

2025

MSU Fisheries and Wildlife

# SPOTLIGHT



# SPOTLIGHT

is written, designed, and edited by Michigan State university  
Department of Fisheries and Wildlife Graduate Students

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Cover photo: Morning at Pilanesberg National Park in South Africa by Christopher Potter

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## LAND ACKNOWLEDGEMENT

Michigan State University occupies the ancestral, traditional, and contemporary lands of the Anishinaabeg – Three Fires Confederacy of Ojibwe, Odawa, and Potawatomi peoples. In particular, the university resides on land ceded in the 1819 Treaty of Saginaw. We recognize Michigan's 12 federally recognized Native Nations, historic Indigenous communities in Michigan, Indigenous individuals and communities who live here now, and those who were forcibly removed from their homelands. In offering this land acknowledgment, we affirm Indigenous sovereignty, history, and experiences.

Spotlight recognizes that this land acknowledgment does not absolve the actions of settler-colonialists who founded this institution. It does not absolve the continued occupation of Native lands, nor the continued utilization of Native lands for our department's research endeavors. We urge our department to develop an action plan of things to do that support living Indigenous peoples' sovereignty to accompany land acknowledgments. In the meantime, readers can donate to MSU's American Indian and Indigenous Studies at <https://aiis.msu.edu/donate/>.



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**SEPTEMBER 12 & 13, 2025: SAVE THE DATE!**

**MICHIGAN STATE UNIVERSITY  
DEPARTMENT OF FISHERIES & WILDLIFE**



**CELEBRATION**

**ALUMNI, FACULTY, STAFF, STUDENTS, PARTNERS & FRIENDS ARE ALL WELCOME!**

# Letter from the *Chair*



*Dr. Dana Infante*  
*Department*  
*Chair and*  
*Professor*

Welcome to the Spring 2025 edition of Spotlight magazine! I've had the privilege of serving as Chair of the Fisheries and Wildlife Department for just over a year. Without a doubt, this has been a year of extremes in terms of challenges we've faced but also due to some of our achievements. I'll speak to those next, but I'll first share that in September, our colleague and friend Dr. Chris Vandergoot passed unexpectedly.

Chris was an FW alum and an FW faculty member working closely with the Great Lakes Fishery Commission (GLFC). Since 2019, he served as the director of the Great Lakes Acoustic Telemetry Observation System (GLATOS). His innovative contributions to the field of fisheries management made global impacts, and his research is highly valued by scientists and anglers alike. Chris was a husband and father, a scientist, mentor, teacher, colleague, and friend to many. His passing leaves a void in our workplace and in our lives. Multiple individuals have honored Chris by stepping up and assisting with his work in his absence, and I'm grateful that the FW community has come together to honor his memory in this way. We miss him dearly.

In terms of achievements, FW has much to be proud of. In August, we held a productive faculty retreat which set the course for the academic year. Six new faculty members joined FW in 2024 and 2025: Dr. Katie LaCommare, Dr. Jeremy Hartsock, Dr. Maria del Mar Mancha Cisneros, Dr. Jared Homola, Dr. Sam Brunner, and most recently, Dr. Mauri Liberati. Former Chair Dr. Gary Roloff deserves credit for establishing those positions and leading our department through a time of growth and expansion! As an additional success, a committee of faculty, staff, and students reinvigorated the FW Seminar Series, and we brought five world-



-class scholars to MSU this year. We scheduled weekly coffee hours, a time to step away from work and connect with each other, not to mention a time to sample delicious baked goods! Our undergraduate student body was as large as it's been in recent years, with approximately 250 students enrolled, thanks in part to the introduction of four new majors. Multiple faculty and staff have been honored with awards this spring. Special recognition goes to Jill Cruth for the Dean's Award of Distinction for Staff, Travis Brenden for the You Belong Here Faculty Award, Daniel Hayes for the CANR Excellence in Teaching Award, and Alexa Warwick for the CANR Global Scholar Award. We've celebrated defenses of multiple graduate students throughout the year, and in May, we celebrated graduation for both undergraduate and graduate students. And let's not forget our committed Graduate Student Organization who put this great publication together! Community is the key to all of these achievements, and we couldn't do what we've done

without effort, commitment, and camaraderie from across FW!

In the coming year, we'll be celebrating an additional achievement; 2025 marks our 75th anniversary as a department. We'll soon be contacting you to save the date for September 12 and September 13, 2025. Please consider joining us for this important celebration – it's meant not just for current faculty, staff, and students, but for our alumni, stakeholders, friends, and families! While the 2025-26 academic year may bring its share of challenges, we'll kick it off with this important event commemorating the FW community and setting the stage for a great year ahead! The following pages of this year's Spotlight will provide you with a sample of the amazing and vital contributions of our students, faculty, and staff. Thank you for being interested in our department and for being a part of our community! Please enjoy this issue of Spotlight!

*Dana Trifante*

**This edition of Spotlight is lovingly dedicated to Dr. Chris Vandergoot.**



# SPOTLIGHT ON FELLOWSHIPS

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



**Nick Boucher**

Program: PhD Fisheries and Wildlife

I was honored to be selected for the Robert C. and Betty A. Ball Fisheries and Wildlife Fellowship last spring. My dissertation focuses on integrating fish tracking data from acoustic telemetry into the sustainable management of Great Lakes fishes. Funds from this award allowed me to travel to Sandusky Ohio and Genoa Wisconsin to capture video footage demonstrating proper implantation of acoustic telemetry transmitters and to produce training videos for researchers who are developing their own telemetry projects. This award also supported my travel costs associated with attending the Ocean Tracking Network Symposium in Halifax, Nova Scotia in the fall of 2024.

Marinna hails from the verdant Sasquatch habitat that is the Pacific Northwest. She is a Ph.D. student working with Dr. Mark Axelrod. Her research interests center around human adaptation strategies around environmental change in the context of Great Lakes fisheries and beyond, with an emphasis on working with Indigenous communities. She's interested in exploring power relations across all levels of natural resource management as well as developing effective science communication strategies. In her spare time, Marinna enjoys practicing the art of cat photography and making abstract sound compositions.



**Marinna Guzy**

Program: PhD Fisheries and Wildlife

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



**Nick Alioto**

Program: PhD Fisheries and Wildlife

Nick is originally from Ontario, Canada. He obtained his BS in 2016 from Bishops' University in Quebec, Canada. Currently he is a PhD student at MSU where he studies the migration of Red-tailed Hawks in Michigan. This project is in collaboration with the Red-tailed Hawk project and the Mackinac Straits Raptor Watch. Nick has been working on migration related projects since 2016 and specifically with Red-tailed Hawks since 2019.

*Carly Andrews, M.S. was also awarded the Joseph Laurence Maison Fellowship for Wildlife Conservation.*



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



**Kristen Hirst**

Program: PhD Fisheries  
and Wildlife

I am a second year PhD student in the Fisheries and Wildlife department specializing in disease ecology and conservation medicine. I've spent most of my life in central Missouri, focusing on my interests in wildlife conservation. After graduating, I began working in conservation as a wildlife disease technician and fell in love with the study of wildlife disease. I earned a master's in 2023 studying the impact of zoonotic diseases on wildlife. My current research focuses on the impacts of hemorrhagic disease on deer populations. Broadly, I'm interested in conservation biology, with special interests in wildlife disease management, One Health concepts, and disease epidemiology.

Gia recently finished her Master's degree in the Fisheries and Wildlife Department with a focus on the human dimensions of disease spread in the amphibian pet trade. She was advised by Dr. Alexa Warwick. They are extremely honored to have been selected for such a prestigious fellowship. This fellowship has aided in their equipment for statistical analysis and has been an invaluable aide in financial piece of mind. After receiving her Master's, Gia continued in the department as a PhD candidate. Broadly, she hopes to continue building her skills as a community-informed, human dimensions specialist to better preserve and protect natural resources.



**Gia Haddock**

Program: MS Fisheries  
and Wildlife

The **Annual Ambrose Pattullo Fund for Environmental Issues Graduate Fellowship for Literary Work** is awarded to students interested in current environmental issues.



**Morgan Doherty**

Program: PhD Community  
Sustainability

Morgan is a lifelong Lanstronaut, former public librarian, and current coordinator for MSU's Gender and Sexuality Campus Center. They have been a founding member of Tender Heart Gardens, a queer and trans gardening collective in Lansing, since 2017, and they have been on the planning team for the Great Lakes Queer Farmer Convergence since 2023. Their research in Community Sustainability under Dr. Lissy Goralnik focuses on queer and trans relationships to non-human nature.

*Read Morgan's Patullo piece in the Spotlight 2024!*

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



**Nick Manning**

Program: PhD Fisheries  
and Wildlife

My research focuses on the environmental impacts of international agricultural trade on ecosystems across scales. My main motivation to apply for the fellowships I received was to help cover travel costs to various conferences and project meetings. The input of experts in multiple subjects benefits and strengthens this research, and traveling to work with and learn from them has been incredibly rewarding. At these venues, I was also able to help host several different events, such as workshops and poster/paper sessions, which provided spaces for valuable interdisciplinary collaborations to evolve. The support provided through these fellowships is greatly appreciated.

*Gabby Nielson, MS, also received the Vera M. Wallach Fellowship.*

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

Justin Miller is a third-year doctoral student in the Fisheries & Wildlife department. He is based in the Aquatic Landscape Ecology Lab advised by Dr. Dana Infante. Justin's research is focused on managing freshwater ecosystems for resiliency in changing climate. To conduct his work, Justin utilizes a variety of methods, such as field-based data collection, ecological modeling, machine learning, interviews, and surveys. His projects are based on the Au Sable River watershed and metro Detroit. Regarding the Au Sable River, Justin has collected over two years of temperature data across the watershed and is currently developing summer temperature models to understand current and future conditions. In metro Detroit, he is interviewing experts to identify priority species that would benefit from habitat that is created through green infrastructure to mitigate flooding. Justin was motivated to apply for these fellowships to provide the resources needed to take part in additional programs and meetings. Specifically, Justin was admitted to the Great Lakes Leadership Academy and these fellowships provided enough funding to cover tuition for the program. Additionally, Justin was able to attend the Symposium on Urbanization and Stream Ecology, an event that only takes place every three years, in San Juan, Puerto Rico.



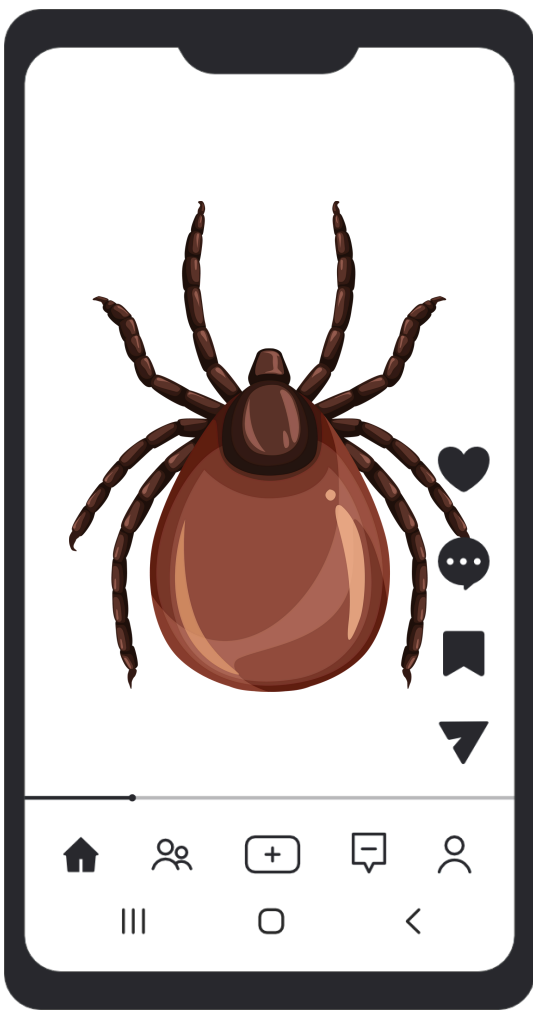
**Justin Miller**

Program: PhD Fisheries  
and Wildlife

Justin also received the **John Peters and Marietta Peters Endowed Fellowship** which recognizes a graduate student who seeks a career in aquatic biology related to fisheries and wetland resources.

Sydney Waloven, Nick Manning, and Justin Miller also received **Theodore Roosevelt Conservation and Environmental Leadership Fellowship**, which enables graduate students from a variety of disciplines to build their leadership capacity early in their career.





# TICK TALK:

## Using social media to raise awareness of ticks and tick-borne diseases

By Michelle Volk

When the world shut down in 2020, the more energetic of us explored new hobbies and dug up old pastimes, from baking bread to roller blading. Once I became disenchanted by daily two-hour walks and one too many failed sourdough loaves, I decided to take on a new venture: science communication on social media. I had never been that active on social media, tending to be a consumer of content rather than a producer, but I soon found that there was a market and an unexpected audience for the videos I started to make.

I study ticks and tick-borne diseases, specifically the tick and bacteria that cause Lyme disease. When I started doing this research, I quickly realized that direct engagement with the public goes hand-in hand with this field. While

collecting ticks, I am frequently stopped by hikers and asked question after question about what I am doing and why. These experiences inspired me to take this type of communication to TikTok, where I reasoned that I could reach a broader audience than just the strangers that I meet in the woods. The coincidental pun of a “tick TikTok” also helps to attract attention and adds an air of levity to the page.

I make videos about tick prevention (wearing insect repellent, performing daily tick checks, etc.), research and field work, and slightly more facetious and glib quips about being in graduate school. I particularly love demonstrating proper tick attire, which includes long sleeves, close-toed shoes, and the best of tick prevention’s haute couture: pants tucked into socks. One of

my more popular videos features me kneeling in winter forest denuded of foliage, recording adult ticks crawling on bare branches as I tried to stay upright and avoid falling into the thick layer of leaf litter. That shaky video garnered over a million views (an unfathomable number) and hundreds of comments ranging from “Ew!” to “That’s so cool!” to questions about tick safety, tick-borne diseases, and why in the world I was trying to find ticks on purpose.

One of the most common questions I get on my videos is why ticks and tick-borne diseases are spreading and becoming so common. Ticks have been increasing in geographic range over the past several decades for many reasons, including reforestation, habitat change, increasing deer populations, and climate change. This pattern is not unique or unobserved in other systems, as climate change and habitat alteration are common causes of shifts in the natural mechanisms that we have come to expect. I’ve found that some people are genuinely scared of the increasing risk of tick bites, and that fear is preventing them from participating in outdoor activities; however, I believe it removes some fear of the unknown to elucidate the ecology of invasion and infectious diseases in an accessible, easily understandable way. I’ve also shown the MDHHS Lyme Disease Risk Map<sup>1</sup> to demonstrate where and how ticks have spread across Michigan over the last several years. Maps like these are powerful tools as visual aids for describing where disease risk is, especially in the case of tick-borne diseases where the most effective prevention is measures taken by the individual. While I’ve seen this serve as a startling wakeup call for some, it can also be an impetus for taking preventive measures if you live in the “hot zone,” as a hiker once told me.

Today, misinformation and disinformation per-

*“When someone goes from an unawareness or misunderstanding of ticks to knowing the tangible steps to prevent a tick bite, they have astronomically reduced their risk of contracting a tick-borne disease.”*

vade social media, preying on conspiracy theorists and those who, through no fault of their own, lack the scientific literacy some of us are privileged to have. “Scienceploitation,” coined by public health professor Tim Caulfield, refers to the trend where media reporting takes credible science and warps it inaccurately to simplify it for the public; this is often seen in “click-bait” articles, whose headlines are so outrageous that one cannot resist clicking to learn more. Deceptive claims can be innocuous but can also result in negative health outcomes and the refusal of medical treatment.<sup>2</sup> The purpose of science communication is to disseminate what has been rigorously studied and peer-reviewed in a way that is accessible and intriguing to the public as well as to battle the misrepresentation of attention-grabbing claims. On TikTok, I find myself often busting the frightening myth that ticks can jump or fly, which I’m sure lends some relief. Unfortunately, I also experience some push back when I try to refute myths or misunderstandings, showing the deep-rooted mistrust of science that also exists in the media.



The most impactful part of my experience as a science communicator on social media has been my realization that the vast majority of people ask what I consider to be basic questions about tick prevention: how to avoid ticks, what to do with a tick bite, etc. These questions are easy for me to answer, but that does not lessen their importance. When someone goes from an unawareness or misunderstanding of ticks to knowing the tangible steps to prevent a tick bite, they have astronomically reduced their risk of contracting a tick-borne disease. This is no small thing, as tick-borne diseases can be life-altering and even fatal; given the current state of the world, I often find myself confirming to people that yes, ticks are a fact of life now, and we need to adapt to the reality of the interconnectedness of human, animal, and environmental health.

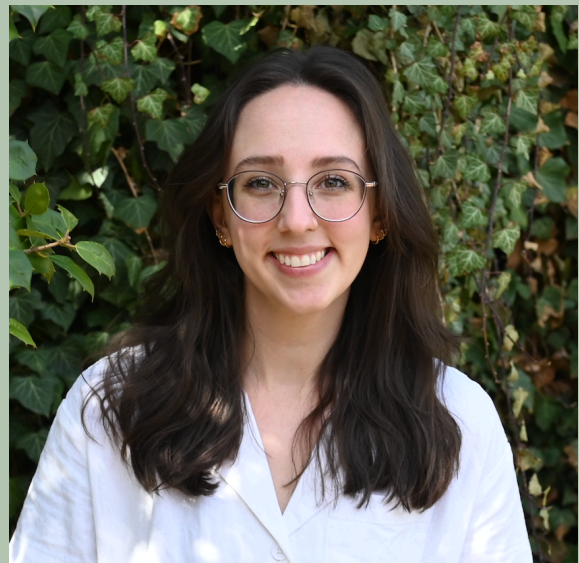
Science communication is a powerful tool for dissemination and should continue to be used as climate change and other anthropogenic consequences change our world. Social media has the potential to democratize communication and serve, not only as a vehicle for public health and risk reduction, but also, as an instrument to empower by providing knowledge for which there is a clear demand. This is evident to me based on the engagement and conversations I have on TikTok but is occurring in other media as well. Science podcasts are becoming more popular, including the infectious disease podcast “This Podcast Will Kill You” and Ali Ward’s Ologies, which shows that science communication to a large audience is not only possible, but is highly successful and valued.

I look forward to seeing how science communication can be used to directly combat tick-borne diseases through education and prevention, as we are unlikely to see a reduction


in ticks any time soon. Until then, I will continue to spread the word about tick prevention and accept that I am that girl on TikTok who likes to talk about ticks. Whenever I feel discouraged about the difficulties of trying to communicate science on the internet, I try to remind myself that I will have made a difference if I can get one more person to tuck their pants into their socks.

1. [https://www.michigan.gov//media/Project/Websites/emergingdiseases/Folder2/Lyme\\_risk\\_map2020.pdf?rev=2643a33acd9a4bd5aed0788cc421f129](https://www.michigan.gov//media/Project/Websites/emergingdiseases/Folder2/Lyme_risk_map2020.pdf?rev=2643a33acd9a4bd5aed0788cc421f129)
2. Johnson, S. B., Park, H. S., Gross, C. P., & James, B. Y. (2018). Complementary medicine, refusal of conventional cancer therapy, and survival among patients with curable cancers. *JAMA oncology*, 4(10), 1375-1381.

*Michelle Volk is a fifth year PhD student advised by Jean Tsao. She is studying the genetic diversity of the Lyme disease bacteria in blacklegged tick populations across Michigan.*







# PLANES, TRAINS, AND AUTOMOBILES (AND SHIPS!) *CONNECTIONS ACROSS A GLOBALIZED WORLD*

On a recent plane ride, I was not feeling well and ended up looking out the window for much of the flight. While I was feeling guilty about completing fieldwork that expels many tons of CO<sup>2</sup> and other gases through my research travel, I noticed (not for the first time) the peculiar way we have designed our cities in America. While looking out my window, I saw the beautiful Great Lakes, where so many of us live and work, and which provide us with abundant natural resources. Hovering above the cloud cover of a winter sunset and snow-covered fields, I also noticed roads snaking across the landscapes, connecting fields and homes, but also demonstrating the conversion from old growth forests to highway construction that started occurring in the 1830s. Later on in the trip, I looked out my window again, and we appeared to be soaring over what looked like roadless wilderness.

The environmental issues that I spend most of my time considering are climate change, the impacts of

tourism, and effects of species invasion. All three topics are intimately connected to each other; each presents challenges, but also opportunities. These three research areas have a common intersection: the same one that I noticed on that flight to Alaska. This connection is transportation.

Transportation connects us all to each other and to the many modern comforts that we have today. We can open an application on a smartphone, tap a screen a few times, and food magically appears at our door. Similarly, we can type the name of a location we want to visit thousands of miles away, book a few tickets, and can be hurtling through the air, over roads or train tracks toward that location. You want to have a piece of silicone, shaped like a pig, that will also separate egg yolks for you? Fear not, it is available on eBay for only \$11.99. Almost anything and everything that we could ever want is out there on the Internet. This is exceedingly helpful for scientific endeavors, as we have all the tools we need to make pretty cool advancements.





*BY MICHELE REMER*

However, these fantastic technological advancements mask all the environmental issues and high costs that our modern conveniences afford us. For example, there are 2.8 million miles of paved roadway in the U.S., requiring extensive time, money, and labor to maintain. Trucks and ships bring us seemingly unlimited goods along these roads and established oceanic routes, and we have developed efficient routes and lightweight packaging materials to cut costs. You would think that with these efficiencies, we would have a reduction in environmental impacts. However, our engineering colleagues have found that whenever they make improvements to fuel economy in cars to reduce emissions or produce ever more lightweight plastics, the pesky rebound effect occurs, and we start to drive our cars farther than we did before and buy more of these cheaper goods. This flurry of activity has caused greenhouse gases to soar into the atmosphere, like we wanted to set a new planetary record for who could melt polar ice the fastest. These emissions are the main driver of an-

thropogenic climate change.

Now, you may be wondering how tourism and species invasion relate to climate change and transportation. Well, in my research, I seek to understand how tourism will impact the Arctic, and with the melting of sea ice, increased tourism is already occurring. But more broadly, even though tourism contributes to environmental degradation through the burning of fossil fuels, it also has many benefits. It allows us to visit a new place after we've been working our (potentially) dead-end jobs for countless hours, giving us precious cultural enrichment through time away from our desks. Tourism also provides us with cultural exchange opportunities that we do not receive elsewhere. Visiting new places often stimulates the local economy. A few years ago, a global study in our lab found that tourists to protected areas were more likely to visit areas that had high biodiversity. We all want to see the interesting wildlife beyond our backyard; nature is amazing at connecting people



across boundaries. Tourism also can provide more income to local communities; for example, in the Wolong Nature Reserve in China, increased income for the residents of the reserve helped them to decrease their fuelwood consumption, resulting in more available habitat for the giant pandas that reside there. However, in the Arctic (my study region) the increase in tourism has raised concerns for locals, as cruise ships, along with other increased shipping in the region, have led to worries about impacts on local livelihoods and ocean and coastal habitats. At the same time, over 2 million visitors traveled to Alaska in 2018, mostly on cruise ships. This has had an enormously positive impact on Alaska's economy: tourism employs many people and local businesses thrive. With climate change, these tourists are also moving further north. Increased shipping and a warming climate mean that there is a perfect storm for non-native species to be transported to the state and introduced to a new location, which may contain a perfect niche for them to fill. After the introduction, they can then establish a population by multiplying rapidly with all the abundant resources that Alaska has to offer. And once the spread occurs? It is officially invasion time! Most tourism typically takes place from nearby areas; however, people who visit the Arctic come from far away due to its remoteness. In a pilot study where we surveyed Alaskan visitors (mostly cruise ship passengers), we found that visitors traveled from 16 different countries besides the United States and 35 states outside of Alaska. In addition, many visitors had been to multiple countries in the past year. This



leads to spillover effects, such as invasive species. We also asked visitors if they had equipment they had used in other locations, to determine if there was a risk of transporting invasives to Alaska through their travels. These results were more inconclusive due to a lower response rate because our question was too complicated. So we will be improving that in the next round of the survey (thank goodness for pilot studies, right?).





With climate change, these three connections can collide further. The Arctic has been warming at rates four times faster than the rest of the world. This means that increased shipping will allow not only more tourism to occur, but also for more goods to reach the Arctic, which will likely enable more infrastructure to be built, further increasing the complexity of these interactions. And since polar environments are sometimes seen as the last remaining wilderness areas in the world, it is a rather large concern. So there you have it—a trifecta of environmental issues that is currently occurring in the Arctic, but is also occurring, with different degrees of intensity, in locations across the world.

Perhaps you can tell from reading this far into my essay, I've been told I can be a bit pessimistic about the state of our modern world. However, even with these challenges, I remain optimistic. For the environmental issue of climate change, we have some of our greatest minds tackling it from different directions: researching the best ways to communicate climate science, discussing building

towns with less reliance on cars, and streamlining energy efficiency in households, businesses, and data centers. We also have already lowered the price of generating solar and wind power immensely compared to the turn of the century, and the price of batteries to store this power is also dropping. Tourism has environmental drawbacks, but I believe that we will continue to ensure a more equitable distribution of its economic benefits and find creative ways to mitigate our impact while visiting new and amazing places. Invasive species currently have many vectors for spreading to new habitats, but we can address the issue across the main phases of the invasion process through technologies like anti-fouling paint. Other creative solutions are also available; a local Michigan brewery named one of their craft beers after an invasive crayfish to bring awareness to consumers. Through both systemic change and individual choice, we can all work to reduce our collective burden on the environment. After reading this article, you are now better equipped to consider transportation choices that will benefit both people and the planet.



*Michele is a third year PhD student in Jack Liu's lab and is completing a dual degree in Environmental Science and Policy. When she's not studying Arctic tourism and invasive species, you can find her biking, hiking, or reading.*



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# SMELLS LIKE HOME:

EXPLORING IMPRINTING IN CISCO  
BY HANNAH GILL

Smells can take us back to special memories from childhood. The smell of cut grass may remind us of summer days playing outside or the aroma of freshly baked cookies may bring back memories of baking with family during the holidays. Fish, too, can remember smells they encountered during early development and use memories of these odors to locate their natal spawning grounds as adults. Adult salmon spawn in freshwater habitats (rivers, streams, and lakes) along the Pacific coast. Young salmon hatch and imprint or form memories of

the distinct odors of their natal waters before migrating into the ocean. The odors salmon imprint to may come from a variety of sources such as other animals, microbes, plants, soil, and rock. Juvenile salmon leave their natal waters and migrate to the ocean to feed on abundant food resources and grow. Once mature, the salmon will migrate from the coast back to their natal waters to spawn using imprinted odor cues to help navigate through the freshwater portion of their migration.



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Imprinting is important to the reproductive success of Pacific salmon. Olfactory cues help fish home to suitable spawning habitat and locate potential mates, increasing their reproductive success. Additionally, imprinting leads to the development of genetically distinct populations. The olfactory cues help guide fish from the same population back to the same spawning grounds, leading the populations to become reproductively isolated and genetically distinct from other populations. These populations develop localized adaptations to their natal habitat. For example, in sockeye salmon males tend to have large dorsal humps to attract mates, but sockeye salmon that spawn in shallower rivers tend to lack large dorsal humps to avoid detection from brown bears. Research on imprinting helps us understand what cues are important for salmon spawning site selection and how genetically distinct populations are maintained.

Several other fish species have been thought to imprint, including lake sturgeon, lake whitefish, and arctic grayling. However, many of these species have very different life history strategies from salmon. Therefore, it is challenging to apply the salmon model of imprinting to these fish. Most Pacific salmon species only spawn once and then die shortly afterwards, but many species suspected of imprinting spawn multiple times during their life, like lake sturgeon. It would be extremely difficult to conduct a study assessing the behavioral response of adult sturgeon to odors they were exposed to as larvae because they can take over 20 years to sexually mature. There is the potential for the odors of natal habitats to change from time of imprinting to time of spawning or even between spawning events. Potentially, these other species refresh their memory of the odor cues each time they spawn, and/or rely on additional cues to guide them to their natal site. Imprinting is often associated with the parr-smolt transformation stage in Pacific salmon species. This is a developmental period at which they imprint would need to be

-studied.

My research seeks to understand if cisco (*Coregonus artedii*) can imprint. Cisco were once among the most abundant fish species in the Great Lakes. Populations have since declined drastically between the 1920s and 1970s, largely due to overharvesting, as well as invasive species and habitat destruction. Cisco serve as prey to many predatory fish, such as lake trout, and can provide valuable recreational and commercial fisheries, making them a priority of fisheries managers to restore in the Great Lakes. Stocking has been deemed necessary for restoring cisco populations. For stocking efforts to be successful, stocked fish need to survive to adulthood and return to the sites they were released to spawn. Ideally, these stocked individuals will reestablish self-sustaining populations at these spawning grounds. If fish stray from the release sites, they may spawn in unsuitable habitat, not locate potential mates, and fail to reproduce. Additionally, there are concerns that stocked fish may stray and spawn with wild fish and compromise the genetics of remnant wild populations. Currently, little is known about the cues that guide cisco spawning site selection. Understanding if cisco imprint to their natal waters will provide valuable information to help restoration efforts. This information can lead to the implementation of rearing and stocking practices that encourage cisco to imprint and return to their release sites for spawning.

For this research, technicians Ryleigh Talaske (USGS/MSU), Braden Idalski (USGS/MSU) and I are conducting behavioral experiments on spawning adult cisco to see if they are capable of imprinting. This research is being conducted at the USGS Hammond Bay Biological Station in Millersburg, MI. We use two current choice flumes to conduct behavioral experiments. The flumes have two separate parallel flowing water currents, each carrying a different odor cue. The currents do not mix, and the fish can move



freely between them. Our behavioral experiments test the response of the cisco to putative imprinted odor vs. a control water source. We will measure the amount of time each fish spent in the two currents (one with the putative imprinted odor vs. the control). If the adult spawning cisco demonstrate a preference to putative imprinted odor, this provides evidence that the cisco imprinted to this cue. This research could lead to future studies to determine the developmental periods during which cisco imprint and identify which rearing practices are most successful for helping stocked fish to imprint.

While odor memories may not hold sentimental value to fish like they do to us, they can be very helpful for fish to locate their natal stream via imprinting. While there has been much research on salmon imprinting, we cannot assume the salmon model applies to all other fish species. Understanding if species such as cisco imprint will be valuable for implementing stocking and rearing practices to help fish imprint and return to spawning sites. I hope through this research to contribute more information on the spawning behaviors of cisco and to help inform stocking efforts to increase the success of cisco restoration in the Great Lakes. Additionally, I am excited to be able to study imprinting in a non-Pacific salmon species and contribute to research on this fascinating spawning behavior.

*Hannah Gill is a master's student in Fisheries and Wildlife with a specialization in Ecology, Evolution, and Behavior, advised by Dr. Tyler Buchinger. In her free time, she enjoys hiking, baking, fishing, and spending time with family and friends.*



# REUNITING



## *Fire and Oak*

By Clay Wilton  
Photography by Mitch Lettow,  
Bradford S. Slaughter, MDNR,  
and Clay Wilton

**A new partnership helps shed light on the benefits of prescribed fire for Michigan's oak forests.**

It would be 21 years following the birth of Michigan State University Extension before the U.S. Geological Survey (USGS) Cooperative Research Unit (CRU) program would be established, and another 88 years before the two would become partners. MSU Extension was founded in 1914 to “help people improve their lives through an educational process that applies knowledge to critical issues, needs and opportunities.”





*A prescribed fire slowly burns its way through the leaf litter of an oak forest in a southwest Michigan State Game Area. Photo courtesy of the Michigan Department of Natural Resources.*

Likewise, the USGS CRU program was founded in 1935 to “enhance graduate education in fisheries and wildlife sciences and to facilitate research and technical assistance between natural resource agencies and universities on topics of mutual concern.” It was not until 2023 that the CRU program would expand to Michigan and find a home on the campus of Michigan State University.

Housed within the MSU’s Department of Fisheries and Wildlife, the Michigan CRU is quickly establishing itself as an applied research center for various fisheries and wildlife research needs of participating cooperators. From the Michigan Department of Natural Resources (DNR) to the U.S. Fish and Wildlife Service, cooperator needs are met through research projects tailored to train the next generation of scientists. But I am getting a little ahead of myself by several hundred years.

## Michigan’s vast oak savannas

Prior to either of these institutions laying their foundations on Michigan soil, Michigan’s southern landscape was a vast expanse of oak-hickory forest and oak savanna shaped by occasional to frequent surface fires during the passing millennia. Forests of white oak, red oak, black oak, and hickory filled the canopy where fire sometimes spared its reach,

while scattered oaks, stunted and gnarled by frequent fires and harsh winds, dotted grassy savannas.

With little competition from neighboring trees, these savanna oaks were free to stretch hardy limbs far beyond their trunks. Massive flocks of passenger

pigeons roosted on their strong branches and elk took refuge in their cool shade. Indigenous peoples, along with lightning strikes, shaped these conditions through frequent burning of the landscape to maintain the structure and species composition that benefited diverse human and wildlife needs.



*An old white oak tree in southern Michigan displaying an "open grown" crown structure with strong lateral limbs reaching outward from its trunk. Photo credit: Bradford S. Slaughter, Michigan Natural Features Inventory*



However, with the oppression and forced removal of Indigenous peoples and subsequent fire suppression for more than 150 years, the landscape today is nearly unrecognizable from this not-so-distant past.

Passenger pigeons are extinct, elk roam a fraction of their historic range, and oak trees now keep their mighty limbs close in the confines of forests that no longer remember the rejuvenating breath of a good fire.

## Restoring balance to our ecosystems

Though passenger pigeons are gone forever, fire can return if we allow it. And today, a handful of dedicated biologists, foresters, and scientists are working to bring fire back to Michigan's ecosystems whose functions intricately depend upon this defining force. For example, the DNR has been using prescribed fire for years to restore the balance between fire and oak ecosystems across southern Michigan.

But decades upon decades of fire suppression across the landscape has shifted oak ecosystems far beyond their historical equilibrium with fire, and the complexities of natural ecosystems and fire behavior has made its application a formidable challenge.

To shed light on these complexities, the DNR proposed a research project aimed at disentangling the outcomes of using fire and other management activities to restore and sustain Michigan's diverse oak ecosystems. In 2023, the USGS CRU, MSU Extension's Michigan Natural Features Inventory (MNFI), and the Applied Forest and Wildlife Ecology Laboratory (AFWEL) joined forces to take on the challenge of this project. Based within the Department of Fisheries and Wildlife, this research supports my doctoral dissertation project in partnership with MNFI botanists and ecologists.

The project has two main branches. First, to retrospectively investigate how prescribed fires and other oak management actions affect oak regeneration, plant community composition, and wildlife use of managed oak forests. Second, to experimentally measure the effects of forthcoming actions using a before and after treatment approach.

## Heeding the lessons of fire

Together, these efforts will help us develop a suite of easily collected metrics that can be leveraged by biologists and foresters in their evaluations of long-term oak management outcomes.

Although our oak ecosystems may never look the way they did 1,000, or even 500,

years ago, we can still listen to the lessons fire has to share and harness its beneficial powers that shaped these natural communities.

Combined with the careful guidance of cooperative science-based management, we may just be able to hold on to the precious oaks we have left.

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MSU researchers collecting field data to determine how oak forests respond to prescribed fire in the Flat River State Game Area. Photo credit: Clay Wilton



# UNDERGRAD SPOTLIGHT: BEN EILER

## WHAT IS YOUR CURRENT RESEARCH PROJECT?

I work at the intersection of local art and conservation thinking about how these two areas can work more synergistically as partners to lift each other up. We are living in an unprecedented time in which formerly disparate communities need to come together now more than ever to find common ground and support each other. Making these connections between conservation and the humanities can strengthen each field and provide new avenues for public engagement.

My first exploration into this area was in the summer of 2024 when I established and led the Corey Marsh Theater Project. Advised by Dr. Emily Pomeranz and several other faculty members across the university, we hired a group of MSU student theater artists to work with over 30 researchers, conservation practitioners, and community members who all had a connection with the Corey Marsh Ecological Research Center (CMERC) to write a show, titled *The Link*, about CMERC which was performed onsite for an audience of over 170.

Along with producing *The Link*, we conducted social science research exploring the impacts of integrating theater into local conservation through participant observation, interviews, and surveys. We are still in the midst of data analysis and plan to publish this research in a peer-reviewed journal.

Currently, I am continuing work connecting arts and the environment by serving as the program manager for a climate change theater festival we will be hosting on campus in September of this year. Additionally, I am working in collaboration with Dr. Pomeranz and the Michigan Lakes and Streams Association to develop a series of arts-based workshops for Michigan shoreline landowners encouraging them to re-imagine their understanding of natural shorelines through art.

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## HOW DID YOU START WORKING ON THIS PROJECT?

In 2022, I transferred to Michigan State University from Western Michigan University where I studied theatrical acting and directing. When I came into the conservation field, I was so surprised to find how much of this work relies on connecting with people and getting them to care. Whether through enforced regulations, education campaigns, or community events, much of the work of conservation is trying to manage, encourage, and collaborate with people.

Once I had this realization, I saw an opportunity for me to combine two of my passions within the framing of conservation: nature and the arts. I approached Dr. Pomeranz with the idea to explore the integration of community theater and conservation, and with her support, along with other faculty members across the university, we were awarded a seed grant to establish the Corey Marsh Theater Project.



## WHAT WERE YOUR MOTIVATIONS FOR STARTING THIS WORK?

My motivations for this project were twofold. First, I was just excited about the opportunity to combine these two areas, art and conservation, which I have loved separately my entire life. Growing up, I often felt like I was living two lives: one in which I was an artist deeply involved in theater, music, acting, and directing, and the other in which I was a young scientist and environmentalist passionate about biology, the climate crisis, and the outdoors. Before the Corey Marsh Theater Project, I always felt like I had to choose one or the other, but with this project, I could bring these two parts of myself together in a way I had not done before.

My second motivation for this work was to provide opportunities for others. At its best, interdisciplinary work should open new doors that we never knew existed, and that is exactly what this Corey Marsh Theater Project did. Throughout the project, scientists got to experience the work of artists, and the artists had the opportunity to experience the scientific process, with one of the artists even winning an award at a research conference for presenting on their experience. Additionally, much of our research on this project was designed to provide a foundation for other interdisciplinarians who want to establish future art/science projects. Our work will, hopefully, provide a model for others to create similar projects in their own communities, serve as an example of the benefits of creativity and artistic integration in conservation, and inspire others to integrate new aspects of their lives and communities into their research and practice.

## WHAT DO YOU HOPE YOUR WORK WILL ADD TO THE CURRENT SCIENTIFIC PARADIGM?

The integration of artistic practice, knowledge, and rituals into conservation and, more broadly, science has vast potential to improve these fields. Scientists often consider the outputs of their work as truth—that work produced by perfectly following the scientific method is right, and other ways of knowing about the world are either wrong or, at the very least, less right.

I think the integration of the arts into conservation and science pushes us towards a more pluralistic understanding of the world and our place in it. In this pluralistic understanding, there can be multiple truths that may not align with each other, but are all valid. A poet may not be able to easily understand the truths hidden within a nuclear physics paper and a nuclear physicist may struggle to find the truth within a poem, but that does not mean that either of these truths are greater or less than each other.

I hope that my work finds ways to build community and understanding across disciplines and people, lifting up voices both new and old and providing the space and tools needed to continually re-imagine our current world and make positive changes.

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## WHAT SKILLS HAVE YOU GAINED, AND HOW ARE THESE SKILLS PREPARING YOU FOR YOUR FUTURE?

Throughout my time at MSU I have gained a plethora of skills, from project management and workshop development to camera trap deployment and skull identification. However, I think the most important skill that I have learned is to continue to be curious.

Every single one of us working in the field of conservation have lives and passions outside of work. These are often the practices that calm us down, bring us joy, and recharge our batteries. For some of us, these hobbies align with “historical conservation activities” (i.e. hunting, fishing, and trapping), but for many others, myself included, these hobbies are separate from this work. Whether its ceramics, yoga, gardening, or theater, these activities add a richness to our lives and connect us to new communities and to ourselves in new ways.

We are living in a historic time in which more people than ever before care about the natural world, but at the same time, environments both near and far are facing more threats than ever. These two conflicting truths make it necessary for us to find new ways to move the needle, and that cannot happen if we are not open to new possibilities about what conservation can look like. My time at MSU has inspired me to stay curious and look to these personal hobbies and activities as ways for us to move the needle for conservation, be better neighbors to others, and be kinder to ourselves.

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## WHO ARE YOU OUTSIDE OF YOUR RESEARCH?

Reflecting on my research, I guess it’s not unexpected that I often find it difficult to only have one hobby at a time. I love learning new things and am constantly finding new interests. I have recently started knitting and woodcarving, and enjoy reading, gardening, and cooking.

Unsurprisingly, I am also passionate about the arts. I am an amateur creative writer and musician, and I enjoy watching and participating in local theater and supporting local artists. These creative outputs keep me sane when work or school gets too crazy and have been wonderful places to build new communities.

I graduated in May of 2025 and am excited to prioritize more of these hobbies and interests with a bit more time on my hands.



# FALL PHOTO CONTEST

## *Fauna*

First Place  
"You're #1" Crayfish  
Jeremy Hartsock



Second Place  
A Piping Plover Enjoying the Beach at  
Sleeping Bear Dunes National Lakeshore  
Sarah Scheitz



# Flora

First Place  
White Water Lily  
Jeremy Hartsock



Second Place  
Perfumed Passionflower  
Taylor Pettway







First Place  
Corey Marsh Theater Project's  
production of "The Link"  
Ben Eiler



Second Place  
Youth Fishing Program  
Mark Stephens

*Community Engagement*



# *Fieldwork*

First Place  
Turtle Sampling at Corey Marsh  
Ecological Research Center  
Hannah Bey



Second Place  
Searching for Birds on the Shores of Lake Michigan  
Sarah Scheitz



# *Landscape*



First Place  
Morning at  
Pilanesberg  
National Park in  
South Africa  
Christopher Potter



Second Place  
Sunrise over Backus  
Creek in Roscommon  
Sarah Scheitz



A collection of what grew in our farmhouse yard throughout 2024. After over a hundred years of being mowed, we left the lawn untouched to see what would grow.

Many plants were non-native and weedy, others were native. But all were volunteers.

VOLUNTEERS

Madi

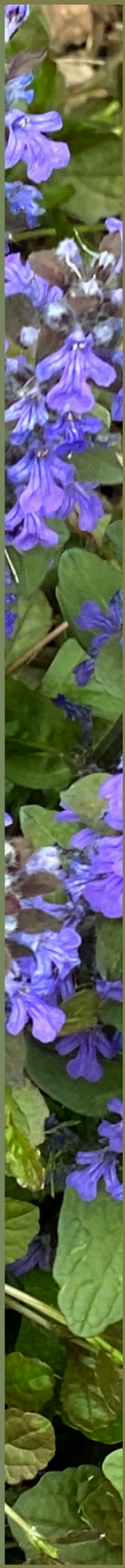
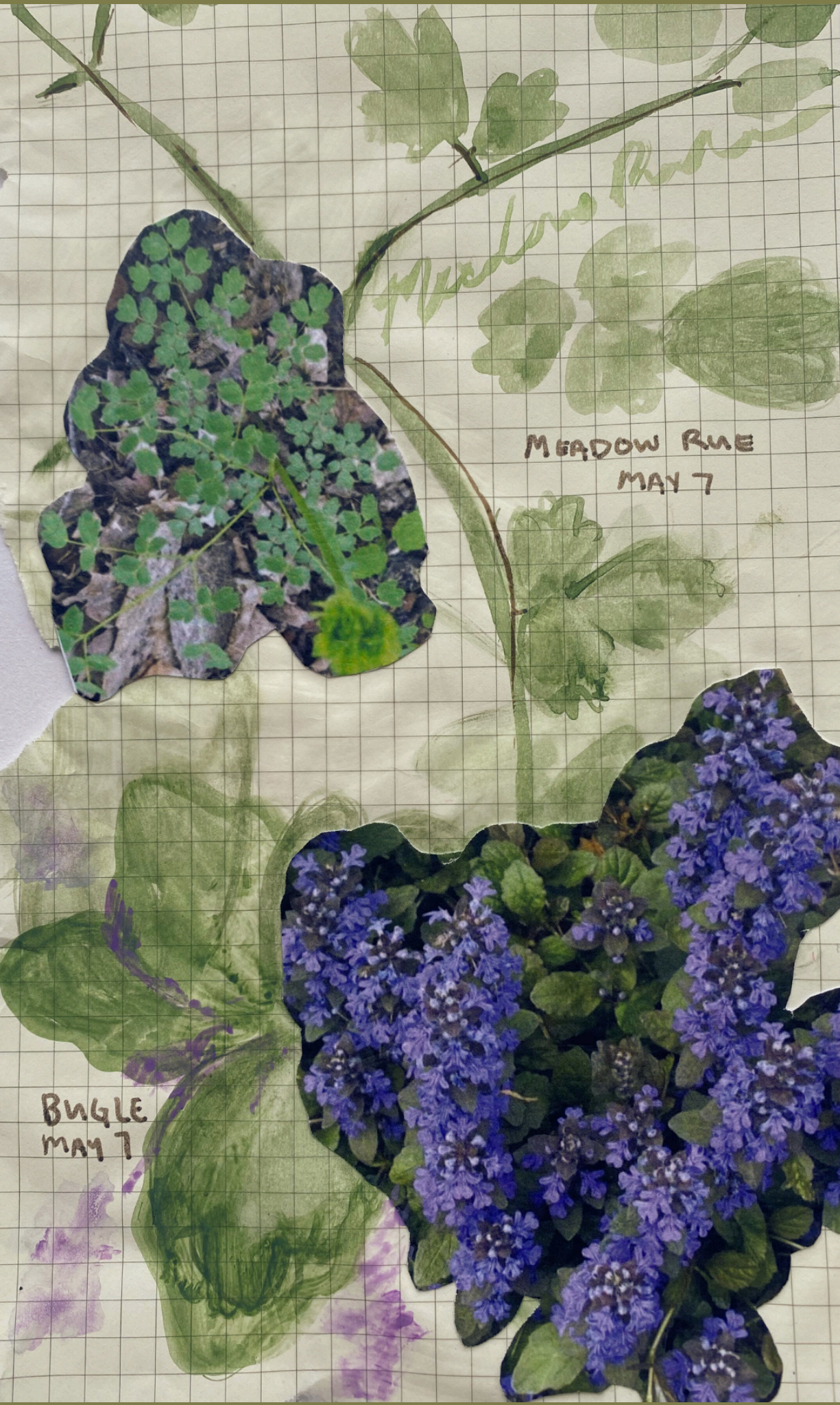
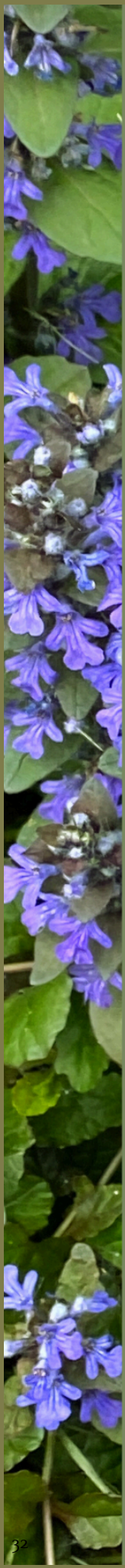




Daffodils -  
2 varieties

Daffodils





















*Madi is a PhD student studying cooperative governance of invasive species management in Michigan advised by Dan Kramer. She is interested in collective action conservation and encouraging stewardship in yards and gardens.*