

Drawing on my love of birds, passion for inquiry, and years of experience in conservation, teaching, and parenting, my career goals include 1) developing a new synthesis between phylogenetics, community ecology, and conservation science, and 2) using my research to open a dialog with Americans of diverse regional and political backgrounds about evolutionary biology, conservation, and the value of scientific research. Through my graduate research and broader impacts goals, I will grow into an outstanding researcher and inspire interest in scientific inquiry among rural, Native, and other marginalized K-12 students, and contribute to a broader consensus on the importance of science and conservation.

I ♥ birds: As a teenager in Colorado Springs, I volunteered to go mist-netting with local bird banders. As I held that first tiny, fluttering ball of vitality in my hand, I knew I wanted to study birds. I volunteered for 5 years, mentored by master banders and fascinated by banding studies that revealed continental migratory patterns in songbirds. A few years later, I experienced the thrill of discovery as an undergraduate at Lawrence University. For my senior research project, I developed a simple PCR assay to determine if cedar waxwing offspring in a nest were related to their social “father.” I spent a year on the project, including time collecting samples and observing nesting behavior. I found evidence of extra pair offspring in this socially monogamous species, earning *summa cum laude* honors. Everyone expected me to go straight to graduate school, but I wasn’t ready. I needed a break from school, and I wanted a career that touched science with a broader focus.

Like fine wine, I needed time to mature: I focused on finding a job – doing anything – in a conservation organization. My first job was as receptionist at The Nature Conservancy (TNC). I was thrilled and proud: even though I was answering phones and sorting mail, I was keeping the premiere conservation organization in the world running. As TNC Minnesota’s staff meeting transcriber, I learned about TNC’s collaborative and inclusive approach to conservation. Conservation targets are often in rural, conservative areas and TNC succeeds because they know that local people fundamentally care about their land. I admire how TNC succeeds at protecting entire landscapes not because they are the biggest or best funded, but because they partner with landowners, other NGOs, indigenous communities, and governments to make strategic plans grounded in conservation best practices. I became deeply ingrained with TNC’s culture of leveraging partnerships across political and cultural boundaries to achieve conservation. Any TNC conservation success gave me a deep sense of shared accomplishment.

The 16 years between my undergraduate degree and pursuit of a Ph.D. in Ecology, Evolution, and Behavior focused on conservation and family. Along an unorthodox career path for a scientist, I gained important skills I would later use in graduate school. In 10 years at TNC, I rose through the ranks of human resources, expanding my data analysis, presentation, and training skills. Hobbies of community theater and professional singing sharpened my public performance skills. When my daughter was born, I became adept at juggling competing priorities. To spend more time at home with her, I built a private piano studio from scratch. Within 6 months I had recruited enough students to quit my full-time job. For 7 years as a piano teacher and business owner, I honed my ability to present material in an exciting way, modify curricula for different learning styles and abilities, manage relationships, and market my work.

Ready for graduate school: When my daughter started second grade, I began to rethink my professional aspirations. I needed a career that felt as profound as parenthood. Teaching

piano was rewarding, but it couldn't compare to the thrill of discovery or sharing in a huge conservation success. Science always felt profound in a way human resources (even at TNC) never quite did. I was finally ready to pursue a Ph.D. With nearly 15 years since my undergraduate days, I needed some intensive work to reacquaint myself with studenthood. I began a 3-semester journey through organic chemistry and math. I tutored and mentored a diverse group of chemistry students at Normandale Community College. I took the GRE and prepared to apply to graduate programs.

I was, at first, overwhelmed by the fantastic possibilities. I explored several top-tier universities, with my innate love of birds, desire to work across many species, and strong conservation ethic in mind. During my search, I perused the University of Minnesota (U of M) faculty web pages and came across a 2015 paper on the phylogeny and biogeography of over 800 species of birds. Instantly, I was riveted. The magnitude of phylogenetics and thinking about how the species in those phylogenies come together to assemble communities captured my nerdy, scientific, bird-loving soul. I knew what I wanted to study. The lead author was Dr. Keith Barker. I called him that day to ask if I could volunteer in his lab.

From that time on, I worked with Dr. Barker on the largest (>200 taxa, 5000 loci) phylogeny of songbirds yet completed. I joined this project at its beginning stages, which afforded me an opportunity to learn a wide variety of research skills. I have assembled, annotated and worked on phylogenetic analysis of these species' complete mitogenomes. We were interested in the relative utility of nuclear versus mitochondrial data to recover avian phylogeny. This research deepened and solidified my enthusiasm for phylogenetic research.

Success! 18 months later, I am a Ph.D. student at the U of M with Dr. Barker as my advisor. I earned two fellowships to support my first year of graduate study and participated in the Graduate School Diversity Office's prestigious summer research institute (a fully funded research experience for incoming minority graduate students). I spent the summer on the avian phylogeny project – research I was increasingly excited about. By September, we estimated the mitochondrial evolutionary tree and compared it to the equivalent nuclear tree. We found 2 cases where the mitochondrial and nuclear trees did not match (probably due to ancient hybridization events), and will publish our results in spring 2018.

Broader Impacts: I am committed to making science accessible to rural, minority, and Native students. I will create interactive, interpretive webcast programs to disseminate my future research on birds of prey. Initially, I will target Minnesota Native classrooms and rural traditional public-school classrooms; offering a digital alternative to schools for whom field trip costs may be prohibitive. My programs will consist of 2 parts, A) a regionally and tribally tailored introduction to the significance of raptors and B) a lab tour, common to all presentations (aligned with Next Generation Science Standards), showing what we do, what we've found, why it matters, and how students can engage with conservation efforts and prepare for a career in science. I will ensure cultural relevance by consulting with appropriate Native leaders, an existing network available through the Gabbert Raptor Center (GRC) on campus. I will post programs on social media for later (and public) viewing. My advisor's position as a curator at the Bell Museum of Natural History (Bell) and our proximity to GRC offer natural opportunities for cross-promotion. GRC staff are excited about folding my plans into their existing future plans to offer virtual programs in partnership with Bell. While I must initially focus on Minnesota, I will

use early successes (measured by programs conducted, children reached, and post-program survey results) to expand offerings to inner city schools (many of which have high populations of Native Americans and other marginalized groups), and eventually to schools in other states.

Americans love birds of prey. I expect to succeed in opening a dialog about science because raptors are a shared interest to Native Americans, small-town conservatives, city-dwelling liberal environmentalists, or anyone in between. Raptors grace our currency, our national seal, even many of our sports teams. They are sacred religious symbols to indigenous peoples. There are 223 raptor rehabilitation centers in 48 US states. In the current political climate of federal divestment in science, raptors can facilitate increased public scientific literacy and engagement. They provide an opportunity to empower children in impoverished Native and other rural schools, and in urban schools isolated from nature, to look to the world beyond.

Rural America can be a garden of young scientists: I am a first-generation immigrant, interracial child of liberal parents from a conservative southwestern town. It was an hour drive to our nearest natural history museum, and longer to a major university. But travel to Navajo and Pueblo reservations opened my eyes to the challenges of truly rural students, particularly those in Native schools. I was a child tourist, exploring Anasazi ruins and attending public Kachina dances, yet I could not avoid seeing the pervasive poverty and other challenges faced by these communities. I was reminded of family trips to India where poverty is just part of the landscape. In part because my family was impacted by colonialism in India, the historic and ongoing violence perpetrated against Native people in this country outrages me. But more importantly, it inspires me to do something to help. Geographic isolation, lack of funding, and endemic poverty make a rigorous science curriculum difficult to achieve in most rural schools – and nearly impossible in Native schools on reservations. Students may never even see potential paths out of poverty. I want to use the power of the internet to help connect rural students with their country's indigenous (and in some cases, their own) history, and show them the world of scientific inquiry beyond the walls of their school. Virtual programs are a low-cost, high-impact option to bring cutting edge science into underfunded Native, rural, and urban schools.

I have always looked for greater meaning in my work, whether I was working in HR to support conservation, raising my child to be a compassionate global citizen, or making music accessible for people of all ages and abilities. A career in science means more to me than contributing to scientific understanding of evolution and conservation. It means collaborating with diverse partners to broaden the impact of my work beyond intellectual merit. I first saw the power of such a leveraged strategic approach at TNC. They find common ground among diverse constituencies, based in a shared love of nature, and to use it to protect whole landscapes. In the same spirit, as I delve into stories of raptor evolution, community assembly, and conservation opportunities, I will use them to reach across geographic, socioeconomic, cultural, and political divides, connect with people where they are, and inspire interest in science and conservation.

I will use my graduate education to develop a new synthesis between phylogenetics, community ecology, and conservation science. Capitalizing on common interest in raptors, I will use my research to enrich marginalized students' lives. At TNC, one of my successes was designing and leading interesting and fun online training for the HR database. If I can make online database training fun, imagine what I can do with a subject as exciting as birds of prey!