

Student Research Symposium

Friday April 5, 2013



College of Natural Resources
University of Wisconsin - Stevens Point



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University of Wisconsin-Stevens Point

Student Research Symposium

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Booklet Editing: Alyssa Uhen and Elise Worthel
Cover Design and Photo: Alyssa Uhen

COVER PHOTO: Peninsula State Park. Weborg Point. Taken July 2012.

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 5, 2013

Welcome to the 14th 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 will have gained a greater understanding of the world around you, a deeper learning of the subject matter taught in your classes and possibly the opening of new opportunities beyond college.

Attendees and observers, I hope you will join me in applauding the drive and initiative of these students. They and their work are at the core of the University's new path toward creating "*thriving communities*" that are vibrant, healthy, prosperous and sustainable.

Whether you are here to make a presentation or to listen and observe, you will be participating in the celebration of these academic achievements. This is a special opportunity for students to share the results of their 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 5, 2013

The University of Wisconsin-Stevens Point College of Natural Resources (CNR) is pleased to present the 14th annual Student Research Symposium featuring and celebrating the scholarly achievement of many of our 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, the students build on the knowledge and skills they develop within the College's multi-discipline integrated curriculum that emphasizes practical hands on learning experiences. These experiences will help prepare these students for rewarding careers, and 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 participant turnout ever with over 80 students and 60 presentations! This continues a long tradition of success at this annual event. The late Clive David, a past member of our forestry faculty, helped organize the first Symposium in 2000. 750 students have presented oral or poster presentations since that inaugural event. His spirit lives on here today.

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

Thank you for attending this wonderful celebration of scholarly achievement and hands on experiential learning. Welcome to the UW-Stevens Point campus 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 14th Annual University of Wisconsin-Stevens Point College of Natural Resources Student Research Symposium. This year's program features students who have invested considerable time conducting research in areas such as fisheries and water resources, forestry, human dimensions of natural resource management, paper science and engineering, soil and waste management, and wildlife ecology. This event allows for the showcasing of students' questions which have been crafted into research projects. Students collected, explored, and analyzed data in an attempt to answer their questions. Student mentors helped guide students through the process in a spirited and educational fashion which expands beyond the traditional bricks and mortar of the classroom.

As we proceed with this year's poster and oral presentations, we honor the memory of Dr. Clive A. David. David was extremely influential in building and strengthening the undergraduate research program and was a true friend to students and faculty. Dr. David, who passed away in November 2004, not only helped to create a venue for students to present their research, but also fostered a positive atmosphere where students learned how to conduct and present their research. The hundreds of students who have benefited from the symposium over the past fourteen years can credit Dr. David for his pioneering efforts.

This year marks the highest year 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,

Hunter Gosda (chair)
Emilia Kenow

Pat Otero (cochair)
Rebecca Kelble

Alyssa Uhen and Elise Worthel (booklet editors)
Claire Hillmeyer **Molly O'Grady**

Faculty Advisors:

Rich Hauer (faculty chair)

Rob Michitsch

Gerry Ring

Kristin Floress

Clive A. David

Memorial Research Scholarship Award



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

Victoria Bertolami is from Algonquin, Illinois and is majoring in water resources. She has exhibited excellent skills as a student, researcher, leader, and overall young professional. Victoria has received three outstanding student awards, including the 2012 CNR outstanding undergraduate student award. Last summer she was selected to study water quality in the Yucatan Peninsula, Mexico. Her travels to Mexico led to her research investigating methods for detection of antibiotics. Bertolami is also currently conducting a watershed study to determine areas critical to the improvement of non-point source pollution in the Weyauwega Lake Watershed located in Weyauwega, Wisconsin. She recently presented her research at the international meeting of the Soil Science Society of America, which is remarkable for an undergraduate student. Victoria is an active member of the student chapters of the Soil and Water Conservation Society (SWCS), American Water Resources Association (AWRA), and Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS). She previously served as president of the SWCS and MANRRS. Victoria is an all around student excelling in academics, research, service, and is a true mentor to her classmates.



Victoria Bertolami

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

Victoria, we congratulate you!

Acknowledgements

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

Dean Christine Thomas

Chancellor Bernie Patterson

Kevin Lawton - computer assistance

Marshall Lee and UW-Stevens Point Catering

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Jake Smith and Tammy Naczek - financial and purchasing

College of Natural Resources - room accommodations

Biology Department - room accommodations

University Relations and Communications Office - publicity

CNR and Biology Faculty - mentoring and support

Volunteer Evaluators and Moderators

Laura Anderson, Kim Becken, Karyn Biasca, James Cook, Ronald Crunkilton,
Tracy Westbury, Bill DeVita, Paul Doruska, Shelli Dubay, Becca Franzen,
Justin Hall, Tim Ginnett, Jim Hardin, Angie Hauer, Kyle Herrman,
Kendra Liddicoat, Daniel Isermann, Diane Lueck, Lynn Markham, Jen McNelly,
Kevin Masarik, Ron Masters, Chris Mechenich, Rob Michitsch, Andrea Musch,
Jonathan M. Rivin, Becky Roberts, Jacob Prater, Aaron Thompson,
Jessica Tomaszewski, Justin A. VanDeHey, Melinda Vokoun, Milo Harpstead,
Betty Trainer, Ted Roeder, Joe Dittrich, Jake Richter, Valerie Johnson,
Craig Kelling, Melissa Johnson, John Clare, Tony Sharp and Joel Stokdyck.

Symposium Support Volunteers

Doug Moore - photography

Student Research Symposium

Schedule of Events

Refreshments/Registration

8:30 a.m.

TNR West Lobby

Dean's Welcome Address

9:00 a.m.

TNR 170

Oral Presentations

9:20 a.m.

TNR 120, TNR 122, and TNR 170

Poster Presentations

Lunch

11:00 a.m. - 12 p.m.

TNR South Hallway
and Central Lobby

Oral Presentations

12:15 p.m.

TNR 122 and 170

Rendezvous Awards

4 p.m.

Sentry Theater

Schedule of Oral Presentations: TNR Room 120

Presenter(s)	Time	Title
Alyssa DeRubeis	9:20	Is there a relationship between diurnal raptor and greater prairie-chicken abundances as Buena Vista Wildlife Area?
Katherine Moratz Kristina Borgstrom	9:45	Abundance and occupancy modeling of eastern gray squirrels (<i>Sciurus carolinensis</i>) within Sandhill Wildlife Area in response to stand age.
Jacob Gross	10:10	Wisconsin waterfowl species identification utilizing a skull diagnostic probability.
Bryant Kern	10:35	Environmental variables that influence exposure of white-tailed deer (<i>Odocoileus virginianus</i>) to parainfluenza 3 virus.
<u>LUNCH BREAK</u>		
Robert Lisiecki	12:15	Prevalence of <i>Filaroides martis</i> in short-tailed weasels (<i>Mustela erminea</i>).
Matthew Buchholz	12:40	Intensity of <i>Skrjabingylus nasicola</i> infection in short-tailed weasels (<i>Mustela erminea</i>).
Zachary Beard	1:05	Evaluation of dorsal spines as a nonlethal alternative to otoliths for estimating bluegill ages.
John Grosch	1:30	Comparing diatom communities of the Plover River via gut content analysis of the Central Stone Roller (<i>Campostoma anomalum</i>).
John Tix	1:55	Blocking and guiding adult sea lamprey with vertical fields of pulsed direct current.

Schedule of Oral Presentations: TNR Room 122

Presenter(s)	Time	Title
Kurt Olezsko Jacob Farley Trevor Snyder Tommi Kuusisto	9:20	Size press improvement.
Mitch Socha Nathan Martin Jason Halambeck Tony Stefka	9:45	Paper formation optimization.
Gerrit Spiess David Lieble Lucas Moureau Kenneth Fayas	10:10	Cross-directional basis weight variability on the pilot paper machine.
Melissa Wanasek Alex Stieve Casey Hallum Wade Przekurat	10:35	Drainage profile optimization.

Schedule of Oral Presentations: TNR Room 170

Presenter(s)	Time	Title
Hunter Gosda	9:20	Synonymous plant common names, their different perceptions, and their effect on marketability.
Jordan Winkenbach Steven Bachleda	9:45	Comparison of micro-topography & vegetative communities found in four constructed depressions of the restored Moses Creek Wetland.
Allison Willman	10:10	Effectiveness of the 80-150% hydrology requirements on isolated wetlands in Lake County, IL.
Danielle Rupp Allison Willman	10:35	Comparison of microbial salinity tolerances in anthropogenically influenced wetlands.
<u>LUNCH BREAK</u>		
Danielle Rupp Chase Kasmerchek	12:15	The influence of vegetated buffers and shoreline development on aquatic macrophyte diversity in Central Wisconsin Lakes.
Aaron Pape	12:40	Methodology to identify priority conservation lands in NE Portage County.
Timothy Runde	1:05	Anaerobic digestion: monitoring biogas production and the treatment of wastewater sludge.
Jessica Kuna Dan Hoff	1:30	Results of Plover Energy Efficiency Project and preliminary analysis of UWSP Efficiency Potential.
Ethan Conover Daniel Schultz	1:55	Factors leading to fatalities of all-terrain vehicle and snowmobile users in Wisconsin.

Poster Presentations

Presenter(s)	Title
Claire Ault Mitch Groenhof	Evaluation of second year vegetative growth in the Moses Creek floodplain restoration.
Bree Bender	The effects of <i>Phragmites australis</i> on wetland soils.
Sarah Bowman	Storm size's effect on constant slope hydrograph separation method.
Heath Brandner	Micropropagation of the American Hazelnut.
Zachary Buchanan	Deflection of juvenile wood in comparison to mature wood.
Dana Christel	The effects of biochar addition and cover crops with corn growth on soil physical and chemical properties of the Central sands of Wisconsin.
Nigel Golden	Seroprevalence of <i>Leptospira interrogans</i> antibody in white-tailed deer from two sites in Wisconsin.
Hunter Gosda	Synonymous plant common names, their different perceptions, and their effect on marketability.
John Grosch	Comparing diatom communities of the Plover River via gut content analysis of the Central Stone Roller (<i>Campostoma anomalum</i>).
Jacob Gross	Wisconsin waterfowl species identification utilizing skull diagnostic probability.
Tessa Hasbrouck Rebecca Kelble	Comparing bobcat (<i>Lynx rufus</i>) home-range size and its habitat characteristics in central Wisconsin to northwest Wisconsin.

Poster Presentations

Presenter(s)	Title
Matt Havlik Shantanu Pai	Watershed governance and Lake Wausau: An institutional analysis.
Amanda Heckenlaible	A comparison of red pine plantation management techniques via red squirrel (<i>Tamiasciurus hudsonicus</i>) and small mammal populations.
Erik Hendrickson	UV spectrophotometry for nitrate analysis of drinking water.
Zachary Hudson Andrea Schneider	Effects of salicylic acid and lemon-lime soda on the vase life of fresh cut Chrysanthemums (<i>Dendranthema grandiflorum</i> (Ramat.) Kitamura).
Laura Jaskiewicz Tanner Jones	Presence of shrews in stomachs of weasels legally trapped in Wisconsin.
Stuart Lannoye Ashley Hansen Eric Englund	The development of soil and microbial communities in the Moses Creek Restoration Wetland in Stevens Point, Wisconsin.
Austin Lee Andrew Voigt	White-tailed deer home range comparison between rural, urban, and Schmeckle deer.
Kasey McCauley Connor Christopherson	The use of artificial nesting boxes inside and outside the Little Eau Pleine River corridor by wood ducks (<i>Aix sponsa</i>) and hooded mergansers (<i>Lophodytes cucullatus</i>) in central Wisconsin.
Leah McSherry Jen Anton	Nest box use of southern flying squirrels (<i>Glaucomys volans</i>) in relation to tree species and understory stem density.

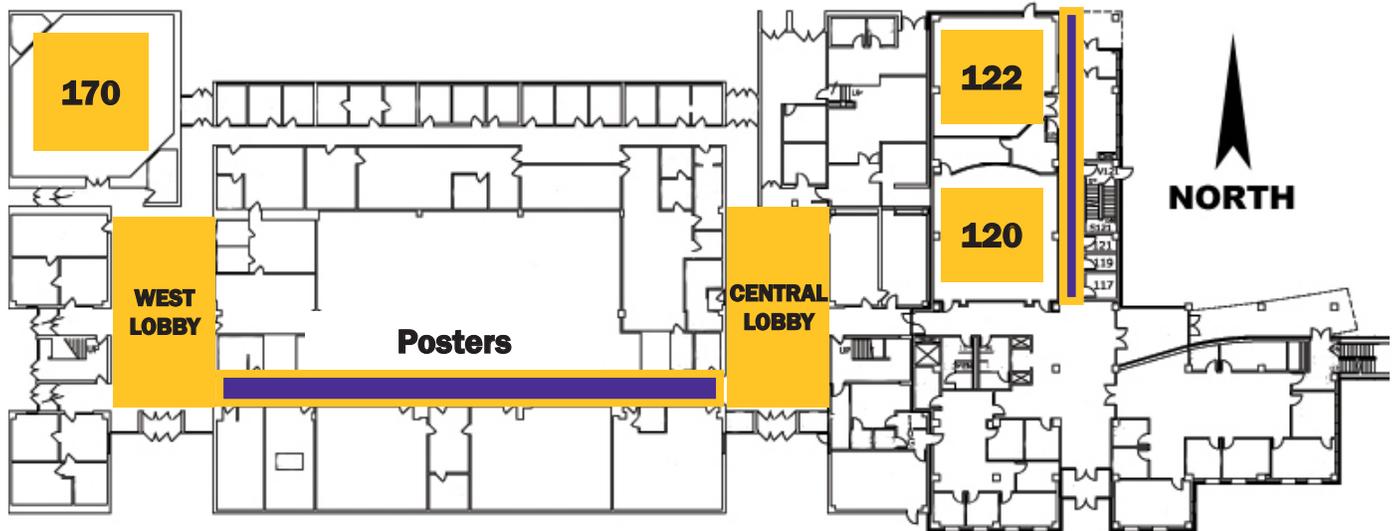
Poster Presentations

Presenter(s)	Title
Maddie Michels-Boyce	Snake behaviors during avian nest depredation events in North Carolina.
Kurt Olezsko Jacob Farley Trevor Snyder Tommi Kuusisto	Size press improvement.
Aaron Pape	Methodology to identify priority conservation lands in NE Portage County.
Sarah Rademacher Ashley Hansen	Evaluation of soil carbon and nitrogen concentrations in a restored and remnant wetland.
Ryan Rodenkirch Brittany Ruttenberg	Prevalence and intensity of ectoparasites on white-tailed deer in two sites in Wisconsin.
Timothy Runde	Anaerobic digestion: monitoring biogas production and the treatment of wastewater sludge.
Danielle Rupp Chase Kasmerchak	The influence of vegetated buffers and shoreline development on aquatic macrophyte diversity in central Wisconsin lakes.
Danielle Rupp Allison Willman	Comparison of microbial salinity tolerances in anthropogenically influenced wetlands.
Michelle Scarpace	Improving and analyzing soil health of degraded soils in central Wisconsin.
Elise Worthel	Why take tail length measurements from migrating Northern Saw-Whet Owls?

Poster Presentations

Presenter(s)	Title
Mitch Socha Nathan Martin Jason Halambeck Tony Stefka	Paper formation optimization.
Gerrit Spiess David Lieble Lucas Mourau Kenneth Fayas	Cross-directional basis weight variability on the pilot paper machine.
Kacey Tait Amanda Webb	Evaluation extraction methods of mustard and potassium permanganate for sampling <i>Lumbricus terrestris</i> populations.
Hayley Templar Victoria Bertolami Nathan Anschutz	Identifying areas critical to the improvement of non-point source pollution in the Weyauwega Lake Watershed, Waupaca County, Wisconsin.
Sam Thomas	An analysis of bathymetric model accuracy from data collected by two digital systems on inland lakes; Marathon County, WI.
Melissa Wanasek Alex Stieve Casey Hallum Wade Przekurat	Drainage profile optimization.
Allison Willman	Effectiveness of the 80-150% hydrology requirements on isolated wetlands in Lake County, IL.
Anastasia Wolf-Flasch	Above ground biomass and nitrogen concentrations of vegetation in Moses Creek in fall 2012.

Trainer Natural Resources Building Map



Symposium Presentations

Oral Presentation Rooms:

- room 120 (see page 9 for schedule)
- room 122 (see page 10 for schedule)
- room 170 (see page 11 for schedule)

Poster Presentations will be displayed in the South Hallway and the Central Lobby

Evaluation of second year vegetative growth in the Moses Creek floodplain restoration.

Adviser: Dr. James Cook

POSTER

This study evaluates vegetative success of the Moses Creek floodplain two years after its restoration. Overall vegetative richness at the quadrat and floodplain scale, percentage of wetland obligates, and relative cover per quadrat were predicted to have increased from the previous fall. Twenty-three previously established transects ran 20 meters apart across the floodplain, and 1-2 plots in each transect were randomly chosen to be sampled. Vegetation and bare mineral soil were measured on a percent cover basis within a 1 m x 0.5 m quadrat at each plot. An average of 5.8 plant species were found per quadrat and the average vegetative cover was 30%. Both values are less than those from the previous fall; however an unexpected result was a distinct cover pattern which showed that vegetation increased dramatically throughout the northern section of the floodplain and decreased in the southern. Wetland obligates made up 65% of the dominant species in each quadrant, and FQI was calculated to be 15, an increase from the previous fall. The summer drought had less of an impact on the wetland system than the magnitude of the drought would have suggested, and although only recently restored, data suggests a resilient and properly functioning system.

Consider for judging.

Claire Ault



Major: Forest Ecosystem
Restoration & Management

Mitch Groenhof



Major: Forest Ecosystem
Restoration & Management

Evaluation of dorsal spines as a nonlethal alternative to otoliths for estimating bluegill ages.

Adviser: Dr. Daniel Isermann

ORAL

Zachary Beard



Major: Fisheries

Otoliths are considered the most accurate structure for obtaining estimates of fish age for a variety of species, including bluegill (*Lepomis macrochirus*). However, removal of otoliths requires fish sacrifice. Scales offer a nonlethal method to age fish, but scale-based age estimates are often inaccurate and imprecise. Dorsal spines may offer a better nonlethal alternative to otoliths for estimating the age of bluegills, but a previous study indicated that dorsal spines provided consistently lower ages than otoliths for black crappies (*Pomoxis nigromaculatus*). Our objective was to determine if ages estimated from dorsal spines and otoliths were similar for bluegills collected from several Wisconsin lakes and to determine if age estimates differed between whole and sectioned dorsal spines. On average, ages estimated from dorsal spines were lower and less precise than ages estimated from sectioned otoliths. The extent to which dorsal spine ages differed from otolith ages was not consistent among fish, making development of an age-error matrix difficult. Sectioning of spines appears unnecessary because ages provided from whole spines and sectioned spines were the same .

Consider for judging.

The effects of *Phragmites australis* on wetland soils.

Adviser: Dr. Kyle Herrman

POSTER

Bree Bender



Major: Water Resource
Minors: Soil Science ,
Wetland Certificate

Invasive plant species are generally thought to have negative impacts on ecosystems. They out compete native species, alter ecosystem processes, and alter habitat of the ecosystem they invade. *Phragmites australis* is a large perennial, woody grass found primarily in wetlands. It can grow up to 6 meters tall. This plant is widespread and most likely naturalized in coastal wetlands in the Eastern United States but appears to be invasive and disruptive in inland wetlands in the Midwest. During the fall of 2012, 3 wetlands that are known to *P. australis* were sampled (Schmeckle Reserve, Necedah Wildlife Refuge, and Mead Wildlife Area). At site soil cores of the top 10 cm were collected in subplots ($n = 7$) that were occupied by *P. australis* and subplots ($n = 7$) were sampled that contained native vegetation as well. Soil samples were analyzed for bulk density, microbial biomass carbon, microbial biomass nitrogen, nitrogen mineralization rate, soil carbon and nitrogen content, and extractable nitrogen. Two-way ANOVA was used to analyze statistical difference using SigmaStat 3.1 ($\alpha = 0.05$). The data suggest little differences exist between the soil invaded by *P. australis* and the soil occupied by native vegetation in Schmeckle Reserve and Necedah Wildlife Refuge. Differences were observed in Mead however. In particular, extractable nitrogen ($p < 0.001$), microbial biomass carbon ($p = 0.107$), and microbial biomass nitrogen ($p = 0.036$) were significantly lower in the *P. australis* section of the wetland. Results from this study suggest that the impact of *P. australis* site dependent and most likely will depend on the native vegetation the invasive species is attempting to displace.

Consider for judging.

Storm size's effect on constant slope hydrograph separation method.

Adviser: Dr. Katherine Clancy

POSTER

Sarah Bowman



Major: Water Resources
Minors: Conservation
Biology and Soil Sciences

The two main components that make up stream flow are baseflow and runoff. Baseflow is important as it maintains flows during times of low precipitation and dryness. Its abundance is also an indicator of habitat. Hydrograph separation techniques are one of the methods used to determine the amount of baseflow in a gauged stream. One widely used and relatively simple hydrograph separation technique is the constant slope method. A limitation of this method is the problem associated with finding the inflection point which is determined by the equation $N = A^{0.2}$ where N is the number of days past the peak of the hydrograph and A is the watershed area. The equation does not perform equally well in all watersheds and for all storm sizes. The objective of this project is to determine how sensitive the equation is to storm size. To determine this sensitivity, twenty storms ranging in size from (0.01 to 1 cm) were identified in two similarly sized gauged watersheds: the Kickapoo at La Farge (266 sq mi) and Pecatonica (273 sq mi). Hydrograph separation was done manually using the constant slope method and compared to inflection point determination using curve fitting software and USGS HYSEP minimum flow hydrograph separation.

Consider for judging.

Micropropagation of the american hazelnut.

Adviser: Dr. Michael Demchik

POSTER

Heath Brandner



Major: Forest Administration and Utilization

Minor: Business Administration

Due to the smaller size of the nuts and the lack of improved varieties, the American hazelnut (*Corylus americana*) is not currently traded on the world market, while the European hazelnut is the basis for a sizable industry. The main barriers to cultivation of European hazelnut in the Lake States are its lack of winter hardiness and lack of resistance to the main disease, Eastern Filbert Blight, to which the American hazelnut has multiple mechanisms of resistance. This project aims at successfully optimizing the transfer intervals for micropropagated stem cultures of American hazelnut. We are assessing transfer intervals of 2-weeks, 3-weeks, and 4-weeks. We started with 3 cultures per transfer interval with a total of 2-3 stems per culture. After 12 weeks, we found that cycle times of 2 and 3 weeks significantly optimized production of more viable stems than the stem cultures that were transferred at 4-week intervals. At the time of this proposal's submission, we have 22 weeks of data, as the research continues more results are expected. Our next step is to grow viable plants by creating a root developing protocol for these micropropagated cuttings.

Consider for judging.

Deflection of juvenile wood in comparison to mature wood.

Adviser: Dr. Michael Demchik

POSTER

Zachary Buchanan



Major: Forestry
Management
Minor: Soil Science

Juvenile wood in trees, produced when the tree is young and small, is often weaker and less structurally sound and stable than wood that was produced when the tree was older. The objective of this study is to measure the difference in deflection of the wood from closer to pith (more juvenile) and from farther away from the pith (more mature). The species of wood used in this study was *Prunus serotina* (black cherry); both boards used were perfectly clear pieces of wood, from the same log and were planed into square and level pieces. Each piece was 2" wide x 40" long x 3/8" thick. One pound lead weights were used, each weight was added directly to the center of the board, at which point the amount of deflection was measured. I hypothesized that the wood farther from the pith wood have less deflection due to fact that it is more mature growth. At this point in the study it appears that the more mature wood (farther from the pith) will have more initial deflection, but will deflect less as more weight is added; while the more juvenile wood (closer to the pith) will deflect less initially than the more mature wood. It appears that at this point, both pieces have the same amount of total deflection.

Consider for judging.

Intensity of *Skrjablingylus nasicola* infection in short-tailed weasels (*Mustela erminea*).

Advisers: Dr. Shelli Dubay and Dr. Todd Huspeni

ORAL

Matthew Buchholz



Major: Wildlife Ecology Research
and Management
Minors: Captive Wildlife and
Biology

Short-tailed weasels (*Mustela erminea*) are trapped as legal furbearers but are not actively managed by the Wisconsin Department of Natural Resources. Trappers tend to trap from late November to late January. Carcasses from trappers provide a unique opportunity to investigate parasite infections. We have been identifying internal parasites in weasels for 6 years (320 total necropsies with 69 being conducted this year), beginning a long-term health assessment of the weasels in Wisconsin. Our aim is to better understand the ecology of free-ranging weasels and to provide weasel trappers with health updates on the animals they trap. In the past, we have identified *Skrjablingylus nasicola*, a parasitic nematode of the nasal sinuses, in over 95% of the weasels. This parasite is transmitted to weasels when they consume an infected adult gastropod or small mammal. Intensity of infection (number of worms per host) varies dramatically, with some animals having 1 – 2 worms and others having over 50 in the nasal cavities. This year, our goals were to: 1) identify differences in intensity by year and by gender, 2) identify differences in intensity by age for male weasels 3) determine if one nasal sinus has a higher intensity than the other, and 4) investigate if infection affects body condition of weasels. Parasites were collected and identified using reference specimens in the Steven Taft Parasitological Collection. We used a ruler to measure total length of each weasel and weighed them to identify species. We used baculum shape to age males and all females are adults because they are capable of reproducing in their first year. We use \log_{10} weight divided by \log_{10} length as an index of body condition because measuring body fat is unreliable in weasels. This year, we necropsied 66 weasels and *S. nasicola* was found in all but one. Average intensity for weasels this year was 14.84 worms per weasel (SD = 11.43). Analyses from previous years show that high intensity infections do not affect body condition of weasels. We will update statistical analyses to include data from this year and discuss implications of our findings.

Consider for judging.

The effects of biochar addition and cover crops with corn growth on soil physical and chemical properties of the central sands of Wisconsin.

Adviser: Dr. Jacob Prater
POSTER

Dana Christel



Major: Land and Soil
Management
Minor: Water Resources

Cover cropping and applying biochar as a soil amendment are two methods that aid in increasing soil productivity and restoring soil quality. This project integrates these two techniques to determine their effect on sandy soils that have been extensively farmed in corn for consecutive years in central Wisconsin. Corn is currently being grown in a greenhouse in sandy soil material taken from a farm located in central Wisconsin. Three different treatments, along with a control, have been applied to determine their effect on the soil. The treatments include: a control, planting rye as a cover crop, adding biochar as a soil amendment, and the combination of planting the cover crop and adding biochar. Cover crops benefit soil by reducing evaporation, soil temperatures, and erosion from wind and water. Biochar is the byproduct of the pyrolysis of biomass to produce biofuels. It has been shown to decrease the bulk density of the soil, increase water holding capacity and alter other soil physical properties, making it more productive for plant growth. To evaluate whether the treatments have an effect the following properties will be analyzed: bulk density, soil pH, soil nitrogen content, soil organic matter, water holding capacity and plant available water. The anticipated outcome of this project is to determine if the three treatments have a positive effect on physical and/or chemical soil properties. Preliminary results for pre-plant soil analyses showed that soil treated with biochar had a higher bulk density than the control with values of 1.63 g/cm³ and 1.57g/cm³, respectively. These results were not expected, however it is possible that post-plant results may show otherwise. Pre-plant soil amended with biochar had a higher soil pH of 7.45 compared to the control with a soil pH of 6.15. Germination appeared to be inhibited in the pots treated with biochar, with the amended pots producing a 37% germination rate and the control a 77% germination rate. It is hypothesized that post-plant results will show that the addition of biochar improved bulk density, water holding capacity, and organic matter content. It is hypothesized that covercropping will improve the analyzed properties as well. The findings of this study would be valid for sandy soil under agricultural production of this area and may impact future management techniques for agricultural soils.

Consider for judging.

Factors leading to fatalities of all-terrain vehicle and snowmobile users in Wisconsin.

Adviser: Dr. Robert Holsman

ORAL

Ethan Conover



Majors: Resource Management -
Law Enforcement
Minor: Conservation Biology

Daniel Schultz



Majors: Resource Management -
Law Enforcement
Minor: Land Use Planning

In recent years, there has been continued use in the number of all-terrain vehicle (ATV) and snowmobile users in the state of Wisconsin. However, incidents are increasing per registered Wisconsin ATV according to data provided by the Wisconsin Department of Natural Resources (WDNR), and were climbing rapidly until the introduction of a night time speed limit for snowmobile users. Information from each fatality is recorded by the WDNR, the agency responsible for organizing both ATV and snowmobile safety courses, in order to identify common factors between the fatalities. We reviewed existing data from past incidents ranging back to 2002 in order to determine the most common cause of incidents as well as to suggest preventative measures to reduce future fatalities and injuries associated with the use of ATVs and snowmobiles in Wisconsin.

Do not consider for judging.

Is there a relationship between diurnal raptor and greater prairie-chicken abundances at Buena Vista Wildlife Area?

Advisers: Dr. Jason Riddle and Dr. Scott Hull

ORAL

Alyssa DeRubeis



Majors: Wildlife Ecology
Research and Management
and Biology
Minor: Spanish

The greater prairie-chicken (GPCH) is a threatened species in Wisconsin and has experienced population declines of >90% nationwide within the past 50 years. The bird also has economic value both for hunting and wildlife-viewing purposes. Therefore, it is critical to restore its population to a sustainable level. Some of the greatest threats to viable GPCH populations include habitat loss and a lack of genetic diversity. However, relative raptor abundance has been questioned as another potential factor of GPCH decline. I compared Raptor Road Surveys (RRS; conducted by the University of Wisconsin-Stevens Point Student Chapter of The Wildlife Society) with male GPCH booming ground surveys (managed by the Wisconsin Department of Natural Resources) in the Buena Vista Wildlife Area (BVWA). I used simple linear regression to analyze the average number of American Kestrel, Northern Harrier, Red-tailed Hawk, Rough-legged Hawk, and total diurnal raptors observed per surveyor per RRS and total male GPCH counts from 9 years between 1995 and 2012. If raptors are responsible for recent GPCH declines at BVWA, then a negative relationship should exist between one or more raptor trends and GPCH abundance. I found no statistically significant relationship ($P > 0.05$) between any of the raptor/GPCH combinations. These preliminary results suggest that relative diurnal raptor abundance may not be a major cause of GPCH declines in BVWA.

Consider for judging.

Seroprevalence of *Leptospira interrogans* antibody in white-tailed deer from two sites in Wisconsin.

Advisers: Dr. Shelli Dubay and Dr. Jason Riddle

POSTER

Nigel Golden



Majors: Biology, Wildlife Ecology:
Research and Management

White-tailed deer (*Odocoileus virginianus*) are the most important game species in Wisconsin. In 2010, the WDNR initiated a research project to estimate deer density and to quantify cause-specific mortality of fawns and adult male deer. One potential cause of mortality that has been proposed by the public is leptospirosis infection. Leptospirosis (*Leptospira interrogans*) is a bacterial disease that infects primarily the kidneys of affected hosts, and can cause abortion in deer. Bacteria are shed in urine and contaminate primarily surface water. We aimed to identify if deer in Wisconsin were commonly exposed to leptospiral bacteria and to identify environmental factors related to exposure. During the winters of 2010 – 2011 and 2011 – 2012, researchers with WDNR and the University of Wisconsin-Madison (UW-Madison) trapped white-tailed deer in two sites in Wisconsin. Blood samples were collected and blood serum was sent to Minnesota Veterinary Diagnostic Laboratory for antibody testing. Sera were tested for antibody against six serovars of *Leptospira interrogans* using microscopic agglutination. Because we had significant numbers of deer exposed to *L. i. serovar pomona* in both years, we ran logistic regression analyses on exposure to leptospiral antibody. We used 6 environmental factors in analyses: Land type (public or private), deer age, year, trap site (Winter or Shiocton), exposure to Parainfluenza 3 virus, and exposure to infectious bovine rhinotracheitis virus. Using these factors, we specified 14 a priori, candidate logistic regression models to explain exposure to *L. i. pomona*. We used Akaike's Information Criterion corrected for small sample size (AICc) for model selection. We used 223 deer in our analyses and 13% of them were exposed to *L. i. pomona*. Older deer trapped on public land were more likely to be exposed to *L. i. pomona*, possibly because of the increased number of maintenance hosts for leptospiral bacteria on public land.

Consider for judging.

Synonymous plant common names, their different perceptions, and their affect on marketability.

Adviser: Dr. Richard Hauer

POSTER AND ORAL

Hunter Gosda



Major: Urban Forestry
Minors: Soil Science and
German

Many woody landscape plants, not to mention plants in general, are known to have multiple common names. Plant common names can vary according to region, the environment they grow in and the people who refer them. All plant names are anthropogenic and are used in different contexts by different people, whether the name is used to assert a particular quality or whether it is part of regional vernacular; it is used to communicate an ideal. All plant names are merely signs that people use to refer a particular plant and those signs (common names) will have varying perceptions associated. That is to say, different names bring to attention different, sometimes distinct, attributes of the plants that they signify. Some plant names may bring to attention a splendid fall color or may warn of a toxic effect while other names are simply arbitrary or even erroneous in regards to physical characteristics. Some names are ubiquitously familiar while other alternatives may be virtually unknown. We hypothesize that the name of a plant has an effect on one's perception of that plant and thus the marketability of the plant. Our survey targets people's propensity to select a plant based upon the perception the common name incurs. Respondents were asked to indicate their overall experience with plants in general as well as whether each common name was familiar to them or not. Respondents were then asked to indicate their likelihood to select based on the common name listed. Many plants found in landscapes or within the urban environment in general have been selected and planted by humans. This implies a selection pressure. Urban plant communities often have a unique composition and the data from this study could be used to formulate further studies on selection pressures of urban plant communities.

Consider for judging.

Comparing diatom communities of the Plover River via gut content analysis of the Central Stone Roller (*Campostoma anomalum*).

Adviser: Dr. Justin Sipiorski

POSTER AND ORAL

John Grosch



Majors: Fisheries and
Biology Management

The central stoneroller (*Campostoma anomalum*) is a benthic, stream dwelling fish. Stonerollers feed upon periphyton along the substrate of streams. Housed within the Becker Memorial Ichthyologic Collection of the University of Wisconsin-Stevens Point, are a number of specimens collected and preserved within the last 45 years. Using groups of specimens collected in the same geographic range during three time frames (1967, 1989, 2010), we analyzed the diatom communities present at 3 time intervals. The fish were dissected and gut contents were removed. The contents were acid washed using 12M HCl, and 40% H₂O₂. The samples were dried, prepared, and analyzed using an electron microscope. Pictures of the samples were taken in a predetermined pattern at specified magnification for further identification. Numbers were tallied for each genera present. A Chi-Square analysis was done to examine community shifts in number of individuals from each genera present through the different time frames, and a Bonferroni Correction was applied. We concluded the communities present in 1967 and 1989 were relatively similar. However, a dramatic shift in community composition occurred between 1989 and 2010. This was correlated to land use practice changes and water quality shifts of this time frame. We were able to identify indicator genera, which shifted dramatically as caused by specific hydrologic changes.

Consider for judging.

Wisconsin waterfowl species identification utilizing a skull diagnostic probability.

Adviser: Dr. Eric Anderson

POSTER AND ORAL

Jacob Gross



Major: Wildlife Ecology
Minors: Biology and
Resource Management

The ability to identify unknown waterfowl species from skeletal remains can assist in determining a species' historical range. Different species of waterfowl in Wisconsin can be identified by comparing certain diagnostic features of an individual skull. This project focused on creating an interactive Excel spreadsheet that will allow researchers to enter skull measurements and find the most probable corresponding species. Measurable diagnostic criteria for the skull program include: skull length, foramen magnum width, inter-orbital width, brain case depth, brain case width, naso-frontal hinge length, post orbital process length, supra-orbital process length, and lacrimal process length. Along with the Excel program, 22 different waterfowl species skulls were collected during the 2012 Wisconsin waterfowl season and prepared to display as examples. Wildlife managers and educational institutions, can use this program to further distinguish different skull diagnostics of waterfowl and identify unknown deceased specimens.

Consider for judging.

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

Adviser: Dr. Eric Anderson

POSTER

Tessa Hasbrouck



Majors: Wildlife Ecology Research and Management and Biology
Minor: Adventure Education

Rebecca Kelble



Majors: Wildlife Ecology Research and Management and Biology

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

Consider for judging.

Watershed governance and Lake Wausau: an institutional analysis.

Adviser: Dr. Kristin Floress

POSTER

Matt Havlik



Major: Natural Resource
Management

Minor: Sustainable Energy and
Business Administration

Shantanu Pai



Major: Soil and Waste Management

Minor: Communication

Lake Wausau is a 1,851 acre lake located in central Marathon County, Wisconsin. Known for its abundance of outdoor recreational opportunities, diminished water quality and degradation of shoreline habitat have plagued the Lake Wausau watershed over recent decades. Point and non-point sources of pollution may both have detrimental impacts on water quality. The primary objective of this study is to examine the structure of water governance impacting the management of the Lake Wausau watershed. This research was performed through a content analysis of resource management, land use, and other plans and documents from various institutions related to Lake Wausau. Current policies in place described by ordinances, master plans, and bylaws of local municipalities and organizations were coded according to established methods of plan analysis. In order to understand the clarity of policies, the Institutional Analysis and Development framework by (Ostrom, 2007) was used to determine the level of coerciveness of each policy and the extent to which policies specifically described necessary actions and sanctions. Early results of this research indicate that most plans do not demand actions, but rather suggest them, making it difficult to effectively manage resources impacting water quality.

Consider for judging.

A comparison of red pine plantation management techniques via red squirrel (*Tamiasciurus hudsonicus*) and small mammal populations.

Advisers Dr. Jason Riddle, Kevin Burns, and Joseph Dittrich

POSTER

The purpose of this study was to compare the abundance of red squirrels and occupancy of small mammals between two red pine plantations that differed in management techniques on the University of Wisconsin – Stevens Point (UWSP) Treehaven property. The two red pine plantation management techniques were a production technique, designed to produce optimal timber for sales purposes, and a wildlife promotion technique, designed to provide harvestable timber as well as increase wildlife use and biodiversity. This study assessed the impact of the management techniques on red squirrels use by comparing the results of a mark-recapture study between the two stand types. During January 2013, twenty Tomahawk live traps were baited with a mixture of peanut butter, molasses, and oats, and placed in a 30 meter grid within each stand. Each grid was checked every three hours from being opened, and captured squirrels were ear tagged and released. A total of nine individual red squirrels were captured during the 27 capture session study, eight in the wildlife promotion stand, and one in the production stand. The difference in apparent abundance was significant at the alpha = 0.05 level ($X_{12} = 7.11$, $P < 0.02$). Analysis performed in Program MARK yielded a capture probability estimate for both stands of approximately 0.095 per trap session. Many traps indicated some form of mammal activity (missing bait or droppings), though not all captured the target species. Trap data that included all small mammal activity (captured red squirrels, missing bait, or droppings) were analyzed in Program PRESENCE via a single-season occupancy approach, and model selection was accomplished with Akaike's Information Criterion (AIC). $\Psi(\text{stand})$ was the top model, with approximately 70% of the AIC weight. The results show that occupancy rates were higher in the wildlife promotion stand (0.76) than the production stand (0.20). Collectively, the results indicate that the stand managed for wildlife promotion has higher red squirrel abundance and more widespread small mammal activity than the stand managed simply for timber production. Forest managers at Treehaven can use this information to guide future forest management practices.

Amanda Heckenlaible



Major: Wildlife Ecology: Research and Management, Biology
Minors: Water Resources, Wetlands Certificate

Do not consider for judging.

UV spectrophotometry for nitrate analysis of drinking water.

Advisers: Dr. Paul McGinley, Kevin Masarik, and Brent Bednarek

POSTER

Erik Hendrickson



Major: Water Resources
Minor: Chemistry

Ultraviolet spectrophotometry has the potential to be an easy, low-cost, and safe analytical method for measuring nitrate concentrations in drinking water. Nitrate contamination is a common problem in Wisconsin, especially in private wells near agriculture. Contamination is generally a result of non-point sources like fertilizers mobilizing through soil and into the groundwater. Drinking water above the EPA 10 part per million standard is associated with various health complications like methemoglobinemia and some recent studies suggest various cancers. If ultraviolet spectrophotometry proves to be a precise and accurate means of measuring nitrate, than this method could prove useful as a quick and cost efficient analysis of nitrate. In this study, nitrate standards were used to create Beer's law plots at various wavelengths. Samples were derived from numerous counties in the state of Wisconsin. The method was compared to a reliable colorimetric method used by the Water and Environmental Analysis Laboratory on UW-Stevens Point's campus. The results derived from the experiment have the potential to support the application of ultraviolet spectrophotometry as a feasible and efficient method for both analytical laboratory and field work.

Consider for judging.

Effects of salicylic acid and lemon-lime soda on the vase life of fresh cut Chrysanthemums (*Dendranthema grandiflorum* (Ramat.) Kitamura).

Adviser: Dr. Virginia Freire

POSTER

Zachary Hudson



Major: Biology
Minors: Ethnobotany &
Anthropology

Andrea Schneider



Major: Biology
Minors: Ethnobotany & Chemistry

This experiment was done to investigate the effects of different water additives on the vase life of fresh cut garden mums. Flowers were placed in solutions of tap water, lemon-lime soda, aspirin, and a commercial fresh cut flower food. Observations of aesthetics and signs of senescence were recorded every other day for the course of the experiment. The experiment ran for 40 days until the last head, on the lemon-lime solution, was considered totally senesced.

Consider for judging.

Presence of shrews in stomachs of weasels legally trapped in Wisconsin.

Adviser: Dr. Shelli Dubay

POSTER

Laura Jaskiewicz



Major: Wildlife Ecology Research
and Management
Minor: Biology

Tanner Jones



Major: Wildlife Ecology Research
and Management
Minor: Conservation Biology

Weasels (*Mustela* spp.) that live in the Midwestern United States primarily eat shrews, squirrels, voles, mice, rabbits and mollusks. Diet varies with gender because male weasels are larger than females and are therefore able to take larger prey than females. Adult weasels consume larger prey than juveniles as well. For the last 6 years, we have been working with furbearer trappers to acquire carcasses for parasite investigations. Since 2011, we have investigated stomach contents of weasels trapped in Wisconsin and identified prey species based upon hairs found inside the stomachs. We hypothesized that 1) a higher proportion of male weasels will have mammals in their stomachs because males are larger in size, 2) that a higher proportion of adult weasels will eat shrews than juveniles, and 3) shrews will be the most common vertebrate in weasel stomachs. We evaluated stomach contents of approximately 135 weasels using dissecting microscopes over the past three years. Hairs in stomachs were identified to genus or species using a hair identification key. Hairs were placed on a slide with xylene in order to see the unique characteristics of the medulla (central portion) of the hair. We compared proportion of shrews in stomachs by gender, year, and age using a Fisher's exact test. Prey species included shrews, chipmunks, squirrels, opossums and rabbits. In previous years, shrews were the most common prey item identified in weasel stomachs. We will discuss importance of differences in diet by gender, age, and year.

Consider for judging.

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

Adviser: Dr. Shelli Dubay
ORAL

Bryant Kern



Major: Wildlife Ecology Research
and Management and Biology

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

Consider for judging.

Results of Plover Energy Efficiency Project and preliminary analysis of UWSP Efficiency Potential.

Adviser: Dr. Anna Haines

ORAL

Jessica Kuna



Majors: Economics and Social Science

Minors: Sustainable Energy, Environmental Science, and Geography

Dan Hoff



Major: Wildlife Ecology: Research and Management

Minor: Sustainable Energy

Challenges occur when demand for energy continues to increase and distribution becomes increasingly more costly as coal and oil prices continue to rise. As a result energy efficiency projects are becoming extremely attractive options for developed nations. Many utility companies are turning to pilot projects to test both the potential for demand side reductions, and the consumer willingness to integrate demand load controls. We spent the summer working for Franklin Energy Services, an implementation contractor for Focus on Energy, in the Village of Plover. During the course of this internship we identified projects that are estimated to save the Village over \$8,000 annually. This experience provided us with a unique skill set to utilize for a project at UW-Stevens Point. During the Fall 2012 semester, we led a student project for Dr. Michael Reisner's NRES 341 class (Introduction to Energy Policy) analyzing the potential for energy efficiency projects in campus facilities. We will present a summary of results from the Village of Plover followed by a summary of results from the campus buildings, and discuss opportunities and challenges for implementation of energy efficiency projects in both locations.

Consider for judging.

The development of soil and microbial communities in the Moses Creek Restoration Wetland in Stevens Point, Wisconsin.

Adviser: Dr. Kyle Herrman
POSTER

Mitigation is a process in which restored or created wetlands are used to offset the loss of naturally functioning wetlands during land development projects. Current time frames of monitoring mitigation projects may not be long enough to completely evaluate wetland progression which may take decades if not centuries to reestablish. The objective of this study was to examine how the Moses Creek Restoration Wetland is progressing towards a naturally functioning wetland (i.e., a reference site). Within the restoration site two locations, floodplain and standing water scrapes were sampled in 4 subplots each to determine if any differences could be observed between microhabitat created during the project. The reference site for this study is located in the headwaters of Moses Creek and did not contain any microhabitat and thus was only sampled in 4 subplots of floodplain. Soil cores of the top 10 cm were collected in the field and analyzed in the laboratory to determine if any statistical differences were observed. Bulk density, carbon and nitrogen content, extractable nitrogen (both nitrate and ammonium), and microbial biomass carbon were the primary components tested. One-way ANOVA was used to determine if any significant differences were observed ($\alpha = 0.05$) on the measured parameters using SigmaStat 3.1. Results indicate that the reference wetland had significantly higher carbon and nitrogen content and microbial biomass carbon, but lower bulk density than the floodplain and scrape within the restoration site (which were not statistically different). Most of these differences can be explained by the limited time of development in the restoration site which was sampled during the second year following construction. Continued monitoring of the Moses Creek Restoration Wetland will continue to further evaluate the progression of this restoration site.

Do not consider for judging.

Stuart Lannoye



Majors: Water Resources and
Geoscience
Minor: Geology

Ashley Hansen



Majors: Water Resources and
Soil Science

Eric Englund



Major: Water Resources
Minor: GIS and Spatial Analysis

White-tailed deer home range comparison between rural, urban, and Schmeeckle Deer.

Adviser: Dr. Tim Ginnett

POSTER

Austin Lee



Major: Wildlife Ecology:
Research and Management
Minor: Writing: Environmental
and Scientific Track

Andrew Voigt



Major: Wildlife Ecology Research
and Management

Our proposed study is focused on identifying the home ranges of White-tailed deer (*Odocoileus virginianus*) in the Schmeeckle Reserve, and comparing them to the ranges of other urban and rural populations. Food and water resources are plentiful and available throughout the reserve, and the lack of predators could mean an increase in the overall survivability of the deer when compared to larger rural populations (Rouleau et al. 2002). However, habitat loss initiated by urban development may cause an alteration in the home ranges (Etter et al. 2002) of Schmeeckle Reserve deer. This is important in that deer historically utilize woody cover as bedding and browsing areas of their range (Grund et al. 2002). Identifying the home ranges and movements of the white-tailed deer would allow us to improve the habitat management in the reserve. Alternative management plans can be influenced by: social interactions of bucks and does, population densities and forage competition, all of which are initiated by the size of their home range (Larson et al. 1978). This study will provide wildlife managers with spatial data regarding habitat preference and home range. Our data could lead to further studies of management in other urban reserves where white-tailed deer are present. In our project we are testing three hypotheses in the following order: **1.** The home ranges of white-tailed deer in Schmeeckle Reserve are significantly smaller than the home ranges of other reserve deer. **2.** The home ranges of Schmeeckle Reserve deer are significantly smaller than the home ranges of other urban deer. **3.** The home ranges of Schmeeckle Reserve deer are significantly smaller than that of rural deer.

Consider for judging.

Prevalence of *Filaroides martis* in short-tailed weasels (*Mustela erminea*).

Adviser: Dr. Shelli Dubay and Dr. Todd Huspeni

ORAL

Robert Lisiecki



Major: Wildlife Ecology
Minor: Captive Wildlife

Short-tailed weasels (*Mustela erminea*) are trapped as legal furbearers but are not actively managed by the Wisconsin Department of Natural Resources. Trappers tend to trap from late November to late January, providing a unique opportunity to acquire carcasses from trappers after furs have been removed. We have been necropsying weasels and looking for internal parasites for 6 years so we are beginning a long-term health assessment of the weasels in Wisconsin to better understand the ecology of free-ranging weasels and to provide weasel trappers with health updates on the animals they trap. In the past, we have identified *Filaroides martis*, a parasitic nematode of the respiratory tract, in approximately 35% of the weasels we necropsy. *Filaroides martis* is transmitted to weasels when they consume an infected adult gastropod. This year, our goals were to: 1) identify differences in prevalence and intensity by year, and 2) identify differences in parasite prevalence and intensity by gender. In 2012 - 2013 we necropsied 69 weasels and parasites were collected and identified using reference specimens in the Steven Taft Parasitological Collection. We will use a Fishers Exact test to compare prevalence of *Filaroides martis* in males and females. In the past, males had a higher prevalence ($P=0.00$, $\alpha=0.05$, $df=1$). We will also use a Mann-Whitney U-Test to identify difference in intensity by gender. Previous tests showed that males had more parasitic cysts on the lungs than females ($P=0.0323$, $\alpha=0.05$, $df=1$). Males are believed to have a higher prevalence and intensity of *Filaroides martis* because they are larger-bodied and need to consume more food than females putting males at a higher risk of contracting *Filaroides martis*.

Consider for judging.

The use of artificial nesting boxes inside and outside the Little Eau Pleine River corridor by wood ducks (*Aix sponsa*) and hooded mergansers (*Lophodytes cucullatus*) in central Wisconsin.

Adviser: Dr. Kevin Russell
POSTER

Kasey McCauley



Major: Wildlife Ecology:
Research and Management

Connor Christopherson



Major: Wildlife Ecology: Research
and Management.
Minor: Soils Science

Wood ducks (*Aix sponsa*) and hooded mergansers (*Lophodytes cucullatus*) are two cavity-nesting species of waterfowl that are common in central Wisconsin. Due to the long-term reduction in the availability of natural nest cavities in trees, these birds have increasingly relied on artificial nest boxes for reproduction. Past erection and placement of these boxes in Mead Wildlife Area (MWA) in Marathon County, Wisconsin has allowed for this study to be conducted. Of the several large flowages that are found in MWA, the Little Eau Pleine River differs because of the habitat created by unique vegetation. We defined this area as a river corridor by measuring 50 meters on either side from the center of the Little Eau Pleine River. This corridor encompasses the majority of boxes that are located near the river. Combined historic data on nest boxes used by wood ducks and hooded mergansers have been composed from MWA between the years of 2002 and 2012. New data has been collected from the 128 artificial nest boxes in MWA in January of 2013. We determined use of nest boxes by the presence of egg shells. We identified species of the presumed hatchings by shell thickness, and nest success was defined by the presence of intact membranes separated from shells. We will present results of our analyses through the evaluation of the potential relationship between artificial nest boxes and their success. This will be established by whether the box was inside or outside the Little Eau Pleine River corridor we established.

Consider for judging.

Nest box use of southern flying squirrels (*Glaucomys volans*) in relation to tree species and understory stem density.

Advisers: Dr. Shelli Dubay and Dr. Jason Riddle
POSTER

Leah McSherry



Major: Wildlife Ecology, Research and Management and Biology

Southern flying squirrels (*Glaucomys volans*) select habitats based on food availability and large (>25 cm DBH) mast-producing hardwoods. Southern flying squirrels inhabit areas with higher tree species richness and tend to be less active in areas where maples are dominant. Additionally, flying squirrels use cavities in large trees as nesting and roosting sites. The student chapter of the Wildlife Society erected nest boxes in Schmeeckle Reserve in 2001 to provide cavities for the squirrels. Nest boxes are located in various forest types, such as red pine stands and mixed deciduous forests. We hypothesized that flying squirrels would use nest boxes in stands with larger average DBH and in stands with a high diversity of mast-producing trees. We also thought that squirrels would use boxes at sites with lower shrub stem density and height, given that flying squirrels glide to the bottom of trees and then climb up to cavities or nest boxes. We checked 20 nest boxes three times from September through December of 2012, and recorded the number of squirrels occupying the boxes. Tree species and DBH were recorded for each tree with a nest box as well as the closest tree within each of the four quadrants. Stem density was evaluated by counting the number of stems from two randomly selected quadrants at the base of the nesting tree. A t-test was used to compare shrub density and DBH of trees near used and unused nest boxes. An ANOVA with Tukey multiple comparisons was used to determine if the mean number of squirrels occupying boxes differed by tree species. Analyses are ongoing, but 9 boxes (47%) were occupied by squirrels at least once, and 10 (52%) were not. We will discuss the implications of our findings in relation to future nest box studies in Schmeeckle.

Consider for judging.

Jen Anton



Major: Wildlife Ecology Research and Management

Snake behaviors during avian nest depredation events in North Carolina.

Advisers: Dr. Jason Riddle and Jessica Piispanen

POSTER

Maddie Michels-Boyce



Majors: Wildlife Ecology:
Research and Management,
Biology
Minors: Captive Wildlife,
Spanish

Little documentation exists regarding the behavior of snakes at avian nests during depredation events. However, 10 depredation events were recorded by video at bird nests on farms in North Carolina. These video recordings were analyzed to document behavioral trends in both the snakes and the birds. The snake species documented are the black rat snake (*Elaphe obsoleta obsoleta*), the eastern kingsnake (*Lampropeltis getula*), and 4 unidentified snakes. The bird species documented are the northern bobwhite (*Colinus virginianus*), the blue grosbeak (*Passerina caerulea*), and the indigo bunting (*Passerina cyanea*). There were 7 depredation events during the day compared to only 3 that occurred after dark. Differences in the time of day were compared to the amount of time the snakes spent at the nests. A parent bird was usually absent and, when present, they rarely actively defended the nest.

Consider for judging.

Abundance and occupancy modeling of eastern gray squirrels (*Sciurus carolinensis*) within Sandhill Wildlife Area in response to stand age.

Advisers: Dr. Shelli Dubay and Dr. Jason Riddle

ORAL

Katherine Moratz



Major: Wildlife Ecology,
Research and Management.
Minor: Conservation Biology

Kristina Borgstrom



Major: Wildlife Ecology,
Research and Management.
Minor: Captive Wildlife

Small mammals can be used as indicators of ecosystem health assisting in the assessment of timber harvest influences on population dynamics. The influence of stand age on Eastern gray squirrel (*Sciurus carolinensis*) populations has not been well documented in the Midwest, and information in Wisconsin is lacking. Our research examines the relationship between stand age and abundance of gray squirrels in Sandhill Wildlife Area, Babcock, Wisconsin. We hypothesize that squirrel abundance and occupancy rate will be higher in a mature stand when compared to younger stands. We gathered information on gray squirrel abundance in a mature (70+ years), an intermediate (10-20 years), and a young (<5 years) stand. We trapped gray squirrels in the winters of 2012 and 2013 using 20 Tomahawk traps per stand. In 2012, we caught 34 gray squirrels with 16 recaptures. We captured 89% of the squirrels (95% of the recaptures) in the mature stand, 11% (5% of the recaptures) in the intermediate stand, and none in the young stand. Trapping in 2013 is ongoing, but so far the majority of the squirrels (XX90%) have been trapped in the mature stand. A comparison will be made between the 2012 and 2013 linear regressions. Preliminary occupancy modeling using 2012 data suggests that occupancy varies by stand and capture probability is constant among stands. Given each stand's detection history, the average probability of site occupancy is 100%, 11.9%, and 0% in respect to stand age. Based on squirrel abundance and occupancy modeling, squirrels are more likely to be present in mature stands than recently cut stands.

Consider for judging.

Size press improvement.

Adviser: Dr. Karyn Biasca

POSTER AND ORAL

Kurt Olezsko



Major: Paper Science and
Engineering
Minor: Chemistry

The purpose of this project is to optimize the size press and all related operations on the Paper Science and Engineering Department pilot paper machine to allow continuous application of surface size at a controlled rate. Initially mathematical modeling was utilized to assess the feasibility of design concepts, flow and application rates, and prototype dimensions. Once satisfactory data was obtained work began on a full scale prototype of a controlled application water box that has been mounted on the size press of the paper machine. While no continual operational tests have been performed at time of publication initial testing shows favorable flow and application control. Moving forward the starch kitchen will be improved and further testing will include starch application studies.

Consider for judging.

Jacob Farley



Trevor Snyder



Tommi Kuusisto



Methodology to identify priority conservation lands in NE Portage County.

Adviser: Dr. Aaron Thompson
POSTER AND ORAL

Aaron Pape



Major: Land Use Planning
Minors: Public Administration
and Policy Analysis

Conservation easements are an increasingly utilized tool to protect valuable natural resources on private lands. Land trusts often use conservation easements as their primary means of resource protection. This research is intended to develop a GIS based methodology for locating properties that have desirable characteristics that make the parcel worthwhile for placing an easement on. The criteria used to determine a property's inclusion for permanent protection were: proximity to existing protected lands, proximity to surface water resources, within a core forest area, and larger than 10 acres. The GIS analysis yielded 44 properties ranging in size from 10 to 161 acres and totaling 1985 acres. The owners of these properties were then surveyed by phone to learn basic information regarding their attitudes towards conservation and their willingness to work with nonprofit and government organizations to improve and protect their properties.

Consider for judging.

Evaluation of soil carbon and nitrogen concentrations in a restored and remnant wetland.

Adviser: Dr. James Cook

POSTER

Sarah Rademacher



Major: Forestry: Ecosystem Restoration and Management,
Minors: Soil Science and Conservation Biology

Ashley Hansen



Majors: Water Resources and Soil Science

Draining wetlands for agriculture has reduced the amount of undisturbed wetlands and limited the natural function of wetlands. Wetlands are an important carbon and nitrogen sink; they help reduce the levels of carbon dioxide in the atmosphere and remove nitrogen as a potential water pollutant. This study aims to test the impact of restoration on wetlands and to analyze its recovery with soil carbon and nitrogen concentrations. Two sites were chosen in Stevens Point, Wisconsin; a restored wetland, Moses Creek Restoration Site (MCR), and a remnant wetland which served as the reference site (RW). The restored site was a previously abandoned farm field left to natural forest succession, but was restored in 2010 using the RW for guidance. Twenty-eight locations were sampled within MCR two years after restoration, at which eight inches of soil were obtained using a soil core sampler and the top four inches and bottom four inches were separated for analysis. Similarly, twelve samples were obtained from RW and the top four inches were separated in the same manner. A carbon and nitrogen analyzer was used to quantify percentages of carbon and nitrogen in a subset of the upper four inch samples. Remaining samples were tested using a loss of ignition combustion oven to determine percent carbon. The RW site contained a significantly higher average percentage of carbon and nitrogen (Carbon 20.863%, 5.054%; Nitrogen 1.679%, 0.593%). The loss of ignition method revealed similar results, with significantly greater average percentages of carbon in the RW site (12.25%, 3.33%). The data indicate an evident difference between the nutrient accumulations of a restored versus a remnant wetland. It implies disturbances such as agriculture and subsequent forest successions impact a wetland's natural cycling of nutrients and that restored wetlands take time to develop into a fully functioning wetland.

Consider for judging.

Prevalence and intensity of ectoparasites on white-tailed deer in two sites in Wisconsin.

Advisers: Dr. Shelli Dubay and Dr. Todd Huspeni

POSTER

White-tailed deer (*Odocoileus virginianus*) are the most economically and culturally important game species in Wisconsin. The Wisconsin Department of Natural Resources is conducting research to determine causes of mortality in fawn and adult male deer from 2011-2014. To fit deer with radio-collars for mortality investigations, DNR biologists captured deer in box and Clover traps and drop-nets near Winter and Shiocton, WI. We collected ectoparasites to determine if the number of ticks and lice on deer differ by gender, study area or field season. We combed the ears of deer with flea combs and the parasite specimens were placed in vials containing 70% alcohol until identification. To date, we have acquired 27 samples, and have identified deer ticks (*Ixodes scapularis*) in at least one sample so far. In the 2011-2012 results, a t-test revealed that intensity of deer ticks (number of ticks on each deer) differed with site ($P = 0.002$). Deer captured in Winter had a higher intensity of ticks than those captured in Shiocton. This difference was attributed to variation in habitat type, because the Winter site has more forests than Shiocton, providing better quality habitat for ticks. We will further investigate this relationship for the 2012-2013 field season, but we hypothesize that greater parasite intensity will be found on white-tailed deer captured at the Winter site because of differences in habitat between the two sites.

Consider for judging.

Ryan Rodenkirch



Majors: Wildlife Ecology and
Biology
Minor: Captive Wildlife

Brittany Ruttenberg



Majors: Wildlife Ecology and
Biology

Anaerobic Digestion: Monitoring biogas production and the treatment of wastewater sludge.

Adviser: Dr. Rob Michitsch

POSTER AND ORAL

Timothy Runde



Major: Waste Management

Every year large amounts of livestock waste are produced and there are very few options of what farmers can do with the waste. This waste is a biological hazard and it contributes to greenhouse gas emissions, primarily methane (CH_4). However, this can be changed by anaerobically digesting the livestock waste and promoting the production of CH_4 by making and collecting biogas. Biogas is a low grade natural gas that can be used to produce electricity. If a simple, low cost yet effective system was produced a farmer could produce their own electricity and potentially put power back on the grid thus helping to secure the sometimes fragile rural power grids. Two simple anaerobic digesters have been set up to maximize the biogas being produced, and to find how much waste would be needed to power a typical U.S. farm. Gas production will be measured by water displacement (mL) per treatment over time. BOD (mg/L), COD (mg/L) and the concentrations CH_4 and CO_2 will be measured in the biogas at the start and end of each trial. If this research finds that this is a viable option, in the future every moderately sized farm could be considered a miniature power plant, and once again the American farm could be independent.

*Consider POSTER for judging,
Do not consider ORAL presentation for judging.*

The influence of vegetated buffers and shoreline development on aquatic macrophyte diversity in Central Wisconsin Lakes.

Aquatic macrophyte diversity in lakes is important to the state of the ecosystem—from providing food for wildlife and shelter for fish to contributing to the natural nutrient cycling of lakes. The flora of Wisconsin lakes is ever changing due to alterations to nutrient flow, introduction and advancement of invasive species, and human influence on a changing landscape. In natural systems, a continuum of vegetation occurs from near shore into the lake. Riparian vegetation on lakes provide habitat for wildlife, filter water of contaminants entering a lake, protect shorelines from erosion, serve as a nursery for young fish, and enhance the beauty of Wisconsin lakes. However, many of our lakeshores are developed or altered for human use. Forty six percent of the lakes found in the Upper Midwest have moderate to high human lakeshore disturbance (EPA National Lakes Assessment 2009). Previous studies have suggested that plant biomass decreases with increased shoreline development (Radomski 2001). This study examines the relationship between shoreline health and aquatic plant diversity within Central Wisconsin lakes; the focus of this study was primarily on whether or not the diversity and quality (maximum coefficient of conservation) of freshwater aquatic plant communities decreases as shoreline buffer width decreases and development increases. Aquatic macrophyte surveys were conducted during the summers of 2011 and 2012 on Marathon County lakes, each following a coordinate grid system and surveying techniques outlined by the Wisconsin Department of Natural Resources (WDNR). Shoreline assessment surveys were also conducted in 2011 and 2012 and were related to shoreline vegetation health and lakeshore development. Vegetated buffer depths were characterized and recorded at this time. Maximum coefficient of conservation (c-value) and richness was recorded at sample points adjacent to shorelines to assess macrophyte community quality and diversity. Determining the relationship between lakeshore health and aquatic macrophyte communities' diversity and quality will demonstrate how a lake's shoreline health has a major influence on its ecosystems.

Do not consider for judging.

Adviser: Nancy Turyk

POSTER AND ORAL

Danielle Rupp



Majors: Water Resources and Spanish

Chase Kasmerchak



Majors: Geoscience and Physical Geography

Comparison of microbial salinity tolerances in anthropogenically influenced wetlands.

Adviser: Dr. Rob Michitsch

POSTER AND ORAL

Danielle Rupp



Major: Water Resources and Spanish

Allison Willman



Major: Soil and Land Management

Communities in northern latitudes apply salts to their roads to ensure safe driving conditions during winter weather events. These road salts eventually drain off the roads and settle in nearby ecosystems. Wetlands act as sinks to the surrounding landscape, collecting minerals and nutrients that drain into them, including road salts. Microbial communities, which are an integral part of wetland ecosystems, respond to changes in their host ecosystems such as increasing salinity. This study examined microbial response and tolerance to salinity changes by observing growth and diversity over a salinity concentration gradient, and what greater effects this might have on the ecosystem as a whole. Five concentrations, chosen based upon the 23 g/L road salt application rate in the study area, were used: 16.5, 23, 46, 69, and 128 g/L. Samples were collected from two different wetlands, one receiving point source runoff (i.e. applied salinity treatments) and the other receiving non-point source runoff from parking lots and roadways in Stevens Point, Wisconsin. Overall, as salinity increased, the growth rate of the microbial community decreased. Significantly more bacterial growth at higher salt concentrations was observed in the non-point samples than the point samples in incubated Agar broth tubes in a laboratory setting. This may suggest a level of adaptability in the microbes receiving non-point road salts that was not seen in the microbes receiving larger, irregular pulses of point source runoff.

Do not consider for judging.

Improving and analyzing soil health of degraded soils in central Wisconsin.

Adviser: Dr. Jacob Prater

POSTER

Michelle Scarpace



Major: Soil and Land Management

In current agricultural practices performed across the U.S, degraded soils and ground water contamination issues are of great interest. In the green house experiment that I will be conducting our concerns for degraded soils and ground water contamination issues, specifically nitrogen leaching will be investigated. Our experiment will use a Rosholt loam soil that has been cultivated for many years. Our goal for this experiment is to further our knowledge of how cover cropping and biochar might be used to improve degraded soils and/or reduce nitrate leaching. Biochar and covercrops together can provide habitats for microbial communities. With more microbial communities, the soil will, overall be more fertile. Rye will be used as a cover crop in our investigations. We expect to see improved soil qualities that will promote less nitrate leaching, increased yields, better water holding abilities, and more efficient nitrogen use. The experiment will be performed in a greenhouse. We will be growing corn in the soil from our selected field. Our control will be corn growing by itself. The other three treatments are as follows, corn with a cover crop, corn with a biochar amendment, and corn with a cover crop and biochar amendment. There will be five replications of each treatment. Soil and plant tissue will be analyzed for Total Nitrogen, Carbon and Nitrate; also the leachate will be analyzed for Nitrates. Microbial colonies will also be counted to determine if Biochar and covercrops can increase microbial colonies. These results will help us learn how to improve our agricultural practices and soils and make our farming systems more capable of the sustained production of healthier crops.

Consider for judging.

Paper formation optimization.

Adviser: Dr. Gerry Ring

POSTER AND ORAL

Mitch Socha



Major: Paper Science and Engineering

Instantaneously measuring paper formation during machine runs as well as automatically adjusting process variables affecting formation will allow machine tenders to hit the targeted formation much quicker. This will improve machine runnability, decrease paper strength variation, improve the drainage profile, increase fiber distribution uniformity, and significantly improve overall paper quality. The current state of our pilot paper machine does not allow us to quickly measure and correct bad sheet formation. We must take a sample from the reel and test that sample's formation in the paper testing lab. Any paper machine adjustments available to us to improve bad formation, such as adjusting the jet/wire ratio or refining intensity, are manual adjustments. These manual adjustments in combination with the off-line formation testing increase the response time needed to improve formation; this lengthy process could cause us to produce more off-spec paper than necessary. Our overall goal is to measure the formation of a 75 grams/square meter (gsm) sheet on-line and decrease the response time necessary to improve upon bad formation by at least 50%. We have determined the machine conditions that provide us with the maximum sheet formation index and defined the response time necessary to make adjustments and verify new formation levels. We will now install and evaluate the donated Procemex camera system to determine the optimum camera mounting position and software settings. After camera installation, we will evaluate the response time compared to previous testing methods.

Consider for judging.

Nathan Martin



Jason Halambeck



Tony Stefka



Cross-directional basis weight variability on the pilot paper machine.

Adviser: Dr. Karyn Biasca

POSTER AND ORAL

Gerrit Spiess



Major: Paper Science and Engineering

For our Paper Science and Engineering course 486 Senior Design II, we've been working on improving the cross-directional basis weight variability on our pilot paper machine in the science building. Having a perfect basis weight profile is impossible; therefore, there is always room for improvement. We've set our goal for improvement at 10%. To accomplish this, we performed numerous machine runs to collect data on our ideas that will potentially improve this variability. We've focused our efforts in the wet-end of the paper making process. Our presentation will cover our data, an analysis of our data, and how our design(s) will improve the cross-directional basis weight variability, as well as an economical analysis of our solution.

Consider for judging.

David Lieble



Lucas Moureau



Kenneth Fayas



Evaluating extraction methods of mustard and potassium permanganate for sampling *Lumbricus terrestris* populations.

Advisers: Dr. Jason Riddle and Dr. Les Werner

POSTER

Kacey Tait



Major: Wildlife Ecology
Minor: Biology

Amanda Webb



Major: Wildlife Ecology

The presence and introduction of earth worms into a habitat has the ability to alter an area's soil, wildlife, and vegetation in potentially destructive ways. Chemical vermifuges are often used in field studies as a quick and low cost method for assessing earth worm populations. However, assessments conducted in the field create an issue of accuracy where the precise population size cannot be definitively censused. Our study sought to compare the extraction efficiency of mustard powder, and potassium permanganate as vermifuge on nightcrawlers (*Lumbricus terrestris*) within a laboratory setting that predetermined with a known population size. Out of 117 earth worms, the recovery rate for those exposed to Potassium Permanganate extract (92.3%) was statistically higher than those exposed to mustard extract (69.23%) or distilled water (12.8%, $F_{0.05(1),2,36} = 49.23$, $P < 0.05$). Potassium Permanganate proved to be more effective in small-scale sampling and suggests the possibility of larger applications

Consider for judging.

Identifying areas critical to the improvement of non-point source pollution in the Weyauwega Lake Watershed, Waupaca County, Wisconsin.

Adviser: Eric Olson

POSTER

Weyauwega Lake is a 253 acre lake located in Waupaca County, Wisconsin. The lake is in the heart of the town of Weyauwega and was formed in the mid-1800s when a dam was constructed on the Waupaca River downstream of the city of Waupaca. Weyauwega Lake is used for recreational activities such as fishing, kayaking, and canoeing, and can be accessed by two public boat launches. It is also home to a number of residential shoreland owners. In recent years, Weyauwega Lake has suffered from a host of problems including excess plant growth and sedimentation, as well as the spread of aquatic invasive species. Dredging of sediment and drawdown of the lake are costly measures that have been considered to remediate the lake's problems. Drawdown has been used in recent years as a way to reduce excess plant growth during the summer months. The objective of this study is to develop a less costly plan for improving water quality, preventing excess plant growth, and reducing sedimentation rates to Weyauwega Lake by identifying critical areas of non-point source pollution up stream of the lake between the towns of Waupaca and Weyauwega. The analysis of critical areas will be accomplished using ArcGIS and spatial modeling in combination with field verification, local knowledge from the county conservation department, and consideration of adaptive management strategies. The critical areas for improvement will be prioritized and management plan recommendations will be made.

Consider for judging.

Hayley Templar



Major: Water Resources
Minor: GIS and Spatial Analysis

Victoria Bertolami



Major: Watershed Management
Minor: Soil Science

Nathan Anschutz



Major: Watershed Management
Minor: Chemistry

An analysis of bathymetric model accuracy from data collected by two digital systems on inland lakes; Marathon County, WI.

Adviser: Dr. Ron Crunkilton

POSTER

Sam Thomas



Major: Water Resources
Minor: Chemistry

Two small lakes in Marathon County were mapped in mid-summer 2012 using a 12-foot jon boat, a Sonar Mite sounder with Trimble R6 GPS and Trimble TSC2 data collector utilizing WISCORS real-time GPS correction, a Lowrance HDS5 fishfinder GPS with sounder, and ESRI ArcMap 10 GIS software. ANOVA analysis showed no significant difference ($p > 0.05$) between the Sonar Mite depth, the Lowrance HDS5 depth, and the manual depth, at randomly-generated sites. Both sounders will reliably predict known depth ($R^2 > 98\%$). The models built using Trimble data can reliably predict known depth (Mission Lake: $R^2 = 67.7\%$, Mayflower Lake: $R^2 = 78.8\%$). The models built using Lowrance data will not predict known depth as well as the Trimble model (Mission Lake: $R^2 = 65.7\%$, Mayflower: $R^2 = 66.2\%$). The Mayflower Lake model built using Lowrance data was not significantly different than the model built using Trimble data (paired t-test: $\alpha = 0.05$, $p = 0.082$). The Mission Lake models were significantly different (paired t-test: $\alpha = 0.05$, $p < 0.001$). The digital models built using Lowrance data produced total lake volumes that were greater than models built using Trimble data by 1.2% at Mayflower Lake and 3.6% at Mission Lake.

Consider for judging.

Blocking and guiding adult sea lamprey with vertical fields of pulsed direct current.

Adviser: Dr. Justin Sipiorski

ORAL

John Tix

Controlling invasive species is of high importance to resource managers. Sea lamprey (*Petromyzon marinus*) invaded the upper Laurentian Great Lakes and triggered fishery collapse and ecosystem dysfunction. Development of new technologies to limit sea lamprey access to spawning habitat and enhance trapping is a priority. We tested the hypothesis that adult sea lamprey would exhibit behavioral avoidance to graduated vertical fields of pulsed direct current (DC; electrodes vertical in water column) and that the electric field would not injure or kill non-target fish. Laboratory and in-stream experiments demonstrated that graduated vertical fields of pulsed DC block sea lamprey migration and direct sea lamprey into traps. Rainbow trout (*Oncorhynchus mykiss*) and white sucker (*Catostomus commersoni*), species that migrate sympatrically with sea lamprey, avoided the electric field and had minimal injuries when subjected to the electrical field.



Majors: Fisheries and Biology
Minor: Aquaculture

Consider for judging.

Drainage profile optimization.

Adviser: Dr. Karyn Biasca

POSTER AND ORAL

Melissa Wanasek

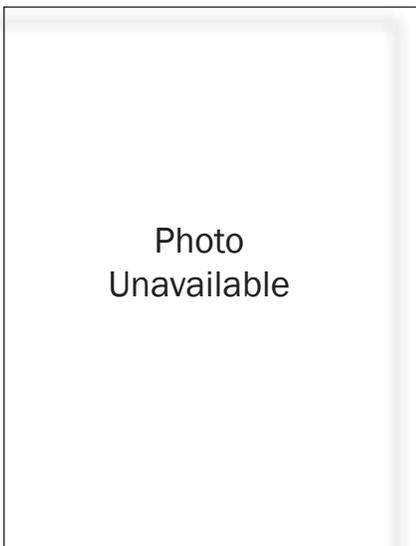


Major: Paper Science and Engineering

Water removal in the wet end of a paper machine is essential to the successful production of paper. The goal of this project is to improve the drainage capabilities and the formation of the sheet on the wet end of the PS&E pilot paper machine. Following baseline data collection, the locations of the foils that are used to remove water need optimization through testing of the different types of foils at various positions. Modifications to the wet end of the machine are being made, including reinforcement of seven foils to prevent sagging and leveling the wet end of the paper machine to ensure an even cross and machine direction drainage profile. Optimization will improve the yield of paper machine runs, due to better formation and reduced downtime from breaks during the runs.

Consider for judging.

Alex Stieve



Casey Hallum



Wade Przekurat



Effectiveness of the 80-150% hydrology requirements on isolated wetlands in Lake County, IL.

Adviser: Dr. Rob Michitsch

POSTER AND ORAL

Allison Willman



Majors: Soil and Land
Management

In response to the 2001 Solid Waste Agency of Northern Cook County Vs. US Army Corps of Engineers Supreme Court ruling, Lake County, IL amended their Watershed Development Ordinance (WDO) to regulate all isolated wetlands of Lake County (IWLC) to be under the jurisdiction of the county. Anyone who wished to develop land that would impact an isolated wetland would have to apply for a permit through the county. A crucial element of this regulation included restricting development that would impact a nearby wetland such that the wetland cannot receive less than 80% hydrological levels from pre-development conditions or more than 150% hydrological levels post-development. In 2003, the county started a decade long study to determine the effectiveness of the WDO wetland hydrology requirement on IWLC sites in terms of floristic quality and overall wetness. Over the following years, vegetation inventories, hydrology observations, hydric soil indicators, wetland boundaries, and rainfall and temperature data were collected from IWLC sites. After the final collection in 2012, the data displayed an overall trend towards increased wetland diversity and wetness. These results suggest the effectiveness of the WDO requirements and the strength of these established isolated wetlands to adapt to changes in the surrounding land use.

Consider for judging.

Comparison of micro-topography & vegetative communities found in four constructed depressions of the restored Moses Creek Wetland.

Adviser: Dr. James Cook

ORAL

Jordan Winkenbach



Majors: Forest Ecosystem Restoration and Management, and Biology, emphasis in Botany

Steven Bachleda



Major: Hydrology
Minor: Soil Science

Multiple shallow excavated areas (depressions) were included in the restoration of the Moses Creek floodplain with the purpose of creating diverse, heterogeneous hydrologic regimes and plant communities (Natural Resources Consulting Inc., 2009). This study examines the variability between four depressions within the Moses Creek Floodplain in species richness, evenness, and total vegetation cover. The four depressions span a north-south gradient in the floodplain and were labeled A, B, C and D, respectively. Transects were run from West to East perpendicular to the midline, at two meter intervals the length of each depression. Using the line-intercept technique, species occurring under these transects or above them were counted and the percent cover for each species was estimated. The estimated total vegetation cover was highest in depression A and steadily decreased to the south; the covers were 80.4%, 66.5%, 37.9% and 16.5% in depressions A, B, C and D, respectively. The jackknife estimate of richness indicated a similar pattern from north to south. Estimated richness ranged from 13.85 for depression A, 10.88 for B, 10.77 for C and 3.93 for depression D. Values of the Shannon Diversity Index were also decreased from north to south. Based on Sorenson's Similarity Index, the similarity in composition between depressions A and B was 0.76, between A and C was 0.7, between B and C was 0.59, between C and D was 0.54, between A and D was 0.4, and between B and D was 0.33. To explain the varying levels of similarity between these four depressions, data were collected to determine the micro-topographic heterogeneity, slope of the banks, soil composition and ground water levels through the 2012 growing season, for each depression. The variation in the plant communities between the four selected depressions appears to have been influenced by a set of complex factors including annual and seasonal differences in hydrology, micro-topography and seed dispersal by water. Additional research is needed to further explore these factors.

Consider for judging.

Above ground biomass and nitrogen concentrations of vegetation in Moses Creek in fall 2012.

Adviser: Dr. James Cook
POSTER

Anastasia Wolf-Flasch



Major: Ecosystem Restoration
and Management
Minor: Spanish

Wetlands are a key component to many landscapes, as they introduce diversity and richness to the environment. To measure the progress of the Moses Creek Restoration project in Schmeekle Reserve, above ground biomass samples were collected from previously designated transects. The permanent transects were established for future studies. Samples were clipped from a 900 cm² square along these transects and sorted by sedge, rush, grass, and forbs. In total, 28 samples from randomly selected quadrants were collected across the floodplain between September and October. Reproductive structures were separated from vegetative structures. Samples were dried and weighed to attain above ground biomass estimates. They were later ground up and analyzed for carbon and nitrogen concentrations. It was expected that with the dry growing season, less above-ground production would occur, in comparison to similar studies. Results showed 97.4% of material collected was vegetative, resulting in 2.6% reproductive material. Of the sampled vegetative material, rushes had the highest average carbon content of 44.54%. In reference to other studies, the overall average carbon and nitrogen for all species (42.67% and 1.4%) are slightly above average for a sedge meadow. Comparatively, the average above ground biomass for each plot (487.75 g/m²) appeared to be high, also. These results differ from the hypothesis regarding the effect of the drought. One reason for this difference may be the time in which moisture stress actually began to take place. Based on other studies, the time of peak biomass production is in late July; however onsite measurements found that the water table did not drop until June. Because the soil retains some of that moisture, conditions were not unfavorable until the end of this period. The success of the sedges and rushes in particular indicate that they may be a more drought tolerant taxa and may be able to persist and outcompete in a drier wetland environment. If this is true, management would need to be altered to allow for drier conditions in order to achieve the idealistic sedge meadow.

Consider for judging.

Why take tail length measurements from migrating Northern Saw-Whet Owls?

Adviser: Dr. Shelli Dubay

POSTER

Elise Worthel



Major: Wildlife Ecology and Management, Biology.
Minor: Captive Wildlife

Northern Saw-Whet Owls (*Aegolius acadicus*) migrate through Wisconsin in fall and spring. Owls are commonly banded and weighed at capture sites and molt patterns are used to identify age (Hatch year, Second year, Third year). Tail length, is taken as well. My goal was to determine if tail length would predict gender or age of owls. I sampled owls at Sandhill Wildlife Area in October 2012. Owls were caught in mist nets using a conspecific call from a battery-powered caller as a lure. Tail length between the central retrices was measured with a ruler to the nearest mm. Molt pattern was used to identify age to year. I used an Analysis of Variance with a Tukey post hoc test to identify if tail length varied with gender (male, unknown, female) or age for females only. Tail length differed with gender for 82 birds sampled ($F=26.999$, $DF=2$, $P=0.00$). Females ($N=54$) had longer tail lengths than unknowns ($N=20$) and males ($N=8$), but unknowns did not differ from males. Among females, tail length did not differ by age ($F=2.812$, $DF=2$, $P=0.069$). Mean tail lengths were males=65.750mm, unknowns=68.350, and females=71.556. Tail length could be used to more definitively determine gender in Northern Saw-Whet Owls, as well as determine the genders of unknown birds.

Consider for judging.

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