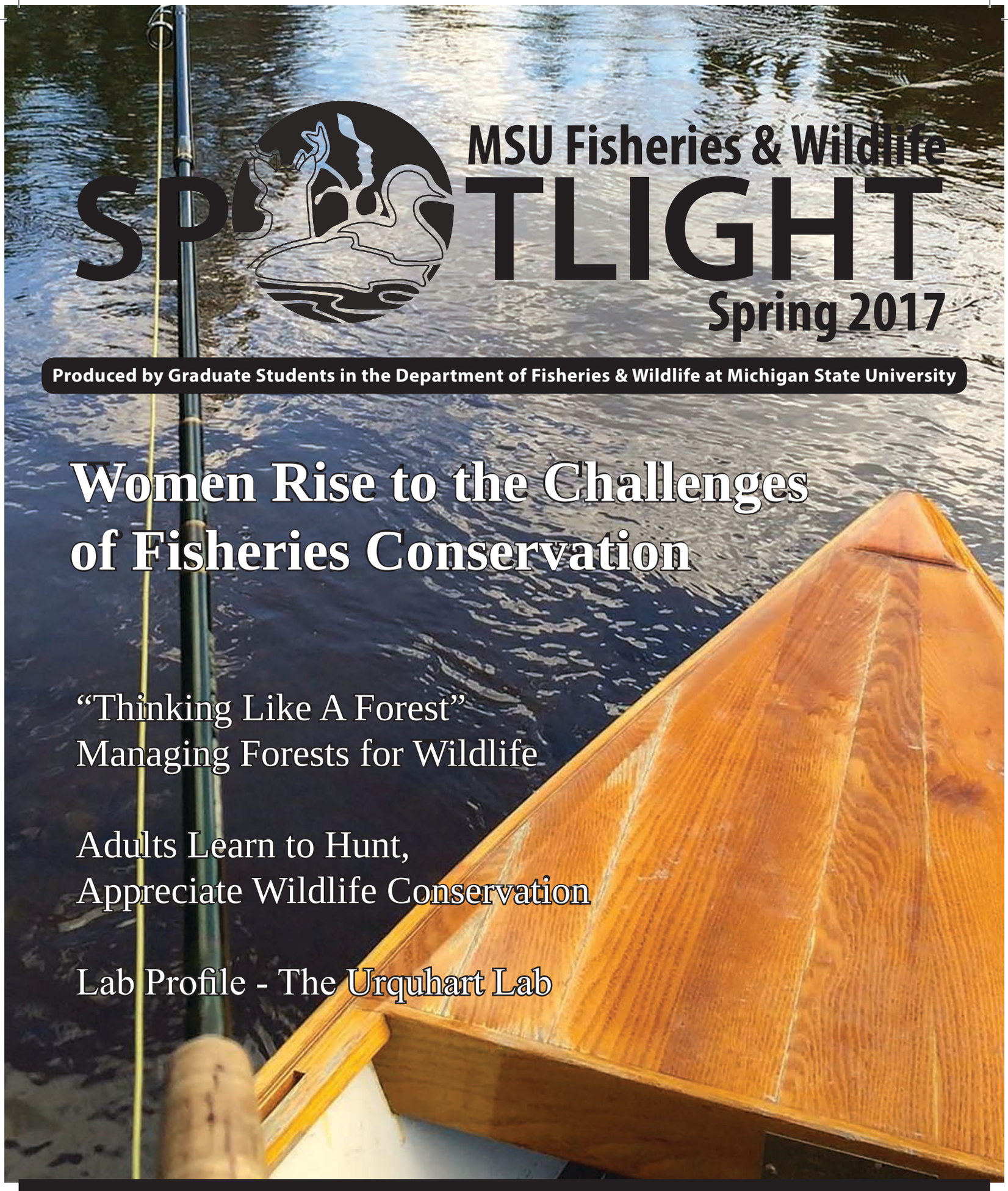


MSU Fisheries & Wildlife SPOTLIGHT

Spring 2017

Produced by Graduate Students in the Department of Fisheries & Wildlife at Michigan State University

Women Rise to the Challenges of Fisheries Conservation

"Thinking Like A Forest"
Managing Forests for Wildlife

Adults Learn to Hunt,
Appreciate Wildlife Conservation

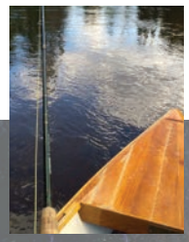
Lab Profile - The Urquhart Lab

ALSO INSIDE: Alumni Corner, Pattulo Fellowship, Gourmet Gone Wild, Fenske Fellowship, Moose Mystery & MORE!

MSU Fisheries & Wildlife
SPOTLIGHT

Spring 2017
Issue 13

Cover Photo: The infamous Au Sable boat; Molly Good



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Interested in being a part of Spotlight?
Contact David Dressel (dressel5@msu.edu)

FW SPOTLIGHT is a magazine written, edited, and designed by graduate students in the Department of Fisheries & Wildlife at Michigan State University.

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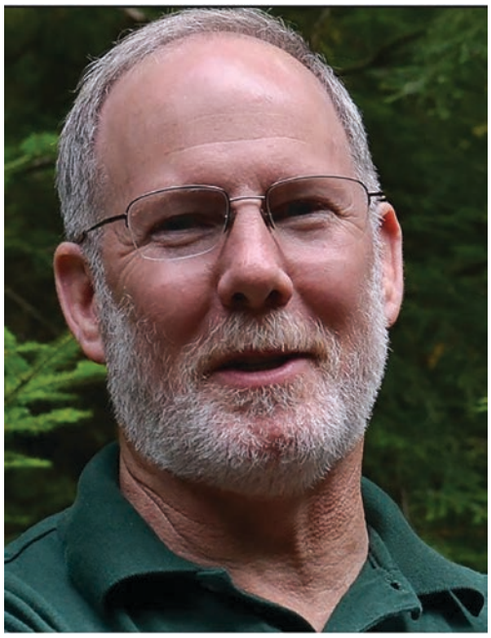
Letter from Dr. Scott Winterstein

It is my great pleasure to introduce the 2017 edition of the Department of Fisheries and Wildlife Graduate Students' Spotlight magazine. This is the thirteenth issue and like each of the previous issues, I strongly recommend that you read it cover to cover. The magazine is a testament to the quality and dedication of the FW graduate students. Everyone involved in putting it together should be deservedly proud. Particular recognition goes out to David Dressel (Coordinator), Kathryn Frens (Copy Editor), and the multi-member Editing and Design Subcommittees.



Fisheries and Wildlife is a multidisciplinary department, which is clearly apparent in this year's Spotlight. The passion that the FW graduate students bring to their research and outreach is on display on every page. Kathryn Frens, the Pattullo Fellowship awardee, recounts the simple wonders of growing up near a "one-frog" pond. Janet Hsaio and Tomena Scholze profile the Learn to Hunt Deer program, along with a "shout out" to Gourmet Gone Wild. In "Thinking Like a Forest", Andrew Crosby examines the linkages between forest management and biodiversity. Never heard of the MSU Fly Gals? Molly J. Good and Jordan Pusateri Burroughs recount the history and impact of this unique program aimed at increasing participation among women in fly fishing and outdoor recreation. Kyle Redilla ponders what cutting-edge moose research might look like in 2048.

You can find the FW Photo Contest Winners on the back two pages. In this issue, you will also find a profile of the department's fellowship awardees, including a report by Andrew Carlson (and his mentors Bill Taylor and Troy Zorn) on his 2015 – 2016 Fenske Fellowship research project focused on the human dimensions of fisheries. Congratulations to all the award and fellowship recipients.

In the alumni corner, you will find interviews with Robyn Bailey (M.S. 2010) and Daniel Walsh (Ph.D. 2007). Robyn is the Project Leader for NestWatch at the Cornell Lab of Ornithology in Ithaca, NY. Dan, following some time out west, is now a research scientist with the USGS National Wildlife Health Center in Madison, WI. This issue's Lab Profile looks at Dr. Jerry Urquhart's tropical ecology projects he and his students are conducting.

I hope you enjoy this issue of Spotlight. After you have read it, pass it on to a friend or a stranger – don't worry, I can always get you another copy. As the chair of the department, one of my favorite pastimes is bragging about the Spotlight magazine.

-Scott Winterstein

Department of Fisheries & Wildlife
Michigan State University

Alumni Corner

Interview with Alumna

Robyn Bailey

M.S., 2010

Spotlight: *Tell me about what you did when you were at MSU.*

Robyn: As part of Dr. Rique Campa's lab, I tracked Eastern Massasauga Rattlesnakes in the field and quantified their daily survival and habitat use. My Master's thesis revealed that daily survival was quite high, and I was able to model where the Eastern Massasauga Rattlesnakes preferred to live with respect to different habitats available.

Spotlight: *Where are you now and what is your position?*

Robyn: I am now working as the Project Leader for NestWatch at the Cornell Lab of Ornithology in Ithaca, NY. NestWatch is a national citizen-science project that uses the power of volunteer birdwatchers to study nesting birds across the country (www.NestWatch.org).

Spotlight: *What motivated you to apply to your current position?*

Robyn: After graduating from MSU, I relocated to Ithaca to join my significant other (now husband) who had recently accepted a job. The Lab of Ornithology is a global leader in the study of birds, and I worked hard to get a foot in the door. Birds were my first love (before I learned how awesome rattlesnakes are), so it was fitting that I landed in a hub for birdwatching. Before long, a tailor-made position opened up, and I have been fortunate to be able to grow from there.

Spotlight: *What is a typical day for you?*

Robyn: My job is a mixture of extension and research, so I do a lot of writing. I love to write, especially in the context of informal science learning. Translating science into articles that laypeople, funders, and other professionals can relate to is creative work. I also like poring over the data and stewarding this massive data set that is unique in North America. Knowing that thousands of people who care about birds freely give their time to contribute to this project, in the name of helping birds, motivates me to put their data to good use. Occasionally, I get to do fun stuff like travel to bird festivals and conferences, work with youth, and get in the field a bit.

Spotlight: *Do you have any advice for FW students?*

Robyn: I would advise students to be open in terms of the career they pursue. Who knows what the next big thing will be? Maybe you'll develop an app that helps bring an end to wildlife crimes, or use social media to crowdfund land conservation! The landscape of "wildlife work" is constantly changing, and technology is making it possible to apply knowledge in new ways.

Spotlight: *What at MSU best prepared you for your position now?*

Robyn: The best way to learn something is to teach it. This will build your confidence and credibility, and you'll start to think of yourself as an authority. No matter what career you eventually have, chances are good that you'll need to interact with undergraduate and graduate students, junior staff members, or the public in some way. Knowing that you're uniquely qualified to teach people about something is helpful. Whether it's an official TA position, or a volunteer class for the public, this is probably the best way to learn not only the content, but also the art of teaching.

Spotlight: *Anything that you'd recommend as a MUST to students new to East Lansing?*

Robyn: When you need to just get away from it all, I recommend taking advantage of the campus' many natural areas and gardens. My favorites were the Children's Garden, the rose gardens, and the arboretum. Some of my best memories are from reading in a secluded garden spot, and discovering critters in the Children's Garden with a friend.

Alumni Corner

Interview with Alumnus

Daniel Walsh

Ph.D, 2007

Spotlight: *Tell me about what you did when you were at MSU.*

Daniel: I received a B.S. in Fisheries and Wildlife at MSU. I came back to MSU after completing a M.S. in Wildlife Biology at Colorado State, and I received a M.S. in Statistics and a PhD in Fisheries in Wildlife at MSU. My Ph.D. focused on developing population estimation techniques for elk in Northern Michigan, and assessing risk of bovine-TB to elk in that region.

Spotlight: *Where are you now and what is your position?*

Daniel: I am currently a research scientist with the USGS National Wildlife Health Center in Madison, WI.

Spotlight: *What motivated you to apply to your current position?*

Daniel: I like the fact that the USGS's mission focuses exclusively on science and its application. I also was intrigued by the ability to conduct wildlife health research nationally as well as globally.

Spotlight: *What is a typical day for you?*

Daniel: I work as a quantitative ecologist so I spend a good deal of my time behind a computer conducting analyses focused on spatio-temporal aspects of wildlife diseases and their spread. I also maintain multiple field projects and still manage to find time to get out into the field as part of those research endeavors. I think it is critical to have a balance between office and field-based work.

Spotlight: *Do you have any advice for FW students?*

Daniel: My advice for FW students is to become actively involved in the profession through activities including the FW club, TWS conclaves and meetings, volunteering on research projects, and getting to know professors. An often used cliché is, "it's not what you know, but who you know" and this is certainly true for the wildlife profession. Also, plan on getting an advanced degree. Although I was reluctant to attend graduate school at first, looking back now I see how truly valuable it was, and how critical an advanced degree is to obtain permanent positions in this field. Lastly, assess your own strengths and determine what niches you can fill in the field, particularly those that are not currently well represented in the profession. In my case, the lack of quantitatively-oriented professionals was the niche I sought to help fill.

Spotlight: *What at MSU best prepared you for your position now?*

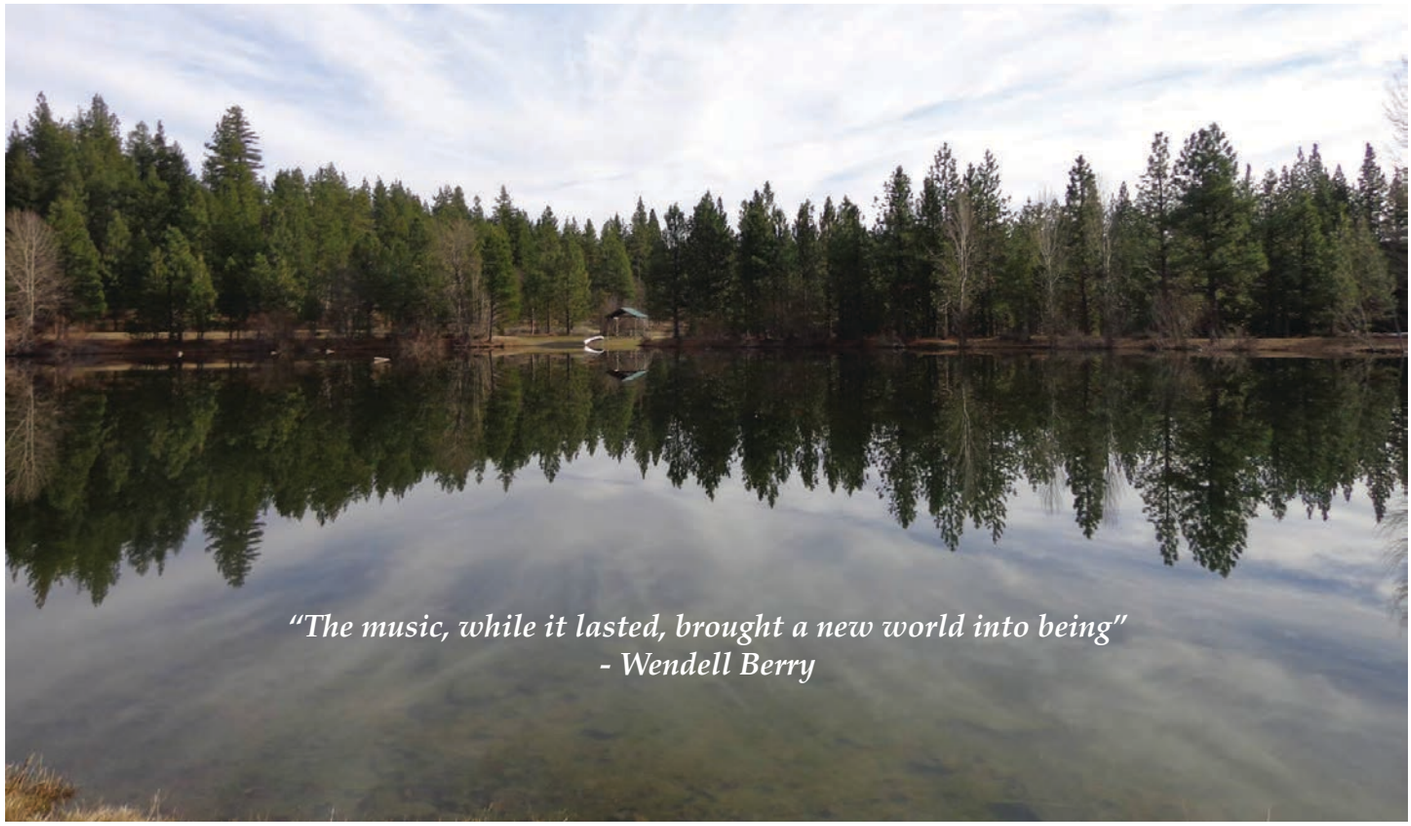
Daniel: I don't think there was any one thing that best prepared me for my current position. The academic training was definitely invaluable, and provided me the necessary skill sets. I also believe the professional relationships with my professors, MI DNR researchers, and peers have all proven to be important assets over the years.

Spotlight: *Anything that you'd recommend as a MUST to students new to East Lansing?*

Daniel: The Dairy Store ice cream should be an important staple of every student's diet.

Frog Songs

Kathryn Frens



Millpond. Photo credit: Kelton Cobb

Grandpa called it the "one-frog pond". We'd been there long after bedtime some April nights, when the tiny clearing swarmed with spring peepers, but he said that those nights were special frog parties, and there wasn't enough elbow room for two frogs to live in that pond every day. I believed him-- we never did see more than one during the day, usually a bullfrog who I was sure came back summer after summer. Sometimes there were salamanders too, eye-deep in the muck or underneath logs with the pillbugs. Grandpa never let me touch them, because they breathe through their skin. He always told me I should kiss the bullfrog, though, in case it was a prince in disguise. I never tried it. I told him it was a girl bullfrog anyway. The one-frog pond was out behind the bark burner, maybe two hundred yards into the trees, across the road from the millpond where we kept a canoe. Nearby, a tree had split down the middle, leaving a slanted fallen log and a sort of platform right next to the trunk, where I pretended to be Robin Hood watching over Sherwood Forest, or a dryad in Narnia, or sometimes a spy.

Not that much happened to spy on. There were geese in the millpond, and one summer there were carp that Grandpa released to eat the pondweeds, and then for awhile there was an osprey that ate all the carp, and Grandpa running out of the house waving a rake every time he saw it fly by. There were gray tree frogs, surprised to see me high in the branches. There were always dragonflies buzzing around like green airplanes, and sometimes turtles basking half-in, half-out of the water. A snapping turtle climbed into the canoe once and couldn't get back out. That was the summer after the first big flood, early in June when the forest floor squished like a sponge where I walked. Everybody said it was a once in a hundred years flood, and Grandpa didn't argue. The millpond overflowed, and for a month minnows could swim from the pond to the road and back. Two years later, we had another hundred-year flood, and the next summer the state forest land down the road caught fire. It wasn't a big fire, not like they have out west, but it made the air smell like smoke. It made Grandpa stand on the porch and watch the sky. That year, there was no one-frog pond and no bullfrog. No salamanders, either, even though the ground in the pond clearing was still a little bit damp, and the pillbugs were there same as ever.

That year, bored and finally old enough to use the internet on my own, I read about frogs. About glass frogs and how you could see their guts through their bellies, about neon poison dart frogs, about how the wood frogs I'd seen in the one-frog pond let their blood freeze in the winter and then just wait for spring to thaw them out. About threatened and endangered frogs and drained wetlands and drought. About frogs disappearing from the tops of mountains and from little pockets of water in cornfields and from other places where frogs were and then were not. I found an old field guide and went looking for frogs in the woods. Grandpa always made me take a whistle and be back before dark. I found all the pools and ponds that were left, caught frogs and moved them in. I brought fourteen leopard frogs to the millpond before I realized that they were probably small enough for the snapping turtle to eat. I thought about the girl in the fairy tale who has frogs fall from her mouth when she speaks, and I wondered if she ever carried a bucket of them to a far-off one-frog pond and hoped they would share the space, just for this summer. I climbed trees and asked the sky, very quietly, for rain. The fires kept burning, new patches catching when the old ones were stamped out. The pools in the woods kept being empty when I came back to check on them.

Winter that year came early and cold. I looked for wood frogs buried in frozen piles of leaves. I skated on the millpond and waited for snow. Grandpa came home from the library carrying books about landscaping with prairie plants. It finally snowed late in January, drifting high on tree trunks, blowing in whorls on the road. The sky reflected whiteness back at the ground. We bought sunflower seeds in twenty-pound bags to feed to the flocks of juncos in the yard.

The geese were back before the millpond thawed, same as always. It rained, then froze, then rained again, and I rode muddy trails on an old bike that Grandpa found in the barn. Crocuses poked their heads above the snow, and then the redbuds flowered. I heard the rasps of chorus frogs before the snow piles had melted, and soon after, I heard the spring peepers. I hadn't said anything about the one-frog pond, or even gone to look at it, but Grandpa was waiting with his boots and his flashlight when I tried to sneak out hours after dark on a clear night in April. Orion flamed above the millpond, and I knew the peepers sounded too far away. The clearing was empty. Grandpa cleared his throat and kicked over a log. I thought about the trickle of water, slowly seeping up from thawing dirt, about snowmelt and aquifers and about ephemeral. About the other dark pools back in the woods and my buckets of frogs, and about that girl again, that fairy-tale girl with the frog curse and the magic voice. *Bullfrog*, I said. Nothing answered.

Kathryn Frens
frenskat@msu.edu

Burn scars. Photo credit: Chris Hoving

"Thinking Like a Forest"

Managing Forests for Wildlife Habitat and Biodiversity

By Andrew Crosby

Imagine that, in the year you were born, a forest stand in Michigan underwent some major disturbance. Maybe a windstorm, a large fire, or a logging operation removed most or all of the mature trees, allowing new seedlings to grow in the suddenly-open canopy. If this were a northern hardwood forest, which occurs over large areas of the state of Michigan, it would likely be composed mainly of sugar maple with a mixture of other less-dominant tree species, including some conifers. Now realize that, by the time you turn 80, this forest would just be starting to mature, meaning that the first growth of seedlings is now tall and strong and large enough to be valuable as timber. It is not even middle-aged in human terms. By the end of the average human lifespan, a northern hardwood forest has a long way to go and a lot of changes to go through before it will have the majestic old trees and structural complexity that characterize what many of us call "old-growth" forest. The fact is that the life of a forest usually operates at a much longer time scale than the life of a human. How much longer? It depends on the forest, but 40 years is a minimum for fast-growing monocultures such as aspens or pine plantations. Many of the northern hardwood forests that were devastated during the initial cutover in Michigan are just now reaching the mature stage after a mere 100–150 years, and it will take between 250 and 600 years for them to be considered old-growth forests.

Wildlife species are intimately linked to the ecosystems they inhabit, and in Michigan this usually means forests. I have always associated wildlife management with forest management. This bias is probably due to my experience growing up in northeast Ohio, where I spent much of my time camping and hiking in the woods and began learning about wildlife. Even Aldo Leopold – the godfather of the wildlife management profession – began his career as a forester. Leopold recognized early in his career that wildlife management was closely intertwined with forest management and that healthy forests protected the entire biotic community. To protect wildlife properly, then, we must understand how forests grow and how they respond to distur-

Christopher Hoving, Michigan DNR

bances. The fact is that forests grow and change over a range of spatial and temporal scales that go well beyond those encompassed by most research projects and management prescriptions. Therefore, understanding how forest management affects wildlife habitat and biodiversity requires thinking at multiple scales of space and time and taking a larger and longer view than most of us are used to — or "thinking like a forest."

In my research, I examine how forest conditions affect bird community composition at different scales across space. As forests grow and change, and respond to disturbances ranging from small timber harvests to large intense fires, the habitat conditions for different wildlife species change as well. Birds are excellent indicators of environmental conditions, and different bird species respond to changes in their environment in different ways. Examining changes in bird communities across multiple spatial scales can tell us how forest management impacts ecosystems. By counting birds and measuring forest conditions at many locations, we can create what are known as "wildlife-habitat models." These models help predict which species will occur at a place under a certain set of habitat conditions (Figure 1). Ideally this leads to forest management strategies that best maintain a full diversity of bird species and forest conditions across the study area.

Wildlife-habitat models are very important for successful conservation planning because they help us predict how wildlife species will respond to future conditions. Disturbances and management activities tend to happen quickly relative to the process of recovery and the growth of the forest. Therefore, thinking about how forest management will affect wildlife requires thinking about how the forest will look in 5, 10, 30, 80, and 150 years from now. Forest management planning means esti-

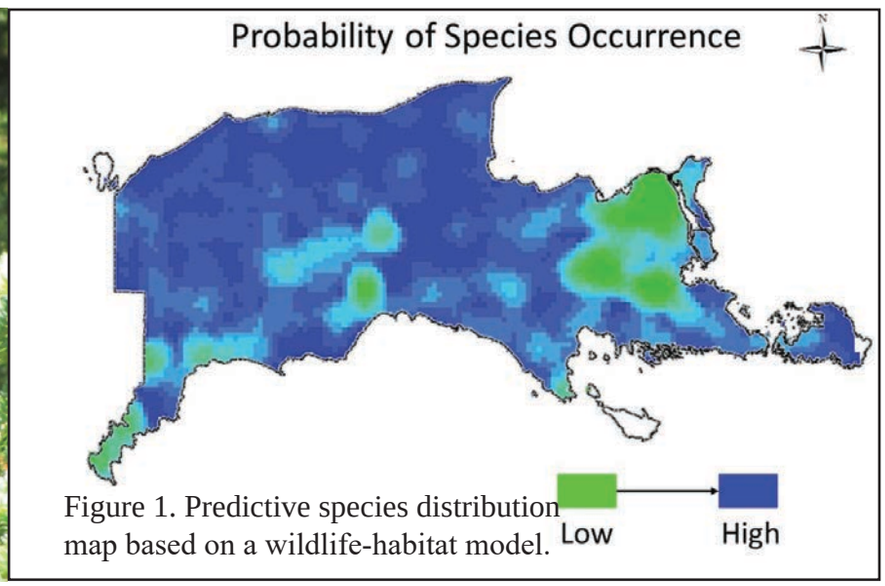


Figure 1. Predictive species distribution map based on a wildlife-habitat model.

mating the impact of management activities not only at the local scale, but also across the landscape. By applying these estimates to wildlife habitat models, researchers can forecast how different activities might impact wildlife populations based on different management scenarios, and can investigate the kinds of management activities to which species might be sensitive. Timescales range from decades to centuries and can cover hundreds to millions of hectares.

An added benefit of modeling how forest management impacts the breeding bird community is that the diversity of birds can act as a useful index of biodiversity. My research focuses on beta diversity, which is a measure of the differences in bird community composition among locations throughout an area. By looking at beta diversity, we can measure how bird diversity is distributed across space. And because birds are highly responsive to environmental conditions, this gives us a good idea of how variable the environment is across the study area and at different spatial scales. Therefore, modeling changes in the bird community in response to forest management can help us understand whether our management system is meeting the goal of maintaining biodiversity.

Trying to conserve wildlife over large forested ecosystems is not easy, and requires thinking about management in scales of space and time that are relevant to forests rather than humans. Do you remember the Ents in the Lord of the Rings trilogy, and how slowly they did everything? Now think of how frustrated the Hobbits were that the Ents would not respond more quickly to their needs and you will get an idea of the conflicts we face when trying to do research and make management decisions about our forests in "human time." It is difficult, but it must be done if we are going to practice effective long-term wildlife conservation. In taking the long-term view, we can adapt our thinking to the natural processes that maintain the forests we depend on for so much: lumber to build with, clean water to drink, fresh air to breathe, and the personal, cultural, and spiritual benefits we gain from them. So, the next time you look at a forest, try to see how it might have looked to your grandfather, or how it might look to your grandchildren, and in so doing, you might begin to understand how we can have healthy forests and abundant wildlife into the future.

Department of Fisheries & Wildlife Fellowship Awards

The Hal and Jean Glassen Conservation Medicine Fellowship recognizes a student committed to the study of fish and wildlife disease ecology and conservation medicine.

Genevieve Pang

Advisor: Dr. Jean Tsao

Graduate Program: Fisheries and Wildlife (Disease Ecology and Conservation Medicine specialization) & Ecology, Evolutionary Biology, and Behavior, Ph.D.

Graduate Research: My dissertation project strives to elucidate how abiotic and genetic factors mediate development and mortality rates of the blacklegged tick, the major vector species of Lyme disease in the Eastern United States. A better understanding of these relationships and how they affect pathogen transmission within tick and host populations may improve our ability to mitigate Lyme disease risk in response to climate change and the ongoing spread of blacklegged tick populations.

Motivation to Apply: I appreciate the Hal and Jean Glassen Foundation's commitment to wildlife management and disease ecology. My research is directly related to these topics, with the underlying goal of mitigating disease risk though informed management decisions.

Benefits of Fellowship: The Hal and Jean Glassen Conservation Medicine Fellowship will provide me with support for the completion of my dissertation research, as well as travel support to present my findings at future conferences.

Arthur Bienvenu Muneza

Advisor: Dr. Robert A. Montgomery

Graduate Program: Fisheries and Wildlife, Ph.D.

Graduate Research: Examining the effect of Giraffe Skin Disease (GSD) on giraffe-lion interactions.

Motivation to apply: My interest is to better understand a disease commonly referred to as Giraffe Skin Disease, which has been largely ignored by the scientific community yet giraffe populations have declined by 40% in the last two decades. The disease manifests as chronic and severe scabs, wrinkled skin, and encrustations that can afflict either the limbs or the upper regions of giraffe and has been suggested to result in lower leg lameness. While the disease was first described in western Uganda in the early 1990's, there's no information on the etiological agent or the physiological effects of the disease to this date.

Benefits of Fellowship: My Master's research revealed that the disease has been recorded in protected areas in 7 countries in sub-Saharan Africa and is prevalent in zoos across the world but more research effort is required to better understand GSD. The Hal and Jean Glassen Conservation Medicine Fellowship provides much needed financial support to collect additional data to assess the severity and seasonal variation of giraffe skin disease in different protected areas.

The Dr. Howard A. Tanner Fisheries Excellence Fellowship recognizes students who are committed to fisheries research related to the Great Lakes, connecting waterways, or tributary streams.

Alex Jensen

Advisor: Dr. Michael Jones

Graduate Program: Fisheries and Wildlife, M.S.

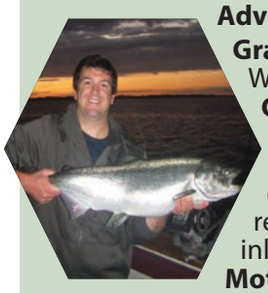
Graduate Research: I work in the Quantitative Fisheries Center to evaluate the probable response of Lake Michigan sea lamprey population to dam removal scenarios. Dam removals have the potential to help the invasive, parasitic sea lamprey by providing additional habitat to the stream dwelling larvae, resulting in increased control costs for the Great Lakes Fishery Commission. I have developed a model to predict the abundance of larval sea lamprey habitat in stream reaches upstream of existing dams. A modified sea lamprey operating model is then used to evaluate the impact of increased habitat availability on lake-wide abundances.

Motivation to Apply: I applied for the Dr. Howard A. Tanner Fisheries Excellence Fellowship because my research directly addresses Great Lakes fish populations and issues regarding river connectivity in the region.

Benefits of Fellowship: Receiving this fellowship supports my research and helps enable a greater degree of flexibility in communicating my findings to diverse groups of managers and stakeholders.

Robert C. Ball and Betty A. Ball Fisheries and Wildlife Fellowship provides graduate students with the opportunity to study fisheries, limnology, or water research.

Joe Nohner



Advisor: Dr. William Taylor

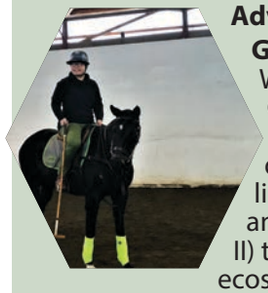
Graduate Program: Fisheries and Wildlife, Ph.D.

Graduate Research: Impacts and socioeconomic drivers of lakeshore development and in-lake habitat degradation on Largemouth Bass recruitment and productivity in inland Michigan lakes

Motivation to Apply: The Robert C. Ball and Betty A. Ball Fisheries and Wildlife Fellowship honors Dr. Ball's contributions to our department and enables students to pursue their passion in fisheries, limnology, and water quality. As I approach the end of my career at Michigan State, I needed additional financial support to complete my dissertation research. This fellowship provided me with much-needed funds to do just that.

Benefits of the Fellowship: In addition to the financial benefits of the fellowship, it is an honor to be recognized as someone striving toward the high bar that Dr. Ball set in limnology. My goal of improving inland lake fish habitat combines fisheries and limnology, so this fellowship also provides me professional recognition in these disciplines.

Janet Hsiao



Advisor: Dr. Dana Infante

Graduate Program: Fisheries and Wildlife, M.S.

Graduate Research: My thesis aims to contribute to the understanding of I) the hydrologic linkages between the landscape and nearshore coastal habitats and II) the spatial distribution of coastal ecosystem services to inform conservation strategies.

Motivation to Apply: The mission of the Ball fellowship aligns with my research interests and personal goals. In addition to determining the spatial relationship between landscape characteristics and aquatic habitat conditions, I aspire to identify avenues that will allow my research to ultimately inform coastal management and conservation actions.

Benefits of the Fellowship: The Ball Fellowship enabled my participation in the Great Lakes Leadership Academy, a nine month professional development opportunity for natural resources professionals. I am sincerely grateful for this experience that exposed me to facilitation and organizational skills that will help me become a more effective communicator in working with multiple stakeholders.

The Joseph Laurence Maison Award recognizes students who are committed to pursuing a career in wildlife conservation.

Randy Thomas Knapik

Advisors: Dr. Scott R. Winterstein and Dr. David R. Luukkonen

Graduate Program: Fisheries and Wildlife, Ph.D.

Graduate Research: My Ph.D research aims to derive Michigan-specific demographic and movement parameters for mute swans (Cygnus olor) that will be used to determine management strategies needed to reach short- and long-term population goals set forth by the MDNR.

Motivation to Apply: Joseph Laurence Maison was a passionate individual who relished the many treasures found within Michigan's fields, forests, and lakes. He also appreciated the intricate connections between people, habitat, and wildlife. His interests and passions resonated with me as I've also spent many years searching Michigan's woodlots for wild turkey, fields for white-tailed deer, and hard and soft water for panfish. Furthermore, I believed that he would have appreciated this research which takes an active role in managing an invasive wildlife species for the benefit of Michiganders as well as their native flora and fauna.

Benefits of the Fellowship: The JLM Fellowship allowed us to increase the number of mute swan nests that can be monitored each spring by affording us the ability to purchase technology from which we can infer hatching and failure dates without visiting nests daily.

Amber D. Goguen

Advisor: Dr. Shawn Riley

Graduate Program: Fisheries and Wildlife, Ph.D.

Graduate Research: My graduate research focuses on how the traditional use of natural resources, in particular wild-harvested meat, couples human and natural systems.

Motivation to Apply: As a Ph.D. student pursuing a career in wildlife conservation, I felt my dissertation research was directly in line with the spirit and intent of this fellowship honoring Joseph Laurence Maison, who was an outdoorsman and hunter who held a great appreciation for Michigan's natural resources. My dissertation research focuses on identifying the ecosystem services provided by the harvesting, sharing, and consumption of wild-harvested meat from recreational hunting in Michigan and Sweden.

Benefits of the Fellowship: It was truly an honor to have been selected for this fellowship. It will help support my dissertation research and outreach in Michigan and Sweden.

The Vera M. Wallach Fellowship is awarded to students who are studying wildlife management, ecology, or natural resource management or conducting Arctic and Antarctic research with emphasis on the protection and preservation of wildlife.

Tracy Melvin

Advisor: Gary Roloff

Graduate Program: Fisheries and Wildlife, Ph.D.; Ecology, Evolutionary Biology, and Behavior

Graduate Research: I am working on Alaska's Kenai Peninsula with the USFWS. Alaska is experiencing the effects of climate change at a rate twice that of the contiguous United States. We are conducting a climate adaptation study to combat deforestation caused by warmer, drier summers and subsequent unprecedented outbreaks of spruce bark beetles. My research mainly focuses on a common garden experiment using novel tree species assemblages and moose/hare exclosures. We consider seed provenance, genetics and ecological integrity with our project to develop best management practices in ecosystems that are rapidly changing. I will also look at novel grassland management and changes in biodiversity using Next Generation Sequencing.

Motivation to Apply: The Vera Wallach Scholarship is specific to wildlife conservation and Arctic/Boreal systems. I love what it represents – it is very much needed in times of Arctic ecosystem transformation.

Benefits of the Fellowship: I was able to begin developing my field research site and collaboration with the USFWS in Alaska solely because of the support of this fellowship.

The Science to Action Fellowship supports students in developing a product that puts science into action, directly applying scientific research to decision making about natural resources.

Andrew Carlson

Advisor: Dr. Bill Taylor

Program: Fisheries and Wildlife, Ph.D.; Ecology, Evolutionary Biology, and Behavior

Graduate Research: Effects of climate change on stream ecosystems and salmonid populations; implications for management of streams as coupled human and natural systems; resilience-based fisheries management.

Motivation to Apply & Fellowship Benefits: The USGS National Climate Change and Wildlife Science Center (NCCWSC) collaborates with natural and cultural resource managers to collect and use scientific information to build tools that help fish, wildlife, and ecosystems adapt to the impacts of climate change. My Ph.D. research is broadly focused on climate change, so a fellowship with NCCWSC is an ideal opportunity to translate my research into something actionable and relevant for fisheries managers and policy makers. The fellowship is also valuable for professional networking, offering multiple opportunities to cultivate relationships with federal employees and understand what a career with the USGS offers.

Department of Fisheries and Wildlife • Michigan State University •

GOURMET gone WILD

Sharing a meal of wild game before the hunt made Jordan Burroughs, the pioneer of the Learn To Hunt Program, recall the very beginning of the program. "We started this program [Gourmet Gone Wild] that was really focused on gaining support for hunting by bringing people together to share wild foods, and after each Gourmet Gone Wild event, lots of people would ask 'What's next? How can I harvest my own wild game?' Now, there's a next step – the LTH program." When asked what the future might have in store for the LTH program, Burroughs expressed hope that more partners would join. Ideally, the goal is to have a stand-alone curriculum and program evaluation package, eventually expanding to other species and locations.

Gourmet Gone Wild (GGW) is built upon partnerships between Michigan Department of Natural Resources, Michigan State University, Michigan United Conservation Clubs, the Boone and Crockett Foundation, and the Glassen Foundation. GGW is currently funded by a grant from the "Cabela's Outdoor Fund". GGW works by connecting with urban and suburban communities to enhance their support for hunting and angling, while building on their interests in gourmet and local foods.

"We're introducing a whole new generation to natural resources and conservation through the cooking and tasting of wild game and fish."

Jordan Burroughs
Wildlife Outreach Specialist
Michigan State University

GGW hosts events that introduce the concept of conservation, hunting, and angling to a new generation of conservationists, by bringing the message to the table - literally. During each event, professionally prepared wild fish and game harvested in Michigan is served with local beer and wine. At the events, attendees learn about the benefits of eating local and the important role that hunters and anglers play in conserving natural resources.

The goals of the program are:

Awareness

Attract a new generation of lifelong conservationists by articulating the vital role that hunting and angling play for our natural resources, namely through wild meat sources.

Image

Increase the number of people who support hunting and fishing, while improving the public perception and image of hunters and anglers.

Opportunity

Incite the curiosity and desire to harvest and prepare wild fish and game at home.

Action

Instill passion to preserve and protect natural resources, an outdoor heritage, and the unique character of our region.

Please visit http://www.gourmetgonewild.org/ for upcoming events and wild game recipes.

Program introduction by hunter safety instructor

Ethics and regulations talk with conservation officer

Field dress demonstration

Adults Learn to Hunt, Appreciate Wildlife Conservation

by Janet Hsiao and Tomena Scholze

In Michigan, deer hunting is a long-standing tradition. However, hunting license sales have been on the decline, with about 372,000 fewer hunters purchasing a license in 2015 than in 2000.[1] In the past, many new hunters were recruited to the sport by family members, but today fewer hunters are being recruited due to urbanization, inability to find a mentor, other time commitments, shifting demographics, and/or a negative perception of hunting and firearms. Additionally, hunting recruitment programs have typically been designed for youth. Adults interested in hunting as a way to connect with nature and harvest sustainable wild protein do not have clear avenues to do so. In hopes of introducing more adults to hunting and providing a hands-on learning experience, the Learn to Hunt Deer Program (LTH) launched its pilot curriculum in Fall 2015. Through LTH, participants learned the skills necessary to hunt deer in Michigan, earned their hunter and bowhunter safety certifications, and participated in a mentored hunt.

LTH Deer 2015

The first cohort of LTH participants was comprised of 10 people who signed up with various motives. "I decided to participate so I could learn to provide my own source of meat that would be more sustainable and ethical compared to factory-farmed meat. I also felt hunting was a way for me to have a greater connection to and understanding of where my food comes from," says Sam Loscalzo, a M.S. student in the Department of Community Sustainability. During the weekend-long program, students gathered and were exposed to multiple aspects of the sport. Hunter safety instructors discussed the fundamentals of deer hunting including scouting, shot placement, and tracking, as well as hunting ethics and how hunting contributes to the economy and conservation funding. The class also covered logistical aspects of hunting deer in Michigan, including purchasing a hunting license, the equipment needed to hunt deer, and how to find and access public lands using the Mi-HUNT website. Two Michigan Department of Natural Resources conservation officers met with the class to discuss local hunting rules and regulations.

In addition to the classroom setting, LTH participants had

Loading crossbow

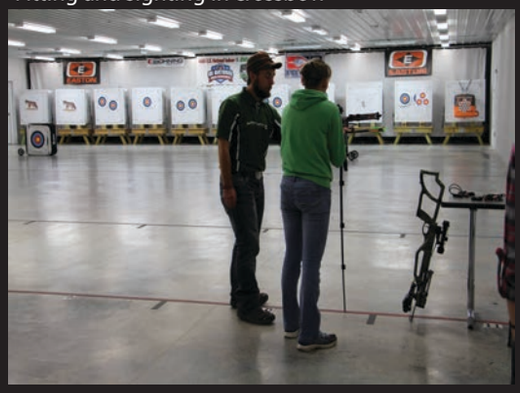
Target shooting

Arrow retrieval and marksmanship assessment

Butchering practice

Processing different cuts of venison

Fitting and sighting in crossbow



multiple hands-on learning opportunities. Under the watchful eyes of the hunter safety instructors, participants got range time at the Demmer Center and Rose Lake Shooting Range and practiced safe firearm and crossbow handling. Everyone earned their hunter and bowhunter safety certifications. This was an exciting time for participants, many of whom had never shot a bow before. At Michigan State University's Kellogg Biological Station, LTH participants met with the owner of a local butcher shop, who demonstrated field dressing and processing techniques on a harvested doe. Program participants enthusiastically helped butcher the deer and learned about the different cuts of meat. Over a lunch of wild game dishes prepared by program instructors and mentors, LTH participants met the mentors who would be joining them on the guided hunt that afternoon. After a demonstration of deer scouting and tracking in the field, program participants and their mentors donned camo and headed out to their hunting blinds with their crossbows. Though no one succeeded in harvesting a deer that afternoon, two program participants were able to harvest their first deer before the close of the hunting season.

Johanna Dart, LTH Program Coordinator, commented further on the success of the pilot class. "After participating in the program the majority of the individuals felt they knew either a 'moderate amount' or 'a great deal' about hunting ethics, how hunting contributes to conservation funding, deer population management, the state agency who manages hunting, and safely preparing game for consumption (as opposed to the majority knowing 'a little' or 'nothing at all' in the pre-program survey). Participants' skills also improved as a result of the program, with the majority indicating either being 'moderately confident' or 'extremely confident' operating a crossbow safely, hunting safely, selecting the proper equipment for deer hunting, finding a suitable place to hunt deer, using the Mi-HUNT website to find a hunting spot, and processing a deer for themselves." Sean Elliott, a Michigan resident and LTH participant, attests to the program success and exclaimed, "I have had the privilege of taking part in LTH Deer in October and thanks to the incredible program I now have the necessary knowledge and skills to wander into the woods without a guide and be successful on a hunt. The experience and knowledge gained from the time spent with my mentor is something I will never forget, and am incredibly fortunate to have received as an adult."

To learn more:
www.learntohuntmi.org

[1] "Historical Hunting License Data." Wildlife & Sport Fish Restoration Program. U.S. Fish and Wildlife Service, 22 September 2015. Web. 14 June 2016.

Hunter safety exam

Hunter safety certified participants

Participants and their mentors

Women Rise to the Challenges of Fisheries Conservation

Molly J. Good and Jordan Pusateri Burroughs

Four cars, packed to the brim with wide-eyed women peering out of dusty windows, tentatively pull up and park on a large field of grass flattened by the many cars that had come before them. Car doors swing open and the women – each one carrying a bottle of wine or a 6-pack of beer – appear as they saunter down the dirt road to Fuller's North Branch Outing Club, a historic fly fishing lodge on the North Branch of the Au Sable River. Inside the lodge, the women are greeted by their colleagues – other women from natural resource and conservation backgrounds – from Michigan State University (MSU), the Michigan Department of Natural Resources (MDNR), the Great Lakes Fishery Commission (GLFC), and elsewhere. Also there to greet the women are Tom Sadler, a renowned fly fishing instructor and guide from Virginia, Bill Taylor, University Distinguished Professor at Michigan State University, and Bill Demmer, successful businessman and avid hunter and angler. With broad smiles on their faces and overflowing glasses of wine in their hands, Sadler, Taylor, and Demmer raise their drinks and declare a toast, "To the new class of MSU Fly Gals; welcome to the Au Sable!"

Photo credit: Unknown

Emergence of the MSU Fly Gals

Bill Taylor and Bill Demmer, old friends and colleagues, first conceptualized the MSU Fly Gals program in 2006 in response to shared observations regarding a lack of diversity within the recreational angler community. Around that time, women comprised just 32.5% of all U.S. anglers and only 20.2% of all fly fishing participants, according to the 2009 Special Report on Fishing conducted jointly by the Recreational Boating and Fishing Foundation and the Outdoor Foundation. Thus, Taylor and Demmer, both fly fishers themselves, became passionate about finding ways to increase local participation among women in fly fishing and outdoor recreation.

In their quest to identify someone who shared their passion for mentoring others, particularly women, and who could also offer instruction and guidance, Taylor and Demmer needed look no further than Tom Sadler. Sadler, an advocate for natural resources and conservation and a fly fishing instructor and guide from Mossy Creek Fly Fishing in Harrisburg, Virginia, was a natural addition to the leadership team. Together, as Demmer said, "We wanted to introduce a sport and all of its related activities to a historically underrepresented group. We wanted to get the non-traditional fly fisher into the water." Above all, "We wanted to provide mentorship and instill a connection to the resource. Fly fishing is a tool that can help participants directly connect to the resource," said Sadler. Thus, over a steak dinner one evening in Washington, D.C., the MSU Fly Gals program was born.

Photo credit: Molly Good

In 2007, Taylor, Demmer, and Sadler brought the inaugural class of MSU Fly Gals to the majestic banks of the historic North Branch of the Au Sable River, a blue ribbon trout stream near Grayling, Michigan. There, for three full days in early summer, seven women (including J. Pusateri Burroughs!) got their first taste of the art and sport of fly fishing.

MSU Fly Gals Daily Log - Day One

The MSU Fly Gals, many of whom are new to fly fishing and new to each other, arrive at Demmer's Big Creek Lodge, where they unpack their belongings and set out their gear (e.g., waders, rods, and reels). Then, they gather at Fuller's North Branch Outing Club with Taylor, Demmer, and Sadler for a "Trout Opener," a celebratory reception that honors the opening of the trout fishing season. With tasty hors d'oeuvres and drinks in hand, the Fly Gals begin to form personal relationships and professional networks through their active engagement and conversation. Erin Jarvie ('2014, '15, '16), a Master's student in the Department of Fisheries and Wildlife at MSU, recalls that the opener allowed her to "meet other women who shared the same passion for natural resources and be a part of meaningful conversations about our field."

MSU Fly Gals Daily Log - Day Two

After a hearty breakfast at Big Creek Lodge, Sadler corrals the Fly Gals and begins his instruction on essential fly fishing gear, including the rod and reel. He also reviews basic knot tying and fly tying. Once the Fly Gals have properly set up their rods and reels, they migrate to a grassy field outside of the lodge for casting practice. Demmer notes, "This program means more than being out in streams; it builds community." Sadler echoes Demmer's sentiments and states, "The Fly Gals are told that this program is more than a few days of fishing and, instead, it is a chance to build connections through a common experience that binds us all going forward." At the end of the day, Jordan Burroughs ('07, '10, '16), an Academic Specialist in Wildlife Outreach and Education in the Department of Fisheries and Wildlife at MSU, recalls, "Evenings around the fire provided additional opportunities to interact with and mentor women about different career paths. It is wonderful to be around individuals, especially women, with the same drive for protecting our natural resources."

MSU Fly Gals Daily Log - Day Three

The MSU Fly Gals spend their third day on the Au Sable River with rod and reel in hand and waders pulled up to their chests. Sadler wades through the water and offers instruction as the women practice their new skills. By the end of this program, Sadler says, "The MSU Fly Gals have waded a mile (or more) in the traditional angler's boots. These women already know that water, fish, and habitat are important, and now that they have had an opportunity to learn and apply a recreational skill to the aquatic system, they can view those skills in a new light." In the end, the Fly Gals "can better relate to decision-makers and the public through their own personal experiences," says Sadler.

Photo credit: Kelsey Hartikainen

Reelin' Through the Years

In May 2016, Taylor, Demmer, and Sadler brought the latest class of MSU Fly Gals to the North Branch of the Au Sable River for the 10th Anniversary Celebration of the program and the people who have helped make this program a reality. Though there are dozens of reasons to celebrate the success of the MSU Fly Gals program, Taylor is most proud of the fact that all of the program participants have made efforts to "become involved and connected, and to learn from one another." Just five years ago, in 2011, 28 women had participated in the MSU Fly Gals program. In 2016, more than double that – 68 women – have participated in the program, and each one of them has subsequently continued or secured employment in the natural resources and conservation fields. Who better than these women will "have empathy and understanding for the state's coldwater fisheries and be advocates for fisheries conservation?" asks Demmer. No one! In addition to providing opportunities for more women to develop into skilled and educated fly fishers, Taylor believes this program has continued to "build skillsets, knowledge of the river, and of one's self." Further, he states, "The MSU Fly Gals program has helped assemble a team of leaders that ultimately comprise a network that will remain throughout the future. I want the best individuals – these women – to be our future leaders in fisheries conservation."

Through the program, the MSU Fly Gals alumnae have gained an appreciation for fly fishing and the outdoors "in a way that being an observer of it never could," says Betsy Riley ('15, '16), a Ph.D. student in the Department of Fisheries and Wildlife at MSU. For example, Hanna Kruckman ('11, '12), a Fish and Wildlife Biologist with the United States Fish and Wildlife Service, "learned a new life-long hobby." Amber Goguen ('13, '14), a Ph.D. student in the Department of Fisheries and Wildlife at MSU, states, "I learned to fly fish, which is a new skill for me, and I had a wonderful time seeing rural Michigan, hearing about the history of the places we stayed and the rivers we fished, and engaging with the other women who participated in the program." Kerry Waco Weaver ('07, '08, '09), an Environmental Biologist

with the United States Environmental Protection Agency, reiterates that the MSU Fly Gals program "instills the idea that practice makes perfect. We need to keep honing our skills in order to retain and learn more about the skills, and be better able to lead people in those skills – whether it be in fly fishing, providing technical support on a contract, conducting stream assessments, or managing people."

Lessons learned about building and maintaining relationships, mentorship, and leadership are also evident in some of the testimonials the MSU Fly Gals alumnae have shared about their involvement in the program. The MSU Fly Gals program "has helped me realize the importance of this kind of network – one that's not built just from relationships established in the work place, but one that is also supported by personal interactions," says Dana Infante ('07, '10, '13), an Associate Professor in the Department of Fisheries and Wildlife at MSU. Similarly, Abigail Lynch ('10, '11, '13), Fisheries Research Biologist with the United States Geological Survey states, "At first, Fly Gals seems to be about the fish, but I quickly came to realize it is much more than that. It is about the camaraderie that forms from a joint experience and the inspiration gained from learning about the diverse life experiences from the group." The MSU Fly Gals program also instills self-assurance in its participants. "This program empowers women by not only giving them confidence in the art and sport of fly fishing, but also by immersing them with other women who are looking to change the world for the better. I left the program energized and refreshed and wanting to work harder to empower other women," says Jess Mistak ('11), Habitat Management Unit Supervisor with the Michigan Department of Natural Resources Fisheries Division.

Remarkably, the MSU Fly Gals program has given our alumnae presence in a field that is and has been historically underrepresented. For example, Julie Hinderer ('14, '15, '16), Science Program Associate with the Great Lakes Fishery Commission, comments, "I have found a new way to connect with the resource I work to protect and to connect with other professionals in the field, most of whom are men." Additionally, this program has given our alumnae a voice in the fly fishing and recreational angler community. "This has been an experience I can draw from in conversations with recreational fisheries constituents," says Chiara Zuccarino-Crowe ('10, '11), Tourism and Recreation Coordinator at the National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries. Lisa Peterson ('16), a Ph.D. student in the Quantitative Fisheries Center at Michigan State University, notes, "This program provided me with the necessary jargon and 'street cred' I need to work alongside and build relationships with fisheries stakeholders."

Staying Afloat (No Buoys Allowed!)

Today, more women are becoming engaged in fly fishing: according to the 2015 Special Report on Fishing conducted jointly by the Recreational Boating and Fishing Foundation and the Outdoor Foundation, women comprised 34.4% of all anglers and 31.4% of all fly fishing participants. Furthermore, these women are becoming involved quickly; in fact, women represent the fastest growing sector of the fly fishing industry. With this information in mind, programs like MSU Fly Gals, which provide access and opportunities for underrepresented individuals, become even more valuable. Fortunately for the MSU Fly Gals and for other hopeful students and professionals, "the fly fishing community is open to the mentoring and nurturing of non-traditional fly fishing, and this program will surely continue," says Demmer.

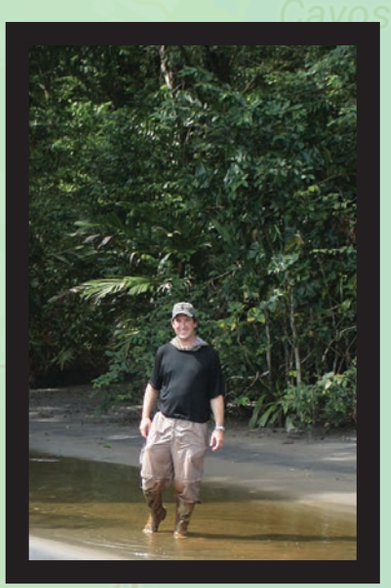
Photo credit: Bruce Jenkins

Waders, rods, reels, and backpacks are tossed around as the MSU Fly Gals hurriedly find their spots at the table for their last meal. Sadler flashes a smile and cracks a joke or two from the head position. One more year has passed and produced another class of "intelligent, focused, and confident women who are eager to learn and push the knowledge envelope far beyond anything I ever cared to do," he says. Before everyone departs, Sadler leaves us with some additional inspiration from Simon Sinek, an author on leadership and management, as we reflect on the lessons learned during our Fly Gals experience.

The Urquhart Lab

Gerald Urquhart is a tropical ecologist who studies coupled natural and human systems with over 20 years of experience working in Nicaragua. He is also a lifelong naturalist with great passions for birds, herps, and fish (which he "studies" with a rod and reel). In his research, Dr. Urquhart is interested in understanding the synergistic effects of globalization and climate change as the last wild places on Earth become more influenced by human activities. The majority of his work has focused on the Caribbean Coast of Nicaragua, but he is beginning a new project in the Brazilian Amazon. Before working at Michigan State University, he received his bachelor's degree from Michigan State University in Zoology, his Ph.D. from the University of Michigan, and held a post-doctoral research position at the Smithsonian Tropical Research Institute.

Contact Jerry at: Urquhart@msu.edu



Joel Betts is a Master's student researching the impact of a rapidly advancing agricultural frontier on fish populations and water quality in the Rama-Kriol indigenous territory along the Caribbean Coast of Nicaragua. He hopes his research will fill critical knowledge gaps and help give a voice to local communities and managers in order to move forward with conservation actions in these areas of rich cultural and biological diversity. Before coming to Michigan State, Joel received a B.S./B.A. in Biology and International Development Studies from Calvin College.

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Lauren Phillips' research focuses on the spatial interactions of humans and carnivores, and the effects of those interactions on conservation values in Nicaragua. She has worked for three years in remote areas of the Southern Caribbean Autonomous Region, where both wildlife and native peoples are experiencing the impacts of rapid human development. She ultimately aims to conduct research that balances the needs of indigenous and traditional cultures with the long-term health of threatened ecosystems. As a Michigan native, she attended MSU as an undergraduate in the Department of Zoology. After she successfully defends her Masters research, Lauren will continue to build on her research in Nicaragua starting in spring 2017 as a PhD student at MSU.

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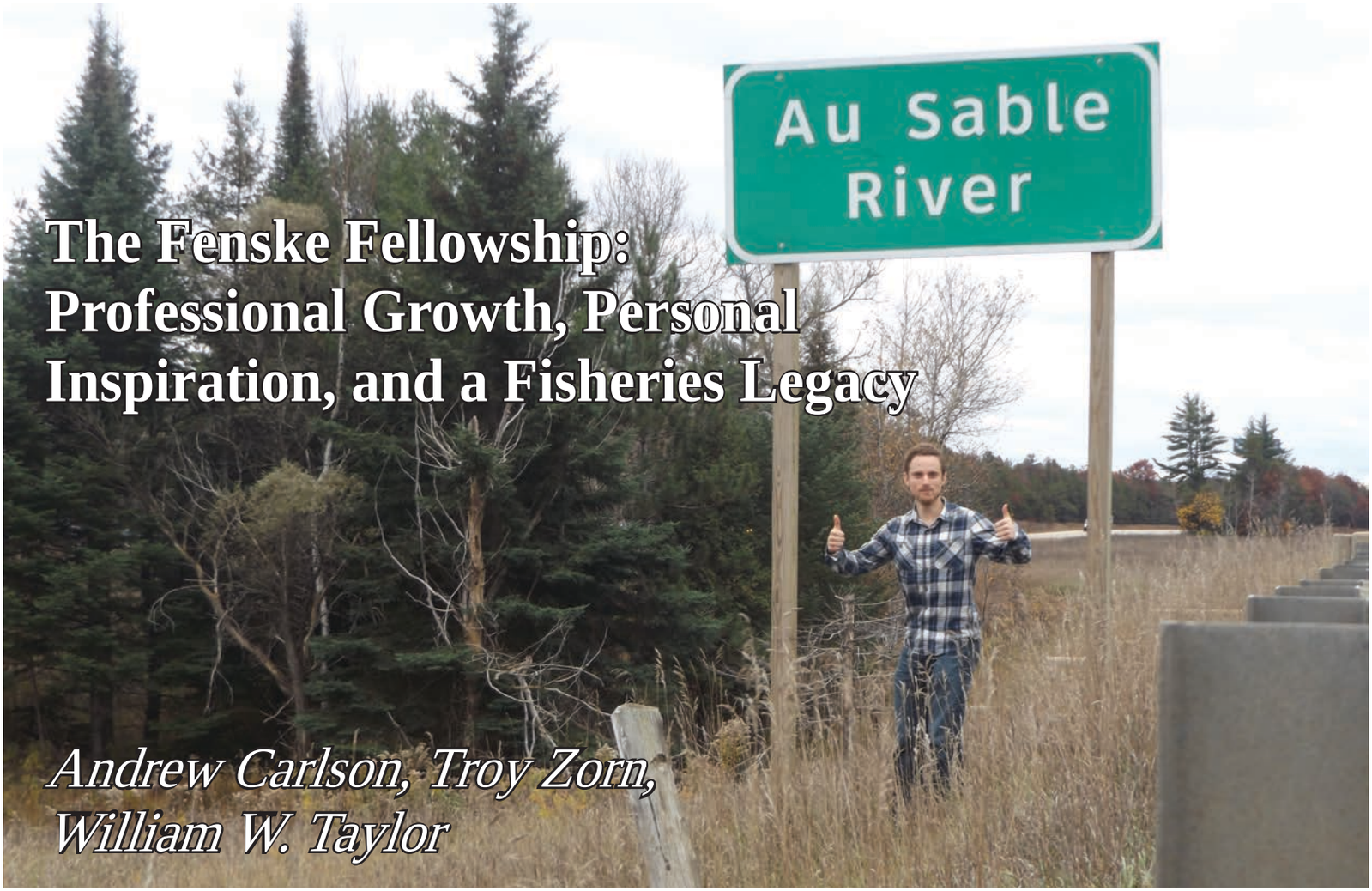
Armando Dans is a visiting Nicaraguan scientist at MSU whose research focuses on the conservation of megafauna in the last wild places of Nicaragua's Caribbean Region. He recently received a grant from Panthera to study the impact of socioeconomic activities of both the indigenous/Afrodescendant people and the rapidly advancing mestizo agricultural frontier on wildlife. His work is part of a larger project overseen by Global Wildlife Conservation/Nicaraguan Tapir Project, Panthera Nicaragua/The Initiatives for Jaguar Corridor, and MSU. Armando obtained his Forestry Engineering degree at the University of the Autonomous Regions of the Atlantic Coast of Nicaragua. He plans to return to Nicaragua to pursue a Master's degree in 2018.
Contact Armando at: arjadans@gmail.com

Maddy Cleary is an undergraduate research assistant studying the impacts of community-based reforestation projects on local attitudes towards the preservation of cultural and natural resources. She collaborates with community members of Kahkabila, a Miskito Indigenous community on the Caribbean coast of Nicaragua. Her goal is to facilitate community initiatives for natural resource management that simultaneously build capacity and preserve both traditional Miskito culture and ecological knowledge in the face of climate change and settler colonialism. Maddy has been a critical contributor to research in the Urquhart lab throughout her undergraduate career. She is currently exploring her graduate school options, and will be sorely missed. Contact Maddy at: clearym1@msu.edu



The Fenske Fellowship: Professional Growth, Personal Inspiration, and a Fisheries Legacy

Andrew Carlson, Troy Zorn, William W. Taylor

A Fisheries Heroine

Janice Lee Fenske is regarded as one of the finest fisheries biologists ever employed by the Michigan Department of Natural Resources (MDNR). Jan was Michigan's first female fisheries biologist, serving for 27 years in a variety of professional roles. Her unwavering passion for the environment and compassion for her friends and colleagues stand as a shining example of personal and professional success in fisheries. Known for her work ethic and can-do attitude, Jan was dedicated to mentoring future fisheries professionals and conservation stewards within and outside the MDNR. Jan passed away in 2005 after a courageous battle with cancer, but her legacy lives on.

The Fenske Fellowship

The Janice Lee Fenske Excellence in Fisheries Management Fellowship (Fenske Fellowship) honors Jan's legacy by providing financial support for a fisheries student to engage in a rich university-agency mentoring experience in fisheries management. Offered through the Department of Fisheries and Wildlife at Michigan State University, the Fenske Fellowship functions as a recruitment tool for incoming students interested in incorporating a fisheries management experience into their graduate research program. The Fenske Fellowship has assisted aspiring fisheries professionals since the 2007-2008 academic year on an array of applied research projects, including the effects of climate change on Great Lakes fisheries, the use of risk assessment models for management of aquatic nuisance species, and the intersection between fisheries management and law enforcement.

Fisheries management is as much about understanding and meeting the needs of resource users as it is about managing fish populations and their habitats. I was fortunate to receive the 2015-2016 Fenske Fellowship to assist with the design and completion of a research project focused on the human dimensions of fisheries. In particular, I worked with Dr. Troy Zorn (MDNR) and Dr. Bill Taylor (Michigan State University), my Ph.D. advisor, to evaluate the attitudes, behaviors, and demographics of Michigan's inland trout anglers. Michigan has

more than 31,000 km of streams supporting ecologically, socioeconomically valuable fisheries for brook trout, brown trout, and rainbow trout. In addition, Michigan's inland lakes provide recreational fisheries for lake trout and splake. However, relatively little is known about the values and motivations of Michigan's inland trout anglers. Although Jan Fenske completed a trout angler survey more than 30 years ago, there is a need for contemporary human dimensions research to promote the development of ecologically and socially informed trout management programs. To help fill this knowledge gap, the MDNR administered the Inland Trout Angler Survey (ITAS) in 2015. The ITAS was designed to provide information on relatively unstudied attributes of Michigan trout anglers for incorporation into the state's first statewide management plan for inland populations of brook trout, brown trout, rainbow trout, lake trout, and splake. The primary goal of my Fenske Fellowship was to analyze data, describe results, and draw conclusions from the ITAS to provide critical human dimensions information for the statewide management plan.

Meeting of the MDNR Fisheries Division Trout Committee (December 1, 2015) at which Andrew presented results from the 2015 Michigan Inland Trout Angler Survey. (Photo: A. Carlson)

Survey Design and Implementation

The questions included in the ITAS spanned an array of topics, including angling experience, fishing trips, stream and inland lake selection factors, species targeted, harvest patterns, tackle use, satisfaction with trout management, and demographics. MDNR fisheries professionals created the ITAS in SurveyMonkey and disseminated it to 83,000 people – one half of Michigan's inland trout anglers – who purchased a non-restricted Michigan fishing license in 2013 (residents and non-residents), bought an annual fishing license in 2014, and had provided their email address through the DNR's eLicense or retail sales system. Prior to 2014, trout and salmon anglers could be distinguished from non-salmonid anglers, because they were required to purchase an all-species license (as opposed to a restricted license). By including anglers who bought both an all-species license in 2013 and a fishing license in 2014, the likelihood that the ITAS reached current trout and salmon anglers was maximized. A question asking anglers about their membership in trout angling groups (i.e., Michigan Trout Unlimited, Federation of Fly Fishers, Anglers of the Au Sable) permitted comparison of the attitudes, behaviors, and demographics of members and non-members.

Andrew's presentation to the Michigan Coldwater Resources Steering Committee (CRSC) at Hartwick Pines State Park on October 30, 2015. The CRSC is a standing committee established by the MDNR Fisheries Division composed of angling group members and others with an interest in coldwater ecosystems that provide input, advice, and recommendations regarding management of coldwater resources in Michigan. (Photo: A. Carlson)

Key Results

Regardless of membership status in angling groups, Michigan trout anglers use a diverse array of resources to plan trout fishing trips, including other anglers, the MDNR Fishing Guide, and MDNR online trout waters maps. However, few anglers contact the MDNR directly to plan fishing trips or use fishing guides other than the MDNR Guide. Although some anglers use smart phones to plan trips, more ITAS respondents use traditional paper resources such as books/guides and mapbooks. More stream trout anglers target brook trout and brown trout than rainbow trout. However, inland lake anglers believe the chance to catch rainbow trout is more important than the chance to catch other species. Both stream and lake anglers tend to focus their fishing effort in the northern Lower Peninsula (NLP); more anglers fish for trout in the NLP than the southern Lower Peninsula and the Upper Peninsula combined. When deciding whether or not to fish a stream or inland lake, trout anglers generally believe that the presence

of quality-sized trout is more important than the presence of trophy trout and the chance to catch large numbers of trout. Ease of access, availability of public access, and aesthetic beauty are also important stream and inland lake selection factors.

There are notable differences between angling group members and non-members. Members tend to have more angling experience, a higher degree of angling specialization, and greater interest in pursuing brook trout, brown trout, and rainbow trout. More than half of members (58%) believe regulations that allow harvest are unimportant or very unimportant, whereas 56% of non-members believe such regulations are important or very important (Figure 1). In addition, 52% of members never keep legal-sized brook trout, compared to only 19% of non-members, 46% of whom sometimes or often keep brook trout. A higher percentage of members (40%) believe stocked trout are unimportant or very unimportant ($P < 0.01$ [chi-square test]), whereas a higher percentage of non-members (49%) are indifferent about stocked trout ($P < 0.01$). This divergence in the importance of harvest was the most notable, management-relevant value difference I observed between members and non-members.

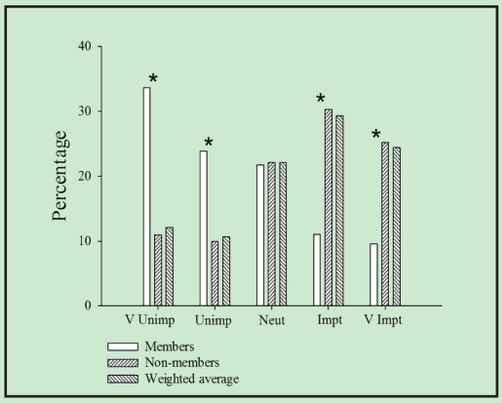


Figure 1. Importance of regulations that allow harvest as a stream fishing selection factor for Michigan trout anglers. Categories of importance include very unimportant (V Unimp), unimportant (Unimp), neutral (Neut), important (Impt), and very important (V Impt). "Members" are members of trout fishing organizations (i.e., Trout Unlimited, Anglers of the Au Sable, Federation of Fly Fishers), whereas "Non-members" are not. * denotes significantly different proportions between Members and Non-members within categories of importance ($P < 0.05$). N = 3,501 respondents (972 Members, 2,529 Non-members).

In addition, proportionally more members (31%) than non-members (10%) and new anglers (12%) attended a fisheries-related meeting in the past 12 months ($P < 0.01$). Their higher level of involvement in fisheries activities suggests that members have a greater stake in trout management than non-members and new anglers, which supports results from previous Michigan angler surveys. As Jan Fenske and other fisheries researchers described in their historical publications, a continual challenge for fisheries professionals is to balance the interests of, and provide desirable angling opportunities for, the more vocal and well-connected members as well as the less vocal non-members, which numerically represent most of Michigan's trout anglers.

Janice Lee Fenske (1954-2005) was the first female Fisheries Biologist and District Fisheries Biologist in the history of the Fisheries Division of the Michigan Department of Natural Resources (DNR). The Janice Lee Fenske Excellence in Fisheries Management Fellowship honors Jan's legacy by providing financial support for students interested in integrating a management experience into their graduate research program. (Photo: Michigan Chapter of the American Fisheries Society).

Honoring Jan Fenske's Legacy

The Fenske Fellowship offered me the privilege to continue human dimensions research that harkens back to Jan's M.S. thesis, "Attitudes and attributes of anglers who fish for trout in Michigan," completed in 1983. Perusing her seminal publication, I am amazed by the similarity of our research, and thus how directly my work contributes to Jan's legacy. Whether fisheries or wildlife, natural resource professional or otherwise, we can all learn something from Jan Fenske. Her influence on the natural resource profession, cultivated by indefatigable passion for conservation and compassion for resource users, is indelible. These hallmarks of her character illustrate, for aspiring professionals of all kinds, two fundamental elements of personal and professional success. In addition to the Fenske Fellowship, Jan's legacy is celebrated through the Janice Lee Fenske Memorial Award, offered annually at the Midwest Fish and Wildlife Conference to recognize deserving students for their dedication to natural resource management, desire to pass on wisdom to others, involvement in professional societies, and strength of character. I encourage you to learn more about Jan Fenske by reading her biography and publications available through Michigan fisheries websites (e.g., MDNR, Michigan Chapter of the American Fisheries Society). I have no doubt that you will be captivated by Jan's life and legacy, as I have been during my Fenske Fellowship. As my graduate program continues, I am grateful for this Fellowship experience, the professional growth it stimulated, and the inspiration it ignited.

Real-time Conservation Technology (REACT) Labs

Friday, 23 April 2048

By: Kyle Redilla

The gentle whirring of Marty's super-cooled machine was having a therapeutic effect on this rainy Friday afternoon. He was in the process of downloading the latest batch of data from the moose telemetry harnesses, and the live screening results were looking good so far. A couple missed locations, but hey, not bad for about 95,000 location estimates in the last 24 hours, each complete with the usual auxiliary data: electrocardiogram, electroencephalogram, hormonal profiles; the works. It's amazing what has become standard, and for every moose in the damn population. REACT Labs had pioneered an era in biological conservation, demonstrating the power of artificial intelligence (AI) in ecosystem management.

But breakthroughs in AI and sensing weren't the core reasons for this success. Marty thought of his father, and the unsteady years he spent training intelligent systems on ecological information during REACTs beginnings. It was only when quantum computing became mainstream that these systems truly flourished.

The computer started making a brash tone, dislodging Marty from his daydream. "Positional inconsistencies?" he asked himself, only to be reminded that he was not alone at his workstation. "It appears there is a 25-minute gap in data for moose ID M117, during which the animal was displaced 55 kilometers," Halsey reported. Though he helped design the training profile for her verbal communication, the AI could annoy Marty at times. It was difficult to program "don't be a know-it-all." Nevertheless, Halsey had become an invaluable part of REACT.

"Halsey, could you bring up the diagnostics?" Marty asked. This type of thing occasionally occurred, with faulty technology being the usual culprit. He examined the different plots as they flashed across the main screen.

"The diagnostics are perfect. Hmm... Probably just a cracked telemetry module." Some equipment was still no match for the elements, he thought. "Halsey, could you perform a full scan across the network for M117? And are there any crews near its current location? I'd like to have a look at the functional MRI (fMRI) data."

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Within the hour Jim, one of the head technicians, walked into the lab with a hard drive and placed it on Marty's desk.

"I'm stickin' around to see this," he said. "That animal was spooked, like really spooked. We were able to download at 100 meters, and I didn't want to go any closer. Looked crazed."

Halsey displayed some vital reports for the animal in question. "Cortisol levels and heart rate indicate the animal was under intense stress when the location recordings resumed."

"Hmm… weird. Let's take a look." Marty said as he pressed the hard drive into his workstation. The fMRI study was still exploratory at this point, but the goal is to eventually predict behaviors of an animal from past neurological states. With quantum simulation, the possible modes of cognition - billions of states extrapolated from each fMRI image - could be modeled with environmental and physiological data.

"Halsey, can you move the object novelty charts forward to the problematic period?" This was a measure of how the animal perceived its environment. It could be understood as departure from its average life experiences. They watched in anticipation, and the information on the vitals dropped out as expected. But the graphs that had been rhythmically bouncing around started skyrocketing.

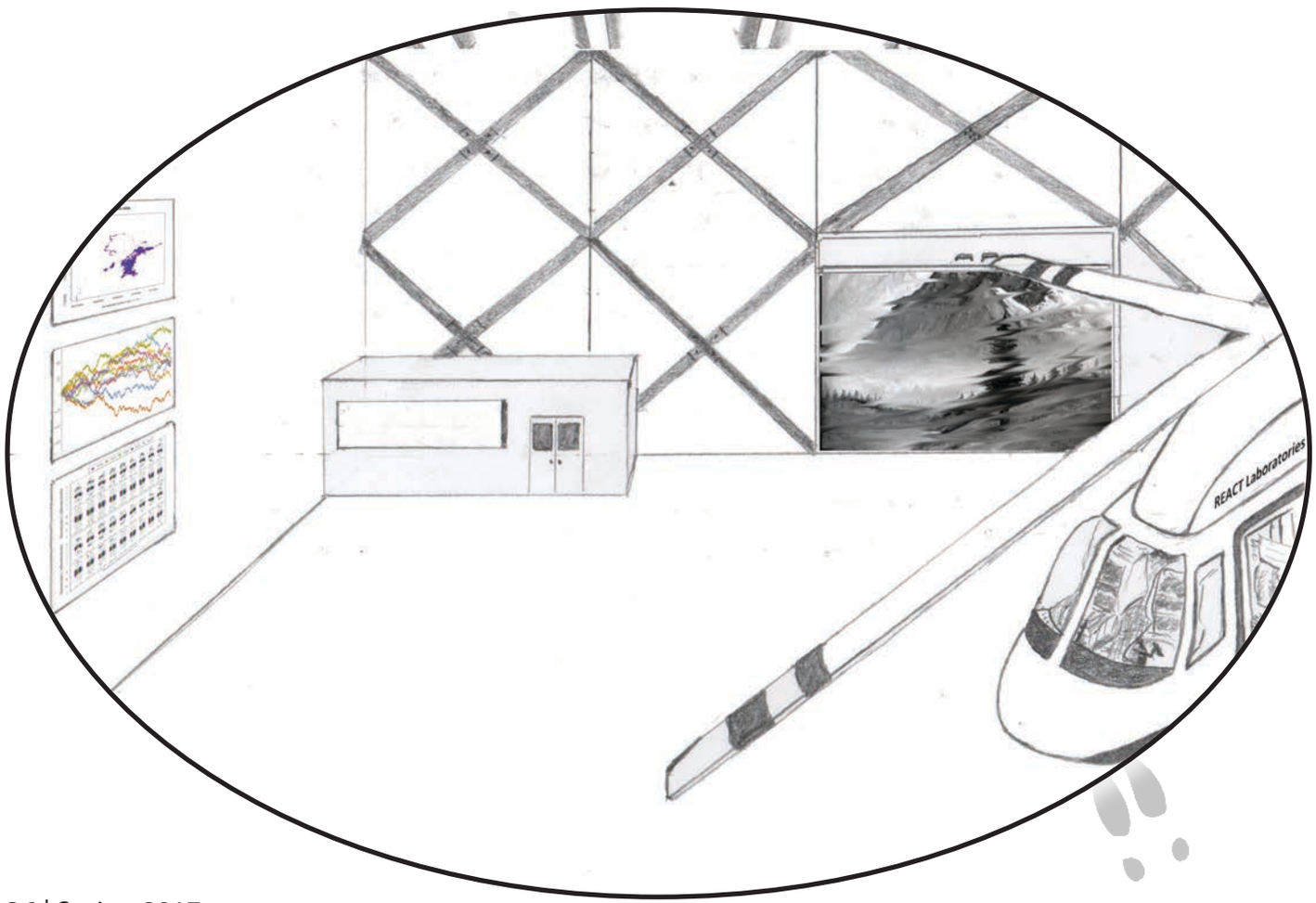
"What does that mean?" the curious technician asked. Marty shook his head. He wasn't sure. "It looks like M117 started experiencing…" he was stopped by a plummeting feeling in his stomach, opposite of the graph he was watching.

Jim watched in confusion as Marty shook himself from his daze. "You okay?"

Marty nodded and restarted his explanation. "Jim," he took a deep breath. "This computer is able to simulate the moose's neural, physiological, and physical states by taking advantage of quantum entanglement. Basically, sub-atomic particles within the moose are connected to other particles, ideally within the computer, although they are distant in time and space. This has only ever evidenced for pairs of particles. The idea is that since Halsey can interpret the states of particles within the computer, we can scale up to estimate the neural states of the moose from the fMRI information."

"But I think…" another pause, and he looked up at the screen. "I think we are seeing the results of more than two particles 'entangled' with each other. I think we may be witnessing episodes of sporadic reconstruction of the moose's physical reality…" He was shaking a bit, "and hence our own, which manifest in…" He couldn't believe what he was thinking, but it made perfect sense…

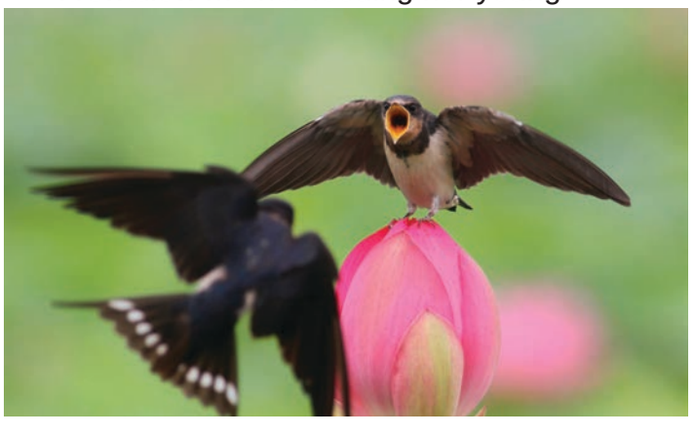
He looked back down at Jim, and proceeded "… teleportation."



FW Photo Contest Runners Up

Outreach: Janet Hsiao

Flora and Fauna: Fang Wang
A swallow mother feeding her young



Scenary: Chris Henderson
Sunset on Lake Michigan near Mackinac Bridge

Winter Scene: David Dressel
White-tailed deer during winter storm

Field Work: Anna Herzberger
Heilongjiang, China. While we interviewed the farmer (her son), she took her ducks for a walk

FW SPOTLIGHT

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FW Photo Contest Winners

Field Work: Kelly Robinson
Johnson Sea Link submersible during the NOAA Ocean Explorer Estuary to the Abyss cruise

Outreach: Fang Wang
Teaching a Tibetan boy about butterfly identification

Flora and Fauna: Fang Wang
Chestnut bee eater mating fight

Scenary: Chris Henderson
Northern lights from Isle Royale National Park shoreline

Winter Scene: Ethan Buchinger
Aurora show at 40°F below while hunting above the Arctic Circle, Alaska