



currents of change

2016 ANNUAL REPORT

PROJECT BACKGROUND

The Yahara Watershed Improvement Network, known as Yahara WINS, is a groundbreaking 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 a watershed work together to reduce phosphorus.

This report includes highlights of project activities in 2016. More information about the activities and partners featured in this report is available on the Yahara WINS webpage, <http://www.madsewer.org/Programs-Initiatives/Yahara-WINs>.

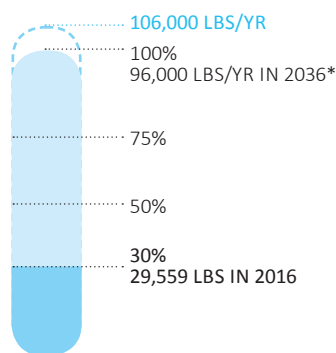
ABOUT THE DISTRICT

Madison Metropolitan Sewerage District began work on adaptive management in 2012, when it collaborated with partners to initiate a successful four-year pilot project. The district is pursuing adaptive management to comply with phosphorus requirements in its Clean Water Act discharge permit. Compared with upgrades to the treatment plant, adaptive management has the potential to be a more comprehensive and less expensive route to clean water. The district is one of the first wastewater treatment plants to use adaptive management and is committed to the success of this approach as it works to cost-effectively meet clean water standards. To advance the adaptive management project, the district facilitates partnerships, promotes adaptive management through outreach, pools resources to fund phosphorus-reducing practices in the watershed, analyzes stream samples and works with the Wisconsin Department of Natural Resources to address regulatory needs for the project.

currents carry positive results forward



PROGRESS ON PHOSPHORUS REDUCTION GOALS



**Based on updated modeling, the phosphorus reduction goal has been revised downward to 96,000 pounds per year.*

During 2016, work by the Yahara Watershed Improvement Network and its partners kept more than 29,000 pounds of phosphorus from area surface waters—more than 30 percent of the total reduction of 96,000 pounds per year needed over the next 20 years. The 96,000 pound total is based on revised modeling and is lower than the previous target of 106,000 pounds.

The reduction came as Yahara WINS transitioned from a four-year adaptive management pilot effort to the full-scale project. The transition period allowed for completion of administrative and planning tasks to scale the pilot up to a larger geographic area and lay the groundwork for the more formal, 20-year project.

Yahara WINS pools resources from local municipalities and funds practices that reduce phosphorus.

Yahara WINS partners including Dane County and Yahara Pride Farms worked with local farmers to put in place practices that kept nearly 29,600 pounds of phosphorus from entering local waters. Efforts ranged from cover crop planting and stream bank stabilization to low-disturbance

manure injection. Local municipalities and homeowners made further reductions through leaf management, erosion control and stormwater management.

Other highlights included:

- Creation of an intergovernmental agreement among 23 participants, providing a long-term framework for the full-scale project.
- A service agreement between Yahara WINS and Dane County outlining the terms and expectations of the county's work to implement phosphorus-reducing practices.
- Notification from the Wisconsin Department of Natural Resources that Madison Metropolitan Sewerage District's adaptive management plan—a requirement of the district's discharge permit—was approvable.
- Two awards acknowledging Yahara WINS' success: one from the National Association of Clean Water Agencies and the other from the Rock River Coalition.

CONTENTS

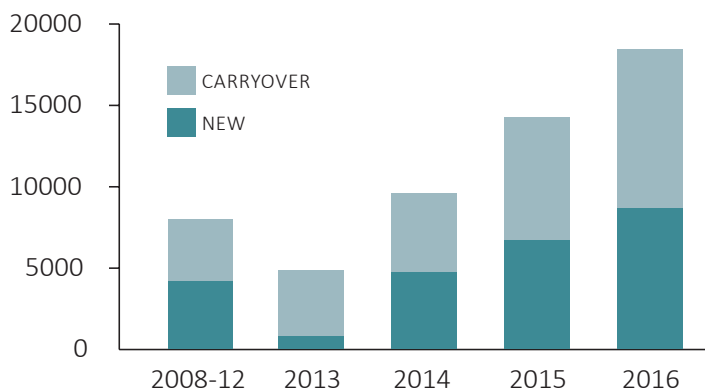
PHOSPHORUS REDUCTIONS 2016	2
YAHARA WINS GRANTS	5
OTHER WINS-RELATED ACTIVITIES IN 2016	8
YAHARA WINS BUDGET INFORMATION.....	9
INTERGOVERNMENTAL AGREEMENT AND RELATED AGREEMENTS.....	10
LOOKING AHEAD.....	11

phosphorus reductions

Phosphorus reductions documented in 2016 exceeded the reduction target for the year, reflecting the persistent efforts of WINS partners to implement runoff control practices. The adaptive management cost model, which is the source of calculations of necessary phosphorus reductions and associated costs per year of the full-scale project, established a target reduction of 15,000 pounds in 2016. The combined actions of the Dane County Land and Water Resources Department and Yahara Pride, working with area farmers, resulted in an estimated reduction in phosphorus of more than 29,000 pounds (counting new pounds reduced in 2016 as well as continuing pounds reduced from practices implemented in previous years).

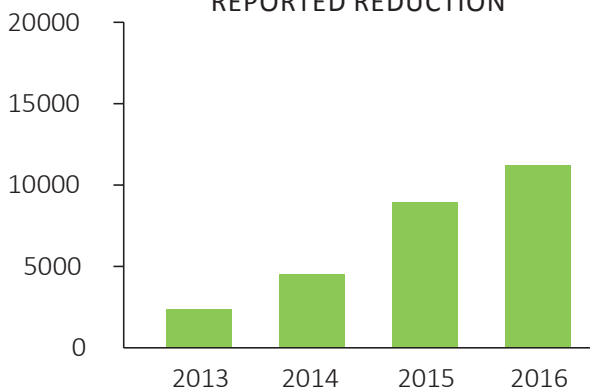
YAHARA WATERSHED PHOSPHORUS REDUCTIONS

DANE COUNTY REPORTED REDUCTION



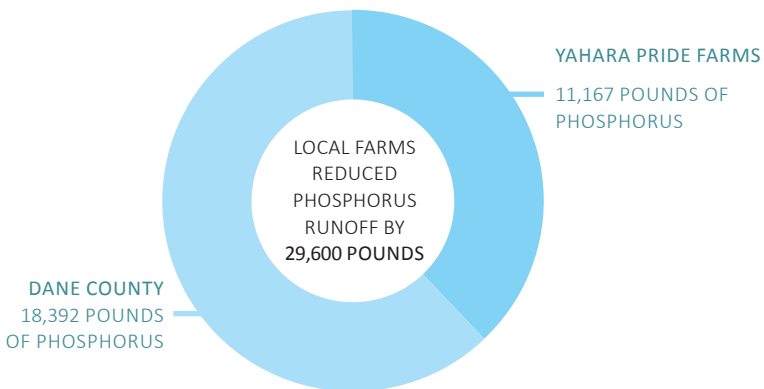
Dane County's reported reduction of new and carryover pounds of phosphorus. Dane County works with farmers throughout the watershed to put in place practices that reduce phosphorus runoff.

YAHARA PRIDE FARMS REPORTED REDUCTION



This graph shows the phosphorus reduction reported by Yahara Pride Farms for each year the group has received funding from Yahara WINS. Reported phosphorus reductions include amounts directly supported by grant dollars as well as reductions accomplished by Yahara Pride Farms members without cost share funds. All reductions count toward the total phosphorus reduction goal for the watershed.

REPORTED PHOSPHORUS REDUCTION IN 2016



THIS SECTION DETAILS HIGHLIGHTS FROM EACH OF THESE PARTNERS' WORK IN 2016.

DANE COUNTY LAND AND WATER RESOURCES DEPARTMENT

Dane County Land and Water Resources Department is working with farmers on behalf of Yahara WINS to implement agricultural conservation practices to reduce phosphorus. In 2016, this included a reduction of some **18,392 total pounds of phosphorus** with:

- 8,642 pounds from new practices; and
- 9,750 pounds from ongoing practices.

Also during the year, the county:

- **Assisted 295 landowners** in the Yahara Watershed;
- Implemented and tracked more than **313 conservation practices**, including harvestable buffers (pictured above); and
- **Entered into 24 cost-share agreements** totaling more than **\$677,000** for conservation practices throughout the watershed.

Full Dane County Report: <http://www.madsewer.org/Programs-Initiatives/Yahara-WINs/Resources>

Harvestable buffers help keep phosphorus-laden sediment in place.



Service agreement between Yahara WINS and Dane County

A significant development in 2016 was the signing of a service agreement between Dane County and Yahara WINS. This five-year agreement defines the expected actions and phosphorus reductions to be achieved by the county. Dane County services provided through this agreement include:

- Identifying resource concerns related to water quality and measures to address them;
- Assisting landowners with practice implementation and cost-share for those practices;
- Verifying practice installation and maintenance; and
- Calculating resulting phosphorus reductions and reporting progress.

The agreement also includes cost-share funds and a pay-for-performance component if phosphorus reductions exceed baseline reduction goals.



Low disturbance manure injection puts nutrients where crops can use them.



Cover crops provide a layer of protection for area waterways by holding sediment in place.

YAHARA PRIDE FARMS

Yahara Pride Farms is a farmer-led, nonprofit organization working to implement conservation practices in the watershed. In 2016, Yahara Pride Farms was awarded \$80,000 from Yahara WINS, and with this funding offered cost-share for five types of practices, as well as bonus payments for combinations of practices and implementing a practice for multiple consecutive years.

The pounds of phosphorus reduced by cost-share practices in 2016 are listed at right. Yahara Pride Farms activities in 2016

included a watershed conference in March, an Ag Innovation Day in August with a focus on manure management and a farm tour of Ripp's Dairy Valley that included a look at the nearby manure digester.

Full Yahara Pride Report: <http://www.madsewer.org/Programs-Initiatives/Yahara-WINs/Resources>

LAND USE PRACTICES CUT PHOSPHORUS

PRACTICE	TOTAL PREDICTED PHOSPHORUS REDUCTION (POUNDS)
Strip Tillage	703
Low-Disturbance Manure Injection (LDMI)	1106
LDMI plus Cover Crop	548
Cover Crop	7130
Headland Stacking Manure	107
Combination of Practices	1085
Multiple Years of Adoption- 1	297
Multiple Years of Adoption- 2	191
TOTAL	11,167

Yahara WINS grants

Yahara WINS has offered grants for urban and rural phosphorus reduction projects since 2013. These grants are designed to advance projects that reduce phosphorus at the lowest cost per pound. The program was offered again in 2016 and received six applications for agricultural and urban stormwater runoff control projects.

While the grant budget was initially \$60,000, the Yahara WINS executive committee approved increasing the total funding allotted to these grants to allow for funding these projects, summarized below, at the full amount requested. Note that the WINS funding does not cover the total cost of these projects.

GRANTS DIVERSIFY PRACTICES

APPLICANT	PROJECT TITLE	COMPLETED IN 2016	TOTAL AWARD GRANTED BY WINS	TOTAL POUNDS (LIFESPAN)
Dane County Extension	Cover Crops for Seed Corn	N	\$4,500	270
Dane County Land and Water Resources Department	Pollinator cover – Cherokee Marsh Natural Resource Area	N	\$15,000	1,320
Village of DeForest	Yahara River Banks – Stabilization	Y	\$15,000	280
City of Madison	Diversion of water basin to pond	N	\$15,000	200
City of Monona	Installation of stormwater treatment devices, dredging of silt, replacement of 2 outfalls	Y	\$15,000	220
City of Stoughton	Stabilization and restoration of Yahara River Streambank	Y	\$15,000	640
TOTAL			\$79,500	2930



The City of Monona completed a shoreline restoration project.



Monona also upgraded a stormwater outfall.

water quality monitoring snapshot

USGS WATER QUALITY MONITORING SUMMARY

Yahara WINS contracts with U.S. Geological Survey to collect and analyze water quality throughout the watershed, as water quality monitoring is a requirement of adaptive management and will demonstrate progress made toward phosphorus goals over the project. Water samples are collected from five stations funded by Yahara WINS: Dorn Creek at Highway Q, Dorn Creek at Highway M, Sixmile Creek at Highway 19, Sixmile Creek at Highway M and the Yahara River at Fulton.

In Water Year 2016 (Oct. 1, 2015 – Sep. 30, 2016), USGS monitoring recorded the following data:

Precipitation

- Forty percent more precipitation fell in the Yahara Watershed than normal. Meanwhile, the winter of 2015-16 was relatively mild, with lower-than-normal total snowfall.
- Above-average rainfall at times of the year corresponded to higher streamflow discharge into Lake Mendota from its four major tributaries, with the largest runoff event happening in July during intense thunderstorms.

Phosphorus loads

- A total of 42,500 pounds of phosphorus entered Lake Mendota through its four major tributaries, which is about 30 percent below the long-term loading estimate. However, annual phosphorus loads can vary significantly based on the timing and intensity of rain and runoff events.
- For comparison, and to illustrate the variability in phosphorus loads from year to year, at right is a table of total phosphorus load to Lake Mendota by water year.

PHOSPHORUS VARIES BY YEAR

WATER YEAR	TOTAL P LOAD TO LAKE MENDOTA (LBS.)
2013	77,000
2014	63,000
2015	25,000
2016	42,500



Volunteers assist in monitoring phosphorus levels through sample collection.



A permanent USGS monitoring station monitors flow and phosphorus.

Phosphorus sampling data

- A total of 624 water samples were collected and analyzed from six USGS monitoring locations.
- Median baseflow concentrations for USGS-monitored sites for the relevant monitored periods to date are shown in the table below.

Median phosphorus concentrations are above the statewide phosphorus criteria. However, at this point of the project, this is expected as it will take time to see a response in water quality following implementation of phosphorus-reducing practices.

MEDIAN PHOSPHORUS CONCENTRATIONS

MONITORING SITE	TOTAL P CONCENTRATION, MG/L	STATE PHOSPHORUS CRITERION, MG/L
Dorn Creek @ Hwy Q	0.12	0.075
Dorn Creek @ Hwy M	0.24	0.075
Sixmile Creek @ Hwy 19	0.21	0.075
Sixmile Creek @ Hwy M	0.18	0.075
Yahara River @ Fulton	*0.13	0.10

The computed values represent the median of daily total phosphorus concentrations for the 15th of each month from Aug. 2012- Oct. 2012, and May-Oct. 2013-2016.

**For the Yahara River at Fulton, the computed value represents the median of daily total phosphorus concentrations for the 15th of each month from May-Oct. 2014-2016.*

TP LOAD DISTRIBUTION, WY 2016 ~42,000 LB TOTAL



WATERSHED SIZE (LOCATION)

- 8,000 ACRES (DORN - HIGHWAY M)
- 12,000 ACRES (PHEASANT BRANCH)
- 24,000 ACRES (YAHARA - WINDSOR)
- 31,000 ACRES (SIXMILE - HIGHWAY M)

ROCK RIVER COALITION VOLUNTEER MONITORING

USGS monitoring is supplemented by additional samples taken by volunteer monitors through the Rock River Coalition. This was the fourth year that Yahara WINS has provided funding to the coalition for its stream monitoring program. This monitoring engages citizen scientists to provide additional water quality data throughout the watershed, helping establish a more robust baseline for measuring water quality improvements through adaptive management projects.

In 2016, this funding supported:

- Training and equipment for about 85 volunteer monitors;
- Monitoring of 50 stream monitoring sites, including 35 sites where samples are collected for analysis at the district's lab; and
- Two training workshops and a watershed conference for Yahara River Watershed volunteers.



Citizen scientists provide support in our efforts to monitor water quality.

other WINS-related activities in 2016



REFINING PHOSPHORUS MODELING TOOLS

Researchers from UW-Madison, UW-Platteville and the U.S. Department of Agriculture's Agricultural Research Service continued to work in 2016 to better assess potential phosphorus losses in certain scenarios. One research project is focused on improving the winter runoff predictions of the Wisconsin Phosphorus Index (P Index), a common tool for predicting phosphorus loss from agricultural areas. Another project examined phosphorus loss from cattle lots, helping test modifications to another phosphorus loss model (APLE-Lots). This research can help conservation planners better understand impacts of land use actions on phosphorus loss and focus actions.



DANE COUNTY LEGACY PHOSPHORUS REMOVAL

A WINS-funded study by UW-Madison's Water Resources Management program indicated that legacy sediment in stream beds, deposited over decades, can continue contributing significant amounts of phosphorus to water bodies. This could mask the effects of phosphorus reduction efforts. In response, in 2016 Dane County announced a \$12 million, four-year effort to remove legacy sediment associated with 870,000 pounds of phosphorus. In 2016, Yahara WINS provided a letter of support to the Dane County Board for this effort. This project will begin in 2017 and take place in streams throughout the watershed.



AWARDS

Madison Metropolitan Sewerage District received two awards related to its work on Yahara WINS in 2016:

- **National Environmental Achievement Award - Operations & Environmental Performance Award** (National Association of Clean Water Agencies) ; and
- **Protector Award** (Rock River Coalition).

These awards reflect the work of all Yahara WINS partners, without whom the innovative adaptive management approach would not be possible.

Yahara WINS budget

The Yahara WINS executive committee approved the 2017 and five-year budget in 2016. Notable budget actions in 2016 included the allocation of funds to conduct an audit of WINS finances and the adoption of a resolution by the Yahara WINS executive committee to establish a designated operating fund reserve.

2016 ACTUAL BUDGET

Balance on 1/1/2016	\$288,144
2016 Revenue	\$469,000
Expenditures (<i>through 12/12/16</i>)	\$488,132
REMAINING BALANCE	\$259,012
Encumbered funds	\$177,000
Estimated additional expenses	\$7,000
ESTIMATED ENCUMBERED CARRYOVER TO 2017	\$75,012



After winter wheat harvest, an application of nutrients prepares the field for the next crop to be planted.

2017 BUDGET

	STARTING BALANCE	\$87,000
REVENUE		
IGA participants		\$1,467,000
Contributions from non-IGA participants		\$17,300
Savings account interest		\$1,200
	TOTAL REVENUE	\$1,485,500
EXPENDITURES-GROUPED BY CATEGORY		
<i>Phosphorus reduction</i>		
Dane County phosphorus reduction services agreement		\$450,000
Columbia County phosphorus reduction services agreement		\$40,000
Rock County phosphorus reduction services agreement		\$40,000
Yahara Pride Farms phosphorus reduction services agreement		\$110,000
General P reduction practice funding		\$120,000
Phosphorus reduction grant program		\$100,000
	Subtotal	\$860,000
<i>Water Quality Monitoring or modeling</i>		
Water quality monitoring analytical services (MMSD)		\$35,000
USGS joint funding agreement		\$75,000
New USGS JFA for an additional gaging station		\$0
Rock River Coalition water quality monitoring		\$27,000
SWAT modeling update		\$0
	Subtotal	\$137,000
<i>General</i>		
WINS staffing		\$43,500
Financial audit		\$7,000
Communications		\$15,000
Miscellaneous		\$10,000
Legal services agreement		\$20,000
	Subtotal	\$95,500
	TOTAL EXPENDITURES	\$1,092,500
Contribution to designated operating reserve fund		\$480,000

intergovernmental agreement and related agreements

To set the legal and administrative framework for the full-scale, compliance-based adaptive management plan, Yahara WINS entered into several formal agreements with project partners and technical assistance providers in 2016, described below.

INTERGOVERNMENTAL AGREEMENT

In 2016, WINS participants contributing funding to the project (i.e., municipalities) and Madison Metropolitan Sewerage District executed an intergovernmental agreement that outlines mutual goals and expectations of participants. The agreement specifies the proportion of funding that each participant is responsible for, project governing bodies, the administrative structure of the project and “off-ramps” for participants every five years. The signatories are contributing funding to the project in proportion to the amount of phosphorus they are each required to reduce to meet targets.

OTHER AGREEMENTS

These agreements are found in full at <http://www.madsewer.org/Programs-Initiatives/Yahara-WINS/Resources> and listed below (omitting the intergovernmental agreement and service agreement with Dane County, which are described earlier). These agreements also reflect contributions from municipalities that have already met their phosphorus reduction obligations under the Rock River Total Maximum Daily Load (TMDL), but decided to support Yahara WINS regardless in recognition of the project’s benefit to the community. Several of the agreements are memoranda of understanding.

AGREEMENT	DESCRIPTION
MOU with Town of Pleasant Springs	Agreement for one-time contribution to Yahara WINS from Town of Pleasant Springs
MOU with Town of Dunn	Agreement for annual contributions to Yahara WINS by Town of Dunn despite having already met TMDL requirements
MOU with Town of Burke	Agreement for annual contributions to Yahara WINS by Town of Burke
MOU with Town of Westport	Agreement for annual contributions to Yahara WINS by Town of Westport for purposes of TSS compliance and support of the project
Legal Services Agreement	Contract with Stafford Rosenbaum, LLP for retention of general legal counsel for Yahara WINS
Joint Funding Agreement with USGS	5-year agreement between USGS and MMSD (using WINS funding) for the continued service of USGS water quality monitoring for WINS.
MGE Foundation Pledge to Yahara WINS	Contribution from the Madison Gas and Electric Foundation to provide funding to WINS over three years

IGA PARTICIPANTS

Towns

Blooming Grove
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 Waste Water Treatment Plant
Stoughton Utilities
University of Wisconsin-Madison
Wisconsin DNR

looking ahead



With the necessary transition steps taken, Yahara WINS is moving ahead as a full-scale project. Actions in the near term will include:

- Creation of a video highlighting the Yahara WINS project, to be completed in fall 2017.
- Development and implementation of agreements with Rock County and Columbia County for conservation practices in the Yahara Watershed in those counties.
- Continued meetings of the Yahara WINS group and executive committee. The schedule includes meetings on: Sept. 13, 2017; Oct. 17, 2017; and Dec. 13, 2017.
- Exploration of a pay-for-performance funding program with Yahara Pride Farms.
- Final approval of the adaptive management plan when the district's discharge permit is approved by DNR (anticipated early 2018).

Yahara WINS has also contracted with Dave Taylor, formerly of the Madison Metropolitan Sewerage District and now of NEMOA Environmental, to act as consulting director of Yahara WINS to facilitate continuity in advancing the Yahara WINS project.



Injecting nutrients into the soil helps keep phosphorus where crops will then use it.



Volunteer monitors help track water quality.



COMPILED BY MADISON METROPOLITAN SEWERAGE DISTRICT