

Student Research Symposium

Friday April 10, 2015



College of Natural Resources
University of Wisconsin - Stevens Point



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University of Wisconsin-Stevens Point

Student Research Symposium

April 10, 2015

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*COVER PHOTO: **Stagmomantis californica**, by Bree Bender*

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 10, 2015

Welcome to the 16th Annual College of Natural Resources Student Research Symposium! You are about to participate in a rich tradition at the University of Wisconsin-Stevens Point, one that is both an educational experience and an academic celebration.

Student participants—I 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 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 hard work participating in investigations, projects and research activities. This year's event features an outstanding turnout of participants representing projects from all the CNR majors, a fitting tribute to the level of faculty and student collaboration in and out of the classroom at the University of Wisconsin-Stevens Point.

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

Sincerely,

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

Bernie L. Patterson
Chancellor



April 10, 2015

The UWSP College of Natural Resources is pleased to present the 16th annual CNR Student Research Symposium, featuring and celebrating the scholarly achievement of many of UWSP's finest natural resource students.

Congratulations to our student participants for taking the time and initiative to extend their learning beyond the traditional classroom by depicting their research contributions in these excellent poster and oral presentations. Through their participation in this event, these students are building on the knowledge and skills they develop within the College's multi-discipline and integrated curriculum that emphasizes practical and in-the-field learning experiences. Participation in the symposium ingrains the importance that research plays in promoting a better understanding of our world. Such experiences will undoubtedly help to prepare these students for rewarding careers, and ultimately may empower and inspire them to be effective leaders for solving natural resource challenges in the communities they will serve.

This year's Symposium – one of the few of its kind that is planned and organized by students – features our ***largest turnout ever*** of participants: over 110 students and 72 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 900.

We salute the CNR student participants for their excellence in critical thinking, inquiry, research and communication demonstrated in the abstracts contained in this booklet and in the presentations during today's event. Let us also recognize the outstanding faculty members who have mentored and motivated students to do their best. Finally, let me offer 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 16th 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. The symposium allows students to present data they have collected, explored, and analyzed during the course of their research. Faculty mentors played an essential role in guiding students through the process in a spirited and educational fashion which expands beyond the traditional bricks and mortar of the classroom.

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

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

We would like to thank the late 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

Secretaries: Emilia Kenow and Rhiannon Belcher

Booklet Editors: Elise Worthel and Bree Bender

Committee Members: Claire Hillmeyer, Anastasia Wolf-Flasch, Michelle Sauers, Traci Tuma, Genevieve Adamski, and Katie Goplerud

Faculty Advisors: Rich Hauer (Faculty Chair), Steve Menzel and Rob Michitsch

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 2015 recipient of the Clive A. David Memorial Research Scholarship is:

Rebecca Kelble

Rebecca Kelble is from Plover, WI and is currently completing her Wildlife Ecology Research and Management and Biology (double major) degrees at UWSP. Ms. Kelble currently has a 4.00 GPA, and has aspirations to pursue graduate studies. Rebecca has built upon her academic excellence through research and service to student organizations.

Through her research she has worked extensively to estimate the population of bobcats within Wisconsin by learning to trap and radio collar them, and then follow them using telemetry. Bobcat diet analysis was the next step for Rebecca, comparing summer versus winter feeding habits and determining the proper techniques to use. This study was innovative because very little research work covers summer feeding habits of bobcats. Rebecca also spent 2 weeks in South Africa in 2013 working on research on caracal and black-backed jackal for Mountain Zebra National Park.

Rebecca has presented her research through many avenues including local symposia at UWSP, regionally, and state-wide. She has received several accolades, such as the 'Best Undergraduate Poster Presentation' at the Wisconsin Wildlife Society (TWS) 2015 meetings. She has been active through three UWSP organizations since her freshman year: Women in Natural Resources (WiNR), The Wildlife Society (TWS), and The Student Research Symposium Planning Committee (SRS). Rebecca has been very active in the TWS, and has chaired the SRS from 2013-2015.

The College of Natural Resources congratulates Rebecca Kelble as the 2015 recipient of the Clive A. David Memorial Research Scholarship Award. This is the CNR's top award given to a student for undergraduate research and/or scholarship activities. Rebecca's activities represent what Clive believed in and what the Clive A. David Memorial Research Scholarship is all about. Rebecca, we congratulate you!



Rebecca Kelble

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

CNR Rendezvous, SentryWorld Atrium

Donor Recipient Meet & Greet and Social Hour: 4:15

Awards Program: 5:30

Schedule of Oral Presentations: TNR Room 120

Time	Presenters	Title
9:20-9:45	Chase Gadbois, Bryn Webber, and Michelle Murawski	A Comparison of Methods for Estimating Ruffed Grouse Abundance using Detection Probability
9:45-10:10	Chase Gadbois, Luke Burlingame, and Jake Kring	Body Fat Comparison in Ducks Using Breast Fat Deposits
10:10-10:35	Katie Goplerud	The Effect of Location and Time of Day on Head-count Surveys of the Northern Diamondback Terrapin (<i>Malachlemys terrapin terrapin</i>)
10:35-11:00	Anastasia Wolf-Flasch	Feral Hog (<i>Sus Scrofa</i>) Influence on Wetland Vegetation in the Western Great Smoky Mountains National Park
12:15-12:40	Rebecca Kelble	Seasonal Food Habits of Bobcat (<i>Lynx rufus</i>) in Central Wisconsin
12:40-1:05	Nick Smetana and Justin Johnson	Success of Artificial Nesting Structures for Cavity Nesting Waterfowl Species in Western Wisconsin
1:05-1:30	Nathan Klopmeier and Shaylee Church	Efficacy of Covered Tomahawk Traps for Trapping Eastern Gray Squirrels in Central Wisconsin
1:30-1:55	Michelle Willis	Differences in Parental Care Behavior Between Whooping Cranes (<i>Grus americana</i>) and Greater Sandhill Cranes (<i>Grus canadensis tabida</i>) at Necedah Wildlife Refuge
1:55-2:20	Nate Rice and Marco Mascitti	Wildlife Species Richness at Human-created Compost Sites
2:20-2:45	Ana Breit	Herbivory and nectar traits in Asclepias: effects of leaf damage on pollen movement
2:45-3:05	Ian Schellhaass, Bryn Webber, and Jordan Jones	The Effect of Irruption Years on Body Mass and Fat Stores in Migrating Northern Saw-whet Owls in Wisconsin

Schedule of Oral Presentations: TNR Room 122

Time	Presenters	Title
9:20-9:45	Anna Radke and Ashley Hansen	Analysis of Carbon, Nitrogen, Phosphorus, and Bulk Density on a Managed Grazing Operation in Junction City, WI
9:45-10:10	Lisa Moehlman	University of Wisconsin-Stevens Point Residential Living Composting Program: Initial Results and Feasibility Based on Troubleshooting and Cost-benefit Analysis
10:10-10:35	Samantha Bussan and Emilie Reilly	Comparison of the Vegetation and Soil of a Restored Wetland and Reference Wetland (Moses Creek and George W. Mead Wildlife Area)
10:35-11:00	Laurice Mara Spinelli	Using Hazelnut Properties in Selection

Schedule of Oral Presentations: TNR Room 170

Time	Presenters	Title
9:20-9:45	Kathryn Witkowski	Development of a Lesson Plan Focusing on Collaboration, Citizen Science, and a Continuous Forest Inventory
9:45-10:10	Jeffery Ross	Environmental Education Training Affects How Teachers Include EE in the Classroom
10:10-10:35	Stephen Maharg	Memories and Lasting Impacts of School Forest Education on High School Students in Central Wisconsin
10:35-11:00	Garrett Johnson	Biotic and Abiotic Factors Influencing Walleye Recruitment in Escanaba Lake, Wisconsin from 1958-2013
12:15-12:40	James Lima	Predicting Capture of Atlantic and Shortnose Sturgeon with Water Quality in the Savannah River, Georgia
12:40-1:05	Aron Schiller	Smallmouth Bass Movements in the Menominee River, Wisconsin-Michigan
1:05-1:30	Bradley Erdman	Implementing the Wisconsin Walleye Initiative with Stock-Based Management Goals: Establishing Genetic Guidelines for Public and Private Hatchery Propagation
1:30-1:55	Bree Bender	Seasonal Denitrification and Nitrogen Removal Capacity of Small Reservoirs
1:55-2:20	Fred Dorn IV, Steven Swan, and Kory Kleuskens	Reduction of Machine Direction Basis Weight Variation for RiverPoint Art Paper
2:20-2:45	Luke Berg, Isaac Silvernale, and Tyler Shimulunas	Improved Mass Transfer and Water Usage Reductions on the UWSP Pilot Paper Machine
2:45-3:05	Jesse Hodel	Patterns of Species Richness and Relative Abundance in Red Pine and Mixed Pine-Hardwood Stands

Poster Presentations

Presenters	Title
Holly Kalbus, Melissa Scherneck, and Andrea Bechtold	Ring-necked Pheasants Latency to Cover and Vigilance in Response to Predator Call
Aaron Schiller	Smallmouth Bass Movements in the Menominee River, Wisconsin-Michigan
Fred Dorn IV, Steven Swan, Kory Kleuskens, and Heul Sanders	Reduction of Machine Direction Basis Weight Variation for RiverPoint Art paper
Bradley Erdman	Implementing the Wisconsin walleye Initiative with Stock-based Management Goals: Establishing Genetic Guidelines for Public and Private Hatchery Propagation
Luke Berg, Isaac Silvernale, and Tyler Shimulunas	Improved Mass Transfer and Water Usage Reductions on the UWSP Pilot Paper Machine
Jeffrey Ross	Environmental Education Training Affects How Teachers Include EE in the Classroom
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Nate Rice and Marco Mascitti	Wildlife Species Richness at Human-created Compost Sites
Samantha Bussan and Emilie Reilly	Comparison of the Vegetation and Soil of a Restored Wetland and Reference Wetland (Moses Creek and George W. Mead Wildlife Area)
Ian Schelhaas and Bryn Webber	The Effect of Irruption Years on Body Mass and Fat Stores in Migrating Northern Saw-whet Owls in Wisconsin
Rebecca Kelble	Seasonal Food Habits of Bobcat (<i>Lynx rufus</i>) in Central Wisconsin
Andrew Weston	Continuous Forest Inventory at Upham Woods Nature Center
Chris Ester and Amy Sandel	Estimating Groundwater Recharge and Solute Loading in Agricultural Systems Using Passive Capillary Lysimeters
Kate Carpenter	Development of a Lesson Plan Focusing on Collaboration, Citizen Science, and a Continuous Forest Inventory

Poster Presentations

Presenters	Title
Brian Gorman and Gustav Parkhurst	Does Frequent Fire Affect Red Pine (<i>Pinus resinosa</i>) Bark Thickness?
Eric VanNatta and Ana Breit	Lunar Phobia Across Several Genera of Vespertilionid Bats
Brian Gorman and Gustav Parkhurst	Bark Thickness and Diameter Relationship in Mature Red Pine (<i>Pinus resinosa</i>) Stands
April Ann Opatik	Impacts of Conservation Easements on Local Property Taxes and Adjacent Properties: A Portage County Case Study
Lisa Moehlman	University of Wisconsin-Stevens Point Residential Living Composting Program: Initial Results
Lisa Moehlman	Feasibility of the UWSP Residential Living Composting Program: Troubleshooting and Cost-benefit Analysis
Erik Halverson and Richard Mahoney	Black Spot Parasitism of <i>Luxilus cornutus</i> (<i>Cyprinidae: Actinopterygii</i>) in Wisconsin: A Statewide, 65-year Perspective
Cole Walli and Michelle Sauers	River Otter Diet at Sandhill Wildlife Area, Wisconsin
Sarah Johanson, Julia Watson, Jarod Lueck, and Logan Hubbard	Peak Migration Periods of Female Hatch Year and Second Year Northern Saw-whet Owls (<i>Aegolius acadicus</i>) in Regards to Fat Content Within Central Wisconsin
Kurt Bennett and Allison Earl	Stem Mapping Tool for Selective Tree Removal in Oak Savannah Restoration
Erik Halverson	Wisconsin Common Shiner Aquaponics Waste as Fertilizer Source to Grow Tomato
Jennifer Dombrowsky, Anna Schneider, Laine Yandell, and Katie Youngberg	Prevalence of <i>Strongyloides robustus</i> in a Population of Southern Flying Squirrels (<i>Glaucomys volans</i>) in Central Wisconsin
Justin Nachtigal	Effects of Calcium on Phosphorus Loading in Aquatic Systems of the Central Sands Region of Wisconsin
Tessa Collins, Jaide Ryks, Margaret Nannenhorn, and Amy Nakano	Should the TNR Vivarium be Used for Some Other Purpose?

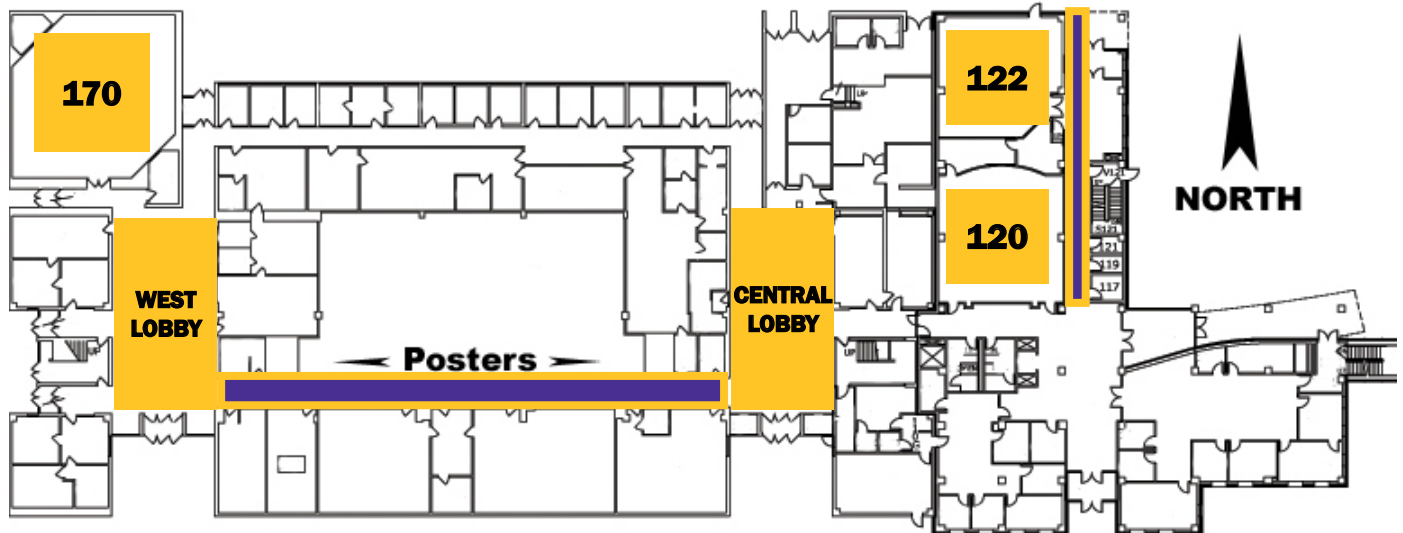
Poster Presentations

Presenters	Title
Erika Jensen	Schmeckle Reserve and Green Circle Trail Visitor Use Evaluation 2014
Jackson Beck and Megan Eames	Developing and Validating Urban Forest Leaf Area and Biomass Models
Alissa Johnson	Burn Frequencies and Their Impact on Fluctuation of Plant Communities on Anoka County, Minnesota
Bree Bender and Alli Kuehn	Species Composition, Trends, and Space Partitioning on the North Bluff
Shaylee Church and Nathan Klopmeier	Temperature Effects on Gray Squirrel Capture Rates in Sandhill Wildlife Area, Babcock, Wisconsin
Jacob Gretzinger, Kurt Thorsen, and Nick Stelzner	Wintering Habitat Preference of White-tailed Deer
Brandon Lee	Modeling Large Storm Events with the Curve Number Equation for Several Watershed Delineation Methods
Jason Hawksford	Response of Macroinvertebrate Communities to Stream Restoration in the Driftless Area of Wisconsin
Ashley Hansen	Soil Physical and Chemical properties Under Different Cover Crop and Tillage Management Systems in Carbondale, IL
Celia Hein	Impact of Canine Scent Lure and Human Scent on Detection of Species by Trail Camera in Mountain Zebra National Park, South Africa
AJ Leiden	Development of a Method to Assess Phosphorus Retention in a Soil
Tony Willman	Smallmouth Bass Stock-recruitment Relationships in Big Crooked Lake, Wisconsin, 1997-2004
Scott Virden, Zachary Buchanan, and Alissa Johnson	Development of a Maximal Crown Area Equation for Open-grown Bur Oak (<i>Quercus macrocarpa</i>)
Eric Canania, Kacey Jertson, John VandenBoom, and Sarah Johanson	Trap Site Utilization of White-tailed Deer in Schmeckle Reserve
Eric Canania, Andrew Voigt, and Kurt Stetzer	White-tailed Deer Wintering Home range Comparison During the Winters of 2013/14 to 2014/15

Poster Presentations

Presenters	Title
Devin Murray	Context of Reaction Wood in <i>Fraxinus spp.</i> Co-dominant Stems to Differentiate Adaptive Growth
Joy Gadouas, Ian Schellhaass, and Michelle Rehak	Effects of Proximity to Abandoned Structures on Upland Game Bird Nest Survival
Cheyenne Yates	Relative Abundance of Free Roaming Cats Related to an Urban-rural Gradient
Samantha Anderson, Brandon Berndt, Nick Bachman, and Peter Rabholz	Beta Species Diversity of Predators Between Two Wildlife Areas in Central Wisconsin
Michael Jungen, Trenton Rohrer, Stuart Featherston, and Emma Doden	Changes in the Ungulate and Predator Community in Mountain Zebra National Park, South Africa After Lion (<i>Panthera leo</i>) Reintroduction
Michael Jungen	Small Mammal Species Richness at Treehaven Fire Units
Rob Knauber and Jacob Cerminar	Seed-bank Analysis of the Moses Creek Restoration Site
Kurt Stetzer and Kyle Hackert	Protimeter Accuracy for Determination of One-hour and Ten-hour Fuel Moisture
Bryn Webber, Chase Gadbois, and Michelle Murawski	Estimates of Ruffed Grouse Detection Probability from Repeated Point Counts
Natalie Studer	Forest Metrix and ArcCollector App for Forest Inventory
Garrett Johnson	Biotic and Abiotic Factors Influencing Walleye Recruitment in Escanaba Lake, Wisconsin from 1958-2013
Jenna Hulke, Laura Wright, Anna Schneider, and Jennifer Dombrowsky	Survey of Liver and Lung Parasite in Wisconsin White-tailed Deer
Margaret Nannenhorn, Molly O'Grady, and Cheyenne Yates	Determining the Effect of Lion (<i>Panthera leo</i>) Reintroductions on Black-backed Jackal (<i>Canis mesomelas</i>) Populations Through Scat-surveys in Mountain Zebra National Park

Trainer Natural Resources Building Map



Symposium Presentations

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

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

Ring-necked Pheasants Latency to Cover and Vigilance in Response to Predator Call



Holly Kalbus
Major: Wildlife Ecology
Research & Management



Melissa Scherneck
Major: Wildlife Ecology
Information & Education



Andrea Bechtold
Major: Wildlife Ecology
Information & Education

Latency to cover and vigilance are common behaviors implemented by animals to help increase their survival rates from predators (Javurkova et al. 2010 and Ivins and Smith 1983). For many species, this could mean the difference between life and death; ring-necked pheasants (*Phasianus colchicus*) are no different. Five samples from different blocks at the Poynette Game Farm in Wisconsin were taken to demonstrate how ring-necked pheasants would react to a red-tailed hawk (*Buteo jamaicensis*) call. We hypothesize that female pheasants will have an increase in display of vigilance and latency to cover versus the male population when hearing the red-tailed hawk call. Data was collected on October 17th and 18th 2014. Each sample was video recorded; later data was categorized and analyzed from the footage. For every sample, behavioral categories (1-4), 1-no reaction to 4-most reaction; which includes running and flying, were issued to each pheasant to see which sex would display more latency to cover and vigilance. Our results didn't support a difference in the type of response of males or females to the red-tailed hawk call. Further studies to test how ring-necked pheasants detect predators, and also studies to determine the effects of different predators would be useful in understanding their behaviors, and if there is a difference between males and females. This would then help ring-necked pheasant game farms as well as hunters become more effective in management and harvest rates.

Poster
Advisor: Dr. Cady Etheredge
Consider for Judging

Smallmouth Bass Movements in the Menominee River, Wisconsin-Michigan



Poster and Oral
Advisor: Dr. Daniel Isermann
Consider for Judging

Aaron Schiller
Major: Fisheries & Water
Management and Biology

Several segments of the Menominee River that borders the states of Wisconsin and Michigan support exceptional fisheries for smallmouth bass. Fishery managers would like to know more about the seasonal movements of these populations in order to make more informed management decisions. Specifically, there is some concern that smallmouth bass congregate in relatively small areas during fall and winter months, making them more susceptible to harvest when compared to other portions of the open-water fishing season. We used acoustic telemetry to determine if smallmouth bass in the Menominee River between Grand Rapids and Park Mill dams all moved to the lower, more lacustrine section of the river during fall or if bass generally remained in the segment of river where they were tagged (i.e., upper, middle, lower). During May 2014, smallmouth bass ≥ 15 inches were collected by electrofishing and implanted with acoustic transmitters and their movements were monitored using both active tracking and fixed receivers. Preliminary results indicate wide variation in smallmouth bass movement, but our preliminary analysis suggests that smallmouth bass utilize a variety of locations for fall/winter habitat.

Reduction of Machine Direction Basis Weight Variation for RiverPoint Art Paper



Left to right: **Fred Dorn IV, Huel Sanders, Kory Kleuskens, and Steven Swan**
Majors: Paper Science and Engineering

Poster and Oral
Advisor: Dr. Karyn Biasca
Consider for Judging

RiverPoint art paper, which is a 100% cotton-fiber paper produced at UWSP, is currently sold to an outside customer, so product quality is of utmost importance. During a typical production run, approximately 50% of the paper produced is rejected, resulting in large manufacturing costs. The major causes of rejects are machine direction basis weight variations, sheet width variations, and debris on the sheet. Basis weight accounts for 49% of the total rejects, debris 47%, and width another 4%. From this we decided to focus on reducing the machine direction basis weight variability. We researched causes of machine direction basis weight variability, and consulted industry professionals, comparing our findings with what we observed on the paper machine. We observed consistency variations in the stuffbox up to 0.5% which we traced back to consistency variations in stock tank 1. We plan on purchasing and installing a microwave type consistency meter to replace our current blade type consistency meter to control our consistency coming out of stock tank 1. We estimate that better consistency control will reduce rejects on the machine by 12% and other low cost operational changes could potentially reduce rejects up to 20%.

Implementing the Wisconsin Walleye Initiative with Stock-based Management Goals: Establishing Genetic Guidelines for Public and Private Hatchery Propagation



Poster and Oral

Advisors: Keith Turnquist, Brian L. Sloss,
and David Giebtbrock
Consider for Judging

Bradley Erdman
Major: Fisheries

The Wisconsin Walleye Initiative (WWI) aims in part to increase the number of walleye in Wisconsin waters through stocking of large fingerlings produced by state, private, and tribal fish hatcheries. The State of Wisconsin has been proactive in implementing stock-based management aimed at protecting the integrity (both genetic and biological) and sustainability of delineated management units of walleye. As such, State hatcheries implement stock-based management practices and conservation-oriented rearing protocols to protect the genetic integrity of Wisconsin's walleye populations. The addition of large scale production of walleye to be stocked in state waters from private and tribal hatcheries created a potential challenge to stock-based management in terms of domestic brood sources and number of broodfish used for annual production. Our objective was to develop a set of easily quantified and measurable genetic metrics and brood source identification practices all hatcheries (State, Private, and Tribal) must meet to be compliant with stock-based management. We used microsatellite genetic data from 21 previously sampled walleye populations to establish minimum genetic diversity threshold values for mean number of alleles per locus, observed heterozygosity, and expected heterozygosity. We developed a system of Bayesian admixture and population assignment measures using the aforementioned 21 populations as references. Each brood source would require a holder to declare one of three management units for origin and the Bayesian result was used to determine if the genetic diversity of the source was consistent with that declaration. These methods allowed WDNR to implement cooperative agreements with various private and tribal hatcheries and effectively meet the goals of increased stocking of extended growth fingerlings in 2014.

Improved Mass Transfer and Water Usage Reductions on the UWSP Pilot Paper Machine



Tyler Shimulunas
Major: Paper Science &
Engineering and Chemistry



Luke Berg
Major: Paper Science &
Engineering and Chemistry

Not Pictured:

Name: **Isaacc Silvernale**
Major: Paper Science &
Engineering and Chemistry

Targeting reductions in water and energy usage is key in industrial processes, so the purpose of this design project is to lower operating costs and create a smaller environmental footprint for the pilot paper machine on our University of Wisconsin-Stevens Point campus. Reducing water usage will be achieved through clarifying and reusing currently sewered process water for freshwater applications. These applications will include process water sources for the wire knock-off showers, wash-up hoses, and couch pit dilution. There is a potential to reduce water usage by 720,000 gallons per year. The energy side of the project will attempt to increase the mass transfer rate of water evaporating out of the paper web in the dryer section of the machine. This will be achieved by supplying dry, warm air into the pockets in the dryer sections to replace air otherwise fully-saturated with moisture and steam. The result would be more-efficient water transfer, thus an increase in steam usage efficiency leading to less steam usage overall. The resulting increases in efficiency will then be determined based on current energy and mass balance audits being performed.

Poster and Oral
Advisor: Dr. Karyn Biasca
Consider for Judging

Environmental Education Training Affects How Teachers Include EE in the Classroom



Poster and Oral

Advisor: Dr. Becca Franzen
Consider for Judging

Jeffrey Ross

Major: Environmental Education
and Interpretation

People take a better role as ambassadors of this planet when they are taught about it at a young age. To increase environmental education of youth in K-12 classes, Wisconsin mandates that college prepares teachers to include environmental education in their classrooms. Currently, there is no research to tell if this training has any affect on how lessons are taught in the classroom. In an effort to find how this training leads to environmental education being taught, an exploratory study was started by the Research Committee of the Wisconsin Environmental Education Board. A survey was sent to over 1,000 K-12 education graduates from UWSP. To continue this research, 25 respondents to this survey will be interviewed by phone to find what they are doing to include environmental education in their teaching. Data from surveys will be analyzed using descriptive statistics. Interviews will be transcribed and then open-coded to find similar themes. The findings will set the framework for future study, and eventual changes to NRES 370: Introduction to Environmental Studies and Environmental Education. The results will also be shared with other teacher educators across Wisconsin, so that they are made aware of what has successfully helped graduates to include environmental education in their classrooms.

Memories and Lasting Impacts of School Forest Education on High School Students in Central Wisconsin



Stephen Maharg
Major: Forest Recreation
Spanish, and Education

Poster and Oral
Advisor: Dr. Kendra Liddicoat
Consider for Judging

The School Forest program is an outdoor education model in which school groups visit local woodlands with goals of learning personal, social and technical skills. Although School Forests in Wisconsin have been offering forms of environmental education for over 75 years, few studies have documented the lasting influence of their programs. The purpose of this project was two-fold: to pilot a research method that could be used to document lasting impacts of School Forest education, and to gather such data about the Boston School Forest in Plover, WI. Through the implementation of written surveys, 38 high school students were asked to share their memories of the program and to reflect on its impact on their understanding of natural resources. The responses were organized into a data spreadsheet, analyzed for common themes and finally compiled into a summative report. Students were able to recall memories most often related to first-time learning experiences, plant and wildlife identification, as well as social engagement in outdoor settings. As a result, these memories heavily impacted their understandings of the local environmental conditions and enhanced their advocacy for natural resource conservation.

Wildlife Species Richness at Human-created Compost Sites



Not Pictured: **Marco Mascitti**
Major: Wildlife Ecology
Research & Management

Nate Rice
Major: Wildlife Ecology
Research & Management

Compost piles have risen in popularity in recent years, both in rural and urban settings. These compost piles vary in composition and can provide food and/or shelter for wildlife. Urban compost piles increase wildlife activity and potential human wildlife interactions. Not only can these interactions shape the public perception and ultimately the goals of those who manage wildlife, but could be altering the animals themselves. Understanding sites of human-wildlife interaction and the extent of this contact allows for perspective and insight into potential human wildlife conflicts. This is a quantitative study of wildlife abundance around specific compost areas, intended to record and analyze the numbers of individuals and different species who frequent these areas. We will use camera traps and observation sessions to collect our data. In sampling two different plots in Schmeckle Reserve, we expect to find higher species richness in the compost pile composed of food scraps in comparison to the compost pile composed of woody debris. This study will investigate tendencies of wildlife's use of human created waste sites. We believe the behavioral aspect of this project should be an aim of future research.

Poster and Oral
Advisor: Dr. Cady Etheredge
Consider for Judging

Comparison of the Vegetation and Soil of a Restored Wetland and Reference Wetland (Moses Creek and George W. Mead Wildlife Area)



Emilie Reilly
Major: Forest Ecosystem
Restoration and Management



Samantha Bussan
Major: Forest Ecosystem
Restoration and Management

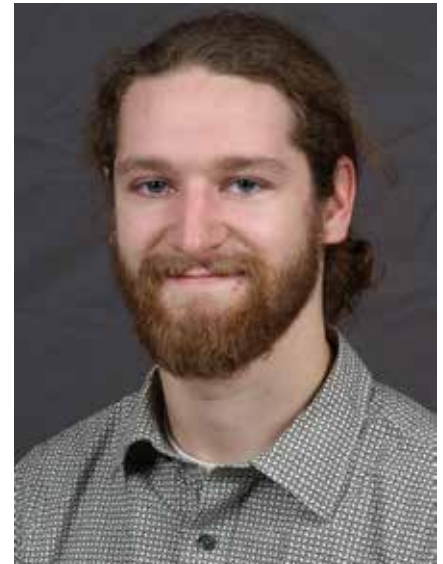
Poster and Oral
Advisor: Dr. James Cook
Consider for Judging

Reference sites can be used as a benchmark to measure the progress of a wetland restoration project. This study compares the vegetation and soil of the Moses Creek floodplain, a four-year-old restored sedge meadow, and Mead Wildlife Area, an intact sedge meadow that may be a suitable reference site. The objective was to determine the suitability of Mead Wildlife Area as a reference site and to measure the restoration progression of Moses Creek. At both locations, the vegetation was sampled by estimating percent cover by species in 1 meter x 0.5 meter quadrats. The quadrats at Moses Creek were previously established, randomly selected plots located along 23 transects. Plots at Mead Wildlife Area were sampled in two areas. The first area consisted of 3 transects with 8, 8, and 9 plots. The second area consisted of 2 transects with 8 plots each. Soil samples were also collected by using a soil corer at randomly selected plots at both Moses Creek and Mead Wildlife Area. Moses Creek was found to have 78% wetland plant cover, while Mead Wildlife Area had 84%. Moses Creek had 81% native and 2.2% invasive species cover. Mead Wildlife Area, on the other hand, had 50% native and 36% invasive species cover. This was due to the fact that it was heavily invaded by *Phalaris arundinacea*. Based on the vegetation data, there is some doubt to the suitability of Mead Wildlife Area as a reference site. At press time, further indicators are pending, including soil carbon and nitrogen content and the percent similarity of the two sites. This will help us to better determine if Mead Wildlife Area serves as a viable reference site and measure the progress of the Moses Creek restoration.

The Effect of Irruption Years on Body Mass and Fat Stores in Migrating Northern Saw-whet Owls in Wisconsin



Bryn Webber
Major: Wildlife Ecology
Research & Management



Ian Schellhaass
Major: Wildlife Ecology
Research & Management

Irruption migrations of northern saw-whet owls (*Aegolius acadicus*) and the effect on mass and fat stores have been extensively studied in the mid-Atlantic region and east coast of the United States, but the complex migration patterns of the Great Lakes are not fully understood. We analyzed data from four banding stations across the state of Wisconsin to determine if northern saw-whet owls exhibit irruption migrations within the state. We used data from 10,423 saw-whet owl captures over 15 years to find the long-term mean proportion of hatch year birds for all sites together and each site individually. We determined the number for 115% of the mean proportion of all sites; any year with a proportion of hatch year owls over 115% was determined to be an irruption year. We found that five irruptions occurred over the 15 years from 2000-2014 in Wisconsin. We found no difference between the mass of owls during irruption years and owls during non-irruption years, and no difference was found between fat index scores of owls during irruption years and owls during non-irruption years at Linwood Springs Research Station. Our analysis suggests density dependent factors on body condition do not have a significant impact on Northern Saw-whet Owls migrating through Wisconsin.

Poster and Oral
Advisor: Dr. Cady Etheredge
Consider for Judging

Seasonal Food Habits of Bobcat (*Lynx rufus*) in Central Wisconsin



Rebecca Kelble
Major: Wildlife Ecology
Research and Management

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

Bobcats (*Lynx rufus*) are an ecologically and economically important furbearer species in the state of Wisconsin. They have been legally harvested in the northern 1/3rd of the state and a statewide harvest is scheduled to open in 2014/15. During the winters of 2006 and 2008, the stomachs of 275 harvested bobcats were analyzed for their contents. Their winter diet was dominated by white-tailed deer (*Odocoileus virginianus*; 62.9% occurrence), followed by rabbits and hares (*Sylvilagus* and *Lepus* spp.; 24.4%), squirrels (Sciuridae; 7.6%), and small mammals (*Microtus* spp, *Myodes* spp., *Peromyscus* spp., and *Tamiasciurus* spp.; 6.2%). However, since the stomachs were collected primarily during the month of December, the dominance of deer in their diet might not be the result of direct predation, but incidental scavenging of hunter-wounded deer. During the summer of 2011, as part of another study of bobcat population estimation techniques, 56 scat were collected using scat detecting dogs. The samples, from 3 areas of central Wisconsin, provided an opportunity to verify the importance of deer in the diet of bobcats. Following genetic analysis to confirm species identity, bone fragments and hair were extracted from fecal samples and analyzed to determine content. The most common prey items were small mammals occurring in 59.6% of scats, followed by muskrat (*Onychomys leucogaster*) at 40.4%. Deer was detected in a much smaller percentage of scats (30.7%). Although the diets are clearly different between seasons ($P < 0.001$), it is impossible to determine if the differences are the result of over-representation of deer in the winter sample, a seasonal change in food habits (winter vs. summer), or changes in sampling locations (northern vs central Wisconsin). Regardless, the continued importance of deer in summer scat samples suggests the impact of bobcat on deer populations may be substantial.

Seasonal Denitrification and Nitrogen Removal Capacity of Small Reservoirs



Oral

Advisor: Dr. Kyle Hermann
Consider for Judging

Bree Bender
Major: Water Resources

Research has shown that aquatic ecosystems with high hydraulic residence times (e.g., wetlands and reservoirs) can be important nitrogen sinks via denitrification. The objective of this study was to examine denitrification rates and the nitrogen removal capacity each month in three small to mid-sized reservoirs (Jordan Pond, Springville Pond, and McDill Pond) in central Wisconsin between May and September of 2014. A two-way ANOVA determined that Jordan and Springville Ponds had significantly higher denitrification rates (4.97 and 4.59 $\text{mg N m}^{-2} \text{hr}^{-1}$, respectively) than McDill Pond (2.71 $\text{mg N m}^{-2} \text{hr}^{-1}$). In addition, Springville Pond had the highest hydraulic residence time (6.8 days) but surprisingly it had the lowest nitrogen removal capacity (3.5%) compared to Jordan Pond (10.3%) and McDill Pond (9.6%). We determined that nitrogen removal via denitrification was insignificant in Springville Pond due to the high incoming nitrate concentration (7.9 mg N L^{-1}). Results from this study suggest that reservoirs in central Wisconsin can become nitrate saturated and in such cases appear to remove significantly lower amounts of nitrate than predicted.

University of Wisconsin-Stevens Point Residential Living Composting Program: Initial Results and Feasibility Based on Troubleshooting and Cost-benefit Analysis



Lisa Moehlman

Major: Waste Management and
Soil & Land Management

Oral

Advisor: Dr. Robert Michitsch
Consider for Judging

The University of Wisconsin-Stevens Point, student led Waste Management Society, College of Natural Resources, Residential Living, and Facility Services implemented a voluntary composting program for students in the residential halls that has been running for two years. The program aims to divert food waste from being landfilled and promote education, decrease campus tipping fees, and create an end product that can be used on-campus. The primary objective was to divert organic waste from the University's resident halls and to assess the program to determine its feasibility considering troubleshooting, associated costs compared to landfill tipping fees, and pounds of organics diverted from landfilling. The organic waste is collected from the resident halls weighed on a scale and processed in an industrial augur. Organic waste is collected throughout the school year where two to three times a week the temperature is recorded and compost pile is watered. During the two to three month layover between academic years the compost pile is cured, sifted, and reapplied to campus grounds. Documented weights are collected, and correlated to waste audits of the residential halls to help quantify the percentage of organics collected. The results of the data allow for analysis of how efficient the program is along with the potential volumes still available. To determine if the program is feasible, organics coming into the program were weighed, data was collected on cost of implementation and maintenance, figures were collected from tipping fees per pound, and a waste audit was performed to calculate the percentage and weight of organics not currently included in the program. Results of troubleshooting indicated that errors throughout the program have made it more efficient. Cost benefits analysis results show that although there were major expenses initially and throughout the program, that the savings outweighed the expenses.

Feral Hog (*Sus Scrofa*) Influence on Wetland Vegetation in the Western Great Smoky Mountains National Park



Anastasia Wolf-Flasch
Major: Forest Ecosystem
Restoration
Minor: Soil Science and
Spanish

Oral
Advisor: Dr. James Cook
Consider for Judging

Feral hogs were introduced from Europe to a hunting preserve in the North Carolina Mountains in 1912, from which they escaped and entered Great Smoky Mountains National Park in the 1940's. Several studies of feral hog influence on vegetative communities suggest a great level of disturbance associated with their behavior. This study focuses on the impact that hog feeding and wallowing has on the vegetative communities of wetlands found primarily in the western portion of the park. Based on past studies, it was expected that hog behavior in a wetland would result in decreased relative cover of obligate wetland species, increased areal coverage of exotic species, and decreased native species richness when compared to a wetland absent of hogs. Vegetation data were collected from 21 wetlands, 10 with evidence of hog presence and 11 without. Evidence of hogs was defined primarily as rooting patches and wallows. A Mann-Whitney test proved no significant difference for any of the three variables previously mentioned. An examination into the natural history of hogs, the land use history, and the vegetation of the surrounding area may account for the findings.

Herbivory and Nectar Traits in *Asclepias*: Effects of Leaf Damage on Pollen Movement



Ana Breit

Major: Wildlife Ecology
Research & Management and
Biology
Minor: Economics

Oral
Advisor: Dr. Jessamyn Manson
(University of Alberta)
Consider for Judging

Pollinators place plants under selective pressures, changing variables associated with attraction such as nectar. However, herbivory may also have consequences for floral traits, which could then affect pollination services. Flowers offer nectar to pollinators as a reward for visiting the plant, so nectar is presumably under selective pressures by those pollinators. Those differences in nectar variables can impact pollinator behaviors and overall reproductive success of the plant. In this study, we examined whether simulated herbivory altered nectar traits and pollen movement in two milkweeds, *Asclepias exaltata* and *Asclepias syriaca*. Several nectar traits, such as volume produced and overall sugar concentration, were measured and we compared across species and treatments. This study found that *A. syriaca* had significantly more insertions (a proxy for reproductive success) than *A. exaltata*. Significantly more nectar was produced in plants that had been herbivorized, and the volume of nectar produced per flower differed significantly by species and by date. There were no significant differences in nectar sugar concentration. These results show little change in nectar traits and pollen movement under stressful conditions, which is contrary to what we predicted. Understanding how variation in nectar affects pollinator behavior is critical to understanding pollination, a key ecosystem process.

The Effect of Location and Time of Day on Head-count Surveys of the Northern Diamondback Terrapin (*Malachlemys terrapin terrapin*)



Oral

Advisors: Dr. Lisa Ferguson
and Dr. Cady Etheredge
Consider for Judging

Katie Goplerud

Major: Wildlife Ecology
Research & Management and
Conservation Biology

The Northern diamondback terrapin (*Malachlemys terrapin terrapin*) is a keystone species in the salt marsh along the Atlantic coast and is a strong indicator of habitat health and condition. Terrapin populations are recorded as stable or declining throughout most of their range, but are challenging to monitor. To determine abundance and density, head-count surveys can be implemented as a method for rapid assessment. I performed head-count surveys twice a week in June and July 2014 to identify potential relationships between terrapin heads counted at different times of day in particular locations in Scotch Bonnet and Mulford Creeks, Stone Harbor, New Jersey. I split these creeks into nine sections, each between 350 to 375 meters long, and used a double-observer method to perform surveys by kayak at low tide. During surveys, I recorded the waypoint and number of terrapin heads for each observation. A secondary observer discretely tallied heads I missed. The number of heads counted differed among sections with the most terrapins observed upstream in Mulford Creek. I found a moderately significant difference in terrapin heads at different times of day, where more were counted in mornings than afternoons. Water temperature within 0.5m of the surface did not vary among sections. My results may be helpful for designing future studies of the local population using head-count surveys by narrowing the window in which low-tide surveys should be conducted. The detection rate of the terrapins can be used further to compare survey designs and estimate populations.

Development of a Lesson Plan Focusing on Collaboration, Citizen Science, and a Continuous Forest Inventory



Kathryn R. Witkowski,
CNR Honors Intern - Land
Management at Nature Centers

Oral
Advisor: Dr. Steve Kerlin
Consider for Judging

The Wisconsin Nature Centers Collaborative was created to increase the capacity and impact of nature centers throughout WI. One function of the collaborative is to provide outreach services that promote partnerships and site-based consulting in land management. Upham Woods Outdoor Learning Center, an outdoor learning camp managed by the University of Wisconsin-Extension, was selected to receive funding and consulting to implement land management on site. The center is located on about 300 acres of forested land adjacent to the Wisconsin River in Wisconsin Dells, WI. It provides environmental education programming to students, youth groups, and adults. The land management collaboration focuses on a Continuous Forest Inventory (CFI) implemented by students at the University of Wisconsin—Stevens Point. Permanent sampling plots were established to collect long term quantitative and qualitative data to measure changes in the forest over time. As part of this larger project, I worked in coordination with Wisconsin Center for Environmental Education (WCEE), LEAF Program, and Upham Woods staff to research and develop a lesson plan that utilizes the data and methods from the CFI to implement a citizen science project for student groups at Upham Woods. Document analysis of existing lesson plans from other organizations and work by the collaborative team identified concepts and instructional methods to create a lesson highlighting the unique opportunity with the CFI at Upham Woods. The lesson plan focuses on promoting student-driven inquiry by allowing the students to act as scientists. Following the same data collection guidelines established for forestry professionals, students collect valuable data that will contribute to the long-term analysis and management of the Upham Woods property. This lesson and data collection serves a critical role by promoting inquiry-based science and collaborative skill-building in an environmental education capacity while also providing Upham Woods with long-term ecological scientific data collection.

Efficacy of Covered Tomahawk Traps for Trapping Eastern Gray Squirrels in Central Wisconsin



Oral

Advisor: Dr. Shelli Dubay
Consider for Judging

Nathan Klopmeier (left) and **Shaylee Church** (right)
Majors: Wildlife Ecology Research & Management

For the past 4 years, students working with the Wildlife Society have been trapping eastern gray squirrels (*Sciurus carolinensis*) at Sandhill Wildlife Area in Babcock, WI to identify differences in squirrel population with forest stand age. In previous years, up to 26% of the animals captured in ground-set Tomahawk traps were non-target species, including blue jays (*Cyanocitta cristata*). Covered traps could reduce non-target captures when trapping for eastern gray squirrels. In fall 2014, we covered traps with a light-weight, white fabric to determine if a covering would have an effect on squirrels entering the trap. We set three grids of covered and uncovered Tomahawk traps in Schmeeckle Reserve, Stevens Point, WI. The covered and uncovered traps were set by row in the grid. We recorded the number and species captured for each trap. We used a t-test for independent samples to compare catch efforts of covered and uncovered traps by row. Covered traps and uncovered traps showed no difference in squirrel captures ($t = 0.163$, $df: 0.875$). Increased squirrel mortality occurred in covered traps (8.6%) as compared to uncovered traps (0%). When trapping for gray squirrels, covering Tomahawk traps with a light-weight, white fabric is not recommended. To reduce open bait absent trapping instances, we are uniformly placing bait as far back as possible on the trap plate. Analyses are ongoing, but the method seems to be reducing non-target captures and open bait absent instances.

Predicting Capture of Atlantic and Shortnose Sturgeon with Water Quality in the Savannah River, Georgia



James Lima
Major: Fisheries and Biology

Oral
Advisor: Dr. Joshua Raabe
Consider for Judging

Atlantic and shortnose sturgeon are federally endangered species that inhabit coastal rivers and estuaries along the Atlantic coast of North America. Maximizing the efficiency of capture could benefit telemetry studies, recovery efforts, and potentially reduce risks of stress and mortality. The objectives of our study were to determine the probability of Atlantic and shortnose sturgeon captures based on salinity and dissolved oxygen levels in the Savannah River, Georgia and to determine if gill net and trammel net soak time is positively correlated with probability of capture. Sampling was accomplished using gill and trammel nets within the freshwater/saltwater boundary of the Savannah River, Georgia during the summer of 2014. Logistic regression was used to analyze the binomial catch data. Soak time and salinity were significant predictors of the probability of capture of Atlantic sturgeon with soak time exhibiting a positive relationship and salinity exhibiting a negative relationship. Soak time, salinity, and dissolved oxygen all significantly predicted the probability of shortnose sturgeon capture. Soak time and dissolved oxygen exhibited a positive relationship while salinity exhibited a negative relationship. Our study provides insights into maximizing the effectiveness of sampling Atlantic and shortnose sturgeon in the Savannah River and potentially other systems.

Analysis of Carbon, Nitrogen, Phosphorus, and Bulk Density on a Managed Grazing Operation in Junction City, WI



Ashley Hansen
Major: Soil Science and Water Resources



Anna Radke
Major: Hydrology and Soil Science

Oral

Advisors: Dr. Robert Michitsch and Dr. Jacob Prater
Consider for Judging

Rotational grazing is an agricultural practice that provides long-term ecological and environmental benefits. These benefits include, but are not limited to: improved soil health, erosion control, reduced weed growth, greater soil fertility, and increased soil organic matter. This study is a long-term research project through the Soil and Water Conservation Society that will analyze the impact of rotational grazing on soil development. A dairy farm recently converted to rotational grazing will be studied. In creating the research design, fields were divided into five-acre parcels using ArcGIS. Random sampling points were then assigned in each five-acre parcel. All fields will be tested in the first year of sampling. A four-year rotation will then be implemented: fields will be divided into three groups, with one group sampled per year; a wetland area adjacent to the operation will be sampled every fourth year. We will monitor carbon, nitrogen, phosphorus, and bulk density changes. Preliminary project design will be presented at this symposium.



Left to right: **Michelle Murawski** (left), **Bryn Webber** (back center), **Chase Gadbois** (right), **James Hansen** (front center)

Majors: Wildlife Ecology Research & Management

A Comparison of Methods for Estimating Ruffed Grouse Abundance Using Detection Probability

Oral

Advisor: Dr. Jason Riddle

Consider for Judging

Drumming surveys are commonly used by managers as a method of monitoring ruffed grouse abundance, however detection probability is rarely accounted for. We conducted drumming surveys for ruffed grouse at the University of Wisconsin - Stevens Point's Treehaven property near Tomahawk, WI. Each point count consisted of four 2.5min intervals for a total of ten minutes, and each point was visited three times during the peak drumming season. We compared two methods of using detection probability to estimate ruffed grouse abundance. Program MARK was used to analyze detection histories from individual grouse on three separate survey days, and program Presence allowed us to analyze repeated visits, in which the number of grouse heard at each point is used as the frame of detection. The two methods of analysis used similar model sets, including environmental and time based variables. Based off our results we determine that our point count surveys can be cut from ten to five minutes, and survey efforts should be focused on the earliest morning hours. We also found that many repeated surveys did little to increase the estimated ruffed grouse abundance, so we may be able to achieve the same results with fewer surveys in the future.

Using Hazelnut Properties in Selection



Oral
Advisor: Dr. Michael Demchik
Consider for Judging

**Laurice Mara Spinelli
Correa**
Major: Forestry

European hazelnut (*Corylus avellana*) is an internationally significant nut crop. It is used in a wide range of products with great popularity in Europe; however, until recently, it was a minor nut in the United States. With the introduction of a range of processed products (notably Nutella), hazelnut market has increased dramatically in the United States. In the Lake States, a market opportunity exists for using European/American hazelnut hybrids (*C. avellana* X *C. americana*) as a potential crop. American hazelnut is a native species that has developed and coexisted with local weather conditions, and pathogens, that the European species cannot tolerate. Despite the great chances of success as nut crop and oilseed, these hybrids are largely untested. The objective of this study is to analyze the physical characteristics of the hybrid hazelnut that are important for the large-scale processing, such as percentage of kernel, facility of cracking, shell thickness, presence of pellicles, and sphericity. It will be analyzed over a hundred hybrids of the species, with a sub-sample of ideally ten nuts to each one. The study is in progress and does not have any results. Results will be completed prior to the symposium.

Differences in Parental Care Behavior between Whooping Cranes (*Grus americana*) and Greater Sandhill Cranes (*Grus canadensis tabida*) at Necedah Wildlife Refuge



Michelle Willis

Major: Wildlife Ecology
Research & Management
Minor: Captive Wildlife and
Biology

Oral
Advisors: Dr. Shelli Dubay and
Lindsey McKinney
Consider for Judging

The endangered Whooping Crane was reintroduced into Wisconsin in 2001. Whooping and Greater Sandhill Cranes breed in Necedah National Wildlife Refuge in central Wisconsin. The ground nests of these birds are fairly large and each breeding pair usually lays one or two eggs between April and June. After about a month of incubation the chicks hatch and eventually fledge from the nest. The first year of life is shown to be the most vulnerable time period for these birds. The wild population of Whooping Cranes, which breeds in Wood Buffalo National Park, Canada, has an annual chick survival rate of 0.42 while the annual adult survival is 0.87. In spring 2014, data from trail cameras were collected at nine Whooping Crane and seven Sandhill Crane nests. Cameras took one photo every 5 minutes. Pictures were sorted and then individually tagged with behaviors exhibited by the birds at the nest. I compared behavior indicative of parental care (average time spent tending, brooding, both tending and brooding, and time spent away from chick) at each nest between Sandhill (n=4) and Whooping (n=5) crane nests. Differences between the two species were then analyzed using a two-way factorial ANOVA with subsampling. Results show that Sandhill Cranes spent more time brooding ($F_{(0.05)1,7}=13.33, P=0.0082$) and caring for the chick ($F_{(0.05)1,7}=14.27, P=0.0069$). Whooping and Sandhill Cranes spent similar amounts of time tending the chick and away from the nest ($F_{(0.05)1,7}=0.3, P=0.6017$ and $F_{(0.05)1,7}=0.68, P=0.4374$ respectively). The results indicate a difference in parental care behavior between these two crane species. More research is needed to determine if a difference in parental care results in a difference in fledging success.

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



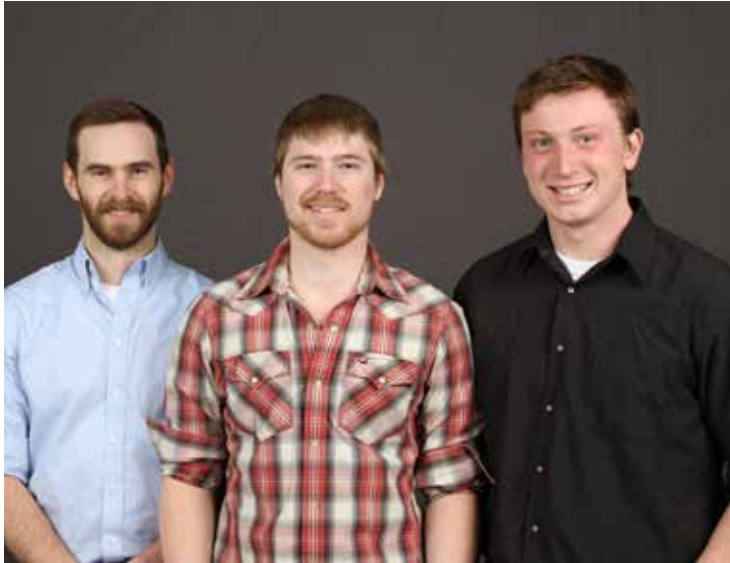
Oral

Advisor: Dr. Ron Masters
Consider for Judging

Jesse Hodel

Major: Forestry Ecosystem
Restoration and Management

In this study we are examining the overall plant community of Red Pine and mixed pine hard wood of Treehaven. There were 25 different units and each unit had 12 plots. On every plot we did quadrat sampling with a meter and a half by meter and meter and a half square. The plots right next to the post has had a lot of use by people coming for other projects so we went two meters right of a north baring away from the plot. This was all done on a 50 Acre land area set aside in Tree haven. Every unit had a different type of fire treatment or thinning treatment. Overall we were trying to find the differences in species richness within the biological community to determine what these differences where and how well the plants react to the presence of a disturbance like fire in different intervals. The Shannon's diversity index is going to be used to find the distribution of plant species on all the burn units. The Evenness Index is going to be used as well to help compare the distribution of different plant species. Some other diversity index's that are used to compare the distribution of species are the Simpson's index and Margalef's index. There were some plant species that where way more prevalent then others on all the units. The mot abundant herbaceous species was Canada mayflower (*Maianthemum canadense*). The most abundant wood species was Red Maple (*Acer rubrum*).



Body Fat Comparison in Ducks Using Breast Fat Deposits

Left to right: **Luke Burlingame, Jake Kring, and Chase Gadbois**

Majors: Wildlife Ecology Research & Management

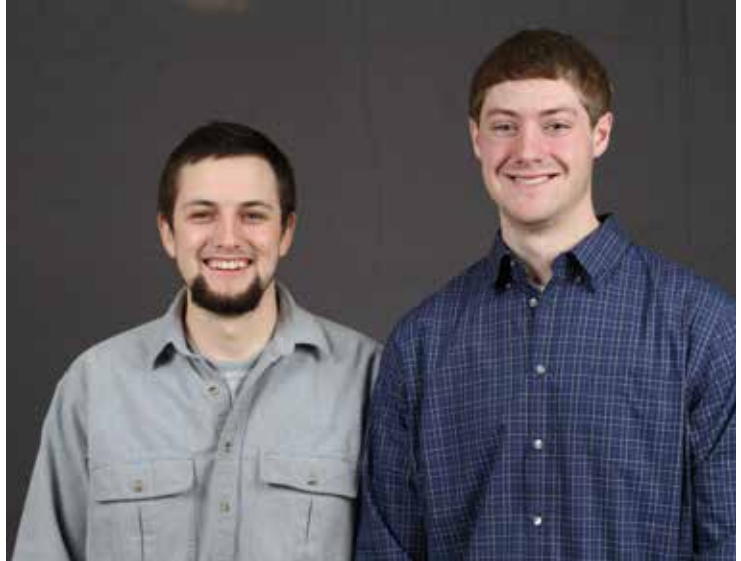
Ducks rely on fat deposits for survival when migrating from nesting sites to wintering areas. Measurements of certain fat deposits can give an indication of overall body fat content. We aimed to identify a more simplified field technique to evaluate fat content in ducks. Using a breast fat measurement to body mass ratio, we hypothesized that male ducks would have larger fat to body mass ratios than females because females must deplete their fat reserves while nesting and then build more deposits before migration. We also hypothesized that the body fat ratio would vary among species because each species has a unique diet that varies in fat content. We measured breast fat thickness with a caliper and used a hanging scale to measure body mass. We compared ratios for males (n=68) and females (n=57) of 11 species using a t-test ($t=0.05$, $df=123$, $P=0.996$). We also used t-tests to identify differences in body fat ratio by sex for each species. Gadwall (*Anas strepera*) males had a higher fat ratio ($t=0.05$, $df=13$, $P=0.005$), and Bufflehead (*Bucephala albeola*) females had a higher ratio ($t=0.05$, $df=3$, $P=0.019$). We then used a single factor ANOVA with a Tukey HSD Multiple Comparison test to compare these ratios among all species. Several species differed in fat ratios ($t=0.05$, $df=124$, $P=0.000$), but smaller ducks such as teal (*Anas spp.*) were typically fatter than larger birds like canvasbacks (*Aythya valisineria*). The results of this study suggest that a breast fat content to body mass ratio can be used to determine differences in body fat among duck species. This simplistic technique lends support to its future potential in body condition determination in waterfowl.

Oral

Advisor: Dr. Shelli Dubay

Consider for Judging

Success of Artificial Nesting Structures for Cavity Nesting Waterfowl Species in Western Wisconsin



Oral

Advisor: Dr. Kevin Russell
Consider for Judging

Left to right: **Nick Smetana** (Land Use) and **Justin Johnson** (Wildlife Ecology)

There are two cavity nesting waterfowl species in western Wisconsin, the wood duck (*Aix sponsa*) and the hooded merganser (*Lophodytes cucullatus*). From June to August of 2014, seasonal staff working with the U.S. Fish and Wildlife Service collected data on 66 nest structures located on Waterfowl Production Areas throughout the St. Croix Wetland Management District. We investigated the structure height above water, cardinal direction of the structure opening, the presence/absence of predator guards, and the distance to the nearest artificial nesting structure to determine use and fate throughout the brood rearing period. For the purposes of this study use was defined as any nest structure that contained hatched or unhatched eggs. Fate was defined as successful or unsuccessful. A successful nest was one that produced eggs that hatched and an unsuccessful nesting structure was one that became abandoned, had no eggs present, or was predated.

Continuous Forest Inventory at Upham Woods Nature Center



Andrew Weston
Major: Forest Management and
Urban Forestry

Poster
Advisors: Dr. Steven Kerlin
and Kevin Burns
Consider for Judging

The process of establishing a continuous forest inventory (CFI) and initial data collection will be described in this research presentation. A CFI is being conducted over 69, 1/5th acre plots on the 300 forested acres at the Upham Woods Outdoor Learning Center. The forest system is unique at Upham Woods because it is a second growth forest ecosystem that was clear-cut in the 1800's, farmed and then abandoned as the Wisconsin River created an island out of the property because of a dam downstream. Applications of data collected from the CFI include but are not limited to: monitoring ecological changes, establishing allowable harvest volumes, determining net growth, comparing and contrasting the impacts of different management prescriptions, and assessing wildlife impacts on forest development. Data collected consists of live tree, coarse woody debris (CWD), and sapling measurements. A measurement cycle of these plots will be conducted yearly over 1/4 of the plots to make data collection manageable in perpetuity. The data will be collected during the dormancy season while the trees are not growing to track the change in the forest ecosystem through time. Therefore it is of utmost importance that the same methods and measurement standards are employed by each person during each measurement period. Consistent and accurate data collection will allow the true dynamics of the forest to be captured and analyzed for research and education purposes. Interpretation of the resulting CFI information will be utilized to modify management of the Upham Woods forest to ensure that overall property objectives are being satisfied.

Estimating Groundwater Recharge and Solute Loading in Agricultural Systems Using Passive Capillary Lysimeters



Amy Sandel (left)

Major: Water Resources and Soil Science

Chris Ester (right)

Major: Hydrology and Soil Science

Poster

Advisor: Dr. George Kraft

Consider for Judging

Groundwater recharge and solute loads under agricultural systems are important to groundwater management but notoriously difficult to quantify. A need exists for methodologies that measure recharge and solute loads at field scales to inform modeling at scales of groundwater basins. Approaches for measuring recharge and loads have included pan and monolith lysimeters, pore water collection and analysis, and drain tile monitoring. These have generally proved less than satisfactory. Recharge and loads would ideally be measured directly in the aquifer, but this is practical for only a small subset of cases.

Passive capillary lysimeters are a relatively new technology with potential promise for measuring recharge and solute loads. They are unique among lysimeters because of inbuilt fiberglass wicks engineered to match the matric suction of sandy soils (a constant 11 kPa), which allows them to be installed below cultivation to capture percolation in the vadose zone.

We installed 24 lysimeters below the effective crop rooting zone in 6 irrigated fields typical of a Wisconsin central sands rotation (sweet corn, field corn, peas, potatoes, and various cover crops). These were sampled intermittently from spring thaw through June 9 2014, and then weekly through November 17 2014. Leachate volume, nitrate-N, and Cl were measured.

Preliminary results indicate a tremendous range of values, even within a single field. Across all fields and crops, recharge estimated from deep percolation averaged 567 (376.53) [mean (sd)] mm. Nitrate-N and Cl loads were 269 (203) and 285 (386) kg ha⁻¹, respectively. Within single fields, recharge varied by factors up to 4.8, while nitrate-N and Cl loads varied by up to 34 and 92. More evaluation will be done to assess potential sources of variability and whether the variability can be constrained.

Hatch Timing of Largemouth Bass in Wisconsin Lakes



Kate Carpenter
Major: Fisheries
Minor: Water Resources

Poster
Advisor: Dr. Daniel
Isermann
Consider for Judging

Previous work has demonstrated that largemouth bass (*Micropterus salmoides*) in Wisconsin lakes hatch over periods of several weeks or more during the spring. Hatch timing could influence the growth and recruitment of age-0 largemouth bass and could regulate the number of largemouth bass available to recreational anglers in future years. While spring water temperatures are known to influence hatch timing, water temperatures can vary substantially from year to year, and warming rates are likely influenced by both latitude and lake size. Our objective was to determine if water temperature, latitude, and lake size affect hatch timing of age-0 largemouth bass in a suite of Wisconsin lakes over a 3-year period. Our work is part of an ongoing study designed to provide fishery biologists with a better understanding of factors influencing largemouth bass recruitment in Wisconsin lakes.

Does Frequent Fire Affect Red Pine (*Pinus resinosa*) Bark Thickness?



Not Pictured:
Brian Gorman
Major: Wildland Fire Science

Gustav Parkhurst
Major: Natural Resource
Management

Many mechanisms may cause damage to trees. Damage from fire (natural or prescribed) can be one of these mechanisms. A common question of managers considering the use of prescribed fire in a red pine (*Pinus resinosa*) cover is, if reparative burning will have a damaging effect by reducing bark thickness? Damage that could facilitate woody volume loss. Helping to answer that question, this research aims to report baseline data as part of a long term study established on the Treehaven Fire Plots. This research reports current average bark thickness of red pine in order to observe long-term trends with the reintroduction of fire as well as stand thinning.

Poster
Advisor: Kevin Burns and Jon
Steigerwaldt
Consider for Judging



Lunar Phobia Across Several Genera of Vespertilionid Bats

Ana Breit (left)

Major: Wildlife Ecology Research & Management
and Biology

Eric VanNatta (right)

Major: Wildlife Ecology Research & Management

Poster

Advisor: Dr. Christopher Yahnke

Consider for Judging

Lunar phobia is a behavior that is a function of moonlight, where prey species are less active during periods of higher light intensity. Since bat species in central Wisconsin are predators, and because bat behavior is closely tied to the behavior of the insects they consume, we expected to see their activity shift as a response to a shift of nocturnal flying insect prey. Certain species of bats are specialized for foraging for different prey insects at different heights. The use of two detectors at one location increases the probability of detecting numerous species at a site. Linear regressions revealed that bat activity significantly increases as light intensity increases. This may be because prey species exhibiting lunar phobia are more difficult to hunt, so bats must forage further and for longer periods of time.

Bark Thickness and Diameter Relationship in Mature Red Pine (*Pinus resinosa*) Stands

Not Pictured:
Brian Gorman
Major: Wildland Fire Science

Gustav Parkhurst
Major: Natural Resource
Management



Red pine (*Pinus resinosa*) supports many forest products industries of Wisconsin. This conifer species is important for the production of poles, pulpwood, posts, and lumber. When making estimates of board foot volume, outside bark diameter is a commonly measured. However, knowledge of inside bark diameter is more important when determining volume of wood within a standing tree. The goal of this study was to develop a formula that foresters can use to predict inside bark diameter in red pine, using outside bark diameter measured at breast height.

Poster
Advisor: Kevin Burns and Jon
Steigerwaldt
Consider for Judging

Impacts of Conservation Easements on Local Property Taxes and Adjacent Properties: A Portage County Case Study



April Ann Opatik
Major: Land Use Planning and
Soil Science

Poster
Advisor: Dr. Anna Haines
Consider for Judging

Municipalities rely largely on property taxes to fund everything from road maintenance to parks. Landowners pay property taxes which they reluctantly do and typically dislike any increase in them. Given the context of property taxes, one useful tool for conserving private lands is a conservation easement. A conservation easement is a voluntary land protection agreement between a landowner and a non-profit entity, called a land trust, willing to hold and enforce the easement in perpetuity. The conservation easement is a legal document that becomes a part of the deed, restricting certain activities or uses, or subdivision. One controversy that arises from conservation easements is if a reduction in property taxes occurs on these parcels and if the overall tax burden is shifted to other landowners. A levy is a set property tax amount based on the local government's budget. Research suggests that a town's total levy is not affected by conservation easements (King & Anderson, 2004). However, we don't know if adjacent properties to these conservation easements are affected and if there is a tipping point in terms of the number of conservation easements within a town's boundaries, for example, that would affect the overall tax levy. For land trusts, it's important to help people understand the tax implications of a conservation easement, specifically its effect on property taxes. This research will examine a set of conservation easements within Portage County using GIS spatial analysis through the use of county parcel data. The outcome of this research can be used to help the local land trust's respond to landowners' and elected officials' concerns.

King, J. R., & Anderson, C. M. (2004). Marginal Property Tax Effects of Conservation Easements: A Vermont Case Study. *American Journal Of Agricultural Economics*, 86(4), 919-932.

University of Wisconsin-Stevens Point Residential Living Composting Program: Initial Results



Poster

Advisor: Dr. Robert Michitsch
Consider for Judging

Lisa Moehlman

Major: Waste Management and
Soil & Land Management

The University of Wisconsin-Stevens Point, student led Waste Management Society, College of Natural Resources, Residential Living, and Facility Services implemented a voluntary composting program for students in the residential halls that have been running for two years. The program aims to divert food waste from being landfilled and promote education, decrease campus tipping fees, and create an end product that can be used on-campus. The primary objective was to divert organic waste from the University's resident halls. The organic waste is collected from the resident halls weighed on a scale and processed in an industrial augur. Organic waste is collected throughout the school year where two to three times a week the temperature is recorded and compost pile is watered. During the two to three month layover between academic years the compost pile is cured, sifted, and reapplied to campus grounds. Documented weights are collected, and correlated to waste audits of the residential halls to help quantify the percentage of organics collected. The results of the data allow for analysis of how efficient the program is along with the potential volumes still available.

Feasibility of the UWSP Residential Living Composting Program: Troubleshooting and Cost-benefit Analysis



Lisa Moehlman

Major: Waste Management and
Soil & Land Management

Poster

Advisor: Dr. Robert Michitsch
Consider for Judging

The University of Wisconsin-Stevens Point, student led Waste Management Society, College of Natural Resources, Residential Living, and Facility Services implemented a voluntary composting program for students in the residential halls that has been running for two years. The program aims to divert food waste from being landfilled and promote education, decrease campus tipping fees, and create an end product that can be used on-campus. The primary objective of this research presentation is to assess the program to determine its feasibility considering troubleshooting, associated costs compared to landfill tipping fees, and pounds of organics diverted from landfilling. To determine if the program is feasible, organics coming into the program were weighed, data was collected on cost of implementation and maintenance, figures were collected from tipping fees per pound, and a waste audit was performed to calculate the percentage and weight of organics not currently included in the program. Results of troubleshooting indicated that errors throughout the program have made it more efficient. Cost benefits analysis results show that although there were major expenses initially and throughout the program, that the savings outweighed the expenses.

Black Spot Parasitism of *Luxilus cornutus* (Cyprinidae: *Actinopterygii*) in Wisconsin: a Statewide, 65-year Perspective



Poster

Advisor: Dr. Justin Sipiorski and Todd
Huspeni

Consider for Judging

Richard Mahoney (left)

Major: Fisheries and Biochemistry

Erik Halverson (right)

Major: Soil & Land Management

We are currently constructing a dataset comprising all specimens of the Becker Memorial Ichthyology Collection (University of Wisconsin- Stevens Point Museum of Natural History) for the Common Shiner (*Luxilus cornutus*). Specimens have been collected from throughout the state of Wisconsin over the past 60 years. Our accessioning and cataloging is ongoing, and to date we have currently gathered data from over 10,000 specimens. This represents approximately 30% of the total individuals in this collection. For each specimen cataloged, we recorded total length (mm), preserved mass (g), gonad mass (g) and estimated age. We also recorded the number of individual Black Spot parasites (metacercariae of *Uvilifer ambloplites*) on the left side of each specimen. Considering size classes of fish over 30 mm and sample sizes of at least 30 fish, prevalence (% individuals with at least one parasite) varied across populations from 100% to 25%. Considering similar size classes and sample sizes, average intensities (average number of parasites on the left side of infested individuals) varied from 0 to 213. Separate analyses were conducted for each sex for individuals ranging from 30 – 80 mm (ages I & II; Becker 1983). Multiple regression analyses were calculated to evaluate the relationships among parasite intensity, sex, location, season, latitude, and total length. The results of these are reported here.

River Otter Diet at Sandhill Wildlife Area, Wisconsin



Cole Walli
Major: Undeclared



Michelle Sauers
Major: Wildlife Ecology
Research & Management

Poster
Advisor: Dr. Eric Anderson
Consider for Judging

River otters (*Lontra canadensis*) are a keystone predator in North American aquatic systems. Understanding their diet is crucial to understanding their enormous impact in their niche. The otters in Sandhill Wildlife Area consume a diverse range of prey, primarily fish. Approximately once per month throughout 2014, extensive surveys were taken of the Sandhill Wildlife Area to locate latrine sites. A latrine site is a location frequently used by river otters to defecate, scent mark, and socialize. A sample of otter scat was taken at each latrine. The sampled scats were then washed in order to remove the organic matter and leave the prey remains. The cleithra, a fish bone located near the gills, within the samples were removed and used to distinguish different families and species. No extensive statistical analysis has been completed yet, but Centrarchidae, Umbridae, and Salmonidae were the most prevalent families found, with each composing over a third of all collected cleithra. The presence of Salmonidae in such density within the otter scats suggests that a population of Salmonidae is closer to the wildlife area than expected, or the river otters are ranging farther than expected.

Peak Migration periods of Female Hatch Year and Second Year Northern Saw-whet Owls (*Aegolius acadicus*) in Regards to Fat Content Within Central Wisconsin



Left to right: **Julia Watson** (Wildlife Ecology Information & Education), **Logan Hubbard** (Wildlife Ecology Research & Management), **Jarod Lueck** (Wildlife Ecology Research & Management), and **Sarah Johanson** (Wildlife Ecology Information & Education)

Poster

Advisor: Dr. Jason Riddle

Consider for Judging

Northern Saw-Whet Owls (*Aegolius acadicus*) are an owl species that migrate in the fall and spring. Fall migration times range from September until December with peaks around mid-October. Northern Saw-Whets in the Northeastern United States appear to migrate at the same rate, distance and direction regardless of age. However, birds from the Great Lakes region appear to migrate in different patterns. Specifically, migration varying annually and with gender and age classes such that adult birds migrate earlier than younger ones. We hypothesize that Northern Saw-Whets from Central Wisconsin will exhibit age variation in migration as well. Specifically, Hatch Year (HY) birds will migrate earlier than Second Year (SY) birds because the former are migrating based off of instinct rather than experience. We also hypothesize that early migrating birds will have worse body conditions and less fat content. We collected data to test these hypotheses between the years of 2010-2014. Birds were captured from dusk until dawn with mist nets, which were arranged around a male Saw-Whet Owl auditory decoy. We banded captured birds and took the following measurements: wing chord, mass, age, sex and fat content. Preliminary analyses indicate that SY birds migrate earlier than HY birds and fat content plays no roll in migration times.

Stem Mapping as a Tool for Selective Tree Removal in Oak Savanna Restoration



Kurt Bennett

Major: Forestry Ecosystem
Restoration and Management



Allison Earl

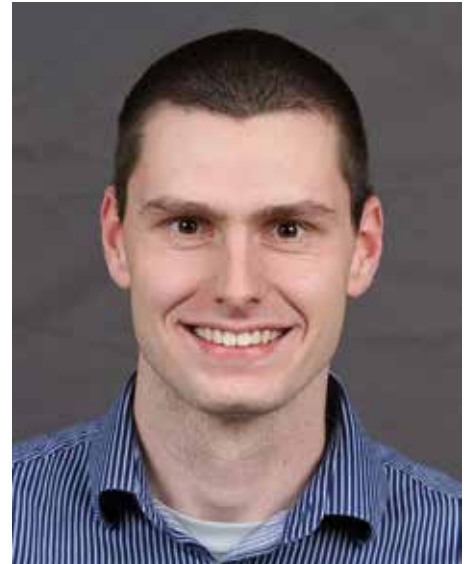
Major: Forestry Ecosystem
Restoration and Management

Poster

Advisor: Dr. Michael Demchik
Consider for Judging

Oak savannas are a transitional ecosystem between prairies and oak woodlands, made distinct by their herbaceous understory and open grown oaks. This ecosystem once occupied more than 10 million hectares of central North America, but now cover less than 1% of their historic range due to fire suppression, conversion to farmland, and overgrazing. This significant loss has resulted in oak savannas becoming a major focus of restoration projects. One of the most important aspects of oak savanna restoration is returning the crown density to savanna conditions, which is typically regarded as less than 50% canopy cover. Our study encompasses a 1.5 acre plot in Schmeckle Reserve, undergoing restoration by the UWSP chapter of the Society for Ecological Restoration. The purpose of our project was to establish the crown density of the site and recommend the removal of unwanted trees (based on size and species) in order to return the site to more savanna-like conditions. To do this, we recorded the species of each tree and measured their diameters at breast height (DBH) with a D-tape, which was later used to calculate crown cover. In addition, the geographic coordinates of the trees were collected using a Juno GPS unit. This information was then mapped in ArcMap, giving us a visual representation and allowing us to systematically select trees best suited for a savanna ecosystem. When resources become available, the unwanted trees can be removed as a first step in restoring this site to oak savanna.

Wisconsin Common Shiner Aquaponics Waste as a Fertilizer Source to Grow Tomato



Poster

Advisor: Dr. Robert Michitsch
and Dr. Justin Sipiorski
Consider for Judging

Erik Halverson
Major: Soil and Land
Management

The effects of fish waste water from a Wisconsin native fish (*Luxilus cornutus*) as a fertilizer on tomato plants (*Solanum lycopersicum*) was researched. Fish waste water was collected all at one time from fish tanks containing only common shiner minnows and was stored in the TNR cold room throughout the experiment. Tomatoes were planted in pots containing between 5-9 plants per pot. Tomato plants were grouped into three treatments: one group receiving only tap-water, another group receiving fish waste water, and the final group receiving a 20-20-20 NPK commercial fertilizer. The plants receiving fertilizer were given equal amounts based on the nitrogen content of the fish waste water. Plants were given treatments once a week and weekly SPAD measurements were taken. After 8 weeks of receiving treatments, the plants were harvested and the following measurements were taken: plant height, plant width, 2nd -3rd internode length, and stem diameter. The plants were then dried and analyzed for NPK content. Soil samples were also taken from each pot and analyzed for NH_4^+ , NO_3^- , P and K. Results will be presented. The outcomes of this experiment have the potential to benefit the UWSP-TNR green house by opening up the possibility for a system that allows use of fish waste water as a watering component in the green house.



Prevalence of *Strongyloides robustus* in a Population of Southern Flying Squirrels (*Glaucomys volans*) in Central Wisconsin

Left to right: **Anna Schneider** (Wildlife Ecology Research & Management), **Jennifer Dombrowsky** (Biology), **Laine Yandell** (Wildlife Ecology Research & Management), and **Katie Youngberg** (Wildlife Ecology Research & Management)

Poster

Advisor: Dr. Shelli Dubay

Consider for Judging

Within North America, northern (*Glaucomys sabrinus*) and southern (*Glaucomys volans*) flying squirrels occupy distinct ranges with limited overlap. In the early 2000's, both species were documented in Schmeckle Reserve, the 83-ha reserve on the University of Wisconsin-Stevens Point campus. Currently, only the southern flying squirrel inhabits the Reserve. *Strongyloides robustus* is an intestinal parasite (nematode) that infects both species but appears to be deleterious only to northern flying squirrels. Therefore, *S. robustus* could be a critical determinant of flying squirrel populations in areas of sympatry. Parasite eggs are produced within the hosts' gastrointestinal tract, are shed in feces, and develop into larvae, which, after two molts, transform into an infective form. Our goal was to assess fecal samples from the southern flying squirrel population in Schmeckle Reserve to determine prevalence of the intestinal parasite and to identify spatial trends in parasitism. We collected fecal samples from nest boxes used by flying squirrels in the reserve. The boxes were placed in 3 distinct forest stands and we will compare prevalence of infection by stand. We will use a modified zinc sulfate centrifugal fecal floatation technique to identify *S. robustus* eggs in fecal pellets. We will use a chi-square test to determine if prevalence varies by stand.

Effects of Calcium on Phosphorus Loading in Aquatic Systems of the Central Sands Region of Wisconsin



Poster

Advisor: Nancy Turyk and
Dr. Paul McGinley
Consider for Judging

Justin D. Nachtigal
Major: Water Resources

Central Wisconsin is home to a variety of lakes. These lakes may be subject to excessive nutrient loading due to land management practices and natural conditions. Excessive amounts of phosphorus can readily enter an aquatic ecosystem through surface water runoff and in some instances, with groundwater. Runoff presents a dilemma of phosphorus loading to lakes in excess of the natural inputs. Contributions of calcium via groundwater into these systems result in “hard water” lakes with increased amounts of marl production. Some conditions such as pH and D.O. will cause calcium to transform from a soluble form to a precipitate that settles out of the water column. The co-precipitation with phosphorus will lead to deposition of this nutrient into the sediments, making it less available for algal and aquatic macrophyte use. Ultimately, this process renders the ecosystem to be less responsive to phosphorus loading and eutrophication. This study examines how calcium entering into lake systems can affect phosphorus concentrations. Data was collected during spring and fall overturn periods and will be evaluated to establish the relationships between calcium and phosphorus. These analyses will help to understand the capacity of calcium to mitigate phosphorus in a variety of lakes. Establishing this relationship may result in the development of a phosphorus mitigation model to be used for better and more efficient management decisions to sustain and improve upon water quality conditions.

Should the TNR Vivarium Be Used for Some Other Purpose?



Maggie Nannenhorn
Major: Wildlife Ecology
Information & Education

Not Pictured: Tessa Collins
(Biology), **Jaide Ryks** (Biology),
and **Amy Nakano** (Wildlife
Ecology Information & Education)

The Vivarium and associated plant and animal display space in the lobby of the TNR is one of the main focal points of the TNR building as well as of the UWSP campus. Along with future renovations, greater change is being considered. Therefore, we performed a survey of students, faculty, and staff to determine their opinions regarding the current and future use of the Vivarium in the lobby of the TNR. We specifically wished to know how people currently use the space, how they think it should be used, and if changed, in what ways. We followed these surveys with observations of students outside the Vivarium to determine where and for how long they interacted with the display. Our goals are to use this information to propose changes to the current space so as to improve its appeal to the UWSP community, the greater Stevens Point community, and future UWSP students.

Poster

Advisor: Dr. Peter Zani

Consider for Judging

Schmeeckle Reserve and Green Circle Trail Visitor Use Evaluation 2014



Poster

Advisors: Dr. Laura Anderson
Mc-Intyre

Consider for Judging

Erika Jensen

Major: Forest Recreation
Management and
Environmental Education

This study is a continuation of an ongoing research project that studies and analyzes visitor use at Schmeeckle Reserve and the Green Circle Trail (GCT) in Stevens Point, WI. Using twelve infrared TrafX trail counters, the number of visitors using the trails was collected at twelve specific sites in accordance to management objectives of Schmeeckle Reserve managers and the Green Circle Trail board.. The trail counters were positioned next to the trails in camouflaged protective casings, and were visited every two to three weeks to be maintained and have data collected. Data collected from the counters were analyzed with DataNet software to obtain information on trends based on hourly, daily, weekly, monthly, and yearly trail use per each site as well as in comparison to the others. Observational data, including visitor gender, activity, group size, and time observed, were collected throughout the months of May 2014 to October 2014 near the twelve trail counter sites. While collecting observations, surveys were offered to visitors inquiring about frequency of trail use, attitudes towards the recreation site, trail habits, visitor age group and gender, as well suggestions for better management. During this study, effects of weather, seasonality, academic school year became evident from the data collected. This type of data can be very beneficial for outdoor recreation managers. Collecting and analyzing this data on a yearly basis can help managers make better management decisions while acknowledging visitor habits and needs, as well as recognize changing trends over time.



Developing and Validating Urban Forest Leaf Area and Biomass Models

Left to right: **Megan Eames** (Urban Forestry) and **Jackson Beck** (Forestry Management)

As our society becomes more urbanized, trees planted in urban environments play a great role in contributing to those ecosystems. As a consequence the need for accurate measures of the ecosystem services that urban trees provide arises. Many studies use the i-Tree Eco/Urban Forest Effects (UFORE; hereafter i-Tree model) model developed by US Forest Service to estimate ecosystem services. In the past several studies have been conducted acting upon the assumption that relationships the i-tree model uses are applicable to sites that vary in species, site, climate, and environmental conditions. Our goal is to test the accuracy of leaf area and leaf biomass models in i-Tree, when used outside the region in which it was developed. To do this we will measure 80 urban trees (summer 2015) in Stevens Point, Wisconsin collecting data such as diameter at breast height (dbh), tree height, height to the base of live crown, crown width, crown volume, crown profile, and leaf samples. This information will be recorded in order to develop local equations to predict the leaf area and biomass of the urban trees measured using some structural characteristics of trees. We will then compare predictions of the leaf area and biomass calculated from the local equation we developed to the equation used in the i-Tree model. We expect to see a significant difference between the two model predictions. This comparison will be used to both gauge relative accuracy of the models and to help highlight error in ecosystem service estimation when using the i-Tree model outside of the range in which it was developed.

Poster

Advisor: Dr. Nilesh Timilsina

Consider for Judging

Burn Frequencies and Their Impact on Fluctuation of Plant Communities in Anoka County, Minnesota



Poster

Advisor: Dr. James Cook
Consider for Judging

Alissa Johnson

Major: Forest Ecosystem Restoration
and Management

Globally, fire has shown to dramatically impact ecosystems by selecting for plant species able to endure, or take advantage of, the conditions created. However, very little research has shown the impact fire has on short term plant community dynamics. For this research project, data from a long-term study at Cedar Creek Ecosystem Science Reserve, University of Minnesota were used. A series of treatment units are spread throughout the 367 hectare reserve with burn frequencies ranging from no burns to burns every nine in ten years. Every five years, cover was recorded by species in a total of 35 plots. Twelve of the plots were categorized into high, low and intermediate burn frequencies, and gain and loss rates were calculated by life form, species origin, time period and burn frequency. Results showed that significantly more species were lost over a 15 year time period as compared to the number gained. In 1995, richness was observed to be an average of 53.75 species and in 2010 it dropped to an average 47.5 species. The high frequency burn units showed a decrease in gain rates and an increase in loss rates whereas the lower frequencies were shown to be more stable. Between 2005 and 2010, species richness and forb gain rates dropped dramatically (10-15 species) in the intermediate and high frequency burn categories. Forbs and shrubs experienced overall larger gains compared to their losses whereas grasses and trees experienced higher losses. Over time in higher burn frequencies, grasses experienced large increases of lost species; a consistent loss rate in the intermediate frequencies; and a steady decline in loss rates for the low burn frequencies. These results suggest the most suitable burn interval is ≥ 4 years to restore or maintain the xeric savanna type ecosystem of the Upper Great Lakes region.

Species Composition, Trends, and Space Partitioning on the North Bluff



Bree Bender
Major: Water Resources



Alli Kuehn
Major: Wildlife Ecology
Research & Management

Poster
Advisor: Dr. Jason Riddle
Consider for Judging

Woodpeckers and nuthatches are sedentary species that must share the same habitat year-round. While much is known about the species- and sex-specific foraging behaviors shown by many of these species, little is known about how individuals of different species distribute themselves within the same wintering area. We used a mark-recapture study of 22 Downy Woodpeckers (DOWO, *Picoides pubescens*), 33 Hairy Woodpeckers (HAWO, *Picoides villosus*), 11 Red-bellied Woodpeckers (RBWO, *Melanerpes carolinus*) and 68 White-breasted Nuthatches (WBNU, *Sitta carolinensis*) wintering in Sandhill Wildlife Area during 2006-2014 to analyze species composition, trends, and space partitioning. All four of the observed species inhabited the bluff in 6 of the 9 study years, with HAWO missing in 2006, RBWO missing in 2007, and only HAWO occurring in 2011. The population of each species did not consistently increase or decrease over the years of the study, although per year numbers fluctuated (DOWO: $t = -2.15$, $p = 0.07$; HAWO: $t = 0.23$, $p = 0.83$; RBWO: $t = 1.46$, $p = 0.18$; WBNU: $t = 2.08$, $p = 0.08$). In all years during 2009-2014, certain species used some parts of the bluff more than others, indicating that space partitioning did occur ($t = -3.43$, or $t > 2.73$, $p < 0.05$). This forest fragment seems to support small, unstable populations of woodpeckers and nuthatches. Further study is needed to determine how the bluff is partitioned among the species; such as whether each species prefers different parts of the study area or if some species displace others from the same area.

Temperature Effects on Gray Squirrel Capture Rates in Sandhill Wildlife Area, Babcock, WI



Poster

Advisors: Dr. Shelli Dubay and
Dr. Tim Ginnett
Consider for Judging

Nathan Klopmeier (left) and **Shaylee Church** (right)
Major: Wildlife Ecology Research & Management

The eastern gray squirrel (*Sciurus carolinensis*) is an important game species in many states. In Wisconsin, the hunting season for eastern gray squirrels is open between mid-September and late January. Since 2002, long term research in Sandhill Wildlife Area, Babcock, Wisconsin, has been focused on collecting data pertaining to the live capture of eastern gray squirrels. Data have included individual squirrel information such as sex, age, weight, trap number, and trapping instance such as open bait absent, tripped bait present, tripped bait absent, and captures of non-target species. General information such as trap times, cloud cover, precipitation events, wind speed and temperature were also recorded. We live trap squirrels during the winter months from late January through March, until the snow melts. Traps are open between the temperature ranges of 0 F and about 35 F to reduce the risk of snow melting on a squirrel, putting it at risk for hypothermia. We will determine if gray squirrel captures are correlated with temperature using a linear regression. If we identify a temperature range where most squirrels are trapped, we may be able to optimize capture success by trapping during a narrow range of temperatures. Additionally, squirrel hunters might optimize success by hunting during a temperature range when squirrels are more active.



Wintering Habitat Preference of White-tail Deer

Left to right: **Nick Stelzner, Jake Gretzinger, and Kurt Thorsen**
Majors: Wildlife Ecology Research & Management

Poster
Advisor: Dr. Cady Etheredge
Consider for Judging

White-tail deer (*Odocoileus virginianus*) movements and activity change during the winter months. The amount of available forage, and less demanding travel routes, impacts the amount of activity between habitat types. Woodland and wetland habitats provide different advantages for wildlife depending on the season and weather conditions. Trees catch much of the snow that falls, making accumulation less in woodland areas, and travel for deer easier. Wetland areas provide bedding sites and more available grass forage. The purpose of our project is to determine if white-tail deer prefer woodland or wetland habitats during the winter. Our survey locations will take place across middle-east Wisconsin in Weyauwega, Shawano, and Portage Counties during February of 2015. Our locations in Weyauwega and Shawano are set on private lands, and our location in Portage is set in Schmeckle Reserve. We will randomly select points within these areas across woodland and wetland habitat types. At each point we will perform a track survey for activity levels, and will record snow depth at each track or trail, along with the amount of available forage. We expect to find more deer activity in the habitat with less snow and more available forage. This information will be critical for wildlife and land managers in ensuring that white-tail deer have ideal habitat to survive harsh Wisconsin winters.

Modeling Large Storm Events with the Curve Number Equation for Several Watershed Delineation Methods



Poster

Advisors: Dr. Katherine
Clancy, Bill Troolin
Consider for Judging

Brandon Lee
Major: Water Resources and
Geology

Accurately modeling runoff in watersheds is imperative for land-use planning and hydrological models. Recognizing runoff flow direction within drainage networks is important for management and delineation of a watershed. Doing so in GIS software requires the identification of drainage areas capable of contributing runoff. Areas not capable such as topographical features containing low relief depressions or sinks were examined.

Three watershed delineation methods were used to determine modeled areas. Standard delineation by filling sinks in the Digital Elevation Model (DEM), cutting sinks from consideration through reclassification, and identifying Potential Contributing Source Areas from an unfilled DEM. The standard delineation method fills the low relief depressions, often producing undesirable results in the runoff model. Precipitation events were determined by hourly precipitation and daily flow data from several Wisconsin watersheds. Five to ten rain events were modeled in ArcMap using the Curve Number equation for each delineation method. Selected watersheds shared characteristics including similar land cover, topography and the presence of sinks in the surface drainage network.

Modeled runoff was compared to the direct flow component of USGS mean daily flow data as determined by the local minimum base flow separation method. The error of each delineation method was calculated for each storm. Normalized error was calculated to account for the large size variation between watersheds. Initial results indicate that filled-sink watershed delineations have lower normalized error values for large storms.

Response of Macroinvertebrate Communities to Stream Restoration in the Driftless Area of Wisconsin



Jason Hawksford

Major: Fisheries and Water
Resource Management

Poster

Advisor: Dr. Bill Fisher
Consider for Judging

Streams in the Driftless Area of Wisconsin have undergone severe degradation since settlement in the 1850's due to the clearing of hilltops to make way for intensive agriculture on or near riparian land. The Driftless Area Restoration Effort (DARE) has assisted in multiple stream restorations in Wisconsin. To assess the result of these restorations macroinvertebrate metrics were analyzed on Kittleson Valley Creek in Dane County. The hypothesis in question was that channel restorations would improve stream quality by decreasing sedimentation. GPS restoration start and end points were obtained from the US Fish and Wildlife Service and macroinvertebrate sampling data was acquired from the Wisconsin Department of Natural Resources. Data analysis was completed through spatial analysis in ArcMap and statistical analysis in Microsoft Excel. Overall, preliminary results indicated that streams were becoming more favorable for feeding function groups like scrapers and shredders and less favorable for filterers and gatherers. While the Hilsenhoff Biotic Index showed an increase in overall water quality. Statistical analysis was not able to be calculated based on the lack of longevity on each sampling point. Data did not exhibit the same trend from metric to metric or index to index. It is still inconclusive from this analysis if stream restorations create better water quality although it is expected that they would greatly benefit the streams that the restorations are completed on. Further research would include obtaining more sample data and sample dates for each sample point for deeper statistical analysis. An active biological monitoring program would greatly benefit these restoration projects.

Soil Physical and Chemical Properties Under Different Cover Crop and Tillage Management Systems in Carbondale, IL



Poster
Advisor: Rachel Cook
Consider for Judging

Ashley Hansen
Major: Soil Science and Water
Resources

Soil sustainability is an important facet of agriculture and must be practiced to maintain long-term crop productivity. Farmers can use various management techniques such as cover crops, reduced till, or no till to practice soil sustainability. This study aimed to determine how cover crops and tillage practices influence bulk density, aggregate stability, soil strength, and carbon and nitrogen content of soil. A randomized replicated field trial was implemented in Carbondale, IL with three replicates of each treatment. Treatments were no cover crop and no till, no cover crop with till, cover crop with no till, and cover crop with till. There were no statistically significant differences between the soil physical and chemical parameters. These results can be explained by the limited time of development of the treatment plots that were sampled during the first year after construction. Continued monitoring of these experimental plots will continue to further evaluate soil development of this site.

Impact of Canine Scent Lure and Human Scent on Detection of Species by Trail Cameras in Mountain Zebra National Park, South Africa



Celia Hein

Major: Wildlife Ecology
Research & Management,
Biology, and Spanish

Poster

Advisors: Dr. Eric Anderson
Consider for Judging

Non-invasive field practices are becoming more prevalent in modern wildlife research. Trail cameras in particular are becoming more popular, effective, and affordable as technology advances. With most trail camera studies, researchers assume that human odors have no impact on the probability of detecting a particular species. Therefore it is essential to determine if human scent alters detectability of various species. We also wanted to know if detectability of some species could be increased by the use of certain lures. During January 2015, we used 14 trail cameras already deployed for a brown hyena study and arranged in a grid approximately 3 km apart in Mountain Zebra National Park, South Africa. We tested 2 hypotheses: 1) the frequency of visitation and time spent at the cameras (linger time) by certain species would increase by placing “Canine Call”, a lure proven to be effective in attracting coyotes (*Canis latrans*) in North America, in front of all of the cameras, and 2) the number of animal species and their visitation rates would decrease for up to 24 hours immediately following our visits to the site due to residual human odors. Data collected by the cameras prior to the lure being put out was considered the pre-treatment period. Following the placement of the lure by 2-3 researchers, cameras were not visited for 3 days (post-treatment period), at which time the photo cards were retrieved.

Development of a Method to Assess Phosphorus Retention in a Soil



Poster

Advisor: Dr. Paul McGinley
Consider for Judging

AJ Leiden

Major: Water Resources, Soil
Science, and Spanish

Phosphorus has been demonstrated to cause eutrophication of surface water systems and as a primary concern in the conservation of water quality it is important to understand how it can be transferred from land to water. Private onsite wastewater treatment systems (POWTS), often referred to as septic systems, are designed to remove phosphorus through reaction with the subsurface soils in the drainfield. However phosphorus may still enter groundwater from POWTS effluent depending on the composition and reactivity of the soil that the effluent may pass through. While this may be an appreciable source of phosphorus into hydrologic systems, there is currently no method established to analyze the extent to which phosphorus might enter groundwater from a septic tank effluent. The purpose of this study was to create a method which can be used to determine to what extent phosphorus might react with a given soil and therefore be used to determine if septic systems may pose a threat to surface waters. In this study, a column method was developed to evaluate the reaction of phosphorus with subsoils. Benchtop scale experiments were conducted by passing phosphorus loaded water through a soil column and quantifying the amount of phosphorus that passed through the column to examine the extent to which a specific soil reacted with the phosphorus.

Smallmouth Bass Stock-recruitment Relationships in Big Crooked Lake, Wisconsin, 1997-2004



Tony Willman
Major: Fisheries

Poster

Advisors: Dr. Joshua Raabe and Dr. Dan Isermann

Consider for Judging

The relationship between the number of spawning adult fish (stock) and their offspring (recruitment) is fundamentally important to fisheries management. However, determining the actual stock-recruitment relationship is often inconclusive for a variety of reasons, including the difficulty of collecting abundance data at different life stages. The goal of this study is to examine potential stock-recruitment relationships for smallmouth bass *Micropterus dolomieu*, a popular sport fish whose reproductive strategy includes males guarding nests during early life stages (egg and fry). We will analyze a unique dataset from Big Crooked Lake in Vilas County, Wisconsin, with abundance estimates at the egg, fry, young of year (YOY), and adult life stages from 1997 through 2004. Adult abundance was estimated through mark-recapture using fyke nets and electrofishing in spring. Smallmouth bass nests were surveyed every other day during the spawning season (spring-summer) using snorkel and SCUBA gear to estimate egg and fry abundance. Fall beach seining and electrofishing was used for YOY mark-recapture estimates. We will use regression analyses to examine survival and potential stock-recruitment relationships at different life stages. Our results may help us identify when smallmouth bass year-class strength is established and provide insights into the elusive fish stock-recruitment relationship.

Development of a Maximal Crown Area Equation for Open-grown Bur Oak (*Quercus macrocarpa*)



Scott Virden
Major: Forest Management



Zachary Buchanan
Major: Forest Management



Alissa Johnson
Major: Wildlife Ecology
Research & Management

Bur Oak (*Quercus macrocarpa*) is the principal oak found in oak savannas of the upper Midwest, particularly in Wisconsin. Bur oak achieves its characteristic, aesthetically pleasing, wide crown when open-grown in a savanna setting. Bur oak also serves an important ecological role in savanna ecosystems. Due to its importance it is frequently utilized for oak savanna restoration projects. Curiously, despite its significance, no research in maximal crown area has been conducted, until now. For this analysis, 40 open-grown bur oaks were measured by: diameter at breast height (DBH), total tree height, height to live crown, and crown radius in each of the cardinal directions. From these measurements a quadratic equation was created to predict maximal crown area from DBH. This research can see application by assisting in the restoration of oak savannas by predicting crown cover as the bur oaks grow over time.

Poster
Advisor: Dr. Michael Demchik
Consider for Judging



Trap Site Utilization of White-tailed Deer in Schmeckle Reserve

Left to Right: **Kaceey Jertson** (Wildlife Ecology Research & Management), **John VandenBoom** (Wildlife Ecology Research & Management), **Sarah Johanson** (Wildlife Ecology Information & Education), and **Eric Canania** (Wildlife Ecology Research & Management)

Poster

Advisor: Dr. Tim Ginnett

Consider for Judging

White-tailed deer (*Odocoileus virginianus*) are the most sought after game species in North America and proper management is critical to their survival. As human development encroaches on natural habitats, deer and human interactions are steadily on the rise. The act of trapping deer is a necessary technique in order to administer radio-collars which record vital behavioral information such as movement, mortality and habitat use. Before these important factors that directly influence management decisions can be studied, we need to better understand the factors associated with how deer utilize trap sites in urban environments. This is an explorative study that examines trap site utilization within the Schmeckle Reserve, a forested habitat located adjacent to an urban interface, in Central Wisconsin. Trail cameras were placed at four trap sites that were randomly positioned throughout the reserve. Currently, we are in the process of analyzing activity times, sex ratios and age structure of deer who utilize the trap sites, along with those who enter the traps. We predict that immature deer are more likely to enter a trap compared to that of a mature deer, and females will utilize the sites more than males. At the end of the study we will test for significant differences between classifications, such as male vs. female and immature vs. mature. Data collection is ongoing and will continue until sufficient data is collected. Results will provide critical information about trap site utilization for urban deer management along with age and sex ratios of deer in Schmeckle Reserve.

White-tailed Deer Wintering Home Range Comparison During the Winters of 2013/14 to 2014/15



Kurt Stetzer
Major: Wildland Fire Science



Eric Canania
Major: Wildlife Ecology
Research & Management



Andrew Voigt
Major: Wildlife Ecology
Research & Management

White-tailed deer (*Odocoileus virginianus*) in urban environments present a unique challenge to wildlife managers. Movement patterns and home ranges vary depending on habitat availability during specific times of the year. This study compares the wintering home ranges of White-tailed deer in Schmeckle Reserve, a forested habitat located adjacent to an urban interface, during the winters of 2013/14 and 2014/15. Deer were trapped using modified Stephenson Box Traps (Anderson and Nielson 2002) baited with corn. Selected deer were then outfitted with VHF radio-collars and ear tagged for personal identification. Currently, we have radio telemetry data and home range estimates from four collared deer during the winter of 2013/14. This previously acquired data was collected by Andrew Voigt and Nathan Francois, who were crew leaders during that winter. At this time, we are collecting data from three of the four deer from last winter as well as three newly collared deer (2 males, 1 female) to determine 2014/15 wintering home range densities. Home range analysis for each deer will be constructed by using the Kernel home range estimator. A t-test will then be used to compare the average home range size between the two separate winters. Data collection is ongoing and will continue until sufficient data is collected. This analysis will provide insight to movement patterns of deer over the course of multiple wintering seasons that occupy an ever expanding urban landscape.

Poster

Advisor: Dr. Tim Ginnett
Consider for Judging

Context of Reaction Wood in *Fraxinus* spp. Co-dominant Stems to Differentiate Adaptive Growth



Devin Murray
Major: Urban Forestry

Poster
Advisor: Dr. Les Werner
Consider for Judging

There are many terms that describe the differences between how a tree grows. As far as studies have shown, tension wood is a form of adaptive growth and is observed at a cellular level. There is no developed S3 layer (the secondary cell wall) within tension wood and instead it has a gelatinous layer that consists of microfibrils. Microfibrils contain tensile force to account for maturation and corrective stress in inclined stems. The research done in this study was to have a deeper conceptual understanding of tension wood being a form of reactive growth. The experiment consisted of performing light microscopy on thin cross-sections of co-dominant stems from 15 urban Green and White Ash (*Fraxinus pennsylvanica* x *Fraxinus americana*) at varying distances from the point of attachment (PoA) to observe and identify the presence of both reaction and normal wood. From this research, three observational outcomes were analyzed. The first observation was tension wood being found in the upper portion of the inclined stem, closest to the PoA, above an un-centered pith, while at a farther distance the pith is centralized and in a similar orientation normal wood is found. The second observation was, tension wood being absent in the entire system alluding to a different form of adaptive growth. The third observation was tension wood occurring in the expected location nearest to the PoA as well as farther away with varying characteristics. From these three observations, the first observation is the expected result of the cause of reaction wood. This observation implies that tension wood is a form of adaptive growth through which preferential cell division occurs in response to loading forces. The implications of these results could assist in the proper understanding of tree formation as well as the mechanisms through which they rely on for survival. Through this understanding, we as managers could then administer better service to trees in terms of various growth objectives.

Effect of Proximity to Abandoned Structures on Upland Game Bird Nest Survival



Not Pictured:
Jeremiah Ulrich
Major: Environmental Law Enforcement

Left to right: **Joy Gadouas** (Biology), **Alli Kuehn**, **Michelle Rehak** (Wildlife Ecology Research & Management), **Ian Schellhaass** (Wildlife Ecology Research & Management), and **Courtney Wohlman** (Wildlife Ecology Information & Education)

Abandoned structures are used by predatory species to perch, den, and pursue prey. In Wisconsin, predation is the major cause of mortality for upland game birds; removing these abandoned structures may decrease upland game bird mortality. This study will seek to determine if abandoned structures have an influence on upland game bird nest depredation. Artificial nests containing quail eggs will be placed at intervals around three abandoned structures. The nests will be monitored for predator activity using track stations and cameras. Our study will determine whether or not there is a correlation between nest depredation and the proximity of the nest to an abandoned structure. We hypothesize that nest depredation will be greater with closer proximity to abandoned structures. This study will also help identify ground and avian predators that potentially decrease upland game bird nesting success. Our results will help inform wildlife managers possible solutions to increase upland game bird survival on both private and public lands.

Poster
Advisor: Dr. Cady Etheredge
Do Not Consider for Judging

Relative Abundance of Free-roaming Cats Related to an Urban-rural Gradient



Cheyenne Yates

Major: Wildlife Ecology Research
& Management and Biology

Poster

Advisor: Dr. Eric Anderson
Consider for Judging

Free-roaming cats (*Felis catus*) have caught the attention of many biologist for their predation of birds and wildlife as well as disease concerns that affect both humans and wildlife. Yet, some communities have documented that feral cats have adapted to urban/suburban ecosystems and are not always the threat that they have been made out to be. Stevens Point, Wisconsin lacks on any information about feral cat abundance and how those numbers affect the wildlife and people residing in the same areas. Thus, I conducted a study to determine where free-roaming cats live in Stevens Point as well as if higher human densities result in higher concentrations of free-roaming cats.

Beta Species Diversity of Predators Between Two Wildlife Areas in Central Wisconsin



Poster
Advisor: Dr. Jason Riddle
Consider for Judging

Left to right: **Peter Rebholz, Nicholas Bachman, Samantha Anderson, and Brandon Berndt**
Major: Wildlife Ecology Research & Management

Conservation efforts are important in predator species because of their vulnerability to extinction and their ability to enhance ecosystems. Predators are low in densities but significantly impact harvest, habitat change, and environmental variables in wildlife communities. Having predators in an ecosystem will enhance carbon storage, manage prey abundance, and lower disease in ungulate communities. Our goal was to compare predator species richness between Mead and Schmeckle Reserve in central Wisconsin. The distance between Mead and Schmeckle Reserve is 23.7 miles. We determined species richness by the use of scent posts. Scent posts are composed of sifted soil, with a fatty acid in the middle. For our fatty acid, we used a rotten egg scent. The scent posts we used are a meter in diameter with scent attractant in the middle of 1 m of loose sand. We placed 9 scent posts in Schmeckle Reserve and 9 in Mead. At both locations we used a 3x3 grid system with 500 feet between each scent post. The first scent post was randomly selected. They were checked in March 2015 on a daily basis in the morning. The tracks were identified using a dichotomous key. Since we are measuring Beta diversity, we used the Sorensen's Coefficient of Community and calculated the percent similarity between Mead and Schmeckle Reserve. Our results and management implications are discussed in our poster.



Changes in the Ungulate and Predator Community in Mountain Zebra National Park, South Africa After Lion (*Panthera leo*) Reintroduction

**Michael Jungen, Emma Doden, Stuart Featherston,
and Trenton Rohrer**

Majors: Wildlife Ecology Research & Management

Poster

Advisor: Dr. Eric Anderson

Consider for Judging

Top predators influence their ecosystem through trophic cascades, recently discovered when wolves (*Canis lupus*) were reintroduced to Yellowstone National Park. Wolves reestablished a landscape of fear for many species, including elk (*Cervus canadensis*) and coyote (*Canis latrans*), and allowed the regeneration of heavily browsed vegetation. The Mountain Zebra National Park, South Africa recently reintroduced a top predator, the lion (*Panthera leo*), after more than 50 years of absence. In April 2013 three lions were brought in to increase the biodiversity of the park and slow the growth rate of prey. Two brothers and a female were initially introduced; however the female was removed and so only the two males remain. We investigated the effects that the reintroduction of lions had on the relative abundance of ungulates and other carnivores in the park and in particular black-backed jackals (*Canis mesomelas*), which fill an ecological niche similar to coyotes in the United States. In January of 2013, just prior to the release of the lions, and again in January of 2015 wildlife students from the University of Wisconsin-Stevens Point conducted research in Mountain Zebra National Park using camera traps. On both trips, 16 trail cameras were set in a 4x4 grid formation for 6 days. Each trail camera was placed near the center of its respective 4 km² grid cell in an area likely to capture animal movements, such as along game trails, dirt roads, or in drainages. Species richness and the number of events per species (defined as photos of a species <30 minutes apart) were recorded for the 2013 and 2015 camera data. Spearman's rank correlation and percent similarity were calculated to compare the data collected from the two separate years and identify significant changes. We will discuss the differences, particularly in black-backed jackal detections, and examine alternate explanations for the observed changes.

Small Mammal Species Richness at Treehaven Fire Units



Poster

Advisor: Dr. Ron Masters

Consider for Judging

Michael Jungen

Major: Wildlife Ecology Research
& Management

This was the second year in a multi-year research project involving different fire intervals and thinning regimes at the 24 unit research plot at Treehaven, Tomahawk, WI. We trapped small mammals using baited Sherman traps from July 24th to July 31st 2014 for a total of 3,859 trap nights and 318 captures. Small mammals were marked upon capture and released in the same location. The small mammal data was compared to the plant communities in which small mammals were caught. Small mammal richness was related to total ground cover (litter, stems, CWD, rocks, and cryptogams), woody plant cover, and plant species diversity using Simpson's index. Ground cover, woody plant cover, and plant species diversity explained 56% of the variation in small mammal richness. Small mammal diversity did not strongly relate to any of the compared variables. Percentage of bare ground, plant diversity, and plant richness explained 70% of the variation in eastern chipmunk (*Tamias striatus*). Higher herbaceous diversity and low bare ground percentage had a positive influence on eastern chipmunk abundance. *Peromyscus leucopus* was so widely distributed that there was no detectable influence of any of the variables. When comparing this year's data with last year's small mammal data, there are a couple notable differences. The number of eastern chipmunks and red squirrels (*Tamiasciurus hudsonicus*) decreased. The number of southern red-backed voles (*Myodes gapperi*) increased dramatically. The change in red-backed vole abundance in our research units is consistent with the literature on its favorable response to fires.

Seed-bank Analysis of the Moses Creek Restoration Site



Jacob Cerminar
Major: Forestry Ecosystem
Restoration & Management



Rob Knauber
Major: Forestry Ecosystem
Restoration & Management

Poster
Advisor: Dr. James Cook
Consider for Judging

Restoring a wetland can arguably be one of the hardest types of restoration to achieve because the soil, hydrology, and vegetation of this ecosystem are very unique and can take many years to develop to a functioning state. The Moses Creek and associated floodplain was restored in 2010; it was previously agricultural land and the creek was channelized, creating upland conditions over the past several decades. The project goal is to restore the site to an ecologically sound, sedge meadow wetland. The objective of our research is to determine if the seed-bank of Moses Creek has changed in density or composition since 2011, and to determine if wetland species are accumulating. We split the Moses Creek floodplain into five sections, North to South, and collected ten soil samples per section using systematic random sampling. The soil samples were brought to the TNR greenhouse and spit into two watering regimes: 1) consistent moisture and 2) flooded conditions for four weeks followed by consistent moisture. The latter treatment represented spring conditions as much as possible, with consistent water available and anaerobic conditions (stratification) that may be required for some wetland seeds to germinate. Plants can be divided into groups based on the type of site(s) they can inhabit, such as facultative upland and obligate wetland. Currently, we have 15 plants identified and two yet to be identified. Among these are three obligate wetland species, including: *Hypericum spp.* (St. John's wort), *Juncus brevicaudatis* (path rush), and *Leersia oryzoides* (ricecut grass). The St. John's wort plant and the ricecut grass plant both grew under the consistent moisture watering regime; the two path rush plants emerged under the flooded conditions watering regime. This is significant in regards to how certain species, like path rush, are responding to the change in hydrology in the floodplain. A 2011 seed-bank analysis recorded a total seed density of 539.9 seeds/square meter in the floodplain. Our analysis recorded a total seed density of 955.1 seeds/square meter. This increase in total seed density signifies the build-up of the seed-bank as a whole. We also found a wetland seed density of 318.4 seeds/square meter, which shows that the wetland species of the Moses Creek floodplain comprise approximately one-third of the entire seed-bank. This suggests that the composition of plant species in the floodplain will be progressing towards more wetland species than what has been observed in previous years.

Protimeter Accuracy for Determination of One-hour and Ten-hour Fuel Moisture



Not Pictured:

Kyle Hackert

Major: Wildland Fire Science

Kurt Stetzer

Major: Wildland Fire Science

Fuel moisture has a direct influence on the way fuels will burn. Fuels of different sizes absorb or release moisture from the atmosphere at different rates depending on the size and class of that fuel. For example fuels that are 0-1/4 inches in diameter will typically equilibrate with the relative humidity in the atmosphere in about one hour and hence are called one-hour fuels. Those fuels that are 1/4– 1 inch in diameter will equilibrate with atmospheric relative humidity in about ten-hours. Accurate determination of fuel moisture can be made by oven-drying which is an extensive process and can take three days or more. Because the amount of moisture in a fuel can change rapidly and influence the probability of ignition for the fuel and the intensity of a fire, a method for sampling fuel moisture is needed in the field for quick data. Our study looked at the accuracy of a basic wood protimeter for sampling one and ten hour fuel moistures. We used a GE Protimeter BLD5600 hand held moisture meter to determine fuel moisture in the field. (GE Protimeter, 2015). This protimeter is designed to sample the moisture of lumber, but has been used to sample moisture in one-hour and ten-hour fuels. The one hour fuels tested, were red pine (*Pinus resinosa*) needles, red oak (*Quercus rubra*) leaves, and bluestem grasses (*Andropogon gerardi*). Our sample of ten hour fuels consisted of red pine cones and red oak twigs. We tested the accuracy of the protimeter against the standard oven drying method. With the data collected a T-test was used to determine how accurate our protimeter was compared to the oven-drying method. We found that the protimeter adequately characterized 10-hour fuel moistures but was not adequate for one hour fuels. This study provides more information on real time fuel sampling methods that will allow an increase in efficiency and accuracy for on the fire line behavior assessment or prior to a prescribed burn. This knowledge will help burn bosses assess the risk to fire fighters and management personnel.

Poster

Advisor: Dr. Ron Masters

Consider for Judging

Estimates of Ruffed Grouse Detection Probability from Repeated Point Counts



Bryn Webber
Major: Wildlife Ecology
Research & Management

Not Pictured:
**Chase Gadbois, Michelle
Murawski, and James Hansen**
Majors: Wildlife Ecology
Research & Management

Drumming surveys are commonly used by managers as a method of monitoring ruffed grouse abundance. We conducted drumming surveys for ruffed grouse using a time-of-detection method at the University of Wisconsin - Stevens Point's Treehaven property near Tomahawk, WI. We surveyed 57 unique locations on each of three days and encountered 35-66 individuals per day. Each point count consisted of four 2.5min intervals for a total of ten minutes. We used an information-theoretic approach (AICc) in program Presence 5.5 with repeated visits to consider the influence of the following variables on ruffed grouse detection: time of day, individual survey day, cloud cover, and wind speed. Preliminary analysis indicates the following results. The top two models were based on time of day covariates, carrying over 95% of the AIC weight. The individual survey day covariate had the least influence on ruffed grouse detection. Our top model estimated detection probability as 0.33 (SE= 0.09) on May 3, 0.17 (SE= 0.05) on May 4, and 0.39 (SE= 0.10) on May 10 and an average abundance per survey point of 2.28 grouse. Our results suggest that birds are less detectable as the day proceeds and that in the future, we will not have to use as many drumming surveys to obtain successful abundance estimates.

Poster
Advisor: Dr. Jason Riddle
Do Not Consider for Judging

Forest Metrix and ArcCollector App for Forest Inventory



Poster

Advisors: Kevin Burns and
Dr. Steve Kerlin
Consider for Judging

Natalie Studer

Major: Forest Administration,
Forest Management, Urban
Forestry

A forest inventory was setup for the Conserve School Property in Land O' Lakes, Wisconsin. The school was looking for a way to set up a management plan of the surrounding forest. In order to get the management plan underway a detailed forest inventory was going to have to be accomplished as well as a detailed geodatabase of the Conserve School property.

I will be conducting a detailed forest inventory in order to gain plot information, along with other property landmark characteristics (trails, buildings, etc.) to provide a detailed Geodatabase which will then be used for educational purposes. By way of using the iPad mini in conjunction with the Forest Metrix software and the ArcCollector application also being the main focus of this research.

Biotic and Abiotic Factors Influencing Walleye Recruitment in Escanaba Lake, Wisconsin from 1958-2013



Garrett Johnson
Major: Fisheries and Water
Resources

Oral
Advisors: Dr. Justin VanDeHey,
Dr. Josh Raabe, Greg Sass
Consider for Judging

Stock-recruit relationships are one of the most important relationships in fisheries management, yet one of the most difficult to estimate due to many factors that can affect the relationship. Walleye (*Sander vitreus*) are one of the most popular and intensively managed sportfish in North America making the stock-recruit relationship one of the most desirable relationships to model. We used Age-0 Walleye (recruits), Yellow Perch (*Perca flavescens*) abundance, Walleye spawning stock abundance and May water temperature data from Escanaba Lake collected from 1958-2013 to develop a multiple factor stock-recruit model and to determine whether a Ricker stock-recruit relationship was observed. We used Statistical Analysis System (SAS) to estimate parameters for a multiple factor Ricker stock-recruit model. The interaction of May water temperature coefficient of variation (CV) and adult Yellow Perch abundance accounted for 50% of the recruitment variation. Adult Yellow Perch abundance and spawning stock abundance increased the explained variation to 72% and 79% respectively. Spawning stock abundance, adult Yellow Perch abundance and May water CV all showed a negative correlation with Age-0 Walleye abundance. Based on our model, there are other important factors other than spawning stock abundance, Yellow Perch abundance and May water temperature CV that affect Walleye recruitment. Possible variables that may affect Walleye recruitment not included in our model include: wind, water temperatures and prey abundance. The development of a stock-recruit model for Walleye would allow fisheries managers to make better management decisions based on a more accurate estimation of Walleye recruitment.

Survey of Liver and Lung Parasites in Wisconsin White-tailed Deer



Not Pictured:
Jenna Hulke
Major: Biology

Left to right: **Anna Schneider, Jennifer Dombrowsky, and Laura Wright**
Majors: Biology

White-tailed deer (*Odocoileus virginianus*) represent a major wildlife resource for the state of Wisconsin, with over 200,000 harvested each year. Deer serve as important hosts for several helminth parasites, including the liver fluke, *Fascioloides magna*, the tapeworm *Echinococcus granulosus* and *Taenia hydatigena*. To assess the infection levels of these parasites we conducted a survey of white-tailed deer harvested during the fall of 2014. We provided hunters with kits to procure and transport the lungs and livers of deer they harvested. Samples were either refrigerated or frozen and examined using razor blades to cut approximately 5mm sections. Employing this protocol permitted us to locate all trematode and tapeworm (cestode) infections in these two organs. Processing of a single sample (i.e., a liver and two lungs) typically took about one hour. We received samples from a total of 52 deer. Overall prevalence (percent of deer infected with at least one fluke) for *F. magna* was 36% (17/47). Overall, the number of *F. magna* worms per infected deer ranged from 1 to 37 worms each with an average intensity of 6.65. In terms of cestode stages, we did observe *Echinococcus granulosus* hydatid cysts in the lungs at a prevalence of 11% (4/37), which had not been previously reported in Wisconsin. Cysts were observed with an average intensity of 1.75 (1-3) per infected deer. In the livers we observed the cysticerci of *Taenia hydatigena*. The overall prevalence of *T. hydatigena* cysticerci was 17% (8/47), and cysts per deer ranged from 1 to 4.

Poster

Advisors: Dr. Todd Huspeni and Amanda Kamps

Consider for Judging

Determining the Effect of Lion (*Panthera leo*) Reintroductions on Black-backed Jackal (*Canis mesomelas*) Populations Through Scat and Camera Surveys in Mountain Zebra National Park



Margaret Nannenhorn
Major: Wildlife Ecology
Information & Education



Molly O'Grady
Major: Wildlife Ecology
Research & Management



Cheyenne Yates
Major: Wildlife Ecology
Research & Management

In January 2013, black-backed jackal scat and camera surveys were conducted by University of Wisconsin Stevens Point and Rhodes University to determine black-backed jackal abundance and the average deposition rate of fresh scats per km road in each of 16 4-km² grid cells established in Mountain Zebra National Park, South Africa. Since the study in 2013, three lions, two male and a one female, were reintroduced to the park. African lions and black-backed jackals often compete for the same resources. However, black-backed jackals are also known to scavenge from lion kills. Thus, the introduction of lions could have either adverse or beneficial effects on the black-backed jackal population. The purpose of this study was to determine whether or not the population of black-backed jackals at Mountain Zebra decreased since the reintroduction of lions into the park. In January 2015, we conducted an identical scat and camera surveys by identifying black-backed jackal scat along the same roads and placing cameras at the same GPS locations in each grid cell. We used paired t-tests to compare the total number of fresh scats detected as well as the number of individuals in each of the cells for both years.

Poster
Advisor: Dr. Eric Anderson
Consider for Judging

Factors Effecting Walleye Growth Trajectory in Northern Wisconsin Lakes

Presenter: **Austin Noring**

Understanding population dynamics of sympatric fishes can be important for management. Walleye *Sander vitreus* are an important recreational species and a top predator in the systems they inhabit. Walleye growth can be highly variable among lakes suggesting that within-lake factors such as prey availability and quality are important. A statewide assessment of Cisco *Coregonus artedii*, an important prey species for Walleye, was recently conducted in Wisconsin lakes to better understand the status of this important species. We used data from a long-term standardized Walleye survey program (Ceded Territory of Wisconsin; CTWI) and the recent Cisco assessment to determine Walleye growth trajectories among lakes with and without Cisco. Analysis of the data from 87 populations of walleye across the CTWI revealed that female walleye reach greater asymptotic lengths in lakes where Cisco were detected, while male Walleye asymptotic length did not differ among lakes with and without Cisco detections. Common Walleye minimum length limits, 15 and 18 inches, were reached 0.6 and 0.9 years earlier in lakes with Cisco detections. Yellow Perch *Perca flavescens*, another common prey item for Walleye, mean length was significantly lower than lakes without Cisco. This could further enhance Walleye growth as they generally select for prey < 130 mm. Therefore, managing to maintain Cisco habitat in these lakes could help ensure fast growth and trophy potential of Walleye in these systems.

Oral

Advisors: Gregory G. Sass, Dr. Justin A. VanDeHey,
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Factors Effecting Walleye Growth Trajectory in Northern Wisconsin Lakes

Presenter: **Austin Noring**

Understanding population dynamics of sympatric fishes can be important for management. Walleye *Sander vitreus* are an important recreational species and a top predator in the systems they inhabit. Walleye growth can be highly variable among lakes suggesting that within-lake factors such as prey availability and quality are important. A statewide assessment of Cisco *Coregonus artedii*, an important prey species for Walleye, was recently conducted in Wisconsin lakes to better understand the status of this important species. We used data from a long-term standardized Walleye survey program (Ceded Territory of Wisconsin; CTWI) and the recent Cisco assessment to determine Walleye growth trajectories among lakes with and without Cisco. Analysis of the data from 87 populations of walleye across the CTWI revealed that female walleye reach greater asymptotic lengths in lakes where Cisco were detected, while male Walleye asymptotic length did not differ among lakes with and without Cisco detections. Common Walleye minimum length limits, 15 and 18 inches, were reached 0.6 and 0.9 years earlier in lakes with Cisco detections. Therefore, managing to maintain Cisco habitat in these lakes could help ensure fast growth and trophy potential of Walleye in these systems.

Poster

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