

Biosurvey News

The Newsletter of the Oklahoma Biological Survey
Fall 2005



Publications of the Oklahoma Biological Survey is Online and Active Once Again

by Wayne Elisens

The peer-reviewed serial overseen by the Oklahoma Biological Survey, the *Publications of the Oklahoma Biological Survey (POBS)*, has a newly released volume and past issues that are now available online. Volume 6 initiated the second series of the *POBS*, which was released on October 3, 2005 after a 72-year hiatus since publication of Volume 5. Coincident with the online publication of Volume 6 was release of Volumes 1 to 5 (the first series), which can be accessed through the Oklahoma Biological Survey website (www.biosurvey.ou.edu/) or directly at <http://digital.library.okstate.edu/obs/>. The *POBS* will be published at regular intervals and distributed to regional libraries in hard copy format and posted online as searchable PDF files.

Volumes 1 to 5 of the *Publications of the Oklahoma Biological Survey* were published from March 1929 until December 1933 and included 21 significant contributions on the biological diversity of Oklahoma. Illustrating the breadth of research activities undertaken by biologists during that period, representative articles included: "A preliminary list of the ferns and seed plants of Oklahoma", "The birds of Oklahoma", "The desmids of Oklahoma", "Fishes collected in Oklahoma and Arkansas in 1927", and "The ecology of the western Oklahoma salt plains". The list of authors reads like a veritable "who's who" of Oklahoma field biologists and includes such individuals as Carl Hubbs, Royal Jeffs, Margaret Nice, Arthur Ortenburger, and Melville Hatch.

PUBLICATIONS OF THE UNIVERSITY OF OKLAHOMA
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Logo of the *Publications of the Oklahoma Biological Survey* as it appeared in 1931.

The second series of the *POBS* continues the mission established by the original series and provides an outlet for high quality, externally reviewed investigations on the biodiversity of Oklahoma and adjoining regions. Published articles will have a similar conceptual emphasis as those in Volumes 1-5, and will focus on but are not limited to research in ecology, systematic biology, and biogeography. The three articles published in Volume 6 include a compendium of the type specimens in the Bebb Herbarium of the University of Oklahoma, a floristic survey of the Deep Fork and Eufaula Wildlife Management Areas, and an inventory of the tetrapod vertebrates in the Chickasaw National Recreation Area.

All aspects of the editing, production, and distribution of the second series of the *Publications of the Oklahoma Biological Survey* are carried out using personnel and facilities of the Oklahoma Biological Survey. The editors for the second series include: Richard Broughton, Wayne Elisens, Bruce Hoagland, Karen Kilbourne, and Dan Reinking. Dan Hough worked with the Oklahoma State University Electronic Publication Center during conversion of Volumes 1 to 5 from hard copy to electronic format. The editors encourage scientists with research suitable for publication in the *POBS* to submit their manuscripts for review in either hardcopy or electronic format. Instructions for authors and submission can be accessed through the Oklahoma Biological Survey website at www.biosurvey.ou.edu/pobs/index.html. By initiating the second series of the *POBS*, the Biological Survey once again provides a peer-reviewed publication for research on Oklahoma's diverse biota and a valuable service to the state.

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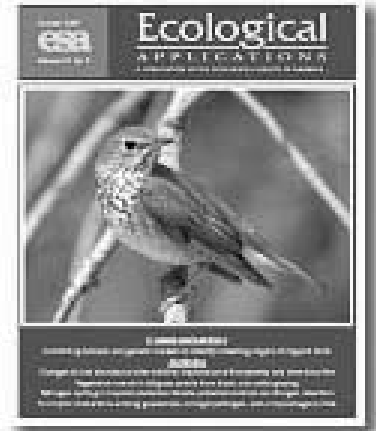
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OBS Researchers Featured in *Ecological Applications*

by Jeff Kelly

Most birds found in Oklahoma migrate to other locations for at least part of the year. Understanding these migratory movements is an important facet of developing effective management strategies for populations of migrants. For large birds like ducks, geese, and cranes these movements are readily tracked with many forms of markers, radios, and satellite transmitters. For a variety of reasons these approaches are much less successful when applied to small songbirds. To better understand migration in these small birds Jeff Kelly and colleagues have been using genetic markers and feather chemistry to track migrant birds. Results of their work on Swainson's Thrushes (*Catharus ustulatus*) are featured on the cover of the October 2005 issue of *Ecological Applications*.



NEW ON THE WEB

Publications of the Oklahoma Biological Survey pages

Final report and data for OK-GAP project

Pages for this year's Blitz!

www.biosurvey.ou.edu

128 PROJECTS ENTERED INTO DATA CATALOG

by Bill Dengler and Ian Butler

Last spring we introduced the OBS-ODWC Data Catalog, which is an archive of biological field research project data. This catalog will provide a ready reference for projects accomplished at OBS and through the Wildlife Diversity Division of the Oklahoma Department of Wildlife Conservation. Over the summer we developed data descriptions, or metadata, for 128 completed research projects on file at the Oklahoma Biological Survey. We also scanned or converted final reports for each of the 128 projects to PDF format. Project data, final reports, and other products will be available electronically when the Catalog goes online next year. If you have done research on non-game species, we would like to add your projects to the Data Catalog. Please contact Ian Butler at 405-325-1985 or Bill Dengler at 405-325-5061, or write them at the Oklahoma Biological Survey, 111 E. Chesapeake St., Norman, OK 73019-5112.

<p>Biosurvey News Fall 2005 Amy K. Buthod and Caryn C. Vaughn, editors</p> <p>Biosurvey News is published twice each year and reports on the activities, programs, and news related to the Oklahoma Biological Survey.</p>	<p>We welcome readers' comments and suggestions.</p> <p>The Oklahoma Biological Survey is proud to be a unit in the College of Arts and Sciences at the University of Oklahoma.</p> <p>This publication, printed by the Oklahoma Biological Survey, is</p>	<p>issued by the University of Oklahoma. One thousand copies have been prepared and distributed at a cost of \$440.00 to the taxpayers of the State of Oklahoma.</p> <p>The University of Oklahoma is an equal opportunity institution.</p> <p>© 2005</p>
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The Sutton Center's Educational Program is "Taking Off"

by Steve Sherrod and Karen Kilbourne

The George Miksch Sutton Avian Research Center's Educational Program is growing; the new and expanded version will be presented to school children in Oklahoma starting in January 2006.

The new show, "IT'S ALL ABOUT BIRDS!" involves live, trained birds that will fly down to the stage or otherwise perform in auditorium-styled, Disney-type presentations directed toward environmental conservation. By using the magic of live birds from the natural world, our show will compete with the gadgetry kids have today such as handheld computer games and iPods, not to mention television 24/7. It really IS both entertaining and educational, AND the kids will be tested on the content. Sutton Center Executive Director Steve Sherrod likens the lack of exposure to the natural world for kids growing up in America today "in a way" to the experiments in the 50's by Harlow in raising baby rhesus monkeys with surrogate, cold, wire-framed mothers. Sherrod suggests that because we raise children today on the cold glass and plastic of televisions and computers, they have little contact with and thus little appreciation for the natural world. "They don't have the opportunity to raise a baby bird or baby squirrel or really even take the time to watch an insect to see what it is actually doing," he said. Our program is an attempt to bring real life to the school so the kids might absorb some of its excitement--something in addition to a picture in a text book or on a computer screen. Those who have visited us and have seen the training in progress have all come away very excited about this new opportunity for Oklahoma kids! One educator who recently visited our facility was so impressed at what we are developing that he cannot wait to schedule the new program at his own facility. He said this is exactly what is needed to get kids excited about math and science, and "your program will blow them away!"



Lead trainer Ryan VanZant and a Peregrine falcon. Both will be traveling to schools across the state in our specially outfitted education van.

As this program evolves, additional material related to environmental conservation as portrayed through bird-related subjects will be made available to teachers in each of the disciplines. The cockatoo putting dollar bills in the plexiglass box introduces the subject of economics and birds, such as \$85 billion overall economic output in 2001 from birding and \$1.4 billion spent on hunting of migratory birds, and \$28.9 billion on broiler chickens, eggs, and turkeys.



Merlin, a Moluccan cockatoo, entertains supporters at a Tulsa-area fund-raiser.

But that is not all. The Sutton Center has been working with the statewide One Net educational teleconferencing system, and via this new tool will be presenting programs to some schools unable to be reached during the year. Some presentations will be interactive, and others will be "observer only." In addition, the Center is in the process of placing Nest Cams (weatherproof cameras) on certain Bald Eagle and Red-tailed Hawk Nests in the state so that students will be able to observe the daily life of these magnificent birds on a continual basis until the nests fledge young or fail. This involves bringing prey and feeding the young, defending the nest from other predators, and parents simply brooding the chicks. People absolutely love this, plus it can be used for behavioral research!

Over the past four years the Center has been presenting special environmental communicators from *National Geographic*, *Discovery*, and *Nature* in person to give illustrated presentations to 7,000-10,000 northeastern Oklahoma school kids (geographic limits due to past financial constraints) and adults so that they can see what it is like to

be an outdoor photographer/cinematographer. These speakers have shared their work with the kids and allowed the latter to ask questions and learn how hard work can be so rewarding. For 2006, the Center has invited as a speaker, *National Geographic* photographer, Annie Griffiths Belt, who provided all the magnificent photographs illustrating Barbara Kingsolver's recent coffee table book, *Last Stand, America's Virgin Lands*. In addition, this year for the second season and with help from The F&M Bank in Tulsa, the Center will be offering \$14,000 in scholarships for young environmental communicators.

BUGS OF BIOBLITZ

by Sandy Dengler

I've been catching bugs since childhood.

You sniff. "Isn't it time you got a life?"

Au contraire. It's a rewarding life. Each year I apply my interest in bugs to BioBlitz, counting terrestrial invertebrates such as insects, spiders, centipedes etc.

Briefly, two populations show up at BioBlitz, the scientists who make it happen and the casual visitors who hear about it. The object is two-fold—to help the visitors appreciate the natural world around them, and to come up with a fast-and-dirty inventory of local species.

Scientists who deal with plants and most animals go out, catch stuff, and bring back some of it to show the visitors. Terrestrial invertebrates don't work like that. There are far too many to find in 24 hours. Certainly we workers catch some insects, especially at the start. But the main thrust of capture-and-identify falls on the visitors themselves. We hand visitors jars and insect nets with the request to grab everything they can. They bring it all in, we record it, and they release their finds back into the wild.

Sheer numbers matter because animals species are unevenly distributed. In any area live one or two abundant species, a few common ones, and a whole lot of uncommon ones. This is especially true of invertebrates. We sift through huge volumes of insects and spiders, etc. to find the one-of-a-kind specimens. For example, most butterflies will be of one sort—hackberry emperors, perhaps—with a few swallowtails and gulf fritillaries (splendid beauties with metallic-silver blotches on the underside). And in that vast lot will occur single specimens of another two dozen species. The more you catch, the higher the number of species, the more reliable the inventory, the better our estimate of diversity.

But the fun is engaging the visitors. Watch an eight-year-old with a net sneak up on a grasshopper. He stalks, on tiptoe, then swings wildly. In triumph, he returns with the prize. Sure, grasshoppers are abundant. But there are often a dozen species in a given meadow, and the only way to find all dozen is to send out lots of catchers. Kids are very good at grasshoppers.

A pair of girlfriends age fifteen or so will be yakking their way across an open field. They're socializing, not hunting, right? Wrong. Suddenly they're flailing their nets wildly, and usually, they are successful.

Most rewarding is watching parents go out with their kids. Few indeed are the activities of substance in which the whole family working together can make a true difference. This is one.

Tis said that the best educational experience is hands-on. It is certainly true of the invertebrates at BioBlitz. Adults and kids return glowing. They found things; they caught things; best of all they contributed significantly to a scientific cause. They will never again look at a bee or a praying mantis in the same way. And if the kids are really lucky, they'll spend the rest of their lives catching bugs.

BIOBLITZ 2005 RESULTS

By Ian Butler

One thousand and ninety-four. That's the grand tally of species volunteers found at BioBlitz 2005.

We held our fifth annual BioBlitz September 9-10, 2005, at Tulsa's Mohawk Park. Our hosts, Oxley Nature Center and the Tulsa Zoo, did an excellent job facilitating the crowd of 200 participants who descended on Mohawk Park.

Many thanks to all who turned out for a warm and sunny weekend. We also want to thank the Oklahoma Master Naturalists and Valeri Bodkin for doing the grill work on Friday night. We hope you had a good time, and we look forward to seeing you next year.

We are adding the species tallied this year to our database as we receive more information on taxa found. These data will be published on our web site later this fall.

It's not too early to note that BioBlitz 2006 will be held at Quartz Mountain State Park in southwest Oklahoma, September 15-16.

BioBlitz 2005 Results:

Herps - 24 (16 reptiles/8 amphibians)
 Fish - 15
 Mammals - 19
 Bivalves - 6
 Fungi - 61
 Birds - 89
 Aquatic Inverts - 54
 Plants - 362
 Algae - 40
 Terrestrial Inverts - 424
A total of 1,094 species!

Participating groups at BioBlitz included:

University of Oklahoma, Spring Creek Elementary Earth Club, Northeastern State University, Liberty Academy, University of Central Oklahoma, Three Forks Nature Center, Southwestern Oklahoma State University, Lake Thunderbird State Park, Oklahoma State University, Tulsa Herpetology Club, University of Tulsa, Oklahoma Ornithological Society, Oral Roberts University, Tulsa Audobon Society, University of Science & Arts of Oklahoma, Oklahoma Master Naturalists, Southern Nazarene University, Oxley Nature Center, Oklahoma City Community College, Tulsa Zoo & Living Museum, Tulsa Community College, Oklahoma City Zoo, Hillsdale Freewill Baptist College, Oklahoma Department of Wildlife Conservation, University of Jaen (Spain), U.S. Fish & Wildlife Service, McLoud High School, Oklahoma Conservation Commission, and Riverfield Country Day School

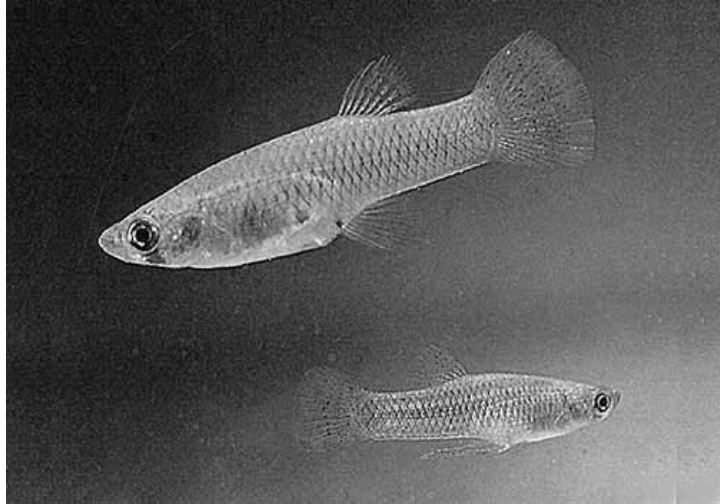
If your group is missing from our list, please e-mail Ian Butler, BioBlitz Coordinator, at ian_b@ou.edu.

Graduate Student Research: Molecular Response Mechanisms of the Mosquitofish

by Paulette Reneau

At least one fish species usually can be found in the drying waterways of Oklahoma. *Gambusia affinis*, commonly known as mosquitofish, reign supreme among the few fishes that are able to survive in habitats that have little water, no flow, low dissolved oxygen, various pollutants and high thermal instability.

Gambusia affinis belong to the family of fishes known as the Poeciliidae which are distinguished from other groups by their ability to bear live young. They are small, surface-dwelling fishes that are ubiquitous members of aquatic ecosystems throughout much of the continental United States. Introduced into many rivers and streams around the U.S. as a biological control agent for mosquitoes, mosquitofish sometimes can take on an invasive role, having negative impacts on native fish. Living in highly variable lentic environments distinguished by seasonally changing water levels, mosquitofish have proven to be excellent colonizers, thriving in environments lethal for many other fishes.



The mosquito fish (*Gambusia affinis*). Photo by Bob McDowall.

What makes the mosquitofish such a champion among fishes? How is this organism able to exist in environments with temperature regimes that are stochastic and extreme? My research seeks to unravel the molecular response mechanism behind the ability to inhabit these environments. I am contrasting expression patterns of stress-related genes within populations subject to extreme environments versus populations from constant spring habitats. One of these genes codes for heat shock proteins (Hsps). Continued elevated expression of Hsps would suggest a chronic stress response, while a reduced Hsp expression would suggest that populations have adapted to the thermal regime. Increasing attention has been paid to the role that abiotic environmental stresses may play in defining the limits of adaptation – exerting a selection for stress tolerance or avoidance. When an organism is faced with stress there are many responses that can be elicited. Often times an immediate response would be behavioral, i.e. move away from the environment that is causing the stress. However, as the intensity and the duration of the stress increases, a longer time scale will allow for genetic modifications to better adapt to a stressful environment.

Due to the physical characteristics of water, the aquatic environment can be extremely stressful to its inhabitants. The high specific heat and thermal conductivity of water ensure that the majority of aquatic organisms will have body temperatures equivalent to that of their surroundings. This overall state also engenders hypoxia and osmoregulatory difficulties as dissolved oxygen concentration decreases and aquatic environments shrink, increasing salt concentrations. Mosquitofish living in high thermal environments may have adapted to their surroundings to avoid overheating and certain death. Since changes in temperature can affect activities of proteins within the fish as well as cellular functions, a response must exist that will help to alleviate or cope with such a stress. One such response involves the synthesis of Hsps that help to protect cellular proteins from denaturation. By measuring Hsp levels in different populations, I can use this information to determine if populations of mosquitofish adapt to chronic thermal stress by varying Hsp expression.

By utilizing mosquito fish as a model to study how organisms are able to genetically adapt to their environment, I hope to shed light on the evolutionary adaptations that shape the success of many invasive species. Additionally, with the growing impact of human activities on natural environments, I hope to define how environmental stress may impact evolutionary and ecological processes that affect and shape the genetic structure of and evolution of populations.

Paulette Reneau is currently a Ph.D. student in Zoology under the direction of Dr. Richard Broughton.



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Biodiversity: **Desert Shrew** **(*Notiosorex crawfordi*)**

By Jeff Kelly

Wood rats, also known as pack rats, have the conspicuous habit of collecting twigs, leaves and other assorted objects to build nests. These nests, or middens, occur throughout Oklahoma where four species of wood rats are native. Such middens have been the focus of intense ecological and evolutionary study because they harbor information about past climates and species occurrences. Despite their fascinating biology, occasionally a wood rat will build a nest in a place that is inconvenient for people, perhaps in someone's house. Even ardent naturalists can find these uninvited guests a bit vexing. It might, therefore, be comforting to realize that wood rats can also find themselves playing host to freeloaders.

When looking for a desert shrew (*Notiosorex crawfordi*) the best place to start searching is in middens of wood rats. Although this species is most abundant in the arid southwestern United States and in Northern Mexico, it occurs throughout western Oklahoma and ranges east across the southern half of the state into southwestern Arkansas. This shrew may look similar to its close relatives and eat a similar diet of insects, but it has a number of life history traits that make it unusual among shrews. For starters this species typically does not construct its own runways and tunnels. Rather, it builds a nest within the midden of a wood rat. It is unclear exactly what advantage the shrew gains through cohabitation. Nor is it clear if the wood rat objects to this arrangement. One thing that is clear is that if one wood rat houses a desert shrew, so does its neighbors. Researchers report that when you locate one desert shrew in a midden there are likely to be others in nearby middens.

Because capturing them is not easy, we don't know as much as we'd like about desert shrews. Much of what is known about their distribution comes from their predators. Desert shrews appear in the diets of numerous owls. Analysis of the pellets that these owls regurgitate yields bones of prey that can be identified to species. Some might think that this is a fitting way for a freeloading shrew to meet its end, but the wood rat might rather have somebody else around to feed the owls.



The desert shrew. Photo by Ray Matlack.