FIELD NOTES

IOWA STATE UNIVERSITY
NATURAL RESOURCE
ECOLOGY & MANAGEMENT

GRADUATE STUDENT MAGAZINE

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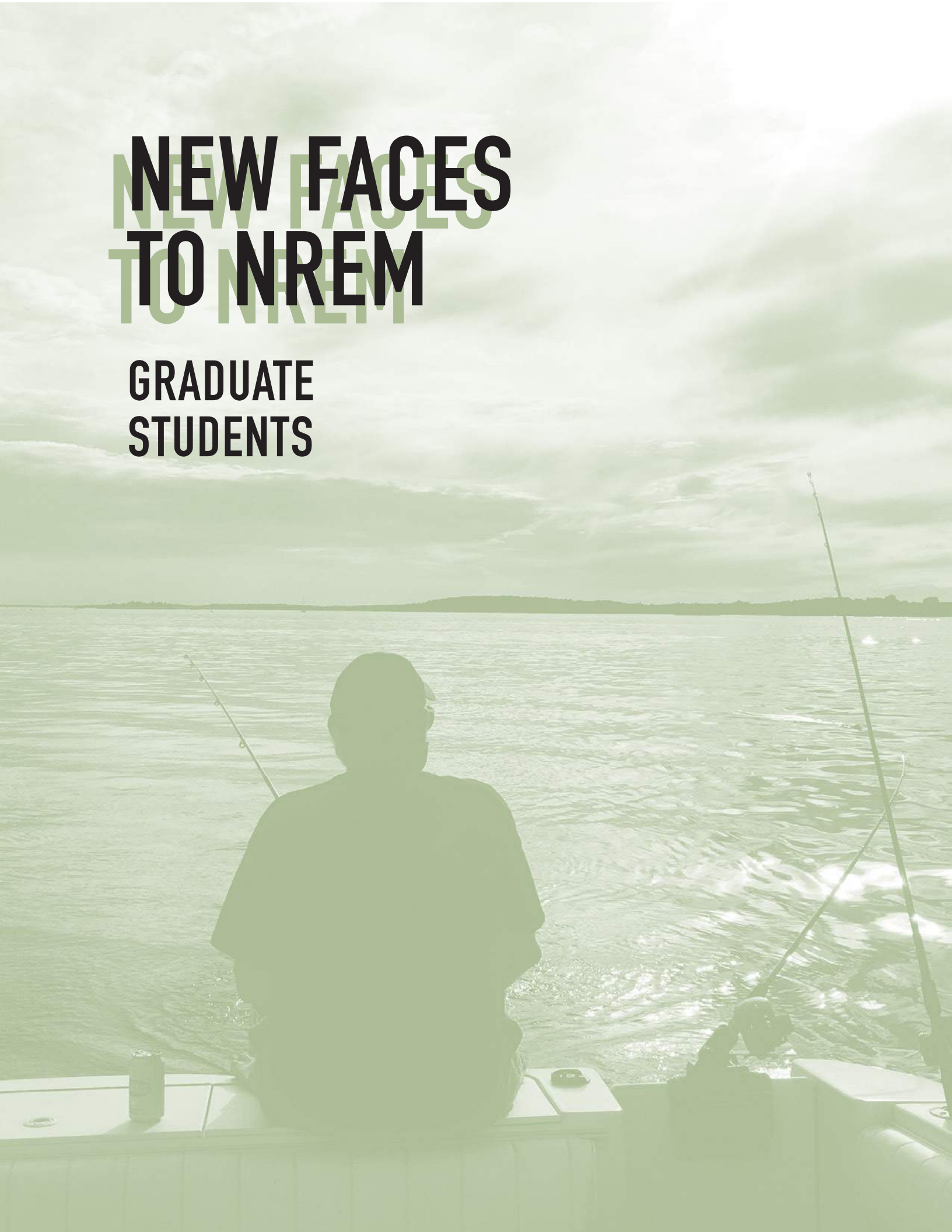
THIS ISSUE

cover photo by Johanna Ford

Natural Resource Ecology and Management

NEW FACES TO NREM

GRADUATE STUDENTS



STEPHEN GRAUSGRUBER

Stephen Grausgruber joined the department in the spring of 2018 as a master's student under Dr. Joseph Morris majoring in Fisheries Biology. His research involves evaluating biotic and abiotic factors that influence stocked adult Yellow Perch survival and reproduction in central Iowa's small community systems.

Stephen is originally from Northern New York, where he developed an appreciation for natural resources (especially fisheries) along the perpetual shorelines of the St. Lawrence River and Lake Ontario, as well as in the small headwater trout streams of the Adirondack Mountains. Prior to his master's research, Stephen obtained a Bachelor's of Science degree in Animal Ecology with a fisheries and aquatic sciences option from Iowa State University. During his time as an undergraduate, Stephen held several seasonal positions with various state agencies, worked as a technician on a variety of research projects in the Fisheries Ecology and Management Lab, and also conducted undergraduate research that assessed the effects of habitat enrichment on the reproduction of Fathead Minnows in a recirculating aquaculture system.

Appropriately, Stephen is an avid angler, but enjoys a multitude of other "outdoorsy" activities as well. Stephen is excited to continue his education here at Iowa State, and feels fortunate to be in the NREM department.

BEN JOHNSON

This move to Ames is Ben's 16th move in his life. He grew up in the United States, the Philippines, Thailand, and China. Even through all this, his career plans of studying animals have gone unchanged since he was a toddler. Ben has been passionate about animals and conservation his whole life and is excited to be involved in a department at Iowa State University so focused on vital issues of conservation and management.

Ben graduated from Rice University in May of 2018 with a B.S. in Ecology and Evolutionary Biology. His undergraduate research at Rice was focused on the behavior of fruit flies and he got to work on projects with topics ranging from larval learning behavior to light pollution's effects on disease susceptibility. Throughout his four years working in this lab, Ben became increasingly certain that behavior was what he was most interested in studying, and he started looking for PhD programs where he could focus on integrating the fields of behavioral ecology and conservation biology.

Ben's research interests can be broadly defined as how anthropogenic development and disturbance affect the behavior of wildlife, focusing on how individuals vary in the plasticity of their behavioral responses and how populations adapt over time. Here at Iowa State, Ben is researching bighorn sheep in protected areas of Montana. He is focusing on how human activity affects the stress response in bighorns and how this can be measured both through behavioral and physiological indicators. He also hopes that his work can increase the scientific community's knowledge of how behavioral plasticity can be impacted by energetic trade-offs in behavioral decision-making.

BRANDON MAAHS

Brandon Maahs is a new fisheries graduate student in the NREM department working on his Masters. Over the past few years, Brandon has worked throughout the Midwest and received his B.S. degree in Fisheries Biology from the University of Wisconsin-Stevens Point in December 2016. After graduating from UWSP he moved to Pierre, South Dakota to work with SD Game, Fish and Parks as a Fisheries Seasonal where he helped evaluate the short-term survival of Lake Oahe landlocked Chinook Salmon. Arriving in Ames in May 2018, Brandon immediately began the first of his two field seasons to continue an ongoing evaluation of how bass tournaments are impacting the Largemouth bass population in Brushy Creek Lake.

In the spring of 2018 new black bass tournament regulations were implemented in Iowa, allowing tournament anglers to weigh-in up to 5 bass with no minimum length limit. Previous regulations restricted tournament anglers to 3 bass and a 15-in minimum length limit. It is unknown if these new regulations will change the impact tournaments are having on the bass population. Therefore, the new regulations are being evaluated through an additional two years (2018-2019) of mark-recapture analysis. Results from 2018-2019 (post-regulation change) will be compared with data collected from 2015-2017 (pre-regulation change) providing a greater understanding on how live-release tournaments are impacting the bass population at Brushy Creek Lake.

Along with loving any time he gets to spend on the water, Brandon enjoys bow hunting, hiking, camping, and mentoring others to help grow their understanding and appreciation for natural resources. Brandon looks forward to what his time here at ISU has in store for him as he gains new skills and expands his knowledge!

BEN LUUKKONEN

Ben Luukkonen joined the NREM department at Iowa State University in August 2018 as a graduate research assistant working toward a Master's Degree in Wildlife Ecology. Ben graduated from Michigan State University in 2018 with a B.S. degree in Fisheries and Wildlife Biology and Management. He concurrently worked for the Michigan Department of Natural Resources Wildlife Division throughout his time at Michigan State. Ben's responsibilities included data collection and analysis to inform policy and management decisions, and the majority of his time was devoted to waterfowl research and management projects. Ben has a particular interest in waterfowl, and highlights from previous positions include waterfowl banding, aerial surveys, and band recovery analyses. Additionally, he worked on undergraduate research analyzing methods of estimating Canada goose abundance.

Ben grew up hunting, fishing, and spending time outdoors in Michigan. These activities directly led to his passion for wildlife. As hunting and fishing have provided him with so much, Ben feels an obligation to contribute to conservation so wildlife continue to provide benefit to people and ecosystems. His career goal is to become a wildlife research biologist and conduct applied wildlife research to inform policy and management decisions.

Ben's research will focus on movement and survival of Canada geese in Iowa. The Iowa Department of Natural Resources needs more information on the ecology of Canada geese in urban areas due to increasing human-wildlife conflict. The goals of the research are to evaluate movement, survival, and band recovery rates to determine susceptibility of Canada geese to hunter harvest and improve management of urban goose populations. Goose movement data are collected by marking a subsample of geese with GPS transmitters while survival and recovery rate analyses will use goose banding and recovery data. Ben's general interests include wildlife population dynamics, effects of harvest on wildlife populations, human-wildlife conflict, and waterfowl research and management.

BLAKE MITCHELL

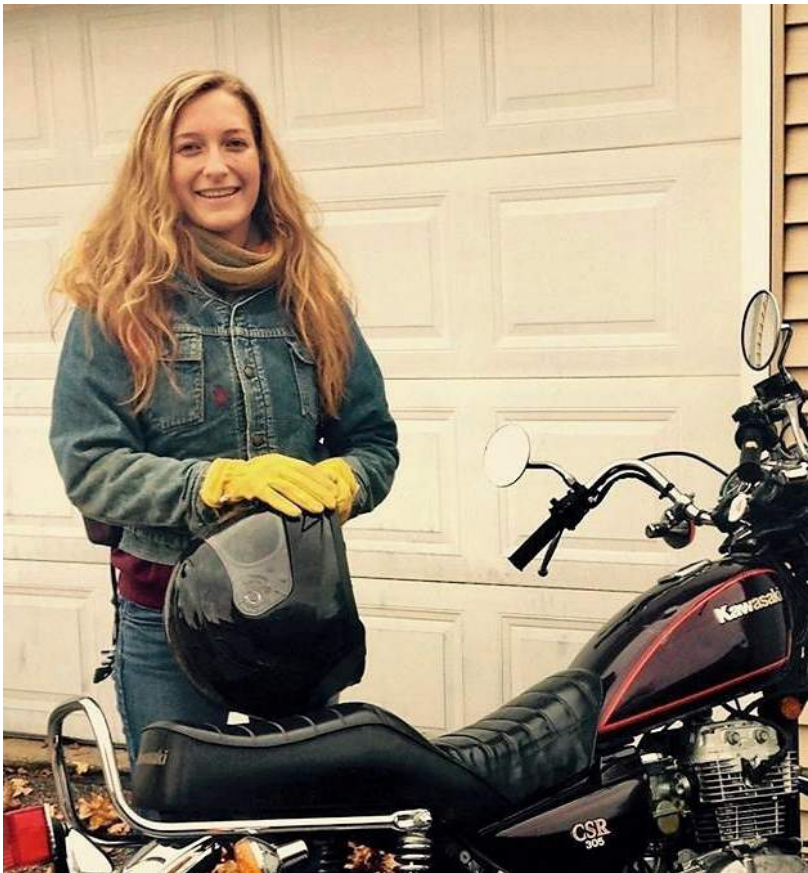
Blake Mitchell is a new Masters student in the NREM department advised by Dr. Adam Janke. Blake grew up in Maple Grove, Minnesota but feels most at home up at his cabin in northern Minnesota where he can hunt and fish for hours on end. Blake was fortunate enough to be raised in a hunting and fishing family, and that is where he got his start as a nature lover and as an aspiring wildlife biologist. Blake completed his Bachelor's degree in wildlife biology at the University of Minnesota-Twin Cities in December 2017. His project assesses wetland use and selection by duck broods in the Prairie Pothole Regions of Iowa and South Dakota. The goal of this project is to determine what type of wetlands are being used by broods so Ducks Unlimited (the main donor for his project) can essentially purchase and manage for "better" wetlands in terms of duck production. The first component of this project involves two rounds of brood surveys conducted via drone (see photo). The second component involves the sampling of many different wetland metrics including submersed aquatic vegetation, upland vegetative buffers, coarse particulate organic matter, conductivity, temperature, depth, as well as invertebrate and fish communities. Blake finished his pilot season this past summer and most of the data is still being analyzed, but he is anxious to start his first real field season this upcoming summer.

ALEXANDER MULLINS

Alexander Mullins is a new graduate student in the EEOB department here at Iowa State. His research involves monarch butterflies, particularly understanding their perceptual range to plant resources. As part of a large effort to reestablish a healthy monarch butterfly population, Alexander's work contributes to the understanding of landscape-level factors that affect their movement, habitat selection and ultimately their reproductive success.
His goal is to elucidate the distances at which monarch butterflies can effectively perceive and locate milkweed and flowering plants (by olfactory and/ or visual cues). The knowledge from this research has implications for habitat managers in that understanding the effective perceptual range of monarchs will aid in the strategic restoration and implementation of monarch habitat across the landscape that facilitates movement and reproductive success.

CAROLINE MURRAY

Caroline Murray is a first year master's student majoring in sustainable agriculture housed in the NREM department. Originally from upstate New York, Caroline grew up on a family farm. She moved to Iowa in 2014 to attend Iowa State where she earned her undergraduate degree in Forestry. Caroline's current research is on the effects of prairie strips on native bee diversity and abundance, as well as on abundance of Monarch butterflies.



JULIA SCHWAGER

Julia is a first-year M.S. student in the NREM department at Iowa State. Originally from Ames, she earned her B.S. in Forestry here in 2016. During her undergraduate program she was fortunate enough to have opportunities to travel to many new places including the Upper Peninsula of Michigan for Fall Forestry Camp, the west coast of Oregon for a summer internship, Baton Rouge, Louisiana for a national convention of SAF, and Ireland for a semester of study abroad. Following graduation, she moved to Washington State to work as a Range Technician on the Colville National Forest for two years before moving back to Iowa to begin her M.S. program.

Julia's research takes place on three Long-Term Soil Productivity (LTSP) sites in the northern Lake States located on the Chippewa, Ottawa, and Huron National Forests. These sites consist of primarily aspen-birch forest types that were clear-cut harvested in the early 1990's. The LTSP program was founded to examine the effects of soil disturbance, specifically impacts to soil organic matter and soil compaction, on fundamental forest productivity. Julia's research explores how different levels of organic matter removal and soil compaction have affected forest growth responses to stress over time across sites with varying soil texture.

BEN WEST

Ben is a new Master's student in Wildlife Ecology working with Dr. Steve Dinsmore. He received his first bird field guide at the age of 8, and he has had an interest in birds ever since. He grew up in North Liberty, Iowa, but moved to Brunswick, Maine after graduating high school to attend Bowdoin College. In spring of 2016, Ben earned his B.A. in Biology. Between graduating from Bowdoin and starting at graduate school at Iowa State, he pursued a variety of bird-related positions, assisting with research on Gray-cheeked Thrushes, migrating raptors, Long-billed Curlews, and Least Bell's Vireos. He also held a position as a naturalist at Cape May Bird Observatory.

Ben is interested in avian conservation, especially the ways that models, statistics, and spatial analyses can be used to inform conservation efforts. His thesis at Iowa State focuses on forest bird ecology in South Central Iowa, with emphasis on Iowan Species of Greatest Conservation Need. He will specifically be using point count surveys and habitat variables to create models based on occupancy, distance sampling, and community diversity.

LEWIS WIECHMANN

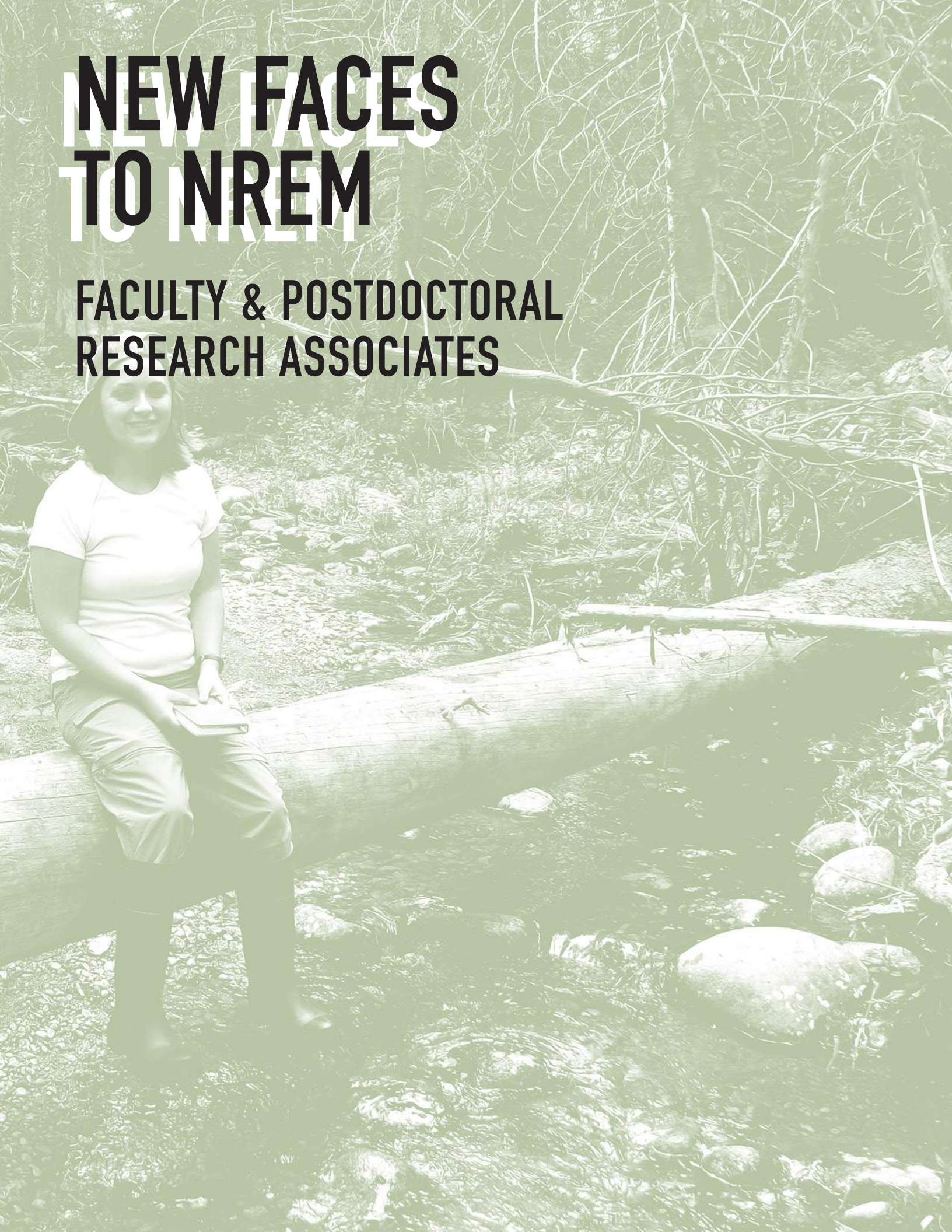
Lewis Wiechmann is a new graduate student in the Natural Resources and Ecology Management pursuing a Master's of Science degree in Forestry. Lewis graduated from Northland College in Spring of 2017 with a B.S. Degree in Natural Resources emphasizing in Forestry and Ecological Restoration. He has previous work experiences in wildland fire, and silviculture for the U.S. Forest Service.

Lewis' research is part of the Adaptive Silviculture for Climate Change study in Northern Minnesota on the Cutfoot Experimental Forest. His research focuses on natural regeneration of woody plant species, and how the different silvicultural treatments performed in the overall study effect species composition and ecosystem adaptability.

Lewis enjoys fishing (open water and ice), hiking, camping, and the Northwoods.

NEW FACES TO NREM

FACULTY & POSTDOCTORAL RESEARCH ASSOCIATES



BRIDGET LIVERS-GONZALES

Bridget joined the department in August 2018 as a post-doctoral research associate working with Dr. Pete Moore. Originally from Kansas City, Bridget received her bachelor;s from the University of Kansas in Environmental Science with minors in geology and music. She then worked in environmental consulting at an engineering firm for three years before relocating to Colorado State University for graduate school, where she received her master's and PhD in the Department of Geosciences.

Bridget's primary field is geomorphology with an emphasis in fluvial processes and riparian-stream ecology. Her primary research goals are to understand feedbacks between streams and riparian zones and the role of streams in terrestrial ecosystems. Her graduate work involved field work in streams in high-elevation old-growth forests of the Colorado Front Range in the Rocky Mountains. This included evaluating process, form, and expected downstream patterns and determining relationships between riparian forest history, instream wood, and stream channel complexity in forested valleys. In particular, Bridget is interested in how stream morphology impacts stream and riparian ecology, and the long-term impacts of land use changes on such ecosystems, including the influence of stream-riparian ecosystems with abundant instream and floodplain wood on the global carbon cycle.

Following graduate school, Bridget was a lecturer in the Department of Geography at UCLA for two years, where she taught physical geography and environmental studies courses. There, she had the opportunity to design multiple courses and take students on several field trips designed to enhance classroom learning, community engagement, and critical thinking skills. While she misses being in the classroom, Bridget is excited about getting back into stream research here at ISU, where she plans to reconstruct past instream wood dynamics of Iowa streams in order to inform restoration and natural resource managers. In her free time, Bridget loves cooking, traveling, and trying to visit all of the National Parks!

BORIS JOVANIC

Boris Jovanovic is a new Adjunct Assistant Professor in the NREM department. He is a multidisciplinary researcher, with main research interests in nanotoxicology, aquatic toxicology, in situ ecotoxicology (community and ecosystem level), and marine pollution. He started his term assistant professor position at NREM in January 2018.

Dr. Jovanovic received his PhD in Toxicology with a co-major in Fisheries Biology from Iowa State University in 2011. Afterwards, he received a short-term Smithsonian Fellowship at the Smithsonian Tropical Research Institute of Panama and then continued to work briefly as a postdoc associate in Canada at the University of British Columbia working on a "Sea Around Us Project". In June 2012, Boris was appointed as the Research Group Leader at the Ludwig Maximilian University of Munich, Germany and earned his tenure few years later. He also completed a 4-year long habilitation program in Germany and earned a Dr. habil. title in 2016.

Boris carried out international projects in several countries including Germany, Turkey, Serbia, Ireland, Canada, and Panama. Boris has published 28 research manuscripts in top tier peer reviewed journals, and currently has 642 citations and an H index of 15. He is serving as the editorial board member for the Environmental Toxicology and Chemistry Journal.

Boris will continue his research on microplastics and engineered nanoparticles effects on aquatic ecosystems / aquatic organisms, and whether they ultimately pose threat to human health. He looks forward to collaborating with other faculty members at ISU to address pressing needs in ecotoxicology of nano and micromaterials.

Boris is very excited to teach in the NREM department. He is teaching the Ecology (A ECl 312) this Fall Semester and is contributing to TOX 401/501 and TOX 689. Boris developed a new course – Aquatic Toxicology (A ECL/TOX 444/544X) which will be offered in the upcoming Spring semester. He is also developing another new experimental course – Marine Biology – and is very excited about offering this course in the future. Boris is a proud father of his 15-month old daughter, Aila. He is looking forward to the days when they go fishing and horseback riding together.

TYLER GROH

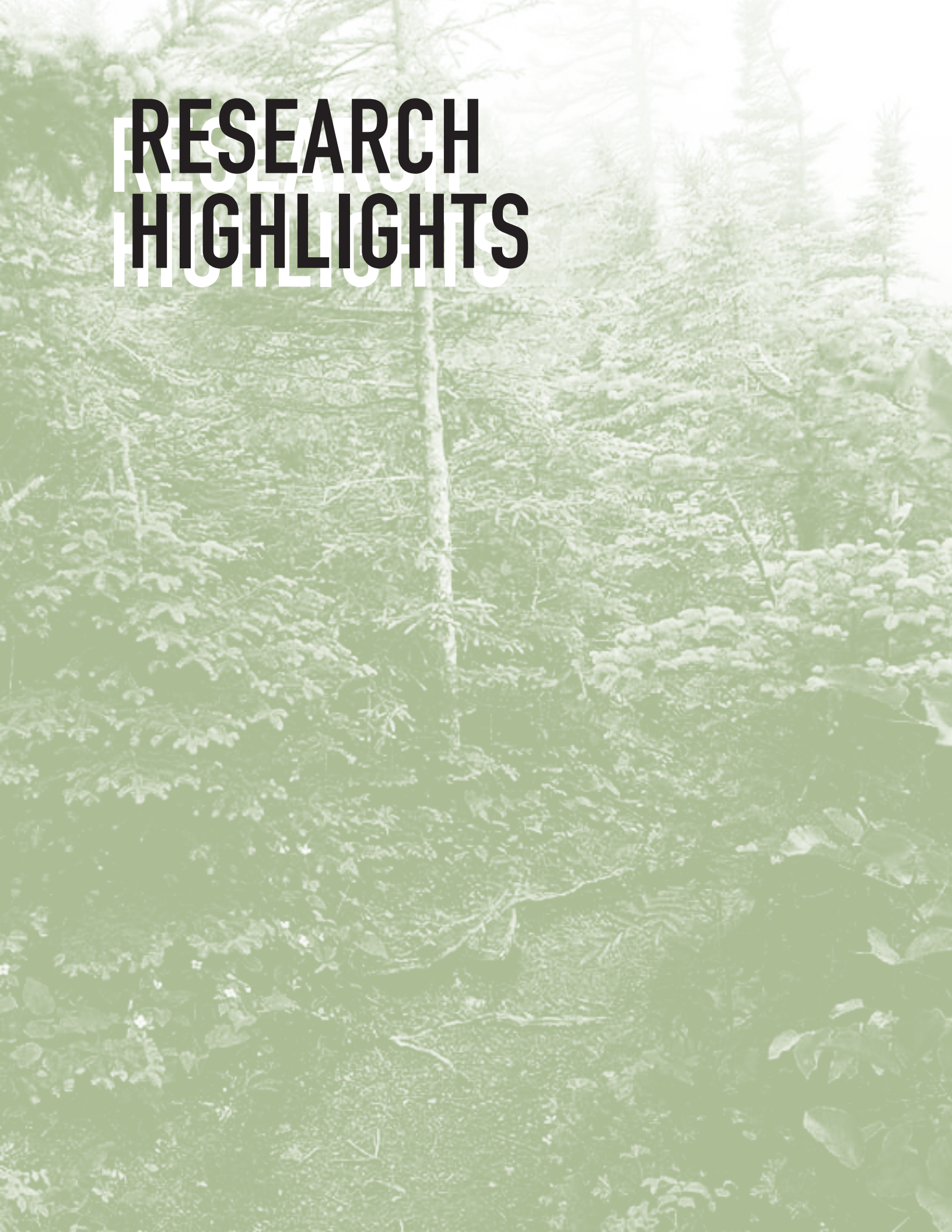
Hello Everyone! My name is Tyler Groh, and I am a postdoctoral researcher in the Natural Resource Ecology and Management department at Iowa State University. More about that later. I was born and raised in Jackson, Wisconsin, a small town roughly 45 minutes north of Milwaukee. I grew up surrounded by agriculture (mostly corn production and dairy operations), went on family vacations in the great Wisconsin Northwoods, and made many trips to the shores of Lake Michigan since the lake was only a 20 minute drive from my home. This upbringing gave me a great curiosity for the natural environment and the ways we interact with it. However, it was not until my senior year in high school when I took AP Environmental Science that I decided to make a career out of studying our natural resources.

This decision lead me to the College of Natural Resources at the University of Wisconsin-Stevens Point (UWSP-Go Pointers!). I instantly fell in love with both the water and soil departments, and decided to major in Watershed Management and minor in Soil Science. Further into my education, I realized that I wanted to research what is known as environmental biogeochemistry, and added a minor in Chemistry to make sure I had the skill set for laboratory analyses. Environmental biogeochemistry focuses on the cycling of nutrients in the environment, mainly carbon, nitrogen, and phosphorus. My advisor at UWSP encouraged me to apply to graduate school programs, and I eventually accepted a Masters position at the University of Illinois in Urbana-Champaign (UIUC).

While at UIUC, I studied under Dr. Mark David in his biogeochemistry laboratory. My main research focus was on three constructed wetlands used to remove both nitrogen and phosphorus from tile drainage water. I also analyzed greenhouse gas emissions from two of these wetlands. In addition to learning about wetlands and greenhouse gases, I was able to be fully immersed in tile drainage research (pun intended) and gain a better understanding of corn and soybean production in the heart of the Midwestern Corn Belt. I also had the opportunity to be a teaching assistant for at least one course every semester. This was a great experience, and I realized that I really enjoyed teaching and helping students learn. My experience at UIUC confirmed for me that I wanted to obtain a PhD, and continue in academia.

I eventually graduated UIUC with my Masters in Natural Resources and Environmental Science, and was accepted to the PhD program in Environmental Science at Iowa State University (ISU). My work at ISU was with Dr. Thomas Isenhart, and I studied nitrate removal, specifically microbial denitrification, in both traditional and saturated riparian buffers. This experience allowed me to further my field and laboratory skills, as well as provided me the opportunity to teach more classes as a teaching assistant and an instructor on record. I enjoyed my time at ISU and the research topic of saturated buffers so much that when I graduated in the summer of 2018, I stayed on as a postdoctoral researcher. I currently am continuing my work with saturated buffers, but am now focused on new, innovative designs for this nitrate removal technique. My goal for my postdoc is to explore these new designs, as well as research more biogeochemical imbalances from the tile drained agricultural systems of the Midwest. If you want to know more about me, saturated buffers, soil science, water resources, or biogeochemistry, please feel free to stop on by my office in room 301 of Science II. Thank you!

RESEARCH HIGHLIGHTS



SHEDDING LIGHT ON ANTLER GROWTH

DAN ADAMS

Gathering antler metrics from a rack at a taxidermist

Antlers are, by definition just bone. They are of the same composition as the bones of the animal, mostly calcium. These bones that grow external to the flesh on top of the head of the animal are different, and that's what makes them interesting.

Only members of the Cervidae family can grow antlers. Deer, elk, and moose have antlers, while cattle and goats do not. Instead, these species and other ungulates have horns made of keratin (the same material that makes up your hair and fingernails). Additionally, antlers are deciduous. They fall off once a year just like most leaves, and are grown again the next year. Think about the time and energy put into growing the antlers of a moose, just for them to be shed after the mating season. In a loose sense of the terminology, this is bone regeneration. This regeneration cycle typically revolves around the mating season and is regulated by photoperiod, the amount of light in the day. White-tailed deer, for example, typically shed their set of antlers in late winter and begin growing a new set almost immediately. The antlers grow throughout the spring and summer where they are soft, covered in a fuzzy flesh, and still able to be damaged. But as the days begin to shorten in late summer, the antlers calcify and the overlying, protective skin begins to die and fall off. The wasting away of that flesh reveals what most people picture antlers as, the shining headgear of a majestic male cervid.

The predominant belief for why deer have antlers is as weaponry during competition for females during the breeding season. Males lock their antlers together with those of their

Gathering antler metrics from a hunter-harvested deer

sparring partner and begin pushing and shoving to determine the stronger of the two. The victor claims mating rights. Breakage of the antlers occasionally occurs during these duels, so one positive of the annual regrowth of antlers is to replace the damage that would otherwise inhibit the ability of a male to compete for females in later years. Antlers have also been theorized as a sign of a deer's age and condition to females and would-be challengers.

The size and characteristics of a deer's antlers are determined by the deer's age, genetic background, and environment. Antler mass increases with age, with the largest set of antlers peaking around five or six years old, with a possible decline in size coming at advanced ages. The contribution of genetics to antler characteristics isn't entirely understood, but it is known that potential size and shape are coded within a deer's DNA. My research aims to identify the environmental factors that affect antler characteristics in Iowa deer. Most environmental factors are related to available nutrition, as a deer in an environment with an abundant amount of nutritional resources will have more resources to contribute toward antler growth. Antlers are dependent upon body condition because nutritional requirements for body maintenance and growth take precedence over antler growth. Therefore, antlers can also be an indicator of a deer's health and access to resources.

The main objectives of my research are to quantify variation in antler size and characteristics in Iowa white-tailed deer, and to identify any environmental factors associated with that variation. Previous studies that attempted to identify environmental factors associated with antler characteristics have been conducted in parts of the country that are very different from Iowa (e.g.,

"THINK ABOUT THE TIME AND ENERGY PUT INTO GROWING THE ANTLERS OF A MOOSE, JUST FOR THEM TO BE SHED AFTER THE MATING SEASON..."

different land use, soil types, seasonal precipitation). Therefore, the results and management implications from other regions may not be directly applicable to Iowa deer management. I hypothesize that the row crop agriculture covering the majority of the state provides deer populations across Iowa sufficient access to quality nutrition. As such, age and genetics are the main factors responsible for variation in antler characteristics and that ecological factors will have minimal influence because deer in Iowa are not limited by nutrition. This research will also contribute to ongoing efforts by the Iowa Department of Natural Resources (IADNR) evaluate the health of the Iowa deer herd.

Since deer do not allow me to approach them and measure their antlers, I collect antler measurements from hunter-harvested deer. The measurements I take include the length of the main beam of each antler, the circumference at the base of each antler, and the number of points on each antler. These samples are obtained by working with meat processors, taxidermists, and the public across the state for voluntary sampling, with many of my data coming from the partnership with the IADNR's chronic wasting disease surveillance sampling. Along with the antler measurements, I also gather the location of harvest and other details from the successful hunter. Because antler size and characteristics are, in part, a function of a deer's age, it is important that I also obtain an age estimate of the deer. Age is estimated based on tooth development, replacement, and wear in the field. Since this method has been shown to be prone to considerable error, I also extract an incisor for cementum annuli-based aging. Cementum annuli are similar to rings on a tree. These rings are found in the root of the tooth and, when cross-sectioned, can be counted with the aid of a microscope.

I am exploring a variety of ecological factors that affect antler size and characteristics and many of them are still related to available nutrition. Every deer is affected by their environment differently based on the location of where it was harvested. Land use is obviously important because it

determines what vegetation types are available for consumption, but with almost three quarters of the state of Iowa in crop production, most deer in the state probably have access to high quality forage during antler growth. Soil productivity is also being examined as more fertile soils can produce more forage on the landscape compared to poorer soils. Population densities may be related to the amount of available forage too, as more deer on the landscape may mean there is less forage available on a per deer basis. Since antlers are regrown every year, annual weather conditions could play a role in antler development. For instance, perhaps a severe winter can put a deer at an energy deficit and cause them to spend nutritional resources on body maintenance instead of antler growth. Or perhaps a lack of adequate precipitation during the growing season decreases the amount of quality forage. Maternal condition during gestation and lactation can also have a lasting effect on antler characteristics; therefore, I am also investigating how weather may have affected the mother during the year the buck was born.

Because antlers are dependent upon condition, identifying variation in antler size and characteristics in Iowa deer will contribute to ongoing efforts by the IADNR to evaluate the Iowa deer herd's condition and health. This research will also contribute to deer antler data for the Midwest where soils and habitat are of higher quality than in places where such studies have been conducted previously. By identifying whether there are any environmental factors that influence antler growth in Iowa deer, I will also provide managers data that can be used when making habitat management decisions.

Aging a deer by tooth replacement and wear

UNDER THE SURFACE

BRETT KELLY

Releasing a wild Brook Trout after collecting fin tissue for later genetic analysis

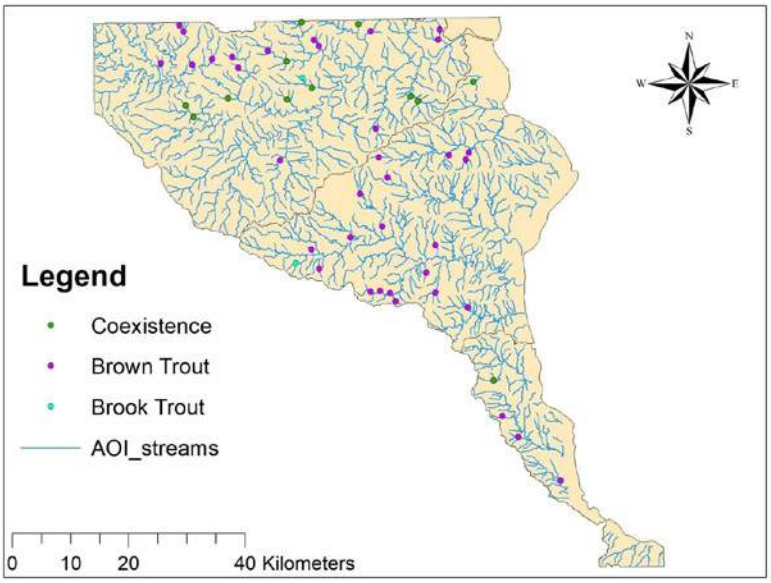
Cold, crystal clear water gushes past stone and logs teeming with aquatic insects building their precarious homes while hungry trout swiftly rise to break the surface and pick off their next meal. Riparian shrub and grassland ebbs to densely forested bluffs. Eagles soaring over the river valley hunting for another meal as the summer sun rises to illuminate the meandering pathway that fish and other organisms call home. If you have never experienced the Driftless Area, you may assume that the habitat I am describing is in the foothills of the Rockies, or high among the Appalachians. But for those well-traveled few; one may recognize this scene as none other than one of many streams nestled in the Northeastern corner of Iowa.

The Driftless Area, a colloquial name given to a distinct ecoregion of the Midwest, is

Rainbow and Brown Trout sampled from Livinggood Springs – Yellow River drainage.

a previously unglaciated landscape that is composed of karst limestone geology, steep valleys, abrupt bluffs, and groundwater influence that gives rise to spring streams thriving with aquatic life. These hidden groundwater resources flow from beneath the surface to provide cold and well oxygenated water, creating suitable habitat for stream fish. Specific to Iowa, the Driftless Area spreads across 8 different counties and thousands of headwater streams. Notable watersheds of the area include the Upper Iowa River, Yellow River, and the Turkey River. Trout are the common apex predator in these streams; accompanied by species ranging from Creek Chubs and Southern Redbelly Dace to Mottled Sculpin and Blacknose Dace. The Brook Trout, however, is the only native trout species in Iowa and

The watersheds (tan regions) displaying sites where only Brook Trout were sampled (teal), Brown Trout were sampled (purple), or both species were sampled (green). Streams are shown in blue.



is considered to have persisted here for thousands of years.

Although the Driftless Area offers favorable hydrogeological conditions that have allowed Brook trout and other biota to thrive, this landscape is not lacking from ecological stressors. Factors such as water quality and quantity, habitat fragmentation and loss, nutrient influx, introduction of nonnative species like Brown trout, climate change, etc., all surround this unique landscape and have caused fish such as the Brook Trout to experience large scale decline over the previous century.

In order to investigate the current status and distribution of northeastern Iowa's stream fish communities; The United States Fish and Wildlife Service, Iowa Department of Natural Resources, and Iowa State University partnered together to launch a large scale assessment of headwater streams of the Driftless Area. As part of the project, I was hired on as a graduate research assistant in Dr. Weber's Fisheries Ecology and Management Lab to lead the field stream surveys and subsequent analysis. My specific study area was reduced to The Upper Iowa and Yellow River systems mainly in order to effectively sample a large geographic area in a short amount of time. Sampling scheme was designed to assess fish community assemblage as well as habitat quality.

Beginning in May 2018 we transitioned into the first field season of the project

"THE BROOK TROUT IS THE ONLY NATIVE TROUT SPECIES IN IOWA AND IS CONSIDERED TO HAVE PERSISTED HERE FOR THOUSANDS OF YEARS."

Taking measurements on a Southern Redbelly Dace durning an electrofishing survey. Southern Redbelly Dace are listed a s a Species of Greatest Conservation Need in Iowa.

with two goals in mind:
1) sample headwater streams of the Upper Iowa and Yellow River drainages and; 2) install temperature monitors in order to gain insight to seasonal/annual stream temperature fluctuation.
To address these goals our team of ISU undergraduate students, Iowa DNR officials, and myself conducted standardized stream assessments using Iowa wadeable streams protocols involving backpack/barge electrofishing and habitat measurements. All fish were identified, enumerated, and all trout were measured in length and weight. Brook Trout were fin clipped for later genetic assessment. Stream temperature monitors were placed in the streambed of sites anchored to rebar and a nearby tree or hard structure.

After the dust settled and the field season came to a close, our team tallied 88 stream surveys, and located 5 new sites where previous data on Brook Trout did not exist! Although we were able to gain a wealth of information from our first field season; the project intends to monitor the stream temperature loggers in the following spring and then follow up our summer 2018 efforts with another round of stream assessments in 2019. Incorporating multiple partners has allowed, and will continue to allow, ease of sampling logistics, and will help facilitate healthy interactions across agencies, academia, private landowners, and anglers in hopes of ensuring a bright future for wild Brook Trout in the state of Iowa.

Brett K. holding a Brown Trout sampled during an electrofishing survey

Sally (left) and field assistant Quyn Westfall (right) survey cross-section of stream using stadia rod. This process was repeated several times within each stream reach.

IS WOOD GOOD?

SALLY CARULLO

River managers across the United States tend to have very different opinions on large wood (LW) and riparian forests. At the 2018 Driftless Area Symposium- a conference held "in effort to share results of research, monitoring, lessons learned, and management work in streams, along riparian corridors, and across watersheds," I was astonished to hear the overall negative opinion on

riparian trees coming from fisheries ecologists, engineers, and landowners. The hate extended to large wood (in stream wood greater than 1 meter in length and 10 centimeters in diameter) as well as beavers. I was perplexed as river managers took to the stage to discuss their restoration plans of anchoring wood into stream banks, creating bank hides with rootwads, and even more confusing- adding large wood to streams in engineered dam jams. They talked about how beavers "mysteriously" disappeared from their restoration reaches and how planting trees in riparian areas was too cumbersome and management intensive. They advocated for planting grasses and burning instead. I sat there dumbfounded as others around me nodded their heads in agreement as talk after talk discussed enhancing ecosystems and restoration efforts, all while negatively viewing riparian trees without any type of data to back up their accusations. To some, riparian trees and the possibility of resulting large wood are only seen as a hazard to humans and infrastructure. Others cite the potential of large wood to enhance bed and/or bank scouring, elevate flood stage, and enhance overbank flooding and channel avulsions (pulling or tearing away). When these people see forested riparian areas, they immediately think of widening and channel erosion, but isn't there more to the story?

"WHEN THESE PEOPLE SEE FORESTED RIPARIAN AREAS, THEY IMMEDIATELY THINK OF WIDENING AND CHANNEL EROSION, BUT ISN'T THERE MORE TO THE STORY?"

Field assistant Quyn Westfall (left) analyzes stream bank looking for bank full indicators such as perennial vegetation, change in sediment type, or tree roots. Sally (right) poses for her photo. Life vests were always wore while working in deeper-faster moving streams. Safety first!

Field Assistants Quyn Westfall (left) and Ellen Justis (right) reeling in the long-profile tape after a long day surveying Holland Creek in Grundy County, Iowa.

Research into this complex relationship between riparian land use and stream morphology has often taken place within the Pacific Northwest. These mountainous regions are very different from the Midwest or Iowa. Additionally, many of these studies only focus on a few reaches within one watershed—seriously limiting the statistical power of their data—and yet they still continue to make broad claims about large wood and streams. In Iowa today, forest almost exclusively exists in the floodplains and slopes of narrow stream valleys. In 2017, according to the United States Department of Agriculture's Statistics Service, 36.7% of the land cover in Iowa was corn, 27.17% soybeans, and 14.1% grass and pasture. Only 8.63% of Iowa contained deciduous forest. The riparian forests in Iowa may seem inconsequential, but riparian forest zones are a transition between the terrestrial landscape and freshwater aquatic ecosystems and have an immense impact on physical, ecological, and biological processes Not to mention the beauty and recreational value we get from them.

My research aims to explore the relationship of land use and stream

morphology on a large scale in Iowa. From 2007-2010, Light Detection and Ranging (LiDAR) was flown across the state of Iowa. These remote sensing products allowed the Iowa Department of Natural Resources to digitize all stream centerlines as well as banks across the state. Through my GIS analysis using the LiDAR products and DNR shapefiles, I am able to conduct analyses on streams all across the state to examine their width, contributing area, and land use along the stream at 50m intervals. With this data, we can begin to see if streams running through forest do tend to be wider.

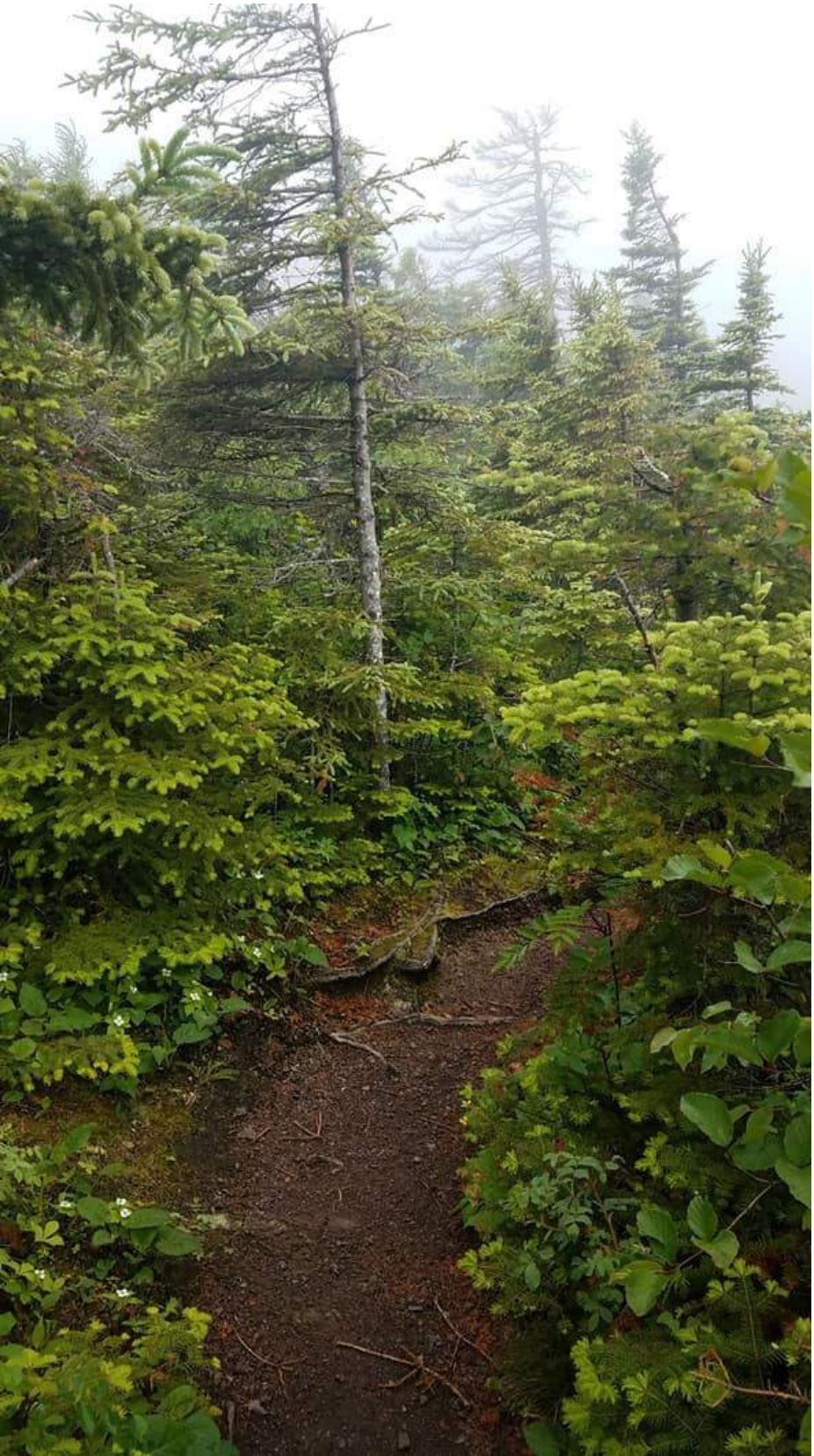
My research also contained a field component. In ten different reaches, we collected multiple cross sections, completed large wood inventories, and also measured and characterized the adjacent riparian forests (Figure 1). In the field, we were able to see firsthand the impacts LW had on streams as well as the differences in morphologies when running through the different land uses. Field work was hard and hot, but it was an awesome experience to see streams all over Iowa.

Our research will be one of the first studies in Iowa on forested riparian areas and the resulting channel morphology impact. We hope the results from my project will eventually help river managers make more educated decisions when undertaking restoration efforts. I believe the future of this research and similar research needs to contain an ecology component in order to further back the claim that forested riparian areas increase species heterogeneity and are a positive entity for ecosystems.

TREES ON A SCREEN

JAKE OLBRICH

A small trail through dense brush of a spruce-fir forest at Tettegouche State Park



For decades, millions have traveled to northeastern Minnesota annually to capture their own piece of serenity held within the virgin forests. The lakes glimmer every sunrise and the calls of birds reverberate through the seemingly endless labyrinth of conifers. While these forests are not known for causing much trouble - except maybe a story or two about a rambunctious moose- even the most unsuspecting of forests may incite a wildfire. I remember listening to forest rangers recount their time fighting the Pagami Creek Fire of 2011. The roar of the fire was deafening and the air was suffocating as embers rained from the sky. By the end of its reign over the land, the Pagami Creek Fire consumed over 98,000 acres, the largest in the state since 1918. This incident sparked multiple investigations into wildfire risk management in northeastern Minnesota.

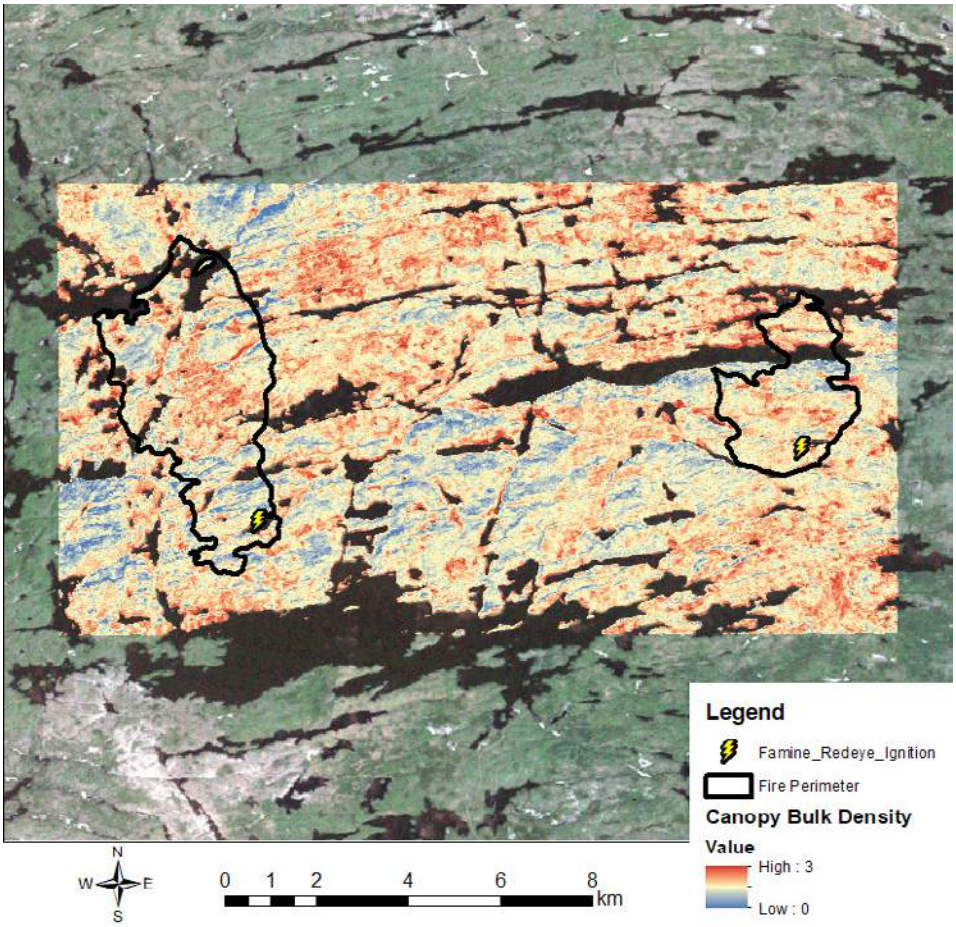
Flashback to 1919, the United States adopted "A Policy of Forestry for the Nation" that emphasized the complete suppression of all fires to prevent large, destructive instances such as Great Fire of 1910 which took the lives of 86 people. The ensuing decades drastically altered forest

structure, especially in fire-dependent regions. Shade tolerant species such as balsam fir increased in density, outcompeting early stage successional species like jack and red pine, all thewhile surface fuels compounded on the forest floor. This created a platform for fire to spread rapidly through the surface and grant an easy pathway to the crown, as balsam fir is not adapted to handle fires. It would take 50 years until scientists discovered the role of fire in seed germination of several conifers, redefining how controlled burns could be used in a management setting. Research shortly thereafter began to mathematically examine how fuel drives spatial patterns in burn probability and rate of spread. Now, fire and fuel experts rely on computer simulation and modeling software to derive how a fire will interact with the topography, fuels, and weather in a given landscape.

The lack of research on fires in the eastern United States, coupled with the complexity of forest types in northeastern Minnesota, makes fire behavior prediction a lingering challenge. There is a natural tendency for region-wide forest parameters to be underestimated. Most techniques look from an aerial or satellite perspective in a manner that does not cut completely through the canopy, often missing elements of the understory. In a 2015 pilot study, Dr. Wolter investigated ways to quantify canopy bulk density (CBD; the burnable biomass held in the canopy of forests) in a manner that accounts for more of the understory. From this work, we found several different models that estimate CBD. These models were calibrated from ground- based and allometric data. Dr. Wolter gathered canopy gap fractions (fraction of light that pierces through the canopy) that were converted into CBD. The gap fractions were taken from either averaging two or three angles from either ground level or two meters above ground level. The first part of my research analyzes the sensitivity of a fire area simulator (FARSITE) to these new estimates. This not only takes into account the growth, but also the overlap between simulated and actual fires. I am looking into two fires, Winchell (1995) and Redeye (2005), whichburned approximately 4,000 acres each in the heart of northeastern Minnesota. Simulation accuracy is quantified by the Lee-Sallee spatial correspondence metric, a unit describing the proportion that area predicted and actual areas have in common.

"THE LACK OF RESEARCH ON FIRES IN THE EASTERN UNITED STATES, COUPLED WITH THE COMPLEXITY OF FOREST TYPES IN NORTHEASTERN MINNESOTA, MAKES FIRE BEHAVIOR PREDICTION A LINGERING CHALLENGE."

When discussing wildfires, it is important to not only account for where an uncontrolled burn will spread, but also what we can do to prevent future uncontrolled burns. When I visited the forest service this past summer, I was curious to know how much time and effort is necessary to manage understory vegetation for fire scenarios. To test this, I am using a physics-based fire dynamics simulator that utilizes processes of combustion in a three-dimensional, time sensitive interface. This study focuses



Famine and Redeye Fire perimeter overlaying canopy bulk density estimate

on how understory balsam fir density affects fire spread, total area, and heat release rate in a simulated forest stand. These stands are based on plot data collected from the 2015 pilot study.

Although data analysis is still in a preliminary state, it appears that estimates derived from ground level estimation produce fires closer to the natural perimeters. Estimates from two meters above ground level may be missing crucial ladder fuels that drive the conversion from surface to crown fire. In the second study, simulation results suggest active crown fire spread begins to falter when balsam fir is thinned to the extent where crown radii are no longer overlapping. Without overlap, fire spread depends less on fuel as a driver and more on flame length to transfer from tree to tree.

This work adds to the management strategy of the Gunflint Ranger District of Superior National Forest. The initial pilot study was conceived to use remote sensing techniques to enhance the estimation accuracy of forest fuel parameters in the region. Between the initial work of Dr. Wolter and my current work, we have derived several models that use an array of sensor data to estimate CBD that has agreement significantly higher than current methods (0.97 adjusted R^2) in one model compared to 0.58 using LANDFIRE methods, the national fuels database). In the wake of a rapidly changing climate with no shortage of surface or ladder fuels, I hope to add insight on both how computer programs can perceive canopy fire behavior and balsam fir management in the forests of northeastern Minnesota.

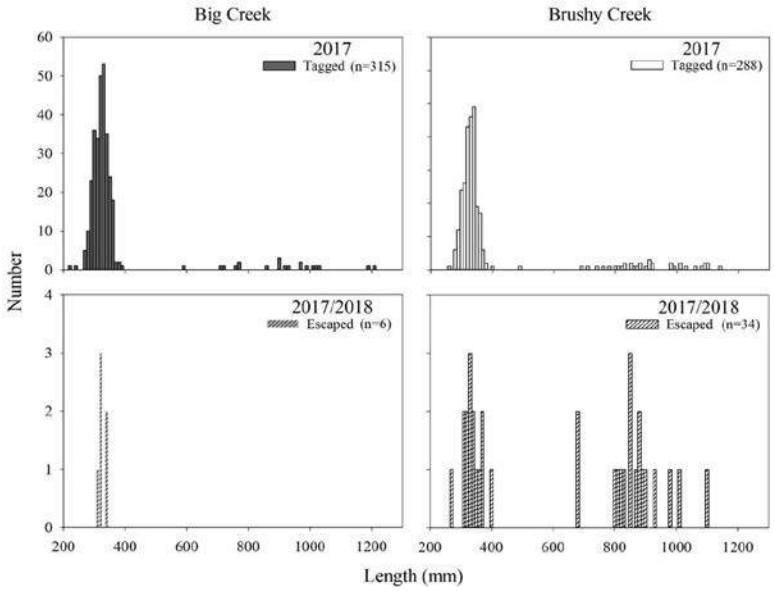
Robbie with a 50-inch radio tagged muskie

"I THINK I HEARD ONE:"

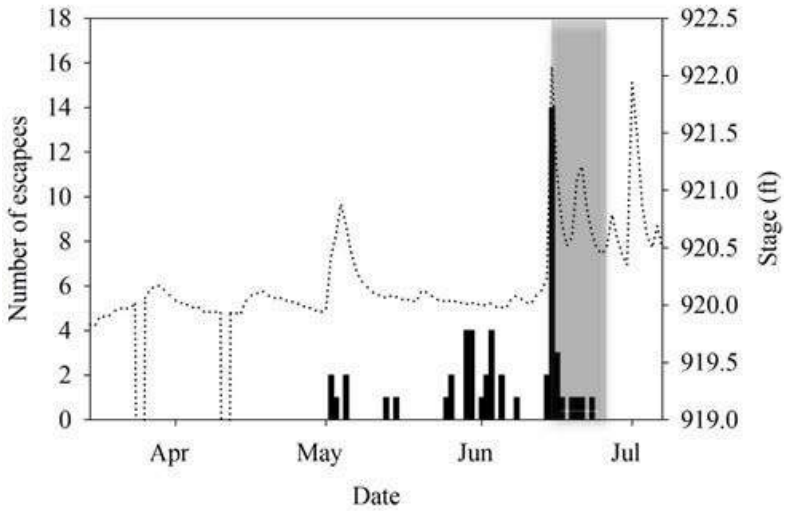
A TELEMETRY TALE

ROBBIE WEBBER

It's a brisk October morning here in central Iowa, accompanied by clear skies and dazzling fall colors. As I arrive at Big Creek Lake I glance at the marina's windsock and observe, to my delight, that it is hanging limply. The water is smooth as glass as I begin loading my work boat with the necessary equipment for the day ahead; the forecast suggests that it will be a perfect day for radio telemetry. Once the boat is launched and the truck is parked, I hop on board and bask in the peace and quiet around me for a moment. Although the serenity remains, the silence is short-lived; I fire up the outboard motor, turn on my telemetry receiver, and begin slowly scanning for the muskellunge (hereafter



The number of muskies PIT tagged at Big Creek and Brushy Creek in 2017 (top panels) and the number of muskies that escaped from each lake during 2017/2018 (bottom panels). The x-axis shows the length of the muskies tagged/escaped.



The number of escaped fish from Big Creek Lake plotted as a function of date with the lake level (stage) in feet as a second y axis. The grey highlighted area shows when the barrier failed this past spring due to high flows, and the corresponding fish escapement from the lake.

muskie) and walleye that I've radio-tagged over the past two years. My ears are now filled with static from the receiver, occasionally (and preferably) accompanied by a small beep, which indicates there is a tagged fish nearby.

The radio telemetry I conduct is part of a research project focused on evaluating fish escapement - the permanent emigration of fishes from a body of water - from two reservoirs in central Iowa. Big Creek Lake is a popular reservoir fishery among anglers around the Des Moines area but, over the past decade there have been many complaints regarding low catch rates of muskies and walleye despite continued stocking efforts by the Iowa Department of Natural Resources (IDNR). These low catch rates are attributed in part to escapement of these fishes that occur during high flow events.

In an effort to improve angling opportunities and reduce escapement from this popular urban system, the IDNR partnered with the US Army Corps of Engineers to install a physical barrier at the outlet of Big Creek in 2012. In addition to this barrier, a Passive integrated transponder (PIT) tag antenna array was installed in 2016 to detect tagged fish leaving the system. PIT tags are small radio transponders with unique codes that allow tagged fishes to be individually identified. Muskies and walleye are

implanted with these tags at the hatchery before being stocked, and any untagged muskies or walleye collected during our spring and fall sampling efforts are implanted with a tag as well. When a tagged fish goes over the spillway, the antenna array detects it and readers record the tag number as well as the date and time when the tag was detected. An antenna array was also installed at Brushy Creek Lake (near Webster City), which does not have a physical barrier and is serving as the reference lake for this study. Escapement rates at Brushy Creek provide us with a baseline from which to evaluate how effective the barrier at Big Creek is in preventing or reducing escapement.

How does my radio telemetry relate? The objective of my research is to study the behavior of muskellunge and walleye, and then relate their behavior to environmental data and habitat characteristics to better understand what factors influence escapement. I began radio tagging muskie and walleye during fall 2016 and have been tracking at each lake on a weekly basis since. Tracking involves slowly searching the perimeter of each lake using a 3-element Yagi antenna connected to a receiver. During the open water season I track by boat, while during the safe ice season I track on foot. When a fish is located, I record the GPS coordinates and measure various habitat parameters including depth, substrate type, and water temperature. I also take measurements of aquatic vegetation density and coarse woody habitat complexity if present at a fish location. Location data from telemetry tracking events are being analyzed in ArcGIS and used to calculate behavioral metrics such as movement rates and home range sizes for individual fish.

Additionally, I am using Program MARK to estimate escapement, harvest, and survival rates of both species in each of my study systems.

The three years of data suggest that the barrier at Big Creek is effective in reducing escapement rates of muskies and walleye. Eight tagged muskies and 55 tagged walleye have escaped Big Creek since 2016, while 57 muskies and 164 walleye have escaped from Brushy Creek. In addition, 54% of radio tagged muskies and 23% of radio tagged walleye in Brushy Creek have escaped since fall 2016, while no radio tagged fish have escaped from Big Creek. Escapement rates have been greatest at both lakes from April through June, when both species are exhibiting spawning behavior and movement rates are high.

Almost all Big Creek escapees were juvenile fish tagged before being stocked in 2016 or 2017, while Brushy Creek escapees were primarily older fish that were tagged during spring sampling. This is likely a result of larger fish not being able to fit through the barrier at Big Creek, which has horizontal rails with 2-inch openings between them. A large portion of our Big Creek escapement data was collected this spring, when high flows events led to the physical barrier being compromised.

"THE THREE YEARS OF DATA SUGGEST THAT THE BARRIER AT BIG CREEK IS EFFECTIVE IN REDUCING ESCAPEMENT RATES OF MUSKIES AND WALLEYE."

To date, I've been out tracking nearly 200 times which has resulted in over 3,000 locations of radio tagged muskies and walleye. I'll be continuing my tracking efforts through next spring, then it's time to start my final data analysis and writing before defending in fall 2019. It's been a wonderful experience working on this project with the IDNR, sharing results with fellow researchers, and informing anglers about my research and how it will improve future angling opportunities. I've learned so much since I started at Iowa State and I'll definitely miss the project when it concludes. However, I will NEVER miss the sound of static from the receiver...

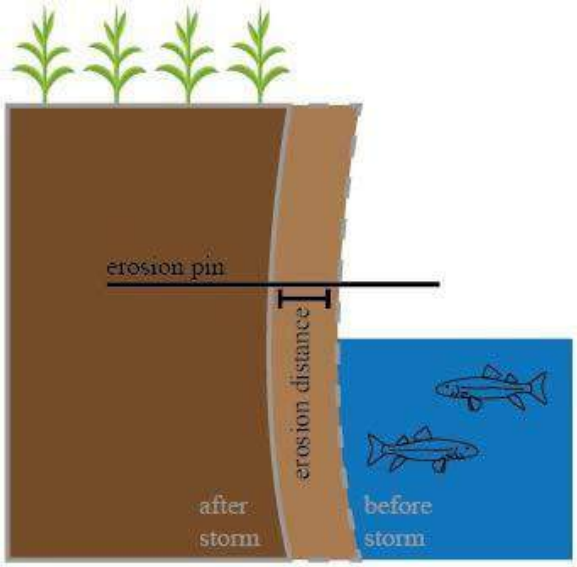
MUDDYING THE WATERS:

ADDING BANK EROSION TO THE WATER QUALITY DISCUSSION

FORREST WILLIAMS

Hello, my name is Forrest Williams and I am a master's student at ISU working with Professors Tom Isenhart and Peter Moore on an ongoing study within the Onion Creek watershed. I grew up on a small farm in Michigan where my father, a USDA district conservationist, and my mother, a forester, instilled in me a love of the outdoors and the farming landscapes of the Midwest. In the spring of 2016, I graduated from Carleton College in Northfield, MN as a geology major, and while there I completed a research project that looked at how large storms affect the health of cold-water trout streams. In January of 2017, I joined ISU and took over the Onion Creek project. I've enjoyed contributing to the work on Onion Creek, and I'd like to share with you all the details of this project, as well as some of our new work modeling streambank erosion within larger watersheds.

In recent years, there has been increasing concern about the health of Iowa's waterways, Excess soil within waterways has been identified as a primary reason for their deteriorating health. Much of the research concerning erosion however has taken place in the uplands, but if you've ever visited a stream after a large storm event, you know that eroding streambanks can be a major source of sediment inputs. By studying the erosion of streambanks within Onion Creek we hope to



determine the proportion of eroded soil that is coming locally from eroding streambanks instead of other sources. By understanding when and why banks are eroding, we can hopefully design more effective strategies for preventing streambank erosion. Additionally, if we can convince lawmakers that streambank erosion is a major issue we might be able to direct conservation dollars toward stabilizing banks.

To accomplish these goals, we perform two different measurements within the stream system: eroding bank surveys and erosion pin measurements. Eroding bank surveys are conducted by walking the entirety of the stream system and cataloging every eroding bank we can find. We perform erosion pin measurements by first installing metal rods within select eroding banks, and then we periodically measure the exposed length of the erosion pin. Since the exposed length of the erosion pin increases as material is removed from the bank via erosion, we are able to track the amount of erosion that is occurring at each bank as time progresses.

This project was previously led by graduate students Nicholas Leete and Brain Noonan, who have both published dissertations that outline the early results of this study. According to their results, more soil is being eroded from streambanks than is leaving Onion Creek; indicating that soil is building up within Onion Creek's stream channel. In addition, most erosion is occurring during and after large storms, which means that reducing the amount of water that enters the creek immediately after storm events will limit the streambank erosion that occurs. Since I arrived here in the winter of 2017 we've had two very different years within Onion Creek. During 2017 there was so little rain that for the majority of the year the creek was completely dry and we had almost no erosion to measure at all. On the other hand, 2018 was an incredibly wet year and it took all the time my field technicians and I had to keep up with all the erosion.It's been really interesting to observe how much erosion occurs in wet years when they are preceded by incredibly dry years, instead of more moderate ones.

The work I've done on Onion Creek has taught me a lot about storm influence and annual cycles of bank erosion. As we move towards estimating the amount of bank of erosion that is occurring across the entirety of Iowa, we need to approach this problem in

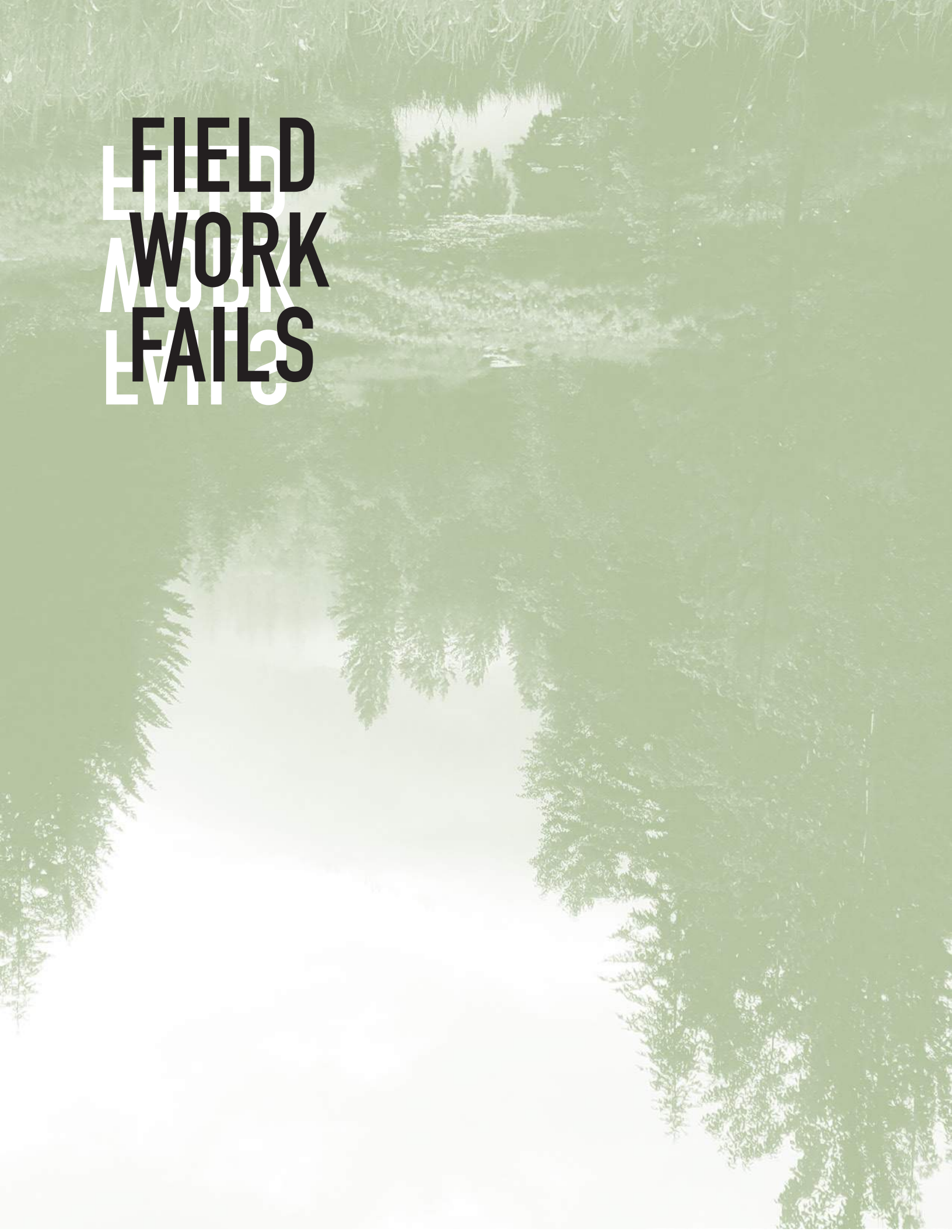
"BY UNDERSTANDING WHEN AND WHY BANKS ARE ERODING, WE CAN HOPEFULLY DESIGN MORE EFFECTIVE STRATEGIES FOR PREVENTING STREAMBANK EROSION."

a different way. The approach we've decided to try involves using aerial images in order to automatically track the migration of rivers and streams. In order to accomplish this we classify every square foot of the river corridor as either part of the river or as not a part of the river inside of a computer model, then by comparing where the river was in two different years we can figure where the river has migrated into a bank. If we know where the river has moved this means that we know where the river has eroded!

This approach relies on an index called normalized difference water index (NDWI for short), in order to automatically classify areas as either water or not water. Although this is a hilariously boring name, NDWI is a really effective tool that is based on how light reflects off of different surfaces. If you've ever looked at light through a prism you know that sunlight is made up of different colors, and when a digital camera take a picture, they're actually recording a value for each primary color in each pixel of the image. Aerial photography uses the same process for taking pictures but in addition to red, blue, and green aerial images also record a value for infrared light, which is a type of light we cannot see. This type of light is often used in trail cams since most animals also can't see this type of light. Since green and infrared light are reflected by most plants (this is the reason they're green) and not by water, we can use the values the camera records for green and infrared light to determine where water is on the landscape.

Using NDWI in order to determine how rivers are moving is still a new idea, but we're excited about this method's potential. If this method works we will be able to accurately estimate how much bank erosion is occurring across the state without having to do the decades of hard and expensive field work that this effort would traditionally take, which would be an incredible step forward. All of my fellow researchers and I are really excited about the progress we've made with this work and we're grateful for the opportunity to share it with all you. If you have any questions please feel free to contact me at forrestw@iastate.edu.

FIELD WORK FAILS



"When on a farmers property, I pulled off to the side of the road in my vehicle. Turns out the grass was misleading and there was a ditch where my wheels went. The car was pretty much vertical leaning to the right- inches from rolling. Luckily, the farmer brought his tractor and pulled me out. Whew!"

– ANONYMOUS

"Let me preface this with the fact that my sense of direction is almost nonexistent. This summer, before starting my Master's here at Iowa State, I had a job in southern California. Before going out into our study area, we would meet at Skate park just about every morning. Two months into the job, it is foggy in the morning. This probably wouldn't be an issue for a less directionally challenged person, but this is me we are talking about. The fog was sufficient as to confuse me enough that I missed the turn, turned around, missed the turn again, then defaulted to Google Maps to finally find the place. I was ten minutes late to work that day..."

– BEN WEST

"During some downtime before my techs and I began some fieldwork, one of my techs managed to get this treble hook stuck in his thumb. With no time to drive to a clinic to take it out, I used the tools I had in my truck to get the hook out while sitting in the boat ramp parking lot. After a few minutes...we were back on schedule!"

– BRANDON MAAHS

"My spring field work involves radio tagging age-1 muskellunge (hereafter "muskies") at Rathbun Fish Hatchery before they are stocked in my study systems, and subsequently tracking these fish on a regular basis to understand their post-stocking movement and habitat use. Many of these fish hang out in shallow water near the stocking location for a while after being stocked, leaving them susceptible to predators. Spring 2017 was a great year for these young muskies, but this past spring we observed relatively high mortality of these fish likely due to rapidly increasing water temperatures as well as handling and transportation stress. Because of this my daily tracking regimen quickly turned into a tag recovery effort, as radio tags are expensive and these tags still had most of their battery life. One of my first tracking sessions I located two of my muskies together, both in shallow water under overhanging vegetation. Coincidentally (or so I thought), there was a large northern water snake sunbathing in said vegetation. Next day, same story; both muskies in the same area, under overhanging vegetation with a large snake in it. This aroused the suspicion of me and my technician, who decided to spook the snake and see if the "tagged muskies" moved. We spooked the snake, the "muskies" moved, and my technician and I were now on a snake hunt. A few hours passed before the snake found a new spot to sunbathe. We captured and killed the snake (for science), cut it open, and found two radio tags and a partially digested muskie in its stomach. I had found radio tags in blue herons and eagle's nests before, but never thought I'd have to capture a snake with multiple tags in it!"

– ROBBIE WEBBER

"I had recently treated my clothing with permethrin and proceeded to rub an apple on my shirt to clean it. I proceeded to throw up the apple."

– LEWIS WIECHMANN

"After spending most of October off the water due to equipment failures, staffing issues, and inclement weather, I was ready to get back in the field the first week of November. The stars had aligned and all the repairs were made, technicians were available, and the weather was (allegedly) free of precipitation. What could go wrong? I had my first inkling of trouble when light snow started falling on the three and a half hour drive from Ames up to Spirit Lake, Iowa. I should not have been surprised the next morning to see ¼" of ice around the shoreline of the lake we meant to sample first. No problem, field work always involves improvisation and we had a backup lake to sample that was luckily free of ice. We launched the boat, began sampling and had to stop immediately due to waterfowl hunters camped out with decoys in our sample area. No problem, we can sample another part of the lake. Except we didn't see a single fish from the two most abundant species in the lake. Equipment was seizing up in the cold and there was a layer of ice growing on the boat deck. With tails between our legs and admitting defeat, we return to the boat launch to find there is a conservation officer waiting for us; he had received a complaint about an Iowa State University boat interfering with waterfowl hunters. Naturally, the officer was quite upset at being called out in below-freezing temperatures to chastise inconsiderate college students. Sometimes you need to pay more attention to signs from the universe instead of swimming against the current."

— MARTY SIMONSON

"My tech Ellen and I were measuring cross sections on a stream when a storm hit. The winds were powerful, but we pushed through. When we were leaving the site we saw several cars pulled off to the side of the road with the passengers standing outside their cars looking around. We had no idea what everyone was doing until later... Turns out there was a tornado that touched down a few miles from where we were! The onlookers were storm chasers."

— SALLY CARULLO & ELLEN JUSTIS

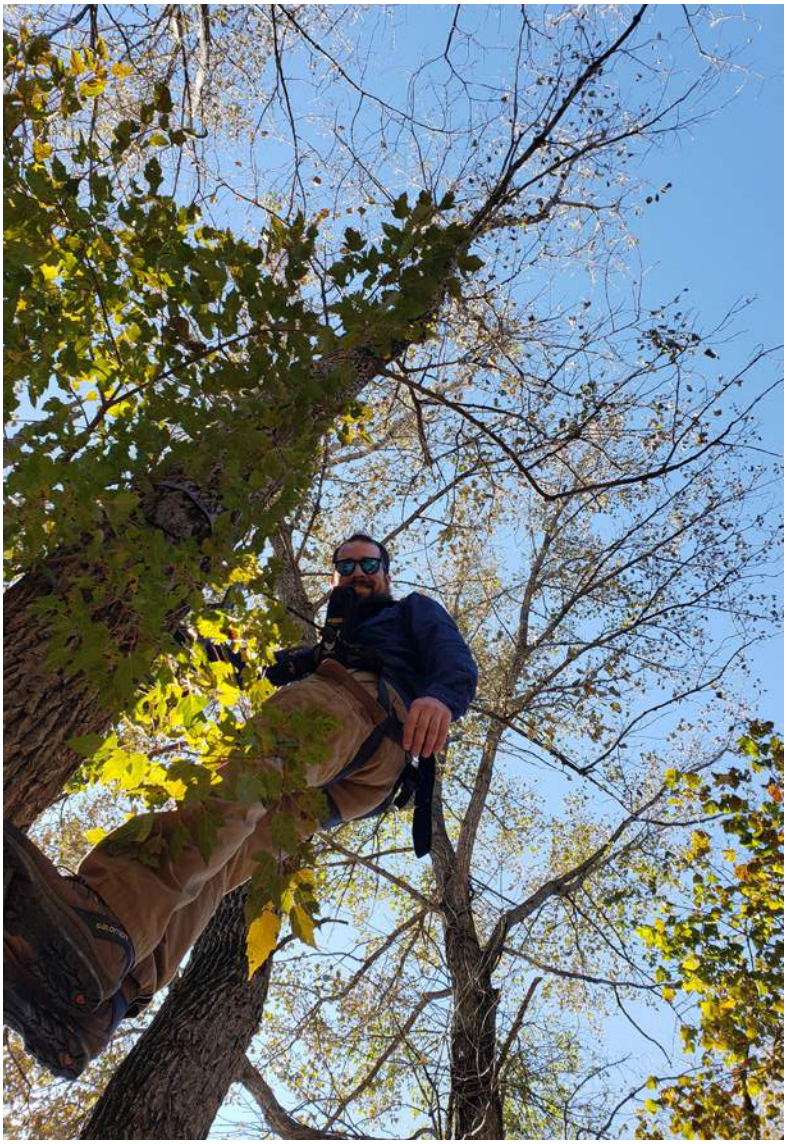
WHERE ARE THEY NOW?

CAMILLE KARNATZ

completed her M.S. in Environmental Science in the Fall of 2017. For the past year Camille has been working as an Environmental Compliance and Permitting Consultant in Minneapolis, MN with the engineering and design firm, AECOM. Having studied stormwater management, she primarily conducts stormwater site assessments and writes Storm Water Pollution Prevention Plans for her industrial and construction clients. She also creates compliance plans for hazardous waste generation, oil spill containment, and air permits. Her position has allowed her travel to over 20 states conducting soil, water, and air emissions sampling. What she loves most about her position is that every day delivers a new environmental challenge.

COURTNEY ZAMBORY

completed her MS degree in Fisheries Biology in 2018. Her thesis involved developing methods to integrate LiDAR data and species distribution models to identify and prioritize off-channel restoration site selection to conserve the Topeka Shiner, a federally listed endangered species of fish in Iowa. After graduation, Courtney moved across the country to Oregon to work as a spatial analyst for the Oregon Department of Fish and Wildlife's Fish Research Evaluation Data Decision support (REDD) group. She now works closely with the EPA to model stream flow across coastal Oregon under present and current day climatic conditions. Her work will help inform Coho Salmon restoration activities.



PATRICK MCGOVERN

completed his M. S. degree in Wildlife Ecology at Iowa State University in 2018. He worked with Drs. Steve Dinsmore and Julie Blanchong on a project studying the survival, cause-specific mortality, and habitat use of white-tailed deer fawns. He also addressed factors affecting accuracy of radio-telemetry locations. Pat now works as a Project Coordinator for Purdue University's Department of Forestry and Natural Resources. Specifically he oversees the Integrated Deer Management Research Project which hopes to integrate information on white-tailed deer populations, human attitudes and expectations, and habitat condition for the holistic management of deer in Indiana. His job involves coordinating a combined team of Indiana Department of Natural Resources staff and Purdue faculty, graduate, and undergraduate student researchers while fostering collaboration with private landowners.

WILL HERBER

Since graduation in December 2017, with his Master's degree in forestry from Iowa State University, Will has been on the move trying to find his path. He is currently working for Frontier Coop, an organic spice company in Norway, Iowa that purchases spices from all around the world. As a floor supervisor, he is committed to maintaining the safe quality of the spices and the working environment. Will is still working on finding his way back to graduate school to finish his dream of acquiring a PhD. In the meantime, he enjoys his time at home (he commuted from Cedar Rapids throughout his degree at Iowa State), getting to see his wife and daughters every evening, and taking care of his aging parents.

NICK SIMPSON

completed his M.S. in fisheries biology at ISU in May 2018. Advised by Dr. Michael Weber and Dr. Clay Pierce, his research was focused on assessing associations of the endangered Topeka Shiner. After graduating, he accepted a position as a fisheries biologist with the Kentucky Department of Fish and Wildlife Resources in western Kentucky. Much of his time is spent improving fish habitat and conducting fish surveys on Kentucky Lake and Lake Barkley, two of the largest reservoirs east of the Mississippi River. Most of the current projects focus on monitoring trends of sport fish populations and assessing the impacts of invasive Asian Carp on these populations.

DR. JESSE RANDALL

was the Extension Forester in the NREM department from 2007 to 2018, when he began a position as the director of forestry research and extension at the Michigan State University Forest Biomass Innovation Center in Escanaba, Michigan. As director, he oversees a total of 9,000 acres of research forests across the Upper Peninsula, as well as day-to-day facility operations. He works as a liaison between state and federal forestry groups to promote research and outreach with MSU forestry. Additionally, this position allows him to continue with forestry extension programming to serve the needs of state and private foresters, the timber products industry, and private landowners.

While the research station has focused heavily on woody biomass studies over the past three decades, Jesse hopes to broaden the scope of research to include a more diverse group of forestry stakeholders, underserved forestry entities, and to meet the emerging needs of the forest industry here. To that end, he plans to revise the research station's name to more accurately reflect this expanded focus of the forest resource.

Since becoming a transplant "Yooper", Jesse has enjoyed hunting Ruffed Grouse, preparing for white-tailed deer rifle season opener (a Yooper holiday), brewing craft beer, and spending time with his family.

BRIDGETTE (KIRK) GLASS

completed her M.S. degree in Ecology and Evolutionary Biology at ISU in 2018. She studied seed rain data from Costa Rica with Dr. Ann Russell and focused on the effects of a single tree species on seed dispersal. She also studied the effect mesh size within seed traps has on our understanding of tropical species seed dispersal. Since graduation, Bridgette has continued working remotely for the Center for Environmental Management Military Lands (CEMML) as a biologist for two Air Force bases in California while residing in Ohio. She writes and reviews biological consultations, natural resources management plans, and policy documents. She also has been working to publish her M.S. research. Bridgette will be moving to Washington next year with her new husband, Josh Glass.

RACHEL VANAUSDALL

completed her M.S. degree in Wildlife Ecology at Iowa State University in May 2018, where she focused on migrating and breeding waterbird response to shallow lake restoration in Iowa. Shortly after graduation, Rachel began working as a Research Associate II in NREM. She primarily assists with managing surveys, technicians, and data for the Multiple Species Inventory and Monitoring Program, which is a long-term monitoring program with the goal of conducting annual, standardized surveys of Iowa's wildlife populations. In collaboration with the Iowa DNR, Rachel is using these data to help identify management strategies that will benefit a variety of taxa, including butterflies, birds, herpetofauna, and odonates in the state of Iowa.

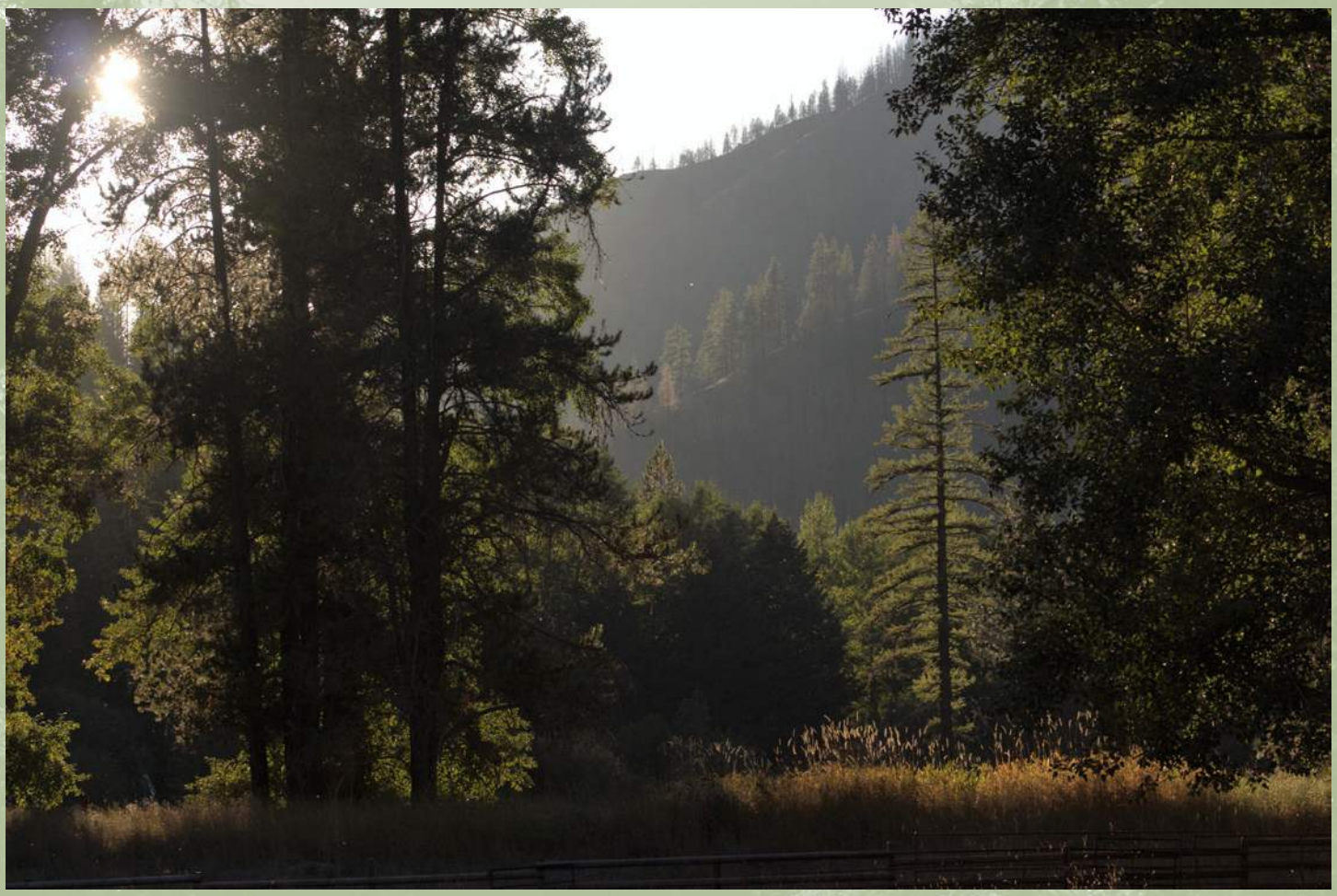
BRET LANG

completed his M.S. in Environmental Science in December of 2017. Bret studied butterfly monitoring protocols in urban ecosystems with Dr. Jan Thompson in Central Iowa. After graduation, Bret started working as a visiting instructor of Environmental Science at Drake University in Des Moines where he teaches courses in Urban Ecology, Environmental Science, GIS, Remote Sensing, and Geology. Most of his courses are field intensive, meaning he gets to spend plenty of time outdoors, which he loves. In addition to teaching, Bret have been working on a few projects through Drake University with the Polk County Conservation Board including creating a biological inventory for one of its conservation areas, Chichaqua Bottoms Greenbelt and creating models to estimate oxbow longevity within their parks.

PHOTO CONTEST

LANDSCAPE

WINNING PHOTOS



Forestry Camp 2018
James Barger

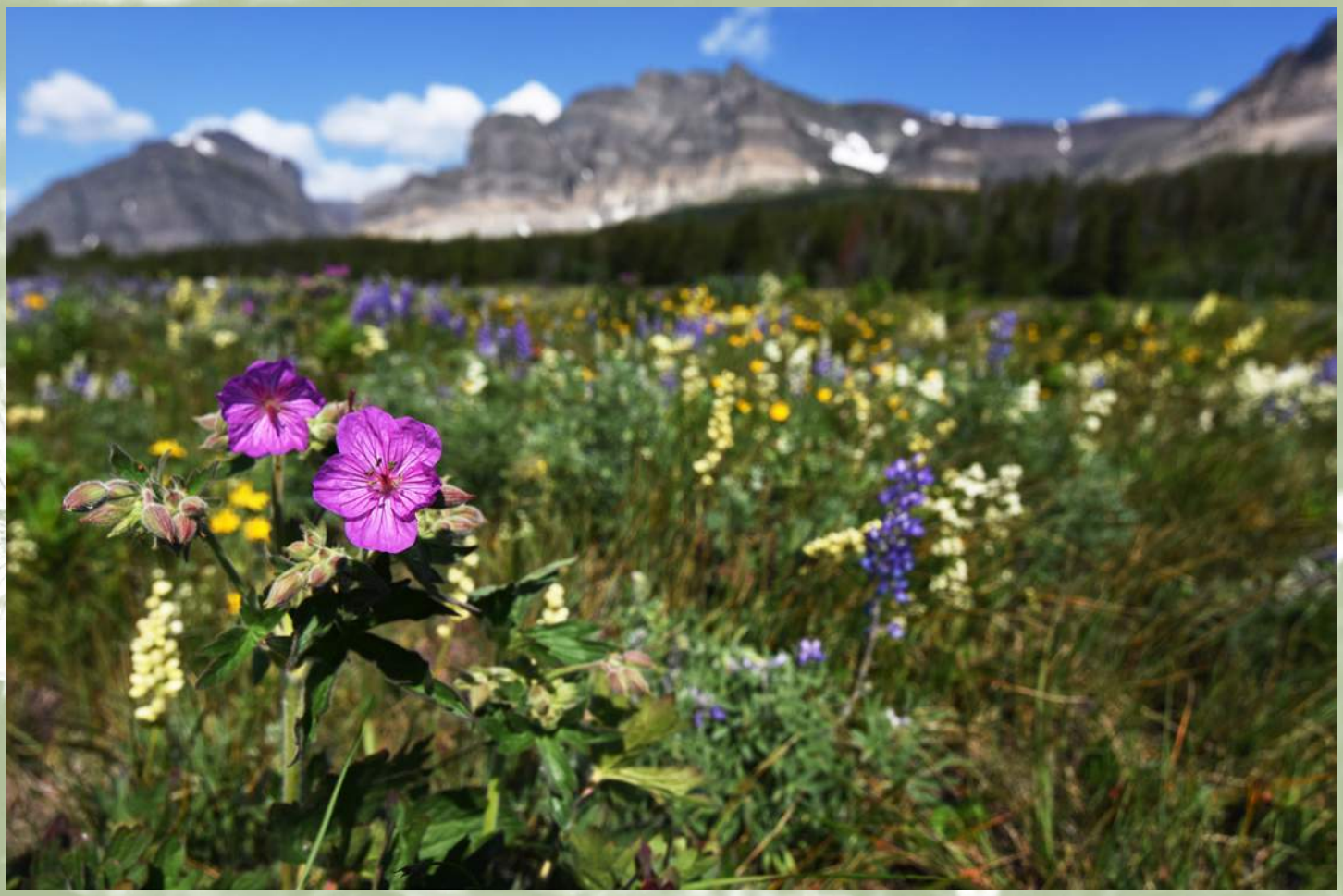
Altered. Dark Hedges, Northern Ireland
Amanda Chung

The Views of Wales, Snowdonia National Park

Amanda Chung

Rose Lake, Boundary Waters
Bob Klaver

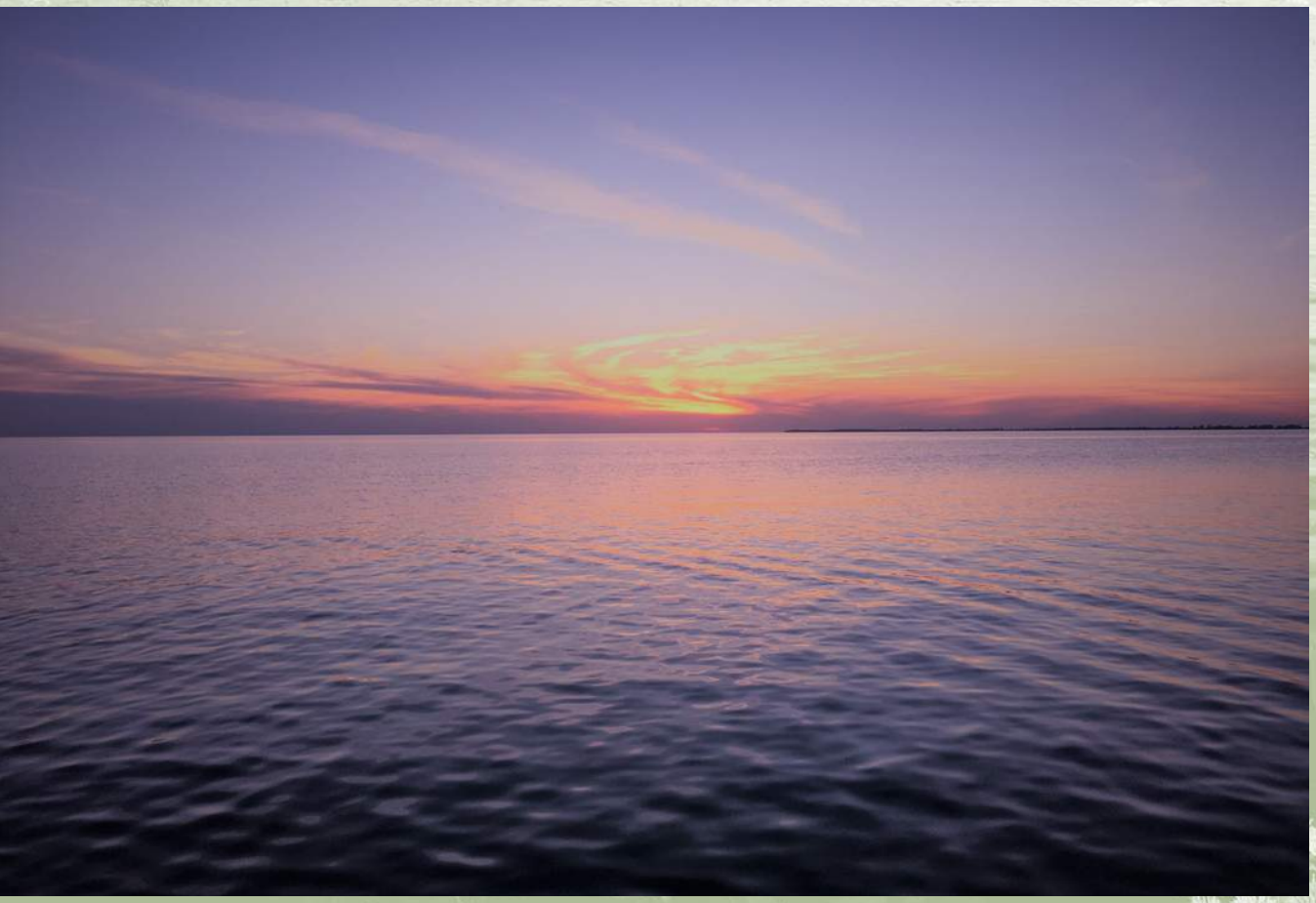
St. Louis River in Jay Crooke State Park, MN
Brett Kelly



Pink flower and mountains
Cassandra Nunez

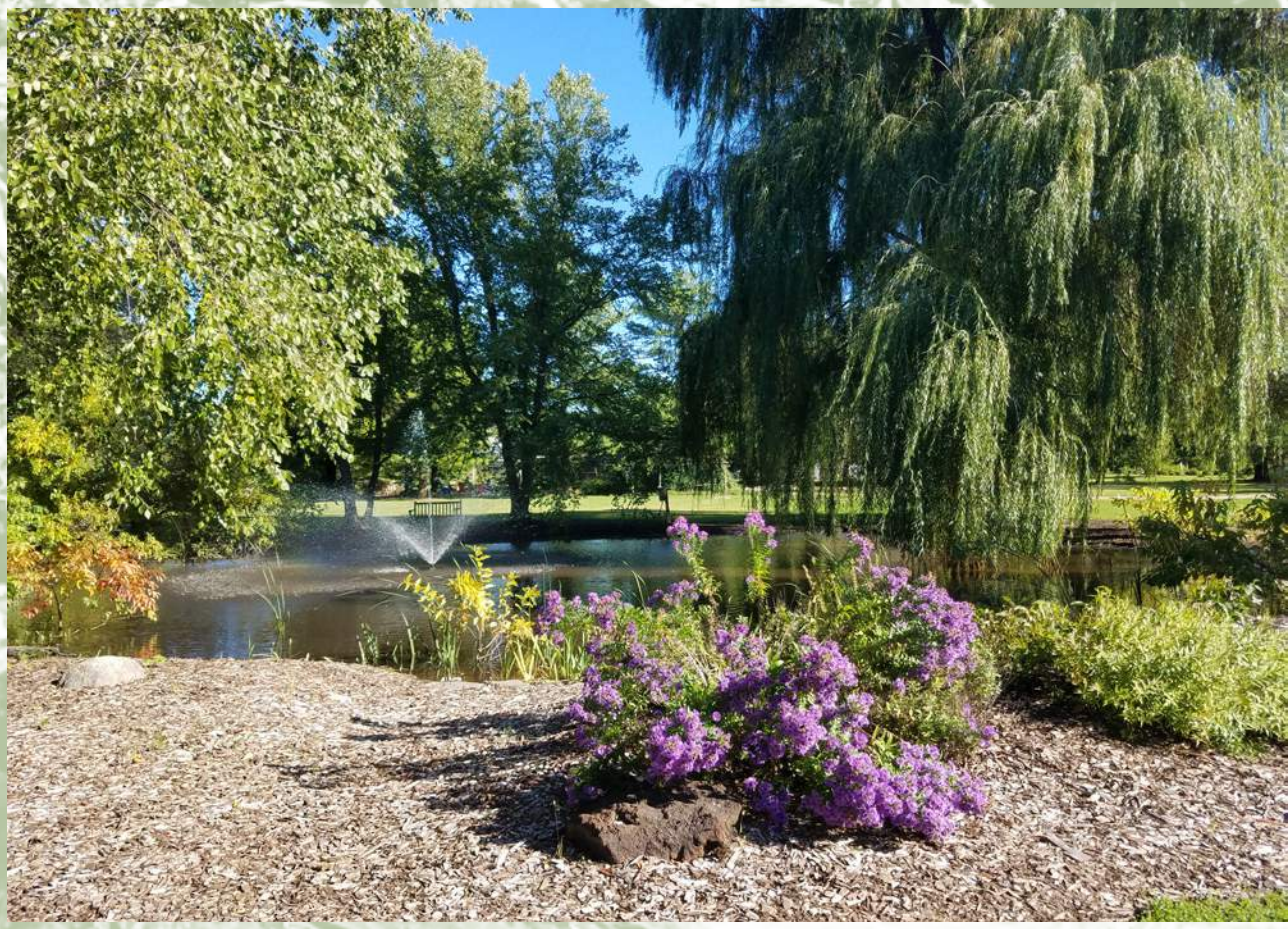
HONORABLE MENTIONS

A storm brews on the horizon over Riverton Wildlife Area in Fremont County in southwestern Iowa. Adam Janke



End to a perfect day. Emily Ball

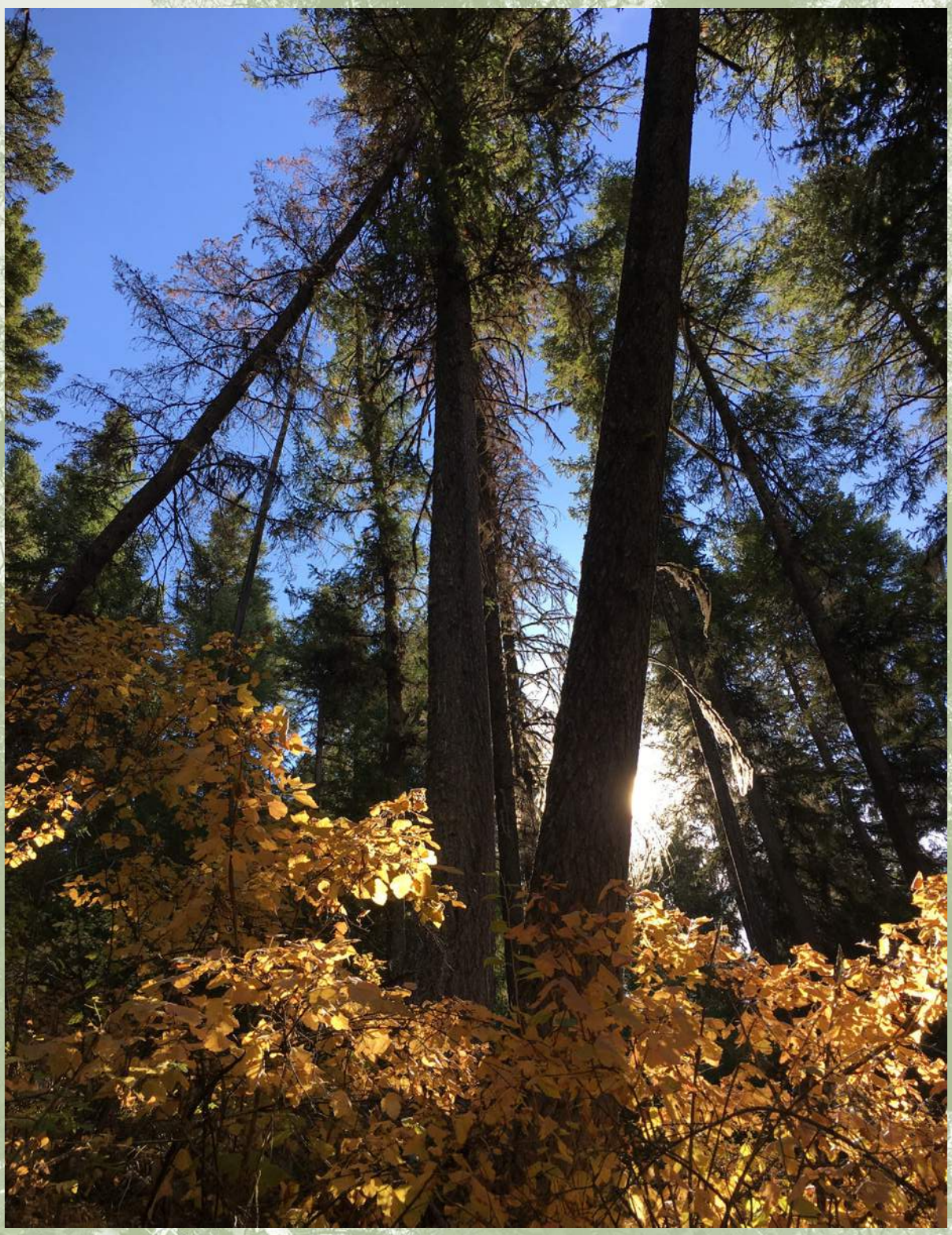
Ranomafana National Park. Ben Johnson



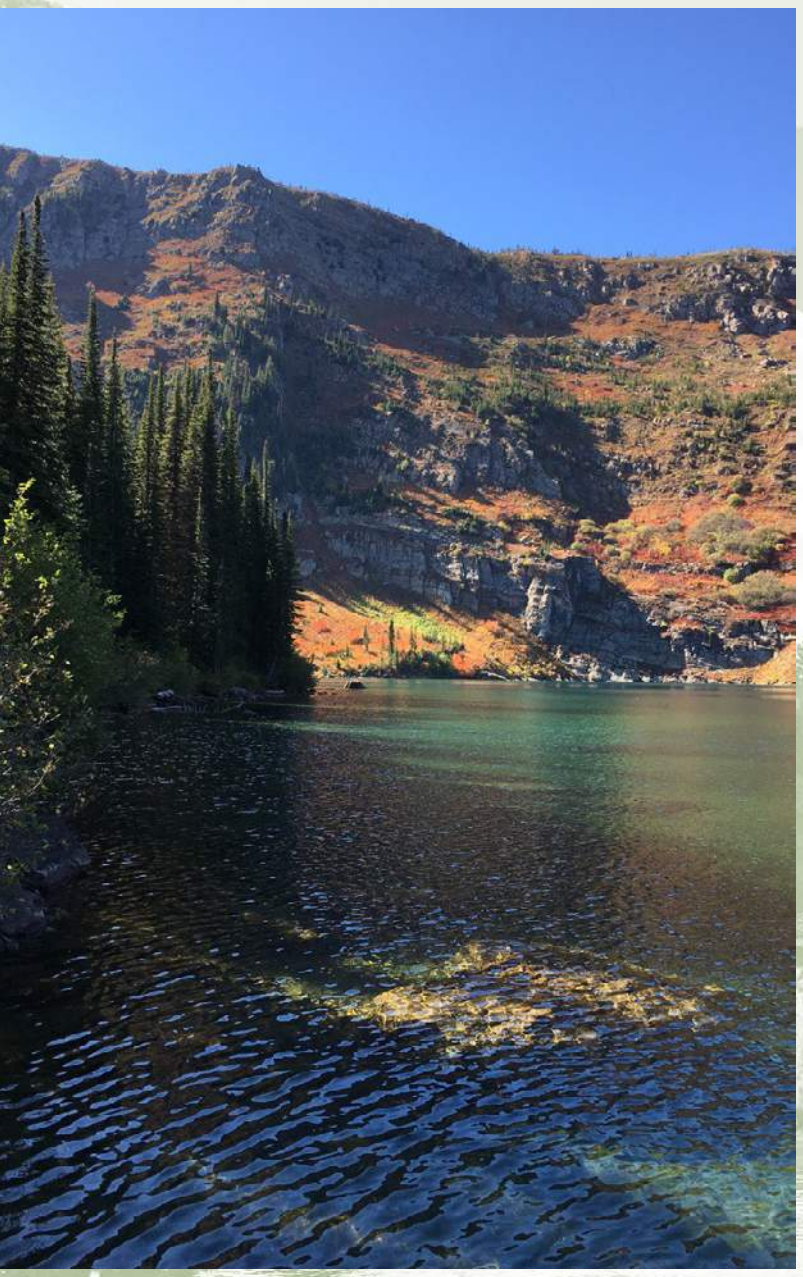
Iowa Arboretum. Bree Marmur

Paint Creek within Yellow River State Forest. Sally Carullo

Forestry Camp 2018. James Barger



French Camp, MT. Heather Bryant



French Camp, MT.
Heather Bryant

French Camp, MT.
Heather Bryant

French Camp, MT.
Johanna Ford

French Camp, MT.
Johanna Ford

Sunset
Northeast IA
Robbie
Weber

DeepPool,
Northeast IA
Robbie
Weber

ANIMALS

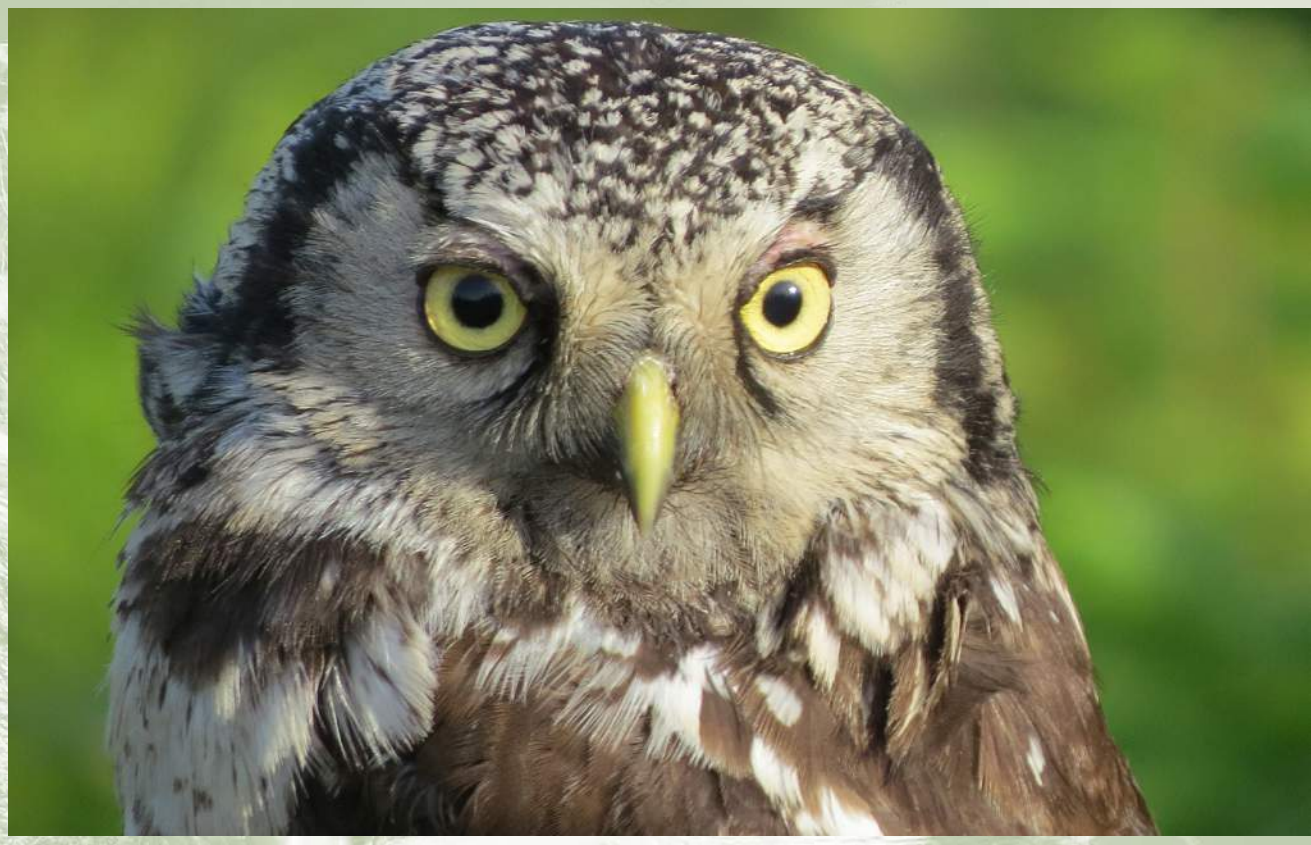
WINNING PHOTOS

Gecko on Tree. Ben Johnson

Puffin. Amanda Chung

Ring-tailed Lemur. Ben Johnson

Tiger Trout Northeast IA. Robbie Weber



Northern Hawk Owl in Main River Watershed, Newfoundland, Canada. Ben West

Red squirrel at Gros Morne National Park, Newfoundland, Canada. Ben West

Altered. Monarch in Blue. Ames, IA. Bree Marmur

Dipper. Cassandra Nunez

Mountain Goat. Cassandra Nunez

Forestry Camp 2018. James Barger

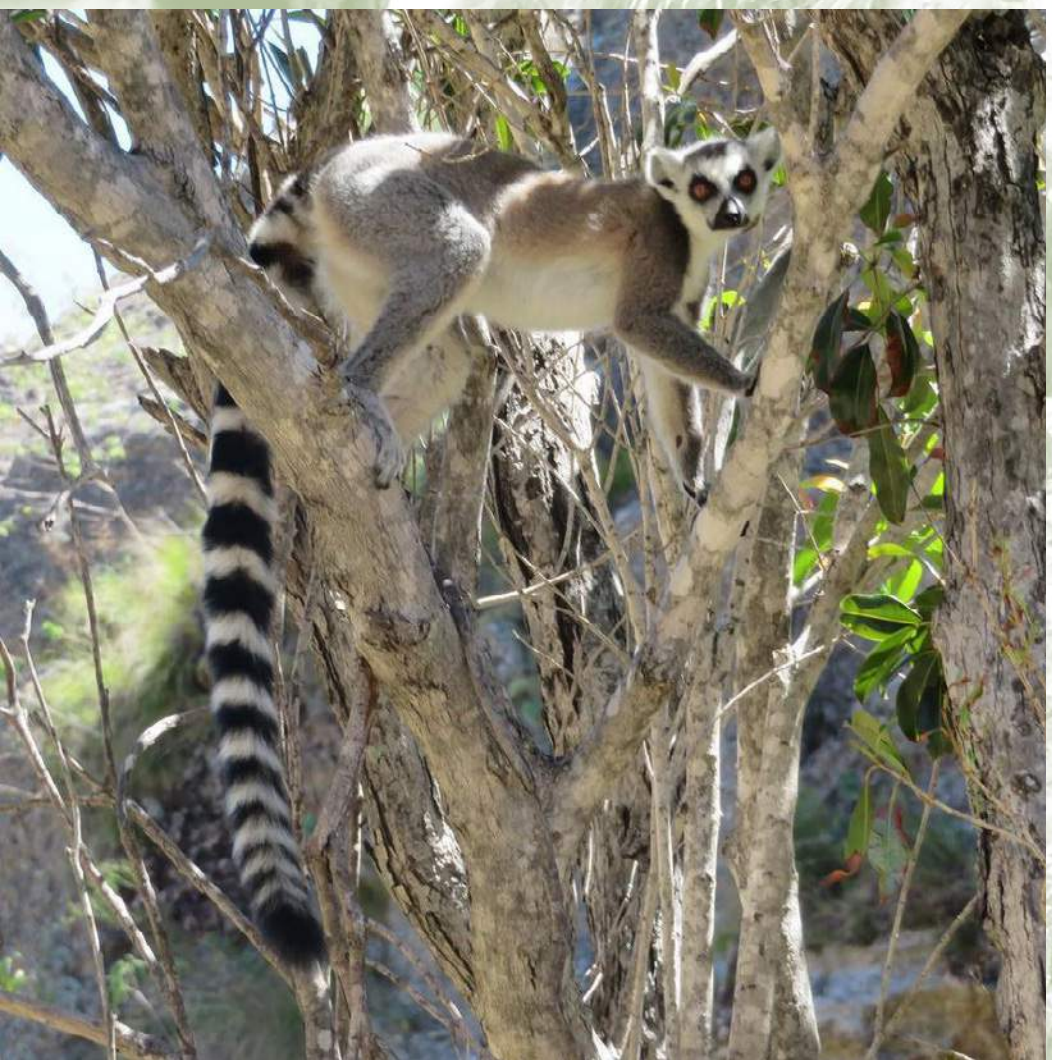
Seen on high trestle trail, Madrid, IA. Dan Adams

Brook Trout. Brett Kelly

Brown Trout.
Brett Kelly

Rainbow in the Lake. Rainbow Trout, KS.
Emily Ball

French Camp, MT.
Johanna Ford



Ring-tail lemur, Madagascar
Peter Wolter

PLANTS

WINNING PHOTOS

Frozen Rose, Ames, IA
Bree Marmur

Smooth Sumac, Ames, IA.
Peter Wolter

HONORABLE MENTIONS

Vibrant milk weed blooming along Holland Creek in Grundy County.
Sally Carullo

An Early Snow, Ames, IA.
Bree Marmur

PEOPLE IN NATURE

WINNING PHOTOS

Waiting to Strike. Emily Ball

Soil profile of Jack Trice Stadium, Fall 2018. Bree Marmur

Feral cannabis or ditch weed, is wild-growing cannabis. As early as 1914, a United States Department of Agriculture publication stated: "Hemp is abundant as a wild plant in many localities in western Missouri, Iowa, and in southern Minnesota, and is often found as a roadside weed throughout the Middle West." (Wikipedia) Sally Carullo

HONORABLE MENTIONS

Bara women, Madagascar. Peter Wolter

Field Biologist observes a Great Basin fence lizard in Joshua Tree National Park, CA. Ben West.

Participants and instructors in the Master Conservationist Program examine an Ornate Box Turtle. Adam Janke

ABOUT THE EDITORS

BREE MARMUR

was born and raised in Iowa where she also attended undergrad at Grinnell College. Bree is currently a Ph.D. student in Environmental Science housed in the NREM Department. Bree's research focuses on urban stormwater management and better understanding the social and biophysical aspects of residential stormwater best management practices. Bree loves reading, knitting, piano, and taking long walks with her dog Loki.

STEPHEN GRAUSGRUBER

is a second year master's student with Dr. Joseph Morris majoring in fisheries biology. Stephen's research involves evaluating biotic and abiotic factors that influence stocked adult Yellow Perch survival and reproduction in central Iowa's small community systems. Although angling occupies a majority of Stephen's free time, he also enjoys hiking, camping, boating, and anything else that will get him outside.

MARTY SIMONSON

grew up in West Michigan and earned a BS in Fisheries and Wildlife from Michigan State University in 2015. He then began Master's research at The University of Toledo studying how the nearshore fish community in Lake Erie responds to different shoreline modifications, earning a degree in 2017. He immediately began a PhD Program at ISU in Fall 2017 and started fieldwork in 2018. Based out of the Iowa Lakeside Laboratory in Spirit Lake, Iowa he sampled fish at seven Iowa lakes as part of his research project about restoring shallow lake ecosystems through commercial harvest of nuisance fish species. In his free time he enjoys live music, reading, bicycling, and of course fishing!

SHANNON SCHMIDT

is a M. S. Student in Wildlife Ecology within the NREM department. Her research focuses on using remote sensing techniques to map and better understand the ecological impacts of reed canary grass in Iowa's wetlands. Shannon likes reading, hiking, kayaking, and hanging out with her dog.

ALISON PETERS

led the design of Field Notes: Volume 10. Ali is a graphic design student graduating with a BFA in Spring 2019. She grew up in a small town in Western Iowa and has a passion for exploring nature. Her design interests include illustration and publication design, and she hopes to work at a design firm after she graduates and continue freelance work on the side. When she's not at the College of Design or interning at Workiva, Ali loves to spend her time hiking, playing piano, reading, and travelling. Ali's professional portfolio can be found at alisonpeters.xyz.