



The Bees of a Sandhill Community Before and After a Rare Flooding Event in the Big Thicket National Preserve, Texas

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Introduction

Bees are herbivorous insects, feeding on the nectar and pollen produced by their floral hosts. Recently documented bee declines highlight the importance of surveys aimed at these pollinators [2].

Sampling took place in a xeric sandy upland located in the Big Thicket National Preserve (BTNP), Hardin County, Texas. In August of 2017, Hurricane Harvey struck the Big Thicket National Preserve, causing rivers and creeks to overflow and leaving widespread areas inundated. Sampling was conducted again in 2019 in order to examine the possible effects of flooding. While the responses of insects to flooding have been documented [1, 3], few studies have data from prior to a such disturbances [4].

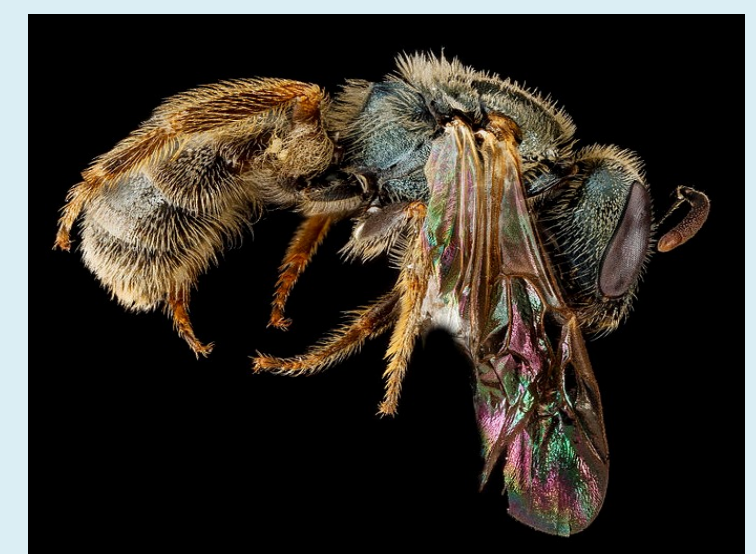
In this study we present bee fauna data from a before and after Hurricane Harvey floodwaters inundated a xeric sandhill habitat in the BTNP. We hypothesized that bee species nesting below ground were impacted more than bee species nesting above ground.

Methods

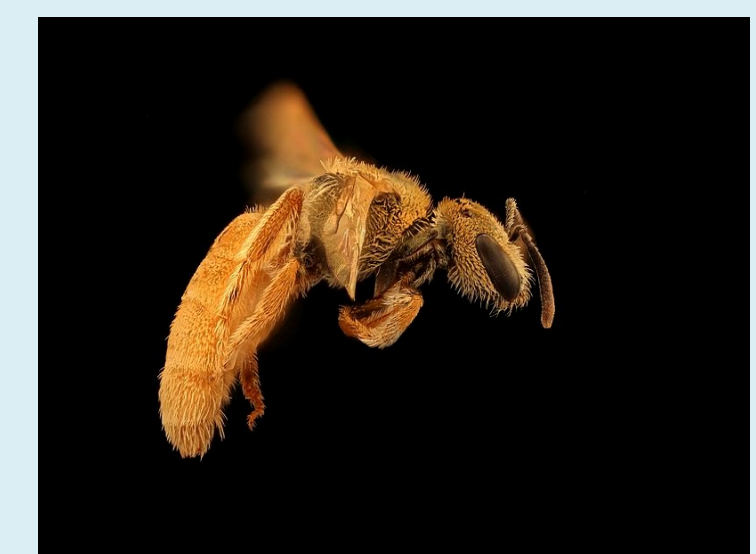
- Sampling events took place in the Turkey Creek Unit of the BTNP near the intersection of Turkey Creek and Village Creek.
- Traps were established late Feb. 2017 and serviced at roughly two-week intervals through Aug. 2017. In 2019 traps operated through October.
- One Malaise Trap and two vane traps were utilized; the latter were filled with propylene glycol.
- Pan traps: Two transects containing ~18 small cups painted blue, yellow, and white; traps were separated by ca. 5 m.
- Hand collecting: 30 minute sampling of site using a sweep net was used occasionally.
- Specimens were pinned, identified and archived.
- Accumulation curves presented here are based on Malaise and vane traps preceding the 2017 disturbance. (2019 samples are partially processed.)
- The checklist herein is based on all traps and hand collecting from 2017 and partial data for 2019.



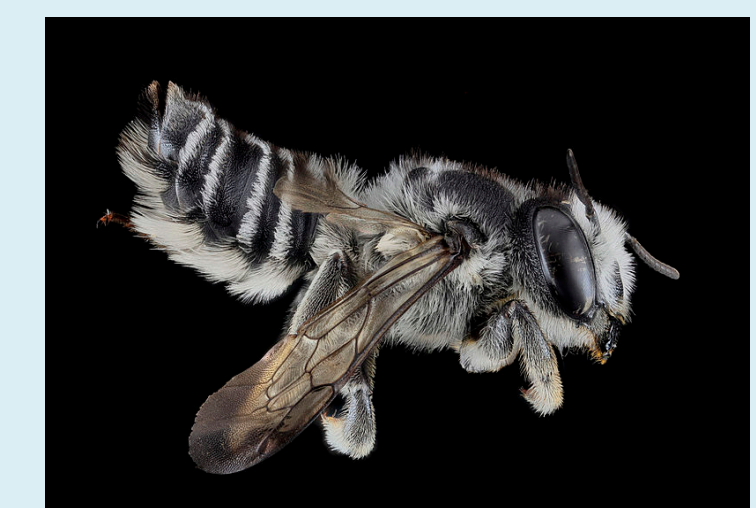
Melissodes communis
Credit: USGS Bee Inventory and Monitoring Lab, Beltsville, Maryland, USA



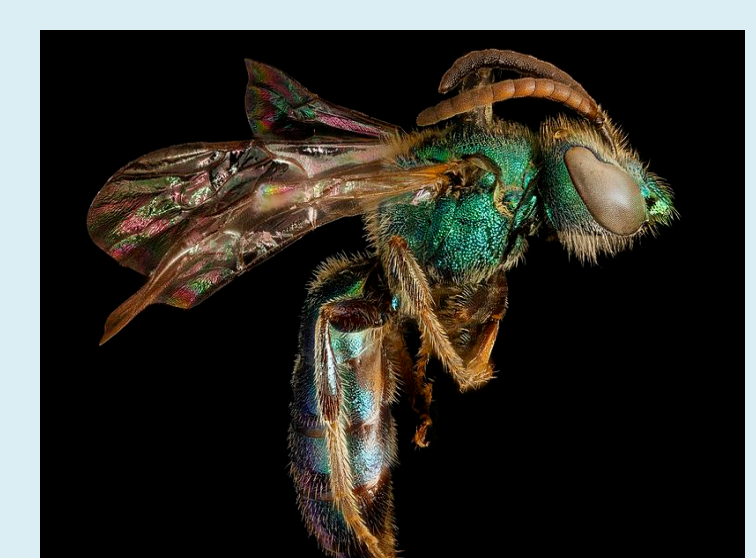
Lasioglossum floridanum.
Credit: USGS Bee Inventory and Monitoring Lab, Beltsville, Maryland, USA



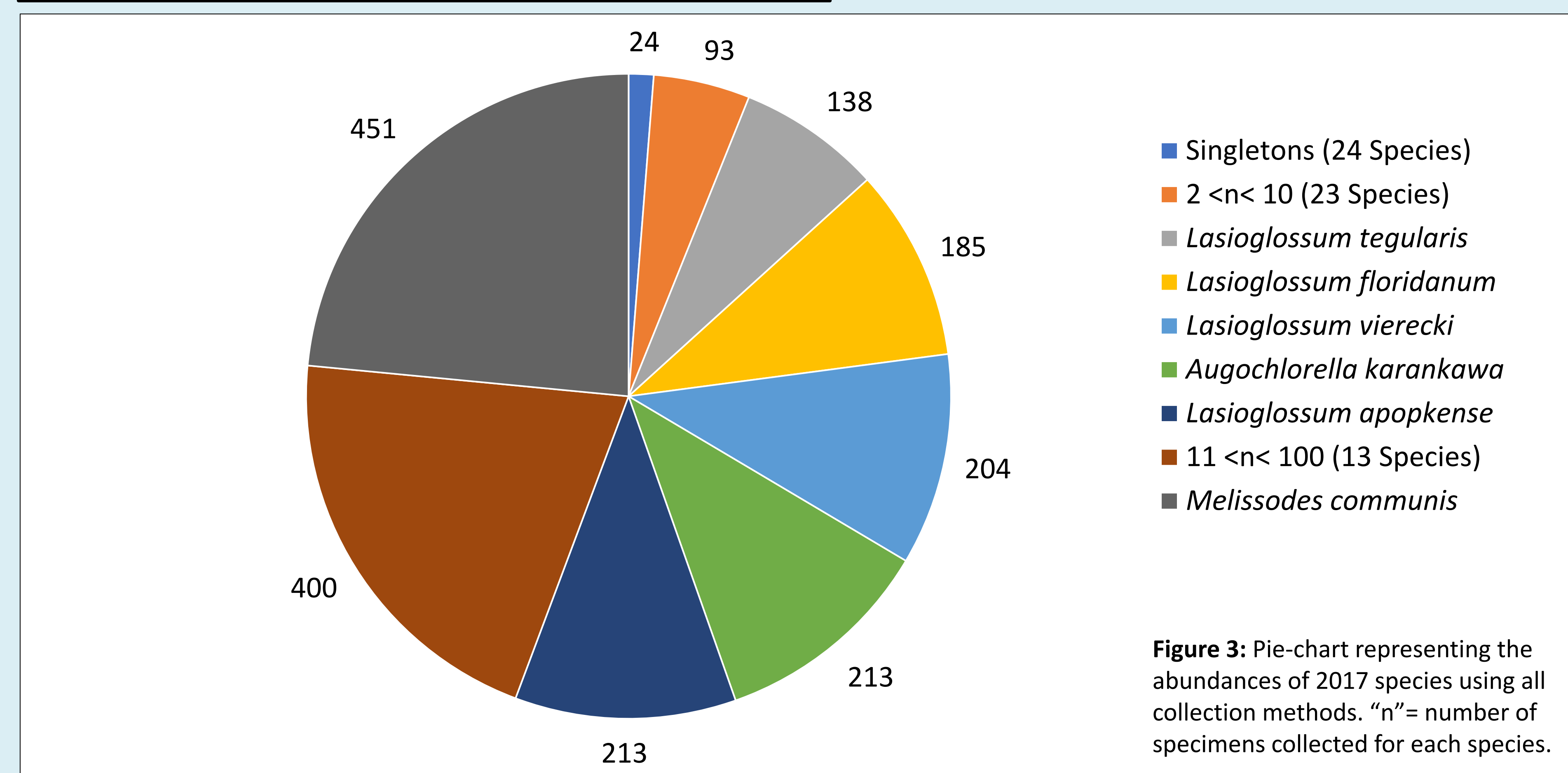
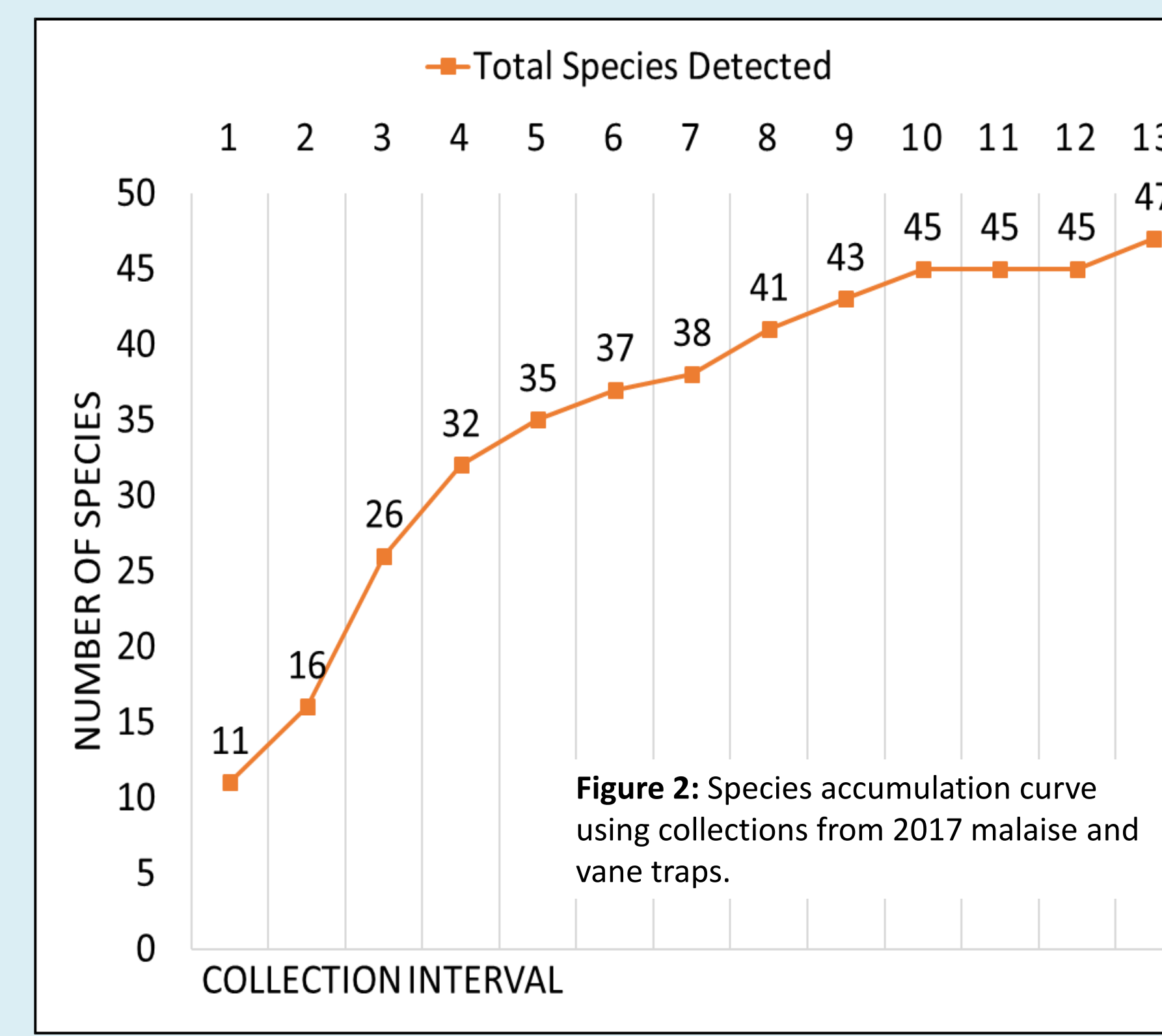
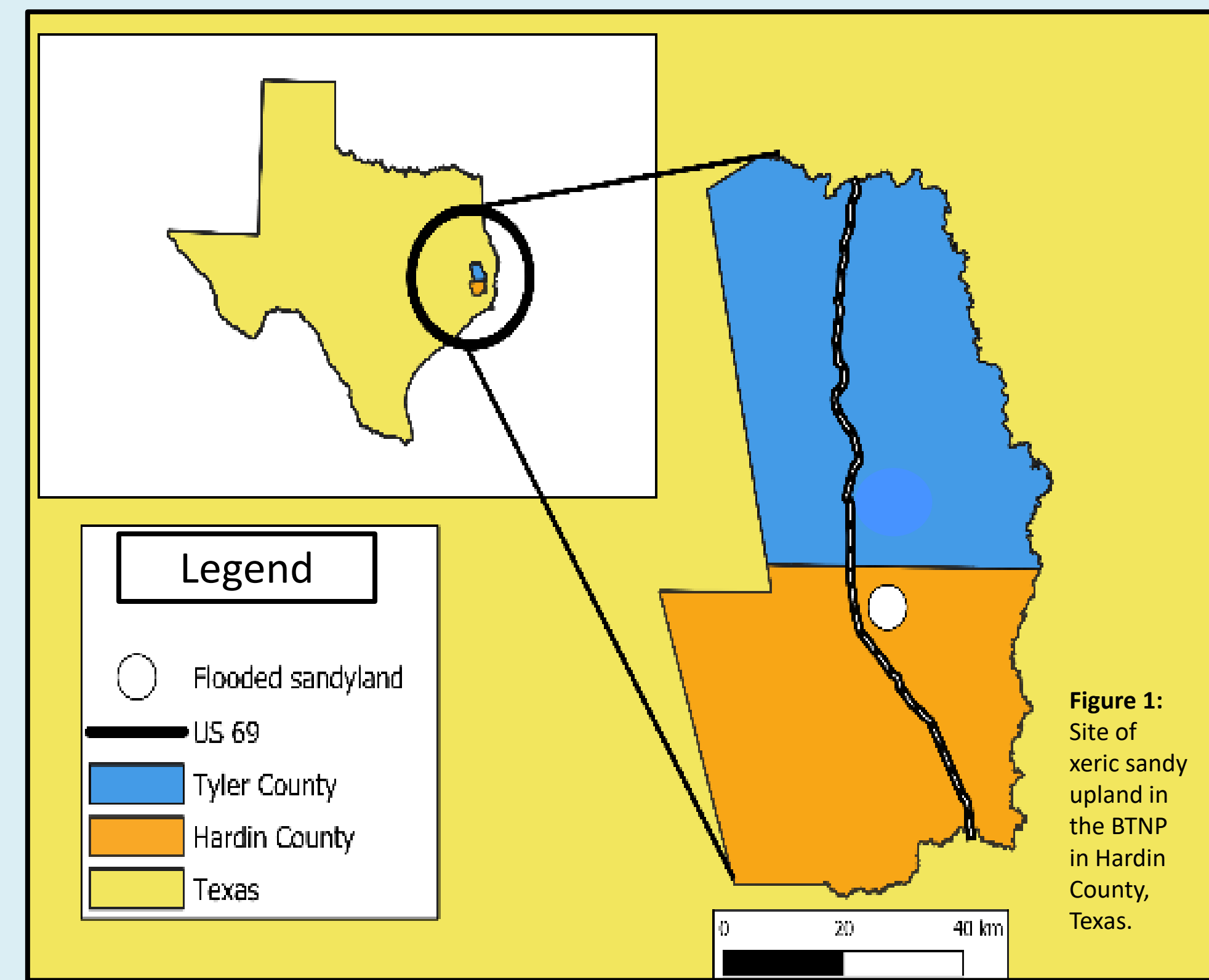
Lasioglossum vierecki
Credit: USGS Bee Inventory and Monitoring Lab, Beltsville, USA



Megachile texana
Credit: Sam Droege



Augochlora pura
Credit: USGS Bee Inventory and Monitoring Lab, Beltsville, USA



Results & Discussion

- 2017: 66 species identified from 1920 specimens
- 2019: 44 species identified from ~1900 specimens
- *M. communis*, *A. karankawa*, and 4 *Lasioglossum* species produced the most specimens in 2017
- Of the 66 species from 2017, 44 were ground nesting, 22 were above-ground nesting
- 31 species were only captured in 2017
- 10 species were only captured in 2019
- 35 species were detected in both 2017 and 2019
- 76 total species were detected in both 2017 and 2019
- Ground nesting species had a higher rate of survival than cavity nesters (58% of ground nesters survived vs. 43% of above-ground nesters)
- Thus far, the original hypothesis appears not to be supported.

References:

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- Plum, N. 2005. Terrestrial invertebrates in flooded grassland: A literature review. *Wetlands* 25 (3), 721-737.
- Cane, J. H. 1997. Violent weather and bees: populations of the Barrier Island Endemic, *Hesperapis oraria* (Hymenoptera: Melittidae) survive a category 3 hurricane. *Journal of the Kansas Entomological Society* 70(1): 73-75.

Family	Genus species	Nesting Type	2017	2019
Andrenidae	<i>Andrena gardineri</i>	GROUND	*	
Andrenidae	<i>Andrena imitatrix</i>	GROUND	*	
Andrenidae	<i>Andrena miserabilis</i>	GROUND		*
Andrenidae	<i>Calliopsis andreniformis</i>	GROUND		*
Andrenidae	<i>Perdita bishoppi</i>	GROUND	*	
Andrenidae	<i>Perdita halictoides</i>	GROUND		*
Andrenidae	<i>Perdita obscurata</i>	GROUND	*	*
Apidae	<i>Anthophora abrupta</i>	GROUND	*	*
Apidae	<i>Apis mellifera</i>	GROUND	*	*
Apidae	<i>Bombus grisceolus</i>	GROUND	*	
Apidae	<i>Bombus impatiens</i>	GROUND	*	*
Apidae	<i>Bombus pennsylvanicus</i>	GROUND	*	*
Apidae	<i>Ceratina cockerelli</i>	STEM	*	
Apidae	<i>Ceratina strenua</i>	STEM	*	*
Apidae	<i>Epeolus ilicis</i>	GROUND	*	*
Apidae	<i>Epeolus lectoides</i>	GROUND	*	*
Apidae	<i>Habropoda labriosa</i>	GROUND	*	*
Apidae	<i>Holcopasites illinoiense</i>	GROUND	*	
Apidae	<i>Melissodes bimaculate</i>	GROUND	*	*
Apidae	<i>Melissodes communis</i>	GROUND	*	*
Apidae	<i>Melissodes tepaneca</i>	GROUND	*	
Apidae	<i>Melitoma taurea</i>	GROUND	*	
Apidae	<i>Ptilothrix bombiformis</i>	GROUND	*	*
Apidae	<i>Svastra atripes</i>	GROUND	*	
Apidae	<i>Svastra compta</i>	GROUND	*	
Apidae	<i>Triepeolus lunatus</i>	GROUND		*
Apidae	<i>Triepeolus simplex</i>	GROUND	*	*
Apidae	<i>Xylacopa virginica</i>	WOOD	*	*
Colletidae	<i>Colletes inaequalis</i>	GROUND		*
Colletidae	<i>Colletes nudus</i>	GROUND		*
Colletidae	<i>Colletes thoracicus</i>	GROUND	*	*
Halictidae	<i>Agapostemon splendens</i>	GROUND	*	*
Halictidae	<i>Agapostemon texanus</i>	GROUND	*	
Halictidae	<i>Augochlora pura</i>	WOOD		*
Halictidae	<i>Augochlora karankawa</i>	GROUND	*	
Halictidae	<i>Augochloropsis metallica</i>	GROUND	*	*
Halictidae	<i>Auochloropsis sumptuosa</i>	GROUND		*
Halictidae	<i>Lasioglossum apokense</i>	GROUND	*	*
Halictidae	<i>Lasioglossum batya</i>	GROUND	*	
Halictidae	<i>Lasioglossum birkmanni</i>	GROUND		*
Halictidae	<i>Lasioglossum bruneri</i>	GROUND	*	
Halictidae	<i>Lasioglossum cinctipes</i>	GROUND	*	*
Halictidae	<i>Lasioglossum coactum</i>	GROUND	*	
Halictidae	<i>Lasioglossum coreopsis</i>	GROUND	*	*
Halictidae	<i>Lasioglossum dispariie</i>	GROUND	*	*
Halictidae	<i>Lasioglossum fedorense</i>	GROUND	*	*
Halictidae	<i>Lasioglossum floridanum</i>	GROUND	*	*
Halictidae	<i>Lasioglossum illinoense</i>	GROUND	*	*
Halictidae	<i>Lasioglossum lustrans</i>	GROUND	*	
Halictidae	<i>Lasioglossum pruinolum</i>	GROUND	*	
Halictidae	<i>Lasioglossum tarponense</i>	GROUND	*	*
Halictidae	<i>Lasioglossum tegularis</i>	GROUND	*	*
Halictidae	<i>Lasioglossum vierecki</i>	GROUND	*	*
Halictidae	<i>Lasioglossum weemsi</i>	GROUND	*	
Halictidae	<i>Sphecodes brachycephalus</i>	GROUND	*	*
Megachilidae	<i>Anthidellum notatum</i>	ABOVE GROUND	*	*
Megachilidae	<i>Coelioxys immaculata</i>	ABOVE GROUND	*	
Megachilidae	<i>Coelioxys sayi</i>	ABOVE GROUND	*	
Megachilidae	<i>Coelioxys thoracicus</i>	ABOVE GROUND	*	
Megachilidae	<i>Hoplitis truncate</i>	ABOVE GROUND	*	
Megachilidae	<i>Megachile brevis</i>	ABOVE GROUND	*	
Megachilidae	<i>Megachile campanulae</i>	ABOVE GROUND	*	
Megachilidae	<i>Megachile deflexa</i>	ABOVE GROUND	*	
Megachilidae	<i>Megachile frugalis</i>	ABOVE GROUND	*	*
Megachilidae	<i>Megachile georgica</i>	ABOVE GROUND	*	*
Megachilidae	<i>Megachile melanophoea</i>	ABOVE GROUND	*	
Megachilidae	<i>Megachile lippiae</i>	ABOVE GROUND	*	
Megachilidae	<i>Megachile mendica</i>	ABOVE GROUND	*	*
Megachilidae	<i>Megachile mucida</i>	ABOVE GROUND	*	*
Megachilidae	<i>Megachile pseudobrevis</i>	ABOVE GROUND	*	*
Megachilidae	<i>Megachile rugifrons</i>	ABOVE GROUND		*
Megachilidae	<i>Megachile texana</i>	ABOVE GROUND	*	*
Megachilidae	<i>Megachile xylacopoides</i>	ABOVE GROUND	*	
Megachilidae	<i>Osmia atriventris</i>	ABOVE GROUND	*	*
Megachilidae	<i>Osmia chalybea</i>	ABOVE GROUND	*	
Megachilidae	<i>Osmia sandhousea</i>	ABOVE GROUND	*	*