Freshwater@UW

Summer Research Opportunities Program

Recruiting undergraduate researchers for positions within the Universities of Wisconsin, including:

- Madison
- Milwaukee
- Green Bay
- La Crosse
- Oshkosh
- Parkside
- Stevens Point

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Summer 2025

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Title	Institution	Location	Code
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Elucidating the physiological impacts of per- and poly fluoroalkyl substances (PFAS) on non-target species in aquatic environments.	UW - Madison	Madison, WI	MSN22
Contributions of blue green algae (cyanobacteria) to freshwater quality	UW - Madison	Madison, WI	MSN23
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Removal of PFAS from Water using Metal-Organic Framework Materials	UW - Stevens Point	Stevens Point, WI	SP01

Project Code **GB01**

Novel Filter Media for Removal of Phosphorus from Agricultural Runoff

Mentor: Michael Holly

Contact email: hollym@uwgb.edu

Institution: University of Wisconsin - Green Bay

Location: Green Bay, WI

Keywords: Environmental engineering, water quality, agriculture

Project Description

Seasonal hypoxia of lakes of the Great Lakes as a result of excessive algal production, has a detrimental effect on the local aquatic species, environment, and recreation. Seasonal hypoxia is persistent in part due to non-point agricultural sources of phosphorus (P) (35% of total P load to Lake Michigan). Reactive media incorporated at the edge of agricultural fields could be used as a cost-effective and low maintenance treatment to remove dissolved phosphorus in agricultural runoff through sorption and precipitation. Reactive media derived from waste products would create beneficial product from waste, extend the time prior to disposal, and support a circular economy. The scholar will design and produce reactive media from waste residuals and evaluate runoff treatment potential through flow through columns. Influent and effluent samples will be collected at set time intervals hours until effluent P is >80% of influent P. Ortho-phosphorus and ammonia will be measured using a discrete analyzer (Seal AQ300) at UWGB.

Project Tasks

Weekly analysis of water quality
Support of ongoing agricultural runoff treatment research
Analysis and reporting of results

Required knowledge, skills & abilities

General chemistry

Preferred knowledge, skills & abilities

Analytical chemistry, wastewater treatment

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **GB02**

Evaluating PFAS biochar sequestration performance at field scale

Mentor: Kpoti Gunn

Contact email: gunnk@uwgb.edu

Institution: University of Wisconsin - Green Bay

Location: Green Bay, WI

Keywords: contaminants; environment; laboratory;

Project Description

Sewage sludges (biosolids) applied onto agricultural lands may be the most diffuse source of legacy per- and polyfluoroalkyl substances (PFAS) contamination of groundwater resources in Wisconsin. Previous laboratory research indicated that activated biochar may be an effective and economically viable material to immobilize PFAS in soils, therefore mitigating groundwater resources contamination. This project aims to evaluate the performance immobilization of PFAS by biochar fabricated under variable temperature and biomass source conditions, and to continue an onsite assessment of PFAS immobilization
performance of activated biochar incorporated in soils receiving biosolids. Methods for PFAS analysis of soil leachate will be tested in lab. The project will be completed
with the help of undergraduate scholars. Most particularly, student scholars funded under the Freshwater@UW Summer Research Opportunities Program will complete soil water sampling and solid phase extraction in a laboratory setting necessary for PFAS analysis. scholars will participate in testing biochar fabrication methods under variable conditions. Overall, the project will provide scholars with experience in laboratory methods for experimental design.

Project Tasks

Soil water sampling; solid phase extraction in a laboratory; biochar fabrication; data management and analysis; result presentation

Required knowledge, skills & abilities

Ability to follow directions and respect safety rules; ability to be proactive.

Preferred knowledge, skills & abilities

Analytical chemistry background; basic algebra and statistics.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **GB03**

Evaluation of downstream juvenile lake sturgeon passage through two dams on the Menominee River

Mentor: Patrick Forsythe

Contact email: forsythp@uwgb.edu

Institution: University of Wisconsin - Green Bay

Location: Green Bay, WI

Keywords: Fish ecology, lake sturgeon, animal husbandry, acoustic telemetry, fish passage and conservation

Project Description

Lake Sturgeon passage has been embraced as a restoration prescription in the Great Lakes. However, adaptive management strategies dictate that quantitative assessment of passage benefits be provided to managers. The scholar will join a project seeking to evaluate the effectiveness of downstream juvenile passage on an important Great Lakes tributary, the Menominee River, and through the Park Mill and Menominee Dams. Evidence of successful downstream passage of juvenile lake sturgeon through the dams, coupled with research showing upstream migration after transfer and reproduction among passed parents, will provide managers with an integrated understanding of where/when juvenile lake sturgeon from upriver spawning are recruiting, aiding managers in projecting where future population growth can be expected in this system (above or below dams in the Menominee River). The scholar will assist with the collection of drifting larval lake sturgeon in the Grand Rapids section of the upper Menominee River. Larvae will be transported to a stream side facility where the scholar will learn the basics of fish culture, feeding and care over several months. We further expect that the scholar will be involved with tagging sturgeon, deploying detection arrays downstream from the Menominee Dam and tracking the movements of sturgeon after release.

Project Tasks

Larval lake sturgeon collection using drift nets. Daily husbandry and care of lake sturgeon and stream side facility maintenance. Collection of biological data in the form of fish growth and daily morality. Deployment and upkeep of river-based monitoring equipment including PIT detection systems and acoustic telemetry receivers.

Required knowledge, skills & abilities

Ability to work in the field and/or hatchery settings for long hours and in collaboration with peers. Interest in fisheries ecology/biology and demonstrated success in related coursework is encouraged. Ability to lift/carry heavy objects and comfortable working with tools. Strong listening comprehension skills. Ability to follow protocols carefully and work independently following training. Willing to work on weekends and at night if necessary.

Preferred knowledge, skills & abilities

Prior experience with fish husbandry is encouraged but not required. Experience trailering and driving boats is appreciated but also not required.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **GB04**

Novel combinations of native wetland species for runoff treatment

Mentor: Jessica Warwick & Karen Stahlheber

Institution: University of Wisconsin - Green Bay

Location: Green Bay, WI

Contact email: warwickj@uwgb.edu, stahlhek@uwgb.edu

Keywords: phosphorus, native plants, wetland ecology

Project Description

The aquatic plant and invertebrate communities of sedimentation basins, as used for both urban and agriculture runoff treatment, influence nutrient cycling in these systems. Previous laboratory and field research suggests that novel combinations of native wetland plant and invertebrate species could optimize dissolved phosphorus removal in agricultural sedimentation basins. This project aims to evaluate how novel combinations of floating and emergent native wetland plants interact with Faxonius immunis, a native crayfish species, to alter phosphorus dynamics in agricultural and urban systems through field experimentation. The scholar will perform weekly analysis of water quality and assessment of plant growth of field experiments, will gain experience processing plant and soil samples for nutrient analysis, and will have the opportunity to design and carry out a laboratory-scale experiment.

Project Tasks

Weekly analysis of water quality and plant growth
Maintenance of plant and invertebrate cultures
Processing of plant biomass samples
Analysis and reporting of results

Required knowledge, skills & abilities

N/A

Preferred knowledge, skills & abilities

General biology background
Any experience in a laboratory setting

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **GB05**

Evaluating Geochemical Controls on Phosphorus Mobility in Streambank Sediments

Mentor: Erin Berns-Herrboldt

Contact email: bernse@uwgb.edu

Institution: University of Wisconsin - Green Bay

Location: Green Bay, WI

Keywords: Water chemistry, phosphorus, geochemistry, groundwater-surface water interactions

Project Description

Phosphorus is a limiting nutrient in many surface water systems. Excess phosphorus (P) can drive eutrophication events, negatively impacting water quality, aquatic ecosystems, and water-based economies. Streambank sediments can store P through particulate entrapment or sorption; this stored P is often referred to as legacy P. Large erosional events have been shown to release legacy P to surface waters, but there is limited understanding of how changes in streambank groundwater chemistry associated with stream stage fluctuations impact the mobility of legacy P. Storage of P in sediments has been linked to carbon and iron cycling, but the magnitude of P release associated with these geochemical processes is not well constrained. This project aims to quantify P released from streambank sediments during high stream stage events and evaluate correlations with sediment carbon decomposition and iron cycling. Streambank porewater will be monitored regularly at field sites on the Wisconsin River, and sediments sampled from the sites will be used to evaluate P mobility in batch experiments with varying carbon and iron loading. Results from this study will allow for better quantification of P mobility associated with geochemical transitions during high stream stage events.

Project Tasks

1.) Sample streambank porewater at field sites
2.) Analyze sampled water for phosphorus and other analytes
3.) Set up a suite of batch experiments and regularly sample and analyze porewater

Required knowledge, skills & abilities

Ability to work in the field and canoe to field sites, curiosity and willingness to ask questions, general chemistry concepts

Preferred knowledge, skills & abilities

Hydrology concepts, experience with Excel, experience analyzing water samples

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **LAC01**

Understanding the toxicity of PFAS to fish larvae

Mentor: Tisha King-Heiden

Contact email: tking-heiden@uwlax.edu

Institution: University of Wisconsin - La Crosse

Location: La Crosse, WI

Keywords: toxicology, fish, ecology, physiology

Project Description

We are evaluating the toxicity of 3 different PFAS in fish larvae (summer work will primarily be fathead minnows, zebrafish, and perhaps bluegill). We are studying impacts of chronic exposure to environmentally relevant concentrations on the cardiovascular system, immune system, and nervous system. Students would gain experience running standard toxicity assays, using microscopes, analyzing behaviors, and using plate readers/general biochemical assays.

Project Tasks

Assistance with exposures, and then depending upon interests, collecting data related to the experiment they would focus on.

Required knowledge, skills & abilities

Coursework in general biology and introductory chemistry would be required. Experience with standard laboratory practices like accurately weighing materials on a balance.

Preferred knowledge, skills & abilities

Additional coursework in chemistry, physiology and/or ecology would be helpful.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **LAC02**

Preservation and Promotion of Oral Histories: Coon Creek and Kickapoo River Watersheds

Mentor: Tiffany Trimmer

Contact email: ttrimmer@uwlax.edu

Institution: University of Wisconsin - La Crosse

Location: La Crosse, WI

Keywords: Oral History, Digital Storytelling, Digital Humanities, Kickapoo River Watershed, Coon Creek Watershed, Inland Waterways, Flooding, Flood Responses, La Farge Dam Project, Wisconsin History

Project Description

Help us preserve freshwater-related oral histories and increase their chances of being used by researchers! UW-La Crosse's Oral History Program (OHP, est. 1968) has five interview collections describing daily life in the Coon Creek and Kickapoo River Watersheds ca. 1960s – 2020s. But right now, the oral histories in these collections are not being listened to by researchers and community members because not many people know they exist or can easily access them. OHP seeks a summer intern to conduct research and do content development work to help us create subject matter guides (indexes), an interactive website, and social media content describing the kinds of historical evidence contained in these five collections: the La Farge Dam Project, the Kickapoo Valley Project, the Gays Mills Project, the "Stories From The Flood" project, and the Coon Creek Community Watershed Council Oral Narrative Project.

Project Tasks

Listen to oral history interview recordings, read interview transcripts, and create topical subject matter guides (indexes) for them. Collaborate with OHP staff on content development work related to evidence in oral history collections (interactive website guides and social media). Conduct additional research to contextualize evidence in oral history collections (examples: visiting campus archives, searching in online databases, reading scholarly sources). Communicate professionally with archivists, librarians, scholars, and community groups.

Required knowledge, skills & abilities

Previous coursework in History or other Humanities-related subject(s) that focused on analyzing evidence and building a narrative. Ability to communicate ideas effectively in writing for diverse audiences. Strong listening comprehension skills. Strong research skills, and an ability to find relevant information in different formats including archives, online databases, and scholarly publications.

Preferred knowledge, skills & abilities

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **LAC03**

Aquatic invertebrate productivity and biodiversity in threatened river floodplain habitats

Mentor: Ross Vander Vorste

Contact email: rvandervorste@uwlax.edu

Institution: University of Wisconsin - La Crosse

Keywords: fieldwork, invertebrates, freshwater ecology

Location: La Crosse, WI

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.

Project Tasks

Collect aquatic invertebrates from the Upper Mississippi River, Count and Identify invertebrates in the laboratory using a dissecting microscope, prepare and maintain sampling equipment. Data analysis related to aquatic invertebrates

Required knowledge, skills & abilities

Interest in collection and identification of aquatic invertebrates.

Preferred knowledge, skills & abilities

Experience in collection and identification of aquatic invertebrates. Experience using R programming language.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MAN01**

Wading into marshes and streams

Mentor: Titus Seilheimer

Contact email: tseilheimer@aqua.wisc.edu

Institution: University of Wisconsin - Madison

Location: Manitowoc, WI

Keywords: Stream ecology, fish ecology, restoration, fieldwork, coastal wetlands

Project Description

Dip your toes in the field of aquatic habitat restoration in Northeastern Wisconsin with this opportunity to contribute to several restoration and monitoring projects. We are collecting pre-restoration data in several streams that will be used to track improvements through time. There will also be opportunities to survey fish species in Green Bay's coastal wetlands. Work locations include bay of Green Bay, Two Rivers, Manitowoc, and Port Washington.

Project Tasks

Assist PI with planning and conducting monitoring in streams and coastal wetlands. Map stream habitat and physical conditions, measure stream flow, collect water for phosphate measurements, collect and identify invertebrates. Assist with wetland fish monitoring.

Required knowledge, skills & abilities

Ability to work in all conditions and weather, Ability to lift 40 pounds and walk on uneven ground, Interest in aquatic ecology and restoration, Basic science experience

Preferred knowledge, skills & abilities

Coursework in stream ecology and aquatic science, GIS experience, Comfortable in boats and water

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MAN02**

Diving into History: A Scholar Research Opportunity with Shipwreck Artifacts

Mentor: Serena Stuettgen

Contact email: sstuettgen@wisconsinmaritimw.org

Institution: Wisconsin Maritime Museum

Location: Manitowoc, WI

Keywords: Maritime history research, maritime archaeology, shipwrecks

Project Description

The Wisconsin Maritime Museum (WMM) is home to over 85,000 historic artifacts with the mission to preserve the maritime history of Wisconsin and the Great Lakes region from the initial settlement of American Indians to today. Through the collection, WMM documents the lives and stories of all who called the Great Lakes home. WMM also acts as an official state repository for retrieved submerged cultural resources. Many of these artifacts are related to the Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNMS) which provides stewardship for our nation's maritime heritage in Lake Michigan through co-management by NOAA and the state of Wisconsin. The 36 historic shipwreck sites within the sanctuary represent vessels that played a central role in building the nation between the 1830s and 1930s.

The scholar's work will be hands-on in both the artifact preservation and historical research areas. This project seeks to continue the work of researching, contextualizing, and preserving these artifacts for future exhibition and educational purposes. Related experiences/opportunities are anticipated as these projects develop.

Project Tasks

The core activities for the research scholar include: 1) assisting with the assessment, rehousing, and cataloging of a large collection of shipwreck artifacts related to the Wisconsin Shipwreck Coast National Marine Sanctuary; 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.

Required knowledge, skills & abilities

Ability to work semi-independently, while given regular guidance and direction.
Good organizational and communication skills.

Preferred knowledge, skills & abilities

History or archaeology degree seekers are encouraged to apply.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MIL01**

Water purification by removing PFAS contaminations

Mentor: Junjie Niu

Contact email: niu@uwm.edu

Institution: University of Wisconsin - Milwaukee

Keywords: Water treatment

Location: Milwaukee, WI

Project Description

Perfluoroalkyl and polyfluoroalkyl substances (PFASs) have caused widespread water pollution due to their water solubility, non-biodegradable, toxic, and bioaccumulative properties. The currently available technologies such as granular activated carbon (GAC) adsorption, ion exchange resins (IER), and high-pressure reverse osmosis (RO) membranes to remove PFAS molecules are either less efficient or costly. These conventional adsorbents usually require long contact time to achieve high removal efficiency. Recently there has been a growing interest in developing alternative adsorbents that originate from abundant renewable natural sources. In this project, we target to develop a composite adsorbent that has 3-5 times larger absorption capacity than GAC and can rapidly adsorb anionic PFASs from water. The removal capability and kinetics of predominant PFAS molecules such as PFOA, PSOS, and PFHxS will be investigated in stimulated and real water from dairy field via both batch and column adsorption tests. The real water will be treated by a modified industry-style filtration system which includes a series of treatment steps such as screening, sedimentation, coagulation, flocculation, and the CD hydrogel composite filtration.

Project Tasks

Participate some material characterizations and performance tests

Required knowledge, skills & abilities

Any background is welcome with engineering background as a plus

Preferred knowledge, skills & abilities

N/A

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MIL02**

Biosensor for bacteria detection in water

Mentor: Junjie Niu

Contact email: niu@uwm.edu

Institution: University of Wisconsin - Milwaukee

Keywords: Sensor in water detection

Location: Milwaukee, WI

Project Description

Bacterial waterborne pathogens seriously affect the human health. After COVID-19, the necessity for the development of a fast and facile method to detect and quantify the bacterial pathogens in water has increased. The commonly used bacterial quantification methods such as platting, rtPCR, isothermal amplification, ELISA, paper-based sensors, mass spectrophotometry, and fluorescence assays normally require expensive equipment, specialized training, and complex interpretation. Therefore, an alternative method to quickly detect the bacteria with high sensitivity is needed.
Through this project, we will develop a low cost, potable biosensor to detect bacteria in water. Our designed sensor will be able to detect pathogenic bacteria from drinking water, wastewater and other matrixes faster than the currently available technologies.

Project Tasks

Sensitivity test in water

Required knowledge, skills & abilities

Any background better with engineering background

Preferred knowledge, skills & abilities

N/A

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MIL03**

Environmental fate of emerging contaminants

Mentor: Laodong Guo

Contact email: guol@uwm.edu

Institution: University of Wisconsin - Milwaukee

Location: Milwaukee, WI

Keywords: Microplastics; PFAS; Fate and transport; Dissolved organic matter

Project Description

We seek to understand the fate and transport of emerging contaminants such as microplastics, nanoplastics and Per- and Polyfluorinated Substances (PFAS), and their interactions with natural organic matter and sediment in aquatic environments. Students will learn and conduct literature reviews, experimental designs, relevant laboratory techniques, and instrumentation, such as Total Organic Carbon analyzer, ultraviolet-visible spectroscopy, fluorescence spectroscopy, dynamic light scattering, and others for the characterization of dissolved organic matter (DOM), plastic polymers, sediment, and changes in surface and colloidal properties of macromolecules and nanoparticles.

Project Tasks

Design and carry out a research project related to emerging contaminants combining field sampling and laboratory experiments.

Required knowledge, skills & abilities

Junior or senior with science background

Preferred knowledge, skills & abilities

Some chemistry and laboratory experience

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MIL04**

Virtual Water Trade

Mentor: Avik Chakrabarti

Contact email: chakra@uwm.edu

Institution: University of Wisconsin - Milwaukee

Location: Milwaukee, WI

Keywords: Water, Trade, Technology, Endowment, Comparative Advantage

Project Description

Virtual water trade (VWT) is typically defined as international trade in water-intensive commodities. With the expansion of international trade in agricultural crops, VWT has gained significant mileage. How can we distinguish the contribution of technology from that of relative endowments to VWT? This challenging question has stimulated much debate among scientists, academics, and government policymakers ever since Merrett (1997) noted that the water content of imported grain is much less than the totality of water that was used to grow the grain. Early contributors, to this debate, had pinned the driving force behind VWT to technology (Ricardian Theory) while an alternative explanation is founded on factor proportions (Heckscher-Ohlin-Samuelson Theory). In this project, the student mentee is expected to gain hands-on experience in data modeling and analysis in the process of measuring the factor content of VWT to distinguish the contribution of technology from that of relative endowments.

Project Tasks

Data management, modeling, and analysis: deliverables include the completion of a short communications assignment and a poster presentation.

Required knowledge, skills & abilities

Reproducible data management, modeling, and analysis.

Preferred knowledge, skills & abilities

Familiarity with integrated statistical computing environment, data wrangling, R programming language, data graphics and visualization, and report generation using R Markdown.
Experience using R to manipulate data; perform exploratory data analysis; write conditional expressions, loops, and functions; manipulating data matrices and arrays; extracting data from text; and making high level visualizations of data.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MIL05**

Enhanced feed management to support lake sturgeon and walleye stocking program

Mentor: Dong-Fang Deng

Contact email: dengd@uwm.edu

Institution: University of Wisconsin - Milwaukee

Location: Milwaukee, WI

Keywords: Feed nutrition; Fish; Lake sturgeon; Walleye

Project Description

The objective of this project is to develop optimal feed formulation and feeding techniques to support hatcheries raised lake sturgeon and walleye for stocking. Specifically, we aim to investigate optimal feed recipes specified for these two species of fish at different life stages based on growth, survival, nutrient utilization, and tolerance to different environmental stressors including temperature fluctuation, hypoxia, and emergent contaminants (microplastic and PFAS). Optimal feeding rates will also be determined for the fish at various stages of life to help hatchery establishing protocol for feeding management. Research will be performed through feeding trials on lake sturgeons or walleye at various life stages. The project will involve collaboration with Wisconsin DNR and hatcheries for extension research.

Project Tasks

The mentee will learn and complete the International Animal Care and Use Committee animal research certificate.
Following lab SOP's for fish maintenance, system cleaning, and feed preparation.
The candidate will lead the data collection and complication, which will include the weight and length of the fish, calculating growth rate, feed efficiency and other fish nutrition metrics.

Required knowledge, skills & abilities

The candidate should have interest in aquatic research and know how to use Microsoft office for data collection, report, and presentation preparation.
The candidate should be able to work in a wet lab, handling fish, and taking care of culture systems with some flexibility on schedule after training. The candidate should be responsible and a team player.

Preferred knowledge, skills & abilities

Understanding of basic fish biology and water quality tests; know how to use Excel for data management and PowerPoint for report preparation.
Basic statistics is needed but not required.
Some travel to fish hatchery optional but not required.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MIL06**

Enhanced feed management to support lake sturgeon and walleye stocking program

Mentor: Michael Carvan

Contact email: carvanmj@uwm.edu

Institution: University of Wisconsin - Milwaukee

Location: Milwaukee, WI

Keywords: Pollution, behavior, stress, environment, fish

Project Description

The goal of this research is to understand the influences of the environment on animal behavior in the laboratory to help support animal preservation and conservation efforts. In our work, the environment is broadly defined and includes the study of chemical, physical and biological stressors (e.g. chemical pollutants, environmental degradation, noise). An organism's behavioral range is deeply rooted in its physiology and represents a link between physiology and the environment. Behaviors can be linked to development, biochemistry, and molecular mechanisms—all of which influence behavior. Behavior is not a random process. It is a collection of structured responses that can be predicted and characterized into behavioral models. These behaviors serve the purpose of maximizing fitness and survival of individuals within a population, and ultimately the survival of populations and species. Data collected in this project will be shared with collaborators and used to create computer models and simulations that will be used to assess the risk of environmental stressors to specific animal populations and species.

Project Tasks

Students will be performing behavior experiments using zebrafish and and possibly other fish species. These experiments are designed to identify impacts of environmental stressors (including pollutants) on development of the nervous system. Data analysis utilizes some basic computer programs specifically designed for the analysis of behavior. Students will also perform standard toxicity assays, work with live animals (fish), perform data analysis, contribute to general fish care (some weekend work required) and light cleaning of glassware and fish tanks.

Required knowledge, skills & abilities

Coursework in general chemistry and biology, willingness to learn, comfort working with a computer, ability to follow protocols carefully and work independently (and as a member of a team) following training.

Preferred knowledge, skills & abilities

Experience with computer coding is desirable but not required. Coursework in developmental biology, ecology, ichthyology, and/or physiology would be helpful.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN01**

Assessment of Biochar and Lignin Foams as Potential Removal Mechanisms for Heavy Metals in Natural Waters

Mentor: Sarah Janssen

Contact email: sjanssen@usgs.gov

Institution: University of Wisconsin - Madison (U.S. Geological Survey)

Location: Madison, WI

Keywords: metals, biochar, sorption, remediation

Project Description

This project will examine the effectiveness of synthesized biochars for the removal of heavy metals (e.g., mercury, lead, copper) from surface waters. As part of this project, we will be examining how ligand modification of biochars, such as the addition of sulfur functional groups, influences the adsorption of metals. Bench-scale experiments will be performed using different surface waters, biochar compositions, and metal mixtures. Follow-up experiments will also be conducted to design a flow through system for water treatment, which will test the structural integrity of the material as well as sorption capacity. A student researcher will be tasked with preparing biochars, running metal concentration analyses, and designing experimental set-ups for the project. This project will be predominantly laboratory based with the opportunity to participate in field work for water collections. Work will be conducted across University of Wisconsin and U.S. Geological Survey laboratories in Madison.

Project Tasks

Experimental design of mesocosms (biochar and metals), analysis of metal concentrations in aqueous samples using ICP-MS, participation in the creation of biochars, data synthesis into tables or figures, comparison of data to the scientific literature.

Required knowledge, skills & abilities

No requirements, student researcher will be trained on all needed background and laboratory methods.

Preferred knowledge, skills & abilities

General chemistry knowledge

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN02**

Understanding Public Communicators' Needs Related to Outreach about PFAS in Rural Wisconsin Drinking Water

Mentor: Bret Shaw

Contact email: brshaw@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: PFAS, drinking water, sustainable agriculture, water quality

Project Description

This project entails interviewing public health communicators (e.g., county public health officials, county land and conservation professionals, Extension educators) from rural areas of Wisconsin about their needs related to communicating with their constituents about the risk of PFAS in their drinking water and how to mitigate those risks. Rural residents of Wisconsin face unique challenges about contaminants in their drinking water as many rely on private wells, which requires different ways to reduce or eliminate PFAS contamination than people relying on public water supplies. This report that will emerge from this project will be used to inform public outreach for the Division of Extension and partners to empower public health communicators communicate more effectively about PFAS in rural water supplies.

Project Tasks

Co-develop interview script, interview public communicators, synethesize interview content to generate public-facing report

Required knowledge, skills & abilities

Ability to interview public communicators about their needs related to outreach about PFAS in rural drinking water supplies, good people skills, ability to write and synthesize interview content into a coherent report.

Preferred knowledge, skills & abilities

Graphics skills to design report

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN03**

Carbon consequences of rising lake water levels

Mentor: Emily Stanley

Contact email: ehstanley@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: Lake, greenhouse gases, water quality, aquatic plants

Project Description

Shifts in climate and land use often have strong effects on lakes by altering the timing or amount of water inputs (hydrology) to these ecosystems. We are studying an extreme case of shifting hydrology to understand how these changes can affect aquatic ecosystems. The water level of Fish Lake (southern WI) increased by >5m between ~1970 and 2015. Between 2017-2021, the water level jumped by 3 m, flooding lakeside houses and lands. A major goal of our research is to determine how plants and algae have taken advantage of newly flooded habitats. An SROP scholar would lead a project that investigates site-to-site variation in carbon dioxide (CO2) and methane (CH4) concentrations in these flooded areas. CO2 and CH4 are key indicators of plant and microbial metabolism and are also potent greenhouse gases that often have high rates of emissions from lakes to the atmosphere. Tracking these gases not only tells us about plant and microbial responses to changing lake levels, it also provides insights into the larger issue of how changing hydrology may affect lake contributions to greenhouse gases in the atmosphere.

Project Tasks

- Collecting samples for CO2 and CH4 analysis and water quality
- Assisting with routine limnological measurements and sample collection and habitat characterization
- Preliminary sample processing in the lab
- Data entry and preliminary data analysis
- Other tasks may emerge depending on student interest and project development

Required knowledge, skills & abilities

Students must be comfortable/willing to do field work that involves working with others, being on a boat and/or wading in shallow water areas, and being able to follow directions and safety rules

Preferred knowledge, skills & abilities

Interest in environmental science; Driver's license and record appropriate to drive a state vehicle

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN04**

Identifying the main causes of tiny plastic buildup in the Great Lakes using a new, easy-to-use testing and imaging system

Mentor: Haoran Wei

Contact email: haoran.wei3@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: Microplastics, Great Lakes, Raman spectroscopy, Data analytics, Membrane technology

Project Description

We're trying to understand tiny plastic particles, smaller than a speck of dust, that are found in the Great Lakes but are hard to study because we don't have the right tools to see them well. Our main goal is to figure out how these tiny plastics build up in the lake's food chain by creating a new way to find and measure them easily. This new method will help us clean up, concentrate, and count these plastics in water and living organisms. We plan to use this method to see how widespread these plastics are in the Great Lakes and how they move up the food chain in different environmental conditions. We also want to start a program to involve local communities, especially indigenous people, in understanding this issue. By getting a better grasp on how these tiny plastics move through the Great Lakes and their food chains, we can come up with ways to minimize their effects on people and the environment.

Project Tasks

Sampling and analyzing low-micrometer microplastics in the Great Lakes. Optimizing pretreatment processes and analyzing spectroscopic data.

Required knowledge, skills & abilities

Basic experimental and data analysis skills.

Preferred knowledge, skills & abilities

Multivariate statistics, Raman spectroscopy

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN05**

Development of a membrane sampler for nano- and low micrometer microplastic detection in the Great Lakes

Mentor: Mohan Qin

Contact email: mohan.qin@wisc.edu

Institution: University of Wisconsin - Madison

Keywords: microplastics, lake water

Location: Madison, WI

Project Description

The Laurentian Great Lakes are critical freshwater fisheries that support over 7 billion U.S. dollars in revenue annually from commercial fishing as well as abundant amounts of recreational and subsistence fishing benefiting local and tribal communities. Despite the economic and cultural significance tied to the Great Lakes food webs, all five lakes are contaminated by microplastics (MPs) with a particle size smaller than 5 mm and other chemical pollutants that continue to threaten the utilization of fisheries resources. We will design and develop a portable membrane sampler that facilitates the efficient and user-friendly sampling of nano- and low micrometer microplastics (NLMMPs) in the Great Lakes, with a particle size range of 0.5-50 μm.

Project Tasks

Required knowledge, skills & abilities

basic chemistry

Preferred knowledge, skills & abilities

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN06**

Perceptions of Climate Change and Embodied Carbon and Water

Mentor: Andrea Hicks

Institution: University of Wisconsin - Madison

Location: Madison, WI

Contact email: alkircho@mtu.edu

Keywords: Embodied water; carbon footprint; social science work

Project Description

Everything has an environmental impact, from eating an apple to driving a car. In general, people are not good at understanding intuitively the relative environmental impacts of different actions. This project will delve into the current body of literature around how people perceive the embodied water and carbon of different materials and actions. And how these perceptions impact how people behave. Based on the literature review results, the student will help to design a future study to better understand people's perception of embodied carbon and water.

Project Tasks

Literature review of current studies, compilation of research study findings, help designing a study for future deployment

Required knowledge, skills & abilities

Passion for sustainability and a positive attitude

Preferred knowledge, skills & abilities

Ability to read research articles

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN07**

Exploring PFAS in aquatic systems

Mentor: Christy Remucal

Contact email: remucal@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: PFAS, contaminants, water, chemistry

Project Description

Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic organic chemicals widely used in industrial and consumer products, such as water-repellent cookware, paper products, and fire-fighting foams. PFAS are highly persistent in the environment and have been associated with various health risks, including developmental toxicity, cancer, and bioaccumulation.

The undegraduate student will assist our cutting-edge PFAS research on measuring PFAS in aquatic systems, including surface water, groundwater, precipitation, and bed sediments. This research aims to improve our understanding of the fate and transport of PFAS in the environment and to develop forensics methods for identifying PFAS sources.

Key responsibilities include:

- Conducting sample preparation using solid phase extraction (SPE).
- PFAS targeted analysis using liquid chromatography-tandem mass spectrometry (LC-MS/MS).
- Supporting additional ongoing aquatic contaminant research in the lab.
- Developing critical thinking skills through engagement with scientific literature review and contributing to research presentations.

Project Tasks

learn to extract and analyze PFAS in environmental samples (water and bed sediments), learn to use a variety of analytical instruments to characterize PFAS composition in aquatic systems.

Required knowledge, skills & abilities

interest in environmental chemistry, having taken analytical chemistry or a similar course, willingness to work in the lab, and interest in learning instruments and data processing.

Preferred knowledge, skills & abilities

Candidates who have taken R or statistics courses and/or have previous lab experience will be preferred but not required.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN08**

Effect of Nanoplastics on Leaching of Antibiotics from Soil

Mentor: Inna Popova

Contact email: ipopova@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: Chemicals of emerging concern, nanoplastics, antibiotics, contaminants removal

Project Description

It is estimated that more than 390 million tons of plastic is produced annually. More than 79 % of produced plastics are deposited in terrestrial environments. With weathering and aging, plastics break down to nanoplastics, which are, due to their physiologically relevant size, are toxic to many species and are considered one of the pressing environmental concerns. Weathered nanoplastics carry a surface charge and consequently can alter the leaching and degradation of soil organic contaminants such as antibiotics. The use of plastics worldwide is only increasing and the influx of nanoplastics in soil is expected to increase as well. By understanding the mechanisms through which nanoplastics interact with antibiotics, a better idea of controlling their leaching of both of these contaminants into water bodies can be obtained. The objective of this project is to elucidate the contribution of major processes that govern the transport of antibiotics in the presence of nanoplastics to the overall antibiotic transport in soil. To accomplish this, a combination of traditional batch sorption experiments and modern visualization techniques will be used.

Project Tasks

Setting up contaminants leaching experiments; analyzing samples for chemicals of emerging concern using HPLC/Q-TOF MS and HPLC/FLD; analyzing data to elucidate trends and driving processes.

Required knowledge, skills & abilities

Basic laboratory skills; experience with literature search and report writing; creative thinking and scientific curiosity

Preferred knowledge, skills & abilities

Experience working in a science lab, knowledge of analytical chemistry techniques; data analysis and note keeping

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN09**

High-resolution mapping soil moisture at turfgass field using proximal sensing techniques

Mentor: Jingyi Huang

Contact email: jhuang426@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: soil moisture; UAV; geophysical instruments; data analysis; irrigation management;

Project Description

The project aims to enhance precision irrigation management by creating detailed soil moisture maps for turfgrass fields. Turfgrass, commonly used in sports fields, golf courses, and urban landscapes, requires optimal water management to maintain quality while minimizing resource use. This project will leverage proximal sensing technologies, such as hand-held Time Domain Reflectometry (TDR) and Unmanned Aerial Vehicle (UAV)-based geophysical instruments (e.g., ground-penetrating radar, thermal camera), to monitor and map soil moisture at high spatial and temporal resolutions (1 m by 1 m, daily).

Proximal sensing techniques offer rapid, non-invasive data collection, providing continuous soil moisture readings across the field. These readings will be integrated into Geographic Information Systems (GIS) to generate detailed soil moisture distribution maps, enabling more accurate water application strategies. The project focuses on improving water use efficiency, reducing over-irrigation, and enhancing turfgrass health through targeted irrigation.

The research will involve data collection at the UW-Madison O.J. Noer research station, and data processing and modeling analysis (e.g., regression models). This study will contribute to sustainable turfgrass management by promoting resource-efficient practices and offering insights into soil moisture dynamics, benefiting both researchers and turfgrass managers in improving water and environmental sustainability.

Project Tasks

Willingness to drive to the field station (20 minutes from Madison) weekly during the summer with other lab members to collect field data.

Required knowledge, skills & abilities

Interest in learning field data collection using modern sensors and geophysical instruments.

A current driver's license

Preferred knowledge, skills & abilities

Interest in learning basic statistical modeling techniques, such as regression models using programming software (e.g., Python, Matlab)

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN10**

Drinking water and aquitards: an outcrop study of geologic units in Grant County, Wisconsin

Mentor: Sarah Bremmer

Contact email: sarah.bremmer@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: Drinking water, groundwater, fieldwork, geology, hydrogeology, stratigraphy, bedrock, aquitard

Project Description

Many private wells in Southwest Wisconsin have high levels of nitrate and impacts from fecal microbes, but aquitards can help protect groundwater.
This project is focused on better understanding the distribution of an important bedrock aquitard (Glenwood Formation and Pecatonica Member) that separates two major aquifer systems in Grant County, WI.
Wells open to the upper aquifer system have a higher risk of nitrate contamination relative to wells open to the lower aquifer system (Stokdyk and others, 2023). Wells that are open to both of these aquifers can increase the risk of contamination in the lower aquifer system.
The project is focused on characterizing the Glenwood Formation and Pecatonica Member, which directly overlie the heavily-used lower groundwater aquifer.
To support these efforts, we are looking for a student to conduct fieldwork, focusing on outcrops of these rocks, including collection of natural gamma measurements, measuring stratigraphic sections, documenting of seeps and springs, and mapping fractures (no experience with this required).
This work will help predict the location of the aquitard and protect drinking water sources for residents in Grant County.

Project Tasks

Accompany mentor in field; collect outcrop data (including natural gamma measurements, and fracture mapping); take field notes and document field sites (e.g. documentation of seeps and springs); synthesize, and interpret field data and measurements; assist with data compilation using spreadsheets and graphing software

Required knowledge, skills & abilities

Enthusiastic and engaged
Ability to travel and conduct field work with mentor in Grant County, Wisconsin
Ability to walk over uneven terrain. Willingness to work outside in a variety ofweather conditions
Experience with spreadsheets and graphing software
Introductory course in geology

Preferred knowledge, skills & abilities

Driver's license
Interest in hydrogeology/hydrology
Coursework in sedimentology & stratigraphy
Knowledge of Wisconsin stratigraphy
Experience with GIS software
Proficiency with spreadsheets and graphing software
Experience working in Illustrator
Fieldwork experience

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN11**

Urban ponds in a changing world

Mentor: Jessica Hua

Contact email: jhua23@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: Environmental change, pollutants, science communication, amphibians

Project Description

Aquatic ecosystems face diverse challenges including shifting climate patterns, pollutants, and infectious diseases. The ability to detect and monitor these threats and their effects on wildlife across space and time are imperative to protecting aquatic ecosystems. Towards this goal, we will combine field, lab, and science communication efforts to better understand how pollutants like microplastics or road salts influence wildlife. Towards this goal, the project has three phases (1) Gain field experience and identify wildlife threats by participating in collaborative lab survey ponds around Madison, WI. (2) Design experiments or protocols to better understand how pollutants affect amphibians (the most threatened vertebrate taxa). (3) Generate community interest in science via non-traditional science communication avenues (past efforts integrated art, social media, card games).

Project Tasks

Towards this goal, the project has three phases (1) Gain field experience and identify threat of interest by participating in collaborative lab survey ponds around Madison, WI. (2) Design experiments or protocols to better understand how pollutants affect amphibians (the most threatened vertebrate taxa). (3) Generate community interest in science via non-traditional science communication avenues (past efforts integrated art, social media, card games).

Required knowledge, skills & abilities

Curiosity, willingness to learn, and ability work as part of a collaborative team are the only requirements for this project.

Preferred knowledge, skills & abilities

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN12**

Investigating the source of molybdenum to Wisconsin groundwater

Mentor: Athena Nghiem

Institution: University of Wisconsin - Madison

Location: Madison, WI

Contact email: sefinley@wisc.edu

Keywords: groundwater, field sampling, environmental chemistry, hydrogeochemistry, lab analysis

Project Description

This project focuses on understanding the sources of molybdenum to drinking water in southeastern WI, an area experiencing elevated concentrations. Molybdenum is an essential nutrient, but concentrations too high in drinking water can lead to adverse health effects. Initially, it was thought that the contamination stemmed from coal ash leaching from nearby landfills; however, recent findings suggest that it may be naturally occurring. Despite this evolving understanding, the exact origin of molybdenum in drinking water remains uncertain. This research aims to resolve molybdenum origins in drinking water wells to reduce its presence, with a specific emphasis on private wells. This research will also investigate molybdenum and arsenic co-occurrences in the environment, as this could provide more information on the source of molybdenum and its mobilization mechanisms. In this project, handling of both molybdenum and arsenic samples will be required. Field work will include collecting groundwater samples and solid phase samples. Field-employed instrumentation will be utilized to characterize groundwater samples in-situ and in-vitro analyses will further be employed on the collected groundwater and solid phase samples. Analytical instrumentation including but not limited to ICP-OES, ICP-MS, IC, XRD, SEM, and TGA will be utilized in this project.

Project Tasks

assist in field sampling of groundwater wells and sediment samples, operate and calibrate field instruments for in-situ water quality measurements, prepare and analyze samples using lab instrumentation, including ICP-MS, IC, and others, maintain organized field and lab records of sampling and analysis activities, contribute to data entry, preliminary analysis, and interpretation of findings under supervision

Required knowledge, skills & abilities

familiarity or willingness to learn laboratory and field safety protocols, strong organizational skills, ability to work independently and as part of a team, willingness to engage in outdoor work

Preferred knowledge, skills & abilities

prior experience with fieldwork, knowledge of chemistry or geochemistry concepts, familiarity with analytical instruments, experience with GIS

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN13**

Ecohydrology of Ridge and Swale Systems in Door County, WI

Mentor: Steve Loheide

Contact email: ekastelic@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: Ecohydrology, ridge and swales, groundwater, vegetation, tree rings, fieldwork, laboratory analysis

Project Description

Are you interested in the interactions between trees and groundwater? Coring trees and measuring groundwater in Door County, WI? Solving the puzzle of how landscape location and water levels impact tree growth? If so, come join the Hydroecology Lab at the UW-Madison for a summer of groundwater ecohydrology! This project will involve tree coring in Door County to determine how groundwater within the root zone and landscape position affects tree growth. Individual hypotheses relating to these main project goals will be developed and explored as your grad student mentor Eric (ekastelic@wisc.edu) will tailor this experience to your current skill sets and interests! Potential project ideas for the summer may be included in your application (if desired) or developed once in Madison. Collaboration with Dr. Larson of UW-Platteville's TREES Laboratory will help you further develop skills in processing and recording tree ring data. During this project you'll be involved in a mix of fieldwork, lab work, and office-based work. Approximately two nonconsecutive weeks during the program will be spent completing field work in ridge and swale complexes around Door County, WI.

Project Tasks

Development (with mentor guidance) and execution of an independent research project.
Collection of tree cores and analysis of tree rings.
Collection of groundwater data.
Collection of topographic data.
Management and analysis of data.

Required knowledge, skills & abilities

Interest in spending time outdoors while deciphering natural processes.
Interest in water and tree interactions (ecohydrology).
Interest in tree growth response to environmental factors (dendrochronology).
Ability to maintain a positive attitude during wetland focused summer fieldwork (potential hot and cold weather, summer rain, high humidity, and biting insects).

Preferred knowledge, skills & abilities

Basic hydrology coursework (Will be covered during the program regardless of background).
Data processing skills (R, Python, Matlab, or Excel)
Comfortable with or open to tent camping for days at a time (With access to nice bathroom and shower facilities but potential for summer rain storms)

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN14**

Quantification of phosphorous in riverbank sediments and pore water along the Wisconsin River

Mentor: Christopher Zahasky

Contact email: czahasky@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: field work, hydrology, hydrogeology, river, chemistry

Project Description

The overall objective of this project is to characterize the distribution of phosphorus in sediment and water and to quantify how phosphorous distribution varies temporally and spatially near the Wisconsin River. Phosphorus (P) can be associated with both aqueous (water) and mineral (sediment) phases in the hyporheic zone. In Central Wisconsin, specifically in the Wisconsin River Basin, P is the limiting nutrient in most surface waters and is of concern for many lakes and stream. Streambank P storage has been quantified in some regions, but this study focuses on understanding the storage and stability of P stored in the streambanks of different sized Wisconsin streams. The P stored in streambank sediments may be loosely associated with mineral surfaces, more strongly sorbed to different mineral phases, or bound in mineral structures. The distribution of P in different phases is known to be impacted by different environmental conditions such as water saturation, oxygen and iron availability, pH, and other factors. Sediments from the streambanks will be sampled and the distribution of P will be evaluated at multiple depths from the surface of the stream channel into deeper portions of the hyporheic zone. In this study, it is important to understand the initial distribution of P in streambank sediments to understand how the P distribution can change with variability in hyporheic flow.

To complete this objective the student will work closely with other undergraduate and graduate students and faculty to perform weekly water sampling and analysis by canoeing to field sites on the Wisconsin River. Activities will also include collecting and analyzing soil sediments and performing routine chemical analysis on soil and water samples. This will include training on cutting edge chemistry instrumentation.

Project Tasks

Ability to perform field work outdoors

Required knowledge, skills & abilities

Ability to perform field work outdoors

Preferred knowledge, skills & abilities

Water chemistry background would be valuable.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN15**

Source tracking of contaminants in sewers

Mentor: Erica Majumder

Contact email: emajumder@wisc.edu

Institution: University of Wisconsin - Madison

Keywords: contaminants, source tracking

Location: Madison, WI

Project Description

We are working with the local sewerage district on issues around Fats, Oils and Grease clogs in the sewer system. We are trying to identifying the source of the materials causing the clogs by analyzing the lipid and microbial community composition of the wastewater and fat deposits. We receive samples from the sewerage district, perform extractions, measure composition with Gas Chromatography and DNA sequencing and then perform computational analyses. We discuss our results with employees of the sewerage district to interpret the findings and to help create an outreach strategy to prevent FOG inputs into the sewers.

Project Tasks

genomic DNA extractions, microbial community analysis, fat extractions, lipid analysis, discussing with social scientists to design targeted outreach

Required knowledge, skills & abilities

some coursework in chemistry and/or biology OR environmental science OR engineering will be helpful

Preferred knowledge, skills & abilities

This is an interdisciplinary project so some knowledge in one of the areas mentioned above will be great.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN16**

Assessment of Enhanced Aquifer Recharge in a Rural Setting with a Heterogeneous Soil Profile

Mentor: Mike Cardiff

Contact email: skershner@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: Groundwater, Recharge, Runoff, Fieldwork

Project Description

The Wisconsin landscape is dominated by agriculture, which brings leaching of Nitrate into the soil and groundwater. Clean available water is crucial for communities, and many communities in Wisconsin rely on groundwater as their primary source of drinking water. A method for improving groundwater quality is pivotal for ensuring access to clean water for future generations. This project aims to evaluate an enhanced aquifer recharge method (a practice used to replenish groundwater supply and or dilute present contaminants) in a sloped rural setting with a heterogeneous soil profile. Several dry wells (a small diameter hole in the ground that surpasses low permeable surface layers, where length reaches above the water table) will be evaluated for effectiveness based on the quantity and quality of water recharged, cost of implementation, and maintenance needed. We will sample runoff and groundwater to test for contaminants, conduct field experiments, evaluate runoff of natural precipitation events, test the permeability of different soil layers/textures, and overall learn more about the hydrogeology of this environment. This will help us review the effectiveness and efficiency of drywells in this landscape, and potentially provide a mechanism for diluting contaminants present in the groundwater.

Project Tasks

Participation in multiple field projects, which includes implementation of different geophysical tools, collecting runoff and groundwater samples, and collecting soil samples. Lab work, which includes testing permeability of different soil textures and helping with determining precision of tools. Computer work, which includes editing spreadsheets and helping with site characterization. (Training will be provided)

Required knowledge, skills & abilities

Ability to carry up to 50lbs
Ability to walk through sloped terrains
Ability to travel for field work
Basic proficiency in excel
Willingness to learn new lab and field skills

Preferred knowledge, skills & abilities

Familiarity with hydrologic field equipment, and sampling protocols

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN17**

Explaining catchment rainfall / runoff, groundwater recharge, and streamflow dynamics: The impact of loess and other porous media

Mentor: Ken Ferrier

Contact email: kferrier@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: Permeability, Runoff partitioning, Groundwater Recharge, Loess

Project Description

Partitioning of water between overland flow and subsurface storage is strongly controlled by near-surface permeability (i.e. ease of flow through a material). This partitioning affects the dynamics of streamflow within a catchment, the chemistry of streams, and quantity and quality of groundwater resources. The goal of this project is to investigate how loess deposits alter hydrology of a catchment by measuring permeability of loess, soils, and weathered bedrock in a set of hillslopes at Wyalusing State Park, WI. Loess deposits are accumulations of windblown silt-sized dust, which cover as much as 10% of Earth's terrestrial surface and provide fertile soils for cultivated and non-cultivated plant life. Despite their significance, little is known on how loess deposition alters how a landscape partitions water and controls water quantity, water quality, and drought resiliency of a landscape. A student working on this project will collaborate with a team to measure permeability using field experiments, learn to take environmental water samples from a stream and subsurface samplers, apply basic statistical methods to test hypotheses comparing permeability of areas with and without loess, and make interpretations of how the presence of loess impacts water quality and quantity.

Project Tasks

Field experiments, environmental water sampling, data analysis

Required knowledge, skills & abilities

- Ability to stand/ work on uneven and steep ground
- Willingness to get dirty and learn!

Preferred knowledge, skills & abilities

- Experience with data management in Excel or Google Sheets

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN18**

Ecohydrology of Solar Farms

Mentor: Steve Loheide

Institution: University of Wisconsin - Madison

Location: Madison, WI

Contact email: wdougherty2@wisc.edu

Keywords: ecohydrology, microelectronics, solar farms, sustainability, fielwork

Project Description

Solar farms create unique environments by sheltering plants from precipitation and blocking incoming sunlight. Because of these differences solar arrays likely affect ecological and hydrological processes; how and when those changes occur are not well understood. Solar power generation is growing rapidly in Wisconsin, with capacity projected to more than double in the next three years. This presents a unique opportunity to understand the ecohydrological changes that come with solar development as large land use and land cover changes across the state. Understanding how solar panels alter the environment can inform a wide range of sustainable practices, including strategies for managing cover crops and designing drainage systems for slope stability and stormwater control. To define these processes, we will measure hydroecological variables, including soil moisture, groundwater, plant water use, plant growth, and precipitation. This information will support solar developers in designing arrays that maximize co-benefits such as crop and forage production to support farming and grazing at solar farms. In addition to the above, we plan to design new, robust wireless sensor networks for continuous monitoring of soil moisture, temperature, radiation, plant water use, and other environmental parameters across the solar array. The outcome of this project will culminate in a final deliverable in multiple time-series visualized with open-source libraries such as an R-Shiny app or a Plotly Dash summarizing the student researchers' findings during the internship/assistantship.

Project Tasks

Ecohydrology: Installation and management of conventional environmental monitoring devices, including soil moisture and groundwater sensors; database management and cleaning; preliminary data analysis.
Microelectronics: Designing, building, installing, and maintaining soil moisture, radiation, and other parameter sensors; data management and cleaning; data analysis.

Required knowledge, skills & abilities

- Interest in hydrology and ecosystem science
- Desire to conduct field research
- Ability to write technical notes

Preferred knowledge, skills & abilities

- Hydrology coursework
- Basic understanding of signal processing, with a focus on communication protocols
- Experience with single-board computers and microcontrollers such as Arduino or Raspberry Pi
- Data processing and programming skills including familiarity with C/C++, Matlab, R, or Python

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN19**

Improving irrigation management with remote sensing

Mentor: Mallika Nocco

Contact email: nocco@wisc.edu

Institution: University of Wisconsin - Madison

Keywords: irrigation, remote sensing, UAVs

Location: Madison, WI

Project Description

Irrigated agriculture can increase agricultural productivity, but also deplete water quantity and quality in Central Wisconsin and similar regions across the Midwest US. Farmers and scientists are working together to improve irrigation and nutrient management to grow more food with less water. Satellites and drones offer the opportunity to remotely sense crop development and irrigation demands throughout the growing season with vegetation indices and irrigation crop coefficients. This project seeks to develop new remotely sensed vegetation indices and irrigation crop coefficients for important crops in Wisconsin. Students will learn how to conduct aerial missions using UAVs to collect and process remote sensing data. Additionally, students will learn how to collect field measurements of leaf area index and canopy height. We will work together to build remote sensing models to represent leaf area index, canopy height, and crop coefficients for key Wisconsin cropping systems. These data and models will directly contribute to better irrigation management in Wisconsin, which will lead to better outcomes for water quantity and quality.

Project Tasks

field data collection, UAV missions, data processing, statistics, visualization

Required knowledge, skills & abilities

Enthusiasm for field work, Enthusiasm for UAVs, Willingness to work evenings and some weekends, familiarity with MS Office, licensed to drive in Wisconsin

Preferred knowledge, skills & abilities

Coursework in irrigation, sustainable agriculture, or hydrology
Data processing skills in R or Python

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN20**

Water Talk Podcast Content Creation

Mentor: Mallika Nocco

Contact email: nocco@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: podcasting, public education, content creation

Project Description

The Water Talk Podcast (https://www.watertalkpodcast.com) is a podcast for the water curious public in its fifth season of production. Podcast episodes span topics across a broad range of ecosystems (e.g., agricultural, urban, forest) and disciplines (hydrology, policy, ecology, law, sociology) related to water. Dr. Mallika Nocco (UW–Madison) is one of the creators and producers of this cooperative extension focused podcast. We are looking for a motivated individual excited about making water accessible and inviting to many different types of people. There will be >70 episodes by summer 2025 and this project will be focused on creating educational 'shorts' episodes (<5 min) from all of the topics that we have in our database as well as transcript development. If the mentee is interested in producing additional new podcast episode(s), we will also work with them to choose a topic and develop an episode that will be featured on the podcast. This is a great opportunity for undergraduates interested in science communication, public engagement with science, policy, and cooperative extension.

Project Tasks

Content curation, audio editing, transcription, potentially podcast recording

Required knowledge, skills & abilities

Interest in podcasting, excitement for a variety of water-related topics, interest in audio editing

Preferred knowledge, skills & abilities

familiarity with audio editing tools

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN21**

Short- and Long-term Influences of Soil Conservation Management Practices on Nutrient Losses in Cold Agroecosystems

Mentor: Francisco Arriaga

Contact email: snlee3@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: water nutrient dynamics, groundwater, runoff, agroecosystems

Project Description

The non-growing season is a critical period for nutrient losses in cold agricultural regions, such as the upper Midwest. However, soil and water nutrient dynamics during the wintertime and critical transition periods between frozen to non-frozen conditions (e.g. fall to winter, and winter to spring) are poorly understood. This study integrates hydrology, soil physics, and nutrient measurements at a study site in south central Wisconsin to: 1) Improve understanding of the effects of soil moisture, snow pack, and soil temperature on soil freezing/thawing, infiltration, and nitrogen and phosphorus losses in runoff from frozen and partially-frozen soil; 2) Characterize the effects of weather and agricultural management (tillage, manure application, and cover crop use) year-round on soil freezing/thawing, surface hydrology, and surface nutrient losses; and 4) Incorporate improved soil temperature assessment to better predict soil frozen condition for the improvement of hydrologic modeling and quantification of nutrient losses in runoff. This research is part of a larger USDA-National Institute for Food and Agriculture (NIFA) funded project with the aim of providing guidance for agricultural management practices with the goal of protecting water quality in Midwest agroecosystems.

Project Tasks

Collection of lysimeter and runoff water samples from Arlington Research Station field site
Water sample nutrient analysis (we will teach you how to conduct the analysis)
Maintaining operation of soil temperature and moisture probe array, collection of array data
Correlation of sensor data with water nutrient data.

Required knowledge, skills & abilities

basic chemistry skills and a willingness to do combination of laboratory and field work and data analysis

Preferred knowledge, skills & abilities

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN22**

Elucidating the physiological impacts of per- and poly fluoroalkyl substances (PFAS) on non-target species in aquatic environments.

Mentor: Gavin Dehnert

Contact email: dehnert2@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: PFAS, Fish, Birds, Endocrinology, Physiology

Project Description

Per and poly-fluoroalkyl substances (PFAS) are a large group of man-made organic chemicals that have been used in numerous industrial and consumer applications. PFAS can enter aquatic ecosystems throughout the Great Lakes Region and have detrimental impacts on non-target organisms (e.g., fish, birds, mammals). This research project will explore a variety of physiological (e.g., respiration, enzyme levels, etc.) and endocrinological endpoints (e.g., reproductive hormones, growth hormones, immune function, etc.) endpoints. across different aquatic species (e.g., fish and birds). The goal of this project is to understand how varying concentrations of PFAS can impact physiological and endocrinological of fish and bird species native to Wisconsin using field samples.

Project Tasks

Sample prep, tissue extractions, Eliza assays, data analysis.

Required knowledge, skills & abilities

Pipetting Skills, Lab Bench Skills

Preferred knowledge, skills & abilities

Eliza Assays, Tissue Extractions

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN23**

Contributions of blue green algae (cyanobacteria) to freshwater quality

Mentor: Trina McMahon

Contact email: trina.mcmahon@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: water quality, bacteria, algae, eutrophication

Project Description

The McMahon lab has been studying harmful blue-green algae (cyanobacteria) blooms in Lake Mendota for 16 years. A summer student would continue this work through a combination of field work and lab work. The student will be a member of our summer Lake Mendota Microbial Observatory field crew that collects samples twice weekly, weather permitting. The student will learn basic methods to measure water quality. Under the mentorship of a PhD students in Genetics, the summer student will collect water samples specifically for isolating cyanobacteria. The student will learn how to prepare selective culture media, to maintain cultures on both solid media (agar) and in liquid. They will also learn how to identify cyanobacteria using a microscope. This work will contribute to our broader understanding of how cyanobacterial communities change across the summer season, with implications for production of potent toxins and degrading water quality.

Project Tasks

Assisting with field sampling in a boat, microscopy to identify cyanobacteria in lake water, instrument calibration, data entry

Required knowledge, skills & abilities

NA

Preferred knowledge, skills & abilities

pipetting, simple chemistry, comfort with boats and field work

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **MSN24**

Social Science to Support Aquatic Invasive Species Prevention

Mentor: Tim Campbell

Contact email: tim.campbell@wisc.edu

Institution: University of Wisconsin - Madison

Location: Madison, WI

Keywords: outreach, social science, survey, creative writing, communications

Project Description

Aquatic invasive species negatively impact Wisconsin's environment, economy, and way of life. Outreach and behavior change programs are the primary ways by which natural resource management professionals help people prevent the spread of invasive species while also managing their impacts. These outreach and behavior change programs include many communication efforts that rely on figurative language and metaphors to communicate the impacts of invasive species to people that are less engaged in the topic. However, militaristic and nativist language are often used within invasive species communication and can have unintended, often unhelpful, consequences. To further explore this idea, we would like to generate multiple short stories about a single invasive species scenario that all use different message frames to test message frame impact on intended behaviors and invasive species management actions. The project will involve some creative writing and basic social science techniques, including questionnaire development and interviewing. In addition to this project, there will be opportunities to help with other local invasive species prevention projects, including boater education events and pet rehoming efforts.

Project Tasks

1) develop an understanding of different message frames used in invasive species communication, 2) writing short stories using message frames 3) administering a pilot survey to students 4) administering a survey to boaters 5) writing up a short report of the findings

Required knowledge, skills & abilities

Enthusiasm for communication and social science

Preferred knowledge, skills & abilities

Creative writing, experience with surveys, communications experience

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **OSH01**

Microcystin Monitoring and Analysis throughout Northeast Wisconsin

Mentor: Greg Kleinheinz

Contact email: kleinhei@uwosh.edu

Institution: Univeristy of Wisconsin - Oshkosh

Location: Oshkosh, WI

Keywords: Microcystin, Blue-green algae, lab analysis, field collection, Microcystis

Project Description

This project will assist in the collection and analysis of nearshore water samples for microcystin (Cyanobacterial toxin) and compare rapid in-situ methods with these traditional laboratory methods. Microcystin is a cynanbacterial toxin that is often found in what are popularly called blue-green algae growth events. The project will involve both field and laboratory work and will allow the mentee to also explore other water analyses for various water constituents as well as learn field collection techniques. Primarily, the mentee will learn the techniques for collection of microcystin, analysis of samples for microcystin concentration using established laboratory techniques, as well as using in-situ direct measurements of indicator chemicals. The comparison of in-situ rapid measurements with laboratory data will help establish better field methods that can help indicate the presence of cyanobacterial toxins.

Project Tasks

Field collection of water samples for various components. Field measurements of water quality parameters. Lab analysis of various water components. Opportunity to conduct E.coli, ICP, AA, discrete analyzer, ELISA, and other methods on various water samples.

Required knowledge, skills & abilities

Basic lab skills. Drivers license. Good communication skills.

Preferred knowledge, skills & abilities

Field sampling experience. Willingness to learn.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **OSH02**

Comprehensive Water Lab and Field Training Experience

Mentor: Greg Kleinheinz

Contact email: kleinhei@uwosh.edu

Institution: Univeristy of Wisconsin - Oshkosh

Location: Oshkosh, WI

Keywords: Water analysis, E.coli, laboratory, field collection, certified, training

Project Description

If you are looking to learn many of the laboratory and field methods associated with water testing this is the opportunity for you! As part of this project you will undertake a rotation in the Environmental Research and Innovation Center (ERIC) that will allow you to learn the most commonly used water testing laboratory methods. The ERIC is a state-certified laboratory for various chemicals, microbiological, and specialized testing for both surface and ground water. As a result the ERIC uses the most contemporary methods of water analyses that are used throughout the United States. You will learn standard method SOPs and rotate between various areas of the lab to learn standard methods such as defined substrate coliform and E.coli testing, discrete analyzer analyses for nitrate, total phosphorus, and total Kjeldahl nitrogen (and more), ICP for various metals and elements, atomic adsorption for arsenic and lead in drinking water, total organic carbon, and FTIR for microplastics. In addition to laboratory analyses you will have the opportunity to conduct field sampling for surface water and in drinking water systems. You would be based in Oshkosh, WI, but will have the opportunity to travel to field sites to conduct beach and water well system sampling with field groups in Door and Vilas Counties. Depending on the candidate's interest they could join a field group full-time for the summer experience.

Project Tasks

Lab and field analyses of water samples from surface and groundwater sources.

Required knowledge, skills & abilities

Willingness to learn. Willingness to work with a team. Valid drivers license for 2+ years.

Preferred knowledge, skills & abilities

Lab experience is helpful but not required.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **PAR01**

Evaluating Habitat Suitability for Hine's Emerald Dragonfly (Somatochlora hineana) in Southeastern Wisconsin.

Mentor: Jessica Orlofske

Contact email: orlofske@uwp.edu

Institution: University of Wisconsin - Parkside

Location: Kenosha, WI

Keywords: insects, dragonflies, freshwater invertebrates, crayfish, wetland ecology, invertebrate ecology, vegetation surveys, conservation biology endangered species

Project Description

The Hine's Emerald Dragonfly (HED, Somatochlora hineana) is a federally endangered species in the United States. The current range of HED in Wisconsin is restricted to areas of the Door County peninsula with additional records from Iowa, Ozaukee, Richland, and Rock Counties. The unique habitat requirements and life history of the HED make it particularly vulnerable to extirpation and extinction. Specifically, the HED favors shallow groundwater-supported wetland (i.e., fen) habitats where nymphs require multiple years (4-5) to fully develop prior to emergence. To survive with this combination of a long development period and a shallow, sometimes temporary, habitat, dragonfly nymphs require refugia. Thus, the HED cohabitates with burrowing crayfish, specifically the Great Plains Mudbug (Lacunicambarus nebrascensis) to avoid inhospitable conditions. Therefore, suitable habitat for this endangered species includes appropriate hydrology, wetland vegetation, and the presence of other invertebrate species not only for food but also for shelter.

This study will evaluate the hydrologic and biological habitat component for supporting HED at a high-quality prairie wetland complex, the Chiwaukee Prairie State Natural Area (Kenosha County), and adjacent habitat managed by the Wisconsin Department of Natural Resources and many additional partners, including the Lake County Forest Preserves and the Nature Conservancy.

Project Tasks

In collaboration with project leads and partners, the mentee will quantitatively assess the essential features for larval HED according to US Fish and Wildlife Service criteria, specifically:
•Collecting and interpreting available soil and hydrologic data for the survey sites
•Using existing wetland plant and invertebrate community data to develop a list of priority survey locations
•Geolocating crayfish burrows in the field
•Pumping crayfish burrows and identifying freshwater invertebrates from pumping samples (in field and/or in the laboratory)
•Catching and identifying crayfish
•Documenting vegetation characteristics, including herbaceous and woody vegetation
•Maintaining detailed field and laboratory data suitable for statistical analysis

Additional responsibilities of the mentee include:
•Calculating preliminary descriptive statistics for physical, chemical and biological parameters
•Participating in field trips and meetings with partners, including US Fish and Wildlife Service, Lake County Forest Preserves, Forest Preserve District of DuPage County, Genoa National Fish Hatchery, University of South Dakota, and other stakeholders.
•Contributing to potential captive rearing efforts for Hine's Emerald Dragonfly and / or Great Plains Mudbug
•Collaborating with other students (graduate and undergraduate) in the lab

Required knowledge, skills & abilities

- Ability to follow directions and respect safety rules
- Ability to follow protocols carefully and work independently following training
- Willingness to work in prairie and wetland habitat in a variety of weather conditions
- Ability to carry up to 20 pounds of equipment into the field (across uneven surfaces)
- Comfortable handling live invertebrates

Preferred knowledge, skills & abilities

- An interest in wetland ecology, invertebrate ecology, and/or conservation biology

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.

Project Code **SP01**

Removal of PFAS from Water using Metal-Organic Framework Materials

Mentor: Joseph Mondloch **Contact email:** jmondloc@uwsp.edu

Institution: University of Wisconsin - Stevens Point

Keywords: Chemistry, PFAS, Water

Location: Stevens Point, WI

Project Description

Per- and poly-fluoroalkyl species, aka PFAS or "forever chemicals", are a class of man-made chemicals with useful properties that make them attractive for a variety of consumer products. Unfortunately PFAS persist in the environment and cause adverse health effects. This project aims to create novel porous solids (think molecular sponges) and understand how they soak up PFAS from water. Students will learn experimental methods in the synthesis of porous solids as well as their characterization via powder X-ray diffraction, nitrogen adsorption analysis, and thermogravimetric analysis. Student will also use nuclear magnetic resonance and liquid chromatography to do aqueous analytical PFAS chemistry.

Project Tasks

Synthesis and characterization of porous materials. Analytical PFAS chemistry.

Required knowledge, skills & abilities

Completed one year of general chemistry at the college level. Interest in chemistry research. Willingness to work in the lab.

Preferred knowledge, skills & abilities

Completion of one semester of analytical chemistry and one semester of organic chemistry. Prior research experience.

Note to applicants: These skills are helpful, but are not requirements. Most can be taught or trained, so if you have a strong interest in this project but lack these skills, you should still apply.