FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**EAU-1**
Mentor	David Lonzarich
Campus	UW-Eau Claire
Affiliation	Biology
Email	Lonzard@uwec.edu
Project title	Deep-water mosses in WI lakes
Location of research	Eau Claire
Project Description	Deep-water mosses (DWM) occur at depths below the light limits of all other aquatic plant life. In ongoing work, I have found DWM in nearly Â½ of Wisconsin lakes that I have surveyed. Apart from this work, little is known about DWM communities. My goals in the study are two-fold: (1) to explore the ecological roles of DWM in lake ecosystems and (2) to conduct genetic studies to answer questions concerning the origins and conservation value of these unique communities. The broader goals of this work are to achieve a greater understanding of the ecology of Wisconsin lakes.
Qualifications Desired	undergraduate, major in biology. experience or interest in working in lab and in the field. Hard working, willing to work independently, mature, ambitious, outgoing, problem solver. Knows how to run an outboard motor.
Tasks	Work in lab (DNA extraction, PCR) and in the field (boating, collecting moss). Some chemistry (limnological sampling).
Keywords	lakes, aquatic plants, ecology, genetics

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**GRB-1**
Mentor	Michael Holly
Campus	UW-Green Bay
Affiliation	Resch School of Engineering
Email	hollym@uwgb.edu
Project title	Reactive Media for the Removal of Phosphorus from Agricultural Runoff
Location of research	Green Bay
Project Description	Professor Holly has funding to research reactive media for the removal of phosphorus from agricultural runoff. Novel reactive media from modified waste residuals will be created and evaluated in the lab through pilot reactors. Media with the highest treatment potential will be deployed at the field scale within an agricultural runoff treatment system monitored by USGS and UWGB.
Qualifications Desired	Analytical chemistry
Tasks	Design and modify waste (under the supervision of Dr. Holly and a graduate student) through the following processes: soaking in metal oxides, thermal treatment, and pelletization. Student will complete experimental trial at the pilot and field scale. Results will be analyzed by the student and presented at local conferences (UW System Symposium).
Keywords	Phosphorus, Wastewater treatment, Agricultural Runoff, Reactive media, Eutrophication

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**GRB-2**
Mentor	Amy Carrozzino-Lyon
Campus	UW-Green Bay
Affiliation	Natural and Applied Sciences
Email	carrozza@uwgb.edu
Project title	Wetland ecology and restoration on the Green Bay west shore & Lake Michigan
Location of research	Green Bay west shore coastal wetlands & Lake Michigan lakeshore tributaries in Manitowoc Co.
Project Description	A collaborative research project between UW-Green Bay and UW Sea Grant explores coastal wetland ecology through monitoring of aquatic plant and fish communities. Conservation partners have been working to re-establish Manoomin (wild rice), a native wetland grass that was historically common and provides important fish and wildlife habitat in addition to the cultural and nutritional value for indigenous tribes. The scholar will contribute to a team effort to study wild rice restoration sites on the Green Bay west shore and Lake Michigan lakeshore tributaries, documenting phenology, environmental characteristics, and tracking progress and challenges. Additionally, the team studies fish communities at coastal wetlands using both active (seine) and passive (fyke net) sampling gears. Fish species presence, abundance, and age class provides an updated snapshot of communities using these wetlands and how they might be changing over time in response to habitat, climate, and/or land use changes. The project also has a strong outreach component to share restoration and research activities with diverse audiences through on-site field tours and developing materials using mixed media.
Qualifications Desired	Required: -An excellent communicator, responsible, organized, a problem solver, and attentive to detail. -Comfortable working outdoors (in motorized boats, canoes/kayaks, or wading in wetlands) with a variable work schedule based on weather and conditions. Preferred/bonus experience: -Prior experience working with fish or aquatic plant identification and/or research. -Boat operator certification and experience, including ability to launch and tow trailered boats.
Tasks	
Keywords	Fish, restoration, wetlands, wild rice

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**GRB-3**
Mentor	Emily Tyner
Campus	UW-Green Bay
Affiliation	Director of Freshwater Strategy
Email	tynere@uwgb.edu
Project title	Science communication, public engagement, and technical writing in support of the designation of the Bay of Green Bay National Estuarine Research Reserve
Location of research	Green Bay, possibility that the scholar could be remote with occasional in-person attendance at meetings
Project Description	The University of Wisconsin-Green Bay (UWGB) is the lead state organization for the designation of a Bay of Green Bay National Estuarine Research Reserve (NERR). The NERR System is a network of 30 coastal sites around the U.S. designed to protect and study estuarine systems through four core pillars: research, education, stewardship, and training. In the summer of 2023, UWGB will be drafting a Management Plan to guide the first 5-10 years of the NERR's operation. The scholar will work closely with the state lead on the designation, the Director of Freshwater Strategy, to design and implement public engagement and technical writing in support of the NERR Management Plan. This includes organizing and co-facilitating listening sessions with stakeholder groups (i.e., local NGOs, state agency partners, community members) to capture community input on the future directions of the NERR; development of outreach materials explaining the management plan and progress on the Bay of Green Bay NERR designation; the design and writing of the Draft Management Plan. Engagement with Tribal Nations in Wisconsin and Michigan is a priority for the Bay of Green Bay NERR designation and will be a component of this project. An example management plan from the Lake Superior NERR can be found here: https://lakesuperiornerr.org/files/2020/03/lsnerr-management-plan.pdf.
Qualifications Desired	- An excellent communicator, responsible, organized, a problem solver, and attentive to detail. - Interest in science communication and public engagement towards stewardship and conservation. - Comfortable working both collaboratively and independently toward shared tasks.
Tasks	- Organize and co-facilitate virtual and in-person listening sessions with NERR project partners and stakeholder groups - Development of mixed media NERR outreach materials for newsletters, social media, and briefing documents. - Technical writing on sections of the Management Plan. - Community engagement in partnership with UWGB staff.
Keywords	Public engagement, science communication, estuary

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**LAC-1**
Mentor	Tisha King-Heiden
Campus	UW-La Crosse
Affiliation	Biology
Email	tking-heiden@uwlax.edu
Project title	Using small fish models to study endocrine disruptors
Location of research	La Crosse, WI
Project Description	We will explore how early exposure to environmentally relevant concentrations of the pesticide thiamethoxam impacts reproductive success later in life (in zebrafish), and will also explore the potential for this pesticide to disrupt metamorphosis in zebrafish larvae
Qualifications Desired	Student should have completed introductory level biology and chemistry courses; any additional coursework in ecology or physiology would be excellent, but not required.
Tasks	Expose fish to contaminant, monitor health and survival of the fish, collect & analyze data, present data at summer research symposium (poster presentation), help with general fish care; some weekend work will be required. Anticipate student would work ~30 hrs per week
Keywords	fish, toxicology, development, endocrine disruptors

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**LAC-2**
Mentor	Ross Vander Vorste
Campus	UW-La Crosse
Affiliation	Biology
Email	rvandervorste@uwlax.edu
Project title	Aquatic invertebrate productivity and biodiversity in threatened river floodplain habitats
Location of research	La Crosse
Project Description	Aquatic invertebrates are an important component to floodplain ecosystems, providing food for aquatic and terrestrial organisms and are sentinels of global change. My research lab is exploring how aquatic invertebrate productivity and biodiversity is changing in the Upper Mississippi River. In the proposed project, I will work with a student researcher to continue the collection of a long-term aquatic invertebrate dataset aimed at detecting trends in invertebrate productivity and biodiversity. We will collect aquatic invertebrates from sites on the Upper Mississippi River near La Crosse by boat during a 4-week period in summer 2023. Then in the lab, invertebrates will be counted and identified to provide measures of productivity and biodiversity. Results will be analyzed using R software to provide unique insights into how invertebrates are responding to floodplain conditions and what environmental factors are responsible for these changes.
Qualifications Desired	Interest or experience in collection and identification of aquatic invertebrates.
Tasks	Field collection of aquatic invertebrates, Laboratory processing of aquatic invertebrates, Data analysis of biological data.
Keywords	freshwater ecology, community ecology, R, data analysis, fieldwork, lab work

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**LAC-3**
Mentor	Bonnie Jo Bratina
Campus	UW-La Crosse
Affiliation	Microbiologu
Email	bbratina@uwlax.edu
Project title	The effect of Dispersit, a surfactant, on the microbial community in Myrick Marsh
Location of research	Myrick Marsh & UW-L in La Crosse, WI
Project Description	Previous research in Myrick Marsh found that Dispersit, a surfactant and dispersant used with clean-up efforts for some freshwater oil spills, had a larger impact on the bacterial community than did the oil itself. The impact seen could have been due to bacteria breaking down and growing on Dispersit or to the bacteria having different levels of susceptibility to the chemicals found in this product. This project will further explore these findings by isolating bacteria from the water column of the marsh using growth media made with and without Dispersit. One type of medium will have Dispersit as the sole carbon and energy source to try to isolate any organisms that may be breaking down and growing on the Dispersit. The isolated strains will then be tested to determine the minimum inhibitory concentration (MIC) of Dispersit that inhibits the growth of each one and comparisons made between MIC levels and the medium used to isolate the strain.
Qualifications Desired	An introductory microbiology class would be useful, but not required.
Tasks	making growth medium, streaking and spreading agar plates to isolate bacteria, setting up dilution series for the MIC assays, and using a spectrophotometer to measure growth (potentially some DNA extraction and PCR if we find some interesting strains we want to identify)
Keywords	bacteria, MIC, isolation, surfactant

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**LAC-4**
Mentor	Penelope K. Hardy
Campus	UW-La Crosse
Affiliation	History
Email	phardy@uwlax.edu
Project title	Inland waterways in the long 19th century: A global history of science, technology, and medicine in primary sources
Location of research	La Crosse, WI
Project Description	â€œInland waterways in the long 19th century" is one component of a planned four-volume collection of primary sources, collectively titled Knowing the Oceans, 1790-1914: A Global Documentary History. The section will include sources engaging inland waterways and freshwater as well as their connections to marine environments. This period, which includes the height of the industrial revolution, the professionalization of science, and a radical shift in Western understanding of health and medicine, led to the emergence of modern human engagement with the oceans, and a dramatic expansion of their role in science, industry, society, and culture. This collection uses primary sources from the history of science, technology, and medicine to engage a broad historical understanding of the oceans and inland waterways from a diverse number of viewpoints and voices. It intends to provide scholarly access for both students and researchers to primary sources which are important but previously little known or difficult to access.
Qualifications Desired	A humanities major or minor who has completed a research methods course in their field. Experience working with online archival and database collections, specifically finding and contextualizing primary sources. Strong research and organizational skills. Ability to communicate ideas well in writing. Experience with and/or interest in English language sources from beyond the US and Britain especially welcome.
Tasks	Assist in identifying coverage gaps in primary source collection. Propose primary sources. Search databases. Use archival finding aids. Communicate professionally via email, phone, and in person with archivists, librarians, and other researchers. Learn and use applications such as Tropy, Zotero, and Google Sheets. Organize and contribute to shared online files. Identify, read, and use secondary sources to contextualize primary sources. Write preliminary editorial content.
Keywords	History, HSTM, Literature, Humanities, Primary sources, Archives, Databases, Inland waterways, Maritime history, Global history, Environmental history, Nineteenth century

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MAN-1**
Mentor	Kevin Cullen
Campus	UW-Manitowoc / Wisconsin Maritime Museum
Affiliation	Wisconsin Maritime Museum
Email	kcullen@wisconsinmaritime.org
Project title	Maritime Artifact Advanced Imaging Project
Location of research	Wisconsin Maritime Museum Campus, Manitowoc, Wisconsin
Project Description	1) Assist with the assessment and advanced imaging of a large collection of artifacts related to the National Marine Sanctuary and Lake Michigan shipwrecks. Methods will include photogrammetry and 3D modeling of shipwreck artifacts for interpretation, exhibition and preservation. 2) Conduct archival research at Wisconsin Maritime Museum, regional historical societies, and online collections to support historical analysis of sanctuary shipwrecks, other maritime cultural resources, and maritime cultural landscape of Wisconsin's shorelines.
Qualifications Desired	3D modeling (digital and/or physical) experience, material culture handling experience
Tasks	Work with Wisconsin Maritime Museum staff to digitize shipwreck artifacts using 3D scanning software and photogrammetry. Build out modeling capacity for multiple interpretive uses for education and advanced archaeological research.
Keywords	Shipwrecks; Artifacts; 3D Modeling: Maritime Heritage;

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MAN-2**
Mentor	Russ Green
Campus	NOAA National Marine Sanctuary
Affiliation	NOAA
Email	russ.green@noaa.gov
Project title	Diving into History: A Research Scholar Opportunity at the Wisconsin Shipwreck Coast National Marine Sanctuary
Location of research	Wisconsin Maritime Museum; Manitowoc
Project Description	This summer research opportunity will support NOAA's Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNMS) and be located at the Wisconsin Maritime Museum in Manitowoc. Designated in 2021, WSCNMS provides stewardship for our nation's maritime heritage in Lake Michigan. Co-managed by NOAA and the state of Wisconsin, the sanctuary expands on the state's 30-year management of these historic sites, bringing new opportunities for research, resource protection, and education. The 36 historic shipwreck sites within the sanctuary represent vessels that played a central role in building the nation between the 1830s and 1930s. Twenty-seven are listed on the National Register of Historic Places and research suggests that another 60 shipwrecks may yet to be discovered. The core activities for the research scholar include: 1) assisting with the assessment, photomodeling, and cataloging of a large collection of artifacts related to marine sanctuary and Lake Michigan shipwrecks; 2) conducting archival research at Wisconsin Maritime Museum, regional historical societies, and online collections to support historical analysis of sanctuary shipwrecks, other maritime cultural resources, and maritime cultural landscape. The scholar's work will be â€œhands-onâ€ in both the artifact and historical research areas, and lends itself well to a final project report/write up. Related experiences/opportunities, such as on-water fieldwork, are anticipated as these projects develop.
Qualifications Desired	History or archaeology degree seekers encouraged to apply. Strong organizational and communication skills are helpful.
Tasks	Core tasks include: 1) assisting with the assessment, photomodeling, and cataloging of a large collection of artifacts related to marine sanctuary and Lake Michigan shipwrecks; 2) conducting archival research at Wisconsin Maritime Museum, regional historical societies, and online collections to support historical analysis of sanctuary shipwrecks, other maritime cultural resources, and maritime cultural landscape.
Keywords	maritime, history, national, conservation, shipwreck, archaeology, archival

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MIL-1**
Mentor	Junjie Niu
Campus	UW-Milwaukee
Affiliation	Materials Science and School of Freshwater Sciences
Email	niu@uwm.edu
Project title	Groundwater/drinking water purification by removing PFAS molecules
Location of research	School of Freshwater Sciences, Milwaukee
Project Description	We are going to do research on water treatment technology. The project aims to develop a multi-functional hybrid material that can adsorb and degrade PFAS contaminations for drinking tap water, ground water and Lake Michigan water. In summary, we will do research about (1) material synthesis and characterization, and (2) water purification by batch and column tests for cleaning water. Some industries such as AO smith, MMSD may be involved.
Qualifications Desired	Interest in water treatments
Tasks	Participate materials development and water treatment tests
Keywords	Water treatments, PFAS

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MIL-2**
Mentor	Dong Fang Deng
Campus	UW-Milwaukee
Affiliation	School of Freshwater Sciences
Email	dengd@uwm.edu
Project title	Nutritional strategies to reduce water pollution in fish farming
Location of research	School of Freshwater Sciences, UWM
Project Description	One of the major concerns challenging the aquaculture industry is how to minimize nutrient and solid wastes discharged in water. The quality and quantity of feed are critical factors attributed to waste production. Thus, two strategies will be investigated in this project using walleye and yellow perch as research models. The firs approach is to increase nutrient (such as phosphorus and nitrogen) retention by supplementation of feed additive (phytase)in plant protein-based diet fed. Plants store phosphorus in seeds as phytate, which is indigestible to fish. Thus, we hypothesize that an appropriate level of phytase can improve phosphorus utilization by the fish and reduce phosphorus discharge. The second approach is to determine the optimal feeding rate based on water temperature and fish size. Evaluation of these strategies will be based on fish growth, nutrient retention, fecal solid physical and nutrition quality, and water quality. The findings of this project will benefit feed formulation and fish farming management.
Qualifications Desired	Interest in fish nutrition and biology, fish culture techniques, and experimental learnings.
Tasks	The major task of the student is to join the team to conduct a feeding trial, learn how to monitor water quality, take care of fish, and collect samples for analysis. The student will learn how to analyze water and fish samples, manage data, and join our lab meetings to report research progress.
Keywords	Nutrient wastes, Water quality, Fish farming, Aquaculture feed

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MIL-3**
Mentor	John Berges
Campus	UW-Milwaukee
Affiliation	Biological Sciences and Freshwater Sciences
Email	berges@uwm.edu
Project title	Hemimysis: an invader with diverse places in the Lake Michigan food web
Location of research	Milwaukee, WI
Project Description	The mysid Hemimysis anomala (the â€˜bloody red shrimp') is an invasive crustacean that established in Lake Michigan by 2007. Hemimysis inhabits shallow waters and has colonized many breakwalls in Wisconsin harbors. It is described as an opportunistic omnivore, but its diet in Lake Michigan is not well understood. Hemimysis could be high-energy prey for harbor-resident fishes (e. g. juvenile large- and small-mouth bass) or transients (e. g. alewife, rainbow smelt, and juvenile perch, trout, and salmon). Concerns that Hemimysis will cause declines in zooplankton or increase transmission of parasites to fishes make establishing its diet and place in the food web critical. Yet, if understood and managed, Hemimysis could also be one of the uncommon alien species that can enhance a fishery, particularly in harbors which are readily accessible to shore anglers. We will examine Hemimysis diets and also the diets of juvenile fishes in Lake Michigan Harbor regions using a novel immunochemical technique, backed up with laboratory feeding experiments.
Qualifications Desired	Introductory chemistry course needed. Experience with biochemical assays would be perfect. Experience working from boats or shoreline desirable. Potential for SCUBA diving, depending on qualification.
Tasks	Field sampling of organisms using nets and traps. Laboratory culture of Hemimysis and prey species. Sample preparation and immunochemical assays. Data processing.
Keywords	Lake Michigan, food webs, invasive species, diet analyses, immunochemistry, Hemimysis, freshwater ecology

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MIL-4**
Mentor	Woonsup Choi
Campus	UW-Milwaukee
Affiliation	Department of Geography
Email	choiw@uwm.edu
Project title	Investigating Human Impacts on Hydrological Drought
Location of research	UW-Milwaukee campus
Project Description	The research that I aim to conduct with the undergraduate researcher concerns human impacts on hydrological drought, particularly in an urbanized catchment. A hydrological drought means a sustained lack of water in streams and groundwater compared to the normal condition. Hydrological droughts are important because they can impair water resource systems or natural watercourses. However, characteristics of hydrological drought events such as duration, frequency, and severity have rarely been investigated with respect to climatic and catchment characteristics. In addition, human beings now modify the environment at an unprecedented scale, and active human roles are integrated into drought research. My research will focus on understanding human impacts on hydrological droughts in the Milwaukee River basin.
Qualifications Desired	some experience with RStudio; familiarity with GIS
Tasks	data collection from government web sites; data processing using R and GIS; discussion for research design
Keywords	drought, streamflow, climate, human impacts

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-1**
Mentor	Jingyi Huang
Campus	UW-Madison
Affiliation	Soil Science
Email	jhuang426@wisc.edu
Project title	High-resolution soil moisture mapping with citizen science and Artificial Intelligence
Location of research	The student will travel between different UW campuses (e.g., Madison, Milwaukee, Stevens Point, Platterville, River Falls, Greenbay, Superior) and coordinate with volunteers from different campuses to collect citizen science data on soil moisture.
Project Description	Soil moisture is a key indicator of ecosystem health, agricultural productivity, and climate resilience. The student will travel between different UW campuses (e.g., Madison, Milwaukee, Stevens Point, Platterville, River Falls, Greenbay, Superior) and coordinate with volunteers from these campuses to collect citizen science data on soil moisture with off-the-shelf soil moisture probes. After the data collection is completed, the student will have the chance to learn machine learning methods and programming skills (R software) and use the datasets to build high-resolution (100-m by 100-m, daily) soil moisture maps across the entire Wisconsin.
Qualifications Desired	Driver license, experiences or willingness to learning R programming language; interpersonal skills;
Tasks	The student will first travel between different UW campuses (e.g., Madison, Milwaukee, Stevens Point, Platterville, River Falls, Greenbay, Superior) and coordinate with volunteers from these campuses to collect citizen science data on soil moisture with off-the-shelf soil moisture probes. After the data collection is completed, the student will work at the campus of UW-Madison (Department of Soil Science) to learn machine learning methods and programming skills (R software) and use the datasets to build and evaluate high-resolution (100-m by 100-m, daily) soil moisture maps across the entire Wisconsin.
Keywords	Citizen Science; Soil Moisture; Ecosystem Services; Climate Change;

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-2**
Mentor	Eric Roden
Campus	UW-Madison
Affiliation	Geoscience
Email	eroden@geology.wisc.edu
Project title	Biogeochemistry of hydromorphic soils and riverbed sediments
Location of research	Madison, WI and surrounding areas
Project Description	This project will examine dissolved oxygen consumption and nutrient cycling associated with organic matter decomposition in hydromorphic (periodically water-saturated) soils and riverbed (permanently saturate) sediments, including impacts of fluid flow on the time-dependent impact of microbial metabolism on fluid chemistry. A variety of hydrogeological tools, chemical sensors, and microbiological analyses will be applied.
Qualifications Desired	B.S. student in natural science (chemistry, biology, geoscience/geology, environmental science)
Tasks	Combination of field and laboratory measurements and experiments.
Keywords	soil sediment chemistry biogeochemistry microbiology microbial hydrology hydrogeology

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-3**
Mentor	Christopher Zahasky
Campus	UW-Madison
Affiliation	Geoscience
Email	czahasky@wisc.edu
Project title	Impacts of stream-groundwater exchange on contaminant transport in the environment
Location of research	Madison
Project Description	The hyporheic zone is the region of sediment along and below streambeds where there is mixing and exchange of shallow groundwater and surface water. This hyporheic zone is known to be important for the removal of contaminants from surface waters and serves as a filter for groundwater. What is less well known is how specific contaminants, such as forever chemicals (per- and polyfluoroalkyl substances, also known as PFAS) may become stuck to sediments and act as a long-term source of contamination to both groundwater and surface water. The goal of this project is to work with lab group members to build a multilevel temperature and pressure probe for measuring the exchange of water between groundwater and surface water systems. Once constructed, several of these probes will be deployed in a stream with known surface water contamination. Corresponding streambed sediment samples will be collected to measure quantities of contamination. The student will then analyze and explore how the extent of contamination in sediments in these samples is related to the local stream-groundwater fluxes.
Qualifications Desired	Undergraduate hydrogeology or fluid mechanics desired by not required. Experience with microcontrollers (e.g. Arduinos, Raspberry Pi, etc) and/or programming (e.g. Matlab, Python, etc) desired.
Tasks	Data analysis, use of microcontrollers to measure environmental variables, stream gauging and sediment collection (fieldwork)
Keywords	hydrology, hydrogeology, PFAS, contaminants, sensors

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-4**
Mentor	Trina McMahon
Campus	UW-Madison
Affiliation	Civil and Environmental Engineering / Bacteriology
Email	trina.mcmahon@wisc.edu
Project title	Impacts of invasive zebra mussels on cyanobacterial communities
Location of research	Madison
Project Description	Invasive mussels alter the fundamental ecosystem structure in freshwater systems. In Lake Mendota, zebra mussels took hold in 2015 and appear to have shifted the timing and species composition of cyanobacterial blooms. This project addresses the mechanisms for this shift. Do ZMs preferentially graze on particular microbial taxa (cyanobacteria or not)? Are the impacts indirect, through alterations of the micro-eukaryote populations (e.g. zooplankton that consume bacteria)? How does ZM density affect the microbial community composition on short (hourly) to seasonal time scales?
Qualifications Desired	Some lab experience (coursework labs included, e.g. intro chemistry).
Tasks	Design and conduct mesocosm experiments with zebra mussel additions; microscopy; routine sampling; analysis of existing datasets
Keywords	microbiology, invasive species, cyanobacteria, bacteria

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-5**
Mentor	Haoran Wei
Campus	UW-Madison
Affiliation	Civil and Environmental Engineering
Email	haoran.wei3@wisc.edu
Project title	PFAS Sensors for Water Quality Monitoring
Location of research	Water Science and Engineering Laboratory at UW-Madison
Project Description	Per- and polyfluoroalkyl substances (PFAS) are a family of over 4,000 man-made chemicals that have been released into the environment for decades. Because they are extremely difficult to break down in natural environments, PFAS are also called the "forever chemicals". PFAS have been detected in the blood samples of 97% Americans and considered an urgent concern for human health. One of the major routes for human exposure to PFAS is via drinking tap water. For this reason, a growing number of states across the US are regulating PFAS in drinking water. To alert people of PFAS contamination in tap water, fast, cheap, and onsite detection of PFAS is required, which, unfortunately, cannot be fulfilled by the current grab-sampling and laboratory-based analytical methods. The overall goal of this project is to develop an innovative sensor for inexpensive and rapid PFAS analysis in drinking water supplies. To achieve this goal, hollow molecules that can strongly and selectively bind with PFAS will be used to enrich PFAS onto the sensor surface via â€œlock-and-keyâ€ interactions. Subsequently, the sensor will generate light signals that contain the identity and concentration information of PFAS. How the background molecules in tap water affect PFAS detection will also be carefully investigated. The sensor developed in this project could be deployed in field to monitor the spatial and temporal fluctuation of PFAS concentrations in drinking water supplies and provide guidance for data-driven action plans for PFAS contamination and for reducing human exposure to PFAS.
Qualifications Desired	General Chemistry
Tasks	Conduct experiments in the laboratory. Analyze data, Give presentations
Keywords	PFAS, Sensor, Water

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-6**
Mentor	Sarah Janssen
Campus	UW-Madison
Affiliation	U.S. Geological Survey/ University of Wisconsin-Department of Civil and Environmental Engineering
Email	sjanssen@usgs.gov
Project title	Examining Mercury Adsorption and Transport on Microplastics in Freshwater Environments
Location of research	Madison
Project Description	Mercury is a ubiquitous, long-standing contaminant in the environment, which can rapidly bioaccumulate in the food web and result in fish and wildlife consumption advisories. Another emerging concern for aquatic ecosystems is the prevalence of microplastics, which have been found across numerous biological matrices including fish tissue and human blood. Both microplastics and mercury are often co-occurring stressors within aquatic systems, but there is only limited research on the interactions between these contaminants. The knowledge gap leads to uncertainty regarding if microplastics increase the bioaccumulation of contaminants like mercury, which has major implications for the mitigation of fish consumption advisories. This project aims to determine the sorption kinetics of mercury to microplastics under different freshwater conditions, including a dissolved organic carbon gradient. The student will be tasked with developing laboratory assays and learning mercury and microplastics analysis techniques in a partnership between the University of Wisconsin and the USGS Mercury Research Lab. In addition, the student will also learn surface water sampling methods for both trace metals, microplastics, and ancillary water quality parameters. This project will yield novel data regarding mercury-microplastics interactions and provide insight on how microplastics may alter mercury bioaccumulation.
Qualifications Desired	General coursework in chemistry and biology
Tasks	Collection of surface water samples from Wisconsin Lakes and tributaries, processing and analysis of samples using trace metal clean procedures, training and operation of instrumentation for mercury, microplastics, and dissolved organic carbon, data processing and interpretation, figure preparation, writing
Keywords	microplastics, mercury, bioaccumulation

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-7**
Mentor	Jessica Hua
Campus	UW-Madison
Affiliation	Forest and Wildlife Ecology
Email	jhua23@wisc.edu
Project title	Pond Soundscapes: Understanding how human activities influence the ecology of pond communities through sound and machine learning
Location of research	UW-Madison, Hua Lab in Russell Laboratories and the Arboretum
Project Description	This project will address three questions: (1) Can we detect sounds made by tadpoles underwater? (2) Can we predict what tadpoles are doing based on the sounds they make? (3) Can we predict if tadpoles are diseased or impacted by pollutants based on the sounds they make? To address these questions, we will: 1. Collect tadpoles and place them in arenas where we will record underwater sounds while tadpoles are swimming, feeding, interacting with enemies (predators and pathogens), interacting with pollutants (road salts, light pollution, microplastics). 2. Using machine learning techniques, we will use the sound data to develop a program that can predict tadpole activity and health status. Future goals: While this project focuses on a single tadpole species, future work will evaluate whether we can distinguish between multiple species of aquatic organisms. Our long-term goal is to develop a tool for citizen (community) scientists to help us collect data on the relationship between pond biodiversity/health and human activities.
Qualifications Desired	Strong willingness to work as part of a team, willingness to work in both field and lab scenarios, interest in science communication or community science efforts, and willingness to work hard.
Tasks	The student will help to collect tadpoles and conduct sound assays by building and placing tadpoles in arenas where we will record underwater sounds while tadpoles are swimming, feeding, interacting with enemies (predators and pathogens), interacting with pollutants (road salts, light pollution, microplastics). The student will also have the opportunity to learn a wide variety of techniques including DNA/RNA extractions, qPCR, pathogen culturing, hands on experiences with finding breeding amphibians, macroinvertebrate identification, animal husbandry, conducting field surveys, and can also participate in science communication and community science efforts. Students will work closely with Dr. Hua, graduate students, and postdocs gaining experience in ecotoxicology, science communication and disease ecology. Additionally, this is a collaborative project with the Sound Lab led by

	Dr. Zuzana Burivalova and the Bick lab (Dr, Emily Bick) so there are also opportunities to interact with other groups.
Keywords	Conservation, amphibians, disease ecology, ecotoxicology

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-8**
Mentor	Steven Loheide
Campus	UW-Madison
Affiliation	Civil and Environmental Engineering
Email	loheide@wisc.edu
Project title	Relationship between engineering design of stormwater retention ponds, surrounding land use and land cover, and in-pond and downstream ecosystem services
Location of research	Around 20 stormwater retention ponds in Madison, WI
Project Description	This project will study stormwater retention ponds in Madison over time to better understand the effects of surrounding land use/land cover and pond design on environmental health and ecosystem services the pond provides, such as flood mitigation, water purification, and habitat creation. This project will use pressure transducers to measure the water levels of the ponds long-term, specifically the rapidly changing pond levels, or bounce, during and after a storm. Additionally, the outflow of the pond will be measured, along with the topography around the ponds using a drone, and these measurements will allow for estimation of the stormwater inflow. For the Freshwater@UW summer research program, the main objective would likely be to create topographic maps around 20 stormwater retention ponds in Madison using a drone. The overall goal of this project is to determine if engineering design or surrounding land use/land cover has a greater impact on the bounce in stormwater retention ponds and from there determining if there is a direct or inverse relationship between the driver of bounce and the in-pond and downstream ecosystem services. The student would work with Steven Loheide's graduate student, Hannah Curtis (hncurtis@wisc.edu), as part of her master's research.
Qualifications Desired	Field work experience, drone flying experience or interest, and an eagerness to learn!
Tasks	Setting up and monitoring pressure transducers in stormwater retention ponds, measuring pond discharge during and after storms using velocimeters and weir equations, determining topography around ponds with drones, and various computer/data analysis tasks.
Keywords	Urban ponds, ecosystem services, drone bathymetry

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-9**
Mentor	Michael Cardiff
Campus	UW-Madison
Affiliation	Geoscience
Email	cardiff@wisc.edu
Project title	Supercharging recharge: Economics and efficiency of rural drywells for enhancing groundwater quantity and quality
Location of research	Spring Green, WI; Windsor, WI; Trout Lake, WI; UW-Madison
Project Description	The goal of this research project is to assess drywell arrays (i.e., shallow-bored wells with a maximum depth of 3m / 10 feet) and associated surface infrastructure as a technology for increasing recharge rates on uncultivated lands and thus for improving rural water quality. Specifically, our research seeks to test these approaches in areas that represent significant land cover throughout the state, including: 1) unplanted field areas at the perimeter of center-pivot agricultural fields; 2) ditches adjacent to rural roads; and 3) forested areas of the state. Our research will seek to answer the following questions through a combination of field-based and modeling studies: RQ1: How much additional recharge to groundwater aquifers can be realized via shallow drywell installations in rural areas, and how does this vary across surficial deposits in Wisconsin? RQ2: What techniques of drywell installation produce the greatest return-on-investment, in terms of annual recharge per annualized dollar of cost? This project also focuses on estimating groundwater recharge, a component of the global water balance that has been difficult to quantify accurately and has spawned several methods for recharge estimation (Scanlon et al. 2002). Several authors have noted the errors and uncertainties associated with the most commonly used â€œwater table fluctuationâ€ method for assessing recharge (Crosbie et al. 2019; Park 2012), which ignores complicated vadose zone dynamics. Therefore, an additional goal of this project will be to assess the accuracy of methods for estimating recharge by comparing multiple hydraulic and geophysical measurements: RQ3: Which hydraulic / geophysical measurement methods (or combinations thereof) are appropriate for accurately estimating recharge adjacent to drywells, when compared with direct volume injection experiments? The majority of field work in this project will be implemented at two field sites within an hour's drive of UW-Madison (Spring Green, WI and Windsor, WI) that represent end-members of settings for drywell implementation.
Qualifications Desired	Ability to work with field hardware, power tools and troubleshooting "on the fly". Experience with Raspberry Pi or Arduino a plus!

Tasks	-Assisting with implementation of "controlled storm" recharge studies at 2-3 research sites; -Working closely with / taking direction from graduate students and Wisconsin Geological Survey personnel -Documentation of experiment and data management
Keywords	groundwater; recharge; rural landscape; agriculture; geophysics

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-10**
Mentor	Christy Remucal
Campus	UW-Madison
Affiliation	Civil & Environmental Engineering
Email	remucal@wisc.edu
Project title	Investigation of organic contaminant transformation by manganese oxides for water treatment applications
Location of research	Water Science and Engineering Laboratory, UW-Madison
Project Description	Manganese oxides are naturally occurring minerals that can be used for in situ water treatment of organic contaminants, such as triclosan and bisphenol A. Manganese oxides are also responsible for the transformation of dissolved organic matter (DOM) in aquatic systems. DOM is complex mixture of organic molecules found in natural and engineered water systems. DOM impacts nutrient transport, biogeochemical cycling, and contaminant transport, making it a critical component of environmental systems. The interactions between DOM and manganese oxides are known to affect organic contaminant treatment; however, studies are lacking in examining these mechanisms in environmentally relevant matrices. This project aims to address this gap in knowledge by investigating the mechanisms of organic contaminant and DOM transformation by manganese oxides in whole water samples using a variety of analytical techniques.
Qualifications Desired	Interest in environmental chemistry and working in a laboratory setting. Analytical chemistry coursework and/or previous lab experience preferred but not required
Tasks	learn to run laboratory kinetics experiments, learn to analyze organic contaminants in water, learn to use a variety of analytical instrumentation
Keywords	water treatment, contaminants

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-11**
Mentor	Erica Majumder
Campus	UW-Madison
Affiliation	Bacteriology
Email	emajumder@wisc.edu
Project title	Hitching a ride: Microplastic & Harmful Algal Bloom interactions
Location of research	UW-Madison and likely a few days travel to field site (usually Lake Superior)
Project Description	Microplastics have become ubiquitous in the environment and are entering aquatic ecosystems in large part due to runoff from urban and agricultural areas. As these microplastics accumulate, the potential for surface colonization by microbes, notably cyanobacteria which cause harmful algal blooms, will also increase. As biological materials adhere to the surfaces of these plastic particles, the buoyancy of this microbe-plastic complex is likely to shift relative to each individual component, changing where in the water column each will reside. By studying the impacts of these microbe-plastic interactions through environmental sampling using a novel sampling device on Lake Superior and particle settling velocity in a still-water tank, we hope to best understand how transport mechanisms of both microbes and plastics are influenced by this complex formation and investigate the potential for this complex to serve as a dispersal mechanism for harmful algal bloom causing cyanobacteria and their associated toxins.
Qualifications Desired	Coursework including laboratory classes or research experience is suggested in one of the following areas but not required: water chemistry or limnology (or general & organic chemistry), microbiology or biochemistry, environmental engineering or physics
Tasks	Processing lake samples, identifying microplastics, culturing microbes, studying adhesion
Keywords	harmful algal blooms, microplastics

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-12**
Mentor	Andrea Hicks
Campus	UW-Madison
Affiliation	Civil and Environmental Engineering
Email	hicks5@wisc.edu
Project title	Sustainable Aquaculture and Aquaponics
Location of research	UW-Madison
Project Description	Aquaponics is a method of closed loop food production which has the potential to significantly reduce the environmental impacts of food production. This project will utilize sustainability tools such as life cycle assessment and survey in order to generate insight as to the environmental impacts working with a current PhD student.
Qualifications Desired	Interest in sustainability, ability to work independently, interest in computer modeling.
Tasks	1. Conduct literature review, 2. Cooperate with graduate student, 3. Contribute to life cycle assessment.
Keywords	Sustainability, aquaponics, aquaculture

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-13**
Mentor	Steven Loheide
Campus	UW-Madison
Affiliation	Civil and Environmental Engineering
Email	loheide@wisc.edu
Project title	Investigation of groundwater changes in South Central, WI.
Location	UW Madison Campus: Engineering Hall
Project Description	In South Central Wisconsin, issues of groundwater flooding and depletion occur within short distances to each other. What causes this? Where is there flooding? Depletion? During this research experience, we'll investigate these questions to further the understanding of WI's groundwater in the face of climate and land-use changes. By deep diving into publicly available hydrologic, climatic, and remote sensing data the student will seek to identify regions of groundwater flooding & depletion, differing soil properties, changes in baseflow, and changes in precipitation. Depending on future interests the student may interact with engineers, hydrologists, and geologists from UW Madison, the USGS, Wisconsin Geological Survey, and local government agencies. There are possibilities for field work related to this opportunity. The student's time will be tailored to their prior experiences, interests, and future career goals that creates and strengthens a combination of computer, lab, and field skills. Our goal is to grant an unparalleled opportunity to learn about groundwater related issues in South Central Wisconsin. While working with the Hydroecology Lab, the student will be a member of an active collaborative research lab similar to a future water focused graduate student research experience. Faculty: Dr. Steve Loheide; Graduate Student Mentor: Eric Kastelic EKastelic@wisc.edu
Qualifications Desired	-Basic experience in hydrology through coursework, research, and/or curiosity in the subject. -Desire to interact with other hydrology students, researchers, professors, and professionals. -Interest in aspects of computer based (Using R, Google Earth Engine, and QGIS) and field (Taking field measurements and interacting with stakeholders) activities.
Tasks	-Review relevant literature and participate in personalized instruction. -Learn how to access and process hydrologic data from local, state, national and international resources. -Visualize and interpret shifts in surface and groundwater resources using R. -Possibility to learn field/lab skills relevant to hydrology and hydrogeology. -Interact with the local communities to relay knowledge from internship.
Keywords	Hydrogeology, Groundwater, Monitoring, Flooding, and Data Visualization

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-14**
Mentor	Grace Wilkinson
Campus	UW-Madison
Affiliation	Center for Limnology
Email	gwilkinson@wisc.edu
Project title	Investigating how storms drive greenhouse gas production in urban ponds
Location of research	Madison, Wisconsin
Project Description	Inland waters are biogeochemical factories in the landscape, acting as hot spots of carbon and nutrient cycling. They receive inputs from their watershed, they fix, transform, emit, and store nutrients and organic matter, and they export this modified material downstream. Despite covering a small fraction of global land area, emissions of greenhouse gases from inland waters are significant at both a regional and global scale. Small, shallow, productive inland waterbodies (i.e., ponds), have high rates of greenhouse gas production, but little is known about how these rates vary over time. Join a team of limnologists and volunteer water monitors to understand the drivers of greenhouse gas production from urban storm water ponds in Madison, Wisconsin. Specifically, we will be investigating how storms contribute to nutrient loading and subsequent algal blooms, fueling methane and carbon dioxide dynamics. In addition to sampling campaigns in the field and laboratory analyses, the REU student will have the opportunity to work with our Community Water Monitoring network, a volunteer group of water stewards contributing to aquatic research at the Center for Limnology.
Qualifications Desired	* Interest in limnology * Comfort spending time on the water in small craft * Prior experience with environmental sample collection (aquatic or terrestrial ecosystems) and processing for analysis in the lab preferred, but not required * Interest in science outreach and communication with community members preferred, but not required * Valid drivers license
Tasks	* Weekly synoptic sampling of urban pond water quality using canoes, kayaks, and shore sampling with a partner * Event-based sampling of greenhouse gases and nutrients following major storm events * Laboratory analysis of environmental samples for nutrients, algal pigments * Analysis of greenhouse gas concentrations using a gas chromatograph * Participate in science outreach events with the Center for Limnology and continued training of water monitoring volunteers
Keywords	

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-15**
Mentor	Matthew Ginder-Vogel
Campus	UW-Madison
Affiliation	Civil and Environmental Engineering
Email	mgindervogel@wisc.edu
Project title	Factors Controlling Environmental Arsenic Speciation and Transport
Location of research	UW Madison
Project Description	Arsenic (As) contamination of drinking water affects over 200 million people worldwide. Due to its carcinogenic nature, As poses significant public health risks as well as environmental justice challenges. Trivalent As is more toxic and more aquatically mobile than pentavalent As, which can be more easily removed from water due to its higher sorption capabilities. Research in the Ginder-Vogel group has examined fundamental interactions between inorganic As and environmentally-relevant minerals like manganese oxides to deepen scientific understandings of As transformations for the ultimate purpose of informing groundwater remediation strategies. We seek an undergraduate student to aid in further examining mechanisms through which As interacts with metal-doped manganese oxides under environmentally-relevant conditions (e.g., in the presence of varying kinds of dissolved organic matter, divalent cations, variable pHs). Under the guidance of a graduate student mentor, the selected REU student will gain experience in mineral solids syntheses and will utilize a suite of analytical methodologies and instrumentation (e.g., ICP-MS, LC-MS, spectrophotometry) to characterize As-mineral oxide interactions.
Qualifications Desired	Ideally, student should have completed general and analytical chemistry, and preferably be an undergraduate going into their junior or senior year of college. At minimum, the student should have completed general chemistry. Student should be interested in environmental science or an adjacent field of study, must have good letters of recommendation, and work well with others
Tasks	The student will work alongside a graduate student to perform mineral oxide syntheses and characterization (e.g., X-ray Diffraction, X-ray Photoelectron Spectroscopy, spectrophotometry). To examine As-mineral oxide interactions, the student will learn how to perform timed batch reactions and utilize LC-ICP-MS to investigate As(III) transformation into As(V) under varying environmental conditions.
Keywords	Environmental chemistry, water chemistry, arsenic

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**MSN-16**
Mentor	Grace Bulltail
Campus	UW-Madison
Affiliation	Nelson Institute for Environmental Studies
Email	bulltail@wisc.edu
Project title	Developing experimental and analytical framework for wetlands water quality in Wisconsin
Location of research	Wetlands in WI
Project Description	Climate change poses a significant threat to wetlands, their biogeochemistry features, and their functionality. While they cover a small portion of the land surface, wetlands play a critical global role as the major carbon sink, flood control and protection, and water purification. Anthropogenic greenhouse gas emissions, global warming, land use changes, and the hydro-climatological new patterns like dry/wet spells affect the natural wetlands ecosystem services, hydrological functions, and water quality and quantity. On-site field surveys, sample collections, and laboratory experiments are recommended approaches to deepen our perceptions of wetland system conditions in a changing climate. Here in this study, we propose to design and run an experimental framework to test and analyze Wisconsin's natural wetlands' water quality. The developed framework includes a literature review, water samples collection, sample preservation, water quality experiments running, and results' analytics and visualization. Hands-on experimental and analytical water quality training for data collecting, testing, and analyzing skills improvement will be provided for the selected research scholar. The results of the proposed study will be supported to present in the possible on-campus water-related meetings and events.
Qualifications Desired	Water quality/chemistry background
Tasks	Literature review, sample collection, experiments running, results' analysis
Keywords	Water, Quality, Experiment, Analytics

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**OSH-1**
Mentor	Greg Kleinheinz
Campus	UW-Oshkosh
Affiliation	Engineering and Engineering Technology and Environmental Research and Innovation Center
Email	kleinhei@uwosh.edu
Project title	Microplastics sampling and analysis of Great Lakes surface water
Location of research	Oshkosh and/or Door County (depending on interest of candidate)
Project Description	This project will entail collection of surface water samples from Lake Michigan for detection of microplastics. The research team will sample water from our marine debris boat and local beach sampling sites and these samples will be filtered and then analyzed via FTIR for both quantification of microplastics in the samples and well as identification of what type of microplastics present. Additionally, the team will work on method refinement of microplastics recovery from sediment and sand using density separation methodologies. The researcher will also have the ability (depending on their interest and background) to work with a multi-disciplinary research team on a variety of other water-centric projects and learn standardized techniques for field and water analysis. The ERIC at UW Oshkosh is an US EPA, WI DNR, DATCP, and US Composting Council certified laboratory that houses a team of full-time research staff, undergraduates, graduate students, and faculty.
Qualifications Desired	Introductory Biology and any field or lab experience is a plus but not required.
Tasks	Field and laboratory sample collection, processing, and analysis techniques for physical, chemical, and biological constituents.
Keywords	Microplastics, Great Lakes, contamination, water sampling, water analysis, laboratory

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**OSH-2**
Mentor	Carmen Ebert
Campus	UW-Oshkosh
Affiliation	Environmental Research & Innovation Center
Email	ebertc@uwosh.edu
Project title	Microbiological Assessment of Select Lake Michigan Beach Waters
Location of research	Manitowoc, Wisconsin
Project Description	This research project is located in Manitowoc, Wisconsin and will be focused on microbiological contaminants, including Cyanobacteria and E coli in Lake Michigan waters. The concentration of these contaminants determines public health decisions related to recreational usage of waters. The student will be tasked with weekly water sample collection & data collection at various locations along Lake Michigan. Samples will be analyzed for Microcystins and E. coli by the student at a laboratory located in Manitowoc, Wisconsin. Laboratory results will be compared to physical data collected at each site to help determine potential sources of water pollution. Results may be summarized and presented at a research symposium.
Qualifications Desired	Basic water quality knowledge, basic laboratory skills, aseptic techniques.
Tasks	Water sample collection, field data collection, laboratory analysis, and data analysis/statistics.
Keywords	Water quality, Water sampling, Beach, E coli, Microcystins, Cyanobacteria, Public Health

FreshWater@UW Summer Research Scholar Program – Project Description

Project Code	**SUP-1**
Mentor	Dr. Kaitlin Reinl
Campus	UW-Superior
Affiliation	Lake Superior National Estuarine Research Reserve, UW-Madison Division of Extension Natural Resources Institute
Email	kreinl@wisc.edu
Project title	Evaluating techniques for effective in situ algal abundance monitoring in the St. Louis River Estuary
Location of research	Superior, WI
Project Description	The Lake Superior Reserve, located on Barker's Island near the south shore of Lake Superior, operates a continuous water quality monitoring program that tracks short and long-term changes to the health of the St. Louis Estuary. Recently, the Reserve added Total Algae Sensors to the program and began tracking chlorophyll-a fluorescence. However, initial testing has revealed several inferences, including temperature, dissolved organic carbon, and turbidity, that affect the sensor's accuracy. This project will build on previous experimental trials to quantify these interferences, allowing for better estimations of algal abundance. In addition, this project will explore how specific algal taxa affect the sensor's measurements. The project will be a mixture of in situ experiments in the field, paired with controlled environment trials in the Reserve's laboratory. This project is an opportunity to gain experience with long-term monitoring data and water quality sensors. Expect to learn about sensor technology and freshwater algal dynamics.
Qualifications Desired	We seek self-motivated applicants with a background in aquatic ecology, biology, and/or chemistry. Experience conducting field sampling, laboratory studies, and data analysis (Excel, R, etc) is preferred.
Tasks	Design and conduct field and laboratory studies to improve the use of the Total Algae sensor. Collect, curate, and analyze data to determine accuracy and develop corrections based on field and laboratory studies. Writing up results for technical reports and presenting results to Reserve staff and other audiences.
Keywords	Algae, Sensors, Water Quality, Experiments, Phytoplankton, Estuary, Lake Superior