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Native Bees of Pennsylvania

Angie Hartley, Penn State Extension Master Gardener, Dauphin County

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Brown belted bumble bee on verbena bonariensis. © 2023, Angela Hartley

Learning Objectives

Attendees will be able to

- Understand current initiatives to identify and track bee populations in Pennsylvania
- Identify some of the native bees common in the state (particularly Dauphin County), their unique characteristics, and their parasites
- Understand why native bees are important, why they are in danger, and how to protect them

Background

Not a comprehensive presentation of all native bees in Pennsylvania

- Species easily identifiable or likely to be seen in Dauphin County
- All photos from my garden unless noted otherwise
  - Started garden in spring 2021
  - Started tracking insects in spring 2024
- 205 species of insect observed at Willowdale Farm
  - 45 species of bees

Set monitor to full screen and enjoy!

Female flat-tailed leaf cutting bee on verbena bonariensis.

Bee Roll

In his “Bee Roll,” Michael Pisano documents “30-something bee species that I've encountered, almost all in the backyards of my previous and current homes in Pittsburgh, PA.”

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Pennsylvania Bee Monitoring Program

Dauphin County Master Gardener Tony Shaw sets up bee traps at Willowdale Farm.

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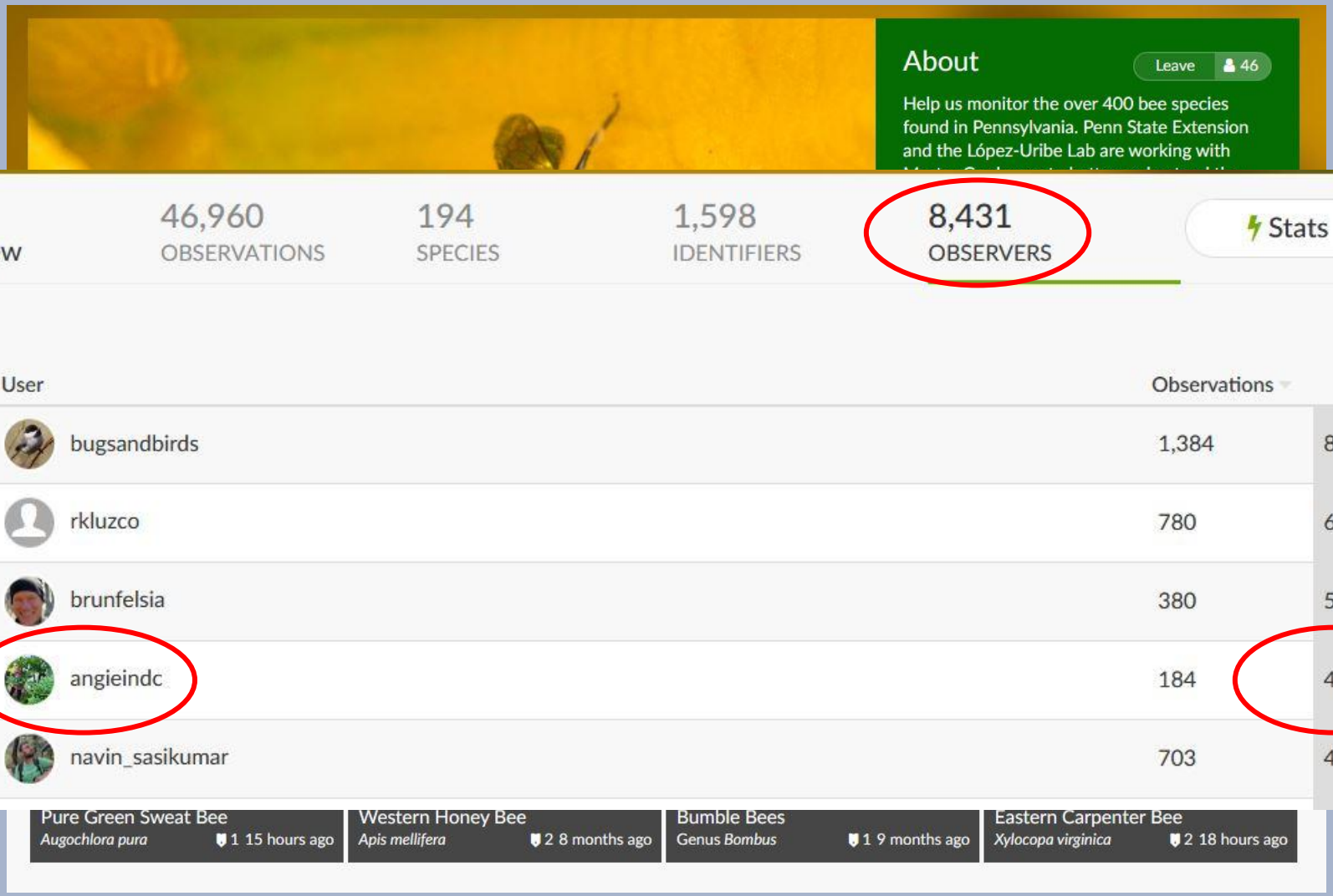

Pennsylvania Bee Monitoring Project

with iNaturalist

https://www.inaturalist.org/projects/pennsylvania-bee-monitoring

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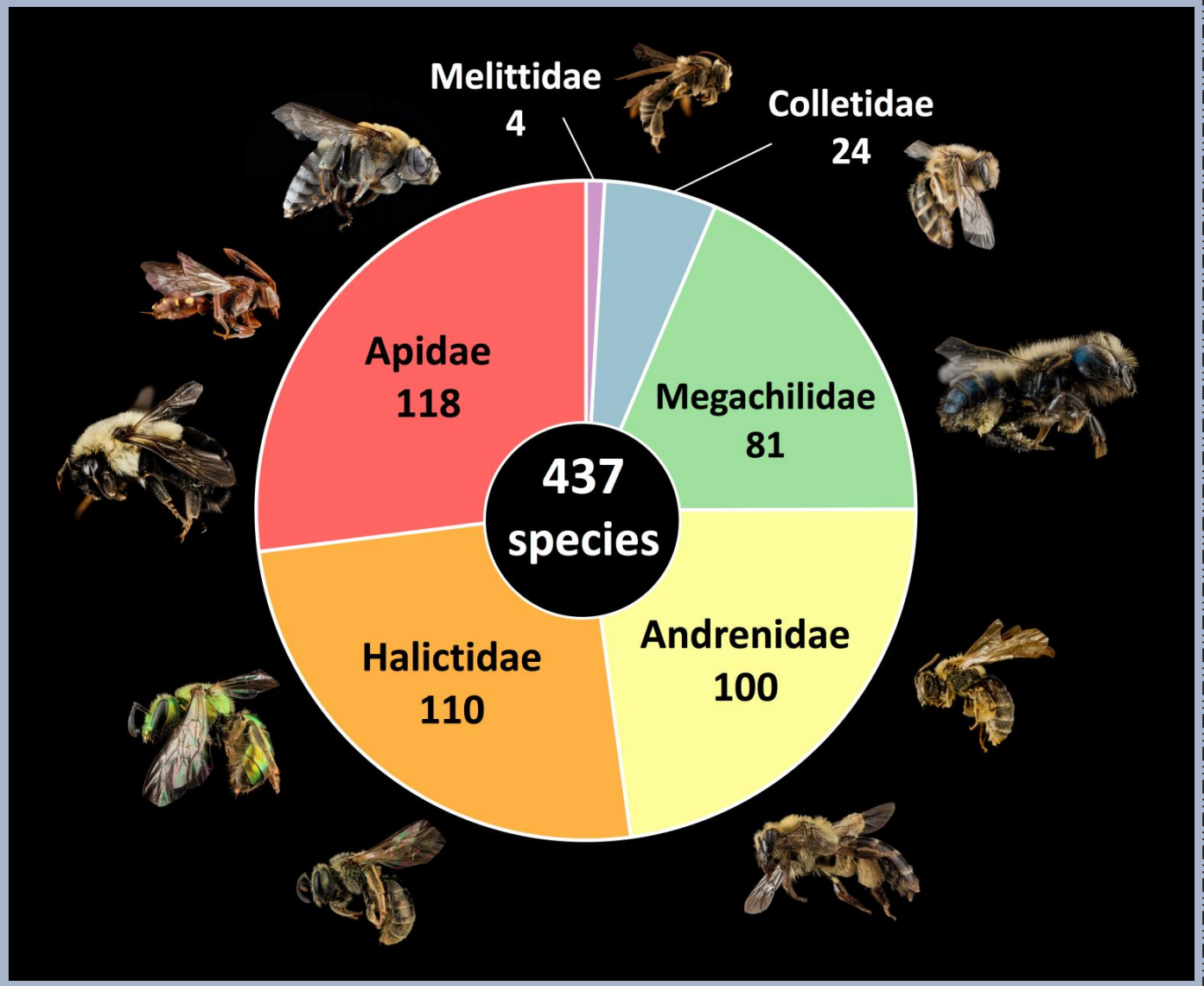

Bees of Pennsylvania

Pie Chart: USGS Bee Inventory and Monitoring Lab. Lopez-Uribe Lab, 2025. https://lopezuribelab.com/checklist-bees-pennsylvania/

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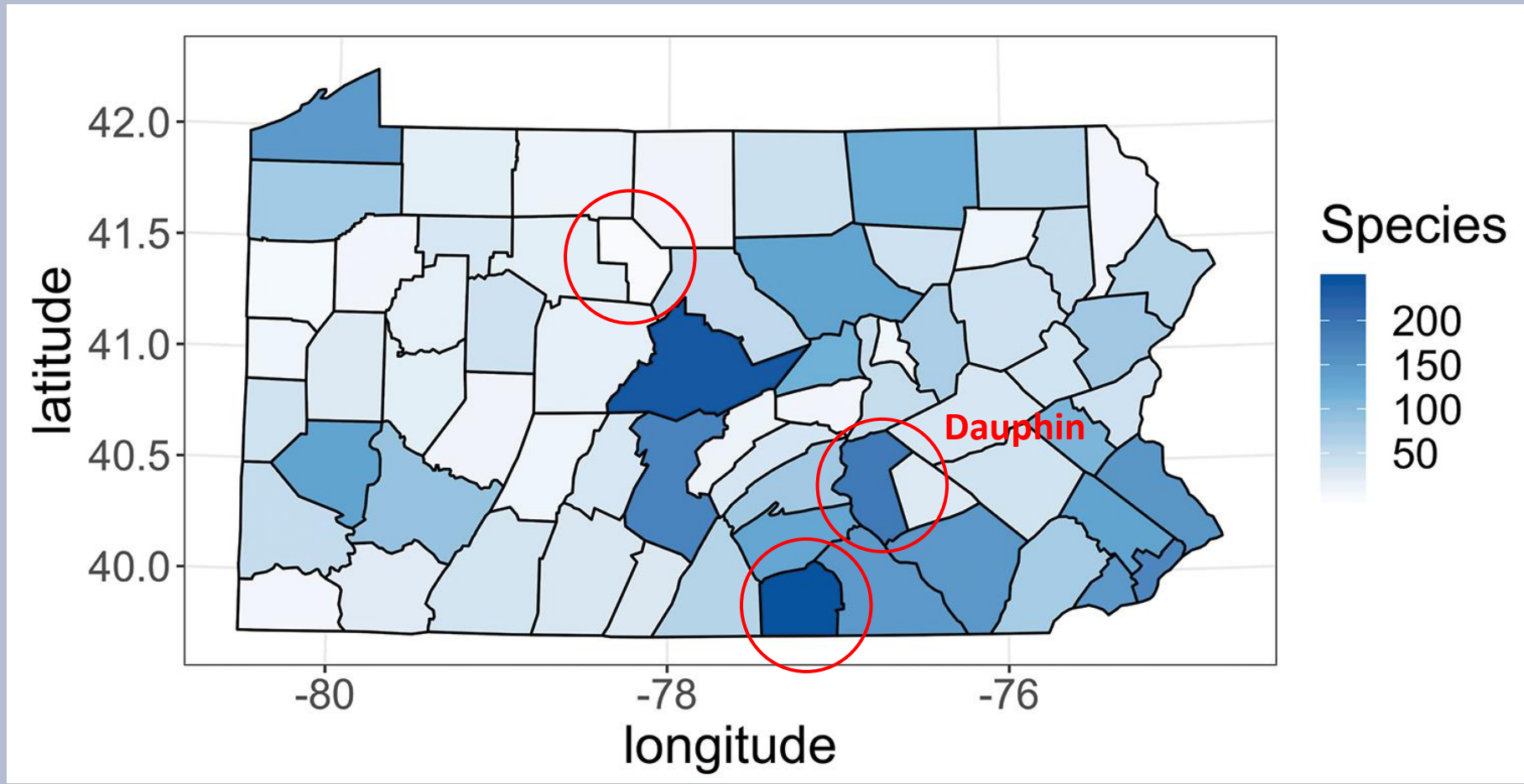

From Kilpatrick SK, et al. (2020). An updated checklist of the bees (Hymenoptera, Apoidea, Anthophila) of Pennsylvania, United States of America. *Journal of Hymenoptera Research 77*, 1-86. https://doi.org/10.3897/jhr.77.49622. Used with permission under CC BY 4.0.

Choropleth map of Pennsylvania specifying bee species richness by county. The greater number of species recorded for a county, the darker blue the county is on the map; lighter-colored counties have fewer reported species. The number of species ranges from one (Cameron) to 246 (Adams).

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Carrying Pollen: Scopa, Corbicula, or Crop

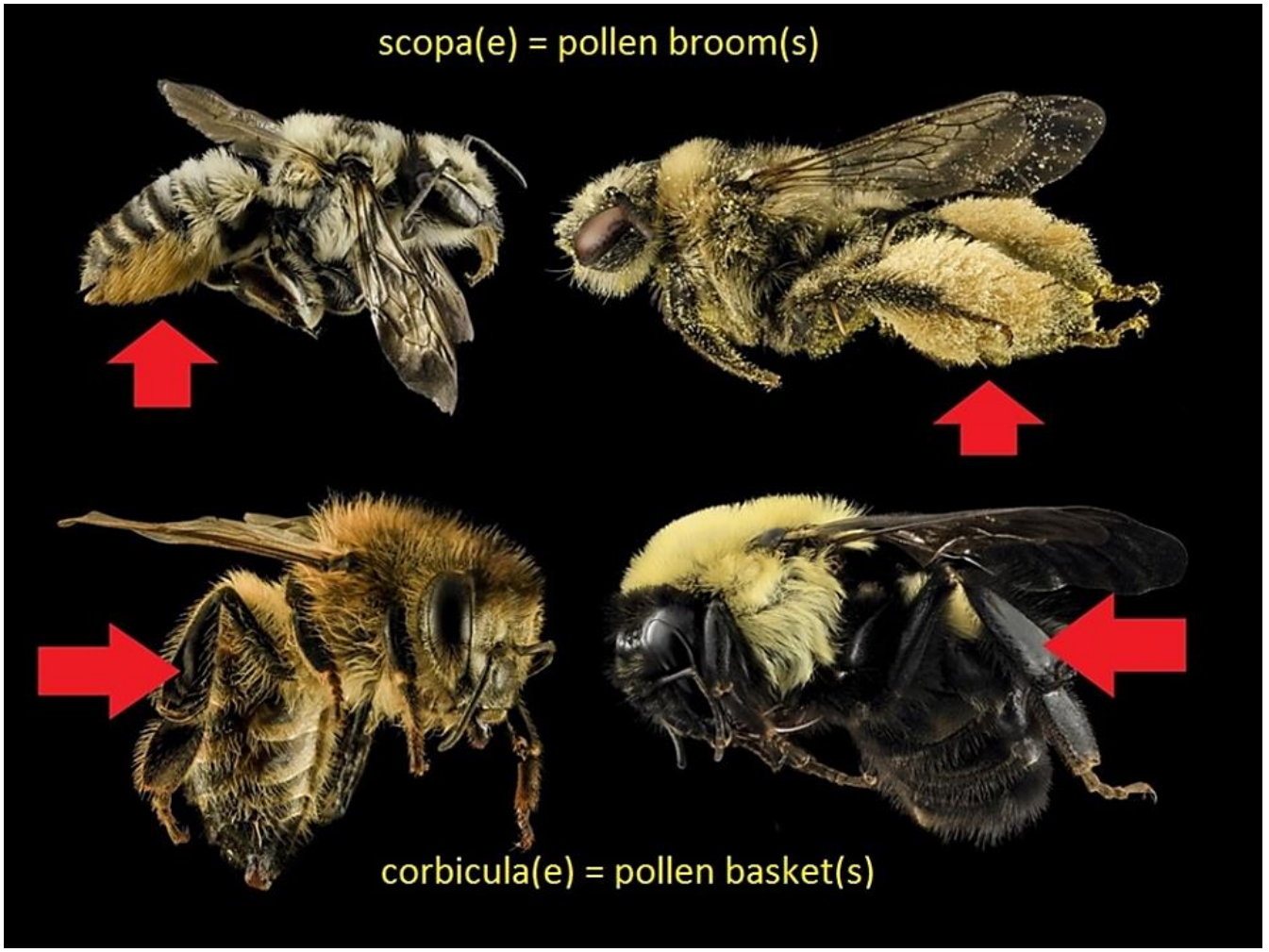

Image used with permission from The Garden Professors Facebook page,
https://www.facebook.com/TheGardenProfessors/photos/a.194845343984513/1527724597363241/?type=3

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Carrying Pollen: Scopa, Corbicula, or Crop

L to R: subgenus *Eumelissodes*, patchwork leaf-cutting bee, and common Eastern bumble bee. © 2024, Angela Hartley

Carrying Pollen: Scopa, Corbicula, or Crop

Crop

Modest masked bees on dill flowers. © 2024, Angela Hartley

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Type of Pollinator: Generalist vs. Specialist

Generalists (polylectic): collect pollen from a wide range of plants.
Specialists (oligolectic): collect pollen primarily from a specific plant family, genus, or species.

Eastern carpenter bee. © 2024, Angela Hartley

Generalist: Eastern Carpenter Bee

Specialist: Pickerelweed Shortface

Bee Social Structure/Behavior: What Does it Mean?

Did you know?

Solitary bees are nonaggressive, and females rarely sting. Males usually don't have stingers.

Social bees and wasps are likely to be very aggressive because they protect their nests.

How bees live together or alone and rear young

- **Most bees are solitary**
  - Individual females build nests and alone

cial (bumble bees)
bees (in PA, only

es a nest
generations
- Reproductive division of labor
- Cooperative brood rearing

Honey bee swarm. © 2024, Angela Hartley

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Apidae

- Roundish, often hairy bodies with wide range of colors and patterns
- Various nesting habits: tunnels or wood (solitary species) or cavities (eusocial species)
- Carry pollen on legs
- Generalist and specialist feeders

Male dark-veined longhorn bee on sunflower left and brown-belted bumble bee.

Native Apidae Species

Eastern carpenter bee on verbena bonariensis.

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Native Apidae Species

Perplexing Bumble Bee

Bombus perplexus

- Mated females (gynes) emerge and establish new colonies in spring
- Males and new gynes appear by June
- Active throughout the summer; scarce by September
- Feeds on nectar and pollen from various flowers
- Range: widespread in southern Canada and northeastern US

Perplexing bumble bee on eryngium. © 2024, Angela Hartley

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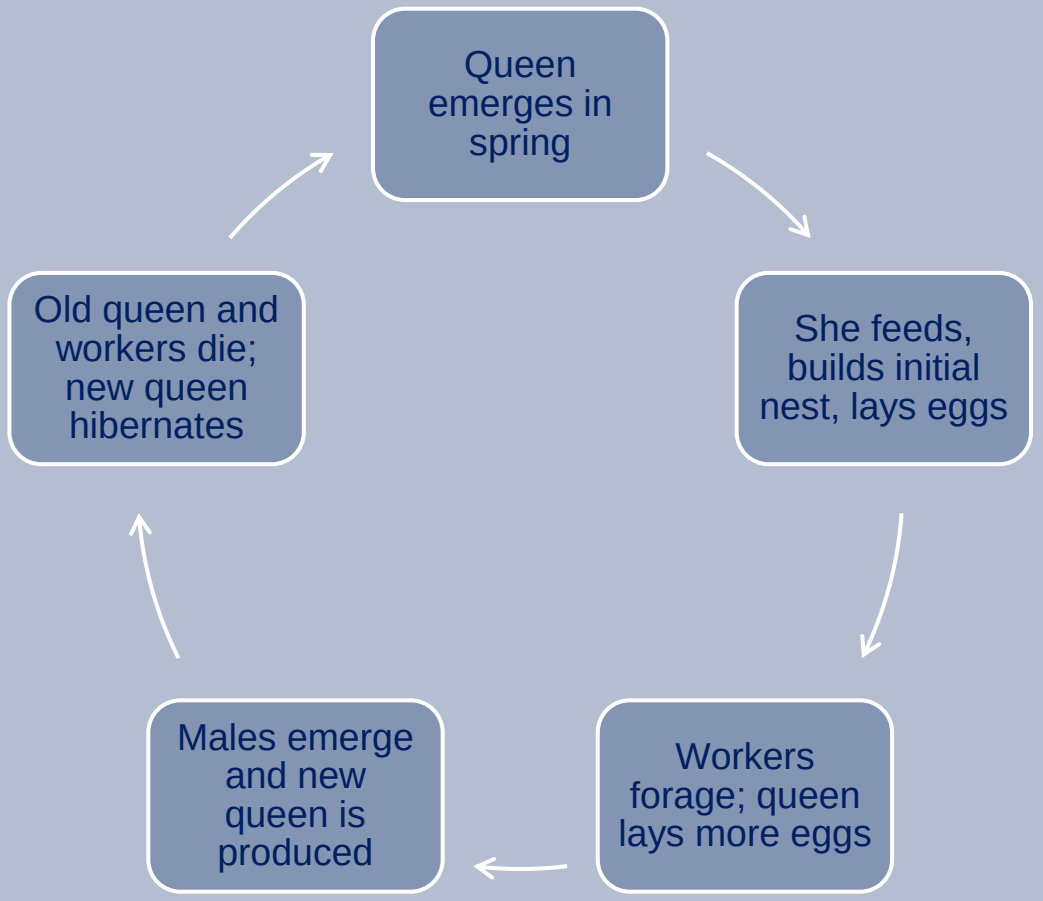
Bumble bees made a nest in insulation. Photo by Debbie Roos for NC State Extension. Used with permission.. go.ncsu.edu/bumble-nest



Social Structure/Lifecycle of Bumble Bees

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Native Apidae Species

Long-Horned Bees

Genus *Melissodes*

- Essential pollinators of garden and native flowers and sunflower crops
- Active July through September
- Feeding patterns vary:
  - Specialist to generalist
- Nest in the ground
- Range: Canada to Argentina

Two-spotted longhorn bee on coneflower. © 2024, Angela Hartley

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Longhorn Cuckoo Bees

Cuckoo Bees

- Usually same fa
- Enter the nests
  collect pollen
- Lay eggs in cell
  the host female
- Larva hatches a
  pollen ball left f
- Kills and eats th

Lunate longhorn
Triepeolus lunatu

- Family Apidae
- Nest parasite of the two-spotted longhorn bee

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Native Apidae Species

Orange-Tipped Wood Digger Bee

Anthophora terminalis

- Usually one generation per year: active mid-June through August
- Broad diet but seems to prefer long-tubed flowers
- Solitary: nests in wood
  - Unique – most species in genus nest in ground
- Range: much of US and Canada

Orange-tipped wood digger on great blue lobelia. © 2024, Angela Hartley

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Halictidae (Sweat Bees)

- Wide range of colors and patterns
- Vary from solitary to primitively eusocial
- Nest in burrows in the ground or decaying wood
- Carry pollen on legs
- Generalist and specialist feeders that consume salt

Pure green sweat bees. © 2024, Angela Hartley

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Native Halictidae Species

Ligated Furrow Bee

Halictus ligatus

- Very abundant and easily identifiable
- Nests in rotting wood or soil
- Primitively eusocial
- Multiple generations
- Generalist feeder
- Range: throughout Americas and southern Canada

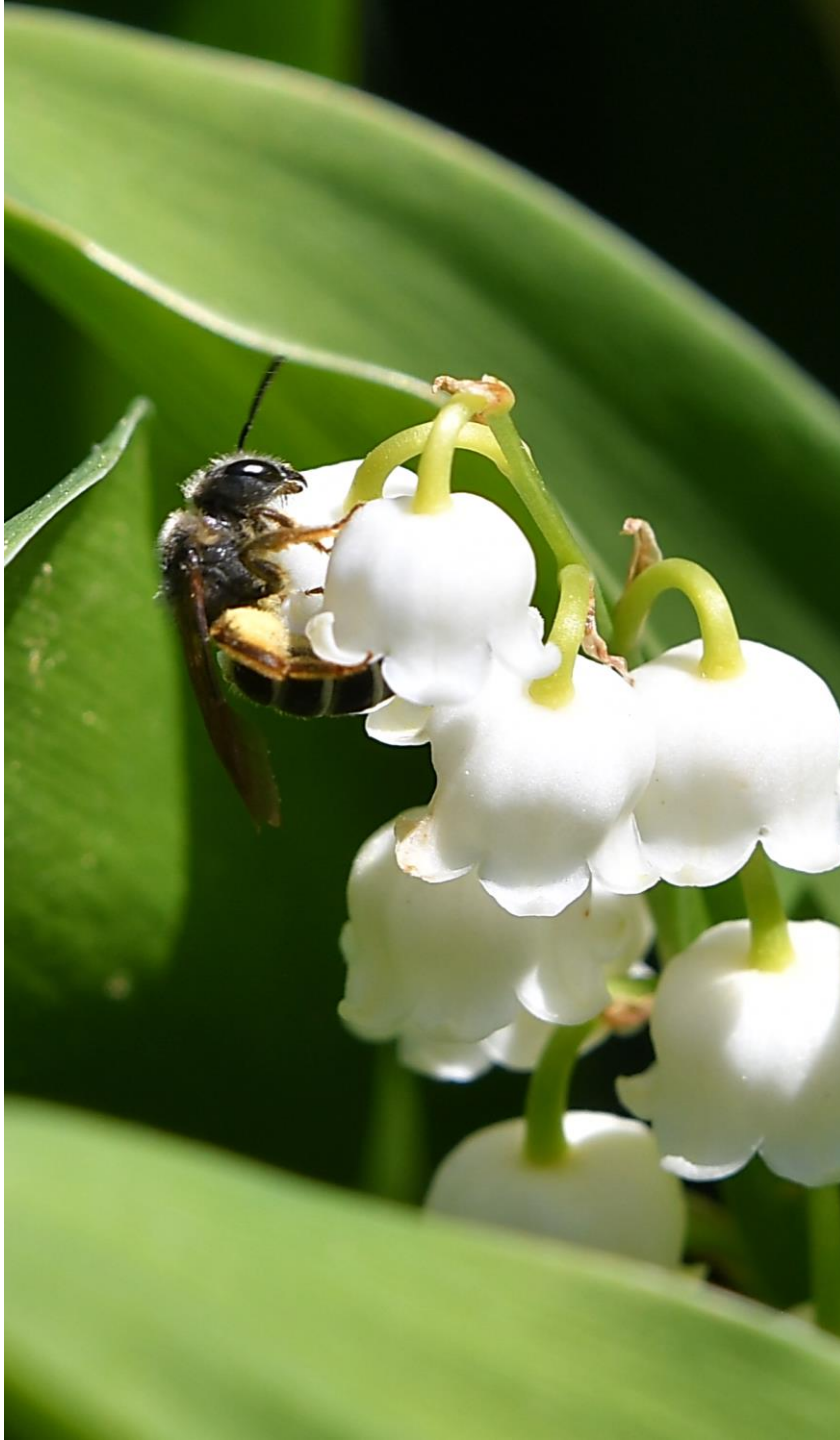
Ligated furrow bee on goldenrod. © 2024, Angela Hartley

Native Halictidae Species

Orange-Legged Furrow Bee

Halictus rubicundus

- Socially polymorphic depending on climate
  - Higher elevations (short season): solitary
  - Lower elevations (longer season): social
- Range: throughout the temperate regions of the northern hemisphere
- Nest in southward facing slopes of sand or soil



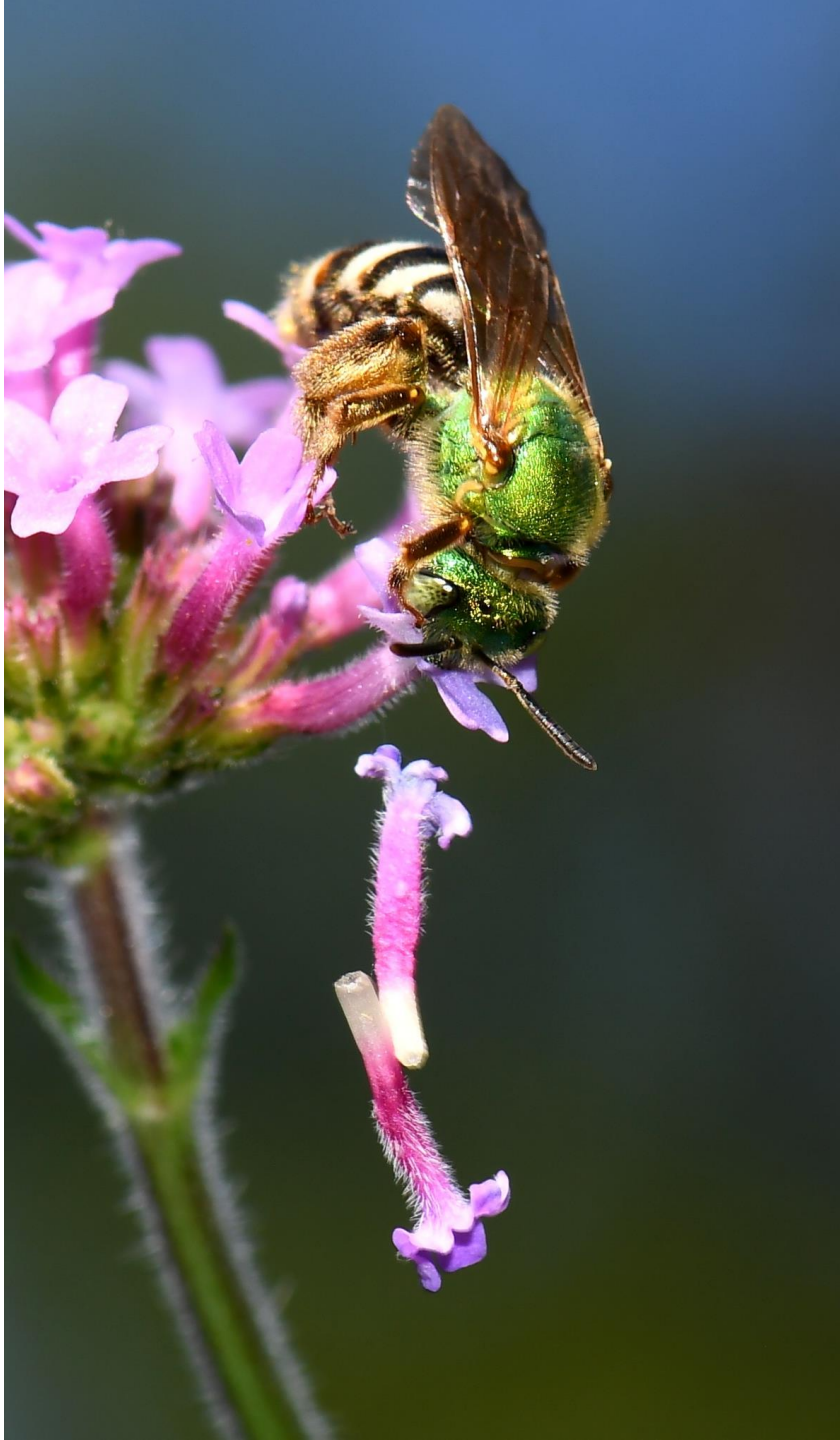
Orange-legged furrow bee. © 2024, Angela Hartley

Native Halictidae Species

Bicolored Striped Sweat Bee

Agapostemon virescens

- Very abundant and widespread
- Easily identifiable
- Solitary: nests underground
  - Can form aggregations; multiple females share a single burrow
- Range: midwest and northeast US



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Female bicolored striped sweat bee on verbena bonariensis.

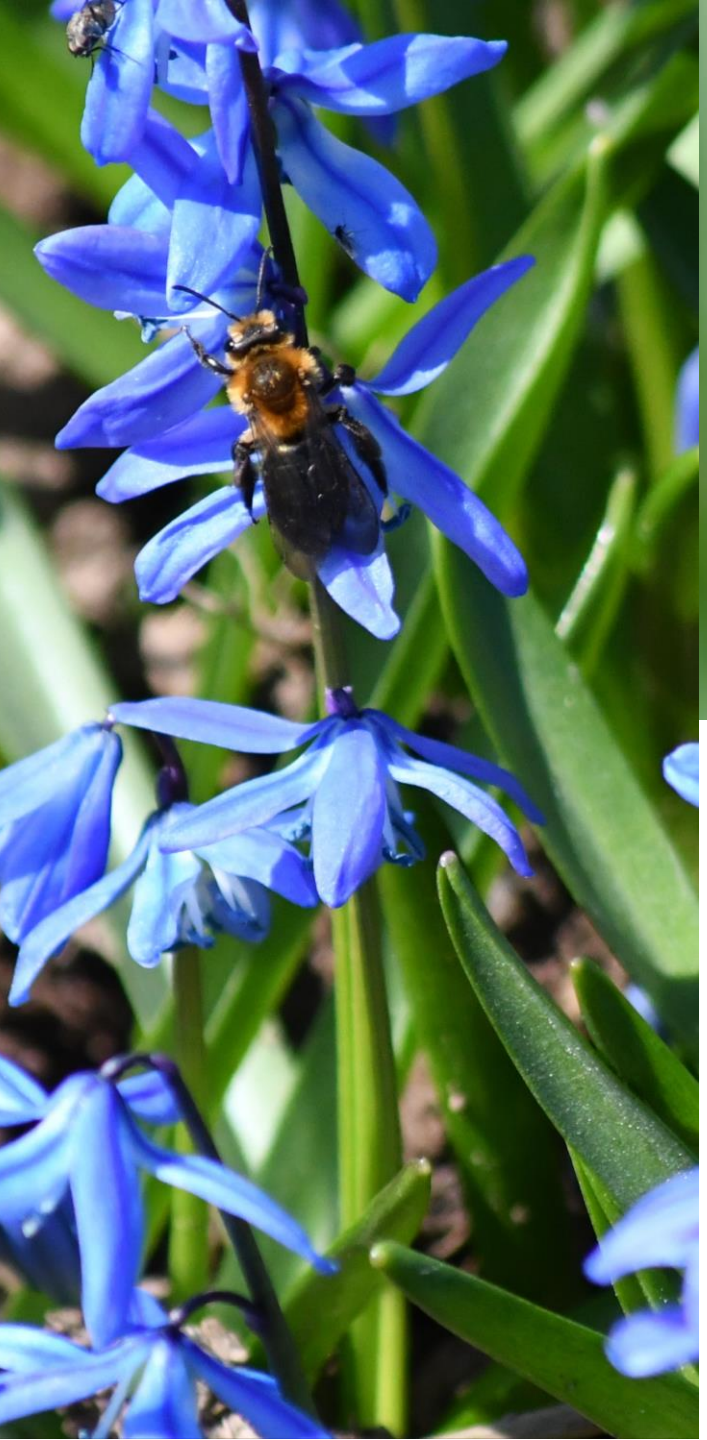
Native Halictidae Species

Pure Green Sweat Bee

Did you know?

Hover flies that mimic the appearance of bees are often confused with sweat bees.

Pure green sweat bee on kale flowers.© 2024, Angela Hartley



Andrenidae (Mining Bees)

- Small to medium size with wide range of colors and patterns
- All species solitary but may nest close together (in the ground)
- Carry pollen on legs
- Many are plant specialists

Neighborly mining bee left and genus *Andrena* right. © 2024, Angela Hartley

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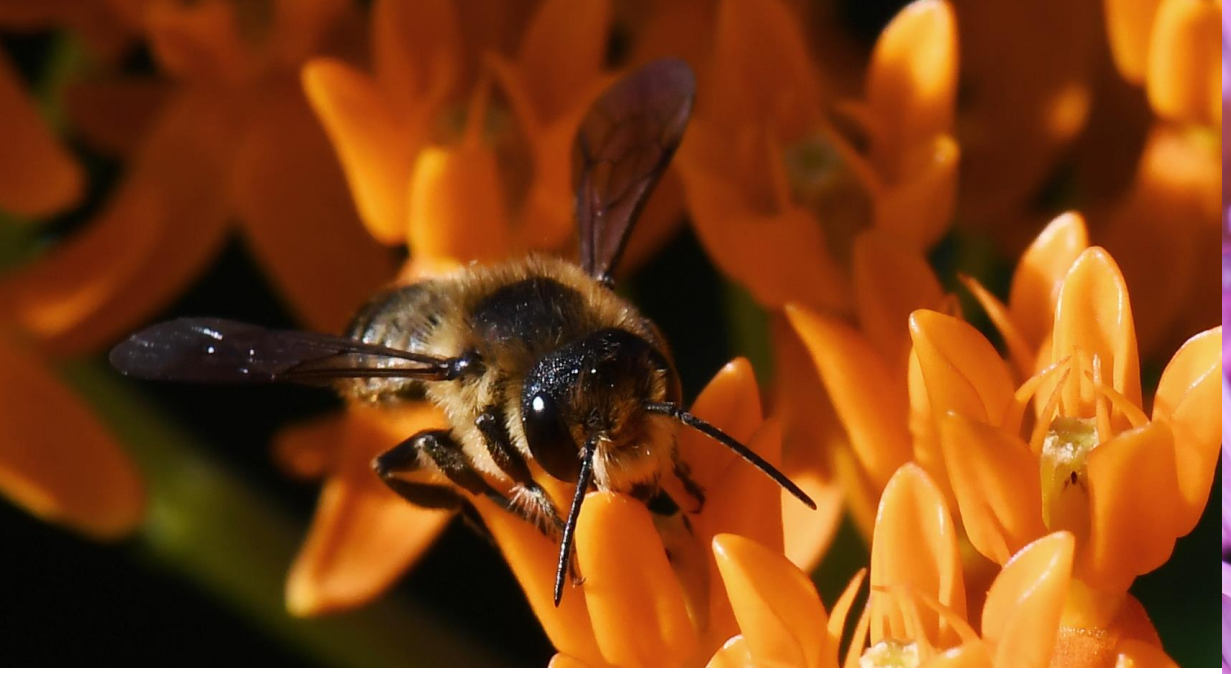
Dunning's miner

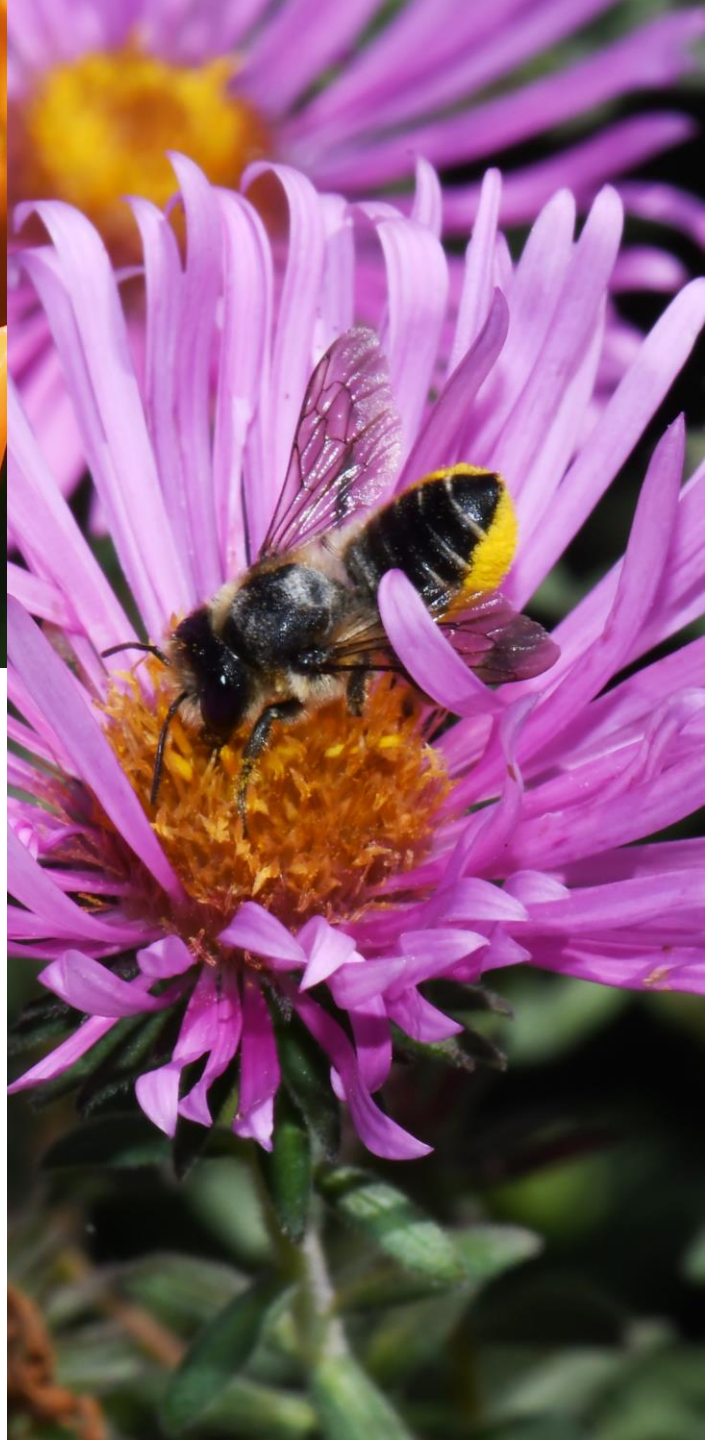
Nomad Be

Nest parasites

Imbricate cu
nomad bee,
imbricata

- Family Apidae
- Parasitizes D
  miner bee an





Megachilidae

- Leaf cutters, mason bees, and resin bees
- Wide range of colors and patterns
- All species solitary
- Generalist and specialist feeders
- Scopa on abdomen

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Female Texas leaf cutter left and female patchwork leaf cutter right..

Wool Carder Bees

Three species found in PA; none is native but first 2 are very common

Genus *Anthidium*

- European wool carder
- Oblong wool carder

- European small wool carder, *Pseudoanthidium nanum*
  - Exotic bee first documented in the state in 2020

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Native Megachilidae Species

Leaf-Cutting Bees

Genus *Megachile*

- Important native pollinators
- Cigar-shaped nests made from leaves or petals
- Overwinter in nests as newly formed adults
- Range: all continents except Antarctica

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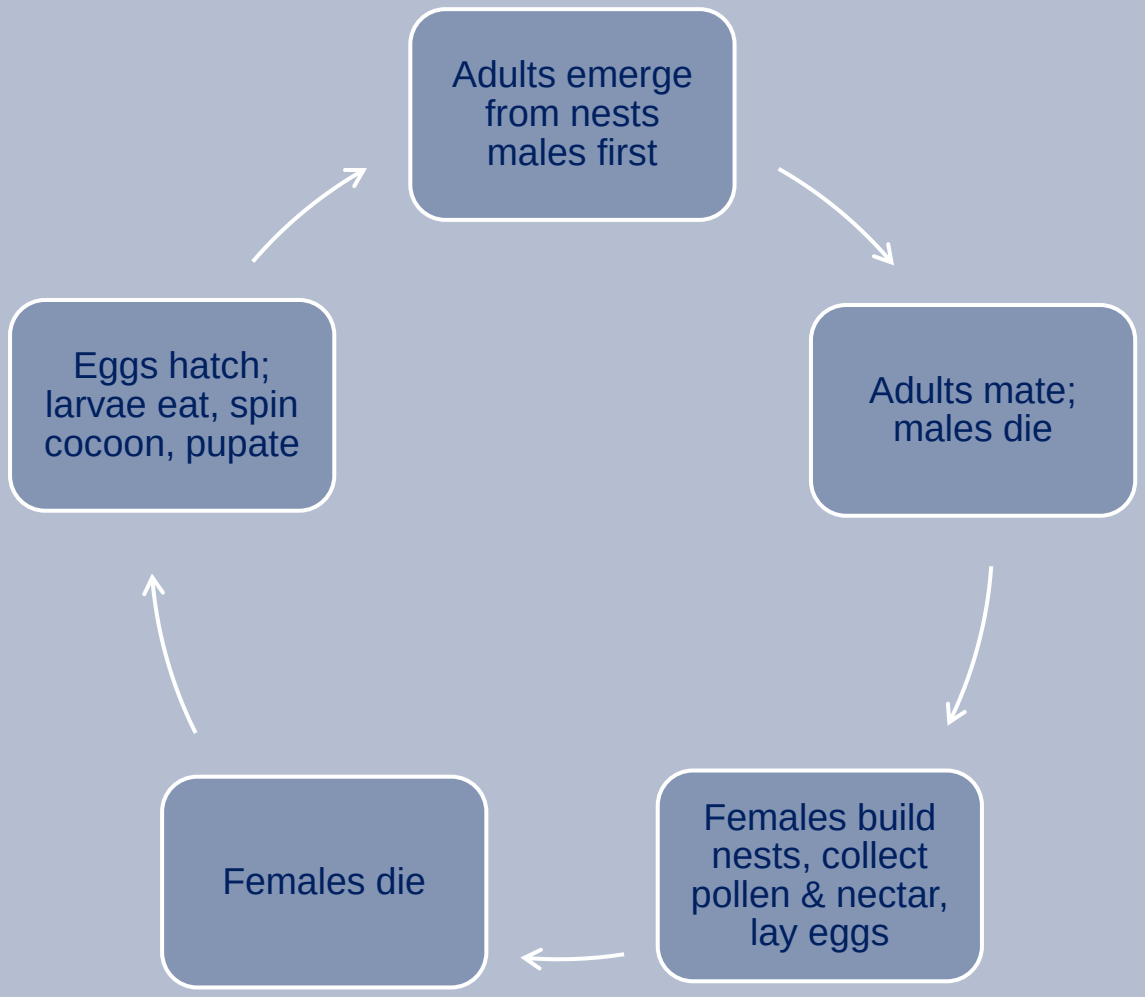
Female patchwork leaf cutting bee on helenium.



Leafcutter bee larva. © Crown Bees, 2025. https://crownbees.com/pages/leafcutter-bee-life-cycle. Used with permission.

Lifecycle of Leaf-Cutting Bees

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Native Megachilidae Species

Mason Bees

Georgia mason bee, *Osmia Georgica*

- Broad specialist on the family Asteracae
- Nest in cavities
- Range: Massachusetts to Michigan, south to Georgia and Texas
- Flight period is early spring

Female Georgia mason bee on Philadelphia fleabane. © 2024, Angela Hartley

Native Megachilidae Species

Resin Bees

Slender resin bee, *Megachile exilis*

- Nests in pre-existing cavities
- Generalist feeder
- Range eastern US to Rockies and Mexico

Megachile exilis on New England Aster. © 2024, Angela Hartley

Megachilid Cuckoo Bees

Genus *Coelioxys*

Say's Cuckoo Leafcutter, *Coelioxys sayi*

- Family Megachilidae
- Referred to as sharptail
- Targets nests of flat-tailed leafcutter bees

Say's cuckoo leafcutter female top and male bottom. ©2024, Angela Hartley

Megachilid Cuckoo Bees

Genus *Stelis*

Louisiana P
Stelis louis

- Family M
- Nest para
  of megac
  nests with

A note on parasites:

The presence of cuckoo bees indicates the presence of a healthy population of the host species.

Louisiana painted dark bee. ©2024, Angela Hartley

Colletidae (Cellophane and Masked Bees)

- Make a cellophane-like lining around brood cells
- All species solitary
- Wide range of colors and patterns
- Genus *Hylaeus*: hairless

Modest masked bee on dill flowers.

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Did you know?

Hawai'i has only about 70 native species of bee and they all belong to the genus *Hylaeus*, ie, masked bees.

Cellophane Cuckoo Bees

Two-banded Cell
Cuckoo Bee, *Epe*
bifasciatus

- Family Apidae
- Nest parasite o
  footed cellopha
- Both uncommo
- Both plant spec
  ground cherries
  tomatillos (genu

Broad-footed cellophane bee. *Colletes latitarsis.*

From left: common eastern bumble bee, female dark-veined longhorn bee, male (same species) and ligated furrow bee. © 2024, Angela Hartley

We Need Native Bees

- 75% of flowering plants, 35% of food crops,[2] and nearly 90% of wild plants[3] depend on insect pollination.
- Crop yields are improved by 3,500+ species of native bees.[2]
- Native bees contribute more than $3 billion in fruit-pollination services annually.[3]

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Golden northern b

According to Penn State Extens s essential for sustaining agricultural production in P

We Need Native Bees

Did you know?

Native bees are more effective and efficient pollinators than honey bees?

- Increase diversity of plant offspring[5]
- Buzz pollination
- Better pollen collection
- Evolved with native plants

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Native bees need our help!

Populations
worldwide; s
extinction.

Native Bees

Center for Bi

- More than
  are declin
- Nearly 1 i
  extinction
- 28% of Nc
  have expe
- Golden nc
  “vulnerabl

Macropis cuckoo bee, *Epeoloides pilosulus*. ©2024, Stephen Mirick, Creative Commons CC BY-NC 4.0

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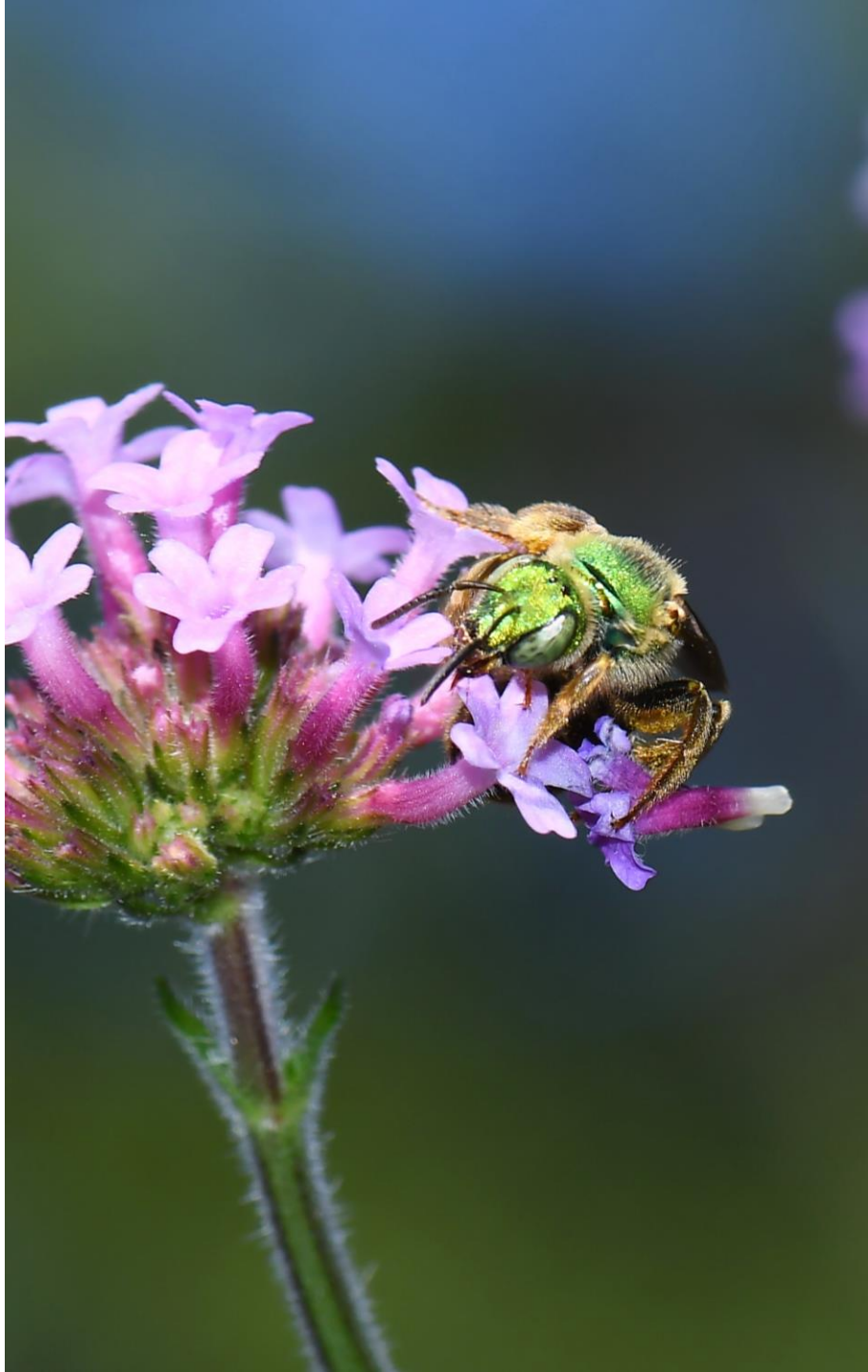
Golden northern bumble bee on false indigo. © 2021, Angela Hartley

Native bees need our help!

Population declines caused by

- Habitat loss and changes in land use
  - Lack of pollinator-friendly plantings
- Competition from non-native species
  - Disease and parasites
- Pesticides and other environmental contaminants
- Climate change



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Female bicolored striped sweat bee.

"Penn State Extension Master Gardeners are taking action to protect pollinators by planting pollinator-friendly gardens and providing education for the gardening public."[7]

Pollinator Habitat Certification

- Habitat certification
  - Increases biodiversity
  - Reduces water consumption
  - Improves natural and biological control of pests
- Available from multiple organizations
  - Penn State Extension
  - National Wildlife Federation
  - Pollinator Partnership
  - Xerces

Patchwork leafcutter bee on helenium.

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Certification: It's the steps -- not the status.

Certification includes the following requirements meant to protect and support native bees.

You can implement these steps without obtaining certification.

1. Provide food for adult insects and larvae
2. Provide a water source
3. Provide shelter and nesting sites
4. Avoid invasive plants
5. Avoid pesticides

Female flat-tailed leaf cutter on verbena bonariensis. © 2024, Angela Hartley

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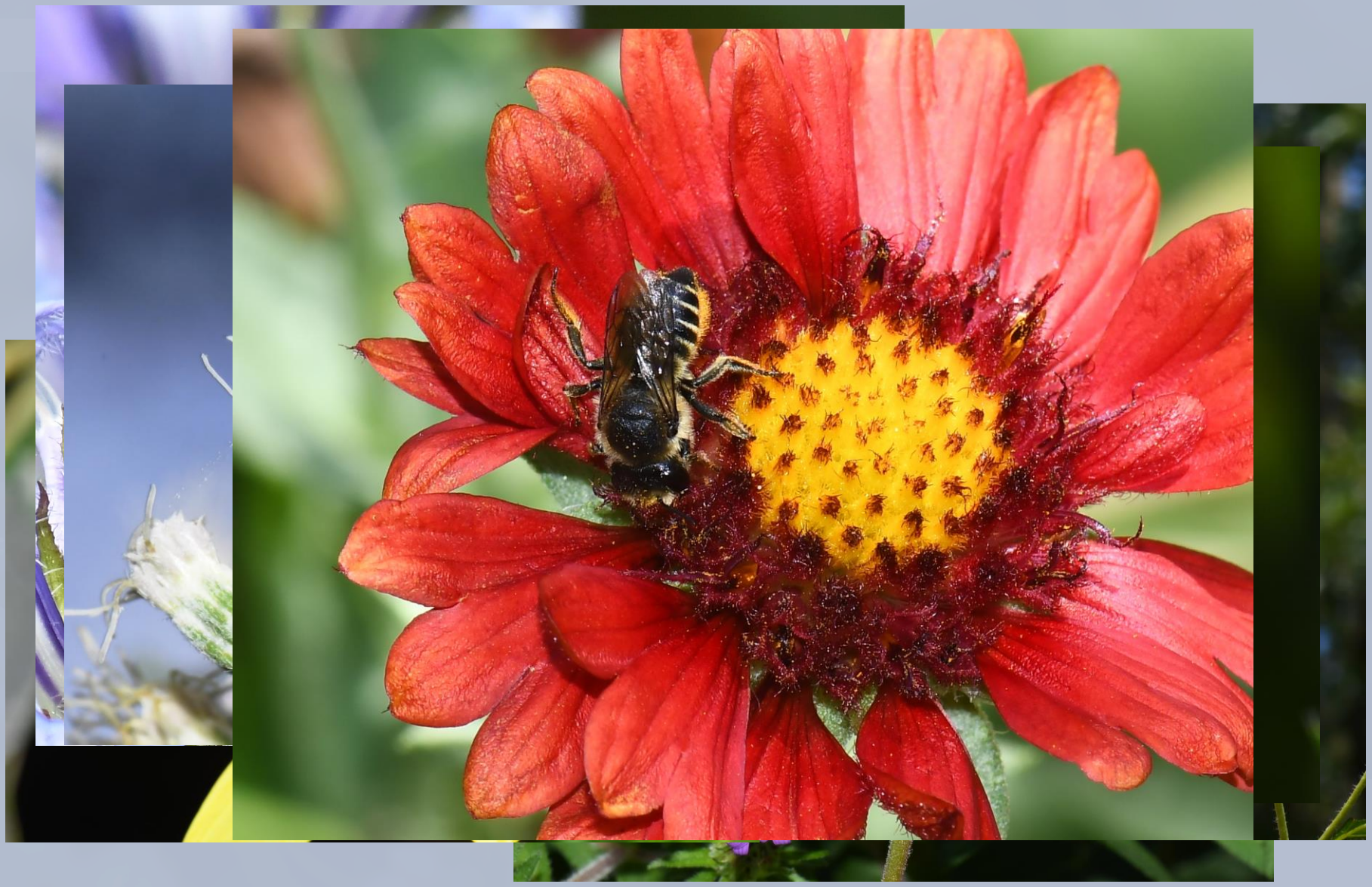
Native Plants Support Native Bees



Helping native bees and other pollinators helps us all!

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3. Kopec, K., & Burd, L. A. (2017). Pollinators in Peril: A Systematic Status Review of North American and Hawaiian Native Bees. Center for Biological Diversity.
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Resources

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4. Penn State Extension. Pollinator Series - Bee Biodiversity in Pennsylvania. Webinar. https://psu.mediaspace.kaltura.com/media/1_6vhvj6i1
5. Pollinator Partnership. Pollinator Steward Certification
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Thank you!

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Questions?

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