

Supplementary Material

Rapid bee inventories for monitoring changes in Cerrado assemblages: Complementary traps for multiple taxa and trait groups.

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Table S1 Decimal coordinate of each trap (Malaise) or transect of traps (blue cup traps and Bootle scent traps) in Parque Nacional de Brasília (Brazil, Distrito Federal)

Name	Decimal latitude	Decimal longitude	Method
Site 1	15.728715	47.953998	Blue cup traps
Site 2	15.731.977	47.971.782	
Site 3	15.740.539	47.987575	
Site 4	15.708.637	47.924.378	
Site 5	15.729039	47.925729	Scent bottle traps
Site 6	15.727012	47.944264	
Site 7	15.706846	47.954662	
Site 8	15.,72525	47.939.833	Malaise traps
Site 9	15.729.361	47.941.778	
Site 10	15.725.389	47.939.722	
Site 11	15.729.278	47.941.917	
Site 12	15.729.278	47.942.139	

Table S2 Bee species recorded at Parque Nacional de Brasília with each methodology

Taxon	Blue cup trap	Malaise	B-scent trap	Total
Andrenidae				
Oxaeini				
<i>Oxaea flavescens</i> Klug, 1807	11	0	1	12
<i>Oxaea mourei</i> Graf, 1992	744	0	0	744
Apidae				
Ancyloscelidini				
<i>Ancyloscelis aff. apiformis</i>	20	0	0	20
Apini				
<i>Apis mellifera</i> Linnaeus, 1758	335	17	20	372
Bombini				
<i>Bombus (Fervidobombus) brevivillus</i> Franklin, 1913	258	1	2	261
<i>Bombus (Fervidobombus) cf. pauloensis</i> Friese, 1913	40	0	0	40
<i>Bombus (Fervidobombus) morio</i> (Swederus, 1787)	150	0	0	150
Centridini				
<i>Centris (Aphemisia) mocsaryi</i> Friese, 1899	1	0	0	1
<i>Centris (Centris) aenea</i> Lepeletier, 1841	4	0	0	4
<i>Centris (Centris) nitens</i> Lepeletier, 1841	3	0	0	3
<i>Centris (Centris) spilopoda</i> Moure, 1969	1	0	0	1
<i>Centris (Hemisiella) tarsata</i> Smith, 1874	3	0	0	3
<i>Centris (Ptilotopus) denudans</i> Lepeletier, 1841	2	0	0	2
<i>Centris (Ptilotopus) maranhensis</i> Ducke, 1910	2	0	0	2
<i>Centris (Ptilotopus) scopipes</i> Friese, 1899	14	0	0	14
<i>Centris (Trachina) machadoi</i> Azevedo & Silveira, 2005	1	0	0	1
<i>Centris (Xanthemisia) lutea</i> Friese, 1899	7	0	1	8
<i>Epicharis (Anepicharis) dejeanii</i> Lepeletier, 1841	3	0	0	3
<i>Epicharis (Epicharis) flava</i> Friese, 1900	18	0	0	18
<i>Epicharis (Epicharitides) iheringi</i> Friese, 1899	1	0	0	1

<i>Epicharis (Epicharoides) albofasciata</i> Smith, 1874	2	0	0	2
<i>Epicharis (Hoplepicharis) affinis</i> Smith, 1874	4	0	0	4
<i>Epicharis (Triepicharis) analis</i> Lepeletier, 1841	41	0	0	41
<i>Epicharis (Xanthepicharis) bicolor</i> Smith, 1854	24	0	0	24

Ceratinini

<i>Ceratina (Ceratinula) minima</i> Friese, 1908	1	3	0	4
<i>Ceratina (Crewella) acuminata</i> Roig-Alsina 2022	3	0	0	3
<i>Ceratina (Crewella) cf. gossypii</i> Schrottky, 1907	76	1	1	78
<i>Ceratina (Crewella) paraguayensis</i> Schrottky, 1907	30	0	0	30
<i>Ceratina (Crewella) sericea</i> Friese, 1910	2	0	0	2
<i>Ceratina (Crewella) sp. 1</i>	2	0	0	2
<i>Ceratina (Crewella) sp. 2</i>	9	0	0	9
<i>Ceratina (Crewella) sp. 3</i>	1	0	0	1
<i>Ceratina (Crewella) sp. 6</i>	3	0	0	3
<i>Ceratina (Crewella) sp. 7</i>	1	0	0	1
<i>Ceratina (Crewella) sp. 8</i>	5	0	0	5
<i>Ceratina (Crewella) sp. 9</i>	2	0	0	2
<i>Ceratina (Crewella) sp. 10</i>	1	0	0	1
<i>Ceratina (Crewella) sp. 11</i>	1	0	0	1
<i>Ceratina (Neoclavicera) sp. 4</i>	15	0	0	15

Emphorini

<i>Melitoma danunciae</i> Oliveira & Engel, 2015	50	0	0	50
<i>Melitoma segmentaria</i> (Fabricius, 1804)	8	0	0	8
<i>Ptilothrix plumata</i> Smith, 1853	13	0	0	13

Ericrocidini

<i>Ctenioschelus goryi</i> (Romand, 1840)	1	1	0	2
<i>Hopliphora velutina</i> Lepeletier & Serville, 1825	0	1	0	1
<i>Mesocheira bicolor</i> (Fabricius, 1804)	1	0	0	1
<i>Mesonychium asteria</i> (Smith, 1854)	1	0	0	1

Eucerini

<i>Florilegus (Euflorilegus) fulvipes</i> (Smith, 1854)	1	0	0	1
<i>Florilegus</i> sp.	1	0	0	1
<i>Peponapis fervens</i> (Smith, 1879)	7	0	0	7
<i>Thygater (Thygater) analis</i> (Lepeletier, 1841)	14	0	0	14
Euglossini				
<i>Eufriesea aff. surinamensis</i>	0	0	1	1
<i>Eufriesea auriceps</i> (Friese, 1899)	0	0	12	12
<i>Eufriesea</i> sp. 1	3	0	175	178
<i>Eufriesea</i> sp. 2	1	0	0	1
<i>Euglossa (Euglossa) amazonica</i> Dressler, 1982	0	0	4	4
<i>Euglossa (Euglossa) cordata</i> (Linnaeus, 1758)	3	0	12	15
<i>Euglossa (Euglossa) fimbriata</i> Moure, 1968	0	0	7	7
<i>Euglossa (Euglossa) leucotricha</i> Rebêlo & Moure, 1996	0	0	1	1
<i>Euglossa (Euglossa) melanotricha</i> Moure, 1967	18	0	182	200
<i>Euglossa (Euglossa) pleosticta</i> Dressler, 1982	0	0	3	3
<i>Euglossa (Euglossa) securigera</i> Dressler, 1982	2	0	124	126
<i>Euglossa (Euglossa) townsendi</i> Cockerell, 1904	0	1	0	1
<i>Euglossa (Glossura) imperialis</i> Cockerell, 1922	1	0	4	5
<i>Euglossa</i> sp.	5	0	0	5
<i>Eulaema (Apeulaema) cingulata</i> (Fabricius, 1804)	1	0	88	89
<i>Eulaema (Apeulaema) nigrata</i> Lepeletier, 1841	41	0	266	307
<i>Eulaema (Eulaema) helvola</i> Moure, 2003	1	0	0	1
<i>Exaerete dentata</i> (Linnaeus, 1758)	0	0	5	5
Exomalopsini				
<i>Exomalopsis (Exomalopsis) sp.</i>	0	0	1	1
<i>Exomalopsis (Phanomalopsis) sp.</i>	0	0	1	1
<i>Exomalopsis (Exomalopsis) analis</i> spinola, 1853	8	0	0	8
<i>Exomalopsis (Exomalopsis) auropilosa</i> spinola, 1853	5	2	1	9
<i>Exomalopsis (Exomalopsis) cf. campestris</i> Silveira, 1996	1	0	0	1
<i>Exomalopsis (Exomalopsis) fulvofasciata</i> Smith, 1879	158	0	9	167

<i>Exomalopsis (Exomalopsis) minor</i> Schrottky, 1910	1	0	0	1
Meliponini				
<i>Geotrigona aequinoctialis</i> (Ducke, 1925)	29	0	0	29
<i>Geotrigona mombuca</i> (Smith, 1863)	0	0	2	2
<i>Geotrigona subterranea</i> (Fries, 1901)	0	0	1	1
<i>Lestrimelitta limao</i> (Smith, 1863)	0	1	718	719
<i>Lestrimelitta rufipes</i> (Fries, 1903)	0	0	1	1
<i>Leurotrigona muelleri</i> (Fries, 1900)	0	0	3	3
<i>Melipona (Melikerria) quinquefasciata</i> Lepeletier, 1836	14	3	0	17
<i>Paratrigona lineata</i> (Lepeletier, 1836)	55	33	13	101
<i>Partamona ailyae</i> Camargo, 1980	1	10	8	19
<i>Partamona combinata</i> Pedro & Camargo, 2003	1	2	45	48
<i>Partamona cupira</i> (Smith, 1863)	1	0	73	74
<i>Plebeia droryana</i> (Fries, 1900)	52	3	4	59
<i>Scaptotrigona</i> sp.	0	0	1	1
<i>Tetragona clavipes</i> (Fabricius, 1804)	79	5	7	92
<i>Tetragonisca angustula</i> (Latreille, 1811)	1	1	0	2
<i>Trigona hyalinata</i> (Lepeletier, 1836)	0	36	8	44
<i>Trigona spinipes</i> (Fabricius, 1793)	522	36	28	586
<i>Trigonisca aff. intermedia</i>	0	0	1	1
<i>Trigonisca intermedia</i> Moure, 1990	0	0	13	13
Nomadini				
<i>Odyneropsis armata</i> (Fries, 1900)	3	2	0	5
Osirini				
<i>Osiris</i> sp. 1	1	0	0	1
<i>Osiris</i> sp. 2	1	0	0	1
Rhathymini				
<i>Rhathymus nigripes</i> Fries, 1912	1	0	0	1
<i>Rhathymus cf. michaelis</i> Fries, 1900	1	0	0	1
<i>Rhathymus unicolor</i> (Smith, 1854)	12	0	0	12

Tapinotaspidini

<i>Arhysoceble</i> sp. 1	1	0	0	1
<i>Chalepogenus</i> sp. 1	1	0	0	1
<i>Monoeca pluricincta</i> (Vachal, 1909)	0	0	1	1
<i>Paratetrapedia connexa</i> (Vachal, 1909)	1	0	0	1
<i>Paratetrapedia punctata</i> Aguiar & Melo, 2011	163	7	0	170
<i>Tropidopedia flavolineata</i> Aguiar & Melo, 2007	22	0	0	22
<i>Tropidopedia punctifrons</i> (Smith, 1879)	8	0	0	8
<i>Xanthopedia larocai</i> Moure, 1992	9	1	0	10

Tetrapediini

<i>Tetrapedia ornata</i> (spinola, 1853)	5	0	0	5
<i>Tetrapedia tereza</i> Rocha-Filho & Aguiar, 2024	50	2	1	53

Xylocopini

<i>Xylocopa</i> cf. (<i>Cirroxylocopa</i>) <i>vestita</i> Hurd & Moure, 1963	4	0	0	4
<i>Xylocopa</i> (<i>Nanoxylocopa</i>) <i>ciliata</i> Burmeister, 1876	3	0	0	3
<i>Xylocopa</i> (<i>Neoxylocopa</i>) <i>grisescens</i> Lepeletier, 1841	2	0	0	2
<i>Xylocopa</i> (<i>Neoxylocopa</i>) <i>hirsutissima</i> Maidl, 1912	467	0	4	471
<i>Xylocopa</i> (<i>Neoxylocopa</i>) <i>nigrocincta</i> Smith, 1854	11	0	0	11
<i>Xylocopa</i> (<i>Schonnherria</i>) <i>subcyanea</i> Pérez, 1901	9	0	0	9

Colletidae**Caupolicanini**

<i>Ptiloglossa hemileuca</i> Moure, 1944	0	0	1	1
<i>Ptiloglossa pretiosa</i> (Fries, 1898)	0	0	10	10
<i>Ptiloglossa</i> sp. 1	4	3	0	7
<i>Ptiloglossa</i> sp. 2	0	0	4	4

Hylaeini

<i>Hylaeus</i> sp.	0	0	1	1
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Halictidae	0	0	0	0
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Augochlorini

<i>Augochlora</i> (<i>Augochlora</i>) sp.	2	1	2	5
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<i>Augochlora (Augochlora) aff. curvinasis</i>	1	0	0	1
<i>Augochlora (Augochlora) aff. microsticta</i>	1	0	0	1
<i>Augochlora (Augochlora) aff. silveirai</i>	1	0	0	1
<i>Augochlora (Augochlora) aguiari</i> Gonçalves & Lepeco, 2026	2	0	0	2
<i>Augochlora (Oxystoglossella) aurinasis</i> (Vachal, 1911)	0	4	0	4
<i>Augochlora (Augochlora) caerulea</i> Cockerell, 1900	2	0	0	2
<i>Augochlora (Augochlora) cephalica</i> (Moure, 1941)	1	0	0	1
<i>Augochlora (Augochlora) cf. rhea</i> Gonçalves & Lepeco, 2026	1	0	0	1
<i>Augochlora (Augochlora) detudis</i> (Vachal, 1911)	5	0	0	5
<i>Augochlora (Augochlora) daphnis</i> Smith, 1853	0	0	1	1
<i>Augochlora (Augochlora) esox</i> (Vachal, 1911)	0	3	0	3
<i>Augochlora (Augochlora) micans</i> (Moure, 1940)	8	0	4	12
<i>Augochlora (Oxystoglossella) morrae</i> Strand, 1910	0	1	0	1
<i>Augochlora (Augochlora) scabrata</i> Lepeco & Gonçalves, 2020	1	0	0	1
<i>Augochlora (Augochlora) vachali</i> Gonçalves & Lepeco, 2026	12	0	0	12
<i>Augochlorella kelliæ</i> Gonçalves, 2019	4	1	0	5
<i>Augochloropsis aurifluens</i> (Vachal, 1903)	2	0	3	5
<i>Augochloropsis smithiana</i> (Cockerell, 1900)	20	1	0	21
<i>Augochloropsis</i> sp. 1	20	1	1	22
<i>Augochloropsis</i> sp. 2	14	1	1	16
<i>Augochloropsis</i> sp. 3	14	0	0	14
<i>Augochloropsis</i> sp. 4	14	0	0	14
<i>Augochloropsis</i> sp. 5	2	0	0	2
<i>Augochloropsis</i> sp. 6	2	0	0	2
<i>Augochloropsis</i> sp. 7	3	5	0	8
<i>Augochloropsis</i> sp. 8	2	0	0	2
<i>Augochloropsis</i> sp. 9	2	0	0	2
<i>Augochloropsis</i> sp. 10	2	0	0	2
<i>Augochloropsis</i> sp. 11	1	0	0	1
<i>Augochloropsis</i> sp. 12	1	0	0	1

<i>Augochloropsis</i> sp. 13	1	0	0	1
<i>Augochloropsis</i> sp. 14	1	0	0	1
<i>Augochloropsis</i> sp. 15	1	0	0	1
<i>Augochloropsis</i> sp. 16	1	0	0	1
<i>Augochloropsis</i> sp. 17	2	0	0	2
<i>Augochloropsis</i> sp. 18	1	0	0	1
<i>Augochloropsis</i> sp. 19	0	3	0	3
<i>Ceratalictus clonius</i> (Brèthes, 1909)	9	2	0	11
<i>Ceratalictus stigon</i> (Vachal, 1911)	18	2	0	20
<i>Megalopta guimaraesi</i> Santos & Silveira, 2009	0	0	1	1
<i>Pereirapis</i> cf. <i>rhizophila</i> Moure, 1943	1	0	0	1
<i>Pseudaugochlora callaina</i> Almeida, 2008	11	0	0	11
<i>Pseudaugochlora flammula</i> Almeida, 2008	10	0	0	10
<i>Pseudaugochlora graminea</i> (Fabricius, 1804)	5	0	0	5
<i>Pseudaugochlora pandora</i> (Smith, 1853)	1	0	0	1
<i>Pseudaugochlora simulata</i> Almeida, 2008	5	0	0	5
<i>Rhectomia</i> cf. <i>pumilla</i> Moure, 1947	0	1	0	1
<i>Temnosoma</i> cf. <i>metallicum</i> Smith, 1853	0	1	0	1
<i>Thectochlora alaris</i> (Vachal, 1904)	2	0	0	2

Halictini

<i>Dialictus</i> sp. 1	6	0	7	13
<i>Dialictus</i> sp. 2	2	1	0	3
<i>Dialictus</i> sp. 3	1	0	0	1
<i>Dialictus</i> sp. 4	1	0	0	1
<i>Dialictus</i> sp. 5	1	0	0	1
<i>Dialictus</i> sp. 7	1	0	0	1
<i>Habralictus acuminatus</i> Liz & Gonçalves, 2025	0	4	0	4

Megachilidae

Anthidiini

<i>Anthidium sertanicola</i> Moure & Urban, 1964	3	0	0	3
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<i>Epanthidium aureocinctum</i> Urban, 1995	4	0	0	4
<i>Epanthidium tigrinum</i> (Schrottky, 1905)	7	0	0	7
<i>Hypanthidium cacerense</i> Urban, 1998	1	2	0	3
<i>Larocanthidium diversum</i> Urban, 1997	1	0	0	1
Megachilini				
<i>Coelioxys</i> sp.1	1	0	0	1
<i>Coelioxys</i> sp.1	1	0	0	1
<i>Megachile</i> (<i>Leptorachis</i>) sp.	0	0	4	4
<i>Megachile</i> (<i>Melanosarus</i>) sp.	0	0	1	1
<i>Megachile</i> (<i>Chrysosarus</i>) <i>frankieana</i> Raw, 2006	3	0	0	1
<i>Megachile</i> (<i>Pseudocentron</i>) <i>rubricata</i> Smith, 1853	43	0	0	43
<i>Megachile</i> sp. 1	1	0	0	1
<i>Megachile</i> sp. 2	1	0	0	1
<i>Megachile</i> sp. 3	1	0	0	1
<i>Megachile</i> sp. 4	3	0	0	2
<i>Megachile</i> sp. 5	2	0	0	2
<i>Megachile</i> sp. 6	1	0	0	1
<i>Megachile</i> sp. 7	1	0	0	1



Figure S1. Malaise, blue cup traps, and scent bottle traps used for sample bees in Parque Nacional de Brasília, Central Brazil.

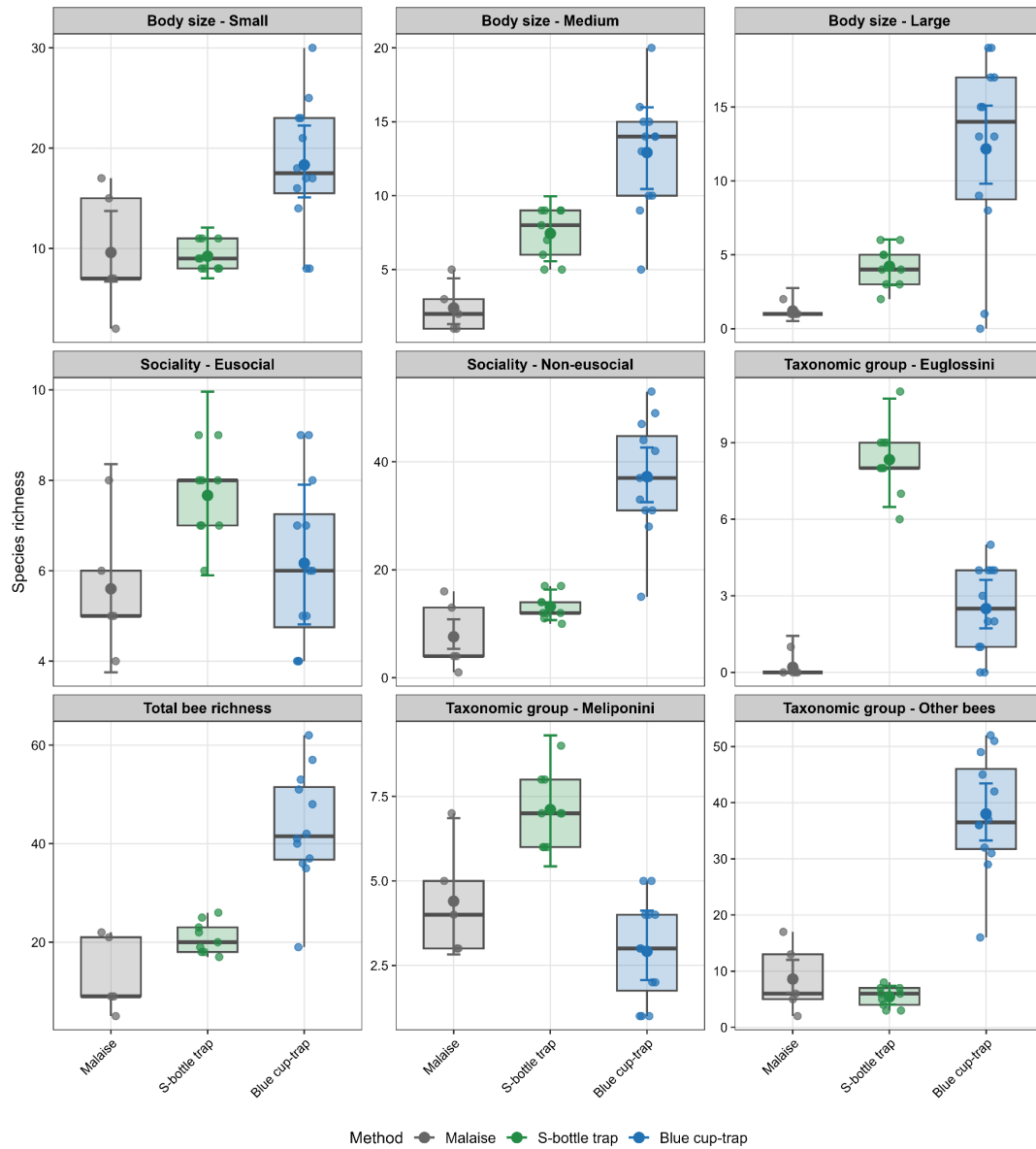


Figure S2. Species richness per sampling event across sampling methods and functional and taxonomic bee groups. Points indicate predicted marginal means and vertical bars are 95% confidence intervals from negative-binomial GLMs. Functional groups include body size classes and sociality categories, whereas taxonomic groups include Euglossini, Meliponini, and other bees. The lower-left panel shows observed total bee richness per sampling event.