Wisconsin Water Quality Report to Congress 2022

WISCONSIN
DEPT. OF NATURAL RESOURCES

WISCONSIN WATER QUALITY REPORT TO CONGRESS 2022

Wisconsin Department of Natural Resources

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Division of Environmental Management

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Water Quality Bureau

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101 S Webster Street,
PO Box 7921,
Madison, WI
53707-7921

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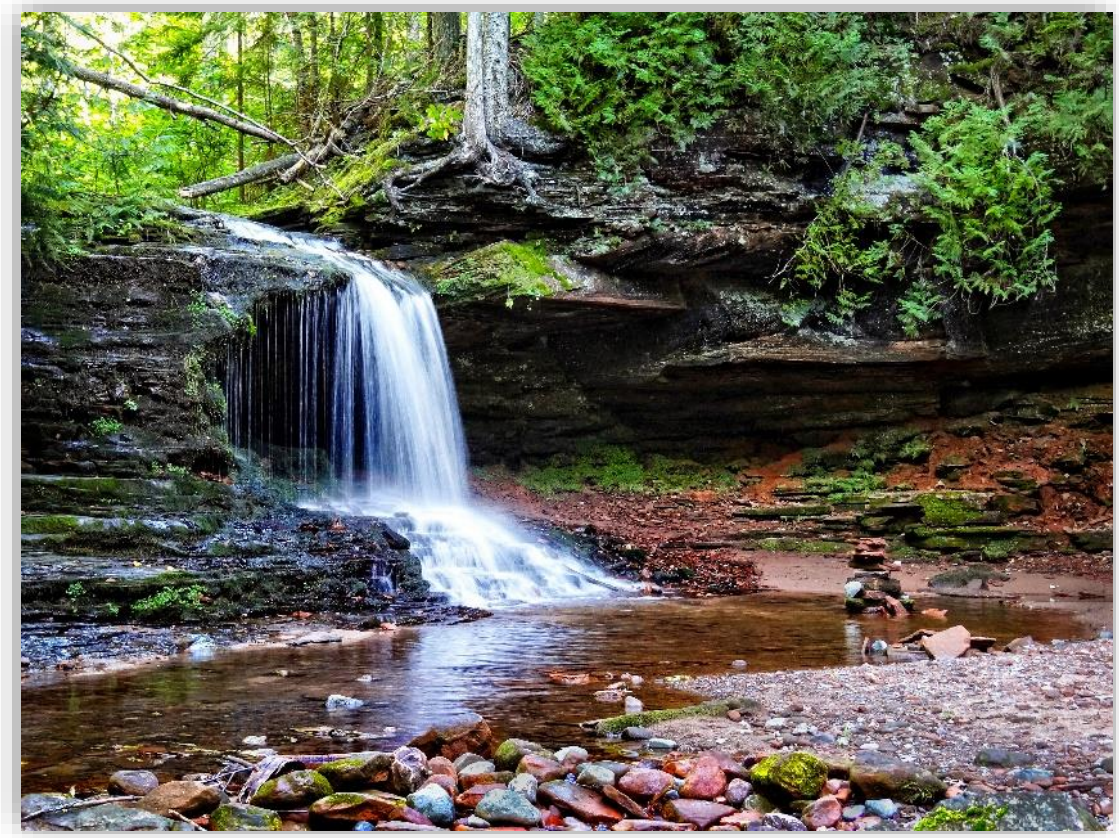
WISCONSIN'S WATER QUALITY REPORT

The Federal Clean Water Act (CWA) requires all states to prepare a Water Quality Report to Congress every two years. This "Integrated Report" combines the CWA sections 305(b), 303(d), and 314. The report contains an overall summary of water quality conditions in the State and an updated Impaired Waters List. Wisconsin data are also provided electronically to the United States Environmental Protection Agency (EPA) as part of the Integrated Reporting Process.

Wisconsin's 2020 Wisconsin Water Quality Report to Congress summarizes assessment progress and activities related to water quality protection during the past two years. This document is an online publication only that can be accessed at the Wisconsin Department of Natural Resources (WDNR) website: dnr.wisconsin.gov.



Cover photo:
A Hidden Gem *by*
Sheri Erickson, 2013

Previous reports were published in 2020, 2018, 2016, 2014, 2012 (online only), 2010, 2008 (data submittal only), 2006, 2004, 2002, 2000, 1996, 1994, 1992, 1990, 1988, 1987, and earlier. WDNR's earlier documents, prior to 2000, are available for review at the GEF II building, 101 S. Webster Street, Madison. Later versions are available electronically.

Editor

Ashley Beranek

Authors and contributors to this report

Tim Asplund, Jim Amrhein, Brian Austin, Kendra Axness, Ashley Beranek, Luke Beringer, Dave Bolha, Katy Bradford, Camille Bruhn, Heidi Bunk, Matt Claucherty, Jacob Dickmann, Donalea Dinsmore, Mary Gansberg, Melissa Gibson, Kevin Gauthier, Shawn Giblin, Mark Hazuga, Emily Heald, Katie Hein, Craig Helker, Andy Hudak, Ted Johnson, Kevin Kirsch, Jon Kleist, Jim Klosiewski, Jim Killian, Lisa Kosmond, Jim Kreitlow, Kim Kuber, Jim Lemke, Jodi Lepsch, Madeline Magee, Kristi Minahan, Brenda Nordin, Patrick Oldenburg, Randal Piette, Emily Punke, Kristen Rathbun, Mark Riedel, Craig Roesler, Rachel Sabre, Mike Shupryt, Paul Skawinski, Alex Smith, Mike Sorge, Casey Sweeney, Susan Tesarik, Pam Toshner, Scott Van Egeren, and all Water Quality Biologists, Water Resources Specialists, and Water Program Managers. All photos courtesy of Wisconsin DNR unless otherwise credited.

CONTENTS

Figures

Tables

Appendices

Common Acronyms

AU – Assessment Unit; segment of a waterbody used for assessment.

CLMN – Citizen Lake Monitoring Network

CWA – Clean Water Act

EPA – United States Environmental Protection Agency

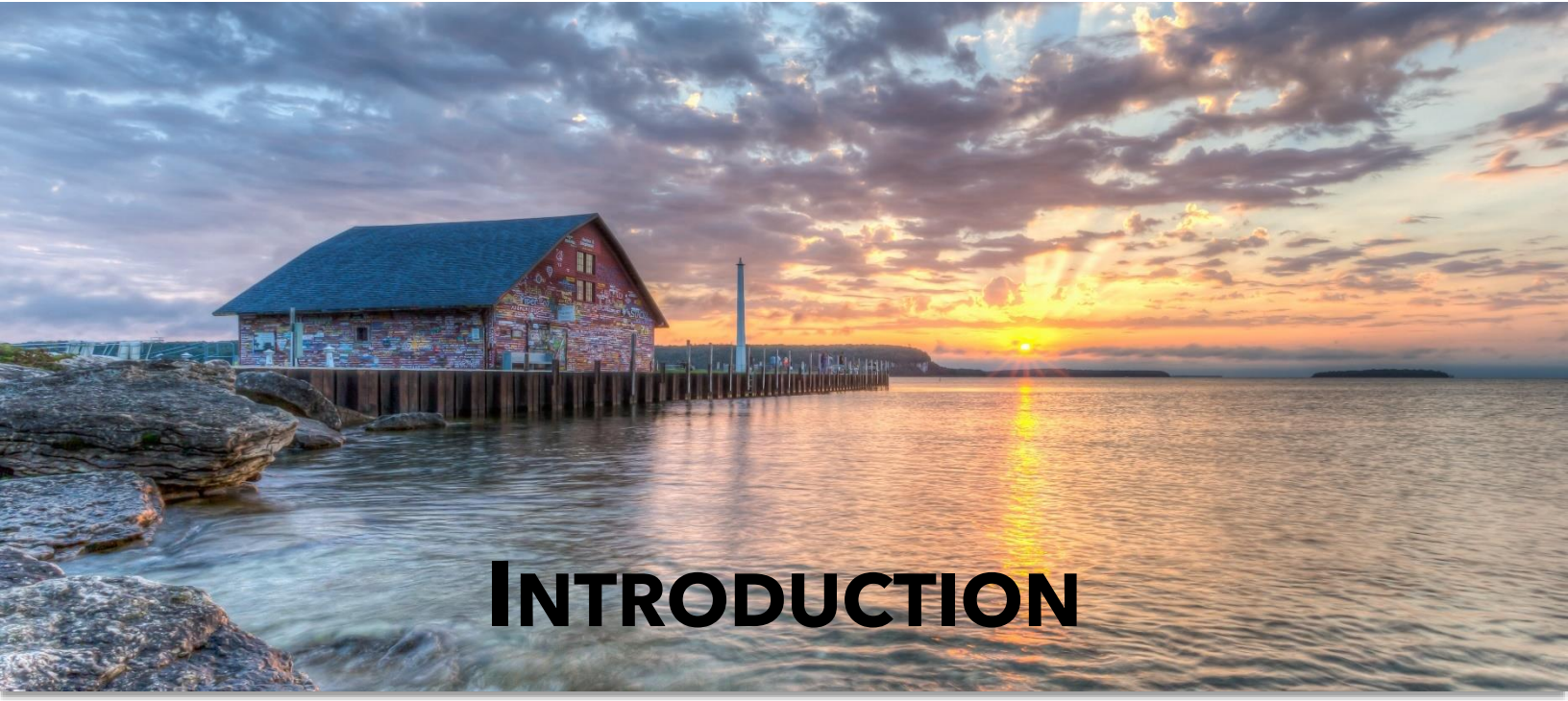
TMDL – Total Maximum Daily Load

TSS – Total Suspended Solids

WAV – Water Action Volunteers

WDNR – Wisconsin Department of Natural Resources

WisCALM – Wisconsin Consolidated Assessment and Listing Methodology



INTRODUCTION

Lake Michigan, Door County ***Anderson Dock Sunset*** *by Lisa and Paul Schultz 2017*

Wisconsin is a state bountiful with natural resources, including many and varied lakes, streams, wetlands, aquifers, and springs. Every other year, the Wisconsin Department of Natural Resources (WDNR) provides reports on the quality of the State's water resources to the United States Environmental Protection Agency (EPA), which in turn, shares this information with the United States Congress. The information provided may be considered as a tool for rule making, budget appropriations, and program evaluation by federal legislators.

Perseverance and Safety During COVID-19

At the start of the COVID-19 global pandemic state offices closed, staff were sent home and all water resource monitoring activities were suspended. During this time, the WDNR-Water Resources Policy and Management Team formed a COVID-19 workgroup that developed Water Resources and Office of Great Waters return to fieldwork standard operating procedures (SOP) for field season 2020. It was recognized that the priority during this time was staff safety but also that certain monitoring activities could resume.

Prior to resuming monitoring activities, the workgroup defined essential work that could be completed under COVID-19 restrictions. A few activities were identified as either non-essential or unable to be performed under restrictions. COVID restrictions, under the Department's COVID Phase 2 Internal Operating Procedures (IOPs), included restricted travel by multiple individuals in a vehicle, social distancing, wearing a face covering, and disinfection of equipment.

Activities that were suspended in 2020 included:

- Checking or deploying temperature/dissolved oxygen buoys in lakes
- Fish surveys using tow barges on wadable streams and rivers
- Fish surveys using netting methods on the Mississippi River
- Winter limnology surveys using air boats on the Mississippi River
- Wetland survey site preparations
- Snorkel-Scuba surveys for invasive species, plant management, or mussels
- In-Person training support for volunteers as individuals or small groups

The finalized list of essential work, approved monitoring activities, and SOP's to conduct these activities were not approved until mid-June of 2020. Most approved monitoring activities resumed by mid-July of 2020 across the state. The restrictions to activities for the field season of 2020 were put in place out of extreme caution.

For field season 2021, a review of the SOP was conducted to re-evaluate the ability to resume activities that were suspended in 2020. As Department COVID guidelines shifted, the updated Phase 2-IOP's allowed for activities suspended in 2020 to resume in field season of 2021. The impacts to monitoring activities during the COVID-19 pandemic has been minimized to the extent practicable while exercising extreme caution to protect the health of staff and citizens of the state.

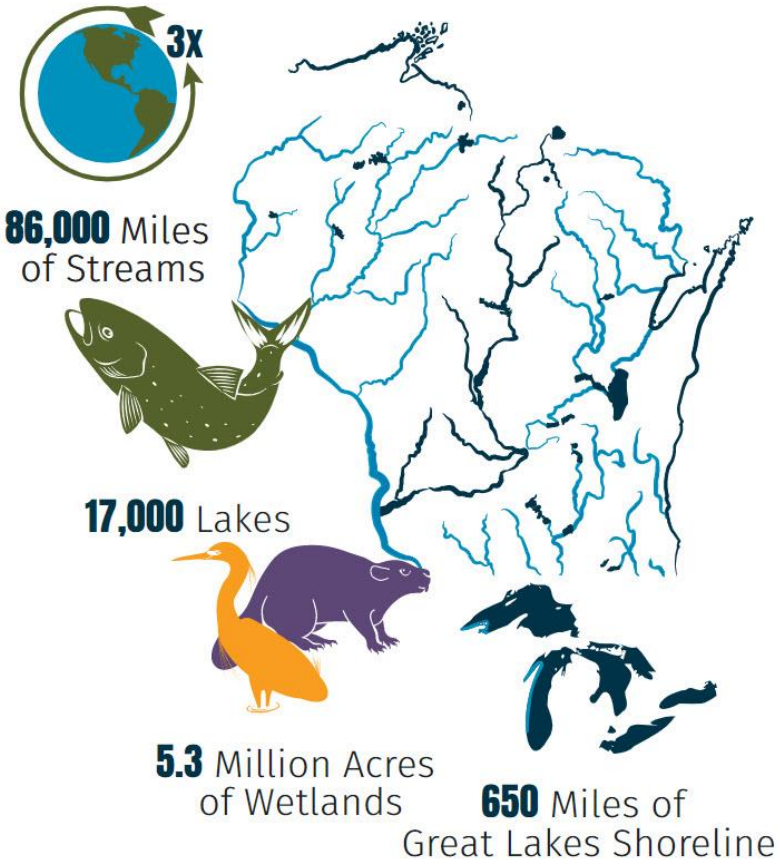
Key Findings

- 82% of evaluated waters are healthy, by waterbody/ assessment unit (AU) count (Figure 3).

- 126 listings on 122 waters were added to the Impaired Waters List and Restoration Waters List.

- Top three newly listed pollutants: phosphorus (49%), bacteria (30%), and PFOS (14%).

- 22 listings were removed; 3 Total Suspended Solids (TSS) listings were removed due to long-term restoration projects.



Sign up for GovDelivery emails for real-time updates via email or text message. The topic 'Water Quality Standards and Assessments' under 'Water' will provide information regarding standards, changes to water quality condition, WisCALM updates, and general TMDL updates.
https://public.govdelivery.com/accounts/WIDNR/subscriber/new.

WISCONSIN'S WATER QUALITY

Fisher Lake, Florence County *Luke Ernster 2018*

Total Waters

There are over five and a half million people in Wisconsin that share the state's bountiful water resources. Wisconsin has approximately 1.2 million lake and impoundment acres and approximately 88,000 river and stream miles. Despite the abundance of water resources in Wisconsin, many are threatened by human-induced stressors.

Data Used for Assessments

Waters were assessed using quality-assured data originating from WDNR's monitoring program, county and state partners, university partners, and the public. All data used for assessment met WDNR's quality assurance requirements and local WDNR staff determined whether available data were representative of a water's condition.

WDNR Data

Chemistry data collected by staff, volunteers, and grant recipients, among others, go to the State Lab of Hygiene (SLOH), which sends its data to the SWIMS database through the Laboratory Data Entry System (LDES). Data in the Surface Water Integrated Monitoring System (SWIMS) database are considered readily available and were used in assessments when they met assessment requirements. Data in SWIMS were assessed using automated assessment packages that are programmed to follow assessment protocols outlined in *Wisconsin Consolidated Assessment and Listing Methodology* (WisCALM).

Public Data

In addition to WDNR's monitoring data described above, public data were gathered and considered for use in assessments through an active data solicitation process. Every two years, the WDNR requests that citizens and interested groups submit their surface water data (biological, chemical, and physical). Data meeting specified requirements were evaluated, along with WDNR-collected data, to assess the quality of the state's water resources. Data were accepted from the public from December 7, 2020 – January 15, 2021, and the WDNR received information/data submittals from three entities. During the first public comment period an additional set of data was received.

City of Green Lake

The City of Green Lake provided 2019 – 2020 phosphorus data for a station on the Puchyan Millpond, part of the Puchyan River. The Puchyan River flows out of Green Lake. Collection and analytical methods met WDNR data requirements, and these data were included in 2022 assessments.

Public Health Madison & Dane County

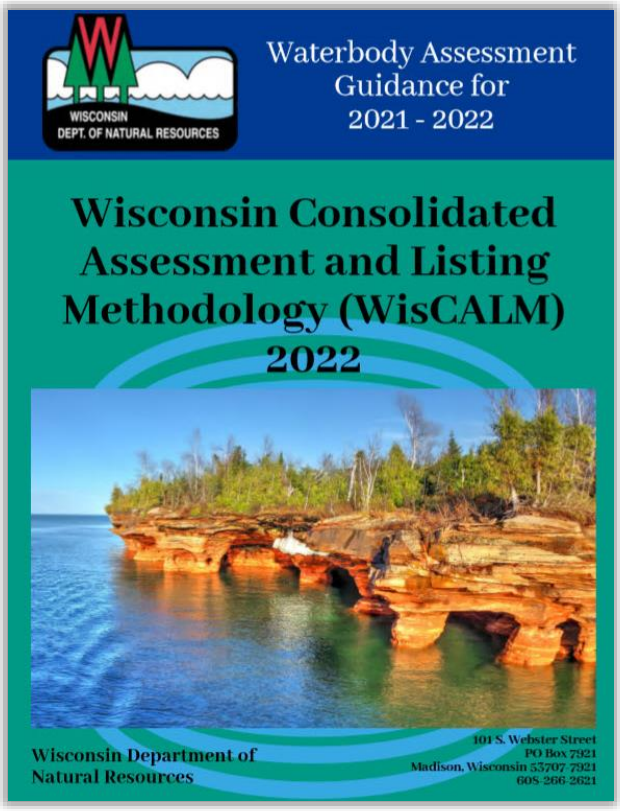
The Dane County Health Department sent 2019 – 2020 beach *E. coli* data. The Dane County beach bacteria data back to 2015 were uploaded to the SWIMS database and included in the automated assessment process. A few new stations and assessment units were created to associate with this data. Collection and analytical methods met WDNR data requirements, and these data were included in 2022 assessments.

Taylor County Land Conservation Department (LCD)

Staff at Taylor County LCD submitted total phosphorus data for 2019 – 2020 and metals data for 2017 – 2020. Collection and analytical methods met WDNR data requirements, and these data were included in 2022 assessments. These data were formatted and uploaded to SWIMS; a few new stations were created for the metals data.

Lake Comus Protection and Rehabilitation District

The Lake Comus Protection and Rehabilitation District has been collecting water quality data for a lake management plan. Phosphorus data for the tributaries to Lake Comus were not entered into SWIMS before the 2022 assessments were drafted; during the first comment period a district member noted that the phosphorus data had not been assessed. The data collection and analytical methods met WDNR data requirements; the data were from 2019 and 2020 and were included in the 2022 assessments.



Assessment Methodology

WDNR's water quality assessment goal is to use clearly defined, publicly accessible methods for collection and analysis of data to ensure defensible assessment decisions. To this end, the WDNR built upon its 2020 assessment methodology work by creating a revised *Wisconsin Consolidated Assessment and Listing Methodology* (WisCALM) to conduct assessments in 2022 for determining the attainment of designated uses. The most significant update made to the methodology was incorporating finalized *E. coli* criteria.

Statewide Water Quality

Percentage of Waters Assessed

Wisconsin has a large amount of water resources to assess and over time has evaluated at least one metric on 31% of rivers and stream miles and 87% of lake and impoundment acres (Figure 1). While it appears like a low percentage of stream and river miles have been evaluated, it can be seen in the accompanying map that all major rivers and streams across the entire state have been evaluated. Water quality information is available for more waters than are assessed, but minimum data requirements weren't met.

There are many lakes, by count, that have not been evaluated; for context, Lake Winnebago accounts for 13% of all lake and impoundment acres. Summaries for lakes are often done by count to avoid any size skew.

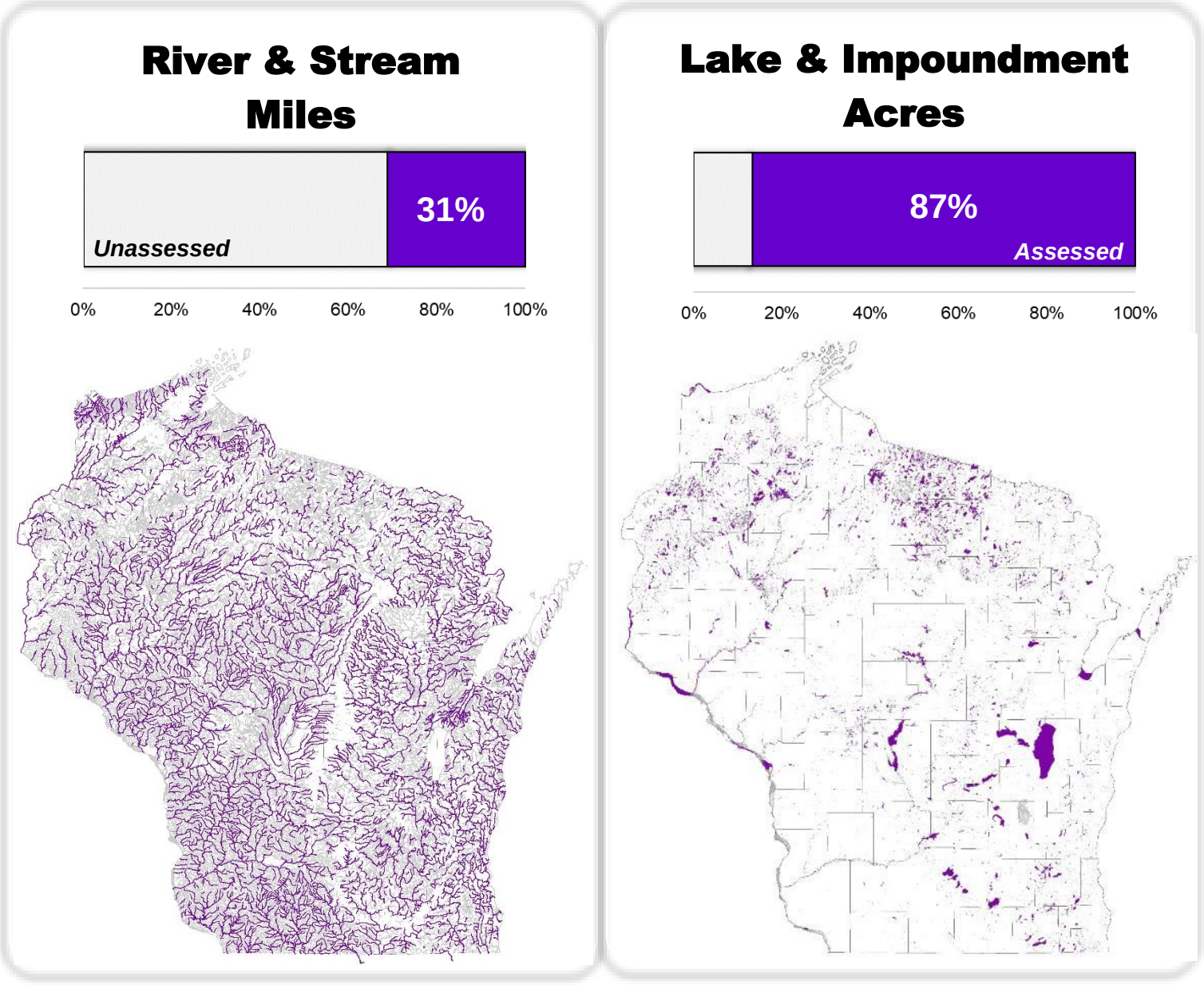


Figure 1. Percentage of waters assessed by size and maps of rivers/streams and lake/impoundments.

Assessed Parameters

Trophic State Index is the single most assessed parameter across the state (Figure 2); this is made possible by the combination of multi-year satellite lake image processing and volunteer clarity sampling (secchi and chlorophyll-*a*). The high percentage of assessed lakes (Figure 1) can be in part attributed to general assessments based on TSI.

Read more about Citizen Lake Monitoring Network activity.

Combined bioassessments of fish and macroinvertebrate ('bug') communities account for the most evaluated parameters in rivers and streams. The number of AUs with these parameters meeting criteria far outweighs those where they did not meet criteria (Degraded Biology, Figure 2).

Total phosphorus is the most evaluated chemical parameter. WDNR released its Nutrient Reduction Strategy in 2013 and the numeric water quality criteria for assessments were established in 2010. The combination of focus and benchmarks allowed for many AUs to be evaluated for phosphorus, with about half not meeting criteria.

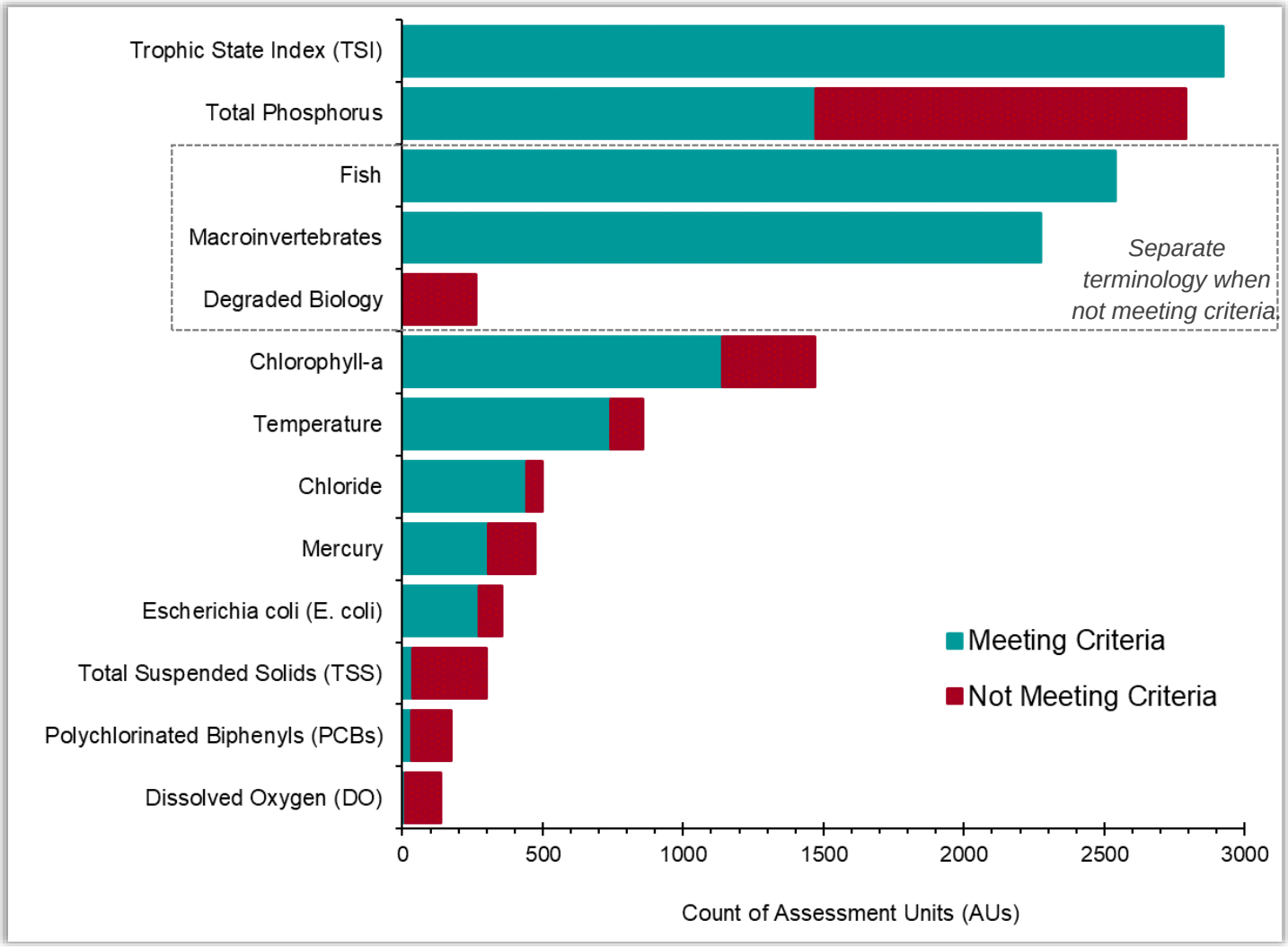


Figure 2. The most assessed parameters by count of assessment units (AU); only showing those with more than 100 AUs. These parameters were largely assessed over the course of five cycles (2014 – 2022); unless new information is collected a parameter's status determination is kept cycle to cycle. Parameters not meeting criteria have assessments back to the 1998 cycle. Degraded Biology is a listing term used for fish and/or macroinvertebrate bioassessments that did not meet criteria.

2022 Water Condition Lists

These Water Condition Lists serve as a record of water quality across the state and are a starting point for water resource management. Changes in the Water Condition Lists are the result of restoration planning work, advances in monitoring and assessment technology, additional monitoring data, and water quality restorations.

In the 2022 cycle the list with the greatest net increase was the Impaired Waters List (Table 1). The list with the largest overall increase of AUs was the Healthy Waters List (see Healthy Waters List section). The percentage of waters on each list did not significantly change, with the majority of AUs, 82%, on the Healthy Waters List (Figure 3). Nearly a quarter of all impairment listings have a TMDL or equivalent and these are designated as Restoration Waters.

Table 1. Summary of AUs and listings on each of the Water Condition Lists.

2022 Water Condition List	# Waters *Net Change*	# Listings *Net Change*
Healthy	7,737 *+39*	*NA*
Impaired	1,300 *+54*	1,542 *+65*
Restoration	377 *+34*	568 *+41*

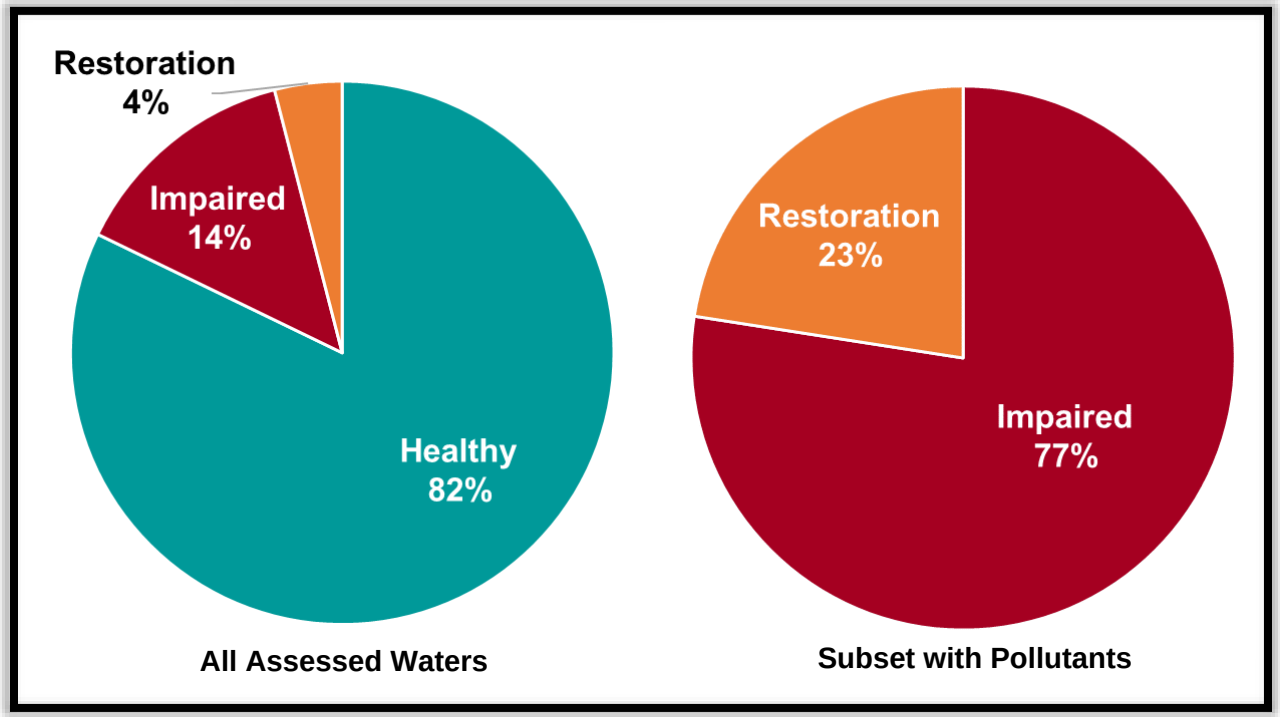


Figure 3. Percentage of assessed AUs on each list. Of the AUs with a pollutant listing, 23% have a restoration plan.

Lists by Waterbody Type

When summarizing the Water Condition Lists an AU count is most often used because it works across all waterbody types. AU count summaries do not account for size differences, which can be informative. Figure 4 shows the percentage of assessed waters on each list based on AU count (top) and size (bottom) for three waterbody types. Differences between AU count and waterbody size are starkest for Lakes and Impoundments because a single AU can range from 1 acre to over 131,000 acres (lakes average of 47 acres and median 4 acres; impoundments average of 298 acres and median 25 acres). For rivers and streams the sizes range from less than a mile to over 70 miles (average of 3 miles; median 1.7 miles).

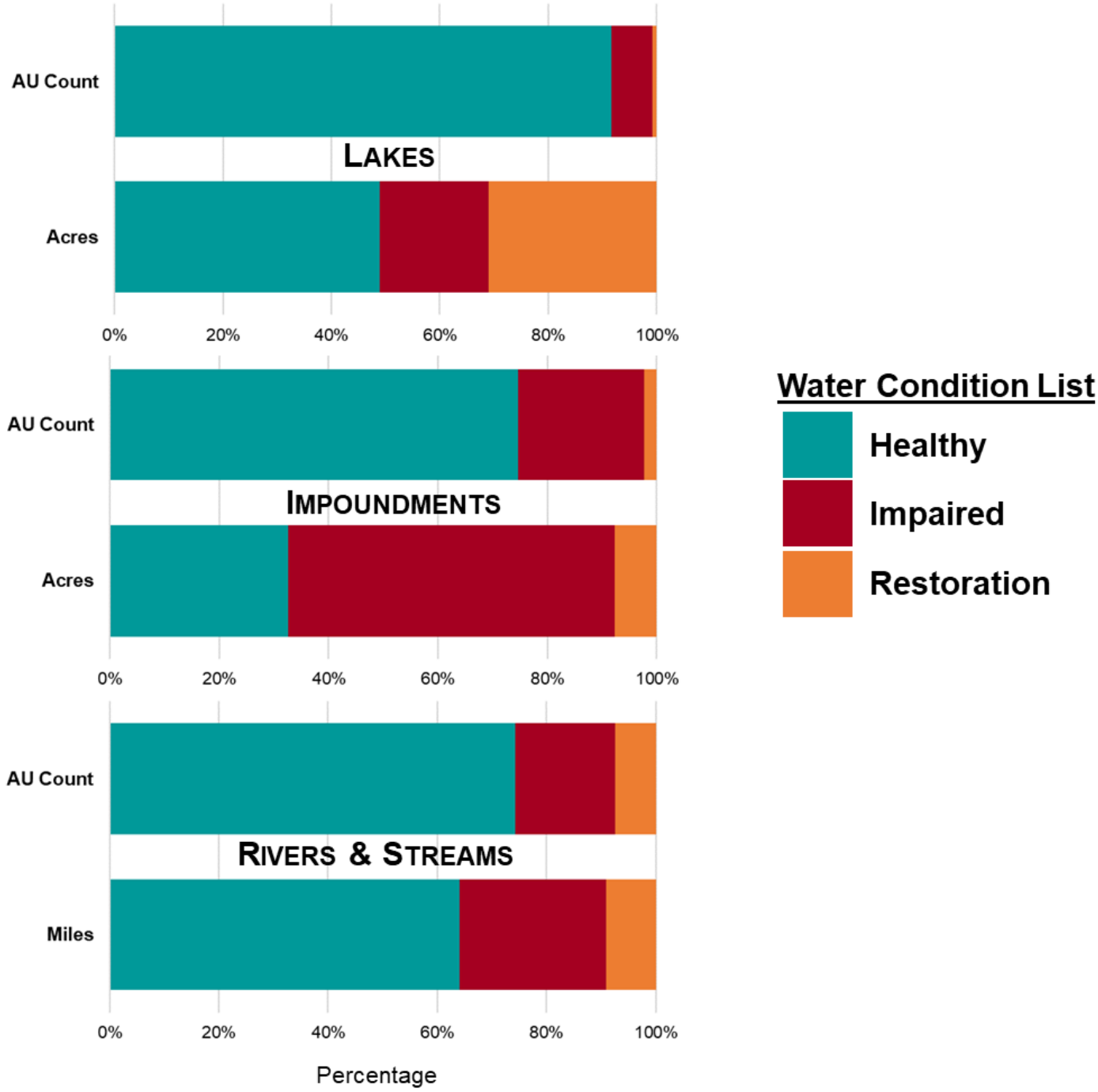


Figure 4. Water Condition List percentages by waterbody type, size, and count.

Healthy Waters List

The Healthy Waters List increased by about 1% by AU count between the 2020 and 2022 assessment cycles. This increase was due to monitoring on new waterbodies and some delistings. Placement on the healthy waters list is determined by general and in-depth water quality evaluations. General water quality evaluations include review of satellite photos, single bug or fish samples, and chemistry samples. Waters with only a general assessment may have unknown issues with water quality.

A total of 244 waters were newly assessed and determined to be on the Healthy Waters List. There were 228 river and stream segments evaluated with biological and/or phosphorus samples, 2 beaches evaluated for *E. coli*, and 14 lakes and impoundments evaluated for multiple parameters.

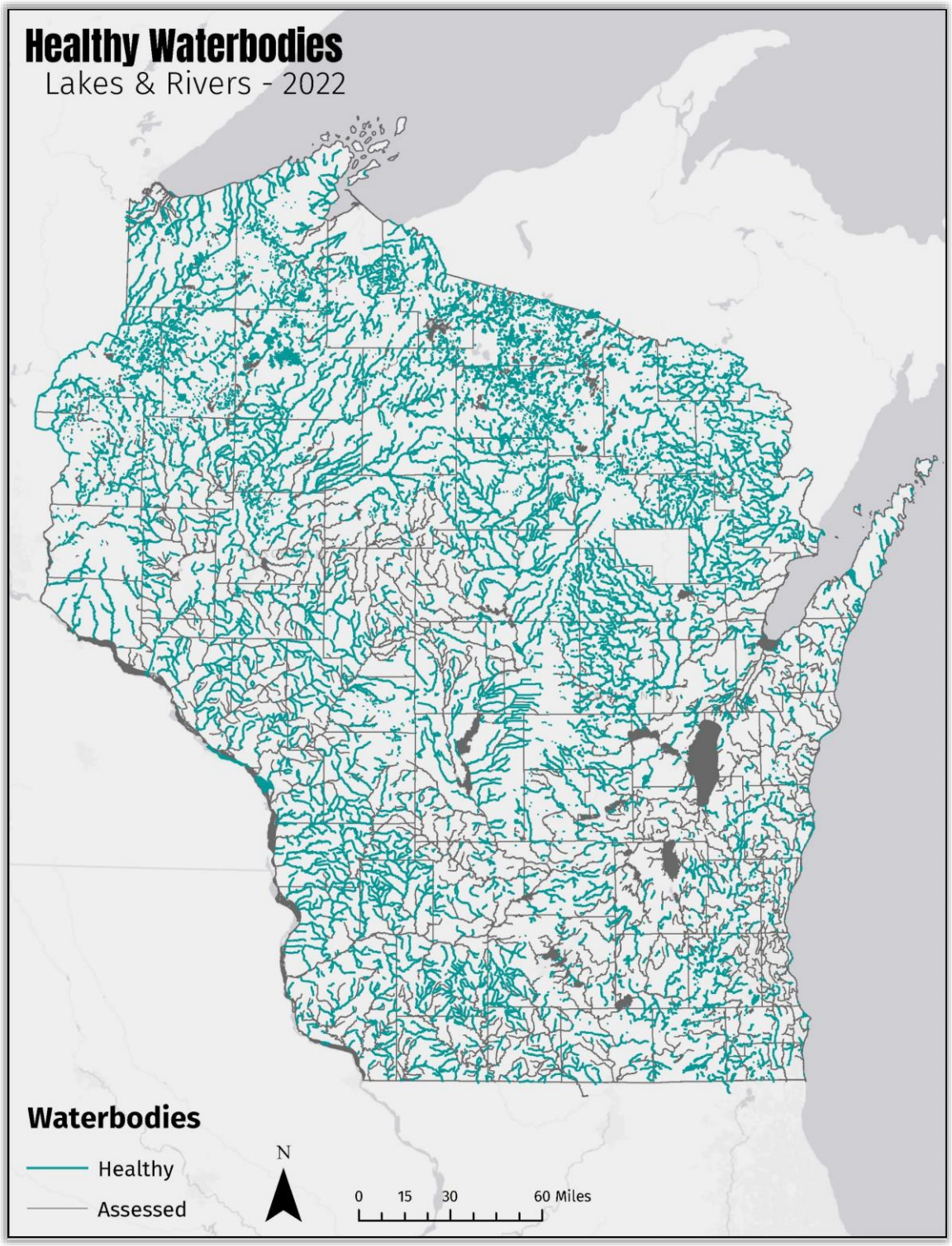


Figure 5. Location of all waters on the Healthy Waters List across the state of Wisconsin.

Impaired Waters List

The majority of pollutant listings, nearly 50%, are for phosphorus (Nutrients in Figure 6). This corresponds with the state's focus on nutrient reduction in our waterways (see Wisconsin's Nutrient Reduction Strategy).

Mercury and PCBs are at the next highly listed pollutants (Figure 7). The majority of these are based on fish consumption advisories.

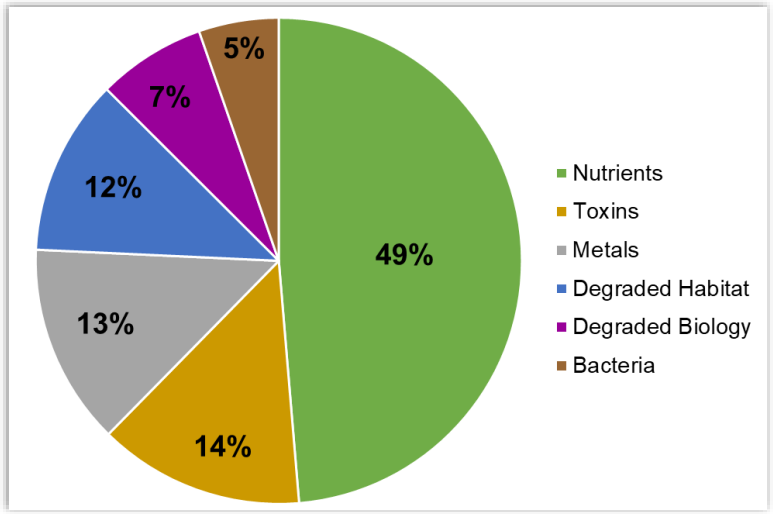


Figure 6. Types of listings on the 2022 Impaired Waters List.

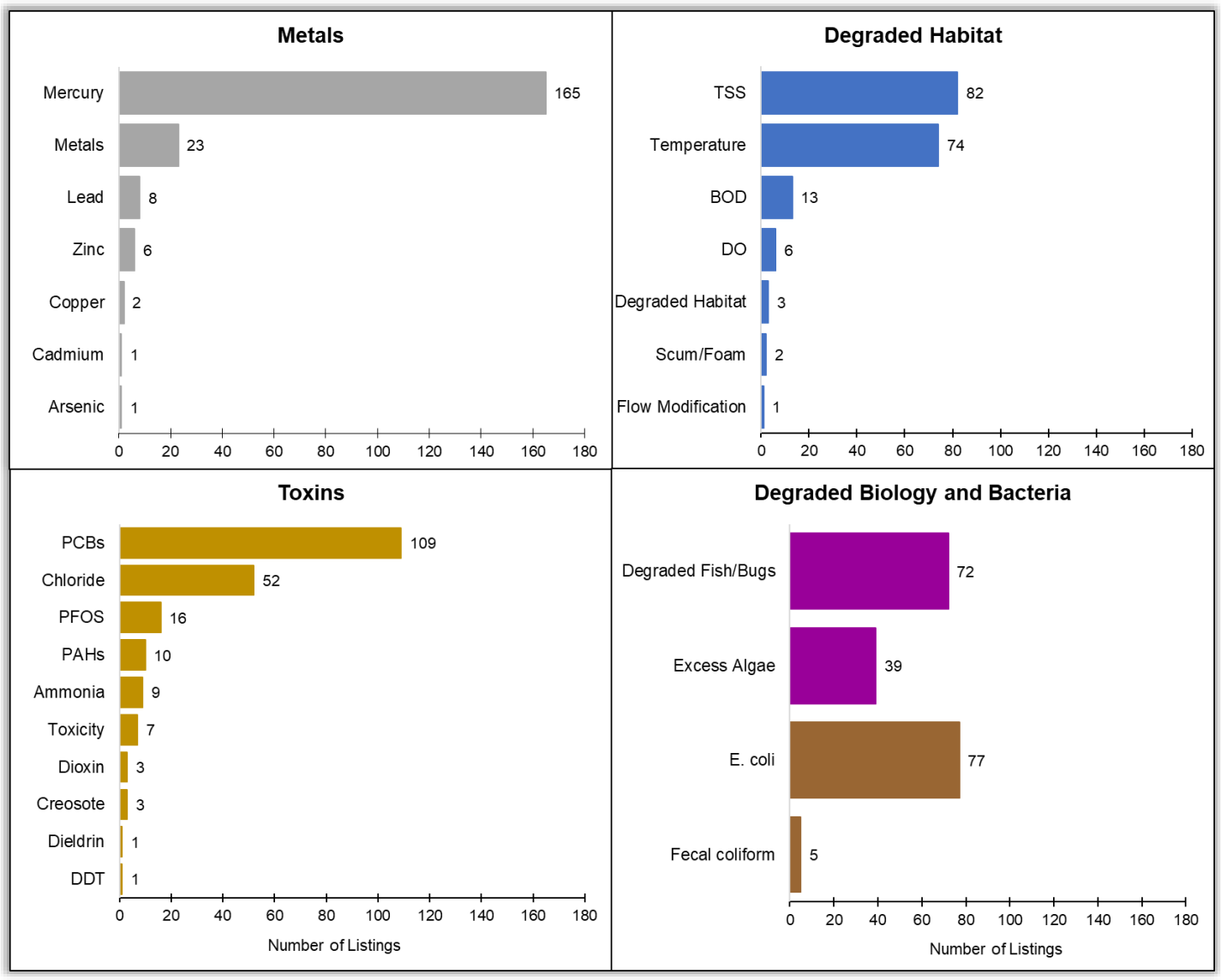


Figure 7. Breakdown of pollutants in each group on the 2022 Impaired Waters List. Degraded Biology listings are those with an Unknown Pollutant.

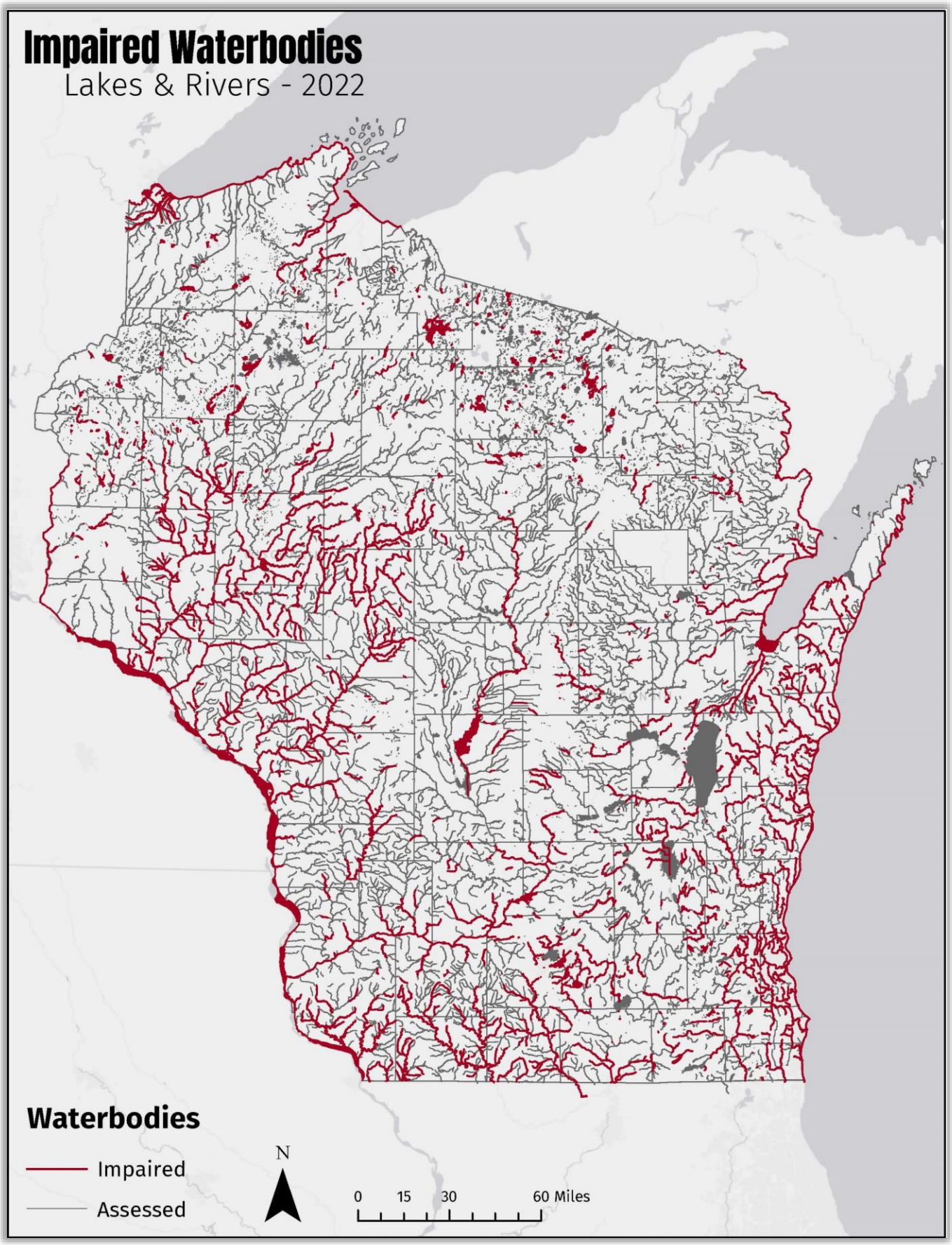


Figure 8. Location of impaired waters across the state in the 2022 cycle.

Restoration Waters List

Phosphorus (Nutrients) and TSS (Degraded Habitat) make up the majority of parameters covered by TMDLs (Figure 9). Additions to the Restoration Waters List were all waters within three basin TMDLs: Milwaukee River, Wisconsin River, and Upper Fox-Wolf River.

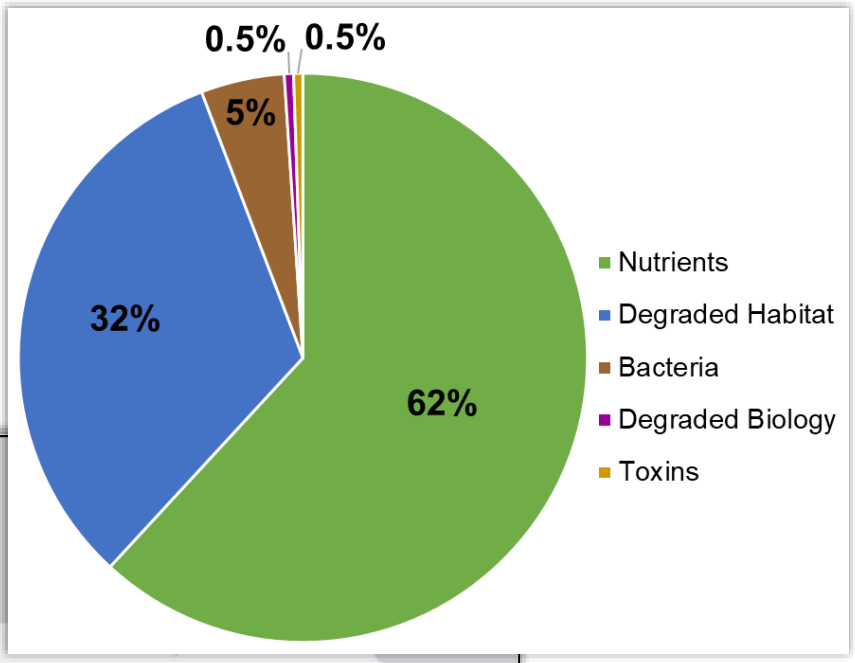


Figure 9. Types of listings on the 2022 Restoration Waters List.

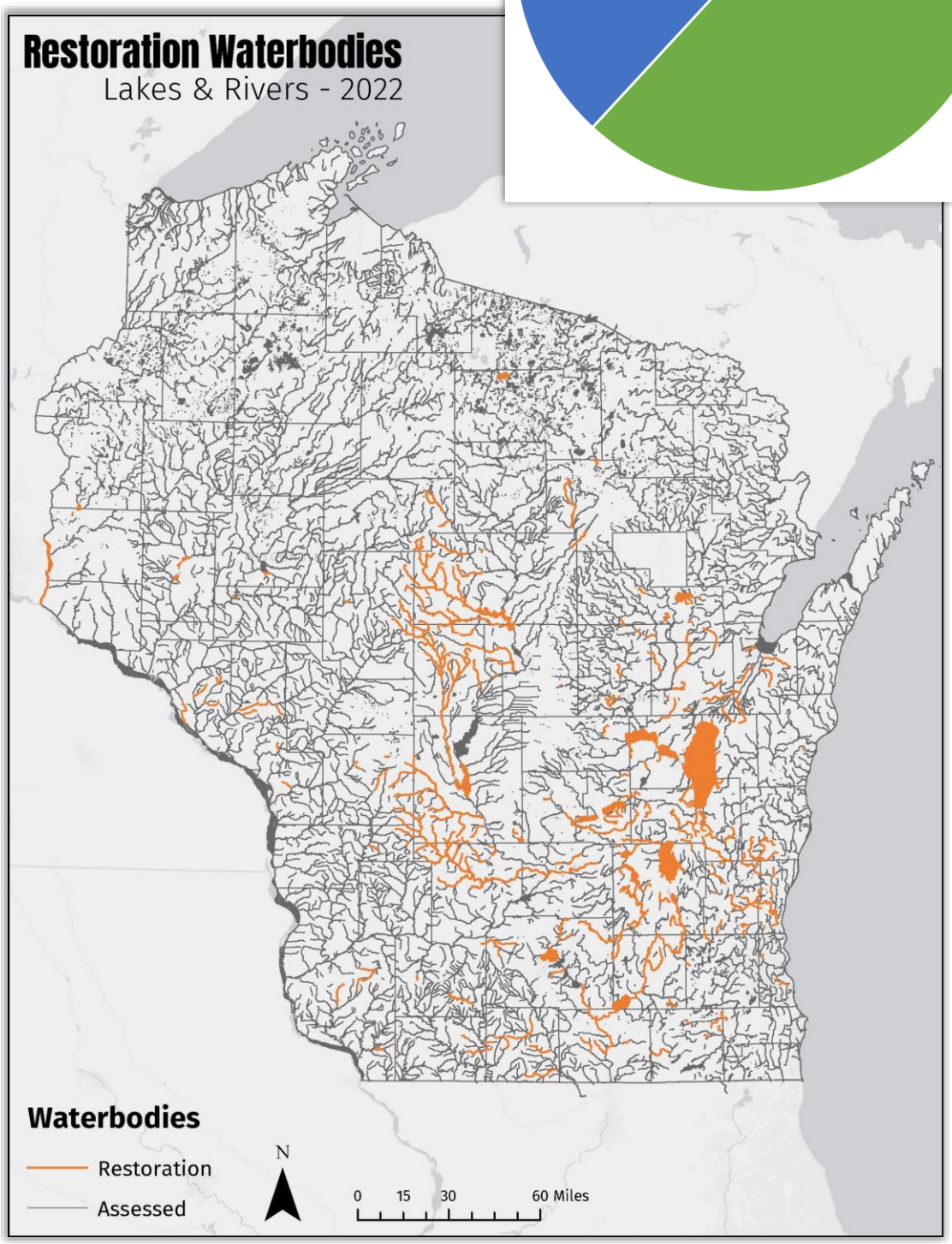


Figure 10. Location of waters on the Restoration Waters List across the state in the 2022 cycle.

New Pollutant Listings

In the 2022 assessment cycle there were 126 listings added to the Impaired and Restoration Waters Lists (Table 2). Figure 11 breaks down the listings by parameter and the available restoration plans (9-Key Element Watershed Plan or a Total Maximum Daily Load (TMDL)). There were 17 listings with a 9-Key Element plan, part of the Impaired Waters List. There were 11 listings that were part of existing TMDLs, making them part of the Restoration Waters List.

Table 2. Number of new waterbodies and listings add during the 2022 assessment cycle.

2022 Water Condition List	# New Waters	# New Listings
Impaired	111	115
Restoration	11	11

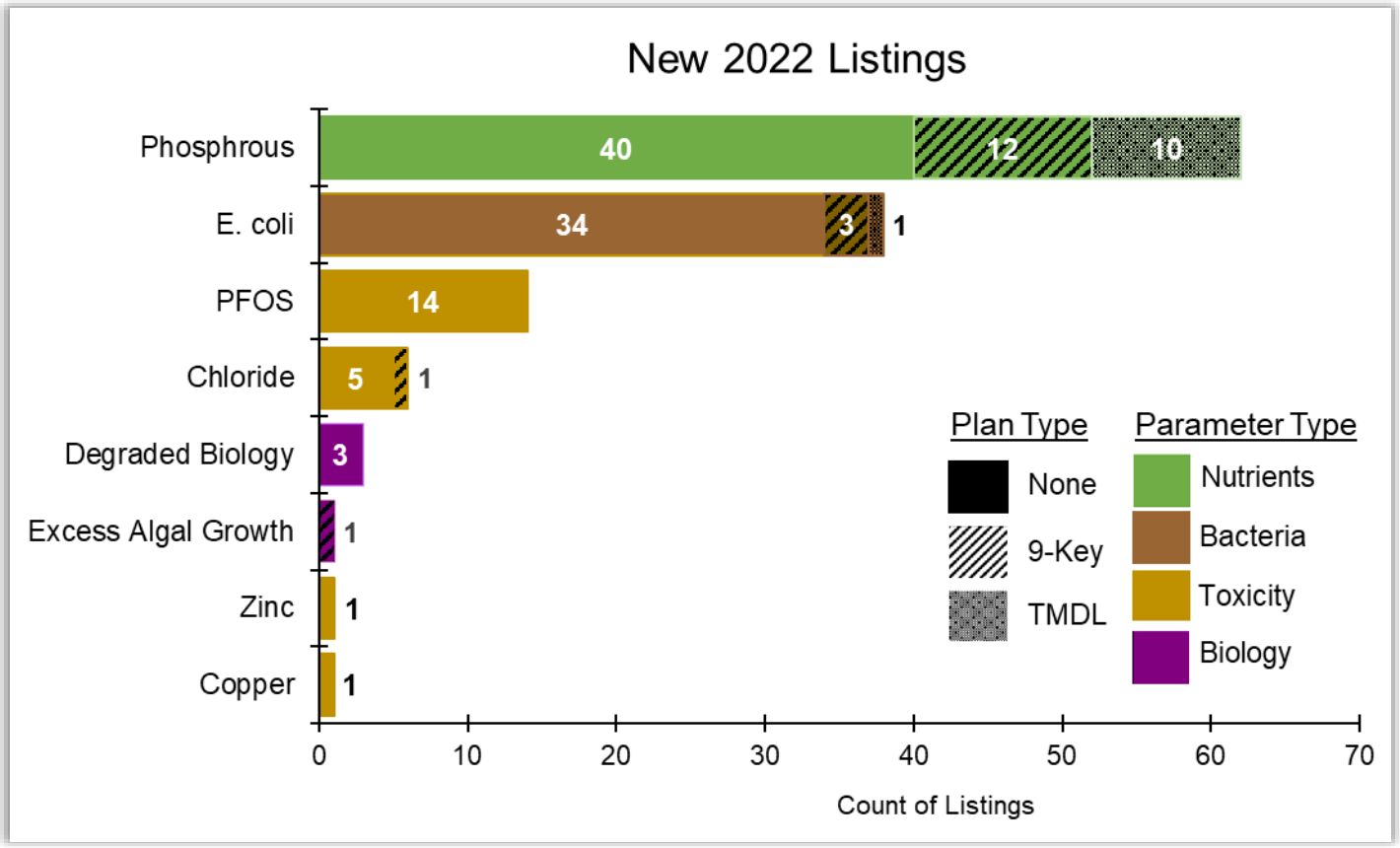


Figure 11. Number of new listings by parameter with available plan type applied.

Phosphorus

The 62 new phosphorus listings were spread across the state and part of many different projects. Some of those projects are briefly outlined below.

Listings in TMDL Areas

Ten of the new phosphorus listings were in basins with TMDLs (Table 3). The three basin TMDLs where allocations were already sufficiently outlined for newly listed waters were the Milwaukee, Upper Fox-Wolf, and the Wisconsin. Appendices were made for each basin TMDL, to outline which waters were now included and which allocations applied. These appendices were given to the public for comment prior to review and approval by EPA. This was the first assessment cycle where TMDL updates were included in the process.

Table 3. 2022 phosphorus listings within TMDL areas.

Waterbody Name	WDNR AU ID	EPA AU ID	Pollutant	Impairment(s)	TMDL Basin
Evergreen Creek	10058	WI10000252	Total Phosphorus	Impairment Unknown	Milwaukee River Basin
Little Menomonee River	8106460	WI10044280	Total Phosphorus	High Phosphorus Levels	
Mole Creek	3993907	WI10028711	Total Phosphorus	Degraded Biological Community	
N. Br. Cedar Creek	10055	WI10008042	Total Phosphorus	Impairment Unknown	
Noyes Creek	3988299	WI10028301	Total Phosphorus	Impairment Unknown	
Silver Creek	10076	WI10000265	Total Phosphorus	Degraded Biological Community	
Fox River	5535277	WI10033740	Total Phosphorus	Impairment Unknown	Upper Fox/Wolf River Basins
Fox River	6778560	WI10039711	Total Phosphorus	Degraded Biological Community	
Unnamed	3993744	WI10028705	Total Phosphorus	Impairment Unknown	
Unnamed Tributary	8110237	WI10044421	Total Phosphorus	High Phosphorus Levels	Wisconsin River Basin

Lake Wissota Stewardship Project

The Lake Wissota Stewardship Project is a collaboration led by Chippewa County Land Conservation & Forest Management Committee (LCFM) and the Lake Wissota Improvement & Protection Association (LWIPA). The project aims to improve water quality in Lake Wissota by reducing runoff pollution from contributing watersheds. Monitoring data were collected across the Little Lake Wissota sub-watershed and the Moon Bay/Yellow River sub-watershed by volunteers in the Water Action Volunteers (WAV) and Citizen Lake Monitoring Network (CLMN) programs. Two 9-Key Element Watershed plans were created based on collected data: Little Lake Wissota (2020) and Yellow River Watershed and Moon Bay (2021). The plans and data collection establish a baseline of current conditions for evaluation of future BMP effectiveness.

The baseline data were also used for surface water quality assessments and 7 new stream AUs were identified as having phosphorus issues (Table 4). Lake Wissota, Moon Bay, Little Lake Wissota, and the Yellow River were all listed for phosphorus in prior cycles (Figure 12).

Table 4. New phosphorus listings within the Lake Wissota watershed.

Waterbody Name	WBIC	WDNR AU ID	EPA AU ID
Big Drywood Creek	2154800	16188	WI10004732
Frederick Creek	2152900	16178	WI10004722
Hay Creek	2157700	16198	WI10004740
Little Drywood Creek	2155100	16190	WI10026346
Paint Creek	2153200	16180	WI10004724
South Fork Paint Creek	2153300	18842	WI10006676
Stillson Creek	2153000	16179	WI10004723

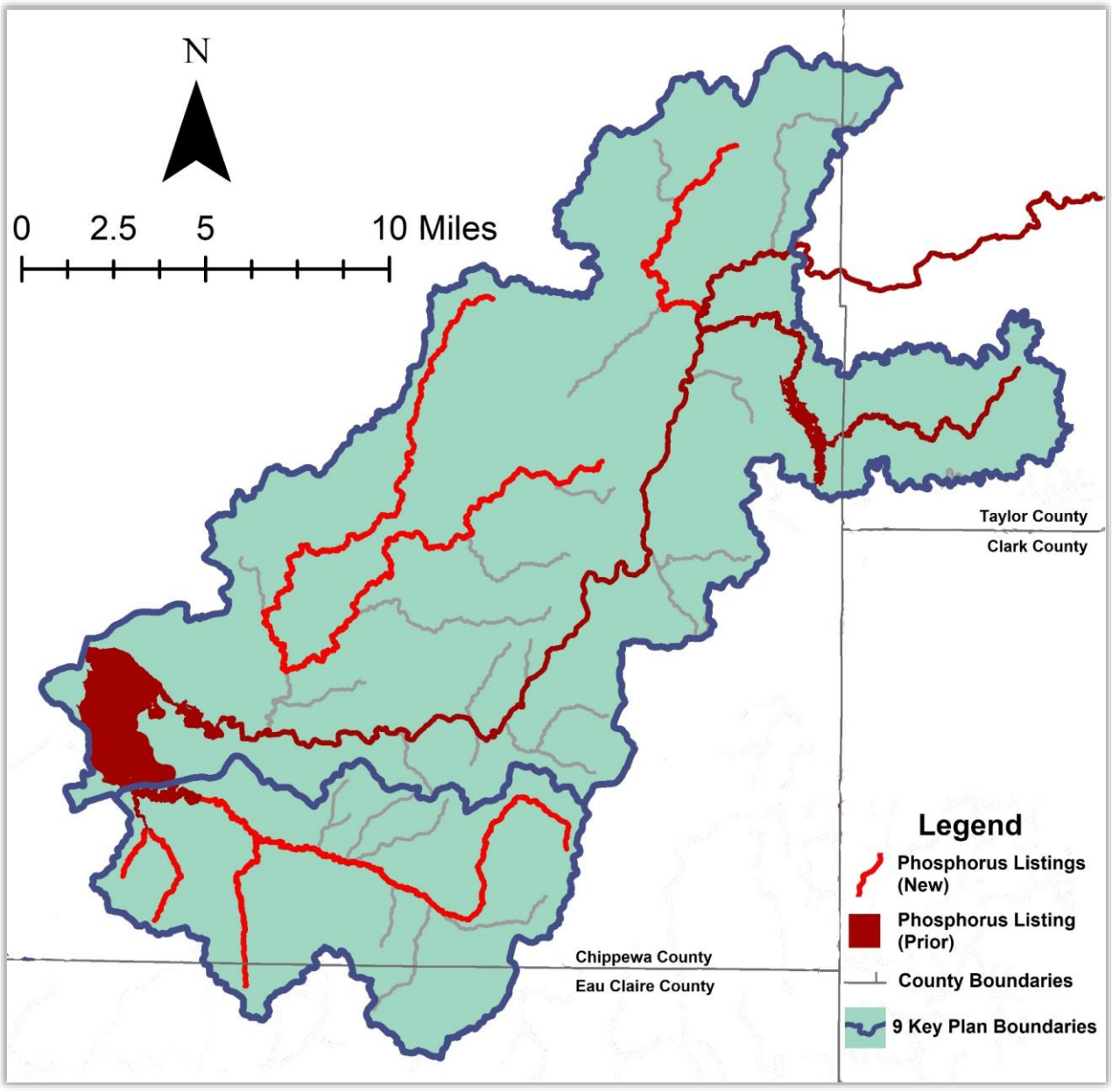


Figure 12. Stream segments added for phosphorus in the Lake Wissota watershed.

Lake Comus Watershed

The Lake Comus Protection and Rehabilitation District (PRD) is working with Southeastern Wisconsin Regional Planning Commission (SEWRPC) to develop a comprehensive lake management plan for Lake Comus. The Lake Comus PRD sent watershed water quality data to WDNR. The data were used for assessments, which resulted in 4 new AUs proposed for phosphorus listing (Table 5).

Spring Brook at Leeson Park Pavilion, May 2019, WAV

Table 5. New phosphorus listings within the Lake Comus watershed.

Waterbody Name	WBIC	WDNR AU ID	EPA AU ID
Comus Lake	794200	11620	WI10001424
Turtle Creek	790300	18241	WI10006231
Unnamed	794300	6854137	WI10039841
Spring Brook	790500	11613	WI10001418

Wildcat Creek Watershed

Dodge County Land and Water Conservation Department developed an implementation plan for the Wildcat Creek watershed. Phosphorus data collected were also used for assessments; 4 AUs were proposed for phosphorus listing (Table 6).

Table 6. New phosphorus listings within the Wildcat Creek watershed.

Waterbody Name	WBIC	WDNR AU ID	EPA AU ID
Neda Creek	859100	11464	WI10001298
Unnamed Trib to Wildcat Creek	858700	9117494	WI10045180
Wildcat Creek	858600	11461	WI10001296
Wildcat Creek	858600	11462	WI10026119

Polk County

A combination of projects by the Polk County Land & Water Resources (LWR), Citizen Lake Monitoring Network (CLMN) and WDNR resulted in 6 new lake phosphorus listings (Table 7). All of these lakes are covered by the Lake St. Croix TMDL Implementation 9-Key Plan.

Table 7. New phosphorus listings for lakes in Polk County.

Waterbody Name	WBIC	WDNR AU ID	EPA AU ID	Monitoring
Loveless Lake (Bass)	2620000	18885	WI10006711	CLMN
Crescent Lake (Pickerel)	2458900	16737	WI10005180	CLMN
Bridget Lake (Mud)	2619100	16491	WI10004974	Polk County LWR
Little Butternut Lake	2640700	16679	WI10005132	Polk County LWR
Mud Lake	2615700	16454	WI10004943	Polk County LWR
Long Lake (Helbig)	2631600	16581	WI10005054	WDNR

Bacteria

A total of 38 listings were added for *E. coli* in the 2022 cycle; this is largely due to implementation of new *E. coli* criteria. The new criteria consider high spikes in bacteria levels, which resulted in more beaches added to the list (Table 8). There were also 5 river or stream segments listed for *E. coli*. The sources of bacteria (sewage pipe lakes, septic systems, agriculture, wildlife) have not been identified in most cases.

Table 8. List of beaches newly listed for E. coli in the 2022 cycles.

Waterbody	Beach Name	Beach Type	WDNR AU ID	EPA AU ID
Bugle Lake	**Island Park Beach**	Inland	8113230	WI10044741
Lake Koshkonong	**Lakeland Campground Beach -- 2803 E. State Rd. 59**	Inland	3899461	WI10027437
Lake Mendota	**Gov Nelson State Park Beach**	Inland	3896257	WI10027095
Lake Monona	**Schluter Beach**	Inland	9124116	WI10045360
Lake Ripley	**Lake Ripley Beach**	Inland	3894224	WI10026954
Lake Winnebago	**High Cliff SP - Lake Winnebago Beach**	Inland	3896136	WI10027092
Rock Lake	**Sandy Beach West**	Inland	6878187	WI10040618
Rock River	**Traxler Park Skier's Platform Beach**	Inland	3899467	WI10027438
Spring Brook	**Palmer Park Beach**	Inland	6877807	WI10040606
Strum Lake	**Strum Lake Beach**	Inland	8113409	WI10044783
Trempealeau River	**Pietrek County Park Beach**	Inland	8113439	WI10044800
Vern Wolf Lake	**Richard Bong State Rec Area - Vern Wolf Lake Beach**	Inland	3898972	WI10027368
Lake Michigan	**Neshota Park Beach**	Great Lake	481979	WI10008811
	Point Beach State Park Beach		482011	WI10008812
	Upper Lake Park Beach		1452959	WI10024775
	Amsterdam Beach		1487416	WI10024777
	Southport Park Beach		1491250	WI10024852
	Bayview Park Beach		1527102	WI10025421
	Fish Creek Beach		3896985	WI10027173
	Haines Park Beach		3897039	WI10027175
	Otumba Park Beach		3897218	WI10027182
	Sand Bay Beach 1		3897303	WI10027186
	Klode Park Beach		3899028	WI10027377
	Harrington State Park Beach North		3899054	WI10027383
	Myers Park Beach		3899108	WI10027392
	Wind Point Lighthouse Beach		3999943	WI10029380
Lake Superior	**Bayview Park Beach**	Great Lake	3894378	WI10026958
	Kreher Park Beach		3895108	WI10027031
	Herbster Beach		3895679	WI10027077
	Port Wing Beach West		3895787	WI10027081
	Sixth Avenue West Beach		6878249	WI10040620
	Wisconsin Point Lot 12 Beach		6878341	WI10040623

PFOS

Across the state there were 12 PFOS based fish consumption advisories established based on recent sampling data during the assessment cycle (Figure 13). The 14 impacted waters were added to the Impaired Waters List due to not meeting Fish Consumption use (Table 9). Consumption advisories for Green Bay and its tributaries were issued in January 2022, outside the assessment period; these will be considered for the 2024 lists.

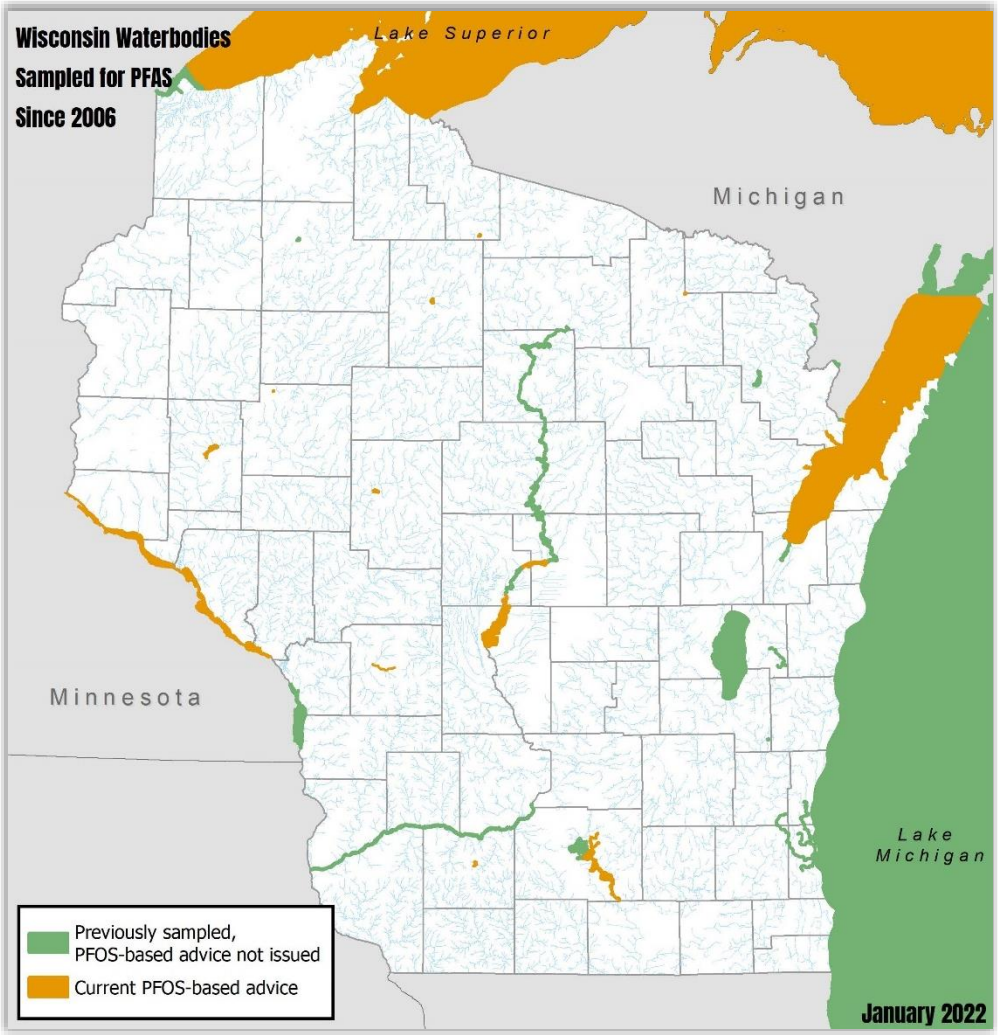
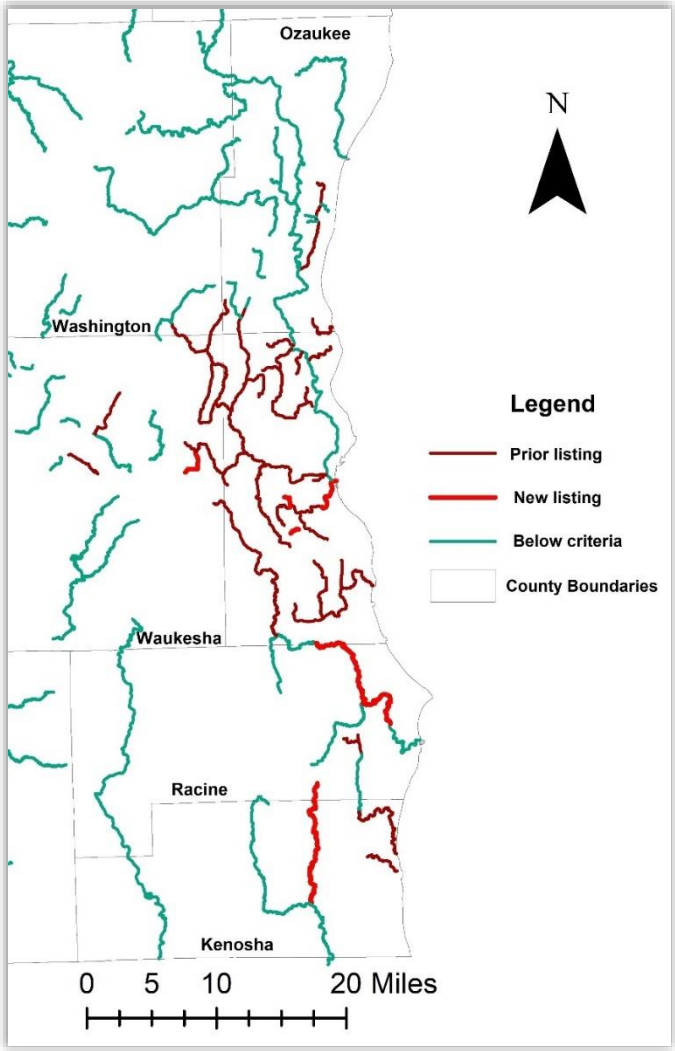


Figure 13. Fish consumption advisories for PFOS based on monitoring from 2006 – 2021. The majority of PFOS-based advice was issued between 2019 and 2021.

Table 9. Waterbodies with new PFOS based fish consumption advisories and impairment listings

Waterbody Name	Water Type	Counties	WBIC	WATERS ID	EPA AU ID
Lake Superior	Great Lakes Shoreline	Douglas	2751220	892439	WI10008955
Petenwell Lake	Impoundment	Adams, Juneau	1377100	424132	WI10008638
Biron Flowage	Impoundment	Wood, Portage	1396900	424404	WI10008648
Silver Creek	River	Monroe	1660500	1180470	WI1180470
Silver Creek	River	Monroe	1660500	949202	WI10010407
Mud Lake	Lake	Dane	803400	18251	WI10006241
Lake Waubesa	Lake	Dane	803700	11661	WI10001452
Lake Monona	Lake	Dane	804600	11665	WI10001455
Lake Kegonsa	Lake	Dane	802600	11643	WI10027603
Upper Mud Lake	Lake	Dane	804000	18256	WI10006244
Starkweather Creek	River	Dane	805100	11668	WI10001458
W. Br. Starkweather Creek	River	Dane	805200	893239	WI10008957
Wingra Creek	River	Dane	804700	11666	WI10001456
Wingra Creek	River	Dane	804700	5533632	WI10033422



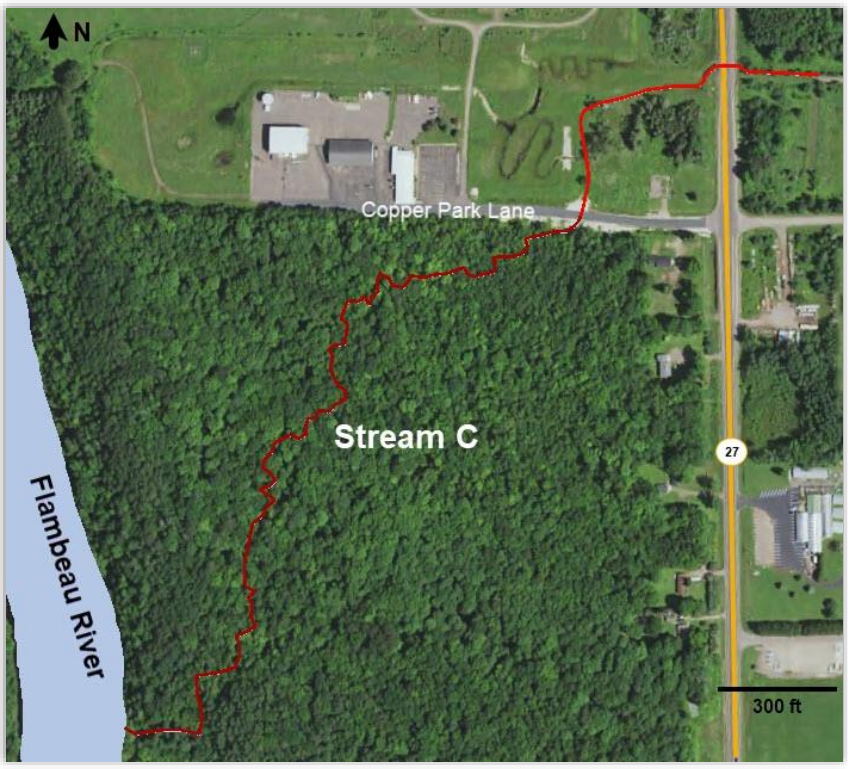
Chloride

The six new chloride listings were concentrated in and around southeastern Wisconsin (Table 10, Figure 14). Chloride is routinely collected as part of the state's Long-Term Trend monitoring and through a WAV urban road salt study. Increased use of road salt during the winter has correlated with an increase in waters with chloride-related aquatic toxicity. Chloride pollution can also come from sidewalk salt and water softeners.

Figure 14. Rivers and streams in the southeastern corner of the state evaluated for chloride. Red shades are chloride listings, with the bright red indicating addition in 2022. The teal AUs have chloride levels evaluated to be below criteria.

Table 10. New chloride listings on river and stream segments.

Waterbody Name	WBIC	WATERS ID	EPA AU ID
Kilbourn Road Ditch	736900	10421	WI10000524
South 43rd Street Ditch	15900	9981	WI10000209
Zablocki Park Creek	5036633	3987849	WI10028282
Kinnickinnic River	15100	9973	WI10008186
Root River	2900	896175	WI10027840
Dousman Ditch	17100	10029	WI10000237



Zinc & Copper

A short segment of Stream C above Copper Park Lane was added to the Impaired Waters List for elevated levels of Copper and Zinc (Figure 15). The lower portion of Stream C, from its mouth to Copper Park Lane, is currently listed for Copper. The source of the metals is currently unknown

Figure 15. Map of Stream C in Rusk County. The dark red portion was listed in the 2014 cycle. The light red segment is proposed for the 2022 Impaired Waters List.

Pollutant Removals

There were 22 listings removed during the 2022 cycle (Figure 16):

- Seven of the eight phosphorus listing removals were for lakes, with two being removed based on updated criteria. The other phosphorus listing removal was based on new lake data being below criteria.
- Two lakes listed for excess algal growth (pollutant unknown) were removed based on new chlorophyll-a data being below impairment thresholds.
- Three listings of excess algae growth with no known pollutant were changed from “pollutant unknown” to “total phosphorus” due to identification of Total Phosphorus as the pollutant causing the impairment.
- Three streams were delisted for degraded habitat from sedimentation (Total Suspended Solids (TSS)) based on habitat restoration.
- Lake Mendota and Green Lake had their PCB fish consumption advisory removed based on new fish tissue data; in response the PCB listing was removed.
- One beach segment was delisted for *E. coli* based on new data showing levels below criteria.
- One stream segment was delisted for Fecal coliform because it was on Tribal lands, outside of State jurisdiction.
- One stream segment had its chloride listing removed based on data below criteria.
- One stream segment was delisted for elevated water temperature based on data below criteria.

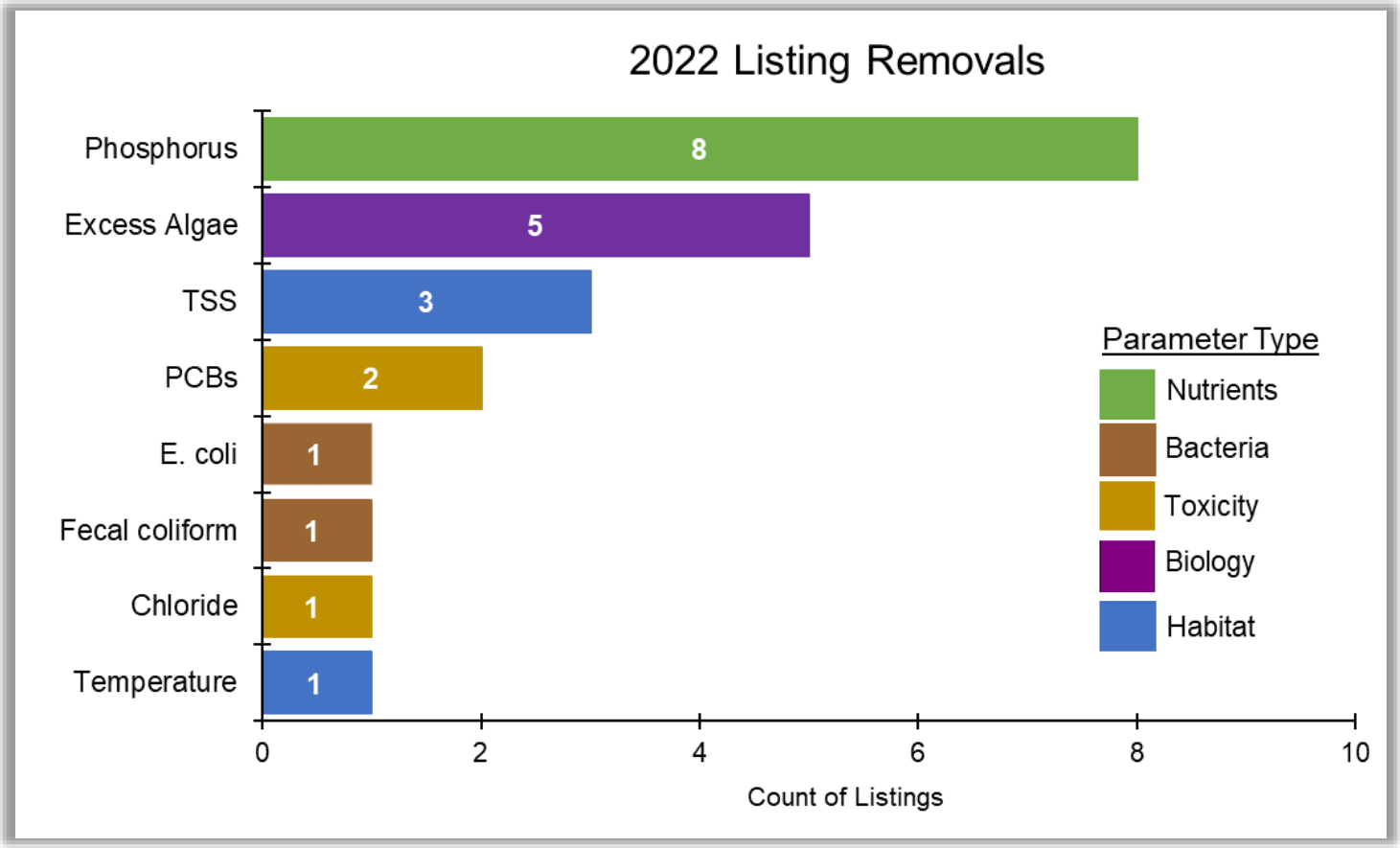


Figure 16. New listings for the 2022 cycle.

Habitat Restoration

Legler School Branch and Pioneer Valley Creek, Green County

Legler School Branch and Pioneer Valley Creek were placed on the Impaired Waters List in 1998 for degraded habitat caused by sedimentation. Beginning in fall, 2012 and continuing over the next 2 years, the Green County Land Conservation Department spent nearly $630,000 on installation of Best Management Practices (BMPs) throughout the 2 sub-watersheds. Nearly 6,500 feet of livestock fencing, 320 feet of stream crossing, and 17 acres of critical area stabilization were implemented. Additionally, over 16,500 feet (3.12) miles of stream was rehabilitated: 8,500 feet on Legler School Branch and 3,325 feet on Pioneer Valley. This rehabilitation included removal of dense stands of nuisance (box elder) trees which tend to shade out undergrowth and destabilize the banks as they fall in the stream. After tree removal, the banks were sloped, shaped, and seeded in native grasses. Habitat structures were placed in bends on the stream and rock weirs were used on straight sections to create plunge pools for generating deeper water areas.

In 2017 WDNR water resource biologists sampled along both streams for fish and qualitative habitat. Based on the results, outlined in a 2020 Targeted Watershed Assessment (TWA) report, riparian stream corridor improvements on Legler School Branch and Pioneer Valley Creek resulted in reducing streambank erosion and improved fish habitat. Soft sediment was reduced, and biological communities were generally in fair to good condition. These two stream segments were proposed for delisting in the 2022 cycle based on these findings.

Legler School Branch 2017

Becky Creek, Rusk County

Becky Creek is part of the Soft Maple and Hay Creeks Watershed in Rusk County. This creek is an Exceptional Resource Water and a Class I Trout water, listed in the 2004 cycle for degraded habitat caused by sedimentation. The administered a watershed project at the local level over an 11-year period from 1996 through 2007. The goal of the project was to reduce nonpoint source impacts to waterways by working with landowners to install various agricultural BMPs throughout the watershed. A total of 68 BMPs were reported installed by 35 different property owners. The BMPs implemented on Beck Creek included stream bank improvement, shaping, and seeding.

In 2015 WDNR water resource biologists sampled the watershed for fish, macroinvertebrates, habitat, and chemistry. The stream banks of Beck Creek were well vegetated and riffle areas were mainly gravel and cobble. Biological communities, both fish and macroinvertebrates, scored high biological integrity. Based on these results, the full summary available in the 2020 Soft Maple and Hay Creek TWA report, Becky Creek was proposed for delisting.

Becky Creek 2015

PUBLIC PARTICIPATION

Kayaking And Canoeing With Family 2018

The Clean Water Act depends on public involvement and Wisconsin lakes and rivers are public resources, owned in common by all Wisconsin citizens. Throughout the process of assessing and addressing water quality problems there are many opportunities for public comment, including input on proposed water quality standards, updates to the impaired waters listings, and TMDL creation. In Wisconsin citizen-based monitoring data, if minimum data requirements are met, are used in water quality assessments and there are several opportunities for citizens to volunteer.

Monitoring

Citizens provide a vital resource for gathering water quality data all across the state of Wisconsin. There are multiple programs available for training and monitoring through the DNR, University of Wisconsin, and environmental groups.

Citizen Lake Monitoring Network (CLMN)

Wisconsin's Citizen Lake Monitoring Network (CLMN) provides a bond between the Wisconsin Department of Natural Resources, University of Wisconsin Extension Lakes Program, and about 1,000 volunteer citizens. DNR and Extension staff provide training, support, and equipment, and cover the cost of laboratory analysis of water samples. CLMN volunteers enter their own data into a statewide database, which automatically generates public-facing, annual summary reports for each lake on a daily basis.

In 2021 volunteers gathered monitoring data for 1,106 distinct sites.

Starting with just over 100 volunteers in 1986, CLMN participants collected water clarity data on about as many lakes. Participation has trended upward since then, and many additional parameters have been available to volunteers. Volunteer responsibilities range from simple water clarity readings taken approximately bi-weekly, to some volunteers monitoring clarity, total phosphorus, chlorophyll-A, water temperature profiles, dissolved oxygen, aquatic invasive species, and more.

In 2021, 978 CLMN volunteers had entered their data into the database as of January 19th, 2022. The Network requests data to be entered by November 1st, but data tend to come in through early spring of the following year for various reasons. Data was entered for 1,106 distinct monitoring sites in 2021, with water clarity data being the most common, but over 560 volunteers also collected data on total phosphorus, chlorophyll-A, and temperature profiles. We are very lucky in Wisconsin to have such a devoted network of volunteers partnering with us to monitor conditions on our lakes, and to provide a wealth of assessment data.

CLMN chemistry volunteers (who collect phosphorus, chlorophyll-A, temperature, and clarity data) follow strict protocols to ensure consistency and high-quality data. About 10% of them are selected annually for extra Quality Assurance sampling. Through this robust QA/QC program, we are able to proudly demonstrate the impressive quality and reliability of our volunteers' work.

Sampling Wisconsin's waters.

Many Citizen Lake Monitoring Network volunteers also participate in early detection monitoring for aquatic invasive species, ice cover duration monitoring, and special projects like a continuous temperature monitoring study. For example, in 2015, volunteers on 31 Wisconsin lakes each mounted a continuous-read thermometer to a leg of their pier, one foot down from the lake surface. Volunteers installed these as soon as they could after ice-out, and left them in the water for as long as possible before the lake froze again (the longest was 297 days). These data were used in a lake temperature study by the Wisconsin Department of Natural Resources and United States Geological Survey, and these data are informing current work on cool-water fisheries and walleye management.

Table 11. 2020 and 2021 Citizen Lake Monitoring Network Participation.

	Total Volunteers	Lakes	Sites	Clarity Volunteers	Chemistry Volunteers	AIS Volunteers	Ice Volunteers
2020*	938	733	1,065	766	533	83	155
2021**	978	769	1,106	778	565	71	140

*Participation was lower due to COVID-19 travel restrictions and other complications.

**Reported data still incomplete as of this report publication.

Water Action Volunteers (WAV)

In 2021, WAV celebrated its 25th anniversary.

Participants in the Water Action Volunteers (WAV) volunteer stream monitoring program range far and wide across the state of Wisconsin. WAV is a collaboration of the Wisconsin DNR and the University of Wisconsin–Madison Division of Extension. The citizen science program relies heavily on partnerships with local WAV coordinators at participating organizations to help recruit, train and support volunteers in their local area on the WAV methods. In 2021, WAV celebrated its 25th anniversary. Since its founding, volunteers have collected data in all 72 counties. In 2020, WAV supported over 460 volunteers statewide, and in 2021, WAV supported over 500 volunteers.

Baseline Monitoring

Volunteers enter the WAV program by training to do baseline stream monitoring. Each year, baseline volunteers journey to their monitoring sites once per month from May to October to collect four baseline parameters: dissolved oxygen, instantaneous temperature, transparency and streamflow. During at least two of these months (May/June and September/October), volunteers also collect macroinvertebrates to calculate a biotic index score. Once per season, some advanced volunteers also conduct a habitat assessment. In 2020, volunteers collected this baseline data at 284 unique monitoring sites. In 2021, these data were collected at 279 unique sites.

Sue Ristow assisting with WAV youth education.

Special Projects Monitoring

After at least one season of baseline monitoring, some WAV volunteers will support special projects monitoring. Special projects monitoring is designed to either use the same methods as DNR professionals for data collection or to meet specific data needs. Recently these special projects have included monitoring with meters, aquatic invasive species monitoring, nutrient monitoring, and deploying continuous temperature monitors.

Nutrient monitoring is the most widespread of the special projects. Volunteers sample for total phosphorus concentrations in rivers and streams. In some instances, volunteers also collect suspended solids samples and/or nitrogen panels. These samples contribute to Follow Up Monitoring, Local Needs Projects, 9-Key Element Projects, TMDL area monitoring, and Targeted Watershed Approach Projects. In 2020, volunteers collected nutrient samples at 103 sites across the state, and in 2021 volunteers collected nutrient samples at 111 sites. This monitoring included not only DNR projects but also projects for businesses, watershed groups, and counties extending from Trempealeau to Waukesha and beyond.

Volunteers also assist in deploying continuous temperature monitors, called thermistors. Temperature affects oxygen availability and demand, and it can predict the types of organisms able to survive in a stream. Each season volunteers deploy and monitor thermistors at over 60 sites.

AIS Snapshot Day

University of Wisconsin-Madison Division of Extension, in partnership with the River Alliance, UW Extension Lakes, and DNR hosts a joint lake, stream, and wetland invasive species Snapshot Day. This event organizes citizen scientists around the state to monitor priority bridge-stream crossings, boat landings and roadsides/trails for AIS of concern on a given day in August.

In 2021, 105 participants visited 128 sites, locating 24 newly reported infestations of AIS.

AIS Snapshot Day Crew 2021

Public Data Solicitation

The Clean Water Act asks that all readily available data are used to assess a state's water quality. Before the assessments are done the WDNR sends out a request for water quality data. During the 2022 cycle there were four entities that submitted data (see Data Used for Assessments section for specifics):

- City of Green Lake
- Public Health Madison & Dane County
- Taylor County Land Conservation Department (LCD)
- Lake Comus Protection and Rehabilitation District

Dissolved Oxygen Titration by Toben Lafrancois 2018

Public Comment Periods

Public comments were sought during multiple points of the assessment process. These included for updated assessment methods (Wisconsin Consolidated Assessment & Listing Methodology (WisCALM) 2022 Draft, October 12 – November 20, 2021), the draft 2022 water condition lists (August 16 – October 1, 2021), and listing updates to three basin TMDLs (November 29, 2021 – January 7, 2022). A full summary of comments and WDNR responses can be found on the WDNR webpage (dnr.wi.gov).

Person emailing a comment.

Monitoring, Restoration & Protection

Indian Slough Pool 4 Mississippi River *Sara Strassman 2020*

Monitoring and restoration work are on a continuous cycle. Monitoring and restoration for the 2022 cycle were guided by the:

- 2015 – 2020 Wisconsin Water Monitoring Strategy;
- 2015 Wisconsin's Water Quality Restoration and Prioritization Framework; and the
- 2013 Nutrient Reduction Strategy.

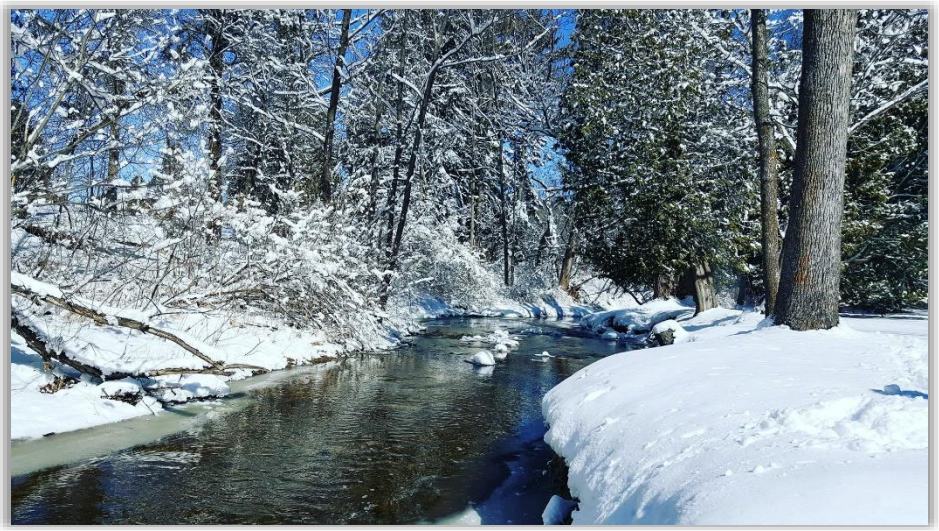
The monitoring strategy and the restoration and prioritization framework documents are both being updated. Progress reports for the Nutrient Reduction Strategy are available online.

Total Maximum Daily Loads (TMDLs)

The most recently approved basin TMDL was the Upper Fox-Wolf Rivers in February 2020. The listings associated with this TMDL were categorized as having a restoration plan (Category 4) in the 2020 Water Condition Lists. In the time since this TMDL was approved work was being done on Wisconsin's next projects.

Northeast Lakeshore TMDL

Located along the shore of Lake Michigan in the northeast part of Wisconsin, this TMDL covers sediment, TSS, and phosphorus impairments for the streams, rivers, and lakes in the aforementioned area but does not address the nearshore area of Lake Michigan or explicitly address beach impairments. However, it is expected that the TMDL will aid in addressing nutrient related impairments associated with the



Silver Creek with snowy banks in Manitowoc County

nearshore area or beaches. The TMDL development process was supported by the EPA contractor Cadmus that in collaboration with DNR developed a SWAT watershed model. Results of the watershed model were fed into an allocation database and draft allocations were released at the end of 2021. Currently, stakeholder comments regarding the allocations are being addressed, the edge of field agricultural targets are being developed to aid in implementation of the load allocation for agricultural sources, and the report documentation is being prepared. It is anticipated that the TMDL will be submitted to EPA for approval toward the end of 2022.

Fox Des-Plains TMDL

Des Plaines near Highway K crossing.

Located in Southeast Wisconsin, this TMDL will cover sediment, TSS, and phosphorus impairments in the aforementioned basins. River, stream, and lake impairments will be addressed. A multi-year monitoring and data collection effort for the TMDL development process is wrapping up and watershed modeling is slated to begin toward the end of 2022. Stakeholder groups are currently being assembled to provide input and allow for a robust stakeholder process throughout the development process. In addition, the WDNR has evaluated the potential impact of downstream TMDLs located in Illinois immediately south of the Wisconsin border. The Fox River flows into a series of lakes in Illinois that are both listed as impaired for phosphorus and have criteria lower than that of the Fox River and thus must be factored into the TMDL analysis. WDNR is targeting the end of 2024 as a completion date for the TMDL.

Lake Pepin TMDL

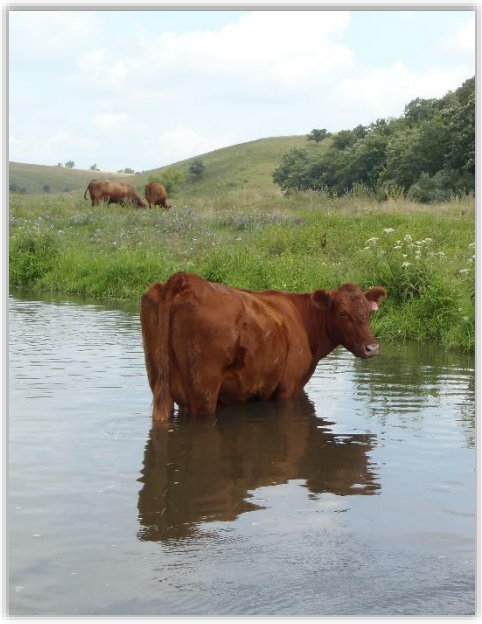
Lake Pepin at sunset.

Located along the Mississippi and above Lake Pepin, this TMDL will address sediment, TSS, and phosphorus reductions needed to meet water quality criteria and targets for Lake Pepin. Utilizing the TMDL for Lake Pepin, recently submitted by Minnesota Pollution Control Agency (MPCA) and approved by EPA, WDNR will incorporate the necessary wasteload allocations identified in the MPCA TMDL and refine the load allocations and reductions that are vaguely laid out in MPCA's TMDL to cover the Wisconsin portion of the Lake Pepin drainage basin. Currently, DNR is working with an EPA funded contractor to refine the load allocations, develop edge of field targets to aid agricultural implementation, and identify critical areas and fields that could be prioritized for nonpoint implementation. It is expected that this work will be completed in 2022 with the goal of submitting a TMDL to EPA in 2023.

Adaptive Management

The four new plans target a total phosphorus reduction of 23,155 lbs/year.

Adaptive management is a phosphorus compliance option that allows point and nonpoint sources (e.g. agricultural producers, storm water utilities, developers) to work together to improve water quality in those waters not meeting phosphorus water quality standards. This option recognizes that the excess phosphorus accumulating in our lakes and rivers comes from a variety of sources, and that reductions in both point and nonpoint sources are frequently needed to achieve water quality goals. By working in their watershed with landowners, municipalities, and counties to target sources of phosphorus runoff, point sources can minimize their overall investment while helping achieve compliance with water quality-based criteria and improve water quality.



Cow in a state river.

Throughout the 2020-2021 biennium, a number of WPDES permittees established adaptive management efforts in their local watersheds. WDNR approved four adaptive management plans, bringing the total number of permittees approved for adaptive management to 21 since the program's conception. The four new plans of the biennium target a total phosphorus reduction of 23,155 pounds/year to be achieved within four WPDES permit terms. In the permittees' first permit term, these four projects have committed to a minimum offset of 1,086 pounds/year of phosphorus, collectively. Each permittee will begin formally monitoring the receiving water to track implementation progress, which is reflected in monitoring requirements found in the WPDES permit. New partnerships between municipalities, agricultural producers, and environmental organizations have formed around adaptive management, as common restoration interests bring resources to the table to achieve common goals.

Water Quality Trading

A total of 21 plans were approved, curtailing 15,537 lbs/year of nonpoint source phosphorus loading.

Water Quality Trading (WQT) may be used by WPDES permit holders to demonstrate compliance with WQBELs. Generally, water quality trading involves a point source facing relatively high pollution reduction costs compensating another party to achieve a less costly pollution reduction with the same or greater water quality benefit. In other words, water quality trading provides point sources with the flexibility to acquire pollutant reductions from other sources in the watershed to offset their point source load so that they will comply with their own permit requirements. In Wisconsin, stringent phosphorus and TSS limits drive interest in WQT. Agricultural sources of phosphorus and TSS are prevalent in many Wisconsin watersheds. As such, the majority of trades involve nonpoint source pollutant reductions.

Statewide, WPDES permittees and their consultants are gaining experience in establishing relationships with credit generators, quantifying nonpoint source pollution offsets, and executing projects in tandem with permit deadlines. At the conclusion of 2021, over 60 permittees formally indicated that WQT will be used to comply with phosphorus limits. Of these, 46 permittees have submitted an approvable water quality trading plan to DNR. During the 2020-2021 biennium, 21 water quality trade plans were approved. These plans, with associated agreements and permit conditions, ensure that 15,537 pounds/year of nonpoint source phosphorus pollutant loading is curtailed. Pollutant reductions are subject to a trade ratio based on factors such as modeling certainty

and project location. After trade ratios, WPDES permittees will receive 9,209 pounds/year of total phosphorus credits that may be used to demonstrate compliance with WQBELs.

Nature Preserve by Katherine Murray, 2016

Projects designed to reduce nonpoint source pollution for WQT purposes provide several ancillary benefits. The most commonly employed WQT practice, conversation of fields from high-intensity agriculture to perennial prairie vegetation, may also provide atmospheric carbon sequestration, habitat for insects and wildlife, and improve hydrology. Pollutants other than the traded pollutant, such as nitrogen and chlorides, may also be kept from entering waterways. Projects occurring in years 2020 and 2021 restored hundreds of acres of perennial prairie vegetation and resulted in adoption of lower-impact agricultural practices (e.g. cover crops, no-till, or nutrient management) on 724 acres of farmland. In-stream habitat benefits also stem from WQT practices, particularly those that reduce sediment loading to waterways. Eleven WQT projects employed in-stream habitat restoration to further mitigate the effects of excess sediment in the system.

The provisions of all water quality trades are incorporated into the discharger's WPDES permit, with a monthly accounting process for the use of pollutant credits. All nonpoint source best management practices are inspected regularly and conform to a NRCS or DNR performance standard. Many wastewater dischargers throughout Wisconsin look to WQT for long-term compliance solutions. These nonpoint source pollution control efforts leverage new partners and funding to address runoff issues.

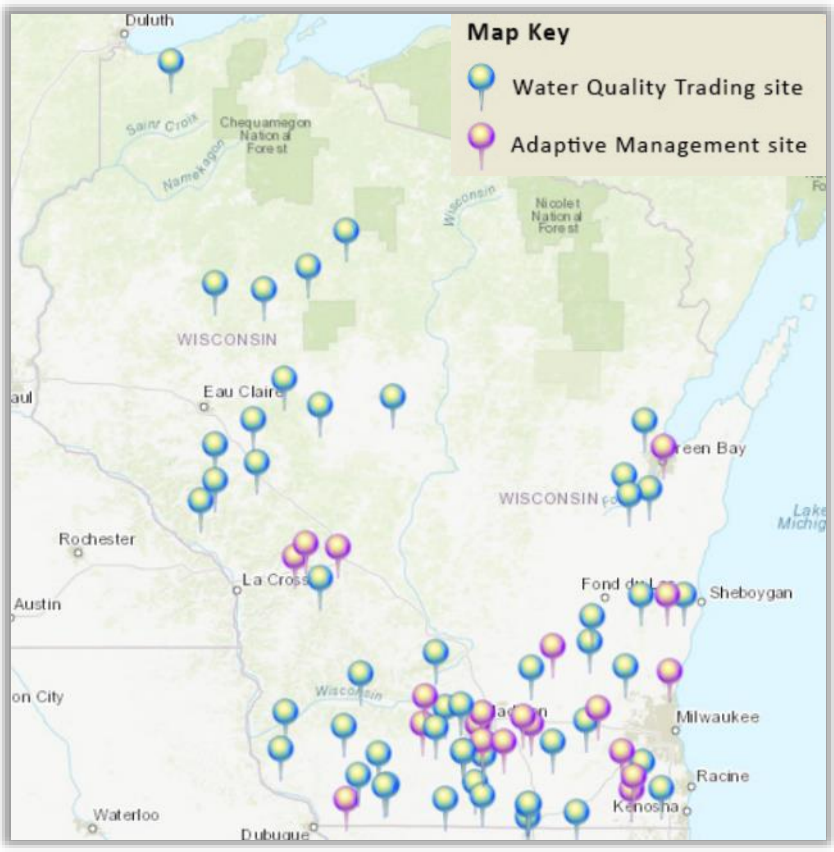


Figure 17. Locations of AMPs and WQT sites across the state.

Water Quality Management Planning & Targeted Watershed Assessments

A total of 25 Water Quality Plans were published by WDNR in 2020.

Wisconsin's water quality planning program continues the tradition of Clean Water Act plans from the early 1970s that identified priorities for federal funding under the State Revolving Grant Program. Today's Water Quality Plans (WQ Plans) are closely integrated with Targeted Watershed Assessment (TWA) monitoring projects. WQ Plans serve as the summarization of conditions within the project areas and incorporate analyses of monitoring results, stressor variables, water resource conditions, and management and monitoring recommendations. Condition decisions from comparing biological, physical, and chemical data compared to water quality assessment thresholds support CWA reporting summaries.

Sinisawa River upstream of Sinisawa Road. Streambank erosion on the left bank.

Targeted Watershed Assessment Projects are also tightly integrated with local and regional nine key element plans and river and lake grant programs. County conservation agencies and coalitions of local organizations and agencies work with the WDNR to identify areas with impaired waters. Areas with runoff grants fund best management practices are a high priority for WDNR monitoring of pre- and post- BMP installation to provide science-based "snapshots" of resource condition before and after restoration activities. WQ Plans conducted pre-implementation may recommend specific BMPS that would address conditions found on the landscape.

WQ Planning 2020

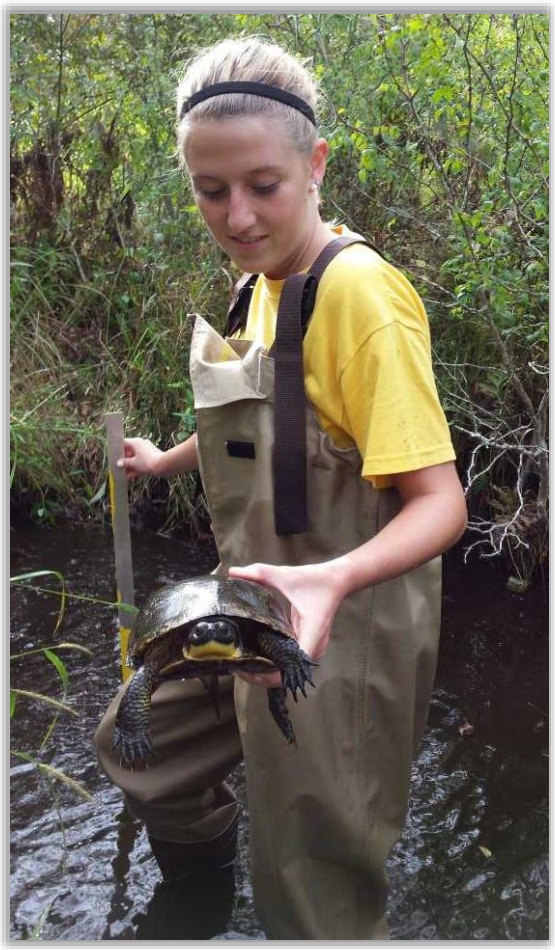
In the spring of 2020, DNR Water Quality staff published 25 Water Quality Plans from TWA studies, which included surveys of fish, habitat, water chemistry, and aquatic macroinvertebrate species to identify detailed water conditions (Table 12). DNR held a public comment period, finalized the plans, and requested and received certification of these amendments to the state's Areawide Water Quality Management Plan. These reports were posted on the WDNR's website and integrated into online pages for basins, watersheds, waterbodies and published documents so that the public may access the material.

Table 12. Targeted Watershed Plans (TWAs) published in 2020.

TWA WQ Plans and Monitoring	Watershed (Watershed Code)
Bear and Bluff Creek, Douglas County	St. Louis and Lower Nemadji River (LS01)
Bear Lake, Waupaca County	Lower Little Wolf River (WR06)
Beaver Creek, Dodge County	Beaver Dam River (UR03)
Black and Little Black River, Douglas County	Black and Upper Nemadji River (LS02)
East Twin River, Manitowoc and Kewaunee Counties	East Twin River Watershed (TK02)
Garners Creek, Outagamie County	Plum and Kankapot Creeks (LF03)
Koshkonong Creek Jefferson, Rock & Walworth	Upper Koshkonong Creek (LR12)
Lake Weyauwega, Waupaca County	Waupaca River (WR05)

TWA WQ Plans and Monitoring	Watershed (Watershed Code)
Legler School and Pioneer Valley, Green County	Little Sugar River (SP14)
Lower Little Wolf River Priority Watershed Water Quality Evaluation, Waupaca County	Waupaca River (WR05)
Pecatonica River, Lafayette and Green Counties	Middle Pecatonica River (SP08)
Pigeon River, Waupaca County	Pigeon River (WR10)
Pine River, Waushara County	Pine and Willow Rivers (WR02)
Pipe Creek, Fond du Lac County	Lake Winnebago - East (UF02)
Plum-Kankapot Creek, Brown County	Fox River - Appleton (LF04)
Pokegama River, Douglas County	St. Louis and Lower Nemadji River (LS01)
Sinsinawa River, Grant County	Galena River (GP01)
Soft Maple Hay Creek, Rusk County	Soft Maple and Hay Creeks (UC17)
South Fish Creek, Bayfield County	Fish Creek (LS08)
Upper East River, Brown County	East River (LF01)
Upper Fox Pebble, Waukesha County	Lower Fox River - Illinois (FX02)
West Branch Sugar River, Dane County	Allen Creek and Middle Sugar River (SP13)
Wood River, Barrett Creek, Crex Meadows, Burnett County	Wood River (SC11)
Waupaca Tomorrow River, Portage and Waupaca Counties	Waupaca River (WR05)
Yellowstone River, Lafayette County	Yellowstone River (SP04)

Waupaca River upstream of Harrington Road. David Bolha 2017



Blandings turtle on Geskey Creek in the Pigeon River watershed. David Bolha 2015

Great Lakes

In the WDNR Office of Great Waters (OGW) the Great Lakes team is responsible for implementing the Areas of Concern, Lakewide Action and Management Plans, and Beach programs. For a full review of the responsibilities and objectives for the Great Lakes see our Wisconsin's Great Lakes Strategy (PDF, 1.46 MB).

Trees on the Rocks, Norma Larrabee Gabriel 2017
Big Bay State Park, Lake Superior

Lakewide Action and Management Plans (LAMPs)

The development of Lakewide Action and Management Plans (LAMPs) is required under Annex 2 of the Great Lakes Water Quality Agreement Protocol of 2012, which is a commitment between the United States and Canada to restore and protect the waters of the Great Lakes. The LAMP provides the framework for prioritizing issues, defining lakewide objectives, and identifying actions for each of the five Great Lakes. The LAMP is comprehensive and Wisconsin's Great Lakes restoration and protection projects contribute to meeting LAMP goals for Lake Michigan and Lake Superior.

Wisconsin has made significant progress on LAMP goals thanks in part to resources available through GLRI. Through GLRI Focus Area 4 grant opportunities from EPA, the State of Wisconsin along with partners has secured over $5.5 million in grant funds since 2016 which is being used to protect or restore over 11,000 acres of coastal wetland and other critical habitat.

A recently completed project on Interstate Island in the St. Louis River between Duluth and Superior restored critical nesting habitat for Common Terns and stopover habitat for Piping Plovers—helping to increase populations of these rare birds in the St. Louis River Area of Concern. Photo by J.F. Brennan Company, Inc.

Lake Superior Management

Wisconsin is included in a partnership with the U.S. and Canada to share responsibility for Lake Superior management. DNR's Lake Superior Binational Program Coordinator contributed to the development of the 2016 Lake Superior LAMP (PDF, 5.01 MB). An updated Lake Superior LAMP is anticipated to be released in 2022.

The LAMP lays out a five-year binational strategy for taking action to

restore and protect the Lake Superior ecosystem. This plan supports the development and implementation of lake-specific strategies and initiatives including biodiversity, cooperative science and monitoring, and nutrient management strategies. For more information, also refer to the Lake Superior LAMP Annual Reports, which highlight accomplishments and progress in achieving LAMP goals during the past year.

Lake Michigan Management

The Lake Michigan LAMP is currently being developed and is anticipated to be released in 2022. Other current activities include assessing the state of the lake, measuring progress, and promoting action to address identified problems. For more details, see the Lake Michigan LAMP Annual Reports. They highlight accomplishments and progress in achieving LAMP goals during the past year and identify LAMP-related activities including outreach, monitoring, and protection and restoration actions.

Areas of Concern

Forty-three Areas of Concern (AOCs) were designated by the U.S. and Canada under the Great Lakes Water Quality Agreement in 1987. They are areas requiring special attention for cleanup and restoration due to contamination of sediments by toxic pollutants from past industrial practices or other pollution sources. In the Areas of Concern program, problems arising from toxic pollution are described as “beneficial use impairments” or BUIs.

Wisconsin had five AOCs at the time of designation: St. Louis River (shared with Minnesota), Lower Menominee River (shared with Michigan), Lower Green Bay and Fox River, Sheboygan River, and Milwaukee Estuary. Lower Menominee River was delisted in 2020 and now Wisconsin has four active AOCs. The DNR’s Office of the Great Waters provides leadership for cleaning up these areas by:

- Developing policies and procedures for removing BUIs and delisting AOCs.
- Establishing Beneficial Use Impairment (BUI) delisting targets; assessing the status of the AOCs relative to the targets (e.g., evaluate data); and identifying and implementing actions that will lead to achievement of the targets if they have not yet been met.
- Engaging technical experts and citizens via communication, education, outreach, and/or advisory committees to ensure the consideration of diverse stakeholder perspectives in AOC decision-making.
- Ensuring that partners (internal and external) who are involved in sediment clean up, habitat restoration, and water quality and ecosystems monitoring for the AOCs are coordinating as needed to ensure proper sequencing of activities and taking advantage of efficiencies (e.g., sharing data) where possible.

DNR has developed Remedial Action Plans for each of the active Wisconsin AOCs, and they are updated periodically. These plans describe the beneficial use impairments, the end goals for each impairment, the projects needed to achieve those goals, as well as current and future activities. Opportunities are provided for AOC stakeholders and partners to review drafts of the Remedial Action Plans and to provide feedback in the update process.

The OGW maintains webpages for each of the five AOCs containing background about each AOC, details on the status of beneficial use impairments, remedial action plans, community engagement, projects, maps, and resources. For detailed information about these AOCs, visit their webpages:

- Lower Green Bay and Fox River
- Lower Menominee River
- Milwaukee Estuary
- St. Louis River
- Sheboygan River

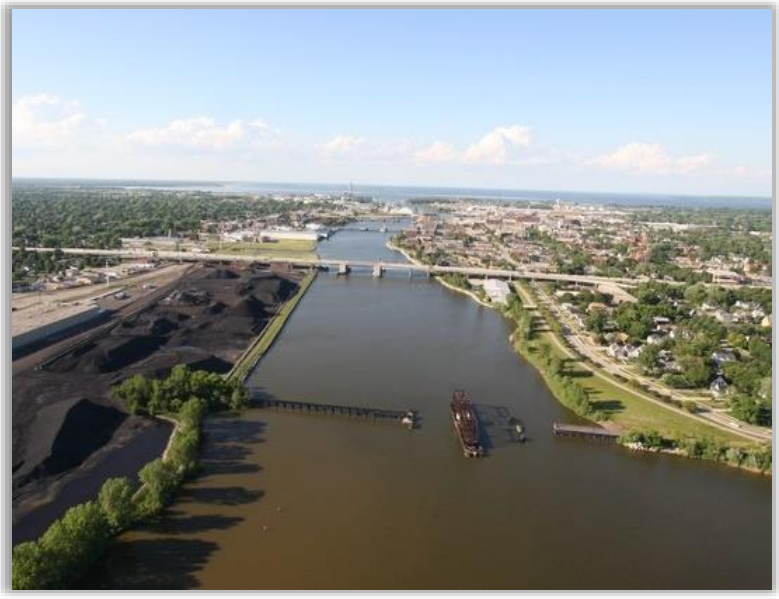
Notable accomplishments for the Great Lakes Areas of Concern in this reporting period include the following:

Lower Menominee River flowing into Lake Michigan. Photo by Brian Holbrook, Bird's Eye Aviation.

- Wisconsin and Michigan initiated the delisting process for the **Lower Menominee River Area of Concern** in 2019 and provided the U.S. Environmental Protection Agency's Great Lakes National Program Office with a final delisting report summarizing the cleanup and restoration actions. As part of the delisting process, Wisconsin and Michigan held a public comment period from March 9 - April 24, 2020 and hosted a public meeting on April 9, 2020. The EPA then took the final step with the U.S. and Canadian governments to officially remove the AOC designation, effective August 14, 2020.

- After 17 years, the **Lower Fox River PCB remediation project**, the largest PCB sediment cleanup in the world, was completed in Summer 2020. While this massive project spanned the entire 39-mile length of the Fox River, most of the remedial efforts occurred within the Lower Green Bay and Fox River AOC. A total of 6.5 million cubic yards of contaminated sediment was removed and safely disposed, and 275 acres of riverbed were covered with engineered caps to further protect the aquatic ecosystem from remnant PCBs. Sediment dewatering and processing resulted in approximately 10 billion gallons of treated water returned to the river. A long-term trend monitoring program will now be used to evaluate the degree and rate of the decline of PCBs in the water, sediment, and fish throughout the entire river.

The largest PCB sediment cleanup in the world! Summer 2020 the 17 year Lower Fox River PCB remediation project was completed; a total of 6.5 million cubic yards of contaminated sediment was removed.



Aerial view of the Lower Fox River flowing into the bay of Green Bay. Photo by Wisconsin Department of Transportation.

- The **Milwaukee Estuary AOC** is Wisconsin's most complex AOC to address; not only in the multitude of contaminant types and contaminant sources needing remediation, but as well as the technical restraints that this heavily urbanized AOC presents. Overall, nine discrete remediation projects will occur throughout 11 miles of river and the outer harbor, all designed in such a way to minimize

public and commercial disruption of this urban artery. In spring of 2021, the non-federal project sponsors—the WDNR, Milwaukee Metropolitan Sewerage District (MMSD), the City of Milwaukee, Milwaukee County Parks (MCP), and We Energies (WEC)— executed the *NFS Funding Contribution Agreement* that define contributions, roles, and responsibilities for the NFS portion of the project agreement (PA) signed in early 2020. As a result, this PA was amended to outline additional NFS contributions and include cost-matching

Aerial view of a portion of the Milwaukee Estuary AOC where remaining contaminated sediment was sampled in 2020. Photo by Sigma Group.

documentation. These financial commitments have paved the way for the full development and construction of a Dredged Material Management Facility (DMMF), the most critical component for a cost-effective sediment remedial strategy for the Milwaukee AOC. The DMMF is being designed by MMSD and will be a 42-acre area located adjacent to the existing Port of Milwaukee disposal facility in the southern part of the outer harbor. The new facility is specifically designed for the containment of contaminated dredge material and will be able to hold 1.9 million cubic yards of spoils. The proximity of this managed disposal facility to the river and harbor work zones will significantly reduce cleanup costs, and reduce truck traffic, transport accident risk, and carbon emissions.

Location of the new Dredged Material Management Facility in the Milwaukee Estuary Area of Concern. Photo credit: Milwaukee Metropolitan Sewerage District.

- For the **St. Louis River AOC**, the **Howards Bay** contaminated sediment cleanup began in late 2020 and was completed in summer of 2021. The project was conducted under a partnership between EPA, U.S. Amy Corps of Engineers (USACE), the City of Superior and Fraser Shipyards, and focused on the removal of sediment contaminated with lead, mercury, tributyl tin, and polycyclic aromatic hydrocarbons (PAH) throughout a 300-acre embayment located at the mouth of the St. Louis River. Howards Bay is home to the only U.S. shipyard on Lake Superior, and yard services remained active during remedial operations. Remediation was done in two phases; USACE contractors first conducted navigation dredging of the federal channel within the bay using Strategic Navigation funding authority, removing 34,000 cubic yards of sediment. Following the SND action, 85,000 cubic yards of more heavily contaminated material was dredged from the remainder of the bay. In-water work was conducted using a combination of both hydraulic and mechanical (environmental bucket) dredges, and a post-dredge cover of clean sand was placed over the bed to control any residual contamination and enhance habitat recovery. Disposal took place at local landfill facilities, with the City providing nearby facility space.

A total of 119,000 cubic yards of contaminated sediment was removed from Howards Bay.

Dredging at Howards Bay, in the St. Louis River AOC. Photo by Fraser Shipyards.

M/Vs Lee A. Tregurtha and Stewart J. Cort coming into Fraser Shipyards in Howards Bay, a hub for maritime commerce, historical sawmill and grain industries for more than a century. The only U.S. shipyard above the Soo Locks and largest grain elevator in the Duluth-Superior Harbor are located here. Photo by David Schauer.

- Also part of the **St. Louis River AOC,** The **Pickle Pond** restoration project continued to progress through final design in 2021, reaching 90% design specifications for both remedial actions and post-remediation habitat construction. Implementation of the project is expected in late 2022 once design is finalized and property transfer actions are complete.

- BUI removals that were completed in 2020 include the *Excessive loading of nutrients and sediments* (eutrophication) BUI for the St. Louis River AOC*;* the *tainting of fish and wildlife flavor* BUI in the Lower Green Bay and Fox River AOC; and the *Degradation of Benthos* BUI in the Sheboygan River AOC.

- BUI removals that were completed in 2021 include the *restrictions on dredging activities* BUI in the Lower Green Bay and Fox River AOC; the *degradation of phytoplankton and zooplankton populations* BUI in the Sheboygan River AOC; and, the *degradation of aesthetics* BUI in the Milwaukee Estuary AOC.

Beach Program

The Beach Program has funded monitoring at 106 coastal beaches.

The Beach Program oversees beach monitoring, manages Beaches Environmental Assessment and Coastal Health (BEACH) Act funds from the EPA, and collaborates with coastal communities to carry out beach monitoring and restoration projects. Beaches are a vital resource for Wisconsin tourism and bring economic vitality to the communities in which they are located. The Beach program works to ensure continued safe use of public beaches while contending with issues including aging sewerage infrastructures, agricultural impacts, fluctuating water levels, and increasingly limited budgets.

The Wisconsin Beach Health website lists up to date beach advisory and water quality data for monitored beaches and includes an interactive map. This web site shows beach advisories for Great Lakes Beaches as well as inland beaches. Funding from the US EPA under the federal BEACH Act supports beach water quality monitoring and issuing public health advisories on Great Lakes beaches. Funding for monitoring at State Parks beaches and select inland beaches comes from the Wisconsin DNR. For more details on monitoring and program updates see these web pages: https://dnr.wisconsin.gov/topic/Beaches.

Highlights of recent Beach Program activities include:

- Funded monitoring at 106 coastal beaches.
- Expanded partner monitoring and use of the website for an additional 14 inland beaches
- Created a new Wisconsin Beach health database and website as the previous website would no longer be supported by USGS. This work included creating a new database infrastructure and redesigning the website to improve functionality, improve the web mapper tool, increase efficiency in the data download tools, and improve visuals and information presented to the public.
- Developed a new user interface for uploading data

The beach at Barker's Island in the city of Superior now has cleaner water thanks to added native plants and improved access for people to enjoy the water through ecologically sound parking and beach upgrades. This project is part of the larger effort to restore the St. Louis River Area of Concern. To learn more watch: Restoring Barker's Island Beach in Superior. Photo by Wisconsin DNR.

into the new Wisconsin Beach Health database and improved connectivity and automatic upload of beach data from the LDES system into the Wisconsin Beach Health system.

- Developed new user manuals, training video, and FAQ documentation for the Wisconsin Beach health system.
- Worked with DNR staff on reprioritizing inland beach monitoring and funding allocation
- Worked with the AOC program to complete a monitoring and management action list development project for all beaches in the Milwaukee Estuary Area of Concern
- 2019 and 2020 beach annual reports were submitted to EPA and released on the WDNR beach website.

Polar Dip, Joseph Eichers 2021
Port Washington, Lake Michigan

Monitoring

Data is needed to inform decision making for Great Lakes policy development and program implementation. The Office of Great Waters works closely with many other agency programs in areas of special concern to the Great Lakes including aquatic invasive species, fisheries management, and nutrient loading. OGW helps to oversee projects in support of Great Lakes management.

National Coastal Condition Assessment monitoring on Lake Superior was completed in 2021.

Highlights of Great Lakes Monitoring accomplishments for this reporting period include:

- Monitored approximately 55 miles of Lake Superior nearshore biweekly to describe water quality conditions and investigate drivers of harmful algal blooms on the Lake in collaboration with multiple partners working on the Cooperative Science and Monitoring Initiative project on Lake Superior.
- Completed National Coastal Condition Assessment monitoring on Lake Superior in 2021. Monitoring was originally scheduled for 2020 but was delayed due to the COVID-19 pandemic.
- WDNR assisted EPA-ORD in the investigation of fish and sediment PCBs concentration at potential PCBs bioaccumulation hotspots based on the St. Louis River AOC biota-sediment accumulation factor (BSAF) model with the collection of 35 sediment samples.

- In 2020, the AIS team performed 104 early detection surveys on lakes and streams within the Great Lakes basin. These locations were picked by identifying the riskiest pathway using a boater movement tool created by the WDNR.
- In 2021, coordinated and conducted aquatic invasive species early detection monitoring following statewide protocols on 8 lakes, 10 streams, multiple coastal wetlands, and 4 pathways throughout the Lake Superior Basin and 16 lakes and 5 streams in the Lake Michigan Basin.
- Response monitoring was conducted for spiny waterfleas, starry stonewort, hyacinth, European frogbit and non-native Phragmites in 2021.
- Led a statewide zebra mussel moss ball response.
- Assessed impairments in the Lake Michigan Areas of Concern by evaluating ambient water in Milwaukee, sediment toxicity in Green Bay, beach water quality in Milwaukee, collecting fish and wildlife consumption advisory data in multiple AOCs, collecting data on white sucker fish tumor incidence in Sheboygan and Green Bay, assessing fish and wildlife populations and habitat conditions in Milwaukee, collecting information on cyanobacteria harmful algal blooms and water quality in Green Bay, and assessing benthic communities in Green Bay.
- WDNR worked with UW-Green Bay to evaluate benthic communities at a total of 258 stations in the Bay of Green Bay and Fox River; measured DO conditions at 10 locations in Green Bay; and map benthic habitat in the Fox River and Green Bay to assess benthic community impairments in the Lower Fox River-Green Bay AOC.

Zebra mussel on a decorative moss ball. U.S. Geological Survey.

Collaboration on Great Lakes Policies and Priorities

The updated Great Lakes Water Quality Agreement is nearing its 10th anniversary.

DNR provides leadership for addressing important Great Lakes issues. Wisconsin and its partners integrate and implement priorities of the LAMP, Great Lakes Regional Collaboration, internal program priorities, and the priorities of internal and external Wisconsin Great Lakes partners. Wisconsin brings its voice to regional Great Lakes discussions by participating in Great Lakes Water Quality Agreement subcommittees as assigned and ensuring participation and engagement in regional activities related to the International Joint Commission, Great Lakes Commission, Council of Great Lakes Governors, the Great Lakes Protection Fund, and other Great Lakes forums to ensure Wisconsin's perspective is considered in regional policy-making.

Former EPA Administrator Lisa Jackson and Canadian Environment Minister Peter Kent sign the updated Great Lakes Water Quality Agreement. Sept. 7, 2012. Epa.gov.

The DNR Office of Great Waters also manages Wisconsin's allocation of the Great Lakes Protection Fund, the Great Lakes Harbors and Bays funds, EPA grants for the Great Lakes, and other Great Lakes funds.

Mississippi River

In the WDNR Office of Great Waters (OGW) the Mississippi River team is responsible for developing Upper Mississippi River policy, coordinating grant funds, monitoring, and research.

Harmful Algal Bloom/Cyanobacteria Research and Monitoring

Harmful algal blooms dominated by cyanobacteria, also called “bluegreen algae”, are occurring in large river ecosystems and at the mouth of large rivers with increasing frequency. The Mississippi River can exhibit severe blooms of cyanobacteria that can produce toxins (microcystin and anatoxin-a) dangerous to people and pets. These blooms can also cause decreased water clarity, oxygen depletion, and fish kills. Ongoing research is contributing to our understanding of when and where these blooms are occurring and what actions can be taken to reduce the severity of these blooms.

Harmful algal bloom at the Trempealeau National Wildlife Refuge on the Mississippi River.

In research published in River Research and Applications, we captured two of the most extreme high and low discharge years within the last 20 years on the Upper Mississippi River, allowing a natural experiment to evaluate how environmental variation drives harmful algal bloom development. We developed models describing significant environmental drivers for harmful algal blooms and derived water quality targets that would reduce the prevalence and intensity of these blooms. Our analyses indicated that toxin-producing cyanobacteria dominate during conditions with high phosphorus concentration, low nitrogen concentration, low nitrogen to phosphorus ratio, low turbulence, low flushing, adequate light and warm water temperature. Dominance by toxin-producing cyanobacteria rarely occurs due to a single factor, but rather, a combination of these factors co-occurring to trigger harmful algal bloom proliferation in the Mississippi River.

This research elucidates potential corrective actions and identifies water quality and habitat restoration measures that can be implemented to reduce harmful algal blooms. For example, isolated backwaters with high phosphorus, low nitrogen, warm water temperature, and low flushing rate are more susceptible to cyanobacterial dominance. Addressing legacy phosphorus and optimizing water inflows to these areas could improve water quality conditions and restore ecological function in these Upper Mississippi River habitats. Habitat projects in conjunction with surface water nutrient reductions will be required to address these blooms on the Mississippi River to achieve protection of recreation and ecosystem health.

Freshwater Salinization Research and Monitoring

Chloride in Wisconsin surface waters continues to increase on an annual basis.

The salinization of freshwater has become a major ecological problem in recent decades due to human activities that add salts to the environment. Natural background levels of chloride are driven by the weathering of rock and are typically very low in unimpacted freshwaters. Chloride budgets developed for states in the northern United States typically list de-icing salt as the most significant source of chloride, followed by potassium chloride fertilizer use and water softening equipment. Urban environments have been linked to increased chloride concentration due to the increase in impervious surfaces in urban settings and the use of deicing salts on those surfaces.

Pedestrians and cars on snowy roads.

Freshwater organisms can differ widely in the level of salinity they can tolerate. Many species of fish, invertebrates, plants and amphibians are highly sensitive to elevated chloride concentration. Elevated chloride concentrations can lead to an overall reduction of ecological integrity and biodiversity in aquatic ecosystems. Currently, thousands of North American rivers and lakes are at significant risk for salinization over the long term.

The pace of freshwater salinization has resulted in increased attention toward chloride in recent years. The term “freshwater salinization syndrome” has become popular in scientific literature and is used to describe a suite of symptoms that range from ecosystem degradation to infrastructure corrosion. Chloride is also of concern for drinking water systems. Corrosion related to elevated chloride can result in corrosion of lead and copper drinking water lines creating contaminated drinking water. Excessive use of salt has been linked to groundwater contamination. Other work has pointed to the inadequacy of current regulations to protect freshwater ecosystems from salinization and its negative consequences.

Road salt pile.

Chloride in Wisconsin surface waters continues to increase on an annual basis. All 43 of the Wisconsin Department of Natural Resources Long Term Trend Rivers water quality sites are indicating increasing chloride concentrations. Most sites are indicating 1-4% annual increase in chloride, with some sites increasing > 10% annually. This trend is consistent with trends in the northern United States that have indicated a doubling of chloride concentration in recent decades. Chloride accounts for 3% of impaired water pollutant listings in Wisconsin. More than half of these listings were added in the 2016 and 2018 reporting cycle and are in the Milwaukee Area. It is becoming clear that the current pattern of salt usage is unsustainable, and it will be prudent for communities across Wisconsin to act before impaired waters listings expand.

In 2020-2021 twenty sites representing a wide range of urban development were sampled in one of the most populated counties within the Mississippi River Basin in Wisconsin (La Crosse County). Results of this study revealed a wide range of concentrations throughout the county with numerous exceedances of WI and EPA chronic and acute toxicity criteria. Of the 120 total samples from six sampling events:

- 10.83% exceeded EPA chronic toxicity criteria (> 230 mg/L Cl)
- 7.5% exceeded Wisconsin chronic toxicity criteria (> 395 mg/L Cl)
- 3.33% exceeded Wisconsin acute toxicity criteria (> 757 mg/L Cl)
- 3.33% exceeded EPA acute toxicity criteria (> 860 mg/L Cl)

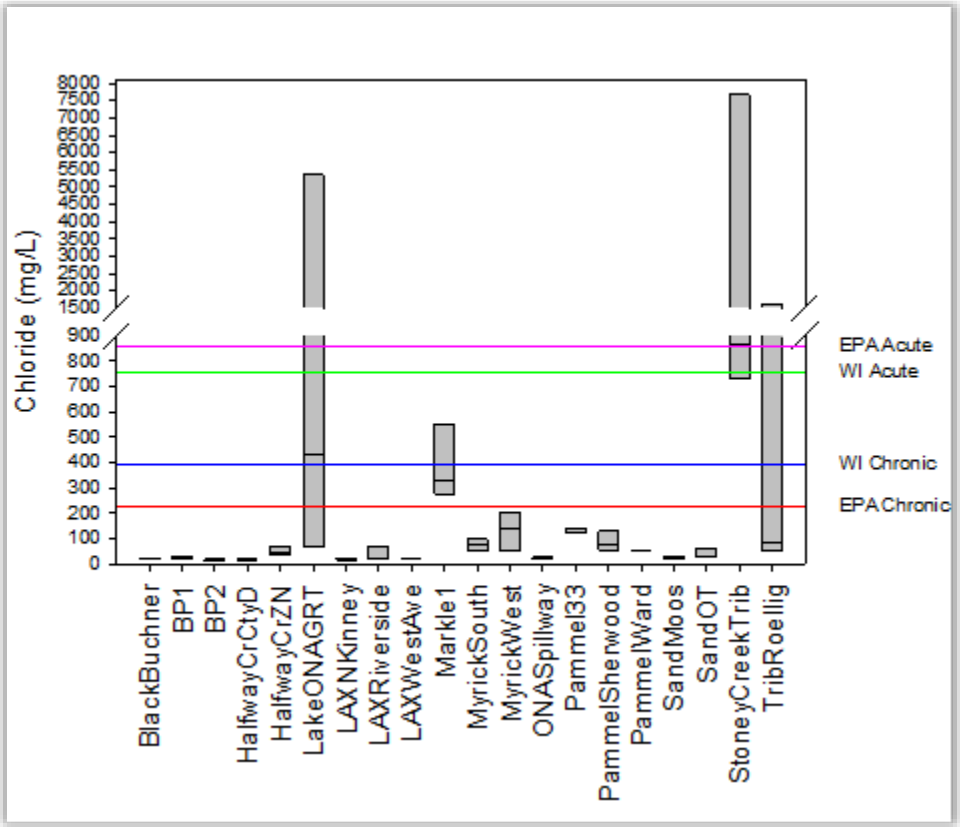


Figure 18. Winter La Crosse County chloride data from 2021-2022. Boxplots represent the 25th, 50th and 75th percentiles. Colored lines represent the Wisconsin (395 and 757 mg/l) and EPA (230 and 860 mg/L) chronic and acute toxicity values.

This study highlights the degree to which La Crosse County is on an unsustainable path regarding salt use. Many sites routinely exceed toxicity guidance promulgated by Wisconsin and EPA. This is notable when considering that La Crosse County is only a partially urban county, with the mid-sized city of La Crosse (pop. 52,000) as its main population center. It is also important to note that many of the watersheds from this study are tied into regional wastewater plants, so a sizeable fraction of human salt additions via water softening equipment aren't fully captured in these results. Actions will need to be taken to reduce chloride concentration statewide and within waters of the county to prevent future Wisconsin Impaired Waters listings. The WDNR Chloride Workgroup ranked actions that would reduce salinization in the following order:

1. Make the switch away from the use of rock salt as a deicer and move toward the increased use of liquid brine deicing systems that use less salt.
2. Ensure proper calibration of salt application equipment.
3. Implement a salt training program for commercial applicators on the benefits of reducing salt use. Offer legal liability protection in exchange for completion of this training.
4. Increase participation in salt training programs for county highway and public facilities managers (e.g. wisaltwise.com).
5. Ensure plowing instead of simply salting during minor snow events of less than two inches.

6. Ensure municipal and commercial salt stockpiles remain covered to prevent leaching during precipitation.
7. Upgrade water softening systems to more modern units that use less or no salt.
8. Educate the public and commercial salt applicators regarding the importance of reducing or eliminating salt as a deicer on parking lots, driveways and sidewalks.
9. Educate the public about the consequences of elevated chloride and sodium levels to aquatic resources and human health.
10. Ensure placement of plowed snow away from waterways.
11. Implement centralized water softening systems where possible.
12. Implement rebate program for upgrades to more efficient water softeners (e.g. Lake Geneva, WI).
13. Emphasize that prevention is the only viable option to reduce salt.

Mississippi River Climate Change: Status, Challenges and Adaptations

Climate change is causing significant degradation to the Mississippi River ecosystem. Over the past decade, the negative consequences of climate change to the health of the Mississippi River have become very evident. Destruction of island habitat, breaches of natural landforms, loss of floodplain forest, changes in water exchange rates between the main channel and backwater lakes, loss of water depth in backwater lakes and even mudslides have occurred in recent decades. While significant degradation to the ecosystem has occurred, floodplain rivers are capable of healing themselves if adaptive measures are implemented to restore the ecosystem.

Natural landform breach through a Mississippi River island as a result of increasing river discharge and stage that has occurred over recent decades.

One of the most obvious climate change trends is increasing river discharge and river stage. The Mississippi River has a reliable long-term record of discharge. Mean annual discharge never exceeded 45,000 cubic feet per second (CFS) from 1929 to 1980 at the Winona, MN gauge (Pool 6 of the Mississippi River). Conversely, the river exceeded the 45,000 CFS mark 11 times since 1980, with 6 of those years occurring since 2011. This sizable change is upsetting the balance of the ecosystem. In an open, unregulated river, habitats and channels would respond to increasing flows by adjusting banks, channels, bedforms and floodplain features to adapt to a new energy regime. This channel evolution process harnesses physical processes to reform the river system to achieve a physical balance. Due to the impoundment caused by navigation dams and the floodplain constriction caused by levees, railroads and roadbeds, the managed Upper Mississippi River System (UMRS) cannot reform these habitats entirely unassisted.

The loss of floodplain forest is a symptom of climate change. Extended periods of high river stage result in forest loss.

Mudslide to Mississippi River and consequent property loss. Fifteen inches of rainfall over a 24-hour period triggered the slide.

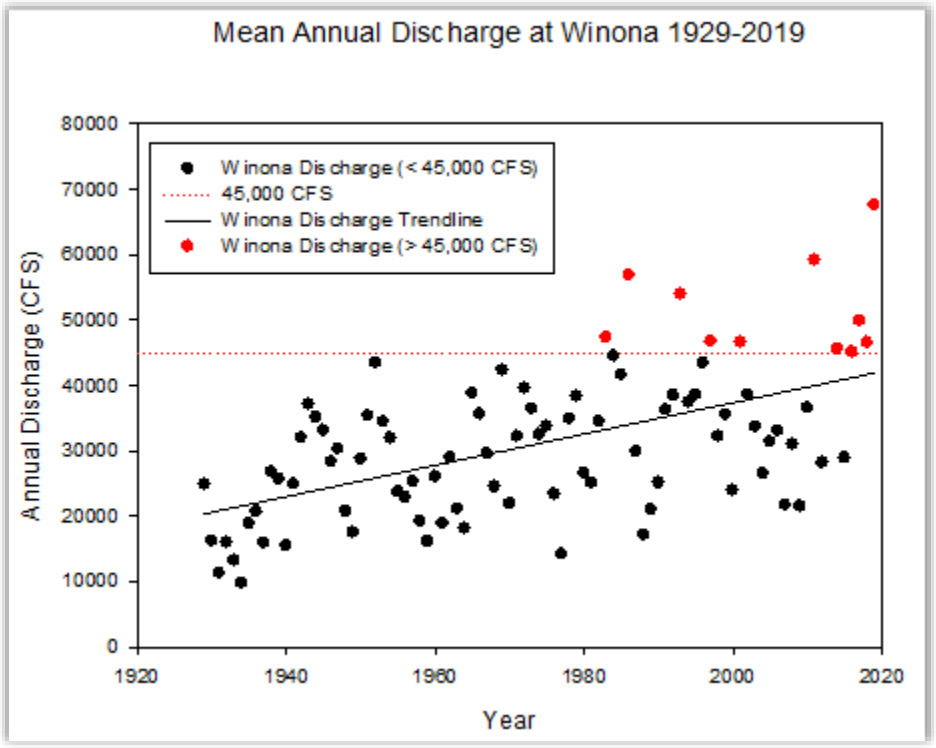


Figure 19. Mean annual discharge at Winona, MN 1929-2019. United States Geological Survey stream gauge data. CFS = cubic feet per second.

Climate change infrastructure adaptation example. Photo on left shows pre-project uncontrolled culverts. Photo on right shows post-project water control via stoplogs up to river elevation of 632 feet. At water surface elevation greater than 632 feet, water is uncontrolled. This adaptation was effective in controlling the high volume of cold water during high discharge winters that was negatively impacting winter fish habitat in this backwater of the Mississippi.

While the challenges related to climate change are substantial, it is encouraging to note that applied science approaches to adapt to a changing climate are being implemented on the Mississippi River with success. Floodplain rivers like the Mississippi have tremendous capacity to heal themselves if adaptive measures can be employed to restore realistic ecosystem conditions that preceded the recent era of degradation. Adaptation to these changing conditions requires optimizing connections between channels and backwater habitat, creating deep water refugia in backwaters, planning for increased navigation channel dredging, and making strategic infrastructure retrofits. Many successful adaptations have been implemented on the Mississippi River, but more are needed to keep pace with the rate of ecosystem degradation resulting from climate change.

Volunteer-led effort to adapt to climate change using a brush bundling technique to limit excessive flow into critical fisheries overwintering habitat in Lake Onalaska.

Aquatic Vegetation Research and Monitoring

Aquatic vegetation plays a fundamental role in large floodplain river ecosystems as it provides critical food and habitat for a diverse assemblage of fish and wildlife. Due to its importance, there is a long-standing interest in restoring aquatic vegetation in areas where it has declined or disappeared. To better understand what constrains vegetation distribution in large river ecosystems and inform ongoing efforts to restore submersed aquatic vegetation (SAV), recent research delineated areas in ~1200 river km of the UMRS where the combined effects of water clarity, water level fluctuation, and bathymetry appeared suitable for establishment and persistence of

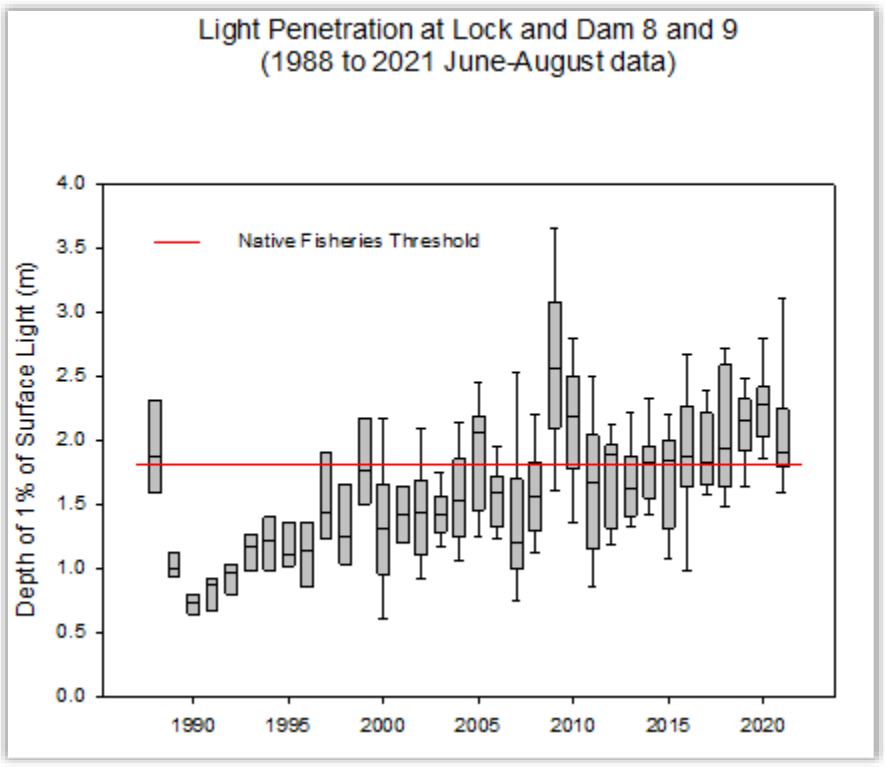


Figure 20. Water clarity on the Mississippi River is improving over time as measured by the depth of 1 % of surface light at Lock and Dams 8 and 9 on the Mississippi River. The red line indicates an observed threshold for native and recreational fish biomass on the Mississippi River (Giblin 2017).

SAV based on a 22-year dataset for total suspended solids (TSS), water surface elevation, and aquatic vegetation distribution. We found a large increase in suitable area downstream from Lake Pepin, due to the sediment trapping efficiency of the Lake. These results improve our understanding of the structure and function of large river systems by illustrating how water clarity, fluctuations in water level, and river geomorphology interact to create suitable habitat suitability for fish and wildlife species and will help to distinguish locations most likely to benefit from management and restoration efforts.

Evaluating aquatic vegetation along the Mississippi River.

Long Term Resource Monitoring and Habitat Restoration

The U.S. Army Corps of Engineers' Upper Mississippi River Restoration (UMRR) Program - Long Term Resource Monitoring (LTRM) element is implemented by the U.S. Geological Survey, Upper Midwest Environment Sciences Center (UMESC), in cooperation with the five Upper Mississippi River System (UMRS) states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The U.S. Army Corps of Engineers (Corps) provides guidance and has overall Program responsibility. The UMRR-LTRM program has been collecting data since 1988 and assesses water quality, vegetation, fisheries, land-cover/land-use and other resource information to determine the trends and ecological health of the UMR. The program utilizes stratified random sampling carried out within select trend pools of the UMR, and for water quality it also samples a network of fixed sites along the mainstem and tributaries. WDNR's LTRM field station at La Crosse, WI, carries out this monitoring on navigation Pool 8 and tributaries to pools 7 – 9 of the Mississippi River.

Small child playing with a mussel shell and sand along the Mississippi River. By Shawn Giblin.

The Wisconsin DNR's LTRM 2020 Status Report provides a comprehensive summary of discharge, water quality, fisheries and vegetation monitoring data collected by the WDNR LTRMP field station for the years 1993 to 2020. The level of sampling effort and rigor in

this program are unique to the Upper Mississippi River and allow for deeper examination of environmental drivers, a high degree of confidence in deriving trends and an overall knowledge of ecological interactions.

This UMRR program provides a balanced combination of habitat restoration, monitoring and research. The habitat restoration activities of the UMRR have improved critical fish and wildlife habitat on over 106,000 acres through 56 projects since 1986. These projects improve water quality and provide protection, nesting, and feeding areas for a highly diverse set of fish, birds, mussels, reptiles, amphibians and mammals, including many rare and endangered species.

UMRR is a national leader and pioneer in large-river restoration, emulating natural processes and restoring mosaics of wetlands, channels, and forests. UMRR's restoration techniques are tested and proven to address the most significant stressors to the ecosystem by:

- Protecting riverine wetlands and lakes from fluctuating water levels and high sedimentation.
- Recreating islands to provide refuge, food and improved water quality for many species of fish and wildlife.
- Restoring the natural mosaic of water velocities and depths to improve fish and wildlife habitat.
- Restoring forest health and diversity, resulting in habitat for a variety of wildlife.

Large River Biological Monitoring

In 2016, the WDNR implemented a nonwadeable Rivers Monitoring Program to track long-term changes in biotic indices at selected reference sites across Wisconsin's large warmwater rivers. Large rivers were defined as having at least 1.9 miles of contiguous river channel too deep to be sampled effectively by wading. This generally coincides with 5th order stream size or greater (Figure 21). By this definition, Wisconsin has at least 46 large rivers with a combined length of over 2,500 miles. Large rivers are highly dynamic in nature and generally have complex heterogeneous habitat leading to high biodiversity in undisturbed reaches. As water quality and habitat begin to degrade due to anthropogenic disturbance, changes begin to occur in the fish and macroinvertebrate communities. Riverine specialist species and intolerant species begin to disappear while habitat generalist and tolerant species increase in abundance. The WDNR has been monitoring for various physical and chemical stressors on large rivers dating back to the 1970's and 1980's as part of the LTT monitoring program to assess

Figure 21. Large rivers across the state.

Mussels on the Chippewa River.

in the fish community that may be related to stressors on the riverine biological community.

Macroinvertebrates are a vital part of the aquatic food chain. Macroinvertebrates have been widely used to assess stream health in wadeable waters and recently, indices have been developed for use on nonwadeable waters of Wisconsin (Weigel and Dimick 2011). There are several aspects that make using macroinvertebrates a good choice to assess ecological conditions of rivers which include: limited migration patterns, sensitive to human impacts, easy to sample and identify, have a broad range of habitat requirements and are sensitive to pollutants with a range of tolerance values. Macroinvertebrate communities may respond differently than fish communities under different stressors, providing an additional component to evaluate river health.

water quality. More recently, Indices of Biotic Integrity (IBI's) for fish and macroinvertebrates have been used to assess the health of riverine systems in addition to chemical parameters. The WDNR began a rotational basin approach to sampling large rivers statewide on a five-year cycle beginning in 2017. Two major river basins that correspond approximately to the HUC 6 level were intensively monitored each year for fish, macroinvertebrates, and mussels.

Multi-metric IBIs have been used to assess the status of rivers relative to their impacts via their fish communities (Karr 1981, Fausch et al. 1990, Karr and Chu 1997) and have been modified and calibrated for Wisconsin's large rivers (Lyons et al. 2001). Regional modifications to the IBI help to strengthen the original IBI concept based on regional difference in the fish communities and geography (Miller et al. 1988). IBI's provide a quantitative bioassessment of the biotic community by which to gauge riverine health and compare across rivers of similar size. The overall goals of fish surveys were to determine the status of the existing riverine fish community and evaluate if there were any changes

Catching fish on the Mississippi River. By Shawn Giblin.

Fish

Nonwadeable fisheries data were collected in accordance with IBI sampling protocols established and calibrated for Wisconsin's large warmwater rivers by Lyons et al. (2001). Large river IBI scores were calculated for each site according to Lyons et al. (2001) with corrections for geographic location and naturally low sucker species diversity. IBI scores and biological ratings could range from 0 (very poor) to 100 (excellent) in 20-point increments.

From 2016 to 2021 Bureau of Water Quality fish monitoring efforts completed 519 nonwadeable fish community surveys capturing 80,513 individual fish representing 109 fish species weighing a total of 71,225 lbs. The number of species captured per site ranged from 1 to 33 species with a mean of 16.4 species. The number of individuals captures per survey ranged from 1 to 4,653 fish with a mean of 155 fish. Fish community

Catching fish on the Mississippi River. By Shawn Giblin.

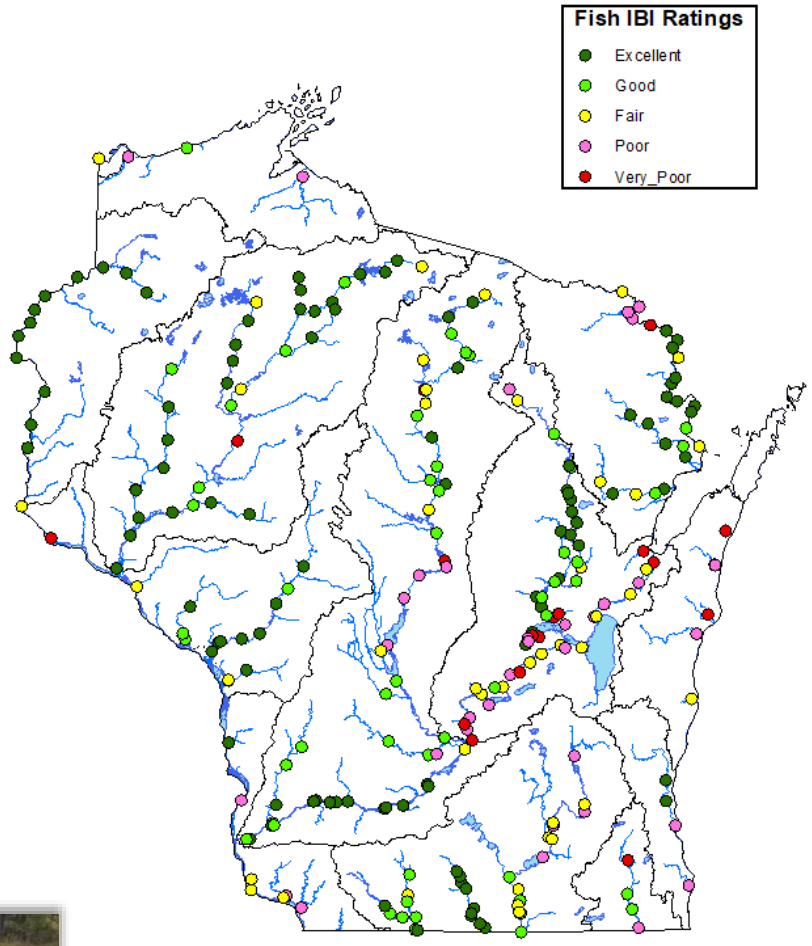


Figure 22. Large river fish sampling sites.

IBI scores ranged from 0 (very poor) to 100 (excellent) with a mean of 74.8. IBI scores were lower in central and south eastern regions compared to northern and western regions of the state (Figure 22). The median IBI score was 85.1 with 18 surveys rated as very poor (3%), 46 poor (9%), 61 fair (12%), 92 good (18%) and 302 excellent (58%). Sites with the least amount of human impacts had higher scores than sites with non-point, hydropower, or multiple impacts. Based on fish community surveys, 24 percent of sites were not meeting their biological potential rating fair, poor or very poor. Areas of concern include the Fox, Grant, Il. Fox, Rock, middle Wisconsin, upper Menominee rivers, and Lake Michigan tributaries.

Fish sampling collected 10 listed species; three state endangered species (goldeye, gravel chub and crystal darter), five threatened species (shoal chub, blue sucker, black buffalo, river redhorse and gilt darter), one species of concern (lake sturgeon) and 30 species considered intolerant of environmental degradation. The

number of intolerant species captured per survey ranged from 0 to 8 species, averaging 3.2 species. No intolerant species were captured at 17 different sites.

Macroinvertebrates

Nonwadeable macroinvertebrate data were collected in accordance with mIBI sampling protocols established and calibrated for Wisconsin's large warmwater rivers by (Weigel and Dimick 2011) utilizing Hester-Dendy artificial substrate samplers. A total of 69 mIBI samples were collected and processed from 2016 to 2020. Scores ranged from 0 to 95 and averaged 48.2. The median mIBI score was 55 with 17 surveys rated as very poor (25%), 9 poor (13%), 11 fair (16%), 20 good (29%) and 12 excellent (17%). Based on macroinvertebrate community surveys, 54 percent of sites were not meeting their biological potential rating fair, poor or very poor. Macroinvertebrate IBI ratings strongly coincided with fish IBI ratings within the same river reaches indicating that both fish and macroinvertebrate communities were responding in a similar manner to water quality and habitat present within the reach (Figure 23).

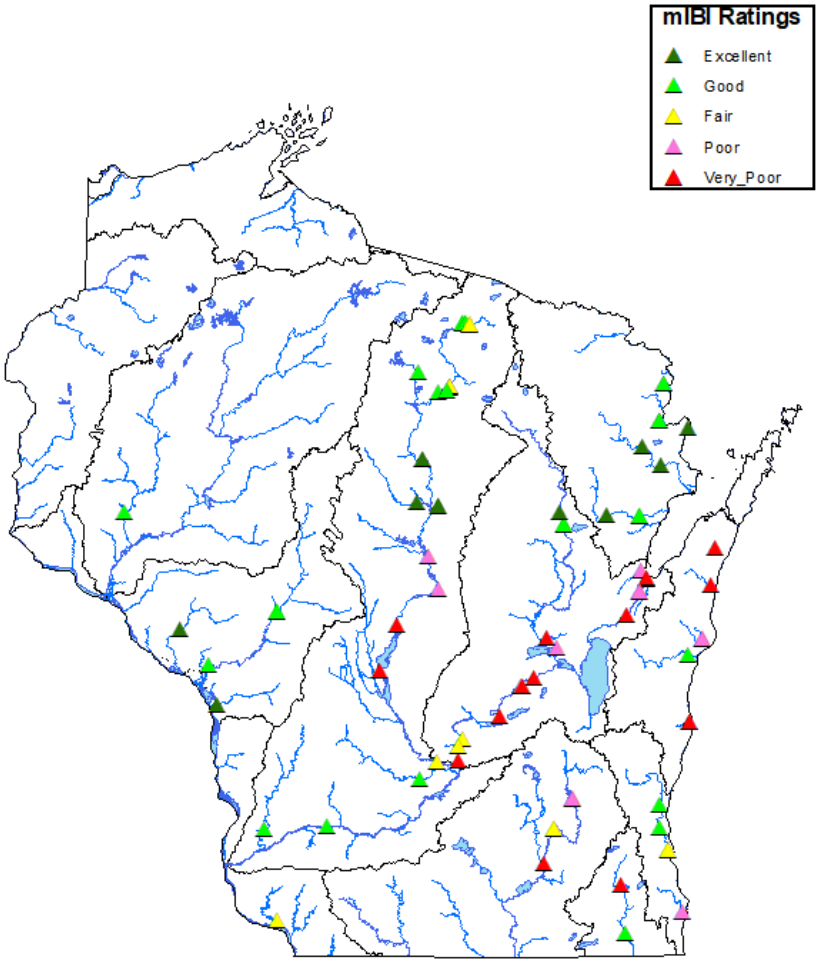


Figure 23. Macroinvertebrate sampling sites across the state.

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Weigel, B. M. and J. J. Dimick. 2011. Development, validation, and application of a macroinvertebrate-based Index of Biotic Integrity for nonwadeable rivers of Wisconsin. Journal of the North American Benthological Society 30(3):665-679. 2011.

Healthy Watersheds, High Quality Waters

To draw attention to the state's finest waterbodies, the WDNR launched a Healthy Watersheds, High-Quality Waters (HWHQW) initiative. A guiding principle of the HWHQW Kickoff Strategy is that watershed scale protection is essential for high-quality waters to thrive.

The goal of this initiative is to keep 100% of the priority healthy watersheds and high quality waters within them at or better than their current conditions through 2025. In spring 2021 the HWHQW Kickoff Strategy was published with the following objectives:

- Increase capacity to provide technical assistance to partners.
- Increase utilization of funding for protection.
- Leverage and adapt existing program tools to achieve results.
- Increase external awareness of protection priority areas and activities.

Working with the EPA, other WDNR programs and partners, the team identified key attributes of healthy watersheds and high-quality waters and used the EPA's Preliminary Healthy Watershed Assessment (PHWA) and Recovery Potential Screening (RPS) tools (epa.gov/rps) to model healthy watersheds.

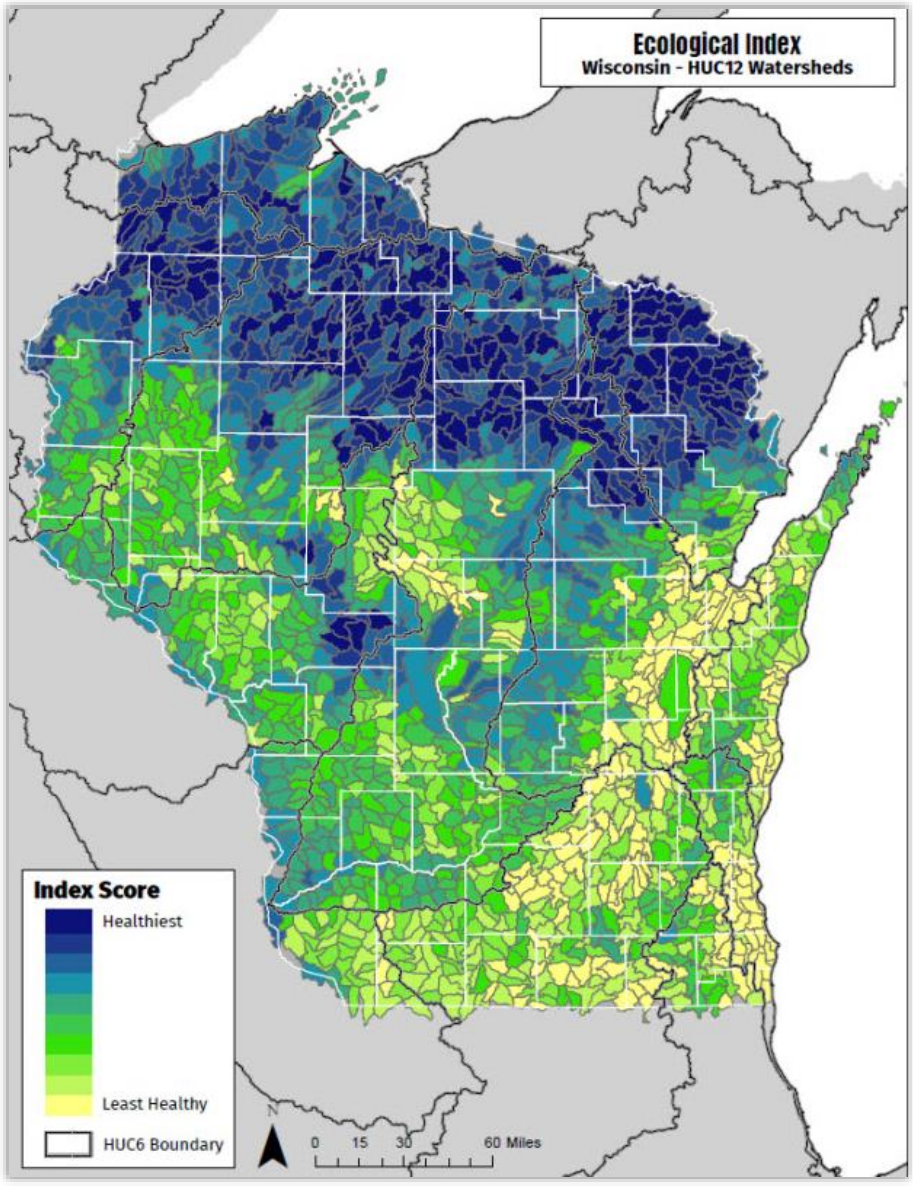


Figure 24. Results of a Wisconsin modified US EPA Preliminary Healthy Watersheds Assessment- Watershed Health Index (PHWA-WHI) reflecting watershed Ecological Health. Individual HUC12 results reflect ranking vs. all other HUC12s statewide. County boundaries are outlined in white. (From Technical Report)

The success of the initiative depends on meaningful partnerships. Shortly after the strategy release the Healthy Waters Team engaged key partners in refining the HWHQW Kickoff Strategy and helping to define what successful implementation will require in a forthcoming action plan. Eight virtual discussion groups with a total of 164 participants representing 93 organizations tackled a variety of questions. The Partner Discussion Group Summary consolidates the key themes and actions participants shared (Participant List). Cross-program and partner enthusiasm to balance historical restoration efforts with the HWHQW protection initiative is high.

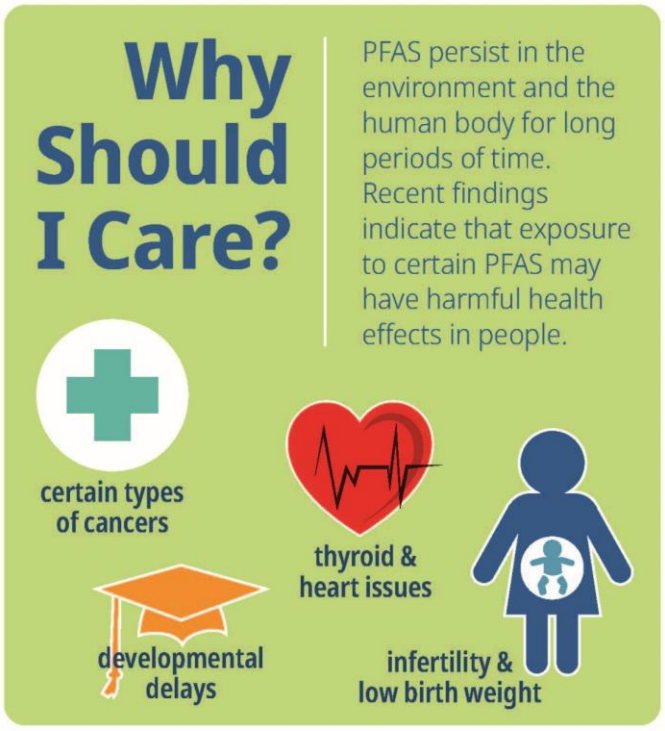
The final result was an action plan that can be found at: https://dnr.wisconsin.gov/topic/SurfaceWater/HQW.html.

Emerging Contaminants & Water Quality Criteria

The hidden dangers in firefighting foam, U.S. Fire Administration

Perfluoroalkyl and polyfluoroalkyl substances (PFAS)

PFAS are human-made, organic compounds that have been manufactured for use in non-stick coatings, waterproof fabrics, firefighting foams, food packaging and many other applications since the 1940s. PFAS are highly resistant to degradation and have been detected globally in water, sediment and wildlife. This global distribution is of concern as PFAS have documented toxicity to animals and because epidemiological studies have suggested probable links to several human health effects.



Monitoring

In 2020, DNR collected water samples from 44 Long-term Trend sites, which are located on major river systems and whose water quality are routinely sampled each year. These sites have been purposefully selected to capture different geographic regions and the watersheds in this monitoring network collectively cover approximately 80% of the state. The DNR also collected fish and water samples from 8 inland lakes in order to analyze patterns of PFAS accumulation.

In general, PFOS and PFOA were often non-detectable (37% and 19% of sites respectively), and when detectable PFOS concentrations were < 5.0 ng/L (1.4 ng/L average) for all sites and < 10 ng/L (2.2 ng/L average) for PFOA. Geographic areas that showed higher relative PFAS concentrations were the Wisconsin and Mississippi Rivers and the Southeastern part of the state, whereas the Northwestern rivers were relatively lower, or non-detectable (Figure 25).

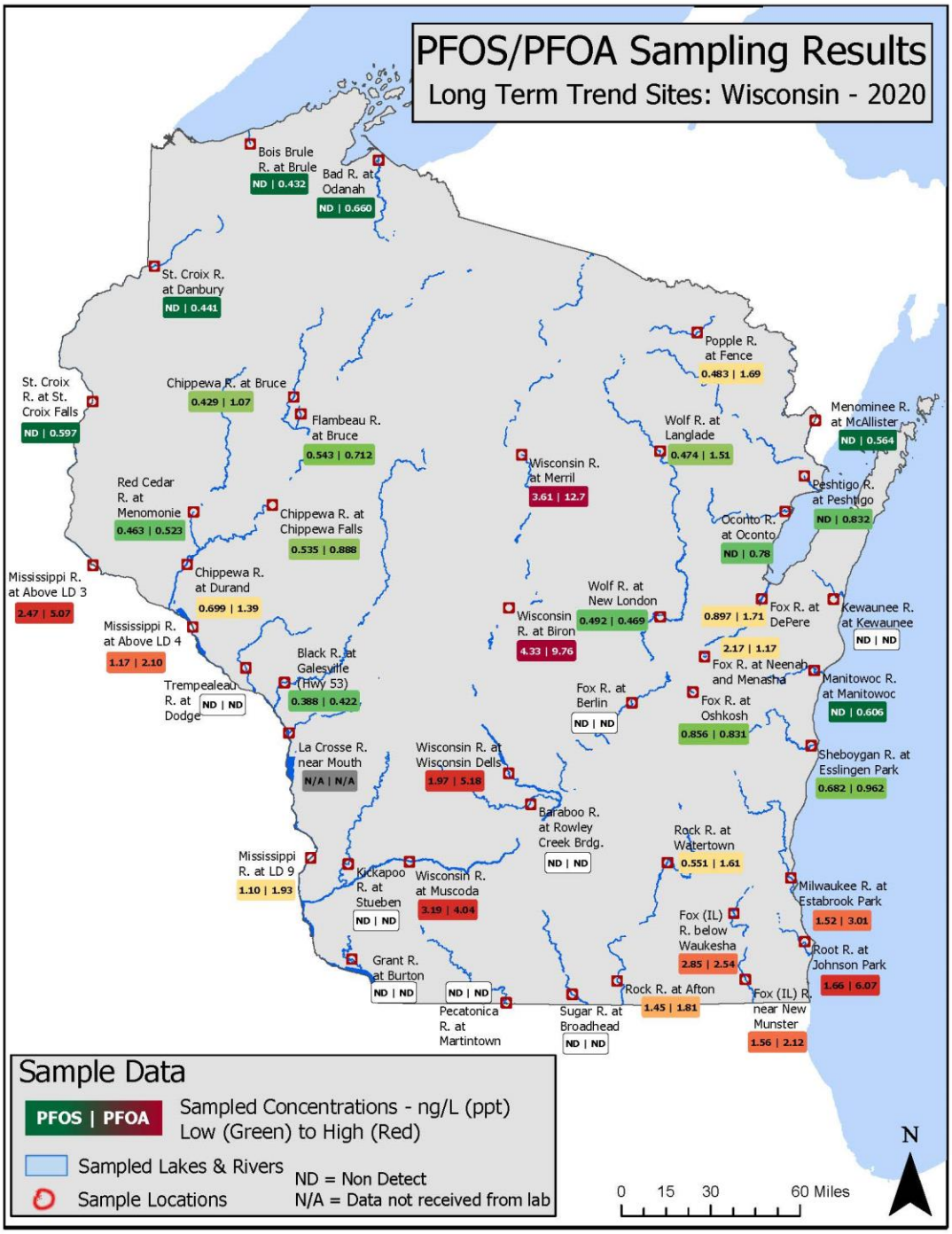


Figure 25. 2020 PFOS/PFOA sampling results at Long Term Trend monitoring sites across Wisconsin.

Fish Consumption Advisories

Based on results of fish tissue sampling in 2020, DNR and DHS issued PFAS-based fish consumption advisories for:

- Silver Creek in Monroe County on April 12, 2021. More details in the fish advisory fact sheet.
- Yahara Chain waters in Dane and Rock counties on June 9, 2021. Details can be found in the informational packet. Prior sampling on Starkweather Creek and Lake Monona resulted in PFAS fish consumption advisories.
- Bay of Green Bay and its tributaries on January 18, 2022. More details are in the fish advisory fact sheet.

All the recent fish consumption advisories issued from 2019 – 2021 were used to list the waters found in Table 9.

Water Quality Criteria (WQC)

There are various criteria being created or revised through Department rulemaking efforts. Establishing WQC facilitates evaluations and listings. Updates are available on the Surface Water Quality Rule Update webpage.

Two WQC rule packages were passed in 2020.

Bacteria

Revisions to the state's bacteria criteria (WY-17-15) were promulgated and became effective May 1, 2020. The rule revised Wisconsin's bacteria criteria to better protect recreation and public health. It changed the bacterial indicator from fecal coliform to *E. coli* because *E. coli* better predicts the risk of human illness caused by exposure to human fecal contamination. The rule's criteria were integrated into 2022 WisCALM and utilized for assessments.

Site-Specific Phosphorus Criteria for WI River Basin Lakes

The rule created phosphorus site-specific criteria (SSC) for three waterbodies, Petenwell Lake located in Wood, Juneau, and Adams Counties, Castle Rock Lake located in Adams and Juneau Counties, and Lake Wisconsin located in Columbia and Sauk Counties. Analyses during the development of the Wisconsin River Basin TMDL concluded that the statewide phosphorus criteria for Petenwell Lake and Castle Rock Lake were more restrictive than needed to protect the lakes' recreation and aquatic life designated uses, and the statewide criterion for Lake Wisconsin was not sufficiently protective of its designated uses. The SSC rule (WY-09-18) was promulgated and became effective June 1, 2020.

PFOS and PFOA

A proposed rule to create PFOS and PFOA water quality standards (WY-23-19) defines levels of public health significance for the two types of PFAS based on preventing adverse effects from contact with or ingestion of surface waters of the state, or from ingestion of fish taken from waters of the state.

- For PFOS, the proposed level of public health significance is 8 ng/L for all waters except those that cannot naturally support fish and do not have downstream waters that support fish.
- For PFOA, the proposed level of public health significance is 20 ng/L in waters classified as public water supplies under ch. NR 104, and 95 ng/L for other surface waters.

A public hearing on the proposed rule was held on Dec. 10, 2021. In February 2022 the surface water quality proposed rule went before the Natural Resources Board and was passed for review by the legislature. More information on the rule's progress is available on the PFAS Surface Water Quality Criteria webpage.

Assessing Waterbodies using Biological Metrics

A proposed rule is in progress to codify several of the biological assessment processes and thresholds used for assessing waterbody health (WY-23-13). This rule was submitted to the Legislature for consideration in January 2022. It would codify the following:

- An overview of the department's obligations under the Clean Water Act to assess Wisconsin's waterbodies every two years and report to EPA.
- "Narrative biological assessment thresholds" that set expectations for the level of health of aquatic communities for any waterbody type.
- Algae thresholds to protect recreation and health of aquatic communities.
- Aquatic plant thresholds for lakes to protect healthy aquatic habitat.
- Criteria to protect lakes that have coldwater fish, based on the temperature and oxygen needs of these fish.
- Biological "phosphorus response indicators" for use in conjunction with phosphorus criteria to evaluate whether or not phosphorus-related impacts are occurring.

Financial Assistance to Meet Water Quality Goals

Lower Peshtigo River

Environmental Improvement Fund

Wisconsin's Environmental Improvement Fund (EIF) consists of two separate financial assistance programs: the Clean Water Fund Program for wastewater treatment and urban runoff projects, and the Safe Drinking Water Loan Program for drinking water projects. The EIF directs limited financial resources to projects with the highest environmental priority score. The programs are administered jointly by WDNR and the Department of Administration.

The EIF is an excellent tool for Wisconsin in meeting its responsibilities under both the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA). EIF programs provide financial assistance to local units of government in the form of subsidized loans and, in some cases, grants, principal forgiveness, or interest subsidy payments.

Clean Water Fund Program

The Clean Water Fund Program (CWFP) is the larger of Wisconsin's two revolving loan programs. The CWFP uses funding from annual capitalization grants awarded by the Environmental Protection Agency (EPA) as authorized by the CWA, state match to the capitalization grants, repayments from previous loans, and state borrowing to leverage the fund to help achieve state water quality goals and the objectives under the CWA.

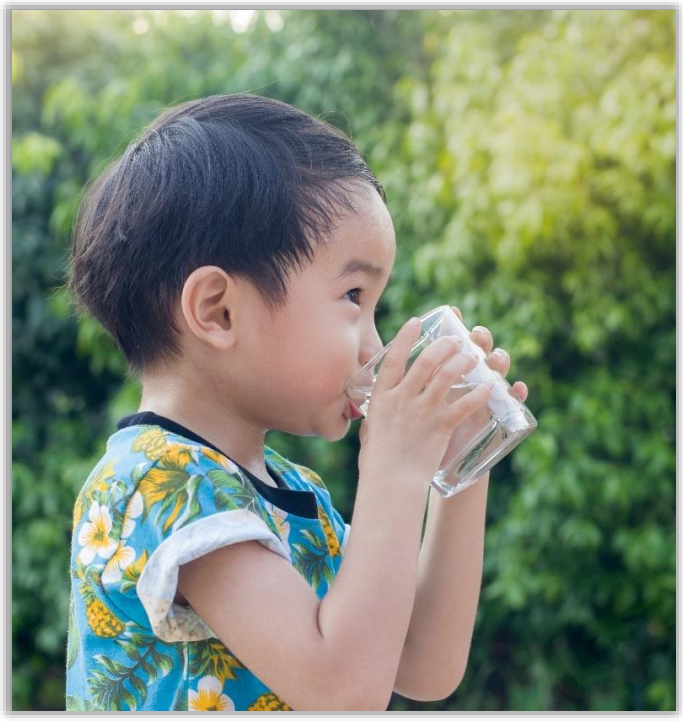
Repayments of principal and interest from CWFP loans will make up the primary source of funding for future CWFP projects. The CWFP provides financial assistance to municipalities for planning, design, and construction of surface water and groundwater pollution abatement facilities to process municipalities' wastewater and urban runoff. Projects typically are constructed to maintain compliance with existing permit limits, but other eligible projects achieve compliance with new limits, or provide wastewater treatment in areas previously not served. Financial assistance is administered by the CWFP through: 1) a federal leveraged program and 2) an interest rate subsidy program for small projects.

From 1991 through June 30, 2021, the CWFP entered into 1,115 financial assistance agreements with Wisconsin municipalities totaling $5.3 billion—$5 billion in loans and $318.6 million in grants and principal forgiveness. The amount of financial assistance provided for individual CWFP projects ranges from $18,851 to over $138 million. To be qualified for CWFP funding, a project must meet eligibility requirements as outlined in s. 281.58 (7) (b), Wis. Stats.

The CWFP may provide financial assistance to municipalities in the following ways: provide loans at or below market interest rates, purchase or refinance the debt obligations of municipalities incurred for CWFP-eligible water pollution control projects, and make subsidy payments to municipalities to reduce interest on loans made by the Board of Commissioners of Public Lands for CWFP-eligible projects. For the past several years, the CWFP has met federal requirements regarding additional subsidization by providing principal forgiveness to municipalities that meet principal forgiveness eligibility criteria established by the state in the annual CWFP Intended Use Plan.

Each CWFP project is prioritized using a system established by Wisconsin Administrative Code. The criteria used to evaluate projects are based on human health, regionalization, water quality impacts (based on a facility's discharge permit limit), and the population served by the project. The priority system assigns a score to every project based on these criteria. Projects are ranked numerically, so in the event funding is not available for all requested projects in a given year, awards will be made by the order in which they are ranked. Funding each biennium has been sufficient to fund all eligible CWFP projects, except for those projects requested under Wisconsin's financial hardship assistance program, which was phased out and removed from state statutes.

Safe Drinking Water Loan Program



Young child drinking a glass of water.

The Safe Drinking Water Loan Program (SDWLP) was enacted in 1997 to provide financial assistance to municipalities for the planning, design, construction, or modification of public water systems. The SDWLP uses funding from the capitalization grant authorized by the SDWA and repayments from previous loans.

From the beginning of the program in 1998 through June 30, 2021, the SDWLP entered into 424 financial assistance agreements with Wisconsin municipalities totaling $884.6 million—$797.1 million in loans and $87.5 million in principal forgiveness. To be qualified for SDWLP funding, a project must meet eligibility as outlined in s. NR 166.06, Wis. Adm. Code.

In addition to providing financial assistance for traditional drinking water infrastructure projects, the SDWLP provided $39,076,105 in 80 principal-forgiveness-only Financial Assistance Agreements for replacement of private Lead Service Lines (LSLs) from July 2017 through June 2021.

The SDWLP may provide financial assistance to municipalities as loans at or below market interest rates or may purchase or refinance the debt obligations of municipalities incurred for SDWLP-eligible projects. Since 2009 the SDWLP also provides principal forgiveness for a portion of the project costs to some municipalities as required under federal appropriation bills, regulations and detailed in Wisconsin's annual SDWLP Intended Use Plan.

Each SDWLP project is prioritized using a system established by Wisconsin Administrative Code. The criteria used to select projects include: risk to human health of acute and chronic contaminants, financial need based on population and median household income of the municipality served by the project, secondary contaminant violations or system compliance with regulations, and system capacity.

The priority system assigns a score to every project based on the criteria. Projects are ranked numerically, so in the event funding is not available for all project applicants in a given year, awards will be made by the order in which the projects are ranked.

A State Lab of Hygiene employee demonstrates the proper procedure to collect a clean water sample.

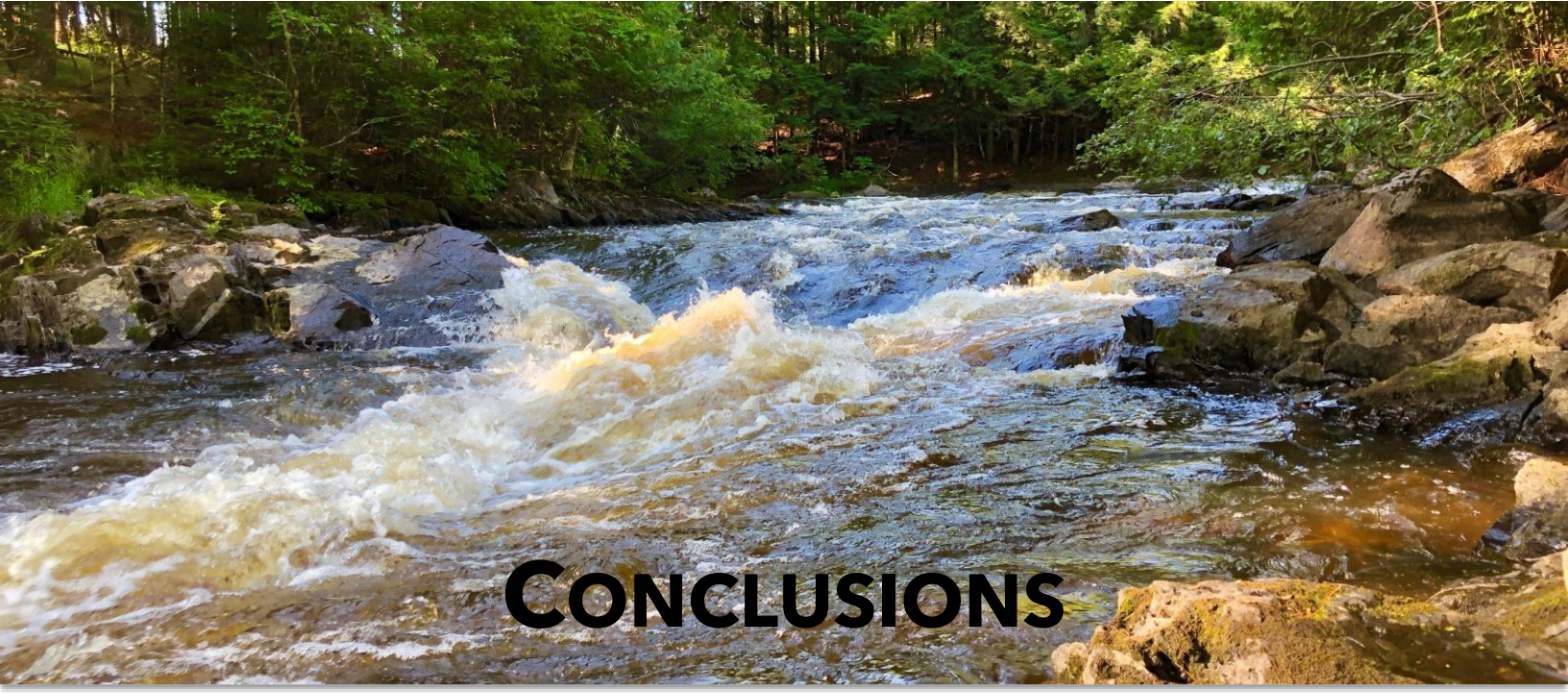
Surface Water Grants Program

The surface water grant program provides cost-sharing grants for surface water protection and restoration. Funding is available for education, ecological assessments, planning, implementation, and aquatic invasive species prevention and control. For the 2021 season the following totals were awarded:

- **Aquatic Invasive Species (total $3,773,049)**
  - Lake Monitoring and Protection Network: $835,501
  - Clean Boats Clean Waters: $886,851
  - AIS Prevention: $93,861
  - AIS Planning: $328,277
  - AIS Research & Demonstration: $217,703
  - AIS Large-Scale Population Control: $923,689
  - AIS Small-Scale Population Control: $487,164
- **Lakes (total $2,155,979)**
  - Lakes Education: $33,350
  - County Lakes: $42,065
  - Comprehensive Planning: $195,484
  - Lake Planning: $147,249
  - Lake Land Acquisition: $277,629
  - Ordinance Development: $31,050
  - Healthy Lakes & Rivers: $252,130
  - Lake Surface Water Restoration: $143,724
  - Lake Management Plan Implementation: $1,033,295
- **Rivers (total $277,000)**
  - River Education: $22,160
  - River Planning: $88,640
  - River Surface Water Restoration: $66,480
  - River Management Plan Implementation: $99,720

Rice Lake in Barron County; the Rice Lake Protection and Rehabilitation District received a small-scale AIS population control grant.

Additional details can be found on the Surface Water Grant website.



CONCLUSIONS

Popple River, Jennings Falls, Florence County *Luke Ernster 2019*

With bountiful water resources, over 5 million residents, and up to 112 million annual visitors, the state of Wisconsin works diligently to protect water quality, biological integrity, and recreation opportunities. The Water Condition Lists are a first step in managing Wisconsin's waters, determining if protection or restoration is required. Monitoring was done across the state, resulting in new pollutant listings and delistings. The majority of new listings were for phosphorus and *E. coli*. There were 22 listing removals for eight different pollutants. A total of 244 waters were newly assessed and determined to be on the Healthy Waters List.

Many DNR programs and partners continue to work together to manage the state's water resources; with safety measures in place, a significant amount of work was done during the 2022 reporting cycle. In 2020 volunteers gathered water quality data for over 1,000 lake sites (CLMN) and nearly 400 stream sites (WAV). WDNR staff collected long-term trend and project data across the state. Monitoring for the Fox Des-Plaines TMDL was undertaken. Modeling for the Northeast Lakeshore TMDL was nearly finished. Sediment remediation work in the Lower Fox River, a 17-year project, was completed in summer 2020; a total of 6.5 million cubic yards of contaminated sediment was removed. Four new Adaptive Management plans targeted a total phosphorus reduction of 23,155 lbs/year. A total of 21 Water Quality Trading plans were approved, curtailing 15,537 lbs/year of nonpoint source phosphorus loading. Two water quality criteria packages were passed. The full magnitude of monitoring, restoration, and protection work done in Wisconsin was briefly summarized in this report.

Sign up for GovDelivery emails for real-time updates via email or text message. The topic 'Water Quality Standards and Assessments' under 'Water' will provide information regarding standards, changes to water quality condition, WisCALM updates, and general TMDL updates.
https://public.govdelivery.com/accounts/WIDNR/subscriber/new.