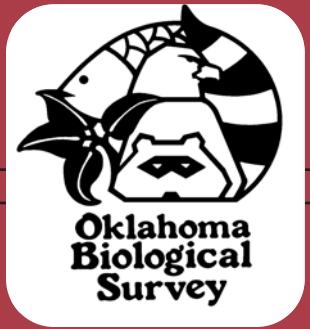


# Biosurvey News



The Newsletter of the Oklahoma Biological Survey  
Spring 2013

## Biodiversity: The Federally Endangered Harperella

Oklahoma's first and only federally listed endangered vascular plant recently was discovered in southeastern Oklahoma.

An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. Oklahoma does have two plants (the prairie white fringed orchid and the Great Plains white fringed orchid) listed as threatened, or likely to become endangered, but these are considered extirpated from the state. *Harperella* (*Harperella nodosa*; Apiaceae) was listed by the U.S. Fish and Wildlife Service in 1988. Only 45 occurrences in 24 watersheds are known, with the largest concentration of populations found along the Maryland/West Virginia border and in Arkansas. Around 25 percent of known occurrences have not been seen in 20 years.

*Harperella* is an aquatic, primarily annual herb. The inflorescence is an umbel of small white flowers quite similar to other members of the carrot family. The most distinguishing character of the plant is its unusual leaf form. Leaves are reduced to a hollow, septate central stalk, or "rachis leaf"—an adaptation to a semi-aquatic habitat. *Harperella* blooms from May through October. Population sizes may vary dramatically from year to year in response to water levels. The Oklahoma population was found along a river in the



*Harperella* in flower. Photo by Amy Buthod.

southeastern part of the state and included two stands of approximately 500 plants.



*Harperella* habitat. Photo by Amy Buthod.

*Harperella* populations face many threats. The plant is vulnerable to fluctuating water levels from dredging, dam and reservoir construction and wetland draining. It can be affected by reductions in water quality from pollution, algae and erosion and siltation from logging and road construction. Invasive plants also may be an issue. Specific threats to the Oklahoma population include increased siltation from timber harvesting, run-off from ranching and poultry farming, the possibility of out-of-state water transfers and recreational activity. The region has experienced drought conditions since 2010 as well, and these could eventually affect river flow.

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# OBS Welcomes New Faculty Member

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Dr. Lara Souza recently joined the Oklahoma Biological Survey and the Department of Microbiology and Plant Biology as a plant ecologist with the aim to investigate the role of global change, including climate change and biological invasions, on the structure and function of tallgrass prairie ecosystems. Dr. Souza joins us from the University of Tennessee and Oak Ridge National Laboratory where she addressed the role of biological invasions and climate change in shaping community structure and ecosystem function in both old fields and eastern temperate forests.

Here in Oklahoma, Dr. Souza will take advantage of the natural precipitation (ranging from 400 mm to 1200 mm) and vegetation gradients (from tallgrass to mixed-grass to short steppe) to establish field experiments where climate and vegetation will be simultaneously manipulated to determine how plant species interactions will mediate climatic change effects on ecosystem structure and function.

When Dr. Souza can't be found in her office analyzing plant community data or in the field establishing experiments and measuring plant responses, she enjoys hiking, riding her bike and traveling with her husband, William Farrell, and daughter Mila Farrell. In fact, Dr. Souza and her family have been exploring the incredible biodiversity/vegetation gradients in Oklahoma on the weekends, ranging from mixed-grass prairie at the Wichita Mountains National Wildlife Refuge to short-grass prairie at Black Mesa in the west and tallgrass prairie at the Tallgrass Prairie Preserve in the north. Next on the list will be a trip to southeastern Oklahoma to visit the beautiful Ouachita National Forest area.



Dr. Lara Souza. Photo courtesy of Lara Souza.

## ***The Federally Endangered Harperella (continued from page 1)***

According to Oklahoma Natural Heritage Inventory Coordinator Bruce Hoagland, global threats to the persistence of rare plant species increase every day. "At a time when rare species are in decline, the discovery of new populations enhances the possibility of successful conservation. Thus is the significance of finding a population of harperella in Oklahoma; it provides both hope for the persistence of this species and emphasizes the need for continued botanical exploration of our state," he said.

Continued monitoring of this newly discovered population will be necessary in the coming years. It is likely that other harperella populations exist in the state, and more extensive botanical inventory work on other eastern Oklahoma rivers and streams will be conducted to search for Oklahoma's only endangered plant species.

# Something's Fishy in the Tree of Life

Fishes account for over half of vertebrate species, and all vertebrates evolved from fishes. But while major groups of vertebrates such as mammals, birds and reptiles have been fairly well understood by scientists for decades, knowledge about relationships among many types of fishes was essentially unknown—until now.

A team of scientists led by Oklahoma Biological Survey Associate Professor Richard Broughton recently published two studies in the April edition of the open access journal PLOS Currents—Tree of Life ([currents.plos.org/treeoflife/](http://currents.plos.org/treeoflife/)) that have dramatically increased our understanding of fish evolution and their relationships. These papers create a new "tree of life," or phylogeny, for fishes. The studies, which integrated vast amounts of genetic and physical information about specimens, are the largest and most comprehensive studies of fish phylogeny to date. Broughton notes, "This is the largest phylogenetic analysis ever conducted on any vertebrate group in terms of the number of species examined and the number of genes analyzed, and the results yield what may be the broadest revision of fish systematics in history."

While some of the findings provided new support for previously understood relationships, others significantly changed existing ideas about fish. Many surprising, unexpected and even strange groupings are proposed in this new tree. For example, the large, streamlined, fast-swimming tunas and marlins are not closely related. Tunas appear to be more closely related to the sedentary seahorses and marlins are close relatives of flatfishes, which are bottom-dwelling and have distinctive asymmetric heads.

Beyond a better understanding of fishes themselves, the potential implications of this research are wide-reaching, said Edward Wiley, curator of ichthyology at the University of Kansas. "Our knowledge about one group can be extended to closely related species, if we understand those relationships," Wiley said. He noted that knowledge of evolutionary relationships among fishes improves scientists' ability to predict how closely related species might react to such environmental factors as climate change. It helps identify and target potential biomedically beneficial substances, and has broader applications related to exploring disease-causing genes and developmental variables shared with humans.

The fish tree is the result of years of work among a collaborative team of scientists as part of the National Science Foundation-funded Euteleost Tree of Life project. Besides Broughton, researchers at the Biological Survey involved in the project include Senior Application Support Programmer Dan Hough and graduate students James Cureton, Feifei Zhang and Paulette Reneau.

**-Rich Broughton**

## **Congratulations!**

At the recent Freshwater Mollusk Conservation Society meeting, OBS Director Caryn Vaughn was awarded the Lifetime Achievement Award for "singular accomplishments and long-term contributions that have advanced the conservation and science of freshwater mollusks at a national and international level". This is the highest honor given by the Society.

Dr. Liz Bergey is the inaugural recipient of the Nancy L. Mergler Mentor award from the University of Oklahoma Joe C. and Carole Kerr McClendon Honors College, which is presented to an individual for excellence in mentoring undergraduates in research. Bergey was nominated by the students working with her.



# OBS Welcomes New Faculty Member: Eli Bridge

I officially joined the Oklahoma Biological Survey just a few months ago, but it already feels very much like home. Part of the reason is that I was a post-doc at the Survey for several years before I became an assistant professor. Also, I grew up among the ponds and pastures of Oklahoma, so the state is sort of a big backyard to me. I've very much settled here with a hobby farm just south of Norman, where I live with my wife, two kids and an indeterminate number of cats, dogs, turkeys and chickens.



Dr. Eli Bridge. Photo courtesy of Eli Bridge.

My research involves using tiny electronic devices called geolocators (or geologgers) to track small migratory birds. These devices are an important breakthrough in my field because up until now we have had no way of following the movements of small birds over long distances. Satellite tags and cellular tags are much too large for most songbirds, and traditional radio tags don't transmit very far or for very long. I originally became interested in geologgers when some colleagues and I wanted to track Painted Buntings (Oklahoma's most colorful bird), which weigh about 15 grams. To do this, we needed a geologger that weighed considerably less than 1 gram (i.e., less than the weight of a raisin). The devices available for purchase at the time were too large, so I decided to make my own. A year or so later we had used the world's smallest tracking device to map the migration route of the smallest bird ever tracked.

My current projects involve continued tracking of Painted Buntings, with plans this year to expand our efforts throughout the species range to see how different regional populations negotiate potential migration barriers (such as the Gulf of Mexico) and where they pause during migration to molt their feathers. We are also beginning a statewide study of grassland birds that will forecast population-level responses to anticipated expansion of biofuel crops in Oklahoma and make management recommendations to help ensure that grassland birds remain part of our dynamic landscape. Lastly, I am still engaged in designing and testing new geologgers. My colleagues and I are trying to make ever smaller devices that minimize the impact of the tag on birds we track, and we want to substantially reduce the current price of these devices (currently more than \$100 per tag) so that tracking studies can become more widespread.

## NEW ON THE WEB

Now hosting sites for Color Oklahoma and the Oklahoma Academy of Science

Oklahoma Odonata checklist now available

[www.biosurvey.ou.edu](http://www.biosurvey.ou.edu)



Photos From the Field: *Dodecatheon meadia* (shooting star) from The Nature Conservancy's Pontotoc Ridge. Photo by Amy Buthod.

# BioBlitz! 2012 at Foss Reservoir

BioBlitz! 2012 was record setting—the coldest BioBlitz! held in Oklahoma. Nonetheless, 292 expert and citizen biologists converged at Foss Reservoir to inventory the biological diversity during this chilly, windy October weekend. With lows in the 30s and gray skies, the animals were reluctant to come out of hiding. The counts of mammals, terrestrial invertebrates and birds all suffered. And, two years of drought affected the count of plants, fungi and lichens. Despite the cold and drought, participants found 866 species during the inventory of Foss State Park and the Washita National Wildlife Refuge. These tough attendees found tarantulas, Osprey, prairie dogs, pin-cushion cactus, red shiners and 861 more species during our 24-hour count. Those who braved the chilly conditions for a second night were treated to a free showing of the documentary "Where Did the Horny Toad Go?" Oklahoma native Stephanie Leland produced and directed this quirky and educational movie about the decline in Texas horned lizards across their range. We were lucky to have Ms. Leland in attendance, who chatted with attendees before and after the movie.

BioBlitz! Oklahoma 2013 takes us back to south-central Oklahoma—Camp Simpson Boy Scout Camp in Johnston County. Sitting in the heart of the oldest mountain range in the United States, Camp Simpson covers 2,200 acres of oak, hickory, elm and juniper woodlands in the cross timbers ecoregion. The camp is located approximately 30 miles northeast of Tishomingo. The property includes steep granite cliffs, lichen-covered limestone outcrops and a 120-acre lake on Delaware Creek, a spring-fed stream that flows through the camp.



Dr. Katrina Menard tallies the terrestrial invertebrates. Photo by Sheila Strawn.

On the banks of Delaware Creek, you will find growing this year's highlighted species. The seaside alder (*Alnus maritima*) is a state rare plant that grows in Oklahoma only in the Clear Boggy Creek and Blue River watersheds of south-central Oklahoma. But what makes this tree extra special is the location of the nearest populations of seaside alder—the Mid-Atlantic coast and a swamp in Georgia. The seaside alder has not been found any other place in between.



Bruce Hoagland leads a botany walk. Photo by Sheila Strawn.

Scouts and school groups already have begun to inventory the camp, creating a vertebrate checklist that includes more than 65 birds, 38 reptiles and amphibians, 14 mammals and 19 fish. We are looking forward to adding to their lists.

The inventory will begin at 4 p.m. on Friday, Oct. 11 and end at 4 p.m. on Saturday, Oct. 12, but the fun doesn't end there! Plan to stay another night and enjoy the camp after the biodiversity rush. Additional activities will be planned for Saturday evening.

Registration is online only and will open in the spring of 2013. The cost will be \$8 for students and \$15 for non-students. Registration fees will include two nights of tent camping, an event T-shirt, a Friday night meal, a Saturday light breakfast, a full schedule of activities during the inventory and 24 hours of biodiversity!

**-Priscilla Crawford**

# Oklahoma's BioBlitz! Origins: Ian Butler

Biodiversity. The term conjures images of pristine rainforests in Brazil, dripping jungles in southeast Asia or the coastal forests of California. I suspect you didn't automatically think of Mohawk Park in Tulsa. Yet, during a 24-hour BioBlitz! inventory, biologists who seined the waters and climbed the hills found 1,094 species within this modestly sized park.

BioBlitz! was an event dreamed up by Smithsonian biologists to survey an urban park in Washington, D.C., to call attention to the diversity found all around us—found in our "backyard." Thirteen years ago, Ian Butler, the Oklahoma Natural Heritage Inventory's data specialist and network coordinator, brought this concept to Oklahoma with our first BioBlitz! event. Butler had no idea if this concept would work. Would people come? Would we find more than a dozen species? In May 2001, the Sutton Urban Wilderness, a 160-acre urban park in northeast Norman, was combed and scoured by more than 30 biologists who found 485 species in 24 hours. Success!

In initiating BioBlitz!, Butler was looking for a way to highlight the Oklahoma Biological Survey's work, to make it interesting to the public and to show Oklahomans the biological diversity found in our state. Butler had heard about these blitzes happening in other states and thought we could probably pull off an event here. "BioBlitz! is a perfect vehicle for getting out the message of the importance of biodiversity without having to go to the Amazon," Butler said. The biologists at OBS quietly go about their research on the state's flora and fauna, writing technical reports and publishing articles in journals for experts, but Butler felt that the citizens of Oklahoma didn't really know what we were doing.

"The state's flora has always interested me," Butler explained. "And I thought we have nothing to be ashamed about." He lamented that many people in Oklahoma head to the tropics or mountains to see diversity. But BioBlitz! is a way to demonstrate that you don't have to travel to Colorado to see beautiful flowers or a variety of wildlife. "It's staggering that in a 24-hour period you can come up with a thousand species," declared Butler.

Butler organized the annual BioBlitz! event for seven years, taking it to the four corners of the state and a few spots in between. State parks, wildlife refuges and wildlife management areas have all embraced the event and hosted a number of blitzes over the years. "The concept of BioBlitz! is easy to understand," Butler said. "It's up there with apple pie and mother...it's celebrating something local."

At BioBlitz! 2005 at Boiling Springs State Park, Butler recalls the weekend starting off as a typical hot and dusty western Oklahoma September afternoon, but a cool front came through overnight and the weather turned delightful. Butler said: "There were children running around excitedly, waving butterfly nets—waving with abandon. Not being effective, but they were having the time of their lives." Butler divulged that the inventory really isn't that important. Showing people the diversity that could be found in a typical state park was the greater goal. "It was always fun to see people who were just amazed at the different things that could be found," Ian remarked. "Those were the best bits."

"I didn't really care if we came up with a rare species," Butler revealed. "That wasn't the point. The inventory was just a device to get people out and appreciating Oklahoma's natural diversity."

**-Priscilla Crawford**

*Ian Butler is the long time data manager and network specialist for the Oklahoma Natural Heritage Inventory at the Oklahoma Biological Survey. In addition to introducing BioBlitz! to Oklahoma, he also is the originator of the Biosurvey News. He retired in April after 25 years of service.*

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Amy K. Buthod  
and Caryn C.  
Vaughn,  
editors

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# Status of the Lesser Prairie Chicken

The plight continues, and who knows if expected legislation will alleviate or exacerbate the problem. I speak of the Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*), a nonmigratory grouse endemic to the south-central United States. Its entire world population, which numbers between 10,000 and 30,000 individuals, is confined to five states: Colorado, New Mexico, Kansas, Oklahoma and Texas. Despite a great deal of charisma—I have not met anyone who does not thrill in seeing males dance on their springtime leks in hopes of being the lucky one chosen to mate—this species' rather narrow habitat needs within the shortgrass prairie biome have doomed it to scarcity as humans developed the plains. In the past century, the species' population size and geographic range have shrunk by over 90 percent, with the decline especially sharp in western Oklahoma and the Texas panhandle. Worse, the contiguous population stretching across the Oklahoma panhandle to eastern New Mexico is no more—the endpoints are now separated by at least tens and often hundreds of kilometers, with many intervening subpopulations having disappeared only since the early 1960s. And even where suitable shortgrass prairie remains, our research has shown that the Lesser Prairie-Chicken, a low, fast flier, is prone to often-fatal fence collisions and avoids areas where tall structures have been erected.

Rangewide population declines, associated genetic loss and ongoing threats of further reduction of both populations and habitat area almost certainly will mean protection under the federal Endangered Species Act. For many years the Lesser Prairie-Chicken has been a candidate for listing; however, its listing priority was upgraded by the USFWS in 2008: “Based on our most recent assessment, we find that ongoing threats to the Lesser Prairie-Chicken have increased in terms of the amount of habitat involved and that the overall magnitude of threats to the Lesser Prairie-Chicken throughout its range is high because the threats put the viability of the lesser prairie chicken at substantial risk.” All signs point toward the species receiving ESA protection before year’s end.

What will protection of the Lesser Prairie-Chicken mean for landowners and other stakeholders? The ESA does not grant any special authority for the government to seize land or control land use. A listing will mean that the species cannot be killed or harmed, but such restrictions already are in place in Oklahoma and three of the four



The Lesser Prairie Chicken. Photo by Gary Kramer (USDA NRCS).

other states that harbor the Lesser Prairie-Chicken (a hunting season remains in effect in Kansas, which supports at least half of the world population). A listing would mean that development of occupied habitat would require an ESA exemption and the developer likely will need to mitigate any habitat loss. Finally, listing will mean that certain portions of the species’ range will be declared as “critical habitat,” and exempted from further development. When designating critical habitat, the USFWS makes every effort to designate lands already held by the public, which would likely include occupied federal lands in the Comanche and Cimarron National Grasslands in Colorado and Kansas, respectively, as well as those managed by the Bureau of Land Management in eastern New Mexico, and could include state-owned wildlife management areas.

An increased draw for ecotourism could be a boon to economically depressed areas in the Lesser Prairie-Chicken's geographic range. For example, one need only look at the revenue birders bring into communities in northern Michigan where the Kirtland's Warbler breeds or in central Texas where the Golden-cheeked Warbler breeds—two species listed under the ESA—to see the kind of economic benefit a listing may bring. Birders and other nature enthusiasts will pay good money to see prairie-chickens dance. Moreover, habitat set aside to ensure the future health of prairie-chicken populations will protect many other species that an increasingly aware public would like to see, to say nothing of ensuring that ecosystem continue to function in ways that ensure environmental health that helps all species, us included.

**-Michael Patten**