What can bees tell us about our prairies?

Chris Helzer photo

Elements of a bee community profile

Total no. of individual bees collected
Total no. of bee species collected (N)
No. of exotic/introduced species (nx)
No. of native species (nn)
No. of pollen-collecting species (np)
No. of pollen generalist species (P)
No. of pollen specialist species (O)
No. of cleptoparasitic species (C)
PO ratio (P/np x 100, O/np x 100)
POC ratio (P/N x100, O/N x 100, C/N x 100)
Flight curve
No. univoltine species
No. bi/multivoltine species
No. social species
No. conservative species
% of potential oligoleges found (observed vs. expected)
Abundance rankings
Regionally rare or uncommon species
No. singletons, doubletons, etc.
Accidental species
No. ground-nesting species
- shallow sp.
- deep sp.
- sand obligate sp.

No. on or above ground-nesting species
- in cavities
- in pithy stems
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Plant families and genera supporting oligolectic bees on Missouri prairies

Anacardiaceae 1 (*Rhus*)
Apiaceae 4 (*Lomatium*, *Perideridia, Polytaenia, Taenidia, Thaspium, Zizia)*
Asteraceae 50 + (*Aster s.l., Cirsium, Chrysopsis/Heterotheca, Coreopsis, Echinacea, Grindelia, Helianthus, Pyrrhopappus, Ratibida, Rudbeckia, Senecio, Solidago, Vernonia)*
Boraginaceae 1 *(Onosmodium)*
Cactaceae 2 (*Opuntia*)
Campanulaceae 2 (*Campanula*, *Triodanis*)
Convolvulaceae 2 (*Ipomoea*)
Cornaceae 4 (*Cornus*)
Fabaceae 14 (*Amorpha, Dalea, Psoralea s.l., Strophostyles, Tephrosia*)
Labiatae 2 (*Monarda, Salvia*)
Lilliaceae (*Erythronium, Nothoscordum*)
Malvaceae 3 *(Callirhoe*, *Hibiscus*)
Onagraceae 3 (*Oenothera*)
Primulaceae 2 *(Lysimachia)*
Portulacaceae 1 (*Claytonia*)
Rhamnaceae 1 (*Ceanothus*)
Rosaceae 1 *(Potentilla)*
Salicaceae 8 (*Salix*)
Saxifragaceae 1 *(Heuchera)*
Scrophulariaceae 1 (*Penstemon*)
Solanaceae 3 (*Physalis*)
Verbenaceae 1 (*Verbena*)
Violaceae 1 (*Viola*)


Tetraloniella cressoniana,
specialist on *Salvia azurea*
Photo: Johnson Co. Parks, KS

Andrena nothoscordi,
specialist on *Nothoscordum bivalve*

Photo: Edge of Appalachia Preserve


Melissodes desponsus,
specialist on late summer *Cirsium* spp.
James Trager photo


Colletes compactus, specialist on
Asters and goldenrods
Karen Campbell photo

Profiles of two remnant prairie communities, Johnson Co. KS (2017)

	Ogg (11ac.)	Kill Creek (15 ac.)
Total no. of species collected (N)……..	56	49
No. of individual bees collected …….	159	128
No. of exotic/introduced species (nx)……..	1	1
No. of native species (nn)……..	55	48
No. of pollen-collecting species (np)……	48	47
No. of pollen generalist species (P)……	33	37
No. of pollen specialist species (O)…….	15	10
No. of cleptoparasitic species (C)……	8	2
PO ratio (P/np x 100, O/np x 100)……	69:31	79:21
POC ratio (P/N x100, O/N x 100, C/N x 100)…….	59:27:14	75:21:4
% of potential oligoleges found (observed vs. expected)	**13/31**	**8/34**
Flight curve……	(22,5,8,11,4,11,14)	(8,13,18,13,7,12,7)
No. univoltine species……	20	23
No. bi/multivoltine species…….	13	14
No. social species……	14	10
No. conservative species……	2	2
Abundant species (no.'s of individuals >15%)…….	0	2
Regionally rare or uncommon species……..	1	0
No. singletons ……	31	25
Accidental species……..	0	0
No. soil-nesting species……	38 (72%)	30 (63%)
sand obligates……	0	0
No. on or above ground-nesting species……..	18 (34%)	20 (42%)
in cavities……..		
in pithy stems…….	12	10
in dead wood……..	2	2
on ground surface…	4	4
No. plant species collected from……..	16	17

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Bee species relative abundance on two Missouri prairie remnants after 22 years

1988 (total individual bees = 1,001)
Lasioglossum versatum complex (12%)
Augochlorella aurata/persimilis (10%)
Megachile brevis (5%)
Halictus ligatus (5%)
Ceratina mikmaqi/calcarata (5%)
Bombus pensylvanicus (4%)
Agapostemon virescens (3%)
Bombus griseocollis (3%)
= 47%

2010 (= 568)
Lasioglossum versatum complex (16%)
Augochlorella aurata/persimilis (11%)
Ceratina strenua (4%)
Halictus ligatus (4%)
Ceratina mikmaqi/calcarata (3%)
Megachile brevis (2%)
Megachile mendica (2%)
Bombus griseocollis (2%)
=44%

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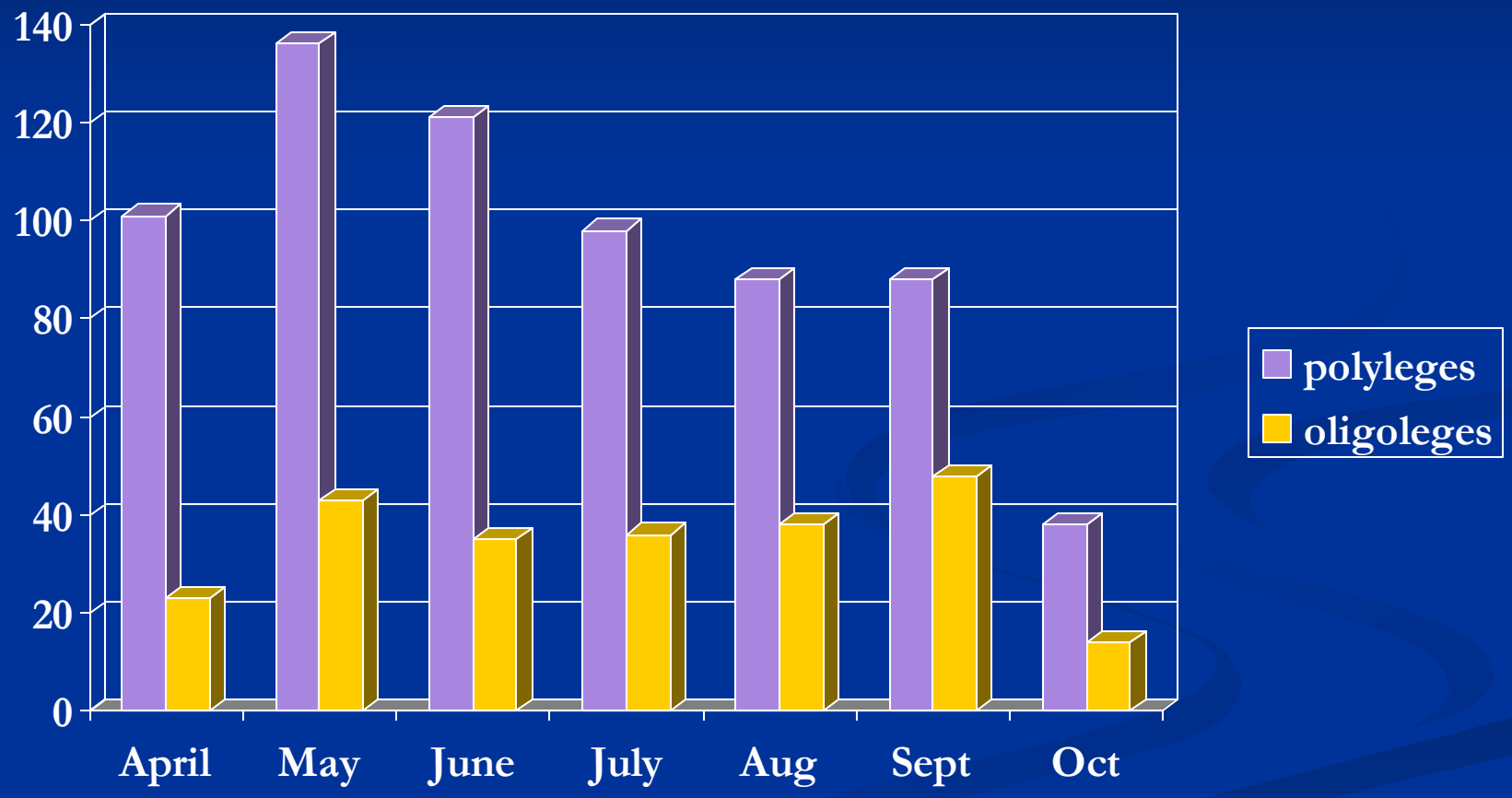
Number of bee species active by month (statewide, MO)



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Creating PO/POC ratios

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N…....total number of species found
nx ….number of exotics found
C..…number of cleptoparasitic (cuckoo) species found
np….. number of pollen-collecting species found
P….number of pollen generalists found
O….number of pollen specialists found

	N	nx	C	np	P	O	P:O:C
Ogg Prairie	56	1	8 (15%)	47	32 (68%)	15 (32%)	57:27:14
J. Smith West	51	1	6 (12%)	44	28 (61%)	17 (39%)	55:33:12
Friendly/Drovers	126	1	19 (15%)	107	67 (63%)	40 (37%)	53:32:15

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Friendly/Drovers	126	1	19 (15%)	107	67 (63%)	40 (37%)	53:32:15
Neal Smith	112	2	14 (12%)	98	78 (80%)	20 (20%)	70:18:12

Iowa hill prairie restoration – USFWS McGregor site (years 1 and 2)

	N	nx	C	np	P	O	P:O	P:O:C
NE IA (2012-13)	68	2	5	63	55	8	87:13	81:12:7

Neal Smith Refuge (after 20 + years)

Central IA, (sampled in 2014-2016)	112	2	14	98	78	20	80:20	70:18:12

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C.….number of cleptoparasitic (cuckoo) species found
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Pollen dependency among native bees in Missouri