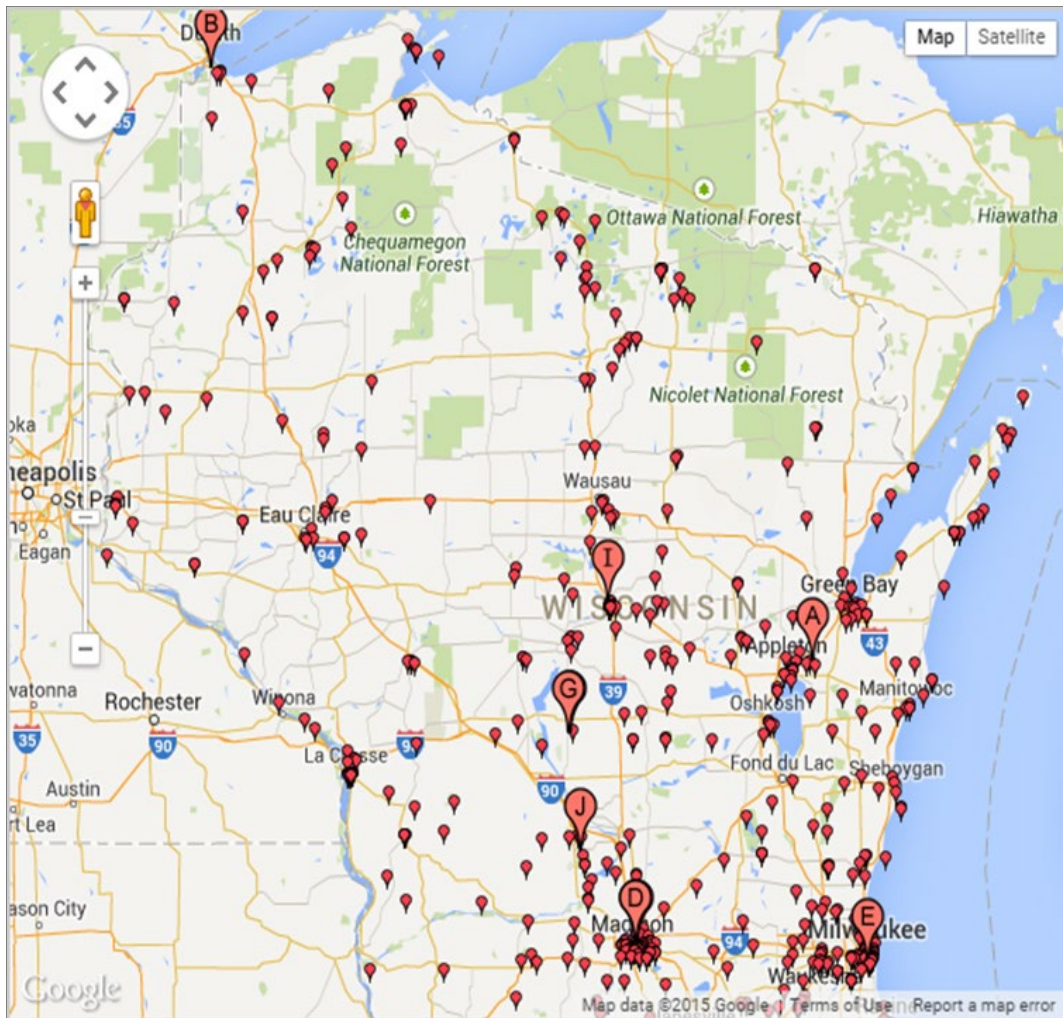


Following Water

Into Communities and Classrooms

Deanna Erickson, Lake Superior Reserve
Justin Hougham, Upham Woods Outdoor Learning Center
Deb McRae, Wehr Nature Center



700
Environmental
Education
related
organizations in
Wisconsin

Status & Needs Report of Wisconsin Environmental Education Related Organizations

1. Organizational management, content understanding (i.e. water) and effective delivery is a high priority
1. They would benefit from trainings focused on technology usage in outdoor education and using STEM as a context for environmental education
1. Professional development on increasing inclusion in facility and programmatic accessibility

In total **156 EE organizations responded** to the survey including:

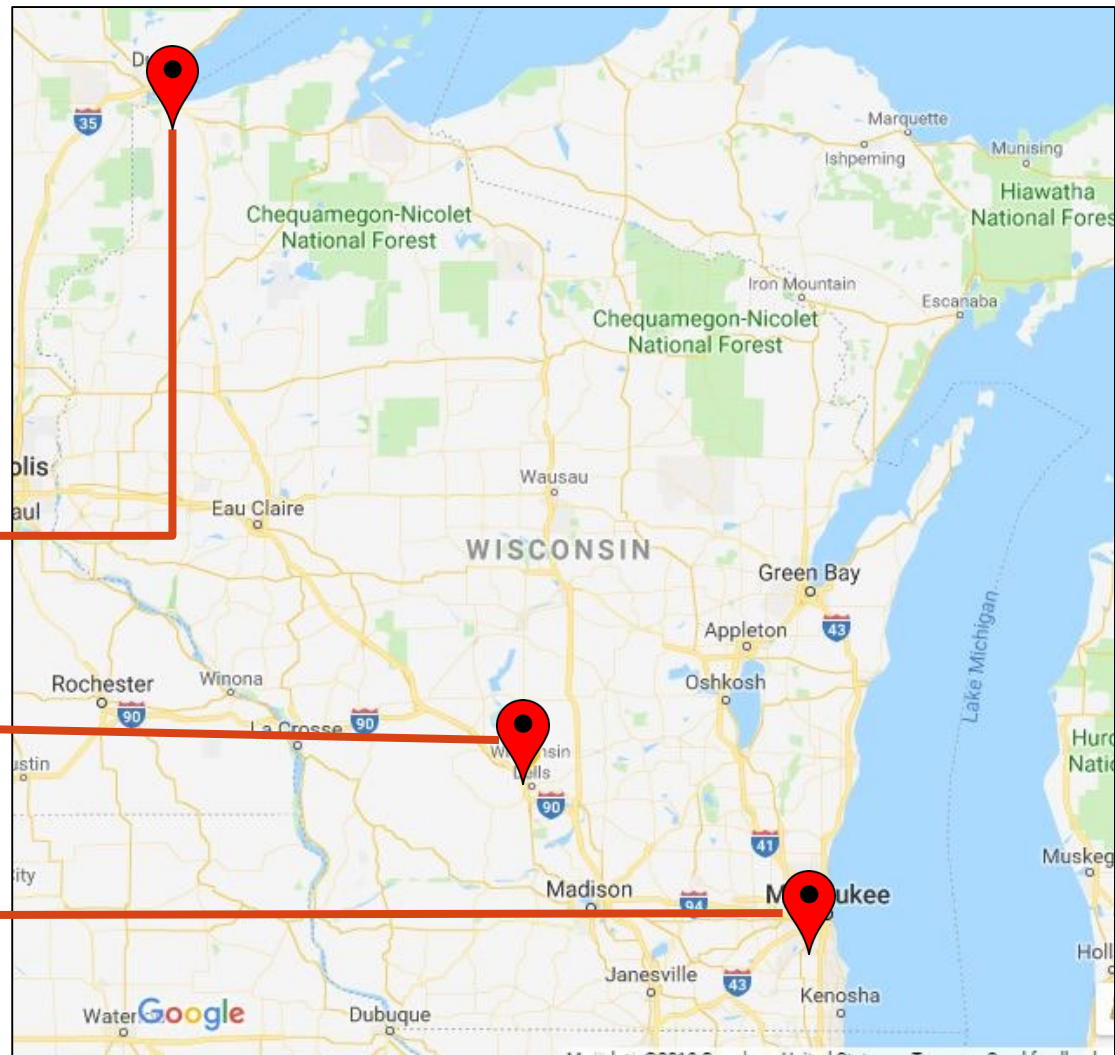
- 23 Camps
- 20 K-12 School Programs or Groups
- 18 State-Run Parks, Programs, or Groups
- 13 University-Run Programs or Groups
- 11 City/County-Run Program or Groups
- 7 Friends Groups
- 6 Watershed Groups
- 7 Museums/Zoos/Aquariums

University of Wisconsin-Extension:

Lake Superior Reserve

Upham Woods

Wehr Nature Center





Duluth, MN

Superior, WI





RIVERS & Lake











UPHAM WOODS

Upham Woods

The Wisconsin Idea Outdoors

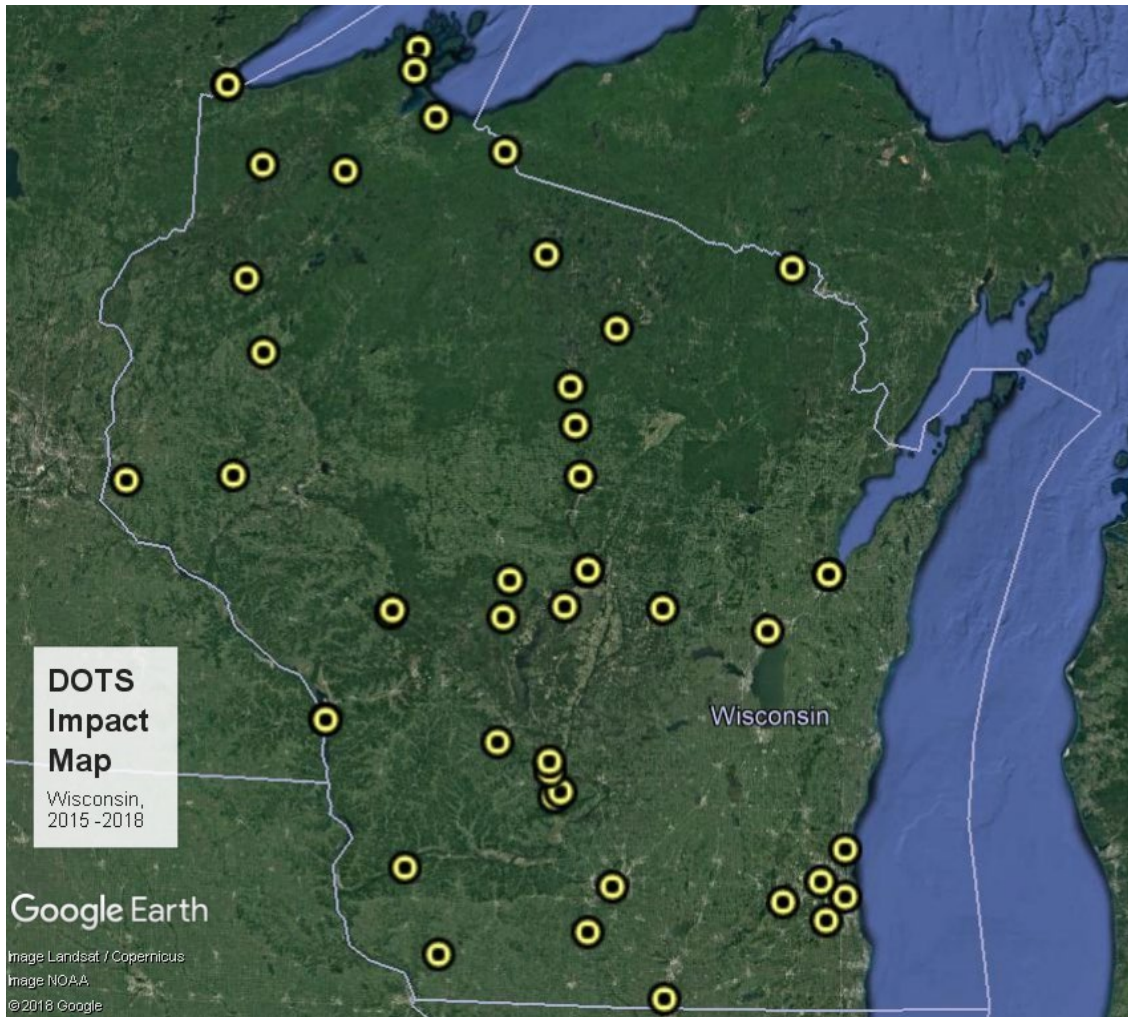




DISCOVERY 174

Digital Observation Technology Skills

Statewide Impact



Student Led Water Quality Monitoring

Developing a sense of place with science and storytelling

“In moving environmental education into the digital age, educators should look to empower youth with the tools and responsibility to examine their surroundings and in encouraging youth to take and use technology outside, educators can capitalize on students collecting their own data sets to develop deeper more meaningful inquiry questions.” *Hougham et al., 2017b*



Technology in Environmental Education

Student Generated Data Informing Student Generated Inquiries

The DOTS program engages both youth and adults in digital literacies, and connects the dots from data collection to inquiry and analysis.

How do we train educators to successfully interface technologies with the outdoor experiences that they provide their students?

by R. Justin Hougham, Marc Nason, Megan Gilbreath, Quinn Robinson - University of Wisconsin - Extension

Technology in education has been consistently changing and growing in impact in classrooms across the globe. While not all have great practices for closing achievement gaps in schools, the education community is anxious not to be seen here this will study live up to its potential (“Smart Cities”, 2017, July 25). Ed tech is anticipated to grow to a \$120 billion market by 2020, which will largely be spent on software and web services. How might we help to see this about up from classrooms field experiences?

Undoubtedly in these articles and what we explore here are the specific impacts that the construction of technology in environmental education brings as well as a case study that shows strategies we have found to be effective when an education combines the merging of hands-on (digital) tools, technology application in professional development, and web-based collaborative tools. Important questions for environmental education to ask include:

- How does the web for education for the environment?
- What considerations need to be taken to ensure that treatment works?
- How would we know if it did?
- How do we train educators to successfully interface technologies with the outdoor experiences that they provide their students?

An article published in CLEARING in 2014, we explored the instructional framework for merging field based science education with mobile computing in the framework entitled *Advancing Learning 2.0* (Hougham, Nason, and Nason, 2014). In the years since, this model has informed a collection of hardware kits that support the concepts in CLEAR as well as an examination of the questions outlined above. These hardware kits are called Digital/Characterization Technology (DOTS) kits.

In the middle link of the Salmon River in Idaho you'll see a student, making reports and hot springs that all tell the story of the landscape. Similarly along the Wisconsin River you will see towns, towns and fields that have a link to the industries that have shaped the state over the last 150 years. If you're on the right

spot at the right time, you can find responsive young people and bright yellow cones filled with glowing fishing lure green and glowing fluorescent floats about the waterbodies in their state. The question of whether it is a wild river or a small tributary outside a hardwood scientific stream run to be held on these places and technology that is appropriately considered helps which and where these experiences.

In a world where technology is strongly, making digital literacy is practically a requirement in our understanding of just about everything. The students of today are able to navigate through web pages and apps with ease, information at their fingertips like never before. If then, we can find ourselves removed from that information, disconnected from these data sources and collections, using our ability to consider and require more. By inserting digital tools that can enhance inquiry of the natural world, education can bridge the divide of both information and the ability to be a primary data collector. By equipping students with tools and interfaces familiar to youth of today, they are able to provide an early real world application of scientific observation, but also experimental design and offers learning toward the future.

Young people in Wisconsin have been contributing to the development of the idea of digital data collection and inquiry, through DOTS. The DOTS program has been developing in Wisconsin since 2014, engaging both youth and adult demographics in digital literacy, and connecting the dots from data collection to inquiry and analysis. By involving youth in the visualization and comparison of their data collections, they are able to begin to accomplish higher order learning such as developing their own hypotheses and synthesizing the meaning of their findings. DOTS has been developed for students in 4th through 8th grades but has been modified for students in 2nd through high school. DOTS has been developed with both teachers, continuing to build education and professional development.

Case studies of this application vary widely in the location and content. Currently DOTS kits are used in Idaho and in Wisconsin by youth to examine water quality. A full scale application is underway in Wisconsin in Wisconsin to connect youth from many different watersheds. That's the goal, August, (continued on next page)

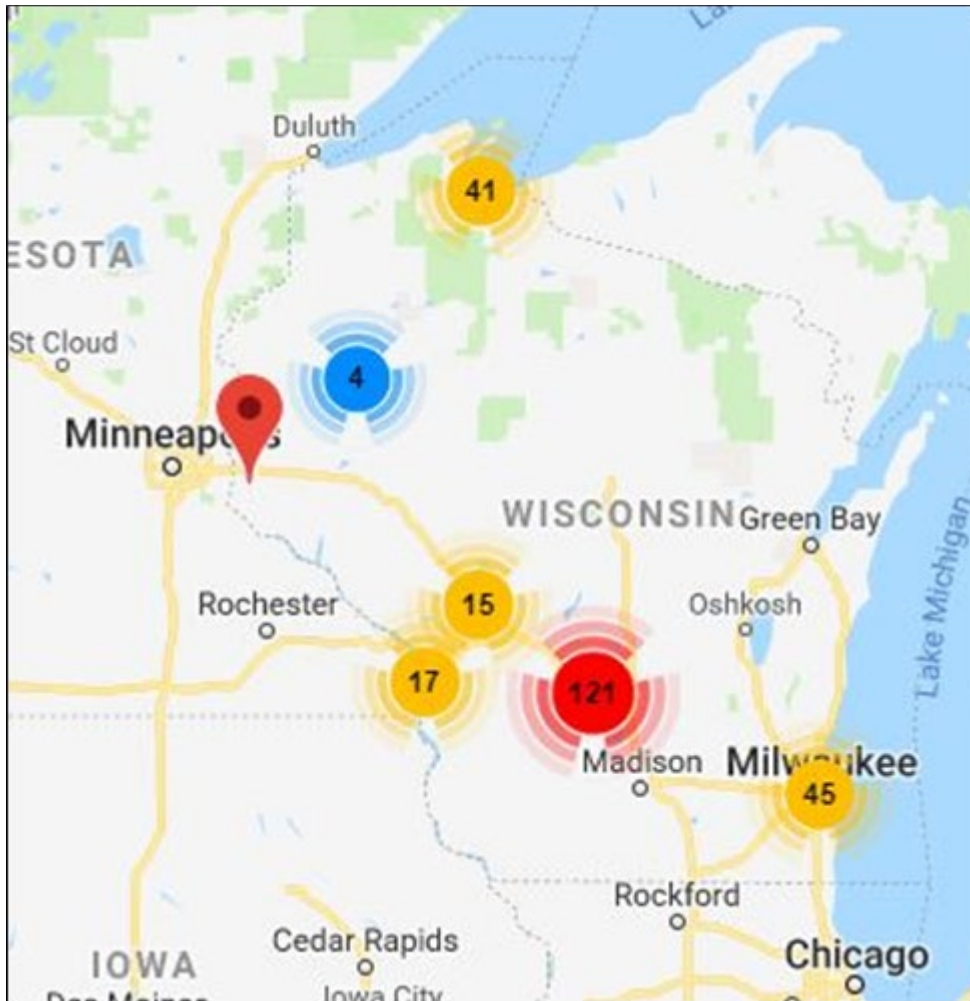
CLEARING Fall 2017 www.clearingmagazine.org Page 15



Student Research

Students led water quality research around the state.

<https://sites.google.com/view/uphamwoodsdotswatermonitoring/home>



Water Data Summit



Team Members: RJ Rivera, Lidiana Rivera, Lorelai Madson, Vivian Madson, Beatrix Madson, Gweneviere Madson, Olivia Hautanen, Nora Hautanen

Date: August 3rd, 2017



Location: Upham Woods, Wisconsin Dells, Wisconsin



Scientific Story

We investigated two different locations as a part of the water study blitz at Upham Woods. The first location was the Fishing shore on the Wisconsin river, and the second location was a stagnant inlet only 100 feet away. We noticed several differences between the two locations.

Fishing Shore	Inlet Water
Clean, Crystal, Murky	Dark, Murky
No Algae	Algae
Water Temp: 73 F Air Temp: 73.8	Water Temp: 70 F Air Temp: 75.5 F
Sandy	Muddy
Less plant life	More plant life
More animal diversity	Less animal diversity
No canopy	Canopy cover
Low Phosphate level	Medium Phosphate level
Moving water	Stagnant water



For more information, contact Justin Hougham, or check out our website:

justin.hougham@ces.uwex.edu • (608) 254-6461

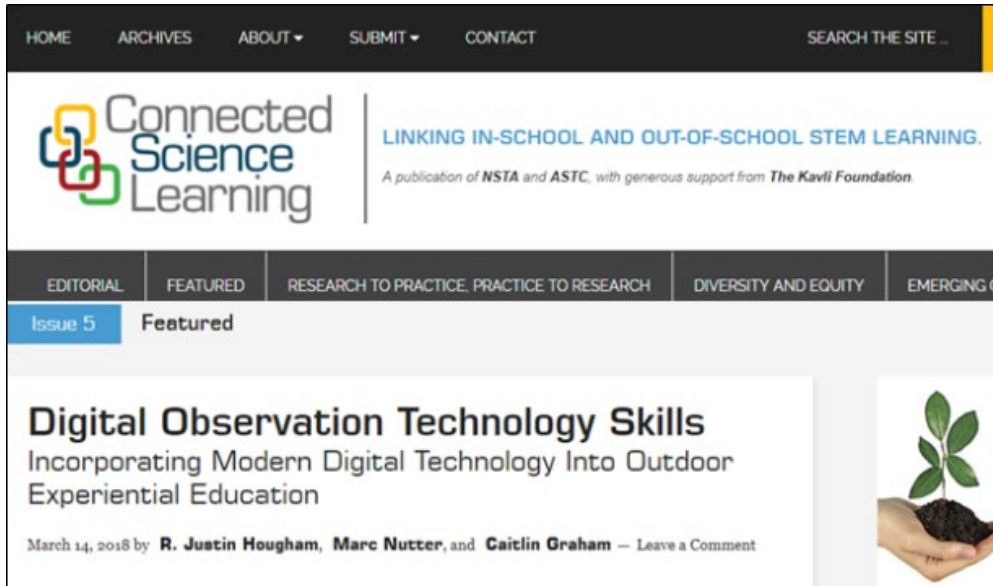
<http://tyl.uwex.edu/environmentaleducation/>





Digital Literacy: Modern Tools for Observation and Inquiry

“DOTS addresses longstanding tensions between modern technology and classical outdoor education by carefully selecting appropriate digital technology for educational purposes and by situating these tools in classical experiential pedagogy...to maintain the inquiry-driven nature of experiential education while incorporating 21st-century learning goals, like digital literacy.” *Hougham et al., 2018a*



The screenshot shows the homepage of the Connected Science Learning website. At the top, there is a navigation bar with links for HOME, ARCHIVES, ABOUT, SUBMIT, and CONTACT, along with a search bar labeled "SEARCH THE SITE". Below the navigation bar is the logo for Connected Science Learning, which consists of three interlocking loops in yellow, blue, and green. To the right of the logo is the text "LINKING IN-SCHOOL AND OUT-OF-SCHOOL STEM LEARNING." and "A publication of NSTA and ASTC, with generous support from The Kavli Foundation." Below this is a horizontal menu with categories: EDITORIAL, FEATURED, RESEARCH TO PRACTICE, PRACTICE TO RESEARCH, DIVERSITY AND EQUITY, and EMERGING C. The "FEATURED" category is selected, and the page displays the title "Digital Observation Technology Skills" with the subtitle "Incorporating Modern Digital Technology Into Outdoor Experiential Education". Below the title is the date "March 14, 2018" and the authors "R. Justin Hougham, Marc Nutter, and Caitlin Graham" with a "Leave a Comment" link. To the right of the text is an image of a hand holding a small green plant growing out of soil.





Enhancing Outdoor Observation with Technology


Journal of Experiential Education


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Bridging Natural and Digital Domains: Attitudes, Confidence, and Interest in Using Technology to Learn Outdoors

R. Justin Hougham, Marc Nutter, Caitlin Graham

First Published January 9, 2018 | Research Article |  Check for updates

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 2 

Article Information
Article first published online: January 9, 2018
<https://doi.org/10.1177/1053825917751203>

“EARPOD used an integrated technology program, Digital Observation Technology Skills (DOTS), to engage underserved students in experiential education meant to increase environmental literacy and provide evaluative data for pedagogical development in environmental education...Preliminary results showed that students reported an increase in three main characteristics with regard to technology: confidence in using technologies outdoors, knowledge of available technologies, and knowledge of using different technologies.”



Hougham et al., 2018b



Community Science

A group of people interested in place based observation, studies, and scientific processes with the goal of understanding and addressing local issues.

Community

1. Institutional: informal and formal
2. Students
3. Teachers
4. Adults
5. Friend Groups

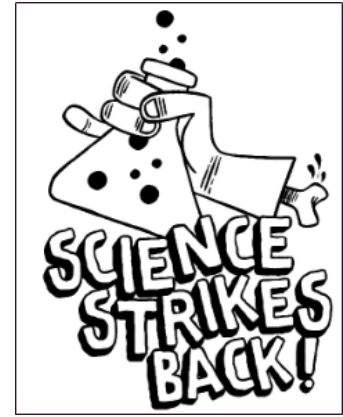
Community members connect people to solutions related to their stories.

Science

1. Data collection and documentation
2. Observation
3. Questions
4. Process oriented
5. Experiments

Data connects people to the stories they want to tell.

Science Strikes Back, a Community Science Fair





Went Nature Center

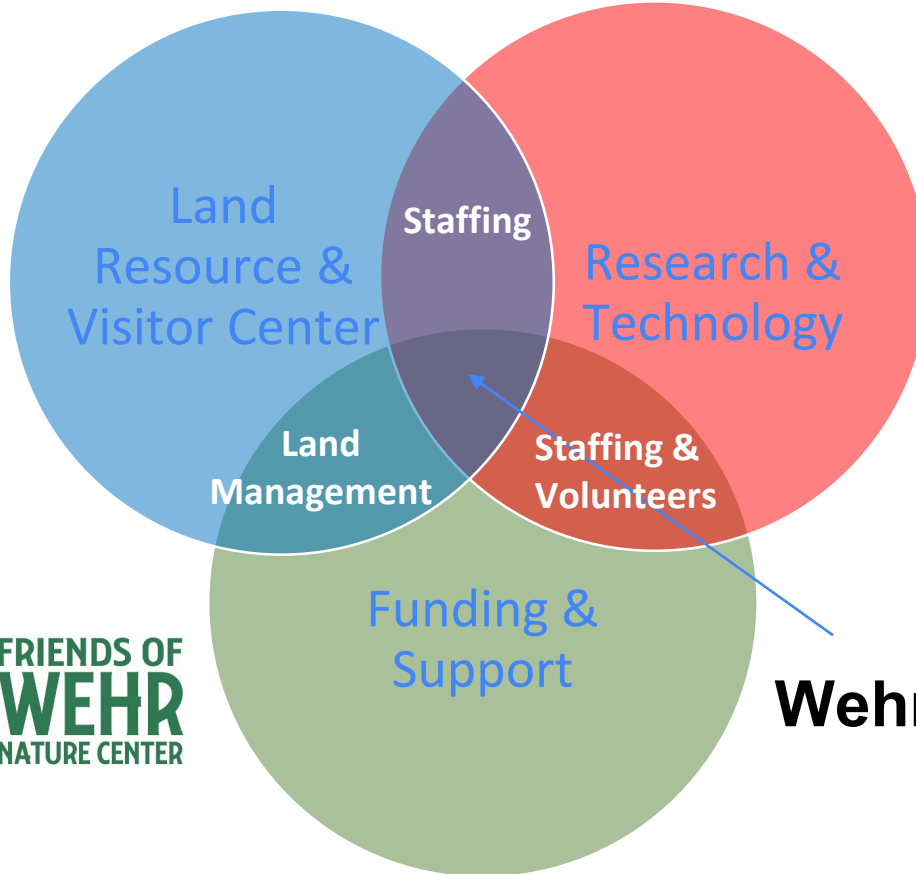
“A Place for All Seasons
A Place for Everyone”



The mission of Wehr Nature Center is to inspire current and future generations to explore and care for the natural world...



Wehr is built by partnerships



Wehr Nature Center

Wehr Nature Center:

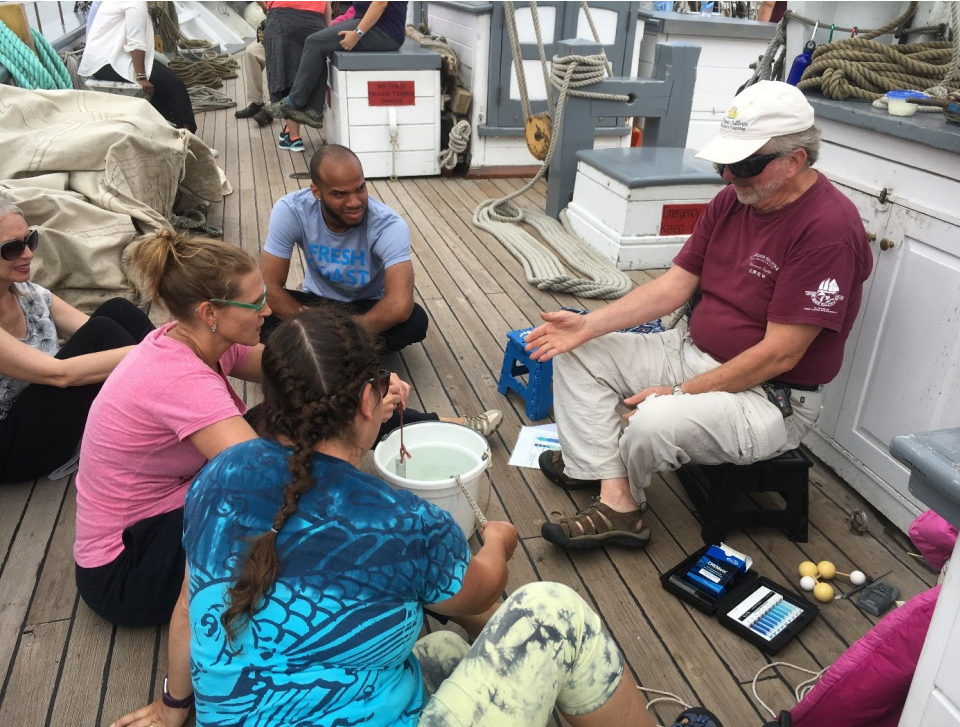
100,000+ visitors/year
hours/year



13,500 volunteer



Following the water to Lake Michigan: Watershed Alive Partnership with Milwaukee Metropolitan Sewerage District – Teacher Training





Following the water to Lake Michigan: Student Explorations











