



# Spring 2019 Newsletter

(No. 29, a double feature covering 2017 and 2018!)

Southwestern Research Station, Portal, AZ

American Museum of Natural History

## From the Director

*Geoff Bender, SWRS Director*

The Annual Newsletter is back.

Yes, it has been awhile. In case you haven't heard, SWRS has gone through some recent organizational changes that will better position us for sustained future growth.

Since our inception in 1955, the SWRS Director was responsible for all operations as well as science and educational programs. However, extraordinary growth in the past eight years has forced us to adapt to increased users. In June 2017, we created the new position of Resident Research Scientist and were thrilled to hire Michele Lanan. Michele has intimate knowledge of SWRS and the surrounding ecosystems, and has led our ant ecology course *Ants of the Southwest* since 2012. She did her doctorate work at the University of Arizona and some of her research on ant-plant interactions was done in the Chiricahuas.

At SWRS, Michele will focus on all things *science* including the development of new courses, expanding our internship program, curating our collection and liaising with researchers, institutions, and agencies. Her enthusiasm, unique skill set (she can play a mean fiddle) and her love of the Chiricahuas makes her a great addition to our SWRS family. Next time you are here make sure you say hello and I am certain she will be happy to tell you all about her ant research.

By all measures it was a very busy year at SWRS. August saw the greatest number of users in any month in SWRS history as course participants, researchers, and interns taking advantage of the monsoon season filled the station to capacity. In 2018, we hosted 25 different courses from 21 institutions, 49 distinct research projects, and 10 tours/naturalists groups representing over 6,000 user days. We were also proud to support 50% of the room and board costs for 11 graduate students seeking PhDs (*your donations are used to support these students*).

And we are not just hosting guests. We are actively developing long-term research projects in cooperation with multiple agencies with the aim of helping land managers make science-based decisions. We are involved in local conservation efforts with the Forest Service, National Park Service, Arizona Game & Fish, U.S. Wildlife Service, and Bureau of Land Management. We are partnering with local universities to develop courses and internships for

credit, both undergraduate and graduate. Recently, we formed an alliance with other southern Arizona field stations including the Audubon Appleton-Whittell Research Ranch, Tumamoc Hill Desert Laboratory, and Arizona-Sonora Desert Museum in an effort to share information and resources, collaborate on research, grant writing, and courses. Future efforts will focus on organizing, expanding and digitizing our collections and building a research database for data archiving.

There is a lot to be excited about. The fact we get to do this in such a beautiful environment where, heck, jaguars roam makes it all the more fun. Of course we couldn't have all this fun without the support of our researchers, interns, volunteers, courses



*Station volunteers won Best Float at the 2017 Rodeo 4<sup>th</sup> of July Parade with their papier- mâché trogon.*



*Geoff, Steve, and Joe with the Forest Service mules that helped us haul one ton of cement for a new weather station near Bootlegger Saddle.*

organizers, naturalists, and donors. We send our sincere thanks to all the people that help SWRS fulfill its mission of supporting field research and mentoring the next generation of scientists.

## Settling in at SWRS

*Michele Lanan, Resident Research Scientist*

I started working at SWRS in June 2017, just as the summer field season was heating up. The staff told me that this was one of the busiest research years yet at the station, and I immediately plunged into a nonstop whirlwind of activity. I helped find and band owls with our Hawkwatch groups, got a crash course on our resident threatened species with Team Leopard Frog, spent hours poring through the herbarium and setting up plant plots on the station with Lynn Loveless, became moderately proficient at noosing lizards with the Herpetology Course and Stacey Weiss, was trained to identify and band hummingbirds with Susan Wethington and the Hummingbird Monitoring Network, learned about native bees with the Bee Course, and taught the sixth year of my Ants of the Southwest course to a fantastic group of students. In the fall I learned an incredible



*Michele, with a very large *Hericium coralloides* she found last August.*

amount about the recent and historical fire history of the Chiricahuas and the effect of fire on geological processes, plant communities, and wildlife during the Southwest Fire Science Consortium field trip.

A lot of my first year has been spent gathering information: meeting all of the researchers and talking to them about their research needs and ideas, spending time with our volunteers and thinking about ways to expand the educational value of their experience, meeting people at our neighboring institutions, organizations, and community, figuring out the permitting processes for research activities, shadowing our field courses, and sorting through our equipment, library, collections, and files to learn what we have and what we might need. I also worked a lot with our volunteers, guiding them on setting up a long-term research project on the Reed Creek watershed, connecting them with researchers looking for field assistance, training them on collecting GIS data, and pointing them to literature on their favorite organisms. It's been exhausting, but also very rewarding.

My own research focuses on ant ecology, evolution, diet, and behavior, and it's a privilege to find myself living in a place where colleagues come through regularly for courses and fieldwork and my study systems are right outside my door (although I wish the resident *Liometopum* colony would limit our interactions to *outside* my door). Ants will continue to be a focus for me scientifically, but shadowing our researchers and courses has been a revealing way to experience this amazing place through many different lenses. I've always been a scientific generalist at heart, and I think there's something uniquely wonderful about the way field stations can foster a scientific community with such diverse and deep insights into the ecology of a single place.

Settling in to the old Stephen Reed cabin and life in the canyon has been wonderful, if a bit of an adventure. My husband Andrew Waser and I have enjoyed exploring the station grounds and surrounding canyons and watching the nightly wildlife show out the kitchen windows. We continue to find interesting mementos from the past stuffed into the walls as we repair the chinking, and the wood stove is a welcome luxury on cold winter nights. The most memorable cabin experience so far has been the night a ringtail came out of the living room ceiling at 2am to start a heated discussion with our *indoor* cats.

In spring 2018 I joined the Department of Entomology at the University of Arizona as Adjunct Scientist, where I look forward to collaborating on both research and development of new field courses. We hosted an extremely talented film crew from Japan at SWRS for several months as they worked on a documentary about black-chinned hummingbirds with Harold Greeney, and we hope to have a showing of their spectacular footage sometime in the coming year. Geoff and I worked on negotiating the many administrative issues related to setting up our new Graduate Field Research Award (announced below!). I started the complicated task of cataloging and moving our library to new shelves in the conference room in the interest of making them more accessible and freeing up work space in the collection room. I taught Ants of the Southwest and worked with our other courses again, and we were very excited to welcome a new course led by Jim Downer on trees. My numerous ant colonies are finally set up for in-nest filming and data collection. I also made my first



*What's in the ceiling now?*

trip to the American Museum of Natural History, where I gave a talk on my research, checked out the collections and equipment, and met my colleagues in person for the first time. Andrew joined Portal Rescue as a wildland firefighter (and put those skills to the test this fall), built a new mesh wifi system for SWRS, and helped with the bullfrog work. I'd like to thank the SWRS and Portal community for the very warm welcome we have received since moving here. I'd also like to thank the fantastic SWRS staff for helping me get up to speed and for tolerating the occasional pilfered coffee mug. I look forward to helping SWRS build a strong and enduring research and educational program for current and future scientists.

## Honeypot Excavation

*Ti Eriksson, PhD student at Arizona State University*

In early July 2017 I was given the rare opportunity to excavate an entire colony of the honey ant *Myrmecocystus mendax* on the SWRS grounds. Having shadowed Ray Mendez during a partial dig in 2010, I knew that it would require a backhoe, a lot of patience, hard work, and luck to capture the queen and her workers alive. Geoff Bender generously lent his substantial backhoe skills to the project, and a small army of fellow graduate students and SWRS volunteers helped with the hand excavation and ant collection (special thanks to Michele Lanan, Christina Kwapich, volunteer Christian d'Orgeix, and my advisor Jay Taylor).

We used the backhoe to dig a pit adjacent to the nest and then carefully excavated from there into



*Ray Mendez consults with expert hole digger Geoff Bender*



*A honeypot replete from the excavation*

the nest chambers using trowels and even spoons. It took five solid days of digging to reach the royal chamber, almost two meters below the surface. At one point a sudden monsoon storm filled the pit with three feet of water, but we bailed it out and kept digging. At other points Christian and I constructed a crude shade structure with cardboard over the pit to shelter us from the blazing sun. Concerned that I was running out of time on the fourth day, I asked Geoff and Michele to set up a generator and flood lights so I could continue digging late into the night.

At last, at 8:30pm on July 15 I carefully lifted out a single wingless queen from a chamber at the bottom of the

muddy pit. In total we collected nearly 4300 ants, 371 of which were honeypots. The colony now resides in our laboratory at ASU, where we continue to study them. Honeypot specimens were also taken by Michele for her gut morphology and microbiology research and mites from the nest were given to Jay Taylor.

One interesting observation I made after bringing the colony to the lab was that many large workers were parasitized by nematodes that emerged after I brought the colony back to the laboratory. I am curious about how the workers were infected and why the nematodes emerged from their hosts in the lab.

I'd like to thank the SWRS staff for providing a location to do the excavation and for all of their assistance with this project. One can't ask for a better place to do research.

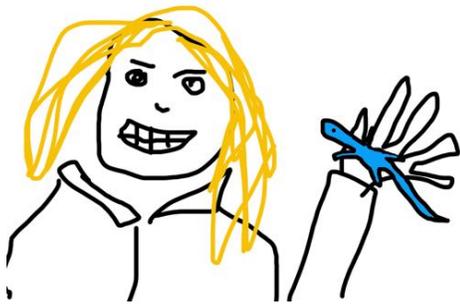
## Thoughts from an intern

*Karen Watson, masters student at the University of Illinois*

Hello! My name is Karen Watson, and from August through October 2017, I was immersed in an “Epic Internship” at the Southwestern Research Station in Arizona. This internship would help complete my master’s program in Environmental Studies, through the University of Illinois, Springfield. I was so excited to reside in the Arizona mountains, especially in the unique ecosystem of the Sky Islands!

The goal of my internship was to obtain field experience. Now let me share with you that I am an “older” learner of 55 years and an online student. So, other than some citizen scientist projects, I had never had the opportunity to perform field work. I was blessed to be under the instruction of new resident scientist, Dr. Michele Lanan. When I arrived, she was teaching an ant course to visiting professors and students. So, for my first week, I jumped in and learned field techniques collecting ants, identifying ants, setting up transects in a variety of landscapes. And it just got better...

I then worked with Dr. Stacey Weiss, noosing Striped Plateau lizards, in order to collect data on these reptiles. I also helped to release hatchlings from her lab - talk about adorable!



*Karen, who kept forgetting to send us a photo.*

pools. This baseline data will provide a point of comparison as the Forest Service installs check dams throughout the creek to create vernal pools, lessen erosion and prevent debris flows during the monsoon season and winter thaw. I also conducted a pitfall trap study at SWRS to collect data on populations of invertebrate species along the creek.

And, as if all of the above experiences weren't enough fun and excitement - I worked with another intern, setting up trail cams to track wildlife moving along the creek. We hoped to catch a glimpse of a jaguar, migrating north from Mexico, but the deer, bears, coati, lions, foxes, squirrels, rabbits, birds, ringtails, turkeys, and researchers we photographed were pretty exciting too.

My immersion in the Southwestern Research Station internship has only improved me as a person and technician. The fellowship and positive learning dynamic of the station are amazing! I felt so welcomed by the staff, the researchers and interns and was invited to work on studies, attend lectures and outdoor recreational activities. It was such a rewarding experience to be an integral part of data collection and assisting scientists in research and conservation of species.

From the first day I arrived at SWRS, I texted my children and told them I did not want to come home. I stand by that proclamation! My internship was nothing short of EPIC and the best learning experience for an aspiring future field technician.



*A lion photographed on SWRS grounds by one of Karen’s camera traps*

I assisted with a hummingbird banding project. We caught hummingbirds in specialized nets covering the feeders, bagged them and delivered to the researcher for data collection. When finished, I had the pleasure of holding the tiny birds, dipping their beaks in sugar water and setting them free.

I also participated in bee collecting near “the playa”, a dried lake bed of white sand near Wilcox, AZ. We collected native bees with nets and popped them in jars with ethanol, for later examination in the lab. We even found ground nests of desert bees!

Dr. Lanan advised me on field technique methodologies for an ecosystem assessment of a predominately dry creek, Reed Creek, located near the station.

I took measurements of the height of the creek beds, as well as depth of water in



*Researcher Stacey Weiss weighing a lizard*

## Frogs Galore!

*Michele Lanan and Geoff Bender*

The threatened Chiricahua Leopard Frog was first described in Cave Creek Canyon and named for this location, but by the mid-90s they were locally extinct due to competition and predation by non-native bullfrogs introduced to Arizona for sport hunting.

Geoff Bender and Dawn Wilson led an effort to bring Chiricahua leopard frogs back to the canyon with our Fish and Wildlife, AZ Game and Fish, University of Arizona, Forest Service, and local community partners, and we are continuing that work today at SWRS. We now host the largest population of leopard frogs in the region in our spring-fed ponds, and are working on an ambitious project this year to eradicate bullfrogs from the Portal/Rodeo area and re-introduce leopard frogs across the eastern Chiricahuas. Healthy leopard frogs are an indicator of healthy water, and by removing bullfrogs we also protect the native fish, amphibians, and nesting birds that bullfrogs prey on. We extend our heartfelt thanks to all of the community members and local landowners who have been working with us on this project.



*One of the frog ponds at SWRS*



*Alina Downer (volunteer at the time, now SWRS Administrative Assistant) clears reeds from a pond we drained this spring for bullfrog eradication*



*U of A scientist David Hall shows off leopard frogs that will be swabbed for disease and released*



*Volunteer Ellen Fox, learning bullfrog identification*

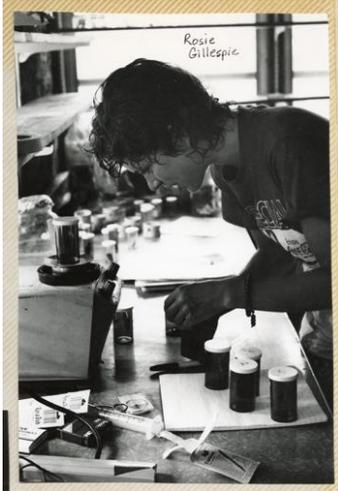


*A bucket of beautiful leopard frogs, delivered by Game and Fish to the station after their pool dried up*

## SWRS History, in photos

Ellen Fox, historical detective and volunteer

While volunteering at the station in winter 2017/18, Ellen Fox undertook an ambitious project to find, organize, and scan all of the station's historical photos and albums. In the process she also tracked down and contacted a number of past researchers and learned about their time at SWRS and subsequent activities. Here are a few of her favorites:



Rosemary Gillespie, Professor and Schlinger Chair in Systematic Entomology at University of California Berkeley is shown here weighing spiders in 1985. "I worked at SWRS for one summer as a grad student at the University of Tennessee with Susan Riechert," she writes. "We were looking at territoriality in spiders (*Agelenopsis aperta*), and outcomes of interactions between individuals when they compete for webs: What is the role of spider size (weight) in dictating the outcome of an interaction, and how does habitat (riparian vs desert) affect the tendency of an interaction to escalate (fighting versus just running away)? So here I am weighing the individuals."



Jerry Rozen digs up the nest of a solitary ground nesting bee in 1978. Rozen was back at the station as usual in 2018 for The Bee Course, its 20th anniversary!



Larry Orsak immersed in the latest computer technology circa 1983! Dr. Orsak passed away last year in Papua New Guinea, where he was head of the Department of Forestry at the Papua New Guinea University of Technology. He was given a ceremonial funeral and burial in his adopted village of Baitabag. For more information about his life and work there, visit

<https://lifeworklarry.wordpress.com/>



Here's a shot from 1982 of then-grad-student Deborah Gordon filming ants to compare spatial patterns of different species. Dr. Gordon continues her research at SWRS and Stanford and has written two excellent books: "Ants at Work: How an Insect Society is Organized" and "Ant Encounters: Interaction Networks And Colony Behavior."

For more SWRS historical photos as well as current shots, follow us on Facebook, Twitter, and Instagram! Ellen now resides in Douglas, AZ, where she is teaching English as a second language to high school students.

## Happy Trails

A heartfelt goodbye to Rose Rothpletz and Erinn Enriquez. Rose took a position at San Simon School to be closer to her growing family and Erinn is off to pursue her dream of becoming a helicopter pilot. Both have been instrumental to the growth of SWRS and we wish them all the best in their future endeavors.



Erinn Enriquez, future helicopter pilot



Rose Rothpletz

## Speaking of Happy Trails

We are thrilled to have hired Alina Downer as our new Administrative Assistant handling researcher and group reservations, managing our volunteer program, and a multitude of other tasks. Alina volunteered at SWRS this past year, and just couldn't get enough. Alina is an avid hiker/spelunker/naturalist and helped with trail maintenance all over the Chiricahuas. She also joined Portal Rescue as a wildland firefighter and fought her first fire this October. In short order, Alina has proven to be a valuable asset not just to SWRS, but to the Portal community at large. Please welcome her to the fold next time you call or email [adowner@amnh.org](mailto:adowner@amnh.org).



Alina, dressed as a pleasing fungus beetle (*Gibbifer californicus*), with Elaine



View of the October fire near SWRS from Rattlesnake Rock. Alina and Andrew are down there somewhere helping to put it out.

# New Graduate Student Funding Opportunity!

*Michele Lanan and Geoff Bender*

Graduate students often struggle to find funding for field research, and decisions about how much fieldwork to include in their dissertation project often come down to the availability of money. This need is particularly acute today with the loss of important funding sources such as the NSF Doctoral Dissertation Improvement Grant (DDIG).

## **That's why we are absolutely delighted to announce the Southwestern Research Station Graduate Field Research Fund, with a yearly award of \$5000!**

This new fund was endowed by an anonymous donor for the purpose of supporting field research by graduate students at SWRS. The purpose of this competitive award is to make extensive station-based fieldwork possible for graduate students, recognizing that such fieldwork provides a uniquely immersive opportunity to explore their study system and develop a sense of place. The recipient receives an award of up to US \$5000 to be applied towards covering station fees, research equipment and supplies, and travel expenses. Supported fieldwork must be in the Chiricahuas or neighboring areas. Regional projects including those with components at neighboring field stations within Arizona will be considered, but supported research must be based in part at SWRS.

This generous gift from our donor has also been a great opportunity to establish a framework with our parent institution, the American Museum of Natural History, for creating an endowment specifically for student support donations. In order for the annual \$5000 award to be sustainable in the long term the fund will need additional contributions, and our benefactor was adamant that the fund be open to future contributions from additional donors. If the fund grows substantially we may eventually be able to issue multiple awards per year or support an expanded range of student field research in the Sky Islands! Interested in contributing? Contact Geoff Bender, [gbender@amnh.org](mailto:gbender@amnh.org). Students! Interested in applying? Keep an eye out for our call for applications early this spring! The deadline will be March 15.



*Sorry, but turkeys are not eligible for this award.*

## **New Trees Course**

The SWRS trees course, also known last year as the "Chiricahua Rendezvous" was a partnership effort with the University of California, University of Arizona and the AMNH. Twenty five attendees and instructors traveled from four western states to attend an intensive five day course on the biology, ecology and soils related to desert adapted trees growing in the Chiricahua mountains. Arborists received over twenty continuing education units for the course, and many indicated that it was a life changing experience to visit SWRS and study trees in the surrounding ecosystem. The course brought together experts from UC, UA, and the local community. We have set aside a date in October of 2019 for the next meeting which will be called the Trees Course. We are hoping to attract international experts on desert adapted trees to speak this year.

## **New Coleoptera Course**

Planning is underway for a new SWRS course on Coleoptera taxonomy in August 2019! Stay tuned for the official announcement this spring!

## **Weather Stations**

We are delighted to announce that our final Chiricahua Sky Island Transect Network Station is installed and reporting data from Bootlegger Saddle, elevation 9110ft. The 6 weather stations were installed in collaboration with the Desert Researcher Institute, the Western Regional Climate Center, the National Park Service, and the Forest Service. Funding was from the National Science Foundation. To access the station data, visit <https://wrcc.dri.edu/ChirSkyIsland/>.

## Seen at SWRS

A few photos from 2017 and 2018.



Volunteers refilling ethanol vials in the collection



New Year's snow, 2019



Koi from Rusty's RV park enjoy a 3-week vacation in the pool while we remove bullfrogs from their pond



Ants of the Southwest students examine a *Formica* nest at Barfoot Park



The Bee Course, hard at work in the Ed Building



Alina, Chris, Jocelyn, and Elaine (background) at the Desert Museum Halloween party



Ellen perfects her voter registration signs in the Reed cabin



Goliath, the world's largest tadpole (10.25in, discovered during bullfrog work) peering out of his tank



Michele's nap on the lawn becomes slightly dangerous



Michele takes a break from bullfrog pond draining to build a snowman



Dennis, Herpetology and Ants of the Southwest student, shows off his boletes



Tiare with the award for best 4<sup>th</sup> of July float

## 2017 Research

- Bob Baggett and Brittany Burke, Tennessee Technological University. *The effects of abiotic and biotic factors on the movement patterns of Pardosa valens and Rabidosa santrita wolf spiders.*
- Alan Bond and Judy Diamond, University of Nebraska. *Avian social complexity.*
- Matthew Bolek, Oklahoma State University, and Ben Hanelt, University of New Mexico. *Unraveling a Gordian knot: biodiversity of Gordian worms, Phylum Nematomorpha, in the new world.*
- Chris Brown, Bob Baggett, and Matt Steffenson, Tennessee Technological University. *Population of wolf spiders and scorpions in Southeastern Arizona.*
- Gina Calabrese, University of North Carolina. *Population variation in mate preference behavior of Spea multiplicata.*
- Bill Cooper, Indiana University, Purdue University Fort Wayne. *Lizard escape behavior.*
- Catherine Cumberland, University of New Mexico. *Forty years of change in the sunflower bee community of the southwest United States.*
- Stephen Christian d'Orgeix, Christian Artuz, Shericia Campbell, and Victoria Buskey, Virginia State University. *Behavioral Ecology of Slevin's bunchgrass lizard.*
- Paul DeLuca and Stephen Buchmann, University of the Bahamas (and University of Arizona). *Diversity of buzz-pollination in North America bees and plants.*
- Jessica Dudley and Jacqueline Stella Dennis, University of Sydney. *What cellular changes in the uterus allow for successful implantation and formation of the placenta in the Kangaroo Rat?*
- Lee Dyer, University of Nevada, Reno, and Earthwatch Institute. *Diversity of caterpillar, parasitoid, and plant interactions.*
- Ti Eriksson, Andrew Burchill, and Jenny Marzhauser, Arizona State University. *Soil ecology, colony demography, and ant guests in a nest of Myrmecocystus mendax.*
- Donald Frack, Los Angeles County Museum of Natural History. *Survey and biology of primitive moths in the Southwestern United States.*
- Jeremy Frank, Richard Gilder Graduate School of the American Museum of Natural History. *Building the first phylogeny for the behaviorally diverse Bembix Sand Wasps.*
- Daniel Friedman and Jacob Friedman, Stanford University. *Neurophysiology of harvester ants.*
- Tiare Gill, University of Puget Sound. *Female visual ornamentation and skin lipids as potential redundant signals in sexual communication of the striped plateau lizard.*
- Deborah Gordon, Becca Nelson, Christopher Jackson, Sam Crow, Richard Paul, Christian Tellez, LeAnn Howard, and Daniel Friedman, Stanford University. *Behavioral ecology of harvester ants.*
- Donald Harvey, Smithsonian Institution Dennis Johnson, Independent Researcher, Timothy McMahan, Joan Milam, University of Massachusetts Amherst. *Bee Biodiversity Initiative.*
- Piotr Jablonski and Maciej Fuszara, Seoul National University. *Ecology of Mexican jays.*
- Taylor Jones, Yohami Fernandez-Delgado, and Julianne DeMarco, Wake Forest University. *Mechanisms of sonar jamming.*
- Patrick Kelly, University of North Carolina at Chapel Hill. *The interplay of sexual and natural selection across life stages in spadefoot toads.*
- Michele Lanan, Southwestern Research Station, American Museum of Natural History. *Foraging behavior of polydomous trail-making ants. Mechanisms of long-term food storage in honeypot ants. Worker-brood interactions in ant nests. Evolution of the ant proventricular valve.*
- Marilyn Loveless, Wooster. *Ecology of coral bean (Erythrina flabelliformis).*
- Alannah Lymburner, Noah Johnson, and Nicolas Oulette, University of Ottawa. *Thermoregulatory effort in Yarrow's spiny lizards at varying altitudes in the Chiricahua Mountains of Southeastern Arizona.*
- Ryan Martin, Case Western University. *Ecological character displacement, ecosystem processes, and community structure.*
- Earyn McGee, University of Arizona. *Linking perennial surface water and aquatic food subsidies to lizards in arid environments.*
- George Middendorf, Chris Agard, and Emily Middendorf, Howard University. *Behavioral ecology of Sceloporus jarrovi and other sympatric lizards.*
- Michael Ohl, Maraike Willsch, Stefan Graf, and Thorleif Dorfel, Museum fur Naturkunde Berlin. *Phylogeny, taxonomy, and evolution of aculeate Hymenoptera.*
- Dave Oleyar, Hawkwatch International. *Small owl communities and the tree hollows they use in the Chiricahuas.*
- David Pfennig, University of North Carolina. *Evaluating phenotypic plasticity's role in adaptive evolution.*
- Karin Pfennig, University of North Carolina at Chapel Hill. *Hybridization and mate choice in spadefoot toads.*
- Lauren Ponisio and Magda Argueta, UC Riverside. *Connecting ecological networks with their evolutionary histories to determine drivers of ecosystem function and resilience.*
- Don Powers, Isabelle Cisneros, Kaheela Reid, Anusha Shankar, and Theo Powers, George Fox University. *Hummingbird physiological response to high environmental temperature.*
- Christian Rabeling, Kyle Gray, and Jeffrey Sosa-Calvo, Arizona State University. *Behavioral ecology of Strumigenys ants that live in colonies of Trachymyrmex arizonensis.*
- James Saulnier, Los Angeles County Museum of Natural History. *A synoptic collection of the endemic species of Aphodius occurring within and in the vicinity of the Chiricahua Mountains.*
- Wade Sherbrooke, Southwestern Research Station American Museum of Natural History. *Reproduction and antipredator behaviors of horned lizards (Phrynosoma).*
- Janet Tyburec, Bat Survey Solutions. *Bat diversity and acoustic monitoring.*
- Ethan Van Arnam, Keck Science Department, Claremont Colleges. *Chemical ecology of fungus-growing ant symbioses.*

Stacey Weiss and Tiare Gill, University of Puget Sound. *Maternal protection of eggs via anti-fungal microbes in oviparous lizards.*  
Susan Wethington and Lee Rogers, Hummingbird Monitoring Network. *Long-term trends in hummingbird populations.*  
Jerome Keaton Wilson, University of Arizona. *Geographic variation in host-plant quality of *Datura wrightii*, parasitoid behavior and function of tachinid flies on *Manduca sexta* caterpillars.*

## 2018 Research

Alan Bond, University of Nebraska. *Avian social complexity.*  
Chris Brown, Tennessee Tech University. *Behavioral ecology of riparian wolf spiders and scorpions.*  
Gina Calabrese, University of North Carolina Chapel Hill. *Drivers of reproductive isolation among populations of *Spea multiplicata*.*  
Catherine Chen, University of North Carolina Chapel Hill. *The role of female hybrid behavior in shaping species divergence in spadefoot toads.*  
Stephen Christian d'Orgeix, Cameron Lockett, and Raissa Kemajou, Virginia State University. *Do life-history patterns trump environment in shaping genetic variation of sympatric lizard species? Metabolic rates and thermal regimes of bunchgrass lizards.*  
Lee Dyer, University of Nevada, Reno, Earthwatch Institute. *Diversity of caterpillar, parasitoid, and plant interactions.*  
Yohami Fernandez Delgado, Wake Forest University. *Acoustic behavior during mating in the tiger moth *Bertholdia trigona*.*  
Susanne Foitzik, Barbara Feldmeyer, and Matteo Negroni, Johannes Gutenberg University Mainz, Germany. *The functional basis of lifespan and fecundity in the ant *Temnothorax rugatulus*.*  
Daniel Friedman, Stanford University. *Neurophysiology of behavioral variation in red harvester ants.*  
Iulian Gherghel, Case Western Reserve University. *Field and experimental tests for coevolutionary dynamics driven by resource polymorphism (fairy shrimp and spadefoot toads).*  
Deborah Gordon, Becca Nelson, Jules Wyman, Sam Crow, Michael Yang, Jacob Kupperman, LeAnn Howard, Daniel Friedman, and Mikaela Wilson, Stanford University. *Behavioral ecology of harvester ants.*  
Donald Harvey and Timothy McMahon, Smithsonian Institution, Joan Milam, University of Massachusetts, Amherst. *Bee biodiversity initiative.*  
Piotr Jablonski, Maciej Fuszara, Elzbieta Fuszara, Sangim Lee, Minjung Baek, Seoul National University. *Winter ecology of the Mexican jay.*  
Paul Kaseloo and Erik Kaseloo, Virginia State University. *Do life-history patterns trump environment in shaping genetic variation of sympatric lizard species? Metabolic rates and thermal regimes of bunchgrass lizards.*  
Patrick Kelly, UNC Chapel Hill. *Sexual selection and resource competition in spadefoot toads.*  
Michele Lanan, Southwestern Research Station, American Museum of Natural History. *Foraging behavior of polydomous trail-making ants. Mechanisms of long-term food storage in honeypot ants. Worker-brood interactions in ant nests. Evolution of the ant proventricular valve.*  
Cristina Ledon-Rettig, Indiana University. *Hormonal correlates of polyphenism in larval spadefoot toads.*  
Ryan Martin and Alexandru Strugariu, Case Western Reserve University. *The ecological character displacement, ecosystem processes, and community structure of Spadefoot toads and their puddle communities.*  
Earlyn McGee, University of Arizona. *Linking perennial surface water and aquatic food subsidies to lizards in arid environments.*  
George Middendorf and Chris Agard, Howard University. *Behavioral ecology of *Sceloporus jarrovi* and other sympatric lizards.*  
Dave Oleyar and Felicia Aragon, Hawkwatch International. *Small owl communities and the tree hollows they use in the Chiricahuas.*  
Karin Pfennig, University of North Carolina Chapel Hill. *Hybridization and mate choice in spadefoot toads.*  
David Pfennig, University of North Carolina. *Evaluating phenotypic plasticity's role in adaptive evolution (spadefoot toads).*  
Donald Powers, Natalie Amodei, Sarah Thompson, and Anusha Shankar, George Fox University. *Physiological response of hummingbirds to high temperatures.*  
Cristina Romero-Diaz and Stephanie Campos, Arizona State University. *Chemical signaling in *Sceloporus* lizards.*  
Brody Sandel and Claire Pavelka, Santa Clara University. *A comparative study of grass strategies in California and Arizona.*  
Jon Seal, Katrin Kellner, Sarah Senula, and Alix Matthews, University of Texas at Tyler. *Mechanisms of specificity and homeostasis in an obligate symbiosis (fungus-growing ants).*  
Wade Sherbrooke, Southwestern Research Station, American Museum of Natural History. *Reproduction and antipredator behaviors of horned lizards (*Phrynosoma*).*  
Matt Steffenson, Adams State University. *Autotomy compensation mechanisms in the wolf spider *Pardosa valens*.*  
Robert Unckless, Kelly Dyer, Paul Ginsberg, and Brandon Cooper, University of Kansas. **Drosophila* biodiversity in the sky islands.*  
Ethan Van Arnam, Keck Science Department, Claremont Colleges. *Chemical ecology of fungus-growing ant symbioses.*  
Stacey Weiss, University of Puget Sound. *Maternal protection of eggs via anti-fungal microbes in oviparous lizards.*  
Susan Wethington and Lee Rogers, Hummingbird Monitoring Network. *Long-term trends in hummingbird populations.*  
Sarah Worthington, Diana Hews, and Noelle Emge, Indiana State University. *Hormones, maternal aggression, and natal dispersal in female *Sceloporus jarrovi* lizards.*

## 2017/2018 Education and Groups

AMNH Bee Course  
Amphi Middle School  
Arizona Sonoran Desert Museum Animal Behavior  
Arizona Native Plant Society  
Bangor University Herpetology

Sonoma Audubon  
St. Francis University Arizona Field Course  
Sulphur Springs Young Birders Association  
SWRS Ants of the Southwest  
SWRS Bird Tours

Bat Management International Workshop  
 Big Chill  
 Cal Poly Herpetology  
 Colorado State Ecology  
 EarthWatch Caterpillars and Climate  
 Ecological Society of America SEEDS leadership meeting  
 Fryeburg Academy  
 Great American Bicycle Association  
 HawkWatch International Owl Monitoring  
 Hummingbird Monitoring Network Banding Training  
 Chiricahua Leopard Frog Recovery Team  
 Matsubayashi Film Crew  
 North American Tang Shou Tao Association  
 Raven's Way bird tours  
 Reid Park Zoo team volunteer group  
 SDSU Field Ecology

SWRS Conservation Medicine of Reptiles and Amphibians  
 SWRS Herpetology Field Course  
 SWRS Lepidoptera Course  
 SWRS Tree Course  
 Tampa Audubon  
 Texas Tech Advanced Wilderness Life Support  
 The Gregory School  
 Tucson High School  
 University of Arizona Dendrochronology  
 University of Arizona Mammalogy  
 University of Mississippi Sky Island Biodiversity  
 Venom Group  
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