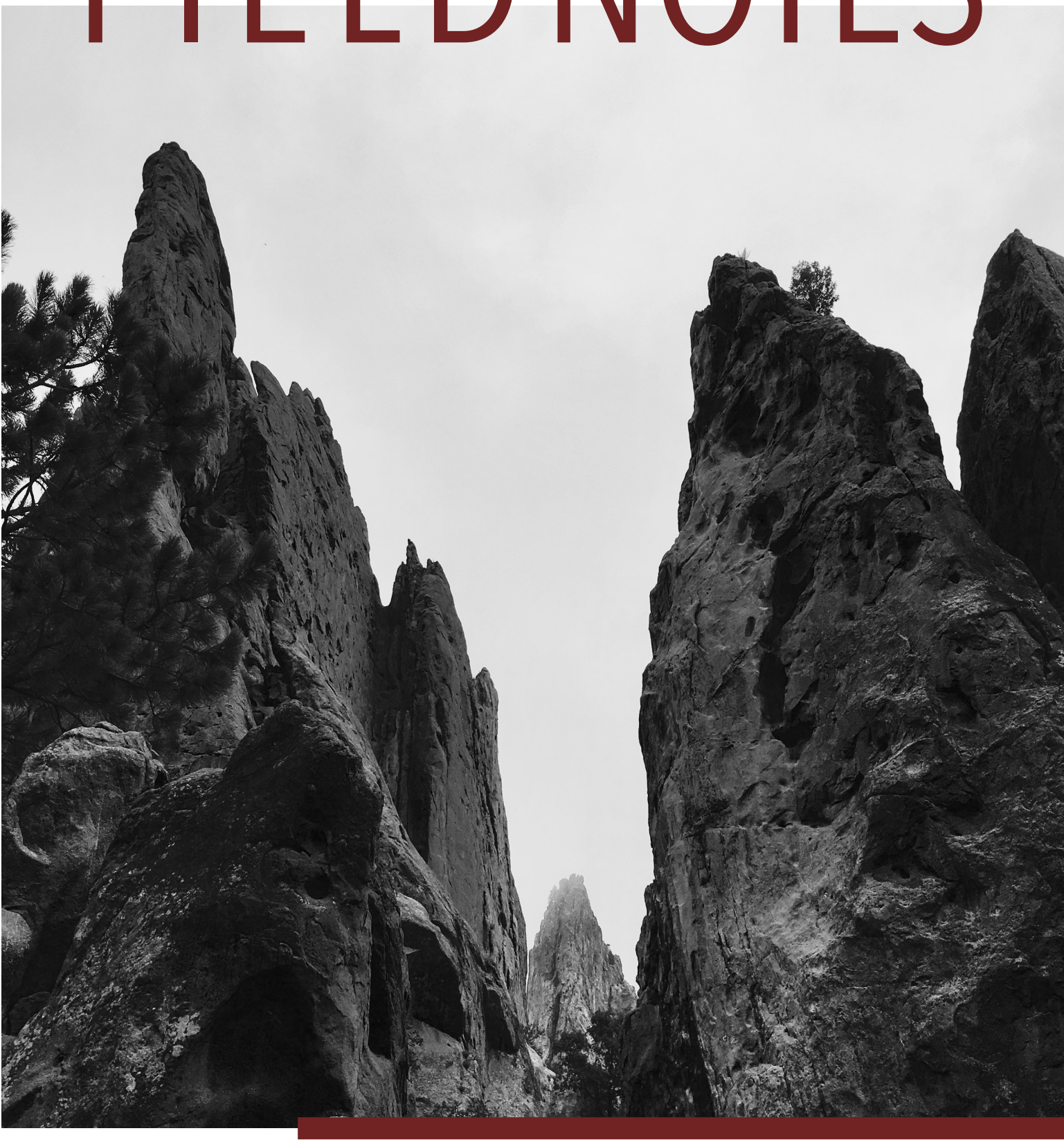
FIELD NOTES



Iowa State University
Department of Natural Resource Ecology & Management
Graduate Student Magazine
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THIS ISSUE

Natural Resource Ecology and Management

Photo: Benjamin Sipma

WELCOME

New Faces to NREM

Please welcome *Dr. Jennifer Schieltz* to the NREM Faculty. Jennifer joined the department in March 2017 as a Lecturer and Director of NREM's new Rod and Connie French Conservation Education Camp, located about 50 miles west of Missoula, Montana. Formerly a resort and lodge, the camp was recently donated to the ISU Foundation by Rod and Connie French and is being developed into an amazing field station for Iowa State students. Since arriving in March, Jennifer has been busy getting the camp ready, including converting guest rooms into bunk rooms and a restaurant into a dining hall, and preparing a classroom for the two undergraduate summer courses that were held there this past summer. To learn more about the French Camp, please read the other article by Jennifer in this issue of Field Notes describing all of the exciting happenings and future plans for the Montana Camp.

Dr. Schieltz is broadly interested in wildlife biology, animal behavior, and conservation, especially in large mammals. She completed her PhD in Ecology and Evolutionary Biology at Princeton University where she studied the effects of cattle grazing on various wild ungulates in Kenya and worked with land managers to promote livestock-wildlife coexistence on shared rangelands, supporting both human needs and wildlife conservation.

In between field seasons Jennifer helped teach several field courses to Princeton and Columbia University undergraduate students in Kenya. She is also very involved in outreach and education, interacting with children, land managers, and the general public about science and natural resources. She loves teaching and is excited about this new position and the chance to continue to help students discover nature through hands-on learning in the field. Dr. Schieltz will be teaching courses on campus during the fall and spring (notably NREM

Dr. Schieltz in Kenya, with a blind elephant friend grazing in the background.

120: Intro to Renewable Resources) and will run the French Camp in Montana and teach Field Ecology there during the summers.

Jennifer grew up in Ohio and obtained her B.S. in Biology from Washington and Lee University in Virginia. Her interests include science communication, outreach, downhill skiing and horseback riding. She welcomes the chance to serve on grad student committees, or provide any informal mentoring or assistance to students that she can. She would love to talk to anyone interested in research or teaching opportunities in Montana. Just drop by her office (142 Science II) anytime!

Please welcome *Dr. Miranda Curazon* to the NREM Faculty. Miranda joined the NREM department in October 2017 as an assistant professor focusing on silviculture. Her research uses a combination of field data and retrospective techniques (e.g. dendrochronology) to answer basic and applied questions about forest ecosystems and disturbance response.

Miranda comes from Saint Paul, MN where she was a research associate at the University of Minnesota and postdoctoral fellow with the Northeast Climate Science Center. In this position, she investigated the impacts of conventional silvicultural practices on functional diversity in northern hardwood and mixed conifer forests across the northeastern U.S., reconstructed eighty years of change in an old-growth red pine stand, and assessed the effects of ecological forestry practices on aspen-dominated ecosystems. Prior to her postdoctoral fellowship, Miranda completed a Ph.D. at the University of Minnesota. Her dissertation demonstrated that the impacts of biomass harvest on regenerating aspen forests across the northern Lake States vary widely with site quality and soil texture.

Formative practical experiences in Miranda's career include work in land management and conservation for The Nature Conservancy in Colorado and Vermont, the Colorado Natural Areas Program, and the National Park Service. She is committed to pursuing interdisciplinary partnerships and considers her position as a scientist and teacher as an opportunity to serve. With her research at ISU, Miranda

will continue pursuing questions about how land use and its impacts to biodiversity, composition, and structure affect forest productivity, competition, and resilience to disturbance and stress across Iowa and the Upper Midwest. She looks forward to working with others at Iowa State University as well as other organizations to address some of the pressing needs for forest management and conservation in the region.

Miranda is equally excited to teach in the NREM department, starting with Silviculture this spring. There are few things she enjoys more than spending time in the woods, and she looks forward to getting to know her students, giving them hands-on experience, and encouraging them to think creatively about forests and management.

ANGRY BIRDS

Studying Immunity in Song Sparrows

By Grace Vaziri

I've never met a bird I didn't like. As a kid, I had pet parakeets and even a pet sparrow that I raised from a fallen-hatching to adulthood. Unfortunately, birds have never really liked me back. At the age of 10, I lost a month of school due to an infection with bird-transmitted Psittacosis. Not one to be deterred, I recovered, and continued keeping birds until I went off to college and fell in love with small mammals. But, like a moth to a flame, I came to Iowa State to work on a master's project studying drivers of immune variation in, you guessed it, birds!

The research I've worked on so far has investigated how internal symbionts, like gut helminths (parasitic worms),drive variability in the expression of different components of the immune response (like fever or lethargy) when birds are challenged with a bacteria-mimicking immune antigen. All that is to say that I study whether changes in parasite load impacts how sick birds get during a simulated bacterial infection. Interestingly, a lot of research in mammalian species has suggested that infection with macro-parasites, like gut helminths, pushes hosts toward expressing less-severe inflammatory responses when infected with micro-parasites (like bacteria).The question, how does co-infection impact the immune response, translates easily to organisms other than birds (including humans), but addressing this question in the wild is not so easily done!

Let's design an experiment to test whether having a parasite infection changes some physiological response to a bacterial infection in a wild animal. A controlled experiment administering anti-parasitic drugs to treat helminth infections? (if you delete the next sentence) is the obvious first step. Next, let's take the animals we drugged (or used as controls), and give them an injection of bacterial antigen to induce an immune response. After this injection, birds' immune responses will kick in quickly, typically within the first 6 hours. Tracking temperature and activity level can give us a measure of how birds' immune responses differ based on whether they were treated with anti-parasitic drugs. If the trend we see from studies in mammals holds true, then we hypothesize that birds that get treated for their helminth infections will have more severe fever and greater reductions in activity level than their worm-infected counterparts when exposed to the same bacterial antigen.

As any scientist will say, it's one thing to dream up an exciting question, but coming up with an experimental design that's feasible is often much trickier. For almost any wild animal, designing an experiment to capture, treat, recapture, treat, and monitor for fine-scale temperature and activity measurements would be logistically infeasible. Many animals

are too wide-ranging, too secretive, or simply too smart to be recaptured. This is why I love my study organism, Song Sparrows(Melospiza melodia). As bonny and melodious as they are, Song Sparrows are fiercely territorial, and can often be lured into a mist net with just a single playback of another Song Sparrow's tune. Chalk it up to loyalty or hormones or both, but during the breeding season, Song Sparrows guard their territory with impressive consistency, making them easy to relocate, even weeks after they are fist captured. After relocating them, it's just a matter of setting up a mist net and finding another pre-recorded playback to stoke Mr. and Mrs. Song Sparrows' ire, and relatively easily, birds can be captured again.

Of course, I'd be painting too pretty a picture of Song Sparrow-related fieldwork if I didn't mention the occasional snags. For all the variability in immune response I managed to measure, I observed just as much variability in Song Sparrow territory selection and personality quirks. What were the drivers behind #38643's uncanny ability to dodge my net, hour after hour, day after day? Does building a nest in thorny blackberry bushes increase the impalement risk only for predators (and biologists), or do Song Sparrows suffer blackberry-related injuries as well? For that matter, what is the relationship between time spent untangling mist nets from blackberry brambles and the biologist's conviction to "get a better job when she gets outta here?"

Difficulties aside, studying co-infection in a free-living wild animal was an unmatchable experience for a self-proclaimed disease nerd and amateur bird-enjoyer. With help from my adviser, Dr. Adelman, and lab-mate, Rachel Ruden, I traveled to the Charles L. Pack Experimental Forest in Eatonville, Washington, captured 70 Song Sparrows,and then recaptured 40 in the span of a month. Using temperature-sensitive radio transmitters and automated radiotelemetry, I collected data on their skin temperatures and levels of activity for up to two days after injecting them with bacterial antigen. Fast-forward several months of data management and analysis, and an interesting trend emerged. Birds with artificially cleared helminth infections (the birds that got dosed with anti-parasitic drugs) had higher fevers than birds who still had their helminth infections intact. But, unlike our predictions, activity level varied only with bacterial antigen injection, not with helminth infection status. The decoupling of these two measures of immune response is unexpected, and signals a need for more experimentation that considers potentially confounding effects of seasonality, variability in helminth infection burden and more.

"Birds with artificially cleared helminth infections had higher fevers than birds who still had their helminth infections intact"

My work on this project adds to an exciting legacy of research conducted by Dr. Adelman and others on this population of Song Sparrows (a population fortuitously situated in the foothills of Mt. Ranier, Washington). Maybe it was their sweet little song, or perhaps it was their paradisiacal habitat, but I think I started falling in love with those Song Sparrows. Alas, my love was unrequited, and it was only due to their disdain for my presence and my irksome song playback that we ever interacted, and that I was able to carry out my project.

Birds by Amy Wilson // Portrait by Jim Adelman

A ROOM WITH A VIEW

New French Camp in Montana

By Dr. Jennifer Schieltz

As the trail descended from the ridgeline and began to curve back and forth downslope, we wondered when the lake would finally come into view. Even though it was only September and the sun on our faces was warming the air to 60 degrees F, we had been hiking in ankle deep snow for the last hour or two. Thirty-eight ISU Fall Forestry Camp students and I were up at the border between Idaho and Montana, gazing at miles and miles of roadless area ahead of us.

As we came around a corner, through the trees, suddenly there it was –a beautiful blue mountain lake. "We found it!" I heard someone exclaim from up ahead. Excitement spread and, before long, everyone was posing for photos in front of the striking background of Heart Lake.

The trail we took that day is just one of many amazing locations in reach of NREM's new field station –The Rod & Connie French Conservation Education Camp –located about 50 miles west of Missoula, Montana. Donated by the Frenches in 2016, this former lodge/resort and restaurant has been converted into an invaluable educational site for hands-on learning.

The French Camp property lies 16 miles down a gravel road, surrounded by the Lolo National Forest and just up the road from Fish Creek State Park and Wildlife Management Areas. Fish Creek, which runs right next to camp, is among the most undeveloped tributary watersheds in the Clark Fork basin. It represents a key stronghold for several sensitive fish species, including the threatened bull trout and the iconic west-slope cutthroat.

Just west of camp, three Forest Service trails head out into the proposed Great Burn Wilderness. This expanse of undeveloped land serves as valuable habitat and migration corridors for elk, moose, bears, mountain lions, wolves, and much more.

The first undergraduate courses took place at the French Camp this past summer 2017. Students in Jim Adelman and Mike Rentz's Wildlife Population Methods course learned how to mist net birds, trap small mammals, and estimate and monitor populations in

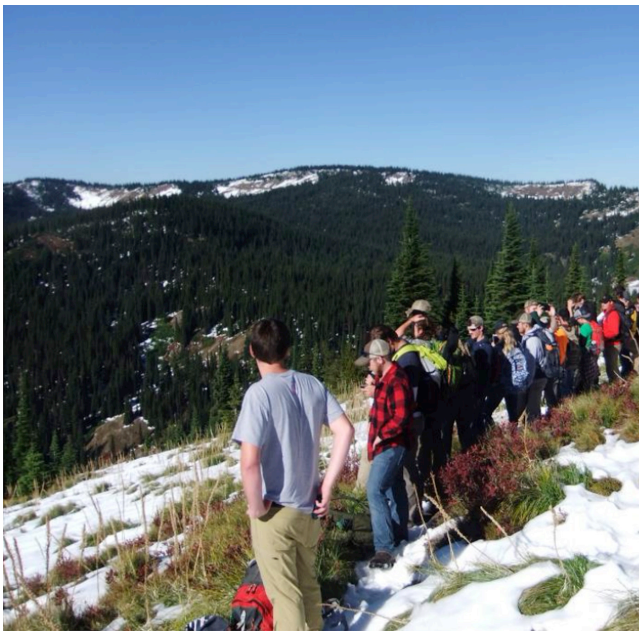
Field Ecology students make observations along Fish Creek

the wild. Jennifer Schieltz, Ashley Keiser, and Ann Russell's Field Ecology students explored the core concepts and principles of ecology through experiments and first-hand observations in the field. In September, the French Camp hosted this year's three-week Fall Forestry Camp, where students were able to interact with a variety of professionals in their field and get ideas about future career paths.

For many of the students, this was their first trip out West. This wild and rugged landscape contrasts markedly with the predominantly agricultural, managed ecosystem surrounding Iowa State University. So not only do these mountains provide some breath-taking scenery, but an opportunity to learn about diverse natural resource management issues in a new ecosystem.

This upcoming 2018 summer, the camp will be offering five different undergraduate courses covering a range of forestry and ecology topics. Courses are open to ISU students from any major, and to students from other universities. The camp welcomes grad students, post-docs, or faculty wanting to conduct research! When not fully occupied by students, the camp is also available to rent for conferences, workshops, or retreats.

To see more of what the camp has to offer, visit our new website at: https://www.nrem.iastate.edu/montanacamp/ Contact camp director Jennifer Schieltz at jms3@iastate.edu with any questions or ideas for the camp.



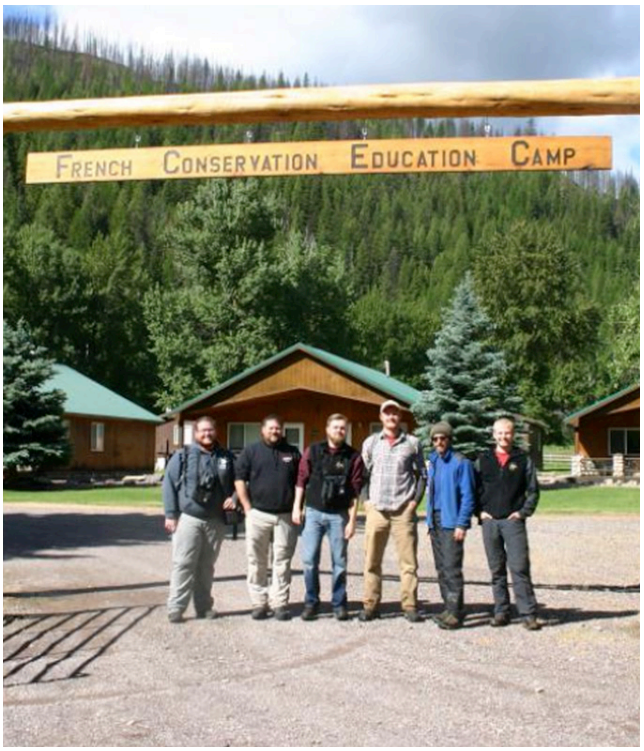


Photo 1: Forestry Camp students take in the view from the state line trail at the border between Montana and Idaho.
Photo 2: Mike Rentz, Jim Adelman, and Wildlife Population Methods students pose for a photo under the French Conservation Education Camp sign at the entrance to the camp.
Photo 3: Soaking in the first view of Heart Lake as we descended from the ridge line.

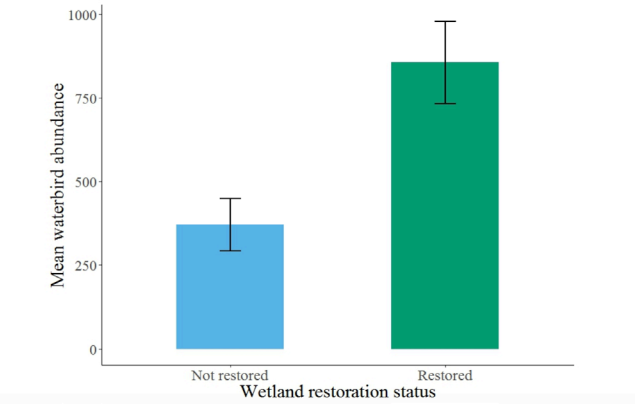
WETLAND RESTORATION

Birds benefit from efforts in Iowa

By Rachel A. Vanausdall

During the spring and fall throughout Iowa, if you take a moment to look up to the sky you might notice flocks of Canada Geese flying overhead, Sandhill Crane pairs bugling, or ducks dropping into a wetland. These birds are migrating to northern breeding grounds as far as the Arctic, and many of them fly thousands of miles to reach their destination. Spring migration is a dramatic and critical life history event for waterfowl and other species. While many of these birds demonstrate amazing feats of endurance, they still need nourishment and refueling during their long journeys. That is part of the reason why wetland management and restoration in Iowa has become so important and what brought me to Iowa as a graduate student.

Part of Iowa is situated in the Prairie Pothole Region, an area comprised of extensive wetland and grassland complexes used by over 100species of birds during migration. This region covers about 500,000 km2in the United States and Canada, including part of Iowa. This landscape was formed by retreating glaciers more than 10,000 years ago, which created depressional wetlands adjacent to grasslands that are filled mostly by precipitation and groundwater. These wetlands are typically naturally interspersed with aquatic vegetation and full of macroinvertebrates, both of which provide foraging and nesting habitat for birds. However, most of these wetlands were drained for agriculture by European settlers. In Iowa alone, about 90% of the original wetland area was drained by the 1980's. As a result, about 40% of these wetlands remain in the conterminous United States today. Of the wetlands that were spared, many of them are degraded due to excessive runoff from crop fields, changes to their hydrological cycle, and rough fish invasions. While wetlands may naturally experience periods of little vegetation and mostly open water, these human-caused disturbances have resulted in wetlands that are persistently turbid and unvegetated, making many of them unsuitable for waterbird species.



Waterbird abundance averaged across non-restored sites and restored sites from surveys conducted in the spring in 2016 and 2017 in the Iowa PPR. The error bars represent the 95% confidence interval.

The drawdown phase for Little Swan Lake, a shallow lake in Dickinson County, IA. Restoration at this site began in the spring of 2017. The lake will be gradually refilled over (ideally) two years. Shorebirds, dabbling ducks, and other water birds forage in the exposed mudflats during the spring and summer.

As we gradually realized the importance of wetlands not only for birds but for humans and other wildlife, wetland restoration and monitoring waterbird response to these restorations became a goal of many state and federal agencies, groups, and individuals. The Iowa Department of Natural Resources (IDNR) and Ducks Unlimited, Inc. teamed up and have restored about 38large shallow lakes since 2006. Part of their goal is to restore habitat for migrant waterbirds in the spring and fall and convert degraded lakes into wetlands with vegetation and macroinvertebrates that could attract more waterbirds. They achieve this by manipulating the water level to mimic natural hydrological fluctuations that may normally occur because of drought or precipitation. To begin the process of restoring a degraded wetland, IDNR biologists completely drain the wetland, which allows plants to grow from seeds that were already in the wetland basin. Over two years, they allow the basin to gradually refill, resulting in a wetland with more vegetation and structural diversity than it had before restoration. My project involves monitoring the response of migrant waterbirds to these habitat changes and determining the overall impact of restoration on the avian community.

To do this, I conducted surveys at 30 shallow lakes, 19 of which have been restored within the last 10 years and 11 of which have not yet been restored. These wetlands are located throughout 11 counties in Iowa. My surveys involved weekly counts at each site for about 10 weeks in the spring of 2016 and 2017. I also measured several habitat characteristics, such as the percent of the wetland area covered in emergent vegetation, to determine the habitat differences between preferred wetlands and wetlands not used as much by waterbirds.

Based on preliminary analyses, it seems that (unsurprisingly) more waterbirds are using the restored sites than the non-restored sites. Additionally, the amount of emergent vegetation and the size of the wetland may influence waterbird use. This finding is important because one issue with wetland restoration is the dramatic growth and spread of thick emergent vegetation, particularly cattail. This can be managed by increasing water depths. Muskrats may also colonize the wetlands, and they can cut back emergent vegetation by using it for forage and building huts. Many waterbirds,such as dabbling ducks,prefer wetlands that provide both open water for foraging and vegetation for cover in the spring. Therefore, if these wetlands become too thick with vegetation due to aggressive cattail growth or lack of muskrat activity, the site may become unsuitable for many water-

A Lesser Yellowlegs walking on mudflats at Ventura Marsh, located in the counties of Cerro Gordo and Hancock in Iowa in the summer of 2017. Water levels at this site were low enough to support several shorebird and other waterbird species.

bird species. Indeed, we are seeing fewer species and numbers of birds in sites restored 5 to 10 years ago. At the same time, changes in water level at each site may impact use by birds. In particular, the draw down of a wetland, for either initial restoration or periodic vegetation changes, can expose the wetland bottom. These areas of bare ground are often referred to as mudflats, and they can provide foraging habitat for migrant shorebirds,such as the Pectoral Sandpiper. Overall, the varying water levels and vegetation cover have a significant influence on waterbird abundance and community composition, so it is important to manage for this wet/dry cycle to provide habitat for a variety of birds.

The change from an open, murky lake to a thriving, vegetated wetland is an amazing and dramatic shift. At wetlands that are still in this open state, we generally see few species, such as Common and Red-breasted mergansers, Ring-billed Gulls, and maybe an occasional grebe during migration. For restored sites, we hear the "pump-er-lunk" of the American Bittern, which uses the vegetation to creep above the water; hundreds of both diving and dabbling ducks spread like a blanket in the open spaces; and even pairs of Trumpeter Swans, a species once extirpated from the state, have chosen several of these sites to begin nesting. These restorations have definitely made many of these lakes come to life.

A Least Bittern moving through cattails at Jemmerson Slough in the summer of 2017. This is a shallow lake restored about nine years ago in Dickinson County, Iowa. This species is a common migrant and breeder in Iowa and relies on the robust vegetation of wetlands for foraging and nesting.

About the author: Rachel Vanausdall is a M.S. student in Natural Resource Ecology and Management studying under Dr. Stephen J. Dinsmore. She received her B.S. in Wildlife Science from Purdue University. She is interested in avian ecology and the influence of restorations and other habitat management efforts for birds.

Common Snapping Turtle

Photo:Thomas Hansen

THE SECRET LIFE OF IOWA WALLEYE

Assessing factors that influence post-stocking survival of advanced fingerling Walleye

By Emily Ball

It is two in the morning and there is a thick fog coming off the cooling waters of the Okoboji's. The lights on our electrofishing boat, Bertha, illuminate the water and allow the technicians to see fish lurking below the surface. Two technicians are standing on the bow of the boat, nets in hand,anxiously looking for a "monster fish"such as a 50-inchMuskellungeor a 30-inch Walleye. The stars and moonshine brightly in the sky;there are usually no noises other than our boat's generator and the occasional hooting and hollering from the technicians after netting a feisty fish. For my technicians and I, this is a typical night of fall fieldwork. For three months, my crew and I become nocturnal and spend our evenings sampling young-of-year Walleye and predatory fishes in both East and West Okoboji.

Stocking Walleye is a common fisheries management practice across the state of Iowa. At the Iowa Great Lakes, the public is welcome to stop by the Spirit Lake Hatchery and witness the entire rearing process,from the collection of adult eggs and milt to observing Walleye grow from fry (individuals the size of an eyelash)to fingerlings (individuals reaching up to 12 inches in length). A great deal of time and care goes into rearing fingerling Walleye in the hatchery. However, little is known about their fate after being stocked,which is directly related to the number of harvest able, adult Walleye in lakes and reservoirs across the state.

For the past three years I, along with numerous technicians,have been evaluating post-stocking survival of Walleye in East and West Okoboji. My field season begins in early September and lasts until the end of November, with another sampling event in April. Every night we sample the littoral zone, or near shore waters,with an electrofishing boat. The main objective of my research is to determine factors that may influence the success of a Walleye stocking program. To address this question, I have been assessing how hauling distance, post-stocking predation, Walleye diets, and overwinter survival influence how many stocked Walleye survive each year.

The Iowa Department of Natural Resources (DNR) haulWalleyein large trucks from the hatchery to lakes throughout Iowa, sometimes over long distances. The hauling process can be stressful for fish due to increased handling during various stages associated with getting Walleye out of hatchery tanks or ponds, onto trucks, and into lakes and reservoirs throughout Iowa. To assess how the hauling process might affect survival, we have been collecting blood samples and monitoring mortality rates of fingerling Walleye transported anywhere from3 to 300miles before being stocked in Rathbun, Big and Brushy Creek, Blackhawk Lake, and the Okobojis. By collecting blood samples, we can quantify changes in glucose and cortisol levels,which are indicators of stress. The goal of this portion of my research is to

determine if hauling distance is related to Walleye stress levels and mortality rates. Results from this aspect of the research will provide insight on the effects of fish hauling practices.

Another factor that has the potential to negatively influence survival of stocked Walleye is predation. In the hatchery, fingerling Walleye are raised in an environment void of predatory fishes. Thus, their lack of experience with predators could make them an easy meal. To assess the prevalence of post-stocking predation, our team has collected potential predators in the Okoboji's, such as Muskellunge, Northern pike, Largemouth bass, small mouth bass, and adult Walleye each fall. We use gastric lavage to recover recently consumed prey by forcing water into the predator's stomachs before they are returned to the lake. The goal of this portion of the research is to determine which species of potential predators, if any,consume fingerling Walleye.

Dietary habits of fingerling Walleye may also influence their survival. Young fish that quickly shift from easily captured,less nutritious prey(i.e. zooplankton)to small fish are able to grow faster, decreasing their vulnerability to predators and leading to increases in condition,which is associated with better overwinter survival. At the hatchery, fingering Walleye are fed a pellet based diet. However, after being stocked, individuals need to adapt to a diet consisting of benthic invertebrates and fishes. To assess changes in diet habits, we have been collecting fingerling Walleye in the fall and spring and performing gastric lavage to see what food items they have recently consumed without harming the fish. Additionally, every fingerling Walleye captured is measured and weighed in order to assess their growth. The objective of this research is to assess what prey items fingerling Walleye are consuming,as well as how long after stocking it takes them to start consuming fish.

Lastly, we have been implanting passive integrated transponder (PIT) tags into a subset of the fingerling Walleye released into the Okoboji's each year. PIT tags are similar to the microchips used to identify pets. These tags, which are white and the size of a grain of rice, are inserted into the dorsal or back muscle, and each tag has a unique identification number. PIT tags are the ideal way to mark fingerling Walleye because they can be used to monitor individuals throughout their lifespan. By releasing and recapturing the PIT tagged fingerling Walleye, we can determine how well Walleye are growing and surviving.

This research is being conducted in collaboration with the Iowa Department of Natural Resources, and the results will provide insight into the fate of fingerling Walleye after they are stocked. Furthermore, the information collected will help guide state agencies in improving Walleye stocking practices, leading to an increase in the number of adult Walleye in Iowa systems better fishing opportunities for Iowa anglers.

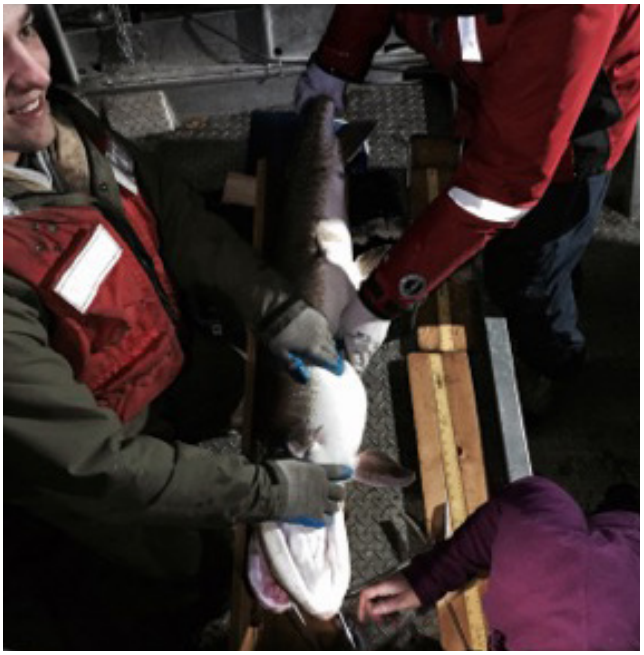


Photo: Jacqueline Boorom

FIELDWORK FAIL

By Aaron Matthews

Working on the water can be enjoyable, but also dangerous. Paying attention to possible hazards is important; every tree, bridge, stump, rock and could be dangerous, but it's also important to have awareness within the boat. During my first graduate field experience, Chris, a now former graduate student, was showing me the methods of sampling for Asian Carp in southeast Iowa rivers. Things were going smoothly until the boat shut off without warning. After a few failed attempts to revive the motor, the current was clearly in control. Chris' usual calm demeanor was betrayed by urgency when he shouted, "Throw the anchor!" I did just that. I grabbed the anchor and gave it an Olympic style launch upstream. The anchor gracefully arced through the air with the rope flailing behind it. All of the rope. After a brief, shared moment of silence, we gathered our wits to address the free-falling boat at the mercy of the current. Chris frantically troubleshot the engine while I desperately reached out towards a fallen tree still rooted to the bank. I grasped some branches as the current pushed against the boat. My hold slipped. Before the branches snapped, I grabbed a sturdier part of the tree and held tight. Chris got the boat up and running again, and thankfully we got back to the boat ramp without another incident. A potentially dangerous situation was averted; just with one less anchor aboard.

WHERE ARE THEY NOW?

Jenny Swanson

completed her MS degree in Wildlife Ecology in 2017. She studied amphibians with Dr. Clay Pierce in north central Iowa. Her research focused on looking at the effects of habitat use on pesticide exposure and accumulation in Northern Leopard Frogs. After graduation Jenny started working as a Habitat Management Specialist for Pheasants Forever and the Iowa Department of Natural Resources at Brushy Creek State Recreation Area. She primarily assists in management of tallgrass prairies and the production of native prairie seed for restoration projects across the state of Iowa.

Thomas Devine

completed his B.S. in Animal Ecology (focus in Fisheries) at ISU in May 2017. He is currently attending Southeast Missouri State University for his M.S. studying Paddlefish on the Mississippi River. His research involves tagging Paddlefish with jaw bands on the river in order to evaluate their population and estimate the population of paddlefish within Missouri. He has also implanted a variety of species with acoustic tags in Mississippi River Pool 20 to study micro-habitat use and migratory patterns. Fish that leave the pool are located by a widespread acoustic receiver array that spans the whole Mississippi river from Minnesota to the delta. When not working on his M.S. research,Thomas assists with other projects including Small Mouth Bass population dynamics, caving for the federally endangered Grotto Sculpin, Pallid Sturgeon sampling, and more.

Chris Sullivan

completed his M.S. in fisheries biology at ISU in December 2016. Advised by Drs. Michael Weber and Clay Pierce, his research was focused on evaluating spatio-temporal trends in population characteristics and dynamics of Asian Carp at both local and regional scales. After graduating, he accepted a position as a research scientist with the University of Wisconsin – Stevens Point. Together with collaborators from the University of Wisconsin – Madison and the Wisconsin DNR, he is evaluating biological factors influencing Walleye recruitment in northern Wisconsin lakes. Additionally, he is aiding with projects evaluating Walleye, Lake Sturgeon, Lake Whitefish, and Muskellunge movement patterns throughout Green Bay, WI.

D. Allen Pattillo

was the fisheries and aquaculture extension specialist from 2011 to 2017 with a joint appointment between NREM and NCRAC. His role included pond and aquatic plant management, as well as aquaculture, with a major focus on aquaponics. Allen left ISU to work in Jamaica with INMED Caribbean, an international non-profit, using aquaponics as a means of helping farmers improve their livelihoods in impoverished regions. He is the program manager for the Increasing Access to Climate-Smart Agriculture project funded by the International, Caribbean, and Jamaican Development Banks. This program seeks to train farmers in technical and business aspects of aquaponics, as well as access to financing and markets. Through the course of this 3-year project he hopes to train 300 farmers in aquaponics, and jump-start the aquaponics industry in Jamaica, with plans to expand into other Caribbean islands, Peru, and South Africa.

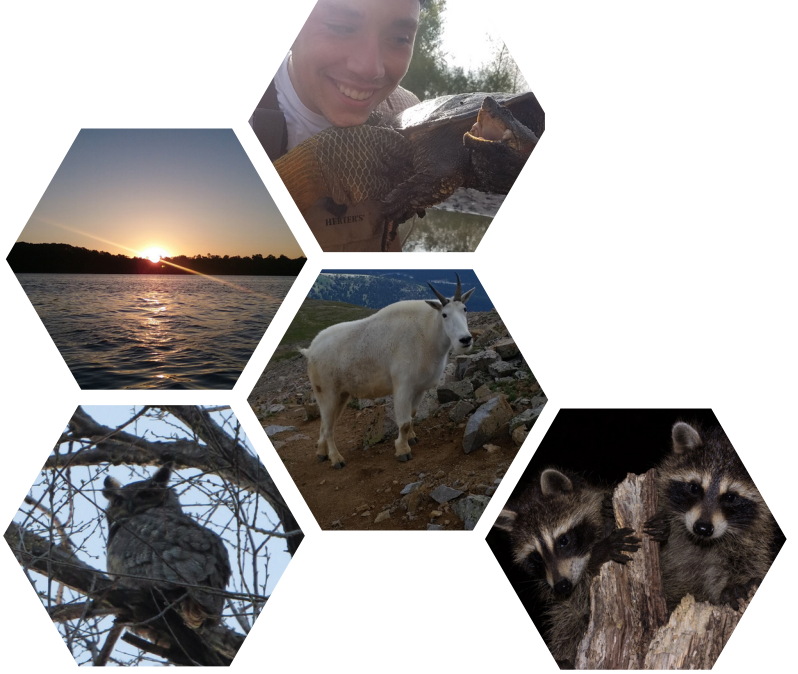


PHOTO CONTEST

"Look deep into nature, and then you will understand everything better." ~Albert Einstein

SECOND PLACE

plants & animals

Photo: Emily Ball

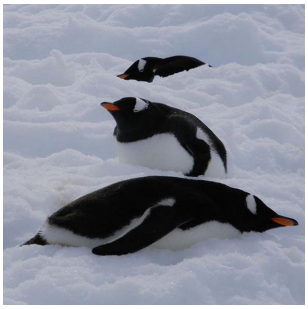


Photo: Peter Wolter

Photo: Peter Wolter

Photo: Rachel Vanausdall

Photo: Simone Lord

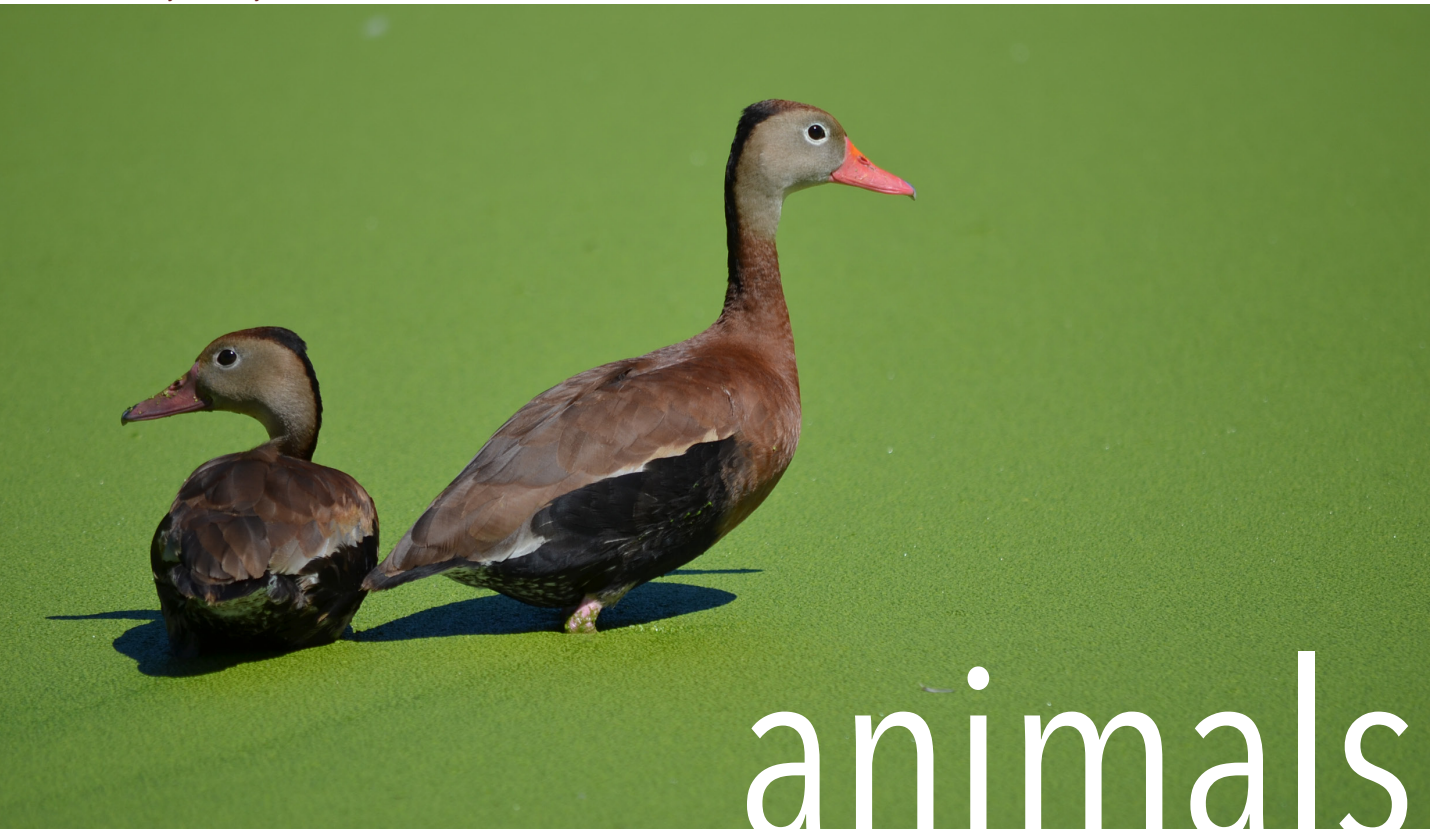
Photo: Cassandra Nunez

Photo: Benjamin Sipma

Photo: Abby Reed

Photo: Abby Reed

Photo: Courtney Zambory



animals

FIRST PLACE PICKS

Photo: Patrick McGovern

Photo: Selina Tefft

plants

FIRST PLACE PICKS

Photo: Cassandra Nunez

Photo: Simone Lord

Photo: Patrick McGovern

Photo:Emily Ball

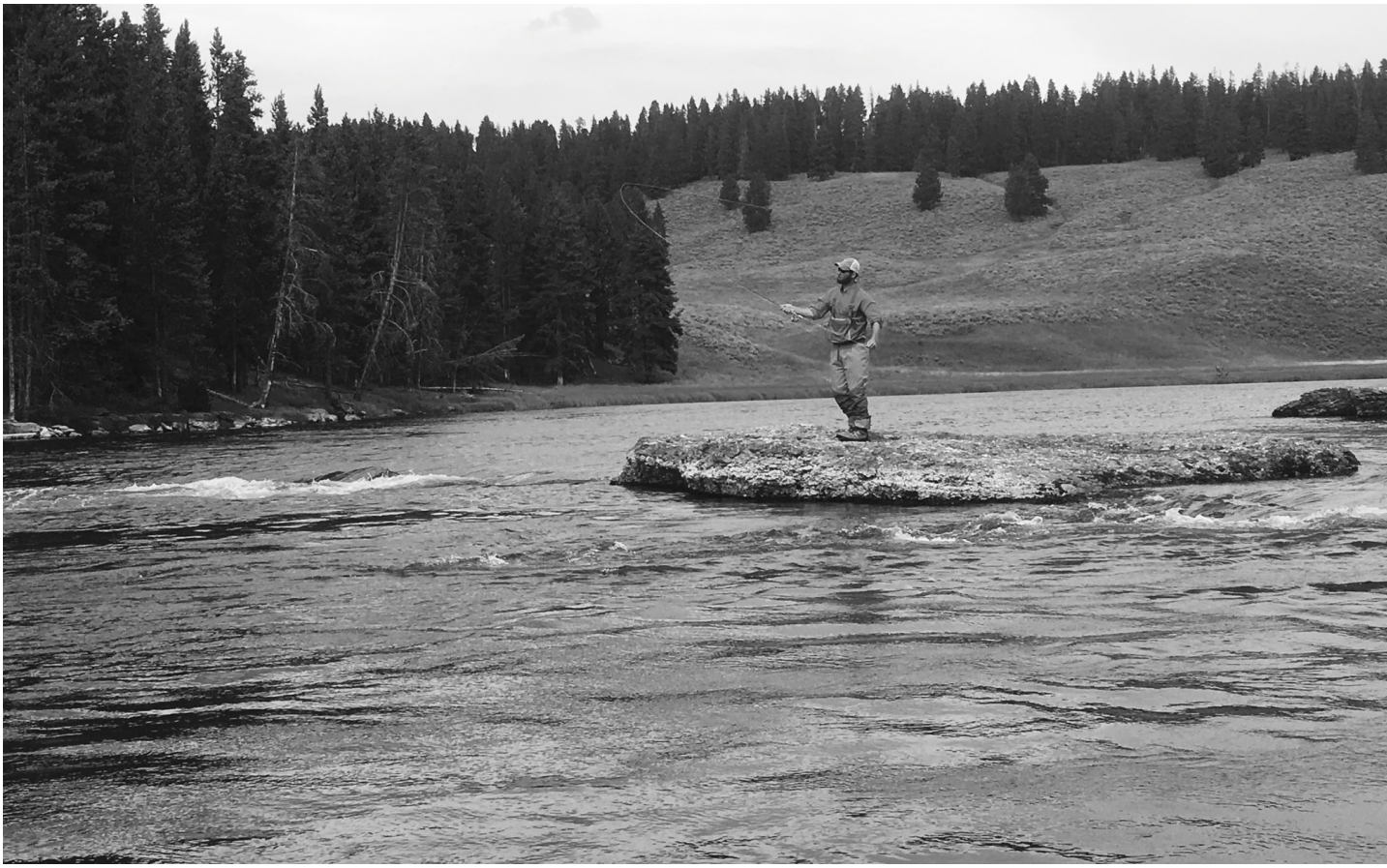


Photo: Mike Rentz

people

FIRST PLACE PICKS

Photo: Brandon Sieck

Photo: Kristopher Mueller

landscape

FIRST PLACE PICKS

Photo: Brandon Sieck

Photo: Rachel Geekie

SECOND PLACE

landscape & people

Photo: Estefany Argueta

Photo: Stephen Grausgruber

Photo: Mya Gibbons

Photo: Caitlyn Clemmer

Photo: Stephen Grausgruber

Photo: Estefany Argueta

editors

Maggie Jones is in her second year of grad school studying the impacts of immunocontraception management on feral horse behavior and stress physiology. She loves hiking and writing and is an avid, if untalented, dancer.

Emily Ball, Ph.D. Candidate in Fisheries Biology, housed in the NREM Department. Emily's research focuses on assessing abiotic and biotic factors that influence post-stocking survival of Walleye. In her free time, Emily enjoys fishing, swimming, and hiking.

Robert Weber, M.S. Student in Fisheries Biology, housed in the NREM Department. Robert's research focuses on habitat use and movement of Muskellunge and Walleye in central Iowa reservoirs, as well as relating their behavior and other environmental factors to reservoir escapement.

Bree Marmur, Ph.D. Student in Environmental Science Bree studies urban storm water management and how to integrate the social and biophysical aspects of residential stormwater best management practices. Bree loves reading, going on long hikes with her dog, and being creative.

Design by Kaari Devens