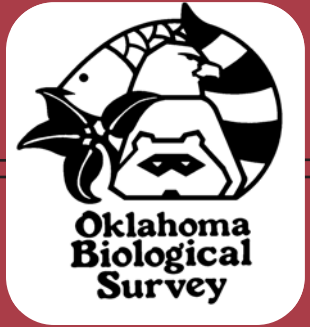


Biosurvey News



The Newsletter of the Oklahoma Biological Survey
Spring 2011

Unlocking the Woods

What is the value of a wild place – a place where you can watch red-shouldered hawks nesting in a tall cottonwood; find cottontail rabbits dashing off in the underbrush; encounter striped skunks trundling along their paths, or see coyotes, raccoons, armadillos and barred owls leading their normal lives?

What is the value of woodland where you can observe green ash, elm, hackberry, willow and cottonwood playing their roles in forest establishment and succession?

What is the value of a place with a mosaic of forest soils developed across an old river flood plain, an ancient sand dune, upland Permian red clays, steep south-facing slopes and intermittently flooded dry washes?

The Oklahoma Biological Survey manages a little-known 70-acre tract of woodland, the Oliver Wildlife Preserve, on the south side of the OU campus. Oliver's Woods has been used for half a century as a sanctuary for wildlife, a natural teaching laboratory and for many research projects and student theses resulting in dozens of peer-reviewed publications.

Recently, use of the Woods has been growing. I have developed 2.5 miles of new or rebuilt trails crisscrossing the Woods connecting different areas. Scientists from the Biological Survey, Botany/Microbiology, Geology, Geography, Engineering and Zoology have walked the trails and added their observations and knowledge. Oliver's Woods is a place where the various questions, skills and knowledge of many observers can be brought together on the doorstep of the university. It is a place to observe natural history and feed curiosity. Natural history knowledge is a foundation element of almost all good ecological studies of lasting value.

As a forest entomologist, I have been interested in recording the presence and abundance of beetle species in the Woods. Wood-boring beetles (beetles belonging to the families Cerambycidae, Scolytinae, Buprestidae, Bostrichidae and others), in particular, attract my interest. Oliver's Woods represents an unusual opportunity because the forest there is in transition from an open canopy grazed area to a closed canopy forest of young 40 to 50-year-old trees. Large-diameter individuals from the previous open stands are becoming senescent and breaking down. They fall or drop large branches among the younger forest trees, producing an abundance of broken slash that these beetles require for breeding. Studies of these beetles in the past have been difficult because the normally scarce and scattered food resource supports only limited low-density populations.



Ken Hobson monitors a beetle trap in Oliver's Woods. Photo by Sarah Hobson.

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Biosurvey News
Spring 2011

Amy K. Buthod and
Caryn C. Vaughn,
editors

Biosurvey News is published twice each year and reports on activities, programs and news related to the Oklahoma Biological Survey. We welcome readers' comments and suggestions.

The Oklahoma Biological Survey is proud to be a unit in the College of Arts and Sciences at the University of Oklahoma.

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Survey Research Highlighted in *Nature*

A paper published in the journal *Ecology* by PhD student Daniel Allen and OBS Director Dr. Caryn Vaughn was a featured research highlight in the January 27 issue of *Nature*. Several decades of research have shown that biodiversity affects trophic ecosystem processes like biomass production and resource acquisition. However, studies investigating if biodiversity can influence non-trophic ecosystem processes, such as the physical creation and modification of habitat, are lacking. Allen and Vaughn hypothesized that freshwater mussel biodiversity might influence the erosion of riverbed sediments because mussel species differ in burrowing behaviors and shell morphologies that may influence turbulence patterns at the sediment water interface. They conducted experiments in artificial streams that demonstrated that an increase in mussel species richness is associated with increased sediment erosion. Further, these effects were additive at low densities, but non-additive at high densities, indicating that organism abundance fundamentally alters the relationship between biodiversity and erosion. This research demonstrates that biodiversity can influence physical processes in ecosystems, and that changes in abundance also may influence this relationship.

Unlocking the Woods (continued from page 1)

The Scolytinae, Buprestidae and Cerambycidae include many species of particular interest because of their destructive power. One example is an exotic buprestid, the emerald ash borer (*Agrilus planipennis*), discovered in Michigan in 2002. This beetle has spread steadily southward and eastward, killing scores of millions of ash trees in 13 states from Michigan to Missouri, with 99 percent mortality of infested ash stands. Green ash (*Fraxinus pennsylvanica*) is the dominant species of Oliver's Woods. I expect essentially all of the green ash there to be killed in the next five to 20 years, depending on when the beetle arrives. Throughout Oklahoma, green ash-dominated ecological communities will be transformed. It is unclear what species will dominate the new forest communities.

By returning to one place repeatedly over a long term and by developing a sense of that place, it is possible to see what is important ecologically: what questions, what processes. From a long-term familiarity with the natural history of a place, we will have our best tools for managing the changes that will come to similar habitats.

-Ken Hobson

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<http://www.facebook.com/pages/Norman-OK/Oklahoma-Biological-Survey/161597383891344>



Photographing Plants for Identification



Fruits can aid in identification. *Parmentiera cereifera* photo by Amy Buthod.



Bark can be a distinguishing characteristic. *Zanthoxylum clavaherculis* photo by Amy Buthod.

As the botanical specialist at the Oklahoma Biological Survey, I frequently am asked to identify plants from around the state. More often than not, I am asked to make the identification from a digital photograph rather than from a live specimen. While it certainly is possible to correctly determine the identification of a plant from a photo, it often is difficult. Non-botanists simply don't realize what sorts of photos we need to make a determination.

The first issue is photo quality. Submit the highest quality photo your camera can produce. When determining an identification, it often is necessary to zoom in on certain small features, and a high-resolution photograph allows for this. Also, make sure the photo is focused properly and not blurry. Only use sharp photos. Different shots of the same plant are crucial as well. The most frequently encountered photos are close-ups of flowers or landscape shots where the plant is only visible at a distance. While both of these are helpful, a few other shots can make the identification process easier and more accurate. Include shots of the vegetative (non-reproductive) parts of the plant, especially the leaves. A shot of the plant's habit, or how it is growing, is helpful. Fruits, if present, also often are used in identification. In addition to the photos, you also should collect some basic information, including the date the photos were taken, the location and the type of habitat in which the plant was found.



Leaves are important for plant identification. *Oxalis* photo by Amy Buthod.

In addition to consulting your local botanist, many other resources are available to help you determine plant identifications. Your cooperative extension service may be able to provide some assistance, particularly in regard to garden and lawn weeds. Interested amateur botanists (and their unknown plants) are welcome statewide at meetings of the Oklahoma Native Plant Society (<http://www.usao.edu/~onps/>). County species lists are available through the Oklahoma Vascular Plants Database (<http://www.oklahomaplantdatabase.org/>). Finally, a listserv for those interested in Oklahoma plants has been established. To sign up for the listserv, send a message to LISTSERV@LISTS.OU.EDU with the command SUBSCRIBE OKPLANTS-L YOUR NAME, replacing "YOUR NAME" with your first and last name (for instance, subscribe OKPLANTS-L Amy Buthod). Once you have subscribed, you can post your unknown photos and get some input from others interested in Oklahoma's plants.

-Amy Buthod

New on the Web

Updated personnel pages
Updated publications pages
Updated rare plant tracking list
New link to Sutton Center's live eagle nest camera

www.biosurvey.ou.edu



Graduate Student Research: The Impact of Urbanization on the Ornate Box Turtle (*Terrapene ornata*)

As a child, I spent hours each day scouring the nearby woods for any wildlife that could be spotted. Several times, especially after a light rainfall, I would encounter box turtles searching for fresh earthworms or low-lying blackberries. Unfortunately, today's children are unable to find box turtles with such ease because they have experienced a range-wide decline due to increasing human collection (the pet trade) and urban development.

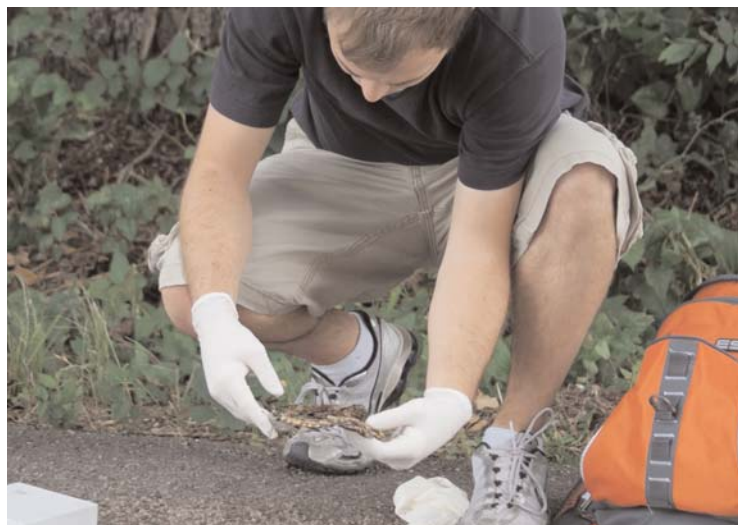
Although human collection has a strong impact on the persistence of box turtles, continued urban development and subsequent habitat loss are likely the primary forces driving box turtle decline. To develop effective conservation plans targeted at box turtles, it is important to understand how anthropogenic structures, such as roads and highways, alter genetic diversity, movement patterns and habitat utilization.

For my master's thesis at Sam Houston State University, I investigated the impact of urbanization on genetic diversity and gene flow in ornate box turtles (*Terrapene ornata*). I used microsatellites (repeating base pairs of DNA), to survey the genetic diversity in a natural and urban population of *T. ornata*. I also estimated gene flow across a busy four-lane highway in north Texas. I found high genetic diversity in the urban population and attributed it to a remnant of the pre-fragmentation population (due to their 30+ year lifespan). I also found that gene flow between sub-populations on opposing sides of a large highway was significantly reduced, with only zero to one migrants successfully crossing the road and contributing to the gene pool each generation.



Terrapene ornata, the ornate box turtle. Photo by James Cureton.

These results led me to postulate that one of two scenarios will likely result from the observed habitat fragmentation. First, turtles may remain in the habitat fragment in which they are isolated, where they will have limited access to mates, food and habitat. If populations in the fragments are small this will lead to inbreeding and hamper the long-term viability of the sub-population. Small population sizes also could lead to hybridization between *T. ornata* and a co-occurring species of box turtle, *Terrapene carolina* (the three-toed box turtle). The alternative scenario is that turtles may attempt to move to a more prosperous habitat with mates and food resources. If turtles attempt to move between isolated fragments, they face the risk of being struck by an automobile. In 2009 and 2010, I collected 0.54 and 0.72 road-struck *T. ornata* and *T. carolina* per search day, respectively. Such high road-mortality rates suggest that very few box turtles successfully cross the road, a result corroborated by the microsatellite data. I suggest that other similar-sized highways, as well as smaller, busy roads, also prevent free movement of turtles and significantly inflate mortality rates. Because of the longevity and low annual reproductive success (4-20 eggs) of box turtles, increasing mortality rates reduces the long-term viability of populations in fragmented habitats.



Collecting a road-struck turtle. Photo by Aaron Marshall.

Recently, myself, Dr. Jeff Kelly (University of Oklahoma) and Dr. Raelynn Deaton (Sam Houston State University) were awarded a grant from the Fort Worth Zoo's Seeligson Conservation Fund to investigate urban habitat use of *T. carolina* and *T. ornata*. We will use a combination of radio transmitters and stable isotopes to determine if *T. ornata* and *T. carolina* are competing for habitat and food resources in fragmented habitats. Additional future work includes discerning the role of box turtles in ecosystem function and nutrient cycling. Knowing what role box turtles have in the ecosystem will be crucial to gaining government and financial support and ensuring box turtles can be observed in their natural habitat for generations to come.

-James Cureton

BioBlitz! 2010

During our annual rapid inventory of Oklahoma's flora and fauna last October, 320 volunteer BioBlitz! biologists found 954 species at Kaw Lake. Just a few miles east of Ponca City, Kaw Lake and Camp McFadden were the hosts of the ninth annual Oklahoma BioBlitz! Scout groups, environmental clubs, high school and college students and home-school families enjoyed a warm week-end of biological discovery. Near-record attendance ensured there was enough people-power to survey the variety of habitats around Kaw Lake--from the tallgrass prairie fragments to bottom-land forests. Expert biologists led walks and talks for the less-experienced volunteer biologists. New activities this year included trapping carrion beetles, a night-time family hike, butterfly conservation and Bird Bingo. The standard activities--bird walks, insect collecting and snake talks--were as popular as ever.

We are looking forward to our tenth BioBlitz! this year at the Chickasaw National Recreation Area during the weekend of October 14 and 15. More information, including online registration, is available at www.biosurvey.ou.edu. We hope to see you there when we celebrate our tenth anniversary of exploring Oklahoma's biodiversity!
-Priscilla Crawford



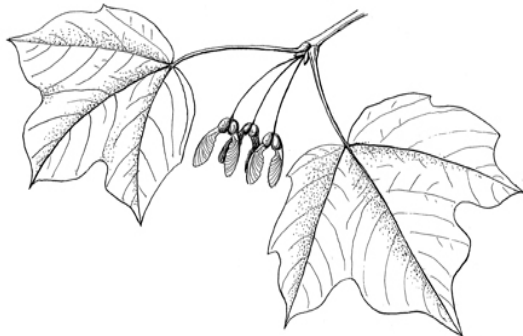
Enjoying the Blitz! Photo by Sheila Strawn.

OBS Director New President of Conservation Society

At the biennial symposium in Louisville, Ky. in April, Director Caryn Vaughn began her two-year term as president of the Freshwater Mollusk Conservation Society (<http://molluskconservation.org/index.html>).



The FMCS is dedicated to the conservation and advocacy of freshwater mollusks, North America's most imperiled animals.



OBS at Capitol GIS Day

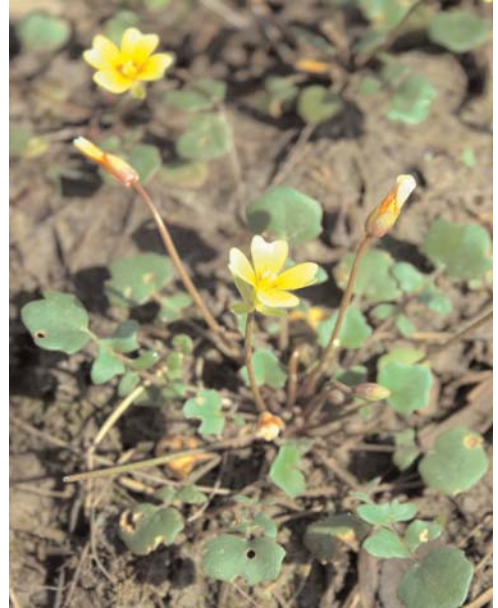
The Oklahoma Biological Survey was represented by two tables at this year's GIS Day at the Capitol, held on March 2. GIS Day at the Capitol is an opportunity for the public and private sectors to showcase the uses of GIS (geographic information systems) in the state of Oklahoma. This year, 51 public and private entities demonstrated to Oklahoma legislators the power of GIS. The event is held in the rotunda of the state Capitol. The Survey was represented by Bruce Hoagland, Dan Hough and Todd Fagin at the OBS table, which highlighted the Oklahoma Natural Heritage Inventory and plans for a new land-cover map for the state that they are developing. In addition, Priscilla Crawford provided information on the Oklahoma Natural Areas Registry Program at an adjacent table. Handouts about the Survey and the programs were available to visitors. Many copies of the current OBS poster, "Life Along a Prairie River", were distributed. The event is an excellent way to get our message out to legislators and a wonderful opportunity to see what others in the Oklahoma GIS community are up to.

-Dan Hough

Biodiversity: Oklahoma Endemics: *Leavenworthia aurea* var. *aurea* (golden gladecress) and *Phlox pilosa* var. *longipilosa* (longhair phlox)

Endemic species are those that are confined exclusively to a particular place or habitat. There are two categories of endemics: neoendemics and paleoendemics. A paleoendemic species is one that once was widespread over a large area but is now restricted to a much smaller range. The ginkgo tree of Eastern Asia is an example of a paleoendemic species. A neoendemic species has arisen recently, frequently as a result of reproductive isolation. In this situation, a population becomes physically divided and both groups diverge genetically over time to a point where they no longer can reproduce with each other. Hybridization, where two different taxa interbreed to create a new species, is another source of neoendemic species. Neoendemics are common on islands, such as the Galápagos, because of their isolation.

Oklahoma's flora includes two endemic taxa, specifically two endemic vascular plant varieties. Golden gladecress (*Leavenworthia aurea* var. *aurea*) is a member of the mustard family (Brassicaceae). This small winter annual is 5-15 cm in height and glabrous with a rosette of pinnatifid leaves. Sepals are purple-tinged and petals are yellow. The fruit is a silique of about 2.5 cm in length. The plant begins flowering in mid-March and continues through April. Golden gladecress is found at 25 sites in Choctaw and McCurtain counties. These sites are relatively flat, and include disturbed roadsides, pastures and creek margins. A single population may include hundreds of individuals. A similar variety, *L. aurea* var. *texana*, only occurs in San Augustine County, Texas, and therefore is endemic to that state. The varieties may be distinguished by petal color (bright yellow in var. *texana*, paler in var. *aurea*) and differences in their apical leaf segments. The two also differ in their number of chromosomes.



Golden gladecress. Photo by Amy Buthod.



Longhair phlox. Photo by Amy Buthod.

Longhair phlox (*Phlox pilosa* var. *longipilosa*) is a highly-branched, erect perennial herb 20-25 cm in height. Leaves are linear toward the base of the plant, but become lanceolate towards the top. The inflorescence is a multi-flowered panicle with pale purple blooms of 10-12 mm in length. The fruit is a capsule of 10-12 mm. Flowering begins in late April and continues through early June. The plant occurs exclusively on soils derived from granitic rock and is associated with mixed grass prairie or live oak or post oak woodlands. It currently is known from 10 to 20 populations in the Quartz and Wichita Mountains of southwestern Oklahoma in the counties of Greer and Kiowa. Plants are locally abundant, with hundreds of plants occurring at a given site.

Endemics naturally are of conservation concern because of their extremely restricted ranges. Both Oklahoma endemics are tracked by the Oklahoma Natural Heritage Inventory. Golden gladecress has a subnational rank of S2, implying that it is imperiled because of rarity due to very restricted range. Longhair phlox is considered rare as well, with a subnational rank of S2.

-Amy Buthod