



NEWSLETTER

Southwestern Research Station

Center for Biodiversity & Conservation
American Museum of Natural History
New York, New York

Number 20

Year 2005

THE SWRS CELEBRATED ITS 50TH ANNIVERSARY!

Early in 2005 the SWRS began preparing for its 50th Anniversary celebrations. To help spruce the place up, the AMNH funded the renovation of three of our housing units and the conference/social room. Our first 50th event was held in May for invited guests from the American Museum of Natural History. Our distinguished guests from New York included Sibyl Golden, John Alexander, Ned and Linda Morgens, and Anne and Connie Sidamon-Eristoff. Several people from the AMNH attended including Michael Novacek, Eleanor Sterling, Felicity Arengo, Jennifer Stenzel, and Susan Phillips. Current members of the Scientific Advisory Council of the SWRS and the former director, Wade Sherbrooke and his family also attended. Organized events for this celebration included birding tours, a trip to the Wonderland of Rocks, and horseback riding. Our second 50th event was held in June for the local community. The Station hosted a barbeque and had live entertainment by local artist Kip Callahan.



Over 100 people helped us celebrate 50 years of supporting research and education.

THE SWRS WAS RECOMMENDED TO RECEIVE A NATIONAL SCIENCE FOUNDATION GRANT!

Our proposal to the NSF to build a new “Green” Research/Education Facility received excellent reviews and was recommended for funding this winter. If funded, the primary purpose of the new facility will be to enhance and accommodate current levels of research and educational activity, and to support the addition of new workshops that are currently being offered and developed through a collaborative effort of the AMNH and SWRS. Use of the station in the spring and fall by students in classes/workshops has increased by 50% since 1995. The new facility will:

- 1) increase available space, thus increasing the number of workshops, classes, and researchers that can use the station. This increase in space will result in more students being trained and more researchers having access to facilities that ultimately would result in more knowledge disseminated through scientific publications and presentations.
- 2) significantly upgrade the SWRS technological infrastructure by making advanced computing resources available to courses and researchers, and
- 3) serve as a stepping-stone for future “greening” of the SWRS, and potentially generate support from other organizations promoting environmentally friendly building practices. Additionally, the facility itself will serve as a teaching tool for high sustainability and ultra-low environmental impact: how to fit in with nature on a practical and cost-effective basis.

Southwestern Research Station

The SWRS Newsletter is published each winter. 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 in New York.

The Southwestern Research Station aspires to add to the existing diversity and strengths of the American Museum of Natural History by providing scientists and educators from the Museum and other institutions 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.

Staff:

Dawn Wilson, Ph.D, Director
David Kuntz, MS., Operations Manager
Diane Smith, Office Manager
Kathleen Gilligan, Volunteer Supervisor/Office Assistant
Alan White, Chief Maintenance
Jodi Kessler, Cook
Robert Lane, Seasonal Cook

Contact Information:

P.O. Box 16553
Portal, Arizona 85632
Phone: 520-558-2396
Fax: 520-558-2396
E-Mail: dsmith@amnh.org
Web: <http://research.amnh.org/swrs/>

EDUCATION

NEW SWRS COURSE FOR SPRING 2006 *SPECIES DISTRIBUTION MODELING FOR CONSERVATION BIOLOGISTS*

Last year the SWRS offered a new course entitled "Practical Remote Sensing Methods for Conservation Biologists." The course was designed as an introductory course to teach scientific methods of remote sensing to students and agency people with little or no remote sensing experience.

Based on the success of the remote sensing course, the Station will offer a new course in spring of 2006 entitled "*Species Distribution Modeling for Conservation Biologists.*" Models that predict species' potential distributions by combining observed

occurrence records with digital data layers of environmental variables have great potential for application across a range of ecological analyses. The course will focus on the theoretical and practical aspects of this approach and is designed for students, researchers and practitioners of conservation biology. Using a mixture of lectures, hands-on computer lab applications, discussions, and case studies, course participants will learn to:

- Obtain and process data necessary for species distribution modeling;
- Run distribution models using a variety of approaches;
- Validate and interpret model results;
- Apply these techniques to a range of applications, including conservation prioritization, predicting potential impacts of climate change, and forecasting species' invasions.

Check out our web site for information on these and other courses offered at the SWRS!!
<http://research.amnh.org/swrs>

NETWORK OF CONSERVATION EDUCATORS AND PRACTITIONERS

The SWRS hosted several educational groups in 2005, including a group of faculty members from around



the country attending a workshop sponsored by the Network of Conservation Educators and Practitioners (NCEP) a project of the Center for Biodiversity and Conservation at the AMNH. NCEP is a global initiative that develops and disseminates teaching materials on biodiversity conservation for educators working with undergraduate and graduate students, and trainers working with conservation professionals in a variety of settings. The purpose of this faculty development

workshop was to facilitate future use of NCEP modules in existing or future courses of the participants. Attendees of the April workshop included 19 professors from all over the United States as well as Mexico, Costa Rica and Puerto Rico. During the workshop, participants shared experiences in using NCEP modules, developed specific plans for module use in future classes, and discussed common challenges to using active teaching techniques. The SWRS was a perfect venue for this workshop-- in between activities and during breaks, participants had the chance to enjoy the beautiful scenery by going on hikes, looking for birds, and visiting local attractions. Participants also raved about the delicious food that kept them going through long work sessions. In the words of one participant, "the field station format was great" for the workshop and 100% of the participants indicated that they would return for any workshop on any topic at the SWRS! For more information about the NCEP project, or to find out how to access NCEP modules, please contact Nora Bynum, Project Director, at nbynum@amnh.org, or check out the NCEP web site at <http://ncep.amnh.org/us/>.

CURRENT RESEARCH ACTIVITIES

Another great year for research! There were too many to list them all, but here is a sample of the projects that were carried out this year.

Evolutionary ecology of muscle development in spadefoot toad tadpoles. Jeff Arendt. Univ. of CA, Riverside.

The variability of song of male and female painted redstart *Myioborus pictus*. Marta Borowiec (with Tadeusz Stawarczyk & Pawel Cygan). Univ. of Wroclaw, Poland.



Community ecology of the riparian wolf spiders, *Pardosa dorsuncata* and *Rabidosa santrita*.

Christopher Brown and Dan Formanowicz. Tennessee Tech. Univ., Cookeville.

Fitness consequences of extra-pair fertilization. Jerram and Esther Brown. Univ. of Albany, NY.

Toad mating systems and population genetics. Lauren Chan. Cornell Univ., Ithaca.

Diversity maintenance mechanisms for species in variable environments. Peter Chesson. Univ. of California, Davis.

Steroid hormones and sexual behavior in *Aspidoscelis* lizards. David Crews. Univ. of Texas, Austin.

Effects of climate on tritrophic interactions. Lee Dyer. Tulane Univ., New Orleans.

How competition and parasitism control local ant communities. Don Feener. (with Jessica Pearce & Jean-Yves Humbert). Univ. of Utah.

Ecology of small owls. Fred and Nancy Gehlbach. Baylor Univ, Waco.

Behavioral ecology of harvester ants. Deborah Gordon. Stanford Univ.

Adaptations of aquatic insects to flash floods. Dave Lytle. Oregon State Univ., Corvallis.



Population genetics of *Conophthorus*. Katrina Menard. Texas A&M Univ., College Station.

Fungi of the Chiricahuas. John Menge (with Jim Downer & Greg Douhan).

Behavioral ecology of *Sceloporus jarrovii*. George Middendorf. Howard Univ., Washington DC.

Worker polymorphism in the ant *Crematogaster smithi*. Jan Oettler. Univ. of Regensburg, Germany.

A phylogeographic investigation of character divergence & Testing effects of kin competition and developmental plasticity. Amber Rice and Ryan Martin. Univ. of North Carolina, Chapel Hill.



Alternate reproductive tactics in the ant *H. opacior*. Markus Ruger. Ludwig-Maximilians Univ., Germany.

Annual survey of winter plant species. Michele R. Schutzenhofer. Saint Louis Univ., St. Louis.

Horned lizard ecology. Wade Sherbrooke. Tucson, AZ.

The biogeographic role of large, deep canyons on invertebrate biodiversity. Lawrence E. Stevens. Stevens Ecological Consulting, Flagstaff, AZ.

Relative importance of direct and indirect benefits to a female's choice of mate. Tatiana Vasquez. Univ. of North Carolina, Chapel Hill.

A test of optimal foraging theory in two lizard species: *Sceloporus virgatus* and *Sceloporus jarrovi*.
Jessa Watters. Univ. of New Hampshire, Durham.

Parasitoid induced changes to whole-colony foraging in the ant host *Pheidole diversipilosa*. Elliot Wilkinson. Univ. of Utah.

WESTERN BOX TURTLES ADAPT TO DESERT LIFE

Dawn S. Wilson, Director SWRS

This year I started a new research project on the desert box turtle, *Terrapene ornata luteola*, in the San Simon Valley. I submitted a proposal to the University of Arizona Conservation Internship Program (NSF Funded) and undergraduate Leslie Woods accepted the position. Together we trailed females to their nest sites to determine how this relatively small turtle can find a place to lay her eggs that is not too hot. Normally, box turtles, like most turtle species, dig nests with their hind legs and the depth of the nest is a reflection of the length of the hind leg (around 10-12 cm for a box turtle). Using temperature probes, we soon realized that at hind-leg depth the eggs would not survive the extreme high ground temperatures. So, how do desert box turtle females prevent their eggs from overheating in such a hot habitat? We observed the following. First, the female starts digging a long tunnel head first into the hot desert sand. When she reaches a depth of 18-20 cm she turns around in the tunnel and with her hind legs she



begins digging the nest cavity. Her eggs are deposited at a depth of around 20–24 cm which insures that they do not overheat.

The preliminary data Leslie and I gathered this past summer will serve as a foundation for a more in-depth study of desert box turtle nesting strategies.

FLASH FLOOD SURVIVAL

David A. Lytle, Oregon State University

Anyone who has spent a summer at SWRS knows the monsoon season. After months of drought, powerful convective thunderstorms rumble up from Mexico and slam the Madrean Sky Island mountain ranges with heavy rainfall. The terrestrial desert comes back to life during these monsoons, with plants putting on leaves and flowers, and animals actively dispersing or seeking mates. But the monsoons also bring powerful flash floods to desert streams – floods capable of destroying nearly all aquatic organisms that fail to get out of harms way. From a scientist’s point of view, this poses a conundrum: if flash floods are so destructive, how can Sky Island streams such as Cave Creek support such an immense diversity of aquatic life?

At least part of the answer lies with evolution. Strong natural selection over long time spans has endowed



A male *Abedus herberti* carrying his eggs. Back brooding, which is common to most giant water bug species, ensures that developing eggs will also survive flash floods (M. Bogan photo)

many, if not most, Sky Island aquatic organisms with adaptations for surviving flash floods. Some species use life history adaptations to escape floods. For example, the sycamore caddisfly *Phylloicus aeneus* emerges from its aquatic larval stage into the terrestrial adult stage in late May and June, just prior to the monsoon floods. This works for most individuals in most years, so long as the monsoons are not too early or too late. Other species, such as the giant water bug *Abedus herberti* possess behavioral adaptations. Giant water bugs sense the torrential monsoon rainfall that often precedes floods and use this as a cue to crawl out of streams temporarily.

How rapidly can these flood escape behaviors evolve? How reliably do these adaptations work for flood escape? What would happen if monsoon patterns shifted due to global climate change or other factors? To answer these questions, my research group is using the entire Madrean Sky Island region as a natural laboratory of evolution in action. The research is funded by the National Science Foundation and involves graduate students, postdocs, and undergrads, as well as collaborators at Mexican universities. When Arizona and northern Mexico became dry following the Pleistocene, populations of the flightless giant water bug

Abedus herberti became isolated in high-elevation streams across dozens of Sky Island mountain ranges. The geology of these mountains is so heterogeneous that some populations regularly experience severe flash floods while others occupy streams that rarely flood. Preliminary data suggest that *A. herberti* populations are evolving along different behavioral trajectories depending on the local flood regime. Populations in flood-prone habitats are highly sensitive to rainfall cues and readily abandon streams, while populations in non-flooding habitats suppress the behavior entirely. Because flood regimes are replicated across different populations (i.e., the same flood regime occurs on multiple mountain ranges), this system presents a unique opportunity to determine whether identical selective pressures independently drive the evolution of identical behaviors.



A typical Sky Island stream just before the monsoon season. This pool contains hundreds of giant water bugs which will climb the near-vertical canyon walls during heavy rainfall (M. Bogan photo).

SWRS SCIENTIFIC ADVISORY BOARD

The scientific advisory council (SAC) of the SWRS met on 23 July. Members attending included Jay Cole, Pam Golden, George Middendorf, Howard Topoff, and Mike Bogan (grad student rep). Members unable to attend included Ray Mendez and Karin Pfennig. Guests that joined the meeting were Sara Helms Cahan, Ross Zimmerman, and William Golden. Several topics were

discussed at this meeting and a report was compiled (by Topoff) for the SWRS and the AMNH.

➤ The first part of the meeting focused on station operations and staff changes. We also discussed the entries for the SWRS Logo Contest and one entry stood out as the winner. We hope to finalize the official SWRS Logo this upcoming year and announce the winner of the contest in our next winter's newsletter!

➤ We discussed and adopted the newly proposed Visiting Scientist Program. Our first visiting scientist in residence for 2006 was chosen: Marilyn Loveless, a botanist from College of Wooster, Ohio. Marilyn will pursue her research on the evolutionary ecology of plant-pollinator interactions in the Chiricahua Mountains. She also will spend time upgrading and computerizing the SWRS botany collection.



➤ The SAC committee also discussed major equipment needed at the SWRS. An email will go out to all researchers that use the Station asking for their input.

➤ Because more researchers apply to come to the Station each year than the Station can accommodate, a no-show/cancellation policy was voted on and will be put into effect in 2006.

➤ The rate structure for researchers and naturalists that visit the Station was modified slightly. Our new rates are posted on the SWRS web site.

➤ Fund raising was a hot topic of discussion. The NSF grant that was not funded the previous year was rewritten and resubmitted in early spring. We also discussed the planned submission of a Kresge Foundation Planning Grant. If funded, the Kresge grant will cover some of the costs of planning a "green" building and energy analysis and modeling for older and future structures at the SWRS. We are working closely with the Solar Alliance in Tucson to put the team of consultants together for this grant.

STATION UPDATES

NEW BIRDING AREA FOR VISITORS

Each year the SWRS hosts many naturalist tours and individuals that use the Station as a base for their many adventures into the diversity of habitats surrounding the SWRS. In addition to those visitors that stay at the Station, 1000's more walk onto Station grounds to



observe hummingbirds at our feeders and other species of birds visiting our riparian areas. This past year, the Station joined forces with Susan Wethington of the Hummingbird Monitoring Network (HMN). The HMN is a non-profit organization whose goal is to generate knowledge about hummingbird diversity, abundance, productivity, and survivorship in a variety of habitats. Their efforts provide land managers with information about which areas support a high diversity of hummingbirds, the timing of their occurrence, and seasonal movement patterns that may indicate the size of the areas needed to maintain hummingbird diversity and abundance. The HCN provides training for students,



scientists, and members of the general public in the skills required for hummingbird study. This past year five undergraduates came to the SWRS to participate in this project.

To aid in our commitment to this project, the Station increased the size of its hummingbird area. We added additional benches for bird watching, planted many native flowering plants, and constructed a flowing pool with a solar powered fountain.

THANK YOU, THANK YOU, THANK YOU

Donations to the SWRS help support students in their research and provide funding for special projects. We would like to thank the following people for their donations:

Jeanne and Stu Abrahm, Ronald Altig, Margaret and Wyatt Anderson, Valer and Josiah Austin, Catherine Buckner, Martha Carter, Alice and Robert Chew, Neil Cobb, Rock Comstock, Jr., Robin Coon, James Davis, Dorothy and Norman Eade, Alan Ferg, Millicent Ficken, Ray Mendez, Barbara and Pete Miller, Nancy and Fred Gehlbach, Sibyl Golden, Nancy Lauver Green, Harry Green, Henry & Rebecca Hesperheide, Madeleine James, Rudolf Jander, Tom Jackson, Penny Johnston, Kurt Leuschner, Charlie Liu, Margaret and Bruce McIntosh, Guy Miller, John Peacock, C. A. Reinhardt, Jerry Rozen, Robert Sandine, Wendy Shadwell, Carol Simon, Barbara Strempek, Howard Topoff, Dorothy Uhlman, Maurice and Roberta Ward, Robert Winston, James Wygle, AST Foundation, and ECO Wear.

2005 VOLUNTEERS

The SWRS would like to thank the following individuals for participating in our volunteer program. We miss all of you and wish you well in your future endeavors.

France: Mattieu Delcourt, Sarah Guerard, Sebastien Guilbert, Alexandria Sebastien

Germany: Susanne Donandt; **Japan:** Madoka Nakashi

Netherlands: Jay Harms; **New Zealand:** Nicola White

Norway: Kari Vindenes; **Scotland:** Robert McMeekin

Poland: Marta Borowiec, Pawel Cygan, Tadeusz Starczyk

United Kingdom: Giles Manning, Katherine Roper, Gemma Wiacek, Amy Windsor

United States: Tom Carter, Jay Grantier, Breja Gunnison, Kojun Kanda, Kelly Lasater, Gabriella Levine, Gail and Harold Lindebo, Charlie Liu, Marcia Martin, Rodney McCollum, Deanna Morrell, Chris Mueller, Jeffery Nelson, Patrick Oakes, Dan Walker, Jessa Watters, Leslie Wood



Volunteer, Gemma Wiacek , with one of our younger research assistants, Adrian Feener.

ANNOUNCEMENTS

SWRS 2nd Annual Horseshoe Competition!

This summer, the volunteers, researchers, and staff participated in the Second Annual Horseshoe Competition. For two days, shoes were tossed for both doubles and singles competitions.

Winner Singles Competition: Giles Manning



Believe it or not we lost the competition to a chap from the United Kingdom. AND, this was the first time he had ever played horseshoes!



Winners Doubles Competition: Ryan Martin (left) & Brian Storz (right)

VOLUNTEER POSITIONS

Approximately 30 positions are available for the 2006 season. Two types of volunteer programs are available at the SWRS:

1. RESEARCH SEASON -- Individuals interested in conducting research:

This volunteer program offers students in biological sciences outstanding opportunities to observe and become involved with scientists conducting field research. Food and lodging are provided to volunteers in exchange for 24 hours per week of routine chores, with the remaining time available for research activities. This program is open from March through October to both undergraduate and graduate students; the latter may pursue their own research projects. Time commitments to the program range from 6-8 weeks.

2. NATURALIST SEASON -- Individuals interested in birding, hiking, and other nature adventures:

This volunteer program offers individuals the opportunity to enjoy all the wonders of the Chiricahua Mountains. Just a few minutes walk from the Station are hiking trails, creeks, and birding areas matched no where else in the United States. Food and lodging are provided to volunteers in exchange for 24 hours per week of routine chores, with the remaining time available for personal activities. This program is open from September through May each year. Very few researchers are at the Station this time of year, but the Station hosts many birding groups and classes. Time commitments to the program range from 4-8 weeks. Longer time periods may be arranged.

To download Volunteer Applications, please visit our web site and click on Volunteer on the left side of the home page or contact: Dawn S. Wilson, Director, Southwestern Research Station, P.O. Box 16553, Portal, AZ 85632 USA; 520-558-2396; dsmith@amnh.org

Hummingbird Monitoring and Banding!

This project begins in March and ends in mid October each year. It is part of a long-term field study to record hummingbird migrations into the Chiricahua Mountains. For more information email Dawn S. Wilson, dwilson@amnh.org.

**PLEASE BECOME A FRIEND OF THE
SOUTHWESTERN RESEARCH STATION**

The Southwestern Research Station is a facility located in one of the most bio-diverse areas in the United States. For over 50 years, we have welcomed researchers, educators, students, and naturalists to stay at the Station while conducting research, participating in courses and workshops, or just enjoying the natural beauty of the surrounding Chiricahua Mountains.

Each year the SWRS sends out a Newsletter to all researchers and visitors that come to the Station updating all of you on increased opportunities for science and education at the SWRS and on our goals for the future. With rising energy costs around the world, the SWRS has found it necessary to cut costs in some areas so that we can continue to attract researchers and their assistants and increase opportunities for science education at the Station.

We invite you to become a friend of the SWRS so that you can help support the Station in both its short- and long-term goals.

Ways You Can Support the Station:

- 1) Your tax-deductible contribution to our General Support Fund will help us meet the our long range goals of -- continuing to foster science that focuses on the high biodiversity of the area, -- advancing both research and educational goals by enhancing the technology infrastructure at the SWRS, and -- becoming a "green" model for the surrounding community.
- 2) Your continued support of student researchers through contributions to the Student Support Fund provides students the opportunity to gain valuable research experience through grants given out by the SWRS each year.

By Becoming a Friend of the SWRS You Will Receive:

- 1) The annual Newsletter informing you of our progress in meeting our goals and providing you with exciting news on research and educational activities at the Station.
- 2) Periodic emails keeping you up to date on new courses, job opportunities, and our volunteer program.

Please detach and return this portion with your contribution (send to address on page 2)

YES! I would like to become a friend of the SWRS and continue to receive the Annual Newsletter and updates on the Station's progress.

Membership

Individual \$20 _____
 Student \$15 _____
 Family \$25 _____

Name _____

Address _____

Phone () _____

Email address: _____

(For periodic updates on Station events and progress).

Additional Support

General Support Fund _____
 Student Support Fund _____

Credit Card Type _____ CC # _____

Expiration date _____

Please make checks payable to SWRS.

Total Enclosed _____

All contributions are tax deductible. We are a 501 (c) (3) organization.