R.B. Annis Water Resources Institute

2023 Year in Review

GRAND VALLEY STATE UNIVERSITY
ROBERT B. ANNIS WATER RESOURCES INSTITUTE

The Mission

of the Robert B. Annis Water Resources Institute (AWRI) at Grand Valley State University is to integrate education, outreach, and research to enhance and preserve freshwater resources.

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Welcome from the DIRECTOR

We are fortunate to be located in a region with such abundant water resources. Muskegon Lake is out our front door, Lake Michigan is just a quick boat ride away, and we are within driving distance of countless inland lakes, cold water streams, warm water streams, wetlands, and even a few bogs.

I am pleased to tell you that AWRI faculty and students continue to make significant contributions to science and our community. We have highlighted those contributions in publications and presentations and continue to grow the stature of AWRI among our peers. And we continue to extend our connections with peers from around the world, hosting delegations from Poland and Ghana.

Our summer internship program and graduate program are a critical piece of our success and are central to our goal of training the next generation of professionals in the field of aquatic science. The ship-based educational program had an outstanding year and reached a new milestone, having hosted over 190,000 participants who engaged in hands-on science.

This past year saw several personnel changes at AWRI. First, we offer our best wishes to Dr. Rick Rediske and secretary Roxana Taylor, who both retired earlier this year. Second, we were all saddened by the loss of our friend and colleague, Kurt Thompson. Last, we are pleased to welcome Dr. Ryan Otter to AWRI and Cheryl Kastas to our admin team. We also welcome Dr. Amanda Buday who will have a joint appointment in AWRI and Sociology. Both professors bring a wealth of experience and will contribute to our science and help build new collaborations across the West Michigan region.

With the support of our local and regional partners, AWRI has worked hard to protect and promote the water resources of the region. But our work is not done and as we look to the future, AWRI is well positioned to be a leader in collaborative research efforts that produce real world solutions. And we will continue our efforts to connect the Muskegon community and the region to our water resources and the blue economy and to draw national and international attention to the region.

Mark Luttenton

Interim Director,
Professor of Biology

Dr. Rick Rediske (left) with AWRI donor and namesake Robert B. Annis (right).

RICK REDISKE Retires

AWRI wishes a fond farewell to Dr. Rick Rediske, who retired from GVSU this summer. Rick has been part of AWRI's story from its early days, first as a community member of AWRI's advisory committee and since 1994 as a senior research scientist, professor, and distinguished research fellow at AWRI. During his tenure at AWRI, Rick has received numerous awards including the Lifetime Achievement Award from the Muskegon Environmental Coordinating Council, the GVSU Outstanding Community Service Award, and the C.R. Evenson Award from the West Michigan Environmental Action Council. Rick's research, professional, and community service activities have been a benefit to our local communities, West Michigan, and even to state and federal levels of government. Thank you, Rick, and best wishes!

A Cornerstone of AWRI

AWRI regrets to announce that Kurt Thompson passed away on December 4, 2022 at the age of 67. Kurt began working at AWRI in 1989, after receiving his BS degree in geology at GVSU. Kurt's knowledge of computers and geographic information systems (GIS) were highly valued at AWRI, and he was incredibly generous in sharing these and other skills with faculty, staff, and students, not only at AWRI but also with the Geography and IT Departments. Kurt was instrumental in AWRI's growth and success, and his absence is felt daily. Kurt is memorialized at AWRI with a plaque at the Lake Michigan Center entrance.

Welcome, RYAN OTTER!

New faculty member Dr. Ryan Otter joined AWRI this semester! Ryan is an environmental and data scientist with interests in Great Lakes restoration, waterborne pathogens, and the movement of contaminants through food webs. Welcome to GVSU, Ryan!

Graduate student Tyler Hoyt holds a yellow perch.

Yellow Perch BIODIVERSITY

Conserving biodiversity is an important societal goal. Typically, biodiversity is used synonymously with species diversity, but biodiversity includes diversity within species. Graduate student Tyler Hoyt is exploring the diversity within yellow perch in Lake Michigan. Previous research associates with the Ruetz Lab at AWRI identified at least three life history types of yellow perch: fish that mainly reside in Lake Michigan, fish from Lake Michigan that seasonally use drowned river mouth (DRM) lakes, and fish that mainly reside in DRM lakes. Tyler's thesis research asks how morphology differs among these three types of yellow perch. His research builds on a current Great Lakes Fishery Trust grant to Dr. Carl Ruetz that aims to understand how angler harvest in DRM lakes targets resident and migrant yellow perch. Tyler's preliminary results suggest there are morphological differences in body shape among yellow perch types, providing another example of hidden biodiversity right here in West Michigan.

Yellow perch preserved to study variation in fish morphology.

Does Preserving Fish CHANGE THEIR SHAPE?

Preserved fish specimens in natural history museums provide an irreplaceable record of the past that can be used to understand and interpret the present. Undergraduate student Jacob Yingling is collaborating with Dr. Carl Ruetz and graduate student Tyler Hoyt to understand how the process of preservation affects the shape of yellow perch. Preliminary results suggest that preservation initially affects fish shape, but the effect lessens over time. This information will help scientists better plan research on fish morphology using preserved specimens.

Undergraduate students Jacob Yingling and Brianne Siple collect yellow perch with a gill net.

Coastal Wetland IMPORTANCE TO FISHES

Graduate student Matthew Silverhart is investigating which fish species use coastal wetlands in the Great Lakes basin. His research focuses on how fish assemblages vary by wetland type among the five lakes and leverages a large dataset collected as part of the U.S. Environmental Protection Agency's Great Lakes Coastal Wetland Monitoring Program.

Graduate student Matthew Silverhart holds a bowfin.

HYPOXIA AND ACIDIFICATION

The Muskegon Lake Observatory (www.gvsu.edu/buoy/) has previously revealed low oxygen (hypoxia) in the bottom waters of Muskegon Lake as an annually recurring phenomenon driven by thermal stratification and eutrophication. Less recognized, is the pattern that hypoxia and declining pH (acidification) co-occur as well. Whereas dissolved oxygen drops from ~12 mg/L in April to ~0 in August/September, pH declines from ~8.5 to ~7.5. Since pH is on a logarithmic scale of H^+ ion concentrations, a 1.0 unit drop in pH implies a tenfold increase in acidity – a huge change. Water column mixing in the fall resets the system by reoxygenating the bottom and raising the pH back to normal levels. Annual summertime deoxygenation and acidification of bottom waters has implications for seasonal habitat quality, life cycles, and biogeochemistry. In a world experiencing greater warming and continued eutrophication, we could see more severe hypoxia and acidification events in our natural waters.

Graduate student Nate Dugener stands next to a mussel-encrusted Muskegon Lake Observatory buoy at the end of the 2022 season.

Little Black Lake: A GEM UNDER PRESSURE

Last year, Dr. Al Steinman was contracted by Norton Shores and Spring Lake Township to study Little Black Lake, which is co-located in both municipalities. The Steinman and Ruetz Labs studied the lake in 2007 and found it in good ecological health. However, local citizens had expressed concern over the lake's status. The Steinman Lab repeated some of the analyses again in 2023; initial findings suggest a decline in the lake's health. A full report is underway with recommendations to improve lake conditions.

Adjunct research assistant Katie Tyrrell (left) and Dr. Al Steinman (right) collect a sediment core from Little Black Lake.

MINIATURIZED LAKE OBSERVATORY Completes Year 13

The Muskegon Lake Observatory (MLO) was successfully deployed and operated for the 13th consecutive year – but this time in a reduced form as a Mini-MLO mounted on the AWRI docks due to funding limitations (www.gvsu.edu/buoy). The Mini-MLO continues to gather hourly water quality info from the lake's surface water to track important issues like eutrophication, harmful algal blooms, and episodic ecosystem events.

High school volunteer Connor Gable (left) and summer intern Kyle McKee (right) conduct maintenance on the Mini-Muskegon Lake Observatory at the AWRI dock.

Understanding West Michigan's
DROWNED RIVER MOUTH LAKES

Lake Michigan's eastern shoreline has over 24 drowned river mouth lakes (DRMs). These lakes formed after the glacial retreat 14,000 years ago. As glaciers melted and water flowed toward Lake Michigan, rivers were trapped (drowned) behind the enormous sand dunes that rose after the weight of the glaciers receded, forming lakes that are critical resources for coastal communities. Al Steinman and Erin Kuhn (Executive Director of West Michigan Shoreline Regional Development Commission) applied to have Michigan DRMs be accepted into NOAA's National Estuarine Research Reserve program. The application is under NOAA review. AWRI alumna Megan Mader and Carl Ruetz, with support from Sean Woznicki and Steinman, evaluated the water quality of these DRMs and found a gradient of high to low water quality as one moved north to south along the coastline. The research was published in the Journal of Great Lakes Research and provides an important foundation for future work.

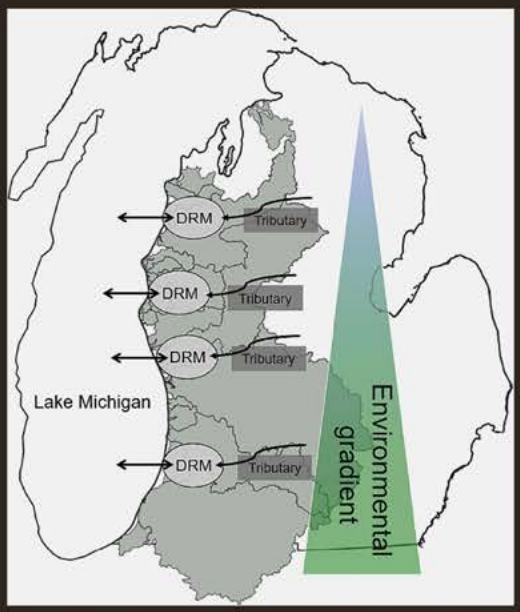


Figure from Mader et al.'s 2023 publication showing the environmental gradient of DRM water quality. Figure credit: Megan Mader.

Sierra to Sea:
DWINDLING MOUNTAIN WATER TOWERS

A high mountain stream in Spain's Sierra Nevada, the southernmost glacial mountain range in Europe. Photo credit: Bopi Biddanda.

A new peer-reviewed opinion piece in *Eos* addresses the issue of protecting the water resources of Spain's Sierra Nevada Mountain range. These glacial lakes, streams, and rivers support a vast ecosystem of life in downstream farms, villages, towns, and cities. However, its future is threatened by changing precipitation patterns over the Mediterranean region. One-half of humanity depends on mountain water resources – and all continental glaciers are projected to disappear by the end of the century.

Climate Change
AND DISEASE

The consequences of climate change are becoming increasingly evident in our bizarre weather patterns. Less evident, however, are the increasing incidents of the spread of pathogens and disease. By engaging the public through forums such as the Community Foundation for Muskegon County, Kevin Strychar is leading conversations about the pressing challenges posed by climate change in our Great Lakes region.

Dr. Kevin Strychar giving a public presentation on October 25. Photo credit: Tanya Cabala.

Ravenna High School
STREAM TEAM

The Ravenna High School (RHS) National FFA Organization Rural Technology class partnered with AWRI to launch a citizen stream monitoring program for Crockery Creek in Muskegon County. The partnership initiated with a landowner survey conducted by Dr. Amanda Buday for the Ottawa Conservation District and grew to involve the Rural Tech class after residents expressed frustration at what they called the "neglect" of Crockery Creek. With support from the Ravenna Community Education Foundation, the West Michigan Great Lakes Stewardship Initiative, the Lower Grand River Organization of Watersheds, the Ravenna Conservation Club, Swanson Pickle Co., the GVSU Department of Geology, and the AWRI Otter Lab, RHS students collected macroinvertebrates from Crockery Creek, monitored general stream chemistry parameters, conducted *E. coli* monitoring, and had some fun along the way.

Ravenna High School students celebrate completing their '22-'23 stream monitoring with a trip on the *W.G. Jackson*. Photo credit: Melanie Block.

Little Manistee River
MANAGEMENT SURVEY

The Little Manistee Watershed Conservation Council (LMWCC) sought feedback from landowners in the Little Manistee River watershed regarding local water quality management and public support for a Michigan Department of Natural Resources (MI DNR) Natural Rivers conservation designation for the Little Manistee River. Dr. Amanda Buday conducted a survey for the LMWCC and participated in a series of six public information meetings hosted by MI DNR about the Natural Rivers program.

Dr. Amanda Buday and GVSU Social Science Lab preparing a mail survey. Photo credit: Kendra Stanley-Mills.

Au Sable River
TELEMETRY STUDY

This summer, the Luttenton Lab used radio telemetry to study how trout respond to warmer temperatures in the North Branch Au Sable River. Previously we found that trout throughout the Au Sable River would seek colder water when stream temperatures were warmest. The current study was inconclusive because water temperatures remained relatively cool this summer. The lab learned that predation may be a bigger factor in reducing fish numbers than previously assumed.

Undergraduate Logan Clark and graduate student Michael Trapp observe a brown trout in the North Branch Au Sable River.

New Normal for OUTREACH PROGRAM

AWRI's outreach program reached an exciting milestone: over 190,000 participants in cruises since 1986! More learning opportunities were offered in 2023 than any other post-pandemic year. The boats ran busily throughout the season, with new growth in summer activity and reached non-traditional groups like camps and homeschool cohorts. Instructors continued to offer land-based programs fully outdoors, recognizing the value of place-based learning. The *W.G. Jackson* visited two Indiana ports on the Lake Michigan coast in June, the first away trip since 2019. The vessel sailed to Hammond (in partnership with the Indiana Department of Environmental Management) and Michigan City (hosted by the Sanitary District of Michigan City). The outreach program was also invited by the Lakeshore Museum into a partnership to provide transportation funding to Muskegon County schools for STEAM experiences in Muskegon, courtesy of a grant from the Howmet Foundation. AWRI provided this opportunity to a dozen schools who visited us this year.

EXCEL Summer Campers learn about water quality onboard the *D.J. Angus*.

Empowering MI Teachers in ENVIRONMENTAL EDUCATION

AWRI was awarded a grant from EGLE to offer four free educator workshops on the Michigan Environmental Education Curriculum Support (MEECS) Water Quality and Ecosystems/Biodiversity units, which were recently updated. MEECS is a state-specific curriculum to help students learn about Michigan's economy and environment through inquiry-oriented, data-based lessons. Christina Catanese and Amanda Syers taught one workshop for each unit at AWRI and on GVSU's Pew Campus. Dozens of educators from a range of backgrounds attended. Participants spent time indoors and outdoors experiencing MEECS activities and left prepared to offer these learning experiences to their students.

Workshop attendees learning an activity from the MEECS Ecosystems & Biodiversity unit.

NETA Conference VISITS MUSKEGON

Leaders from PBS stations across the country visited AWRI for a cruise on the *W.G. Jackson* and a presentation by Dr. Al Steinman, as a part of the 2023 National Educational Telecommunications Association (NETA) Conference & Corporation for Public Broadcasting Public Media Thought Leader Forum. The group also viewed a demonstration of the BeBot at Pere Marquette Beach. AWRI partnered with WGVU, the GVSU College of Education and Community Innovation, and the Lakeshore Museum for this event.

AWRI vessel science instructor Bob Myers (right) teaching NETA conference participants onboard the *W.G. Jackson*.

Freshwater Algae AT ALTITUDE

Dr. Sarah Hamsher was one of nine instructors that team taught a two-week "Freshwater Phycology in the 21st Century" workshop at the Mountain Research Station of the University of Colorado, Boulder (CU). Students in the workshop learned algal collecting techniques, light-microscope based identification, culturing techniques, DNA extraction, phylogenetic systematics, genome assembly, and comparative phylogenomics. The class had 12 students from six different countries (Nigeria, Brazil, China, Indonesia, India, USA), including Ryan Ruppert, Hamsher's AWRI summer intern. This workshop was developed in part as an effort related to the broader impacts of the NSF funded project, "Phylogenomics and taxonomic revision of the Rhopalodiales – diatoms with obligate cyanobacterial endosymbionts" to explore different ways to teach Phycology with classic and modern approaches. The course was organized and offered by Dr. Patrick Kociolek and Dr. Jingchun Li (CU), Dr. Scott Miller (University of Montana), and Hamsher (GVSU).

Dr. Sarah Hamsher (L) teaching students, (L to R) Yogeshwaran Murugesan (Agharkar Research Institute, India), Catherine Ikudaisi (CU), and Ryan Ruppert (AWRI), to extract DNA from algal cultures.

Sharing SULFUR SPRING Research

Dr. Sarah Hamsher and her graduate student Davis Fray continue to study the fascinating microbial mat communities inhabiting five sinkholes/spring habitats fed by low-oxygen, high-sulfur groundwater, creating conditions comparable to those found in ancient seas. Unique algal and bacterial communities were found at each of these sites, with both water chemistry and biogeography influencing their structure. Fray presented his results at the Northeast Algal Symposium and the annual Phycological Society of America meetings.

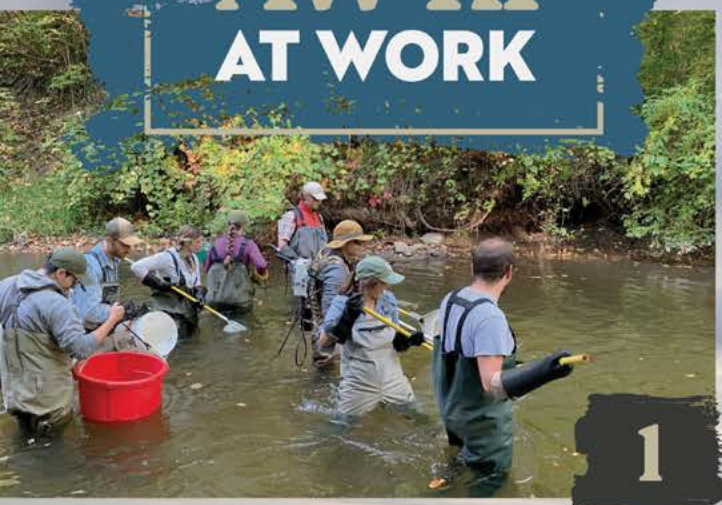
Graduate student Davis Fray (back) with (L to R) Dr. Morgan Vis (Ohio University), Dr. Sarah Hamsher (AWRI), and Dr. Gary Saunders (University of New Brunswick) at the Northeast Algal Symposium in Mystic, CT.

Searching for UNIQUE DIATOMS

Hamsher Lab summer intern Ryan Ruppert spent the summer collecting algae samples in search of Rhopalodiales, a group of diatoms (algae with glass cell walls) that have cyanobacterial endosymbionts (cells that live within cells) as part of a NSF-sponsored project to reveal the evolution of this unique relationship.

Undergraduate Ryan Ruppert collecting algae from Spring Lake.

AWRI AT WORK



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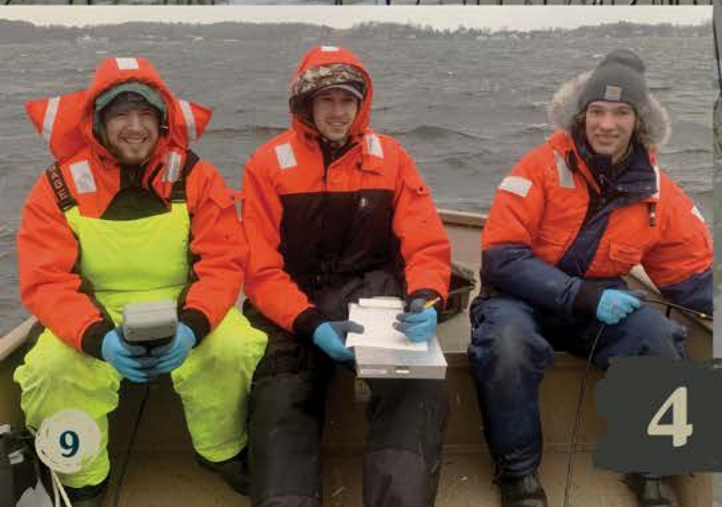

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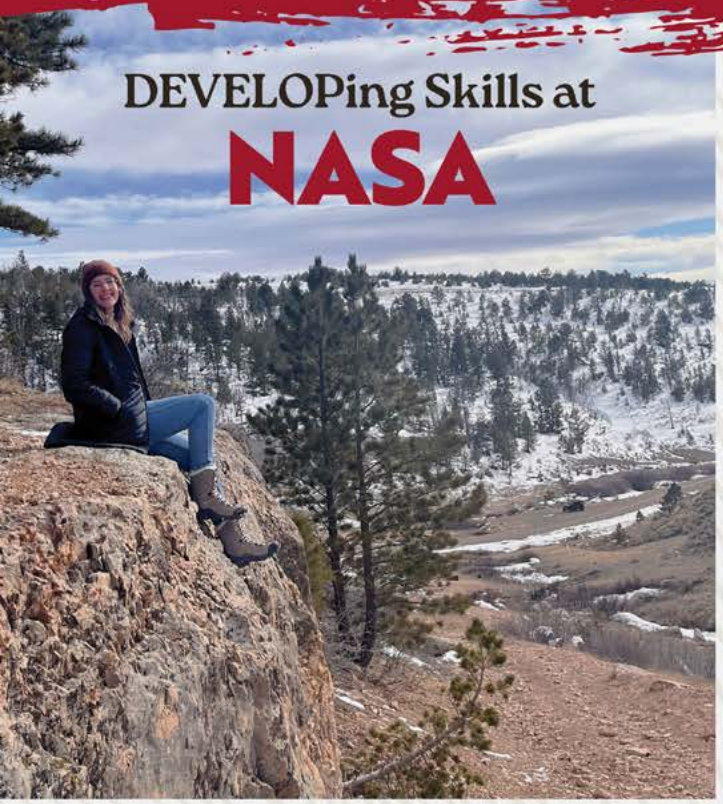
1. GVSU's new Fisheries and Aquatic Science Club learning to conduct electrofishing sampling.
2. Dr. Charlyn Partridge and lab members processing genetic samples.
3. Science instructor Doug Haywick teaching onboard the *D.J. Angus*.
4. Ruetz Lab students Jacob Yingling, Tyler Hoyt, and John Lawerence conduct cold-weather sampling.
5. Roxana Taylor on her last day of working at GVSU after 23 years.
6. New AWRI secretary Cheryl Kastas.
7. Captain Tom Hampton piloting the *D.J. Angus*.
8. AWRI's summer 2023 staff & student potluck.
9. Adjunct research assistant Rachel Orzechowski and intern Isabelle Uganski on a NOAA research cruise.
10. Undergraduate student Kathryn Gellar slingshots a sampling device into a tree canopy.
11. Lead instructor Paula Capizzi displaying magnified *Ceratium*, a dinoflagellate algae.
12. Biddanda & Steinman Lab students and technicians conducting seasonal Muskegon Lake long-term monitoring onboard the *W.G. Jackson*.

Preparing Serbian Agriculture for FUTURE WATER SCARCITY

Dr. Sean Woznicki (left) and BioSense Institute PhD student Branislav Zivaljevic at a center pivot irrigation system in the Vojvodina province of northern Serbia. Photo credit: Tao Liu (MTU).

Dr. Sean Woznicki visited the BioSense Institute in Novi Sad, Serbia, as part of his NASA-funded research determining how climate change, agricultural markets, declining water availability, and increased droughts are changing the agricultural landscape in the Serbian Danube River Basin. Dr. Woznicki and colleagues at BioSense, Michigan State University, and Michigan Technological University carried out field validation of cropping patterns and irrigation systems this summer. Validation collected critical first-hand data on what crops are growing, where they are growing, and where new irrigation systems are installed. The collected data supports the project's three primary tasks: (1) satellite remote sensing of agricultural change, (2) watershed modeling to quantify water use and availability, and (3) economic analysis to understand farmers' landscape decisions. This research will ultimately improve our understanding of how warmer and drier growing seasons influence farmer decision-making and alter water availability in the region.

DEVELOPing Skills at NASA



Jillian Greene at Rogers Canyon near the University of Wyoming.

Graduate student Jillian Greene spent three months at the University of Wyoming participating in the NASA DEVELOP program, where her team used geospatial technologies to locate sources of sediment that ultimately accumulate behind the Willwood Dam on the Shoshone River. The project's results will help the Wyoming Department of Environmental Quality, Shoshone River Partners, and the USGS Wyoming-Montana Water Science Center to implement remediation efforts in sub-watersheds of the Shoshone that are significant sources of sediment.

Dr. Sean Woznicki (back row, middle) poses with other trainers and students at Masaryk University.

Training the Next Generation of REMOTE SENSING EXPERTS

Dr. Sean Woznicki served as a trainer for the NASA and European Space Agency sponsored trans-Atlantic training, "Remote Sensing for Environmental Monitoring and Modelling". Hosted by Masaryk University in Brno, Czechia, the annual training provides educational activities for graduate students and early career scientists in Eastern and Central Europe.

Airborne eDNA FROM HWA

The Partridge Lab continued partnerships with Huron-Manistee National Forest and Sleeping Bear Dunes National Shoreline to use environmental DNA (eDNA) methods to monitor for hemlock woolly adelgid (HWA). HWA is a highly invasive insect that threatens Michigan's coastal hemlock trees. Hemlocks are important for shading coldwater streams, which are important trout habitat. Through a Michigan Invasive Species Program grant, 100 eDNA traps were deployed throughout West Michigan for early detection of HWA. In collaboration with Muskegon Community College, the lab also examined how rapidly eDNA degrades in the environment. This information is important because some high-priority areas for monitoring are not easily accessible, so understanding the duration that eDNA can remain detected in these environments will help optimize monitoring efforts.

The Partridge Lab monitoring HWA in Huron-Manistee National Forest.

Quagga Mussels in HIGGINS LAKE

Rapid changes in Higgins Lake appear to be related to the introduction of quagga mussels, a relative of the zebra mussel. In five years, they have spread throughout the lake and have been found at a depth of 55 feet. During this period, water clarity has improved, with Secchi disc depth readings down to 43 feet. It is likely that water clarity has increased as quagga mussels have expanded their distribution within Higgins Lake.

Large numbers of quagga mussels associated with *Nitella* algae, collected at 55 feet.

BEBOT Rides Again

2023 was the second year the Steinman Lab deployed the semi-autonomous land-based BeBot and water-based Pixie Drone. These Meijer-funded devices, designed to pick up plastic debris from beaches and near-shore zones, also provide the opportunity to inform curious beach-goers about plastic pollution. AWRI is proud to partner with Goodwill International of West Michigan, who accept recovered plastics to be reused in the production of Hydroblox, a recycled product that helps treat stormwater, creating a closed economy.

Dr. Al Steinman and Jamie Cross (center) kneel by BeBot with a crowd of Meijer employees at a beach cleanup.

COVID, *E. coli*, AND DNA

AWRI scientists have conducted SARS-CoV-2 surveillance for a third year in a row, following guidance from Michigan State University, the State of Michigan, and the Centers for Disease Control and Prevention. This year, AWRI analyzed over 4,000 COVID samples across Muskegon and Ottawa Counties and GVSU's main campus in Allendale. Additional lab methods were added this year to include variant testing using whole-genome sequencing via a collaboration with fellow AWRI faculty Dr. Charlyn Partridge. As part of this work, the lab presented multiple collaborative posters at the Public Health Wastewater Surveillance in Michigan Conference in May, including partnerships with Muskegon Resource Recovery Center and Oakland University. This project will move forward with the goal of onboarding additional pathogens for surveillance in wastewater.

Adjunct research assistant Brendan May processing COVID-19 wastewater samples.

New EPA COLLABORATION

Through a collaboration with Environmental Protection Agency scientists and AWRI's Steinman Lab, the Partridge Lab is working to understand how different treatments for harmful algal blooms (HABs) impact community structure. Graduate student Renée Tardani is using a metagenomics approach to understand how the use of glucose and hydrogen peroxide as HABs treatments alters the presence of other microbial communities in aquatic ecosystems.

Graduate student Renée Tardani in AWRI's mesocosm facility.

New Tools for REMEDIATION

Using molecular and geospatial tools, graduate student John Hart's thesis research created a new fecal impairment framework and suggested improvements on monitoring efforts and current GIS models used to better assess fecal pollution risk. These tools will help managers and health departments balance limited resources while making more informed decisions about pollution remediation.

Graduate student John Hart holding water samples.

Organic Wastewater Use on FARM SOILS AND WATER TABLE

Globally, approximately one-third of total food produced is wasted or lost in the supply chain. In Michigan, more than 18,000 tons of pumpkins end up in landfills. Kevin Strychar and graduate student Katelyn Anderson are working with local agricultural producers and industry food processors to examine the use of these materials as natural organic large-scale agricultural fertilizers as a mechanism to reduce or eliminate dependence on synthetic fertilizers. Soil cores are being collected to assess nutrients, heavy metals, and bacteria of concern (*E. coli*) using imaging flow cytometry methods. The goal is to develop a rapid method to detect and potentially eliminate any pathogens infecting food-consumer sources and human health.

Graduate student Katelyn Anderson collecting sediment cores from an agricultural field.

Beach MONITORING

AWRI's 2023 beach monitoring team.

AWRI students and staff monitored *E. coli* at 29 beaches throughout Muskegon County, including Lake Michigan for bacterial contamination to inform Public Health Muskegon County about beach safety. This year, methods included same-day analysis using state-of-the-science molecular techniques so public health officials could make timely and informed decisions about beach advisories and closures.

Lake Sturgeon GENETIC ANALYSIS

At the end of this summer, the Partridge Lab helped the Gun Lake Tribe tag and collect genetic samples of juvenile lake sturgeon at their stream-side hatchery along the Kalamazoo River. This is part of a long-term project to help restore lake sturgeon populations in this area.

Graduate student Keely Dunham clips the tail fin of a juvenile lake sturgeon.

AWRI Faculty & Staff

Mark Luttenton, Interim Director

Staff/Administrative:
Tonya Brown, AWRI Assistant
Heidi Feldpausch, Office Coordinator
Roxana Taylor, Secretary (retired 5/2023)
Cheryl Kastas, Secretary (8/2023)

Facilities/Maintenance:
Len Wittlieff, Maintenance

Geospatial Information Lab:
Sean Woznicki, Assistant Professor

Outreach & Education:
Christina Catanese, Education Specialist
- Paula Capizzi, Lead Instructor *DJA*
- Jamie Cross, Lead Instructor *WGJ*
- Doug Haywick, Science Instructor
- Ann Hesselsweet, Science Instructor
- Tom Jackson, Science Instructor
- Jill Keisling, Science Instructor
- Lynn Knopf, Science Instructor
- Meryl Luoma-Mannisto, Assistant Science Instructor
- Bob Myers, Science Instructor
- Amanda Syers, Science Education Specialist
- Janet Vail, Research Scientist Emerita
- Diane Veneklasen, Science Instructor
- Audrey Whitaker, Assistant Science Instructor

GVSU Vessels/Fleet Operations:
Eric Hecox, Fleet Captain
- Terry Boersen, Deckhand
- Dave Fisher, Engineer *WGJ*
- Paul Haley, Captain *WGJ*
- Tim Halloran, Deckhand *WGJ*
- Tom Hampton, Captain DJA and *WGJ*
- Pete Hewett, Engineer *DJA*
- Jeffrey Hughes, Deckhand
- Jill Johnson, Captain *DJA*
- Ed Perrault, Captain, *DJA* and *WGJ*
- William Young, Deckhand

Ecological Research, Environmental Chemistry:
Richard Rediske, Professor (retired July 2023)
- Antonia Bos, Undergraduate Student
- Tyler Chlystek, Graduate Student (Public Health)

Ryan Otter, Professor
- Randy Lewis, Undergraduate Student
- Brendan May, Adjunct Research Assistant
- Alexis Porter, Adjunct Research Assistant
- Brian Scull, Laboratory Supervisor

Ecological Research, Environmental Biology:
Bopaiah Biddanda, Professor
- Nathan Dugener, Technical Call-in
- Connor Gabel, High School Volunteer
- Anthony Weinke, Technical Call-in

Sarah Hamsher, Assistant Professor

Mark Luttenton, Professor of Biology
- Logan Clark, Undergraduate Student
- Taylor Suttorp, Technical Call-in

Jim McNair, Associate Professor

Charlyn Partridge, Associate Professor
- Colleen Black, Undergraduate Student
- Elliot Fair, Technical Call-in
- Kathryn Geller, Undergraduate Student
- Syndell Parks, Technical Call-in
- James Switzer-Moe, Undergraduate Student

Carl Ruetz III, Professor
- Brendan May, Technical Call-in
- Brianne Siple, Technical Call-in
- Jacob Yingling, Undergraduate student

Alan Steinman, Professor
- Aaron Dunnuck, Adjunct Research Assistant
- Margaret Evele, Undergraduate Student
- Cate Garretson, High School Volunteer
- Michael Hassett, Scientific Technician
- Sophia Lindsay, High School Volunteer
- Rachel Orzechowski, Adjunct Research Assistant
- Katie Tyrrell, Adjunct Research Assistant

Kevin Strychar, Professor

Affiliate Faculty:
Amanda Buday, Associate Professor of Sociology

AWRI Science Advisory Board:
Dr. Harvey Bootsma, University of Wisconsin – Madison
Dr. Jennifer Haverkamp, University of Michigan
Dr. Carol Johnston, South Dakota State University (emerita)
Dr. Gary Lamberti, University of Notre Dame, Chair

Graduate Students

Biddanda, major advisor
- Kaylynne Dennis

Hamsher, major advisor
- Davis Fray

Luttenton, major advisor
- Anna Briem
- Michael Trapp
- Victoria Vander Stelt

Partridge, major advisor
- Keely Dunham-Adkins
- Renée Tardani

Rediske, major advisor
- John Hart

Ruetz, major advisor
- Travis Ellens
- Tyler Hoyt
- Maria Scarborough
- Matthew Silverhart
- Nicholas Vander Stelt

Steinman, major advisor
- Kate Lucas
- Paris Velasquez

Strychar, major advisor
- Katelyn Anderson
- Mitchell Olszewski

Woznicki, major advisor
- Jillian Greene
- Jamshid Jalali

Internships & Scholarships

AWRI provides opportunities for students to pursue their interests in our environment. The following students received internships during 2023.

Herbert VanderMey Intern (summer):
- Carly Thayer (Charlyn Partridge)

Robert B. Annis Foundation Interns (summer):
- Emma Haney (Kevin Strychar)
- John Lawrence (Carl Ruetz)
- Kyle McKee (Bopi Biddanda)

AWRI Interns (summer):
- Jacob Bartell (Mark Luttenton)
- Christopher Kotkowicz (Kevin Strychar)
- Randy Lewis (Rick Rediske)
- Gabriella Loisch (Charlyn Partridge)

Bill and Diana Wipperfurth Scholarship (fall):
- Isabelle Ciarrocchi (Jim McNair)

Allen and Helen Hunting Interns (summer):
- Jacquelyn Molloseau (Alan Steinman)
- Allison Passejna (Alan Steinman)
- Allie Romanski (Alan Steinman)

NOAA Intern (summer):
- Isabelle Uganski (Ashley Elgin, NOAA-GLERL)

NSF Intern (summer):
- Ryan Ruppert (Sarah Hamsher)

Peer-Reviewed PUBLICATIONS

AWRI Staff in bold
Undergraduate Students*
Graduate Students**
Post-doctoral Fellows***

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Non-Peer Reviewed PUBLICATIONS

AWRI Staff in bold
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Graduate Students**
Post-doctoral Fellows***

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2023 Master of Science Theses

Ellens, T. (Advisor: Ruetz) - Seasonal impacts on top-down effects of fish on benthic macroinvertebrates and periphyton in a Michigan stream.

Fray, D. (Advisor: Hamsher) - Characterizing biodiversity and interspecific interactions of microbial mat communities in low-oxygen, high-sulfur springs of Michigan and Florida.

Hart, J. (Advisor: Rediske) - The application of microbial source tracking to aid in site prioritization for remediation in Lower Michigan.

Silverhart, M. (Advisor: Ruetz) - Fish assemblage structure in Great Lakes coastal wetlands over ten years.

Vander Stelt, N. (Advisor: Ruetz) - Spatial variation of fish assemblages, habitat, and Arctic Grayling management implications in the Boardman-Ottaway River.

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