Jim and Katie Krause CNR Student Research Symposium Friday April 5, 2019

College of Natural Resources
University of Wisconsin-Stevens Point

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University of Wisconsin-Stevens Point

Student Research Symposium
April 5th, 2019

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

Booklet Layout: Ian Vierck and Daniel Connolly
Booklet Editing: McKenna Hammons
Cover Photo: Sabrina Claeys

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.

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University of Wisconsin
Stevens Point

Office of the Chancellor

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Phone: 715-346-2123 | Fax: 715-346-4841

April 5, 2019

Welcome to the 20th Annual College of Natural Resources 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 hope you will find the symposium to be one of your most memorable learning experiences. There is little question your research will enhance the academic value of your overall education at the University of Wisconsin-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.

Attendees and observers—please join me in applauding the drive and initiative of these students. Their work is at the core of the university's vision for creating *"thriving communities"* that are vibrant, healthy, prosperous and sustainable.

Whether you are here to make a presentation or to listen and observe, 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 turnout of participants representing projects from all the CNR majors, a fitting tribute to the level of faculty and student collaboration in and out of the classroom at the University of Wisconsin-Stevens Point.

It is my pleasure to welcome participating students, faculty, families, volunteers and guests to our university. Congratulations to all of you. I wish you success in presenting your work today and at future symposia and conferences.

Sincerely,

Bernie L. Patterson
Chancellor

University of Wisconsin-Stevens Point
College of Natural Resources
Stevens Point WI 54481-3897
715-346-4617; Fax 715-346-3624

April 5, 2019

The UWSP College of Natural Resources is pleased to present the 20th annual CNR Student Research Symposium, featuring and celebrating the scholarly achievement of many of UWSP's finest natural resource students.

Congratulations to our student participants 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. Through their participation in this event, these students 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 experiences. Participation in the symposium ingrains the importance that research plays in promoting a better understanding of our world. Such experiences will undoubtedly help to 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.

This year's Symposium – one of the few of its kind that is planned and organized by students – features another large turnout of participants: over 80 students presenting 54 projects (42 poster presentations and 17 oral presentations). This continues a long tradition of success at this annual event. Since 2000, the number of CNR students who have presented research results in posters and oral presentations at this event totals over 1,300.

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

Special thanks to Dr. Jim Krause (BS-Biology, '74) and his wife, Kathleen "Katie" (BS-Mathematics, '75), who through their generous gift in 2017 created an endowment in the UWSP Foundation that will support the Symposium for the foreseeable future. We are grateful for this amazing gift, celebrating 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 attending this wonderful celebration of scholarly achievement and hands-on, experiential learning. Welcome to the College of Natural Resources and enjoy your day with us.

Christine L. Thomas
Dean and Professor of Natural Resource Management

From the Student Research Symposium Committee…

Welcome to the 20th 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. 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 sixteen years can credit Dr. David for his pioneering efforts.

This year marks one of the highest years of 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 the late Dr. James ('74) and Kathleen Krause ('75), all of our volunteer evaluators, faculty and staff members in the CNR and Biology department, CNR student organizations, Dean Christine Thomas, Chancellor Bernie Patterson, 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,

Committee Chair: Conner Ties

Vice Chair: Ian Vierck

Secretary: Emily Colson

Booklet Editor: McKenna Hammons

Web Weaver: Jennifer Wiegert

Judge Coordinator: Joe Quehl

Committee Members: Emmett Wiegel, Bailee Mathieu, Daniel Connolly and Kelsey Moen

Faculty Advisors: Rich Hauer (Faculty Chair) and Steve Menzel

Clive A. David
Memorial Research Scholarship Award

Dr. Clive A. David was a driving force in establishing the CNR Student Research Symposium in 2000. 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 Beveryly David Research Scholarship Endowment, made possible through generous gifts in Clive's Memory from the David family, alumni, and friends.

The 2019 recipient of the Clive A. David Memorial Research Scholarship is:

Macayla Greider

Hometown: Lacon, IL
Major: Wildlife Ecology
Minor: Water Resources and Biology

- Two completed research projects:
  - *Abiotic and biotic factors relating to mermithid infection rates in larval midge (Chironomidae) specimens in northwestern Wisconsin streams* (2017-18) - Honorable Mention - poster, 2017
  - *Breeding Ecology of Waterbirds in a Restored Floodplain of the Illinois River* (2019)
- UWSP Aquatic Biomonitoring Lab - Assistant Lab Supervisor (2018-2019)
- Forbes Biological Station/Bellrose Waterfowl Research Center, Havana, IL - Lead Wildlife Technician (2018)
- CNR Summer Field Experience - Teaching Assistant (2017)
- UWSP Chapter Izaak Walton League - Vice President (2015-2018)
- UWSP The Wildlife Society - Member (2016-2019)
- Michael Dew Scholarship (2018)
- James "Jay" Harvey Research Award (2018)
- Timothy G. Kroeff Field Scholarships (2017)

"Macayla is one of the most intellectually curious students I have worked with to date, and I think she has great potential as a researcher. Most of the research students that I have mentored have been involved with a research project that I designed. Macayla is completely different, she designed this project and came up with her own hypotheses to test each of the last two years."

Dr. Shelli A. Dubay
Professor of Wildlife

Dr. Sarah Orlofske conducts field surveys of amphibians, snails and parasites at Hopland Research and Extension Center in Hopland California in summer 2012. (Photo by Clara Boland)

Keynote Speaker

Dr. Sarah Orlofske

Assistant Professor of Biology
University of Wisconsin-Stevens Point

Ph.D., Ecology and Evolution –
University of Colorado – Boulder (2013)

B.S., Biology and Wildlife Ecology -
UW Stevens Point (2006)

The Jim and Katie Krause CNR Student Research Symposium is pleased to welcome as Keynote Speaker, Dr. Sarah Orlofske.

Dr. Orlofske is a 2006 alumna of UW-Stevens Point (Biology and Wildlife) and is among a handful of past students whose involvement contributed significantly to the future success and growth of the Symposium event. In addition to her many awards as a student here – including the Outstanding CNR Undergraduate Student Award (2006) and co-recipient of the Clive A. David Memorial Research Scholarship Award (2005) – Dr. Orlofske is the only individual in the 20-year history of the Symposium to participate in every capacity: as a student presenter, Symposium committee chair, judge, and more recently as a faculty advisor. She served on the Symposium planning committee every year she was a student (2001-2006), chaired the committee in 2006, and was editor of the Symposium booklet in 2003, 2004 and 2006.

Among her many accomplishments as a student, Dr. Orlofske served as president of the UWSP Herpetology Society, leader of the DNR Frog Census Project for Portage County, member of the Student Chapter of the Wildlife Society and the TriBeta National Biological Honor Society, peer adviser in the CNR student advising center, Biology tutor at the Tutoring Learning Center, and GEM Student Ambassador to La Reserva Amazonica in Peru.

After graduating from UWSP, Dr. Orlofske attended Virginia Tech, where she worked on her Master's project before transferring to the University of Colorado - Boulder for her PhD program. At CU-Boulder, she worked in the lab of Dr. Pieter T.J. Johnson, a leader in the new field of disease ecology. There she studied community and ecosystem level ecology of the parasite Ribeiroia ondatrae that causes amphibian limb malformations. Her doctoral research explored transmission dynamics and the role of predation in controlling parasite infection.

Following completion of her PhD, Dr. Orlofske became Assistant Professor in Biology at Northeastern Illinois University in Chicago from 2013 – 2017 before landing her current position at UWSP in Fall 2017. She is an active member of the American Society of Parasitologists and supports student research involvement in this professional society through its regional gathering, the Annual Midwestern Conference of Parasitologists.

Married to Dr. Robert Jadin, Visiting Assistant Professor of Biology at the University of Wisconsin-Eau Claire, Dr. Orlofske lives in the town of Rudolph on a 10-acre farm where they embrace a more sustainable lifestyle and use their property to support hands-on student research projects.

Acknowledgements

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

Dean Christine Thomas

Chancellor Bernie Patterson

Kevin Lawton - Computer Assistance

Marshall Lee and the UWSP On Point Catering Staff

John Oestreich and Austin Daugherty - Building and Support

Jake Smith - Financial and Purchasing

Sharon Reichert/College of Natural Resources for Room Accommodations

Stacey Allan-Bannach and University Relations and Communications Office - Publicity

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

Schedule of Events

Registration
8:00
West Lobby

Oral Presentations
9:00 - 10:00
Rooms 120, 170 and 110F

Poster Presentations
10:00 - 11:00
West Lobby, South Hallway and Central Lobby

Keynote Speaker
11:00
TNR 170

- 11:30AM to 1:00PM Lunch -

Poster Presentations
12:00 - 1:00
West Lobby, South Hallway and Central Lobby

Oral Presentations
1:00 - 2:00
Rooms 120, 170 and 110F

CNR Celebration Evening Scholarship Banquet, SentryWorld Atrium
Donor Recipient Meet & Greet and Social Hour: 4:30
Awards Program: 5:30

Oral Presentations: TNR Room 120

Time	Presenters	Title
9:00AM	Robert Sheffer	Movements and Habitat Use of Muskellunge in Green Bay, Lake Michigan (p.20)
9:20AM	Ryan Eastman	Yellow perch Recruitment Synchrony in Six Northern Wisconsin Lakes (p.21)
9:40AM	Sawyer Livesey	Chinook Salmon Sibling Regression Model and Migration Timing in The Columbia River (p.22)
1:00PM	Lisa Parlato and Leah Egan	Method Development to Assess Monensin Concentration in Agricultural Runoff Water and Sediment (p.25)
1:20PM	Logan Ebert	Validation of Soil Temperature model for the Agricultural Season in the Central Sands (p.26)
1:40PM	Krista Bryan, Ella Aspenson, Trace Miller, and Emma Schmidt	Color Can Predict Soil Organic Matter in the Major Land Use Areas of Wisconsin (p.27)

CANCELLED

CANCELLED

ADDED: POSTER PRESENTATION 12PM-1PM

Oral Presentations: TNR Room 170

Time	Presenters	Title
9:00AM	McKenna Hammons	Butterfly Response to Barrens Management at Crex Meadows Wildlife Area, Grantsburg, WI (p.29)
9:20AM	Morgan Neff	Seasonal Changes in Captive American Black Bear (*Ursus americanus*) Behavior in Northeastern Minnesota (p.30)
9:40AM	Benjamin Tjepkes	Bald Eagle Nest-site Selection Along the Upper Mississippi River, 1990-2012 (p.31)
1:00PM	Megan Brown	Managing Impoundments for Secretive Marshbirds (p.32)
1:20PM	Zachary Loken	Assessing the Predictability of Waterbird Diversity Using Landscape-scale Variables (p.33)
1:40PM	Joe Quehl, Jacob Kunze, and Gage Harmes	Diet Composition of Mallards During the Fall Migration in the Upper Midwest (p.34)

Oral Presentations: TNR Room 110F

Time	Presenters	Title
9:00AM	Ian Vierck	The Difference In Surface Area Between Simple and Compound Boxelder Leaves (p.23)
9:20AM	Brandon Schulz	Improvement of Tree Storm Debris Estimation Model (p.24)
9:40AM	Heather Foster	Impacts of Hollywood Film and Documentaries on People's Perceptions of Wildlife Species (p.28)

Poster Presentations from 10:00 to 11:00

Presenters	Title
Kayla Wilcox	Aquatic Macroinvertebrate Taxa Richness between Two different Ecological Areas in Small Headwater Stream in Southwest Wisconsin (p.66)
Conner Ties	Lichen and Fungi Fluorescence in a Flying Squirrel's (Glaucomys spp.) Diet (p.51)
Amanda Lang, Shelby Truckenbrod, Kenhall Prehn, Nicole DeMarb, and Madeline Abbatacola	Comparing Small Mammal Diversity in Schmeeckle Reserve in Stevens Point, WI (p.53)
Andrew Pelletier and Kali Rush	Comparison of Hen Wood Duck Survival During Nesting and Brood-Rearing Periods (p.55)
Joe Quehl, Jeff Williams, Ben Tjepkes, Rachel Martin, and Logan Cutler	Determining a Acoustistical Component to Drumming Log Selection in Ruffed Grouse (*Bonasa umbellus*) (p.64)
Sean Mason, Marissa Kaminski, Elianne Heilhecker, and Leah Bell	Ecology of Box-nesting Waterfowl in Central WI: Biological Versus Societal Benefits (p.59)
Kelsey Brown and Timothy Zappa	Species Diversity May Enhance Tourism Potential in Botswana (p.60)
Nora Hargett and Joe Quehl	Assessing the Accuracy of N-Mixture Models and Mark-Recapture using Camera Trap Data on a Known Population (p.61)
Derek Thorn, Timothy Zappa, and Drew Scullard	Does the Arrow Always Point North? Using Suture Patterns to Identify Two Species of Flying Squirrels (p.56)
Timothy Zappa, CJ Glass, Nathan Bartles, and Evan Kuhel	Does Experience Matter? Observing How Previous Experience of Students May Affect Trail Camera Setup. (p.42)

Poster Presentations from 10:00 to 11:00

Presenters	Title
Thompson Hill	Using Genetics to Evaluate Survival and Natural Reproduction of Muskellunge in Wisconsin Lakes (p.36)
Zachary Mohr, Natalie Coash, and Benjamin Schleppenbach	Location and Timing of Spawning Brook Trout in the Little Plover River, WI (p.37)
Josh Kivett	Invasive Species Inventory of Steinhaugen County Park Trails (p.40)
Rachel Mortensen and Amanda Barth	Schmeeckle Seedbank Study (p.39)
Rachel Loomis	What are they Learning at the School Forest? (p.43)
Naomi Albert	Wild Rice Landscape Ecology: Restoration Implications (p.44)
Lindsey Laskowski	Analysis of Key Soil Nutrients and Physical Properties on a Managed Grazing Operation in Junction City, WI (p.47)
Lisa Parlato and Leah Egan **MOVED TO AFTERNOON POSTER SESSION**	Method Development to Assess Monensin Concentration in Agricultural Runoff Water and Sediment (p.25)
Liam Dangeur	Quantifying Nitrogen in Central Sands Irrigation Water (p.49)
Kiersten Czarnecki. Hannah Lukasik, Emma Schmidt, Kayla Wilcox, and Teresa Wolf	A Baseline Assessment to Develop an Appropriate Restoration Regime for the Management and Restoration of Wetlands (p.50)

Poster Presentations from 12:00 to 1:00

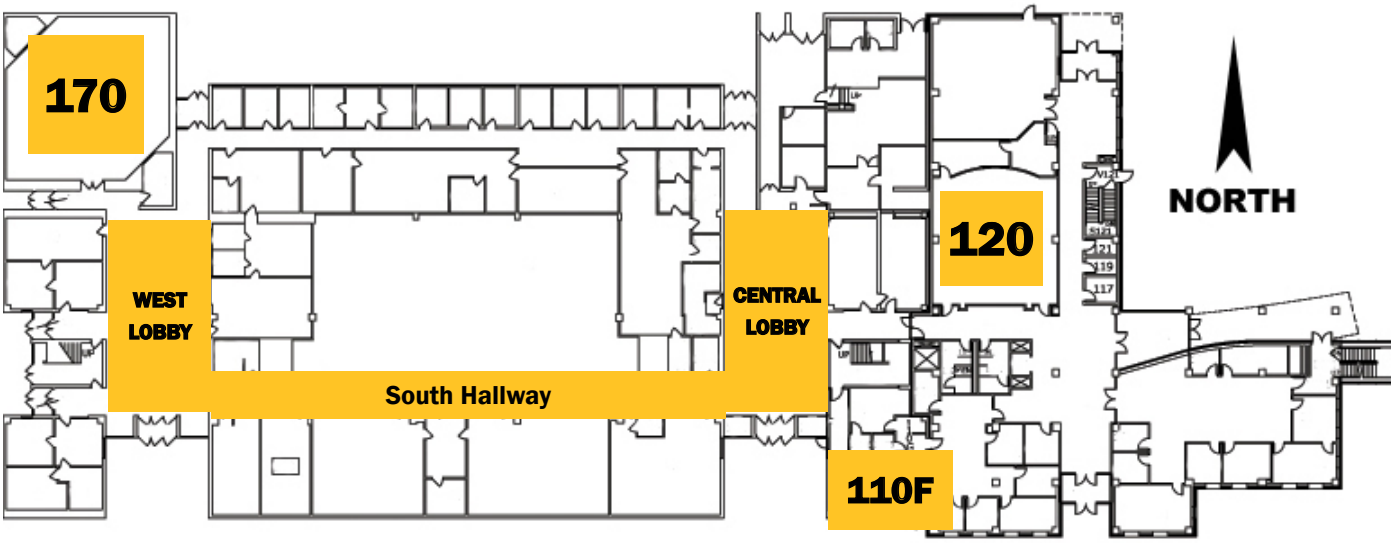
Presenters	Title
Kayla Wilcox and Taylor DeNure	Flood Effects on Macroinvertebrate Richness in Headwater Stream in Southwest Wisconsin (p.67)
Amanda Lang and Madison Fell	Seasonal weight change in migrating Northern saw-whet owls (p.58)
Benjamin Tjepkes	Bald Eagle Nest-site Selection Along the Upper Mississippi River, 1990-2012 (p.25)
Sabrina Claeys, Melinda Houtman, Katherine Brown, and Tommy Young	Comparing Parasite Diversity and Abundance to Body Mass of Eastern Cottontail Rabbits in Central Wisconsin (p.62)
Macayla Greider	Breeding Ecology of Waterbirds in a Restored Floodplain of the Illinois River (p.63)
Jordyn Ziesmer	Herptile Bycatch From Fish Sampling in The Lower Wolf River Basin (p.57)
Mason Wheeler, Kelsie Hayes, and Kelsey Brown	Home Range Comparison of Urban White-Tailed Deer During the Winters of 2014/15 Through 2018/19 (p.65)
Vanessa Komada	Squirrel River Pines Seed Bank Composition (p.41)
Timothy Zappa	Using Safari Guides to Develop an Image Database for Individual Lion Identification (p.52)
Timothy Zappa and Kelsey Brown	Dynamic Water Sources and Their Effect on Large Mammal Movement In Northern Botswana (p.54)

Poster Presentations from 12:00 to 1:00

Presenters	Title
Nicole DeMarb, Megan Brown, Johnathan Sicinski, and Parker Witt	Recent Bat Community Fluctuations Due to WNS at Wildwood Zoo in Marshfield, WI (p.68)
Ben Schlapenbach and Zachary Mohr	Brook Trout Movements, Survival, Body Condition and Gill Lice in the Little Plover River Prior to Watershed Restoration (p.38)
Robert Sheffer	Movements and Habitat Use of Muskellunge in Green Bay, Lake Michigan (p.20)
Ryan Eastman	Yellow perch Recruitment Synchrony in Six Northern Wisconsin Lakes (p.21)
Nathan Jaksha and Jason Lins	Analysis of Abiotic Factors Affecting Brook Trout (Salvelinus fontinalis) Abundance and Recruitment Within the Little Plover River, WI (p.35)
Ian Vierck	The Difference In Surface Area Between Simple and Compound Boxelder Leaves (p.23)
Brandon Shulz	Improvement of Ice Storm Tree Debris Estimation Model (p.24)
Michael Mills, Naomi Albert and Casey Olson	Climate Change in Wisconsin County Forest Planning (p.45)
Laurel Deitch	The Effects of Biochar and Biosolids on Soil Quality and Relative Tree Health of *Quercus macrocarpa* (p.46)
Caroline Rice	Phosphorus Adsorption of Flue Gas Desulfurization Gypsum in a Surface Water Mesocosm (p.48)

CANCELLED

Trainer Natural Resources Building Map



Symposium Presentations

Schedule of Oral Presentations in rooms 120, 170 and 110F on pages 12-14.

Poster Presentations are displayed in the West Lobby, South Hallway, and Central Lobby.

Enjoying the Symposium?

Join the CNR Research Symposium Committee to help plan and organize next year's event! This opportunity gives students a unique and rewarding experience planning one of the coolest undergrad events of the year. There is something for everyone: decorating the bulletin board, organizing judges, and updating the website and social media. Not only does participating in the Symposium look good on a resume, it is full of outstanding and fun people. The CNR Research Symposium has definitely been my favorite of the extracurriculars in the CNR!

Ian Vierck

Jim and Katie Krause CNR Student Research Symposium -Vice Chair









Yellow Perch Recruitment Synchrony in Six Northern Wisconsin Lakes

Ryan Eastman
Fisheries Major

Yellow perch *Perca flavescens* are a popular sport fish in Wisconsin, yet little is known about the status of many perch populations. Furthermore, yellow perch are an important prey species for other popular fishes including walleye *Sander vitreus*, muskellunge *Esox masquinongy,* and smallmouth bass *Micropterus dolomieu*. Yellow perch recruitment can vary substantially among populations, which can influence not only adult perch population characteristics but also the dynamics of fishes dependent on them as prey. Consequently, knowledge of trends in yellow perch population fluctuations has important implications for management of multiple species. As a cursory examination of yellow perch population characteristics in Wisconsin, we evaluated recruitment dynamics and relationships among catch-curve residual values indicative of relative year-class strength to determine the extent of synchrony in perch recruitment in six northern Wisconsin lakes. Recruitment appeared to be moderately variable across the six populations, with recruitment coefficients of determination ranging from 0.33 to 0.67. Correlation coefficients for the 15 bivariate combinations of catch-curve residuals ranged from -0.69 to 0.97 (mean = 0.15), indicating that recruitment was not synchronous among populations. Our preliminary results suggest that recruitment dynamics are independent among lakes and are likely influenced by localized factors rather than factors acting over a broad spatial scale.

Advisor: Daniel Dembkowski
Oral and Poster Presentation
Consider for Judging

Chinook Salmon Sibling Regression Model and Migration Timing in The Columbia River

Sawyer Livesey
Fisheries Major

Columbia River Chinook salmon Oncorhynchus tshawytscha are ecologically important and produce over $1 billion for Pacific Northwest economies but are vulnerable to environmental conditions and harvest. Predicting and understanding the abundance and timing of returning adults would aid fisheries managers but has proven challenging. Therefore, I sought to determine if a Chinook salmon adult returns could be accurately predicted based on the prior year jack returns, through sibling regression models, at the Lower Granite Dam in southeastern Washington, from 1950 to 2017. I also examined the influence of mean spring water temperature upon the migration timing of Chinook salmon over Bonneville Dam in southwestern Washington, from 1939 to 2018. The US Army Corps of Engineers collected fish count and temperature data at both dams. Linear regression models were used to evaluate all relationships. I found a significant ($P<0.001$), positive relationship between the abundances of returning adults and the returning jacks from the prior year. A significant ($P<0.001$), negative relationship existed between the date when 50% of spring Chinook salmon had passed Bonneville Dam and the average spring temperature. The date 50% of spring Chinook salmon pass Bonneville Dam has been significantly ($P<0.001$) later from 1988 to 2018. Low genetic diversity from stocking efforts may have caused later spring Chinook salmon migration timing, despite warming water temperatures from 1988 to 2018. Although, as climate change continues to cause temperatures to increase, spring Chinook salmon should be expected to peak earlier in the year. Migration timing based on temperature and genetic diversity should be considered when selecting open season dates. Fishery managers can also use sibling regression models to aid management in setting harvest quotas and informing anglers on expected runs

Advisor: Joshua Raabe
Oral Presentation

The Difference In Surface Area Between Simple and Compound Boxelder Leaves

Ian Vierck
Forestry Major

The boxelder (Acer negundo) has a variable leaf shape, ranging from a single simple leaf to a bipinnately compound leaf consisting of up to 15 leaflets. The most common leaf shape is a compound leaf consisting of 3-7 leaflets. When the leaflets of the pinnately trifoliate (three leaflet compound) leaf are overlaid, by lining the primary veins of the leaflets with the primary veins of the simple leaf, there seems to be a resemblance to maple leaves. This presents a question; how much surface area does the boxelder gain by having compound leaves instead of simple boxelder leaves? This question led to a random sample of three leaves from the lowest branches of twelve different boxelder trees. Using Adobe Photoshop, we were able to measure the surface area of the compound leaves. Then, moving the boxelder leaflets together to closely resemble the shape of the simple boxelder leaves, we remeasured the surface area. Using an analysis of variance one-way test we were able to confirm there was a significant increase of surface area in the compound leaves by 25.12%. The mean of the arranged compound leaves was 55.5cm2 (SEM 3.7) which was significantly smaller ($p=0.023$) than the 70.1cm2 (SEM 5.1) in pinnately trifoliate leaves. The results from this paper suggest a compound leaf has a greater surface area and potentially has a greater photosynthetic area.

Advisor: Richard Hauer
Oral and Poster Presentation
Consider for Judging

Improvement of Ice Storm Tree Debris Estimation Model

Brandon Schulz
Forestry Major

This study investigated improvement of a rapid estimation model of tree debris following ice storms. We investigated if finer resolution tree canopy cover (TCC) imagery of 2m resolution or better can more accurately predict debris after an ice storm. This study included 39 cities throughout the U.S. We used TCC across the entire community and area covering only the road right of way (ROW) plus a 50-foot buffer on each side of ROW. We found tree canopy across the entire city improved tree debris prediction ($p=0.08$) in the overall multiple regression model ($R2\ adj = 0.917$; $f=133.8$; $df\ 3,33$), but this was not the case with ROW tree canopy ($p=0.66$). TCC over the entire city was 36.2% (SEM = 2.3) on average and significantly ($p < 0.000$) two times greater in the finer 2m or better than in the 17.1% (SEM = 2.2) TCC from 30 m NLCD imagery originally used. The ROW was hypothesized to be the best predictor as debris pickup in communities is typically restricted to debris from ROW and from private land (50-foot buffer) that falls within ROW. The ROW TCC was 32.5% (SEM = 1.7) and significantly lower ($p=0.003$) than community TCC. Findings support the perception that debris is often pulled from private yards and mixed within public ROW debris to be removed by public entity. Results should improve overall ability to predict debris following ice storms from regional models currently used to a more local estimate for a city.

Advisor: Richard Hauer
Oral and Poster Presentations
Consider for Judging

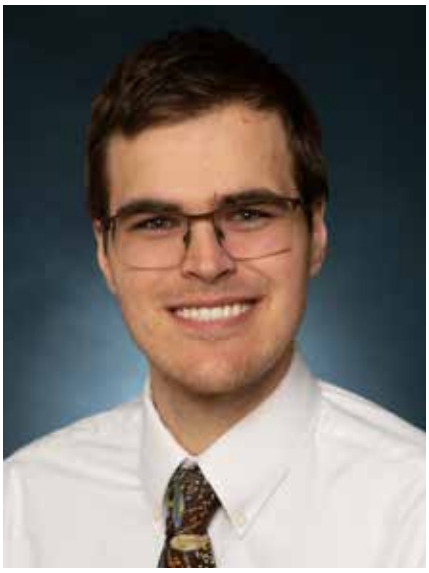
Method Development to Assess Monensin Concentration in Agricultural Runoff Water and Sediment

Leah Egan (Biology Major) and Lisa Parlato (Biochemistry Major)

Monensin is a coccidiostat antibiotic used as a feed additive for disease prevention and increased milk production in dairy cows. The presence of monensin in surface runoff and shallow groundwater near animal feeding operations has been documented in previous research. Being able to track the occurrence of monensin in water may provide a tool to indicate manure contamination as well as to determine the path that the water has taken. Methods of extraction and LC/MS/MS analysis of monensin concentrations from samples of both water and sediment were investigated in this project. Nigericin was used as an internal standard at a fixed concentration for all prepared samples. Solid phase and liquid-liquid extractions were performed with various solvents, and reverse-phase liquid chromatography was conducted with several different mobile phase gradients of acidified water and methanol for analysis by tandem mass spectrometry. Extracted samples were evaporated under nitrogen and reconstituted in solvent for each procedure. After the method was optimized, it was tested on runoff collected at the edge of several dairy grazing plots.

Advisors: Paul McGinley, William DeVita, and Amy Nitka
Poster and Oral Presentation
Consider for Judging

Validation of Soil Temperature Model for the Agricultural Season in the Central Sands



Logan Ebert
Water Resources Major

This research project was conducted to create and validate a model of soil temperature with respect to air temperature, solar radiation, and leaf area index (LAI). Soil temperature data was collected for the 2015 agricultural growing season at the Isherwood Farm research project. Isherwood Farm is located in the Central Sands region of Wisconsin. This sub study looked at six fields at the Isherwood Farm. The six fields grew four crops: two potatoes, two sweet corn, one field corn, and one sweet pea. Field averages were derived from the lysimeter units on each field. This study focused on the 20cm soil depth data. A metrological station was used to collect the air temperature and solar radiation values. LAI values were collected by hand on a weekly basis. LAI was taken across 12 to 14 points on every field and used to make a homogenous average. LAI data was used to make a regression model for the growing season to be applied to the soil temperature model. The goal of this project is to gain an understanding of how plant growth impacts the soil temperature throughout the season. This understanding could be useful in managing seed banks, particularly for cover crops, as we understand the influence of temperature on germination.

Advisor: Kevin Masarik
Oral Presentation
Consider for Judging

Color Can Predict Soil Organic Matter in the Major Land Use Areas of Wisconsin

L to R: Ella Aspenson, Krista Bryan, and Trace Miller
Soil and Land Management Majors

Emma Schmidt
Water Resources Major

Soil organic matter (SOM) is a key component of soil quality, and is therefore important to determine as soil quality is a soil's capacity to function, sustain biotic productivity, and maintain and enhance water and air quality. There is currently no accurate field-based method to measure SOM in Wisconsin, and laboratory analyses are expensive and time-consuming. As other studies have found, soil color correlates strongly with SOM and might be used to predict SOM in the field. The accuracy of this prediction is dependent on the soil management practices as well as soil properties, meaning that different models need to be created for different regions to preserve accuracy. Our objective is to develop a relationship between soil color and SOM for each of the Major Land Resource Areas of Wisconsin. We currently have a data set from MRLA 92(BAyfield/Ashland county), one of the thirteen MRLAs in Wisconsin. Color will be assessed by Munsell color chart, a Konica Minolta CR-400 chroma meter, and two smartphone based applications, all of which have the ability to be used easily in the field. Organic matter content will then be determined using the loss on ignition method and any possible relationships will then be determined. This relationship could be a very practical soil quality assessment tool that is accessible to practitioners which also lays down a basis for continued work throughout other regions.

Advisor: Bryant Scharenbroch
Oral Presentation
Consider for Judging

Impacts of Hollywood Film and Documentaries on People's Perceptions of Wildlife Species

Heather Foster
Wildlife Ecology Major

Hollywood films have for a long time, portrayed several wildlife species such as wolves, sharks, and spiders, as bloodthirsty and dangerous animals. Documentaries have battled the misperceptions of wildlife people have from watching Hollywood films. We tested the hypothesis does the portrayal of wildlife in Hollywood films and documentaries have a significant influence on viewers' negative and positive attitudes towards wildlife species. Within this hypothesis, we also tested the hypotheses does the portrayal of wildlife in Hollywood films have more of a significant influence on viewers' negative and positive attitudes towards wildlife species than documentaries and does the portrayal of wildlife in documentaries have more of a significant influence on viewers negative and positive attitudes towards wildlife species than Hollywood films? In this experiment, students were voluntarily and randomly assigned as a group to watch either the documentary or Hollywood clip. The students were given a written survey to complete before watching the video clip. After viewing the clip, a second survey was given to the students. The study is still in progress and data is being collected and analyzed. We hope to better understand how Hollywood and documentary films influence people's perceptions of wildlife species.

Advisor: Cady Sartini
Oral Presentation
Consider for Judging

Butterfly Response to Barrens Management at Crex Meadows Wildlife Area, Grantsburg, WI

McKenna Hammons
Wildlife Ecology Major

The Northwest Wisconsin Sand Barrens are a unique habitat in decline. Active management is required to maintain this landscape. Butterflies are very responsive to habitat changes. This study aimed to assess the effect of various barrens management strategies on the diversity (i.e. richness and evenness) of the butterfly community at Crex Meadows Wildlife Area, Grantsburg, WI. Butterfly surveys and concurrent vegetation surveys occurred in July and August 2018. Using the Shannon-Weiner diversity index and a Hutchinson t-test I found prescribed fire increased butterfly diversity and richness in the initial years after burn and mowing had no significant effect. These results can be used to guide future management decisions concerning butterfly diversity.

Advisors: Bob Hanson, Cala Hakseth, and Cady Sartini
Oral Presentation
Consider for Judging

Seasonal Changes in Captive American Black Bear (Ursus americanus) Behavior in Northeastern Minnesota

Morgan Neff
Wildlife Ecology Major

The American black bear (Ursus americanus) yearly cycle is closely tied to food availability both in captivity and in the wild (Rogers, 1987). With changing seasons and plant abundance comes behavioral changes to meet the needs of the individual. Four captive black bears of varying ages were observed from June-August 2018 at the North American Bear Center in Ely, Minnesota to assess these behavioral changes. I constructed an ethogram from behavioral observations, and then created activity budgets for each bear during each month of observation. June was considered mating season, July is normal activity, and August is the beginnings of hyperphagia in northern Minnesota (Rogers, 1987). Therefore, mating season should see a higher proportion of time spent in bear-bear interactions, while the end of the season should see a shift towards foraging behaviors. I then ran linear regressions in Microsoft Excel to assess the increase or decrease in the target behaviors. Though there was some difference between individual bears studied, when averaged together there was a negative trend associated with bear interactions and a positive trend associated with foraging. Individual differences were likely due to age and personality. However, even captive black bears still show the same seasonal changes that their wild counterparts experience when provided with a suitable naturalistic enclosure.

Advisor: Shelli Dubay
Oral Presentation

Bald Eagle Nest-site Selection Along the Upper Mississippi River, 1990-2012

Benjamin Tjepkes
Wildlife Ecology Major

The overall population of bald eagles (Haliaeetus leucocephalus) has increased in range and size across much of North America, since they were listed as a federally Threatened Species in the 1970's. This increase likely is due in part to the efforts of several federal and state wildlife management agencies in protecting nest sites, an important factor in raptor reproduction. We studied nest-site selection in bald eagles along the 420-km long Upper Mississippi River National Wildlife and Fish Refuge using survey data from 1990 – 2012. Spatial analyses were conducted on known active nest locations using a GIS to develop several metrics relating to bald eagle nesting ecology (e.g., distance to water, surrounding cover type, patch size) and several disturbance metrics (e.g., distance to navigable channel, distance to road). These metrics were then used to build a mixed-effects resource selection function under a use-availability design for this population. This information will increase the understanding of how bald eagles occupy habitats along the Upper Mississippi River in relation to habitat features and human activities, further contributing to the effective management of this species.

Advisors: Stephen Winter and Scott Hygnstrom
Poster and Oral Presentation
Consider for Judging

Managing Impoundments for Secretive Marshbirds

Megan Brown
Wildlife Ecology Major

Millions of acres of wetlands were lost in the United States between the early 1600s and the mid-1980s. Conservation and government agencies restore and manage wetlands for both waterfowl production as well as endangered species, such as the Whooping Crane. However, some wetland dependent birds are exceedingly difficult to monitor. These birds, often collectively called secretive marshbirds, include species such as the American Bittern, Virginia Rail, and Sora. Secretive marshbirds may be good indicators of wetland habitat quality and surveying for them can help guide management efforts. Our objectives are 1) to estimate detection probabilities for secretive marshbirds at Necedah National Wildlife Refuge, and 2) to determine the habitat relationships between secretive marshbird abundance and wetland management at Necedah National Wildlife Refuge. Specifically, we are interested in how water management for Whooping and Sandhill Crane chick survival affects the distribution of American Bittern, Virginia Rail, and Sora. We conducted point counts using the national, standardized secretive marshbird protocol as described by Conway in 2011. We then used Program MARK to estimate detection probability and abundance of these secretive marshbirds at full pools, drawdown pools, and natural wetlands. Potential opportunities and challenges of simultaneously managing for cranes and secretive marshbirds will be discussed.

Advisors: Jason Riddle and Shelli Dubay
Oral Presentation
Consider for Judging

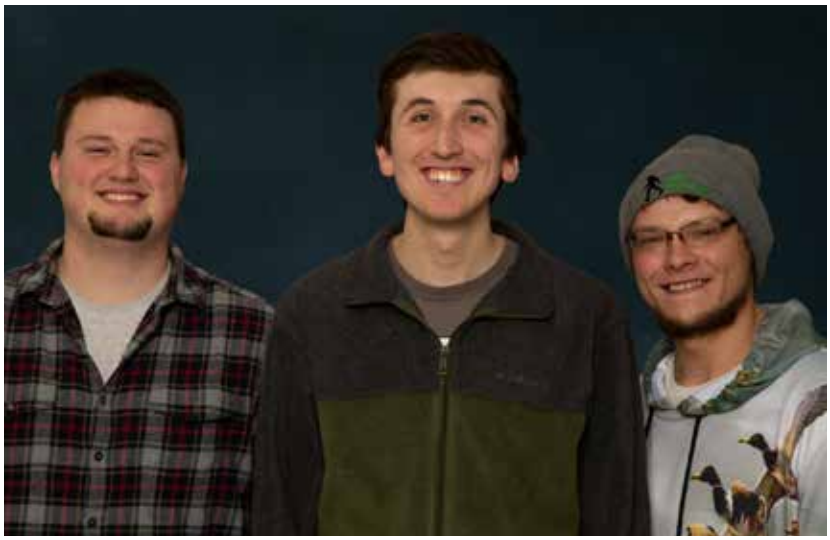
Assessing the Predictability of Waterbird Diversity Using Landscape-scale Variables

Zachary Loken
Wildlife Ecology Major

The Glacial Habitat Restoration Area (GHRA) is a 558,879-acre restoration zone in east-central Wisconsin. The GHRA was designed to enhance wildlife habitat, especially for waterbird, through wetland restorations. We observed and counted all waterbird on wetland basins (n = 103) from April – June of 2017 and 2018 using fixed-location focal scans. Study wetlands were categorized into 3 groups based on hydrologic modification: scrape; scrape plus ditch modification; and scrape plus water control structure. Two reference groups were included: Waterfowl Production Areas (WPAs) and unmodified wetland sites without basins. Wetland plant communities were categorized following the Natural Heritage Inventory database, mapped using aerial imagery, and field checked for accuracy. Habitat heterogeneity was then assessed at the property scale using an interspersion-juxtaposition index (IJI) and using the ratio of nesting-to-foraging habitat within a 1- and 5-km fixed-radius of each property according to WISCLAND2 data. Wetlands with greater habitat heterogeneity may attract more waterbird species than wetlands with a homogenous composition (e.g. reed canary monoculture). An information theoretic approach was used in program R to assess the influence of landscape-scale variables on use of restored wetlands by wetland-dependent bird species, including: hydrologic modification category, IJI, average water depth, relative cover of introduced species, weighted mean C, hectares open water, distance to nearest large wetland patch, land cover type proportions at three various scales, and the ratio of nesting-to-foraging habitat at three different scales. Preliminarily, weak evidence that relationship between waterbird diversity and proportions of both open water and forested cover types exists.

Advisors: Jacob Straub and Rachel Schultz
Oral Presentation
Consider for Judging

Diet Composition of Mallards During the Fall Migration in the Upper Midwest



L to R: Jacob Kunze, Joe Quehl and Gage Harmes
Wildlife Ecology Majors

Mallards (Anas platyrhynchos) are one of the most common waterfowl species in the Upper Mississippi flyway and subsequently the most harvested. For our study, we assessed the change in diet composition of mallards throughout the fall migration. In order to determine a change in diet composition, we broke the hunting season down into three time periods that accounted for early, middle, and late season foraging habits. Food content was examined from hunter harvested mallards across six counties in both Wisconsin and Minnesota during the 2018 hunting season. Once the food was extracted, we broke it down into three categories: agricultural seeds and grains, aquatic invertebrates, and sub-aquatic vegetation. To answer our research question, we conducted three single factor ANOVA tests to look for a change within a food group over time. We were relatively close to being able to make the inference that as fall migration progresses, mallards tend to rely more on agriculture as opposed to invertebrates or sub aquatic vegetation. It is important to know foraging habits of mallards in order to improve their staging areas during the fall migration. This information can be used by wildlife managers and farmers to provide mallards with the appropriate nutrition to survive the fall migration.

Advisor: Jacob Straub
Oral Presentation
Consider for Judging

Analysis of Abiotic Factors Affecting Brook Trout (Salvelinus fontinalis) Abundance and Recruitment Within the Little Plover River, WI

Nathan Jaksha and Jason Lins
Fisheries Majors

Brook Trout (Salvelinus fontinalis) are an important sport fish in Wisconsin, are often used as a biotic indicator of stream health, and fill an important ecological niche as an apex predator. With changing climate and detrimental land and water use practices, Brook Trout populations are becoming increasingly imperiled. To better understand these fragile populations, fisheries managers often estimate abundance and recruitment as an indicator of Brook Trout population health. It is important to understand the causes of change in a population to ensure the use of proper management strategies for that particular species. The Little Plover River, located in Portage County, WI, is a small groundwater fed stream inhabited by a natural Brook Trout population. The Little Plover River has experienced the consequential effects of agriculture, with heavy groundwater usage a major concern. Along with groundwater consumption, a changing climate may also jeopardize the Little Plover River Brook Trout population. In this study, yearly abundance and recruitment of Brook Trout sampled in the Little Plover River was examined in relation to several abiotic factors. Further understanding the relationships between Brook Trout and their environment in the Little Plover River is crucial for managers and their ability to sustain Brook Trout populations.

Advisor: Joshua Raabe
Poster Presentation
Consider for Judging

Using Genetics to Evaluate Survival and Natural Reproduction of Muskellunge in Wisconsin Lakes

Thompson Hill
Fisheries Major
Not pictured: Kristen Gruenthah, Fisheries Major

Stocking of muskellunge *Esox masquinongy* is common throughout Wisconsin and supports many fisheries that could not be sustained through natural reproduction. Most muskellunge stocked in Wisconsin are derived from native broodstock, but progeny of non-native broodstock have been stocked in some locations. For example, muskellunge derived from Leech Lake, Minnesota have been stocked in at least four locations in Wisconsin: Lake Wissota, Petenwell Lake, Castle Rock Lake, and Lake Monona. Leech Lake muskellunge were stocked in these locations because they grow larger and more quickly than native muskellunge from Wisconsin. However, a recent study which used genetics to assign muskellunge caught in Lake Wissota to their strain of origin found that survival of Leech Lake muskellunge was poor. To get a better picture of Leech Lake strain survival we genotyped 135 muskellunge from Petenwell Lake and 129 from Castle Rock Lake at 15 microsatellite to determine origin. Our research will lead to a better understanding of strain-specific survival and recruitment dynamics in muskellunge. Providing information on strain-specific survival will allow managers and angler groups to make more informed choices about what strains to stock. Our research will also help to identify how much natural reproduction is occurring in the lakes included in the study. We are currently analyzing the data and results to inform Wisconsin management.

Advisor: Wes Larson
Poster Presentation
Consider for Judging

Location and Timing of Spawning Brook Trout in the Little Plover River, WI

L to R: Natalie Coash , Benjamin Schleppenbach, and Zachary Mohr, Fisheries Majors

Brook Trout Salvenius fontanalis are a native salmonid species within Wisconsin that require cold, high quality 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. Recent community efforts to improve watershed health and river flows include large scale habitat projects in multiple locations. Understanding Brook Trout spawning locations (i.e., redds) and timing would aid in identifying important locations and time periods for restoration and protection. Therefore, we conducted weekly redd surveys in Autumn 2017 and 2018 by walking the entire river and marking observed redd locations with a GPS. We mapped redds in GIS and compared locations to estimated groundwater inflow data. Brook Trout spawned throughout most of the stream but redd locations varied annually. In 2017, redds were more dense in areas with higher groundwater inflows whereas in 2018 more redds were located upstream and differing groundwater inflows. Varying redd locations could be due to differences in river flow, with much higher flows in 2018 potentially influencing groundwater inflow or Brook Trout movement behaviors. Peak redd numbers occurred during the second and third weeks of November during both years. This research provides valuable information on Brook Trout spawning behaviors and is part of an ongoing evaluation of Brook Trout and watershed restoration efforts in the Little Plover River.

Advisor: Joshua Raabe
Poster Presentation
Consider for Judging

Brook Trout Movements, Survival, Body Condition and Gill Lice in the Little Plover River Prior to Watershed Restoration

Benjamin Schleppenbach
Fisheries Major

Zachary Mohr
Fisheries Major

The Little Plover River is a self-sustaining brook trout (Salvelinus fontinalis) stream and a focal study system for groundwater issues in central Wisconsin. The stream has experienced reduced water levels in recent years including dry reaches in 2005 through 2009, potentially due to a combination of drought conditions and groundwater pumping. The Village of Plover has begun facilitating watershed restoration efforts to increase stream flows. Gill Lice (Salmincola edwarsii), a native parasite of Brook Trout, is present within the Little Plover River system. Our study sought to build upon previous brook trout population data and to provide increased baseline data prior to restoration efforts. Since Autumn 2015 a subset of brook trout (> 120 mm) were implanted with a passive integrated transponder (PIT). Beginning in Spring 2016, PIT antennas at four locations throughout the river were used to detect tagged brook trout, evaluate movements and migrations, and estimate survival rates. Monthly survival estimates were variable with a mean around 0.9. Fish exhibited increased same site and different site movements during high flow periods. Mean gill lice and body condition varied among seasons, with the highest body condition in the spring and increased gill lice during the winter. Although body condition did not differ significantly among most levels of gill lice severity, there were significant differences in the mean number of gill lice per fish as longer individuals were more infested. Individual spawning migration patterns of fish were also evaluated. This information will expand knowledge on brook trout from a unique system and provide increased baseline data to analyze potential effects of watershed restoration efforts.

Advisor: Joshua Raabe
Poster Presentation
Consider for Judging

Schmeeckle Seedbank Study

Rachel Mortensen
Ecosystem Restoration Major

Amanda Barth
Ecosystem Restoration Major

We examined the seed banks in four stands of mixed conifers and hardwoods in Schmeeckle Reserve, Stevens Point, WI. Two of the areas were used for agriculture until 1935 and two areas were forested prior to 1935. Our hypothesis is that seed density will be lower and contain more non-native species in the area previously in agriculture. Twelve soil cores were taken along each of two transects in the four areas for 96 total soil cores. The soil samples were collected in October 2017 and sown in the UWSP greenhouse in November. The pots were monitored 3-4 times per week. At each visit, the plants were counted and species identified as soon as possible. We found that viable seed density was higher in the forested area, but richness was higher in the agriculture area. Neither area contained any invasive species.

Advisor: James Cook
Poster Presentation
Consider for Judging

Invasive Species Inventory of Steinhaugen County Park Trails

Josh Kivett
Ecosystem Restoration Major

Drew Duffy
Biology Major

The Portage County parks are managed with an emphasis on a recreational experience for the user. The county has made native plant communities an important objective for Steinhaugen, the county park in which the project takes place. This condition puts it at different status from the rest, so it will serve as a model for the rest of the parks. The complication Steinhaugen faces, however, is how recreation impacts the diversity of the native plant community due to the inevitable introduction of invasive species. It is believed that with increased recreation there will be an increased amount of species closer to the trails edge than farther into the forest. This study focused on three trails within Steinhaugen marked A, B and C. Each was assessed to ascertain the integrity of the native diversity and abundance within the understory. Each trail was inventoried with transects 20m apart and an average of 10 transects, alternating left and right. Quadrats within each transect were placed at 0.5, 2, 3 and 5 meters perpendicular to the trail and into the forest. The data suggest three main patterns, and the most notable is trail A. This trail has greatest species richness which supports the expected findings. Additionally, quadrat level data shows higher species richness closer to the trails edge. Continual monitoring of our transects will provide further aid in assessing the progress of invasive species in this park.

Advisor: James Cook
Poster Presentation
Consider for Judging

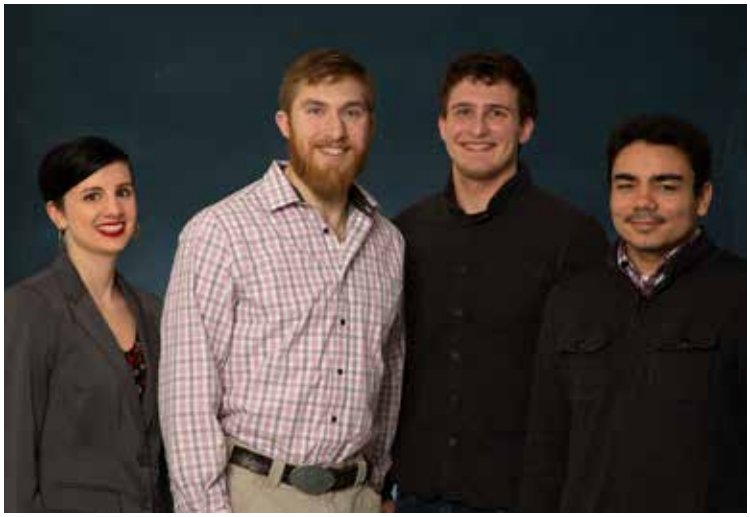
Squirrel River Pines Seed Bank Composition

Vanessa Komada
Ecosystem Restoration Major

Understanding forest seed bank composition can aid in predicting responses to disturbance and help manage important plant species. This study was conducted at Squirrel River Pines State Natural Area in Oneida County. The composition of the vegetation is well established, but the seed bank composition is unknown. In May 2018, the DNR conducted its first prescribed burn on a 3.9-hectare red pine stand in the natural area to prevent further growth and spread of hazel (Corylus spp.). The goals of this research were to answer: Does the current vegetation reflect the composition of the seed bank? Does the composition of the seed bank provide clues about the disturbance history of the site? Does the seed bank contain desired species, and thus some additional restoration potential? In August 2018, sixty-two soil samples were collected using a 2cm x 30cm soil probe. Samples were planted in the campus greenhouse to mimic conditions of a typical Wisconsin summer. Pots were monitored three times per week and all new or dead plants recorded, with each new plant given a unique code. Eighteen species were identified, and unknown species continue to be monitored until identification is possible. The number of viable seeds—not including ferns and mosses—is 512 seeds/sq. meter. Based off current observation, the seed bank is composed of native plant species along with a variety of life forms. This preliminary information could indicate restoration potential, but future identification of unknown species will solidify this evaluation. Ultimately, this survey will help the DNR understand how the seed bank has or will contribute to vegetative response.

Advisor: James Cook
Poster Presentation
Consider for Judging

Does Experience Matter? Observing How Previous Experience of Students May Affect Trail Camera Setup



L to R: CJ Glass (Wildlife Education Major), Timothy Zappa (Wildlife Ecology Major), Nathan Bartels (Wildlife Ecology Major), and Evan Kuhel (Wildlife Ecology Major)

Citizen scientists are being used to collect data more frequently for wildlife research, specifically trail camera research. But the quality of setting up and maintaining these camera stations are rarely questioned. This study was conducted to observe how previous experience with trail cameras, educational presentations, and the field of study may affect trail camera setup for the students attending the Summer Field Experience at Treehaven, Wisconsin. Groups of students were chosen at random and presented one of two possible presentations on trail camera setup. The students were also asked to answer anonymous surveys about previous experience with outdoor activities, and their major. They were then sent out to set up trail cameras in different areas of the property. The teaching assistants would then go around and take photos of the trail camera setup. The data was then compiled in Excel. The results from the surveys were then cataloged based on the student's responses. The data collected from this study is part of an ongoing monitoring program studying wolves (Canis lupus), coyotes (Canis latrans), red fox (Vulpes vulpes) and gray fox (Urocyon cinereoargenteus) populations in comparison to human population in a effort to better comprehend the effect that human development has on Canid movement on the Treehaven Property.

Advisor: Cady Sartini
Poster Presentation
Consider for Judging

What are They Learning at the School Forest?

Rachel Loomis
Environmental Education Major

Prior research with participants in environmental education programs has demonstrated experiences that are active, social, novel, personally relevant, and emotionally engaging create lasting memories. Years later, those memories influence actions, conversations, and personal reflections. The Manitowoc Public School District and Rahr Memorial School Forest have a long history of providing quality outdoor education to children of all ages. In Spring 2018, 58 (21%) of 265 graduating high school seniors over the age of 18 completed electronic surveys. Students were asked to list three memories of their trips to the School Forest and explain why those experiences were memorable, what impacted their lives, and what they would like future students to experience. Several themes emerged from analysis of the survey data. Students developed place-based awareness, bringing attention to local flora and fauna, bird and butterfly migration. Students had experiences that led to social and emotional development, which included spending their first night away from home and getting to know their classmates and teacher in a unique setting. Students also developed a lasting appreciation of nature through service projects, disconnecting from technology, and allowing School Forest programs to foster their interest and stewardship behavior for the natural environment. Through outdoor education lessons, students participated in unfamiliar activities such as archery, snowshoeing, geocaching and compassing, helping build skills and discover possible lifelong activities. The results of the study have been shared with the School Board and will inform future programs at the School Forest.

Advisors: Kendra Liddicoat & Kelly Vorron
Poster Presentation
Consider for Judging

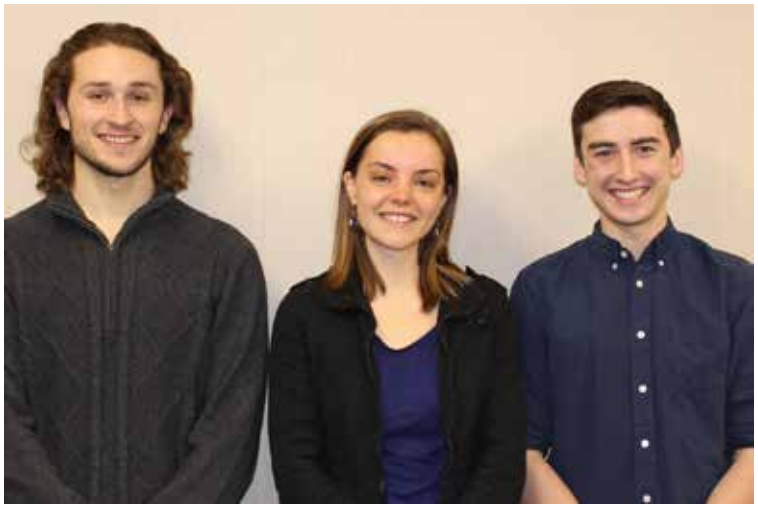
Wild Rice Landscape Ecology: Restoration Implications

Naomi Albert
Natural Resource Planning Major

Wild Rice was once prominent throughout Wisconsin but has declined during the last several decades. The potential for restoring native wild rice (Zizania palustris) was investigated for the Red Cedar Watershed in western Wisconsin. This particular watershed was studied because it is a eutrophic system which could benefit from aquatic vegetation restoration. Five wild rice beds were studied in three counties adjacent to the Red Cedar Watershed in order to observe the conditions associated with wild rice growth in western Wisconsin. Sediment cores were taken at 15 locations within each wild rice site. These samples were analyzed for organic matter and texture. At each sample location wild rice stem density was also recorded. The land use in the sub-watersheds surrounding each of the five wild rice beds was also analyzed. This was accomplished using geographic information systems and Wisconsin Department of Natural Resource land cover data. This analysis showed that wild rice density increased with higher sediment organic matter content. The land use in the sub-watersheds was comparable to that of the Red Cedar Watershed. Our research suggests that the conditions in the Red Cedar watershed may be compatible with wild rice restoration.

Advisor: Arthur Kneeland
Poster Presentation
Consider for Judging

Climate Change in Wisconsin County Forest Planning



Michael Mills, Naomi Albert and Casey Olson
Natural Resources Planning Majors

Climate change is projected to shift ecosystems in northern Wisconsin, bringing profound change to forests, including altered forest structure and habitat loss for vulnerable species. These changes will pose management challenges which should be addressed in forest planning. Counties manage the greatest acreage of public forest in Wisconsin. Since the number of privately-owned forests is high and it is difficult to access landowner management plans, county forest plans are our best tool to gage climate change preparedness in Wisconsin forests. We examined current county forest plans for inclusion of climate change issues and topics, but most plans were created in 2005-6 and do not address climate change. Thus, in order to understand if and how county forests are addressing climate change, we surveyed county forest managers to investigate their understanding and preparedness for climate change in relation to forest management. Our objective is to understand how climate change influences forest planning.

Advisor: Anna Haines
Poster Presentation
Consider for Judging

The Effects of Biochar and Biosolids on Soil Quality and Relative Tree Health of *Quercus macrocarpa*

Laurel Deitch
Soil and Land Management Major

Not pictured: Samuel Vitrano, Soil and Land Management Major

Mature trees have significant value and function within urban environments. Tree growth may be limited in urban soils due to poor soil quality. In this experiment, we assessed soil and tree (*Quercus macrocarpa*) responses to organic amendments at a brownfield remediation site in Milwaukee, Wisconsin. The incorporation of the combined treatment of biosolids and biochar may improve soil quality and tree health. Tree health was assessed by quantitative and qualitative measurements such as relative diameter. Soil quality was defined by physical, chemical, and biological properties and assessed by measuring respiration, organic matter, electrical conductivity, pH, and moisture content. If improvements in soil quality and tree health are observed, these improvements may be the result of both increased water and nutrient retention capacity of biochar, and increased fertility and microbial activity with biosolids. Biochar and biosolids can be beneficial soil amendments that urban landscape managers can use to increase soil quality. These improvements in soil quality will increase the value and function of trees in urban environments.

Advisors: Bryant Scharenbroch
Poster Presentation
Consider for Judging

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

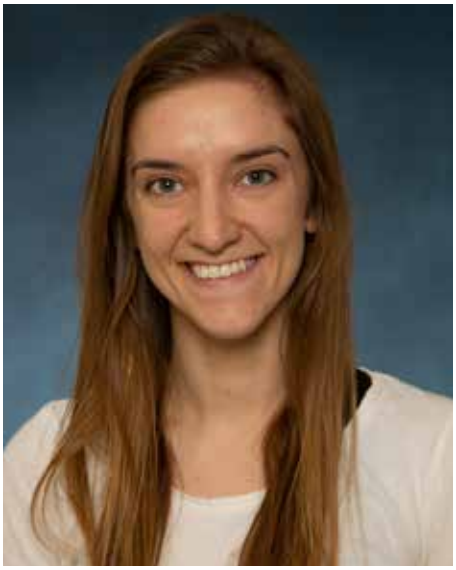
Lindsey Laskowski
Soil and Land Management Major

Not pictured: Erik Halverson (Soil and Land Management Graduate), Zach Leitner (Soil Science Graduate), Jasmine Medukas (Soil and Land Management Graduate) and Derek Potratz (Soil and Land Management Graduate)

Rotational grazing is an agricultural practice which provides long-term ecological, environmental, and soil benefits. The goal of this project is to assess soil quality on a rotational grazing farm over time. This study is a long term-club research project; 20 years long through the University of Wisconsin - Stevens Point Soil and Water Conservation Society. The research crew analyzes the impact of rotational grazing on soil physical and chemical properties on a locally managed grazing operation. Bulk density was tested in fall 2015-2016, soil Carbon to Nitrogen ratio, total Carbon and Nitrogen all in fall of 2017, pH in spring of 2018, while Phosphorus, Potassium, Organic Matter, and Electrical Conductivity will be measured in spring 2019, and biomass yield will be tested in fall of 2019. Fields were broken up into five-acre parcels and grid points were allotted to each parcel. A control field was sampled, which is not rotationally grazed, as well as a newly converted conventionally farmed field. Soil samples (6") were collected within a ten-meter radius around each point in fall 2015. Fields will be resampled every fall in a four-year sequence, with the next sampling taking place in fall 2019 and testing for the same soil properties as listed above.

Advisors: Daniel Keymer, Robert Michitsch, Jacob Prater, and Bryant Scharenbroch
Poster Presentation
Consider for Judging

Phosphorus Removal Capacity of Two Industrial By-Products



Caroline Rice
Water Resources Major

This research project will examine a potentially inexpensive method to remove phosphorus from a stream. High levels of phosphorus in waterbodies can lead to excessive algal production and lowered dissolved oxygen levels and biodiversity. This study will analyze the effectiveness of flue gas desulfurization (FGD) gypsum as a potential phosphorus adsorbent. To achieve our study objectives, we will create 6 bench-scale mesocosms that will mimic a river channel. The mesocosms will be rectangularly shaped flood tables with a similar width to depth ratio as a local river in central Wisconsin (i.e., Plover River entering McDill Pond). Each flood table will be lined with sediment from a river channel and overlaid with FGD gypsum. This would be similar to how an amendment would occur in the field. FGD gypsum contains a high percentage of calcium which is known to adsorb phosphorus. Each mesocosm will have water with an elevated phosphorus concentration pumped through them using a peristaltic pump to create a realistic hydrological scenario. Daily sampling of the outlet water and sediment analysis at the beginning and of the study will be used to compare a control subset against a subset of mesocosms that are amended with FGD gypsum. This study will examine if FGD gypsum (an industrial waste product) can be used to remediate water quality concerns in waterbodies in central Wisconsin. This experiment will be completed by early spring of 2019.

Advisor: Kyle Herrman
Poster Presentation
Consider for Judging

Quantifying Nitrogen in Central Sands Irrigation Water

Liam Dangeur
Water Resources Major

High nitrate concentrations in groundwater from agricultural land use is a major concern for water quality in the central sands area of Wisconsin. Nitrate has a high mobility in sandy soils, and concentrations in irrigation water can be significant. Nitrate in drinking water is a human health hazard when the concentration of nitrate-nitrogen surpasses 10 mg/L. One of the major issues with high nitrogen in drinking water is the increase of colorectal cancer. Furthermore, infants exposed to high nitrogen levels risk blue baby syndrome. Much of this nitrate is exported into nearby rivers and increases the level of usable nitrogen to the ecological system creating an imbalance. This study investigates the variability of excess nitrate concentrations that come out of irrigators from previous fertilizer applications. Growers may unknowingly apply more fertilizer than needed because of the excess already in the groundwater system. From this study's data, a quantified model is created to determine the variability of nitrate concentration in the irrigation water throughout the growing season. Utilizing this model, growers can better manage the amount of fertilizer applied to crops during the season.

Advisor:Kevin Masarik
Poster Presentation

A Baseline Assessment to Develop an Appropriate Restoration Regime for the Management and Restoration of Wetlands

L to R: Kiersten Czarnecki (Resource Management Major), Hannah L. Lukasik (Water Resources Major), Emma Schmidt (Water Resources Major), Kayla Wilcox (Wildlife Ecology Major), and Teresa Wolf (Soil & Land Managment Major)

Wisconsin has lost nearly half of its original wetland environments, primarily due to development and agriculture. The recognition of the consequences of that loss has led to a revival in recent years to mitigate and restore wetlands to their pristine states. A wetland located west of Stevens Point, Wisconsin, was converted to an agricultural field nearly a century ago and has recently been restored to a wetland environment. The Students for Wetland Awareness, Management and Protection (SWAMP) organization conducted a baseline assessment to evaluate the quality of the site and provide recommended actions that could improve the area. Assessments are conducted annually within the wetland area to record changes in data. The parameters of the assessments include a soil survey, hydrologic analysis, vegetation assessment, macroinvertebrate collection, and water chemistry analysis. Groundwater monitoring wells are also being added to assess the flow of groundwater relative to surface water flow. From our base research we have documented the presence of invasive species on the wetland. These invasive plants are of high concern, specifically reed canary grass (Phalaris arundinacea) and encroachment of cattails (Typha latifolia). Because of this, the group determined that the best option to control them is to implement a fire regime and inserting water control structures. However, due to weather conditions and schedule conflicts we are seeking other alternatives. Other alternative regimes may include herbicides or physical removal of species. We hope that a one of these new regimes may allow for the regrowth of rushes (Juncus), sedges (Carex), and sphagnum mosses (Sphagnum) that are in the seed bank on the property. The burning was decided to be the best alternative because it is the most natural form of eradication without disturbing soils and native plants. The date of a burn regime is still to be determined due to extenuating circumstances, we hope to burn the property sometime in 2020.

Advisor: Kyle Herrman
Poster Presentation
Consider for Judging

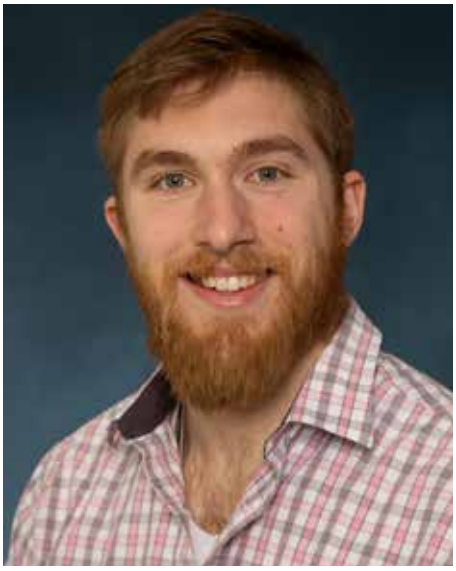
Lichen and Fungi Fluorescence in a Flying Squirrel's (Glaucomys spp.) Diet

Conner Ties
Wildlife Ecology Major

Both the northern flying squirrel (Glaucomys sabrinus) and southern flying squirrel (Glaucomys volans) were found to display fluorescent fur under a black light. The reasoning behind why they have this trait is still unknown. Do the specific lichens or fungi that a flying squirrel (Glaucomys spp.) consume also display that fluorescent characteristic under a black light. Using the University of Wisconsin-Stevens Point museum collections to reference on whether a lichen or fungi possesses the fluorescent trait. Species of lichen that flying squirrels (Glaucomys spp.) consume includes Bryoria spp., Usnea spp. and Trebouxia spp. both of which can be found over most of the flying squirrels (Glaucomys spp.) range in North America. The species of fungi a flying squirrel consumes includes Ascomycotina spp., Basidiomycotina spp., and Rhizopogon spp. these lichens can be found across the flying squirrels range (Glaucomys spp.). Figuring out which lichens or fungi have fluorescent characteristic and are also a part of the flying squirrel (Glaucomys spp.) diet, could help bring the answer as to why flying squirrels (Glaucomys spp.) glow fluorescent.

Advisor: Chris Yahnke
Poster Presentation

Using Safari Guides to Develope an Image Database for Individual Lion Identification



Timothy Zappa
Wildlife Ecology Major

Lions are among the most popular animals that people come to see in Botswana. Lions are also on IUCN list which requires proper management and monitoring of this species. Options for monitoring lions can vary from doing spoor counts to building identification databases. These databases assist with accurate population estimates but are dependent on the positive identification of individuals. While research is done to estimate lions using other techniques these can often be expensive, time consuming and requiring a large team. One common way to resolve these issues is to collect photos of lions from the tourist for a specific duration and use those photos to catalog the individuals using the lion's whisker pattern as a unique identifier similar to fingerprinting humans or spot identification on leopards. This study attempted to determine the amount of time it would take to create complete photographic facial profiles for most of the lions surrounding the Qorokwe Lodge area. Using two of the Safari guides as our volunteers we found that a sixteen-week study was insufficient to completely identify most of the individuals. These results could have been affected due photographic training and non-systematic coverage of the area. Additional study is needed to determine how these variables played a role in our results.

Advisor: Scott Hygnstrom
Poster Presentation

Comparing Small Mammal Diversity in Schmeeckle Reserve in Stevens Point, Wi

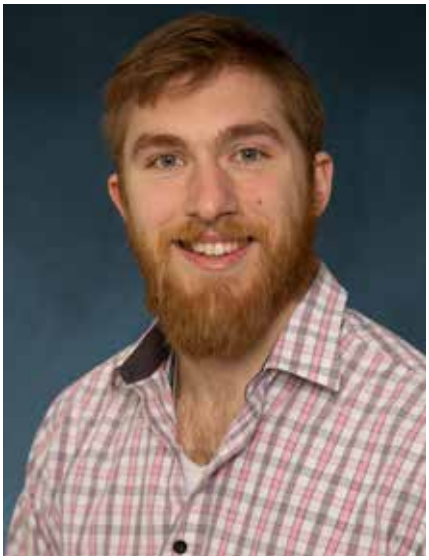
L to R: Shelby Truckenbrod*, Kendall Prehn (Environmental Education Major), Nicole DeMarb*, and Madeline Abbatacola* (*Wildlife Ecology Major)

Amanda Lang
Wildlife Ecology Major

The small mammal population of various species within Schmeeckle Reserve has been monitored from 2008 through 2018. Longitudinal data of this population is valuable for the identification of response to the change in environmental events. This long term data is also useful for monitoring disease within the small mammal population of the reserve. A 5x5 grid of Sherman traps was arranged at two separate locations within the Schmeeckle Reserve, Moses Creek and Chilla Woodlot. Ear length and mass measurements were collected from each small mammal found trapped, then tagged on the ear. Our study will be 1.) Analyzing the species diversity in each grid area using the Sorenson's diversity coefficient 2.) Using the Morisita's Overlap index to compare the diversity of these two areas for the entire length of the study 3.) Using the Dominance index to calculate which species in each community was dominant. The potential problem with the dominance of a specific species is the likelihood of a widespread transmission of disease, which could be transferred to humans.

Advisor: Chris Yahnke
Poster Presentation
Consider for Judging

Dynamic Water Sources and Their Effect on Large Mammal Movement In Northern Botswana



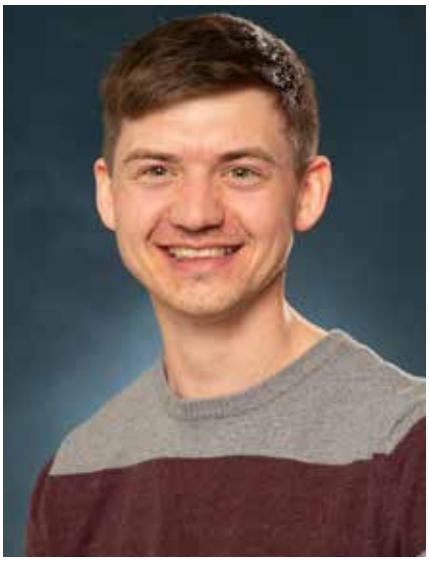
Timothy Zappa
Wildlife Ecology Major

Kelsey Brown
Wildlife Ecology Major

The Okavango Delta is one of the most diverse and dynamic environments in Africa. The seasonal fluctuations from wet marsh to dry shrubland drives several mammalian physical and behavioral adaptations that enhance fitness and survival. The distance that species and individuals will travel from a permanent source of water however is unknown. Monthly variation in temporary water sources may affect the overall movement of many species. We drove transects to locate and count 24 species of large mammals in Northern Botswana during 2016-2018 dry months. We used Sentinel 2 maps and Google Earth shape files to evaluate the availability of streams, ponds, and pans in the vicinity of the transects from month to month during the dry season. We then used Microsoft Excel and ESRI ArcGIS Pro to analyze the distances between animals and both permanent and monthly sources of water. Finally, the data was separated based on individual species to determine the average distance a species will range from a permanent source of water. Our objectives were to determine 1.) the movement distances of species from permanent sources of water, 2) how water availability differs monthly during the dry season, and 3) if there is a spatial relationship in movement of animals during the dry season due to monthly variation in water availability. To our knowledge, no studies have been done to evaluate these phenomena.

Advisor: Scott Hygnstrom
Poster Presentation
Consider for Judging

Comparison of Hen Wood Duck Survival During Nesting and Brood-Rearing Periods



Andrew Pelletier
Wildlife Ecology Major

Not pictured: Kali Rush, Masters of Science in Natural Resources

Wood ducks (*Aix sponsa*) are one of several waterfowl species (i.e. goldeneye and hooded merganser) known for nesting in tree cavities and nest boxes. Hen wood ducks perform various stages and lengths of nesting and brood rearing periods providing increased opportunity for predation. My objective was to study temporal data of predation events and examine if there is a seasonal difference between nesting and brood rearing periods. This project is in collaboration with a graduate project researching adult female wood duck survival conducted at Mead Wildlife Area located in Marathon County, Wisconsin. Radio collars were placed on female wood ducks (n=43, n=13 mortality events) in 2017 and 2018. Data were collected during nesting and brood rearing periods providing predation occurrences. I hypothesized that the collared female wood ducks will be most exposed during the incubation period of nesting season. Additional research may illustrate key components on female wood duck susceptibility to predation during nest and brood rearing cycles.

Advisor: Jacob Straub
Poster Presentation
Consider for Judging

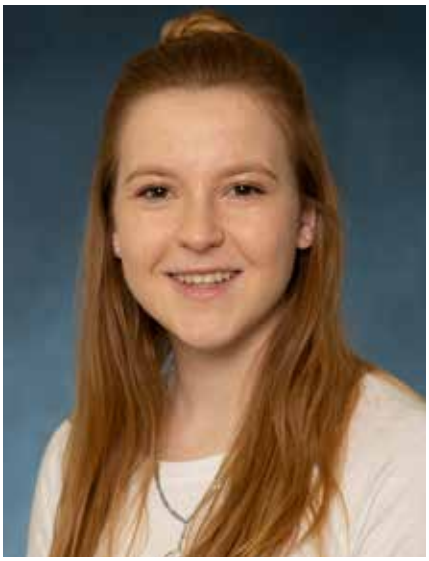
Does the Arrow Always Point North? Using Suture Patterns to Identify Two Species of Flying Squirrels

L to R: Derek Thorn (Wildlife Ecology and Water Resouces Majors), Timothy Zappa (Wildlife Ecology Major), and Drew Scullard (Wildlife Ecology Major)

In recent years the southern flying squirrel (Glaucomys volans) has expanded its range further north displacing the northern flying squirrel (Glaucomys sabrinus). In areas where both species coexist proper field identification techniques are required to distinguish between the two species. Identification is easier with live individuals. For example, there is a diagnostic character using pelage coloration on the ventral surface that distinguishes the species, but there have been no studies looking at diagnostic traits on the skulls of the two flying squirrels. This is important since carcasses or owl pellets may be encountered during small mammal surveys. The presence of one or both of these species signals a shift in forest habitat ecotypes and can assist biologists and wildlife professionals with tracking these changes in small mammal communities. This study looked at whether the suture found on the coronal crest can be used as an identifying characteristic between Northern flying squirrels and Southern flying squirrels. Using randomized photos and a short presentation describing the suture pattern, each student was asked to identify squirrels using the suture pattern. We used the results to determine if this feature is sufficiently diagnostic to separate the two species.

Advisor: Chris Yahnke
Poster Presentation
Consider for Judging

Herptile Bycatch From Fish Sampling in The Lower Wolf River Basin



Jordyn Ziesmer
Wildlife Ecology Major

Bycatch is the accidental catch of non-target species and can be an important factor when conducting various surveys. Knowing the effects of management techniques can allow managers to choose the method that minimizes negative impacts on species. My objective was to identify possible trends and correlations between survey methods, bycatch species, and location. I analyzed data collected from fyke and hoop netting surveys performed by the Department of Natural Resources office in Shawano, Wisconsin. Reptile and amphibian bycatch species began to be recorded for individual waterbodies of the Lower Wolf River Basin in 2010. Results showed that painted turtles (Chrysemys picta) and mudpuppies (Necturus maculosus) were the most common bycatch species. There was a difference found when comparing the bycatch species caught using the two netting methods. This analysis can inform the DNR about the amphibian and reptile bycatch that results from fyke netting and hoop netting in the Lower Wolf River Basin.

Advisor: Cady Sartini
Poster Presentation

Seasonal Weight Change in Migrating Northern Saw-Whet Owls

Amanda Lang
Wildlife Ecology Major

Madison Fell
Wildlife Ecology Major

The Northern saw-whet owl (Aegolius acadicus) (NSWO) is a mesopredator within upland ecosystems. They live as far north as central Canada and Alaska and will migrate as far south as central Mexico. NSWO's migrate in fall from September until December, peaking around mid-October, and are relatively abundant in central Wisconsin during this time. Data for this project comes from the University of Wisconsin - Stevens Point student chapter of The Wildlife Society's long-term saw-whet owl undergraduate research project. Data collection takes place at Sandhill Wildlife Area, a roughly 9,000 acre piece of land owned by the Wisconsin Department of Natural Resources near Babcock, Wisconsin. Research has been occurring each fall from 2007 through 2018. NSWO's were lured and captured using call-playback devices and mist-nets and were banded using USGS aluminum leg bands. Wing and tail chords, weight, age, and sex of birds were recorded with each capture. Previous studies have looked at micro-habitat use of these owls over the 7 sites established at Sandhill. We will use statistical analysis to analyze average weight of owls by sex from early to late in the migration season.

Advisor: Jason Riddle
Poster Presentation
Consider for Judging

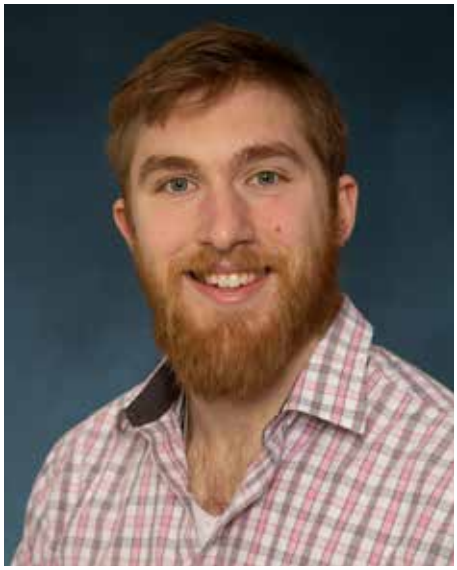
Ecology of Box-nesting Waterfowl in Central WI: Biological Versus Societal Benefits

L to R: Marissa Kaminski, Sean Mason, Elianne Heilhecker, and Leah Bell (Wildlife Ecology Majors)

Cavity nesting birds like Aix sponsa (Wood ducks) and Lophodytes cucullatus (Hooded merganser) rely on nest boxes in areas where natural cavities are not available. In Wisconsin, specifically the Mead Wildlife Area in Marathon County, cavity nesting birds have the option to use tree cavities or nest boxes for their eggs. In the past, forests were logged and tree cavities less abundant, thus the establishment of nest boxes. Currently, sufficient tree cavities are available for cavity nesting birds, yet duck boxes still remain a factor on many landscapes. While nest box use by these species has varied over time, managers have inquired which, if any, factors predict if a nest box will be successful. Our aim is to determine whether nest boxes are significantly used through, use (i.e., a primary species use), nest success (i.e., at least one egg hatches), or parasitism (contains eggs from one or more individuals). Or if the use of the nest boxes pertains to non-biological success (i.e., data collection, outreach). Our study aims to evaluate if five independent predictor variables have any significant effect on our response variables. To determine this, competing model sets will be evaluated with a single or combinations of the following variables: species, year, use from previous year, location, and age of box. Beginning in 2008 data has been collected by the University of Wisconsin-Stevens Point Wildlife Society by checking 78-129 boxes annually in January and February. Other studies in our study site have demonstrated low use rates (<15%) by waterfowl pertaining to ecological role aspects. If the data does not support the ecological role, this would suggest artificial box programs could support sociological aspects.

Advisors: Jacob Straub and Matt Palumbo
Poster Presentaiton
Consider for Judging

Species Diversity May Enhance Tourism Potential in Botswana



Kelsey Brown
Wildlife Ecology Major

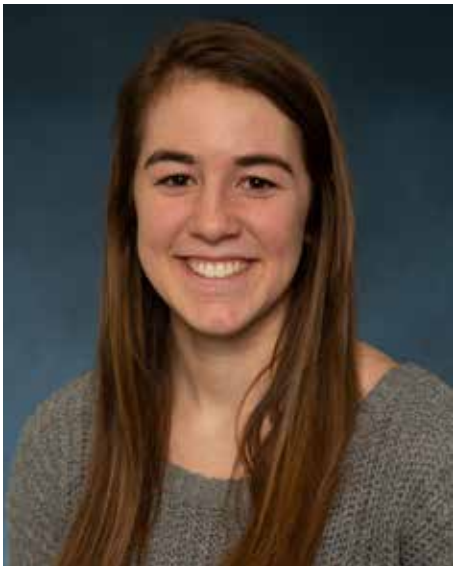
Timothy Zappa
Wildlife Ecology Major

Not pictured: Christiaan Winterbach, Tau Consultants

Northern Botswana is a leading tourist destination, in part due the abundance of wildlife. Much of Botswana's economy relies heavily on wildlife-based tourism. When safari hunting was banned in 2014, a movement arose to convert from hunting to alternative forms of ecotourism, such as the expansion of photo-safaris. Satisfaction of ecotourists corresponds with the number of observations and sightings of free ranging wildlife. Charismatic species such as predators and ungulates create the most desirable experiences for wildlife viewers. Ecotourism in Botswana currently consists of a limited number and capacity of lodges on land that is leased to operators (concessions) by the Government of Botswana. The willingness of ecotourists to pay maybe determined by the diversity of species they encounter. The objective of this study was to quantify and predict the quality of tourist experience among two concessions in northern Botswana. Quality will be based on a species rank system that will determine potential for wildlife viewing areas. We conducted ground surveys twice a day in the Ngamiland and Mababe regions in northern Botswana and recorded species, location, and total number of animals within 200 meters of the transect. We standardized observations by kilometer to determine which areas had the greatest capacity to satisfy tourist expectations and future ecotourism potential.

Advisor: Scott Hygnstrom
Poster Presentation
Consider for Judging

Assessing the Accuracy of N-Mixture Models and Mark-Recapture using Camera Trap Data on a Known Population



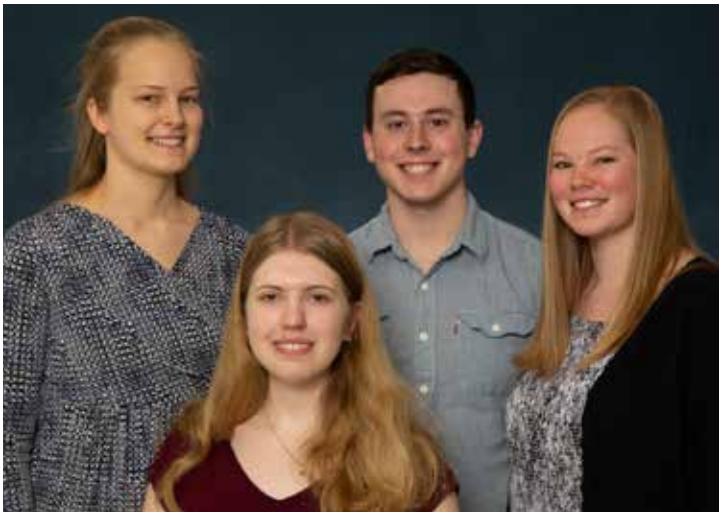
Nora Hargett
Wildlife Ecology Major

Joe Quehl
Wildlife Ecology Major

Traditionally, the use of trail cameras to estimate population abundance relies on the identification of individual animals through the use of a mark-recapture method. These methods require the ability to identify individuals by picture and limits the species that can be studied. However, A new method of estimating abundance using N-mixture models may eliminate the need for physical capture or identifying specific individuals. To test the validity and accuracy of these survey methods, we plan on using camera trap data previously collected on the University of Wisconsin-Stevens Point Treehaven property for other projects investigating the abundance and behavior of various species of wildlife. Using incidental photos of students gathered during these projects, we will be attempting to estimate the number of students attending Treehaven for both summer sessions of 2016 and 2018. By comparing the estimates of the N-mixture model and the mark-recapture model to a known population, we hope to assess any sampling biases associated with either methodology. N-mixture models have been applied to point count data to estimate the abundance of birds in previous papers, but have yet to be used to analyze camera data. This study will give further insight into the application and accuracy of these two models.

Advisors: Cady Sartini and Jason Riddle
Poster Presentation
Consider for Judging

Comparing Parasite Diversity and Abundance to Body Mass of Eastern Cottontail Rabbits in Central Wisconsin



L to R: Melinda Houtman, Katherine Brown, Tommy Young, and Sabrina Claeys
Wildlife Ecology Majors

The Eastern cottontail rabbit (Sylvilagus floridanus) is an abundant species throughout the Midwestern United States. Cottontail rabbits serve as a prey base for many predators and as hosts to several endo-parasites and ecto-parasites; however, parasites in cottontails are rarely observed and documented. Observations of Eastern cottontail rabbit parasites have not been published in Wisconsin since the 1950's. Since then, many areas in Wisconsin have urbanized due to an increase in population. Our objective is to anazlyeanalyze ecto- and endoparasite abundance, diversity, and presence,prevalence comparedative to body mass ofn lagomorph hosts in Rudolph, Wisconsin. We hypothesize individuals with lower body mass have potentially fewer energy resources to invest in parasite defense, therefore species abundance and diversity will be highest on individuals with lower body mass. Traps were set in the evenings from February – March and were baited with sweet feed. When captured, rabbits were processed by measuring hind foot length, weighed, and ear tagged. Fecal samples were collected to do an analysis of endo-parasites. Ecto-parasites were identified to help develop host-arthropod database through the parasitology museum collection. Parasites were analyzed by conducing fecal floats and microscopic observations for identification.

Advisor: Sarah Orlofske
Poster Presentation
Consider for Judging

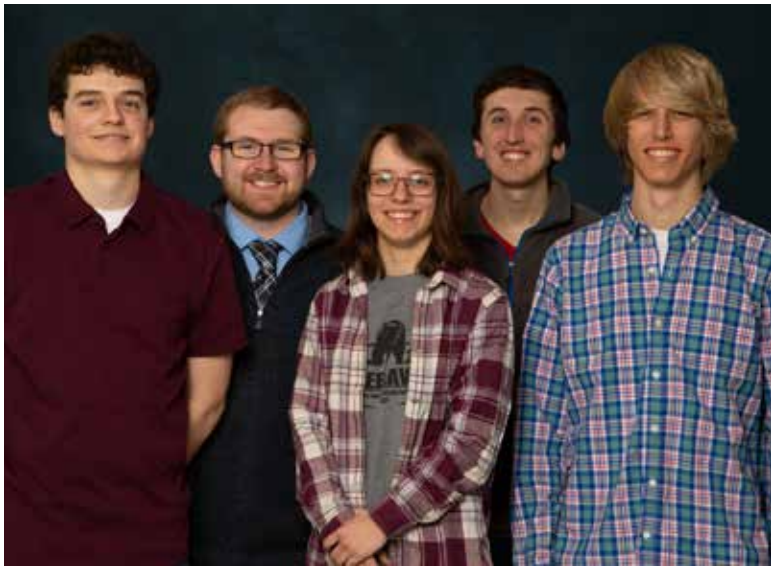
Breeding Ecology of Waterbirds in a Restored Floodplain of the Illinois River

Macayla Greider
Wildlife Ecology Major

Having directly restored, enhanced, and protected greater than 2,700 ha of former floodplain wetlands and associated uplands in the central Illinois River valley, the Nature Conservancy's Emiquon Preserve is the most substantial floodplain restoration effort in the region to date. The restoration has provided critical nesting habitat for many waterbird species, including species of conservation concern such as Least Bittern, Black-Crowned Night Heron, and Common Gallinule. Since 2013, Forbes Biological Station has conducted nest searches in two distinct wetland vegetation communities, dense emergent and hemi-marsh vegetation. We evaluated nest density, nest success, and nest characteristics of marsh birds during June and July of each year. Nest searches were performed in random plots (ha) that were generated in ArcGIS and we also found nests incidentally when travelling between plots The addition of a water control structure in summer 2016 increased water management capabilities at Emiquon Preserve and restored river floodplain connectivity. In 2018 managers implemented a drawdown designed to restore moist soil vegetation and provide opportunity to perform levee repairs and this allowed us a unique opportunity to evaluate the effects of the drawdown on waterbird nesting ecology. We will compare data from summer 2018 with all previous monitoring years and compare estimates and characteristics of nest density and survival. This may provide valuable insight into how small habitat manipulations can have a large impact on marshbird breeding strategies. This multi-year research project will continue to provide information to adaptively manage and improve Emiquon Preserve and areas like it using nesting waterbirds as an environmental indicator and sentinel of wetland quality.

Advisors: Jacob Straub, Aaron Yetter, Joseph Lancaster, and Heath Hagy
Poster Presentation
Consider for Judging

Determining a Acoustistical Component to Drumming Log Selection in Ruffed Grouse (*Bonasa umbellus*)



L to R: Jeffrey Williams (Wildlife Ecology Major), Benjamin Tjepkes (Wildlife Ecology Major), Rachel Martin (Wildlife Ecology Major), Joe Quehl (Wildlife Ecology Major), and Logan Cutler (Fisheries Major)

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. We aim to evaluate drumming log selection in northern Wisconsin as part of a UW-Stevens Point Wildlife Society research project. Auditory drumming surveys were conducted between the months of March and May of 2016 and 2017 to locate used logs. We plan to use the Sound Mapping Tools ArcGIS toolbox to assess where the sound of the drumming is being heard, while accounting for several biotic and abiotic factors. Then we will compare the area of sound propagation of these points to random points throughout the property. Using these methods, we hope to see whether ruffed grouse are selecting drumming logs for their acoustic value. This information will be used to better understand how drumming logs are selected by male ruffed grouse.

Advisor: Jason Riddle
Poster Presentation
Consider for Judging

Home Range Comparison of Urban White-Tailed Deer During the Winters of 2014/15 Through 2018/19

L to R: Kelsie Hayes, Mason Wheeler, and Kelsey Brown
Wildlife Ecology Majors

White-tailed deer (Odocoileus virginianus) in urban environments present a unique challenge to wildlife managers. Movement patterns and home ranges vary depending on habitat availability throughout specific times of the year. This study compares home ranges of white-tailed deer during the winters of 2014 through 2019 in Schmeeckle Reserve, a forested habitat located adjacent to an urban interface. Deer were trapped using modified Stephenson box traps baited with corn. Selected deer were outfitted with VHF radio collars and ear tagged for identification. The average home range size of collared deer for 2018 was 6.944 ha. Currently, we are collecting data from 4 deer. We are in the process of collaring additional deer for this study. Home range analysis for each deer will be constructed using the Kernel home range estimator. A Chi-Square test will be used to compare the average home range size and winter severity for that year. Data collection is ongoing and will continue until April 1, 2019. This analysis will provide insight to movement patterns of urban deer over the course of multiple wintering seasons.

Advisor: Scott Hygnstrom
Poster Presentation
Consider for Judging

Aquatic Macroinvertebrate Taxa Richness between Two Different Ecological Areas in Small Headwater Stream in Southwest Wisconsin

Kayla Wilcox
Wildlife Ecology Major

The Elroy-Sparta bike trail in southwest Wisconsin incorporates three tunnels, the longest just under a mile long. Groundwater coming from the longest tunnel's walls forms a small subterranean stream which exits the tunnel and continues through open landscape. The subterranean stream could host cave-dwelling aquatic macroinvertebrates that are uncommon in Wisconsin and poorly known. I sampled aquatic macroinvertebrates at three subterranean and two open landscape locations and recorded observations of substrate, water velocity, water and air temperature, and weather at each sample location. I examined constituent taxa, taxa richness, and macroinvertebrate relative density to determine if the tunnel portion and open landscape portion of the stream were similar to each other, or representative of two differing ecosystems. The two ecosystems have similar taxa that correlate with low tolerant environments. A particular taxa, living in subterranean environment is showing up in some of the sample. This taxa should not be there but is being found repeatedly. Not all the samples are done and processed, but what has been found it could be a more diverse taxa than previously thought. Because of this it could lead to a more extensive knowledge on where aquatic macro invertebrates could live in subterranean ecosystems.

Advisor: Jeff Dimick
Poster Presentation
Consider for Judging

Flood Effects on Macroinvertebrate Richness in Headwater Stream in Southwest Wisconsin

Kayla Wilcox
Wildlife Ecology Major

Taylor DeNure
Wildlife Ecology Major

In 1878 the Chicago and North Western Railroad created a rail way in South Western Wisconsin to carry passengers, cattle, and goods. In 1967 the railway industry began to fall (Elroy-Sparta Friends Group 2018); and a section of the railway was given to the Wisconsin Department of Natural Resources (WDNR) to create a rail-to-trail for cyclists. Parts of this section contain unique ecological features such as headwater streams. It is an area of interest because of the increased flood effects all around the world have impacted headwater streams, and studies evaluating this stream type are less documented especially in flooding events. This headwater eventually connects to the Kickapoo River which had had increased flooding in the recent years and is having a difficult time predicting and reducing these events. Disturbances, whether natural or man-made, can play a major factor in the spatial and overall dynamic of different populations in that ecosystem (Neal and Ashley 2011). Headwater streams have an important role to streams and aquatic ecosystems by providing different habitat, food resources, and species pools, which includes macroinvertebrates, which all effect abundance and diversity of biota (Meyer et al. 2007). Yet, with flooding disturbance of the stream bed macroinvertebrate richness can be reduced to poor and very poor levels in first and second-order streams (Neal and Ashley 2011). These effects on small streams may have effects on larger streams. If our project can help assess the impacts a flood effects down to an aquatic macro invertebrate level it could help gauge other species effected by the flood or species that will be. We predict aquatic macroinvertebrate richness and diversity will decrease immediately after flood effects in a small southwestern Wisconsin stream.

Advisor: Jeff Dimick
Poster Presentation

Recent Bat Community Fluctuations Due to WNS at Wildwood Zoo in Marshfield, WI

L to R: Megan Brown (Wildlife Ecology Major), Parker Witt (Soil and Land Management Major), Johnathan Sicinski (Wildlife Ecology Major), and Nicole DeMarb (Wildlife Ecology Major)

White-nose-syndrome (WNS), Pseudogymnoascus destructans, was discovered in North America in 2006, and is a fungus that grows on the noses of cave-dwelling bats. This deadly fungus intervenes with bat hibernation cycles and causes them to become active mid-hibernation. Because of this, bats deplete their stored energy, are exposed to the elements, and cannot survive the remaining winter months. Bats play a fundamental role in Wisconsin ecosystems, as they are the primary insect-eater throughout the summer months. Since 2014, many of the bat populations in Wisconsin have been affected by white-nose-syndrome and have been declining ever since. Because of this, it is important to have an understanding of the remaining bat populations in Wisconsin. Our study will be looking at 1.) Identifying false positives in the calls of various bat species at Wildwood Zoo in Marshfield, WI 2.) Using that given data to evaluate fluctuations in bat communities to determine the level of influence of white nose syndrome.

Advisor: Chris Yahnke
Poster Presentation
Consider for Judging

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