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A Preliminary Survey of Bees (Apoidea) from Prairie State Park, Missouri.

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Abstract

A preliminary inventory of the bee fauna of Prairie State Park was conducted from May through October in 2003. The 1,498 hectare park is located in Barton County and protects the largest remaining stand of tallgrass prairie in Missouri. A total of 60 hours of sampling was conducted with an aerial net on seventeen different dates. Seventy eight species of bees from five families and twenty-four genera were represented on the preserve. Thirteen species (17 % of the fauna) were parasitic on other bees 46 species (59%) were polylectic, 18 species (23%) oligolectic, and 14 species (18%) of unknown floral preference. Sixty three percent of the park's bee fauna is shared with other prairies sampled within Missouri. Natural Community Dependency (NCD) is an estimate (based on collection data and observations) of a species' fidelity to natural communities. Two species in the fauna are considered highly NCD [*Colletes nudus* Robertson and *Lasioglossum* (*Evylaeus*) *truncatum* (Robertson)], and three species are moderately NCD [*Andrena commoda* Smith, *Bombus fraternus* (Smith), and *Halictus parallelus* Say]. Two new state records were collected: *Coelioxys biscornua* Hill and *Melliodes menuachus* Cresson.

Introduction

The awareness of the need to conserve native bee populations to pollinate native plants has stimulated interest in faunistic surveys. The objective of this research was to begin to assess the bee fauna of Prairie State Park.

Methods

Study Site --Prairie State Park is located in Barton County, Missouri. It is situated on rolling upland prairie over sandy and silt loam soils derived from shale and sandstone. Prairie head-water streams, wet depressions, sandstone outcrops and ledges are some features. A visitor's center features interpretive exhibits and programs for the public. There are a number of hiking trails. Bison and elk roam the park, and it is also home to breeding populations of many native grassland birds. Coyotes, deer, bobcats, burrowing crayfish, bullsnakes, regal fritillary butterflies, greater prairie chickens, Henslow's sparrows, short-eared owls, upland sandpipers, scissor-tailed flycatchers, northern crayfish frogs, prairie mole cricket, northern harriers and nearly 600 plant species including Mead's milkweed have been observed at Prairie State Park" (Kurz 2003).

The park is 1,498 hectares, most of which is original tall grass prairie. It includes the largest remaining stand of tallgrass prairie in Missouri. The park also contains four natural areas: Regal Prairie Natural Area (97 hectares); Tri-Sho Prairie Natural Area (97 hectares); East Drywood Creek Natural Area (20 hectares) and Hunkah Prairie Natural Area (65 hectares). (Kurz 2003)

The park is located within the Cherokee Plains subsection of the Osage Plains ecological section of Missouri. "This subsection is one continuous plain of very low relief (usually of less than 80 feet) mostly on Pennsylvanian sandstones and shales, but with associated thin-bedded limestones and coal. Streams have hardly dissected the surface and valleys are topographically subdued. Wetlands are abundant throughout the wide, flat alluvial plains. Claypan soils add further distinction to the subsection. Presettlement vegetation was both upland and wet prairie, with timber confined to narrow strips along stream courses. Most of the land is in farms, both pasture and cropland, with local areas of extensive strip mines. Substantial prairie remnants occur, many in conservation ownership. Mean annual precipitation is 40-42 inches. The wettest months are May-June and September-October, and 64 percent of the annual precipitation occurs during the six warmer months of the year. Annual snowfall ranges from 18 inches in the north to 13 inches in the south. Mean July maximum daily temperature is 90 91degrees F. The growing season averages 210 days. (Nigh & Schroeder 2002)

Sampling and Identification - Sampling took place on approximately weekly intervals from 22 May through 21 October 2003. A total of 60 hours collecting ranged between 09:00 am and 5:15 pm on 17 dates. Collecting entailed regularly sampling nine sites within the park, as indicated on Figure 1. These included a forested campground site (four locations within that area), five prairie flower sites along roadsides, and extended hikes through three sites within prairie natural areas (Regal, Hunkah, and Tri-Sho Prairies). Additional sites were included on occasion. Bees were collected with an aerial net. Species identifications were made by M. Arduser.

Results and Discussion

A total of 78 species were collected, including thirteen cleptoparasites (17% of the fauna), representing five families and 24 genera (Table 1). Comparing this list to the bee species known from other prairies in Missouri (Table 2, Arduser, unpublished data), it can bee seen that thirty two bee species found at Prairie State Park (63% of the fauna) are common to all Missouri prairies. Two new state records were collected: *Coelioxys biscornua* Hill and *Melliodes menuachus* Cresson.
Two species are considered highly NCD [*Colletes nudus* Robertson and *Lasioglossum* (*Evylaeus*) *truncatum* (Robertson)], and three species are moderately NCD [*Andrena commoda* Smith, *Bombus fraternus* (Smith), and *Halictus parallelus* Say].

Natural Community Dependency (NCD) it similar to the concept of conservatism embraced by many plant ecologists. It is an estimate (based on collection data and observations) of a species' fidelity to natural communities. For example, *Halictus ligatus* (even though it is a common and often abundant bee in many natural communities) has low natural community dependency because it is not remotely confined to natural communities, but is readily found in all types of habitats that aren't natural communities (old fields, edges of agricultural fields, back yards, groomed parks, etc.). *H. ligatus* is a kind of bee equivalent of the American robin. On the other hand, *Colletes nudus* appears to be largely confined to natural communities or their remnants based on all the available data. One might worry about confusing rareness with natural community dependency, but when a species repeatedly shows up in natural communities throughout a region at a variety of sites and years (as is the case with *C. nudus*), but not in disturbed sites, NCD seems like a reasonable conclusion, even though we can't pinpoint why *C. nudus* would be NCD.

These results are preliminary. Collecting in 2003 was initiated after the flight season began and it is expected that some early flying species were missed. In April 2005 some additional collecting was carried out, and continued collecting is planned for the future. Additional information on flight seasons, relative abundance and flower visitation is currently being analyzed.

Acknowledgements

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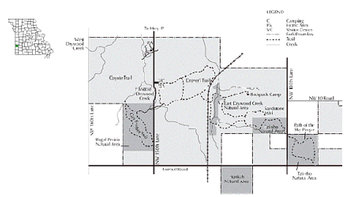


Figure 1. Map of Prairie State Park, indicating the nine sites that were regularly sampled.

Table 1. A preliminary List of Bees from Prairie State Park, Missouri.

Colletidae	
Colletinae	
Colletes americanus Cresson	
Colletes nudus Robertson	Highly NCD[1]
Hylaeinae	
Hylaeus (Prosopis) affinis Smith	
Hylaeus (Hylaeus) mesillae (Cockerell)	
Andrenidae	
Andreninae	
Andrena (Rhacandrena) brevipalpis Cockerell	
Andrena (Melandrena) commoda Smith	Moderately NCD
Andrena (Melandrena) crataegi Robertson	
Andrena (Gonandrena) integra Smith	
Andrena (Gonandrena) nigrifrons (Cresson)	
Andrena (Cellandrena) nuda Robertson	
Halictidae	
Halictinae	
Agapostemon (Agapostemon) nericeus (Forster)	
Agapostemon (Agapostemon) texanus Cresson	
Agapostemon (Agapostemon) virescens (Fabricius)	
Augochlora (Augochlora) pura (Say)	
Augochlorella (Augochlorella) persimilis (Viereck)	
Augochlorella (Augochlorella) striata (Provancher)	
Augochloropsis (Paraugochloropsis) metallica fulgida (Smith)	
Augochloropsis (Paraugochloropsis) metallica metallica (Fabricius)	
Lasioglossum (Dialictus) admirandum (Sandhouse)	
Lasioglossum (Dialictus) anomalum (Robertson)	
Lasioglossum (Dialictus) coreopsis (Robertson)	
Lasioglossum (Dialictus) imitatum (Smith)	
Lasioglossum (Dialictus) rohweri (Ellis)	
Lasioglossum (Dialictus) versatum (Robertson)	
Lasioglossum (Dialictus) zephyrum (Smith)	
Lasioglossum (Evylaeus) pectorale (Smith)	
Lasioglossum (Evylaeus) truncatum (Robertson)	Highly NCD
Lasioglossum (Lasioglossum) fuscipenne (Smith)	
Halictus (Seladonia) confusus Smith	
Halictus (Monelictus) ligatus Say	
Halictus (Nealictus) parallelus Say	Moderately NCD
Halictus (Protohalictus) rubicundus (Christ)	
Sphecodes clematidis Robertson	
Sphecodes heraclei Robertson	
Sphecodes minor (Robertson)	
Sphecodes stygius Robertson	
Megachilidae	
Megachilinae	
Coelioxys (Xerocoelioxys) biconcornis Hill	New State Record
Coelioxys (Boreocoelioxys) sayi Robertson	
Heriades (Neotrypetes) carinata Cresson	
Heriades (Neotrypetes) variolosa Crawford	
Hoplitis (Alcidamea) pilosifrons (Cresson)	
Hoplitis (Alcidamea) producta (Cresson)	
Megachile (Xanthosarus) addenda Cresson	
Megachile (Litomegachile) brevis Say	
Megachile (Chelostomoides) exilis (Cresson)	
Megachile (Xanthosarus) fortis Cresson	
Megachile (Sayapis) inimica Cresson	
Megachile (Litomegachile) mendica Cresson	
Megachile (Legtorachis) petulans Cresson	
Apidae	
Xylocopinae	
Ceratina (Zadontomerus) calcarata Robertson	
Ceratina (Zadontomerus) strenua Smith	
Xylocopa virginica (Linnaeus)	
Nomadinae	
Doeringiella (Triepeolus) concava Cresson	
Doeringiella (Triepeolus) simplex (Robertson)	
Doeringiella sp.	
Epeolus sp.	
Nomada articulata Smith	
Nomada pygmaea Cresson	
Nomada texana Cresson	
Apinae	
Apis mellifera L.	
Bombus (Bombias) nevadensis auricomus Robertson	
Bombus (Fraternobombus) fraternus (Smith)	
Bombus (Separatobombus) griseocollis (DeGeer)	
Bombus (Pyrobombus) impatiens Cresson	
Bombus (Pervidobombus) pennsylvanicus (DeGeer)	Moderately NCD
Bombus (Tyrobombus) vagans Smith	
Melissodes (Eumelissodes) agilis Cresson	
Melissodes (Melissodes) bimaculata (Lepeletier)	
Melissodes (Eumelissodes) boltonius Robertson	
Melissodes (Melissodes) communis Cresson	
Melissodes (Melissodes) comptoides Robertson	
Melissodes (Eumelissodes) coreopsis Robertson	
Melissodes (Eumelissodes) denticulata Smith	
Melissodes (Heliomelissodes) desponsa Smith	
Melissodes (Eumelissodes) menuachus Cresson	New State Record
Melitoma taurea (Say)	
Ptilothrix bombiformis (Cresson)	
Svastra (Epimelissodes) obliqua (Say)	

Total Species	78	
Polylectic species	46	59%
Oligolectic Species	18	23%
Unknown Floral Preference	14	18%
Cleptoparasitic Species	13	17%

1. Natural Community Dependency (NCD) is an estimate (based on collection data and observations) of a species' fidelity to natural communities. For example, *Halictus ligatus* has low natural community dependency because it is not remotely confined to natural communities, but is readily found in all types of habitats that aren't natural communities (old fields, edges of agricultural fields, back yards, groomed parks, etc.). On the other hand, *Colletes nudus* appears to be largely confined to natural communities or their remnants based on all the available data.

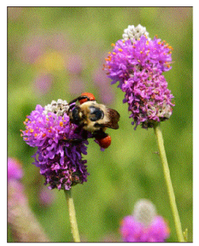
Table 2. Bee species common to all prairie types sampled in Missouri [1]

Colletidae
Colletes compactus
C. inaequalis
Hylaeus affinis
H. illinoisensis
H. mesillae
H. modestus
H. sp A
Andrenidae
Andrena imitatrix
Halictidae
Agapostemon virescens
Halictus confusus
H. ligatus
H. tuberculus
Lasioglossum (*Evylaeus*) *cinctipes*
L. (*E.*) *pectorale*
L. (*Dialictus*) *admirandum*
L. (*D.*) *illinoense*
L. (*D.*) *imitatum*
L. (*D.*) *rohweri*
L. (*D.*) *tegulare*
L. (*D.*) *versatus*
L. (*D.*) *zephyrum*
Sphecodes creaseyi
Augochlora pura
Augochlorella persimilis
A. striata
Megachilidae
Megachile brevis
M. exilis
M. mendica
M. montivaga
M. petulans
M. texana
Coelioxys octodentata
C. sayi
Heriades carinata
H. leavitti
H. variolosa
Apidae
Xylocopa virginica
Ceratina calcarata
C. dupla
Melissodes agilis
M. bimaculata
M. communis
M. rustica
M. trinodis
Svastra obliqua
Bombus bimaculatus
B. fraternus
B. griseocollis
B. impatiens
B. pennsylvanicus
Apis mellifera

Total Species	51	
Polylectic species	44	86%
Oligolectic Species	4	8%
Cleptoparasitic Species	3	6%

1. (M. Arduser, unpublished data).

Andrena sp. on liverleaf, *Hepatica nobilis*.



Bombus sp. on purple prairie clover, *Petalostemon purpureum*

Picnic area in wooded site (site number 1 on map).

Regal Prairie Natural Area (site number 6 on map).

Tri-Sho Prairie Natural Area (site number 9 on map).

Hunkah Prairie Natural Area (site number 7 on map).

Looking East into Creek Basin Containing Bison (site number 4 on map).