MSU Fisheries & Wildlife

SPOTLIGHT

Spring 2019

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

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

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Cover photo: Jacalyn Beck's Two Lion Cubs Playing

Photo credit: Chris Henderson

Letter from Dr. Scott Loveridge

Albert Camus, a French philosopher, once said, "The wide-eyed newcomer sees nothing." This year I was a newcomer brought in to steer the department on a temporary basis, but I've seen a lot! I have to start with the students, who are an impressive group—from entering undergraduates to people finishing their Ph.Ds. They are active, articulate, engaged, and respectful of each other and the environment, even though the department attracts people from an array of places and political perspectives. The capacity of our students was certainly on display when I participated in our annual Graduate Research Symposium, which highlighted the work of roughly 20 students. The array of research approaches and questions was quite impressive, and the study sites ranged from Michigan to Asia, Antartica, and Africa. Clearly, the department is having an impact at home and throughout the world.

A theme that unites these diverse activities is keeping the wonder in nature. This includes the wonder of seeing natural phenomena and allowing future generations to experience it, but also the wonder of scientific discovery in nature, pushing the boundaries of the discipline so that our understanding of the forces underlying our observations increases. Both elements—experience and discovery, are strong within the department. These themes are evident in the pages of this magazine, where, among other things, you can learn about:

- the new Corey Marsh Ecological Research Center, which will introduce youth to outdoor activities while also facilitating ecological research activities;
- the department's efforts to combat chronic wasting disease, a scourge that is affecting the deer herd in several places in Michigan;
- work to improve and sustain one of the most visited places in Chicago, the Shedd Aquarium;
- a student's connections with local boys in Tanzania in her efforts to help understand how to sustain the wild lion population.

This year produced sadness with the passing of Brian Mauer, a long-time faculty member. We heard from many of Brian's former students testifying to the dedication faculty exhibit towards our students.

On the brighter side, we completed two new faculty hires. Dr. Abigail Bennett and Dr. Thomas Loch both started on the same day, August 16. Dr. Bennett is focusing on fish food supply chains worldwide in an effort to improve availability and sustainability while reducing costs. Dr. Thomas Loch is jointly appointed with Fisheries and Wildlife and the MSU College of Veterinary Medicine and will help to identify and control fish diseases, with particular emphasis on the Great Lakes region and in partnership with the Michigan Department of Natural Resources.

The department is also in the process of renewing its leadership via a national search for a permanent chair. Check in with us next year for an update on that important decision.

-Scott Loveridge

An Interview with Janet Hsiao

Spotlight: What did you work on while you were a student at MSU?

Janet: As a part of the Aquatic Landscape Ecology Lab, my graduate research investigated how landscape characteristics may affect the quality and condition of coastal habitats and the organisms they support. I tested for relationships between condition of coral reefs and proximate watersheds draining to reefs around Maui, Hawaii. Findings from my research illustrate complex influences of inland systems on coastal habitats, contribute to the broader understanding of hydrologic linkages between inland and coastal habitats, and can inform coastal conservation strategies to manage current and future threats.

Spotlight: Where are you now and what do you do?

Janet: I am a Sea Grant Knauss Marine Policy Fellow at the NOAA Global Ocean Monitoring and Observing Program. My office maintains 50% of the global ocean observing system; we support different technologies (e.g., Argo floats, surface drifters, buoys) that measure temperature, currents, salinity, and other essential variables that characterize the ocean. Specifically, I staff various levels of science administration and policy efforts related to the Tropical Pacific Observing System. My main responsibilities include organizing grant competitions, coordinating intra-agency and inter-agency communication, and facilitating a working group that convenes multiple expertise (i.e., oceanographers, modelers, program managers) to improve NOAA's ability to forecast El Niño-Southern Oscillation.

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

Janet: I first learned about the Knauss Fellowship from mentors on my guidance committee. I thought the opportunity would supplement my scientific training with practical experiences in the public agency setting, which would ultimately support my pursuit of a career in natural resources management and conservation.

Spotlight: What's your favorite thing about your current position?

Janet: Definitely the diversity of my portfolio, which makes every day different. I appreciate that my current position has a good mix of desk time, meetings, and occasional field work. Not to mention that I get to meet and work with the coolest people!

Spotlight: What experiences at MSU best prepared you for your current position?

Janet: Much of my time nowadays involves writing for various platforms (reports, memos, web content for the public, etc.) and interfacing with other research institutions or federal agencies. Being able to articulate my office's impact and relevance to our partners is integral in fostering engagement and collaboration. In retrospect, MSU offered many communication training opportunities. In addition to writing exercises through coursework, Spotlight, and research, I also practiced public speaking at multiple forums. This includes presenting at the FW GSO Symposium and the American Fisheries Society annual meeting, as well as being a Teaching Assistant. I am grateful for good mentors and friends that offered frank feedback, which helped my writing and speech improve.

Spotlight: Do you have any advice to share with current Fisheries and Wildlife students?

Janet: Yes. You're surrounded by incredible intellectual capacity and passion at MSU. Take time to meet the people around you. Getting involved in the GSO is a great way to get to know your peers outside of the classroom setting! Your graduate colleagues will become a network that supports you, often in unexpected ways.

Out of the Muck

A new ecological research center opens near campus

By Allie Shoffner

On November 28, the ribbon was cut: the Corey Marsh Ecological Research Center officially opened after a whirlwind six months of planning and repairs. In April 2018, MSU AgBioResearch began the process of repurposing the former Muck Soils Research Farm into the Corey Marsh Ecological Research Center, their 14th off-campus research center in the state. Known affectionately as CMERC (pronounced *see-murk*), the 440-acre property will be a haven for research, restoration, outreach, and community engagement located just 20 minutes from MSU's campus.

Corey Marsh, the geographical feature that is CMERC's namesake, is part of the Looking Glass River Watershed. For the last 70 years, water has been pumped off the land for muck soil farming. Muck soil farming, or farming on drained swampland, is an important part of agriculture in much of the United States, although the practice is controversial due to the negative impacts of draining wetlands on wildlife. In 2012, after a long and valuable tenure, MSU's Muck Soils Research Farm closed when it was no longer cost-effective to manage the water levels necessary for conducting research on vegetable agriculture. Dr. Jen Owen, the Center Coordinator at CMERC, is now working to repurpose the property into a center of ecological research with the support of AgBioResearch. The pervasive water conditions that made muck

From left to right: Allie Shoffner, Brian Graff, Jen Owen, Doug Buhler, and Ben Darling at CMERC's ribbon cutting ceremony on Nov. 28, 2018.

1855

Michigan Governor Kinsley S. Bingham approves Public Act No. 130, an act for the establishment of a state agricultural school, to be known as the Agricultural College of the State of Michigan. In 1857, classes begin at the Agricultural College with 57 male students.

1858

The Michigan Legislature approves Act No. 31, which reserves the swamp lands in the four adjacent townships for the use of the College. This act added 6800 acres to the 676 previously owned by the College. The editor of the Michigan Farmer, writes: ''We do not see why the Institution [College] with the great facilities this tract will afford…may not at no very distant day embrace one thousand students.''

1870

The State Agricultural College begins accepting women students.

1889

David Ralston Corey purchases 240 acres adjacent to MSU's Bath Township property from the Agricultural College. He owns the land until July 8, 1911. Corey was born in 1841 in Ontonagon, MI, and was a lawyer by profession, at one point partnering with his brother-in-law at the firm Sunderlin and Corey in Hubbardston, MI. Corey also served in the 13th Michigan Volunteer Infantry in the Civil War from 1862 to 1865. He died aged 76 in 1917, and is buried at Mount Hope Cemetery in Lansing, MI.

Today, Corey Marsh is a local landmark in Clinton County that covers the western portion of MSU's Bath Township property and also extends further north. It appears likely that the marsh has been known colloquially as Corey Marsh since Corey's ownership of the adjacent property in the late 1800s. The name Corey Marsh has been federally recognized by the U.S. Geological Survey since 1980.

1941

The Muck Soils Research Center is established on the Michigan State University's Bath Township property.

1964

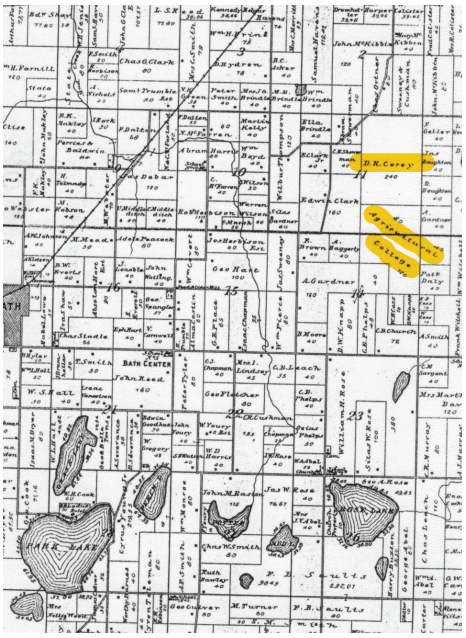
After several name changes, the College finalizes its name to Michigan State University.

2012

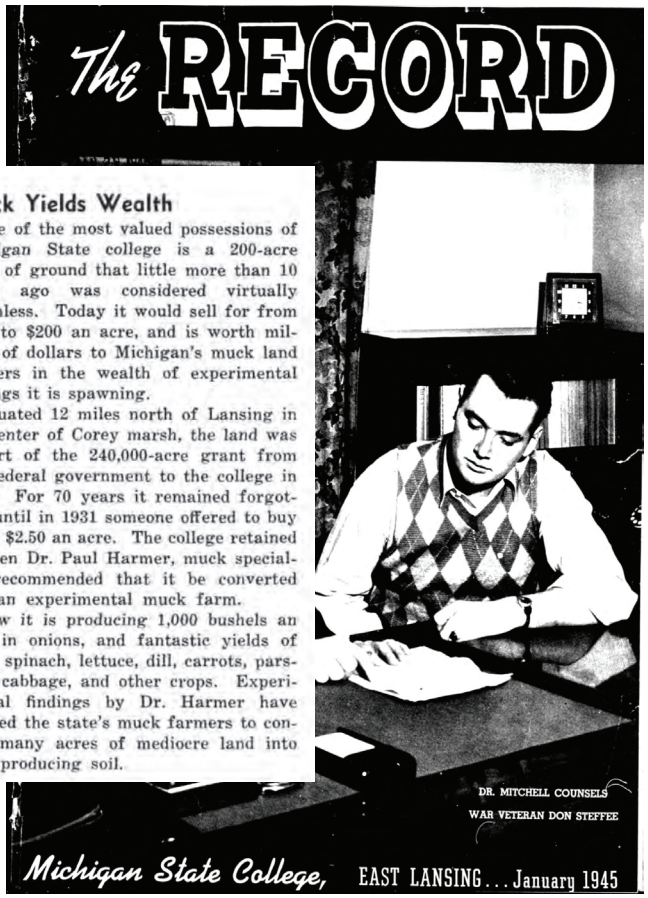
The Muck Soils Research Farm closes after 70 years of agricultural research.

2018

The Bath Township property is renamed Corey Marsh Ecological Research Center (CMERC).



Above: An excerpt from Bath Township's 1896 Plat Map, showing Corey's property adjacent to that of the Agricultural College. Below: A blurb regarding the early success of the Muck Soils Research Farm, in the Michigan State College Record from January 1945.



The RECORD

Muck Yields Wealth

One of the most valued possessions of Michigan State college is a 200-acre piece of ground that little more than 10 years ago was considered virtually worthless. Today it would sell for from $150 to $200 an acre, and is worth millions of dollars to Michigan's muck land farmers in the wealth of experimental findings it is spawning.

Situated 12 miles north of Lansing in the center of Corey marsh, the land was a part of the 240,000-acre grant from the federal government to the college in 1862. For 70 years it remained forgotten, until in 1931 someone offered to buy it for $2.50 an acre. The college retained it when Dr. Paul Harmer, muck specialist, recommended that it be converted into an experimental muck farm.

Now it is producing 1,000 bushels an acre in onions, and fantastic yields of mint, spinach, lettuce, dill, carrots, parsnips, cabbage, and other crops. Experimental findings by Dr. Harmer have enabled the state's muck farmers to convert many acres of mediocre land into high producing soil.

DR. MITCHELL COUNSELS WAR VETERAN DON STEFFEE

Michigan State College, EAST LANSING...January 1945

soil research a challenge are ideal for studying wetland ecosystems. Like CMERC, many unused muck farms across the United States have been reclaimed and the wetlands restored for wildlife preserves.

Photo credit: Jen Owen

Corey Marsh is open to the public and visitors are welcome to explore.

CMERC has vast potential in 440 acres of wetlands, forest, mixed shrubland, fallow agricultural fields, and facilities for hosting events and outreach activities. Some of these habitats provide a unique challenge and opportunity for long-term restoration and monitoring projects: after six years of inactivity, the agricultural fields are now solely reed canary grass, and the wetlands are primarily comprised of narrow-leaf cattail, both of which are invasive species to this region. In addition to habitat restoration, the center will provide opportunities for the public to be active participants in scientific research to promote awareness and understanding of the relevance of science to society. Research and outreach activities at the center will also serve as a platform for training undergraduate students in science communication, engagement, and field-based research. Though the center has just opened, there are big plans in store for its future. Wheelchair-accessible paths, an interpretive center, field housing, boardwalks and observation platforms, and a demonstration garden are just some of the structures that have been envisioned to help CMERC reach its full potential. The center has already hosted successful outreach events in its first few months, including a viewing party for the Perseid meteor shower and several educational programs focused on bird banding for visiting schools. The center is planning to host a BioBlitz in the spring to begin documenting the biodiversity on-site and raise awareness of the new facility. CMERC is open to the public, and visitors are welcome to explore the two miles of walking trails and enjoy the abundant flora, fauna, and views – learn more at https://www.canr.msu.edu/cmerc/.

Outreach programs focused on migratory birds began at Corey Marsh Ecological Research Center last summer.


Photo credit: Parks Marion

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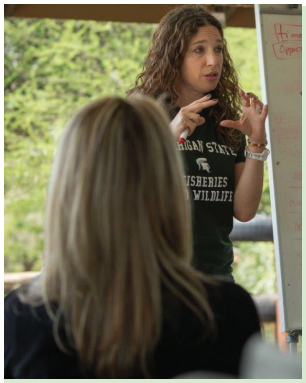
The Gore-Riley Lab



Meredith Gore is a conservation social scientist working to build knowledge about human-environment relationships, mostly those that are deviant and pose risks to humans and the environment. She has been using conservation criminology (i.e., interdisiplinary framework incorporating risk and decision science, natural resource management and criminology/crime science) in domestic and international contexts to achieve this objective. Dr. Gore currently teaches a conservation criminology course online—one of the few offered in the world! Most of her work is participatory and involves building collaborations between the FW and global conservation communities in pursuit of rigorous conservation social science, which she finds really rewarding. She has served as a Jefferson Science Fellow and Embassy Science Fellow; these opportunities enable her to share conservation criminology research from her lab with illegal wildlife trade decision makers all over the planet! Dr. Gore has two daughters and her husband is a data scientist. She enjoys reading, traveling, swimming with her kids, and running in warm weather. She loves dogs, particularly Siberian Huskies and donuts, particularly Groovy Donuts.

www.conservationcriminology.com | @meredithgore

Shawn Riley is the Parrish Storrs Lovejoy Professor of Wildlife Management in the Department of Fisheries and Wildlife at Michigan State University, and a scientist in the Partnership for Ecosystem Research and Management (PERM). PERM is a long-term collaboration between MSU and the Michigan Department of Natural Resources (MDNR). In 2009–2010, he was Senior Fulbright Fellow at the Swedish Agricultural University in Umeå, where he still conducts research and helps teach a course. Dr. Riley's research focuses on human-wildlife interactions, how those interactions affect human attitudes and behaviors, and wildlife program enhancement. He works with the MDNR and state agencies throughout the US to promote more effective conservation. In research and outreach, Dr. Riley partners with myriad entities ranging from the MSU's Department of Organization Psychology to the Swedish Hunters Association. To bring his experiences to the classroom, he teaches a course titled Human Dimensions of Fisheries and Wildlife and is a coauthor of a textbook by a similar name. Dr. Riley has been a "trout bum" his entire life, but can be caught fishing for just about anything that has fins.

Parker Banas is a first year M.S. student working with Dr. Meredith Gore on Conservation Criminology at Michigan State University. He received his B.S. in Kinesiology from Michigan State in 2013. Parker's current interests in Conservation Criminology include working with risk and risk perception, the illegal trade and poaching of wildlife in Africa and Asia, climate change, pollution and overuse, illegal logging of Rosewood in Madagascar, and illegal burl sales in the Western United States. Parker will be doing field work in Africa this summer and is working on choosing a thesis topic. In his free time, Parker enjoys traveling and experiencing new things and cultures. He would love the chance to visit every National Park within the United States, Acadia National Park being his most recent addition from a trip this past summer to Maine and Canada. His other hobbies include outdoor activities such as hiking and kayaking, multiple sports, board games, and nature/landscape photography.

Megan Cross is a Ph.D. candidate studying stakeholder engagement. Successfully managing wildlife and wildlife habitat necessitates involvement from a myriad of organizations and agencies, and partnerships offer one mechanism for achieving coordination between disparate groups and increasing the capacity of resource managers to effect change. Such relationships can help address the decline in available resources for fish and wildlife management and increase alignment between wildlife agencies conducting large-scale projects. Megan's professional interests include training and organizational behavior, and she incorporates these professional interests into her academic work by engaging with state wildlife agency employees and partners to improve their ability to evaluate and improve their capacity for collaborations.

Amber Goguen is a University Enrichment Fellow and a National Science Foundation Graduate Research Fellow pursuing her Ph.D. in human dimensions. Amber's graduate research occurs at the intersection of food, wildlife, and people. Her dissertation research seeks to identify and describe the provisioning and cultural ecosystem services wildlife meat provides to society and how these services are distributed and amplified through wildlife meat sharing and consumption. Her work also explores how formal and informal institutional structures influence the distribution of ecosystem services provided by wildlife meat through comparisons of research conducted in Michigan and Sweden. Amber is from Worcester, Massachusetts and a fan of all things New England (especially the championship sports teams). She enjoys going to The Cape, hiking in the White Mountains, and calling water fountains bubblers (pronounced *bubblah*).

Chris Henderson is a Ph.D. candidate in the Department of Fisheries and Wildlife. He has a B.S. in ecology from the University of Montana, and a M.S. in environmental and energy policy from Michigan Technological University. For his dissertation he is working closely with the Michigan Department of Natural Resources to explore the social aspects of wildlife-associated recreation and the diverse ways in which recreationists value and support wildlife conservation efforts. Changing participation trends in hunting and angling, as well as broader trends in society (such as urbanization) have altered the way people engage with nature and wildlife, with important implications for conservation policy and wildlife management. In his spare time, Chris and his wife Amanda enjoy hiking, camping, kayaking, photography, live music, and brewing beer. They have two dogs, Coltrane and Marlee, who accompany them on their adventures.

Ronak Sripal's Ph.D. rsearch focuses on using conservation criminology frameworks to address issues related to compliance with trapping rules and regulations in Michigan for the four sealed-furbearer species: bobcat, fisher, marten, and otter. He is using opportunity theories like Routine Activity Theory (RAT) to help explain how illegal trapping activities take place when opportunities are presented in lack of capable guardianship in space and time. His research focuses on understanding crime and not criminals. Ronak's research will help to improve enforcement efforts, aid calibration of age-to-harvest population models used by Michigan Department of Natural Resources (MDNR), and help develop effective crime prevention strategies specifically tailored to address illegal trapping in Michigan in order to ensure that the furbearer resource remains sustainable in Michigan. In his free time, Ronak practices martial arts and theater and enjoys hiking, playing board games, and listening to ghazals.

Protecting Michigan's Waters from Invasive Organisms in the Aquarium and Water Garden Trade

A popular way to experience nature up close is through aquarium keeping and water gardening. However, what many people do not realize is that these activities can be a risk to the environment if hobbyists are not responsible. Exotic species are frequently sold for aquariums and water gardens and when hobbyists lose interest or when a plant or animal is too large or prolific to care for, hobbyists often released them into the wild. While this may seem like a humane decision, these plants and animals can be highly invasive. Some characteristics that are prized by the horticulture and aquarium industries can increase an organism's invasive potential, such as environmental hardiness, high reproduction rates and vigorous growth.

A third of the world's 100 most damaging invasive species are related to the aquarium and water garden trade. At least 16 exotic plants and animals with established populations in the Great Lakes were introduced from unauthorized aquarium releases.

Regulations exist at the federal and state level to prevent the sale of some invasive plants and animals. However, there are inconsistencies between plants and animals that states and the federal government regulate, limited communication between regulating agencies and retailers, and overall weak enforcement of regulations across the United States. While Michigan prohibits the sale of more plants and animals than the United States Department of Agriculture and Fish and Wildlife Service, state regulations have limited effectiveness. For example, in Michigan it is unlawful to sell Carolina fanwort (a popular aquarium plant) due to its invasive potential; however in the adjacent state of Ohio there are no restrictions on its sale or possession. This patchwork of inconsistent regulations across jurisdictions and their implementation are not stopping the movement of invasive species. In addition, e-commerce is accelerating the global trade of invasive species and it is difficult to locate and enforce regulations online. Despite the fact that the number of invasive species introduced to the wild via the aquarium and water garden industries continues to rise, policy makers are often reluctant to suggest stiffer regulations given the economic value of both industries.

RIPPLE: Michigan's Education Program to Address Invasive Species

RIPPLE
REDUCE INVASIVE
PET & PLANT ESCAPES

To address this problem in Michigan, I worked alongside the Michigan Department of Agriculture and Rural Development and leading pet and garden retailers to create a new invasive species program: Reduce Invasive Pet and Plant Escapes (RIPPLE). Through RIPPLE, I educate hobbyists and retailers about the harmful impacts aquatic invasive species have on Michigan's waterways and I share proper containment and disposal information to prevent the introduction of aquarium and water garden plants and animals into the wild.

A. I frequently shared invasive species information with the public through educational exhibits.

B. Aquarium clings are one way retailers display RIPPLE messaging in their stores.

C. The RIPPLE logo and color scheme was designed to catch the eye. The logo can be interpreted as a mitten for Michigan or a stop hand signal. The color scheme is made up of natural hues to coinscide with natural environments.

Research shows that hobbyists expect to learn about invasive species from retailers but unfortunately they report not learning about them while making purchases. Therefore, RIPPLE outreach materials are designed to be displayed in pet and garden stores. RIPPLE outreach materials include vinyl clings that can be applied to fish tanks, waterproof posters, informational rack cards with tips for containment and disposal, a brochure describing state-regulated aquatic plants, a classroom coloring and word search sheet, and two videos. I engage aquarium and water garden retailers and hobbyists through in-store educational visits, articles in popular magazines, educational booths at trade shows and swap-meets, presentations at home and garden shows and aquarium and water garden clubs, and via social media. Due in part to these outreach efforts, RIPPLE materials are displayed in over 60 independently owned pet and garden stores and 50 nature centers, zoos, aquariums and classrooms across Michigan. Since launching RIPPLE in May 2016, over 100,000 people have been exposed to RIPPLE messaging. The pet and garden retailer and hobbyist community has been overwhelmingly supportive of the program.

RIPPLE is a research-driven outreach program, and to ensure educational materials and outreach activities are aligned with retailer knowledge and attitudes, I surveyed independently owned pet and garden retailers in Michigan. Preliminary findings indicate that independently owned businesses are concerned about the release of live organisms but some do not believe it is their responsibility to communicate invasive species information. One barrier faced by hobbyists is not knowing where to surrender unwanted organisms. Only half of the businesses surveyed accepted unwanted plants and animals from the public. However, I discovered more businesses would be willing to accept unwanted organisms if they had connections with non-profit partners that could assist with rehoming, or if they received recognition as a conservation partner. To learn more about RIPPLE visit www.mi.gov/invasivespecies.

Paige Filice is a M.S. student in the Department of Fisheries and Wildlife. She is advised by Dr. Jo Latimore and can be reached at filicepa@msu.edu.

LET'S BE HONEST ABOUT THE BROKER

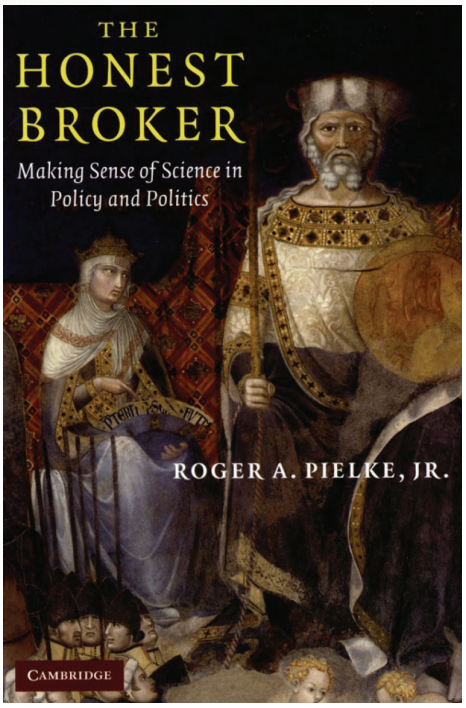
By Betsy Riley

Stop me if you've heard this one: As a scientist, we should all strive to be honest brokers. We should stand apart from the political fray and instead serve as facilitators, finding and offering options to all sides of an issue. We should help others to narrow down their options based not on our own values, but on theirs.

Any time I see the word "should," I have serious reservations. It's the scientist in me. I like to do my research.

The idea of the scientist's role as an honest broker comes, fittingly enough, from The Honest Broker, a book by Roger A. Pielke, Jr. This is a book that many students in Fisheries and Wildlife will be familiar with, either because they were directly assigned a chapter in their classes, or they may be indirectly familiar with it though the new introductory course which includes discussion of the honest broker theory. If you have heard the theory described and haven't taken the time to read the whole book, this article is for you.

In his book, Pielke discusses the role of scientists in society, and, in addition to the honest broker, described above, he outlines three other "idealized" ways of interacting with policy as a scientist: as a "pure scientist" a "science arbiter," and an "issue advocate." The "pure scientist" concept is likely familiar to many of us—the dedicated scientist toiling away in her lab,



"You need to decide for yourself what kind of scientist you want to be."

happy to answer questions about her work, but totally disinterested in the push and pull of political whims. To paraphrase Jeff Goldblum's classic line, pure scientists are more preoccupied with whether they can, not whether they should [a value judgement].

The "science arbiter" is similar—described by Pielke as a "hotel concierge," arbiters are the Google of scientists, willing to research and answer any questions that a decision maker may have, avoiding inserting her own bias into determining the final answer.

The last is the widely demonized "issue advocate." You've heard the whispers: the failed scientists so incapable of seeing past their own biases about an issue that they can no longer see objective truth? Failed scientists like Jane Goodall, who foolishly let herself get emotionally attached to the chimpanzees, to the point of naming them and raising funds to aid in their preservation?

"We are in desperate need of more issue advocates who understand science."

A good honest broker would have seen that offering people policy alternatives would have naturally led to saving chimp habitat. This sort of scientific insolence dates all the way back to Galileo Galilei, who continued to advocate for the scientific process when the church told him not to—totally failing to understand that the church wasn't interested in science and that he should have given them options more in line with church values.

Please don't see the facetiousness of my previous paragraph as being dismissive. I genuinely believe in the value of all types of scientists. That belief is what is driving this article, and my message is very simple: You need to decide for yourself what kind of scientist you want to be. Pielke outlines these concepts as idealized scientist archetypes—the understanding being that most real-world scientists will fall somewhere in between these types. It is not fair to students in this

"...We must start seeing scientists as full humans, able to fill all the roles that society needs us to fill."

department to be told that the "honest broker" archetype is the only "correct" archetype to strive for. Not even Pielke thinks that! He writes: "Rather than prescribing what course of action each individual scientist ought to take, the aim [of this book] is to identify a range of options for individual scientists to consider in making their own judgements on how they would like to position themselves in relation to politics."

As someone who was (and continues to be) personally inspired by figures like Goodall and Galileo, allow me to propose some options which may not have been presented to you in your classes. We are in desperate need of those who understand science. Look around you. The current administration's attacks on our wild, national treasures clearly shows there are not enough advocates for fish and wildlife in Washington D.C. The current march of oil and gas pipelines through our Great Lakes shows there are not enough advocates in Michigan. For almost the entirety of our lifetimes, scientists have fought an ongoing struggle against decision makers who have denied climate change. How many policy makers have we heard say, "Well, I'm not a scientist," and then refuse to defer to real scientists? The idea that all scientists should strive to be honest brokers hurts our laws, our lives, and our country in a world that is crying out for issue advocates and decision makers who understand, respect, and yes, even continue to perform science.

Yeah, I said it. Decision makers: the fifth option that Pielke forgot.

You can run for office, too. You can make decisions that protect the natural spaces and creatures that you care about. It's hard, and it's endless, and there will be days where you want to retreat to your quiet chair in your quiet lab and be alone with your petri dish. Days when you think being the honest broker would have been such an easier position, because then someone else could make the decisions. But those other decision makers don't care about protecting habitat like you do. They don't care like you do about fish and deer and cougars. Your study species needs you. So sit on that board. Chair that committee. Canvas. Vote.

If you're reading this and thinking, "This woman is nuts. There's no way I'm getting into politics," then good! Please continue to be an honest broker, a pure scientist, a science arbiter, or something in between. You are very much needed. But don't think that your inclination should dictate the choices of all scientists. It's just not rational to think that all people who are interested in science can only contribute in a small number of ways. Why are we putting scientists in a box? If we want to bring science back to our hallowed halls of government, we must start seeing scientists as full humans, able to fill all the roles that society needs us to fill. If you don't want to join the political fray yourself, you can still support the scientists who do.

You have a choice. If being an honest broker isn't what you've signed up for, then don't sign up for it. Be an issue advocate. Be a decision maker.

Your country needs you.

Betsy Riley is a Ph.D. student in the Department of Fisheries and Wildlife. She is co-advised by Dr. William Taylor and Dr. Heather Triezenberg. Her research is focused on aquaculture in the Great Lakes region, using qualitative social science methods to understand stakeholder perceptions of risk. She can be reached at bril@msu.edu.

A Herder's Life

By Jacalyn Mara Beck

Photo credit: Nancy Felix

Ready to start another day in the field.

Photo credit: Jacalyn Beck

Boys of all ages are expected to spend their days watching over their families' herds.

When I became a Ph.D. student at MSU, I knew that I would be traveling to East Africa to study human-wildlife conflict. I knew that lion populations were declining at an alarming rate and I wanted my research to have positive results for their conservation. What I didn't know was that to achieve my goals, I would have to become a cattle herder.

But last summer in northern Tanzania, that's exactly what I appeared to do. Every day my assistant, Nancy, and I would get incredulous looks from the villagers and the repeated demanding question:

"YOU herd cows?"

"Well, actually, ninautafiti ng'ombe,"

I'd reply in my broken, basic Swahili, meaning

"I am studying the cows."

Nancy, who is a native Tanzanian, helped me to communicate more complicated sentences as we explained our research efforts in the region to every surprised cattle owner.

Learning about cattle and the local herding strategies were fundamental components of the first field season of my Ph.D. research. I spent the summer investigating the effects that lions have on herds in the region and whether domestic cows have retained any anti-predator behaviors from their wild relatives. Because a cow's body size is about the same as the lion's preferred wild prey, cows are regularly targeted and attacked while they are herded across the grazing lands. These attacks, or depredations, have direct negative impacts on the herds, but I would like to know how the very presence of lions, the risk of depredation, impacts cattle. If cows are responding to depredation risk by being more vigilant, it means that they are spending less time eating and their value to the local people declines. However, if cows do not exhibit any anti-predator behavior, then they may be sitting ducks for opportunistic lions, increasing the probability of attack.

To gain a better understanding of this, I followed Maasai herdsmen across the community grazing lands, observing cattle and collecting spatial, temporal, and behavioral data. I expected those data to reveal some of the fine-scale drivers of lion-livestock conflict and help to reduce negative interactions. All of that being said, to most people my research just looked like I was herding cows. And although for three straight months I could be found alongside the herds from sunup to sundown, I had no idea what it really meant to be a herdsman in rural Tanzania. But I was learning.

First, the title of herdsman is a bit of a misnomer. Typically, those entrusted with the protection of the herds are actually young boys, ages six to 15 or so, and sometimes even younger. Armed with a stick and dressed in lengths of cloth called shukas and sandles made out of old tires, these boys lead their families' most precious possessions to pasture. In search of nutritious grasses and fresh water, they may travel more than 20 km a day without any food or drink. Despite their young age and these extreme conditions, it's exceptionally unusual to hear a herdsman complain. Herding isn't just a

job, it's their entire way of life.

During one very hot day in the field, Nancy and I sat for a moment in the shade of a thorn bush with a young herdsman we were following. Nancy asked him if he went to school and when his answer was no, she inquired as to why.

Because," he replied, matter-of-factly. "I have to herd these cows until I die."

The boy was about ten years old.

Although this may seem like a cruel existence to those accustomed to life in the 'West,' the Maasai and other pastoralist tribes have been passing down this tradition to their children for thousands of years. In fact, cattle are so deeply ingrained in the cultural heritage, they are considered a defining feature of communal identity. Owning a cow is a sign of pride, wealth, and status. Thus, the loss of a cow to a lion is a very serious issue that can provoke herders to retaliate by killing or maiming lions. This is one of the leading causes in lions' drastic decline. East African lion populations have decreased by 60% over the last 15 years alone and currently occupy just 8% of their historic range. Despite the gravity of this situation and the immense responsibility shouldered by the herders, it didn't seem to stop these kids from being kids.

On that same day, I watched our herdsman catch butterflies with a shuka, practice hopping on one foot and jumping over thorn bushes, and crouch in the tall grass pretending to be a hyena. Later, when I was sweaty and exhausted from the long day, he was attempting to chase down a lone impala. Where he got the energy, I can't say. But his imagination and verve kept us laughing despite the extreme heat and dust.

Although my experimental design focused on studying the behavior of cows, some of the most interesting behavioral observations that I made were not of the cows, but of the kids. Sometimes these observations were amusing like the playful games of our little "hyena." Other times these observations weighed heavier on my mind and were at once sobering and humbling. I will not quickly forget the day I saw a herder laying on his belly in the dirt of a dry river bed, his lower half sticking out of a hole that had been dug in the ground. Nearly upside down, he was slurping muddy water from the bottom. Knowing they will receive little milk and no water at home, these boys' creativity sometimes manifested itself more as resourcefulness than imagination. Their strength and resilience were something I had never seen before. Even as children, these boys were expected to act as warriors.

Historically, their ancestors had lived nomadic lifestyles, moving seasonally across the landscape, following the rains and fresh vegetation for their cattle. The Maasai warriors hunted and killed lions to prove their strength as well as to protect their families. Just centuries ago, this lifestyle was sustainable. But in recent decades, human population growth has increased the development of permanent settlements and the conversion of rangelands into agriculture. This has considerably reduced and fragmented important habitats for lions and other wildlife, increasing the rate of interactions with humans and livestock and leading to conflicts over space and resources. Now this conflict is threatening the lions' survival. It is this human-caused population decline that I came to Tanzania to help remedy, and it is to this that my mind often wanders: the struggle of all life to survive and coexist in this complex ecosystem.


Photo credit: Jacalyn Beck

Nancy shares laughter and cellphone pictures with a young herdsman.


Photo credit: Nancy Felix

Appreciating the company of a new friend.

On days like this, when the hardships are real and the spirits are low, I was glad when the herders and I could offer each other a more positive distraction. As much as I was captivated by the young men, they too loved watching me. Having never experienced much beyond their own grazing lands, their curiosity was amplified by many of my unfamiliar behaviors and belongings. They enjoyed watching me record data on my field tablet, and I could easily bring a smile to their faces by letting them test out my stopwatch. And above all else, a few cellphone "selfies" could make any rough day brighter and get the boys chatting.

Then there were times when we couldn't converse with the herdsmen at all. If a child spoke Swahili we knew he had received some education. However, we met many young people who only spoke the Maasai language, Maa. This meant that they had never gone to school and likely never would.

One morning, we met with a cattle owner, explained the purpose of my work, and asked for permission to follow his herd for the day. He agreed and sent us off with the herders, his son and nephew, who were probably eight and ten years old, and about 120 cows.

As we headed into the bush, we tried to get to know the boys we would be spending the next ten hours with.

"Jina lako ni nani? –What is your name?"
…
"Unaitwa nani? –What are you called?"
…

It was going to be a quiet day.

In the life of a herder, however, quiet does not mean boring. Nancy and I came to think of each day as a new adventure. And that day was no exception. The further we walked, the higher the elevation became until we realized we were heading right up a mountain. The vegetation was incredibly thick and thorny, the ground littered with rough stones that threatened our footing with every step. It became almost impossible to keep our eyes on the cow we were observing and we were forced to concentrate on simply climbing safely to the top. The boys were adept at this—their tiny bodies darting nimbly under shrubs, their bare legs already hardened from years in the bush. We, however, seemed to snag ourselves on every thorn we encountered, sliding and falling on loose rocks. When the younger boy noticed my struggles, he came silently to my side and started to lead me through the brambles. He held branches back for me to pass through, and if I chose a poor path, he took my hand and guided me on a safer course.

Although I was making far better progress under the direction of my new field guide, I still managed to snag my finger on a sharp plant. As he saw the blood drip from my finger, he gently took it in both of his hands and blew softly on the cut to soothe the pain.

I stood in awe of this young boy who understood nothing of my strange manners or my purpose for being there that day. Without any hesitation, he had taken me under his little wing and attempted to assist and nurture me. He spoke compassion without any words at all.

I first went to Tanzania with a simple list of objectives and specific information to collect about behaviors and interactions on the grazing lands. However, I have since discovered that there is much more to this story than can be recorded on a data sheet. As a conservationist and ecologist, I was prepared to study the animals and tout my empathy for the lions' plight all across the Maasai Steppe. Yet through my observations, I saw and learned more than I ever expected. Suddenly, the human-wildlife conflict I had come to study seemed a lot more human.

The Ambrose Pattullo Fund for Environmental Issues Graduate Fellowship is awarded to students interested in current environmental issues who have written about these issues for publication in a literary context.

Jacalyn Beck is a 3rd year Doctoral candidate in the Department of Fisheries and Wildlife at MSU. She is advised by Dr. Robert Montgomery. Jacalyn is assessing how the interactions of carnivores and their prey influence the interactions of carnivores and people in East Africa. *Email: beckjaca@msu.edu*

What's in the water at the *Shedd Aquarium*?

Understanding the microbial communities and addressing USDA standards for "clean"

by Christopher Owen

My thesis research was conducted at Chicago's Shedd Aquarium in a collaboration between MSU and the Aquarium Microbiome Project. The goal of the project was to better understand how clean is too clean concerning the diversity of microbial communities on, inside, and around the animals at the aquarium. In Shedd's dolphin habitat, I examined how water standards set by federal agencies affected the microbial communities and explored how current systems in place for water quality standards worked. In addition, I looked for relationships between the bacteria used for measuring water quality and other types of bacteria that may have more direct significance for the animals' health and welfare.

In order for a zoo or aquarium to care for marine mammals—including all species of dolphins, whales, seals, sea lions, otters and polar bears—the accredited institution must meet certain standards put forth by the United States Department of Agriculture's Animal and Plant Health Inspection Service (USDA APHIS). One such standard is microbial: the zoo or aquarium must test the water in the animals' habitat weekly for total coliforms (a group of bacteria defined by their ability to ferment lactose) and take corrective action if the concentration of these bacteria exceeds 1,000 per 100 mL of water. Almost all mammal feces contain some total coliforms, but they can also be found in other environments such as soils. Most total coliforms, and bacteria in general, are nonpathogenic, but they are used as water quality indicators because their presence may be associated with fecal-borne pathogens that are difficult to measure directly.

Photo Credit: Brenna Hernandez/Shedd Aquarium

Photo Credit: Brenna Hernandez/Shedd Aquarium


Photo Credit: Brenna Hernandez/Shedd Aquarium

The standard comes from a regulation by the Environmental Protection Agency (EPA) that was put in effect during the 1970s and was designed for human recreational waters. However, optimal microbial conditions for marine mammals are not well understood. The USDA regulation theorized that healthy conditions for humans are also healthy for other species. But marine mammals have different needs from humans in many ways. While humans typically only spend time in water for recreation, marine mammals are highly adapted to spend much or all of their lives in aquatic environments. As a consequence, the range of microbiological conditions that a marine mammal's immune system is adapted to may be quite different from the range for humans.

In addition, our understanding of the safest conditions for human recreational waters has advanced substantially over the past 40 years. The total coliform test has been replaced by several more accurate means of determining aquatic fecal levels in human recreational waters. Yet, advancements on standards for marine mammals have been limited.

In one attempt to modernize marine mammal water quality regulations, APHIS has recently proposed an update that would reduce the total coliform limit and add limits on other bacteria called Pseudomonas, Staphylococcus, and Enterococcus. The Enterococcus suggestion is likely copied from the updated requirements for human recreational use, while it isn't clear why the other organisms are named in the proposal, or what they are supposed to mean for marine mammal health. The proposed new limits are also quite stringent. To reduce bacterial concentrations below proposed limits, zoos and aquaria may need to use sanitation measures that drastically reduce the prevalence of beneficial microbes as well.

For my research, I monitored concentrations of each type of bacterium from the proposal in the dolphin habitat water. In order to assess the effects of water regulations, I also measured bacterial concentrations at two points along the exhibit's water treatment system. First, I looked at the water right after it left a series of sand filters designed to remove particles from the water. Second, I looked at the water after it passed through an ozone contact chamber (ozone is a highly reactive gas that destroys organic matter, including many bacteria).

All four types of bacteria showed reduced concentrations after ozone contact, implying that ozone was eliminating them effectively. Out of the four types, only Enterococcus were reduced by sand filtration. Somewhat surprisingly, a bacterium similar to Pseudomonas was found in much greater numbers in water that passed through the filters (though this bacterium was reduced below proposed regulation levels after ozone contact). This suggests that the sand in the filters is actually providing a habitat for the bacterium to grow rather than removing it. This is valuable information for

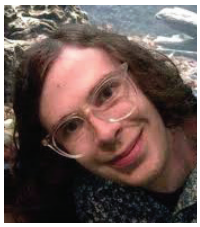

Photo Credit: Brenna Hernandez/Shedd Aquarium

people who design marine mammal habitats and need to meet water quality regulations.

I was also interested in whether the bacteria that would be limited by the APHIS proposal have anything to do with the rest of the microbial community in the water and what that meant for the dolphins living there. I used genetic sequencing to look for bacteria that could have health impacts for dolphins and found that increased concentrations of potentially regulated bacteria did not equate with higher relative abundances of known dolphin pathogens. This calls into question the efficacy of using these bacteria to determine whether water conditions are better for dolphins.

Diagram (right): Current and proposed legal standards set by APHIS and the US EPA affect microbial water quality, which in turn shapes marine animals' health and welfare.

While there is still much work to be done to determine the optimal microbial conditions for marine mammals, this research takes some important steps in understanding what the current and proposed legal standards tell us about microbial water quality for marine mammals. It will be useful both for informing future regulations and for designing water treatment systems that meet those regulations. Finally, this will help accredited organizations who take care of marine mammals ensure that the animals are as comfortable and healthy as possible.



Christopher Owen earned his M.S. from the Department of Fisheries and Wildlife in 2017. He is currently a research associate at the Shedd Aquarium in Chicago.

Photo Credit: Brenna Hernandez/Shedd Aquarium

MURPHY'S LAW: FIELD WORK FAILS

As Told by the A.L.E. Lab

The ladies of the Aquatic Landscape Ecology Lab (or A.L.E. Lab, as it is affectionately termed) are no strangers to the ups, downs, and everywhere in between of the roller coaster we call field biology. How often have we all heard something along the lines of, "Oh, you get to work outside, how lucky!" only to secretly muse that it's not all sunshine and roses. While designing scientific experiments and leading data collection comes with its own challenges, throwing in the unpredictability of mother nature and human nature ensures that at least one good fieldwork fail can be expected! You try to plan for every variable and obstacle imaginable: the weather, the season, gathering all the necessary sampling equipment, consulting stakeholders, hiring technicians – you name it, and you have planned and accounted for it. As per usual, particularly if you are working in a remote area, you arrive ready to handle anything that comes your way – except for that one freak event that you never even thought to consider until this very moment as you watch your carefully laid field plans explode into chaos. The ladies of A.L.E. Lab – Sam Betances, Emily Dean, and Erin Tracy – share a few stories that celebrate the beauty, hardship, embarrassment, and complete disasters we all experience as field biologists.

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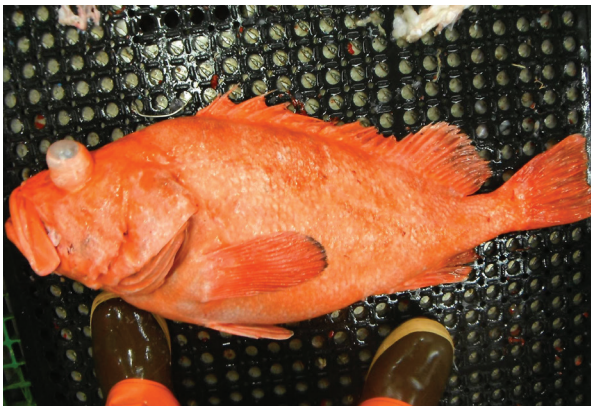
THAT GIRL SEEMS FISHY

BY SAM BETANCES



It was a frigid morning as we began our steam to the fishing grounds, deep into the Bering Sea. I was working as a North Pacific Groundfish Observer on a commercial fishing vessel for the National Marine Fisheries Service. On the first of each month, vessels must practice emergency drills. It was during our 'man overboard' drill that I revealed to a deckhand who acted as the boat's rescue swimmer my huge fear of falling overboard. "If you fall overboard, I'll jump in after you, that's my job," he exclaimed confidently. It should be mentioned that a fishing vessel's rescue swimmer training consists of the captain asking: "Can you swim?" and hope the answer is yes.

Weeks pass and the weather picks up: high winds and higher seas. Twenty-something foot swells crash around the boat, but fishing is excellent. I brace against the storm, trying to record catch data while fighting to stand. Below, I spot a human-sized rockfish snap off the longline and begin to bob along the surface 30 feet out from the boat. It's bulky, orange, and bloated – exactly what I look like in my raingear. Over the howl of the wind I suddenly hear, "Oh my God, it's Sam! SAM!!!" I look below to see the rescue-swimmer-deckhand pointing at the rockfish – clearly, he was not wearing his contact lenses. A second deckhand appears, tossing the life ring towards the fish repeatedly, missing each time. "Guys, I'm up here!" I call below. They can't hear me; they are panicking, screaming after the would-be overboard observer. The fish floats away until the dark sea engulfs the faux-observer into its midst. The deckhands are beside themselves and rescue-swimmer-deckhand has failed to jump in after his charge. The captain spots the commotion from the wheelhouse above; his hailer breaks through the roaring wind and panic: "Lookup guys, that was just a fish!" Sheepishly, the rescue-swimmer-deckhand looks above as I wave cheerfully to him. I shout over the whip of the wind, "So what happened to the part where you jump in after me?"

THE LADIES IN THE WATER

BY EMILY DEAN

I assisted a Master's student in their field research on the Muskegon River during my undergraduate degree at Grand Valley State University in Allendale, Michigan. The goal of the student's research was to evaluate how a diffuser system installed at Croton Dam on the Muskegon affected the growth and production of steelhead parr. We spent most of our summer days electrofishing stream reaches to sample parr. On a particularly hot day, many tubers were floating down the Muskegon in an attempt to beat the heat. We were approaching our last reach for sampling when we saw several women relaxing on tubes anchored to the bank. One of the women in the group spotted us pulling up on the opposite bank in our boat. She quickly threw her beer can and immediately submerged. The other women followed suit. We eventually found out that the women had decided to stop and go skinny-dipping on their tubing adventure. I think they were hoping we were just a fishing boat passing through, but this was not the case! Our sampling site was on the bank directly across from their party spot. When your samples can only be taken seasonally, every day in the field counts; there was no way we were going to skip this reach today! We ended up sampling for the next two hours with a flock of bobbing heads for an audience. To the Ladies in the Water, I'm sorry for the pruning!

A LIGHT IN THE DARKNESS

By Erin Tracy

My first field biology position out of college was working for the Bureau of Land Management in a tiny Nevadan town called Winnemucca. After graduation, I packed everything I owned in my car and started the 2,571-mile drive from North Carolina to the barren desert that would be my home for the next six months. This position often involved my crew and me camping in remote parts of the desert to conduct vegetation surveys (recording juniper and cheat grass over and over again), all for the noble cause of monitoring Sage Grouse habitat. To really get into the spirit of the desert, we all took turns reading Edward Abbey's Desert Solitaire, a nonfiction account of his time as a park ranger in the southwest. The pages describe a man on a quest to experience nature in its purest form, far from any man-made influences. Spurred on by his descriptions, everyone on the crew experimented with shunning our modern comforts in an attempt to commune with nature. In perhaps the most memorable of these ill-fated attempts, my crewmate decided one night that we should not use our headlamps to return to camp, but instead let the sky full of stars guide us. Of course, 10 minutes into our dark walk back from a nearby hot spring, we hear an unusual noise. I immediately turn my headlamp on to discover we are inches from stepping on a rattlesnake. The snake is frantically shaking its rattle to warn our ears of what our eyes could not see. This incident and countless others continue to illuminate that sometimes being at one with nature means taking the good with the bad, experiencing the beautiful sky of stars as well as the dangerous rattle snakes. And in those bad moments, I really want my headlamp.

The Challenges of Communicating Chronic Wasting Disease Research in Michigan

By Jonathan Cook, Noelle Thompson, and Jonathan Trudeau


Photo Credit: Jonathan Trudeau

Using science-based evidence to shift or change personal beliefs or behaviors can be difficult and ineffective. One needs to look no further than the myriad of cases in which science is discredited or ignored; prominent examples include the severity of climate change and the health risks of smoking. These examples highlight a communication problem in science where, despite incredible amounts of evidence, there is a failure to initiate change. In many cases, this lack of change results from poor communication and knowledge sharing and a lack of credibility between those generating knowledge and the segments of society that are most at-risk of experiencing negative outcomes. We in the Boone and Crockett Quantitative Wildlife Center (QWC) are working to improve communication and trust by actively involving community members in the scientific process, engaging in diverse public discussions, and becoming better storytellers.

Our Focus

Our work primarily focuses on chronic wasting disease (CWD), a fatal neurodegenerative disease that affects deer across the United States. In 2015, CWD showed up in our backyard when a sickly-looking doe was found wandering around a suburban neighborhood in Haslett, Michigan. Since then, the disease has been detected in six additional counties in the Lower Peninsula, as well as a recent occurrence in the western Upper Peninsula. The reason these discoveries are so concerning for Michiganders is that CWD is the source of science fiction nightmares. The protein causing the disease is nearly impossible to destroy and, once an animal becomes infected, CWD leads to "zombie-like" behaviors; blank stares, aimless wandering, and loss of fear of humans. At the population level, CWD has been shown to result in long-term declines of entire herds of infected deer.

In response to the growing threat that CWD poses to deer, we are working to develop ways to slow or stop the spread of disease. We are increasing our understanding of the human-mediated risks associated with long distance movement of disease and of deer behaviors that move disease across the landscape, and identifying effective management interventions for CWD. However, success will be heavily reliant on not only our scientific results, but also on our ability to communicate effectively to a diverse array of stakeholders. In fact, communication may be our greatest challenge because of the way the disease is currently perceived. Given the prolonged disease course and lack of observable mass die-offs that are characteristic of some other prominent wildlife diseases, there is a perception out there that "CWD does not kill deer", "CWD is a hoax", or "CWD is a natural condition of deer and not a disease". Therefore, in addition to furthering our understanding of how to combat CWD, we are also emphasizing the need for effective communication across diverse groups of people that may be interested or affected by this disease.

Left: A private landowner in Haslett, MI observing the collaring of a juvenile deer during the 2018 field season. Photo credit: Cory Highway

Citizen Participation in the Research Process

To understand deer behaviors, we are placing GPS collars on deer in central Michigan. These collars provide us with critical information about deer movement in the context of disease spread.

Support from our local community is essential: we rely on private landowners to grant us access to properties where we can collar deer. As one might expect, it can be challenging to convey the importance of this project and talk through concerns about the research, especially in suburban areas. To gain trust and support, we have actively involved landowners in our research by inviting them to watch the collaring process and report observations of collared deer. This empowers our cooperating landowners to feel invested in our research and provides them with the tools needed to communicate the importance of CWD research to their neighbors and friends.

Community Engagement

Deer farmers within the private cervid industry are a group with shared interests and concerns for white-tailed deer health, given that their livelihood depends on it. Understanding and acknowledging this group is critical; the QWC presents a research update each year at the Cervid Industry meeting, where over 100 farm owners around the state meet to discuss deer-related matters. We also work to communicate with another group of individuals who are critical to combatting CWD in Michigan: our hunters. We have actively engaged with many local hunting groups to communicate the focus of our research and why CWD represents a serious threat to the state's deer population.

Finally, we recognize that our research has wide reaching impacts across Michigan. Therefore, we broadly engage members of the public in our work, including those living in areas occupied by collared deer. We use a wide variety of tools to engage the public, targeting different segments of the community with tailored communication strategies. A large component of our community engagement efforts is focused on developing

Noelle Thompson presenting the QWC's research on CWD at the 2018 Joint Cervid Industry meeting in Gaylord, MI.

relationships and speaking directly with citizens to alleviate concerns about animal welfare. The collaring of deer can be controversial and we have found that proactively communicating and sharing face-to-face conversations with members of the public goes a long way in developing trust. Within the first year of our field study, we have discussed CWD and the benefits of our study with over 200 local residents. In addition to personalizing our messaging for individual audiences, we communicate our research through storytelling via popular media outlets. Television interviews, Facebook posts, newspaper articles, and being showcased on popular TV shows such as the Outdoor channel's "Wardens" have allowed us to reach a broader audience and capture the interest of individuals that are not directly impacted by CWD or our local research. Moreover, we have found that diverse communication strategies improve people's understanding of the science behind the research, particularly when it is tied to a story that they can relate to.

Conclusion

Today's scientists are faced with the challenge of addressing a non-scientific community who has vast amounts of information available to them, but who often rely on information that has little scientific merit. Communicating the importance of CWD research can be daunting when portions of your audience believe the disease is a "hoax." The QWC has addressed this challenge by using multiple approaches when sharing our research with others. By personalizing our communication strategies for each stakeholder group and highlighting how this disease directly affects them, it is possible to shift predefined notions about CWD. Though we are not likely to change every mind, educating people about our research through well-thought out communication plans and diversified efforts allows us to reach out more effectively and to a larger audience. In fact, within our first field season we have noticed greater receptiveness within the community as a direct result of our diverse outreach approach. Landowners previously opposed to our study now enthusiastically provide our research team with access to their property. As a result of this greater receptiveness and general awareness of our research, we went from having 7 to 30 participating landowners during our first season.

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Department of Fisheries & Wildlife Fellowship Awards

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

Emily Dean

Advisor: Dr. Dana Infante

Graduate Program: Fisheries and Wildlife, Ph.D.
Graduate Research: Migratory fish species are unique compared to non-migratory fishes because they require access to two or more distinct habitats to complete their life cycles. Ensuring that multiple habitats are suitable and that access between habitats exists can make the job of conserving migratory fishes challenging. The goal of my research is to understand the condition of, and limits to, freshwater migratory fish habitat in the United States as well as identify opportunities for habitat conservation.
Motivation to Apply: I used the funds to attend and present my research at the 2018 American Fisheries Society (AFS) Annual Meeting. I also received feedback from regional fish experts on a database that I created to integrate information on migratory life histories of North American freshwater fish species. The database can help in identifying habitat needs of many migratory species, ultimately aiding in their conservation.
Benefits of Fellowship: The funds supported my attendance at the 2018 AFS Annual Meeting, where I gained insights on different perspectives for habitat conservation. I established a network of professionals that will facilitate my professional development and provide opportunities for advancement of my career in the future.

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

Ciara Hovis

Advisor: Dr. Jianguo (Jack) Liu
Graduate Program: Fisheries and Wildlife, Ph.D.
Graduate Research: Impacts of global trade on biodiversity.
Motivation to Apply: I applied for the Vera M. Wallach grant to fund my second field season in Northeast China, where I study birds and agriculture. Specifically, I study how global trade has influenced many farmers to abandon soybeans (which are imported in astronomical amounts from the United States and Brazil) in favor of growing other crops like rice and corn, as well as altering their field size and mangement. I aim to understand the implications of these changes in the agricultural landscape for bird biodiversity as well as the ecosystem.
Benefits of the Fellowship: As a result of being awarded this fellowship, I was able to fully fund my second field season in Heilongjiang, China to gather the data I needed to address my research questions. Additionally, I was able to continue to foster my collaboration with the Chinese Academy of Agricultural Sciences in Beijing, China and established partnerships with several Chinese scholars.

Steven Gray

Advisors: Drs. Gary Roloff and Robert Montgomery
Graduate Program: Fisheries and Wildlife, Ph.D. and Ecology, Evolutionary Biology and Behavior Program
Graduate Research: I study the behavior and spatial ecology of wild pigs in Michigan. My research focuses on understanding the ecology of this species and informing effective management strategies in northern systems of the United States.
Motivation to Apply: I felt that the aims of the Vera M. Wallach scholarship closely aligned with my personal interests and goals. My project revolves around an invasive species (wild pigs) that pose risks to a variety of native flora and fauna. Therefore, one of the primary motivations of my research is to inform management techniques that will ultimately protect and preserve Michigan's natural resources.
Benefits of the Fellowship: I am honored to be a recipient of this scholarship. This funding allowed me to travel to and present at a national conference and pursue additional professional development opportunities.

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

Amanda Dolinski

Advisor: Dr. Jen Owen

Graduate Program: Fisheries and Wildlife, Ph.D.
Graduate Research: Analysis of the intrinsic factors responsible for variation in avian influenza viral load in wild ducks.
Motivation to apply: I applied for the Hal and Jean Glassen Conservation Medicine Fellowship because I appreciate an organization that values wildlife disease ecology. I am very grateful to be a recipient of this award, and also thankful to the foundation for consistently supporting wildlife disease ecology students at MSU.
Benefits of Fellowship: These funds will be used to support my graduate work and travel expenses to international conferences where I will share my research.

The Janice Lee Fenske Excellence in Fisheries Management Fellowship honors the first female fisheries biologist with the Michigan DNR, Jan Fenske. It is designed to facilitate interactions of graduate students with agency professionals through the implementation of a fisheries project.

Katie Kierczynski

Advisor: Dr. Brian Roth

Graduate Program: Fisheries and Wildlife, M.S.
Fenske Mentor: Dr. Dave Fielder, Michigan Department of Natural Resources (MDNR)
Motivation to Apply: I was motivated to apply for the Fenske Fellowship because it allows me to see the inner workings of the MDNR and how management decisions are made. I was also excited for the opportunity to network with professionals while working on an important project.

Fenske Project: Chinook salmon equivalents are sometimes used in management to compare Great Lakes predator consumption and guide stocking decisions. The methods and data sources behind the equivalents have not been well documented. My project is to document the past methods and data sources behind Chinook equivalents and look at the strengths and weaknesses of each. The project will help me to understand how stocking decisions are made in the Great Lakes and what information is needed to make them.
Lessons Learned: I now understand how research, management, and stakeholder groups fit together in decision making through discussions with professionals and attendance at Citizens Advisory and Technical Committee meetings.
Application Beyond Fellowship: The Fenske Fellowship has allowed me to look at the inner workings of the MDNR and see how practical issues in the fisheries field are handled while gaining valuable connections in the Great Lakes region.

Sam Betances

Advisor: Dr. Dana Infante

Graduate Program: Fisheries and Wildlife, M.S.
Fenske Mentors: Todd Wills and Jan-Michael Hessenauer, MDNR
Motivation to Apply: My previous work experience with natural resource management agencies was incredibly rewarding. The hands-on management approaches of state and federal agencies appeals to my interest in directly protecting the environment, and my career goal is to work for an agency after my M.S. The Fenske Fellowship is a wonderful opportunity to make connections with managers and gain an understanding of how agencies operate.
Fenske Project: My project focuses on expanding the utility of habitat data collected by MDNR's Stream Status and Trends Program. Currently, MDNR collects a variety of habitat variables from streams throughout Michigan. My project aims to identify new opportunities for MDNR managers to use habitat data in decision-making, including proposing applications for the data that have been used successfully in other programs.
Lessons Learned: My fellowship experience is just beginning, but I've already learned so much! My mentors Jan and Todd have given me a variety of advice on my project as well as how to catch a Chinook or two! I've also been lucky enough to attend MDNR meetings, which have given me insights on how decisions are made and steps that must be taken to address management concerns.
Application Beyond Fellowship: I am excited to apply what I learn from my Fenske experience to my future career as an agency biologist. Through this fellowship, I will learn skills that I can draw on through my career in public service.

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

Claire Hoffmann

Advisor: Dr. Robert Montgomery
Graduate Program: Fisheries and Wildlife, Ph.D.
Graduate Research: My graduate research centers on spatial patterns of conflict between humans and carnivores in East Africa. I am particularly interested in how factors like landscape features, human behaviors, and weather patterns can drive these patterns at a fine spatial scale.
Motivation to Apply: This fellowship helped support my field costs.
Benefits of the Fellowship: I was able to travel to Tanzania and Kenya this summer to conduct my first round of data collection. The funds were invaluable in supporting my living expenses and a wide variety of unexpected research expenses that cropped up while I was there!

Remington Moll

Advisor: Dr. Robert Montgomery
Graduate Program: Dual Ph.D. in Fisheries and Wildlife and Quantitative Biology
Graduate Research: I study the spatial ecology of wildlife communities, especially those that interface with humans and urban areas.
Motivation to Apply: I resonate deeply with the three core values of this fellowship - conservation, community service, and leadership. As a lifelong city-dweller, I am passionate about applying these values to conserve wild spaces within urban areas and help people learn about wildlife in city parks.
Benefits of the Fellowship: This funding allowed the launch of a new study throughout an urban park system in Cleveland, Ohio. This study is monitoring the prevalence of Lyme disease and evaluating the role that predators have in controlling the spread of this disease.

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

Andrew Carlson

Advisor: Dr. William Taylor
Graduate Program: Fisheries and Wildlife, Ph.D. and Ecology, Evolutionary Biology and Behavior Program
Graduate Research: Effects of climate change on stream trout growth and survival in Michigan streams; fisheries as coupled human and natural systems.
Motivation to Apply: Inspiration to continue Dr. Ball's legacy in limnology and fisheries; desire to study reciprocal human-environment interactions in aquatic ecosystems to enhance social-ecological knowledge and advance fisheries management.
Benefits of the Fellowship: Gratitude for the people who make graduate education possible, especially donors and academic advisors; opportunity to conduct research with implications for how fisheries are managed; freedom to research fisheries as coupled human and natural systems with peace of mind regarding travel costs, publication expenses, etc.

Katelyn King

Advisor: Dr. Kendra Cheruvelil
Graduate Program: Fisheries and Wildlife, Ph.D.
Graduate Research: My research focuses on understanding nutrient concentrations and fish diversity among lakes and streams at broad spatial scales. Specifically, I am interested in the role of connections between different freshwater types in shaping fish communities.
Motivation to Apply: My research is a unique combination of limnology and fisheries, which embodies and builds upon the limnology research that Dr. Robert Ball undertook during his life.
Benefits of the Fellowship: This will help cover some of my expenses so I can focus on my research. Specifically, I hope to meet with agency personnel to become familiar with my data sources, increase my professional collaborations, and participate in field sampling with local agencies. I am very grateful to the Ball family for providing this award.

Photo Contest
Second Place

Field Work
Jacalyn Beck

Science and Community
Joel Betts

Scenery
Chris Henderson

Flora and Fauna
Aimee Baier

Winter Scenes
Katie Kierczynski

FW SPOTLIGHT

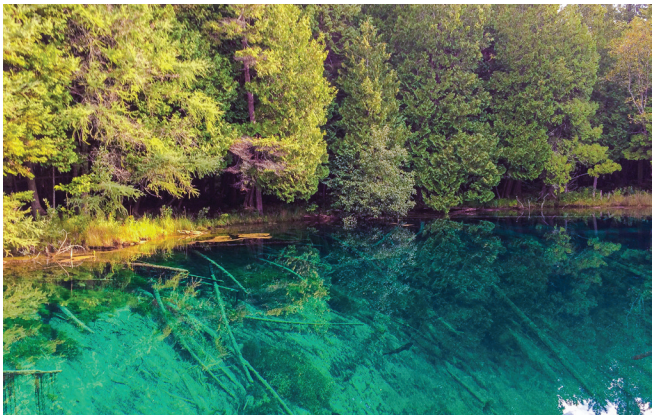
DEPARTMENT OF FISHERIES & WILDLIFE
MICHIGAN STATE UNIVERSITY
480 WILSON ROAD
EAST LANSING, MI 48824

Photo Contest Winners

Winter Scenes
Claire Hoffman

Science and Community
Katie Kierczynski

Scenery
Sarah Burton



Flora and Fauna
Jacalyn Beck

Field Work
Katie Kierczynski

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