	> 110000

Analyte Name	Number of Samples Tested	Number of Detections	Lowest Detection (µg/L)	Highest Detection (µg/L)	Wisconsin Admin. Code Ch. NR 140 Standards (µg/L)		US Environmental Protection Agency Aquatic Life Benchmarks (µg/L)					
					PAL	ES	Freshwater Vertebrates (Acute)	Freshwater Vertebrates (Chronic)	Freshwater Invertebrates (Acute)	Freshwater Invertebrates (Chronic)	Nonvascular Plants (IC50)	Vascular Plants (IC50)
Diuron	738	9	0.062	1.52	---	---	660	26.4	87.5	0.83	3.08	13
EPTC	723	0	0	0	50	250	7000	40	3250	800	1400	5600
Esfenvalerate	662	0	0	0	---	---	0.071	0.017	0.000424	0.0000309	> 5.6	> 8.6
Ethalfuralin	662	0	0	0	---	---	16	0.4	30	24	25	7.3
Ethofumesate	662	0	0	0	---	---	5760	< 306	17150	300	> 2760	39000
Fipronil	1	1	0.626	0.626	---	---	41.5	6.6	0.11	0.011	76	> 100
Flumetsulam	679	5	0.0536	0.0763	---	---	> 146500	197000	127000	111000	3.21	3.1
Flupyradifurone	662	0	0	0	---	---	---	---	---	---	---	---
Fluroxypyr	818	0	0	0	---	---	7150	---	> 50000	---	> 100000	---
Fomesafen	738	32	0.05	0.327	---	---	63000	9400	188000	50000	92	210
Glufosinate Ammonium	9	0	0	0	---	---	> 156000	50000	325500	31000	72	1470
Glyphosate	10	0	0	0	---	---	21500	25700	26600	9220	11400	11900
Halosulfuron Methyl	738	0	0	0	---	---	---	---	---	---	4.1	0.042
Hexazinone	738	0	0	0	---	---	137000	17000	75800	20000	7	37.4
Hydroxysimazine	1	0	0	0	---	---	---	---	---	---	---	---
Imazapyr	738	7	0.0555	0.361	---	---	> 50000	43100	> 50000	97100	12200	24
Imazethapyr	738	4	0.0574	0.207	---	---	120000	97000	> 500000	103000	4770	8.1
Imidacloprid	947	74	0.0116	0.318	---	---	114500	9000	0.385	0.01	---	---
Isoxaflutole	725	0	0	0	---	---	> 850	80	> 750	350	110	4.9
Isoxaflutole RPA202248 (DKN)	738	0	0	0	---	---	> 15300	---	> 29800	---	5000	75
Lambda-cyhalothrin	662	0	0	0	---	---	0.0145	0.031	0.00004	0.00022	> 310	> 0.508
Linuron	738	1	0.144	0.144	---	---	1500	5.58	60	0.09	13.7	2.5
Malathion	662	0	0	0	---	---	2.05	8.6	0.049	0.06	2040	24000
MCPA	774	3	0.0639	0.0837	---	---	---	---	---	---	630	170
MCPB	774	0	0	0	---	---	1960	< 530	25100	2510	1370	200
MCPP	844	16	0.0502	0.284	---	---	> 46500	50000	68000	50800	14	10
Mesotrione	739	1	0.122	0.122	---	---	> 60000	11000	67000	3055	> 820	4.8
Metalaxyl	738	25	0.051	0.162	---	---	65000	9100	14000	1200	---	85000
Methyl Parathion	662	0	0	0	---	---	925	< 10	0.485	0.25	15000	18000
Metolachlor	1183	224	0.0501	6.44	10	100	1600	30	11750	3200	8	14

Analyte Name	Number of Samples Tested	Number of Detections	Lowest Detection (µg/L)	Highest Detection (µg/L)	Wisconsin Admin. Code Ch. NR 140 Standards (µg/L)		US Environmental Protection Agency Aquatic Life Benchmarks (µg/L)					
					PAL	ES	Freshwater Vertebrates (Acute)	Freshwater Vertebrates (Chronic)	Freshwater Invertebrates (Acute)	Freshwater Invertebrates (Chronic)	Nonvascular Plants (IC50)	Vascular Plants (IC50)
Metolachlor ESA	1182	1084	0.0611	6.36	260	1300	24000	---	> 54000	---	> 99450	43000
Metolachlor OA	1182	356	0.101	5.19	260	1300	> 46550	---	7700	---	57100	> 95400
Metribuzin	1183	166	0.0502	0.664	14	70	21000	< 3000	2100	1290	8.1	130
Metribuzin DA	662	62	0.101	0.278	---	---	---	---	---	---	---	---
Metribuzin DADK	662	169	0.247	1.34	---	---	---	---	---	---	---	---
Metsulfuron Methyl	738	0	0	0	---	---	> 75000	4500	> 75000	---	31	0.36
Napropamide	1	1	0.697	0.697	---	---	6000	1100	12350	1100	2020	350
Nicosulfuron	679	0	0	0	---	---	> 500000	---	> 500000	43000	---	---
Nitrogen Kjeldahl Total	57	56	0.21 mg/L	2.62 mg/L	---	---	---	---	---	---	---	---
Nitrogen (Nitrate + Nitrite)	672	602	0.5 mg/L	20.8 mg/L	2 mg/L	10 mg/L	---	---	---	---	---	---
Norflurazon	739	165	0.0507	4.43	---	---	4050	770	> 7500	1000	6.03	59
Oxadiazon	723	0	0	0	---	---	600	0.88	> 1200	30	5.2	41
Pendimethalin	723	0	0	0	---	---	69	6.3	140	14.5	5.2	12.5
Permethrin	400	0	0	0	---	---	0.395	0.052	0.0033	0.0042	> 4.4	> 3.2
Picloram	819	0	0	0	100	500	2750	550	17200	11800	34900	---
Prometon	724	4	0.0561	1.91	20	100	9800	6530	12850	3450	98	160
Prometryn	738	0	0	0	---	---	1455	620	4850	1000	1.04	11.9
Propiconazole	738	0	0	0	---	---	425	15	2400	180	21	3500
Quinclorac	45	0	0	0	---	---	15150	16000	> 50000	110000	> 500	> 500
Saflufenacil	738	2	0.0655	0.075	---	---	> 54000	997	6800	1330	42	87
Simazine	1183	11	0.0518	0.834	0.4	4	3200	60	500	40	6	67
Sulfentrazone	738	14	0.0552	1.94	---	---	46900	2950	30200	200	31	28.8
Sulfometuron Methyl	738	0	0	0	---	---	> 74000	---	> 75000	97000	4.3	0.45
Tebupirimphos	662	0	0	0	---	---	44.5	130	0.039	0.011	630	8800
Tembotrione	738	0	0	0	---	---	> 50000	604	24450	6.41	310	5.2
Thiacloprid	738	0	0	0	---	---	12600	918	18.9	0.97	45000	> 95400
Thiamethoxam	1017	158	0.0133	0.525	---	---	> 57000	20000	17.5	0.74	> 99000	> 90200
Thiencarbazone Methyl	738	0	0	0	---	---	> 52000	4800	> 49300	3540	298	0.8
Total Phosphorus	59	59	0.008 mg/L	0.321 mg/L	---	---	---	---	---	---	---	---
Triclopyr	819	16	0.0518	0.499	---	---	58500	---	66500	---	32500	---
Trifluralin	723	1	0.0782	0.0782	0.75	7.5	9.25	1.9	125.5	2.4	21.9	49.7

## Appendix C - Tables of Detections of Notable Compounds

Table 8: Locations of Atrazine Compound Detections (2008-2022)

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of PAL Exceedances	Number of ES Exceedances
Ahnapee River at CTH X Nr Forestville	153029	Atrazine	6	1	0
		Atrazine TCR	6	1	0
Balmoral Pond	10022318	Atrazine	19	2	0
		De-ethyl atrazine	19	0	0
		Deisopropyl atrazine	19	0	0
		Atrazine TCR	19	2	0
Big Eau Pleine River West Branch - Chestnut Rd	373143	Atrazine	6	4	0
		De-ethyl atrazine	6	2	0
		Atrazine TCR	6	4	0
Black Creek at Cth H	373052	Atrazine	8	1	0
		De-ethyl atrazine	8	1	0
		Atrazine TCR	8	2	0
Black River DS of STH 53 Bridge at Galesville	623001	Atrazine	6	0	0
		Atrazine TCR	6	0	0
Carter Creek - CTH G (CC-2 DS)	10013259	Atrazine	10	0	0
		De-ethyl atrazine	10	0	0
		Deisopropyl atrazine	10	0	0
		Diamino atrazine	10	1	0
		Atrazine TCR	10	9	0
Chippewa River - Sth 10 Bridge	473008	Atrazine	9	0	0
		Atrazine TCR	9	0	0
De Neveu Creek at 4th St (Cth T)	10007739	Atrazine	6	1	0
		Atrazine TCR	6	1	0
Ditch 5 / N Branch 10 Mile Creek - Taft Rd (Site 14)	10009200	De-ethyl atrazine	1	0	0
		Atrazine TCR	1	0	0
Duncan Creek at 157th Ave	093072	Atrazine	16	0	0
		De-ethyl atrazine	16	0	0
		Atrazine TCR	16	1	0
Embarrass River 5m us Hayman Falls Lane	10052089	Atrazine	9	0	0
		Atrazine TCR	9	0	0
Embarrass River at Cth M	593168	Atrazine	9	0	0
		Atrazine TCR	9	0	0
Embarrass River North Branch Rd. Ibi	10022027	Atrazine	9	0	0
		Atrazine TCR	9	0	0

Fourteen Mile Creek (Ditch # 7) - CTH D	013173	De-ethyl atrazine	48	0	0
		Atrazine TCR	48	0	0
Fox River at Green Bay Yacht Club	053222	Atrazine	9	0	0
		Atrazine TCR	9	0	0
Grand River at Cth H (Bi)	243029	Atrazine	14	1	0
		Atrazine TCR	14	1	0
Grant River - University Farm Rd.	223221	Atrazine	7	0	0
		Atrazine TCR	7	0	0
Honey Creek-50m Upstream Of Cth P Bridge	10014475	Atrazine	7	0	0
		Atrazine TCR	7	0	0
Kickapoo River at Bridge St in Steuben	123017	Atrazine	28	0	0
		De-ethyl atrazine	28	0	0
		Atrazine TCR	28	0	0
Leola Ditch Downstream Of Confluence W/Ditch 13-13 Site 4a	10009165	Atrazine	49	0	0
		De-ethyl atrazine	49	0	0
		Atrazine TCR	49	0	0
Little Platte River - Oak Rd. (Bi)	223242	Atrazine	7	0	0
		Atrazine TCR	7	0	0
Little River at Sth 22	433205	Atrazine	6	0	0
		Atrazine TCR	6	0	0
Manitowoc River at Cth Jj(Michigan Ave)	363069	Atrazine	5	1	0
		Atrazine TCR	5	1	0
Milwaukee River at Cth C (Pioneer Rd)	463098	Atrazine	9	1	0
		De-ethyl atrazine	9	0	0
		Atrazine TCR	9	1	0
Milwaukee River at Estabrook Park At Milwaukee WI	413640	Atrazine	86	4	0
		De-ethyl atrazine	86	1	0
		Deisopropyl atrazine	86	0	0
		Atrazine TCR	86	4	0
Mississippi River - Pool 3 at Lock & Dam 3 (L/D3)	483027	Atrazine	41	0	0
		De-ethyl atrazine	41	0	0
		Deisopropyl atrazine	41	0	0
		Atrazine TCR	41	1	0
Mississippi River at Lock And Dam 9 Lynxville	123016	Atrazine	91	6	0
		De-ethyl atrazine	91	0	0
		Deisopropyl atrazine	91	0	0
		Atrazine TCR	91	7	0
Mormon Coulee Creek #6 - Bridge at Cth Yy	10008928	Atrazine	18	1	0
		De-ethyl atrazine	18	0	0
		Deisopropyl atrazine	18	0	0
		Atrazine TCR	18	1	0

Neenah Slough - Neenah Slough - Cecil St	10011360	Atrazine	8	1	0
		Atrazine TCR	8	1	0
Nine Springs - Big Spring	10051661	De-ethyl atrazine	3	0	0
		Deisopropyl atrazine	3	0	0
		Diamino atrazine	3	3	0
		Atrazine TCR	3	3	0
Nine Springs - Nursery Springs	10051660	Atrazine	3	0	0
		De-ethyl atrazine	3	0	0
		Diamino atrazine	3	0	0
		Atrazine TCR	3	3	0
Nine Springs - Syene Springs	10051662	Atrazine	36	0	0
		De-ethyl atrazine	36	0	0
		Deisopropyl atrazine	36	0	0
		Diamino atrazine	36	30	0
		Atrazine TCR	36	34	0
North Branch Tenmile Creek at Isherwood/Harding	10042017	De-ethyl atrazine	1	0	0
		Atrazine TCR	1	0	0
Oak Creek US of 15th Ave N of Beech St	413913	Atrazine	9	0	0
		De-ethyl atrazine	9	0	0
		Deisopropyl atrazine	9	0	0
		Atrazine TCR	9	0	0
Pecatonica River at Martintown WI	233002	Atrazine	20	1	0
		De-ethyl atrazine	20	0	0
		Diamino atrazine	20	0	0
		Atrazine TCR	20	2	0
Red Cedar River at Menomonie Hydro	173208	Atrazine	9	2	0
		Atrazine TCR	9	2	0
Rock River at Afton WI	543001	Atrazine	26	6	0
		De-ethyl atrazine	26	0	0
		Deisopropyl atrazine	26	0	0
		Atrazine TCR	26	6	0
Root River at Eight Mile Road	10039425	Atrazine	41	2	0
		De-ethyl atrazine	41	0	0
		Deisopropyl atrazine	41	0	0
		Atrazine TCR	41	4	0
4 - Rush River - 385th St.	10008903	Atrazine	6	1	0
		Atrazine TCR	6	1	0

Sauk Creek - South Wisconsin Street	10030655	Atrazine	8	1	0
		De-ethyl atrazine	8	1	0
		Deisopropyl atrazine	8	1	0
		Diamino atrazine	8	1	0
		Atrazine TCR	8	1	0
Schoenick Creek 175m US Long Lake Confluence	10042141	Atrazine	5	0	0
		Atrazine TCR	5	0	0
South Branch Tenmile Creek - Taft Rd (Site 7)	10009196	De-ethyl atrazine	1	0	0
		Atrazine TCR	1	0	0
South Fork Bad Axe River - Oliver Rd.	10022633	De-ethyl atrazine	18	0	0
		Atrazine TCR	18	0	0
Sucker Creek - Sucker Brook Lane	10030656	Atrazine	8	1	0
		Atrazine TCR	8	1	0
Tenmile Creek - CTH U (Site 3)	10009190	De-ethyl atrazine	19	0	0
		Atrazine TCR	19	0	0
Tenmile Creek - Evergreen Rd. (40 Yards Upstream)	10016427	De-ethyl atrazine	67	0	0
		Atrazine TCR	67	0	0
Tenmile Creek Cty U	10009128	De-ethyl atrazine	1	0	0
		Atrazine TCR	1	0	0
West Branch Sugar River at CTH PB	10017221	Atrazine	34	0	0
		De-ethyl atrazine	34	0	0
		Deisopropyl atrazine	34	0	0
		Diamino atrazine	34	1	0
		Atrazine TCR	34	13	0
Wild Creek at Maple Road	373130	Atrazine	6	2	0
		Atrazine TCR	6	2	0
Wilson Creek at 390th St Bridge	173222	Atrazine	7	0	0
		Atrazine TCR	7	0	0
Wisconsin River at Sth 80 Bridge At Muscoda WI	223282	Atrazine	92	1	0
		De-ethyl atrazine	92	0	0
		Deisopropyl atrazine	92	0	0
		Diamino atrazine	92	1	0
		Atrazine TCR	92	5	0
Wisconsin River at Wisconsin Dells	573052	Atrazine	20	0	0
		De-ethyl atrazine	20	0	0
		Atrazine TCR	20	0	0
Wisconsin River Below Biron Dam temporary site	10031139	Atrazine	20	0	0
		Atrazine TCR	20	0	0

Yahara River at Sth 113 At Madison WI	133040	Atrazine	17	0	0
		Atrazine TCR	17	0	0
Yellow River - Below Pittsville Stp	723237	Atrazine	8	1	1
		De-ethyl atrazine	8	2	0
		Atrazine TCR	8	1	1

*Table 9: Locations of Clothianidin and Imidacloprid Detections (2012 - 2022)*

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of ALB Exceedances
Carter Creek - CTH G (CC-2 DS)	10013259	Imidacloprid	10	6
Ditch 5 / N Branch 10 Mile Creek - Taft Rd (Site 14)	10009200	Clothianidin	1	1
		Imidacloprid	1	1
Duncan Creek at 157th Ave	093072	Clothianidin	16	0
Fourteen Mile Creek (Ditch # 7) - CTH D	013173	Clothianidin	48	3
		Imidacloprid	48	15
Leola Ditch Downstream Of Confluence W/Ditch 13-13 Site 4a	10009165	Clothianidin	49	2
		Imidacloprid	49	12
Milwaukee River at Estabrook Park At Milwaukee WI	413640	Clothianidin	78	0
		Imidacloprid	78	1
Mississippi River at Lock And Dam 9 Lynxville	123016	Clothianidin	91	0
Nine Springs - Syene Springs	10051662	Clothianidin	36	0
North Branch Tenmile Creek at Isherwood/Harding	10042017	Clothianidin	1	1
		Imidacloprid	1	1
Pecatonica River at Martintown WI	233002	Clothianidin	20	0
Rock River at Afton WI	543001	Clothianidin	26	0
Root River at Eight Mile Road	10039425	Clothianidin	41	2
		Imidacloprid	41	8
South Branch Tenmile Creek - Taft Rd (Site 7)	10009196	Clothianidin	1	1
		Imidacloprid	1	1
South Fork Bad Axe River - Oliver Rd.	10022633	Imidacloprid	18	1
Tenmile Creek - CTH U (Site 3)	10009190	Clothianidin	19	0
		Imidacloprid	19	4
Tenmile Creek - Evergreen Rd. (40 Yards Upstream)	10016427	Clothianidin	67	0
		Imidacloprid	67	23
Tenmile Creek Cty U	10009128	Clothianidin	1	1
		Imidacloprid	1	1
West Branch Sugar River at CTH PB	10017221	Clothianidin	25	0

*Table 10: Locations of Nitrogen (Nitrate + Nitrite) Detections (2011 - 2022)*

Sampling Location	SWIMS ID Number	Compound Detected	Number of Samples Tested	Number of PAL Exceedances	Number of ES Exceedances
Badfish Creek at Schneider Rd	10033395	Nitrogen (nitrate + nitrite)	8	0	8
Balmoral Pond	10022318	Nitrogen (nitrate + nitrite)	9	0	0
Carter Creek - CTH G (CC-2 DS)	10013259	Nitrogen (nitrate + nitrite)	10	6	4
Ditch 5 / N Branch 10 Mile Creek - Taft Rd (Site 14)	10009200	Nitrogen (nitrate + nitrite)	1	0	1
Duncan Creek at 157th Ave	093072	Nitrogen (nitrate + nitrite)	16	15	0
Embarrass River 5m us Hayman Falls Lane	10052089	Nitrogen (nitrate + nitrite)	9	2	0
Embarrass River at Cth M	593168	Nitrogen (nitrate + nitrite)	9	2	0
Embarrass River North Branch Rd. Ibi	10022027	Nitrogen (nitrate + nitrite)	9	2	0
Fourteen Mile Creek (Ditch # 7) - CTH D	013173	Nitrogen (nitrate + nitrite)	48	37	0
Kickapoo River at Bridge St in Steuben	123017	Nitrogen (nitrate + nitrite)	23	0	0
Leola Ditch Downstream Of Confluence W/Ditch 13-13 Site 4a	10009165	Nitrogen (nitrate + nitrite)	49	48	0
Milwaukee River at Estabrook Park At Milwaukee WI	413640	Nitrogen (nitrate + nitrite)	62	6	0
Mississippi River - Pool 3 at Lock & Dam 3 (L/D3)	483027	Nitrogen (nitrate + nitrite)	30	28	0
Mississippi River at Lock And Dam 9 Lynxville	123016	Nitrogen (nitrate + nitrite)	65	25	0
Mormon Coulee Creek #6 - Bridge at Cth Yy	10008928	Nitrogen (nitrate + nitrite)	18	4	0
Nine Springs - Big Spring	10051661	Nitrogen (nitrate + nitrite)	3	3	0
Nine Springs - Nursery Springs	10051660	Nitrogen (nitrate + nitrite)	3	3	0
Nine Springs - Syene Springs	10051662	Nitrogen (nitrate + nitrite)	36	6	29
North Branch Tenmile Creek at Isherwood/Harding	10042017	Nitrogen (nitrate + nitrite)	1	0	1
Oak Creek US of 15th Ave N of Beech St	413913	Nitrogen (nitrate + nitrite)	9	0	0

Pecatonica River at Martintown WI	233002	Nitrogen (nitrate + nitrite)	10	10	0
Porcupine Creek Upstream Of Culvert. 187	10020966	Nitrogen (nitrate + nitrite)	2	0	0
Rock River at Afton WI	543001	Nitrogen (nitrate + nitrite)	10	2	0
Root River at Eight Mile Road	10039425	Nitrogen (nitrate + nitrite)	41	10	0
South Branch Tenmile Creek - Taft Rd (Site 7)	10009196	Nitrogen (nitrate + nitrite)	1	0	1
South Fork Bad Axe River - Oliver Rd.	10022633	Nitrogen (nitrate + nitrite)	18	18	0
Tenmile Creek Cty U	10009128	Nitrogen (nitrate + nitrite)	1	1	0
Tenmile Creek - Evergreen Rd. (40 Yards Upstream)	10016427	Nitrogen (nitrate + nitrite)	58	58	0
West Branch Sugar River at CTH PB	10017221	Nitrogen (nitrate + nitrite)	25	24	1
Wisconsin River at Sth 80 Bridge At Muscoda WI	223282	Nitrogen (nitrate + nitrite)	68	0	1
Wisconsin River at Wisconsin Dells	573052	Nitrogen (nitrate + nitrite)	10	0	0
Wisconsin River Below Biron Dam temporary site	10031139	Nitrogen (nitrate + nitrite)	10	0	0

# Appendix D - Maps of Detections of Notable Compounds

Figure 20: Map of Acetochlor Detections in Surface Water (2008-2022)

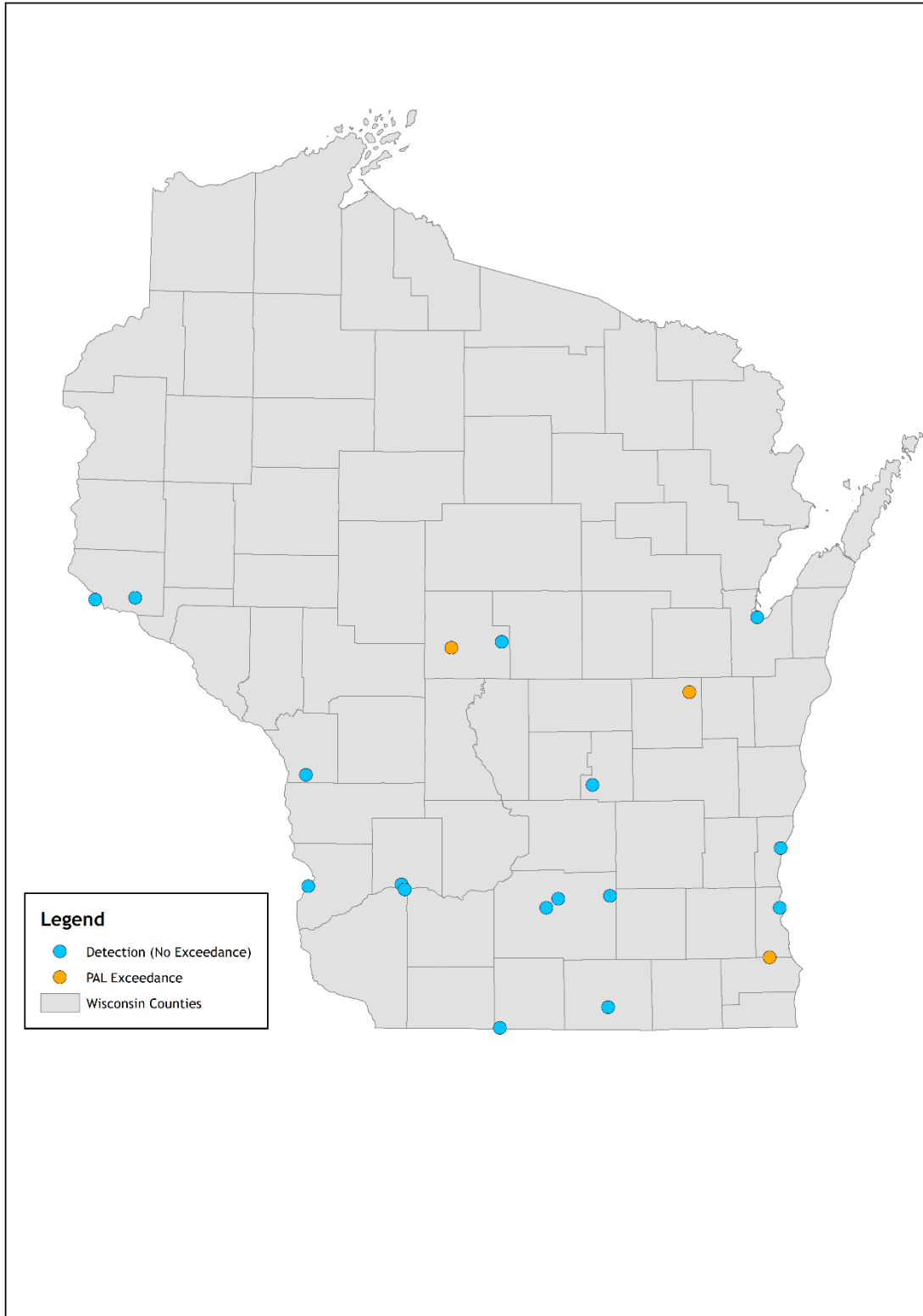


Figure 21: Map of Acetochlor ESA Detections in Surface Water (2008-2022)

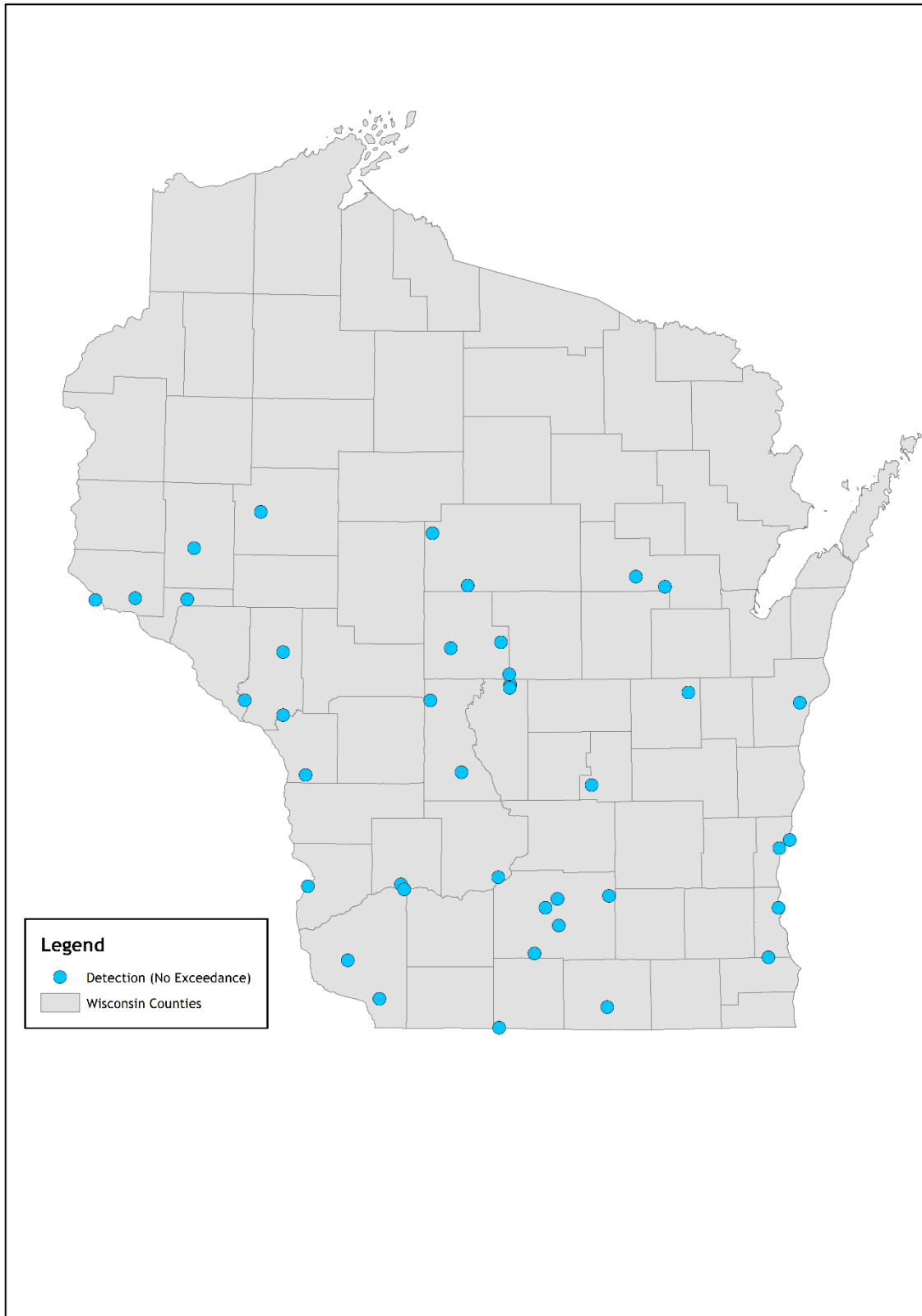


Figure 22: Map of Acetochlor OA Detections in Surface Water (2008-2022)

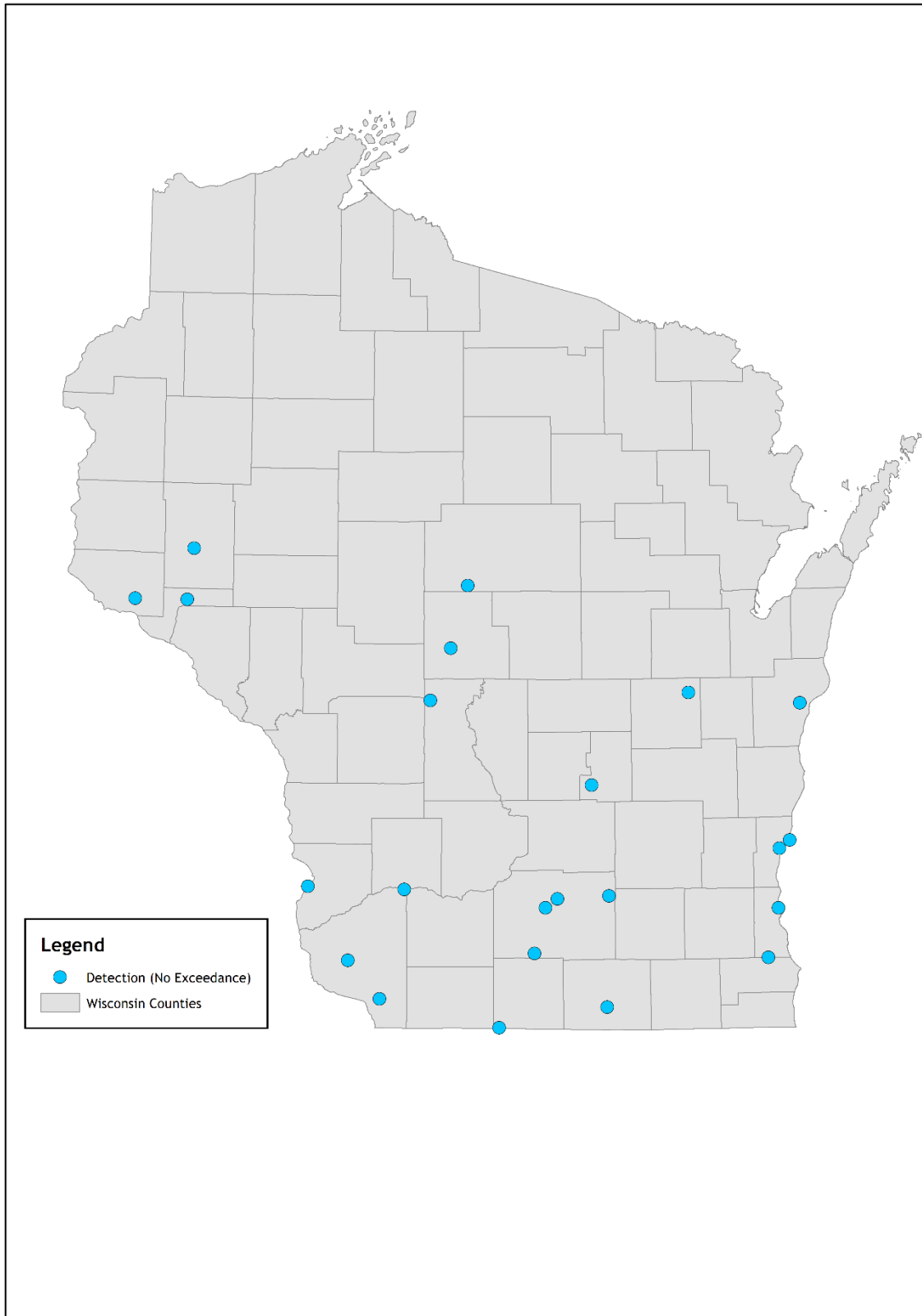


Figure 23: Map of Alachlor Detections in Surface Water (2008-2022)

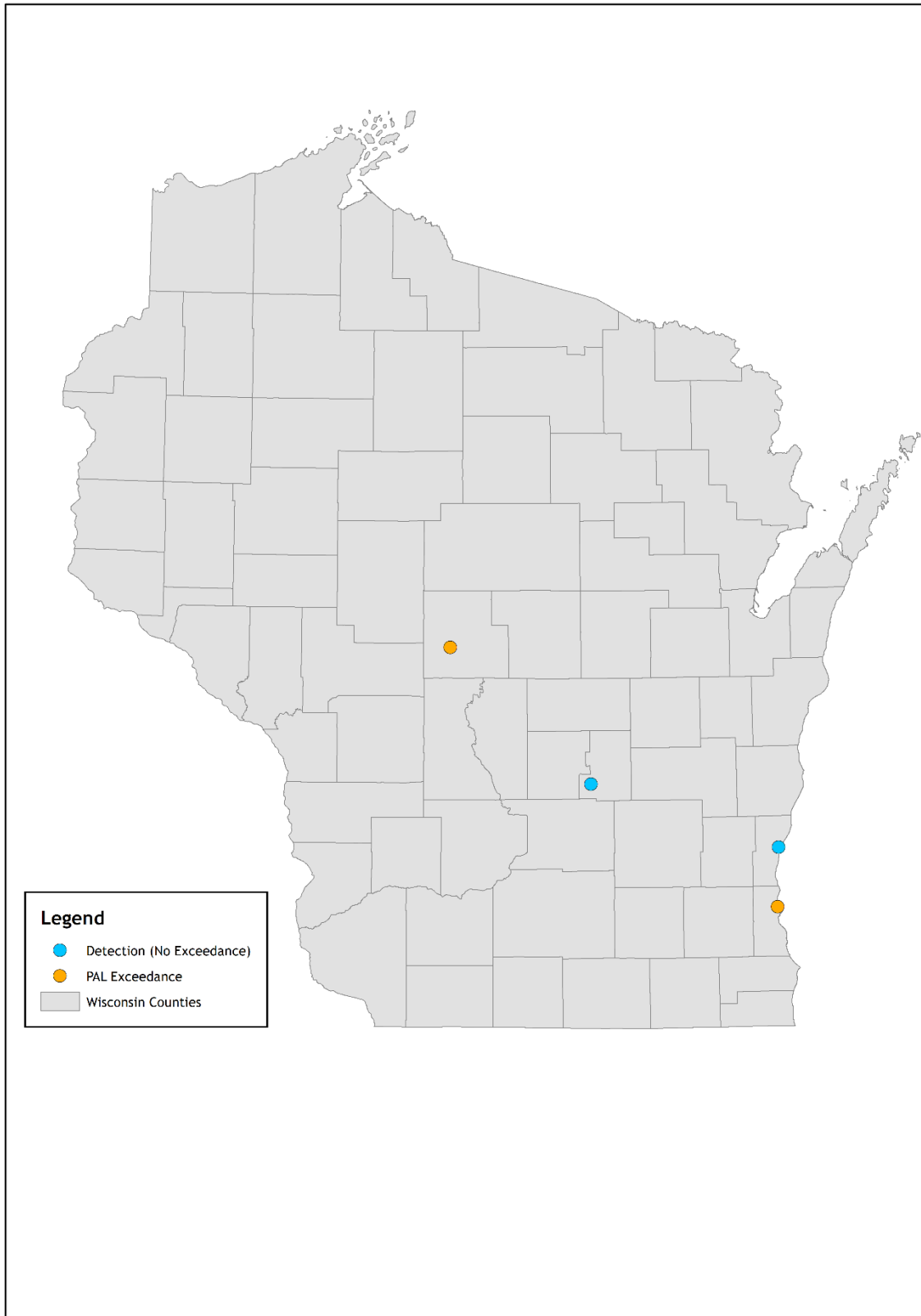


Figure 24: Map of Alachlor ESA Detections in Surface Water (2008-2022)

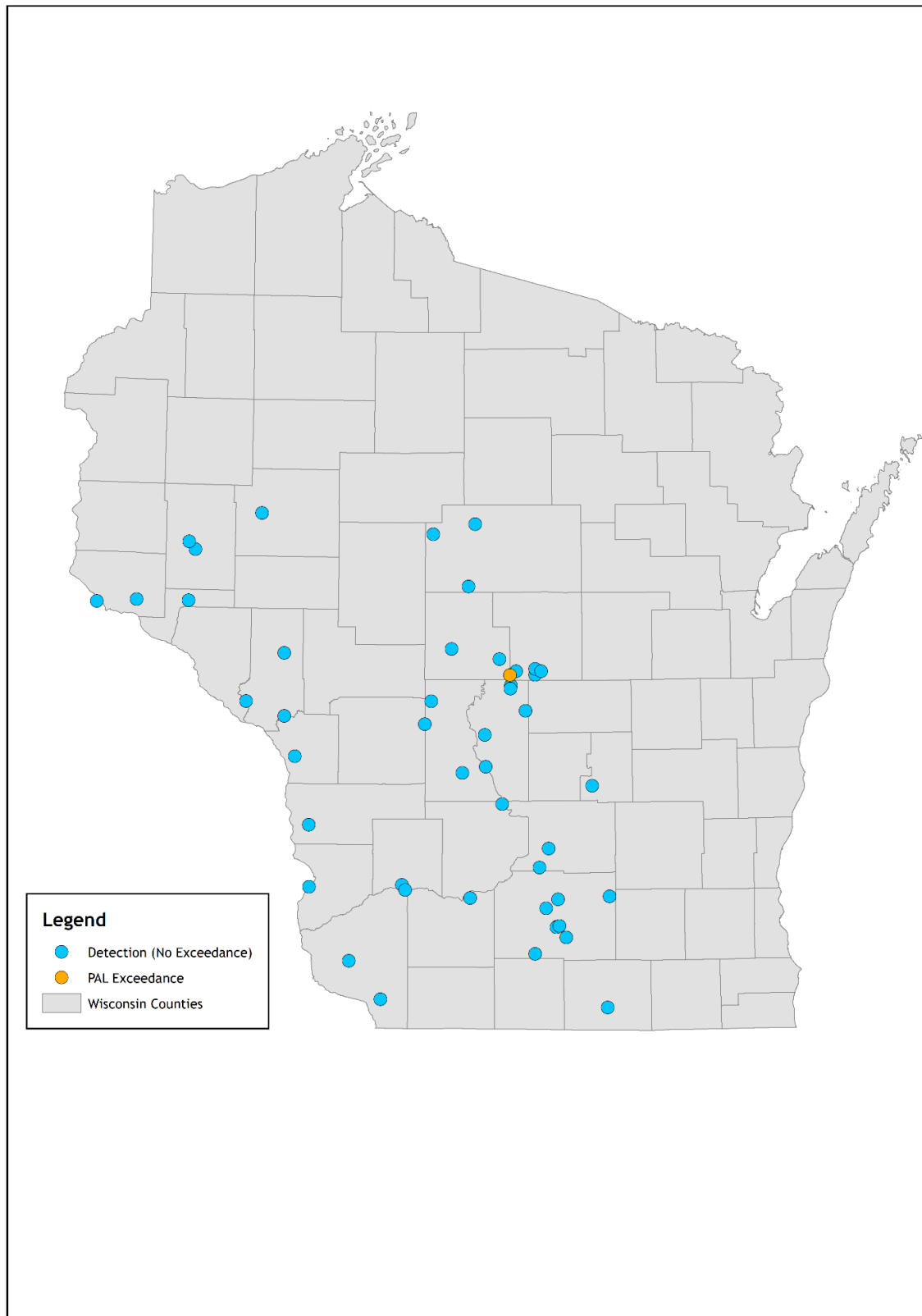


Figure 25: Map of Alachlor OA Detections in Surface Water (2008-2022)

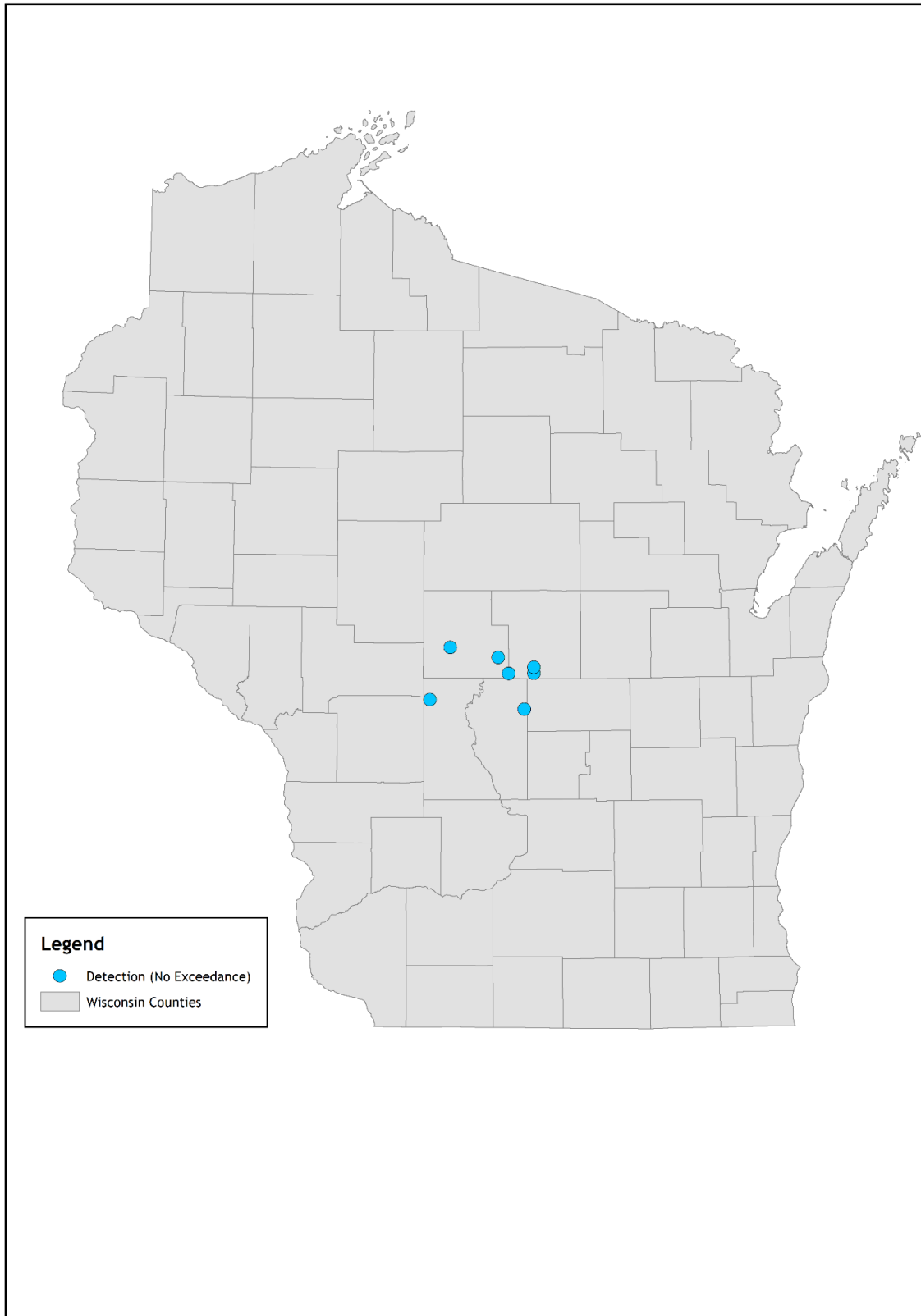


Figure 26: Map of Atrazine Detections in Surface Water (2008-2022)

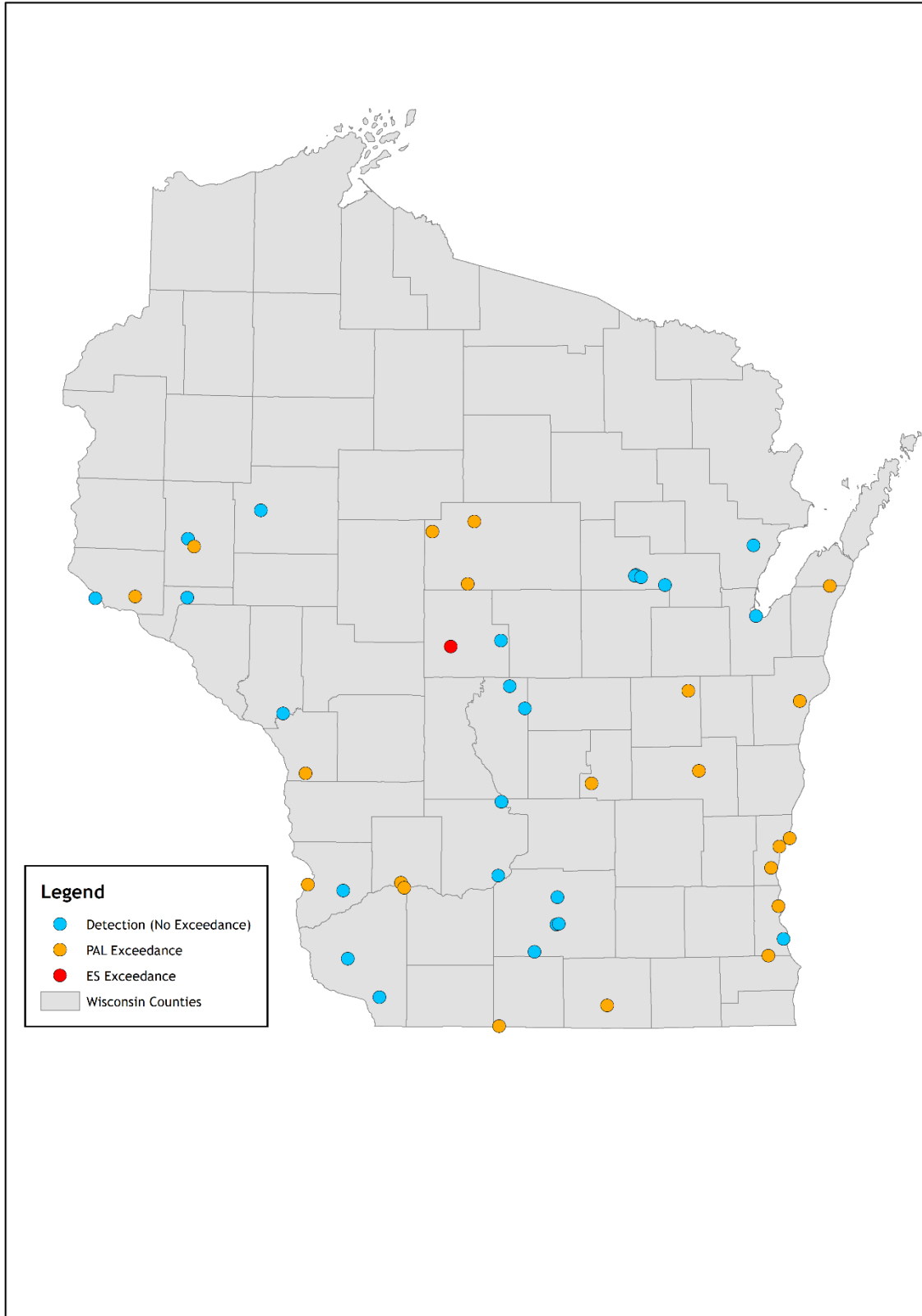


Figure 27: Map of De-ethyl Atrazine Detections in Surface Water (2008-2022)

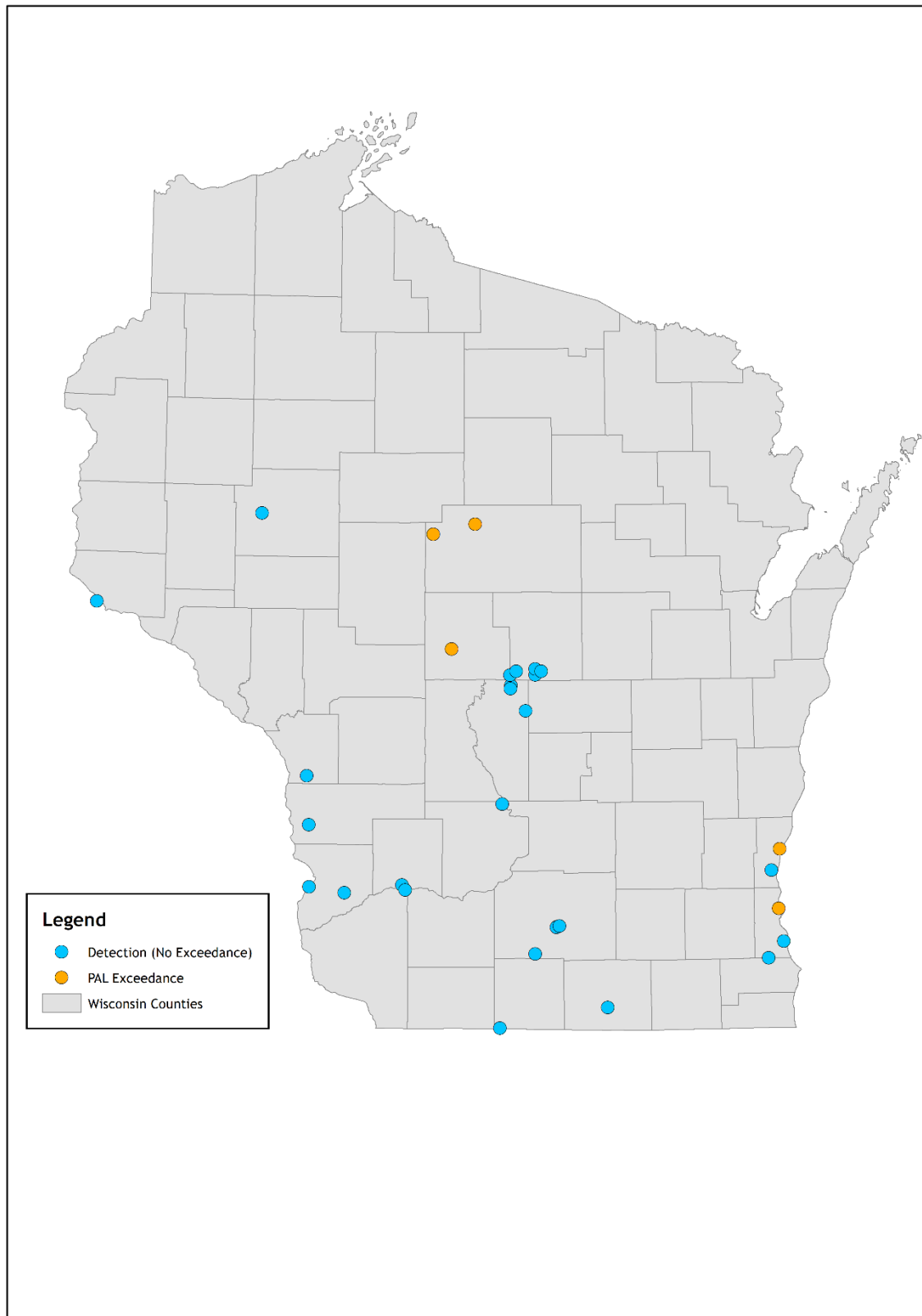


Figure 28: Map of Deisopropyl Atrazine Detections in Surface Water (2008-2022)

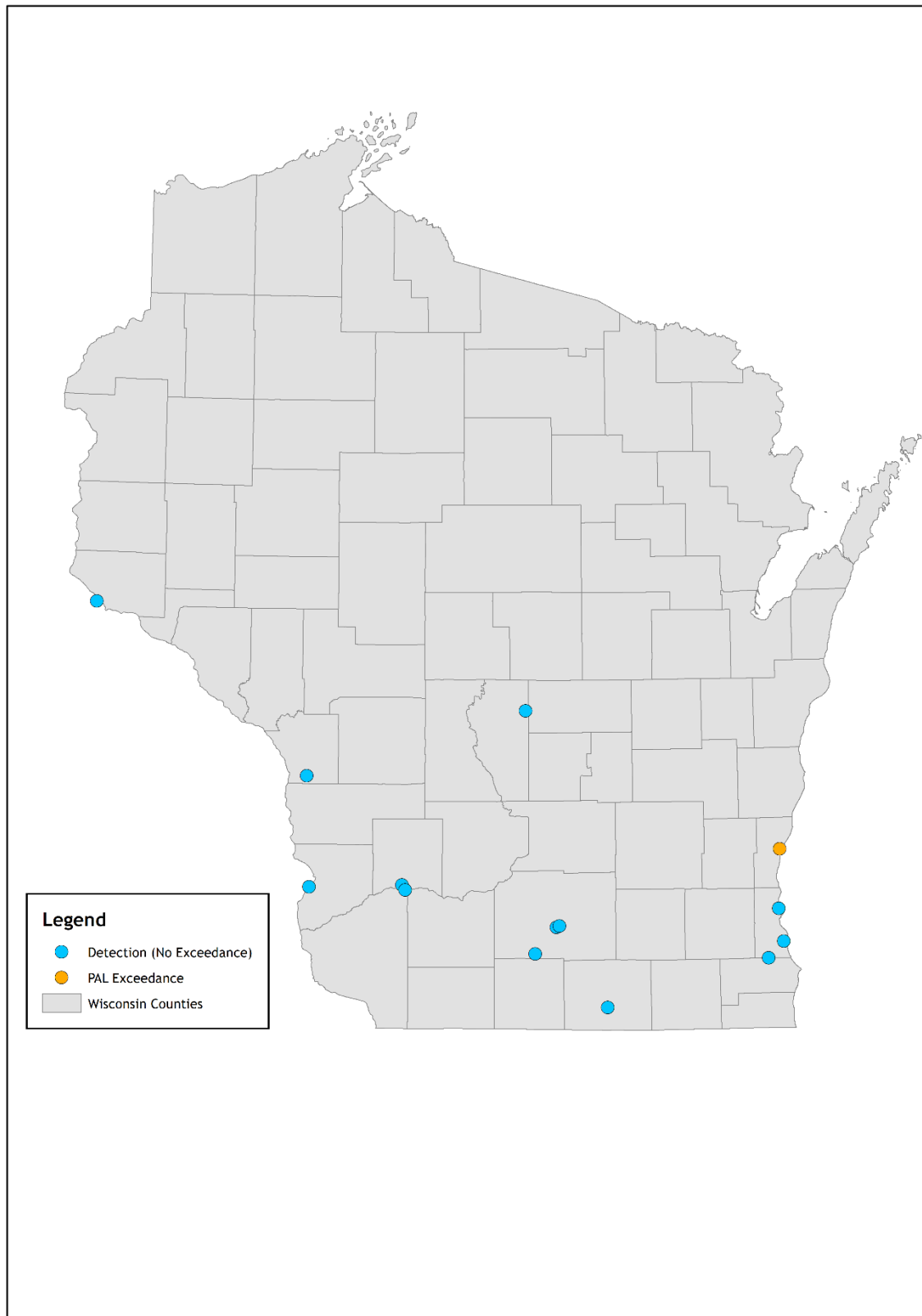


Figure 29: Map of Diamino Atrazine Detections in Surface Water (2008-2022)

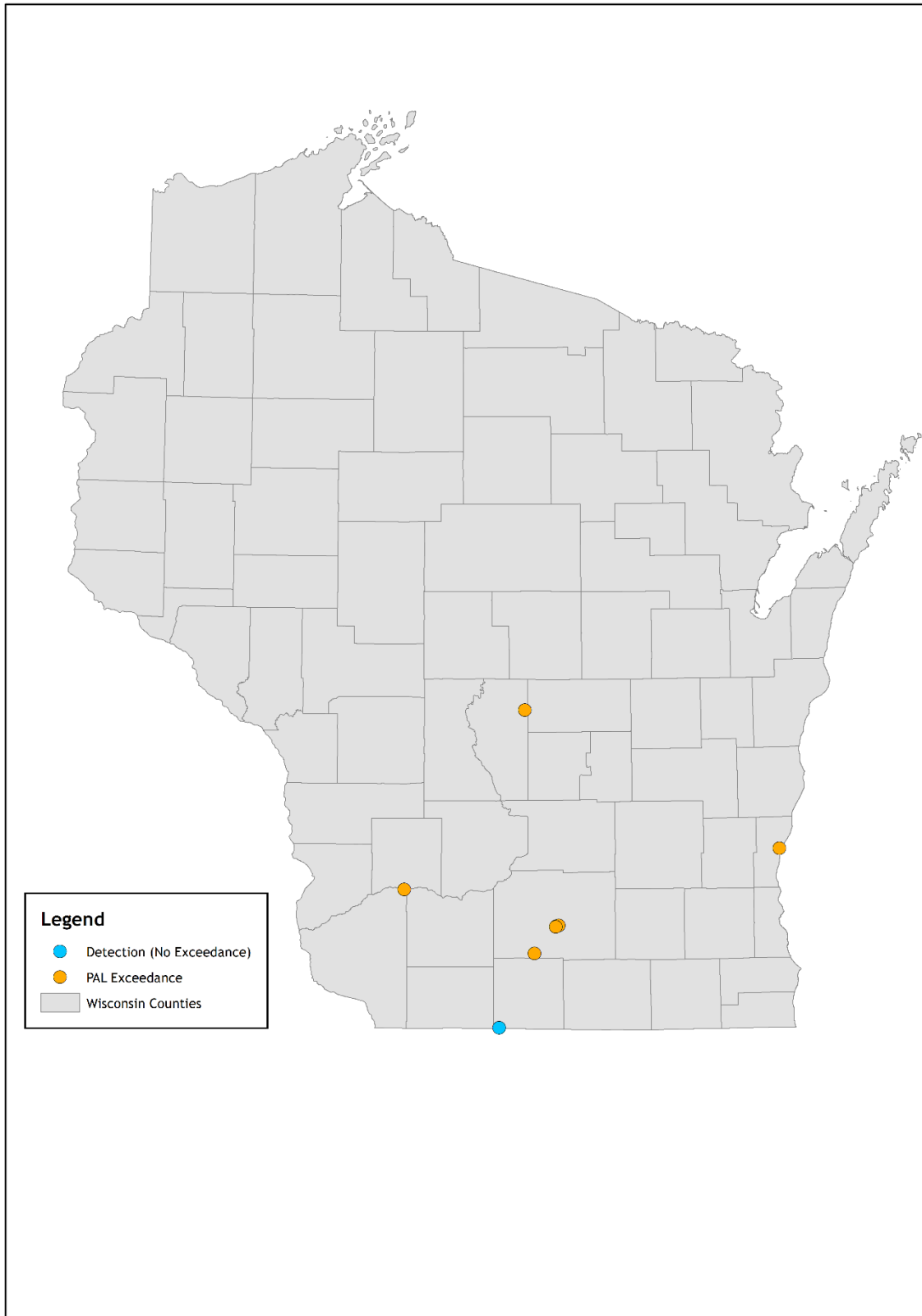


Figure 30: Map of Atrazine TCR Detections in Surface Water (2008-2022)

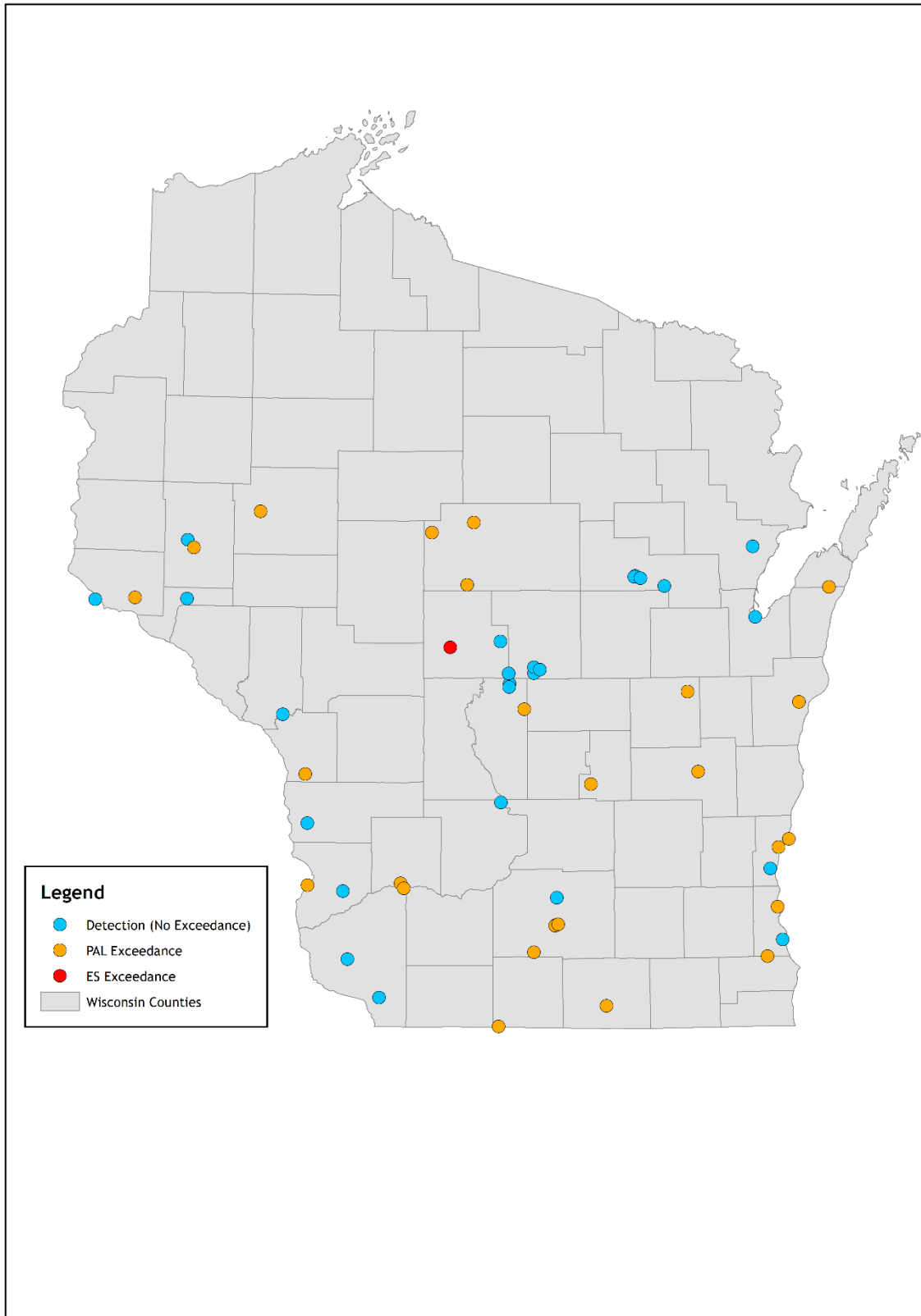


Figure 31: Map of Metolachlor Detections in Surface Water (2008-2022)

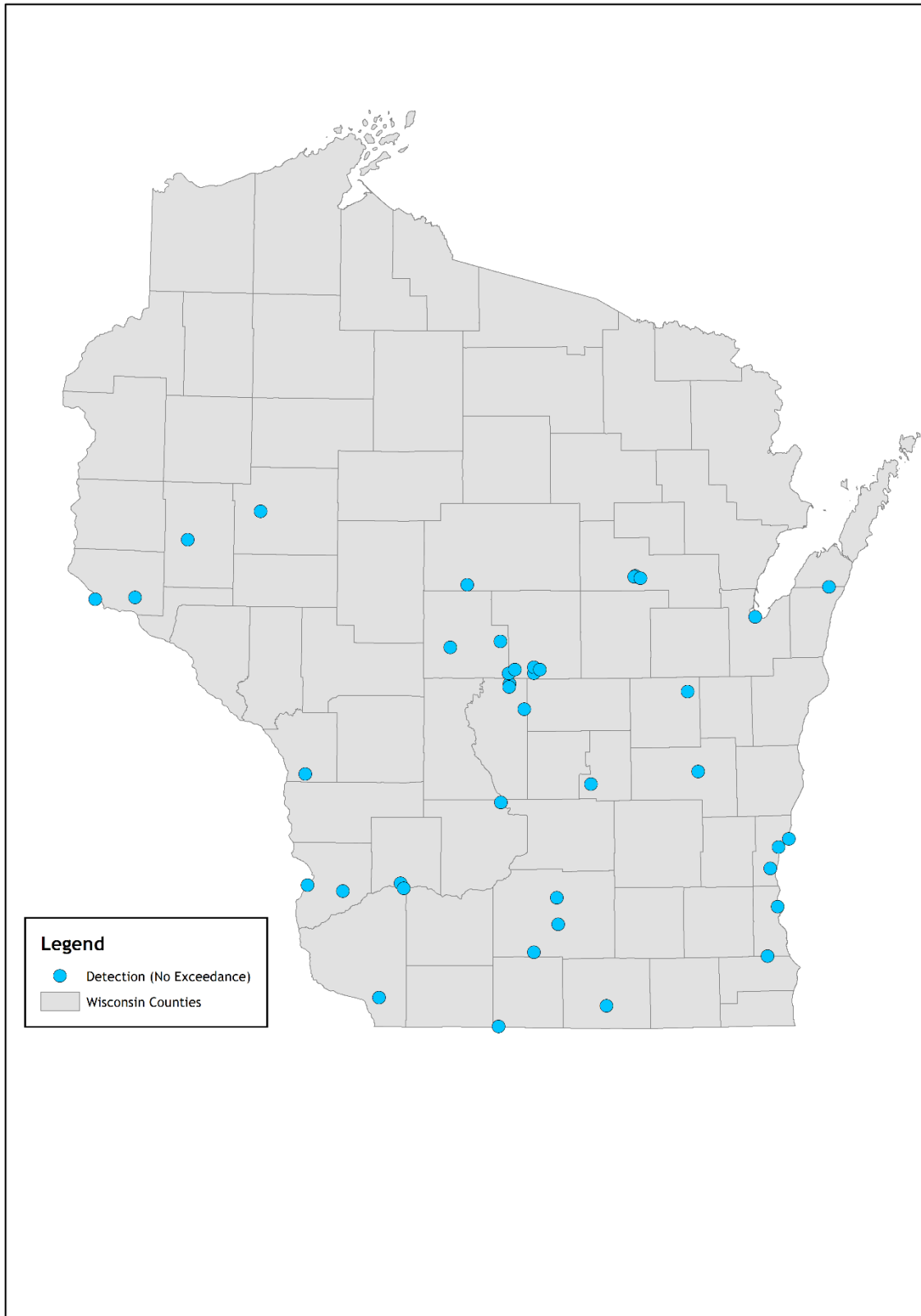


Figure 32: Map of Metolachlor ESA Detections in Surface Water (2008-2022)

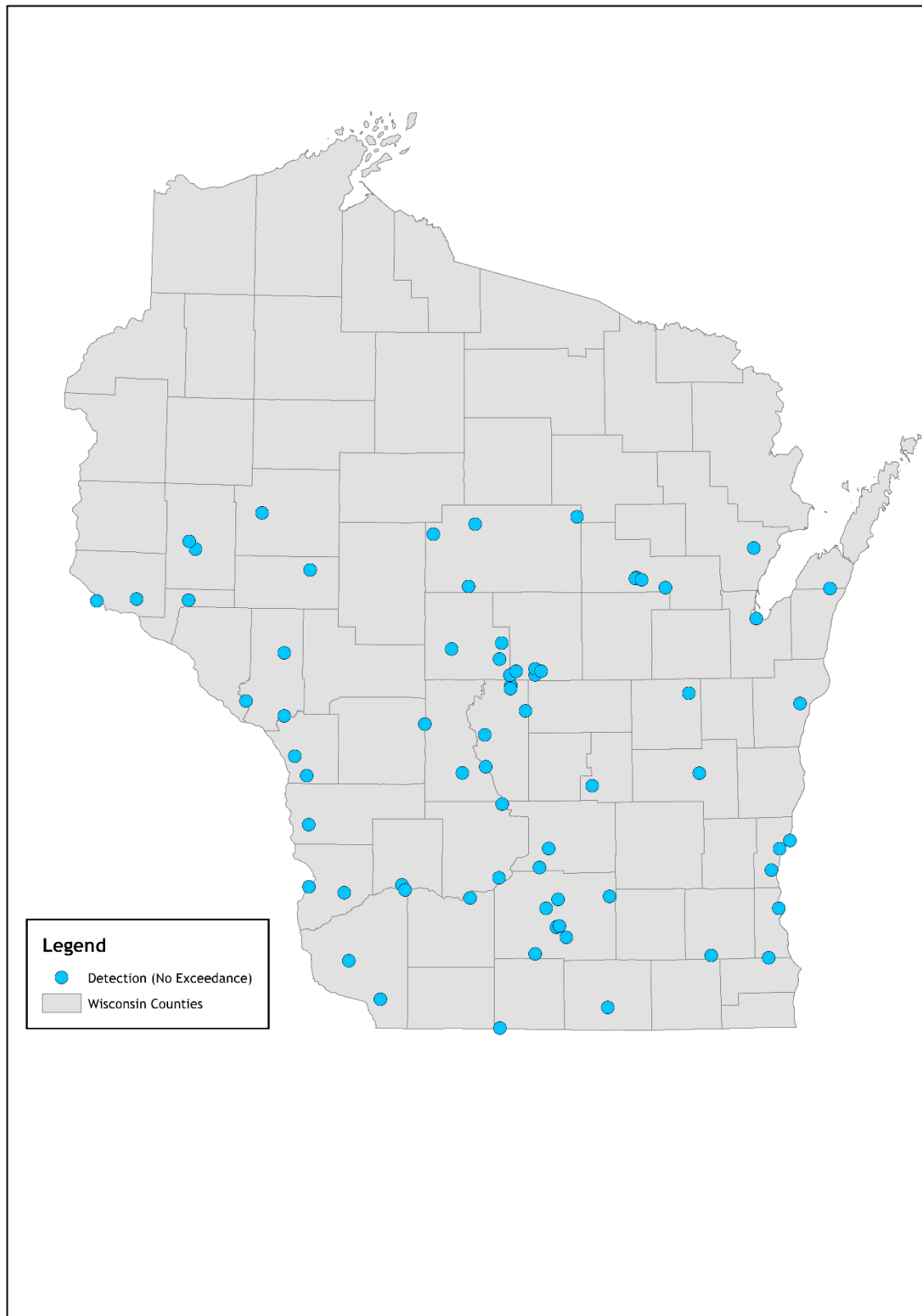


Figure 33: Map of Metolachlor OA Detections in Surface Water (2008-2022)

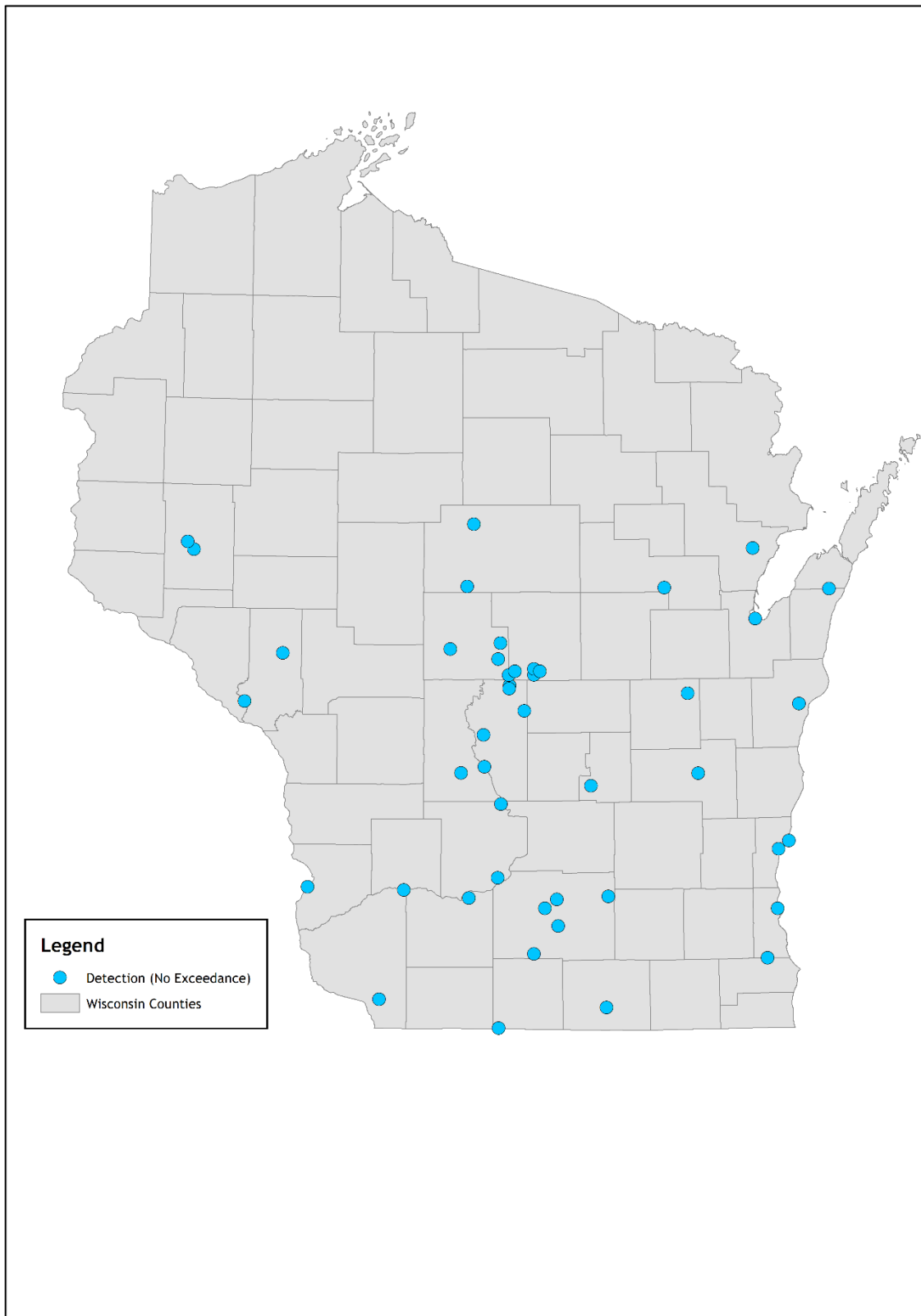


Figure 34: Map of Clothianidin Detections in Surface Water (2012-2022)

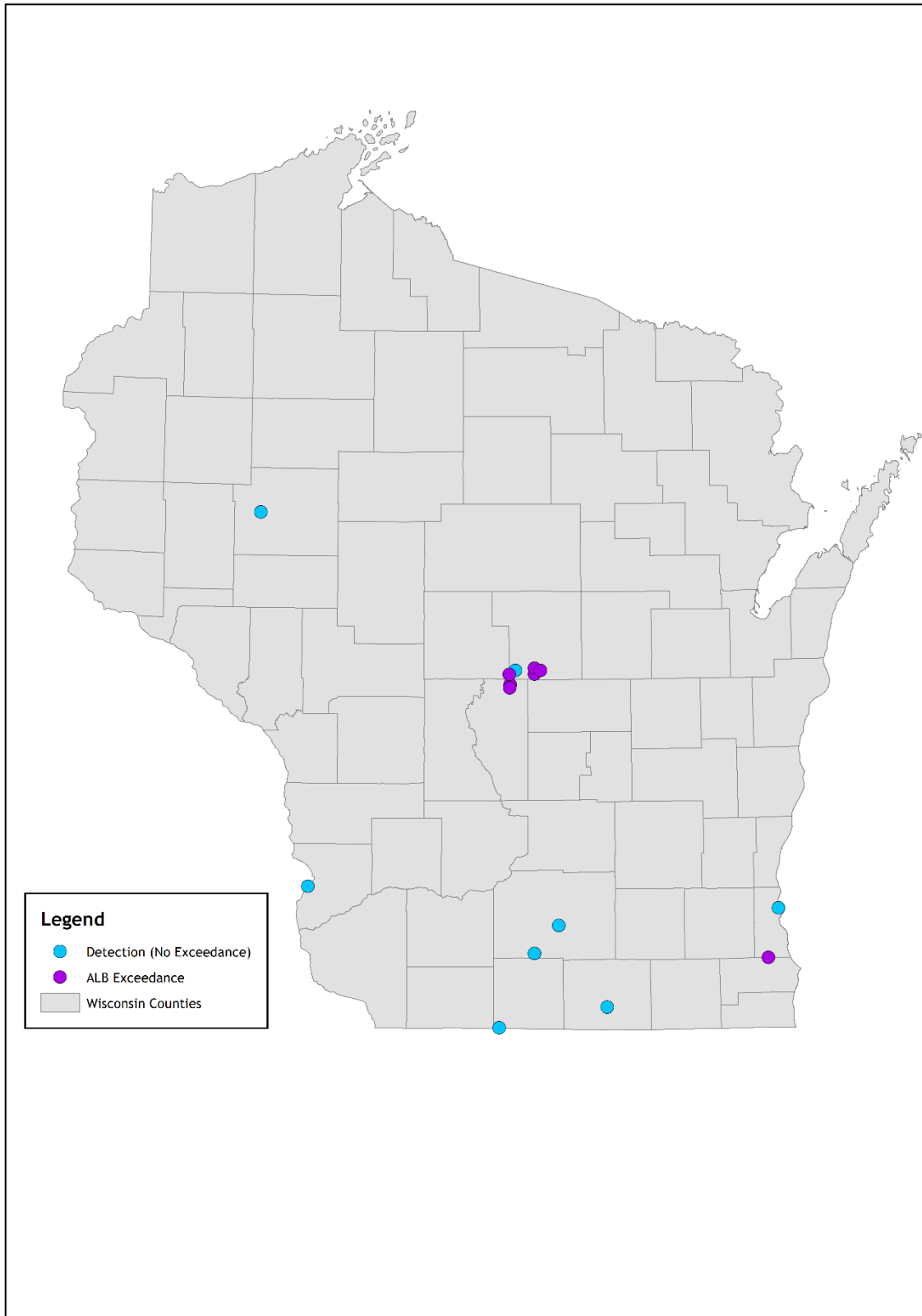


Figure 35: Map of Imidacloprid Detections in Surface Water (2012-2022)

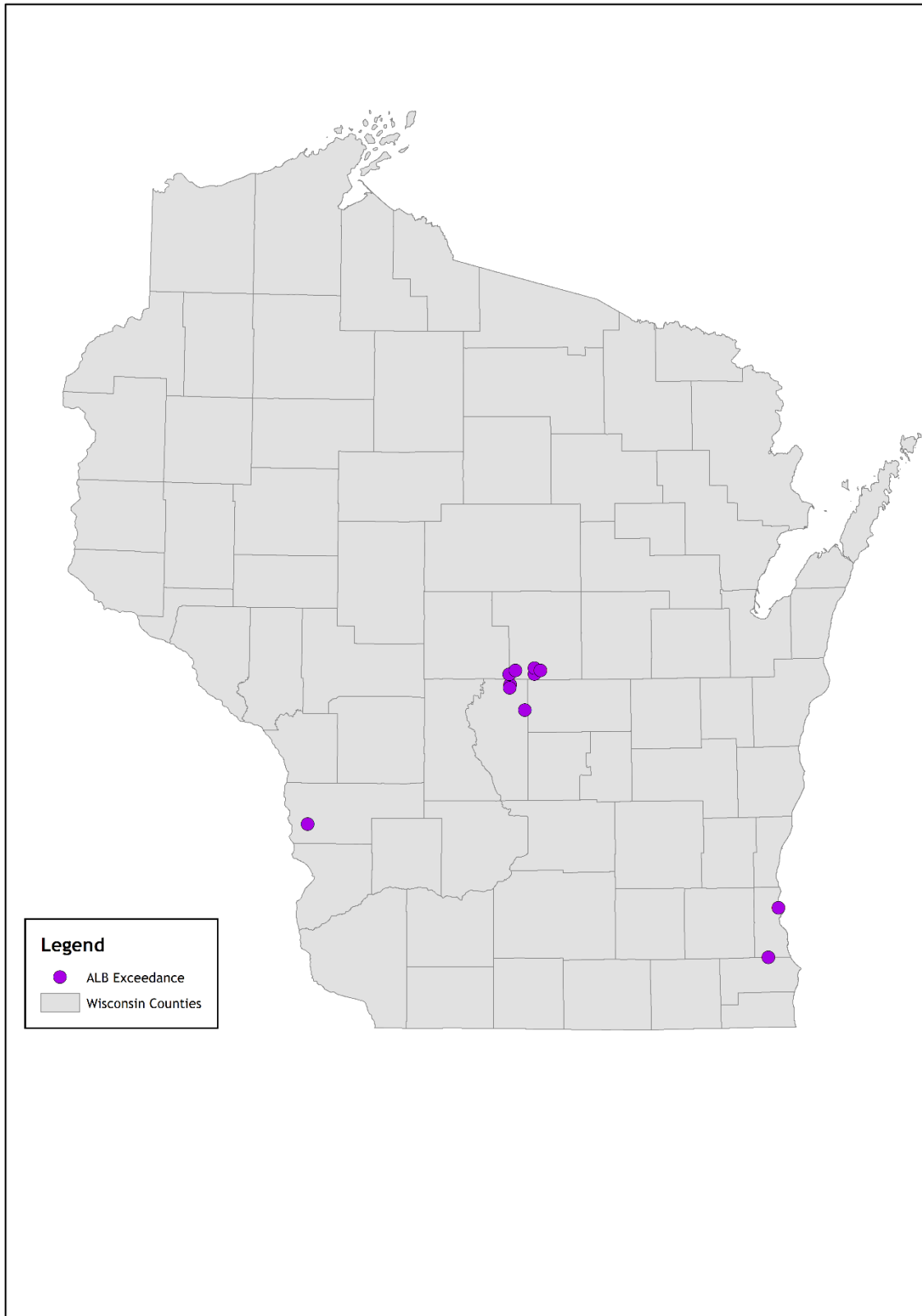


Figure 36: Map of Thiamethoxam Detections in Surface Water (2012-2022)

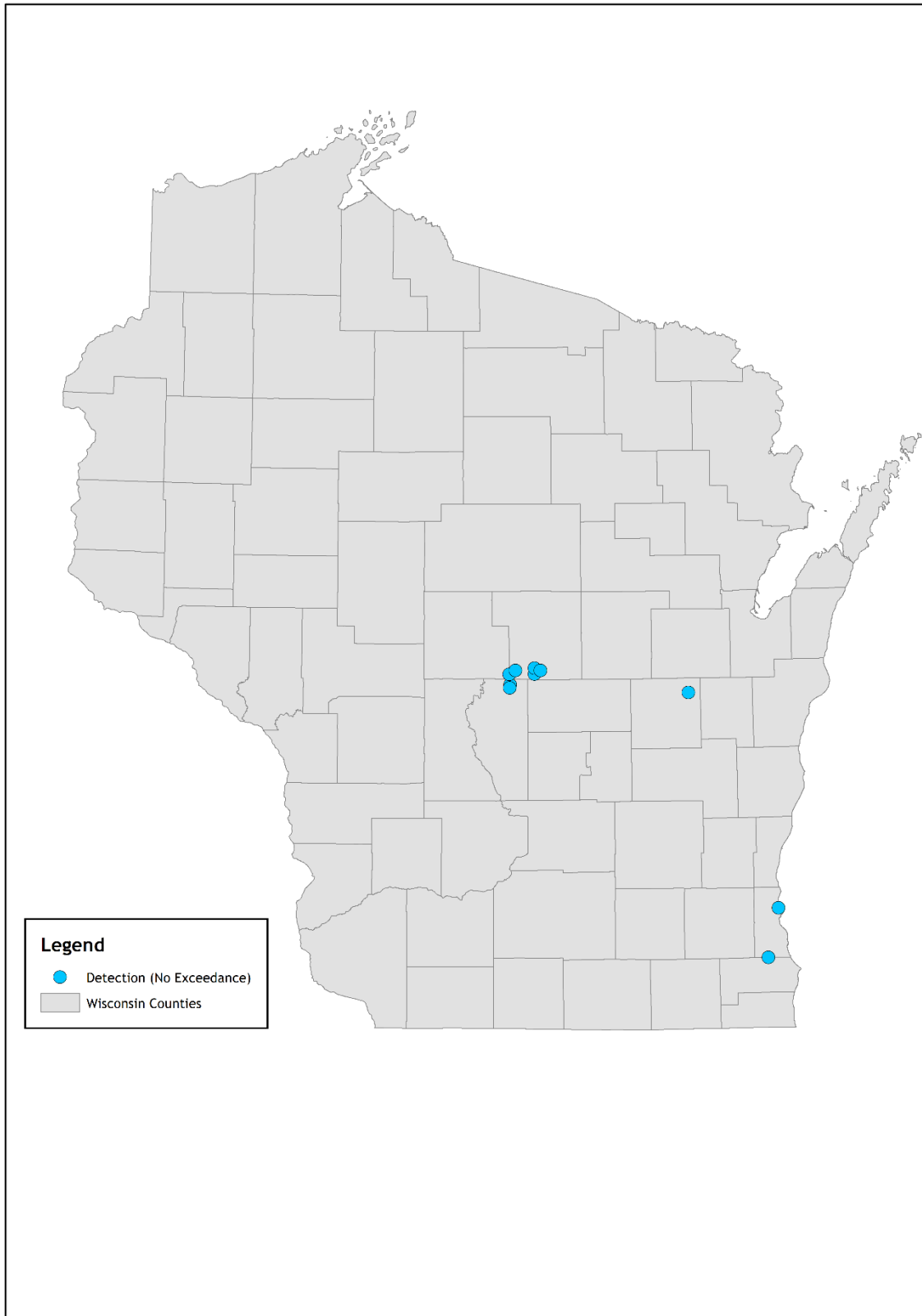


Figure 37: Map of Nitrogen (Nitrate + Nitrite) Detections in Surface Water (2011-2022)

