



College of Natural Resources

Student Research Symposium
Friday, April 8, 2011



College of Natural Resources Student Research Symposium

April 8, 2011

University of Wisconsin-Stevens Point

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

Booklet Layout and Editing: Alyssa Uhen

Cover Design and Photo: Alyssa Uhen

PHOTO: Gulfoss Waterfall, Iceland. Taken during the summer of 2010 on the CNR European Environmental Studies Seminar.

College of Natural Resources

MISSION

The College of Natural Resources provides education, research, and outreach in integrated natural resources management and environmental education, and in paper science. 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, summer camp, 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 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 8, 2011

Welcome to the Twelfth Annual College of Natural Resources Undergraduate 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.

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 UWSP. 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.

Whether you're 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 UWSP.

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 here and at future symposia and conferences.

Sincerely,

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

Bernie L. Patterson
Chancellor



The UWSP College of Natural Resources is pleased to present the 12th annual CNR Student Research Symposium, featuring and celebrating the scholarly achievement of many of UWSP's finest natural resource students.

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

This year's Symposium – planned and organized by students – features an outstanding turnout of participants: over 60 students and over 50 presentations, continuing a tradition of success at this annual event. Added to the previous ten year totals, the number of CNR students who have presented research results in posters and oral presentations at this event is nearly 600.

We salute the CNR student participants for their excellence in critical thinking, inquiry, research and communication demonstrated in the abstracts contained in this booklet and in the presentations during today's event. Let us recognize the outstanding faculty members who have mentored and motivated students to do their best. Finally, let me offer thanks to the late John and Anne Meyer, friends and benefactors of the College, whose establishment of the John R. Meyer Endowment Fund for CNR makes this event possible.

Thank you for attending this wonderful celebration of scholarly achievement and hands-on, experiential learning. Welcome to the College of Natural Resources, and enjoy your day with us.

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

Christine L. Thomas
Dean and Professor of Natural Resource Management

From the College of Natural Resources Student Research Symposium Committee...

Welcome to the 12th Annual College of Natural Resources Student Research Symposium. This year's program features many students from a multitude of disciplines. Students have spent time conducting research in fisheries, forestry, wildlife, biology, soils, waters, paper science, waste management, human dimensions, resource management, and other areas. This event allows students' questions to be crafted into research which they collect, explore, and analyze. This symposium is the culmination of these activities into poster and oral presentations. Student Mentors help guide students through the process in a truly 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. He was extremely influential in building and strengthening the undergraduate research program for the College of Natural Resources and was a true friend of both the students and the faculty. Dr. David, who passed away in November 2004, not only helped to create a venue for students to present their research, but also a positive atmosphere where students could learn how to conduct and present research. The hundreds of students who have benefited by the Symposium event over the past twelve years can credit Dr. David for his pioneering efforts.

This year marks one of the highest years of student participation in this event, due largely to the students' initiative, faculty encouragement, and other sources of support, including the work of the Symposium Committee itself. 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.

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.

Finally, we would like to thank the late John & Anne Meyer and the John & Anne Meyer Fund for CNR, all of our volunteer evaluators, CNR and Biology Department faculty and staff members, CNR student organizations, Dean Thomas, Chancellor Bernie Patterson, and the UWSP administration.

Cheers!

Ben Kissinger (Co-Chair)
Alyssa Uhen (Booklet Editor)
Pat Otero

Matt Flintrop (Co-Chair)
Emily Fuger
Brian Luedtke

Faculty/Staff Advisors:

Dr. Rich Hauer (Faculty Chair)
Dr. Ron Crunkilton

Dr. Rob Michitsch
Mr. Steve Menzel

Dr. Gerry Ring
Dr. Kevin Russell

Dr. Kristin Floress
Ms. Bobbi Kubish

The Clive A. David Memorial Research Scholarship Award



Dr. Clive A. David, retired professor of Forestry, was a driving force in establishing the CNR Student Research Symposium back in 2000. Dr. David passed away in November 2004 after a lengthy illness. He taught in the CNR from 1989-2003 and was considered by his colleagues and students a true champion of student research and cutting edge technology. His leadership and vision were important in making the Symposium a success.

Throughout his years of teaching, Dr. David encouraged participation in undergraduate research. Some of his projects related to deforestation and soil erosion prevention, windbreaks, and solid waste. Dr. David's excellence in teaching was recognized several times during his career by both colleagues and students, including being named a UW System Teaching Fellow in 2000.

This spring, the College of Natural Resources proudly recognizes the following students, in Dr. David's memory, who have displayed extraordinary commitments to research.

Alexandra is from Belgium, Wisconsin and currently completing a major in Biology and an Environmental Studies minor. Ms. Anderson has earned a perfect 4.0 grade point average at the University of Wisconsin – Stevens Point. Her academic excellence has been in conjunction with an active pursuit of research, service in student organizations, and residential living. Alexandra has conducted research projects investigating the Effects of Burrowing Distance on Yellow-Bellied Marmots, Acoustical Identification of Wintering Bats, and Plant Systematics of Rocky Mountain Plants. She has presented her research at UWSP and regionally at the Rocky Mountain Biological Laboratory. Alexandra has actively served student organizations. In residential living she leads the Natural Resources Freshman Interest Group as an Academic Resource Coordinator. She has served on the executive board as an officer, and a committee member for the UWSP Wildlife Society, UWSP Tri-Beta Biological Society, and residential living. Her plans after UWSP involve the pursuit of graduate studies.



Alexandra Anderson

Ben is from Mosinee, Wisconsin and is completing a major in Fisheries and a Biology minor. Mr. Kissinger got an early start in undergraduate research at UWSP and has built an excellent track record of conducting and presenting research. This complements his excellent academic success in the classroom and extensive commitment to service through student organizations. Ben has developed research skills through Estimating Walleye Age through Dorsal Spines and Using Genetic Markers for Lake Trout Conservation. Mr. Kissinger has presented his research at UWSP and has been invited to present at national conferences. Most recently, he presented at the National Conference on Undergraduate Research. Ben has been a vital co-chair of the CNR Student Research Symposium committee for the past two years. During this tenure, the largest symposium ever in the college occurred. As an active member of The Fisheries Society and The Wildlife Society, he has served as a leader in several aspects. Example leadership roles include leading the Little Plover River and Fall Fyke Net survey, aiding in Prairie Chicken Surveys, and co-founding the Stevens Point Flowage Turtle Survey. Mr. Kissinger is pursuing graduate studies after UWSP.



Benjamin Kissinger

Both co-recipients made the committees choice easy in selecting them as recipients of the Clive A. David Memorial Research Scholarship. To both Alexandra and Ben, 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 UWSP Catering

Jerry Kummer, John Oestreich - Building/Support

Jeff Keuntjes and Tammy Naczek - Financial and Purchasing

UWSP College of Natural Resources - Room Accommodations

UWSP Biology Department - Room Accommodations

University Relations and Communications Office - Publicity

CNR and Biology Faculty - Mentoring and Support

Volunteer Evaluators and Moderators

(As of 3/31, Ryan Andvik, Amit Arda, Mary Bartkowiak, Kim Becken, Bob Brush, Megan Buckley, Kevin Burns, Katherine Clancy, James Cook, Ron Crunkilton, Mike Demchik, Bill DeVita, Paul Doruska, Shelly DuBay, Matthew Faust, Paul Fowler, Tim Ginnett, Justin Haglund, Jim Hardin, Milo Harpstead, Angie Hauer, Rich Hauer, Kyle Herrman, Bob Holsman, John Houghton, Dan Isermann, Elise Kahl, Diane Lueck, Lynn Markham, Chris Mechenich, Rob Michitsch, Kelly Mortenson, Andrea Musch, Eric Olson, Jessica Orlando, Holly Petrillo, Jessica Piispanen, Don Quay, Jason Riddle, Jason Riddle, Gerry Ring, Jonathan Rivin, Ted Roeder, Scott Roepke, Jess Sherman, Stan Szczytko, Aaron Thompson, Amy Timm, Jessica Tomaszewski, Melinda Vokoun, Matt Waterhouse, Les Werner, Lacie Westbrook, Pat Wherley, Dennis Yockers)

Symposium Support Vounteers

Doug Moore - Photography

Schedule of Presentations

April 8, 2011

Refreshments/Registration

9:30 a.m.

TNR West Lobby

Dean's Welcome Address

10:00 a.m.

TNR 170

Oral Presentations

10:20 a.m.

TNR 170 and TNR 120

Poster Presentations

Lunch

12:00 p.m.

TNR South Hallway

Oral Presentations

1:15 p.m.

TNR 170 and TNR 120

Rendezvous

5:00 p.m.

Noel Fine Arts Center

Schedule of Oral Presentations: Room 170

<u>Oral Presenter(s)</u>	<u>Time</u>	<u>Title of Presentation</u>
Matt Gunderson	10:20	Assessment of a rapid procedure for estimating walleye fecundity.
Benjamin Kissinger	10:45	Microsatellite inheritance and Great Lakes Lake Trout propagation.
Christine Koeller	11:10	Bathymetric lake mapping using ArcGIS mapping software in north central Wisconsin.
Hanna Kruckman	11:35	Effect of temperature and 3kPZS on upstream migration of female sea lampreys.
<u>Lunch Break</u>		
Laura Lorentz	1:15	Investigating the estimate that residual biomass is 45% of merchantable weight for red pine.
Lucas Nathan	1:40	Genetic stock temporal stability of lake whitefish in Lake Michigan.
Luke Olson	2:05	Build-out model analysis for three towns in Waupaca County.
Jon Steigerwaldt	2:30	Development of a paper birch regeneration alternative.
Benjamin K. Van Thiel	2:55	Policy options for community solar projects in the Midwest.

Schedule of Oral Presentations: Room 120

<u>Oral Presenter(s)</u>	<u>Time</u>	<u>Title of Presentation</u>
Alexandra Anderson	10:20	Effects of burrow distance on anti-predator vigilance in foraging yellow-bellied marmots (<i>Marmota flaviventris</i>).
Kevin Brecka Daniel Fuhs	10:45	Environmental conditions that improve hatchability of Cinnamon Teal eggs.
David Burke, Christine Karras, Tao Lin, Yuan Lu, Christian Marz, James LaLuzerne, Ho-Seong Myeong, John Ohman, Christopher Rockey	11:10	Fibers' alignment and distribution in a sheet of paper.
Emily Fuger	11:35	Microbial diversity in soil treated with compost teas.
<u>Lunch Break</u>		
Brian Luedtke	1:15	An investigation into controlled compost tea production.
Robert Lisiecki	1:40	Prevalence of <i>Filaroides martis</i> in Wisconsin's weasels.
Rachel Piette	2:05	Intensity of ectoparasites on white-tailed deer (<i>Odocoileus virginianus</i>) in two sites in Wisconsin.
Nathan Waid Joshua Nemec	2:30	Browse of Buckthorn (<i>Rhamus</i> spp.) by white-tailed deer (<i>Odocoileus virginianus</i>) in central Wisconsin.
Sara Wendt	2:55	Effectiveness of pitfall and Sherman live traps in capturing Wisconsin small mammal species.

Poster Presentations: TNR South Hallway

<u>Presenter(s)</u>	<u>Title</u>
Derek Bahr	Back-calculation of walleye total length based on otolith measurements.
Victoria Bertolami Mitchell Olds	Impacts of land use practices and increased precipitation on storm water runoff.
Stephen Chastain Christine Karras Nate Schimmelpfenning Scott Gewiss	Multi-component analysis for fiber blending.
Adam Clifford	Sustainability through agro-forestry in East Africa.
Adam Clifford Laura Jaskiewicz	Diets of weasels legally trapped in Wisconsin.
Anna Courtney Joel Stokdyk Evan Roberts	Effects of compost tea on soil microbial activity and nutrient content.
Mark Cufaude Matthew Haugen	Flooding effects on waterfowl harvest in Mead Wildlife Area.
Emily Fuger	Microbial diversity in soil treated with compost teas.
Tyler Groh	Iron: a fix to the phosphorus issues in water?
Justin Hall	Developing an economical analytical technique for identifying manure contamination.

Poster Presentations: TNR South Hallway

<u>Presenter(s)</u>	<u>Title</u>
Mitchell Isaacson	GIS-based habitat models for small mammal species with information needs in Wisconsin.
Brandon Jochem Benjamin Cardinal Christian Marz Katherine Mess	UWSP pilot paper machine vacuum system improvement.
Andrew Karleigh Benjamin Brown Ian Torkelson	Treehaven stream habitat assessment for brook trout and wood turtles.
Christine Koeller Hayley Templar	Identifying causes of blue-green algae blooms in Bear Lake, Forest County, Wisconsin.
Helen Leavenworth	Soil analysis of total carbon, nitrogen, and phosphorus concentrations within the Horicon Marsh.
Laura Lorentz	Investigating the estimate that residual biomass is 45% of merchantable weight for red pine.
Yuan Lu Christine Karras Christian Marz Christopher Rockey David Burke Ho-Seong Myeong James LaLuzerne John Ohman Tao Lin	Fibers' alignment and distribution in a sheet of paper.

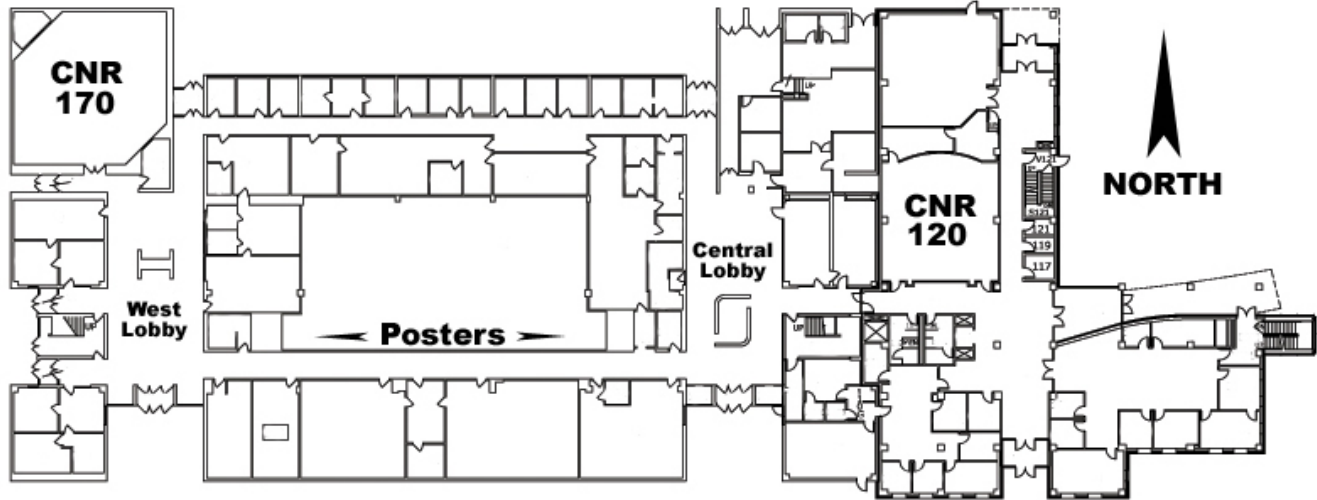
Poster Presentations: TNR South Hallway

<u>Presenter(s)</u>	<u>Title</u>
Brian Luedtke	An investigation into controlled compost tea production.
Jeanne Lust	Infection rate of liver flukes (<i>Fascioloides magna</i>) in male white-tailed deer in Wisconsin.
Marcus Mueller	The effect of trap placement and bait type on the differential capture success of painted turtles (<i>Chrysemys picta</i>).
Lucas Nathan	Genetic stock temporal stability of lake whitefish in Lake Michigan.
Coulter Nyenhuis	The impact of stand conditions on residual branch biomass for pulpwood-sized red pine in central Wisconsin.
Luke Olson	Build-out model analysis for three towns in Waupaca County.
Tyler Pederson	Estimating fuel rod volume and weight for Red Pine pulpwood trees.
Jacob Richter	A comparison of fish total length-otolith radius relationships among three Wisconsin Yellow Perch populations.
Nicole Rumpca	Iceland Field Work: In the shadow of the erupting Eyjafjallajokull.

Poster Presentations: TNR South Hallway

<u>Presenter(s)</u>	<u>Title</u>
Anthony Sedlak Jr.	The movement of Brown Trout (<i>Salmo trutta</i>) in SW Wisconsin streams. A look at how manmade and natural barriers pose as obstacles for brown trout spawning.
Bradley Smith	Success of gravel spawning sills for increasing salmonid abundance in two Michigan rivers.
Andrew Stetter Nathan Waid	Time of first use of artificial nest boxes by wood ducks (<i>Aix sponsa</i>) and hooded mergansers (<i>Lophodytes cucullatus</i>) in central Wisconsin: implications for management.
Alyssa Untiedt	Disfigurement rates of Blanding's turtles (<i>Emydoidea blandingii</i>) in central Wisconsin.
Marissa Vine	Analysis of stand age structure in Quincy Bluff and Wetlands Natural Area.
Benjamin Wegleitner	Comparison of back-calculation models for estimating yellow perch length at age from anal spines.
Matthew Gunderson	Assessment of a rapid procedure for estimating walleye fecundity.
Edwin Koeppe	Visitor use on day use areas around the Northern Highlands American Legion State Forest.

College of Natural Resources Building Map



Symposium Presentations

Oral Presentations: Lecture rooms TNR 170 and TNR
120

Poster Presentations: South hallway between central
and west lobbies

Effects of burrow distance on anti-predator vigilance in foraging yellow-bellied marmots (*Marmota flaviventris*).

Advisor: Dr. Christopher Yahnke

ORAL



Alexandra Anderson

Senior, Biology.

Minors: Environmental
Studies, Broadfield Natural
Science

Abstract: The risk of predation influences the behavior of individuals and can determine how an animal allocates its time when searching for and obtaining food. To reduce predation risk, many animals use refuges and protective cover to increase their chances of survival, but it is unclear how these safe areas affect anti-predator vigilance behaviors (scanning and looking for predators) when the animal is no longer covered. I experimentally tested the effects of burrow distance on anti-predator vigilance in foraging yellow-bellied marmots (*Marmota flaviventris*) by placing food at increasing distances (1, 5, 10, and 20m) from designated marmot burrows. I measured (1) time latency to forage at feeding stations, (2) reluctance to forage at stations, (3) proportion of time allocated to anti-predator vigilance and foraging, and (4) alert and flight initiation distances in response to an approaching threat. Marmots were reluctant to forage far from the burrow, and time latency to forage increased linearly as distance from the burrow increased. When individuals foraged alone, distance from burrow did not affect the proportion of time allocated to foraging or anti-predator vigilance. However, individuals increased foraging and decreased anti-predator vigilance when 5m from the burrow in the presence of conspecifics. There was no effect of distance from burrow on alert and flight initiation distance. These findings suggest that marmots are equally alert at any distance from burrow, and there may be a distance limit to which social animals rely on others to alert them to predators.

Consider for judging.

Back-calculation of walleye total length based on otolith measurements.

Advisor: Dr. Daniel Isermann

POSTER



Derek Bahr

Junior, Water Resources:
Fisheries

Abstract: Back-calculation is a common method used by fisheries biologists to estimate the size of a fish at previous ages using increments measured on calcified structures. This technique can provide valuable insight regarding growth patterns in fish populations. Otoliths are a calcified structure that is commonly used to estimate the age of walleyes, but methods for back-calculating lengths from walleye otoliths have not been thoroughly evaluated. Using walleye otoliths collected from Leech and Winnibigoshish lakes in northern Minnesota, we determined whether linear back-calculation models were appropriate for describing the relationship between otolith radius and walleye total length and whether this relationship varied between lakes. Our research represents the first steps in developing a standardized method for otolith-based back-calculation for walleyes.

Consider for judging.

Impacts of land use practices and increased precipitation on storm water runoff.

Advisor: Dr. Katherine Clancy

POSTER



Victoria Bertolami
Junior, Watershed
Management
Minor: Soil Science



Mitchell Olds
Junior, Watershed
Management
Minor: Geology

Abstract: Following the 1930's Dust Bowl, farmers were encouraged to introduce land practice changes in agricultural regions. In high agricultural regions such as southwest Wisconsin's Driftless Area, increases in baseflow and decreases in runoff are correlated with this shift in land practice. Complicating this trend has been a step increase in precipitation detected throughout much of the Eastern US since 1970. In our research we examine two watersheds: the Kickapoo River Watershed at La Farge and the Pecatonica River Watershed at Blanchardville with long term (1940 -2010) USGS gages. The goal of our research is to determine if increased precipitation increased the runoff in the watershed. We compare the two variables by first using precipitation data to determine the step increase in the watersheds. Using independent storm events, discharge associated with the event was separated. BFI, curve number, and the $Q_{1.5}$ were examined to determine a trend over time which corresponds with either the land practice changes or the precipitation increase.

Consider for judging.

Environmental conditions that improve hatchability of Cinnamon Teal eggs.

Advisor: Dr. Shelli Dubay

ORAL



Kevin Brecka
Senior, Wildlife
Management and
Ecology, Biology



Daniel Fuhs
Senior, Wildlife, Biology
Minor: GIS and
Spatial Analysis

ABSTRACT: Blue-winged teal (*Anas discors*) populations are thought to be declining in Wisconsin. The Wisconsin DNR has initiated population studies in blue-winged teal and cinnamon teal (*Anas cyanoptera*) are used as decoys to lure blue winged teal to capture sites. Currently, DNR biologists raise cinnamon teal from eggs and adults are used as decoys. Eggs are expensive (\$8 per egg) so hatch success is particularly important for economic reasons. Eggs are particularly sensitive to environmental conditions inside the incubator during incubation. To better understand factors that contribute to hatch success, we investigated how humidity, temperature, and time of year during the breeding season affect hatch success of cinnamon teal eggs. We hypothesized that 1) humidity higher than 50% would improve hatchability, 2) incubation temperature between 37.5-37.8°C would allow for proper embryo development and higher hatchability, and 3) eggs that start incubation during the middle portion of the breeding season would hatch more often than eggs that began incubation in early and late portions of the breeding season. Looking at what week has the highest hatch rate shows when incubation will most successful. We analyzed the effect of humidity, temperature, and the week during the breeding season independently using chi square tests. We found that temperature ($\chi^2=20.73$, p value = 0.0001) and the week during the breeding season ($\chi^2=108.54$, p value = 0.0000) both impacted the hatch rates. Humidity ($\chi^2=0.02$, p value = 0.888) was not significant. Results of this study will provide DNR biologists with methods to improve hatchability but will also outline the most cost efficient way to incubate eggs.

Consider for judging.

Treehaven stream habitat assessment for brook trout and wood turtles.

Advisor: Dr. Katherine Clancy

POSTER



Benjamin Brown
Senior, Water Resources



Andrew Karleigh
Senior, Water Resources
Minor: Soil Science



Ian Torkelson
Senior, Water Resources
Minor: Soil Science

Abstract: Brook trout (*Salvelinus fontinalis*) inhabit much of the clean, cold, highly oxygenated waters of Wisconsin. When working to improve quality fish habitat, the overall health of the ecosystem must be considered. We are continuing stream habitat assessments on Pickerel and Pine Creeks located at Treehaven, the UW-SP field research station near Tomahawk, WI. These assessments will determine if the habitat is suitable for both brook trout and wood turtles (*Glyptemys insculpta*). Habitat requirements include clear, cold water with high levels of dissolved oxygen. Undercut stream banks and large coarse woody debris are also important necessities. In order to better understand the dynamics of these habitats, we have performed field surveys to categorize stream geomorphic and hydraulic characteristics which include: width, depth, discharge, wetted perimeter, hydraulic radius, bank full elevation, water temperature, and slope.

Consider for judging.

Fibers' alignment and distribution in a sheet of paper.

Advisors: Dr. Gerard Ring, Dr. Amit Arora

Paper Science and Engineering

ORAL AND POSTER



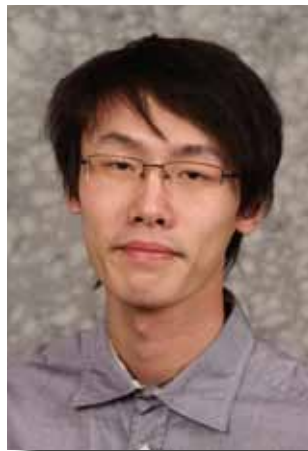
David Burke

Abstract: The purpose of this project is to demonstrate that fibers in a sheet of paper are both randomly aligned and randomly distributed following Poisson statistics. This project is an extension of laboratory work from last year. This year several experimental modifications were introduced to circumvent previous problems. Dyed fibers were again used to provide an in-sheet fiber sample, but this year the dyed and un-dyed fibers were physically identical. Fiber measurements were performed in Photoshop at 1200 dpi rather than 300 dpi. And, we used a grid counting technique rather than a line counting technique. Preliminary results indicate that fibers are randomly distributed according to Poisson Statistics but the results from the fiber alignment experiments are still being analyzed at this time. This project is a joint effort between PSEN 355 Paper and Fiber Physics and PSEN 314 Engineering Statistical Design and Analysis.

Consider for judging.



Christine Karras



Tao Lin



Yuan Lu



Christian Marz



James LaLuzerne



Ho-Seong Myeong



John Ohman



Christopher Rockey

Evaluation of dorsal spines for estimating the age of bluegills in Bear Lake, Wisconsin

Advisor: Dr. Dan Isermann

POSTER



Christopher L. Cahill
Senior, Fisheries, Biology

Abstract: Dorsal spines may offer a non lethal alternative to otoliths for estimating the age of bluegill *Lepomis macrochirus*; however, a previous study with black crappies suggested that ages estimated from dorsal spines were consistently lower than ages estimated from otoliths. No previous study has examined the relationship between bluegill ages estimated from otoliths and dorsal spines. Our objective is to determine if among-reader precision and age estimates associated with dorsal spines are similar to precision and age estimates associated with whole and sectioned otoliths for bluegills from Wisconsin lakes.

Consider for judging.

UWSP pilot paper machine vacuum system improvement.

Advisor: Dr. Don Guay

POSTER



Benjamin Cardinal
Senior, Paper Science
and Engineering
Minor: Chemistry

Abstract: The vacuum systems of a paper machine are very important and need to perform at peak efficiency to ensure high quality products, high yields, lower energy consumption, and high machine efficiency. The UWSP pilot paper machine is known to have vacuum limitations for both the flatbox vacuum pump and the couch roll vacuum pump. At one time, the press felt suction boxes had their own vacuum pump as well. When that pump was removed, those boxes were added to the couch roll vacuum pump. This has limited the consistency coming off of the couch and coming out of the press section. The purpose of this project was to determine the root causes of the vacuum limitations and to improve the system to achieve 20% consistency coming off of the couch roll. This will require the addition of a new vacuum pump to the system. Increasing the amount of vacuum available to the system will increase consistency and in turn enable a higher machine speed on heavyweight grades, increase machine efficiency, and decrease energy consumption in the dryers.

Consider for judging.



Brandon Jochem
Senior, Paper Science
and Engineering



Christian Marz
Senior, Paper Science
and Engineering



Katherine Mess
Senior, Paper Science
and Engineering
Minors: Chemistry,
Mathematics

Multi-component analysis for fiber blending.

Advisor: Dr. Don Guay, Dr. Karyn Biasca

POSTER



Stephen Chastain
Senior, Paper Science
and Engineering,
Chemistry

Abstract: The fiber length distribution of a paper machine furnish has been shown to be directly correlated to the strength properties of the paper sheet. Furnishes of different component stocks have demonstrated nearly identical fiber length distributions and strength properties. The goal of this project is to demonstrate control of multiple fiber streams to achieve a desired and constant fiber length distribution of the furnish to a paper machine. The theory is to be tested on the UWSP pilot paper machine.

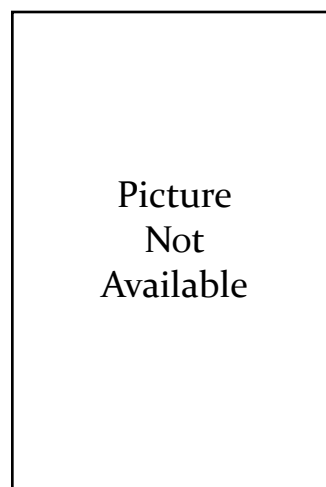
Consider for judging.



Christine Karras
Senior, Paper Science
and Engineering



Nate Schimmelpfenning
Senior, Paper Science and
Engineering, Chemistry



Scott Gewiss
Junior, Paper Science
and Engineering,
Chemistry

Diets of weasels legally trapped in Wisconsin.

Advisor: Dr. Shelli Dubay

POSTER



Adam Clifford
Senior, Wildlife Ecology
and Management
Minors: Biology,
International Resource
Management



Laura Jaskiewicz
Sophomore, Wildlife
Ecology and
Management

Abstract: Weasels (*Mustela spp.*) primarily eat shrews, squirrels, voles, mice, rabbits and mollusks in the Mid-western United States. Diet varies with gender and age 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 4 years, we have been working with furbearer trappers to acquire carcasses for parasite investigations. This year, we investigated stomach contents of weasels trapped in Wisconsin and identified prey species based upon hairs found inside the stomach. We hypothesized that 1) a higher proportion of male weasels will have mammals in their stomachs because males are larger in size, and 2) that a higher proportion of adult weasels will eat shrews than juveniles. We evaluated stomach contents of 52 weasels for presence of hairs, feathers, and mollusk remains using dissecting microscopes. Mollusks were identified by the presence of shell particles and hairs 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. From these characteristics, we were able to identify mammalian prey items in weasel stomachs. Prey species included shrews, mollusks, squirrels, mice, voles and rabbits. Shrews were the most common prey item identified in weasel stomachs. We did not find a difference in diet by age or gender of weasels examined using a Fisher's exact test, potentially because of low sample size.

Sustainability through agro-forestry in East Africa.

Advisor: Dr. Holly Petrillo

POSTER



Adam Clifford
Senior, Wildlife Ecology and
Management
Minors: Biology,
International Resource
Management

Abstract: The castor plant (*Ricinus communis*) is a fast-growing, short-lived plant native to the Mediterranean Basin, India and East Africa. The seeds can be pressed into oil that can be then converted into a bio-fuel. The melia tree (*Melia volkensii*), is a drought-resistant tree native to east Africa. On a 10 to 12 year rotation cycle, melia can be harvested for its lumber. Nyumbani Village, an HIV/AIDS orphanage in the Kitui District of Kenya, is devoted to becoming an self-sustaining village through agro-forestry. There are currently 3 acres of castor being actively managed and 100 acres of melia on the 1,000 acre property. Through the integration and expansion of both castor and melia plots, the village can have a year-round supply of bio-fuel to run all electricity off of, with some excess to sell to the outside community and a year-round supply of lumber to use and sell.

Consider for judging.

Effects of compost tea on soil microbial activity and nutrient content.

Advisor: Dr. Rob Michitsch

POSTER



Anna Courtney
Senior, Soils, Land
Management, Geology



Joel Stokdyk
Senior, Soils, Land Management
Minors: GIS/Spatial Analysis



Evan Roberts
Junior, Soils and Land Management
Minor: Natural Science

Abstract: This project is part of the activities of the Environmental Microbial Analysis and Research Laboratory (EMARL) at UWSP, where the relationship between soil microbial activity and the structure/diversity of the microbial community is being examined. Kentucky bluegrass was grown in a sandy loam soil in the UWSP Daniel O. Trainer Building greenhouse in 20 cm (8 in) diameter PVC rings and subjected to treatments of reverse osmosis water, compost tea, compost tea amended with mycorrhizal fungi, and compost tea amended with the fungi and humic acid. Compost teas are highly concentrated solutions of beneficial micro-organisms and nutrients that are extracted from compost using an aerated brewing method over 24-48 hours. Currently, the recommended rate of application for compost teas to urban turfgrasses is 468 L·ha⁻¹ (50 ga·ac⁻¹). It is speculated that this rate is too low to cause an increase in soil microbial activity and plant growth. Forty-eight hours after treatments, the 0-10cm soil profile of our turf grass pots was sampled for soil leachate and nutrient analysis testing. This was done in order to uncover the value of extractable nutrients and nutrient content of the soil after treatment to show what effect the recommended amount of compost tea has on the soil environment from a soil microbial community and soil nutrient perspective. During the 48 hours between treatment application and soil sampling, CO₂ evolution was measured at 0, 2, 24, and 48 hours to monitor changes in microbial respiration and plant respiration, based on CO₂ flux. Our results will provide critical data that will help land managers determine proper application rates of compost teas to more efficiently supplement their crops and soils. The main objectives of this project (the monitoring soil leachable nutrients, soil extractable nutrients, microbial and plant CO₂ evolution levels) were examined separately by the three main authors of this research

Consider for judging.

Flooding effects on waterfowl harvest in Mead Wildlife Area.

Advisor: Dr. Shelli Dubay

POSTER



Mark Cufaude
Senior, Wildlife Ecology:
Research and
Management



Matthew Haugen
Senior, Wildlife
Ecology: Research and
Management, Biology

Abstract: In September 2010, waterfowl hunters complained to biologists working at Mead about the lack of birds available to harvest during flooded conditions during opening weekend of the northern waterfowl season. We hypothesized that waterfowl harvest would increase as water levels receded. We asked waterfowl hunters to report the number of birds they harvested from September 25th through October 30th, 2010. We compared water level data to the number of waterfowl harvested/ hunter surveyed. Using linear regression, we found a significant relationship ($R^2=0.2079$, $P=0.0129$) between waterfowl harvest and water level, and a significant relationship between date and waterfowl harvest ($R^2=0.1927$, $P=0.0172$). However, the data showed that number of waterfowl harvested/hunter decreased as water levels receded. In general, hunters harvested fewer birds later in the hunting season. We think that those hunters who were able to capitalize on the relatively inaccessible flooded habitat had very successful hunts. Thus, we reasoned that hunter effort was more influential than water levels on hunter success. We will be able to help wildlife biologists explain to the public the consequences of flooding on waterfowl harvest.

Consider for judging.

Microbial diversity in soil treated with compost teas.

Advisor: Dr. Rob Michitsch

ORAL AND POSTER



Emily Fuger
Senior, Soil Science

Abstract: Microbial population diversity was evaluated in a sandy loam soil subjected to treatment combinations of compost tea, a mycorrhizal inoculant, and humic acid amendments. Compost teas are low-nutrient liquids that result from placing mature compost in water, and percolating air through the compost for a period of usually 24 to 48 hours thereby allowing the solution to take on characteristics of the nutrients and microbes present in the compost. To date, very little is known about compost teas and their effect on the soil microbial communities. In an effort to learn more about how microorganisms are effected by compost teas, soil samples were obtained from pots planted with turfgrass (Kentucky Bluegrass mix) in the TNR greenhouse at UWSP as part of the efforts of the Environmental Microbial Analysis and Research Laboratory (EMARL). Microbial populations were evaluated by directly sampling the soil, subjecting the sample to serial dilution, and incubating at the average soil temperature of 35 degrees C for 48 hours. The resultant numbers of colonies were quantified by morphology, and select species were identified using differential growth media and microscopic techniques. Distinct differences between the types of microbial colonies will be reported.

Consider for judging.

Iron: a fix to the phosphorus issues in water?

Advisor: Dr. Paul McGinley

POSTER



Tyler Groh
Senior, Watershed
Management
Minors: Soil Science,
Chemistry

Abstract: In recent years, phosphorus, an essential and often limiting plant nutrient, has raised concern. Those that apply fertilizers view phosphorus as essential to the overall yield of their plants. On the other hand, there has been growing concern in the past decade involving the effects of phosphorus on surface water systems, the highest of these being eutrophication. Ever since eutrophication became a concern, researchers have been looking for ways to tie up phosphorus in the soil and prevent it from reaching a water source. Current studies suggest that iron may be able to precipitate phosphorus in two different forms, depending on the oxidation state of the iron available, and therefore decrease the phosphorus concentration in the water. Ferric iron, Fe(III), may form the phosphate mineral strengite, while Ferrous iron, Fe (II), may form a different phosphate mineral, vivianite. The type and amount of iron available in the soil varies with the Eh and pH respectively. This study attempted to test this phosphorus precipitation hypothesis by analyzing chemical data that has been collected since 2001. The sources for this data were samples taken from tap water from various wells around the state of Wisconsin focusing extensively on Taylor County. This data was then analyzed, including statistical analyses, to find a relationship between the amount and type of iron and the concentration of phosphorus obtained from the well. It is thought that the data provided here can provide some insight on how phosphorus behaves, and is treated, in soil.

Consider for judging.

Assessment of a rapid procedure for estimating walleye fecundity.

Advisor: Dr. Daniel Isermann

ORAL AND POSTER



Matt Gunderson
Senior, Fisheries & Water
Resources: Fisheries

Abstract: Operating the largest walleye stocking program in the country, the Minnesota Department of Natural Resources (MNDNR) collects approximately 600 million eggs and returns >250 million fry annually. It is unknown, however, what impacts these returned fry have on natural recruitment (e.g. density dependent factors). In conjunction with a larger MNDNR study examining walleye recruitment patterns in Minnesota lakes, this study focused on developing a model which will allow accurate estimation of individual fecundity based on overall body size. These models can then be applied to population size structure estimates and thus a total system fecundity estimate obtained. Additional objectives were to determine if egg density (egg/g) varies among different locations within a walleye ovary, and whether components of the estimation process (ovarian wall weight, water retention, etc.) could significantly bias fecundity estimates. Strong correlations were found between total number of eggs per fish and both individual length and weight ($R^2 = 0.95$ and 0.98 respectively). Non-egg material was found to account for approximately 8% of ovary weight. Known sources of error in the sampling method were shown to have a small net effect ($< 2\%$). The walleye examined in this study were collected by MNDNR personnel during the spring of 2010 from Lake Winnibigoshish, MN.

Consider for judging.

Parasites of Wisconsin's weasels

Advisor: Dr. Shelli Dubay and Dr. Todd Huspeni

POSTER



Luke Haen

Senior, Wildlife Ecology and Management

Abstract: Three weasel species are found in Wisconsin, the long-tailed (*Mustela frenata*), short-tailed (*M. erminea*), and least weasel (*M. nivalis*). Weasels are trapped as legal furbearers in Wisconsin but are not actively managed by the Wisconsin Department of Natural Resources. Information gathered on the 3 weasel species that occur in the state could help wildlife managers better understand population dynamics of weasels. Weasels harbor parasites in the gastrointestinal tract, nasal cavity and respiratory tract but little information is known on the prevalence of these parasites or how they impact body condition of weasels in Wisconsin. The focus of this study was to evaluate how *Skrjabingylus nasicola*, a parasite of the nasal cavity, affects body condition in weasels. Mollusks are intermediate hosts for the parasite, but since mollusks are not heavily preyed upon by weasels it is thought small mammals, a more likely prey target of weasels, may be paratenic hosts of *S. nasicola*. Specifically, we wanted to: 1) determine the prevalence and intensity of *S. nasicola*, 2) determine if the intensity of the parasite *S. nasicola* influences body condition, and 3) compare 2011 results with those from 2009 and 2010. We acquired 52 weasel carcasses from trappers in winter 2011. Weasel carcasses were necropsied and parasites were identified and collected to determine prevalence and intensity. During necropsy, hairs in stomach contents were also identified to genus to determine potential transmission routes for *S. nasicola* in weasels. Weasel body condition was evaluated using Log transformed weight of weasels when corrected for Log transformed head and body length. We used multiple linear regression analyses to compare number of parasites in the nasal cavity to body condition by gender for short-tailed weasels. We used chi square tests to compare prevalence by year. In 2009, we discovered *S. nasicola*, in 98% of the weasels necropsied, and in 2010, the parasite was found in 94.2% of the animals necropsied.

Consider for judging

Developing an economical analytical technique for identifying manure contamination.

Advisor: William DeVita

POSTER



Justin Hall
Senior, Water Resources
Minor: Chemistry

Abstract: Human and animal waste poses a serious threat to the quality of groundwater, surface water, and sources of drinking water. Current source tracking methods for reliable identification to the source of the waste contamination requires the use of expensive genetic testing. The Water and Environmental Analysis Laboratory has recently received a National Science Foundation grant to purchase an Agilent 6430 QQQ/LC/MS/MS. This instrument allows for the simultaneous analysis of numerous compounds at the part per billion level. With support from the Wisconsin Institute for Sustainable Technologies (WIST), we seek to develop methodology using indicator/tracer compounds to distinguish the source of the waste in a more cost efficient manner. Artificial sweeteners (sucralose, acesulfame), caffeine, paraxanthine (metabolite of caffeine), cotinine (metabolite of nicotine) have been identified as potential indicators/tracers for human waste. We propose to use an array of fecal sterols to use as indicators/tracers for sources of animal waste contamination. Different species of animals (including humans) have shown to have unique proportions and compositions of sterols in their feces. Coprostanol, 24-ethylcoprostanol, campestanol, sitosterol, and sitostanol have been identified as possible compounds for analysis. Utilizing indicator/tracer compounds methods should be able to be established to identify the source of waste contamination as animal, human, or a mix of both.

Consider for judging.

GIS-based habitat models for small mammal species with information needs in Wisconsin.

Advisor: Ryan Stephens, Dr. Eric Anderson

POSTER



Mitchell Isaacson
Senior, Watershed
Management, GIS and
Spatial Analysis

Abstract: Small mammals significantly influence ecological communities in Wisconsin. However, little research has been conducted on even the most rudimentary aspects of small mammal ecology. Many Wisconsin small mammal species are listed by the Wisconsin Department of Natural Resources (WDNR) as species with information needs (SIN). In order to address these information needs, we modeled predicted habitat use by select small mammal SINS based on trapping data collected during the summers of 2009 and 2010. We developed habitat occupancy models in a geographic information system (GIS) by integrating known habitat locations with corresponding spatial attributes from statewide geographic datasets. We used logistic regression and AIC model selection to create the most parsimonious models. We then applied weighted habitat variables across the state to predict suitable habitat. We evaluated the performance of these models using a set of independent points gathered from other small mammal studies and the WDNR Small Mammal Inventory Museum Records Database. Our results show that GIS is a promising tool for predicting potential small mammal occurrence in Wisconsin. Our models and ancillary maps can help the WDNR determine distribution and potential management guidelines for small mammal SINS in Wisconsin.

Consider for judging.

Microsatellite inheritance and Great Lakes Lake Trout propagation.

Advisor: Dr. Brian Sloss

ORAL



Benjamin Kissinger
Senior, Fisheries
Minor: Biology

Abstract: Restoration of Great Lakes lake trout (*Salvelinus namaycush*) currently relies on hatchery propagation to establish and maintain populations. Monitoring and evaluating the efficacy of management efforts is a focus of sound propagation programs. Molecular genetic techniques can provide cost-effective, accurate evaluation of strain-specific success over multiple generations. To achieve such goals, an effective suite of molecular markers is required. Ideal genetic markers should be codominant (i.e., observed alleles from both mother and father) and inherited in a Mendelian pattern (i.e., strict inheritance of alleles from parents). My objectives are: 1) to determine if a suite of 11 lake trout specific microsatellite genetic markers are inherited in a codominant Mendelian fashion; and 2) determine if any of the 11 genetic markers are significantly linked to observed albinism in lake trout. To test whether the 11 microsatellite markers were inherited in a codominant, Mendelian fashion, lake trout broodfish and a sample of resulting offspring (N= 90/ cross) from the Ontario Ministry of Natural Resources' Codrington Fish Hatchery were genotyped. Given the known parental genotypes, errors in inheritance and the mutation rates of the loci were estimated. This was replicated for twelve total parental crosses. Observed genotype frequencies were compared to expected Mendelian genotype frequencies using chi-square tests. Two of the twelve crosses produced a 50:50 ratio of normal to albino fish; parents of these offspring showed no albino phenotypes. This pattern of inheritance is consistent with a single-gene albinism control (albino allele recessive trait) with each of the parents being heterozygotes for the albino trait. Microsatellite allele identities and frequencies were compared for correlation to the albino phenotype. No correlation was observed. The results of this study show this suite of microsatellite markers can be combined with previous markers to increase our level of accuracy in monitoring and evaluating the Great Lakes lake trout propagation program.

Consider for judging.

Bathymetric lake mapping using ArcGIS mapping software in north central Wisconsin.

Advisor: Dr. Ron Crunkilton

ORAL



Christine Koeller
Senior, Watershed
Management

Abstract: Bathymetric lake maps are an important tool for water resource scientists. They are used to calculate lake volume for water storage and chemical application rates for nuisance aquatic plant control, delineate depth contours, assess littoral zone area, and locate valuable lake habitat. Water resource scientists also use bathymetric maps for navigation and to determine suitable sampling points. Historically, creating bathymetric maps for lakes proved to be expensive and time consuming. As a result these maps are not updated often. This project reviews historical procedures for creating bathymetric maps and presents an updated procedure based on modern technology including acquisition of depth and position information with boat-mounted sonar/GPS chartplotters with final maps produced using ArcGIS mapping software. This bathymetric mapping procedure was used to create new lake depth contour maps and morphometric measurements for three lakes in north central Wisconsin. A random sample of known sonar depth points (n greater than or equal to 60) from each lake were then statistically compared to their interpolated ArcGIS raster cell depths (two-way T-test). The new ArcGIS procedure is a comparably inexpensive tool for mapping bathymetry in a lake.

Consider for judging.

Visitor use on day use areas around the Northern Highlands American Legion State Forest.

Advisor: Dr. Melissa Baker

POSTER



Edwin Koepp
Senior, Forest Recreation

Abstract: Comprised of over 225,000 acres, the Northern Highland American Legion State Forest (NHAL) is the largest state-owned property in Wisconsin. Located within Vilas, Oneida and Iron counties in northern Wisconsin, the forest is managed for a variety of social, ecological, and economic benefits. Among the benefits is the provision of public recreation. To appropriately provide for recreation, managers must have an understanding of the types of recreation experiences that visitors seek as well as the unique niche the may serve in the community. The purpose of this study was to understand the differences in recreation experiences preferences between visitors to NHAL and visitors to other regional public recreation areas. The study employed an on-site questionnaire completed by 184 visitors to recreation areas in and around NHAL. While visitors to NHAL and surrounding municipal area recreation areas were similar on most items, visitors to the state forest placed more importance on recreation experiences related to escape and nature than visitors to municipal sites. Visitor's desired experiences for the state forest were consistent with management goals for the area and support management decisions to provide for nature based recreation opportunities.

Consider for judging.

Effect of temperature and 3kPZS on upstream migration of female sea lampreys.

Advisor: Dr. Daniel Isermann

ORAL



Hanna Kruckman
Senior, Fisheries

Abstract: Effect of stream temperature on upstream movement of migratory phase, female sea lampreys in the presence of the spermiating male sea lamprey pheromone compound 3kPZS was quantified to determine if 3kPZS stopped migrating female sea lampreys from moving upstream to suitable spawning habitat. PIT-tagged migratory phase, female sea lampreys were released on the upper Ocqueoc River, Millersburg, Michigan to monitor sea lamprey movement upstream toward baited (3kPZS treatment) and un-baited (control methanol treatment) sub-channels when stream temperature ranged from 11.8°C to 23.7°C. From 13 May to 17 June 2009, 43 trials were conducted, of which 21 were control trials and 22 were 3kPZS trials. Analysis of covariance (ANCOVA) was used to quantify the relationship between the proportion of sea lampreys that swam upstream and stream temperature for two treatment classes. The percent of female, migratory phase sea lampreys that moved upstream during 3kPZS trials was significantly greater than that of control trials for the lowest range of stream temperatures. 3kPZS and control trials did not differ significantly in the percent of animals that swam upstream for middle and upper quartile ranges of stream temperature. The relationship between increasing temperature and increased upstream migration of female sea lampreys for early and late control trials was significantly greater than the upstream migration of female sea lampreys for early and late 3kPZS trials. The pheromone compound 3kPZS can be used to lure migratory phase female sea lampreys into baited traps over a wide range of temperatures, and applying pheromones under appropriate environmental conditions could make sea lamprey trapping and removal programs more efficient.

Consider for judging.

Soil analysis of total carbon, nitrogen, and phosphorus concentrations within the Horicon Marsh.

Advisor: Dr. Steve Levine

POSTER



Helen Leavenworth
Senior, Soil Science
Minor: International
Resource Management

Abstract: The Horicon Marsh is an internationally-significant 32,000-acre freshwater cattail marsh located in Dodge and Fond du Lac County, Wisconsin. The surrounding area is predominantly agricultural land that may contribute to significant nutrient loading events. In 2001, undergraduate student members of the Soil and Water Conservation Society (SWCS) at the University of Wisconsin - Stevens Point initiated a project to identify the locations of nutrient loading within the marsh. Every winter since 2001, soil cores were collected at points positioned $\frac{1}{4}$ mile apart along east-west transects throughout the marsh. Thereafter, the cores were divided into five-centimeter sub-samples, oven-dried, and analyzed for total carbon, nitrogen, and Olsen phosphorus. With this data, SWCS members aim to develop a nutrient density map to illustrate the nutrient concentrations within the Horicon Marsh system. This map will enable natural resource professionals to: (1) link historic land use practices to patterns of nutrient loading; (2) understand how nutrients are captured and distributed; and (3) indicate potential implications of management practices in the marsh and surrounding area. This poster shows preliminary nutrient analysis data from cores sampled from areas that are of high interest to Wisconsin Department of Natural Resources officials.

Consider for judging.

An investigation into controlled compost tea production.

Advisors: Dr. Robert Michitsch, Dr. Aga Razvi, Dr. Les Werner, Dr. Jonathon Rivin

ORAL AND POSTER



Brian Luedtke

Senior, Urban Forestry
Minor: Soil Sciences

Abstract: Compost teas (CT) are liquid extracts made from soaking compost in water. The majority of research conducted with CT's is focused on disease suppressive properties. However, few studies have focused on CT production methods. This study will focus on the length of time CT should be brewed for to achieve certain levels of CT maturity. Compost tea was brewed from compost obtained from Busy Bee Gardens Mosinee, WI. A mixture of 1 kg compost to 10 L de-chlorinated water was used. Teas were brewed by actively aerating (aerated with an air pump) the compost-water solution for a total of 5 days. Samples were taken every 12 hours beginning at experiment start (ie. when compost was introduced to water). Samples taken were analyzed for key characteristics which may provide insight to when a CT may be considered finished. These key characteristics were: $\text{NO}_3:\text{NH}_4$, dissolved organic carbon (DOC), soluble reactive phosphorus, potassium, pH and, electrical conductivity. Depending on the desired use (ie. disease suppression, soil building or, nutrient source) CT can be considered mature when any of the key characteristics are at their desired concentrations. This research will serve as the baseline for future CT research which will investigate key factors in CT production.

Consider for judging.

Prevalence of *Filaroides martis* in Wisconsin's weasels.

Advisor: Dr. Shelli Dubay

ORAL



Robert Lisiecki

Junior, Wildlife Ecology
Research and Management.

Abstract: Weasels (*Mustela spp.*) harbor internal parasites in the kidneys, gastrointestinal tract, nasal cavity, and respiratory tract, but little is known about prevalence of these parasites in weasels, particularly in Wisconsin. The short-tailed (*M. erminea*), long-tailed (*M. frenata*) and least weasel (*M. nivalis*) are trapped as legal furbearers in Wisconsin 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 4 years (251 total necropsies), 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. In 2008, juvenile male weasels had a higher prevalence of *F. martis* than adult males, but we did not detect a difference in 2009. *Filaroides martis* is transmitted to weasels when they consume infected adult gastropods. This year, our goals were to: 1) identify parasite communities in weasels, 2) determine the effects of infection with *F. martis* on weasel body condition, 3) compare prevalence results in 2010-2011 to those from previous years, and 4) investigate the relationship between habitat where weasels were trapped and infection with *F. martis*. In 2010 – 2011, trappers provided 52 weasel carcasses and recorded location and habitat information on data sheets. Weasels were necropsied and parasites were collected and identified using reference specimens in the Steven Taft Parasitological Collection. Analyses are ongoing, but we hypothesize that 1) prevalence of *F. martis* will not differ between juvenile and adult male weasels, 2) body condition will not be affect

Consider for judging.

Investigating the estimate that residual biomass is 45% of merchantable weight for red pine.

Advisor: Dr. Paul Doruska

ORAL AND POSTER



Laura Lorentz
Senior, Forest Management,
GIS and Spatial Analysis

Abstract: As the use of alternative energy sources continues, resource managers and landowners need accurate estimates of residual biomass produced during harvesting activities. Hahn (1984) estimates residual biomass of red pine (*Pinus resinosa*) to be 45% of the merchantable stem weight. However, applying the 45% constant to all red pine does not account for site and management history nor bole and crown form. This study uses data collected from 15 red pine trees located on four separate sites in central Wisconsin to examine how applicable the 45% constant is to red pine pulpwood trees. After recording dbh and total height, each tree was felled. The green weight of each live branch on the tree was determined. Dead branches were collected and also weighed. Beginning at the base of the tree, cookies were cut every 8.33 ft. (pulpstick) along the bole until a 3-inch diameter merchantability limit was reached. The green weight of each cookie was determined and each was subsequently measured for volume. The weight of the non-merchantized bole was also determined. Merchantable stem weight for each tree could then be estimated by applying the lbs. per cu.ft. estimates from the cookies to the volumes calculated to be in each pulpstick. The green weights of all branches and the non-merchantized bole were summed to determine the weight of the residual biomass for each tree. Residual biomass averaged 33% of merchantable weight for these trees, and was significantly lower than the 45% estimate (p-value = 0.0004). When examined on a stand by stand basis, only the least dense of the four stands had a ratio (43%) numerically close to the 45% constant. Based on this work, it appears the 45% constant should not be universally applied to pulpwood sized red pine trees in central Wisconsin.

Consider for judging.

Infection rate of Liver Flukes (*Fascioloides magna*) in male white-tailed deer in Wisconsin.

Advisor: Dr. Shelli Dubay

POSTER



Jeanne Lust
Senior, Wildlife Education.
Minor: Captive Wildlife.

Abstract: Liver flukes (*Fascioloides magna*) are common in white-tailed deer (*Odocoileus virginianus*) and high intensities of flukes have been correlated with fewer antler points and small body size in males. Liver flukes are parasitic trematodes that belong to the phylum Platyhelminthes, and adult flukes reside in the liver of ruminants. The liver fluke life cycle requires a snail as an intermediate host. Inside snails, flukes develop into infective stages that encyst on vegetation after leaving the snails. Deer consume vegetation contaminated with encysted infective flukes. We investigated the relationship between antler points and intensity of liver fluke infection in male white-tailed deer, predicting that deer with fewer antler points would have more intense infections of liver flukes. We asked successful deer hunters from the College of Natural Resources to donate livers to the project and record number of antler points from male deer. We provided a gift card as an incentive. We dissected all livers and counted the number of flukes in the liver. We used a linear regression analysis to compare antler points by number of flukes in the liver. We collected 23 livers from male deer. Deer had between 2 and 10 antler points. Deer with fewer flukes in the liver had fewer antler points ($R^2 = 0.23$, $F = 6.36$, $P = 0.0197$), so our hypothesis was not supported. Perhaps deer with more antler points were also older because antler size is correlated to age in white-tailed deer. If true, older deer may have acquired more flukes because they have more time to acquire infection. Secondly, we only found flukes in 4 livers but all 4 deer had > 9 antler points. As a result, small sample size may partially explain the relationship we found. Further testing with larger sample sizes would be beneficial in the future.

Consider for judging.

The effect of trap placement and bait type on the differential capture success of Painted Turtles (*Chrysemys picta*)

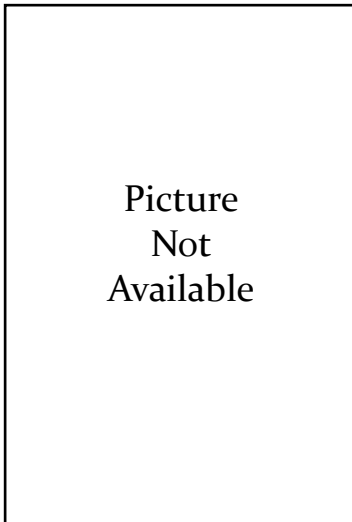
Advisors: Dr. Shelli Dubay, Dr. Eric Anderson

POSTER



Marcus Mueller

Junior, Wildlife Ecology:
Research and
Management
Minor: Biology



Danielle Berger

Sophomore, Wildlife
Ecology: Research and
Management, Biology

Abstract: Each year, instructors of Wildlife 340 ask students to trap painted turtles (*Chrysemys picta*) during the Treehaven Summer Session as part of the population estimation and animal handling exercises. Differential trapping success observed among basking traps in Dragonfly Pond indicated that trap success may be maximized by modifying trapping procedures. The purpose of our research was to identify trap locations and types of bait that maximize catch effort. During the 2010 summer session, we captured turtles using five basking traps at five fixed locations in Dragonfly Pond. Each trap received one of three baiting treatments or was left unbaited as a control. The three bait types tested were tuna, sardines packed in oil, and sardines packed in water. Bait types and control measures were rotated among traps on a weekly basis. Each trap was subjected to each treatment on an equal number of occasions. Bait types were used equally over the course of the field season. Each trap was checked twice a day for the presence of turtles. We captured 139 turtles from May – August 2010. We are currently using Analysis of Variance tests to determine if catch success varied with bait type or with location of trap on the pond. However, we expect that the data will reveal that traps located near the eastern shore of Dragonfly Pond captured more turtles because of a lack of adequate basking surfaces in close proximity to the traps. We also predict that sardines packed in oil will be the most effective bait type because persistent oil residue in the traps attracts turtles even after the primary bait has been consumed. Our findings will be practically applied to enhance trapping success so the exercise may better serve the learning objectives of the Wildlife 340 curriculum.

Consider for judging.

Genetic stock temporal stability of lake whitefish in Lake Michigan.

Advisor: Dr. Brian Sloss

ORAL AND POSTER



Lucas Nathan
Junior, Water Resources:
Fisheries

Abstract: Lake whitefish (*Coregonus clupeaformis*) are the most important fish in the Lake Michigan commercial fishing industry. This popularity is in spite of a dramatic population reduction in the early 1900s. Subsequently, much effort has been put into attempting to manage for sustainable populations through the use of stock-based management. In a previous study, six management units were identified based on genetic differentiation of spawning stocks. The objective of this study is to determine whether or not the genetic composition of these stocks has been consistent over time. Archive scale samples collected by state and tribal agencies from the 1970's, 1980's, and 1990's were used as a source of DNA for this project. I hypothesize that these samples will demonstrate a relatively stable composition consistent with that of the previous genetic study. If the populations show temporal stability then the quotas for each management zone may need to be adjusted in accordance with commercial fishing exploitation to conserve genetic variation. If the populations fail to show temporal stability, the implications are that the resolved genetic management units are of less relevance in terms of sustainability and viability of the resource and more a result of chance recolonization of spawning sites.

Consider for judging.

The impact of stand conditions on a residual branch biomass for pulpwood-sized red pine in central Wisconsin.

Advisor: Dr. Paul Doruska

POSTER



Coulter Nyenhuis
Senior, Forest Management

Abstract-The increase in demand for energy alternatives to fossil fuels has led to a market for woody biomass. Traditionally, branches from the merchantable bole of red pine pulpwood trees have been left on site, now they might be removed for bioenergy. This project examined the total amount of biomass (branch wood, bark and foliage combined) in these branches for a given tree, and investigated whether the amounts vary by stand. Twenty five trees across five sites in central Wisconsin were measured and then felled for use in this project. Standing tree measurements included dbh and total height. Once felled, the green weight of each live branch found along the merchantable was weighed in the field, and the age of each tree was determined. The branch weights were subsequently summed by tree, and then standardized in three different ways: dividing by tree age, dbh, and total height, respectively. ANOVA analyses indicated significant differences exist between the standardized measures by stand (p -values < 0.0002), suggesting stand conditions do impact the amount of biomass generated by such branches. Relationships between stand conditions and the standardized biomass measures will be discussed. Results from this work should prove useful to those examining the amounts of residual biomass produced when thinning red pine pulpwood stands.

Consider for judging.

Build-out model analysis for three towns in Waupaca County.

Advisors: Dan McFarlane, Dr. Mike Koles

ORAL AND POSTER



Luke Olson

Senior, Resource
Management: Land Use
Planning
Minor: Soil Science

Abstract: Numerous municipalities within Waupaca County, Wisconsin, have recently adopted a zoning ordinance that focuses on density-based development. This progressive policy measure provides landowners with development rights based on the amount of land acreage they own and allows for flexibility in determining the location and size of new buildable lots. When the allotted development occurs on the parcel, the rights are forfeited, further protecting the land resource. The question arises as to whether or not this density-based zoning is superior to traditional minimum lot size zoning in terms of protecting large, contiguous tracts of land for agriculture and forestry through restricted development. To create a comparison, a residential build-out analysis using Geographic Information Systems (GIS) software will be conducted for three Waupaca County towns: Bear Creek, Little Wolf, and Iola. Recent developments in GIS have made the development of alternative policy scenarios relatively easy to document and analyze. I will use the results of the build-out scenario to compare the potential consequences of the newly adopted ordinance to evaluate the likely impacts on landscape fragmentation.

Consider for judging.

Estimating fuel rod volume and weight for red pine pulpwood trees.

Advisor: Dr. Paul Doruska

POSTER



Tyler Pederson

Junior, Forest Management
Minor: GIS, Soil Science

Abstract: Researchers are looking to renewable resources as an alternative energy source. One possible resource is the non-merchandized portion (tops) of red pine tree stems, known as fuel rods. In order to estimate the amount of energy one might produce from fuel rods from a given stand, one must be able to estimate the volume or weight of fuel rods in trees as they are inventoried. This project developed equations to estimate the outside bark volume (cu.ft.) and the weight (lbs.) of fuel rods from pulpwood-sized red pine trees in central Wisconsin. Twenty-five trees across five sites were measured and then felled for use in this project. Standing tree measurements included dbh and total height, whereas felled tree measured included merchantable height, merchantable top diameter, and fuel rod length. These served as potential independent variables in the regression equations developed. The volume and green weight of each fuel rod was also measured. These served as the dependent variables in regression equations developed. More than 80% of the variation in fuel rod green weight and volume was explained by independent variables. The results were also extended to dry weight estimation. Use of the developed equations should aid those inventorying red pine trees for alternative energy applications.

Consider for judging.

Intensity of ectoparasites on white-tailed deer (*Odocoileus virginianus*) in two sites in Wisconsin.

Advisor: Dr. Shelli Dubay

ORAL



Rachel Piette
Senior, Biology
Minor: Captive Wildlife

Abstract: White-tailed deer (*Odocoileus virginianus*) are the most economically and culturally important game species in Wisconsin. The Wisconsin Department of Natural Resources initiated a \$2 million research endeavor in January – February 2011 to determine causes of mortality in fawn and adult male deer. To fit deer with radio-collars for mortality investigations, DNR biologists captured deer in box and Clover traps and via helicopter net – gun near Winter and Shiocton, WI. We collected ectoparasites to: 1) determine if non-native mites (*Damalinia* sp.) that cause hair-loss syndrome in black-tailed deer (*O. hemionus columbianus*) and mule deer (*O. hemionus*) occur on deer in Wisconsin and 2) to determine if the number of ticks and lice on deer differ with gender or study area. We combed the base of the tail and the ears of deer with flea combs and specimens were placed in a vial of 70% alcohol until identification. To date, we have collected parasites from 31 deer and have identified Mallophaga sp. lice and/or deer ticks (*Ixodes scapularis*) on several deer. *Damalinia* sp. have not been found. Analyses are ongoing, but we hypothesize that male deer will have higher intensities of ectoparasites because they have larger home ranges than adult female deer, allowing them more area from which to acquire parasites. Our results will contribute to the overall study because some parasites transmit diseases to deer and could affect overall body condition in deer.

Consider for judging.

A comparison of fish total length-otolith radius relationships among three Wisconsin Yellow Perch populations.

Advisor: Dr. Daniel Isermann

POSTER



Jacob Richter
Senior, Fisheries/Water
Resources, Biology

Abstract: Relationships between measurements from calcified structures used for fish age estimation and fish length are commonly used to estimate body lengths at previous ages (i.e., back-calculation). A previous evaluation conducted at UWSP has provided relationships for back-calculating the lengths of Green Bay yellow perch from otoliths, one of the structures commonly used by biologists to estimate fish age. However, it is unknown if this relationship is constant among yellow perch populations. Our objective was to determine if the relationship between otolith radius and fish length observed for Green Bay yellow perch is similar to relationships observed for perch in Lake Winnebago and the area of Lake Michigan around Milwaukee.

Consider for judging.

Iceland Field Work: In the shadow of the erupting Eyjafjallajökull.

Advisors: Dr. Kevin Hefferan, Dr. Aga Razvi

POSTER



Nicole Rumpca
Senior, Soil and Land
Management, Geoscience
Minor: Geology

Abstract: Field excursions to Iceland in the summers of 2009 and 2010 provided an opportunity to observe before and after changes in Icelandic landscape as due to the April 14, 2010 Eyjafjallajökull eruption. The eruption completely covered the surrounding landscape with ash and later generated flooding as glacial melt water rushed to the sea via the Markarfljot River.

In the summer of 2010, I participated in a field survey analyzing the impact of ash on the vegetation in Thorsmork. Careful analysis of the ash impact from June 3, 2010 to August 30, 2010 was conducted. Ash samples were gathered for the University of Iceland in Reykjavik along the Laugavegur trek in early June to allow for the creation of maps showing the distribution and extent of ash fall.

Numerous images of plants, ash distribution, and landscape changes were recorded each day. Together with researchers from Soil Conservation Service and the Gunnarsholt field station, vegetation was classified in sample plots with three distinct characteristics. The sample sites were of a dense forest, young forest, and gravel to show the various effects from ash. Three separate 10 x 10 meter plots were constructed at each site to specifically evaluate the vegetation and impact from ash. Data collected was recorded on a log sheet with images. Over this time, remarkable changes in the landscape were observed. I anticipate returning to Iceland in 2011 to continue field surveys of landscape rejuvenation.

Do not consider for judging.

The movement of brown trout (*Salmo trutta*) in SW Wisconsin streams. A look at how manmade and natural barriers pose as obstacles for brown trout spawning.

Advisors: Dr. Daniel Isermann and Dr. Scott Walter

POSTER



Anthony Sedlak Jr.

Junior, Fisheries and Water

Resources: Fisheries

Minor: Environmental

Education and

Interpretation

Abstract: Trout Unlimited along with the DNR destroy many beaver dams a year, in an attempt to better the trout population. But does it really help? In this research project I used brown trout on two different streams in south west Wisconsin in the fall of 2009 to spring 2010. Tenny Spring Creek (Vernon Co. WI) and Ash Creek (Richland Co. WI). One with a man made barrier to keep brown trout out and the other with a series of beaver dams and found that some trout are able to maneuver over these obstacles, wale some are stuck waiting for the right chance.

Consider for judging.

Success of gravel spawning sills for increasing salmonid abundance in two Michigan rivers.

Advisor: Dr. Michael Hansen

POSTER



Bradley Smith

Senior, Water Resources:
Fisheries
Minor: Biology

Abstract- My objective was to determine if salmonid abundance increased following construction of gravel spawning sills in Eighteenmile Creek and West Branch Pine River, Michigan during 1985–2010. Pre-treatment habitat characteristics and salmonid abundance estimates were documented in treatment and control zones then gravel spawning sills were constructed in treatment zones downstream from existing sediment traps and were sampled every 2-5 years following treatment to detect change in salmonid abundance. In Eighteenmile Creek, brook trout *Salvelinus fontinalis* abundance increased significantly following construction of gravel spawning sills ($t=346.35$; $df=3$; $P=0.003$). Steelhead *Oncorhynchus mykiss* abundance also increased following treatment but was not significant ($t=13.34$; $df=3$; $P=0.067$). Coho salmon *Oncorhynchus kisutch*, which were absent prior to treatment, were found in every subsequent sampling period following treatment except 2010. In West Branch Pine River, brook trout abundance did not differ significantly from pre-treatment years ($t=1.88$; $df=3$; $P=0.303$). However, steelhead abundance increased significantly in West Branch Pine River following treatment ($t=32.23$; $df=3$; $P=0.030$). The impact of gravel spawning sills on coho salmon abundance was inconclusive. Installation of gravel spawning sills in association with a sediment trap can be used to increase salmonid abundance in historically damaged rivers where abundance of salmonids is limited by availability of spawning habitat.

Consider for judging.

Development of a paper birch regeneration alternative.

Advisor: Kevin Burns

ORAL



Jonathan Steigerwaldt
Senior, Forest Management

Abstract: The successful regeneration of paper birch in northern Wisconsin has been a difficult one since the virtual removal of wildfires from the ecology of the landscape. Several regeneration types are suggested for regenerating paper birch through the scarification of the soil. With a large proportion of the paper birch of northern Wisconsin originating from widespread fires of the 1930's, questions are raised as to whether the suggested silvicultural treatments are and will be viable options with a population that is at or reaching over maturing. The development of an alternative method that looked at regeneration under high animal herbivory conditions was explored in this research to see if there was a better method than that currently used.

Consider for judging.

Time of first use of artificial nest boxes by wood ducks (*Aix sponsa*) and hooded mergansers (*Lophodytes cucullatus*) in central Wisconsin: implications for management.

Advisor: Dr. Kevin Russell

POSTER



Andrew Stetter

Senior, Wildlife Ecology:
Research and Management



Nathan Waid

Senior, Wildlife
Ecology: Research and
Management, Biology
Minor: Soil Science, GIS

Abstract: Wood ducks (*Aix sponsa*) and hooded mergansers (*Lophodytes cucullatus*) are two cavity-nesting species of waterfowl that are common in Wisconsin. Because of the long-term reduction in the availability of natural nest cavities, these and other species of cavity-nesting birds have increasingly relied on artificial nest boxes for reproduction. Previous research conducted at the Mead Wildlife Area (MWA) in Marathon County, Wisconsin has evaluated a suite of variables that influence nest box use by and fledgling success of wood ducks and hooded mergansers. Although wildlife biologists have continually added new artificial nest boxes to the MWA, little is known about the specific reasons why some nest boxes are never used by waterfowl or how long unoccupied nest boxes should be retained at a particular site before relocation. For example, if there is a high probability that a nest box will never attract waterfowl and has not been occupied within 2 years of installation, wildlife managers can relocate the nest box to increase the probability of use. Therefore, our objective was to determine if the long-term failure of specific nest boxes to attract waterfowl could be predicted by lack of use within a minimum number of years immediately after box installation. We combined historic data on nest box use by wood ducks and hooded mergansers collected from MWA between 2003 and 2010 with new data that we collected from 127 artificial nest boxes in February of 2011. We determined use of nest boxes by the presence of egg shells. We identified species of the presumed hatchlings by shell thickness and nest success was defined by the presence of intact membranes separated from shells. We will present results of our analyses evaluating the potential relationship between short-term and long-term lack of occupancy of artificial nest boxes by wood ducks and hooded mergansers.

Consider for judging.

Identifying causes of blue-green algae blooms in Bear Lake, Forest County, Wisconsin.

Advisor: Nancy Turyk

POSTER



Christine Koeller
Senior, Watershed
Management



Hayley Templar
Sophomore, Watershed
Management.
Minor: GIS and Spatial
Analysis

Abstract: Bear Lake is a 68-acre drainage lake located within the Nicolet National Forest in east central Forest County. The lake attracts recreational users for activities such as fishing, boating, and camping. About seven private homes exist along the southern and eastern shore and a 27-site Forest Service campground exists along the western shore. A health advisory was posted for Bear Lake by the USFS for blue-green algae levels, which exceed the World Health Organization's health standards. Since 2006, water quality data shows high concentrations of phosphorus (P), which likely contributes to the excess blue-green algal growth in Bear Lake. Because Bear Lake resides in a relatively undeveloped watershed, it is unclear why P concentrations are elevated and a high level of blue-green algal growth is occurring. The purpose of this study is to achieve a better understanding of the dynamics that are driving the blue-green algal growth in Bear Lake and determine whether anthropogenic sources are contributing to this problem. A combination of P sources and biological processes may be responsible for the issue. Collection of lake data including water quality, algae, temperature, and inflow/outflow measures began in May 2010 and will continue through fall 2011. These data will be used to create hydrologic and phosphorous budgets for the lake. The inflow and outflow samples were also analyzed for chloride, which can be an indicator of human-activity in the watershed. Thermosters are being used to determine if the lake is polymictic. The invasive rusty crayfish population is being monitored and is believed to have an impact on aquatic plants in the lake, and aquatic plant density is being evaluated. Nutrient budgets and models will be developed and used to create a strategic plan to address water quality and the aquatic plant community in Bear Lake.

Consider for judging.

Disfigurement rates of Blanding's turtles (*Emydoidea blandingii*) in central Wisconsin.

Advisor: Richard Thiel

POSTER



Alyssa Untiedt

Senior, Wildlife Research
and Management, Biology

Abstract: Turtle disfigurements are typically caused by injuries from encounters with predators and anthropogenic sources, including farm implements and vehicles. Disfigurement rates, then, can be especially helpful in gauging the extent of anthropogenic pressure provided that turtle biologists also report disfigurement rates from landscapes with little anthropogenic influence. Various types of disfigurements were observed among Blanding's turtles encountered between 1991- 2010 in a mark-recapture study conducted at Sandhill Wildlife Area, a 9,000 acre reserve part of a rural, non-agricultural area located in the central Wisconsin. Limb amputations, shell cracks, chips, and scars were sketched and recorded. A 12.2 percent disfigurement rate was observed, providing a base-line for Blanding's turtles existing in natural landscapes.

Consider for judging.

Policy options for community solar projects in the Midwest

Advisor: Dr. Kristin Floress

ORAL



Benjamin K. Van Thiel

Senior, Human Dimensions:
Natural Resource Policy

Abstract: Community solar projects include photovoltaic (PV) and solar thermal (ST) technologies purchased with the help of multiple investors and have the potential to increase solar energy installations by reducing initial costs. These projects provide opportunities and have a multitude of benefits for investors, including lower cost barriers, reduced cost-per-watt projects, and larger production capacity over a typical small solar installation. It also provides the opportunity for preferential site selection. While several financial incentives exist for PV and ST technologies in the Midwest, very few specifically address community solar options. Examining policies currently in place in seven Midwestern states including Minnesota, Iowa, Wisconsin, Illinois, Michigan, Indiana, and Ohio, this research analyzes the existing policy tools which benefit community solar projects and finally develops recommendations for policy development targeting community solar market creation in the Midwest.

Consider for judging

Analysis of stand age structure in Quincy Bluff and Wetlands Natural Area.

Advisor: Dr. James Cook

POSTER



Marissa Vine
Junior, Forest Ecosystem
Restoration and
Management

Abstract: The Quincy Bluff and Wetlands Area consists of over 3700 acres and features communities ranging from southern sedge meadow to oak-pine barrens. Located in Adams County, Wisconsin, it lies within the flat, sandy bed of former Glacial Lake Wisconsin. It is currently owned and managed by the WDNR and The Nature Conservancy. The purpose of this study was to determine stand age composition for the oak-pine barrens community, and whether it has changed in the past 20 years. The study was conducted in the fall of 2010 to estimate individual tree ages and the range in age variation for *Quercus sp.* and *Pinus banksiana*. Tree selection was conducted using randomly chosen, previously established transects. A core was extracted from each tree using an increment borer and later analyzed to determine approximate age. A total of 40 samples were collected; 20 cores were collected from *Quercus sp.* trees and 20 cores were collected from *P. banksiana* trees. The study found that the average age of *Pinus banksiana* is 59 years, indicating year of origin to be 1951. This is inconsistent with a similar study conducted in 1990. The average age of *Quercus sp.* was 77 years, indicating year of origin to be 1933. This is roughly consistent with the time at which fire control was first implemented in the area as well as the previous study. The *Quercus* species were found to have a greater degree of variability in ages than *Pinus banksiana*. These results may serve as a baseline for a future, more in-depth study.

Consider for judging.

Browse of Buckthorn (*Rhamnus spp.*) by white-tailed deer (*Odocoileus virginianus*) in central Wisconsin.

Advisor: Dr. Shelli Dubay

ORAL



Nathan Waid

Senior, Wildlife Ecology:
Research and Management,
Biology
Minor: GIS, Soil Science



Joshua Nemec

Senior, Wildlife Ecology: Research
and Management
Minor: Water Resources, Biology

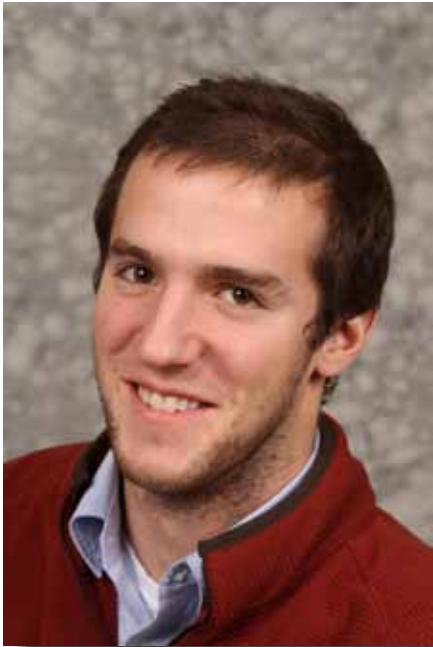
Abstract: Browse intensity of buckthorn species (*Rhamnus spp.*) by white-tailed deer (*Odocoileus virginianus*) influences forest composition and dispersal of non-native vegetation in urban areas. Deer in urban areas may select different forage species than rural deer because of forage availability, thereby potentially spreading non-native vegetation. We hypothesized that deer in Schmeeckle would consume buckthorn, potentially influencing forest composition and buckthorn dispersal. We compared availability to use (diet selection) of buckthorn, paper birch (*Betula papyrifera*), red maple (*Acer rubrum*), quaking aspen (*Populus tremuloides*) and white pine (*Pinus strobes*) by deer in Schmeeckle Reserve and Sandhill Wildlife Area in central Wisconsin. We used the Aldous browse survey to identify plant species available and those browsed by deer on 50 plots 0.01 acres in size in both Sandhill and Schmeeckle. We used t-tests to compare percent availability to percent use by site and to compare percent availability to percent use within each site. Red maple ($t = 3.038$, $P = 0.002$), quaking aspen ($t = 2.542$, $P = 0.006$), and paper birch ($t = 1.856$, $P = 0.033$) were more common in Sandhill, and we did not find buckthorn in Sandhill. Deer in Schmeeckle consumed 41.7% of the buckthorn available, but did not eat it in relation to availability ($t = 4.802$, $P < 0.001$), suggesting that they avoided buckthorn. Deer in Schmeeckle selected red maple ($t = -4.309$, $P < 0.001$), white pine ($t = -4.284$, $P < 0.001$), and paper birch ($t = -1.852$, $P = 0.035$). Red maple is commonly browsed by deer but white pine and paper birch are not often selected. We think that deer are overabundant in Schmeeckle and browse intensity could impact forest composition and dispersal of buckthorn. We suggest that deer consume a more natural diet at Sandhill than at Schmeeckle Reserve.

Consider for judging.

Comparison of back-calculation models for estimating yellow perch length at age from anal spines.

Advisor: Dr. Daniel Isermann

POSTER



Benjamin Wegleitner
Junior, Water Resources:
Fisheries

Abstract: Back-calculation of fish length from measurements on calcified structures is commonly used to describe growth patterns within fish populations. This technique has been recently applied when using anal spines collected from Green Bay yellow perch (*Perca flavescens*), but it is unknown whether back-calculation formulas derived for one population can be used for all yellow perch populations. The objective of this study was to determine whether formulas for back-calculating length at age of yellow perch from anal spines are similar among perch populations in Green Bay and Lake Winnebago.

Consider for judging.

Effectiveness of pitfall and Sherman live traps in capturing Wisconsin small mammal species.

Advisors: Dr. Shelli Dubay, Ryan Stephens

ORAL



Sara Wendt

Junior, Wildlife Ecology:
Management and Research.
Minor: Biology

Abstract: Small mammals are significant components in natural ecosystems because of their roles as prey, predators, insectivores, granivores, herbivores, and for spreading mycorrhizal fungi. Small mammals are often used as indicator species because they are sensitive to environmental changes at the local level. Small mammals are live trapped to determine community structure and presence or absence of a species in an area. The type of trap used varies depending on the study objective but snap traps, live traps, or pitfall traps are commonly used. Previous studies have found that each trap type has inherent bias for capturing small mammal species, however little data are available for Wisconsin species. To investigate trap bias in Wisconsin, we live trapped small mammals during summer of 2009 and 2010 using transects of pitfall (n=10) and Sherman live (n=20) traps. We captured a total of 3,261 individuals of 22 different species in 2 years of trapping. We investigated the ability of pitfall and Sherman live traps to capture Wisconsin small mammal species. Additionally, we examined mortality rates associated with each trap type for specific species and for nights with and without rain. To determine the influence of trap type on the calculation of small mammal community composition, we compared species richness when using Sherman traps, pitfall traps, or a combination of both. We hypothesized that fossorial species or those that reside in the duff layer such as shrews would be captured more often in pitfall traps. We also predicted that species with cursorial and scansorial locomotion residing primarily on top of the leaf litter would be captured more frequently in Sherman traps, and that pitfalls capture more species overall. Analyses are ongoing, but preliminary results indicate that species have significant biases for certain trap types. Our results will help researchers identify the best trap to use for species of interest.

Consider for judging.

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