

# **Student Research Symposium**

## **Friday April 4, 2014**



**College of Natural Resources**  
**University of Wisconsin - Stevens Point**



College of Natural Resources  
University of Wisconsin-Stevens Point

# Student Research Symposium

## April 4, 2014

This booklet and the CNR Student Research Symposium have been made possible by support from the **John and Anne Meyer Fund for the CNR.**

Booklet Layout: Elise Worthel

Booklet Editing: Elise Worthel

Cover Design and Photo: Elise Worthel and Emilia Kenow

*COVER PHOTO: Costa Rica, Monteverde Biological Reserve*

### 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 through 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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April 4, 2014

Welcome to the 15th 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 celebration.

Student participants—I trust 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 will 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—I hope you will join me in applauding the drive and initiative of these students. They, and their work, are at the core of the university's new path toward 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 investigations, projects and research activities. This year's event features an outstanding gathering of participants representing projects from all CNR majors, a fitting tribute to the level of faculty and student collaboration in and out of the classroom at UW-Stevens Point.

It is my pleasure to welcome participating faculty and staff members, students, families, volunteers and guests to our university. Congratulations to all of you.

Sincerely,

A handwritten signature in cursive script that reads "Bernie L. Patterson".

Bernie L. Patterson  
Chancellor



April 4, 2014

The UWSP College of Natural Resources is pleased to present the 15th 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. 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 one of our largest turnouts ever of participants: over 70 students and 60 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 825. The late Clive David, a past member of our Forestry faculty, helped organize the inaugural event. His spirit lives on here today.

I salute the CNR student participants for their excellence in critical thinking, inquiry, research and communication demonstrated in the day's events. I also recognize the outstanding faculty members who have mentored and motivated students to do their best. Finally, let me offer special thanks to the late John and Anne Meyer, friends and benefactors of the College, whose establishment of the John R. Meyer Endowment Fund for CNR makes this event possible.

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.

A handwritten signature in black ink, appearing to read "Christine L. Thomas".

Christine L. Thomas  
Dean and Professor of Natural Resource Management

## *From the Student Research Symposium Committee...*

Welcome to the 15th Annual University of Wisconsin-Stevens Point College of Natural Resources 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. This event allows for the showcasing of students' questions which have been crafted into research projects. Students collected, explored, and analyzed data in an attempt to answer their questions. Student mentors helped guide 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. David was extremely influential in building and strengthening the undergraduate research program and was a true friend to students and faculty. Dr. David, who passed away in November 2004, not only helped to create a venue for students to present their research, but also fostered a positive atmosphere where students learned how to conduct and present their research. The hundreds of students who have benefited from the symposium over the past fourteen 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 John and Anne Meyer and the John and Anne Meyer Fund for CNR, 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: Rebecca Kelble**

**Secretary: Emilia Kenow**

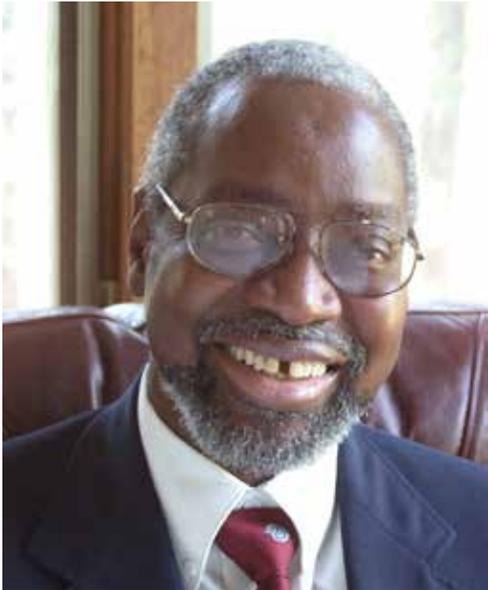
**Booklet Editors: Elise Worthel, Cheyenne Yates, Taylor Fabricius, Michelle Sauers**

**Committee Members: Claire Hillmeyer, Molly O'Grady, Nigel Golden, Anastasia Wolf-Flasch**

**Faculty Advisors: Rich Hauer (Faculty Chair), Steve Menzel, Rob Michitsch, Kristin Floress**

# 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. The College of Natural Resources proudly recognizes this year's scholarship recipient, **Tessa Hasbrouck**, in Dr. David's memory.

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Tessa is from Petersburg, Alaska, and currently completing a major in Wildlife within the College of Natural Resources. Even though Wisconsin is far from Alaska, Ms. Hasbrouck selected UWSP because of the well-known reputation and prestige of the College of Natural Resources. Frankly it is students such as Tessa that foster the prestige and reputation of the University of Wisconsin – Stevens Point and the College of Natural Resources because of her outstanding accomplishments. Her track towards becoming an excellent researcher started as a freshman with receiving an honors internship. At her Sophomore level she received the Doug Stephens Fellowship Grant to support her research with bobcats. This has led to further research funding that has expanded her research to determine the summer feeding habits of bobcats in Central Wisconsin. Her scholarship findings have been presented locally in the CNR and regionally at the Riversedge Nature Research Center Symposium in Wisconsin. Tessa also has an active role in fish survival studies with the Wisconsin Cooperative Fishery Research Unit at UWSP. Her fisheries work has been presented recently at the 74th Midwest Annual Fish and Wildlife Conference in Kansas City, MO. Her excellence also goes beyond research and the classroom. She is active in the Wildlife Society and served as the vice-president of the American Indians in Science and Engineering Society. Tessa is a student athlete and conference finalist swimmer for the UWSP Swim/Dive Team. How she is able to fit the 20 to 30 hours per week to compete as an athlete; carry on an active undergraduate research program; be active through student organization service; and excel in the classroom is testament to her deserving recognition with this award. To summarize, Tessa is a student who shines on all fronts through academics, research, service, and as a mentor to her classmates. Dr. David was a faculty mentor who asked his students to excel to this level and Tessa is the model student Clive always admired.



As with most years, several great applicants were considered for this award. Tessa stood above the rest through her many accomplishments and represents what the Clive A. David Memorial Research Scholarship is all about. To Tessa, we congratulate you!

# **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 UW-Stevens Point Catering

Jerry Kummer, John Oestreich - Building and Support

Jake Smith and Tammy Naczek - Financial and Purchasing

College of Natural Resources for Room Accommodations

Biology Department - Room Accommodations

University Relations and Communications Office - Publicity

CNR and Biology Faculty - Mentoring and Support

Volunteer Evaluators and Moderators

Symposium Support Volunteers

Doug Moore - Photography

# **Schedule of Events**

## Dean's Symposium Address

9:00AM

TNR 170

## Oral Presentations

9:20AM

Rooms 120, 122, and 170

- 11:00 Lunch -

## Poster Presentations

11:00 - 12:00

South Hallway and Central Lobby

## Oral Presentations

12:15PM

Rooms 120 and 170

## Photo Contest

9:00 - 3:00

West Lobby

## CNR Rendezvous, Sentry Theater

Registration: 4:00

Awards Program: 5:00

# Schedule of Oral Presentations: TNR Room 120

Presenters:	Time:	Title:
Derek Danielson, Amber Honadel, Nicole Witzel	9:20	Body Condition of Male vs Female Coyotes During Breeding Season
Chase Gadbois, Colin Erovick, Dan Hoff	9:45	Home Range and Habitat Use of Male Ruffed Grouse ( <i>Bonasa umbellus</i> ) at UWSP's Treehaven
Sarah Shawver	10:10	Predator Response to Visual and Olfactory Cues in Artificial Nest Boxes
Leah McSherry, Alex Roszkowski	10:35	Nest Box Use of Southern Flying Squirrels ( <i>Glaucomys volans</i> ) in Relation to Stem Density, Mid-Layer Density and Canopy Cover in Central Wisconsin
Bryant Kern	12:15	Environmental Variables that Influence Exposure of White-Tailed Deer ( <i>Odocoileus virginianus</i> ) to Parainfluenza 3 Virus
Matthew Buchholz	12:40	Sex-Biased Parasitism in <i>Skrjabinogylus nasicola</i> Infection in Ermine ( <i>Mustela erminea</i> )
Kacey Crooks	1:05	Small Mammal Community Assessment on Red Pine and Mixed Pine-Hardwood Sites in North Central Wisconsin
Nigel Golden	1:30	Environmental Factors that Explain Seroprevalence of <i>Leptospira interrogans</i> Antibody in White-Tailed Deer from Wisconsin
Tammy Weiss, Erin Scherer	1:55	Habitat Use of Migrating Saw-Whet Owls ( <i>Aegolius acadicus</i> )

## Schedule of Oral Presentations: TNR Room 120

Presenters:	Time:	Title:
Tessa Hasbrouck, Rebecca Kelble	2:20	Bobcat ( <i>Lynx rufus</i> ) Summer Food Habits in Central Wisconsin
Brock Brandner, Kelli Hultman, Rachel Strelow, Seth Nelson	2:45	Automated Fiber Blending System

## Schedule of Oral Presentations: TNR Room 122

Presenters:	Time:	Title:
Roshel Stewart	9:20	Place Attachment and Recreation Experience Preference at Northern Highland American Legion State Forest: A Comparison of Three Visitor Activity Groups
Matt Zangl	9:45	Defining Areas of Improvement for the Lake Wausau Community
Kelly Mercier	10:10	Analysis of Total C, N, P Contents Loading in Soil Cores over 10+ Years from Horicon Marsh in Dodge County, WI
Michelle Scarpace	10:35	Understanding How Water Governance Affects the Water Quality of Lake Management

# Schedule of Oral Presentations: TNR Room 170

Presenters:	Time:	Title:
Jaime Tauscher, Adam Offerdahl, Hoffman, Jordan Hansen	9:20	Design and Implementation of a Continuous Chemical Addition System
Isaiah Robertson, Erik Hendrickson	12:15	An Evaluation of Illicit Stimulants in Wastewater Effluent and the Wisconsin River Along the Central Wisconsin River Basin
Michelle Scarpace	12:40	Analyzing the Effects of Biochar and Cover Crops on Nitrogen Leaching and Soil Physical Properties of Central Wisconsin Soils
Rebecca Gregory	1:05	Patterns of Species Richness and Relative Abundance in Red Pine and Mixed Pine-Hardwood Stands
Andrew Gulickson	1:30	Comparison of Ages Estimated from Sagittal Otoliths and Fin Rays for two Genetic Stocks of Lake Whitefish in Lake Michigan
Makenzie Henk	1:55	Evaluation of Dechlorane Plus Flame Retardant Exposure in the U.S. Terrestrial Ecosystems Using Peregrine Falcon as a Bio-indicator
Joshua Schulze	2:20	Age Validation of Hatchery-Raised Lake Whitefish <i>Coregonus clupeaformis</i> Using Otolith Daily Growth Rings
Zachary Beard	2:45	Evaluation of Dorsal Spines and Scales as Nonlethal Alternatives to Otoliths for Estimating Bluegill Ages

# Poster Presentations

Presenters:

Title:

Cassandra Apostolou,  
Holly Kalbus, Tara  
Buehler

Changes in Small Mammal Populations Amongst  
Habitat Succession

Claire Ault, Mitchel  
Groeanhof

Characteristics of third year vegetative growth in the  
Moses Creek riparian zone.

Phillip Bau

Schmeeckle Reserve and Green Circle Trail Visitor  
Use Evaluation 2013

Zachary Buchanan,  
Alissa Johnson

Development of a maximal crown area equation for  
open-grown Burr Oak (*Quercus macrocarpa*)

Sam Bussan, Jesse  
Hodel

Development of a maximal crown area equation for  
open-grown Burr Oak (*Quercus macrocarpa*)

Jacob Druffner

Coliform and *E. coli* in the Streams and Well Water of  
Rural Tanzania

Nate Francois

Two Heads are Better than One...or the Other One

Katie Goplerud, Ana  
Briet

Small Mammal Diversity in Treehaven

Ian Hackett

Susitna River Chinook, Coho and Pink Salmon In-  
River Distribution Relative to the Susitna/Watana  
Hydroelectric Dam Site Proposal

Ashley Hansen

*Hexagenia* viability in long-term enclosures in lower  
Green Bay, Wisconsin

# Poster Presentations

Presenters:

Title:

Tessa Hasbrouck,  
Rebecca Kelble

Comparing bobcat (*Lynx rufus*) home-range size and its habitat characteristics in central Wisconsin to northwest Wisconsin

Amanda  
Heckenlaible, Steven  
Pence and Cassandra  
Gierszewski

Evaluating Survivorship of Eastern Grey Squirrels (*Sciurus carolinensis*) in Sandhill Wildlife Area

Claire Hillmeyer,  
Anastasia Wolf-  
Flasch

Upland influence on wetland restoration in Lost Creek

Justin Howard

Effects of Latitude and Water Temperatures on Hatch Timing of Largemouth Bass in Wisconsin

Jacob Marty, Rebecca  
Kelble

Habitat Suitability Map for Caracal (*Caracal caracal*) in Mount Zebra National Park, South Africa

Caitlin Luebke

Comparison of Lake Sturgeon Growth Rates Estimated from Fin Rays and Recoveries of Fish Implanted with Passive Integrated Transponders

Sarah Manka

Geographic Variation in Antipredator Behavior of *Uta stansburiana*

Kasey McCauley,  
Connor  
Christopherson

Re-visitation of: Artificial nest box use and success between pole and tree mounted boxes for both wood duck (*Aix sponsa*) and hooded merganser (*Lophodytes cucullatus*) in Central Wisconsin

# Poster Presentations

Presenters:

Title:

Shannon McNamara,  
Molly O'Grady

Developing a habitat suitability model for fisher  
(*Martes pennanti*) in central Wisconsin

Lisa Moehlman

Preliminary Feasibility Study on Replacing Cooking  
Fat with Sunflower Oil in Rural Kenya

Sarah Rademacher

Assessment of the wet meadow composition of Lost  
Creek Mitigation Site

Kelly Redmond

Seed Selection by Five Bird Species at Wild Bird  
Feeders in Central Wisconsin

Isaiah Robertson, Erik  
Hendrickson

An Evaluation of Illicit Stimulants in Wastewater  
Effluent and the Wisconsin River Along the Central  
Wisconsin River Basin

Christopher  
Rosenthal

Movement of flathead catfish in the Little River  
and Cape Fear River, North Carolina following fish  
passage efforts

Brittany Ruttenberg,  
Jennifer Paulus

Impact of waterfowl dropping density on *Escherichia*  
*coli* concentrations in city parks

Jacob Marty, Alex  
Linton, Kaitlyn  
Bagnall-Newman,  
Michelle Sauers

Investigating Canine Relative Abundance in Central  
Wisconsin Using Scent Post Station and Camera  
Trap Surveys

Aaron Schiller

Validation of Daily Growth Rings in Otoliths of Age-0  
Muskellunge *Esox masquinongy*

Sarah Shawver

Scavenger Attraction to Food Waste in Urban and  
Rural Environments

# Poster Presentations

Presenters:

Title:

Jamie Tauscher,  
Offerdahl, Lindsey  
Hoffman, Jordan  
Hansen

Design and Implementation of a Continuous  
Chemical Addition System

Jacob Utrie

Effects of commercial brood diets on growth and  
fecundity of domestic female brown trout (*Salmo  
trutta*) broodstock.

Rebecca Vasquez

Optimizing timing of first thinning for a red pine  
plantation

Andrew Voigt, Nate  
Francois

Habitat analysis of white-tailed deer (*Odocoileus  
virginianus*) in an urban environment using home  
range analysis.

Matthew Zangl

Defining Areas of Improvement for the Lake Wausau  
Community

Makenzie Henk

Determining if Significant Differences Exist Between  
Lowrance and Trimble Survey Techniques on the  
Stevens Point Flowage; Stevens Point WI.

Mason Johnson

A Compilation and Spatial Analysis of Terrestrial  
Invasive Species Records for Northern Wisconsin

Brock Brandner, Kelli  
Hultman, Rachel  
Strelow, Seth Nelson

Automated Fiber Blending System

# Poster Presentations

Presenters:

Title:

Elise Worthel, Lisa  
Moehlman, Sarah  
Shawver

Abundance of Woodcock in Managed Intensive  
Grazing and Associated Soil and Earthworm  
Properties

Rebecca Vasquez

Optimizing Timing of First Thinning for a Red Pine  
Plantation

Samuel Thomas,  
Cody Tennant

Passive Water Sampling for Agricultural Antibiotics  
on Three Rivers in Eastern Wisconsin, Great Lakes  
Basin

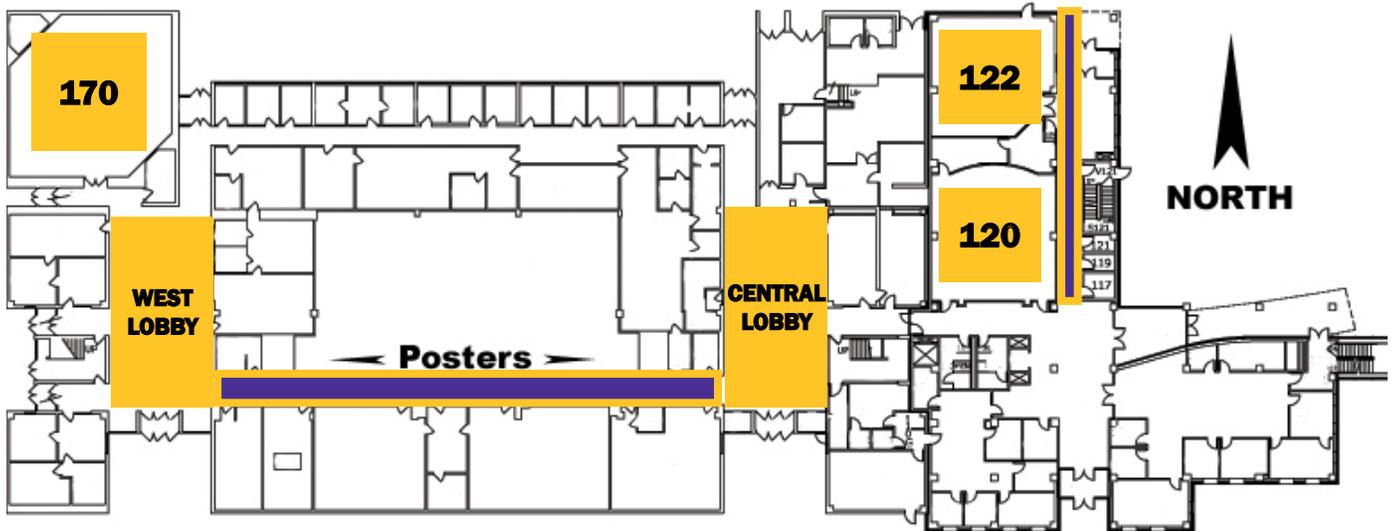
Samuel Thomas

Subwatershed nutrient contributions to the  
Milwaukee Estuary Area of Concern, Milwaukee, WI

Tessa Hasbrouck

Comparison of Growth and Short-term Survival of  
Age-0 Muskellunge Reared Using Two Different  
Methods

# Trainer Natural Resources Building Map



## Symposium Presentations

Schedule of Oral Presentations in rooms 120, 122, and 170 on pages 9-11.

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

# Population and Community Ecology of Small Mammals in Relation to Ecological Succession

Small mammal abundance and species diversity depends significantly on the successional of the habitat (Kaminski et al. 2007). We compared two plots in the Schmeeckle Reserve in Stevens Point, WI to determine which habitat provides a higher abundance and/or greater species diversity. The plots consisted of an early successional woodlot near the recently restored Moses Creek floodplain and the Chilla Wood plot resembling a later successional woodland habitat. We hypothesize that the species diversity of small mammals will be greater in early successional habitat (Moses Creek) compared to a later successional habitats (Chilla Wood plot). We also hypothesized that small mammal abundance will increase over time regardless of habitat type/stage. Data was collected throughout the month of October 2013 for species diversity; while abundance data was collected from the years 2011-2013. Mark and recapture methods were used along with Bailey's abundance test for estimating abundance and the Shannon-Weiner diversity index for estimating species diversity. Our results did not support an increase in abundance of small mammals from 2011-2013. Our data did show a higher diversity in the early successional habitat relative to the later successional habitat. This study can be used for managing habitats in terms of successional stages involving small mammal species in relation to desired abundances and species diversity in Schmeeckle Reserve as well as on a larger habitat scale.

Poster

Advisor: Dr. Chris Yahnke

Consider for Judging



Cassie Apostolou

Major: Wildlife Ecology Research  
& Management  
Minor: Biology



Holly Kalbus

Major: Wildlife Ecology Research  
& Management  
Minor: Biology; Environmental  
Education



Tara Buehler

Major: Wildlife Ecology Research  
& Management

# Characteristics of third year vegetative growth in the Moses Creek riparian zone.

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This study assesses the vegetative growth of the riparian zone of Moses Creek three years after its restoration. Preliminary observations of the riparian zone led us to predict a woody species gradient from north to south of the floodplain. Woody vegetation was measured on a percent cover basis in thirty 2X1 meter plots, spaced thirty feet apart along the riparian zone on alternating sides of the creek. Herbaceous vegetation and bare mineral soil were measured on a percent cover basis in 1X1 meter plots, which were nested within the 2X1 meter plots. An average of 7.2 herbaceous species was found per 1X1 meter plot, and an average of 0.6 woody species were found per 2X1 meter plot. Wetland obligates made up an average of 52% of the dominant species in each 1X1 plot. An interesting north-south woody species gradient was confirmed with the Tag Alder species, which appeared in 7 of the first 10 plots, and not again. The most common species found were *Juncus effuses* (common rush) and *Scirpus cyperinus* (woolgrass).

Poster

Advisor: Dr. James Cook

Consider for judging.



Claire Ault

Major: Forest Ecosystem  
Restoration and Management



Mitchell Groeanhof

Major: Forest Ecosystem  
Restoration and Management

# Schmeeckle Reserve and Green Circle Trail Visitor Use Evaluation 2013

---

Producing and maintaining an estimate of visitor use can greatly benefit parks, reserves, and trail systems. It allows managers to predict and prepare for trends in visitor use, as well providing useful figures for interpretative literature, newsletters, and grant requests. This continuing observational study monitors trail traffic at Schmeeckle Reserve and on the Green Circle Trail (GCT) in Stevens Point, WI. Visitor counts were generated via TrafX Infrared trail counters. Twelve total counters were installed in camouflaged, PVC pipe housing at key locations on the GCT and in Schmeeckle Reserve in accordance with management objectives of the GCT Board of Directors. Data were collected and analyzed using TrafX DataNet software to analyze trends in hourly, weekly, monthly, and yearly trail use as well as traffic comparisons at each individual site. In addition to data generated by infrared trail counters, observational data and surveys were also collected. Observational data collected included visitor gender, mode of use, and time recorded. Surveys included trail use habits, motives for trail use, and visitor age group and gender, as well as a line for any open-ended comment. Surveys were administered near each counter, and also at key locations along the trails. Response rates at each site were recorded as well. Trends in visitor use versus weather conditions and the academic school year became visible.

Poster

Advisor: Dr. Laura Anderson-McIntyre

Consider for Judging.



Phillip Bau

Major: Forestry Recreation

Minor: Land Use Planning

# Development of a maximal crown area equation for open-grown Burr Oak (*Quercus macrocarpa*)

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Burr Oak is the most common oak found in oak savannas in the Upper Midwest. It has a large, wide spreading canopy that develops when grown in a savanna setting. This species contributes both to the ecological function and aesthetics of oak savannas. For this reason, Burr Oak is commonly planted in savanna restorations. In this analysis, we measured Diameter at Breast Height (DBH), total tree height, height to live crown, and crown radius in the four cardinal directions for 20 open-grown burr oaks. A quadratic equation was developed for data analysis. This equation was used to predict maximal crown area from DBH. This equation can then be used to predict crown cover of the savanna as the burr oaks grow. This will aid in the planning of Burr Oak planting in oak savanna restorations.

Poster

Mentor: Dr. Michael Demchik

Consider for Judging



Zachary L. Buchanan  
Major: Forest Management and  
Urban Forestry



Alissa Johnson  
Major: Wildlife Ecology  
Minor: Biology and Spanish

# Sex-biased parasitism in *Skrjabingylus nasicola* infection in ermine (*Mustela erminea*)

---

Ermine (*Mustela erminea*) are trapped as legal furbearers but are not actively managed by the Wisconsin Department of Natural Resources. We are conducting a long-term parasite assessment of ermine through collection and necropsy of carcasses provided by trappers. Our aim is to better understand the host-parasite relationship between ermine and *Skrjabingylus nasicola*, a parasitic nematode of the nasal sinus. Specifically, we investigated sex-biased parasitism, where one sex of a host displays higher intensities (number of worms per host) than the other sex. Additionally, we wanted to investigate if size of the cranium limits the intensity of *S. nasicola* by limiting the size of the nasal sinuses that the adult parasites inhabit. We hypothesized that male ermine would have higher intensity infections of *S. nasicola* and that ermine with larger cranial volume would have higher intensities. Ermine were necropsied and *S. nasicola* were identified using reference specimens in the Steven Taft Parasitological Collection. Sex of ermine was determined by the presence or absence of a baculum. Cranial volume was calculated by measuring the length, width, and depth of the cranium with calipers. We used a two-way ANOVA to determine if intensity differed with sex and a simple linear regression to determine the relationship between cranial capacity and intensity. Over the last 6 years, average intensity for male ermine was 19.35 worms per host (SD = 11.60) and average intensity for female ermine was 10.69 worms per host (SD = 7.55) resulting in males having significantly higher intensities ( $F_{1, 231} = 27.571$ ,  $P < 0.001$ ). Cranial capacity was positively related to intensity ( $F_{1, 32} = 15.381$ ,  $P < 0.001$ ), suggesting that cranium size may limit intensity for *S. nasicola*. Ermine natural history traits such as a polygynous mating structure, difference in home range size, and sexual dimorphism likely influence sex-biased parasitism in ermine.

Oral

Mentors: Dr. Shelli Dubay and Dr. Todd Huspeni

Consider for Judging



Matthew Buchholz  
Major: Wildlife Research &  
Management  
Minor: Biology

## Seed Bank Analysis of Lost Creek

---

The seedbank in a restored wetland is of critical importance to the development of the vegetation community, as the species composition will affect the procedures and costs of the restoration. Lost Creek is a mitigated wetland located near Stevens Point, Wisconsin. No seedbank study has ever been conducted on the site. We took soil samples in three areas of sedge meadow habitat and allowed them to grow in the greenhouse to compare the species composition and density in each. We also studied the effect of the moisture regime on species germination. Half the samples were kept saturated for two months and then allowed to dry to moist, imitating the natural seasonal progression and half the samples were kept moist with no variance. We found a species richness of 20, in addition to three genuses that cannot be identified to species level at this time. Of the species known, according to the United States Department of Agriculture Plant Database, two were obligate wetland species, four were facultative wetland species, six were facultative species, and five were facultative upland species, while the status of the final three has not been determined.

Poster

Mentor: Dr. James Cook

Consider for Judging



Samantha Bussan  
Major: Forest Ecosystem  
Restoration and Management



Jesse Hodel  
Major: Forest Ecosystem  
Restoration and Management

# Small Mammal Community Description on Red Pine and Mixed Pine-Hardwood Sites in North Central Wisconsin

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We examined the relationship between small mammal presence and absence relative to stand basal area, stand density, herbaceous plant richness, soil nutrient content, and coarse woody debris (CWD), as well as their activity levels throughout the spring and summer season. The relevance of this study pertained to the fact that small mammal communities are known for their rapid response to habitat change and are used as bio-indicators for assessing land management practices. We examined small mammal community response on a variety of thinned to un-thinned sites in red pine (*Pinus resinosa*) and mixed pine-hardwood stands. Study sites were on Treehaven, located between Tomahawk and Rhinelander, Wisconsin. There were 24 sites, each a 1.3 ha unit with unique understory composition and tree density from a thinning approximately five years prior to this study. We hypothesized that areas with lower tree density and basal area would result in an increase in small mammal community richness and relative abundance of Eastern chipmunk (*Tamias striatus*), *Peromyscus* spp., and red squirrel (*Sciurus vulgaris*). A total of 10 species and 327 captures resulted from 5365.5 trap-nights of effort. Captures were highest during the last two weeks of July and the first week of August. Species richness varied from minimum of two per unit to maximum of six per unit. Stepwise regression analysis suggested a positive association between small mammal species richness, soil nitrogen and percent cover of CWD; however, there was a negative association with pH, organic matter and percent cover of leaf litter. Eastern chipmunk (*Tamias striatus*) presence was positively associated with plant species richness, while negatively associated with higher trees per acre, basal area, soil pH, organic matter content, and stem cover < 1 m. *Peromyscus* species occurred on all units and showed no strong relationship with any environmental variable. Red squirrel (*Sciurus vulgaris*) had a positive association with plant species richness, and a negative association with basal area, soil potassium, and cryptogam cover.

Oral

Advisor: Dr. Ron Masters

Consider for Judging



Kacey Crooks  
Major: Wildlife Ecology Research  
and Management  
Minor: Biology

# Body Condition of Male vs Female Coyotes during Breeding Season

Coyotes are a prevalent top predator in and an important part of the ecosystem of Wisconsin because of their ability to consume a wide range of items from berries to carcasses to rabbits. Because they have such a profound effect on their environment, the condition of coyotes in an area and the ability of the coyote to reproduce can be an interesting topic for researchers. We expect to find that female coyotes have a better body condition than male coyotes in the late winter months because they are preparing for pups. Females need to build up greater fat deposits than males during the winter months to provide for the upcoming embryos and future rearing of pups. We expect males will have fewer fat deposits because they will not have such a large future demand on their bodies. To evaluate an individual coyote's body condition, we primarily looked at fat deposits around the kidneys and percentage of fat in the marrow in the femur of each coyote. For females, we also looked at placental scarring to see if the female had been reproductively active in the past. We also measured the length, weight and approximate age. This information on male to female coyote body conditions would provide insight to how coyotes provide for themselves over the winter to prepare for upcoming pups.

Oral

Advisor: Cady Etheredge

Consider for Judging



Derek Danielson  
Major: Wildlife Ecology  
Research and Management  
Minor: Captive Wildlife



Amber Honadel  
Major: Wildlife Ecology  
Research and Management  
Minor: Captive Wildlife



Nicole Witzel  
Major: Wildlife Ecology Research  
and Management

# Coliform and *E. coli* in the Streams and Well Water of Rural Tanzania

---

The purpose of this research was to determine Coliform and *E. coli* concentrations in the streams, well water, and in storage in homes of rural Tanzania. Coliform bacteria are used as indicators of potential fecal contamination and *E. coli* is positive indication. The samples of water were taken and stored using sterilized and sealed plastic bottles. Samples of the villager's drinking water were taken at the well or stream source as well as from water stored in the home. Samples were diluted with sterilized water to produced readable plates with less than 200 colonies per plate. Coliform and *E. coli* bacteria were grown on M-Coli blue media in 47mm plates with absorbent pads. A total of 52 samples were tested. Coliform and *E. coli* bacteria in the source water as well as the water stored in homes had elevated levels of bacteria ranging from 60 to 138,400 total Coliforms and 0 to 11,800 *E. coli* bacteria per 100ml. Any detection of these bacteria in drinking water is considered unsafe. There was also a significant increase of both Coliform and *E. coli* bacteria in the water stored in the home compared with the well source from which their water came. This indicates contamination is also occurring during water storage and a need to improve sanitation in homes. This information will be vital to helping reduce gastrointestinal disease from consumption of household drinking water in rural people of Tanzania.

Poster

Advisor: Dr. Ronald Crunkilton

Consider for Judging



Jacob Druffner  
Major: Water Resources

# Two Heads are Better than One...or the Other One

---

Abundance of bird populations is often estimated using point count surveys. This method can be used to estimate abundance of a single bird species or multiple bird species. A component of some point count surveys involves multiple observers collecting data on birds as well as covariates such as sky condition, wind condition, and noise level. These covariates may affect the probability of detection and therefore abundance estimates. We hypothesized that averaged covariate estimations in a double observer point count method would be more similar to instrumental measurements when compared to covariates estimated by a single observer. We used two data sets to test our hypothesis: 1) a single-species roadside survey for ring-necked pheasants in Wisconsin (2011 and 2012), and 2) Breeding Bird Survey (BBS) data from a detection probability project in North Carolina (2008). The pheasant study consisted of 2,939 point counts, each surveyed simultaneously by 2 of 9 different observers. The BBS study consisted of 1,800 point counts, each surveyed simultaneously by 2 of 6 different observers. We tested our hypothesis with the pheasant data by using Z-tests to compare minimum, maximum, and averaged observer wind speed estimates to wind speed readings taken by an anemometer. We tested our hypothesis with the BBS data by using a single-factor ANOVA to compare observer estimates of excessive noise to sound level readings taken by a sound level meter. We rejected the null hypothesis in each data set. Our results suggest averaged double observer covariate estimates are more consistent with instrumental readings of similar covariates when compared to covariates estimated by a single observer. My results have important implications for the use of covariates in analyses of double-observer data as well as for potential equipment needs in single-observer surveys.

Poster

Advisor: Dr. Jason Riddle

Consider for Judging



Nathan Francois

Major: Wildlife Ecology Research  
and Management

Minor: Biology

# Home Range and Habitat Use of Male Ruffed Grouse (*Bonasa umbellus*) at UWSP's Treehaven

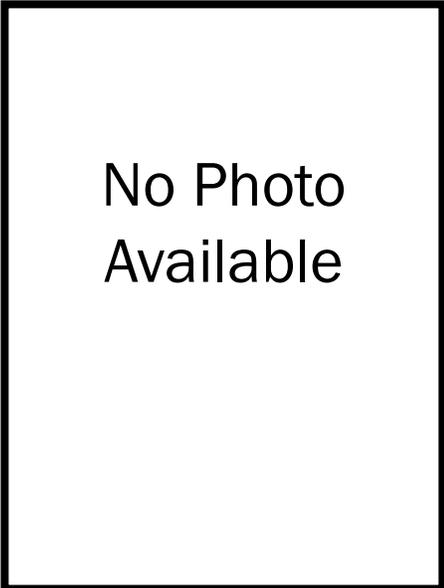
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Ruffed Grouse drumming locations have been partially mapped at Treehaven by students volunteering through the Rhinelander based Northwoods Community Secondary School (NCSS). We will expand on that dataset by developing an occupancy and abundance survey protocol to identify the locations of drumming male Ruffed Grouse. Special interest is in targeting the 80 acre area surrounding the Cordwood Cabin that is that is designated a Ruffed Grouse management area. Knowledge of the home range size and habitat usage of male Ruffed Grouse can be used by Treehaven personnel in making management decisions, particularly in the Ruffed Grouse management area. In order to determine Ruffed Grouse occupancy and abundance, home range size, and habitat use we plan to start by conducting drumming surveys around the property in coordination with NCSS students. For this we have roadside spots picked throughout the Treehaven property. Surveys are conducted at each point for 10 minutes, recording an azimuth and estimating distance to the drumming bird. Within the 80 acre management area a grid survey technique with overlapping points will allow triangulation of drumming log locations to serve as trap sites. Telemetry collars can then be used by WLDL 340 students to track trapped birds during the summer camp sessions, and TWS researchers to track trapped birds over the school year. Analysis of survey data will provide the occupancy and abundance estimates, and future analysis of telemetry data will provide home range and habitat use data. This project uses three student groups (NCSS, TWS, WLDL 340) to provide land managers with feedback on Ruffed Grouse, an umbrella species for young forest habitat.

Oral

Advisor: Dr. Jason Riddle

Judging: Yes



No Photo  
Available

Chase Gadbois

Major: Wildlife Ecology Research  
and Management



No Photo  
Available

Colin Erovick

Major: Wildlife Ecology Research  
and Management



No Photo  
Available

Dan Hoff

Major: Wildlife Ecology Research  
and Management

# Environmental factors that explain seroprevalence of *Leptospira interrogans* antibody in white-tailed deer from Wisconsin

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In 2010, the WDNR initiated a research project to estimate white-tailed deer (*Odocoileus virginianus*) density and to quantify cause-specific mortality of fawns and adult male deer. One potential cause of mortality is leptospirosis infection. Leptospirosis is a bacterial disease that infects the kidneys of affected hosts, and can cause abortion in deer. Bacteria are shed in urine and contaminate surface water. We aimed to identify if deer in Wisconsin were commonly exposed to leptospiral bacteria and to identify environmental factors related to exposure. During the winters of 2010 – 2013, the WDNR trapped white-tailed deer in two sites in Wisconsin. Blood samples were collected and serum was sent to Minnesota Veterinary Diagnostic Laboratory for antibody testing. Sera were tested for antibody against six serovars of *Leptospira interrogans* using microscopic agglutination, and parainfluenza 3 (PI3) and infectious bovine rhinotracheitis (IBR) virus using serum neutralization. We ran logistic regression analyses on exposure to leptospiral antibody, using 6 environmental factors in analyses: Land type (public or private), deer age, year, trap site (Winter or Shiocton), exposure to parainfluenza 3, and exposure to infectious bovine rhinotracheitis virus. Using these factors, we specified 13 a priori, candidate logistic regression models to explain exposure to *L. i. pomona*. We used Akaike's Information Criterion corrected for small sample size (AICc) for model selection. We used 315 deer in our analyses and 11% of them were exposed to *L. i. pomona*. Of 13 logistic regression models explaining exposure of deer to *L. i. pomona*, a model containing all factors (global) was selected as the best-approximating model. The Receiver Operating Characteristic (ROC) value for the global model was 0.812. Exposure to *L. i. pomona* is complex and may be influenced by deer behavior and environmental factors.

Oral

Advisor: Dr. Shelli Dubay

Consider for Judging



Nigel Golden

Major: Wildlife Ecology Research  
and Management and Biology

# Small Mammal Diversity in Treehaven

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The purpose of this study was to determine if there is a relationship between small mammal diversity and forest stand type. We set up three transects of 10 Sherman traps each in three different stand types: red pine (*Pinus resinosa*), red maple (*Acer rubrum*), and quaking aspen (*Populus tremuloides*), for a total of 90 trapping locations. Each week during May 25th – August 15th we sampled a cluster of one of each stand type. We checked traps daily at 7am and 7pm. We caught a total of 65 individuals: 35 deer mice or white-footed mice (*Peromyscus* spp.), 17 eastern chipmunks (*Tamias striatus*), and 11 southern red-backed voles (*Myodes gapperi*). We also measured coarse woody debris (CWD) and compared its abundance to the small mammals caught in each stand type. At each trapping location we measured CWD as percent cover and number of extra small (0-7.5cm), small (7.6-14cm), and medium sized stems (14.1-30cm). No significant relationship was found between stand type and small mammal populations or coarse woody debris and small mammal populations when using ANOVA and linear regression. We ran ANOVA tests and found that the percent cover and number of stems are significantly different between the three stands. A follow up LSD test revealed higher values in red maple stands than the quaking aspen and red pine stands. We ran ANOVA tests on southern red-backed vole captures and stand types and found a significant difference in red pine stands. We also ran ANOVA tests on eastern chipmunk captures and found a significant difference in quaking aspen stands. Unfortunately our capture numbers were extremely low. Unseasonably cold weather could have played a part in the low numbers. Using pitfall traps would ensure a larger sample size or greater diversity.

Poster

Advisors: Dr. Jason Riddle and Dr. Eric Anderson

Consider for Judging



Katie Goplerud  
Major: Wildlife Ecology Research  
and Management



Ana Breit  
Major: Wildlife Ecology Research  
and Management

# Patterns of Species Richness and Relative Abundance in Red Pine and Mixed Pine-Hardwood Stands

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The purpose of this study was to examine plant community characteristics in Red Pine and Mixed Pine-Hardwood Stands at Treehaven. The Treehaven property in Tomahawk, Wisconsin is a 1,400 acre facility owned by University of Wisconsin Stevens Point. Since summer 2013, approximately fifty acres were set aside as part of a long-term study of red pine and mixed-hardwood ecosystem responses to thinning and fire frequency. This study is the base line portion on herbaceous plants of the larger study. We determined patterns of species richness and relative abundance of herbaceous plants in twenty-four experimental units. Quadrat sampling was used in twelve plots in each of those twenty-four units. We used Mallows' CP statistic for model selection in stepwise regression. Species diversity was negatively related to basal area. For soil nutrients, diversity was negatively related to magnesium, and positively related to calcium. Species evenness yielded similar results but was negatively related to nitrogen within the soil. Number of species ranged from thirty-five to sixty-two across individual units. The most abundant herbaceous species include Canada Mayflower (*Maianthemum canadense*) and Wood Anemone (*Anemone cinquefolia*). The most abundant woody species were Red Maple (*Acer rubrum*) and Beaked Hazelnut (*Corylus cornuta*). *Carex* species were also a dominant component of the ground vegetation.

Oral

Advisor: Dr. Ron Masters

Consider for Judging



Rebecca Gregory

Major: Forestry Ecosystem  
Restoration and Management

# Comparison of ages estimated from sagittal otoliths and fin rays for two genetic stocks of lake whitefish in Lake Michigan

---

Lake whitefish (*Coregonus clupeaformis*) support the largest commercial fishery in the Great Lakes, while also providing important tribal and recreational fisheries. Fishery managers estimate ages for lake whitefish in order to describe growth and mortality. Most agencies estimate lake whitefish ages using fin rays, but previous work with several fish species suggests that fin rays underestimate the age of older fish when compared to ages estimated from otoliths. Recent research suggests that there are at least six separate genetic stocks of lake whitefish that result in a mixed stock fishery and these stocks likely vary in terms of growth rate and longevity. For some stocks, fin rays may provide ages similar to those estimated from otoliths, but this may not be true for all stocks. The objective of our study is to determine whether agreement between ages estimated from otoliths and fin rays varies among stocks of lake whitefish in Lake Michigan.

Oral

Advisor: Dr. Dan Isermann

Consider for Judging



Andrew Gulickson  
Major: Fisheries Management

# Susitna River Chinook, Coho and Pink Salmon In-River Distribution Relative to the Susitna-Watana Hydroelectric Dam Site Proposal

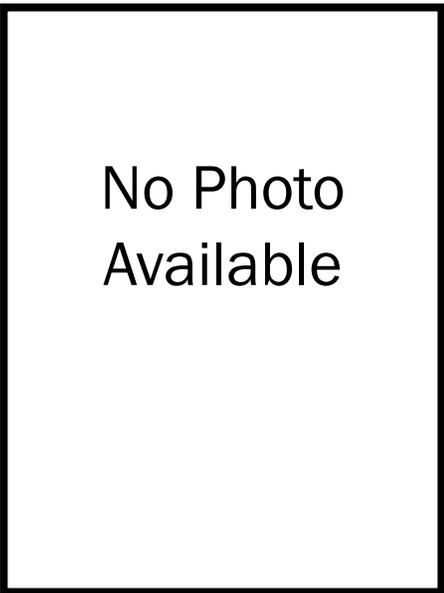
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The Alaska Energy Authority (AEA) is in the beginning stages of planning to install the Susitna-Watana Hydroelectric Dam on the main tributary of the Susitna River. This dam would be located on the 184 river mile on the Susitna River and would stand roughly 750ft high (AEA, 2012). With the size and location of the dam proposal, AEA has allocated funds to the Alaska Department of Fish and Game (ADF&G) to conduct studies on the abundance and spawning distribution of Chinook, Coho, and Pink Salmon. The main purpose for a spawning distribution study is to collect significant evidence for these salmon species spawning past the proposed hydroelectric dam site. A natural barrier of extreme white water rapids called Devils Canyon exists roughly 30 miles downriver from the proposed dam site. Even with this barrier some salmon manage to spawn beyond this point. In coincidence, the ADF&G is collecting significant evidence for the abundance of salmon that spawn past the proposed dam site. This study of spawning distribution and abundance is required for the permit application for AEA's construction of the hydroelectric dam. Not only will this data serve for the permit application but it will provide data on habitat use and confidence in known spawning distributions. However, AEA's Susitna-Watana Hydroelectric Dam is not the only driving factor for this study. Decreasing abundance of Chinook Salmon has been observed over the last few decades. The last assessment of Chinook Salmon conducted on the Susitna River was 1984 (Cleary et. al). With this in mind, the abundance assessment of this study will be of great use to many other fishery managers as well as the public

Poster

Advisor: Dr. Ronald Crunkilton

Consider for Judging



No Photo  
Available

Ian Hackett

Major: Fisheries & Water  
Resources and Biology

## Hexagenia viability in long-term enclosures in lower Green Bay, Wisconsin

---

The ecological health of Lake Michigan's Green Bay has deteriorated significantly in the twentieth century (Markert 1981). *Hexagenia*, a burrowing mayfly, an indicator of a healthy water body, disappeared from Lower Green Bay in 1955 and in the twentieth century, remediation efforts to improve water quality of the Bay have been implemented which should reestablish the *Hexagenia* population. Long-term enclosures were put in Lower Green Bay in the summer of 2012 to determine the viability of *Hexagenia* in a controlled environment (Barbour, 2012). Enclosures were collected in the summer of 2013 to analyze contents for *Hexagenia* nymphs. In addition, the density of the sediment within the enclosures was measured to determine the ability of *Hexagenia* for building burrows. No *Hexagenia* nymphs were found upon retrieval of enclosures in the summer of 2013, however, the enclosures contained amphipods, chironomids, and gastropods. Amphipods are significant because they are less adapted to survive in hypoxia and their presence suggests elevated oxygen levels compared to previous levels and thus, healthier water in the Bay (Hoback, 1996). Sediment density tests revealed that sediment in the Condos was not compact enough for *Hexagenia* to build and maintain burrows and that may be a limiting factor in their re-establishment in Lower Green Bay. Further work needs to be done to re-establish *Hexagenia* in Lower Green Bay in the future and to assess additional factors that could be limiting *Hexagenia* growth currently.

Poster

Advisor: Dr. Jerry Kaster

Consider for Judging



Ashley Hansen  
Major: Water Resources and Soil  
Science

# Comparing bobcat (*Lynx rufus*) home-range size and its habitat characteristics in central Wisconsin to northwest Wisconsin

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While the bobcat (*Lynx rufus*) is managed as a fur-bearer in northern Wisconsin, evidence suggesting its range expansion into the southern and central portions of the state has triggered increased interest in determining its status and ecology south of U.S. Highway 64. Central Wisconsin's juxtaposition of transitional tension-zone forests and row crops provide a unique habitat configuration. Understanding bobcat habitat use in this part of the state is crucial information for assessing overall suitability. Moreover, home-range size may provide useful information for assessing population and density. We followed three adult radio-collared bobcats (2 males and 1 female) between 2011 and 2013. We created 95% minimum convex polygons to estimate home-range size, and used a chi-square goodness-of-fit test with a post-hoc Bonferroni z-test to assess habitat preference based on remotely sensed cover types. We used a t-test to compare our results to historic home-range data for bobcats from northwestern Wisconsin.

Poster

Advisor: Dr. Eric Anderson

Consider for Judging



Tessa Hasbrouck

Major: Wildlife Ecology Research  
& Management and Biology



Rebecca Kelble

Major: Wildlife Ecology Research  
& Management and Biology

# Evaluating Survivorship of Eastern Grey Squirrels (*Sciurus carolinensis*) in Sandhill Wildlife Area

Eastern grey squirrel (*Sciurus carolinensis*) survivorship has been investigated across both its native range in North American and where it has been introduced as an exotic species. Grey squirrels are a small game species recreationally hunted in their native range. Our objective is to estimate survival probability of a population of Eastern grey squirrels at Sandhill Wildlife Area in Babcock, WI, and comparing these estimates with other studies. We will consider the following variables as potentially impacting survival: average air temperature and snow depth. Our study area consists of three plots with 20 tomahawk traps per plot. The three plots are separated into a mature stand (70+ years old), intermediate stand (10-20 years old), and a young stand (<5 years old). We sampled stands in 2012-2014 on weekends from late January to mid-March. Traps were baited with a peanut butter and oat mixture and checked every three hours from 6:00am to 3:00pm. Once trapped, squirrels were weighed, sexed, aged, and marked for future identification. Our results could have significant impacts on the management strategies for the Sandhill Wildlife Area property including increasing or decreasing bag limits based on survival and possible turnover rates.

Poster

Advisors: Dr. Jason Riddle and Dr. Shelli Dubay

Consider for Judging



Amanda Heckenlaible

Major: Wildlife Ecology Research  
& Management



Steve Pence

Major: Wildlife Ecology Research  
& Management



Cassandra Gierszewski

Major: Wildlife Ecology Research  
& Management

# Upland influence on wetland restoration in Lost Creek

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Ecotones are defined as areas of transition between two different plant communities. The restoration of Lost Creek included an upland ridge seeded with prairie species and a lowland with wetland species. This study focuses on how the prairie component of the restoration site influences the sedge meadow wetland. Because the restoration site is young, one objective of this study was to set a baseline of the Lost Creek vegetation along the ecotone for future reference. In total, 42 point intercept transect surveys were inventoried in four different zones selected by change in slope, vegetation, and location. Percent wetland cover and richness were calculated for each transect. It was expected that the percent cover of wetland (OBL and FACW) species would increase moving further from the ecotone into the wetland. It was hypothesized that the prairie species would invade the wetland portion of the site. We expected these values to vary between the four different zones based on observations of plant composition. Results indicated that the four zones were not equal in percent cover of wetland species or richness. Further monitoring of Lost Creek may reveal implications on future restoration designs and how prairie-wetland ecotones may affect development of a restored area.

Poster

Advisor: Dr. James Cook

Consider for Judging



Anastasia Wolf-Flasch  
Major: Forestry Ecosystem  
Restoration & Management  
Minor: Soil Science and Spanish



Claire Hillmeyer  
Major: Forestry Ecosystem  
Restoration & Management  
Minor: Soil Science

# Prevalence of *Strongyloides robustus* in a population of Southern flying squirrels in central Wisconsin

Two species of flying squirrels, the northern flying squirrel (*Glaucomys sabrinus*) and the southern flying squirrel (*G. volans*), were formerly found in Schmeckle Reserve, but *G. sabrinus* has not been seen in the reserve since 2004. A possible reason for why northern flying squirrels no longer occur in the reserve includes parasitism by *Strongyloides robustus*, a nematode that impacts northern flying squirrels but does not affect southern flying squirrels. Our goal was to determine prevalence of *S. robustus* in southern flying squirrels in Schmeckle and to compare prevalence to data previously published by Pauli et al. (2004). We hypothesized that *G. volans* would have a higher prevalence of *S. robustus* in 2013 than published in Pauli et al. (2004) and that males would have a higher prevalence of *S. robustus* than females. We collected fecal samples from flying squirrels that were captured in Sherman live traps and from known used nest boxes. All scat samples were collected from flying squirrels live-trapped throughout October and nest boxes on 16 October and preserved in 95% ethanol. Fecal samples were analyzed on 12 November for the presence of *S. robustus* using a standard fecal flotation technique. We used a Fisher's Exact test to determine if prevalence varied with gender and to determine if prevalence varied from that published in Pauli et al. (2004). Prevalence did not vary by sex ( $P=1.00$ ), and although prevalence increased in 2013 when compared to early 2000's, the results were not statistically significant ( $P=0.144$ ). These data could be used in the future to help minimize the displacement of northern flying squirrels in areas where the two species are sympatric.

Poster

Advisor: Dr. Shelli Dubay

Consider for Judging



Nick Jensen

Major: Biology and Wildlife Ecology

Minor: Conservation Biology



Tawny Liebe

Major: Wildlife Ecology

Minor: Biology



Jeff Hyma

Major: Wildlife Ecology

Minor: Captive Wildlife

# Effects of Latitude and Water Temperatures on Hatch Timing of Largemouth Bass in Wisconsin

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Largemouth bass *Micropterus salmoides* have protracted spawning and hatching periods that can last up to several weeks and hatch timing has been shown to influence first-year growth and survival of bass. Logically, the initiation and duration of hatching is related to water temperature regimes that can vary by latitude, but no previous study has specifically analyzed these relationships. Consequently, we determined if hatch timing of largemouth bass observed in 12 Wisconsin lakes was related to latitude and water temperatures during May and early June. Hatch timing was estimated by enumerating daily rings in age-0 largemouth bass otoliths and hourly water temperatures were recorded using temperature loggers deployed in each lake.

Poster

Advisors: Dr. Justin VanDeHey and Dr. Dan Isermann

Do Not Consider for Judging



Justin C. Howard  
Major: Fisheries and Water  
Resources

# Ethnobotanical Aquatic Herb Garden

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This project was done to add aquatic ethnobotanically significant plants to the Science Courtyard Herb Garden. Six local, native ethnobotanically significant plants were researched and along with a free-formed pond, installed into the Herb Garden.

Poster

Advisor: Dr. Virginia Freire

Consider for Judging



Zachary Hudson  
Major: Biology  
Minor Ethnobotany



Andrea Schneider  
Major: Biology  
Minors: Ethnobotany and  
Business

# Habitat Suitability Map for Caracal (*Caracal caracal*) in Mountain Zebra National Park, South Africa

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Eco-tourism in reserves, private game ranches, and parks contribute to a large portion of South Africa's economy. Wildlife viewing is at the heart of this attraction, particularly the "Big Five": elephant, rhinoceros, lion, leopard, and Cape buffalo, but other species can contribute as well. The satisfaction of the tourist, and ultimately their continued economic revenue largely depends on successful viewing, particularly of less abundant or elusive species such as predators rather than common grazing herbivores. One tool that can theoretically be used to improve viewings is a habitat suitability map that displays the probability of occupancy across the terrain derived from multiple parameters. These maps can also be used to focus surveys or studies to the most probable habitats of a target species. We created a habitat suitability map for Mountain Zebra National Park, South Africa for the caracal (*Caracal caracal*), a meso-carnivore similar to the bobcat (*Lynx rufus*) of North America. We used presence data of caracal from a camera trap survey done in the park in 2011 and 2012. Density of drainages, percent tree cover, road density, elevation, slope, and presence of jackal were the parameters that were considered. These parameters were compared spatially to caracal detection using GIS ArcMap. An Akaike Information Criterion (AIC) was used to determine the combination of parameters that were the most reliable in predicting caracal presence, and presented visually on the final map.

Poster

Advisor: Dr. Eric Anderson

Consider for Judging



Rebecca Kelble  
Majors: Wildlife Ecology  
Research & Management and  
Biology



Jacob Marty  
Major: Wildlife Ecology Research  
& Management  
Minor: Conservation Biology  
Student Research Symposium

# Environmental variables that influence exposure of white-tailed deer (*Odocoileus virginianus*) to parainfluenza 3 virus

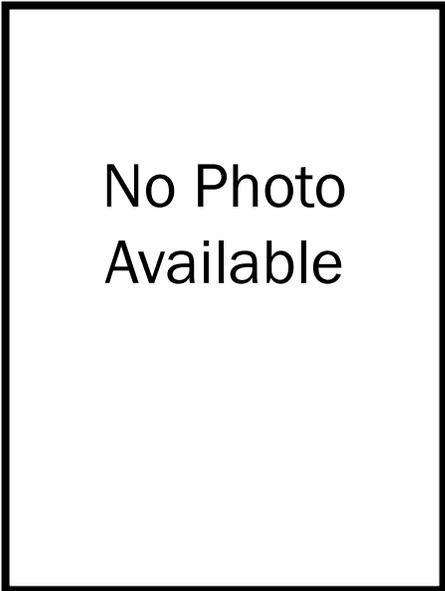
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White-tailed deer (*Odocoileus virginianus*) are commonly exposed to parainfluenza 3 virus (PI3), a virus causing respiratory disease in cattle. The virus is transmitted through aerosolization and contact with nasal fluids. Little is known about the disease in deer, but it is thought to be spread to deer through contact with domesticated cattle. The goal of this study was to determine if the presence of antibodies against PI3 in deer was correlated with the following factors: deer age, field site, year, land type (public or private), sex, exposure to *Leptospira interrogans* serovars and exposure to Infectious bovine rhinotracheitis (IBR). During the winters of 2010-2011 and 2011-2012, the Wisconsin DNR trapped deer in Shiocton and Winter, WI and provided us with 223 white-tailed deer blood samples. The blood samples were centrifuged and sera were sent to Minnesota Veterinary Diagnostic Laboratory for antibody testing. Sera were tested for antibody against six serovars of *Leptospira interrogans* using microscopic agglutination, against IBR using serum neutralization, and against PI3 using hemagglutination inhibition. Logistic regression with AIC model selection identified a model including exposure to IBR, exposure to *L. interrogans pomona*, and year as the best-approximating model. All models with empirical support included these 3 variables. Deer trapped in 2010 that were exposed to *L. i. pomona* and IBR were more likely to be exposed to PI3. Relationships could result from increased disease transmission at sites with high deer or cattle density. We will discuss the implications of our findings in relation to disease management.

Oral

Advisor: Dr. Shelli Dubay

Consider for Judging



No Photo  
Available

Bryant Kern  
Majors: Wildlife Ecology  
Research & Management and  
Biology

# A Comparison of Prey Selection Regarding Weasel Size and Home Range

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Ermine (*Mustela erminea*) are small, aggressive predators commonly trapped for fur in Wisconsin. Ermine commonly consume small mammals, but will readily scavenge when carcasses are available. For the last 7 years, we have been necropsying trapped ermine to determine diet items in stomachs. Trappers provide ermine from several locations in Wisconsin. Our goal was to determine prey consumed using internal and external characteristics of mammalian hairs in ermine stomachs. We hypothesized that prey selection will vary in ermine with differences in age, sex, and size. Ermine carcasses were collected from trappers located near Rice Lake, Wisconsin, and from various areas within Lincoln and Marathon Counties, Wisconsin. Stomachs were examined for hairs, which were identified with the help of a hair identification key. Skull length and overall body length were measured to assess how diet varies with ermine. We used a t-test to determine if mean body length of ermine that consumed squirrels and rabbits differed from body length of ermine that consumed shrews and moles. We found that the results were not significant with respect to size, age, and sex. When males were tested against females, a p-value of .721 was obtained. Additionally, a p-value of .439 was acquired when testing juveniles against adults. The p-value for overall size was .589.

Poster

Advisor: Dr. Shelli Dubay  
Consider for Judging



Alexander Linton  
Major: Wildlife Ecology Research  
& Management



Jenna Tuma  
Major: Wildlife Ecology Research  
& Management

# Comparison of Lake Sturgeon Growth Rates Estimated from Fin Rays and Recoveries of Fish Implanted with Passive Integrated Transponders

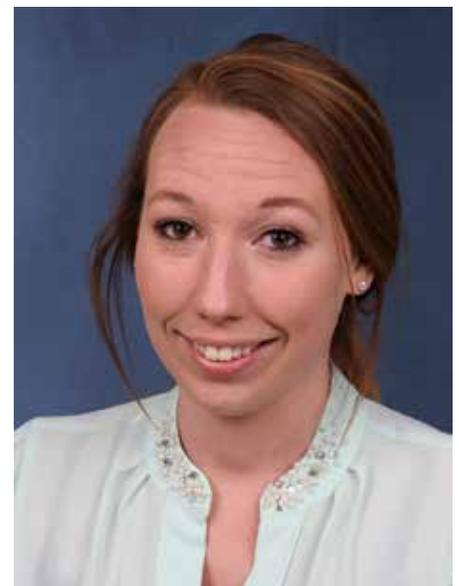
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Lake sturgeon (*Acipenser fulvescens*) age is commonly estimated from pectoral fin rays. Although fin rays can underestimate the age of lake sturgeon, this method may still yield reasonable estimates of growth rate. Growth rates of lake sturgeon in the Menominee River, Wisconsin, estimated using fin ray ages and a von Bertalanffy growth model were compared to observed growth rates obtained from recaptures of fish implanted with passive integrated transponders. Our objective was to determine if growth rates estimated from fin rays were similar to rates estimated from mark-recapture data. We predict that mark-recapture data will provide slower growth rates than pectoral fin rays, because fin rays underestimate lake sturgeon ages.

Poster

Advisor: Dr. Dan Isermann

Consider for Judging



Caitlin Luebke  
Major: Fisheries

## Geographic Variation in Antipredator Behavior of *Uta stansburiana*

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Prey species will often contextually differentiate their escape behavior with respect to predator risk and location differences. Optimal escape theory predicts that lizards and other prey species should modify flight behavior based on differences in predation risk. Previous studies also demonstrated that predation risk and geographic differences have separate effects on escape behavior. This study examines how the combination of predation and geographic variation affect pre- and post-escape behavior of Side-blotched Lizards. We hypothesized that individuals will maximize their survival by differentiating flight responses. Further we predicted that flight behavior should vary based on predator type and local density of predators. At each of nine sites, we studied behavioral responses of Side-blotched Lizards to the approaches of two different types of predators. Pre- and post-escape behavior were recorded for each trial. Although we did not detect differences in lizard behavior prior to escape, we did find that flight distance increased when the when a subject was approached by a snake vs. when approached by a predatory lizard the side-blotched lizard. Lizards also used refuges more often when approached by a lizard. Geographic variation, in predator densities at each site explained behavioral differences such that predatory lizard densities were correlated with enhanced escape behavior. At areas with high densities of predatory lizards, side-blotched lizards selected higher perches. From these results, we conclude that side-blotched lizards differentiate between types of predators, assess predation risk, and respond to maximize survival.

Poster

Advisor: Dr. Peter Zani

Consider for Judging



Sarah Manka

Major: Wildlife Ecology Research  
& Management  
Minor: Biology

## **Re-visitation of: Artificial nest box use and success between pole and tree mounted boxes for both wood duck (*Aix sponsa*) and hooded merganser (*Lophodytes cucullatus*) in Central Wisconsin**

A re-visitation of a research project done in 2006 by Nick Docken, Luke Fara, Brian E. Schmidt & Joseph Schultz students at that time students of University of Wisconsin – Stevens Point. Wood ducks (*Aix sponsa*) and hooded mergansers (*Lophodytes cucullatus*) are the two of the cavity nesting waterfowl species in Central Wisconsin, both species use artificial nesting structures for nesting opportunities. These artificial nesting structures can be mounted either on a standalone pole or tree. In this study, the preference of structure placement, either on a pole or a tree, will be examined for both species. Also the preference will be compared over the years, with data dating back to 2006. Chi-square ( $\chi^2$ ) tests were used to determine differences in selection, success, and alternative use between pole-mounted and tree-mounted boxes.

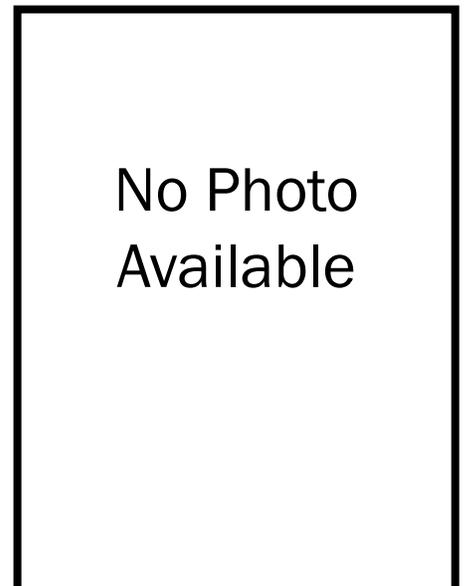
Poster

Advisor: Dr. Kevin Russell

Consider for Judging



Connor Christopherson  
Major: Wildlife Ecology Research  
& Management  
Minor: Soils



Kasey McCauley  
Major: Wildlife Ecology Research  
& Management

# Developing a Habitat Suitability Model for Fisher (*Martes pennanti*) in Central Wisconsin

In recent years, the reintroduction of fisher into Wisconsin and the subsequent regulated harvest has spurred the use of statistical models based on variables such as age structure, harvest size, and gender to aid in estimating fisher population size in the northern third of the state (Rolley and MacFarland 2012). However, current population goals and statistical models have not been established for Trapping Zones E (the central forest area) or F (the southern portion of Wisconsin) (Rolley and MacFarland 2012). To improve management of fisher populations in Zones E we developed a GIS habitat suitability model that identifies fisher habitat quality for the region. Previous research on fisher habitat suggests that GIS models are just as successful if not better than standard models employing field data (Davis et. al. 2007). For this study, the model was built utilizing trail camera images from a separate study conducted in 2012 to determine bobcat abundance. A total of 141 camera locations were evaluated for the presence of fisher during approximately 5 week long monitoring periods, and then categorized as sites with fisher present or sites without fisher detections. Areas around each camera site were buffered and information on habitat type, distance to roads, and proximity to water/wetlands were measured using GIS (Davis et. al. 2007). We selected the best-fit model using AIC (Akaike Information Criterion) and then generated a habitat suitability map of the area. The efficacy of the map to predict suitable fisher habitat will be tested in future research.

Poster

Advisor: Dr. Eric Anderson

Consider for Judging



Shannon McNamara  
Major: Wildlife Ecology Research  
& Management



Molly O'Grady  
Major: Wildlife Ecology Research  
& Management

# Nest box use of southern flying squirrels (*Glaucomys volans*) in relation to stem density, mid-layer density, and canopy cover in central Wisconsin

Nesting locations are essential for southern flying squirrel survival (*Glaucomys volans*). Flying squirrels often forage near their nesting sites. Shrubs are important to provide cover from aerial predators while foraging on the ground; however, tall shrubs may hinder flying squirrels' ability to glide through the forest. Flying squirrels primarily glide within the mid-layer (3-8 meters), so an open mid-layer may be more beneficial for flying squirrels. Canopy cover is also important to provide protection from areal predators while gliding within the mid-layer. We hypothesized that nest boxes located in areas with a dense but short shrub layer, an open mid-layer, and a closed canopy would be occupied more frequently than nest boxes located in sites with a lacking or overbearing shrub layer, a dense mid-layer, and an open canopy. We measured stem density, stem height, mid-layer density, and canopy cover in relation to nest box occupancy (n=18). We used a multivariate ANOVA (MANOVA) to compare nest box occupancy to the habitat variables measured. The measured habitat characteristics as a whole were not statistically significant when compared to nest box occupancy; however, mid-layer density was significant (p=0.021). Our study suggests that nest boxes should be hung in areas with an open mid-layer, with little to no vegetation 3-8 m from the ground. To determine other habitat variables that are important for southern flying, more variables should be measured as well as a larger sample size of nest boxes. Nest boxes may then be mounted in the most beneficial areas and be used to monitor populations and to increase nesting locations for flyers.

Oral

Advisor: Dr. Shelli Dubay

Consider for Judging



Leah McSherry  
Majors: Wildlife Ecology  
Research & Management and  
Biology



Alex Roszkowski  
Major: Wildlife Ecology Research  
& Management

# Analysis of Total C, N, P Contents Loading in Soil Cores Over 10+ Years From Horicon Marsh in Dodge County, WI

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Horicon Marsh is the largest freshwater cattail marsh in the United States, which spans 32,000 acres and is located in Dodge County, Wisconsin. The surrounding upland landscape is dominated by agriculture. Nutrient (carbon, nitrogen, and phosphorus) loading from these areas can potentially lead to significant changes in the marsh's aquatic life and vegetation. Identifying areas of increased nutrient loading could lead to identifying areas where land management practices could be improved. The objective of this study is to compare C, N and P levels from cores collected in identical spots 10 years apart to see if there are any significant differences. Sampling sites were positioned every ¼ mile apart along the east-west transects throughout the marsh. A soil core was obtained at each sample site and subsequently cut into five centimeter segments, oven dried, and analyzed for total nitrogen, carbon, and phosphorus concentrations. The data will enable (1) the evaluation of land management techniques of the surrounding upland landscape, (2) the further understanding of nutrient movement through wetland soil, and (3) the impact of nutrient loads on Horicon Marsh. Results from 2002-2012 show that all carbon and phosphorus levels increased over this ten year time span, while nitrogen decreased. From 2003-2013 all nutrient levels increased.

Oral

Advisor: Dr. Rob Michitsch

Consider for Judging



Kelly Mercier  
Major: Soil and Land  
Management

# Preliminary Feasibility Study on Replacing Cooking Fat with Sunflower Oil in Rural Kenya

Nyumbani Village is a bio-friendly and self-sustaining community serving orphans and elders who have been left behind by the “lost generation” as a result of the HIV/AIDS pandemic in Kenya, Africa. An extensive sustainability program is in development at the village encouraging self-reliance and sustainability. The primary objective of this research was to perform a preliminary feasibility study regarding the replacement of an outside source of cooking fat currently distributed to families. The goal was to determine if black-oil sunflowers (*Helianthus spp.*) grown within the village could completely replace purchased cooking fat. This research was performed through harvest of sunflower seeds followed by oil content analysis per area. Throughout the summer of 2012, samples were collected by hand from three sunflower fields from a designated number of plants and were then dried, threshed and manually pressed. Data was compared to extrapolate the volume of oil to the weight of seed as well as the area of land harvested. Results of this study indicated that with unpredictable rain fall, seed to oil ratio, labor-intensive nature of the process, and limited available land, it was not feasible for the continuation of planting sunflowers to completely replace the villages cooking fat. It is possible for individual families to continue planting sunflower seeds for small amounts of oil, but not as a complete replacement for the needs of the population. A perennial oil producing crop, for example *Moringa oleifera*, may be a better option to replace the cooking fat due to the climate adaptations, currently available land and an established local seed source.

Poster

Advisor: Dr. Holly Petrillo

Consider for Judging



Lisa Moehlman  
Major: Soil and Land  
Management

# Assessment of the wet meadow composition of Lost Creek Mitigation Site

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Lost Creek includes 150 acres of wet meadow as a part of the mitigation of Highway 10 that was completed in 2009. This study examines areas of wet meadow to determine if they are different in composition and abundance of species. Four areas were non-randomly selected for sampling. Quadrats were placed along fifty meter transects within each area to sample vegetative cover of each species. The relative percent cover of wetland obligate species was calculated and Area A had 62%, Area B had 21%, Area C had 91%, and Area D had 55%. Dominant species were green bulrush and wool grass for A, fox sedge and green bulrush for B, bristly sedge and wool grass for C, and fox sedge and green bulrush for D. Analyses were run to test if the areas of wet meadow are different in composition and abundance. The Cluster Analysis indicates that Area C is distinctly different from the other areas except for one transect. Area A and D were clustered together despite being the furthest apart. The Multi-Response Permutation Procedure (MRPP) strongly rejected ( $p < 0.001$ ) the null hypothesis that the areas of wet meadow were the same. Throughout the restored site, there are differences between areas as well as transects within the areas. Another wetland site that was also restored, Moses Creek, was compared with Lost Creek using a Similarity Analysis, which indicated that the two sites are dissimilar in species composition and abundance. Despite similar restoration treatments, there were distinct communities within a site and between sites.

Poster

Advisor: Dr. James Cook

Consider for Judging



Sarah Rademacher

Major: Forestry Ecosystem  
Restoration & Management

# Seed Selection by Five Bird Species at Wild Bird Feeders in Central Wisconsin

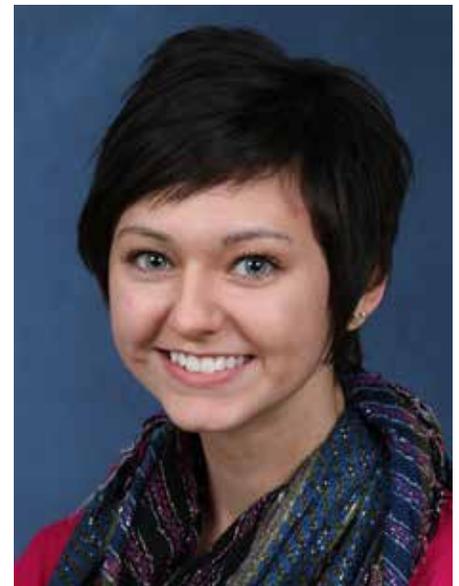
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Wild bird feeders are commonly placed near houses as a way for the public to view and interact with wildlife. Numerous sources suggest using certain seed types to attract specific bird species, but little experimental testing has been done regarding seed selection at feeders. The goal of this experiment was to test for differences in seed selection between and within the observed bird species in central Wisconsin. To accomplish this, I filled 3 bird feeders with 3 popular bird seed types: Black Oil Sunflower, Safflower, and Nyjer seed. Trail cameras were set to take a photo every hour on the hour from 6 am to 8 pm for 9 days. I counted every individual bird in each picture, recorded the species, and which seed it was consuming. The bird species documented were American Goldfinch (*Spinus tristis*), Black-capped Chickadee (*Poecile atricapillus*), Rose-Breasted Grosbeak (*Pheucticus ludovicianus*), Red-Breasted Nuthatch (*Sitta canadensis*), and Hairy Woodpecker (*Picoides villosus*). The data were analyzed using one-way ANOVAs with Student–Newman–Keuls post hoc tests. I calculated differences in seed selection between the 5 species for each of the 3 seed types, and differences in seed selection within each of the documented species. Results revealed the Rose-Breasted Grosbeak selected to consume safflower seed over the other two options. The American Goldfinch, Black-capped Chickadee, Red-Breasted Nuthatch, and Hairy Woodpecker all selected black oil sunflower seed significantly more than the other 2 seed types.

Poster

Advisor: Dr. Eric Anderson

Consider for Judging



Kelly Redmond  
Majors: Wildlife Ecology  
Research & Management and  
Biology

# An Evaluation of Illicit Stimulants in Wastewater Effluent and the Wisconsin River Along the Central Wisconsin River Basin

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Methamphetamine and cocaine are illicit stimulants under the United States Drug Enforcement Administration. These and their metabolites, amphetamine and benzoylecognine, are pollutants of emerging concern. In this study, these four substances were evaluated in four cities. Cities' samples were taken from Merrill, Wausau, Stevens Point, and Wisconsin Rapids. Grab samples were taken from three sites associated with each city: One upstream and one downstream of effluent convergence, and one at the site of effluent convergence. In total twelve sites were evaluated for the tetrad of compounds. Analytes of interest were isolated via solid-phase extraction using an Oasis HLB cartridge designed to adhere to polar compounds. High Performance Liquid Chromatography/Mass Spectroscopy was used to quantify and identify substances of interest. Results yielded detectable quantities of at least one analyzed substance in each effluent and one Wisconsin River sample. Evidence of this study proves the capability to quantify illicit stimulants in treated wastewater effluent along with surface waters.

Poster and Oral  
Advisor: Bill DeVita  
Consider for Judging



Isaiah Robertson  
Majors: Water Resources and  
Biology  
Minor: Chemistry



Erik Hendrickson  
Major: Water Resources  
Minor: Chemistry

# Movement of flathead catfish in the Little River and Cape Fear River, North Carolina following fish passage efforts

Flathead catfish (*Pylodictis olivaris*) are large, predatory fish that have been introduced outside of its native range in North America with ecologically harmful consequences. Knowledge of movement patterns of flathead catfish is limited and controversial, with early studies indicating flathead catfish are non-migratory compared to more recent studies that found seasonal migratory patterns. There also is limited knowledge of flathead catfish movement following fish passage efforts. The objective for this study was to determine and compare flathead catfish movements during the spring to early summer in the Little and Cape Fear rivers, North Carolina. Complete and partial dam removals occurred on the Little River while a fish passage structure was constructed at the first lock and dam on the Cape Fear River. To monitor flathead catfish movement, PIT (passive integrated transmitter) tags and antennas were used in the Little River and sonic telemetry tags and receivers were used in the Cape Fear River. In 2010, flathead catfish were found to use restored habitat in the Little River, but the majority stayed within the first 13 river kilometers. In 2013, a high proportion of flathead catfish used the fish passage structure on the Cape Fear River but the majority did not move extensively upstream. In both systems, flathead catfish made seasonal movements but did not extensively use available upstream habitat, possibly due to conservation of somatic energy reserves, prey availability, and spawning habitat preferences. Our results indicate upstream habitats may provide native fish with refuge from introduced flathead catfish.

Poster

Advisor: Dr. Josh Raabe

Consider for Judging



Chris Rosenthal  
Major: Fisheries

# Impact of Waterfowl Dropping Density on *Escherichia coli* Concentrations in City Parks

*Escherichia coli* is a bacterium commonly found in waterfowl feces. Resident (non-migratory) populations of waterfowl in city parks produce large amounts of fecal material, potentially contaminating water bodies in city parks with *E. coli*. Fecal contamination in water bodies is a public health concern because of its zoonotic potential. Additionally, artificial feeding of waterfowl by humans in city parks could attract high numbers of non-migratory waterfowl. We measured waterfowl fecal dropping density, *E. coli* concentration in the waterbody, the number of waterfowl and number of human users present at six parks in Chicago, Illinois and Milwaukee, Wisconsin. Fecal density was evaluated by conducting transects along the perimeter of each water body. Water was then sampled at two randomly determined points along the transect. At each water sampling site, the number of waterfowl and the number of human users were counted for ten minutes. Linear regressions were used to identify relationships between the number of waterfowl and the number of human users observed and between the number of fecal droppings and *E. coli* in adjacent water bodies. Average dropping density and average *E. coli* concentrations showed a positive relationship ( $R^2=0.9113$ ,  $P=0.003$ ), while the average number of waterfowl was not related to number of human users ( $R^2=0.02137$ ,  $P=0.771$ ). Dropping density may be a potential predictor of *E. coli* concentrations in water bodies in city parks.

Poster

Advisor: Dr. Shelli Dubay

Consider for Judging



Brittany Ruttenberg

Majors: Wildlife Ecology: Research  
Management and Biology



Jennifer Paulus

Majors: Wildlife Ecology: Research  
and Management and Biology

# Investigating Canine Relative Abundance in Central Wisconsin Using Scent Post Station and Camera Trap Surveys

Coyotes (*Canis latrans*) are one of the most common meso-carnivores in central Wisconsin, but are not closely monitored by the state despite being a major game species. Call surveys, camera trap surveys, telemetry, and scent post station surveys are the most commonly used methods to collect data on their movements, abundance, and population dynamics. This project set out to investigate the temporal dynamics and relative abundance of the coyote population in the Buena Vista Wildlife Area in Wisconsin Rapids, WI and the effectiveness of the scent post station survey method. Relative abundance of non-targeted species such as the red fox (*Vulpes vulpes*), the gray wolf (*Canis lupus*), and the striped skunk (*Mephitis mephitis*) was also analyzed. The techniques and methods used in the survey were quickly refined and improved based on expert opinion to deal with environmental issues and the natural history of canine species to increase the likelihood of detecting presence. Fine-grained sand replaced bleached flour as a substrate, and measures were taken to reduce residual, human-associated scents while setting up the stations. These alterations in techniques coincided with an increase in visitations of the previously listed species. Preliminary camera trap surveys were originally employed in Schmeekle Reserve, Stevens Point to detect coyote presence, but failed to produce any detections. After bait was added to camera sites, gray (Urocyon cinereoargenteus) and red fox presence was detected. Investigation into possible further improvements to this survey method are being discussed and implemented.



Michelle K. Sauers  
Major: Wildlife Ecology Restoration & Management  
Minor: GIS & Spatial Analysis

Poster  
Advisor: Dr. Anderson  
Consider for Judging



Jacob J. Marty  
Major: Wildlife Ecology Research & Management  
Minor: Conservation Biology



Alex J. Linton  
Major: Wildlife Ecology Research & Management  
Minor: Biology



Kaitlyn A. Bagnall-Newman  
Major: Environmental Education and Interpretation  
Minor: Biology

# Analyzing the Effects of Biochar and Cover crops on Nitrogen Leaching and Soil Physical Properties of Central Wisconsin Soils

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Current agricultural practices performed across the U.S, degrade soils and contaminate ground water. A greenhouse experiment concerned with these issues, specifically nitrogen leaching and improving degraded soils was conducted by planting corn plants in a Rosholt loam. This experiment involved 4 treatments: the addition of biochar to soil (at ~6% mass), planting a rye cover crop, the combination of these two, and a control. The objective of the experiment was to determine the effect of a rye cover crop and biochar (as well as the combination) on nitrogen leaching, soil carbon and nitrogen content, and soil physical properties (bulk density, water holding capacity, and hydraulic conductivity). Preliminary tests have shown that there is a higher water holding capacity in soil that was treated with biochar. The first leaching event indicated that soil treated with biochar had a higher amount of Nitrogen leaching. Soil and plant tissue will be analyzed for Total Nitrogen, Carbon and Nitrate. These results will help us learn how to improve our agricultural practices and soils and make our farming systems more capable of the sustained production of healthier crops.

Oral

Advisor: Dr. Jacob Prater

Consider for Judging



Michelle Scarpace  
Major: Soil and Land  
Management

# Validation of Daily Growth Rings in Otoliths of Age-0 Muskellunge *Esox masquinongy*

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Muskellunge *Esox masquinongy* support popular, economically-important fisheries in many states and provinces, including Wisconsin. Many of these fisheries are supported by stocking because natural recruitment is not sufficient to maintain fishery quality. However, the factors regulating first-year survival and recruitment of muskellunge are poorly understood. Several previous studies have demonstrated that hatch timing can influence the survival, growth, and recruitment of age-0 fish, but no study has examined the effects of hatch timing within age-0 muskellunge cohorts. Hatch dates are typically estimated from daily otolith rings, but this method has not been validated for muskellunge. We used known-age muskellunge collected during a 30-d period after hatching to determine if otolith daily rings provided accurate estimates of hatch dates.

Poster

Advisor: Dr. Daniel Isermann

Consider for Judging



Aaron Schiller  
Major: Fisheries Biology

# Age validation of hatchery-raised lake whitefish *Coregonus clupeaformis* using otolith daily growth rings

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Accurate age determination is a vital component of fisheries management. The need for this information has led to a variety of age determining methods such as counting the incrementally-produced rings on calcified structures. Otoliths are a calcified structure that are often capable of providing accurate age estimates. In addition to using annual growth rings (annuli) to estimate a fish's age in years, daily growth rings (circuli) on otoliths can be used to estimate a fish's ages in days during its first year. Young of the year (YOY) age estimates in particular are important as they can provide information on hatch dates, spawn time, and growth rate of age zero fish. Lake whitefish *Coregonus clupeaformis* comprise a substantial fishery in the Laurentian Great Lakes. Being able to age YOY lake whitefish would be a valuable tool in the management of this resource. There is extensive literature on the use of calcified structures to age older lake whitefish, however, otolith circuli age determination for YOY lake whitefish is absent; this process has not yet been validated. The objective of this study was therefore to validate otolith circuli aging for YOY lake whitefish. Otoliths were removed from hatchery-raised lake whitefish and imaged under a light microscope. Circuli averages were then plotted against known ages to determine the accuracy of the counts. Underestimation of true age occurred across all readers and for every otolith. Reasons for this underestimation may include poor growth ring resolution, reader inexperience, and small sample sizes ( $n \leq 5$  per age). Further validation efforts are needed if otolith circuli are to be used for age determination of YOY lake whitefish.

Oral

Advisor: Dr. Daniel Isermann

Consider for Judging



Josh Schulze

Major(s): Fish and Water  
Resources; Fisheries Option

# Scavenger Attraction to Food Waste in Urban and Rural Environments

Urbanization is converting natural environments to urban and suburban areas densely populated by humans. Urban exploiters, wildlife species that thrive in urban environments, tend to have generalist diets. Species present in rural habitats are often absent in urban areas because of habitat fragmentation. Common urban exploiters include striped skunks (*Mephitis mephitis*) and raccoons (*Procyon lotor*), and they consume human food waste in urban environments. Urban exploiters are found at higher densities and have smaller home ranges than the same species in rural environments. We aimed to identify differences in abundance and species richness of scavengers in urban and rural environments in Wisconsin. We hypothesized that richness would be higher but abundance would be lower in rural areas. We placed a total of 24 scent post stations centered around food waste at 2 sites, 12 in Melrose and 12 in Stevens Point, Wisconsin. At each site, 6 scent post stations were located in an urban setting, and 6 were located in a rural setting. Stations were randomly treated with meat or meat-free food waste. We identified tracks and disturbances to stations once per week for three weeks in mid-October through November. Using a two-tailed t-test, we found that the mean number of disturbances per station was 46% larger in Stevens Point than in Melrose ( $t_{60} = 2.00$ ,  $P = 0.006$ ). The number of species was 30% higher in Melrose than in Stevens Point ( $t_{22} = 2.07$ ,  $P = 0.008$ ). Higher densities of wildlife in urban environments may have implications for zoonotic diseases.

Poster

Advisor: Dr. Shelli Dubay

Consider for Judging



Sarah Shawver  
Majors: Soil Science and Wildlife  
Ecology

# Predator response to visual and olfactory cues in artificial nest boxes

Nest predation is recognized as the primary cause of nest failure for birds. Thus, adaptations are most likely present in both predators and prey to find nests and protect them, respectively. Nesting in cavities is one such adaptation that many species use to avoid predation. Research suggests that predators use various visual, auditory, and olfactory cues to locate prey. In this study, we separated visual and olfactory cues to determine what cavity nest predators use to locate their prey. We used 30 nest boxes already placed in the Cache River watershed in southern Illinois. There were 15 boxes in the Upper Cache at Heron Pond, and 15 in the Lower Cache at Section 8. We used 3 treatments: an olfactory cue, a visual cue, and a control. We had 5 replicates of each treatment at both sites. The nest boxes had flour on the bottom to record tracks of animals that visited the box. Two trail cameras were placed facing the opening of each nest box to identify visitors. We recorded a total of 41 visits over a three week period, with raccoons accounting for 37 of the visits. We found no significance in total visits with respect to site and treatment ( $F_{5,24} = 0.01$ ,  $p = 0.9144$ ), or in visits from raccoons only with respect to site and treatment ( $F_{5,24} = 0.23$ ,  $p = 0.8817$ ). The nest boxes were visited with the same degree of regularity, regardless of treatment, which suggests that raccoons did not use the stimuli we provided when visiting nest boxes. As nest boxes visually stand out, it is likely that raccoons use their sight to locate cavities, and explore all cavities they locate.

Oral

Advisor: Dr. Mike Eichholz (Southern Illinois University – Carbondale)

Consider for Judging



Sarah Shawver

Majors: Soil Science and Wildlife  
Ecology

# **Place Attachment and Recreation Experience Preference at Northern Highland American Legion State Forest: A comparison of three visitor activity groups**

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Developing an understanding of visitor expectations, preferences, and characteristics can help inform better outdoor recreation management. In this study, Place Attachment (PA) and Recreation Experience Preferences (REP) are compared among three types of activity groups at Northern Highland American Legion State Forest (NHAL). Visitors were surveyed on-site from June to August 2013. Four on-site surveyors handed out questionnaires at campgrounds, boat landings, picnic areas, and trails. Each group of visitors encountered was approached and the person with the most recent birth date was asked to fill out the questionnaire. A total of 815 surveys were gathered, with a response rate of 90%. Visitors were asked to specify their primary activity on the day of the survey. Camping (n=351), hiking (n=118), and fishing (n=115) were the three activities most participated in at NHAL. Visitors were also asked to rate the importance of 12 dimensions of REP (achievement/stimulation, escape physical pressures, escape personal and social pressures, similar people, family togetherness, autonomy/leadership, learning, enjoy nature, nostalgia, new people, physical fitness, and escape technology) and 3 dimensions of place attachment (social bonding, place identity, and place dependence). In this presentation it is hypothesized PA and REP will differ among camping, hiking, and fishing groups. Preliminary analysis shows significant differences ( $p < 0.05$ ) among the three activity groups for 10 of 12 REP dimensions and all 3 PA dimensions. The hiking activity appears to be the most different. Findings have implications for managing visitors with different primary activities.

Oral

Advisor: Dr. Laura Anderson McIntyre

Consider for Judging



Roshel Stewart  
Majors: Forest Management and  
Forest Recreation  
Minor: Soil Science

# Design and Implementation of a Continuous Chemical Addition System

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Chemical usage is necessary in the papermaking process in order to meet specific paper properties for different products and should be added at strategically locations in the approach flow to achieve maximum chemical efficiency. The purpose of this project is to design and implement a continuous chemical addition system on the UW-Stevens Point Mead Witter Pilot Paper Machine to simulate industry standards and to replace the current batch process that combines the water, pulp and chemicals in the first stage. Initially research was completed to determine the most effective chemical addition point locations. Proper fittings, pumps that meet flow specifications, and proper containment for the chemicals were explored to determine the best fit for the implementation of the project and have been ordered. Trials will be done on wet strength, size, and dye chemicals to ensure that the continuous chemical addition system either outperforms or performs as well as preparing the stock using the current batch process. At the completion of this project the pilot paper machine will still be used for student research, industry trials, and producing products such as the art paper on campus. This innovative system will, however, better resemble industry standards and increase efficiency of the chemicals

Poster and Oral

Advisor: Dr. Karyn Biasca

Consider for Judging



Adam Offerdahl,  
Lindsey Hoffman,  
Jordan Hansen, and  
Jamie Tauscher

Major: Paper Science  
Engineering

# Effects of commercial brood diets on growth and fecundity of domestic female brown trout (*Salmo trutta*) broodstock.

Egg production of fishes varies among individuals and populations due to differences in biology, life history, and environmental factors like competition, temperature, and food supply. In hatchery settings, we control many of these variables and different diets can have varying effects on size and egg production. We compared growth, fecundity, and percent eyed-eggs of domestic brown trout fed two commercial brood diets, Skretting and Biobrood. We also compared the size of fry at first feeding between the two diets. We used 320 (during 2012) and 256 (during 2013) domestic female brown trout broodstock reared at the Wild Rose state fish hatchery. Females were measured (total length; TL; mm), weighed (kgs), and evenly split into two raceways and fed at 0.4% body weight/day. Several months later, during spawning, females were collected, measured, weighed and stripped of their eggs. The size of fry at first feeding size was estimated volumetrically (number of fry/g). Brown trout fed the Biobrood diet were significantly larger at spawning in 2012 ( $t_{\text{weight}} = -6.88$ , d.f. = 1,171,  $P < 0.001$ ;  $t_{\text{length}} = -5.69$ , d.f. = 1,155,  $P < 0.001$ ) and 2013 ( $t_{\text{weight}} = -4.11$ , d.f. = 1,175,  $P < 0.001$ ;  $t_{\text{length}} = -3.74$ , d.f. = 1,181,  $P < 0.001$ ) and had higher average fecundity compared to the Skretting fed trout; however, fecundity was not significantly different in either year ( $P > 0.18$  both years). Percent of eyed-eggs was similar between the diets. Brown trout fry from the Biobrood diet were larger compared with the fry from the Skretting diet ( $\chi^2 = 0.997$ , d.f. = 1,300). Brown trout fry from the Biobrood diet were larger than fry from the Skretting diet. Biobrood diet was more expensive, however due to its increased biological performance this may be the diet for brown trout at the Wild Rose hatchery.

Poster

Advisor: Dr. Justin VanDeHey

Consider for Judging



Jacob Utrie

Major: Fisheries and Biology

# Optimizing timing of first thinning for a red pine plantation

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Growth and yield modeling of tree growth improves a forester's ability to develop management plans and determine timing of stand entries. We worked with red pine (*Pinus resinosa*), a species which is important to the paper industry and other wood using industries in Wisconsin. During fall 2012, cross-sections were taken at both ends of each merchandized pulpstick to a 3.5 inch top diameter. The age at which each tree grew large enough for the next pulpstick to be salable was determined by previous students (Andy LaChance and Joe Szczepanski). For these years, MAI (mean annual increment) and PAI (periodic annual increment) were calculated. Through the use of this data we are able to model volume increase through time from a stand and came to the conclusion that for these pines, they should have been thinned at 22 years to optimize growth. To increase predictability of the results, this project should be modeled for additional stands.

Poster

Advisor: Michael Demchik

Consider for Judging



Rebecca Vasquez  
Major: Forest Management  
Minor: International Resource  
Management

# Habitat analysis of white-tailed deer (*Odocoileus virginianus*) in an urban environment using home range analysis.

White-tailed deer (*Odocoileus virginianus*) in urban environments present a unique challenge to wildlife managers. Movement patterns and home ranges vary depending on the habitat available to the animals and the time of year. This study investigated the effect snow depth and temperature had on the movement of deer in Schmeeckle Reserve, a forested habitat located adjacent to an urban environment, during the winters of 2012 and 2014. Climate data will be obtained from the National Climatic Data Center and a t-test will be used to compare the snow depth and temperature throughout the winter months of 2012 and 2014. Deer were trapped using modified Stephenson Box Traps (Anderson and Nielson 2002) and adult deer were radio-collared and ear tagged for identification. To date, we have radio telemetry data from four adult deer during the 2012 winter months. We have five additional adult deer that are fitted with VHF radio collars upon which data collection for the 2014 winter is still in progress. We will construct Kernel home range estimates for each animal and a t-test will be used to compare the average home range size between two separate winters. Data analysis is ongoing and will continue as more data are collected. This analysis will provide insight into managing on an ever expanding urban landscape.

Poster

Advisor: Dr. Tim Ginnett

Consider for Judging



Andrew Voigt  
Majors: Wildlife Ecology  
Research and Management and  
Biology



Nathan Francois  
Majors: Wildlife Ecology  
Research and Management and  
Biology

# Habitat use of migrating saw-whet owls (*Aegolius acadicus*)

Northern saw-whet owls (*Aegolius acadicus*) are small (70 – 110 grams) forest owls and are vulnerable to predation by barred owls (*Strix varia*) and great-horned owls (*Bubo virginianus*). Saw-whet owls migrate through Wisconsin during the spring and fall. Little is known about habitat use of owls while migrating across North America. Hatch year owls may not have learned appropriate habitat for migration corridors because they have not migrated previously. Habitat selection is important for survival during migration, and our goal was to identify differences in habitat use of adult and hatch year saw-whet owls during fall migration. We hypothesized that hatch year owls would be found in higher frequency in open sites when compared to older owls. We captured saw-whet owls between dusk and dawn during their fall migration from 2008 – 2012 in central Wisconsin. We used mist nets with a conspecific call as a lure in three sites with differing habitat characteristics. One site consisted of open grassland, one site was surrounded by deciduous forest, and the last site was surrounded by coniferous forest. After capture, we weighed owls using an electronic balance scale and measured wing chord and tail length. We identified age using molt patterns discernable under ultraviolet light. Owls were banded and we identified the sex of each bird. We used a chi-square goodness of fit test to identify differences in habitat use by hatch year and adult birds during migration. We used 411 owls in the analysis, and found that hatch year birds were netted more often in open areas than in forests ( $\chi^2=6.37$ ,  $df=2$ ,  $P=0.041$ ). We think that hatch year birds have not yet learned to use the optimal habitat while migrating.

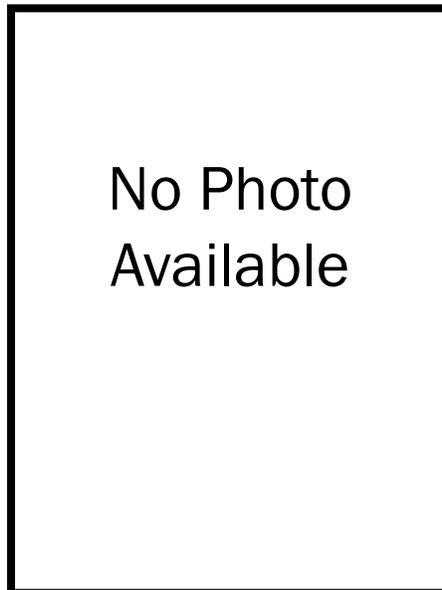
Oral

Advisor: Dr. Shelli Dubay

Consider for Judging



Tammy Weiss  
Major: Wildlife Ecology:  
Information and Education  
Minor: Captive & Biology



Erin Scherer  
Major: Wildlife Ecology:  
Research and Management  
Minor: Biology & Spanish

# Defining Areas of Improvement for the Lake Wausau Community

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Where would improvement to the Lake Wausau region be most beneficial to its users and community? This question can be a very difficult to answer at times. There are many factors that play a role in deciding what area of a town or city needs improvement. Recently a survey was sent to residents of the Lake Wausau region asking many questions, such as where people recreate, what kind of activities do they enjoy and what areas of the Lake Wausau region need improvement. By mapping this data on ArcMap it will help to illustrate what areas may need improvement. Other data like the shoreline condition, lake vegetation and access points can be incorporated to help determine specific locations. Combining the data will help to find multiple locations that could use improvement and are priorities for community residents to enhance Lake Wausau. The final area of improvement will then be chosen by ranking the amount of use and condition of each spot.

Poster and Oral

Advisor: Dr. Aaron Thompson

Consider for Judging



Matt Zangl

Major: Land Use Planning

Minor: Soil Science

# Evaluation of Dechlorane Plus Flame Retardant Exposure in the U.S. Terrestrial Ecosystems Using Peregrine Falcon as a Bio-indicator

---

Dechlorane Plus (DP), a chlorinated flame retardant, has attracted emerging environmental and human health concerns because of its shared characteristics with persistent organic pollutants. Currently there is very little information available on DP exposure in U.S. ecosystems, particularly in the terrestrial biota. This study investigated DP exposure in three representative sites from the east and west coasts by using peregrine falcon eggs as a biomonitoring species. I performed an analysis of addled eggs which has been demonstrated as an efficient, non-destructive method of evaluating contaminant exposure in female birds. My two hypotheses proposed for this study were: (1) DP is bioavailable to the peregrine falcon and can accumulate in eggs via maternal transfer; and (2) DP is widely distributed in ecosystems from various sites across the U.S. The DP isomers, Syn-DP and Anti-DP, were detected in all samples, and the compound Dec-603 was seen in all but three samples from Pennsylvania.

Oral

Advisor: Da Chen (Southern Illinois University, Carbondale)

Consider for Judging



No Photo  
Available

Makenzie Henk

Major: Major: Wildlife Ecology

Research & Management

Minor: Psychology

# Minimum Transect Spacing and Appropriate GPS/Sonar Equipment for Fluvial Lake Mapping

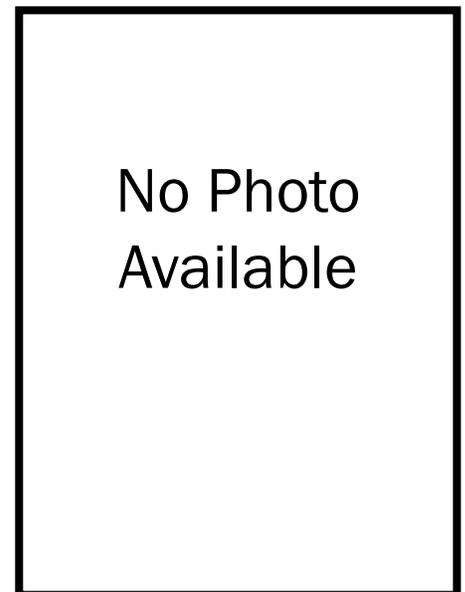
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The Stevens Point Flowage was surveyed September 2013 using a Trimble R6 GPS receiver with a TSC2 data collector, Lowrance HDS5 GPS and sonar, and an Ohmex Sonarmite depth sounder. The surveying technique comprised of traversing perpendicular grid-like transects across the flowage. The surveyed data was mapped using ESRI ArcGIS 10.2 software. TIN models were produced to determine the minimum spacing required to construct an acceptable lake model. Total volume and depth variations from each TIN model depicted the differences from each survey method. Random points were selected to participate in a two-way paired t-test. Significant differences were found for each survey technique.

Poster

Advisor: Christine Koeller

Consider for Judging



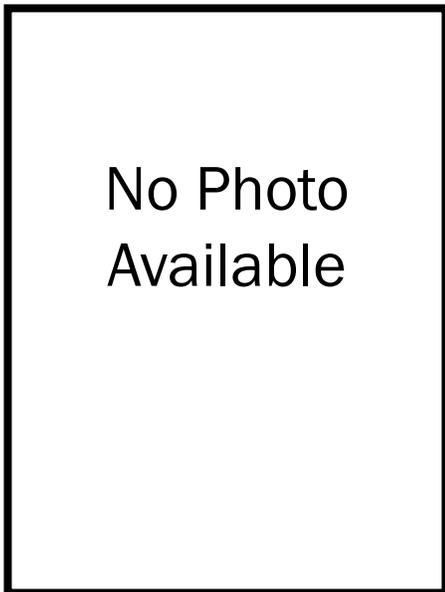
Mason Johnson  
Major: Fisheries and Water  
Resources  
Minor: GIS and Spatial Analysis

# Regional Spatial Analysis of Invasive Species for Northcentral Wisconsin

---

A spatial analysis of terrestrial invasive plants was conducted mid-February 2014 in Vilas, Oneida and surrounding counties. Raw survey data was assembled from various sources to be analyzed using ESRI ArcGIS 10.2 software. Frequency tables were generated to display the number of occurrences within each region and area of interest. Landcover, watersheds, and right-of-way networks were included in the analysis. Percent coverage by county was generated for each species. A comprehensive list of terrestrial invasive species and analytical maps were created for multiagency cooperative for implementing better management practices.

Poster  
Advisor: Caleb Slemmons  
Consider for Judging



Mason Johnson  
Major: Fisheries and Water  
Resources  
Minor: GIS and Spatial Analysis

# Automated Fiber Blending System

---

Papermakers manipulate fiber ratios in a furnish to achieve specific sheet qualities. Automated fiber blending systems can adapt stock flows to react to inconsistent fiber sources in order to maintain the desired sheet properties. These sheet properties are principally controlled by fiber length and coarseness. In this study, a Morfi Fiber Analyzer is coupled with a digital control system to regulate stock ratios to the mix chest. This system will enable a pilot paper machine to adapt to various fiber sources while maintaining a base-sheet with little variability.

Poster and Oral

Advisor: Dr. Karyn Biasca

Consider for Judging

Kelli Hultman, Rachel  
Strelow, Brock  
Brandner, and Seth  
Nelson

Major: Paper Science  
Engineering



# Abundance of Woodcock in Managed Intensive Grazing and Associated Soil and Earthworm Properties

American woodcock (*Scolopax minor*) are an important game species and are consistently losing habitat. Woodcock rely heavily on early successional habitats, and have also been observed foraging in agricultural areas, including Managed Intensive Grazing (MIG) fields. Earthworms, which are sensitive to soil properties, are the main component of a woodcock's diet. Our goal is to determine how woodcock habitat is correlated with soil and earthworm properties of MIG and crop fields. We will spotlight for woodcock, counting eyeshine, to determine relative abundance in each type of field. We will measure soil properties that influence woodcock ability to probe for earthworms and earthworm mobility including bulk density, penetration resistance, aggregate size and stability, soil moisture and organic matter. Carbon, nitrogen, calcium, magnesium, phosphorus and potassium are important factors we will measure for both earthworm and woodcock nutrition. Earthworm abundance, along with protein and calcium content of earthworms will be measured to represent the abundance and quality of food available to woodcock. Overall, we predict MIG fields will have soil properties more suitable for earthworms when compared to crop fields. Increased abundance and quality of earthworms, coupled with early successional structure provided by rotational grazing will create suitable habitat for woodcock. Knowledge gained from this study will be valuable to both public and private land managers to help provide habitat for woodcock and promote soil conservation.

Poster

Advisors: Dr. Jacob Prater and Dr. Jason Riddle

Consider for Judging



Elise Worthel  
Major: Wildlife Ecology  
Information & Education



Sarah Shawver  
Major: Wildlife Ecology Research  
& Management and Soil Science



Lisa Moehlman  
Major: Soil Land Management  
and Waste Management

# Evaluation of Dorsal Spines and Scales as Nonlethal Alternatives to Otoliths for Estimating Bluegill Ages

---

Otoliths are considered the most accurate structure for obtaining estimates of fish age for a variety of species, but bluegill (*Lepomis macrochirus*) ages are often estimated using scales because removal of otoliths requires fish sacrifice. While scales offer a nonlethal method for age estimation, scale-based age estimates are often inaccurate and imprecise. Dorsal spines may offer another nonlethal alternative to otoliths for estimating the age of bluegills, but they have not been evaluated for bluegills and a previous study indicated that dorsal spines provided consistently lower ages than otoliths for black crappies (*Pomoxis nigromaculatus*). Our objectives were to determine if: 1) ages estimated from dorsal spines, scales, and otoliths were similar for bluegills collected from several Wisconsin lakes; 2) estimates of growth and mortality for individual bluegill populations vary when using different structures to estimate age and 3) age-correction matrices for dorsal spines and scales can be used to provide growth and mortality metrics that are similar to metrics estimated from otoliths. On average, ages estimated from dorsal spines and scales were lower than ages estimated from sectioned otoliths and age estimates from dorsal spines were less precise than those from otoliths, while scales had similar precision to otoliths. The extent to which dorsal spine and scale ages differed from otolith ages was not consistent among lakes and individual readers, making development of a universal age-correction matrix difficult.

Oral

Advisor: Dan Isermann

Consider for Judging



Zachary Beard  
Major: Fisheries

# Comparison of Growth and Short-term Survival of Age-0 Muskellunge Reared Using Two Different Methods

---

Muskellunge *Esox masquinongy* are commonly reared on natural prey in hatcheries. This method is expensive and introduces biosecurity risks. Some states rear muskellunge on pelleted diets; however, studies on pellet versus minnow-reared muskellunge have raised concerns regarding comparative size and post-stocking survival. Nevertheless, continued biosecurity and fiscal concerns have led the Wisconsin Department of Natural Resources to investigate pellet-rearing with minnow finishing as an alternative approach in muskellunge propagation. Our objectives were to determine if differences in length, weight and short-term survival existed between muskellunge reared on natural prey (minnow only; MO) and muskellunge reared on pellets and finished on minnows (50 days; minnow finished; MF). Muskellunge ( $N \approx 6,000$ /treatment) were reared, marked, and stocked into 23 Wisconsin lakes. On average, MO fish (306 mm, 167 g) were significantly larger than MF fish (272 mm, 107 g) ( $t_{TL} = -16.73$ ,  $df = 198$ ,  $p < 0.001$ ;  $t_{Weight} = -17.53$ ,  $df = 198$ ,  $p < 0.001$ ). Short-term, post-stocking survival was estimated using night-time shoreline electrofishing. Muskellunge from one or both rearing methods were captured in all stocked lakes. Fifty-nine percent of total captured muskellunge were MO fish compared to 41% MF. Of the total 5,552 MO stocked fish 7.2% were captured ( $n = 398$ ) and of the total 5,328 MF stocked fish 5.2% were captured ( $n = 278$ ). Across lakes we captured an average of 10% of total stocked MO and 7.3% of total stocked MF. These data are the first preliminary results of a long term (>5 years) study of survivorship among these differentially muskellunge.

Poster and Oral  
Advisor: Dr. Justin VanDeHey  
Consider for Judging



Tessa Hasbrouck  
Major: Wildlife Ecology Research  
& Management and Biology

# Bobcat (*Lynx rufus*) Summer Food Habits in Central Wisconsin

Bobcat (*Lynx rufus*) is an important furbearer species in the state of Wisconsin. With recent immigration into southern parts of the state and the recent extension of the harvest area into the entire state south of Hwy 64, it is important to further understand the ecological role of bobcats in the ecosystems of Wisconsin. Although winter food habits studies have been done, there is lack of information about bobcat food habits during the summer season. White-tail deer (*Odocoileus virginianus*) are a common prey item during winter months but it is unknown if this is related to increased post-hunting season availability of wounded deer. During the summer of 2011, bobcat scat samples (N = 56) were collected from the central Wisconsin areas of Necedah Wildlife Refuge, Mead Wildlife Refuge, Clark County and Navarino using scat-detecting dogs followed by genetic analysis to confirm species. Bone fragments and hair were extracted from fecal samples and analyzed to determine content. Bones were referenced using the University of Wisconsin – Stevens Point’s Museum of Natural History mammalogy collection. Hair analysis was used to cross reference data from bone fragments. Results were compared with previous studies performed during the winter season using chi-squared analysis. Our results could be used to better manage for bobcat habitat and their prey species.

Poster and Oral  
Advisor: Dr. Eric Anderson  
Consider for Judging



Tessa Hasbrouck  
Major: Wildlife Ecology Research  
& Management and Biology



Rebecca Kelble  
Major: Wildlife Ecology Research  
& Management and Biology

# Understanding How Water Governance Affects the Water Quality of Lake Management

---

Governance is defined as the development of policies by using multi-actor structures other than a normal hierarchy (Carlsson and Sandström, 2008). These policies are created to improve water quality. This study will analyze how governance of local water bodies affects water quality. Lake Wausau, located in Marathon County, was the focus area of this study. This area is prime for fishing, boating, swimming and other recreational activities. Located on the shores of the City of Wausau, the City of Schofield, the Village of Rothschild, and the Town of Rib Mountain, Lake Wausau has many different governance structures managing water quality. In order to properly understand these governance structures, interviews were conducted of individuals who are involved with the management of Lake Wausau. Individuals from diverse backgrounds participated in interviews to determine the best method for proper management of water quality in Lake Wausau. Interviews were analyzed to provide a proper management strategy for Lake Wausau to improve water quality.

Oral

Advisor: Dr. Kristin Floress

Consider for Judging



Michelle Scarpace  
Major: Soil and Land  
Management

# Passive Water Sampling for Agricultural Antibiotics on Three Rivers in Eastern Wisconsin, Great Lakes Basin

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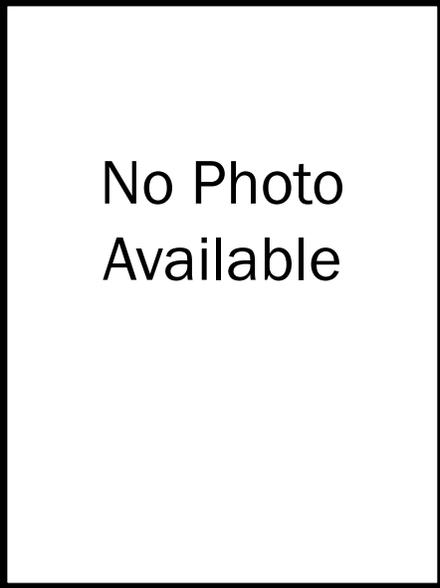
There is growing concern over antibiotic resistance resulting from the heavy use of antibiotics for animal production and in human medicine. Antibiotic resistance has been linked to illness and death. Therapeutic and subtherapeutic antibiotic use has been shown to correlate with antibiotic resistance on Wisconsin dairy farms. The presence of antibiotics in streams may be a way to track their release into the environment. Traditional sampling methods are insufficient for these trace-level analytes in dynamic surface water systems. Passive integrative samplers that accumulate pharmaceuticals in-situ allow detection of very low concentrations as a time-weighted average.

This study investigated the occurrence of veterinary antibiotics in the Manitowoc, Sheboygan, and Milwaukee Rivers in eastern Wisconsin over three weeks in fall 2013. Antibiotic analytes were accumulated on pharmaceutical-optimized sorbent, eluted, and analyzed by LC-MS/MS. Sulfonamide antibiotics were found at all three sites. Time-weighted average concentrations ranged from 0.5 to 4.5 ng L<sup>-1</sup>. The toxicological impacts of low-level chronic exposures to mixtures of antibiotics are not well-understood and these types of studies will be useful for understanding the importance of offsite transport.

Poster

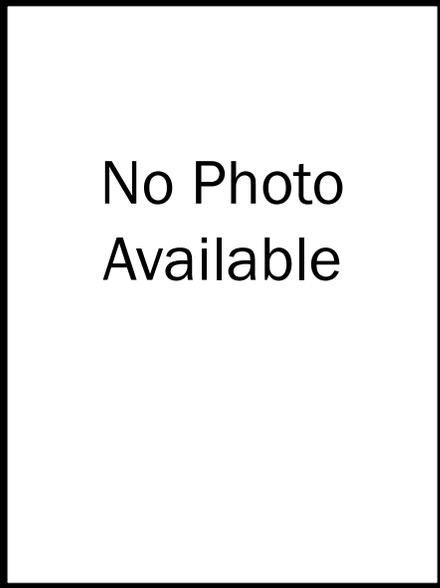
Advisors: Dr. Bill DeVita and Dr. Paul McGinley

Do Not Consider for Judging



No Photo Available

Samuel D. Thomas  
Major: Water Resources  
Minor: Chemistry



No Photo Available

Cody J. Tennant  
Major: Water Resources  
Minor: Chemistry

# Subwatershed nutrient contributions to the Milwaukee Estuary Area of Concern, Milwaukee, WI

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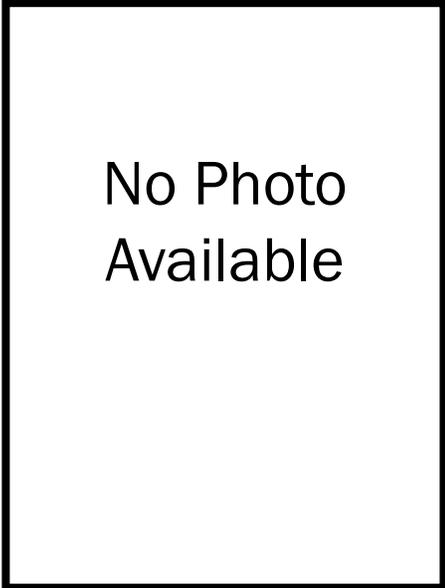
The Great Lakes are the largest freshwater system on earth. They are managed by an international group of 8 US states and 2 Canadian provinces under the Great Lakes Water Quality Agreement. The US EPA has designated 31 sites within the basin as priorities or Areas of Concern, one of which being the Milwaukee Estuary. Despite the relatively small land area drained by this estuary, it experiences high concentrations of nutrients and toxicants. The Great Lakes Commission has identified knowledge gaps, including nearshore monitoring, especially in identifying the sources of phosphorus pollution.

This project examines the relative contributions of phosphorus and nitrogen pollution from subwatersheds to the Milwaukee Estuary and ultimately Lake Michigan. Grab samples were collected on four consecutive weekends in spring 2013 and analyzed for total nitrogen, total phosphorus, and soluble reactive phosphorus. Samples were filtered and preserved in the field, prepared by standard methods, and analyzed by flow injection analysis and ion chromatography. USGS discharge data was used in mass load calculations. Results show highest average mass loads were from the Cedarburg branch of the system (USGS 04086600, 04087000). Highest SRP input, when considering land area, was a Menomonee River subwatershed (USGS 04087030). Highest total phosphorus and total nitrogen, considering land area, were from the Cedarburg branch (USGS 04086500, 04086600, 04087000).

Poster

Advisor: Kyle Herrman

Do Not Consider for Judging



No Photo  
Available

Samuel D. Thomas

Major: Water Resources

Minor: Chemistry

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