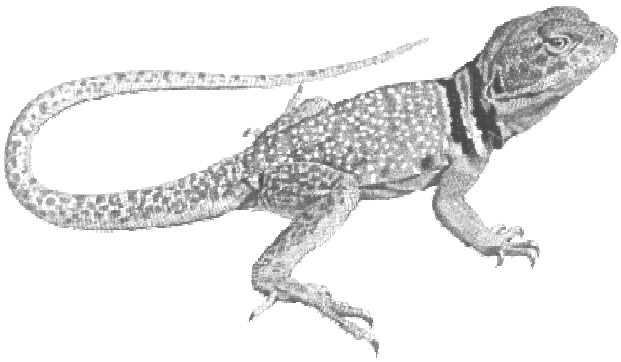

The Glade

The Newsletter of the Missouri Chapter of the Society for Conservation Biology

Volume 12, Number 2 **Fall-Winter 2009**

Society for Conservation Biology

Contents

The Missouri Chapter of the Society for Conservation Biology is pleased to announce the Seventh Annual Student Poster Competition

At the Missouri Natural Resources Conference
6:30 – 8:30 p.m. Wednesday, February 3, 2010

The Missouri Chapter of the Society for Conservation Biology (MOSCB) works to encourage and recognize quality student research with conservation implications. For the past six years, we have sponsored a student poster competition at the Missouri Natural Resources Conference (MNRC).

The competition is open to all full-time undergraduates, graduate students, or recent graduates (within past 6 months) whose posters have been accepted for MNRC 2010. Posters will be evaluated based on their relevance to biological, economic, and/or social aspects of conservation, the soundness of the study design, and the quality of the presentation (clarity, organization, and graphics). **The poster should clearly state the conservation significance of the work.**

Contest judges will visit and rate each poster during the MNRC poster session and social. The winner will be announced around 9 p.m. in the poster session exhibit hall. The winning presenter will receive a one-year membership to the Society for Conservation Biology, which includes a subscription to either the journal *Conservation Biology* or the journal *Conservation* (student's choice). The winner will also be invited to write an article about their work for our chapter newsletter *The Glade*.

To enter the competition, **email** your poster abstract, along with your school affiliation, email address and telephone number to Amy Buechler, MOSCB Treasurer abuechler@confedmo.org

Abstracts must be received by January 22, 2010. **Don't wait; do it today!** Simply forward the abstract accepted by the MNRC Program Committee. For more information call Amy Buechler at 573-634-2322.

Conservation Federation of Missouri Announces the 2010 Missouri Teaming With Wildlife Mini-Grants Program

Calling all citizen conservation groups, outdoor organizations, etc!

The Teaming With Wildlife Mini-Grant Program seeks to involve more conservation organizations and businesses in implementing Missouri's Comprehensive Wildlife Strategy.

Purpose: To provide funding for TWW Coalition organizations to help implement Missouri's Comprehensive Wildlife Strategy.

Grant Awards: Individual grant awards are available up to a maximum of $2,500. Matching funds are encouraged but not required.

Eligibility: Any organization, business, or volunteer group can apply, although preference will be given to Teaming With Wildlife Coalition organizations. State and Federal agencies are not eligible, but can work with another organization to submit a proposal. Funding must be used to further efforts within a Conservation Opportunity Area (COA).

Priority will be given to projects that:

- Bring in partners that have had little or no involvement with implementation of Missouri's Comprehensive Wildlife Strategy to date.
- Grow partnerships in currently inactive COAs.
- Fulfill a gap in protecting all wildlife.
- Kick-start longer term activities.
- Demonstrate matching funds.

Funds may be used for a variety of projects that promote the conservation of healthy habitats within a Conservation Opportunity Area.

To learn more, and to view the complete "Request for Proposals", visit www.confedmo.org/teaming. Contact Amy Buechler, Teaming With Wildlife Coordinator (800-575-2322, abuechler@confedmo.org) with any questions.

News and Notes

How to publish in *The Glade*:
Send your conservation biology newsletter item as a digital **.doc** or **.pub** file to the editor by email — <james.trager@mobot.org>. If the file is very large (over 2MB) it will be beneficial to send it divided into 1- or 2-MB bits, and I will reassemble it.

(**News and Notes** continued next page…)

News and Notes (continued)

Attend the MOSCB Annual Chapter Meeting: Even if you are not a voting member, we invite you to learn more about MOSCB by attending our annual chapter meeting. The meeting will be held Thursday, February 4th at 4pm in room 70/71 at Tan-Tar-A resort during the Missouri Natural Resources Conference. Please attend of you can. We will hold officer elections and plan activities for the coming year.

Donate items for our annual Silent Auction: Our silent auction at Missouri Natural Resources Conference is our primary fundraiser. Please consider donating items (books, wine, framed prints or photographs, etc). If you are attending MNRC, you can bring your items to our booth in Wingate hall on Wednesday afternoon, February 3rd.

Nominations sought for MOSCB 2010 Board of Directors:
Terms of office begin one month after the election and are for one year. All MOSCB officers must join the Society for Conservation Biology. Other than that, we are simply looking for dedicated, organized individuals to serve in the following roles:

- **President.** The President is responsible for overseeing the day-to-day operations of the Chapter, organizing and presiding over meetings, representing the Chapter to SCB, and submitting required annual reports to SCB.

- **Vice-President.** The Vice-President performs the duties of the President when the latter is absent. The Vice-President coordinates the annual Silent Auction.

- **Secretary.** The Secretary records minutes, administers correspondence between the Chapter and the Society, oversees elections, and maintains historical records and a roster of members.

- **Treasurer.** The Treasurer collects dues, maintains accounts, and collects and distribute funds for Chapter activities. The Treasurer reports on the financial activities and status of the Chapter at Chapter meetings and coordinates the annual student poster contest.

- **Chair of the Conservation Committee.** The Chairperson of the Conservation Committee seeks submissions to and edits *The Glade*, the twice-yearly newsletter of the Chapter. (The current editor is willing to continue editing, but will gladly cede conservation committee duties to a willing volunteer.)

Please submit your nominations (you may nominate yourself) to MOSCB Secretary Stephanie Manka sgmdc2@mail.missouri.edu by January 26, 2010. Elections will be held at the MOSCB Annual Chapter Meeting on February 4th at 4 pm in room 70/71 at Tan-Tar-A Resort in Osage Beach, Missouri. Ballots will be emailed to voting Chapter members on approximately January 28th, one week prior to the elections. **If you cannot attend the annual chapter meeting at MNRC, you may vote via absentee ballot by emailing your completed ballot to Stephanie by noon Wednesday, February 3rd.**

The President's Corner

by Esther D. Stroh

Preparing for Climate Change: Conservation-Based Recommendations from The Society for Conservation Biology

Over the past few years, Missouri Chapter of the Society for Conservation Biology (MOSCB) has focused on the biodiversity effects of climate change. An article in the October 2007 issue of *The Glade* (Stroh 2007) interpreted a 2006 comprehensive review of the biological effects of climate change (Parmesan 2006) in light of the regional projections in the 2007 Fourth Assessment Report from the International Panel on Climate Change (Christensen et al. 2007). In 2008, MOSCB hosted a well-attended workshop for scientists and resource managers titled "The Potential Consequences of Climate Change for Missouri's Biodiversity" at the Missouri Natural Resources Conference (MNRC); a synopsis of this workshop appeared in the Spring 2008 issue of *The Glade* (Journet 2008). In 2009, about 80 scientists and resource managers attended another MOSCB-hosted workshop at MNRC titled "Managing Resources in the Face of Climate Change." A synopsis of this workshop appeared in the Spring 2009 issue of *The Glade* (Jones-Farrand 2009).

While we have been busy thinking about the effects of climate change in Missouri, the larger Society for Conservation Biology (SCB) has been addressing the issue on a national and global scale. Based in part on recent scientific findings that the Amazon and other tropical forests are now at a dangerous tipping point, SCB leaders were concerned that calculations underpinning the December 2009 climate talks in Copenhagen were inaccurate. In November, SCB President Luigi Boitani sent letters to the Prime Minister of Denmark and the Chair of the United Nations Climate Conference. The letters urged the leaders to provide conference attendees with a copy of eleven climate-related conservation principles developed by SCB in consultation with policy experts in the natural and social sciences and supported by peer-reviewed research (Society for Conservation Biology 2009). It was hoped that the Climate Conference attendees would use the Principles to help guide their negotiations during and after the Conference. Meanwhile, within the U.S., senior SCB members briefed the Congressional Research Service, staff of the Speaker of the House, and the White House Council on Environmental Quality regarding the Principles. The Eleven Principles include recommendations such as:

- Setting a target for greenhouse gas pollutants well below today's levels, and getting there as soon as possible given the damage already being done;
- Not depending on less reliable offsets, but offering direct assistance and controls to conserve forests and other ecosystems;
- Protecting the world's primary and older forests for their irreplaceable capacity to capture and store large quantities of carbon for centuries; and
- Preparing to adapt to climate change by fully funding and guiding ecosystem and wildlife restoration.

So, as we work locally and regionally to address the biological and ecological effects of climate change, we can look to SCB to provide national and world leaders with scientifically-based

(**The President's Corner** continued on next page...)

The President's Corner (continued)

evidence of the biodiversity effects of climate change policies in order to help guide their decisions. The letter from SCB President and the entire document, *Mitigating and Preparing for Climate Change: Eleven Conservation Principles for Decision-makers*, can be read or downloaded from the SCB website (www.conbio.org).

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The Editor's Corner

Well, at last — Volume 12-2 of *The Glade* appears! Originally scheduled for November, I had at least hoped to have this out before the end of 2009. And I can't even claim to have been in some exotic location doing field work, or anything else important-sounding — Only that I was moving all through December, after almost 20 years of living in the same house, and now combining residences with someone who has lived 30 years in her place. Traumatic would be too strong a word, but stressful would be appropriate, and certainly time-consuming. Enough said!

I'm getting to like this editing thing, and have decided to do it for another year, that is, if there are no strenuous objections out there. My hope is that *The Glade*'s readership will provide me with interesting new material for the two editions due out during the rest of 2010. So, if you have conservation biology research that is not yet journal-ready, or other newslettery materials that will be of interest to conservation and field biologists, please contribute, as detailed on the back page of this issue.

I'll be looking forward to the flood of manuscripts!

The editor strains to identify an ant collected in a Wisconsin peat bog..

Photo by Gerould Wilhelm

BioBlitz Brings Nature and Community Together

Stephanie Manka and Katy Klymus

BioBlitz is a nation-wide event where groups of biologists and citizens try to race the clock and identify as many species as possible ("Bio") over the course of 24 hours ("Blitz"). In Columbia, graduate students in biological sciences, science education, and anthropology at the University of Missouri organize BioBlitz every September in a park or local conservation area. This year's BioBlitz took place at Eagle Bluffs Conservation Area, a wetland area located 8 miles southwest of Columbia and was co-organized by a Wildlife Biologist with the Missouri Department of Conservation.

Since 2005, students, professors, and wildlife biologists have led the public on nature walks observing a wide range of biodiversity including plants, birds, herps, fish, insects, fungi, and mammals. During these walks, experts talk about the natural history of plants and animals encountered. Species are tallied and are included in a BioBlitz inventory list. Participants can learn songs of common Missouri birds and migrants, learn different plant species they may have overlooked, and identify some of the thousands of diverse insect species that inhabit Missouri.

On BioBlitz nature walks, the public also has a rare opportunity to participate in different wildlife surveying methods in order to capture species that are more difficult to document. For example, nets are set up to catch and release bats and fish, and cage traps are set in the forest to catch and release small and medium sized mammals. This year, bat expert Sybill Amelon of the University of Missouri brought her “rescue” bats to give the public an opportunity to view them up close, as well as learn about numerous bat facts. The “rescue” bats were injured and could not be rehabilitated to be released to the wild. They have a special role in teaching the public about bat biology and conservation. Amelon also brought Anabat detectors, special machines that let you hear bats' sonar sounds.

In addition to rescue bats, this year's BioBlitz also featured Raptor Rehab, an organization through the University of Missouri School of Veterinary Medicine specializing in rehabilitating birds of prey such as hawks, eagles, and vultures. Birds that are debilitated from injuries and are not likely to survive in the wild are permanent residents of the organization and are brought to community events, like BioBlitz, where they serve as teaching aides in conservation and raptor biology. Some of this year's featured raptors were a Red-Tailed Hawk and a Great Horned Owl. The event also included local nature photographers who talked about their experiences photographing nature both in Missouri and in more exotic locations.

BioBlitz is not only about the wildlife. This year's BioBlitz had a free picnic and ice cream social where community members could talk and socialize with nature walk leaders and other BioBlitz participants. The picnic also was close to a check station for hunters on Eagle Bluffs Conservation Area, which allowed communication between different parts of Columbia's diverse outdoor community. Not only is it a great event for the public but it also allows scientists and biologists a chance to communicate to the public their passion and interest in nature.

“Effective communication between scientists and the public is essential if we expect the public to care about biodiversity and conservation. BioBlitz offers this opportunity to wildlife biologists in Columbia” says Klymus, one of this year’s coordinators.

If you are interested in learning about nature and meeting the people who study nature, please participate in BioBlitz 2010 and help us find as many Columbian species as possible next year. Please contact Katy Klymus at kektgb@mail.missouri.edu if you are interested in organizing or helping out with BioBlitz 2010. For more information visit: http://bioblitz.missouri.edu.

See complete list of animals recorded during BioBlitz 2009 starting on the next page...

BioBlitz (continued)

Invertebrates			
Snails	Gastropoda	20	
Giant Millipede	*Archispirostreptus gigas*	1	
Mayfly larvae	Ephemeroptera genus?	5	
Dragonfly larvae	Odonata-Anisoptera genus?	10	
True Katydid	*Pterophylla camellifolia*	1	
Giant water bug	*Lethocerus* sp.	4	
Water scorpion	*Nepa cinerea*	2	
Cicada	*Tibicen* sp.	1	
Whirligig beetle	*Gyrinus natator*	20	
Tree cricket	*Oecanthus* sp.	1	
Ground cricket	Gryllidae genus?	1	
Toe Biters	*Belastoma* sp.	4	
Herps			
Cricket Frog	*Acris crepitans blanchardi*	106+	
American Toad	*Bufo americanus cepedianum*	21+	
Woodhouse's toad	*Bufo woodhousei*	5	
gray tree frog	*Hyla versicolor*	2	
Plains Leopard Frog	*Rana blairi*	3	
Bullfrog	*Rana catesbeiana)*		10+
Green Frog	*Rana clamitans*	5	
Southern leopard frog	*Rana sphenocephala*	62+	
Pickerel Frog	*Rana palustris*	1	
Black Racer	*Coluber constrictor*	1	
Ringneck Snake	*Diadophus punctatus*	5	
Northern water snake	*Nerodia sipedon sipedon*	1	
False Map Turtle	*Graptemys pseudogeographica*	2	
Red eared slider turtle	*Trachemys scripta elegans*	1	
Fence Lizard	*Sceloporus undulatus*	2	
5 lined skink	*Eumeces fasciatus*	2	
Western Painted Turtle	*Chrysemys picta*	10	
Birds			
Great Blue Heron	*Ardea herodias*	3	
Great egret	*Ardea alba*	11	
Mourning Dove	*Zenaida macroura*	2	
Yellow-billed Cuckoo	*Coccyzus erythrocephalus*	1?	
Barred Owl	*Strix varia*	1	
Ruby Throated hummingbird	*Archilochus colubris*	1	
Belted Kingfisher	*Megaceryle alcyon*	1	
Pileated woodpecker	*Dryocopus pileatus*	2	
Flycatcher	*Empidonax* sp.	2	
Carolina Wren	*Thryothorus ludovicianus*	1	
Indigo Bunting	*Passerina cyanea*	1	
Red-winged Blackbird	*Agelaius phoeniceus*	1	
Northern Cardinal	*Cardinalis cardinalis*	16	
American Goldfinch	*Carduelis tristis*	1	
Turkey Vulture	*Cathartes aura*	48	
Killdeer	*Charadrius vociferus*	*?*	
Warbling Vireo	*Vermivora peregrina*	1	
Barn Swallow	*Hirundo rustica*	5	
Cliff Swallow	*Petrochelidon pyrrhonota*	2	
Bald Eagle	*Haliaeetus leucocephalus*	1	
Wood Duck	*Aix sponsa*	1	
Dicksissel	*Spiza americana*	1	
Sandhill Crane	*Grus canadensis*	2	
Blue-headed Vireo	*Vireo soltarius*	1	
Mammals			
Raccoon	*Procyon lotor*	2 (juveniles)	
Opossum	*Diadelphis virginiana*	2	
Short-tailed shrew	*Blarina brevicauda*	1	
White footed mouse	*Peromyscus leucopus*	5	

BioBlitz (continued)

Fishes

Bluegill Sunfish	*Lepomis macrochirus*	10
Green sunfish	*Lepomis cyomellus*	30-40
Gizzard Shad	*Dorosoma cepediarum*	3
Orange-spotted Sunfish	*Lepomis humilis*	400
Western Mosquitofish	*Gambusia affinis*	20-30
Large mouth bass	*Micropteris salmoides*	0
Crayfish (red claws)	Astacoidea genus?	2
Crayfish (blue claws)	Astacoidea genus?	1
Big Mouth Buffalo	*Ictiobus cyprinellus*	3
Common Carp	*Cyprinus carpio*	150
Mirror Carp	*Cyprinus carpio ??*	1
Shortnose Gar	*Lepisosteus platostomus*	4

Augochlora pura is a generalist, solitary bee that nests in rotting logs in forests and woodlots. Here it nectars at the woodland herb, *Elephantopus carolinianus.*
Both species are common at Litzsinger Road Ecology Center, St. Louis.

(See following article.)

Photo by James C. Trager

Bees and Butterflies of the Litzsinger Road Ecology Center, St. Louis MO
Comparison with regional natural area remnants

By Malinda Slagle and Richard Clinebell (Deceased Feb. 2006)

Introduction

In the Midwest, where few natural ecosystems remain, ecosystem restoration can conserve plant and animal species and create new habitat for organisms to live. The Litzsinger Road Ecology Center (LREC) is an environmental educational center and restoration project in suburban St. Louis, Missouri that is managed by the Missouri Botanical Garden. It is dedicated to teaching students and teachers about ecology and stewardship of the earth through hands-on science and restoration. The LREC comprises 14 ha, 5 ha of which are prairie reconstructions, and 6 ha of which are restored woodlands which surround 1 km of Deer Creek. Our goal in restoring prairie and woodland ecosystems was primarily to educate children about these habitats and the organisms they contain. We are also trying to create habitats containing as much biodiversity as possible to conserve the species that live in this area. We involve students in the restoration process to connect them with their environment and to help them understand all of the pieces that make up an ecosystem.

The prairie at the LREC was planted in two stages: 4.2 ha were planted in 1990 in former hayfields that had once been plowed for crops and 0.8 ha were planted starting in 1999 in a former horse pasture. Wet-mesic tallgrass prairie is an appropriate target community for this area based on historical accounts. According to General Land Office Surveys of St Louis, the Deer Creek Valley bottoms and all the land along Litzsinger Road was prairie in 1817 at the time of completion of their survey (Schroeder 1982). The prairie was managed with annual spring burns until 2003. Since 2003, rotating burns have been conducted in late fall-early spring with one burn unit left unburned each year. Newly sown portions of the prairie are managed by monthly mowing and some prairie patches are managed with yearly mowing. Invasive plant species in the prairie are removed by spot spraying or cutting and painting with herbicide or by hand pulling.

We have been monitoring our progress towards restoration goals in the prairie by inventorying the plants in regularly spaced permanent monitoring plots in the prairie since 2000. In 2006, we then compared the distribution and composition of the plant species growing at Litzsinger to those at native prairie remnants in Missouri and Illinois (Slagle et al. 2006). We found over 200 species of plants in the prairie, which was similar to remnant areas in Missouri and

Some beetles, such as this locust borer *Megacyllene robiniae,* are also important pollinators . Beetle diversity at Litzsinger Road Ecology Center remains to be studied, but could provide an interesting comparison to other pollinator groups.

Photo by James C. Trager

Bees and Butterflies (continued)

Illinois. However, the distribution of the plants in our restoration was different than that of remnants. Remnants had much higher plant diversity in individual plots than was in the LREC prairie plots. This distribution pattern could have negative impacts on animal species such as insects that operate on a small scale.1941

Almost all of the woodland at the LREC was logged over 60 years ago (Aerial photo). New growth in the woodland is primarily spontaneous, although some active restoration has been attempted in small areas. We conducted inventories of the woodland plants using the same method as in the prairie surveys from 2004 to 2007. The current tree and shrub cover is dominated by early successional and invasive species such as box elder (*Acer negundo*), bush honeysuckle (*Lonicera maackii*), Ohio buckeye (*Aesculus glabra*), elderberry (*Sambucus canadensis*), and ash (*Fraxinus americanus*) (M. Slagle unpublished data 2007). Herbaceous plant cover is dominated by the invasive plant, wintercreeper (*Euonymus hederaceus*). Invasive species removal is a large part of woodland restoration efforts and includes spot-spraying *E. hederaceus* with herbicide, cutting and painting stumps of woody species with herbicide and hand pulling garlic mustard (*Alliaria petiolata*) and Japanese hops (*Humulus japonicus*). The LREC staff also burned a small part of the woodland in late fall 2003 and 2007. We plan to replace dying successional trees with oaks, hickories, and other tree species.

While monitoring plant populations is important to understanding the success of a restoration project, animals are often assumed to follow plant population restoration without intentionally adding animal species or managing for their needs, despite the fact that diverse plant communities may have few animal species (Taron 1997). One group that often goes unmonitored is insects. Insects make up over half of all the known species on earth and carry out significant ecological roles such as decomposition, herbivory, pollination, parasitism, and predation (Wilson 1999). Without insects, pollination of the plant species thought to be so essential to the restoration of these ecosystems would not occur which could result in cascading effects on the plant and animal communities (Rathcke and Jules 1993, Buchmann and Nabhan 1996). Bees and butterflies are important pollinators in the prairies and woodlands of the Midwest, making them important taxa to examine when trying to evaluate restoration success.

Butterflies contribute to the pollination of flowering plant species by visiting many species for nectar. Some plant species require visitation by butterflies in order to reproduce (Hendrix and Kyhl 2000). Butterfly species are also good monitoring subjects because they are easy to identify and inventory and their larva are highly oligophagous, consuming plants in only one genus or family (Heitzman and Heitzman 1996). This means that they may be restricted in their habitat by their larval food source. Because many butterflies overwinter in leaf litter, they can be negatively affected by prescribed fire (Orwig 1992, Schlicht and Orwig 1992, Swengel 1998, but see Panzer 2000) and should be monitored in areas where burning is used as a management tool.

Bees are another important pollinator group, accounting for the majority of pollination of 1000 crop species (Roubik 1995) with an estimated value of $117 billion/year (Costanza et al., 1997). They are the only taxon that purposefully collects pollen, which means they are more likely to spread it from flower to flower than any other group. Many bee species, called oligoleges or oligolectic, can eat pollen from only one genus or family (Müller 1996), meaning that similar to butterfly species, they are restricted in their habitats to places where that plant is available (Buchmann and Nabhan 1996). Bees also vary in their nesting substrate (O'Toole and Raw 1991), which can determine their distribution, and their social behavior (Michener 1974), which may influence their effectiveness as pollinators and the likelihood that a collector will find them.

Bees and Butterflies (continued)

Due to bees' and butterflies' importance to ecosystems for pollination and because some species are oligophagous, or need specific nesting substrates or overwintering habitats, if a diversity of bees and butterflies, including some of these restricted bees and butterflies are present, the habitat restoration is of high conservation value and quality for pollinators. We collected bees and butterflies and evaluated their functional group status and compared them with collections from nearby natural areas to determine the conservation value of our restoration. We captured and observed bee and butterfly species in the prairie and woodland at the LREC from 1996 to 2006. We compared our results to those at remnant prairie and woodland areas within 50 km of the LREC. We evaluated number of bee and butterfly species, percent oligophagy/lecty, nesting substrate, habitat restriction, nativeness, and social behavior.

Materials and Methods

Pollinator research at LREC included two types of data: plant-focused data collections and plot data collection. Clinebell collected bees at LREC from 1996-2005. He primarily concentrated on collecting pollinators from certain species of plants to better understand their pollinator communities, particularly: *Veronicastrum virginicum*, *Echinacea purpurea*, *Eryngium yuccifolium*, *Penstemon digitalis*, *Liatris pycnostachya*, and *Monarda fistulosa*. He captured all bees and identified them using Mitchell (1960, 1962).

From 2005-2006, I took a plot-oriented approach to pollinator collecting. I ensured a representation of bees and butterflies located throughout the site by randomly choosing 30 m x 60 m plots in some of our highest quality restoration areas. I collected bees and butterflies from flowers at LREC once a month April-October in 4 locations, with a ½ hour sample for each location. I sampled the woodland in April and May when understory plants are flowering. I sampled only in weather >60° F, wind <15 mph, and clouds<50%. I used a stopwatch so that I only counted time spent collecting, not processing time. Some additional species richness information was collected in less strict collecting conditions in 2004. I collected all bees except honeybees for identification and collected representative specimens of each butterfly species. I caught and released honeybees and butterflies I had previously captured. I did not count butterflies or honeybees that were seen but not caught. I identified all bee species using the Droege et al. (2008) as my primary reference and Mitchell (1960, 1962) as a secondary reference. Michael Arduser, Missouri Dept. of Conservation, verified all bee identifications. I identified all butterfly species using Heitzman and Heitzman (1996).

The reference sites for this study are all located within 50 km of LREC (Table 1). Reference sites were chosen because at least part of the site was undisturbed by plowing or logging. Only species lists were available for butterflies, so only comparisons of numbers of species could be carried out. No analysis of numbers of butterfly individuals could occur. All reference sites included fewer individual bee collections than the LREC, some only 5% of the number collected at the LREC. Only 2 of the 7 comparison sites had 40% the number of specimen collections of those at the LREC, Tyson Research Center and Cuivre River State Park, so these bee collections were compared extensively with collections from the LREC. Other sites are only compared at the level of species richness. .

Butterfly species were assigned native, oligophagous and habitat specific status based on Heitzman and Heitzman (1996). Bee species were assigned oligolectic status based on Mitchell (1960, 1962) or Arduser (*in prep*), habitat restriction status based on Arduser (*in prep*), native status based on Mitchell (1960, 1962), Giles and Ascher (2006), or Matteson et al. (2008), nest type based on Eickwort et al. (1981), O'Toole and Raw (1991), Giles and Ascher (2006), or Matteson et al. (2008), and social behavior based on Michener (1974), Giles and Ascher (2006), or Matteson et al. (2008).

Bees and Butterflies (continued)

Table 1. Site descriptions for LREC and reference sites along with their bee and butterfly species richness.

Site name	Location	Latitude/ Longitude	Habitat Type	Size (ha)	Length of bee study (# specimens)	Bee Species Richness (# species shared with LREC)	Length of butterfly study	Butterfly Species Richness (# species shared with LREC)
Litzsinger Road Ecology Center (LREC)	St. Louis County, MO	38°37'30"N 90°22'44"W	Restored prairie, woodland	14	10 yrs (2223)	105 (105)	3 yrs	26 (26)
Calvary Cemetery	St. Louis City, MO	38°42'29" N 90°14'32"W	Prairie, old field	10	3 yrs (44)	22 (14)		-
Cuivre River State Park (CRSP)	Lincoln County, MO	39°4'46"N 90°56'23"W	Prairie, woodland	2587	5 yrs (835)	76 (42)	15 yrs	86 (26)
Englemann Woods Conservation Area	Franklin County, MO	38°34'07"N 90°46'33"W	Forest	59	4 yrs (158)	40 (22)		-
Shaw Nature Reserve (SNR)	Franklin County, MO	38°28'30"N 90°49'06"W	Glade, restored prairie, woodland, forest, wetland	979	6 yrs (481)	73 (36)		70 (25)
Tyson Research Center (TRC)	St. Louis County, MO	38°31'42"N 90°33'35"W	Forest, woodland, glade, old field	796	4 yrs (1075)	110 (51)		79 (24)
Valley View Glade Conservation Area	Jefferson County, MO	38°15'44" N 90°37'39" W	Woodland, glade	91	7 yrs (115)	45 (20)		-
Victoria Glade Conservation Area	Jefferson County, MO	38°12'07" N 90°32'37" W	Woodland, glade	97	11 yrs (211)	64 (31)		-

Bees and Butterflies (continued)

Results

Clinebell found 76 species of bees at LREC, and I found 56 species of bees. When our finds were combined, 105 species of bees in 5 families were found to occur at the LREC (Appendix).
Of the bee species, 20 were oligolectic, with 6 of these oligoleges on *Helianthus spp.* (Appendix). None of these were oligoleges on conservative plant species, although in some cases the species of the genus that occurs at LREC is a conservative species. For instance, we have 6 oligoleges on *Helianthus spp.*, which is not generally a conservative group, but at LREC we found these bees on *Helianthus maximiliani*, which is a somewhat conservative prairie species (Ladd 1993), indeed, restricted to prairie reconstructions in the St. Louis area. Eighteen of all the bee species had a restricted habitat, 11 of them being restricted to forests or woodlands.

Some of the more interesting species we found included: *Andrena (Callandrena) rudbeckiae*, which is only found in prairies or glades and is a specialist on *Ratibida* spp. and *Rudbeckia* spp., *Andrena (Thysandrena) phaceliae*, a specialist on *Phacelia* spp. that lives in forests, *Svastra obliqua*, a specialist on *Helianthus* spp. that lives only in glades and prairies, *Ptilothrix bombiformis*, a specialist on *Hibiscus* spp. that lives only in wetlands, and *Andrena (Micrandrena) polemonii*, a specialist on *Polemonium reptans* that lives in woods. *A. polemonii* is a state record for Missouri (Arduser pers. comm.).

More bee species were found at the LREC than all of the other reference sites except Tyson Research Center (Table 1). The LREC shared approximately 50% of the species with the reference sites. Similar numbers of species occurred at LREC and Tyson Research Center but fewer species occurred at Cuivre River State Park (Table 2). The bees of the LREC were similar in their functional group distribution to those at Tyson Research Center and Cuivre River State Park except that there were many more exotic, hive-nesting, eusocial individuals (specifically, more honeybees, *Apis mellifera*) at the LREC than at either of the other locations. Additionally, the LREC had a higher percentage of oligolectic species but a lower percentage of oligolectic individuals than the reference sites.

I also found 26 species of butterflies representing 8 families (Appendix). At the LREC, 22 of the 26 butterfly species were oligophagous. One was oligophagous on a conservative plant species. Three of these had a restricted habitat. This is much fewer than the number of total species found at the reference sites (Table 1). The LREC shared only around a third of the number of butterfly species that the other reference sites had, with the reference sites generally containing all or nearly all of the species occurring at the LREC (Table 1). The reference sites contained a somewhat lower percentage of exotic species than the LREC (the only exotic butterfly species at any site was the cabbage white, *Pieris rapae*) but a lower percentage of habitat restricted species (Table 3).

Some interesting butterfly species that we caught included: the Gulf Fritillary (*Agraulis vanillae*), a specialist on *Passiflora* spp. that is somewhat rare in Missouri (and a migrant from the South), the zebra swallowtail (*Eurytides marcellus*), a specialist on *Asimina triloba* that lives in the forest, the spicebush swallowtail (*Pterourus troilus troilus*), a specialist on *Lindera* spp. and *Sassafras* spp. that lives in the forest, the red admiral (*Vanessa atalanta*), a specialist on Urticaceae that lives in the woodlands, and the wild indigo dusky wing (*Erynnis baptisiae*), a specialist on *Baptisia* spp. that also now feeds on the exotic *Securigera varia* and is found only in prairies, glades and open habitats.

Bees and Butterflies (continued)

Table 2. Percentage of bee species and individuals in functional groups within the Litzsinger Road Ecology Center and comparison sites

Functional Group	% LREC species (n = 105)	% LREC individuals (n = 2,223)	% CRSP species (n=76)	% CRSP individuals (n = 835)	% TRC species (n = 110)	% TRC individuals (n = 1075)
Native/exotic						
Native	96	74	99	96	98	99
Exotic	2.9	26	1.3	4.3	1.9	0.8
Nest Substrate						
Cavity	25	14	20	16	24	17
Hive	7.7	62	9.2	13	5.4	4.4
Soil	53	18	63	43	52	58
Wood	3.8	3.5	3.9	24	2.7	17
Social Behavior						
Eusocial	23	72	34	54	24	54
Parasitic	10	2.1	3.9	3.1	15	4.2
Solitary/ communal	63	18	55	36	58	37
Subsocial	2.9	7.4	6.6	6.5	2.7	4.0
Nectar						
Oligolectic	19	6.0	3.6	14	16	10
Polylectic	81	94	96	86	84	90

Bees and butterflies (continued)

Discussion

The LREC has more bee species than any other sampled community except Tyson. This may be due to the diversity of habitats and plants present at the LREC, or because of its existence as with little other available bee friendly habitat. Because of the diversity of habitats available in close proximity at the LREC, a wider variety of bees may be attracted here than to other sampled areas. The sandy banks of Deer Creek provide good soil nesting habitat and the woodland and prairie provide nectar and pollen resources throughout the spring and summer. The dead wood and rodent nests in the woodland and dead stems in the prairie provide good cavity nesting habitat. The large size of the bee community at the LREC in comparison with other nearby areas may also be due to sampling differences. We have put in more effort into sampling the bee community at the LREC than was put into the other areas, I have studied the community for 3 years and Clinebell had studied the area for 9 years. More sampling of other nearby areas is needed to determine how many species could be added for additional sampling effort. The differences between the honeybee communities at the LREC versus reference habitats may be an interesting subject to study. Two landowners adjacent to the LREC keep approximately 7 honeybee hives annually. This close proximity to honeybee colonies increases the number of individual honeybee visitors present at the LREC in comparison to reference sites. This may provide an opportunity for further study of effects of nearby honeybee hives on a native bee community.

The butterfly community at the LREC was much smaller than that of comparison sites; however, the sites that were available for comparison with the LREC were better studied and much larger. When comparing a subsample of the overall sample at Cuivre River State Park (CRSP), the Dry Branch Prairie (8.5 ha) had only 40 butterfly species over a 14 year survey period and the Northwoods Prairie (6 ha) had 66 butterfly species over a 13 year survey period. These prairies are more comparable in size to those at the LREC than the whole of CRSP. If a two year portion of the Northwoods Prairie survey portion of CRSP is chosen, only 35 species are represented and in 2 years at Dry Branch Prairie, 24 species were represented, a relatively comparable number to those found at the LREC in a 2 year period. Over a longer period of time, equivalent numbers of butterfly species might be found at the LREC. Sampling methods may also have created discrepancies between my data and the other surveys. I used a plot sampling technique, which is not often a technique used for butterfly observation. Transects were used by the other surveys, similar to those used to monitor butterflies in the Chicago region by Panzer et al. (1992). This technique involves walking along a line through habitats and recording any observation of butterflies and does not require their capture in order to record their occurrence. However, sampling or sample size may not be the only difference between the survey at the LREC and the reference communities. The LREC may have below-average numbers of species in the butterfly community due to frequent burning, poor colonization from remnant sites, and lack of abundant host plants. Effects on butterfly populations of the current rotational burning system should be more closely analyzed. Butterflies from nearby remnants could be introduced to the LREC by catching them on other sites and releasing them at the LREC. Host plant populations could be increased by collecting and sowing seed from these species.

Bees and butterflies (continued)

Future study of the butterfly and bee species of the LREC might include looking specifically for bees and butterflies that are associated with particular plant species. We have 421 plant species on site (Slagle unpublished data). Of the plants we have at the LREC, 56 of the plant species are associated with oligolectic bee species (Arduser *in prep.*). We have found 16 of these oligoleges, and there are a possible 74 other oligolectic bee species. Of the plants we have growing at the LREC, 83 have a coefficient of conservatism >5 (Ladd 1993). Thirty-eight of the possible oligoleges visit 16 of these plant species. We currently have found only 8 of these possible conservative plant-visiting oligolectic bees on site. In order to better understand the conservation value of our bee community, we should look for these oligoleges on the conservative plant species that they visit. We might also consider increasing the population size of some of the host plants for oligoleges to encourage them to use the LREC as their habitat. Additionally, we should look for butterfly species that might be here because their food plants are here abound. We found 24 species of butterflies that are oligophagous on plants occurring at the LREC. There are an additional 76 species of butterflies that specialize on plants that occur at the LREC, none of which have a high C of C value, and occur widely in this area of Missouri. We should look for these butterfly species as well.

Table 3. Percentage of butterfly species in functional groups within the Litzsinger Road Ecology Center and comparison sites

Functional Group	% LREC species (n = 26)	% CRSP species (n = 86)	% SNR species (n = 70)	% TRC species (n = 79)
Native/exotic				
Native	96	99	99	99
Exotic	3.8	1.2	1.4	1.2
Habitat restriction				
Restricted	15	9.4	11	10
No restriction	85	91	89	90
Food plants				
Oligophagic	85	88	84	87
Polyphagic	15	12	16	13

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Speyeria cybele is an abundant butterfly of woodland openings and edges in eastern North America. Its larvae feed on the common violet, *Viola sororia.*
Both species are common at Litzsinger Road Ecology Center, St. Louis.

Photo by James C. Trager

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