



WAWASEE AREA CONSERVANCY FOUNDATION

CONSERVANCY VIEWS

Summer 2019



Message from the Chairman:



Doug Yoder
WACF Chairman

In this special summer edition of Conservancy Views, you are about to learn more about the Wawasee Inlets Nutrient Study (WINS). There have been and continue to be other studies of Lake Wawasee, so you may ask why another study? Our answer to that is while we welcome all studies and value all science, we have a specific need for deeper insights that lead us to actionable strategies to protect and preserve our watershed.

In early 2018, our WACF science-based leadership (primarily Joan Szyal, MD and Beth Morris) began to imagine a study. They were fortunate to find Dr. Jerry Sweeten, Melinda Sweeten and Herb Manifold, who had recently formed EcoSystems Connections Institute. This team had the experience and highly-specialized equipment necessary to design and implement a revolutionary study that had never been implemented on Wawasee or indeed any lake in Indiana.

WACF ecology committee chairman Beth Morris will go into greater detail regarding the methodology and importance of the WINS study later in the newsletter. We are also excited to have Dr. Sweeten share his thoughts on the study and a few preliminary findings.

As you can imagine, when we bring together nationally recognized experts and state-of-the-art equipment, there are significant costs involved. We are excited to share that with the generous assistance of grants from the Kosciusko County Community Foundation and the Indiana Natural Resources Foundation, which funds important DNR programs, about one third of the three year study is now funded. While this is a great start, we still need your help to complete our very important work. Please consider supporting this critical research.

Doug Yoder, Chairman



Heather Harwood
WACF Executive Director

A note from the Executive Director

I wear a lot of hats at WACF. The most important one may be the construction projects up in the watershed that protect our water quality (sediment basin, 2-stage ditch, grade control, filter strips along streams and shoreline stabilization). We've been at it for 25 years. I believe we are making a substantial difference, and we are committed to continuing the work knowing that our lake's water quality will benefit.

But how much does it benefit, and where is the most impact for the investment? We are hungry for knowledge to know where and how much from an intensive study of the status of our water quality and where we need to be focusing our work.

I look forward to results from the Wawasee Inlets Nutrient Study (WINS) and our partnership with Jerry Sweeten and Ecosystems Connections Institute. I thank our donors for the support, AND our important partners at the Indiana Natural Resources Foundation and the Kosciusko County Community Foundation for their support of this study.



Jerry Sweeten and Heather Harwood

With thanks,
Heather

Conklin Bay rainbow photo by Shannon McNett-Silcox

Why is WACF doing this study?



Beth Morris
Ecology Committee
Chairman

WACF is the only organization that partners and invests resources to address problems in upstream tributaries, reducing nutrients and sediment from entering our lakes. In order to focus WACF's resources on the most critical areas, more accurate data from continuous sampling is imperative to identify which tributary contributes the highest load of nutrients and sediment.

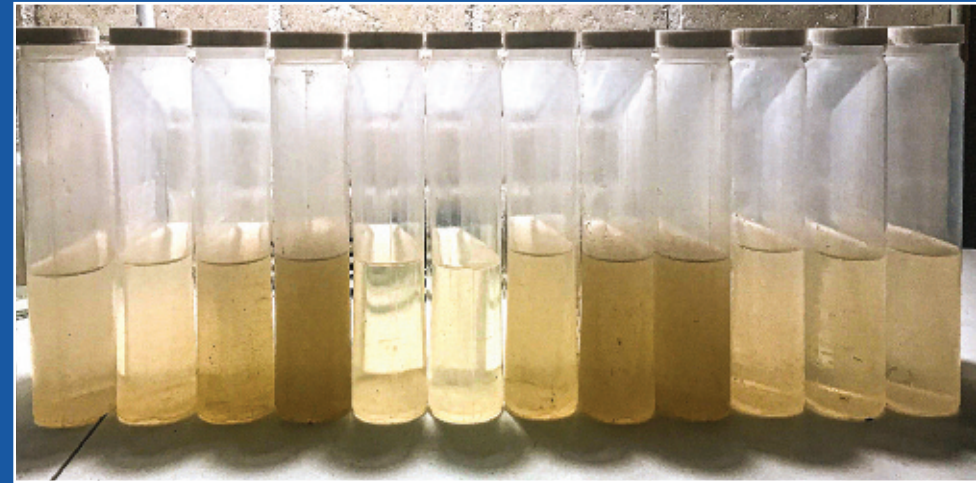
Before starting this intensive study, we considered available data sources: historical assessments, volunteer testing with IU Clean Lakes Program, and data shared by Lilly Center for Lakes and Streams. The intermittent "grab

samples" from these studies do not provide a complete story of nutrients and sediment entering Wawasee from each tributary, or how much is exiting from Syracuse Lake. Nutrients and sediment can lead to increased algae growth that, left unchecked, can harm the quality of water in our lakes.

So again, why this study? Consider "grab samples" versus continuous sampling. This example might help. You have a heart rhythm that is irregular but not consistently irregular. You go to the doctor for an EKG every week for a year and the results are

normal but you know something is going on that's not showing up with those "grab samples." So you go to a specialist who has you wear a heart monitor 24 hours/day for a month, providing detailed data showing what is really going on with the heart, leading to a diagnosis and treatment plan.

The photo (above) of water samples taken from one test site every 4 hours over 48 hours shows variability in the color that reflects differences in the amount of sediment and nutrients in samples. If we only took a grab sample every week, we could easily miss dramatic changes in incoming water, thereby underestimating or overestimating what is coming into our lakes. The continuous sampling, like a heart monitor, provides data that can be statistically analyzed to reflect water quality entering from each tributary leading to a "diagnosis" of the



biggest source of incoming nutrients and sediment, leading to a prioritized "treatment plan" for mitigating the biggest offenders first.

From the "Hot Spots" study commissioned by WACF in 2017, 99 remediation projects were identified, with the worst 29 critical hot spots estimated to cost in excess of \$560,000 to fix. The dilemma: prioritizing the most impactful projects first, given that WACF and our partners providing matching grant money for projects have finite resources. To do so requires the type of data gained from this study. In many cases, fixing the root causes involves partnering with our neighbors who are farming the land, and they are intensely data-driven.

Data from the study's first year will be used to identify priority projects. The study will be continued for two more years to track trends at each tributary and the outflow. This data will help us understand impacts of what's coming into and flowing out of our watershed for reference in future WACF work.



Beth Morris and Jerry Sweeten

Wawasee Inlets Nutrient Study (WINS): *A new approach to a persistent ecological challenge*

By Jerry Sweeten, Ph.D.
and Herb Manifold, MS

While every lake and stream is ecologically unique, there are some fundamentals that help us understand this "uniqueness". Simply put, lakes and streams reflect the watershed of their origin.

On one hand, there are science geeks like Herb and me who have spent our careers trying to unravel secrets of nature through complex details. On the other hand, we must distill these details into applied management science that leads to a clear understanding to achieve

specific ecological goals like a clean lake. A sound scientific approach is essential for both the nitty-gritty details and the broad-brush of clarity. Data drives both and is the foundation for good scientific endeavors. What is in short supply for applied management lake science is continuity in data over space and time.

The Wawasee Inlets Nutrient Study (WINS) is founded on sound management science in a strategic approach to quantify, for the first-time, nutrients and sediment entering and leaving Lake Wawasee. This three-year project is unique in Indiana and beyond. We know nitrogen, phosphorus, and sediment are the accelerants for lake eutrophication and the lake is a great trap for all three. What we don't know is how much comes into the lake and how much leaves the lake.

The WINS project uses technology to paint a clear picture of how many pounds of nitrogen, phosphorus, and sediment enter and leave the lake each year. This data allows WACF to identify which of the four major tributaries is the main source of these constituents and to build a conservation bridge to everyone in the watershed with good scientific support.

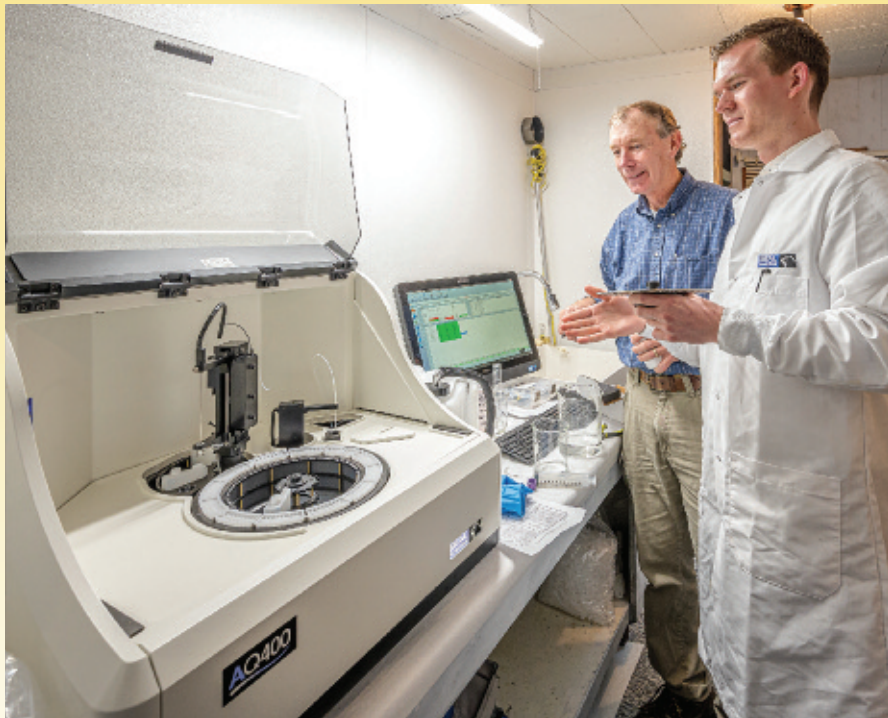
Imagine walking outside and viewing Lake Wawasee with the expectation the lake will look the same each day of this year and each subsequent year. While this a simple example that we all



Dr. Jerry Sweeten, Melinda Sweeten and Herb Manifold at a testing gage

realize is not going to happen, we must consider the variables in nature with water entering and leaving the lake. To account for these variables, we use technology that collects water samples once every four hours during April-May and the first major rain event of each subsequent month. If we simply collected a bottle of water on a random irregular basis, we would not be able to draw good conclusions.

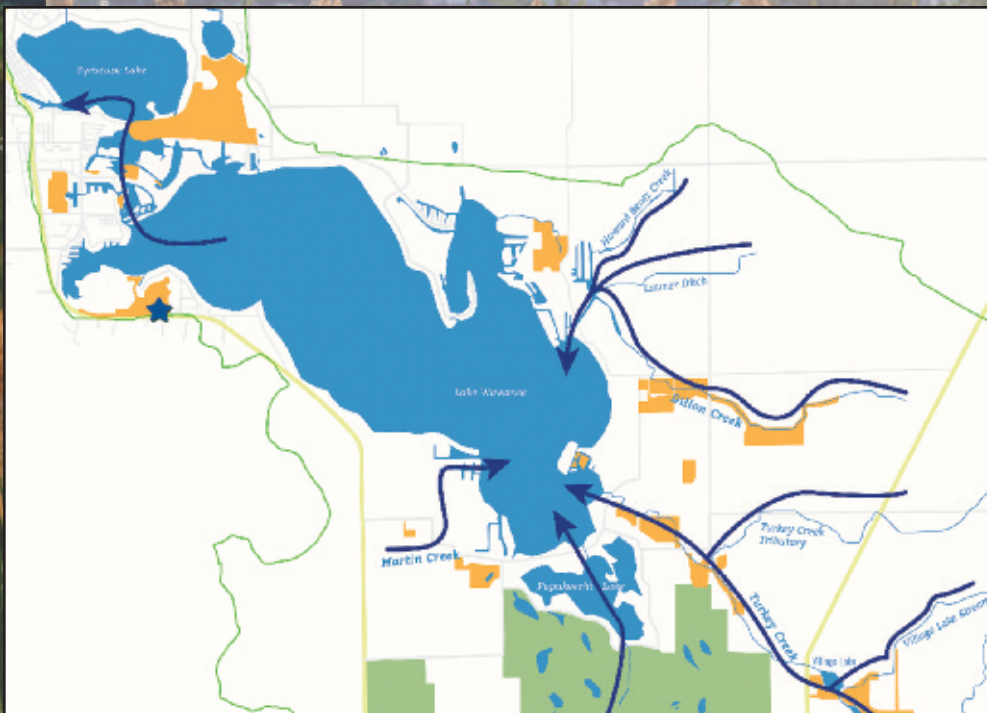
In 2019 we have analyzed nearly 3,000 water samples on a constant schedule. The WINS project will result in strategic decisions that will make Lake Wawasee cleaner for today and for future generations.



Dr. Jerry Sweeten at the lab (left) with lab tech

Objectives:

- Quantify nutrients and sediment (mg/L), Loads (pounds and pounds per acre)
- Calculate stream discharge rating curves for each gage station (cubic feet per second) (CFS)
- Describe physical characteristics of each sub-watershed
- Provide a statistical summary and analysis of data collected during the study.
- Determine stream biological integrity (Index of Biotic Integrity) and stream habitat (Qualitative Habitat Evaluation Index).
- Calculate hydraulic retention time for Lake Wawasee (years).
- Summarize conservation practices with projected nutrient and sediment reduction (pounds).
- Provide data that drives strategic conservation initiatives for a cleaner lake.



Status:

- The Wawasee Inlets Nutrient Study began on January 1, 2019.
- There are five gage stations of which four are equipped with automatic water samplers, pressure transducers, temperature probes, rain gauges and data loggers.
- Since beginning, 2,845 samples of water have been collected and analyzed. Nearly 20,000 individual tests have been completed.
- Water samples are analyzed for: Total Phosphorus, Soluble Phosphorus, Nitrate-Nitrite, Total Nitrogen, Stream sediment, and water temperature.
- Each site is assessed for:
 - Quantity of water flowing into the lake at each gage site and the quantity of water leaving the lake.
 - Aquatic insect community
 - Fish community



In the graphs to the right, Dr. Sweeten has provided some data that represents just a small preview of the full report to come over the course of our three-year study. We are only about half-way through the first year of the study and a full statistical analysis of the robust amount of data will require several more months before he presents his full first-year report.

Data alone doesn't change water quality, so WACF and Dr. Sweeten will work to leverage this landmark study into partnerships with the local farming community plus state and federal agencies as we tackle the many mitigation projects on our identified "hot spot" list.

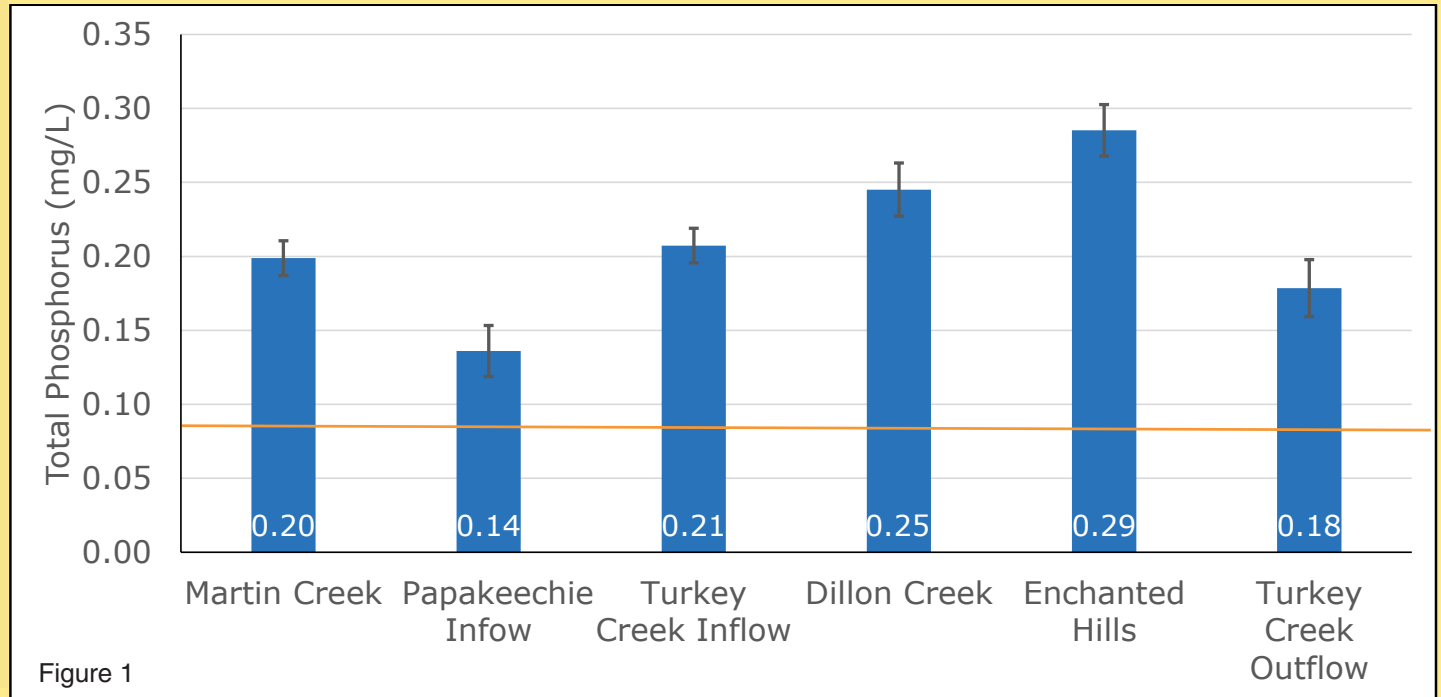


Figure 1

Figure 1. This graph represents the mean (average) concentration of Total Phosphorus entering and leaving Lake Wawasee by site. Total Phosphorus is a limiting nutrient for algae. The horizontal orange line represents the **water quality target of 0.076 mg/L**. Except for Papakeechee Inflow and Turkey Creek outflow, the Total Phosphorus is more than twice the water quality target value. The vertical black lines are standard error bars and indicate if Total Phosphorus by site is statistically different.

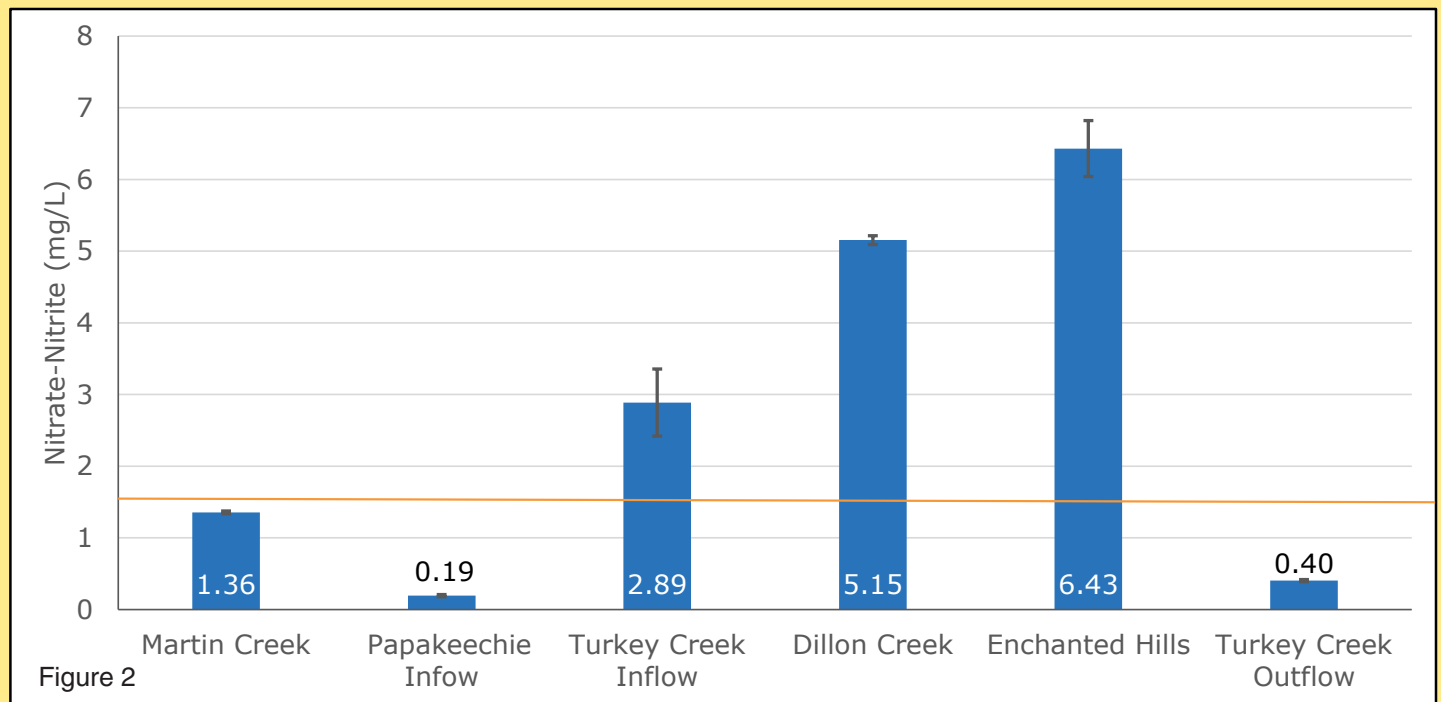


Figure 2

Figure 2. This graph represents the mean (average) concentration of Nitrate-Nitrite in mg/L or parts per million entering and leaving Lake Wawasee. The horizontal orange line represents the **water quality target of 1.5 mg/L**. Papakeechee Inflow, Turkey Creek outflow, and Martin Creek are below the target value. The vertical black lines are standard error bars and indicate if Nitrate-Nitrite by site is statistically different.



“The Watershed Inlets Nutrient Study at Lake Wawasee is an incredibly important scientific endeavor to better understand nutrients and sediment loads entering this glacial lake and effectively address the issue. I commend WACF for their dedication to keeping Lake Wawasee clean and healthy.”

Joe Nohner, Ph.D.
Inland Lakes Habitat Analyst
Midwest Glacial Lakes Partnership Coordinator



“The Wawasee Inlets Nutrient Study is a one of a kind solid piece of science to help understand nutrient and sediment loads entering a glacial lake. The study will lead to a better Lake Wawasee.”

Donovan Henry
Director of the Ohio River Basin Fish Habitat Partnership
United States Fish and Wildlife Service Biologist





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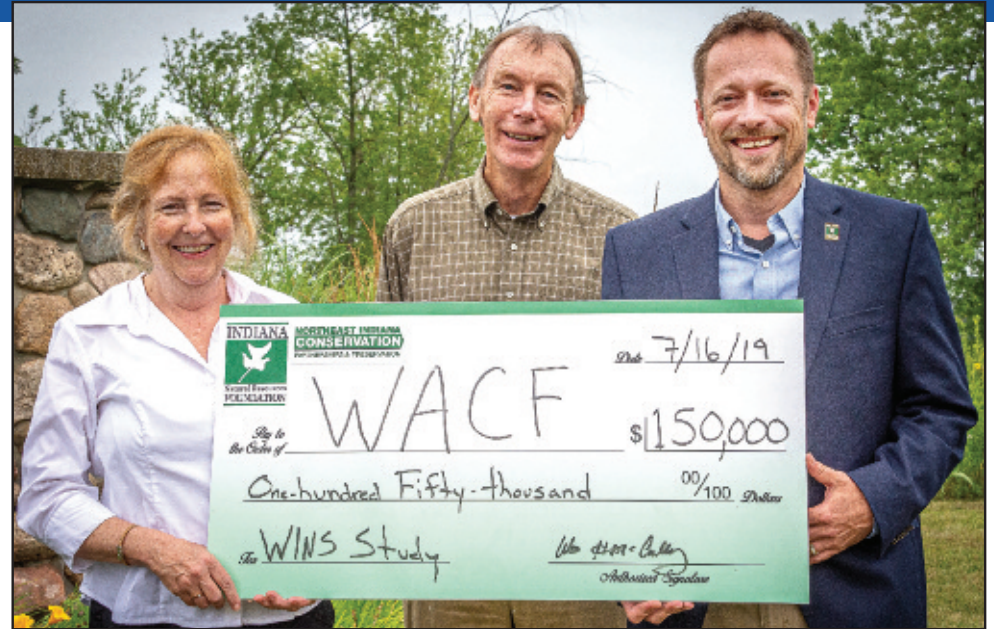
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\$150,000 grant

WACF was recently presented with a matching grant for \$150,000 from the Indiana Natural Resources Foundation (INRF). The Foundation raises funds to support the DNR and other important environmental initiatives like the WINS project. Thanks to INRF, approximately 1/3 of the three-year WINS project is now funded. Pictured are Heather Harwood, executive director of WACF, Dr. Jerry Sweeten and Jody Kress, executive director INRF.



Protecting and Preserving our Lakes since 1991



Established in 1991, The Wawasee Area Conservancy Foundation (WACF) is a 501(c)(3) tax-exempt, non-profit organization. Contributions to the WACF are tax-deductible to the extent current tax law allows. Please check with your tax advisor.

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