Ecological Gardening

For CMC, February 19, 2023

Anna Maria and Steven David Johnson

Ecological gardening

1/ Choosing plants that:

-feed and shelter wildlife

-improve soil fertility

-protect clean water

2/ Redefining “beauty” as ecologically healthy and functional

(instead of static and pristine)


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Why Native Plants?

Drawing by Anne Elise Lintelman

Considerations

Remove invasive plants

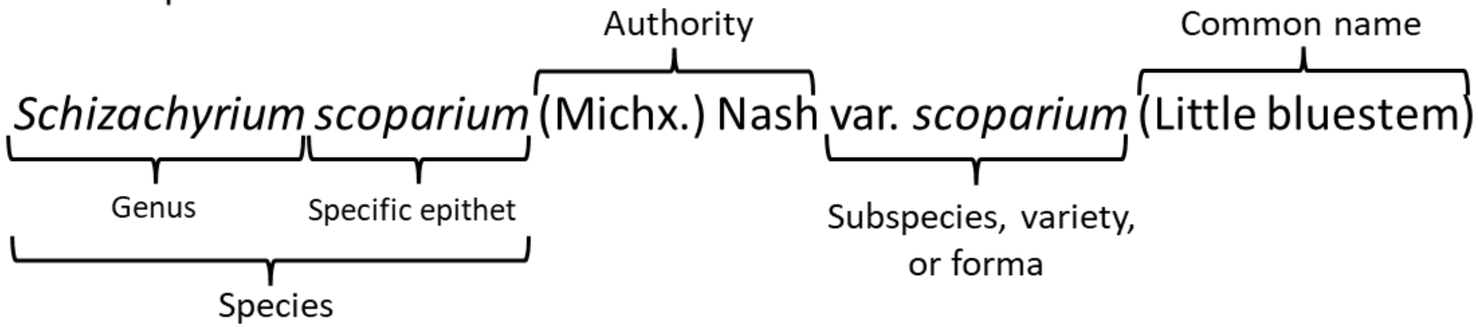
Use straight species vs. cultivars

Maximize diversity

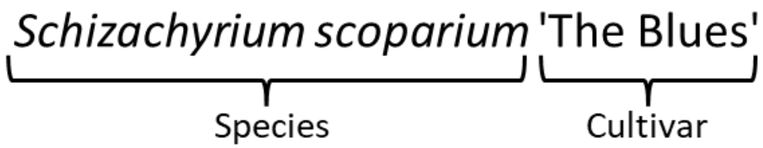
Consider ecoregion

Anatomy of a plant species name

Species names are two words and include the genus and specific epithet. Also included are the authority (the person or persons who named the species) and sometimes recognized natural varieties or subspecies. Common names follow in parentheses.



Horticultural varieties will be designated by a cultivar name in quotation marks.



Source: Dr. Ed Lickey, Bridgewater College

Four Kinds of Diversity

1. **Species Diversity:** use a variety of different plant species

2. Structural Diversity: combine plants that are different heights and shapes (trees, shrubs, flowers, grasses, and groundcovers)

3. **Functional Diversity:** include species that together provide different types of food and shelter throughout the season, from early spring till late fall (March-November)

4. Genetic Diversity: choose plants grown from seed instead of cuttings to increase the genetic pool

Source: Dr. Iara Lacher, Seven Bends Plant Nursery

Ecoregions of Virginia

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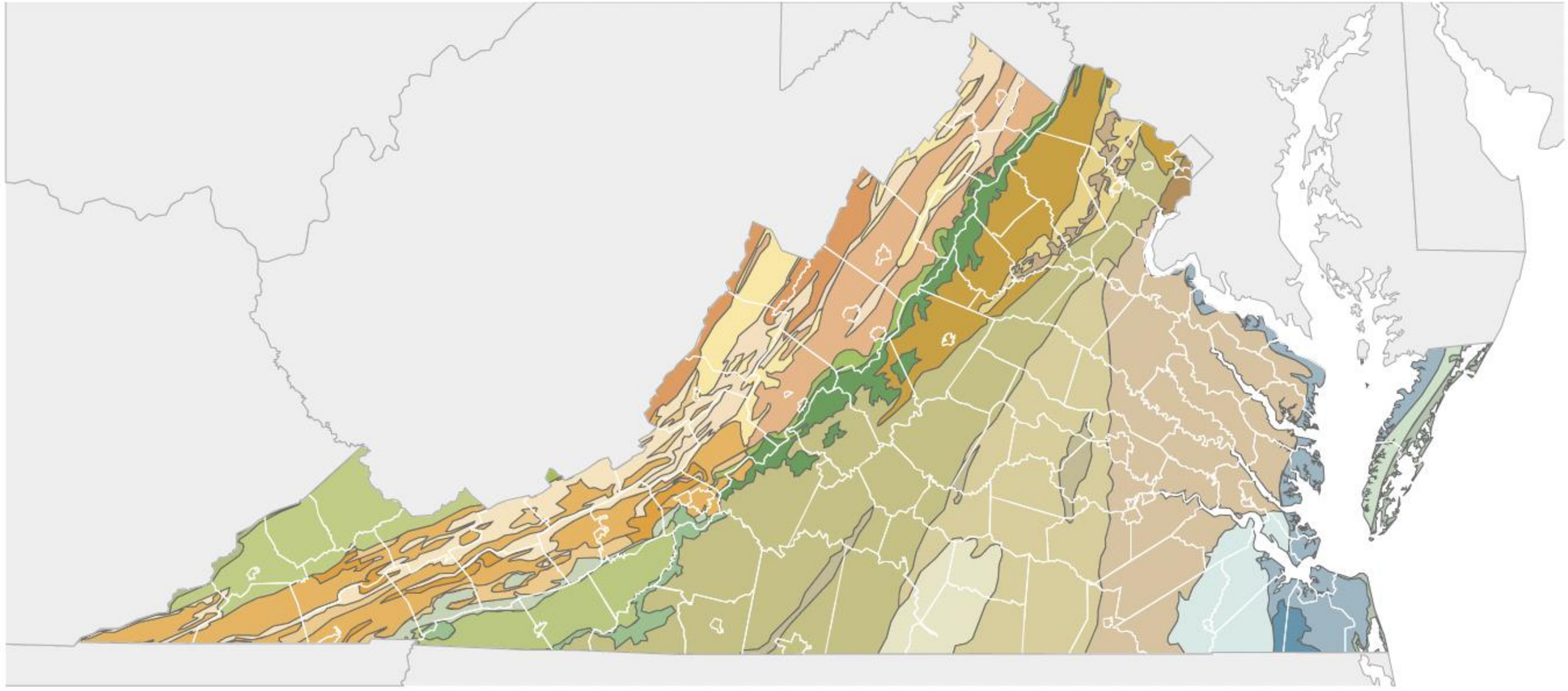
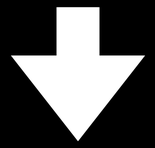
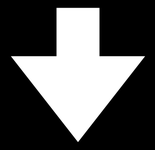


Source: https://bplant.org/region/1390#map

Eastern Temperate Forest



Ridge and Valley



Northern Limestone/Dolomite Valleys (Harrisonburg)

Plant Ridge & Valley Natives

www.plantvirginianatives.org

www.vnps.org

bplant.org

Our Gardens

Photos by Anna Maria Johnson

A story about a specialist bee at Heron Cove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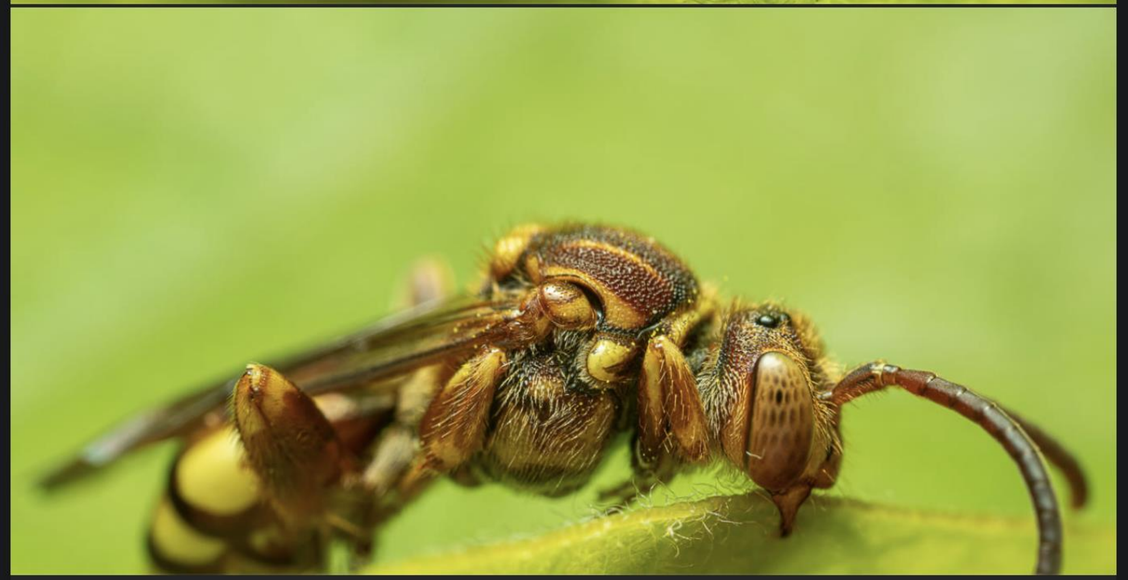
The Spicebush Chronicles

The Spicebush Chronicles:

Cuckoo bees in ultramacro

A couple weeks ago, I started noticing cuckoo bees hanging from their mandibles asleep on the spicebush. Now it's easy to spot them in the mornings before the sun heats up and they flex their wings and head out to work.

I often talk with students about "getting their eyes on." In this case, the behavior is an everyday thing for these little bees. I just had to learn to see it.



Steven David Johnson
May 28, 2021 ·

The Spicebush Chronicles:

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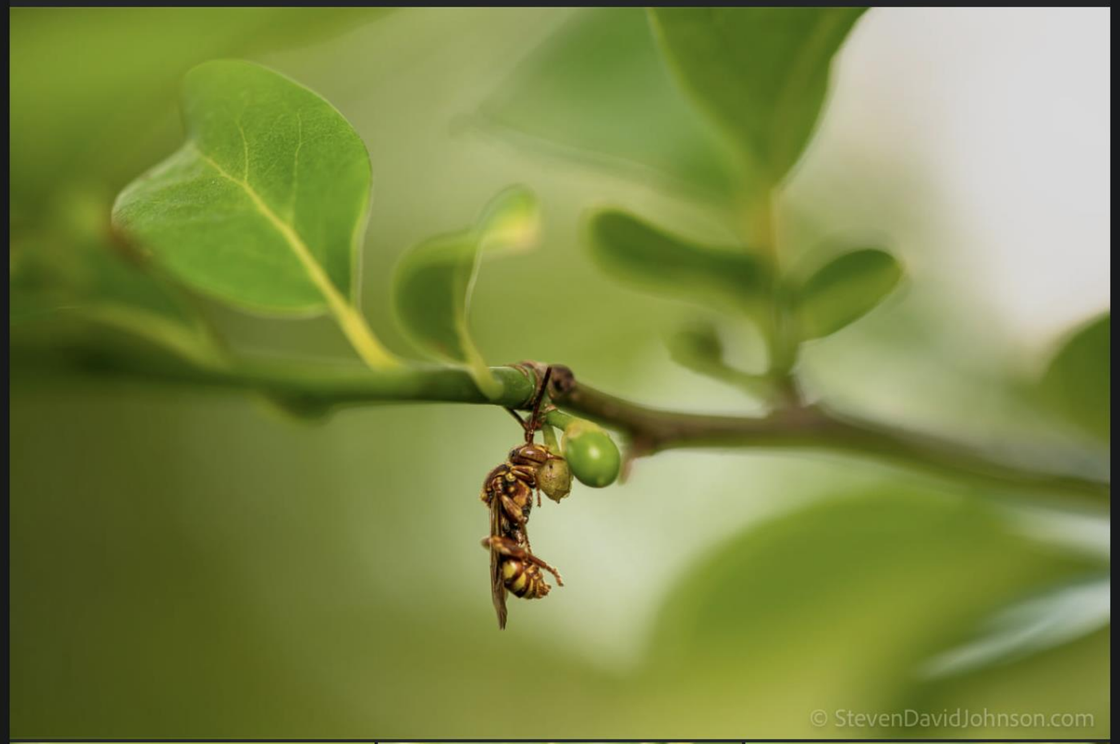


Steven David Johnson
March 26, 2021 ·

The Spicebush Chronicles: Spice Mine

I've been working on a new series about the fantastic tiny interactions I'm finding on a spicebush. Here, golden pollen coats a tiny ant making its way through the early spring blooms.. Click for a detail view that shows individual globes of pollen.

Steven David Johnson
October 8, 2022 ·

There are probably more than a hundred spicebush trees at Heron Cove. I've been checking the leaves for many weeks looking for spicebush caterpillars. It took me a while to get my eyes on, but now I'm seeing them!

Steven David Johnson
October 16, 2022 ·

Sometimes the changes in leaf color get ahead of the color changes in the spicebush swallowtail caterpillars.

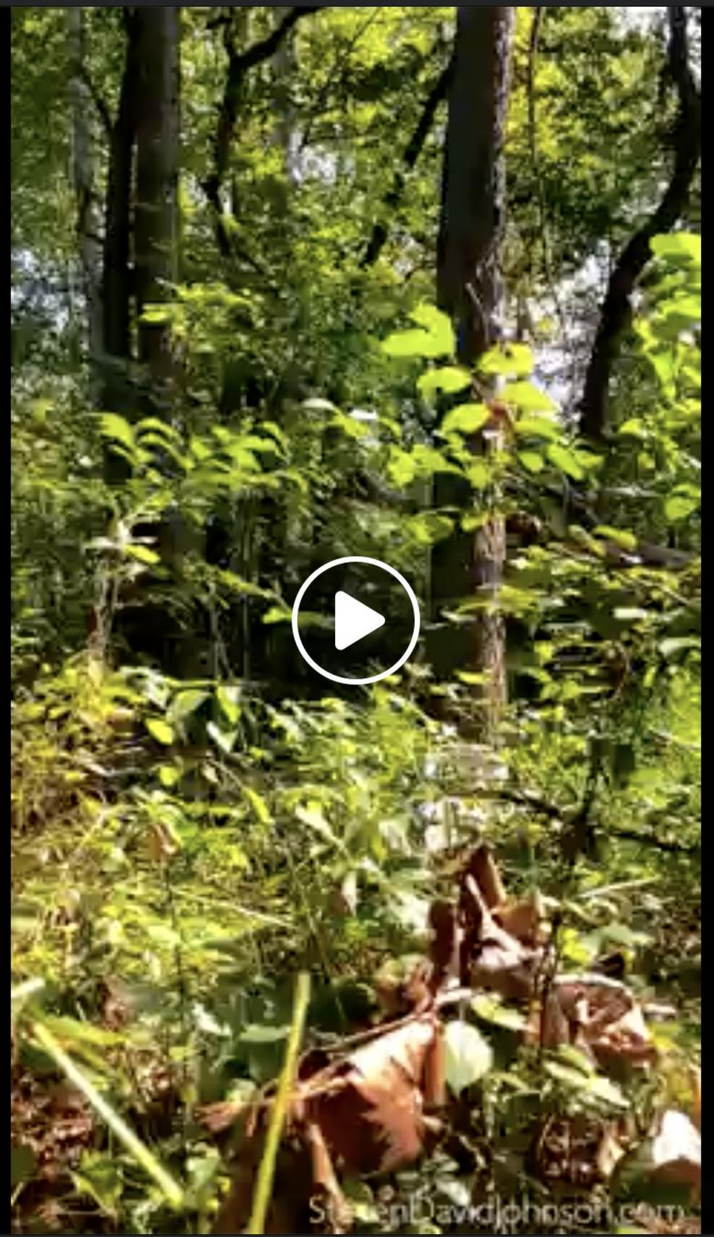
(So great to have Maggie home on break to explore the small worlds of Heron Cove with me. She has such sharp eyes!)

Steven David Johnson
October 9, 2022 ·

Spicebush caterpillars can also be found just feet from our house. I had lost track of this one a couple days ago, but searching at eye level today, I suddenly found my gaze returned (... or was it?)

Steven David Johnson
September 18, 2022 ·

There are probably over a hundred spicebush shrubs at Heron Cove. Yesterday morning, I was out looking for spicebush caterpillars with no luck ... but around noon, elegant spicebush butterflies began bobbing and weaving through the sunlit forest!



Steven David Johnson
August 12, 2020 ·

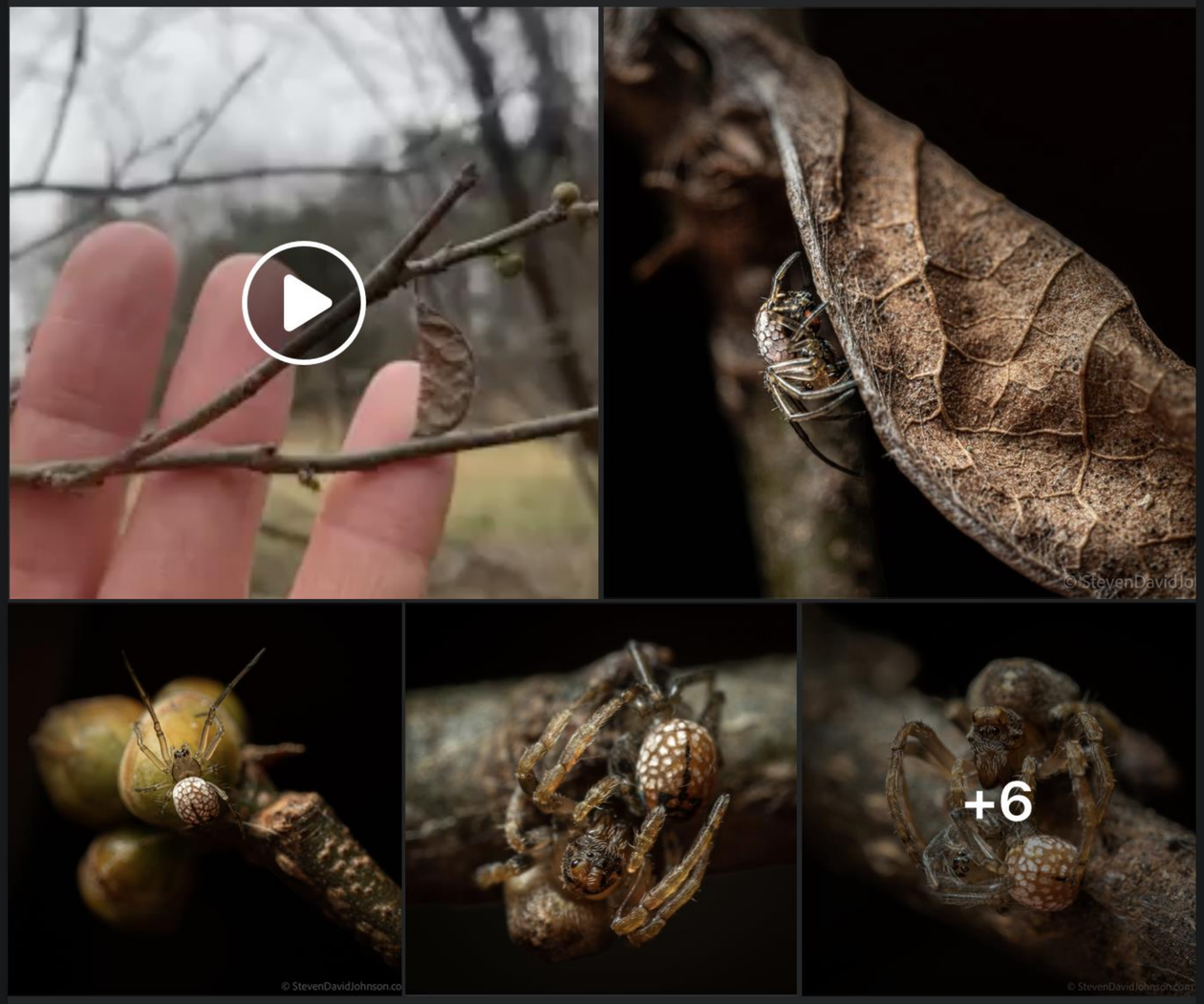
When threatened, a spicebush caterpillar shoots out these yellow "horns" called osmeteria that contain acids. Learn more at: http://entnemdept.ufl.edu/.../bfly/spicebush_swallowtail.htm

Steven David Johnson
January 4, 2021 ·

UPDATE 2: Help me solve a backyard nature MYSTERY!

First, watch the video for context. Then weigh in on the following questions ... especially number 3:

1. What is the identity of the tiny spider with the spotted abdomen? I called it a ray spider in the video. UPDATE: After some more digging on iNaturalist, I think my initial ID was correct - a ray orb weaver (Theridiosoma gemmosum). There's a good bit of color and pattern variation in ray spiders.... **See more**



Steven David Johnson
April 15, 2021 ·

The Spicebush Chronicles

Evening rain brought dense morning fog. When I went to check on the spicebushes, I found this little bronze jumper covered with dew.

(Tech info: Photographed with a Laowa 25mm ultramacro and processed with Lightroom and Topaz Sharpen AI)

Steven David Johnson
April 15, 2021 ·

The Spicebush Chronicles

Also on that dewy morning, I found this bee fly resting perfectly still on a new spicebush leaf.

Thanks to Dave Huth for the ID! ... **See more**

Steven David Johnson
August 14, 2020 ·

Went back with the ultramacro lens today to get the detail of the eyespot structures on the spicebush swallowtail caterpillar. Such amazing mimicry!

Click for a more detailed version.

Steven David Johnson

October 8, 2022 ·

Here's a handy tip. If you ever find yourself to be a soft-bodied caterpillar perched on a spicebush leaf in a Virginia forest, try pretending to be a snake with giant, googly eyes. You can even stick out your tongue for good measure!

Steven David Johnson
March 28, 2021 ·

The Spicebush Chronicles: One of these buds is not like the others

See the comments for a closeup view

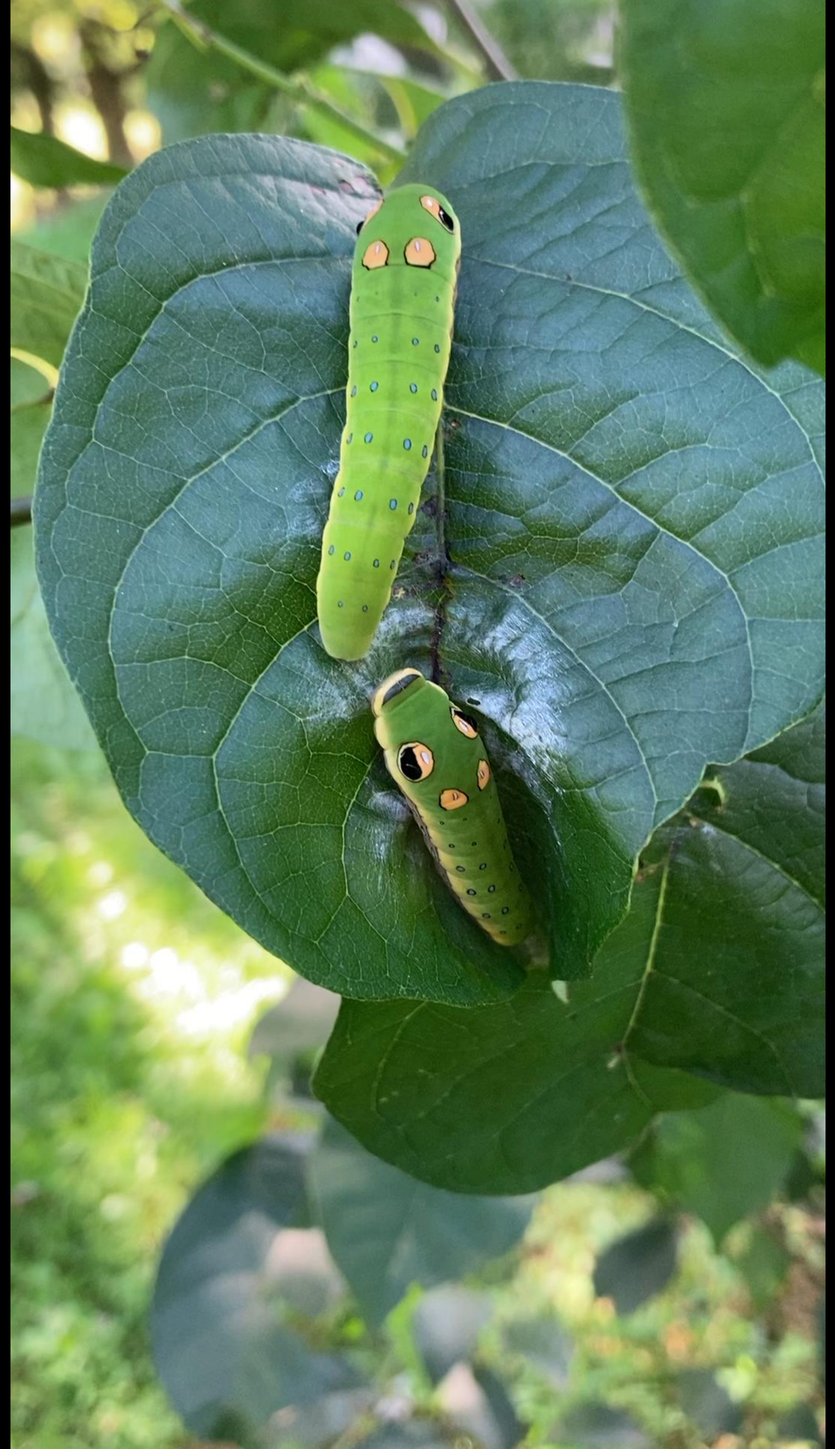
Steven David Johnson
March 28, 2021 ·

The Spicebush Chronicles

An abundance of pollinators has also brought back some old friends like Eris militaris, the bronze jumping spider.

The Spicebush Chronicles

This mining bee was blanketed in pollen after a few trips to the spicebush flowers.



The Rusty-patched Bumblebee Story

Overview

The rusty patched bumble bee is one of about 21 species of bumble bees in eastern United States, and was listed as federally endangered in 2017.

Historically, the rusty patched bumble bee was broadly distributed across the eastern United States and upper midwest, as well as in southern Quebec and Ontario, in Canada. This historical range continued south to the northeast corner of Georgia and reached west to the eastern edges of North and South Dakota, as noted in the species status assessment in 2016.

Prior to its listing as endangered in 2017, the species experienced a widespread and steep decline. The exact cause of the decline is unknown, but evidence suggests a synergistic interaction between an introduced pathogen and exposure to pesticides, specifically insecticides and fungicides, which was also noted in the species assessment. The species status assessment notes that the remaining populations are exposed to several interacting stressors, including pathogens, pesticides, habitat loss and degradation, non-native and managed bees, the effects of climate change and small population biology. These stressors likely operate independently and synergistically. For example, dietary stress due to insufficient floral resources may reduce an individual's resiliency to pathogens and pesticides, exposure to insecticides can reduce resistance to disease and exposure to fungicides can increase insecticide toxicity.

The rusty patched bumble bee is a social species with an annual cycle that starts in early spring when colonies are initiated by solitary queens that emerge from overwintering sites. This cycle progresses with the production of workers throughout the summer, and ends with the production of males and new queens in late summer and early fall. Survival and successful recruitment require food from floral resources from early spring through fall, undisturbed nesting habitat in proximity to foraging resources and overwintering habitat for the next year's queens.

Conservation

The U.S. Fish and Wildlife Service wrote a species status assessment for the rusty patched bumble bee in 2016, listed the species in 2017 and finalized the recovery plan for the rusty patched bumble bee in 2021. Along with our partners, we are actively engaging in conservation of this species. This work includes, but is not limited to: surveys and monitoring, conservation planning, research, habitat management and enhancement, as well as outreach.

Additional resources

We also developed mapping tools for federal agencies, researchers and others who are interested in rusty patched bumble bee conservation:

What can I do to help conserve the rusty patched bumble bee?

Garden: Grow a garden or add a flowering tree or shrub to your yard. Even small areas or containers on patios can provide nectar and pollen for native bees.

Native plants: Use native plants in your yard such as lupines, asters, bee balm, native prairie plants and spring ephemerals. Don't forget spring blooming shrubs like ninebark and pussy willow! Avoid invasive non-native plants and remove them if they invade your yard. For more information on attracting native pollinators, visit www.fws.gov/pollinators/pdfs/PollinatorBookletFinalrevWeb.pdf.

Natural landscapes: Provide natural areas - many bumble bees build nests in undisturbed soil, abandoned rodent burrows or grasss clumps. Keep some unmowed, brushy areas and tolerate bumble bee nests if you find them. Reduce tilling soil and mowing where bumble bees might nest. Support natural areas in your community, county and state.

Minimize: Limit the use of pesticides and chemical fertilizer whenever possible or avoid them entirely. Pesticides cause lethal and sublethal effects to bees and other pollinators.

NEW RUSTY PATCHED BUMBLEBEE POPULATIONS FOUND NEAR THE PATH OF THE ATLANTIC COAST PIPELINE

by Steven David Johnson

I first became aware of the Rusty Patched Bumblebee through the enthusiastic advocacy of my good friend, conservation photographer Clay Bolt. Clay has worked tirelessly to raise awareness about the decline of this species through photography, film and even testimony before Congress. As a Virginia resident, I was excited to learn that a Rusty Patched Bumblebee had been spotted at Sky Meadows State Park in 2014, the first evidence that this bee had not gone extinct in this part of the country.

In the summer of 2017, a survey for the Atlantic Coast Pipeline found a lone Rusty Patched Bumblebee in mountainous western Virginia. Because of its proximity to the pipeline route, that sighting triggered the concern of the Southern Environmental Law Center. SELC, representing Defenders of Wildlife, the Sierra Club, and Virginia Wilderness Committee, argued that the U.S. Fish and Wildlife Service had not complied with the law when it issued an Incidental Take Statement for multiple endangered species including *Bombus affinis*.

In the summer of 2018, the 4th Circuit Court vacated the permits for the pipeline, and the Federal Energy Regulatory Commission temporarily halted construction of the pipeline.

Shortly before this ruling, I was contacted by private landowners (also impacted by the pipeline route) who thought they might have Rusty Patched Bumblebees living on their property in Bath County, Virginia, near where the bee was found in 2017. On July 28, I made the trek to the beautiful country home of Bill and Lynn Limpert. Bill informed me that a state agency had found a second Rusty Patched Bumblebee just the week before in the nearby George Washington National Forest. After a day of searching and photographing for RPBB with Bill, I thought I had come up a short, but a closer look through my photos of the Limpert's back yard revealed a Rusty Patched perched just below a butterfly! The location of this individual was approximately 600 feet from the centerline of the Atlantic Coast Pipeline.

Bill and Lynn Limpert at Miracle Ridge, the area of their property slated for pipeline development.

I quickly alerted Virginia state agencies to this find on private land. In the following weeks, the Virginia Department of Conservation and Recreation's Natural Heritage Program initiated new surveys that turned up another twenty Rusty Patched Bumblebees! Bill was also able to photograph Rusty Patched Bumblebees on his property.

On September 11, 2018, the U.S. Fish and Wildlife Service issued a Revised Biological Opinion for the Atlantic Coast Pipeline taking into account the new Rusty Patched discoveries. While the report acknowledges that individual bees may be killed and nests crushed, the agency maintained its assessment that the pipeline "is not likely to jeopardize the continued existence of the RPBB." (20180917-3001 FERC PDF). However, the Southern Environmental Law Center counters that "the U.S. Fish and Wildlife reauthorized the pipeline despite new data confirming that critically endangered species will be significantly harmed by the project."

As of September 22, pipeline construction is back on, but the Southern Environmental Law Center (advocating for Sierra Club, Defenders of Wildlife and Virginia Wilderness Committee) is already mounting a new legal challenge with the hopes of protecting the Rusty Patched Bumblebee and other endangered species in this rugged and scenic area of Virginia.

Heron Cove

Planting Buttonbushes