RENEW THE BLUE

A COMMUNITY GUIDE FOR CLEANER LAKES & BEACHES IN THE YAHARA WATERSHED

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Capital Area Regional Planning Commission • City of Middleton • Dairy Farmers of Wisconsin
Dane County Cities & Villages Association • Dane County Towns Association • Madison Area Builders Association
Madison Metropolitan Sewerage District • REALTORS Association of South-Central Wisconsin
UW-Madison Center for Limnology • UW-Madison Division of Extension
UW-Madison Nelson Institute for Environmental Studies • Yahara Lakes Association
Yahara Watershed Improvement Network

MAY, 2022

RENEW THE BLUE
A Community Guide for Cleaner Lakes & Beaches in the Yahara Watershed

Clean and healthy lakes are a benchmark of a healthy community. We, the undersigned, recognize that the Yahara Watershed's five majestic lakes—Mendota, Monona, Wingra, Waubesa, and Kegonsa—define our sense of place and contribute to the region's natural heritage, economic vitality, and local quality of life. We are proud of our prior work and investments to protect and enhance these assets, but more needs to be done for the lakes to meet their potential.

On this 18th day of May 2022, we come together under the Yahara CLEAN Compact to renew and strengthen our partnership, uniting around a shared vision and path forward. We pledge through our signatures to champion the Compact's goals and objectives, to support implementation of this RENEW THE BLUE guidance, and to stay the course to build a better water quality future for this and future generations.

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The Yahara CLEAN Compact and this updated roadmap to cleaner lakes is the result of the contributions of many individuals. We thank each of them for their collaboration and dedication to this plan.

THIS PLAN WAS A PARTNERSHIP BETWEEN:

City of Madison

Clean Lakes Alliance

Dane County

University of Wisconsin-Madison

Wisconsin Department of Agriculture, Trade and Consumer Protection

Wisconsin Department of Natural Resources

IN CLOSE COLLABORATION WITH:

Capital Area Regional Planning Commission

City of Middleton

Dairy Farmers of Wisconsin

Dane County Cities & Villages Association

Dane County Towns Association

Madison Area Builders Association

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SUBGROUP/COMMITTEE MEMBERSHIP FOOTNOTE KEY:

1 Phosphorus Loading (scientific/technical team)

2 Public Engagement

3 Social Equity

4 Additional Compact Participation

5 Agricultural Outreach

6 Contractor Selection

7 Logic Model

8 Compact Decision-Making

SPECIAL THANKS TO PAUL DEARLOVE – YAHARA CLEAN COMPACT, MANAGING DIRECTOR & RENEW THE BLUE MANAGING EDITOR

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FOREWORD

It was early 2020 and we gathered -- scientists and builders, town officials and city engineers, researchers and realtors -- in a large sunny room on the Madison Metropolitan Sewerage District campus.

"Welcome to the future," I announced. It was a Friday morning, winter cold outside. We were gathered to update our community's plan for a cleaner watershed. "This work has been successful beyond your wildest dreams. Consider. In this successful future, what do you see or hear or feel?"

We thought and wrote and talked, we grouped and discussed, we considered and revised. We stood close together, unmasked, as the scientists asked the realtors how this impacted property values, as the realtors asked the scientists what could make the biggest change.

Clearer lakes, the group decided. Open beaches. Less blue-green algae.

Members came from different organizations with different styles and different perspectives. Some knew each other already, some didn't. Some had spent decades on water quality issues, some were new to most pieces of the conversation. Some knew the economics, some knew the science, some knew the politics. All of us were concerned about the lakes and all of us wanted to get this plan right -- even if we weren't sure yet what right looked like.

In that sunny room, we considered. How did we arrive at that bright future? What was it like working together and what values did we hold dear?

Reduce phosphorus, the group agreed. Reduce *E. coli*. Reduce runoff.

Fairness, the group agreed. Effectiveness, achievability, adaptability, inclusion. Build on progress. Do more together than the sum of what we could do separately.

Then, in March, the pandemic arrived.

We did not meet in March and we did not meet in April. We got Zoom accounts and figured out how to use them. We set up home offices. Some of our spouses filed for unemployment. Some of our spouses were declared essential workers. School was closed. Daycare was closed.

In May, we began meeting online.

How are you? we asked and asked again, as faces appeared on the screen.

Through spring and summer and fall, we learned about the science and about the history of cleaning up the lakes. We learned what was working and what was holding us back. We learned about how farmers were changing manure practices, and how cities were changing leaf pickup, and how that was helping. We learned how climate change and land development were increasing rainfall and runoff, and how that was hurting. We learned about what we didn't know. And we learned about each other.

Each of the 19 organizations within the group was interviewed. Each was asked to do a short presentation. What should we know about your organization and its members? What unique assets do you bring to this group? What big ideas would you like to see in the plan?

We learned about affordable housing and waterfront property values, about adaptive management and regional planning, about local ordinances and county parks, about Wisconsin cheese and the Wisconsin Idea. We learned about what members of other organizations found hopeful and what scared them. We learned where opportunity might lie.

I never realized, we said in our conversations afterward. I wonder if, we said. We said, I can see how.

Between meetings, members kept working. The scientists worked on the science. An agriculture subgroup reached out to farmers. A public-engagement subgroup advised on focus groups and a community survey. The leadership subgroup advised on how best to pull together everything we were learning and everything we might recommend.

One of the group's ground rules was this. If you're passionate about a topic, volunteer for the subgroup. And so these small teams were a mix of experts and amateurs, of deep knowledge and fresh perspectives. They were sent off with difficult questions and they wrestled with them and returned to share what they had learned. They shared. Here is what we know. Here is what is working. Here is what is broken. And here is what we do not know.

We had 90 minutes together each month. The Clean Lakes Alliance staff and the rotating co-chairs from the partner organizations and I considered how to help the group get the most from that time. What would be most useful now? we asked each other and asked the group members. What else do you need?

We worked online for over 12 months. In the summer, there were protesters in the streets. In the fall, an election. In the winter, armed civilians in the Capitol. Newspaper headlines described a nation divided. Vaccines arrived. It was 2021. Another spring.

In summer, we met in-person -- first indoors and then outdoors -- to talk through the draft recommendations. We met at DNR's Nevin Fish Hatchery and we met at the City of Madison's Marshall Park shelter. We moved from table to table, asking questions, offering suggestions, thinking together about what would work best.

Is this grounded in science? we asked ourselves. Does it offer a role for everyone in the watershed to play in caring for our lakes? And does it faithfully represent the purpose, mission, values and work of the Yahara CLEAN Compact?

We met and revised and finally we voted. Yes, we agreed. Yes.

I say we although, of course, the facilitator does not vote. The facilitator's role -- my role in this project -- is to serve the group, to help them create a space where they can learn and listen, where they can design together the future they want and the path to travel there.

We will do more together than the sum of what we could do separately.

This is what the members of these 19 organizations said to each other in that sunny room in early 2020.

In complicated times, I have been inspired and moved by their courage, conviction, and creativity in living up to those words -- and by the power of the direction it has yielded.

I hope that you will be, too.

Alison S. Lebwohl

Madison, Wisconsin

February 2022

EXECUTIVE SUMMARY

OUR YAHARA LAKES

Lakes Mendota, Monona, Wingra, Waubesa and Kegonsa provide 29 square miles of interconnected waters that bolster regional identity, pride, and quality of life. All this water—roughly 193 billion gallons worth—is held in the public trust, and 48% of the 66 miles of encircling lakeshore are owned by public entities.

The Yahara lakes have a long history of attracting people to their shores. They are natural wonders of incalculable value, literally and figuratively putting our surrounding communities on the map as special places to live, work and play. Property values, tax base, mental health, tourism, subsistence fishing, local employment, and biodiversity are but a handful of measures by which this value is gauged, appreciated, and experienced. Just as they provide for us, it is our responsibility to provide for them through collective action and stewardship.

So, how are the lakes doing? On the one hand, they continue to support diverse aquatic life, provide scenic beauty, and offer an abundance of recreational opportunities. On the other hand, they can be so green and thick with algae that few people would want to swim in them. Their conditions are also always changing, making it difficult for the average person to know when they are safe. Perhaps not surprisingly, the lakes and beaches periodically fail to meet basic standards of water quality and usability.

History is replete with past decisions that undervalued the lakes and underestimated our ability to degrade them. The very conception of how they should be is clouded by the slow pace of change and our lack of experience with their past condition. Although weather and other short-term events can influence their day-to-day status, a trajectory is set by the cumulative effect of how we use the surrounding land.

Today, we stand at a crossroads where our collective choices have the power to lead us down one of two paths. One path takes us to a future in which stewardship actions prevail and the community is doubling down on cleanup efforts, transforming the lakes back into our greatest natural assets. The other leads us to a day when our lakes are widely seen as liabilities of neglect and underinvestment. It is time we made the lakes a higher priority in our decision-making and commit to guiding them back to a healthier state. RENEW THE BLUE offers guidance on how to do just that.

SOLVABLE CHALLENGES

Considered among the most studied in the world, the Yahara lakes are both complex and dynamic. We know them well and their fate is in the math. With every pound of phosphorus capable of producing up to 500 pounds of algae, our waters mirror an upstream landscape that is out of balance. Clearly, watershed lands that surround and drain to the lakes are the keys to their recovery.

That path to recovery begins with good news in the watershed's predominantly rural headwaters. More than ever, agriculture is adopting conservation practices that are helping to restrict sediment-bound phosphorus from washing off fields and into nearby streams. Conservation-minded farmers, producers, and land stewards are responsible for these gains, and their efforts to improve soil health and curb erosion merit continued celebration and support.

But a warmer and wetter climate is masking these gains, sending more snowmelt and stormwater runoff sweeping across the landscape. January, February, and March are particularly noteworthy months for their disproportionate impact. It is from thawing farm fields—made more vulnerable by winter and early-spring runoff events—where most of the lakes' phosphorus contributions originate.

Phosphorus has accumulated in soils over decades of farming, but it is the fraction contained in raw manure spreading that is most mobile during this critical time. These early-season pulses of phosphorus then cascade down the rest of the chain, affecting each lake along the way. Fortunately, farmers continue to innovate and adapt by composting manure and planting more grasses and forages in their rotations. Their efforts provide for the more beneficial use and timing of manure applications. But while promising steps are underway to increase manure storage, digestion and composting, more action and support are needed in these areas if current trends are to be reversed.

Meanwhile, in our urban settings, the autumn leaf-fall period presents its own challenges and opportunities. Dissolved phosphorus easily escapes from the wet, decaying leaves that accumulate on residential streets and parking lots, resulting in the largest source of urban phosphorus pollution. With each rainfall, a nutrient-rich "tea" washes down street gutters, into storm sewers, and eventually out to the lakes. Municipalities are increasingly stepping up to address this concern by expanding leaf collections, street sweeping and composting operations, but more is still needed.

Great strides are being made to rectify past wrongs and find better paths forward. That progress is owed to a strengthening culture of leadership, investment, and cooperation that is getting more of the right practices adopted. Over the last 30 years, monitoring data show declining phosphorus and sediment concentrations entering Lake Mendota during the growing season. If it were not for increased rainfall and runoff during this same period, conservation efforts would have resulted in a ***36% decrease*** in phosphorus delivered. These same measures often produce benefits extending well beyond water quality, such as improvements to soil health, wildlife habitat, air quality, flood abatement, drought resilience, weed and pest resistance, and operational cost savings.

Yet we also know it will take more than these current "Best Management Practices" alone to reach our water quality goals, and increased phosphorus loading is the proof. With urban boundaries expanding to accommodate a rapidly growing population, the hardening of the landscape coupled with a shrinking rural land base is sure to magnify challenges in the years ahead. This means the more we can build soil health, reduce runoff, and address known sources of phosphorus and *E. coli*, the better the outlook for our lakes and surrounding communities.

A PATH TO RECOVERY

The 19 member organizations of the Yahara CLEAN Compact believe a better future is possible in which "all community members feel connected to, proud of, and responsible for our lakes and streams in the Yahara watershed." With a commitment to "clearer lakes, open beaches, and fewer cyanobacteria blooms," Compact members sought to build upon prior work to address the root causes of today's lake impairments, excess phosphorus, *E. coli*, and runoff.

Grounded in science and informed by public input, priority actions are set forth in which all major stakeholders can participate, focusing effort where it can make the biggest difference. Action recommendations recognize that everyone has a part to play, that we are all in this together, and that more must be done to reach our goals. Recommendations are therefore allocated among five stakeholder groups believed to have the greatest agency to affect change.

- Agriculture
- Builders & Developers
- Government
- Parks & Open Space Managers
- Residential & Commercial Landowners

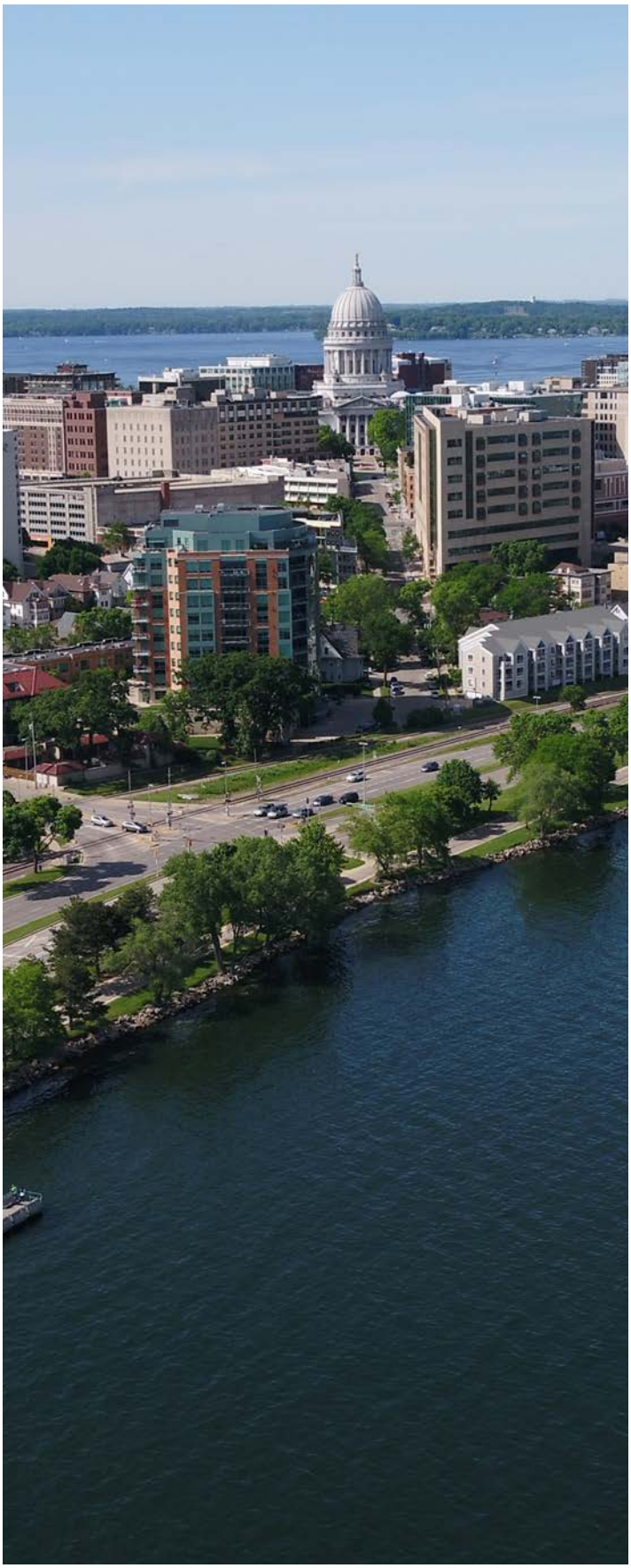
The vision of clearer lakes with fewer cyanobacteria blooms and beach closures is attainable. While past plans focused attention primarily on the Government and Agriculture stakeholder groups this plan seeks to empower participation by a broader cross-section of the community. As more individuals implement changes at their homes and places of business, the more likely those same individuals will advocate for policies, incentives, and funding models that will help support and sustain the overall effort.

Scientists estimate that the number of summer days when our lakes are clear and free of algal blooms will double if average annual phosphorus loading is reduced to 47,600 pounds. This represents a 57% reduction from the current 30-year annual average (110,100 pounds), a gap that has increased by several percentage points since a decade ago. While closing this gap and reaching the target threshold is ambitious, it is certainly achievable if enough of the right actions are taken. We also have improved understandings to direct that action to where and when it is most needed.

FOUR MAIN PRIORITIES

- **Prioritize action in the high phosphorus-loading period between January to March.** During this time, runoff over frozen farm fields delivers large quantities of dissolved phosphorus to the lakes. High levels of soil phosphorus and runoff, a lack of overwintering cover crops and vegetative cover, and/or the winter spreading of raw manure would characterize those areas at greatest risk.
- **Prioritize actions that reduce phosphorus runoff from urban streets.** The autumn leaf-collection period is a time of high dissolved phosphorus delivery to the lakes. This "leaf tea" effect is increasing with climate change and development. Municipal efforts that strive for leaf-free streets and reduced runoff, especially through coordinated action with area residents, can be effective at addressing this problem at the source.
- **Prioritize actions that reduce net phosphorus availability in the watershed.** The most promising methods to achieve this objective include transporting manure outside of the watershed (usually as digested or composted solids), transporting manure within the watershed to replace the use of commercial fertilizer, and reducing imports of phosphorus-containing fertilizers and feed supplements.
- **Prioritize action in areas most directly connected to the lakes.** Target resources to urban and rural areas where surface runoff drains directly to the lakes, rather than into closed depressions.

Reducing phosphorus helps keep our beaches open by limiting the magnitude and extent of potentially toxic cyanobacteria blooms. Phosphorus-reducing actions should also be paired with those that address the sources of *E. coli* (and associated pathogens) that threaten public health. RENEW THE BLUE provides a framework for how these objectives can best be accomplished.



TOP OVERALL ACTIONS

To the right are the top direct- and indirect-impact actions considered most foundational to reaching water quality goals. They are emphasized here over other important plan recommendations given their strategic significance in targeting high-loading time periods or locations, major sources of pollution or runoff, or because of their importance in facilitating effective implementation and progress reporting.

Because of their continued relevance and proven effectiveness, many recommended actions found in this guide are carryovers from prior Yahara CLEAN planning efforts, highlighting continuing opportunities to expand their implementation within the watershed. For all recommended actions, tactical approaches seeking to limit pollutant sources are preferred over those that restrict the pollutant's mobility on the landscape or try to remove it once it has entered a waterway.

Exploring and leveraging emerging market-based solutions and alternative funding models can be a game changer in moving all actions forward. Many of these tools have already proved successful in other areas. RENEW THE BLUE recommendations are not only meant to guide our own individual decisions as stakeholders, but to help the larger community promote policies and investments that can carry us into a new era of resource stewardship.

TODAY'S "WATERSHED MOMENT"

Established science and sound planning are vital, but they will only take us so far. Fostering a culture of action also depends on continued trust and relationship building among the five stakeholder groups and supporting nonprofit organizations. Yahara CLEAN Compact members placed a high emphasis on expanding the umbrella of participation in the watershed, including having more organizations, perspectives, and public input reflected in the planning process. The goal is to continue building a more diverse coalition motivated by shared values. If successful, vital feedback loops will be created. And as more people use, appreciate, and help care for the lakes, more people will start demanding what is necessary to improve them.

Every action matters. We know what is expected of us, and now we are called upon to muster the willingness

TOP DIRECT-IMPACT ACTIONS

1. **Build additional manure-processing capacity.** Support farmers in using existing manure-processing facilities or to build their own on-farm systems. Pilot a manure-collection and processing program targeting the critical January-March period when most phosphorus loading occurs.
2. **Increase the ability to handle and transport manure.** Use composting and other processing techniques to allow for improved timing and targeting of applications. Minimize chemical fertilizer use by substituting with composted manure or other sources of crop nutrients generated within the watershed.
3. **Increase farmland acres guided by a nutrient management plan.** Use plans to improve operational decision-making, ensure the most efficient use of costly nutrient inputs, and reduce the risk of phosphorus loss.
4. **Increase farmland acres under no-till (or reduced tillage) and continuous living cover.** Limit soil disturbance and maintain a living root in the soil with cover/forage crops, harvestable buffer strips, overwintering hay, etc. to build better soil health and reduce erosion.
5. **Increase municipal street-cleaning miles and frequency during the fall.** Regularly remove leaf litter from streets to prevent rainwater-leached phosphorus from entering storm sewer systems.
6. **Protect internally drained lands and wetlands.** Use closed depressions (accounting for an estimated 41% of the watershed) to naturally retain and absorb runoff. Maintain and restore wetland function to achieve similar benefits.
7. **Increase green-infrastructure installations in parks, new developments, and on existing residential and commercial properties.** Incorporate nature-based solutions such as rain gardens, bioswales, infiltration trenches, and permeable pavement to capture, absorb, and filter runoff. Use tools such as stormwater utility credits, rate adjustments, and recognitions to reward action.

TOP INDIRECT-IMPACT ACTIONS
1. **Continue to work together as Yahara CLEAN Compact members.** Maintain ongoing member meetings to collaborate on recommended actions, report progress, and coordinate effort around new initiatives. Ongoing collaboration should consider how actions might affect the watershed phosphorus mass balance, among other factors.
2. **Increase participation in producer-led watershed groups.** Expand farmer involvement in conservation planning and practice adoption through continued learning, information sharing, and distribution of cost-share incentives.
3. **Complete an inventory of shoreline and beach conditions.** Establish guidelines and criteria for the sustainable design, development, management, and restoration of shorelines and public beaches.
4. **Increase *E. coli* testing at public beaches.** Focus efforts on beaches shown to be most susceptible to problems. Assess *E. coli* bacteria sources at beaches with high closure rates so corrective measures can be taken.
5. **Continue to track and report progress.** Use and support the annual State of the Lakes Report as a means of outreaching to the community. Support continued maintenance and operation of stream-gaging stations that track changes in phosphorus loading.

and resources to follow through. RENEW THE BLUE offers guidance on stakeholder roles and lays the groundwork for recruiting more water quality champions to the cause. Compact members have already stepped up to serve as leaders on this front. Plus, with the arrival of new conservation organizations and partnerships in the last decade, like Clean Lakes Alliance, Yahara Pride Farms and Yahara WINS, there is renewed momentum to help propel us forward.

Designed to be an inclusive and accessible menu of solutions, RENEW THE BLUE complements and reinforces other regional planning goals, such as those that relate to climate and flood resiliency, renewable energy, and sustainability. Greater Madison is poised to further its water quality goals through improved outreach, funding, and land management, and phosphorus reduction remains the central lever that must be pulled to get us there. Fortunately, the road ahead is built on a solid foundation of progress and collaboration, and it leads toward a vision for our lakes that is both possible and within our grasp.

"It may take several decades to reach the target P [phosphorus] load through incremental progress. However, even gradual change may produce noticeable improvements in water quality before the target is met. In a study by Lathrop and Carpenter (2014), the frequency of good water clarity during the summer in Mendota and Monona was linearly related to P loading. This means that every percentage of P loading reduction will lead to a proportional percentage improvement in the frequency of good water clarity."

- Chapter 2.0. State of the Science, *RENEW THE BLUE*

WE SHAPE OUR OWN FUTURE

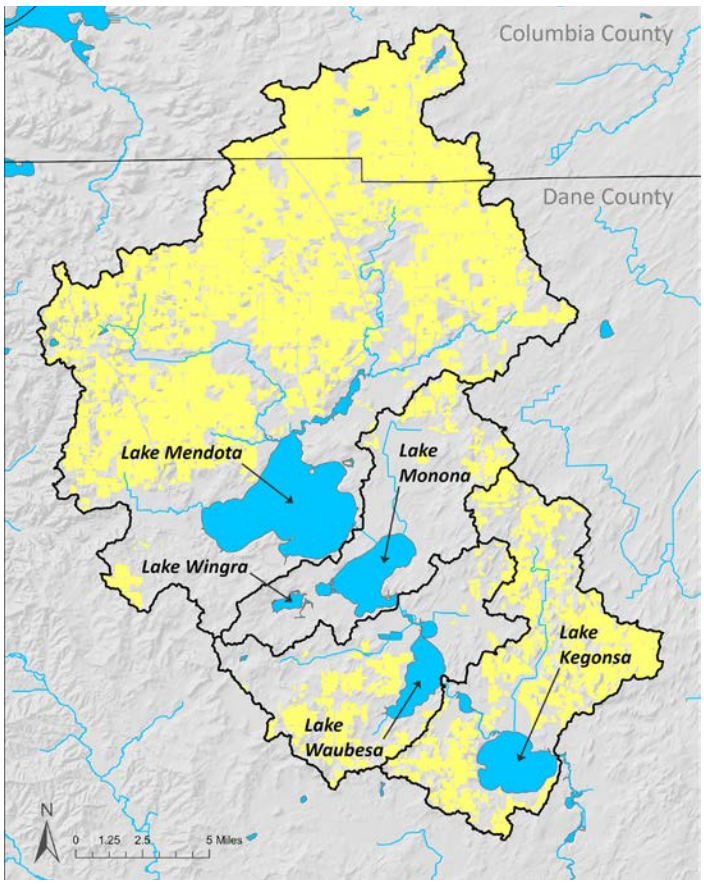
The lakes are counting on all of us. Creating a legacy of clean lakes is a shared responsibility, and we owe it to ourselves to take that responsibility seriously. Yahara CLEAN Compact members are united in the belief that while the challenges may seem daunting, the lakes are too valuable to let the difficult stand in the way of the possible. Our collective actions do make a difference, and the lakes can and will respond favorably. It may not be immediate, but undoing a long history of degradation rarely happens overnight.

"The [Compact] timeline had me skeptical at the start, but it turns out that slow work into a plan has helped to build trust and respect. I've been a part of many public policy brainstorms and think tanks and have often come away feeling like nothing was accomplished. Not the case here. I feel encouraged that our rag tag team is finding solutions that will help, and doing so in a kind and respectful way."

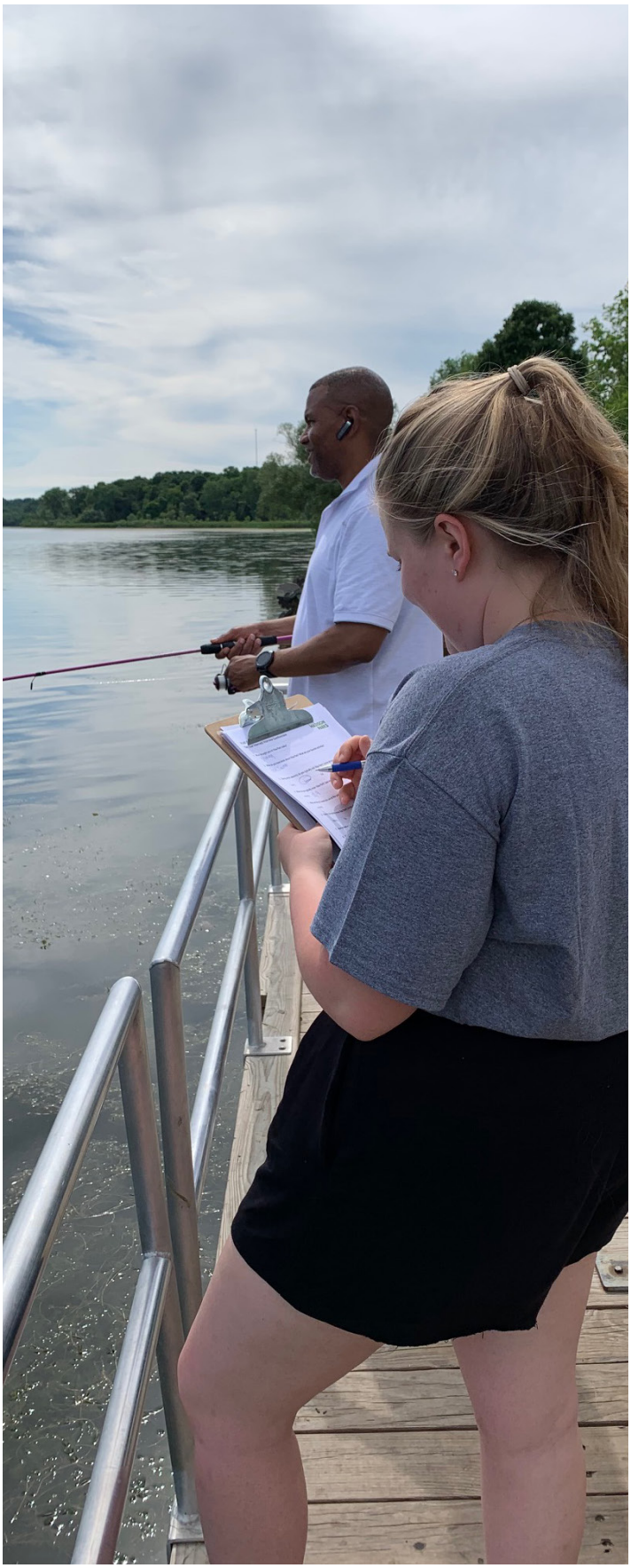
- Ruth Hackney, *CEO, REALTORS of South-Central Wisconsin & member of the Compact Steering Team*

Today, all of us are called upon to renew our efforts and lead by example, to become participants in the solutions, and to advocate for supporting initiatives and investments that will spur us forward. Whether you are a farmer practicing regenerative agriculture that builds critical soil health, a municipality or developer promoting green infrastructure, or neighbors planting rain gardens and raking leaves out of the street, each of us can be an example of leadership and healthy change for others to emulate.

Healthy lakes lead to a healthy community that benefits us all. By adopting a new water ethic, we open the door to making Greater Madison's lakes among the best in the world. Now is the time to renew our efforts with greater knowledge, capacity, intensity, and passion to protect the lakes now and for generations still to come. We hope you join us in this worthy cause.



Yahara lakes watershed - land areas draining directly to the lakes (yellow represents rural, non-urbanized areas)



A CASE FOR ACTION

LAKE VALUES & PERCEPTIONS

A 384-square-mile Yahara Watershed and a chain of five lakes to which it drains—Mendota, Monona, Wingra, Waubesa, and Kegonsa—create a unique sense of place for nearly a half million people, and contribute to the region's identity, economy, recreational offerings, and quality of life. Since their formation approximately 13,000 years ago following the retreat of the glaciers, the lakes have drawn people to their expansive shores. With 29 square miles of surface area and 108 miles of lake shoreline, they are an enduring testament to why the original inhabitants built one of the largest collections of effigy mounds in North America here, and why the native Ho-Chunk call this area Te Jop, meaning Four Lakes.

We are all connected to and impacted by water. Surface waters like the Yahara chain of lakes provide numerous ecosystem services, abundant freshwater resources, flood regulation, outdoor recreation, subsistence fishing opportunities, physical and mental health benefits, and natural habitat for a variety of water-dependent wildlife (Beyer et al., 2014). Our lakes can either serve as our region's biggest natural assets or become its biggest liabilities. Whether lake quality improves or declines, the resulting repercussions are like ripple effects that can extend well beyond the water's edge.

Since the time European settlers found their way here, the Yahara lakes have long suffered from human-caused water quality problems. We see this today in the cyanobacteria blooms and *E. coli* contamination that leads to regular beach closures each season. Increased algal bloom intensity due to phosphorus runoff threatens public health, as contact with toxins produced by cyanobacteria (blue-green algae) can be extremely harmful, and even fatal (Patz et al., 2020). Economically speaking, homes located near algal-infested waters lose approximately 22% of their property value (Wolf & Klaiber, 2017). Alternatively, when resources are invested to improve lake health and water quality, property values in the area tend to rise (Eiswerth et al., 2005). According to a 2014 lake-user study commissioned by Clean Lakes Alliance, an estimated two jobs and over $150,000 of economic impact are conservatively generated from every 1,000 visitors to the lakes (Northstar Consulting Group, 2014).

Although readers of the free weekly newspaper, Isthmus, voted "the lakes" as the number one thing to celebrate about Madison in the 2017-18 Annual Manual, 77% of City of Madison taxpayers expressed dissatisfaction with the quality of the lakes (City of Madison Services Satisfaction Survey, 2009). Another survey conducted by Dane County found that citizens of the greater Madison area who are educated about their watershed and regularly use the Yahara lakes for recreational purposes are more likely to think that the lake's water quality is very poor (Madison Area Municipal Stormwater Partnership Survey, 2018).

EFFECTS OF A CHANGING CLIMATE AND LANDSCAPE

Algal blooms, poor water clarity, and high bacterial concentrations at public beaches are the primary, but not exclusive, water quality concerns in the Yahara lakes (Wisconsin DNR, 2020, Rock River TMDL Report, 2011, Clean Lakes Alliance State of the Lakes, 2012-2020). Algal blooms can deplete waters of their dissolved oxygen, cause fishkills, and prevent sunlight from penetrating the water column, negatively impacting aquatic life. Cyanobacteria has the potential to produce cyanotoxins dangerous to people, pets, and wildlife. People are exposed to these toxins by swimming in, accidentally swallowing, or inhaling aerosolized contaminated water, as well as by consuming fish from untreated waterways and essentially interacting with contaminated lakes (Patz et al., 2020).

Both cyanotoxins and high *E. coli* bacterial concentrations contribute to the recurring beach closures the Yahara lakes experience each year (Patz et al., 2020, Clean Lakes Alliance State of the Lakes Report, 2012-2020). An increasingly wetter and warmer local climate, combined with a loss of wetlands and other water-absorbing landscape features, exacerbate these problems by

delivering more runoff and phosphorus, and by creating ideal conditions for algal growth. The Greater Madison area has been experiencing a long-term trend of warmer temperatures and increased rainfall volume and intensity, which is all very likely to continue (Varvus, 2021 Greater Madison Lake Guide). All five Yahara lakes, several stream tributaries, and nine public beaches are designated as "impaired" under the Clean Water Act for failing to meet basic use and quality standards, mostly due to phosphorus and *E. coli* (Wisconsin DNR, 2020).

The growth potential of algae and cyanobacteria is determined by the availability of phosphorus, a natural element and essential nutrient that has become overabundant due to human activities on the landscape. Most phosphorus (40% of the annual total) enters the lakes during January to March runoff events when rainfall and snow-melt cannot infiltrate into frozen soils (Diebel et al., 2020). Over half of the total phosphorus input into the Yahara lakes originates from agricultural settings (Montgomery Associates, 2014), and with most occurring during this critical time period (Diebel et al., 2021). High ammonium concentrations measured in runoff samples during this time within the Lake Mendota watershed likely tie these high phosphorus inflows to winter manure spreading (Lathrop, 2021 & Diebel, 2021). In addition, reducing phosphorus levels that have built up in the soil will be critical to improving and sustaining the quality of our lakes and streams in the future (Motew et al., 2017).

Long-term records show that phosphorus loading to the lakes is increasing as a result of more precipitation and runoff, and despite the positive impacts of conservation practices within the watershed. Most of this phosphorus loading is delivered in overland rainfall and snow-melt runoff to streams and drainage ditches that carry it to the lakes (Diebel et al., 2021).

BUILDING ON WHAT WORKS

The Yahara lakes and their contributing watershed have been the subject of study and management interventions for decades (Lathrop and Carpenter, 2013). Past management efforts include large-scale sewage treatment and diversion projects, whole-lake food web manipulations, and the expanded implementation of stormwater treatment and soil conservation measures. While prior community investments have laid a foundation for future water quality improvements, an analysis of the long-term data record shows that water quality conditions are not improving (Diebel et al., 2020 & Ness, 2017). While total annual phosphorus loading can be highly variable, there has been no discernable trend over the last 30 years. In fact, the average annual phosphorus load to the lakes during the 1976-2008 baseline period used for the Yahara CLEAN Strategic Action Plan for Phosphorus Reduction was 95,200 lbs./year. Using data from the most recent 30-year period (1990-2020), the baseline load was shown to have increased to 110,100 lbs/year as an annual average. This means that the reduction needed to meet a 47,600 lbs/year recommended target load is now 62,500 lbs/year, or a 57% reduction from current conditions (Diebel et al., 2020).

Achieving the goal of clean lakes will require building on what is working. The good news is that we know what works, and that the bulk of the 14 priority action recommendations from the *Yahara CLEAN Strategic Action Plan for Phosphorus Reduction* are still valid and should continue to be pursued (Diebel et al., 2021). We also know that reducing runoff and phosphorus inputs have the greatest potential to generate water quality improvements (Diebel et al., 2020). Statistical modeling that controlled for climate and stream-flow variability shows there would have been a 36% decrease in phosphorus loading to Lake Mendota over the prior 30-year period if weather patterns had stayed constant. This suggests the positive impact of conservation practices are currently being masked and overwhelmed by increased rainfall (Dane County Land & Water Resources, 2019).

STRATEGIES FOR SUCCESS

Until recently, about 15% of the Yahara watershed was mapped as internally drained (closed depressions that hold back surface water), and phosphorus-reducing actions in these areas have been excluded from progress-tracking reports. Using higher-resolution terrain data derived from LiDAR and new GIS tools, it is now possible to refine this map. New estimates show that about 41% of the Yahara watershed is internally drained. This means that past progress reporting is likely overestimating the impact of conservation practices located in these areas. It also means that future actions might be best targeted to the other 59% of the watershed where runoff is delivered directly to the lakes (Diebel et al., 2020).

Actions that help limit net phosphorus availability, such as increasing phosphorus exports out of the watershed while decreasing imports, have the greatest potential to result in lasting improvements in the lakes. In fact, a recent analysis conducted by UW-Madison demonstrated a significant and sustained "mass balance" improvement following the addition of the watershed's two manure digesters that allow for easier export of nutrients (Booth, 2021). The most promising methods include transporting manure (usually digested or composted solids) outside of the watershed, transporting manure within the watershed to replace commercial phosphorus fertilizer for non-livestock farms, and reducing imports of phosphorus-containing fertilizers and feed supplements (Diebel et al., 2020).

Sources of phosphorus in the watershed are not evenly distributed, with some areas contributing more than others. As the continued adoption of conservation measures becomes increasingly effective at preventing soil movement, more emphasis will be needed on rural strategies that focus on reducing dissolved phosphorus delivered during late-winter and early-spring runoff events, and especially in areas hydrologically connected to the lakes. In urban settings, the timely removal of fall leaf debris from streets would effectively target the primary urban source of dissolved phosphorus loads (Diebel et al., 2021). Phosphorus in its dissolved state is much more mobile and difficult to manage, as well as more biologically available to algae once it reaches surface waters.

Many factors that affect water quality can change simultaneously. As practices are being implemented, other factors and variables are changing that can mask progress. Plans and goals should therefore be more robust to account for changes that are less within our control, such as climate, invasive species, and land use (Diebel et al., 2021). In addition, it is well established that there can be long lag times between management interventions and water quality responses in lakes. The good news is that the Yahara lakes are shown to recover quickly after experiencing high influxes of phosphorus (Lathrop & Carpenter, 2013), meaning they respond favorably to phosphorus loading reductions.

ALL OF US PLAY A ROLE

The Yahara CLEAN Compact's partners and collaborators remain united in the belief that while the challenges are great, so is our understanding of what needs to be done and what we stand to gain. The following plan offers an updated roadmap for how we can work together for a better water quality future. Designed as a community user guide, the plan includes specific action guidance for five major stakeholder groups considered to have the most agency to affect change in the watershed. residential and commercial property owners, local units of government, farmers and agricultural landowners, builders and developers, and parks and open space managers.

Our collective actions make a difference, and all of us are called upon to lead by example by doing what we can within our own spheres of influence. Creating a legacy of clean lakes for the benefit of this and future generations is a community responsibility, and it will take motivated and empowered community members to make it happen.

1.0 BACKGROUND

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1.1 INTRODUCTION

Greater Madison's communities are known and loved for their majestic lakes. These glacial relics have enriched our area with their magnetic beauty and abundance for thousands of years. Indigenous cultures were the first to recognize their value. With lakes like Mendota, Monona, Wingra, Waubesa, and Kegonsa rich in fish, wild rice, and other natural amenities, native inhabitants were known to congregate around their shores. The building of one of the most concentrated groupings of effigy mounds in North America is a testament to their spiritual importance. The area and its water were considered sacred to the early Woodland and Ho-Chunk peoples, and the lakes were viewed as worldly gifts to be respected and revered.

European colonialism would later forcibly supplant indigenous populations, severing a prior relationship with water and the natural world that was driven by reverence and respect. Settlers were also drawn to the lakes, with the arrival of land speculators marketing the financial appeal of these assets whose value could be sold for profit. As Madison grew into a regional trade and population center, the widely held perception of a vast and limitlessly resilient resource quickly unraveled. Raw sewage dumping and the conversion of surrounding lands to "productive use" drained protective marshes, stripped the landscape of its prairies and woodlands, and turned the once clear waters into symbols of abuse and degradation. It was an early wake-up call that would launch an era of human-engineered repair efforts that continues to this day.

In more recent times, a growing understanding for how landscape-management decisions and policies connect to the quality of our waters is leading to a new era of awareness, conservation, and stewardship. This is perhaps most evident in the formation and strengthening of organizational partnerships. Today, collaboration is occurring more than ever among all levels of government, as well as between watershed nonprofit associations, alliances, Friends groups, and producer-led councils and their memberships, and often with significant private-sector support and involvement. Collaborations such as these are representative of a caring community that is stepping up to play a role in the solutions. The Yahara CLEAN Compact is one example of groups coming together in common purpose to turn challenge into opportunity. Significant partner actions and progress have and continue to be made, including:

- Newly formed organizations and partnerships, such as Clean Lakes Alliance, farmer-led groups like Yahara Pride Farms and Biological Farmer Friends, and the Yahara Watershed Improvement Network
- More acres of agricultural land under nutrient management plans and conservation practices
- Increased adoption of urban green infrastructure and stormwater treatment installations
- Investments in innovative solutions like removing legacy stream sediment ("Suck the Muck")
- A more engaged public actively volunteering, learning, advocating, and supporting organizations and government bodies working for positive change

Doubling down on this success and what we know is working will be paramount to achieving our water quality goals and objectives. The more the public is engaged and uses our lakes and beaches, the more it will demand the action and funding support that builds additional momentum for continued progress.

1.2 YAHARA CLEAN OVERVIEW

Three initiatives emerged independently in the fall of 2007, each responding to identified needs for visioning and planning for the Yahara lakes. The Yahara Lakes Legacy Partnership was created to coordinate, support, and provide for communication among the initiatives, and to formulate a plan for continued, long-term, broader partnerships aimed at protecting and enhancing Yahara lakes and watersheds. The three initiatives were:

1. **Yahara CLEAN (Capitol Lakes Environmental Assessment and Needs) Memorandum of Understanding** (MOU) between Dane County, Wisconsin Department of Natural Resources (DNR), Wisconsin Department of Agriculture, Trade & Consumer Protection (DATCP), and the City of Madison. Its purpose was to assess existing nutrient and sediment loading to the Yahara lakes and determining actions required to decrease the loading and address bacterial outbreaks at beaches to improve water quality. Dane County provided funding to support work on this MOU.

Table:1 Timeline of important Yahara CLEAN milestones (see above)

YEAR	DEVELOPMENT
2008	Memorandum of Understanding formalizes the Yahara CLEAN partnership between Dane County, City of Madison, Wisconsin Department of Natural Resources, and Wisconsin Department of Agriculture, Trade & Consumer Protection.
2010	*A CLEAN Future for the Yahara Lakes: Solutions for Tomorrow, Starting Today* is published, listing 70 action opportunities to rehabilitate water quality, reduce phosphorus, and improve beach safety. [**CLEAN 1.0**]
2011	UW-Madison Limnologists R. Lathrop and S. Carpenter release *Phosphorus Loading and Lake Response Analysis for the Yahara Lakes* calling for a 50% phosphorus reduction. Clean Lakes Alliance forms a public-private partnership and hires Strand Associates to develop a detailed action plan to achieve the 50% reduction.
2012	*Yahara CLEAN Engineering Report* is published outlining specific actions, reduction targets, and 20-year-present-value costs to implement the major activities. Utilizing the report, Clean Lakes Alliance later releases the *Yahara CLEAN Strategic Action Plan for Phosphorus Reductio*n, streamlining CLEAN 1.0's original 70 phosphorus and *E. coli*-reduction opportunities down to 14 phosphorus-reduction actions to achieve the 50% goal. [**CLEAN 2.0**]
2013	Clean Lakes Alliance begins investing in projects and efforts to reduce phosphorus as recommended in CLEAN 2.0. It also begins the tracking and public reporting of community progress toward our Yahara CLEAN goals through an annual State of the Lakes Report.
2016	A CLEAN 2.0 forecasting analysis by Clean Lakes Alliance raises concerns about a slowing pace of implementation progress in the face of intensifying headwinds, such as climate change. The analysis introduces questions about whether we're still on track to achieve water quality goals.
2018	A Dane County Healthy Farms, Healthy Lakes Task Force recommends that the County "continue to support, implement and evaluate the *Yahara CLEAN Strategic Action Plan* and other Yahara watershed water quality efforts." Recommendations included reconvening the Yahara CLEAN partnership coalition for the purpose of evaluating, updating, and adopting the *Yahara CLEAN Strategic Action Plan for Phosphorus Reduction* (2012).
2019	Clean Lakes Alliance reconvenes and expands the Yahara CLEAN partnership. Renamed the Yahara CLEAN Compact, a coalition of 19 partners and collaborating organizations sign on to a Letter of Intent and begin regularly meeting to develop an updated action plan for the lakes. [**RENEW THE BLUE**]
2021- 2022	The RENEW THE BLUE updates are completed, and a public rollout of the recommendations focused on five major stakeholder groups is initiated.

2. **City of Madison budget amendment**. Provided funding to initiate a planning process to pull together stakeholders and community members to establish clear and achievable goals and an implementation plan for cleaning the lakes.
3. **The Yahara Lakes Legacy Project.** Gathering Waters and Clean Wisconsin, two nonprofit organizations with funding from the Madison Community Foundation, documented historical lake rehabilitation efforts and developed ideas for a common vision for restoring and maintaining a healthy, sustainable Yahara lakes watershed.

Representatives of these three initiatives were brought together under the auspices of the Dane County Lakes and Watershed Commission through its Visioning, Partnerships, and Planning Committee. All parties agreed the different initiatives would ultimately be more successful if they cooperated with one another.

Launched in 2008, Yahara CLEAN remains an evolving lake-improvement partnership and planning effort. Despite a long and storied history of watershed and in-lake management interventions, evidence of persistent water quality problems has prompted the partnership to try to mobilize an effective response. Table 1 shows a timeline of important Yahara CLEAN milestones that shows the progression of partnership building and planning.

Today's Yahara CLEAN Compact is motivated by the belief that we can and must do better for our lakes. It is driven by a philosophy that we should be able to regularly enjoy the waters in our own backyard and play a role in their protection. Further, it envisions facilitating a cultural shift in which our lakes, streams, and wetlands are not only revered, but inspire behavior change that sets us apart as a national leader in water quality stewardship.

1.3 THE MAKING OF A COMPACT

Lake and watershed rehabilitation often flounders when community participation and investment cannot match the scope of the challenge. It is a reality made worse given that opportunities and barriers to success are always changing, causing even the best-laid plans to fall short in delivering on promised outcomes.

CLEAN 1.0

Following decades of management interventions and growing public dissatisfaction in the quality of Greater Madison's lakes, a government partnership was formed in 2008 to determine what it would take to finally achieve clean beaches and improved water quality. Another motivation was growing concern at the time that the lakes were on their way to being listed as "impaired" under the federal Clean Water Act for failing to meet designated uses and minimal water quality standards.

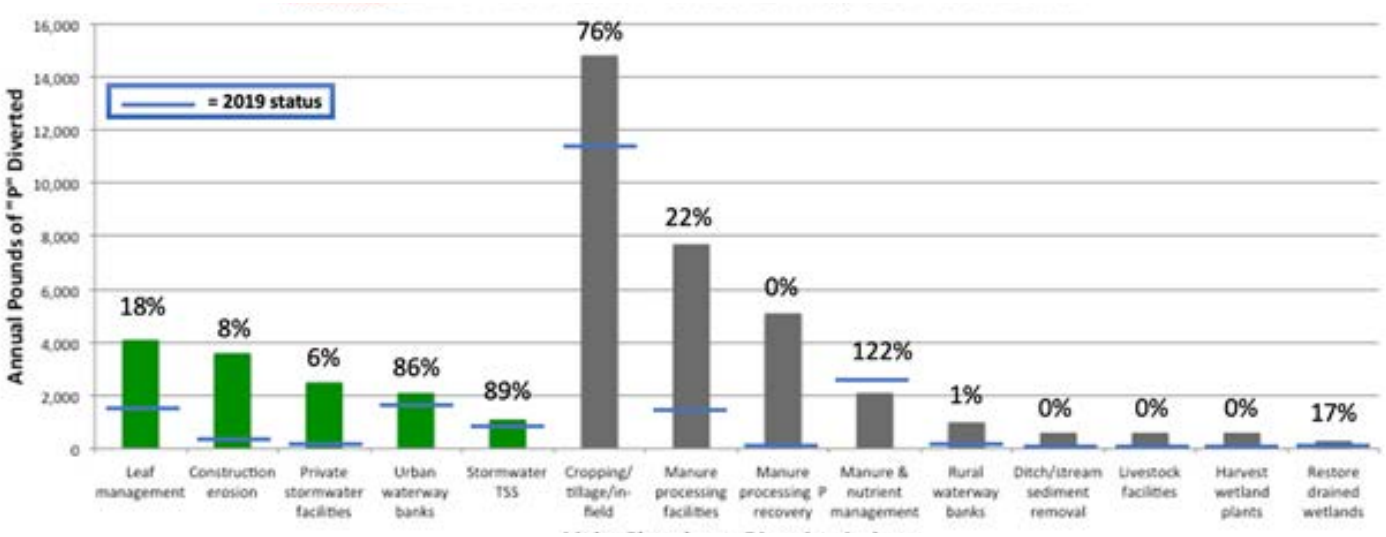

Figure:1 Yahara CLEAN 2.0 Action Goals and Progress Dashboard (see discussion in the following page)

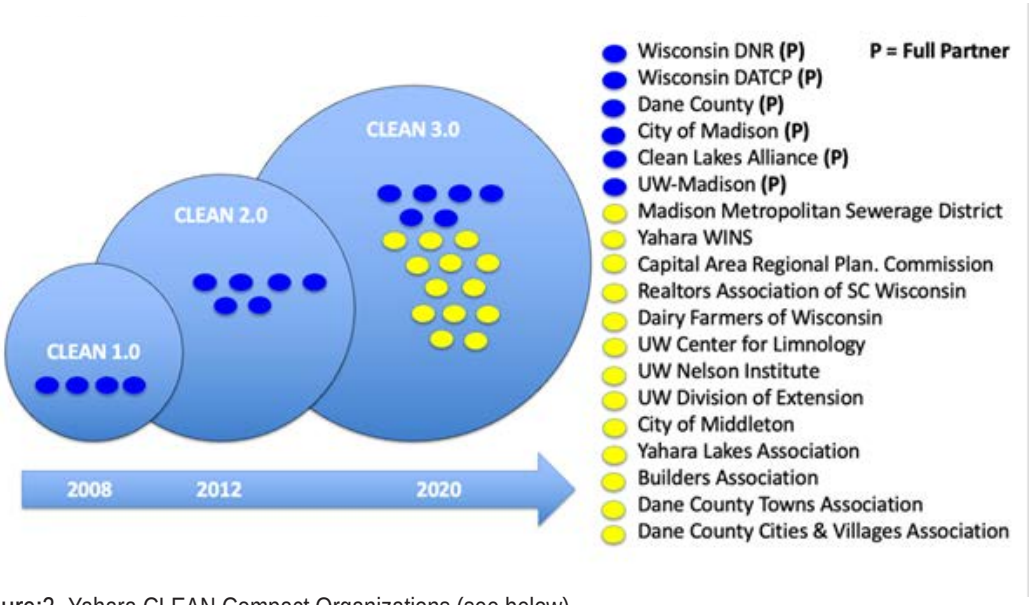

Figure:2 Yahara CLEAN Compact Organizations (see below)

The resulting partnership and planning effort, referred to as Yahara CLEAN (Capital Lakes Environmental Assessment and Needs), generated a report outlining 70 action opportunities to reduce phosphorus and *E. coli* contamination. This report was titled *A CLEAN Future for the Yahara Lakes: Solutions for Tomorrow, Starting Today (2010).*

CLEAN 2.0

In 2011, the newly formed Clean Lakes Alliance reconvened and expanded the partnership. University of Wisconsin-Madison scientists were brought into the fold, as well as members of the Clean Lakes Alliance Community Board and Yahara Pride Farm's Conservation Board. The objective was to turn the list of 70 action opportunities into a streamlined implementation plan. That plan was to focus on the most cost-effective strategies to reach a 50% phosphorus-load reduction called for by UW-Madison scientists. If fully implemented, it was predicted that the number of days each summer when the lakes are clear and free of algal blooms would double.

Working with Strand Associates, the partners developed and released the *Yahara CLEAN Strategic Action Plan for Phosphorus Reduction* in 2012. The plan offered a 14-action road map that continues to guide phosphorus-reduction work in the watershed to this day. One year following its release, and despite renewed efforts and momentum it helped spark, all five lakes had become designated as impaired waters by the Wisconsin Department of Natural Resources and U.S. Environmental Protection Agency.

It took several years of carrying out the plan and tracking progress for the partners to begin questioning whether the rate of implementation, especially in the face of climate change, was sufficient to meet water quality goals (see Figure 1 showing progress by action through 2019). It was this concern that prompted Dane County's Healthy Farms, Healthy Lakes Task Force to recommend in 2018 that the County,

> "*Continue to support, implement, and evaluate the Yahara CLEAN Strategic Action Plan and other Yahara watershed water quality efforts.*"

Specifically, the Task Force advised the Dane County Board to,

> "*Reconvene the Yahara CLEAN partnership coalition for the purpose of evaluating, updating and adopting the Yahara CLEAN Strategic Action Plan for Phosphorus Reduction. Updates shall account for progress from implemented actions, new information and assumptions used in estimating needed phosphorus reductions, revised cost estimates, staffing needs, implementation roles, and a timeline necessary for full implementation of all action items.*"

Yahara "CLEAN" Compact – Letter of Intent

Capital Lakes Environmental Assessment and Needs

We, the undersigned, recognize that the Yahara River Watershed and its five majestic lakes—Mendota, Monona, Wingra, Waubesa, and Kegonsa—define our sense of place and contribute significantly to the region's economic vitality, recreational standing, and local quality of life. Clean and healthy lakes are truly the benchmark of a healthy community. In recent years, big investments have laid the foundation for future water quality improvements, yet our lakes remain federally impaired, with intensifying climate impacts and other headwinds threatening our progress. It is for these reasons we must take action now. Today, we come together to renew and strengthen our partnership, and to unite around a common vision and action plan for cleaner, healthier lakes.

By signing this letter of intent, we hereby pledge to work cooperatively toward the development of a Yahara CLEAN Compact, with a goal of adopting a shared roadmap to achieve water quality goals for the Yahara chain of lakes. We further pledge to continue our joint efforts defining a scope of work for updating and building upon guidance set forth in the *Yahara CLEAN Strategic Action Plan for Phosphorus Reduction* (2012), and to work together on an implementation framework and timeline for which the community can hold itself accountable.

Preston D. Cole, Secretary — Wisconsin Department of Natural Resources* — 5/8/19

D. Michael Mucha, Director & Chief Engineer — Madison Metropolitan Sewerage District** — 5/8/19

Joseph T. Parisi, County Executive — Dane County* — 5-8-19

Karl J. Martin, Dean & Director — UW-Madison Division of Extension** — 5/16/19

Satya Rhodes-Conway, Mayor — City of Madison* — 5/8/19

Paul Robbins, Dean — UW-Madison Nelson Institute for Environmental Studies** — 5/20/19

James Tye, Executive Director — Clean Lakes Alliance* — 5/8/19

Jake Vander Zanden, Director — UW-Madison Center for Limnology** — 6/7/19

Brad Pfaff, Secretary — Wisconsin Department of Agriculture, Trade, & Consumer Protection* — 5/22/19

Martin Griffin, Executive Committee President — Yahara Watershed Improvement Network (Yahara WINS)** — 6/27/19

Chad T. Vincent, CEO — Dairy Farmers of Wisconsin** — 5/8/19

Larry Palm, Executive Chairperson — Capital Area Regional Planning Commission** — 7/15/19

Rebecca M Blank, Chancellor* — University of Wisconsin - Madison — 8/30/19

Ruth A. Hackney, Chief Executive Officer — REALTORS® Association of South Central Wisconsin, Inc.** — 10/3/2019

Gurdip Brar, Mayor — City of Middleton** — 10/9/2019

Sal A. Troia, President — Yahara Lakes Association, LTD.** — 10/10/2019

Chad M. Lawler, Executive Director — Madison Area Builders Association** — 1/27/20

Robert Wipperfurth, President — Dane County Cities & Villages Association** — 1-27-2020

Jerry Derr, President — Dane County Towns Association** — 2-19-2020

Partners

Partners are official signatories to the Compact providing agreed upon staff and financial resources to facilitate the Yahara CLEAN updating process. They typically have participated as original Yahara CLEAN agency signatories and/or would have direct responsibility or control over plan implementation. Partners, through their designated representatives, are invited to participate on a steering team to finalize a scope of work to be included in a Request for Proposals, furnish information as needed, and provide input and guidance to the contracted consultant hired to develop the updated plan. Partners are granted final sign-off privileges related to any completed work products under the Compact, and will make their best effort to follow the resulting implementation guidance upon completion.

****Collaborators***

Collaborators are supporting agencies or organizations that play a significant cooperating role in watershed phosphorus reduction and/or improving water quality, and are provided opportunities for input and information sharing.

Figure:3 Yahara CLEAN Compact Letter of Intent with Signatures

In 2019, Clean Lakes Alliance acted on the Task Force recommendation by reconvening and further expanding the Yahara CLEAN partnership, bringing 19 governmental bodies and community organizations together under a single planning umbrella. The progression of the partnership over time is illustrated in Figure 2. Members of the new coalition, named the Yahara CLEAN Compact, signed on to a multi-year effort to jointly create a refreshed action plan (see Letter of Intent in Figure 3). The plan was to leverage the momentum of recent implementation successes, utilize the latest scientific understandings, and provide updated direction on how to address some of our lakes' biggest challenges. It was also meant to elevate the issue of lake health as a community priority, and signal to the larger public that more must be done to address current problems.

Today's Yahara CLEAN Compact is a coalition of partners and collaborators who.

1. Share a desire to meet our water quality goals sooner rather than later,
2. Understand the value of working together in a cooperative and coordinated manner to achieve mutual objectives,
3. Recognize that factors such as climate change and resource constraints impede our collective progress, and
4. Agree that public buy-in and participation are foundational to overall success.

1.4 GOALS & OBJECTIVES

The simple desire of being able to enjoy safe, swimmable lakes was a unifying theme among Compact members from day one. As a coalition, members worked to champion common clean water values and to jointly guide community leaders and stakeholders willing to take the steps necessary for a better water future. It would be through a more community-inclusive road map that members hoped to galvanize efforts around a shared vision for the lakes.

VISION

All community members feel connected to, proud of, and responsible for our lakes and streams in the Yahara watershed.

GOALS

Clearer lakes. Open beaches. Fewer cyanobacteria blooms.

OBJECTIVES

- *Build on progress and leverage what we have learned.*
- *Focus on reducing phosphorus, runoff, and E. coli entering the lakes.*
- *Support clean-water actions that contribute to healthier soils and shorelines.*

BELIEFS & COMMITMENTS

- *We see clearer lakes with open beaches and safer water at the center of our community.*
- *We believe the lakes belong to and benefit all of us, and that success depends upon thoughtful inclusion of diverse voices and experiences.*
- *We are bringing new partners, collaborators, and resources to the table, and are committed to an inclusive and transparent process.*
- *We recognize that community efforts are already making a difference, and that there are new tools to help us expand and accelerate our progress.*
- *We believe a strong set of strategies will be equitable, effective, lasting, affordable, inclusive, achievable, and adaptable. They will be urban and rural, communal and individual, and help us nurture and care for the lakes we love.*
- *We will leverage science, experience, culture change, collaboration, outreach, and funding.*

- *We will bring our passion, creativity, and experience to the table in service of our common goals.*
- *Working together, we will choose proven strategies, create metrics to keep them on track, identify funding to support them, and design outreach to sustain them.*

The Compact was created under the premise that healthier lakes are not only attainable but a priority. It was also understood that recurring beach closures and the failure of our lakes to support basic water quality and use standards were symptoms of a watershed out of balance. Through this updated plan, the Compact strives to correct these imbalances, accelerate the pace of action, and overcome current barriers to progress. It has attempted to do this by building on past recommendations, investments and successes, and by facilitating a broader and more participatory community role in the solutions.

To achieve the Compact's goals and objectives, plan updates focused on engaging multiple levers of opportunity to affect transformational change.

- **Economics** - Markets and incentives that fuel and sustain the creation of more sustainable landscapes.
- **Projects/Practices** - Infrastructure and activities that function to address identified problems.
- **Public Engagement** - Opportunities that foster awareness, understanding, and action.
- **Policies** - Formalized community expectations and frameworks that level playing fields, reduce conflicts, and minimize negative externalities.
- **Resources** - Funding and empowerment mechanisms that put plan recommendations into motion.
- **Information** – Metrics and measurable performance data that enhances understanding, decision-making, and progress-tracking.

The following, four-phased logic model was developed early in the process to establish relationships between planning activities and expected outcomes (Figure 4).

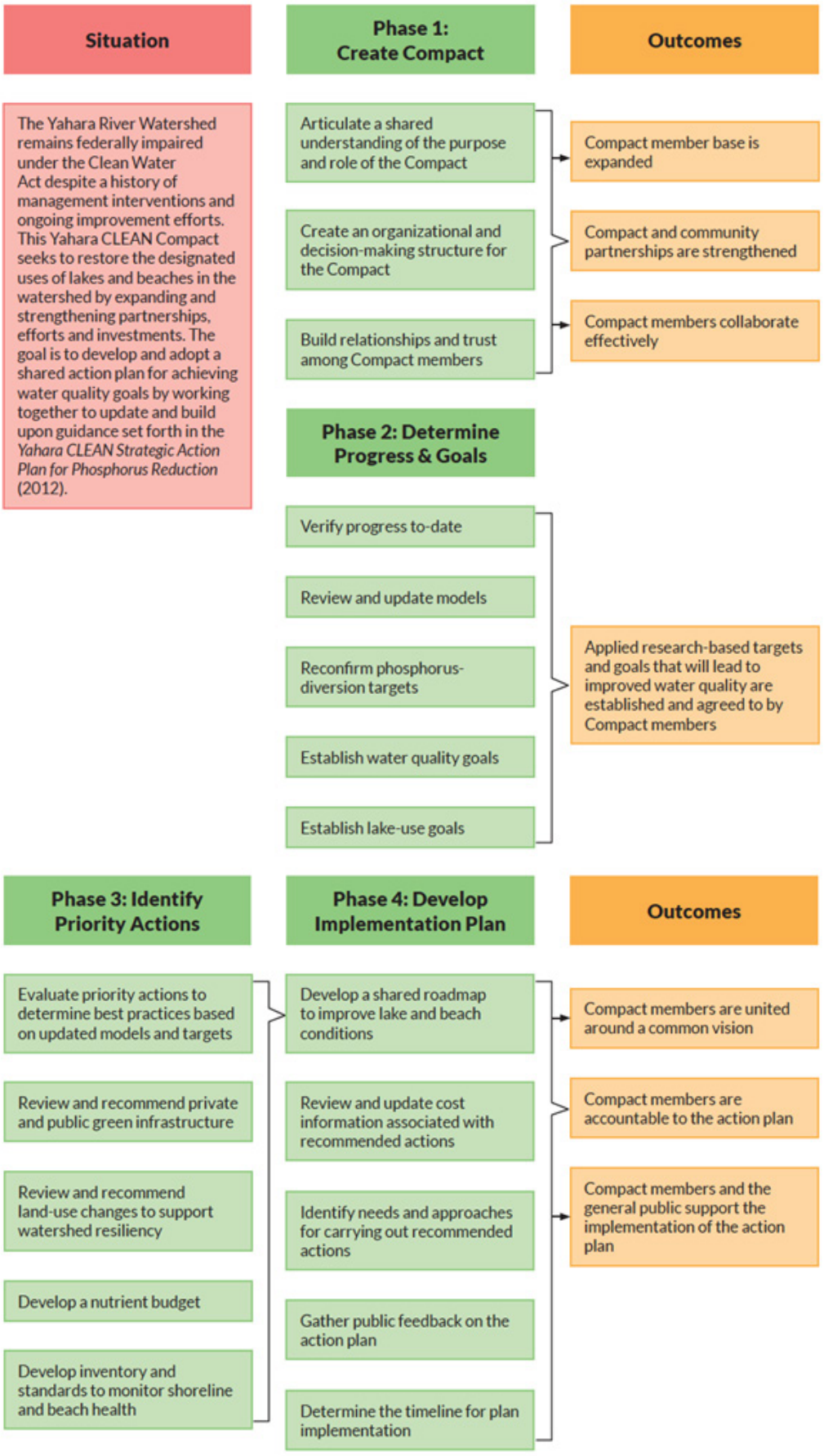

Figure:4 Four-Phased Logic Model

1.5 RENEW THE BLUE PLAN PURPOSE

The RENEW THE BLUE plan is intended to improve lake water clarity, prevent beach closures, and reduce the frequency of cyanobacteria blooms. It specifically focuses on reducing phosphorus, runoff, and *E. coli* inputs originating from the surrounding watershed to achieve these outcomes. What makes this implementation plan update unique from those before it is fourfold.

1. It involves more of the watershed community in the identification and participation of solutions by giving major stakeholder groups a role to play,
2. There is an added focus on runoff reduction and beach health as means of accomplishing key outcomes,
3. It attempts to direct actions toward critical time periods and locations for maximum impact, and
4. It views changes in the "mass balance" of phosphorus within the watershed as paramount to sustaining change over the long-term.

Importantly, RENEW THE BLUE is not intended to serve as a comprehensive lake management plan. Those types of plans attempt to manage in-lake processes, such as aquatic plant growth and recreational use. The Yahara CLEAN Compact and this plan are also different but complementary to the Yahara WINS Adaptive Management project. Yahara CLEAN represents partnerships and planning directly focused on cleaning up the lakes to make them more useable to the general public. Among its goals is to reduce the amount of phosphorus loading within each lake's direct drainage area to a degree that will result in a modeled lake response. Alternatively, Adaptive Management is a permit-compliance tool governing how point source contributors can work with nonpoint sources to meet P-reduction requirements at the lowest cost. In Adaptive Management, P reduction credits can come from anywhere within the Yahara "River" Basin, including from areas that do not drain to the lakes.

1.6 OPERATING & DECISION-MAKING FRAMEWORK

The graphic in Figure 5 illustrates the operating and decision-making structure of the Yahara CLEAN Compact. Participation roles were defined by each organization's committed level of involvement as either a full partner or strategic collaborator. These classifications, roles, and expectations are described below.

In general, partners make up the Executive Committee, which has final decision-making authority, and serve on the larger Steering Team and topic-focused subgroups. Collaborators participate exclusively through the Steering Team and its subgroups, which are advisory to the Executive Committee. With the Steering Team being the larger deliberative body, a "gradient of agreement" process was used to conduct straw polls and get a sense of the room when crafting recommendations. Partner designees then decide and act on Steering Team recommendations in a separate Executive Committee meeting that follows, and with the knowledge of any opinions or issues raised by individual groups.

Steering the overall process, Clean Lakes Alliance served as the Compact's convenor, managing director, and fiscal agent. This multi-faceted role involved overseeing service contracts as approved by the Executive Committee. Contracted services were employed to assist with monthly meeting planning and facilitation, public engagement, and overall plan development. To maintain transparency, a Yahara CLEAN webpage was hosted and maintained by Clean Lakes Alliance through which meeting notes and other documentation could be made available for public review.

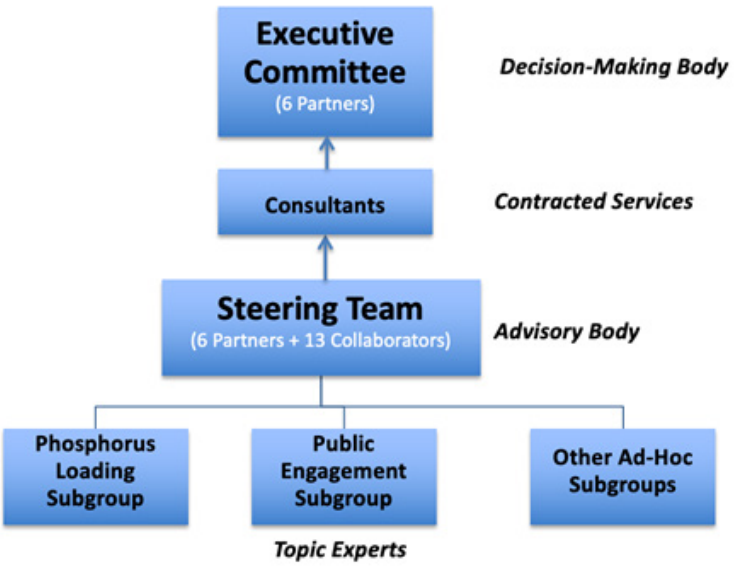

Figure:5 Operating and Decision-Making Structure

1.7 PARTNERS

Partners are voting members of the Executive Committee under the Compact, providing agreed upon staff and financial resources to facilitate the Yahara CLEAN updating process. A two-year, annual contribution of $25,000 ($50,000 total) was requested from each partner to help pay for related costs. Represented by an appointed lead designee and co-designee, partners are expected to,

1. Participate on the Executive Committee to make decisions related to budget, consultant hires, final recommendations, and project deliverables, commit to send a representative to at least five of every seven Executive Committee meetings,
2. Participate on the Steering Team to finalize the scope of work and oversee its implementation,
3. Participate on subgroups as needed to gather detailed or technical information and to provide analysis and deliberation,
4. Assist in the development of as-needed Requests for Proposals, and vote on the selection of any needed consultants with contracts executed by Clean Lakes Alliance,
5. Furnish agreed upon information, staff support, and financial resources helpful to the effort,
6. Provide input and direction to any contracted consultants,
7. Agree to a public communication strategy and process,
8. Sign off on any final recommendations and project deliverables produced under this Compact, and
9. Support and work to implement the updated plan upon its completion.

1.8 STRATEGIC COLLABORATORS

Collaborators are supporting agencies or organizations that often play a significant cooperating role in reducing watershed phosphorus and/or achieving water quality improvements. A two-year, annual contribution of $1,000 ($2,000 total) was requested to demonstrate full investment in the effort and to help pay for related costs. Collaborators are provided opportunities for input and information sharing but are not voting members of the Executive Committee under the Compact. Represented by an appointed lead designee and co-designee, collaborators are expected to,

1. Participate on the Steering Team to provide guidance and information to the Executive Committee on goals, scope of work, consultant hires, final recommendations, project deliverables, and public outreach, commit to send a representative to at least three of every four Steering Team meetings,
2. Participate on subgroups as needed to gather detailed or technical information and to provide analysis and deliberation,
3. Share information, perspectives, guidance, and advice within the Steering Team and Subgroups, and as needed with contracted consultants, and
4. Support and work to implement the updated plan upon its completion.

1.9 UPDATING THE ROADMAP

EVOLUTION OF A LIVING PLAN

Over a decade has passed since the partnership's original "CLEAN 1.0" guidance was released in *A CLEAN Future for the Yahara Lakes: Solutions for Tomorrow, Starting Today*. Around that time, growing public dissatisfaction in the condition of the lakes and beaches was a clear indicator that water quality expectations were not being fulfilled.

Today, a refreshed cleanup effort has a broader and more diverse coalition of partners behind it, signaling a new chapter of community cooperation and participation. Despite recent progress in getting recommended actions completed, we now know a wetter climate (among other factors) is more than offsetting those beneficial impacts. The good news is that cleanup goals and most of the action priorities identified in the *Yahara CLEAN Strategic Action Plan for Phosphorus Reduction* (CLEAN 2.0, 2012) are

Compact members participating in a web call.

still valid. Also, new information is telling us we can better target our efforts, and updates to the plan are intended to leverage these refined understandings about timing and location opportunities. Ultimately, more can and needs to be done, and all of us are being called upon to play a role as fellow stakeholders.

The most effective plans always reflect the best information available. As approaches, technologies, and implementation capacities evolve, so do the headwinds that threaten the pace of progress, such as invasive species, changing weather patterns, and intensifying land-use impacts. The RENEW THE BLUE plan that follows accounts for accomplishments and progress to date, reaffirms phosphorus-reduction targets, and sets forth revised strategies and tactics to complete the needed work. It also attempts to capitalize on new understandings and opportunities, address known implementation barriers, and hold us accountable to the actions needed for success. If successful, our lakes and beaches will be cleaner and more useable, and a culture of action and sustainability will prevail throughout the watershed.

"Anyone who visits our lakes knows that we deserve better and can do better. Unwavering community support and advocacy to clean up our lakes will continue to be the key ingredient to our success. As we work together to develop and implement the Compact, we must all stay engaged and give voice to the community's expectation for bold action. There is no better time than now."

- Matt Frank, *former Clean Lakes Alliance Board Chair and former Wisconsin DNR Secretary during CLEAN 1.0*

"Given the way people feel about the Yahara lakes, simply continuing current efforts while still dealing with blue-green algae blooms, fish kills, non-swimmable beaches, and poor water quality overall, is less and less acceptable to more and more Dane County residents."

- *A CLEAN Future for the Yahara Lakes*, 2010

As we enter the tenth year of implementing the *Yahara CLEAN Strategic Action Plan for Phosphorus Reduction* (2012), this plan update aims to better align partner efforts around an achievable action strategy for attaining shared water quality goals. It is a response to more intense runoff events, continuing challenges with manure handling, and expanding urbanization that hardens the landscape and limits land-treatment options for livestock waste. To tackle these and other issues, the plan provides stakeholder guidance to increase practice-adoption rates, enhance the capacity of implementation partners, and expand the base of participation.

Fortunately, the Compact is building on a solid foundation of innovation and success. Recent on-the-ground accomplishments would not have been possible if it were not for local leaders investing in needed actions. The Yahara CLEAN Compact worked to build upon these recent successes and partnerships, offering improved ways to target and coordinate efforts so we might reach our goals that much sooner. By growing the coalition and elevating the issue of lake health as a public priority, we hope to rally people around the best solutions to our challenges. Clean water should not be something we have to wait decades to experience. The Compact and this plan represent our commitment to keep that from happening.

THE PLAN UPDATING & PUBLIC ROLLOUT PROCESS

Yahara CLEAN Compact members met monthly for over two years to execute all four phases of plan development as summarized in the logic model shown earlier. This process involved the following steps.

1. Recruit and finalize coalition membership
2. Create operating agreements
3. Produce a logic model linking planning activities with expected outcomes
4. Understand the history and latest science behind water quality drivers
5. Establish common goals, objectives, and values to guide us to our destination
6. Develop and carry out a public- and stakeholder-engagement plan
7. Assess progress to-date and determine what is already working well
8. Identify priority action recommendations for five major stakeholder groups
9. Develop an updated implementation plan informed by science and public input

Following plan completion, Compact members will enter a coordinated public-messaging and rollout phase. This phase is expected to culminate in a plan unveiling and celebration of partner efforts as part of a Clean Lakes Alliance-hosted, public-rollout event (spring of 2022).

"The Yahara CLEAN Compact is driven by a philosophy that everyone should be able to regularly enjoy the lakes and play a role in their protection. We envision a cultural shift in which lakes are revered, intertwined with daily life, and motivate all of us to act on their behalf. Our community is tired of waiting. [As a Compact], we're prepared to do what it takes to make our shared vision a reality – not just for future generations, but for our generation."

-James Tye, *Clean Lakes Alliance Founder & Executive Director*

2.0 STATE OF THE SCIENCE

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2.1 PRIMARY WATER QUALITY CONCERNS

Algal abundance, water clarity, bacteria concentrations, and aquatic plants strongly influence the perception of water quality and the suitability of lakes for recreation.[1] Algal blooms can also harm aquatic life by depleting dissolved oxygen when they decompose and by shading aquatic plants that serve as habitat. Cyanobacteria blooms (commonly referred to as blue-green algal blooms), in particular, are a problem because of their tendency to form scums that accumulate along shorelines and their potential to produce toxins. Algal blooms can be very patchy and their severity can change from day to day based on weather and other factors.

High enteric bacteria concentrations (i.e., *E. coli*) also occur at many beaches on the Yahara lakes and can cause illness when water is ingested while swimming.[2] Monitoring data indicate that bacterial contamination is mainly delivered by runoff from storm sewer outfalls near beaches, although dense geese populations near beaches (e.g., Vilas Beach at Lake Wingra) are also a source of contamination.

Abundant invasive aquatic plants (e.g., Eurasian water milfoil) are a nuisance for many kinds of recreation. Conversely, native aquatic plants do not usually cause problems and are a natural and important part of lake ecosystems. Invasive plants and animals have also caused undesirable changes in the lakes, and some species thrive in poor water quality conditions.

2.2 PHOSPHORUS CONTROLS ALGAL BLOOMS

Algae require several nutrients to grow. Numerous studies, however, have shown that cyanobacteria blooms in lakes can be controlled by reducing phosphorus inputs. The types and abundance of cyanobacteria can also be influenced by other factors, including nitrogen, light, and food web effects, but these factors have weaker effects relative to phosphorus, and are more difficult to control.[3] During extended dry periods (1987-1988, 2002-2003, 2011-2012) with low phosphorus inputs to the Yahara lakes, lake phosphorus concentrations declined substantially and water clarity improved, indicating that the lakes should respond relatively rapidly to sustained reductions in phosphorus inputs.[4] However, feasible reductions in phosphorus will likely not reduce aquatic plant abundance because aquatic plants get most of their nutrients from the bottom sediments, and reduced algae may actually increase plant cover, particularly in shallow areas, because of increased penetration of sunlight.[5]

1 Smeltzer & Heiskary (1990) found strong relationships between user perception of water quality and Secchi depth and chlorophyll a in Minnesota and Vermont lakes. Unpublished research by M. Diebel on Wisconsin lakes found similar relationships.

2 Bacteria are a natural part of lake ecosystems, and many are harmless to humans. However, some types of bacteria and viruses, particularly those found in animal feces, can cause gastrointestinal illness when ingested. *E. coli* is a common bacterium in feces and is therefore used as an indicator of potential health risks of swimming. *E. coli* is monitored regularly during the summer at the most popular beaches on the Yahara Lakes, and results are used to issue swimming advisories.

2.3 PHOSPHORUS LOADING: STATUS, TRENDS, SEASONAL PATTERNS, AND SOURCES

A. PHOSPHORUS LOADING STATUS AND TRENDS

I. MONITORING NETWORK

The primary source of information on phosphorus loading to the Yahara lakes is a set of tributary stream monitoring stations (Figure 6) operated by the United States Geological Survey (USGS). USGS maintains a website that describes the sites and monitoring methods, provides publications based on the monitoring, and names the partner organizations who contribute to the operational costs. In addition to phosphorus, other water quality parameters, including suspended sediment and nitrogen, are monitored at several of these stations. Monitoring at several stations started in 2011 or 2012. Because stream flow has been highly variable since this time, trends in phosphorus at these stations cannot yet be confidently characterized. Two stations (Yahara River at Windsor and Pheasant Branch at Middleton) have approximately 30-year records and are the basis for most of the information on phosphorus trends. These two stations are both tributaries to Lake Mendota, inferences from these stations may not be applicable to the other Yahara lakes that receive the majority of their phosphorus inputs from the outlet river water of their respective upstream lake (particularly for shallower lakes Waubesa and Kegonsa with their relatively fast flushing rates).[4]

3 Schindler et al. 2016.
4 Lathrop & Carpenter 2014.
5 Lathrop et al. 2013.

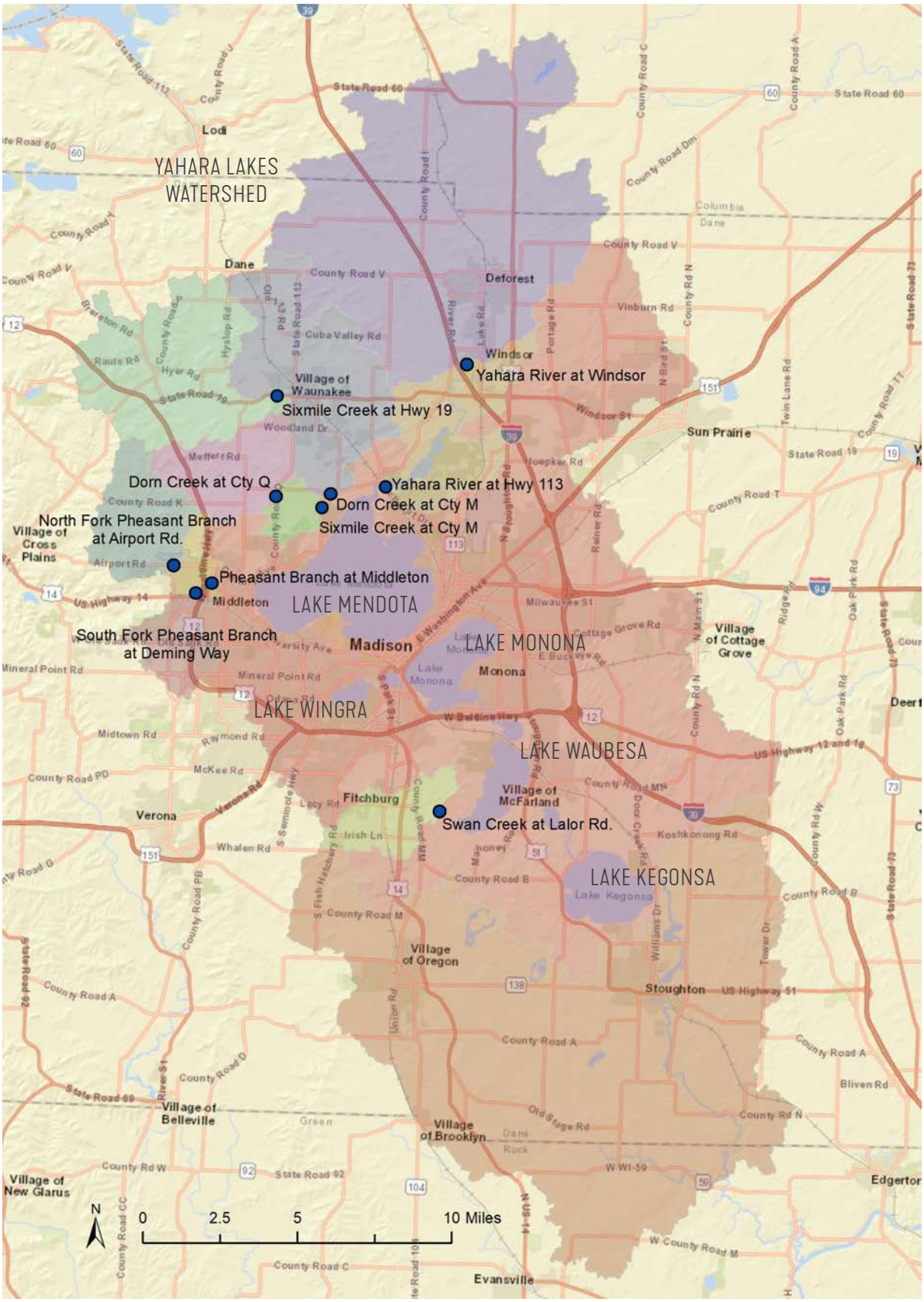

Figure:6 Map of U.S. Geological Survey's water quality monitoring stations located within portions of the Yahara River Watershed that drain to the lakes.

II. LOAD CALCULATIONS

Phosphorus (P) input to the lakes is measured as mass per time (e.g., lbs. per year), and is typically called "load" or "flux". Load divided by the drainage area of a monitoring station is called "yield" and is a good variable for comparing stations. Loads are calculated and published annually for each station by the USGS using the GCLAS computer program. P concentrations are measured in discrete samples that are collected routinely during low flow conditions and more frequently during runoff events. GCLAS is used to fill in the gaps between these discrete samples to give continuous P concentration estimates.

The continuous concentrations are then multiplied by stream flows and summed to give daily P loads. Daily loads are then summed by year to give annual P loads. Annual loads are strongly affected by stream flow, which is highly variable as a result of variations in rainfall and snow-melt, making it difficult to evaluate trends in P loading caused by management over time. The following section describes a method for factoring out flow variability to better evaluate trends at individual stations and compare yields among stations.

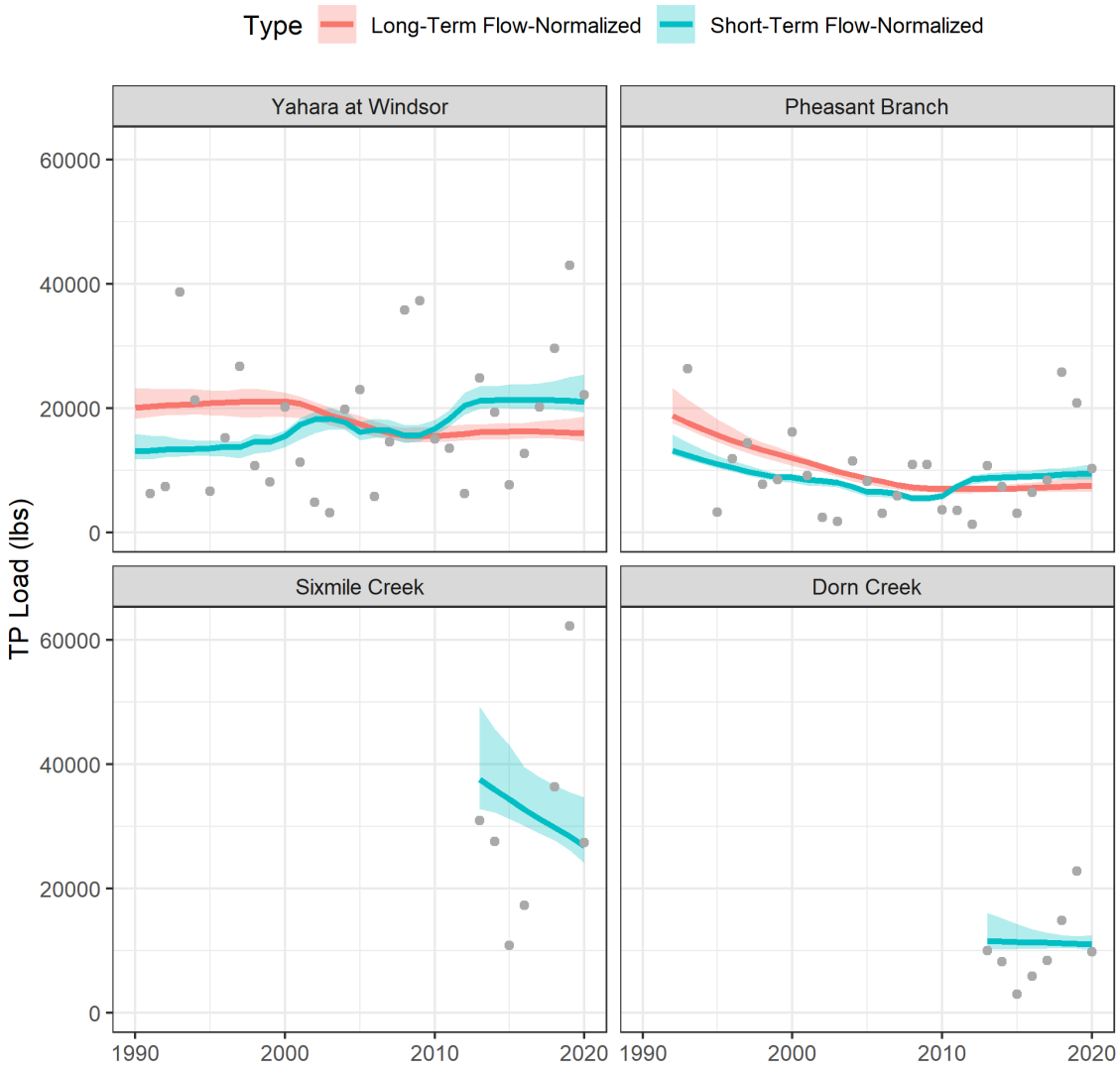

Figure:7 Actual and flow-normalized trends in total phosphorus loads in Lake Mendota tributaries (bands are 90% confidence intervals).

III. FLOW-NORMALIZED TREND ANALYSIS

A new analysis was conducted by Diebel, Lathrop, and Stuntebeck to evaluate trends in P loading in Lake Mendota tributaries. A statistical method called Weighted Regressions on Time, Discharge, and Season (WRTDS) was used to estimate trends in P loading with the effect of flow variation removed, referred to as flow-normalized (FN) loads. Details of this analysis will be included in a manuscript intended for publication. A summary of the preliminary results is presented in the following sections.

IV. TRENDS IN PHOSPHORUS LOADING

P loading to Lake Mendota from the Yahara River and Pheasant Branch has increased over the last 30 years, but this increase was primarily caused by increased stream-flow. FN P loads decreased over this same period, indicating that changes in watershed management would have decreased P loading if stream-flow had not increased (Figure 7). FN P loads in Pheasant Branch decreased the most, by 60%, from 1992 to around 2008, but have not changed since around 2008. FN P loads in the Yahara River decreased by 20% from 2000 to around 2008, and also have not changed since around 2008. FN P loads in Sixmile Creek appear to have decreased over the 8-year period of record, 2013-2020, but the change is not statistically significant. There was no change in FN P loads in Dorn Creek over the same period. Stream-flow varied substantially among years in this period, making it unlikely that any trend would be statistically detectable.

There are several possible causes of the decreased FN P loads at Pheasant Branch and Yahara. The timing of the largest decreases in the 1990s at Pheasant Branch and early 2000s at Yahara coincides with a large reduction in net P imports (e.g., fertilizer, animal feed) to the Mendota watershed (see section 2.4.C.i. for details). With assistance from the Lake Mendota Priority Watershed Project from 1998 to 2008, many farms implemented agricultural conservation projects around this same time. In addition, a large detention basin was constructed in 2002 immediately below the confluence of the South Fork and North Fork of Pheasant Branch that has been shown to trap a significant amount of suspended sediment (and sediment-bound P).[6] The lack of further decreases in FN P loading after around 2008 indicates that any effects of additional P-reducing actions described in section 2.5.A.iii. have been offset by other changes in the watershed. In addition, the majority of the actions expected to reduce agricultural runoff P since 2008 occurred in the Sixmile and Dorn Creek watersheds where many farms participate in Yahara Pride Farms cost-share programs. However, as described above, the relatively short period of record in those watersheds with widely varying stream-flow makes it difficult to detect trends.

6 Gebert et al. 2012.

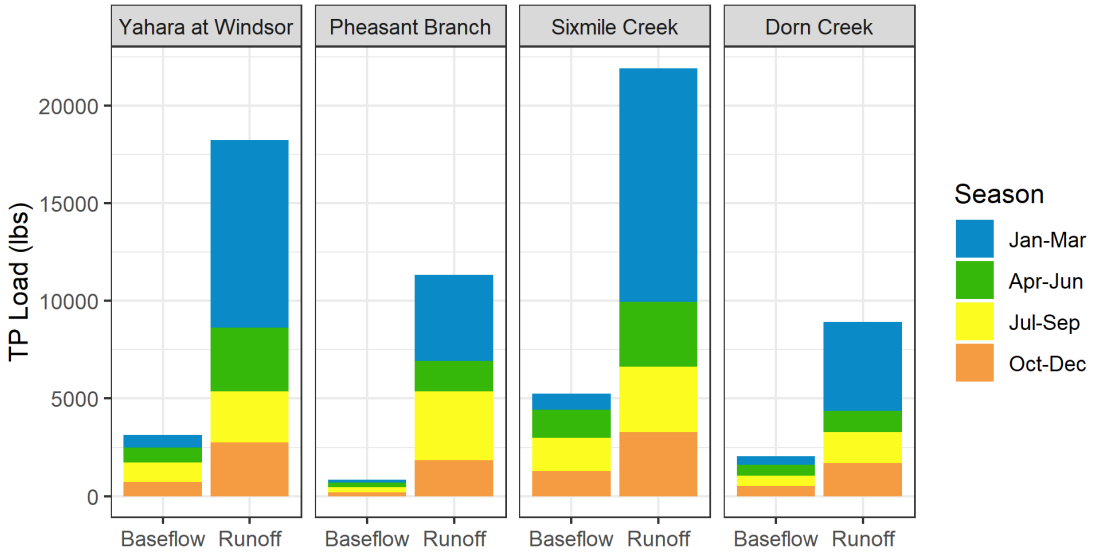

Figure:8 Seasonal distribution of total phosphorus loads in base-flow and runoff in four Lake Mendota tributaries.

In addition to changes in management of existing land uses, land use change itself may be a contributing factor to trends in P loading. The amount of developed land increased from 16% to 29% in the entire Yahara lakes watershed between 1992 and 2019 (Figure 9). In the two sub-watersheds with long-term monitoring, developed land now makes up much more of the Pheasant Branch sub-watershed (16% developed in 1992 to 40% developed in 2019), while the Yahara at Windsor sub-watershed is still primarily agricultural (6% developed in 1992 to 13% developed in 2019). Stormwater management practices on newly developed land can retain a significant amount of runoff and may lead to lower overall P loading as agricultural land is developed. Further monitoring in other developing sub-watersheds, such as at the new USGS gage on Swan Creek in Fitchburg, will help determine if this trend is common.

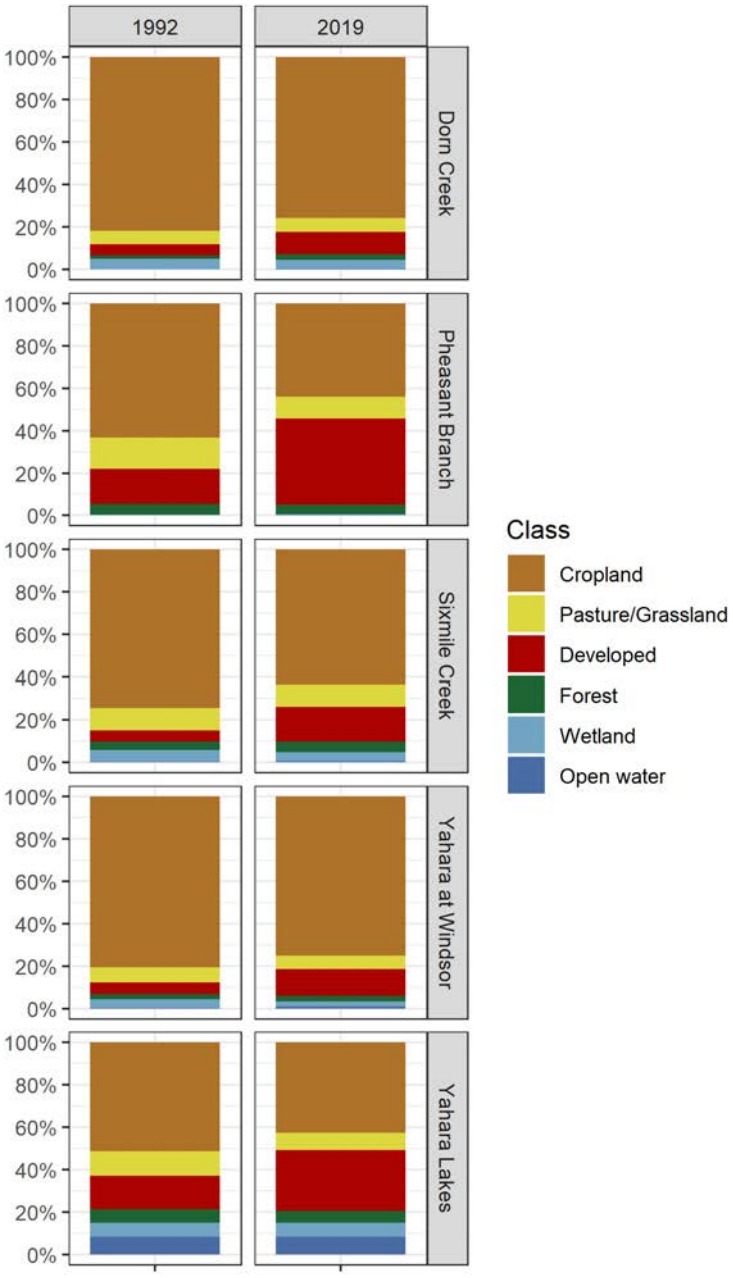

Figure:9 Land cover change in Yahara River watersheds from 1992 (Wiscland) to 2019 (NLCD).

V. SEASONAL DISTRIBUTION OF PHOSPHORUS LOADING

P loading varies seasonally in Lake Mendota tributaries because of variation in stream-flow and runoff P concentrations. The largest fraction of annual P loading (37 to 48%) occurred in Jan-Mar in all of the monitored streams (Figure 8). Most of the January through March P loading occurred in runoff, which can be caused by rain or snow-melt at this time of year. There are probably three factors contributing to high P loads from January to March. 1) frozen ground leading to more runoff volume for a given amount of precipitation or snow-melt, 2) little vegetation present to slow runoff and promote settling of particulate P, and 3) manure spread on crop land during the winter not being incorporated into the soil and easily transported by runoff.

Stream-flow and sediment loads are also disproportionately high January through March. Since snow-melt and rain on frozen ground leads to runoff events that do not typically have high sediment concentrations (based on field-edge monitoring), the higher sediment concentrations observed during January-March are likely a result of channel erosion. Channel erosion is often caused when large volumes of water are being passed through the system with a lack of vegetation to slow its velocity. Freeze-thaw cycles also help degrade channel banks.

VI. PHOSPHORUS LOADING IN RUNOFF EVENTS

In the average year, most (81-93%) P is transported to Lake Mendota in runoff, rather than base-flow[7] (Figure 8). The seasonal distribution of large runoff events (those transporting more than 0.1 pounds of P per acre of contributing watershed) is similar to the overall seasonal

7 In this analysis, stream-flow is separated into runoff and base-flow with a statistical procedure called a recursive digital filter (Fuka et al. 2018). Runoff is the quickly varying component and base-flow is the slowly varying component of stream-flow. Runoff is mostly water moving over the ground surface to streams, but may include some fast subsurface water movement, such as in tile drains. Base-flow is mostly subsurface flow which may include shallow and deep pathways.

Table:2 Total phosphorus yields from watersheds of Lake Mendota tributaries. Loads and yields are 2020 flow-normalized values based on flows from 2014-2020. The method for estimating the contributing watershed area is described in section 2.5 B. v.

STATION	TOTAL WATERSHED AREA (MI2)	CONTRIBUTING WATERSHED AREA (MI2)	PERCENT OF WATERSHED CONTRIBUTING RUNOFF	TP LOAD (LBS.)	TP YIELD FROM CONTRIBUTING WATERSHED (LBS./ ACRE)	TP YIELD FROM TOTAL WATERSHED (LBS./ ACRE)
Yahara at Windsor (05427718)	74.7	28.7	38%	21,312	1.16	0.45
Sixmile Creek at Cty M (05427910)	47.3	30.0	63%	27,122	1.41	0.90
Dorn Creek at Cty M (05427930)	13.0	10.6	81%	10,950	1.61	1.31
Pheasant Branch at Middleton (05427948)	18.8	12.1	64%	12,130	1.57	1.01
Gauged Lake Mendota tributaries	153.9	81.4	53%	71,514	1.37	0.73

Table:3 Seasonal distribution of large runoff events, defined as events transporting more than 0.1 lbs of P per acre of contributing watershed. Values in parentheses are the number of events per year of record.

STATION	PERIOD OF RECORD	JAN - MAR	APR - JUN	JUL - SEPT	OCT - DEC	ANNUAL
Yahara at Windsor	1990-2020	32 (1)	8 (0.3)	7 (0.2)	1 (0)	48 (1.5)
Sixmile Creek at Cty M	2013-2020	11 (1.4)	5 (0.6)	2 (0.3)	2 (0.3)	20 (2.5)
Dorn Creek at Cty M	2013-2020	11 (1.4)	2 (0.3)	2 (0.3)	2 (0.3)	17 (2.1)
Pheasant Branch at Middleton	1992-2020	37 (1.3)	20 (0.7)	11 (0.4)	5 (0.2)	73 (2.5)

Table:4 Sources of P loading (lbs/year) to the Yahara lakes, as estimated by the SWAT model developed for Yahara WINS (Montgomery Associates 2014).

WATERSHED	AGRICULTURE	DEVELOPED	NATURAL	POINT SOURCES	TOTAL
Mendota	40,431 (62%)	21,602 (33%)	3,340 (5%)	1,360 (2%)	66,733
Monona	1,757 (11%)	12,609 (81%)	1,272 (8%)	12 (0%)	15,650
Waubesa	6,347 (36%)	8,580 (49%)	2,619 (15%)	423 (2%)	17,969
Kegonsa	17,210 (70%)	5,058 (21%)	2,265 (9%)	0 (0%)	24,533
Yahara Lakes	65,745 (53%)	47,850 (39%)	9,495 (8%)	1,795 (1%)	124,885

P loading distribution (Table 3). The dominance of runoff vs. base-flow in P loading, along with the seasonal distribution described above, indicates the need to find new strategies to limit winter P runoff (see section 2.5.B.iv.1. for details).

VII. PHOSPHORUS YIELD COMPARISON AMONG STATIONS

P yield is annual P load divided by watershed area (pounds/acre/year). It is a good measure to compare among watersheds because it normalizes watershed loads to differences in watershed area. P yield was calculated from two versions of watershed area. 1) total watershed area, and 2) watershed area weighted by runoff delivery, referred to as contributing watershed area. Runoff delivery is the fraction of the annual runoff volume that is delivered to the sub-watershed outlet (see this map for details, https://experience.arcgis.com/experience/ff3b77e2f8c8440887dd03be0afa7a01/).

P yield from the *total* watershed area of all gaged tributaries to Lake Mendota was 0.73 pounds/acre/year and ranged from 0.45 from Yahara River at Windsor sub-

watershed to 1.31 from Dorn Creek sub-watershed (Table 2). P yield from the *contributing* watershed area was 1.37 pounds/acre/year and ranged from 1.16 from Yahara River to 1.61 from Dorn Creek. For comparison, the field-scale P yield in the entire Mendota watershed was estimated to be 2.8 pounds/acre/year, based on average P Index values in nutrient management plans for 57% of the cropland in the watershed.[8] The difference between field-scale and watershed-scale P yield indicates that differentiating the area contributing runoff from the entire watershed is important, and that even from the contributing watershed, only about 50% of the P is delivered to sub-watershed outlets (i.e., monitoring stations where P loads are measured). This finding has important implications for progress tracking, as described in section 2.4.C.ii.

B. PHOSPHORUS SOURCES

Since the tributary monitoring described in section 2.3.A.i. does not cover the entire watershed of the Yahara lakes, and all of the tributaries have mixed land uses, a watershed model is the best way to estimate P loading for the entire watershed and partition it among sources. Based on the SWAT model developed for Yahara WINS, the sources of P for the entire watershed are 53% from agricultural areas, 39% from developed areas, and minor amounts from natural areas and wastewater.[9] These contributions vary somewhat among the lakes (Table 4).

Based on the most recent P mass balance for the watershed, the largest imports of P to the Lake Mendota watershed are agricultural fertilizer and dairy cattle feed.[10] Most P is delivered in overland rainfall and snow-melt runoff to streams and drainage ditches that carry it to the lakes. Some parts of the watershed contribute more P to the lakes than others.[11] This variation is caused by differences in P sources such as fertilizer and manure, landscape factors such as soil type and slope, and characteristics of flow paths such as depressions and distance to the lakes. The largest source of mobile P in urban areas is tree leaves in streets. Rain water leaches dissolved P from leaves, which is directly transported to the lakes by storm sewers.[12] Despite this large input of P in fall, the largest P loads in some urban areas come in late winter when the highest runoff volumes occur.

P stored in wetlands, stream banks and stream beds also contributes to lake inputs, but most of this P originally came from agricultural and urban runoff.[13] While the downstream lakes (Monona, Waubesa, and Kegonsa) receive some P from their direct drainage basins, the majority of their P comes from the upstream lake(s) through the Yahara River.[14] P is also recycled from the bottom sediments in all of the lakes, this process contributes more to poorer summer water quality in the shallow lakes (Wingra, Waubesa, and Kegonsa) due to wind-driven mixing of the water column in contact with the bottom sediments than in deeper lakes (Mendota and Monona).[15] This internal recycling of P is enhanced by abundant carp populations. Contracted removals of carp from Lake Wingra in 2008 resulted in a dramatic increase in water clarity, although increased growth of Eurasian water milfoil and filamentous algae created other lake management problems that peaked around 2012, in recent years the milfoil growth and associated filamentous algae has lessened substantially.

8 Dane County Land & Water Resources Department nutrient management plan database.
9 Montgomery Associates 2014, Table 3.1 (reaches 62-66). Land cover of the Yahara lakes watershed (excluding open water) in 2019 (USDA Cropland Data Layer) was 54% agriculture, 30% developed, and 16% natural.
10 Booth 2021
11 Montgomery Associates 2014, Figure 3.6. Phosphorus loading rate varies from <0.19 to 1.02 lb/acre/year among sub-basins in the Yahara watershed.
12 Selbig 2016.
13 Huisman et al. 2013.
14 Lathrop & Carpenter 2014, Table 2.
15 Lathrop & Carpenter 2014, p. 6.

Table:5 Summary of annual P loads (lbs/year) for the Yahara lakes.

DIRECT DRAINAGE P LOAD	MENDOTA	MONONA	WAUBESA	KEGONSA	TOTAL
1976 - 2008 Average[1]	65,300	16,500	4,600	8,800	95,200
1990 - 2020 Average	75,500[2]	19,100[3]	5,300	10,200[3]	110,100
Target[1]	32,600	8,300	2,300	4,400	47,600

1 Lathrop & Carpenter, 2014.
2 Sum of measured tributary loads plus estimates of ungauged areas (14%).
3 1976-2008 average multiplied by ratio of 1990-2020 to 1976-2008 averages for Mendota.

2.4 WATER QUALITY GOALS

A. BASELINE AND TARGET PHOSPHORUS LOAD, AND REDUCTION NEEDED TO MEET TARGET

The annual P load delivered to all the Yahara River chain of lakes from the watershed during the late 1980's and early 2000's droughts were used by Lathrop and Carpenter (2014) to set the average annual target load of 47,600 lbs/year. In-lake summer-average P concentrations declined to a desirable 24 µg/L in lakes Mendota and Monona under these conditions. In turn, it was estimated that this would result in a doubling of summer days when the lakes would be free of nuisance algal blooms. While there have been changes in the lakes since CLEAN 2.0 that might affect the response of the lakes to P load reductions, such as the infestation of invasive zebra mussels and spiny water fleas, no alternative load target has been established. We recommend retaining the target load of 32,600 lbs/year to Lake Mendota, with a similar distribution of this load among the lakes as in CLEAN 2.0.

The average annual load during the 1976-2008 baseline period for CLEAN 2.0 was 95,200 lbs/year. Using data from the most recent 30-year period, 1990-2020, the current baseline load has increased to 110,100 lbs/year (Table 5). This means that the reduction needed to meet the target is now 62,500 lbs/year, or 57%, from current conditions. The increase in the baseline and the target load reduction does not mean that actions taken since CLEAN 2.0 have had no effect, instead, recent increases in precipitation and runoff have more than offset effects of implemented actions.

B. HOW WILL THE LAKES RESPOND AS PHOSPHORUS IS REDUCED?

Unless there are rapid, transformational changes to the Yahara watershed, it is probable P loading will change slowly. It may take several decades to reach the target P load through incremental progress. However, even gradual change may produce noticeable improvements in water quality before the target is met. In a study by Lathrop and Carpenter (2014), the frequency of good water clarity during the summer in Mendota and Monona was linearly related to P loading. This means that every percentage of P loading reduction is expected to lead to a proportional percentage improvement in the frequency of good water clarity. Small changes will still be difficult to perceive for occasional lake users because conditions vary on any given day. Also, other changes will likely compete with water clarity in a lake user's holistic perception of lake quality. In particular, increased water clarity is likely to lead to increased growth of aquatic plants. In addition, invasive zebra mussels may already be promoting growth of filamentous algae in near-shore areas, and this shift is likely to be exacerbated by improvements in water clarity.

C. PROGRESS TRACKING

Effective methods for tracking progress toward water quality goals for the Yahara lakes are important to determine which actions are most effective and whether enough is being done, and to sustain public support for what is likely to be a long-term effort. There are several ways that progress has been tracked in the past, and others that have been proposed. Each of these methods has its strengths and weaknesses. A holistic evaluation of progress should draw from several methods, acknowledge uncertainly and ambiguity, and provide feedback that can be used to adjust planned actions if warranted.

I. MASS BALANCE

The balance between imports and exports of P in a watershed indicates whether P is accumulating or declining. The mass balance measures trends in the *supply* of P, which along with landscape factors and actions that affect the *movement* of P, determine P loading to the lakes. A negative mass balance indicates that more P is leaving the watershed than is entering and there will be less P available to contribute to P loading to the lakes. A consistent negative P balance will lead to less P stored in watershed soils and is thus likely to lead to less P delivered to the lakes even without practices that reduce P movement.

A recent analysis estimated the P mass balance for the Mendota and Yahara watersheds for the period 1992-2017.[16] The analysis found that P accumulation has decreased substantially over this period, but P imports are still greater than exports. The analysis will be updated every five years by Dane County Land & Water Resources Department. The goal should be to reduce net P accumulation in the Yahara watershed to zero or less (i.e., net export). Further work is needed to identify the

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best methods to achieve this goal.

II. ACCOUNTING FOR ACTIONS

The primary method for progress tracking since CLEAN 2.0 has been estimating P load reductions from individual management actions, and then comparing the sum of these reductions to the overall goal (46,200 lbs using the CLEAN 2.0 baseline). It can be described as a "mass-based" method because it converts all actions into the common currency of P mass reduced. This method is appealing because it directly accounts for the effects of all reported actions and can be used to track progress on specific types of actions. The main weakness of this method is that, according to the CLEAN 2.0 calculation methods, nearly all (94%) of the P load to the Yahara lakes could be eliminated through policies, management, and technology. In fact, with some small, seemingly reasonable changes to the effects of some actions, the P load reduction could exceed 100%. This is clearly impossible, and it indicates that the effects of individual actions are likely overestimated and that the sum of potential reductions is not constrained by the baseline load. In addition, actions that increase P loading are not accounted for, and therefore the amount that they offset reductions is unknown. Ultimately, there are too many actions occurring (only some of which are reported and many that interact in complex ways to determine P loading) for a mass-based accounting system to give meaningful insight into progress.

The majority of recently reported P load reductions came from changes to agricultural land management (79% in 2019 *State of the Lakes* report). As described in section 2.5.B.ii., the Wisconsin P Index is the best way to track the *net* effect of changes to agricultural management systems. The P Index is already being used to estimate the effects of management practices, but only where those changes are related to a cost share program. A better way to look at net changes across all agricultural land is to use Dane County's nutrient management database to track changes in watershed average P Index over time. This metric should be reported every two years and aggregated by HUC12 watershed to provide information on the spatial distribution of P loss while protecting the privacy of individual farms. Agricultural producers can facilitate this tracking method by including their Snap Plus database when submitting a nutrient management plan to county or federal agencies to participate in technical or financial assistance programs.

The effect on P loading of several of the actions recommended in CLEAN 2.0 (e.g., stabilizing eroding gullies and stream banks, controlling construction site erosion, and improving leaf management) is difficult to even approximate, despite general consensus that they are worth doing. For these actions, progress reporting should be expressed as a percentage of the maximum amount of each action that could be implemented (e.g., the length of stabilized stream banks relative to the total length of eroded banks, or the percentage of developed area in the watershed with various leaf collection practices). It will remain difficult to compare the effect of this category of actions with other, more quantifiable actions, but the percent progress reporting will still provide a concise summary of which actions are being emphasized.

III. TRIBUTARY PHOSPHORUS LOADS

Trends in tributary P loads represent the net effect of changes in land use and management and delivery of P through the drainage network. Given that there may be time lags in the response of tributary P loads to changes in watershed management, and that there are large areas that drain to most of the tributary monitoring stations, it is usually not possible to attribute trends to any particular action. However, as described in section 2.3, analysis of tributary P data, particularly with the effect of flow variability controlled (normalized), has provided many insights into the magnitude, spatial distribution, seasonal and flow-related patterns, and trends over time of P loading in the Yahara watershed. Many of these insights were only found through analysis of long-term records.

Continued operation of the existing monitoring network is important. In addition, it would be valuable to establish a new monitoring station in a watershed with primarily established urban land use. This station would help better constrain P yields from established urban land that makes up a large fraction of the currently ungaged areas that drain to Lakes Mendota and Monona. Directly measured urban P yields would help in the calibration of watershed models and evaluate effects of stormwater management practices.

The analysis of tributary P data described in section 2.3.A.iv. should be updated annually and communicated to the public through an online dashboard. In particular, the dashboard should display trends in flow-normalized P loads for all USGS monitoring stations in the watershed with at least 10 years of record.

IV. LAKE CONDITIONS

The main focus of the Yahara CLEAN Compact is the Yahara lakes themselves. As described in section 2.2, P is the main factor affecting algal growth in lakes. Summer average P concentrations and the P concentration measured at the lake surface shortly after fall turnover in deeper lakes Mendota and Monona are the best measures for evaluating in-lake water quality trends. In summer months, water clarity and surface chlorophyll *a* concentration are the best indicators of conditions for lake recreation. The standard biweekly sampling frequency is appropriate for these metrics. Organizations who have historically conducted this sampling, including UW Center for Limnology, Wisconsin DNR, and lake associations, should coordinate sampling plans to avoid omissions and redundant sampling. Annual summaries of P, chlorophyll *a*, and clarity should be included in the online dashboard described above.

Direct measures of cyanobacteria abundance, such as phycocyanin, may be a better measure of human health hazard than chlorophyll, but more research is needed on causes of variability of these measures before they can be used for routine monitoring.

Public Health Madison and Dane County monitors beaches for *E. coli* and cyanobacteria toxins, and closes beaches if concentrations exceed safety limits. This monitoring is most useful for providing warnings to the public, although these warnings are often delayed because of staffing limitations. Multi-year trends in beach closures may be affected by factors other than water quality, including changes in which beaches are monitored, sampling frequency, and differences in perception of algal conditions by staff who determine whether to collect samples.

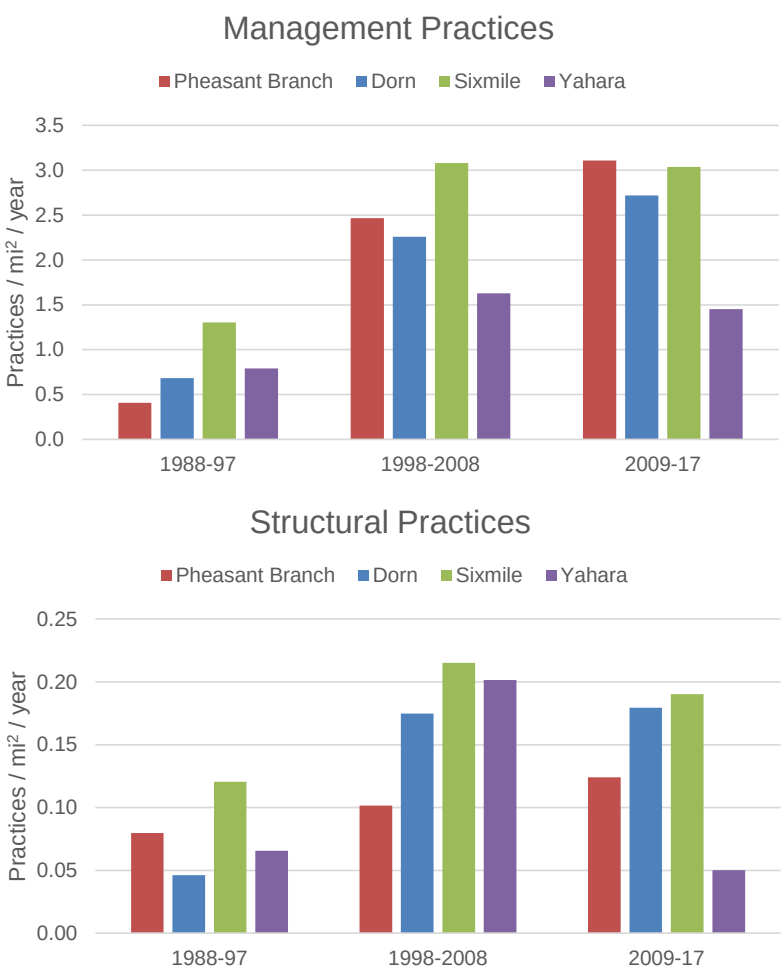

Figure:10 Agricultural conservation practice implementation over three time periods in four Lake Mendota tributary watersheds.

2.5 RECOMMENDATIONS FOR ACTION

A. ASSESSMENT OF IMPLEMENTED ACTIONS

I. PRE-CLEAN 2.0

There is a long history of efforts to improve water quality in the Yahara lakes. Lathrop (2007) describes much of this work through the early 2000s, and there have been several significant programs and projects since. Updating this history with concise summaries of the major projects to date could provide some insight into changes in focus, but is not in the scope of this report. Ideally, we could quantify the effect on P loading and the cost of all previously implemented actions, and use this information to identify cost-effective actions. However, as described in section 2.4.C.ii., we simply do not have a reliable way to do P accounting for many individual actions. So what can we learn from experience that will help guide a strategy for the future?

One option is to assess whether trends over time in implementation of agricultural conservation practices correspond with trends in water quality at tributary gages. We used data from Dane County's Conservation Practice System (CPS) database to calculate the number of practices in each of the gaged watersheds over three periods, 1988-1997, 1998-2008, and 2009-2017. The beginning of the first period was when CPS started routine use, the middle period was the implementation phase of the Lake Mendota Priority Watershed Project, and the end of the last period was when CPS was replaced by a new database. There are approximately 30 practice types in CPS that could plausibly affect P loading, but for this summary, they were grouped into management (e.g., nutrient management plans, cover crops, contour farming) and structural (e.g., barnyard runoff management, sediment basins, grassed waterways) practices. We used the number of instances of each practice group per square mile of watershed area per year in each period as a rough measure of trends in agricultural conservation effort.

In total, there were 7,076 management practices and 506 structural practices in these four sub-watersheds in the CPS database. Implementation of management practices increased during the Priority Watershed Project and remained high in the last period in all four sub-watersheds (Figure 10). Among the four sub-watersheds, the Yahara had the lowest management practice intensity during the second and third periods. The implementation of structural practices also increased during the Priority Watershed Project and remained high in the last period in all watersheds except Yahara, where it dropped. Fewer structural practices in the last period may not indicate reduced effort, it could mean that most of the high priority projects were completed. Similarly, early instances of management practices may have a greater effect on P loading than later instances, which could explain the pattern of decreasing tributary loads through around 2008 and no significant change since then. In addition, the reduction in net P imports into the watershed around the same time as the Priority Watershed Project makes it difficult to determine the relative impact of changes in supply and transport of P.

Overall, this simple analysis shows that agricultural conservation effort increased around the same time that flow-normalized tributary P loads decreased. This does not prove cause and effect or provide any more granular insight into the effectiveness of the many types of actions that comprise agricultural conservation. It does, however, illustrate the magnitude of the conservation work that has been implemented, and suggests that even maintaining the status quo of water quality may require sustained high levels of conservation.

II. MANURE PROCESSING

In 2008, Dane County completed a Community Manure Management Feasibility Study examining various community and individual farm-based manure management alternatives in the Upper Lake Mendota Watersheds. Management alternatives evaluated included, biological manure treatment (anaerobic & aerobic digestion as well as composting), thermal manure treatment (combustion, pyrolysis and gasification), solids separation and drying technologies (sand and grit separation, manure solids separation and manure drying), and phosphorus removal and recovery (phosphorus minimization in feeds and phosphorus removal from manure). Financial analyses, business structures, agricultural interest, and cluster/siting evaluations were also included within the report. Recommendations and conclusions from this report were then used to further the implementation of a preferred

strategy. With strong support from the community, a public-private partnership was developed for the construction of two anaerobic digesters utilizing solids separation technology.

The first digester project, located north of Waunakee, was completed in 2010. This facility processes approximately 35 million gallons of manure annually from three participating farms. The second digester project was completed in 2013 and is located northwest of Middleton. This facility processes manure from three farms totaling roughly 26 million gallons of manure annually. Together these facilities process approximately 10% of the manure produced in the Lake Mendota watershed. Both facilities use a combination of screw press and centrifuge technology to remove solids. These solids, which contain 15-75% of the phosphorus within the manure, are then removed from the watershed or land applied as fertilizer to grow crops, reducing the amount of commercial nutrients imported into the watershed. However, the challenges associated with the large volume and low nutrient concentration of nutrients within manure still remain even after utilization of this manure management strategy.

The use of anaerobic digestion in combination with solids removal technology has proven beneficial but also still poses some challenges. Benefits include the generation and collection of methane gas, conversion of methane to electricity and more recently renewable natural gas (RNG), reduction of greenhouse gas emissions, and removal of phosphorus. Yet, the volume of manure still remains as one of the biggest challenges as this management strategy does not significantly reduce it. Transportation, storage, and land application are all directly linked to this challenge. Also, the relatively low concentration of nutrients in manure compared to commercial fertilizer make it challenging to compete as an economically viable alternative. To help address these two major challenges, Dane County has invested in technology at the Middleton facility to remove additional phosphorus from the liquid fraction of separated manure utilizing ultrafiltration and reverse osmosis. This technology was commissioned in 2019 and is being reintegrated into operations as the facility has undergone significant plant upgrades and ownership changes. Once fully operational, clean water will be removed from the manure reducing its volume and thereby increasing its nutrient concentration.

While distinct from manure processing, manure storage can also mitigate the effects of manure production on water quality by allowing manure to be spread on cropland when runoff risk is lowest. A 2016 study of manure storage in the Yahara watershed found that at least 24% of the manure produced in the watershed is spread throughout the year, making it more difficult to prevent manure runoff.[17] The study identified two northern regions in the eastern and western portion of the Upper Yahara sub-watersheds as target areas for installation of additional manure storage. This overview of recent experiences with manure processing in the Yahara watershed illustrates that it can facilitate the export of phosphorus from the watershed. However, many challenges remain to be addressed before manure processing can be expected to play a major role in manure management in the region.

III. STATE OF THE LAKES REPORTS

Clean Lakes Alliance has been reporting progress toward the CLEAN 2.0 P reduction goal in their annual State of the Lakes reports since 2013. The reported total P reduction has increased steadily to 19,500 lbs/year in 2019, which is 42% of the goal reduction of 46,200 lbs/year. There are 14 actions in CLEAN 2.0, but six of these have made up nearly all of the progress to date (listed below). Because the reported P reduction does not necessarily equate to actual load reductions, we recommend not using mass-based practice accounting in the future (as described in section 2.4.C.ii.). As an alternative, we recommend reporting the amount of a practice that has been implemented relative to the maximum extent possible. To illustrate this approach, we will describe the new format on the six major Clean 2.0 actions.

1. **Improve cropping, tillage, and in-field agricultural practices.** The effect on P loading of this group of practices is best estimated with the P Index. However, rather than using changes in the P Index

17 Larson, R.A and M. Sharara (eds.). 2016. Evaluation of Manure Storage Capital Projects in the Yahara River Watershed. University of Wisconsin-Extension and UW-Madison College of Agricultural and Life Sciences, Biological Systems Engineering.

to calculate a total mass of P load reduction, the average percent change in P Index multiplied by the percentage of watershed cropland with practices in this category should be reported. This method will likely underestimate the total effect of this category because not all changes are reported. For example, in 2019, Yahara Pride Farms reported conservation practices on 11,500 acres of cropland, which is 7% of the cropland in the Yahara River watershed. The average reduction in the P Index for that cropland was 40%, which means these practices reduced the P load from agricultural land in the watershed by approximately 3%.

2. **Manage manure and nutrients.** As described in section 2.5.B.ii., manure and fertilizer management are part of agricultural management systems, so the effects of changes in those practices should be integrated into the P Index reporting described above. Structural practices that are part of this category, including manure storage facilities and barnyard runoff systems can be reported separately as counts relative to the number of farms that need, but do not yet have, these practices.
3. **Build community manure-processing facilities.** Manure processing facilities can affect the export of P from the watershed by separating it into liquid and solid fractions. P export should be reported as part of the mass balance reporting described in section 2.4.C.i. However, it should be made clear that changes in watershed P mass balance are not equivalent to changes in P loading to the lakes. As with the previous two categories, the effect of manure processing facilities on P loading should be integrated into changes in watershed average P Index. If it is considered important to quantify the effects of the facilities on P loading separately, changes in P Index of the farms which contribute manure to the facilities can be reported separately.
4. **Stabilize urban waterway banks.** Between 2013 and 2019, 15 urban waterway stabilization projects were reported as being completed, which were estimated to reduce P loading to the lakes by 1,820 lbs/year, but the method for estimating P load reductions from this kind of project is a rough approximation. In particular, erosion from urban waterway banks occurs episodically, may not contribute very much to P loading in most years, and may reach a state where there is little ongoing erosion in areas that clearly eroded in the past. Regardless of the difficulty in estimating ongoing P loading contributions from these areas, there are many good reasons to stabilize them, including reducing hazards to people and property. Therefore, reporting progress on these activities is worthwhile. However, instead of attempting to quantify P load reductions, reporting should focus on the proportion of eroded banks that have been stabilized. This method requires an inventory of un-stabilized banks.
5. **Reduce total suspended solids in municipal stormwater.** Between 2013 and 2019, 60 stormwater management projects were reported as being completed, which were estimated to reduce P loading to the lakes by 980 lbs/year. Unlike the waterway bank stabilization projects, the P load reduction estimates for these projects are probably fairly accurate because detailed site-specific models were used in the project designs.
6. **Improve leaf management.** Based on Wisconsin Department of Natural Resources interim guidance, urban leaf management practices, including frequent collection and street sweeping, can reduce annual P loads from certain urban areas by 17-25%. Municipal stormwater systems may use these reductions to estimate P loading reductions in their stormwater permits. Because P reductions from leaf collection interact with other stormwater management practices, such as detention ponds, the quantitative effect of this action cannot be isolated, but can be mentioned as one of the means to the overall estimated urban P reduction.

B. RECOMMENDED ACTIONS

I. SUPPORT SYSTEMS THAT ALLOW FUNDS TO BE SPENT WHERE THEY ARE MOST COST-EFFECTIVE

Reducing P loading from established urban areas is relatively expensive (per pound of P) compared with rural areas. Partnership agreements such as Yahara WINS, which allow urban areas to share the cost of rural practices that reduce P loading, should be supported because they are potentially much more cost-effective. However, the method for quantifying P reductions in these agreements should be re-evaluated because it has the same shortcomings described in section 2.4.C.ii. Urban actions recommended by CLEAN 2.0 should continue to be implemented. In particular, leaf management has the potential to greatly reduce urban P loading (including dissolved P), but further work is needed on the operational feasibility of implementing new or expanded municipal leaf-collection programs, as well as evaluating their performance in removing leaf debris from streets.

II. Group rural actions that relate to agricultural land and nutrient management as a P Index performance target

The majority of the rural actions in the CLEAN 2.0 plan are related to agricultural operations. While that plan categorizes these actions, they are all strongly inter-related parts of agricultural management systems, including the actions related to manure digesters. As such, we recommend grouping these actions as "Reduce phosphorus loss to surface waters from agricultural operations." Because the effects of individual practices are difficult to isolate from the overall performance of the management system, the integrative Wisconsin P Index appears to be the best way to track progress by agricultural operations from cropland and pastures.[18] For example, the average P Index in the Lake Mendota watershed in 2019 was 3.0. Meeting the target P load, which would require a 57% reduction from the current annual average, means the average P Index target would need to be 1.3 (for reference, the statewide agricultural performance standard is a P Index of 6). This doesn't mean that all fields, or even all farm averages, need to be at 1.3, but that the average P Index, weighted by runoff delivery, should be 1.3. To be clear, this recommendation does not imply that the goal of 1.3 should be a regulated performance standard. In 2019, 22% of Mendota watershed fields had P Index values less than 1.3. If actions were taken on the fields that currently have a PI > 3 such that they decrease to 3, the watershed average as a whole would decrease by 30% to 2.1. This would be a good interim goal.

III. Group other rural actions as "practices to reduce P transport through the drainage network"

The existing drainage network of the Yahara watershed efficiently transports both current and legacy sources of P to the lakes. There are several practices that can slow or greatly reduce P transport, including dredging legacy sediment from streams and ditches, stabilizing eroding stream banks, restoring wetlands, and constructing detention basins. This family of practices can play an important role in the overall P reduction plan, but because the choice of practice is site-specific, they should be considered as a group for planning purposes.

18 Specifically, a version of the P Index called Potentially Tradable Phosphorus (PTP) would be the most appropriate measure of P loss from cropland and pasture. Also, it would be best to track both the Total P Index and the Soluble P Index because practices that reduce the Total P Index often end up increasing the soluble P Index over time.

IV. Emphasize rural actions that are most likely to reduce P loading during winter runoff events, increase net P export out of the watershed, and retain runoff

1. **Winter runoff**. The largest fraction of annual P loading occurs during winter (Jan-Mar) when rain and snow-melt occur on frozen ground with little vegetation to slow runoff. Actions that have the greatest potential to reduce winter P runoff include reducing P sources (soil P and soluble P on the soil surface, which is primarily in manure), retaining runoff in constructed basins or natural depressions, and converting cropland to perennial vegetation. Other practices, such as cover crops, can also be effective in some situations.
2. **Net phosphorus export.** Actions that increase net P export out of the Yahara watershed have the greatest potential to result in lasting improvements in the lakes. The most promising methods include transporting manure (usually digested or composted solids) outside of the watershed, transporting manure within the watershed to replace imported commercial P fertilizer for non-livestock farms, and reducing imports of P-containing fertilizers and feed supplements.
3. **Retain runoff.** The terrain of the Yahara watershed was good at retaining runoff, but land drainage in ditches, drain tiles, and storm sewers have reduced this retention capacity. Retention of runoff reduces both P loading and flooding. Actions that could help retain more runoff including preserving internally drained areas (i.e., limiting the use of new culverts and other drainage outlets in topographic depressions that currently hold water), improving soil infiltration capacity by reducing tillage and increasing organic matter, and constructing basins in strategic locations to retain runoff.

V. Focus rural actions on areas with high runoff delivery to the lakes

It is known that parts of the Yahara watershed are topographic depressions, also called internally-drained areas. These areas collect runoff from their watersheds, and the water then either infiltrates into the ground, is taken up by vegetation, or evaporates. For the most part, the land that drains to these depressions has a relatively minor effect on the lakes. Until recently, about 15% of the Yahara watershed was mapped as internally drained, and P-reducing actions in these areas have been excluded from progress tracking. New terrain data derived from LiDAR, plus new GIS tools, have made it possible to refine this map. Now, we estimate that about 40% of the Yahara watershed is internally drained. This means that future actions can be targeted within the other 60% of the watershed where runoff is delivered directly to the lakes.

2.6 RESEARCH AND MONITORING

This section describes several research and monitoring activities that could improve understanding and management of the Yahara Lakes.

A. IMPLEMENT A PILOT WATERSHED PROJECT

When actions taken in large complex systems, like the Yahara watershed, do not achieve the predicted outcomes, it can be hard to isolate the reason, possibilities include lag times in the movement of P through the watershed, inaccurate estimates of the effectiveness of actions, unaccounted-for land use changes, and weather variation. To help understand these factors with the goal of making better decisions in the future, we recommend implementing a pilot watershed project on a relatively small sub-watershed within the larger Yahara watershed. The Dorn Creek watershed would be a good option for this approach because it has the smallest area and the highest P yield (lbs./acre/year) of the gaged tributaries. With this approach, extra P reduction efforts could be focused in the pilot watershed to determine how much effort is needed to reach the target P yield (load per watershed area), that if achieved over the entire watershed, would meet the lake water quality goal. Additional water quality monitoring in the pilot watershed would help determine which specific P-reducing actions were most effective. Actions would continue concurrently in the rest of the watershed, but at a lesser intensity. Findings from the pilot watershed would be reviewed periodically and used to revise the watershed-wide strategy.

B. CONTINUE DEVELOPMENT OF RUNOFF AND PHOSPHORUS DELIVERY MAPS

The runoff delivery analysis described in section 2.5.B.v. and on this map (https://experience.arcgis.com/experience/ff3b77e2f8c8440887dd03be0afa7a01/) has the potential to direct management actions to areas of the watershed where they will have the most impact on P delivery to the lakes. Some aspects of this analysis that need further development include, 1) verifying the lack of drainage structures (culverts and tile drains) for mapped depressions, 2) adding storm sewers to the drainage structure dataset, 3) estimating particulate P delivery with a measure of sediment transport efficiency, such as unit stream power or travel time, 4) adding winter runoff events to the analysis, using the sum of snow melt and rain and higher runoff curve numbers to reflect frozen ground.

C. EVALUATE DIFFERENCES IN PHOSPHORUS YIELD BETWEEN URBAN AND RURAL AREAS

Many aspects of runoff and phosphorus loading are different in urban and rural areas. For example, impervious surfaces in urban areas yield runoff in smaller rain events than the mostly pervious land in rural areas, but many rural areas in the Yahara watershed have higher soil P concentrations, which may lead to higher P concentrations in runoff. In addition, newly developed urban areas are required to have substantial stormwater management practices that detain runoff and retain P, but these practices are less common in established urban areas. Natural depressions in rural areas in the Yahara watershed serve many of the same functions as stormwater management practices in urban areas. The net effect of these differences on P yield is unclear. It would be valuable to establish a new monitoring station in a watershed with primarily established urban land use. This station would help better constrain P yields from established urban land that makes up a large fraction of the currently ungaged areas that drain to Lakes Mendota and Monona. Directly measured urban P yields would help in the calibration of watershed models and evaluate effects of stormwater management practices. Better estimates of P yield from different areas of the watershed will help focus further management actions where they will be most cost-effective.

D. CARP REMOVAL

The population of common carp were reduced in recent years through contracted removals in Lakes Wingra and Kegonsa. Carp removal appears to have contributed to increases in water clarity and aquatic plant abundance in both lakes. Carp removal is not likely to be effective in deeper Lakes Monona and Mendota. Ongoing sonar-based monitoring of aquatic plant distributions in Lake Kegonsa can help determine the effect of carp populations and aquatic plant distributions on water clarity.

E. PHOSPHORUS CONCENTRATION VS. LOAD OF LAKE INFLOWS

To evaluate changes in the watershed, it may be better to evaluate changes in P concentrations of inflows rather than P loads in the inflows to remove much of the inter-annual effects of changes in flow.

F. USE EMPIRICAL MODELS TO SIMULATE CHANGES IN WATER QUALITY IN THE LAKES

To evaluate changes in the lake, it may be better to use both empirical and process driven models. Process-driven models help explain seasonal changes in water quality of the lakes. However, to evaluate long-term changes in lake water quality, it may be better to use mixed reactor empirical models with an annual time step to evaluate potential changes in mean summer and fall turnover P concentrations in the lake.

3.0 PUBLIC ENGAGEMENT FINDINGS

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3.1 PUBLIC ENGAGEMENT OVERVIEW

The input summarized in this chapter will provide strategic guidance for RENEW THE BLUE public outreach in 2022 and beyond. In December 2020, The Yahara CLEAN Compact, a 19-member coalition, engaged the SmithGroup and Urban Assets Team to lead community engagement efforts for RENEW THE BLUE. To ensure the community's priorities and concerns were better understood by the project team, a robust community engagement process was conducted from March through September 2021.

The goal of the community engagement process was to help determine the community's relationship to the lakes, understanding of water quality issues, and appetite for working to improve the water quality of the lakes. The input summarized in this chapter will provide strategic guidance for the implementation of CLEAN 3.0 in 2022.

SOURCES OF INPUT

The engagement team utilized multiple sources to share information and gather public input.

1. Six groups of compact member interviews (totalling 24-individuals) conducted virtually in March 2021.
2. One facilitated Clean Lakes Alliance Community Board workshop on April 22, 2021.
3. Eight stakeholder interviews with a total of eleven participants conducted virtually May through July 2021.
4. Twenty eight interviews conducted with farmers, agronomists, agricultural educators, and agricultural business operators.
5. 1,388 responses from a community survey distributed through a variety of online and in-person efforts from May 26 to September 10, 2021.
6. Seven tabling opportunities at community events and at lakefront parks in June through August, 2021.
7. Seven intercept interview sessions at parks and key community locations in June through August 2021.
8. Multiple email blasts to neighborhood associations, community organizations, and friends of the lakes groups.
9. Promotional materials posted twice at over 30 highly frequented community locations, including community centers, libraries, grocery stores, coffee shops, and parks.

OUTREACH TOOLS

Public engagement opportunities and project information were widely promoted through the following channels.

1. Initiative case statement and project overview (see Appendix A)
2. Project website (https://www.cleanlakesalliance.org/yahara-clean)
3. Project flyers (digital and print)
4. Email blasts
5. Social media promotional posts (Facebook and Instagram)
6. Press releases and local TV announcements

The following sections summarize the feedback received during the RENEW THE BLUE planning period (2021).

3.2 GREATER MADISON LAKES SURVEY RESULTS

The online survey was administered to gather the community's input regarding values, priorities, and recommendations for the RENEW THE BLUE strategic action plan. The survey was conducted from late May through early September 2021. The survey was promoted by Urban Assets, Clean Lakes Alliance, and Compact members through email blasts, social media, and at key community locations including community centers, lakefront parks, Goodman Pool, farmers' markets, downtown, and the UW.

While the survey gathered important data regarding the community's perspectives and concerns regarding Greater Madison's lakes, it did not receive as many responses as hoped. The initial goal was 2,000 responses and the final tally came in at 1,388. There are a number of factors that could explain this. The survey was conducted primarily over the summer months when UW Madison and Madison College were not in full session, the City of Madison was also conducting community engagement for a number of high-profile projects at the same time, and the abundance of requests for input coupled with reactions to the ongoing pandemic have led to community burn out. Despite this shortfall, the survey provided valuable input which was considered during the development of recommended actions and should inform future outreach efforts.

WHAT WE HEARD

The summary below illustrates the participants' thoughts regarding the existing condition of our lakes and their level of desire to carry out actions in order to improve lake quality. The data was analyzed based on the following demographics.

1. All respondents
2. Black, Indigenous, and People of Color (BIPOC), 7%
3. Regular lake users (people who use the lake once per week in every season), 60%
4. Low-income (less than $35,000), 7%
5. 18 to 34 years olds, 19%
6. Seniors, 26%
7. People living with a disability, 5%

To review the detailed tables, please see Appendix B.

KEY FINDINGS

The watershed community absolutely values its lakes

IMPORTANCE

The lakes are very important to all respondents (82%), ranging from just under one hundred percent for regular lake users (96%) to just under three-quarters for BIPOC (70%). None of the respondents felt that the lakes were not important, though a very small percentage (1% to 5%) felt they were only somewhat important.

FREQUENCY

During the summer and spring months, the majority of respondents (60%) stated they visited a lake or waterfront park regularly (at least once a week) and just under a quarter stated they visited at least once a month (22%). This percentage generally holds true for BIPOC and low-income community members. Seniors, however, reported visiting lakes regularly even more (66%). People living with a disability reported a slightly lower percentage of regular visits (48%) but maintained a similar percentage of frequent visits (23%).

During the fall and winter, the percentage of total respondents who reported visiting regularly dropped off by twenty percent (39%), with the largest decrease in people living with a disability (18%). Many seniors, however, continue to enjoy the lakes during the fall and winter (49%). Regular lake users, by definition, enjoy the lakes year-round. The lakes continue to be frequented at least once a month or occasionally (every couple of months) across all demographics.

Lake Monona is the most popular lake among all respondents (40%) followed closely by Lake Mendota (34%). Well over half of BIPOC (57%) report using Monona the most while somewhat more low-income (38%) report using Lake Mendota. Lakes Wingra, Waubesa, and Kegonsa were reporated as least popular among survey respondents, even among regular lake users.

KEY FINDINGS

Across all demographics, the lakes are an important part of people's lives.

Lake Monona is the most frequented lake among survey respondents

ACTIVITIES

By far the most popular way the respondents experience the lakes, across all demographics, is walking along the lakes. Table 6 breaks down the top five ways respondents experience the lakes by demographic. For all respondents, the top five activities were:

1. Walking along the lakes (72%)
2. Sitting at a lakefront restaurant or at Memorial Union (58%)
3. Biking along the lakes (55%)
4. Enjoying the view from my neighborhood (52%)
5. Paddling (48%)

Biking along the lakes comes in at second or third across all demographics (68% to 46%), except for people living with a disability (34%). Low-income respondents were the only ones to list swimming as a top five activity (44%) and BIPOC cited hanging out at the beach as a top five activity (48%). BIPOC and low income do not list paddling as an activity they currently undertake.

Respondents had the opportunity to provide additional information regarding how they experience the lakes. Overall, leisurely enjoyment (31%) such as walking around a specific lake, bird watching, and picnicking were most cited. Additional activities include water sports (18%), living on the lake (16%), ice skating and hockey (9%), and walking/playing with pets (8%). See Figure 11 for a graphed summary of other ways the lakes are experienced.

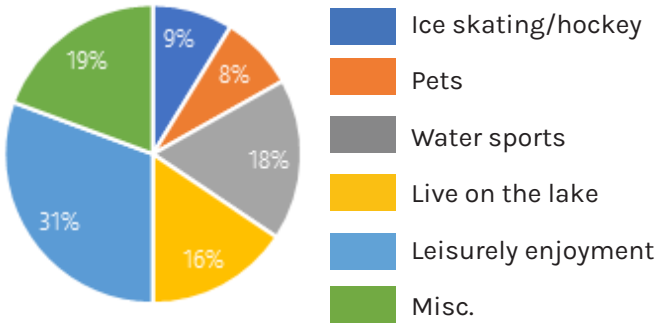

Figure:11 Other ways lakes are experienced

WATER QUALITY

Over half of the respondents (56%) have had their lake activities impacted by a beach or boat access closure, with regular lake users (63%) being most impacted followed by people living with a disability (61%) and low-income (53%). More BIPOC respondents (48%) stated they had not had their activities impacted by a beach or boat access closure.

The majority of all respondents (86%) had concerns about water quality. Not surprisingly, the concern was highest among regular lake users (92%) followed by seniors (88%), people living with a disability (85%), low-

Table:6 Top five ways respondents experience the lakes (by demographic), with 1 being the most frequent and 5 being the least

EXPERIENCE	ALL DATA	BIPOC	REGULAR LAKE USERS	LOW INCOME	18 - 34 YEARS	SENIORS (65+)	PERSONS WITH DISABILITIES
Walking along the lakes	1	1	1	1	1	1	1
Sitting at a lakefront restaurant or at Memorial Union	2	3	5	5	2	2	2
Biking along the lakes	3	2	3	2	3	3	5
Enjoying the view from my neighborhood	4	4	2	4	4	4	3
Paddling	5		4		5	5	4
Swimming				3			
Hanging out at the beach		5					

income (84%), 18 to 34 year olds (83%), and BIPOC (78%). When asked to provide specific concerns regarding water quality, respondents overwhelmingly identified algae (35%) and general concerns about lake quality (31%) such as water color, runoff, and pollution. Of lesser concern were weeds (10%), health (7%), bacteria (6%), smell (5%), chemicals (5%), and trash (1%). See Figure 12 for a graph of survey respondents' water quality concerns.

All respondents reported perceiving the issue of water quality through the lens of public health (48%), quality of life (24%), and sustainability (22%). Seniors (53%) and people living with a disability identify (61%) public health with water quality more than other respondent types. The impact of water quality on tourism is not perceived as important (ranging from 2% to 4%) nor is the impact on the economy (ranging from 2% to 6%). The average levels of understanding by all survey respondents of phosphorus impacts on lakes and human health (Figure 13) and understanding of cyanobacteria and *E. coli* on human health (Figure 14) are similar.

COMMUNITY ACTIONS

Table 7 summarizes the top five activities survey respondents are currently doing to improve lake quality by demographic. The top five actions respondents are currently taking to improve the lakes are picking up litter (66%), reducing the use of salt on the pavement (61%), raking leaves out of the street gutter (56%), directing downspouts to green space (53%), and picking up pet waste (51%). In general, these are among the top five actions across demographics, but the order changes. Composting is among the top five for BIPOC (42%), low-

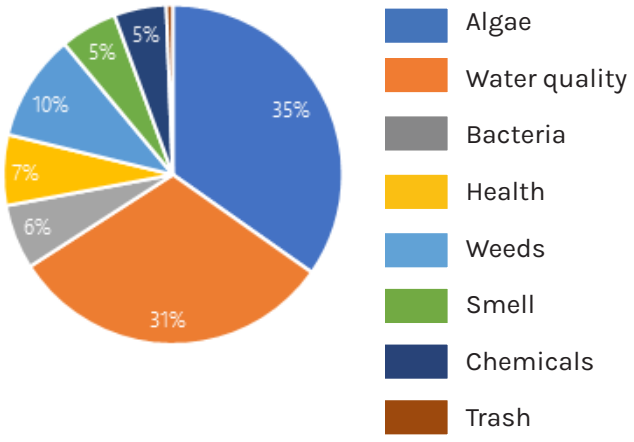

Figure:12 Specific water quality concerns of survey respondents

KEY FINDINGS

The lakes are predominantly enjoyed from the shoreline

Having clean lakes for swimming for low-income is an equity issue

Ensuring that beaches are safe and welcoming for BIPOC is an equity issue

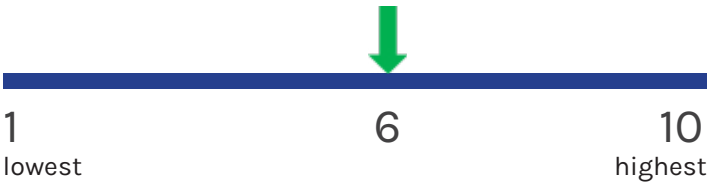

Figure:13 Respondents' understanding of phosphorus impacts on the lakes and human health

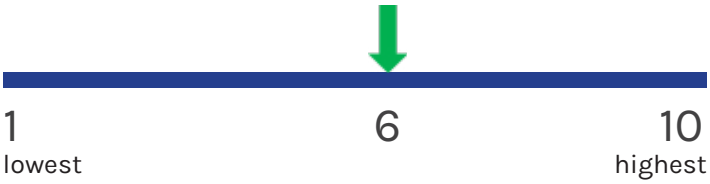

Figure:14 Respondents' understanding of cyanobacteria and *E. coli* on human health

income (48%), and 18 to 34 year-olds (37%). Seniors, however, include donating to a conservation organization working in the Yahara Watershed (61%) in their top five.

Other actions the respondents are doing include:

- Limiting fertilizers and pesticides
- Educating kids and peers
- Pulling lake weeds
- Volunteering with the Clean Lakes Alliance

All respondents report being very willing or willing to plant a rain garden (53%), install rain barrel (49%), donate to a conservation organization working in the Yahara Watershed (48%), plant native vegetation (46%), and direct downspouts to green space (34%). In general, these are among the top five across demographics except for BIPOC, with only one similar top five - directing downspouts to green space (57%). Only BIPOC (59%) and people living with a disability (26%) are very willing or willing to compost.

KEY FINDINGS

Beach and boat access closures disproportionally impact regular lake users (not surprisingly), people living with a disability, and low income.

The respondents are very aware of the negative impacts of algae and water quality on the lakes and their enjoyment of them

The respondents have a fair understanding of the contaminants (phosphorus and bacteria) that are hurting the lakes, but there is room for improvement, particularly among those who have very little understanding

The respondents do not see the connection between healthy lakes and the economy (local businesses and tourism)

Respondents were asked to prioritize strategies and actions that should be included in the action plan. The strategies and actions included.

- Personal action - projects or actions that an individual could perform.
- Local policy - adoption of new standards or rules by municipalities.
- Local action - implementation of a project of program by municipalities.
- State policy - adoption of new standards or rules by the state legislature.
- State action – implementation of a project of program by a state agency.

Targeting local policy was the top priority for all respondents and demographics except for low-income. Low-income respondents identified personal action (29%) and state policy (28%) as the top two priorities, respectively, to be included in the action plan. Similarly, state policy was the second priority for seniors (22%) and people living with a disability (29%). BIPOC identified personal action as their second priority (25%).

Table:7 Top five activities survey respondents are currently doing to improve lake quality, by demographic, with 1 being the most frequent and 5 being the least

ACTIVITY	ALL DATA	BIPOC	REGULAR LAKE USERS	LOW INCOME	18 - 34 YEAR OLDS	SENIORS (65+)	PERSONS WITH DISABILITIES
Pick up litter	1	1	1	1	1	1	1
Reduce salt use on pavement	2	3	2	3	3	2	
Rake leaves out of the street gutter and dispose of them sustainably	3	4	3			3	2
Direct downspouts to green space	4		4	4	5	4	3
Pick up pet waste	5	2	5	5	2		4
Compost		5		2	4		
Donate to a conservation organization working in the Yahara Watershed						5	
Plant native vegetation							5

BIPOC INPUT

Engaging all demographic groups was an expressed goal of the project and the focus of the Community Engagement Subgroup. With a response rate of 7%, the survey was not as successful as hoped in gathering input from the BIPOC community. However, 18% (28) of the intercept interviews conducted at beaches and parks around the chain of lakes were from BIPOC. The survey and the intercept interviews yielded insights for developing strategies for increasing BIPOC engagement in the implementation of RENEW THE BLUE.

- More than 50% of BIPOC respondents indicate they frequent Lake Monona.
- BIPOC respondents were the only demographic to list hanging out at the beach among the top five ways they experience the lakes.
- BIPOC respondents do not list paddling as one of the top five ways they experience the lakes.
- BIPOC responses indicate they are very willing to compost.
- Local policy and personal action are BIPOC's top two strategies for addressing water quality.

DEMOGRAPHICS

A variety of community members took the survey, including homeowners, renters, people living on a lakefront, farmers, and students. However, there is some cross over of respondent types. Respondents were overwhelmingly home owners (75%) with few renters (14%), and fewer commercial property owners and businesses (7%).

The ages of respondents ranged from <17 to >75. Most respondents were between the ages of 25 and 64 (69%). Seniors also participated in higher percentages (26%). For the purposes of the analysis, 18 to 24 year olds and 25 to 34 year olds were combined in order to capture the input of emerging and younger adults (19%).

Over half of the survey respondents (58%) reported incomes from $75,000 to over $200,000. Responses from those with lower incomes, including those with incomes, $35,000 or less, provided fewer response (7%). Those respondents with middle incomes, greater than $35,000 but less than $50,000, provided twice the number of responses of those with lower income (15%).

KEY FINDINGS

Most people are already taking basic action with regards to improving lake quality, i.e., picking up litter and pet waste, directing downspouts to greenspace, and reducing the use of salt.

The vast majority of respondents were able-bodied (90%), though 5% preferred not to say.

Respondents to the survey were overwhelmingly white (88%), in keeping with Dane County's mostly white demographic (84%). Despite a commitment and serious effort to engage BIPOC, only 7% BIPOC responded to the survey. This figure is comparable to community wide surveys during the pandemic (i.e., Metro Network Redesign Phase One Survey – 8%), but not reflective of BIPOC representation in Dane County (16%). Five percent of survey respondents preferred not to answer, however, and 13% skipped the question altogether.

Based on Urban Assets' experience doing community engagement in Madison over the last twenty years, several factors impact the BIPOC response rate. Historically, the BIPOC community has been skeptical of providing plan and project input. This is something community engagement professionals and community organizers nationally have contended with for many years, not just in Madison. The BIPOC community does not have confidence that their input will be seriously considered or that it will have any measurable impact. Even worse, they believe the request for their input is for show – simply checking the diversity box.

Five years ago, the City of Madison implemented the Racial Equity and Social Justice Tool (RESJI), which requires all city policies, plans, and projects to be evaluated by city staff through the lens of equity and social justice. This elevated the importance of gathering input from the BIPOC community in general. Since the murder of George Floyd and the growth of the Black Lives Matter movement, however, many organizations and institutions, including the City, have prioritized input from the BIPOC community. The BIPOC community's response to these efforts depends on the relevance to the community, when compared to other priorities, and who is doing the asking.

During the pandemic, the importance and relevance of a plan or project to the BIPOC community became even more important. Relevance factors include whether the plan or project has a direct impact on the health, welfare, and well-being of BIPOC individuals and families. In addition, how tangible are the benefits – immediate or sometime in the future. Even more important, is the organization doing the asking one the BIPOC community knows, respects, and sees as an ally? Does it have a real connection and strong relationship to individuals and other organizations within the BIPOC community?

To achieve a more robust response from the BIPOC community in the future, the Compact and the Clean Lakes Alliance must make the case that the health of the lakes directly impacts the lives and livelihood of the BIPOC community. The BIPOC community must also be able to have confidence that their input will be integral to the action plan and that the impact on results can be seen. Outreach to the BIPOC community should happen on their terms and in their spaces – go to BIPOC organization events and meetings, design programming that leverages BIPOC interests (i.e., beach activities). Finally, the Compact and the Clean Lakes Alliance must build a relationship with and become an ally of BIPOC organizations and leaders.

KEY FINDINGS

The majority of survey respondents were higher income and white.

3.3 TABLING AND INTERCEPT INTERVIEWS

EVENT TABLING

The engagement team tabled at events and parks near and on lakefronts throughout the community in order to share information on the project and encourage participation in the community survey. Tabling was performed during summer 2021 at the following locations.

1. Loop the Lake
2. Ride the Drive
3. Olbrich Summer Concert Series
4. Mad City Ski Team
5. Dane County Farmer's Market
6. Monroe Street Farmer's Market
7. Capitol Square
8. Library Mall
9. Brittingham Boats
10. Goodman Pool
11. Olin Park
12. UW Arboretum

INTERCEPT INTERVIEWS

In addition, on-site intercept interviews were conducted at lakefront parks and other public spaces. A simple questionnaire was utilized, which included questions similar to the community survey. A total of 28 intercept interviews were conducted and yielded a greater percentage of input from BIPOC (18%) than the community survey. Intercept interviews were performed during summer 2021 at the following locations.

1. James Madison Park
2. Warner Park
3. Wingra Park
4. Vilas Park
5. Capitol Square
6. Olbrich Gardens
7. Brittingham Park
8. Memorial Union

INPUT

- Greater Madison's lakes are of great value to the community. The majority (64%) believe that the lakes are extremely or very important. Roughly a quarter (27%) see the lakes as somewhat important. Only a small percentage (9%) see the lakes as not very important.
- The majority experience the lakes from the shoreline (42%), followed by watersports (29%) and swimming (26%).
- The majority (58%) have not had their beach or boat access impacted by a closure.
- The top two concerns regarding the lakes are water quality (30%) and algae (30%) followed by health (15%) and trash (12%). Of less concern were bacteria (5%), chemicals (3%), and smell (3%).

"I love Madison Lakes, thanks for your work!"

"I think the community should implement a shore clean-up day."

- Park users interviewed

- A quarter (26%) do not understand what is impacting water quality nor where it comes from. Of those that do understand, the majority attribute it to chemicals (26%), followed by waste (19%), urban runoff (13%), and road salt (6%).
- Solutions to improving water quality should come from legislative action (31%), decreasing sources of contamination (31%), individual action (25%), community initiatives (6%), and increased awareness (6%).

Please see Appendix C for a more detailed summary of feedback.

3.4 STAKEHOLDER OUTREACH AND FEEDBACK

The consultant team facilitated meetings and a series of interviews with the following stakeholders.

1. Compact Members
2. Clean Lakes Alliance community board
3. Community stakeholders
4. Members of the agricultural industry (see section 3.5, below)

The meetings and interviews yielded input from a total of 82 stakeholders. All members of the Compact Steering Team were invited to participate in interviews with the consultant team. The following Compact Member interviews were conducted in March 2021.

- Mark Riedel, Water Resources Specialist, Wisconsin DNR
- Janet Schmidt, Storm Sewer Design Manager, City of Madison
- Dick Lathrop, UW-Madison Center for Limnology
- Emily Reynolds, Community Engagement & Alumni Relations Assistant Director, UW-Madison Nelson Institute
- Brenda Gonzalez, Director of Community Relations, UW-Madison
- Bob Wipperfurth, President, Dane County Cities and Villages Association

Community stakeholders from the following categories were invited to participate in small group meetings and interviews.

- Municipalities
- Major lakefront property owners
- Major lake users
- Developers
- Builders
- Utilities
- Farmers, agronomists, agricultural educators, agricultural business operators

Community stakeholders who participated included.

- Laura Hicklin, Matt Diebel, Kyle Minks, Dane County Land & Water Resources
- Steve Fuhlgren, Village of DeForest
- Randy Guenther, Hovde Properties
- Tyler Leeper, Madison Boats
- Sayer Larson, Village of McFarland
- Phil Grupe, City of Fitchburg
- Bill Conners, Smart Growth Madison
- Cory Conzemius, Camp Randall Rowing Club

A total of 28 individuals from the agricultural production industry were interviewed in a one-on-one setting. A third of these were exclusively producers, although many of the others interview were also producers but wear 'multiple hats' in the industry. All participants requested to remain anonymous.

> "The folks that have enjoyed the lakes have been privileged. We need them to be focused on the community, invest in parks and beaches. It goes hand in hand."
>
> - Compact Member

The Clean Lakes Alliances' Community Board members who participated in the workshop held on April 22nd, 2021 included.

Becky Mitchell
Karin Swanson
Adam Sodersten
Sarah Dance
Alexandra Bogner
Gaby Thomas
Jim Gallegos
Peter Foy
Tamara Knickmeier
Pam Christenson
Michael Mucha
Ed Reams
Carin Reynen
Sam Robertson
Nathan Fagre
Mark Riedel
Angie Rieger
Mike Rupiper
Matt Frank
Thomas Wilson
Courtney Searles
Lloyd Eagan
Dan Lee
Mark Guthier
Bryan Dow
Colleen Johnson
Kelda Roys
Andy Kurth
Gregory Levesque
Sopen Shah
David Merritt
Alex Vitanye
Hollie Kemmer
Christie Baumel
Scott Seymour
Jessica Niekrasz
Brenda González
Jason Potter
Paul Wrycha
Courtney Kruger

The input gathered from the meetings and interviews could be catagorized in five topic themes.

1. Educate & Engage
2. Community Partnerships
3. Recreation
4. Solutions
5. Miscellaneous

Each stakeholder group had a slightly different lens, consequently the amount of input across the categories varied. Compact Member input was generally spread equally between Educate & Engage, Solutions, and Community Partners. The Community Board's input focused overwhelmingly on Educate & Engage followed by Solutions. Community stakeholder's input split almost equally between Solutions and Educate & Engage.

The majority of comments from the Compact Members (6) and the Clean Lakes Alliance Community Board (40) related to educating and engaging the community about water quality and the lakes. Other comments provided by these groups were focused on solutions. Alternatively, Community stakeholder (8) comments were more directed at solutions followed by educating and engaging the community about water quality. Comments regarding community partnerships was note expressed as frequently from compact members and the Clean Lakes Alliance Community Board. Specific input from each group is included below.

COMPACT MEMBER INPUT

- Support farmers and give them the ability to participate without burdening them.
- Focus on effective messaging to the community on the science behind improving the lakes – points should be clear, concise, and free of jargon.
- Make the correlation between water quality and social and environmental justice.
- Leverage urban resources (increased fees for utilities, development) for investment in innovative and effective remedies in rural areas (manure-processing facilities).
- Continue broad community outreach and engagement – essential to achieving clean lakes in the future.
- Tailor messaging and engagement to specific community groups.
- Translate educational materials and communications into other languages.
- Encourage municipalities to collaborate and think creatively about policy solutions.
- Collaborate with community organizations, neighborhood associations, grassroots advocacy groups.
- Engage more farmers and reach out more effectively to farmer's groups.
- Use equity lens for all conversations and events, urban and rural.
- Increase participation of BIPOC and create a space where they feel welcome.
- Be better to partner better.

CLEAN LAKES ALLIANCES COMMUNITY BOARD INPUT

- Involve schools and businesses
- Use lake appeal to recruit employees
- Education
- Use government resources and communication platforms to educate
- Encourage small habits for easy solutions
- Address stormwater management, particularly run off
- Raise development standards
- Lake use will increase when water quality improves
- Water quality affects businesses, events, and tourism
- Support farmers in being sustainable
- Lake quality impacts our local economy and quality of life for residents, in a variety of ways (tourism, workforce development, recreation).
- Messaging must be simplified, tailored, easily accessible, and effectively communicated to all residents of the watershed.

"I think it potentially starts with all of us and not just in our neighborhoods, but within our businesses and talking to people we work with as well as business leaders we know."

- Clean Lakes Alliance Community Board Member

- Farmers have made great efforts but need additional aid and strategic consideration.
- More targeted engagement approaches, especially for historically underrepresented communities.
- Partnerships are key to increased participation and action (public-private, nonprofit, and intergovernmental).

COMMUNITY STAKEHOLDER INPUT

- Communication strategy should balance urgency, highlighting problems, and work towards solutions.
- Improving water quality requires building relationships and partnerships.
- Do not demonize people or businesses.
- Stormwater planning and management is key – put water back into the ground instead of pushing it down the line.
- Raise awareness of activities that harm the lakes, e.g., blowing leaves and grass into the road.
- Encourage salt recycling program.
- The cost to improve water quality should be shared.

> "Any moves in the right direction are valuable, even if it does not fix the problem entirely."
>
> - Community Stakeholder

- Improving water quality requires that everyone do their part – share this story.
- Establish lakes as a part of Madison's identity, like the UW and the Capitol.
- Increase involvement of other lake and waterway users – duck hunters, fisherman.
- Support the development of more parks.

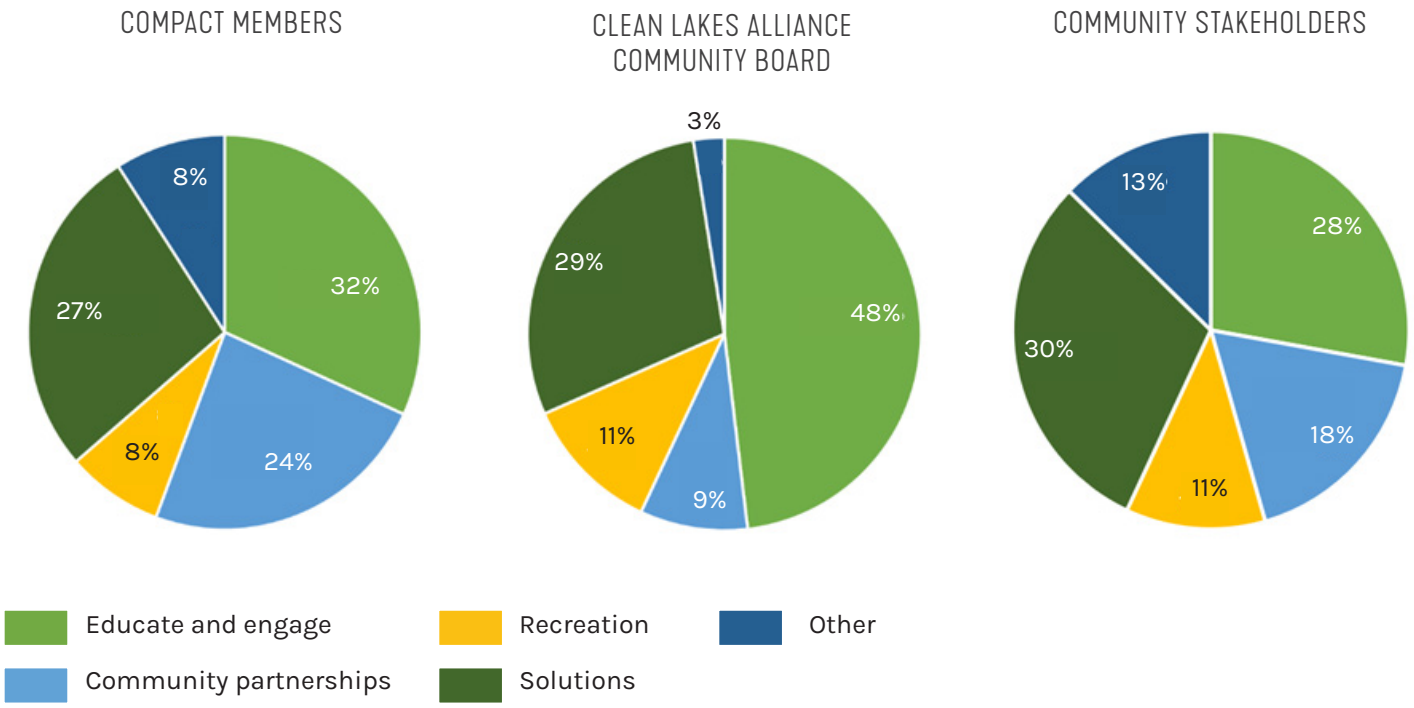

Figure:15 Suggested focal areas for executing change in the watershed from three engagement participant groups

3.5 AGRICULTURAL STAKEHOLDER FEEDBACK SUMMARY

Agriculture is the dominant land-use in the Greater Madison lakes' watershed. Because of this, agricultural practices have a significant impact on water quality within the lakes. Recognizing the significance of the agricultural community and industry within the region and its impact on the lakes, it is understood how important it is to develop strong, cooperative relationships with this stakeholder group. For this reason, one-on-one interviews were conducted with 28 individuals in the agricultural production industry. All interviews were conducted on the basis of anonymity and the request to remain anonymous. However, it can be noted that participants resided and worked throughout the watershed. Some participants, such as resource input companies and lenders had a more regional outlook, others were more focused on the land they manage.

The following observations were gathered from discussions with farmers, agronomists, agricultural educators, and agricultural business operators in and immediately around the Yahara watershed basin during the spring of 2021. The following conveys general viewpoints expressed in the interviews about agricultural conservation and farmer participation, and suggests recommended strategies for future cooperation. It is very important to note that the viewpoints of producers are not a monolith. Moreover, the conclusions in this document should be read simply as reporting attitudes, not endorsing or evaluating them.

MAIN CONCLUSIONS FOR INCREASING CONSERVATION

There is a significant adoption gap between farmers already engaged in conservation in the basin and those that are not within the Yahara basin. Much of the conservation practice participation is coming from highly motivated farmers. While there has been a strongly observed growth in the amount of conservation practice (mostly in the form of annual cover crops and less tillage) wide spread adoption of conservation practices are still relatively uncommon compared to conventional practice.

Farm conservation groups report strong member participation and growth.. Most interviewees also believe that farmers in their group are doing better than the general public thinks they are with respect to conservation. Those interviewed do not report a strong knowledge of what other groups are doing or even the existence of other similar farmer groups. Participation and information sharing are still hyper-local.

Outreach to new farmers was consistently identified by those interviewed as among the largest obstacles to expanded conservation practice. They believe that there are many more acres under cover than there were 10 years ago. However, there is also a belief that farmers who are following state recommendations are not contributing to excess nutrient loading. Overwhelmingly, annual cover, minimal tillage, and riparian buffers were identified by interviewees as the conservation practices being used. Grazing, perennial cover, planting into living cover, reduced spreading was less commonly reported, but emerging. There is some interest in composting manure and methane harvesting.

The main findings expressed by those interviewed were.

- There is not a shared, consistent viewpoint about the extent, pace, or goals of conservation practice in the Yahara basin.
- They do not have clear financial assessments of the economic value of conservation practice or its consequences that might guide their decision-making.
- They generally believe that they are doing a lot better than they were historically and yet are aware that conservation practice needs to be adopted more widely.
- They do not believe the general public understands their challenges or what they are already doing on the conservation front.
- They do not feel that conservation groups focused on urban lake quality are good faith partners.
- They believe the obstacles to practice adoption are cultural not financial, though they do identify financial barriers.
- Farmers want to be advised by other farmers or crop consultants, and they largely do not see lake/river groups or the cities in the area as good faith partners.
- There are a limited number of individual producers in the region who are consistently identified as trusted voices.
- A focus on building peer-group strength, non-fault collaboration, and soil health are likely productive avenues.

The resulting actions for producing change are presented below in this report. Two of the actions identified from these interviews emerged as priority actions.

- A-03. Develop and follow a Nutrient Management Plan, and
- A-05. Increase number of acres under no-till and continuous living cover (i.e. overwinter cover crops).

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4.0 PRIORITY ACTIONS

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4.1 RENEW THE BLUE: A USER GUIDE

A NEW APPROACH

RENEW THE BLUE is different from previous initiatives because it is organized as a user-friendly guide geared towards targeted stakeholder audiences. For example, the 2012 Yahara CLEAN Engineering Report (referred to as CLEAN 2.0 throughout this planning process) was structured as a technical document focused on 14 key actions to reduce and manage phosphorus within the watershed. The relative successes and limitations of the CLEAN 2.0 actions were tracked after its publication. One aspect that was identified as missing from that report were clear recommendations for implementation, and community investment in clean lakes. The previous actions were predominantly centered on municipal (especially county and state) actions as well as agricultural practices. While those are still valid, there were stakeholder groups with potential agency to affect meaningful change who were not accounted for in that iteration of Yahara CLEAN planning.

COLLECTIVE ACTION

One of the defining goals of RENEW THE BLUE is to spur a sense of collective action and responsibility among all who live and work within the Yahara lakes watershed. When water quality of the lakes is seen as everyone's responsibility (not just the government's), there will be more political will to implement the big investments and changes that are needed to really move the needle on lake water quality. This approach, where everyone has a part to play, requires a much broader and more concerted effort of engagement and education.

Although CLEAN 2.0's recommendations are numerically quantifiable (modeled using engineering software to predict the direct phosphorus impacts), the recommended actions in RENEW THE BLUE include quantifiable metrics as well as non-numeric, or qualitative, metrics. This makes it more challenging to predict an overall impact of all of the actions, but it recognizes there is a need to move beyond engineering and scientific data, to promote a larger agenda around outreach and stewardship in order for the public to embrace and buy-in to the bold changes needed in the face of climate change and other challenges.

It should be noted that many of the recommendations that follow will require further development to be actionable. In addition, the structure of actions varies based on which stakeholder group an action was assigned.

This plan seeks widespread participation based on stakeholder groups while acknowledging the scale of impact and amount of agency required to affect change varies by group.

GOALS AND STRATEGIES OF RENEW THE BLUE

The goals of RENEW THE BLUE as described in Section 1.4 are.

- Clearer lakes
- Open beaches
- Fewer cyanobacteria blooms

These goals are based on the findings from the State of the Science chapter of this document (Chapter 2), as well as the findings from previous inititaives (CLEAN 1.0 and CLEAN 2.0).

The ten strategies identified to achieve these goals are as follows.

1. Minimize soil losses from construction
2. Stabilize shorelines and river banks
3. Reduce phosphorus in urban stormwater runoff
4. Reduce phosphorus from agricultural sources
5. Restore wetlands
6. Reduce runoff volumes
7. Promote public awareness and ownership
8. Improve water quality at public beaches
9. Increase scientific understanding of phosphorus.
10. Identify funding sources

Each priority action included in this chapter contributes to an overall strategy. The tables in this plan are organized by stakeholder group.

THE STAKEHOLDER AUDIENCES

The RENEW THE BLUE priority actions are organized around five stakeholder groups who have the most direct ability to implement actions related to improving water quality in the Yahara lakes. These stakeholder groups were identified because they either own or control land within the watershed (and the collective actions they take on that land are directly related to watershed health), or they are responsible for setting policy and/or allocation of funding related to water quality and conservation practices in the region.

- ***Government***. This is the most influential of all five groups, and encompasses municipal governments (cities, villages and towns) as well as county and state governmental agencies. The majority of the priority actions, perhaps not surprisingly, fall within this category. Typically any action that involves policies, ordinances or other guidelines and recommendations which encompass a larger community falls within this category. This includes urban and rural actions, if an action was centered around an agricultural practice but goes above what any individual farmer or producer could do, the action was put within this group. Where possible, this plan attempts to identify which level of government is most suited for implementation of the action, but in some cases, multiple agencies may be involved. Government also has the greatest ability to allocate funding or to commission research towards water quality practices. For this reason, actions related to creating new funding streams or models are put in the Government category.
- ***Agriculture***. This stakeholder group primarily focuses on farmers and other landowners involved in agricultural production and processing, but it may involve other key groups within that world such as farmer-led conservation groups and others up and down the supply chain (such as feed suppliers). This stakeholder group is the second most influential in terms of direct potential water quality impacts, after government.
- ***Developers and Builders***. This stakeholder group includes land development companies and builders involved in both new development (typically urban or suburban) or redevelopment of previously developed lands. The actions taken by this group typically are governed by the ordinances and policies adopted by the local municipality in which their development project is located. However, there are few incentives for developers or builders to practice land management that exceeds adopted ordinances. The Wisconsin DNR's Green Tier provides some incentives for developers.

  This plan identifies actions that stakeholders can take to raise the bar, especially in places where ordinances are less stringent. The outcome of clean lakes is directly tied to the quality of life and thus the cost of real estate in Dane County, so there is bottom line incentive for these groups to partner in helping improve the lakes with key, meaningful actions.
- ***Parks and Open Space Managers***. This stakeholder group includes agencies at the municipal and county level whose responsibilities include programming, maintaining, overseeing, improving, retrofitting or adding new parks and open spaces within the watershed. This also includes land conservation stewards and other non-profit managers of publicly accessible conservation land. Public parks and open spaces directly adjacent to lakes and other water bodies (rivers, creeks, and streams) should be prioritized for the actions presented in this plan.
- ***Residential and Commercial Landowners***. This stakeholder group has the most potential participants capable of executing change within the watershed. However, individual homeowner or commercial business owners have not always felt that their individual actions would have an impact. Collectively this group is influential. Similar to builders and developers, the value of their land and their quality of life is tied to the health of the watershed and lakes. The actions included in this plan are identified as simple steps that this stakeholder group can take not only on their own property but also in advocating for and participating (donating, volunteering, pushing for legislation, etc) to ensure that cleaner lakes are prioritized at all levels of government.

HOW ACTIONS ARE PRIORITIZED

The actions shown in this plan were identified through a lengthy process with considerable input from Compact members and leadership, the P-Loading Subgroup, stakeholder conversations, and input from the community survey, intercept interviews, and meetings with agricultural stakeholders.

Some of the actions came directly from CLEAN 2.0, edited and revised based on changes in the watershed since the publication of CLEAN 2.0. Other actions were a direct result of the public engagement process or emerged from the current scientific understanding of the watershed. All action recommendatons were based on a thorough review of the latest scientific understandings that connect land use with water quality (see Chapter 2.0).

The inital prioritizing of actions was developed using a scoring rubric. Following this, Compact members identified actions they felt were most significant. The final prioritized action list resulted from evaluating actions against criteria identified and developed with the Compact leadership, the P-Loading Subgroup, and Compact member guidance. The criteria were used to prioritize the actions based on the values expressed by the Compact members.

Five criteria were used to help prioritize actions.

- ***Impact***. How effectively this action would result in water quality improvements in the watershed.
- ***Cost Benefit***. How costly this action would be to implement relative to its impact.
- ***Achievable***. How easy this action would be to implement.
- ***Sustainable***. How durable this action and the benefit of the action is expected tp be over time (how much maintenance the action will require or how costly it is to maintain).
- ***Engaging/Inclusive***. How well this action would foster individual and collective action and promote community stewardship in an accessible way.

Based on these criteria, those actions expected to produce the greatest change in the watershed were identified and categorized by their expected impact. top actions overall, followed by actions specific to phosphorus, runoff and *E. coli* reduction. The remaining actions were prioritized by stakeholder group.

It is important to note that not all actions in this plan are unique or new to this plan. Some of the actions proposed in this plan are carry-overs from the preceding CLEAN 2.0 report (such as action G-02), some are modifications to the actions proposed in CLEAN 2.0 (such as action G-28). In addition, some of the actions proposed are already underway, have been successful in implementing change, and should continue to be executed. Successful actions that should continue to be executed include. G-01, G-04, G-06, G-11, G-18, A-01, A-03, A-05, A-07, and B-03 to name a few,

HOW TO USE THIS PLAN

In the following subsections within Chapter 4, the actions for each of the stakeholder groups are identified, beginning with priority actions. Priority actions are the first actions identified in this chapter. These actions are pulled from among the five stakeholder groups. The priority actions are expected to have the greatest impact on water quality in the Yahara Lakes Watershed.

Following the priority actions list are the remaining actions for each of the five stakeholders. Top actions for each of the stakeholders are described in greater detail in each of the individual stakeholder subsections. All actions for each of the stakeholder groups are summarized in tables at the end of the individual stakeholder subsections.

In addition, the top actions for each of the five stakeholder groups are highlighted in bold on their corresponding table.

- ***Action Number & Description***. The number associated with each priority action is assigned based on the primary stakeholder group it is attributed to. G = government, A = agriculture, B = builders and developers, P = parks and open space managers, R = residential and commercial landowners. Actions identified as priority actions are highlighted in light blue. Top actions for each stakeholder group are shown in bold type face.
- ***Strategy***. This item refers to the larger strategy to which that action contributes. Some actions may contribute to multiple strategies.

Table:8 Description and examples of the three types of approaches assigned to actions

	REDUCE	RESTRICT	REMOVE
Description	Address the source of phosphorus, *E. coli*, or runoff.	Restrict the movement of the source on land & prevent its movement into water bodies.	Remove the contaminant from the impacted water body (typically river or lake).
Example	Limiting use of fertilizers containing phosphorus	Erosion control	Dredging lake sediment containing phosphorus
Preference	First	Second	Third

Table:9 Description of relative cost for stakeholder(s) assigned to execute an action

COST SYMBOL	DOLLARS (ORDER OF MAGNITUDE)
$	Thousands
$$	Tens of thousands
$$$	Hundreds of thousands
$$$$	Millions
$$$$$	Tens of millions or more

- ***Objective***. There are three targets for RENEW THE BLUE, Phosphorus, *E. coli*, and stormwater runoff. The tables identify which target the action is focused on reducing. Some actions address more than one target. Top priority actions for each target are indicated with a star.
- ***Approach***. The approach is defined as what point in the watershed the action is influencing the target. These are defined as reduce, restrict, or remove (see Table 8 for more details). The sooner in the process a pollutant is removed, the easier it is to manage. An analogy to this is reduce, reuse, recycle where reduce is preferred, reuse is the next best step, and recycle is the last option for managing solid waste.
- ***Additional Detail***. The additional description for each action includes a brief rationale for each action, why it is important, and other pertinent information which may not be obvious from the action description.

Within the written narrative descriptions for the highest priority actions, the following additional information is provided for each action.

- ***Overview***. This provides an overview of the action including a more detailed rationale and description, tips for implementation, and other considerations.
- ***Cost***. This is a relative cost provided on a rough order of magnitude, and a brief description of the anticipated expenditures which are anticipated to implement the action. See Table 9 for a description of the cost symbols.
- ***Timing***. Describes when this action is recommended to occur, whether it is an ongoing action with no defined time-table, or whether it is a short-term, medium-term, or long-term priority.
- ***Baseline***. This is the status quo of where we are starting today, if known. In some cases more research or data may be needed to determine the starting point against which to measure progress on an individual action.
- ***Tracking metric***. This is the unit by which we recommend tracking and measuring progress towards this action.
- ***Impact***. This is a quantitative estimate or qualitative impact that this action would have in the watershed (if implemented).
- ***Implementation Partners:*** For Government-directed actions only the agency or parties expect to implement an action is identified.
- ***Co-Benefits***. These are beneficial ancillary outcomes that, while not the main reason an action is being done, can benefit the community in other ways.

Within each stakeholder group, a top overall priority action is listed first. This action is followed by priority actions by target (phosphorus, *E. coli*, and runoff). Not every stakeholder group has priority actions for each target. Within the tables for each stakeholder group, additional actions which are recommended (but lower priority) are highlighted in light gray.

4.2 PRIORITY ACTIONS

The following section identified the priority actions which are expected to have the greatest impact on water quality in the watershed. The list of priority actions includes actions from multiple stakeholder groups.

INDIRECT-IMPACT ACTIONS

- **G-01: Maintain ongoing meetings of the Yahara CLEAN Compact membership to better coordinate the implementation of recommended planning actions.**
  - ***Overview:*** Continuing to convene the Yahara CLEAN Compact and maintaining cross-agency participation is critical for increasing awareness, promoting collaborative outcomes, and making change. Completion of the RENEW THE BLUE report is just the beginning. The Compact membership should continue to meet regularly to maintain collaboration and advocate for implementation of priority actions recommended in this plan by the various stakeholder groups.
  - ***Cost:*** $ (meetings, dedicated staff time and participation).
  - ***Timing:*** Starting in 2022, recommend meetings are convened at least quarterly.
  - ***Baseline:*** The CLEAN Compact.
  - ***Tracking Metric:*** Membership participation and meeting minutes.
  - ***Impact:*** While the Yahara CLEAN Compact does not result in direct reductions in phosphorus, *E. coli* or runoff, it maintains ongoing collaboration, data sharing and coordination among disparate agencies, bodies of government, and private organizations. The Compact members are well positioned to be champions of change within their respective organizations and the larger community.
  - ***Implementation Partners:*** CLEAN Compact members.
  - ***Co-Benefits:*** Promote policy changes, increase scientific understanding, improve collaboration.

- **R-01: Encourage policy-makers to develop and adopt strategies that will reduce phosphorus, *E. coli*, and runoff.**
  - ***Overview***. When the public calls for water quality, water quality will become a priority for policy-makers. Calling for water quality improvements and encouraging policy-makers to drive improvement will prioritize water quality changes.
  - ***Cost***. $
  - ***Timing***. Ongoing (no defined start or end date).
  - ***Baseline:*** The baselines for this action are the current policies and ordinances across agencies and government bodies regulating the allowable amount of phophorus, *E. coli* and runoff in the lakes, and the current data as presented in this document for each of these items.
  - ***Tracking Metric***. Number and quality of new strategies adopted.
  - ***Impact***. Reduces a direct source of phosphorus, *E. coli* and stormwater runoff loading to rivers and lakes.
  - ***Co-Benefits***. Increases awareness and a sense of stewardship among the public.

PHOSPHORUS ACTIONS

▸ G-02: Build additional manure-processing facilities within the watershed.

- ***Overview***. Five new manure-processing facilities were recommended in CLEAN 2.0, five new facilities is still a reasonable goal. Two of the manure-processing facilities recommended in CLEAN 2.0 have been built and are operational, an additional three facilities optimized for phosphorus removal should be developed and built within the watershed. Desirable digester locations should be identified using phosphorus generation and loading data.

  A 2016 study, 'Evaluation of Manure Storage Capital Projects in the Yahara River Watershed' could serve as a reference for the identification facility locations.

- ***Cost***. $$$$$ (review phosphorus loading data within the watershed to determine manure-processing location, purchase property, design, permit, construct processing facility, operate processing facility).

- ***Timing***. Identification of the manure-processing facility locations can begin immediately. Installation of one new facilitiy is expected to take 5 to 8 years to complete.

- ***Baseline:*** When built, the additional three new facilities could be reasonably expected to reduce annual phosphorus loading by as much as 4,500 pounds/year.

- ***Tracking Metric***. Mass (pounds or tons) captured at the processing facility.

- ***Impact***. This action has the potential to significantly reduce phosphorus and *E. coli* availability within the watershed. Although manure-processing facilities are primarily managed for their energy production, they could also be managed to maximize phosphorus removal, increasing their impact. The two existing facilities export approximately 200,000 lbs of manure P per year from the watershed, which is approximately equal to the pounds/year of P imported into the Mendota watershed from agriculture, development, non-point, and natural sources combined. .

- ***Implementation Partners:*** Wisconsin DNR, Dane County.

- ***Co-Benefits***. Creation of new jobs, production of alternative and renewable energy source.

▸ G-03: Cost-share the development of on-farm (site) manure-processing facilities for phosphorus removal.

- ***Overview***. Construction of an on-site manure-processing facility is cost prohibitive for most agricultural production operations. Cost-sharing facilities will make them more accessible to farmers. Manure-processing facilities at the farm can be managed to maximize phosphorus recovery from waste.

  The need for additional manure-processing facilities in the wateshed may not be needed if additional on-site processing facilities were developed.

- ***Cost***. $$$ (identification of farm operations willing to participate, identification of funding source, administering funds, construction and operation costs).

- ***Timing***. On-site facilities are relatively new in the United States but gaining in popularity in some parts of Europe. The program is expected to take 3 to 5 years to become established, depending on funding.

- ***Baseline***. Other on-site processing facilities in the United States or abroad.

- ***Tracking Metric***. Identification of preferred facility locations, identification of funding source(s), installation of on-farm facilities, mass (pounds or tons) of manure processed, mass of phosphorus removed, and identification of markets or recipients of the removed phosphorus.

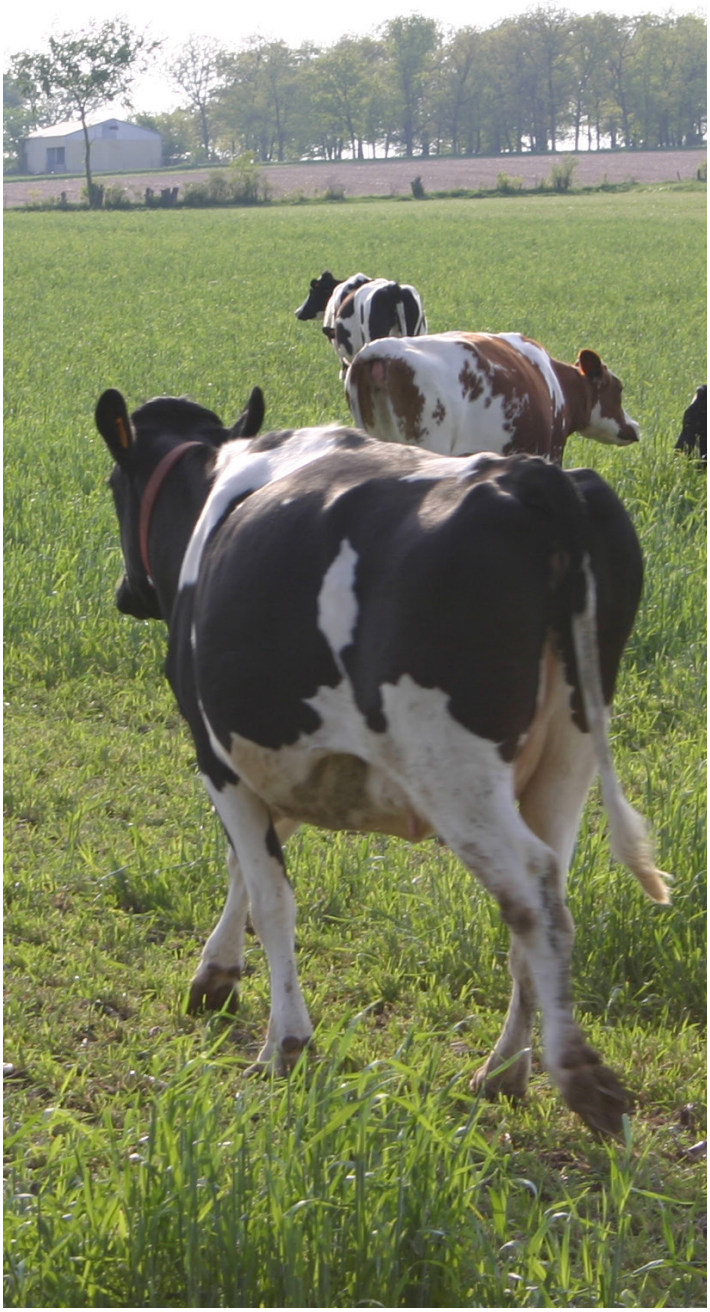
- ***Impact***. This action has the possibility of resulting in significant phosphorus reductions.

- ***Implementation Partners:*** Wisconsin DNR, Dane County.

- ***Co-Benefits***. On-site manure-processing facilities recycle phosphorus at the farm, they also reduce transportation constraints and costs associated with commercial digesters.

▸ G-04: Incentivize farmers and agriculture producers to use existing manure-processing facilities.

- ***Overview***. Develop and establish funding incentives that make delivery or distribution of animal waste to manure-processing facilities more attractive and financially viable for farmers and agriculture producers.
- ***Cost***. $$$ (establish funding pools, administer funding program).
- ***Timing***. This action requires identification and establishment of the funding program and staffing for administration and distribution of funds.
- ***Baseline***. Currently seven farms participate and use the two manure-processing facilities in the watershed.
- ***Tracking Metric***. Mass (pounds or tons) of manure collected and sent for processing, estimated phosphorus removed based on mass of manure collected.
- ***Impact***. The potential impact of this action is expected to be high.
- ***Implementation Partners:*** Wisconsin DNR, Dane County.
- ***Co-Benefits***. Increased use of the existing manure-processing facilities and increased demand for new processing facilities within the watershed.



▸ G-05: Pilot a manure collection and processing program targeting the January to March high phosphorus loading period.

- ***Overview:*** January through March has been found to be when with the greatest phosphorus loading occurs annually. This period of the year is also when the ground can be frozen, resulting in lower soil absorption of phosphorus laden runoff, and when vegetation is dormant, resulting in a lack of vegetative uptake of phosphorus. A program to collect and treat phosphorus generated by agriculture facilities from January through March would reduce the annual contribution of phosphorus within the Yahara watershed.
- ***Cost:*** $$$$ (development of the program, purchase and operation of collection equipment, establishment and operation of a treatment facility, agency oversight and permitting approval).
- ***Timing:*** Since this action may be among the most impactful proposed, development of a collection pilot program plan should begin immediately. The plan should outline a process for collection and treatment, coordination with farmers and agricultural producers, method for reporting/requesting collection, identification of equipment and staffing needs, location of treatment facility, and collection frequency. With a pilot-implementation plan in place, funding of the action should be prioritized and a pilot program initiated for evaluation of the outcomes and impact.
- ***Baseline:*** Modeling and estimating the impact of manure collection and the predicted phosphorus loading is needed. This action could result in the greatest potential phosphorus reduction if proven successful and scalable to the rest of the watershed.
- ***Tracking Metric:*** Mass (pounds or tons) of manure collected and processed, estimated phosphorus diverted from the lakes based on mass of manure collected and treatment process employed.
- ***Impact:*** As reported in Chapter 2 of this plan, 37 to 48% of the annual phosphorus loading occurs between January and March. An ongoing manure collection program would likely have an immediate impact on phosphorus loading because it would eliminate new manure additions to the soil surface. However, much of the phosphorus in runoff comes from soil phosphorus that built up over many decades, so the full impact of this kind of program would take decades to be realized.
- ***Implementation Partners:*** Dane County.
- ***Co-Benefits:*** Improved networks of communication and coordination. The pilot program would support livestock operators' capacity to manage manure.

► G-06: Increase municipal street sweeping miles and frequency during the autumn leaf-fall period.

- ***Overview***. Phosphorus leaching from leaf litter is the largest contributor to phosphorus loading in the urban environment. Phosphorus quickly leaches from leaves in its dissolved form. Leaves in the road discharge the dissolved phosphorus directly to the storm drains. Removing leaf litter from streets and stormwater systems reduces leached, dissolved phosphorus from reaching the lakes through the storm sewer system.

  Increasing programs that credit P removal through the MS4 permit related to street sweeping will incentivise this action.

- ***Cost***. $$$ (Additional street sweeping or leaf collection trucks, additional staff time for collection)
- ***Timing***. This action can begin immediately as municipalities are able to fund the action.
- ***Baseline***. A randomized, visual assessment of leaf-accumulation and collection survey should be conducted in communities and neighborhoods within the watershed. The initial survey will serve as the baseline.
- ***Tracking Metric***. Changes in the visual assessement of leaf-accumulation and collection through routine, frequent surveying of communities and neighborhoods.
- ***Impact***. Additional leaf pick up will reduce the amount of dissolved phosphorus from entering the storm sewer system. Improved collection could have a significant impact on the amount phosphorus entering the system from urban areas.
- ***Implementation Partners:*** Cities, towns, villages, and townships in the Yahara Lakes Watershed.
- ***Co-Benefits***. Cleaner streets, reduced street stormwater collection clogging.

► G-07: Develop and implement a leaf-collection notification system to inform municipal residents when their leaves will be collected, encouraging leaf removal from street gutters.

- ***Overview***. Develop and implement a program that alerts residents when leaf collection will take place to ensure they are prepared with their leaves in designated locations for pick up. Coordinating leaf pick up for 'just in time' collection enables homeowners to stage leaves for collection without risk of leaf piles damaging or killing their lawn.
- ***Cost***. $$ (app development, collection documentation at the leaf-collection vehicle, implementation and distribution of the app with residents, advertising and awareness campaign)
- ***Timing***. This action could be developed and begin immediately.
- ***Baseline***. Because no notification system currently exists, there is no baseline for this action. The action baseline should be based on homeowner participation in keeping street gutters leaf-free.
- ***Tracking Metric***. Completion and publication of the notification app, mass (tons or pounds) of leaves collected. Number of households participating in and using the notification app and a visual assessement of street gutters free from leaves.
- ***Impact***. This action is expected to improve residential responses and timing of leaf collection. It is expected to reduce leached phosphorus from entering stormwater systems.
- ***Implementation Partners:*** Cities, towns, villages, and townships in the Yahara Lakes Watershed.
- ***Co-Benefits***. Reduced flooding caused by clogging of stormwater systems, improved community participation in leaf collection programs, increased awareness.

► A-02: Increase or start composting manure.

- ***Overview***. Composting manure and recycling the nutrients, where possible, is an effective way of reusing nutrients produced at the farm. Using farm-produced compost can reduce the need for purchasing other types of P-based fertilizers.
- ***Cost***. $$$ (equipment purchase, dedicated composting area)
- ***Timing***. This action can be implemented at any time.
- ***Baseline***. There is not a clear understanding of how much manure is currently being composted in the watershed. This action will require identification of the amount of manure currently being composted in the watershed, to track change or increase over time.
- ***Tracking Metric***. Mass (pounds or tons) of manure composted.
- ***Impact***. The potential impact could be high. This action could reduce the dependency on other forms of imported P as well as process manure at on-site.
- ***Co-Benefits***. Reduced cost of transporting wet and heavy waste, provides compost for reuse at the farm, improved redistribution of nutrients and flexibility of application timing.

► A-03: Develop and follow a Nutrient Management Plan.

- ***Overview***. Many, but not all farmers and agricultural operators prepare and submit a Nutrient Management Plan (NMP). NMP's help farmers save money, often just preparing the NMP gives farmers a better sense of how much phosphorus is being produced and released by their operation. The NMP identifies nutrient management opportunities (such as composting) and leaks (runoff) that with proper management can help reduce the need for outside sources of phosphorus. Preparing a NMP often results in practice changes that result in a reduction of on-farm phosphorus losses.

  Getting all farmers to prepare, submit, and update their NMP would raise phosphorus impact awareness at the farm. A NMP is a requirement for all farms in Wisconsin. The goal of this action is to have 100% of farms preparing and submitting nutrient management plans.
- ***Cost***. $ (increased engagement with farmers, increased enforcement of plans, assistance in the development of plans)
- ***Timing***. This action is already required but not enforced. Increased participation could begin immediately.
- ***Baseline***. In the last four years, approximately 60 to 80% of cropland acres within the watershed was included in a nutrient management plan.
- ***Tracking Metric***. Number of farms within the watershed participating, submitting/completing nutrient management plans and the percentage of acres in a NMP.
- ***Impact***. Nearly all farms that produce a nutrient management plan reduce their nutrient losses when they better understand what is happening at their farm.
- ***Co-Benefits***. Improved stewardship from participants, improved soil health, reduced operational costs, improved on-farm efficiencies, decreased nutrient input needs.

▸ A-04: Minimize the use of chemical fertilizer, and instead use manure, compost, or other sources of crop nutrients generated from within the watershed when possible.

- ***Overview***. Bringing nutrients from outside the watershed into the watershed in the form of fertilizer and feed increases the P and other nutrients the watershed is expected to treat and store. It can result in nutrient loads exceeding watershed capacity.
- ***Cost***. $$ (establishment of in-watershed nutrient recycling infrastructure and distribution networks, reduction in reliance on sources from outside the watershed)
- ***Timing***. This action could be phased into the watershed over the next 8 to 10 years.
- ***Baseline***. Phosphorus mass balance estimate developed for the, 'Phosphorus Flows and Balances for the Lake Mendota and Yahara River Watesheds, 1992-2017'.[1]
- ***Tracking Metric***. Mass (pounds or tons) of phosphorus reused within the watershed from manure-processing facilities, composting and other in-watershed sources instead of purchased from outside the watershed.
- ***Impact***. Recycling nutrients within the watershed can reduduce the accumulation from outside sources. As mined sources of nutrients become restricted or cost prohibitive for acquiring, the infrastructure for recycling nutrients within a watershed becomes more cost effective.
- ***Co-Benefits***. Improved watershed self-reliance and development of internal market value for recycled nutrients.

▸ A-05: Increase number of acres under no-till, reduced tillage, and continuous living cover (i.e. overwinter cover crops).

- ***Overview***. Tilling exposes and turns over soil that has reached a relatively stable (low erosion potential) state and increases the potential for loss through erosion. Reducing the acreage tilled and preserving soil in place with perennial vegetative cover such as hay and pasture reduces the soil loss at the field.
- ***Cost***. $$ (change in land management and production practice, purchase of new or additional equipment)
- ***Timing***. This action is ongoing.
- ***Baseline***. Approximately 5,000-acres of the farmed land in the watershed is estimated to be managed under no till or continuous living cover. The CLEAN 2.0 report estimated the opportunity ranged from 36,000 to 64,000 acres.
- ***Tracking Metric***. Acres per year under these practices.
- ***Impact***. Converting from traditional tilling practices to no-till and continuous cover will reduce erosion loss at the field. Based on experience by Yahara Pride Farms, cover crops reduce P loss by an average of 40%.
- ***Co-Benefits***. Increased soil water holding capacity, improved soil health, farmer cost savings, reduced nutrient loss, reduced erosion loss, improved habitat cover for some species, carbon sequestration.

1 Booth, 2021.

► B-01: Perform regular street sweeping and leaf collection on all developer-owned property (including hardscape surfaces such as private roads, parking lots, and walkways).

- ***Overview***. Decaying leaves and plant material is a known source of phosphorus, and leaves that accumulate in streets release phosphorus that can easily entert local storm sewers and water bodies when it rains. Regular collection and removal of lawn waste and other plant waste prevents it from leaching phosphorus into the stormwater runoff, and reduces accumulation of debris in storm sewers and local water bodies.
- ***Cost***. $$ (development of baseline survey, additional staff or staff time directed at survey collection, assembly of data, reporting of data.)
- ***Timing***. Ongoing (no defined start or end date), focused in autumn months
- ***Baseline***. A randomized, visual assessment of leaf-accumulation and collection survey should be conducted in communities and neighborhoods within the watershed. The initial survey will serve as the baseline.
- ***Tracking Metric***. Changes in the visual assessement of leaf-accumulation and collection through routine, frequent surveying of communities and neighborhoods.
- ***Impact***. Removing leaves from the street before it rains can reduce the amount of phosphorus in stormwater by 80% compared to no leaf removal.
- ***Co-Benefits***. Increases awareness and a sense of stewardship among the public, reduces need for maintenance of storm sewers and clogging of grates which could cause local flooding, reduced local flooding.

► R-02: Collect leaves weekly to prevent leached phosphorus from entering stormwater systems (keep leaves out of the streets).

- ***Overview***. Decaying leaves and plant material is a known source of phosphorus, and leaves that accumulate in streets release phosphorus that can easily entert local storm sewers and water bodies when it rains. Regular raking and bagging lawn waste and other plant waste prevents it from leaching phosphorus into the stormwater runoff, and reduces accumulation of debris in storm sewers and local water bodies.
- ***Cost***. $$ (development of baseline survey, additional staff or staff time directed at survey collection, assembly of data, reporting of data.)
- ***Timing***. Ongoing (no defined start or end date), focused in autumn months
- ***Baseline***. A randomized, visual assessment of leaf-accumulation and collection survey should be conducted in communities and neighborhoods within the watershed. The initial survey will serve as the baseline.
- ***Tracking Metric***. Changes in the visual assessement of leaf-accumulation and collection through routine, frequent surveying of communities and neighborhoods.
- ***Impact***. Removing leaves from the street before it rains can reduce the amount of phosphorus in stormwater by 80% compared to no leaf removal.
- ***Co-Benefits***. Increases awareness and a sense of stewardship among the public, reduces need for maintenance of storm sewers and clogging of grates which could cause local flooding, reduced local flooding.

More than 50% of the annual amount of phosphorus in stormwater entering our lakes is in the form of 'tea water' that leaches from fall leaf debris in the street. Removing leaves from the street before it rains can reduce the amount of phosphorus in stormwater by 80% compared to no leaf removal.

- U.S.G.S. Study conducted in Madison

RUNOFF REDUCTION ACTIONS

► G-08: Protect existing, internally-drained areas that capture overland flow and naturally infiltrate runoff.

- ***Overview***. In addition to restoring banks, shorelines, and other habitat areas, existing, internally-drained areas, particularly those that contribute to runoff reduction should be protected. Preserving the functionality of internally drained portions of the landscape significantly reduces runoff volumes and in riparian systems and contributes to nutrient capture.
- ***Cost***. $$ (identification of internally drained systems, protection policy development and adoption, management of internally drained systems and areas)
- ***Timing***. Authoring the policy for the protection of these spaces can begin immediately, execution and management of the policy is expected to take 1 to 3 years.
- ***Baseline***. 2021 Dane County mapping of internally drained areas.
- ***Tracking Metric***. Acres of land protected, estimated stormwater storage volume for protected areas.
- ***Impact***. Preventing internally drained portions of the landscape from contributing to watersheds significantly reduces the volume of stormwater expected to be carried and processed by a river and adjacent lands.
- ***Implementation Partners:*** Wisconsin DNR, Dane County, Cities, towns, villages, and townships in the Yahara Lakes Watershed.
- ***Co-Benefits***. Reduced downstream flooding.

► G-09: Incentivize green infrastructure on private property through credits, rate adjustments, or stormwater utility fee rebates.

- ***Overview***. Capturing rain and runoff as close to where it hits the earth is the most effective way to reduce the distribution of excess nutrients or other contaminants. Where this can be done on private property it should be recognized, rewarded, and encouraged. Incentive programs should promote the construction and maintenance of structures that reduce the burden on municipal treatment and/or conveyance systems.
- ***Cost***. $$$ (identification of funds, drafting and development of policy language, adoption, establishment, and administration of the program, advertising and awareness campaign)
- ***Timing***. This action is administrative and can begin immediately.
- ***Baseline***. Because this would be a new program there is not a baseline for this action. An evaluation of codes or ordinances that could restrict this action should be conducted. Additionally, training for some staff in regulatory positions may be needed to understand, promote, and ensure the action's success.
- ***Tracking Metric***. Publication of the program, participation reporting, estimated runoff reductions in volume.
- ***Impact***. This action is administrative, and policy-based, once in place it could increase participation in green infrastructure development.
- ***Implementation Partners:*** Cities, towns, villages, and townships in the Yahara Lakes Watershed.
- ***Co-Benefits***. Increased habitat areas, improved community awareness and participation.

► A-06: Protect and preserve wetlands and existing, internally draining areas.

- ***Overview***. Regrading or removing naturally formed internally drainage areas, such as wetlands, contributes to flooding. Preserving and protecting existing, naturally-formed systems that capture and control stormwater and runoff helps manage runoff rate and volume of a watershed.
- ***Cost***. $$ (identification of naturally internally draining areas, modifications to operational practices to protect internally draining areas.)
- ***Timing***. Protecting existing overland flow collection points, depressions, and wetlands can be done immediately.
- ***Baseline***. 2020 Dane County mapping of internally draining areas.
- ***Tracking Metric:*** Acres of land protected or restored.
- ***Impact:*** Naturally occurring, internally draining areas and wetlands minimizes the amount of runoff expected to be controlled by watershed systems. Many of these low areas, if managed properly, can treat as well as store runoff.
- ***Co-Benefits:*** Habitat improvement and protection, reduced stormwater flooding.

► B-02: Protect and preserve existing internally drained areas and wetlands in new projects and developments.

- ***Overview***. Internally drained areas and wetlands do not overflow into adjacent waterways in minor rain events and can capture phosphorus and *E. coli* conveyed in stormwater runoff and keep it in place. When builders develop in areas that are internally drained, these areas are typically designed with storm sewer systems which connect the drainage area to a larger sewer network and thus contribute more water to local streams and lakes. This increases flooding potential and also delivers more pollutants to the lakes.
- ***Cost***. Varies (potentially low cost if addressed early in the pre-development site planning).
- ***Timing***. During acquisition of land and planning for new developments.
- ***Baseline:*** 2021 Dane County mapping of internally drained areas within the watershed could serve as the baseline for this action.
- ***Tracking Metric***. Acres of preserved internally-drained areas.
- ***Impact***. Reduces P loading from urban areas to rivers and lakes via storm sewers by reducing TSS and stormwater runoff.
- ***Co-Benefits***. Conservation of land, focus more development in existing urbanized areas, reduced downstream flooding.

▸ B-03: Use green infrastructure Best Management Practices (BMPs) in new developments such as permeable pavement, rain gardens, bio-swales, etc.

- ***Overview***. Green infrastructure slows runoff rates while also capturing a portion of sediment in the runoff. Sediment is a known source of phosphorus. Consider installing green infrastructure that goes above and beyond the best management practices required to meet local total suspended solids (TSS) performance standards.
- ***Cost***. $$ (consultant costs, construction of BMPs)
- ***Timing***. During project design and implementation.
- ***Baseline:*** Number of acres which drain to a private BMP, some municipalities may have a list of private BMPs, but to our knowledge there is no aggregate map or quantification.
- ***Tracking Metric***. Volume of water treated by BMPs.
- ***Impact***. Reduces P loading from urban areas to rivers and lakes via storm sewers by reducing TSS and stormwater runoff.
- ***Co-Benefits***. Improved property values and rents, reduced heat island effect, opportunities for urban habitat, flood reduction, natural aesthetics, greater awareness among the public.

E. COLI ACTIONS

▸ G-10: Set guidelines and criteria for the sustainable design, development and management of public shorelines and beaches.

- ***Overview***. Beach design and management guidelines should be established for all public beaches that guide site manager actions and decision-making in ways that will improve the quality and health of public beaches. Design and management guidelines should include practices to intercept and treat surface runoff (such as infiltration basins, swales, biofilters, or permeable pavers), increase native perennial herbaceous vegetative cover in lieu of turf or other low infiltration land uses, groom beaches regularly, and discourage geese and gulls. The capture and treatment of stormwater sewer outfalls at or near public beaches should also be included as management practices.
- ***Cost***. $$ (consultant design fees, implementation costs, increased staffing time)
- ***Timing***. Evaluation of public beaches should be prepared as soon as possible.
- ***Baseline***. Clean Lakes Alliance's Back to the Beach Audit and Beach Scorecard.
- T***racking Metric***. Published design guidelines for public beaches within the Yahara watershed. Documentation of expected projects at public beaches, documentation of implemented projects, on-going phosphorus and *E. coli* monitoring and testing outcomes at public beaches.
- ***Impact***. Improving the design and management of public shorelines and beaches could greatly reduce the presence of geese and gulls at beaches, both of which can be primary contributors of *E. coli*. Other practices such as regular grooming increase the amount of sand regularly exposed to ultraviolet rays from the sun which kill *E. coli*.
- ***Implementation Partners:*** Wisconsin DNR, Dane County
- ***Co-Benefits***. Improves health outcomes, cleaner beaches and shorelines, improves equity issues, reduced beach closures, improved habitat, reduced erosion.

► G-11: Assess sources of *E. coli* bacteria at public beaches with frequent closures.

- ***Overview***. Identifying where the greatest risks exist is needed to determine where improvements can be made. For example, identifying where bacterial and quality concerns are affected by stormwater or waterfowl at each public beach.
- ***Cost***. $$ (site sampling and analysis, review of data and identification of closure source and frequency, recommendations for reductions in closures)
- ***Timing***. This action is administrative and can begin immediately. Complete analysis is expected to take 1 to 3 years.
- ***Baseline***. Mapping of beaches with frequent closures, year-one base data collected from problematic beaches.
- ***Tracking Metric***. Sampling data and change in closure rate caused by *E. coli*.
- ***Impact***. Beach sampling can be paired with storm event, and outfall sampling data to identify sources of contamination.
- ***Implementation Partners:*** Dane County, Cities.
- ***Co-Benefits***. Reduced beach closures, improved cross-agency collaboration

► G-12: Increase and improve the frequency and targeting of *E. coli* testing and reporting at problem public beaches with frequent closures.

- ***Overview***. Increased testing frequency, especially at beaches that have historically had recurring closures due to *E. coli*, will provide a better understanding of the locations, timing, and contributing conditions of high *E. coli*. In addition, more frequent testing of our public beaches will yield valuable information that can be used by testing entities like Public Health Madison and Dane County to identify and target those at-risk beaches warranting the greatest attention. The resulting information can also help, 1) guide the execution of *E. coli*-control efforts where they are needed most, 2) make the public more aware of conditions as they evolve, and 3) better protect public health and people's confidence in the safety of our beaches. It is recommended that closure status continue to be communicated to the public via government website, email notices to subscribers, and the Clean Lakes Alliance LakeForecast app.
- ***Cost***. $$ (site sampling and analysis, review of data to identify closure source and frequency, recommendations for actions that can be taken to reduce closures, maintaining public-notification systems)
- ***Timing***. This action requires administrative commitment and staffing. Increased data collection should begin as early as the spring of 2022.
- ***Baseline***. Median historical closure rate (in total and by individual beach).
- ***Tracking Metric***. Annual average closure rates of tested beaches.
- ***Impact***. This action is not expected to result in a direct reduction in *E. coli*, but will identify timing, locations, and contributing factors (i.e., rain events) leading to high *E. coli* for improved awareness and management.
- ***Implementation Partners:*** Cities and villages with public beaches.
- ***Co-Benefits***. Reduced beach closures, improved cross-agency collaboration.

4.3 GOVERNMENT ACTIONS

In addition to the priority actions identified in Section 4.2, the following actions that should be implemented by government entities are expected to have significant impacts on water quality in the Yahara lakes. Table 10 provides a full list of the actions that should be implemented by the government stakeholder group and includes more information about the associated strategy, objective pollutants, and approach for each action.

PHOSPHORUS ACTIONS

- **G-13: Maintain and increase stream gaging stations within the watershed that track phosphorus loading.**
  - ***Overview:*** Stream gaging stations can help identify phosphorus hot spots where management action should be prioritized. Gaging stations enable long-term data collection, tracking, and analysis of phosphorus loading to the lakes.
  - ***Cost:*** $$ (funding and management of existing stream gage stations, identification and installation of new gaging stations)
  - ***Timing:*** This action can begin immediately.
  - ***Baseline:*** Watershed modeling and resulting estimates for the impact of manure collection and the predicted phosphorus loading is needed.
  - ***Tracking Metric:*** This action will not result in direct reductions but will continue to provide baseline data for the watershed.
  - ***Impact:*** This action will improve the understanding and anlysis of phosphorus loading within the watershed. The data collected by this action could be used for the development of policy or capital improvements within the watershed
  - ***Implementation Partners:*** Wisconsin DNR.
  - ***Co-Benefits:*** Increased understanding of the watershed, improved policy development, assessment of action/BMP performance, and identification of new actions.
- **G-14: Restructure cost-share programs to align eligibility prioritization with watershed areas at higher risk of stormwater runoff and phosphorus loss.**
  - ***Overview***. Aligning funding with areas of highest potential impact allows for the biggest bang for the buck.
  - ***Cost***. $$ (identification of high-risk areas, policy alignment or refinement, approval, and adoption of changes)
  - ***Timing***. This action is administrative and can begin immediately.
  - ***Baseline***. Quantify current cost share programs.
  - ***Tracking Metric***. Dollars directed at high risk sites, runoff reductions resulting from funding in volume, phosphorus loss reduction in mass (tons or pounds).
  - ***Impact***. Aligning funding with needs allows for the best use of dollars. This action could have a significant impact and benefit sites where dollars might not be otherwise available.
  - ***Implementation Partners:*** Wisconsin DNR, Dane County.
  - ***Co-Benefits***. Increased awareness.

Table:10 Government Actions (1 of 5)

#	ACTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
G-01	**Maintain ongoing meetings of the Yahara CLEAN Compact membership to better coordinate the implementation of recommended planning actions.**	Increase scientific understanding of phosphorus; Promote awareness and ownership	★	★	★
G-02	**Build additional manure-processing facilities within the watershed.**	Reduce phosphorus from agricultural sources	★	+	
G-03	**Cost-share the development of on-farm (site) manure-processing facilities for phosphorus removal.**	Reduce phosphorus from agricultural sources	★		
G-04	**Incentivize farmers and agriculture producers to use existing manure-processing facilities.**	Reduce phosphorus from agricultural sources	★	+	
G-05	**Pilot a manure collection and processing program targeting the January to March high phosphorus loading period.**	Reduce phosphorus from agricultural sources	★	+	
G-06	**Increase municipal street sweeping miles and frequency during the autumn leaf-fall period.**	Reduce phosphorus in urban stormwater runoff	★		
G-07	**Develop and implement a leaf-collection notification system to inform municipal residents when their leaves will be collected, encouraging leaf removal from street gutters.**	Reduce phosphorus in urban stormwater runoff	★		
G-08	**Protect existing, internally-drained areas that capture overland flow and naturally infiltrate runoff.**	Reduce runoff volumes; Restore wetlands	+		★

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

\+ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
			Continuing to convene the Yahara CLEAN Compact and maintaining cross-agency participation is critical for increasing awareness, promoting collaborative outcomes, and making change. Completion of the RENEW THE BLUE report is just the beginning. The Compact membership should continue to meet regularly to maintain collaboration and advocate for implementation of priority actions recommended in this plan by the various stakeholder groups.
●			Five new manure-processing facilities were recommended in CLEAN 2.0; five new facilities is still a reasonable goal. Two of the manure-processing facilities recommended in CLEAN 2.0 have been built and are operational, an additional three facilities optimized for phosphorus removal should be developed and built within the watershed. Desirable manure-processing facilities locations should be identified using phosphorus generation and loading data.
●			Construction of an on-site manure-processing facility is cost prohibitive for most agricultural production operations. Cost-sharing facilities will make them more accessible to farmers. Manure-processing facilities at the farm can be managed to maximize phosphorus recovery from waste.
●			Develop and establish funding incentives that make delivery or distribution of animal waste to manure-processing facilities more attractive and financially viable for farmers and agriculture producers.
●			January through March has been found to be when the greatest phosphorus loading occurs annually. This period of the year is also when the ground can be frozen, resulting in lower soil absorption of phosphorus laden runoff, and when vegetation is dormant, resulting in a lack of vegetative uptake of phosphorus. A program to collect and treat phosphorus generated by agriculture facilities from January through March would reduce the annual contribution of phosphorus within the Yahara watershed.
●			Phosphorus leaching from leaf litter is the largest contributor to phosphorus loading in the urban environment. Phosphorus quickly leaches from leaves in its dissolved form. Leaves in the road discharge the dissolved phosphorus directly to the storm drains. Removing leaf litter from streets and stormwater systems reduces leached, dissolved phosphorus from reaching the lakes through the storm sewer system.
●			Develop and implement a program that alerts residents when leaf collection will take place to ensure they are prepared with their leaves in designated locations for pick up. Coordinating leaf pick up for 'just in time' collection enables homeowners to stage leaves for collection without risk of leaf piles damaging or killing their lawn.
	●		In addition to restoring banks, shorelines, and other habitat areas, existing, internally-drained areas, particularly those that contribute to runoff reduction should be protected. Preserving the functionality of internally drained portions of the landscape significantly reduces runoff volumes and in riparian systems and contributes to nutrient capture.

Table 10 Continued: Government Actions (2 of 5)

#	ACTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
G-09	**Incentivize green infrastructure on private property through credits, rate adjustments, or stormwater utility fee rebates.**	Reduce phosphorus in urban stormwater runoff	★	+	+
G-10	**Set guidelines and criteria for the sustainable design, development and management of public shorelines and beaches.**	Improve water quality at public beaches	+	★	+
G-11	**Assess sources of E. coli bacteria at public beaches with frequent closures.**	Improve water quality at public beaches		★	
G-12	**Increase and improve the frequency and targeting of E. coli testing and reporting at problem public beaches with frequent closures.**	Increase scientific understanding of phosphorus; Improve water quality at public beaches		★	
G-13	**Maintain and increase stream gaging stations within the watershed that track phosphorus loading.**	Increase scientific understanding of phosphorus	★		+
G-14	**Restructure cost-share programs to align eligibility prioritization with watershed areas at higher risk of stormwater runoff and phosphorus loss.**	Identify funding sources	★		+

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

✚ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
	●		Capturing rain and runoff as close to where it hits the earth is the most effective way to reduce the distribution of excess nutrients or other contaminants. Where this can be done on private property it should be recognized, rewarded, and encouraged. Incentive programs should promote the construction and maintenance of structures that reduce the burden on municipal treatment and/or conveyance systems.
●	●		Beach design and management guidelines should be established for all public beaches that guide site manager actions and decision-making in ways that will improve the quality and health of public beaches. Design and management guidelines should include practices to intercept and treat surface runoff (such as infiltration basins, swales, biofilters, or permeable pavers); increase native perennial herbaceous vegetative cover in lieu of turf or other low infiltration land uses; groom beaches regularly; and discourage geese and gulls. The capture and treatment of stormwater sewer outfalls at or near public beaches should also be included as management practices.
			Identifying where the greatest risks exist is needed to determine where improvements can be made. For example, identifying where bacterial and quality concerns are affected by stormwater or waterfowl at each public beach.
			Increased testing frequency, especially at beaches that have historically had recurring closures due to *E. coli* , will provide a better understanding of the locations, timing, and contributing conditions of high *E. coli* . In addition, more frequent testing of our public beaches will yield valuable information that can be used by testing entities like Public Health Madison and Dane County to identify and target those at-risk beaches warranting the greatest attention. The resulting information can also help: 1) guide the execution of *E. coli* -control efforts where they are needed most; 2) make the public more aware of conditions as they evolve; and 3) better protect public health and people's confidence in the safety of our beaches. It is recommended that closure status continue to be communicated to the public via government website, email notices to subscribers, and the Clean Lakes Alliance LakeForecast app.
			Stream gaging stations can help identify phosphorus hot spots where management action should be prioritized. Gaging stations enable long-term data collection, tracking, and analysis of phosphorus loading to the lakes.
			Aligning funding with areas of highest potential impact allows for the biggest bang for the buck.

Table 10 Continued Government Actions (3 of 5)

#	ACTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
G-15	Align stormwater control performance standards with Total Maximum Daily Load (TMDL) limits and achieve the TMDL limits for phosphorus and Total Suspended Solids (TSS) for each municipality.	Reduce phosphorus in urban stormwater runoff	★		
G-16	Install green infrastructure at municipally-owned buildings, parks, and other properties.	Reduce phosphorus in urban stormwater runoff	★	+	+
G-17	Prioritize shoreland habitat restoration adjacent to public beaches.	Improve water quality at public beaches		★	
G-18	Expand funding sources to cover the cost of completing water quality projects in the Yahara Lakes watershed.	Identify funding sources	★	★	★
G-19	Fund and execute restoration projects for shorelines and river banks to meet the ecological goals of the water body.	Stabilize shorelines and river banks	★		
G-20	Implement a Green Street program to capture and treat runoff within public rights-of-way.	Reduce Phosphorus in Urban Stormwater Runoff; Reduce Runoff Volumes	★	+	+
G-21	Evaluate the condition of drainage corridors, waterway banks, and shorelines to prioritize high-need areas for stabilization and restoration.	Stabilize shorelines and river banks	★		

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

\+ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
●	●		Total maximum daily load (TMDL), total phosphorus (TP) and total suspended solids (TSS) limits are set by the regulators that define the amount of nutrients that are acceptable within different waterway systems. Meeting these limits is difficult and often not achieved. Complying with the limits would require identification and implementation of a suite of strategies for removal. Develop stormwater ordinances that link runoff quality with the TMDL standards set by regulators.
●	●		Governmental bodies should pilot and pattern appropriate land management practices that will can contribute to changes in phosphorus, *E. coli* , and runoff.
	●		Where beaches are present improve and increase habitat restoration that discourages pests that can lead to increases in *E. coli* or other water quality issues at the beach. For example, converting turf areas to native vegetative cover discourages geese from occupying the shoreline.
●	●	●	Identify additional funding opportunities for funding water quality projects within the watershed. Identify mechanisms to expand the current funding sources for phosphorus reduction at the farm.
	●		Restoration efforts should be directed at improving the conditions of the site in a way that maximizes the ecological benefits and ecosystem services the site provides related to water quality. Where ecological goals for a waterbody have been established, they should be met as part of the shoreline restoration or erosion control work. Goals may include habitat character, invasive species management, or other ecological goals.
	●		Street runoff that is captured and treated along the street before reaching the lakes eliminates many in flow contaminants and helps cool the waters that discharge to the watershed. Green streets rely on BMP's to capture and control runoff from the street in the median or boulevard of the street.
	●		Cataloging and documenting current conditions is needed to identify where opportunities for improvement can be found. Map, characterize, and evaluate drainage corridors and banks and shorelines in urban and rural areas and prioritize drainage ways that need restoration.

Table 10 Continued Government Actions (4 of 5)

#	ACTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
G-22	Prioritize stormwater outfalls for end-of-pipe treatments.	Reduce phosphorus in urban stormwater runoff; Improve water quality at public beaches	★	+	
G-23	Explore the potential effectiveness and feasibility of a pay for performance (or pay to report) program for farmers who reduce phosphorus losses.	Reduce phosphorus from agricultural sources	★		
G-24	Inspect and enforce operating compliance for all major private permitted stormwater facilities.	Reduce phosphorus in urban stormwater runoff; Reduce runoff volumes	★	+	+
G-25	Partner with Lenders and Ag banking services to establish incentives for regenerative farming practices (i.e. rotational grazing, cover cropping, etc.).	Reduce phosphorus from agricultural sources; Identify funding sources	★		+
G-26	Establish incentive programs for the restoration of privately owned shorelines or riverbanks.	Stabilize shorelines and river banks	★		
G-27	Incentivize the purchase of phosphorus containing products generated from within the watershed to make them more market attractive.	Reduce phosphorus from agricultural sources	★		
G-28	Quantify the impact of Dane County's 'Suck the Muck' project on phosphorus loading to the lakes.	Increase scientific understanding of phosphorus	★		

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

✚ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
	●	●	Capturing and treating sediment and nutrients at a pipe outlet is easier and more cost-effective than after they have entered riparian or other aquatic systems. End of pipe treatments could include mechanical traps as well as alum treatments but should be identified and determined based on the character and quality of the water exiting the pipe.
●	●		Increase farmer participation in reporting programs by incentivizing their participation. Self-reporting by farmers enables a better understanding of the work being done at the farm to control phosphorus loss and identify where improvements can be made.
	●		Once constructed it is critical that stormwater facilities are maintained to function properly. Regular inspections are needed to ensure maintenance and repair needs are identified so they can be executed.
●	●		Identify a program for funding farm operations and P-control with execution of on-farm regenerative practices.
	●		Much of the shoreline is privately held. Incentivizing landowners to change or improve their shorelines reduces erosional losses and improves nutrient capture at the fringes.
●			Phosphorus can be brought into the watershed in many different forms, but primarily as fertilizer or animal feed. Recycling existing phosphorus in the watershed reduces the need to import additional sources and slows the net accumulation of phosphorus. Discourage the import of phosphorus containing products into the watershed (ex. Purchasing hay from outside of the watershed will bring phosphorus into the local system).
		●	Suck the Muck mechanically removes phosphorus loaded sludge from lakes and waterways. However, a better understanding of the cost benefit and identification of the impact of the program is needed.

Table 10 Continued Government Actions (5 of 5)

#	ACTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
G-29	Establish a data-sharing arrangement among Yahara CLEAN implementation partners for the purpose of reporting annual community progress.	Increase public and community awareness	★	★	★
G-30	Assist and help ensure that all watershed farmers stay in compliance with Nutrient Management Plan requirements.	Reduce phosphorus from agricultural sources	★		
G-31	Assess the delivery potential from tile lines as described in the State of the Science chapter of this report.	Reduce phosphorus from agricultural sources	★		
G-32	Establish a mandatory policy to have a local planner or sustainability officer meet with developers at the start of the development planning process.	Reduce phosphorus in urban stormwater runoff; Reduce runoff volumes			★
G-33	Optimize processing capacity and phosphorus removal at existing manure-proessing facilities within the watershed.	Reduce phosphorus from agricultural sources	★		
G-34	Pursue a Yahara River-Cherokee Lake Estuary restoration as conceptualized and proposed by Dane County and Wisconsin DNR.	Reduce phosphorus in urban stormwater runoff; Reduce phosphorus from agricultural sources	★		

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

✚ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
			The success of the CLEAN Compact has been a result of the coorperation of the Compact members. The State of the Lakes annual report depends on data-sharing between Compact members. As the Compact progresses, sharing data with, and through the Compact is the fastest way to track and report progress.
●	●		58% of the cropland acres in Dane Co. submitted nutrient management plans in the last four years. It is estimated only 60-80% of the cropland acres within the watershed had a submitted a nutrient management plan. However, per state statute, plans are required for all cropland. Enforcement of plan preparation and submittal is needed to achieve compliance.
●	●		Dane County Land and Water Resources Department should modify the P Index results coming from SnapPlus where tile lines are present. This may not require a change to SnapPlus, if the county can identify the location of existing tile lines.
	●		Ensures that the sustainability goals are understood and considered as part of the plan design, and will help to navigate regulatory conflicts between state and local government.
●	●		Manure-processing facilities are built to create energy from waste. They are managed to maximize their energy generation, P removal is not a priority for these systems. Elevate P removal as a desired outcome not merely a beneficial biproduct of the process to maximize P removal outcomes.
	●		The Yahara River-Cherokee Lake Estuary restoration would result in 670 acres of restoration planned for the inlet of Lake Mendota.

4.4 AGRICULTURE

The following are the additional actions that agricultural partners can take for the biggest impact on water quality in the Yahara Lakes. Table 11 provides a full list of the actions for this stakeholder group and includes more information about the associated strategy, targeted pollutants, and approach of each action.

INDIRECT-IMPACT ACTION

- **A-01: Actively participate in producer-led watershed groups.**
  - ***Overview***. Ongoing participation in watershed groups ensures farmer needs, pressures, and concerns are heard by all. It also gives farmers a chance to develop and share solutions with others.
  - ***Cost***. $ (meetings, dedicated staff time and participation)
  - ***Timing***. This action can begin immediately.
  - ***Baseline***. Membership is increasing, though the exact numbers on total acreage is unknown. Participating member throughout the watershed have averaged around 50 farms.
  - ***Tracking Metric***. Membership participation.
  - ***Impact***. This action does not result in direct reductions, it does however improve coordination and collaboration.
  - ***Co-Benefits***. Increases awareness and a sense of stewardship, promote policy changes, increase scientific understanding, improve collaboration.

RUNOFF REDUCTION ACTIONS

- **A-07: Put in practices that will infiltrate or hold runoff on farmland (i.e. water and sediment control structures, grade stabilization structures, wetlands, etc.).**
  - ***Overview***. Holding stormwater on farmland increases infiltration and reduces runoff volumes that have the potential to carry sediment and contaminants into nearby waterways.
  - ***Cost***. $$$ (regrading of existing on farm drainage patterns, dedication of land for the collection and storage of runoff, installation of structures for storm control, restoration of storm storage areas)
  - ***Timing***. This action is ongoing.
  - ***Baseline***. The total runoff generated by farms could be estimated and modeled. The area dedicated for capturing and storing stormwater is not mapped.
  - ***Tracking Metric***. Fraction of the watershed that drains to a water control feature, modeled volume of captured water.
  - ***Impact***. Reducing runoff from the farm can be as effective as reducing phosphorus inputs. Depending on the design and placement of these facilities, phosphorus and other nutrient capture could be high. Seasonally (Jan-Mar) capturing and preventing runoff could significantly reduce phosphorus loading.
  - ***Co-Benefits***. Increased soil water holding, reduced runoff, reduced erosion.

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Table:11 Agriculture Actions (1 of 2)

#	DESCRIPTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
A-01	**Actively participate in producer-led watershed groups.**	Reduce Phosphorus from Agricultural Sources	★		+
A-02	**Increase or start composting manure.**	Reduce Phosphorus from Agricultural Sources	+	★	
A-03	**Develop and follow a Nutrient Management Plan.**	Reduce Phosphorus from Agricultural Sources	★	+	
A-04	**Minimize the use of chemical fertilizer, and instead use manure, compost, or other sources of crop nutrients generated from within the watershed when possible.**	Reduce Phosphorus from Agricultural Sources	★		
A-05	**Increase number of acres under no-till, reduced tillage, and continuous living cover (i.e. overwinter cover crops).**	Reduce Phosphorus from Agricultural Sources	★		
A-06	**Protect and preserve wetlands and existing, internally draining areas.**	Reduce Runoff Volumes			★
A-07	**Put in practices that will infiltrate or hold runoff on farmland (i.e. water and sediment control structures, grade stabilization structures, wetlands, etc.).**	Reduce Runoff Volumes			★
A-08	Increase acreage of perennial grasses for forage and managed grazing.	Reduce Phosphorus from Agricultural Sources	★		+
A-09	Stabilize eroding drainage, stream and river banks that flow through or are adjacent to agricultural lands.	Stabilize Shorelines and River Banks	★		
A-10	Identify and permanently vegetate upland areas that protect streams, wetland areas, and drainage ditches.	Reduce Phosphorus from Agricultural Sources; Reduce Runoff Volumes	★		+

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

\+ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
●	●		Ongoing participation in watershed groups ensures farmer needs, pressures, and concerns are heard by all. It also gives farmers a chance to develop and share solutions with others.
	●		Composting manure and recycling the nutrients, where possible, is an effective way of reusing nutrients produced at the farm. Using farm-produced compost can reduce the need for purchasing other types of P-based fertilizers.
●	●		Many, but not all farmers and agricultural operators prepare and submit a Nutrient Management Plan (NMP). NMP's help farmers save money, often just preparing the NMP gives farmers a better sense of how much phosphorus is being produced and released by their operation. The NMP identifies nutrient management opportunities (such as composting) and leaks (runoff) that with proper management can help reduce the need for outside sources of phosphorus. Preparing a NMP often results in practice changes that result in a reduction of on-farm phosphorus losses.
●			Bringing nutrients from outside the watershed into the watershed in the form of fertilizer and feed increases the P and other nutrients the watershed is expected to treat and store. It can result in nutrient loads exceeding watershed capacity.
	●		Tilling exposes and turns over soil that has reached a relatively stable (low erosion potential) state and increases the potential for loss through erosion. Reducing the acreage tilled and preserving soil in place with perennial vegetative cover such as hay and pasture reduces the soil loss at the field.
	●		Regrading or removing naturally formed internally drainage areas, such as wetlands, contributes to flooding. Preserving and protecting existing, naturally-formed systems that capture and control stormwater and runoff helps manage runoff rate and volume of a watershed.
	●		Holding stormwater on farmland increases infiltration and reduces runoff volumes that have the potential to carry sediment and contaminants into nearby waterways.
	●		Pasturing and grazing livestock is a much more effective way of distributing waste generated by farming operations. Unlike confined feedlots where waste has to be removed and managed mechanically, healthy pastures are capable of 'recycling' the waste where it is deposited by grazers.
	●		Streams adjacent to farm operations typically receive direct discharges of farm operation runoff which can be laden with phosphorus. Where stream banks erode soil particles with bound P are rereleased into the watershed. Restoring banks with appropriate, desirable native vegetation reduces losses from erosion by locking soil on the bank with deep, wide root systems.
	●		Vegetated upland areas prevent erosion of sediment and filter sediment carried in stormwater runoff.

Table 11 Continued Agriculture Actions (2 of 2)

#	DESCRIPTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
A-11	Use alternative cropping systems or land uses on wet and saturated fields instead of installing tile lines or drainage systems.	Reduce Phosphorus from Agricultural Sources	★		+
A-12	Use planting green technology (i.e. roller-crimpers, no-till, appropriate seed drills, etc.).	Reduce Phosphorus from Agricultural Sources	★		
A-13	Establish permanent, perennial vegetation to stabilize dredged drainage ditch banks.	Reduce Phosphorus from Agricultural Sources	★		
A-14	Relocate or cover livestock facilities to prevent nutrients in manure or feed from discharging directly to surface waters.	Reduce Phosphorus from Agricultural Sources	★		
A-15	Plant vegetative buffers along streams, drainage ditches and wetlands (i.e. harvestable buffer strips).	Reduce Phosphorus from Agricultural Sources	★		+

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

\+ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
	●		Limiting tile lines and drainage systems holds stormwater on the land and allows it to infiltrate instead of carrying sediment into nearby waterways.
	●		Technologies for farming more effectively can be expensive. Programs should be developed that provide additional opportunities for farmers to access equipment with technologies (such as seed drilling) that enable the farmer to sow seed without tilling fields. This action could be used as a method for achieving action A-07.
	●		Stabilizing drainage ditche banks after dredging will protect them from further erosion. Establishing permanent perennial vegetation within the ditches will slow down and filter the flow of stormwater in ditches.
	●		Preventing precipitation from coming into contact with manure and feed will help keep the water clean, keep the manure and feed dry, and prevent nutrient runoff.
	●		Vegetated buffers capture and trap sediment in runoff and stabilize waterway banks. Increasing the buffer areas increases the areas to trap nutrient laden sediment before it reaches waterway systems.

4.5 BUILDERS & DEVELOPERS

The following are the additional actions that land developers and builders can take for the biggest impact on water quality in the Yahara lakes. Table 12 provides a full list of the actions for this stakeholder group and includes more information about the associated strategy, targeted pollutants, and approach of each action.

PHOSPHORUS ACTION

- **B-04: Avoid the use of phosphorus-based fertilizers for the establishment of lawn or vegetated areas.**
  - ***Overview***. Phosphorus-based fertilizers are already banned for use in Dane County for regular lawn maintenance, but they are allowable for establishment of lawns. Phosphorus-based fertilizers are readily available in many home improvement and garden stores in the watershed, thus many well-meaning land owners may not realize they are using products that are banned for regular maintenance. In addition, this action goes one step further and recommends that fertilizers containing phosphorus not be used at all, even for establishment. Excess fertilizer can run off into the storm sewer during a rain event, delivering excess phosphorus directly to area water bodies. Switching to other fertilizers should not have any cost impacts but requires awareness and may require land owners to pay more attention to labels.
  - ***Cost***. Minimal
  - ***Timing***. During establishment of new lawn areas or restoration of lawns
  - ***Baseline:*** Total use of phosphorus-based fertilizers in the watershed. This is unknown but a recommendation is to survey a sampling of lawn care businesses who work on development projects and extrapolate to establish a baseline.
  - ***Tracking Metric***. Pounds of fertilizer purchased for vegetative establishment.
  - ***Impact***. Reduces phosphorus loading from urban areas to rivers and lakes via storm sewers
  - ***Co-Benefits***. Increase awareness and grow stewardship among the public.

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Table:12 Builder & Developer Actions (1 of 2)

#	DESCRIPTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
B-01	**Perform regular street sweeping and leaf collection on all developer-owned property (including hardscape surfaces such as private roads, parking lots, and walkways).**	Reduce phosphorus in urban stormwater runoff	★		
B-02	**Protect and preserve existing internally drained areas and wetlands in new projects and developments.**	Reduce runoff volumes			★
B-03	**Use green infrastructure Best Management Practices (BMPs) in new developments such as permeable pavement, rain gardens, bio-swales, etc.**	Reduce runoff volumes	✚		★
B-04	**Avoid the use of phosphorus-based fertilizers for the establishment of lawn or vegetated areas.**	Reduce phosphorus in urban stormwater runoff	★		

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

✚ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
●			Decaying leaves and plant material is a known source of phosphorus, and leaves that accumulate in streets release phosphorus that can easily enter local storm sewers and water bodies when it rains. Regular collection and removal of lawn waste and other plant waste prevents it from leaching phosphorus into the stormwater runoff, and reduces accumulation of debris in storm sewers and local water bodies.
●	●		Internally drained areas and wetlands do not overflow into adjacent waterways in minor rain events and can capture phosphorus and *E. coli* conveyed in stormwater runoff and keep it in place. When builders develop in areas that are internally drained, these areas are typically designed with storm sewer systems which connect the drainage area to a larger sewer network and thus contribute more water to local streams and lakes. This increases flooding potential and also delivers more pollutants to the lakes.
	●		Green infrastructure slows runoff rates while also capturing a portion of sediment in the runoff. Sediment is a known source of phosphorus. Consider installing green infrastructure that goes above and beyond the best management practices required to meet local total suspended solids (TSS) performance standards.
●			Phosphorus-based fertilizers are already banned for use in Dane County for regular lawn maintenance, but they are allowable for establishment of lawns. Phosphorus-based fertilizers are readily available in many home improvement and garden stores in the watershed; thus many well-meaning land owners may not realize they are using products that are banned for regular maintenance. In addition, this action goes one step further and recommends that fertilizers containing phosphorus not be used at all, even for establishment. Excess fertilizer can run off into the storm sewer during a rain event, delivering excess phosphorus directly to area water bodies. Switching to other fertilizers should not have any cost impacts but requires awareness and may require land owners to pay more attention to labels.

Table 12 Continued Builder & Developer Actions (2 of 2)

B-05	Meet with the applicable governmental jurisdiction's local planner or sustinability officer at the start of the development planning process.	Minimize soil losses from construction; Reduce runoff volumes; Reduce phosphorus in urban stormwater runoff	+	+	★
B-06	Protect vegetated areas from over compaction during construction.	Reduce runoff volumes			★
B-07	Amend soils in project developed areas to increase the infiltration rates for all turf areas on a development site.	Reduce runoff volumes	+		★
B-08	Implement and protect shoreline stabilization measures.	Stabilize shorelines and riverbanks	★		
B-09	For all new projects, include mechanical sediment trap inside new and existing inlets that capture the project runoff in addition to existing temporary sediment control measures.	Minimize soil losses from construction	★		
B-10	Document expected soil loss and demonstrate soil loss protection measures on all new construction sites.	Minimize soil losses from construction	★		

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

\+ Other Objectives by Action

● Action Approach

●	●	●	Developers who meet with a local planner or sustainability officer are more prepared to navigate regulatory conflicts.
	●		Over compacting soil decreases the infiltration capacity of the soil. Higher infiltration rates decrease the amount of stormwater runoff that can wash *E. coli* and phosphorus into the stormwater system.
	●		Increased infiltration rates decreased runoff rates that can wash *E. coli* and phosphorus into the stormwater system.
	●		Stabilize shorelines to prevent phosphorus containing sediment and plant material from eroding into the waterways. Follow the latest guidelines and criteria for design and development of shorelines.
		●	Mechanical sediment traps would be in addition to upstream best management practices that capture and filter the project runoff. Use mechanical sediment traps in addition to temporary sediment-control measures.
	●		Preventing soil loss from active construction sites prevents phosphorus containing soil from running off into the stormwater system.

4.6 PARK & OPEN SPACE MANAGERS

The following are the additional actions that park and open space managers can take for the biggest impact on water quality in the Yahara lakes. Table 13 provides a full list of the actions for this stakeholder group and includes more information about the associated strategy, targeted pollutants, and approach of each action.

PHOSPHORUS ACTION

- **P-01: Maintain regular street sweeping, leaf collection, and landscaping debris collection in parks and along water bodies. Collect floating aquatic plant debris that accumulates near shore.**
  - ***Overview***. Decaying leaves and plant material is a known source of phosphorus. Frequent street sweeping (especially before a storm, following spring snow melt, and during autumn leaf drops) clears plant material from the streets that would otherwise wash into the sewer and out to waterways during a storm.
  - ***Cost***. $$ (cost of maintenace staff and equipment)
  - ***Timing***. Ongoing (especially important in autumn and spring)
  - ***Baseline***. The amount of park streets being swept and total volume of leaves currently being collected from watershed parks should serve as the baseline for this action.
  - ***Tracking Metric***. Number of parks (or acres) which are regularly being maintained and frequency of maintenance
  - ***Impact***. Reduces phosphorus and *E. coli* loading from urban areas to rivers and lakes via storm sewers and overland runoff from lakeside parks.
  - ***Co-Benefits***. Reduces need for maintenance of storm sewers and clogging of grates which could cause local flooding, improves aesthetics, reduces beach closures, helps keep essential park programming open and supports revenue streams.

RUNOFF ACTIONS

- **P-02: Develop, implement, and demonstrate water quality Best Management Practice (BMP) technologies at park facilities and include phosphorus, *E. coli*, and runoff management in planning and design of new and retrofitted park projects.**
  - ***Overview***. Considering water quality at the design phase of planned park improvements is a proactive approach to phosphorus, runoff, and *E. coli* management while supporting desired activities and amenities. It also demonstrates BMP technologies such as green infrastructure in ways that can be easily understood and adopted by residents and other stakeholder groups.
  - ***Cost***. $$$ (potential consulting fees, implementation costs)
  - ***Timing***. During planning and design phases of park improvement projects (new and retrofitted)
  - ***Baseline:*** Total possible park areas where BMP's are feasible within the watershed. Accounting of currently implemented BMP practices and policies.
  - ***Tracking Metric***. Number of new practices installed or acres draining to a BMP.
  - ***Impact***. Reduces phosphorus and *E. coli* loading from urban areas to rivers and lakes via storm sewers and overland runoff from lakeside parks.
  - ***Co-Benefits***. Increases awareness and a sense of stewardship among the public, reduces beach closures, helps keep essential park programming open and supports revenue streams.

► P-03: Manage parks and open spaces to maximize soil-infiltration capacity, including by increasing native vegetative cover.

- ***Overview***. Many soils in urban areas are less infiltrating, and soils in lawn areas become compacted with use, reducing the infiltration capacity. Park spaces often have large areas of lawn which are heavily utilized. Amending the existing soils through mechanical aeration, or introducing compost and other organic amendments can increase the infiltration capacity of lawn areas and decrease stormwater runoff. In addition, reduced overland runoff reduces phosphorus and *E. coli* in our waters.
- ***Cost***. $$ (implementation costs for amendments, reseeding)
- ***Timing***. Every 5-8 years in high-use recreational fields, every 10-12 years in less frequently used areas.
- ***Baseline:*** Document existing infiltration rates within the parks to serve as the baseline for this action. NRCS soil map profiles can be used as an alternative where testing is cost prohibitive.
- ***Tracking Metric***. Acres of amended soil or conversion to native vegetation
- ***Impact***. Reduces stormwater runoff volume to rivers and lakes.
- ***Co-Benefits***. Reduces standing water on recreational fields, reduces the area of lawn needing to be mowed, helps prevent flooding, lowers water elevation in the lakes, recharges drinking water aquifers by promoting infiltration, promotes goose control and other water quality benefits associated with *E. coli* reduction.

Table:13 Park & Open Space Manager Actions (1 of 2)

#	DESCRIPTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
P-01	**Maintain regular street sweeping, leaf collection, and landscaping debris collection in parks and along water bodies. Collect floating aquatic plant debris that accumulates near shore.**	Reduce phosphorus in stormwater runoff	★	+	
P-02	**Develop, implement, and demonstrate water quality Best Management Practice (BMP) technologies at park facilities and include phosphorus, *E. coli* , and runoff management in planning and design of new and retrofitted park projects.**	Promote public awareness; Reduce runoff volumes; Improve water quality at public beaches; Reduce phosphorus in urban stormwater runoff	★	★	★
P-03	**Manage parks and open spaces to maximize soil-infiltration capacity, including by increasing native vegetative cover.**	Reduce runoff volumes			★
P-04	Protect internally drained areas on park property.	Reduce runoff volumes			★
P-05	Maintain and stabilize drainage ways and ditches on park property.	Reduce phosphorus in stormwater runoff	★		
P-06	Eliminate the use of any phosphorus-based fertilizers for establishment of lawn or vegetated areas on any park-owned golf courses, lawns, and sporting fields.	Reduce phosphorus in stormwater runoff	★		

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

✚ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
●			Decaying leaves and plant material is a known source of phosphorus. Frequent street sweeping (especially before a storm, following spring snow melt, and during autumn leaf drops) clears plant material from the streets that would otherwise wash into the sewer and out to waterways during a storm.
●	●		Considering water quality at the design phase of planned park improvements is a proactive approach to phosphorus, runoff, and *E. coli* management while supporting desired activities and amenities. It also demonstrates BMP technologies such as green infrastructure in ways that can be easily understood and adopted by residents and other stakeholder groups.
	●		Many soils in urban areas are less infiltrating, and soils in lawn areas become compacted with use, reducing the infiltration capacity. Park spaces often have large areas of lawn which are heavily utilized. Amending the existing soils through mechanical aeration, or introducing compost and other organic amendments can increase the infiltration capacity of lawn areas and decrease stormwater runoff. In addition, reduced overland runoff reduces phosphorus and *E. coli* in our waters.
	●		Internally drained areas are not directly connected to water bodies that discharge to the lake system (and thus do not contribute pollutants to the lakes). Existing, internally drained areas should be preserved and protected from future regrading, land-shaping, or under-draining that would result in directly discharging these areas into water bodies or the lake system.
	●		Phosphorus-containing sediment can deposit into a drainage ditch and ditches may need to be periodically dredged in order to operate as designed. Stabilizing ditch bank and bed erosion restricts soil-bound phosphorus from collecting in flow and accumulating in water bodies.
●			The application of phosphorus-based lawn fertilizers is already banned in the State of Wisconsin and care should be taken that no phosphorus based fertilizers are purchased or applied at public facilities. Park facility operational manuals should clearly instruct staff on the approved use of fertilizers to prevent overfertilizing. When there is too much fertilizer applied, these excess nutrients are carried away from the site in stormwater flows.

Table 13 Continued Park & Open Space Manager Actions (2 of 2)

#	DESCRIPTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
P-07	Form a park operators council of the individual municipal and county bodies that will cooperatively assist one another in the identification, pursuit, and preparation of state and federal grant programs for the control and removal of phosphorus, *E. coli* , and stormwater runoff.	Reduce phosphorus in stormwater runoff; Improve water quality at public beaches; Reduce runoff volumes	★	★	★
P-08	Enforce existing rules and restrict pets at all public swimming beaches.	Reduce phosphorus in stormwater runoff; Improve water quality at public beaches	★	★	
P-09	Require pet waste collection in all public parks, provide pet waste stations for public use, and educate the public on the importance of pet waste removal for controlling *E. coli* and phosphorus.	Promote public awareness and ownership, Reduce phosphorus in stormwater runoff; Improve water quality at public beaches	★	★	
P-10	Partner with and support watershed friends groups for the implementation of phosphorus, *E. coli* , and runoff reduction projects.	Reduce phosphorus in stormwater runoff	★	★	★
P-11	Provide educational material and signage that raises awareness of phosphorus, *E. coli* , and stormwater runoff impacts in the watershed.	Promote public awareness and ownership	★	★	★

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

✚ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
●	●	●	Watersheds are not restricted by government boundaries. The Yahara lakes watershed includes multiple government jurisdictions. Cross- governmental projects are often more attractive to funding agencies because they demonstrate a greater value to a watershed. Working together can improve funding experiences and project outcomes.
●			Pets in public swimming beach areas should not be allowed. (This restriction does not include service animals.) Pets should only be allowed on beaches designated for pets.
●			Pet waste contains *E. coli* and phosphorus. During a storm event, residue from pet waste can wash into the storm drains. Cleaning and properly disposing of pet waste keeps it out of the waterways.
●	●		Watershed groups and parks will make a valuable partnership to help parks reduce phosphorus, *E. coli* , stormwater runoff.
●	●		Educational material can be developed to encourage the public to take action on phosphorus, *E. coli* , and stormwater runoff impacts. The materials can draw attention to water quality open source portals where more information about water quality issues can be shared and learned. An educated public is more supportive of regional watershed groups and government officials working on water quality initiatives.

4.7 RESIDENTIAL & COMMERCIAL LANDOWNERS

The following are actions that residential and commercial landowners can implement to positively impact water quality in the Yahara lakes. Table 14 provides a full list of the actions for this stakeholder group and includes more information about the associated strategy, targeted pollutants, approach, and focus area of each action.

RUNOFF REDUCTION ACTION

► **R-03: Direct roof downspouts towards vegetated areas, rain barrels or rain gardens rather than onto pavement.**

- ***Overview***. Directing roof downspouts toward vegetated areas slows runoff rates and promotes infiltration. Downspouts directed onto sidewalks, driveways, or other pavement increase the stormwater flows and the likelihood that leaves and landscaping debris is pushed into the stormwater system and eventually downstream water bodies. This action may require physical modifications to roof downspouts, existing landscape areas, or purchasing and installing equipment such as a rain barrel. Even better, if it can be directed towards a rain garden with vegetation designed to absorb and take up the water.
- ***Cost***. $ (Costs to retrofit downspouts or install practices)
- ***Timing***. Ongoing (no defined start or end date)
- ***Baseline***. The current total number of rain barrels or total area dedicated to rain gardens in the Yahara watershed is unknown. Residential rain gardens can reduce property runoff by as much as 20%.[1]
- ***Tracking Metric***. Number of households or commercial properties who are willing to implement
- ***Impact***. Reduces runoff volumes and rates which indirectly reduces phosphorus loading to urban storm sewers and water bodies
- ***Co-Benefits***. Promotes infiltration and potential reuse of harvested rainwater, reduces need for potable water irrigation.

1 2006. Burnsville Stormwater Retrofit Study. https://www.epa.gov/green-infrastructure/what-green-infrastructure#raingardens

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Table:14 Residential & Commercial Landowner Actions (1 of 2)

#	DESCRIPTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
R-01	**Encourage policy-makers to develop and adopt strategies that will reduce phosphorus, *E. coli* , and runoff.**	Promote public awareness; Reduce runoff volumes; Reduce phosphporus in runoff	★	★	★
R-02	**Collect leaves weekly to prevent leached phosphorus from entering stormwater systems (keep leaves out of the streets).**	Reduce phosphorus in stormwater runoff	★		
R-03	**Direct roof downspouts towards vegetated areas, rain barrels or rain gardens rather than onto pavement.**	Reduce runoff volumes			★
R-04	Participate (financially support, volunteer, etc.) with regional watershed groups working to keep the lakes clean.	Promote public awareness	★	★	★
R-05	Collect and properly dispose of yard waste at the end of the growing season to prevent it from rotting and releasing phosphorus where it can wash into storm sewers and lakes.	Reduce phosphorus in stormwater runoff	★		

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

✚ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
●	●	●	When the public calls for water quality, water quality will become a priority for policy-makers. Calling for water quality improvements and encouraging policy-makers to drive improvement will prioritize water quality changes.
●			Decaying leaves and plant material is a known source of phosphorus, and leaves that accumulate in streets release phosphorus that can easily enter local storm sewers and water bodies when it rains. Regular raking and bagging lawn waste and other plant waste prevents it from leaching phosphorus into the stormwater runoff, and reduces accumulation of debris in storm sewers and local water bodies.
	●		Directing roof downspouts toward vegetated areas slows runoff rates and promotes infiltration. Downspouts directed onto sidewalks, driveways, or other pavement increase the stormwater flows and the likelihood that leaves and landscaping debris is pushed into the stormwater system and eventually downstream water bodies. This action may require physical modifications to roof downspouts, existing landscape areas, or purchasing and installing equipment such as a rain barrel. Even better, if it can be directed towards a rain garden with vegetation designed to absorb and take up the water.
●	●		Supporting regional watershed groups allows them to grow and expand water quality programming, research, and advocacy in the watershed.
●			Decaying leaves and plant material is a known source of phosphorus. Residents can assist by keep street gutters clear of plant material, and bagging and properly disposing of leaves and other landscaping waste to prevent it from washing into the storm sewer system which drains to sensitive waterbodies in the watershed.

Table 14 Continued Residential & Commercial Landowner Actions (2 of 2)

#	DESCRIPTION	STRATEGY	OBJECTIVE		
			Phos.	*E. Coli*	Runoff
R-06	Minimize the use of fertilizers and eliminate the use of phosphorus-based fertilizers for establishment of lawn or vegetated areas.	Reduce phosphorus in stormwater runoff	★		
R-07	Convert lawn areas to native plants or lower-maintenance vegetative cover.	Reduce phosphorus in stormwater runoff; Reduce runoff volumes			★
R-08	Install, maintain, and promote green infrastructure such as rain gardens and permeable pavement.	Reduce runoff volumes	+	+	★
R-09	For shoreline property owners, stabilize and ecologically restore shorelines and stream banks as needed.	Stabilize shorelines and river banks	★		
R-10	Participate in local programs to install green infrastructure projects within the terrace area.	Reduce Runoff Volumes	+	+	★
R-11	Advocate for municipal credits (such as a stormwater utility fee rebate) for the implementation of water quality Best Management Practices (BMPs) on private properties.	Reduce runoff volumes			★

Note. Actions in bold print were identified as the top actions for the stakeholder group.

Priority Action

★ Primary Objective(s) by Action

\+ Other Objectives by Action

● Action Approach

APPROACH			ADDITIONAL DETAIL
Reduce	Restrict	Remove	
●			Phosphorus-based fertilizers are already banned in Dane County. Homeowners throughout the watershed should eliminate the use of any phosphorus-based fertilizers and review fertilizing instructions in general to prevent overfertilizing. When there is too much fertilizer applied, or it is applied incorrectly, excess nutrients are carried away from the yard in stormwater flows.
	●		Native and low-maintenance plants have lower fertilizer requirements reducing the chance that excess fertilizer will runoff into the storm sewer. In addition, native plans are deep rooted and promote increased rainfall infiltration.
	●		Green infrastructure slows runoff rates while also capturing a portion of sediment in the runoff. Sediment is a known source of phosphorus.
	●		Phosphorus-containing soil on the banks of a river or shoreline washes into the waterways when it erodes. Stabilizing the banks improves the ecology of the waterway while keeping phosphorus contained in the soil and out of the water.
	●		Green infrastructure slows runoff rates and captures some sediment runoff. Sediment is a known source of phosphorus. Some communities offer programs that encourage the installation of green infrastructure in the terrace, between the sidewalk and the street.
	●		If residents advocate for receiving credit for installed BMPs, it will encourage municipal staff to prioritize water quality initiatives. Credits will help offset the cost to install a water quality project on private property such as a rain garden or permeable paver system.

4.8 TOP PRIORITY ACTIONS BY STAKEHOLDER GROUP AND TARGET

In summary, the top actions by stakeholder group and objective (supporting, phosphorus, *E. coli*, and runoff reduction) are presented in the following tables.

Table:15 Indirect-Impact Actions by Stakeholder Group

STAKEHOLDER GROUP	ACTION #	ACTION DESCRIPTION
Government	G-01	Maintain ongoing meetings of the Yahara CLEAN Compact membership to better coordinate the implementation of recommended planning actions.
Agriculture	A-01	Actively participate in producer-led watershed groups.
Residential & Commercial Landowners	R-01	Encourage policy-makers to develop and adopt strategies that will reduce phosphorus, E. coli, and runoff.

Table:16 Phosphorus Actions by Stakeholder Group

STAKEHOLDER GROUP	ACTION #	ACTION DESCRIPTION
Government	G-02	Build additional manure-processing facilities within the watershed.
Government	G-03	Cost-share the development of on-farm (site) manure-processing facilities for phosphorus removal.
Government	G-04	Incentivize farmers and agriculture producers to use existing manure-processing facilities.
Government	G-05	Pilot a manure collection and processing program targeting the January to March high phosphorus loading period.
Government	G-06	Increase municipal street sweeping miles and frequency during the autumn leaf-fall period.
Government	G-07	Develop and implement a leaf-collection notification system to inform municipal residents when their leaves will be collected, encouraging leaf removal from street gutters.
Government	G-13	Maintain and increase stream gaging stations within the watershed that track phosphorus loading.
Government	G-14	Restructure cost-share programs to align eligibility prioritization with watershed areas at higher risk of stormwater runoff and phosphorus loss.
Agriculture	A-02	Increase or start composting manure.
Agriculture	A-03	Develop and follow a Nutrient Management Plan.
Agriculture	A-04	Minimize the use of chemical fertilizer, and instead use manure, compost, or other sources of crop nutrients generated from within the watershed when possible.
Agriculture	A-05	Increase number of acres under no-till, reduced tillage, and continuous living cover (i.e. overwinter cover crops).
Builders & Developers	B-01	Perform regular street sweeping and leaf collection on all developer-owned property (including hardscape surfaces such as private roads, parking lots, and walkways).
Builders & Developers	B-04	Avoid the use of phosphorus-based fertilizers for the establishment of lawn or vegetated areas.
Parks & Open Space Managers	P-01	Maintain regular street sweeping, leaf collection, and landscaping debris collection in parks and along water bodies. Collect floating aquatic plant debris that accumulates near shore.
Residential & Commercial Landowners	R-02	Collect leaves weekly to prevent leached phosphorus from entering stormwater systems (keep leaves out of the streets).

Priority Action

Table:17 Runoff Reduction Actions by Stakeholder Group

STAKEHOLDER GROUP	ACTION #	ACTION DESCRIPTION
Government	G-08	Protect existing, internally-drained areas that capture overland flow and naturally infiltrate runoff.
Government	G-09	Incentivize green infrastructure on private property through credits, rate adjustments, or stormwater utility fee rebates.
Agriculture	A-06	Protect and preserve wetlands and existing, internally draining areas.
Agriculture	A-07	Put in practices that will infiltrate or hold runoff on farmland (i.e. water and sediment control structures, grade stabilization structures, wetlands, etc.).
Builders & Developers	B-02	Protect and preserve existing internally drained areas and wetlands in new projects and developments.
Builders & Developers	B-03	Use green infrastructure Best Management Practices (BMPs) in new developments such as permeable pavement, rain gardens, bio-swales, etc.
Parks & Open Space Managers	P-02	Develop, implement, and demonstrate water quality Best Management Practice (BMP) technologies at park facilities and include phosphorus, E. coli, and runoff management in planning and design of new and retrofitted park projects.
Parks & Open Space Managers	P-03	Manage parks and open spaces to maximize soil-infiltration capacity, including by increasing native vegetative cover.
Residential & Commercial Landowners	R-03	Direct roof downspouts towards vegetated areas, rain barrels or rain gardens rather than onto pavement.

Table:18 *E.coli* Actions by Stakeholder Group

STAKEHOLDER GROUP	ACTION #	ACTION DESCRIPTION
Government	G-10	Set guidelines and criteria for the sustainable design, development and management of public shorelines and beaches.
Government	G-11	Assess sources of *E. coli* bacteria at public beaches with frequent closures.
Government	G-12	Increase and improve the frequency and targeting of *E. coli* testing and reporting at problem public beaches with frequent closures.

Priority Action

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5.0 PUBLIC MESSAGING AND SUSTAINED COORDINATION

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5.1 FRAMEWORK FOR FUTURE COMMUNITY ENGAGEMENT

The 2020 final report from the Public Engagement Subgroup (Appendix D) and the associated proposed action schedule provides a stakeholder outreach and community engagement roadmap for the Compact to aid in carrying out planning recommendations. Combined with the recommendations from the 2021 engagement activities, and the survey in particular, there are specific recommended steps the Compact can take to better engage and motivate the community to improve the quality of Greater Madison's lakes.

The following table outlines recommended engagement by the Compact. The table is based on input developed by the subgroup and Urban Assets. The timing priority column indicates the recommended ranking of engagement priorities. Items with a one should be done first.

Table:19 Recommendations for Future Outreach from the Public Engagement Subgroup and Urban Assets

	SUBGROUP RECOMMENDATION	TIMING PRIORITY	URBAN ASSETS RECOMMENDATION
1	Contract with a Diversity, Equity, and Inclusion (DEI) firm to provide education on DEI strategy and engagement with diverse audiences.	1	First work with the DEI consultant to build capacity to do this work in a meaningful way.
2	Develop shared language to discuss DEI efforts.	1	Determine how to share information and engage with diverse communities around water quality.
3	Develop deeper understanding of Ho Chunk Nation history, tribe organization, and natural resource philosophy.	2	Building a relationship with the Ho Chunk Nation takes time, commitment, and serious effort. University and DNR compact members should lead this effort.
4	Develop deeper understanding of underserved/ under-represented communities by hearing stories of these communities and their relationships to water resources.	3	Build working relationships with community organizations that represent and work with diverse communities.
5	Address gaps in understanding about the intersection of underserved communities and water quality / water resources.	3	Develop communication and educational tools targeted to each specific community.
6	Utilize DEI lens and City of Madison equity tool in designing public input opportunities. The tool emphasizes inclusive engagement - targeting historically underserved communities to assure inclusion and that the voices of the disenfranchised are included in discussion and decision making.	1	RESJI tool provides a good model, but the Compact should develop a tool specific to the organizations' mission and goals.
7	Find ways to engage with underserved communities by attending their events and finding points of intersection of interest.	2	Participate in and support activities and events coordinated by and important to diverse communities.

	SUBGROUP RECOMMENDATION	TIMING PRIORITY	URBAN ASSETS RECOMMENDATION
8	Identify opportunities to talk with leaders of various organizations representing these communities around issues of environmental justice, access to recreational opportunities, access to food resources (e.g., work with Sustain Dane to convene round-table discussions on these issues).	2	Reach out to leaders of community organizations representing and serving diverse communities for guidance on how to build relationships and engage diverse communities.
9	Develop family-friendly, fun events for the public that specifically engage diverse communities.	3	Events and activities must be culturally authentic and should be planned and implemented in partnership with diverse community organizations.
10	Information sharing (community-wide), via public events, print, web, and social media, video and webinar content to inform the general public about (a) State of the Lakes baseline data, (b) progress to date / tracker on what actions have had impact thus far (c) recommended strategies for Yahara CLEAN 3.0 (priority actions) that are being implemented.	2	Engage a communications consultant to draft communication tools and develop a roll out strategy.
11	Public events that draw attention to lake resources and engage lake users in ways that build interest and connection with lakes.	3	Events should provide the opportunity for participants to actively engage with the lakes and the watershed, bring the community out in nature.
12	During pandemic restrictions, there may be opportunity to utilize broad digital survey tools, such as Polco, in conjunction with the County.	2	Collaborate with municipalities, Dane County, UW-Madison, MG&E and other organizations on future surveys in order to broaden the audience.
13	Information sharing (farmers, municipalities, builders, contractors), via public events, print, web, and social media, video and webinar content to inform interested partners about (a) *State of the Lakes* baseline data, (b) progress to date / tracker on what actions have had impact thus far (c) recommended strategies for Yahara CLEAN 3.0 (priority actions).	2	Communication tools and messages should be tailored to each specific group - farmers, municipalities, builders, contractors.
14	Events to get input from various constituent groups (farmer groups, municipalities, builders, contractors, other interested partners), via public events, virtual events, innovative document sharing, other strategies to hear from those with ability to implement strategies.	3	Request an invitation to present to existing organizations and working groups to share information on the strategic action plan and to gather feedback.

	SUBGROUP RECOMMENDATION	TIMING PRIORITY	URBAN ASSETS RECOMMENDATION
15	Where possible, invite representatives of various organizations representing farmers, municipalities, builders, and contractors to share about their organizations and their priorities.	2	Reach out to leadership of existing organizations and working groups for guidance in how best to speak to and engage their constituencies.
16	Invite representatives of constituent groups that have a role to play in implementation (farmer groups, conservation groups, municipalities, builders, contractors, etc.) to a steering committee meeting where strategies are being discussed/finalized. This may be a longer meeting to allow for description/ rationale of strategies and input from non-compact members.	3	Build and/or strengthen relationships with constituent groups before asking them to participate in a lengthy meeting.

KEY OUTREACH & MESSAGING RECOMMENDATIONS

The following summarizes some key recommendations based on the results of the community survey and stakeholder interviews.

- Collaborate with the City of Madison and Dane County for surveys focused on similar projects (e.g. watershed studies, stormwater plans, infrastructure projects proximal to lakes).
- Conduct future surveys when UW and Madison College are in session.
- Incorporate lake quality concerns from regular lake users and seniors in future planning efforts.
- To expand the number of actions the community could take to improve the lakes, target planting rain gardens and native vegetation, installing rain barrels, and composting.
- Low income and 18-34 year olds should be encouraged to rake leaves out of the street gutter and dispose of them sustainably.
- Implement a communications campaign targeting BIPOC to educate them on why and how to plant a rain garden and native vegetation as well as installing rain barrels.
- Local policy and action should be prioritized in the action plan.
- BIPOC and low-income emphasis on personal action provides an opportunity to engage them in additional actions to address lake quality.
- Youth should be actively engaged in future efforts.
- Develop a comprehensive strategy to directly and meaningfully engage BIPOC.
- In order to better engage BIPOC, develop programs and events to occur at beaches that are welcoming and family-friendly.
- Partner with lake-focused businesses (Madison Boats, MSCR boat rentals) and community organizations (rowing, fishing, sailing) to encourage and expand low-income and BIPOC engagement with the lakes.

IMMEDIATE NEXT STEPS

- Engage a Diversity, Equity, and Inclusion (DEI) consultant to identify the issues and opportunities for improving the Clean Lakes Alliance standing with the BIPOC community.
- Engage a marketing consultant to develop and test the messaging strategy for RENEW THE BLUE implementation.
- Ensure the final messaging strategy is aligned with the recommendations of the DEI consultant.
- Evaluate current partner relationships and identify necessary new partner relationships, particularly for BIPOC.
- Develop an outreach strategy, talking points, and timeline for developing relationships with new partner organizations.

5.2 YAHARA CLEAN PROGRESS TRACKING

Effective methods for tracking progress toward water quality goals for the Yahara lakes are important to determine which actions are most effective and whether enough is being done, and to sustain public support for what is likely to be a long-term effort. Chapter 2 of this report includes a discussion and evaluation of several progress tracking methods. The following section summarizes this information and recommends specific tracking metrics for the Yahara lakes watershed. Further discussion and coordination among Compact participants will be required to design a communication platform (e.g. annual report, web dashboard) and reporting procedures, roles, and schedules.

There are two main ways to track progress. First, we can account for actions, such as the import or export of phosphorus from the watershed, the amount of cropland with cover crops, or the amount of eroding stream bank that is stabilized. Second, we can monitor outcomes, such as the average soil phosphorus concentration, tributary phosphorus loads, or number of beach closures. The value in accounting for actions is that it demonstrates effort by the community toward improving water quality, but quantifying the effects of actions in a common currency such as annual phosphorus loading is difficult and may produce unrealistic expectations about outcomes. The value in monitoring outcomes is that it reveals the net effect of all the actions and other factors that affect water quality, however, many outcomes are slow to respond to actions. Progress tracking should include both actions and outcomes, but the meaning of these two types of metrics should be clearly communicated.

A. ACTIONS

I. PHOSPHORUS MASS BALANCE

The balance between imports and exports of P in a watershed indicates whether P availability is accumulating or declining. A recent analysis estimated the P mass balance for the Mendota and Yahara watersheds for the period 1992-2017. The analysis will be updated every five years by Dane County Land & Water Resources Department.

II. PHOSPHORUS INDEX

The Wisconsin Phosphorus Index estimates annual phosphorus loss from cropland and pastures, and is part of agricultural nutrient management plans. Dane County Land & Water Resources Department will report the average P Index by HUC12 watershed every two years.

III. OTHER ACTIONS

The effect on P loading of several of the actions recommended (e.g. stabilizing eroding gullies and stream banks, controlling construction site erosion, and improving leaf management) is difficult to even approximate, despite general consensus that they are worth doing. For these actions, progress reporting should be expressed as a percentage of the maximum amount of each action that could be implemented (e.g., the length of stabilized stream banks relative to the total length of eroded banks, or the percentage of developed area in the watershed with various leaf collection practices). For some actions, it may be difficult to estimate the maximum amount that could be implemented. It will remain difficult to compare the effect of this category of actions with other, more quantifiable actions, but the percent progress reporting will still provide a concise summary of which actions are being emphasized.

B. OUTCOMES

I. SOIL PHOSPHORUS.

Phosphorus loss from agricultural land is strongly influenced by soil phosphorus concentration, which changes with the balance of phosphorus inputs and outputs. Soil phosphorus is reported in agricultural nutrient management plans. Dane County Land & Water Resources Department could report the average soil phosphorus by HUC12 watershed every two years.

II. TRIBUTARY PHOSPHORUS LOADS

Trends in tributary P loads represent the net effect of changes in land use and management and delivery of P through the drainage network. Trends in flow-normalized P loads for all USGS monitoring stations in the watershed with at least 10 years of record should be updated annually.

III. LAKE PHOSPHORUS, CHLOROPHYLL, AND CLARITY

Summer average P concentrations and the P concentration measured at the lake surface shortly after fall turnover in deeper lakes Mendota and Monona are the best measures for evaluating in-lake water quality trends. In summer, water clarity and surface chlorophyll a concentration are the best indicators of conditions for lake recreation.

Target parameters for phosphorus concentrations and water clarity should follow those established by the Wisconsin Consolidated Assessment and Listing Methodology (WisCALM), 2022. And as reported in the State of the Lakes Annual Report, prepared by the Clean Lakes Alliance. Poor, Fair, Good, and Excellent targets are defined for phosphorus concentrations and water quality for the deeper (Mendota and Monona) and shallower (Wingra, Waubesa, and Kegonsa) lakes.

C. REPORTING TOOLS

The setting of realistic targets and the taking of measurements along the way are how we learn what works, how to adjust, and how we hold ourselves accountable. Since 2013, Clean Lakes Alliance has presented the community with an annual State of the Lakes Report, updating the public on changing lake and beach conditions while highlighting the progress of watershed partners in completing Yahara CLEAN actions. Partners ranging from county and municipal governments to nonprofit conservation organizations and the UW-Madison voluntarily share details of their latest research, project completions, and phosphorus-reduction accomplishments. Next, that information is aggregated and distilled into yearly status briefings on lake conditions and action implementation. The release of each report is then timed to coincide with a spring community event that celebrates this progress and foreshadows what lies ahead.

Leveraging the popularity and effectiveness of an annual State of the Lakes Report can help honor adaptive-management principles while keeping stakeholders engaged and accountable. Because timely and transparent progress reporting depends on the cooperation of multiple watershed partners, the process would also benefit from the creation of formalized information-sharing arrangements.

Below is a simple illustration of what can be conveyed through a watershed-segmented progress dashboard. The directional "flow" of expected impacts is represented by the arrows, and recommended health metrics are listed to the right of each interconnected zone of interest. How individual measures within each zone change over time provides valuable information on progress trends, including possible cause-and-effect relationships as they play out within the watershed. The table that follows summarizes these progress-tracking metrics relative to established targets, analytical tools, data sources, and improvement needs.

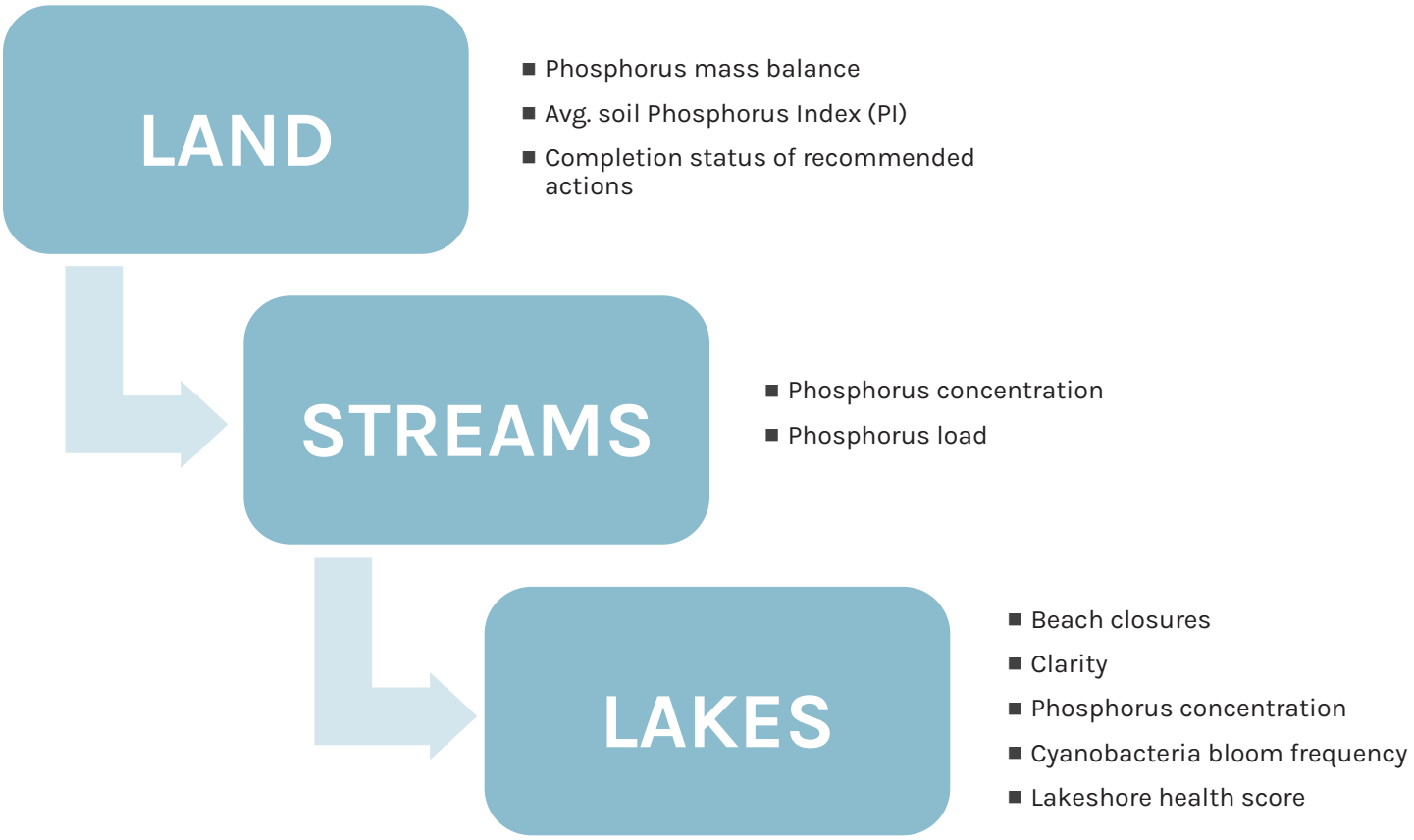

Figure:16 RENEW THE BLUE progress tracking metrics.

	PERFORMANCE CATEGORY	METRIC	TOOL OR MODEL	GOAL	REPORTING FREQUENCY	DATA SOURCE	NEED
LAND	**Watershed mass phosphorus balance.** Measures phosphorus accumulation in the watershed	Net P as mass/ yr. (watershed P imports minus exports)	Phosphorus Flows and Balances for the Lake Mendota and Yahara River Watersheds, 1992-2017 (Booth, 2021)	Negative balance	Every 5 years	Dane County & UW-Madison	Identify schedule & secure resources to complete, formalize reporting process & timing
	Phosphorus Index. A risk assessment tool used to quantify the potential for phosphorus runoff from a field based on site conditions and practices	Average PI for Mendota watershed with index value representing lbs./ac.	SnapPlus	2.1 or lower (WI standard = 6)	Biennual	Dane County & Agricultural Partners	Establish transect method, formalize reporting process & timing
	Practice units. Quantity or coverage of recommended projects and practices as reported by implementation partners	Area, length, or number relative to target or total opportunity	NA	Practice dependent	Annual	Dane County, Municipalities, Yahara WINS, & Yahara Pride Farms	Identify projects and practices to track, develop or update targets, formalize data sharing, reporting process & timing
	Phosphorus reductions by practice. Calculated or modeled reductions as reported by implementation partners	lbs./yr. over practice lifespan	SnapPlus (rural), SLAMM (urban), or similar	Practice dependent	Annual	Dane County, Municipalities, Yahara WINS, & Yahara Pride Farms	Formalize data sharing, reporting process & timing
	Shoreline health. Outcome of inventory assessing various ecological-health and erosion-stability factors	Score or rating	Wisconsin DNR assessment method	High score or rating	Every 5 years	Not identified	Identify implementation lead, methodology, & resources to complete

Table:20 Yahara CLEAN Progress-Tracking Tools for Land

	PERFORMANCE CATEGORY	METRIC	TOOL OR MODEL	GOAL	REPORTING FREQUENCY	DATA SOURCE	NEED
STREAMS[1]	**Phosphorus loading.** Mass of total P per unit of time reported as pounds per water year, impacted by runoff, landscape P loss, and streamflow	lbs./water yr.	USGS stream gages	47,600 (all lakes)	Annual (continuous data collection)	U.S. Geological Survey	Continued funding and operation of current stream gages, new urban stream gage on Starkweather Creek
	Sediment loading. Mass of suspended sediment per unit of time and reported by water year, indicator of soil erosion and delivery of particulate P	lbs./water yr.	USGS stream gages	NA	Annual (continuous data collection)	U.S. Geological Survey	Continued funding and operation of current stream gages, new urban stream gage on Starkweather Creek

Table:21 Yahara CLEAN Progress-Tracking Tools for Streams[1]

1 NOTE. Other in-stream metrics and targets are established as part of the **Rock River Total Maximum Daily Load (TMDL)**. The TMDL was approved by the U.S. Environmental Protection Agency in 2011 as a requirement under Section 303(d) of the Clean Water Act. It serves as a regional restoration plan covering all Rock River Basin waterbodies designated as being impaired. Impaired waters are those that do not meet designated uses or water quality criteria. The TMDL establishes the amount of a pollutant a water can receive and still meet water quality standards. Additionally, it allocates allowable pollutant loads between point and nonpoint sources that is then used to set permit and monitoring requirements for regulated dischargers. An example of a Rock River TMDL target is an in-stream phosphorus concentration of 75 ug/L.

	PERFORMANCE CATEGORY	METRIC	TOOL OR MODEL	GOAL	REPORTING FREQUENCY	DATA SOURCE	NEED
LAKES	**Water clarity.** Visual transparency of the water column	Feet of clarity as a Jul-Aug median	Secchi disk (offshore), turbidity tube (nearshore)	Carlson Trophic State Index criteria for "good" or better water quality. >5 ft. for Mendota & Monona, >3.1 ft. for Wingra, Waubesa & Kegonsa	Annual (twice weekly, minimum, nearshore data collection, variable timing for offshore)	UW-Madison Center for Limnology (LTER Program), LakeForecast citizen monitoring	More consistent offshore data collection, especially on Lakes Waubesa and Kegonsa
	Phosphorus concentration. Total phosphorus per unit volume of water	ug/L as a Jul-Aug median and at fall turnover for Mendota	Surface grab samples analyzed in the lab	2022 WISCALM criteria. <30 ug/L for Mendota & Monona, <40 ug/L for Wingra, Waubesa & Kegonsa	Annual (variable timing and consistency of data collection)		More consistent data collection, especially on Lakes Waubesa and Kegonsa
	Beach closures. Days when monitored beaches are closed to the public due to water quality concerns	Daily closures by beach each summer caused by cyanobacteria and/or *E. coli*	Shallow-water grab samples analyzed or cultured in the lab	Zero	Most beaches tested weekly	Public Health Madison & Dane County (PHMDC), WDNR for state beaches, closure info shared on LakeForecast	More frequent and targeted testing, especially at beaches with higher closure rates
	Cyanobacteria blooms. Seasonal frequency of "strong evidence" observations by lake as reported by trained monitors	Season average by lake	Visual observations by trained monitors	Yearly declines in confirmed sightings	Twice weekly, minimum	Clean Lakes Alliance's LakeForecast citizen monitors	Funding support to equip, train, and coordinate volunteer monitors and manage data

Table:22 Yahara CLEAN Progress-Tracking Tools for Lakes

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6.0 CONCLUSION

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6.1 FINDING THE RIGHT FUNDING MODEL

Significant change requires significant funding. We need strong, sustainable, dedicated revenue sources. The potential for transformative improvement is as great as the willingness to invest for the promise of future returns. Lean government budgets and shifting spending priorities are a call for more creative funding solutions. Too much is at stake to use them as excuses for inaction.

The following table lists several models for generating dedicated and sustained revenue enhancements. The intention is not to prescribe a specific funding structure. Rather, these examples are meant to give government leaders and decision-making authorities a suite of options that could merit further investigation. Dedicated funding mechanisms can take many forms, ranging from what is already in place and functioning to what has proved viable elsewhere. Any combination of approaches has the potential to produce the type of income streams that an investment of this scale demands.

FUNDING MODELS
Lake Protection & Rehabilitation District Special-purpose taxing authority established under Ch.33, Wisconsin State Statutes. These operate much like a school or sanitary district.
Lakes & Watershed Commission Existing Dane County coordinating and advisory body created under Ch. 33, Wisconsin State Statues. The Commission has the power to levy special assessments for certain projects.
Watershed Adaptive Management Existing permit-compliance approach, directed by the Yahara Watershed Improvement Network (Yahara WINS), that pools and allocates resources from regulated dischargers. Those funds then pay for phosphorus-reduction projects and practices anywhere within the watershed. It is used to pay for lower-cost alternatives to phosphorus control compared to what can accomplished with treatment technologies or by the permittees acting independently.
Municipal stormwater utility Existing (in select watershed municipalities) governmental structure that uses impact fees to fund the operation of a stormwater management program and related infrastructure. These can be established via referenda, like what was recently done in the city of Middleton.
Sewerage District Existing, special-purpose district in which rate payers cover the costs associated with collecting and treating wastewater. The Madison Metropolitan Sewerage District is the administrative lead and member of Yahara WINS. There may be opportunities to supplement or raise rate-payer fees to make more dollars available for Watershed Adaptive Management (see above).
Environment & Natural Resources Trust Fund Clean Water, Land and Legacy Amendment to the Minnesota Constitution that allocates a portion of the state's sales tax to fund natural resource protection and water quality improvement.
Yahara CLEAN Compact partner contributions Existing, voluntary coalition of 19 organizations that pooled resources and expertise to develop this RENEW THE BLUE community-action guide.
Market-based solutions A variety of brokered arrangements that generate revenues to pay for defined, public-benefiting projects or activities (i.e., carbon credit offsets, phosphorus banking, etc.).

6.2 AN APPEAL FOR ACTION

As noted in the introduction of this report, the Compact was created based on the premise that healthier lakes are achievable and a priority. Despite changing land management practices and policies to help control the influx of excess runoff, nutrients, and *E. coli* the quality and usability of the lakes have remained unbalanced. In part this was because the region was in a wetter than average weather cycle, however, the volume and intensities of storms were exacerbated by climate change. Land-use change also impacted lake water quality. As more and more farms were converted to other land uses and as the land around farms was increasingly developed, farmers were asked to keep pace with consumer demands with less land.

Regardless of the causes, the fact remains the lakes have not gotten better in the past decade. This is not a government, development, or agriculture problem, it is our problem. We have all contributed to the diminishing lake quality and to actions and behaviors that have contributed to lower lake quality. The solution to improving the lakes starts and ends with us.

A distinguishing feature of RENEW THE BLUE is to identify water quality actions by stakeholder groups. Government, Agriculture, Developers & Builders, Parks & Open Space Managers, and Residential & Commercial Landowners. The actions proposed in this document utilize the opportunity levers identified in the introduction (Economics, Projects, Engagement, Policy, Resources, and Information) for each stakeholder group, recognizing that not all levers can be applied to all groups in the same way.

Some of the recommended actions proposed in this report are big, requiring community support, government initiation, changes in historic practices, and funding. These big actions will not happen overnight or by chance, we must want to make the changes. Some of the actions proposed could be real game-changers (like piloting a manure collection program from January through March).

This report proposes a path to cleaner lakes through specific actions. The action descriptions are intentionally flexible providing stakeholders the creative freedom to identify how they will implement actions. This enables stakeholders to review an action and strategize how they might best execute the proposed action within the framework of their current or future capabilities. This also supports the flexibility for partnering among stakeholders to make the actions a reality. Many of the actions proposed in this report will only be achieved with cooperation among stakeholder groups.

Finding funding for the proposed actions will require patience and persistence. Many of the priority actions proposed in this report are costly. Developing funding structures to pursue actions is part of executing the action. The current round of American Recovery Plan Act (ARPA) funding is specifically targeted at water quality improvements and protection. Many of the actions proposed in this report may qualify as fundable projects within the ARPA structure. Ongoing EPA and other federal fundings sources will also be required to execute the actions.

The quality of the Yahara lakes can improve, and actions in the watershed can and do make a difference. We cannot know all the changes that will come in the next decade, but we can predict with fair certainty that without increased action to improve quality we may continue to see water quality declines in the Yahara lakes.

Now is the time for us to come together as partners united to improve the Yahara lakes for the health of this community and future generations.

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7.0 RESOURCES

7.1 ABBREVIATIONS AND ACROMYMS

µg/L - micrograms per liter

ARPA - American Recover Plan Act

BIPOC - Black, Indigenous, and People of Color

BMP - best management practice

CLEAN - Capital Lakes Environmental Assessment and Needs

CPS - Conservation Practice System

DATCP - Department of Trade and Consumer Protection

DEI - diversity, equity and inclusion

DNR - Department of Natural Resources

EPA - Environmental Protection Agency

FN - flow normalized

GIS - geographic information system

GLCAS - Graphical Constituent Loading Analysis System

HUC - hydrologic unit code

lbs - pounds

LiDAR - light detection and ranging

mi^2 - square miles

MOU - memorandum of understanding

NMP - nutrient management plan

RESJI - Racial Equity and Social Justice Initiative

P - phosphorus

SWAT - Soil Water Assessment Tool

TAC - technical advisory committee

TSS - total suspended solids

UW - University of Wisconsin

USDA - United States Department of Agriculture

USGS - United States Geological Service

WRTDS - Weighted Regressions on Time, Discharge, and Season

Yahara WINS - Watershed Improvement Network

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2018 Madison Area Municipal Storm Water Partnership Survey

APPENDIX

APPENDIX A – CASE STATEMENT USED FOR OUTREACH

APPENDIX B –PUBLIC SURVEY RESULTS

APPENDIX C – INTERCEPT INTERVIEW RESULTS

APPENDIX D – ENGAGEMENT SUBGROUP SUMMARY REPORT

APPENDIX A: PUBLIC OUTREACH CASE STATEMENT

OUR LAKES HAVE VALUE

The Yahara Lakes are a defining characteristic of our region that contribute to our quality of life. They are social, economic, and recreational engines that help shape our community and its future. Healthy communities depend on healthy watersheds and clean water.

OUR LAKES ARE IN TROUBLE

It is no secret that the Yahara Lakes suffer from poor water quality. High levels of nutrients in the lakes lead to unattractive algal blooms, and bacteria near the shore has caused frequent beach closures in some areas. These conditions prevent us from being able to use and enjoy these tremendous assets and can negatively impact the local economy. Unhealthy lakes impact all of us, not just those who live, work, or play on the lakes.

WE ARE TAKING ACTION, BUT WE NEED TO DO MORE

Over the last two decades, significant progress has been made in the implementation of conservation technologies, low impact development, and best management practices to reduce the impacts of pollution and nutrients on our lakes from urban areas and agriculture. Through the hard work of many, new policies have been enacted, practices have been implemented, and natural areas have been restored and protected throughout the watershed.

However, increased urbanization of the watershed, intensified farming production, and most significantly, climate change (more intense storms with more rainfall) have undermined that hard work to improve lake water quality. Unfortunately, these trends have offset the gains and have resulted in limited net improvements to lake water quality.

A SHARED ROADMAP

The Yahara CLEAN Compact, is a coalition of community partners working collaboratively towards creating a strategic plan with recommendations and implementation tools to empower citizens, lawmakers, and businesses to improve lake water quality. The strategic plan, called Yahara CLEAN 3.0, will include.

- Shared community vision and goals
- A roadmap to cleaner lakes
- Identification of actions, roles and timeframes
- Funding strategies
- Milestones for tracking progress

THESE ARE OUR LAKES!

It's time for a renewed effort! No one person or organization can do it alone, and it won't happen overnight. It will take all of us pitching in for a better future for our lakes, our watershed, and our communities. Everyone has a role to play in solving today's challenges.

For more information, visit
https.//www.cleanlakesalliance.org/yahara-clean/.Questions?

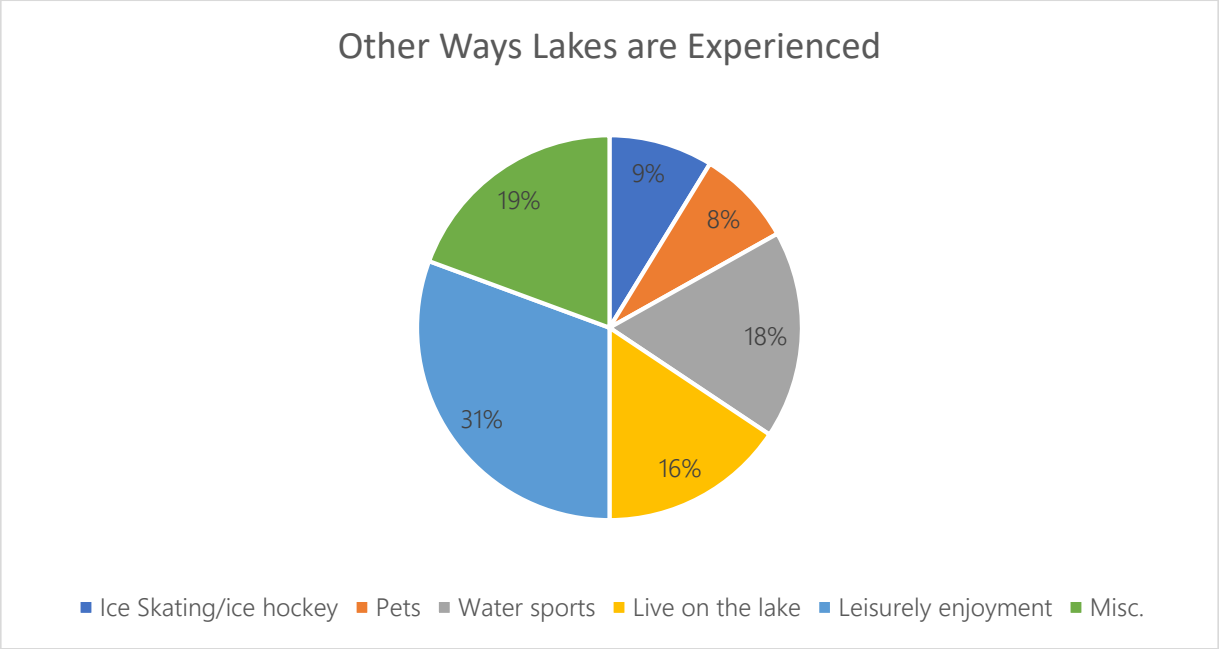
APPENDIX B: PUBLIC SURVEY RESULTS

Question One (n=1386)							
How often do you visit the Yahara lakes or waterfront parks? (Spring/Summer)	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
Regularly (at least once a week)	60%	57%	100%	63%	62%	66%	48%
Frequently (at least once a month)	22%	22%	0%	24%	24%	15%	23%
Occasionally (every couple of months)	11%	12%	0%	6%	9%	11%	18%
Rarely (once or less a year)	5%	7%	0%	3%	4%	5%	10%
Never	1%	3%	0%	3%	0%	2%	2%
How often do you visit the Yahara lakes or waterfront parks? (Fall/Winter)	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
Regularly (at least once a week)	39%	35%	100%	31%	30%	49%	18%
Frequently (at least once a month)	26%	27%	0%	37%	30%	20%	18%
Occasionally (every couple of months)	21%	20%	0%	24%	27%	17%	36%
Rarely (once or less a year)	11%	15%	0%	3%	10%	10%	15%
Never	3%	3%	0%	5%	2%	4%	3%

Question Two (n=1380)							
Which of the five Yahara lakes do you use most often?	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
Mendota	34%	25%	29%	38%	32%	40%	34%
Monona	40%	57%	45%	37%	48%	32%	48%
Wingra	10%	3%	8%	15%	12%	8%	5%
Waubesa	10%	10%	13%	8%	6%	12%	10%
Kegonsa	6%	5%	6%	2%	3%	7%	3%

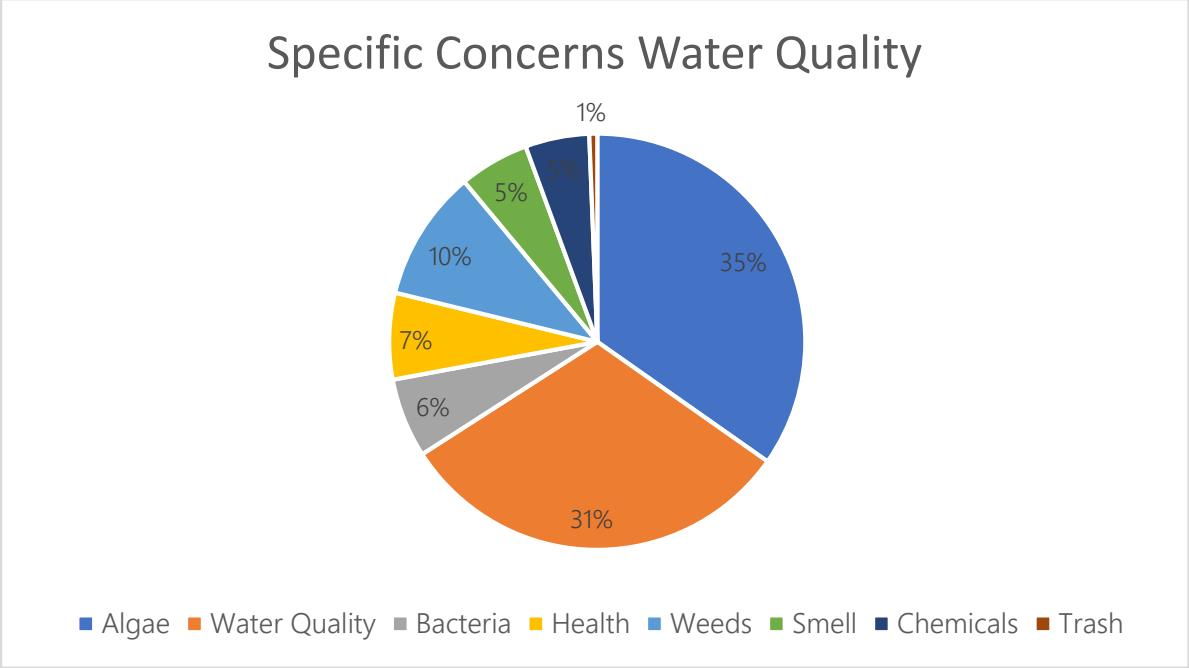
Question Three (n=1386)							
How important are the lakes to you personally?	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
Very Important	82%	70%	96%	76%	75%	88%	80%
Important	16%	28%	4%	23%	23%	9%	15%
Somewhat Important	2%	2%	0%	2%	1%	3%	5%
Not Important	0%	0%	0%	0%	0%	0%	0%

Question Four (n=1386)							
How do you usually experience the lakes? Check all that apply	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
Swimming	41%	28%	49%	44%	39%	31%	26%
Hanging out at the beach	31%	48%	28%	31%	45%	15%	26%
Paddling	48%	43%	57%	35%	46%	43%	38%
Power boating	31%	23%	42%	11%	20%	36%	16%
Water skiing	12%	7%	18%	5%	6%	13%	10%
Sailing	9%	3%	12%	2%	4%	13%	8%
Sitting at a lakefront restaurant or at Memorial Union	58%	62%	53%	40%	69%	51%	51%
Enjoying the view from my neighborhood	52%	52%	78%	42%	53%	56%	43%
Biking along the lakes	55%	68%	65%	53%	61%	46%	34%
Walking along the lakes	72%	82%	79%	82%	84%	70%	67%
Exploring water habitat areas	26%	43%	33%	34%	25%	23%	26%
Fishing	25%	27%	28%	21%	18%	25%	26%
Ice fishing	11%	10%	14%	6%	12%	4%	11%
Ski/run/snowshoe across the frozen lakes	23%	15%	38%	21%	20%	18%	11%
Other (please specify)	11%	12%	14%	6%	10%	15%	13%



Question Five (n=1386)							
Has a beach or boat-access closure ever impacted your ability to use the lakes?	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
Yes	56%	40%	63%	53%	50%	49%	61%
No	37%	48%	32%	42%	39%	46%	33%
Not sure	6%	12%	5%	5%	11%	4%	7%

Question Six (n=1364)							
Do you have any specific concerns about the water quality of our lakes? In other words, is there a specific reason you would feel hesitant about using the lakes?	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
No	14%	22%	8%	16%	17%	12%	15%
Yes (please specify)	86%	78%	92%	84%	83%	88%	85%



Question Seven (n=1364)							
Please choose your level of understanding of how phosphorus contamination impacts our lakes and human health.Select your level of understanding using the sliding scale below.	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with disabilities**
Average number	6	6	7	6	5	7	6
Median number	6	5.5	7	6	5	7	6

Question Eight (n=1364)							
Please choose your level of understanding of how cyanobacteria (bluegreen algae) and E. coli bacteria impact our lakes and human health.	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with disabilities**
Average number	6	6	7	6	6	7	7
Median number	6	5.5	7	6	5	7	7

Question Nine (n=1360)							
The benefit of water quality can be categorized in a number of ways. Please rank the following categories to reflect how you perceive the issue in order of importance.	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
Public Health	48%	46%	44%	42%	46%	53%	63%
Economy	2%	6%	2%	2%	2%	2%	2%
Quality of Life	24%	22%	31%	13%	14%	27%	8%
Sustainability	22%	22%	20%	38%	34%	13%	22%
Tourism	3%	2%	3%	2%	2%	4%	2%

Question Ten (n=1350)					
Please identify your level of willingness to do each of the following actions to help improve the quality of our lakes and the Yahara Watershed. Use dropdown menus to select your level of willingness to do any of the following actions, or to identify actions you are already doing.	**All Data**				
	Currently taking this action	**Very willing**	**Willing**	**Not very willing**	**N/A**
Plant a rain garden	20%	23%	30%	14%	13%
Plant native vegetation	40%	23%	23%	6%	8%
Direct downspouts to green space	53%	19%	15%	3%	11%
Install a rain barrel	22%	21%	28%	16%	13%
Rake leaves out of street gutter and dispose of them sustainably	56%	14%	16%	4%	10%
Reduce salt use on pavement	61%	15%	14%	3%	6%
Pick up litter	66%	18%	13%	2%	1%
Pick up pet waste	51%	9%	6%	5%	30%
Compost	46%	12%	21%	14%	7%
Donate to a conservation organization working in the Yahara Watershed	40%	15%	33%	9%	4%
	BIPOC				

Please identify your level of willingness to do each of the following actions to help improve the quality of our lakes and the Yahara Watershed. Use dropdown menus to select your level of willingness to do any of the following actions, or to identify actions you are already doing.	Currently taking this action	Very willing	Willing	Not very willing	N/A
Plant a rain garden	20%	23%	37%	12%	8%
Plant native vegetation	30%	22%	32%	8%	8%
Direct downspouts to green space	35%	22%	27%	2%	15%
Install a rain barrel	22%	25%	32%	7%	15%
Rake leaves out of street gutter and dispose of them sustainably	43%	15%	27%	3%	12%
Reduce salt use on pavement	48%	28%	13%	3%	7%
Pick up litter	53%	18%	23%	5%	0%
Pick up pet waste	52%	13%	17%	3%	15%
Compost	42%	17%	25%	10%	7%
Donate to a conservation organization working in the Yahara Watershed	33%	15%	37%	10%	5%
Please identify your level of willingness to do each of the following actions to help improve the quality of our lakes and the Yahara Watershed. Use dropdown menus to select your level of willingness to do any of the following actions, or to identify actions you are already doing.	**Regular Lake User**				
	Currently taking this action	**Very willing**	**Willing**	**Not very willing**	**N/A**
Plant a rain garden	25%	21%	29%	12%	12%
Plant native vegetation	42%	21%	24%	5%	8%
Direct downspouts to green space	57%	15%	15%	2%	12%
Install a rain barrel	22%	21%	30%	15%	13%
Rake leaves out of street gutter and dispose of them sustainably	62%	14%	13%	4%	7%
Reduce salt use on pavement	68%	14%	9%	4%	5%
Pick up litter	74%	17%	8%	1%	1%
Pick up pet waste	50%	7%	4%	6%	34%
Compost	47%	11%	20%	14%	7%
Donate to a conservation organization working in the Yahara Watershed	55%	12%	26%	5%	2%
	Lower Income				

Please identify your level of willingness to do each of the following actions to help improve the quality of our lakes and the Yahara Watershed. Use dropdown menus to select your level of willingness to do any of the following actions, or to identify actions you are already doing.	Currently taking this action	Very willing	Willing	Not very willing	N/A
Plant a rain garden	10%	26%	34%	11%	19%
Plant native vegetation	27%	39%	18%	3%	13%
Direct downspouts to green space	32%	32%	11%	5%	19%
Install a rain barrel	16%	32%	29%	5%	18%
Rake leaves out of street gutter and dispose of them sustainably	40%	24%	23%	3%	10%
Reduce salt use on pavement	44%	32%	13%	2%	10%
Pick up litter	65%	26%	10%	0%	0%
Pick up pet waste	31%	23%	11%	8%	27%
Compost	48%	23%	21%	3%	5%
Donate to a conservation organization working in the Yahara Watershed	21%	15%	32%	19%	13%

Please identify your level of willingness to do each of the following actions to help improve the quality of our lakes and the Yahara Watershed. Use dropdown menus to select your level of willingness to do any of the following actions, or to identify actions you are already doing.	18 - 34 Years				
	Currently taking this action	Very willing	Willing	Not very willing	N/A
Plant a rain garden	9%	30%	32%	11%	18%
Plant native vegetation	18%	36%	26%	5%	15%
Direct downspouts to green space	26%	30%	20%	4%	20%
Install a rain barrel	14%	31%	28%	9%	18%
Rake leaves out of street gutter and dispose of them sustainably	26%	20%	33%	8%	13%
Reduce salt use on pavement	39%	22%	22%	5%	12%
Pick up litter	46%	27%	22%	3%	1%
Pick up pet waste	44%	14%	10%	4%	28%
Compost	37%	20%	22%	15%	6%
Donate to a conservation organization working in the Yahara Watershed	16%	21%	48%	13%	2%

	Seniors (65+)

Please identify your level of willingness to do each of the following actions to help improve the quality of our lakes and the Yahara Watershed. Use dropdown menus to select your level of willingness to do any of the following actions, or to identify actions you are already doing.	Currently taking this action	Very willing	Willing	Not very willing	N/A
Plant a rain garden	29%	15%	23%	17%	16%
Plant native vegetation	52%	16%	18%	6%	9%
Direct downspouts to green space	65%	13%	9%	2%	11%
Install a rain barrel	22%	12%	24%	25%	17%
Rake leaves out of street gutter and dispose of them sustainably	68%	11%	10%	2%	10%
Reduce salt use on pavement	70%	12%	12%	2%	4%
Pick up litter	73%	13%	12%	1%	2%
Pick up pet waste	42%	6%	5%	10%	38%
Compost	51%	8%	17%	13%	11%
Donate to a conservation organization working in the Yahara Watershed	61%	9%	19%	7%	4%

Please identify your level of willingness to do each of the following actions to help improve the quality of our lakes and the Yahara Watershed. Use dropdown menus to select your level of willingness to do any of the following actions, or to identify actions you are already doing.	Persons with Disabilities				
	Currently taking this action	Very willing	Willing	Not very willing	N/A
Plant a rain garden	16%	33%	20%	13%	18%
Plant native vegetation	43%	21%	11%	8%	16%
Direct downspouts to green space	59%	15%	10%	3%	13%
Install a rain barrel	25%	18%	21%	7%	30%
Rake leaves out of street gutter and dispose of them sustainably	61%	13%	10%	3%	13%
Reduce salt use on pavement	51%	21%	18%	0%	10%
Pick up litter	70%	16%	8%	0%	5%
Pick up pet waste	46%	10%	5%	3%	36%
Compost	43%	15%	11%	18%	13%
Donate to a conservation organization working in the Yahara Watershed	34%	16%	30%	11%	8%

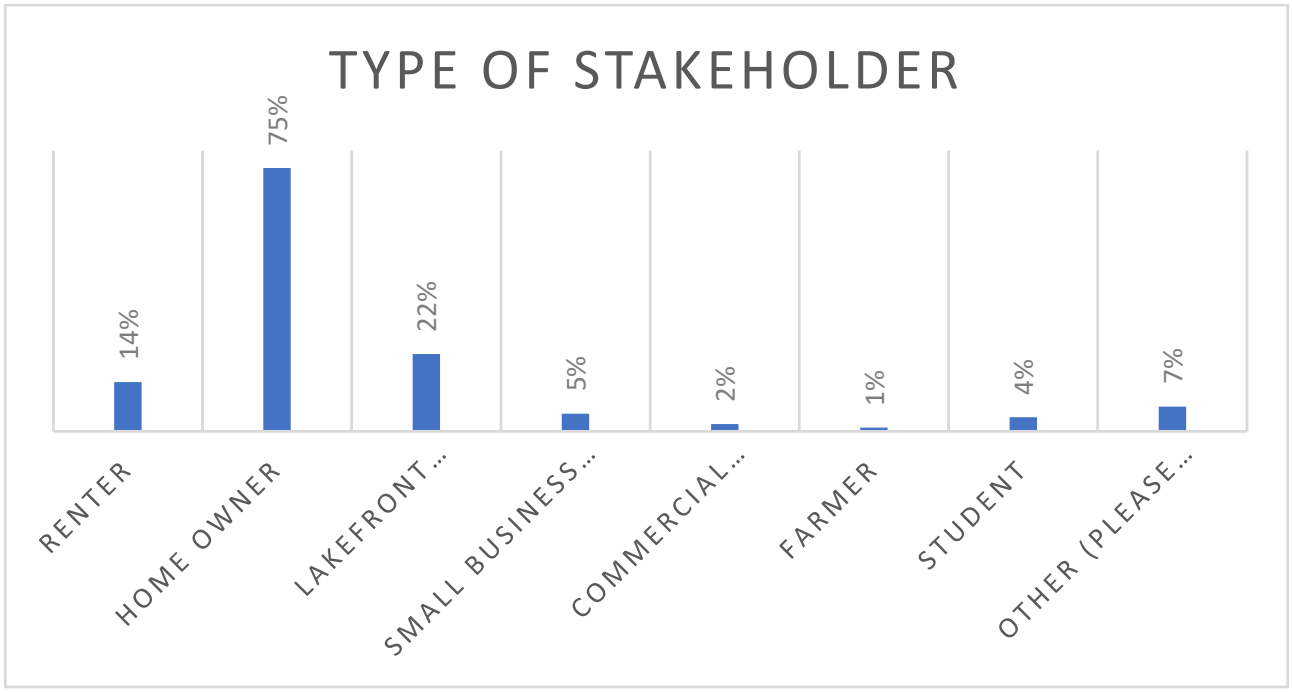
Question Eleven (n=1289)							
Are there any other actions, not listed in the previous question, you are taking to help improve the quality of our watershed?	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
No	68%	77%	63%	73%	81%	58%	67%
Yes (please specify)	32%	23%	37%	27%	19%	42%	33%

Typical Answers to Please Specify

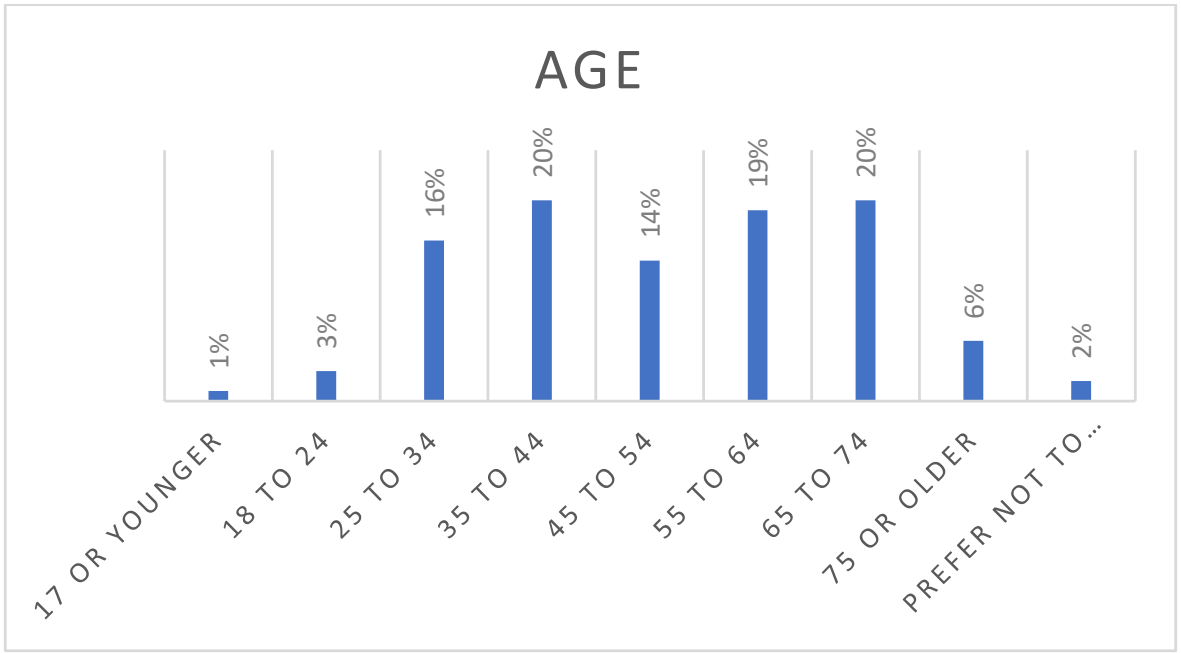
Limiting fertilizers and pesticides
Educating kids and peers
Pulling lake weeds
Volunteer with CLA

Question Twelve (n=1272)							
The lakes within the Yahara Watershed are not meeting federal water quality standards despite a history of ongoing governmental and organizational improvement efforts. Please prioritize the strategies the community action plan should include to address water quality.	**All Data**	**BIPOC**	**Regular Lake Users***	**Low Income****	**18 - 34 Years**	**Seniors (65+)**	**Persons with Disabilities**
Personal action (Projects or activities that an individual is asked to perform, such as raking leaves out of the street gutter or building a rain garden)	17%	25%	19%	29%	12%	20%	8%
Local policy (The adoption of new standards or rules by a county, town, city, village, or district for the purpose of governing certain activities)	28%	27%	26%	14%	30%	27%	32%
Local action (The implementation of a project or program by a county, town, city, village, or district)	21%	19%	24%	19%	27%	20%	14%
State policy (The adoption of new standards or rules by a state government agency or the legislature)	19%	23%	18%	28%	16%	22%	29%
State action (The implementation of a project or program by a state government agency or the legislature)	14%	6%	14%	10%	15%	12%	17%

Survey Demographics



(n=1226)



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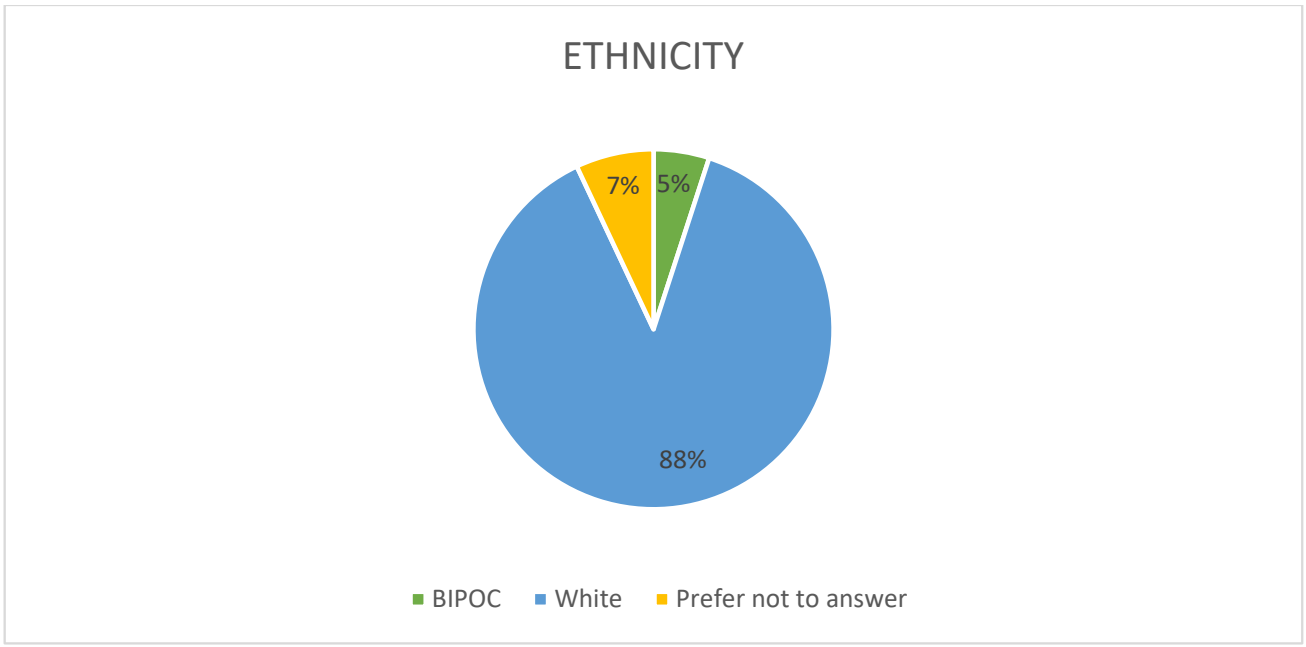
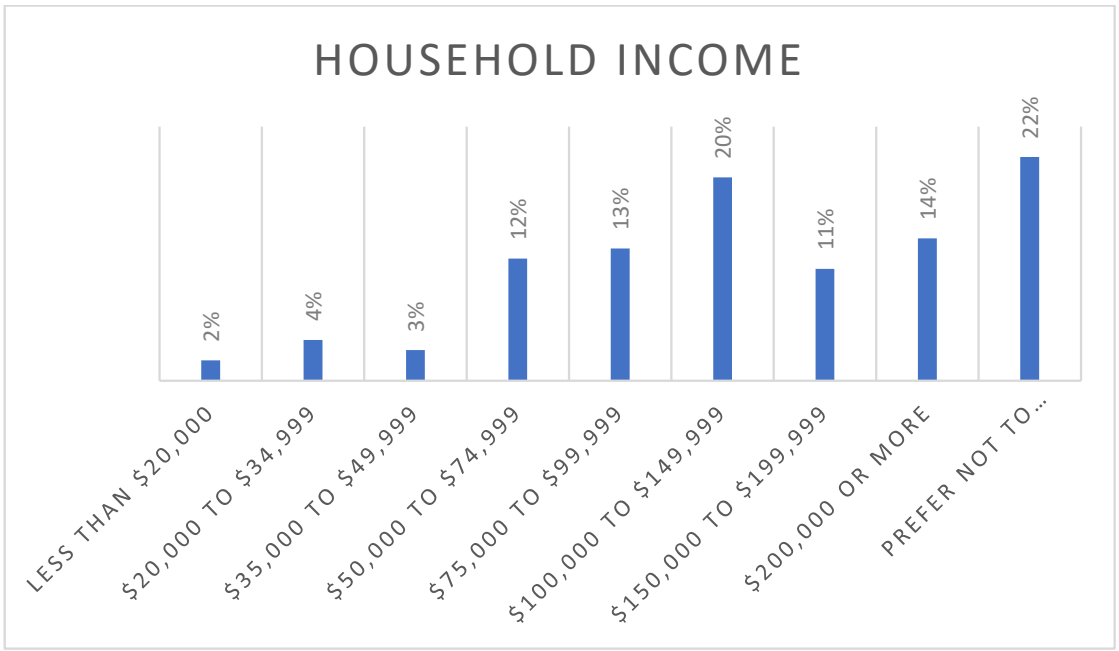


(n=1218)

Note: 13% of total respondents skipped question



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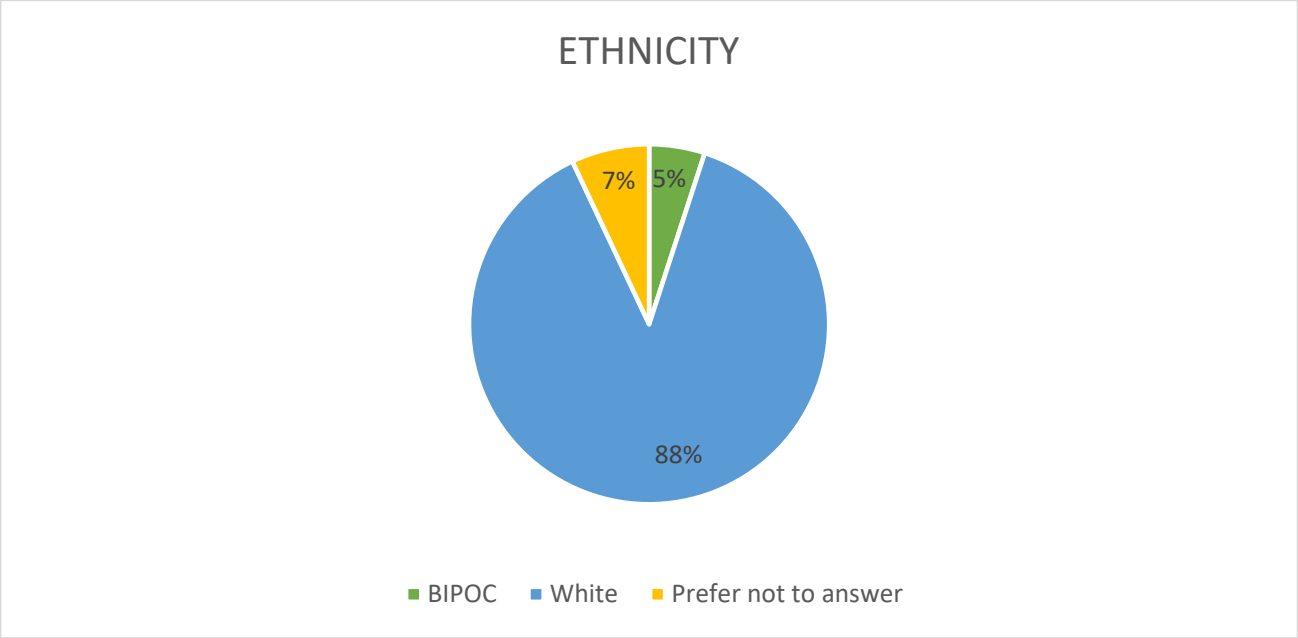
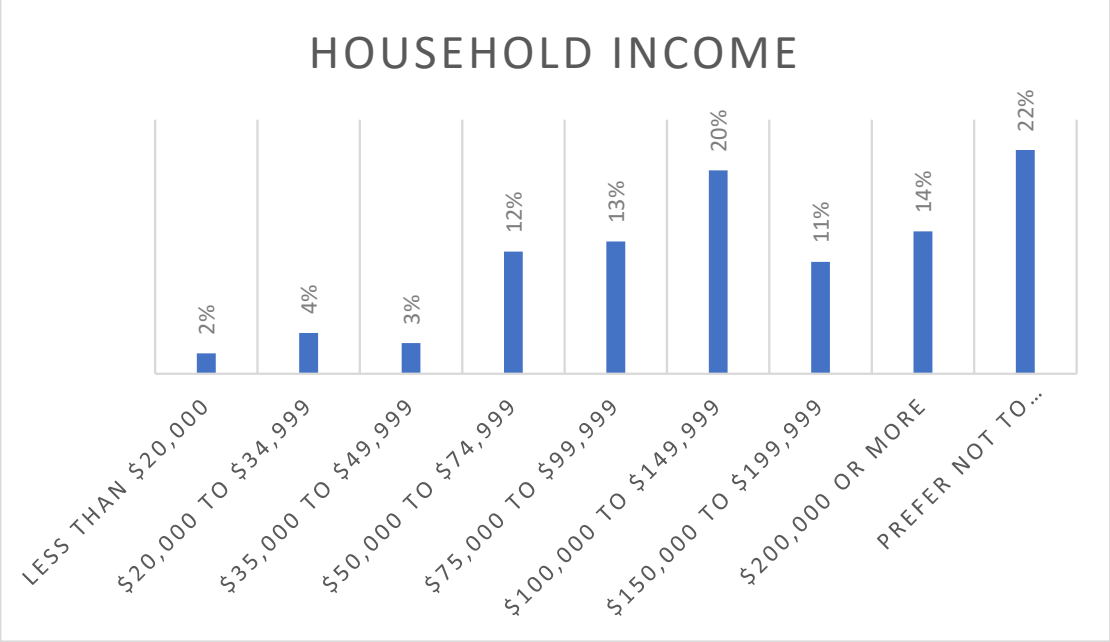
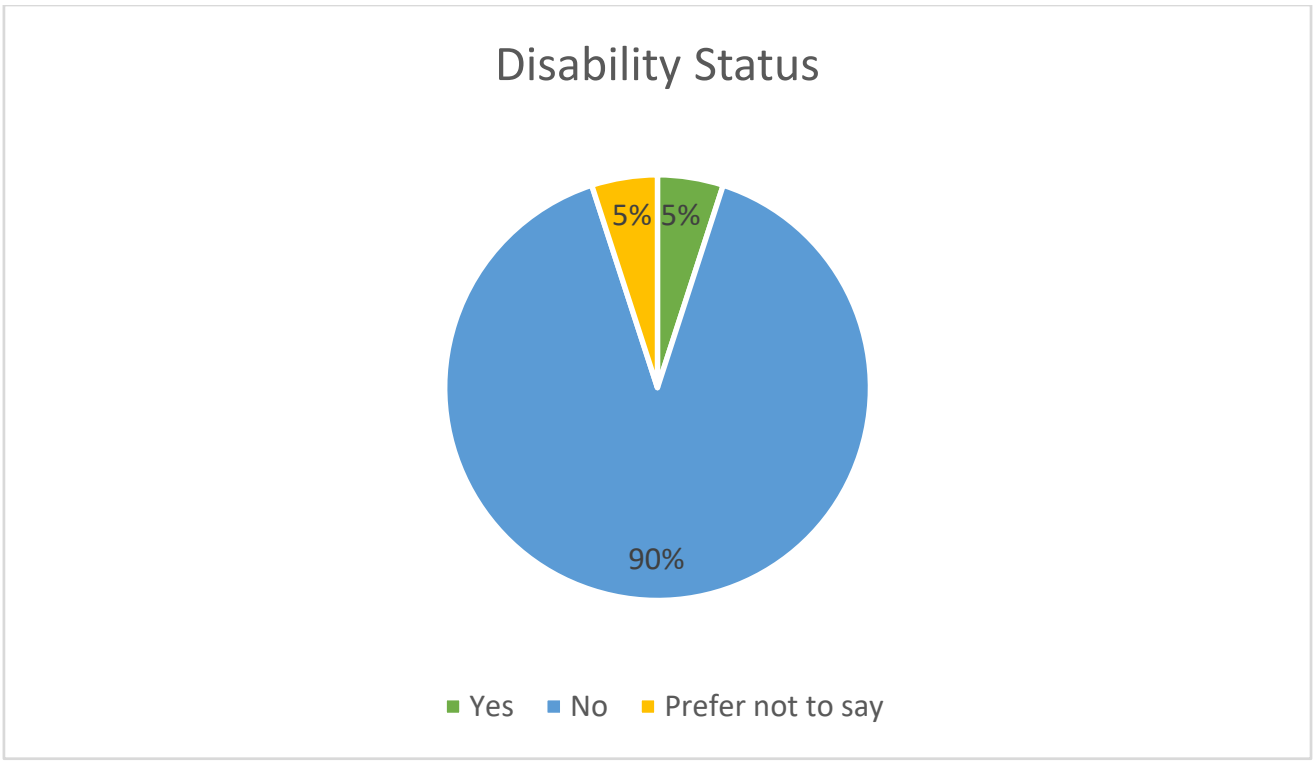


(n=1218)

Note: 13% of total respondents skipped question



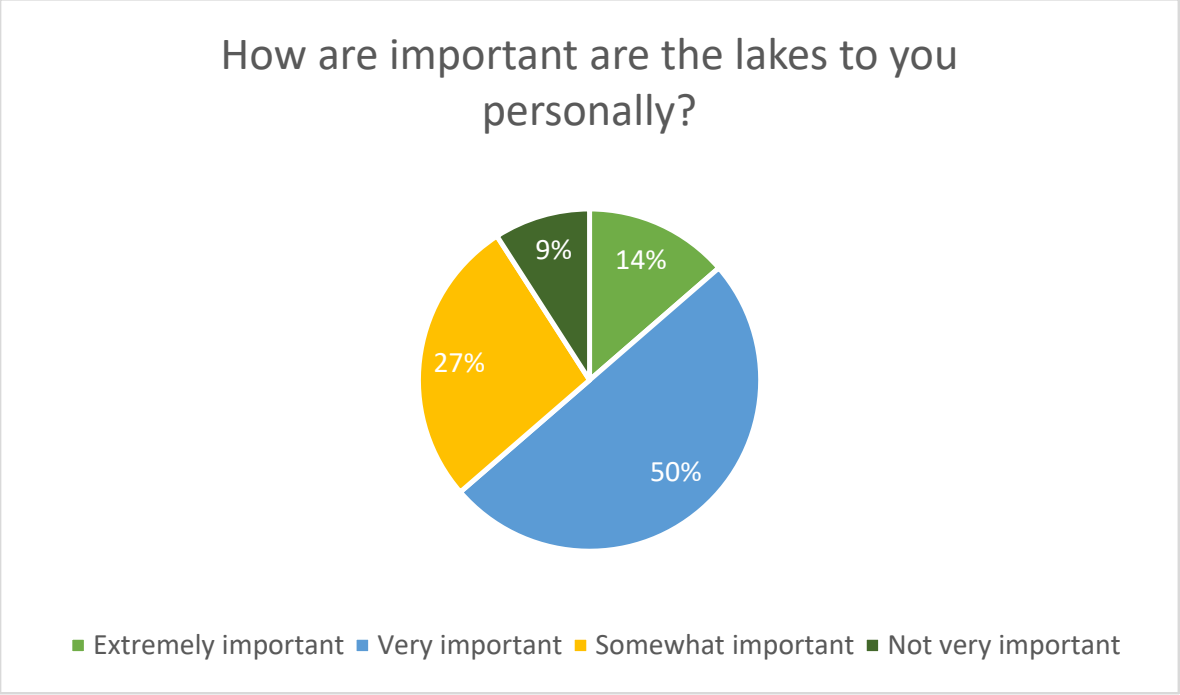
(n=1207)

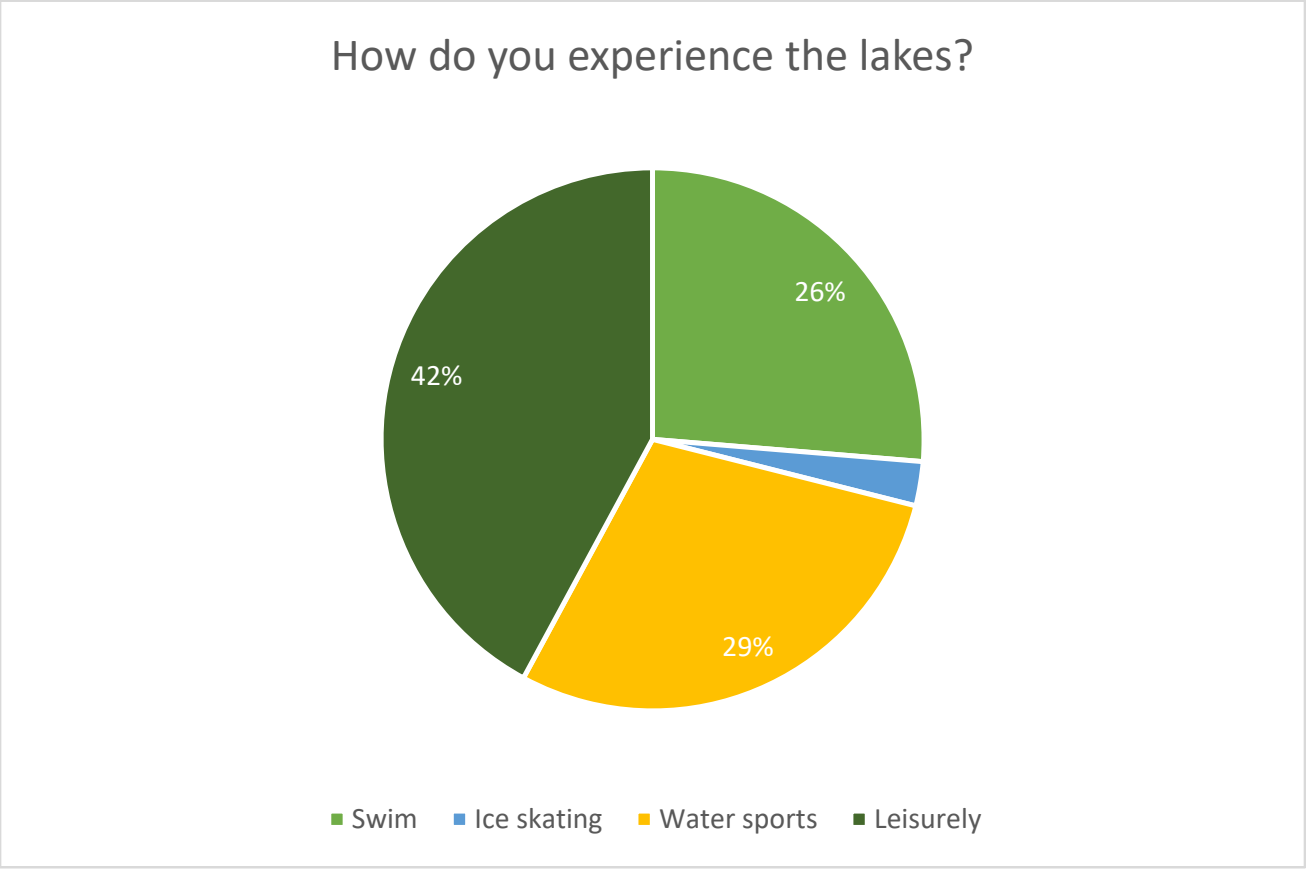


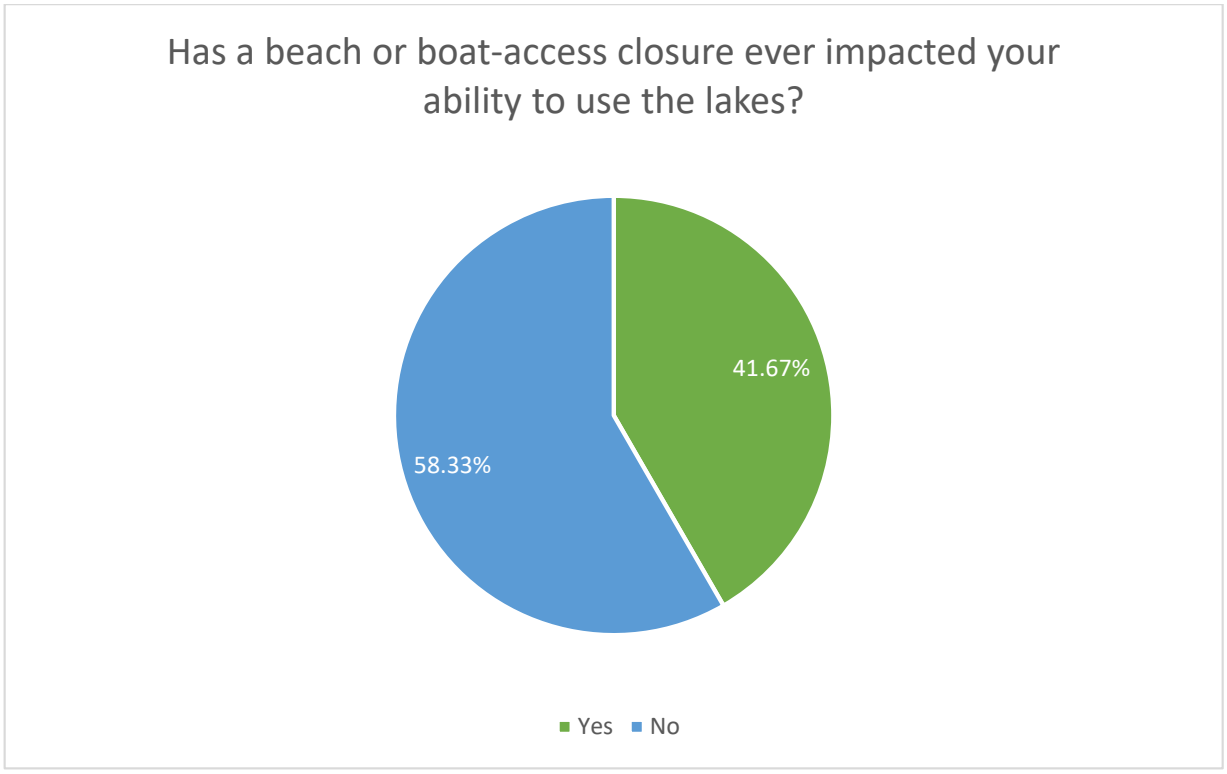
(n=1218)

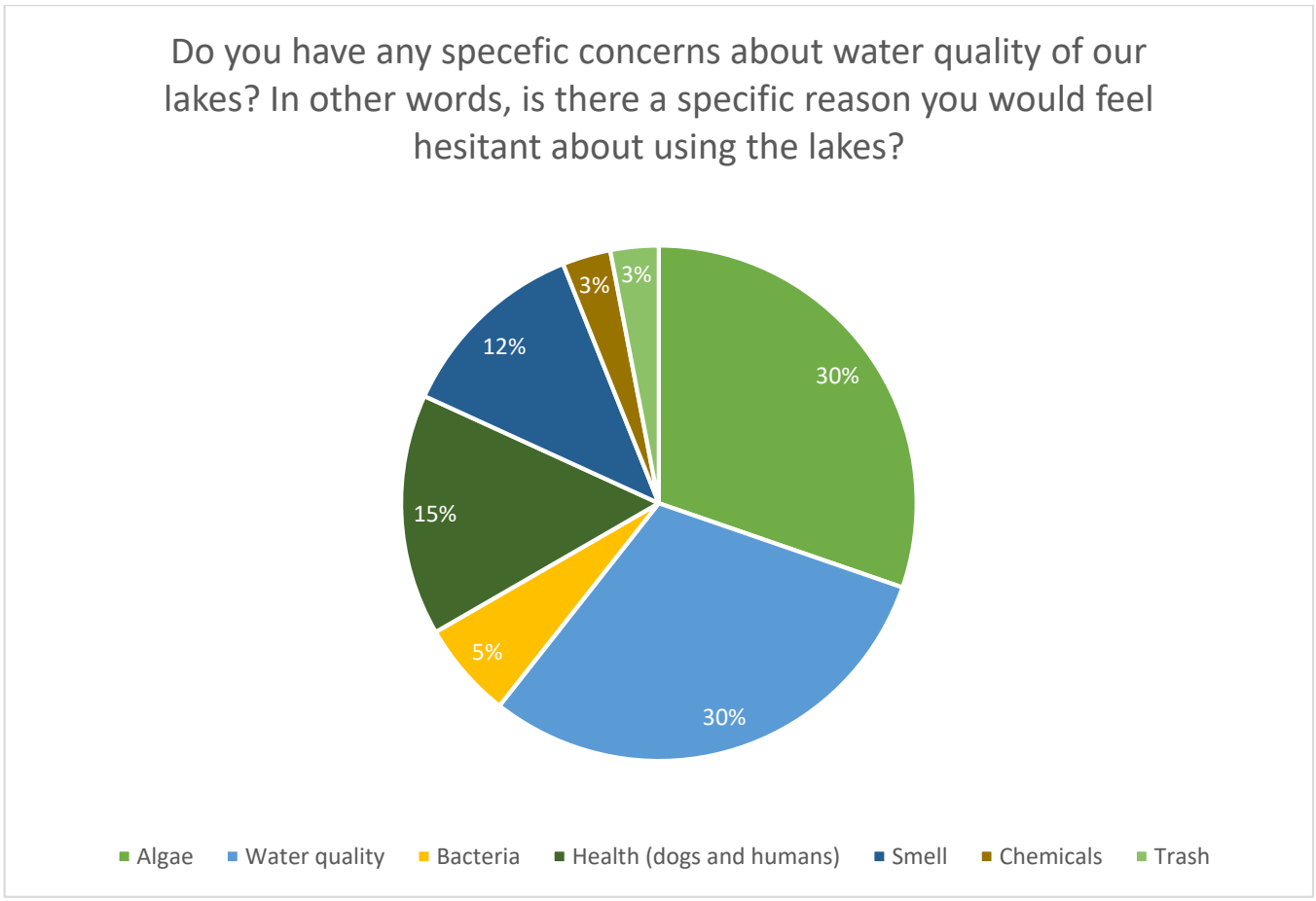
APPENDIX C: INTERCEPT INTERVIEW RESULTS

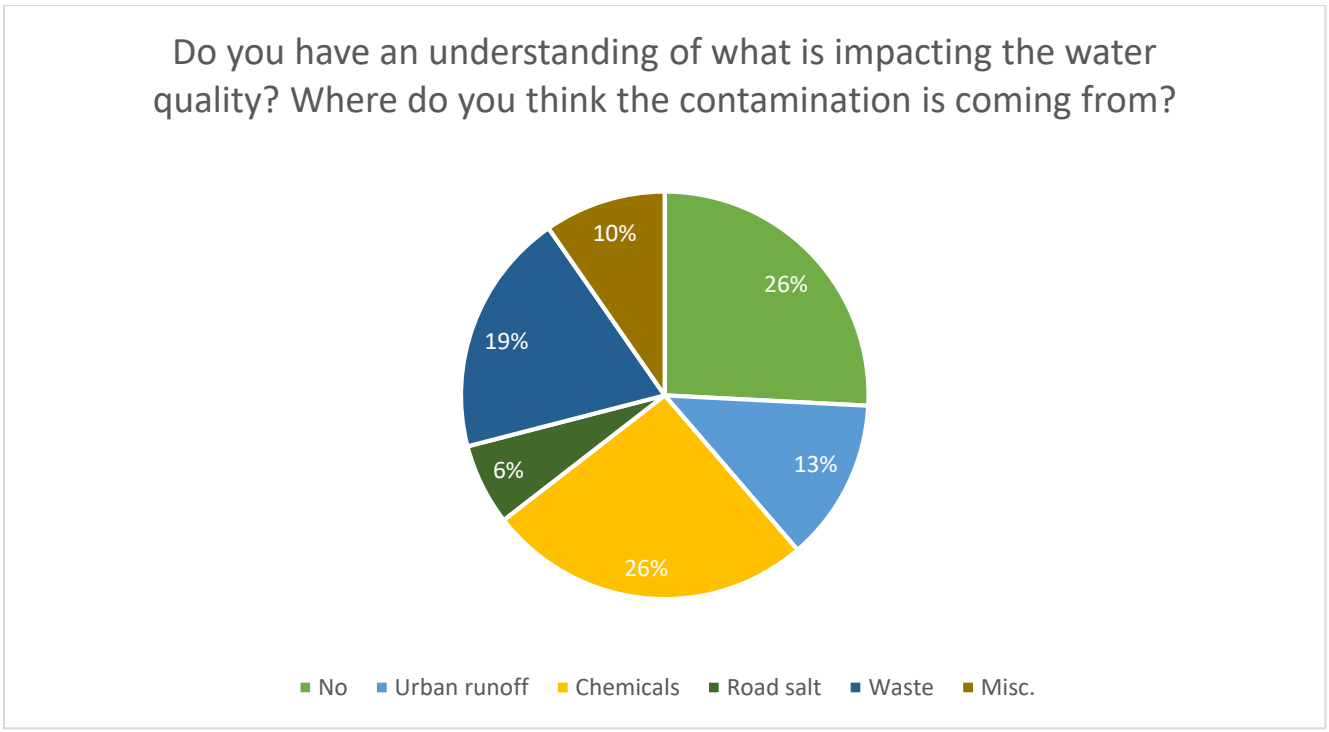
Intercept Interviews (n=28)

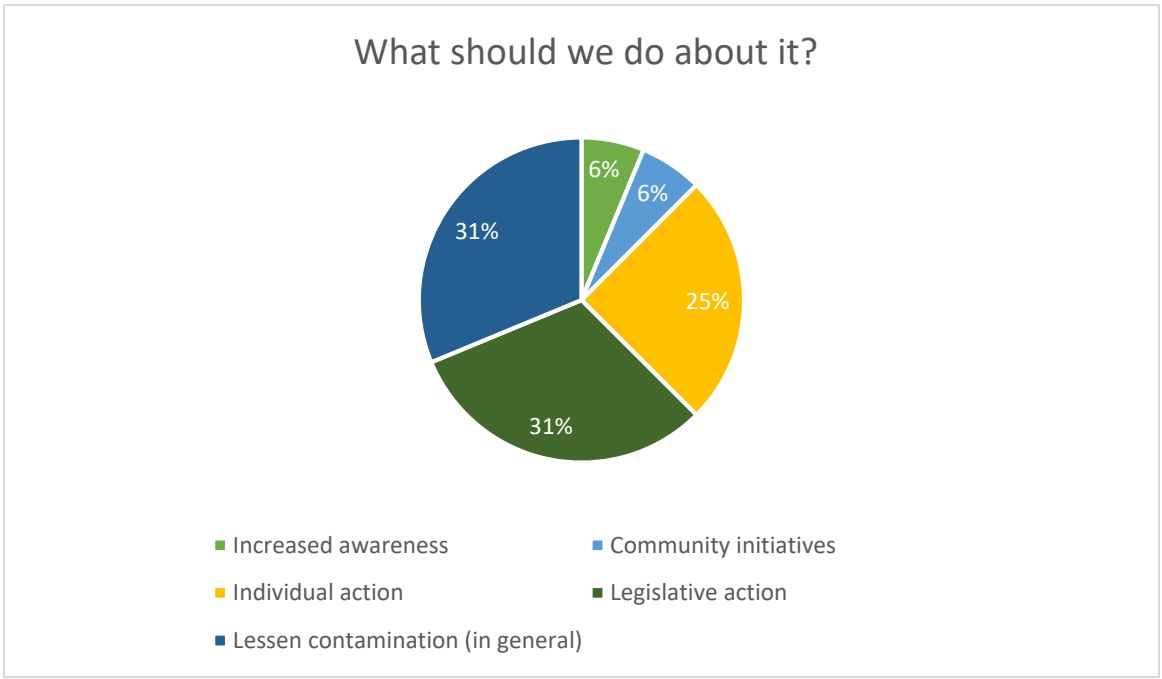





Has a beach or boat-access closure ever impacted your ability to use the lakes?
41.67%
58.33%
Yes
No


Do you have any specefic concerns about water quality of our lakes? In other words, is there a specific reason you would feel hesitant about using the lakes?
30%
30%
5%
15%
12%
3%
3%
Algae
Water quality
Bacteria
Health (dogs and humans)
Smell
Chemicals
Trash


Do you have an understanding of what is impacting the water quality? Where do you think the contamination is coming from?
10%
26%
19%
13%
6%
26%
No
Urban runoff
Chemicals
Road salt
Waste
Misc.


What should we do about it?
6%
6%
31%
25%
31%
Increased awareness
Community initiatives
Individual action
Legislative action
Lessen contamination (in general)

APPENDIX D: ENGAGEMENT SUBGROUP SUMMARY REPORT

Yahara CLEAN Compact Public Engagement
Report on the discussions and recommendations of the Public Engagement Subgroup (Sept-Dec., 2020)

Sessions facilitated by & report compiled by: Sarah Dance (PhD student, Civil & Environmental Engineering; Public Humanities Exchange Scholar), Sharon Lezberg (UW-Extension Dane County; Community Development Institute), and Samuel Pratsch (UW-Extension, Evaluation Unit, Natural Resources Institute).

About this report: This report provides a record of the process of deliberation for three meetings of the Public Engagement Subgroup and a summary of recommendations from that committee regarding how to expand and enhance public engagement for audiences that are interested in, and are impacted by, lake water quality. The bulk of recommendations are suggestions from the Public Engagement Subgroup (Appendix C includes consultant recommendations).

We acknowledge that constraints of time, money, and personnel may limit or delay the implementation of some recommendations, and that these constraints have been a primary concern for the project management team. Nevertheless, there are a few ambitious but key recommendations made in direct response to the Public Engagement Subgroup's feedback. Yahara CLEAN 3.0 and future iterations of the Compact will be strengthened by working to create a foundation for inclusive engagement now. Expanding the involvement of all lake users will ultimately build a broader advocacy base for clean lakes and waterways.

The authors of this report voice our support for prioritizing these three themes:

(1) The members of the Compact and of the Public Engagement Subgroup lack in-depth knowledge of and personal relationships with members of underserved watershed communities. Learning about these communities and their concerns is a necessary first step;

(2) Members of the Ho-Chunk Nation and underserved communities (indigenous people, Black, Hispanic, Hmong, others) have just as great a stake in the lakes as do individuals who have been engaged in the past (lakeshore homeowners, boaters, farmers, municipal leaders). It is imperative that Yahara CLEAN 3.0 address previous exclusion by prioritizing relationship building and outreach to underserved communities. This can be accomplished by applying a DEI lens to public outreach activities, and by a long-term commitment from Clean Lakes Alliance to steward these relationships;

(3) While all audiences have interest in improving lake water quality, some of the audiences have greater agency to both impact water quality through their practices, and to reduce phosphorus and e-coli through implementation of recommended strategies. These audiences - farmers, builders, contractors, and municipal officials - should be deeply engaged in development of strategies, assessment of feasibility, implementation, and evaluation of effectiveness.

Outline for the Report

1) Executive Summary: Listing of recommendations
2) Process Overview
3) Engagement recommendations by audience
4) Frequently expressed concerns
5) Appendices

Executive Summary

The summary below provides a quick overview of recommendations from the Public Engagement Subgroup. Details on these recommendations are provided in the report narrative below. Throughout the report, we refer to terms from the International Association for Public Participation (IAP2) spectrum of public participation. The spectrum is included in Appendix A; definitions are provided here for easy reference:

> ***Inform**: To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.*
> ***Consult**: To obtain public feedback on analysis, alternatives, and/or decisions.*
> ***Involve**: To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.*
> ***Collaborate**: To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.*
> ***Empower**: To place final decision making in the hands of the public.*

Abbreviated List of recommendations:

1) The Public Engagement Subgroup recommends that the Executive Committee review and adopt the proposed consult, involve, and collaborate engagement strategies for farmers, municipalities, developers, commercial property owners, and homeowners.
    a) Ensure Farmer Groups have input and that feedback is directly reflected in alternatives developed.
    b) Involve Farmer Groups as partners in the design and implementation of solutions; ensure that their efforts are highlighted when sharing information with the public.
    c) Consult with membership of the Dane County Cities and Villages Association (CDDVA) and the Dane County Towns Association (DCTA) for advice & co-creation of solutions and implementation process. Municipalities are key collaborators in implementing solutions, and should be deeply engaged in designing strategies and in identifying funding mechanisms. While representatives of the leadership of these associations serve on the Compact Steering Team, efforts to inform, consult and involve members (municipal officials and staff) of these associations is essential.
    d) Consult with Builders/Developers after the 1st draft of strategies is developed.

2) The Public Engagement Subgroup recommends that the Executive Committee review and adopt the proposed informed and relationship building engagement strategies for the Ho-Chunk Nation and other Indigenous communities within the watershed.
    a) Educate compact members of the history, context, and culture of the Ho-Chunk Nation, in order to move toward developing a relationship of mutual understanding and respect.
    b) Focus on relationship building and understanding the needs and concerns of the Ho-Chunk community concerning water quality in the Yahara River Watershed.
    c) Recognize relationship- and trust- building takes time, effort, and intentional actions.

3) The Public Engagement Subgroup recommends that the Executive Committee review and adopt the proposed informed and relationship building engagement strategies for underserved communities within the watershed.
    a) Take time to educate compact members on issues of equity, diversity, and inclusion.
    b) Prioritize relationship building as a starting point; focus on understanding the concerns of the community.
    c) Address gaps in understanding about the intersection of underserved communities and water quality/water assets.
    d) Ensure these communities have input and that feedback allows for alternatives developed to be inclusive and equitable and not adversely impact underserved communities.

4) The Public Engagement Subgroup recommends that a DEI lens is utilized when developing engagement strategies for all watershed communities.
    a) Identify and use existing tools (such as the City of Madison's RESJ tool) to improve DEI efforts.
    b) Use Urban Assets' expertise to evaluate DEI efforts in Clean Lakes Alliance's leadership, previous plan iterations, and the current planning process for Yahara CLEAN 3.0 and recommend short and long term strategies for improvement.
    c) Frequently reaffirm the compact's commitment to using a DEI lens and recognize all compact members share a responsibility to educate themselves and others about these issues.

Process Overview

The ***Public Engagement Subgroup*** met three times with UWEX facilitators to discuss and plan for public engagement. Compact members have clearly articulated the desire to expand public engagement and public outreach to audiences that have been excluded from participation and decision-making in the past. This is reflected in the land acknowledgement statement and the Diversity, Equity and Inclusion statement (included below). Note that the Public Engagement Subgroup understands public

engagement to go beyond messaging and information sharing (outreach) to include involvement in deliberation and decision-making.

Charge: Formulate a recommended implementation strategy for how the Yahara CLEAN Compact will communicate with, engage, and empower diverse watershed communities to support our decision-making and plan development.

Objectives:
(1) Recommend content and outreach coordination strategies related to Compact messaging and information sharing;
(2) Recommend specific questions to ask the public to inform plan development;
(3) Recommend desired outcomes, methods, level of intensity, and timing for soliciting public feedback, particularly from specific communities or demographics; and
(4) Recommend how and by whom this work gets completed.

Land Acknowledgement Statement: The Yahara River Watershed has a long history of ethnic cleaning and colonization that sought to forcibly remove the Ho-Chunk from Wisconsin. Today, the Yahara CLEAN Compact partners acknowledge that we reside on stolen land and respect the inherent sovereignty of the Ho-Chunk Nation, along with the eleven other First Nations of Wisconsin. We recognize that the First Nations are the traditional stewards of this land and protectors of water. Therefore, as we work towards developing an action plan for the Yahara River Watershed, we will strive to respectfully listen and learn from our Indigenous communities.

Diversity, Equity & Inclusion (DEI) Statement: The Yahara CLEAN Compact is a diverse group of partners working to make a collective impact on the health of the Yahara River Watershed. We recognize the importance of providing an equitable forum for all communities to share their perspectives on lake use. We further recognize the importance of ensuring an inclusive decision-making approach to improve the health and accessibility of the lakes for all users.

Compact members will consistently apply a DEI lens to its decision-making and public outreach, and will adopt practices that are as inclusive to as many groups as possible. In addition, a Public Engagement Subgroup will be created to advise on Compact-related outreach, the gathering of public input, and the development and coordination of shared messaging.

Our process: We started with identifying the various watershed communities, and addressing the level of engagement desired and possible for each of these communities. In order to have a framework and common language for the discussion, we used the IAP2 Spectrum for Public Participation (link below, #3a). By using this tool, we were able to specify the level of engagement and promise to each audience. Further discussions addressed the specifics: identifying who is included in each watershed community; providing steps/options for respectful engagement, and identifying challenges to address.

Index of Meeting Materials & Record of Meetings

1. Meeting Process Graphic

2. Public Engagement Subcommittee Survey Results - The qualtrics survey was sent to sub-group members to get a preliminary sense of initial considerations for engagement.

3. Public Participation Spectrum
    a. IAP2 Spectrum of Participation
    b. Leading Inside Out Community Engagement Spectrum

4. Meeting #1 - 9/23/2020 - During this first meeting, we discussed various audiences independently of each other, with the goal of identifying the level of engagement appropriate to the audience and the promise that we are making to this community. Note that the response sheets represent small group discussions and are not decisions of the group.
    a. Presentation
    b. Record of committee small group discussions
        i. Local Farmer Groups
        ii. Municipalities
        iii. Ho-Chunk Nation
        iv. Builders
        v. Urban Native American Community
        vi. Hmong Community
    c. Other watershed communities were not discussed during this meeting, as we ran out of time
    d. Meeting notes 9/23/2020

5. Meeting #2 - 9/29/2020 - during this meeting, we continued discussions from the first meeting about level of engagement for each audience. The goal was to determine an outreach plan for different stakeholder groups (level of engagement; promise to community; who to engage; when to engage; specific asks).
    a. Presentation - this presentation includes graphics to illustrate user level of influence on water quality;impact on user & level of influence to improve water quality through implementation strategies.
    b. Record of committee small group discussions
        i. Farmer Groups
        ii. Municipalities
        iii. Builders, Commercial Property Owners, Homeowners
        iv. Ho-Chunk Nation & Diverses Watershed Communities
    c. Meeting notes 9/29/2020

6. Summary of work of the Public Engagement Subgroup as shared with the Exec. Cmte.
    a. Summary Table submitted by Sarah Dance

7. Meeting #3 - 10/30/2020
    a. Engagement strategy Pre-meeting summary sheets for audiences that have agency to implement strategies toward lake quality improvement
        i. Farmer groups
        ii. Municipalities
        iii. Builders / Commercial property owners / Homeowners
        iv. Ho Chunk Nation
    b. Meeting Presentation
    c. Record of committee discussion (full group)
        i. Shared document * to record ideas regarding engagement 'Steps we need to take' for HoChunk Nation, General public underserved communities, and 'Using Diversity, Equity & Inclusion Lens'
    d. Meeting Notes

Engagement Recommendations by Audience (summary)

	Level of Engagement	Promise being Made	Notes of Strategies
Farmers	Consult/ Involve	We promise to keep you informed and work with you to ensure your concerns and aspirations are reflected in the alternatives considered.	Inform and consult with organizations that serve farmers once baseline data and draft strategies are developed.
Municipalities	Involve/ Collaborate	We promise to keep you informed and look to you for advice and innovation in identifying how solutions are implemented.	The Compact Steering Team has several representatives from this group
Builders/ Commercial Property Owners/ Homeowners	Developers: Involve All Other: Inform/ Consult	Developers: We promise to keep you informed and work with you to ensure your concerns and aspirations are reflected in the alternatives considered. All Others: We will keep you	There is a significant difference between builders, developers, and others in this audience; the

		informed, listen to, and acknowledge concerns and aspirations.	strategies to reach them will differ.
Ho-Chunk Nation and Other Indigenous Communities	Inform/ Build Relationships	We promise to keep you informed and consideran iterative approach to public engagement with regards to impact. We promise to regularly revisit who is impacted as strategies evolve and continue to listen and address your concerns.	Relationship building takes time and trust, so we intend to build trusting relationships first, inform audiences about our strategies, and have an open invitations for deeper engagement during plan implementation and future Compact iterations.
Underserved Watershed Communities	Inform/ Build Relationships	We promise to keep you informed and consideran iterative approach to public engagement with regards to impact. We promise to regularly revisit who is impacted as strategies evolve and continue to listen and address your concerns.	Relationship building takes time and trust, so we intend to build trusting relationships first, inform audiences about our strategies, and have an open invitations for deeper engagement during plan implementation and future Compact iterations.

Recommendations for Engaging Farmer Groups

Who: Farmer Groups - Yahara Pride farmers, Farm Organizations (Dairy Business Association, Farm Bureau, etc.), Agriculture Retail Groups, Agronomists, County Agents, Other Watershed Farmers, Rural Farmland Owners, Tenant Farmers

Strategies:

1. Ensure Farmer Groups have input and that their feedback is considered in alternatives developed
    a. Inform them when data is available about benchmark
    b. Consult with them after 1st draft of strategies are developed
    c. Inform them on how their involvement influenced decisions

    d. Inform them on how much impact farmer initiatives have had on water quality
2. Continue to involve Farmer Groups as partners to implement solutions
3. Continue to reach out to Yahara Pride Farms (as representative farmer group)
4. Reach out to other farmland owners and tenant farmers through additional farmer organizations
5. Look to partner with other organizations like DBA DATCP, etc. to reach out to farmer networks
    a. Provide information sharing opportunities to their networks and events

Recommendations for Engaging Municipalities

Who: Association Membership: Elected officials, Administrators, Public Works Officials, Staff of Municipality, State Level Politicians

Strategies:

1. Inform DCCVA & DCTA membership through association meetings and communications (i.e. e-mails to Village Presidents, Town Chairs, DCCVA newsletter, online webinar or Zoom discussion)
    a. Share stories of success of how various municipalities have succeeded with this issue
2. Inform the membership of DCCVA & DCTA when benchmarks are determined.
    a. Share information about options to improve lake water quality.
3. Create an online forum for communities to talk with each other and ask questions
    a. Share how this is being done in various communities. This information may need to be shared several times per year. Associations have an annual meeting, but the membership should be engaged (both for inform and consult) more than once/year.
4. Consult with the leadership of DCCVA & DCTA for advice & co-creation of solutions and implementation process
    a. Consult with them when strategies are developed.
    b. Share what has been recommended.
    c. Seek feedback on recommendations before they become finalized.
5. Collaborate with the leadership of DCCVA & DCTA around how to implement strategies and seek recommendation on funding mechanisms.
    a. What are reasonable and feasible policy options?
    b. What can be done readily and right away? What might be more extensive and down the road?
    c. How can implementation be funded?
    d. What support is necessary to get buy-in for implementation?

Recommendations for Engaging Builders, Commercial Property Owners, Homeowners

Who: Developers, Contracting Building Companies, Building Associations, Realtors, Commercial & Institutional Property Owners (with high level of impact on the lakes i.e. Truax Field, Kipp), Homeowners (two subgroups those contiguous to lakes and waterways, and those within the watershed)

Strategies:

1. Decide who needs to be engaged in the near vs long term and development vs. implementation phases
    a. Each of these audiences need to be engaged at different times in the Yahara CLEAN Compact's development (i.e. who needs to be engaged in creation of the plan vs. carrying out the plan successfully)
    b. Big difference between builder subgroups (developers vs contractors) - developers are the more appropriate group to engage at the involve level
2. Continue to invite Builders/Developers for steering team presentations
    a. Ensure that the Madison Areas Builders Association representation on the Steering Team is inclusive of all builders/developers in the area
    b. If the Madison Builders Association's representation is not inclusive look to partner with other builders or developers who are underrepresented
3. Continue to consult with Builders/Developers after 1st draft of strategies is developed
    a. Seek input on revisions
    b. Ask what recommendations Builders/Developers are willing and able to implement
    c. What are their concerns and issues with the proposed strategies?
    d. How can we assure/promote implementation without regulation?

Recommendations for Engaging the Ho-Chunk Nation

Who: The Ho-Chunk Nation's government, tribal liaisons, community, organizations that already engage with Nation

Strategies:

1. Educate compact members of the history, context, and culture of the Ho-Chunk Nation
    a. Build a shared understanding of the Ho-Chunk Nation's relationship to the land and water in the Yahara River Watershed
    b. Identify existing contacts and networks in compact that can facilitate future relationship building and information gathering and/or dissemination.
    c. Have Clean Lakes Alliance and other compact leaders meet together or individually with Ho-Chunk and other Indigenous representatives, liaisons, and educators to start building relationships and expanding existing compact networks. This can only be done if contact is willing and able to engage.
        i. Potential contacts: Aaron Bird Bear(UW Tribal Liaison), David O'Connor(American Indian Studies Consultant at the Wisconsin Department of Public Instruction), Omar Poler(UW Indian Curriculum Consultant), Missy Tracy(Municipal Relations Coordinator at Ho-Chunk Gaming), Representatives from the Wisconsin Tribal Conservation Advisory Council (WTCAC), DNR/DATCAP tribal liaisons
2. Focus on relationship building and understanding the needs and concerns of the Ho-Chunk community concerning water quality in the Yahara River Watershed.
    a. Allow Ho-Chunk community members to decide if, when, where and how they want to be engaged. Honor that input and follow-through on any promises and commitments.
3. Alter messaging and framing of compact public communications to authentically incorporate the rich history and culture of the Ho-Chunk People

a. Work with DEI consultants, Ho-Chunk contacts to further develop a meaningful land acknowledgement. Foster inclusivity by incorporating the compact's land acknowledgement into every major presentation.
    i. Tips for Indigenous Land Acknowledgements
b. Consider commissioning (& compensating) contacts to write an inclusive preamble that includes the Ho-Chunk Nation's history and relevance to water quality for final plan

4. Recognize relationship- and trust- building takes time, effort, and intentional actions.
    a. Create space for deeper engagement (collaborate, partner) on future plan iterations and/or other Clean Lakes Alliance lake-clean up efforts.
    b. Ensure contacts/community members that are engaged are followed up with and informed how their input informed the final plan's recommendations.

Recommendations for Engaging General Public Underserved Communities (lake users)

Who: Members of the general public use the lake for many purposes (swimming, boating, fishing, enjoyment, aesthetics), but there are some groups of the public who are heard from more than others. For example, there have been concerted efforts to communicate with lakeshore property owners and boat owners around issues of lake quality. Other lake users tend to have disaggregated voice (e.g., there are not recognized organizations that speak for them). Compact members have recognized the importance of building relationships with the lake users we typically do not hear from, including: people who fish; black/Latinx/Hmong sportsmen/women; urban residents who do not live proximate to the lake; low income residents; transient population; renters; people from cities/towns/villages ringing Madison and others. Compact members have insisted that the Yahara CLEAN 3.0 prioritize engagement with people of color and those who have previously been left out of decision making roles.

Strategies:

1. Educate compact members on issues of equity, diversity, and inclusion.
    a. Support education about Diversity, Equity and Inclusion (DEI), starting with understanding how Urban Assets incorporates DEI screens into their public engagement work. Support on-going efforts to find funding to contract with a DEI firm to provide educational sessions on issues related to race and diversity (e.g., August Ball; Cream City Conservation or Annette Miller, EQT by Design; YWCA racial justice training);
    b. Develop a shared language and understanding in order to build readiness and muscle for engagement by understanding the terms used. Urban Assets can support the effort by providing a glossary of terms;
    c. Understand the history and barriers that have impeded use of the lakes by underserved communities.
2. Prioritize relationship building as a starting point; focus on understanding the concerns of the community.
    a. Bring in the expertise of Urban Assets to work with the Public Engagement Subgroup to identify representative organizations to reach out to;
    b. Identify organizations serving diverse communities that compact members already have a relationship with; grow these networks;
    c. Invite speakers to come to Compact meetings (during implementation phase) to discuss

their organization/community and how their community values and use the lakes (potentially Monica White, Peng Her, Indigenous Arts & Science Inst./ Rachel Byington);

   d. Support compact members in expanding diversity, equity and inclusion efforts within their own organizations and in having greater, more inclusive reach.

3. Address gaps in understanding about the intersection of underserved communities and water quality/water assets.
   a. Seek out research that provides insights into how underserved communities use water resources and value these resources;
   b. Where research does not currently exist, articulate research needs and seek out University colleagues to do this research.
4. Working with Urban Assets, develop strategic outreach events to inform audiences about lake quality issues: including baseline data, strategies recommended, and how they would be implemented.
   a. Reach out to community centers, Churches, neighborhood organizations, business leaders, and other community based organizations that already have relationships with underserved communities;
   b. Link the Compact's concern with water quality to those issues that are of concern to the community (for example: health disparities, access to recreational resources, values such as sustainability, wellness);
5. Prioritize feedback from underserved communities
   a. Ensure that there are multiple opportunities for underserved communities to provide feedback (in that these communities have not been included in the past);
   b. Ensure that feedback from underserved communities is given equal consideration to that of other public comments and engagement is intentional.
   c. Allow for alternative strategies to be considered, and allow the process to remain transparent by publishing public comments and responses on the Clean Lakes Alliance webpage (or other means to increase transparency).
   d. Ensure that selected recommendations do not adversely impact underserved communities.
6. Recognize that relationship building is a marathon not a sprint; there needs to be an organization that will hold space to maintain and build trusting relationships.
   a. CLA should take the lead in developing and maintaining relationships with diverse audiences. This involves listening to the concerns of the community and respond to these concerns;
   b. CLA staff, in efforts to develop and maintain diverse relationships, should attend events of communities of color to learn, engage, and understand.

Recommendations for Using a DEI Lens When Developing Public Engagement Strategies for All Watershed Communities

Who: All target and general audiences members that may not have been engaged in previous iterations.

Strategies:

1. Identify and use existing tools (such as the City of Madison's RESJ tool) to improve DEI efforts.
    a. Ask compact members to share the justice, equity, diversity, and inclusion-centered efforts underway in their organization, department, or neighborhood
        i. When organizational representatives are presenting to the Compact, we recommend that they highlight efforts to address diversity and inclusion
    b. During Compact meetings with speakers, consider adding/changing breakout room questions to include questions from The City of Madison's Racial Equity and Social Justice(RESJ) Tools
        i. "The RESJI tool is used as part of the development of City policies, plans, programs and budgets. We use this tool to facilitate conscious consideration of equity and examine how communities of color and low-income populations will be affected by a proposed action/decision of the City."
        ii. Example Questions:
            1. "What identified community needs are being met or ignored in this issue or decision?"
            2. "Are there potential disproportionate impacts on communities of color or low-income communities?"
    c. Use other tools and best practices from the Dane County Board's Inclusive Engagement efforts (EngageDane) to guide planning efforts and implementation
        i. 12 Best Practices for Inclusive Community Engagement
        ii. Planning Worksheet
        iii. Tools and Techniques for Inclusive Engagement
2. Use Urban Assets' expertise to evaluate DEI efforts in Clean Lakes Alliance's leadership, previous plan iterations, and the current planning process for Yahara CLEAN 3.0 and recommend short and long term strategies for improvement.
3. Reaffirm the compact's commitment to using a DEI lens and forefront that agreement at the start of each steering and executive team meeting.
    a. Recognize no single person can represent an entire race, ethnicity, or class.
    b. All compact members and leadership share the responsibility of educating themselves and others, and applying a DEI lens to all of the compact's efforts.

Frequently Expressed Concerns

These are concerns frequently brought up in public engagement subgroups and responses to those concerns.

Frequently Expressed Concerns	Response
There is a need to directly engage farmers instead of just engaging groups that work with farmers.	The compact and its past iterations have a long history working with farmers and farming groups. Yahara Pride Farms indicated in the past they do not have the time to engage with plan creation but need to be consulted regarding the feasibility of strategies.
Significant rural/urban cultural divide with deep-rooted history that should be acknowledged and addressed.	Promote transparency and accountability by keeping farmers updated on plan throughout the process. Honor the way Yahara Pride Farmers (YPF) asked to be involved in the plan creation but recognize YPF doesn't speak for all farmers. Use the final plan to celebrate farmer success stories, and emphasize that all community members and groups have a shared responsibility and play an important role in protecting our lakes.
Difference between municipality officials and community perspectives, values, and concerns. Incredible variety of capacity to collaborate across different municipality levels.	Continue to work with officials and seek community input when possible. Recognize the differences in capacities and tailor level of involvement on a case-by-case basis.
The identified builder's audience is too large and diverse.	Addressed in recommendations. There should be greater care to parse this audience and identify critical sub-audiences that should have a greater impact on the final plan.
Lack of information available concerning how lake water quality impacts the lives of underserved communities in Madison	Addressed in recommendations. Seek out research into these issues. If non-existent, articulate the need to ethically research this topic to University colleagues.

Underserved communities are facing more pressing issues than surface water quality. COVID-19, poor drinking water quality, healthcare disparities, etc.	Addressed in recommendations. Link the concerns of the compact to the concerns of the community by prioritizing relationship building and listening to the community.
Non-starter if Ho-Chunk contacts and community are not interested in working with compact	This is a challenge engaging all communities. There should still be efforts to educate compact members and recognize the Ho-Chunk as the original caretakers of the water and land here.
Performative engagement only harms the community. Authenticity is needed for meaningful engagement.	Addressed in recommendations for relevant audiences. This concern highlights the need to consult with DEI experts and leaders in specific communities. There should be transparency and accountability for any engagement plan made for the Ho-Chunk Nation (and other diverse watershed communities). Compact members and the audiences should feel safe and welcome to criticize the compact's actions or language around engagement.
DEI is too political/controversial to explicitly center it in any compact community engagement efforts	Science, environmental advocacy, city-wide planning, and public engagement are all inherently "political" and potentially controversial. This does not absolve the compact of its responsibility to forefront DEI in its efforts (see DEI lens compact statement). Building a shared understanding of these issues with compact members will yield greater consensus.
Engaging underserved communities and applying a DEI lens to the compact's work is out of the original compact's scope of work and can lead to "scope-creep". This is not the role or responsibility of the compact to address these issues.	The Yahara CLEAN Compact Executive committee approved 3 decisions regarding DEI in 2020. They are the "Land Acknowledgement Statement," the "DEI Statement," and the "Application of DEI Principles." Each of these statements charge the compact to ensure their decision-making approach is as inclusive as possible. The compact should hold themselves accountable to follow-through on these commitments to the fullest extent feasible.

Compact members lack the necessary training and education to : · Center DEI in compact efforts. · Ethically engage underserved audiences. · Ethically engage the Ho-Chunk Nation.	Addressed in recommendations for each relevant audience. Compact leadership should provide avenues to educate and train members about these issues. The compact should strive to foster an environment where members seek and share training and education resources with one another. Every compact member shares a responsibility to forefront DEI in wide-reaching planning efforts.

Appendices

A: IAP2 Spectrum of Public Participation

B: Stakeholder Map: Impact & Influence Grids

C: Public Engagement Proposed Timeline & Tasks

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	General Recommendations (not audience specific)	Audiences addressed by these recommendations	Specific Recommendations - Outreach & Engagement Strategies and preparedness actions	Timeline: Planning (next 13 months)	Timeline: Implementation Yahara CLEAN 3.0
1	Preparing YaharaCLEAN compact members & their organizations to develop cultural competency regarding history/communications with specific audiences and on using a DE&I lens	Compact members	1) Contract with a DEI firm to provide education on DEI strategy and engagement with diverse audiences.		X
			2) Develop shared language to discuss DEI efforts		X
			3) Develop deeper understanding of HoChunk Nation history, tribe organization, and natural resource philosophy	X	
			4) Develop deeper understanding of underserved/under-represented communities by hearing stories of these communities and their relationships to water resources	X	
			5) Address gaps in understanding about the intersection of underserved communities and water quality / water resources		X
2	Intentional relationship building for inclusive engagement incorporating a DEI lens	The Ho-Chunk Nation and other indigenous peoples; Historically underserved communities. In this watershed specifically includes Black, Latinx, and Hmong communities, especially people who use the lakes for subsistence fishing or beach-going, swimming, and other forms of recreation.	1) Utilize DEI lens and City of Madison equity tool in designing public input opportunities: The tool emphasizes inclusive engagement - targeting historically underserved communities to assure inclusion and that the voices of the disenfranchised are included in discussion and decision making.	X	
			2) Find ways to engage with underserved communities by attending their events and finding points of intersection of interest		X
			3) Identify opportunities to talk with leaders of various organizations representing these communities around issues of environmental justice; access to recreational opportunities; access to food resources (e.g., work with Sustain Dane to convene round-table discussions on these issues)		X
			4) Develop family friendly, fun events for the public that specifically engage diverse communities		X
3	Outreach, Education & public input with broad array of lake users to build a constituency for clean lakes	All lake users and interested parties, using a DEI lens for developing outreach and engagement strategies	1) Information sharing: via public events; print, web, and social media; video and webinar content to inform the general public about (a) State of the lakes baseline data, (b) progress to date / tracker on what actions have had impact thus far (c) recommended strategies for Yahara CLEAN 3.0 (priority actions) that are being implemented.		X
			2) Public events that draw attention to lake resources and engage lake users in ways that build interest and connection with lakes		X
			3) During pandemic restrictions, there may be opportunity to utilize broad digital survey tools, such as Polco, in conjunction with the county		X

Compact led task	Individual org led task (Name of Org)	Owner - who is responsible for making this happen?	Frequency	Resource Needs	Notes
X		Compact: solicit funds to provide training so that the DEI efforts are informed and intentional.	1 training event; potentially followed with specific consulting by a firm specific to DEI	Funds to pay consultant	
X		Urban Assets: either lead discussion or identify organizations/consultants who can provide guidance here			UA may be able to provide a glossary o terms and a short presentation to develop shared language
X	University of Wisconsin; DATCP; DNR (to invite tribal liaisons)	Executive Committee/Urban Assets: Assist the compact in developing relationships with Tribal liasons. Compact: solicit funds to provide training so that the DEI efforts are informed and intentional.	1 initial conversation; follow-up falls under relationship-building	Unknown: would tribal liaisons be compensated for their time? Potential for agency representatives to invite tribal representative from their agency.	This would be an on-going effort
X		Executive Committee/Urban Assets: Arrange for speakers to present at a special meeting of the Compact membership (with additional stakeholders); University of Wisconsin representatives could assist with this.	1 event, specific to Compact membership; follow-up falls under relationship-building	Unknown: would invited speakers be compensated?	This would be an on-going effort
	Clean Lakes Alliance; University of Wisconsin	CLA with interns			This would be an on-going effort
Compact & Urban Assets	Urban Assets to utilize DEI tools when designing public input strategies and events	Executive Committee/Urban Assets	With all engagement activities		This would be an on-going effort
	CLA				This would be an on-going effort
	CLA				This would be an on-going effort
	CLA				This would be an on-going effort
Compact & Urban Assets	Urban Assets to organize and facilitate public information sessions	Executive Committee/Urban Assets	Multiple sessions (~3)over 6-12 months in order to provide multiple opportunities to the public to learn and be engaged as emerging advocates for lake quality improvement		This would be an on-going effort
	CLA				This would be an on-going effort
		Executive Committee/Urban Assets			

	General Recommendations (not audience specific)	Audiences addressed by these recommendations	Specific Recommendations - Outreach & Engagement Strategies and preparedness actions	Timeline: Planning (next 13 months)	Timeline: Implementation Yahara CLEAN 3.0
4	Consult, Involve, and Collaborate with specific watershed audiences in developing strategies & recommendations	Audiences that have agency to implement strategies toward lake quality improvement (farmers, municipalities, builders, contractors)	1) Information sharing: via public events; print, web, and social media; video and webinar content to inform farmer groups, municipalities, builders, contractors, and other interested partners about (a) State of the lakes baseline data, (b) progress to date / tracker on what actions have had impact thus far (c) recommended strategies for Yahara CLEAN 3.0 (priority actions)	X	
			2) Events to get input (consult) with various constituent groups: via public events; virtual events; innovative document sharing; other strategies to hear from those with ability to implement strategies (farmer groups, municipalities, builders, contractors, other interested partners).	X (once Compact has proposed initial set of strategies to implement)	
			3) Where possible, invite representatives of various organizations to share about their organizations and their priorities.	already happening through steering committee	
			4) Invite representatives of constituent groups that have a role to play in implementation (farmer groups, conservation groups, municipalities, builders, contracters, etc.) to a steering committee meeting where strategies are being discussed/finalized.This may be a longer meeting to allow for description/rationale of strategies and input from non-compact members.	When strategies are almost finalized.	

Compact led task	Individual org led task (Name of Org)	Owner - who is responsible for making this happen?	Frequency	Resource Needs	Notes
X		Urban Assets to provide leadership in designing information sharing events with various constituencies.	One time per audience prior to input sessions	As part of contract	This would be an on-going effort
X		Urban Assets to provide leadership in designing public input events for various constituencies that will be involved in implementation of the plan; in order to consult wtih these audiences as to feasibility of implementation strategies; constraints; opportunities; plan for moving forward.			
X		Executive Committee/Urban Assets			
Compact & Urban Assets	Urban Assets to organize & facilitate input process	Executive Committee/Urban Assets	One session with representation from wide range of implementing organizations		

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