Biosurvey News

The Newsletter of the Oklahoma Biological Survey
Fall 2008

Survey Biologist Leads International Course

Mexico has long been recognized for its biological diversity. With biomes ranging from deserts to tropical forests, a tremendous number of species dwell within the borders of our neighbor to the south. But there are botanical ties between Oklahoma and Mexico. This point became clear to me during my first visit to the El Cielo Biosphere Reserve in the Sierra Madre Orientale Mountains of southern Tamualipas (the Mexican state on the Gulf Coast that borders Texas). The Sierra Madre hosts a variety of habitats, ranging from tropical sub-deciduous forest to desert. The east side of the Biosphere Reserve receives high amounts of precipitation due to the proximity to the Gulf of Mexico in combination with prevailing winds that lift moisture up the east slope of the Sierra Madre. As a result, cloud forest vegetation occurs at its northernmost extent. Several familiar tree species dwell within these mid-elevation forests—redbud (*Cercis canadensis*), *Carpinus caroliniana*, shagbark hickory (*Carya ovata*), sweetgum (*Liquidamabar styraciflua*) and *Ostrya virginica*. But unlike Oklahoma, these trees are festooned with diverse assemblages of epiphytes.

UAT and OU students with Dr. Hoagland and Dr. Olivo (third and fourth from left). Photo by Amy Buthod.

After several visits to the Biosphere Reserve, I had the pleasure of meeting Jorge Mora of the Instituto de Ecología Aplicada at the Univerdidad Autónoma de Tamaulipas. He and I discussed offering a course in ecological field methods that would involve students from UAT and OU. Before the course came to fruition, Jorge left Tamaulipas for San Luis Potosi. Fortunately, Arturo Mora Olivo of the institute, with whom I share an interest in aquatic plants, eagerly joined with me to offer a course titled "Techniques for the Sampling and Analysis of Vegetation in the Biosphere Reserve El Cielo." The course was designed to highlight the profound environmental gradient present in the Biosphere Reserve.

Early on the morning of April 28, Amy Buthod and I loaded the truck with OU Geography graduate students Melissa Hinten, Scott Schellenberger, Jennifer Shurley and Rick Thomas. We departed for Cuidad Victoria, home of UAT, and the inauguration of the "curso internationale." Our visit to Victoria opened with a forum at UAT, where we met the students who would be our companions for the next three days: Ana María Hernández, Judith Luna, Jacinto Treviño and Elías Orozco. Ing. Julio César Gómez Hernández, director of the Instituto de Ecología Aplicada, opened the forum with a gracious greeting and charge for the course. He sincerely wished that this would be the first of many collobarations between UAT and OU.


OU Geography students with Dr. Hoagland and a very old cactus specimen. Photo by Amy Buthod.

The staff of the institute presented talks on an array of topics; Dr. José G. Martínez on ecology and conservation of cacti in the genus *Ariocarpus*; Arturo Mora on the vegetation and flora of El Cielo; and Hector Garza on current and ongoing research at the Instituto de Ecología Aplicada. I was asked to discuss the Oklahoma Natural Heritage Inventory. The similarities between research at the institute and the Oklahoma Biological Survey are striking, particularly in ornithology. The institute has several ornithologists on staff working with neotropical migrants, and a winter visitor from Oklahoma to El Cielo will encounter many familiar summertime species. This is one of many reasons that OU ornithologist George Sutton was attracted to the El Cielo region.

Please see *International Course* on page 2

Bountiful BioBlitz! for Birders

Well, we knew the Great Salt Plains was the place to see a diversityof birds during the fall migration, and we were not disappointed. The ornithologists had a very good weekend, finding 115 species of birds during the 24-hour inventory. This was the first time in BioBlitz! history that more than 100 species of birds were counted. Non-bird biologists were not disappointed either – a total of 939 species were found within the BioBlitz! boundaries, which included both the Great Salt Plains State Park and Salt Plains National Wildlife Refuge. More than 20 species were found for each of the mammal, reptile and amphibian, fungi and fish groups. Josh Cooper, a graduate student focusing on diatoms, identified 74 of those unicellular species. Vascular plant taxa numbered more than 200. As usual, the big winners were the entomologists, with more than 350 terrestrial species and over 50 aquatic species.

Although BioBlitz! had to be rescheduled due to flooding in Alfalfa County, over 100 volunteer scientists joined in the species tally. Students and faculty from several Oklahoma universities attended, as well as students from Norman High School, Oklahoma homeschoolers, and members of several regional Audubon Societies. Many attendees took advantage of the activities led by experts throughout the weekend. The "Snakes of Oklahoma" presentation, owl calling, seining for fish, and the night-time insect ecology talk were big hits and we plan to offer similar activities next year. So, mark your calendar for BioBlitz! 2009 at Robbers Cave State Park and Wildlife Management Area on September 18 and 19.

—Priscilla Crawford

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International Course **(Continued from Page 1)**

On the day following the forum, we embarked for El Cielo and several days of vegetation study. Our first two stops were in the tropical sub-deciduous forest. Here such trees as the gumbo-limbo (*Bursera simaruba*), coral bean (*Erythrina herbacea*) and shaving brush tree (*Psuedobombax ellipticum*) predominate. We also encountered a rare species of cycad and the orchid pinepink (*Bletia purpurea*). After a delicious dinner of langostinos at a restaurant on the banks of the Rio Frio, we ascended into the cloud forest. There our plots contained many of the temperate species listed above as well some familiar genera: Skutch's maple (*Acer skutchii*), Mexican beech (*Fagus mexicana*) and Tamaulipas magnolia (*Magnolia tamaulipana*, an endemic). Our study of El Cielo forest vegetation culminated in the dry oak and oak-pine forest, where smoothbark pine (*Pinus pseudostrobus*), Canby's oak (*Quercus canbyi*), Mexican Royal oak (*Quercus germana*) and loquat leaf oak (*Quercus rysophylla*) dominated.

The day after our colleagues from UAT departed, ProBiosphera's Jean-Louis Lacaille Múzquiz, one of my favorite traveling companions, joined us for the trip to Joya de Salas to study the orchid *Laelia speciosa*. Señor Lacaille has written the only book about the orchids of El Cielo and is very knowledgeable about the ecology and history of the Reserve. Before arriving at Joya, however, we had to crest the Sierra Madre, and passed through pine forests and stands of madrone (*Arbutus xalapense*). For three days we camped at Joya de Salas and intensively sampled a large stand of oaks that harbors numerous *L. speciosa* individuals. The aspect of the dry oak forest was familiar—the low growing, widely spaced trees with spreading branches resembled the crosstimbers. The low stature of the oaks facilitated epiphyte study, and we left Joya de Salas with a great deal of data.

After so many days of data collection, I scheduled a stay at the Hotel La Florida before beginning the long trip back to Norman. Proprietor Jamie Salazar treated us with great hospitality. Before returning home, though, an introduction to the desert vegetation of southern Tamaulipas was in order. We drove to Miquihuana, an area renowned for its diversity of cacti. Here we saw the endemic *Dasylirion miquihuanensis* and a large specimen of biznaga (*Echinocactus platyacanthus*) that UAT researchers estimate to be 500 years old. The following day we began our return journey. Like Arutro Mora and Julio César Gómez, I hope this was the beginning of many collaborations between our institutions.

—Bruce Hoagland

***Biosurvey News*, Fall 2008**
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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Graduate Student Research: The Tallgrass Prairie in Oklahoma

Anyone who has driven through Oklahoma can recognize that it is comprised of expansive grasslands. Oklahoma has three distinct types of grasslands: shortgrass prairie, mixedgrass prairie and tallgrass prairie. Ecologists categorize these grasslands based on the abundance of particular grass species. The tallgrass prairie is recognized by four abundant tall grasses–big blue stem (*Andropogon gerardii),* little blue stem *(Schizachyrium scoparium)*, switch grass (*Panicum virgatum)* and Indian grass *(Sorghastrum nutans)*. The range of North American tallgrass prairie once expanded north into Canada and south into southern Texas. Today only a fraction of the original range remains.

Of all the ecosystems in North America, the largest reduction in area belongs to the tallgrass prairie. Two of the largest remaining tracts of tallgrass prairie are located in Kansas and Oklahoma, and in Oklahoma there remain two regions of tallgrass prairie: the Flint Hills and the Osage Plains. A majority of the tallgrass prairie in the Osage Plains has been altered due to row crops, monoculture pastures and urban development. As a result, the tallgrass prairie in the Osage Plains remains only as isolated patches. These patches are usually maintained as hay meadows that are mowed and baled every July. The Flint Hills are the largest remaining continuous area of tallgrass prairie and extend from north-central Kansas to north-central Oklahoma. This is attributed to shallow, rocky soils that present an obstacle for crop production. These prairies are maintained by cattle and bison grazing. Oklahoma is a unique place because it harbors one of the last remaining ranges for extensive tallgrass prairie. For this reason, my research focuses on mapping and surveying the remnant tallgrass prairie in Oklahoma.

Under the supervision of Dr. Bruce Hoagland, I am studying the spatial extent and temporal change in Oklahoma tallgrass prairie. To determine the spatial extent of current tallgrass prairie, I am creating a vegetation map using a Geographic Information System (GIS). Currently there are no comprehensive vegetation maps of tallgrass prairie in Oklahoma. This map will be a dynamic tool for researchers and wildlife managers.

Creating the vegetation map involves mapping and documenting the extent of tallgrass prairie in Oklahoma using a GIS. In conjunction with GIS, I use aerial photography to identify and map tallgrass prairie patches. Once tallgrass prairie is identified on the aerial photography, it is digitized and a digital abstraction is created with the GIS. I assign attributes to each prairie patch, such as size, land-use and quality. Once all identifiable tallgrass prairies have been digitized, it must be verified by ground-truthing. To ground-truth, I select a subsample of patches to visually survey and compare to my GIS map. During ground-truthing I am trying to determine if the patches were correctly identified as tallgrass prairie within my GIS layer. Once this GIS layer is developed it will aid in the analysis of the extent of tallgrass prairie and the size of individual patches.

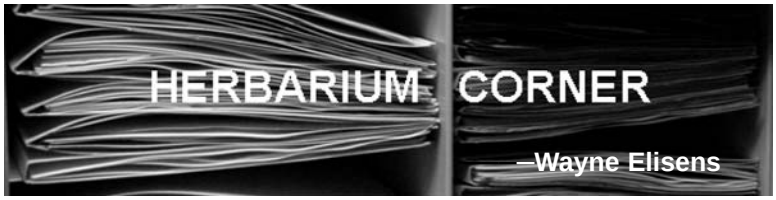
A subset of the digitized tallgrass prairie patches is selected for a field study to gather vegetation data. These data will be used to determine changes in plant species abundance over the past 50 years. I want to determine if there have been any changes in species abundance due to loss of habitat area as the tallgrass prairie is converted to other uses. This has yet to be quantified for hay meadows in the Osage Plains. The sites selected within the Osage Plains are based on a previous study conducted in the 1950s. Throughout the growing season I survey these hay meadows to gather species abundance data. At each site, a 50 x 20 meter modified Whittaker plot is set up, and all plant species present within that plot are recorded. These data will provide an understanding of the current vegetation in Oklahoma tallgrass prairies and will be compared to the previous data set collected in the 1950s to determine if species abundance has changed.

Lots of plots. Quantifying vegetation in the tallgrass prairie.

It is important to determine the extent of this disappearing habitat and to understand its stability over time. As landscapes continue to be altered by humans, a comprehensive picture of these habitats is necessary for conservation. My research fills in the knowledge gaps that remain for tallgrass prairies in Oklahoma.

–Melissa Hinten

Melissa Hinten is a Ph.D. student under the direction of Dr. Bruce Hoagland.



Fern Mural on Display in the Goodman Foyer

The Bebb Herbarium's George J. Goodman Foyer is proud to display a mural painted by Robert Shead in 1934 depicting the evolution and diversity of ferns. The mural measures 4 x 6 feet and was commissioned originally as a Work Projects Administration project for the University of Oklahoma. For years the mural hung in Botany classrooms in the old pharmacy building (now Sutton Hall), Richards Hall and George Lynn Cross Hall. More recently, the mural was displayed in a location where it was seldom noticed and subject to damage. With the renovation of the Goodman Foyer, there was now a suitable location to display this unique piece of botanical artwork.

There is little known about the artist, although many suspect a close relationship with Ralph Shead, who was the artist for the OU Museum of Geology and Paleontology–the precursor of the old Stovall Museum. Ralph Shead is best known for a series of paleontological murals also commissioned by the W.P.A. that are housed currently at the Sam Noble Oklahoma Museum of Natural History. It is not known whether Robert Shead produced any murals other than the fern mural.

The mural depicts microscopic details of fern morphology on the bottom panel and a diorama of extinct and extant ferns in the main panel. Many Paleozoic ferns common in Oklahoma shale and coal deposits are represented as well as many genera present in the modern flora of Oklahoma. The mural represents one-of-a-kind artwork with an intriguing historical legacy. It is now archived safely in the Bebb Herbarium for all to see and enjoy.

Biodiversity: The Western Cottonmouth

Sometimes called a water moccasin, the Western Cottonmouth (*Agkistrodon piscivorus leucostoma*) is found in about the southeastern one-third of Oklahoma. It is a member of the pitviper group of snakes, which (in Oklahoma) includes the copperhead and five species of rattlesnake, all of which are poisonous. The name pitviper comes from the heat-sensitive pit between the eye and the nostril. Their poison is hemolytic, destroying the red blood cells.

The Western Cottonmouth inhabits a variety of habitats: living in and around swamps, lowlands, sloughs, rivers and lakes. They may reach up to six feet in length and live up to 15 to 20 years.

During the spring and fall they may be active during the day, often basking on banks, brush piles and logs, but become nocturnal in the warm summer months.

The cottonmouth is an opportunistic feeder, preying on a variety of forms, including cicadas, fish, frogs, toads, salamanders, sirens, small mammals and birds.

The cottonmouth gets its name from the threat display. When disturbed, it may coil, raise the head and gape its mouth exposing the white (cotton-like) lining, and may also vibrate its tail. Usually they are not very aggressive, remaining quiet or moving away when approached.

An adult female will give birth to an average of six or seven young. As seen in the accompanying photo, she may remain with these young for two or three days (note the two small brown heads to the right of the female). The young have a blotched or banded pattern, which in most Oklahoma individuals fades and the adults are usually dark brown to black. Some adults may retain a dim remnant of the pattern. The young have a brightly contrasting (yellow) tip of the tail. This may function, when vibrated, as a lure to prey.

Over the winter the snakes may aggregate underground in hibernation dens along rocky ledges, stump holes and under logs–often with other large species of snakes.

–Charles Carpenter

Though many snakes reproduce by laying eggs, there are some that give birth to living young. One of these is the Western Cottonmouth (seen here with newborn). The females and newborns may remain together for a day or two. Photo by Amy Buthod.

From Thailand with Fulbright

Imagine escaping the Oklahoma winter and flying off to the Asian subtropics for six months. One of the OBS biologists had this opportunity, thanks to funding from the Fulbright Program. Dr. Liz Bergey journeyed to Thailand, where she was hosted by Chiang Mai University. Chiang Mai is a bustling city of almost one million set between forested mountains. In contrast to the city, the sprawling, hilly university is more park-like, with enormous native trees, scattered soccer fields and many hedges of elephant topiaries, plus the usual campus buildings and parking lots. While Liz taught biology classes, her two children went to an English-speaking elementary school, where her daughter's teacher was from–Oklahoma!! They enjoyed several local tourist activities–elephant treks, gliding down picturesque streams on bamboo rafts, watching the pandas at the zoo eat bamboo and, of course, eating lots of delicious Thai food.

Elephants at the elephant hospital. The foot wound was from a land mine along the Thai-Burmese border. Photo by Liz Bergey.

One of the highlights of the trip was a four-day field conservation course. The first stop was the Elephant Conservation Center. Overall, elephant numbers are decreasing in Thailand and the government moratorium on timber harvests has put most elephants out of work. In addition to watching an elephant show, the group saw demonstrations of fundraising projects (elephant painting and converting elephant droppings to paper) and toured the elephant hospital. Much of the four-day trip was spent at a rambling Thai temple complex abutting picturesque forested cliffs. Troops of monkeys came down from the forest and took turns hanging out, hoping for food–and providing an excellent opportunity to observe monkeys and human-monkey interactions. Because the temple was close to the Thai-Burmese border, the group visited the extensive market area on the Thai side of the border, looking for wild animal and plant products. Not much was found, except by the Thai instructors, who checked out the Burmese markets, where there was plenty of bush (wild animal) meat and parts. On the way back to Chiang Mai, the group visited a government-run retirement center for elephants. Ending in typical Thai style, there was a small ceremony at the university with short speeches, certificates, and group photos–then everyone headed home to rest up.

Giving food to the monks on their early morning rounds. Photo by Liz Bergey.

In addition to teaching, Liz worked with her Thai colleagues researching the effects of hydroelectric dams on the flora and fauna of a local river. Worldwide, a major impact of hydropower reservoirs is the downstream release of cold water–water that is too cold in the warm months to harbor the usual stream biota. In Thailand, they were surprised to discover that the outflow wasn't colder, but that flow changes–high flow during power production and no flow during non-production–discouraged animal life, allowing ungrazed filamentous algae to bloom. Downstream, a wetland moderated the flow differences, leading to more invertebrates and enough fish that fisherman with their cast nets were frequently seen. This was the first comprehensive study of the downstream effects of a dam in Thailand and plans are underway for continued work on the effects of both large hydropower and small check dams. Perhaps Liz will get another chance to return to Thailand!

–Liz Bergey

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NEW ON THE WEB

- Addition of database of upland forests of Oklahoma from Rice and Penfound *Ecology* paper (1959)
- Addition of non-native, invasive plants of Oklahoma pages (in association with the Oklahoma Native Plant Society)
- Updated Bebb Herbarium pages
- Updated pages for BioBlitz! 2008

–Dan Hough

We would like to hear from you!

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