Jim and Katie Krause
CNR Student Research Symposium
Friday April 9, 2021

College of Natural Resources
University of Wisconsin-Stevens Point

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University of Wisconsin-Stevens Point

Jim and Katie Krause CNR Student Research Symposium

This booklet and event have been made possible by support from the James and Kathleen Krause Student Research Endowment

Booklet Layout: Avantika D'Cruz
Booklet Editing: Avantika D'Cruz and Dan Connolly
Cover Photo: Tyler Brasington

MISSION

The University of Wisconsin-Stevens Point College of Natural Resources provides education, research and outreach in integrated natural resources management, environmental education, and in paper science and engineering. The College of Natural Resources:

1. Provides undergraduate and graduate instruction that combines theoretical concepts with practical experience, such as laboratory and field oriented courses, internships and special projects;
2. Promotes scholarly activities that enhance the creation or application of knowledge or contributes to the resolution of environmental and natural resource management issues, especially through student research.
3. Shares faculty and student expertise with citizens, communities, agencies and industries through outreach, scholarship, and consulting.

PHILOSOPHY

The University of Wisconsin-Stevens Point College of Natural Resources embraces the philosophy of integrated natural resource management. All students in the college, regardless of major, need to understand and appreciate relations between natural resources and human needs. They need to understand the scientific method and its application to environmental problem solving. Critical thinking and problem solving strategies based on integrated resource management and education will be promoted though the college's teaching, scholarship, and outreach activities.

The college is composed of faculty, staff, and students, each with their own expertise, strengths, attitudes, and values. This diversity contributes to the education offered by the college because of our integrated philosophy. Responsibilities and appointments vary among college faculty and staff. Most have teaching appointments, some have extension appointments, while others serve mainly in research or administrative capacities. Faculty and administrators will capitalize on the strengths and diversity of College personnel to promote integrated resource management through teaching, scholarship, and outreach.

IMPORTANT NOTE:

Due to the ongoing COVID-19 pandemic, the Jim and Katie Krause CNR Student Research Symposium has been converted to a mostly online digital presentation format.
Links to the presentations may be found at:
https://www.uwsp.edu/cnr/StudentSymposium

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Acknowledgments

Special thanks to all those who helped make this year's event possible:

- Dean Brian Sloss
- Chancellor Thomas Gibson
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- Jake Smith - Financial and Purchasing
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- CNR and Biology Faculty - Mentoring and Support
- Volunteer Evaluators and Moderators
- Tom Charlesworth - Photography
- Symposium Support Volunteers
- Dr. Andy Felt, and the Math 310 Operations Research Class - Developed Judge Sorting Algorithm
- Steve Menzel for 22 years of making the symposium great, Happy Retirement

Clive A. David Memorial Research Scholarship Award

Dr. Clive A. David was a driving force in establishing the CNR Student Research Symposium in 2000 (now called the Jim & Katie Krause CNR Student Research Symposium). Dr. David passed away in November 2004 after a lengthy illness. He taught in the CNR from 1989 – 2003 and was considered by his colleagues and students a true champion of student research and cutting edge technology. His leadership and vision were important in making the symposium a success. Throughout his years of teaching, Dr. David encouraged participation in undergraduate research. Some of his projects related to deforestation and soil erosion prevention, windbreaks, and solid waste. Dr. David's excellence in teaching was recognized several times during his career by both colleagues and students, including being named a UW- System Teaching Fellow in 2000.

This award is funded by the Clive and Beverley David Research Scholarship Endowment, made possible through generous gifts in Clive's Memory from the David family, alumni, and friends.

The 2021 recipient of the Clive A. David Memorial Research Scholarship is::

Natalie Coash

Hometown: Ada, MI
Major: Fish and Water Resources/Fisheries and Aquatic Sciences

Completed projects:

- Oral presentation: Midwest Fish and Wildlife Conference, St Paul, MN, Virtual – Brook Trout spawning research (February 2021)
- Oral presentation: Wisconsin Chapter - American Fisheries Society Conference, Virtual (February 2021)- 2021 Best Student Oral Presentation - "Phenology and Habitat Utilization of Spawning Brook Trout in the Little Plover River WI"
- Poster presentation: Wisconsin Chapter - American Fisheries Society Conference, Eau Claire, WI (February 2020)
- Poster presentations: UWSP College of Natural Resources Jim and Katie Krause CNR Student Research Symposium:
  - » 2019 – Honorable Mention Poster – "Location and Timing of Spawning Brook Trout in the Little Plover River"
  - » 2020 Highest Honors Poster - "Location and Timing of Spawning of Brook Trout in the Little Plover River, WI"

"Natalie is the whole package as she has excelled in research, coursework, and as a leader…I am confident she will make a difference in natural resources, and that she truly embodies the characteristics of this prestigious award."

-Dr. Joshua Raabe

University of Wisconsin
Stevens Point

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April 9, 2020

Welcome to the 22nd Annual Jim and Katie Krause CNR Student Research Symposium! You are about to participate in a rich tradition at the University of Wisconsin-Stevens Point, one that is both an educational experience and an academic celebration.

Student participants—I trust you will find the symposium to be one of your most memorable learning experiences. This year you will be participating in a mostly ***virtual*** edition of this event in response to the coronavirus pandemic we are all facing. I am so proud of your ingenuity and determination to pull this off!

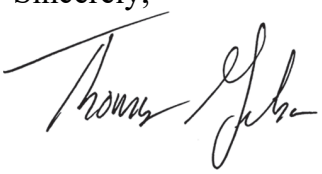
I have no doubt your research will enhance the academic value of your overall education at UW-Stevens Point. You have gained a greater understanding of the world around you, a deeper learning of the subject matter taught in your classes and possibly the opening of new opportunities beyond college.

Virtual attendees and observers, please join me in applauding the drive and initiative of these students, especially their efforts to convert their presentations to an online format. Even during these difficult times, the students and their work represent exactly what our university means when we encourage our students to *"**Discover Your Purpose**."*

Whether you are here to make a presentation or to witness them, you will be participating in the celebration of these academic achievements. This is a special opportunity for students to share the results of their hard work participating in investigations, projects and research activities. This year's event features an outstanding group of student researchers representing projects from across CNR majors, a fitting tribute to the level of faculty and student collaboration in and out of the classroom at UW-Stevens Point. Thank you to the faculty members for their mentorship to our students.

Welcome, and congratulations to all of you! I wish you success in presenting your work today and at future symposiums and conferences.

Sincerely,



Thomas Gibson, Ed.D.
Chancellor

University of Wisconsin-Stevens Point
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715-346-4617; Fax 715-346-3624

April 9, 2020

Welcome to the College of Natural Resources! As the College of Natural Resources celebrates its 50th Anniversary, I am pleased to present the 22nd annual Jim and Katie Krause CNR Student Research Symposium, featuring and celebrating the scholarly achievements of many of UWSP's finest natural resource students.

Congratulations to our student participants, not only for taking the time and initiative to extend their learning beyond the traditional classroom by depicting their research contributions in these excellent poster and oral presentations, but also for their creativity in adapting their work to a virtual format in light of the pandemic! Student participants are building on the knowledge and skills they develop within the College's multi-discipline and integrated curriculum that emphasizes practical and in-the-field learning opportunities. These experiences will help prepare these students for rewarding careers, and ultimately may empower and inspire them to be effective leaders for solving natural resource challenges in the communities they will serve.

Special thanks and congratulations to our Symposium planning committee for their ingenuity and resolve in providing this event in a virtual, on-line format. One of the few symposia of its kind that is planned and organized by students – this year's event features another large turnout of participants: over 85 students presenting 37 poster presentations and 16 oral presentations. This continues a long tradition of success at this annual event. Since 2000, more than 1,400 CNR students who have presented research results in posters and oral presentations at this event.

We salute participants for their excellence in critical thinking, inquiry, research and communication demonstrated in the abstracts contained in this booklet and in their virtual presentations prepared for this event. Let us also recognize the outstanding faculty members who have mentored and motivated students to do their best.

Finally, special thanks to Dr. Jim Krause (BS-Biology, '74) and his wife, Kathleen "Katie" (BS-Mathematics, '75), whose 2017 endowment gift makes this event possible. We are grateful for their belief in the value of higher education, undergraduate research, their alma mater, and the beautiful natural resources of their home state of Wisconsin.

Thank you for participating in this wonderful celebration of scholarly achievement and hands-on, experiential learning. Enjoy the day!

Brian L. Sloss
Dean and Professor of Fisheries and Aquatic Science

From the Student Research Symposium Committee...

Welcome to the 22nd annual University of Wisconsin-Stevens Point Jim and Katie Krause CNR Student Research Symposium. This year's program features students who have invested considerable time conducting research in areas such as fisheries and water resources, forestry, human dimensions of natural resource management, paper science and engineering, soil and waste management, and Wildlife Ecology and Management. The symposium allows students to present data they have collected, explored, and analyzed during the course of their research. Faculty mentors played an essential role in guiding students through the process in a spirited and educational fashion which expands beyond the traditional bricks and mortar of the classroom.

As we proceed with this year's poster and oral presentations, we honor the memory of Dr. Clive A. David, a true friend to students and faculty. David was extremely significant in building and strengthening the undergraduate research program. Although he passed in November 2004, Dr. David's influence remains to this day. The positive atmosphere he fostered created a venue for students to learn to conduct and present their research. The hundreds of students who have benefited from the symposium over the past 22 years can credit Dr. David for his pioneering efforts.

This year is among the highest for student participation, due largely to the students' initiative, faculty encouragement, and other sources of support including the work of the Student Research Symposium Committee. Our constant challenge is to meet the needs of the student presenters and promote and encourage participation in research and the symposium all year long.

We would like to thank our primary benefactors, Jim and Katie Krause, all of our volunteer evaluators, faculty and staff members in the CNR and Biology department, CNR student organizations, Dean Brian Sloss, Chancellor Thomas Gibson, and the UW-Stevens Point administration.

Congratulations to all our student presenters. Your work is truly outstanding! Our hope is that today can be as enjoyable as it is educational for you, and that you inspire more students to step up to the challenge of undergraduate research.

Cheers,

CNR Student Research Symposium Committee

Amber Smith (Chair), Brady Roberts (Vice Chair/Secretary), Kaylee Woelfel (Web Designer), Sam Andres (Judge Liaison), Jacob Tepsa (Communications Coordinator), Anna Mathews (Logistics Coordinator), Avantika D'Cruz (Booklet Manager), Dr. Richard Hauer (Advisor), Dr. Rob Michitsch (Clive A. David Award Chair), Alyssa Gunderson (Coordination and Moderation), Dan Connolly (Logistics and Good Humor), Steve Menzel (Engagement and Fundraising)

Oral Presentations

Presenters	Title
Carter Freymiller, Luke Trittelwitz	Frequency of *Leucocytozoon* spp. Blood Parasites Found in Red-shouldered Hawk (*Buteo lineatus*) Adults and Nestlings in Central Wisconsin
Colby Powers	Factors affecting the presence of invasive buckthorn (*Rhamnus cathartica* & *Frangula alnus*) in Wisconsin school forests
Bethany Brownfield, Shannon O'Fallon	Effectiveness of Native Plant Regeneration after Glossy Buckthorn Removal and Treatment in Schmeeckle Reserve
Tim Lamourex	Graphene-Based Materials in Wastewater Treatment
Natalie Coash	Phenology and Habitat Utilization of Spawning Brook Trout in the Little Plover River, WI
Rachel Valeria and Logan Cutler	Effects of Riparian Habitat on Diets of Brook Trout in the Little Plover River, Wisconsin
Lydia Martin	Effects of Fire on Flowering of Two Prairie Forbs
Casey Kroening	Waterfowl Distributions and Habitat Use on Pool 8 of the Mississippi River During Autumn Migration
Arthur Young	Influence of hard mast production on bait site visitation frequency of Ursus americanus
Shelby Truckenbrod	Evaluating Wild Turkey Brood Activity Levels in Wisconsin Using Snapshot Wisconsin Trail Camera Images
Cole Suckow, Carter Freymiller, Aiden Gehrke, Madison Fell, Nicole Luoma, Sophie Reid	Compared Morphometrics of Northern Saw-Whet Owls (*Aegolius acadicus*) Trapped in Sandhill Wildlife Area and Schmeeckle Reserve.

Poster Presentations

Presenters	Title
Marcie Nelson	Potential GHG Emissions Reductions From Biogas in Wisconsin
Ryan Michalesko	Geospatial Analysis of Residential Sector Greenhouse Gas Emissions and the Carbon Sequestering Properties of Local Natural Spaces
Katie Livernash, Jeffrey Lim, Ryan Michalesko	Climate Resilient Menu for Wisconsin Communities: Built and Natural Environment
Sean Lapano, William Hutt	The Effect of Community Health on Community Resilience
Danni Brosend, Gregory Peterson	Resilient Wisconsin Menu: Agriculture and Food Systems Subtheme
Adam Laehn, Mark Cook	Can Permanganate Oxidizable Carbon Help Draw Differences Between Ecological Site Descriptions?
Calvin Dee	Resilient Wisconsin Menu, Energy and Efficiency sub-theme
Dylan Doporcyk	Invasion of Buckthorn Over Time
Steven Krueger	Schmeeckle Oak Savanna Restoration
Hannah Lukasik	Using Acesulfame to Determine Septic System Impact to Wisconsin Lakes
Nicholas Koschak	The Potential for Inter-planting to Reduce Nitrate Leaching to Groundwater in Agriculture Farm Fields in Central Wisconsin
Isabel Dunn	Benthic Macroinvertebrate Community Responses to Wastewater Treatment Plant Discharges in Central Wisconsin
Kennan Foley	Brook Trout Movement and Habitat Use in the Little Plover River, Wisconsin
Rachel Valeria, Logan Cutler	Effects of Riparian Habitat Type on Macroinvertebrate Drift in the Little Plover River, Wisconsin
Andrew Johnson, Natalie Coash	A Comparison of Brook Trout Diel Movement Patterns to Spawning Activity and Other Environmental Factors

(Posters continued)

Presenters	**Title**
Arua de Catro Ferreria, James O'Shea, John Haas, Shannon O'Fallon	Will Plant Diversity Improve Soil Quality and Maximize Carbon Storage in a Prairie Restoration?
Emily Yulga, Candra Carter, Noelle Vallee	Analysis of Key Soil Nutrients and Physical Properties on a Managed Grazing Operation in Junction City, WI
Teresa Wolf, Hunter Lemler, Emily Yulga, Jacon Buettner	Soil Organic Matter Can Predict Soil Color in Wisconsin Central Sands Region
Allison Luebke, Nicolle Lueck, Gina Magro	Parasite Communities in Populations of Greater and Lesser Scaup in Green Bay, WI
Jonathon Sicinski, Avantika D'Cruz, Rachel Dooley, Hannah Klopotek, Parker Witt	Anomalously High Activity of Little Brown Bats (*Myotis lucifugus*) on Chambers Island, Door County, WI
Reece Muellen, Michaela Meehl	Utilizing Molecular Phylogenetic Analyses to Identify Helminth Communities of Waterfowl
Ellianne Heilhecker, Casey Kroening, Aiden Gehrke, Victoria Fasbender	Selection of Nest Boxes by Cavity Nesting Waterfowl Based on Diameter at Breast Height in Mead Wildlife Area
Lauren Welvaert	The Effects Separation Have on the Behavior of Captive African Wild Dogs (*Lycaon pictus*) at the Dallas Zoo, Dallas, Texas
Cole Suckow, Carter Freymiller, Aiden Gehrke, Madison Fell, Nicole Luoma, Sophie Reid	Comparison of Northern Saw-whet Owl (*Aegolius acadicus*) Frequency and the Prey Availability in Schmeeckle Reserve
Jacob Bergstrand, Samuel Andres, Dan Ruka, Ashley Skalitzky, Hayden Walkush	Post-Release Movement and Behavior of Rehabilitated Orphan Black Bears
Emmaline Belling, Allison Anthony	Comparing Mercury Levels of Red-Shouldered Hawks to Body Condition in Central Wisconsin
Melinda Houtman	Intoxication Cases in Passerines and Near-passerines Through Eight Years of Avian Rehabilitation in Northern Wisconsin
Jacob Bergstrand	The Influence of Prescribed Burning on Small Mammal Diversity
Brady Roberts, Logan Cutler, Catrina Johnson, Phullip Maguire	Preliminary Study into how Cover Type Adjacent to Home Range Affects Drumming Patterns in Ruffed Grouse (*Bonasa umbellus*) in Northern Wisconsin

(Posters continued)

Presenters	**Title**
Joseph Cannizzaro, Sara Haroldsen	The Habits and Behavior of a Captive Alligator snapping Turtle (*Macrochelys temminckii*) Before and After an Enclosure Renovation
Nicole Luoma, Maddie Hartlaub, Rebecca Funk, Noah Andexler, Kaylee Woelfel, Adam Tess	Population Estimate of Urban Eastern Gray Squirrels in Schmeeckle Reserve
Carter Freymiller, Aiden Gehrke, Madison Fell, Michaela Meehl, Cole Suckow	Population Estimate of Urban Eastern Gray Squirrels in Schmeeckle Reserve
Marinn Champenau, Alyssa Johnson, Sam Sodke	Occupancy Modeling of Southern Flying Squirrels (*Glaucomys volans*) in Schmeeckle Reserve
Tess Bigalke, Amber Smith, Katie Stough	Capture Probability of Female and Male Southern Flying Squirrels in Schmeeckle Reserve
Amber Smith, Susanna Baker, Alex Thomas, Johnathan Girard	Composting Deactivation of CWD Prions: Preliminary Results
Brilyn Brecka, Jeffrey Edwards, Beau Schartner	Wildlife-vehicle Collision Frequency of White-tailed Deer (*Odocoileus virginiarius*) in Association with Temporal Variation in Central Wisconsin
Colby Powers	Factors affecting the presence of invasive buckthorn (*Rhamnus cathartica* & *Frangula alnus*) in Wisconsin school forests
Bethany Brownfield, Shannon O'Fallon	Effectiveness of Native Plant Regeneration after Glossy Buckthorn Removal and Treatment in Schmeeckle Reserve

Potential GHG Emissions Reductions From Biogas in Wisconsin

Marcie E. Nelson
Paper Science and
Chemical Engineering Major

Biogas is a renewable energy resource that results from the breakdown of organic matter in the absence of oxygen, producing a gas similar to natural gas containing methane and carbon dioxide. Its production offsets methane emissions—having 21 times the warming impact of carbon dioxide over a 100-year time frame— that would have occurred through the degradation of organic materials into the atmosphere, and its combustion and use as an energy resource offsets carbon dioxide emissions that would result from fossil fuel energy use. There are many other benefits of biogas production including useful coproducts, economic opportunity, and increased energy independence that are outside the scope of this study. Wisconsin is an excellent candidate for biogas production due to its large agricultural, dairy, and food processing sectors.

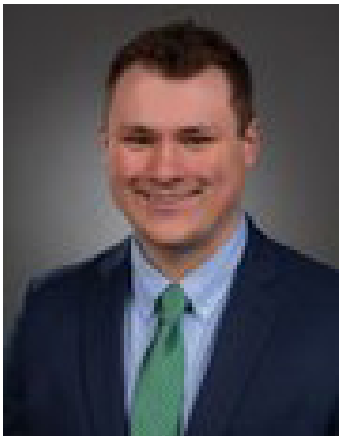
To the knowledge of the researcher, no study has assessed the total energy benefits and emissions reductions potential of biogas production and use in Wisconsin. This study aims to address this information gap through the performance of a mathematical aggregate analysis of the amount of fossil fuel electricity generation and greenhouse gas emissions that could be avoided through biogas production and use in Wisconsin.

This study draws conclusions of total electricity generation and emissions reductions potentials from biogas in Wisconsin from the comparison of two scenarios: 1) Emissions from organic material degradation from sources including manure, wastewater, industrial food processing waste, and landfills and emissions from coal fired electricity generation continue as usual and 2) Biogas is produced and used for electricity generation, replacing emissions in Scenario 1 with the lesser emissions resulting from the combustion of biogas.

It is hypothesized that the study will reveal a significant decrease in greenhouse gas emissions and that emissions reductions will be accompanied by an increase in renewable energy electricity generation for Wisconsin. This study may show that biogas potential in Wisconsin has been undervalued by policymakers, and that this value should be reflected in Wisconsin energy policy through further incentivizing biogas production across Wisconsin's economic sectors.

Advisor: Dr. Shiba Kar
Poster
Consider for Judging

Geospatial Analysis of Residential Sector Greenhouse Gas Emissions and the Carbon Sequestering Properties of Local Natural Spaces



Ryan Michalesko
Natural Resources Planning Major

The residential sector on average makes up about a quarter of Wisconsin's total energy consumption (Energy Information Administration, 2018). Furthermore, Wisconsin ranks in the top three states for highest total energy consumption and the top ten for carbon dioxide emissions per square meter of residential space, according to data analyzed by researchers at the University of Michigan (Goldstein et al., 2020). The concept of local greenhouse gas inventory is ever evolving and often unreliable at the community scale. Since many of the mitigation efforts aimed at lowering and offsetting emissions are local in nature, it is crucial to gather data at this level. This project serves as a case study to develop a workflow to find community specific residential emissions information through remote sensing and geospatial dataset analysis. Using building footprint and height data from nearly 6,700 residential buildings, collected through geospatial analysis, this study illustrates the role that the residential sector plays in greenhouse gas emissions of Stevens Point, Wisconsin. Additionally, by classifying the land cover types of area natural spaces, a comparison of emissions totals and the offsetting benefits of tree cover is possible. This analysis at the community level provides another data point for use when prioritizing strategic planning and conservation decisions.

Advisor: Dr. Shiba Kar and Dr. Anna Haines
Poster
Consider for Judging

Climate Resilient Menu for Wisconsin Communities: Built and Natural Environment

Katie E. Livernash'
Geospatial Sciences Major

Ryan Michalesko
Natural Resources Planning Major

Jeffrey Lim
Wildlife Ecology and Management

The Resilient Wisconsin Menu (RWM) project is an interactive and comprehensive framework for Wisconsin communities to utilize in order to enhance resilience to the impacts associated with disruptions from climate change and other systemic shocks. The RWM is a collaboration of the project team throughout UW-Extension offices and student researchers at UW-Stevens Point. The goal of the project is to help communities identify critical elements within multiple themes, that when implemented, will increase their capacity to adapt to shocks and changes while being cost-effective and sustainable. Using a lens of equity and culture, the assessment will be organized into the following themes that contribute to community resilience: food and agricultural systems, built and natural environment, and energy systems. The RWM includes a self-assessment for communities to conduct to identify strengths and gaps in local systems and guides communities to resilience and preparedness concepts and actions. The RWM also includes a menu offering flexible approaches that will allow decision-makers to select strategies to build a customized resilience response that makes sense for their community's unique environment, culture, and economy. Climate change impacts, such as increased drought and flooding, will be felt across WI communities, many of which may be vulnerable to and unaware of impacts. Other publications (Tribal Climate Adaptation Menu, 2019) (Wisconsin's Changing Climate: Impacts and Adaptation, 2019) have sought to address this gap in readiness, but none that are so flexible to the needs of each specific Wisconsin community. For this poster, we will present the Built and Natural Environment sub-theme of the RWM. We have used resources from around the state and nation to create an assessment and compile a menu of possible strategies and supporting materials. We have structured the sub-theme around temperature and precipitation conditions, highlighting the corresponding impacts that will occur with fluctuations in precipitation and temperature that effect the diverse livelihoods and ecosystems of the surrounding built and natural environments. The RWM will be distributed through the UW-Extension system by using "Train the Trainer" workshops and will be made accessible via a website for community use to be more climate resilient.

Advisor: Dr. Shiba Kar and Dr. Anna Haines
Poster
Consider for Judging

The Effect of Community Health on Community Resilience

Sean A. Lapano
Natural Resources Planning Major

William M. Hutt
Natural Resources Management Major

The ever-growing COVID-19 pandemic in America has given rise to many different social issues such as homelessness, health problems, and economic inequality. Past research has found that community resilience is a complex idea stretching across many different disciplines. The question the study aims to answer is what is the size of impact that current personal health/community health has on the resilience of the community? We already know of the impact that things such as infrastructure or economic stability has on community resilience. However, what is less studied is the impact of personal health issues such as obesity or drug usage on community resilience. To test the hypothesis that counties with lower health face more severe impacts from COVID-19, information was gathered from counties across the upper Midwest from their recent Community Health Improvement plans (CHIP). The findings are then compared with the metrics of how each county is affected by the current pandemic. Using different time frames from the beginning of the pandemic it is clear to see and chart how well a county is responding to the pandemic. We expect to see a negative correlation between counties with lower overall health and the increased impacts of COVID-19, however, the study is not yet complete.

Advisor: Dr. Anna Haines
Poster

Resilient Wisconsin Menu: Agriculture and Food Systems Subtheme

Danni Brosend
Wildlife Ecology and
Management Major

Gregory Peterson
Environmental Education
and Interpretation Major

The Resilient Wisconsin Menu (RWM) project is an interactive and comprehensive framework for Wisconsin communities to utilize in order to enhance resilience to the impacts associated with disruptions from climate change and other systemic shocks. The RWM is a collaboration of the project team throughout UW-Extension offices and student researchers at UW-Stevens Point. The goal of the project is to help communities identify critical elements within multiple themes, that when implemented, will increase their capacity to adapt to shocks and changes while being cost-effective and sustainable. Using a lens of equity and culture, the assessment will be organized into the following themes that contribute to community resilience: food and agricultural systems, built and natural environment, and energy systems. The RWM includes a self-assessment for communities to conduct to identify strengths and gaps in local systems and guides communities to resilience and preparedness concepts and actions. The RWM also includes a menu offering flexible approaches that will allow decision-makers to select strategies to build a customized resilience response that makes sense for their community's unique environment, culture, and economy. Climate change impacts, such as increased drought and flooding, will be felt across WI communities, many of which may be vulnerable to and unaware of impacts. Other publications (Tribal Climate Adaptation Menu, 2019) (Wisconsin's Changing Climate: Impacts and Adaptation, 2019) have sought to address this gap in readiness, but none are so flexible to the needs of each specific Wisconsin community. For this poster, we will present the Food and Agricultural Systems subtheme of the RWM. We have used resources from around the state and nation to create an assessment and compile a menu of possible strategies and supporting materials. We have created the food and agricultural systems subtheme around the following topics: soil and water management, farm energy systems, food availability, food waste management, and climate-and-farm-friendly food systems. The RWM will be distributed through the UW-Extension system by using "Train the Trainer" workshops and will be made accessible via a website for community use to be more climate resilient.

Advisors: Dr. Shiba Kar and Dr. Anna Haines
Poster
Consider for Judging

Can Permanganate Oxidizable Carbon Help Draw Differences Between Ecological Site Descriptions?

Adam Laehn
Soil Science and Land Management Majors

Mark Cook
Chemistry Major

Ecological site descriptions (ESD) are based on soil properties and distinctive types of vegetation. These ESDs relate ecosystem dynamics of natural succession and/or human management. Soil organic matter may be an optimal property to understand ESD dynamics. However, much of SOM is recalcitrant and a labile portion of the total SOM pool may better indicate ESD dynamics. Permanganate oxidizable carbon (POXC) is a labile portion of SOM indicative of soil quality and responsive to disturbance and management. This study will focus on three ESDs in the Central Sands region of Wisconsin. Sandy floodplains occur near streams and lakes and are subjected to frequent flooding periods. Sandy outwash uplands has a broad range of soil characteristics but is characterized by very deep, well drained soils. Acidic poor fen is characterized by very poorly drained soils that have formed in moderate to deep organic materials of herbaceous origin. Total SOM and POXC will be determined on all horizons from five soil pedons in each of these three ESDs. An analysis of variance will be conducted to test whether total SOM and/or POXC differs in these ESDs. We hypothesize that differences in POXC among these ESDs will be greater than differences in total SOM. If this hypothesis is supported, our study will suggest that POXC might be a more indicative soil property to related ESD dynamics.

Advisor: Dr. Bryant Scharenbroch
Poster
Consider for Judging

Resilient Wisconsin Menu, Energy And Efficiency sub-theme

Calvin T. Dee
Natural Resource Planning Option

The Resilient Wisconsin Menu (RWM) project is an interactive and comprehensive framework for Wisconsin communities to utilize in order to enhance resilience to the impacts associated with disruptions from climate change and other systemic shocks. The RWM is a collaboration of the project team throughout UW-Extension offices and student researchers at UW-Stevens Point. The goal of the project is to help communities identify critical elements within multiple themes, that when implemented, will increase their capacity to adapt to shocks and changes while being cost-effective and sustainable. Using a lens of equity and culture, the assessment will be organized into the following themes that contribute to community resilience: food and agricultural systems, built and natural environment, and energy systems. The RWM includes a self-assessment for communities to conduct to identify strengths and gaps in local systems and guides communities to resilience and preparedness concepts and actions. The RWM also includes a menu offering flexible approaches that will allow decision-makers to select strategies to build a customized resilience response that makes sense for their community's unique environment, culture, and economy. Climate change impacts, such as increased drought and flooding, will be felt across WI communities, many of which may be vulnerable to and unaware of impacts. Other publications (Tribal Climate Adaptation Menu, 2019) (Wisconsin's Changing Climate: Impacts and Adaptation, 2019) have sought to address this gap in readiness, but none that are so flexible to the needs of each specific Wisconsin community. For this poster, we will present the Energy and efficiency subtheme of the RWM. We have used resources from around the state and nation to create an assessment and compile a menu of possible strategies and supporting materials. We have created the energy and efficiency subtheme around the following topics: energy education, efficiency, generation, integration, and emission reduction. The RWM will be distributed through the UW-Extension system by using in "Train the Trainer" workshops for educators and will be accessible via a website for community use to be more climate resilient.

Advisors: Dr. Anna Haines and Dr. Shiba Kar
Poster

Frequency of *Leucocytozoon* spp. Blood Parasites Found in Red-shouldered Hawk (*Buteo lineatus*) Adults and Nestlings in Central Wisconsin

Carter Freymiller
Wildlife Ecology and Management Major

Luke Trittelwitz
Wildlife Ecology and Management Major

In Wisconsin, red-shouldered hawks (*Buteo lineatus*) are listed as a threatened species (Wisconsin DNR 2012). Population decline is primarily due to habitat destruction from forestry practices, civilized development, and draining of wetland nesting habitat (Bednarz and Dinsmore 1982, Jacobs and Jacobs 2002, McLeod et al. 2000). Population declines in the genus *Buteo* may be attributed to parasitic infections (Hayes et al., 2019), and red-shouldered hawks nest near forested wetlands where definitive hosts of blood parasites are common. *Leucocytozoon* is an Apicomplexan parasite and either blackflies (*Simulium* species) or a biting midge serve as their definitive host and birds serve as the intermediate host (Nahm et al. 1997). *Leucocytozoon* spp. can cause anorexia, emaciation, and extreme limb weakness (Bates 2004). Little is known about blood parasites of raptors, although previous research on red-shouldered hawks showed that nestlings can be heavily parasitized. Our goal was to determine the baseline prevalence of *Leucocytozoon* in red-shouldered hawks in Central Wisconsin. Red-shouldered hawk nests were located from March to May 2020 and sampled while nestlings were still present in June of 2020. Blood samples were taken from adults and nestlings to assess the presence of *Leucocytozoon*. Morphometric data were also taken, including mass, tail length, wing chord, and fat scores. Determining the extent to which red-shouldered hawks are infected with *Leucocytozoon* will help us understand how parasitic loads are changing within the environment and how we can better manage wildlife afflicted by blood parasites.

Advisors: Dr. Shelli Dubay and Matthew Hanneman
Oral Presentation

Invasion of Buckthorn Over Time

Dylan Doporcyk
Ecosystem Restoration
and Management Major

Glossy buckthorn was introduced to the United States in the mid 1800's as an ornamental. Since then, it has become one of the most invasive species in our area. On the north end of UWSP campus lies Schmeeckle Reserve. The Reserve is a 280-acre conservancy area and is overrun with buckthorn. During 2010 and 2018, estimates of aggregate height of buckthorn per acre were completed by students in NRES 457. During spring 2021, these plots were reinventoried. Measurement is ongoing at the time of this abstract. ArcMap will be used to process the data using the Inverse Distance Weighting function to assist in targeting focal areas for future buckthorn management.

Advisor: Dr. Michael Demchik
Poster

Factors Affecting the Presence of Invasive Buckthorn (*Rhamnus cathartica* & *Frangula alnus*) in Wisconsin School Forests

Colby V. Powers
Forest Management Major

Land use and disturbance have both been of rising concern for their role in the invasion of European buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Frangula alnus*), and other exotic invasive species. Buckthorn has long been known to cause many negative forest health problems such as decreased herbaceous biodiversity and decreased forage for native fauna. It can be difficult to control due to its ability to grow in a wide variety of habitat types and environmental conditions. Land use changes have been linked to increases in buckthorn densities in the past, however it has never been conducted on a statewide level in Wisconsin. This study measures common land use factors such as housing density, road density, distance to the nearest house, and amount of forest edge and compares them with the presence of both buckthorn species in forests across Wisconsin. We sampled 44 school forests in 44 counties across Wisconsin ranging in size from 7.9 hectares to 23.5 hectares with a total of 664 plots sampled. Our study determined that housing density, distance to nearest house, solar irradiation ($WH/m^2/y$), and road density all were significant factors while distance to the edge of the stand was not found to be significant. Our findings can be used to help land managers focus efforts in areas with higher predicted concentrations of buckthorn.

Advisors: Dr. Shuva Gautam, Dr. James Cook, T.J. Boettcher
Oral and Poster Presentation
Consider for Judging

Schmeeckle Oak Savanna Restoration

Steven J. Krueger
Forest Management Major

Oak savannas historically represented 15% of Wisconsin's landscape. Due to both fire suppression and conversion to agriculture, savannas are now the most endangered ecosystem in the Lake States. Savannas provide a range of ecosystem services and support a number of threatened and endangered species. Savannas differ from both grasslands and woodlands by having only partial crown cover by trees. For restoration activities, meeting crown cover goals inherent to savannas is quite important to their success. A solution to meeting these crown cover goals can be found with the utilization of GIS and hierarchical ranking. For this project, every tree in the savanna restoration unit was identified, measured, and geo-referenced. The individual trees were ranked 0-10 based on their historic presence, size, and form. The higher the score the more desirable that individual tree is for retention on the site. Using ArcMap, each tree received a buffer which was calculated to represent the crown of a tree. Combined with the score, decisions could be made for which trees to keep or remove. The goal was to meet 25% crown closure and increase oak savanna biodiversity. Once the model was created, the site was marked and cut to meet those goals. This technique could allow managers to better model future crown cover with savanna restoration.

Advisor: Dr. Michael Demchik
Poster
Consider for Judging

Effectiveness of Native Plant Regeneration after Glossy Buckthorn Removal and Treatment in Schmeeckle Reserve

Bethany A. Brownfield
Ecosystem Restoration
and Management Major

Shannon A. O'Fallon
Ecosystem Restoration
and Management Major

With the aid of Society of Ecological Restoration (SER) members, site stewards Bethany Brownfield and Shannon O'Fallon removed glossy buckthorn at a site in Schmeeckle Reserve named Jetson Oaks. Jetson Oaks is one of the sites that has been selected for student restoration and monitoring efforts as a part of the stewardship program led by SER. We delineated four quadrants of the site to assess and monitor any changes in vegetation and site quality that result from buckthorn removal and subsequent herbicide treatment. A baseline vegetative assessment was conducted for each quadrant before and after the glossy buckthorn removal, which was then analyzed using a Universal Floristic Quality Assessment Calculator to compare the pre-removal state to the post-removal state. Data was collected for assessment concerning several conservation-based metrics, particularly regeneration and basal area. Glossy buckthorn herbicide treatment will be followed by native vegetation seeding in half of the quadrants to investigate the effectiveness of native plant seeding on regeneration at sites that were previously dominated by invasive buckthorn. Our results remain inconclusive since the study remains in its preliminary stages, and post-removal metrics will be collected in the spring when vegetative changes can be accurately assessed. We hypothesize that quadrants that are seeded with native vegetation will show greater levels of regeneration than those left to naturally regenerate following glossy buckthorn removal and herbicide treatment. This study is meant to provide a basis for future stewardship research as ongoing restoration efforts throughout Schmeeckle Reserve require further monitoring and management adaptation.

Advisor: Dr. Michael Demchik and Dr. James Cook
Oral and Poster Presentation
Consider for Judging

Using Acesulfame to Determine Septic System Impact to Wisconsin Lakes

Hannah Lukasik
Hydrology and Spanish Majors

Artificial sweeteners such as acesulfame in groundwater are helpful indicators of human waste source contamination in water. Acesulfame enters the groundwater through septic system effluent and is later carried to surface waters. Acesulfame's slow rate of decay allows for it to persist in groundwater and to be found in measurable concentrations in lakes across Wisconsin. The purpose of this study is to determine the relative contribution of septic system effluent to the water budget of a lake by measuring the concentrations of acesulfame in lake water. Since septic system usage and impact on surface water quality is difficult to estimate, we sought to develop a chemical method that accurately quantifies the concentration of acesulfame in the water and reveals the impact of septic system drainage to the lakes' water budgets. Laboratory methods were refined to improve the recovery of acesulfame through solid phase extraction by pH adjustment and addition of ethylenediaminetetraacetic acid (EDTA) with liquid chromatography–mass spectrometry (LC/MS) analysis. In this study, surface water samples were collected from lakes in central Wisconsin. The concentrations of acesulfame from the lakes will be compared to septic system density and groundwater inflow. Lakes near areas with high septic system density relative to the amount of the lake's inflow are expected to contain higher concentrations of acesulfame.

Advisor: Dr. Paul McGinley and Amy Nitka
Poster
Consider for Judging

Graphene-Based Materials in Wastewater Treament

Tim J. Lamourex
Paper Science and Chemical
Engineering Major

Graphene is a carbon-based two-dimensional honeycomb structured material that has properties creating technological revolutions. Currently, Graphene has sheered its way into markets including but not limited to, anti-corrosive coatings, clothing, computing, as a concrete additive, energy storage, and wastewater treatment. The following research encompasses a review of applications for Graphene-based materials used in wastewater treatment. Graphene Oxide expresses efficiency at treating a range of wastewater contaminants. Moreover, at a reduced cost compared to pure Graphene, Graphene Oxide exhibits several properties which permit it as a viable material for raising wastewater standards while reducing energy usage in wastewater treatment. Graphene Oxide is hydrophilic and corrosion-resistant so water containing harsh chemicals can easily flow through it without degrading its properties. Controlling the ability of water to flow through Graphene Oxide is essential for the ability to improve wastewater filtration by limiting the flow of contaminants while still allowing water to easily flow through. By intercalating π bonds of Graphene Oxide with polycyclic π conjugated cations, a relationship between the filters' ability to reject contaminants is expressed based on the concentration of the polycyclic material. For example, Graphene Oxide nano-filters have been used to filter salts within the pulp and paper industry, and for the adsorption of organic compounds such as dyes and pharmaceuticals. Through simulation and testing, optimal polycyclic materials for intercalating with Graphene Oxide could further improve Graphene Oxide filtration practicality influencing economic motive for industrial Graphene Oxide water filtration implementations.

Advisor: Dr. Seyed Amirfakahri
Oral Presentation

The Potential for Inter-planting to Reduce Nitrate Leaching to Groundwater in Agriculture Farm Fields in Central Wisconsin

Nicholas D. Koschak
Hydrology Major

Many modern day agriculture farms use some form a fertilizer, particularly nitrogen based fertilizer, to maximize profit margins. However, not all of the nitrogen is used, some is leached to groundwater as nitrate; which in Wisconsin is a widespread drinking water contaminant. This study looked at the potential for inter-planting or cover crops (CC) in a potato field to reduce this leaching. A mixture of three types of vegetation (oats, rye, and pearl millet) were planted in furrows between potato rows at a farm near Plover Wisconsin. Canopy cover and vegetation height of the companion vegetation were then measured until end of year harvest. The resulting biomass from both the potato crop and companion vegetation were measured and then sampled for total nitrogen content to determine nitrogen accumulation differences between treatments. This data will be used to estimate the potential of inter-planting companion vegetation to reduce nitrate leaching to groundwater. The results of this study provide insight into the viability and potential benefits of this practice.

Advisor: Kevin Masarik
Poster
Consider for Judging

Benthic Macroinvertebrate Community Responses to Wastewater Treatment Plant Discharges in Central Wisconsin

Isabel R. Dunn
Water Resources Major

Municipal wastewater treatment plants provide necessary services for municipalities and receiving waters through removing contaminants from wastewater and converting it into an effluent that can be returned to the environment. Effluents from wastewater treatment plants can negatively affect the water quality of receiving waterbodies. It is important to assess the impacts from these additions to better manage water quality for both humans and aquatic ecosystems. Changes in water quality are often expressed by the benthic macroinvertebrate community. Because these organisms respond to anthropogenic impacts in predictable ways, examination of macroinvertebrate community metrics can provide valuable insights on the ecological condition of these waterways. Macroinvertebrates were kick net sampled both upstream and downstream from the discharge point of four mid-sized wastewater treatment facilities in central Wisconsin. Basic water chemistry and physical stream characteristics were also recorded at each sample location. Family-level taxonomies were used to compute metrics based on community composition, richness, tolerance, and trophic function. One-way ANOVAs will be used to determine if significant differences exist between macroinvertebrate metrics upstream and downstream of the discharge from wastewater treatment plants. Stream chemical and physical measurements will also be examined to explain metric responses. I hypothesize that the aquatic macroinvertebrate metrics will reflect a decrease in water quality downstream of the wastewater treatment plants.

Advisors: Dr. Kyle Herrman and Jeff Dimick
Poster
Consider for Judging

Phenology and Habitat Utilization of Spawning Brook Trout in the Little Plover River, WI

Natalie S. Coash
Fisheries and Aquatic
Sciences Major

Brook Trout (*Salvelinus fontinalis*) are a native salmonid species within Wisconsin that require cold, high quality, flowing water. Brook Trout naturally reproduce in the Little Plover River, a groundwater dominated stream in central Wisconsin, but experienced mortalities during low flows and dry reaches from 2005-2009 caused by drought and groundwater pumping. Efforts to improve watershed health and river flows include groundwater pumping changes, wetland restoration, and riparian and channel modifications. Understanding Brook Trout spawning locations (i.e., redds), timing, and behavior would aid in identifying important locations and time periods for restoration and protection. Therefore, we conducted weekly redd surveys in Autumn 2017-2020 by walking the main passage of the river and recording redd locations consisting of at least two actively staging or spawning Brook Trout over a designated redd. Redd locations were over-laid on a simulated groundwater upwelling ArcGIS map of the Little Plover River. Brook Trout spawned throughout most of the stream but redd locations varied by week and annually. In 2017, redds were denser in areas with higher groundwater inflows. In 2018-2020 redds were located upstream and at differing groundwater inflows. Varying redd locations could be due to differences in river discharge, with much higher flows in 2018-2020 potentially influencing groundwater inflow and/or Brook Trout movement. Peak redd activity occurred during the second and third weeks of November during all four years. As water levels continue to rise over the period of study, we look into how habitat availability and quality may play a role in spawning location and possible effects on recruitment. This research provides valuable information on Brook Trout spawning behaviors and can be used to help ensure maximum benefits of restoration efforts and is part of an ongoing evaluation of the Brook Trout population and watershed restoration efforts of the Little Plover River.

Advisor: Dr. Joshua Raabe
Oral Presentation

Brook Trout Movement and Habitat Use in the Little Plover River, Wisconsin

Keenan M. Foley
Biology Major

Brook Trout Salvelinus fontinalis are the only salmonid native to Wisconsin streams, and as such are an important apex predator and source of angling recreation in small headwater streams throughout Wisconsin. The Little Plover River in Portage County, Wisconsin provides a unique study system in that brook trout are the major apex predator and the river is cut off from invasion due to an impoundment. Our study was designed to determine if brook trout utilized a downstream impoundment or areas of recent stream restoration. Brook trout were surgically implanted with radio transmitters. Radio telemetry was utilized from June 22, 2020 to November 26, 2020 to locate each Brook Trout weekly by walking the river and recording precise GPS locations. Brook Trout home range was variable across individuals with a minimum home range of 9.95 m and a maximum of 3612.49 m with a majority (78.26%) of individuals less than 1000 m. Slightly over half (52.17%) of brook trout had a home range of less than 200 m. A spatial distribution map was created in ArcGIS was also created to show study area and show the specific locations of brook trout. This information will further be used to determine if brook trout are selection areas of recent restoration work with any increased frequency. This study shows that brook trout can have highly varied home ranges within a small system and that when habitat work is conducted the entire system should be included for consideration as not all brook trout reside within the same area throughout the course of the spawning season.

Advisor: Dr. Joshua Raabe and Jeremiah Shrovnal
Poster
Consider for Judging

Effects of Riparian Habitat Type on Macroinvertebrate Drift in the Little Plover River, Wisconsin

Rachael R. Valeria
Fisheries and Aquatic Sciences Major

Logan M. Cutler
Fisheries and Aquatic Sciences Major

Coldwater streams and their inhabitants are heavily dependent on critical elements derived from the surrounding riparian habitat. Riparian areas benefit stream ecosystems by supporting diverse vegetation, preventing bank erosion, and increasing the ecological productivity. The vast majority of the stream's fishes, such as the socially, economically, and ecologically important Brook Trout (*Salvelinus fontinalis*), rely on macroinvertebrates that either fall into the water from the riparian zones, or are aquatic at some point in their life cycle. Central Wisconsin's Little Plover River supports a self-sustaining population of Brook Trout and features a variety of riparian habitats including forest, wetland restoration, agriculture, and grassland. The focus of this study is to determine if the composition of aquatic and terrestrial macroinvertebrate communities in the Little Plover River drift varied among differing riparian areas. Locations were chosen on the Little Plover River corresponding with three riparian habitat types; forested, wetland restoration, and agriculture/grassland. In fall 2019, drift nets were deployed for 24 hours at all three locations. All captured invertebrates were preserved, sorted, and identified to family. Macroinvertebrate drift composition was compared among each of the riparian habitat types. Results from the drift samples exhibited a higher proportion of aquatic invertebrates, while terrestrial invertebrate composition varied among the three stream sections. This research provides insight into how Brook Trout prey availability is affected by riparian habitats along a cold-water stream.

Advisors: Dr. Jered Studinski, Dr, Joshua Raabe, Jeffery Dimick
Poster
Consider for Judging

Effects of Riparian Habitat on Diets of Brook Trout in the Little Plover River, Wisconsin

Rachael R. Valeria
Fisheries and Aquatic Sciences Major

Logan M. Cutler
Fisheries and Aquatic Sciences Major

Coldwater streams are heavily dependent on elements derived from the surrounding riparian habitat. The vast majority of stream fishes, including the socially, economically, and ecologically important Brook Trout (*Salvelinus fontinalis*), rely on macroinvertebrates that either fall into the water from the riparian zones or are aquatic at some point in their life cycle. The Little Plover River in central Wisconsin supports a self-sustaining population of Brook Trout and features a variety of riparian habitats including forest, wetland restoration, agriculture, and grassland, that may support different macroinvertebrate communities. The objectives of this study were to determine if the composition of aquatic and terrestrial macroinvertebrate communities in Brook Trout diet contents differed from those available in drift or among riparian habitats in the Little Plover River. The three sampling sites on the Little Plover River corresponded with different riparian habitats (forested, wetland restoration, and agriculture/grassland). In fall 2019, drift nets were deployed for 24 hours to collect aquatic and terrestrial macroinvertebrates, and electrofishing was conducted immediately after drift nets were removed. Brook Trout diets were obtained through gastric lavage and were compared with drift net samples. There was much variation among samples, with some taxa that were abundant in drift yet absent from Brook Trout diets, and other taxa that occurred more often in diets than in drift nets. These results provide insight into Brook Trout feeding behavior among riparian habitat types in small coldwater streams.

Advisors: Dr. Jered Studinski, Jeff Dimick, Dr. Joshua Raabe
Oral Presentation

A Comparison of Brook Trout Diel Movement Patterns to Spawning Activity and Other Environmental Factors

Andrew R. Johnson
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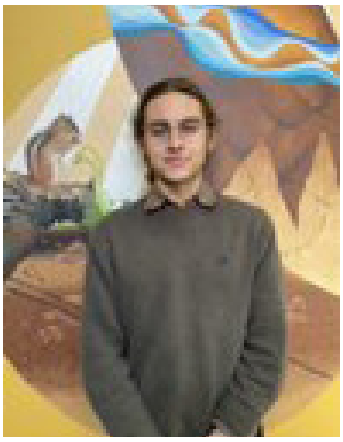
Natalie S. Coash
Fisheries and Aquatic Sciences Major

The Little Plover River in central Wisconsin contains a self-sustaining brook trout population Salvelinus fontinalis, but also has experienced extreme low flow periods leading to recent stream restoration efforts and increased research. Brook trout research from 2017-2020 included tagging individuals with PIT tags and installing antennas at four sites to monitor movements and survival. Also, redd surveys have been conducted to document spawning locations. Preliminary analyses of PIT antenna data indicated brook trout behaviors (hourly detections) were primarily crepuscular and nocturnal in most months but shifted to diurnal during the spawning period. Brook trout diel patterns have not been studied closely and may provide insights into spawn timing, movement cues, and feeding behaviors. Therefore, my study objectives were to further evaluate hourly detections to determine if brook trout diel movement patterns were related to weekly redd counts or differed with environmental conditions (e.g., water temperature, flow). The PIT antenna data were filtered to one detection every 15 minutes per individual to limit detections of fish remaining near an antenna for extended periods. Histograms of detections by hour were used to evaluate potential patterns and differences by month, by week around the spawning period and related to redd counts, and by differing levels of water temperature, flow, barometric pressure, and photoperiod. Results will increase understanding of brook trout movements and patterns throughout the day, providing insights on spawning behaviors, responses to environmental conditions, and feeding behaviors in the Little Plover River and other small coldwater streams.

Advisor: Dr. Joshua Raabe
Poster
Consider for Judging

Will Plant Diversity Improve Soil Quality And Maximize Carbon Storage in a Prairie Restoration?

James D. O'Shea
Soil and Waste Resources Major



John P. Haas
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Arua Y. de Castro Ferreria,
Ecosystem Restoration and Management Major

Shannon A. O'Fallon,
Ecosystem Restoration and Management Major

Prairie restoration is the process of reestablishing prairie ecosystem structural, compositional, and functional components. Intimate to prairie restoration is the improvement of native plant diversity. Native plant diversity may have implications for carbon storage, which is a primary prairie ecosystem function. Furthermore, soil quality is critical to plant health and growth in restored prairies. This study evaluated correlations between the plant diversity and soil quality in an experimental prairie restoration at The Morton Arboretum in Lisle, IL USA. Soil quality for this project is defined as the soil's functional capacity to store carbon. Soil cores were collected each of the 454 1 m^2 plots which include differing levels of phylogenetic diversity. The following soil core properties were described: horizonation, description of color, structure (type and grade), and redoximorphic features. These data were compiled into a soil quality index to relate the function of soil carbon storage. Correlation analyses will be performed to test whether a significant relation exists between soil quality and pant diversity on these plots. We expect to find positive correlation between plant diversity and the soil quality index, and if so, our results would suggest plant diversity in prairie restoration is important for maximizing the ecosystem function of carbon storage in prairie restoration.

Advisor: Dr. Bryant Scharenbroch
Poster

Analysis of Key Soil Nutrients and Physical Properties on a Managed Grazing Operation in Junction City, WI

Emily R. Yulga
Soil and Land
Management Major

Candra A. Carter
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Noelle E. Vallee
Water Resources and Soil
Land Management Major

Rotational grazing is an agricultural practice that provides long-term ecological and soil benefits. Our project objective is to assess soil quality on a rotational grazing farm over a 20-year period. We hypothesize that the temporally longer a field is rotationally grazed, the more improved soil quality and greater fertility there will be. This long-term research project, conducted through the UW-Stevens Point Soil and Water Conservation Society, analyzes a rotationally grazed operation in Junction City, Wisconsin. The fields are broken up into five-acre parcels, and grid points are randomly allotted to each parcel. A control field is also sampled, which is not rotationally grazed, as well as newly converted conventionally farmed fields. Soil samples (6") were collected within a ten-meter radius around each grid point in fall 2015. Physical and chemical testing has been completed for 2015 soil samples, which includes: bulk density, Carbon: Nitrogen ratio, total Carbon and Nitrogen, pH, Phosphorus, Potassium, Electrical Conductivity, organic matter, and biomass yield data collection. Fields are to be resampled every four years and tested for the same soil properties as listed above. 2019 samples are currently undergoing testing with bulk density, pH, and organic matter completed. Testing of 2019 samples will conclude in fall 2023, when resampling will occur again.

Advisors: Alyssa Gunderson, Dr. Daniel Keymer, Dr. Robert Michitsch,
Dr. Jacob Prater, Dr. Bryant Scharenbroch

Poster

Soil Organic Matter Can Predict Soil Color in Wisconsin Central Sands Region

Teresa Wolf
Soil and Land
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Jacob L. Buettner
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Hunter C. Lemler
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Emily R. Yulga
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Soil organic matter (SOM) is a key property that affects soil quality and ecosystem services. Laboratory analyses to measure SOM can be time-consuming and expensive, however, developing a field method would be practical for in-field use. Our objective is to identify a relationship between SOM and value (light and dark measurement) of the Munsell soil color system. We hypothesize that if SOM percentage is greater, then color value will be lesser. We also hypothesize that grouping samples by master horizons will improve our ability to predict SOM by color value. The soil profiles we studied are from the Wisconsin Central Sands Region (107 profiles, 640 samples). Soil color was evaluated with a Chroma Meter (Konica Minolta CR-400) and SOM was determined by loss on ignition. We expect that our relationships between SOM and color value will weaken as influences on color value by organic matter, parent material, and wetness become stronger. These relationships will assist in creating a practical method to estimate SOM in the field, which will allow for efficient management decisions for soil quality and ecosystem services.

Advisor: Dr. Bryant Scharenbroch
Poster
Consider for Judging

Parasite Communities in Populations of Greater and Lesser Scaup in Green Bay, WI

Allison G. Luebke
Biology Major

Nicole L. Lueck
Biology Major

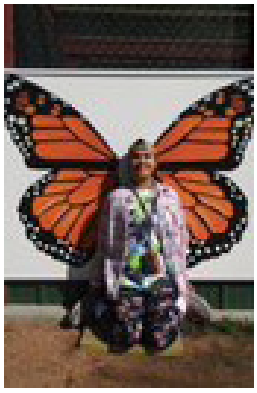
Gina Magro
Biology Major

Across North America Greater and Lesser Scaup populations have declined over the last few decades. In Wisconsin, major die offs of scaup along the Mississippi River have been linked to non-native trematode (flatworm) parasites. Scaup have diverse and abundant parasite communities because of their habitat use, behavior and diet. Our research goal is to survey parasites of scaup, including potentially pathogenic trematodes, in the Green Bay, WI area since very little data has been collected on scaup parasites in this region of the state. We predict that scaup with higher parasite loads could potentially suffer from pathology or mortality. We obtained waterfowl carcasses donated from hunters during the 2019 and 2020 season. A total of 20 birds were dissected into their major organs and each was inspected for parasites using standardized protocols. Any parasites we found were separated by major taxonomic group, counted, and identified the lowest taxonomic level possible using morphological traits. We found a diversity of different parasites in scaup with cestodes (tapeworms) being the most abundant endoparasites. Arthropods including lice and mites were detected on feathers. Specimens from the Phyla Acanthocephala and Nematoda were also identified. In our focal parasite group of trematodes, we found representatives of 9 families and all three of the pathogenic introduced trematodes: *Leyogonimus* sp., *Cyathocotyle* sp. and *Sphaeridotrema* sp. The average number of parasites in females was only slightly higher than males with a total of 95 and compared to 81. Our research uncovered a high diversity and abundance of parasites within the scaup population. Our future goals include comparing our parasite inventory to published data for scaup from other regions. Monitoring parasites in scaup is important for waterfowl management to better describe the distribution of pathogenic species as well as understand the species interactions with the native parasite community.

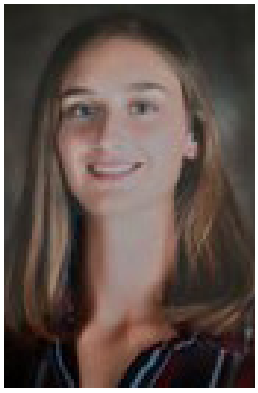
Advisor: Dr. Sarah A. Orlofske
Poster
Consider for Judging

Anomalously High Activity of Little Brown Bats (*Myotis lucifugus*) on Chambers Island, Door County, WI

Jonathon M. Sicinski Wildlife Ecology and Management Major



Avantika F. D'Cruz, Wildlife Ecology and Management Major



Hannah M. Klopotek, Wildlife Ecology and Management Major

Parker J. Witt Soil and Land Management Major

Rachel M. Dooley Wildlife Ecology and Management Majors

Bats are a fundamental component of Wisconsin's natural ecosystem. They are key to controlling insect populations, especially during the summer. During these summer months, bats are active and highly vocal as they navigate and hunt insects. This project uses stationary high-frequency acoustic recording devices to remotely monitor the bat activity on Chambers Island. Chambers Island is located 10.8 kilometers northwest of the Fish Creek Harbor in Door County. The island habitat is unique, containing wetlands and forests, which provides important habitat for wildlife, specifically bat populations. Species richness of bats can be related to the area and isolation of islands, especially those with dense vegetation. This relationship may arise from the optimal foraging strategies and patch-use decision making (Frick et. al 2007). The Chambers Island acoustic data is compared to data collected from non-island acoustic recording devices located in Marshfield, WI and Kemp Natural Resource Station in Woodruff, WI. *Myotis lucifugus* activity is identified by Kaleidoscope Pro auto-identification software based on the bat's call frequency. The comparison of the Chambers Island data to the other stations illustrated that there is more *Myotis lucifugus* activity on Chambers Island. In 2018, much bat activity was detected on the island. Active bat boxes were found with guano underneath them. In 2019, a private landowner sponsored a bat detector which gave us data for the summers of 2019 and 2020. The data showed an increase of the activity of little brown bat activity, as well as northern long-eared bat (*Myotis septentrionalis*) activity.

Advisor: Dr. Christopher Yahnke
Poster
Consider for Judging

Utilizing Molecular Phylogenetic Analyses to Identify Helminth Communities of Waterfowl

Reece A. Muellen
Biology Major

Michaela M. Meehl
Biology Major

Biodiversity surveys are the foundation of community ecology. In order to fully understand species interactions, it is necessary to first properly identify the organisms in the environment. This is especially true for parasite communities, where surveys are lacking, leaving gaps in the understanding of parasite ecology. Taxonomic resolution in parasite surveys has steadily decreased due to the loss of experts who can properly identify the parasites to the species level using only morphology. One potential solution is to use molecular analyses to identify parasite species as the framework for continued monitoring of parasite populations through environmental changes. The objectives of this project are to analyze the DNA from helminth parasites collected from waterfowl in Green Bay, WI to confirm the identity of known and possible new species. Waterfowl are ideal hosts for our research because their diet and habitat choices result in high infection rates of many parasites by consuming the parasites' intermediate host. We sequenced approximately 850 to 1,000 bases of the internal transcribed spacer region (ITS 1—5.8S—ITS 2) for molecular phylogenetic analysis. This gene region provides high homology between the species while maintaining a high mutation rate because they do not contribute to the function of the ribosome. They are therefore useful molecular markers to distinguish species. To date, we have dissected 5 species of ducks (n=18) and collected 58 parasite samples. Forty-five gene sequences were successfully amplified from what we believe to be 21 morphotypes (11 Echinostomes, 4 Strigeids, 1 Zygocotyle, 1 Cyclocelid, 4 Unknown/Other). This study illustrates the utility of molecular data in wildlife biodiversity surveys, especially for taxa that are difficult to identify using traditional morphological methods.

Advisor: Dr. Sarah Orlofske and Dr. Robert Jadin
Poster
Consider for Judging

Selection of Nest Boxes by Cavity Nesting Waterfowl Based on Diameter at Breast Height in Mead Wildlife Area

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Cavity nesting birds rely on nest boxes in areas where natural cavities are not available. In Wisconsin, specifically the Mead Wildlife Area in Marathon County, *Lophodytes cucullatus* (Hooded merganser) and *Aix sponsa* (Wood ducks) use nesting cavities or boxes for their eggs; however, the use rate and number of young produced may be declining. To evaluate a potential factor affecting nest box use at the Mead, we examined selection and success of wood duck and hooded merganser nests based on diameter at breast height (DBH) of the tree nest boxes were affixed to. Data on use and success were collected at the Mead Wildlife Area by the UWSP Wildlife Society, and DBH data was collected in 2019. 130 boxes were checked annually in January and February by opening the boxes, removing, and examining the contents, and recording any type of use. Previous research conducted in central Minnesota concluded that wood ducks specifically did not use trees with a DBH less than 20 cm (Gilmer et al. 1978), and work done by Bellrose, Johnson and Meyers quantified natural cavity dimensions. Our study found no selection preference related to DBH but had much higher success rate for boxes mounted on poles rather than trees. Our goal is to inform science-based decisions on where to place nest boxes to be the most effective.

Advisor: Dr. Benjamin Sedinger
Poster
Consider for Judging

The Effects Separation Have on the Behavior of Captive African Wild Dogs (*Lycaon pictus*) at the Dallas Zoo, Dallas, Texas

Lauren M. Welvaert
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Due to the species' reclusive nature in the wild and their endangered status, little data has been collected to understand African Wild Dog pack dynamics and behavior. This study focuses on how the absence of a male member of the Dallas Zoos' small African Wild Dog (*Lycaon pictus*) pack, named Mzingo, affects the amount of time his brother and littermate, Jata, spent alone with the newly introduced female, Cholula. Tensions were high over how the brothers might react to the presence of the new female due to a previous attempt in 2019 to introduce an older female, Olah, which ended in a fatal incident. After the initial introduction of Cholula to the brothers, small scuffles and chases with the new female as the target led to zoologists making the decision to separate Mzingo from the pack. The null hypothesis, "Mzingos absence had no effect on the time Jata spent with Cholula and the time Cholula spent with Jata," was created to better understand the influence Mzingo's presence had on Cholula and Jata's relationship. Interns collected data from the roof of the carnivore building which overlooked the Wild Dog habitat. This allowed for optimum visibility and the ability to collect auditory behaviors that would be missed on security cameras. Collected behavioral data was split into three categories: Before Mzingos Separation, During Mzingos Separation, and After Mzingos Separation. A t-test was performed to understand the statistical significance of how the separation affected Jata and Cholulas relationship. This data can be used for future reference by other captive facilities facing similar challenges, and provides zoologists the opportunity to decide if separation is the solution to their struggles. Since the end of the data collection period and internship, the dogs have been reportedly doing well.

Advisor: Darian Livanec, Dallas Zoo Carnivore Team
Poster

Effects of Fire on Flowering of Two Prairie Forbs

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Fire is an important aspect of prairie communities. Habitat managers seek to better understand how fire affected the land throughout history and how prairie plants adapted to it. I examined flowering rates of two native wildflowers, Pale Purple Coneflower (*Echinacea pallida*) and Wild Quinine (*Parthenium integrifolium*), in areas that had been burned in the current year compared to those that were left unburned. In the burned areas, I also looked at the time since that area had last been burned: two years previously and four years previously. Flowers and plants of both species were counted by quadrat sampling on transects. From there, I calculated the percentage of individuals flowering, flowering stem count per flowering individual, and flowering stem count per individual. Data analysis is ongoing, but I expect to find higher rates of flowering in plants in the burned area when compared to the unburned area. Higher flowering rates along with synchrony have been shown to increase plant reproduction. Habitat managers can use this data to help increase reproduction and make management and restoration more efficient.

Advisor: Dr. Cady Sartini and Rich Henderson
Oral Presentation

Post-Release Movement and Behavior of Rehabilitated Orphan Black Bears

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In Wisconsin, orphaned American Black Bear (*Ursus americanus*) cubs, can be cared for by two Wisconsin DNR authorized wildlife rehabilitation centers. The species has a strong state-wide adoration and supports a deep-rooted hunting tradition; therefore, it has been in the state's best interest to place orphaned cubs into rehabilitation centers for future release. This is done to maintain a black bear population that fulfills ecological, social, and cultural desires. The long-term goal of our project is to evaluate the movement patterns, behavior, and survival of orphaned black bears post-release. In October of 2019, two female cubs were released into the Chequamegon-Nicolet National Forest. The two bears had VHF collars placed on them to allow for tracking via radio telemetry until they denned for winter. Den visits were then conducted in order to place GPS collars on the two bears. Using ArcGIS, we created a map of all the telemetry points and GPS coordinates to report the movement patterns and habitat selection of the two bears. Due to mortality soon after spring emergence and a low frequency of telemetry triangulation the previous fall, there was not enough data collected to evaluate the behavioral significance of the movements. Despite initial roadblocks, the long-term goal of the project remains steadfast. The project already owns two GPS collars and hopes to obtain more in the future to ensure consistent data collection across multiple individuals. The future information collected will better inform the state on how orphaned bears integrate into the north woods landscape.

Advisor: Dr. Cady Sartini
Poster
Consider for Judging

Comparing Mercury Levels of Red-Shouldered Hawks to Body Condition in Central Wisconsin

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In Wisconsin, red-shouldered hawks (*Buteo lineatus*) are listed as a threatened species (Wisconsin DNR 2012). This status is primarily due to anthropogenic activities such as timber harvesting, development, and wetland draining (Bednarz and Dinsmore 1982, Jacobs and Jacobs 2002, McLeod et al. 2000). Among raptors, red-shouldered hawks are unusual in that reptiles and amphibians comprise a large portion of their diet. Population declines also may be attributed to environmental contaminants, like mercury (Hg). Mercury is a pervasive contaminant that poses a threat to environmental health (UNEP 2019, Gilmour et al. 2013), and birds can be important indicator species for contaminants across environments (Jackson et al. 2015). In addition, mercury concentrations in birds can have negative effects on reproduction, neurochemistry, physiology, and behavior (Scheuhammer et al. 2007). Mercury concentrations have been studied in large birds of prey that consume primarily fish (Carlson et al. 2012), but mercury levels in species that consume more semi-aquatic prey are not well understood (Bourbour et al. 2019). Our goal is to compare mercury levels of individual red-shouldered hawks to their mass and fat score as an indication of body condition. We believe that individuals with higher levels of mercury will have poorer body condition compared to those with lower mercury levels. Red-shouldered hawk nests were located from March to May 2020, and sampled while nestlings were still present in June of 2020. Blood and feather samples were collected, along with mass, tail length, wing cord, and fat scores. Mercury levels will be determined by testing the blood and feather samples. Determining the extent to which red-shouldered hawks are being affected by mercury will help us understand how mercury levels are changing within the environment, and how we can better manage wildlife affected by mercury contamination.

Advisor: Matthew Hanneman, Dr. Shelli Dubay, Dr. Marie Perkins
Poster
Consider for Judging

Intoxication Cases in Passerines and Near-passerines Through Eight Years of Avian Rehabilitation in Northern Wisconsin

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Insecticides are applied to millions of acres of land in the United States each year. Some organophosphate insecticides like DDT are banned in the United States due to environmental and health concerns. Many other insecticides are used liberally despite little research into their impacts on native wildlife. During the summer of 2020, staff at Raptor Education Group Inc., a wildlife rehabilitation center in Antigo, Wisconsin noticed a drastic increase in songbirds showing signs of poisoning. While the true cause of these poisoning cases remains unknown, insecticides are suspected given the behaviors exhibited by the birds. I conducted an analysis of eight years of patient records to determine trends. Many of the songbird species examined are primarily insectivorous. When birds consume contaminated insects, poisons can bioaccumulate and eventually kill the animal. Few treatment options exist for poisoned birds once they begin showing symptoms so the best method to prevent these cases is to limit insecticide use in the environment.

Advisor: Dr. Shelli Dubay and Dr. Jason Riddle
Poster
Consider for Judging

Waterfowl Distributions and Habitat Use on Pool 8 of the Mississippi River During Autumn Migration

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Migrating waterfowl can meet their nutritional demands by foraging at stopover locations during migration. Nutritional demands are species specific so the distribution of waterfowl species is dependent on the occurrence of their preferred forage types. Distributions of waterfowl species can also be influenced by predation risk and other behaviors not related to foraging. The Mississippi River corridor is an important migratory pathway for many waterfowl species traveling to and from their breeding grounds. We used 2017-2019 vegetation data from the Long Term Resource Monitoring Program (USGS) and waterfowl aerial survey data (USFWS) from pool 8 on the Mississippi River to examine how two species, Canvasbacks (*Aythya valisineria*) and Mallards (*Anas platyrhynchos*), distribute themselves relative to the common waterfowl foods, wild rice (*Zizania aquatica*) and wild celery (*Vallisneria americana*). We also examined how hunting disturbance and proximity to terrestrial environments affected the distribution of these species on pool 8 throughout the hunting season. Canvasbacks appear to be selecting areas in close proximity to wild celery, a preferred food, while mallards were generally located in closer proximity to wild rice beds and land cover. Canvasbacks and mallards used waterfowl sanctuary areas that were closed to hunting which suggests that both disturbance and food availability influence how waterfowl use the river corridor during migration. Conclusions from this research aim to help prioritize resources selected for by various species of waterfowl during migration along the Mississippi River Corridor.

Advisors: Dr. Benjamin Sedinger, Kirsten Schmidt, Stephen Winter
Oral Presentation
Consider for Judging

Influence of Hard Mast Production on Bait Site Visitation Frequency of *Ursus americanus*

Arthur T. Young
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Multiple studies have found a negative correlation between the abundance of hard mast and the hunting success of hunting bears with bait. Even though the interaction between hard mast production and hunter success has been examined in other states, a similar study in Wisconsin is useful because of its unique combination of hunting methods and an extended baiting season. The objective of this study is to examine how hard mast production affects the frequency of bears visiting bait sites. Ten bait sites with trail cameras were installed in two central Wisconsin counties from August third to October third. A hard mast index was created for the all the counties within the bear management zones by sampling ten random locations within each county for acorn abundance. The number of minutes a bear was present each day as well as the estimated hard mast availability were calculated for each site. We expect to find that as mast production decreases, the visitation rates of bears at bait sites will increase. We hope that the correlation between mast production and bait site visitation will be strong enough that an annual, regional hard mast survey can be used to help predict hunter success rates in Wisconsin counties.

Advisors: Nathan Kluge and Dr. Cady Sartini
Oral Presentation

The Influence of Prescribed Burning on Small Mammal Diversity

Jacob Bergstrand
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Prescribed fire can be utilized as a management tool to maintain habitat for wildlife in different ecosystems. One of the most common ecosystems to the Midwest, which is now extremely rare and depends on prescribed fire, it is the oak savannas. This is a grassland that is sparsely dominated by an oak overstory. Historically, oak savannas provided prime habitat for important game species as well as smaller mammals. Now many endangered animals and plant species inhabit the oak savannas. The focus of this study was to trap small mammals in two dissimilar locations that one being an area treated with a seven-year prescribed burn rotation and the other area non-treated. The study was done at Schmeeckle Reserve in the fall of 2020. Small mammals were present in both units which were dominated by the eastern chipmunk (*Tamias striatus*) and the white-footed mouse (*Peromyscus leucopus*). In the unit with prescribed burning, we saw more small mammals and a more diverse range of the small mammals that were present. Small mammal abundance and diversity was affected using fire for maintaining oak savanna ecosystems.

Advisor: Dr. Christopher Yahnke
Poster
Consider for Judging

Preliminary Study into how Cover Type Adjacent to Home Range Affects Drumming Patterns in Ruffed Grouse (*Bonasa umbellus*) in Northern Wisconsin

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Ruffed Grouse (*Bonasa umbellus*) are an important game bird in the Great Lakes region. Males perform a unique drumming display atop fallen logs to attract females and maintain their territory throughout the spring. Drumming activity is routinely performed on the same log, facing the same direction. As a part of the UW-Stevens Point Wildlife Society, our undergraduate research project aims to evaluate drumming patterns of Ruffed Grouse in Northern Wisconsin. Telemetry was conducted between March and June of 2019. In a previous study, home range sizes and drumming log locations were identified. Analysis revealed that the majority of drumming logs were positioned within ten meters of the home range edge and drumming primarily faced out of the home range. Because of this, adjacent habitat may be affecting drumming activity. This project plans to examine the land cover types that occur in the direction of drumming efforts to identify any consistency using Locate 3.11 and ArcMap. These aspects will be analyzed within ArcMap using the land cover map of Treehaven. Using these methods, we hope to see whether male Ruffed Grouse are focusing drumming activity on particular resources and land cover types in order to attract mates or best establish breeding territory. This information will be used to influence habitat management decisions on the Treehaven property and other Ruffed Grouse management areas.

Advisor: Dr. Jason Riddle
Poster
Consider for Judging

The Habits and Behavior of a Captive Alligator Snapping Turtle (*Macrochelys temminckii*) Before and after an Enclosure Renovation

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The Alligator snapping turtle (*Macrochelys temminckii*) is the largest freshwater turtle in the United States (Ernst and Lovich 2009.). It is widely kept in zoos around the world. Despite this fact, there are little studies on the captive behavior and activity of this chelonian. In order to Decrease stress and improve general welfare, a proper enclosure fitted to a species natural history attributes is needed (Fabreges and Guillon-Salazar 2011.). Providing this kind of enclosure is one of the UW-Stevens Point (UWSP) Herpetology Society's main goals for its animal collection. Our goal was to document the behaviors of a captive adult Alligator Snapping Turtle before and after it was transferred from a barren 75-gallon stock aquarium to a naturalistic 400-gallon stock aquarium. Over thirty hours of video footage was taken before and after the individual was transferred. Random 10-minute clips of each recording were then analyzed via instantaneous sampling, wherein at the end of every minute a behavioral code was assigned to document the species behavior. Overall, prior to the move, *M. temminckii* moved very little and exhibited sedentary behaviors including resting and extending the head out of the water to breathe. When transferred to a larger bioactive enclosure, a variety of behaviors were observed, including swimming, active foraging, digging, tongue wiggling, and basking. These active behaviors were observed with greater frequency in the hours just after the move, and began to decrease in prevalence throughout the study period. This decrease in activity suggests the turtle became acclimated to the enclosure.

Advisor: Dr. Cady Sartini
Poster
Consider for Judging

Population Estimate of Urban Eastern Gray Squirrels in Schmeeckle Reserve

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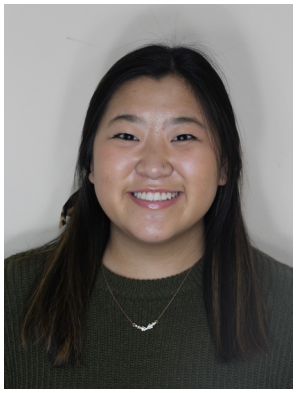

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The Eastern gray squirrel (*Sciurus carolinensis*) is commonly found in forests and in urban settings, where densities of gray squirrels can be quite high. In addition, gray squirrels in city limits in urban parks are not hunted, so the likelihood that a squirrel survives each year is high can be high when compared to hunted populations. We trap gray squirrels in Schmeeckle Reserve to calculate population estimates for urban squirrels. In 2020, the population estimate of gray squirrels in the Reserve was 55 individuals, but site, time of day, and sex influenced capture. In 2021, we anticipate that many squirrels trapped and tagged in 2020 will be re-caught and that the population estimate will be similar to 2020. We are trapping squirrels in two sites of Schmeeckle Reserve and recording age, sex, and weight of the squirrels as well as marking them with numbered ear tags. We also will be recording environmental variables such as temperature and cloud cover to determine their influence on trap success. Traps will be open between 0°F and 40°F and checked at 9am, 12pm, and 3pm to reduce the risk of hypothermia from snow melt. Trapping will not occurs below freezing temperatures for animal welfare purposes. We will be using MARK to calculate an updated population estimate. We anticipate that more squirrels will be caught on days with little cloud cover and when temperatures range between 15°F and 40°F. Results will help future squirrel trappers set traps when squirrels are more likely to be trapped.

Advisor: Dr. Shelli Dubay and Dr. Ben Sedinger
Poster

Evaluating Wild Turkey Brood Activity Levels in Wisconsin Using Snapshot Wisconsin Trail Camera Images

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The Eastern Wild Turkey (*Meleagris gallopavo silvestris*) was successfully reintroduced to Wisconsin in the 1970s and is currently found in every county throughout the state. Populations have traditionally been monitored through fall and spring harvest and brood observation surveys. Trail cameras may offer an effective, cost-efficient alternative method for monitoring wild turkey populations. For this study, we reviewed and classified Snapshot Wisconsin trail camera images of wild turkeys from 2016 to 2019 based on sex and age class. Our objective was to determine the level of brood activity between May and August in forested, open, and developed landscapes. We defined "activity level" as the number of triggers or events/camera/unit time. We hypothesized that there would be a difference in (1) the number of brood triggers and events, (2) brood activity between dawn/dusk hours and daylight hours in open, forested, and developed landscapes, and (3) brood activity between May to June and July to August. The Snapshot Wisconsin program provides a novel way to observe long-term brood activity trends at unprecedented spatial scales.

Advisors: Hannah Butkiewicz, Dr. Jason Riddle, Christopher Pollentier,
Jennifer Stenglein, Emily Buege Donovan
Oral Presentation

Compared Morphometrics of Northern Saw-Whet Owls (*Aegolius acadicus*) Trapped in Sandhill Wildlife Area and Schmeeckle Reserve

Cole D. Suckow
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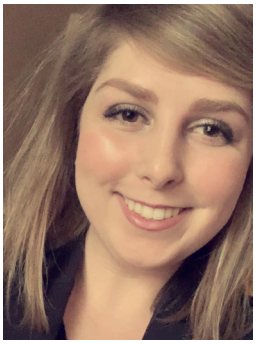

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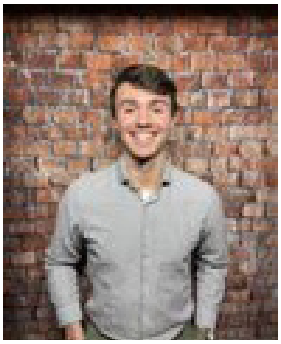

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The Northern Saw-whet Owl (*Aegolius acadicus*) (NSWO) is a mesopredator within upland ecosystems that can be found as far North as Central Canada and Alaska and will migrate as far south as Central Mexico. NSWOs migrate in the fall from September until December, peaking around mid-October, and this species is relatively abundant in Central Wisconsin during this time. Our project is interested in studying the migration patterns of these owls. From 2007 to 2019, this project was conducted at Sandhill Wildlife Area, a 9,000-acre wildlife refuge in Babcock, WI, operated by the Wisconsin Department of Natural Resources. Over 1,000 NSWOs have been captured at Sandhill. The 2020 trapping season was conducted at Schmeeckle Reserve in Stevens Point, WI. Schmeeckle Reserve is a 280-acre nature area and wildlife refuge located North of the University of Wisconsin - Stevens Point campus. During the 2020 NSWO trapping season, 20 NSWOs were captured using call-playback devices and mist-nets. The owls were banded using USGS aluminum leg bands, contributing to National banding data on Northern Saw-whet Owls. The methods and protocols used at Schmeeckle Reserve were identical to those used at Sandhill to minimize bias. We are interested in comparing how the population of birds caught at Schmeeckle in the 2020 season corresponds to the population of owls at Sandhill and determining the effect of an urban environment on the activity of NSWOs. Morphometrics comparing weight, sex, and age will determine if the populations of owls are similar between locations. Further research will examine the time of capture to determine if NSWOs in Schmeeckle, representing urban environments, are active at different times of night than the owls in Sandhill Wildlife Area, representing rural environments. We hypothesize that the NSWOs in urban areas will be active later in the night compared with owls in rural areas due to the presence of auditory interference and will therefore have a later average time of capture than the owls in rural locations.

Advisor: Dr. Jason Riddle
Oral
Consider for Judging

Comparison of Northern Saw-whet Owl (*Aegolius acadicus*) Frequency and the Prey Availability in Schmeeckle Reserve

Cole D. Suckow
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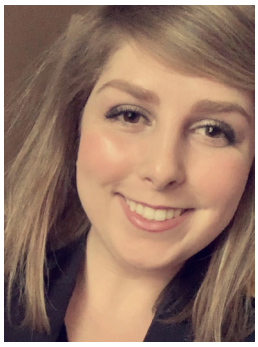

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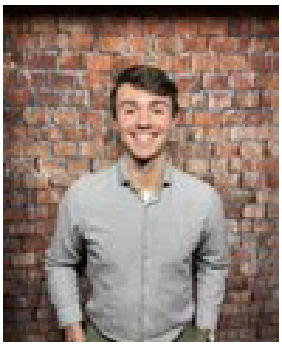

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The Northern saw-whet owl (*Aegolius acadicus*) (NSWO) is a mesopredator within upland ecosystems. NSWOs migrate in the fall from September until December, peaking around mid-October, and this species is relatively abundant in central Wisconsin during this time. Trapping data were collected at Schmeeckle Reserve, a 280-acre nature area and wildlife refuge located north of the University of Wisconsin - Stevens Point campus. Research and data collection recently began on the property during the Fall of 2020. Within the 2020 NSWO trapping season, 20 NSWOs were captured using call-playback devices and mist-nets. NSWOs were banded using USGS aluminum leg bands. Team members recorded wing and tail chords, weight, age, and sex of birds with each capture. Previous studies have found that rodents account for 84.5% of Saw-whet Owl diets. 67.7% of the diet consisted of deer mice (*Peromyscus leucopus* and *P. maniculatus*), 16.1% voles (*Microtus pennsylvanicus* and *M. ochrogaster*), and 8.6% shrews (*Blarina brevicauda* and *Sorex cinereus*). NSWOs also ate songbirds, insects, and bats, which accounted for 7.6% of the remaining dietary components. The Student Chapter of the Wildlife Society - Small Mammal Project, trapped prey species including white-footed mice, southern flying squirrels, red-backed voles, and eastern chipmunks within Schmeeckle Reserve. The literature sourced indicates some of these species are critical components of the saw-whet diet. Therefore, we hypothesized that we would see a positive correlation between the owls captured and the number of small mammals trapped in Schmeeckle throughout the season.

Advisor: Dr. Jason Riddle
Poster
Consider for Judging

Occupancy Modeling of Southern Flying Squirrels (*Glaucomys volans*) in Schmeeckle Reserve

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The Southern flying squirrel (*Glaucomys volans*) is a nocturnal small mammal commonly found in hardwood forests throughout the eastern United States. Because of their highly arboreal nature, flying squirrels are not as susceptible to trapping with protocols commonly used for other small mammals. Traps used for flying squirrels are more fixed than other methods. We used occupancy modelling to determine how trap location influences likelihood of catching a squirrel in each trap. We set traps at 20 trap sites in the Berard Oaks area of Schmeeckle Reserve in Stevens Point, WI. Sherman traps were baited at 5pm and checked at 10pm from September 9, 2020 to October 14, 2020, roughly 4 times per week. Upon capture, squirrels were weighed, sexed, ear tagged, and released on site. After 21 nights of trapping, 8 squirrels were captured 40 times. We fit occupancy models to estimate detection and occupancy probabilities in Excel. Across our 20 trap sites, 66% were occupied (Ψ=0.66). Occupancy probability at each site ranged from 0.0359 to 1, and the number of trapping occasions per site ranged from 0 to 5. On any given night, we had a 15% chance of capturing a squirrel in any trap. Future research will focus on which habitat characteristics such as presence of tree cavities, food resources, and canopy cover influence likelihood of trapping a squirrel at each trap site.

Advisors: Dr. Shelli Dubay and Dr. Ben Sedinger
Poster
Consider for Judging

Capture Probability of Female and Male Southern Flying Squirrels in Schmeeckle Reserve

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Biology Major

The southern flying squirrel (*Glaucomys volans*) is one of two species of flying squirrel found in North America. It is found in all of Eastern North America, ranging from Florida to Southeastern Canada. Previous research from various areas in the Eastern United States has shown that female flying squirrels are much more territorial than males. This appears to be a trend in Schmeeckle Reserve, Stevens Point, Wisconsin, as well. We are attempting to discover why, out of seven individuals we trapped this season, only one of them was a female. We also only recaptured this female one time, for a total of two captures. Some of the male squirrels were captured as many as fifteen times. Flying squirrels have two mating seasons each year, the first from January to April and the second from June to August. Our trapping season began on September 10th, 2020. We believe that the ending of the mating season overlapping with our trapping season is an explanation for the low capture probability of females. We utilized a pulley system to hoist sherman traps, baited with a peanut butter-granola mixture, into twenty different trees. Our trapping grid was in the Berard Oaks of Schmeeckle Reserve. We checked traps approximately five hours after they were set, but later in the trapping season after temperatures dropped, the traps were checked about three hours after they were set. During our trapping season, female flying squirrels are still nursing their young, as their offspring are not independent until they reach four months of age. When female flying squirrels are raising their young they build a secondary nest. They do not allow any other squirrels, even males, within immediate vicinity of the nest. Male southern flying squirrels play no role in raising young, so their activity level is not changed by the end of the mating season. Females also have a smaller home range than males. Female home ranges are approximately 4,050 square meters while males' are around 6,000 square meters.

Advisors: Dr. Shelli Dubay and Dr. Ben Sedinger
Poster
Consider for Judging

Composting Deactivation of CWD Prions: Preliminary Results

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Alex Thomas
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Through hunting, slaughtering or ingestion of CWD infected cervids, exposure to specified risk materials is considered an exposure route to prions that might lead to infection. Prions cause transmissible spongiform encephalopathy (TSE) diseases in animals and humans. The composting process has proven effective for the biodegradation of recalcitrant organic contaminants, and the high number of microorganisms and high temperatures achieved during composting have prompted interest in this process for inactivating prions; however, literature on survival of prions in composting systems is limited. Since thermophilic temperatures do not definitively cause pathogen reduction, multi-barrier approaches are employed to improve pathogen inactivation. As such, primary-phase duration, C-substrate, anaerobic conditions, drying, storage, antagonistic microorganisms, ammonia evolution, microbial inoculants and other degradation methods have been used to establish an unstable habitat for pathogen survival. Compost piles offer or complement these different approaches, which may prove useful to degrade infectious prions.

Advisor: Dr. Rob Michitsch
Poster
Consider for Judging

Wildlife-vehicle Collision Frequency of White-tailed Deer (*Odocoileus virginiarius*) in Association with Temporal Variation in Central Wisconsin

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Beau M. Schartner
Wildlife Ecology and Management Major

Wildlife-vehicle collisions are common throughout the state of Wisconsin, and white-tail deer (*Odocoileus virginianus*) account for a large majority of these accidents. As we see wildlife populations grow, we see the inflicted damage on vehicles and injuries to motorists rise (Messmer 2009). Drivers are especially on edge during the fall months because of increased breeding behavior of male deer. This led us to question whether the time of year affects the amount of roadkill white-tailed deer we see on a given road. To answer this question, we surveyed county roads in central Wisconsin throughout the month of November, enabling us to test if there is a positive correlation in the quantity of roadkill deer observed as the Julian Calendar day increased. The study took place within a 48.28 kilometer buffer around the city of Stevens Point, WI where we selected ten independent roads to survey. With data from these roads, we calculated the average number of new deer/kilometer (km) each week and used a linear regression to observe the relationship between the two variables (deer/km and time). We predicted a significant increase in frequency of roadkill deer associated with Julian Calendar day. This observational experiment temporally examined if there is an increase in roadkill deer frequency as the fall season progresses. After running a regression test, we concluded that there were no significant relationships between our two variables, however, a multivariate analysis of several other factors could yield significant results. There are also several management implications for this type of study; improved signage, fencing, motorist education, deductions in deer populations, or other management solutions could reduce the risks of deer-vehicle collisions in the future.

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Poster
Consider for Judging

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