

Pollinators of the Forest

By: Celia Vuocolo, Piedmont Environmental Council

North America has over 4,000 bee species that call it home. From the tiny *Perdita minima* (at less than 2 millimeters) to the colorful blue and green *Augochloropsis anonyma*, our continent supports a wide diversity of native bees. About 400 bee species have been found in Virginia. Our native bees have evolved with local ecosystems over time, developing intricate relationships with the flora that fill our landscape. Native bees are found everywhere (in fields, gardens, overgrown hedgerows, woodlands, and along roadsides). They facilitate the reproduction of indigenous plants, which in turn supports wildlife and ecological functions that humans rely on. Research shows that native bees effectively pollinate many commercial crops like tomatoes, blueberries, and squash, sometimes even more effectively than non-native honey bees. Understanding how these valuable pollinators use our landscape can help guide conservation efforts and farming practices. But there is still much that is unknown about how native bees use Virginia's most common land use — forests!

When thinking about pollinator habitat, a sunny flower-filled garden is usually the first thing that comes to mind. Pollinators need nectar and pollen sources, nesting opportunities (dead trees, undisturbed ground), and sunlight. It's rare that a sunny flower garden fulfills all of these needs for every bee. In reality, a mosaic of diverse habitat types are needed to provide these features. Woodlands are part of the landscape and play an important role in supporting native bee populations. However, we haven't even scratched the surface on understanding how bees use forests. It's a subject that is in sore need of study.

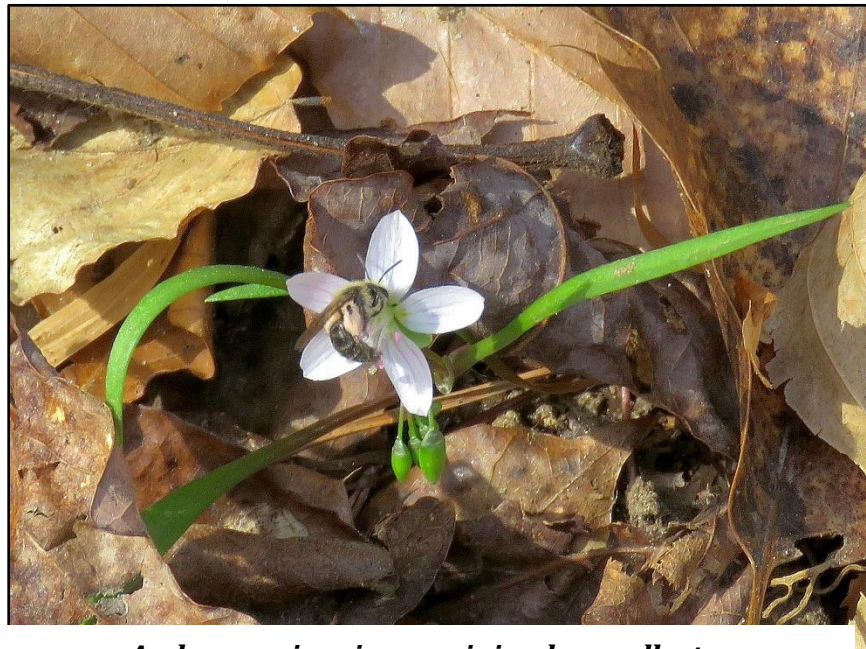


Larval forms of pollinators, such as the spicebush swallowtail caterpillar, use spicebush, a woody forest species, to complete their lifecycles.
Photo by Betty Truax, Virginia Native Plant Society.

So bees are found in forests, but why are they there at all? Answering this question will improve our understanding of how bees use the habitat. There are likely a number of different reasons, such as pollen specialism, incidental occurrences, species with generalist habitat preferences, and forest disturbance. Pollen specialism and forest disturbance are arguably the main reasons why certain native bees use this habitat type. Specialist bees have evolved to collect pollen from either one host-plant family, genus, or sometimes only one species! These intimate relationships benefit both the bee and plant by allowing for pollination and foraging efficiency, but leave both susceptible to habitat degradation or alterations in flowering time. Forest disturbance, such as fire or timber management, opens up the tree canopy, allowing light in and encouraging the growth of herbaceous plant species that attract pollinators. Native bees that evolved with our eastern forests most likely learned to take advantage of forest disturbance events well before agriculture created open habitats across our landscape.

There are a few things that we do know about bees in forests that landowners can consider as part of their management plans. The highest bee diversity in Mid-Atlantic forests occurs in the spring; bee numbers decrease with canopy closure but increase with recent fire activity; and bee diversity rises as nesting opportunities (woody debris) increase. What this translates to is that bees are attracted to well-managed woodlands. Prescribed fire, timber management, encouraging natural vegetation, and leaving woody debris and snags are all part and parcel of a solid forest stewardship plan, and these management activities help bees.

Springtime in the forest is likely the busiest time for bees because of the abundance of spring ephemerals and flowering shrubs and trees. Virginia bluebell, Dutchman's breeches, Viburnum, serviceberry, spring beauty, and a host of other spring flowering plants provide nectar and pollen to newly emerged bumblebee queens and pollen specialists. A poster child example of a native bee/host plant relationship is spring beauty and *Andrena erigeniae*, a pollen specialist in the mining bee family. *A. erigeniae* only collects pollen from spring beauty and one of its sister species, which means that if the plant does



***Andrena erigeniae*, a mining bee, collects pollen from the flower of a spring beauty.**
Photo by: Betty Truax, Virginia Native Plant Society.

not exist in a particular area, then this bee cannot survive there. Many spring woodland plants are visited by pollen specialists with life cycles perfectly synced to coincide with their blooms. Phenological mismatch, brought on by climate change, can seriously threaten the stability of many of these sensitive bee species.

During other times of the year, research has shown that native bees are found in woodlands with open canopies and a healthy understory of wildflowers and grasses. Sunlight is important to bees and butterflies; it creates a warm micro-environment and encourages floral resources. Managing for habitat like this, whether you have a pine or hardwood forest, is probably already occurring if you have an active forest stewardship plan. Most landowners are already controlling the invasive species and managing deer populations that are impacting forest health and, subsequently, bee populations. If more guidance is desired, the U.S. Forest Service published a report in 2015, *Pollinator-Friendly Practices on Federal Lands*, that can be used as a guideline for private forest managers looking to improve habitat for bees. One important takeaway from the report is that as forest canopies have become closed over time (since colonization), bees have been negatively impacted, and the shift could be contributing to the widespread decline of their populations. It's just one more piece of the very complex puzzle of pollinator decline.



Keeping your forest healthy and practicing active management can improve habitat for native pollinators. Photos by Betty Truax, Virginia Native Plant Society.

From a landowner's perspective, managing for native bees is very compatible with other stewardship goals. Many other wildlife species benefit from the same management practices that help them, such as prescribed fire. Prescribed fire encourages growth of

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wildflowers and improves canopy structure, and if used correctly, can have a positive effect on bees. Using frequent, low intensity fire in small patches of forest has been shown to cause the least amount of mortality to bee populations while also improving floral resources. Since the vast majority of native bees nest in or near the ground, fire can have a negative impact on their survival rates. However, if prescribed fire is used thoughtfully, bees can actually flourish from its effects.

Native bees are still a mystery, in many regards, but we do know that they seem to respond to thoughtful forest management practices and healthy woodland habitat. Making room for native bees in your stewardship plan is quite easy, and your forestland will be better for it!

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