



Drawing by Karen Becker

NEWSLETTER

SouthWestern Research Station

Portal, Arizona

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

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Year 2006

FROM THE DIRECTOR

Because winter rains and snows were scarce, we had no flowers at the station in spring 2006. Birds nested late or not at all, insects and other invertebrates were few and far between, and the creeks were dry. We also missed the large poppy bloom that covers the San Simon Valley each year with a carpet of color. Then, the summer monsoon season brought over 11 inches of rain in just two months! The creeks filled and the station once again came to life. Now, winter of 2007 seems to be making up for last year—we already have had several feet of snow and some rain, so next spring should be a bountiful one for plants and animals.

In last year's newsletter, I informed everyone that we had been recommended for an NSF grant to fund a much-needed new education building at the SWRS. I am delighted to report that it became official, and last June, the SWRS hosted a design *charrette* to help site and plan the design of our new building. The term "charrette" goes back to around 1900 from an exercise at the École des Beaux-Arts in France, and refers to an intense process to develop innovative design solutions with a wide range of stakeholders working together.



In keeping with the Museum's and the Center for Biodiversity and Conservation's mission of mitigating threats to biodiversity, we invited a team of experts in sustainable, "green" building design. For three days we brainstormed ideas, and the result is a plan for an efficient building that will not only save the station in energy costs, but will be a showcase for sustainable design and regenerative systems; that is, the building will not only mitigate its environmental impact, it will complement and enhance its extraordinary surroundings. We are currently seeking supplemental funding for the building and we hope to begin construction next winter.

For now, we have replaced all our incandescent lights with much more efficient compact fluorescents, added motion sensors to outside lights, put in more solar path lights, and are in the process of designing a solar array to help lower our consumption of outside energy.

Changes in the SWRS family of employees over the past year included the promotions of Jodi Kessler to full-time cook and Diane Smith to office/program manager, the new hires of P.D. Hulce to volunteer coordinator/office assistant, Alan White to chief maintenance, and Ben Knapp to maintenance. We have a great team of people here at the station and hope you will all come to visit us in 2007.

I hope you all had a nice holiday season,

Dawn S. Wilson

POWDERMILL TURTLES - TURTLES - TURTLES!

Every three to five years or so, a bunch of freshwater turtle biologists get together to share their ecological research studies and socialize. The first official meeting of "Powdermill" was held in 1980 at the Powdermill Biological Station of the Carnegie Museum of Natural

SouthWestern Research Station

The SWRS Annual 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 (AMNH) in New York.

The SWRS enhances the existing diversity and strengths of the AMNH 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 S. Wilson, Ph.D, Director

Diane Smith, Office/Program Manager

P.D. Hulce, Volunteer Coordinator/Office Assistant

Alan White, Chief Maintenance

Ben Knapp, Maintenance

Jodi Kessler, Head Cook

Robert Lane, Seasonal Cook

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History in Pennsylvania. This past fall 2006, I hosted the VI Powdermill Turtle Conference at the SWRS. Fifty-four turtle biologists attended the meeting and for



three days shared their turtle research on topics such as nesting ecology, longevity and growth, temperature sex determination, and habitat use and movements, to name but a few. One of the main purposes of Powdermill is not just to give presentations but to have plenty of time for open discussions on what we do and don't know about turtles -- so we can figure out what to study in the future.

Overall, the meeting was a huge success! Everyone attending agreed that the SWRS was one of the best, most relaxing places to hold such a meeting.



EDUCATION

ANIMAL BEHAVIOR IN THE CHIRICAHUAS

One of our esteemed scientists from Portal, Dr. Howard Topoff (below left), taught a field course at the SWRS this past summer entitled "Animal Behavior in the Chiricahua Mountains." For ten days, students from all walks of life crossed boundaries between biology, psychology, anthropology, and sociology to gain a better understanding of the behavior of a diverse group of species in the Chiricahua Mountains of Arizona. The course was open to birders, museum and zoo docents, teachers, and anyone who enjoys observing and understanding the behavior of animals in their natural habitat. Studies in the course included:

Adaptability of Behavior - using color and odor preferences in the selection of nectar sources by hummingbirds,

Population Dynamics - examining how the territory size of harvester ants relates to colony density,

Communication - using the evolution of visual displays in iguanid lizards,

Social Behavior - investigating orientation and communication in slave-making ants,

Mating Behavior - understanding the role of auditory signals in mating behavior of spadefoot toads.

Because of the station's rich diversity of researchers that visit the station annually, the students also were able to participate in on-going studies being conducted at the SWRS. We hope to offer this course again in the future.

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

CURRENT RESEARCH ACTIVITIES

Scientists and their assistants come from all over the U.S. and from around the world to work on plants and animals living in the diverse habitats that surround the station, which sits in a veritable hotspot of biodiversity. Because research is at the heart of the mission of the SWRS, we list here some of the newer research projects from 2006.



Is the flush-pursuit foraging strategy a common feeding strategy in post-breeding season for the Painted Redstart (*Myioborus pictus*)? Ewa Sergiej, University of Wroclaw, Poland.

Ecological correlates of the *Spea bombifrons* x *S. multiplicata* hybrid zone, AND Historical selection and the outcome of competition in spadefoot toads. Amanda Chunco and Ryan Martin, Univ. of North Carolina, Chapel Hill.

Evolutionary history of cleptoparasitic apid bee. Sophie Cardinal, Cornell Univ., Ithaca, NY.

The role of painted redstart *Myioborus pictus* male and female song variability in relation to different social context. Pawel Cygan and Tadeusz Stawarczyk,, Polish Academy of Sciences, Poland.

Ant task allocation and building behavior. Anna Dornhaus, Univ. of Arizona, Tucson.

Does complexity in social organization predict complexity in vocal communication. Todd Freeberg, Univ. of Tennessee, Knoxville.

Harvester ant chemical recognition cues. Michael Greene, Univ. of Colorado, Denver.

The vomeronasal sensory epithelium used to detect conspecific chemical cues: sex differences, androgen regulation and species variation. Diana Hews, Indiana State Univ., Terre Haute.

Comparative studies of vigilance in sciurid rodents. Donald Kramer, McGill Univ., Quebec.

Geographic variation on different scales in bird song. Daniel Leger, Univ. of Nebraska, Lincoln.

Behavior and ecology of solitary wasps and ees. Kevin O'Neill, Montana State Univ., Bozeman.

Respiratory physiology of beetles. Michael Quinlan, Midwestern Univ., Glendale, AZ.

Species interactions and niche differentiation among *Phrynosoma* lizards. Amy Schneider, Univ. of Colorado, Boulder.

Phylogeography of deserticolous nocturnal Mutillidae (Hymenoptera). Joseph Wilson, Utah State Univ., Logan.

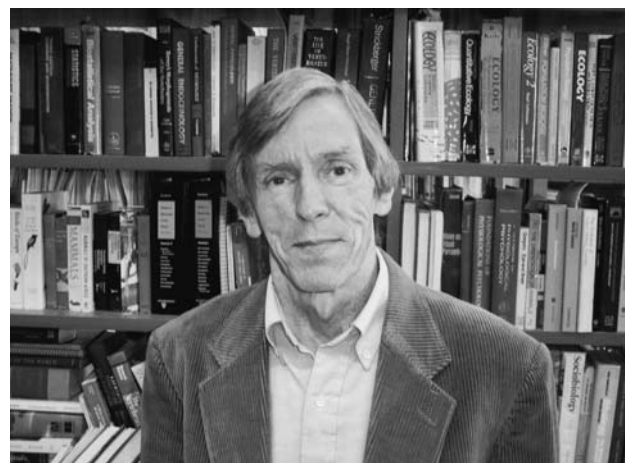
Behavioral ecology of *Sceloporus jarrovii* and other sympatric lizards. George Middendorf, Howard University, Washington, DC.

Phylogenetic revision of the North American asidine darkling beetles (Coleoptera: Tenebrionidae: Asidini). Aaron Smith, Texas A&M Univ., College Station.

What makes the two-lineage system possible? Factors that maintain diversity in populations of the harvester ant *Pogonomyrmex barbatus*. Sevan Suni, Stanford Univ., CA.

FEATURED RESEARCHER FOR 2006: BILL COOPER, OREGON STATE UNIVERSITY

Bill Cooper comes to SWRS from Indiana University Purdue University in Fort Wayne. He is a lizard behavioral ecologist whose research focuses on defense against predators, foraging behavior, and use of the chemical senses to detect food and predators and to communicate by pheromones. He first came to the



Chiricahuas in 1994 to study lizard foraging movements. He loved the mountain scenery and climate as well as the abundance of lizards, and hoped to do more work here. He returned briefly in 1996, and then in 2004 he came to SWRS to study escape behavior by the striped plateau lizard (*Sceloporus virgatus*), as well as, foraging modes of several lizard species. Striped plateau lizards proved to be such good subjects for field experiments on escape and refuge use that he returned in 2006 and will be here again in 2007. SWRS Director Dawn Wilson's interest in behavior of reptiles led to a collaborative research effort starting in 2006, enabling her to expand her studies from turtles to include lizards.

Studies of lizard foraging movements of lizard species in and near the Chiricahuas completed with Laurie Vitt and Janalee Caldwell of the University of Oklahoma has added to the database needed to characterize foraging modes of lizards. Lizards have conventionally been assigned to one of two modes. Ambush foragers wait immobile at ambush posts for prey to approach, detect the prey visually, and then attack. Active foragers move through the habitat while searching for food, which is located visually or by chemical cues. Whether these modes are really separate or are simply extremes on a continuum of activity has been controversial. Cooper and his colleagues have amassed a large data set on percent time spent moving, number of movements per minute, and movement speed while foraging to try to resolve the controversy. It turned out that all species studied fell into one of two clusters corresponding to ambush and active foraging. However, movement traits vary within the clusters. Also, no data exist for species of lizards such as true chameleons and a few other types that may move very slowly (stalk), but spend a considerable amount of time moving. The picture may yet change -- a good excuse for Cooper to do some field work in exotic locations!

During Cooper's last two stays at the SWRS and into 2007, the goal of his research is to examine effects of costs and benefits on decisions that prey make about escaping from predators and refuge use. Traditional escape theory predicts that when a prey detects an approaching predator, it will not flee immediately, but will monitor the predator's approach, fleeing only if the predator comes close enough that the cost to fitness of not fleeing due to predation risk equals the cost of fleeing. Although escaping may in some circumstances be costly energetically or may increase the chances of injury, the main costs of escape are lost opportunities, such as leaving when prey is scarce but currently present, or the prey is courting. Cooper recently published an updated theory that shows that prey can do better if they begin to flee when the predator is at the distance that maximizes the prey's expected fitness after

the encounter than when costs of fleeing and of not fleeing are equal. Both traditional and optimal escape theory make many predictions about the effects of varying the intensity of many predation risk factors and factors affecting costs of escape.

Cooper and Wilson have begun to test these predictions for many risks and escape cost factors in striped plateau lizards and will continue this work this spring. So far, they have studied how a predator's speed and directness of approach and presence of other lizards and the lizard's food affect their escape decisions. Lizards are widely known for their ability to shed their tails to help them escape once overtaken by a predator, but losing the tail can be costly for them in several ways. In many species, lizards cannot run as fast after losing their tails, which makes them more vulnerable to predators. Cooper

and Wilson have shown that striped plateau lizards adjust their escape behavior to compensate for tail loss by decreasing activity while



adjusting to the tail loss and then by beginning to escape sooner during a predator's approach. This year's research plans include more tests of the effects of predation risk factors (including tail loss) and social opportunity costs on escape and complementary studies to test theories predicting how long prey should remain in refuge before emerging. The research will also be extended to Yarrow's spiny lizards. Cooper says "I can hardly wait to get back in the field."

LONG-TERM OWL STUDY REACHES AN END

In June 2006, Fred and Nancy Gehlbach completed their 12th and last year studying small owl nesting ecology in Cave Creek Canyon and five other local and more distant sites, including the Huachuca Mountains. The owls in rank-order of long-term mean density at 1500-2650 m elevation are: Whiskered Screech, Elf, Northern Pygmy, Flammulated, and Western Screech (plus Saw-Whets at 2650). The major finding of their study is that El Nino-Southern Oscillation cycles control life in Mixed Riparian Forest by controlling primary productivity, which then affects secondary productivity that includes insects, the major food-type of all five owls while nesting. They also discovered: 1) that the owls are nesting on average 0.5-0.8 days earlier each year coincident with earlier-appearing insects, which correlate with local warming;



2) that they nest in multi-species clusters and single-species aggregations, sometimes only a meter apart, and similarly close to other cavity-nesting birds (such nests are more often successful than single nests); and 3) that Arizona Sycamore is the keystone tree insofar as cavity-using birds, mammals, reptiles, and insects are concerned, but its populations are

declining. Fred Gehlbach is currently preparing a monograph of the study for the American Ornithologists Union. The manuscript includes many more aspects of novel natural and unnatural history and ecology.

SWRS SCIENTIFIC ADVISORY COUNCIL

This year the scientific advisory council (SAC) of the SWRS met on 21 July. Members attending included Jay Cole, Carol Simon, Dave Lytle, Sara Helms-Cahan, and Dawn Wilson. Members unable to attend included Ray Mendez and Karin Pfenig. Several topics were discussed at this meeting and a report was compiled (by Helms Cahan) for the SWRS and the AMNH. The major topics of discussion were as follows.

- The SWRS budget was discussed and the SAC members were happy to hear that the SWRS received a 17% increase in the operating budget from the AMNH.
- Two designers came up with SWRS logo ideas that the SWRS liked. We melded them together into one design and presented it to the advisory committee. See below in the Newsletter for the new SWRS logo and the names of the winners!
- New courses offered at the SWRS were discussed. These include the Species Modeling course which has become very popular and a new course taught this past August entitled Animal Behavior (see article under Education above).
- A committee was formed last spring to discuss the possibility of a Long Term Research Symposium to be held at the SWRS. The committee consists of Dawn Wilson, George Middendorf, Fred Gehlbach, and Piotr Jablonski. We are looking into possible funding from the National Science Foundation for support of the symposium. See below for more information about this upcoming event.

- We discussed the site location and design of the new education building. The SAC was excited about the new building because it will provide more space for courses taught at the SWRS.
- Two major capital issues were discussed by SAC members: replacement of the SWRS water main and electrical rewiring of the SWRS labs. The AMNH approved the first capital grant submitted by Dawn Wilson and a new water main is currently being installed at the station.
- Ray Mendez and Dawn Wilson informed the SAC that they were working on a Master Plan for future growth and development at the SWRS. Use of the station has increased over the years and the Master Plan aims to make more efficient use of space at the station by renovating existing structures and/or building new structures. Our goal is to build sustainable, energy efficient structures that will decrease energy costs at the station, thereby keeping researcher rates from increasing.

STATION UPDATES

SWRS LOGO DESIGN CONTEST WINNERS!

We congratulate Karen Becker from the Peninsula Art School in Fish Creek, Wisconsin and Narca Moore-Craig, a local artist from Portal, Arizona. The winners each received three nights free room and board at the



SWRS for themselves and a friend. The color version of the logo can be seen on our web site's home page <http://research.amnh.org/swrs/>. The logo depicts a pyramid of life-zones from desert to spruce forest.

SWRS LONG TERM RESEARCH SYMPOSIUM

Research at the SWRS has been going on for over 50 years, and a number of researchers have long-term data sets that may illuminate patterns of changes in habitat, species ranges, and other ecological variables.

The SWRS and American Museum of Natural History are pleased to announce a symposium on long-term biological studies conducted in the Cave Creek Canyon Watershed. The theme of the symposium concerns the effects of natural and cultural environmental change on animal and plant populations during the last ten or more years, and directions for continued research on a natural ecosystems increasingly influenced by people. The symposium will be held at the SWRS and the date is tentatively scheduled for the end of March 2008. The symposium will culminate in an edited volume that will include a section on place and environments, chapters from each participant, and suggestions for future studies.

CONSTRUCTED WETLAND AT SWRS

Wastewater removal and treatment is a tough issue at the SWRS. The main grounds of the station are smack in the middle of two forks of Cave Creek, middle and north forks. Traditional septic systems require leach fields, which, if placed too close to a water source can cause environmental problems down the road. In keeping with our goal of maintaining a compatible balance between human activities and the ability of natural systems to support and nurture life, the SWRS is installing a constructed wetland this winter.

Duplicating the processes occurring in natural wetlands, constructed wetlands are integrated systems where plants, animals, and microorganisms interact to filter out contaminants and improve water quality. The purified water that exits the system can then be recycled for irrigation. Although the primary purpose of the wetland will be to treat the station's wastewater, it also will provide food and habitat for wildlife, create a pleasant landscape, and will be used as an educational tool for SWRS visitors.

FOR THE NATURALISTS

THE CHIRICAHUA NATURALIST BY P.D. HULCE

A severe winter drought defined the natural world in the Chiricahuas for the first half of 2006. Large numbers of Pine Siskins appeared at feeders at private homes throughout the area. A Carolina Wren, the third record

for Arizona, was discovered at the SWRS in December 2005 and recorded on that year's Christmas Bird Count.



The wren's loud singing was heard several times a day around the station. Late March brought an excellent hatch of Yucca Giant-Skippers along Cave Creek by the entrance to the station. Other interesting spring butterflies included Arizona Skippers, Arizona Powdered Skippers, Great Purple Hairstreaks, and a multitude of White-barred

Skippers. By mid April, avian migration was in full swing. An Elegant Trogon was singing on territory at John Hands campground, mixed flocks of warblers were common, and the SWRS hosted a Northern Parula, Rose-breasted Grosbeak, and a Spotted Sandpiper. By May, Red Rock Skimmers were gliding along Cave Creek, a pair of Zone-Tailed Hawks were regular fly-bys over the station, and good numbers of Deva Skippers were being seen. June brought late Brewer's and White-Crowned Sparrows to the SWRS, as well as a vagrant Prothonotary Warbler. The Hummingbird Monitoring Network banded hummers every two weeks at the station, and in addition to the regular species, also banded Calliope, Broad-billed, and White-eared Hummingbirds.

The monsoon rains finally started in early July, and the numbers of butterflies began to increase. A single male Yellow-Headed Blackbird was at the station on July 26th, Short-Tailed Hawks were regularly seen at Barfoot Peak, and a Florida White was seen at a private residence. Late summer and fall brought a Kentucky Warbler, Filigree Skimmers and a single White-Angled Sulphur (previously called the Ghost Brimstone).

On December 20, a Winter Wren, Hammond's Flycatcher, and a Wilson's Snipe showed up at the station. These three species along with 23 other species on the station grounds (including a very cooperative Northern Pygmy-Owl) were all recorded on the Portal Christmas Bird Count on December 31.

BIRDING PARADISE IN THE CHIRICAHUAS

This spring and fall of 2007, the SWRS will offer six birding tours. The Chiricahua Mountains of S. E. Arizona afford some of the best birding in the United States. Our six day/five night Bird and Nature Tours include: cabin housing, three meals/day, hearty and sumptuous sack lunches, bottled water for trips, and a

gift bag full of coupons and more. Our experienced guide is a local of the area and will take you on daily field trips, optional owl walks at night, and provide talks on the natural history of the region. For more information and tour itineraries check our web site at <http://research.amnh.org/swrs/> or contact P.D. Hulce at dhulce@amnh.org, 520-558-2396. To become a friend please see the last page of this newsletter.



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.

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 nowhere 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 we host many birding groups and classes.

For Volunteer Applications, please visit our web site and click on Volunteer on the left side of the home page or contact: P.D. Hulce, SWRS, P.O. Box 16553, Portal, AZ 85632 USA; 520-558-2396; dhulce@amnh.org

A SINCERE THANKS TO ALL OF OUR FRIENDS OF THE SWRS

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: AST Foundation, John Alexander, Debbie Anbinder, Robin Andrews, Marika Austin, James Austin, Joseph and Mary Bagnara, Ian Bartoszek, Rene and Delane Blondeau, Peggy Boston, Judith Boyce, Bayard Brattstrom, Patricia Brown, Gregg Campbell, John Carothers, Jack and Martha Carter, Robert and Alice Chew, James and Gloria Childress, Pamela and Carl Clapp, Rock and Kay Comstock, Justin and Nancy Congdon, Bill Cooper, Michael and Jessie Cyr, Maryann Danielson, Joie DeLeo, James Dodge, Roger Eddy, Eugenia Farrar, Emily Fisher, Ted and Maria Fleming, Stuart Fullerton, Nancy and Fred Gehlbach, Arline Glassman, Geronimo Educational Foundation, Ellery Green, Harry Greene, Sibyl Golden, Karen Halbert, Henry Hesperheide, Sam Hitt, Rudolf and Ursula Jander, David Johnson, Harriet Johnston, Patricia Kabitzke, Lianne Kurina, Thomas Kerwin, Patrick Lambert, Dave Lytle, Mel LaRue, Nancy Lauver, John and Nancy Legates, Kurt Leuschner, Shirley Levy, Louis Lopilato, David Lytle, Ray and Joy Mendez, Guy Miller, Sharon Mulligan, Gillian Newell, Jeffrey Podoshen, Casilda Quinones, Joyce Roach, Jerry Rozen, Stephen Sargent, Ann Scales, Wendy Shadwell, Ruth Shilling, Sara Simmonds, Carol Simon, Frances Spalding, Hugh Spitzer, Eleanor Sterling, Howard Topoff, Eugene Varney, Robert Weaver, Maurice and Roberta Ward, James and Andrea Wygle, Louis Zimmer.

2006 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.

Australia: Saul Newman; **Canada:** Nick Cairns; **Germany:** Doreen Fetting; **Poland:** Marta Borowiec, Pawel Cygan, Ewa Sergiej; **Switzerland:** Karin Luthold; **United Kingdom:** Jennifer Henderson; Vicky Pritchard; **United States:** Darleen Bunker, William Bunker, Achille Clendinning; Brian Clough, Daniel Estabrooks, Kyle Gillich, John Godbey, Joan Hicks, Rachael Kappler, Eileen Kennedy, Betty Ann Kolner, Marchall Knoderbane, Kelly Lasater, Caitlin Mills, Glen Nelson, Jessica Pearce, Guy Plaa, Loretta Plaa, Mario Reyes, Eric Schmitt, Mimi Schmitt, Amy Schneider, Joe Seebacher, Bob Weaver, Bonnie Woods, Andrienne Zillmann.

SUPPORT 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.

Your generous support plays a vital role in enabling us to maintain our programs and facilities. Last year we were able to remodel three of the cabins, put a fresh face on the kitchen, replace the old water main, and build a constructed wetland.

Your tax-deductible contribution to the SWRS will ensure that the Station remains in peak condition, allowing us to meet our long range goals of continuing to foster science that focuses on the abundant biodiversity of the Chiricahua Mountains.

Your gift will also allow us to advance both our research and educational objectives by enhancing

our technology infrastructure, becoming a “green” model for the surrounding community, and providing students the opportunity to gain valuable research experience.

* Contact us about naming opportunities for our new “Green” Education Building

\$50	Will help supply plants for our birding area and new wetland
\$100	Will help upgrade living quarters
\$250	Will help buy microscopes and computers for student workshops
\$500	Will help support a research student for one week
\$1000	Will help make our cabins energy efficient

YES! I would like to support the SouthWestern Research Station!

Please accept my tax-deductible gift in the amount of:

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Please detach and return this portion with your contribution to SWRS, P.O. Box 16553, Portal, AZ 85632 or via fax to 520-558-2018. Any questions please contact Dawn Wilson at 520-558-2396