Proposed Litzsinger Road Ecology Center Pollinator Survey

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Prairie restoration efforts often attempt to restore the flora of prairies, paying little or no attention to the fauna. However, in order to restore a functioning tallgrass prairie ecosystem, restoring the animal species present in a tallgrass prairie, particularly the insects, is necessary (Taron 1997). Insects make up the majority of the world's species, accounting for most of the decomposition and pollination (Wilson 1992), two necessary ecosystem services worth billions of dollars a year to the world market. In the tallgrass prairie, the majority of plant species require pollination by bees or butterflies in order to reproduce. If these plant species have been restored on a site, but cannot reproduce due to lack of pollinators, then their populations will gradually decline without the addition of seed and plants from outside the site. Pollinator surveys at restored prairies are necessary to determine if poor dispersers, rare, and remnant dependant species have dispersed to sites, as well as to ensure that common species are present.

Litzsinger Road Ecology Center (LREC) has three small prairie restorations that were planted over a period of 15 years (Davit 2000). Efforts were made to reintroduce the plant community but efforts to restore the bee and butterfly community of the tallgrass prairie have been limited to increasing floral diversity and hoping that insects will disperse to the prairie from other sites. The annual spring burning of the four prairies may have limited the winter refuges for pollinators and other animal species on the site (Taron 1997) although it likely helped manage woody and invasive plant species (Pauly 1997). Limited surveys have been conducted of the pollinator community of

Bombus spp. (Clinebell and Solodar, 2002) and Lepidoptera (Lollar 2004); however, more widespread surveys of all pollinator taxa on all flowering species throughout the flowering season are necessary in order to determine the current status of the pollinator community at LREC.

I propose to conduct a survey of bee and butterfly species in the prairie and woodland areas at LREC, with a pilot project in 2004 and the formal survey starting in April 2005. I plan to conduct this study for multiple years to get more accurate data because bee and butterfly populations can vary between years. I plan to collect bees and butterflies using an aerial net from flowers in 90 m transects near the center of each of the three prairies at one month intervals from May-September. I will conduct morning and afternoon samples in each prairie. I also plan to collect bees and butterflies in 90 m transects in the woodland areas using an aerial net during the spring flowering period (April-June). I will walk a step, then look a second approach to sample in the transects and will conduct samples for 30 min, not including handling time. I will conduct samples only if the dew has evaporated, the sky is less than 70% cloudy, the temperature is greater than 60° F, and the windspeed is less than 20 mph because bees and butterflies are sensitive to weather conditions (Michener 2000, J. Davis pers. comm.). As much as possible, I will try to identify species in the field, collecting voucher specimens of each species, but I will likely kill all captured solitary bees and skippers to preserve them for later identification as they are very difficult to identify without the aid of a microscope.

I will manage the data for this study by inputing the location captured, flower species captured on, species identity of the pollinator of each captured or observed butterfly or bee individual into Microsoft Access. I will then use a *t* test to compare the

pollinator species richness data for the site with pollinator data from similar remnant areas in Missouri or Illinois obtained from Mike Arduser, Missouri Department of Conservation, Richard Clinebell, Missouri Botanical Garden and Marlin and LaBerge (2001). Another more labor intensive possibility would be to conduct similar transect samples at multiple mesic to wet remnant prairies to collect bees and butterflies; however, because multiple samples would be necessary to get an idea of the wet-mesic remnant community I think this method would be impractical. I will also compare the composition of remnant communities with that of the LREC by calculating Jaccard's similarity indices (based on species presence/absence) for the communities and looking for greater than expected differences using the Chi-Squared test. Within the site, I will compare the pollinator species richness and the Shannon-Wiener index of species diversity at the three different prairie areas using one-way ANOVAs and will calculate the Jaccard's similarity indices between pairs of these prairies to discover differences in composition (if any) between these communities. I will also look for differences in the pollinator community between samples to discover how it changes over the flowering season by calculating Jaccard's similarity indices for each pair of sample periods and conducting ANOVAs to look for differences in species richness and diversity over the season. Finally, I will compare the pollinator species richness, diversity, and composition between the prairie and the woodland (paired by sample period) using Jaccard's indices and one-way ANOVAs.

This data will identify what pollinator species are present at LREC and what species we would expect to see that are not present. We will be able to understand what forb species are important for pollinator species that are here currently, what forb species

are not being visited by pollinators (which may be lacking for those plants), what seasons that pollinator activities decline (which may be seasons where flowering forb diversity is low), and which areas at LREC attract the most species of pollinators. The study will direct future activities to restore pollinator species and the plants they pollinate at LREC, and may be informative for other restoration projects.

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