Florida’s native bees: biology, identification, and conservation

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Outline

Part 1: Bee biology

Part 2: Bee diversity and identification

Part 3: Wildflowers for bees
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About 80% of flowering plants require animals to move pollen.
Pollinators are important for agriculture and the global food supply

- 87 of 115 crops
- 35% of crop production worldwide
- $18 - 27 billion
Bees are important pollinators

- Abundant, diverse
- Diets consist of pollen and nectar
- Actively collect pollen to feed their young
- Exhibit flower constancy or fidelity
What is a bee?

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Hymenoptera
Family: 7 families
How Many Bees?

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How Many Bees?

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How Many Bees?

Over 300!  
Over 4,000!

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How Many Bees?

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Bees vs. other pollinators

Bees are...

- Diet = pollen & nectar
- 2 pairs of wings
- Generally robust-bodied
- Hairy – hairs on thorax, legs, abdomen
Bees vs. wasps

Wasps are....

• Carnivorous
• Nectar supplement
• Yellow jackets, hornets, paper wasps
• Less hairy, often w/bright coloration
• Spurs on legs
• Thin “waist”, relatively long antennae
Bees vs. flies

Flies are….

- Carnivorous
- Nectar supplement
- One pair wings
- Large, bulging eyes
- Short antennae
- Less hairy (esp. on legs)
- Some bee mimics
Types of bees: Honey bees

- Non-native
- Single species in U.S.
- Managed and feral
- Social, perennial colonies
- Generalists

Apis mellifera

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Native wild bees

- Range of sociality, foraging & nesting behaviors
- Effective pollinators for crop and wild plants
- No significant honey production
Native wild bees: Nesting

- Majority (70%) nest underground
  - Tunnels or shallow cavities
- Aboveground nesters (30%)
  - Some excavate own nests
  - Others use pre-existing cavities
Native wild bees: Sociality

Majority solitary

- No division of labor/reproduction, no large colonies
- Exceptions: bumble bees, some sweat bees
Native wild bees: Foraging

- Central-place foragers
- No migration
Florida Native wild bees

~325 species (~315 native)

- Mining bees
- Plasterer bees
- **Leafcutter bees**
- Mason bees
- Resin bees
- Sweat bees
- **Bumble bees**
- **Long-horned bees**
- **Carpenter bees**
- Cuckoo bees
Large-bodied bees

- Bumble bees
- Carpenter bees
- Long-horned bees
Bumble Bees (*Bombus* spp.)

- Nest in cavities – rodent nests
- Social, annual colonies
- Fuzzy, black w/ yellow-orange hairs
- Pollen balls on hind legs
- Robust-bodied
- Year-round activity, generalists
Bumble Bee Life Cycle

**Fall:** Mated queens seek overwintering sites

**Winter:** Hibernating queen

**Spring:** Nest establishment and egg laying

**Fall:** New queens leave the nest and mate

**Fall:** Old queen dies

**Summer:** Colony peak

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Carpenter Bees (*Xylocopa* spp.)

- Excavate nests aboveground in wood
- 2 *Xylocopa* spp.
- Very large with dark, shiny and hairless abdomen
- Activity begins in late winter/early spring

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Long-horned Bees (Eucerini)

- Ground nesters
- Named for long antennae in males
- Most active in summer and fall
- Some specialists on Asteraceae and Cucurbits
Long-horned Bees (Eucerini)

Females:

- Robust and round
- Black with white or yellow hair bands on abdomen
- Hairy hind legs coated with pollen
- Often on Asteraceae or cucurbit plants
Medium-bodied bees

- Leafcutter bees (most)
- Sweat bees (some)
Leafcutter Bees (*Megachile* sp.)

- Nest aboveground in cavities – stems, reeds
- Create individual cells with leaf clippings
- Black w/ white or yellow hair bands
- Carry pollen on underside of abdomen
Sweat Bees (Halictidae)

- Very large group
- Attracted to sweat
- Nest below or aboveground in wood
- Solitary or social
- Metallic green,
- Black w/ white hair bands
- Metallic sheen
Small bees

Sweat bees (Halictidae)

- Metallic black, gray, tan, or green
- Small to very small
- Pollen-collecting hairs on legs

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Pollinator declines

European honey bee

Other bees

Other pollinators

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Native wild bee decline

- 1,437 (of 4,337) species assessed
- 749 (over half) are declining
- 347 (1 in 4) are imperiled

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Causes of wild bee decline

1. Land-use change
2. Pesticides
3. Managed bee use
4. Pathogens
5. Invasive plants
6. Climate change
Pollinator Conservation

1. Flowers
2. Nest habitat
3. Protection from toxins
Floral resources

- Diversity of blooming plants throughout the year
- Native plants
- Plant in clumps (high density)
- Importance of key plant species
Floral resources

- Yellow, white, purple/blue flowers
- Bees not as attracted to red/orange/pink
- Relatively short flower tubes (flat flowers)
- Abundant nectar and pollen

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Florida bee plants – woody

- Walter’s viburnum
- Fringe tree
- Eastern redbud
- Sweet acacia
- Sparkleberry
- Florida privet
- Inkberry/holly (*Ilex* spp.)
- American wisteria
- Saw palmetto
- Beautyberry
- Cabbage palm
- Senna (Privet, Chapman’s)
- Simpson’s stopper (Twinberry)
Florida bee plants - herbaceous

- Sunflower (Dune/Beach)
- Coreopsis
- Seaside goldenrod
- Blanketflower (*Gaillardia*)
- Silver-leaved, Climbing, or Elliot’s aster
- Largeflower false rosemary
- Verbena (Beach or Tampa)
- Blazing star (*Liatris*)
- Spotted bee balm (*Monarda*)
- Sage (*Salvia*)
- Rosinweed (Starry or Bigleaf)
- Black-eyed susan (*Rudbeckia*)
- Mimosa
Plants for specialist bees

- *Vaccinium* spp.: SE blueberry bee
- *Hibiscus moscheutos*: Hibiscus/okra bee
- *Balduina angustifolia*: *Hesperapis oraria*
- *Heterotheca subaxillaris* and *Chrysopsis* spp.: mining bees *Perdita* spp.
- Prickly pear cactus: *Lithurgus gibbosus*
Most attractive wild plants

Snow squarestem (*Melanthera nivea*)
Summer farewell (*Dalea pinnata*)
Elephant’s foot (*Elephantopus elatus*)
Lady lupine (*Lupinus villosus*)
St. John’s wort (*Hypericum spp.*)
*Liatris* spp.
Community/School Gardens

School and Community Gardens: Funding!
- Scott’s Miracle Gro Grants
- US Gardens Grant Program (Whole Kids Foundation/Whole Foods)
- Nature Works Everywhere/The Nature Conservancy

Million Pollinator Garden Challenge
- Register your garden
Citizen Science

- Bumble Bee Watch: https://www.bumblebeewatch.org/
- The Great Sunflower Project: http://www.greatsunflower.org/

How to Submit a Sighting

1. Take a photo of a bumble bee
2. Log in and upload your photo
3. Identify your species
4. Sighting will be verified by expert

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Resources

1. Xerces Society for Invertebrate Conservation: https://xerces.org/
2. Pollinator Partnership: http://pollinator.org/
5. Protecting bees (plant selection): https://protectingbees.njaes.rutgers.edu/