



# NEWSLETTER

## Southwestern Research Station

Portal, Arizona

Center for  
**Biodiversity**  
**Conservation** and  
AMERICAN MUSEUM OF NATURAL HISTORY

Number 26

Year 2011

### From the Director

Dawn S. Wilson

This past year at the SWRS was an emotional roller coaster for all of our friends, the SWRS staff, and me. On May 8<sup>th</sup>, I was in Tucson when I got the call that there was a fire in the Chiricahua Mountains – the Horseshoe II Fire. By the time I got home, the station and the town of Portal had been evacuated. The SWRS operations manager, Geoff Bender, and I stayed at the station helping fire crews in any way we could, but mostly, we spent a lot of time looking up at the mountains – at the flames and smoke that surrounded the station.



Backburn adjacent to station forming a firebreak by reducing fuel load  
Photo by G. Bender

The station itself suffered no fire damage, but in the end, over 230,000 acres of forest burned and a few structures were lost. Some areas were hit hard by the fire, whereas other areas escaped untouched. As hoped, the monsoons came in June, and by fall most of the blackened areas

showed regrowth.

Research and education continues at the station, and naturalists are making reservations for this coming season. There are still many areas in the Chiricahuas where trees provide homes to birds and other wildlife, and other areas where trees will be replaced by meadows full of butterflies and flowers.

I want to thank the fire crews that worked tirelessly day and night to contain the fire, the SWRS staff for working out of their homes to provide much needed

information and updates to all of our friends, and to the many scientists, instructors, and students that patiently waited for the station to reopen. I look forward to the coming season and to the many visitors that come to the Chiricahuas each year -- lending their continued support to the station and the local community.

While waiting for the fire to end and the forest to reopen, the SWRS received some uplifting news – we were awarded a National Science Foundation grant. As I sit writing this newsletter, new dorms are being built and our older housing units are being remodeled. This construction will increase available space and provide safer and more comfortable housing to scientists and students that use the station facilities for research and education, as well as naturalists that visit the station to enjoy hiking and birding. We also received a grant from our parent company, the American Museum of Natural History, to build new animal enclosures for scientists to house animals in secure and safe conditions for use in their studies.

In July, the SWRS offered its first “Field Herpetology of the Southwest”. Drs. Stephen Mullin, Eastern Illinois University, and Emily Taylor, Cal State University (San Luis Obispo) co-organized the class with me. Other instructors included Matt Goode, Jay Cole, Carol Simon, Karin and David Pfennig, Justin Congdon, and two student assistants, Chris Agard and Matt Holding. Based on great reviews from the class participants, the course will be offered again in July 2012



Gila monster seen during course  
Photo by D. S. Wilson

*Dawn S. Wilson*

## The Southwestern Research Station

The research station is a non-profit organization under the direction of the Center for Biodiversity and Conservation at the American Museum of Natural History (AMNH), New York.

The SWRS enhances AMNH's diversity and strengths by providing scientists and educators from the museum, other institutions, and around the world the opportunity to participate in research, workshops, and classes in one of the most biologically rich environments in the United States.

### Staff:

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*Geoff Bender*, Operations Manager/Budget Officer  
*Barbara Roth*, Bookkeeper  
*Tresa Glore*, Office Manager; Intern Coordinator  
*P.D. Hulce*, Chief Maintenance  
*Jodi Kessler*, Kitchen Manager/Head Cook  
*Chip Blackburn*, Cook  
*Juvy McEwan*, Kitchen Assistant  
*Elaine Moisan*, Kitchen Assistant  
*Leesa Bunts*, Head Housekeeper  
*Beatrice Lopez-Faltum*, Housekeeper  
*Lorraine Titus*, Gift Shop Clerk

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## Horseshoe II Fire – Affect on Research and Education at the SWRS

Bat Conservation International has been holding workshops on bats at the SWRS and surrounding areas for over 18 years. The first of three workshops scheduled to arrive this past May had just finished unpacking their gear before the Horseshoe II fire forced them to evacuate to Portal -- the second and third workshops never made it to the station.

In addition to educational workshops, many SWRS scientists also were affected by the fire. Some got a late start on their research projects and some had to cancel their plans for collecting data altogether. Even after the forest service road to the station finally opened, many areas in the forest were still closed for safety reasons,

making it difficult or impossible for scientists to get to their study sites. A few scientists whose study seasons ran from May to June, tried to outwait the fire – some



Reid Peak behind the research station

showing up a bit late and others cancelling for the year. The scientists that did make it modified their research design to include burned study sites. Here, I feature two scientists that persevered and share their story with us.

### Kate Boersma, Ph.D. student at Oregon State University

I have been coming to the Southwestern Research Station to study Chiricahua Mountain streams for the past five years. During summer seasons, many streams in the Chiricahuas stop flowing and become fragmented pools of water. My research centers on aquatic food webs in these isolated pools, so I usually spend my summers collecting samples of stream invertebrates and conducting experiments in tanks at the SWRS. But this was no ordinary summer! The Horseshoe II fire had a big impact on parts of my research design and altered one experiment entirely. Three days after my field assistant Brian Henrichs and I arrived at the research station, we were evacuated and unable to set up our main experiment.

Thanks to the kindness of some Portal residents (Heidi Fischer, Geoff Bender, and Barbara Roth) we had a place to stay in Portal and good folks to keep us company while we waited for the smoke to clear. In the



Kate at her study site at the Chiricahua National Monument

meantime, we set up a few “Plan B” experiments – one in the Chiricahua National Monument and another in Heidi Fischer’s driveway!

As we were setting up water tanks and collecting samples at the National Monument, I remember thinking, “There’s no way the fire will make it all the way over to the Monument.” Yet in the end, this experiment was the one that burned completely. Eventually, we were able to conduct our experiment at the SWRS – and the “driveway” experiment actually ended up yielding some interesting data.

We will continue to monitor the health of Chiricahua Mountain streams and track the recovery of aquatic organisms over the years following the Horseshoe II fire. While the fire made for a challenging field season this year, hopefully in future years it will allow us to learn more about these unique aquatic habitats and how they respond to disturbance.

### **Stacey Weiss, Professor at University of Puget Sound, Tacoma, WA**

If it wasn’t for Robby’s girlfriend, we would already have been on the road. But instead, when I got the news from Barbara Roth, the SWRS bookkeeper, that the research station was being evacuated, Robby was celebrating his girlfriend’s graduation and I was safely at home, 1769 miles and a three day drive away from the situation in the Chiricahuas. Instead of leaving for another field season, our trip supplies stayed in the lab, and our packed duffle bags stayed on the floor. Robby and Sabrina, my two enthusiastic research students, were put on-call with the understanding that we could always be leaving “the next morning”, and I sat waiting for news. This marks my transition to an official “crackberry addict”; as I awaited updates from friends in Portal, I never had my

Blackberry out of reach, even sleeping with it at my bedside. I also fortunately, or unfortunately, discovered Google Earth’s Active Fire Mapping feature with updates every 15 minutes, and dutifully refreshed-refreshed-refreshed-refreshed with a sinking heart, watching the fire outline approach places so dear to me, and to many of you.

I wanted to time our departure from Washington so we’d arrive on the day the evacuation was lifted – not 3 days later – but predicting the end of the evacuation proved difficult. “We are leaving tomorrow!” “No... we are not leaving tomorrow.” “We are leaving Friday!” “No, again...” Robby and Sabrina were so patient! And I just wanted to BE THERE! Amazingly, we timed the departure just right and, after an eight day delay, arrived to SWRS the evening that the station staff were allowed back. The drive down the dirt road from San Simon to Portal showed thick plumes of smoke coming from Cave Creek Canyon and I knew that Horseshoe II was going to be quite different than the previous year’s Horseshoe I! My heart was still firmly in my stomach.

The first few days after we arrived to the station, we were restricted to station grounds. My field site, just a mile down the road near the John Hands Campground, was inaccessible to us for another few days. Once



Once lizard habitat – now just a scar of ash finally on-site, we could assess the damage. Most dramatically, all the fallen logs that had served as refuges to so many critters, including “my” striped plateau lizards, were incinerated into piles of ash stretched out in the exact shape of the previously laying log. We estimated that 80% of the ground cover and leaf litter at my sites had burned, however most trees were standing intact with relatively little damage (though we did have one “levitating” tree that was burned away from the ground to about 2 ft up the base and was being held up by a neighboring tree!). Fortunately, my study site – and most of the area

around the station that burned – was part of backburn operations performed by the Forest Service to remove fuels keeping the fire “relatively cool” with minimal tree damage.



Stacey Weiss and students searching for lizards

Sabrina, Robby and I quickly decided to drop all our planned experiments and instead focus on the effect of the fire on the striped plateau lizards. We measured just about everything we could think of: population size and structure, prey abundances, predation rates,

stress hormone levels, female ornament development, canopy cover, microclimate... We turned this big bag of lemons into the most palatable lemonade we could manage. Though I spent far more time tramping through ash than I ever thought possible, I came away from the field season excited about the data we had collected and by the “opportunity” to now track the post-fire recovery of the population. My initial results show that the lizard population is definitely reduced in size and definitely stressed. But perhaps it can come back even stronger? I plan to find out this next field season!

## The 2011 Lepidoptera Course takes SWRS by Storm! by Hugh McGuinness

Twenty students and ten instructors converged upon SWRS last August to spend eight days studying Lepidoptera. The students came from as far away as Brisbane, Australia to spend a sleepless week pursuing moths and butterflies.

It all began four years ago when a SWRS employee, P.D. Hulce, noticed that many visitors to the station were spending a lot of time watching butterflies. So, in the summer of 2008 the first Lepidoptera course was offered at the SWRS. In 2009, University of Arizona geneticist Bruce Walsh and AMNH systematist Jim Miller took the course over and ran with it. Their goal

was to provide graduate students, professional scientists and interested amateurs with the opportunity for in-depth, graduate level training in the basics of Lepidoptera systematics, morphology, and biology.

Additional instructors during 2011 included John Brown, a Tortricid expert from the U.S. National Museum, Chris Schmidt from the Canadian National Collection in Ottawa; Richard L. Brown, museum director at Mississippi State University, Sang-mi Lee a Gelechioid specialist at Arizona State, Jennifer Zaspel from the University of Wisconsin and University of Arizona pathologist Ray Nagel. I served as a visiting scientist, updating and curating the SWRS collection before and during the course.

Participants enrolled in the course included three professional scientists, two agricultural inspection agents, and one fine dining chef, as well as seven scholars enrolled in degree programs.

Because half a dozen black and mercury vapor lights were set-up around the station each night, sleep was a scarce commodity, as students worked into the wee hours to identify moths attracted to the lights. The lab was abuzz with activity day and night. One course participant Mark Adams, Assistant Director of the National Radio Astronomy Observatory in Charlottesville, VA, noted, “I was impressed that I could engage with the course at any time of day since the lab was always open and someone was almost always there. I had not anticipated this 24-hour access and it enriched the experience for me.”



*Arachnis picta*

Each day’s schedule was based on a general theme, such as caterpillar or adult morphology. The busy day-time schedule

typically included two or more lectures, guided lab work, and a collecting trip for butterflies. Many of the students identified group sorting of the catch from night-time bucket traps as a highlight of the course. During the course more than 500 species of moths and 35 species of butterflies were documented with specimens and photographs.

The 2012 edition of the Lepidoptera Course is scheduled for August 11<sup>th</sup> to 20<sup>th</sup> when another two dozen sleep-deprived Lepidopterists will be roaming the Chiricahuas to document the amazing biodiversity that can be found there.



*Antheraea occulea*

For more on Logistics: <http://research.amnh.org/swrs/education/lepidoptera-course>

For more information on the course: <http://nitro.biosci.arizona.edu/lep/course.html>

## 2011 FEATURED SCIENTIST

**Karin Pfennig, Ph.D**

**University of North Carolina, Chapel Hill**

When the rains come to the desert, magic happens: hundreds of toads suddenly emerge from their underground haunts and make their way to the nearest pond, where the males begin to call. The calls of these males can be heard for miles. Many different species of toad occur in the desert “flats” below SWRS. Each produces its own unique call. The females of each species use these calls to find mates.

I have been coming to SWRS to study the mating behavior of desert toads since 1995. The goal of this research has been to uncover how and why females choose the mates that they do. The work is focused on spadefoot toads. These toads breed on a single night following a rainstorm, so females must choose their mate

in a matter of hours. This decision is important, because females only breed once per year, and any given year might be a female’s last. A bad mating decision could mean that the female leaves behind few, if any, offspring for the next generation.

To choose a mate, females spend 2-3 hours in a pond listening to different males. Male calls can be used to not only identify the correct species, but also to determine if a male is healthy. Indeed, calling requires a great deal of energy, and only males in the best condition can afford to invest in certain calling activities. Research on the toads’ mating behaviors has

revealed that females of the Mexican spadefoot toad place heavy emphasis on mating with their own species of males. Indeed, females will compromise on a male’s quality in order to ensure that she mates with her own species.

By contrast, females of another local species, the Plains spadefoot toad, sometimes *prefer* Mexican spadefoot males. Why should females forego her own type of male to mate with a member of a different species? This behavior seems to bend all the rules! After all, hybridizing with another species is always thought to be disastrous from an evolutionary perspective (think of a sterile mule, which is the result of a mating between a male donkey and a female horse).

As it turns out, tadpoles that result from interbreeding between Plains spadefoot females and Mexican spadefoot males develop much faster than Plains tadpoles. This faster development is crucial in desert ponds, which often dry before Plains spadefoot tadpoles can transform from a tadpole to a baby toad. Mexican spadefoot tadpoles develop faster than Plains spadefoot tadpoles. Therefore, by mating with a Mexican spadefoot male, Plain spadefoot females can ensure that their offspring inherit the faster developing

Mexican spadefoot genes. Furthermore, our genetic analyses have revealed that these hybrid toads survive and often pass on their genes into the next generation by mating with spadefoots toads of either species. In other words, hybridizing with Mexican

spadefoots can be an effective strategy for a female Plains spadefoot to propagate her distinctive genes into the next generation’s gene pool.

Despite their advantage of faster development, mixed-species tadpoles pay a price at adulthood in that they have reduced fertility. Consequently, Plains spadefoot females only prefer Mexican spadefoot males when rain is scarce, water levels are low, and ponds are likely to dry rapidly. In wet years with full ponds that provide Plains spadefoots enough time to escape, females prefer their own types of male.

This behavior has important implications for



Calling male spadefoot toads. Left: A Mexican spadefoot (*Spea multiplicata*); Right: A Plains spadefoot (*Spea bombifrons*). The black shapes visible on the feet of the Mexican spadefoot are the spades that give the toads their name. The spade is used to dig themselves underground to escape the heat and drying of the desert.



A recently metamorphosed spadefoot toad, sitting atop thousands of other tadpoles who are less fortunate. The more slowly developing tadpoles are dying of desiccation.

understanding larger patterns of diversity. First, we find that tadpoles in many of the ponds around SWRS consist of individuals of mixed species ancestry, suggesting that the behavior is generating exchange of genes between the two species. Second, geographic analyses combined with comparisons of museum specimens suggest that this behavior may have actually enabled the Plains spadefoot to expand its range into Arizona. Thus, female mating behaviors can explain why some species are found where they are. Members of my lab and I are currently seeking to evaluate the genetic basis of the behavior as well as its hormonal and neural correlates. Ultimately, our goal is to understand how patterns of natural selection in nature explain the evolution of traits at the genetic, neural and organismal levels.

## 2011 INTERNS AND VOLUNTEERS

This past year, the station hosted 18 volunteers and student interns. They assisted scientists with their projects and helped the SWRS complete many projects. **Australia:** Neil Brougham; **Canada:** Alexandra Jopp; **France:** Julie Jail; **United States:** Arizona - RoseAnn Adame, Scott Warren; California – Erica Bender; Maine – Lucian Copeland; New York – Jane Thompson; Ohio – Galen Cobb, Ananda Menon; Oregon – Sabrina Duncan, Brian Henrichs; Rhode Island – Bob Weaver; Tennessee – John Barthelme; Washington State - Steve Christensen; **United Kingdom:** Kieran Bates, Julian Sorensen.

### STUDENT INTERNS & VOLUNTEERS

Approximately 30 positions are available for the 2012 season. For more details on these positions, please visit our website or contact: Tresa Glore, SWRS, P.O. Box 16553, Portal, AZ 85632 USA; 520-558-2396; [tglore@amnh.org](mailto:tglore@amnh.org)

### THANKS TO OUR FRIENDS OF THE SOUTHWESTERN RESEARCH STATION

We would like to thank the following individuals for their support of the station in 2011. Your donations provide financial support to student scientists. These young scientists are in degree seeking programs and use data that they collect here at the SWRS to further out understanding of the flora and fauna of the Chiricahua Mountains.

Peg Abbott, Robin Andrews, Rosemary Barba, L. Barello and L. Krueger, Raymond Barkhaus, Vicky Barnes, Lisa Bender, Bonnie Bowen and Rolf Koford, Judith Boyce, Frank Boyle, Leesa Bunts, Carol and Jay Cole-Townsend, Martha Connor, Lynn Crew and Aaron Miller, David Crowe, Jessie and Michael Cyr, Susan Dieterich, Linda and James Dodge, Randy Duncan, David Elwonger, Larry Fowler, Stuart Fullerton, Robert Getz, Tresa Glore, Arnie and Jenny Gooder, Diana Hadley and Peter Warshall, Stephen Hansen, David Hardy, Sr., Henry Hesperheide, Don Hollister, Meghan Jacobs, Penny Johnston, Karen Judkins and Steve Wade, Georgia and Douglas Kellough, Nancy and John Legates, Kurt Leuschner, Ellen and David Levy, Lyn Loveless, David Lunt, Steve Lynn, Katherine and Jack Marietta, Pat and Hal Michael, Guy Miller, Joseph Morris, Nicholas Paizis, Kim Perry, Reed Peters, Martha Pippitt, Helen Roca-Garcia, Robert Sandine, Lorraine Titus and Kim Vacariu, Carol Simon and Howard Topoff, Steve and William Stiffler, Marie and Paul Stone, Steve Tompkins, Elizabeth Trever, Mary Sue and Peter Waser, James Weigand, Vicki Wilhite, Mary Willy, Andrea and James Wygle.

We wish we could provide our newsletter to everyone in color, but it is cost prohibitive. To see all pictures in this newsletter in color please visit our website and click on **Researchers then Publications**

## BECOME A FRIEND OF THE SOUTHWESTERN RESEARCH STATION!

The SWRS provides scientists, educators, and students from across the country and around the world the opportunity to participate in research, workshops, and classes in one of the most biologically rich environments in the United States. Most importantly your donations provide grants to student scientists so that they can conduct research at the SWRS. Last year we were able to sponsor eight students. Our goal is to increase this number each year.

Your generous support plays a vital role in enabling us to maintain our programs and facilities. For 2012, we will offer several new workshops: Weevil Course, Ants of the Southwest, Art and Storytelling in Wildlife and Landscape Photography, and Guidelines for the Use of Amphibians and Reptiles in Field and Laboratory!

Your tax-deductible gift helps us advance both our research and educational objectives at the SWRS by enhancing our technology infrastructure, becoming a “green” model for the surrounding community, and providing students the opportunity to gain valuable research experience.

**\* Please contact Dawn Wilson (520-558-2396; [dwilson@amnh.org](mailto:dwilson@amnh.org)) for more information about contributing to the SWRS**

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## Southwestern Research Station Newsletter New Courses To Be Offered This Year!



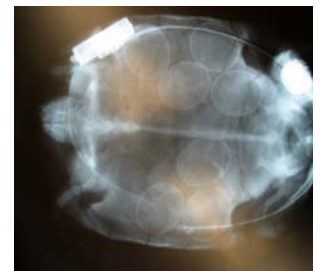
Red-Leg disease in frog

Taxonomy and ecology workshops have become increasingly popular at the SWRS. Because of the additional rooms that our new dormitories will provide, we are actively developing several new courses.

A very popular course currently offered at the station is **The Ant Course**. Because The Ant Course is only offered at the station every two or three years, we have developed a new course, **Ants of the Southwest**, to be offered in the interim years. This new course will cover such topics as photography, collecting techniques, ecology and behavior, and systematics.

Other courses to be on the lookout for this next season are **The Weevil Course**, **Art and Storytelling in Wildlife and Landscape Photography**, and **Guidelines for Use of Amphibians and Reptiles in Field and Laboratory Research**. Check out our Education webpage for more information on current courses offered at the SWRS and these newly developed courses scheduled to debut this summer!

<http://research.amnh.org/swrs/education>



X-ray of female gopher  
tortoise with eggs (radio  
transmitter attached)



*Lachnopus guerini*