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### Ground Nesting Bee and Wasp Preference Between Two Forested Habitats

Nesting preferences for the majority of ground nesting bees and wasps are poorly understood across all ecosystems. In this project we sought to learn more about the nesting preferences of ground-nesting bees and wasps found in the Natural Area Training Laboratory (NATL), and in turn create an educational resource for NATL visitors. The usage of fire management and prescribed burning by NATL provides an exemplary opportunity to understand more about the habits of the ground-nesting bees in various successional forest habitats and compile a list of the common species inhabiting the area.

We compared the upland pine and hammock habitats in NATL for ground-nesting bee abundance. The two study habitats were divided into twelve 50 x 50 m plots using the preexisting grid system based on north-south and east-west gridlines. On each sampling date, we deployed five soil emergent traps in four different plots within the upland pine and hammock habitats (40 traps each sampling date). Emergent traps are enclosed mesh structures that taper to a kill jar at the apex. Insects are trapped after leaving their nests and, encountering the enclosed mesh, fly upwards and are funneled into the collecting bottle that is filled with 5 centimeters of soapy water. Each edge of the emergent traps was flush with the ground to prevent bees and wasps from entering and exiting. During each sampling period, the 40 traps were placed at dusk and removed the following day. From April to October 2017 traps were active once per week.

In total, 83 ground-nesting bees and wasps were collected: 35 bees and 48 wasps (Table 1). Overall, the upland pine habitat contained significantly more bees and wasps than in the hammock ( $P= 0.001$ ). Some factors that may have contributed to this include nesting variables that are used to quantify nesting resources. Traits such as bare soil, soil compaction, and vegetative cover can vary across the landscape and could be contributing factors for bee and wasp nesting success. Upland pine may have had the more desirable nesting traits in comparison to the hammock. Also, the species that we caught may prefer the even ground of the upland pine habitat to the slopes of the hammock habitat. The emergence traps used a small portion of the entire study site and could have not sampled the entire population of ground nesting pollinators. Finally, in the latter portion (August) of the experiment a hurricane affected the study landscape and accounted for the flooding and damage of both habitats which was more impactful in the hammock habitat.

Family	Species	Upland Pine	Hammock
<b><u>Bees</u></b>			
Apidae	<i>Epeolus zonatus</i>	6	2
Halictidae	<i>Agapostemon splendens</i>	2	2
	<i>Augochlora pura</i>	1	0
	<i>Augochloropsis metallica</i>	1	0
	<i>Halictus poeyi</i>	1	0
	<i>Lasioglossum sp.</i>	14	1
	<i>Sphecodes ignitus</i>	1	0
Colletidae	<i>Colletes thoracicus</i>	1	0
Megachilidae*	<i>Megachile brevis</i>	1	0
	<i>Megachile communis</i>	1	0
	<i>Megachile polycaris</i>	1	0
<b><u>Wasps</u></b>			
Crabronidae		11	5
Ichneumonidae		1	2
Mutillidae		7	0
Pompilidae		9	0

Sphecidae	<i>Prionyx parkeri</i>	1	0
	<i>Sphex ichneumoneus</i>	1	0
Tiphiidae		7	2
Vespidae*	<i>Pachodynerus errynis</i>	2	0

\*These bees and wasps are wood-nesting.

A picture of the final compilation, as seen below, is descriptive of the most common ground-nesting bee and wasp species found in NATL. This can be used as a visual tool to enhance NATL visitors' experience with the ground-nesting species they may encounter:

Over 300 species of native bees live in Florida and the majority construct nests in the ground.

## Common Ground-nesting Bees and Wasps in NATL

In forested habitats, ground-nesting bees and wasps are the most common pollinators.

### COMMON BEE SPECIES

### COMMON WASP SPECIES



Striped Sweat Bee: *Agapostemon splendens*

Sweat bees are named because they are often attracted to the salts found in sweat. Most sweat bees are bright metallic green.



Sweat Bee: *Lasiosiglossum* sp.

Sweat bees are important pollinators for many crops such as sunflower and alfalfa. They nest underground, in dead tree trunks or in hollow wood.



Variegated Cuckoo Bee: *Epeolus zonatus*

The term "cuckoo" comes from this bee being dependent on the nest of another bee. The female will lay her eggs on pollen masses made by other bees.



Soil emergent traps are a novel way to test where ground-nesting bees may be present in an ecosystem.



Spider Wasp: *Anoplius* sp.

This wasp assassin feeds on arachnids. The wasp paralyzes its prey with its sting. Luckily, these wasps are not typically aggressive toward people.



Velvet Ant: Mutillidae

Velvet ants are not ants, but actually solitary wasps that are visitors of flowers. They receive their name from the fact that females do not have wings.




Flower Wasp: *Tiphia* sp.

Adults drink nectar from flowers, but many species larvae are parasitoids of beetle larvae, thus providing biological control of some pest species.

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