

Bees of the Big Thicket National Preserve: 2018 Final Report

(Insecta: Hymenoptera: Apoidea)

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Summary

Bees were sampled from late February 2017 through August 2018 within select areas of the Big Thicket National Preserve (BITH), Texas with funds provided by Texas Commission on Environmental Quality (TCEQ) (awarded by Big Thicket Association [BTA]) and Stephen F. Austin State University (SFA). The majority of samples taken have been processed, and a voucher collection of identified bees has been assembled. To date, 3232 specimens have been mounted, labeled, and archived, representing 93 species of bees (Table 1). Sixty-seven of these represent new records for the Big Thicket National Preserve, 11 are new records for the Piney Woods ecoregion, and two are new state records. Though many of the original goals have been met, due to impacts of Hurricane Harvey on BITH infrastructure, some of the objectives of this project were only partially met. Herein, we submit this final report earlier than anticipated in the original proposal. This will allow us to reassess the project as a whole and submit a new proposal that targets opportunities for novel research on the impact of flooding on bees resulting from Hurricane Harvey.

Methods

Three localities were selected as permanent sampling sites for a standard array of traps: (1) a mesic, mixed pine-hardwood forest near Pitcher Plant Trail at the north end of Turkey Creek Unit (30.58636° - 94.33606°; “PT”); (2) a longleaf pine restoration area with a wet savanna understory near National Park Preserve headquarters complex on FM 420 (30.4596° -94.38316°; “HQ”); and (3) a longleaf pine, xeric savanna/sandyland near Sand Loop, Kirby Nature Trail (30.47388° -94.33773°; “SL”). At each of these sites, one Malaise trap (Fig. 1) and four vane traps (two blue, two yellow) (Fig. 2) were in continuous operation from late February to late August 2017 for SL and from late February to early November 2017 for HQ and PT. These traps were serviced roughly every other week. Limited sampling with various methods also occurred in 2017 at a wet savanna within the Hickory Creek Savannah Unit (30.54571° - 94.41125°; “HC”) and a longleaf pine restoration area at the northern part of Turkey Creek Unit (“TC-North”), 30.61413° -94.34719°. Occasional sampling using various methods also occurred during June, July, and August 2018 at SL, TC-North, and PT.

In addition to the standard array of traps described above, pan traps, which consist of small colored cups filled with soapy water, were utilized routinely at HQ and SL and occasionally at PT, HC, and TC-North. These traps were set along two, ca. 150 m transects. Each transect contained 36 alternating blue, yellow,

and white traps separated by ca. 5 m. Three traps of each color were placed on the ground, elevated 0.5 m on pvc poles, elevated 1.5 m on pvc poles, and hung about 2.0 m above ground in trees. Additionally, about 10 traps of each color were often placed on the ground along nearby trails. Traps were left in place for a period of ca. 24 h before samples were gathered.

Sweep netting was occasionally employed at all sites, but this was largely abandoned as a routine method due to poor results and greater than anticipated time constraints involved in servicing each of the sites. Hand collecting was somewhat productive but was also minimized for the same reasons.

Bees were sorted from bulk trap samples in the Biology Department at SFA and transferred to Sam Houston State University (SH) for pinning, labeling, and identification.

Project Personnel Effort Summary

Fieldwork. Effort in the field was carried out by Principal Investigator Daniel Bennett (DB) and SFA biology majors, Ryan Pingnot (RP), Archie Sauls (AS), and Chris Strong (CS). In total, 613.8 personnel hours were devoted to the fieldwork components of this project.

Lab work. DB supervised initial processing of samples. SFA students RP and CS contributed to sorting bees from bulk samples, preparing label files, and prepping field equipment. Principal Investigator John Pascarella (JP) supervised pinning and labeling of specimens and contributed a minimum of 40 hours towards identification of species. Sam Houston State University graduate student Cindy Botero provided the bulk of specimen pinning and labeling services (150.5 hours).

Results

As of 9/30/18, nearly all samples collected in 2017 have been processed, and nearly all bees (3232 specimens) from these samples have been pinned, labeled and identified. To date, 93 species have been recognized from this work; 92 are identified to species, and one male *Lasioglossum* remains to be fully identified. Of the specimens processed, all but six (99.8%) are identified to species (Table 1). Minor additional collections were made in June, July, and August of 2018, and these are awaiting processing.

In a previous study initiated by Sam Droege of the U.S. Geological Survey, 27 species of bees were found in the Hickory Creek Savannah Unit of BITH from collections made in 2010 and 2012. Of these, 21 species were found in this study. Of the identified species recognized in our survey, 67 represent new distributional records for the Big Thicket National Preserve. Eleven species are new records for East Texas (not previously found in this region based on JP county database of Texas bee species). These include *Andrena gardineri*, *Perdita obscurata*, *Epeolus lectoides*, *Melissodes agilis*, *Svastra compta*, *Triepeolus simplex*, *Hylaeus confluens*, *Lasioglossum versatum*, *Megachile melanophaea*, *Megachile pseudobrevis*, and *Osmia atriventris*. Two species, *Epeolus lectoides* and *Osmia atriventris*, are new records for Texas.

We are presently working with NPS and Big Thicket Association staff to provide specific distributional data in the format required for institutional databases.

Discussion of Project Status

In August 2017, Hurricane Harvey sharply curtailed fieldwork. Due to the closure of a bridge over Turkey Creek on Kirby Nature Trail, site SL became largely inaccessible after 25 August 2017. Other sites remained accessible and were sampled with vane traps and Malaise traps following the original sampling scheme. However, pan traps were dropped as a method after the storm due to the high cost (two sampling days required per collecting event vs. one for the other methods) and the inability to deploy them at SL as a result of the damaged bridge over Turkey Creek. As of this writing, the bridge over Turkey Creek remains closed, and it was not possible to exhaustively sample SL in 2018. Limited sampling of SL resumed in June 2018 when creek waters lowered enough to allow wading across safely.

Justification for work done thus far includes documenting the occurrence of 67 bee species not previously recorded for BITH as a result of extensive field and lab effort. As a result, the spring, early summer, and mid-summer bee faunas for select habitats in BITH are now well-characterized. It is regrettable that exhaustive late summer and fall samples could not be made, as this represents an important flight period for many bee species. It is hoped that future work will allow for this gap to be filled. Such data would allow for a near complete picture of the bee fauna of select areas of BITH to emerge. These goals will be further detailed in a forthcoming proposal.

Due to the many obstacles and changing nature of project goals as a result of Hurricane Harvey, we hereby submit this final report ahead of schedule as outlined in the original proposal. This will allow us to reassess the project as a whole and submit a new proposal that targets opportunities for novel research on the impact of flooding on bees resulting from Hurricane Harvey.

Table 1. Bee species recorded at three sites in Big Thicket National Preserve resulting from collections made February through November 2017. * = new to Big Thicket National Preserve, ** = new to Piney Woods Ecoregion, *** New to Texas.

Family	Genus	Species (*, **, ***)	Turkey Creek Unit, near Pitcher Plant Trail (PT)	Near Preserve Headquarters (HQ)	Turkey Creek Unit, Sand Loop (SL)
Andrenidae	Andrena	cressoni*	1	0	0
Andrenidae	Andrena	imitatrix*	0	0	1
Andrenidae	Andrena	fulvipennis*	4	1	0
Andrenidae	Andrena	gardineri*, **	0	0	1
Andrenidae	Andrena	krigiana*	0	1	0
Andrenidae	Perdita	bishoppi*	6	1	3
Andrenidae	Perdita	ignota isopappi*	9	2	4
Andrenidae	Perdita	obscurata*, **	2	0	65
Apidae	Anthophora	abrupta*	1	0	1
Apidae	Apis	mellifera	36	19	18
Apidae	Bombus	griseocollis*	1	0	1
Apidae	Bombus	impatiens*	12	3	1
Apidae	Bombus	pennsylvanicus*	19	19	14
Apidae	Ceratina	calcarata*	21	0	0
Apidae	Ceratina	cockerelli*	4	4	8
Apidae	Ceratina	strenua*	1	0	1
Apidae	Epeolus	lectoides*, **, ***	0	0	2
Apidae	Habropoda	laboriosa*	40	24	30
Apidae	Holcopasites	illinoiensis*	0	0	1
Apidae	Melissodes	agilis*, **	0	1	0
Apidae	Melissodes	bimaculata*	10	0	1
Apidae	Melissodes	communis	110	20	452
Apidae	Melissodes	comptoides*	1	0	0
Apidae	Melissodes	dentiventris*	4	5	0
Apidae	Melissodes	tepaneca*	1	0	3
Apidae	Melitoma	taurea*	8	1	11
Apidae	Ptilothrix	bombiformis	78	51	29
Apidae	Svastra	atripes*	3	3	5
Apidae	Svastra	compta*, **	0	1	1
Apidae	Triepeolus	simplex*, **	1	0	1
Apidae	Xylocopa	micans*	2	1	0
Apidae	Xylocopa	virginica*	9	9	2
Colletidae	Colletes	thoracicus*	1	0	1
Colletidae	Hylaeus	affinis*	1	1	0
Colletidae	Hylaeus	confluens*, **	0	3	0
Halictidae	Agapostemon	texanus*	2	5	2

Halictidae	Agapostemon	splendens*	10	0	7
Halictidae	Augochlora	pura*	0	1	0
Halictidae	Augochlorella	karankawa*	6	0	227
Halictidae	Augochloropsis	metallica	5	7	5
Halictidae	Halictus	ligatus	4	1	0
Halictidae	Lasioglossum	apopkensis	55	6	167
Halictidae	Lasioglossum	batya	9	0	14
Halictidae	Lasioglossum	birkmanni*	2	0	0
Halictidae	Lasioglossum	bruneri	46	24	57
Halictidae	Lasioglossum	callidum*	8	8	0
Halictidae	Lasioglossum	cinctipes*	1	0	9
Halictidae	Lasioglossum	coactum	0	0	1
Halictidae	Lasioglossum	coreopsis	49	35	10
Halictidae	Lasioglossum	creberrimum	18	18	4
Halictidae	Lasioglossum	disparile*	0	7	2
Halictidae	Lasioglossum	fedorensis*	9	0	18
Halictidae	Lasioglossum	floridanum*	26	1	184
Halictidae	Lasioglossum	illinoiensis	10	3	7
Halictidae	Lasioglossum	imitatum	95	0	0
Halictidae	Lasioglossum	lustrans*	0	0	1
Halictidae	Lasioglossum	pectoralis*	3	0	0
Halictidae	Lasioglossum	pruinatum	0	0	4
Halictidae	Lasioglossum	reticulatum*	1	0	0
Halictidae	Lasioglossum	Male not identified to species	0	4	2
Halictidae	Lasioglossum	tarponensis*	7	0	3
Halictidae	Lasioglossum	tegularis	38	11	144
Halictidae	Lasioglossum	trigeminum	1	4	0
Halictidae	Lasioglossum	versatum*,**	0	2	0
Halictidae	Lasioglossum	vierecki	54	1	206
Halictidae	Lasioglossum	weemsi	53	63	1
Halictidae	Nomia	nortoni*	0	1	0
Halictidae	Sphecodes	brachycephalus*	0	2	42
Halictidae	Sphecodes	atlantis*	2	0	0
Megachilidae	Anthidiellum	notatum*	2	0	3
Megachilidae	Coelioxys	immaculata*	0	0	1
Megachilidae	Coelioxys	mexicana*	1	0	0
Megachilidae	Coelioxys	sayi*	0	0	1
Megachilidae	Dianthidium	curvatum	1	2	0
Megachilidae	Heriades	carinata*	0	1	0
Megachilidae	Hoplitis	truncata	0	0	2
Megachilidae	Megachile	albitarsis	3	1	0
Megachilidae	Megachile	brevis	0	0	1
Megachilidae	Megachile	campanulae*	0	2	1
Megachilidae	Megachile	deflexa*	0	0	1

Megachilidae	Megachile	frugalis*	0	0	1
Megachilidae	Megachile	georgica	8	27	27
Megachilidae	Megachile	melanophaea*, **	0	0	1
Megachilidae	Megachile	mendica*	9	6	9
Megachilidae	Megachile	mucida*	0	0	3
Megachilidae	Megachile	polycaris*	0	0	1
Megachilidae	Megachile	psuedobrevis*, **	1	0	2
Megachilidae	Megachile	texana*	1	1	50
Megachilidae	Megachile	xylocopoides*	2	0	2
Megachilidae	Osmia	atriventris*, **, ***	0	0	1
Megachilidae	Osmia	chalybea*	1	1	1
Megachilidae	Osmia	sandhousae	2	1	2
Megachilidae	Stelis	louisae*	0	1	0
# Specimens	Total = 3232		931	417	1884
# Species	Total = 93		63	50	67

Figures 1–4: (1) Malaise trap, (2) vane trap, (3) elevated pan traps in wet savanna, (4) ground pan traps in wet savanna recently subjected to a prescribed burn.

