

Biosurvey News

The Newsletter of the Oklahoma Biological Survey
Winter 2007



Biological Survey Research: The El Cielo Biosphere

By Bruce Hoagland

The El Cielo Biosphere Reserve (www.elcielobiosphere.org) in Tamaulipas, Mexico, is a six hour drive south of Harlingen, Texas. Although far from Oklahoma, the two places share surprising biogeographic ties. Not only will one find such tropical species as radicalis palm (*Chamaedorea radicalis*) and the tropical conifer palmillo (*Podocarpus reichii*) at El Cielo, but familiar species such as hop hornbeam (*Ostrya virginiana*), redbud (*Cercis*

canadensis), sweetgum (*Liquidambar styraciflua*), and many others are also present ... but festooned with epiphytic bromeliads and orchids.

El Cielo also is significant to the University of Oklahoma community because it was

a frequent haunt of the late ornithologist Dr. George M. Sutton. The birds of El Cielo were often the subject of his paintings. But it is the botanical and biogeographic significance of the place that has caught the attention of fellow botanist Amy Buthod and me.

In 2005 we were invited to join an expedition to El Cielo by the non-profit group WildShare International (www.wildshareintl.org). We were easily lured by tales of botanical beauty and exotic habitats. Of particular interest to us was the Cloud Forest (or Bosque Mesófilo), a product of moist air from the Gulf of Mexico lifting up the eastern slopes of the Sierra Madre Orientale. Located at elevations of 700 to 1,400 meters above sea level, the Cloud Forest not only harbors numerous temperate species, but many tropical plant and animal species reach their northern extent in this area. The alert visitor can see elegant trogons (*Trogon elegans*), ornate hawk eagles (*Spizaetus ornatus*), military macaws (*Ara militaris*), yellow-headed parrots (*Amazona oratrix*), and a dazzling array of orchids and other tropical plants.

But our time at El Cielo is not just enlightened tourism. One purpose for our repeat visits is to assist members of the Ejido

de Alta Cima (ejidos are village lands held in communal ownership but with individual use) develop the capacity to identify the multitude of plant species surrounding them. For the men of Alta Cima, the neighboring ejidos of San José and La Gloria, and the town of Gómez Fariás, this is an offshoot of the growing desire for their services as bird guides. The people of the ejidos have turned to ecotourism as a means to supplement their income. Harvesting radicalis palm fronds, which are sold to the floriculture industry for plant arrangements and Palm Sunday services, was a primary source of economic benefit, but restrictions were placed on the harvest following the establishment of the Biosphere Preserve.

We have also initiated a program to monitor populations of the rare orchids *Stanhopea tigri-na* and *Laelia speciosa*, both listed as endangered by the Mexican government. This effort relies heavily on ejido members who locate orchid populations and record occurrences using global positioning sys-



The orchid *Laelia anceps*. Photo by Amy Buthod.

tems. These populations are then revisited when in flower, and data are gathered about the population size, health, and vigor. Since these species are collected for commercial and ceremonial purposes, it is hoped that these data will serve as a baseline for monitoring long-term population trends of these orchids.

Finally, we have initiated a preliminary study of epiphytic plant communities at El Cielo. According to our colleagues at Universidad Autónoma de Tamaulipas, Instituto de Ecología y Alimentos, such studies have been lacking in recent years and there is

great interest in how these epiphytes will respond to climate change. There is also discussion of jointly offering a field course. Although we are excited about our research at El Cielo, it is the warm reception given to us by the people of Mexico and their willingness to share this extraordinary place that has been the most rewarding.



Tillandsia--one of the numerous epiphytic plants at El Cielo. Photo by Amy Buthod.



The orchid *Encyclia cochleata*. Photo by Amy Buthod.

BioBlitz 2006 at Quartz Mountain Nature Park

By Bill Dengler and Dustin Woods

BioBlitz 2006 took place at Quartz Mountain Nature Park and adjacent Lugert Wildlife Management Area on September 15 and 16, 2006. BioBlitz Coordinator Ian Butler reported that a total of 161 people registered to participate in the 24-hour survey. One-hundred and forty-four of these were affiliated with one of the 22 allied education or conservation organizations. The public component was composed of individuals, families, and various groups such as Boy Scouts and Girl Scouts.

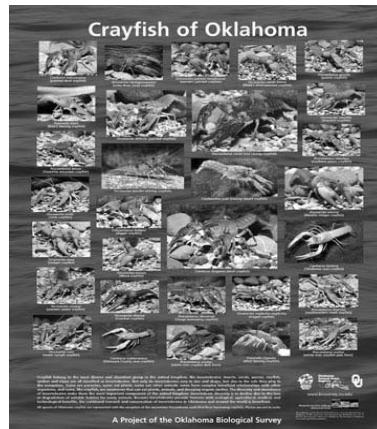
The 1,162 specimens recorded during the 24-hour survey period represent the spectrum of biological organization including microbes (196), fungi (26), lichens (18), algae (96), vascular plants (272), aquatic invertebrates (52), insects (296), spiders (38), centipedes (4), millipedes (2), scorpions (1), terrestrial gastropods (4), fish (27), amphibians and reptiles (18), birds (96), and mammals (16).

In conjunction with the 24-hour count, a special educational program was presented to approximately 130 students representing four school districts. The education program consisted of ten outdoor stations and featured the topics of insects, water erosion table, Oklahoma eco-regions, fish of Oklahoma, mammals, range management, spiders, animal tracks, Oklahoma biodiversity, and hibernation. Each group of students rotated among the outdoor stations on a timed schedule, thus completing the circuit during their visit at Quartz Mountain. In addition to the educational stations, each student group viewed an extensive Playa Lakes exhibit provided by the Oklahoma Wildlife and Prairie Heritage Alliance. Sue Hokanson, Quartz Mountain Park naturalist, said, "The educational outreach event was one the students will remember for a lifetime".

BioBlitz 2007 is scheduled to take place at the Wichita Mountains National Wildlife Refuge on September 14 and 15, 2007.

NEW Biosurvey Poster!

'Crayfish of Oklahoma' is the third installment in our poster series on Oklahoma's Biodiversity. Copies of this new poster can be picked up at the Oklahoma Biological Survey's office in Norman. Contact us if you would like a poster but are unable to pick one up at our Norman office. If you are interested in distributing posters to people in your organization, group, department, or school, please call at (405)325-7658 or e-mail us at okregistry@ou.edu. We will be happy to arrange a pick-up or delivery of posters.



-Priscilla Crawford

New on the Web

- *Addition of information on landowner programs on the Registry pages
- *New volume of the *Publications of the Oklahoma Biological Survey*
- *Updated publications pages
- *Information on the new Crayfish of Oklahoma poster

-Dan Hough

Inside this issue:

Biological Survey Research: The El Cielo Biosphere Page 1

BioBlitz 2006 Page 2

New on the Web Page 2

New Poster: "Crayfish of Oklahoma" Page 2

The Oklahoma Highway Biology Studies Program Page 3

Conservation and the State Wildlife Grant Program Page 4

Release of Volume 7 of the *Publications of the Oklahoma Biological Survey* Page 4

Student Research: Species Response to Woody Plant Encroachment Page 5

Biodiversity: The American Burying Beetle Page 6

Biosurvey News
Winter 2007

Amy K. Buthod and Caryn C. Vaughn,
editors

Biosurvey News is published twice each year and reports on the activities, programs, and news related to the Oklahoma Biological Survey. We wel-

come 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.

This publication, printed by the Oklahoma Biological Survey, is issued by the University of Oklahoma. Eight hun-

dred copies have been prepared and distributed at a cost of \$400 to the taxpayers of the State of Oklahoma. The University of Oklahoma is an equal opportunity institution.
© 2007



The Oklahoma Highway Biology Studies Program

By Phillip Crawford

The Oklahoma Highway Biological Studies Program is a cooperative agreement between the Oklahoma Biological Survey and the Oklahoma Department of Transportation (ODOT) and is located on the OU Norman campus. This program was initiated in July of 2002 and consisted of a single staff person charged with conducting environmental assessments of transportation-related projects and the potential of those projects to adversely impact natural aquatic and terrestrial resources (such as wetlands and federally protected plant and animal species).

Many of the transportation projects constructed throughout the state are funded, at least in part, by grants from the Federal Highway Administration to ODOT and to local governments. These federal funds are granted with certain stipulations, and construction agencies that receive them must ensure that such projects meet the legal requirements of such state and federal laws as the Oklahoma Water Quality Standards, the Clean Water Act, and the Endangered Species Act.

Some projects (such as intersection modifications in urban areas or the resurfacing of paved city streets) have limited potential to adversely impact the environment; conversely, the construction of new roadways and bridges in environmentally sensitive areas may have significant long-term effects on natural ecosystems.

The Oklahoma Biological Survey (through the Oklahoma Natural Heritage Inventory) maintains Oklahoma's premier geo-referenced database of information on rare and endangered plants and animals, as well as significant ecological communities, and is charged with assisting citizens, organizations, and agencies in the preservation of those species and communities. Given that ODOT must consider these natural elements in the planning and development of federally funded highway improvements, this collaborative effort allows important natural resources to be identified relatively early in project development and decreases the likelihood of expensive delays in construction.

Many of Oklahoma's rarest plants and animals are found in relatively remote undisturbed habitats and do not frequent areas adjacent to heavily trafficked roadways. Consequently, it is unusual for us to encounter an individual of a protected species or to locate habitat preferred by these organisms within a project area (the accompanying photograph depicts the rare exception in which the only entrance to a limestone cave historically used by the endangered gray bat lies immediately adjacent to, and extends under, a paved county roadway). On those occasions when a given project may affect a protected species or its habitat, transportation biologists and engineers, in collaboration with state and federal resource agencies, attempt to avoid or minimize the negative impacts of project construction. This may be accomplished by timing construction to coincide with a period when a migratory species is absent from a project area, or outside of the breeding season of a protected species. If construction will result in the unavoidable disturbance of habitat, individuals of a rare species may be removed from a project area prior to construction and transported to suitable habitat elsewhere. For example, the American burying beetle is being encountered with increasing frequency at project sites in eastern Oklahoma, and the trapping-and-relocating of individuals of this endangered species prior to construction is now a common practice. Additionally, enhancement activities may be carried out in existing habitat nearby, such as constructing artificial perches for bald eagles in areas that lack perch trees, but that otherwise provide suitable eagle

habitats and engineers, in collaboration with state and federal resource agencies, attempt to avoid or minimize the negative impacts of project construction. This may be accomplished by timing construction to coincide with a period when a migratory species is absent from a project area, or outside of the breeding season of a protected species. If construction will result in the unavoidable disturbance of habitat, individuals of a rare species may be removed from a project area prior to construction and transported to suitable habitat elsewhere. For example, the American burying beetle is being encountered with increasing frequency at project sites in eastern Oklahoma, and the trapping-and-relocating of individuals of this endangered species prior to construction is now a common practice. Additionally, enhancement activities may be carried out in existing habitat nearby, such as constructing artificial perches for bald eagles in areas that lack perch trees, but that otherwise provide suitable eagle



The Highway Biologist at work. Phillip Crawford conducts an assessment.

habitat. In instances where adverse impacts to wetlands cannot be avoided, existing wetlands may be acquired by ODOT to be preserved in perpetuity; alternatively, degraded wetlands may be restored to a fully functional status by earthwork (designed to restore wetland hydrology to an area) and the planting of appropriate vegetation.

The amount of funding dedicated to roadway and bridge construction in Oklahoma has increased substantially during the past year, and the Highway Biological Studies Program has increased in size as well; we now have three full-time staff persons conducting field work statewide and throughout the year. We hope to be able to make information regarding the preservation of rare species and communities accessible to construction agencies, and to thereby reduce the adverse impact of transportation-related construction on these natural resources.

Conservation and the State Wildlife Grant (SWIG) Program

By Bruce Hoagland

Scientists at the Oklahoma Biological Survey are dedicated to the mission of gathering, analyzing, and disseminating “information regarding animal and plant forms and ecological communities within the state and associated geographical areas.” This is no small challenge, since procuring funding for field inventory and data management is often a daunting task; however, OBS biologists have received a significant boost in attaining these goals. In fiscal year 2001, the U.S. Congress created the State Wildlife Grant (SWIG) Program to support conservation of declining species at the state level. Funding through SWIG is available to states, the District of Columbia, Puerto Rico, Guam, the U.S. Virgin Islands, the Northern Mariana Islands, American Samoa, and federally recognized Indian tribes under the provisions of the Fish and Wildlife Act of 1956 and the Fish and Wildlife Coordination Act. Funds are released to state wildlife agencies, which then disperse the monies to meet conservation needs.

The federal government appropriated \$68.5 million for the State Wildlife Grants program in 2006, and the U.S. Senate Interior Appropriations Committee announced that funding will be approximately \$67.5 million in FY07, less than the president’s request for \$74.7 million and the \$85 million supported by several

members of Congress. The Oklahoma Department of Wildlife Conservation (ODWC) has received a total of \$4.6 million through the SWIG program to date. New funds are awarded annually. To receive federal SWIG funds, each state was required to develop a Comprehensive Wildlife Conservation Strategy (CWCS). In July 2004, ODWC convened the CWCS Advisory Group, including representatives of the OBS, to provide feedback for the CWCS development. To facilitate conservation planning, the ODWC divided the state into six ecoregions; Ouachita Mountains and Gulf Coastal Plains, Ozarks, Crosstimbers, Tallgrass, Mixed-grass, and Shortgrass Prairie. Priority habitats and species were identified for each of these regions. In general, the approach adopted by ODWC is habitat based, rather than a species-by-species management.

Several members of the OBS faculty and staff are working on SWIG-funded projects. For example, Ian Butler and Bill Dengler are directing a project titled “Development of Inter-agency Rare Species Data Sharing and Exchange for Statewide Wildlife Conservation Planning”. The goal of this project is to retrieve and catalog relevant information from unpublished reports in state and federal agencies within Oklahoma. These reports often have important species conservation data that is not widely available. Dr. Liz

Bergey was awarded funding for a grant titled “Faunal Survey of Oklahoma Springs”. During the course of this project, she visited numerous springs, some of which had been surveyed in the past. Dr. Jeff Kelly was awarded funds for the project “Effects of Land Cover Change in Sandy Sanders, Packsaddle, and Cooper Wildlife Management Areas on State Birds of Greatest Conservation Need”. The project goals are to analyze the impact of woody plant encroachment into native grasslands and to determine the impact on prairie bird species. The invasion of grasslands by woody plants has been recognized as a phenomenon jeopardizing grassland ecological integrity. As woody plant abundance increases, typically as a result of fire suppression and land use, the plant species diversity declines. This process also affects the structure of grassland communities that will impact bird species composition.

Two mapping projects have been funded through SWIG. “Wildlife Habitat in Oklahoma Territory and the Chickasaw Nation, circa 1871” is developing a historical land cover map of Oklahoma that will serve as a baseline for the analysis of land cover change. “Wildlife Habitat Mapping in the Tallgrass Prairie CWCS Region” is supporting a project to map remnant tallgrass prairie habitats as well as riparian/bottomland forest and wetland habitats.

Release of Volume 7 of the *Publications of the Oklahoma Biological Survey*

Five research articles appeared in the latest volume of the open access journal *POBS*. Articles in Volume 7 present data on historical mollusk collections, avian ecology, plant ecology, and ethnobotany.

All volumes of the *POBS* can be accessed directly at <http://digital.library.okstate.edu/obs>. Instructions for authors and guidelines for submission can be accessed through the Oklahoma Biological Survey web site at www.biosurvey.ou.edu/pobs/index.html. The *POBS* publishes peer-reviewed articles on the biodiversity of Oklahoma and adjoining regions.

-Wayne Elisens

Student Research: Species Response to Woody Plant Encroachment

By Jacqueline Paritte

Since grazing in the American Southwest began in the 1700s, arid grasslands of the southwest deserts have undergone increased human-induced stress. Desert grazing intensity peaked in the early 1900s, and with the onset of severe drought around this same time, much of the grass died. Soil eroded on the newly bare ground, and when rain returned, little area soil was left where grass could grow. This permitted establishment of woody plants and initiated shrub encroachment into desert grasslands, a problem which still exists today.

My research focuses on how this shift in plants across the landscape affects birds living there. Birds, as with many organisms, use vegetation for both food and shelter. A shift from grass to shrubs in an area not only changes available food, but also alters habitat structure. The question I am asking is how different bird species respond to each of these changes. I hypothesize that shrub encroachment affects the use of vegetation by birds for both food and habitat structure, but uniquely for each species.

How a species responds to shrub encroachment should relate to its classification as a generalist or specialist. A bird species that specializes on living in grasslands should avoid using shrub encroached areas. If this species is a grassland specialist because of the food it eats, I expect to find this species only eating grassland food, but possibly inhabiting shrubby areas. If the species specializes on something about grassland structure (e.g., suitability for nest building), the species should only be found living in grass areas, but may be eating food from shrub-encroached places. Further, a generalist species, if it is a forage generalist, should eat whatever food is available, and if it is a habitat structure generalist it should be found in a wide range of landscapes from grassland to shrubland.

To see if this is the case, I use a technique called stable isotope analysis, which involves quantifying relative amounts of different isotopes (atoms differing in their number of neutrons) of an element that are in a sample. For example, carbon has three isotopes, one with six neutrons, one with seven, and one with eight. The isotope with eight neutrons is radioactive carbon-14, and the other two are non-radioactive and are called stable isotopes. These two are involved in stable isotope analysis.

In nature, phenomena occur that segregate isotopes. In plants, there are three types of photosynthesis: C₃, C₄, and CAM. It turns out C₃ plants incorporate less of the heavier stable carbon isotope into their tissue than either C₄ or CAM plants. In desert grasslands, conveniently, dominant grass species are C₄ and encroaching shrubs are C₃, making shrubs and grasses isotopically different. Consequently, when an organism eats from a landscape with both grass and shrubs, I can measure the isotopes in the organism and figure out how much of its food was from grass and how much was from shrubs.

This is exactly what I do with birds. Currently, I study black-throated sparrows (*Amphispiza bilineata*), thought to be shrub specialists, at the Jornada Long Term Ecological Research site, located in the Chihuahuan Desert of southern New Mexico. I catch birds living in habitats that range from grass to shrubs. I measure isotopes in feather and blood samples from birds and in leaves from plants, then compare birds to the plants found where they live to see where the birds fall in the generalist/specialist scheme. The goal of this project is to ultimately show how different species respond to habitat change.

It is important to determine how human impacts on the landscape affect the organisms that live there. In the case of shrub encroachment in desert grasslands, the alteration in vegetation is obvious, but consequences for consumers like birds, reptiles, mammals, and insects are harder to see. Changing the plants on a landscape can change the species of consumers found there, their interactions, and the overall stability of the ecosystem, but these effects may not be seen immediately. The shrub encroachment seen today is a result of overgrazing decades ago, and grazing still continues in the Southwest. Its intensity has decreased; however, we will not see its landscape consequences for many years. Determining our effects on natural systems now can both help mitigate negative impacts that have already occurred and prevent them from occurring in the future.



Adult male black-throated sparrow. Photo by Jackie Paritte.



Biosurvey News

Oklahoma Biological Survey
University of Oklahoma
111 East Chesapeake Street
Norman, OK 73019-5112
(405)325-4034
www.biosurvey.ou.edu

Non-profit Organization
U.S. Postage
PAID
University of Oklahoma

Biodiversity: The American Burying Beetle (*Nicrophorus americanus*)

by Victoria Smyth

The American burying beetle (*Nicrophorus americanus*) was placed on the endangered species list by the U.S. Fish and Wildlife Service in 1989. Historically, this beetle occurred in 35 states in the eastern and central United States, as well as southern portions of Canada. Today, it occurs only in portions of eight states: Arkansas, Oklahoma, Kansas, Nebraska, Iowa, South Dakota, Texas, and Rhode Island. Losing over 90 percent of its historical range, the American burying beetle has declined drastically in numbers. The reasons for the decline are not fully understood. Possible factors of importance are: habitat loss, pollution, and competition for food. The largest carrion beetle in the United States, the American burying beetle measures 0.98-1.50 inches in length. It is shiny black and has orange markings on the head, elytra (wing covering), pronotum, and the tips of the antenna. It is important ecologically as it breaks down and helps recycle decaying organic matter.

American burying beetles are nocturnal (active at night); thus, you likely won't see them unless you are looking for them. They feed and reproduce on carrion and when a suitable carcass is found the beetles go to

work. A male and female will excavate the dirt under the carcass and bury it. The pair then prepares the carcass for laying eggs. The fur and skin are removed and a breeding tunnel is built inside the carcass. The female lays up to 30 eggs inside the tunnel and the larvae, with assistance from the parents, feed on the carrion. The American burying beetle shows expert parenting skills and the pair stays with the brood until they emerge as youngsters.

Studies are ongoing with respect to recovery of the species. The information learned from studying this species is vital to the recovery efforts. These studies include extensive yearly monitoring, relocation projects, overwintering studies, soil and habitat evaluations, and studies to understand the life of the American burying beetle.



The American burying beetle.