perspectives

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COMMUNITY IMMERSION AND COLLABORATION IN COSTA RICA LEADS TO CONSERVATION RESEARCH SUCCESS

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TEXAS A&M UNIVERSITY | APPLIED BIODIVERSITY SCIENCE

PERSPECTIVES

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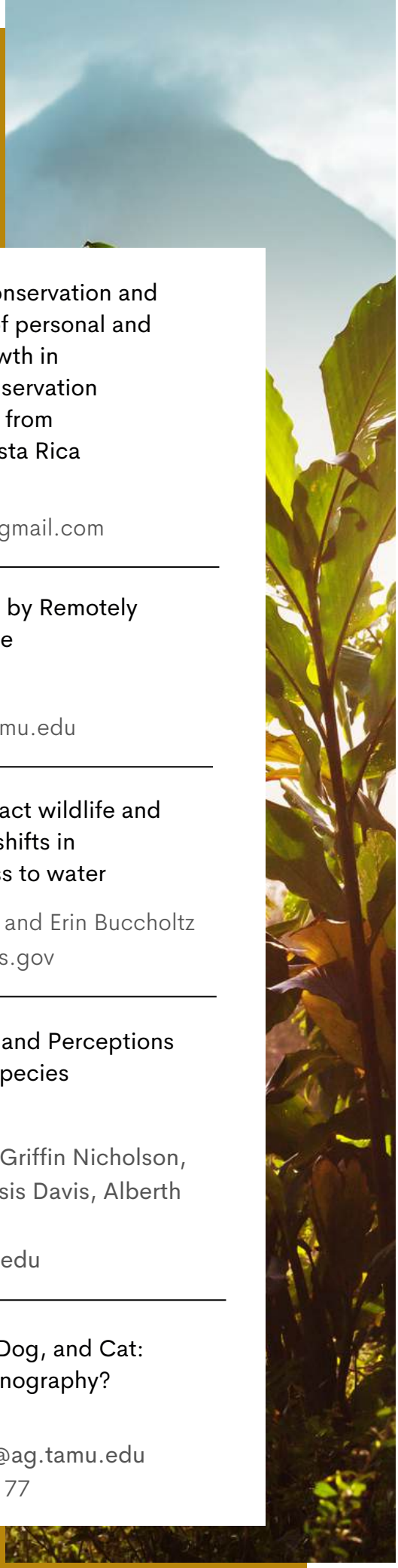

perspectives series

PHOTO COURTESY OF LEE A. FITZGERALD.

APPLIED BIODIVERSITY SCIENCE (ABS) PROGRAM

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APPLIED BIODIVERSITY SCIENCE

Communities, conservation and the confluence of personal and professional growth in international conservation research, as told from Monteverde, Costa Rica

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MONTEVERDE AS CLOUDS BEGIN TO ASCEND INTO THE VALLEY.

As we made our way around each winding curve in the road and steadily climbed up into the mountains in the small bus, I watched clouds float down, settling into soft, white blankets over the valleys and peaks of bright green mountains, the sky turning to dusk in the background in a brilliant, orange display. This was my first introduction to Monteverde and the cloud forest. Upon entering the small town and its adjoining communities, I felt a profound sense that I was coming home in a way I'd never experienced before. The landscapes, forests, and wildlife stunned me into silence, but even more profoundly, it was very clear from the beginning that I was in the presence of a special, close-knit community with strong ties to the land and a commitment to conservation.

When I began graduate school and entered the Applied Biodiversity Science (ABS) program at Texas A&M University in 2015, I did not yet know what my dissertation project would be. I applied to be a part of Dr. Thomas Lacher's Biodiversity and Monitoring lab because I knew that I was passionate about studying anthropogenic impacts on biodiversity. I was particularly interested in the effects of land-use change (habitat loss and fragmentation) on biodiversity in the tropics, which are areas with high levels of biodiversity under threats posed by humans (Le Sauot et al. 2013). While I had always approached conservation from an ecological perspective, the ABS program was instrumental in expanding this viewpoint, by introducing me to the myriad components of the complex social-ecological systems where conservation takes place. I began to learn about the use of social and ecological methodologies in conservation research and how actively engaging local people in the research process, particularly by including their input and local knowledge, is highly valuable and can also increase the success of conservation actions. I started to see people as active participants and fundamental to environmental conservation instead of separate from it and that conservation research can, in fact, be a very personal, not strictly scientific or nature-based, practice - humanity is an integral part of it. This greatly shaped the way I thought about my own dissertation project and the approach I would take as it began to take shape.

The first summer of my PhD was one of the most profound and memorable experiences of my life. After exploring ideas, coming up with more specific questions for my dissertation and making contacts in potential research areas in Latin America, I was off to conduct site visits in person to better ascertain which area would be the best fit. With only an elementary understanding of Spanish (having only started to learn the language primarily through Duolingo the previous Fall), traveling and communicating had its challenges, but I learned a great deal very quickly and embraced every new opportunity and exchange along the way. Having never been to Latin America before, I quickly fell in love with the breathtaking landscapes and the unique cultural signatures, customs, sights, and sounds of each country I visited. This experience quickly turned from a professional excursion to determine where I would conduct my dissertation research into an experience of vast personal growth and exploration. There was no way to separate the professional experience from the personal one; they were inextricably linked. Much like I had been learning more deeply the ways in which people and human experience were a fundamental part of the environment a successful conservation research, I discovered

MONTEVERDE/SAN LUIS VALLEY SHOWING A COMPLEX OF FRAGMENTED FOREST PATCHES, PASTURES AND SETTLEMENTS.

just how much international dissertation research would have an impact on my personal life as it contributed to my professional goals.

Though each potential research site I visited had unique and interesting characteristics and opportunities to offer to my research project, Monteverde immediately stood out from the rest. The Neotropics represent one of the most biodiverse regions in the world but simultaneously represent one of the most threatened due to human impacts, and it is therefore a critical area for conservation research and action (Le Sauot et al. 2013, González-Maya et al. 2016). Monteverde is a highly unique neotropical montane ecosystem within the Bellbird Biological Corridor (BBC) and comprises eleven climatically distinct Holdridge life zones (Holdridge 1966). This region harbors a wide range of biodiversity and endemism, both of which are directly threatened by land-use change and climate change (Townsend & Masters 2015, Zamzow et al. 2018). Higher elevations (800-1530 m) in the BBC are primarily used for ecotourism, coffee production, and cattle farming, within a large expanse of privately protected forest habitat, remnant forest patches, farms, and windbreaks. At lower elevations (<800 m), there is a matrix of pasture and remnant forest patches interspersed amongst dense human settlements that depend on cattle ranching and agriculture. Despite the Costa Rican Forestry Law 7575, created to protect native forest, many forest habitats in the BBC have continued to be degraded due to lack of policy enforcement (Townsend & Masters 2015). Current levels of land-use change and climate change pose major threats to the health and sustainability of this ecosystem and the biodiversity and livelihoods it supports. Principal sources of income for the community are at serious risk if adaptive solutions to environmental threats are not established (Townsend & Masters 2015).

In Monteverde, I found there were numerous opportunities to work with local conservation NGOs, such as Monteverde Conservation League, who manage the largest private reserve in Costa Rica, the Children's Eternal Rainforest (Bosque Eterno de los Niños), the Monteverde Institute, the research station UGA Costa Rica, and a network of local biologists and researchers. As I

learned more about the landscape, local environmental characteristics, and the history of conservation and land-use in the area, I was convinced that this was an ideal place to study how habitat loss, fragmentation, and other threats impact medium-large mammal biodiversity in mixed land-use systems. The decision to choose Monteverde as my study area for my dissertation project came down to professional reasons (e.g. does this area provide the conditions required to address my research questions adequately?) but also logistical and personal reasons. Did this feel like a place where I could feasibly execute my research goals with logistical support as a solo researcher? Is this somewhere I could feel happy and comfortable living and working in for an extended period of time? These aspects of international fieldwork aren't often discussed in academia and are even discouraged from being acknowledged or emphasized. However, I strongly feel that it is detrimental to refuse to acknowledge your personal experience, desires, and needs, as if those do not exist in the same space where you carry out your professional goals. Once again, I embraced both my personal and professional goals together, recognizing that they are two halves of a whole.

My first field season in Monteverde occurred from June through October of 2017. Due to my ABS training, I was committed to engaging with local institutions and actors from the outset to develop a meaningful project. During this field-season, I primarily worked with local environmental organizations to flesh out my project's objectives, made contact with landowners within the corridor who were interested in participating in the research, and gathered preliminary data using cameras across forest patches in a few private properties and in the Monteverde Cloud Forest Biological Preserve. These organizations and local people were eager to assist me in establishing and carrying out my project and were essential in my ability to do so. I quickly learned that it would be a significant time investment to establish my study sites across so many private properties, and without funds for a vehicle, it would be impossible to do so during this field season. I applied for a Fulbright fellowship for the following year to gain access to the amount of time necessary to establish the large extent of study sites across private lands necessary to meet my project's objectives and to collect my data. I felt extremely fortunate to subsequently be selected as a Fulbright fellow and returned to Monteverde in June 2018 for what would be my longest immersive experience in another country.

MONTEVERDE CLOUD FOREST, WITH CHARACTERISTIC CLOUD FOREST EPIPHYTES AND PLANT COMMUNITY.

In total, I spent a year and a half consecutively in Costa Rica. I remained committed to continuing work with the local community and organizations to create transparency in my research process, sharing knowledge and developing actionable research outcomes using inclusive and participatory processes. I delivered several presentations on my research, including a talk at a conservation planning meeting for the Bellbird Biological Corridor (BBC) involving key actors, organizations, and stakeholders leading conservation initiatives in the region. Here, I garnered key support and input to carry out my project with a higher conservation impact. During this time, I successfully collected data from over 50 different study sites and properties using a multi-disciplinary approach, where I both implemented use of camera traps and conducted landowner interviews through collaborative efforts with local people. To assess mammalian species diversity patterns in relation to land-use change, camera traps were placed in forest patches across sites with low to high levels of surrounding forest cover. To do this, I required a research assistant and wanted to choose someone local who would have an intimate understanding of the area, especially its ecology and history, and strong ties to the local community. I worked in collaboration with the environmental government organizations MINAE and SINAC to provide an information session to local stakeholders. This session overviewed the opportunities in government subsidized conservation incentives programs intended to benefit local people and the environment simultaneously.

AUTHOR JORDAN ROGAN ENJOYING SURROUNDINGS IN THE FIELD, SAN LUIS DE MONTEVERDE.

JORDAN ROGAN AND LOCAL RESEARCH ASSISTANT, DANIELA QUESADA SETTING A CAMERA TRAP AT A RESEARCH SITE.

Daniela, a local biologist and undergraduate student at the time, proved to be a key component to the success of my project as a research assistant, as well as someone who vastly broadened and challenged my perspective of the local culture, and became a great friend in the process. I felt an instant personal connection upon meeting her, and the bond we created on field days, especially those that were particularly grueling or exciting, is something I will always cherish as an unparalleled, shared experience. To come from such different backgrounds and cultures, to learn so much more about Monteverde and her culture through her eyes and unique experiences, but to also find so many similarities in our views and some of our personal experiences or interests, was profound for me. It allowed me to gain a new perspective on a different culture and way of life through a very personal lens, while recognizing that we are also all connected as people in fundamental ways through our shared human experience.

As the ABS program emphasizes the integration of ecological and social science approaches to effectively address pressing conservation challenges, I conducted semi-structured interviews with stakeholders to gain a greater understanding of the role of rural communities in conservation as well as perceived threats to biodiversity, natural resources and livelihoods. Monteverde is a close-knit community with deep-rooted historical ties to the land and the forest, and local citizens have a large influence on decision-making processes regarding land-use practices and sustainability. The knowledge collected through these semi-structured interviews provided fine scale details regarding local perceptions of land-use policy and management and threats to mammals (hunting and human-wildlife conflict) and natural resources. Conducting interviews added a component of humanization to my research and forced me to take a step back from the more rigid, "hard science" approaches that often come with more ecologically based approaches. Even before delving into the content of the interviews themselves, meeting with local people provided me with a greater perspective of the cultural context and livelihoods of people in the area. Knowing that trust was a large factor in how willing local people were to talk to me and to be forthcoming, Daniela helped me gain higher quality interviews which were likely rooted in more truthful information than I might have obtained had I been alone. Since I am not fluent in Spanish, Daniela provided a critical opportunity for individuals to speak freely without worrying about speaking too quickly and using more localized slang I didn't know, especially in more rural communities. Daniela was also instrumental in helping me navigate social situations, responding appropriately to social cues so as not to cause offense. Very often we were invited into people's homes and offered tropical fruits, local dishes or coffee (a staple of Costa Rican culture, especially in Monteverde). Social gatherings are highly valued, and people generally move more slowly, with intention and without rush in their daily lives in rural parts of Costa Rica. It was impossible to stay on a strict schedule, and to not embrace it would not only be exceptionally rude but would have been hugely detrimental to both the content and quality of my research and to my personal experience of fully embracing the culture, customs, and daily life of people in the area. The knowledge gained through these interviews contributed very meaningfully to my project - it was the personal connections that were made

and the larger understanding gained of the relationship between people, conservation, the environment, and the unique history of the area, as told through those who have lived it, that are some of the most memorable and impactful components of my fieldwork.

The research experience I gained and professional accomplishments I made during my time in Monteverde are rivaled by the personal growth and broadened perspective on people and culture I gained throughout my long-term field seasons. It was a difficult transition to return to the United States after spending so much time embedded in the community and environment of another country that I had grown so fond of and accustomed to and to simply be expected to resume life as usual as if I've not been vastly changed by the experience. However, I plan to continue to contribute to local conservation efforts through dissemination of my findings upon finishing my dissertation, and I am currently planning a community-based biodiversity monitoring initiative throughout the corridor, to which I plan to donate my camera traps. My experience working with local people on conservation issues illuminated for me the complex intersections and dependencies between people, the environment, and conservation. I am beyond grateful to have had the incredible opportunity to live within and embrace such a beautiful community, ecosystem, and culture simultaneously and look forward to many returns into the future.

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Virtual Exploring by Remotely Operated Vehicle

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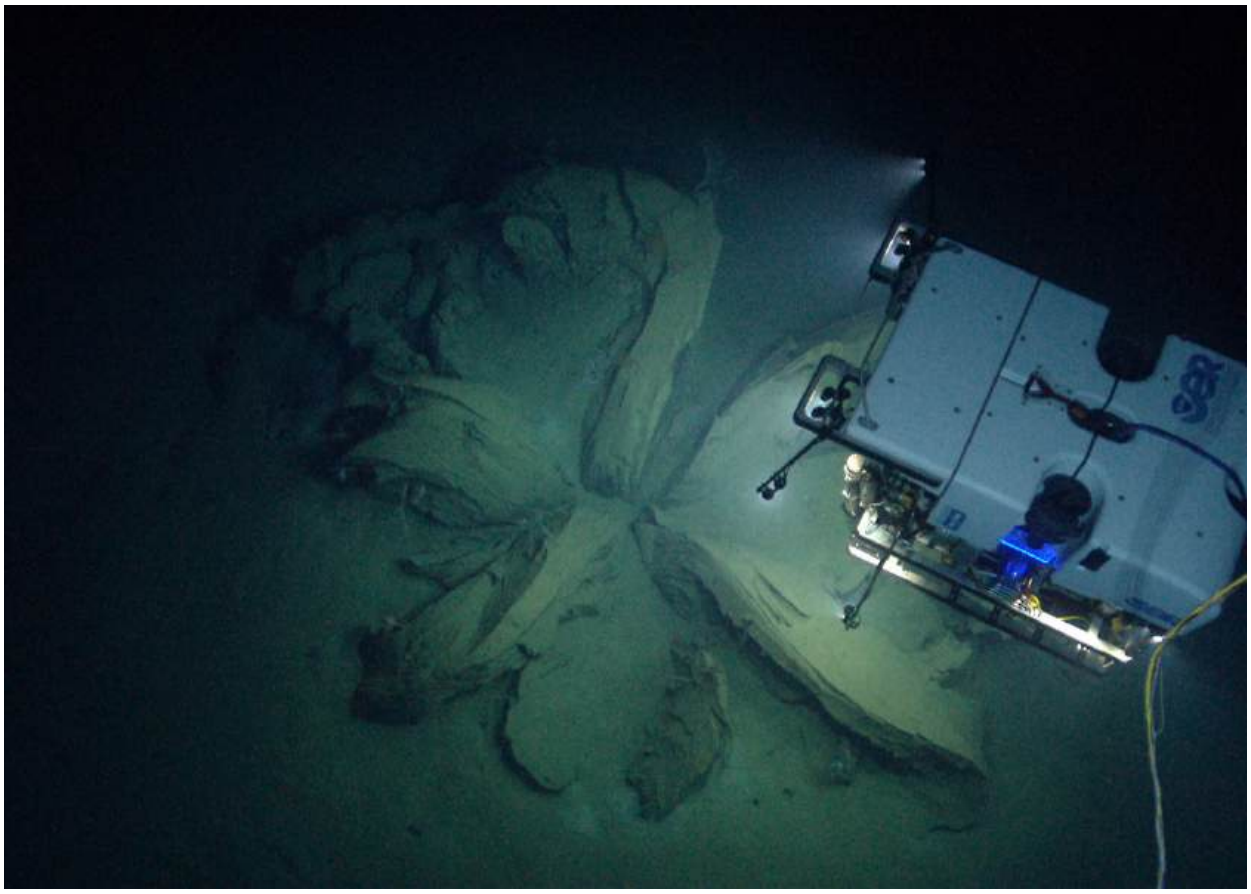


REMOTELY OPERATED VEHICLE (ROV) ILLLUMINATING A TAR LILY. PHOTO COURTESY OF THE U.S. NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA), OFFICE OF OCEAN RESEARCH.

Depending on whom you ask, the "deep sea" starts either at 200 m (the lowest sea level during the Pleistocene period), or 1000 m (the oxygen minimum zone) in many oceans. Early views of the deep oceans saw them as lifeless stagnant places or populated by monsters. In the late 1800's, European and American fisheries agencies and museums sent out exploratory cruises, including those of the American steamer Albatross and the famous British vessel Challenger. They usually deployed trawls or dredges, which often brought up broken or mashed specimens. Even today, many species are known only from distorted, bleached specimens or drawings.

In the 1970's, towed underwater cameras and manned submersibles began to explore deep areas, including rocky areas that entangled trawls. Modern technology led to the development of remotely operated vehicles (ROVs) that could be operated from aboard ships and send data and video footage directly by satellite feed to biologists ashore.

I have collaborated with at-sea partners aboard the National Oceanographic and Atmospheric Administration ship Okeanos Explorer and the Oceanic Trust ship Nautilus since 2012. These ships manage ROVs in pairs: one that moves directly over the sea floor and one above it that makes sure that there is nothing entangling the lower one. The near-bottom ROV can collect using claws, baskets or suction devices. The video feed is accompanied by data on exact location and depth as well as a measuring scale.

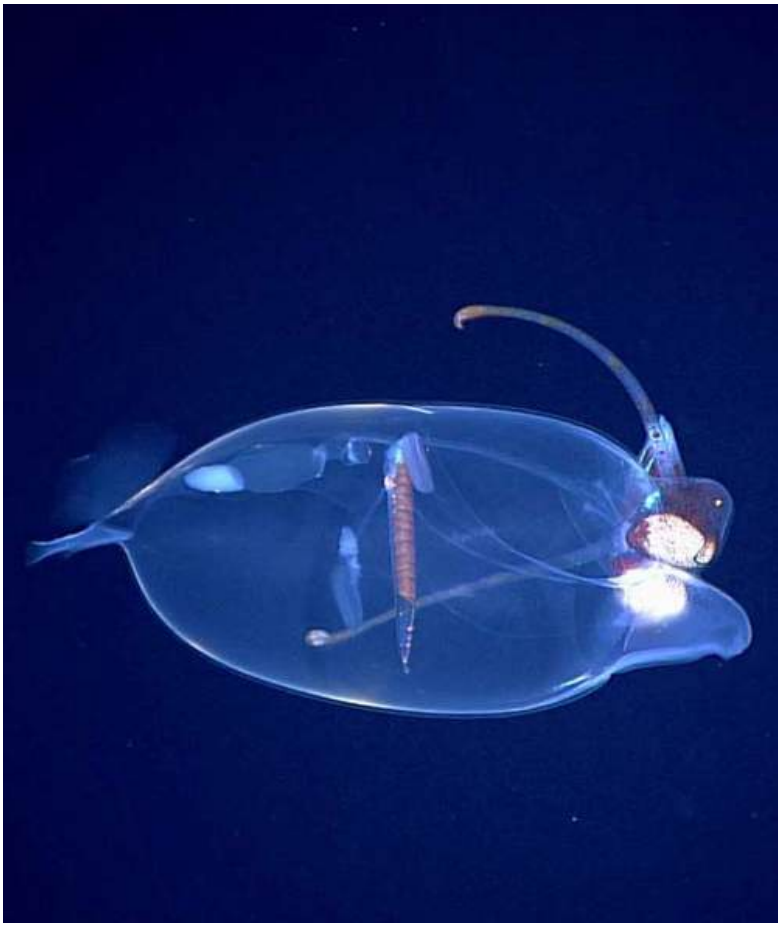
Video photographs show fragile midwater animals such as squids. Bottom photographs show many invertebrates, including giant sea spiders and the weird "yoda worm". My specialty is deep-water crabs, shrimps and lobsters, many of them blind or with limited vision. You might expect them to be white, living as they do in total darkness, but some are brightly colored.

DR. MARY WICKSTEN WITH SQUID.

SPIDER EATS ANEMONE. PHOTO COURTESY OF NOAA RESEARCH.

SQUAT LOBSTER ON GOLDEN CORAL. PHOTO COURTESY OF NOAA RESEARCH.

YODA WORM. PHOTO COURTESY OF NOAA RESEARCH.



SQUID. PHOTO COURTESY OF NOAA RESEARCH.

Nobody knows why they have pigmentation, although it may have a physiological function.

A particularly exciting find from the ROV studies is the extensive beds of deep-sea corals or sponges. Certain squat lobsters and shrimps only live on particular coral or sponge hosts. What is the relationship between the crustaceans and their hosts? Do they steal food from them, or do they protect them from predatory starfish that might eat the host? And how do they interact with brittle starfishes that live on some hosts, or the octopuses and sharks that leave egg cases on the hosts? Do the species in these sponge or coral beds have distinct faunas by geography or do certain genera or families occur world-wide? Our teams continue to analyze and publish our results.

How people impact wildlife and their resources: shifts in elephants' access to water

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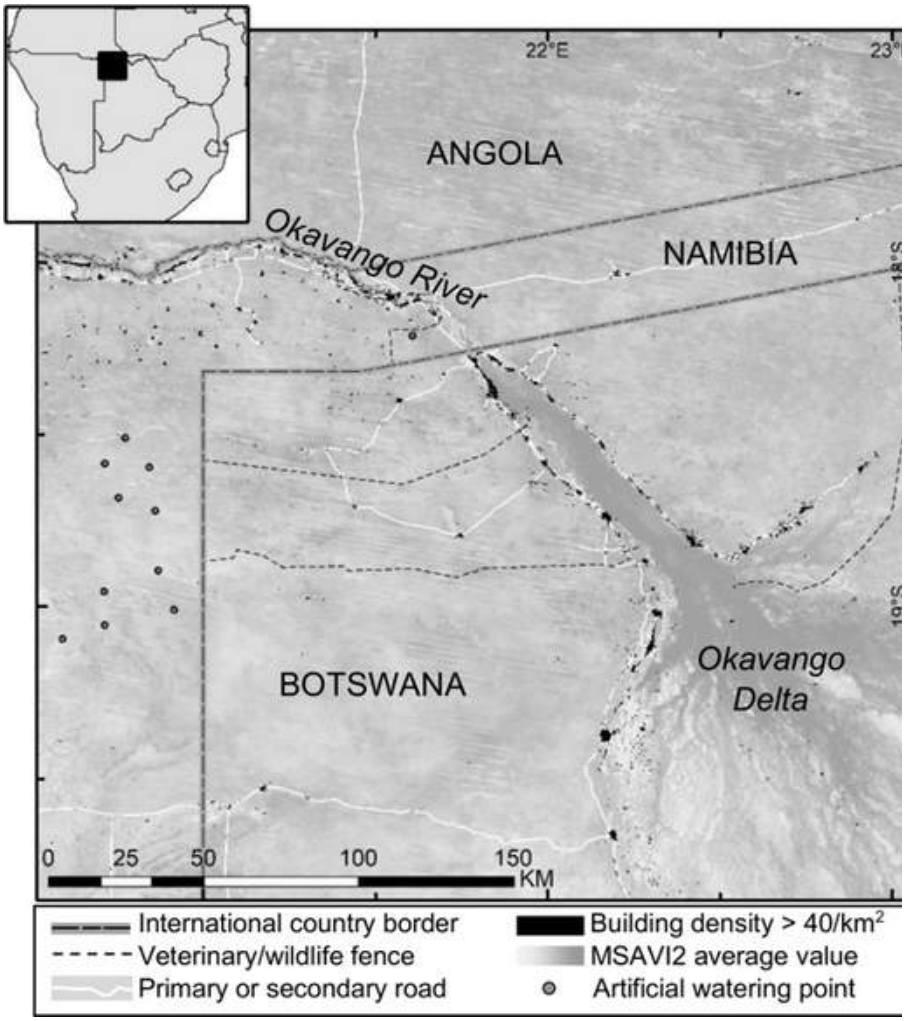
The rapidly expanding human footprint undeniably impacts wild animals and the landscapes that they inhabit. This is why understanding how we, as people, influence the lives and activity of animals is becoming increasingly crucial for the conservation of endangered species. Despite the growing presence of people in natural areas across the world, wild animals must continue to exist in environments that have been altered by people. For example, elephants that have roamed the savannah for centuries must now navigate around human buildings, roads, and villages that have not always been there and are expanding every year. This has become a rising issue in parts of southern Africa, particularly in Botswana, where high numbers of elephants often come into contact with people (both directly and indirectly, through man-made structures).

Globally, people have observed that animals may shift their movement and behavioral patterns as a response to human development that they perceive to avoid risks. However, less is known about how this avoidance of perceived risky areas influences animals' ability to access vital resources (e.g., water, food, shelter). Our research investigates this by looking at how elephant activity at a specific point and time is influenced by man-made structures and features along the Okavango Delta Panhandle of Botswana. We used GPS collars from 39 elephants, tracked from 2014-2018, to collect data on where and when elephants moved to visit permanent water sources (like the Okavango River) relative to the presence of villages. This GPS data allowed us to quantify the most common locations used to access water and how close these drinking locations are to human settlements. We used this information to create a model which showed that elephants commonly choose to drink water at points that are in areas farther away from human developments.



STUDY SITE OF THE OKAVANGO PANHANDLE, BOTSWANA.

Elephants were more likely to visit water at the same rate during day and night when they were in areas that had no buildings nearby, but they chose to drink water more frequently at night (as opposed to during the day) when they were in areas with many buildings. This shift in activity, moving their drinking habits to more nocturnal patterns and away from people, is a form of "spatial and temporal displacement" which reflects how animal behavior is being changed by people's presence. Analyzing data like this is critically important, because it helps us to understand how man-made changes to a landscape can create significant changes to wild animals in that same area.

Though these changes may seem small, for a protected species such as the African elephant, these changes could alter their ability to regulate their temperature during hot afternoons when water is crucial. Moreover, shifting behaviors can impact how they metabolize food, conserve energy, protect their young, and survive on a rapidly changing landscape. Research on how people can impact the ability of wild animals to access critical resources, such as water, will continue to influence how we approach conservation of endangered species. It is our hope that further investigation into how humans impact animals spatially and temporally will allow us to understand how we may be threatening these animals' ability to survive and help us work towards coexistence between people and wildlife.

The research described in this summary can be found in our peer-reviewed publication:
Buchholtz, E.K., S. Spragg, A. Stronza, A. Songhurst, G. McCulloch, & L. Fitzgerald (2021). Anthropogenic impact on wildlife resource use: spatial and temporal shifts in elephants' access to water. African Journal of Ecology. DOI: 10.1111/aje.12860

Elephant GPS collar data and permission for use in this research are from the Ecoexist Project NGO in Botswana. More information on the NGO and their ongoing work can be found at ecoexistproject.org and facebook.com/ecoexistproject.

Public Outreach and Perceptions of Endangered Species Conservation

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NICOLE STEVENS AND BREANN RICHEY DISCUSSING CONSERVATION WITH PARTICIPANTS AT DARWIN DAY 2024.

Public Outreach for Wildlife Conservation

Given the rapid pace and consequences of biodiversity loss, conservation decisions are frequently made with limited information. At the same time, the information that we can gain and utilize in these decisions is crucial to increasing the chances of successful interventions. In the United States, conservation policies are often designed based on the best science available, even with the understanding that said science is incomplete. This practice reduces uncertainty in environmental policies and is essential for effective conservation. However, conservation policies are not based on scientific consensus alone. The implementation of new policies often requires buy-in from a wide range of parties, including private interest groups and the general public. Policies that propose a new rule or regulation often undergo a public comment period, which gives members of the public the ability to provide feedback, criticism, or

support for proposed rules.

The consideration of public comments or sentiments can shape conservation policy, often positively but also sometimes negatively. Public valuations of nature, including those that are cultural, recreational, or utilitarian, may be neglected in decision making without input from the public[1]. Public input can lead to decisions that may be positive for biodiversity but would not be considered a top priority based on reviews of scientific literature. For example, the Yurok tribe's cultural valuation of the California condor (*Gymnogyps californianus*) has led to a movement to reintroduce the species to tribal lands in Northern California. Models predict higher condor survival in already established populations, but the support for the species in tribal lands may provide more protection for the species and additional population redundancy in case of future threats to the species[2]. Consideration of some valuations, such as recreational and utilitarian values, may also overcome previously held support for actions that may be of detriment to species valued in this way. For instance, individuals who may normally value habitat modifications for human development, such as the construction of dams, may retract their support if these modifications affect the abundance and distribution of fish they value for sport or consumption.

On the other hand, public valuations can also stand in the way of effective conservation strategies. The public's perceptions and valuations of some invasive species exemplifies the negative aspect of public involvement in conservation decisions. In many instances, removal of feral cats would be of great benefit to the abundance and persistence of native biodiversity but cultural valuations of cats by the public can prevent their removal or regulation. Similarly, the public in the Western United States may value invasive species such as American Bullfrogs (*Rana catesbeiana*) and Largemouth Bass (*Micropterus salmoides*) for recreational and utility reasons as they were introduced for hunting and consumption. These perceptions and valuations may lead members of the public to oppose actions to remove invasives detrimental to the persistence of native species. However, we may be able to change these perceptions and valuations through education and outreach, though some may be difficult to change.

A hallmark example of the important interface between the public, scientists, and natural resource managers is endangered species conservation, which is shaped in the United States by the Endangered Species Act (ESA). The US Fish and Wildlife Service (USFWS) evaluates species for listing under this act, which benefits listed species by providing varying levels of legal protection. The act calls for decisions to be made on "the best science and commercial data", although it does not clearly define what constitutes "the best science", and the inclusion of "commercial data" may allow the USFWS to prioritize commercial interests over scientific consensus.

The act also stipulates public comment periods for any species listing decisions. The USFWS advertises comment periods in a variety of ways, but it may be difficult for members of pertinent communities to have their voices heard in this process. Members of the public may also not believe that their input will be valued or considered. This distrust may be partially driven by USFWS's lack of clarity on the degree to which they consider public comments in decision making. Due to the lack of public awareness and trust, public comments will be disproportionately represented by those already monitoring the spe–

-cies' status and legal protections, and those with personal stakes in private activities such as resource extraction that may be disrupted by environmental protections. This means that the agencies trying to follow their mandate of valuing the "best science" potentially miss out on other important factors for effective conservation such as public support and an understanding of the public's perceptions of the species.

If conservation policy makers gather opinions from citizens in forums that are more publicly accessible, such as science outreach events, they may increase engagement and diversify their feedback. Conservation outreach can also educate communities about conservation problems, motivating their participation in rulemaking and benefiting policy makers by ascertaining the level of community support. Additionally, involving communities in conservation decision-making that affects them can engender public support and may be critical to long-term success of conservation policy. We wanted to explore how community outreach at a well-attended public science event could be used to educate community members on conservation issues and gather their immediate feedback on the issue presented. Here, we provide a case study on interfacing with the public in a non-regulatory forum with our public discussion of the conservation of Dunes Sagebrush Lizards (*Sceloporus arenicolus*), a species recently listed as endangered under the ESA. We evaluated the responses from the public and considered the merit of this approach for creating meaningful community interest and assisting with conservation decisions.

Community Outreach Event & Lizard Conservation

We conducted surveys at Darwin Day, a large-scale public outreach event hosted annually by the Ecology and Evolutionary Biology Doctoral Program at Texas A&M University. At the event, various groups including university programs, research laboratories, student organizations, wildlife rehabilitation facilities, artists, and community groups host booths with themes relating to ecology, evolution, wildlife biology, and conservation. In March 2024, Darwin Day included 42 booths, over a dozen graduate student posters, and over 1400 attendees from the community. The Applied Biodiversity Science (ABS) Program hosted one of these booths and collected opinion data about Dunes Sagebrush Lizard conservation from interested participants.

We first discussed the ecology of Dunes Sagebrush Lizards, and the issues related to their conservation. We presented these facts in a neutral manner, meaning that, though we conveyed facts about lizard declines, we did not argue for any particular conservation actions nor present any overt bias towards lizard conservation. We presented photographs, written information, and fluid-preserved specimens of the lizards from the TAMU Biodiversity Research and Teaching Collections. The entire range of this species, a small area in West Texas and Southwestern New Mexico, lies within the Permian Basin, the highest-producing oil region in the United States. The lizards are small, reaching a total length of 152 mm (*Figure 1*), and only live in sand dune blowout formations that form from the interactions between Shinnery Oaks, wind, and sand[3,4].

Due to their habitat specialization, populations of Dunes Sagebrush Lizards are highly susceptible to landscape change and fragmentation caused

FIGURE 1. ADULT DUNES SAGEBRUSH LIZARD (SCELOPORUS ARENICOLUS). PHOTO COURTESY OF LEE A. FITZGERALD.

by oil industry activities, which include drilling and constructing oil pads, building associated road networks between oil pads, and applying herbicides for plant control[3,5]. As a result, the species has undergone a range contraction consequential enough to merit its recent listing as an endangered species.

Once visitors were made aware of the conflict between the oil industry and lizard persistence, we asked them to write potential solutions on a sticky note and place it on a trifold poster (*Figure 2*). We also introduced visitors to the major themes of the ABS Program, which include Scientific Disciplines, Broader Impacts, and Institutions and Actors, and asked them to indicate which theme(s) was most relevant to their suggestion. Scientific Disciplines include fields like ecology, systematics, anthropology, economics, or sociology. Broader Impacts include capacity building, management plans, policy, and outreach. Institutions and Actors include universities, museums, government, private sector, and communities.

Public Perceptions of Dunes Sagebrush Lizard Conservation

Participants interacting with our Darwin Day poster ranged from young children to senior citizens and had varying levels of interest and engagement with the activity. Public comments were largely pro-conservation. When they addressed fossil fuel interests, the opinions ranged from hostility to a desire for compromise. Only one comment ("Neither pro or anti lizard") did not explicitly favor conservation, and there were no comments favoring oil industry interests over lizard conservation.

In total, we received 45 participant responses, including 40 written comments and five drawings.

Younger participants were those who primarily made the drawings. All drawings seemed to reflect positive conservation themes, as they were primarily drawings of animals, Earth, and various symbols of peace. The written comments were predominantly positive (39/40) toward lizard conservation. We sorted quotes by specificity, with 14 that directly applied to this lizard conservation issue, 12 that related more generally to biodiversity conservation, 16 that focused on broader environmental issues, and four that did not fit into these categories.

Many comments advocated for some form of compromise between oil extraction and lizard conservation. We received comments that reflected previously proposed ideas, including one comment that suggested, "wildlife landmen in oilfield", likely referring to wildlife surveyors who would mark sensitive habitats for conservation while allowing oil extraction to take place in the wider area. Another suggestion was, "Setting up reserved government owned areas that build on the population and grow the area over time. Also making different oil drilling that still allow for a suitably sized environment." These comments are interesting as they reflect two currently proposed strategies considered in

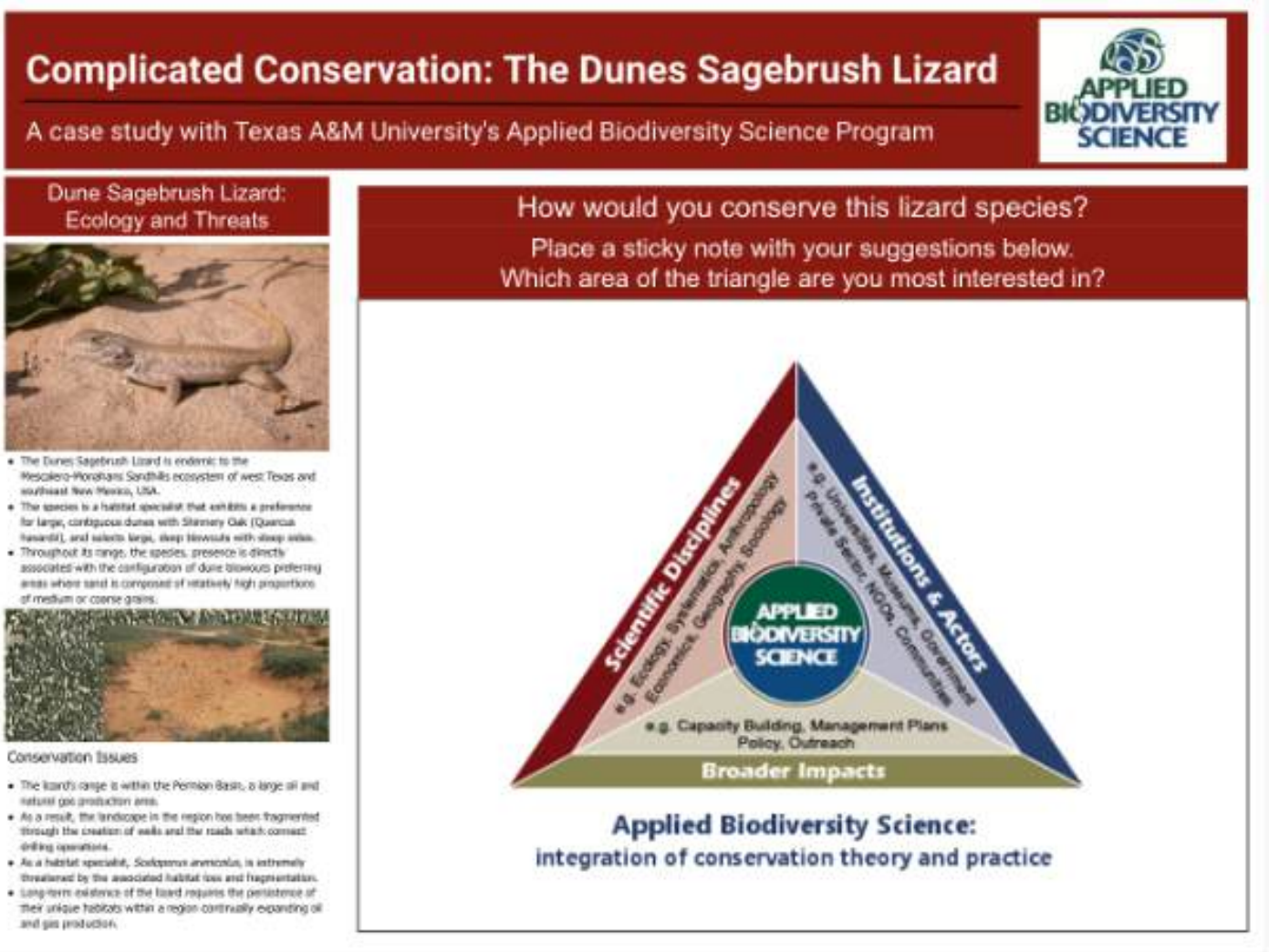

FIGURE 2. POSTER PRESENTED TO DARWIN DAY ATTENDEES ABOUT DUNES SAGEBRUSH LIZARD CONSERVATION CHALLENGES.

POSTER BEING PRESENTED AT DARWIN DAY 2024 INCLUDING SOME PARTICIPANTS' COMMENTS. PHOTO COURTESY OF LEE A. FITZGERALD.

"Community outreach is essential for the long-term success of conservation efforts"

actual conservation decisions. Both comments touch upon separating out areas for lizard protection while still allowing for oil extraction, which is possible as lizard range only covers a small percentage of the Permian Basin. The second comment may be referring to reducing impact to lizard habitat by changing oil extraction methods. For example, horizontal drilling less directly disrupts lizard habitat than the current practice of vertical drilling.

Several comments suggested variations of, "share research with stakeholders" without specifying the policies that should be derived from the research. Though they do not explicitly promote oil interests, the comments advocating for compromise have a broadly optimistic view of the oil industry's willingness to approach conservation in good faith For example, horizontal drilling would require that drilling operations sacrifice a portion of profit to conserve lizard habitat, and the use of wildlife landmen would rely on oil interests adhering to the survey results.

Some comments fully supported lizard conservation in defiance of oil interests. These comments generally involved broad statements of principle. For example, one comment said, "say too bad to the oil industry <3", another comment said, "squeeze $$ from oil companies", and another comment called for "more protected habitats". These comments do not specifically mention the lizard and may be motivated by broad environmentalist views as opposed to an

interpretation of the specific scenario we detailed at Darwin Day. Some comments did not weigh directly in on the debate regarding oil interests and instead proposed policies around limiting land and resource use, seemingly with the intention of indirectly reducing threats to the lizard habitat. One comment said, "list as an endangered species" and another said "give a lizard a habitat". Other comments proposed environmental policies that were specific in scope but not related to the lizard or its habitat. Examples of these include "home grown food reduce reuse recycle", "nuclear energy and electric vehicles that are sustainable", and "compost more and reuse". Though these comments may have resulted from participants misunderstanding the project, they may also be driven by the belief that sustainability-related policies in other areas of life will reduce the energy demands that drive the exploitation of new habitats.

In addition to sorting by conservation approach, we also grouped comments by which ABS theme(s) they most closely reflected. We found 15 comments that addressed Institutions, 17 that focused on Broader Impacts, and only 3 that related to Research. Focus on institutions included policymakers (e.g., "more educated policymakers"), local communities (e.g., "rallying the locals to speak to politicians"), and individuals (e.g., "not drive", which likely is encouraging individuals to limit oil usage). Broader impacts included increased sustainability (e.g., "be sustainable", "compost more & reuse"), increasing connection with the species (e.g., "encouraging empathy"), and education (specifically stated as "education and outreach" and "encourage education + awareness"). Only three comments related to biological research ("conservation plans", "share research with stakeholders", and "their endangerment affects the rest of our ecosystem too!"). The impact of research on biological conservation was not a major consideration for participants, which may result from either a lack of understanding of the research process or that participants do not consider research to be important for conservation. Another possibility is that participants may value research but assume, based on scientific findings being presented, that conservationists are already aware of the causes of biodiversity decline and further research is unnecessary. Though enough scientific data may certainly exist to make some conservation decisions, this potential assumption by the public underestimates the level of scientific knowledge on biodiversity and the modern crisis biodiversity faces.

Most comments were related to results (e.g., "more funding", "more protected habitats", "protect biodiversity") instead of methods for attaining those results (e.g., "run social campaigns"). This shows that participants are aware of the general goals of conservation projects, but they may not know the processes necessary to achieve these goals. Notably, only 9 comments had some level of specificity for who should be solving the problem (i.e., scientists, landowners, government). Our findings indicate that the general public may not be aware of how conservation works on a practical level or how many actors are required to generate change. Therefore, community outreach events like ours are beneficial for making people more aware of how we can better protect wildlife.

Although almost all comments were in support of conservation, there was considerable diversity in ideology and scale of proposed policies. The disagreement between those advocating for

compromise with oil interests and those taking a firm conservationist stance may be driven by differences in trust levels towards corporations. Their disagreement may also be driven by philosophical differences on government intervention in private industry. Another interesting point of divergence lies between comments advocating specific, smaller-scale policies and those taking broader environmentalist stances. This may represent a difference between participants who view the lizard conservation issue as an individual problem resulting from unique circumstances and those who view this issue as one manifestation of a wider struggle against environmentally destructive institutions such as the oil industry. This can also be interpreted as a disagreement between those who believe that the lizard can be protected through reforms to existing institutions and those who view the current socio-economic order as inherently hostile to conservationist aims.

Given the outreach event's location on a university campus and its focus on ecology, evolution, wildlife biology, and conservation, a substantial portion of respondents were conservation-minded individuals. Many participants included university faculty, staff, students, and local community members, often with young families. Consequently, the feedback represents a specific segment of the community with a conservation orientation, reflecting an engaged subset of perspectives on habitat conservation and economic considerations. Though this sample may not fully capture the broader community's views, it provides valuable insights into conservation-focused perceptions toward protecting Dunes Sagebrush Lizards and their habitats.

Conclusions

Community outreach is essential for the long-term success of conservation efforts, particularly for species like the Dunes Sagebrush Lizard that inhabit regions where economic and environmental priorities often intersect. By engaging the public, scientists can provide information on species' natural history while fostering a greater sense of shared responsibility and ownership in conservation goals. This collective approach helps facilitate conversations about the natural history and the ecological importance of a species and aligns conservation practices with the unique needs and values of local communities. Such collaboration enhances trust between scientists and local communities and encourages community members to engage in important conversations. Public participation thus amplifies the reach and impact of conservation efforts in meaningful ways.

Although community outreach can provide a foundation for more adaptive conservation strategies, the diversity of community feedback can make it difficult to accurately characterize public sentiment. Even when public consensus cannot be discerned, feedback can reveal social trends and contradictions that can be useful for guiding work in outreach and policy. For example, our public opinion data revealed that most commenters did not consider additional scientific research to be an important factor in deciding their positions. In contrast, wildlife officials and managers primarily consider new scientific information about a species when proposing and implementing management actions.

Outreach encourages active participation from diverse stakeholders and integrates community knowledge with scientific insights. This full-picture approach can drive policies the reflect both ecological and socio-economic realities, promo-

-ting sustainable solutions that benefit both Dunes Sagebrush Lizards and the communities that value their habitat.

For a national scale view of this topic, please visit the U.S. Fish and Wildlife website. The comments from a national survey on the protection of the Dunes Sagebrush Lizard conducted by the U.S. Fish and Wildlife Service can be found at https://www.regulations.gov/docket/FWS-R2-ES-2022-0162/comments.

The authors would like to thank the Texas A&M University Biodiversity Research and Teaching Collections for lending us the specimens to share with the public during this event. The authors would also like to thank the anonymous reviewers of this article and Dr. Lee Fitzgerald for their insightful comments and suggestions.

*Capitalization of comments was changed for consistency.

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Anthropologist, Dog, and Cat: Multispecies Ethnography?

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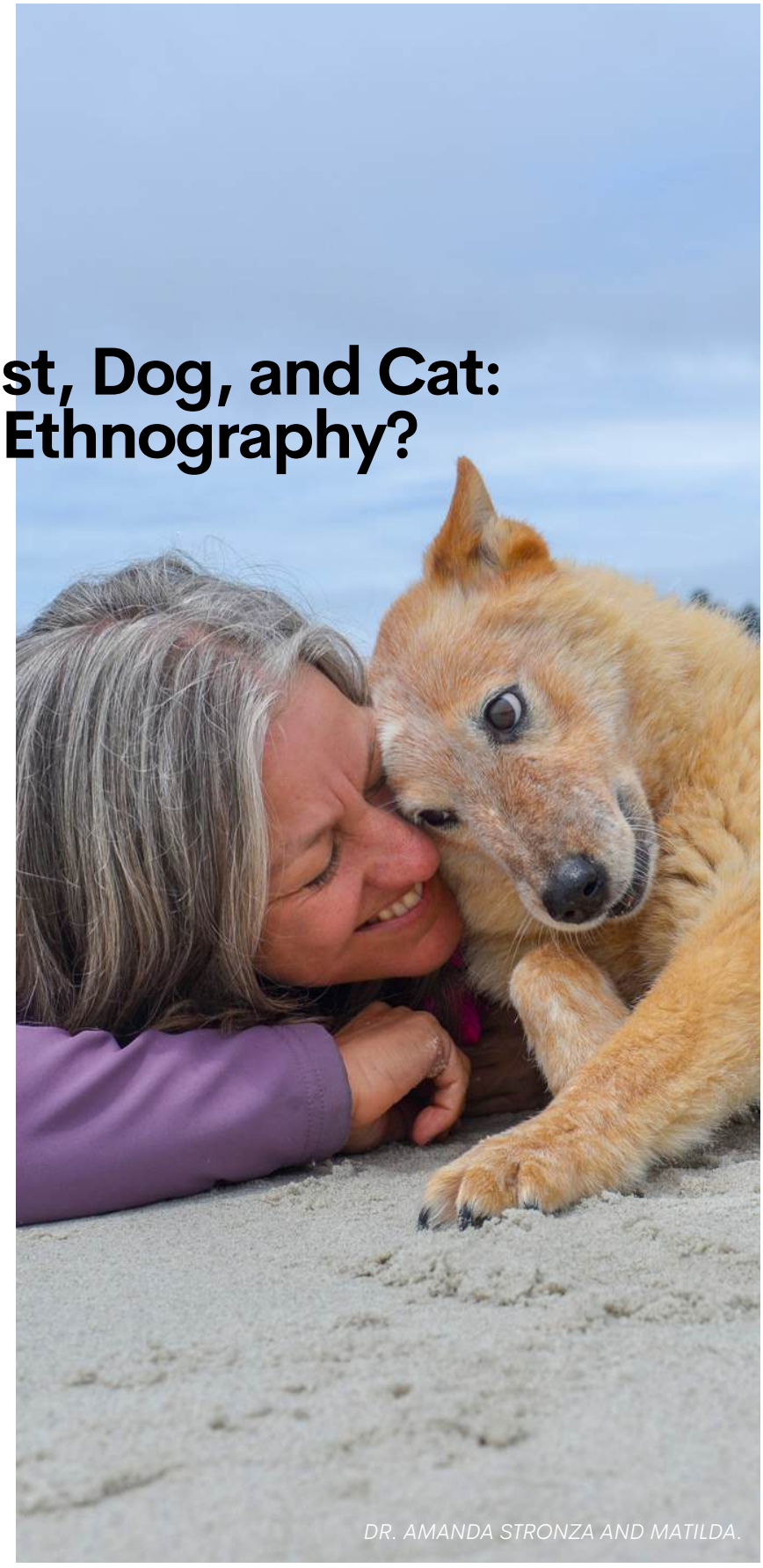

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PANDORA AND MATILDA.

This is an essay about traveling overseas for a year of field research with my dog and cat. It is a creative piece more than a scholarly one. I hesitated to submit it. What kind of anthropologist writes about her dog? What kind of conservationist takes a cat to Botswana? I looked to the literature for examples and found inspiration in the writings of Donna Haraway and in articles about the ethics of ethnographic research. Cultural anthropologists regularly write about the need to be reflexive and transparent, sharing with readers who we are as ethnographers, how we present ourselves, and how we are interpreted by the communities we interpret. We write about the attention we pay to bias and subjectivity, and how all facets of our lives and our positions in society filter what we see, what we experience, and ultimately what we write of what we see and experience.

In writing about myself in relation to my cat and dog, I connect in some ways with the genre of multispecies ethnography and what Augustin Fuentes (2010) has called "an "anthropology of personal life," or that which is "concerned with the integration, engagement and the interface between humans and other kinds of living things" (p. 601). Human-animal relationships are increasingly the focus of anthropologists' attention (Mullin 1999). In her book, When Species Meet, Donna Haraway (2008) observed, "Dogs have become patients, workers, technologies, and family members by their action, if not choice, in very large industries and exchange systems in lively capital."

Multispecies ethnography is a framework for deconstructing the humanism of landscapes and giving attention to "other-than-humans" (Kirksey & Helmreich 2010). It is an anthropology focused not just on the human but also on the effects of our relationships with other beings (Ogden et al. 2013). In his book, "Among the Bone Eaters," Marcus Baynes-Rock (2013) wrote of how humans and hyenas are "co-shaping each other's worlds" in the city of Harar, Ethiopia. A multispecies approach acknowledges that living beings do not exist in isolation of each other, but are "entangled" (Okuno 2021). It reflects the "animal turn" in science, meaning that animal others are included in research not solely to be analyzed biologically or as benefit, service, or use to humans, but also as beings who have stories of their own (Ritvo 2007).

Much of the multispecies scholarship is indebted to Haraway's engagement with companion species. She described mutual dependency and the intimate relationships we have with animals who share our homes. Writing about pets and domestic life challenges the classic ethnographies that revere the exotic. Other scholars have followed Haraway's lead, detailing the experiences and spaces of animal-human companionships, not just dogs and cats, but also elephants (Lorimer 2010). Rebekah Fox (2006) studied how British pet guardians juggled notions of animal instinct with anthropomorphic ideas about intentionality and emotion. Emma Power (2008) explored how pets make "more-than-human" homes in Australia. Traveling with companion animals has gained interest among tourism scholars as well (e.g., Gretzel and Hardy 2015, Kirillova et al. 2015, Markwell 2015).

The popular media is rife with stories of dogs and cats in modern family life. Two-thirds of American homes have at least one pet and 91 million homes in Europe have at least one pet (Baker 2024). In One Nation Under Dog: America's Love Affair with Dogs, Schaffer noted 83% of Americans with companion animals refer to themselves as their animal's "mommy" or "daddy." Dogs and cats are treated like babies ("furbabies"), pampered with customized nutrition plans, knapsack carriers, dog hydrotherapy, and stays in boutique cat hotels (Baker 2024). McConnell et al. (2019) found that viewing one's pet as a family member improves wellbeing, and can even play a role in preventing suicide (Hawkins et al. 2021, Love 2021). The Bark, a magazine for dog lovers, reported, "72% of its 110,000 subscribers regularly sing to their dogs" (p. 18). A list of top dog names includes, "Max, Molly, Chloe, Lucy, and Jake, the sorts of names you might hear thrown around the playgrounds of fancy Manhattan preschools" (Schaffer 2010:18).

My dog's name was Matilda. She was a stray pup who shared her life with me for 18 years before

she died in in 2023. She was a 35-pound Australian Cattle Dog, or red heeler, with a tender, adventurous spirit and a smiling, knowing gaze. My cat, Pandora, was also a stray, a shy Siamese with the bluest eyes, who died shortly after we returned from Botswana. As they were like family to me, I've included in this essay perspectives of anthropologists who traveled to the field with their children.

Joan Cassell's, Children in the Field: Anthropological Experiences, is a collection of stories about the joys and frustrations of taking children along for fieldwork. One couple conducted fieldwork with their children in an Amazonian longhouse. They discovered their kids were naturals in learning language, fitting in, and building rapport. Matilda helped me meet people, too. In other ways, she and Pandora created even greater cultural and economic distance from the people I wanted to know and connect with in meaningful ways in Botswana.

I hope what I share here might be useful to others traveling to the field with companion animals. After Cassell (1994) wrote of taking her children to her study site in Jamaica, she observed "Panicked neophytes approached her at anthropology meetings, saying, 'I heard you did fieldwork with children. What was it like? Were your kids okay? Could you get your work done?'" (p. viii). I hope the stories might also reveal something about how we connect with animals, in this case the cats and dogs so many of us in the U.S. have come to know as family, worthy of the same treatment, love, and regard. Navigating is a theme. I focus on how to navigate the pet travel industry, how I navigated my identity in the field, learning how to fit in and understand a bit of life in Botswana from the in-side while clearly marking myself as an outsider by doing something as unusual, even by "first world" standards, as taking my pets across oceans and continents. Finally, I write of navigating the ethical dimensions of conducting field research with pets in tow.

A Year in the Okavango

The story begins in 2012 when I traveled to Maun, Botswana, at the southern edge of the Okavango Delta, an oasis of water and lilies, golden grasslands and mopane woodlands in the heart of the Kalahari Desert. I lived in Maun for a year to begin new research on the trophy hunting industry. As a Visiting Professor at Okavango Research Institute, I collaborated with my graduate student, Dr. Joseph Mbaiwa, conducting interviews with wildlife managers, biologists, hunters, trackers, and safari guides, learning their perspectives and arguments in favor and against trophy hunting as a strategy for conservation. I focused on elephant trophy hunting as a tool for alleviating human-elephant conflict. That project evolved to become a broader, longer-term program and non-profit organization with colleagues in Botswana focused on fostering coexistence between elephants and people in the northern Okavango Delta.

Though I had worked in Botswana before and published some research papers on safari tourism and conservation, a year in Africa was a departure from my work on ecotourism and community-based conservation in the Amazon. The year was an opportunity to explore different questions, connect with a new network of scholars, literatures, peoples, and places. I felt like a grad student again, with many of the insecurities I had when I learned to do field work. This time was

better--I had tenure, a salary, and a family--Matilda and Pandora.

Navigating Travel: Crossing Borders with Your Pets in Cargo

Anyone who's ever traveled with an animal knows how hard it can be. It's hard despite an entire "pet travel" industry that's booming. Companies with names like Happy Tails Travel, Pet Express, and Global Paws specialize in helping people like me navigate the rules and regulations. Understanding the required dimensions and features of animal crates alone is confusing. The paperwork for getting animals through customs requires countless signatures and stamps from numerous authorities. Veterinary certificates must adhere to many specific criteria and fall on precise and certain dates within travel. Some rules are established by the airline companies, some by the U.S. Department of Agriculture, and some by foreign ministries. The rules vary a lot country to country. When I took my two cats to Ecuador a few years earlier for a different project, they each required their own visas, embossed by diplomats at the Ecuadorian embassy in California.

Though the rules are numerous and detailed, no one, including the companies who charge a lot of money for their knowledge about the rules, seems to know anything about them. This creates an exasperating experience of paying exorbitant fees to feel even more confused. Here are some things I learned. Every airline requires official documentation showing the pets are in good health and free of communicable diseases. Most countries require no quarantine. Only a handful of countries prohibit live pets from traveling in the plane's cabin. South Africa is one of them, partly because the official port of entry, Johannesburg, has no state vet on hand to examine the animals on arrival. That means pets flying to South Africa are required to go as cargo. By law, pets in air transit require layovers of at least four hours. So, if a connecting flight leaves in less than that, you go, but your pets stay behind. The consensus among frequent-pet-fliers is KLM is the most pet-friendly airline. Apparently, the Dutch love their pets more than anyone and have the nicest "pet hotel" in the Amsterdam airport. Having said that, and sparing the distressing details, the KLM cargo warehouse in Houston should be avoided.

Traveling with pets can be risky to the animals' health and welfare. Stress factors are numerous, including everything from separation anxiety to reduced space and controlled climate, and fear triggered by noises, imbalances, and turbulence associated with loading and movement of shuttles and airplanes (Dotson et al. 2011). For these reasons and others, I worried for months before travel. Preparing for my own research was easy. I networked with colleagues in the Okavango, read everything I could, applied for research grants, put my things in storage, rented out my house, coordinated schedules with my grad students, and secured an "alternate work location" with the dean of my college. Preparing the trip for my pets was not as easy. I fretted about everything. Would I find a suitable home for them, one with secure doors and windows, and a place for Matilda to run? What would they eat? More pressingly, what might eat them? Would I find a vet?

I've since read of similar fears among anthropologists who took their children to the field. "What precisely were we afraid of?" Hugh-Jones (1994) remembered. "First, that the chil-

MATILDA IN AFRICA.

THE GIRLS LOUNGING IN THE SUN.

PANDORA IN BOTSWANA.

-dren might fall ill or have an accident. We worried about hunger and what would happen if they refused, point-blank to eat Indian food. I began to feel the enormity of the risks we were going to impose on our children." (p. 42). Prepared to take her children to the Colombian Amazon, she decried "those people who annoy[ed] us with their conviction that either homesickeness or snakes will finish off our children as they step off the airplane" (Hugh-Jones 1994:31).

I understand how she felt. People expressed great concern about my dog (oddly, not so much about my cat). Mostly, people seemed to worry about the heat and whether Matilda would have a way to stay cool. I found it endearing how Texans, who were coping with 90+ consecutive days of temperatures well over 100F that summer, worried my Texas dog might be too hot in Africa. Other comments fueled my fear. The worst came from a South African friend of a friend. After hearing about our plans, he looked down his nose at Matilda and snorted, "There are a million things in Botswana that'll kill your dog." That morning, the state vet at the USDA office in downtown Austin had given me similarly ominous words. I was there to retrieve the permits to export live animals. Because of some discrepancy in Matilda's heartworm tests, the state vet was hesitant to issue the permit. She did sign, but only after I'd checked an official form indicating I understood my dog might be "quarantined indefinitely, shipped back to the U.S. at my expense, or terminated upon arrival to South Africa." "Terminated." I called my vet from the otherwise quiet, staid government office in a state of hysteria. Having traveled back and forth to South Africa with her own dogs, my vet assured me with a calm voice that none of those possibilities were likely. Still, I cried long after picking up the permits, wondering if treating my animals as family was ultimately proving to be cruel, costly, and selfish.

Packing took some extra thought. Preparing to take her children to Jamaica, Melanie Dreher (1994) wrote, "In addition to the usual accouterments of fieldwork—clothing, camera, typewriter—I now had a Snuggli carrier, umbrella stroller, portacrib, a vast supply of diapers, bottle" (p. 151). For my "kids," I packed an entire duffel bag (half of my official airline weight allowance), full of dog and cat food, treats, scratching boxes, heartworm pills, flea treatments, toys, and most unreasonably, two bags of litter. I knew other people kept dogs and cats in Botswana; I just didn't know how long it might take for me to find to a place to buy local supplies.

Compared to getting documents, packing, and worrying before the trip, the travel itself was easy. On the first leg, from Houston to Amsterdam, I sat rigid in my seat, refusing to get up or even go to the bathroom. In some foolish (and unhealthy) act of empathy, I decided if my pets couldn't relieve themselves, why should I? I arrived in Botswana in two days, and my pets arrived two days later. For those two days, they were essentially live cargo in transit between Europe and Africa. While I waited, I, too, was in a state of limbo. I had no home or transportation, no easy access to food, phone, internet, or at that point, because of floods in Maun, running water. But I had a duffel bag full of litter, leashes, foil balls, and pet dishes. Thankfully, my student, Joseph, had a room for us.

The day Matilda and Pandora landed in Botswana

was the most stressful. When the flight touched down, the airport guards in Maun gave me a special badge and directed me to a tiny customs area where I found my cargo, my family, waiting on a conveyor belt, wagging their tails inside their crates. They were dazed, but in good health, and visibly relieved to see me. We still had to go through customs, but I thought that would be easy, given the months of preparation and thousands of dollars I'd paid to reach this point. I approached the customs officers with a smile and two folders of papers, each two inches thick with triplicates of certified, embossed, stamped, official documents. The uniformed woman shuffled through my papers for several minutes with a face that registered nothing but annoyance. "Where is your import permit?" she asked. "What?" I replied. "Where is your import permit?", even more annoyed. I stammered, searching through the stack. "It's here, isn't it?" "No," she sighed, giving me the impression she'd been through these very steps too many times with clueless foreigners who insisted on traveling with pets to her country. Now, more patiently, she explained, "This is the export permit from the United States. This is the import permit to South Africa. This is the export permit to Botswana. But you have no import permit." Of course, the requirement to have all of these things may seem obvious, but as I said, the rules are unclear, even to the people who are paid to issue and enforce them. Frantic, I asked Joseph if I could borrow his phone to make an international call to the pet travel company in South Africa. The woman on the other end checked my file, and muttered with no discernible measure of concern, "It looks like you paid to get them to the airport in Botswana, but not to leave the airport."

The customs official was ready to put Matilda and Pandora on the next plane and send them back to South Africa for a quarantine of indeterminate length at my expense. A few hours of bargaining and pleading with a State Vet, possible only because of Joseph's connections, cultural legitimacy, and fluency in Setswana and the ways of Botswana government offices, we were able to negotiate a deal. The State Vet spent an hour writing up a citation for me, mandating a two-week in-house quarantine for Matilda. He implored me to stop importing dogs into Botswana without following the clear rules established by the Southern African Development Community official "movement protocol with animals." He was very kind. I realized I was off to a terrible start in terms of establishing trust and rapport with the people of Botswana.

That initial run-in with the government proved to be a great advantage over the course of the year. Maybe not surprisingly, the State Vet never forgot Matilda or her recalcitrant human, and we returned several times to get authorization to take Matilda around the country, past veterinary cordon fences designed to separate domestic livestock and pets from wild animals, and across international borders. At one point, Matilda and I drove north from Maun to the eastern edge of the Okavango Delta to stay at a trophy hunting camp. Matilda rode around in a Land Cruiser with us and from the safety of the vehicle, like a tourist, watched zebra, wildebeests, impala, and gemsbok. She slept with me those nights near a watering hole frequented by elephants, wild dogs, hyenas, and leopards. I kept her safely in the tent with me. We also drove to Namibia on one trip, across hundreds of kilometers of the Kalahari Desert, passing ostriches, warthogs,

innumerable goats, and at least two lackadaisical donkeys in the middle of the road. We reached the coast of Namibia where she swam in the Indian Ocean. At the end of our year, Matilda and Pandora traveled across the border into South Africa with in a small rental car. The border officials waved me through each time, with smiles and at least three offers to buy Matilda. People tended to assume she was very valuable and they offered me great prices in dollars, pula, and Rand. They always wanted to know how much she was "really worth." Of course, I had no way of responding. She had come to me free, as a stray I discovered living under my house in rural Texas. She was a mutt. Worthless. She was my family. Priceless.

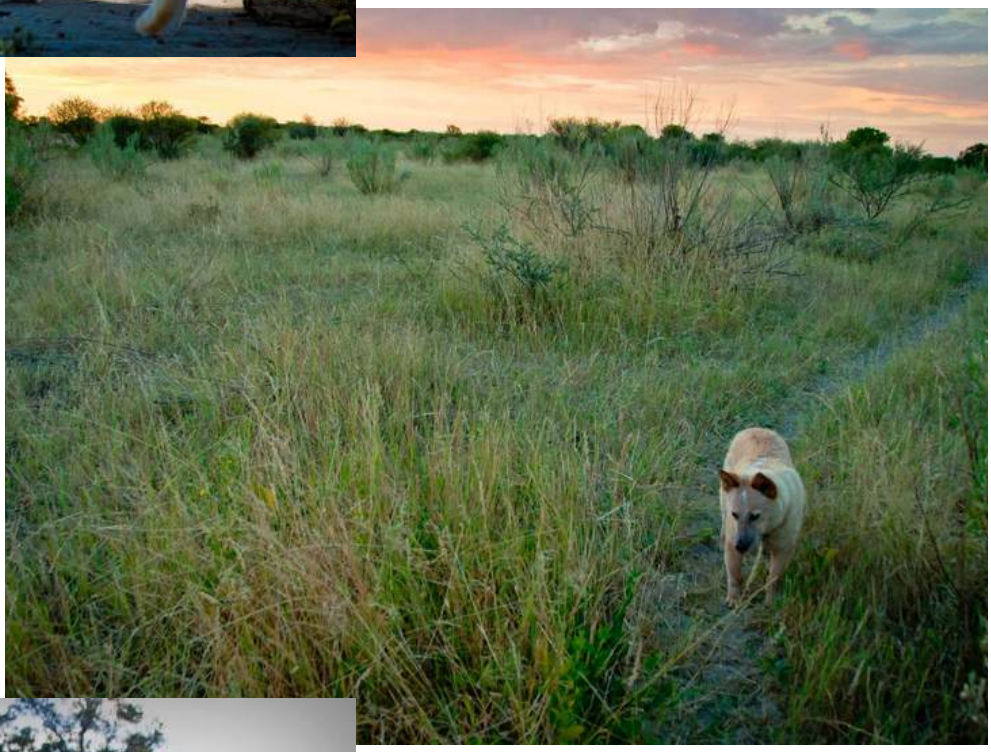
Navigating Fieldwork: Building Rapport with A Dog by Your Side

Once I settled in Maun with Matilda and Pandora, the real joys and concerns of how to do field research with my pets kicked in. I quickly learned how they were helping me connect me with people, and also how they almost instantly separated me. Cassell (1994) described her kids as "emotional anchors" in the field. While dealing with initial fears about her fieldwork, she set up a daily routine with her children, arranging familiar meals, and making them feel at home. She said reassuring them helped reassure her. Nancy Scheper-Hughes (1994) traveled to Brazil with her children, too, and said they each kept daily journals. She interviewed them and took photos of them in the field as part of her own work. Of course, I had no journals or interviews with my pets, but I took many, many photos, especially of Matilda. "Through the eyes of a dog" can be an unusual way to see Botswana, but she did help me perceive life there in ways I would not have otherwise. She also attracted people to her, and by extension, or by her leash, to me.

In a study about the health benefits of pet ownership, Wood et al. (2005) found that pets can be conduits for social interaction. The authors surveyed residents in Perth, Australia, and discovered that people with pets were more likely to engage in social interaction, and that dogs helped increase the "friendliness" of a neighborhood (see also Barker and Wolen 2008). Similarly,
Dotson et al. (2011) found that people who travel with their dogs reported feeling less lonely. Irvine (2013) described dogs and other pets as social facilitators who "often initiate relationships between people." Similarly, Robins et al. (1991) showed that dogs facilitate encounters between their humans and strangers and also help establish trust among the newly acquainted. In many ways, dogs can be fully woven into the fabric of public life.

"Dogs' roles have been multifaceted, and they have not been passive raw material to the action of others," Haraway (2008) wrote. "Relations are constitutive; dogs and people are emergent ... as subjects and objects to each other, precisely through the verbs of their relating. People and dogs emerge as mutually adapted partners in the naturecultures of lively capital" (p. 8). No question, Matilda became my alter ego. Or rather, I became hers. She went nearly everywhere with me, sharing the public spaces of Botswana with me, including the local university campus, various restaurants and riverside camps, and even petrol stations where the attendants knew her by name. My cat, Pandora, stayed in my house and never gained the fame Matilda had. For that matter, I never gained

PANDORA IN BOTSWANA.



MATILDA IN MAUN, BOTSWANA.

MATILDA ON THE OKAVANGO IN AFRICA.

the fame Matilda had. More people on campus—faculty, students, staff, gardeners, and housekeepers—knew her as the dog who goes everywhere with "the prof" from the U.S. Few people knew me by name, but everyone knew her as "Matilda!" She was mostly adored, and to my surprise, many people doted on her. Just as in Texas, they worried how she was weathering the heat. Most dogs in Botswana seem somehow related to Rhodesian ridgebacks and are not nearly as fluffy as Matilda. "That fur!" people would exclaim, "She's too hot!" Many urged me to shave her.

In my neighborhood, Matilda was a minor celebrity. We lived in a spacious, three-bedroom house the university rented for students and visiting scholars. I shared the home with one of my PhD students from the U.S. Our immediate neighbors were students from the university and the landlord, a physician and his family from Zambia. Our house was near Maun's main, paved road, in an eclectic neighborhood of one-room cinder block shacks, thatch and mud homes, and at least a few relatively opulent, gated homes with Land Rovers in the yard. We had no roads, just sandy lanes that were sometimes impassable without 4X4 drive. Our backyard was a big, open thornveld near the river, with a sandy soccer pitch where neighborhood boys and men gathered at sunset to play. Matilda and I walked past the games each evening while I looked for hornbills, hoopoes, lapwings, shrikes, drongos, and rollers, and she bolted after donkeys, goats, and cows, poking her nose in animal burrows. My friend's Jack Russell Terrier had been bitten by (and survived) a venomous puff adder snake in that field just months before and I kept a close eye. We were often followed by groups of children who would come running and yelling with their arms waving, so excited to see and pet Matilda.

Calm, playful, and receptive as she was to children and strangers, Matilda became a kind of cultural broker, bringing me close to people. She also separated me. She was clearly unlike any of the countless local dogs that roamed the streets and fields, often in packs. She drew attention for how different she was, and how different I was with her. I remember one man afraid to come near me for fear I had a jackal on a leash. The dogs in town that looked like Matilda--clean, well fed, pampered--tended to belong to the large expat community of mostly South Africans, Brits, and Americans. Matilda put me squarely with the expats, as if other facets of my persona didn't.

Partly because of the clear ways Matilda reinforced my white, privileged outsider status, I chose not to take her with me when I traveled to the more remote and rural villages. Though many local Batswana and expats alike encouraged me to take her, either for company or safety, I left her in Maun. I was concerned both for her and for my interviewees. Most people I met in the villages have dogs of their own, and I sensed their dogs would be aggressive with Matilda. At the same time, I worried she would make people more fearful of her, making it impossible for me to build trust. I also worried she'd have a run-in with a black mamba, leopard, crocodile, or elephant—all common dangers for dogs in the villages. So, though I took her to the field, I didn't take her to the field.

Despite my efforts to shield her from local fauna, Matilda did have at least one encounter with a venomous snake, a Mozambique spitting cobra. I was working late one evening on campus, and like always, Matilda was with me. The campus is near

the river, several kilometers outside of Maun and just south of the Okavango's the Moremi Game Reserve. The surrounding woodlands are frequented mostly be livestock, but at least a few times a year, elephants and lions pass through. Snakes and smaller fauna are very common. That evening, as I shut down my office, Matilda went running to the truck ahead of me. By the time I caught up with her, seconds later, she was rubbing both eyes with her paws. I brought her under the light to discover her eyes were reddening and swelling. In a
tant. This was a miracle as it was 10 pm. She agreed to meet me, and by the time we reached her, Matilda's eyes were nearly swollen shut. The venom of spitting cobra contains a neurotoxin that causes a lot of pain and can destroy mucus membranes in the cornea. The vet tech helped me cleanse the venom from Matilda's eyes with just water. There was nothing to stop the swelling, but she offered ointment to alleviate the pain. She assured me Matilda would be fine and we would need to check her corneas in better light the next day to confirm she didn't suffer permanent damage or scarring.

I should say something about "my vet" here. He lived within walking distance of my home, and his primary skills were in working with wild animals. When I first tried to schedule appointments, I learned he was out darting hyenas. He worked with many of my colleagues in wildlife science to place radio trackers on animals like cape buffalo, zebra, lions, and other big cats. When Matilda and I showed up to his clinic the day after her encounter with the cobra, we found two elephant collars the size of hula hoops on his porch.

Navigating Ethics: The Disparities Your Pets Reveal

We polish an animal mirror to look for ourselves. Donna Haraway

More than anything I've experienced over decades of living and working in rural communities in the Amazon, Central America, and Southeast Asia, taking my companion animals to Botswana made me acutely aware of my privilege and the disparities between me and others in my writing. Everything I've described so far points to things that separated me from the people I was there to learn from and with, write about, talk about, and ultimately try to serve in some way through conservation research and advocacy. Remember I panicked at the prospect of my dog going to quarantine. I fretted for weeks about which pet carrier to take on the plane, and how many dog treats to pack in my duffel bag. I lay awake worrying whether the pet hotel in the Amsterdam airport would provide comfortable enough overnight care for my dog and cat. I spent nearly $4,000 for the flights, a colossal sum for something that is essentially unessential. In short, the experience of taking Matilda and Pandora to Botswana brought my privilege into great relief. I see myself in the animal mirror.

In his Theory of the Leisure Class, Thorstein Veblen called pets living emblems of conspicuous consumption. "As [the pet] is also an item of expense, and commonly serves no industrial purpose, he holds a well-assured place in men's regard as a thing of good repute." If Veblen could write that in 1899, I wonder what he would say about the pet economy today. According to Schaffer (2010), people with pets spend billions annually on food, medical care, and "goofy gewgaws" (i.e., talking food bowls, dog kimonos, leashes that blink, leashes that beep, leashes that glow in the dark, organic dog treats, kosher dog treats, etc.). There is a whole body of work devo-

-ted to interpreting the human-animal relationships through consumption for pets and companion animals (Bettany and Daly, 2008; Mosteller 2008). Haraway (2008) wrote of the ethical, political, and economic dilemmas of caring for our pets.

"How does a companion animal's human make judgments about ... how much care is too much? Does paying fourteen hundred dollars for an MRI for Bear add to the world's injustice, or is the comparison between what it costs to run decent public schools or to repair wetlands and what it costs for Bear's diagnosis and treatment the wrong comparison? What about the comparison between people who love their pet kin and can afford an MRI and people who love their pet kin and can't afford annual vet exams, good training education, and the latest tick and flea products, much less hospice care? What comparisons are the right ones in the regime of lively capital?" (p. 50).

Haraway's words about how much is too much and comparisons between those who can afford such care and those who can't resonated for me in relation to one of my closest connections in Botswana. As I noted, I decided to leave Matilda and Pandora in town when I relocated to the villages for weeks at a time for research. Though I had carried them across continents, I could go only so far with them. At the recommendation of one of my expat friends, nearly all of whom have housekeepers, nannies, pet sitters, and gardeners, I found someone to watch my pets while I was in the villages. Tendai is a lovely woman from Zimbabwe. She became a trusted and dear friend. She knew how much I loved my cat and dog like family, and she cared for them the way I would, sending me reassuring texts every couple of days to let me know my Matilda had taken her pills and Pandora had cuddled with her at night. Meanwhile, Tendai's own two children, both under the age of 10, were living with her mother in Zimbabwe. Tendai had traveled to Botswana
to seek the kind of work I was paying her to do so she could send remittances home to Zimbabwe. She was supporting her children, her human children, in another country, a day's bus ride away, by caring for my cat and dog.

Reflections

Returning to how ethnography compels us to grapple with ourselves as subjects, I am aware of how writing this has helped me consider how my pets plugged me into certain social circles in Botswana while excluding and even alienating me from others. Did Matilda and Pandora help me bond and build trust, or did they prevent me from engaging with people in authentic and valid ways? Did they serve as cultural brokers, enabling me to connect, or did they highlight disparities that marked me as foreign?

Though dogs can be conduits for social connection, maybe this is more common where pets are treated as children or family members. In other places, dogs play different social roles, and people ascribe different meanings to them. In Botswana, many village and local dogs are treated as companion animals, sometimes aiding in hunting and guarding livestock, sometimes offering soft company around the fire. Though some dogs are cared for as family, most are not. By this, I don't mean to imply people lack the ability to care for or connect with dogs, only that human-dog relationships vary culturally, as do notions of what a "pet" is or should be. Most

people in the rural villages of the Okavango cannot afford to feed or pamper a dog in the same way I did with Matilda, even if they wanted to. This alone set me apart, creating more social distance rather than connection. Of course, other facets of my identity across gender, ethnicity, nationality, education, and income, served to both connect and separate me. My pets, and more specifically how I treated them, doting on them as family, mirror all of those characteristics. Taking them to the field for the first time in my 30 years of ethnography helped me to see them, and also to understand what they revealed about me.

I will always wonder if taking them was the right decision. They faced spitting cobras, braying donkeys, many hours in the cargo hold of airplanes, and at least a few aggressive packs of street dogs. Was it more humane to leave them for a year or take them with me? I turn again to Haraway (2008) who in relation to her own dog observed, "the dog is neither the same as a child nor an aged parent. Parent-child, guardian-ward, and owner-property are all lousy terms," she argues, "for the sorts of multispecies relationships emerging among us. The categories need a makeover "(p. 51).

I may never fully grasp how Matilda and Pandora influenced the substance of my research and conservation work, or how they either enabled or impeded my chances of meaningfully connecting with people in Botswana. After our year there together, I returned to Botswana more than 30 times, spending many months in the Okavango while furthering my work on human-elephant coexistence. I always traveled alone, leaving my family at home in the U.S., in the care of pet sitters. Each time I returned, people in Botswana often asked about them, wanting to know the whereabouts of my better-known companions.

I believe it is not a stretch to say Matilda and Pandora helped shape my work, who I was while I was doing my work, how people perceived me, and what I was able to see, do, learn, and understand while in the field. Perhaps in the end this is another perspective on the meaning of multispecies ethnography.

DR. AMANDA STRONZA AND MATILDA ON THE OKAVANGO IN AFRICA.

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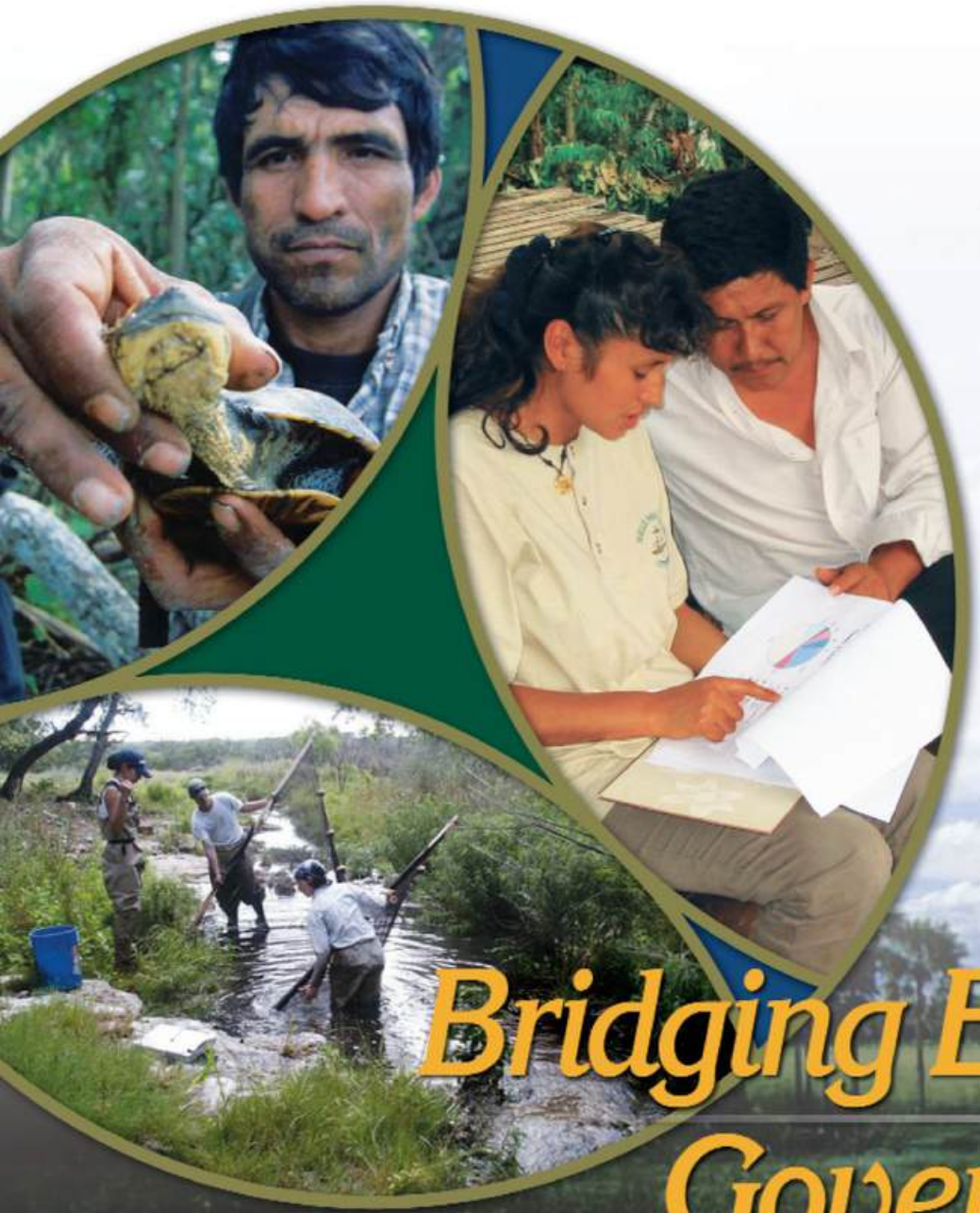

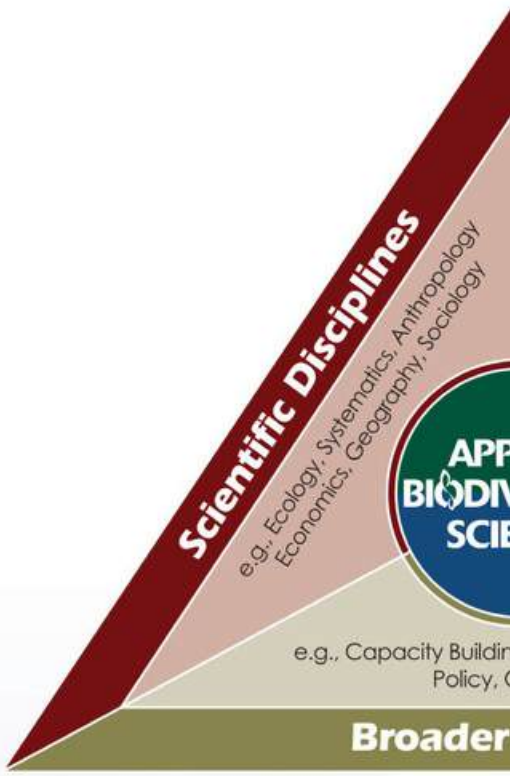

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