



POLLINATORS: The Wings of Life

POLLINATOR STEWARD
TRAINING
2026

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Pollinator Foundations (~50min)

- Pollination and importance
- Who are the pollinators?
- Bees– why so special?
- Issues pollinators are facing and status (Anthony)
- How bees live (and what they need)
- How to help



POLLINATION



How does pollination happen? Self, Wind, Animal

Flowers need pollination

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Importance of Animal Pollination

90% World's flowering plants need
animal pollinators

Seeds and berries, plant material
needed by wild animals

87 of the top 128 Global food crops

1/3 of the food we eat

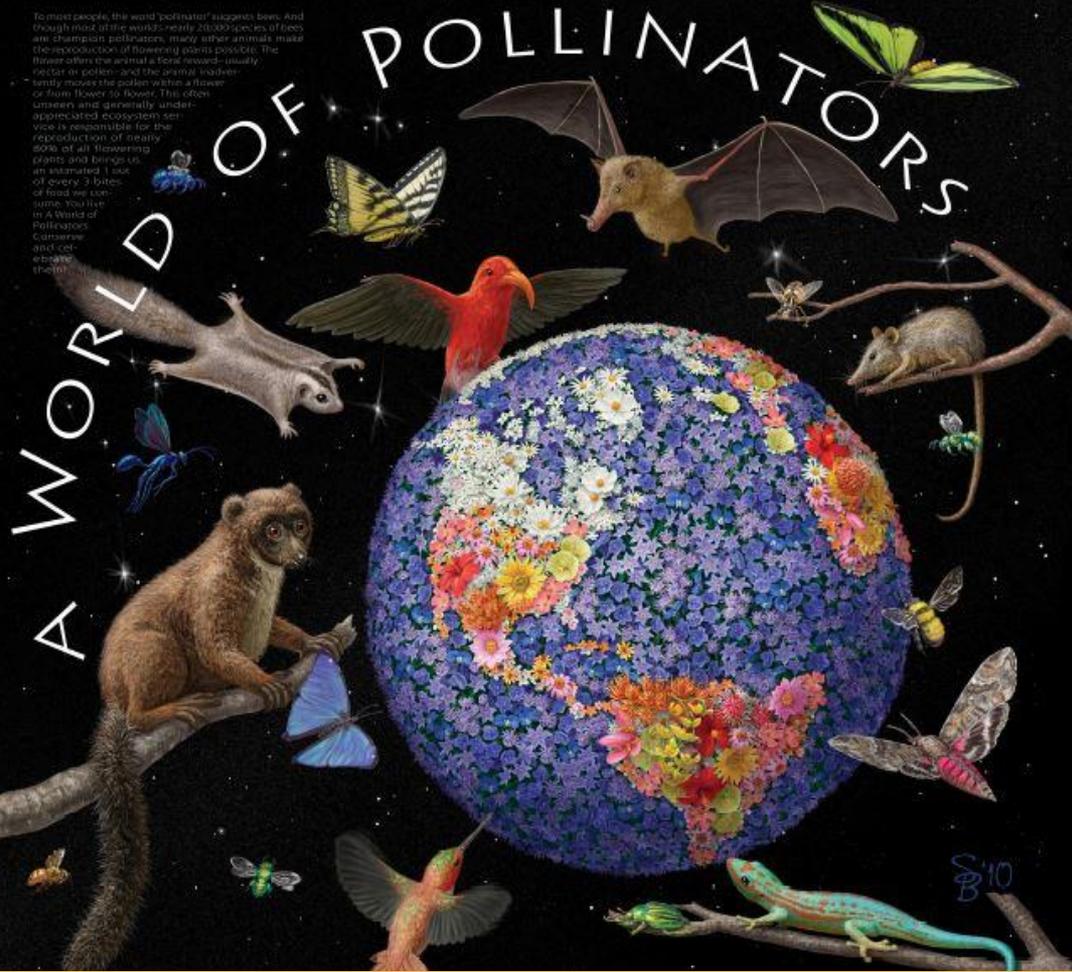
Important nutrition: fruits,
vegetables, seeds, nuts, oils





Ecosystem Services

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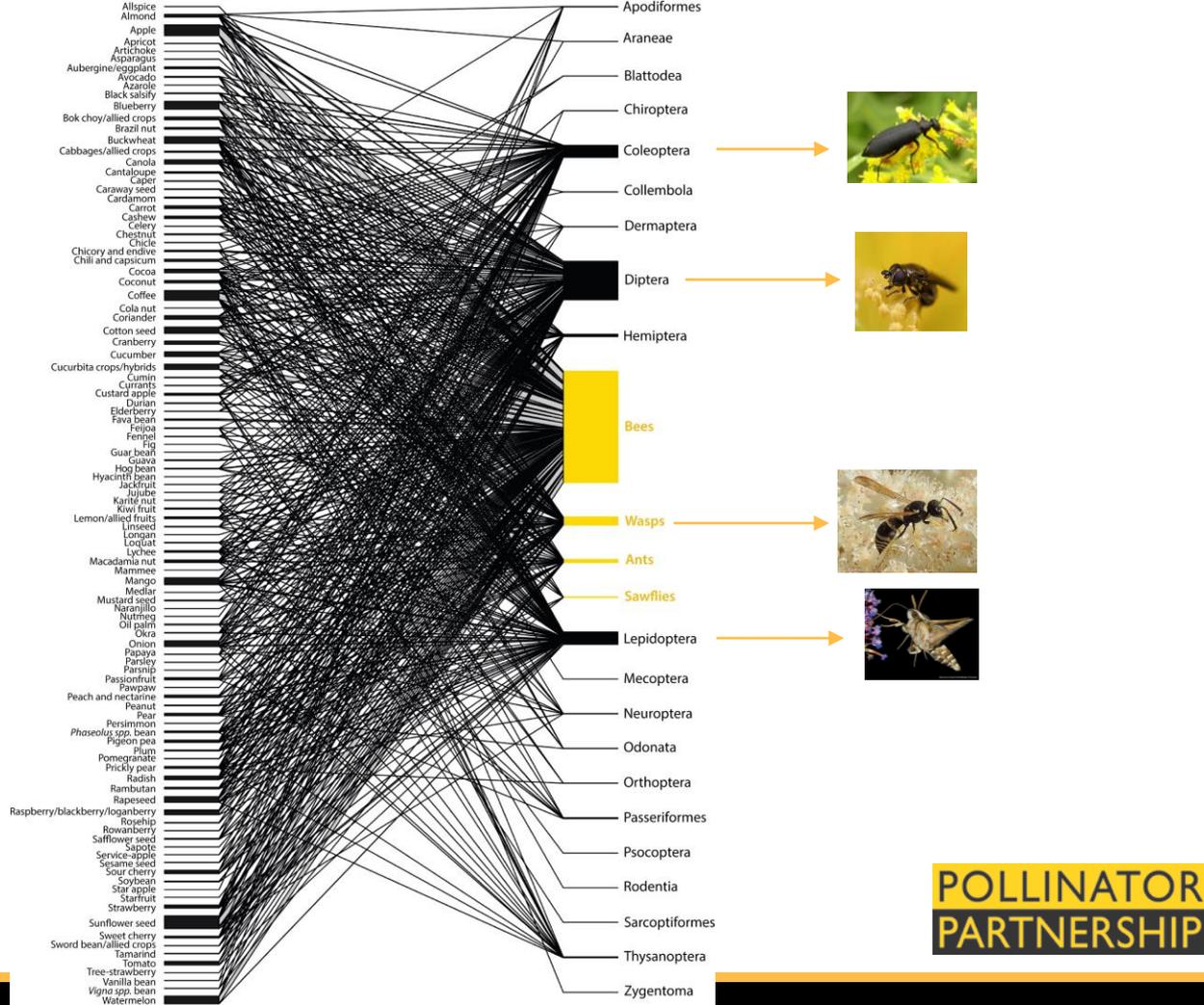


To most people, the word "pollinator" suggests bees. And though many of the world's nearly 20,000 species of bees are champion pollinators, many other animals make the reproduction of flowering plants possible. The flower offers the animal a food reward—usually nectar or pollen—and the animal inadvertently moves the pollen within a flower or from flower to flower. This often unseen and generally undervalued ecosystem service is responsible for the reproduction of nearly 80% of all flowering plants and brings us an estimated 100 of every 3 bites of food we consume. You live in A World of Pollinators. Conserve and celebrate them.

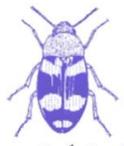
Who are the Pollinators?

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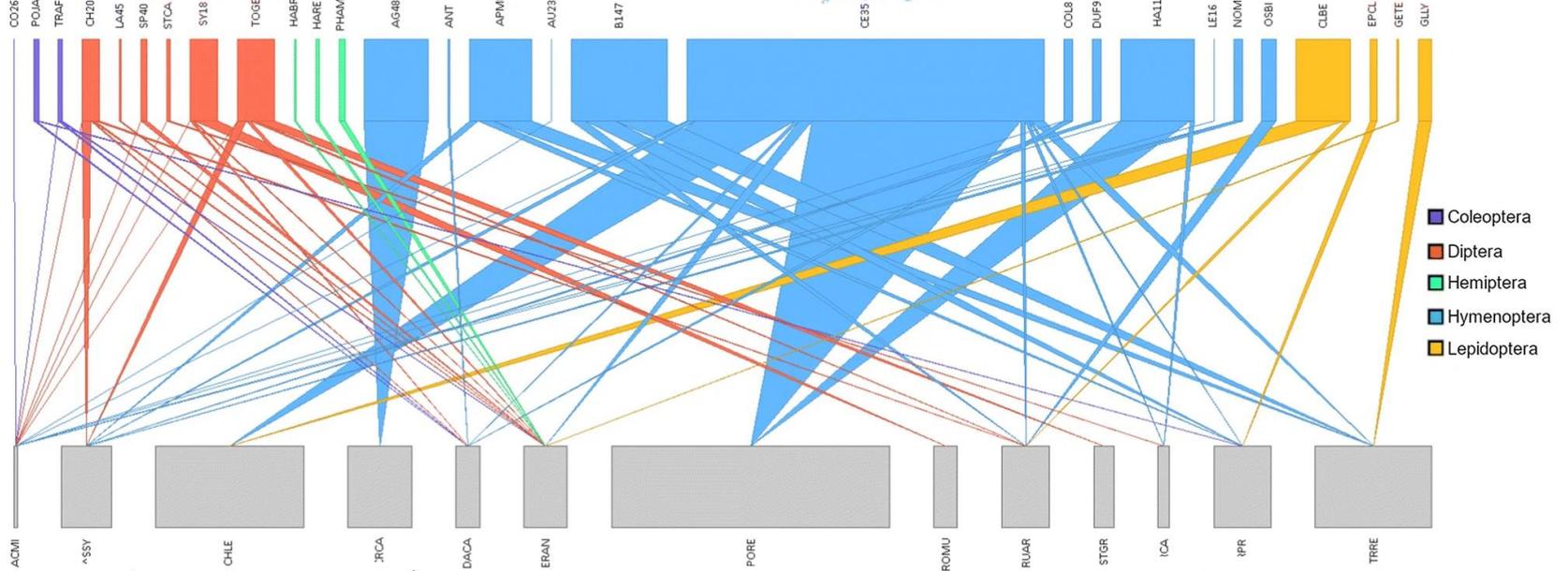
Rader et al. 2020. Non-Bee Insects as Visitors and Pollinators of Crops: Biology, Ecology, and Management. Annual Review of Entomology



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Site 2



- Coleoptera
- Diptera
- Hemiptera
- Hymenoptera
- Lepidoptera





Honey bees important for agriculture

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Join the Conversation about Native Bees



What's the buzz?

North America has over 4,400 described species of native bees* that pollinate wildflowers and crops. From the tiny *Perdita minima* to the substantial carpenter bee (*Xylocopa varipuncta*), these local pollinators are hard at work in the floral landscapes of gardens, farms, forests, grasslands and urban and wild lands. Unfortunately, several species of native bees are showing disturbing signs of decline. Learn more about these colorful pollinators and how you can support them at www.pollinator.org

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Over 4,000 Native Bee Species in North America!

Art and Design
© 2015 The Nature Conservancy





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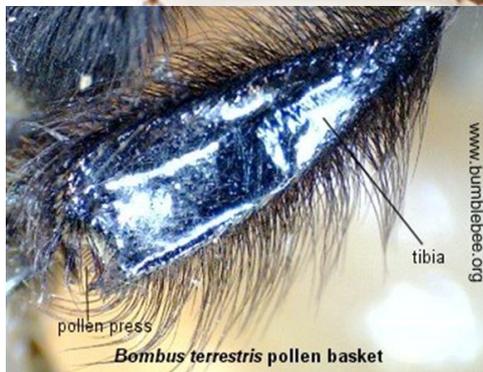


<https://www.walterreeves.com/gardening-q-and-a/magnolia-beetles-in-flower/>

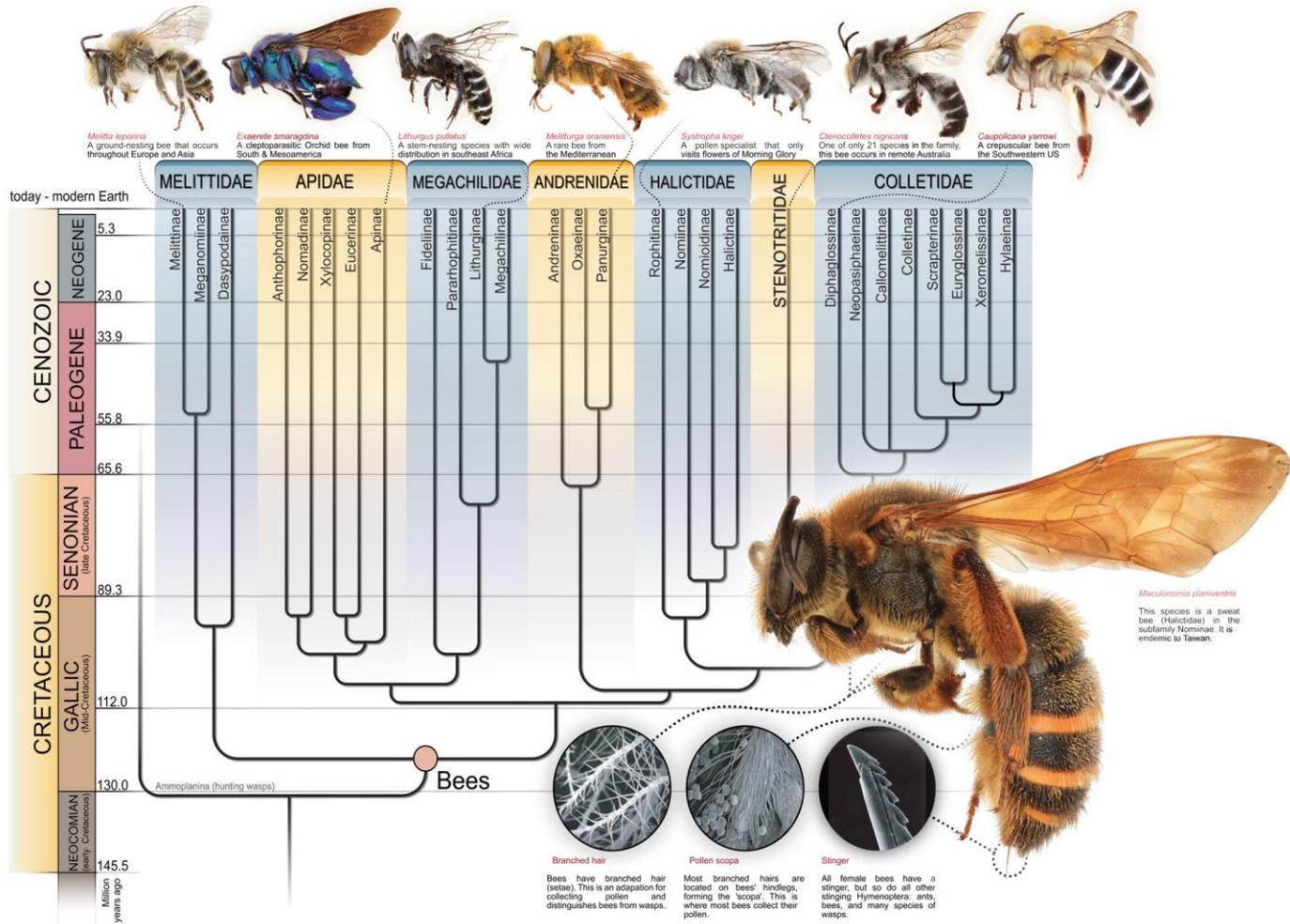


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Pollen carrying hairs
Only bees have these
grocery bags!



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Rabeling et al. 2013 Current Biology



Stephen Buchmann

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Native Bees

4000+ species in North America!

Essential for agriculture

Essential for native ecosystems

Great crop pollinators

MANY IN DECLINE

SHORT North American HISTORY OF HONEY BEES

- Brought to eastern US from Europe 1622 (400 yrs ago)
- Mainly honey production
- Out west mid-1800s
- Peak 5.9 million 1947
- Declines 1950-1990s: honey demand and prices fell, importation, less exports

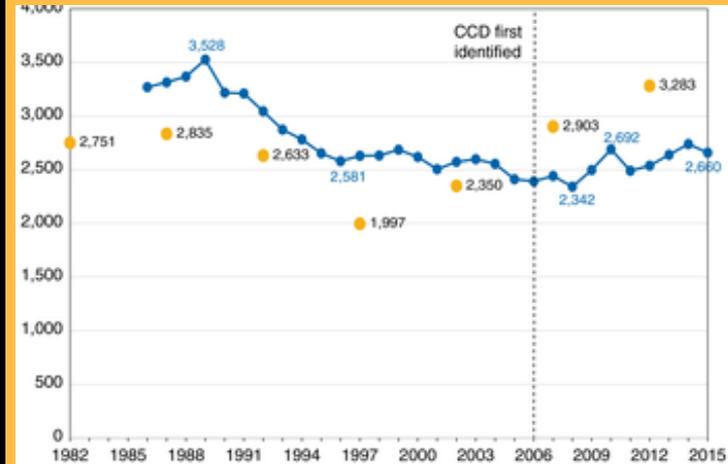


SHORT North American HISTORY OF HONEY BEES... Cont.

- About 2.5 million colonies US since 1990's- stable
- Mainly used for agricultural pollination
- Last 15yrs: Increasing disease and other issues: high yearly loss
- Colonies being split and imports to maintain numbers
- Rising prices and uncertainty
- Increasing hobby numbers (not reflected in NASS)
- Need floral diverse areas to stay healthy



Photo by Alex Wil



Notes: CCD = Colony Collapse Disorder. NHR = National Honey Report.
Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service Agriculture Census data and USDA, Agricultural Marketing Service National

Honey bee value US

- 15 billion added crop value/yr
- Non-*Apis* 3.4 billion/yr
- Proportion of crops depend on pollination increasing
- Vast acreage that can't be pollinated by remaining native bees (and mismatch between abundance and pollinator dependent crops)



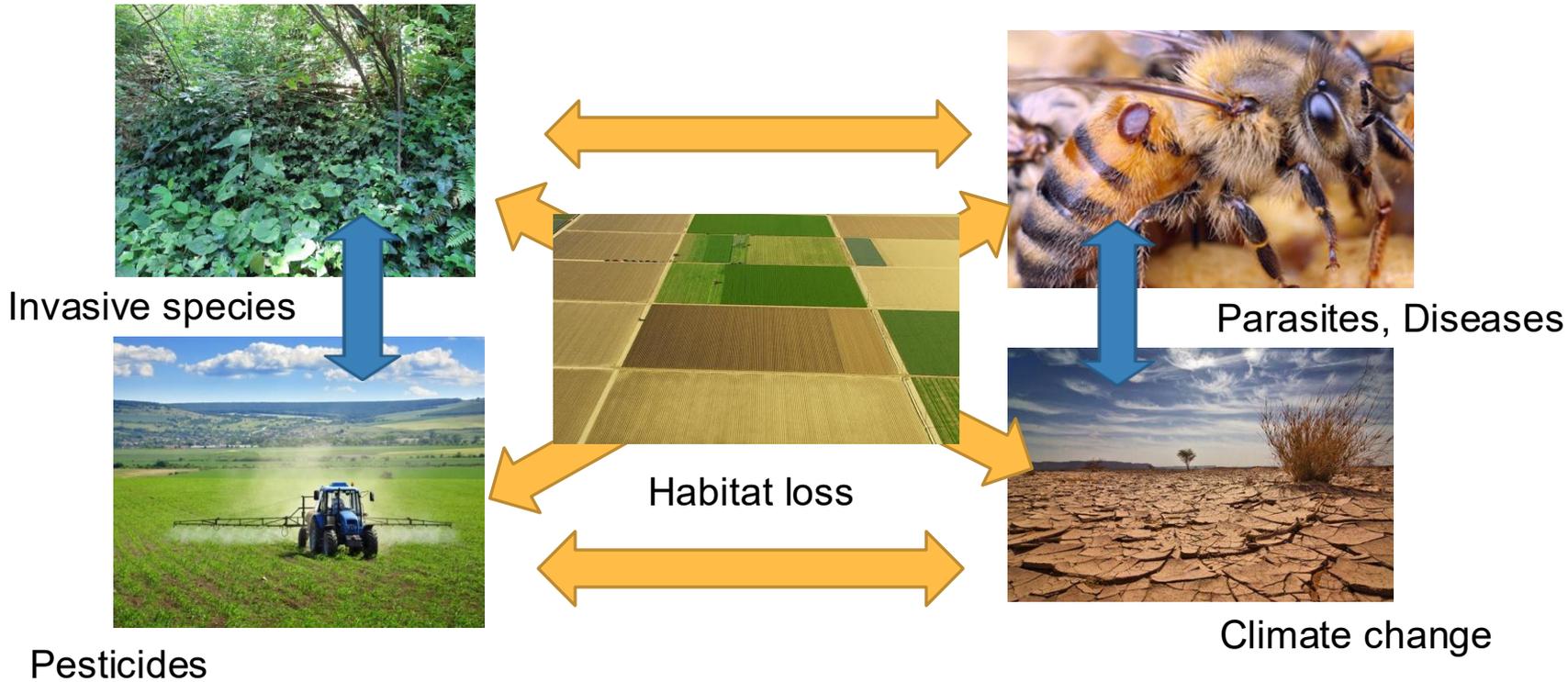




Honey Bees

Are integral to our current agricultural systems, and need support to maintain food production.

This course will focus supporting native bees and other native pollinators. But actions taken to support one type of pollinator can help all.





So, what can you do to help?

1. Habitat!
2. Outreach and education
3. Support conservation

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Honey bees are unique

Honey Bees

Perennial, large colonies

Live over winter

Generalists

Barbed stinger

Fly long distances

North American Native Bees

Most solitary, ground nesters

Short lived/short flying season

Specialize

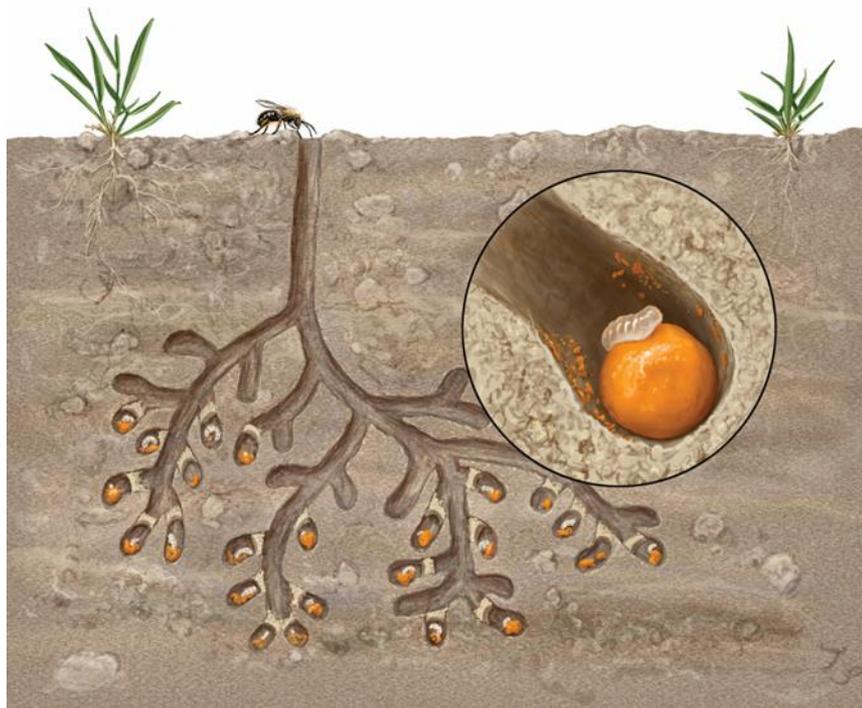
Do not store honey

Forage close to nest

Do not defend colonies



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Solitary Bee Life Cycle



1. Egg



2. Larva



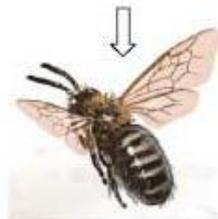
3. Pupa



6. Nest Building:
and Storing and Egg Laying



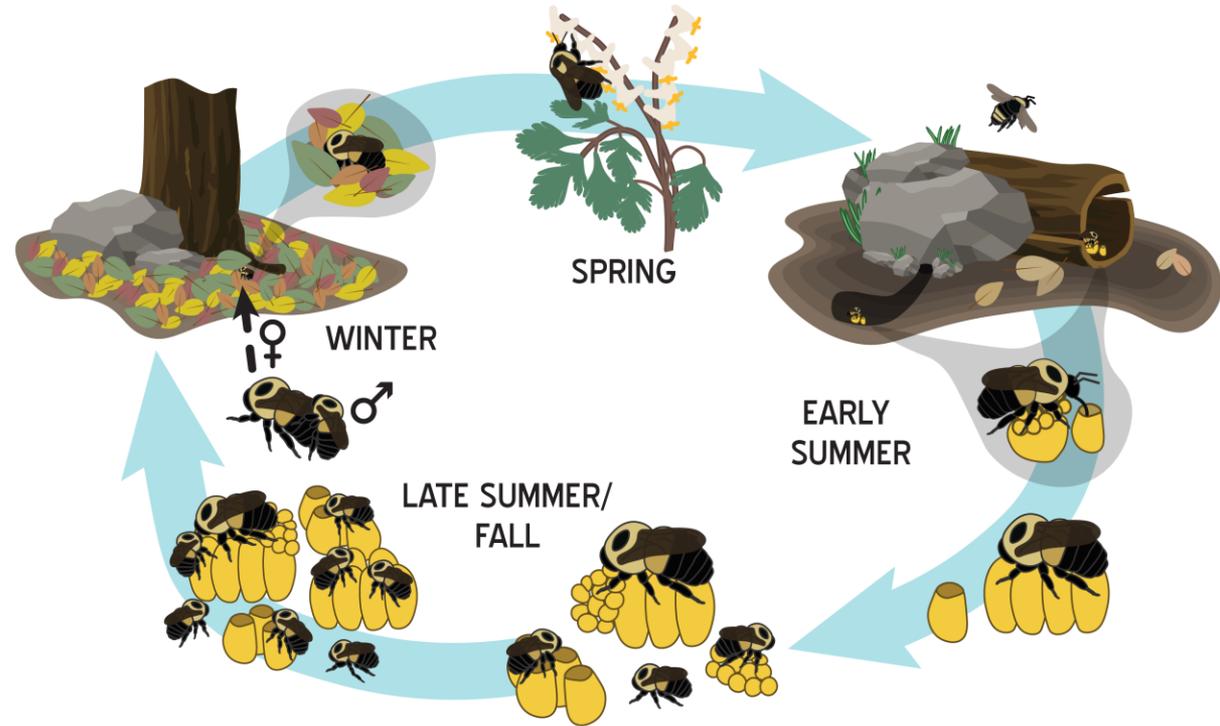
5. Foraging:
Collecting Pollen and Nectar
Pollination!



4. Adult

Illustrations: Steve Buchana
Modified by: Victoria Wojcik

Bumble Bee lifecycle



<https://wisconsinbumblebees.entomology.wisc.edu/about-bumble-bees/life-cycle-and-development/>

Habitat Elements

1. Nesting/overwinter habitat:

ground

scrubby/woody

cavity

2. Floral resources:

Native, non-invasive

Diverse

Continuous

Host

3. Pesticides:

No pesticides harmful to bees

Limit others





No Fear of Stings!

Only half of bees (maybe) can sting

So many others that can't

Reduced stingers

Solitary (all females are 'queens')

Not defending colonies

Vegetarians

Only after flowers



Inviting Bees to Your Property

No Fear of Stings!

Bees and Other Pollinators are Your Gardening Friends; But, Won't I Get Stung?

Humans could not exist without pollinating insects, especially wildflowers, insects like bees and honey bees, pollinate plants throughout with 35% of our diet along with tomatoes, fruits, and medicines. Colorful fruits and vegetables containing nutrients and health-giving antioxidants contain us and give us pleasure. Without bees, our diets would be restricted to bland starchy foods, white-pollinated cereal grains.

Many people are wary of not fearful, of insects such as bees and wasps. We don't like to get stung. Only about 5.8% of children and 3% of adults have actual sting allergies from bees, wasps, and ants which result of irritation, local or systemic reactions. The risk of a sting from bees in your yard or garden is very small, especially with a bit of advance knowledge.

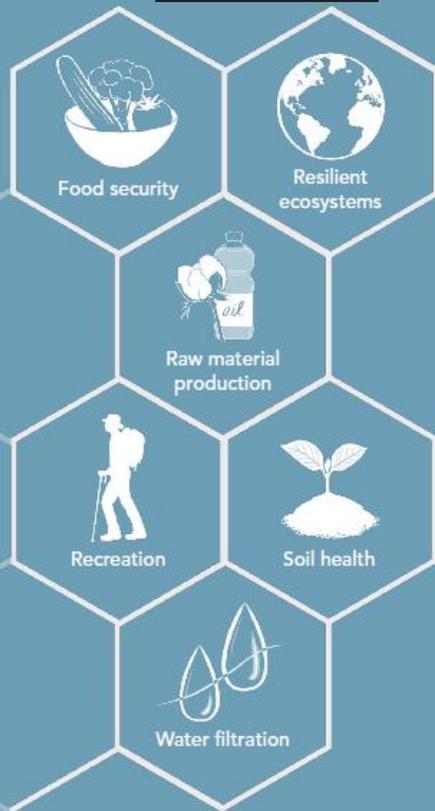
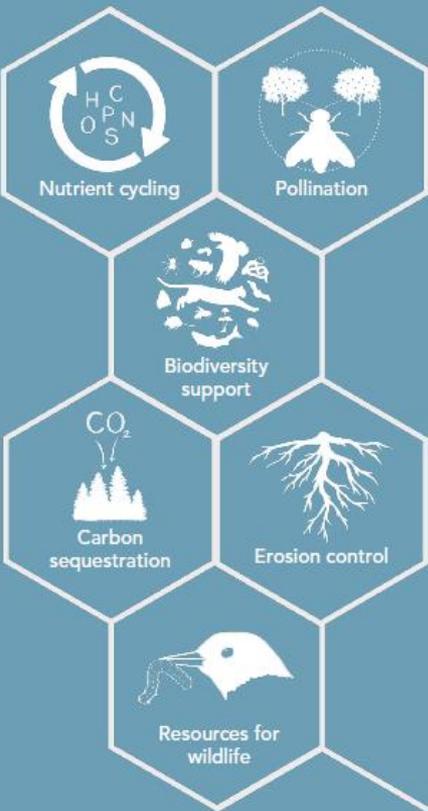
This brochure will help reduce your insect anxiety while promoting an outdoor lifestyle that could include walking, hiking, gardening, taking photographs, or appreciating the beauty of wildflowers and nature. By trying some of these simple tips you may come to appreciate the beauty and fascination of watching pollinators at work.

Prepared by the
Gardens Task Force of the
North Norfolk Pollinator Protection
Coalitions (NPPCC)



OUR FUTURE FLIES WITH POLLINATORS

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Pollinators provide many ecosystem services that support the health of plants, people, and the planet. Get involved at www.pollinator.org.

Meet these plants and pollinators, and learn how you can help them at <https://www.pollinator.org/poster-2020>.

Art by **Fiorella Ikeue**

Los polinizadores proveen de los servicios ecosistémicos que mantienen la salud de las plantas, la gente y el planeta. Involúcrate a www.pollinator.org.

Les pollinisateurs assurent plusieurs services écosystémiques qui contribuent à la santé des plantes, des personnes et de la planète. Impliquez-vous en visitant www.pollinator.org.



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