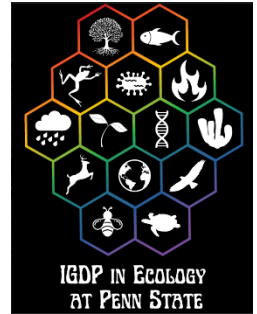


# NOTES FROM THE FIELD

The Biannual Newsletter of the Intercollege Graduate Degree Program in Ecology

The Pennsylvania State University



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## Studying Honey Bee Migration in Kenya

By: Darcy Gray



In North America and Europe this spring, as flower buds start to open and warm, sunny days become more frequent, honey bees emerge from their hives, finally taking trips to collect pollen and nectar after months of relying on honey stores while in their winter cluster inside the hive. African honey bees, however, have an entirely different schedule. Bees in Africa do not need to hunker down for a cold winter, as the seasons are more typically a cycle of wet and dry periods; instead the subspecies of honey bees found in Africa, including *Apis mellifera scutellata* (the East African lowland honey bee) undertake a seasonal migration where many- but not all- colonies will completely abscond from their hive and head for greener pastures. I took a page out of their book this winter, as I left Pennsylvania in December and have managed to escape the most brutal months of the winter while I conduct my fieldwork in Kenya, in partnership with *icipe*, the International Centre for Insect Physiology and Ecology in Nairobi.

Why do some colonies leave and not others? And what are the factors in the landscape that lead to this seasonal absconding and cause differences in the number of colonies that abscond across different regions? These are the questions I am interested in for my Master's in Ecology in Dr. Christina Grozinger's lab, with fieldwork supported by the Fulbright US Student Program. To answer these questions, we installed in-hive continuous monitoring devices across a number of apiaries here in Kenya, spanning from the lowland savannah ecosystem to Kenya's only tropical rainforest near the Uganda border. We will compare data on when colonies abscond to data on landscape and weather factors sourced from satellite remote sensing. We are working with beekeeping cooperatives that *icipe* has relationships with as well as the nonprofit organization Save the Elephants, whose Elephants & Bees Project installs "bee fences," or chains of honey bee hives, around farms to mitigate human-wildlife conflict (as it turns out, elephants are afraid of bees and this is an effective way to keep them off farms!)



Understanding what landscapes and weather conditions are most suitable for honey bees, and what factors increase the likelihood of absconding, will help organizations like Save the Elephants make informed decisions about where bee fences are an appropriate mitigation strategy. Furthermore, Kenyan beekeepers can benefit from a deeper understanding of the seasonal patterns of colony growth and absconding, as they may be able to support colonies with supplemental food, or select apiary sites more strategically.

## The Perfect Grant Writing Course Doesn't Exist...

*By: Sarah Richards*

Hello to all readers! I am a second-year Ecology Ph.D. student in the Bell Lab, where we study how microbiomes impact the function of agricultural and ecological systems. This semester I am participating in a short course co-run by my advisor Dr. Terrence Bell, Dr. Liana Burghardt, and Dr. Jill Hamilton, to guide students through the application process for the USDA AFRI Predoctoral Fellowship.

As some of you may already know, applying for grants can be intimidating, and at times, downright paralyzing. Application requirements (sometimes calling for >30 documents!), fast-approaching deadlines, or good old-fashioned writers block can easily overwhelm even the most seasoned scholars. But not to fear! This course has made a scary process substantially more approachable (shout out to Dr. Burghardt, who color-coded and annotated the guidelines for this grant of over ~60 pages, which helps first time grant-decipherers digest the language and cut to the chase). Each session, we come together as a group to discuss new aspects of the application and, bit by bit, cross off supporting documents from the massive pile of “to dos”, which keeps us on track- far ahead of schedule even. Peer review between students and instructors has been a central component of our learning and writing progress. Both giving and especially receiving critique can be a difficult undertaking for students, but our instructors create a supportive environment by acknowledging the vulnerability in the process and providing guidelines for constructive feedback. Toward the end of the course, students will even have a chance to submit their latest drafts to a mock panel of volunteer professors to simulate a formal application review. As the process of grant applications alone can be a deterrent to the masses, completing this course is a unique leg up for Penn State graduate students in a nationally competitive pursuit. This course and other equivalents for the NSF GRFP and NIH proposals will continue to be funded through the Huck Institute in the coming grant seasons, so keep an eye out for the email calls if you are interested in participating! Regardless of the outcome, participants benefit from chatting about their big science ideas and articulating them on paper. One of the scariest things can be a blank page, but this course reminds us that as scientists, we don't scare easy!

## Field Work Full Steam Ahead!

*By: Elyse McMahon*

Who else is excited about a brand new field season? I wish I could include myself in that list, but I'm off to new adventures so I will have to live vicariously through many of the current Ecology graduate students! This summer, students will be doing a variety of research. Some will be working with waterfowl, others will be working on pollen sourcing from bees, a few will be studying emerging contaminants in streams and some will be studying salamanders. Talk about research diversity within the program!



It seems that while the pandemic impacted many research projects both here and across the globe, it only had minor impacts on some graduate students here. One in particular said the largest inconvenience was “transportation last summer since we couldn't have more than two people in a vehicle at a time.” I had similar problems where in my lab, we could only have one or two people in a room at a time, which made progress very slow going, but we persevered. Makaylee Crone said that the pandemic was actually the reason she started this project. “I had to pivot from research I had been planning to do in the lab at the start of the pandemic.” Even in the early days of the pandemic way back in Spring of 2020, graduate students were coping with changes and were able to shift their focus toward writing and planning future projects!



I asked our graduate students what they are most excited about this coming field season. Karen Beaty, a Master's student, is excited to get hands-on time with waterfowl this summer. One challenge she said she will likely face is the highly pathogenic avian influenza, a serious virus that infects the respiratory and gastrointestinal tract of birds. But on a lighter note, she said another challenge she will definitely be facing is getting pooped on. For those that work with wildlife, we know the struggle behind this one! Maisie Macknight said the biggest struggle she will have is irregular sleep patterns since they'll be doing a lot of night work. Two other graduate students are concerned about the weather this coming summer. “With climate change and more extreme weather events, stream flow is always a concern since I have no control over it,” said Francesca Ferguson. Makaylee Crone agreed with this and said “...winter has lasted much longer than I would have anticipated. I'm concerned that I'll miss a plant's blooming window.” Unfortunately, with climate change being an ever-present problem, it will be difficult to measure consistency across time. But, at least we will be able to track changes we see and make predictions on why we see the changes in our environment.



However, on a brighter note, there are many other areas that students are excited about this summer. Makaylee is excited to be outside and “treasure hunt” for the plants on her list. I can get behind that! I love the idea of turning your research into almost a type of game that helps to break up the monotony when you are a few years into your project. Francesca is excited to be able to compare contaminant concentrations and macroinvertebrate assemblages from past field seasons! In my mind, more data is always something to celebrate! Finally, Maisie is excited about mentoring undergraduates this summer. I can get behind this as well. Having undergraduate assistants when doing research is a major convenience. At the same time, it’s benefiting them to get involved in research and be excited about what they are contributing! Overall, I wish everyone good luck in their coming field seasons and I’m excited to hear about the adventures to come!

## Ecologist Under Construction

*By: Alberto Cruz*



When I started my undergrad school degree in Wildlife Management at the University of Puerto Rico, I was not really into it because I just wanted a degree to attend chiropractic school. But all that changed when I took plant taxonomy and ecology classes. Then I realized that ecology was my passion, and my journey began. As an undergrad, I studied the behavioral ecology of the Puerto Rican Parrot, and the impacts of droughts and hurricanes on amphibian communities in Puerto Rico. I also studied the natural history of some anoles reptiles in Puerto Rico and published two field notes on peer-review journals about their reproduction and

feeding habits.

These early field research experiences further motivated me to pursue a master's degree in environmental science. I focused my master's research on how a so called "super-tramp" avian species were affected by hurricanes, and modeled occupancy and abundance before and after hurricanes. For my Ph.D. at Penn State's Ecology program, I will be working with multi-interactions mutualistic networks in Atlantic forests of Brazil. Basically, my project will be focusing on two serial transport animal-plant mutualistic interactions: pollination and frugivory and seed dispersal (FSD). These two mutualisms are key for the fitness of plant species and potentially impact plant community assembly processes in direct and indirect ways. I will be examining how pollination influences FSD processes by shaping fruit production patterns. I am also interested in potential trade-offs between these two mutualisms that could shape interaction process in plants. For example, how do specialization and traits involved in one mutualism affect the other? Are there patterns that shape organization and interaction networks at community scales? Ultimately, by working in a large experimental framework, I will be able to examine how these mutualisms affect the trajectory of successional forest communities, their diversity, and productivity.



## Women in Ecology Through the Years

*By: Elyse McMahon*

The amount of women in science, technology, engineering and math (STEM) has grown exponentially over the past several years, especially in the biological sciences. This is because there are more opportunities along with increased representation for younger girls to see possible career paths. Personally, I think the Ecology Program excels at having many women both students and advisers. However, I was curious, was the Ecology Program always so forward thinking? So I reached out to several alumni that spanned from Ecology's inception to now and asked just that. What was it like being a woman in the Ecology Program?

Dr. Shirley Malcom was the first graduate student (and first African American woman) to graduate from the Ecology Program with her PhD in 1974. She is now the Director of Education and Human Resources Programs at the AAAS. She said "There were very few women in my program and no women professors...I had to become someone I had never seen...I found community at my residents hall." However, she praised her mentor stating, "I have to thank my mentor who helped me. He was a pretty young guy and born and raised in Mississippi...so he understood where I had been and what I had gone through. And therefore we were able to go forward together."

Dr. Victoria Borowicz graduated from the Ecology Program in 1986 and is now an Associate Professor at Illinois State University. She said that during her time at Penn State, she thinks there was only one tenured female professor in the Biology Department, which was Dr. Jean McClure. "So there were no role models at all. There were quite a few grad students that were women, but it was still a male dominated society." "It was an annoying part of the norm," she chuckled when I asked her more about it, but she said "things have certainly changed a great deal, but it has taken a long time."

Michelle Fink graduated from the Ecology Program in 1993 and is now a Landscape Ecologist at the Colorado Natural Heritage Program. She said, "Frankly, it was better than my experience as a woman undergrad in Wildlife Biology, which is very much a male-dominated field, even now. I didn't notice feeling excluded, but I definitely struggled to be taken seriously by male professors and peers, and there weren't any female professors in the program at the time."

Finally, Dr. Amanda D. Rodewald graduated from the Ecology Program in 2000 and is now the Garvin Professor and Senior Director of Center for Avian Population Studies at Cornell Lab of Ornithology. She said "I always felt very included and supported." Dr. Rodewald started a family while finishing her degree and said "Everyone was incredibly supportive and I remain enormously grateful for that. The community welcomed Julie [her daughter] to campus, seminars and social events. Their support made the experience positive, rewarding and empowering."

Today, I think that not only has the Ecology Program continued to progress with many female mentors and opportunities for all graduate students, regardless of gender. There are also organizations such as Graduate Women in Science (GWIS) and Women in Science and Engineering (WISE).

At the end of each interview, I asked every person what advice would you give to current graduate students (especially women). Here are some of their quotes:

Dr. Malcom: You've got to have mentors that support you...The needle has moved bigtime for women in sciences. We have it in numbers, but we're still working on leadership. Women need to encourage each other and nominate each other for positions. Keep going!

Dr. Borowicz: Graduate school has some of the best times of your life and some of the worst times. It can be extremely stressful, but at the same time, it's important to find your folks! Learn new techniques outside of your field.

Michelle Fink: Stick together and support each other! If you see something that is not right, say something. Get as much hands-on experience as possible. Don't let others dissuade you from your vision of what it is you want to accomplish, but at the same time be willing to re-evaluate that vision as you grow and learn. And, take care of yourself, you've got a lot going on right now and it can get overwhelming pretty fast. Seek help when you need it.

Dr. Rodewald: The imposter syndrome is ubiquitous – even among accomplished and seemingly confident individuals. Even though we know that intellectually, our negative thoughts feel real when we're experiencing an imposter-syndrome storm. I try to remind yourself of that great saying – something to the effect that “the only problem with our thoughts is that we believe they are true” – and remember that, so long as history predicts the future, the storm will pass.

In my opinion, it's important to know what it was like in the past to understand where we are at now and where we need to be. I think the Program has come a long way since it first began in the 1970s.



## The Graduate Student to Nomad Pipeline

By Madalyn Meyers



Finish graduate school. Sell everything I own. Move into an RV. Start traveling the country. That's the normal progression of things, right? No, I suppose my decision to take a break from research and tour the United States in a tiny-home is not the standard way of things. Still, even while my life currently involves less lab work and data collection than it once did, I still find myself immersed in ecology on a day-to-day basis.

As I travel the country with my husband, the journey toward our destinations is often fueled by our mutual love for science and nature. Our curiosity has led us to explore some of the most spectacular corners of the United States. Sledding down the gypsum sand dunes of White Sands National Park, watching progress of the largest rocket in the world from the shore of the secluded Boca Chica Beach, and scaling the side of the iron-rung Beehive Hike at Acadia are amongst our favorite adventures. The diversity the Earth's environments, wildlife populations, and habitats was something that amazed me when I had only seen it through photographs. Now, I have only become ever more awestruck with nature as I have gained the opportunity to walk through just a tiny portion of these landscapes in person.

Although my change of direction was unexpected to many, including myself, I find that the skills I gained at Penn State have been vital in my success as a full-time traveler. As I map out our route and plan our stops, I remember carefully scheduling treatment dates in my more complex experiments. Likewise, I am constantly leaning back on the problem-solving skills I learned at Penn State, systematically determining the culprit when things misbehave in our home-on-wheels. Truly, if there is one thing that lab work and RV life have in common, it is that things will frequently go wrong.



Through it all, I've found success in continuing my work in community outreach and scientific communication which my time as a graduate student taught me is where my deepest passions are buried. At each stop along this grand journey, I research the landscape and document my findings alongside our experiences at my science-themed travel blog, Discovery Detour. As it turns out, people seem to be just as interested in learning about science across the country as they are about travel. My science-oriented writing pieces have been published as several articles across three established travel magazines, making it evident that the skills I retained after years of scientific writing are applicable to other forms of literature as well.

Having no deadline for this expedition, it is rather unclear how long we will stay on the road. I have a feeling that if I wait until I've found every ecological gem in America, I will be traveling for a very long time. For the moment, I remain grateful for my time as a Penn State graduate student, ever present in this opportunity to surrender to nature, and hopeful that I may serve as an example that the steps of an ecologist can blaze many trails.

\*If you would like to see all of the places Maddie has traveled to since she graduated from Penn State, or to keep up with her upcoming adventures, you can follow along at [discoverydetour.com](https://discoverydetour.com)

## Awards and Publications

### Awards:

Darcy Gray received a Fulbright Study/Research Award to study honey bee health and behavior in Kenya.

Marissa Kopp received a USDA NIFA Graduate Predoctoral Fellowship.

Makaylee Crone received the Apes Valentes award.

Liana Burghardt received a NIFA grant from the Foundational Knowledge of Ag Production Systems entitled: “Laying the groundwork to breed for mutualisms: Tracking the long-term adaptation of nitrogen-fixing rhizobia to alfalfa in agricultural fields.” In addition, she received an early-investigator grant from the Agricultural Microbiomes Program titled “Rhizobial cycling between diverse legumes in crop rotations: understanding the effects on soil and plant health.” The Ag Microbiomes program also awarded a conference grant to her and several other ecology faculty (Estelle Couradeau, Terry Bell, Kevin Hockett, Mary Ann Bruns, Francisco Dini-Andreote) to support “Changing Microbiomes: A symposium hosted by the Microbiome Center at the Pennsylvania State University.”

Laura Leites received the 2022 Rosemary Schraer Mentoring Award.

### Publications:

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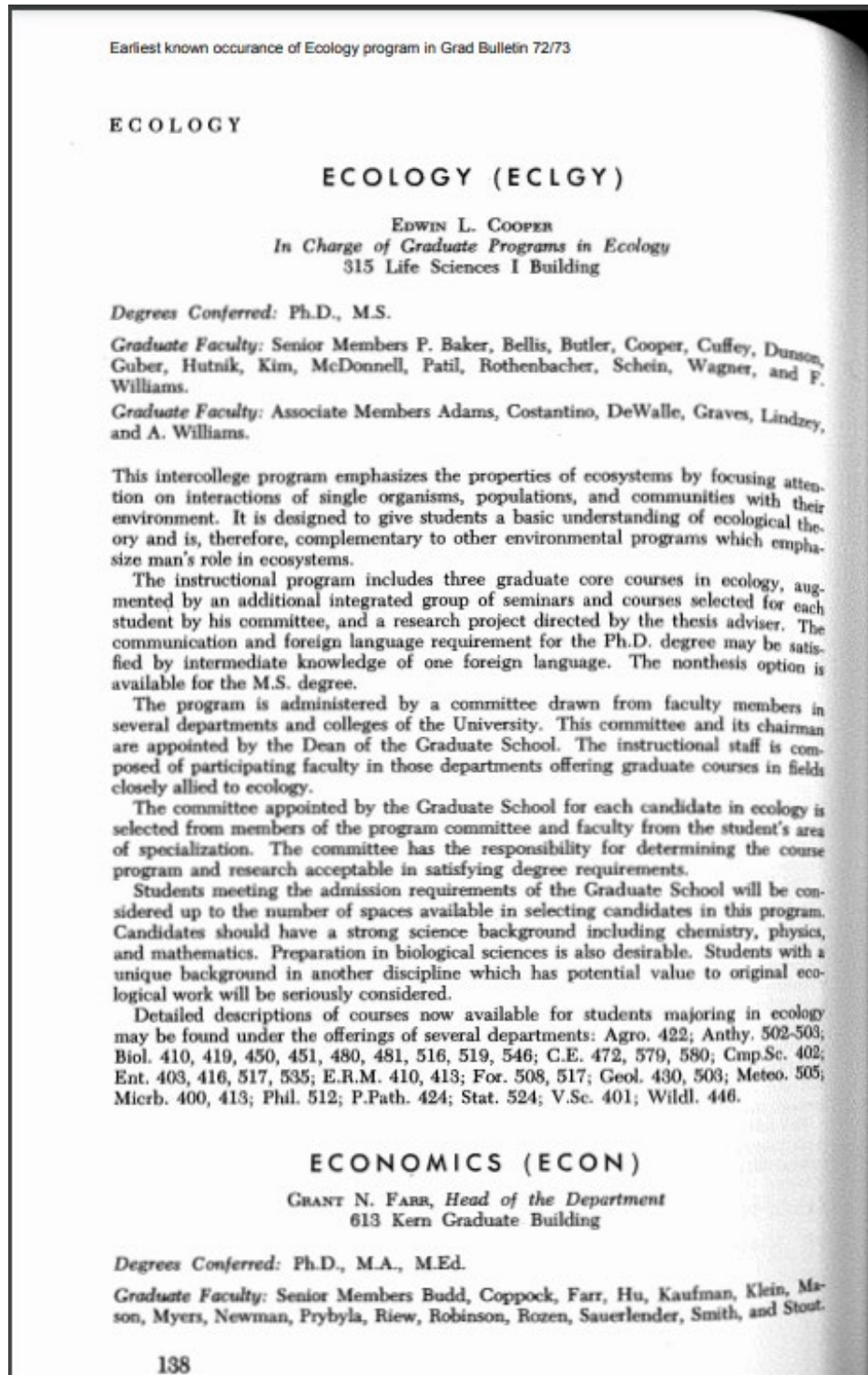
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In honor of the upcoming celebration of the Ecology Program's 50<sup>th</sup> anniversary, here is the first known listing of the Ecology Program in the Graduate Bulletin!



This publication is available in alternative media on request.

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