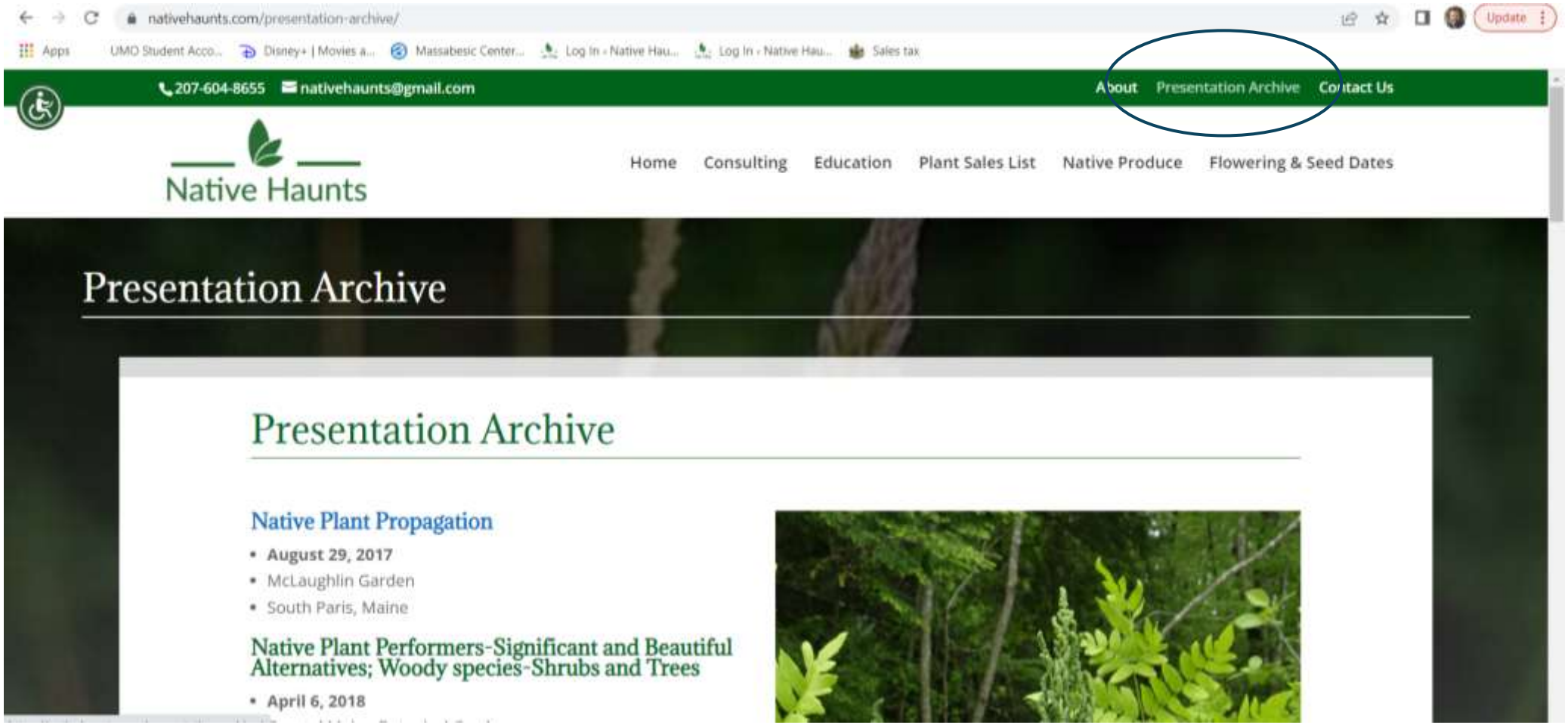
Honeybees; Not so Sweet for Our Native Bees?

Presented by Shawn Jalbert at
The Audubon Native Plant Festival
June 7th, 2025

This Power Point presentation will be available on my website nativehaunts.com under *Presentation Archive*



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There is an accumulating body of evidence showing that domesticated European honeybees are negatively impacting native bee species.

Highlights and Goals of Todays Presentation;

- *Politely* discuss the impacts that non-native bees (*i.e.* European honeybees) are having on our native bee species.
- Spend some time getting to know the interesting variety of native bees that live in Maine.
- No finger pointing.
- Try to avoid the “good guys vs. bad guys” dichotomy.
- EMPOWERMENT! What we can all do to help our native bee pollinations.

Five reasons why honey bees can be a problem

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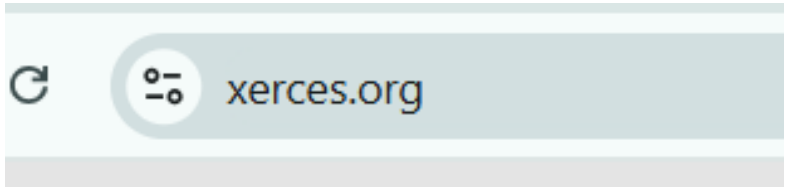

1. **Native plants need native bees.** Native bees coevolved with our native plants and often have behavioral adaptations that make them better pollinators than honey bees. For example, buzz-pollination, in which a bee grasps a flower and shakes the pollen loose, is a behavior at which bumble bees and other large-bodied native bees excel, and one that honey bees lack.
2. **Honey bees are sub-par pollinators.** The way that honey bees interact with flowers means that they sometimes contribute little or nothing to pollination. Honey bees groom their pollen and carry it in neat pollen cakes, where it's less likely to contact the stigma of another flower and pollinate it. They are also known "nectar robbers" of many plants, accessing their nectar in a way that means they don't touch the pollen, often by biting a hole in the base of the flower. By contrast, many of our native bees tend to be messier, carrying pollen as dry grains, often all over their bodies where it's more likely to pollinate the plant.
3. **Hungry hives crowd out native pollinators.** Introducing a single honey bee hive means 15,000 to 50,000 additional mouths to feed in an area that may already lack sufficient flowering resources. This increases competition with our native bees and raises the energy costs of foraging, which can be significant. One study calculated that over a period of three months, a single hive collects as much pollen as could support the development of 100,000 native solitary bees!
4. **Honey bees can spread disease.** Unfortunately, honey bees can spread diseases to our native bees—deformed wing virus, for example, can be passed from honey bees to bumble bees—and can also amplify and distribute diseases within a bee community.
5. **Urban honey bee hive densities are often too high.** There is growing evidence of negative impacts in towns and cities from the presence of honey bees. A recent study from Montreal showed that the number of species of native bees found in an area decreased when the number of honey bees went up. In Britain, the London Beekeepers Association found that some parts of that city had four times as many hives as the city's gardens and parks could support. The conservation organization Buglife recommends creating two hectares (five acres) of habitat for each hive, several times the size of an average residential lot in the United States.

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What's all the buzz about?

- Blueberries require sonication or "buzz pollination" to release pollen from the flower's anthers.
- Our native bumblebees, having co-evolved with plants like blueberries, have developed behavioral and anatomical traits ("hardware and software") that allow them to release this otherwise inaccessible food source.
- Bees will snuggle up next to a flower and vibrate their abdomens at specific frequencies to release the pollen.
- Honeybees don't have the right stuff, neither the hardware or the software.
- Why then, are honeybees used to pollinate blueberries?

Bumblebee feeding on a blueberry flower.
Image source; https://infinitespider.com/sonication-pollination-by-vibration/

- Honeybees are used to pollinate blueberry crops *because of their sheer numbers; millions of honeybees can be brought in on a single tractor trailer truck load.*

- Native bees that are in the area are the ones who do the specialized work of releasing the pollen, honeybees simply spread it around as they go from flower to flower.

630-Wild Bee Conservation for Wild Blueberry Fields

Fact Sheet No. 630, UMaine Extension No. 2111

Prepared by Francis A. Drummond, Professor of Insect Ecology and Constance Stubbs, Assistant Scientist, the University of Maine Cooperative Extension, Orono, ME 04469. June 2003

Why Conserve Native or Wild Bees?

Wind and rain are important in the reproduction of many trees and grasses, but the majority of flowering plants in Maine are pollinated by animals. Small mammals and birds play a minor but important role as pollinators. However, it is the insects that are by far the most significant pollinators in Maine. The insects (jointed six-legged animals) are the most abundant group of terrestrial animals, usually numbering in the tens of millions in an acre of old field. In addition, the insects are the most diverse species of terrestrial animals. There are more species of insects in Maine landscapes than any other group of animals. More than one million species of insects have been scientifically described in the world and it is calculated that there may be in excess of 30 million species existing on the planet today. Not all insect species are pollinators. Some are predators of other insects, parasites of mammals and birds, consumers of green plants, and consumers of decaying organic matter. The most common insect

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As was described in the previous example, honeybees are used to pollinate blueberries because of sheer numbers.

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Conservation Letters
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A Journal of the Society for Conservation Biology

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Gauging the Effect of Honey Bee Pollen Collection on Native Bee Communities

James H. Cane, Vincent J. Tepedino

First published: 16 May 2016 | https://doi.org/10.1111/conl.12263 | Citations: 121

Volume 10, Issue 2
March/April 2017
Pages 205-210

By contesting for finite pollen and nectar resources in natural and semi-natural environs, honey bees can affect native bees in at least seven documented ways: **(1) pollen/nectar depletion**. At some context-specific stocking density, honey bees will daily deplete the pollen and nectar produced in a local plant community, a direct cost to native bee reproduction (e.g., Roubik *et al*. 1986; Carneiro & Martins 2012); **(2) prolonged foraging**. Resource depletion by too many honey bees forces native bee females to devote more time to foraging over greater distances. Scarce forage slows their assembly of larval food masses and reduces lifetime progeny production (Minckley *et al*. 1994; Thomson 2004; Zurbuchen *et al*. 2010); **(3) skewed sex ratio**. Nonsocial females with limited or distant floral resources produce fewer daughters and more sons (Peterson & Roitberg 2006; Bosch 2008), males usually being the smaller sex. Excess male production retards population growth; **(4) smaller progeny**. Smaller provisions yield smaller offspring that are more likely to starve and die during the winter than better-fed siblings (Tepedino & Torchio 1982; Bosch 2008); **(5) enhanced parasitism**. Prolonged absence of solitary mother bees from their nests risks greater progeny mortality, as nest parasites and predators are more likely to attack unguarded nests (Goodell 2003); **(6) floral host pre-emption**. Honey bees can competitively displace native solitary bees from preferred pollen hosts, as when African honey bees invaded Mexico (Roubik & Villanueva-Gutierrez 2009); **(7) pathogen spillover**. RNA viruses and some other honey bee pathogens have been recovered from neighboring wild bee communities; virus propagules were likely transmitted to native bees via pollen at shared floral hosts (e.g., Fürst *et al*. 2014). This disease transmission involves pollen foraging, but is not a competitive effect per se.

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4. **Honey bees can spread disease.** Unfortunately, honey bees can spread diseases to our native bees—deformed wing virus, for example, can be passed from honey bees to bumble bees—and can also amplify and distribute diseases within a bee community.

Varroa mite on European honeybee.

Deformed wing disease on European honeybee. This is caused by a virus spread by Varroa mites.

The dreaded Varroa mite (*Varroa destructor)* mite can have devastating consequences for European honeybees.

Close up of *Varroa destructor.*

Image source; https://vetmed.umn.edu/news/research-roundup-varroa-mites-give-honey-bees-disease-do-they-have-same-impact-other-insects

Do Varroa destructor mites affect other types of bees?

Since Varroa destructor mites have such an immense effect on honeybees, it is possible that their actions impact other types of bees that live in the same environments as the infected honeybees. Varroa mites originated in Asia, feeding on the Asian honey bee (*Apis cerana).* It was in 1962 when the first report of Varroa attacking Apis mellifera (a new host) surfaced in Hong Kong, China. Since then, the mite has shown up on every continent except for Australia through the transport of commercial bees, swarms that travel long distances, and migratory tendencies of beekeepers.

Varroa was first reported in the United States in September of 1987, when colony failure occurred in a few bee hives transported from Florida to Wisconsin. After this, Varroa's presence was revealed in over a dozen states after beekeepers all over the nation began to check their hives. It seemed that there was no way to stop this disaster that was already so widespread, and records kept coming out reporting new finds of Varroa in the U.S.. The number of maintained honey bee colonies in the U.S. has been almost cut in half since the 1940's as reported in the USDA-National Agricultural Statistics Service (NASS) annual survey.

Varroa mites can not successfully live on any other types of bees than Apis mellifera and Apis cerana, but scientists have discovered that the increase in infection rates of numerous viruses such as deformed wing virus (DWV) amongst honeybees affects other types of bees such as bumblebees, resulting in a shortened life span. DWV is one of the most widespread viruses by Varroa mites, and it damages bees' wings so that they are unable to fly. The virus spreads when infected honey bees forage on the same plants as wild bumblebees in the same area. In addition to this, Varroa mites have been seen on bumblebees and yellowjackets to catch a ride from place to place. It is possible for them to feed on the larva of these bees; however the mites do not successfully reproduce on them.

However, some research indicates that there isn't significant spill over of disease from honeybees to other insects-

"While honey bees get Deformed wing virus (DWV) from a parasitic mite, Varroa destructor, the presence of the parasite is not a likely factor in increasing the spread of the disease for other insects, according to a recent study."

"...scientists' findings showed that, while Varroa was associated with a dramatic increase in DWV in honey bees, this change was not seen in any other sampled species. Honey bees share their environment with other insect populations and exist as a homogenous group, frequently sharing common viruses, albeit at low levels. But the data from this study suggest that the threat of Varroa to increase viral load in bee-related species does not automatically translate to an increase in the viral load in other insects living in the wider community. This research was funded by the British Beekeepers Association, CB Dennis Trust, and Bee Disease Insurance."

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Research roundup: Varroa mites give honey bees disease, but do they have the same impact on other insects?

November 16, 2020

Ecol Lett. 2019 Aug;22(8):1306-1315. doi: 10.1111/ele.13323. Epub 2019 Jun 12.

Knock-on community impacts of a novel vector: spillover of emerging DWV-B from Varroa-infested honeybees to wild bumblebees

Robyn Manley [1 2], Ben Temperton [2], Toby Doyle [1], Daisy Gates [3], Sophie Hedges [1], Michael Boots [4], Lena Wilfert [1 5]

Affiliations + expand

PMID: 31190366 PMCID: PMC6852581 DOI: 10.1111/ele.13323

Abstract

Novel transmission routes can directly impact the evolutionary ecology of infectious diseases, with potentially dramatic effect on host populations and knock-on effects on the wider host community. The invasion of Varroa destructor, an ectoparasitic viral vector in Western honeybees, provides a

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5. **Urban honey bee hive densities are often too high.** There is growing evidence of negative impacts in towns and cities from the presence of honey bees. A recent study from Montreal showed that the number of species of native bees found in an area decreased when the number of honey bees went up. In Britain, the London Beekeepers Association found that some parts of that city had four times as many hives as the city's gardens and parks could support. The conservation organization Buglife recommends creating two hectares (five acres) of habitat for each hive, several times the size of an average residential lot in the United States.

“Urban beekeeping is commonly perceived as an environmentally friendly practice or a way to combat pollinator declines, when high-density beekeeping operations may actually have a negative influence on native and wild bee populations through floral resource competition and pathogen transmission.

“Overall, we found a negative relationship between urban beekeeping, pollen availability, and wild bee species richness.”

“ Further research on the influence of urban beekeeping on native and wild pollinators, coupled with evidence-based beekeeping regulations, is essential to ensure cities contain sufficient resources to support wild bee diversity alongside managed honey bees.”

MacInnis G, Normandin E, Ziter CD. 2023. Decline in wild bee species richness associated with honey bee (*Apis mellifera* L.) abundance in an urban ecosystem. *PeerJ* 11:e14699 https://doi.org/10.7717/peerj.14699

Research by MacInnis *et al* have found that urban bee keeping can have negative impacts on local native bee populations. If we want to have bees in urban, we need to be sure we have enough food to go around.

Orange belted bumblebee feeding on *Agastache*.

Let’s get to know our native bees!

Native bees by the numbers;

Worldwide there are approximately 20,000 bee species.
North America has about 4000 bee species.
Maine has about 270 bee species represented by 6 different families.
Around 90% of native bees *are solitary*.
About 1/3 or 30% of bees are cavity nesters, such as mason bees, which use beetle larvae holes in dead trees.
The other 2/3 or 70% of bee species are *ground nesters,* excavating nests in bare or loose soils.

1

2

3

Bees of Maine

Jennifer Lund, Maine State Apiarist
Department of Agriculture, Conservation and Forestry
Division of Animal and Plant Health
Email: jennifer.lund@maine.gov

Nearly 4,000 bee species have been identified in the United States. In Maine, there are more than 270 species of bees, representing six families. Below we will explore the types of bees found in Maine and learn about their biology, foraging preferences and nesting requirements.

Family Apidae (Bumble, Carpenter, Cuckoo, and Honey Bees)

This is a very diverse family containing many of the most recognizable species of bees. Members of these families display a wide range of nesting, foraging, and social behavior.

Bombus spp. (bumble bees) are medium to large (0.4 to 0.9 inches long) in size, very hairy, and have yellow, white, black, orange or red bands and markings. Bumble bees are generalist foragers; visiting a wide variety of plant species throughout the season. Mated queens, from the previous fall, emerge from their hibernation site in the early spring to search for a suitable nesting site, usually abandoned rodent burrows, hollow grass tussocks, and cavities in snag trees. Once a site is chosen, the queen builds several wax cups that she fills it with nectar, pollen or a mixture of both. The queen lays eggs. After hatching, the larvae are fed a mixture of pollen and nectar. Once large enough, the larvae pupate and emerge as adults. Once the queen's first batch of daughters emerge, she no longer participates in raising young and focuses solely on egg laying. The colony can grow to a couple of hundred individuals as the season progresses. In the late summer/early fall, the colony produces new queens and drones (males). After mating, the new queens locate a place to hibernate for the winter.

In Maine we have more than 270 species of native bee species representing 6 different families!

Family Apidae (Bumble, Carpenter, Cuckoo, and Honey Bees)

Family Megachilidae (Leafcutter and Mason Bees)

Family Halictidae (Halictids, Cuckoo, and Sweat Bees)

Family Melittidae (Melittids and Oil Collecting Bees)

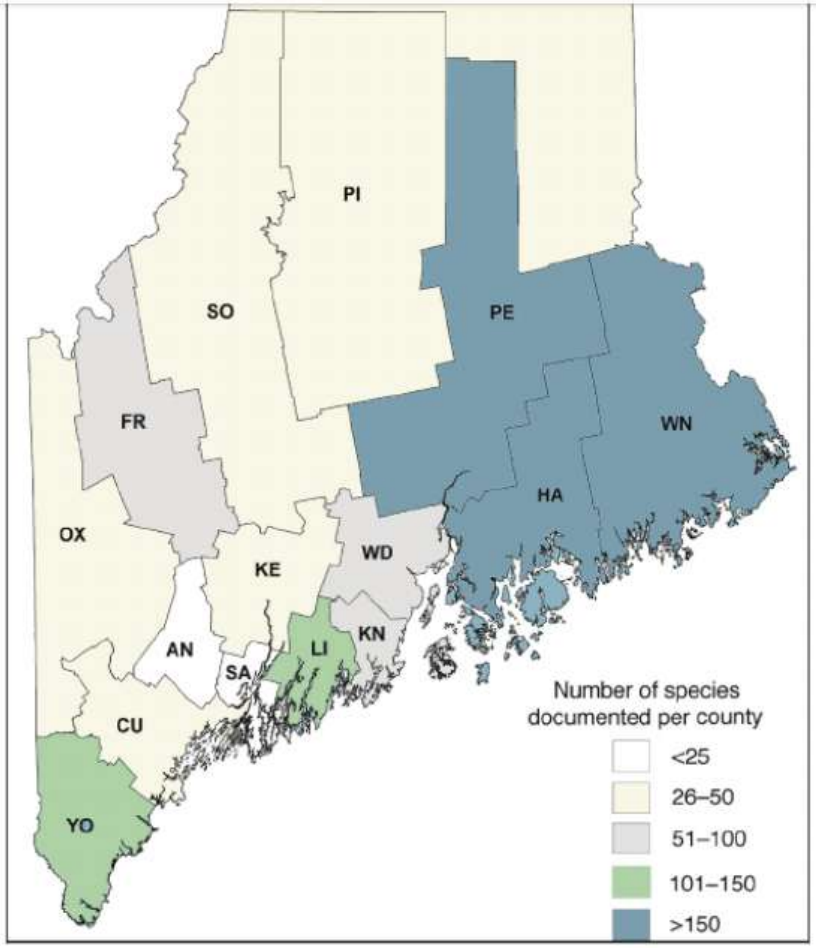
Family Colletidae (Plasterer, Cellophane, Polyester and Yellow-faced Bees)

Family Andrenidae (Miner and Sand Bees)

Native Bee Species Per Maine County

researchgate.net/publication/322277890_Bees_of_Maine_with_a_State_Species_Checklist

Figure 1. State of Maine, showing approximate boundaries of the 16 counties, and number of bee species known. County names are abbreviated as: AN = Androscoggin, AR = Aroostook, CU = Cumberland, FR = Franklin, HA = Hancock, KE = Kennebec, KN = Knox, LI = Lincoln, OX = Oxford, PE = Penobscot, PI = Piscataquis, SA = Sagadahoc, SO = Somerset, WD = Waldo, WN = Washington, YO = York.



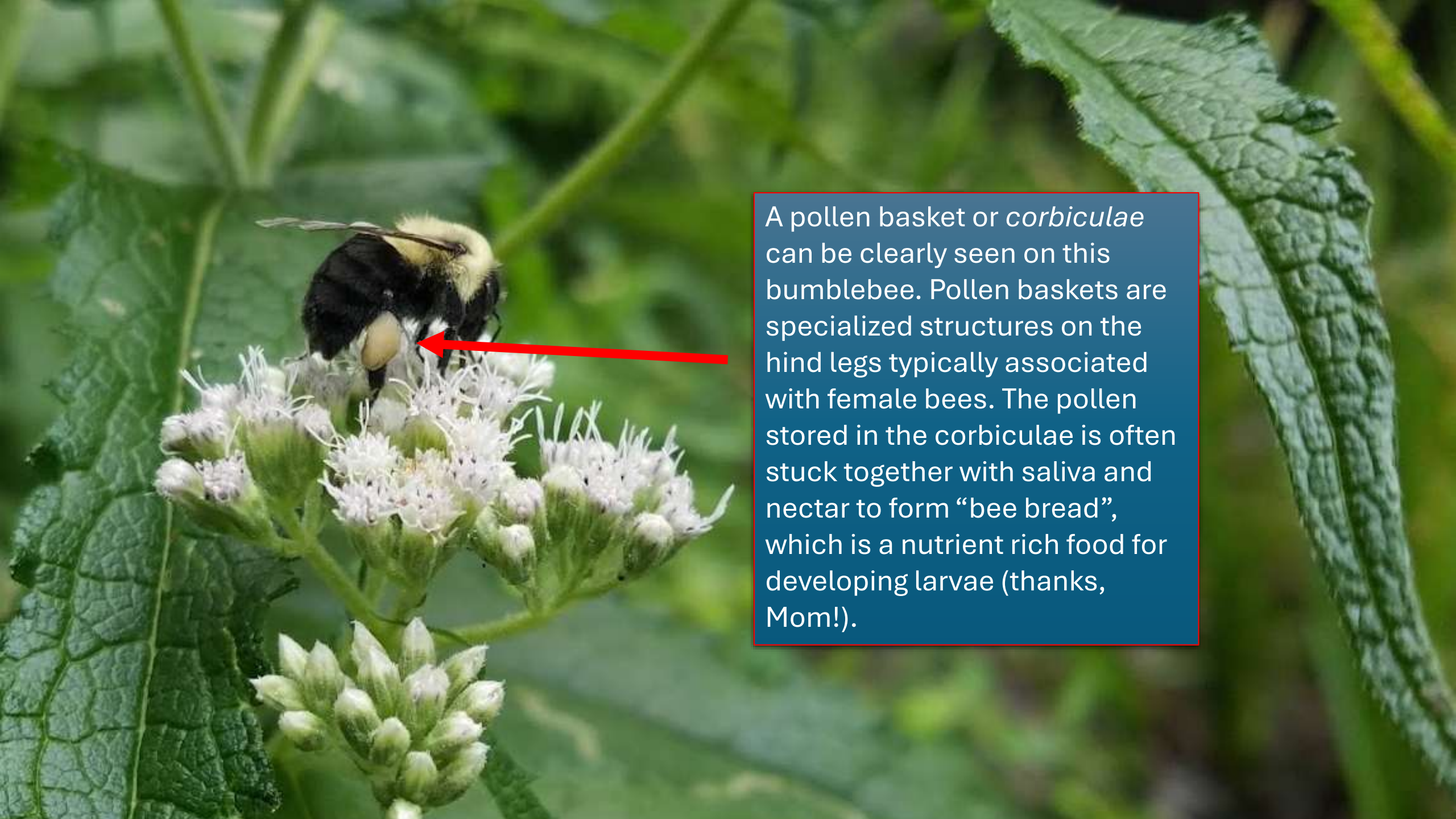
This interesting graphic shows the number of bee species documented per county. Note the high diversity in eastern Maine which may correlate to the intensive research done on pollination of *Vaccinium angustifolium*, our low bush blueberry, a vital commercial crop in this region.

Cuckoo bees (Family Apidae) are considered to be *cleptoparasites* because they take over the nests of other bees. Eggs are laid in the nests of ground dwelling bees.

Once the larvae hatch, they consume the resources (and often the offspring!) of the host insect.

Image source; https://val.vtecostudies.org/wp-content/uploads/2018/07/fernaldbumblebee_Leif.jpg

Bumblebees (*Bombus spp,* Apidae Family) are probably the most recognizable group of bees encountered on a wide range of flowers.



A pollen basket or *corbiculae* can be clearly seen on this bumblebee. Pollen baskets are specialized structures on the hind legs typically associated with female bees. The pollen stored in the corbiculae is often stuck together with saliva and nectar to form “bee bread”, which is a nutrient rich food for developing larvae (thanks, Mom!).

Leafcutter bees (Family Megachilidae) live on the ground in preexisting cavities found in wood, stems, and even rocks.

Females uses their sharp mandibles to cut circular or oval leaf pieces to line and divide their brood cells.

This metallic green sweat bee (*Augochlora pura,* Family Halictideae) is only about 8mm long. It lives in rotten logs and is commonly encountered in Maine.

Image source;https://beecityusa.org/leave-the-leaves-these-invertebrates-depend-on-it-2/

False Solomons seal (*Mainanthemum racemosum)* flowers are attractive to the sweat bee *Augochlora pura*.

Oil Collecting Bees (Family Melittidae) have long spongey hairs on their legs that collect floral oils.

Cellophane Bees (Family Colletidae) are ground nesters often found in river and stream banks that can be prone to flooding.

The female deposits a cellophane-like substance over her brood cells to discourage water intrusion.

Image source=https://www.mvtimes.com/2024/05/01/wild-side-colletes-cellophane-bees

Miner and Sand Bees(Family Andrenidae) are parasitoids of other insects. Each genus tends to specialize in favored prey.

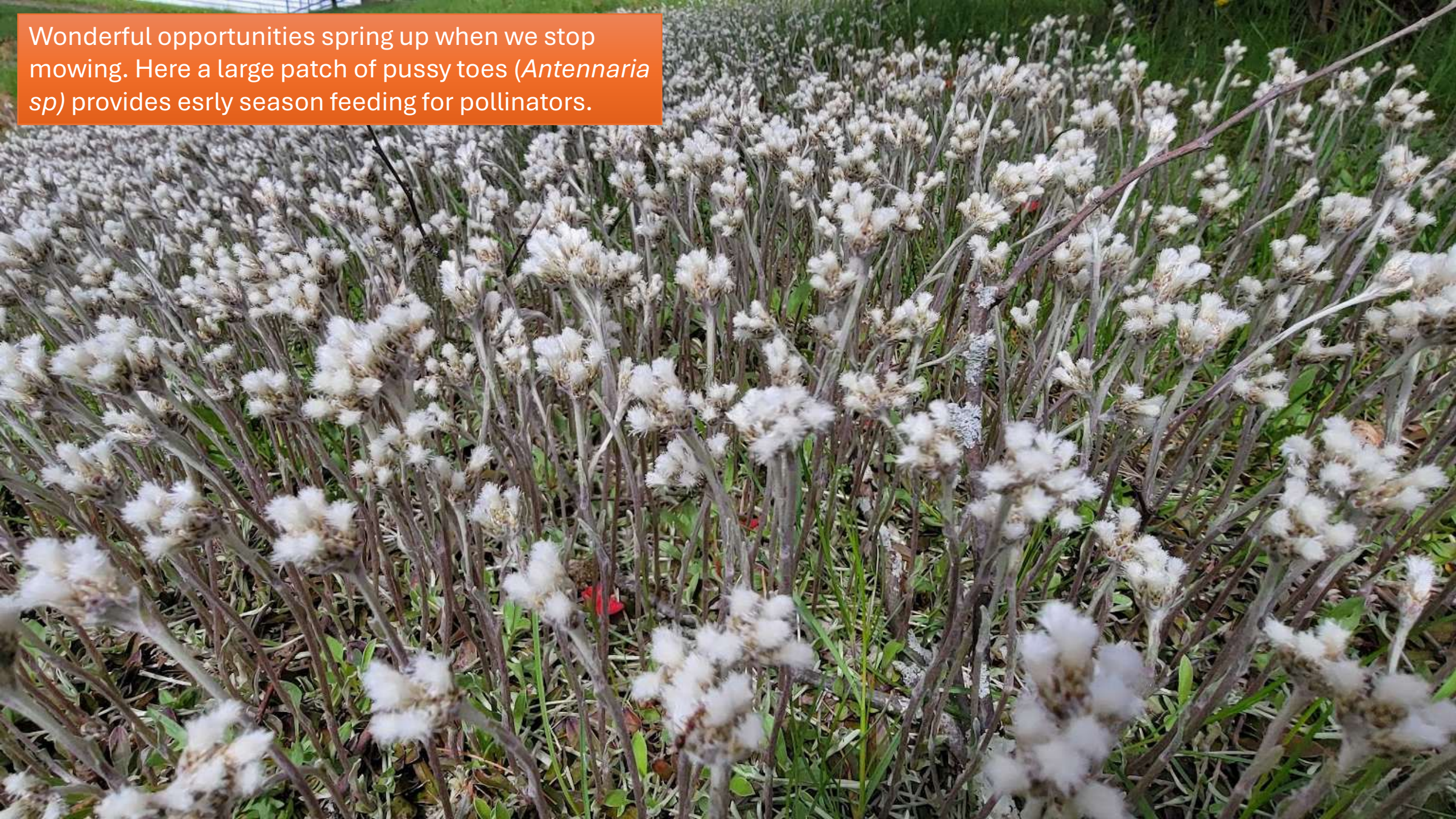
Supporting Bee and Pollinator Habitat


So much lost potential; the typical lawn is a barren monoculture that can be downright hostile to creatures of all kinds. We can do so much more.....

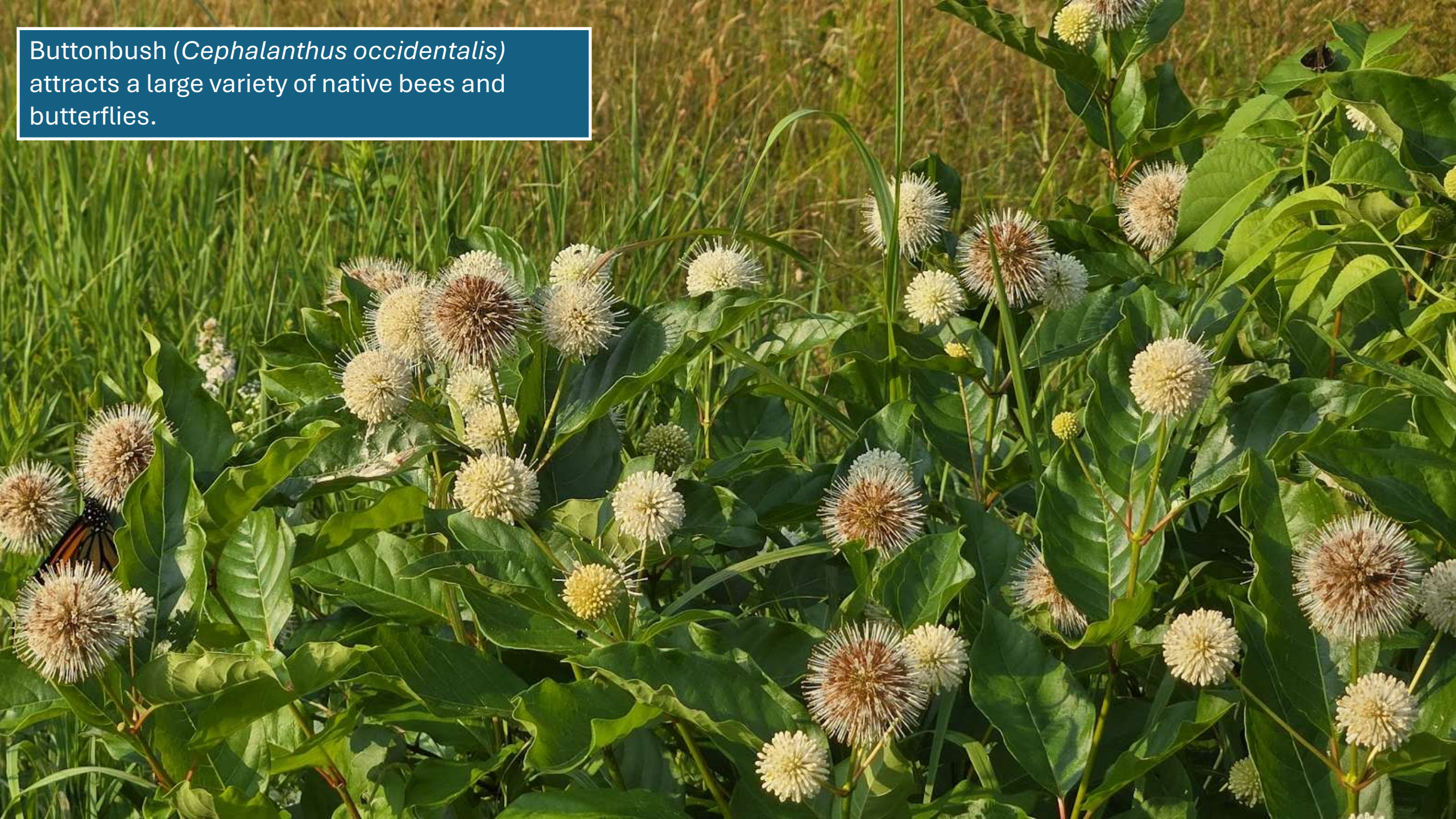
Nope, clovers are not native. But, they are an excellent lawn alternative; they provide ample feeding opportunities and enrich the soil with their nitrogen fixing bacterial symbionts.

Un-mowed fields are full of both animal and plant diversity, one supporting the other. Laudholm Farm Preserve, Wells, ME.

Un-mowed fields are full of both animal and plant diversity, one supporting the other. Note the abundance of common milkweed. Photo taken in Kennebunk, ME at the Kennebunk Land Trust's For All Forever Preserve.


Wonderful opportunities spring up when we stop mowing. Here a large patch of pussy toes (*Antennaria sp)* provides esrly season feeding for pollinators.


Native shrubs like this pagoda dogwood are important nectar and pollen sources for our pollinators.



Buttonbush (*Cephalanthus occidentalis)* attracts a large variety of native bees and butterflies.

A well-planned pollinator garden has trees, shrubs, and perennials offering a variety of flower shape and bloom times.

Parking lots and roadsides are often sterile hostile places for pollinators, but they don’t have to be. The parking areas at Coastal Maine Botanical Garden have been transformed into a pollinator destination and a positive example of what can be done.

Loose sandy soils and bare ground are ideal habitats for ground nesting species like cellophane bees.


A road cut in a steep bank with soft loam should make for excellent bee habitat. Many holes and tunnels can be found in the area, perhaps the work of bees.

Decaying softened wood is excellent habitat for a variety of bees. Trees and othe woody plants continue contributing ecosystem services long after they die.

Hollow stems are used by many species of bees for nest and overwintering sites.
It's important to leave them intact in the landscape.

What's messy to us is home to others.

Conclusions.

Regarding honeybees and native bees;

- Honeybees are affecting our native bees in a variety of ways, in a number of different situations.

- Our agricultural systems have co-evolved with and have been brought to their current scale by the aid of European honeybees. It's not out of line to say that *we need* them to maintain our current level of food production.

- European honeybees are facing some of the same issues as native bees, particularly with exposure to pesticides.

- Native bee populations are falling due to, lack of food, landscape conversion, landscape practices, loss of habitat, pesticide exposure, and competition from a variety of sources including humans and European honeybees.

- Now that we understand some of the ways that honeybees can impact our native bees, we can be proactive.

Conclusions-Action Points.

Conclusions-Action Points.

- PLANT MORE NATIVES; we can solve the bee hunger problem by increasing our native plantings. Trees, shrubs, and perennials are all part of the solution. Even non-native, non-invasive plants can be part of the solution, like clover.
- RECONSIDER YOUR MOWING STRATEGY; Do we really need to mow *all of that area?* In most cases, probably not. Let's be clear, we are not advocating for the abolition of the lawn, *we are simply asking to reconsider how much we really need*.
- LIMIT OR ELIMINATE PESTICIDE USAGE; Pesticides are nasty non-discriminating chemicals that are affecting honeybees and native bees. Think first, spray last.
- LEAVE THE LEAVES, LEAVE THE STUBBLE; It may look messy or unkept leaving leaves, stems, pieces of rotting wood, and even patches of bare ground, but these simple acts have a big impact on our native pollinators and bees.
- GET TO KNOW AND TAKE CARE OF THE NATIVE PLANTS YOU HAVE; Most of us are lucky enough to have native plants on our properties. No need to "recreate the

Questions or Comments about today's presentation? I would be happy to talk.

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