



Yahara WINS Annual Report

2023



ABOUT YAHARA WINS

The Yahara Watershed Improvement Network, known as Yahara WINS, is a long-term initiative to achieve clean water goals for the Yahara watershed. In this effort, community partners, led by Madison Metropolitan Sewerage District, are collaborating on a strategy called watershed adaptive management in which all sources of phosphorus in the watershed work together to reduce nutrient runoff over 20 years. The work began in 2012 and following a four-year pilot effort, it has transitioned to the full-scale implementation throughout the whole watershed. 2023 marks the seventh full year of the initiative.

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Intergovernmental Agreement (IGA) Signatories

Towns

Blooming Grove
Burke
Cottage Grove
Dunn
Middleton
Westport

Villages

Cottage Grove
DeForest
Maple Bluff
McFarland
Shorewood Hills
Waunakee
Windsor

Cities

Fitchburg
Madison
Middleton
Monona
Stoughton
Sun Prairie

Others

Madison Metropolitan Sewerage District
Village of Oregon Wastewater Treatment Plant
Stoughton Utilities
UW-Madison
Wisconsin Department of Natural Resources

Interested Parties

Clean Lakes Alliance
Yahara Pride Farms
River Alliance of Wisconsin
U.S. Geological Survey
U.S. Environmental Protection Agency (EPA)
Madison Gas & Electric
Yahara Lakes Association
Dane County
Friends of Pheasant Branch
Wisconsin Department of Agriculture, Trade and Consumer Protection
Friends of Badfish Creek
Rock County
Columbia County
Rock River Coalition

Bold = Partner that has a funding agreement with Yahara WINS.

IGA Executive Committee Members

Voting Members

President: Martin Griffin,
Madison Metropolitan Sewerage District
Vice President: Tom Wilson,
Town of Westport
Secretary: Greg Fries,
City of Madison
Treasurer: Jeff Rau,
Village of Oregon
At-large member: Judd Blau,
Village of DeForest

Non-voting Advisory Members

Laura Hicklin, Dane County
Bob Uphoff, Yahara Pride Farms
James Tye, Clean Lakes Alliance



*Martye Griffin,
Yahara WINS
President*

President's Message

For centuries, the Yahara Lakes region has been inhabited by the Ho-Chunk people. Their name for the region, Teejop, means "Four Lakes." As reflected in the name, the lakes were central to Indigenous life.

Two hundred years ago, Europeans began to settle in what is now called Madison. With increasing settlements came increasing human waste. As Madison grew, waste was dumped directly into Lake Monona, fouling water quality.

Over fifty years ago, wastewater discharges to Lake Mendota ceased, but pollution from surface runoff continued introducing excessive nutrients to the lake system.

In 2017, Yahara WINS began as a formal project. 2023 marked the seventh full year of the 20-year project. While Yahara WINS is driven by the need to comply with Clean Water Act targets, adaptive management was selected as the compliance option because of its regional benefits to the entire watershed, rather than just downstream of a discharge point.

The Yahara WINS effort has only scratched the surface of the Yahara Lakes' history. In a few years, the project has provided an infusion of energy and resources into lake cleanup. However, it's important to evaluate the project in the context of the watershed's wider history.

The quality of the Yahara lakes today reflects decades of human activity. Years of phosphorus from countless storms are settled into stream sediments and lake beds. We can't expect to counteract decades of lake impacts in just a few short years. In addition to preventing new phosphorus contributions to the lakes, we will need to allow time for historical nutrients to cycle out of the lake system.

Although seven years is a blink of an eye in the grand scheme, Yahara WINS has made long strides in this first phase of the project. We have a strong network of committed partners whose contributions are generating tangible results. For each year of the project, we have seen higher-than-expected phosphorus reductions for the watershed. And the project has spurred innovations in phosphorus reduction that make Yahara WINS a national model for watershed management.

There are steep challenges ahead – not only are we contending with the legacy of historical phosphorus runoff, but climate change can bring intense storms that introduce significant runoff to the lakes. However, even in a short project period, we have seen promising signs that phosphorus reduction efforts are working. With this strong foundation, Yahara WINS is positioned to make long-term improvements in the watershed.

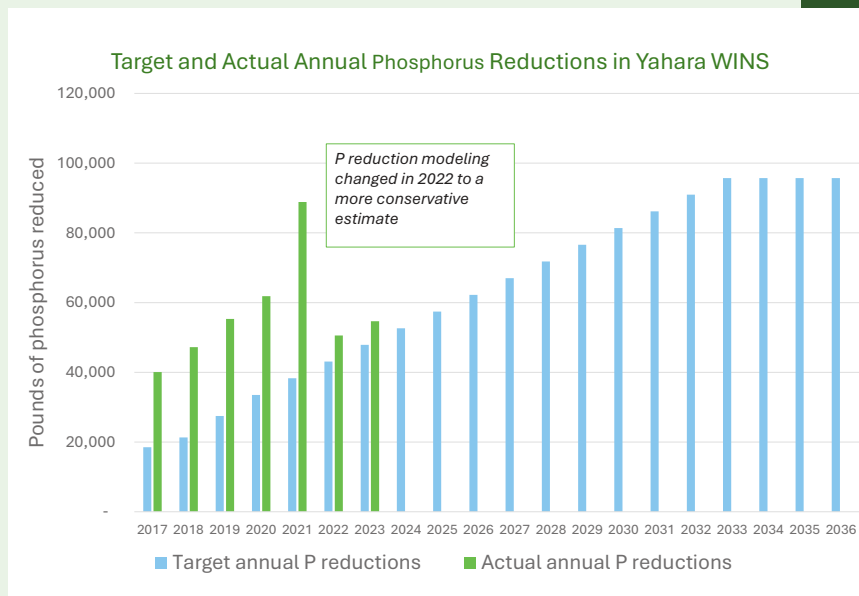
2023 PHOSPHORUS REDUCTIONS

2023 was a dry year in Wisconsin, and farmers struggled with drought conditions. While dry weather is challenging for farming, it also creates fewer opportunities for phosphorus to enter the waterways through storm runoff.

Despite a challenging farming year, Yahara WINS agricultural conservation partners maintained connections with hundreds of farmers across the watershed. With the help of Yahara WINS cost-share, these partners worked with farmers to prevent 54,541 pounds of phosphorus from entering water bodies in the watershed.

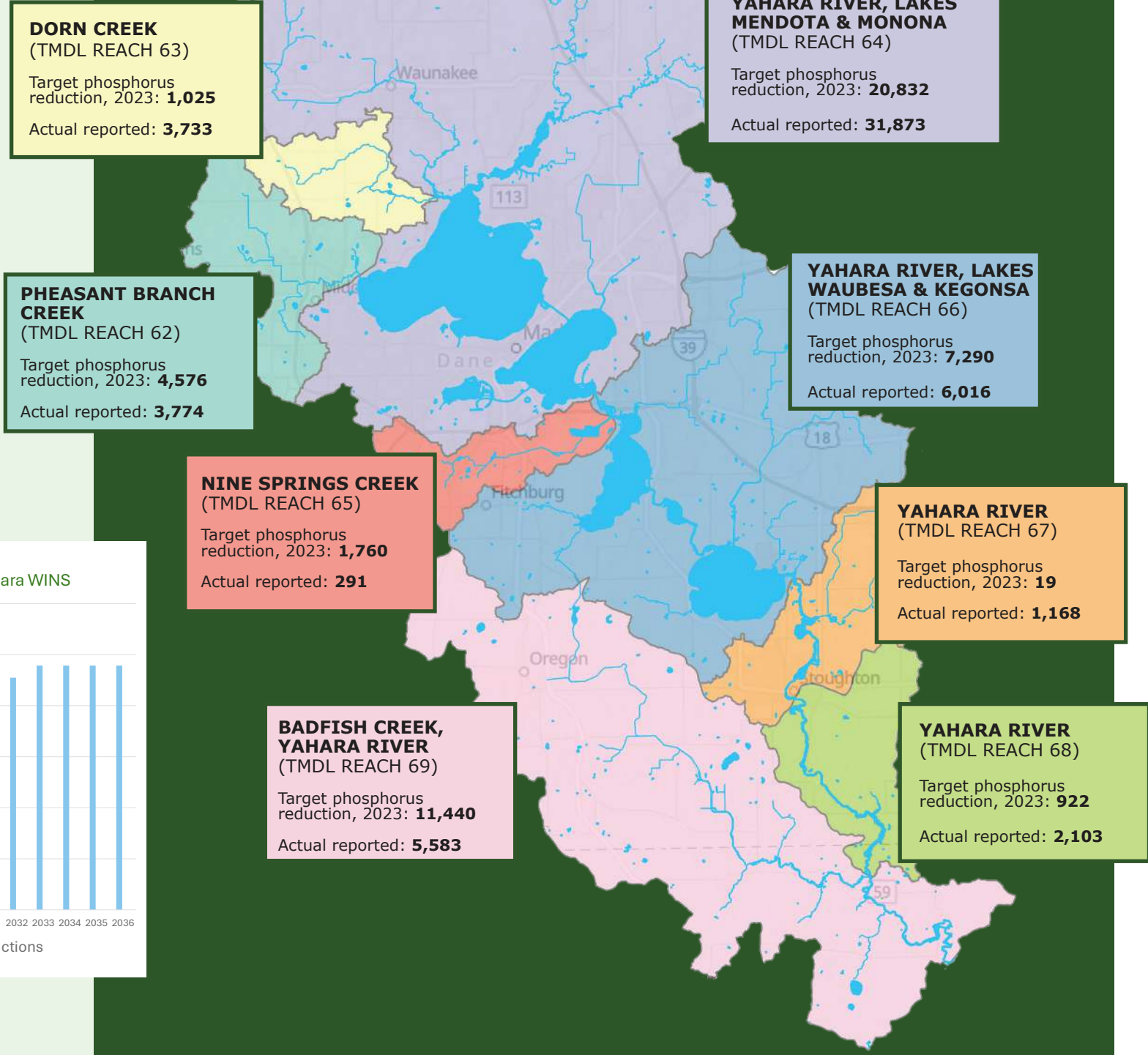
Once again, Yahara WINS exceeded its annual phosphorus reduction target from the cost model, which set a goal of 47,862 pounds of phosphorus for 2023.

The graph below shows the target phosphorus reductions by year along with the actual reported reductions.



Phosphorus Reductions by TMDL Reach in the Yahara Watershed

TMDL = Total Maximum Daily Load, the phosphorus budget for the watershed



Targets vs. Actual: Are we on track for meeting phosphorus reduction goals?

Phosphorus reduction targets for the watershed are geographically divided by reach, the subdivision of the watershed draining to a certain water body. At the outset of Yahara WINS, project planners set target phosphorus reductions by reach by estimating phosphorus reductions that were possible based on hypothetical conservation practices implemented in those reaches.

To date, the phosphorus reductions in some reaches have exceeded annual goals, while in other reaches, phosphorus reductions have not yet reached their annual targets. These differences are partly due to available opportunities. So far, the majority of phosphorus reductions through Yahara WINS have been achieved in Reach 64 (Yahara River, Lake Mendota and Lake Monona), which is a large area with many opportunities for nutrient management.

Meanwhile, it's more difficult to identify phosphorus reduction opportunities in reaches when there's not as much land available for runoff reduction projects. Reach 65 (Nine Springs Creek) is a small, heavily urbanized area with few possibilities for the types of conservation practices common in Yahara WINS to date. Since the project began, this reach has experienced new development, and available land for management practices has been further reduced.

In its first years, Yahara WINS made strides toward its goals by promoting low-cost, well-understood biological conservation practices like cover crops and strip tillage. Now, with a better understanding of the watershed, project planners will need to fine-tune phosphorus reduction strategies to focus on the remaining sources. What has worked in some reaches may not work in others, so future Yahara WINS practices implemented in each reach will depend on the area's unique attributes and needs.

IMPLEMENTING PARTNER HIGHLIGHTS

County conservation departments and farmer-led groups are instrumental to Yahara WINS. They have the expertise, trust and relationships that drive implementation of practices that reduce nutrient runoff. Yahara WINS provides funding to these partners, which use the funding to support planning and implementation of conservation practices.

County boundaries extend beyond the Yahara watershed's boundaries. The practices highlighted in this section are those that took place in the Yahara Watershed. Meanwhile, county conservation staff are also performing similar activities and providing cost-share outside the watershed. Yahara WINS funding helps busy county conservation staff focus on practices that reduce phosphorus in the Yahara watershed.

Here's a look at what implementing partners accomplished in 2023. For full partner reports, visit yaharawins.org/resources/annual-reports.

ROCK COUNTY LAND CONSERVATION DEPARTMENT (LCD)

- 106 pounds of phosphorus reduced from practices implemented in 2023
- 2 acres of cropland in perennial forage
- 22 acres of cropland in perennial vegetation
- Continued multi-year planning for a complex barnyard runoff control system for a 200-steer barnyard within 300 feet of the Yahara River
- Experienced significant staff turnover, including the previous Yahara WINS point person. Yahara WINS planners are providing guidance to Rock County LCD about identifying new projects in upcoming years during staffing transition.

DANE COUNTY LAND & WATER RESOURCES DEPARTMENT (LWRD)

- 23,218 pounds of phosphorus (from new and existing practices) reduced
- 60,000 acres in the Yahara Watershed in nutrient management plans
- 237 landowners/producers assisted
- 32 cost-share agreements for conservation practices and systems
- Established the Dane Demo Farms, a farmer network to test and showcase agricultural conservation practices that protect water quality. Two Demo Farms are in the Yahara Watershed. Find more information at demofarms.danecounty.gov.

YAHARA PRIDE FARMS (YPF)

- 31,217 pounds of phosphorus reduced from practices implemented in 2023, a 9% increase from the reduction in 2022
- 29,034 acres with conservation practices implemented
- \$490,254 allocated as cost-share for conservation practices, with an additional \$583,216 invested by participating farmers; Yahara WINS provided \$425,000 to YPF in 2023 as part of its service agreement
- 78 farms participated in YPF cost-share programs in 2023; 13 farms participated for the first time in 2023
- 10 practices were eligible for YPF cost-share. The practices associated with the highest total phosphorus reductions were overwintering cover crops (8,513 pounds reduced) and low-disturbance manure injection (9,799 pounds reduced).

Yahara WINS Farmer Profile: Luke Laufenberg, Laufenberg Farms

Laufenberg Farms, established in 1899, is a sixth-generation family farm between Waunakee and Middleton (near the headwaters of Dorn Creek, a Lake Mendota tributary). The farm raises dairy cows and pigs and runs a store for meats raised on the farm. Luke Laufenberg manages about 700 acres of land to feed the animals. He is also a YPF board member.

Soil health conservation practices are a mainstay on the farm. For eight years, Laufenberg has been implementing practices to keep the land green (with no exposed soil) to prevent erosion and maintain soil health for future generations:

- Cereal rye is used as a cover crop for planned corn acres (silage and grain). Corn is planted into the cereal rye in the spring.
- In the first year of establishing a three-year alfalfa rotation, oats are seeded with the alfalfa. Oats grow fast, so they hold onto the soil until the alfalfa is established to protect against soil erosion.

The effect of these practices is evident. The pictures below show Laufenberg acres after a wet spring and a field with similar characteristics, but no conservation practices. While other fields in the area had visible gully erosion, creating channels to deliver phosphorus runoff to nearby streams, there was no sign of erosion on Laufenberg fields where vegetation held the soil and nutrients in place.



Gully erosion is visible cutting across a nearby field. This indicates that channels of runoff have flowed across the field, carrying soil and nutrients.

In this Laufenberg field, there is no visible evidence of erosion. Planting has helped keep soil in place.



EXPLORING CARBON TRADING POTENTIAL FOR YAHARA WINS

Many practices that reduce phosphorus runoff have the added benefit of sequestering carbon. Yahara WINS planners are exploring the potential to capitalize on the climate benefits of conservation practices implemented through the project, which could draw new sources of funding.

In 2024, Yahara WINS is entering into an agreement with Local Choice Marketing, LLC to submit an application for a Regional Conservation



Partnership Program (RCPP) grant. The grant is intended to support the creation of a local carbon trading market. In carbon trading, there is a type of carbon credit that can be calculated and certified to represent the quantity of carbon dioxide (and other greenhouse gases) sequestered by a certain practice, such as planting cover crops. Carbon emitters, like local industries, could then purchase credits to offset their emissions. The sale of these types of credits generated through practices that Yahara WINS promotes could be another revenue source for Yahara WINS partners.

Meanwhile, the District is working with Virridy, a company working to quantify climate benefits of avoided technology construction. Through Yahara WINS, wastewater utilities are avoiding the significant greenhouse gas emissions associated with building tertiary treatment, like advanced filtration systems, to remove phosphorus. These avoided emissions can be quantified and certified as credits to be sold on the voluntary carbon market.

Virridy has already quantified potential carbon credits and projected revenues if the District were to participate in the market. By implementing Yahara WINS rather than constructing treatment technology, Virridy estimates that approximately 72,673 tons of greenhouse gas emissions will be avoided over the project lifespan. The project has already generated about 31,905 creditable tons since it began in 2017.

Yahara WINS partners can expect updates on these carbon trading potentials in 2024 and future years.

Photo: A completely vegetated field managed with no-till farming is an example of a practice that can sequester carbon and translate to carbon credits on a carbon market.



The new boat landing area off County Highway A. Photo courtesy of Friends of Badfish Creek.



A kayaker on Badfish Creek. Photo courtesy of Friends of Badfish Creek.

BADFISH CREEK PADDLING STORIES

Yahara WINS isn't just about meeting a number on a permit. It's about keeping the waters in the watershed safe and usable for wildlife and humans. Badfish Creek, the central water body to reach 69 at the southern end of the watershed, illustrates the importance of water quality for recreation.

Badfish Creek is a popular stream for paddlers, making it a valuable recreational waterway. From March 14 to December 31, 2021, a trail camera just below the Old Stage Road boat landing recorded over 2000 people in 1,500 boats.

In 2023, the Friends of Badfish Creek Watershed group approached the District about opening up land along County Highway A for a better boat launch for paddlers on the creek. The District transferred three acres along the creek to the Town of Rutland, allowing the Friends group to start construction on a boat landing with funding from the Stoughton Area Community Foundation.

Here's what Badfish Creek means to members of Friends of Badfish Creek Watershed:

Miles paddled: "In less than 4.5 years, I've paddled portions of the creek 84 times for a distance over 500 miles." – Andrew Hoernemann

Memorable experiences: "Seeing owls, herons, egrets, deer, muskrats, mink, turtles and other wildlife is very encouraging." – Jim Post

Favorite section to paddle: "Our favorite section has been Old Stage to Riley Road (not too long), but we just did Old Stone to Old Stage and liked that as well." – Kathy Dutilly

Changes to the creek in the years you've been paddling: "On the surface, the Badfish doesn't seem to have changed a lot in the 17 years I've been paddling/observing. But learning about contaminants in the stream (phosphorus, *E. coli*, sediment, etc.) has changed my perception: the Badfish needs and deserves our protection..." – Lynne Diebel

WATER QUALITY MONITORING

U.S. GEOLOGICAL SURVEY (USGS) DATA SUMMARY

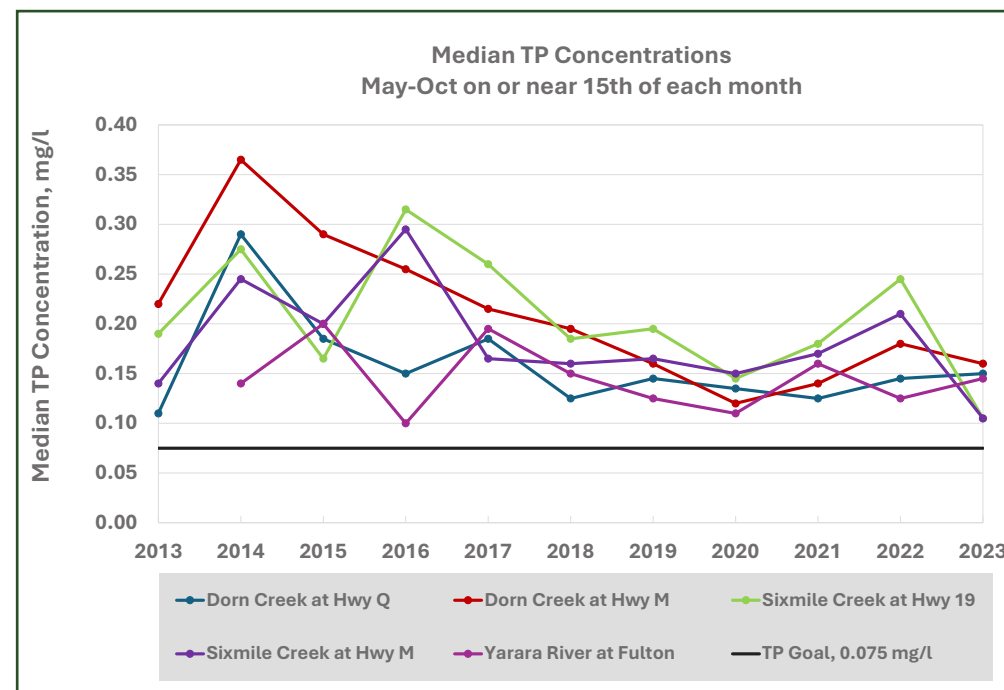
The USGS maintains several monitoring stations in the Yahara watershed, measuring water quality indicators including flow, phosphorus, sediment, nitrogen, and chloride. Five of those stations are funded by Yahara WINS and provide insight into phosphorus loading into various waterways throughout the watershed. The USGS assesses annual data over a water year (WY) (Oct. 1 of the previous year through Sept. 30 of the current year) to take into account snowfall in the winter starting the year.

According to the USGS's end-of-year summary, these trends were observed for the watershed in WY 2023:

- Dry weather continued in 2023, with drought conditions in the spring and summer. Compared to an annual average rainfall of

37 inches, 31 inches fell at the Dane County airport in 2023.

- Total phosphorus loading from the four major tributaries to Lake Mendota was less than 30,000 pounds, compared to an average annual load of about 62,000 pounds looking at the period from 1990 to 2023.
- Median in-stream phosphorus concentrations for Yahara WINS monitoring sites were at or slightly below the long-term values for most sites.
- There were more beach closings on Lake Mendota in 2023 due to blue-green algae and/or *E. coli*, even though phosphorus concentrations were relatively low. This occurrence emphasizes that lakes are complex systems whose health can't be assessed just based on one variable. Water temperature, shoreline topography, wind, and other factors also affect blue-green algae growth, not just phosphorus concentrations.



This graph shows the growing season (May-October) median total phosphorus (TP) concentration at the five USGS sites funded by Yahara WINS. The USGS also monitors seven additional sites in the watershed for TP concentrations. The "Looking Ahead" section of this report includes more information about the use and interpretation of this full data set.

2023 IN-STREAM PHOSPHORUS CONCENTRATIONS

USGS samples for the project area were collected on the 15th of every month during the growing season (May-October). The median of these values is reported for each location. Most of these samples reflect baseflow conditions when the stream is not experiencing higher flow due to storm runoff.

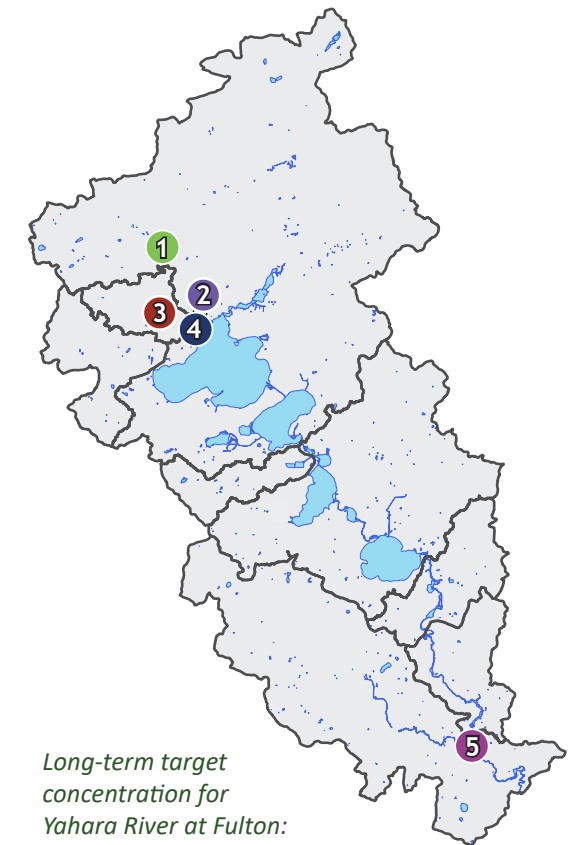
1) Sixmile Creek at Highway 19
2023 concentration: 0.11 mg/L

2) Sixmile Creek at Highway M
2023 concentration: 0.11 mg/L

3) Dorn Creek at Highway M
2023 concentration: 0.16 mg/L

4) Dorn Creek at Highway Q
2023 concentration: 0.15 mg/L

5) Yahara River at Fulton
2023 concentration: 0.14 mg/L



Long-term target concentration for Yahara River at Fulton: 0.10 mg/L

ROCK RIVER COALITION ANNUAL SUMMARY

Rock River Coalition (RRC) has an annual agreement with Yahara WINS to receive funding to support its water monitoring program in the Yahara River watershed, which yields additional water quality data to help measure project progress. In 2023, over 96 RRC volunteers monitored 56 sites throughout the watershed. In addition to assessing baseline water quality indicators like dissolved oxygen, clarity and temperature at all sites, volunteers collected nutrient samples at 44 of these sites. Stream samples are brought to the district lab for analysis and entered into the Surface Water Integrated Monitoring System (SWIMS) database, the Wisconsin Department of Natural Resources (WDNR) repository for surface water data.

RRC also conducts outreach about Yahara WINS and related initiatives. It shared one StoryMap in 2023, "Macroinvertebrate Monitoring in the Yahara Watershed," and several articles in its monthly e-newsletters to volunteers and community members. Staff and volunteers provided stream monitoring demonstrations for Friends of Pheasant Branch's Master Naturalist class, UW-Madison Conservation of Biodiversity class, Waunakee Village Center family outings, and Expand Your Horizons STEM event for middle school girls. They also presented about Yahara WINS and related monitoring efforts to the Wisconsin Lakes and Rivers Partnership. RRC also hosts several continuing education events including the Yahara WINS Season Kick-Off and Yahara WINS Gathering for volunteers.

Read the full RRC annual report at link.madsewer.org/rrc-2023

FINANCIALS

Yahara WINS is funded primarily by signatories to its Intergovernmental Agreement (IGA), which contribute to the project proportionate to the amount of phosphorus they need to reduce under the TMDL. This funding is then distributed to partners contracted for services with Yahara WINS, including implementing conservation practices and conducting watershed monitoring.

In the 2023 budget, two expenditures were removed: the General P Reduction Funding and Innovation Grant Program expenditures. These items remain removed in the 2024 budget.

The main change to the 2024 budget compared to the 2023 budget is the addition of \$58,000 budgeted for cost model updates in 2024.

Over 70 percent of the 2024 expenditures will directly support phosphorus reduction activities. Additionally, the funds temporarily held in the designated operating reserve will ultimately be used to support future phosphorus reduction activities.

2023 ADOPTED BUDGET (rounded to the nearest \$100)

Unencumbered carryover from 2022	\$0
REVENUE	
IGA participants	\$1,514,470
Income from grants, other MOUs, etc.	\$0
MGE Foundation	\$5,000
Savings account interest	\$4,000
<i>Total Revenue</i>	<i>\$1,523,470</i>
Total Revenue plus unencumbered carryover	\$1,523,470
EXPENDITURES	
Phosphorus reduction	
Dane County phosphorus reduction services agreement	\$540,000
Rock County phosphorus reduction services agreement	\$150,000
Yahara Pride Farms phosphorus services agreement	\$425,000
Subtotal	\$1,115,000
Water quality monitoring or modeling	
Water quality monitoring analytical services (MMSD)	\$65,000
USGS joint funding agreement	\$75,000
Rock River Coalition water quality monitoring	\$40,000
Subtotal	\$180,000
Supporting services	
MMSD service agreement	\$60,000
Financial audit	\$11,000
Communications	\$5,000
Legal services agreement	\$4,000
Subtotal	\$80,000
Transfer of funds to designated operating reserve	\$147,000
Total Expenditures	\$1,522,000
Revenue minus expenditures (potential unencumbered carryover)	\$1,470

2024 ADOPTED BUDGET (rounded to the nearest \$100)

Unencumbered carryover from 2023	\$0
REVENUE	
IGA participants	\$1,524,920
Income from grants, other MOUs, etc.	\$0
MGE Foundation	\$5,000
Savings account interest	\$4,000
<i>Total Revenue</i>	<i>\$1,533,920</i>
Total Revenue plus unencumbered carryover	\$1,533,920
EXPENDITURES	
Phosphorus reduction	
Dane County phosphorus reduction services agreement	\$540,000
Rock County phosphorus reduction services agreement	\$150,000
Yahara Pride Farms phosphorus services agreement	\$425,000
Subtotal	\$1,115,000
Water quality monitoring or modeling	
Water quality monitoring analytical services (MMSD)	\$65,000
USGS joint funding agreement	\$75,000
Rock River Coalition water quality monitoring	\$40,000
Cost Model Update	\$58,000
Subtotal	\$238,000
Supporting services	
MMSD service agreement	\$60,000
Financial audit	\$11,000
Communications	\$5,000
Legal services agreement	\$4,000
Subtotal	\$80,000
Transfer of funds to designated operating reserve	\$100,000
Total Expenditures	\$1,533,000
Revenue minus expenditures (potential unencumbered carryover)	\$920

The 2024 budget and associated budget narrative can be found on the Yahara WINS website, yaharawins.org.

LOOKING AHEAD

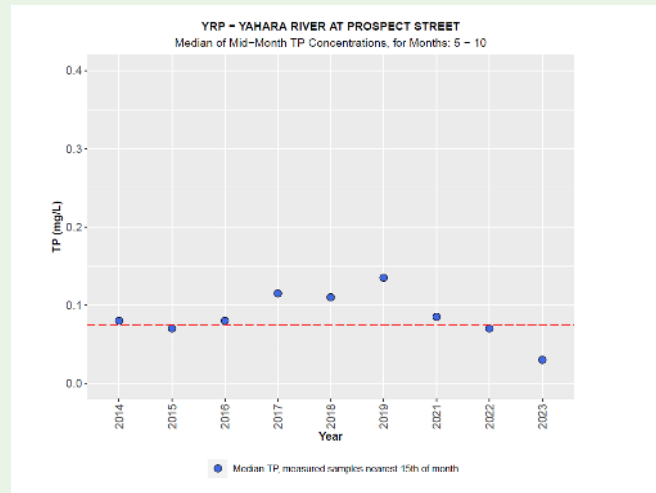
FIVE-YEAR REVIEW OF PROJECT

As part of the adaptive management project reporting schedule in the Madison Metropolitan Sewerage District's discharge permit, the Wisconsin Department of Natural Resources (WDNR) requires a report on the project every five years to ensure it's on track. In 2024, the District is completing its first of these five-year reports.

Yahara WINS, as an adaptive management project, is the District's compliance strategy for phosphorus. That is, Yahara WINS needs to succeed for the District to comply with its permit. If Yahara WINS does not succeed, the District and other participating wastewater treatment plants will be required to make expensive upgrades to their facilities for additional phosphorus removal. Wastewater phosphorus removal technology will reduce phosphorus concentrations in downstream receiving waters, but will not improve water quality in the Yahara lake system.

The District and other project partners, including county conservation departments, have participated in ongoing conversations with the WDNR about project progress and recommended improvements. These periodic reviews will help provide assurance to the District and Yahara WINS partners that the project is on the right track.

The District thanks the project partners who have provided information and time to this review. The detailed five-year report will be submitted to the WDNR in July 2024.



Interpreting the Full Watershed Data Set

For the five-year report, the USGS helped Yahara WINS compile monitoring data. The five-year report will be made available on the Yahara WINS website once it is accepted and approved by WDNR.

Through consultation with USGS, 10 sites were chosen that had the most consistent representative data, each site representing seven to 10 years of monitoring. While it's still too early to definitively tie phosphorus-reducing practices to in-stream water quality, we're seeing encouraging downward trends in phosphorus concentrations near the project point of compliance, as seen in the data for the Yahara River at Prospect Street site shown above.

There's a need for caution in interpreting short-term data sets like this one. Besides the efforts of Yahara WINS partners, there are other variables that affect stream phosphorus levels, such as climate change, precipitation levels, and severity and timing of storms. With a long enough data set, we can start to identify longer-term trends beyond annual variability. If downward trends continue despite other variables, we can more confidently attribute phosphorus reductions to practices implemented on the land.

COST MODEL UPDATES

The Yahara WINS cost model is a guiding tool for project strategy. The cost model looks at the needed phosphorus reductions per watershed reach, the practice mix estimated to achieve those reductions, and the total cost of those practices. The estimated project cost then is broken down into partner allocations based on their phosphorus reduction requirements out of the Rock River TMDL.

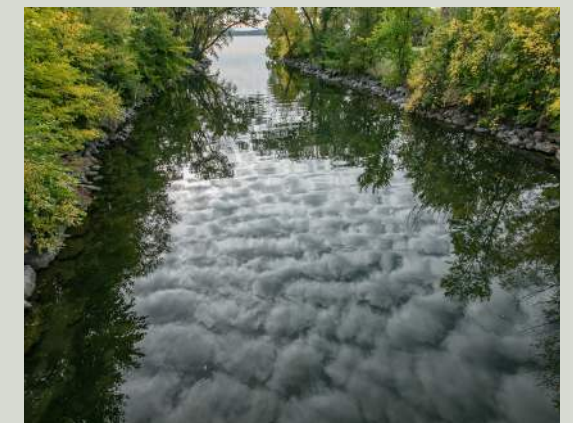
The cost model is in need of revisiting to reflect worldwide financial changes and lessons learned about the watershed in the course of the project. The cost of implementing phosphorus reduction practices has gone up faster than the model anticipated due to major disruptions like the pandemic and global conflicts. Brick-and-mortar supplies, seed, and conservation equipment have become more expensive in recent years.

Additionally, because the stream reaches in the watershed have different characteristics, the reviewed cost model will need to be less one-size-fits all and instead tailor cost estimates to specific reaches. More urbanized reaches, for example, will likely require more engineered solutions, which are more expensive than agricultural practices.

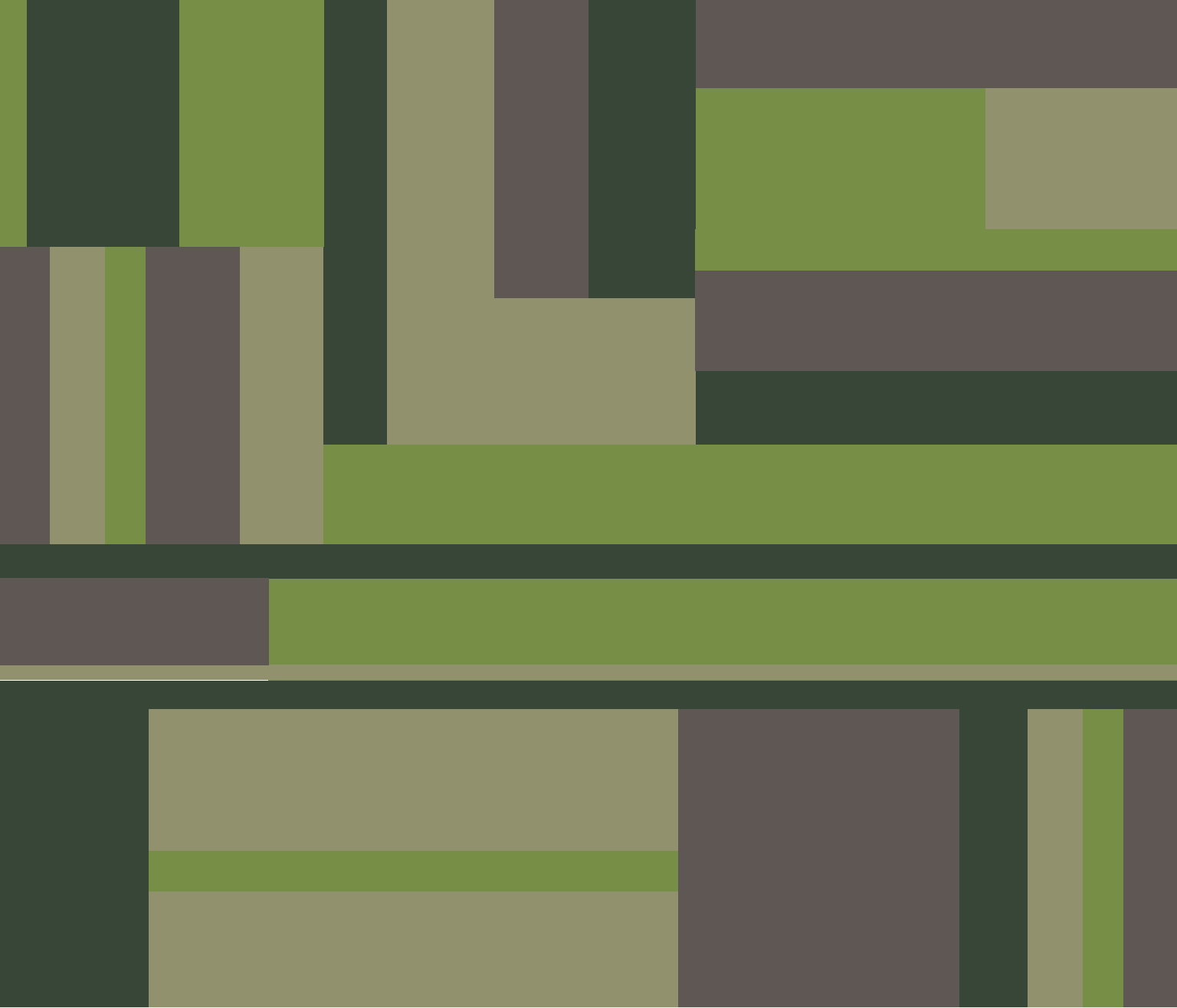
In 2024, Yahara WINS planners will be working with a consultant to update the cost model to reflect current conditions. The purpose of this revision is to ensure that Yahara WINS has sufficient funding to continue to achieve yearly phosphorus reduction goals.



A bridge crosses the Yahara River.
Photo courtesy of Michael W. Rausch.



Yahara River flowing through the Isthmus.
Photo courtesy of Michael W. Rausch.



Yahara WINS
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www.yaharawins.org